Wood Buffalo Environmental Association

AUGUST 2015
MONTHLY REPORT

CONTINUOUS MONITORING
INTEGRATED MONITORING
September 28, 2015

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

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September 28, 2015

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

RE: Monthly Ambient Air Quality Monitoring Report August 2015
Wood Buffalo Environmental Association

Enclosed is the August 2015 Ambient Air Quality Monitoring Report for the continuous ambient air quality monitoring stations of the Wood Buffalo Environmental Association regional air quality monitoring network.

The continuous ambient air quality monitoring network stations are:

AMS 1 - Fort McKay – Bertha Ganter
AMS 2 - Mildred Lake
AMS 3 - Lower Camp B (meteorology)
AMS 4 - Buffalo Viewpoint
AMS 5 - Mannix
AMS 6 - Patricia McInnes
AMS 7 - Athabasca Valley
AMS 8 - Fort Chipewyan
AMS 9 - Barge Landing
AMS 11 - Lower Camp (air quality)
AMS 12 - Millennium Mine
AMS 13 - Fort McKay South
AMS 14 - Anzac
AMS 15 - CNRL Horizon
AMS 16 - Shell Muskeg River
AMS 17 - Wapasu
AMS 18 - Conklin Lookout
AMS 19 - Firebag
AMS 502 - ConocoPhillips Surmont

WBEA commissioned a permanent air monitoring station approximately 5.5 km west of the community of Conklin on August 1, 2015. This station is equipped with ambient air quality analyzers for SO_2, TRS, THC, CH_4, NMHC, NO, NO_2, NO_x, O_3, and $PM_{2.5}$. Temperature, wind speed and direction, relative humidity, solar radiation, precipitation, and surface wetness are also continuously measured.

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

Member	EPEA Approval No.
Athabasca Oil Corporation	289664-00-00
Brion Energy	254465-00-00
Canadian Natural Resources Ltd.	149968-00-01
Cenovus Energy	48522-01-00
Connacher Oil and Gas Ltd.	240008-00-03
ConocoPhillips Canada	48263-00-00
Devon Canada Corporation	224816-00-03
Finning Canada Ltd.	Not Applicable
Hammerstone Corporation	189942-00-02
Husky Oil Operations Ltd.	206355-00-00
Imperial Oil Ltd.	00046586-00-00
MEG Energy Corporation	00216466-00-04
Nexen Energy ULC.	137467-00-00
Shell Canada Energy	20809-01-00
Statoil Canada Ltd.	241311-00-00
Suncor Energy Inc.	094-02-00
Sunshine Oilsands Ltd.	305529-00-00
Syncrude Canada Ltd.	026-02-00
Teck Resources Ltd.	EIA Application
Total E&P Canada Ltd.	228044-00-00
Williams Energy (Canada) Inc.	73203-01-00

Aboriginal Communities

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

Government and Non-Industrial Organizations

Alberta Energy Regulator
Alberta Environment & Sustainable Resource Development
Alberta Health Services
Alberta Health & Wellness
Environment Canada

Health Canada
Parks Canada
Pembina Institute for Appropriate Development
Regional Municipality of Wood Buffalo
Saskatchewan Environment

Figure 1 shows the location of the air monitoring stations and forest health passive towers in the WBEA network.

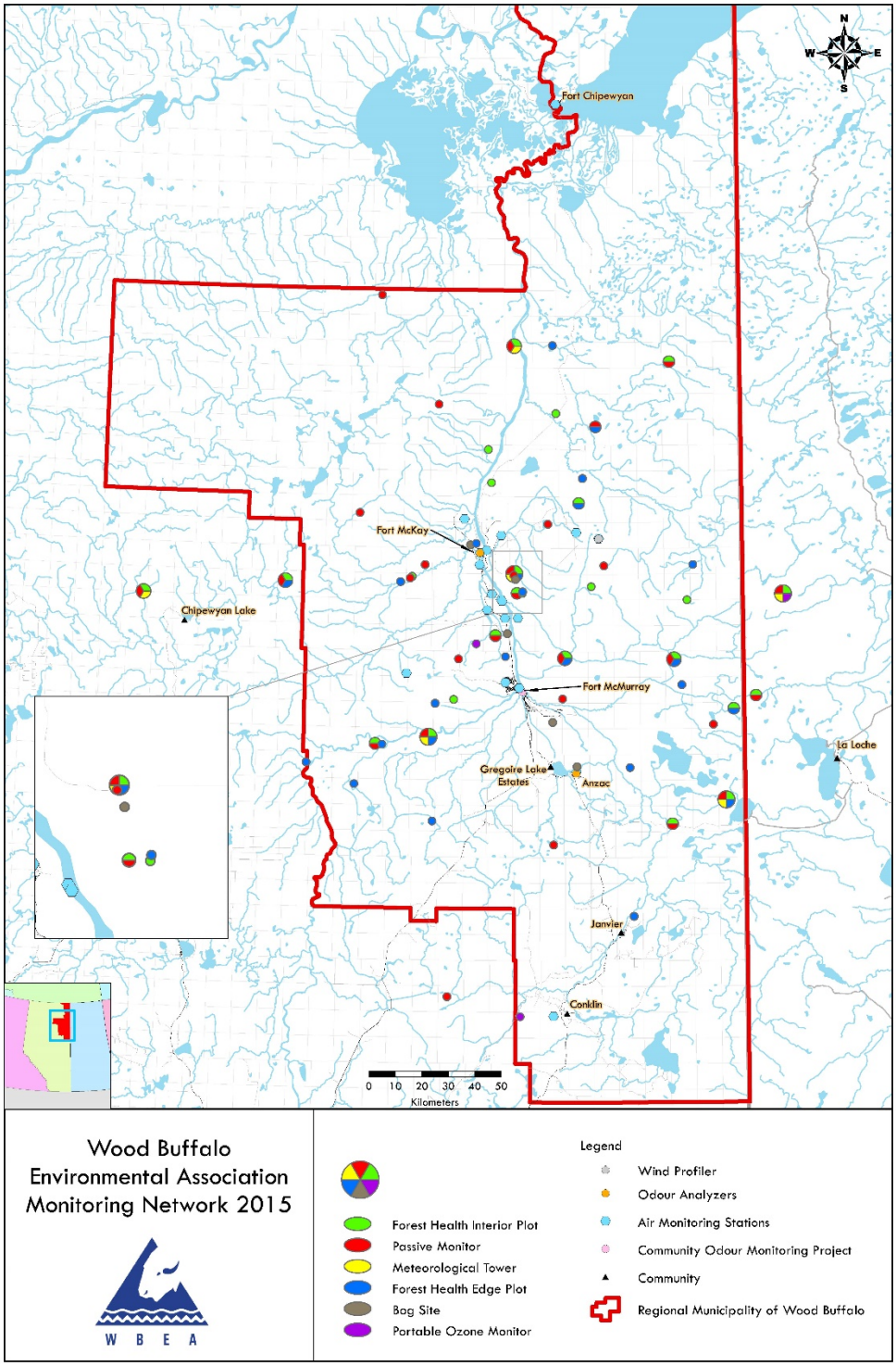

Figure 1 Map of WBEA Air Monitoring Network.

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

1.0 Concentrations in Excess of Alberta Ambient Air Quality Objectives

There were no ambient concentrations in excess of the air quality objectives as indicated in the Air Monitoring Directive Section III.A.3 (a & b) for SO_2, CO, NO_2, NH_3 and O_3.

There were 9 H_2S ambient ground level concentrations in excess of the 1-hour and 24-hour H_2S air quality objectives reported to the Energy and Environmental Response Centre in real time. After data processing to account for analyzer drift with baseline correction, there were 8 concentrations in excess of the H_2S air quality objective. Of these, 7 hourly average concentrations were in exceedance of the 1-hour objective, and 1 daily average concentration was in exceedance of the 24-hour air quality objective. There was 1 24-hour objective exceedance reported in real-time that was found not to be in exceedance after data processing.

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

					Concentration ppb or ug/m^3		
Site	Parameter	Date / Time	Reference	Period	Reported	Final	Status
AMS 5 Mannix	H_2S	01Aug15:23:00	301730	1-hour	11.0	11	exc
AMS 5 Mannix	H_2S	03Aug15:01:00	301754	1-hour	17.0	17	exc
AMS 5 Mannix	H_2S	03Aug15:02:00	301754	1-hour	16.0	16	exc
AMS 5 Mannix	H_2S	25Aug15:01:00	302066	1-hour	15.0	15	exc
AMS 5 Mannix	H_2S	25Aug15:02:00	302600	1-hour	21.0	21	exc
AMS 5 Mannix	H_2S	25Aug15:03:00	302600	1-hour	36.0	36	exc
AMS 5 Mannix	H_2S	25Aug15:04:00	302600	1-hour	11.0	11	exc
AMS 5 Mannix	H_2S	25Aug15:24:00	302600	24-hour	6.0	6	exc
AMS 502 ConocoPhillips Surmont	H_2S	15Aug15:24:00	302248	24-hour	3.4	3	nae

*status legend:

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

1.1 Data Processing and Validation

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

After data processing and validation, NO_2 concentrations were re-calculated from baseline-corrected NO_X and NO concentrations. Specifically, the NO concentration was subtracted from the NO_X concentration to determine the NO_2 concentration. In cases where the NO_X and/or NO values exceeded the operating range of the analyzer, values reported for NO_2 were determined as the largest of either the difference between baseline-corrected NO_X and NO values, or the NO_2 value reported by the data acquisition system with baseline correction applied.

1.2 Revisions to CASA Data Warehouse

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

2.0 Operational Status

2.1 Continuous Monitoring

The ambient air monitoring equipment at AMS 12, Millennium Mine, operated less than 90% of the time in August, 2015.

The Sulphur dioxide (SO_2), Total Reduced Sulphur (TRS), Total Hydrocarbons (THC), Nitrogen dioxide (NO_2), oxides of Nitrogen (NO_X), and particulate matter ($PM_{2.5}$) analyzers routine operations were interrupted due to a fire at the station on August 29, 2015. The analyzers, supporting equipment and shelter were completely destroyed as a result of this fire.

After data validation and processing for baseline corrections, data from this station was available for only 88% of the month. This incident was reported to Alberta Environment on August 31, 2015 (reference number 302917).

In August 2015, there were three incidents of a monitoring instrument not required for air quality compliance operating less than 90% of the time.

- Intermittent flat lines in the sensor output signal interrupted the normal operations of the 90m temperature and relative humidity sensor at the Mannix air monitoring station (AMS 5) for 197 hours.

- Normal operations of the leaf wetness sensor at the Fort Chipewyan air monitoring station (AMS 8) was interrupted for 113 hours due to wiring issues and replacement and testing of the new sensor. The sensor was returned back to service on August 5, 2015.
- Normal operations of the solar radiation sensor at the Fort Chipewyan air monitoring station (AMS 8) was interrupted for 108 hours due to wiring issues. The sensor was replaced and returned back to service on August 5, 2015.

2.2 Intermittent Monitoring

The results for passive and integrated monitoring of PAH, VOC, RSC, $PM_{2.5}$ and PM_{10} samples were not available in time for submission with this report. These results will be submitted at a later date.

3.0 Monitoring Notes

General Network Notes

During this reporting period, the ambient monitoring network was internally audited by WBEA at AMS 1, 6, 7 and 18. As a result, internal audit calibrations were flagged as maintenance. Operational downtimes are detailed in the Operational Notes section of each stations respective monthly report.

The Ammonia (NH_3) analyzer currently operates on a 0 to 2500 ppb operating range with a detection level of 5 ppb in the WBEA network. In data processing, values less than 5 ppb have been considered below detection levels and are reported as zero.

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

Station 1, Fort McKay- Bertha Ganter

The NH_3 analyzer required additional time to stabilize to levels below ambient concentrations following the automated daily spans and routine monthly multipoint calibrations. Additional time for stabilization after exposure to high concentrations of NH_3 gas is an inherent behavior in the NH_3 analyzer operations resulting from the properties of the NH_3 gas. Data for 1 to 3 hours following the daily spans have been reported as invalid for a total of 44 hours this month.

Multiple instances of station cleanup and analyzer rack organization by the station operator interrupted the normal operations of all parameters, except $PM_{2.5}$, for a total of 5 to 17 hours this reporting period.

A sample inlet line on the TRS analyzer was left disconnected from the sample manifold from August 19 to 20 resulting in 26 hours of invalid data.

A loose signal wire affected the normal operations of the leaf wetness sensor for 70 hours from August 19 to 22. The connection was fixed by the station tech.

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

Station 2, Mildred Lake

Maintenance and cleaning of the sample manifold on August 20 interrupted the normal operations of the SO_2 and THC analyzers for 1 hour.

A data logger program upload and restart on August 20 interrupted the normal operations of the SO_2, H_2S, and THC analyzers for 1 hour.

Revision to the data logger program on August 21 interrupted the normal operations of the H_2S analyzer for 1 hour.

Maintenance to upgrade the calibrator and confirm span responses on August 25 affected the normal operations of the SO_2, H_2S, and THC analyzers for 3 hours.

Station 3, Lower Camp B - Meteorology

No operational issues to report this month.

Station 4, Buffalo Viewpoint

Maintenance and cleaning of the sample manifold on August 12 affected the normal operations of the H_2S analyzer for 1 hour.

A power outage at the station from August 13 to August 15 interrupted the normal operations of all air quality parameters for 47 hours. The H_2S and THC analyzers required an additional 1 hour stabilization period following the power outage.

Revision to the data logger program on August 16 interrupted the normal operations of all parameters for 1 hour.

Station 5, Mannix

Maintenance and cleaning of the sample manifold on August 6 affected the normal operations of the H_2S analyzer for 1 hour.

A data logger program update at the station on August 13 interrupted the routine data collection of the H_2S analyzer for 11 hours.

A flat-line in the output signal of the sonic wind sensor at the 90 m level resulted in 1 hour of invalid data on August 13.

A flat-line in the output signal of the ambient temperature and relative humidity sensors at the 90m level resulted in 197 hours of invalid data during the month of August.

Station 6, Patricia McInnes

The NH_3 analyzer required additional time to stabilize to levels below ambient concentrations following the automated daily span and routine monthly multipoint calibration periods. Additional time for stabilization after exposure to high concentrations of the NH_3 gas is an inherent behavior in the NH_3 analyzer operations resulting from the properties of the NH_3 gas. Data for 1 to 3 hours following each daily span has been reported as invalid for a total of 43 hours this month.

A flat-line in the output signal of the wind sensor on August 2 resulted in 1 hour of invalid data.

Depletion and replacement of the fuel cylinder at the station on August 7 affected the normal operation of the THC analyzer for two hours.

Maintenance and cleaning of the sample manifold on August 12 affected the normal operations of the TRS and O_3 analyzers for 1 hour.

Depletion and replacement of the carrier gas cylinder at the station on August 24 affected the normal operation of the THC analyzer for two hours.

Post WBEA internal audit investigation on August 24 interrupted the normal operations of the SO_2 and TRS analyzers for 1 hour.

Station 7, Athabasca Valley

Maintenance and cleaning of the sample manifold on August 13 interrupted the normal operations of the SO_2, TRS, THC, NO_2 and O_3 analyzers for 1 hour.

The $PM_{2.5}$ analyzer experienced a single episode of unstable operation on August 13 resulting in 2 hours of invalid data.

Maintenance to the daily zero and span system interrupted the normal operation of SO_2 and THC for 5 hours on August 24.

Confirmation of reference points for O_3 calibration on August 26 interrupted the normal operation of the NO_2 analyzer for 1 hour.

Station 8, Fort Chipewyan

Intermittent lamp instability interrupted the normal operations of the O_3 analyzer for a total of 6 hours this reporting period.

Revision to the data logger program on August 16 interrupted the normal operations of all parameters for 1 hour.

A power spike on August 30 affected the normal operations of the O_3 analyzer for 1 hour.

The $PM_{2.5}$ analyzer experienced a single episode of unstable operation on August 31 resulting in 1 hour of invalid data.

A flat-line in the output signal of the wind sensor on August 13 and 28 resulted in a total of 2 hours of invalid data during the reporting period.

The solar radiation sensor was removed for repairs on July 2, 2015 and put back in service on August 5, 2015. Data for this reporting period was flagged, resulting in 108 hours of invalid data.

Station 9, Barge Landing

A flat-line in the output signal of the wind sensor on August 3 and 9 resulted in a total of 2 hours of invalid data during the reporting period.

Station 11, Lower Camp

Confirmation of analyzer response to automated daily span checks and re-calibration on August 5 interrupted the normal operations of the H_2S analyzer for 5 hours.

Station 12, Millennium Mine

A flat-line in the output signal of the wind sensor on August 1 resulted in 1 hour of invalid data.

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

Power outages at the station on August 19, 20 and 25 interrupted the normal operations of all air quality analyzers for a total of 5 hours.

Maintenance associated with calibrator replacement on August 21 interrupted the normal operations of the SO_2, TRS and NO_2 for 1 hour, 2 hours and 6 hours, respectively. Site operator activities at the station also interrupted the normal operation of the $PM_{2.5}$ analyzer for 4 hours.

A maintenance calibration on August 22, due to analyzer drift, interrupted the normal operations of the NO_2 analyzer for 4 hours.

A fire at the station resulted in the interruption of normal operations of all parameters from August 29 to September. Station will be offline until further notice.

Station 13, Fort McKay South

A power outage at the station on August 9 interrupted the normal operations of all pollutant parameters for 28 hours; the SO_2 analyzer had an additional 6 hours flagged invalid for recovery and the THC analyzer had an additional 1 hour flagged invalid for recovery after the power outage. The power outage also interrupted the normal operations of the wind sensors, ambient temperature and relative humidity sensors for 13 hours during this time period.

A flat-line in the output signal of the wind sensor on August 7 resulted in a total of 2 hours of invalid data during the reporting period.

Station 14, Anzac

Depletion and replacement of the carrier gas cylinder at the station on August 4 affected the normal operation of the THC analyzer for 2 hours.

Maintenance on August 14 to confirm daily zero and span responses on August 14 interrupted the normal operations of the SO_2, THC, NO_2 and O_3 analyzers for 1 hour.

Maintenance and cleaning of the sample manifold on August 17 interrupted the normal operations of the TRS and the O_3 analyzers for 1 hour.

Site operator activities on August 18 interrupted the normal operations of the THC analyzer for 1 hour.

A flat-line in the output signal of the wind sensor on August 28 resulted in 1 hour of invalid data.

A power spike on August 30 affected the normal operations of the THC analyzer for 1 hour.

Station 15, CNRL Horizon

A flat-line in the output signal of the wind sensor on August 3 resulted in 1 hour of invalid data.

Replacement of the calibration gas cylinder at the station on August 30 affected the normal operation of the TRS analyzer for 1 hour.

Station 16, Shell Muskeg River

Multiple occurrences of flat-lines in the output signals of the wind sensor resulted in a total of 10 hours of invalid data this reporting period.

Station 17, Wapasu

The H_2S analyzer experienced multiple instances of excessive baseline drift resulting in 3 hours of invalid data during this reporting period.

Station 18, Conklin Lookout

WBEA commissioned a permanent air monitoring station approximately 5.5 km west of the community of Conklin on August 1, 2015. This station is equipped with ambient air quality analyzers for SO_2, TRS, THC, CH_4, NMHC, NO, NO_2, NO_x, O3, and $PM_{2.5}$. Temperature, wind speed and direction, relative humidity, solar radiation, precipitation, and surface wetness are also continuously measured.

Maintenance and cleaning of the sample manifold on August 18 interrupted the normal operations of SO_2, NO_2 and O_3 analyzer for 1 hour.

Station 19, Firebag

Flat-lines in the output signals of the wind sensor on August 2 resulted in 2 hours of invalid data.

Station 502, ConocoPhillips Surmont

The H_2S analyzer experienced multiple instances of unstable operation during this reporting period resulting in 4 hours of invalid data.

Maintenance and recalibration on August 21 interrupted the normal operations of the NO_2 analyzer for 8 hours.

If additional information is required, please contact either Sanjay Prasad at (780) 215 4800 or the Wood Buffalo Environmental Association at (780) 799 4420.

Yours sincerely,

Wood Buffalo Environmental Association

Sanjay Prasad
Air Quality Scientist

R00_1508_L01

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

AUGUST 2015

Prepared: Oct 27 2015 16:32

APPROVAL NUMBERS	REPORT DATE MONTH	YEAR
289664-00-00	8	2015
254465-00-00		
149968-00-01		
48522-01-00		
240008-00-03		
48263-00-00		
224816-00-03		
189942-00-02		
206355-00-00		
46586-00-00		
216466-00-04		
137467-00-00		
20809-01-00		
241311-00-00		
094-02-00		
305529-00-00		
026-02-00		
228044-00-00		
73203-01-00		

CONTINUOUS AMBIENT MONITORING

PARAMETER	STN. NO.	% TIME OPERATIONAL	ONE-HOUR AVERAGE MAXIMUM CONCENTRATION	ONE-HOUR AVERAGE NO. READINGS > REGULATION	24-HOUR AVERAGE MAXIMUM CONCENTRATION	24-HOUR AVERAGE NO. READINGS > REGULATION
SO2(ppm)	1	97.31	0.040	0	0.005	0
SO2(ppm)	2	99.33	0.040	0	0.013	0
SO2(ppm)	4	93.55	0.014	0	0.002	0
SO2(ppm)	5	100.00	0.034	0	0.002	0
SO2(ppm)	6	99.46	0.012	0	0.003	0
SO2(ppm)	7	98.79	0.011	0	0.002	0
SO2(ppm)	8	99.87	0.002	0	0.000	0
SO2(ppm)	11	100.00	0.146	0	0.017	0
SO2(ppm)	12	88.71	0.020	0	0.004	0
SO2(ppm)	13	95.43	0.034	0	0.005	0
SO2(ppm)	14	99.87	0.014	0	0.001	0
SO2(ppm)	15	100.00	0.034	0	0.003	0
SO2(ppm)	16	100.00	0.031	0	0.005	0
SO2(ppm)	17	100.00	0.060	0	0.006	0
SO2(ppm)	18	99.60	0.004	0	0.001	0
SO2(ppm)	19	100.00	0.025	0	0.004	0
SO2(ppm)	502	100.00	0.007	0	0.002	0
H2S(ppm)	2	99.33	0.006	0	0.002	0
H2S(ppm)	4	93.28	0.006	0	0.001	0
H2S(ppm)	5	98.25	0.036	7	0.006	1
H2S(ppm)	11	99.33	0.008	0	0.001	0
H2S(ppm)	17	99.60	0.002	0	0.000	0
H2S(ppm)	19	100.00	0.003	0	0.001	0
H2S(ppm)	502	99.46	0.005	0	0.003	0
TRS(ppm)	1	95.70	0.003	0	0.001	0
TRS(ppm)	6	99.46	0.002	0	0.001	0
TRS(ppm)	7	99.60	0.001	0	0.001	0
TRS(ppm)	9	100.00	0.003	0	0.001	0
TRS(ppm)	12	88.44	0.005	0	0.001	0
TRS(ppm)	13	96.24	0.003	0	0.001	0
TRS(ppm)	14	99.87	0.007	0	0.001	0
TRS(ppm)	15	99.87	0.002	0	0.001	0
TRS(ppm)	18	99.87	0.000	0	0.000	0
THC(ppm)	1	97.45	2.7	-	2.0	-
THC(ppm)	2	99.33	5.5	-	2.9	-
THC(ppm)	4	93.41	5.0	-	3.3	-
THC(ppm)	5	99.87	3.6	-	2.6	-
THC(ppm)	6	99.19	2.6	-	2.0	-
THC(ppm)	7	98.92	2.6	-	2.1	-
THC(ppm)	9	100.00	3.9	-	2.4	-
THC(ppm)	11	100.00	4.7	-	2.7	-
THC(ppm)	12	88.84	6.0	-	2.9	-
THC(ppm)	13	96.10	4.1	-	2.4	-
THC(ppm)	14	99.33	2.5	-	2.0	-
THC(ppm)	15	100.00	5.3	-	2.6	-
THC(ppm)	16	100.00	5.5	-	2.8	-
THC(ppm)	17	100.00	2.6	-	2.2	-
THC(ppm)	19	100.00	3.1	-	2.4	-
O3(ppm)	1	97.72	0.055	0	0.031	-
O3(ppm)	6	99.60	0.043	0	0.030	-
O3(ppm)	7	99.60	0.039	0	0.025	-
O3(ppm)	8	98.92	0.047	0	0.035	-
O3(ppm)	13	96.24	0.041	0	0.023	-
O3(ppm)	14	99.73	0.047	0	0.033	-

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20809-01-00		
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CONTINUOUS AMBIENT MONITORING

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O3(ppm)	17	100.00	0.044	0	0.030	-
O3(ppm)	18	100.00	0.054	0	0.037	-
NO2(ppm)	1	97.31	0.018	0	0.006	-
NO2(ppm)	6	99.46	0.019	0	0.005	-
NO2(ppm)	7	98.92	0.018	0	0.007	-
NO2(ppm)	8	99.87	0.007	0	0.001	-
NO2(ppm)	12	87.50	0.027	0	0.011	-
NO2(ppm)	13	96.24	0.024	0	0.005	-
NO2(ppm)	14	99.87	0.009	0	0.002	-
NO2(ppm)	15	100.00	0.026	0	0.008	-
NO2(ppm)	16	100.00	0.038	0	0.012	-
NO2(ppm)	17	100.00	0.015	0	0.007	-
NO2(ppm)	18	99.46	0.005	0	0.001	-
NO2(ppm)	19	100.00	0.018	0	0.005	-
NO2(ppm)	502	98.92	0.015	0	0.004	-
CO(ppm)	7	100.00	0.3	0	0.1	-
NH3(ppm)	1	91.94	0	-	0	0
NH3(ppm)	6	93.15	14	-	1	0
PM2.5(ug/m^3)	1	99.60	29.6	-	13.4	0
PM2.5(ug/m^3)	6	99.73	22.9	-	9.3	0
PM2.5(ug/m^3)	7	99.60	26.6	-	10.4	0
PM2.5(ug/m^3)	8	99.73	20	-	7.5	0
PM2.5(ug/m^3)	12	88.31	38.8	-	14.6	0
PM2.5(ug/m^3)	13	96.24	21.7	-	9.1	0
PM2.5(ug/m^3)	14	100.00	63.3	-	8.5	0
PM2.5(ug/m^3)	15	100.00	198.1	-	22.4	0
PM2.5(ug/m^3)	16	100.00	45.6	-	15	0
PM2.5(ug/m^3)	17	100.00	33.1	-	9	0
PM2.5(ug/m^3)	18	99.87	26	-	10.7	0
WIND	1	99.19	-	-	-	-
WIND	2	100.00	-	-	-	-
WIND	4	99.87	-	-	-	-
WIND	5	100.00	-	-	-	-
WIND	6	99.87	-	-	-	-
WIND	7	100.00	-	-	-	-
WIND	8	99.60	-	-	-	-
WIND	9	99.73	-	-	-	-
WIND	11	100.00	-	-	-	-
WIND	12	89.38	-	-	-	-
WIND	13	97.98	-	-	-	-
WIND	14	99.87	-	-	-	-
WIND	15	99.87	-	-	-	-
WIND	16	98.66	-	-	-	-
WIND	17	100.00	-	-	-	-
WIND	18	100.00	-	-	-	-
WIND	19	99.73	-	-	-	-
WIND	502	100.00	-	-	-	-

SIGNATURE OF ASSOCIATION REPRESENTATIVE

FOR ALBERTA ENVIRONMENT USE ONLY

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 1
BERTHA GANTER FORT MCKAY
AUGUST 2015

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

September 28, 2015

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT McKAY - BERTHA GANTER (AMS 1)
AUGUST 2015

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	686	38	58	97.31	40	0	5	0
TRS(ppb) Average	677	35	67	95.70	3	0	1	0
THC(ppm) Average	687	38	57	97.45	2.7	-	2	-
NMHC(ppm) Average	687	38	57	97.45	0.292	-	0.025	-
CH4(ppm) Average	687	38	57	97.45	2.7	-	2	-
O3 (ppb) Average	692	35	52	97.72	55	0	31	-
NO2 (ppb) Average	686	38	58	97.31	18	0	6	-
NO (ppb) Average	686	38	58	97.31	45	-	4	-
NOX (ppb) Average	686	38	58	97.31	63	-	9	-
NH3 (ppb) Average	643	41	101	91.94	0	0	0	-
PM2.5 (ug/m3) Average	739	2	5	99.60	29.6	-	13.4	0
Wind Speed 10 m (km/h) Average	738	0	6	99.19	16	-	11	-
Wind Direction 10 m (deg) Average	738	0	6	99.19	-	-	-	-
Temperature 2 m (C) Average	739	0	5	99.33	30.6	-	23.3	-
Temperature 10 m (C) Average	739	0	5	99.33	29.8	-	23.7	-
Relative Humidity (%) Average	739	0	5	99.33	99	-	87	-
Precipitation (mm) Total	744	0	0	100.00	1.5	-	4.3	-
Leaf Wetness (% of range) Average	674	0	70	90.59	44	-	11	-
Global Solar Radiation (W/m2) Average	735	0	9	98.79	873	-	270	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BERTHA GANTER FORT McKAY (AMS 1)
AUGUST 2015

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

					Percentile						
Parameter	Number	Mean	StnDev	Total	Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	686	0.9	3	-	0	0	0	0	0	2	40
TRS (ppb) Average	677	0.5	0	-	0	0	0	0	0	1	3
THC (ppm) Average	687	1.85	0.1	-	1.7	1.8	1.8	1.8	1.9	2	2.7
NMHC(ppm) Average	687	0.003	0.019	-	0	0	0	0	0	0	0.292
CH4(ppm) Average	687	1.85	0.1	-	1.7	1.8	1.8	1.8	1.9	2	2.7
O3 (ppb) Average	692	23.1	10	-	6	10	15	22	30	37	55
NO2 (ppb) Average	686	2.1	3	-	0	0	0	1	3	6	18
NO (ppb) Average	686	1	3	-	0	0	0	0	0	3	45
NOX (ppb) Average	686	3.1	6	-	0	0	0	1	4	10	63
NH3 (ppb) Average	643	0	0	-	0	0	0	0	0	0	0
PM2.5 (ug/m3) Average	739	5.4	3.9	-	0	1.7	2.6	4.3	7.1	10.3	29.6
Wind Speed 10 m (km/h) Average	738	6	3	-	0	3	3	5	8	10	16
Wind Direction 10 m (deg) Average	738	-	-	-	-	-	-	-	-	-	-
Temperature 2 m (C) Average	739	17	5.5	-	0.1	9.8	13.5	16.6	21	24.6	30.6
Temperature 10 m (C) Average	739	17.35	5	-	1.8	11.1	14	17.2	20.7	24	29.8
Relative Humidity (%) Average	739	68.8	20	-	24	39	53	70	85	96	99
Precipitation (mm) Total	744	-	-	9.65	-	-	-	-	-	-	-
Leaf Wetness (% of range) Average	674	3.1	8	-	0	0	0	0	0	15	44
Global Solar Radiation (W/m2) Average	735	190	239	-	0	0	0	51	354	604	873

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BERTHA GANTER Fort McKAY (AMS 1)
AUGUST 2015

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2	17 Aug 2015 14:00	17 Aug 2015 16:00	3	Maintenance - internal WBEA audit
SO2	18 Aug 2015 16:00	18 Aug 2015 18:00	3	Maintenance - Stn operator at site cleaning
SO2	19 Aug 2015 12:00	19 Aug 2015 17:00	6	Maintenance - Stn operator at site cleaning
SO2	20 Aug 2015 10:00	20 Aug 2015 17:00	8	Maintenance - Stn operator at site cleaning
TRS	17 Aug 2015 10:00	17 Aug 2015 11:00	2	Maintenance - internal WBEA audit
TRS	18 Aug 2015 15:00	18 Aug 2015 18:00	4	Maintenance - Stn operator at site cleaning
TRS	19 Aug 2015 16:00	20 Aug 2015 17:00	26	Analyzer disconnected from sample manifold
NMHC, CH4, THC	17 Aug 2015 16:00	17 Aug 2015 17:00	2	Maintenance - internal WBEA audit
NMHC, CH4, THC	18 Aug 2015 16:00	18 Aug 2015 18:00	3	Maintenance - Stn operator at site cleaning
NMHC, CH4, THC	19 Aug 2015 12:00	19 Aug 2015 17:00	6	Maintenance - Stn operator at site cleaning
NMHC, CH4, THC	20 Aug 2015 10:00	20 Aug 2015 17:00	8	Maintenance - Stn operator at site cleaning
O3	18 Aug 2015 12:00	18 Aug 2015 18:00	7	Maintenance - internal WBEA audit and site cleaning
O3	19 Aug 2015 16:00	19 Aug 2015 17:00	2	Maintenance - Stn operator at site cleaning
O3	20 Aug 2015 10:00	20 Aug 2015 17:00	8	Maintenance - Stn operator at site cleaning
NO2, NO, NOX	17 Aug 2015 12:00	17 Aug 2015 14:00	3	Maintenance - internal WBEA audit
NO2, NO, NOX	18 Aug 2015 16:00	18 Aug 2015 18:00	3	Maintenance - Stn operator at site cleaning
NO2, NO, NOX	19 Aug 2015 12:00	19 Aug 2015 17:00	6	Maintenance - Stn operator at site cleaning
NO2, NO, NOX	20 Aug 2015 10:00	20 Aug 2015 17:00	8	Maintenance - Stn operator at site cleaning
NH3	01 Aug 2015 08:00	31 Aug 2015 09:00	44	Stabilization after daily span
NH3	19 Aug 2015 12:00	19 Aug 2015 20:00	9	Maintenance - internal WBEA audit and site cleaning
NH3	20 Aug 2015 11:00	20 Aug 2015 17:00	7	Maintenance - Stn operator at site cleaning
PM2.5	20 Aug 2015 15:00	20 Aug 2015 17:00	3	Maintenance - internal WBEA audit
Wind Speed, Wind Direction	19 Aug 2015 13:00	19 Aug 2015 15:00	3	Maintenance - Stn operator at site cleaning
Wind Speed, Wind Direction	20 Aug 2015 12:00	20 Aug 2015 14:00	3	Maintenance - Stn operator at site cleaning
Temperature 2 m	19 Aug 2015 13:00	19 Aug 2015 14:00	2	Maintenance - Stn operator at site cleaning
Temperature 2 m	20 Aug 2015 12:00	20 Aug 2015 14:00	3	Maintenance - Stn operator at site cleaning
Relative Humidity	19 Aug 2015 13:00	19 Aug 2015 14:00	2	Maintenance - Stn operator at site cleaning
Relative Humidity	20 Aug 2015 12:00	20 Aug 2015 14:00	3	Maintenance - Stn operator at site cleaning

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BERTHA GANTER Fort McKAY (AMS 1)
AUGUST 2015

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
Temperature 10 m	19 Aug 2015 13:00	19 Aug 2015 14:00	2	Maintenance - Stn operator at site cleaning
Temperature 10 m	20 Aug 2015 12:00	20 Aug 2015 14:00	3	Maintenance - Stn operator at site cleaning
Surface Leaf Wetness	19 Aug 2015 13:00	22 Aug 2015 10:00	70	Data collection interrupted
Solar Global Radiation	19 Aug 2015 12:00	19 Aug 2015 15:00	4	Maintenance - Stn operator at site cleaning
Solar Global Radiation	20 Aug 2015 12:00	20 Aug 2015 16:00	5	Maintenance - Stn operator at site cleaning

Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO_2) - ppb

Fort McKay - Bertha Ganter - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 40 ppb on Aug 29 15:00 Maximum Daily Average: 5.1 ppb on Aug 8

Minimum Value: 0 ppb on Aug 1 01:00 Minimum Daily Average: 0.0 ppb on Aug 6
Maximum Diurnal Average: 3.8 ppb at hour 11 Minimum Diurnal Average: 0.1 ppb at hour 4
Monthly Average: 0.9 ppb Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 2$ $P_{99} = 18$

Hours in Service:	744
Hours of Data:	686
Hours of Missing Data:	58
Hours of Calibration:	38
Percent Operational Time:	97.3

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0.1	1
2-Aug	0	0	0	0	Z	0	0	0	1	6	30	10	6	5	2	4	2	1	1	1	0	0	0	0	3.1	30
3-Aug	0	0	0	0	0	Z	0	1	10	10	3	1	1	0	1	0	0	0	0	0	0	0	0	0	1.2	10
4-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
5-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	4	3	2	0	1	2	1	0	0	0.6	4
6-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
7-Aug	0	0	0	Z	0	0	0	0	0	1	6	10	9	6	4	2	1	1	0	0	0	0	0	0	1.9	10
8-Aug	0	2	1	1	Z	0	0	1	3	9	31	32	19	5	1	1	0	3	4	0	1	0	0	0	5.1	32
9-Aug	0	0	0	0	0	Z	0	0	3	4	2	1	1	0	0	8	16	13	8	2	1	0	0	0	2.6	16
10-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
11-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
12-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
13-Aug	0	0	0	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
14-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
15-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
16-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
17-Aug	0	Z	0	0	0	0	0	0	0	0	1	0	0	M	M	M	0	0	0	0	0	0	0	0	0.2	1
18-Aug	0	0	Z	0	0	0	0	0	C	C	C	C	C	C	C	M	M	M	1	1	0	0	0	1	--	1
19-Aug	1	2	4	Z	2	1	2	2	4	1	0	M	M	M	M	M	M	0	0	0	0	0	0	0	--	4
20-Aug	0	0	0	0	Z	0	0	0	0	M	M	M	M	M	M	M	M	0	0	0	0	0	0	0	--	0
21-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
22-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.1	1
23-Aug	0	Z	0	0	0	0	0	0	1	8	18	10	11	11	7	4	3	2	1	1	1	5	0	0	3.7	18
24-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
25-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
26-Aug	0	0	0	0	Z	0	0	0	0	0	0	1	1	0	0	1	1	0	0	0	0	0	0	0	0.2	1
27-Aug	0	0	0	0	0	Z	0	0	0	1	4	6	0	0	0	0	0	0	0	0	0	0	0	0	0.5	6
28-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
29-Aug	0	Z	0	0	0	0	0	0	0	1	2	1	4	22	40	22	5	5	2	1	0	0	0	0	4.5	40
30-Aug	0	0	Z	0	0	0	0	0	5	7	5	2	0	0	0	0	0	0	1	1	1	2	0	0	1.1	7
31-Aug	0	0	0	Z	0	0	0	0	4	5	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	7
	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.2	1.1	1.9	3.8	2.7	1.9	1.9	2.1	1.7	1.2	1.0	0.6	0.3	0.3	0.3	0.1	0.1	Diurnal Average	
	1	2	4	1	2	1	2	2	10	10	31	32	19	22	40	22	16	13	8	2	2	5	0	1	Diurnal Maximum	

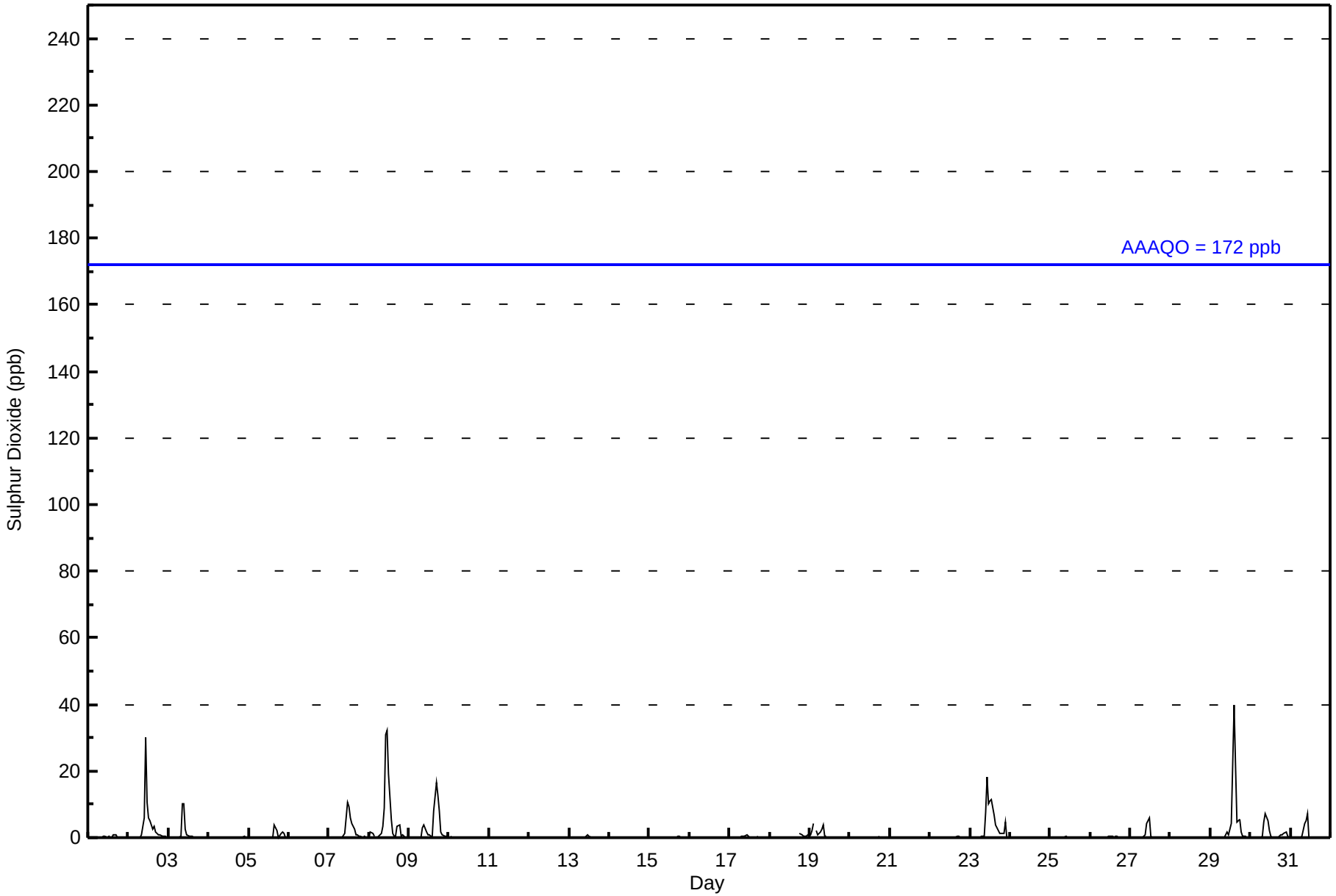
Z - zerospan C - Calibration M - Maintenance
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb

Wood Buffalo Environmental Association

Hourly Averages

Sulphur Dioxide (SO_2) - ppb

Fort McKay - Bertha Ganter - August 2015



Sulphur Dioxide (SO_2) - ppb

Fort McKay - Bertha Ganter - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	674	98.25	98.25
11 - 20	6	0.87	99.13
21 - 60	6	0.87	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

Fort McKay - Bertha Ganter - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 10	47	14	10	5	21	20	29	56	57	51	61	66	58	82	61	36	674
11 - 20	0	0	0	0	0	0	1	1	4	0	0	0	0	0	0	0	6
21 - 60	0	0	0	0	0	0	0	5	1	0	0	0	0	0	0	0	6
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	47	14	10	5	21	20	30	62	62	51	61	66	58	82	61	36	686

Total Number of Valid Hours: 686

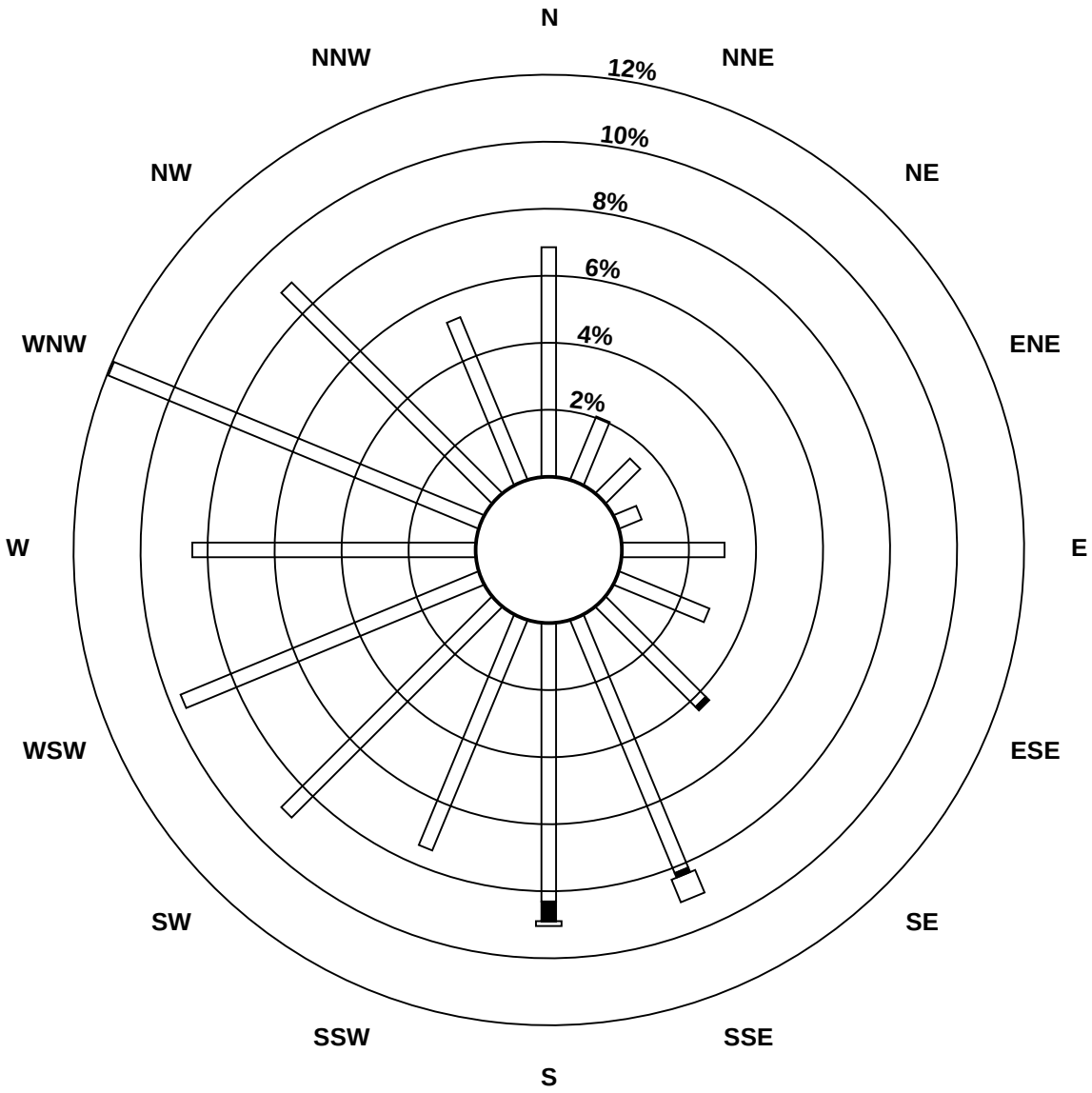
Total Number of Hours: 744

Wood Buffalo Environmental Association

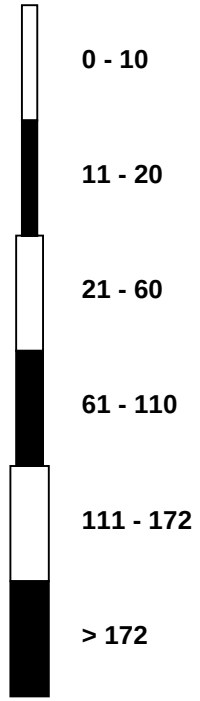
Wind Rose Aug 2015

Sulphur Dioxide (SO_2) - ppb

Fort McKay - Bertha Ganter (AMS 1)



Classes (ppb)



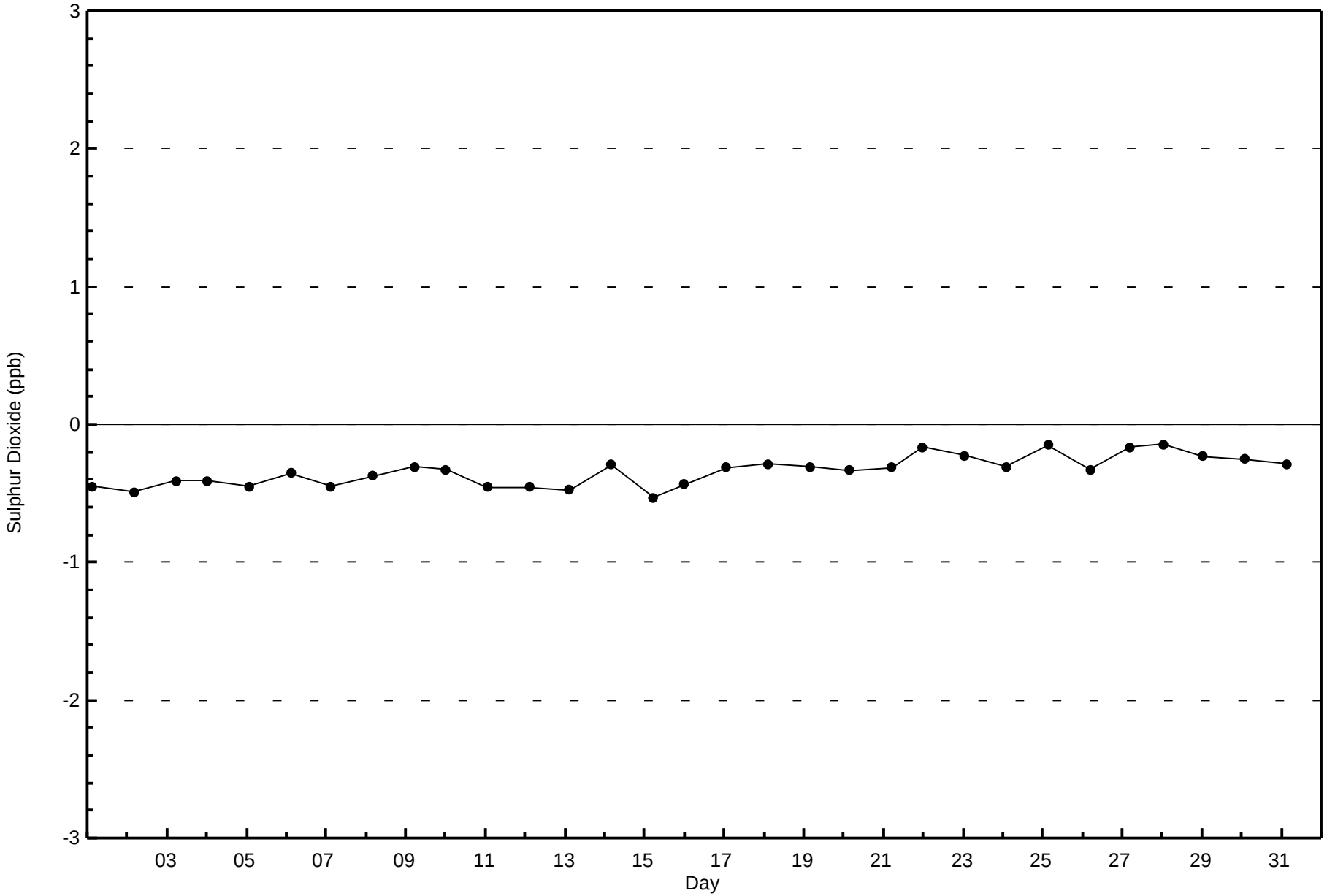
Total Number of Valid Hours: 686

Wood Buffalo Environmental Association

Zero Responses

Sulphur Dioxide (SO_2) - ppb

Fort McKay - Bertha Ganter - August 2015

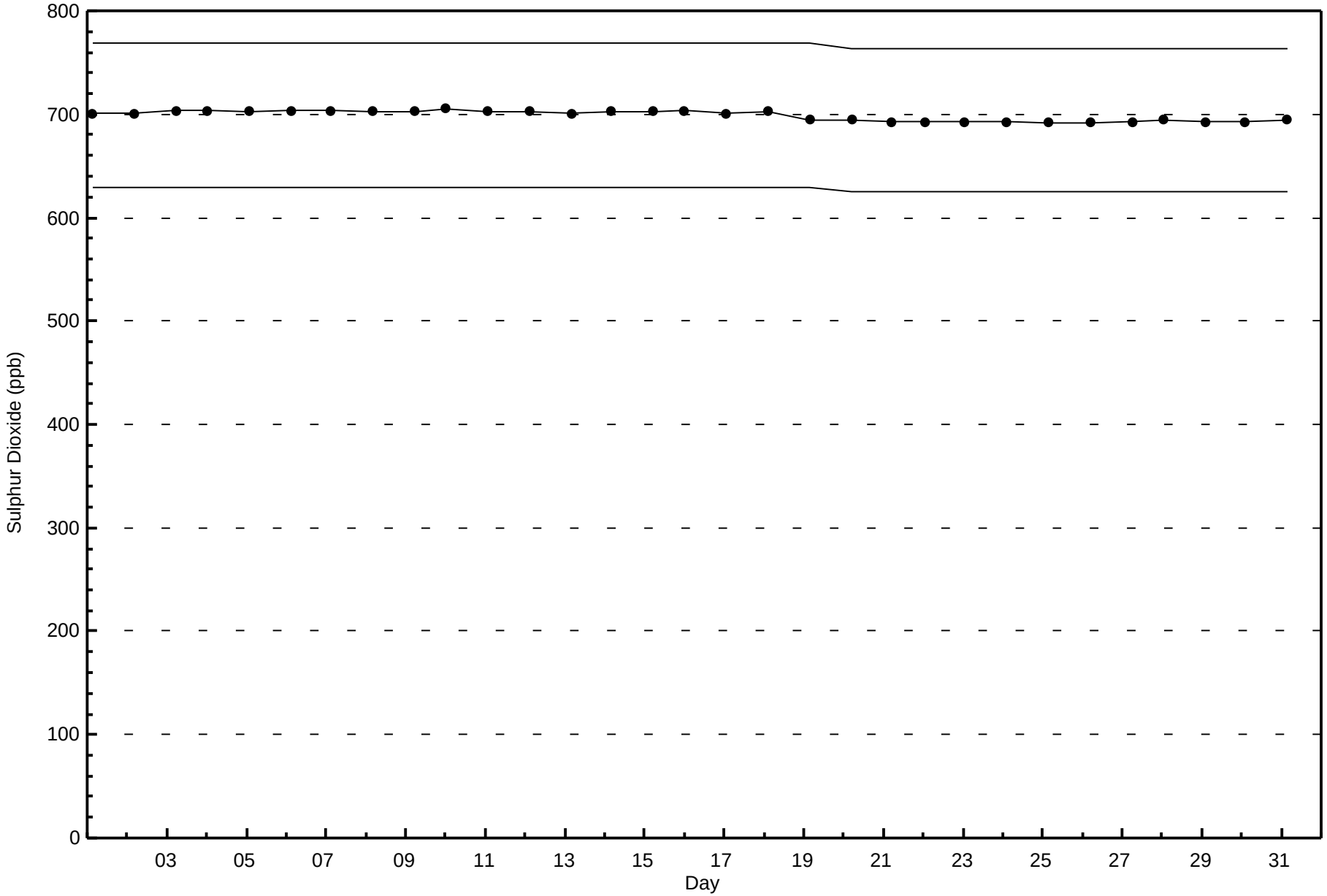


Wood Buffalo Environmental Association

Span Responses

Sulphur Dioxide (SO_2) - ppb

Fort McKay - Bertha Ganter - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

Fort McKay - Bertha Ganter - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 3 ppb on Aug 3 09:00

Maximum Daily Average: 0.8 ppb on Aug 8

Minimum Value: 0 ppb on Aug 23 05:00

Minimum Daily Average: 0.3 ppb on Aug 21

Maximum Diurnal Average: 0.8 ppb at hour 11

Minimum Diurnal Average: 0.4 ppb at hour 15

Monthly Average: 0.5 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 1$ $P_{99} = 2$

Hours in Service:	744
Hours of Data:	677
Hours of Missing Data:	67
Hours of Calibration:	35
Percent Operational Time:	95.7

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

Z - zerospan C - Calibration M - Maintenance

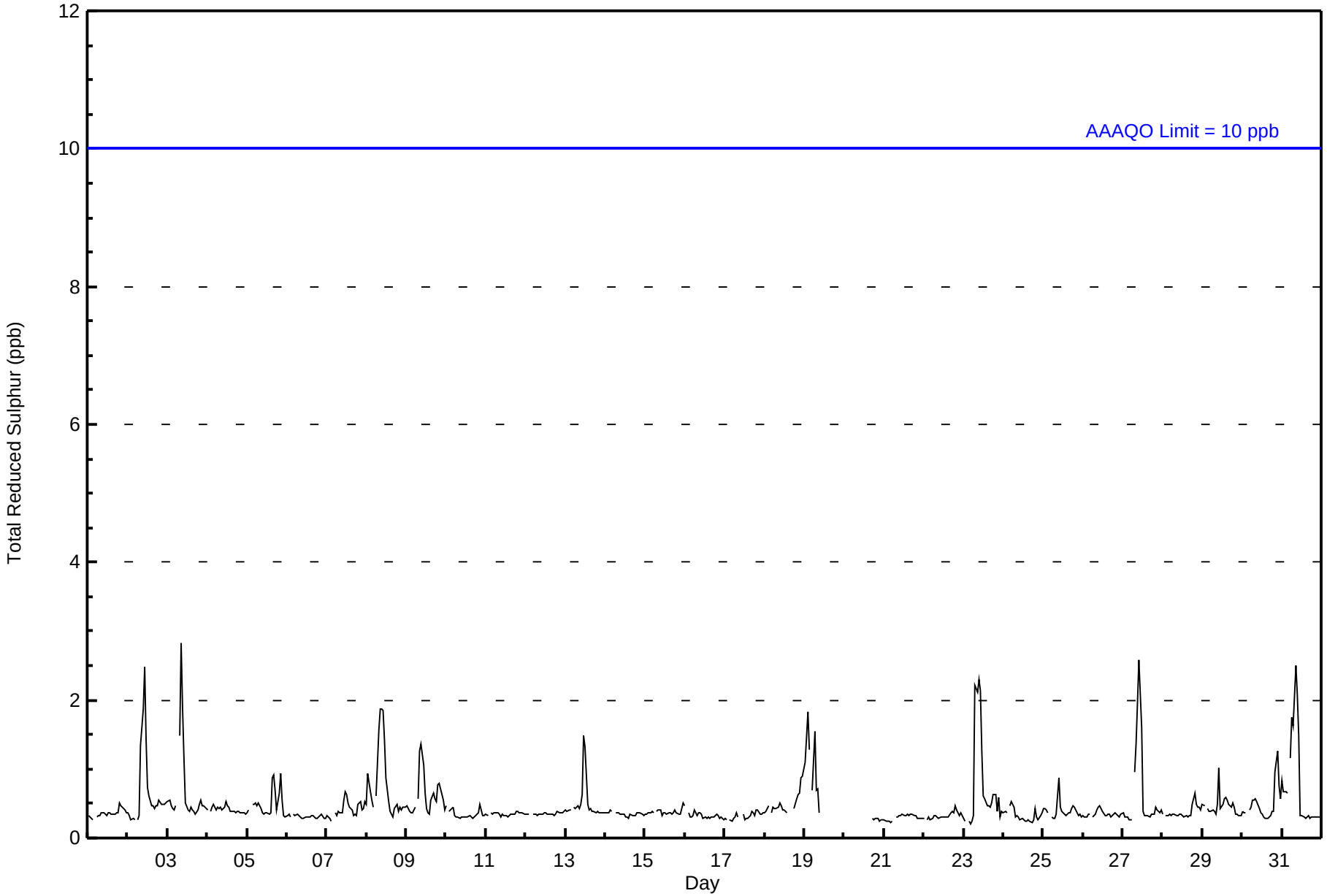
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb

Wood Buffalo Environmental Association

Hourly Averages

Total Reduced Sulphur (TRS) - ppb

Fort McKay - Bertha Ganter - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb

Fort McKay - Bertha Ganter - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	674	99.56	99.56
3 - 4	3	0.44	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: 677

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Total Reduced Sulphur (TRS) - ppb

Fort McKay - Bertha Ganter - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 2	49	11	10	7	22	22	30	56	61	55	59	64	48	80	65	35	674
3 - 4	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	3
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	49	11	10	7	22	22	30	59	61	55	59	64	48	80	65	35	677

Total Number of Valid Hours: 677

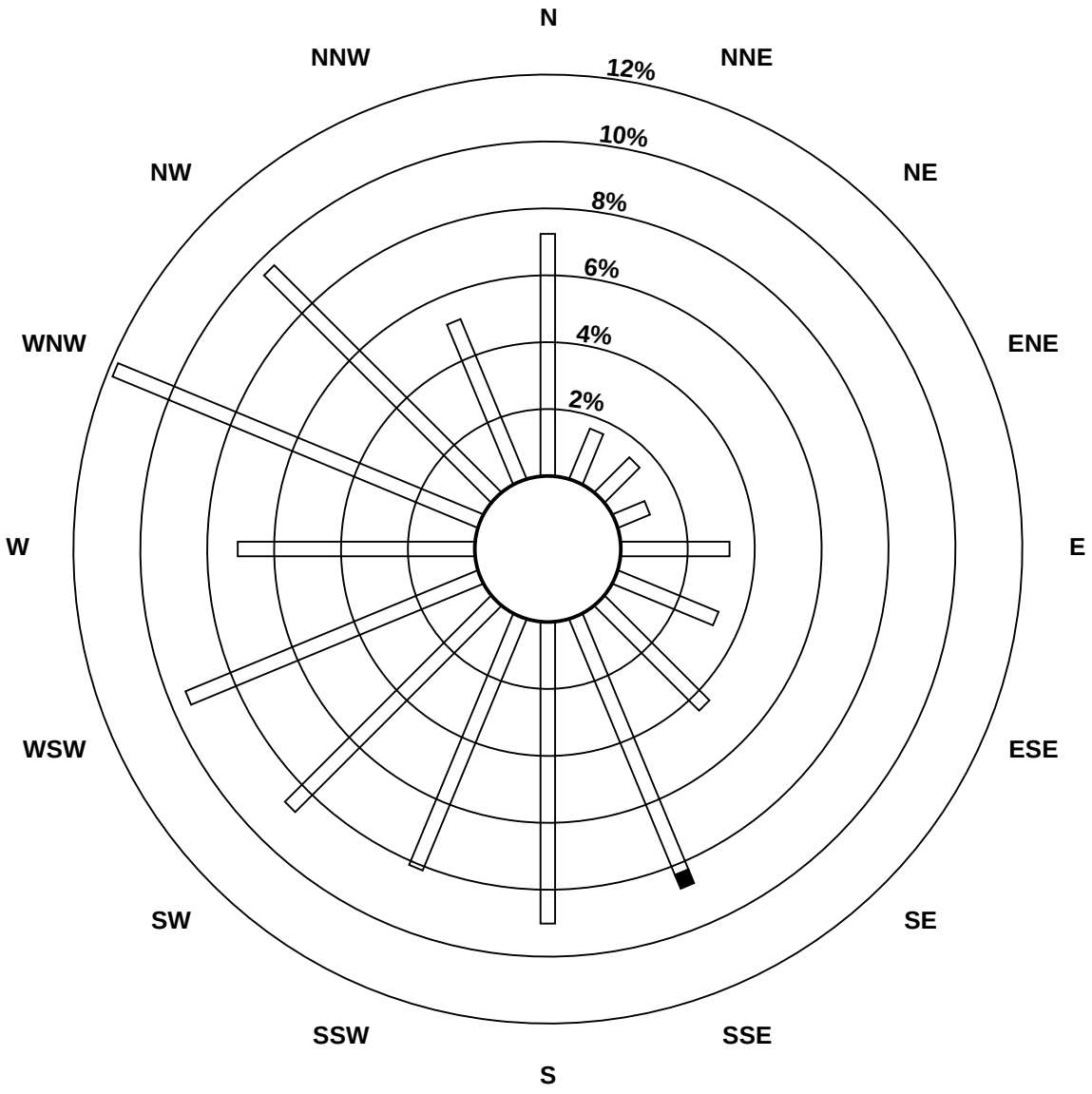
Total Number of Hours: 744

Wood Buffalo Environmental Association

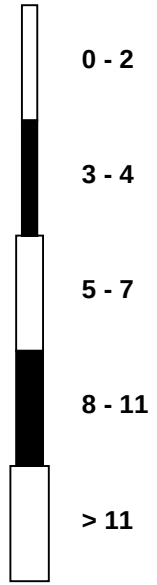
Wind Rose Aug 2015

Total Reduced Sulphur (TRS) - ppb

Fort McKay - Bertha Ganter (AMS 1)



Classes (ppb)



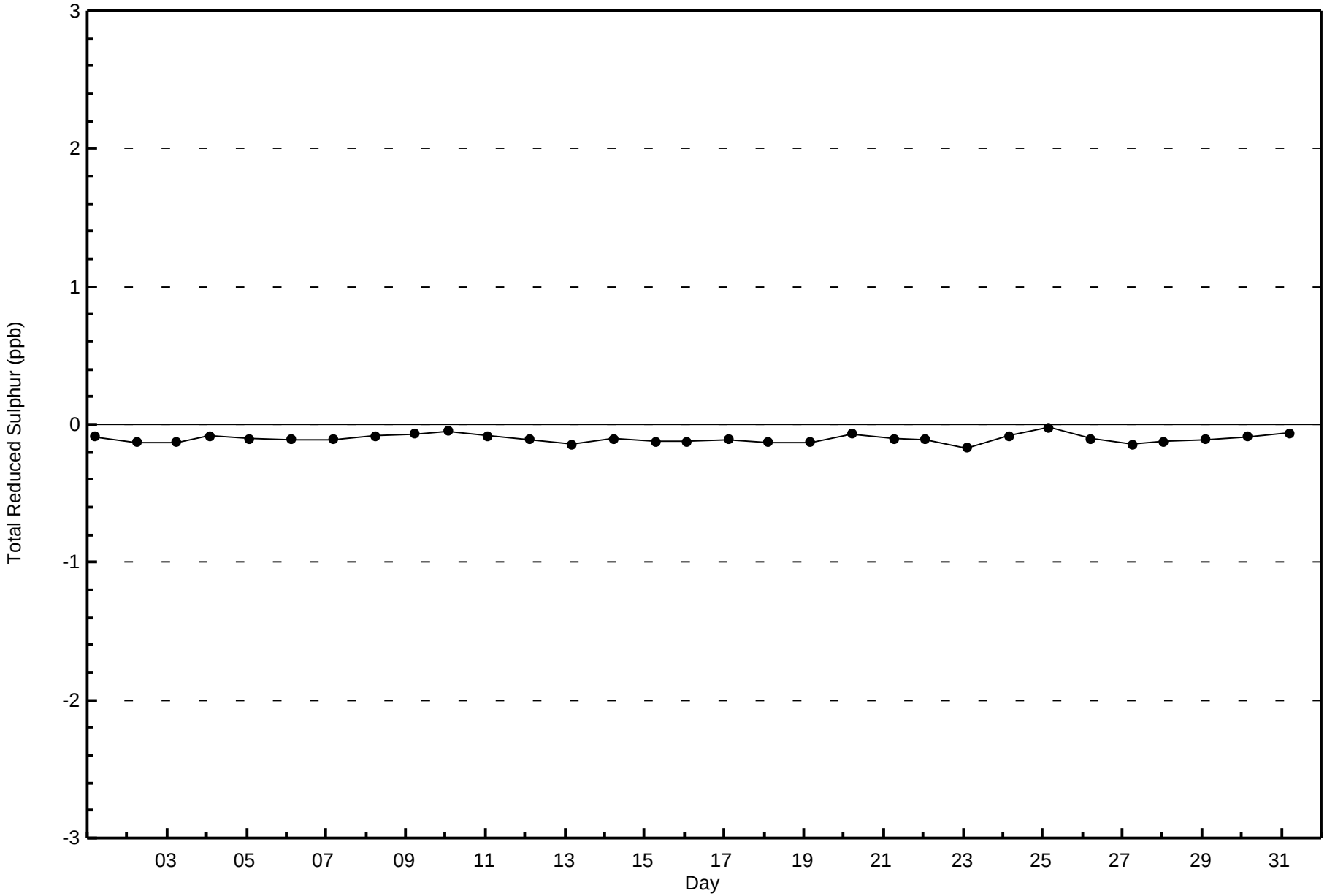
Total Number of Valid Hours: 677

Wood Buffalo Environmental Association

Zero Responses

Total Reduced Sulphur (TRS) - ppb

Fort McKay - Bertha Ganter - August 2015

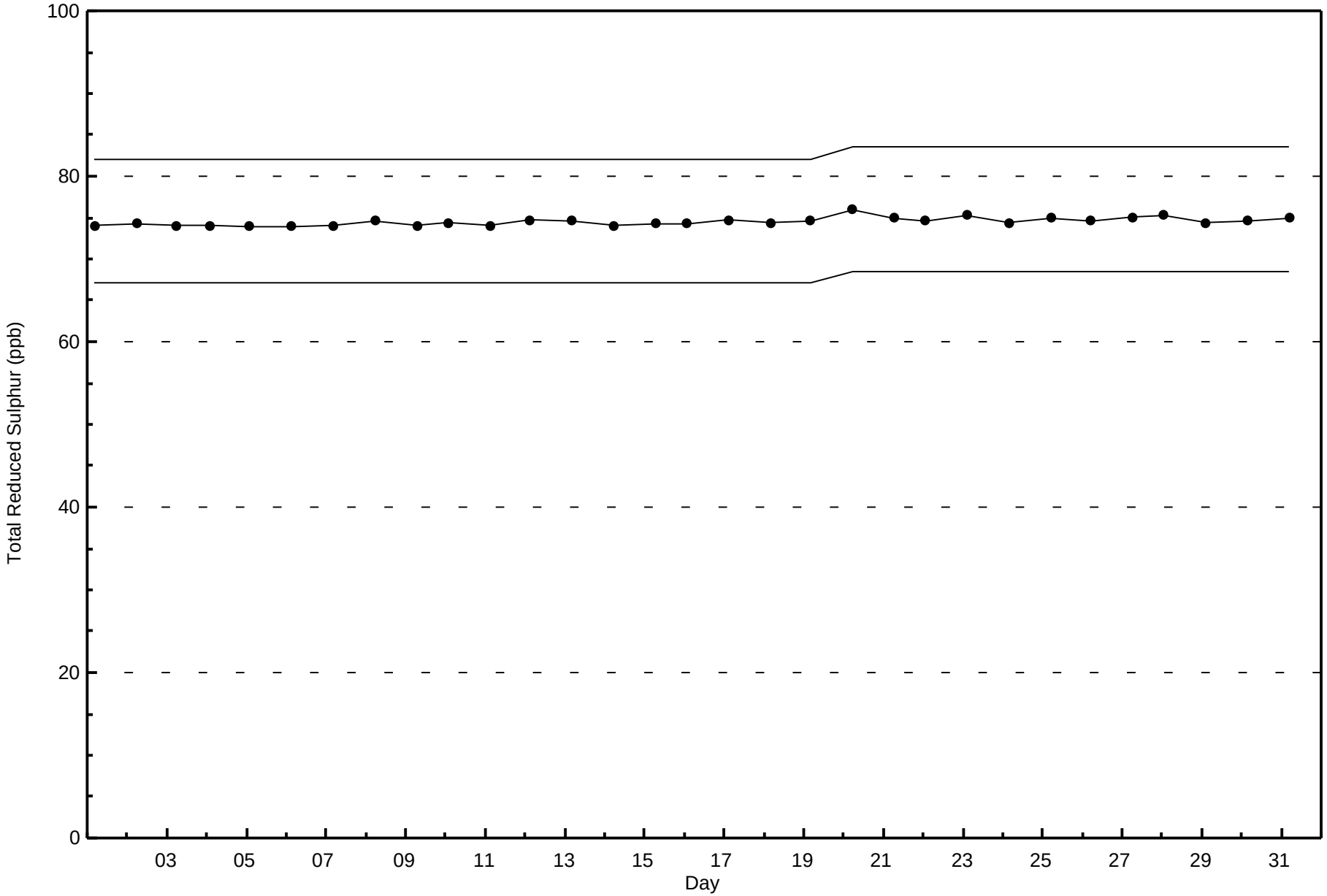


Wood Buffalo Environmental Association

Span Responses

Total Reduced Sulphur (TRS) - ppb

Fort McKay - Bertha Ganter - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Fort McKay - Bertha Ganter - August 2015

Maximum Value: 2.7 ppm on Aug 25 10:00

Maximum Daily Average: 2.0 ppm on Aug 27

Minimum Value: 1.7 ppm on Aug 11 15:00

Minimum Daily Average: 1.8 ppm on Aug 12

Maximum Diurnal Average: 1.9 ppm at hour 9

Minimum Diurnal Average: 1.8 ppm at hour 18

Monthly Average: 1.85 ppm

Percentiles: P_1 = 1.7 P_{10} = 1.8 Q_1 = 1.8 Median = 1.8 Q_3 = 1.9 P_{90} = 2.0 P_{99} = 2.3

Hours in Service:	744
Hours of Data:	687
Hours of Missing Data:	57
Hours of Calibration:	38
Percent Operational Time:	97.5

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	2.0	1.9	1.9	Z	1.9	1.9	2.0	1.9	2.0	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.0
2-Aug	1.8	1.8	1.9	1.9	Z	1.9	1.9	1.9	2.6	2.2	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.8	1.9	2.6
3-Aug	1.9	1.9	1.9	1.9	1.9	Z	2.0	2.0	2.2	2.0	2.3	2.1	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.0	1.9	1.9	2.3
4-Aug	Z	1.9	1.9	2.0	2.1	1.9	2.0	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.1
5-Aug	1.9	Z	2.2	2.1	2.0	2.0	2.0	2.0	1.9	1.8	1.8	1.8	1.8	1.8	1.8	2.0	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.2
6-Aug	1.8	1.8	Z	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	1.8	1.9
7-Aug	1.9	1.8	1.8	Z	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9
8-Aug	1.9	1.9	1.9	1.9	Z	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.8	1.8	1.8	1.9	1.9	1.9	2.0
9-Aug	1.9	1.9	1.9	2.0	2.0	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.0	2.0	1.9	1.9	2.0
10-Aug	Z	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.9
11-Aug	1.8	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.8	1.8	1.8	1.8	1.8	1.9
12-Aug	1.8	1.8	Z	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8
13-Aug	1.8	1.8	1.8	Z	1.9	2.0	1.9	1.9	1.8	2.0	1.9	2.0	1.9	1.8	1.8	1.7	1.7	1.7	1.7	1.7	1.7	1.8	1.8	1.8	1.8	2.0
14-Aug	1.8	1.8	1.8	1.8	Z	1.8	1.8	1.8	1.7	1.7	1.8	1.7	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
15-Aug	1.8	1.8	1.8	1.8	1.9	Z	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	2.0	1.9	1.8	2.0
16-Aug	Z	1.9	1.9	1.8	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	1.9
17-Aug	1.8	Z	1.8	1.9	1.9	1.9	1.9	2.1	2.0	2.0	1.9	1.8	1.8	1.8	1.8	M	M	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	2.1
18-Aug	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	C	C	C	C	C	C	C	M	M	M	1.9	1.9	2.0	2.0	2.1	2.1	--	2.1
19-Aug	2.0	2.0	2.0	Z	1.9	1.9	2.0	1.9	2.0	1.8	1.8	M	M	M	M	M	M	1.8	1.8	1.8	1.8	1.8	1.8	1.8	--	2.0
20-Aug	1.8	1.8	1.8	1.8	Z	1.8	1.8	1.8	1.8	M	M	M	M	M	M	M	M	1.8	1.8	1.8	1.8	1.8	1.8	1.8	--	1.8
21-Aug	1.8	1.8	1.8	1.8	1.8	Z	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
22-Aug	Z	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	1.8	1.9	1.8	1.9
23-Aug	1.9	Z	1.9	1.9	1.9	1.9	2.0	2.2	2.1	2.0	2.0	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.8	1.8	1.9	2.2
24-Aug	1.8	1.9	Z	1.9	1.9	2.0	2.1	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	2.0	2.0	1.9	2.1
25-Aug	2.1	2.1	2.1	Z	1.9	1.9	1.9	1.9	2.1	2.7	2.1	1.9	1.9	1.9	1.8	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.7
26-Aug	1.9	1.8	1.8	1.8	Z	1.9	1.9	1.9	2.0	2.0	2.0	2.0	1.9	1.9	1.8	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.0
27-Aug	1.9	1.9	1.9	1.9	1.9	Z	2.1	2.3	2.4	2.5	2.3	2.0	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.8	1.8	2.0	2.5
28-Aug	Z	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	1.8	1.8	1.8	1.8
29-Aug	2.0	Z	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.2	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	2.2
30-Aug	1.8	1.8	Z	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.1	2.0	1.9	1.9	2.1
31-Aug	2.0	2.0	1.9	Z	2.0	2.1	2.2	2.3	2.1	2.1	2.0	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.3
	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.8	Diurnal Average	
	2.1	2.1	2.2	2.1	2.1	2.1	2.2	2.3	2.6	2.7	2.3	2.1	2.0	2.0	1.8	2.0	1.9	1.9	1.9	1.9	2.0	2.1	2.1	2.1	Diurnal Maximum	

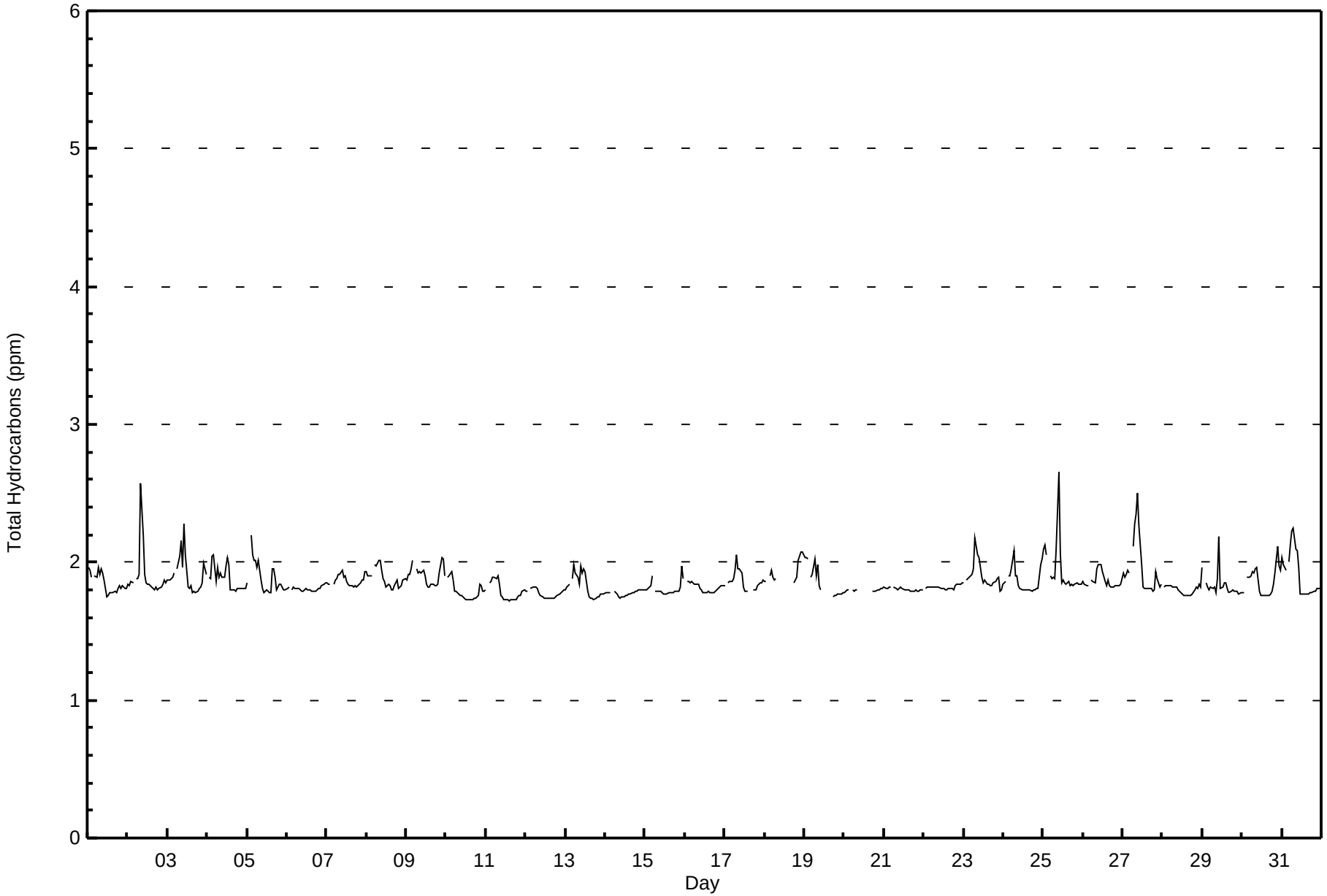
Z - zerospan C - Calibration M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Total Hydrocarbons (THC) - ppm

Fort McKay - Bertha Ganter - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm

Fort McKay - Bertha Ganter - August 2015

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	656	95.49	95.49
2.1 - 3.0	31	4.51	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Total Hydrocarbons (THC) - ppm

Fort McKay - Bertha Ganter - August 2015

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	43	12	9	5	21	20	29	54	56	48	62	65	58	81	58	35	656
2.1 - 3.0	4	2	1	0	0	0	1	8	6	4	0	1	0	1	2	1	31
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	47	14	10	5	21	20	30	62	62	52	62	66	58	82	60	36	687

Total Number of Valid Hours: 687

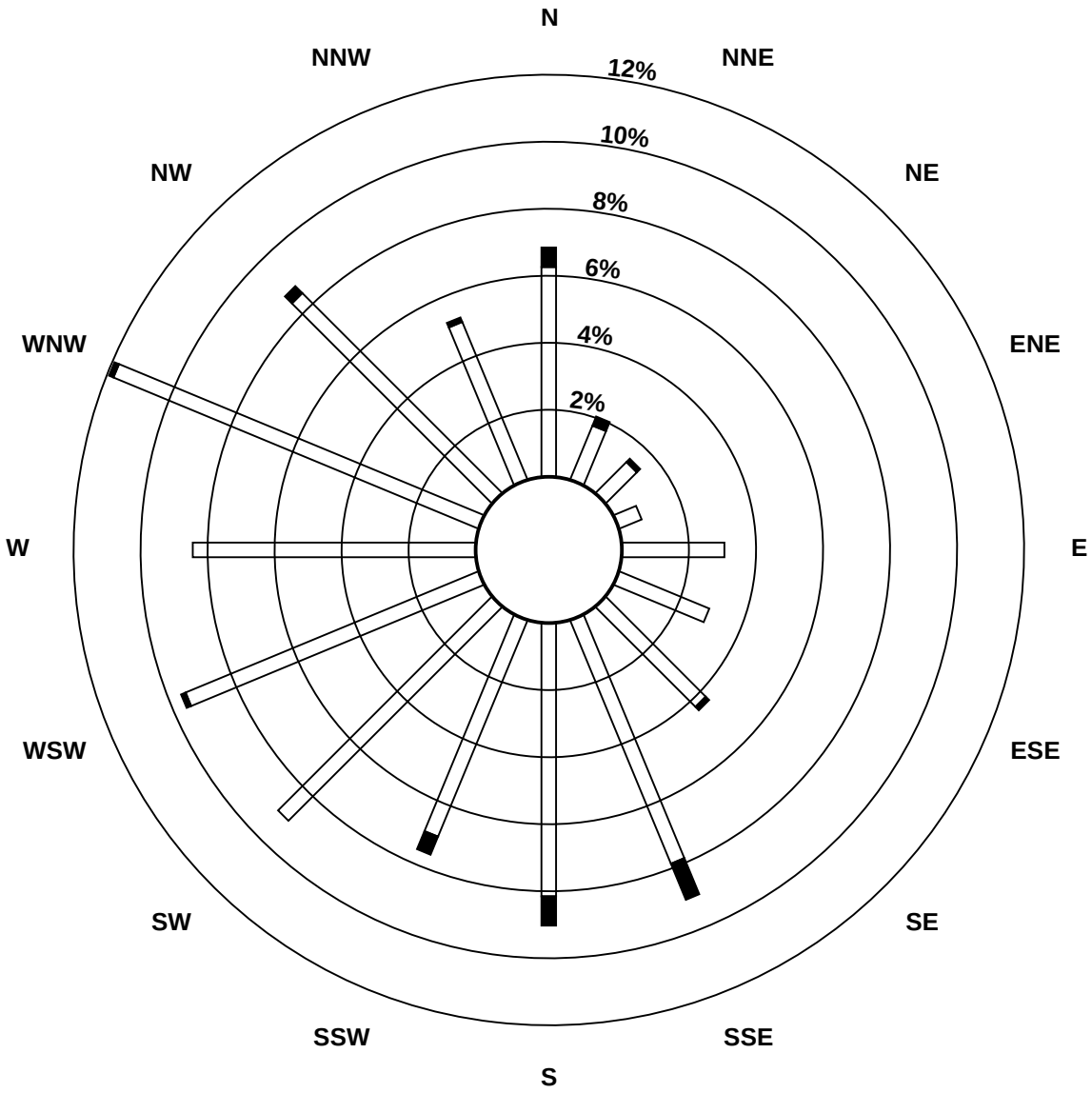
Total Number of Hours: 744

Wood Buffalo Environmental Association

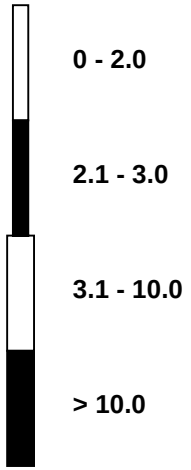
Wind Rose Aug 2015

Total Hydrocarbons (THC) - ppm

Fort McKay - Bertha Ganter (AMS 1)



Classes (ppm)



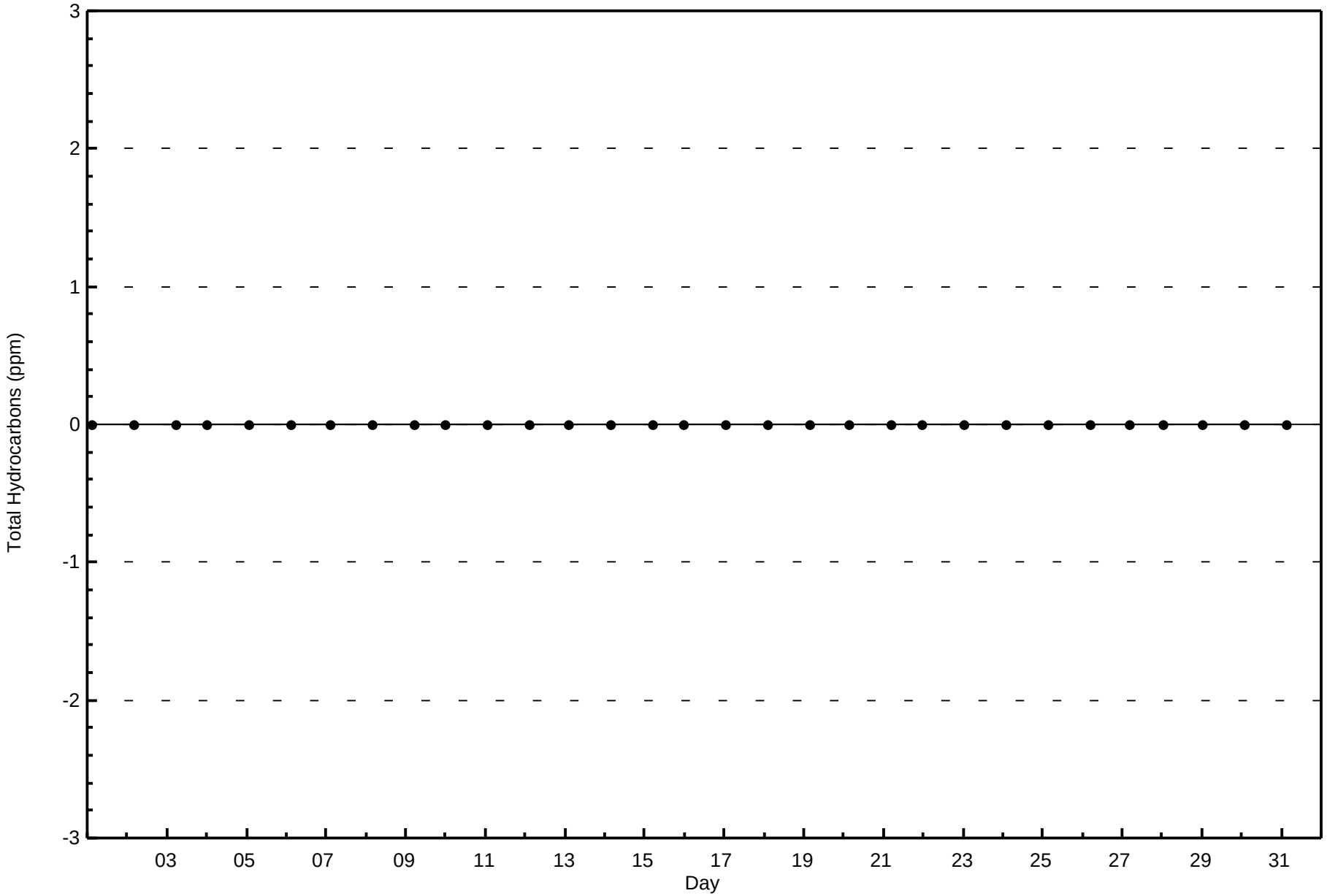
Total Number of Valid Hours: 687

Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Fort McKay - Bertha Ganter - August 2015

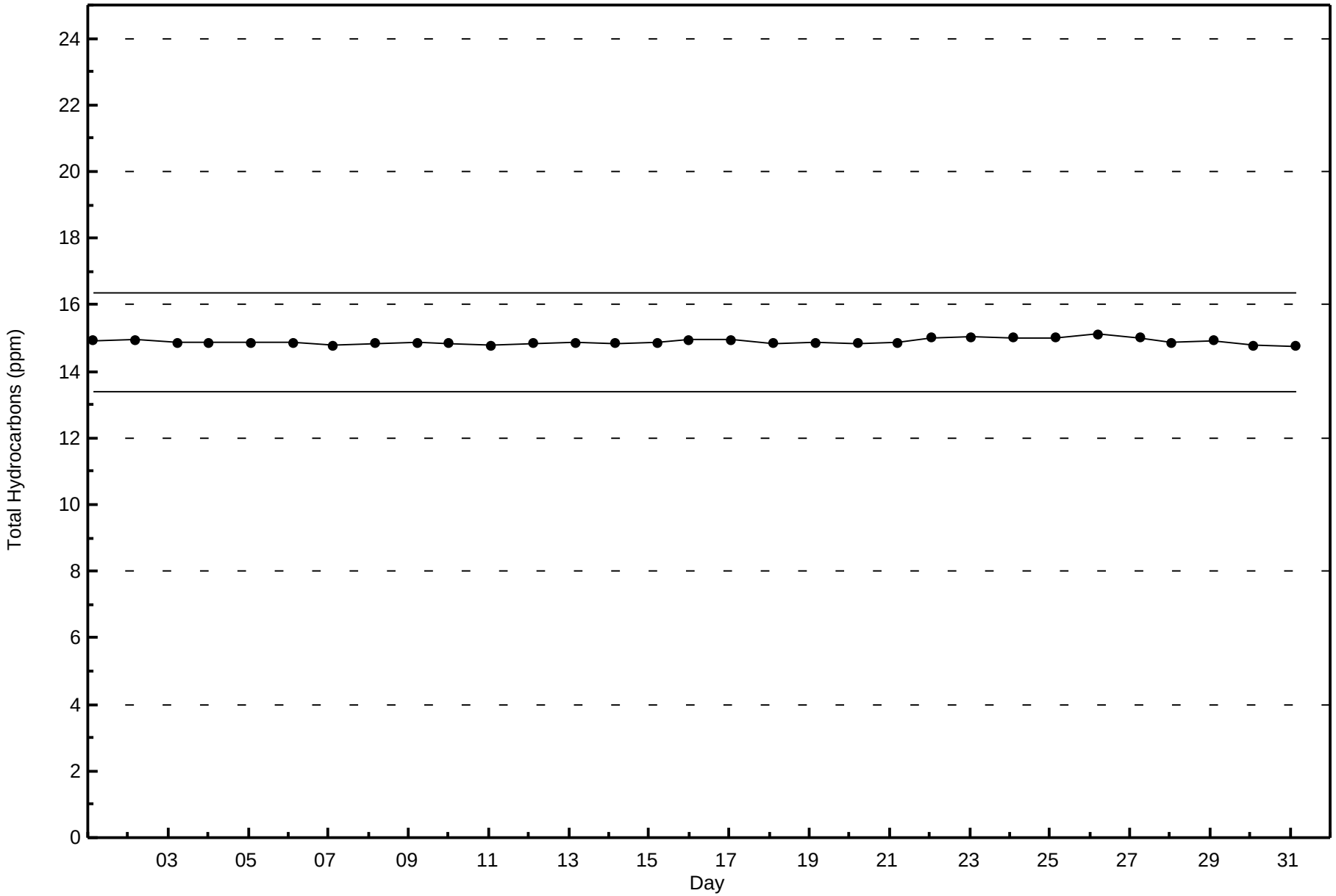


Wood Buffalo Environmental Association

Span Responses

Total Hydrocarbons (THC) - ppm

Fort McKay - Bertha Ganter - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Non Methane Hydrocarbons (NMHC) - ppm

Fort McKay - Bertha Ganter - August 2015

Maximum Value: 0.292 ppm on Aug 3 11:00

Maximum Daily Average: 0.025 ppm on Aug 3

Minimum Value: 0.000 ppm on Aug 1 01:00

Minimum Daily Average: 0.000 ppm on Aug 1

Maximum Diurnal Average: 0.018 ppm at hour 11

Minimum Diurnal Average: 0.000 ppm at hour 1

Monthly Average: 0.003 ppm

Percentiles: P_1 = 0.0 P_{10} = 0.0 Q_1 = 0.0 Median = 0.0 Q_3 = 0.0 P_{90} = 0.0 P_{99} = 0.1

Hours in Service:	744
Hours of Data:	687
Hours of Missing Data:	57
Hours of Calibration:	38
Percent Operational Time:	97.5

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2-Aug	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	0.000	0.002
3-Aug	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.292	0.125	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.097	0.037	0.025	0.292
4-Aug	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.105	0.091	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.105
5-Aug	0.000	Z	0.189	0.088	0.027	0.000	0.000	0.019	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.014	0.189
6-Aug	0.000	0.000	Z	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
7-Aug	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8-Aug	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.020	0.000	0.000	0.000	0.000	0.000	0.001	0.020
9-Aug	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.042	0.080	0.048	0.000	0.008	0.080
10-Aug	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11-Aug	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Aug	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
13-Aug	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
14-Aug	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
15-Aug	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.016	0.000	0.001	0.016
16-Aug	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
17-Aug	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	M	M	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
18-Aug	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	C	C	C	C	C	C	C	M	M	M	0.000	0.000	0.000	0.000	0.000	0.000	--	0.000
19-Aug	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	M	M	M	M	M	M	0.000	0.000	0.000	0.000	0.000	0.000	0.000	--	0.000
20-Aug	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	M	M	M	M	M	M	M	M	0.000	0.000	0.000	0.000	0.000	0.000	0.000	--	0.000
21-Aug	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
22-Aug	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Aug	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.064	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.064
24-Aug	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
25-Aug	0.000	0.001	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
26-Aug	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
27-Aug	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.040	0.066	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	0.005	0.066
28-Aug	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
29-Aug	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.029	0.227	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.227
30-Aug	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.001	0.018	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.018
31-Aug	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.007	0.004	0.001	0.000	0.000	0.003	0.002	0.004	0.018	0.005	0.004	0.003	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.003	0.005	0.001	Diurnal Average	
	0.000	0.001	0.189	0.088	0.027	0.001	0.000	0.064	0.040	0.066	0.292	0.125	0.105	0.091	0.000	0.000	0.000	0.000	0.020	0.000	0.042	0.080	0.097	0.037	Diurnal Maximum	

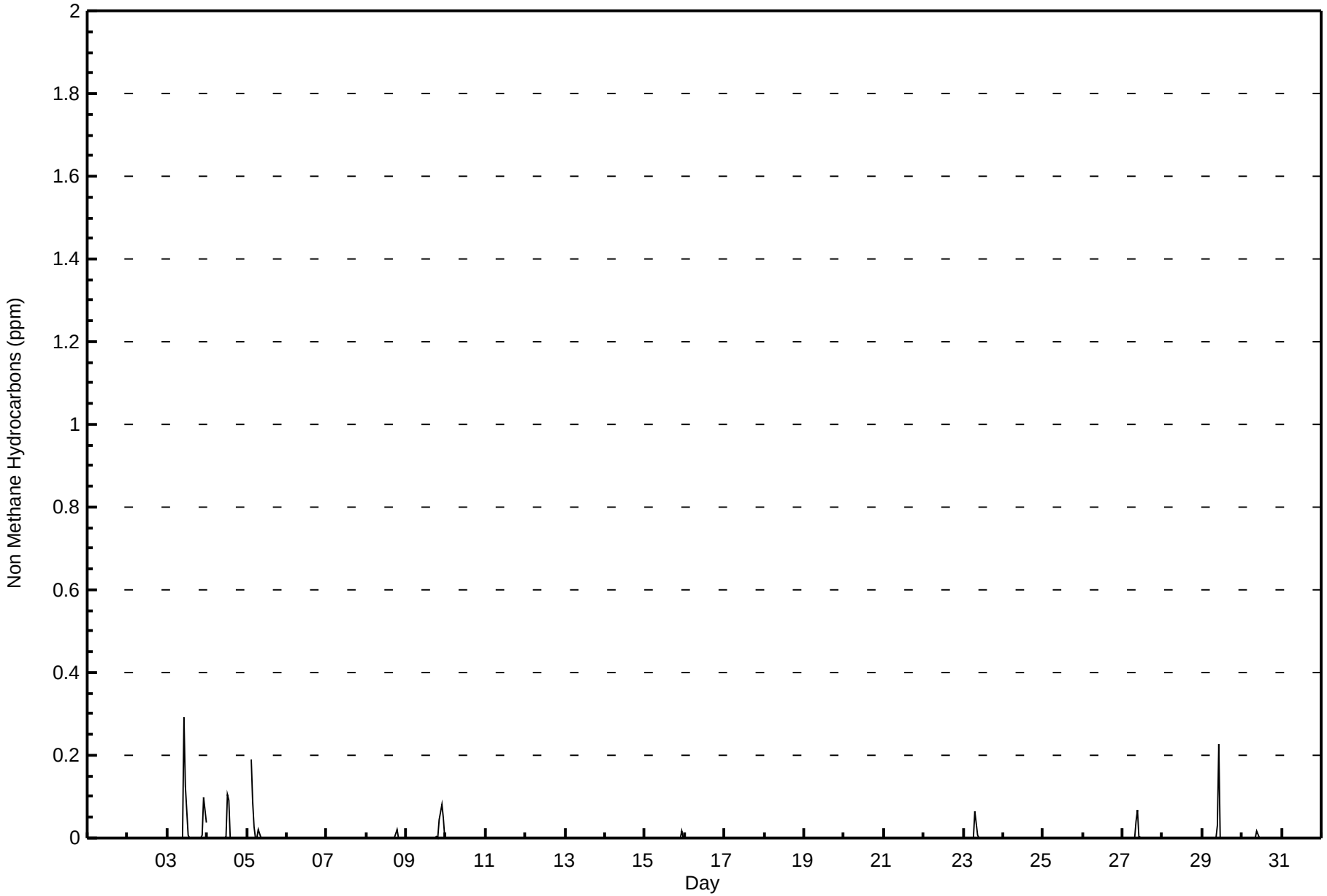
Z - zerospan C - Calibration M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Non Methane Hydrocarbons (NMHC) - ppm

Fort McKay - Bertha Ganter - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm

Fort McKay - Bertha Ganter - August 2015

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	663	96.51	96.51
0.006 - 0.05	13	1.89	98.40
0.06 - 0.1	8	1.16	99.56
> 0.1	3	0.44	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm

Fort McKay - Bertha Ganter - August 2015

Concentration Ranges (ppm)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 0.005	44	7	7	5	21	20	30	60	58	51	62	66	57	81	59	35	663
0.006 - 0.05	2	2	2	0	0	0	0	1	3	0	0	0	0	1	1	1	13
0.06 - 0.1	1	4	0	0	0	0	0	1	0	1	0	0	1	0	0	0	8
> 0.1	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	3
Totals	47	14	10	5	21	20	30	62	62	52	62	66	58	82	60	36	687

Total Number of Valid Hours: 687

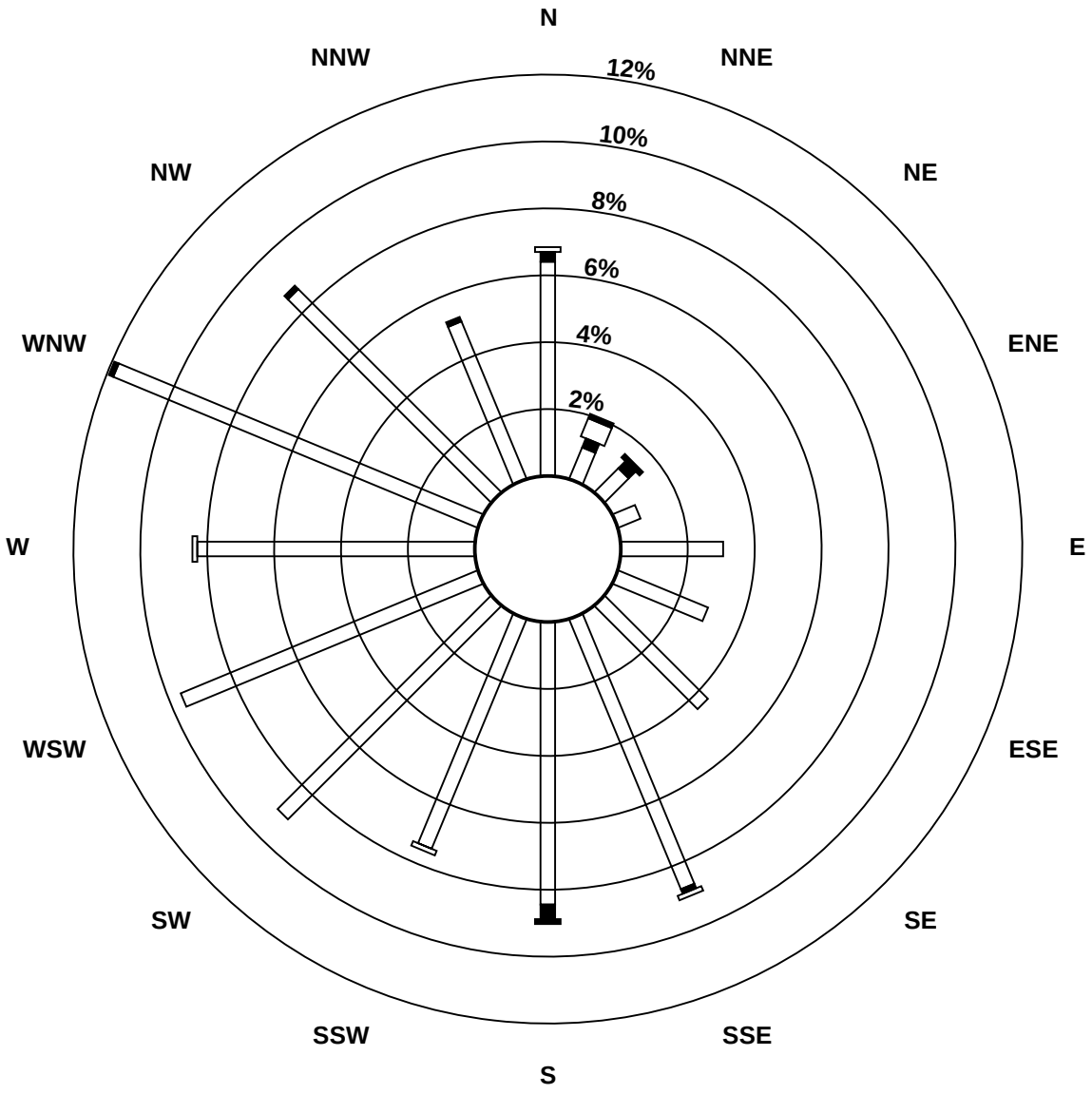
Total Number of Hours: 744

Wood Buffalo Environmental Association

Wind Rose Aug 2015

Non Methane Hydrocarbons (NMHC) - ppm

Fort McKay - Bertha Ganter (AMS 1)



Classes (ppm)

0 - 0.005

0.006 - 0.05

0.06 - 0.1

> 0.1

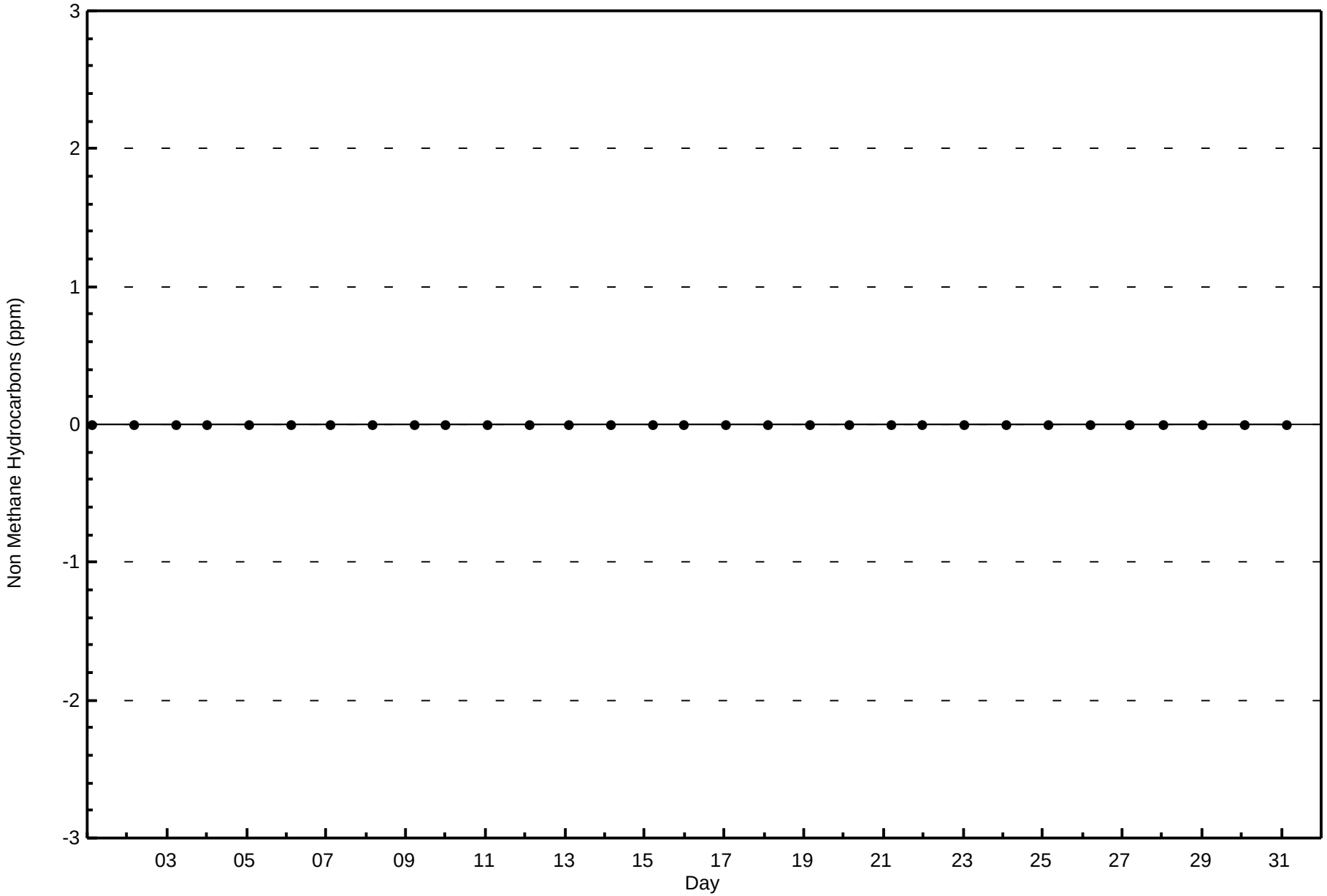
Total Number of Valid Hours: 687

Wood Buffalo Environmental Association

Zero Responses

Non Methane Hydrocarbons (NMHC) - ppm

Fort McKay - Bertha Ganter - August 2015

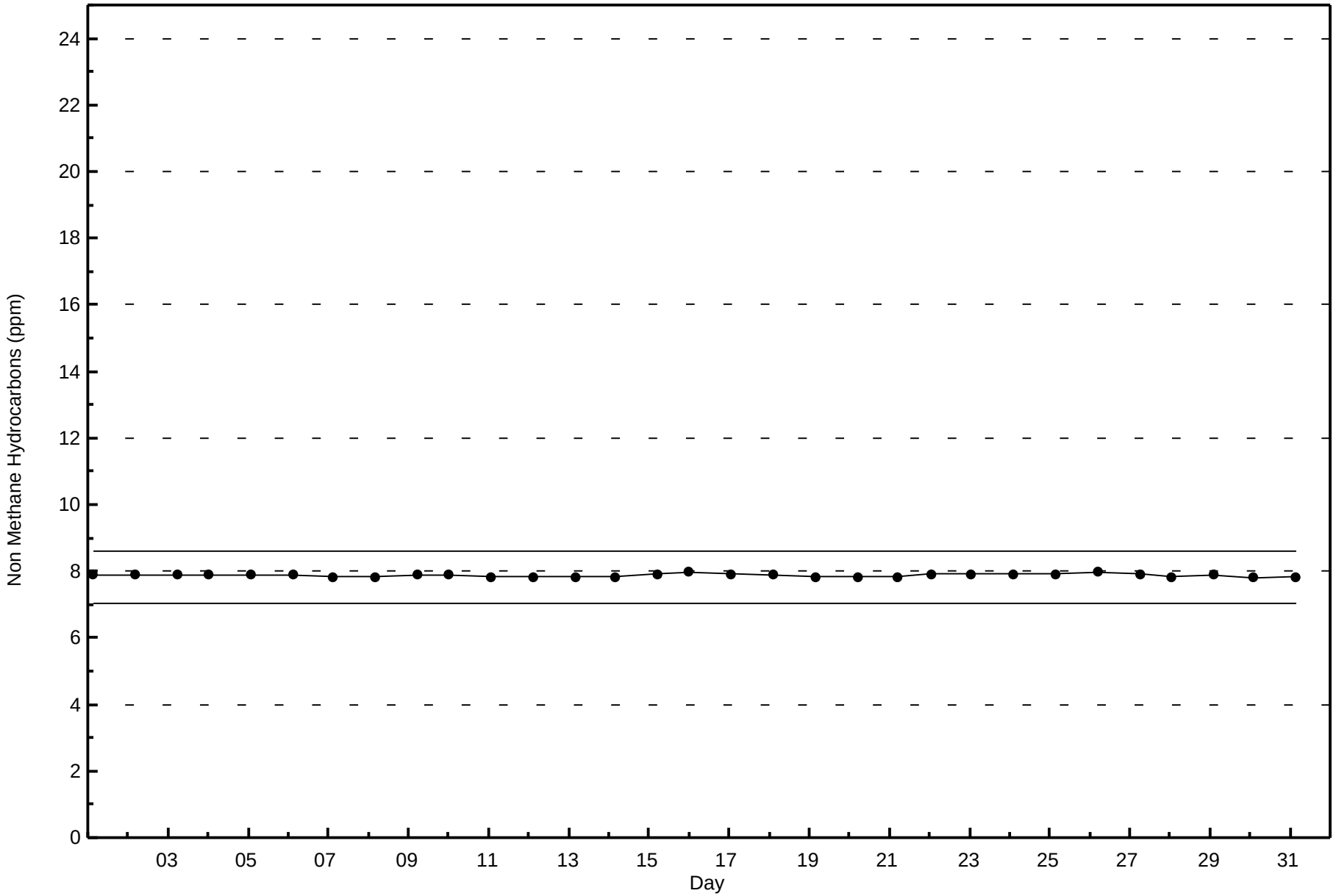


Wood Buffalo Environmental Association

Span Responses

Non Methane Hydrocarbons (NMHC) - ppm

Fort McKay - Bertha Ganter - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Methane (CH_4) - ppm

Fort McKay - Bertha Ganter - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 2.7 ppm on Aug 25 10:00

Maximum Daily Average: 2.0 ppm on Aug 27

Minimum Value: 1.7 ppm on Aug 11 15:00

Minimum Daily Average: 1.8 ppm on Aug 12

Maximum Diurnal Average: 1.9 ppm at hour 9

Minimum Diurnal Average: 1.8 ppm at hour 18

Monthly Average: 1.85 ppm

Percentiles: P_1 = 1.7 P_{10} = 1.8 Q_1 = 1.8 Median = 1.8 Q_3 = 1.9 P_{90} = 2.0 P_{99} = 2.2

Hours in Service:	744
Hours of Data:	687
Hours of Missing Data:	57
Hours of Calibration:	38
Percent Operational Time:	97.5

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	2.0	1.9	1.9	Z	1.9	1.9	2.0	1.9	2.0	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.0
2-Aug	1.8	1.8	1.9	1.9	Z	1.9	1.9	1.9	2.6	2.2	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.8	1.9	2.6
3-Aug	1.9	1.9	1.9	1.9	1.9	Z	2.0	2.0	2.2	2.0	2.0	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	2.2
4-Aug	Z	1.9	1.9	2.0	2.1	1.9	2.0	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.1
5-Aug	1.9	Z	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.8	1.8	1.8	1.8	1.8	1.8	2.0	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.0
6-Aug	1.8	1.8	Z	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	1.8	1.9
7-Aug	1.9	1.8	1.8	Z	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9
8-Aug	1.9	1.9	1.9	1.9	Z	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	2.0
9-Aug	1.9	1.9	1.9	2.0	2.0	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.0	2.0	1.9	1.9	2.0
10-Aug	Z	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.9
11-Aug	1.8	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.8	1.8	1.8	1.8	1.8	1.9
12-Aug	1.8	1.8	Z	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8
13-Aug	1.8	1.8	1.8	Z	1.9	2.0	1.9	1.9	1.8	2.0	1.9	2.0	1.9	1.8	1.8	1.7	1.7	1.7	1.7	1.7	1.7	1.8	1.8	1.8	1.8	2.0
14-Aug	1.8	1.8	1.8	1.8	Z	1.8	1.8	1.8	1.7	1.7	1.8	1.7	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
15-Aug	1.8	1.8	1.8	1.8	1.9	Z	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	2.0	1.9	1.8	2.0
16-Aug	Z	1.9	1.9	1.8	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	1.9
17-Aug	1.8	Z	1.8	1.9	1.9	1.9	1.9	2.1	2.0	2.0	1.9	1.8	1.8	1.8	1.8	M	M	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	2.1
18-Aug	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	C	C	C	C	C	C	C	M	M	M	1.9	1.9	2.0	2.0	2.1	2.1	--	2.1
19-Aug	2.0	2.0	2.0	Z	1.9	1.9	2.0	1.9	2.0	1.8	1.8	M	M	M	M	M	M	1.8	1.8	1.8	1.8	1.8	1.8	1.8	--	2.0
20-Aug	1.8	1.8	1.8	1.8	Z	1.8	1.8	1.8	1.8	M	M	M	M	M	M	M	M	1.8	1.8	1.8	1.8	1.8	1.8	1.8	--	1.8
21-Aug	1.8	1.8	1.8	1.8	1.8	Z	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
22-Aug	Z	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	1.8	1.9	1.8	1.9
23-Aug	1.9	Z	1.9	1.9	1.9	1.9	2.0	2.1	2.0	2.0	2.0	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.8	1.8	1.9	2.1
24-Aug	1.8	1.9	Z	1.9	1.9	2.0	2.1	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	2.0	2.0	1.9	2.1
25-Aug	2.1	2.1	2.1	Z	1.9	1.9	1.9	1.9	2.1	2.7	2.1	1.9	1.9	1.9	1.8	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.7
26-Aug	1.9	1.8	1.8	1.8	Z	1.9	1.9	1.9	2.0	2.0	2.0	2.0	1.9	1.9	1.8	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.0
27-Aug	1.9	1.9	1.9	1.9	1.9	Z	2.1	2.3	2.3	2.4	2.3	2.0	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.8	1.8	2.0	2.4
28-Aug	Z	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	1.8	1.8	1.8	1.8
29-Aug	2.0	Z	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.0	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	2.0
30-Aug	1.8	1.8	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.1	2.0	1.9	1.9	2.1
31-Aug	2.0	2.0	1.9	Z	2.0	2.1	2.2	2.3	2.1	2.1	2.0	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.3
	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	Diurnal Average	
	2.1	2.1	2.1	2.0	2.1	2.1	2.2	2.3	2.6	2.7	2.3	2.0	1.9	1.9	1.8	2.0	1.9	1.9	1.9	1.9	2.0	2.1	2.1	2.1	Diurnal Maximum	

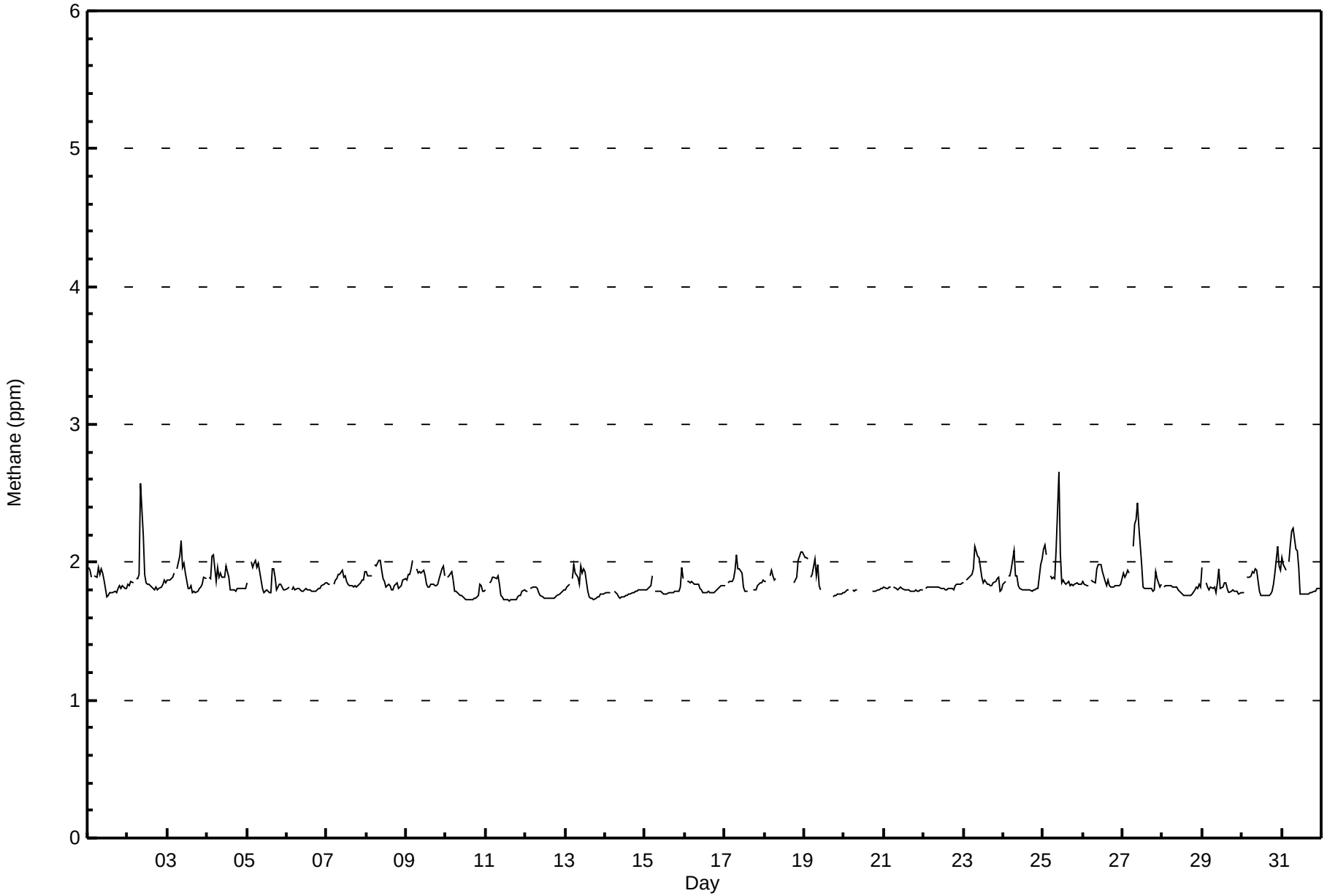
Z - zerospan C - Calibration M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Methane (CH_4) - ppm

Fort McKay - Bertha Ganter - August 2015



Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	662	96.36	96.36
2.1 - 3.0	25	3.64	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 744

Wood Buffalo Environmental Association | **Methane (CH_4) - ppm**

Frequency Distribution | **Fort McKay - Bertha Ganter - August 2015**

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	44	14	10	5	21	20	29	54	58	48	62	65	58	81	58	35	662
2.1 - 3.0	3	0	0	0	0	0	1	8	4	4	0	1	0	1	2	1	25
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	47	14	10	5	21	20	30	62	62	52	62	66	58	82	60	36	687

Total Number of Valid Hours: 687

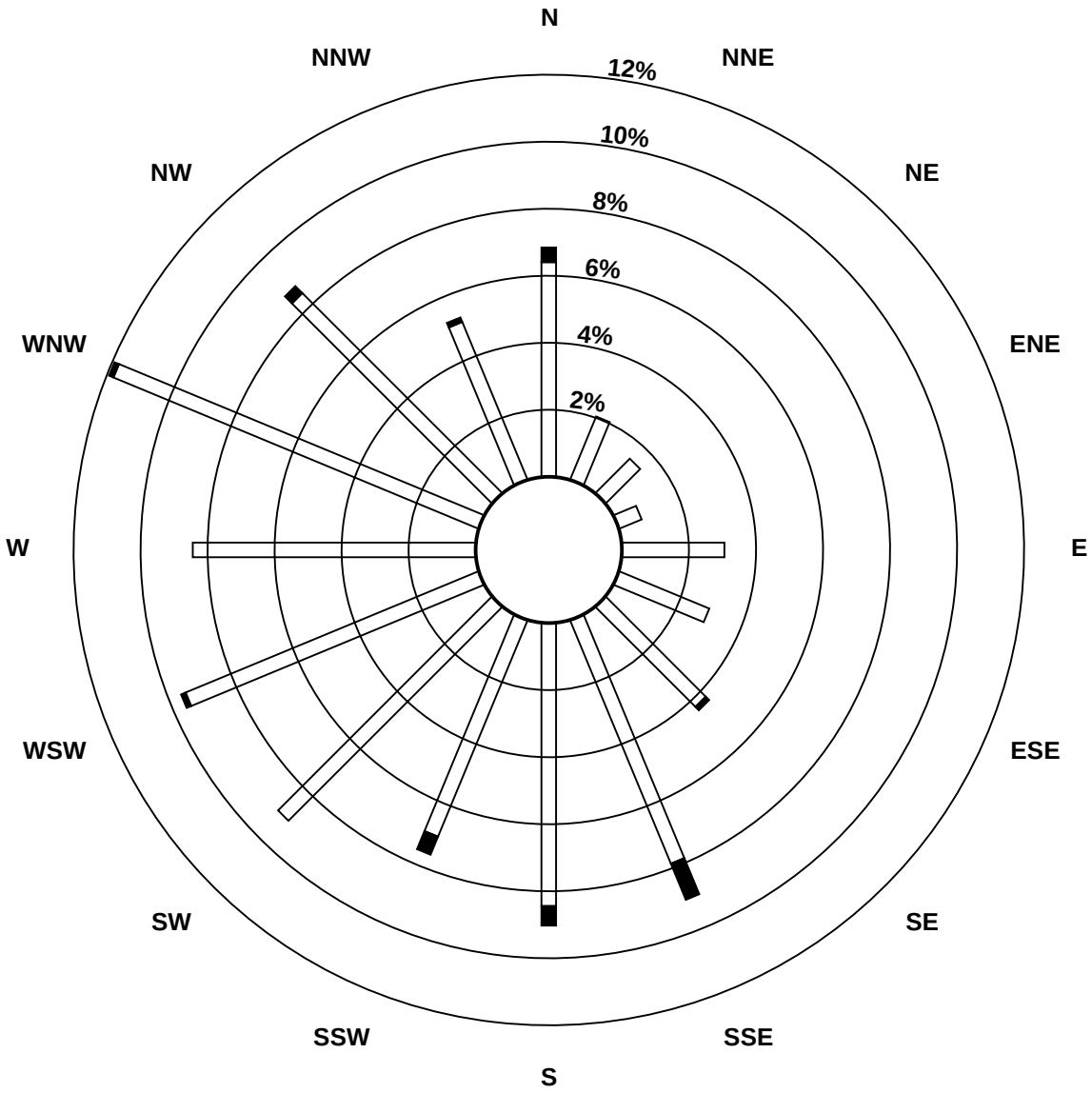
Total Number of Hours: 744

Wood Buffalo Environmental Association

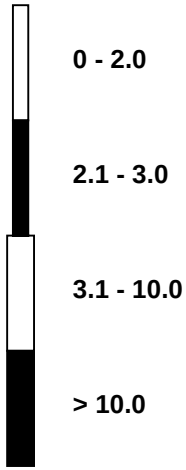
Wind Rose Aug 2015

Methane (CH_4) - ppm

Fort McKay - Bertha Ganter (AMS 1)



Classes (ppm)



0 - 2.0

2.1 - 3.0

3.1 - 10.0

> 10.0

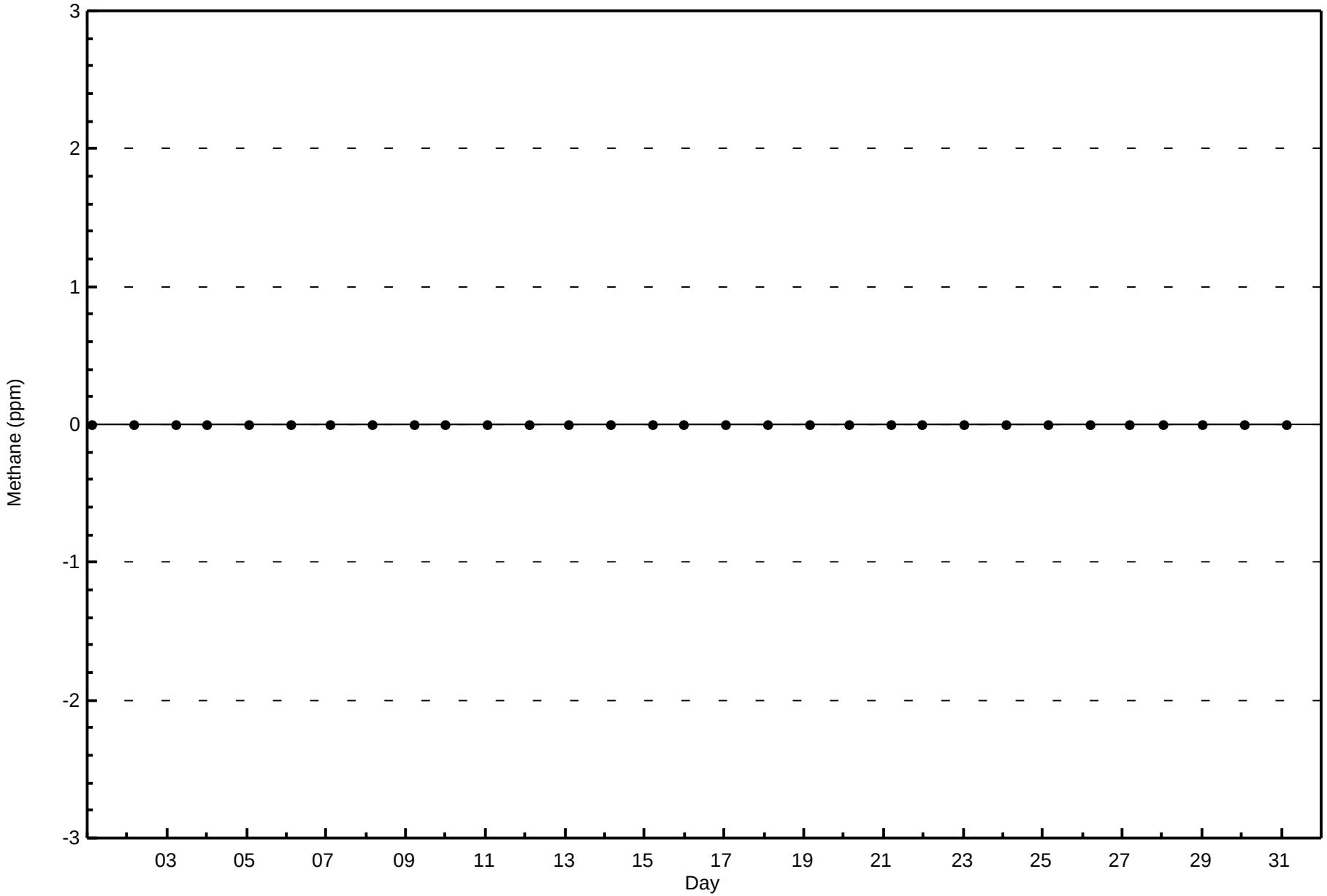
Total Number of Valid Hours: 687

Wood Buffalo Environmental Association

Zero Responses

Methane (CH_4) - ppm

Fort McKay - Bertha Ganter - August 2015

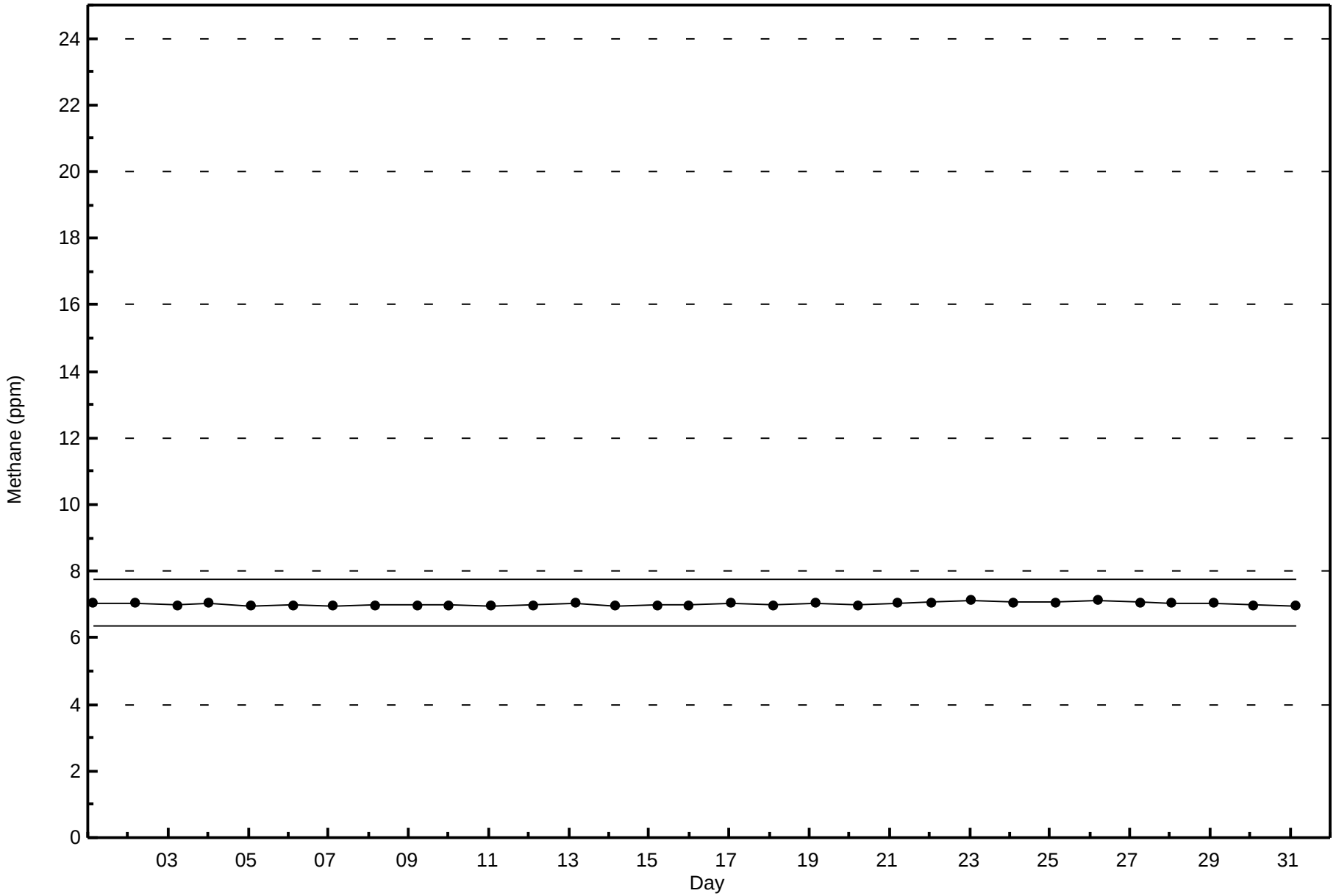


Wood Buffalo Environmental Association

Span Responses

Methane (CH_4) - ppm

Fort McKay - Bertha Ganter - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

Fort McKay - Bertha Ganter - August 2015

Maximum Value: 45 ppb on Aug 25 10:00

Maximum Daily Average: 3.8 ppb on Aug 25

Minimum Value: 0 ppb on Aug 10 12:00

Minimum Daily Average: 0.0 ppb on Aug 28

Maximum Diurnal Average: 4.4 ppb at hour 10

Minimum Diurnal Average: 0.1 ppb at hour 23

Monthly Average: 1.0 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 3$ $P_{99} = 12$

Hours in Service:	744
Hours of Data:	686
Hours of Missing Data:	58
Hours of Calibration:	38
Percent Operational Time:	97.3

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0	0	0	Z	0	0	3	2	6	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	6
2-Aug	0	0	0	0	Z	0	0	2	38	12	7	2	0	0	0	0	0	0	0	0	0	0	0	0	2.8	38
3-Aug	0	0	0	0	0	Z	3	10	13	7	5	6	0	0	0	0	1	0	0	0	0	0	0	0	2.0	13
4-Aug	Z	0	0	1	3	0	3	2	4	5	8	11	4	2	1	0	0	0	0	0	0	0	0	0	1.9	11
5-Aug	0	Z	1	1	1	6	3	5	4	1	0	0	1	0	0	1	2	1	0	0	0	0	0	0	1.2	6
6-Aug	0	0	Z	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
7-Aug	0	0	0	Z	0	0	0	1	4	6	5	6	4	2	1	1	0	0	0	0	0	0	0	2	1.4	6
8-Aug	2	2	4	3	Z	10	13	8	6	9	9	7	4	1	0	0	0	0	0	0	0	0	0	0	3.3	13
9-Aug	0	0	0	0	1	Z	2	4	7	5	3	1	0	0	0	1	1	1	0	0	0	0	0	0	1.1	7
10-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
11-Aug	0	Z	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2
12-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
13-Aug	0	0	0	Z	0	0	1	2	1	7	4	1	1	0	0	0	0	0	0	0	0	0	0	0	0.8	7
14-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
15-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
16-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
17-Aug	0	Z	0	0	0	0	7	9	5	6	3	M	M	M	0	0	0	0	0	0	0	0	0	0	1.5	9
18-Aug	0	0	Z	0	0	0	0	1	C	C	C	C	C	C	C	M	M	M	0	0	0	0	0	0	--	1
19-Aug	0	0	0	Z	0	0	0	1	1	1	0	M	M	M	M	M	M	0	0	0	0	0	0	0	--	1
20-Aug	0	0	0	0	Z	0	0	0	0	M	M	M	M	M	M	M	M	0	0	0	0	0	0	0	--	0
21-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
22-Aug	Z	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	1
23-Aug	0	Z	0	0	0	0	3	5	2	5	7	2	2	2	1	0	0	0	0	0	0	0	0	0	1.3	7
24-Aug	0	0	Z	0	0	1	9	2	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	9
25-Aug	0	2	1	Z	0	0	1	1	13	45	12	3	4	2	1	2	0	0	0	0	1	0	0	0	3.8	45
26-Aug	0	0	0	0	Z	0	0	1	5	5	6	5	3	1	0	1	0	0	0	0	0	0	0	0	1.2	6
27-Aug	0	0	0	0	0	Z	8	18	8	3	3	1	0	0	0	0	0	0	0	0	1	0	0	0	2.0	18
28-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
29-Aug	0	Z	0	0	0	0	0	0	0	1	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0.3	1
30-Aug	0	0	Z	0	0	0	0	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2
31-Aug	0	0	0	Z	2	7	11	11	4	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1.8	11
	0.1	0.2	0.3	0.3	0.3	1.0	2.2	2.9	4.3	4.4	2.7	1.8	0.9	0.4	0.3	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Diurnal Average	
	2	2	4	3	3	10	13	18	38	45	12	11	4	2	1	2	2	1	0	0	1	1	0	2	Diurnal Maximum	

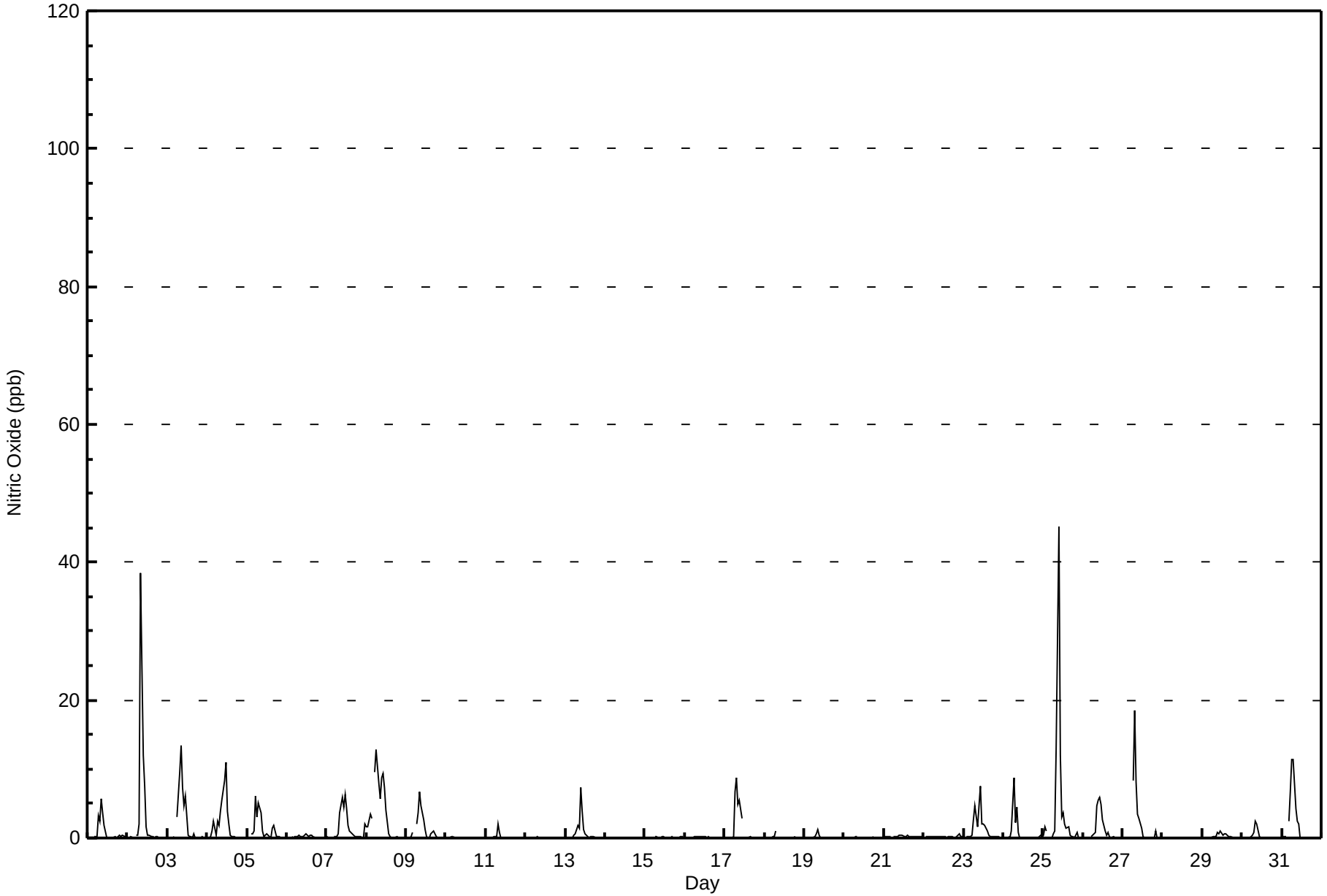
Z - zerospan C - Calibration M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Nitric Oxide (NO) - ppb

Fort McKay - Bertha Ganter - August 2015



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	684	99.71	99.71
21 - 40	1	0.15	99.85
11 - 80	1	0.15	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Nitric Oxide (NO) - ppb

Fort McKay - Bertha Ganter - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	47	14	10	5	21	20	29	62	62	50	61	66	58	82	61	36	684
21 - 40	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
11 - 80	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	48	14	10	5	21	20	30	62	62	50	61	66	58	82	61	36	686

Total Number of Valid Hours: 686

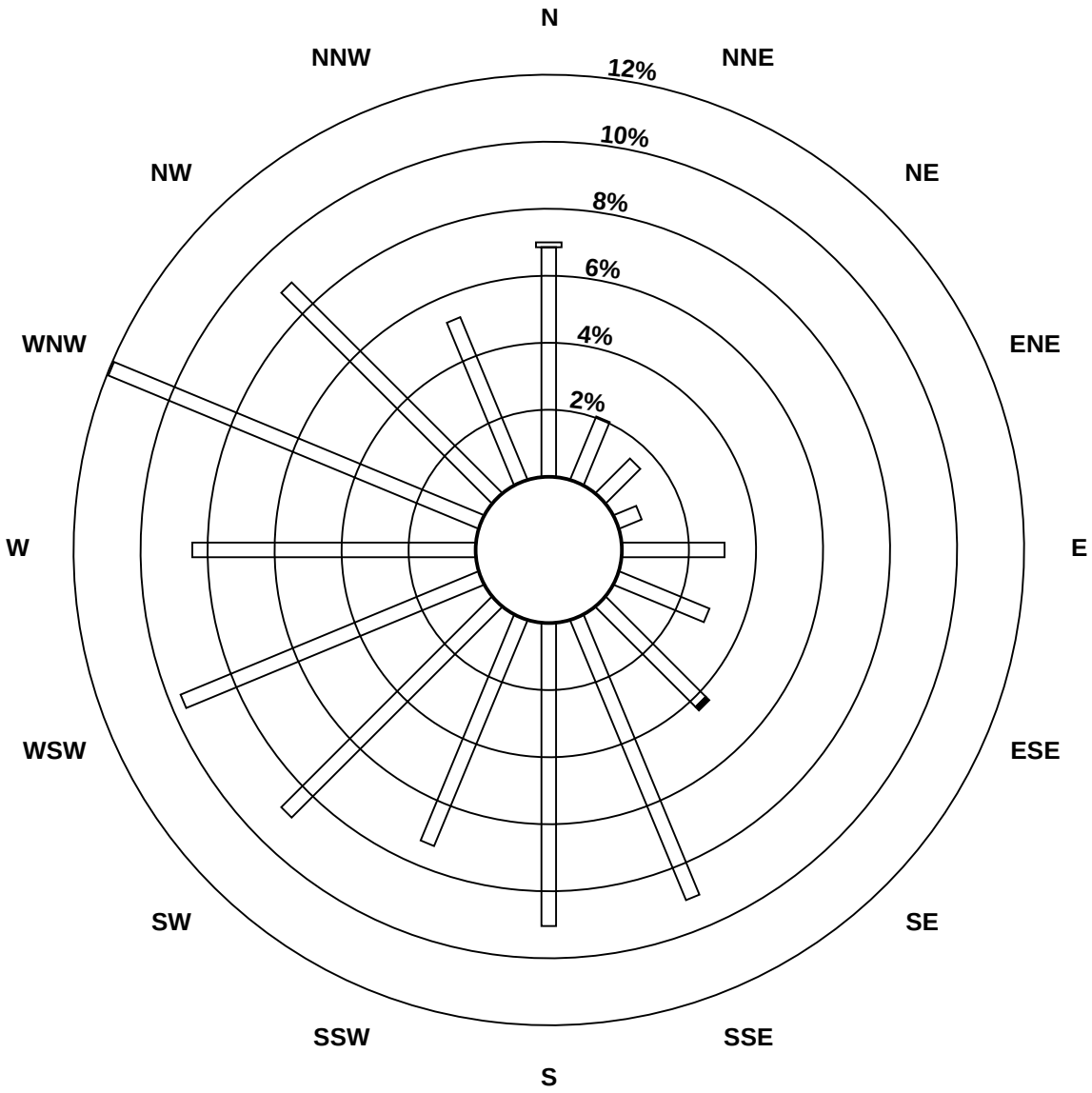
Total Number of Hours: 744

Wood Buffalo Environmental Association

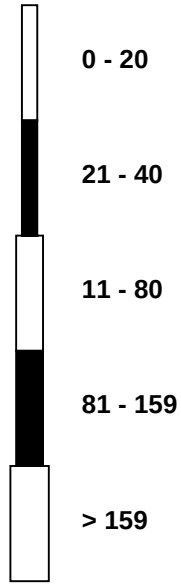
Wind Rose Aug 2015

Nitric Oxide (NO) - ppb

Fort McKay - Bertha Ganter (AMS 1)



Classes (ppb)



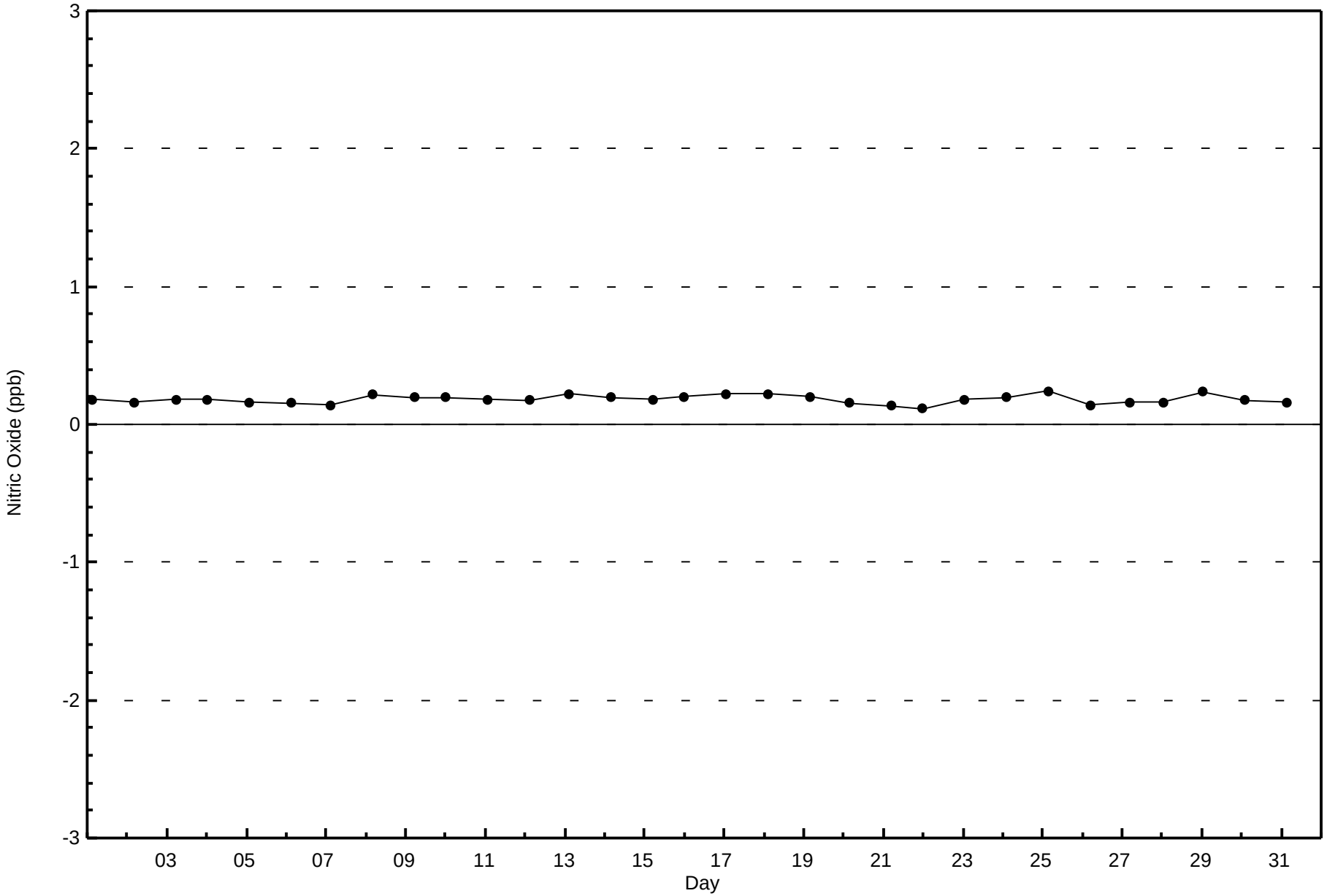
Total Number of Valid Hours: 686

Wood Buffalo Environmental Association

Zero Responses

Nitric Oxide (NO) - ppb

Fort McKay - Bertha Ganter - August 2015

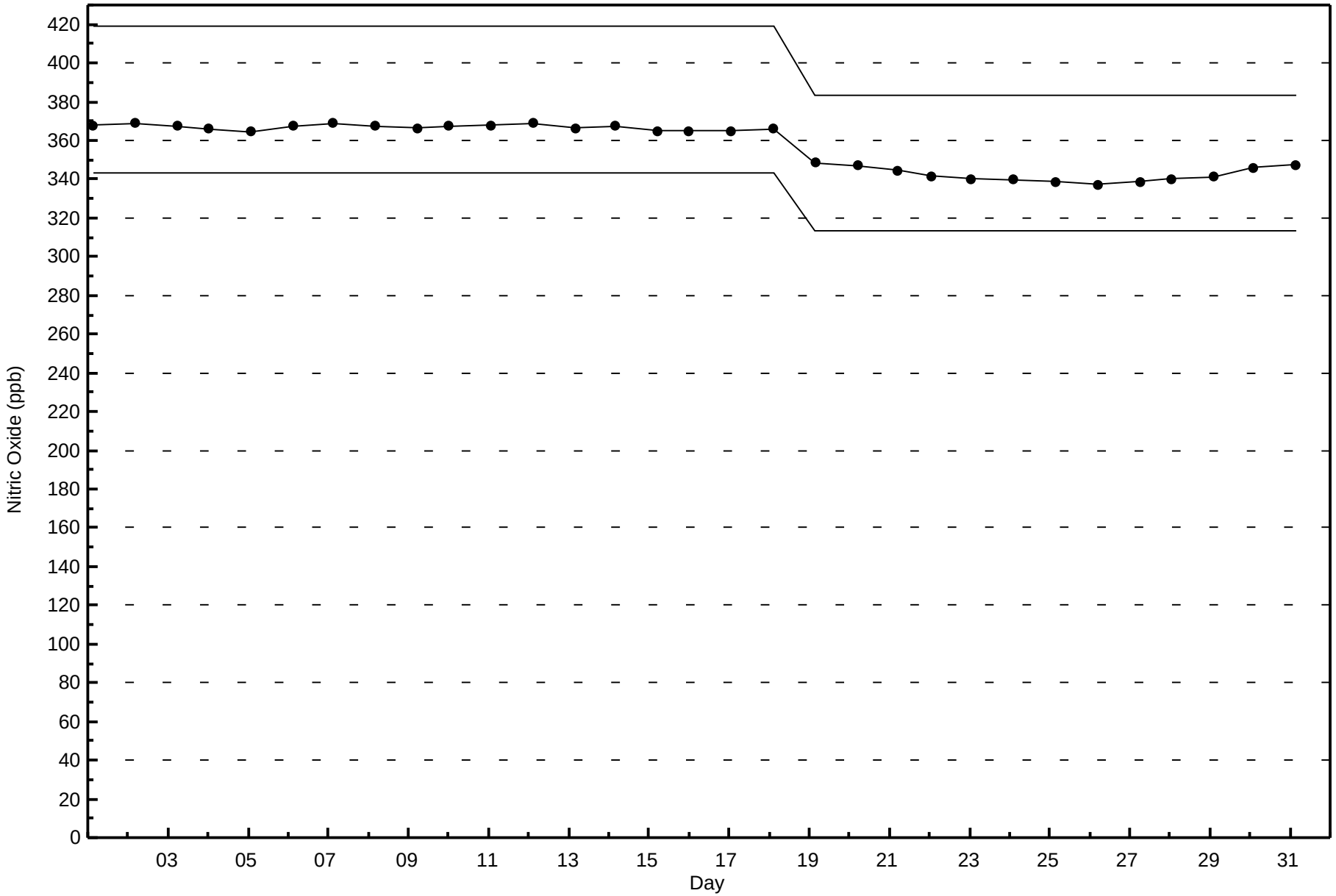


Wood Buffalo Environmental Association

Span Responses

Nitric Oxide (NO) - ppb

Fort McKay - Bertha Ganter - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO_2) - ppb

Fort McKay - Bertha Ganter - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 18 ppb on Aug 25 10:00 Maximum Daily Average: 6.4 ppb on Aug 4

Minimum Value: 0 ppb on Aug 1 15:00
Maximum Diurnal Average: 4.6 ppb at hour 10
Monthly Average: 2.1 ppb

Minimum Daily Average: 0.0 ppb on Aug 14
Minimum Diurnal Average: 1.0 ppb at hour 19
Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 1 $Q_3 = 3$ $P_{90} = 6$ $P_{99} = 14$

Hours in Service:	744
Hours of Data:	686
Hours of Missing Data:	58
Hours of Calibration:	38
Percent Operational Time:	97.3

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	1	1	1	Z	1	1	4	3	4	3	3	0	0	1	0	0	1	0	2	5	1	1	0	0	1.4	5
2-Aug	0	0	0	0	Z	0	0	2	17	14	14	6	3	3	2	2	2	3	2	2	1	2	2	1	3.4	17
3-Aug	1	1	1	1	1	Z	4	7	15	12	12	12	3	2	4	1	4	1	1	1	1	1	1	1	3.7	15
4-Aug	Z	8	11	14	12	8	12	10	10	11	11	14	9	7	2	2	1	0	1	1	2	2	0	0	6.4	14
5-Aug	0	Z	10	9	8	10	8	6	4	1	1	1	2	1	0	8	8	5	1	2	2	3	1	0	3.9	10
6-Aug	0	0	Z	1	1	1	1	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0.4	2
7-Aug	1	0	0	Z	0	0	0	1	3	4	4	4	4	3	3	3	2	2	1	2	2	3	2	9	2.3	9
8-Aug	9	9	9	8	Z	6	6	5	6	8	10	10	8	3	2	1	1	2	4	2	2	1	1	1	4.9	10
9-Aug	1	1	1	2	3	Z	2	3	6	7	6	5	2	2	2	5	9	8	6	3	3	4	5	3	3.8	9
10-Aug	Z	4	5	5	6	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	2	4	1	1	1.3	6
11-Aug	1	Z	1	1	1	2	1	4	2	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0.6	4
12-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.2	1
13-Aug	0	0	1	Z	1	5	4	3	3	10	8	6	4	1	0	0	1	0	0	1	0	1	0	0	2.1	10
14-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
15-Aug	0	1	1	2	5	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	6	2	0.9	6
16-Aug	Z	2	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2
17-Aug	0	Z	0	0	0	1	6	7	5	6	4	M	M	M	0	1	1	1	0	0	2	3	1	1	1.9	7
18-Aug	1	1	Z	1	3	2	0	2	C	C	C	C	C	C	C	M	M	M	2	3	6	5	4	4	--	6
19-Aug	4	5	6	Z	3	2	3	4	4	2	1	M	M	M	M	M	M	0	0	0	0	0	0	0	--	6
20-Aug	0	0	0	0	Z	0	0	0	0	M	M	M	M	M	M	M	M	0	0	0	0	0	0	0	--	0
21-Aug	0	0	0	0	0	Z	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
22-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	1	0	1	0.2	1
23-Aug	0	Z	0	0	0	0	2	5	4	6	9	5	5	5	4	2	2	2	2	4	6	9	1	1	3.2	9
24-Aug	2	4	Z	3	3	6	13	4	6	1	0	0	0	0	0	0	0	0	0	0	0	0	10	10	2.8	13
25-Aug	11	13	9	Z	3	1	1	1	6	18	10	5	6	5	4	4	3	2	2	1	1	2	1	1	4.8	18
26-Aug	3	2	1	1	Z	2	2	2	8	9	9	9	6	3	2	4	1	0	1	1	1	0	0	0	2.9	9
27-Aug	1	1	1	0	1	Z	4	7	7	8	8	5	1	0	0	0	0	1	0	1	16	6	1	1	3.0	16
28-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.3	1
29-Aug	6	Z	2	1	1	2	1	1	0	2	4	3	3	4	4	2	1	2	3	1	1	0	0	0	1.9	6
30-Aug	0	0	Z	2	2	2	2	2	5	4	1	0	0	0	0	0	0	1	2	3	5	7	7	6	2.2	7
31-Aug	5	4	3	Z	4	5	6	6	5	4	4	0	0	0	0	0	0	0	0	1	0	0	0	0	2.1	6
	1.8	2.2	2.5	2.0	2.2	2.2	2.7	2.8	3.9	4.6	4.2	3.3	2.1	1.4	1.1	1.3	1.3	1.0	1.0	1.2	1.8	1.8	1.5	1.5	Diurnal Average	
	11	13	11	14	12	10	13	10	17	18	14	14	9	7	4	8	9	8	6	5	16	9	10	10	Diurnal Maximum	

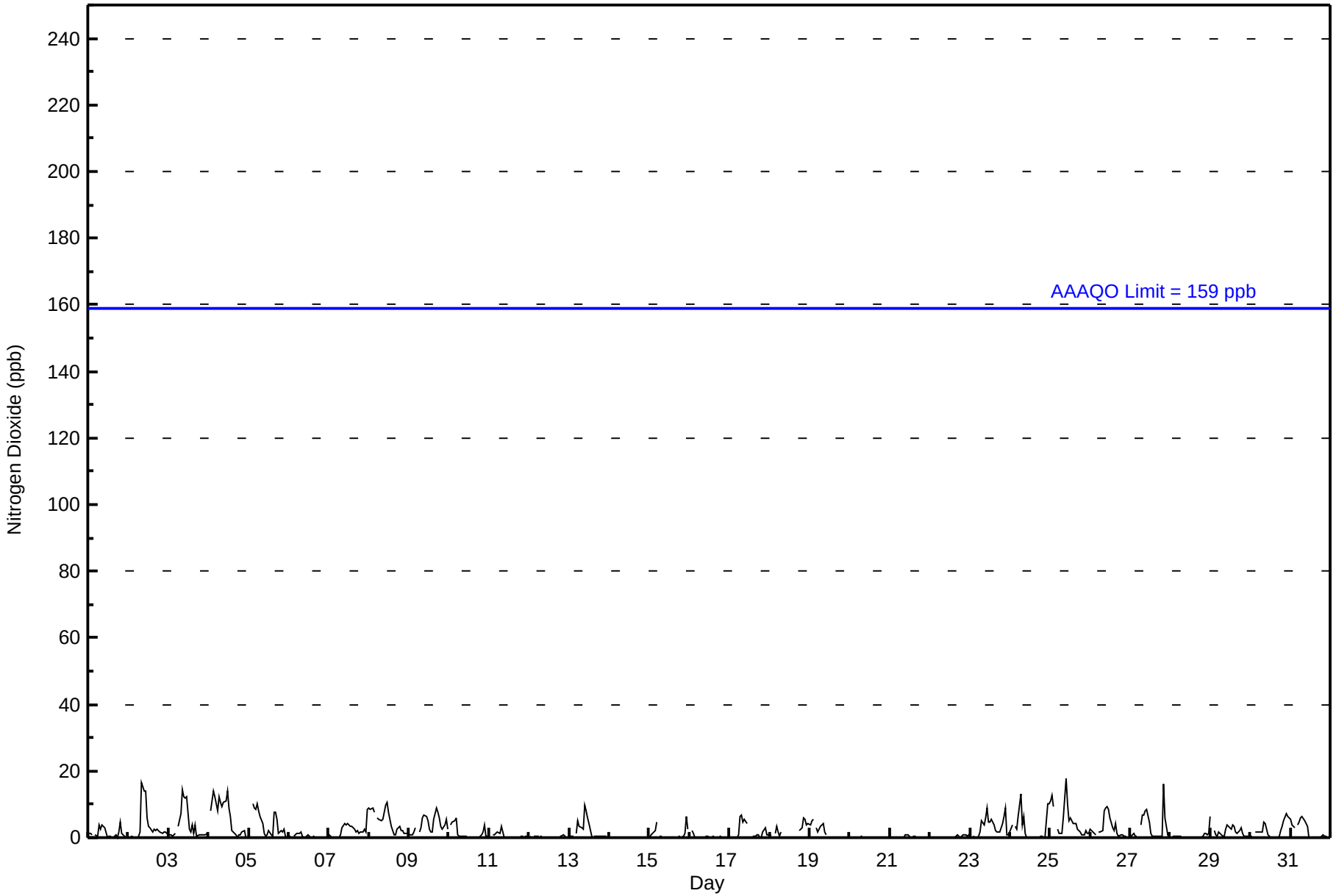
Z - zerospan C - Calibration M - Maintenance
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Dioxide (NO_2) - ppb

Fort McKay - Bertha Ganter - August 2015



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	686	100.00	100.00
21 - 40	0	0.00	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: 686

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Dioxide (NO_2) - ppb

Fort McKay - Bertha Ganter - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	48	14	10	5	21	20	30	62	62	50	61	66	58	82	61	36	686
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	48	14	10	5	21	20	30	62	62	50	61	66	58	82	61	36	686

Total Number of Valid Hours: 686

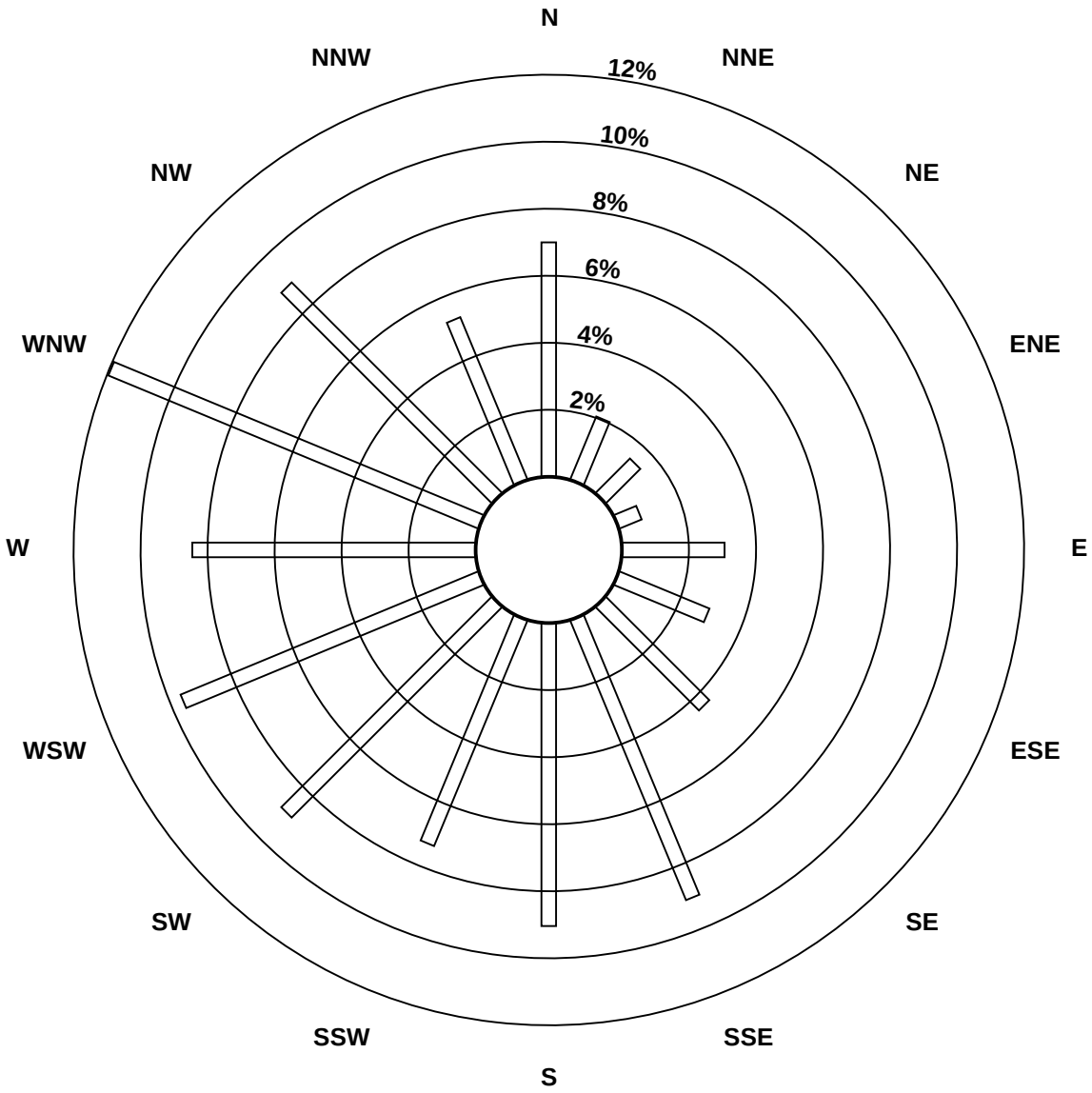
Total Number of Hours: 744

Wood Buffalo Environmental Association

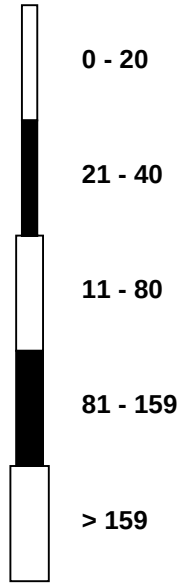
Wind Rose Aug 2015

Nitrogen Dioxide (NO_2) - ppb

Fort McKay - Bertha Ganter (AMS 1)



Classes (ppb)



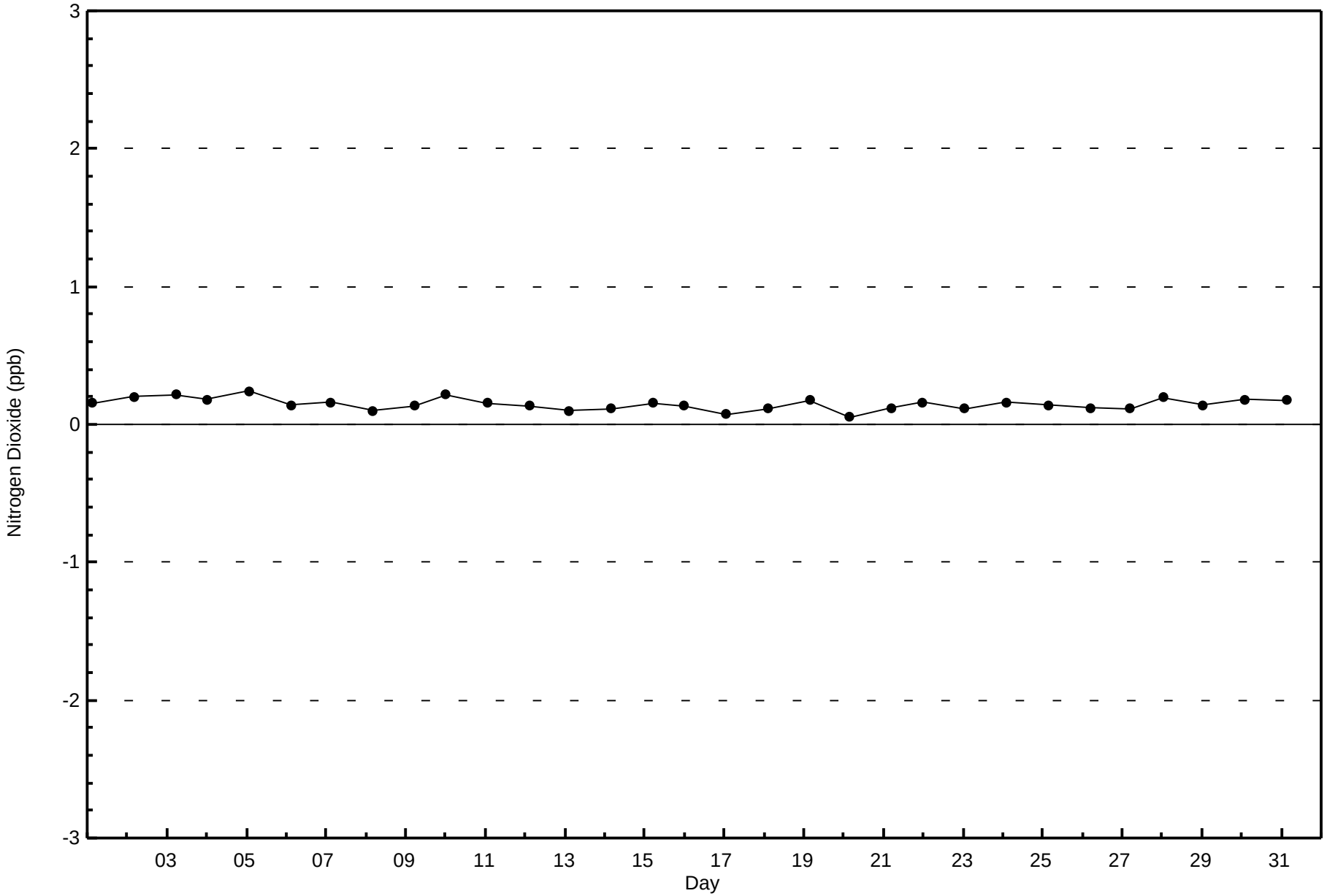
Total Number of Valid Hours: 686

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Dioxide (NO_2) - ppb

Fort McKay - Bertha Ganter - August 2015

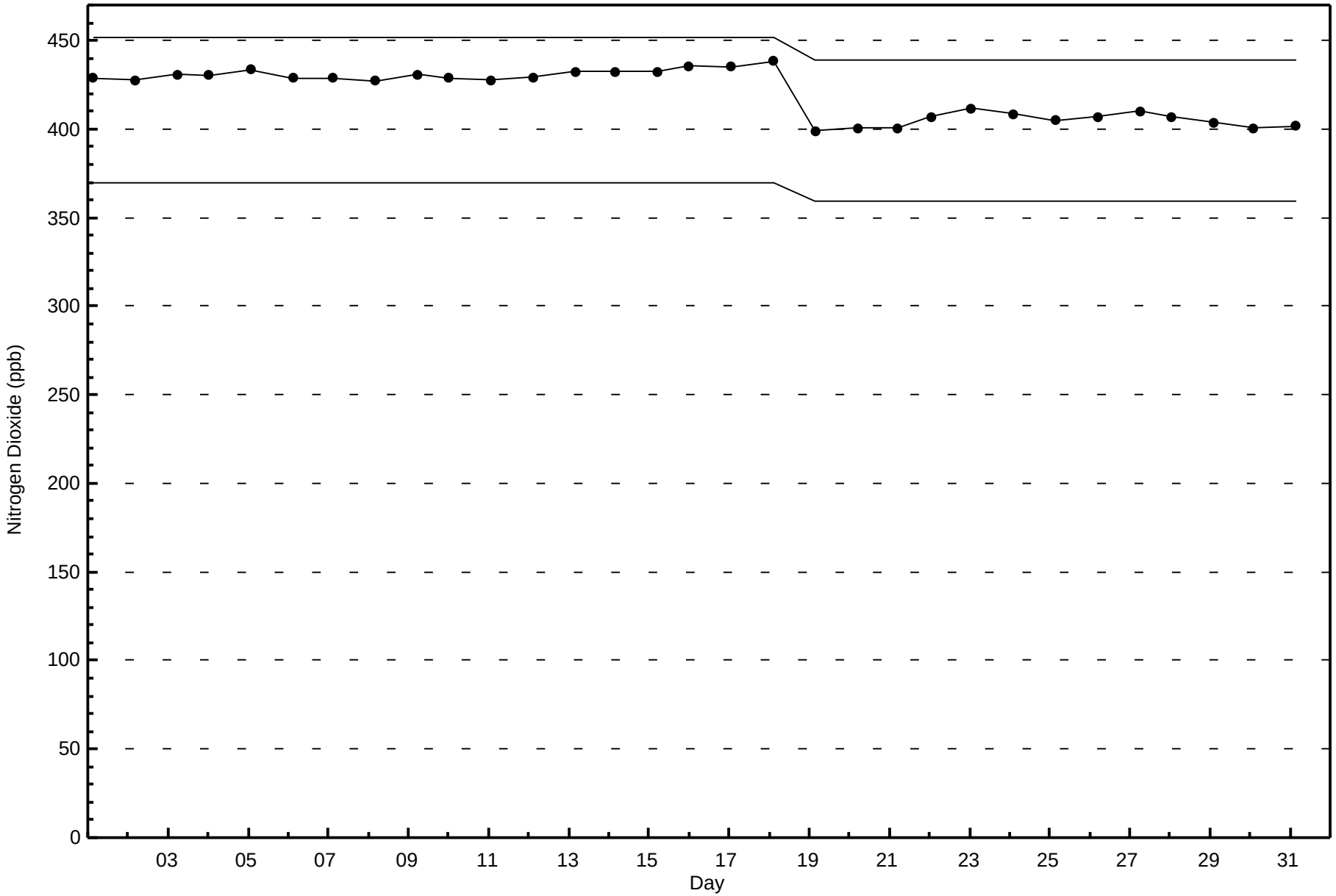


Wood Buffalo Environmental Association

Span Responses

Nitrogen Dioxide (NO_2) - ppb

Fort McKay - Bertha Ganter - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_X) - ppb

Fort McKay - Bertha Ganter - August 2015

Maximum Value: 63 ppb on Aug 25 10:00

Maximum Daily Average: 8.6 ppb on Aug 25

Minimum Value: 0 ppb on Aug 11 12:00

Minimum Daily Average: 0.1 ppb on Aug 14

Maximum Diurnal Average: 9.0 ppb at hour 10

Minimum Diurnal Average: 1.1 ppb at hour 19

Monthly Average: 3.1 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 1 $Q_3 = 4$ $P_{90} = 10$ $P_{99} = 21$

Hours in Service:	744
Hours of Data:	686
Hours of Missing Data:	58
Hours of Calibration:	38
Percent Operational Time:	97.3

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	1	1	1	Z	1	1	7	5	10	7	5	0	0	1	0	0	1	0	2	5	1	1	0	0	2.2	10
2-Aug	0	0	0	0	Z	1	1	4	55	26	21	8	4	3	2	3	2	3	2	2	1	2	2	1	6.2	55
3-Aug	1	1	1	1	1	Z	7	17	28	20	17	19	3	2	4	1	5	1	1	1	1	1	1	1	5.7	28
4-Aug	Z	8	11	15	15	8	15	12	13	16	19	25	13	9	3	2	1	0	1	1	2	2	0	0	8.3	25
5-Aug	0	Z	11	9	9	16	11	11	8	2	1	1	3	1	0	9	9	7	1	2	2	3	1	0	5.1	16
6-Aug	0	0	Z	1	1	2	2	2	1	0	0	2	1	0	1	1	0	0	0	0	0	0	0	1	0.6	2
7-Aug	1	0	0	Z	0	0	0	1	7	10	9	10	8	5	4	3	2	2	1	2	2	3	2	10	3.7	10
8-Aug	11	10	12	11	Z	15	19	13	11	16	19	18	12	4	3	1	1	2	4	2	2	1	1	1	8.2	19
9-Aug	1	1	1	2	4	Z	4	7	13	11	9	6	3	2	2	6	10	8	6	3	3	4	5	3	4.9	13
10-Aug	Z	4	5	5	6	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	2	4	1	1	1.4	6
11-Aug	1	Z	1	1	2	2	1	6	2	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0.8	6
12-Aug	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.2	1
13-Aug	0	0	1	Z	1	6	4	5	4	17	12	7	5	1	0	1	1	0	0	1	1	1	0	0	2.9	17
14-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
15-Aug	0	1	1	2	5	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	6	3	1.0	6
16-Aug	Z	2	2	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0.4	2
17-Aug	0	Z	0	0	0	1	13	15	10	11	7	M	M	M	0	1	1	1	0	0	2	3	1	1	3.4	15
18-Aug	1	1	Z	1	4	2	1	3	C	C	C	C	C	C	C	M	M	M	2	3	6	5	4	4	--	6
19-Aug	4	5	6	Z	3	2	3	4	6	2	1	M	M	M	M	M	M	0	0	0	0	0	0	0	--	6
20-Aug	0	0	0	0	Z	0	0	0	0	M	M	M	M	M	M	M	M	0	0	0	0	0	0	0	--	0
21-Aug	0	0	0	0	0	Z	0	0	0	1	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0.4	1
22-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	2	0	1	0.4	2
23-Aug	0	Z	0	0	0	1	4	10	5	11	16	7	7	7	5	3	2	2	2	4	6	9	1	1	4.5	16
24-Aug	2	4	Z	4	3	7	22	6	11	2	0	0	0	0	0	0	0	0	0	0	0	0	10	10	3.6	22
25-Aug	11	14	10	Z	3	1	2	2	19	63	22	8	9	7	6	6	3	2	2	1	2	2	1	1	8.6	63
26-Aug	3	2	1	1	Z	2	2	3	13	14	15	13	9	4	2	5	1	0	1	1	1	0	0	0	4.1	15
27-Aug	1	1	2	0	1	Z	12	25	15	11	11	6	1	0	0	0	0	0	0	1	17	6	1	1	5.0	25
28-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.4	1
29-Aug	6	Z	2	1	1	2	1	1	0	3	5	4	3	4	4	2	1	2	3	1	0	0	0	0	2.2	6
30-Aug	0	0	Z	2	2	2	2	3	7	6	1	0	0	0	0	0	0	1	2	3	5	7	7	6	2.5	7
31-Aug	5	4	3	Z	7	11	17	18	9	7	5	0	0	0	0	0	0	0	0	1	0	1	0	0	3.9	18
	2.0	2.4	2.8	2.3	2.6	3.2	4.9	5.6	8.3	9.0	6.9	5.1	3.0	1.9	1.4	1.6	1.6	1.1	1.1	1.2	2.0	1.9	1.5	1.6	Diurnal Average	
	11	14	12	15	15	16	22	25	55	63	22	25	13	9	6	9	10	8	6	5	17	9	10	10	Diurnal Maximum	

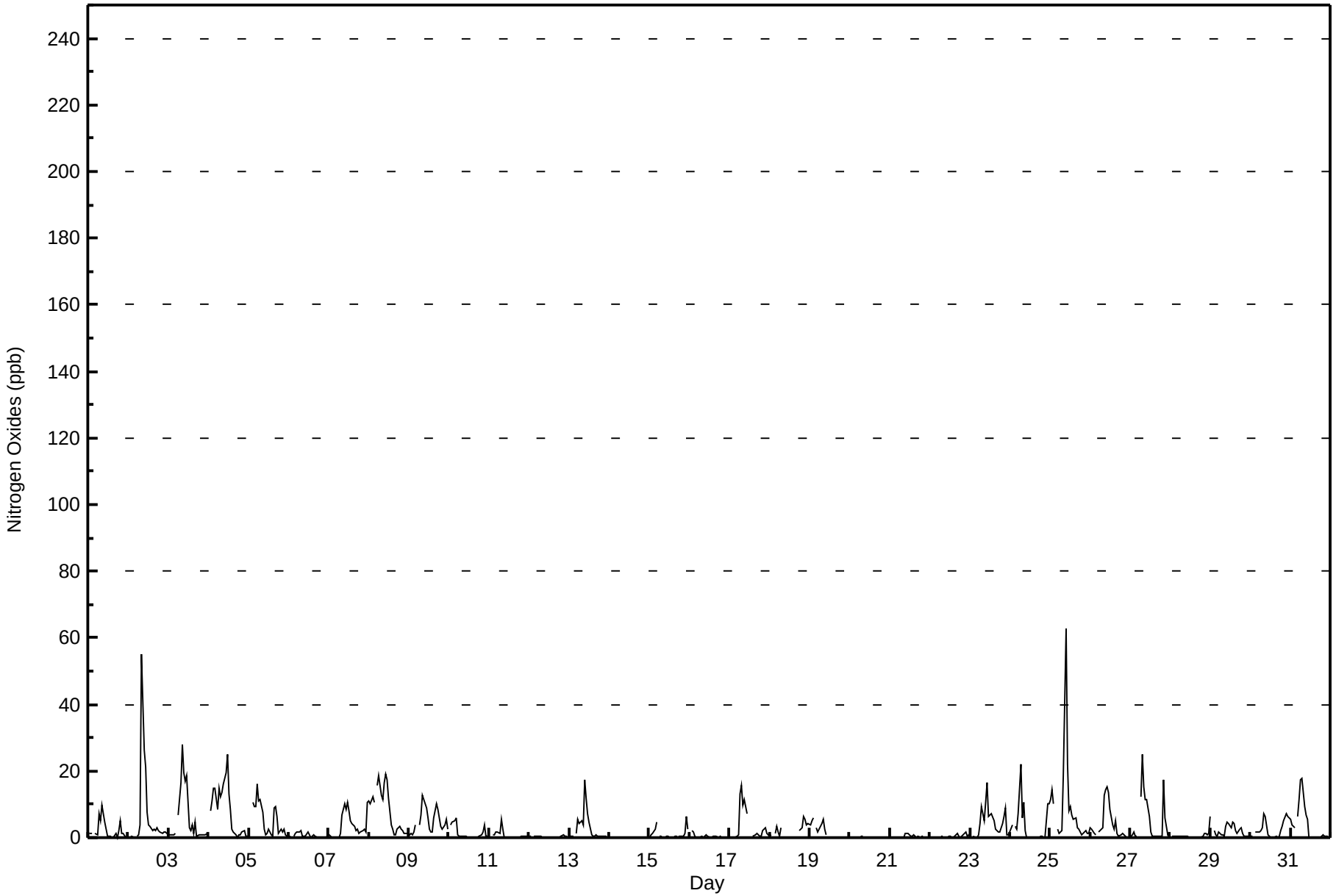
Z - zerospan C - Calibration M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Oxides (NO_X) - ppb

Fort McKay - Bertha Ganter - August 2015



Nitrogen Oxides (NO_X) - ppb

Fort McKay - Bertha Ganter - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	677	98.69	98.69
21 - 40	7	1.02	99.71
11 - 80	2	0.29	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Oxides (NO_X) - ppb

Fort McKay - Bertha Ganter - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	46	13	10	5	21	20	29	58	62	49	61	66	58	82	61	36	677
21 - 40	1	1	0	0	0	0	0	4	0	1	0	0	0	0	0	0	7
11 - 80	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	48	14	10	5	21	20	30	62	62	50	61	66	58	82	61	36	686

Total Number of Valid Hours: 686

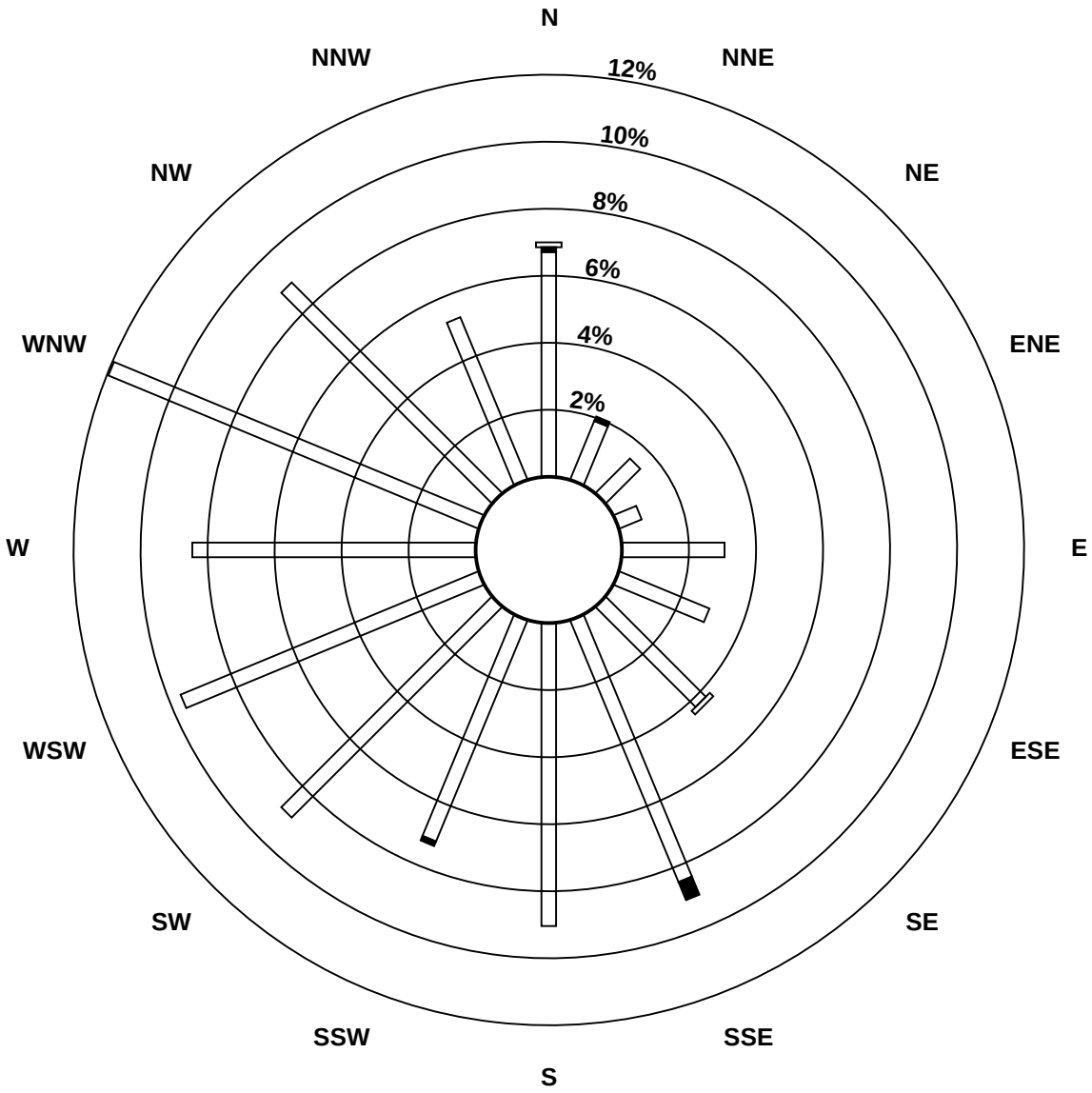
Total Number of Hours: 744

Wood Buffalo Environmental Association

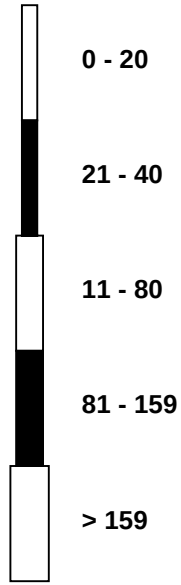
Wind Rose Aug 2015

Nitrogen Oxides (NO_X) - ppb

Fort McKay - Bertha Ganter (AMS 1)



Classes (ppb)



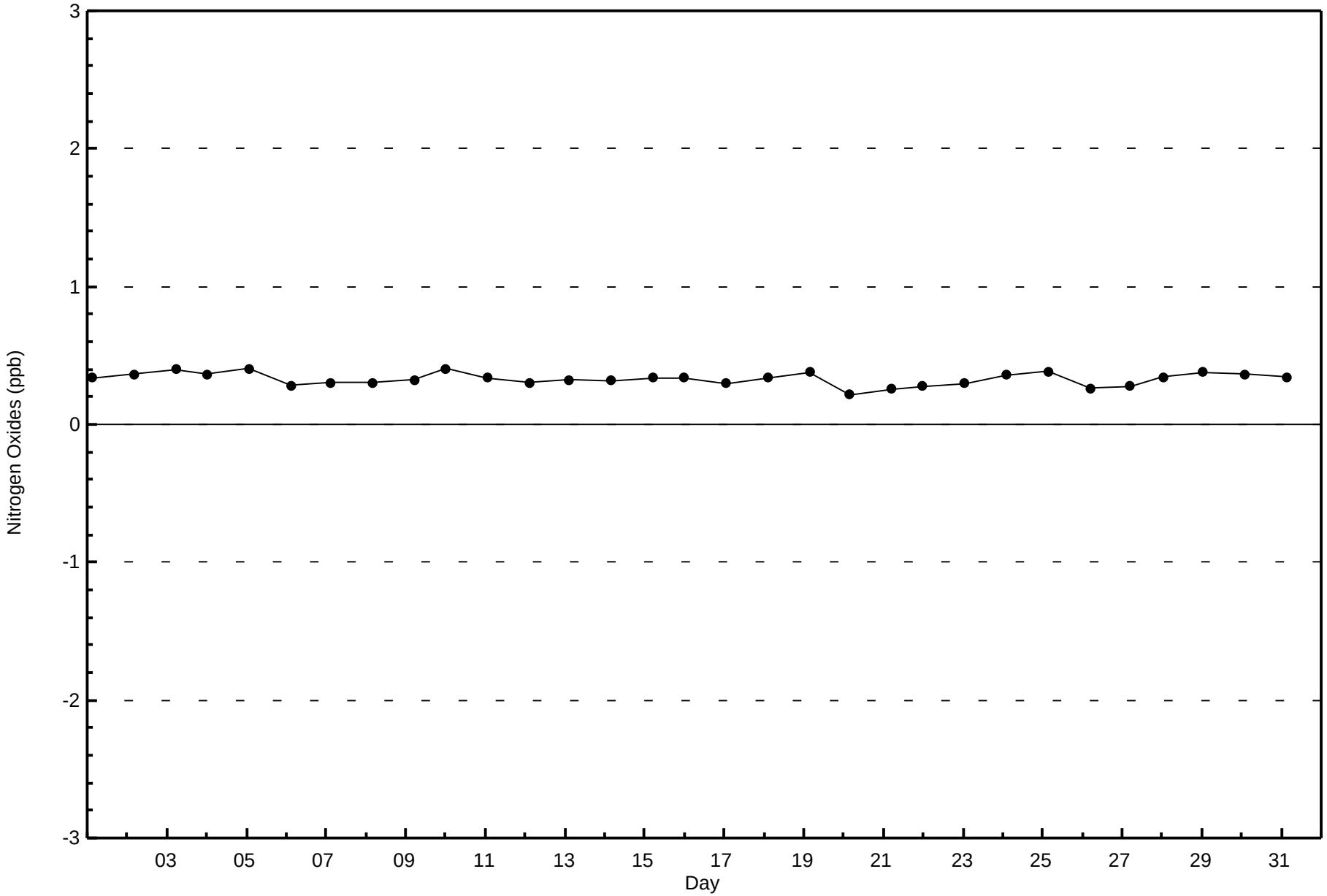
Total Number of Valid Hours: 686

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Oxides (NO_X) - ppb

Fort McKay - Bertha Ganter - August 2015

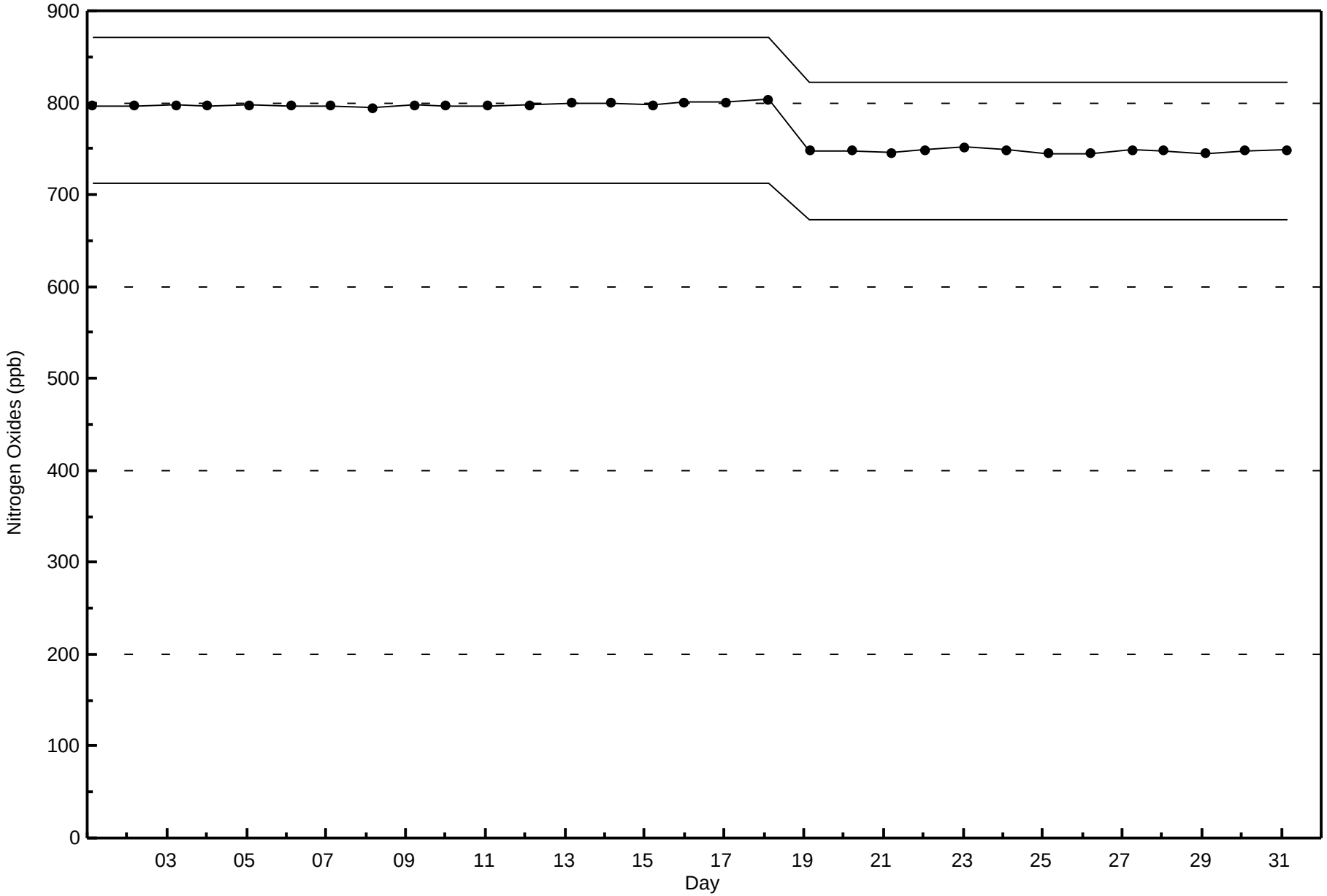


Wood Buffalo Environmental Association

Span Responses

Nitrogen Oxides (NO_X) - ppb

Fort McKay - Bertha Ganter - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O_3) - ppb

Fort McKay - Bertha Ganter - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 55 ppb on Aug 9 16:00

Maximum Daily Average: 31.2 ppb on Aug 10

Minimum Value: 6 ppb on Aug 8 05:00

Minimum Daily Average: 13.7 ppb on Aug 6

Maximum Diurnal Average: 33.2 ppb at hour 17

Minimum Diurnal Average: 14.2 ppb at hour 5

Monthly Average: 23.1 ppb

Percentiles: $P_1 = 6$ $P_{10} = 10$ $Q_1 = 15$ Median = 22 $Q_3 = 30$ $P_{90} = 37$ $P_{99} = 46$

Hours in Service:	744
Hours of Data:	692
Hours of Missing Data:	52
Hours of Calibration:	35
Percent Operational Time:	97.7

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	8	7	8	8	6	Z	6	8	9	17	25	29	29	27	27	30	31	28	26	19	19	12	15	13	17.8	31
2-Aug	10	8	7	8	6	7	Z	13	10	24	29	39	46	46	43	40	41	38	33	27	22	18	16	14	23.7	46
3-Aug	10	9	7	6	6	7	9	Z	16	21	31	31	39	42	43	30	25	29	25	21	16	16	14	14	20.2	43
4-Aug	13	13	Z	6	7	15	10	11	9	11	12	13	17	17	20	21	22	22	18	15	22	20	13	12	14.8	22
5-Aug	14	11	9	Z	6	6	7	8	13	18	21	22	25	26	24	26	23	25	24	20	21	20	18	14	17.4	26
6-Aug	12	13	12	13	Z	15	13	12	13	15	16	15	16	16	16	15	17	16	15	13	13	11	9	9	13.7	17
7-Aug	9	11	10	10	7	Z	7	9	10	10	12	14	19	27	31	34	33	31	25	16	14	14	9	6	15.9	34
8-Aug	7	6	6	6	6	6	Z	10	13	14	18	23	29	39	38	30	34	39	37	26	27	19	15	12	20.0	39
9-Aug	9	7	6	6	6	6	9	Z	15	21	29	39	46	44	48	55	54	49	52	40	27	18	16	18	26.9	55
10-Aug	12	25	Z	22	26	30	29	30	32	35	35	36	36	38	40	39	40	39	35	31	19	25	33	31	31.2	40
11-Aug	29	24	22	Z	18	18	16	18	24	30	32	33	34	36	37	37	37	36	33	31	30	29	25	26	28.5	37
12-Aug	28	29	27	26	Z	26	26	27	27	29	30	31	33	34	35	36	36	35	35	34	31	30	29	27	30.5	36
13-Aug	24	24	21	20	20	Z	17	17	18	13	14	20	17	18	21	28	30	30	28	26	25	25	25	23	22.0	30
14-Aug	25	23	24	27	26	27	Z	27	27	29	28	28	26	24	22	21	21	21	23	24	22	22	21	22	24.2	29
15-Aug	22	22	20	18	16	22	25	Z	24	27	30	32	33	32	30	30	31	30	27	27	27	21	13	14	24.8	33
16-Aug	14	12	Z	13	12	11	12	11	13	17	21	27	29	30	31	33	32	30	27	24	22	21	19	19	20.8	33
17-Aug	19	19	19	Z	17	16	12	13	17	19	26	33	34	35	35	32	31	31	33	29	23	23	22	19	24.2	35
18-Aug	16	14	14	11	Z	13	15	17	18	20	24	M	M	M	M	M	M	M	33	27	19	17	19	18	--	33
19-Aug	21	21	21	24	27	Z	30	30	C	C	C	C	29	34	36	M	M	35	33	30	27	27	28	26	--	36
20-Aug	25	24	23	24	26	26	Z	24	23	M	M	M	M	M	M	M	M	25	25	23	22	23	22	20	--	26
21-Aug	19	19	18	17	16	17	17	Z	20	20	20	22	23	24	24	24	23	21	21	17	18	21	21	18	20.1	24
22-Aug	18	18	Z	19	17	15	15	15	16	17	20	25	29	30	31	30	29	30	29	22	14	12	10	9	20.4	31
23-Aug	8	8	8	Z	7	6	7	11	19	21	21	31	33	33	36	43	47	45	41	34	30	26	35	23	24.9	47
24-Aug	22	18	18	20	Z	13	10	21	20	26	26	29	32	33	32	32	33	33	30	23	20	19	10	10	23.1	33
25-Aug	8	6	6	7	10	Z	9	10	10	9	15	21	22	22	21	21	20	17	16	13	11	14	16	22	14.2	22
26-Aug	18	20	19	16	12	11	Z	15	18	20	23	26	30	36	39	37	38	35	28	27	24	26	24	19	24.4	39
27-Aug	13	14	11	10	11	11	8	Z	15	26	33	35	39	39	40	40	43	43	41	38	22	33	34	28	27.2	43
28-Aug	33	34	Z	34	33	33	32	31	29	30	31	33	36	37	37	38	37	37	28	18	18	19	20	20	30.3	38
29-Aug	15	15	15	Z	17	16	16	19	25	30	36	36	44	45	45	43	43	45	35	32	32	33	34	34	30.7	45
30-Aug	27	26	24	19	Z	12	10	16	22	29	38	40	39	40	41	40	40	38	36	32	26	18	20	19	28.3	41
31-Aug	11	8	7	7	6	Z	7	8	16	24	28	37	38	38	38	38	39	38	37	36	35	32	33	28	25.6	39
	16.8	16.4	14.7	15.2	14.2	15.4	14.4	16.6	18.0	21.5	24.9	28.6	31.1	32.5	33.1	32.9	33.2	32.4	30.0	25.6	22.5	21.4	20.6	19.0	Diurnal Average	
	33	34	27	34	33	33	32	31	32	35	38	40	46	46	48	55	54	49	52	40	35	33	35	34	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance

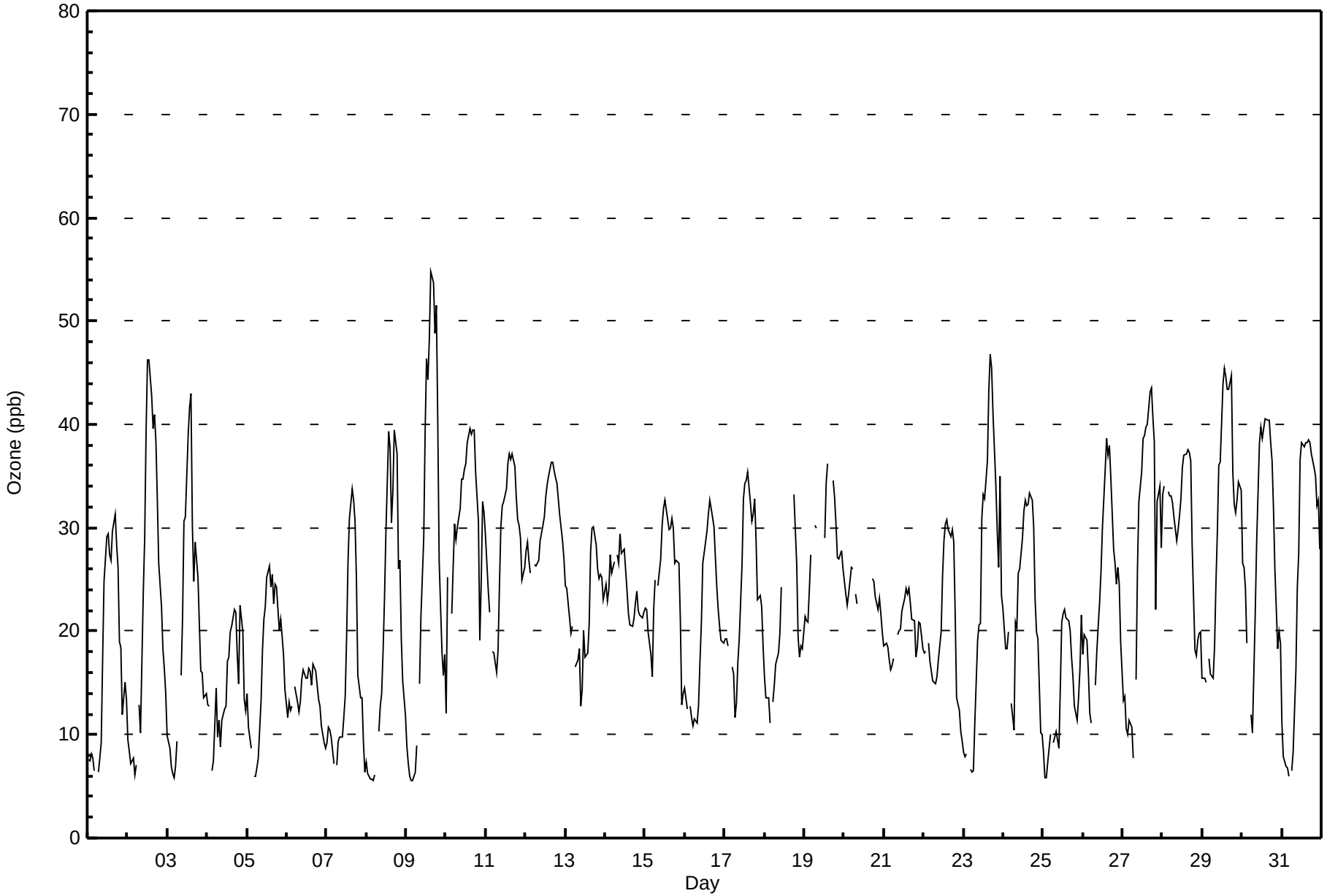
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb

Wood Buffalo Environmental Association

Hourly Averages

Ozone (O_3) - ppb

Fort McKay - Bertha Ganter - August 2015



Ozone (O_3) - ppb
Fort McKay - Bertha Ganter - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	296	42.77	42.77
21 - 50	393	56.79	99.57
51 - 82	3	0.43	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 692

Total Number of Hours: 744

Wood Buffalo Environmental Association | **Ozone (O_3) - ppb**

Frequency Distribution | **Fort McKay - Bertha Ganter - August 2015**

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	27	12	3	5	15	12	10	16	29	16	18	17	27	36	34	19	296
21 - 50	22	2	6	2	5	9	19	42	31	34	45	48	33	46	30	16	390
51 - 82	0	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	3
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	49	14	10	7	20	21	30	58	61	50	63	65	60	82	64	35	689

Total Number of Valid Hours: 689

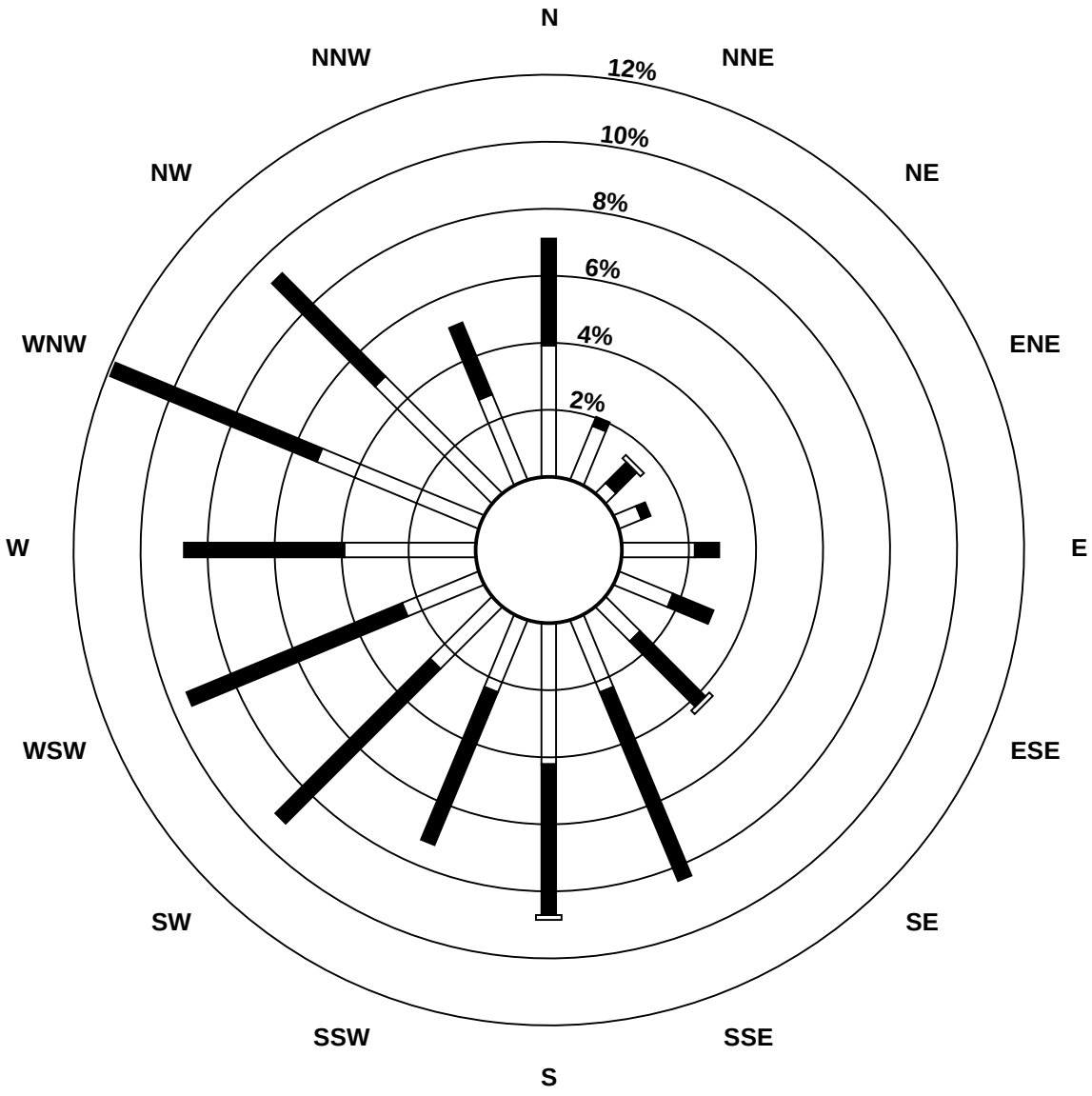
Total Number of Hours: 744

Wood Buffalo Environmental Association

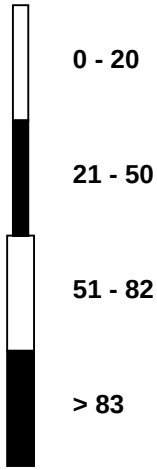
Wind Rose Aug 2015

Ozone (O_3) - ppb

Fort McKay - Bertha Ganter (AMS 1)



Classes (ppb)



0 - 20

21 - 50

51 - 82

> 83

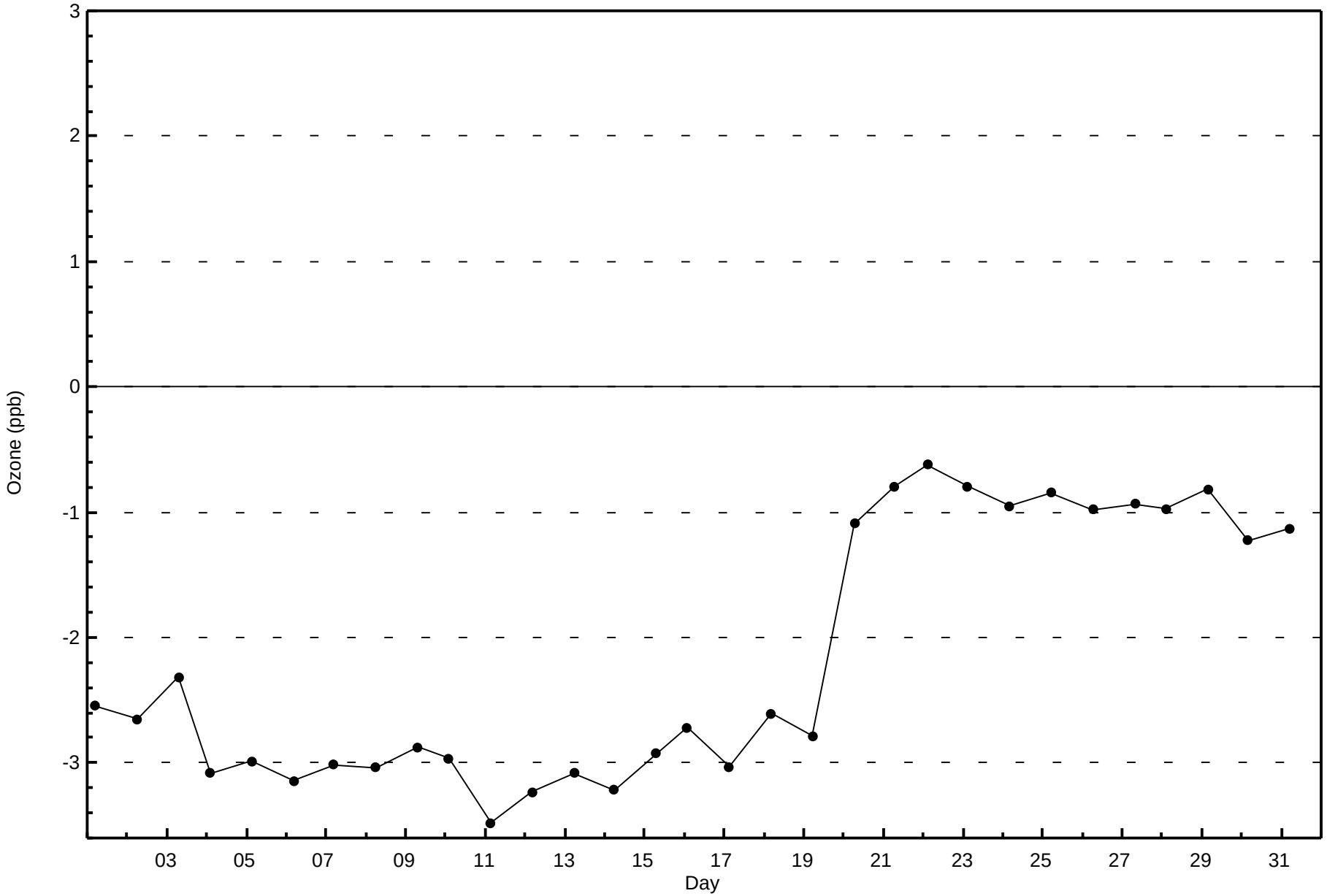
Total Number of Valid Hours: 689

Wood Buffalo Environmental Association

Zero Responses

Ozone (O_3) - ppb

Fort McKay - Bertha Ganter - August 2015

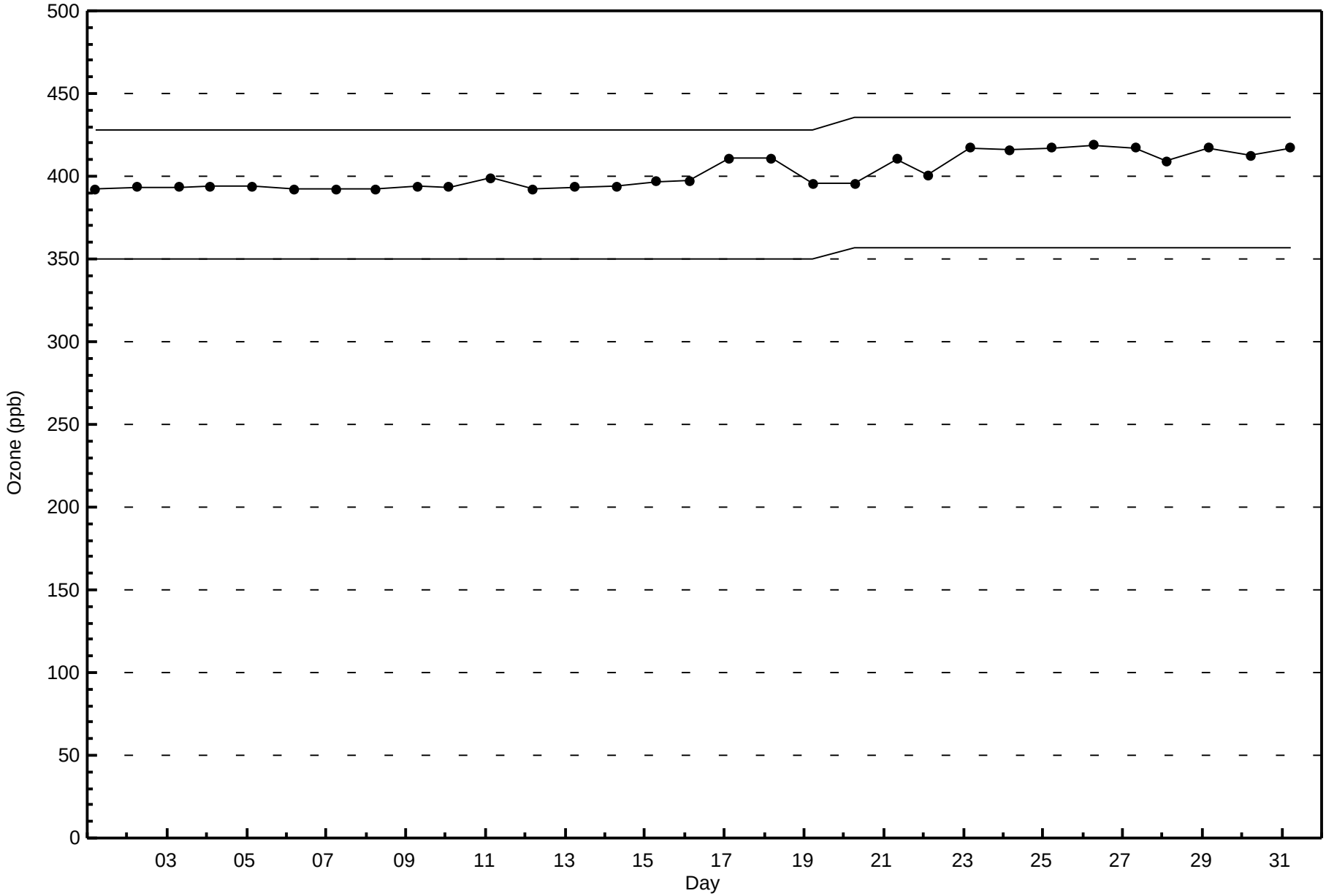


Wood Buffalo Environmental Association

Span Responses

Ozone (O_3) - ppb

Fort McKay - Bertha Ganter - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

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

Fort McKay - Bertha Ganter - August 2015

Number of Exceedences (AAAQO): 24-hr: 0

Maximum Value: 29.6 $\mu g/m^3$ on Aug 9 23:00

Maximum Daily Average: 13.4 $\mu g/m^3$ on Aug 9

Minimum Value: 0.0 $\mu g/m^3$ on Aug 6 14:00

Minimum Daily Average: 1.6 $\mu g/m^3$ on Aug 6

Maximum Diurnal Average: 6.6 $\mu g/m^3$ at hour 23

Minimum Diurnal Average: 4.4 $\mu g/m^3$ at hour 13

Monthly Average: 5.40 $\mu g/m^3$

Percentiles: P_1 = 0.8 P_{10} = 1.7 Q_1 = 2.6 Median = 4.3 Q_3 = 7.1 P_{90} = 10.3 P_{99} = 20.4

Hours in Service:	744
Hours of Data:	739
Hours of Missing Data:	5
Hours of Calibration:	2
Percent Operational Time:	99.6

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	8.3	8.3	7.1	6.8	8.0	7.6	3.5	2.7	3.3	2.1	2.9	1.5	2.2	3.3	1.6	1.1	1.9	1.9	2.7	3.1	1.6	1.5	2.3	2.7	3.7	8.3
2-Aug	4.5	5.8	6.5	6.0	9.0	6.7	4.6	3.4	6.3	8.0	9.5	5.9	8.9	10.6	10.0	8.9	7.9	4.8	3.8	6.3	8.7	10.1	7.8	7.1	7.1	10.6
3-Aug	12.4	14.9	15.7	16.4	16.7	16.2	8.8	11.2	20.5	11.7	10.2	12.0	11.6	11.1	14.9	4.5	6.1	4.5	7.3	6.5	3.8	6.0	8.9	11.0	11.0	20.5
4-Aug	7.2	5.9	7.0	8.7	9.6	8.1	17.6	15.6	11.7	10.2	15.6	15.1	8.9	12.2	13.3	11.2	7.5	8.6	9.2	6.8	5.0	7.2	7.4	4.7	9.8	17.6
5-Aug	4.9	6.7	5.3	5.4	8.0	7.2	5.1	7.0	6.4	6.3	4.3	4.3	5.2	7.2	5.2	10.3	9.0	8.7	2.5	4.1	3.1	2.5	1.5	1.5	5.5	10.3
6-Aug	2.5	2.0	2.2	2.5	1.8	2.0	3.2	2.8	1.4	2.1	2.0	1.2	0.4	0.0	0.4	1.1	0.4	0.8	1.7	1.4	1.0	1.6	2.0	1.8	1.6	3.2
7-Aug	1.1	1.0	1.2	1.1	0.7	1.0	1.3	1.0	1.7	2.3	3.8	4.8	5.9	6.7	8.2	5.3	3.4	4.3	3.9	4.0	3.6	5.9	7.0	5.5	3.5	8.2
8-Aug	3.8	4.5	5.9	4.1	3.4	4.9	5.4	3.6	7.5	9.7	5.0	16.8	13.0	8.0	8.9	3.9	2.4	8.8	10.4	5.5	13.4	9.7	9.7	9.8	7.4	16.8
9-Aug	9.3	11.1	10.5	11.1	11.2	11.3	9.2	4.3	3.4	2.9	4.2	7.5	11.6	10.2	10.5	15.2	20.0	20.6	25.3	21.8	16.7	23.6	29.6	20.0	13.4	29.6
10-Aug	19.0	10.9	10.6	12.5	5.8	3.6	2.6	3.5	3.0	2.1	1.3	1.1	2.0	2.9	3.1	3.4	4.3	5.5	4.7	2.7	6.1	11.4	8.6	9.5	5.8	19.0
11-Aug	9.5	6.8	5.8	8.7	9.0	10.3	6.5	5.0	4.5	1.7	1.7	1.5	1.9	1.7	2.1	2.4	2.8	2.5	1.6	1.8	3.0	3.5	5.2	5.8	4.4	10.3
12-Aug	4.9	5.1	5.3	6.1	4.5	4.2	3.8	3.5	2.6	1.8	1.5	1.5	1.6	2.0	2.7	2.7	3.2	4.5	4.6	4.1	2.8	2.9	4.4	5.4	3.6	6.1
13-Aug	6.4	9.3	10.3	9.0	7.0	6.6	3.5	4.1	3.5	4.0	4.2	9.2	6.2	1.6	0.4	5.0	2.7	1.3	1.1	1.8	2.2	3.2	3.2	3.7	4.6	10.3
14-Aug	5.0	5.2	5.7	5.8	5.1	4.4	4.0	2.6	1.4	1.0	1.0	1.4	1.3	1.1	1.4	1.4	1.4	1.5	1.5	1.8	1.9	2.4	2.3	2.1	2.6	5.8
15-Aug	2.5	2.7	2.5	2.4	2.5	2.4	2.5	2.3	2.4	3.0	2.7	2.8	2.7	2.6	3.0	3.0	3.4	3.2	4.1	3.8	4.6	5.0	6.0	5.5	3.2	6.0
16-Aug	6.6	7.4	6.5	5.9	5.8	5.8	4.0	3.3	3.4	2.5	1.9	1.1	1.0	1.1	1.7	1.5	1.8	1.9	2.1	2.6	2.9	2.9	3.7	3.7	3.4	7.4
17-Aug	3.5	3.2	3.3	3.8	4.1	4.0	4.1	3.3	3.1	3.6	3.2	2.2	1.7	1.8	2.4	3.4	3.6	3.9	3.9	4.4	12.1	12.3	9.8	10.3	4.6	12.3
18-Aug	6.2	5.9	5.9	5.8	6.1	6.1	5.9	5.4	5.3	3.3	2.3	2.6	6.3	6.1	6.3	11.4	14.5	11.7	12.7	15.0	17.8	17.8	10.8	8.8	8.3	17.8
19-Aug	7.8	8.7	7.4	9.6	11.5	4.6	5.8	8.8	9.5	C	C	2.5	2.9	2.9	2.8	3.7	3.5	3.9	2.5	3.7	4.1	2.9	3.0	3.3	5.2	11.5
20-Aug	4.7	6.3	5.9	5.3	4.3	3.5	3.2	2.8	2.7	2.9	2.4	2.3	2.8	2.5	M	M	M	2.9	3.0	3.2	3.6	3.0	3.1	3.3	3.5	6.3
21-Aug	2.3	1.9	1.9	2.0	2.0	2.1	2.3	2.3	2.1	2.2	2.0	1.9	1.9	1.9	2.1	2.1	2.2	2.4	1.7	2.0	2.5	3.0	3.1	3.0	2.2	3.1
22-Aug	3.4	3.6	4.3	4.6	4.2	3.3	3.5	3.3	4.0	4.5	3.6	2.2	2.0	1.8	1.7	2.0	2.1	2.2	2.2	3.2	5.9	4.7	3.4	4.9	3.4	5.9
23-Aug	3.2	3.8	5.2	4.2	3.9	3.4	3.5	5.9	6.3	8.8	22.8	5.6	7.1	7.1	6.4	4.1	3.9	4.0	6.7	9.4	7.0	7.4	4.0	2.0	6.1	22.8
24-Aug	1.8	3.0	3.8	4.0	3.0	4.5	5.3	2.7	1.7	1.0	0.9	0.9	1.1	1.1	1.6	1.7	2.2	2.4	2.9	3.1	2.3	3.0	5.4	6.4	2.7	6.4
25-Aug	8.6	10.0	9.1	8.1	7.2	6.6	7.2	5.9	5.9	6.5	3.2	2.7	4.5	5.4	3.8	2.9	4.0	3.0	2.2	3.5	5.1	5.0	4.9	3.4	5.4	10.0
26-Aug	4.2	4.9	5.7	5.7	6.4	5.9	2.8	2.0	4.3	6.6	7.3	4.3	2.3	2.6	4.8	8.1	9.2	5.4	4.3	2.5	4.3	6.6	7.1	6.9	5.2	9.2
27-Aug	7.5	6.8	6.6	6.4	6.1	6.8	9.9	8.9	6.3	7.5	9.1	11.3	7.3	7.1	7.7	8.7	13.9	11.1	6.1	6.9	10.4	9.1	8.0	10.9	8.4	13.9
28-Aug	9.9	8.8	8.3	7.6	7.1	6.8	6.3	6.1	6.5	4.3	3.1	3.9	3.8	3.6	3.7	3.8	4.6	4.7	5.4	4.2	5.0	4.8	6.0	6.1	5.6	9.9
29-Aug	5.1	4.3	1.8	0.9	0.8	1.1	1.3	1.0	0.7	0.9	1.4	1.1	2.6	5.8	8.2	5.7	3.1	5.0	5.5	2.2	4.4	9.1	11.8	10.7	3.9	11.8
30-Aug	7.3	5.1	6.5	10.3	9.1	7.0	9.4	9.5	6.2	4.7	4.3	4.4	4.2	3.9	4.0	4.8	4.1	2.3	2.2	2.2	6.0	9.3	10.3	10.0	6.1	10.3
31-Aug	10.5	10.7	10.0	8.8	12.0	11.1	10.2	5.4	3.9	6.7	6.9	2.3	2.1	2.8	2.8	2.7	3.0	3.3	3.5	8.4	5.3	4.6	3.8	4.0	6.0	12.0
	6.3	6.3	6.2	6.4	6.3	5.8	5.4	4.8	4.9	4.5	4.8	4.4	4.4	4.5	4.9	4.9	5.1	4.9	4.9	4.9	5.7	6.5	6.6	6.3	Diurnal Average	
	19.0	14.9	15.7	16.4	16.7	16.2	17.6	15.6	20.5	11.7	22.8	16.8	13.0	12.2	14.9	15.2	20.0	20.6	25.3	21.8	17.8	23.6	29.6	20.0	Diurnal Maximum	

C - Calibration M - Maintenance

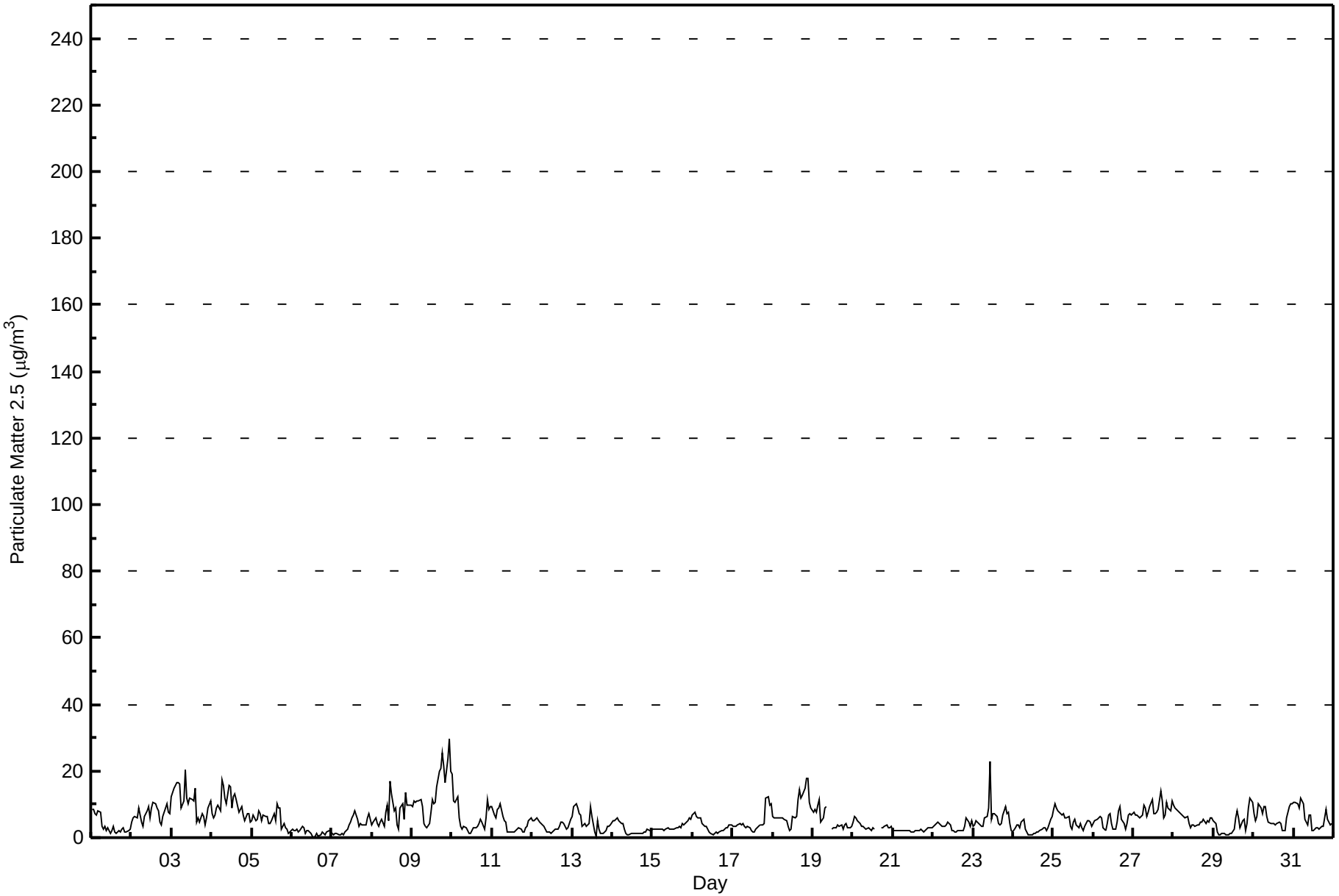
Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 $\mu g/m^3$

Wood Buffalo Environmental Association

Hourly Averages

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

Fort McKay - Bertha Ganter - August 2015



Concentration Ranges ($\mu g/m^3$)	Number of Hours	%	Cumulative %
1 - 5	440	59.54	59.54
6 - 15	262	35.45	94.99
16 - 25	20	2.71	97.70
26 - 80	1	0.14	97.83
> 81.0	0	0.00	97.83

Total Number of Valid Hours: 739

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

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

Fort McKay - Bertha Ganter - August 2015

Concentration Ranges ($\mu g/m^3$)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
1 - 5	30	3	3	5	10	13	14	31	28	27	37	53	36	71	47	26	434
6 - 15	17	10	6	2	12	6	14	35	29	24	23	15	24	18	16	11	262
16 - 25	4	0	1	0	0	0	0	1	5	3	0	0	2	1	3	0	20
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	51	13	10	7	22	19	28	67	63	54	60	68	62	90	66	37	717

Total Number of Valid Hours: 733

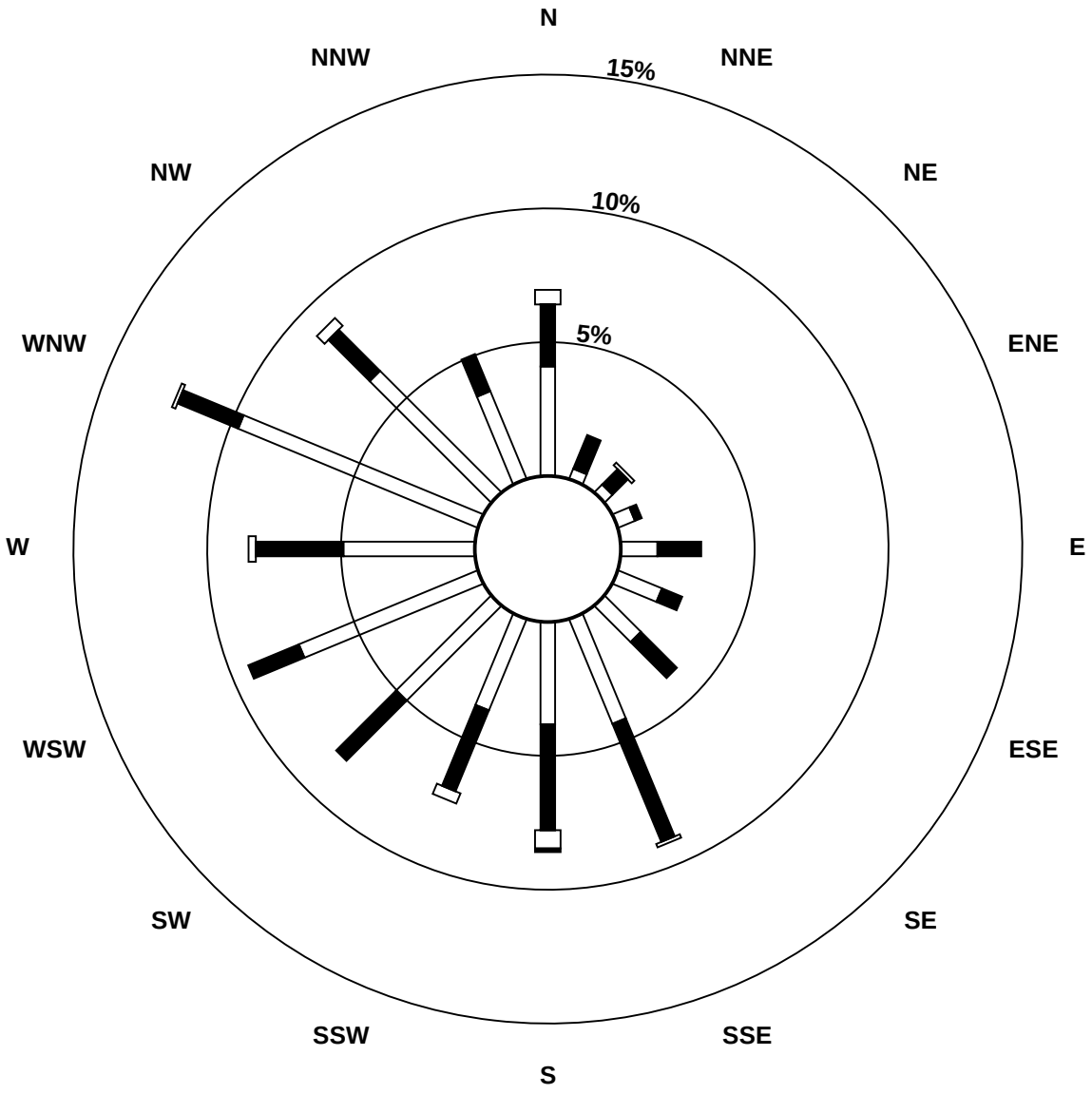
Total Number of Hours: 744

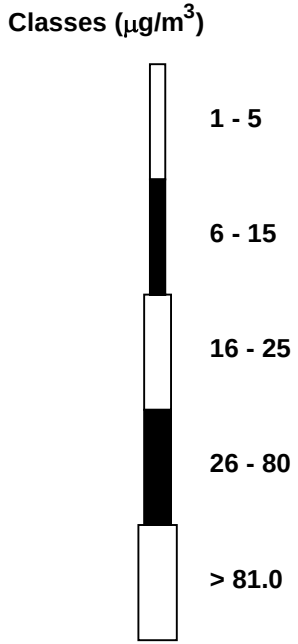
Wood Buffalo Environmental Association

Wind Rose Aug 2015

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

Fort McKay - Bertha Ganter (AMS 1)





Total Number of Valid Hours: 733

Wood Buffalo Environmental Association

Summary of Hour Averages

Ammonia (NH_3) - ppb

Fort McKay - Bertha Ganter - August 2015

Number of Exceedences (AAAQO): 1-hr: 0
Maximum Value: 0 ppb on Aug 1 01:00 Maximum Daily Average: 0.0 ppb on Aug 1

Minimum Value: 0 ppb on Aug 1 01:00 Minimum Daily Average: 0.0 ppb on Aug 1
Maximum Diurnal Average: 0.0 ppb at hour 1 Minimum Diurnal Average: 0.0 ppb at hour 1
Monthly Average: 0.0 ppb Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 0$ $P_{99} = 0$

Hours in Service:	744
Hours of Data:	643
Hours of Missing Data:	101
Hours of Calibration:	41
Percent Operational Time:	91.9

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	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
2-Aug	0	0	0	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3-Aug	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
4-Aug	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
5-Aug	0	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
6-Aug	0	0	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
7-Aug	0	0	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
8-Aug	0	0	0	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
9-Aug	0	0	0	0	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
10-Aug	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
11-Aug	0	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
12-Aug	0	0	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
13-Aug	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
14-Aug	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
15-Aug	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
16-Aug	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
17-Aug	0	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
18-Aug	0	0	0	0	0	Z	RE	0	C	C	C	C	C	C	C	C	C	C	RE	RE	RE	0	0	0	--	0
19-Aug	0	0	0	0	0	0	Z	RE	RE	0	0	M	M	M	M	M	M	M	M	M	0	0	0	0	--	0
20-Aug	0	0	0	0	0	0	0	Z	RE	RE	M	M	M	M	M	M	M	0	0	0	0	0	0	0	--	0
21-Aug	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
22-Aug	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
23-Aug	0	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
24-Aug	0	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
25-Aug	0	0	0	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
26-Aug	0	0	0	0	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
27-Aug	0	0	0	0	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
28-Aug	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
29-Aug	0	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
30-Aug	0	0	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
31-Aug	0	0	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Diurnal Average	
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Diurnal Maximum	

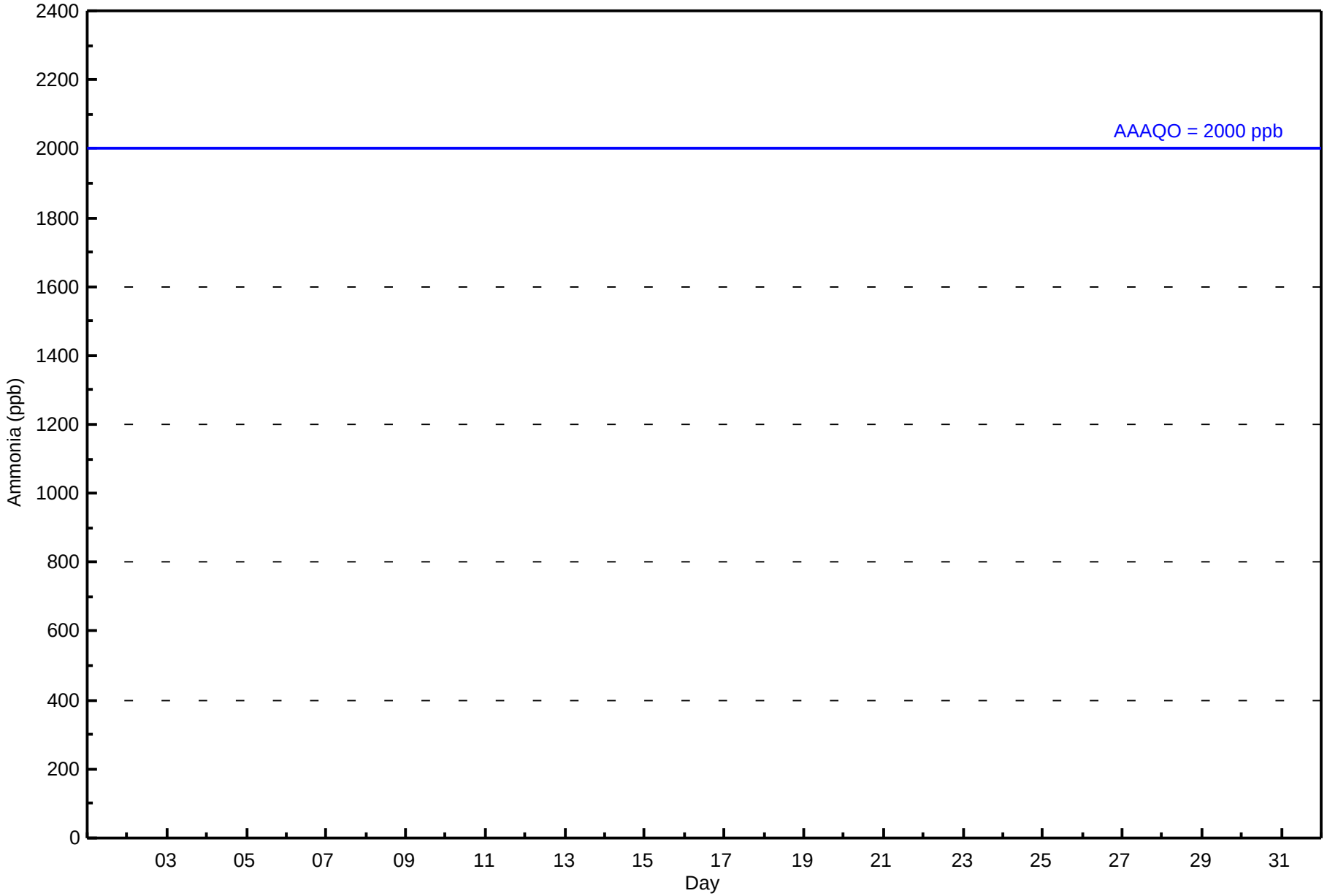
Z - zerospan C - Calibration M - Maintenance RE - Recovery
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 2000 ppb

Wood Buffalo Environmental Association

Hourly Averages

Ammonia (NH_3) - ppb

Fort McKay - Bertha Ganter - August 2015



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 5	643	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: 643

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Ammonia (NH_3) - ppb

Fort McKay - Bertha Ganter - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 5	45	12	10	6	19	21	26	54	53	49	61	66	53	76	59	33	643
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	45	12	10	6	19	21	26	54	53	49	61	66	53	76	59	33	643

Total Number of Valid Hours: 643

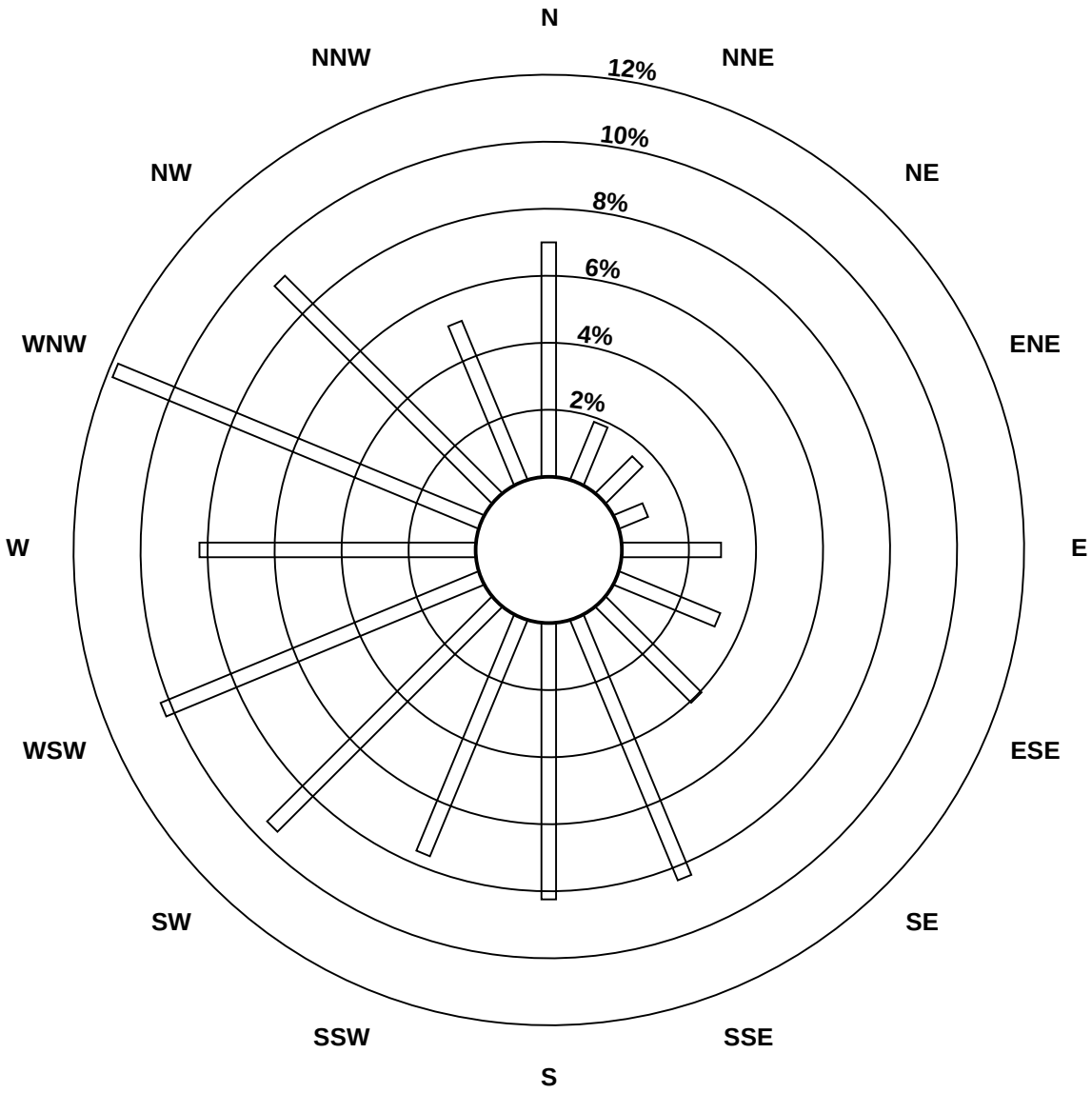
Total Number of Hours: 744

Wood Buffalo Environmental Association

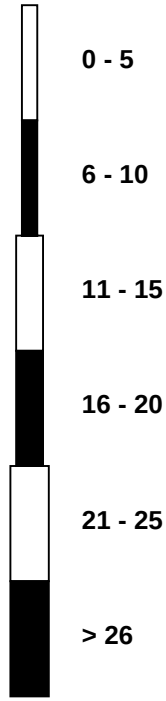
Wind Rose Aug 2015

Ammonia (NH_3) - ppb

Fort McKay - Bertha Ganter (AMS 1)



Classes (ppb)



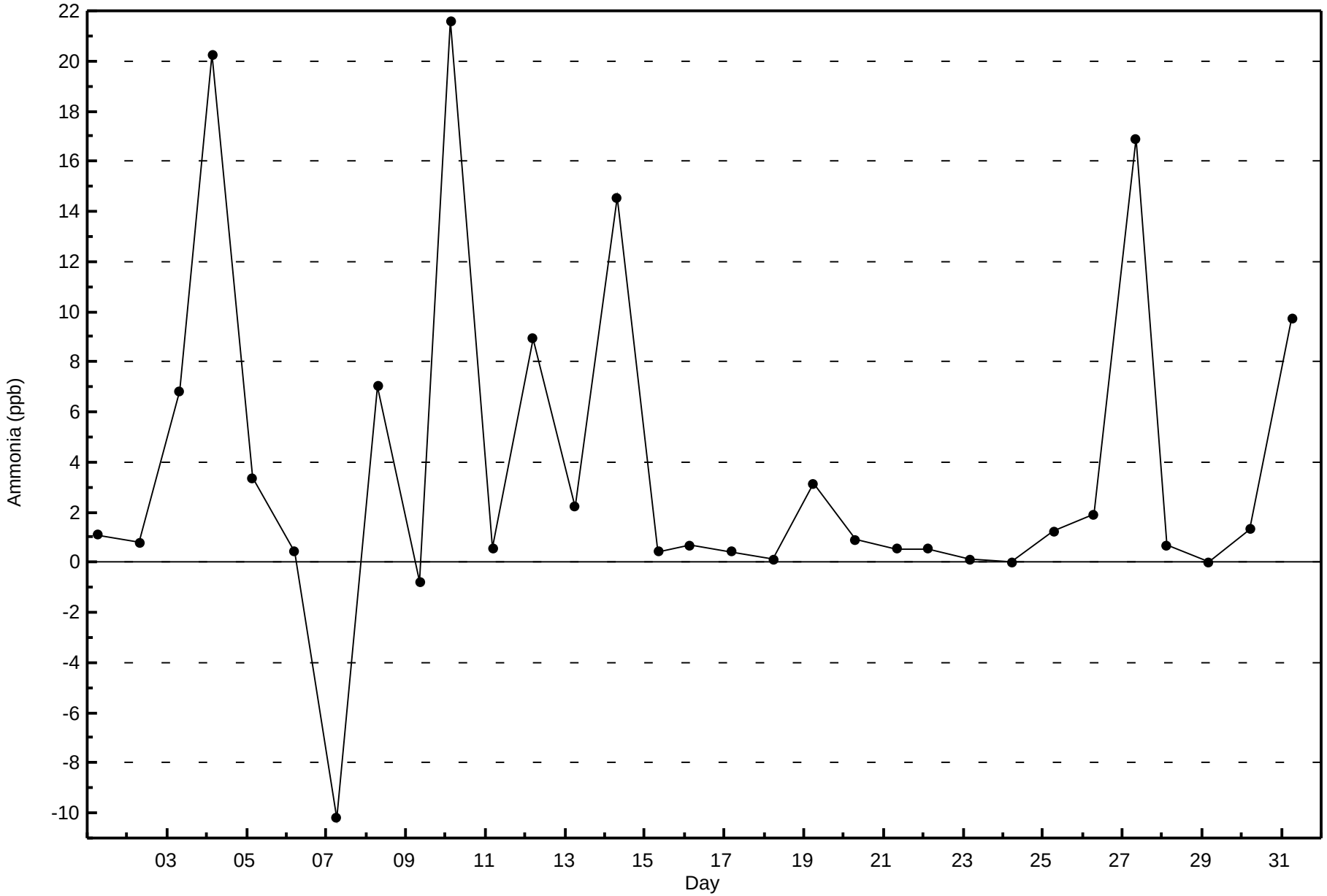
Total Number of Valid Hours: 643

Wood Buffalo Environmental Association

Zero Responses

Ammonia (NH_3) - ppb

Fort McKay - Bertha Ganter - August 2015

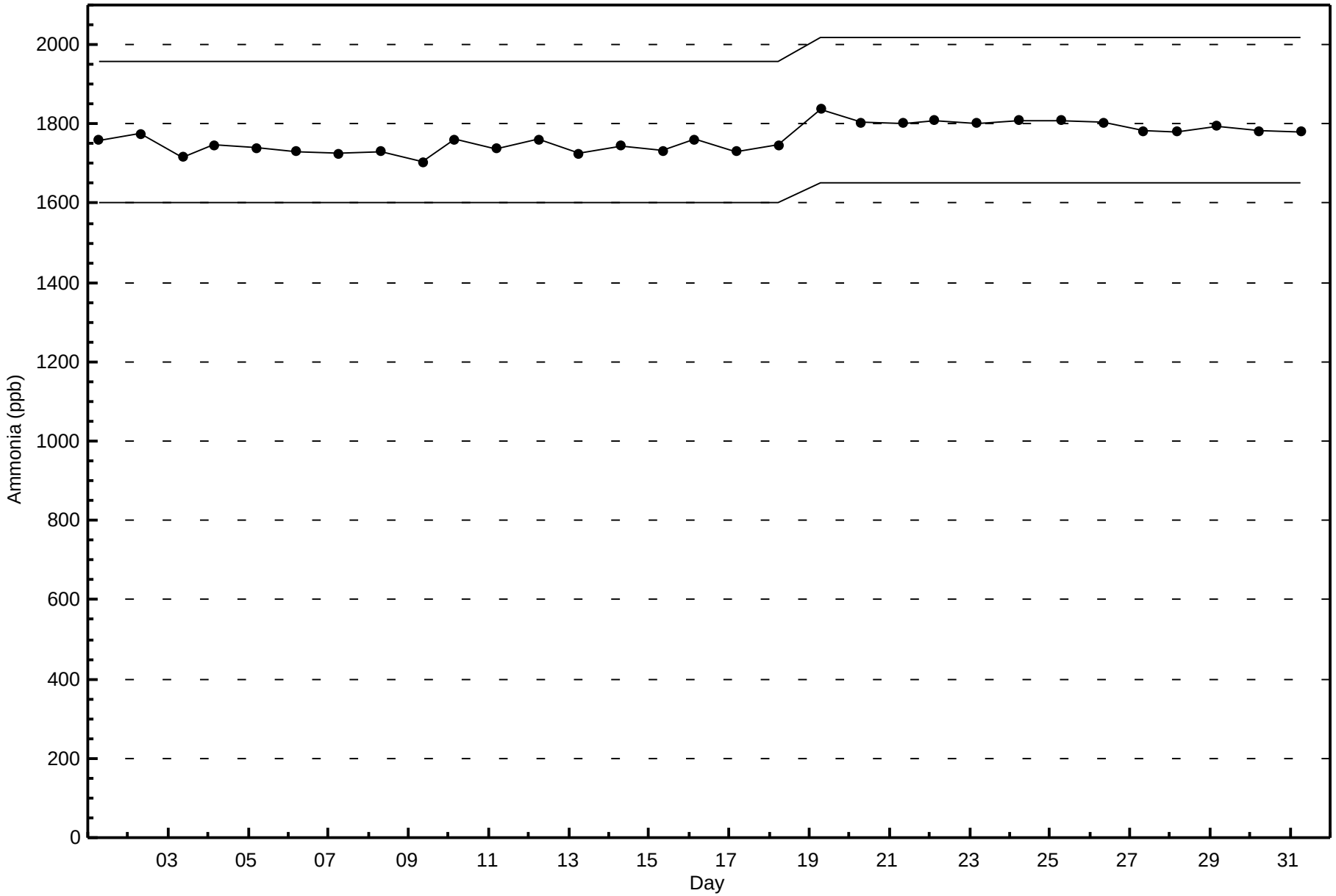


Wood Buffalo Environmental Association

Span Responses

Ammonia (NH_3) - ppb

Fort McKay - Bertha Ganter - August 2015



Maximum Value: 29.8 C on Aug 10 16:00
Maximum Daily Average: 23.7 C on Aug 10

Minimum Value: 1.8 C on Aug 23 06:00
Minimum Daily Average: 10.5 C on Aug 21
Maximum Diurnal Average: 22.1 C at hour 17
Minimum Diurnal Average: 12.2 C at hour 6
Monthly Average: 17.35 C
Percentiles: P_1 = 5.6 P_{10} = 11.1 Q_1 = 14.0 Median = 17.2 Q_3 = 20.7 P_{90} = 24.0 P_{99} = 28.0

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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	13.6	12.9	12.2	11.6	11.3	11.3	11.6	12.5	14.3	17.5	19.9	21.3	21.1	19.8	20.8	23.1	23.4	23.5	22.0	20.0	18.4	16.0	14.5	13.5	16.9	23.5
2-Aug	12.2	11.2	10.4	9.8	9.0	9.8	11.6	14.0	16.6	19.0	21.1	22.5	23.5	24.4	25.1	24.0	20.5	19.8	19.9	19.3	18.5	18.0	17.6	17.1	17.3	25.1
3-Aug	16.4	15.1	14.1	13.4	12.8	13.3	14.9	16.4	18.7	20.7	22.4	24.2	25.7	26.4	25.4	23.7	23.9	24.0	23.2	22.5	21.6	20.8	20.0	19.5	20.0	26.4
4-Aug	18.9	17.9	17.2	16.6	16.1	16.0	16.3	16.2	16.5	17.0	17.9	19.2	19.4	19.8	20.2	19.9	19.2	18.7	17.8	16.9	16.2	15.2	15.3	15.3	17.5	20.2
5-Aug	15.4	15.4	15.5	15.4	15.2	15.2	15.2	15.8	17.3	18.9	19.6	20.0	21.3	21.7	22.2	21.7	21.8	22.4	21.6	19.6	18.6	17.6	15.6	15.0	18.3	22.4
6-Aug	14.7	14.6	14.4	14.4	14.6	14.3	14.4	14.6	15.0	15.8	16.6	16.0	17.1	18.7	19.8	19.1	20.6	19.6	19.1	18.2	17.2	16.3	15.7	15.5	16.5	20.6
7-Aug	15.3	15.0	14.9	14.7	14.3	14.0	14.4	15.2	16.1	16.9	17.9	19.2	20.6	21.1	21.7	22.4	22.9	22.6	22.0	20.7	19.6	19.0	17.9	17.7	18.2	22.9
8-Aug	17.6	17.2	16.6	16.2	15.5	15.4	15.8	16.8	17.6	19.3	21.0	22.3	23.6	24.4	24.5	24.2	25.0	24.7	24.4	21.5	20.3	18.9	17.3	16.4	19.8	25.0
9-Aug	14.9	13.9	13.6	12.6	12.2	12.2	14.4	16.4	18.7	20.5	22.6	24.2	25.5	26.2	26.7	27.1	27.7	27.8	27.4	25.4	23.1	21.2	20.5	19.9	20.6	27.8
10-Aug	19.1	19.4	19.0	18.4	18.3	17.6	18.2	20.3	21.1	23.1	25.0	26.6	27.9	28.7	29.2	29.8	29.5	28.7	28.3	27.2	24.0	23.5	22.9	21.8	23.7	29.8
11-Aug	20.4	19.0	17.8	16.7	16.6	16.4	16.4	18.1	21.3	24.3	25.8	26.5	27.1	27.9	28.2	27.4	27.5	27.3	26.0	25.2	23.5	21.6	19.8	18.8	22.5	28.2
12-Aug	18.0	17.5	16.4	15.6	15.4	16.0	16.7	18.2	19.9	21.8	23.3	24.5	25.4	26.3	26.8	27.1	27.4	27.2	26.4	24.9	22.3	21.1	19.8	18.4	21.5	27.4
13-Aug	17.0	16.3	15.1	14.0	13.5	14.3	14.9	16.8	19.4	19.8	19.8	20.6	20.0	19.6	19.8	19.5	21.6	22.8	23.2	22.2	20.9	19.8	18.8	17.6	18.6	23.2
14-Aug	17.5	16.2	15.1	14.6	13.3	12.8	13.8	15.6	17.0	18.0	18.1	19.4	19.9	20.3	20.3	19.9	19.6	18.7	17.9	16.6	15.3	14.3	14.2	14.2	16.8	20.3
15-Aug	13.9	13.9	13.7	13.4	13.1	13.2	13.3	13.7	14.1	15.1	16.3	17.4	18.1	17.5	17.1	17.3	18.0	18.0	17.0	16.3	15.2	13.7	13.2	12.9	15.2	18.1
16-Aug	12.7	11.8	11.4	11.3	11.3	11.2	11.5	12.5	14.0	15.1	15.8	15.0	17.4	19.3	19.5	20.0	19.8	19.6	19.2	17.4	15.6	14.4	13.1	12.5	15.1	20.0
17-Aug	12.5	11.9	10.8	9.7	8.9	8.6	10.0	12.1	14.2	16.5	19.5	21.6	22.7	23.5	23.6	21.4	21.3	20.5	19.6	18.6	17.4	16.9	16.0	14.4	16.3	23.6
18-Aug	12.7	12.3	11.9	10.2	9.7	8.8	10.2	13.5	16.1	18.0	19.7	20.4	20.6	20.7	21.3	22.5	22.5	22.2	22.1	20.2	18.2	17.1	16.4	15.6	16.8	22.5
19-Aug	15.9	16.3	16.2	16.4	16.7	17.1	17.5	17.9	19.0	20.7	21.9	23.0	M	M	24.9	24.2	23.3	20.9	19.5	17.6	16.2	15.8	15.5	14.7	18.7	24.9
20-Aug	14.2	13.4	13.2	13.3	13.2	13.0	13.1	13.4	13.6	14.2	14.2	M	M	M	13.5	14.4	14.8	14.9	14.4	13.9	13.3	12.7	11.3	10.1	13.4	14.9
21-Aug	9.3	8.8	8.1	7.5	7.2	7.7	8.5	9.6	10.6	10.6	11.0	11.8	12.1	13.0	13.0	13.9	13.4	11.8	12.1	11.5	10.9	10.7	10.2	9.7	10.5	13.9
22-Aug	9.6	9.2	8.9	8.9	8.2	7.7	7.7	8.1	8.8	9.9	11.0	12.4	14.4	15.0	15.6	15.8	15.8	16.5	16.2	14.6	10.6	8.6	7.1	5.8	11.1	16.5
23-Aug	4.7	3.9	3.3	2.5	1.9	1.8	3.1	5.6	8.7	11.6	14.4	17.9	19.5	20.2	21.1	22.1	22.6	22.8	22.0	20.7	19.5	19.2	15.5	13.5	13.3	22.8
24-Aug	13.0	12.7	12.4	12.5	12.5	12.1	12.8	14.2	15.7	17.2	19.1	20.5	21.6	22.4	23.0	23.4	23.6	23.5	22.7	20.2	17.8	16.4	15.2	13.8	17.4	23.6
25-Aug	12.7	11.4	10.1	8.9	8.2	7.9	8.3	9.7	12.8	16.3	17.6	18.4	19.2	19.3	19.0	19.8	19.1	18.3	17.7	16.9	16.1	16.0	15.7	14.9	14.8	19.8
26-Aug	13.8	13.4	13.0	12.1	11.6	11.1	11.4	12.5	14.0	15.4	16.6	17.4	18.1	18.7	19.2	19.6	19.9	19.5	18.8	17.9	16.8	15.7	14.3	12.7	15.6	19.9
27-Aug	11.1	10.0	9.2	8.4	8.4	7.8	7.9	9.5	12.6	15.7	18.8	21.3	23.4	24.4	24.9	25.4	25.7	25.3	24.9	22.7	21.2	19.5	17.9	15.8	17.2	25.7
28-Aug	16.4	16.1	15.3	14.9	14.5	14.1	14.9	15.2	16.3	18.9	20.9	21.6	23.6	24.5	24.8	25.0	25.0	24.6	22.6	20.5	18.9	19.0	17.8	17.0	19.3	25.0
29-Aug	16.8	15.1	14.1	14.0	13.8	13.8	13.7	15.1	17.6	18.8	19.8	21.1	22.4	23.1	23.5	24.1	24.6	24.5	23.2	21.6	20.7	20.7	21.0	20.5	19.3	24.6
30-Aug	19.0	18.7	18.5	17.2	16.5	15.5	15.0	17.5	19.5	21.0	23.1	24.5	25.5	26.2	26.0	25.5	24.3	22.7	18.7	16.7	15.9	14.8	14.1	13.0	19.6	26.2
31-Aug	11.6	10.0	9.1	8.2	7.8	8.3	9.1	10.3	13.2	16.2	18.6	21.4	22.1	22.4	22.7	23.0	22.4	22.0	20.4	18.8	17.1	15.3	14.1	12.4	15.7	23.0
	14.6	13.9	13.3	12.7	12.3	12.2	12.8	14.1	15.8	17.5	19.0	20.4	21.3	21.9	22.0	22.1	22.1	21.8	21.0	19.6	18.1	17.1	16.1	15.2	Diurnal Average	
	20.4	19.4	19.0	18.4	18.3	17.6	18.2	20.3	21.3	24.3	25.8	26.6	27.9	28.7	29.2	29.8	29.5	28.7	28.3	27.2	24.0	23.5	22.9	21.8	Diurnal Maximum	

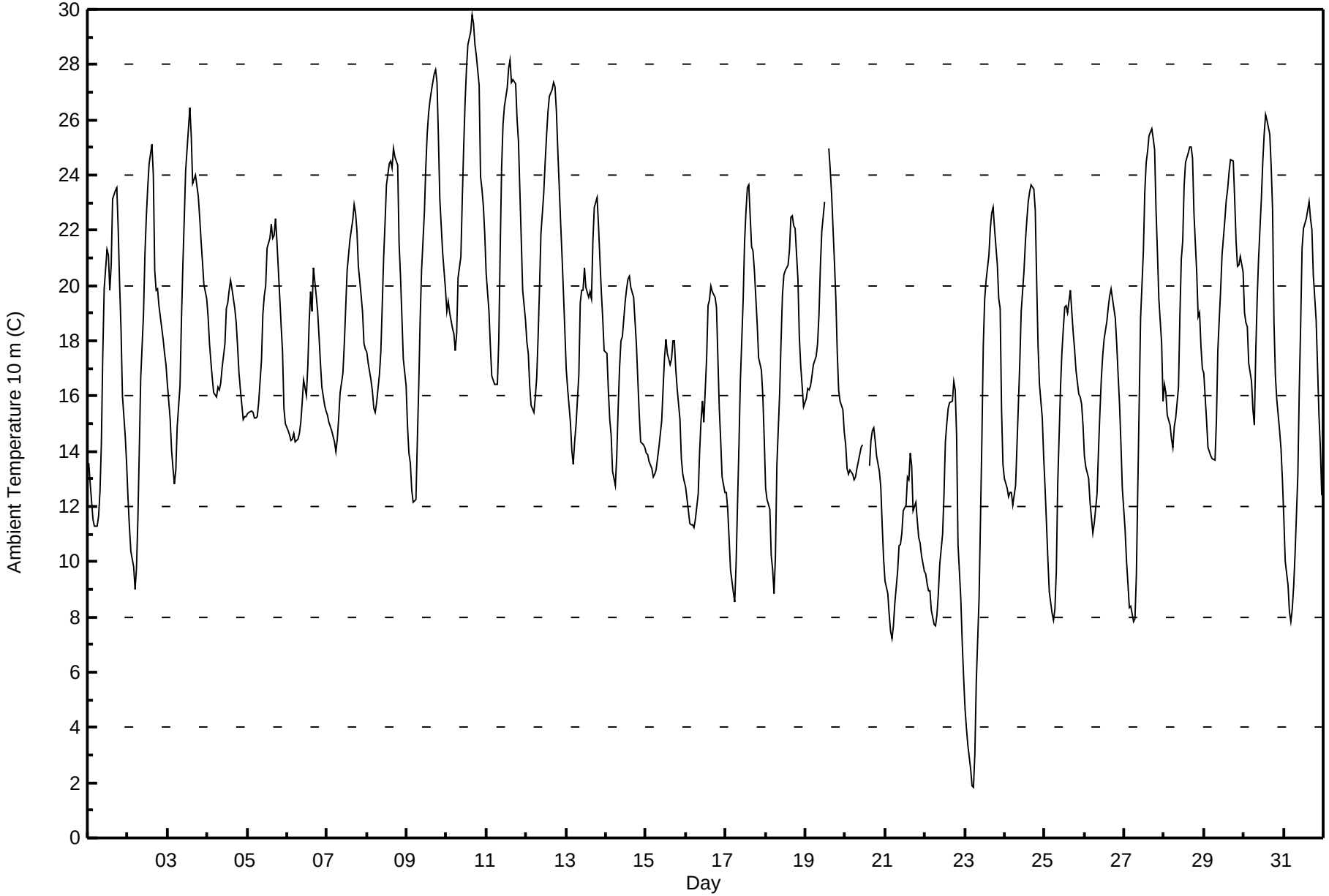
M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature 10 m (AT 10m) - C

Fort McKay - Bertha Ganter - August 2015



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	56	7.58	7.58
10 - 20	470	63.60	71.18
> 20	213	28.82	100.00

Total Number of Valid Hours: 739

Total Number of Hours: 744

Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature 2m (AT 2m) - C

Fort McKay - Bertha Ganter - August 2015

Maximum Value: 30.6 C on Aug 10 16:00

Maximum Daily Average: 23.3 C on Aug 10

Minimum Value: 0.1 C on Aug 23 05:00

Minimum Daily Average: 10.5 C on Aug 21

Maximum Diurnal Average: 22.9 C at hour 14

Minimum Diurnal Average: 11.4 C at hour 5

Monthly Average: 17.00 C

Percentiles: P_1 = 3.8 P_{10} = 9.8 Q_1 = 13.5 Median = 16.6 Q_3 = 21.0 P_{90} = 24.6 P_{99} = 28.7

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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	12.4	11.7	11.5	11.0	10.7	11.1	11.5	12.4	14.0	17.9	20.9	22.2	21.5	20.0	21.4	24.2	24.4	24.0	21.7	18.6	16.6	13.7	12.7	11.5	16.6	24.4
2-Aug	10.3	9.4	8.9	8.3	7.8	8.2	10.9	14.1	17.4	20.1	22.3	24.4	25.6	26.6	27.0	25.3	20.9	20.0	19.9	18.7	17.4	16.8	16.7	15.9	17.2	27.0
3-Aug	14.9	13.6	12.3	11.5	10.8	12.1	14.4	16.4	19.2	21.3	23.0	25.1	26.7	27.6	25.5	23.6	24.0	24.2	22.7	21.4	19.8	18.3	17.3	16.4	19.3	27.6
4-Aug	16.7	17.0	16.1	14.7	14.9	15.5	15.8	15.9	16.1	16.9	18.1	19.4	19.6	19.9	20.2	19.9	19.1	18.7	17.4	16.4	16.1	15.0	15.0	14.9	17.1	20.2
5-Aug	15.0	15.1	15.2	15.1	14.9	15.0	15.2	15.7	17.3	19.5	20.0	20.5	21.9	22.5	22.9	21.9	22.0	22.7	21.4	19.4	18.4	17.4	15.4	14.7	18.3	22.9
6-Aug	14.4	14.2	14.1	14.1	14.2	14.1	14.3	14.6	15.1	16.2	17.1	16.3	18.0	20.0	21.1	19.4	22.0	20.0	19.1	18.0	16.6	15.2	13.9	14.0	16.5	22.0
7-Aug	14.8	15.0	14.7	14.4	13.4	13.3	14.2	15.3	16.5	17.3	18.3	20.1	22.0	23.2	23.2	23.9	24.6	23.2	22.0	18.9	17.8	17.6	16.6	16.7	18.2	24.6
8-Aug	17.3	16.8	16.4	15.8	14.7	14.8	15.9	17.3	18.3	19.9	22.1	23.3	25.7	26.5	25.1	24.8	26.3	25.2	24.2	21.1	18.5	16.4	14.8	13.7	19.8	26.5
9-Aug	12.8	12.2	11.4	10.8	10.4	10.4	13.4	16.2	19.3	21.4	23.7	25.5	26.8	27.7	29.0	29.5	29.2	28.6	26.5	22.2	19.2	18.0	17.1	16.6	19.9	29.5
10-Aug	17.4	18.6	17.6	17.5	18.0	17.4	18.1	20.5	21.5	23.7	25.7	27.4	28.7	29.5	29.9	30.6	29.9	28.6	27.4	24.9	20.9	21.3	22.4	21.2	23.3	30.6
11-Aug	19.3	16.8	15.0	14.5	14.2	15.2	15.6	17.7	21.9	24.7	26.3	27.2	27.8	28.5	28.9	27.7	28.0	27.6	25.4	24.3	22.7	19.4	17.2	16.4	21.8	28.9
12-Aug	16.6	16.5	15.6	15.1	14.7	15.7	16.5	18.2	20.5	22.5	24.2	25.4	26.5	27.3	27.9	28.1	28.2	27.5	25.8	23.8	20.2	19.0	17.7	16.8	21.3	28.2
13-Aug	15.0	13.9	13.3	11.9	12.4	13.9	15.0	17.0	19.9	20.1	20.0	20.9	19.7	19.3	19.6	19.6	22.0	23.0	22.8	21.5	19.9	18.9	17.8	15.4	18.0	23.0
14-Aug	16.5	14.9	14.3	14.1	12.9	12.4	13.6	15.7	17.8	18.6	18.5	20.3	20.8	21.2	21.2	20.8	20.3	19.0	17.7	16.1	14.7	13.7	14.0	14.0	16.8	21.2
15-Aug	13.7	13.6	13.5	13.2	12.9	13.1	13.3	13.8	14.3	15.4	16.7	18.0	18.7	18.1	17.4	17.6	18.5	18.2	16.8	15.9	14.8	12.3	12.3	12.0	15.2	18.7
16-Aug	12.0	11.3	10.7	11.0	11.2	11.2	11.6	12.6	14.4	16.0	16.5	15.5	19.0	20.6	20.3	20.8	20.2	19.7	18.4	15.6	13.6	12.4	10.5	11.0	14.8	20.8
17-Aug	11.7	11.3	9.9	8.8	7.2	7.4	9.8	12.2	14.8	17.3	20.4	22.5	23.5	24.6	24.8	21.5	21.1	20.2	19.4	17.4	15.9	14.9	13.5	11.8	15.9	24.8
18-Aug	9.9	9.7	9.5	8.3	7.9	7.5	9.1	13.3	16.7	18.7	20.8	21.7	21.4	22.0	22.8	24.2	23.7	22.4	21.3	18.1	14.9	15.3	14.7	14.2	16.2	24.2
19-Aug	15.4	16.0	16.0	16.2	16.5	16.9	17.3	17.9	19.2	21.2	22.5	23.8	M	M	25.8	24.8	23.7	21.1	19.5	17.5	16.1	15.4	15.3	14.2	18.7	25.8
20-Aug	13.9	13.0	12.8	13.1	13.1	12.8	13.1	13.5	13.7	14.6	14.7	M	M	M	13.7	14.5	14.9	14.9	14.3	13.6	13.0	12.1	10.4	9.1	13.3	14.9
21-Aug	8.8	8.5	7.6	7.1	7.0	7.6	8.6	9.8	10.9	10.7	11.2	12.2	12.4	13.6	13.7	14.5	13.7	11.8	12.0	10.7	10.0	9.7	9.6	9.0	10.5	14.5
22-Aug	9.1	8.8	8.5	8.7	8.0	7.6	7.5	7.9	8.9	10.1	11.2	12.9	15.2	15.7	16.4	16.5	16.4	16.6	14.9	11.1	8.1	6.1	4.7	3.9	10.6	16.6
23-Aug	2.8	1.9	1.2	0.6	0.1	0.7	2.4	5.6	9.1	12.5	15.4	19.3	21.4	21.1	22.1	23.5	23.4	23.0	21.5	19.4	18.6	18.5	14.8	11.5	12.9	23.5
24-Aug	11.8	12.1	12.1	12.3	11.8	11.2	12.0	14.2	16.1	17.7	19.7	21.3	22.4	23.4	24.0	24.3	24.4	23.6	21.4	17.4	14.6	13.4	12.0	10.9	16.8	24.4
25-Aug	9.6	8.5	7.4	6.8	6.7	6.9	7.8	9.7	13.1	16.8	18.3	19.2	20.0	19.9	19.4	20.3	19.2	18.2	17.2	15.8	14.4	14.8	15.2	14.7	14.2	20.3
26-Aug	12.9	12.8	12.2	10.4	10.0	9.9	11.0	12.6	14.2	15.8	17.4	19.0	19.5	20.6	20.7	20.5	20.3	19.6	18.5	16.9	15.2	13.7	12.1	10.1	15.2	20.7
27-Aug	8.7	8.2	7.4	6.3	6.0	5.8	7.1	9.6	13.4	16.6	20.2	22.9	24.4	25.3	25.6	25.9	25.9	25.2	24.2	21.6	20.2	18.8	16.3	12.5	16.6	25.9
28-Aug	14.3	15.3	14.6	14.5	14.0	13.6	14.6	15.2	16.3	19.1	21.4	22.3	24.4	25.2	25.8	25.9	25.6	24.4	21.1	17.8	17.1	16.7	16.1	15.0	18.8	25.9
29-Aug	14.9	14.4	13.8	13.7	13.6	13.3	13.4	15.1	18.2	19.6	21.0	22.4	23.9	24.4	25.2	25.3	25.5	24.7	21.3	19.6	19.4	19.7	20.3	19.8	19.3	25.5
30-Aug	16.9	16.4	16.5	16.4	15.4	14.0	13.4	16.7	19.9	21.7	23.9	25.3	26.5	27.2	26.6	25.7	24.7	22.6	18.7	16.6	15.0	13.4	10.7	9.6	18.9	27.2
31-Aug	8.4	7.2	6.4	6.1	6.4	6.8	8.5	10.1	13.8	17.2	19.5	22.1	22.8	23.2	23.3	23.7	22.8	21.8	20.0	18.2	16.1	14.0	12.6	9.7	15.0	23.7
	13.2	12.7	12.1	11.7	11.4	11.5	12.4	14.1	16.2	18.1	19.7	21.3	22.3	22.9	22.9	22.9	22.7	21.9	20.5	18.3	16.6	15.5	14.5	13.5	Diurnal Average	
	19.3	18.6	17.6	17.5	18.0	17.4	18.1	20.5	21.9	24.7	26.3	27.4	28.7	29.5	29.9	30.6	29.9	28.6	27.4	24.9	22.7	21.3	22.4	21.2	Diurnal Maximum	

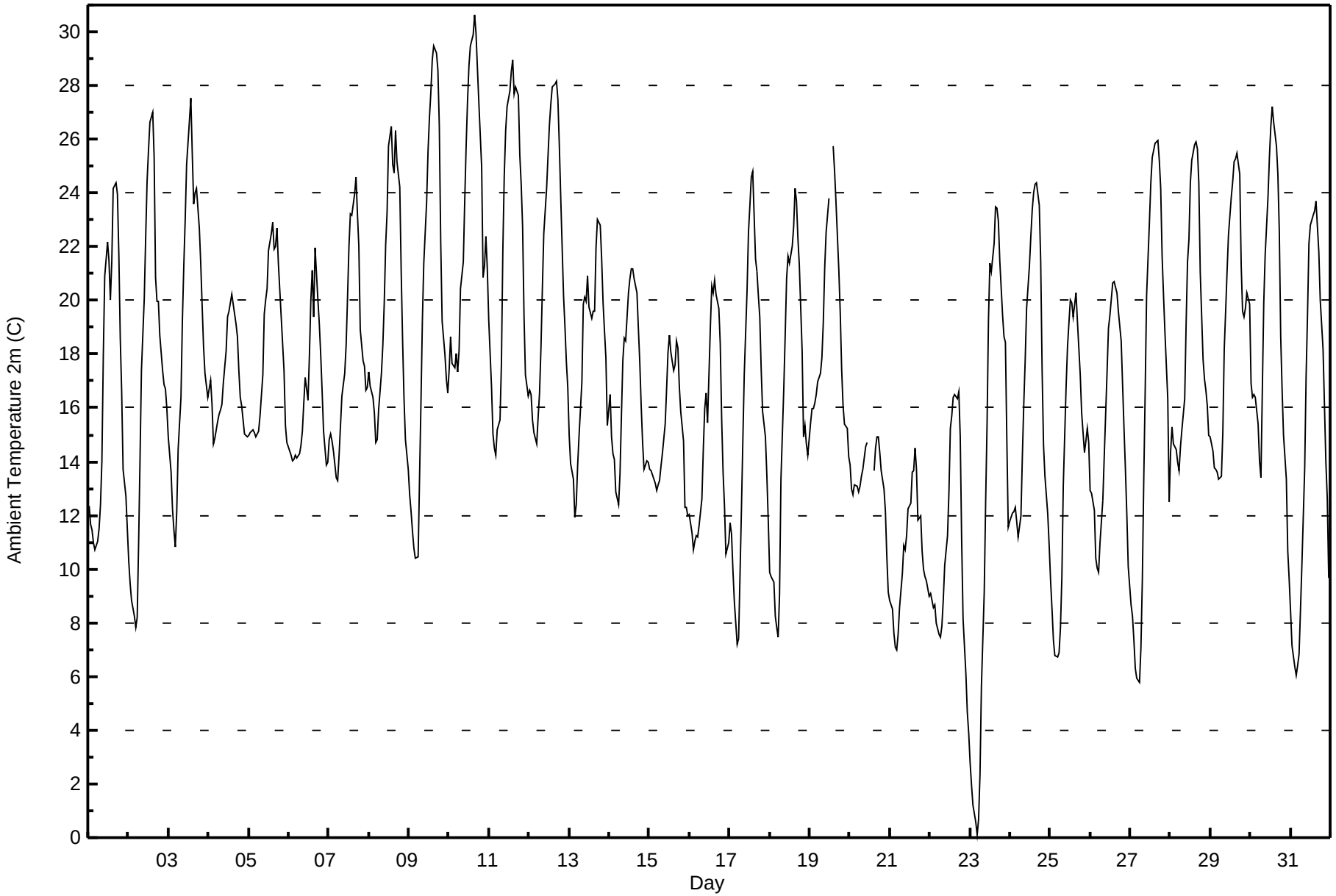
M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature 2m (AT 2m) - C

Fort McKay - Bertha Ganter - August 2015



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	77	10.42	10.42
10 - 20	441	59.68	70.09
> 20	221	29.91	100.00

Total Number of Valid Hours: 739

Total Number of Hours: 744

Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Fort McKay - Bertha Ganter - August 2015

Maximum Value: 99 % on Aug 5 08:00

Maximum Daily Average: 86.8 % on Aug 6

Minimum Value: 24 % on Aug 31 16:00

Minimum Daily Average: 49.7 % on Aug 12

Maximum Diurnal Average: 88.4 % at hour 6

Minimum Diurnal Average: 45.6 % at hour 16

Monthly Average: 68.8 %

Percentiles: P_1 = 28 P_{10} = 39 Q_1 = 53 Median = 70 Q_3 = 85 P_{90} = 96 P_{99} = 99

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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	98	99	99	99	99	99	99	99	97	78	65	53	55	63	57	44	44	41	50	67	75	85	89	93	77.0	99
2-Aug	95	97	97	98	98	98	94	79	71	63	54	47	43	40	38	42	61	69	65	72	78	82	83	86	73.0	98
3-Aug	89	92	95	96	97	98	92	84	72	62	56	50	45	43	52	57	58	56	64	71	78	82	85	88	73.4	98
4-Aug	86	78	75	83	83	75	75	74	79	72	67	67	67	67	65	68	74	76	86	94	95	97	98	99	79.1	99
5-Aug	99	99	99	99	99	99	99	99	93	80	76	74	66	63	62	65	67	65	58	68	72	77	92	97	82.0	99
6-Aug	98	98	98	98	97	96	96	95	94	89	84	93	89	77	68	74	62	69	73	78	82	88	93	94	86.8	98
7-Aug	92	90	93	94	96	97	97	93	87	83	77	70	62	56	56	53	52	58	63	79	84	84	89	88	78.8	97
8-Aug	83	84	86	88	93	92	87	82	79	72	63	58	50	46	50	54	48	53	59	69	77	85	89	93	72.5	93
9-Aug	95	96	97	97	98	98	97	87	75	68	60	52	44	41	40	38	35	36	46	63	74	80	85	85	70.3	98
10-Aug	83	71	77	79	74	81	79	71	67	59	51	43	39	34	30	28	29	32	39	51	68	61	53	60	56.7	83
11-Aug	68	78	86	88	88	86	87	77	58	42	36	33	30	27	26	30	30	33	42	46	48	56	63	65	55.1	88
12-Aug	61	59	64	66	68	63	61	56	52	47	43	40	36	33	32	30	30	31	36	43	55	58	63	67	49.7	68
13-Aug	74	78	82	87	85	83	79	75	68	69	71	72	87	87	82	78	65	59	61	65	69	69	72	82	75.0	87
14-Aug	75	79	80	79	83	83	80	72	66	60	59	52	47	43	42	43	45	50	54	59	65	70	70	70	63.6	83
15-Aug	72	74	76	77	79	81	82	79	75	67	57	50	47	50	55	55	51	52	60	62	67	79	81	84	67.2	84
16-Aug	84	87	90	90	91	92	90	86	79	72	72	73	55	44	41	37	39	42	50	61	69	74	81	81	70.0	92
17-Aug	77	76	81	83	90	90	79	70	62	57	46	36	32	29	29	41	45	46	47	56	65	68	71	78	60.6	90
18-Aug	84	86	87	92	92	92	89	75	67	61	54	46	48	46	43	38	39	44	48	60	72	73	75	77	66.2	92
19-Aug	71	67	65	64	64	64	63	62	59	53	51	48	M	M	32	34	38	45	52	59	68	69	65	70	57.4	71
20-Aug	72	76	77	72	68	68	67	67	67	64	65	M	M	M	74	65	63	62	64	67	70	72	79	84	69.6	84
21-Aug	86	86	88	89	89	86	82	77	76	84	82	74	73	62	66	59	66	81	75	87	89	83	80	84	79.2	89
22-Aug	83	83	84	82	87	92	96	95	92	84	76	63	49	43	42	43	44	43	50	69	82	89	92	94	73.2	96
23-Aug	95	96	96	97	97	97	98	94	78	64	54	41	35	36	36	34	34	35	40	47	49	50	78	95	65.8	98
24-Aug	95	97	98	97	97	98	98	89	80	73	63	51	42	36	36	35	34	36	44	60	70	74	78	81	69.3	98
25-Aug	85	89	92	95	96	95	93	85	75	64	59	57	54	55	58	56	62	68	74	81	85	82	78	76	75.6	96
26-Aug	83	83	87	92	94	95	94	87	79	72	66	60	56	52	51	51	51	51	61	67	74	76	82	88	72.9	95
27-Aug	93	96	96	97	98	98	98	97	83	71	60	51	41	37	37	35	34	37	38	44	46	50	57	71	65.3	98
28-Aug	66	61	62	60	61	60	57	57	58	51	45	41	34	30	29	28	29	32	45	57	65	67	73	81	52.1	81
29-Aug	79	90	97	97	97	97	98	92	78	69	64	57	50	47	44	42	39	41	57	61	60	58	55	59	67.6	98
30-Aug	81	82	80	80	84	89	91	81	66	59	48	41	37	33	33	35	38	45	61	72	82	87	93	94	66.4	94
31-Aug	95	96	96	97	97	98	98	95	81	65	54	35	30	29	26	24	24	26	31	36	41	49	52	61	59.8	98
	83.8	84.7	86.5	87.6	88.3	88.4	86.9	81.8	74.6	66.9	60.6	54.2	49.8	46.6	46.1	45.6	46.2	48.9	54.5	63.5	70.1	73.3	77.2	81.4	Diurnal Average	
	99	99	99	99	99	99	99	99	97	89	84	93	89	87	82	78	74	81	86	94	95	97	98	99	Diurnal Maximum	

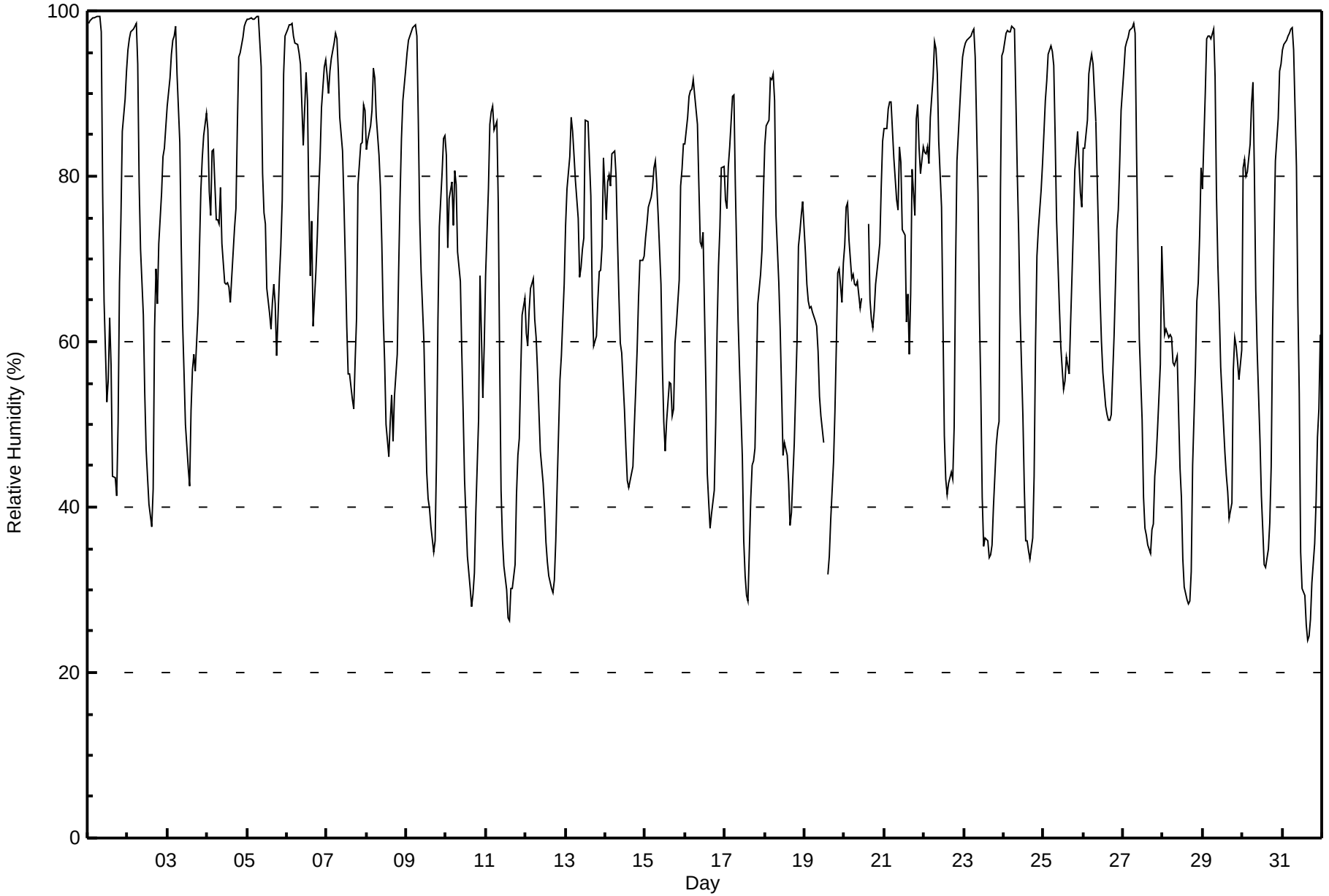
M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity (RH) - %

Fort McKay - Bertha Ganter - August 2015



Summary of Hour Averages

Fort McKay - Bertha Ganter - August 2015

Maximum Value: 1.5 mm on Aug 4 20:00

Maximum Daily Total: 4.3 mm on Aug 4

Minimum Value: 0.0 mm on Aug 1 01:00

Minimum Daily Total: 0.0 mm on Aug 1

Maximum Diurnal Total: 1.5 mm at hour 20

Minimum Diurnal Total: 0.0 mm at hour 5

Monthly Total: 9.65 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} = 0.8

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

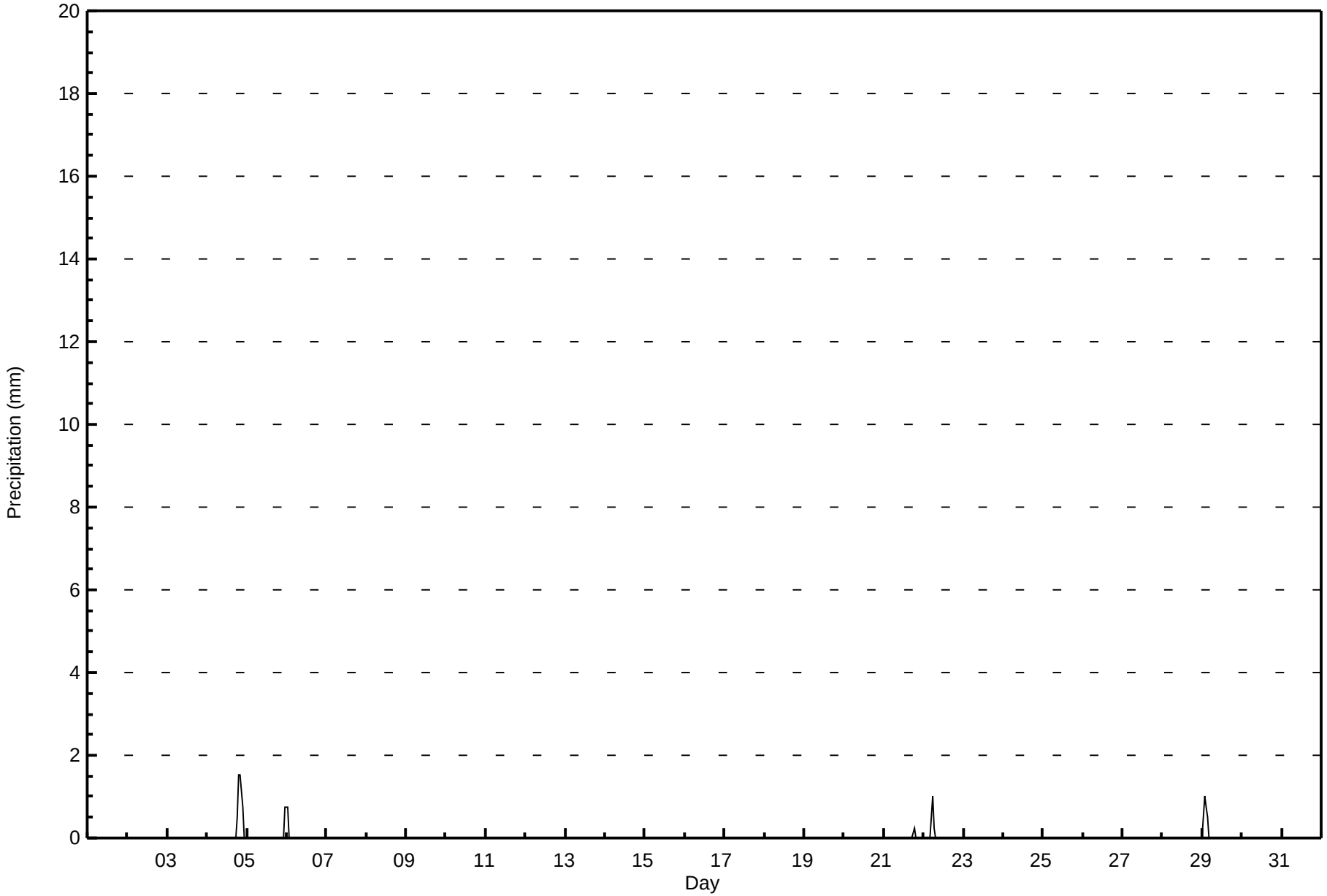
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.5	1.5	0.8	0.0	0.0	4.3	1.5
5-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.8	0.8
6-Aug	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.8
7-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.3	0.3
22-Aug	0.0	0.0	0.0	0.0	0.0	1.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	1.0
23-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29-Aug	0.0	1.0	0.8	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	2.3	1.0
30-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.8	1.0	0.8	0.5	0.0	1.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	1.5	1.5	0.8	0.0	0.8	Diurnal Average	
	0.8	1.0	0.8	0.5	0.0	1.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.5	1.5	0.8	0.0	0.8	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Precipitation (PC) - mm

Fort McKay - Bertha Ganter - August 2015



Concentration Ranges (mm)	Number of Hours	%	Cumulative %
0 - 0.3	734	98.66	98.66
0.4 - 0.5	2	0.27	98.92
0.6 - 0.7	0	0.00	98.92
0.8 - 1.4	6	0.81	99.73
1.5 - 10	2	0.27	100.00
> 10	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

Maximum Value: 44 % on Aug 5 23:00

Maximum Daily Average: 10.5 % on Aug 5

Minimum Value: 0 % on Aug 1 10:00

Minimum Daily Average: 0.0 % on Aug 8

Maximum Diurnal Average: 9.4 % at hour 6

Minimum Diurnal Average: 0.0 % at hour 10

Monthly Average: 3.1 %

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 15$ $P_{99} = 37$

Hours in Service:	744
Hours of Data:	674
Hours of Missing Data:	70
Hours of Calibration:	0
Percent Operational Time:	90.6

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	16	17	18	18	16	13	10	8	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	5.3	18
2-Aug	12	23	34	43	42	37	23	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.3	43
3-Aug	0	0	4	10	15	19	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.3	19
4-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	7	22	38	43	32	21	22	7.8	43
5-Aug	21	33	26	23	24	19	15	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	44	40	10.5	44
6-Aug	28	25	21	21	9	13	7	0	0	0	0	31	16	4	0	0	0	0	0	0	0	0	0	0	7.2	31
7-Aug	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	3
8-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
9-Aug	4	9	15	20	23	26	22	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.2	26
10-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
11-Aug	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	5
12-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
13-Aug	0	0	0	0	0	0	0	0	0	0	0	0	27	8	13	3	0	0	0	0	0	0	0	0	2.1	27
14-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
15-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
16-Aug	0	0	0	0	0	0	0	0	0	0	15	5	0	0	0	0	0	0	0	0	0	0	0	0	0.8	15
17-Aug	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	5
18-Aug	0	0	0	0	4	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	5
19-Aug	0	0	0	0	0	0	0	0	0	0	0	0	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	0
20-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--
21-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--
22-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	0	0	0	0	0	0	0	0	0	0	0	0	0	6	--	6
23-Aug	9	14	19	25	31	35	34	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	15	9.0	35
24-Aug	21	24	33	14	9	13	13	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.6	33
25-Aug	0	0	0	4	7	8	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.0	8
26-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
27-Aug	0	7	11	17	22	29	34	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.8	34
28-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0.2	5
29-Aug	0	24	27	26	12	11	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.5	27
30-Aug	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	9	0.8	9
31-Aug	15	19	24	28	28	28	26	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.7	28
	4.7	6.9	8.4	8.8	8.6	9.4	7.5	3.3	0.2	0.0	0.5	1.2	1.5	0.4	0.5	0.1	0.2	0.2	0.8	1.4	1.5	1.1	3.0	3.6	Diurnal Average	
	28	33	34	43	42	37	34	20	5	0	15	31	27	8	13	3	4	7	22	38	43	32	44	40	Diurnal Maximum	

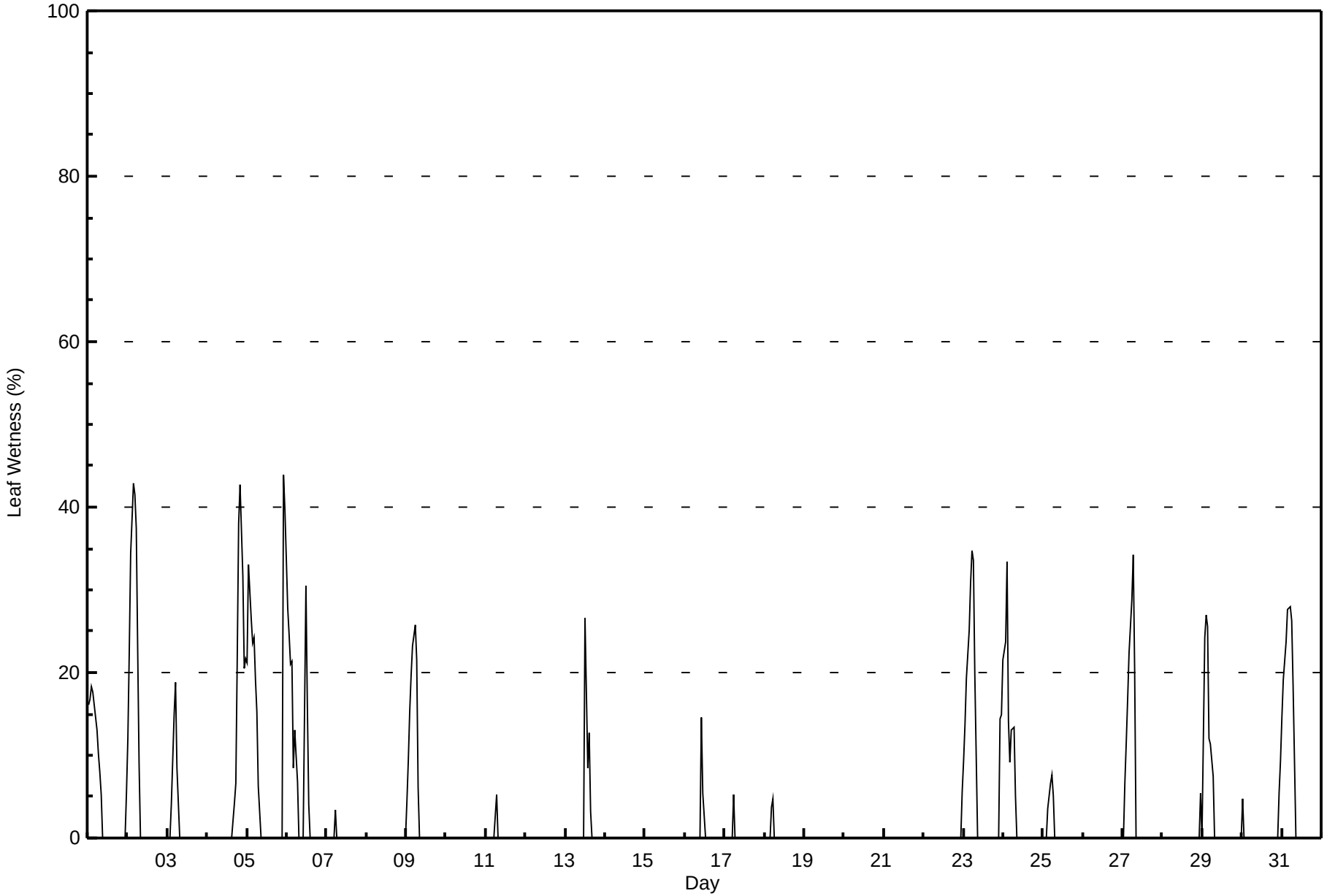
AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Leaf Wetness (LW) - %

Fort McKay - Bertha Ganter - August 2015



Leaf Wetness (LW) - %

Fort McKay - Bertha Ganter - August 2015

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 0.3	556	82.49	82.49
0.4 - 0.5	0	0.00	82.49
0.6 - 0.7	0	0.00	82.49
0.8 - 1.4	0	0.00	82.49
1.5 - 10	38	5.64	88.13
> 10	80	11.87	100.00

Total Number of Valid Hours: 674

Total Number of Hours: 744

Wood Buffalo Environmental Association

Summary of Hour Averages

Global Radiation (GR) - W/m2

Fort McKay - Bertha Ganter - August 2015

Maximum Value: 873 W/m2 on Aug 7 13:00

Maximum Daily Average: 269.5 W/m2 on Aug 12

Minimum Value: 0 W/m2 on Aug 1 01:00

Minimum Daily Average: 53.3 W/m2 on Aug 20

Maximum Diurnal Average: 606.4 W/m2 at hour 13

Minimum Diurnal Average: 0.0 W/m2 at hour 2

Monthly Average: 190.0 W/m2

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 51 $Q_3 = 354$ $P_{90} = 604$ $P_{99} = 762$

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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0	0	0	0	4	15	43	99	196	589	709	659	364	245	627	674	498	359	140	42	9	0	0	0	219.6	709
2-Aug	0	0	0	0	6	26	131	343	464	607	699	726	769	762	716	439	169	119	122	41	5	0	0	0	256.0	769
3-Aug	0	0	0	0	8	50	149	274	459	459	619	745	729	602	109	90	172	153	48	19	5	0	0	0	195.5	745
4-Aug	0	0	0	0	2	14	25	35	47	150	205	241	205	150	118	89	93	84	14	3	0	0	0	0	61.5	241
5-Aug	0	0	0	0	2	8	23	88	287	438	286	449	379	426	305	178	240	204	59	18	3	0	0	0	141.3	449
6-Aug	0	0	0	0	1	15	29	46	51	185	242	173	521	640	503	213	445	144	88	35	5	0	0	0	139.0	640
7-Aug	0	0	0	0	2	13	31	107	161	217	279	655	873	767	508	555	501	234	116	26	2	0	0	0	210.3	873
8-Aug	0	0	0	0	2	31	133	247	275	406	529	603	766	615	296	423	425	200	127	30	5	0	0	0	213.0	766
9-Aug	0	0	0	0	3	23	113	303	448	569	660	718	752	733	670	546	428	303	151	19	2	0	0	0	268.4	752
10-Aug	0	0	0	0	1	18	130	357	339	584	675	735	758	756	608	569	329	190	140	32	4	0	0	0	259.4	758
11-Aug	0	0	0	0	2	15	29	274	467	588	665	649	764	774	645	342	402	298	101	58	7	0	0	0	253.4	774
12-Aug	0	0	0	0	2	25	139	292	419	561	585	731	757	738	689	604	439	317	150	20	2	0	0	0	269.5	757
13-Aug	0	0	0	0	3	29	73	245	281	172	142	114	83	120	128	292	394	303	140	21	2	0	0	0	105.9	394
14-Aug	0	0	0	0	2	19	122	307	459	413	349	644	666	642	553	547	351	215	123	23	2	0	0	0	226.5	666
15-Aug	0	0	0	0	1	14	35	104	141	303	497	606	535	360	185	201	318	200	79	20	1	0	0	0	150.0	606
16-Aug	0	0	0	0	0	15	51	122	285	317	428	441	793	706	477	496	306	177	94	18	1	0	0	0	196.9	793
17-Aug	0	0	0	0	1	18	140	280	415	563	654	719	727	761	559	127	126	53	71	20	0	0	0	0	218.1	761
18-Aug	0	0	0	0	1	13	119	285	424	545	649	607	444	421	641	482	308	147	86	17	1	0	0	0	216.2	649
19-Aug	0	0	0	0	0	9	36	154	317	472	561	M	M	M	M	270	335	137	101	16	0	0	0	0	120.5	561
20-Aug	0	0	0	0	0	15	46	108	91	251	235	M	M	M	M	M	139	82	35	9	0	0	0	0	53.3	251
21-Aug	0	0	0	0	0	17	55	131	131	159	219	212	266	317	387	346	134	120	44	12	0	0	0	0	106.3	387
22-Aug	0	0	0	0	0	5	22	52	148	200	222	396	631	499	488	350	232	239	77	12	0	0	0	0	148.9	631
23-Aug	0	0	0	0	1	22	68	135	396	499	561	682	700	419	437	424	324	206	68	14	0	0	0	0	206.6	700
24-Aug	0	0	0	0	0	7	101	254	376	533	637	714	728	709	644	536	387	245	61	14	0	0	0	0	247.8	728
25-Aug	0	0	0	0	0	13	62	140	407	408	532	495	534	355	271	271	108	59	30	5	0	0	0	0	153.8	534
26-Aug	0	0	0	0	0	8	50	128	264	372	505	553	551	570	423	295	231	125	49	7	0	0	0	0	172.1	570
27-Aug	0	0	0	0	0	9	71	209	417	447	600	643	701	651	508	438	305	201	38	7	0	0	0	0	218.6	701
28-Aug	0	0	0	0	0	13	87	155	191	370	563	648	584	654	608	503	349	177	49	6	0	0	0	0	206.5	654
29-Aug	0	0	0	0	0	4	46	266	411	506	601	669	691	517	470	421	332	176	47	3	0	0	0	0	215.0	691
30-Aug	0	0	0	0	0	6	56	215	365	493	593	652	674	650	415	209	242	62	4	8	0	0	0	0	193.6	674
31-Aug	0	0	0	0	0	4	35	91	363	443	604	670	642	579	516	484	306	188	32	5	0	0	0	0	206.7	670
	0.0	0.0	0.0	0.0	1.4	15.9	72.6	188.6	306.4	413.5	493.7	570.7	606.4	556.5	465.6	380.5	302.3	184.4	80.0	18.8	1.9	0.0	0.0	0.0	Diurnal Average	
	0	0	0	0	8	50	149	357	467	607	709	745	873	774	716	674	501	359	151	58	9	0	0	0	Diurnal Maximum	

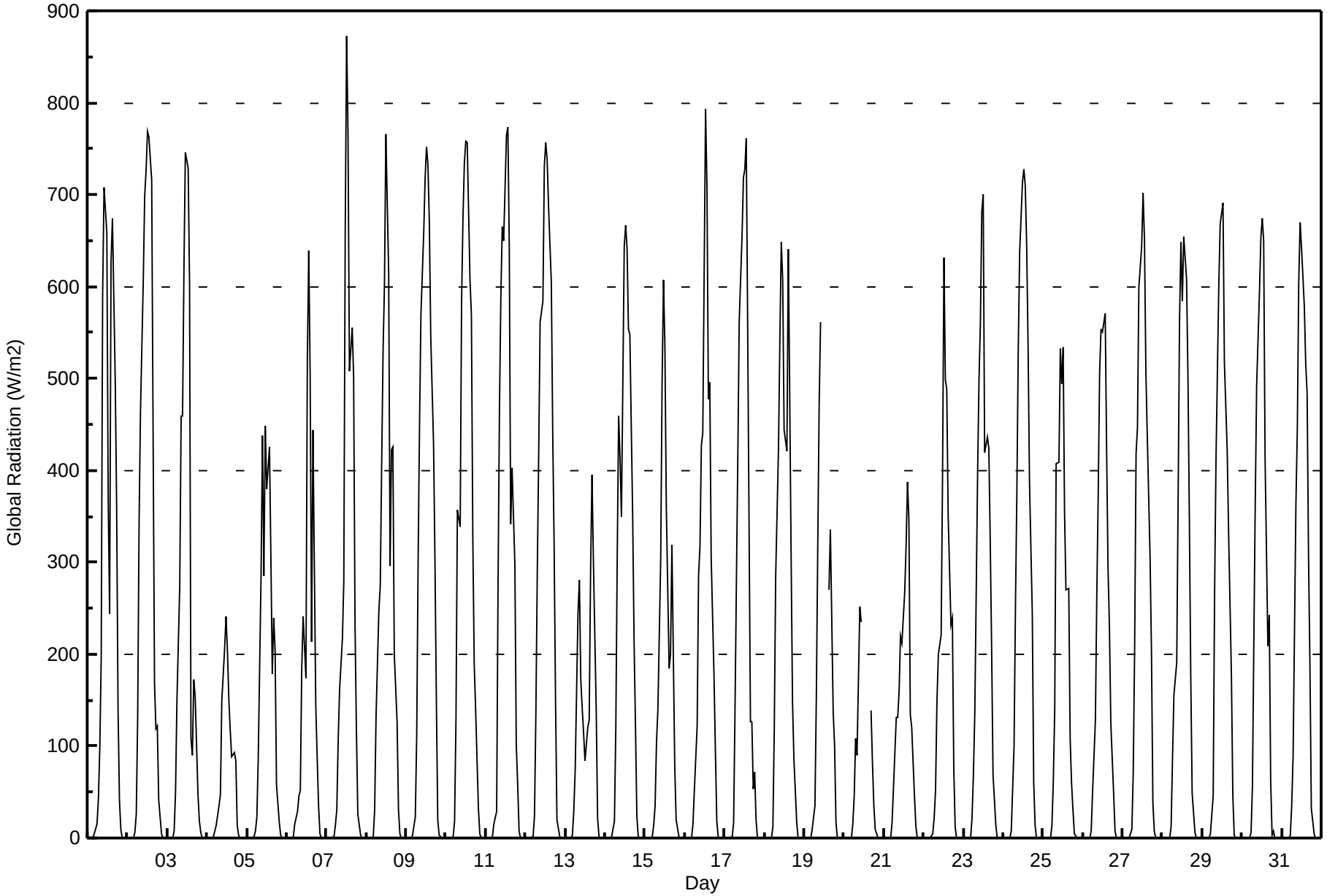
M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Global Radiation (GR) - W/m2

Fort McKay - Bertha Ganter - August 2015



Concentration Ranges (W/m2)	Number of Hours	%	Cumulative %
0 - 20	327	44.49	44.49
21 - 100	73	9.93	54.42
101 - 300	124	16.87	71.29
301 - 600	134	18.23	89.52
601 - 900	77	10.48	100.00
> 900	0	0.00	100.00

Total Number of Valid Hours: 735

Total Number of Hours: 744

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Fort McKay - Bertha Ganter - August 2015

Maximum Speed: 16 km/h on Aug 14 16:00

Maximum Daily Speed Average: 9.8 km/h on Aug 14

Minimum Speed Value: 0 km/h on Aug 8 15:00

Minimum Daily Speed Average: 1.1 km/h on Aug 9

Maximum Diurnal Speed Average: 3.2 km/h at hour 14

Minimum Diurnal Speed Average: 1.4 km/h at hour 24

Monthly Average Velocity: 2.2 km/h 245.4 deg

Percentiles: P_1 = 1 P_{10} = 3 Q_1 = 3 Median = 5 Q_3 = 8 P_{90} = 10 P_{99} = 15

Hours in Service: 744

Hours of Data: 738

Hours of Missing Data: 6

Percent Operational Time: 99.2

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	W4	W4	W4	NW3	NNW3	NNW4	NNW3	NW2	NW3	SW3	SE1	NE5	NW7	NW9	NW11	NW8	NW7	N7	N6	NW6	N2	WNW3	NW4	NW2	NW3.8	NW11
2-Aug	WNW2	W2	SW2	W2	SSW2	SSE2	SSE3	SSE3	SE5	SSE7	SSE8	SE8	SE9	SE8	SSE7	NNW4	NNW6	S9	SSE5	W3	WNW5	E1	WSW3	NNE1	S2.4	S9
3-Aug	WNW3	NW3	W3	WNW4	NW3	NW1	NNE1	ESE2	SSE4	ESE3	NE5	NNE6	NE6	NE5	E3	ESE6	SE4	SE9	SSE4	SSE3	NE2	N3	NNE4	NNE3	ENE1.4	SE9
4-Aug	N5	N6	N5	N4	NNW4	N7	N6	N5	NNW3	N7	N7	NNE6	NNE6	NNE6	E7	E7	SE9	ESE8	E5	ENE5	SE11	SE3	E1	N3	NE3.4	SE11
5-Aug	N4	N3	NNE4	N3	N4	N4	N3	NNE3	E4	E2	S1	WSW3	NNW2	S7	SSE2	SW5	WNW4	NNE3	SE12	S12	S10	SSE11	SE7	ESE3	SE1.5	S12
6-Aug	E3	E4	ENE3	ENE4	E5	E6	E5	E5	ESE5	ESE10	SSE8	S6	ESE6	ESE7	ENE8	ENE7	SE8	ESE10	SE10	ESE7	ESE8	E4	E4	NE2	ESE5.4	ESE10
7-Aug	ESE3	SE5	SE3	ESE3	NNE1	NW2	NW3	N4	NNE3	NW3	NW3	WNW3	SW3	SE5	SSE5	SE4	ESE5	E3	SSE7	S2	S3	SW2	NE1	SSE5	SE1.4	SSE7
8-Aug	SSE8	S5	SSE6	SSE4	ESE3	SSE4	SSE5	SE6	SE7	S6	SSE5	S6	SE7	SE7	W0	WSW5	SSE5	NE3	NE3	ENE5	ESE3	E1	N3	W2	SSE3.3	SSE8
9-Aug	NW3	W4	NW3	WNW4	W3	NW3	NNW2	SSE3	SSE3	SSE4	SE4	SE4	ESE3	S4	SSE6	SE6	S4	S3	NE2	N3	NW3	W1	S3	SSW4	S1.1	SE6
10-Aug	SSW4	NW9	SSE2	SSW5	W9	WNW9	W6	WSW6	SW7	WSW8	SW9	SW9	SW11	WSW10	WSW10	WSW9	SW7	WSW6	W4	SSW3	SW3	SSW7	SW8	SW7	WSW6.0	SW11
11-Aug	SW5	S3	SSW3	S5	SW3	SSW4	SW1	SSW4	S8	SW10	WSW12	W13	WSW14	WSW15	W13	W10	WNW11	WNW9	WNW4	SW4	SW6	WNW5	WNW4	WSW3	WSW5.9	WSW15
12-Aug	W5	WSW4	SW4	S5	SSW4	W5	W5	W7	WSW6	W8	W9	WSW9	W9	WSW8	WSW8	SW9	WSW7	W8	WSW7	WSW5	SW4	WNW5	WNW6	WNW6	WSW5.8	SW9
13-Aug	N1	SSW4	S4	SSW4	SW5	SSW4	S5	S7	S7	S9	S8	S3	SW3	SW6	WSW6	SSW10	SSW10	SSW10	SSW7	SSW7	SW6	SSW6	SW5	WNW4	SSW5.3	SSW10
14-Aug	WNW9	WNW7	WNW7	WNW9	W6	W8	WNW8	W8	WNW10	WNW12	WNW13	WNW13	WNW14	WNW13	WNW15	WNW16	NW13	NW14	WNW12	NW9	WNW7	WNW5	WSW4	WNW7	WNW9.8	WNW16
15-Aug	NW6	NW8	NW8	NW8	NW8	N9	N11	N11	N10	N11	N14	N13	N13	N14	N9	NNW9	N9	NNW10	NNW7	NNW7	NNW6	NW6	NNW4	NW4	NNW8.5	N14
16-Aug	WNW2	W3	W3	WNW3	W3	WNW4	WNW2	WNW2	SSE2	ESE5	SW0	S6	SSE5	SW4	NNW5	NNW7	NW9	WNW4	WSW3	W4	WNW5	WNW4	WNW5	WSW1	WNW2.3	NW9
17-Aug	SW3	WSW3	SW3	SSW4	S4	S6	S8	S8	S8	S9	S10	SSW9	SSW8	SW7	SSW6	N5	NW6	WNW7	NW7	NNW2	SSW3	SW4	WSW2	WSW2	SSW3.9	S10
18-Aug	WNW4	NW2	WNW3	W3	WNW5	WNW2	WNW4	NW4	NNW5	N5	ENE4	E4	ENE2	S6	SSE6	SSE7	SSE9	SSE8	S5	S3	SSW4	S6	S5	S5	S1.5	SSE9
19-Aug	SSE8	SSE10	SSE14	SSE13	SSE11	S13	S15	S15	S14	S14	WSW9	SW10	M	M	M	W12	WNW10	WNW13	WNW12	WNW12	WSW4	W5	W6	WSW4	SSW6.7	S15
20-Aug	W6	SW5	W5	WSW6	WSW5	W7	WNW9	W9	WNW10	WNW14	WNW11	M	M	M	WNW8	WNW10	NW10	WNW10	WNW9	WNW6	WNW6	NW7	WNW6	WNW5	WNW7.4	WNW14
21-Aug	WNW5	WNW5	WNW6	W6	W4	W5	W4	WNW8	NW8	NW9	NW8	NW8	NNW9	NW12	NW10	NNW10	NW9	NW8	NW7	NW5	NW8	NW9	NW8	WNW5	NW7.0	NW12
22-Aug	WNW6	WNW5	WNW7	WNW7	WNW6	WNW5	WNW5	WNW5	WNW6	W6	WNW6	NW9	NW10	NW13	NW12	NNW7	N3	NNW4	NW5	W3	WSW3	WSW4	W3	WSW3	WNW5.4	NW13
23-Aug	WSW3	WSW3	SW3	WSW3	W4	WSW3	SW2	SSW4	S4	SSE8	S8	SSE11	SSE12	S10	SSE11	SSE11	SSE11	SSE10	S6	S5	S7	SW5	NNW6	SSE1	S5.0	SSE12
24-Aug	SSW3	WNW6	SSW1	SSE8	WSW3	SSW5	SSW4	S8	S10	SSW10	SW6	SW8	SW10	W9	WSW8	SW7	WSW6	SW5	SW4	W2	WNW5	NNW5	NNW5	NW3	SW4.3	SSW10
25-Aug	NW4	NW3	WNW4	WNW5	WNW4	NW3	SSW2	NW3	N4	N5	N7	N7	N8	N8	N7	N7	NNW6	NW4	NNW4	NNW4	NNW4	NNW5	N8	N7	NNW4.6	N8
26-Aug	NNW4	N5	N3	NW3	NW3	W3	WSW2	NW3	NNE2	E3	E3	SE6	SE6	SSE9	SSE9	S6	SSW7	SSW6	SSW3	SW4	SW3	WSW3	WNW4	WSW1	SSW1.3	SSE9
27-Aug	W2	WSW4	SW3	WSW3	SW4	S4	S3	SSE5	SSE6	SSE7	SSE9	SSE11	S12	SSW13	SSW13	SSW15	SSW12	SW10	SW6	SSW6	SSW8	SSW7	SW3	S2	SSW6.4	SSW15
28-Aug	WSW5	W6	WSW5	WSW6	W5	W6	W6	SW7	SW6	WSW8	SW10	WSW11	W11	WSW11	WSW10	WSW9	WSW8	WSW6	W1	W2	SW2	W3	N5	NNW3	WSW5.9	WSW11
29-Aug	NNW4	WNW2	W2	S3	SW4	WSW2	S4	SSW6	SW5	S8	S8	S9	SSE10	SSE9	SSE10	SSE8	SSE9	SSE7	SE2	ESE6	SE6	SE7	SSE8	SSE6	SSE4.9	SSE10
30-Aug	E4	ESE2	NW3	N5	NNW4	NNW3	NW3	SE1	SW5	WNW7	WNW5	WSW4	SW7	SW8	SSW8	SSW7	WNW11	SW3	SSE15	SSE8	S5	S4	SSW5	S4	SW2.8	SSE15
31-Aug	SSW1	WSW3	W3	W3	WSW3	SSW3	WSW3	SSW4	SSE11	SSE13	S13	SW13	WSW12	SW11	WSW11	WSW13	SW13	SW10	SSW8	SW7	SSW6	SW5	SW5	WSW2	SW6.3	S13
	W1.9	W2.2	W1.9	WSW2.1	W2.4	W2.2	WSW1.9	SW2.1	SSW2.2	SSW2.7	SW2.5	SW2.7	SW2.6	WSW3.2	WSW2.9	WSW3.0	WSW3.1	WSW2.6	SW1.8	SW1.8	SW2.1	WSW2.2	W1.8	W1.4	Diurnal Average	
	WNW9	SSE10	SSE14	SSE13	SSE11	S13	S15	S15	S14	SSW14	N14	WNW13	WSW14	WSW15	WNW15	WNW16	NW13	NW14	SSE15	S12	SE11	SSE11	SW8	N7	Diurnal Maximum	

M - Maintenance

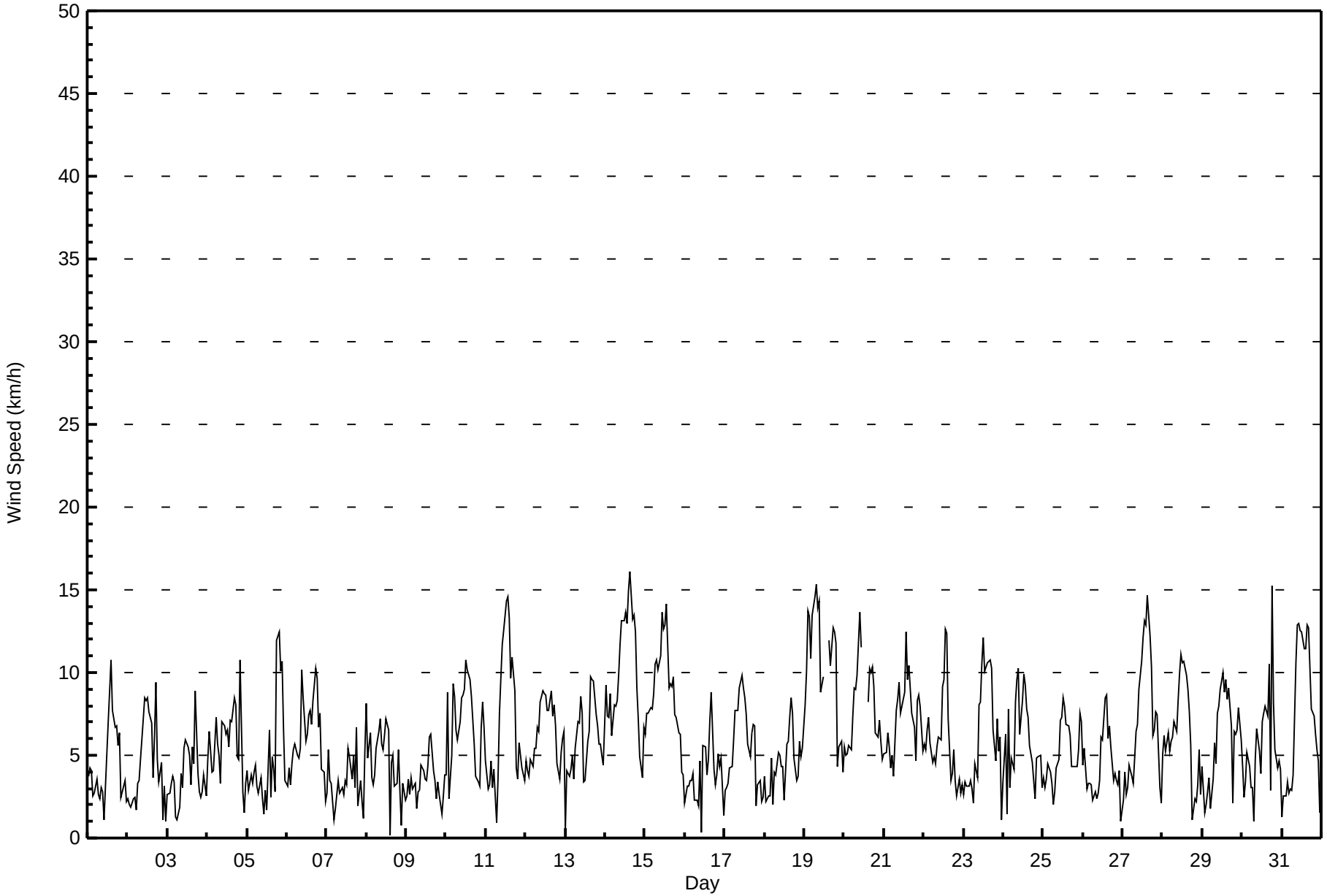
All monthly, daily, and diurnal averages have been calculated using vector methods

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed (WS) - km/h

Fort McKay - Bertha Ganter - August 2015



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	384	52.03	52.03
6 - 11	305	41.33	93.36
12 - 19	49	6.64	100.00
20 - 28	0	0.00	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 738

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Wind Speed (WS) - km/h

Fort McKay - Bertha Ganter - August 2015

Wind Speed Ranges (km/h)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 5	26	10	9	6	19	13	11	23	28	28	37	36	39	43	31	25	384
6 - 11	22	4	1	2	3	9	18	39	30	23	25	28	21	37	31	12	305
12 - 19	4	0	0	0	0	0	1	5	7	5	2	6	2	12	5	0	49
20 - 28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	52	14	10	8	22	22	30	67	65	56	64	70	62	92	67	37	738

Total Number of Valid Hours: 738

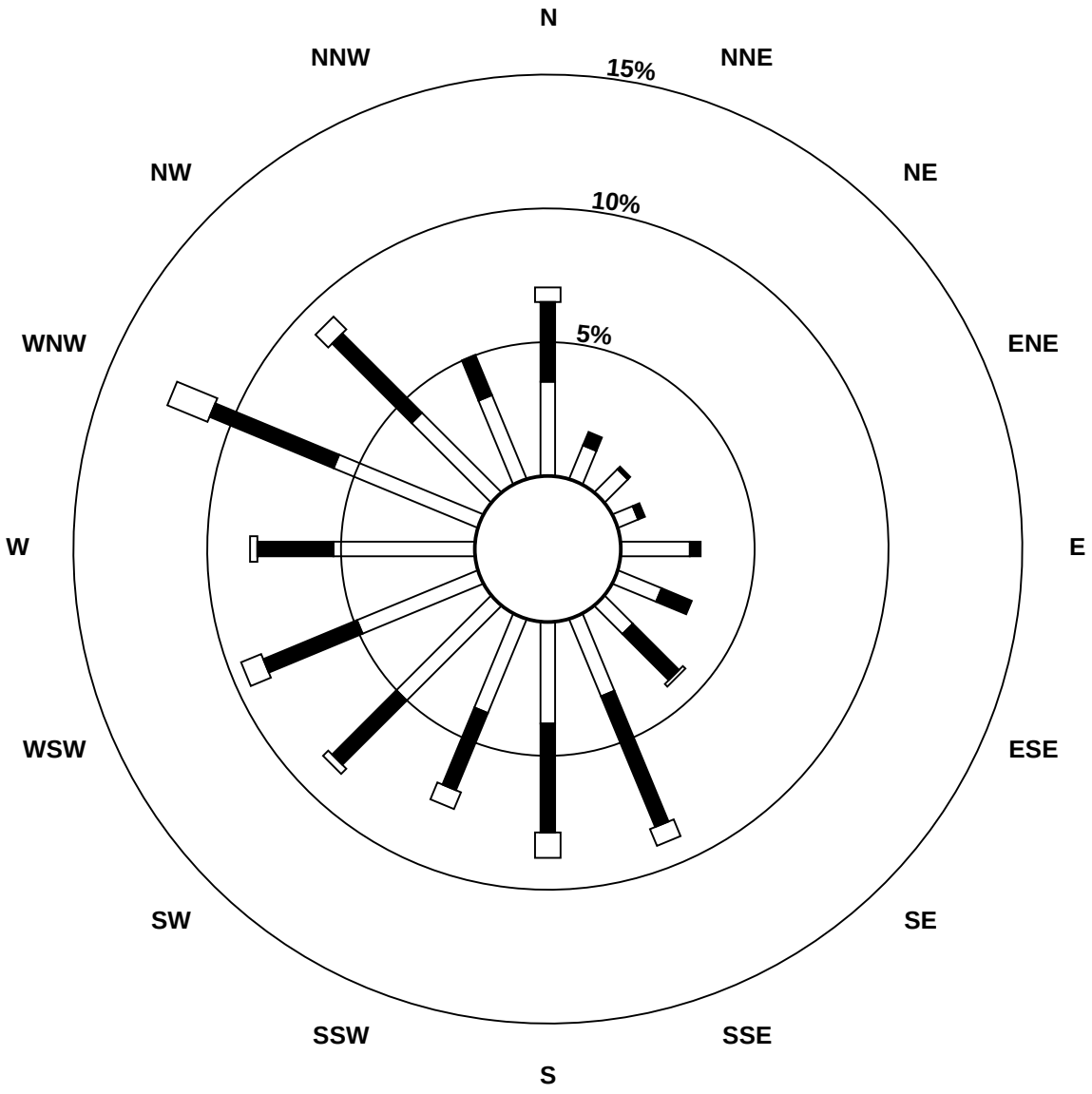
Total Number of Hours: 744

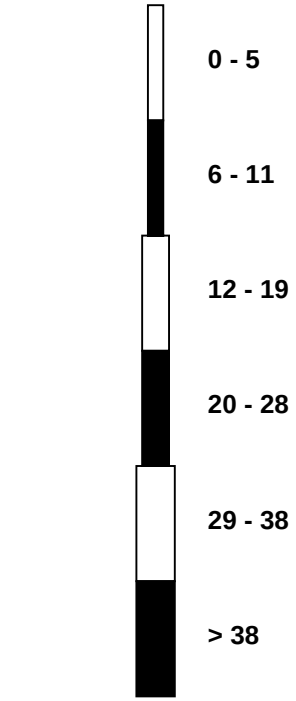
Wood Buffalo Environmental Association

Wind Rose Aug 2015

Wind Speed (WS) - km/h

Fort McKay - Bertha Ganter (AMS 1)





Total Number of Valid Hours: 738

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Speed (WS) - km/h

Fort McKay - Bertha Ganter - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 6 km/h on Aug 19 18:00

Minimum Value: 0 km/h on Aug 9 20:00

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:	738
Hours of Missing Data:	6
Hours of Calibration:	0
Percent Operational Time:	99.2

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

M - Maintenance

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Fort McKay - Bertha Ganter - August 2015

Direction of Maximum Speed: 300 deg on Aug 14 16:00
Direction of Maximum Daily Speed Average: 294.2 deg on Aug 14

Direction of Minimum Speed: 271 deg on Aug 8 15:00

Direction of Minimum Daily Speed Average: 1.1 deg on Aug 9

Monthly Average Direction: 268.2 deg

Hours in Service:	744
Hours of Data:	738
Hours of Missing Data:	6
Percent Operational Time:	99.2

Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average
1-Aug	272	279	281	306	342	337	332	316	311	219	131	34	305	306	313	311	324	356	352	312	358	298	319	313	317.3
2-Aug	288	274	231	273	209	164	167	168	139	154	163	143	144	143	151	338	343	179	154	268	300	95	251	15	170.7
3-Aug	302	308	276	291	314	310	13	111	150	113	42	32	54	49	93	108	124	144	162	157	54	352	18	23	69.1
4-Aug	10	355	357	351	342	358	352	358	341	358	358	22	16	24	93	98	128	108	81	72	137	126	79	4	38.7
5-Aug	1	0	21	8	355	360	4	13	81	84	180	249	330	183	156	217	298	21	143	169	175	160	131	114	141.4
6-Aug	81	91	61	67	90	86	95	94	114	123	153	174	110	102	72	66	128	123	132	120	119	92	80	43	107.2
7-Aug	121	129	129	116	28	304	311	351	14	313	314	282	221	144	149	125	109	97	149	181	176	214	35	148	139.3
8-Aug	168	174	155	166	118	168	151	143	142	176	157	182	139	140	271	257	164	35	52	77	123	87	10	265	150.2
9-Aug	316	277	306	301	275	308	345	159	150	163	136	125	103	175	149	137	178	172	54	9	315	261	182	195	174.0
10-Aug	197	321	161	206	280	293	275	255	225	238	236	223	223	240	247	250	235	252	263	209	228	210	221	222	241.9
11-Aug	216	188	213	191	216	193	223	194	187	225	245	279	247	257	259	262	283	286	282	214	215	292	287	239	247.1
12-Aug	269	240	216	185	203	266	268	269	255	261	269	258	273	244	252	232	245	263	257	239	223	285	292	293	255.7
13-Aug	1	201	172	194	219	210	183	182	170	171	175	176	215	219	245	193	198	213	197	207	214	206	217	285	200.4
14-Aug	298	295	290	290	270	280	284	267	288	291	293	293	294	302	300	300	304	308	303	305	303	284	252	297	294.2
15-Aug	304	308	314	315	325	352	353	352	349	355	5	4	359	352	352	348	350	333	327	335	344	317	341	319	342.8
16-Aug	287	277	278	289	276	296	288	286	154	121	215	176	149	232	343	334	321	289	249	276	291	286	288	244	281.9
17-Aug	226	250	221	201	183	190	188	187	188	180	177	202	209	216	197	355	315	295	306	337	203	219	253	238	213.1
18-Aug	301	318	297	261	291	303	293	310	344	359	73	90	74	174	166	151	157	151	176	185	196	175	177	171	180.2
19-Aug	168	165	167	166	161	173	176	176	183	191	240	233	M	M	M	281	284	289	300	296	250	277	274	238	212.5
20-Aug	262	214	262	250	253	265	284	281	292	296	288	M	M	M	298	296	308	302	301	296	292	304	296	286	286.7
21-Aug	286	287	296	272	269	265	276	299	307	307	308	317	329	319	322	330	305	305	314	304	310	305	305	302	305.8
22-Aug	301	297	293	295	294	289	298	286	288	279	297	326	323	320	314	335	6	333	311	268	237	258	266	251	303.2
23-Aug	253	257	236	253	262	254	232	194	178	160	172	162	157	172	161	156	158	161	178	175	169	223	330	162	178.3
24-Aug	193	302	206	167	255	203	195	188	190	195	228	228	236	274	246	231	243	230	216	260	286	336	332	318	231.7
25-Aug	306	305	294	296	298	322	210	315	11	3	354	3	357	356	357	353	347	326	330	335	338	343	357	6	342.6
26-Aug	341	351	350	313	314	268	256	326	19	94	85	145	125	147	153	182	201	212	209	217	221	241	286	242	199.5
27-Aug	261	247	233	243	219	187	171	153	167	154	153	162	191	196	200	197	210	216	216	198	197	210	219	187	195.0
28-Aug	247	278	256	245	259	259	274	234	228	250	235	244	259	252	252	249	237	253	262	271	223	278	354	337	253.6
29-Aug	332	283	280	180	222	258	173	197	230	173	169	173	163	157	152	166	167	163	141	122	145	137	148	159	166.6
30-Aug	82	113	317	359	341	330	316	145	229	282	282	238	218	225	209	201	287	220	163	168	177	190	193	183	219.2
31-Aug	194	253	276	260	251	213	250	194	162	165	178	236	246	236	247	251	224	235	212	214	212	227	236	254	221.9
	274.2	277.1	262.2	250.7	266.3	266.5	255.9	230.3	211.7	213.7	227.3	231.1	235.4	238.4	243.0	252.5	252.3	247.7	232.9	235.3	218.7	248.6	280.6	262.6	
	Diurnal Average																								

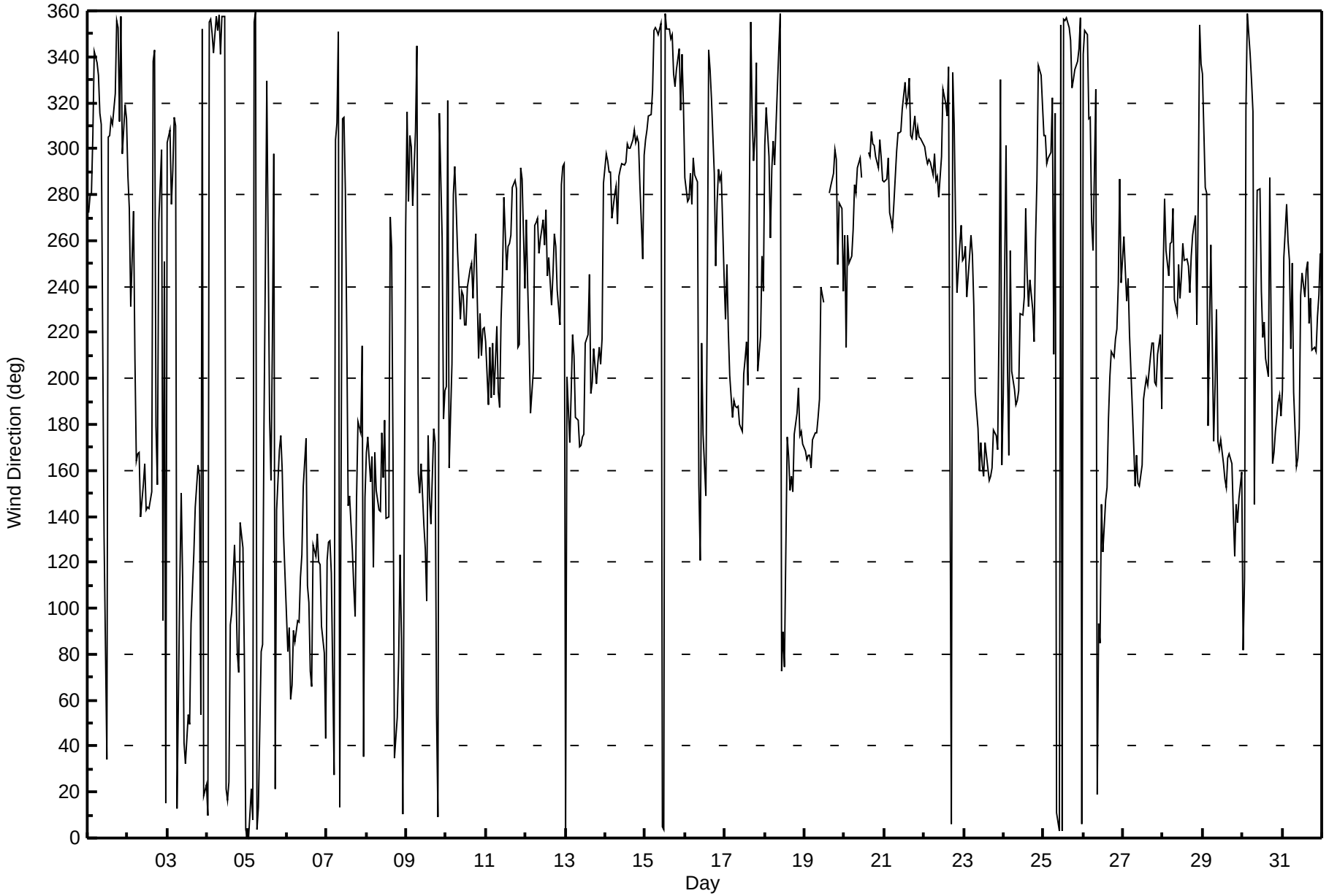
M - Maintenance
All monthly, daily, and diurnal averages have been calculated using vector methods

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction (WD) - deg

Fort McKay - Bertha Ganter - August 2015



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 104 deg on Aug 16 11:00

Minimum Value: 10 deg on Aug 30 23:00

Percentiles: P_1 = 13 P_{10} = 18 Q_1 = 24 Median = 34 Q_3 = 47 P_{90} = 59 P_{99} = 92

Hours in Service:	744
Hours of Data:	738
Hours of Missing Data:	6
Hours of Calibration:	0
Percent Operational Time:	99.2

Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Aug	11	14	21	55	28	26	43	47	47	69	103	62	48	18	24	38	56	38	29	13	50	41	36	38	103
2-Aug	35	57	37	40	28	59	35	42	20	22	24	22	25	28	37	96	81	24	42	33	32	80	31	73	96
3-Aug	40	33	20	18	59	87	84	70	30	58	60	54	59	50	52	38	39	19	25	32	54	39	23	51	87
4-Aug	25	21	30	24	35	23	22	33	31	26	35	43	37	44	34	25	18	23	24	36	20	46	54	22	54
5-Aug	19	37	39	30	17	33	35	54	53	76	93	60	81	28	92	43	28	53	23	19	20	22	19	34	93
6-Aug	30	25	39	35	28	33	27	28	24	19	36	31	34	39	43	42	39	20	15	20	19	24	24	48	48
7-Aug	45	19	18	21	66	37	21	31	65	54	69	75	75	56	54	71	55	57	15	35	58	57	68	23	75
8-Aug	18	20	13	40	21	23	19	21	16	39	36	37	26	40	99	48	43	45	83	53	54	88	33	38	99
9-Aug	30	25	28	28	24	25	60	38	53	38	51	70	78	58	28	27	48	48	52	26	29	66	38	15	78
10-Aug	45	33	70	46	39	27	39	50	41	50	46	44	46	49	48	49	47	49	48	21	26	22	25	27	70
11-Aug	30	48	41	19	37	28	94	66	34	41	50	42	48	49	50	51	40	41	43	33	20	28	23	37	94
12-Aug	42	46	39	21	37	54	63	45	55	46	48	50	53	54	54	49	56	44	52	39	32	28	17	19	63
13-Aug	93	22	21	18	23	49	20	19	23	20	21	44	48	30	48	20	25	30	21	21	15	18	31	40	93
14-Aug	23	19	34	36	40	41	38	44	42	41	35	36	37	34	32	28	33	24	25	21	21	37	66	24	66
15-Aug	18	20	22	21	23	30	29	29	30	33	33	35	35	36	36	33	36	27	23	24	27	15	22	20	36
16-Aug	52	25	18	29	34	24	47	51	83	37	104	34	54	73	76	53	29	36	44	25	14	15	16	85	104
17-Aug	46	47	43	15	13	13	17	21	29	25	26	45	43	57	70	30	33	22	27	51	48	33	59	51	70
18-Aug	22	63	43	32	18	59	27	35	46	52	73	60	86	38	42	36	19	21	29	16	13	15	14	15	86
19-Aug	14	14	14	15	15	15	15	16	20	23	49	45	M	M	M	42	45	38	30	31	54	44	47	48	54
20-Aug	38	39	49	48	47	43	41	42	35	31	38	M	M	M	33	30	25	26	23	25	34	18	23	25	49
21-Aug	37	38	27	41	56	55	49	26	26	20	22	24	31	26	31	39	29	19	33	21	17	17	17	27	56
22-Aug	23	29	27	24	21	25	22	30	31	41	35	30	40	31	27	40	74	75	19	18	43	16	36	31	75
23-Aug	29	32	38	31	15	16	41	22	49	23	27	21	22	23	21	17	19	16	15	17	17	54	62	91	91
24-Aug	60	43	87	53	40	35	43	18	24	27	53	40	50	47	53	52	59	53	28	20	17	29	21	22	87
25-Aug	15	25	22	13	21	21	35	32	56	48	39	40	36	34	35	37	29	20	14	12	15	24	31	40	56
26-Aug	21	36	38	25	24	28	38	43	61	70	70	33	45	23	30	49	40	27	14	13	25	38	25	72	72
27-Aug	53	25	38	25	14	15	24	18	24	23	21	27	29	31	35	25	31	31	27	14	15	20	59	29	59
28-Aug	49	43	56	45	55	55	49	51	46	48	49	47	49	46	53	53	53	49	61	29	45	32	33	73	73
29-Aug	27	90	77	70	51	66	28	28	55	35	38	35	28	28	22	25	23	19	45	14	21	19	36	44	90
30-Aug	39	79	42	26	25	37	26	88	48	47	65	88	58	45	31	30	41	75	18	16	12	14	10	16	88
31-Aug	61	35	23	14	24	29	28	44	18	16	33	46	48	50	53	47	37	45	25	21	18	28	38	82	82
	93	90	87	70	66	87	94	88	83	76	104	88	86	73	99	96	81	75	83	53	58	88	68	91	
	Diurnal Maximum																								

M - Maintenance

Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

Calibration Date	August 18, 2015	Last Calibration	July 7, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	Routine		
Start Time (MST)	8:10	End Time (MST)	14:05
Gas Cert Reference	SA140071A	Station temp.	21 Deg C
Cal Gas Concentration	50 ppm	Cal Gas Exp Date	26-Sep-17
Calibrator Make/Model	Sabio 4010	Serial Number	1730512
ZAG Make/Model	API 701	Serial Number	587
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2582

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 1000 ppb		PMT voltage	-614	-614
Analyzer IP address	192.168.1.43		Lamp voltage	819	808
Calculated slope	0.991630	0.996937	Chamber temp	45.1	45.0
Calculated intercept	2.126419	1.991091	Pressure	715.2	682.2
Analyzer Background	11.8	12.0	Flow	0.518	0.499
Analyzer Coefficient	1.002	0.985	Intensity	90	91

Analyzer make	Thermo 43i	Analyzer serial #	JC1501301448

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5500	0.0	0.0	-0.3	----
as found span	5500	78.1	710.0	720.1	0.986
calibrator zero	5500	0.0	0.0	0.1	----
high point	5500	78.1	710.0	711.7	0.998
second point	5500	43.8	398.2	395.5	1.007
third point	5500	21.9	199.1	196.0	1.016
as left zero	5500	0.0	0.0	-0.1	----
as left span	5500	78.1	710.0	708.2	1.003
				Average Correction Factor	1.007

Corrected As found	720.4	Previous response	713.9	% change	-0.9%

Notes:

Changed filter after as founds. Span adjusted.

Calibration Performed By: Devin Russell

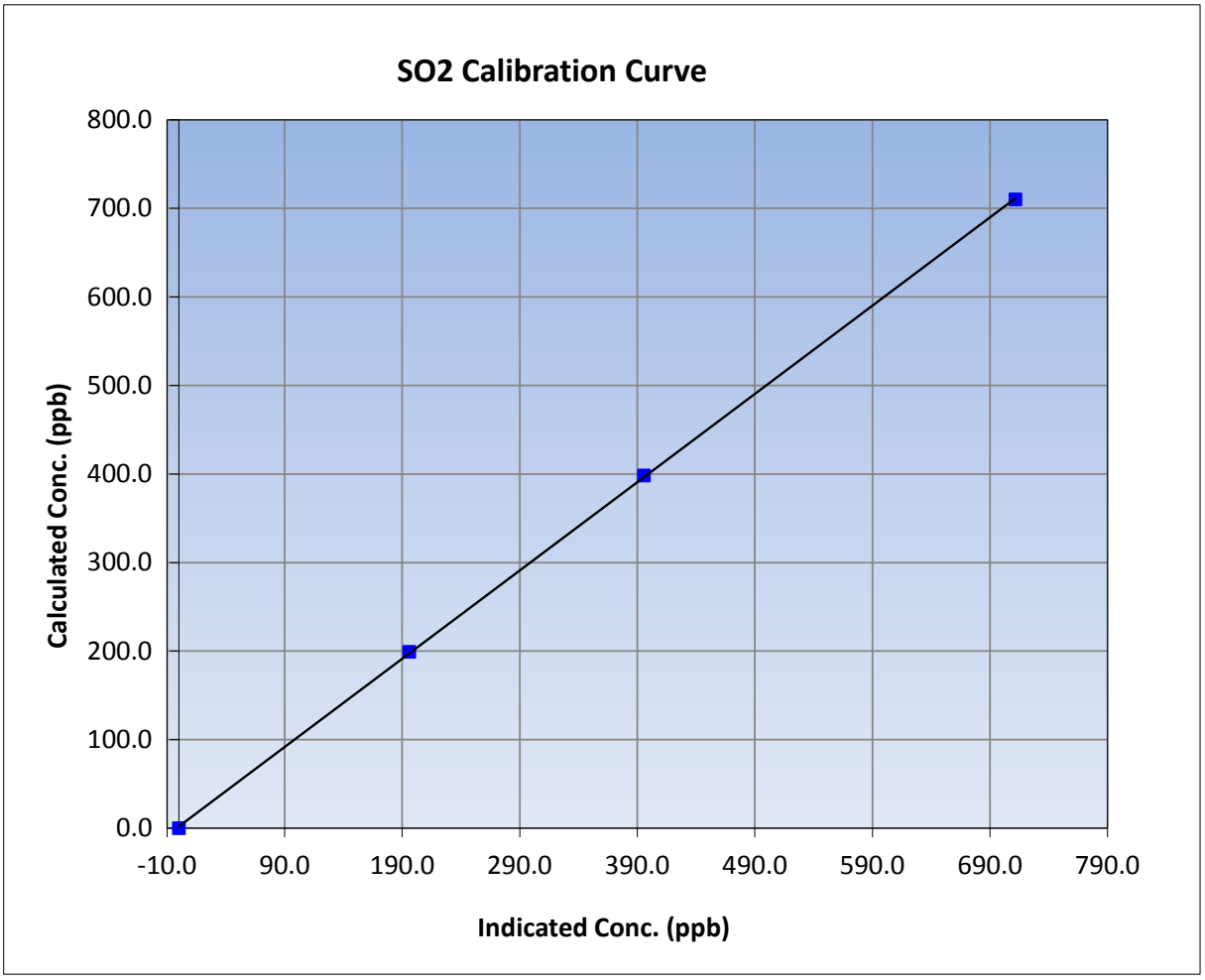
Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

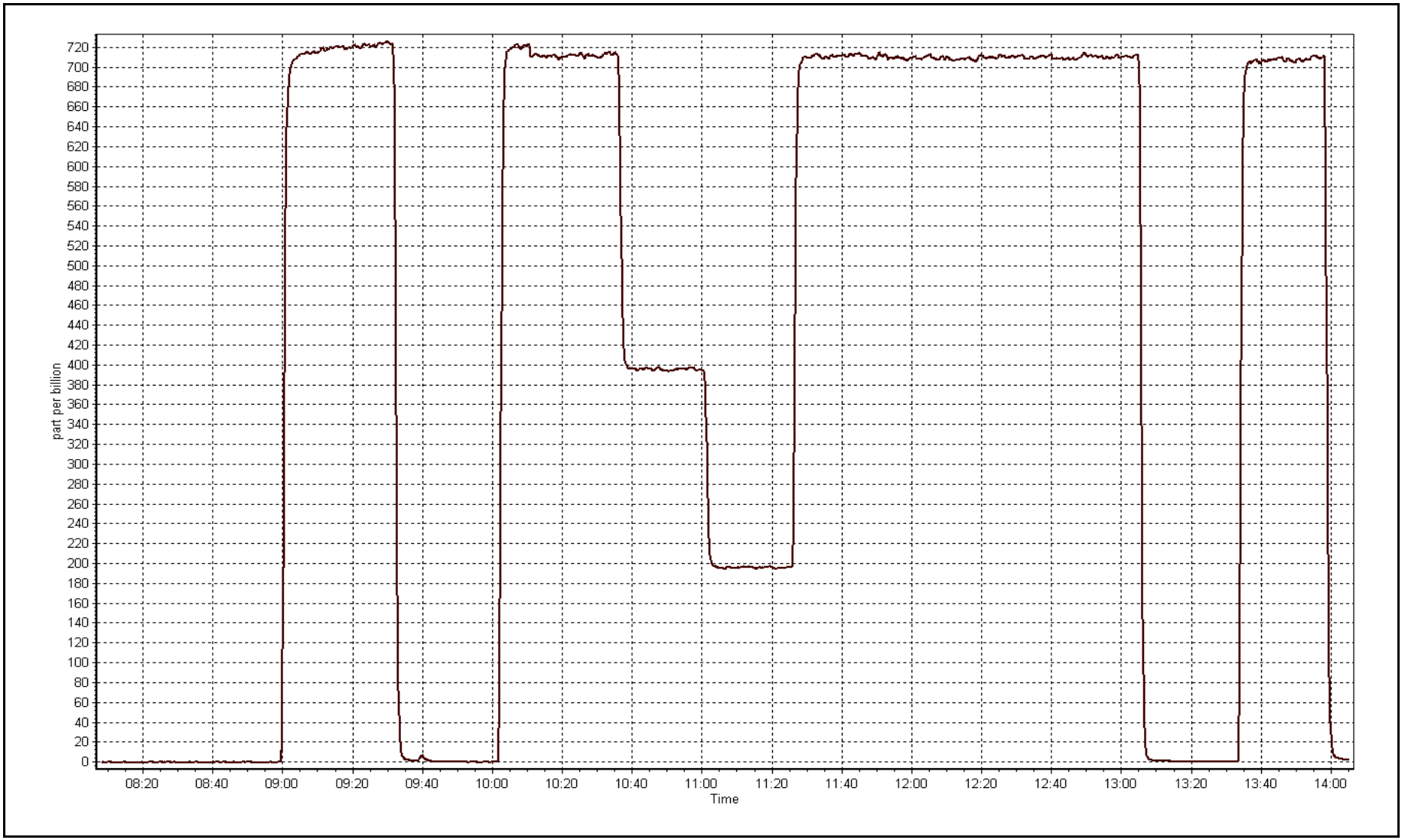
Calibration Date	August 18, 2015	Previous Calibration	July 7, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	8:10	End Time (MST)	14:05
Analyzer make	Thermo 43i	Analyzer serial #	JC1501301448

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	0.999951
710.0	711.7	0.9976		
398.2	395.5	1.0068	Slope	0.996937
199.1	196.0	1.0159		
			Intercept	1.991091



SO2 Calibration Plot Date: August 18, 2015



Wood Buffalo Environmental Association
TRS Calibration Report

W B E A

Station Information

Calibration Date	August 19, 2015	Last Calibration	July 9, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	Routine		
Start Time (MST)	10:35	End Time (MST)	14:45
Gas Cert Reference	LL27480	Station temp.	21 Deg C
Cal Gas Concentration	10.6 ppm	Cal Gas Exp Date	41264
Calibrator Make/Model	SABIO 4010	Serial Number	1730512
Dil air Make/Model	API 701	Serial Number	587
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2582
SO2 gas concentration	50 ppm	SO2 gas cert/exp	SA140071A September-26-17

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-860	-860
Analyzer IP address	192.168.1.42		Lamp voltage	1144	1132
Calculated slope	0.998896	0.997013	Chamber temp	45	45
Calculated intercept	0.207305	0.178406	Pressure	661.8	658.5
Analyzer Background	1.81	1.89	Flow	0.405	0.406
Analyzer Coefficient	1.006	1.006	Intensity	80	80
			Converter temp.	800	800

Analyzer make/model	Thermo 43i-TLE	Analyzer serial #	1218153461
Converter make/model	CDN-101	Converter serial #	470

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6500	0.0	0.0	-0.2	----
as found span	6500	46.0	75.0	74.8	1.003
SO2 scrubber check	5500	21.9	199.1	0.5	----
calibrator zero	6500	0.0	0.0	0.0	----
high point	6500	46.0	75.0	75.2	0.998
second point	6500	24.6	40.1	40.0	1.003
third point	6500	12.3	20.1	19.8	1.015
as left zero	6500	0.0	0.0	0.0	----
as left span	6500	46.0	75.0	76.6	0.979
				Average Correction Factor	1.006

Corrected As found	75.0	Previous response	74.9	% change	-0.1%

Notes:

inlet filter changed after as founds. Scrubber check completed after as lefts.

Calibration Performed By: Devin Russell

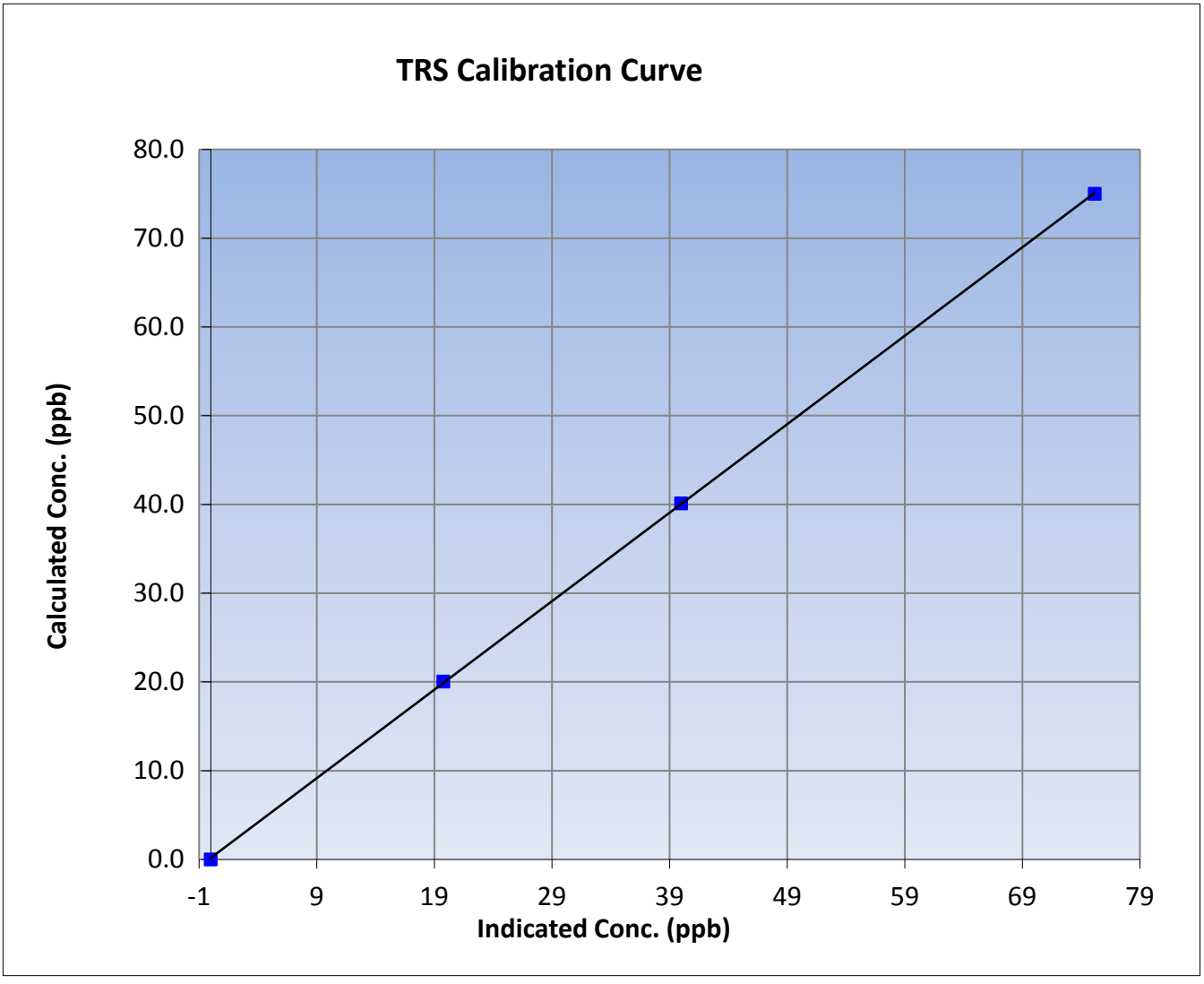
Wood Buffalo Environmental Association
TRS Calibration Report

Station Information

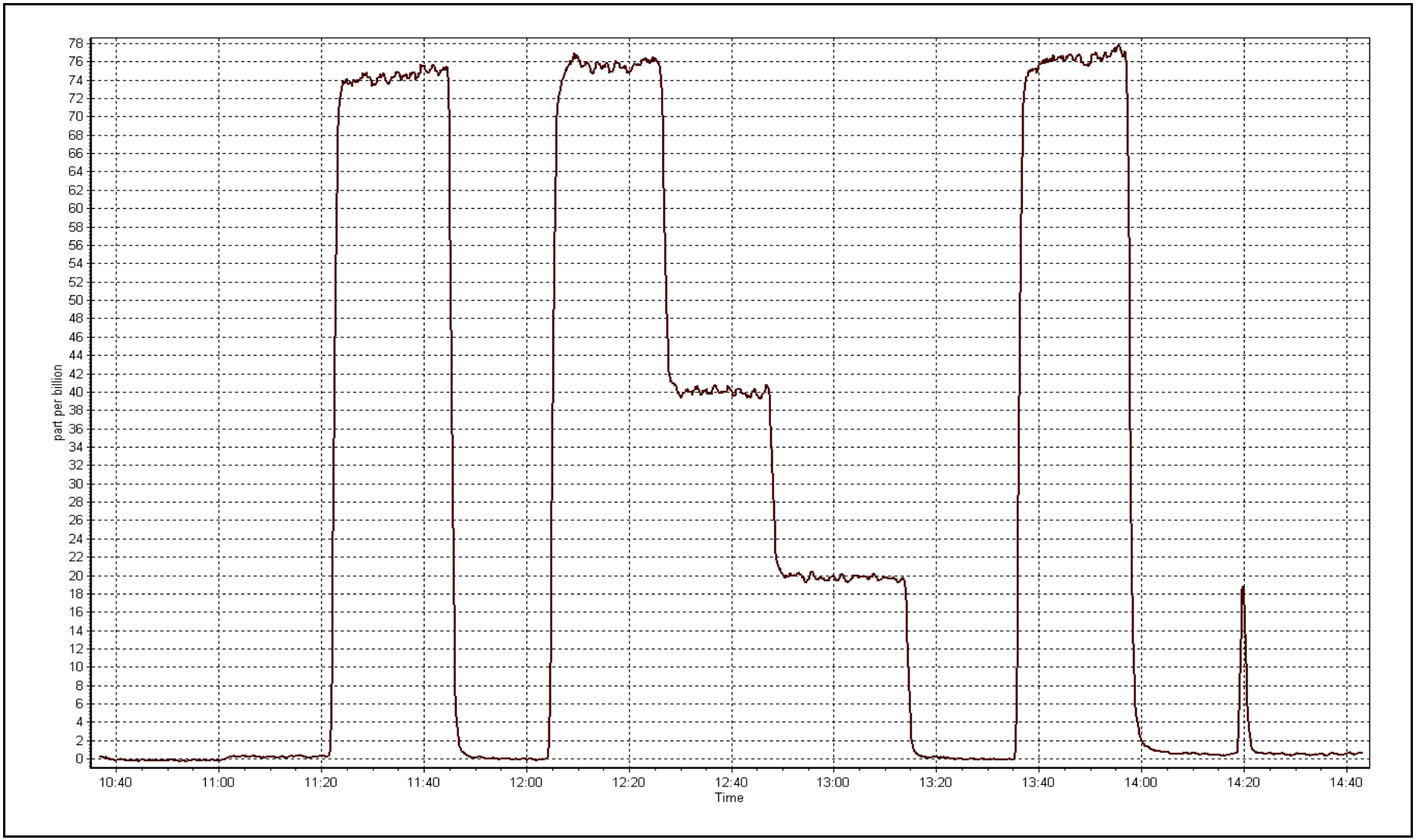
Calibration Date	August 19, 2015	Previous Calibration	July 9, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	10:35	End Time (MST)	14:45
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1218153461

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999976
75.0	75.2	0.9982		
40.1	40.0	1.0034	Slope	0.997013
20.1	19.8	1.0151		
			Intercept	0.178406



TRS Calibration Plot Date: August 19, 2015



Wood Buffalo Environmental Association
THC / NMHC Calibration Report

Station Information

Calibration Date	August-18-15	Last Calibration	July-07-15
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1

Reason: Routine

Start Time (MST)	8:10	End Time (MST)	14:05
Gas Cert Reference	SA140071A	Cal Gas Expiry Date	September-26-17
CH4 Cal Gas Conc.	499.0 ppm	CH4 Equiv Conc.	1054.5 ppm
C3H8 Cal Gas Conc.	202.0 ppm	Station temp.	20 Deg C
Calibrator Model	Sabio 4010	Serial Number	1730512
ZAG make/model	Teledyne API 701	Serial Number	587
DACS make/model	Campbell Scientific CR3000	Serial Number	2582

Analyzer Information

	Before	*After*		*Before*	*After*
THC Range (ppm)	0 - 50 ppm		Column Temp	75.0	75.1
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	175.0	175.0
Analyzer IP address	192.168.1.55		Flame Temp	405.0	405.0
THC Calc slope	0.999391	0.998102	Carrier Pressure	40.4	40.4
THC Calc intercept	0.056014	0.063084	Fuel Pressure	42.2	42.2
NMHC Calc slope	1.000242	0.998143	Air Pressure	32.3	32.3
NMHC Calc intercept	0.022577	0.022662			

Analyzer make	Thermo 55i	Analyzer serial #	1331259520

THC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5500	0.0	0.00	0.00	----
as found span	5500	78.1	14.97	14.87	1.007
calibrator zero	5500	0.0	0.00	0.00	----
high point	5500	78.1	14.97	14.99	0.999
second point	5500	43.8	8.40	8.28	1.014
third point	5500	21.9	4.20	4.10	1.024
as left zero	5500	0.0	0.00	0.00	----
as left span	5500	78.1	14.97	14.92	1.004
				Average Correction Factor	1.012

Corrected As found	14.87	Previous response	14.93	% change	0.4%

Notes:

Filter changed after as founds. Span adjusted.

Calibration Performed By: Devin Russell

Wood Buffalo Environmental Association

THC / NMHC Calibration Report

NMHC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5500	0	0.00	0.00	----
as found span	5500	78.1	7.89	7.87	1.002
calibrator zero	5500	0.0	0.00	0.00	----
high point	5500	78.1	7.89	7.90	0.998
second point	5500	43.8	4.42	4.38	1.010
third point	5500	21.9	2.21	2.18	1.015
as left zero	5500	0.0	0.00	0.00	----
as left span	5500	78.1	7.89	7.87	1.002
				Average Correction Factor	1.008

Corrected As found	7.87	Previous response	7.86	% change	-0.1%

CH4 Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5500	0	0.00	0.00	----
as found span	5500	78.1	7.09	6.99	1.014
calibrator zero	5500	0.0	0.00	0.00	----
high point	5500	78.1	7.09	7.09	0.999
second point	5500	43.8	3.97	3.90	1.019
third point	5500	21.9	1.99	1.92	1.035
as left zero	5500	0.0	0.00	0.00	----
as left span	5500	78.1	7.09	7.04	1.007
				Average Correction Factor	1.018

Corrected As found	6.99	Previous response	7.06	% change	1.1%

Wood Buffalo Environmental Association

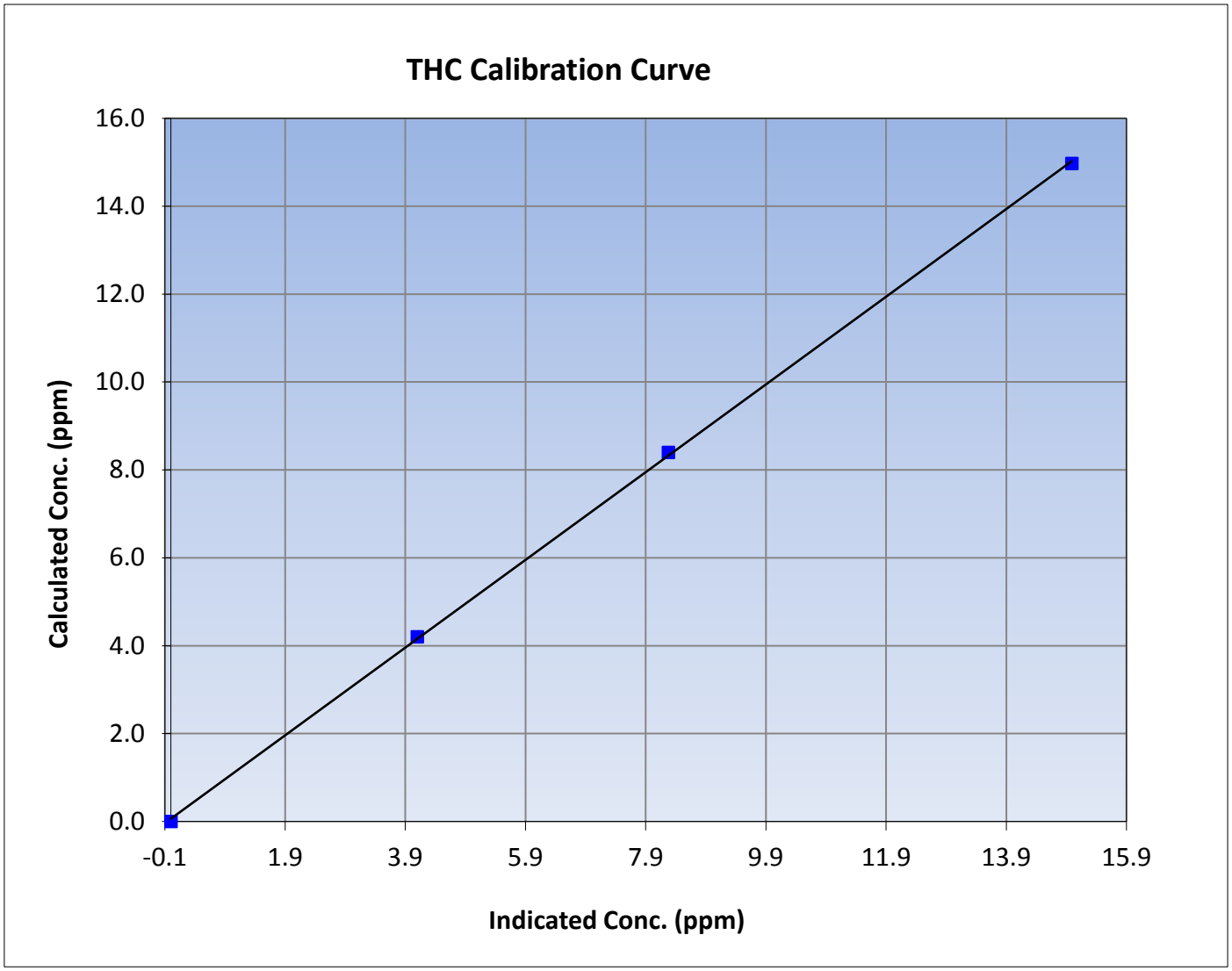
THC Calibration Summary

Station Information

Calibration Date	August 18, 2015	Previous Calibration	July 7, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	8:10	End Time (MST)	14:05
Analyzer make	Thermo 55i	Analyzer serial #	1331259520

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999891
14.97	14.99	0.9989		
8.40	8.28	1.0142	Slope	0.998102
4.20	4.10	1.0241		
			Intercept	0.063084



Wood Buffalo Environmental Association

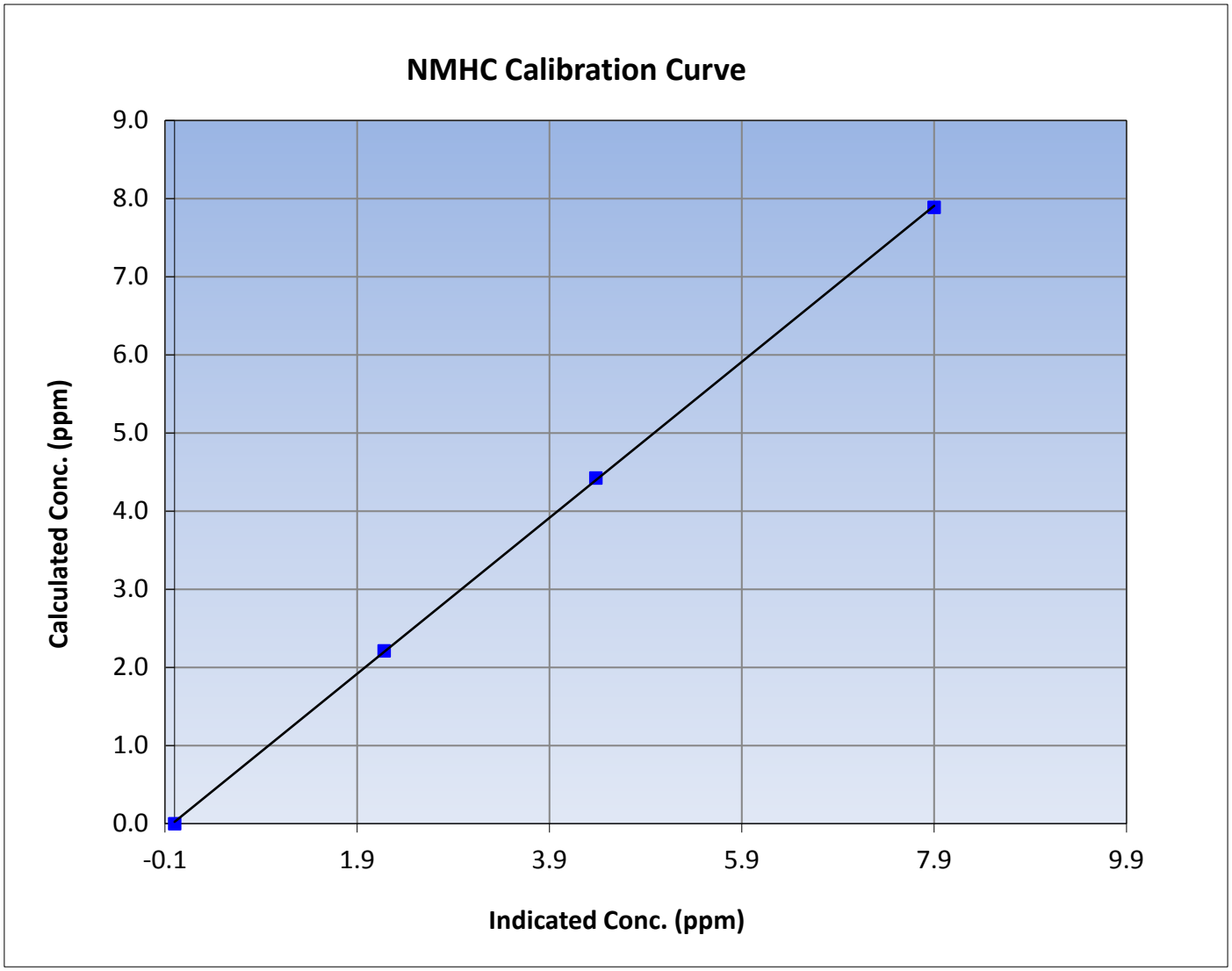
NMHC Calibration Summary

Station Information

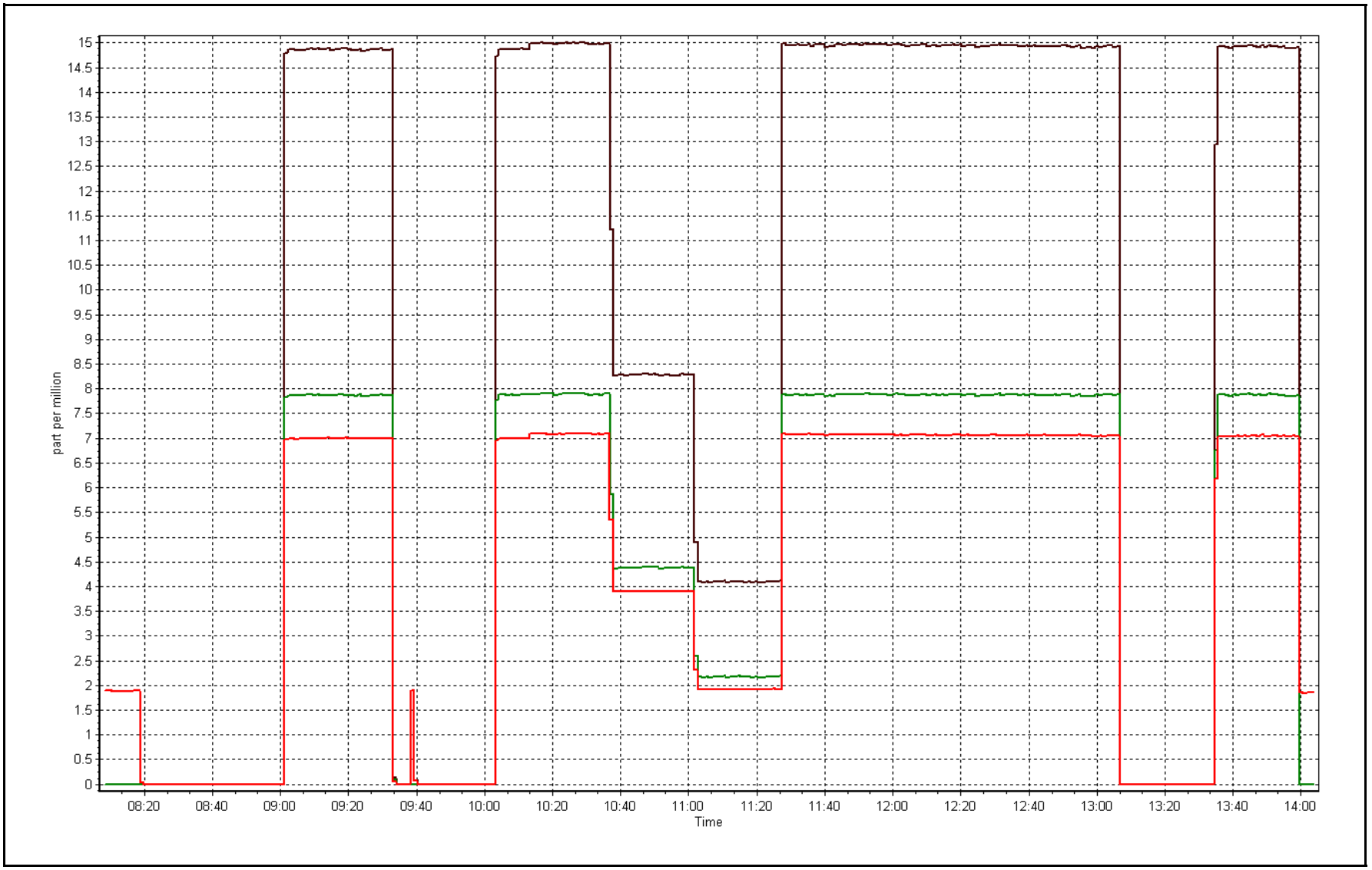
Calibration Date	August 18, 2015	Previous Calibration	July 7, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	8:10	End Time (MST)	14:05
Analyzer make	Thermo 55i	Analyzer serial #	1331259520

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999943
7.89	7.90	0.9985		
4.42	4.38	1.0100	Slope	0.998143
2.21	2.18	1.0146		
			Intercept	0.022662



THC / NMHC Calibration Plot Date: August 18, 2015



Wood Buffalo Environmental Association
O_3 Calibration Report

W B E A

Station Information

Calibration Date	August 19, 2015	Previous Calibration	July 9, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	Routine		
Start Time (MST)	7:50	End Time (MST)	11:25
NO2 GPT Ref date	July-08-15	Transfer Standard	N/A
		Station temp.	21 Deg C
Calibrator Make/Model	SABIO 4010	Serial Number	1730512
ZAG make/model	Teledyne API 701	Serial Number	587
DACS make/model	Campbell Scientific CR3000	Serial Number	2582

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 500 ppb		Bench temp.	26.6	26.3
Analyzer IP address	192.168.1.48		Lamp temp.	53.6	53.5
Calculated slope	1.001773	0.997534	Pressure	655.5	653.4
Calculated intercept	0.493319	-1.351783	Flow cell A	0.718	0.717
Analyzer Background	-2.4	-4.5	Flow cell B	0.721	0.706
Analyzer Coefficient	0.982	0.972	Cell A Intensity	76380	75155
			Cell B Intensity	71560	70613

Analyzer make	Thermo 49i	Analyzer serial #	1300156233

Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator Lamp Intensity (mA)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.00	0.0	-1.3	----
as found span	5500	0.98	394.6	397.0	0.994
calibrator zero	5500	0.00	0.0	0.9	----
high point	5000	0.98	394.6	396.4	0.995
second point	5000	0.56	203.9	206.8	0.986
third point	5000	0.34	105.2	106.8	0.985
as left zero	5500	0.00	0.0	2.8	----
as left span	5000	0.98	394.6	393.1	1.004
				Average Correction Factor	0.989

Corrected As found	398.3	Previous response	393.4	% change	-1.2%

Notes:

Changed filter after as founds. Zero and span adjusted.

Calibration Performed By: Devin Russell

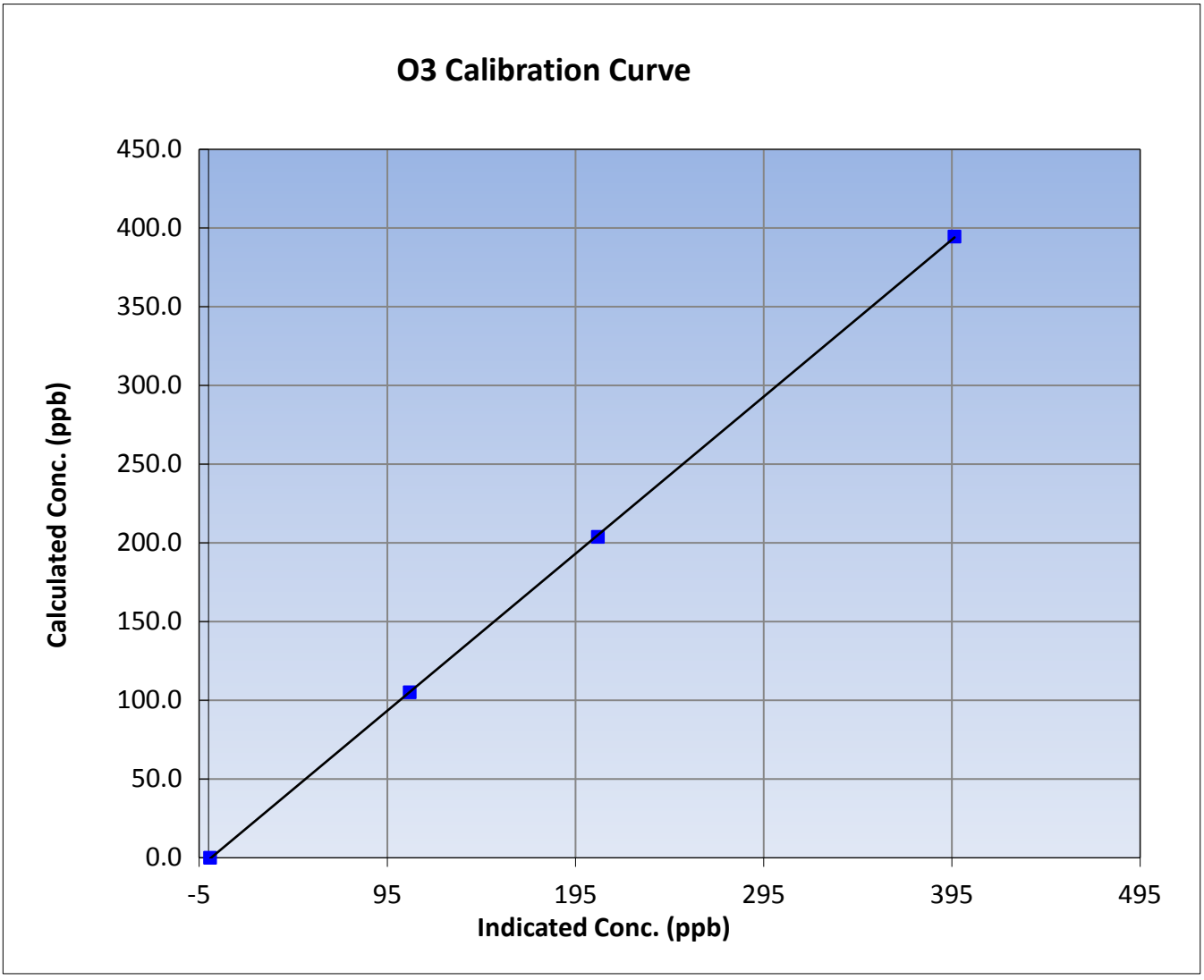
Wood Buffalo Environmental Association
O3 Calibration Report

Station Information

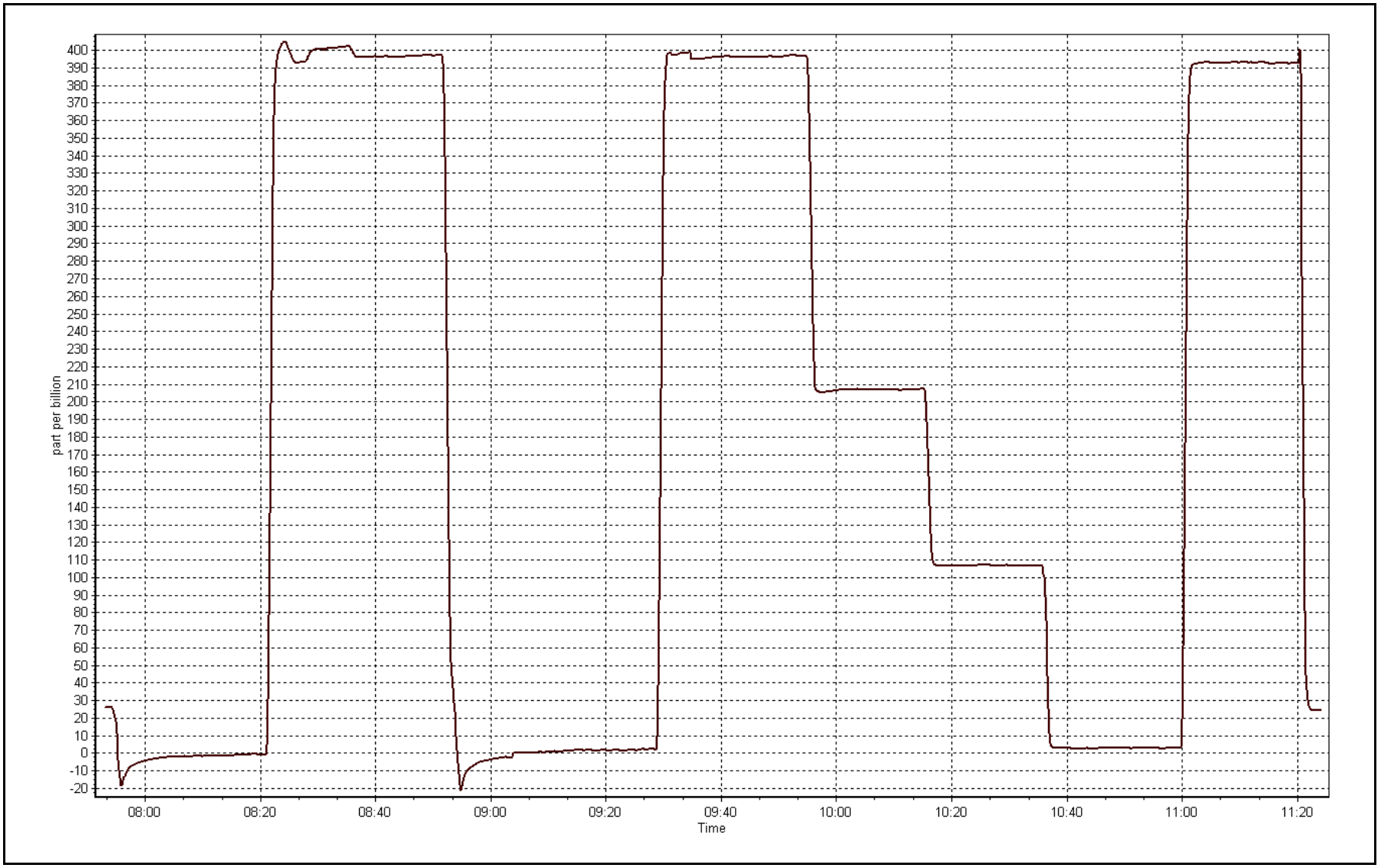
Calibration Date	August-19-15	Previous Calibration	July 9, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	7:50	End Time (MST)	11:25
Analyzer make	Thermo 49i	Analyzer serial #	1300156233

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.9	----	Correlation Coefficient	0.999981
394.6	396.4	0.9955		
203.9	206.8	0.9860	Slope	0.997534
105.2	106.8	0.9849		
			Intercept	-1.351783



O3 Calibration Plot Date: August 19, 2015



Wood Buffalo Environmental Association
NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	August 18, 2015	Previous Calibration	July 8, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	Routine		
Start Time (MST)	8:10	End Time (MST)	14:05
NO Cal Gas Conc	52.8 ppm	Gas Cert Reference	SA140071A
NOx Cal Gas Conc	52.8 ppm	Cal Gas Expiry Date	September 26, 2017
Calibrator	Sabio 4010	Serial Number	1730512
Zero air Generator	Teledyne API T701	Serial Number	587

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	2582

Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	1.000016	1.001043	1.010025
	Data Offset	-0.257864	0.050304	-0.255120
Current Calibration	Data Slope	0.998881	0.997847	1.002235
	Data Offset	2.361433	2.324574	1.155273

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1218153357

Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
NO coefficient	0.744		0.695	
NOX coefficient	1.000		0.998	
NO2 coefficient	1.000		1.000	
NO bkgrnd	5.6		5.2	
NOX bkgrnd	5.7		5.3	
Chamber Temp	50.4	Deg C	50.5	Deg C
Moly Temp	325.5	Deg C	323.7	Deg C
PMT voltage	-850	V	-850.5	V
PMT Temp	-2.9	Deg C	-2.7	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	179.1	mmHg	183.3	mmHg
R Cell Press Nox	179.1	mmHg	183.3	mmHg
NO sample flow	0.511	lpm	0.543	lpm
Nox sample Flow	0.511	lpm	0.543	lpm

Notes:

Filter changed after as founds. Span around 7% high, due to pump and charcoal srubber change last calibration. Span adjusted.

Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: August 18, 2015 Station Number: AMS 1

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5500	0.0	0.0	0.0	0.0	0.1	0.1	0.0	----	----
as found span	5500	78.1	749.8	749.8	0.0	804.7	803.0	1.7	0.9317	0.9337
calibrator zero	5500	0.0	0.0	0.0	0.0	0.2	0.3	0.0	----	----
high point	5500	78.1	749.8	749.8	0.0	749.9	750.8	-0.8	0.9998	0.9987
second point	5500	43.8	420.5	420.5	0.0	416.8	417.2	-0.4	1.0090	1.0079
third point	5500	21.9	210.2	210.2	0.0	205.7	206.0	-0.3	1.0221	1.0208
as left zero	5500	0.0	0.0	0.0	0.0	0.3	0.1	0.1	----	----
as left span	5500	78.1	749.8	355.5	394.2	751.3	372.1	379.2	0.9980	0.9555
								Average Correction Factor	1.0103	1.0091

Corrcted As found NO_X= 804.5 NO= 802.9 Percent Change NO_X= -6.8% NO= -6.7%

Previous Response NO_X= 750.0 NO= 748.9

GPT Calibration Data

Dilution Flow 5500 ccm Source Gas Flow 78.10 ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
Cal zero			0.0			0.0			N/A	
1st NO2 (300)	----	355.5	394.6	748.7	355.5	393.1	0.9874	1.0000	1.0036	99.6%
2nd NO2 (200)	----	546.2	203.9	747.8	546.2	201.6	0.9886	1.0000	1.0113	98.9%
3rd NO2 (100)	----	644.9	105.2	747.6	644.9	102.7	0.9889	1.0000	1.0239	97.7%
4th NO2 (0)	750.1	----	-1.1	749.0	750.1	-1.1	0.9870	1.0000	N/A	----
					Average Correction Factor		0.9880	1.0000	1.0129	98.7%

Calibration Performed By: Devin Russell

Wood Buffalo Environmental Association

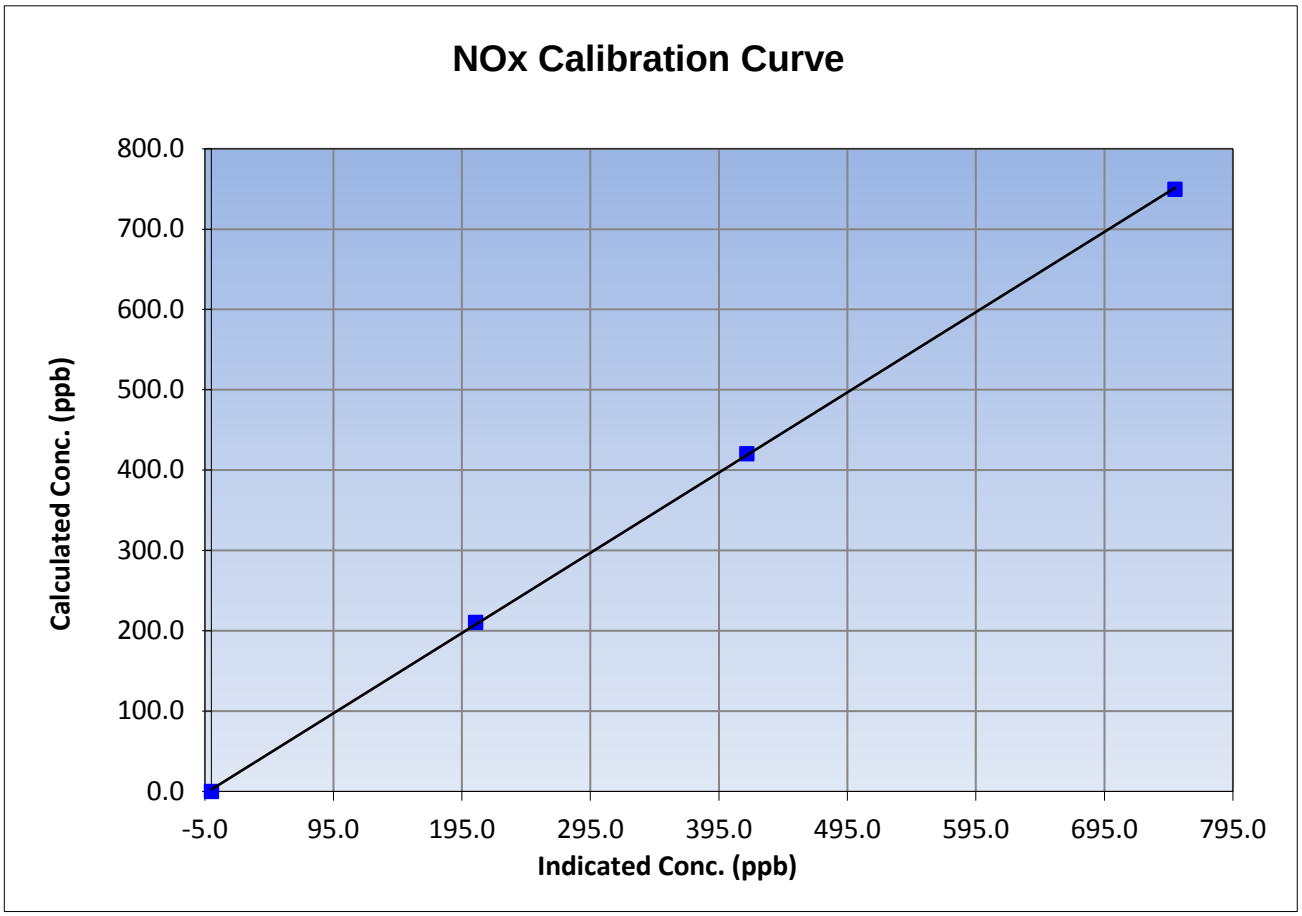
NO_X Calibration Summary

Station Information

Calibration Date	August 18, 2015	Previous Calibration	July 8, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	8:10	End Time (MST)	14:05
Analyzer make	Thermo 42i	Analyzer serial #	1218153357

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	----	Correlation Coefficient	0.999939
749.8	749.9	0.9998		
420.5	416.8	1.0090	Slope	0.998881
210.2	205.7	1.0221		
			Intercept	2.361433



Wood Buffalo Environmental Association

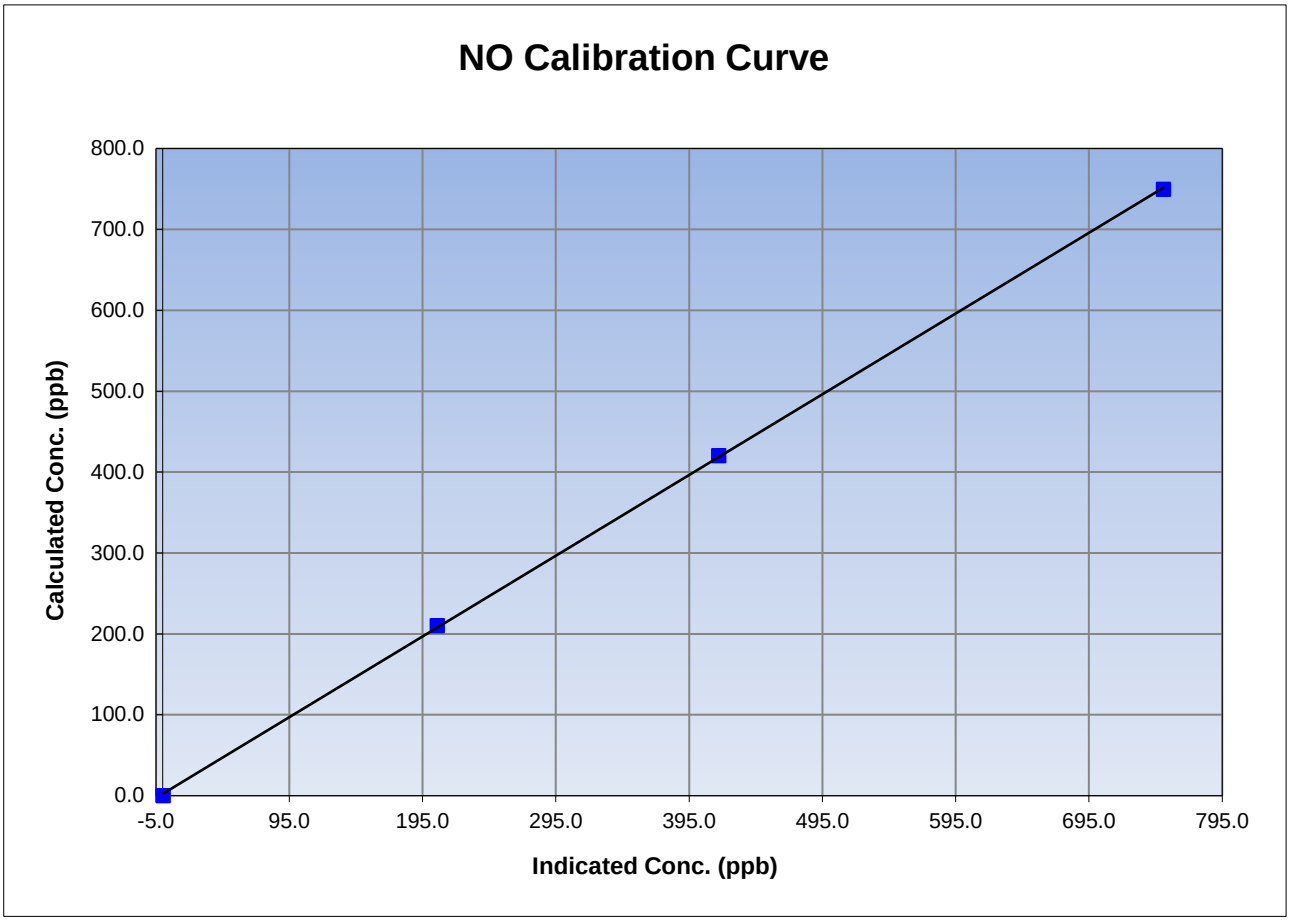
NO Calibration Summary

Station Information

Calibration Date	August 18, 2015	Previous Calibration	July 8, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	8:10	End Time (MST)	14:05
Analyzer make	Thermo 42i	Analyzer serial #	1218153357

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.3	N/A	Correlation Coefficient	0.999939
749.8	750.8	0.9987		
420.5	417.2	1.0079	Slope	0.997847
210.2	206.0	1.0208		
			Intercept	2.324574



Wood Buffalo Environmental Association

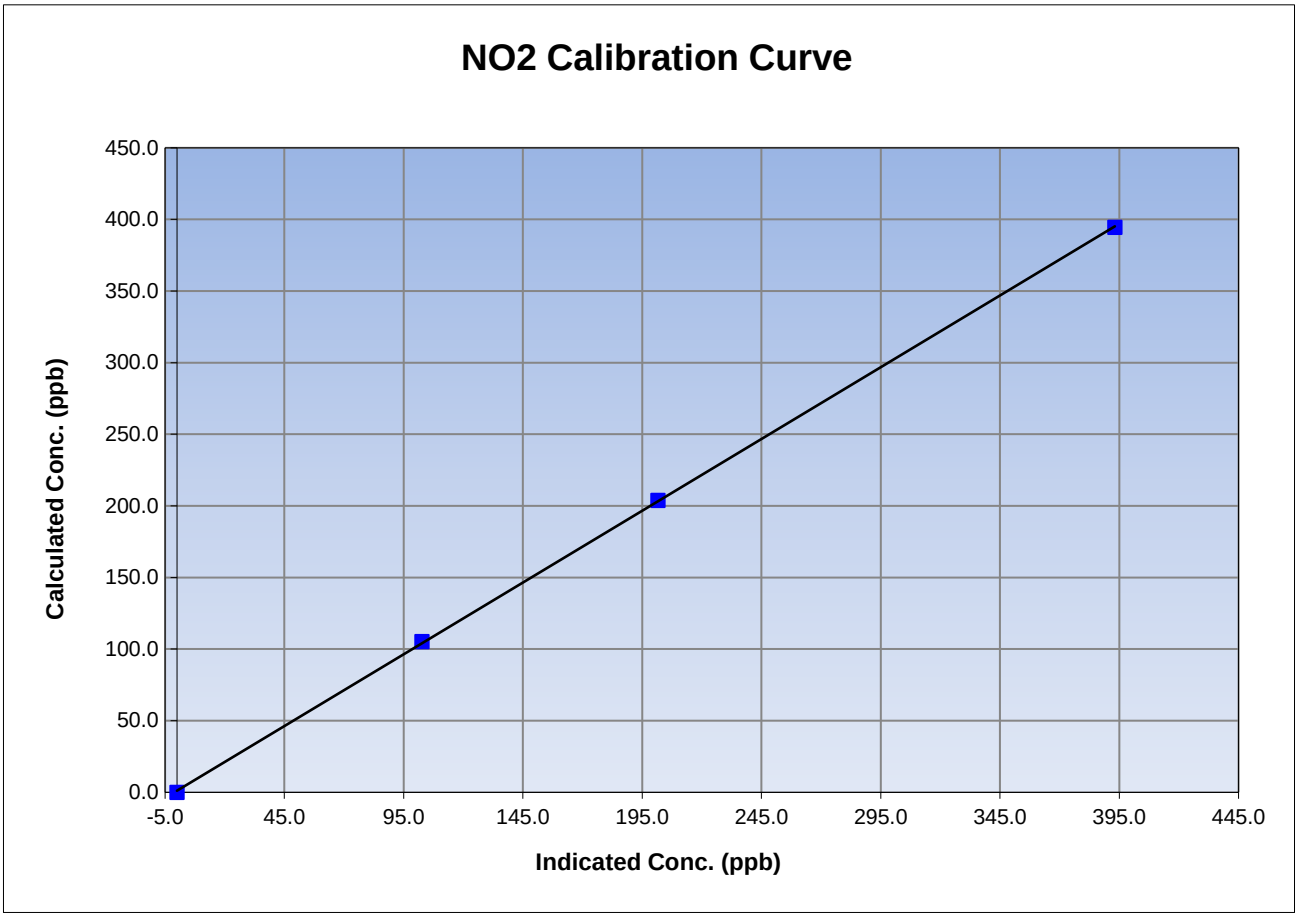
NO_2 Calibration Summary

Station Information

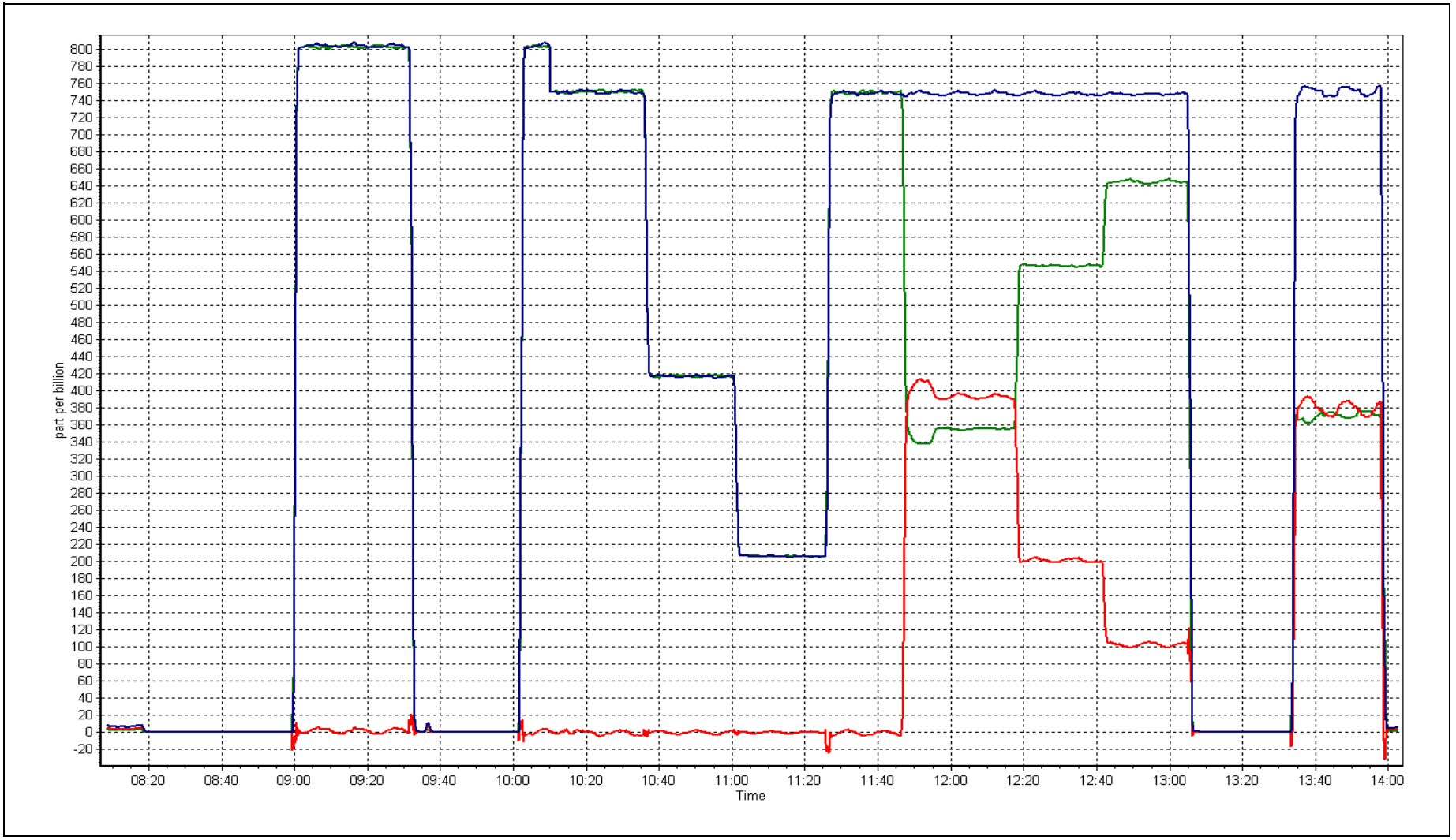
Calibration Date	August 18, 2015	Previous Calibration	July 8, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	8:10	End Time (MST)	14:05
Analyzer make	Thermo 42i	Analyzer serial #	1218153357

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999962
394.6	393.1	1.0036		
203.9	201.6	1.0113	Slope	1.002235
105.2	102.7	1.0239		
			Intercept	1.155273



NOx, NO & NO_2 Calibration Plot Date: August 18, 2015



Wood Buffalo Environmental Association
N_t-NO_X-NH_3 Calibration Report

Station Information

Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
NOX Calibration Date	August 18, 2015	NOX Previous Cal Date	July 8, 2015
NH3 Calibration Date	August 18, 2015	NH3 Previous Cal Date	July 8, 2015

Reason: Routine

Start Time (MST)	11:00		End Time (MST)	17:13	
			Station Temperature	21.0	Deg C
Calibrator	Sabio 4010		Serial Number	14300410	
NH3 Cal Gas Conc	192	ppm	NH3 Expiry Date / SN	3/Mar/2012	LL156612
NOx Cal Gas Conc	52.8	ppm	NO Expiry Date / SN	26/Sep/2017	SA140071A
NO Cal Gas Conc	52.8	ppm			

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	2582

Parameter		NH3	Nt	NOx	NO	NO2
Cal Stats As Found	Data Slope	1.017379	1.007447	0.998277	0.997480	1.001476
	Data Offset	-0.779009	-1.396697	2.638581	2.348379	0.687962
Cal Stats After	Data Slope	0.994142	0.984511	1.000291	0.999053	0.993697
	Data Offset	0.916066	0.491531	2.280278	3.001943	0.722890
IP address		192.168.1.17				

Analyzer Information

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

Test Point	before		after	
NH3 Conc range	0-2500	ppb	2500	ppb
NOX Conc range	0-1000	ppb	1000	ppb
NO BKG	-0.1	ppb	0.0	ppb
NOx BKG	0.0	ppb	0.0	ppb
Nt BKG	0.1		0.1	
NO coefficient	1.140		1.143	
NO2 coefficient	1.000	ppb	1.000	ppb
NOx coefficient	1.233		1.243	
NH3 coefficient	0.895		0.900	
Nt coefficient	1.246		1.283	
NH3 conv temp	825	DegC	825	Deg C
Chamber Temp	50.0	Deg C	50.0	Deg C
Moly Temp	316.3	Deg C	316.3	Deg C
PMT Temp	7.0	Deg C	7.0	Deg C
O3 flow	84.0	ccm	84.0	ccm
R Cell Press	4.6	mmHg	4.6	mmHg
PMT Voltage	645.0	v	645.0	v
Sample Flow 1 NO	515.0	ccm	515.0	ccm
Sample Flow 2 Nox	521.0	ccm	521.0	ccm
Sample Flow 3 Nt	550.0	ccm	550.0	ccm

Notes:

Filter changed after as founds. Changed "filter delay time" from 2 minutes back to 12 minutes.

Wood Buffalo Environmental Association

$Nt\text{-}NO_x\text{-}NH_3$ Calibration Report

Station Information

Calibration Date: August 18, 2015 Station Number: AMS 1

NH3 Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated Nt conc (ppb)	Calculated NOx conc (ppb)	Calculated NH3 conc (ppb)	Indicated Nt conc (ppb)	Indicated NOx conc (ppb)	Indicated NH3 conc (ppb)	Nt Correction factor	NH3 Correction factor
as found zero	5500	0.0	0.0	0.0	0.0	-0.8	-0.3	-0.4	----	----
as found NO	5500	78.1	749.8	749.8	----	724.3	743.2	-18.9	1.035	----
calibrator zero	5500	0.0	0.0	0.0	0.0	-0.2	-0.1	-0.1	----	----
high NO point	5500	78.1	749.8	749.8	----	749.9	748.7	1.6	1.000	----
NO/O3 point	5500	78.1	749.8	749.8	----	759.3	748.5	10.7	0.987	----
as found NH3	6500	67.7	1999.8	NA	1999.8	2045.0	21.0	2030.0	0.978	0.985
first NH3	6500	67.7	1999.8	NA	1999.8	2032.0	20.3	2012.0	0.984	0.994
second NH3	6500	33.9	1001.4	NA	1001.4	1013.0	10.3	1003.0	0.989	0.998
third NH3	6500	17.0	502.2	NA	502.2	511.6	6.3	505.3	0.982	0.994
								Average Correction Factor	0.9936	0.9953

NH3 Corrected As Found	NH3 =	2030.4 ppb	Previous Response	NH3 =	1966.4 ppb	NH3 percent change	-3.2%
Nt Corrected As Found	Nt =	725.1 ppb	Previous Response	Nt =	745.6 ppb	Nt percent change	2.8%
NOx Corrected As Found	NOx =	743.6 ppb	Previous Response	NOx =	748.4 ppb	NOx percent change	0.7%

Wood Buffalo Environmental Association

$NO_X(NH_3)$ Calibration Report

Station Information

Calibration Date: August 18, 2015 Station Number: AMS 1

NOX / NO / Nt Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated Nt conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated Nt conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5500	0.0	0.0	0.0	0.0	-0.3	-0.2	-0.8	----	----
as found span	5500	78.1	749.8	749.8	749.8	743.2	747.0	724.3	1.0088	1.0037
calibrator zero	5500	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.2	----	----
high point	5500	78.1	749.8	749.8	749.8	748.7	750.0	749.9	1.0014	0.9997
second point	5500	43.8	420.5	420.5	420.5	416.4	414.1	416.8	1.0097	1.0153
third point	5500	21.9	210.2	210.2	210.2	206.0	205.8	205.1	1.0208	1.0215
								Average Correction Factor	1.0106	1.0122

	Nt	NOX	NO	NO2
Corrected As found	725.1	743.6	747.2	396.3
Previous Response	745.6	748.4	749.3	392.2
Percent Change	2.8%	0.7%	0.3%	-1.0%

GPT Calibration Data

Total Flow 5500 ccm Source Gas Flow 78.10 ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
Cal zero			0.0			-1.5			----	
1st NO2 (300)	----	356.6	393.5	751.3	356.6	394.7	0.9980	1.0000	0.9968	100.3%
2nd NO2 (200)	----	548.7	201.3	751.2	548.7	202.5	0.9981	1.0000	0.9942	100.6%
3rd NO2 (100)	----	646.4	103.7	750.6	646.4	104.3	0.9989	1.0000	0.9944	100.6%
4th NO2 (0)	750.0	----	-1.5	748.5	750.0	-1.5	1.0017	1.0000	----	----
					Average Correction Factor		0.9991	1.0000	0.9951	100.5%

Calibration Performed By: Devin Russell

Wood Buffalo Environmental Association

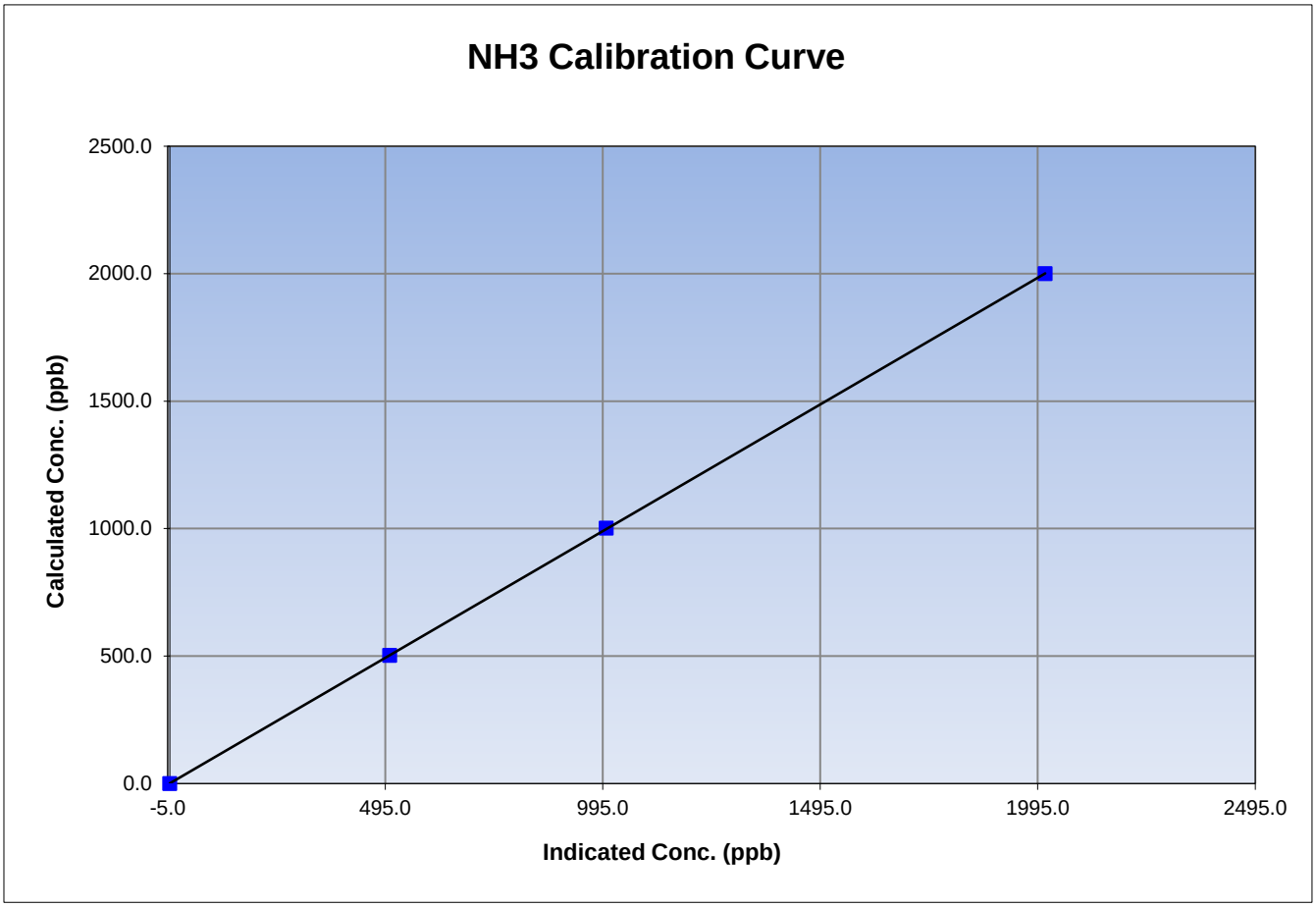
NH3 Calibration Summary

Station Information

Calibration Date	August 18, 2015	Previous Calibration	July 8, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	11:00	End Time (MST)	17:13
Analyzer make	API T201	Analyzer serial #	152

NH3 Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999993
1999.8	2012.0	0.9939		
1001.4	1003.0	0.9984	Slope	0.994142
502.2	505.3	0.9938		
			Intercept	0.916066



Wood Buffalo Environmental Association

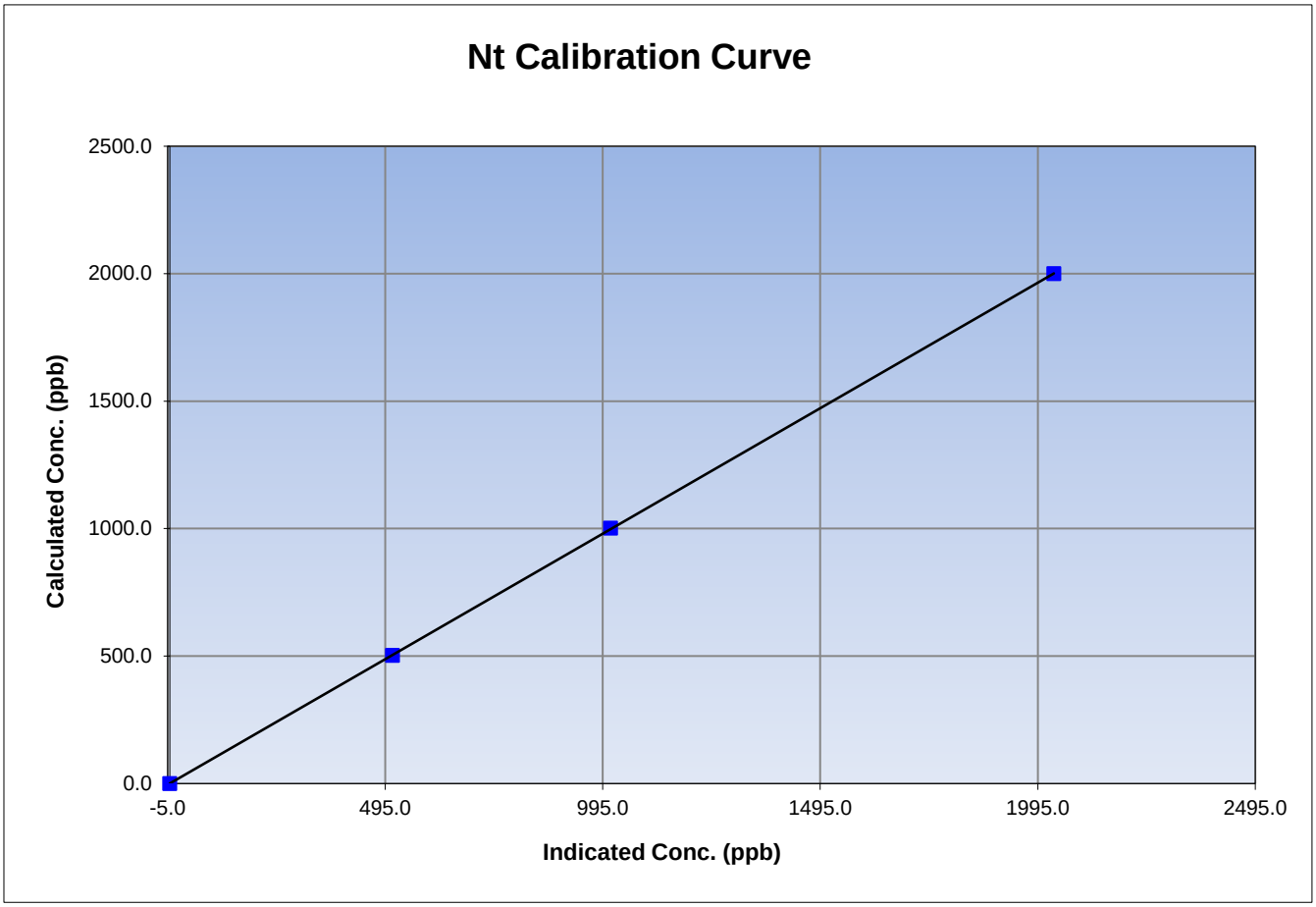
Nt Calibration Summary

Station Information

Calibration Date	August 18, 2015	Previous Calibration	July 8, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	11:00	End Time (MST)	17:13
Analyzer make	API T201	Analyzer serial #	152

Nt (NH_3) Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	----	Correlation Coefficient	0.999992
1999.8	2032.0	0.9841		
1001.4	1013.0	0.9885	Slope	0.984511
502.2	511.6	0.9815		
			Intercept	0.491531



Wood Buffalo Environmental Association

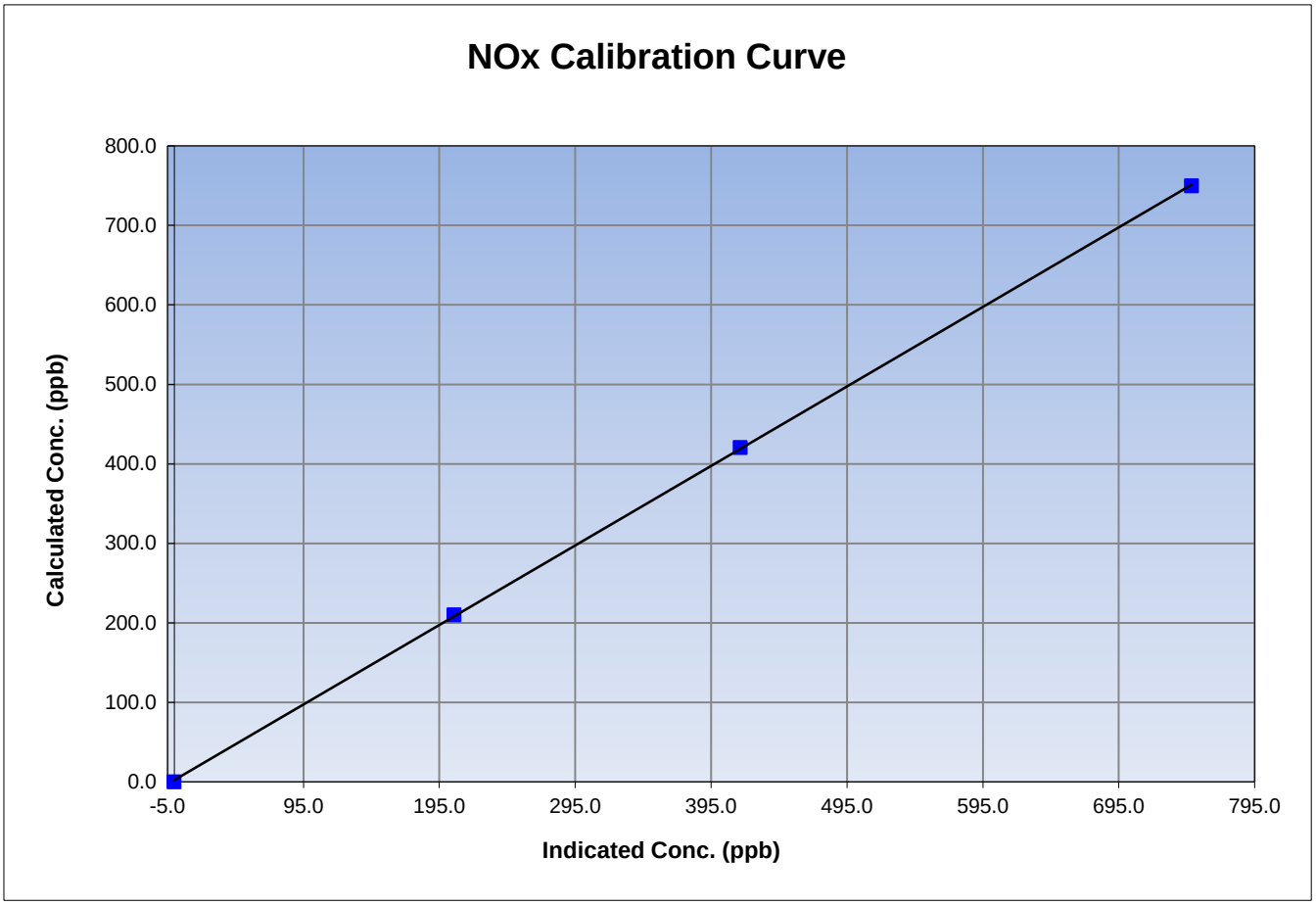
NOx Calibration Summary

Station Information

Calibration Date	August 18, 2015	Previous Calibration	July 8, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	11:00	End Time (MST)	17:13
Analyzer make	API T201	Analyzer serial #	152

NO_X Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999957
749.8	748.7	1.0014		
420.5	416.4	1.0097	Slope	1.000291
210.2	206.0	1.0208		
			Intercept	2.280278



Wood Buffalo Environmental Association

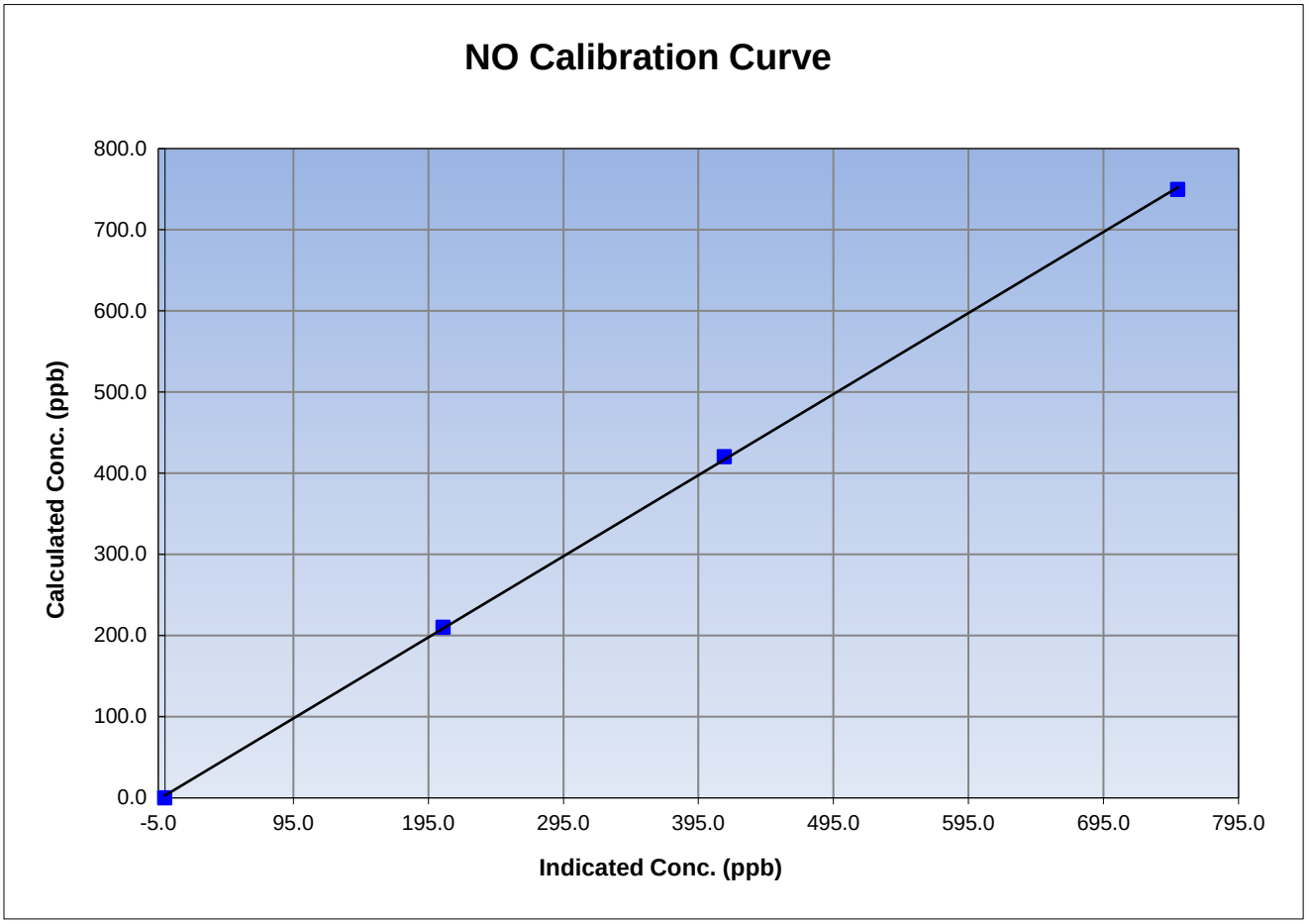
NO Calibration Summary

Station Information

Calibration Date	August 18, 2015	Previous Calibration	July 8, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	11:00	End Time (MST)	17:13
Analyzer make	API T201	Analyzer serial #	152

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	----	Correlation Coefficient	0.999899
749.8	750.0	0.9997		
420.5	414.1	1.0153	Slope	0.999053
210.2	205.8	1.0215		
			Intercept	3.001943



Wood Buffalo Environmental Association

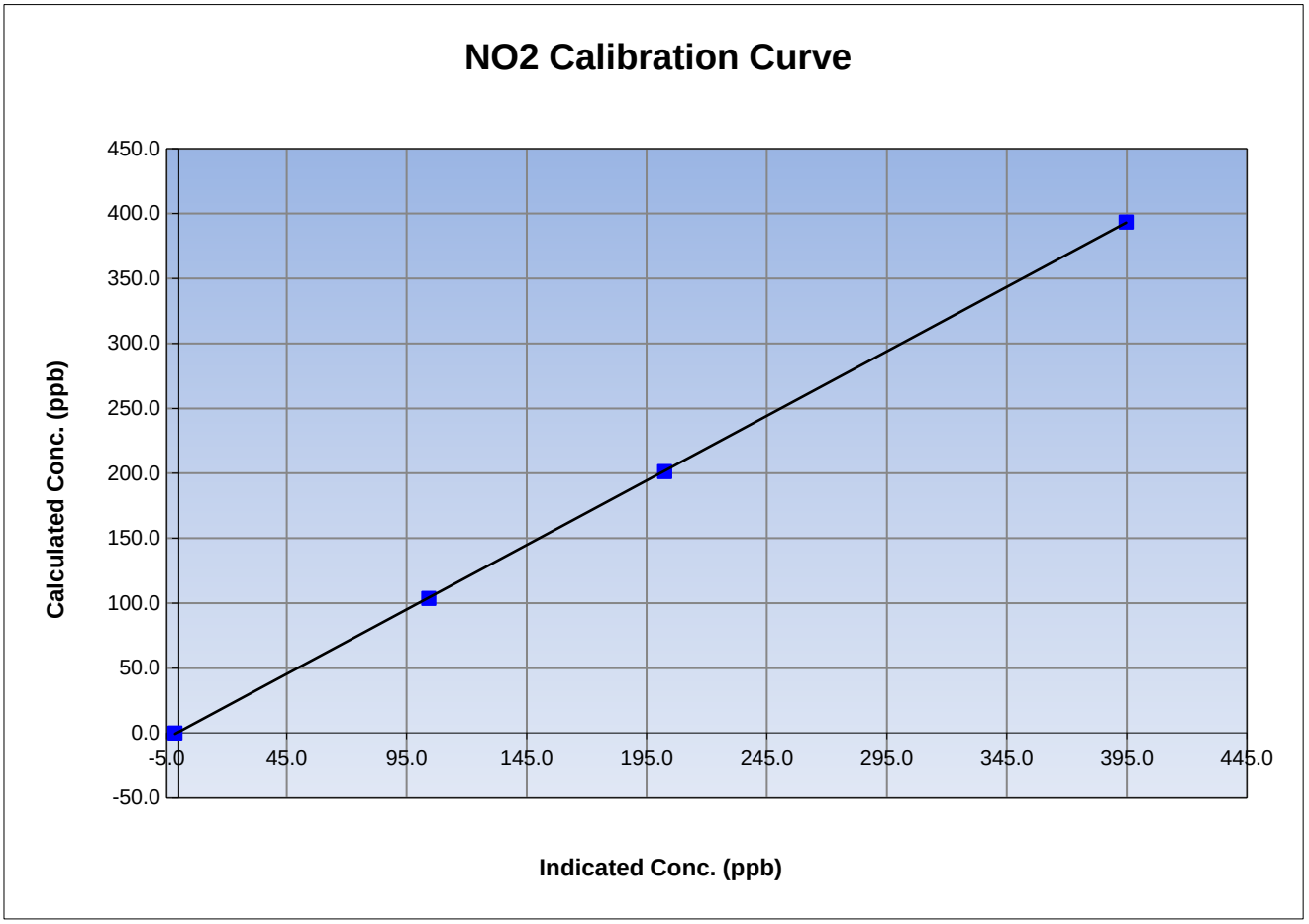
NO_2 Calibration Summary

Station Information

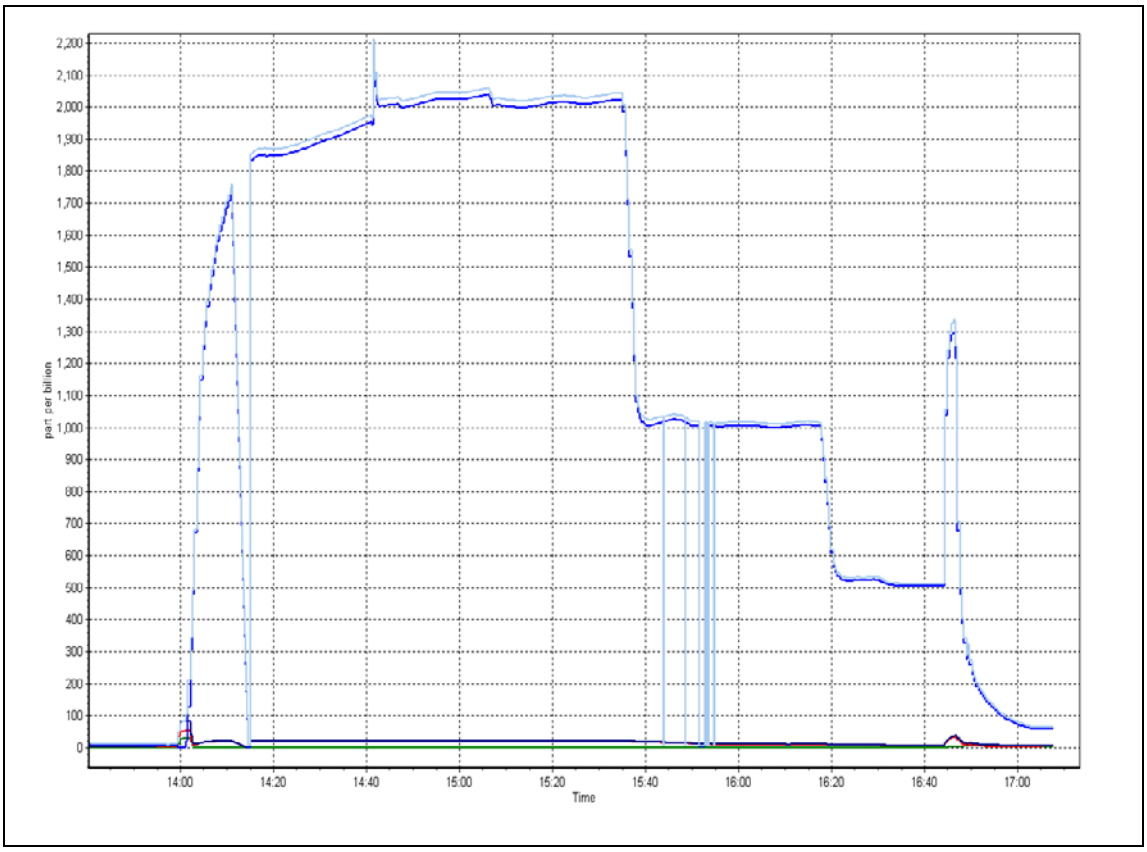
Calibration Date	August 18, 2015	Previous Calibration	July 8, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	11:00	End Time (MST)	17:13
Analyzer make	API T201	Analyzer serial #	152

Calibration Information

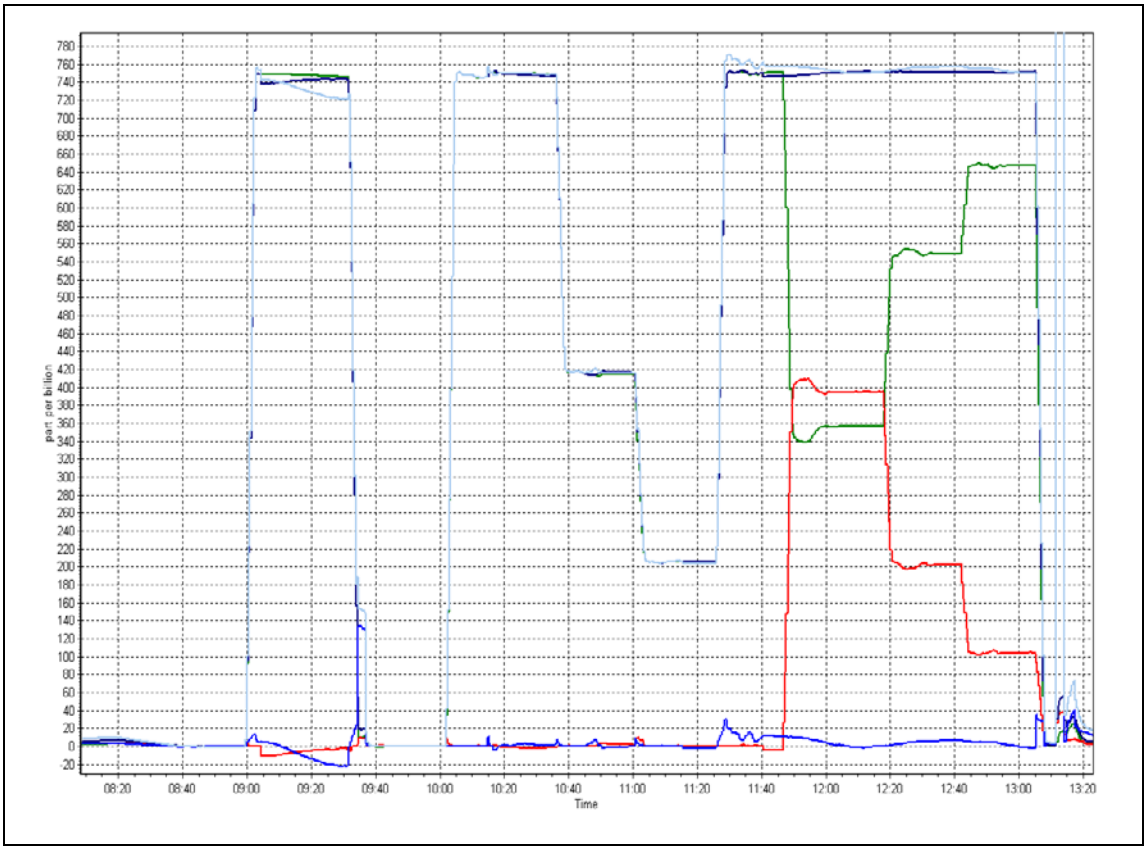
Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-1.5	----	Correlation Coefficient	0.999980
393.5	394.7	0.9968		
201.3	202.5	0.9942	Slope	0.993697
103.7	104.3	0.9944		
			Intercept	0.722890



NH_3 Calibration Plot Date: August 18, 2015



NOX Calibration Plot Date: August 18, 2015



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SHARP CALIBRATION

STATION INFORMATION

Calibration Date:	August 19, 2015	Previous Calibration:	July 8, 2015
Station Name:	Bertha Ganter	Station Number:	AMS 1
Start Time (MST):	9:35	End Time (MST):	10:26
Calibrator Make/Model:	Delta Cal	Calibrator Serial Number:	954

SHARP INFORMATION

Particulate Fraction:	PM2.5
Make/Model:	Thermo / SHARP 5030
Serial Number	E-803
Source SN:	4173
HEPA PN:	12144
Time Correct (MST):	Yes
Paremeters Checked:	T1, T2, T2,T4, P3, Main Flow, Beta, Neph

CALIBRATION DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	21.0	20.8	-0.2	21.0
T2	28.0	na	na	
T3	25.0	na	na	
T4	44.0	na	na	
RH (%)	40.0	na	na	

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	965	965.9	0.9	965

Main Flow (Lph)

Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
1000	1000	0	1000	1000

Nephalometer Calibration

Parameter	As Founds	Zeroed (Limit +or- 2.0ug/m3)	As Left
Analog	218		218
Neph	0.4		0.4
C14	42.5		42.5
Indicated Concentration (ug/m3)	**0.1**	**NO**	**0.1**
Offset 1	219.5		219.5
Offset 2	34.6		34.6

Leak Check (Quarterly)

Leak Check Date:	April 20, 2015	Previous Leak Check Date:	April 20, 2015
	Measured	**Difference LPM (Limit +/- 0.42 LPM)**	
Flow without adaptor (LPM):	16.89	0.09	
Flow with adaptor [turn off pump first](LPM):	16.80		

Mass Foil Calibration (Annualy)

Foil Calibration Date:	not performed this month	Previous Foil Calibration:	n/a
Zeroed?:			
Foil Mass:		**Mass foil set S/N:**	
Previous Correction Factor:			
New Correction Factor:			

INSPECTION DATA

Item	Condition	Date of install or rebuild
Cyclone	Good / cleaned	18/06/2015
Pump	Good	n/a
Filter Tape	Good	n/a
Mass Foil Cal Set	na	n/a
HEPA filter	Good	n/a

NOTES:

Changed out cyclone head

Calibration Performed By: **Devin Russell**

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 2
MILDRED LAKE
AUGUST 2015

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

September 28, 2015

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MILDRED LAKE (AMS 2)
AUGUST 2015

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	700	39	44	99.33	40	0	13	0
H2S (ppb) Average	704	35	40	99.33	6	0	2	0
THC (ppm) Average	700	39	44	99.33	5.5	-	2.9	-
Temperature (C) Average	744	0	0	100.00	30	-	24.2	-
Relative Humidity (%) Average	744	0	0	100.00	99	-	86	-
Wind Speed 10 m (km/h) Average	744	0	0	100.00	22	-	16	-
Wind Direction 10 m (deg) Average	744	0	0	100.00	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MILDRED LAKE (AMS 2)
AUGUST 2015

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

					Percentile						
Parameter	Number	Mean	StnDev	Total	Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	700	2.6	5	-	0	0	0	1	2	9	40
H2S (ppb) Average	704	0.7	1	-	0	0	0	0	1	1	6
THC (ppm) Average	700	2.42	0.4	-	1.9	2.1	2.2	2.3	2.5	2.8	5.5
Temperature 2 m (C) Average	744	17.72	4.9	-	4.4	11.7	14	17.6	21.1	24.4	30
Relative Humidity (%) Average	744	65.1	19	-	26	38	50	66	79	92	99
Wind Speed 10 m (km/h) Average	744	9.1	5	-	1	3	6	9	12	16	22
Wind Direction 10 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MILDRED LAKE (AMS 2)
AUGUST 2015

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2, THC	20 Aug 2015 12:00	20 Aug 2015 12:00	1	Maintenance - sample manifold cleaning
SO2, H2S, THC	20 Aug 2015 20:00	20 Aug 2015 20:00	1	DAS program upload and restart
H2S	21 Aug 2015 09:00	21 Aug 2015 09:00	1	DAS program upload and restart
SO2, H2S, THC	25 Aug 2015 14:00	25 Aug 2015 16:00	3	Maintenance - upgraded calibrator

Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO_2) - ppb

Mildred Lake - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 40 ppb on Aug 12 08:00

Maximum Daily Average: 13.4 ppb on Aug 12

Minimum Value: 0 ppb on Aug 3 19:00

Minimum Daily Average: 0.3 ppb on Aug 15

Maximum Diurnal Average: 4.0 ppb at hour 14

Minimum Diurnal Average: 0.9 ppb at hour 21

Monthly Average: 2.6 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 1 $Q_3 = 2$ $P_{90} = 9$ $P_{99} = 23$

Hours in Service:	744
Hours of Data:	700
Hours of Missing Data:	44
Hours of Calibration:	39
Percent Operational Time:	99.3

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	1	0	0	Z	1	0	0	0	1	1	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0.5	1
2-Aug	0	0	0	0	Z	0	0	3	5	2	2	1	1	0	0	0	2	1	1	1	2	1	1	0	1.1	5
3-Aug	0	0	0	0	0	Z	2	5	15	9	1	1	3	1	0	1	0	0	0	0	0	0	3	1	1.8	15
4-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	1	0	0.4	2
5-Aug	0	Z	0	0	0	0	0	0	0	0	1	1	1	4	2	0	0	0	2	0	0	5	1	3	1.0	5
6-Aug	3	2	Z	0	0	0	0	1	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0.6	3
7-Aug	0	0	0	Z	0	0	0	0	1	2	4	8	9	5	18	12	8	2	0	0	0	1	1	4	3.3	18
8-Aug	3	1	2	4	Z	2	2	2	3	6	2	1	0	0	3	3	0	0	0	0	1	2	2	1	1.8	6
9-Aug	0	0	0	0	0	Z	1	1	3	7	14	7	6	5	3	1	4	4	3	1	0	0	1	3	2.9	14
10-Aug	Z	1	1	2	6	10	9	4	1	1	1	0	6	0	11	16	0	0	0	0	0	0	0	0	3.0	16
11-Aug	0	Z	0	0	0	0	1	0	0	0	2	3	7	5	2	7	9	11	14	0	0	0	3	7	3.1	14
12-Aug	17	4	Z	1	8	21	18	40	27	13	24	15	18	20	16	8	7	12	17	11	6	1	4	2	13.4	40
13-Aug	1	0	1	Z	0	0	0	0	0	0	2	1	1	2	8	2	0	0	0	0	0	0	0	1	1.0	8
14-Aug	10	8	18	24	Z	23	21	28	19	13	10	3	5	2	6	0	0	1	0	0	0	1	3	1	8.6	28
15-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.3	1
16-Aug	Z	0	0	0	0	1	0	1	1	1	1	1	0	1	0	0	9	2	1	1	0	0	1	0	1.0	9
17-Aug	0	Z	1	0	0	0	0	0	0	1	1	0	0	0	0	0	2	0	1	0	0	0	0	0	0.5	2
18-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	5	12	17	3	1	0	0	0	0	0	0	0	1.9	17
19-Aug	0	0	0	Z	0	1	1	1	1	C	C	C	C	C	C	C	C	2	1	0	7	9	11	5	--	11
20-Aug	10	19	3	5	Z	13	13	10	5	1	1	M	0	0	0	0	0	0	0	DF	1	0	0	2	4.2	19
21-Aug	13	7	11	11	13	Z	12	7	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3.5	13
22-Aug	Z	1	1	3	2	2	1	1	3	1	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0.9	3
23-Aug	0	Z	0	1	1	1	1	1	2	1	2	0	0	1	1	1	2	1	1	10	3	1	1	1	1.3	10
24-Aug	0	1	Z	2	1	0	0	0	0	0	2	10	2	8	10	8	9	10	1	0	0	0	0	0	2.8	10
25-Aug	0	0	0	Z	0	1	1	0	1	1	0	1	0	M	M	M	0	0	0	0	0	0	0	0	0.4	1
26-Aug	0	0	0	0	Z	0	0	0	0	0	0	1	13	15	8	2	2	1	1	1	1	1	0	0	2.1	15
27-Aug	0	0	0	0	0	Z	0	2	4	23	4	1	0	0	0	0	0	0	1	0	0	0	0	0	1.7	23
28-Aug	Z	16	5	2	5	3	6	1	1	1	7	17	16	14	1	4	16	3	1	1	1	1	1	1	5.3	17
29-Aug	1	Z	0	0	0	1	1	0	1	1	1	1	1	2	1	1	3	4	6	9	1	10	2	12	2.4	12
30-Aug	3	2	Z	24	12	1	1	3	7	4	3	11	9	16	0	0	1	6	15	7	1	0	0	1	5.5	24
31-Aug	3	6	3	3	4	Z	1	3	6	3	1	0	0	0	0	0	7	0	0	0	0	0	0	0	1.9	7
	2.6	2.7	1.9	3.2	2.1	3.3	3.1	3.8	3.5	3.1	3.0	3.0	3.6	4.0	3.8	2.5	2.8	2.0	2.2	1.6	0.9	1.3	1.2	1.6	Diurnal Average	
	17	19	18	24	13	23	21	40	27	23	24	17	18	20	18	16	16	12	17	11	7	10	11	12	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance DF - DAS Failure

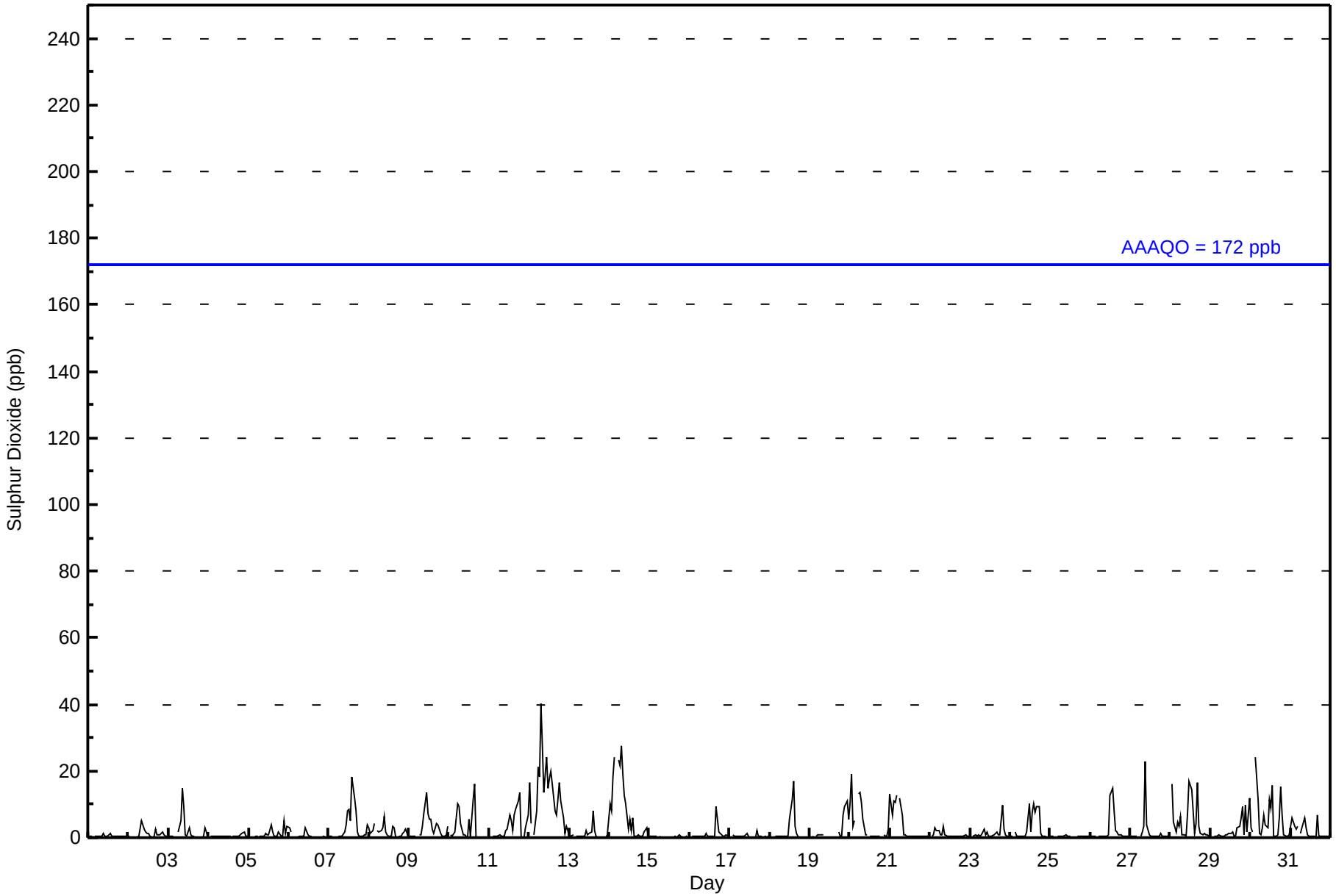
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb

Wood Buffalo Environmental Association

Hourly Averages

Sulphur Dioxide (SO_2) - ppb

Mildred Lake - August 2015



Sulphur Dioxide (SO_2) - ppb
Mildred Lake - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	646	92.29	92.29
11 - 20	44	6.29	98.57
21 - 60	10	1.43	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 700

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

Mildred Lake - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 10	50	30	21	17	18	42	35	45	58	53	48	67	19	52	43	48	646
11 - 20	0	0	0	1	0	1	0	3	1	2	2	6	15	12	1	0	44
21 - 60	0	0	0	0	0	0	1	1	0	0	0	0	6	2	0	0	10
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	50	30	21	18	18	43	36	49	59	55	50	73	40	66	44	48	700

Total Number of Valid Hours: 700

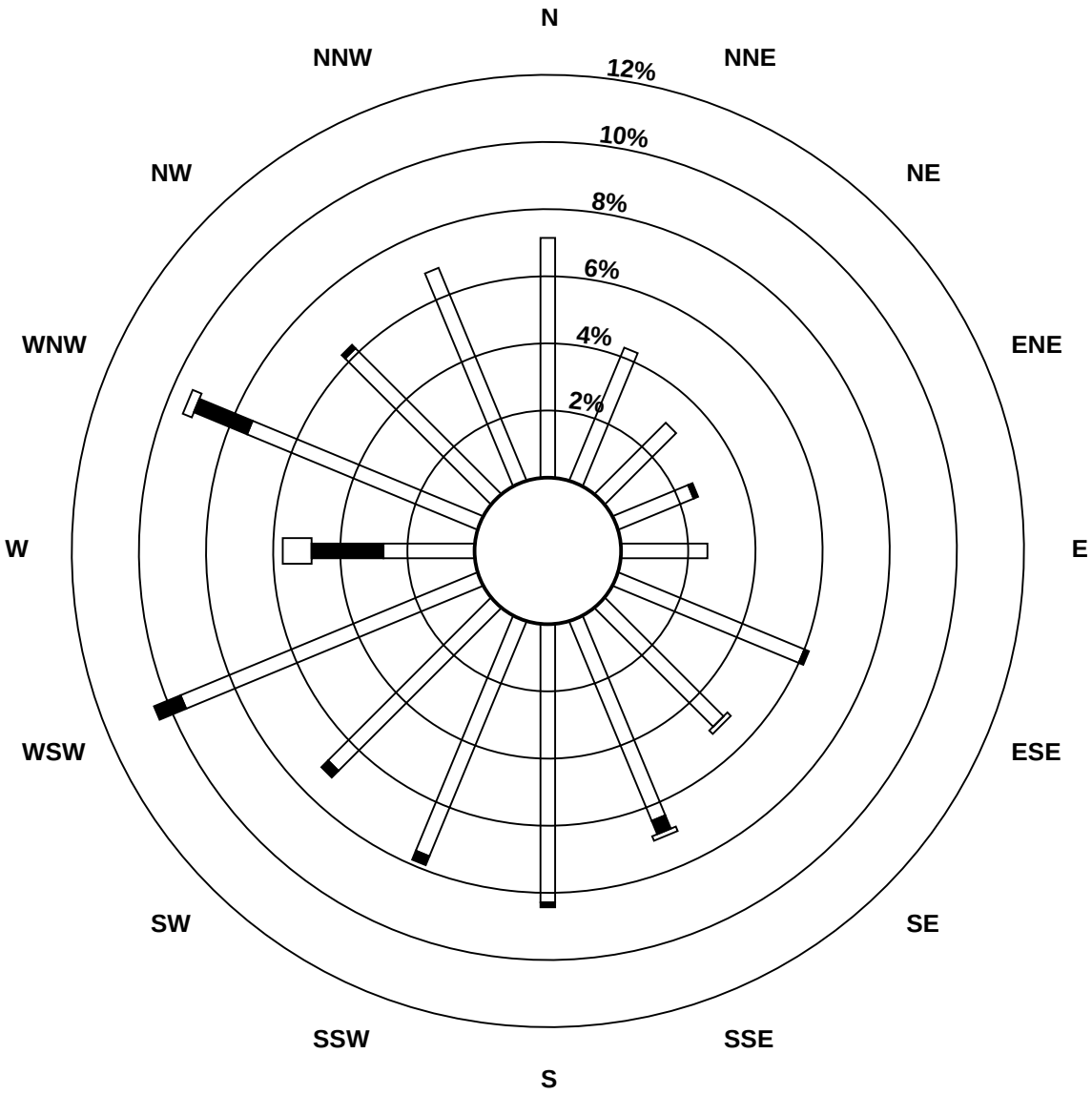
Total Number of Hours: 744

Wood Buffalo Environmental Association

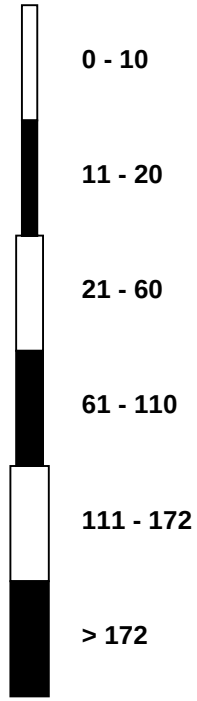
Wind Rose Aug 2015

Sulphur Dioxide (SO_2) - ppb

Mildred Lake (AMS 2)



Classes (ppb)



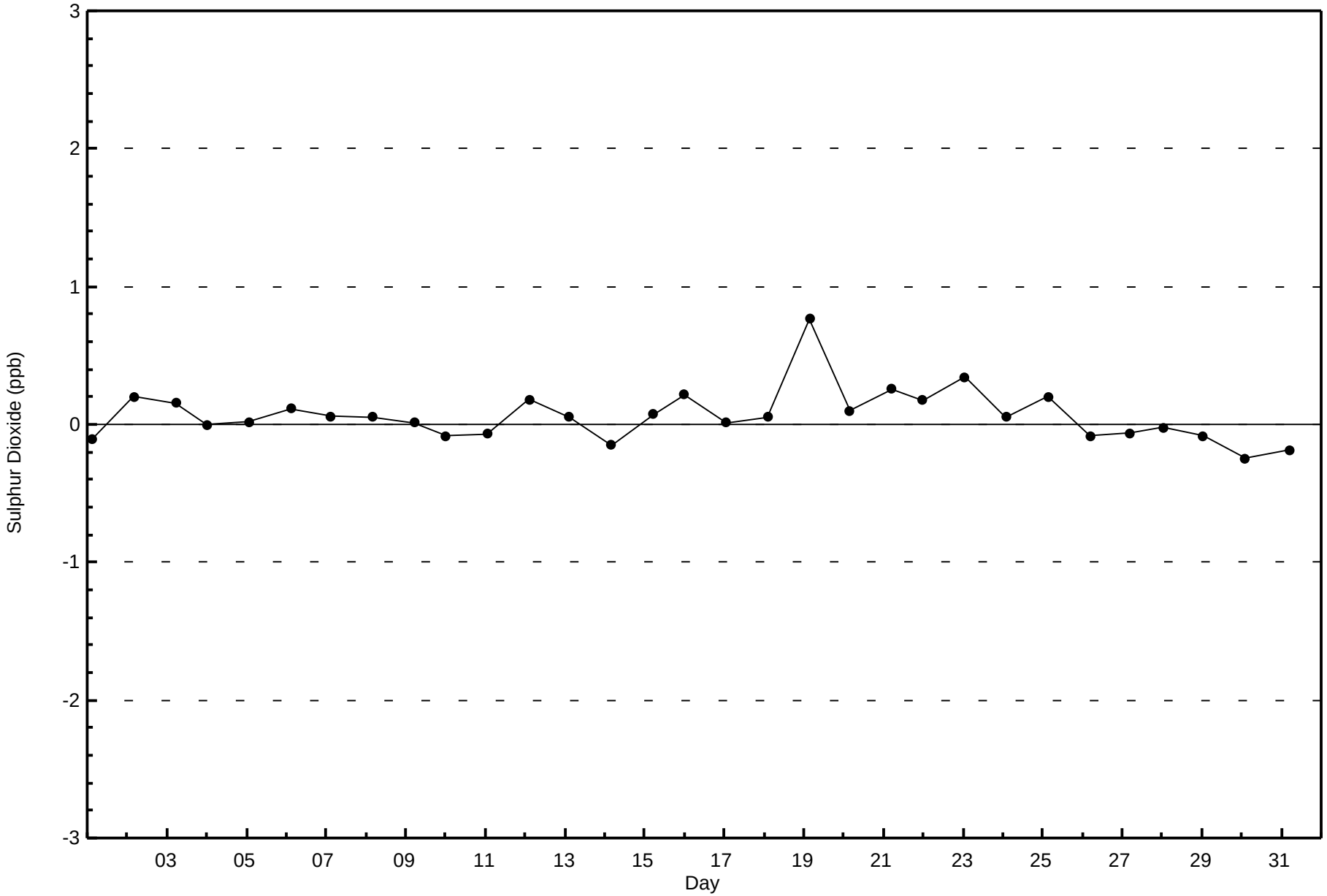
Total Number of Valid Hours: 700

Wood Buffalo Environmental Association

Zero Responses

Sulphur Dioxide (SO_2) - ppb

Mildred Lake - August 2015

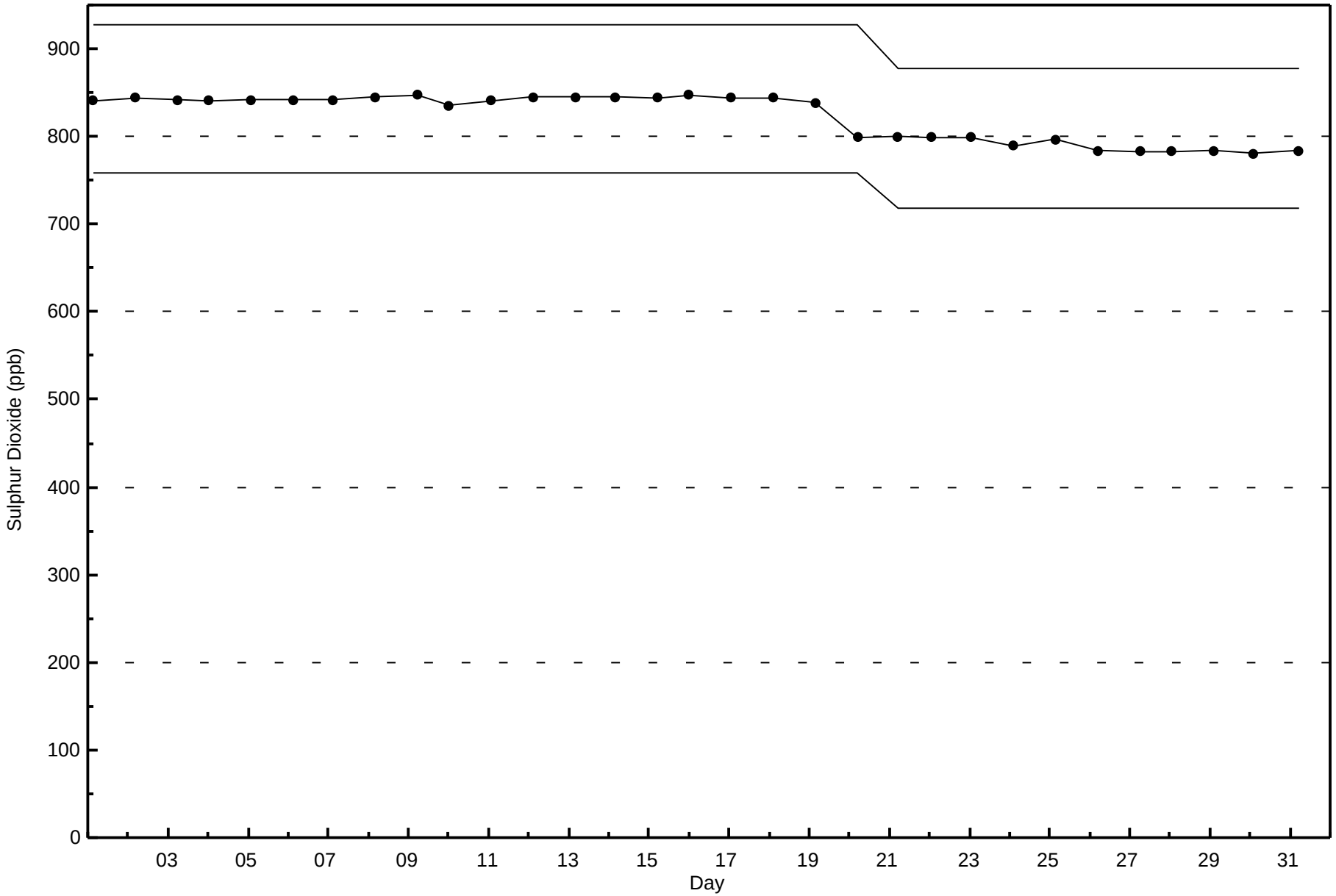


Wood Buffalo Environmental Association

Span Responses

Sulphur Dioxide (SO_2) - ppb

Mildred Lake - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Hydrogen Sulphide (H_2S) - ppb

Mildred Lake - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 6 ppb on Aug 23 05:00 Maximum Daily Average: 1.9 ppb on Aug 31

Minimum Value: 0 ppb on Aug 7 19:00
Maximum Diurnal Average: 1.3 ppb at hour 9
Monthly Average: 0.7 ppb

Minimum Daily Average: 0.2 ppb on Aug 6
Minimum Diurnal Average: 0.3 ppb at hour 16
Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 1$ $P_{90} = 1$ $P_{99} = 5$

Hours in Service:	744
Hours of Data:	704
Hours of Missing Data:	40
Hours of Calibration:	35
Percent Operational Time:	99.3

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	1	0	0	1	Z	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0.5	2
2-Aug	1	1	1	1	1	Z	1	3	6	4	1	1	1	0	0	0	1	1	0	1	1	1	1	1	1.1	6
3-Aug	0	0	0	0	0	1	Z	3	4	2	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0.8	4
4-Aug	1	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0.4	2
5-Aug	0	0	Z	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	1	1	1	1	0	1	0.5	1
6-Aug	1	0	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
7-Aug	0	0	0	0	Z	0	0	0	1	0	1	1	0	1	1	1	1	0	0	0	0	2	2	3	0.6	3
8-Aug	2	2	2	2	4	Z	4	4	4	3	2	1	0	0	0	0	1	0	0	0	1	1	2	1	1.6	4
9-Aug	0	0	0	0	0	0	Z	2	3	3	2	1	1	1	1	0	0	0	0	0	0	0	1	1	0.9	3
10-Aug	1	Z	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
11-Aug	1	1	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	1	0.5	1
12-Aug	1	1	1	Z	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	1	0	1	1	0.7	1
13-Aug	1	1	2	2	Z	0	0	0	0	1	5	3	2	1	1	0	0	0	0	0	0	0	0	0	0.9	5
14-Aug	1	1	2	1	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.5	2
15-Aug	0	1	0	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
16-Aug	0	Z	0	0	1	2	1	1	1	1	0	0	0	0	0	0	0	0	0	1	1	0	1	1	0.6	2
17-Aug	1	1	Z	2	1	0	0	0	0	2	2	0	0	0	0	0	0	0	1	1	0	0	0	0	0.6	2
18-Aug	0	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
19-Aug	0	1	1	0	Z	1	1	1	0	0	1	0	0	0	0	1	0	0	1	1	1	0	1	0	0.5	1
20-Aug	1	1	1	1	1	Z	0	0	0	1	C	C	C	C	0	0	0	0	0	DF	0	1	1	0	0.5	1
21-Aug	0	0	0	0	0	0	Z	1	DF	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0.4	1
22-Aug	1	Z	0	1	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
23-Aug	0	1	Z	5	6	3	4	3	3	2	1	1	0	0	0	0	1	0	2	3	2	2	0	0	1.7	6
24-Aug	0	1	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0.3	1
25-Aug	0	0	0	0	Z	1	1	1	1	1	1	1	0	M	M	M	0	0	0	0	0	0	0	0	0.4	1
26-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.3	1
27-Aug	0	0	0	0	0	1	Z	2	5	5	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0.9	5
28-Aug	0	Z	1	0	1	0	1	0	0	0	0	1	1	1	0	0	1	0	1	1	1	0	0	0	0.5	1
29-Aug	0	1	Z	1	1	3	1	0	0	0	0	1	1	1	0	0	0	0	1	0	0	1	0	1	0.7	3
30-Aug	0	0	2	Z	1	1	0	0	0	0	1	0	0	0	0	0	0	1	2	2	0	0	0	2	0.7	2
31-Aug	5	4	5	4	5	4	2	Z	5	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1.9	5
	0.7	0.7	0.9	1.0	1.1	0.9	0.9	1.0	1.3	1.1	0.9	0.5	0.4	0.3	0.3	0.3	0.3	0.3	0.5	0.5	0.5	0.6	0.6	0.6	Diurnal Average	
	5	4	5	5	6	4	4	4	6	5	5	3	2	1	1	1	1	1	2	3	2	2	2	3	Diurnal Maximum	

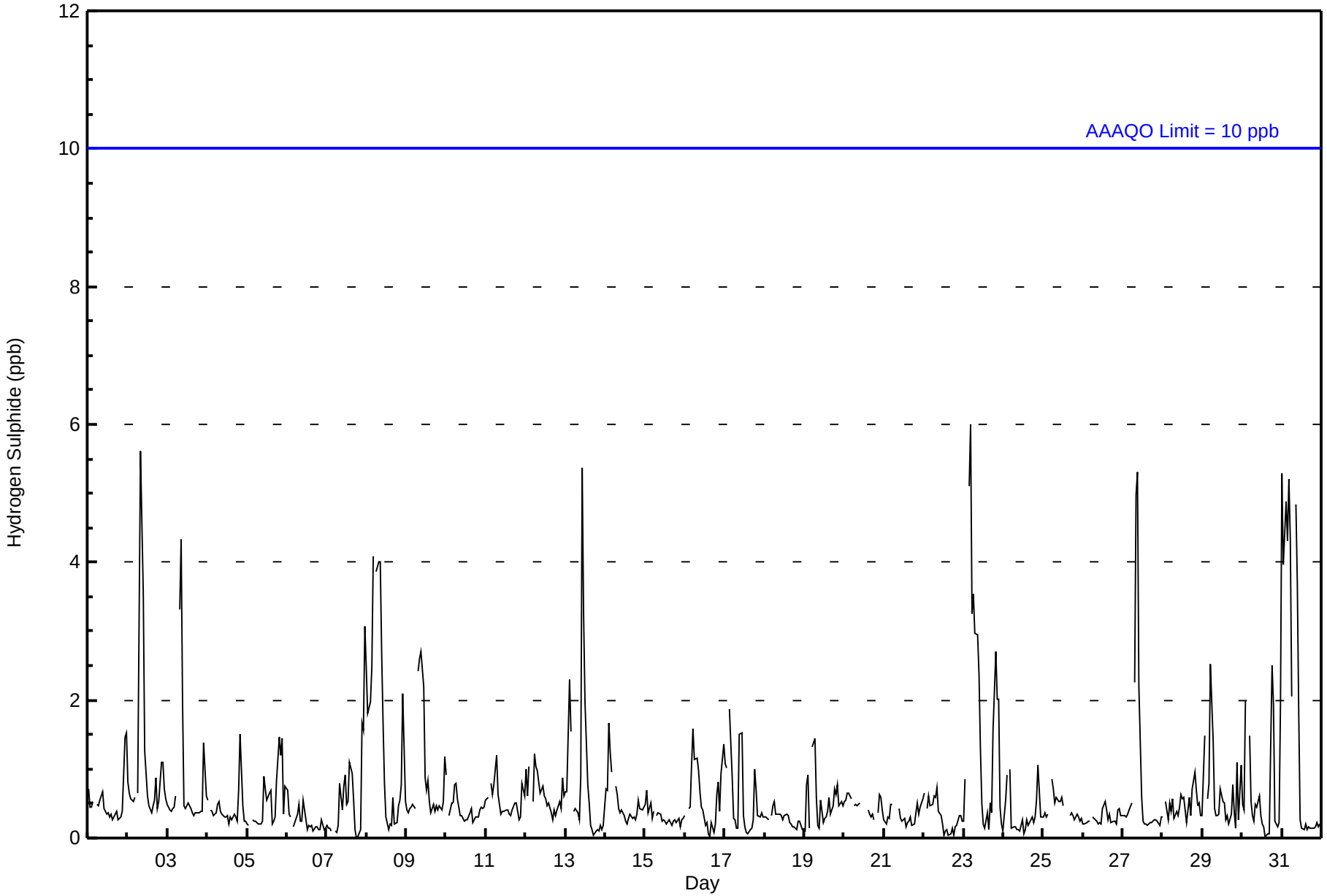
Z - zerospan C - Calibration M - Maintenance DF - DAS Failure
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb

Wood Buffalo Environmental Association

Hourly Averages

Hydrogen Sulphide (H_2S) - ppb

Mildred Lake - August 2015



Hydrogen Sulphide (H_2S) - ppb
Mildred Lake - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	671	95.31	95.31
3 - 4	23	3.27	98.58
5 - 7	10	1.42	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 (H_2S) - ppb

Mildred Lake - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 2	50	30	21	18	17	43	34	29	48	57	49	75	46	62	43	49	671
3 - 4	0	0	0	1	0	0	1	12	6	1	1	1	0	0	0	0	23
5 - 7	0	0	0	0	0	0	1	7	2	0	0	0	0	0	0	0	10
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	50	30	21	19	17	43	36	48	56	58	50	76	46	62	43	49	704

Total Number of Valid Hours: 704

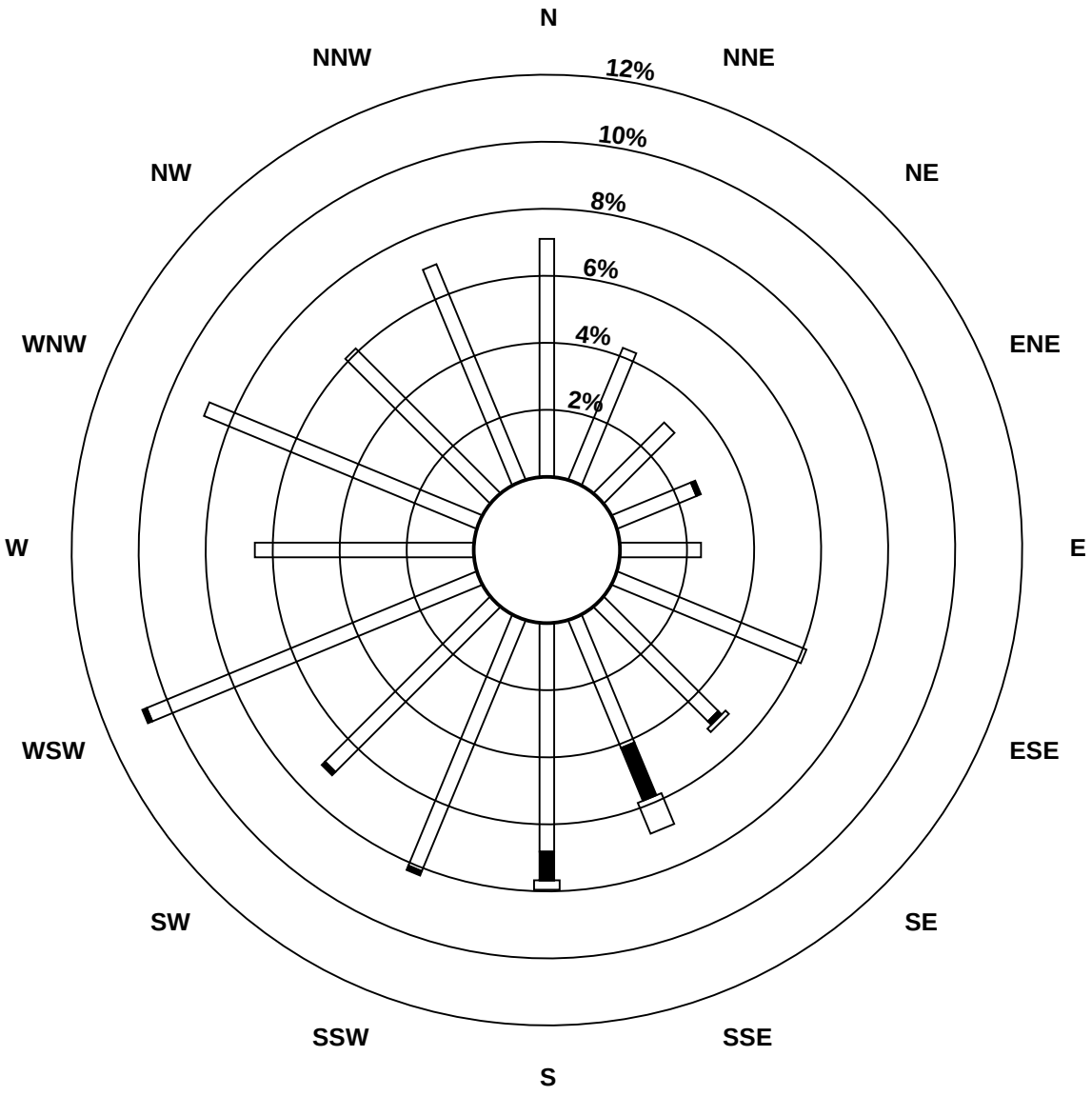
Total Number of Hours: 744

Wood Buffalo Environmental Association

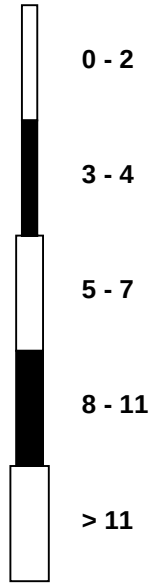
Wind Rose Aug 2015

Hydrogen Sulphide (H_2S) - ppb

Mildred Lake (AMS 2)



Classes (ppb)



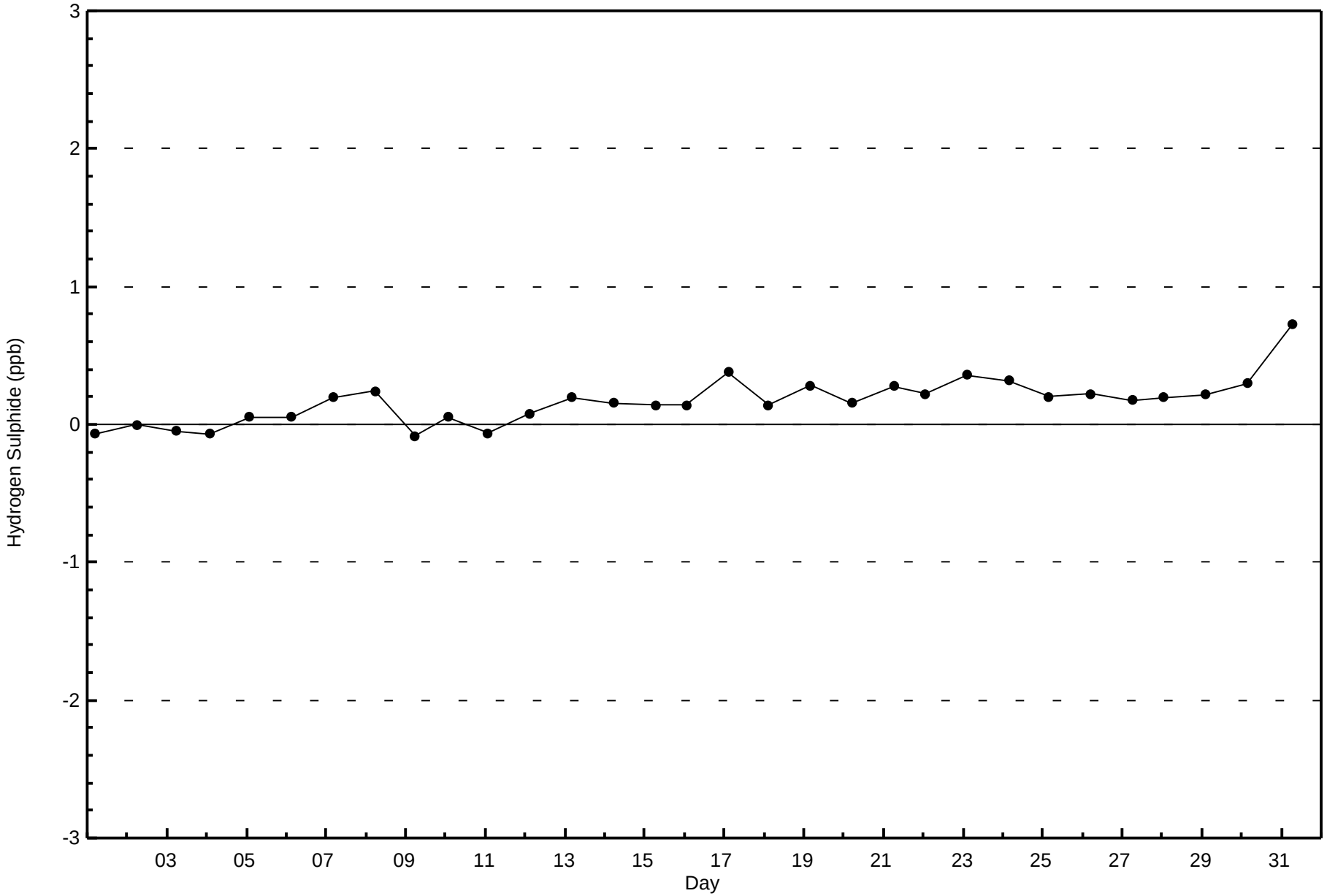
Total Number of Valid Hours: 704

Wood Buffalo Environmental Association

Zero Responses

Hydrogen Sulphide (H_2S) - ppb

Mildred Lake - August 2015

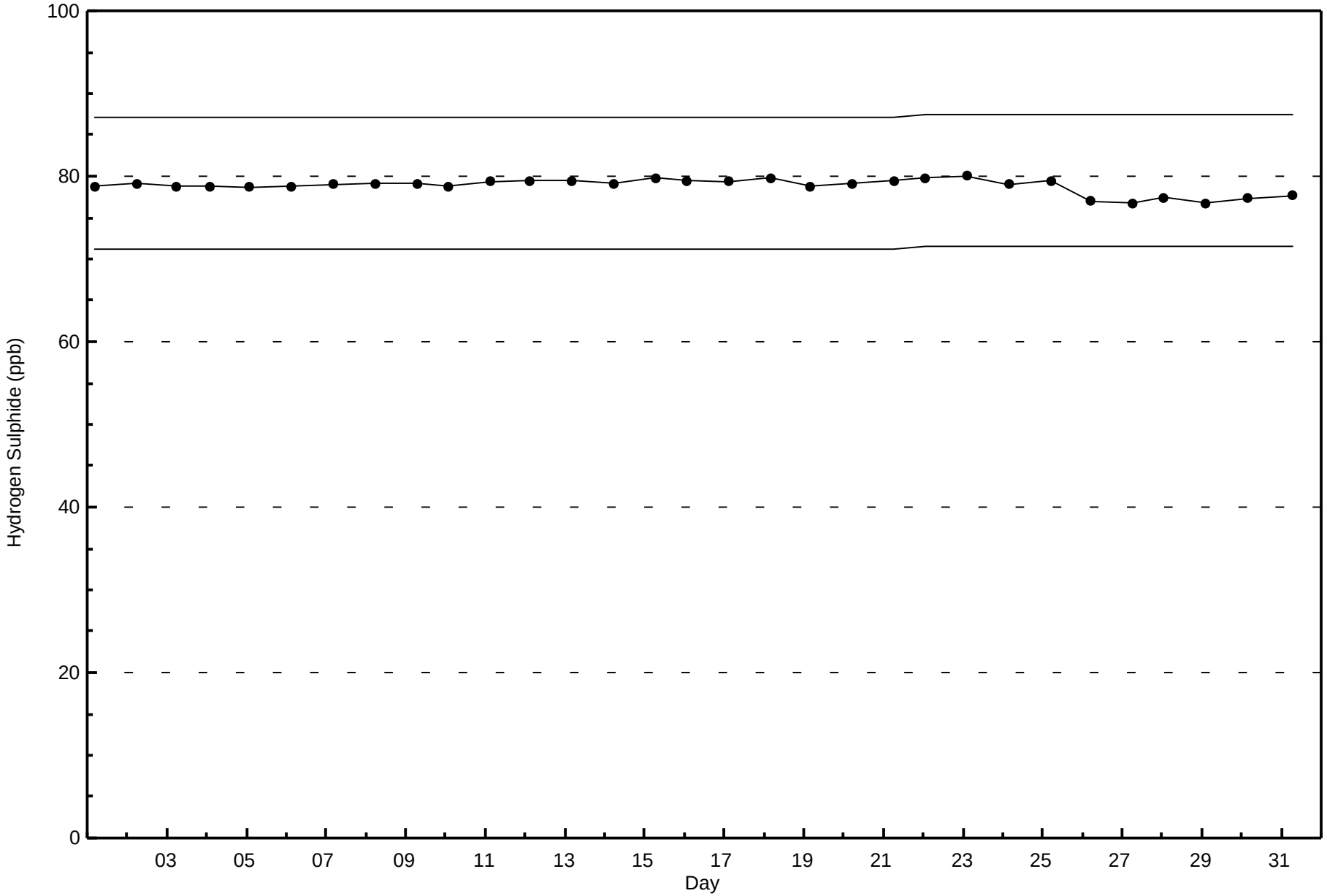


Wood Buffalo Environmental Association

Span Responses

Hydrogen Sulphide (H_2S) - ppb

Mildred Lake - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Mildred Lake - August 2015

Maximum Value: 5.5 ppm on Aug 16 06:00

Maximum Daily Average: 2.9 ppm on Aug 16

Minimum Value: 1.9 ppm on Aug 21 15:00

Minimum Daily Average: 2.1 ppm on Aug 6

Maximum Diurnal Average: 2.7 ppm at hour 6

Minimum Diurnal Average: 2.2 ppm at hour 13

Monthly Average: 2.42 ppm

Percentiles: P_1 = 2.0 P_{10} = 2.1 Q_1 = 2.2 Median = 2.3 Q_3 = 2.5 P_{90} = 2.8 P_{99} = 3.7

Hours in Service:	744
Hours of Data:	700
Hours of Missing Data:	44
Hours of Calibration:	39
Percent Operational Time:	99.3

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	2.8	2.4	2.5	Z	3.0	2.3	2.3	2.5	2.7	2.5	2.2	2.1	2.1	2.1	2.2	2.1	2.1	2.2	2.1	2.1	2.1	2.2	3.8	3.7	2.4	3.8
2-Aug	3.1	3.0	2.8	2.6	Z	2.4	2.4	3.2	2.8	2.8	2.4	2.3	2.3	2.2	2.2	2.3	2.4	2.5	2.1	2.1	2.5	3.1	2.6	2.4	2.6	3.2
3-Aug	2.3	2.3	2.3	2.4	2.4	Z	3.1	3.3	2.9	2.5	2.2	2.2	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.4	2.4	2.4	3.3
4-Aug	Z	2.4	2.2	2.2	2.2	2.3	2.4	2.3	2.3	2.3	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.2	2.1	2.2	2.2	2.4
5-Aug	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.2	2.2	2.3	2.1	2.1	2.2	2.2	2.3	2.2	2.2	2.1	2.3	2.2	2.3
6-Aug	2.2	2.2	Z	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.2
7-Aug	2.1	2.2	2.2	Z	2.1	2.1	2.2	2.2	2.4	2.2	2.5	3.2	2.3	2.4	2.4	2.3	2.3	2.2	2.2	2.3	2.3	2.5	2.6	2.4	2.3	3.2
8-Aug	2.3	2.7	2.5	2.4	Z	3.1	3.0	2.8	2.7	2.5	2.4	2.3	2.3	2.3	2.3	2.4	2.5	2.3	2.4	2.5	2.4	2.6	2.4	2.4	2.5	3.1
9-Aug	2.3	2.2	2.3	2.3	2.3	Z	2.4	3.3	3.4	3.1	2.7	2.4	2.4	2.6	2.4	2.4	2.5	2.6	2.6	2.7	2.7	2.6	2.7	2.8	2.6	3.4
10-Aug	Z	2.5	2.3	2.4	2.3	2.4	2.6	2.3	2.1	2.1	2.2	2.2	2.3	2.4	2.5	2.5	2.5	2.6	2.8	3.0	2.9	2.9	2.9	2.8	2.5	3.0
11-Aug	2.5	Z	2.7	2.4	2.4	2.5	2.7	2.6	2.4	2.2	2.2	2.2	2.3	2.4	2.5	2.5	2.5	2.6	2.5	2.7	2.7	2.4	3.1	2.6	2.5	3.1
12-Aug	2.6	2.3	Z	2.2	2.3	2.9	2.8	2.3	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.7	2.9	2.8	3.1	2.5	3.1
13-Aug	2.3	2.1	2.6	Z	3.3	2.6	2.4	2.3	2.3	2.3	2.9	2.9	2.6	2.8	2.3	2.2	2.2	2.2	2.3	2.8	2.8	2.6	2.6	2.4	2.5	3.3
14-Aug	2.6	2.4	2.6	2.6	Z	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.3	2.3	2.4	2.3	2.4	2.7	2.5	2.4	2.5	2.4	2.7
15-Aug	2.7	3.2	2.3	2.7	2.2	Z	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.3	2.3	2.3	3.2
16-Aug	Z	2.6	2.6	2.5	4.3	5.5	3.5	3.3	3.1	2.9	2.2	2.3	2.3	2.5	2.3	2.2	2.2	2.2	2.4	3.1	3.8	2.7	2.9	2.9	2.9	5.5
17-Aug	2.8	Z	3.3	2.4	2.4	2.3	2.2	2.2	2.2	2.7	2.7	2.3	2.3	2.3	2.4	2.5	2.5	2.7	4.0	3.2	2.6	2.5	2.6	2.3	2.6	4.0
18-Aug	2.3	2.3	Z	2.2	2.3	2.8	3.0	2.6	2.5	2.4	2.3	2.4	2.4	2.5	2.5	2.5	2.5	2.6	2.6	2.7	2.7	2.6	2.5	2.5	2.5	3.0
19-Aug	2.4	2.7	2.7	Z	2.2	2.7	2.6	2.3	2.1	C	C	C	C	C	C	C	C	2.5	2.5	2.5	2.4	2.3	2.2	2.1	--	2.7
20-Aug	2.2	2.2	2.4	2.3	Z	2.2	2.2	2.2	2.2	2.2	2.2	DF	2.2	2.2	2.3	2.2	2.3	2.4	2.3	DF	2.4	2.7	2.7	2.5	2.3	2.7
21-Aug	2.3	2.3	2.2	2.3	2.4	Z	2.3	2.3	2.4	2.3	2.1	2.1	2.1	2.0	1.9	2.1	2.2	2.0	2.2	2.5	2.8	2.4	2.6	2.6	2.3	2.8
22-Aug	Z	2.5	2.5	2.5	2.2	2.3	2.5	2.4	2.4	2.4	2.3	2.2	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.2	2.5
23-Aug	2.2	Z	3.0	3.6	3.9	3.2	3.0	3.2	2.7	2.8	2.5	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.9	2.5	2.5	2.9	2.3	2.0	2.6	3.9
24-Aug	2.1	2.8	Z	2.8	2.1	2.0	2.1	2.0	2.0	2.1	2.1	2.2	2.2	2.3	2.4	2.4	2.5	2.5	2.5	2.5	3.7	3.9	2.4	2.5	2.4	3.9
25-Aug	2.4	2.4	2.4	Z	2.7	3.3	3.0	2.8	2.9	2.5	2.8	2.8	2.4	M	M	M	2.3	2.3	2.2	2.2	2.2	2.2	2.1	2.4	2.5	3.3
26-Aug	2.1	2.1	2.1	2.0	Z	2.1	2.1	2.0	2.1	2.0	2.0	2.1	2.5	2.5	2.4	2.1	2.1	2.1	2.1	2.2	2.2	2.4	2.4	2.3	2.2	2.5
27-Aug	2.2	2.2	2.1	2.2	2.2	Z	2.4	3.1	3.4	2.5	2.7	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.2	3.0	2.2	2.1	2.2	2.3	2.4	3.4
28-Aug	Z	3.0	2.4	2.2	2.4	2.2	2.4	2.2	2.3	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.5	2.9	2.7	2.3	2.4	2.1	2.3	3.0
29-Aug	2.3	Z	3.1	2.4	2.7	4.0	2.6	2.2	2.1	2.1	2.1	2.3	2.2	2.3	2.3	2.2	2.2	2.3	2.3	2.4	2.1	2.4	2.2	2.4	2.4	4.0
30-Aug	2.2	2.1	Z	2.2	2.3	2.3	2.4	2.2	2.3	2.5	2.8	2.6	2.4	2.3	2.3	2.3	2.4	2.7	2.4	2.5	2.0	2.0	2.1	2.7	2.3	2.8
31-Aug	3.2	2.6	3.0	3.2	3.4	Z	2.8	3.6	2.8	2.6	2.5	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.3	2.2	2.2	2.1	2.3	2.1	2.5	3.6
	2.4	2.5	2.5	2.4	2.6	2.7	2.5	2.5	2.5	2.4	2.3	2.3	2.2	2.3	2.3	2.3	2.3	2.3	2.4	2.5	2.5	2.5	2.5	2.5	Diurnal Average	
	3.2	3.2	3.3	3.6	4.3	5.5	3.5	3.6	3.4	3.1	2.9	3.2	2.6	2.8	2.5	2.5	2.5	2.7	4.0	3.2	3.8	3.9	3.8	3.7	Diurnal Maximum	

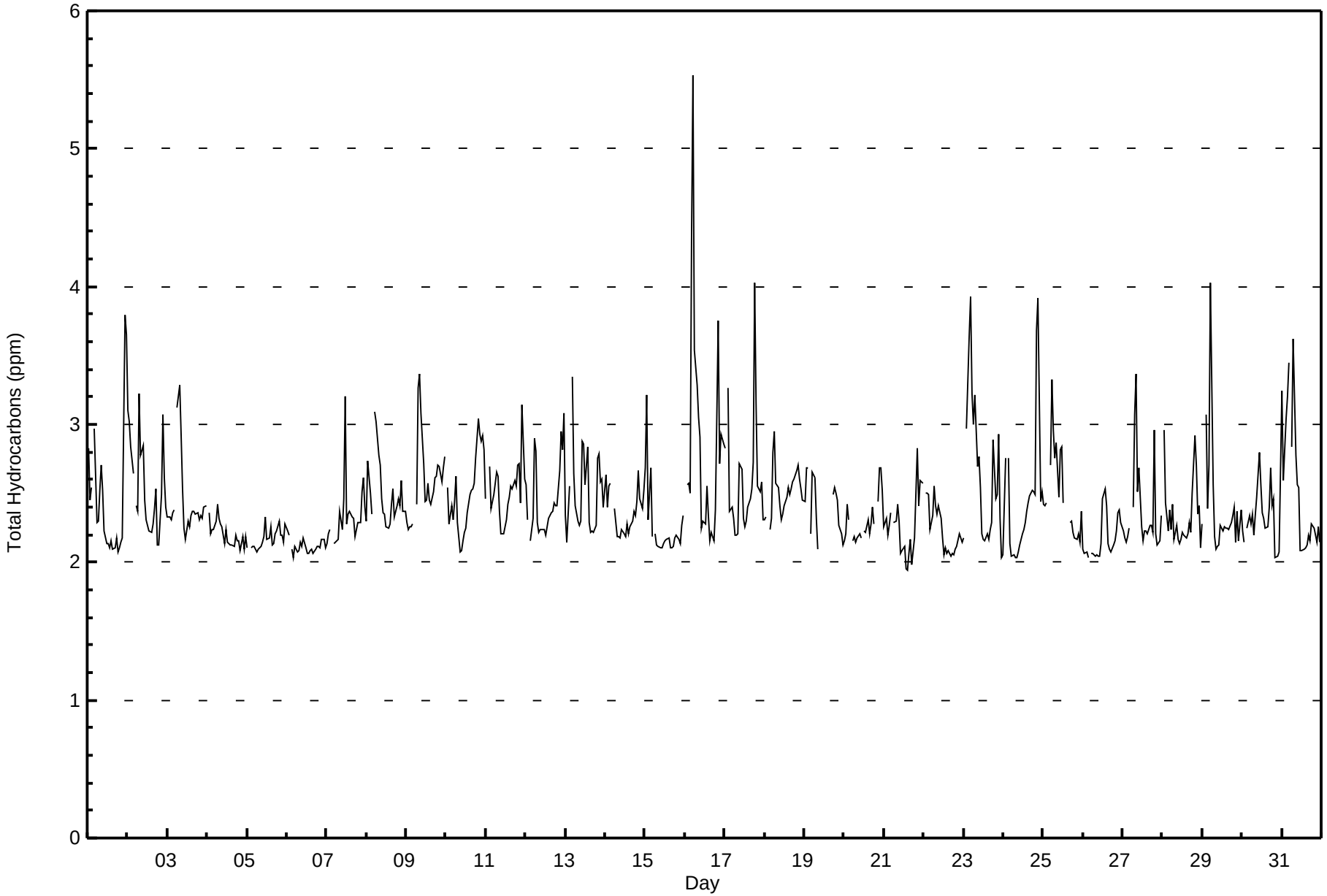
Z - zerospan C - Calibration M - Maintenance DF - DAS Failure

Wood Buffalo Environmental Association

Hourly Averages

Total Hydrocarbons (THC) - ppm

Mildred Lake - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm

Mildred Lake - August 2015

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	15	2.14	2.14
2.1 - 3.0	644	92.00	94.14
3.1 - 10.0	41	5.86	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 700

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Total Hydrocarbons (THC) - ppm

Mildred Lake - August 2015

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	2	0	1	1	1	1	0	0	2	3	0	0	0	0	0	4	15
2.1 - 3.0	48	30	19	16	16	39	35	42	52	50	47	71	39	65	38	37	644
3.1 - 10.0	0	0	1	1	1	3	1	7	5	2	3	2	1	1	6	7	41
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	50	30	21	18	18	43	36	49	59	55	50	73	40	66	44	48	700

Total Number of Valid Hours: 700

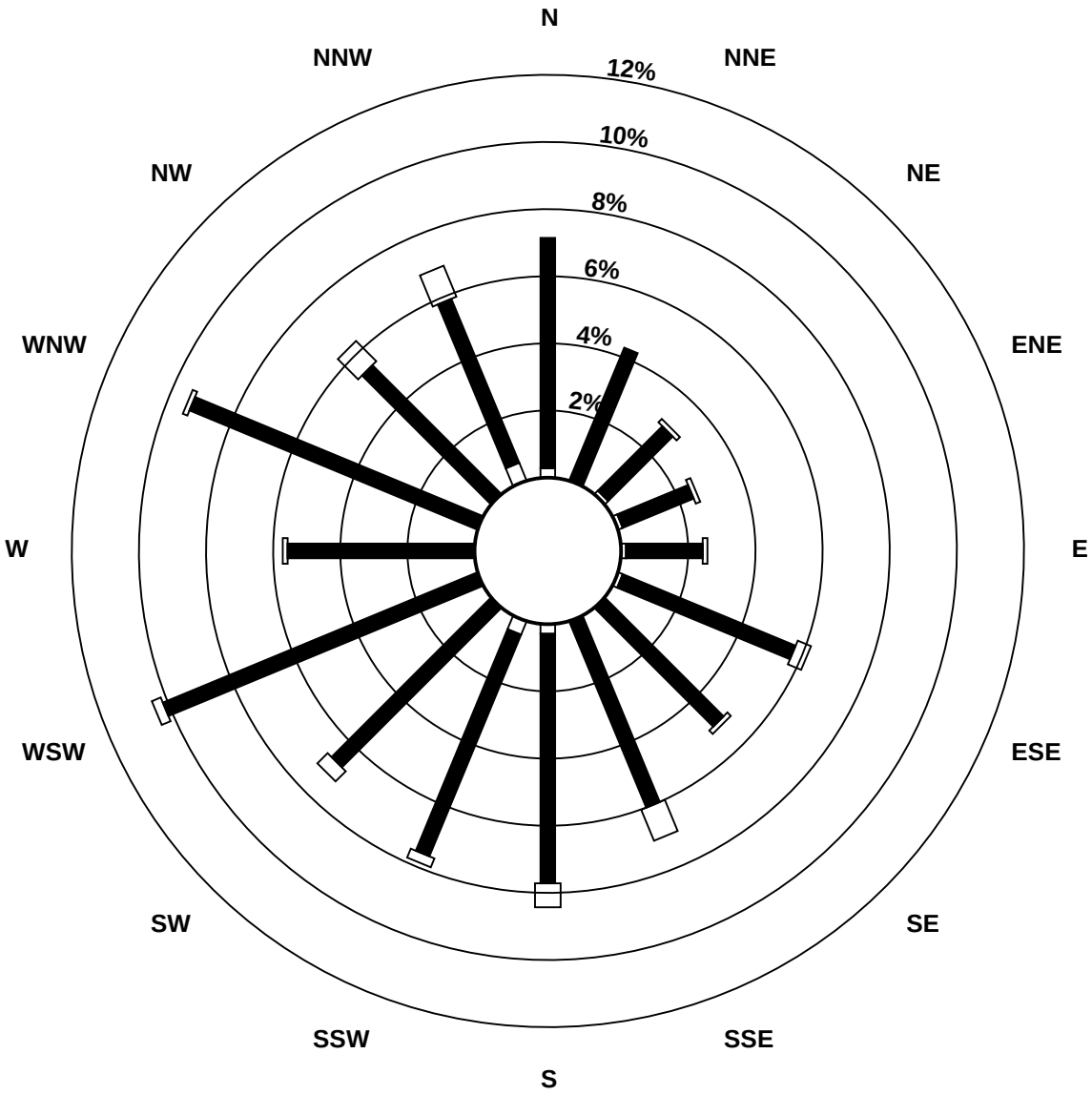
Total Number of Hours: 744

Wood Buffalo Environmental Association

Wind Rose Aug 2015

Total Hydrocarbons (THC) - ppm

Mildred Lake (AMS 2)



Classes (ppm)

0 - 2.0

2.1 - 3.0

3.1 - 10.0

> 10.0

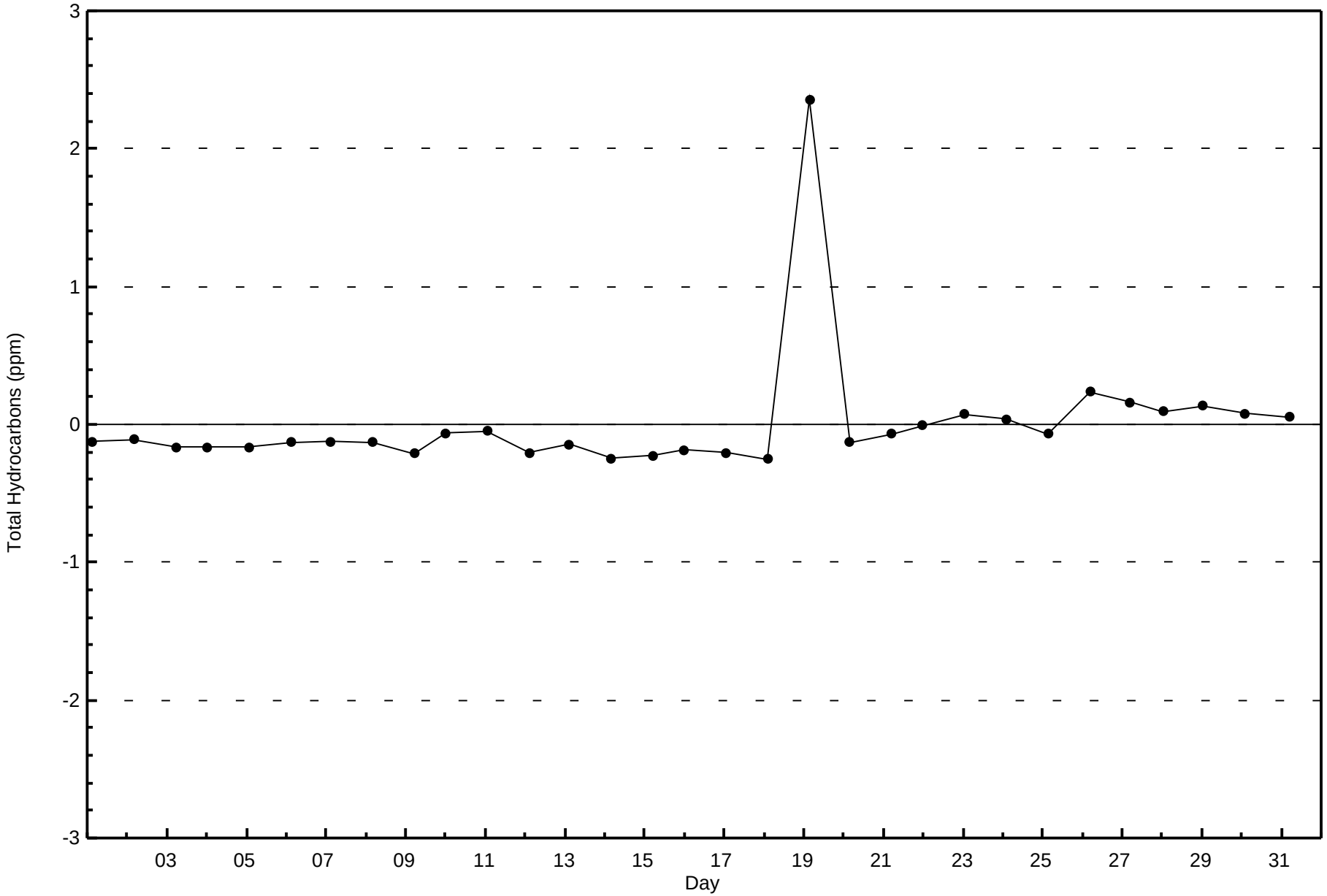
Total Number of Valid Hours: 700

Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Mildred Lake - August 2015

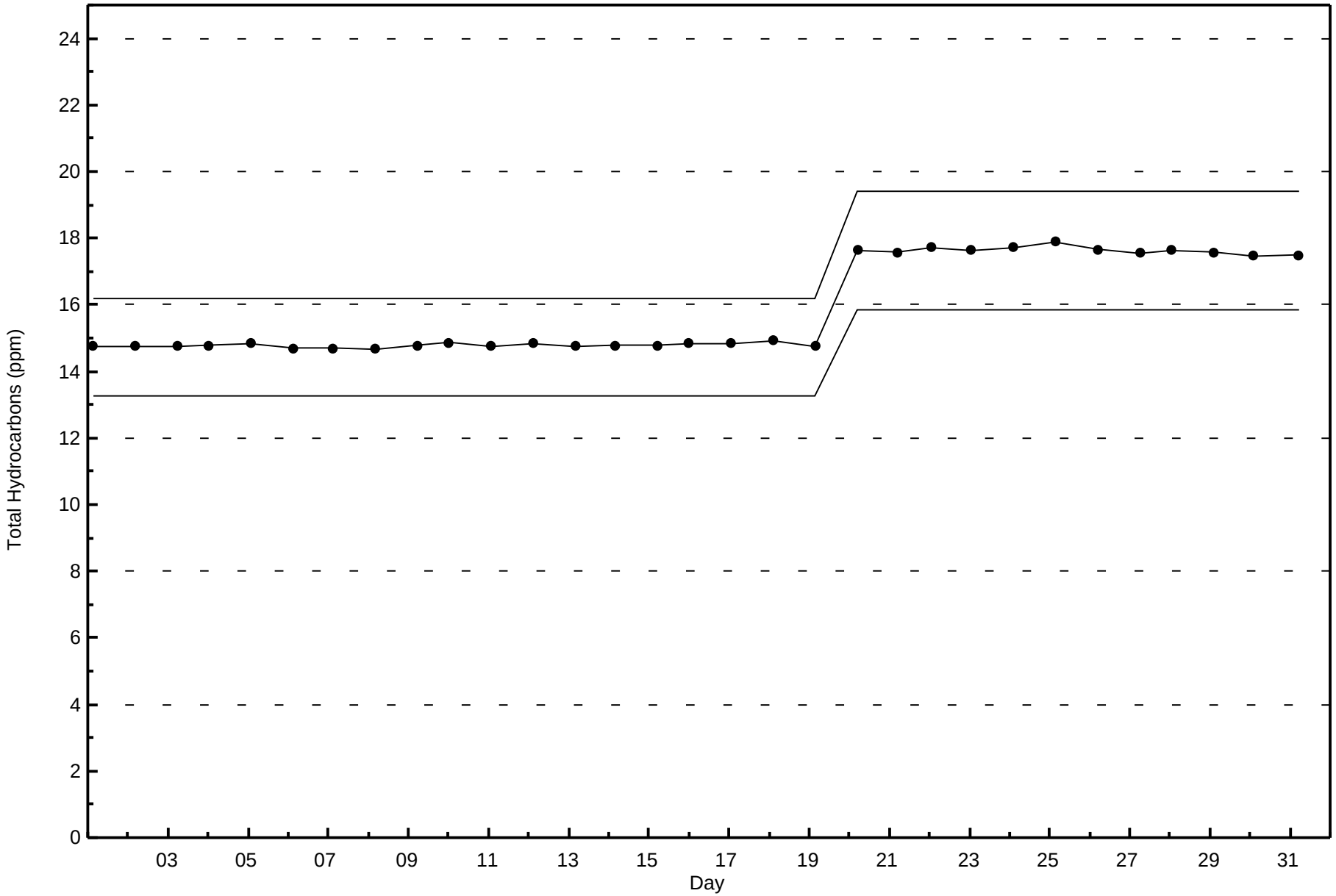


Wood Buffalo Environmental Association

Span Responses

Total Hydrocarbons (THC) - ppm

Mildred Lake - August 2015



Maximum Value: 30.0 C on Aug 10 15:00

Maximum Daily Average: 24.2 C on Aug 10

Minimum Value: 4.4 C on Aug 23 04:00

Minimum Daily Average: 10.9 C on Aug 21

Maximum Diurnal Average: 22.7 C at hour 15

Minimum Diurnal Average: 13.0 C at hour 5

Monthly Average: 17.72 C

Percentiles: P_1 = 7.9 P_{10} = 11.7 Q_1 = 14.0 Median = 17.6 Q_3 = 21.1 P_{90} = 24.4 P_{99} = 28.1

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

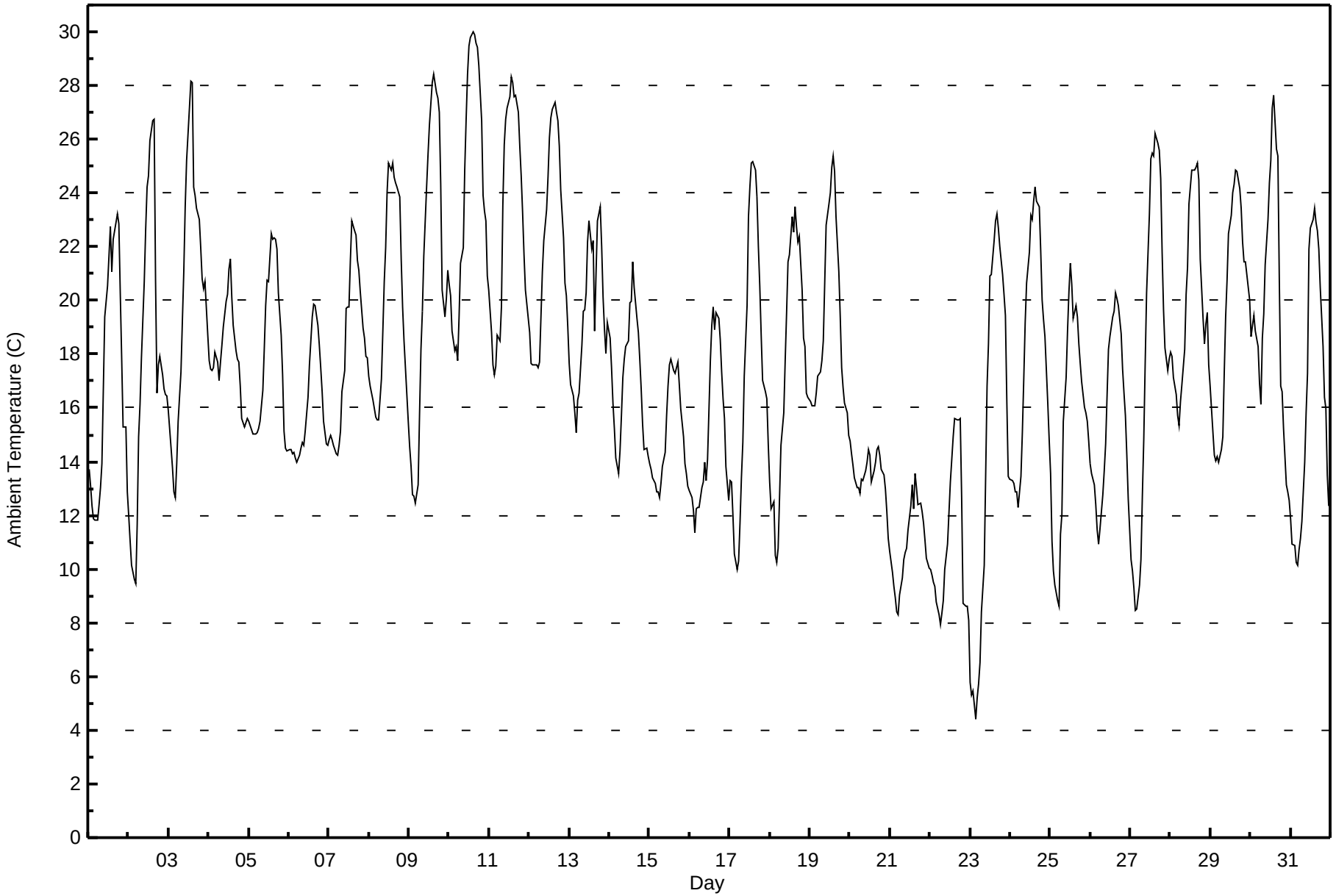
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	13.7	13.1	12.3	11.9	11.8	11.8	12.4	13.0	13.9	16.7	19.4	20.5	21.7	22.7	21.1	22.3	22.9	23.2	22.9	20.3	17.9	15.3	15.3	12.9	17.0	23.2
2-Aug	12.0	11.1	10.2	9.6	9.5	11.7	14.9	16.1	17.9	20.7	22.6	24.2	24.6	26.0	26.7	26.8	20.7	16.6	17.6	17.9	17.2	16.7	16.5	16.5	17.7	26.8
3-Aug	15.9	14.5	13.7	12.9	12.6	13.9	15.5	17.3	19.2	21.1	23.5	25.2	27.2	28.2	28.1	24.2	23.9	23.4	23.0	22.0	20.8	20.4	20.7	18.7	20.3	28.2
4-Aug	17.8	17.5	17.4	17.5	18.1	17.7	17.0	17.7	18.3	19.0	20.0	20.2	21.2	21.5	20.1	19.1	18.1	17.8	17.7	16.8	15.6	15.3	15.5	15.6	18.0	21.5
5-Aug	15.5	15.3	15.0	15.0	15.0	15.1	15.2	15.5	16.6	18.2	19.8	20.8	20.7	22.5	22.3	22.3	22.3	21.9	20.3	18.7	17.2	15.2	14.5	14.4	17.9	22.5
6-Aug	14.4	14.5	14.3	14.4	14.1	14.0	14.2	14.5	14.7	14.6	15.1	16.4	17.6	18.5	19.4	19.9	19.8	19.1	18.4	17.5	16.6	15.5	14.7	14.6	16.1	19.9
7-Aug	14.8	15.0	14.8	14.6	14.3	14.2	14.6	15.1	16.6	17.4	19.7	19.7	19.8	21.5	23.0	22.6	22.5	21.5	21.1	20.3	19.0	18.6	17.9	17.9	18.2	23.0
8-Aug	17.2	16.8	16.3	16.0	15.7	15.6	15.6	17.1	18.9	20.7	22.0	24.0	25.1	24.8	25.1	24.6	24.4	24.2	23.8	21.5	19.8	18.5	17.5	15.5	20.0	25.1
9-Aug	14.6	13.8	12.7	12.7	12.5	13.1	15.8	18.2	19.6	21.7	24.2	25.4	26.5	27.3	28.1	28.4	27.8	27.5	27.0	24.3	20.4	19.4	20.1	21.1	20.9	28.4
10-Aug	20.6	20.2	18.8	18.1	18.3	17.7	19.4	21.4	22.0	24.9	26.7	28.4	29.5	29.8	30.0	29.9	29.6	29.4	28.8	26.7	23.9	23.3	22.9	20.9	24.2	30.0
11-Aug	20.4	18.8	17.6	17.2	17.5	18.7	18.5	19.8	23.5	25.8	26.7	27.2	27.6	28.3	28.1	27.6	27.7	27.0	25.7	24.7	23.3	21.7	20.4	19.4	23.0	28.3
12-Aug	18.8	17.7	17.6	17.6	17.6	17.5	17.7	19.4	21.1	22.2	23.4	24.6	26.0	26.8	27.1	27.4	27.0	26.7	25.8	24.1	22.3	20.6	20.2	19.0	22.0	27.4
13-Aug	17.6	16.9	16.5	15.8	15.1	16.3	16.5	18.4	19.6	19.6	20.3	22.2	23.0	21.9	22.3	18.8	21.0	23.0	23.5	22.0	20.1	18.9	18.0	19.2	19.4	23.5
14-Aug	18.6	17.5	16.2	15.2	14.1	13.5	14.4	15.7	17.2	17.8	18.3	18.5	19.9	20.0	21.5	20.5	19.3	18.8	17.8	16.7	15.4	14.5	14.5	14.2	17.1	21.5
15-Aug	13.9	13.7	13.4	13.2	12.9	12.9	12.7	13.2	13.8	14.3	15.7	16.8	17.6	17.8	17.4	17.3	17.5	17.7	16.9	15.9	14.9	13.9	13.6	13.1	15.0	17.8
16-Aug	12.9	12.7	12.2	11.3	12.2	12.3	12.3	13.0	13.2	14.0	13.3	14.1	17.7	19.1	19.7	18.9	19.6	19.3	18.6	17.3	16.3	15.6	13.8	12.6	15.1	19.7
17-Aug	13.3	13.2	12.0	10.6	10.0	10.3	11.7	13.4	14.7	17.2	19.8	23.1	24.2	25.1	25.1	24.9	23.8	22.0	20.5	18.7	17.0	16.6	16.3	14.7	17.4	25.1
18-Aug	13.2	12.2	12.5	10.5	10.2	10.7	12.7	14.6	15.8	17.8	19.5	21.4	21.7	23.1	22.5	23.5	22.8	22.1	22.4	20.4	18.6	18.3	16.6	16.4	17.5	23.5
19-Aug	16.2	16.1	16.1	16.1	16.6	17.2	17.4	17.8	18.5	20.6	22.8	23.6	24.0	25.0	25.4	24.8	23.1	21.1	19.4	17.5	16.8	16.2	15.8	15.0	19.3	25.4
20-Aug	14.8	14.3	13.9	13.4	13.0	13.0	12.8	13.3	13.3	13.7	14.0	14.4	14.3	13.3	13.7	14.0	14.5	14.5	14.2	13.7	13.5	13.0	12.1	11.2	13.6	14.8
21-Aug	10.7	9.9	9.4	8.9	8.4	8.3	9.0	9.6	10.4	10.6	10.8	11.5	12.4	13.2	12.2	13.6	13.0	12.4	12.5	12.1	11.7	11.1	10.4	10.0	10.9	13.6
22-Aug	10.0	9.8	9.5	9.3	8.8	8.3	7.9	8.3	8.8	10.0	10.9	12.1	13.2	14.1	14.9	15.6	15.5	15.5	15.6	12.6	8.7	8.6	8.6	8.1	11.0	15.6
23-Aug	5.8	5.3	5.5	4.4	5.2	5.7	6.5	8.4	10.2	13.4	16.8	18.4	20.9	21.0	22.2	22.9	23.2	22.7	22.0	21.0	20.2	19.5	16.2	13.5	14.6	23.2
24-Aug	13.3	13.3	13.2	12.9	12.9	12.3	13.4	15.1	17.1	19.2	20.6	21.8	23.2	23.0	23.7	24.2	23.7	23.5	21.9	20.0	19.3	18.7	16.2	14.8	18.2	24.2
25-Aug	13.6	11.0	9.9	9.4	8.9	8.6	11.3	12.0	15.5	17.1	18.9	20.3	21.4	20.6	19.3	19.8	19.4	18.4	17.7	16.9	16.0	15.8	15.5	14.8	15.5	21.4
26-Aug	13.9	13.5	13.1	12.4	11.4	10.9	11.5	12.8	13.6	14.6	16.5	18.2	18.7	19.4	19.6	20.3	20.0	19.8	18.8	17.4	16.6	15.7	14.2	12.6	15.6	20.3
27-Aug	10.3	9.9	9.3	8.5	8.5	9.4	10.3	12.7	14.8	17.7	20.3	23.2	25.3	25.5	25.4	26.2	25.9	25.6	24.5	21.8	19.6	18.2	17.4	17.8	17.8	26.2
28-Aug	18.1	17.9	17.1	16.5	15.7	15.4	16.2	16.9	18.2	20.2	21.2	23.6	24.2	24.8	24.9	25.0	25.1	24.5	21.5	19.3	18.4	19.2	19.5	17.6	20.0	25.1
29-Aug	16.8	15.1	14.2	14.0	14.2	14.0	14.5	14.9	17.3	19.4	20.8	22.5	23.2	24.0	24.3	24.9	24.8	24.2	23.5	22.2	21.4	21.4	21.0	20.0	19.7	24.9
30-Aug	18.7	19.1	19.4	18.9	18.3	16.9	16.1	18.6	19.5	21.4	23.0	24.4	25.2	27.2	27.6	25.7	25.4	20.8	16.8	16.6	15.2	13.1	12.9	12.6	19.7	27.6
31-Aug	11.9	11.0	10.9	10.2	10.2	10.7	11.1	11.8	14.0	15.8	17.3	21.9	22.7	23.0	23.4	22.9	22.6	21.9	20.5	18.3	16.4	16.0	13.5	12.4	16.3	23.4
	14.8	14.2	13.7	13.2	13.0	13.2	13.9	15.0	16.4	18.0	19.5	20.9	21.9	22.5	22.7	22.5	22.2	21.5	20.7	19.2	17.8	16.9	16.2	15.4	Diurnal Average	
	20.6	20.2	19.4	18.9	18.3	18.7	19.4	21.4	23.5	25.8	26.7	28.4	29.5	29.8	30.0	29.9	29.6	29.4	28.8	26.7	23.9	23.3	22.9	21.1	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature (AT) - C

Mildred Lake - August 2015



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	41	5.51	5.51
10 - 20	465	62.50	68.01
> 20	238	31.99	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

Maximum Value: 99 % on Aug 1 05:00

Maximum Daily Average: 85.6 % on Aug 6

Minimum Value: 26 % on Aug 31 15:00

Minimum Daily Average: 46.2 % on Aug 28

Maximum Diurnal Average: 83.5 % at hour 5

Minimum Diurnal Average: 44.9 % at hour 15

Monthly Average: 65.1 %

Percentiles: P_1 = 29 P_{10} = 38 Q_1 = 50 Median = 66 Q_3 = 79 P_{90} = 92 P_{99} = 98

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

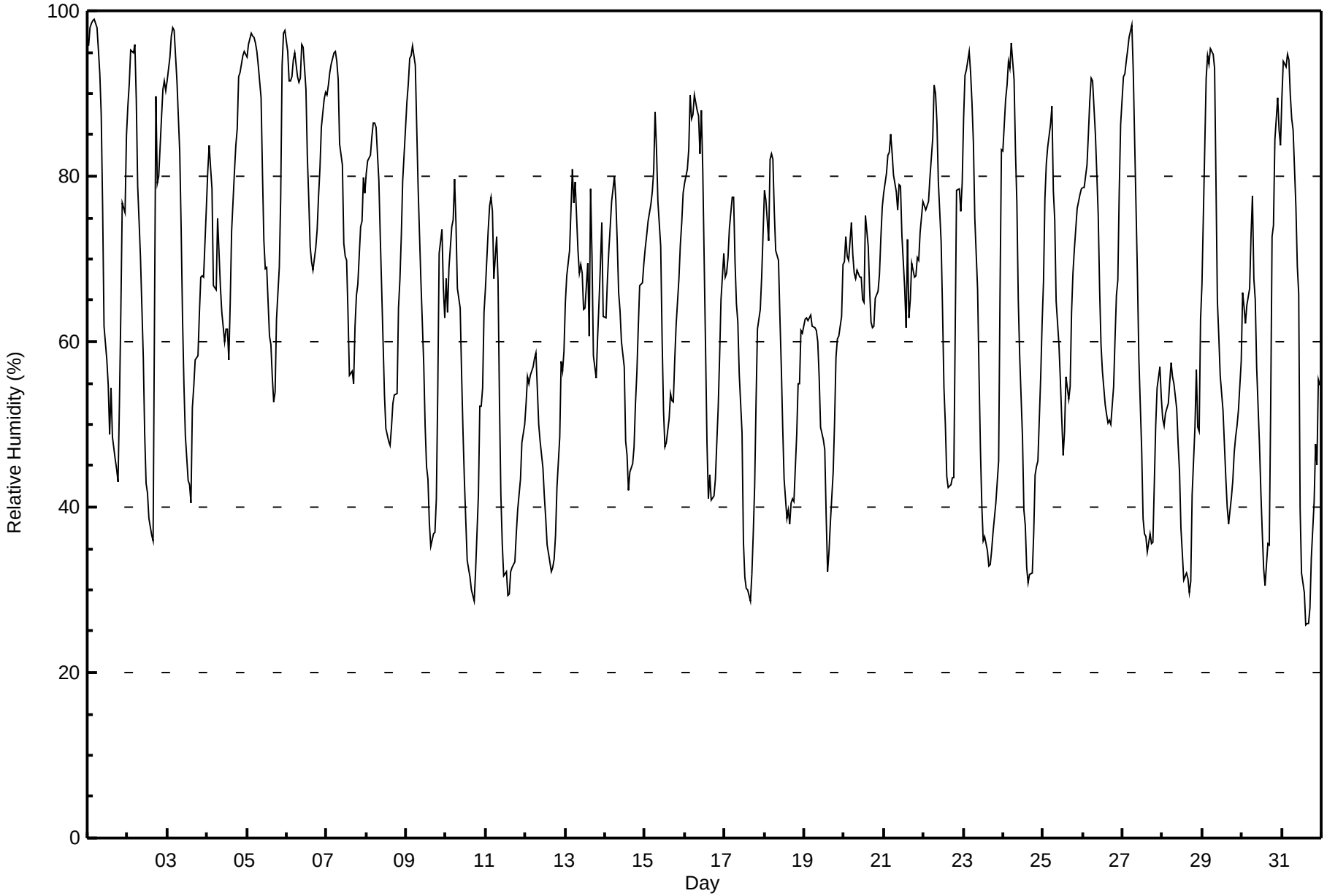
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	96	98	99	99	99	98	95	92	88	76	62	58	55	49	54	48	46	45	43	53	64	77	76	85	73.0	99
2-Aug	89	91	95	95	96	89	79	75	70	58	49	43	42	39	37	36	63	90	79	80	87	90	92	90	73.1	96
3-Aug	91	94	97	98	98	94	92	83	74	63	55	49	43	43	41	52	55	58	58	63	68	68	68	76	70.0	98
4-Aug	81	84	81	78	67	66	75	71	67	64	60	62	62	58	65	73	80	84	86	92	92	95	95	95	76.3	95
5-Aug	94	96	97	97	97	96	95	93	90	80	72	69	69	61	60	56	53	54	63	69	77	93	97	98	80.3	98
6-Aug	95	92	92	92	94	95	92	91	92	96	96	90	82	77	71	70	69	71	74	78	81	86	89	90	85.6	96
7-Aug	90	91	93	94	95	95	94	92	84	81	72	70	70	63	56	56	55	62	66	67	74	75	80	78	77.1	95
8-Aug	80	82	83	85	86	86	86	79	73	67	60	54	50	48	47	50	53	54	54	64	67	73	79	86	68.5	86
9-Aug	89	91	94	95	96	93	86	79	73	67	57	50	45	43	38	35	37	37	41	54	71	74	66	63	65.6	96
10-Aug	68	63	69	74	75	80	74	66	64	56	49	43	38	34	31	30	29	29	32	42	52	52	54	64	52.9	80
11-Aug	66	74	76	78	76	68	73	67	53	42	36	32	32	29	29	32	33	33	37	40	41	43	48	50	49.5	78
12-Aug	53	56	55	56	57	58	59	54	50	48	45	41	39	35	34	32	33	34	37	42	48	58	56	59	47.4	59
13-Aug	65	68	71	76	81	77	79	71	68	69	68	64	64	69	61	79	70	58	56	60	65	69	74	63	68.6	81
14-Aug	63	68	71	74	77	80	77	72	66	64	60	57	48	46	42	44	45	47	52	56	62	67	67	70	61.4	80
15-Aug	71	73	75	77	78	81	88	83	77	71	60	52	47	48	51	54	53	53	58	62	68	72	74	78	66.8	88
16-Aug	79	81	83	90	87	87	90	88	87	83	88	81	59	48	41	44	41	41	43	48	52	58	65	71	68.1	90
17-Aug	68	68	70	74	78	77	70	65	62	56	49	36	32	30	30	29	32	37	42	53	61	64	68	73	55.1	78
18-Aug	78	77	72	82	83	82	76	71	70	63	57	50	43	39	40	38	41	41	41	49	55	55	61	61	59.3	83
19-Aug	63	63	63	63	63	62	62	61	60	56	50	48	47	39	32	35	38	44	50	58	60	61	63	69	54.6	69
20-Aug	70	73	70	70	74	71	68	68	69	68	68	65	65	75	72	66	62	62	62	65	66	68	73	76	68.5	76
21-Aug	78	80	83	83	85	83	80	78	76	79	79	73	67	62	72	63	65	69	68	68	70	70	73	77	74.2	85
22-Aug	76	76	76	77	80	85	91	90	86	79	72	64	54	50	44	42	43	44	44	61	78	78	76	79	68.6	91
23-Aug	87	92	93	95	92	89	84	75	66	56	47	40	36	36	35	33	33	35	37	41	43	46	66	83	60.0	95
24-Aug	83	89	91	94	93	96	92	83	77	65	58	48	40	38	33	31	32	32	37	44	45	46	56	62	61.0	96
25-Aug	67	77	81	83	86	88	78	75	65	60	55	51	46	49	56	53	55	64	68	71	76	77	78	79	68.3	88
26-Aug	79	79	81	85	89	92	92	85	80	75	66	60	56	52	51	50	51	50	55	60	66	67	78	86	70.3	92
27-Aug	92	92	94	95	97	98	93	84	76	68	58	47	39	37	36	35	37	36	36	43	50	54	57	53	62.8	98
28-Aug	51	50	51	52	55	57	56	55	52	48	44	37	34	31	32	31	30	31	42	50	57	50	49	63	46.2	63
29-Aug	67	84	92	95	94	96	95	93	79	65	61	56	52	48	44	40	38	41	43	47	49	50	52	58	63.9	96
30-Aug	66	64	62	64	66	73	78	68	65	57	48	42	37	33	31	36	36	52	73	74	84	89	86	84	61.1	89
31-Aug	89	94	93	95	94	90	87	86	76	69	66	40	32	30	26	26	26	28	34	41	48	45	55	55	59.3	95
	76.9	79.3	80.8	82.7	83.5	83.3	81.7	77.2	72.1	66.1	60.2	53.9	49.2	46.4	44.9	45.1	46.1	48.8	51.9	57.8	63.8	66.7	70.1	73.3	Diurnal Average	
	96	98	99	99	99	98	95	93	92	96	96	90	82	77	72	79	80	90	86	92	92	95	97	98	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity (RH) - %

Mildred Lake - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Mildred Lake - August 2015

Maximum Speed: 22 km/h on Aug 11 15:00

Maximum Daily Speed Average: 15.2 km/h on Aug 14

Minimum Speed Value: 1 km/h on Aug 2 20:00

Minimum Daily Speed Average: 1.4 km/h on Aug 26

Maximum Diurnal Speed Average: 5.5 km/h at hour 15

Minimum Diurnal Speed Average: 1.2 km/h at hour 23

Monthly Average Velocity: 2.7 km/h 257.9 deg

Percentiles: P_1 = 1 P_{10} = 3 Q_1 = 6 Median = 9 Q_3 = 12 P_{90} = 16 P_{99} = 20

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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	N8	NNW2	NNE2	NNW1	N5	N8	N7	N8	NNW6	NNW7	NNW8	N9	NW9	NNW12	NNW16	NNW13	NNW10	NW11	N11	NNE7	NNE4	NNW3	NNW6	NNW3	NNW7.0	NNW16
2-Aug	NNW4	N2	E2	SE1	SSW2	S3	SSW4	SSE5	SSE7	S10	SSE8	S8	SSE7	S7	SSW7	SSW5	NNW10	NE9	ENE6	WSW1	NNW3	E2	E2	NNE4	SSE1.8	NNW10
3-Aug	NE3	NNE3	NNE4	ENE2	NNE2	NE1	ESE3	SE2	ENE3	E5	NE5	NNE5	S4	SSW10	SSW8	E10	E12	ESE10	SE9	SE6	ESE7	ESE7	SE7	ESE4	ESE3.6	E12
4-Aug	ESE4	NNE6	NNE7	NE5	E7	NE6	N7	NNE5	ENE4	NE7	NE10	NE9	ENE8	ESE13	SE12	ESE11	ESE11	ESE9	ESE11	SE14	SSE14	ESE7	ESE7	ESE8	E6.3	SE14
5-Aug	E5	NNE5	NE6	NE5	NE4	NE7	NE7	ENE7	E6	SE6	SSW5	WSW3	W3	WSW3	S5	ESE6	SE9	SE10	SSE17	SSE21	S19	SE13	ESE10	SE10	SE5.2	SSE21
6-Aug	SE9	SE15	ESE13	ESE10	ESE11	ESE12	ESE14	SE11	SE12	SE9	SE10	ESE11	ESE12	ESE13	ESE13	SE12	ESE15	ESE14	ESE11	ESE9	ESE9	ESE7	E4	E6	ESE10.8	ESE15
7-Aug	ESE9	ESE7	ENE4	ENE5	E4	E5	ENE4	NE3	NW3	WNW2	WSW5	NNW6	N6	SE4	SSW4	SSE6	ESE6	E7	E7	ESE8	ESE7	SSE8	SSE8	SSE12	ESE3.4	SSE12
8-Aug	SSE12	S11	SSE11	SSE8	SSE9	SSE8	S8	SSE9	SSE8	S8	SE7	S5	S6	E5	NNE6	NNE5	SSW8	SSW6	SSW3	ESE9	SE10	SE7	SE2	NNE4	SSE5.7	SSE12
9-Aug	NE6	ENE4	NE4	NE4	NNE4	NE2	NE1	SW4	SW3	WSW4	SW4	SE3	SE3	WNW4	W4	W2	N2	ENE5	ENE5	ENE5	ENE6	E5	SE6	SE8	E1.4	SE8
10-Aug	WSW8	NNW11	SE3	SW5	WSW11	WNW12	WSW5	WSW9	WSW9	SW10	SW11	SW11	WSW11	WSW13	W13	WSW11	WSW11	WSW13	SW8	SW7	SSW7	SW10	SW9	WSW6	WSW8.2	WSW13
11-Aug	SW7	SSW8	S7	S8	SSW3	WSW9	S5	SSW9	SW8	WSW11	WSW18	WSW20	WSW18	WSW20	WSW22	W16	W18	W18	W12	SW9	WSW10	WSW10	WNW8	WSW11	WSW10.7	WSW22
12-Aug	WSW10	WSW8	WSW9	WSW12	WSW12	W12	W12	W16	W14	W12	W14	W14	W12	WSW12	WSW11	WSW12	W13	W11	WNW14	W9	W7	WSW6	W6	W5	W10.7	W16
13-Aug	WSW6	WSW7	SW4	SW5	SW8	SSW5	SSW8	SSW9	S8	S8	SSE8	SSE8	ESE4	NW6	WNW13	WSW9	WSW9	WSW11	WSW9	SW8	SW7	SW5	WSW6	WSW12	SW6.1	WNW13
14-Aug	WNW13	WNW11	W11	W11	W13	W16	WNW17	WNW17	WNW18	WNW17	WNW16	WNW16	WNW19	WNW17	WNW20	WNW21	WNW20	WNW18	NW17	NW15	NW13	WNW11	WNW12	WNW12	WNW15.2	WNW21
15-Aug	NW12	NW11	NW12	NW12	NNW12	N14	N12	N16	N17	N17	N19	NNE19	NNE17	N18	N17	N17	NNW16	NNW15	NNW13	NNW11	NNW11	NNW10	N10	N7	N13.2	N19
16-Aug	N6	NNW5	N4	NNW3	NNW5	NW4	NW6	ESE1	ESE2	NE2	SSE3	NNW7	NNW3	WNW6	NW10	N9	WNW9	NNW7	NW10	NW9	NW8	W4	W3	SW4	NW4.3	NW10
17-Aug	WSW4	W2	WSW4	WSW6	SW7	SSW7	SSW10	SSW10	S10	S9	S8	SSW6	SW9	SW10	SW9	SW7	W7	NNW10	NNW7	ENE3	ESE4	SSW2	S6	SSW5	SW4.7	NNW10
18-Aug	N1	N7	N7	N3	N5	NW6	NNW6	NNW7	NNW8	N5	N3	WSW6	WNW4	SSW6	ESE3	SSW6	SSW11	S9	SSW8	SSW6	S8	SSW11	SSW9	S13	SW2.0	S13
19-Aug	S13	S15	S17	S19	S18	S20	S17	S16	SSW18	SSW14	WSW11	W14	W13	W14	W19	W21	W16	WNW19	WNW19	WNW17	WNW16	WNW17	WNW13	W9	WSW10.1	W21
20-Aug	WNW16	WNW12	WNW14	WNW14	WNW11	WNW18	WNW20	WNW19	WNW17	WNW19	WNW17	WNW18	WNW18	NW17	NW16	NW15	NW16	NW15	NW16	NW11	WNW12	NW12	WNW11	WNW12	WNW15.0	WNW20
21-Aug	WNW13	WNW13	WNW12	WNW11	W9	WSW9	WNW11	WNW10	NW14	NW14	NW15	NNW13	NW18	NNW17	NNW18	NW14	NW13	NNW14	NW12	NW12	NW13	NW15	NW13	NW10	NW12.3	NNW18
22-Aug	NW10	WNW10	WNW11	WNW13	WNW15	WNW12	WNW10	WNW10	WNW12	WNW12	WNW13	NW13	NNW10	NW10	NNW17	NNW13	N11	NNE6	NNE6	NE3	SE4	SSW4	S5	SSW6	NW7.7	NNW17
23-Aug	S4	S3	S7	S6	S8	S6	S11	S12	SSE13	S11	SSE11	S14	S12	S11	S12	SSE15	S14	S14	SSE11	SSE13	SSE18	S17	NNW12	E7	S9.5	SSE18
24-Aug	E3	NNW4	N4	SSE13	S7	SSW7	SW6	SSW9	S9	SW8	SW9	WSW9	SW11	WNW12	W10	WSW9	W8	W7	W7	W5	NW7	NNW9	N8	N10	WSW4.4	SSE13
25-Aug	N9	N3	N6	NNW4	N2	NE1	NNE2	N3	NNE4	N8	NNW10	N10	N12	N13	N13	NNE11	N9	N8	N7	NNE6	N3	N6	N10	NNE11	N7.1	N13
26-Aug	NNE9	N12	NNE5	NE4	NNE4	NNE4	NNE2	ENE3	NNE7	N8	NNW2	WNW4	WNW5	SW5	SSW5	SW7	SW6	WSW6	SW6	SSW3	WSW2	WSW4	SSW4	SW4	NW1.4	N12
27-Aug	S3	SSW3	SSW4	SSW4	SSW5	SSW6	SSW5	SSW5	SSE8	SE7	SSE10	SSW9	SW10	SW11	SW12	SW14	SW14	WSW14	WSW12	SW8	SSW8	SSW8	SW5	WSW10	SW7.2	WSW14
28-Aug	WSW14	W12	WSW13	WSW14	WSW11	WSW13	WSW11	WSW13	W13	WSW14	WSW16	WSW14	W13	W16	WSW14	WSW11	W12	W10	NNW1	ESE3	ENE4	NNE5	NNE6	N7	W9.1	WSW16
29-Aug	N7	NNW3	S2	SSW3	NW4	SSW3	SSW5	SSW6	SSW7	S8	S8	SSW5	SSE6	SSE6	SSE9	SSE9	SSE11	SSE10	SSE14	SE14	SE16	SE19	SE19	SSE11	SSE6.6	SE19
30-Aug	ESE12	SE14	SSE15	SSE11	S9	SSW5	S3	SSW8	WNW8	NW10	NW9	NW7	NW11	WSW7	SW11	SW7	WSW7	SE6	SSE15	S11	SSW7	S4	S7	S7	S4.5	SSE15
31-Aug	SSE9	SSE7	SSE8	SSE5	SSE8	SSE9	S7	SSE9	SSE12	SSE13	S13	SW12	WSW17	WSW16	WSW18	WSW20	WSW15	WSW15	SW11	SW8	SW8	SW9	SW5	SW5	SSW8.4	WSW20
	W1.5	WNW1.7	WSW1.3	SW2.3	WSW2.5	WSW2.6	WSW2.6	WSW3.0	WSW2.9	WSW3.0	WSW3.5	W4.2	W4.5	W5.1	W5.5	W4.5	W4.4	W3.5	W2.3	SSW1.6	SSW2.0	SW2.1	W1.2	WSW1.6	Diurnal Average	
	WNW16	S15	S17	S19	S18	S20	WNW20	WNW19	SSW18	WNW19	N19	WSW20	WNW19	WSW20	WSW22	WNW21	WNW20	WNW19	WNW19	SSE21	S19	SE19	SE19	S13	Diurnal Maximum	

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 9 km/h on Aug 19 18:00

Minimum Value: 1 km/h on Aug 26 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:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

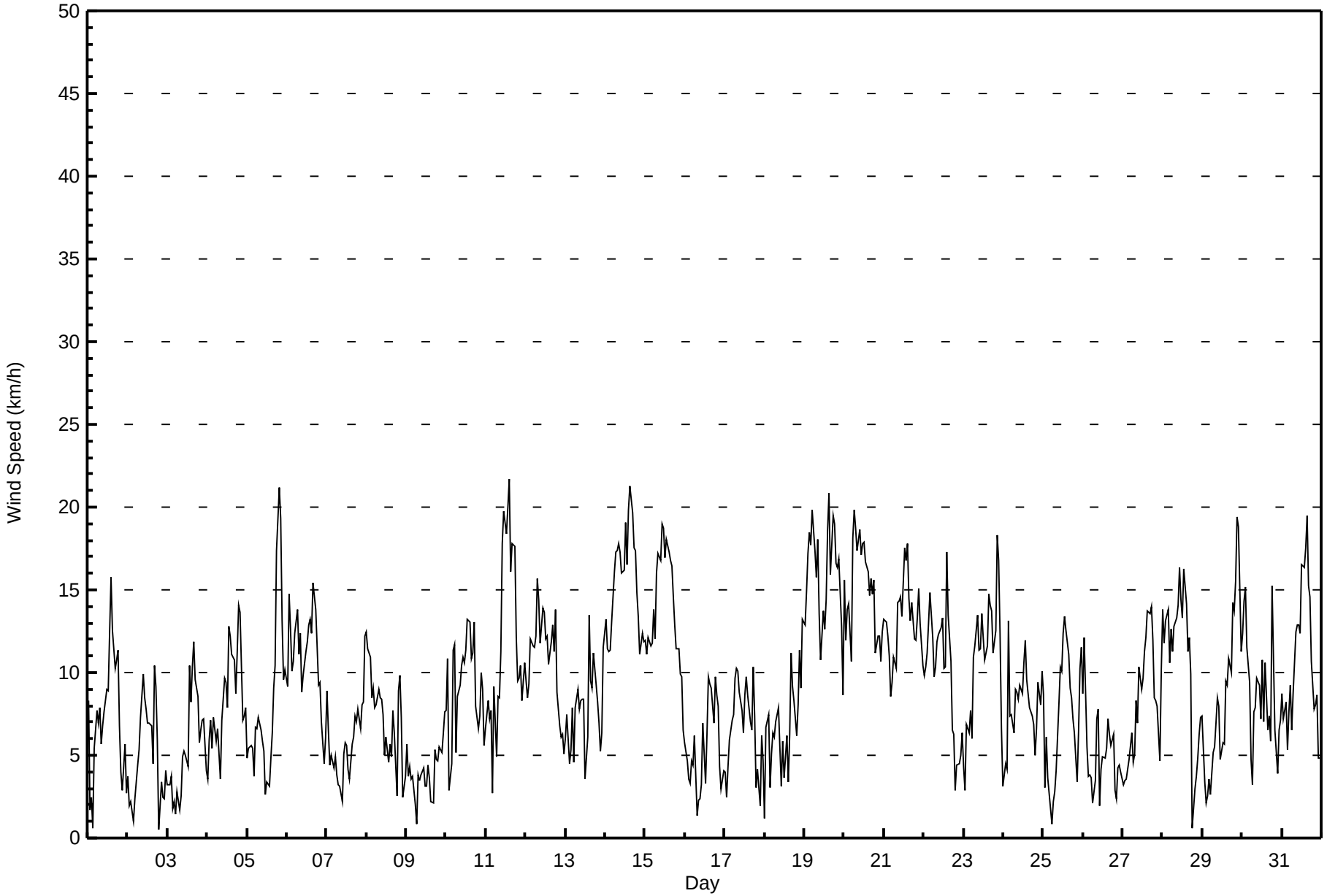
Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Aug	2	2	2	1	3	1	1	1	1	2	3	3	3	5	3	3	3	3	2	2	2	1	1	1	5
2-Aug	1	2	2	1	1	1	1	1	2	2	2	2	3	3	3	3	5	2	3	2	2	1	2	1	5
3-Aug	2	1	2	1	2	1	1	1	1	2	2	2	2	4	3	3	2	2	2	2	1	2	3	1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

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed (WS) - km/h

Mildred Lake - August 2015



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	183	24.60	24.60
6 - 11	342	45.97	70.56
12 - 19	208	27.96	98.52
20 - 28	11	1.48	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Wind Speed (WS) - km/h

Mildred Lake - August 2015

Wind Speed Ranges (km/h)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 5	14	19	14	15	10	9	8	3	12	25	13	10	8	5	3	15	183
6 - 11	29	12	9	4	7	25	18	33	32	32	34	39	13	15	18	22	342
12 - 19	13	2	0	0	1	11	10	15	16	2	4	25	26	44	25	14	208
20 - 28	0	0	0	0	0	0	0	1	1	0	0	4	1	4	0	0	11
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	56	33	23	19	18	45	36	52	61	59	51	78	48	68	46	51	744

Total Number of Valid Hours: 744

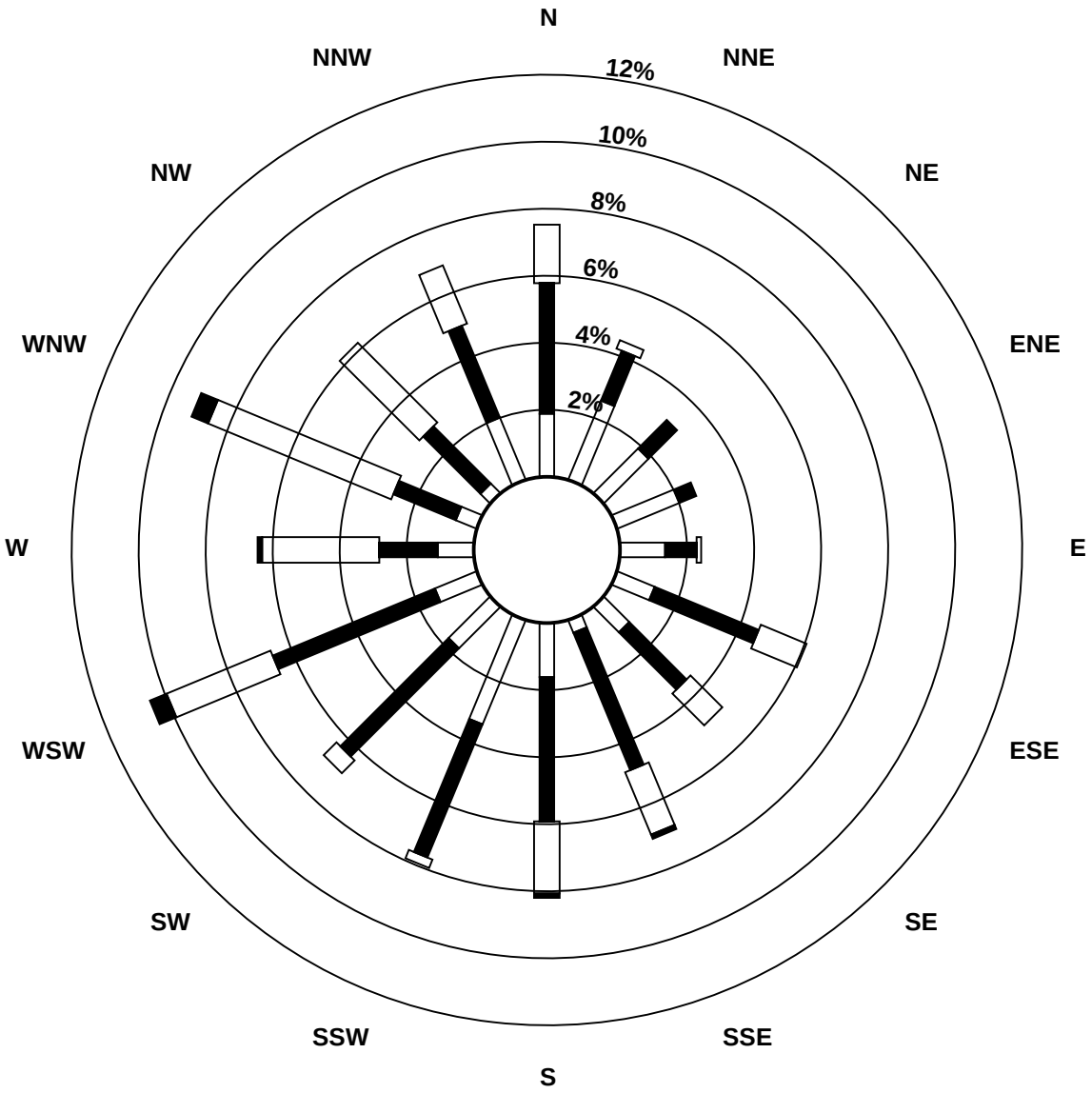
Total Number of Hours: 744

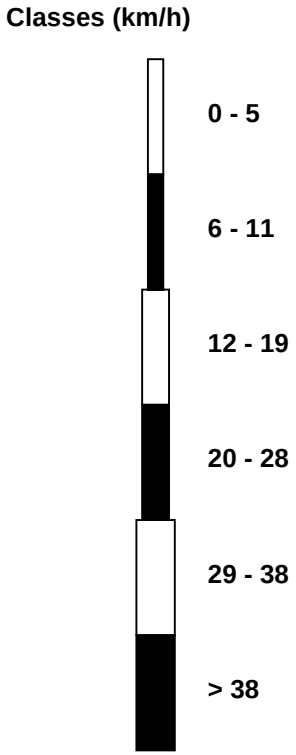
Wood Buffalo Environmental Association

Wind Rose Aug 2015

Wind Speed (WS) - km/h

Mildred Lake (AMS 2)





Total Number of Valid Hours: 744

Direction of Maximum Speed: 257 deg on Aug 11 15:00
Direction of Maximum Daily Speed Average: 294.0 deg on Aug 14

Direction of Minimum Speed: 249 deg on Aug 2 20:00

Direction of Minimum Daily Speed Average: 1.4 deg on Aug 26

Monthly Average Direction: 265.7 deg

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
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average
1-Aug	9	339	13	341	10	5	5	360	345	327	341	352	323	339	335	334	332	326	349	18	23	341	332	346	345.7
2-Aug	344	353	89	130	196	172	204	158	156	171	164	181	149	179	197	194	336	39	64	249	331	83	88	15	153.6
3-Aug	52	30	18	67	25	50	118	140	57	86	53	32	190	207	195	81	99	118	129	126	104	113	146	120	109.6
4-Aug	111	12	18	35	90	48	7	19	72	51	44	47	67	122	124	115	106	119	112	136	151	114	111	103	92.1
5-Aug	85	19	39	51	44	54	55	75	97	140	199	244	274	241	181	120	133	134	167	167	172	141	123	135	134.5
6-Aug	128	130	114	102	107	110	120	126	138	138	127	123	118	106	123	129	115	112	118	117	115	119	79	85	118.3
7-Aug	109	106	72	77	90	88	76	37	316	299	255	327	5	137	202	154	113	81	93	111	105	149	148	160	110.6
8-Aug	155	171	161	162	165	166	170	168	161	169	143	190	178	92	28	30	198	211	198	103	130	142	132	18	156.1
9-Aug	45	57	54	43	16	35	38	219	218	248	218	139	144	290	278	270	9	75	74	61	78	80	131	141	85.2
10-Aug	245	338	133	222	258	297	257	251	243	225	225	223	239	244	269	257	243	247	236	226	212	229	221	248	245.3
11-Aug	236	203	188	175	197	245	186	203	218	241	252	257	258	257	257	261	259	276	279	236	241	248	287	257	247.9
12-Aug	255	252	254	247	255	265	269	276	274	265	267	276	269	258	253	253	267	272	287	271	263	258	280	260	265.1
13-Aug	251	253	215	221	215	208	212	206	190	181	160	157	103	318	292	247	237	243	243	232	224	230	238	254	228.0
14-Aug	289	288	269	273	271	281	291	293	292	288	285	298	292	303	294	303	302	303	320	310	306	293	290	296	294.0
15-Aug	307	317	325	324	336	360	7	0	7	4	1	15	19	10	6	353	347	340	343	334	344	343	355	359	352.4
16-Aug	351	340	351	348	330	323	313	103	121	56	167	330	327	292	309	349	292	331	305	308	310	274	269	230	316.6
17-Aug	256	270	255	243	229	211	196	196	191	176	169	208	214	218	232	216	263	327	332	63	103	207	181	203	216.4
18-Aug	3	358	359	1	359	323	333	347	347	5	359	250	283	196	122	194	193	186	200	197	185	197	205	190	229.5
19-Aug	189	170	172	190	180	172	174	183	196	210	244	269	280	276	271	268	266	302	301	303	294	294	289	279	241.1
20-Aug	291	287	293	289	286	292	293	295	298	299	297	296	303	304	310	304	310	316	319	305	294	307	301	293	299.4
21-Aug	296	297	293	285	277	257	284	292	320	319	324	338	323	331	346	314	319	342	324	320	321	321	319	308	314.5
22-Aug	308	296	297	292	296	299	295	293	293	298	300	309	345	325	338	340	358	14	14	47	132	207	185	194	310.8
23-Aug	172	189	184	181	176	182	176	169	167	169	164	172	187	182	174	166	169	173	167	152	163	171	348	80	169.6
24-Aug	99	331	355	151	179	212	227	200	191	235	231	249	235	291	276	258	273	262	280	267	316	329	356	3	256.7
25-Aug	5	2	4	342	5	52	22	10	18	10	342	11	9	1	7	18	2	354	358	17	350	354	3	18	5.0
26-Aug	22	11	29	53	15	28	27	69	17	359	337	287	295	224	208	225	236	243	218	210	255	241	206	219	307.9
27-Aug	180	202	204	200	195	203	199	202	161	144	162	194	223	227	230	225	230	255	253	229	213	213	224	244	215.5
28-Aug	254	266	253	254	255	253	253	249	260	253	258	257	264	276	244	251	261	259	337	106	71	23	23	8	260.7
29-Aug	352	340	179	212	306	193	212	210	202	171	176	199	164	167	163	166	162	160	158	132	128	130	129	158	157.2
30-Aug	117	130	162	151	176	196	183	213	284	305	321	322	314	237	218	228	244	142	150	173	206	191	179	174	190.6
31-Aug	161	150	166	167	166	166	182	160	163	160	171	235	242	244	254	249	253	246	230	226	229	235	234	229	213.3
	277.4	288.3	247.3	227.7	240.0	252.1	247.2	238.1	239.8	249.2	254.1	275.6	277.4	271.3	273.0	266.2	266.1	280.4	271.3	211.8	206.4	223.5	261.3	238.3	
	Diurnal Average																								

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 101 deg on Aug 26 20:00

Minimum Value: 8 deg on Aug 15 22:00

Percentiles: P_1 = 10 P_{10} = 14 Q_1 = 18 Median = 23 Q_3 = 31 P_{90} = 51 P_{99} = 87

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

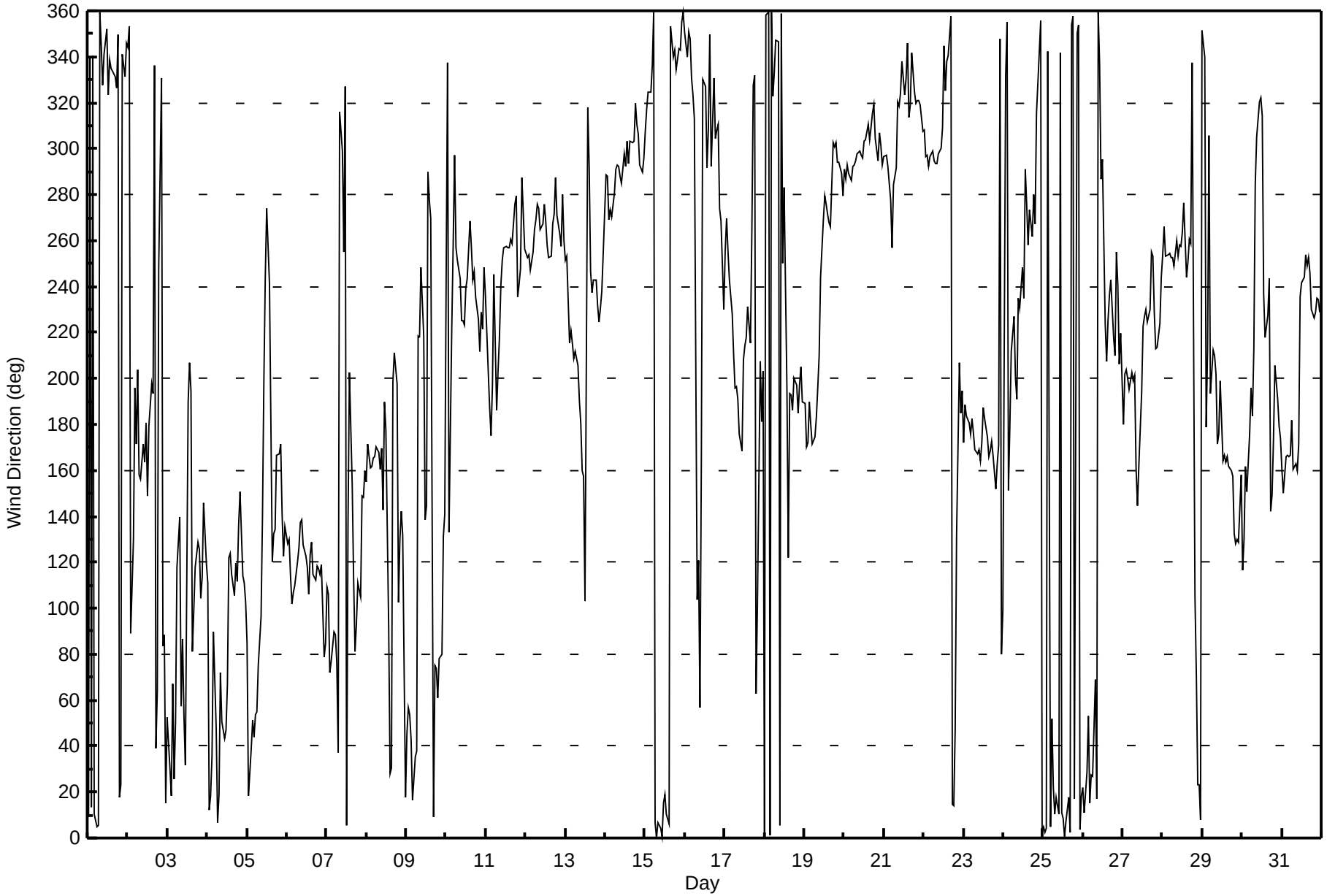
Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Aug	11	61	37	66	17	10	12	14	12	27	29	32	32	27	15	18	26	20	14	17	50	49	16	34	66
2-Aug	20	57	60	52	47	33	28	22	28	21	29	32	69	56	45	62	47	38	29	85	50	66	45	25	85
3-Aug	24	17	47	50	20	73	37	67	61	38	47	60	68	25	46	20	13	13	16	19	13	22	25	18	73
4-Aug	29	31	16	28	12	37	12	31	44	24	21	19	21	20	19	12	12	16	15	22	19	19	16	12	44
5-Aug	24	16	19	18	26	16	15	16	20	36	38	84	44	66	49	29	19	19	23	13	17	22	16	17	84
6-Aug	18	18	15	12	12	14	15	16	18	19	17	17	18	17	19	20	16	15	14	13	11	13	24	15	24
7-Aug	13	12	21	16	16	11	20	31	45	62	38	54	39	67	82	49	39	16	13	21	11	20	15	16	82
8-Aug	15	15	15	16	14	16	16	17	29	31	32	59	57	59	63	51	42	21	69	35	17	17	71	19	71
9-Aug	11	19	10	18	17	36	74	34	53	47	58	72	81	53	74	88	86	36	25	15	12	14	13	15	88
10-Aug	43	50	60	63	26	21	47	27	30	25	26	27	32	33	29	33	28	27	27	22	16	23	23	39	63
11-Aug	28	16	13	17	80	31	70	19	30	28	25	26	26	24	24	27	26	26	27	25	26	24	27	26	80
12-Aug	26	26	24	26	28	26	24	21	25	28	26	28	31	30	33	30	32	26	20	23	29	26	28	20	33
13-Aug	20	19	45	19	20	69	23	26	30	18	20	22	56	54	24	29	28	28	26	25	20	31	26	26	69
14-Aug	23	21	27	26	25	27	20	21	22	21	23	22	21	24	22	21	21	21	17	18	19	18	20	20	27
15-Aug	18	17	14	15	13	15	15	16	15	19	19	21	20	20	18	16	15	17	12	10	12	8	14	11	21
16-Aug	11	16	23	32	11	18	20	83	51	69	96	45	66	45	30	38	25	31	18	16	14	40	38	23	96
17-Aug	26	51	42	27	21	22	13	14	17	18	27	49	30	27	32	34	55	16	35	50	10	79	20	33	79
18-Aug	97	15	10	25	13	16	13	19	22	47	85	37	69	50	83	60	21	19	17	22	14	14	20	13	97
19-Aug	16	13	15	16	17	15	17	18	15	20	32	31	28	28	26	25	26	33	21	20	19	19	22	30	33
20-Aug	21	25	19	22	24	19	20	19	21	20	20	21	20	20	19	20	18	17	18	19	19	18	18	19	25
21-Aug	19	18	23	26	26	23	30	22	18	18	16	20	18	19	14	29	19	17	18	16	15	14	16	19	30
22-Aug	19	19	18	17	17	19	18	20	18	20	22	26	30	26	18	22	20	39	23	30	21	28	16	13	39
23-Aug	23	39	21	24	17	31	17	16	13	19	21	17	24	23	29	19	19	15	13	15	13	24	39	21	39
24-Aug	78	59	62	28	26	18	25	16	26	28	30	38	30	28	41	35	46	34	29	18	23	13	13	11	78
25-Aug	10	30	13	47	47	87	38	35	32	24	18	26	23	15	15	19	15	15	12	59	61	13	13	15	87
26-Aug	16	13	31	22	17	25	43	36	21	20	95	70	50	34	35	29	31	30	23	101	62	27	27	27	101
27-Aug	64	27	21	35	26	11	25	25	19	28	23	34	27	27	28	27	27	27	25	25	17	20	36	26	64
28-Aug	25	25	24	25	25	26	24	25	25	24	24	26	29	26	28	30	27	28	88	45	16	56	16	13	88
29-Aug	14	55	78	63	47	75	24	23	19	22	28	48	52	53	29	30	24	19	17	19	17	17	17	29	78
30-Aug	18	19	21	22	24	15	54	27	35	25	34	40	29	46	22	38	36	87	19	23	25	40	24	10	87
31-Aug	12	22	18	19	15	14	26	15	13	17	19	29	27	30	27	25	29	25	25	22	27	27	28	40	40
	97	61	78	66	80	87	74	83	61	69	96	84	81	67	83	88	86	87	88	101	62	79	71	40	
	Diurnal Maximum																								

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction (WD) - deg

Mildred Lake - August 2015



Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

Calibration Date	August 19, 2015	Last Calibration	July 15, 2015
Station Name	Mildred Lake	Station Number	AMS 2
Reason:	Routine		
Start Time (MST)	9:15	End Time (MST)	10:00
Gas Cert Reference	CC307191	Station temp.	22 Deg C
Cal Gas Concentration	59.4 ppm	Cal Gas Exp Date	26/03/2012
Calibrator Make/Model	Sabio 4010	Serial Number	11541008
ZAG Make/Model	API 701	Serial Number	825
DACS make/model	Campbell Scientific CR3000	DACS serial No.	8346

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 1000 ppb		PMT voltage	-653	-653
Analyzer IP address	192.168.1.43		Lamp voltage	795	786
Calculated slope	0.999415	0.976186	Chamber temp	45.1	45.0
Calculated intercept	1.040728	-0.253808	Pressure	688.8	684.9
Analyzer Background	22.4	22.7	Flow	0.484	0.485
Analyzer Coefficient	1.060	1.060	Intensity	90	91

Analyzer make	TEI 43i	Analyzer serial #	JC1404901075

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.3	----
as found span	5000	69.9	830.4	850.9	0.976
calibrator zero	5000	0.0	0.0	0.3	----
high point	5000	69.9	830.4	850.9	0.976
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	0.976

Corrected As found	850.7	Previous response	829.9	% change	-2.4%

Notes:

No adjustments. Changing cal gas cylinder.

Calibration Performed By: Asad Hidayat

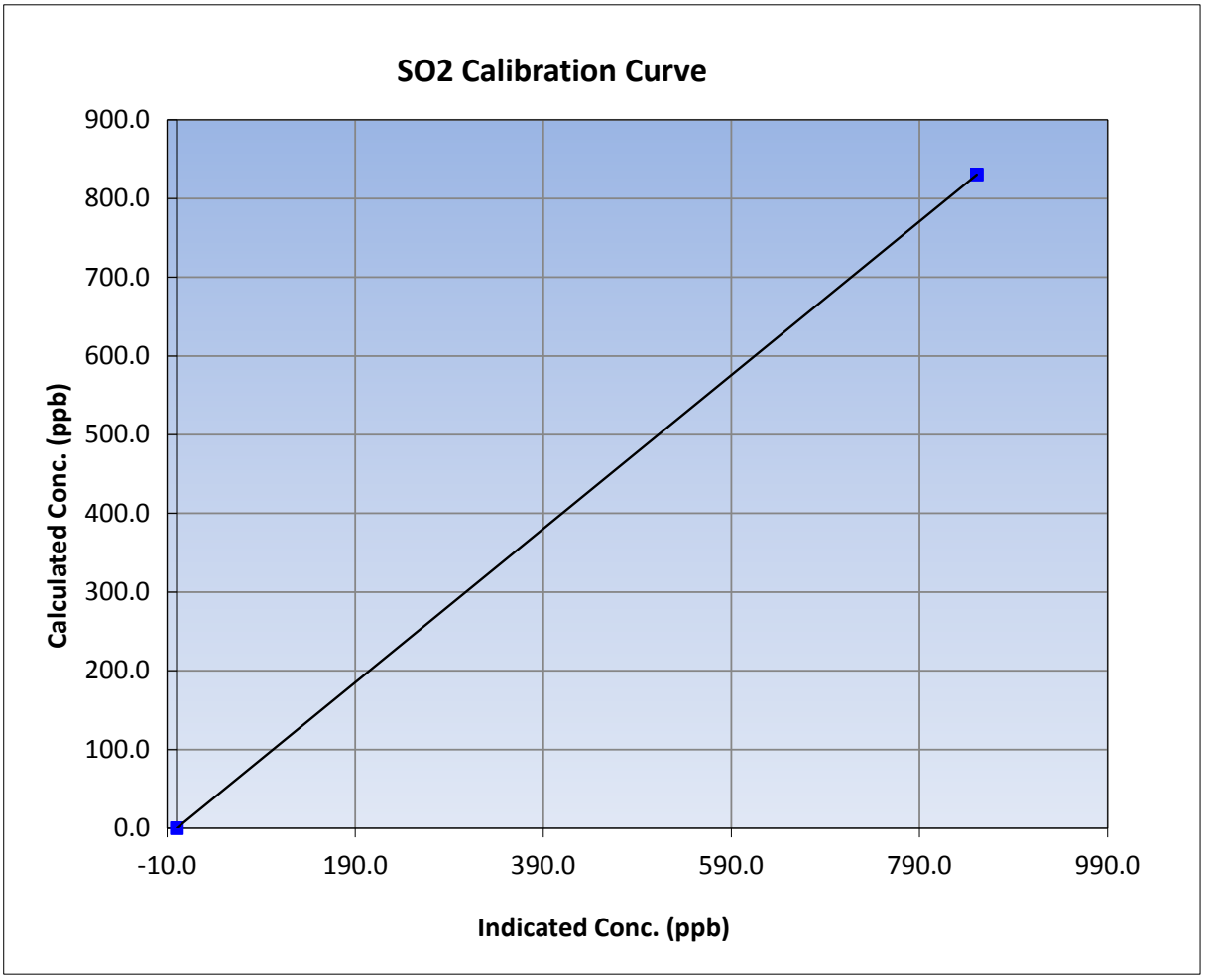
Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

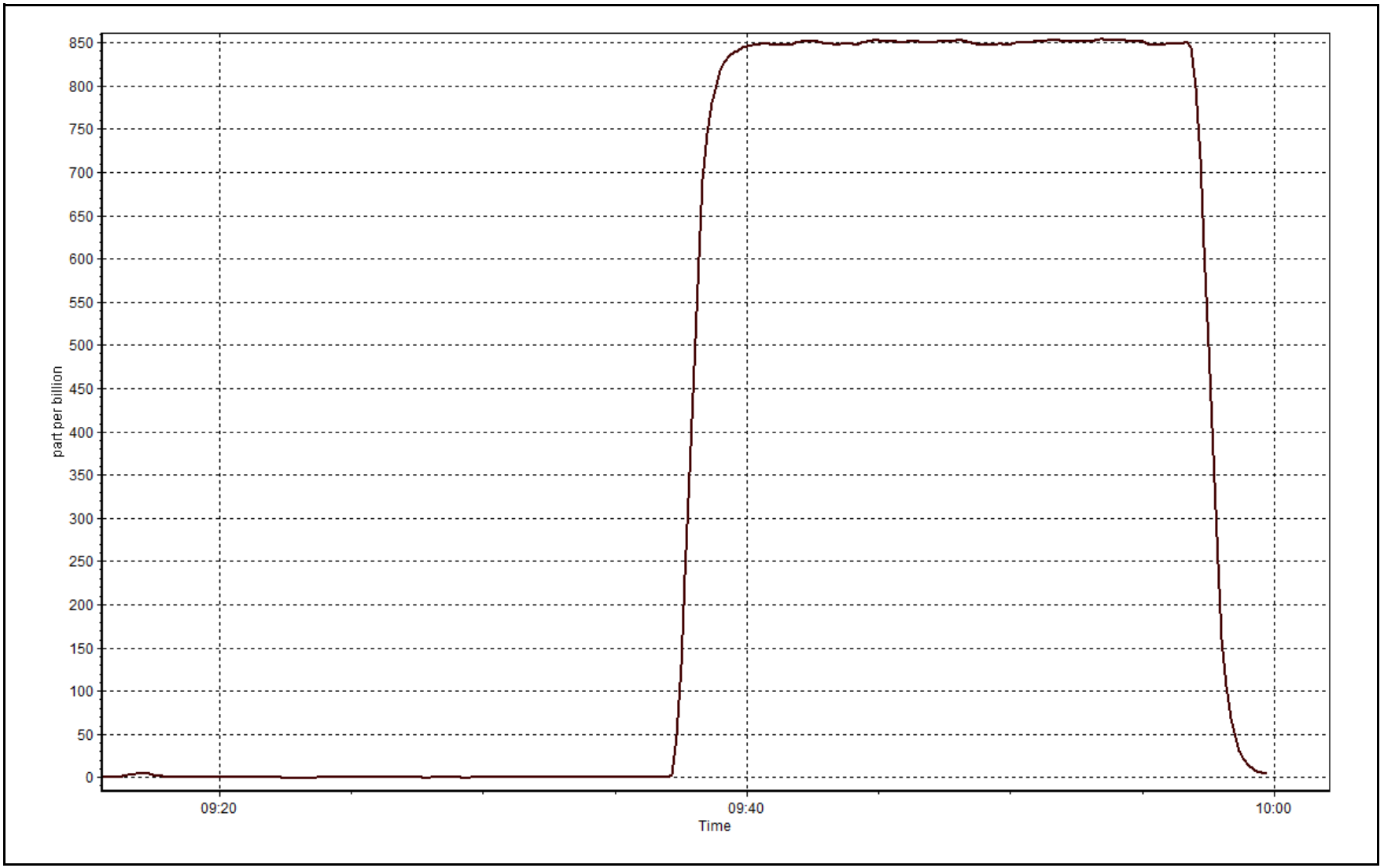
Calibration Date	August 19, 2015	Previous Calibration	July 15, 2015
Station Name	Mildred Lake	Station Number	AMS 2
Start Time (MST)	9:15	End Time (MST)	10:00
Analyzer make	TEI 43i	Analyzer serial #	JC1404901075

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.3	----	Correlation Coefficient	1.000000
830.4	850.9	0.9759		
			Slope	0.976186
			Intercept	-0.253808



SO2 Calibration Plot Date: August 19, 2015



Wood Buffalo Environmental Association
SO2 Calibration Report

W B E A

Station Information

Calibration Date	August 19, 2015	Last Calibration	July 15, 2015
Station Name	Mildred Lake	Station Number	AMS 2
Reason:	Routine		
Start Time (MST)	11:20	End Time (MST)	16:30
Gas Cert Reference	SA1301009	Station temp.	22 Deg C
Cal Gas Concentration	47.2 ppm	Cal Gas Exp Date	12/12/2016
Calibrator Make/Model	Sabio 4010	Serial Number	11541008
ZAG Make/Model	API 701	Serial Number	825
DACS make/model	Campbell Scientific CR3000	DACS serial No.	8346

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 1000 ppb		PMT voltage	-653	-652
Analyzer IP address	192.168.1.43		Lamp voltage	786	785
Calculated slope	0.976186	0.999051	Chamber temp	45.0	45.2
Calculated intercept	-0.253808	0.584649	Pressure	684.9	680.8
Analyzer Background	22.7	20.6	Flow	0.485	0.476
Analyzer Coefficient	1.060	0.976	Intensity	91	91

Analyzer make	TEI 43i	Analyzer serial #	JC1404901075

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.2	----
as found span	5000	82.6	779.7	851.9	0.915
calibrator zero	5000	0.0	0.0	-0.2	----
high point	5000	82.6	779.7	780.0	1.000
second point	5000	41.3	389.9	389.7	1.000
third point	5000	20.7	195.4	194.4	1.005
as left zero	5000	0.0	0.0	0.0	----
as left span	5000	82.6	779.7	784.4	0.994
				Average Correction Factor	1.002

Corrected As found	852.1	Previous response	799.0	% change	-6.2%

Notes:

New cal gas cylinder. Adjusted span

Calibration Performed By: Asad Hidayat

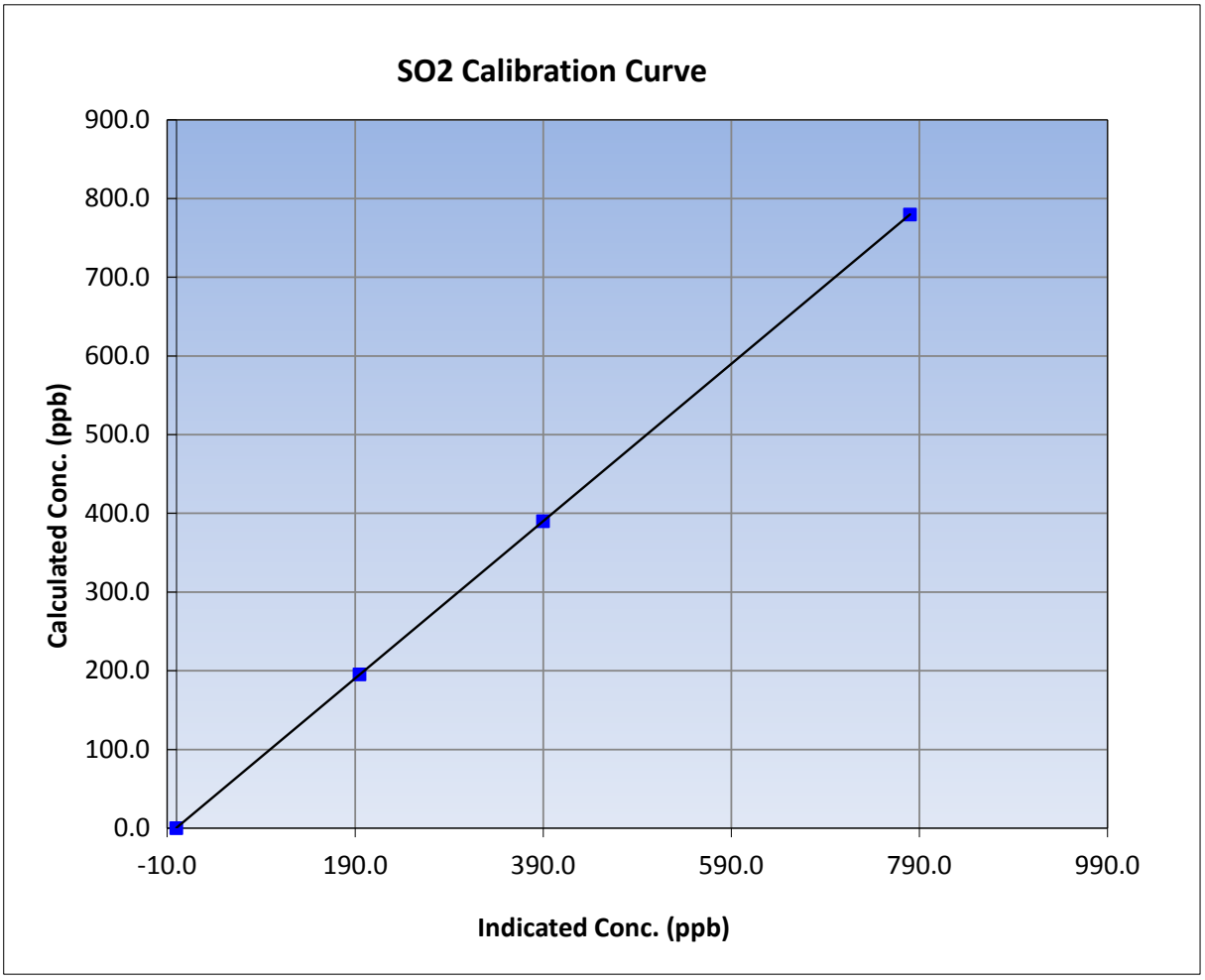
Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

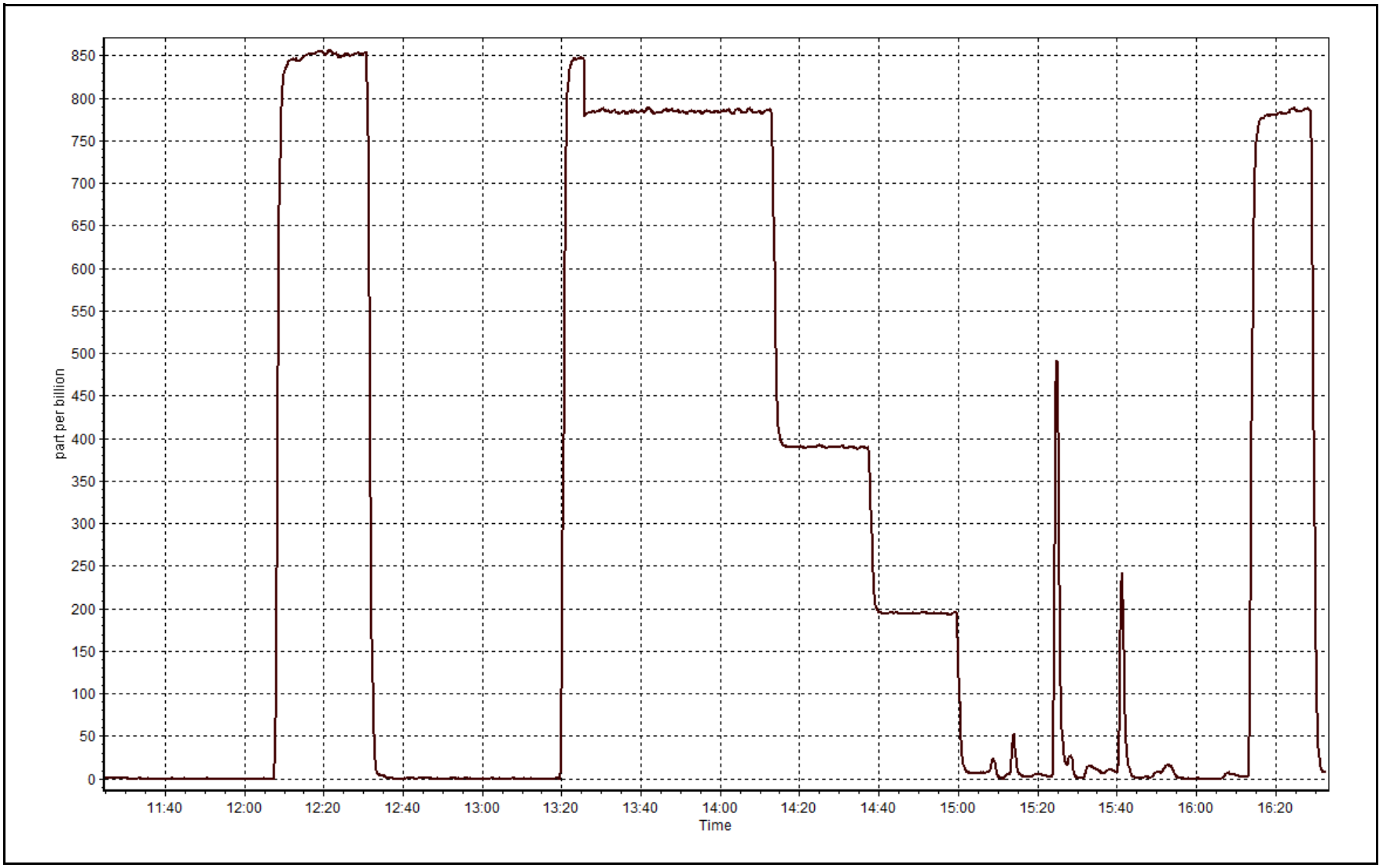
Calibration Date	August 19, 2015	Previous Calibration	July 15, 2015
Station Name	Mildred Lake	Station Number	AMS 2
Start Time (MST)	11:20	End Time (MST)	16:30
Analyzer make	TEI 43i	Analyzer serial #	JC1404901075

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	----	Correlation Coefficient	0.999999
779.7	780.0	0.9997		
389.9	389.7	1.0003	Slope	0.999051
195.4	194.4	1.0050		
			Intercept	0.584649



SO2 Calibration Plot Date: August 19, 2015



Wood Buffalo Environmental Association
H2S Calibration Report

Station Information

Calibration Date	August 20, 2015	Last Calibration	July 16, 2015
Station Name	Mildred Airstrip	Station Number	AMS 2
Reason:	Routine		
Start Time (MST)	9:54	End Time (MST)	13:15
Gas Cert Reference	ALM028262	Station temp.	22 Deg C
Cal Gas Concentration	5.04 ppm	Cal Gas Exp Date	09/09/2017
Calibrator Make/Model	Sabio 4010	Serial Number	11541008
ZAG air Make/Model	API 701	Serial Number	825
DACS make/model	Campbell Scientific CR3000	Serial Number	8346
SO2 gas concentration	47.2 ppm	SO2 gas cert/exp	SA1301009 12-Dec-16

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-601	-601
Analyzer IP address	192.168.1.42		Lamp voltage	775	774
Calculated slope	1.002476	1.001661	Chamber temp	45	45
Calculated intercept	-0.058657	-0.280538	Pressure	551.5	562.1
Analyzer Background	14	13.9	Flow	0.947	0.892
Analyzer Coefficient	0.908	0.908	Intensity	87	87
			Converter temp.	327	323

Analyzer make/model	TEI 450i	Analyzer serial #	815129107
Converter make/model	n/a	Converter serial #	n/a

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	4000	0.0	0.0	0.2	----
as found span	4000	63.5	80.0	80.1	0.999
SO2 scrubber check	5000	20.7	195.4	1.3	----
calibrator zero	4000	0.0	0.0	0.2	----
high point	4000	63.5	80.0	80.1	0.999
second point	4000	31.8	40.1	40.5	0.989
third point	4000	15.9	20.0	20.2	0.990
as left zero	4000	0.0	0.0	0.2	----
as left span	4000	63.5	80.0	80.4	0.996
				Average Correction Factor	0.993

Corrected As found	79.9	Previous response	79.9	% change	0.0%

Notes:

Inlet filter replaced after as founds. No adjustments. Updated datalogger program after as founds.

Calibration Performed By: Asad Hidayat

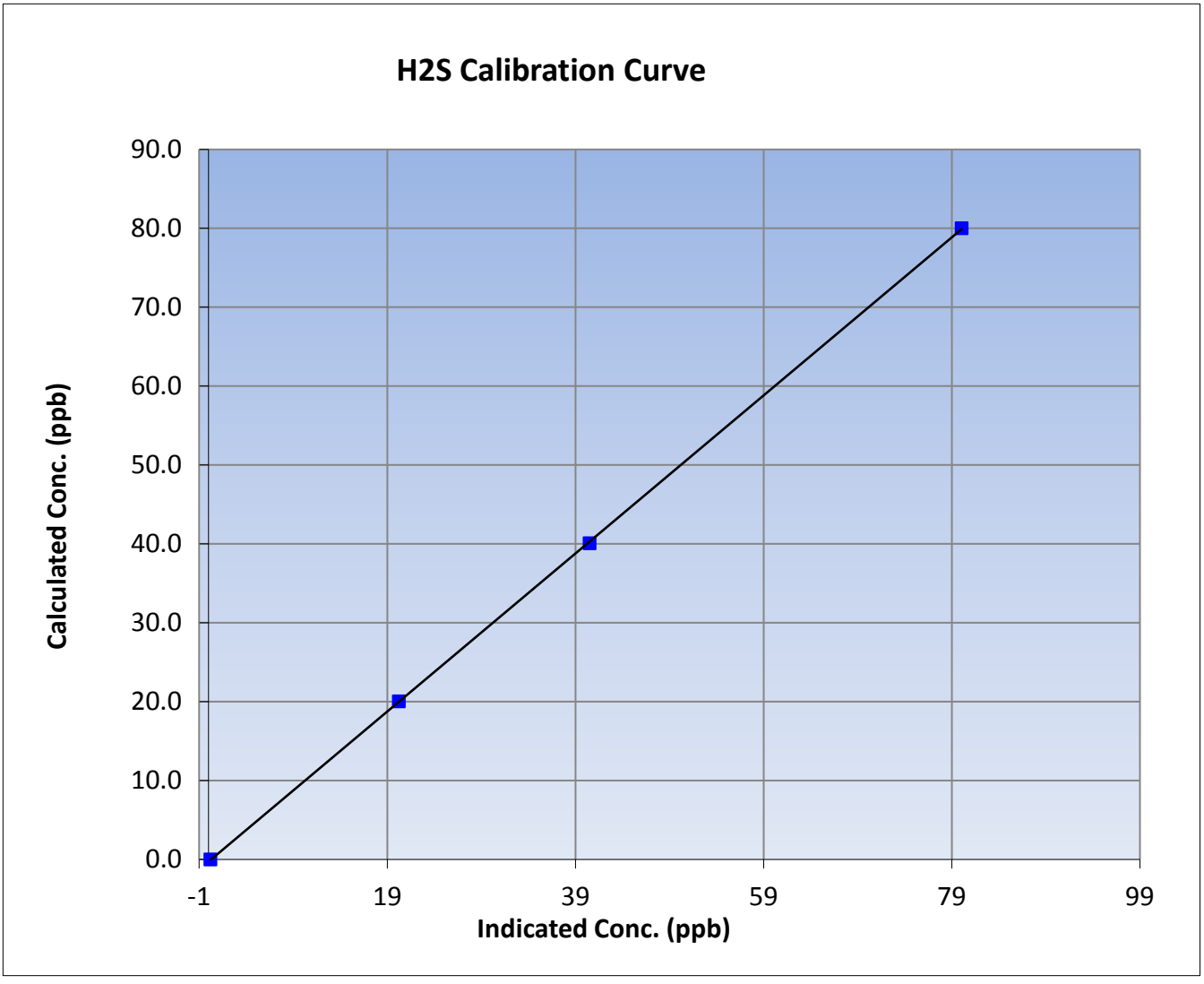
Wood Buffalo Environmental Association
H2S Calibration Report

Station Information

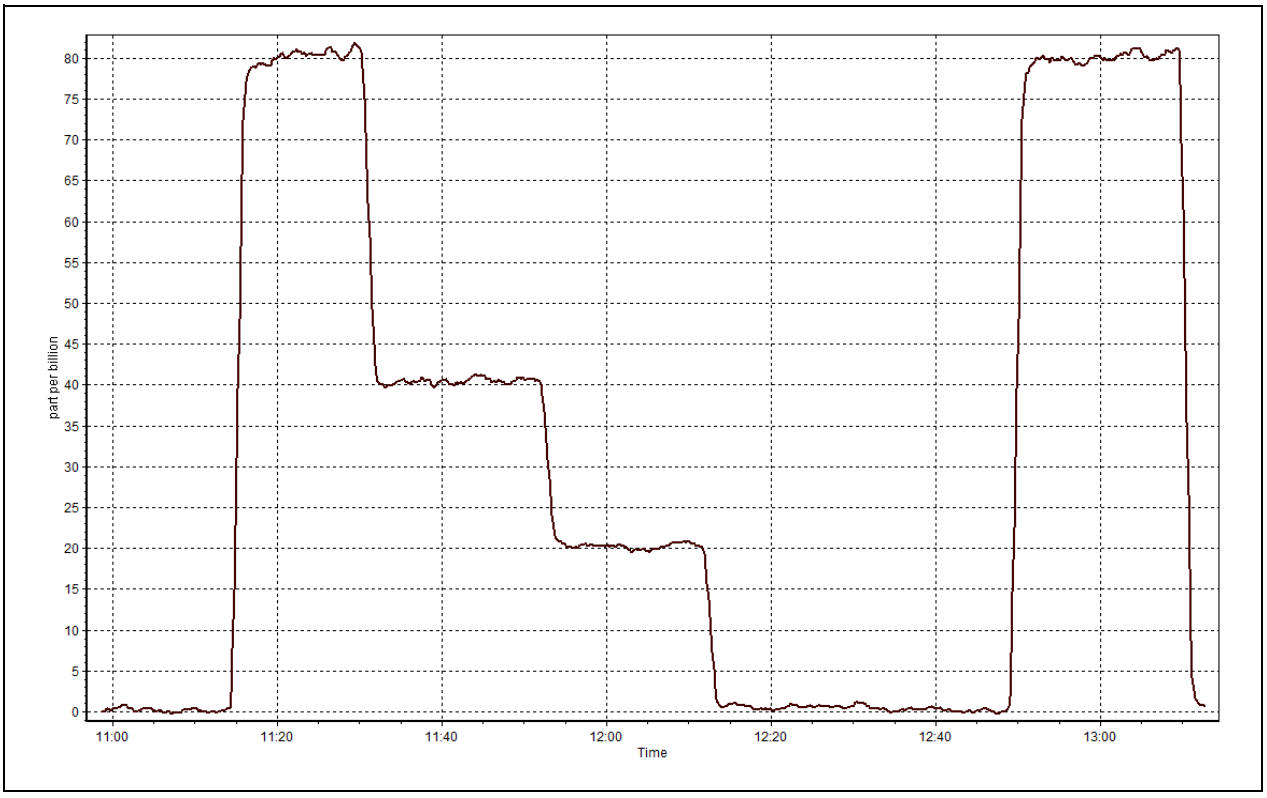
Calibration Date	August 20, 2015	Previous Calibration	July 16, 2015
Station Name	Mildred Airstrip	Station Number	AMS 2
Start Time (MST)	9:54	End Time (MST)	13:15
Analyzer make	TEI 450i	Analyzer serial #	815129107

Calibration Data

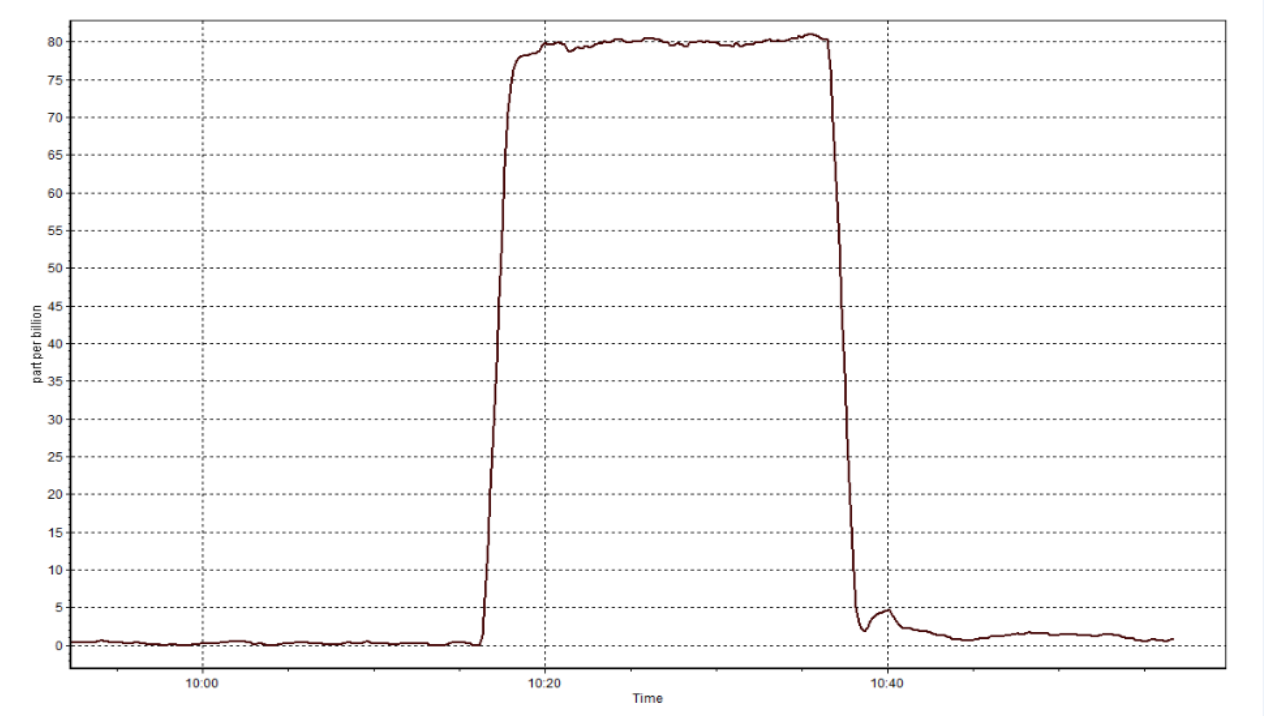
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	----	Correlation Coefficient	0.999981
80.0	80.1	0.9994		
40.1	40.5	0.9893	Slope	1.001661
20.0	20.2	0.9903		
			Intercept	-0.280538



H2S Calibration Plot Date: August 20, 2015



As found graph



Wood Buffalo Environmental Association
THC Calibration Report

Station Information

Calibration Date	August-19-15	Last Calibration	July-15-15
Station Name	Mildred Airstrip	Station Number	AMS 2
Reason:	Routine		
Start Time (MST)	9:15	End Time (MST)	10:00
Gas Cert Reference	CC307191	Cal Gas Expiry Date	26/03/2012
CH4 Cal Gas Conc.	505 ppm	CH4 Equiv Conc.	1060.5 ppm
C3H8 Cal Gas Conc.	202 ppm	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11541008
ZAG make/model	Teledyne API 701	Serial Number	825
DACS make/model	Campbell Scientific CR3000	Serial Number	8346

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 50 ppm		Sample Pressure	8.2	8.2
Analyzer IP address	192.168.1.51		Air or Bypass Press	39.9	39.9
Calculated slope	1.002694	0.981191	Fuel Pressure	25.7	25.7
Calculated intercept	0.012082	0.225674	Analyzer Coeff	4.7	4.2
			Analyzer BKG	2.610	2.610

Analyzer make	Thermo 51i-LT	Analyzer serial #	1300156231

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	-0.23	----
as found span	5000	69.9	14.83	14.88	0.996
calibrator zero	5000	0.0	0.00	-0.23	----
high point	5000	69.9	14.83	14.88	0.996
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	0.996

Corrected As found	15.11	Previous response	14.77	% change	-2.2%

Notes:

No adjustments. Changing cal gas cylinder.

Calibration Performed By: Asad Hidayat

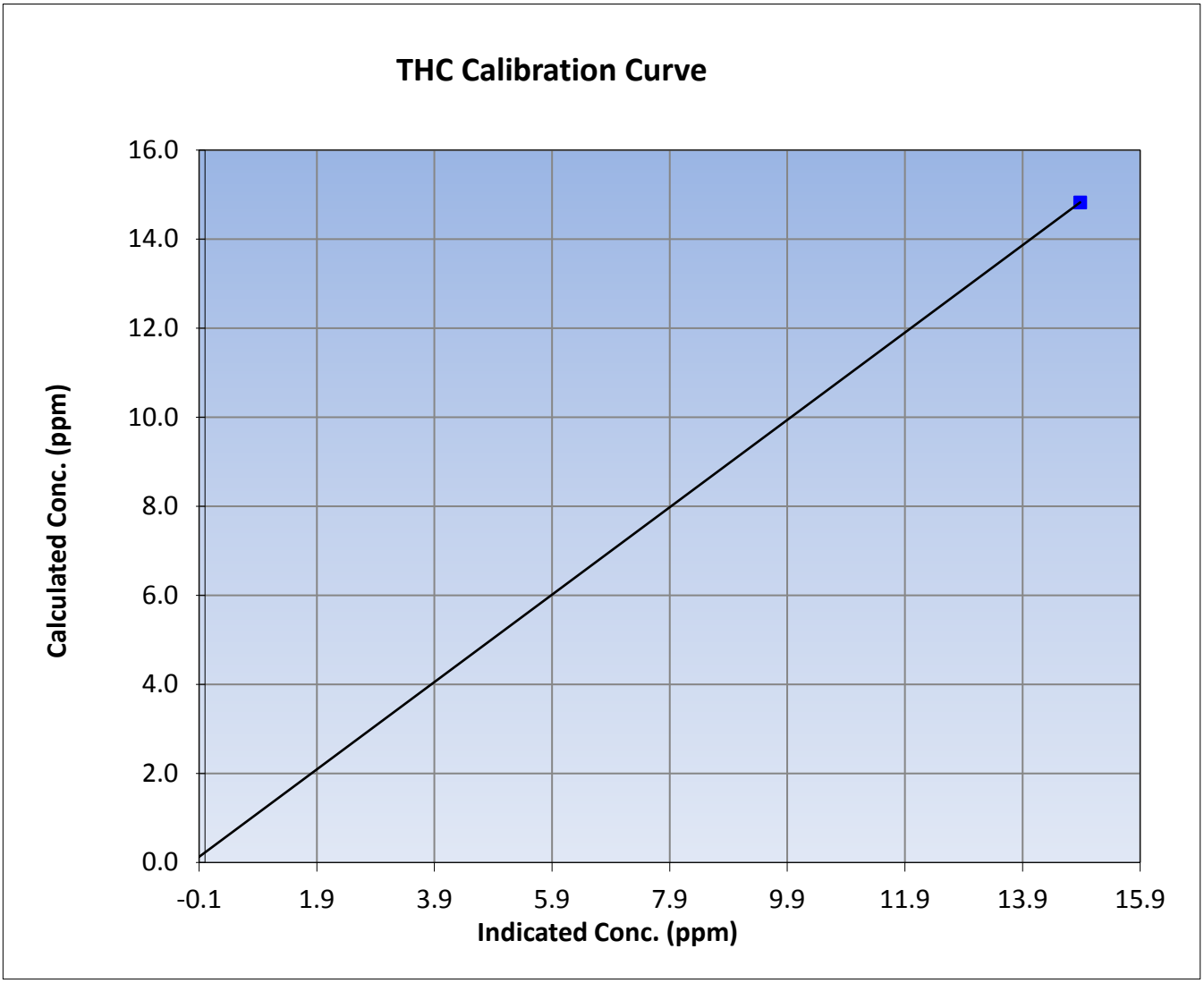
Wood Buffalo Environmental Association
THC Calibration Report

Station Information

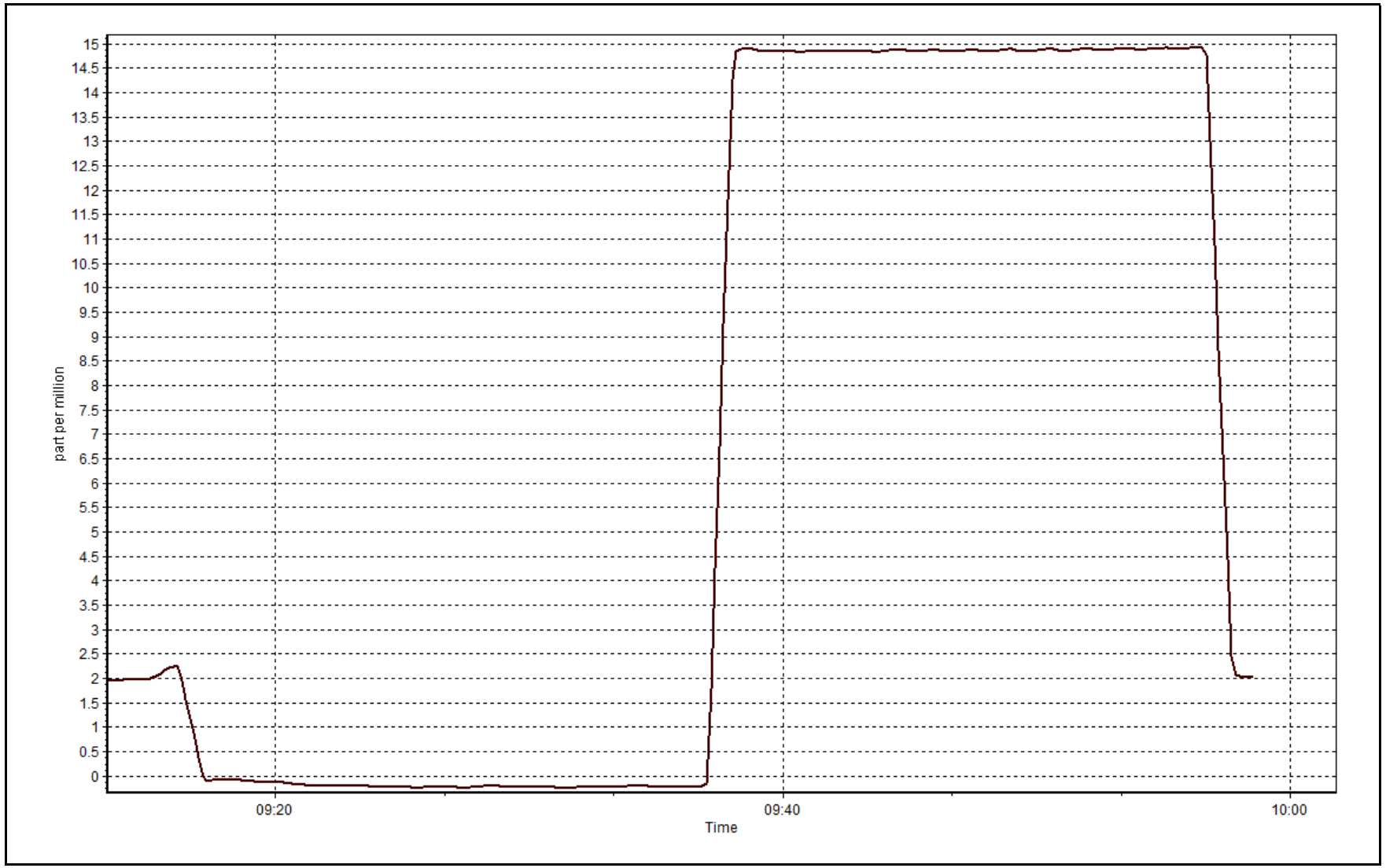
Calibration Date	August 19, 2015	Previous Calibration	July 15, 2015
Station Name	Mildred Airstrip	Station Number	AMS 2
Start Time (MST)	9:15	End Time (MST)	10:00
Analyzer make	Thermo 51i-LT	Analyzer serial #	1300156231

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	-0.23	----	Correlation Coefficient	1.000000
14.83	14.88	0.9964		
			Slope	0.981191
			Intercept	0.225674



THC Calibration Plot Date: August 19, 2015



Wood Buffalo Environmental Association
THC Calibration Report

W B E A

Station Information

Calibration Date	August-19-15	Last Calibration	July-15-15
Station Name	Mildred Airstrip	Station Number	AMS 2
Reason:	Routine		
Start Time (MST)	11:20	End Time (MST)	16:30
Gas Cert Reference	SA1301009	Cal Gas Expiry Date	12/12/2016
CH4 Cal Gas Conc.	510 ppm	CH4 Equiv Conc.	1087.5 ppm
C3H8 Cal Gas Conc.	210 ppm	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11541008
ZAG make/model	Teledyne API 701	Serial Number	825
DACS make/model	Campbell Scientific CR3000	Serial Number	8346

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 50 ppm		Sample Pressure	8.2	8.2
Analyzer IP address	192.168.1.51		Air or Bypass Press	39.9	39.9
Calculated slope	0.981191	0.994523	Fuel Pressure	25.7	25.7
Calculated intercept	0.225674	0.038211	Analyzer Coeff	4.2	4.6
			Analyzer BKG	2.610	2.400

Analyzer make	Thermo 51i-LT	Analyzer serial #	1300156231

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	-0.21	----
as found span	5000	82.6	17.97	18.27	0.983
calibrator zero	5000	0.0	0.00	-0.02	----
high point	5000	82.6	17.97	18.04	0.996
second point	5000	41.3	8.98	8.97	1.001
third point	5000	20.7	4.50	4.48	1.005
as left zero	5000	0.0	0.00	0.07	----
as left span	5000	82.6	17.97	17.70	1.015
				Average Correction Factor	1.001

Corrected As found	18.48	Previous response	18.08	% change	-2.1%

Notes:

New cal gas cylinder. Adjusted both zero and span.

Calibration Performed By: Asad Hidayat

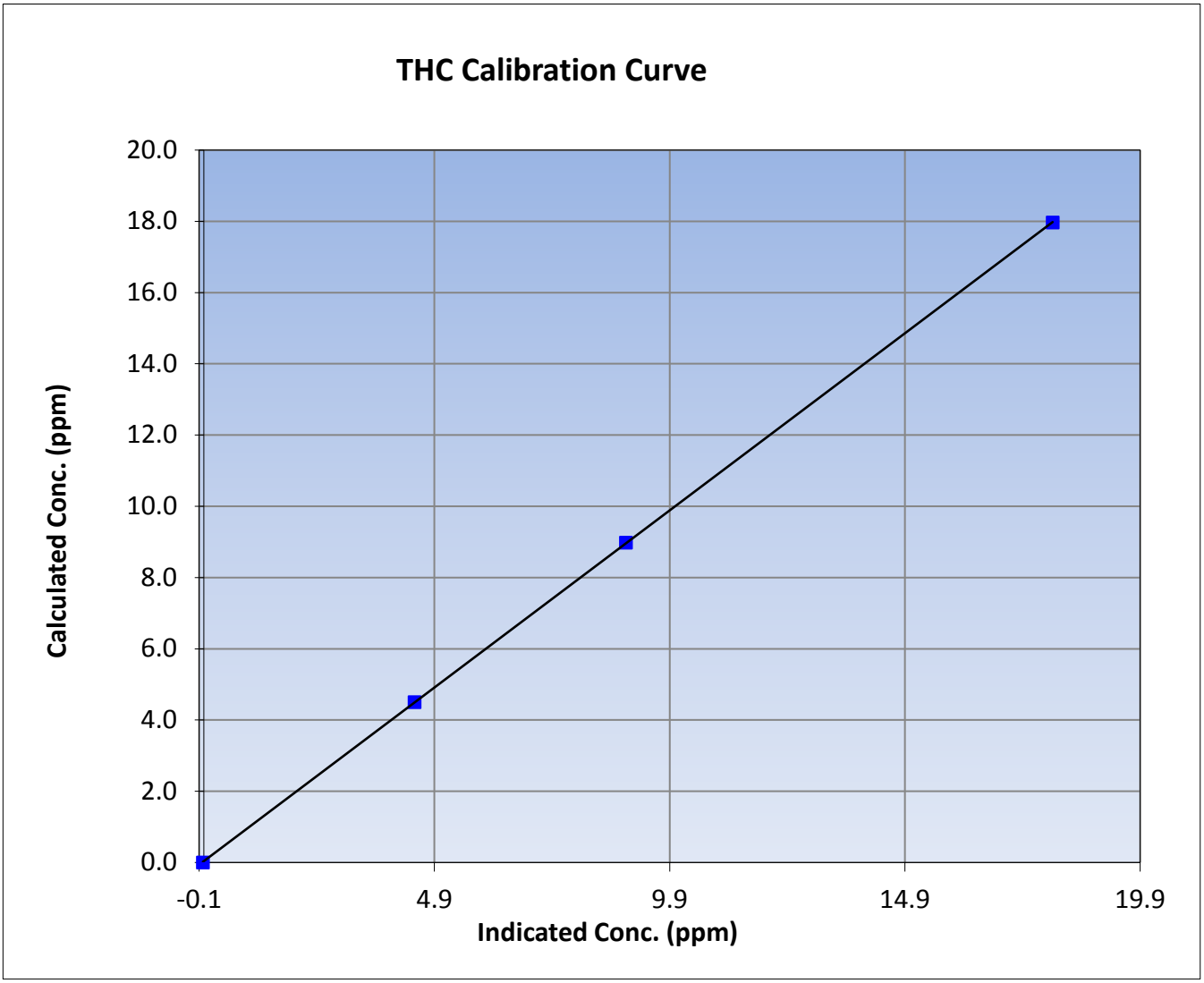
Wood Buffalo Environmental Association
THC Calibration Report

Station Information

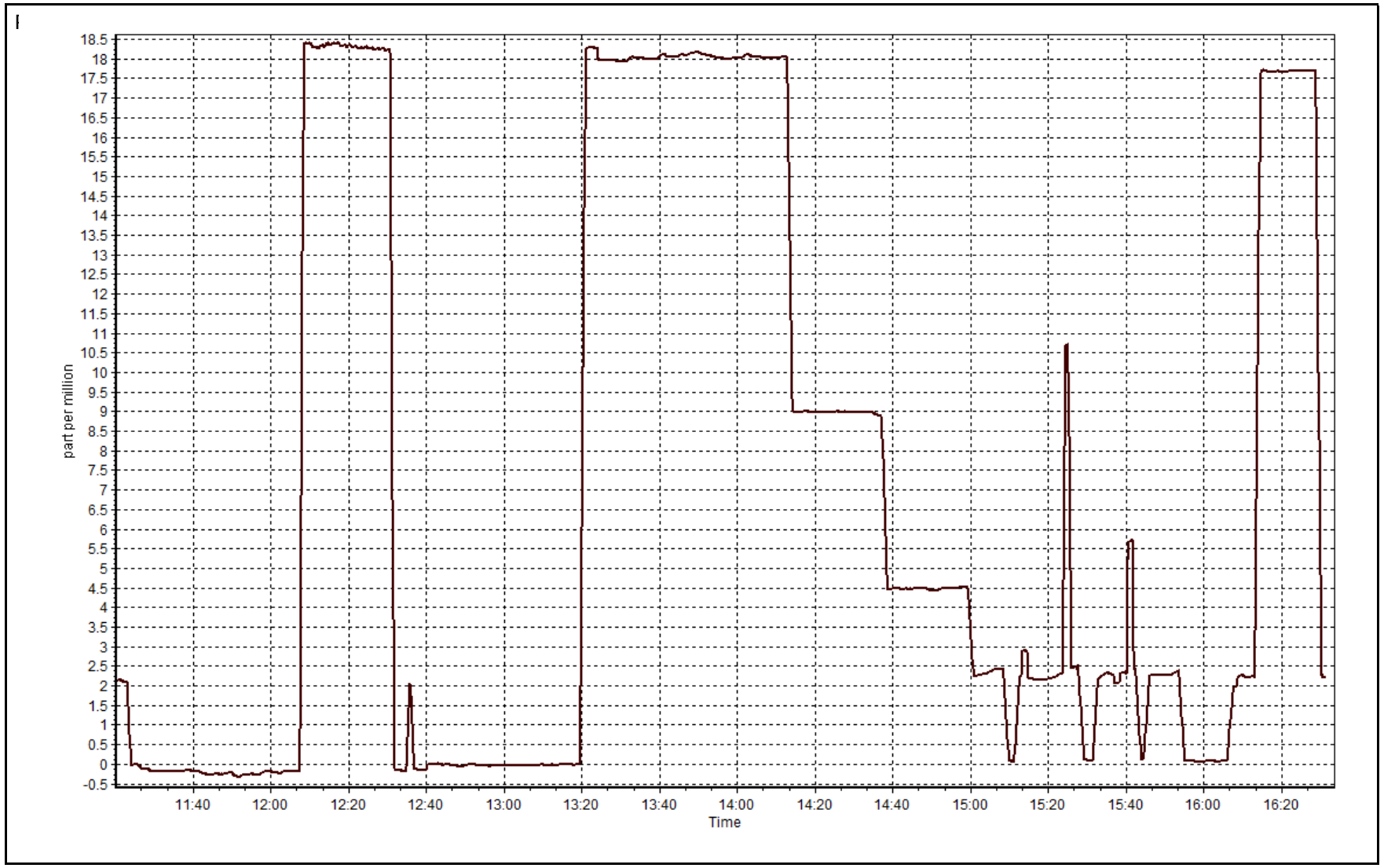
Calibration Date	August 19, 2015	Previous Calibration	July 15, 2015
Station Name	Mildred Airstrip	Station Number	AMS 2
Start Time (MST)	11:20	End Time (MST)	16:30
Analyzer make	Thermo 51i-LT	Analyzer serial #	1300156231

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	-0.02	----	Correlation Coefficient	0.999993
17.97	18.04	0.9959		
8.98	8.97	1.0014	Slope	0.994523
4.50	4.48	1.0050		
			Intercept	0.038211



THC Calibration Plot Date: August 19, 2015



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 3
LOWER CAMP METEOROLOGY
AUGUST 2015

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

September 28, 2015

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP MET TOWER (AMS 3)
AUGUST 2015

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
Temperature 20 m (C) Average	744	0	0	100.00	29.9	-	24.5	-
Temperature 45 m (C) Average	744	0	0	100.00	29.7	-	24.3	-
Temperature 100 m (C) Average	744	0	0	100.00	29.1	-	24.0	-
Temperature 167 m (C) Average	744	0	0	100.00	28.4	-	23.6	-
Relative Humidity 20 m (%) Average	744	0	0	100.00	99	-	81.0	-
Relative Humidity 45 m (%) Average	744	0	0	100.00	99	-	81.0	-
Relative Humidity 100 m (%) Average	744	0	0	100.00	99	-	81.0	-
Relative Humidity 167 m (%) Average	744	0	0	100.00	96	-	83.0	-
Wind Speed 20 m (km/h) Average	744	0	0	100.00	24	-	18.0	-
Wind Speed 45 m (km/h) Average	744	0	0	100.00	33	-	23.0	-
Wind Speed 100 m (km/h) Average	744	0	0	100.00	42	-	30.0	-
Wind Speed 167 m (km/h) Average	744	0	0	100.00	47	-	34.0	-
Wind Direction 20 m (deg) Average	744	0	0	100.00	-	-	-	-
Wind Direction 45 m (deg) Average	744	0	0	100.00	-	-	-	-
Wind Direction 100 m (deg) Average	744	0	0	100.00	-	-	-	-
Wind Direction 167 m (deg) Average	744	0	0	100.00	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	744	0	0	100.00	1.1	-	0.2	-
Vertical Wind Speed 45 m (km/h) Average	744	0	0	100.00	1.6	-	0.5	-
Vertical Wind Speed 100 m (km/h) Average	744	0	0	100.00	3.7	-	0.8	-
Vertical Wind Speed 167 m (km/h) Average	744	0	0	100.00	4.1	-	1.3	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP MET TOWER (AMS 3)
AUGUST 2015

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

					Percentile						
Parameter	Number	Mean	StnDev	Total	Min	P10	Q1	Median	Q3	P90	Max
Temperature 20 m (C) Average	744	17.99	4.7	-	5.9	11.9	14.6	18	21.4	24.2	29.9
Temperature 45 m (C) Average	744	17.93	4.6	-	6	12	14.7	18.1	21.2	23.9	29.7
Temperature 100 m (C) Average	744	17.75	4.4	-	5.8	12.3	14.5	17.8	21.1	23.5	29.1
Temperature 167 m (C) Average	744	17.54	4.2	-	6.5	12.4	14.4	17.6	20.7	23.3	28.4
Relative Humidity 20 m (%) Average	744	64.8	19	-	25	37	50	65	80	91	99
Relative Humidity 45 m (%) Average	744	63.5	19	-	25	36	49	63	79	89	99
Relative Humidity 100 m (%) Average	744	61.5	18	-	25	36	48	62	76	87	99
Relative Humidity 167 m (%) Average	744	60.3	17	-	25	35	47	61	74	84	96
Wind Speed 20 m (km/h) Average	744	8.3	5	-	0	2	4	8	12	16	24
Wind Speed 45 m (km/h) Average	744	11.1	7	-	0	3	5	10	16	22	33
Wind Speed 100 m (km/h) Average	744	15.7	9	-	0	5	8	14	23	28	42
Wind Speed 167 m (km/h) Average	744	18.4	11	-	0	5	10	16	27	33	47
Wind Direction 20 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-
Wind Direction 45 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-
Wind Direction 100 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-
Wind Direction 167 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	744	-0.11	0.3	-	-1	-0.5	-0.3	-0.1	0.1	0.3	1.1
Vertical Wind Speed 45 m (km/h) Average	744	-0.06	0.6	-	-1.5	-0.9	-0.4	0	0.3	0.7	1.6
Vertical Wind Speed 100 m (km/h) Average	744	0.25	0.6	-	-1.4	-0.5	-0.1	0.2	0.6	1	3.7
Vertical Wind Speed 167 m (km/h) Average	744	0.59	0.8	-	-1.6	-0.3	0.1	0.5	1	1.6	4.1

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP MET TOWER (AMS 3)
AUGUST 2015

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
				No operational issues to report

Maximum Value: 29.9 C on Aug 10 18:00

Maximum Daily Average: 24.5 C on Aug 10

Minimum Value: 5.9 C on Aug 23 05:00

Minimum Daily Average: 11.2 C on Aug 21

Maximum Diurnal Average: 22.4 C at hour 16

Minimum Diurnal Average: 13.5 C at hour 6

Monthly Average: 17.99 C

Percentiles: P_1 = 8.0 P_{10} = 11.9 Q_1 = 14.6 Median = 18.0 Q_3 = 21.4 P_{90} = 24.2 P_{99} = 28.3

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

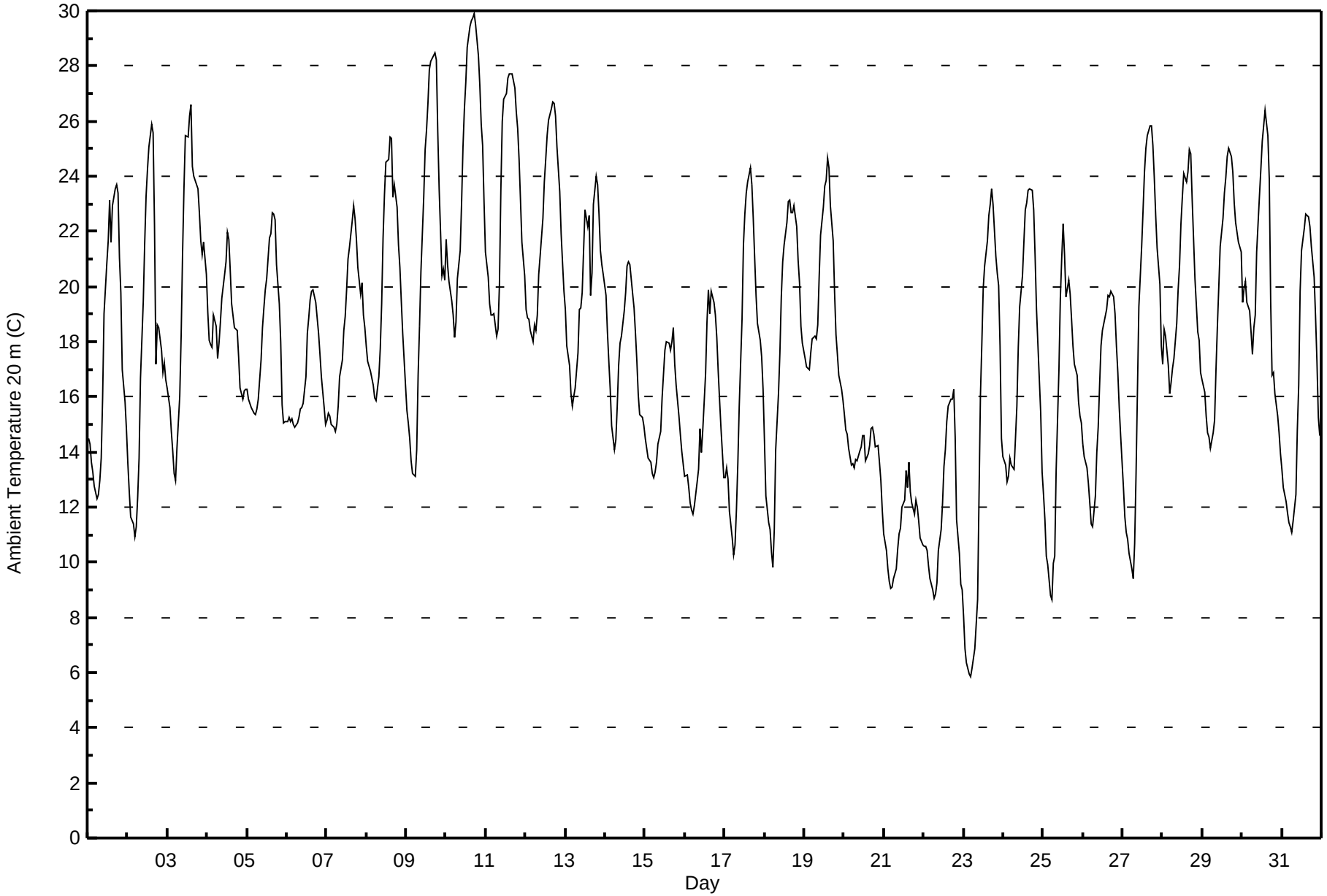
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	14.5	14.3	13.6	13.2	12.8	12.3	12.5	13.0	13.8	16.0	19.0	20.8	21.7	23.2	21.6	22.9	23.5	23.7	23.4	21.0	19.8	17.0	15.8	14.8	17.7	23.7
2-Aug	13.6	12.6	11.6	11.4	10.9	11.3	12.4	13.8	16.7	19.5	21.6	23.3	24.2	25.1	25.9	25.6	22.2	17.2	18.6	18.5	17.7	16.9	17.2	16.6	17.7	25.9
3-Aug	16.3	15.6	14.8	14.0	13.2	13.0	14.1	16.0	18.2	21.1	23.5	25.5	25.4	26.2	26.6	24.4	24.0	23.8	23.5	22.7	21.7	21.1	21.6	20.4	20.3	26.6
4-Aug	19.0	18.1	17.9	17.8	19.0	18.6	17.4	17.9	18.7	19.6	20.4	20.9	22.0	21.7	20.6	19.4	18.5	18.4	18.4	17.4	16.3	15.9	16.2	16.3	18.6	22.0
5-Aug	16.3	15.9	15.6	15.5	15.4	15.3	15.6	15.9	17.4	18.5	19.2	19.9	20.3	21.7	21.9	22.7	22.6	22.4	20.8	19.4	18.0	15.7	15.1	15.1	18.2	22.7
6-Aug	15.1	15.2	15.1	15.2	15.0	14.9	15.1	15.3	15.6	15.6	15.7	16.7	18.3	18.9	19.5	19.8	19.9	19.4	18.9	18.3	17.5	16.7	15.6	15.0	16.8	19.9
7-Aug	15.2	15.4	15.3	15.0	14.9	14.8	15.0	15.6	16.7	17.3	18.4	18.9	19.9	21.0	21.4	22.4	23.0	22.5	21.7	20.7	19.7	20.1	19.0	18.5	18.4	23.0
8-Aug	17.9	17.3	16.9	16.7	16.4	16.0	15.8	16.7	17.7	19.4	21.8	23.3	24.5	24.6	25.4	25.4	23.3	23.7	22.9	21.5	20.7	19.5	18.3	16.4	20.1	25.4
9-Aug	15.5	15.0	14.5	13.7	13.2	13.1	14.1	16.8	18.5	20.6	23.2	25.0	25.7	26.7	27.8	28.2	28.4	28.5	28.2	25.6	23.5	20.4	20.6	20.2	21.1	28.5
10-Aug	21.7	20.8	20.2	19.5	19.0	18.1	18.7	20.3	21.3	23.0	25.1	26.4	27.4	28.7	29.4	29.7	29.7	29.9	29.5	28.4	27.3	25.9	25.1	23.1	24.5	29.9
11-Aug	21.2	20.3	19.4	19.0	19.0	19.0	18.2	18.5	20.1	23.5	26.0	26.8	27.0	27.6	27.7	27.7	27.7	27.2	26.3	25.7	24.6	23.1	21.6	20.4	23.2	27.7
12-Aug	19.2	18.8	18.8	18.4	18.0	18.6	18.4	19.0	20.4	21.1	22.5	23.8	24.6	25.5	26.0	26.5	26.7	26.6	26.2	25.1	23.4	21.9	20.8	19.8	22.1	26.7
13-Aug	19.2	17.8	17.1	16.1	15.7	16.0	16.3	17.6	19.2	19.2	19.8	21.3	22.8	22.2	22.6	19.7	20.5	23.0	24.0	23.7	22.6	21.3	20.8	20.4	20.0	24.0
14-Aug	19.7	18.4	17.3	16.3	15.0	14.1	14.4	15.7	17.1	17.9	18.2	19.1	19.8	20.8	20.9	20.8	19.7	19.2	18.3	17.3	16.1	15.4	15.3	15.0	17.6	20.9
15-Aug	14.5	14.1	13.8	13.6	13.2	13.1	13.3	13.6	14.3	14.8	16.0	16.8	17.7	18.0	18.0	17.7	18.0	18.5	17.2	16.4	15.3	14.6	14.0	13.6	15.4	18.5
16-Aug	13.1	13.1	12.7	12.1	11.9	11.7	12.0	12.9	13.4	14.9	14.0	14.8	16.8	18.7	19.9	19.0	19.8	19.4	19.0	18.2	16.9	15.8	14.8	13.1	15.3	19.9
17-Aug	13.0	13.4	13.0	11.8	10.9	10.3	10.6	11.9	13.6	15.6	18.8	21.5	22.6	23.4	23.8	24.3	23.7	22.5	21.1	19.7	18.7	18.0	17.4	16.3	17.3	24.3
18-Aug	14.4	12.4	11.5	11.2	10.4	9.8	11.2	14.1	16.1	17.6	19.6	20.9	21.5	22.3	23.1	23.1	22.7	22.7	22.9	22.2	20.9	20.1	18.6	18.0	17.8	23.1
19-Aug	17.4	17.1	17.0	17.0	17.6	18.1	18.2	18.1	18.6	20.3	21.9	22.9	23.6	23.8	24.7	24.3	22.9	21.6	19.8	18.3	17.6	16.8	16.3	15.8	19.6	24.7
20-Aug	15.4	14.8	14.6	14.1	13.5	13.6	13.4	13.7	13.7	14.0	14.2	14.6	14.6	13.7	13.9	14.2	14.8	14.9	14.7	14.2	14.3	13.6	13.0	11.9	14.1	15.4
21-Aug	11.0	10.4	9.8	9.3	9.1	9.1	9.4	9.7	10.5	11.0	11.2	12.0	12.2	13.3	12.7	13.6	12.6	12.1	11.8	12.3	12.0	11.5	10.9	10.6	11.2	13.6
22-Aug	10.6	10.6	10.4	9.9	9.4	9.0	8.7	8.8	9.2	10.4	11.2	12.1	13.5	14.1	15.1	15.7	15.9	15.9	16.3	14.5	11.5	10.3	9.2	9.0	11.7	16.3
23-Aug	8.0	6.9	6.3	5.9	5.9	6.1	6.5	6.8	8.6	12.4	16.0	17.9	19.9	20.8	21.6	22.6	23.0	23.5	23.0	21.1	20.5	20.0	17.9	14.5	14.8	23.5
24-Aug	13.8	13.5	12.9	13.1	13.8	13.5	13.4	14.5	15.7	17.8	19.3	20.4	21.6	22.8	23.1	23.5	23.6	23.5	22.8	21.1	19.2	17.9	15.4	13.3	17.9	23.6
25-Aug	12.4	11.6	10.2	9.9	8.8	8.7	10.0	10.2	13.3	17.0	19.6	21.1	22.3	21.1	19.6	20.2	19.8	18.8	17.9	17.2	16.8	15.8	15.3	15.0	15.5	22.3
26-Aug	14.3	13.8	13.4	12.8	12.1	11.4	11.3	12.4	14.0	14.9	16.4	17.9	18.4	18.9	19.2	19.7	19.6	19.8	19.6	19.0	17.8	16.9	15.6	14.6	16.0	19.8
27-Aug	12.7	11.7	11.1	10.8	10.3	9.8	9.4	10.7	13.2	16.3	19.3	21.4	22.8	24.2	25.0	25.5	25.8	25.8	25.1	24.0	22.6	21.4	20.1	17.9	18.2	25.8
28-Aug	17.2	18.4	18.2	17.2	16.1	16.5	17.0	17.4	18.7	19.9	20.7	22.3	23.2	24.1	23.8	24.2	24.9	24.8	23.2	20.3	19.3	18.4	18.1	16.9	20.0	24.9
29-Aug	16.6	16.2	15.3	14.7	14.5	14.1	14.7	15.2	17.0	18.6	20.0	21.4	22.5	23.4	24.0	24.7	25.0	24.7	24.2	23.0	22.3	22.0	21.6	21.3	19.9	25.0
30-Aug	19.4	19.9	20.2	19.4	19.1	18.4	17.5	18.5	19.0	21.3	23.3	24.2	25.3	25.8	26.4	25.5	23.9	19.5	16.8	16.9	16.1	15.3	14.7	14.0	20.0	26.4
31-Aug	13.4	12.7	12.2	11.8	11.4	11.3	11.1	11.5	12.5	14.8	16.4	19.8	21.3	22.1	22.6	22.6	22.5	22.2	21.5	20.3	18.9	17.3	15.3	14.6	16.7	22.6
	15.5	15.0	14.5	14.1	13.7	13.5	13.7	14.6	15.9	17.5	19.1	20.5	21.4	22.1	22.4	22.4	22.2	21.8	21.2	20.1	19.0	18.0	17.1	16.2	Diurnal Average	
	21.7	20.8	20.2	19.5	19.1	19.0	18.7	20.3	21.3	23.5	26.0	26.8	27.4	28.7	29.4	29.7	29.7	29.9	29.5	28.4	27.3	25.9	25.1	23.1	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature 20 m (AT20m) - C

Lower Camp Met Tower - August 2015



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	30	4.03	4.03
10 - 20	467	62.77	66.80
> 20	247	33.20	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

Maximum Value: 29.7 C on Aug 10 18:00

Maximum Daily Average: 24.3 C on Aug 10

Minimum Value: 6.0 C on Aug 23 05:00

Minimum Daily Average: 11.1 C on Aug 21

Maximum Diurnal Average: 22.1 C at hour 16

Minimum Diurnal Average: 13.6 C at hour 6

Monthly Average: 17.93 C

Percentiles: P_1 = 8.4 P_{10} = 12.0 Q_1 = 14.7 Median = 18.1 Q_3 = 21.2 P_{90} = 23.9 P_{99} = 27.9

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

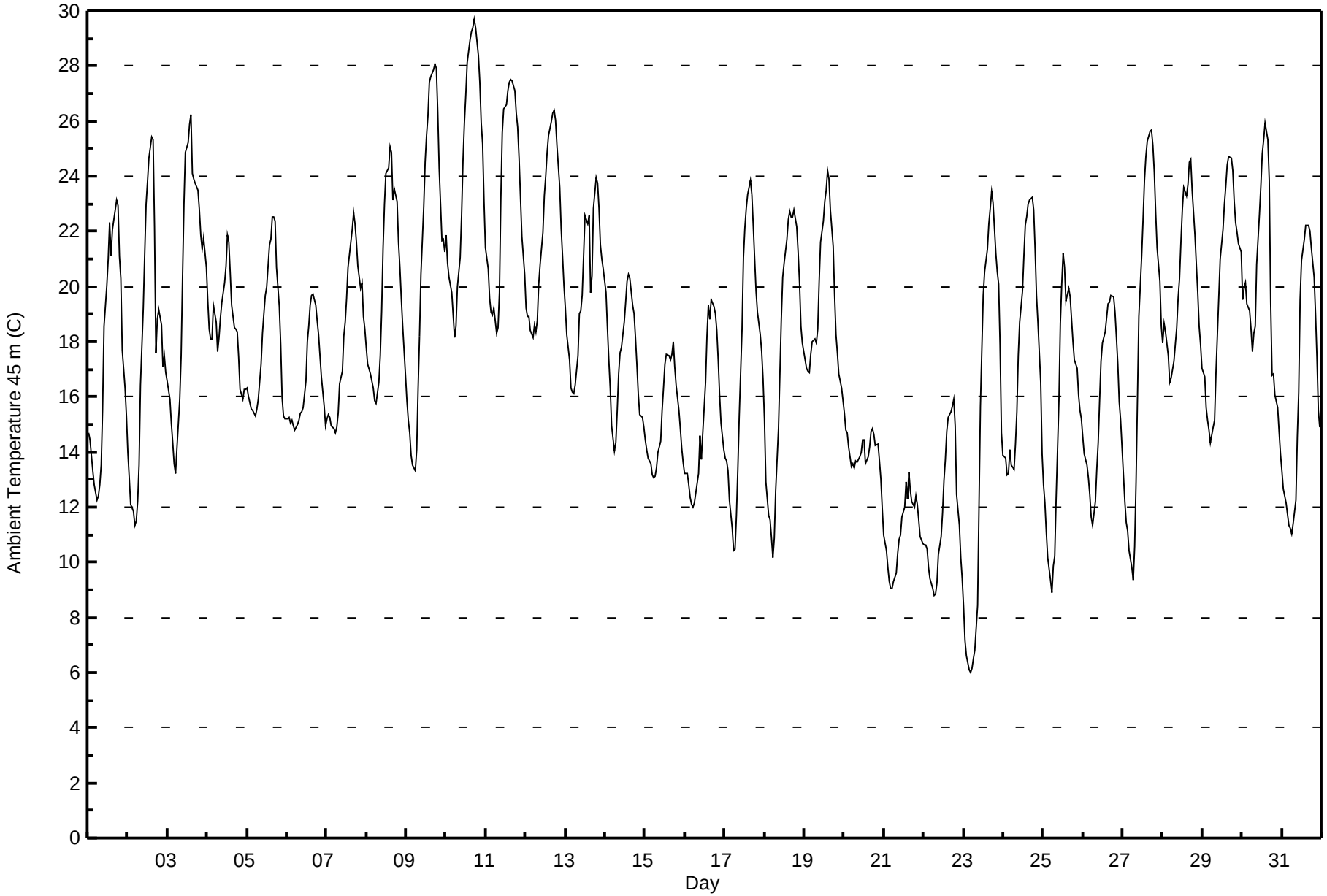
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	14.7	14.4	13.9	13.3	12.8	12.3	12.4	12.8	13.5	15.6	18.5	20.0	21.0	22.3	21.1	22.1	22.8	23.1	23.0	21.1	20.3	17.7	16.3	15.3	17.5	23.1
2-Aug	14.0	13.1	12.1	11.8	11.3	11.5	12.2	13.5	16.4	19.2	21.1	23.0	23.8	24.6	25.4	25.3	22.1	17.6	18.8	19.2	18.6	17.1	17.5	16.9	17.8	25.4
3-Aug	16.6	15.9	15.1	14.3	13.6	13.2	14.1	15.9	17.5	20.3	23.0	24.9	25.2	25.9	26.2	24.1	23.9	23.8	23.5	22.8	21.8	21.3	21.8	20.7	20.2	26.2
4-Aug	19.5	18.4	18.1	18.1	19.3	18.7	17.6	18.2	18.9	19.4	20.1	20.8	21.9	21.6	20.5	19.3	18.5	18.4	18.4	17.4	16.3	15.9	16.3	16.3	18.7	21.9
5-Aug	16.3	16.0	15.6	15.5	15.4	15.3	15.6	15.9	17.2	18.3	19.0	19.7	20.0	21.5	21.7	22.5	22.5	22.4	20.7	19.3	17.9	16.0	15.3	15.2	18.1	22.5
6-Aug	15.2	15.3	15.1	15.1	15.0	14.8	15.0	15.2	15.4	15.5	15.6	16.6	18.0	18.6	19.3	19.7	19.7	19.3	18.8	18.3	17.5	16.7	15.7	15.0	16.7	19.7
7-Aug	15.2	15.4	15.2	14.9	14.8	14.7	14.9	15.4	16.5	16.9	18.2	18.7	19.6	20.7	21.2	22.1	22.7	22.3	21.6	20.8	19.9	20.2	18.9	18.5	18.3	22.7
8-Aug	17.8	17.2	16.8	16.6	16.3	15.9	15.7	16.5	17.5	19.1	21.4	23.0	24.1	24.3	25.1	24.9	23.1	23.6	23.1	21.6	20.7	19.6	18.6	16.8	20.0	25.1
9-Aug	15.9	15.1	14.7	13.9	13.5	13.3	14.1	16.3	18.2	20.4	22.9	24.5	25.5	26.2	27.4	27.6	27.9	28.0	27.9	26.3	24.3	21.7	21.7	21.3	21.2	28.0
10-Aug	21.9	20.9	20.3	19.8	19.0	18.1	18.6	20.0	21.1	22.6	24.6	25.9	27.0	28.1	28.9	29.2	29.4	29.7	29.4	28.3	27.4	25.9	25.2	23.1	24.3	29.7
11-Aug	21.4	20.6	19.6	19.1	19.0	19.2	18.3	18.5	19.8	23.2	25.6	26.4	26.6	27.1	27.4	27.5	27.5	27.1	26.3	25.8	24.6	23.3	21.8	20.4	23.2	27.5
12-Aug	19.2	18.9	18.9	18.4	18.2	18.6	18.3	18.8	20.1	20.8	22.0	23.3	24.0	24.9	25.5	26.0	26.3	26.4	26.0	25.1	23.6	22.1	21.1	20.0	21.9	26.4
13-Aug	19.2	18.2	17.3	16.3	16.1	16.1	16.4	17.5	19.0	19.1	19.7	21.1	22.6	22.2	22.6	19.8	20.4	22.8	23.9	23.8	22.8	21.5	21.0	20.6	20.0	23.9
14-Aug	19.8	18.5	17.3	16.3	15.0	14.0	14.3	15.5	16.8	17.6	17.8	18.7	19.4	20.2	20.5	20.3	19.3	19.0	18.2	17.2	16.1	15.4	15.3	14.9	17.4	20.5
15-Aug	14.4	14.1	13.8	13.6	13.2	13.1	13.1	13.4	14.0	14.4	15.5	16.3	17.2	17.6	17.5	17.4	17.6	18.0	17.1	16.4	15.5	14.8	14.1	13.6	15.2	18.0
16-Aug	13.2	13.2	12.8	12.4	12.1	12.0	12.1	12.8	13.2	14.6	13.7	14.7	16.5	18.2	19.3	18.8	19.5	19.3	19.0	18.4	17.4	16.1	15.1	14.1	15.4	19.5
17-Aug	13.8	13.7	13.3	12.3	11.2	10.4	10.5	11.7	13.4	15.3	18.4	21.1	22.1	22.8	23.3	23.9	23.3	22.2	21.0	19.8	19.0	18.3	17.6	16.6	17.3	23.9
18-Aug	15.2	12.9	11.7	11.6	10.9	10.2	10.9	12.6	14.9	16.8	18.8	20.4	20.8	21.7	22.4	22.7	22.5	22.5	22.8	22.2	21.2	20.1	18.6	18.0	17.6	22.8
19-Aug	17.3	17.0	16.9	16.9	17.5	18.0	18.1	18.0	18.4	20.2	21.6	22.4	23.1	23.5	24.2	23.9	22.8	21.5	19.7	18.3	17.6	16.9	16.3	15.9	19.4	24.2
20-Aug	15.4	14.8	14.7	14.2	13.5	13.6	13.4	13.7	13.6	13.8	14.0	14.4	14.4	13.6	13.8	14.2	14.7	14.8	14.6	14.2	14.3	13.7	13.0	11.9	14.0	15.4
21-Aug	11.0	10.4	9.8	9.3	9.1	9.1	9.3	9.6	10.3	10.8	11.0	11.7	12.0	12.9	12.3	13.3	12.6	12.2	12.0	12.4	12.1	11.5	10.9	10.7	11.1	13.3
22-Aug	10.6	10.6	10.5	9.8	9.4	9.0	8.8	8.9	9.3	10.3	11.0	11.8	12.9	13.8	14.7	15.2	15.5	15.7	15.9	14.9	12.5	11.3	10.2	9.4	11.7	15.9
23-Aug	8.4	7.2	6.6	6.1	6.0	6.2	6.5	6.8	8.4	12.0	15.7	17.7	19.7	20.6	21.4	22.3	22.8	23.4	23.0	21.2	20.6	20.1	17.9	14.7	14.8	23.4
24-Aug	13.9	13.8	13.2	13.2	14.1	13.5	13.4	14.3	15.4	17.5	18.7	19.9	21.1	22.2	22.5	23.0	23.1	23.2	22.8	21.4	19.7	18.7	16.5	13.9	17.9	23.2
25-Aug	12.8	12.2	11.1	10.2	9.4	8.9	9.9	10.2	12.3	15.8	18.7	20.1	21.2	20.7	19.5	19.9	19.6	18.8	18.0	17.3	17.0	16.1	15.5	15.2	15.4	21.2
26-Aug	14.5	13.9	13.5	13.1	12.5	11.6	11.3	12.2	13.4	14.3	15.9	17.3	18.0	18.4	18.8	19.3	19.4	19.7	19.6	19.0	18.2	17.2	15.8	15.2	15.9	19.7
27-Aug	13.2	12.2	11.5	11.1	10.4	9.8	9.4	10.6	12.9	15.9	18.9	21.1	22.4	23.9	24.7	25.3	25.7	25.7	25.1	24.1	22.7	21.4	20.2	18.5	18.2	25.7
28-Aug	18.0	18.7	18.3	17.5	16.5	16.7	17.0	17.3	18.5	19.6	20.3	21.6	22.8	23.6	23.3	23.7	24.5	24.6	23.5	21.9	20.8	19.8	18.5	17.9	20.2	24.6
29-Aug	17.0	16.7	15.6	15.1	14.8	14.4	14.9	15.2	16.9	18.2	19.6	21.0	22.1	23.0	23.7	24.4	24.7	24.7	24.2	23.1	22.3	22.0	21.6	21.2	19.8	24.7
30-Aug	19.5	19.9	20.1	19.4	19.1	18.4	17.7	18.3	18.6	20.8	22.6	23.6	24.8	25.3	25.9	25.3	23.9	19.4	16.8	16.9	16.1	15.6	14.8	13.9	19.9	25.9
31-Aug	13.3	12.7	12.1	11.7	11.4	11.2	11.0	11.4	12.3	14.6	16.2	19.5	21.0	21.7	22.2	22.2	22.2	22.0	21.4	20.3	19.0	17.5	15.5	14.9	16.6	22.2
	15.7	15.2	14.7	14.2	13.9	13.6	13.7	14.4	15.6	17.2	18.7	20.0	21.0	21.7	22.0	22.1	22.0	21.7	21.2	20.3	19.3	18.2	17.4	16.5	Diurnal Average	
	21.9	20.9	20.3	19.8	19.3	19.2	18.6	20.0	21.1	23.2	25.6	26.4	27.0	28.1	28.9	29.2	29.4	29.7	29.4	28.3	27.4	25.9	25.2	23.1	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature 45 m (AT45m) - C

Lower Camp Met Tower - August 2015



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	27	3.63	3.63
10 - 20	472	63.44	67.07
> 20	245	32.93	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

Maximum Value: 29.1 C on Aug 10 18:00 | Maximum Daily Average: 24.0 C on Aug 10

Minimum Value: 5.8 C on Aug 23 05:00 | Minimum Daily Average: 10.7 C on Aug 21

Maximum Diurnal Average: 21.4 C at hour 16 | Minimum Diurnal Average: 13.7 C at hour 6

Monthly Average: 17.75 C | Percentiles: P_1 = 8.1 P_{10} = 12.3 Q_1 = 14.5 Median = 17.8 Q_3 = 21.1 P_{90} = 23.5 P_{99} = 27.0

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

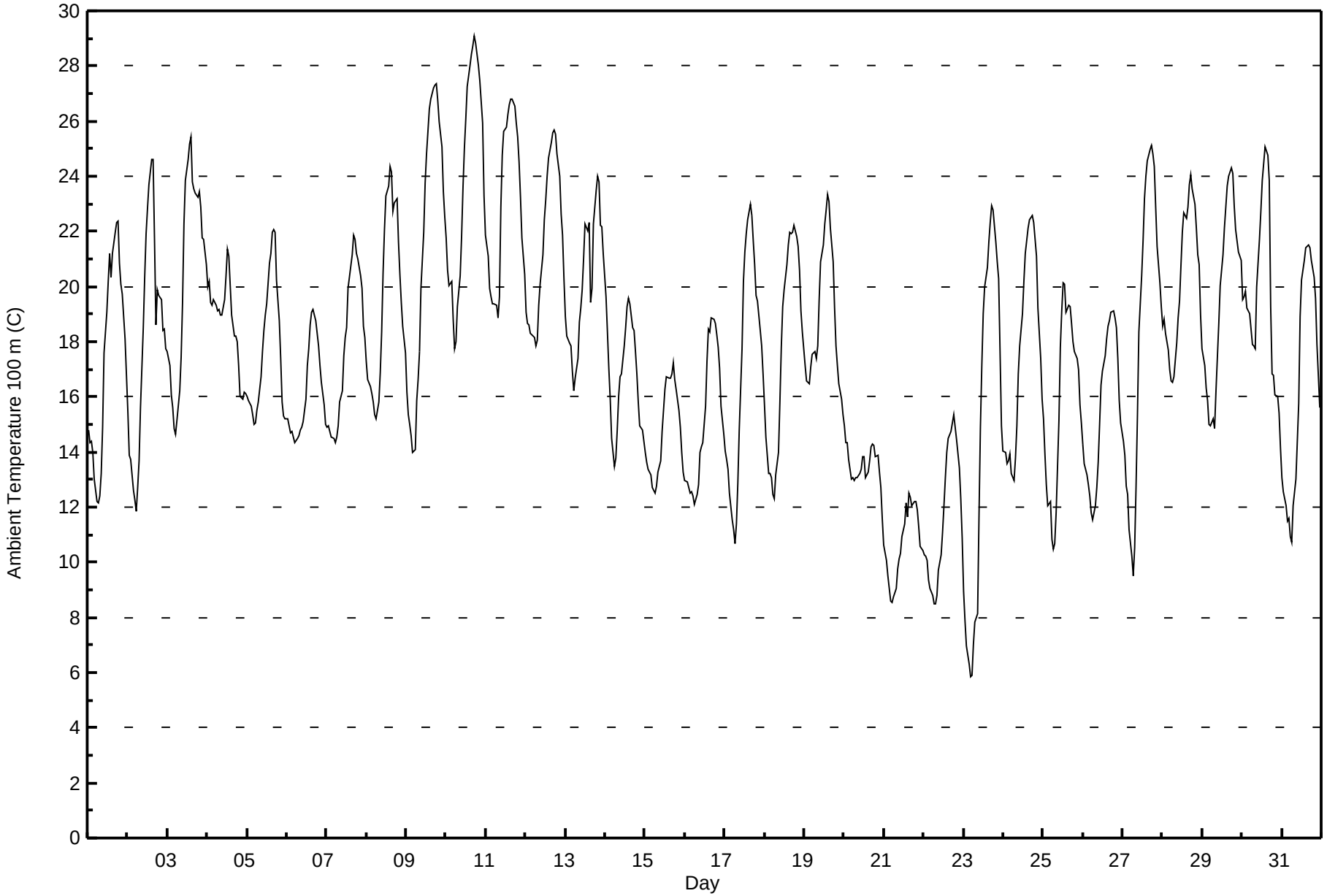
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	14.8	14.3	14.4	14.0	13.0	12.2	12.1	12.4	13.2	14.9	17.6	19.0	20.2	21.2	20.4	21.2	22.0	22.3	22.4	20.8	20.1	19.7	18.1	16.8	17.4	22.4
2-Aug	15.5	13.9	13.7	12.6	12.3	11.9	12.7	13.7	15.6	18.5	20.3	21.9	22.8	23.7	24.6	24.6	21.7	18.6	19.9	19.7	19.5	18.4	18.4	17.7	18.0	24.6
3-Aug	17.6	17.2	16.1	15.6	14.9	14.6	15.1	16.2	17.4	19.4	22.3	23.8	24.6	25.2	25.4	23.8	23.5	23.4	23.2	23.4	22.9	21.8	21.7	20.8	20.4	25.4
4-Aug	20.0	20.2	19.4	19.3	19.5	19.3	19.1	19.2	19.0	19.0	19.5	20.4	21.4	21.1	20.0	19.0	18.2	18.2	18.0	17.1	16.0	15.9	16.2	16.1	18.8	21.4
5-Aug	16.0	15.9	15.7	15.4	15.0	15.0	15.5	15.8	16.7	17.7	18.4	19.0	19.4	20.9	21.2	22.0	22.1	22.0	20.2	18.8	17.4	15.8	15.3	15.2	17.8	22.1
6-Aug	15.2	15.0	14.7	14.8	14.5	14.3	14.5	14.6	14.8	14.9	15.1	15.9	17.1	17.7	18.6	19.1	19.1	18.8	18.3	17.8	17.2	16.5	15.7	15.0	16.2	19.1
7-Aug	14.9	14.9	14.8	14.6	14.5	14.4	14.5	14.9	15.8	16.2	17.5	18.2	18.5	19.9	20.3	21.1	21.9	21.7	21.2	21.0	20.4	19.9	18.6	18.2	17.8	21.9
8-Aug	17.3	16.6	16.4	16.1	15.8	15.4	15.2	15.8	16.9	18.4	20.5	22.1	23.3	23.6	24.3	24.1	22.7	23.0	23.2	21.6	20.4	19.4	18.6	17.6	19.5	24.3
9-Aug	16.2	15.4	15.0	14.6	14.0	14.1	15.8	16.6	17.7	19.9	22.0	23.7	24.8	25.6	26.4	26.8	27.2	27.3	27.4	26.8	26.0	25.1	23.5	22.5	21.4	27.4
10-Aug	21.8	20.6	20.1	20.2	18.8	17.7	18.0	19.3	20.4	21.8	23.6	25.0	26.1	27.3	28.0	28.4	28.7	29.1	28.8	28.0	27.5	26.7	26.0	23.3	24.0	29.1
11-Aug	21.9	21.1	19.9	19.6	19.4	19.4	19.3	18.9	19.6	22.9	24.7	25.6	25.8	26.2	26.6	26.8	26.8	26.5	25.9	25.4	24.5	23.2	21.8	20.4	23.0	26.8
12-Aug	19.1	18.6	18.6	18.3	18.2	18.2	17.8	18.1	19.3	20.1	21.1	22.4	23.2	24.0	24.7	25.2	25.6	25.7	25.5	24.8	24.0	22.6	21.9	20.3	21.6	25.7
13-Aug	18.9	18.2	18.0	17.9	16.9	16.2	16.7	17.4	18.7	19.2	19.9	21.0	22.3	22.0	22.3	19.4	19.9	22.3	23.5	24.0	23.8	22.2	22.2	21.2	20.2	24.0
14-Aug	19.6	18.3	17.0	15.9	14.5	13.5	13.8	14.8	16.0	16.7	16.9	17.8	18.5	19.3	19.6	19.4	18.5	18.4	17.6	16.8	15.8	14.9	14.8	14.4	16.8	19.6
15-Aug	14.0	13.6	13.4	13.2	12.7	12.6	12.5	12.8	13.3	13.7	14.7	15.5	16.3	16.7	16.7	16.7	16.8	17.2	16.6	16.3	15.5	14.9	14.0	13.3	14.7	17.2
16-Aug	13.0	12.9	12.7	12.5	12.6	12.4	12.1	12.5	12.8	14.0	14.2	14.3	15.6	17.3	18.5	18.4	18.9	18.8	18.7	18.3	17.8	17.0	15.6	14.7	15.2	18.9
17-Aug	14.1	13.7	13.4	12.5	11.5	11.2	10.7	11.4	12.9	14.8	17.7	20.2	21.2	21.9	22.4	23.0	22.6	21.7	20.8	19.7	19.5	18.4	17.8	16.9	17.1	23.0
18-Aug	15.7	14.5	13.2	13.2	13.1	12.5	12.3	13.2	14.0	15.8	17.8	19.3	19.9	20.8	21.5	22.0	21.9	22.0	22.2	21.8	21.5	20.6	19.1	18.3	17.8	22.2
19-Aug	17.1	16.6	16.5	16.5	17.1	17.6	17.6	17.4	17.9	19.5	20.9	21.5	22.3	22.8	23.3	23.1	22.1	20.9	19.2	17.9	17.1	16.5	15.9	15.4	18.9	23.3
20-Aug	14.9	14.4	14.3	13.7	13.0	13.1	13.0	13.1	13.0	13.2	13.4	13.8	13.8	13.1	13.3	13.7	14.2	14.3	14.2	13.8	13.9	13.3	12.7	11.6	13.5	14.9
21-Aug	10.6	10.1	9.5	9.0	8.6	8.6	8.8	9.1	9.7	10.1	10.3	10.9	11.4	12.2	11.6	12.5	12.3	12.1	12.2	12.2	11.9	11.3	10.6	10.4	10.7	12.5
22-Aug	10.3	10.2	10.0	9.4	9.0	8.8	8.5	8.5	8.8	9.7	10.3	11.1	12.1	13.1	14.0	14.5	14.7	15.1	15.4	14.9	14.5	13.4	12.3	10.9	11.6	15.4
23-Aug	8.9	7.9	6.9	6.3	5.8	5.9	7.0	7.8	8.2	11.7	14.9	17.2	19.0	20.0	20.7	21.6	22.3	22.9	22.8	21.6	20.9	20.3	17.6	15.0	14.7	22.9
24-Aug	14.0	14.0	13.6	13.7	13.9	13.2	13.0	13.8	14.9	16.8	17.9	19.0	20.2	21.2	21.7	22.1	22.4	22.6	22.3	21.7	21.1	19.2	17.4	15.9	17.7	22.6
25-Aug	15.2	14.0	12.8	12.0	12.2	10.9	10.5	10.7	11.8	15.1	17.8	19.1	20.1	20.1	19.1	19.3	19.3	18.7	18.0	17.6	17.4	17.0	15.7	15.0	15.8	20.1
26-Aug	14.3	13.6	13.1	12.8	12.4	11.8	11.5	12.1	12.7	13.6	15.0	16.4	16.9	17.5	18.1	18.5	18.8	19.1	19.1	18.8	18.5	17.4	15.9	15.0	15.5	19.1
27-Aug	14.4	13.9	12.8	12.4	11.2	10.2	9.5	10.5	12.8	15.4	18.3	20.4	21.7	23.2	24.0	24.6	25.0	25.1	24.8	24.3	22.9	21.4	20.2	19.3	18.3	25.1
28-Aug	18.6	18.8	18.3	17.7	17.0	16.6	16.5	16.7	17.9	18.9	19.5	20.8	22.0	22.7	22.5	22.9	23.7	24.1	23.6	23.0	22.1	21.2	20.8	19.0	20.2	24.1
29-Aug	17.7	17.1	16.3	15.9	15.0	14.9	15.2	14.9	16.2	17.4	18.7	20.0	21.2	22.1	22.9	23.6	24.0	24.3	24.1	23.0	22.1	21.7	21.2	21.0	19.6	24.3
30-Aug	19.5	19.6	19.8	19.2	19.0	18.5	17.9	17.8	17.8	20.0	21.7	22.7	23.8	24.5	25.1	24.8	23.9	19.3	16.8	16.8	16.1	16.0	15.4	14.1	19.6	25.1
31-Aug	13.1	12.6	12.1	11.5	11.6	10.9	10.7	12.0	13.0	14.4	15.8	18.9	20.2	20.9	21.4	21.5	21.5	21.4	21.0	20.3	19.6	17.9	16.8	15.6	16.4	21.5
	15.9	15.4	14.9	14.5	14.1	13.7	13.8	14.3	15.1	16.6	18.0	19.3	20.2	20.9	21.3	21.4	21.4	21.2	20.9	20.3	19.6	18.7	17.8	16.8	Diurnal Average	
	21.9	21.1	20.1	20.2	19.5	19.4	19.3	19.3	20.4	22.9	24.7	25.6	26.1	27.3	28.0	28.4	28.7	29.1	28.8	28.0	27.5	26.7	26.0	23.3	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature 100 m (AT100m) - C

Lower Camp Met Tower - August 2015



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	24	3.23	3.23
10 - 20	488	65.59	68.82
> 20	232	31.18	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature 167 m (AT167m) - C

Lower Camp Met Tower - August 2015

Maximum Value: 28.4 C on Aug 10 18:00

Maximum Daily Average: 23.6 C on Aug 10

Minimum Value: 6.5 C on Aug 23 05:00

Minimum Daily Average: 10.3 C on Aug 21

Maximum Diurnal Average: 20.9 C at hour 16

Minimum Diurnal Average: 13.8 C at hour 7

Monthly Average: 17.54 C

Percentiles: P_1 = 8.3 P_{10} = 12.4 Q_1 = 14.4 Median = 17.6 Q_3 = 20.7 P_{90} = 23.3 P_{99} = 27.0

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

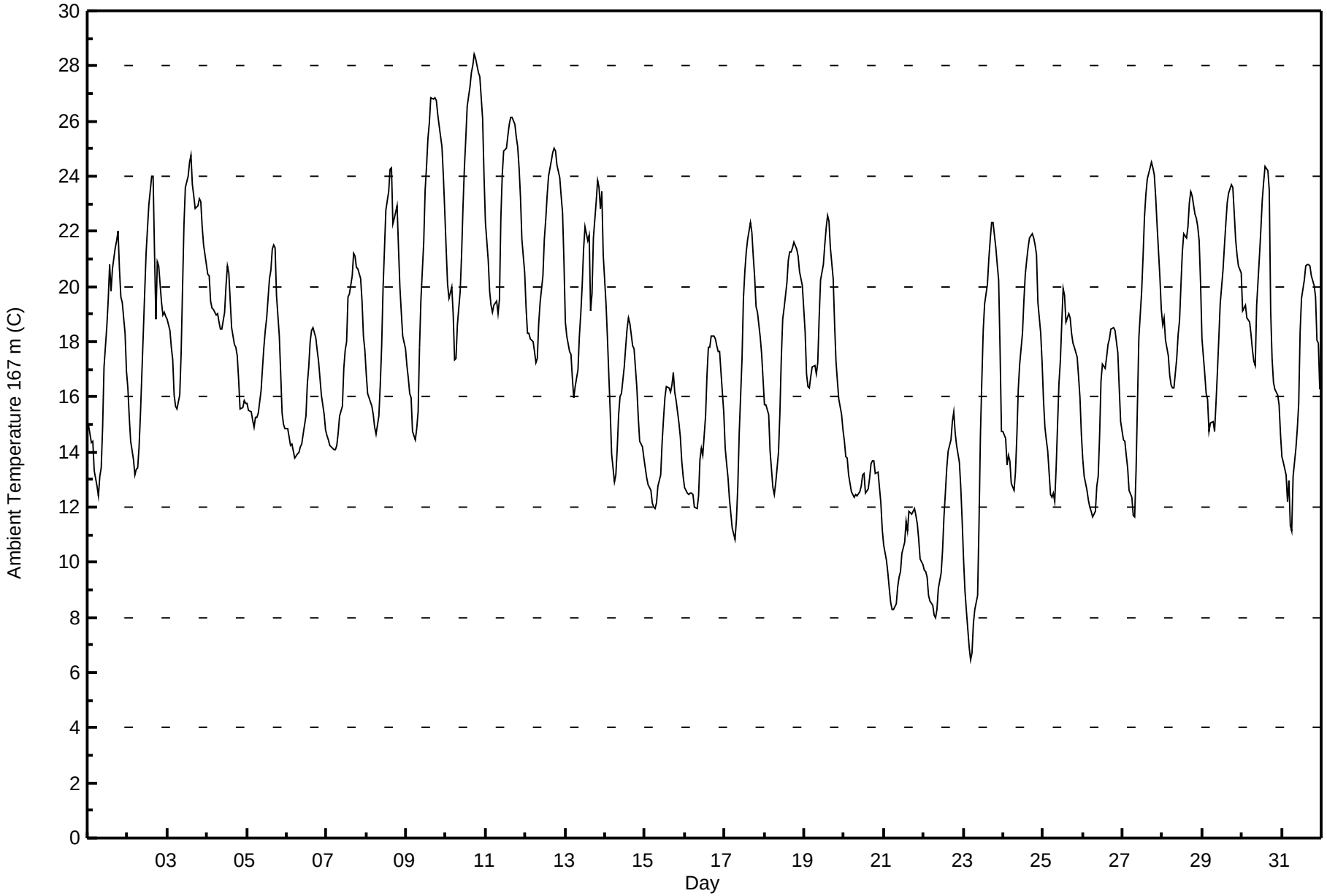
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	15.0	14.6	14.3	14.4	13.3	12.8	12.4	13.1	13.4	14.9	17.1	18.5	19.5	20.8	19.8	20.7	21.4	21.7	22.0	20.6	19.6	19.4	18.3	16.9	17.3	22.0
2-Aug	16.3	15.3	14.4	13.7	13.2	13.4	13.4	14.2	15.4	18.3	19.8	21.2	22.1	23.0	24.0	24.0	21.2	18.8	20.9	20.7	19.4	19.0	19.1	18.9	18.3	24.0
3-Aug	18.8	18.4	17.8	17.3	16.1	15.6	15.5	16.1	17.6	19.9	22.2	23.6	24.0	24.5	24.8	23.7	23.3	22.8	23.0	23.2	23.1	22.2	21.5	20.8	20.7	24.8
4-Aug	20.4	20.4	19.5	19.2	19.2	19.0	19.0	18.7	18.5	18.4	19.1	20.0	20.8	20.5	19.5	18.5	17.9	17.8	17.5	16.6	15.5	15.6	15.8	15.7	18.5	20.8
5-Aug	15.8	15.5	15.5	15.2	14.9	15.3	15.2	15.4	16.2	17.0	17.8	18.4	18.9	20.3	20.6	21.4	21.5	21.4	19.7	18.2	16.8	15.4	15.0	14.8	17.3	21.5
6-Aug	14.9	14.5	14.2	14.3	14.0	13.8	13.9	14.0	14.2	14.3	14.7	15.3	16.5	17.1	18.0	18.4	18.5	18.1	17.7	17.3	16.7	16.0	15.3	14.8	15.7	18.5
7-Aug	14.6	14.4	14.2	14.2	14.1	14.1	14.2	14.7	15.3	15.7	17.0	17.7	18.0	19.6	19.7	20.4	21.2	21.1	20.7	20.7	20.3	19.5	18.2	17.7	17.4	21.2
8-Aug	16.8	16.1	15.8	15.7	15.3	14.9	14.7	15.3	16.4	17.9	19.9	21.3	22.8	23.5	24.3	24.3	22.3	22.5	22.9	21.4	20.0	19.1	18.2	17.7	19.1	24.3
9-Aug	17.1	16.7	16.1	16.0	14.7	14.4	14.8	15.4	17.8	19.5	21.6	23.5	24.3	25.4	25.9	26.8	26.8	26.8	26.7	26.3	25.8	25.1	24.0	22.7	21.4	26.8
10-Aug	21.3	20.1	19.6	20.0	19.0	17.3	17.4	18.6	19.8	21.2	22.9	24.3	25.4	26.5	27.3	27.7	28.0	28.4	28.3	27.8	27.6	26.9	26.1	24.0	23.6	28.4
11-Aug	22.3	20.9	19.8	19.3	19.1	19.3	19.5	19.0	19.5	22.5	24.0	24.9	25.0	25.5	25.9	26.1	26.1	25.9	25.4	25.0	24.3	23.2	21.7	20.5	22.7	26.1
12-Aug	19.2	18.3	18.3	18.1	18.0	17.6	17.3	17.4	18.6	19.4	20.4	21.7	22.4	23.3	24.0	24.5	24.9	25.0	24.9	24.4	24.0	23.3	22.7	20.9	21.2	25.0
13-Aug	18.7	18.2	17.7	17.5	16.7	16.0	16.3	17.0	18.2	19.0	20.1	21.3	22.2	21.6	21.9	19.1	19.7	21.8	23.1	23.9	23.6	22.9	23.5	21.2	20.0	23.9
14-Aug	19.4	18.2	16.8	15.4	13.9	12.9	13.2	14.1	15.4	16.0	16.1	17.1	17.8	18.5	18.9	18.6	17.8	17.8	17.0	16.3	15.3	14.4	14.2	13.8	16.2	19.4
15-Aug	13.4	13.1	12.8	12.6	12.1	12.0	12.0	12.2	12.8	13.2	14.3	15.2	16.0	16.4	16.3	16.2	16.4	16.9	16.2	15.9	15.1	14.5	13.7	13.1	14.3	16.9
16-Aug	12.7	12.5	12.5	12.5	12.5	12.5	12.0	12.0	12.4	13.7	14.2	13.9	15.3	16.8	17.8	17.8	18.2	18.2	18.1	17.8	17.6	17.7	16.9	15.4	15.0	18.2
17-Aug	14.1	13.6	13.1	12.3	11.2	11.0	10.8	11.6	12.7	14.7	17.4	19.6	20.6	21.2	21.7	22.3	21.9	21.1	20.3	19.3	19.1	18.1	17.6	16.6	16.8	22.3
18-Aug	15.7	15.7	15.3	14.1	13.3	12.7	12.5	12.9	14.0	15.4	17.4	18.8	19.2	20.1	21.0	21.3	21.3	21.4	21.6	21.4	21.1	20.5	20.3	20.0	17.8	21.6
19-Aug	18.4	16.8	16.4	16.3	16.7	17.1	17.1	16.8	17.2	18.9	20.3	20.8	21.5	22.1	22.6	22.4	21.4	20.3	18.7	17.3	16.6	15.9	15.3	14.8	18.4	22.6
20-Aug	14.4	13.8	13.8	13.2	12.6	12.5	12.3	12.5	12.4	12.6	12.8	13.2	13.2	12.5	12.7	13.1	13.6	13.7	13.7	13.2	13.3	12.7	12.1	11.2	13.0	14.4
21-Aug	10.6	10.1	9.6	9.1	8.5	8.3	8.3	8.5	9.1	9.5	9.7	10.3	10.8	11.5	11.1	11.9	11.8	11.7	11.9	11.7	11.4	10.8	10.1	9.9	10.3	11.9
22-Aug	9.7	9.7	9.5	8.8	8.6	8.5	8.1	8.0	8.3	9.1	9.6	10.4	11.6	12.5	13.4	14.0	14.4	15.1	15.5	14.7	14.2	13.6	12.7	11.5	11.3	15.5
23-Aug	10.1	8.9	8.2	6.9	6.5	6.7	7.8	8.3	8.8	11.4	14.6	16.6	18.4	19.4	20.1	21.0	21.7	22.3	22.3	21.4	20.8	20.3	17.7	14.8	14.8	22.3
24-Aug	14.7	14.5	13.5	13.9	13.7	12.9	12.6	13.3	14.6	16.3	17.2	18.3	19.5	20.5	20.9	21.4	21.8	21.9	21.8	21.5	21.2	19.4	18.3	17.3	17.5	21.9
25-Aug	15.9	14.9	14.4	14.0	12.4	12.3	12.5	12.2	13.4	16.5	17.3	18.7	19.9	19.7	18.7	19.0	18.9	18.3	18.0	17.8	17.5	16.8	16.0	14.6	16.2	19.9
26-Aug	13.8	13.1	12.6	12.3	12.0	11.9	11.6	11.8	12.8	13.1	14.6	16.6	17.2	17.0	17.5	17.9	18.1	18.5	18.5	18.4	18.0	17.6	16.3	15.1	15.3	18.5
27-Aug	14.4	14.4	13.9	13.4	12.6	12.4	11.7	11.7	13.3	15.8	18.2	19.8	21.1	22.5	23.3	23.9	24.3	24.5	24.3	24.0	23.2	22.2	20.4	19.2	18.5	24.5
28-Aug	18.6	18.9	18.0	17.5	16.8	16.4	16.3	16.3	17.4	18.3	18.7	20.1	21.3	21.9	21.8	22.2	23.0	23.5	23.3	22.6	22.5	22.2	21.6	20.1	20.0	23.5
29-Aug	18.1	16.8	16.1	15.9	14.7	15.0	15.1	14.8	15.7	16.9	18.1	19.4	20.6	21.5	22.3	23.0	23.4	23.7	23.6	22.7	21.7	21.2	20.7	20.5	19.2	23.7
30-Aug	19.1	19.2	19.3	18.9	18.7	18.2	17.7	17.3	17.2	19.3	21.1	22.1	23.2	23.8	24.4	24.2	23.5	19.1	17.4	16.5	16.3	16.1	15.7	14.6	19.3	24.4
31-Aug	13.8	13.6	13.1	12.2	13.0	11.3	11.2	13.1	14.1	14.9	15.8	18.4	19.6	20.2	20.7	20.8	20.8	20.8	20.4	20.1	19.6	18.1	17.9	16.3	16.7	20.8
	16.1	15.5	15.0	14.7	14.1	13.8	13.8	14.1	14.9	16.2	17.5	18.7	19.6	20.3	20.7	20.9	20.8	20.7	20.5	20.0	19.4	18.7	18.0	17.0	Diurnal Average	
	22.3	20.9	19.8	20.0	19.2	19.3	19.5	19.0	19.8	22.5	24.0	24.9	25.4	26.5	27.3	27.7	28.0	28.4	28.3	27.8	27.6	26.9	26.1	24.0	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature 167 m (AT167m) - C

Lower Camp Met Tower - August 2015



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	29	3.90	3.90
10 - 20	496	66.67	70.56
> 20	219	29.44	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

Maximum Value: 99 % on Aug 1 06:00

Maximum Daily Average: 81.2 % on Aug 6

Minimum Value: 25 % on Aug 31 17:00

Minimum Daily Average: 47.2 % on Aug 12

Maximum Diurnal Average: 84.1 % at hour 6

Minimum Diurnal Average: 44.3 % at hour 16

Monthly Average: 64.8 %

Percentiles: P_1 = 28 P_{10} = 37 Q_1 = 50 Median = 65 Q_3 = 80 P_{90} = 91 P_{99} = 99

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

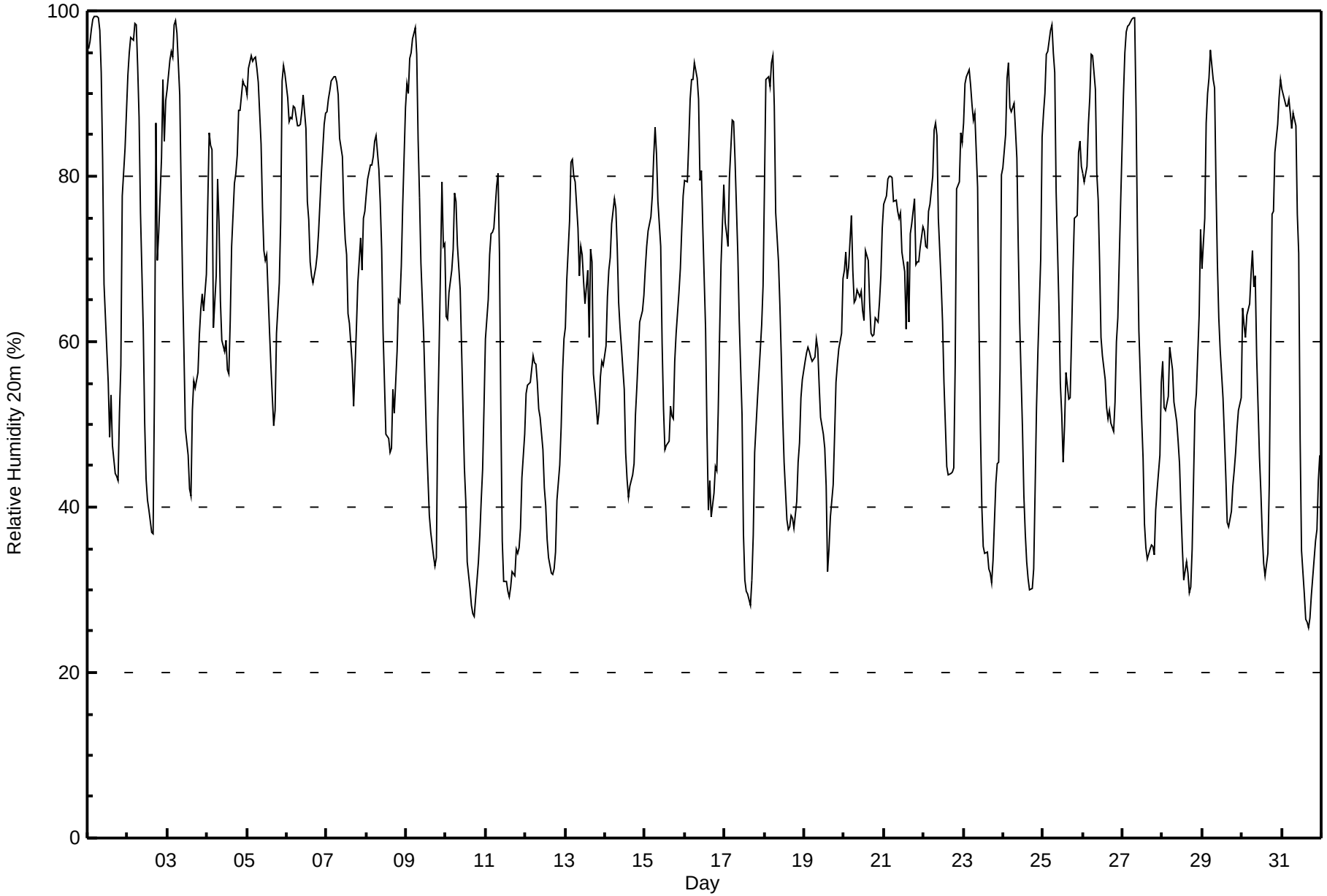
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	95	96	98	99	99	99	99	98	93	82	67	59	55	49	54	47	44	44	43	51	57	78	83	88	74.0	99
2-Aug	92	95	97	97	98	98	93	87	76	61	50	43	41	40	37	37	55	86	70	73	82	92	84	89	73.9	98
3-Aug	91	94	95	94	98	99	97	90	78	68	59	49	46	42	41	52	55	54	56	61	64	66	64	68	70.1	99
4-Aug	77	85	84	83	62	68	80	74	65	60	59	60	57	56	63	71	79	80	83	88	88	91	91	91	74.8	91
5-Aug	90	93	95	94	94	94	93	91	84	76	71	70	70	61	57	53	50	52	61	67	75	92	93	92	77.9	95
6-Aug	90	87	87	87	89	88	86	86	86	88	90	86	77	75	70	68	67	69	71	73	77	80	86	88	81.2	90
7-Aug	88	89	90	91	92	92	91	90	85	82	76	72	71	63	62	57	52	57	62	67	73	69	75	76	75.9	92
8-Aug	78	80	81	81	82	84	85	81	77	71	61	55	49	48	47	47	54	51	59	65	65	69	76	88	68.2	88
9-Aug	91	90	94	95	97	98	95	84	77	69	60	54	48	44	39	37	34	33	34	51	59	79	71	72	66.9	98
10-Aug	63	63	66	69	71	78	77	72	66	59	52	45	41	33	30	28	27	27	29	33	37	41	44	52	50.1	78
11-Aug	60	65	70	73	73	74	79	80	71	52	36	31	31	30	29	30	32	32	35	34	35	37	44	49	49.3	80
12-Aug	54	55	55	55	58	57	57	55	52	51	47	42	40	36	34	32	32	33	35	41	45	50	56	60	47.2	60
13-Aug	62	68	75	82	82	80	79	74	68	71	70	67	65	69	60	71	70	56	52	50	52	56	58	57	66.4	82
14-Aug	59	65	69	70	74	77	76	71	65	62	59	54	47	43	41	43	44	45	51	55	59	62	64	66	59.2	77
15-Aug	69	71	73	75	78	82	86	83	77	71	60	52	47	47	48	52	51	51	58	61	66	69	74	78	65.8	86
16-Aug	80	79	84	89	92	92	94	92	89	80	81	74	61	49	40	43	39	42	45	44	52	61	69	79	68.7	94
17-Aug	74	73	72	80	87	87	82	76	71	62	51	37	31	30	30	28	31	37	47	50	53	59	62	67	57.3	87
18-Aug	79	92	92	91	94	95	88	76	70	64	58	51	45	38	37	38	39	39	37	41	45	48	53	55	61.1	95
19-Aug	58	59	59	59	58	58	58	60	59	55	51	49	47	43	32	35	39	43	49	55	57	59	61	68	52.9	68
20-Aug	69	71	68	69	75	69	65	65	66	65	66	64	63	71	70	65	61	61	61	63	62	65	68	74	66.4	75
21-Aug	77	78	80	80	80	80	77	77	76	75	76	71	69	62	70	62	73	74	77	69	70	70	71	74	73.6	80
22-Aug	73	72	71	76	77	80	86	86	85	75	67	62	55	50	45	44	44	44	45	57	78	79	85	84	67.6	86
23-Aug	86	91	92	93	91	89	87	88	79	62	50	40	35	34	35	33	32	31	34	43	45	45	57	80	60.4	93
24-Aug	81	85	92	94	88	88	89	86	82	71	62	49	41	37	33	31	30	30	33	42	52	59	70	85	62.9	94
25-Aug	88	90	95	95	98	98	95	92	78	64	55	51	45	50	56	53	53	61	68	75	75	83	84	81	74.4	98
26-Aug	80	79	81	86	89	95	95	90	80	77	70	60	58	55	52	51	52	50	49	53	60	63	70	77	69.7	95
27-Aug	90	95	98	98	98	99	99	99	88	73	61	51	46	38	35	34	35	35	35	34	40	42	46	55	63.5	99
28-Aug	58	52	52	53	59	58	57	53	50	48	45	40	35	31	33	32	30	30	35	52	54	58	63	74	48.0	74
29-Aug	69	75	86	90	92	95	92	91	79	70	63	59	53	49	44	38	38	40	43	44	47	50	52	53	62.9	95
30-Aug	64	62	60	63	65	68	71	67	68	58	46	42	37	33	32	34	43	60	75	76	83	86	89	92	61.4	92
31-Aug	90	90	88	89	89	88	86	88	86	75	71	48	35	30	26	26	25	27	29	34	36	37	43	46	57.6	90
	76.5	78.7	80.6	82.3	83.2	84.1	83.6	80.7	75.0	67.7	61.0	54.5	49.7	46.3	44.6	44.3	45.5	47.5	50.3	54.9	59.4	64.3	68.0	72.8	Diurnal Average	
	95	96	98	99	99	99	99	99	93	88	90	86	77	75	70	71	79	86	83	88	88	92	93	92	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity 20m (RH20m) - %

Lower Camp Met Tower - August 2015



Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	98	13.17	13.17
40 - 60	209	28.09	41.26
60 - 80	245	32.93	74.19
80 - 100	192	25.81	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

Maximum Value: 99 % on Aug 1 06:00

Maximum Daily Average: 80.5 % on Aug 6

Minimum Value: 25 % on Aug 31 17:00

Minimum Daily Average: 44.6 % on Aug 28

Maximum Diurnal Average: 82.6 % at hour 6

Minimum Diurnal Average: 43.9 % at hour 16

Monthly Average: 63.5 %

Percentiles: P_1 = 28 P_{10} = 36 Q_1 = 49 Median = 63 Q_3 = 79 P_{90} = 89 P_{99} = 98

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

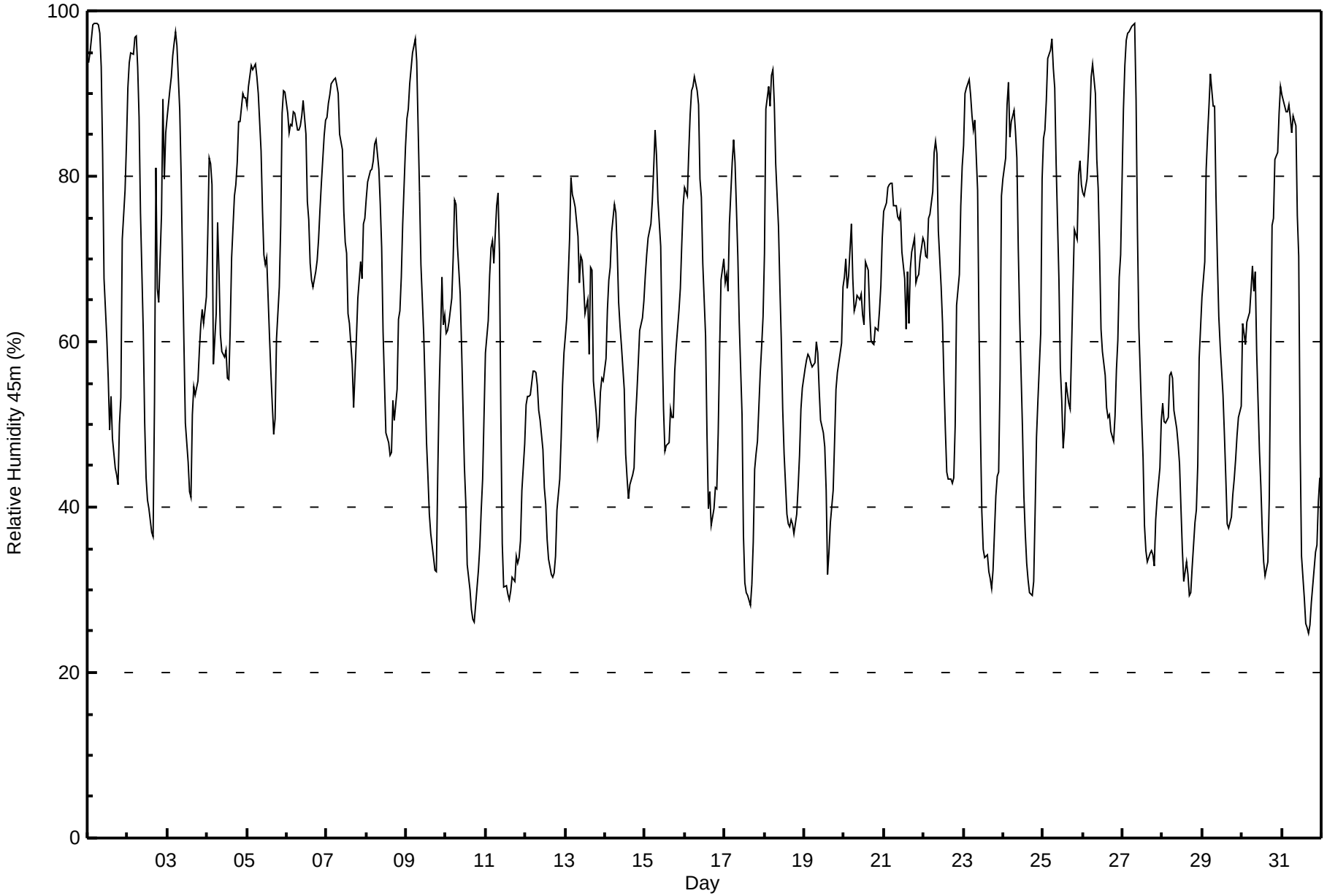
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	94	95	97	98	99	99	98	97	93	83	68	60	56	49	53	48	45	44	43	50	53	72	78	84	73.1	99
2-Aug	91	94	95	95	97	97	93	87	76	61	50	43	41	40	37	36	53	81	67	65	75	89	80	85	72.0	97
3-Aug	87	90	92	95	96	97	96	88	80	69	60	50	46	42	41	51	55	53	55	59	62	64	62	65	69.0	97
4-Aug	73	82	81	79	57	63	74	68	61	59	58	59	56	55	62	70	78	79	82	87	87	90	90	89	72.5	90
5-Aug	89	91	93	93	93	94	92	90	83	76	71	69	70	61	56	52	49	51	60	67	74	88	90	90	76.7	94
6-Aug	88	85	86	86	88	88	86	86	86	87	89	85	77	75	69	68	67	68	70	72	76	79	85	87	80.5	89
7-Aug	87	89	90	91	92	92	91	90	85	83	76	72	71	63	62	57	52	56	61	65	70	68	74	75	75.5	92
8-Aug	77	79	81	81	82	84	84	81	77	71	61	55	49	48	46	47	53	50	54	63	64	68	74	84	67.2	84
9-Aug	87	88	91	93	95	97	94	86	78	69	61	55	48	44	39	37	34	32	32	44	54	68	62	63	64.6	97
10-Aug	61	61	62	65	70	77	77	72	66	59	52	45	41	33	30	28	26	26	28	32	35	40	43	51	49.2	77
11-Aug	59	62	68	71	72	70	76	78	71	51	36	30	31	29	29	30	32	31	34	33	34	36	42	48	48.0	78
12-Aug	52	53	53	54	56	56	56	55	52	51	47	42	40	36	34	32	31	32	34	40	43	48	55	59	46.3	59
13-Aug	61	63	72	80	78	77	76	73	67	70	70	67	63	65	58	69	69	55	51	49	50	54	56	55	64.5	80
14-Aug	58	64	67	69	73	77	76	71	65	62	60	54	47	44	41	43	44	45	51	54	57	61	63	65	58.7	77
15-Aug	68	71	72	74	77	81	86	83	77	72	60	52	47	47	48	52	51	51	56	59	64	66	72	76	65.1	86
16-Aug	79	78	83	87	90	91	92	90	89	80	77	69	61	49	40	42	38	40	42	42	49	59	67	70	66.8	92
17-Aug	67	68	66	74	82	84	82	76	70	62	51	37	31	30	29	28	31	36	45	46	48	56	60	63	55.1	84
18-Aug	71	88	91	88	92	93	89	81	74	67	60	52	46	39	38	38	39	38	37	39	42	46	52	54	60.6	93
19-Aug	57	58	59	58	58	57	57	60	59	54	51	49	47	42	32	35	38	42	48	54	56	57	60	67	52.3	67
20-Aug	68	70	66	68	74	68	64	64	66	65	66	63	62	70	69	64	60	60	60	62	61	64	67	73	65.5	74
21-Aug	76	77	79	79	79	79	76	76	75	75	76	71	68	62	68	62	69	71	73	67	68	68	70	73	72.3	79
22-Aug	72	70	70	75	75	78	83	84	83	73	67	62	55	49	44	43	43	43	44	50	64	68	76	81	64.8	84
23-Aug	84	90	91	92	90	87	86	87	78	62	49	40	35	34	34	32	31	30	32	41	44	44	55	78	59.4	92
24-Aug	80	82	89	91	85	87	88	85	82	71	63	49	41	37	33	31	30	29	31	39	49	53	61	80	61.1	91
25-Aug	85	86	89	94	95	97	93	91	81	67	57	53	47	49	55	52	52	59	67	73	72	80	82	79	73.2	97
26-Aug	78	78	80	83	87	92	94	90	82	78	71	62	59	56	52	51	51	49	48	51	57	60	68	71	68.6	94
27-Aug	88	93	96	97	97	98	98	98	89	73	62	51	46	38	35	33	34	35	34	33	38	41	45	51	62.7	98
28-Aug	53	50	50	51	56	56	56	52	49	48	45	40	35	31	33	32	29	30	33	38	40	45	58	62	44.6	62
29-Aug	65	70	81	85	88	92	88	89	78	70	63	59	54	49	44	38	37	39	42	43	46	49	51	52	61.3	92
30-Aug	62	61	60	62	63	66	69	66	68	59	47	43	37	33	32	33	41	59	74	75	82	83	88	91	60.6	91
31-Aug	90	89	88	88	89	87	85	87	86	75	70	48	34	29	26	25	25	26	28	33	35	35	41	44	56.8	90
	74.3	76.6	78.7	80.6	81.5	82.6	82.4	80.1	75.0	67.8	61.0	54.4	49.6	46.0	44.2	43.9	44.7	46.5	48.9	52.4	56.4	61.3	65.3	69.8	Diurnal Average	
	94	95	97	98	99	99	98	98	93	87	89	85	77	75	69	70	78	81	82	87	87	90	90	91	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity 45m (RH45m) - %

Lower Camp Met Tower - August 2015



Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	105	14.11	14.11
40 - 60	217	29.17	43.28
60 - 80	248	33.33	76.61
80 - 100	174	23.39	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 - August 2015

Maximum Value: 99 % on Aug 1 06:00

Maximum Daily Average: 81.4 % on Aug 6

Minimum Value: 25 % on Aug 31 17:00

Minimum Daily Average: 42.0 % on Aug 28

Maximum Diurnal Average: 79.1 % at hour 6

Minimum Diurnal Average: 44.2 % at hour 16

Monthly Average: 61.5 %

Percentiles: P_1 = 28 P_{10} = 36 Q_1 = 48 Median = 62 Q_3 = 76 P_{90} = 87 P_{99} = 96

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

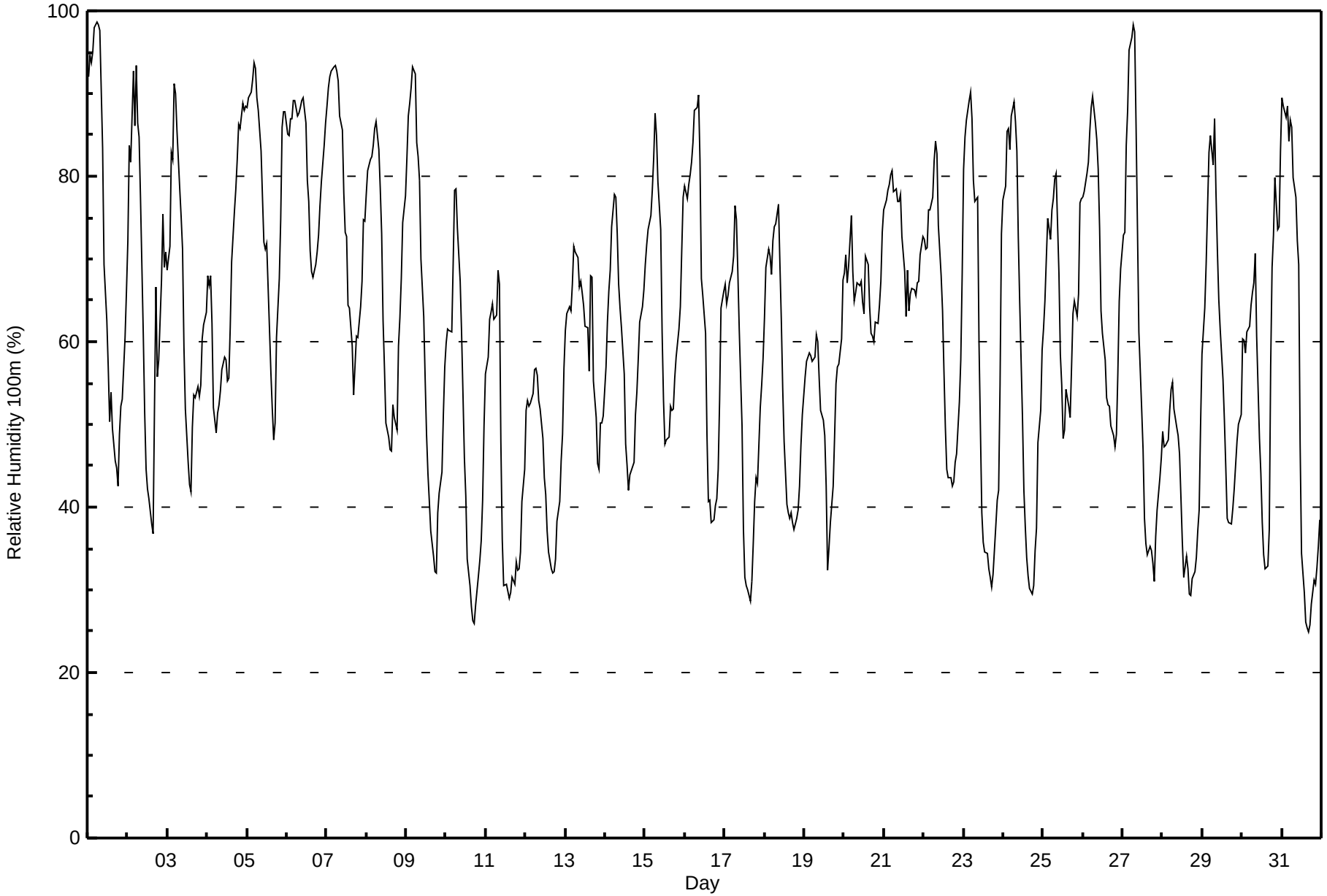
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	92	95	94	95	98	99	98	98	90	83	69	63	57	50	54	50	46	45	42	49	52	53	61	66	70.7	99
2-Aug	72	84	82	93	86	93	86	85	77	61	51	45	42	41	38	37	52	67	56	58	67	75	69	71	66.2	93
3-Aug	69	72	83	82	91	90	86	78	75	71	59	52	45	43	42	50	54	53	55	53	55	60	62	64	64.3	91
4-Aug	68	67	68	62	52	49	51	52	54	57	58	58	55	56	62	70	76	78	82	86	86	89	88	89	67.2	89
5-Aug	88	89	90	92	94	93	89	88	83	77	72	71	72	62	56	52	48	50	61	68	75	86	88	88	76.3	94
6-Aug	85	85	87	87	89	89	87	88	88	89	89	86	80	77	71	69	68	69	71	73	76	79	84	87	81.4	89
7-Aug	89	91	92	93	93	93	93	92	87	86	78	73	73	64	64	60	54	57	61	60	64	67	75	75	76.3	93
8-Aug	78	81	82	82	84	86	87	83	78	73	63	57	50	48	47	47	52	51	49	59	63	68	74	78	67.5	87
9-Aug	82	87	89	91	93	92	84	82	80	70	63	56	49	44	41	37	34	32	32	39	42	44	51	57	61.3	93
10-Aug	60	61	61	61	69	78	79	74	67	61	54	46	41	34	30	28	26	26	28	32	34	36	41	50	49.0	79
11-Aug	56	58	63	64	65	63	63	69	67	48	36	30	31	30	29	30	31	31	33	32	32	35	41	45	45.0	69
12-Aug	52	53	52	52	54	57	57	56	53	52	48	44	42	37	35	32	32	32	34	38	41	46	49	57	45.9	57
13-Aug	61	63	64	64	67	71	71	70	67	67	66	64	62	62	56	68	68	55	51	45	45	50	50	51	60.8	71
14-Aug	57	62	66	69	74	78	77	73	67	64	62	56	48	45	42	44	45	45	51	54	58	62	64	66	59.6	78
15-Aug	69	72	73	75	78	82	88	85	79	73	61	53	48	48	49	52	52	52	56	58	62	64	71	78	65.7	88
16-Aug	79	77	79	80	82	84	88	88	90	82	68	66	61	49	41	41	38	39	40	41	45	53	64	66	64.1	90
17-Aug	67	65	66	67	68	70	76	75	68	62	50	37	31	30	30	29	31	36	41	44	43	52	55	58	52.1	76
18-Aug	63	69	71	70	68	72	74	74	77	69	63	54	48	40	39	39	39	38	37	39	40	42	47	51	55.2	77
19-Aug	56	58	58	59	58	58	58	61	60	56	52	51	49	43	32	35	38	43	48	55	57	57	60	67	52.8	67
20-Aug	68	71	67	69	75	68	65	66	67	67	67	65	63	70	69	64	61	61	60	62	62	64	67	73	66.4	75
21-Aug	76	77	78	79	80	81	78	79	77	77	78	73	69	63	69	64	66	66	66	66	67	67	71	73	72.4	81
22-Aug	72	71	71	76	76	77	82	84	83	74	68	64	56	50	45	44	44	43	43	45	46	53	58	68	62.2	84
23-Aug	81	85	87	89	90	87	79	77	78	60	49	39	36	35	34	33	31	30	32	38	41	42	55	73	57.5	90
24-Aug	77	79	85	86	83	87	89	87	83	73	65	51	42	38	34	32	30	30	31	35	38	48	52	59	58.8	89
25-Aug	62	65	70	75	72	76	77	80	80	68	59	55	48	49	54	52	51	57	63	65	63	66	77	77	65.1	80
26-Aug	77	78	80	82	85	88	90	87	84	81	74	64	61	58	53	52	52	50	49	47	49	56	65	69	68.0	90
27-Aug	73	73	84	88	95	97	98	97	86	74	61	52	47	39	36	34	35	35	33	31	36	40	44	46	59.7	98
28-Aug	49	47	47	48	52	54	55	52	50	49	46	41	36	31	34	32	30	29	31	32	34	37	40	50	42.0	55
29-Aug	59	64	69	76	83	85	81	87	78	71	65	62	55	51	45	39	38	38	40	42	45	48	50	51	59.2	87
30-Aug	60	60	59	61	62	64	66	67	71	61	48	44	38	34	33	33	37	57	69	73	80	74	74	83	58.7	83
31-Aug	89	89	87	88	84	87	86	80	77	72	69	48	34	30	26	25	25	26	28	31	31	33	35	38	55.0	89
	70.5	72.5	74.4	76.0	77.5	79.1	78.7	77.8	74.9	68.6	61.7	55.4	50.6	46.8	44.8	44.2	44.6	45.8	47.5	50.0	52.5	56.4	60.6	65.2	Diurnal Average	
	92	95	94	95	98	99	98	98	90	89	89	86	80	77	71	70	76	78	82	86	86	89	88	89	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity 100m (RH100m) - %

Lower Camp Met Tower - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Relative Humidity 100m (RH100m) - %

Lower Camp Met Tower - August 2015

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	112	15.05	15.05
40 - 60	224	30.11	45.16
60 - 80	273	36.69	81.85
80 - 100	135	18.15	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity 167m (RH167m) - %

Lower Camp Met Tower - August 2015

Maximum Value: 96 % on Aug 1 05:00

Maximum Daily Average: 82.6 % on Aug 6

Minimum Value: 25 % on Aug 31 17:00

Minimum Daily Average: 40.9 % on Aug 28

Maximum Diurnal Average: 76.7 % at hour 7

Minimum Diurnal Average: 44.7 % at hour 16

Monthly Average: 60.3 %

Percentiles: P_1 = 28 P_{10} = 35 Q_1 = 47 Median = 61 Q_3 = 74 P_{90} = 84 P_{99} = 94

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

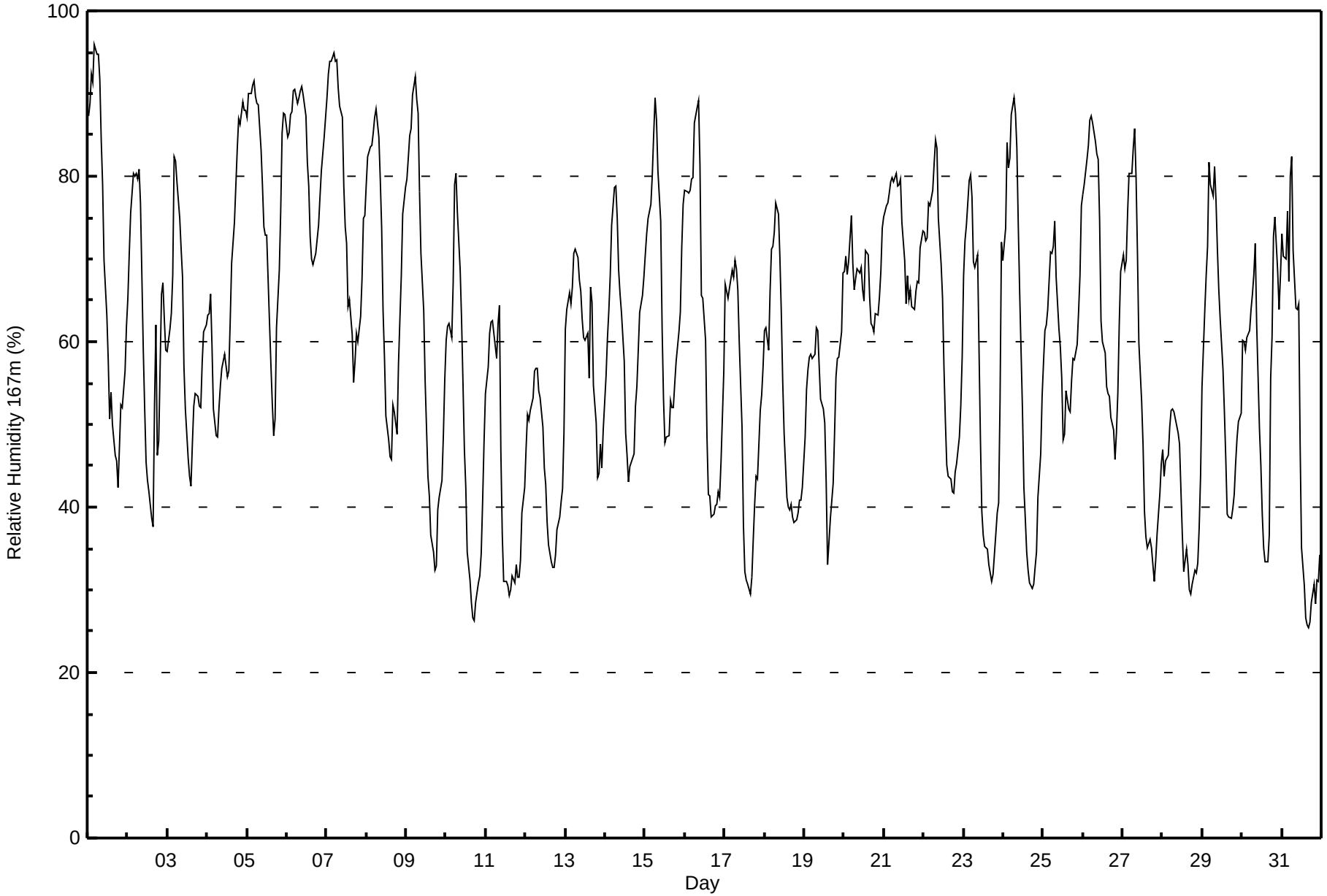
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	87	89	92	91	96	95	95	92	84	79	70	63	58	51	54	50	46	46	42	47	52	52	57	62	68.8	96
2-Aug	65	71	76	80	80	80	80	81	77	59	52	45	43	42	39	38	52	62	46	48	66	67	63	59	61.3	81
3-Aug	59	61	63	68	82	82	79	75	71	68	57	52	46	44	43	48	52	54	53	52	52	57	61	62	60.1	82
4-Aug	63	63	66	59	52	49	49	52	55	57	59	57	56	56	63	70	74	79	83	87	86	89	88	88	66.6	89
5-Aug	87	90	90	91	92	90	89	89	83	79	74	73	73	62	57	53	49	51	62	69	76	85	88	87	76.5	92
6-Aug	85	85	88	88	90	91	89	89	90	91	90	87	82	79	73	70	69	71	72	74	78	81	85	87	82.6	91
7-Aug	89	92	94	94	95	94	94	91	88	87	79	74	72	64	65	61	55	58	61	60	63	68	75	75	77.0	95
8-Aug	79	82	83	84	85	87	88	85	80	74	64	58	51	48	46	46	52	52	49	57	63	68	75	79	68.1	88
9-Aug	80	82	85	86	90	92	89	88	78	71	64	55	49	44	41	37	35	32	33	40	41	43	49	55	60.7	92
10-Aug	60	62	62	60	67	79	80	76	69	63	55	47	42	35	31	29	27	26	28	31	32	34	41	48	49.3	80
11-Aug	54	57	61	62	63	61	58	62	64	47	37	31	31	30	29	30	32	31	33	32	32	34	39	42	43.8	64
12-Aug	47	51	50	52	53	56	57	57	54	53	50	45	43	38	35	33	33	33	34	37	39	41	42	49	45.1	57
13-Aug	61	64	66	65	67	71	71	70	67	66	63	61	60	61	56	67	65	55	50	44	44	48	45	49	59.7	71
14-Aug	56	60	64	68	74	79	79	75	69	66	63	58	49	46	43	45	46	46	52	55	59	64	66	68	60.3	79
15-Aug	70	73	75	77	80	85	89	87	81	75	62	53	48	48	49	53	52	52	55	58	61	64	71	77	66.4	89
16-Aug	78	78	78	78	80	80	86	88	89	81	66	65	60	49	42	41	39	39	40	40	42	41	46	56	61.8	89
17-Aug	67	66	65	66	69	68	70	69	66	60	50	38	32	31	31	29	32	36	40	44	43	52	54	57	51.4	70
18-Aug	61	62	59	66	71	71	73	77	75	70	64	55	49	41	40	40	40	39	38	38	39	41	41	42	53.9	77
19-Aug	48	54	57	58	58	58	58	62	61	57	53	52	50	43	33	36	39	43	49	56	58	58	61	68	53.0	68
20-Aug	69	70	68	70	75	69	66	68	69	68	69	66	65	71	70	65	62	62	61	63	63	65	68	74	67.4	75
21-Aug	75	76	77	78	79	80	79	80	79	79	80	74	70	65	68	65	66	64	64	66	67	67	71	73	72.7	80
22-Aug	73	72	72	77	76	78	82	84	83	75	69	65	57	51	45	44	43	42	42	44	45	48	52	58	61.7	84
23-Aug	68	72	74	79	80	77	70	69	70	59	48	40	37	35	35	33	32	31	32	37	39	40	53	72	53.5	80
24-Aug	70	74	84	81	82	88	90	88	83	74	66	52	42	39	35	32	31	30	31	33	35	41	47	53	57.4	90
25-Aug	58	61	62	64	71	71	71	75	68	62	59	56	48	49	54	52	51	55	58	58	60	64	68	76	61.2	76
26-Aug	78	79	82	84	87	87	86	84	83	82	75	62	60	59	55	54	53	51	49	46	49	54	62	68	67.9	87
27-Aug	71	69	70	76	80	80	83	86	80	71	60	53	47	40	37	35	36	35	33	31	34	37	42	45	55.4	86
28-Aug	47	44	46	46	50	52	52	52	50	49	48	42	37	32	35	33	30	30	31	32	32	33	37	44	40.9	52
29-Aug	54	64	68	71	82	79	78	81	77	71	66	63	57	52	46	39	39	39	40	42	45	48	50	51	58.4	82
30-Aug	60	60	59	61	61	64	66	68	72	62	49	45	39	35	33	33	37	56	61	73	75	69	64	68	57.1	75
31-Aug	73	70	70	76	67	80	82	71	64	64	65	48	35	30	27	26	25	26	29	31	28	31	31	34	49.3	82
	67.5	69.5	71.2	72.8	75.3	76.5	76.7	76.4	73.6	68.3	62.0	56.0	51.2	47.4	45.4	44.7	45.0	45.9	46.8	49.1	51.5	54.3	57.8	62.2	Diurnal Average	
	89	92	94	94	96	95	95	92	90	91	90	87	82	79	73	70	74	79	83	87	86	89	88	88	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity 167m (RH167m) - %

Lower Camp Met Tower - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Relative Humidity 167m (RH167m) - %

Lower Camp Met Tower - August 2015

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	114	15.32	15.32
40 - 60	238	31.99	47.31
60 - 80	281	37.77	85.08
80 - 100	111	14.92	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed 20 m (WS20m) - km/h

Lower Camp Met Tower - August 2015

Maximum Speed: 24 km/h on Aug 19 05:00

Maximum Daily Speed Average: 15.1 km/h on Aug 14

Minimum Speed Value: 0 km/h on Aug 25 07:00

Minimum Daily Speed Average: 0.6 km/h on Aug 9

Maximum Diurnal Speed Average: 5.9 km/h at hour 15

Minimum Diurnal Speed Average: 1.8 km/h at hour 2

Monthly Average Velocity: 3.0 km/h 242.6 deg

Percentiles: $P_1 = 1$ $P_{10} = 2$ $Q_1 = 4$ Median = 8 $Q_3 = 12$ $P_{90} = 16$ $P_{99} = 21$

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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	NNW4	WNW2	NNW3	NNW1	NNW3	NW4	NW3	NW4	NW3	NW2	N2	NNW6	NNW7	N8	NNW9	NNW8	NW7	NW8	NNW8	N4	NNW3	N3	NNW3	NNW2	NNW4.3	NNW9
2-Aug	NNW1	N1	ENE0	ENE1	NE1	SE2	SE6	SE8	SSE7	SSE9	SE9	SE6	SE6	SE5	S1	SE5	NW8	NNE6	ENE2	NNW3	N3	WNW1	E1	N4	ESE1.8	SE9
3-Aug	NNW3	NNW2	N1	NE1	NW1	NW2	NNW1	NW2	NNW3	NNW2	WNW2	WNW2	SSE4	S12	SSE9	ENE7	E7	ESE8	ESE6	E6	E2	SE2	SE7	SE5	ESE1.9	S12
4-Aug	NNE2	N5	N5	N5	ESE6	NE4	N6	NNW5	E2	ENE3	N7	NE5	ESE6	SE12	SE9	SE7	ESE6	ESE9	ESE9	SE13	SSE11	ESE5	ESE6	ESE5	E4.0	SE13
5-Aug	NE2	N4	NNE3	NNE4	N2	NNE4	NNE4	ENE4	ESE5	SE6	S4	WSW3	WNW4	SSW5	SSE8	SE5	SE9	SE10	SSE18	S18	SSE18	SE11	SE9	SE8	SE4.6	SSE18
6-Aug	SE8	SE12	SE9	ESE7	ESE7	SE8	SE11	SE12	SE12	SE11	SE10	SE11	SE11	ESE10	ESE10	SE10	ESE12	SE9	SE10	SE8	ESE8	ESE5	N2	NE2	SE8.6	SE12
7-Aug	NE0	NNE1	NE1	N3	ENE1	ESE2	ENE2	NNW2	NNW1	NNW2	SSW3	SSE3	SE6	SSE4	SSE5	SE4	S3	E3	NE3	ENE3	ESE3	SSE9	SSE11	SSE10	SE2.2	SSE11
8-Aug	SSE12	SSE9	SSE5	SSE7	SSE10	SSE6	SSE7	SSE7	SSE10	SSE9	SE7	SE5	S2	NNE2	ENE3	NNE3	SSW3	SSW4	SE4	SE8	SSE8	ESE3	ENE1	N3	SSE4.8	SSE12
9-Aug	N3	NE2	NE2	NNE2	NNW2	WNW1	NW3	NW1	E0	SSW3	S1	NNE1	WSW2	N1	WNW2	ENE2	ENE2	ESE2	ESE1	NNE3	NW1	N1	SE3	ESE2	NNE0.6	SE3
10-Aug	SSW7	NW6	SSE2	SW7	WSW13	WNW9	W5	W9	WSW8	WSW9	W9	W10	W11	W14	W14	W13	W11	WSW14	WSW14	SW9	SSW8	SW13	SW11	SW10	WSW8.9	W14
11-Aug	SSW5	SSE9	SSE9	SSE11	SSE6	SSE7	SE10	SSE8	SSE10	SW7	W17	W22	W22	W21	W22	W20	W18	W19	W12	WSW11	SW14	WSW13	W11	W14	WSW9.6	W22
12-Aug	WSW13	WSW10	WSW9	SSE6	S6	W11	W14	W16	W16	W16	W15	W15	WSW16	WSW15	WSW15	WSW16	WSW16	W14	W14	W12	WSW11	W9	WSW9	WSW4	WSW11.9	WSW16
13-Aug	SSE2	SSE5	SE7	SSE6	SE5	SSE9	SSE8	S7	SSE7	SSE9	SSE12	SSE9	SE5	NW3	W13	WSW10	SW10	WSW16	WSW10	SW14	SW12	WSW10	WSW14	WSW12	SSW6.0	WSW16
14-Aug	W13	W10	W16	W16	W16	W18	W14	W15	W16	W19	W19	W17	WNW19	WNW15	WNW18	WNW18	NW18	NW16	NW14	NW12	NW14	WNW13	WNW13	WNW15	WNW15.1	W19
15-Aug	NW12	NW9	NW8	NW9	NNW8	NNW7	NNW8	NNW11	N13	N13	N14	N16	NNE15	N14	N13	N12	N12	N10	N6	NW7	NNW8	NNW5	N6	N3	NNW9.4	N16
16-Aug	NW2	NW2	N2	N2	N1	NW2	N1	ENE1	E2	ESE3	N4	NNW6	NE3	NNE3	WNW7	NW7	W7	NW5	WNW5	WNW8	W3	W5	NW2	SSE3	NW2.5	WNW8
17-Aug	SSE6	SSE4	SSE5	SSE6	SE8	SE7	SE8	SSE9	SSE8	SSE9	SSE8	SW2	W7	WSW9	W9	W5	W10	WNW7	N4	NE3	ESE3	S3	SE5	SE3	S3.1	W10
18-Aug	N3	NNW4	NW1	NW3	NW4	NNW4	NNW2	N3	N4	NNW3	NW3	W2	WNW5	WNW5	NW2	WSW3	S10	S7	S10	SSW7	S10	S13	S12	S14	SSW2.3	S14
19-Aug	SSE17	SSE20	SSE23	SSE22	S24	S24	SSE24	SSE22	S18	SSW14	WSW13	W16	WSW16	W17	W21	W23	W20	WNW17	NW18	NW15	WNW15	WNW14	W13	W13	SW10.9	S24
20-Aug	W15	W14	WNW11	W13	W12	W17	WNW15	WNW17	WNW17	WNW18	WNW15	WNW17	NW17	NW17	NW15	NW14	NW13	NW11	NW12	NW11	WNW12	NW13	NW12	WNW12	WNW13.7	WNW18
21-Aug	W14	W13	W15	W15	W16	W16	W14	W11	NW11	NW12	NW12	NW8	NW13	NNW12	NNW11	NW11	NW9	NNW8	NW6	NW7	NW10	NW11	NW12	NW11	WNW10.8	W16
22-Aug	NW11	WNW11	WNW11	W12	WNW12	WNW11	WNW10	WNW10	WNW9	WNW12	WNW14	WNW11	N8	NW7	NNW10	N9	N6	N4	N2	ESE2	SSE2	SE1	SSE2	SE3	NW6.5	WNW14
23-Aug	ESE3	ESE2	SE4	SE5	SSE5	SSE6	SSE9	SSE8	SE7	SSE9	SSE10	SSE13	S11	S10	SSE12	SSE11	S14	S14	S11	SSE8	SSE18	SSE17	NNW6	N3	SSE8.0	SSE18
24-Aug	E0	N2	SE1	SSE11	S5	SSW6	SSW4	S6	SSE10	SSW7	W7	WSW11	W9	W10	W10	W10	WSW10	WSW10	WSW9	WNW5	NW2	WNW1	NNW4	NNW2	WSW4.2	SSE11
25-Aug	WSW1	WNW1	NNW2	NW2	NNW2	NW2	NNE0	NW2	N3	N5	NNW7	NNW8	N8	NNW8	NNW8	N8	NNW6	NNW5	N4	NNW4	NW2	NNW2	N4	N5	NNW4.0	NNW8
26-Aug	NNW4	NNW7	NNW4	N1	NNW3	NW2	N2	WNW2	N4	NW6	NW5	NNE3	NNE6	NNW2	W4	W4	W6	W5	SW7	SW6	WSW5	WSW6	S3	SSE3	WNW2.3	SW7
27-Aug	SSE3	E1	SE1	ESE1	SE4	SE5	SE5	SE3	SE7	SSE9	SSE10	SSE12	S12	SW10	SW15	SW19	SW19	WSW16	W14	SW9	SSW11	SSW11	S7	SE9	SSW6.7	SW19
28-Aug	SE5	W12	W13	SW4	SSW6	WSW9	WSW11	WSW12	W13	WSW18	W18	WSW18	WSW17	W18	WSW18	W14	W11	W9	NNW1	S1	N2	NNW3	NNW2	NNW1	WSW9.0	W18
29-Aug	NW3	NW3	SSW1	SE1	NNW3	SSE3	SE2	SE3	SSE4	SSE6	SE9	SE8	SE8	SSE9	S9	S8	SE9	SSE9	SE12	SE12	SSE12	SSE12	SSE11	SSE13	SSE6.2	SSE13
30-Aug	SE8	SSE12	SSE16	SSE11	SSE10	SSW4	SSW1	SW8	W9	WNW8	NW7	W6	W7	WSW9	W7	W5	SSE7	SSE16	SSE16	SSE8	SSE9	SE9	SSE10	SSE12	S5.7	SSE16
31-Aug	SSE11	SSE13	SSE18	SSE15	SSE17	SSE12	SE10	SSE13	SSE15	SSE15	SSE13	SW12	WSW17	WSW24	W20	W22	WSW18	WSW19	SW15	SW8	SW11	SW10	SW10	SSW4	SSW10.1	WSW24
	SW2.0	WSW1.8	SW2.1	SSW2.3	SSW2.7	SW2.7	SW2.1	SW2.8	SW2.5	SW3.0	WSW3.2	W4.0	W4.4	W5.2	W5.9	W5.2	WSW5.0	WSW4.3	WSW2.9	SW2.6	SSW3.5	SW3.3	SW2.3	SW1.9	Diurnal Average	
	SSE17	SSE20	SSE23	SSE22	S24	S24	SSE24	SSE22	S18	W19	W19	W22	W22	WSW24	W22	W23	W20	WSW19	SSE18	S18	SSE18	SSE17	WSW14	WNW15	Diurnal Maximum	

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 9 km/h on Aug 13 15:00

Minimum Value: 1 km/h on Aug 16 04:00

Percentiles: $P_1 = 1$ $P_{10} = 1$ $Q_1 = 2$ Median = 3 $Q_3 = 5$ $P_{90} = 6$ $P_{99} = 8$

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

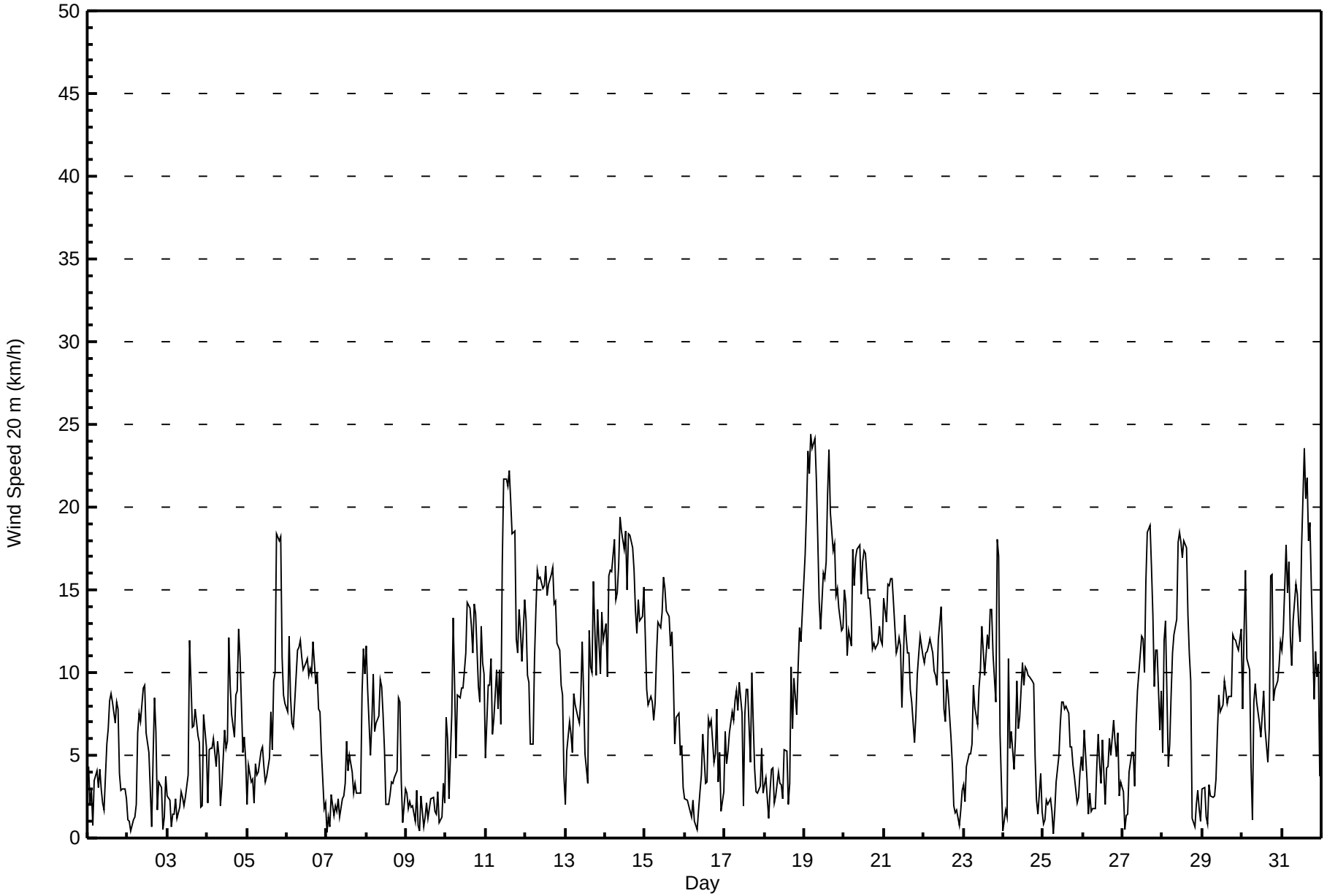
Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Aug	2	1	1	1	2	2	2	2	2	1	3	3	3	4	3	3	3	3	3	3	2	1	1	1	4
2-Aug	2	1	1	1	1	2	2	2	2	3	3	3	3	3	3	3	7	4	3	2	1	2	1	1	7
3-Aug	1	1	1	1	1	1	1	1	1	2	1	2	3	4	4	4	3	3	3	2	1	2	2	3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

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed 20 m (WS20m) - km/h

Lower Camp Met Tower - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Wind Speed 20 m (WS20m) - km/h

Lower Camp Met Tower - August 2015

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	273	36.69	36.69
6 - 11	271	36.42	73.12
12 - 19	182	24.46	97.58
20 - 28	18	2.42	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 744

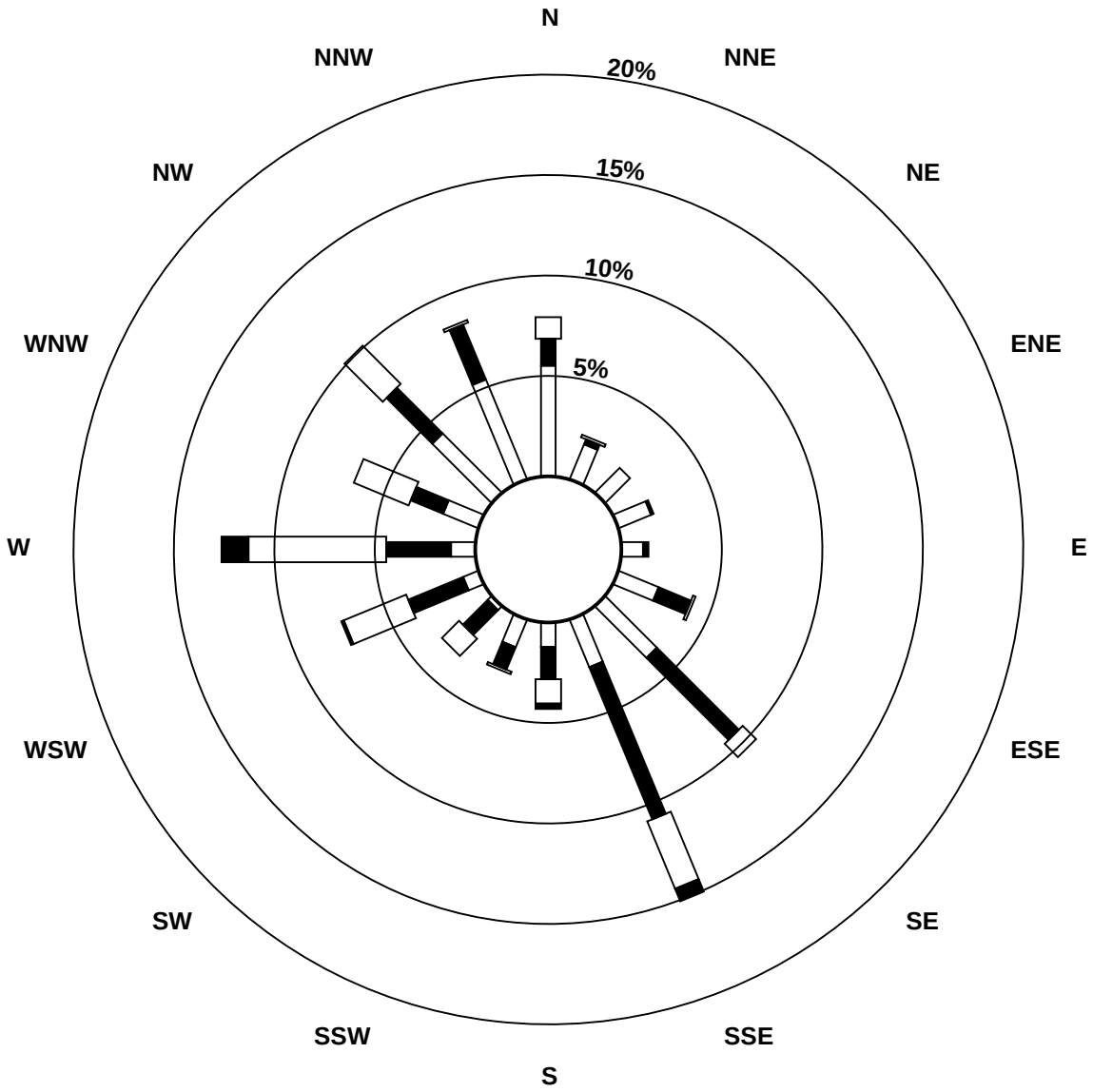
Total Number of Hours: 744

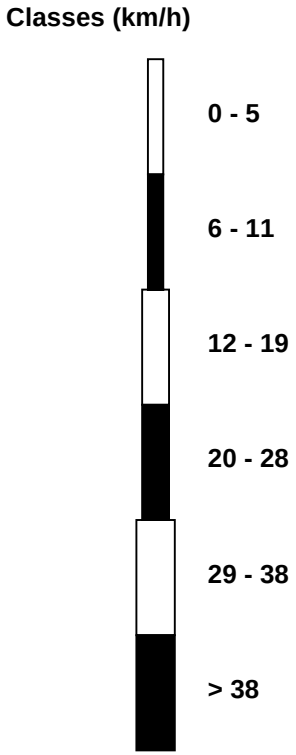
Wood Buffalo Environmental Association

Wind Rose Aug 2015

Wind Speed 20 m (WS20m) - km/h

Lower Camp Met Tower (AMS 3)





Total Number of Valid Hours: 744

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed 45 m (WS45m) - km/h

Lower Camp Met Tower - August 2015

Maximum Speed: 33 km/h on Aug 19 16:00

Maximum Daily Speed Average: 21.2 km/h on Aug 14

Minimum Speed Value: 0 km/h on Aug 2 03:00

Minimum Daily Speed Average: 1.0 km/h on Aug 9

Maximum Diurnal Speed Average: 8.2 km/h at hour 15

Minimum Diurnal Speed Average: 2.5 km/h at hour 24

Monthly Average Velocity: 4.1 km/h 249.2 deg

Percentiles: $P_1 = 1$ $P_{10} = 3$ $Q_1 = 5$ Median = 10 $Q_3 = 16$ $P_{90} = 22$ $P_{99} = 31$

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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	NNW7	WNW2	NNW3	NNW0	NNW5	NW7	NW4	NW6	NW4	NW3	N2	NNW7	NNW9	N11	NNW12	NNW11	NW10	NW11	NNW11	N6	NNW4	N6	NNW5	NNW4	NNW6.1	NNW12
2-Aug	NNW2	N0	ENE0	ENE2	NE1	SE3	SE8	SE9	SSE8	SSE11	SE12	SE7	SE7	SE6	S1	SE6	NW12	NNE10	ENE5	NNW4	N3	WNW1	E2	N6	ESE2.1	NW12
3-Aug	NNW2	NNW3	N2	NE1	NW1	NW2	NNW1	NW1	NNW3	NNW3	WNW2	WNW3	SSE5	S13	SSE12	ENE11	E11	ESE12	ESE10	E10	E4	SE3	SE9	SE9	ESE3.0	S13
4-Aug	NNE2	N7	N7	N7	ESE9	NE6	N7	NNW5	E2	ENE5	N9	NE8	ESE9	SE16	SE12	SE10	ESE9	ESE12	ESE12	SE17	SSE15	ESE8	ESE13	ESE8	ESE5.9	SE17
5-Aug	NE3	N6	NNE5	NNE5	N3	NNE6	NNE6	ENE7	ESE8	SE7	S5	WSW4	WNW5	SSW5	SSE10	SE7	SE13	SE14	SSE23	S21	SSE22	SE15	SE12	SE11	SE5.7	SSE23
6-Aug	SE11	SE16	SE11	ESE10	ESE9	SE11	SE14	SE15	SE15	SE14	SE13	SE14	SE13	ESE13	ESE14	SE12	ESE16	SE13	SE14	SE10	ESE11	ESE8	N3	NE4	SE11.5	SE16
7-Aug	NE2	NNE1	NE1	N3	ENE2	ESE3	ENE2	NNW3	NNW2	NNW3	SSW2	SSE3	SE6	SSE4	SSE5	SE4	S3	E5	NE4	ENE4	ESE5	SSE11	SSE14	SSE13	SE2.8	SSE14
8-Aug	SSE15	SSE11	SSE7	SSE9	SSE12	SSE8	SSE8	SSE9	SSE11	SSE10	SE8	SE6	S2	NNE3	ENE3	NNE4	SSW4	SSW4	SE4	SE12	SSE11	ESE6	ENE2	N4	SSE5.9	SSE15
9-Aug	N4	NE2	NE3	NNE2	NNW3	WNW0	NW2	NW1	E0	SSW2	S1	NNE1	WSW2	N1	WNW3	ENE3	ENE4	ESE2	ESE2	NNE5	NW0	N3	SE7	ESE6	NE1.0	SE7
10-Aug	SSW9	NW9	SSE2	SW10	WSW18	WNW14	W7	W12	WSW11	WSW12	W12	W13	W15	W20	W20	W18	W16	WSW20	WSW18	SW12	SSW11	SW17	SW14	SW14	WSW12.2	WSW20
11-Aug	SSW7	SSE11	SSE11	SSE14	SSE8	SSE8	SE13	SSE10	SSE12	SW9	W24	W31	W31	W31	W31	W29	W27	W27	W17	WSW14	SW18	WSW17	W16	W21	WSW13.6	W31
12-Aug	WSW21	WSW15	WSW14	SSE7	S7	W16	W21	W23	W23	W23	W22	W22	WSW23	WSW21	WSW21	WSW22	WSW23	W20	W20	W18	WSW15	W13	WSW14	WSW8	W17.3	WSW23
13-Aug	SSE2	SSE5	SE9	SSE8	SE7	SSE10	SSE9	S8	SSE8	SSE11	SSE14	SSE10	SE6	NW5	W17	WSW14	SW13	WSW19	WSW14	SW18	SW16	WSW13	WSW18	WSW17	SSW7.6	WSW19
14-Aug	W19	W15	W23	W24	W24	W26	W20	W20	W23	W28	W25	W23	WNW25	WNW21	WNW25	WNW25	NW24	NW22	NW18	NW17	NW19	WNW19	WNW19	WNW21	WNW21.2	W28
15-Aug	NW17	NW13	NW11	NW12	NNW11	NNW12	NNW12	NNW16	N18	N18	N19	N22	NNE21	N19	N19	N17	N18	N14	N8	NW10	NNW12	NNW9	N9	N5	NNW13.6	N22
16-Aug	NW3	NW3	N2	N2	N2	NW3	N2	ENE1	E2	ESE3	N5	NNW9	NE4	NNE4	WNW9	NW10	W10	NW7	WNW8	WNW12	W7	W9	NW3	SSE3	NW3.7	WNW12
17-Aug	SSE7	SSE5	SSE4	SSE7	SE9	SE9	SE10	SSE10	SSE9	SSE11	SSE9	SW3	W10	WSW11	W11	W6	W14	WNW9	N6	NE4	ESE4	S5	SE7	SE4	S3.6	W14
18-Aug	N3	NNW6	NW2	NW3	NW5	NNW5	NNW2	N3	N5	NNW4	NW4	W4	WNW7	WNW6	NW3	WSW4	S11	S7	S11	SSW9	S12	S14	S13	S15	SW2.5	S15
19-Aug	SSE19	SSE22	SSE27	SSE23	S27	S26	SSE27	SSE25	S20	SSW16	WSW17	W23	WSW22	W24	W30	W33	W29	WNW24	NW24	NW20	WNW21	WNW20	W18	W18	SW14.1	W33
20-Aug	W21	W20	WNW16	W18	W17	W25	WNW22	WNW23	WNW24	WNW25	WNW20	WNW22	NW24	NW23	NW19	NW20	NW18	NW16	NW16	NW16	WNW17	NW18	NW17	WNW17	WNW19.1	W25
21-Aug	W21	W20	W23	W22	W23	W22	W20	W16	NW15	NW16	NW15	NW11	NW19	NNW17	NNW16	NW15	NW13	NNW13	NW9	NW11	NW14	NW16	NW17	NW15	WNW15.3	W23
22-Aug	NW16	WNW16	WNW17	W17	WNW18	WNW17	WNW15	WNW14	WNW13	WNW17	WNW19	WNW15	N10	NW10	NNW13	N12	N8	N7	N3	ESE3	SSE4	SE3	SSE5	SE5	WNW9.0	WNW19
23-Aug	ESE5	ESE3	SE6	SE7	SSE7	SSE7	SSE12	SSE9	SE8	SSE11	SSE12	SSE15	S13	S11	SSE14	SSE13	S15	S15	S13	SSE11	SSE22	SSE20	NNW9	N6	SSE9.5	SSE22
24-Aug	E2	N3	SE2	SSE14	S7	SSW8	SSW5	S7	SSE11	SSW8	W10	WSW14	W12	W14	W14	W13	WSW13	WSW13	WSW14	WNW7	NW5	WNW2	NNW7	NNW5	WSW5.6	SSE14
25-Aug	WSW1	WNW2	NNW4	NW2	NNW3	NW2	NNE1	NW2	N4	N6	NNW9	NNW11	N10	NNW13	NNW12	N10	NNW9	NNW9	N8	NNW6	NW4	NNW4	N7	N8	NNW5.9	NNW13
26-Aug	NNW7	NNW10	NNW5	N2	NNW5	NW3	N3	WNW2	N5	NW8	NW5	NNE4	NNE6	NNW3	W5	W6	W8	W7	SW9	SW9	WSW8	WSW9	S4	SSE3	WNW3.3	NNW10
27-Aug	SSE5	E2	SE3	ESE3	SE6	SE6	SE6	SE4	SE8	SSE11	SSE13	SSE14	S14	SW13	SW20	SW23	SW24	WSW23	W20	SW13	SSW13	SSW14	S8	SE10	SSW8.4	SW24
28-Aug	SE5	W18	W19	SW7	SSW8	WSW13	WSW17	WSW17	W19	WSW25	W27	WSW26	WSW24	W26	WSW25	W18	W16	W14	NNW3	S1	N2	NNW4	NNW3	NNW1	W13.0	W27
29-Aug	NW5	NW5	SSW2	SE2	NNW5	SSE2	SE3	SE3	SSE4	SSE7	SE10	SE9	SE9	SSE11	S10	S9	SE10	SSE12	SE17	SE16	SSE16	SSE15	SSE14	SSE17	SSE7.6	SE17
30-Aug	SE11	SSE16	SSE21	SSE15	SSE14	SSW6	SSW2	SW11	W14	WNW10	NW9	W8	W10	WSW11	W8	W7	SSE8	SSE20	SSE20	SSE12	SSE10	SE12	SSE13	SSE15	S7.4	SSE21
31-Aug	SSE14	SSE15	SSE21	SSE18	SSE19	SSE15	SE13	SSE16	SSE19	SSE18	SSE15	SW15	WSW25	WSW31	W29	W32	WSW26	WSW28	SW19	SW11	SW16	SW13	SW14	SSW6	SSW13.2	W32
	WSW2.7	WSW2.7	SW2.8	SSW2.8	SSW3.4	WSW3.7	SW2.8	SW3.6	SW3.2	WSW4.0	W4.5	W5.7	W6.2	W7.3	W8.2	W7.3	W6.9	W6.0	WSW3.8	SW3.3	SW4.5	SW4.3	WSW3.1	SW2.5	Diurnal Average	
	W21	SSE22	SSE27	W24	S27	W26	SSE27	SSE25	WNW24	W28	W27	W31	W31	WSW31	W31	W33	W29	WSW28	NW24	S21	SSE22	SSE20	WNW19	WNW21	Diurnal Maximum	

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 11 km/h on Aug 13 15:00

Minimum Value: 1 km/h on Aug 9 07:00

Percentiles: P_1 = 1 P_{10} = 2 Q_1 = 2 Median = 3 Q_3 = 5 P_{90} = 6 P_{99} = 9

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

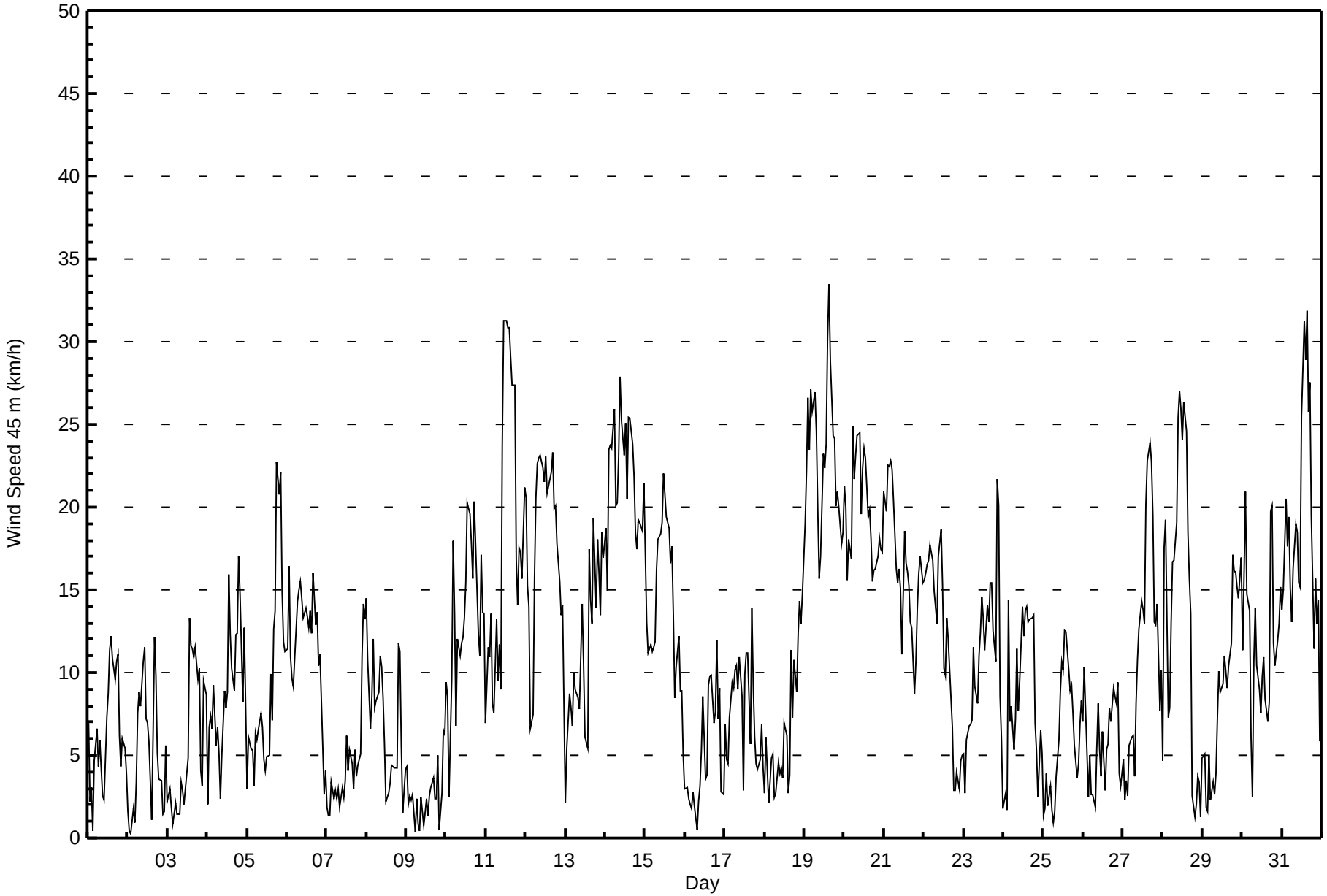
Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Aug	3	1	2	2	3	2	2	2	2	2	3	3	3	5	4	3	3	3	3	4	3	2	2	2	5
2-Aug	2	1	1	1	1	2	2	2	3	4	3	3	3	3	3	3	9	4	6	3	1	2	1	1	9
3-Aug	1	1	2	1	1	1	1	1	1	2	1	2	3	4	5	5	4	3	3	3	2	2	2	2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

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed 45 m (WS45m) - km/h

Lower Camp Met Tower - August 2015



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	204	27.42	27.42
6 - 11	216	29.03	56.45
12 - 19	216	29.03	85.48
20 - 28	97	13.04	98.52
29 - 38	11	1.48	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 744

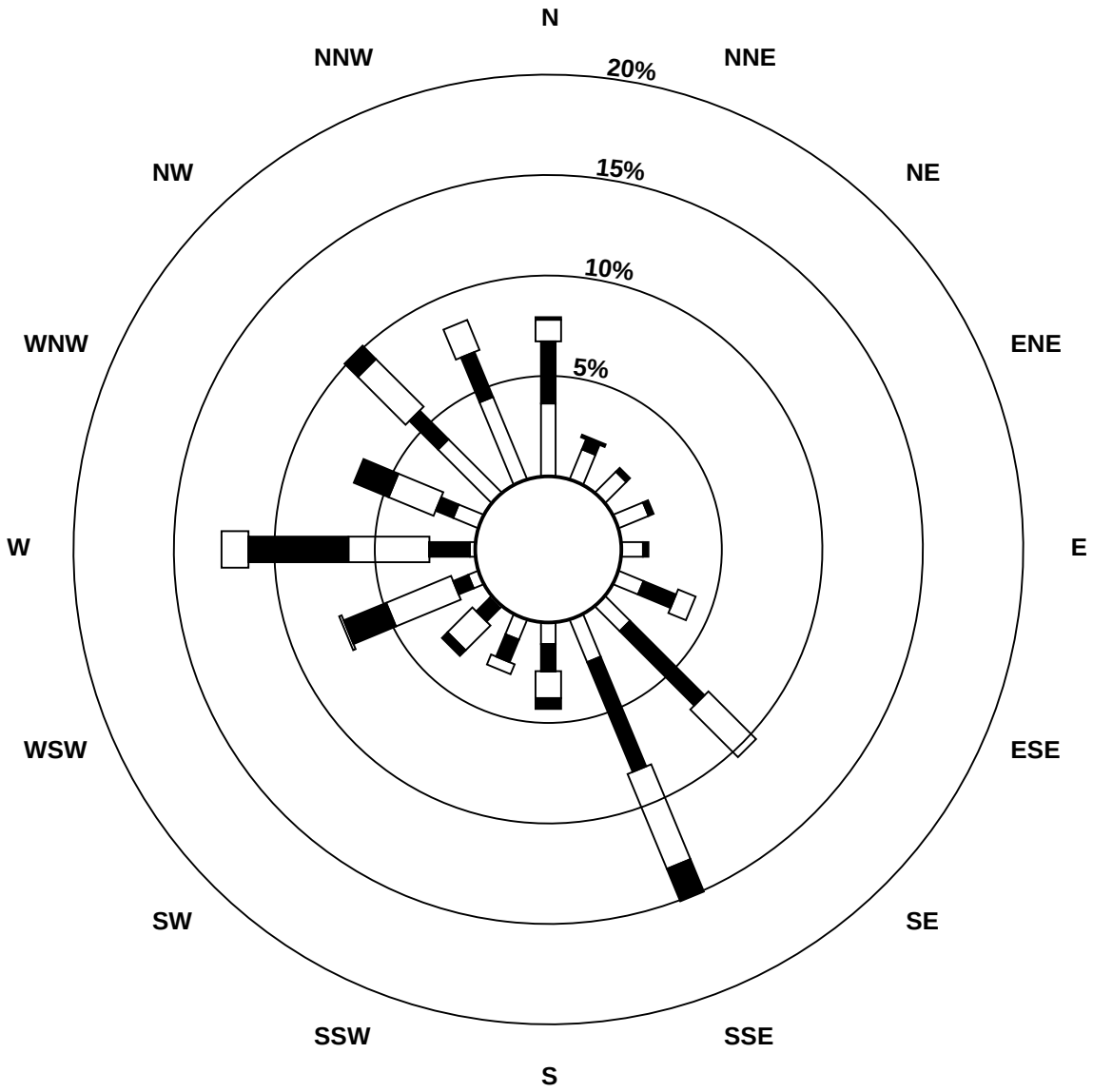
Total Number of Hours: 744

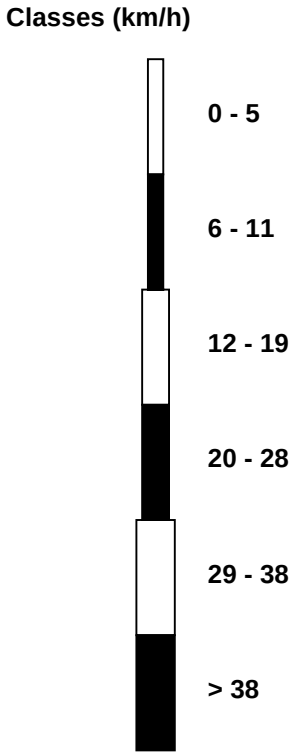
Wood Buffalo Environmental Association

Wind Rose Aug 2015

Wind Speed 45 m (WS45m) - km/h

Lower Camp Met Tower (AMS 3)





Total Number of Valid Hours: 744

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed 100 m (WS100m) - km/h

Lower Camp Met Tower - August 2015

Maximum Speed: 42 km/h on Aug 19 16:00

Maximum Daily Speed Average: 28.8 km/h on Aug 14

Minimum Speed Value: 0 km/h on Aug 9 08:00

Minimum Daily Speed Average: 3.2 km/h on Aug 9

Maximum Diurnal Speed Average: 9.5 km/h at hour 15

Minimum Diurnal Speed Average: 3.7 km/h at hour 3

Monthly Average Velocity: 5.6 km/h 236.0 deg

Percentiles: P_1 = 1 P_{10} = 5 Q_1 = 8 Median = 14 Q_3 = 23 P_{90} = 28 P_{99} = 36

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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	N13	NNW1	NW4	WSW1	NNW5	N10	N7	N8	NNW6	NW5	NW3	NNW9	NW11	NNW16	NNW18	NNW13	NW12	NW14	NNW15	NNE12	N4	NNE8	NW8	NW6	NNW8.2	NNW18
2-Aug	NW6	NNE3	NNE3	SSE5	SSE4	SSE6	SSE5	SE12	SE11	SE14	SE15	SE8	SE9	SE8	SSE2	ESE8	NW15	N19	ENE19	ESE2	W7	NNW7	E5	N4	E3.5	N19
3-Aug	ENE5	N2	NNW6	ESE2	SE3	SE4	SE7	SE4	NNE2	N3	NNW2	NW3	SE8	SSE15	SE17	ENE20	E18	ESE16	ESE18	ESE19	ESE15	SE10	SE14	SE15	ESE7.4	ENE20
4-Aug	SE9	ESE7	E10	E11	ESE17	ESE12	E6	ESE6	ESE6	E9	NNE12	ENE13	E14	ESE23	ESE19	ESE17	ESE17	SE21	ESE22	SE28	SE26	SE18	SE20	ESE15	ESE13.8	SE28
5-Aug	ESE10	NNE5	ENE10	ENE8	NE6	NE11	ENE13	ESE12	ESE13	SE10	SSE5	WSW4	WNW6	S6	SE14	SE12	SE19	SE23	SSE34	SSE28	SSE32	SE27	SE23	SE21	SE12.1	SSE34
6-Aug	SE22	SE27	ESE20	ESE18	ESE16	SE18	SE22	SE22	SE22	ESE20	SE21	ESE20	ESE19	ESE18	ESE19	SE19	ESE22	ESE19	ESE20	ESE17	ESE19	SE17	ESE11	E11	ESE19.1	SE27
7-Aug	ESE10	ESE7	E3	ENE4	E7	E9	E4	N2	N2	NNW4	SW2	SSE3	ESE6	SE4	SE6	ESE6	SE4	E8	E6	ESE9	SE12	SSE17	SSE18	SE24	ESE6.1	SE24
8-Aug	SE25	SE18	SE13	SE14	SE17	SE12	SE11	SE12	SE13	SE13	SE11	ESE7	SSE2	NE2	NE2	NNE4	SSW7	SSW5	SSE2	ESE19	SE21	SE13	SE5	E4	SE9.6	SE25
9-Aug	ENE7	ENE6	E5	ESE4	N2	NNW1	NE1	NNE0	ENE1	SSW1	NW1	N1	WSW1	NNW1	WNW3	NE3	ENE5	ESE5	SE4	ENE9	ESE7	SE7	SE16	SE18	ESE3.2	SE18
10-Aug	SW14	NW14	NE3	SSW14	WSW28	W20	W9	WSW14	SW12	WSW13	WSW15	WSW15	WSW19	WSW23	WSW24	WSW20	WSW19	WSW23	SW21	SW21	SW24	SW33	SW30	SW27	WSW17.4	SW33
11-Aug	SW14	S8	S10	SSE10	S7	SW8	SSE12	SSE8	SSE11	SW12	WSW29	WSW39	WSW38	WSW36	WSW39	WSW36	WSW35	WSW35	W22	SW19	SW25	WSW25	W24	WSW29	WSW19.7	WSW39
12-Aug	WSW27	WSW21	WSW20	SW8	SW12	WSW22	WSW28	W31	WSW28	WSW25	WSW25	WSW25	WSW25	WSW22	WSW22	WSW23	WSW25	WSW25	W28	WSW23	WSW21	WSW22	W23	WSW16	WSW22.6	W31
13-Aug	WSW5	SW8	S6	S5	SSW10	S8	SSW7	SSW8	S7	SSE11	SSE13	SE11	SE5	WNW10	W26	WSW20	SW20	SW23	WSW19	SW27	SW25	SW25	SW30	WSW26	SW12.4	SW30
14-Aug	W28	W23	WSW32	W35	W33	W35	W27	W28	W30	W36	W32	W29	W33	W25	W34	WNW34	WNW32	WNW29	NW26	WNW26	WNW28	WNW26	WNW24	WNW29	W28.8	W36
15-Aug	WNW25	NW20	NW18	NW19	NW18	NNW18	NNW18	NNW23	N25	N25	N27	N30	N29	N28	N26	N25	N24	N20	N15	NNW16	NNW20	NNW15	NNW17	N8	NNW20.0	N30
16-Aug	NNW7	NW6	NNW5	NW7	NW8	NW8	NW4	WSW2	E2	E3	NNW5	NW12	N4	NNW5	WNW12	NW13	W13	NW10	WNW10	W18	W15	W17	W12	WSW9	WNW7.2	W18
17-Aug	SW7	SW5	SW8	SW7	S7	S8	SSE12	SSE11	SSE12	SE11	SE10	SSW5	WSW11	WSW13	WSW14	WSW7	WSW16	WNW12	NNW7	NE5	ESE7	SSE9	SSE7	SSW5	SSW5.4	WSW16
18-Aug	WSW2	NNW10	NNW12	NNW9	NNW11	WNW10	WNW7	NW6	NNW5	NW5	NW4	WNW5	W8	W6	WNW4	WSW5	S12	S8	SSE11	SSW10	S17	S22	SSW17	S20	SW3.8	S22
19-Aug	S22	SSE26	SSE32	S27	SSE32	SSE34	SSE32	SSE28	S22	SSW17	WSW21	WSW27	WSW25	WSW27	WSW37	WSW42	WSW35	W32	WNW33	WNW28	W29	W28	W24	WSW23	SW18.7	WSW42
20-Aug	W29	W28	W22	W25	WSW21	W34	W30	W31	W33	WNW33	WNW27	WNW30	WNW32	WNW31	WNW26	WNW27	WNW26	WNW22	NW24	WNW23	WNW23	WNW27	WNW26	W25	WNW26.5	W34
21-Aug	W29	W28	W32	W32	W32	W29	W26	W21	WNW21	WNW21	NW20	NW15	NW26	NW24	NNW23	NW21	NW20	NW23	NW18	NW18	NW23	WNW26	WNW26	WNW24	WNW22.2	W32
22-Aug	WNW23	WNW23	WNW23	W23	W26	W25	W22	W19	W19	WNW22	WNW24	WNW19	NNW15	NW14	NW18	NNW17	N13	N9	N5	E6	SE12	SSE8	SSE11	SSE13	WNW11.9	W26
23-Aug	SSE11	SSE8	SSE10	SSE10	SSE13	SSE12	SSE17	SSE12	SE13	SSE13	SE17	SSE18	S15	S13	SSE18	SSE16	SSE18	SSE18	SSE17	SE25	SSE28	SSE28	NNW13	NNE10	SSE13.7	SSE28
24-Aug	ENE8	WNW4	NNW5	SE23	SSE11	SSW12	SSW8	SSE10	SSE13	SSW9	WSW11	WSW15	W15	W17	W16	WSW15	WSW14	WSW14	WSW15	WSW14	W15	WNW8	NNW13	NNW18	WSW7.3	SE23
25-Aug	N13	NNW8	NNW10	NW6	NW5	NNW4	NNW3	NW3	NNW4	NNW7	NW10	NNW12	N13	NNW18	N20	N14	N15	NNW15	NNW13	N11	NNE7	NNW10	NNW15	N14	NNW10.2	N20
26-Aug	N12	N18	N9	NNE6	N10	NNE7	NNE5	NE3	NNW6	NW9	NW5	N4	NNE7	NW4	WSW6	WSW7	WSW9	WSW9	SW11	SW13	SW14	WSW13	SW10	SW5	WNW4.1	N18
27-Aug	S5	SSW4	SSE6	SSE5	SSE6	S5	SSE10	SE5	SE13	SE13	SE17	SSE17	SSE16	SW15	SW23	SW28	SW29	WSW29	WSW25	SW23	SSW28	SW30	SSW13	SSW8	SSW12.9	SW30
28-Aug	WSW10	WSW27	WSW28	WSW16	WSW19	WSW21	WSW23	WSW21	WSW24	WSW27	WSW30	WSW28	WSW26	WSW31	WSW26	WSW21	WSW20	W20	WNW7	ENE4	E7	NNE4	N10	NNE8	WSW16.8	WSW31
29-Aug	NNW12	NW11	SSE2	SSE6	W7	WSW3	SW6	SSW3	SSE5	SE9	SE13	SE11	SE11	SE13	SSE12	SSE11	SE14	SE21	SE29	SE27	SE28	SE25	SE24	SE27	SE10.8	SE29
30-Aug	SE22	SE26	SE32	SE28	SE26	S10	SSW6	SW12	WSW16	W12	NW11	W9	WSW11	WSW12	W10	W9	SSE9	SSE26	SE31	SE20	SSE11	S8	SSE11	SSE17	SSE10.6	SE32
31-Aug	SE19	SE20	SSE22	SSE20	SSE19	SE19	SE16	SSE17	SSE20	SE23	SSE18	SW18	WSW29	SW34	WSW34	WSW36	WSW29	WSW30	SW26	SW24	WSW28	WSW23	WSW23	SW15	SSW17.1	WSW36
	SW3.9	WSW4.2	SW3.7	SSW5.0	SW5.6	SW5.4	SW4.8	SW5.1	SW4.5	SW4.6	WSW5.3	WSW6.7	W7.1	W8.3	W9.5	W8.1	WSW7.9	WSW7.1	SW4.7	SSW4.9	SSW7.4	SW7.9	SW6.1	SW5.3	Diurnal Average	
	W29	W28	SE32	W35	W33	W35	SSE32	W31	W33	W36	W32	WSW39	WSW38	WSW36	WSW39	WSW42	WSW35	WSW35	SSE34	SSE28	SSE32	SW33	SW30	WSW29	Diurnal Maximum	

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

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Speed 100 m (WS100m) - km/h

Lower Camp Met Tower - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 12 km/h on Aug 13 15:00

Minimum Value: 1 km/h on Aug 3 04:00

Percentiles: P_1 = 1 P_{10} = 2 Q_1 = 2 Median = 3 Q_3 = 5 P_{90} = 6 P_{99} = 10

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

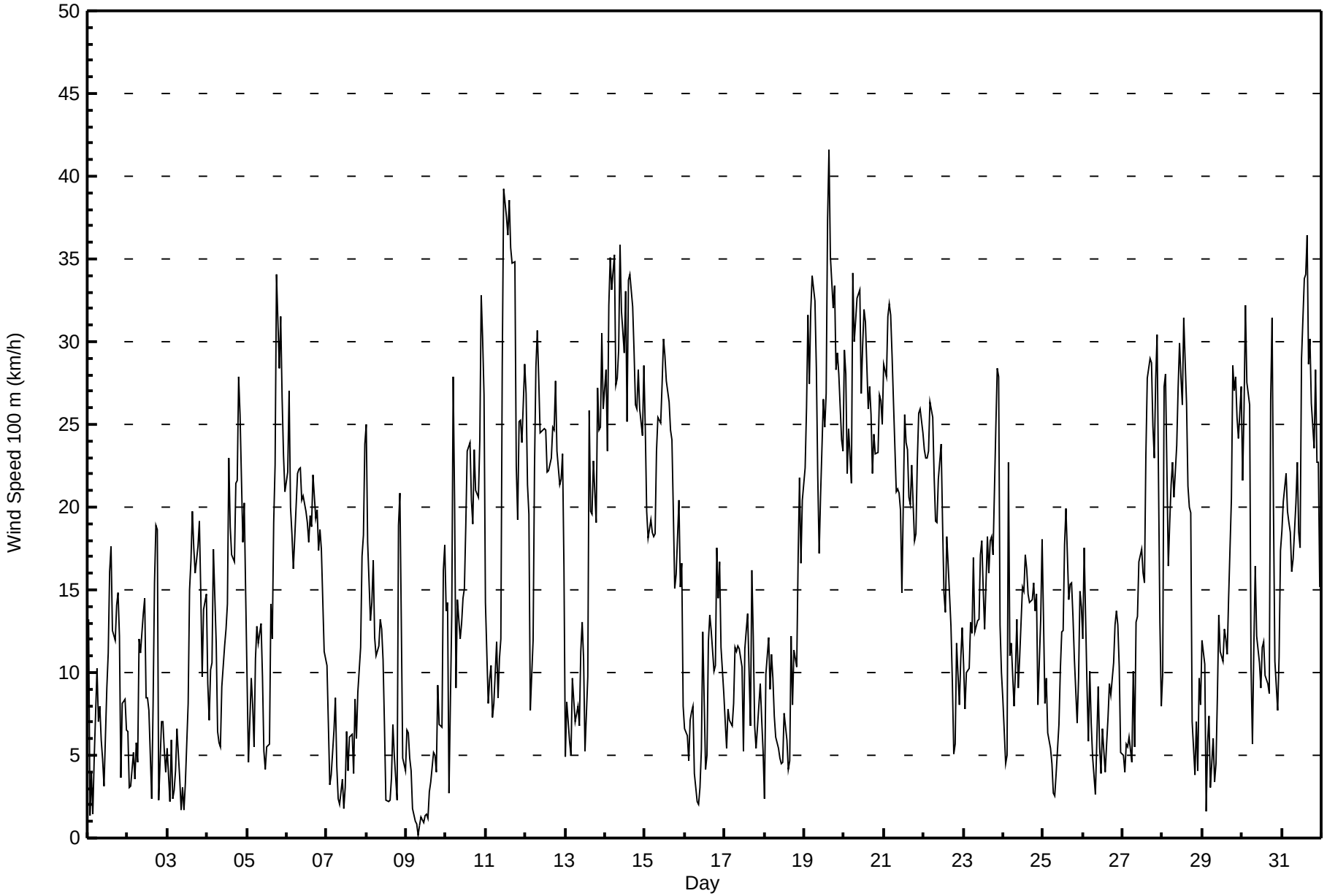
Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Aug	4	2	2	1	5	1	3	2	1	2	4	3	4	5	4	3	4	3	2	5	2	2	2	2	5
2-Aug	2	1	1	2	1	2	2	2	2	2	3	3	3	3	4	4	11	3	11	3	2	3	2	2	11
3-Aug	2	1	2	1	1	2	2	2	1	2	1	2	4	4	4	5	3	2	3	2	3	3	3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

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed 100 m (WS100m) - km/h

Lower Camp Met Tower - August 2015



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	112	15.05	15.05
6 - 11	177	23.79	38.84
12 - 19	196	26.34	65.19
20 - 28	190	25.54	90.73
29 - 38	66	8.87	99.60
> 38	3	0.40	100.00

Total Number of Valid Hours: 744

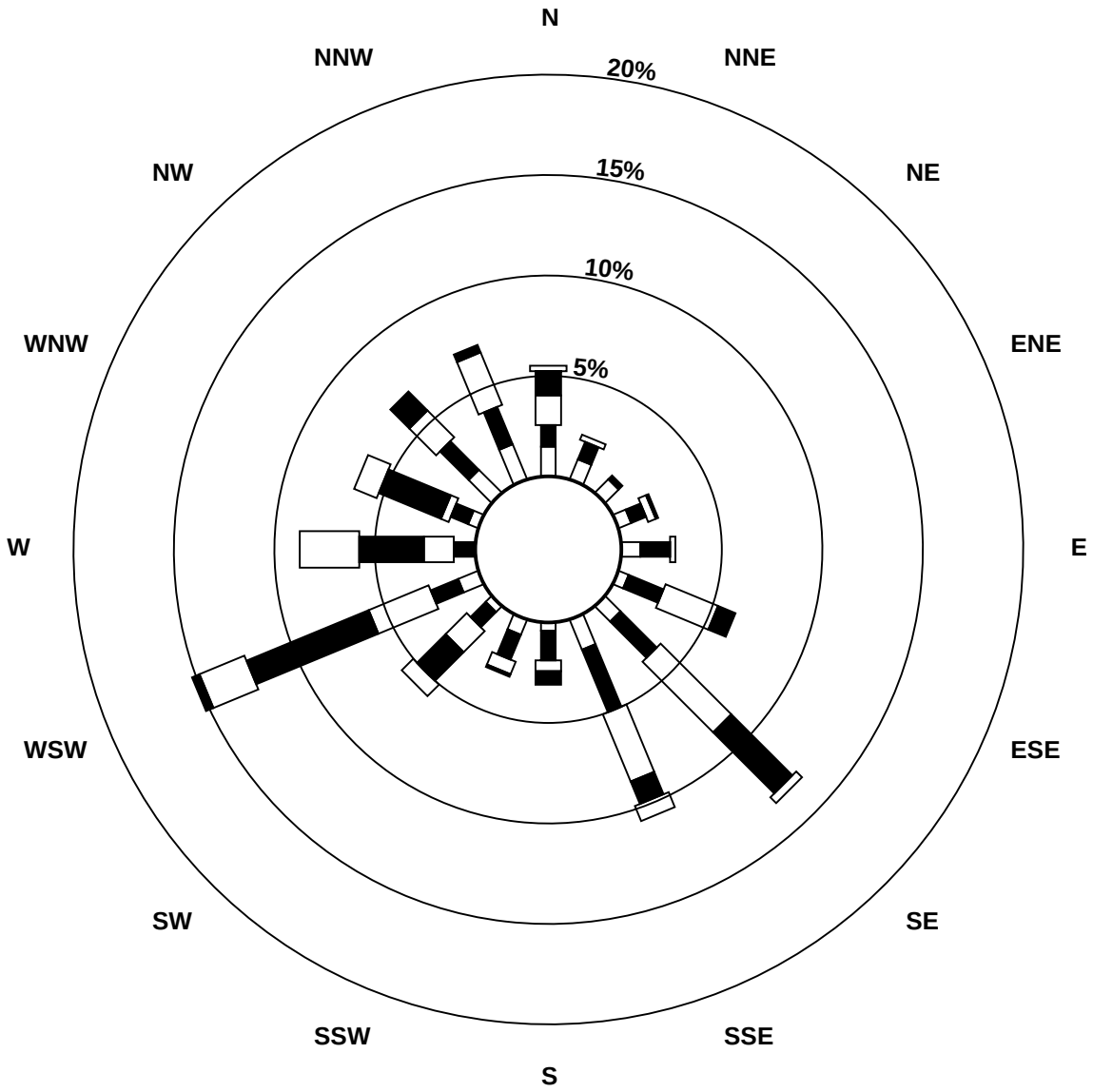
Total Number of Hours: 744

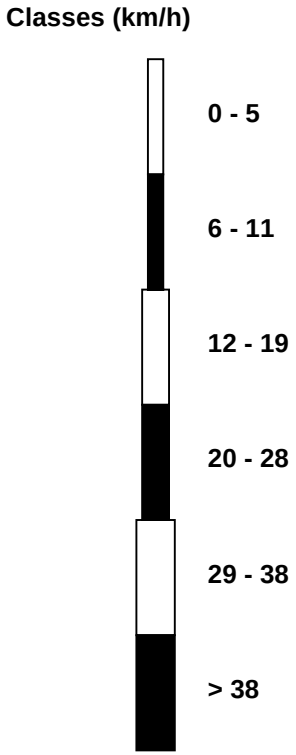
Wood Buffalo Environmental Association

Wind Rose Aug 2015

Wind Speed 100 m (WS100m) - km/h

Lower Camp Met Tower (AMS 3)





Total Number of Valid Hours: 744

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed 167 m (WS167m) - km/h

Lower Camp Met Tower - August 2015

Maximum Speed: 47 km/h on Aug 19 16:00

Maximum Daily Speed Average: 32.8 km/h on Aug 14

Minimum Speed Value: 0 km/h on Aug 7 08:00

Minimum Daily Speed Average: 2.5 km/h on Aug 2

Maximum Diurnal Speed Average: 10.9 km/h at hour 15

Minimum Diurnal Speed Average: 5.0 km/h at hour 3

Monthly Average Velocity: 7.4 km/h 243.1 deg

Percentiles: $P_1 = 1$ $P_{10} = 5$ $Q_1 = 10$ Median = 16 $Q_3 = 27$ $P_{90} = 33$ $P_{99} = 42$

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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	N18	NE7	WNW2	SW1	NW6	N15	N11	N13	NNW10	NW10	NW5	NNW10	NW12	NNW17	NNW19	NNW14	NW13	NW15	NNW16	NE18	NNE3	NNE8	NW8	NNW7	NNW9.7	NNW19
2-Aug	NNW4	WNW3	N1	SSW2	SW6	SW6	SSW5	SSE7	SSE11	SSE12	SE13	SE8	SE8	SE7	SSE3	ESE8	NNW15	NNE21	E27	ESE9	W13	NW7	NE3	NNE4	ESE2.5	E27
3-Aug	NE8	NNE6	NNE2	SE3	SSE6	SSE4	SSE6	SE6	E2	NE3	ENE2	NW3	SE9	S16	SE17	ENE21	E18	ESE16	ESE22	ESE21	ESE21	SE19	SE19	SE19	ESE9.3	ESE22
4-Aug	SE19	SE13	ESE14	ESE16	ESE20	ESE16	ESE10	ESE9	SE10	E12	NE12	E16	ESE16	ESE24	ESE22	ESE22	ESE22	SE26	ESE26	SE32	SE29	SE21	SE23	ESE20	ESE17.9	SE32
5-Aug	SE17	E6	E11	ESE11	E11	E16	E16	ESE14	ESE16	SE11	SSE5	W4	NW5	SSE8	SE15	SE13	SE20	SE24	SSE36	SSE30	SSE32	SE33	SE28	SE26	SE15.3	SSE36
6-Aug	SE27	SE32	ESE27	ESE25	ESE21	SE22	SE26	SE26	SE24	ESE22	SE22	SE22	ESE20	ESE19	ESE20	SE19	ESE23	ESE21	ESE21	SE20	SE21	SE20	ESE16	ESE14	ESE21.9	SE32
7-Aug	ESE16	ESE11	ESE5	ESE5	E5	ESE10	SE5	WSW0	NW2	NW4	SW2	SSE2	ESE5	SE3	SE5	ESE6	SE4	E9	ESE6	SE8	SE13	SSE19	SSE18	SE26	SE6.9	SE26
8-Aug	SE27	SSE18	SE15	SSE17	SSE17	SSE13	SSE11	SE11	SSE12	SE12	SE10	ESE7	S2	NNE1	NE1	NNW2	SSW9	SW6	SW2	ESE21	SE25	SE17	SSE7	SE2	SE10.1	SE27
9-Aug	E5	E10	ESE10	SE11	SE6	SSE3	S2	SW2	SSE0	SW1	WNW2	NNW1	W0	N1	WNW3	NE2	ENE6	ESE6	SE4	ENE10	ESE8	SE10	SE23	SE23	SE4.8	SE23
10-Aug	SW19	NW20	NNE6	SSW10	SW32	W28	W13	WSW17	SW14	WSW14	WSW17	WSW16	WSW22	WSW27	WSW27	WSW24	WSW22	WSW28	SW25	SW28	SW32	SW40	SW39	SW38	WSW21.4	SW40
11-Aug	WSW24	SW13	SW14	SSW11	SW8	WSW15	SSW9	SSW10	SSW10	SW16	WSW33	WSW45	WSW45	WSW42	WSW44	WSW41	WSW41	WSW40	W27	WSW27	WSW33	WSW37	W31	WSW38	WSW26.3	WSW45
12-Aug	W37	WSW31	WSW27	WSW16	WSW20	WSW30	W36	W35	WSW32	WSW28	WSW28	WSW28	WSW28	WSW25	WSW25	WSW26	WSW28	WSW27	W30	WSW30	W30	W31	W28	W23	WSW28.1	W37
13-Aug	WSW14	WSW19	WSW9	SW8	SW13	SW12	SW11	SW13	SSW8	S9	S9	S7	SSW5	WNW14	W31	WSW26	SW27	SW29	WSW27	WSW36	WSW31	WSW34	WSW42	WSW37	WSW18.4	WSW42
14-Aug	W36	W27	W36	W40	W39	W41	W33	W32	W32	W39	W35	W32	W36	W29	W37	WNW38	WNW36	WNW32	NW29	WNW31	WNW33	WNW29	WNW27	WNW32	W32.8	W41
15-Aug	WNW28	NW24	NW23	NW23	NNW22	N20	NNW21	NNW27	N27	N26	N29	N31	N30	N29	N28	N27	N26	N21	N19	NNW18	NNW23	N17	NNW20	N14	NNW22.6	N31
16-Aug	N9	NNW9	NNW10	NNW8	NW10	NW10	W7	WSW5	S1	ENE1	NW7	NW15	NNW5	NW7	WNW12	NW14	W14	NW11	WNW13	WNW20	WNW18	W18	W20	W21	WNW9.8	W21
17-Aug	W15	WSW10	WSW14	WSW12	SW10	SSW11	SSW10	SSW9	S8	S8	SSE8	SSW7	WSW13	WSW14	WSW15	WSW7	WSW17	W13	NW8	NE3	ESE6	S8	S7	SSW8	SW7.8	WSW17
18-Aug	WSW6	NNW11	NNE17	N17	N14	NNW14	NNW13	NNW8	NNW7	NW5	NW5	WNW5	W7	W6	WNW4	WSW6	S14	S9	S12	SSW13	S19	SSW26	SSW32	SSW29	WSW4.6	SSW32
19-Aug	SSW28	S30	S35	S36	S39	SSE37	SSE35	SSE30	S24	SSW21	WSW23	WSW30	WSW28	WSW31	WSW42	WSW47	WSW41	W38	WNW38	WNW33	W34	W32	W29	W28	SW23.8	WSW47
20-Aug	W34	W33	W27	W29	W27	W38	W37	W35	W37	WNW37	WNW30	WNW34	WNW34	WNW36	WNW29	WNW30	WNW29	WNW25	NW28	WNW26	WNW27	WNW31	WNW29	WNW26	WNW30.5	W38
21-Aug	W28	W28	WNW30	W31	W31	W31	W27	W22	WNW23	NW23	NW21	NW17	NW27	NW26	NNW28	NW23	NW22	NW26	NW25	NW22	NW28	NW31	NW32	WNW29	WNW25.1	NW32
22-Aug	WNW28	WNW26	WNW26	W25	WNW27	WNW25	WNW25	WNW21	W21	WNW24	WNW25	WNW20	NNW16	NW15	NW21	NNW18	NNW14	N11	N6	ENE4	SE8	S12	S13	S12	WNW14.1	WNW28
23-Aug	S11	S10	S12	SSE13	SSE15	SSE16	SSE16	SSE17	SSE14	SSE13	SSE15	SSE18	S17	S13	SSE18	SSE17	SSE19	S21	SSE22	SE30	SSE31	SSE30	NNW16	NNE10	SSE15.1	SSE31
24-Aug	E13	W6	WNW8	SSE21	S14	SSW15	SSW13	S11	S12	SW10	WSW12	WSW17	W17	W19	W19	WSW17	WSW16	WSW16	WSW19	W19	WNW18	WNW13	NNW16	NNE19	WSW8.8	SSE21
25-Aug	NE12	NE4	NNE5	N4	NW7	N6	NNE4	W1	NNW4	N8	NNW11	NNW13	N13	NNW18	N21	N16	N16	N16	N15	NNE14	NE14	N10	N19	NNE18	N10.4	N21
26-Aug	NNE16	N21	N13	NE10	NNE15	NE12	ENE9	ENE9	N6	NNW10	NW6	N4	N6	NW5	WSW6	WSW8	WSW11	WSW10	SW12	WSW15	WSW15	W20	W14	WSW10	NW4.5	N21
27-Aug	SW5	WSW7	SW5	SSW4	SSW7	SSW7	S6	S7	SSE11	SSE10	SSE14	SSE16	S16	SW18	SW26	SW31	SW31	WSW33	WSW31	WSW30	SW40	SW45	SW26	WSW16	SW16.6	SW45
28-Aug	WSW22	WSW39	WSW38	WSW28	WSW29	WSW31	WSW33	WSW28	WSW32	WSW33	WSW35	WSW32	WSW30	WSW36	WSW29	WSW25	WSW24	W23	WNW11	NNE3	NE6	NNE9	NNW15	NNE17	WSW22.2	WSW39
29-Aug	N17	NNW14	E2	SSE7	WSW5	W6	SW9	SW8	S6	SE8	SE12	SE11	SE10	SE12	SSE13	SSE12	SE15	SE22	SE32	SE34	SE35	SE30	SE29	SE31	SE12.0	SE35
30-Aug	SE28	SE31	SE35	SE33	SSE32	S16	S9	SW13	W19	W14	NW12	W10	W13	WSW13	WSW11	W10	S7	SSE28	SE37	SSE20	SSW15	SW14	SSW13	S12	S12.0	SE37
31-Aug	S14	S15	S16	S13	S11	SSE17	S13	SSW13	S13	SSE17	S17	SW20	WSW34	WSW38	WSW39	WSW42	WSW33	WSW35	SW29	SW28	WSW37	WSW29	WSW37	WSW26	SW21.2	WSW42
	WSW5.8	WSW5.9	WSW5.0	SSW5.8	SW7.1	WSW7.2	SW6.8	SW6.8	SW6.1	WSW6.0	WSW7.1	W8.1	W8.8	W9.9	W10.9	W9.5	WSW9.4	WSW8.4	SW6.1	SW6.4	SW9.2	SW10.3	WSW9.4	SW7.6	Diurnal Average	
	W37	WSW39	WSW38	W40	S39	W41	W37	W35	W37	W39	W35	WSW45	WSW45	WSW42	WSW44	WSW47	WSW41	WSW40	WNW38	WSW36	SW40	SW45	WSW42	WSW38	Diurnal Maximum	

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 13 km/h on Aug 2 17:00

Minimum Value: 1 km/h on Aug 2 23:00

Percentiles: P_1 = 1 P_{10} = 2 Q_1 = 2 Median = 3 Q_3 = 4 P_{90} = 5 P_{99} = 9

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

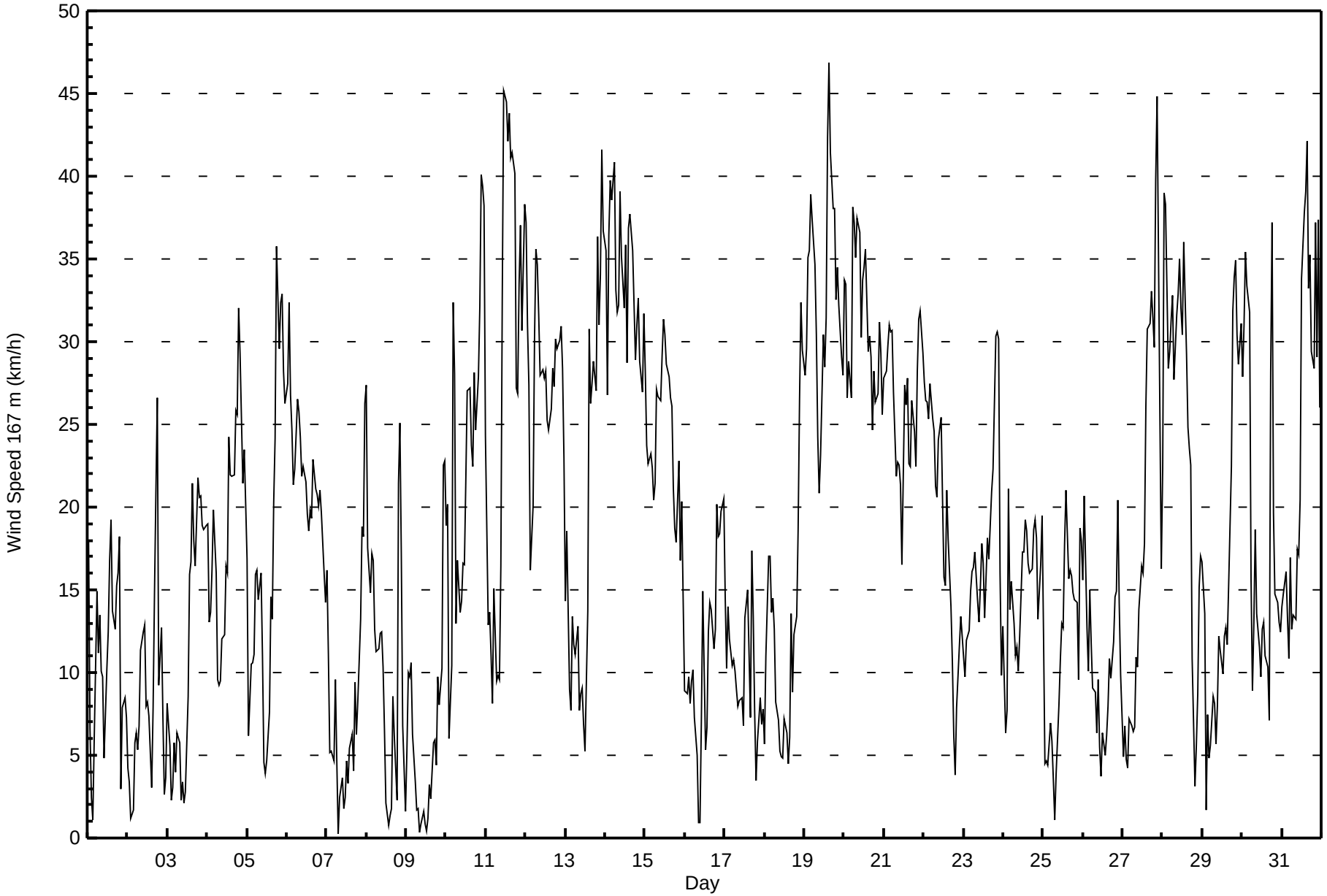
Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Aug	2	5	2	1	5	2	3	2	2	3	4	3	4	5	4	2	3	3	2	3	2	2	2	2	5
2-Aug	1	1	1	1	2	2	2	3	2	2	2	3	3	3	4	3	13	3	5	5	1	3	1	1	13
3-Aug	1	1	1	1	2	2	2	2	1	2	2	2	3	4	4	5	4	3	2	2	1	3	3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

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed 167 m (WS167m) - km/h

Lower Camp Met Tower - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Wind Speed 167 m (WS167m) - km/h

Lower Camp Met Tower - August 2015

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	79	10.62	10.62
6 - 11	154	20.70	31.32
12 - 19	198	26.61	57.93
20 - 28	159	21.37	79.30
29 - 38	131	17.61	96.91
> 38	23	3.09	100.00

Total Number of Valid Hours: 744

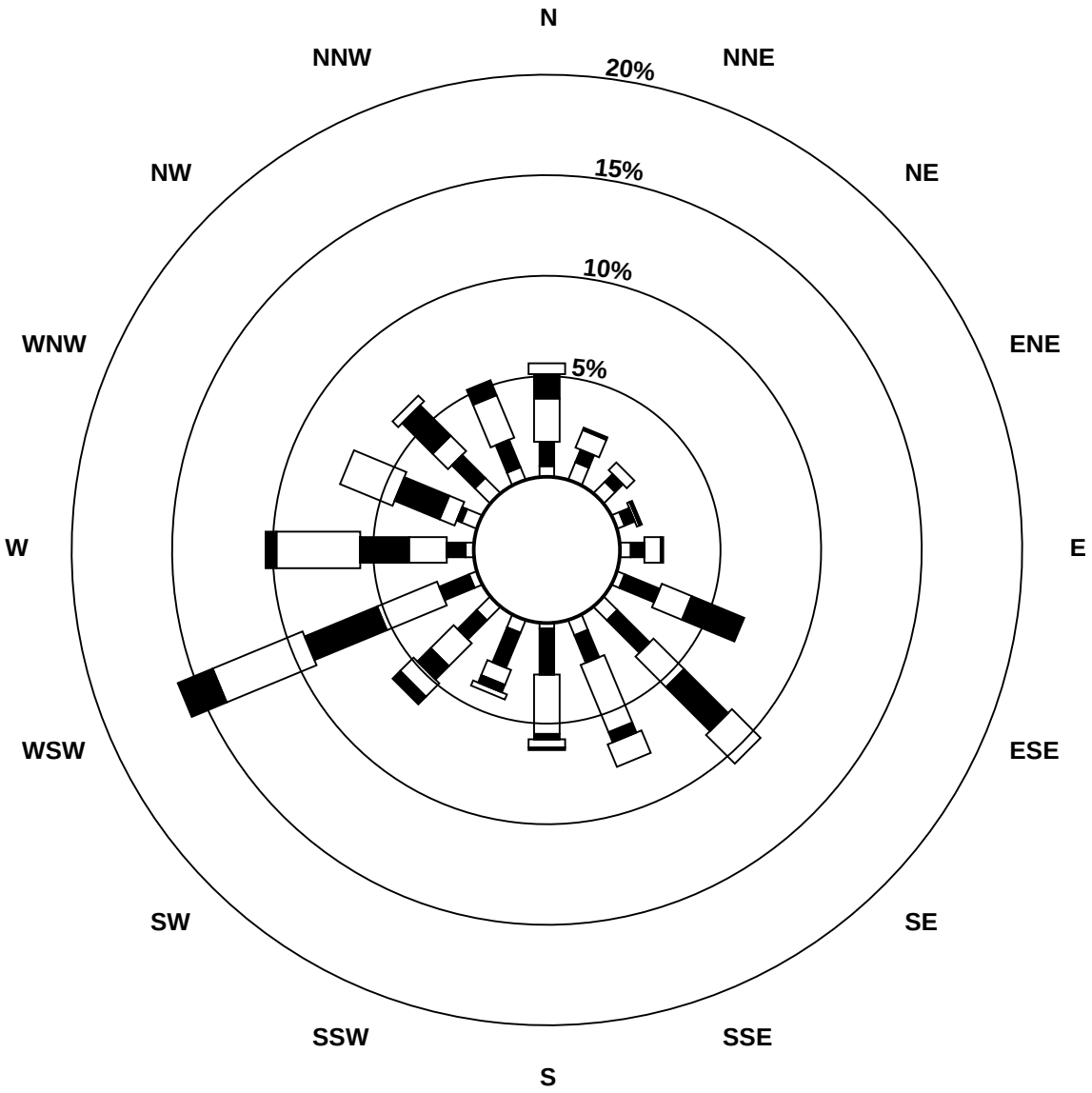
Total Number of Hours: 744

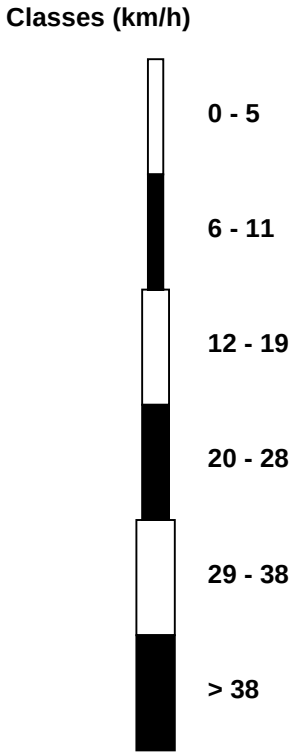
Wood Buffalo Environmental Association

Wind Rose Aug 2015

Wind Speed 167 m (WS167m) - km/h

Lower Camp Met Tower (AMS 3)





Total Number of Valid Hours: 744

Direction of Maximum Speed: 169 deg on Aug 19 05:00
Direction of Maximum Daily Speed Average: 287.9 deg on Aug 14

Direction of Minimum Speed: 27 deg on Aug 25 07:00

Direction of Minimum Daily Speed Average: 0.6 deg on Aug 9

Monthly Average Direction: 283.9 deg

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
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average
1-Aug	339	282	336	343	329	324	323	322	308	318	350	339	327	351	346	341	324	318	335	357	341	358	340	336	334.2
2-Aug	331	355	65	61	43	126	142	145	156	153	127	139	139	141	189	133	325	12	62	338	352	283	88	352	120.4
3-Aug	330	345	353	47	322	322	334	319	339	338	296	291	153	178	149	74	94	112	120	95	84	139	142	128	117.6
4-Aug	16	354	2	9	106	37	358	347	84	68	8	49	103	135	132	127	114	121	120	139	148	118	118	102	99.1
5-Aug	55	349	16	27	8	13	31	64	110	143	169	254	285	208	153	140	143	145	162	170	161	141	126	130	144.6
6-Aug	125	132	127	113	119	135	130	130	136	127	144	126	131	116	122	139	122	124	126	126	115	119	355	50	126.3
7-Aug	45	19	44	6	69	103	59	330	346	346	201	167	130	168	148	131	175	100	34	59	122	153	153	150	133.6
8-Aug	156	166	157	159	165	156	160	159	158	162	137	125	189	24	63	32	198	198	140	126	150	109	64	357	150.4
9-Aug	9	49	38	22	348	287	305	315	81	212	187	29	241	3	292	58	76	105	104	17	304	356	141	113	28.9
10-Aug	212	322	150	219	250	290	273	260	247	248	265	271	273	263	265	259	265	253	239	221	202	225	214	227	249.4
11-Aug	205	153	158	160	164	162	145	152	148	217	266	269	261	262	266	266	267	269	272	237	236	244	279	264	242.9
12-Aug	257	258	258	162	188	263	272	276	268	259	259	264	257	258	256	255	257	266	273	260	242	259	257	247	258.6
13-Aug	168	151	145	148	145	151	156	170	167	148	159	149	131	324	281	250	232	239	249	233	231	237	243	253	207.3
14-Aug	281	278	270	275	275	274	278	277	277	274	276	278	283	284	286	300	312	306	320	316	313	300	296	300	287.9
15-Aug	307	314	317	317	327	344	341	346	353	352	357	2	13	6	356	352	350	349	351	323	331	334	352	353	345.5
16-Aug	306	326	358	356	351	326	1	69	80	110	1	334	37	15	295	325	276	315	301	297	276	270	307	162	316.6
17-Aug	152	155	164	153	146	136	134	149	151	154	150	223	263	258	259	279	261	295	8	47	111	171	137	146	176.4
18-Aug	357	339	315	324	324	332	338	353	358	344	323	266	289	297	311	251	190	176	169	195	175	180	177	173	210.7
19-Aug	167	166	165	168	169	169	167	168	173	199	251	262	258	261	268	268	263	288	304	307	287	285	279	268	224.6
20-Aug	273	277	296	279	261	276	287	283	288	302	303	301	306	310	310	310	309	314	318	307	295	306	305	283	295.8
21-Aug	270	275	276	278	276	274	277	281	312	313	320	323	324	331	341	315	326	332	323	320	316	313	311	308	302.0
22-Aug	306	298	297	280	287	282	289	286	285	298	303	303	351	322	328	351	353	7	2	109	168	136	156	143	304.2
23-Aug	113	106	133	129	147	155	151	151	143	161	150	165	183	182	164	161	169	172	171	167	159	161	331	8	160.4
24-Aug	86	350	124	150	173	211	205	169	156	202	267	257	278	272	268	259	255	255	248	282	313	300	331	347	242.0
25-Aug	247	293	346	314	345	323	27	311	355	355	330	344	356	341	348	357	343	335	349	345	315	331	352	351	343.1
26-Aug	348	346	333	349	348	317	349	292	350	324	311	29	30	327	272	259	263	260	231	220	243	254	181	147	294.5
27-Aug	162	96	145	115	135	133	130	143	144	149	148	159	170	223	231	223	228	250	259	230	200	208	170	137	197.1
28-Aug	146	270	264	231	204	243	257	243	261	258	261	258	257	262	256	264	266	276	327	170	8	335	344	343	258.7
29-Aug	312	324	197	137	331	156	139	146	164	147	142	136	145	147	171	171	146	149	145	138	147	154	155	150	150.3
30-Aug	133	154	156	148	148	201	195	233	262	284	313	263	260	250	265	280	152	161	153	158	159	138	152	153	178.4
31-Aug	156	157	160	161	164	158	144	151	152	154	154	222	255	247	262	259	253	253	231	214	233	230	236	202	205.7
	233.8	242.5	214.4	196.8	206.4	228.7	215.5	222.6	216.7	232.9	256.4	265.2	268.6	264.4	267.7	269.5	257.9	258.3	240.3	227.1	213.3	223.0	231.4	218.7	
	Diurnal Average																								

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 106 deg on Aug 2 15:00

Minimum Value: 8 deg on Aug 31 05:00

Percentiles: P_1 = 9 P_{10} = 16 Q_1 = 20 Median = 24 Q_3 = 41 P_{90} = 66 P_{99} = 96

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

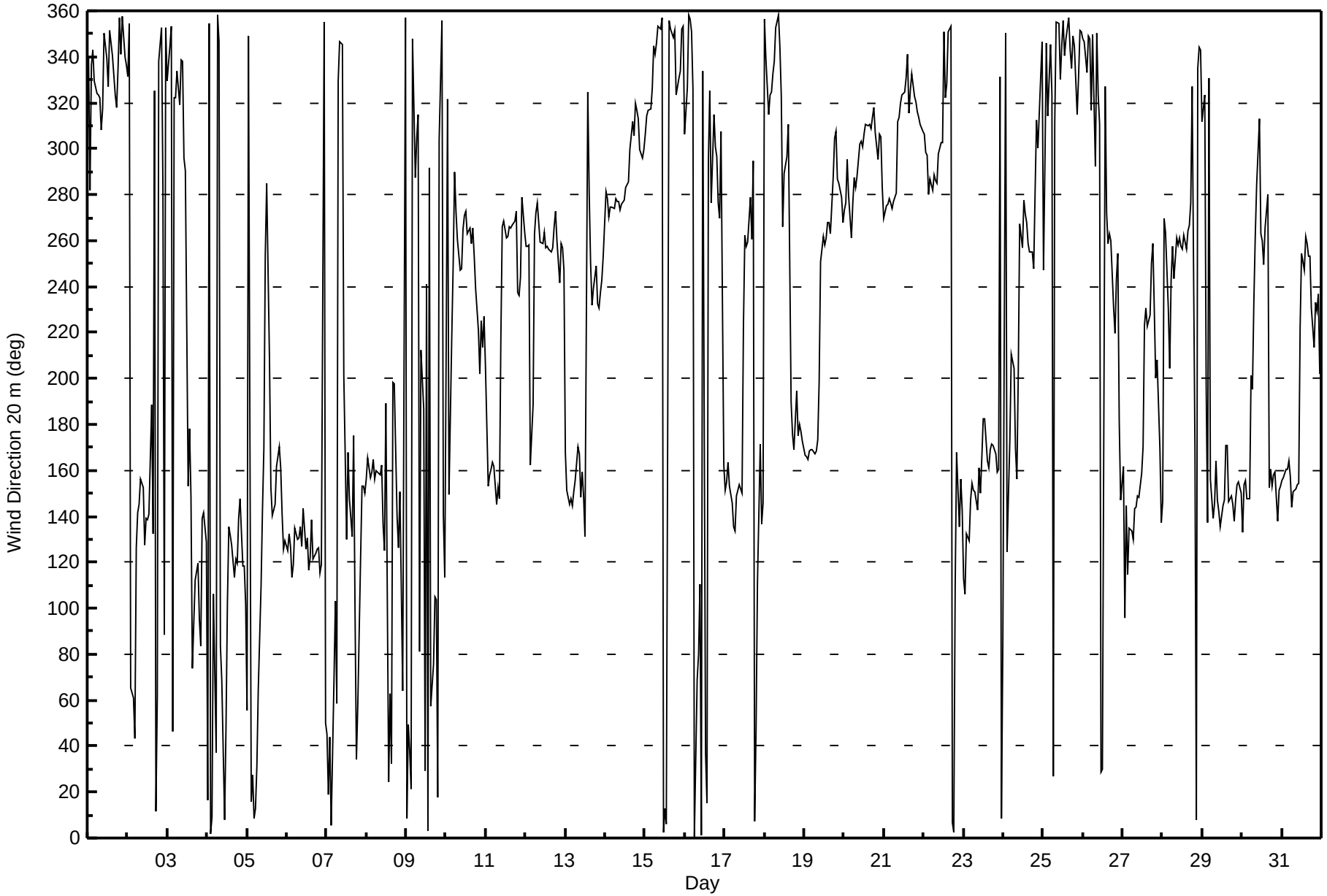
Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Aug	25	32	41	89	26	24	48	27	30	59	95	43	36	33	23	26	30	26	21	33	80	25	47	42	95
2-Aug	98	76	78	57	47	50	16	16	21	20	23	36	44	44	106	49	59	53	93	34	34	99	59	19	106
3-Aug	38	16	91	52	65	31	72	42	41	67	71	67	54	19	29	52	34	25	25	29	63	84	12	47	91
4-Aug	59	27	31	25	36	51	34	36	71	56	25	44	31	25	23	22	26	20	24	22	25	31	23	30	71
5-Aug	55	21	34	26	32	19	31	26	32	30	28	45	44	54	30	35	20	21	22	15	17	24	22	20	55
6-Aug	23	20	25	26	26	23	20	20	20	22	22	23	25	29	28	25	23	26	23	21	21	25	88	61	88
7-Aug	96	83	87	31	56	62	49	39	59	48	56	32	24	37	25	46	42	79	55	78	82	18	16	18	96
8-Aug	19	16	23	25	16	24	19	20	14	16	24	38	94	99	65	65	73	41	76	24	19	83	81	42	99
9-Aug	44	46	29	55	61	69	22	96	95	43	98	103	56	81	83	66	77	76	71	53	94	81	36	68	103
10-Aug	47	59	47	51	24	23	32	27	21	26	29	28	26	24	24	24	23	21	16	14	11	13	14	15	59
11-Aug	45	14	13	11	16	17	20	21	17	54	23	22	21	20	20	19	23	20	22	11	10	12	20	17	54
12-Aug	16	18	21	31	46	24	23	21	23	20	20	24	21	21	19	19	18	21	18	17	11	14	14	62	62
13-Aug	61	23	15	12	20	15	15	35	26	17	14	19	32	82	42	31	16	14	20	10	10	12	13	16	82
14-Aug	19	26	18	20	20	19	21	22	21	21	22	22	23	27	22	23	23	21	19	21	20	20	18	19	27
15-Aug	19	21	19	20	22	27	27	22	22	22	23	23	27	29	24	27	23	29	27	15	16	16	16	30	30
16-Aug	32	24	23	42	43	21	55	86	46	53	67	47	48	66	50	43	36	29	36	17	61	30	71	49	86
17-Aug	13	36	24	19	16	16	18	19	19	17	23	88	43	32	34	53	30	32	33	42	57	59	18	52	88
18-Aug	63	22	89	36	13	18	26	21	29	51	64	89	43	45	88	66	21	21	15	14	16	11	11	12	89
19-Aug	9	9	8	9	10	9	10	11	14	16	29	23	23	23	23	20	19	38	21	22	21	21	22	19	38
20-Aug	19	19	23	25	22	20	21	22	22	21	24	23	20	20	21	23	22	20	19	19	20	20	19	23	25
21-Aug	19	21	20	21	20	20	21	24	25	21	20	28	22	24	23	27	23	26	24	19	18	19	18	18	28
22-Aug	19	19	19	21	24	21	20	20	21	22	20	26	33	31	28	26	27	30	52	72	36	75	32	42	75
23-Aug	33	51	25	21	25	29	40	16	20	16	20	15	21	21	18	16	16	14	13	17	9	11	92	62	92
24-Aug	97	69	95	26	40	26	40	32	19	42	29	21	27	26	31	26	21	19	13	35	78	54	25	40	97
25-Aug	71	52	23	43	19	67	90	34	33	25	26	29	25	25	19	23	23	18	17	21	43	37	46	21	90
26-Aug	24	23	27	46	26	51	59	54	28	25	40	59	29	67	44	45	26	25	13	11	25	14	49	43	67
27-Aug	20	80	59	57	25	15	20	38	19	23	20	20	24	26	21	15	16	23	15	22	11	14	39	15	80
28-Aug	33	18	17	46	42	31	20	18	19	17	19	19	20	21	19	22	23	20	78	54	43	74	68	95	95
29-Aug	29	75	82	90	41	84	68	34	37	27	23	28	27	25	25	27	25	23	19	17	19	18	17	22	90
30-Aug	26	19	17	19	20	36	89	25	26	29	34	39	39	28	37	42	23	27	16	32	34	18	17	13	89
31-Aug	13	15	8	12	8	26	31	17	16	16	19	44	24	17	20	19	20	17	14	12	21	11	15	83	83
	98	83	95	90	65	84	90	96	95	67	98	103	94	99	106	66	77	79	93	78	94	99	92	95	
	Diurnal Maximum																								

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction 20 m (WD20m) - deg

Lower Camp Met Tower - August 2015



Direction of Maximum Speed: 257 deg on Aug 19 16:00
Direction of Maximum Daily Speed Average: 277.6 deg on Aug 14

Direction of Minimum Speed: 300 deg on Aug 2 03:00

Direction of Minimum Daily Speed Average: 1.1 deg on Aug 9

Monthly Average Direction: 278.9 deg

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
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average
1-Aug	343	283	349	341	330	327	331	321	313	310	340	332	319	346	337	331	317	311	330	4	334	355	344	357	332.2
2-Aug	334	229	300	109	119	132	134	135	144	139	119	128	126	131	179	119	318	6	66	339	338	3	111	354	106.4
3-Aug	353	4	352	346	347	346	14	339	336	336	291	284	140	167	134	68	86	105	111	92	96	133	136	124	104.0
4-Aug	51	356	2	10	103	47	356	351	84	68	9	49	94	124	123	117	105	115	113	128	137	110	120	108	95.5
5-Aug	69	350	26	30	3	13	35	71	102	133	158	248	282	199	140	127	133	136	150	158	149	132	117	124	129.0
6-Aug	118	124	119	106	110	125	120	122	124	118	133	115	120	105	113	127	112	116	117	119	106	112	34	68	116.6
7-Aug	80	55	49	15	63	90	60	327	350	342	199	154	119	157	138	119	165	92	41	71	120	144	142	139	118.0
8-Aug	141	149	142	146	152	144	149	147	145	147	129	117	179	22	46	26	193	195	130	114	139	114	84	2	137.1
9-Aug	6	64	34	38	359	308	324	329	46	211	219	14	241	339	289	47	66	103	112	37	334	355	131	125	51.0
10-Aug	209	318	133	210	241	280	266	251	239	240	257	260	263	252	255	249	256	244	231	212	193	217	207	217	241.3
11-Aug	197	146	150	149	152	162	137	145	137	215	256	258	252	252	256	256	256	258	262	230	229	236	269	254	236.5
12-Aug	249	249	249	163	191	254	262	265	257	251	250	254	249	249	248	246	249	257	263	250	234	246	249	243	249.8
13-Aug	178	159	141	143	153	148	153	165	161	138	149	139	120	312	271	244	225	230	240	226	223	224	229	243	203.7
14-Aug	271	266	259	263	264	264	269	267	267	264	266	268	274	275	276	289	302	296	312	307	303	290	287	290	277.6
15-Aug	297	306	309	309	321	337	336	339	349	345	351	358	9	3	351	347	345	343	352	318	328	329	343	349	339.7
16-Aug	327	321	351	350	5	353	11	54	66	98	350	321	25	359	286	320	267	309	295	285	267	255	280	181	305.8
17-Aug	162	164	175	155	145	135	128	138	138	141	138	215	254	250	253	268	253	289	356	48	99	165	138	150	175.4
18-Aug	324	346	341	307	324	338	360	339	352	332	318	268	280	286	295	244	181	166	161	185	170	173	171	168	207.3
19-Aug	160	157	156	162	161	161	158	159	165	190	244	252	249	252	259	257	253	277	295	297	276	273	268	258	224.0
20-Aug	264	265	283	268	252	267	276	273	279	292	293	290	296	300	300	299	299	304	309	296	285	294	294	271	285.1
21-Aug	259	264	265	267	266	264	266	272	301	305	311	315	316	322	331	307	318	324	315	314	307	304	302	297	292.1
22-Aug	295	289	286	268	273	271	279	276	273	288	292	294	344	315	320	342	346	356	0	101	145	130	140	139	292.9
23-Aug	125	126	135	134	145	149	143	143	133	150	138	156	172	172	153	152	161	164	162	145	148	149	334	15	149.9
24-Aug	69	331	60	138	164	202	196	158	146	196	259	250	270	263	260	252	248	246	239	266	289	288	327	354	238.4
25-Aug	350	277	327	299	337	323	13	331	350	348	323	335	351	332	341	352	337	333	341	344	328	338	351	345	338.6
26-Aug	345	340	340	358	348	340	352	287	345	317	303	17	16	320	262	251	255	254	224	214	226	238	196	160	287.8
27-Aug	154	139	145	141	134	132	126	132	134	139	138	149	161	214	224	214	219	242	249	223	191	201	169	138	190.7
28-Aug	150	260	253	238	217	240	249	235	251	250	251	249	248	254	248	255	257	266	310	89	14	337	353	346	251.2
29-Aug	317	308	177	154	312	151	153	144	154	137	133	129	137	139	160	156	135	137	135	129	136	142	142	139	140.4
30-Aug	127	142	143	138	139	201	188	225	253	276	306	258	254	244	261	275	143	149	141	146	149	132	142	143	169.1
31-Aug	144	145	149	149	153	145	133	141	142	142	146	217	246	238	252	250	244	244	223	207	227	218	228	192	200.4
	231.5	241.8	215.4	194.6	204.5	228.0	214.8	219.2	217.5	232.1	252.2	259.6	262.1	258.9	261.6	262.9	252.9	252.8	237.0	217.6	207.0	217.1	225.1	213.4	
	Diurnal Average																								

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

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction 45 m (WD45m) - deg

Lower Camp Met Tower - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 105 deg on Aug 2 15:00

Minimum Value: 6 deg on Aug 12 23:00

Percentiles: $P_1 = 7$ $P_{10} = 11$ $Q_1 = 13$ Median = 18 $Q_3 = 33$ $P_{90} = 57$ $P_{99} = 95$

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

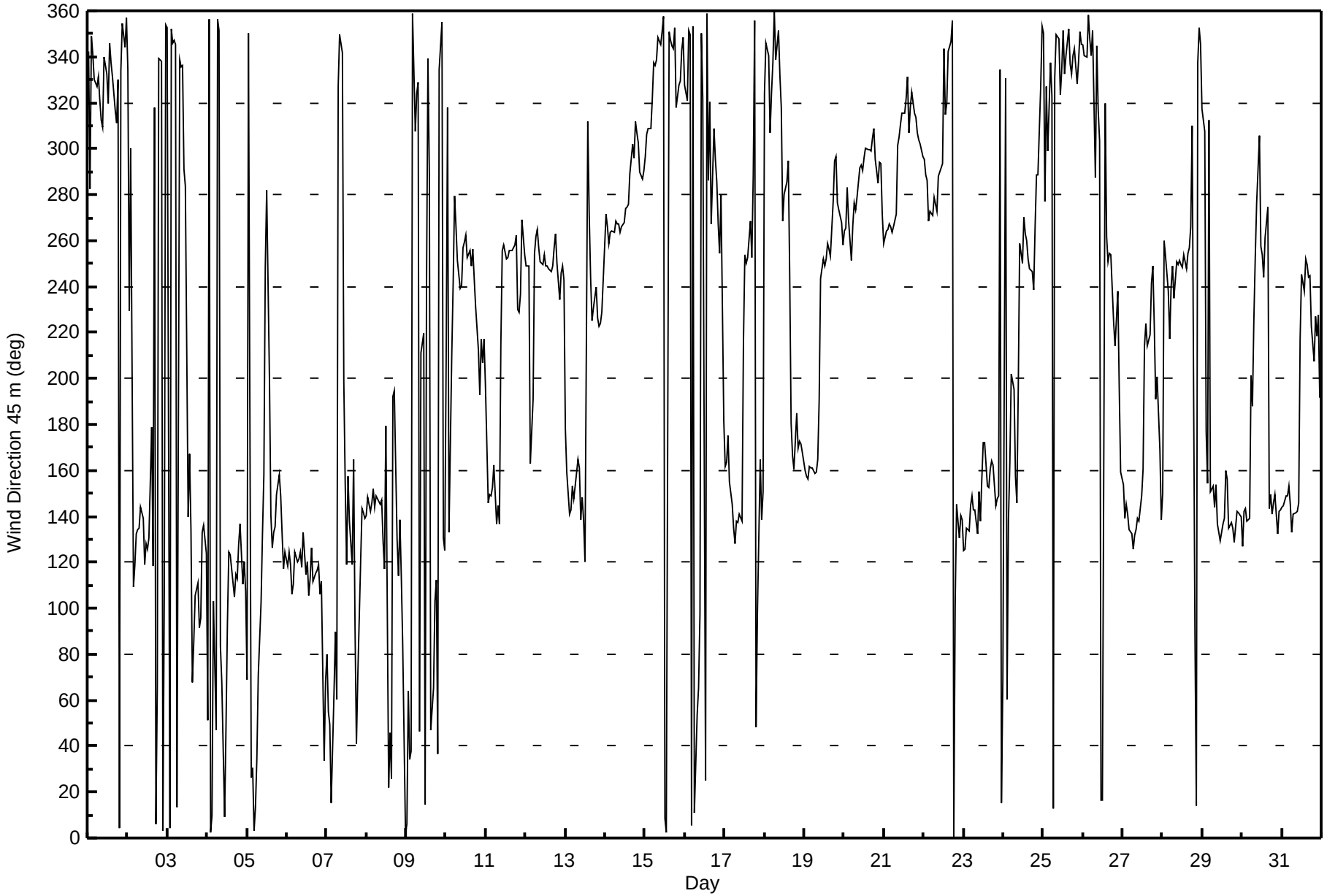
Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Aug	17	44	37	94	28	13	34	18	19	52	80	34	26	28	17	19	22	20	17	24	72	13	31	32	94
2-Aug	88	96	92	29	58	27	12	11	17	15	16	33	37	40	105	44	57	45	67	40	33	95	55	14	105
3-Aug	41	9	84	97	55	37	62	71	35	57	71	65	40	16	27	33	21	15	16	14	26	52	9	20	97
4-Aug	62	42	27	32	25	49	37	50	71	43	19	36	22	19	17	15	20	14	16	16	17	18	14	23	71
5-Aug	49	18	29	21	26	14	21	17	22	28	27	36	41	55	24	32	14	15	19	13	15	18	15	14	55
6-Aug	14	14	18	19	20	18	15	15	15	16	18	17	22	23	23	25	17	19	17	14	16	15	62	34	62
7-Aug	98	88	82	28	43	44	35	31	50	37	62	30	21	39	21	38	43	69	49	69	56	16	13	14	98
8-Aug	15	14	18	22	12	19	15	17	11	14	20	41	92	95	61	62	68	40	79	19	15	75	72	24	95
9-Aug	44	42	46	42	51	84	27	93	101	43	97	101	53	76	70	58	72	69	45	49	92	40	14	20	101
10-Aug	44	45	52	48	18	16	23	19	16	19	19	18	19	15	15	15	14	13	11	14	10	12	13	13	52
11-Aug	39	12	12	8	13	19	15	17	12	54	15	13	13	13	13	12	13	12	16	8	8	7	16	10	54
12-Aug	8	10	14	32	42	16	13	12	13	10	11	16	13	12	12	12	9	14	12	10	7	10	6	43	43
13-Aug	72	22	14	9	14	15	16	35	27	12	11	15	20	72	36	26	12	9	13	7	7	9	8	13	72
14-Aug	13	15	9	11	12	11	13	14	13	13	14	16	16	20	15	19	17	16	14	15	14	11	13	12	20
15-Aug	12	16	13	14	17	17	18	14	16	16	17	17	21	22	18	21	16	24	18	11	11	10	11	22	24
16-Aug	25	17	16	23	25	42	38	86	36	40	54	43	47	63	43	32	30	24	33	10	42	19	65	44	86
17-Aug	11	33	26	18	9	12	12	14	14	13	16	81	31	25	27	45	24	31	30	22	33	32	18	32	81
18-Aug	72	13	65	35	12	18	20	19	25	43	57	69	32	36	77	63	19	19	13	13	9	7	8	9	77
19-Aug	8	7	7	8	8	8	8	9	12	15	25	13	15	17	14	12	11	35	16	17	15	14	15	11	35
20-Aug	10	12	17	19	15	12	14	16	16	15	17	17	15	15	16	17	16	15	14	13	13	12	13	15	19
21-Aug	10	11	11	11	11	11	12	18	18	14	14	22	15	17	16	24	18	17	20	15	13	12	11	12	24
22-Aug	12	12	12	14	13	12	14	12	14	14	13	17	27	23	23	22	23	20	43	45	16	24	10	15	45
23-Aug	16	35	19	15	19	25	29	13	17	12	15	13	17	18	16	15	13	10	10	16	8	11	84	41	84
24-Aug	89	58	82	20	32	26	36	29	14	42	20	14	18	18	20	17	13	12	7	28	39	34	20	10	89
25-Aug	66	22	11	38	12	27	60	36	27	19	20	23	20	17	13	18	14	12	11	13	34	21	19	14	66
26-Aug	15	14	21	26	16	77	57	51	23	17	35	50	25	59	31	37	18	18	12	9	10	8	41	39	77
27-Aug	13	45	44	22	12	11	14	35	15	18	14	17	23	23	18	14	14	19	9	20	10	13	35	13	45
28-Aug	51	11	10	32	40	25	12	11	12	9	11	10	12	12	10	14	14	13	70	60	38	73	62	83	83
29-Aug	17	59	73	83	38	93	53	31	37	20	19	23	23	21	22	24	22	17	12	11	15	13	14	16	93
30-Aug	17	15	12	15	15	24	68	23	20	24	27	31	31	21	36	33	23	24	12	21	26	16	12	9	68
31-Aug	10	11	6	9	6	18	25	12	11	12	15	42	17	11	13	11	12	10	11	12	18	9	13	56	56
	98	96	92	97	58	93	68	93	101	57	97	101	92	95	105	63	72	69	79	69	92	95	84	83	
	Diurnal Maximum																								

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction 45 m (WD45m) - deg

Lower Camp Met Tower - August 2015



Direction of Maximum Speed: 254 deg on Aug 19 16:00
Direction of Maximum Daily Speed Average: 275.5 deg on Aug 14

Direction of Minimum Speed: 26 deg on Aug 9 08:00

Direction of Minimum Daily Speed Average: 3.2 deg on Aug 9

Monthly Average Direction: 263.2 deg

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
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average
1-Aug	355	338	319	257	345	356	2	349	331	306	324	330	318	347	334	330	318	310	334	26	353	14	313	321	337.3
2-Aug	325	24	26	147	167	154	153	135	135	140	127	128	127	128	165	113	323	10	78	116	278	344	82	5	101.1
3-Aug	63	350	345	102	144	129	132	131	12	356	343	304	136	167	132	70	93	114	115	112	113	131	141	134	114.6
4-Aug	128	121	82	92	117	103	98	105	122	86	25	72	101	123	121	114	115	125	120	131	139	126	124	118	114.6
5-Aug	113	24	68	75	44	51	78	109	117	128	148	255	289	175	134	126	133	136	147	152	147	136	128	134	128.4
6-Aug	130	129	121	113	115	126	127	125	126	121	134	120	121	106	114	125	112	116	119	123	117	124	106	98	120.4
7-Aug	112	112	94	60	80	92	97	7	350	329	218	151	115	143	135	122	143	94	86	104	126	148	148	139	120.5
8-Aug	140	146	140	143	145	145	146	140	141	136	131	120	165	36	50	23	202	200	162	111	136	132	133	85	137.5
9-Aug	62	77	99	122	2	346	56	26	65	210	324	2	237	339	291	50	70	107	133	63	115	131	136	138	105.4
10-Aug	218	324	51	201	238	273	260	246	232	237	252	255	258	249	251	247	250	240	231	219	214	224	223	222	239.1
11-Aug	223	181	182	167	172	215	154	166	154	226	253	254	249	250	252	252	251	256	260	236	235	239	262	251	240.7
12-Aug	254	251	247	217	232	252	257	260	255	248	247	252	248	246	244	244	246	254	260	252	248	252	259	249	250.7
13-Aug	239	230	191	190	205	180	199	205	177	153	154	145	138	298	267	239	226	232	239	234	236	231	234	247	225.2
14-Aug	270	266	258	260	261	261	268	266	265	261	263	265	271	272	273	288	300	293	307	302	298	288	284	289	275.5
15-Aug	294	304	309	307	322	345	343	345	353	351	356	1	10	4	356	351	349	350	0	327	336	338	342	1	343.1
16-Aug	345	326	334	326	313	312	308	241	79	88	334	312	0	333	284	324	269	307	287	281	272	261	267	251	296.2
17-Aug	232	227	236	215	191	175	157	151	149	143	145	202	246	247	249	256	250	283	335	45	103	165	166	192	203.8
18-Aug	240	331	343	344	333	303	291	309	341	325	320	283	279	281	303	241	181	172	166	198	173	185	195	184	236.2
19-Aug	173	162	161	170	165	159	159	160	171	198	242	248	248	251	256	254	251	278	291	293	274	271	265	256	226.7
20-Aug	262	263	280	265	255	266	272	270	276	288	290	288	295	296	299	296	297	302	304	294	283	294	292	272	283.1
21-Aug	262	266	266	267	264	260	266	271	301	303	309	317	312	320	330	306	313	319	307	308	304	303	301	294	291.8
22-Aug	293	288	286	268	273	273	281	277	270	287	292	295	347	314	318	343	349	359	7	99	136	166	163	157	289.4
23-Aug	149	151	152	153	150	152	155	159	146	152	142	157	171	172	152	154	160	166	158	140	154	153	345	28	152.5
24-Aug	76	296	333	140	162	197	195	163	157	202	254	246	265	259	259	249	246	244	238	252	273	285	332	341	241.4
25-Aug	350	341	337	319	318	337	328	326	346	336	323	334	352	339	350	1	350	343	347	2	15	339	344	3	345.2
26-Aug	6	351	1	25	7	18	16	54	346	324	311	5	13	323	252	251	252	250	226	229	235	249	230	218	299.5
27-Aug	172	208	162	162	157	175	149	146	139	138	144	151	162	216	223	216	220	240	245	230	212	214	208	208	201.5
28-Aug	239	253	249	245	244	246	247	237	247	245	249	247	246	251	244	252	253	261	293	64	84	28	354	12	250.9
29-Aug	327	309	164	165	276	247	214	200	167	133	134	131	138	140	156	154	132	138	138	131	131	139	138	141	142.3
30-Aug	131	136	143	140	144	181	202	221	254	276	307	261	257	242	259	263	148	151	141	143	168	171	164	149	167.5
31-Aug	146	145	148	148	153	144	144	155	148	144	154	218	242	235	248	246	241	241	225	218	238	232	237	222	204.6
	231.5	243.4	226.7	200.8	215.9	229.8	216.8	217.6	216.7	232.4	248.7	257.6	261.7	260.2	260.8	261.0	251.4	250.9	229.6	207.6	208.5	218.1	233.4	217.8	
	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 100 m (WD100m) - deg

Lower Camp Met Tower - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 104 deg on Aug 9 08:00

Minimum Value: 2 deg on Aug 13 21:00

Percentiles: P_1 = 4 P_{10} = 6 Q_1 = 8 Median = 12 Q_3 = 21 P_{90} = 41 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

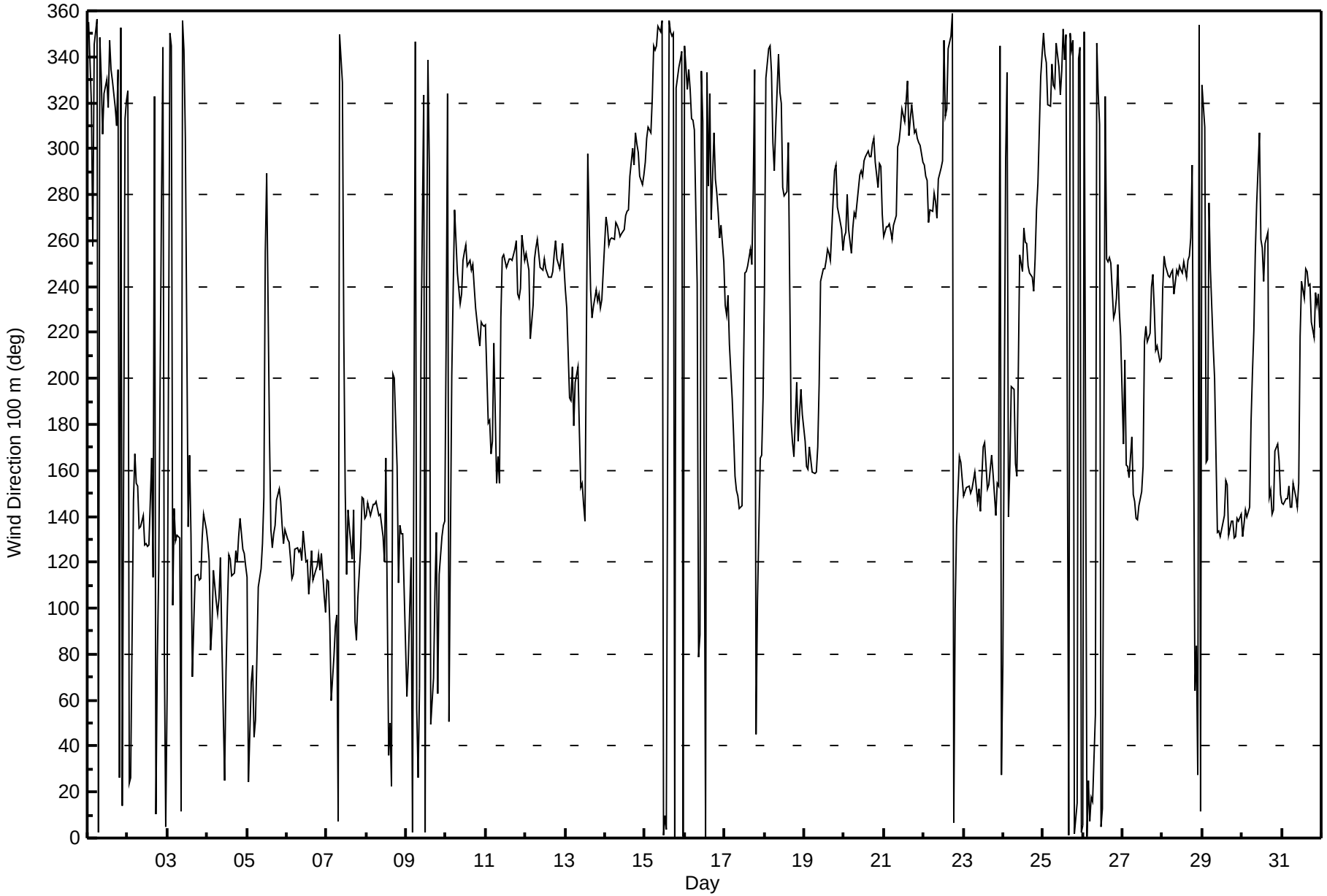
Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Aug	10	70	34	74	59	6	16	11	15	36	74	25	20	16	13	13	17	17	16	13	67	14	15	8	74
2-Aug	14	15	29	17	18	15	23	7	6	7	8	19	21	31	90	39	58	34	19	72	23	29	18	44	90
3-Aug	20	34	11	44	30	20	10	39	65	44	78	60	20	15	16	16	15	6	6	5	8	18	6	8	78
4-Aug	20	39	22	26	6	20	38	44	83	30	17	29	10	14	9	8	8	6	7	9	8	6	4	8	83
5-Aug	19	46	16	25	18	13	13	9	9	16	16	48	39	46	16	19	7	8	14	11	10	9	6	7	48
6-Aug	7	7	9	10	10	9	7	8	7	8	8	9	13	14	15	15	9	11	9	7	8	5	18	12	18
7-Aug	24	46	47	33	22	14	33	33	37	29	78	32	13	29	16	20	37	41	54	36	16	12	9	5	78
8-Aug	5	6	6	10	6	8	8	8	7	7	9	33	78	82	71	70	65	39	58	11	6	13	42	23	82
9-Aug	20	14	19	13	59	75	61	104	97	80	96	101	78	82	80	58	62	47	21	10	30	14	5	6	104
10-Aug	41	33	73	47	14	11	16	14	10	15	12	12	12	10	10	11	10	10	8	7	5	6	7	7	73
11-Aug	28	24	21	13	16	15	26	16	21	40	9	7	8	10	8	7	8	7	13	6	4	4	11	4	40
12-Aug	4	5	9	34	25	9	7	7	8	6	7	11	10	10	9	9	7	9	6	5	5	5	4	8	34
13-Aug	55	23	27	20	11	22	18	19	26	14	15	11	37	34	13	21	6	6	9	4	2	3	3	7	55
14-Aug	13	10	5	4	5	6	9	8	8	9	10	11	12	18	10	14	10	13	10	10	9	8	9	7	18
15-Aug	7	11	8	7	10	11	14	9	9	9	11	10	12	14	11	14	11	20	8	10	10	7	7	15	20
16-Aug	9	8	6	6	8	7	30	47	37	38	53	31	41	58	33	22	26	20	33	8	16	4	12	15	58
17-Aug	14	24	16	25	17	15	13	13	12	12	11	64	29	20	18	37	19	23	34	24	40	27	14	21	64
18-Aug	69	9	6	10	7	18	8	7	22	31	49	52	24	47	51	56	20	18	14	15	6	10	10	9	69
19-Aug	7	7	6	7	8	6	7	8	10	16	21	9	12	15	9	7	6	31	13	12	10	10	11	7	31
20-Aug	6	6	13	15	10	7	10	11	12	11	14	14	11	10	11	11	11	11	9	8	11	7	7	10	15
21-Aug	5	5	5	5	4	5	7	15	14	10	9	16	9	11	11	19	13	10	9	10	9	7	7	6	19
22-Aug	6	8	8	7	7	6	10	10	9	12	9	13	20	18	18	17	14	12	32	35	11	9	9	6	35
23-Aug	6	8	9	9	9	11	10	12	8	7	7	11	17	20	13	13	11	8	12	5	7	7	70	26	70
24-Aug	45	52	58	14	18	17	23	21	15	35	14	9	13	12	15	11	13	10	4	5	9	14	13	2	58
25-Aug	7	6	5	32	18	11	36	31	21	15	13	15	14	9	7	15	6	8	8	13	11	10	9	8	36
26-Aug	10	7	14	12	12	17	20	47	21	12	36	39	17	50	27	29	13	12	9	7	5	7	14	20	50
27-Aug	29	23	17	12	18	19	7	21	9	11	8	12	25	18	14	10	9	15	6	11	5	5	15	29	29
28-Aug	50	5	5	9	12	8	7	7	7	6	7	6	8	8	7	9	7	8	48	18	19	79	17	24	79
29-Aug	11	34	71	42	32	54	48	31	41	10	7	15	19	18	21	20	14	8	5	6	8	7	7	7	71
30-Aug	9	8	6	5	7	20	32	24	18	21	25	22	26	17	30	26	35	23	5	8	21	31	17	8	35
31-Aug	4	3	3	4	6	10	14	13	6	6	19	36	12	9	10	7	8	7	7	6	10	5	6	22	36
	69	70	73	74	59	75	61	104	97	80	96	101	78	82	90	70	65	47	58	72	67	79	70	44	
	Diurnal Maximum																								

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction 100 m (WD100m) - deg

Lower Camp Met Tower - August 2015



Maximum Value: 1.1 km/h on Aug 19 05:00

Maximum Daily Average: 0.2 km/h on Aug 23

Minimum Value: -1.0 km/h on Aug 15 12:00

Minimum Daily Average: -0.6 km/h on Aug 14

Maximum Diurnal Average: 0.0 km/h at hour 5

Minimum Diurnal Average: -0.2 km/h at hour 15

Monthly Average: -0.11 km/h

Percentiles: P_1 = -0.8 P_{10} = -0.5 Q_1 = -0.3 Median = -0.1 Q_3 = 0.1 P_{90} = 0.3 P_{99} = 0.9

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	-0.3	0.0	-0.1	-0.1	-0.1	-0.1	-0.2	-0.1	0.0	-0.1	0.0	-0.2	-0.3	-0.2	-0.3	-0.5	-0.3	-0.4	-0.5	-0.2	-0.2	-0.1	-0.2	-0.1	-0.2	0.0
2-Aug	0.0	0.0	0.1	0.1	0.0	0.0	0.3	0.3	0.1	0.3	-0.2	0.4	0.1	0.1	0.2	0.0	-0.4	-0.3	-0.2	-0.3	-0.1	0.0	0.0	-0.2	0.0	0.4
3-Aug	-0.1	-0.1	0.0	0.0	0.0	-0.1	-0.1	0.0	-0.1	0.1	0.3	0.1	0.2	0.5	0.0	-0.3	-0.4	-0.4	-0.2	-0.4	0.0	-0.1	0.1	0.3	0.0	0.5
4-Aug	0.0	-0.2	-0.3	-0.5	-0.2	-0.6	-0.5	-0.4	-0.1	-0.2	-0.3	-0.3	-0.3	0.0	-0.1	-0.2	-0.3	-0.4	-0.4	0.0	0.2	-0.3	-0.2	-0.2	-0.2	0.2
5-Aug	-0.2	-0.4	-0.3	-0.3	-0.1	-0.2	-0.2	-0.4	-0.2	-0.1	0.1	0.2	0.0	-0.1	0.2	0.1	-0.1	0.3	0.5	0.8	0.6	0.1	-0.3	-0.3	0.0	0.8
6-Aug	-0.2	-0.3	-0.2	-0.4	-0.2	-0.2	-0.4	-0.1	-0.2	-0.4	0.0	-0.3	0.0	-0.4	-0.3	0.0	-0.5	-0.3	-0.4	-0.3	-0.4	-0.2	-0.1	-0.1	-0.2	0.0
7-Aug	-0.2	-0.2	0.0	-0.2	-0.2	-0.1	-0.1	-0.1	0.2	-0.1	0.2	0.1	0.0	0.4	0.0	-0.1	0.0	-0.2	-0.2	-0.2	-0.1	0.2	0.3	0.2	0.0	0.4
8-Aug	0.3	0.2	0.3	0.2	0.1	0.1	0.2	0.4	0.1	0.2	0.1	0.1	0.0	-0.1	-0.1	-0.1	0.0	0.1	0.1	-0.2	0.3	-0.1	-0.1	-0.2	0.1	0.4
9-Aug	-0.1	0.0	0.0	0.0	-0.1	0.0	-0.2	-0.1	0.0	0.0	0.6	0.6	0.4	-0.1	-0.1	0.1	-0.1	0.1	0.1	-0.2	0.0	0.0	0.1	0.0	0.0	0.6
10-Aug	0.2	-0.4	0.1	-0.1	-0.2	-0.4	-0.2	0.0	-0.1	-0.1	0.0	-0.3	-0.3	-0.2	-0.2	-0.2	-0.3	-0.1	-0.2	0.0	0.2	-0.1	0.2	0.0	-0.1	0.2
11-Aug	0.1	0.4	0.4	0.4	0.4	0.4	0.2	0.1	0.2	0.0	-0.3	-0.7	-0.4	-0.4	-0.8	-0.7	-0.4	-0.6	-0.6	-0.1	-0.1	0.0	-0.4	-0.5	-0.1	0.4
12-Aug	-0.1	-0.2	-0.2	0.3	0.2	-0.4	-0.4	-0.7	-0.5	-0.4	-0.2	-0.4	-0.4	-0.1	-0.3	-0.5	-0.5	-0.4	-0.5	-0.3	0.0	-0.3	-0.2	0.1	-0.3	0.3
13-Aug	0.1	0.2	0.3	0.1	0.1	0.3	0.4	0.2	0.2	0.1	0.4	0.3	-0.1	-0.1	-0.5	-0.3	-0.1	-0.3	-0.1	-0.2	-0.1	-0.2	-0.3	-0.3	0.0	0.4
14-Aug	-0.5	-0.4	-0.5	-0.5	-0.6	-0.7	-0.5	-0.6	-0.7	-0.6	-0.8	-0.8	-0.9	-0.4	-0.7	-0.5	-0.6	-0.7	-0.7	-0.5	-0.6	-0.3	-0.5	-0.5	-0.6	-0.3
15-Aug	-0.4	-0.2	-0.3	-0.4	-0.4	-0.1	-0.1	-0.4	-0.7	-0.8	-0.8	-1.0	-1.0	-0.9	-0.9	-0.7	-0.6	-0.3	-0.3	-0.4	-0.3	-0.2	-0.1	-0.1	-0.5	-0.1
16-Aug	-0.1	-0.1	-0.1	0.0	0.0	-0.1	0.0	0.1	0.0	0.0	-0.1	-0.4	-0.1	-0.1	-0.4	-0.3	-0.1	-0.2	-0.2	-0.5	-0.1	-0.1	-0.1	0.2	-0.1	0.2
17-Aug	0.2	0.2	0.1	0.2	0.3	0.3	-0.2	0.2	0.2	0.4	0.4	-0.1	-0.1	-0.2	-0.3	-0.2	-0.1	-0.4	-0.2	-0.2	0.0	0.0	0.0	0.1	0.0	0.4
18-Aug	-0.2	-0.2	0.0	-0.1	-0.3	-0.3	-0.1	-0.3	-0.5	0.0	0.3	0.3	-0.1	-0.1	0.2	0.2	0.5	0.3	0.5	0.3	0.5	0.8	0.9	0.9	0.1	0.9
19-Aug	0.9	0.7	0.9	1.0	1.1	1.1	0.8	0.7	0.9	0.4	-0.1	-0.3	-0.2	-0.4	-0.6	-0.6	-0.4	-0.6	-0.8	-0.6	-0.7	-0.5	-0.5	-0.6	0.1	1.1
20-Aug	-0.5	-0.6	-0.5	-0.3	-0.2	-0.6	-0.7	-0.7	-0.5	-0.6	-0.8	-0.7	-0.7	-0.7	-0.9	-0.5	-0.5	-0.4	-0.5	-0.5	-0.4	-0.4	-0.3	-0.4	-0.5	-0.2
21-Aug	-0.5	-0.3	-0.5	-0.5	-0.6	-0.5	-0.5	-0.4	-0.5	-0.6	-0.6	-0.2	-0.6	-0.5	-0.2	-0.5	-0.3	-0.2	-0.3	-0.3	-0.4	-0.4	-0.6	-0.4	-0.4	-0.2
22-Aug	-0.2	-0.3	-0.3	-0.4	-0.3	-0.3	-0.3	-0.4	-0.4	-0.5	-0.6	-0.4	-0.5	-0.3	-0.3	-0.5	-0.2	-0.3	-0.1	0.1	0.1	0.1	0.1	0.1	-0.3	0.1
23-Aug	0.1	0.0	0.1	0.0	0.1	0.1	0.1	0.1	-0.1	0.1	0.3	0.4	0.5	0.4	0.3	0.2	0.6	0.7	0.5	0.4	-0.1	0.2	-0.4	-0.3	0.2	0.7
24-Aug	-0.1	-0.2	0.0	0.0	0.1	0.1	0.1	0.3	0.0	0.2	-0.1	-0.2	-0.2	-0.2	-0.3	-0.1	-0.2	-0.2	-0.1	-0.2	-0.1	0.0	-0.2	0.0	-0.1	0.3
25-Aug	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	-0.1	-0.5	-0.5	-0.4	-0.4	-0.4	-0.1	-0.1	-0.5	-0.1	-0.2	-0.1	-0.3	-0.1	-0.1	-0.2	-0.2	-0.2	0.0
26-Aug	-0.2	-0.2	-0.2	0.0	-0.2	-0.1	-0.1	-0.1	-0.3	-0.4	-0.1	-0.4	-0.2	0.1	0.0	0.2	-0.1	0.0	0.0	0.1	0.1	-0.2	0.0	0.3	-0.1	0.3
27-Aug	0.1	0.1	0.0	0.1	0.2	0.1	-0.2	0.3	0.2	0.4	0.4	0.5	0.3	0.2	0.1	-0.1	0.0	-0.3	-0.4	0.1	0.2	0.3	0.3	0.2	0.1	0.5
28-Aug	0.2	-0.6	-0.5	0.0	0.2	0.1	-0.2	0.0	-0.3	-0.7	-0.5	-0.3	-0.3	-0.5	-0.3	-0.4	-0.4	-0.3	-0.1	0.1	0.1	-0.1	-0.2	0.0	-0.2	0.2
29-Aug	-0.2	-0.2	-0.1	-0.1	-0.2	0.1	0.1	0.1	0.1	0.0	0.5	0.3	0.1	0.2	0.3	0.2	0.1	0.1	0.0	-0.2	0.2	0.3	0.3	0.2	0.1	0.5
30-Aug	-0.1	0.1	0.0	0.2	0.0	0.4	0.0	0.1	0.0	-0.3	-0.2	0.1	0.3	-0.3	-0.2	0.0	0.1	0.3	0.1	0.1	0.4	0.3	0.2	0.2	0.1	0.4
31-Aug	0.4	0.6	0.2	0.5	0.6	0.2	-0.2	0.5	0.3	0.0	0.4	0.1	-0.2	-0.5	-0.7	-0.4	-0.2	-0.3	-0.1	0.1	-0.2	-0.2	-0.1	0.1	0.0	0.6
	0.0	-0.1	-0.1	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	-0.2	-0.2	-0.2	-0.1	0.0	0.0	-0.1	0.0	Diurnal Average	
	0.9	0.7	0.9	1.0	1.1	1.1	0.8	0.7	0.9	0.4	0.6	0.6	0.5	0.5	0.3	0.2	0.6	0.7	0.5	0.8	0.6	0.8	0.9	0.9	Diurnal Maximum	

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 4.4 km/h on Aug 19 16:00

Minimum Value: 0.1 km/h on Aug 28 20:00

Percentiles: P_1 = 0.2 P_{10} = 0.4 Q_1 = 1.0 Median = 1.7 Q_3 = 2.4 P_{90} = 3.0 P_{99} = 4.0

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

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

Maximum Value: 1.6 km/h on Aug 19 06:00

Maximum Daily Average: 0.5 km/h on Aug 23

Minimum Value: -1.5 km/h on Aug 14 13:00

Minimum Daily Average: -1.1 km/h on Aug 14

Maximum Diurnal Average: 0.1 km/h at hour 5

Minimum Diurnal Average: -0.3 km/h at hour 15

Monthly Average: -0.06 km/h

Percentiles: P_1 = -1.4 P_{10} = -0.9 Q_1 = -0.4 Median = 0.0 Q_3 = 0.3 P_{90} = 0.7 P_{99} = 1.3

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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	-0.3	-0.1	-0.1	-0.1	-0.3	-0.2	-0.2	-0.2	-0.1	-0.1	0.2	-0.2	-0.2	-0.1	-0.7	-0.8	-0.6	-0.6	-0.7	-0.2	-0.3	-0.1	-0.4	-0.1	-0.3	0.2
2-Aug	0.0	0.0	0.0	0.3	0.2	0.2	0.7	0.7	0.5	0.6	0.2	0.8	0.3	0.3	0.4	0.3	-0.8	-0.5	0.1	-0.2	-0.2	-0.1	0.1	-0.4	0.2	0.8
3-Aug	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	-0.2	0.3	0.4	0.4	0.6	0.6	0.6	0.0	-0.1	0.0	0.3	-0.1	0.2	0.0	0.5	0.8	0.2	0.8
4-Aug	0.2	-0.4	-0.6	-0.7	0.1	-0.6	-0.6	-0.5	-0.1	0.0	-0.4	-0.2	0.0	0.6	0.4	0.2	0.0	0.2	0.2	0.5	0.8	0.1	-0.6	-0.3	-0.1	0.8
5-Aug	-0.1	-0.6	-0.3	-0.3	-0.1	-0.2	-0.1	-0.3	0.1	0.3	0.2	0.2	0.0	0.0	0.6	0.5	0.4	0.7	1.2	1.3	1.3	0.7	0.3	0.2	0.2	1.3
6-Aug	0.2	0.2	0.4	0.2	0.2	0.3	0.4	0.4	0.5	0.3	0.5	0.2	0.6	0.2	0.2	0.7	0.2	0.3	0.3	0.1	0.0	0.2	0.0	0.1	0.3	0.7
7-Aug	0.1	-0.1	0.0	-0.4	-0.1	0.0	-0.1	-0.1	0.2	0.0	0.3	0.0	0.4	0.5	0.2	0.1	-0.1	0.0	-0.1	-0.2	0.1	0.7	0.8	0.7	0.1	0.8
8-Aug	0.9	0.6	0.6	0.5	0.5	0.4	0.4	0.5	0.4	0.6	0.5	0.4	0.2	0.0	0.2	0.0	0.2	0.2	0.3	0.3	0.7	0.1	0.0	-0.2	0.3	0.9
9-Aug	-0.2	0.1	0.0	0.0	-0.1	0.0	-0.2	-0.2	0.0	0.0	0.9	0.9	0.4	0.0	-0.1	0.1	0.1	0.2	0.2	-0.1	0.0	0.1	0.4	0.3	0.1	0.9
10-Aug	0.4	-0.6	0.1	0.3	0.1	-0.7	-0.2	-0.1	0.1	-0.1	-0.2	-0.5	-0.6	-0.5	-0.4	-0.2	-0.4	-0.1	0.0	0.0	0.2	-0.1	0.1	0.1	-0.1	0.4
11-Aug	0.4	1.1	1.0	1.2	1.0	0.7	0.8	0.4	0.6	0.1	-0.5	-1.0	-0.8	-0.7	-1.1	-1.0	-0.7	-1.0	-0.9	0.2	0.0	0.2	-0.9	-0.7	-0.1	1.2
12-Aug	-0.2	-0.1	-0.1	0.5	0.7	-0.3	-0.7	-1.0	-0.7	-0.7	-0.2	-0.5	-0.4	-0.3	-0.4	-0.4	-0.5	-0.7	-0.7	-0.4	0.1	-0.3	-0.2	0.4	-0.3	0.7
13-Aug	0.1	0.4	0.9	0.7	0.4	0.7	0.8	0.6	0.4	0.5	0.9	0.6	0.2	-0.2	-0.9	-0.5	0.0	0.0	0.0	0.0	0.0	-0.2	-0.1	-0.2	0.2	0.9
14-Aug	-0.9	-0.4	-0.8	-0.9	-1.0	-1.3	-1.2	-1.0	-1.5	-1.0	-1.1	-1.3	-1.5	-0.8	-1.4	-1.1	-1.4	-1.3	-1.3	-1.0	-1.3	-1.1	-1.0	-1.3	-1.1	-0.4
15-Aug	-0.9	-0.6	-0.8	-0.7	-0.7	-0.4	-0.4	-0.8	-1.0	-1.0	-0.9	-1.2	-1.1	-1.0	-1.0	-0.9	-1.1	-0.6	-0.4	-0.7	-0.6	-0.4	-0.3	-0.2	-0.7	-0.2
16-Aug	-0.2	-0.2	-0.1	0.0	0.0	-0.1	0.0	0.1	0.0	0.1	-0.3	-0.6	0.3	0.2	-0.5	-0.7	-0.4	-0.3	-0.4	-0.8	-0.3	-0.1	-0.4	0.1	-0.2	0.3
17-Aug	0.5	0.4	0.1	0.5	1.0	0.9	0.2	0.5	0.5	0.7	0.8	-0.1	-0.2	-0.2	-0.1	-0.2	0.0	-0.6	-0.4	-0.2	0.2	0.1	0.4	0.4	0.2	1.0
18-Aug	-0.2	-0.3	0.0	-0.2	-0.4	-0.4	-0.1	-0.3	-0.6	0.1	0.2	0.4	-0.3	-0.1	0.0	0.1	0.5	0.5	0.8	0.3	0.7	0.6	1.0	1.3	0.1	1.3
19-Aug	1.3	1.2	1.5	1.4	1.5	1.6	1.3	1.2	1.1	0.1	-0.4	-0.4	-0.2	-0.2	-1.0	-1.0	-0.6	-1.0	-1.4	-1.0	-1.3	-0.9	-0.8	-0.8	0.1	1.6
20-Aug	-1.1	-1.0	-0.7	-0.5	-0.1	-1.1	-1.1	-1.3	-1.3	-1.1	-1.1	-1.2	-1.4	-1.4	-1.5	-1.1	-0.8	-0.7	-1.0	-0.9	-0.8	-0.8	-1.0	-0.8	-1.0	-0.1
21-Aug	-0.8	-0.7	-1.1	-0.8	-1.0	-1.1	-1.0	-0.8	-0.9	-1.0	-0.9	-0.2	-1.2	-0.9	-0.8	-0.9	-0.7	-0.8	-0.6	-0.6	-0.9	-0.9	-1.2	-0.9	-0.9	-0.2
22-Aug	-0.9	-1.0	-0.7	-0.6	-0.8	-0.6	-0.7	-0.7	-0.5	-1.0	-1.2	-0.8	-0.5	-0.6	-0.6	-0.7	-0.2	-0.4	-0.1	0.3	0.2	0.2	0.3	0.3	-0.5	0.3
23-Aug	0.4	0.1	0.3	0.2	0.3	0.5	0.6	0.3	0.1	0.3	0.6	0.8	0.5	0.7	0.8	0.6	1.0	1.0	0.7	0.7	0.7	0.7	-0.8	-0.3	0.5	1.0
24-Aug	-0.1	-0.2	0.1	0.4	0.3	0.0	0.0	0.5	0.4	0.2	-0.3	-0.3	-0.5	-0.4	-0.5	0.0	-0.2	-0.1	0.0	-0.3	-0.2	-0.1	-0.4	0.0	-0.1	0.5
25-Aug	0.1	0.0	-0.1	-0.1	-0.1	0.0	0.0	-0.1	-0.5	-0.7	-0.6	-0.4	-0.6	-0.4	-0.4	-0.5	-0.2	-0.3	-0.3	-0.3	-0.2	-0.2	-0.2	-0.4	-0.3	0.1
26-Aug	-0.3	-0.4	-0.2	0.0	-0.3	-0.1	-0.2	-0.1	-0.5	-0.5	0.1	-0.2	0.0	0.1	-0.1	0.2	-0.1	-0.1	0.1	0.1	0.2	-0.2	0.1	0.2	-0.1	0.2
27-Aug	0.2	0.2	0.1	0.2	0.5	0.4	0.1	0.5	0.4	0.8	0.8	1.0	0.8	0.0	0.3	-0.2	0.1	-0.4	-0.5	0.0	0.1	0.0	0.4	1.0	0.3	1.0
28-Aug	0.3	-0.7	-0.6	0.1	0.5	0.4	-0.1	0.2	-0.4	-0.7	-0.5	-0.6	-0.5	-0.7	-0.4	-0.5	-0.5	-0.6	-0.1	0.1	0.1	-0.2	-0.2	0.0	-0.2	0.5
29-Aug	-0.3	-0.2	-0.1	0.1	-0.4	0.2	0.3	0.1	0.2	0.3	0.9	0.8	0.5	0.5	0.6	0.5	0.7	0.6	0.6	0.6	0.8	0.8	0.8	0.7	0.4	0.9
30-Aug	0.5	0.9	0.8	0.6	0.6	0.6	0.0	0.1	0.1	-0.6	-0.3	-0.1	0.2	-0.4	-0.4	0.0	0.4	0.8	0.9	0.5	0.7	0.9	0.9	0.8	0.4	0.9
31-Aug	1.0	1.2	1.0	1.1	1.2	0.6	0.3	1.1	1.0	0.7	1.0	0.2	-0.4	-0.4	-0.7	-0.4	0.0	-0.3	0.1	0.0	-0.1	-0.1	0.0	0.3	0.4	1.2
	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	-0.1	-0.1	0.0	-0.1	-0.2	-0.2	-0.3	-0.2	-0.2	-0.2	-0.1	-0.1	0.0	0.0	-0.1	0.0	Diurnal Average	
	1.3	1.2	1.5	1.4	1.5	1.6	1.3	1.2	1.1	0.8	1.0	1.0	0.8	0.7	0.8	0.7	1.0	1.0	1.2	1.3	1.3	0.9	1.0	1.3	Diurnal Maximum	

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

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

Lower Camp Met Tower - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 4.5 km/h on Aug 11 12:00

Minimum Value: 0.1 km/h on Aug 25 06:00

Percentiles: P_1 = 0.2 P_{10} = 0.5 Q_1 = 1.1 Median = 1.8 Q_3 = 2.5 P_{90} = 3.1 P_{99} = 4.1

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Aug	1.0	0.3	0.4	0.4	0.8	1.0	0.9	1.1	0.8	1.3	1.7	2.3	2.1	2.7	2.2	2.1	2.0	1.9	1.7	1.3	0.6	0.4	0.4	0.3	2.7
2-Aug	0.3	0.2	0.2	0.3	0.2	0.6	1.2	1.5	1.7	1.9	2.2	2.0	2.2	2.0	2.0	1.8	2.7	1.9	1.8	0.5	0.4	0.5	0.3	0.4	2.7
3-Aug	0.4	0.2	0.2	0.2	0.2	0.3	0.3	0.6	1.1	1.5	1.4	1.6	1.5	2.2	2.4	2.7	2.1	2.0	1.6	1.3	0.8	1.1	0.9	1.3	2.7
4-Aug	0.9	1.1	1.0	1.0	1.4	1.4	1.1	1.1	1.3	1.3	1.7	1.7	1.7	2.8	2.2	1.8	1.6	2.0	2.3	2.9	2.7	1.5	2.1	1.7	2.9
5-Aug	0.9	0.8	1.0	0.8	0.7	1.0	0.8	0.9	1.5	1.4	1.0	1.3	1.3	1.4	1.6	1.5	2.1	2.5	3.8	3.2	3.6	2.7	2.2	1.7	3.8
6-Aug	1.9	2.7	2.2	2.0	1.9	2.1	2.4	2.7	2.7	2.5	2.4	2.6	2.8	2.8	2.7	2.5	3.1	2.4	2.3	1.8	1.9	1.4	1.0	1.0	3.1
7-Aug	1.2	1.0	0.9	0.7	0.7	0.8	0.6	0.8	0.9	1.1	1.4	1.2	2.0	1.8	1.7	1.6	1.2	1.4	1.2	1.6	1.1	1.6	2.0	2.5	2.5
8-Aug	2.6	2.0	1.4	1.5	1.8	1.4	1.2	1.6	1.8	1.7	1.9	1.8	1.7	1.5	1.7	1.8	1.7	1.0	0.7	2.1	2.0	1.1	0.7	0.4	2.6
9-Aug	0.4	0.4	0.4	0.3	0.3	0.2	0.3	0.9	1.1	1.5	1.5	1.5	1.4	1.5	1.7	1.4	1.5	1.1	0.4	0.3	0.6	0.4	0.6	0.6	1.7
10-Aug	2.3	2.1	0.6	1.4	2.4	2.4	1.4	2.0	1.6	2.0	2.5	2.5	2.7	3.0	2.9	2.7	2.4	2.5	1.9	1.3	1.3	2.1	1.8	2.1	3.0
11-Aug	1.3	1.4	1.3	1.1	1.1	1.1	1.8	1.1	1.9	2.2	3.6	4.5	4.2	4.1	4.2	3.7	3.8	3.6	2.5	1.7	1.8	1.7	1.9	2.4	4.5
12-Aug	2.0	1.8	1.8	1.4	1.7	2.5	3.2	3.6	3.3	2.7	3.0	3.1	2.9	2.7	2.6	2.6	2.6	2.6	2.7	1.7	1.2	1.2	0.9	1.6	3.6
13-Aug	0.8	1.0	1.2	0.8	0.8	1.2	1.1	1.4	1.1	1.6	1.9	1.7	1.1	1.2	3.1	2.1	1.8	2.1	1.8	1.8	1.4	1.4	2.1	1.7	3.1
14-Aug	2.8	2.1	2.8	3.5	3.5	3.7	3.0	3.3	3.6	4.1	4.0	3.6	4.1	3.8	4.1	4.4	4.1	3.5	3.1	3.0	3.1	2.6	2.8	3.1	4.4
15-Aug	2.5	2.3	1.8	2.0	2.0	2.2	2.3	2.8	3.2	3.1	3.5	3.7	4.0	3.7	3.5	3.2	2.9	2.8	1.6	1.2	1.6	1.0	1.2	0.9	4.0
16-Aug	0.3	0.3	0.2	0.2	0.2	0.2	0.3	0.5	0.8	1.5	1.5	1.9	1.7	2.0	2.3	1.7	1.8	1.1	1.2	1.2	0.9	1.2	1.0	0.7	2.3
17-Aug	0.9	0.9	1.0	1.1	1.0	1.3	1.7	1.6	1.8	2.0	2.0	2.1	2.1	2.4	2.4	2.0	2.3	1.8	0.9	0.6	0.5	0.8	0.9	0.7	2.4
18-Aug	0.5	0.4	0.4	0.4	0.2	0.3	0.4	0.7	1.3	1.7	2.0	1.9	2.0	2.2	2.2	1.8	1.8	1.2	1.3	0.9	1.2	1.5	1.5	1.8	2.2
19-Aug	2.1	2.3	2.8	2.6	2.9	2.8	2.9	2.9	2.5	2.3	2.5	2.9	2.9	2.9	4.2	4.5	3.6	4.1	3.9	3.4	3.5	3.2	2.7	2.4	4.5
20-Aug	2.8	2.9	2.8	2.8	2.3	3.9	3.6	3.7	3.8	4.0	3.4	3.7	3.8	3.8	3.1	3.3	3.2	2.8	2.7	2.4	2.5	2.8	2.7	2.7	4.0
21-Aug	2.7	2.8	3.2	3.4	3.4	3.0	2.9	2.3	2.6	2.7	2.6	2.2	3.2	3.1	3.2	2.7	2.3	2.4	1.5	1.7	2.1	2.5	2.4	2.3	3.4
22-Aug	2.2	2.3	2.4	2.6	2.7	2.7	2.2	2.0	2.2	2.6	2.9	2.6	2.4	1.9	2.7	2.4	1.8	1.1	0.7	0.5	0.4	0.4	0.4	0.5	2.9
23-Aug	0.7	0.4	0.7	0.9	1.2	1.3	1.8	1.3	1.5	1.6	2.4	2.1	2.2	2.0	2.2	2.1	1.9	1.9	1.5	1.9	2.6	2.6	2.9	1.0	2.9
24-Aug	0.9	0.4	0.8	2.5	1.1	1.0	1.1	1.5	2.0	1.8	2.1	2.2	2.4	2.7	2.6	2.1	1.7	1.5	1.1	0.8	0.6	0.4	0.4	0.4	2.7
25-Aug	0.4	0.2	0.2	0.2	0.2	0.1	0.2	0.4	1.2	1.3	2.0	2.6	2.2	2.2	2.0	1.8	1.5	1.3	0.7	0.7	0.3	0.5	0.9	1.2	2.6
26-Aug	1.0	1.7	1.2	0.3	0.5	0.4	0.3	0.7	1.1	1.7	1.8	1.7	2.0	1.5	1.4	1.6	1.5	1.1	0.9	0.7	0.8	0.8	1.0	0.9	2.0
27-Aug	0.3	0.3	0.3	0.3	0.6	0.7	0.9	1.1	1.6	2.2	2.6	2.4	2.4	2.0	2.6	2.7	2.8	2.8	2.2	1.4	1.7	2.2	1.5	1.2	2.8
28-Aug	1.1	2.2	2.5	1.3	2.0	2.2	2.3	2.1	2.6	2.6	3.4	2.9	2.9	3.5	2.8	2.6	2.4	2.0	0.7	0.1	0.2	0.8	0.6	0.4	3.5
29-Aug	0.5	1.1	0.7	0.9	0.8	0.6	0.8	0.4	1.3	1.7	2.2	2.1	2.1	2.3	2.0	1.9	1.9	2.1	2.5	2.3	2.8	2.6	2.7	2.8	2.8
30-Aug	2.1	2.7	3.3	2.6	2.2	0.9	0.9	1.5	2.3	2.1	2.2	2.1	2.5	2.0	2.1	1.4	1.3	3.1	2.8	2.1	1.5	1.6	1.5	1.9	3.3
31-Aug	2.0	2.2	1.9	1.9	1.7	2.3	1.9	2.4	2.8	2.9	2.3	2.6	3.2	3.5	3.6	3.8	2.9	2.8	2.2	1.4	1.8	1.5	1.1	1.3	3.8
	2.8	2.9	3.3	3.5	3.5	3.9	3.6	3.7	3.8	4.1	4.0	4.5	4.2	4.1	4.2	4.5	4.1	4.1	3.9	3.4	3.6	3.2	2.9	3.1	
	Diurnal Maximum																								

Maximum Value: 3.7 km/h on Aug 5 20:00

Maximum Daily Average: 0.8 km/h on Aug 6

Minimum Value: -1.4 km/h on Aug 21 13:00

Minimum Daily Average: -0.5 km/h on Aug 21

Maximum Diurnal Average: 0.4 km/h at hour 20

Minimum Diurnal Average: 0.1 km/h at hour 17

Monthly Average: 0.25 km/h

Percentiles: P_1 = -1.1 P_{10} = -0.5 Q_1 = -0.1 Median = 0.2 Q_3 = 0.6 P_{90} = 1.0 P_{99} = 1.8

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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0.0	0.0	0.0	0.0	-0.2	-0.1	0.3	0.0	0.0	0.0	0.4	-0.3	-0.3	1.2	-0.1	-1.0	-0.4	-0.7	-0.4	0.3	-0.3	0.1	-0.3	-0.2	-0.1	1.2
2-Aug	-0.2	0.0	0.1	0.3	0.2	0.3	0.3	0.2	0.4	0.4	0.1	0.6	0.1	0.6	1.0	0.1	-0.4	-0.1	1.2	0.2	-0.2	-0.1	0.2	-0.2	0.2	1.2
3-Aug	0.1	0.0	0.0	0.1	0.2	0.2	0.5	0.1	0.1	0.6	0.7	1.5	0.8	0.5	1.4	0.6	0.0	0.0	0.6	0.4	0.8	0.5	0.0	1.2	0.4	1.5
4-Aug	0.8	0.3	-0.2	-0.2	0.1	0.0	0.0	-0.4	0.0	-0.2	0.1	0.0	0.3	1.0	0.9	0.6	0.5	0.5	0.3	1.0	1.5	1.3	0.9	0.1	0.4	1.5
5-Aug	0.0	-0.3	0.2	0.0	0.0	-0.1	0.1	0.1	0.0	0.6	0.2	0.6	0.5	0.4	0.8	0.8	0.7	1.5	2.3	3.7	2.1	1.2	0.7	0.9	0.7	3.7
6-Aug	0.8	0.9	0.6	0.6	0.5	0.3	0.5	0.7	0.8	0.4	1.1	0.4	1.8	1.0	0.7	1.5	0.6	1.0	0.6	0.6	0.5	1.0	1.1	0.3	0.8	1.8
7-Aug	1.3	1.0	0.0	-0.1	0.1	0.1	0.0	0.0	0.2	0.1	0.5	-0.4	0.1	-0.1	-0.3	-0.1	-0.5	0.4	0.1	-0.1	0.3	0.9	1.5	1.7	0.3	1.7
8-Aug	1.9	1.7	1.2	1.1	1.0	0.7	0.6	0.7	0.2	0.7	0.0	0.5	0.9	0.3	0.4	0.2	0.8	0.3	0.1	0.6	1.5	0.9	0.0	0.2	0.7	1.9
9-Aug	0.1	0.0	0.1	0.2	0.1	0.1	0.1	0.1	0.2	-0.1	1.7	0.7	0.8	0.4	0.8	0.5	-0.1	0.6	0.1	0.1	0.2	0.3	0.7	1.1	0.4	1.7
10-Aug	0.5	-0.6	0.0	1.1	1.5	-0.1	0.3	0.6	0.6	0.2	0.2	0.2	-0.4	0.4	0.5	0.6	0.0	0.7	0.7	0.5	0.6	1.2	1.2	1.3	0.5	1.5
11-Aug	0.8	0.1	0.1	0.3	0.5	0.3	0.3	-0.1	-0.1	0.4	0.2	0.1	0.7	0.6	0.5	0.1	0.4	0.0	0.1	0.5	0.6	0.4	-0.5	0.3	0.3	0.8
12-Aug	0.2	1.2	0.9	0.8	1.1	1.0	0.5	-0.3	0.3	0.2	0.8	0.5	0.2	0.0	-0.1	0.0	0.4	0.1	-0.2	0.3	0.2	-0.1	0.3	2.5	0.5	2.5
13-Aug	-0.1	0.1	0.1	-0.1	0.0	0.0	0.0	0.3	0.1	0.3	0.8	0.8	-0.1	-0.4	-0.2	0.1	0.7	0.7	0.5	0.7	0.8	0.5	0.9	0.3	0.3	0.9
14-Aug	-0.4	0.8	0.2	0.1	0.1	0.0	-0.4	-0.3	-0.6	-0.1	-0.2	-0.4	-1.1	0.6	-0.8	-0.4	-1.1	-0.4	-1.0	-0.9	-1.2	-1.3	-0.7	-1.3	-0.4	0.8
15-Aug	-1.0	-0.7	-0.5	-0.5	-0.7	0.1	-0.1	-0.4	0.0	0.0	0.1	-0.5	-0.2	0.0	-0.2	0.2	-0.8	0.4	0.3	-0.5	-0.6	-0.2	-0.1	0.1	-0.2	0.4
16-Aug	0.0	-0.3	-0.2	-0.2	-0.2	-0.2	-0.1	-0.1	-0.2	0.4	-0.2	-0.4	0.4	0.1	-0.5	-0.7	-0.5	0.0	0.0	-0.6	0.3	0.9	0.2	0.1	-0.1	0.9
17-Aug	0.2	0.2	-0.6	0.0	0.1	0.2	0.3	0.5	0.8	0.4	0.3	0.6	0.1	-0.1	0.6	-0.3	0.6	-0.3	-0.4	-0.2	0.3	0.3	0.2	0.0	0.2	0.8
18-Aug	0.1	-0.3	-0.2	-0.2	-0.4	-0.6	-0.3	-0.2	-0.7	0.1	0.4	0.9	-0.3	0.2	0.0	0.3	0.6	0.3	0.1	0.3	0.4	0.2	0.8	0.6	0.1	0.9
19-Aug	0.4	0.8	0.7	0.2	0.3	0.8	1.3	1.1	0.3	0.3	0.1	0.1	0.7	0.5	0.1	0.3	0.4	-0.5	-0.8	-0.2	-0.9	-0.5	-0.1	0.0	0.2	1.3
20-Aug	-0.2	-0.2	0.0	0.2	0.6	-0.5	-0.5	-0.3	-0.6	-0.9	-0.3	-0.4	-0.6	-1.0	-1.1	-0.8	-0.5	-0.4	-0.9	-0.6	-0.2	-1.0	-0.7	-0.1	-0.5	0.6
21-Aug	0.2	0.1	0.0	-0.1	0.3	0.1	-0.5	-0.2	-0.8	-0.6	-0.7	0.0	-1.4	-1.2	-0.7	-0.7	-0.9	-0.9	-0.5	-0.5	-0.8	-0.8	-0.7	-0.7	-0.5	0.3
22-Aug	-0.7	-0.7	-0.7	0.7	-0.2	-0.3	-0.3	-0.1	0.2	-0.4	-0.9	-0.6	0.2	-0.5	0.0	0.0	-0.2	-0.1	0.1	0.3	0.8	0.3	0.3	0.4	-0.1	0.8
23-Aug	0.7	0.1	0.3	0.0	0.8	0.8	1.4	-0.5	-0.4	0.5	0.8	0.6	0.2	0.7	1.2	0.5	1.0	0.1	0.5	2.5	2.2	1.9	-0.1	-0.1	0.7	2.5
24-Aug	0.0	-0.1	-0.1	1.0	0.3	-0.2	0.0	0.4	0.8	0.8	-0.3	-0.3	-0.6	-0.4	-0.2	0.2	0.0	0.5	0.5	0.7	0.0	-0.4	-0.3	-0.2	0.1	1.0
25-Aug	0.2	-0.1	-0.1	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.6	-0.5	0.5	-0.2	-0.4	-0.2	0.1	0.0	-0.2	-0.1	-0.1	0.0	-0.2	0.0	0.1	-0.1	0.5
26-Aug	0.0	0.0	0.1	-0.2	-0.1	-0.1	-0.1	0.1	-0.3	-0.2	0.9	0.6	-0.4	0.0	0.2	0.7	0.1	0.0	0.3	0.6	0.9	0.3	0.3	-0.6	0.1	0.9
27-Aug	0.2	0.0	0.2	0.2	0.5	0.1	0.5	0.3	0.6	0.9	1.1	1.1	1.2	0.3	0.9	0.2	0.9	0.5	0.3	0.5	0.2	0.7	0.1	0.1	0.5	1.2
28-Aug	0.3	0.4	0.5	0.9	1.6	1.4	0.9	1.1	0.5	0.3	0.7	0.2	0.3	0.1	0.4	0.2	0.0	-0.1	0.0	0.1	0.1	0.2	-0.1	0.0	0.4	1.6
29-Aug	-0.2	-0.3	0.0	0.2	-0.2	-0.1	0.5	-0.1	0.2	0.4	0.9	0.7	0.1	0.3	0.6	1.1	0.8	1.1	1.5	1.1	1.3	1.3	1.3	1.2	0.6	1.5
30-Aug	1.4	1.5	1.8	1.3	1.3	1.0	0.4	0.6	0.7	-0.1	0.2	0.2	0.5	0.0	-0.2	0.4	0.4	1.0	1.7	1.5	-0.2	0.0	0.2	0.7	0.7	1.8
31-Aug	1.0	1.4	0.6	0.8	1.0	0.8	0.5	0.8	1.0	1.2	1.4	1.0	0.5	0.2	0.2	0.7	0.9	0.6	0.8	0.5	0.6	0.6	0.4	0.6	0.8	1.4
	0.3	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.1	0.2	0.3	0.3	0.1	0.2	0.2	0.2	0.1	0.2	0.3	0.4	0.4	0.3	0.3	0.3	Diurnal Average	
	1.9	1.7	1.8	1.3	1.6	1.4	1.4	1.1	1.0	1.2	1.7	1.5	1.8	1.2	1.4	1.5	1.0	1.5	2.3	3.7	2.2	1.9	1.5	2.5	Diurnal Maximum	

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

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

Lower Camp Met Tower - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 4.5 km/h on Aug 14 16:00

Minimum Value: 0.2 km/h on Aug 2 02:00

Percentiles: P_1 = 0.2 P_{10} = 0.6 Q_1 = 1.2 Median = 1.7 Q_3 = 2.5 P_{90} = 3.1 P_{99} = 4.0

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

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

Maximum Value: 4.1 km/h on Aug 5 20:00

Maximum Daily Average: 1.3 km/h on Aug 6

Minimum Value: -1.6 km/h on Aug 21 13:00

Minimum Daily Average: -0.3 km/h on Aug 21

Maximum Diurnal Average: 0.9 km/h at hour 20

Minimum Diurnal Average: 0.3 km/h at hour 9

Monthly Average: 0.59 km/h

Percentiles: P_1 = -0.9 P_{10} = -0.3 Q_1 = 0.1 Median = 0.5 Q_3 = 1.0 P_{90} = 1.6 P_{99} = 2.9

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0.2	0.3	0.0	0.2	0.0	-0.1	0.0	0.1	0.0	0.0	0.6	-0.5	-0.1	1.8	0.1	-0.9	-0.1	-0.8	-0.2	0.9	0.0	0.1	-0.1	0.0	0.1	1.8
2-Aug	0.0	0.0	0.1	0.2	0.4	0.4	0.3	0.3	0.5	0.2	0.0	0.3	-0.3	0.8	1.2	0.3	0.4	0.2	2.5	1.1	0.2	0.0	0.2	0.2	0.4	2.5
3-Aug	0.3	0.1	0.1	0.2	0.4	0.2	0.3	0.2	0.1	0.6	0.6	1.8	1.0	0.8	1.9	1.4	0.5	0.2	1.5	1.0	1.7	1.4	-0.3	1.4	0.7	1.9
4-Aug	2.0	0.3	0.5	0.5	0.4	0.3	0.2	-0.2	0.0	0.2	0.3	0.6	0.9	1.4	1.4	1.1	1.3	1.0	0.9	1.8	1.9	1.8	1.4	0.7	0.9	2.0
5-Aug	0.8	0.2	0.9	0.8	0.6	0.8	1.0	0.7	0.2	0.6	0.0	1.0	0.8	0.7	0.8	1.1	0.8	1.9	2.2	4.1	1.8	1.6	1.2	1.3	1.1	4.1
6-Aug	1.4	1.7	1.6	1.5	1.3	0.8	0.7	0.9	1.4	0.6	1.0	0.6	2.3	1.3	1.4	1.9	1.1	1.5	1.2	1.0	1.1	1.8	2.2	0.9	1.3	2.3
7-Aug	2.5	2.0	0.5	0.6	0.3	0.7	0.4	0.2	0.2	-0.1	0.5	-0.4	0.0	-0.5	-0.5	-0.2	-0.5	0.7	0.1	0.5	0.6	1.0	1.3	2.0	0.5	2.5
8-Aug	2.3	1.8	1.5	1.0	0.7	0.5	0.6	0.6	0.1	0.5	-0.4	0.4	1.2	0.5	0.2	0.0	1.5	0.5	0.3	1.4	1.9	1.4	0.1	0.2	0.8	2.3
9-Aug	0.4	0.5	0.8	0.9	0.5	0.3	0.2	0.2	0.1	0.0	1.6	0.4	0.8	0.2	1.2	0.7	-0.4	0.7	-0.1	0.4	0.2	0.4	1.0	1.6	0.5	1.6
10-Aug	1.0	-0.2	0.0	1.4	2.9	0.5	0.7	1.0	0.9	0.7	0.4	0.3	0.1	0.6	0.9	0.9	0.5	1.5	1.5	1.8	2.2	2.8	2.9	3.0	1.2	3.0
11-Aug	1.7	0.5	0.9	0.7	0.8	1.1	0.6	0.6	0.1	0.9	0.9	0.9	1.3	1.4	1.2	1.0	1.4	0.9	0.8	1.1	1.4	1.2	0.2	0.8	0.9	1.7
12-Aug	0.6	1.6	2.1	2.1	2.0	2.0	1.4	0.9	1.4	0.9	1.4	1.2	0.8	0.2	0.2	0.5	0.8	0.5	0.6	0.7	0.6	0.0	0.2	3.1	1.1	3.1
13-Aug	0.6	1.0	0.3	0.4	0.9	0.3	0.5	0.6	0.3	0.3	0.4	0.4	0.1	-0.4	0.6	1.2	1.9	1.8	1.3	1.8	1.3	1.5	1.8	0.9	0.8	1.9
14-Aug	0.4	1.3	0.7	0.6	0.8	0.8	0.1	0.2	0.2	0.9	0.5	0.4	-0.4	2.0	-0.3	0.3	-1.0	0.4	-0.9	-1.1	-1.0	-1.1	-0.2	-1.1	0.1	2.0
15-Aug	-0.9	-0.5	-0.4	-0.3	-0.5	0.4	0.1	-0.4	0.0	0.1	0.5	-0.5	-0.3	0.4	0.2	0.6	-0.9	0.7	0.4	-0.2	-0.3	0.0	0.2	0.0	-0.1	0.7
16-Aug	0.1	-0.3	-0.3	-0.1	-0.2	-0.1	0.2	0.3	0.3	0.4	-0.3	-0.4	0.2	-0.3	-0.4	-0.7	-0.4	0.0	0.4	-0.2	0.6	0.8	1.2	1.1	0.1	1.2
17-Aug	0.6	0.5	-0.8	0.2	0.6	0.8	0.7	0.8	0.3	0.2	-0.1	1.2	0.1	0.0	1.2	-0.2	1.0	0.6	-0.2	-0.1	0.4	0.6	0.5	0.7	0.4	1.2
18-Aug	0.5	0.0	0.0	0.0	0.1	-0.4	-0.3	-0.1	-0.8	0.2	0.7	1.3	-0.3	-0.2	0.2	1.0	1.1	0.7	0.0	1.3	0.4	1.5	3.9	3.7	0.6	3.9
19-Aug	2.8	0.5	-0.2	-0.1	0.1	0.6	0.6	0.6	0.5	1.4	0.9	0.6	1.1	1.1	0.9	1.3	0.9	-0.2	0.2	0.6	-0.3	0.2	0.2	0.6	0.6	2.8
20-Aug	0.3	0.1	0.9	1.1	0.8	-0.1	0.3	0.4	0.4	-0.6	0.4	0.1	0.2	-0.9	-0.8	-0.7	-0.3	-0.3	-0.8	-0.5	0.4	-0.7	-0.1	0.5	0.0	1.1
21-Aug	0.3	0.1	0.1	0.3	0.5	0.7	-0.2	0.3	-0.4	-0.1	-0.6	0.0	-1.6	-1.1	-0.5	-0.6	-0.8	-0.9	-0.4	-0.5	-0.6	-0.5	-0.5	-0.6	-0.3	0.7
22-Aug	-0.4	-0.4	-0.4	1.3	0.2	-0.3	0.3	1.0	0.8	0.5	-0.7	-0.4	0.1	-0.5	0.1	0.5	-0.3	-0.3	0.2	0.3	0.6	0.4	0.5	0.2	0.1	1.3
23-Aug	0.3	0.4	0.3	0.3	0.5	0.5	0.7	-0.8	-0.5	0.5	0.5	0.4	0.8	1.3	1.1	0.6	0.7	-0.1	0.9	3.3	1.8	1.6	0.3	0.0	0.6	3.3
24-Aug	0.6	0.4	0.0	1.1	0.5	0.8	0.9	0.6	0.6	1.7	0.1	0.0	-0.2	0.0	0.1	0.4	0.2	0.7	0.9	1.1	0.2	-0.2	0.1	0.2	0.4	1.7
25-Aug	0.2	0.2	0.2	0.2	0.0	0.2	0.1	0.1	0.1	-0.2	-0.2	1.1	-0.2	-0.3	0.0	0.2	0.2	0.0	0.0	0.1	0.2	0.2	0.2	0.2	0.1	1.1
26-Aug	0.0	0.2	0.2	-0.1	0.1	0.2	0.1	0.4	-0.1	-0.1	0.8	0.6	-0.9	-0.5	0.3	0.9	0.4	0.1	0.6	0.9	1.0	0.9	0.4	-0.4	0.2	1.0
27-Aug	0.3	0.3	0.4	0.4	0.6	0.5	0.3	0.5	0.7	0.8	0.5	1.0	1.4	1.3	1.3	1.4	2.0	1.4	1.2	1.5	2.7	3.4	1.9	0.8	1.1	3.4
28-Aug	1.7	1.3	1.7	1.9	2.9	2.7	1.9	2.2	1.1	1.1	1.2	0.7	0.8	0.6	0.9	0.3	0.6	0.4	0.3	0.1	0.2	0.6	0.0	0.4	1.1	2.9
29-Aug	0.2	-0.1	0.2	0.4	0.1	0.2	1.0	0.5	0.4	0.4	0.4	0.4	-0.1	0.4	0.7	1.2	0.9	1.2	1.7	2.0	2.2	1.3	1.7	1.1	0.8	2.2
30-Aug	2.0	1.9	1.5	1.8	1.5	1.2	0.8	1.2	1.1	0.3	0.5	0.4	0.8	0.0	-0.3	0.7	0.9	0.9	2.0	1.1	0.5	0.3	0.7	0.4	0.9	2.0
31-Aug	0.4	0.4	-0.3	0.0	0.0	0.4	0.4	0.7	0.4	0.4	1.6	1.5	1.7	1.1	1.3	1.7	1.9	1.4	1.7	1.8	1.5	1.0	1.6	2.5	1.0	2.5
	0.7	0.5	0.4	0.6	0.6	0.5	0.5	0.5	0.3	0.4	0.5	0.5	0.4	0.4	0.5	0.6	0.5	0.6	0.7	0.9	0.8	0.8	0.8	0.8	Diurnal Average	
	2.8	2.0	2.1	2.1	2.9	2.7	1.9	2.2	1.4	1.7	1.6	1.8	2.3	2.0	1.9	1.9	2.0	1.9	2.5	4.1	2.7	3.4	3.9	3.7	Diurnal Maximum	

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Vertical Wind Speed 167 m (VW167m) - km/h

Lower Camp Met Tower - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 4.7 km/h on Aug 14 16:00

Minimum Value: 0.2 km/h on Aug 2 03:00

Percentiles: P_1 = 0.2 P_{10} = 0.6 Q_1 = 1.0 Median = 1.7 Q_3 = 2.5 P_{90} = 3.1 P_{99} = 4.1

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Aug	0.8	0.5	0.6	0.4	0.7	0.9	0.9	1.0	0.8	1.3	2.3	3.1	3.1	3.4	2.2	2.6	2.8	2.5	1.7	1.0	1.1	0.5	0.4	0.5	3.4
2-Aug	0.4	0.2	0.2	0.3	0.5	0.5	0.4	0.7	0.9	1.3	1.9	2.0	2.7	2.7	3.0	2.1	2.7	1.6	2.2	1.4	0.8	0.7	0.3	0.4	3.0
3-Aug	0.3	0.2	0.2	0.2	0.4	0.4	0.6	0.7	0.7	1.4	1.4	2.0	2.2	2.9	2.7	2.8	1.6	1.5	1.1	0.7	0.6	1.7	1.3	1.9	2.9
4-Aug	1.8	1.5	0.8	1.1	1.3	1.7	1.3	1.9	2.0	1.5	1.6	1.8	2.1	2.3	1.9	1.8	1.6	1.8	2.0	2.4	2.6	1.8	1.3	1.3	2.6
5-Aug	1.3	1.3	0.9	0.6	0.9	0.7	0.9	0.8	1.5	1.7	0.9	1.8	1.7	2.0	1.9	1.8	1.8	1.9	3.6	3.9	3.6	2.4	2.0	2.0	3.9
6-Aug	1.9	2.6	2.4	2.4	2.2	2.2	2.2	2.7	2.7	2.5	2.0	2.3	3.8	3.3	3.4	2.7	3.1	2.4	1.8	1.5	1.4	1.0	1.4	1.6	3.8
7-Aug	1.3	2.0	1.7	0.9	0.8	0.6	0.6	0.6	0.9	1.2	1.4	0.8	0.9	0.8	1.4	1.9	1.7	1.6	1.6	2.0	1.8	2.0	1.4	1.6	2.0
8-Aug	2.2	1.5	1.3	1.4	1.5	1.2	1.0	1.1	1.2	1.5	1.5	2.0	2.5	2.2	1.6	2.2	2.5	1.4	0.5	1.6	1.7	1.3	1.0	0.3	2.5
9-Aug	0.4	0.6	0.5	0.3	0.5	0.3	0.3	0.4	1.0	1.2	1.8	1.8	1.9	2.1	2.8	1.6	1.8	1.5	0.8	0.7	1.4	1.2	1.3	1.7	2.8
10-Aug	2.1	2.7	1.1	1.7	1.2	2.1	1.5	2.1	2.1	2.6	2.4	2.6	2.6	3.4	3.1	3.1	2.1	2.2	1.8	0.8	0.8	1.4	1.1	1.1	3.4
11-Aug	1.3	2.0	1.5	1.0	1.1	1.8	1.4	1.2	1.5	3.0	3.4	3.1	2.8	3.7	3.4	2.5	2.8	2.6	2.2	1.4	1.1	0.8	1.3	1.3	3.7
12-Aug	1.1	1.4	1.4	2.3	2.2	2.3	2.3	2.4	2.6	2.0	2.7	3.1	3.2	3.0	2.8	3.0	2.3	1.8	1.6	0.8	0.5	0.7	1.1	1.5	3.2
13-Aug	1.9	1.3	1.4	0.9	1.2	1.9	1.5	1.7	1.3	1.0	1.1	0.7	1.5	1.4	2.5	2.5	1.7	2.2	1.6	1.1	0.7	0.6	0.7	1.5	2.5
14-Aug	2.1	2.0	1.2	1.5	1.9	2.2	2.7	2.8	3.0	3.7	3.5	3.6	3.8	4.5	3.9	4.7	4.1	4.0	2.9	2.9	2.6	2.1	2.8	2.6	4.7
15-Aug	1.9	2.3	1.9	1.5	1.9	2.2	2.0	2.6	3.0	3.1	3.6	3.6	4.0	3.8	2.9	3.1	2.8	3.0	1.3	0.9	1.1	1.0	0.6	1.0	4.0
16-Aug	0.8	0.4	0.4	0.4	0.3	0.3	0.7	1.0	0.5	1.4	1.7	2.4	1.8	2.9	3.1	2.1	2.3	1.6	1.5	1.4	1.3	0.8	1.1	1.0	3.1
17-Aug	1.2	1.3	1.7	1.8	1.1	1.0	1.1	1.0	0.8	1.0	1.4	3.0	3.2	3.5	3.3	3.1	2.6	2.4	1.3	0.7	0.7	1.0	0.7	1.3	3.5
18-Aug	0.8	0.9	0.6	1.1	0.3	0.6	0.5	0.6	1.1	2.1	2.9	3.3	2.7	2.7	2.8	2.5	2.3	1.3	1.1	1.0	0.8	1.6	0.8	1.0	3.3
19-Aug	1.2	1.4	1.6	1.7	1.6	2.3	2.7	2.7	1.8	2.6	3.0	2.5	2.8	2.9	2.9	2.9	2.4	3.7	4.3	4.2	3.1	3.0	2.7	2.2	4.3
20-Aug	2.2	2.0	3.4	2.6	2.4	2.8	3.6	3.7	3.6	3.9	3.9	3.7	4.1	3.3	3.6	3.0	3.2	3.0	2.5	2.1	2.5	2.3	2.1	2.1	4.1
21-Aug	1.5	1.3	1.4	1.2	1.2	1.5	2.0	2.5	3.3	3.4	2.8	2.7	3.0	3.3	2.8	3.0	2.3	1.9	1.5	2.0	1.7	1.7	1.9	1.8	3.4
22-Aug	1.8	2.2	2.2	2.3	1.8	1.3	1.8	2.2	2.3	2.8	3.0	3.1	3.1	2.5	3.6	2.7	2.2	1.4	1.7	0.8	0.7	0.7	0.9	0.8	3.6
23-Aug	0.7	0.5	0.7	0.7	1.1	1.1	1.7	1.3	1.2	1.5	1.7	2.6	2.9	2.6	2.8	2.8	2.3	1.5	1.6	1.9	2.9	2.6	3.5	1.3	3.5
24-Aug	1.2	1.0	0.8	2.3	1.3	1.0	1.2	1.1	1.3	2.3	2.3	2.3	2.1	2.7	2.9	2.5	2.2	1.9	1.0	0.6	0.7	1.2	0.8	0.7	2.9
25-Aug	0.7	0.6	0.6	0.5	0.3	0.2	0.2	0.2	0.4	1.1	2.2	3.2	2.8	1.8	1.0	1.6	0.9	0.6	0.4	0.6	0.5	0.6	0.5	1.5	3.2
26-Aug	1.4	1.5	1.6	0.8	1.0	0.7	0.4	1.2	1.1	1.5	2.3	2.1	1.3	2.2	2.0	2.3	1.8	1.6	1.1	0.5	0.8	0.6	0.9	1.1	2.3
27-Aug	0.4	0.4	0.4	0.4	0.5	0.6	0.5	0.7	0.8	1.0	1.5	2.9	3.1	3.6	4.1	3.8	4.0	2.4	1.8	1.0	1.0	0.8	1.4	2.1	4.1
28-Aug	2.1	1.7	1.4	2.1	1.6	1.8	1.5	1.9	2.0	2.1	2.8	2.3	2.5	2.4	2.8	2.1	1.9	1.3	0.8	0.3	0.2	2.2	0.9	0.9	2.8
29-Aug	0.7	0.9	0.6	1.1	1.0	0.7	0.9	0.9	1.1	1.7	2.0	2.4	2.3	2.9	2.8	2.5	2.8	2.5	1.6	1.8	3.1	3.3	3.3	2.9	3.3
30-Aug	2.9	3.1	2.9	1.9	2.1	1.3	1.4	1.5	1.7	2.5	3.2	2.9	3.1	2.8	2.5	2.2	1.4	3.8	1.8	2.6	2.3	2.5	1.7	1.0	3.8
31-Aug	0.9	1.0	1.0	1.0	1.0	1.8	1.4	1.3	1.0	1.6	1.7	3.3	3.2	3.7	3.5	3.1	3.2	2.4	1.9	1.2	0.9	0.9	0.5	1.4	3.7
	2.9	3.1	3.4	2.6	2.4	2.8	3.6	3.7	3.6	3.9	3.9	3.7	4.1	4.5	4.1	4.7	4.1	4.0	4.3	4.2	3.6	3.3	3.5	2.9	
	Diurnal Maximum																								

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 4
BUFFALO VIEWPOINT
AUGUST 2015

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

September 28, 2015

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BUFFALO VIEWPOINT (AMS 4)
AUGUST 2015

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	663	33	81	93.55	14	0	2	0
H2S (ppb) Average	661	33	83	93.28	6	0	1	0
THC (ppm) Average	662	33	82	93.41	5	-	3.3	-
Temperature (C) Average	743	0	1	99.87	29.7	-	23.3	-
Relative Humidity (%) Average	743	0	1	99.87	99	-	85	-
Wind Speed 10 m (km/h) Average	738	5	6	99.87	24	-	18	-
Wind Direction 10 m (deg) Average	738	5	6	99.87	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BUFFALO VIEWPOINT (AMS 4)
AUGUST 2015

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

					Percentile						
Parameter	Number	Mean	StnDev	Total	Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	663	0.7	1	-	0	0	0	0	1	1	14
H2S (ppb) Average	661	0.5	0	-	0	0	0	0	1	1	6
THC (ppm) Average	662	2.39	0.4	-	2	2.1	2.2	2.3	2.5	2.8	5
Temperature 2 m (C) Average	743	17.61	5	-	2.2	11.5	14	17.5	21.3	24.3	29.7
Relative Humidity (%) Average	743	65.1	20	-	25	37	49	66	81	93	99
Wind Speed 10 m (km/h) Average	738	9.4	5	-	0	4	6	8	12	16	24
Wind Direction 10 m (deg) Average	738	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BUFFALO VIEWPOINT (AMS 4)
AUGUST 2015

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
ALL PARAMETERS	16 Aug 2015 18:00	16 Aug 2015 18:00	1	Data logger program uploaded - data not recorded
H2S	12 Aug 2015 12:00	12 Aug 2015 12:00	1	Maintenance - sample manifold cleaning
SO2	13 Aug 2015 16:00	15 Aug 2015 14:00	47	Station power failure
H2S, THC	13 Aug 2015 16:00	15 Aug 2015 15:00	48	Station power failure

Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO_2) - ppb

Buffalo Viewpoint - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 14 ppb on Aug 9 03:00 Maximum Daily Average: 2.2 ppb on Aug 26

Minimum Value: 0 ppb on Aug 6 07:00
Maximum Diurnal Average: 1.6 ppb at hour 11
Monthly Average: 0.7 ppb

Minimum Daily Average: 0.1 ppb on Aug 6
Minimum Diurnal Average: 0.3 ppb at hour 7
Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 1$ $P_{90} = 1$ $P_{99} = 9$

Hours in Service:	744
Hours of Data:	663
Hours of Missing Data:	81
Hours of Calibration:	33
Percent Operational Time:	93.6

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0	0	0	Z	0	0	0	0	1	1	13	11	6	2	1	4	4	1	1	0	1	0	0	0	2.0	13
2-Aug	0	0	0	0	Z	0	0	0	0	1	1	2	1	0	0	0	1	1	3	10	4	3	3	5	1.5	10
3-Aug	4	2	1	0	0	Z	0	0	0	2	9	2	1	1	1	1	1	0	0	0	0	0	0	0	1.2	9
4-Aug	Z	0	1	1	1	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2
5-Aug	0	Z	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
6-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
7-Aug	0	0	0	Z	0	1	0	0	0	1	2	2	3	3	3	4	2	1	1	1	1	0	0	0	1.2	4
8-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.2	1
9-Aug	1	1	14	5	1	Z	0	0	0	0	1	1	1	1	0	0	1	3	1	1	2	0	0	0	1.5	14
10-Aug	Z	1	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	3
11-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
12-Aug	0	0	Z	0	0	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.2	0
13-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	PF	PF	PF	PF	PF	PF	PF	PF	PF	--	0
14-Aug	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	--	--
15-Aug	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	1	4	2	2	1	1	1	1	1	1	--	4
16-Aug	Z	2	2	0	0	0	0	0	0	1	1	0	5	1	0	1	1	M	1	1	0	0	0	0	0.8	5
17-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
18-Aug	0	0	Z	0	1	0	0	2	4	8	2	3	8	3	2	2	1	0	0	0	0	0	0	0	1.7	8
19-Aug	0	0	0	Z	0	0	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	0.5	1
20-Aug	1	1	1	0	Z	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	1	1	1	0	0.5	1
21-Aug	0	1	1	0	1	Z	0	1	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	1	0.4	2
22-Aug	Z	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	1	4	1	0	0	0	0	0	0.8	4
23-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1	1	0	1	0	0.5	1
24-Aug	2	1	Z	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	1	0	0.5	2
25-Aug	0	1	1	Z	1	1	0	0	1	1	6	1	1	0	0	0	0	1	1	0	0	0	0	0	0.8	6
26-Aug	0	0	0	0	Z	0	0	2	1	0	1	11	10	7	5	3	2	1	1	1	1	1	1	0	2.2	11
27-Aug	0	0	0	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0.4	1
28-Aug	Z	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1	1	1	1	0	1	6	1	1	0.7	6
29-Aug	1	Z	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	1	1	0	0	0	0	0	0.4	1
30-Aug	0	0	Z	0	0	0	0	0	2	2	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0.6	2
31-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
	0.5	0.5	1.1	0.6	0.4	0.3	0.3	0.4	0.6	0.9	1.6	1.4	1.6	0.9	0.8	0.9	0.7	0.8	0.6	0.7	0.6	0.6	0.4	0.5	Diurnal Average	
	4	2	14	5	1	1	1	2	4	8	13	11	10	7	5	4	4	4	3	10	4	6	3	5	Diurnal Maximum	

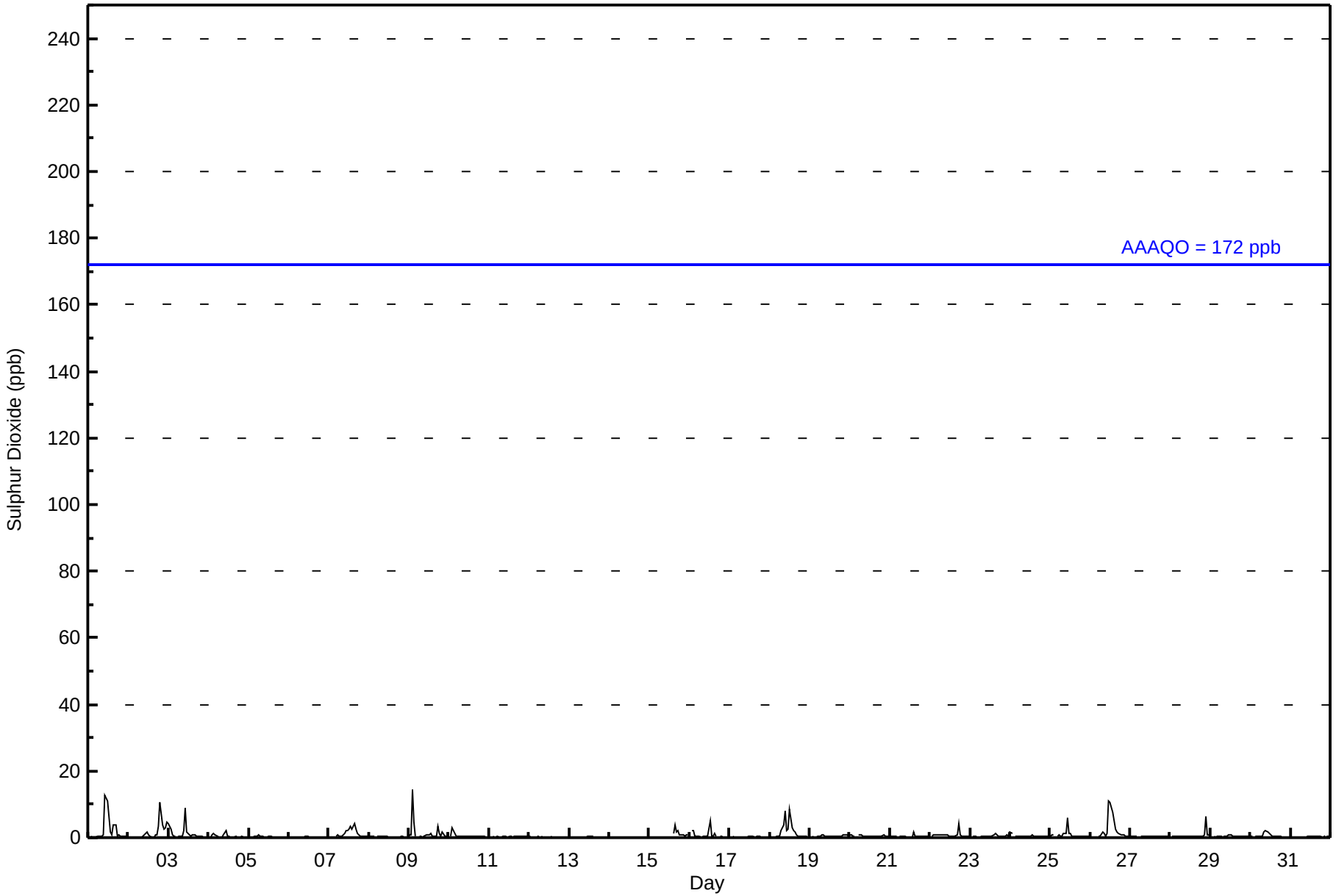
Z - zerospan C - Calibration M - Maintenance PF - Power Failure
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb

Wood Buffalo Environmental Association

Hourly Averages

Sulphur Dioxide (SO_2) - ppb

Buffalo Viewpoint - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

Buffalo Viewpoint - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	659	99.40	99.40
11 - 20	4	0.60	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: 663

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

Buffalo Viewpoint - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 10	27	8	13	6	12	46	90	105	30	35	55	72	40	42	45	28	654
11 - 20	1	0	0	1	0	0	0	0	0	0	0	0	0	1	0	1	4
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	28	8	13	7	12	46	90	105	30	35	55	72	40	43	45	29	658

Total Number of Valid Hours: 658

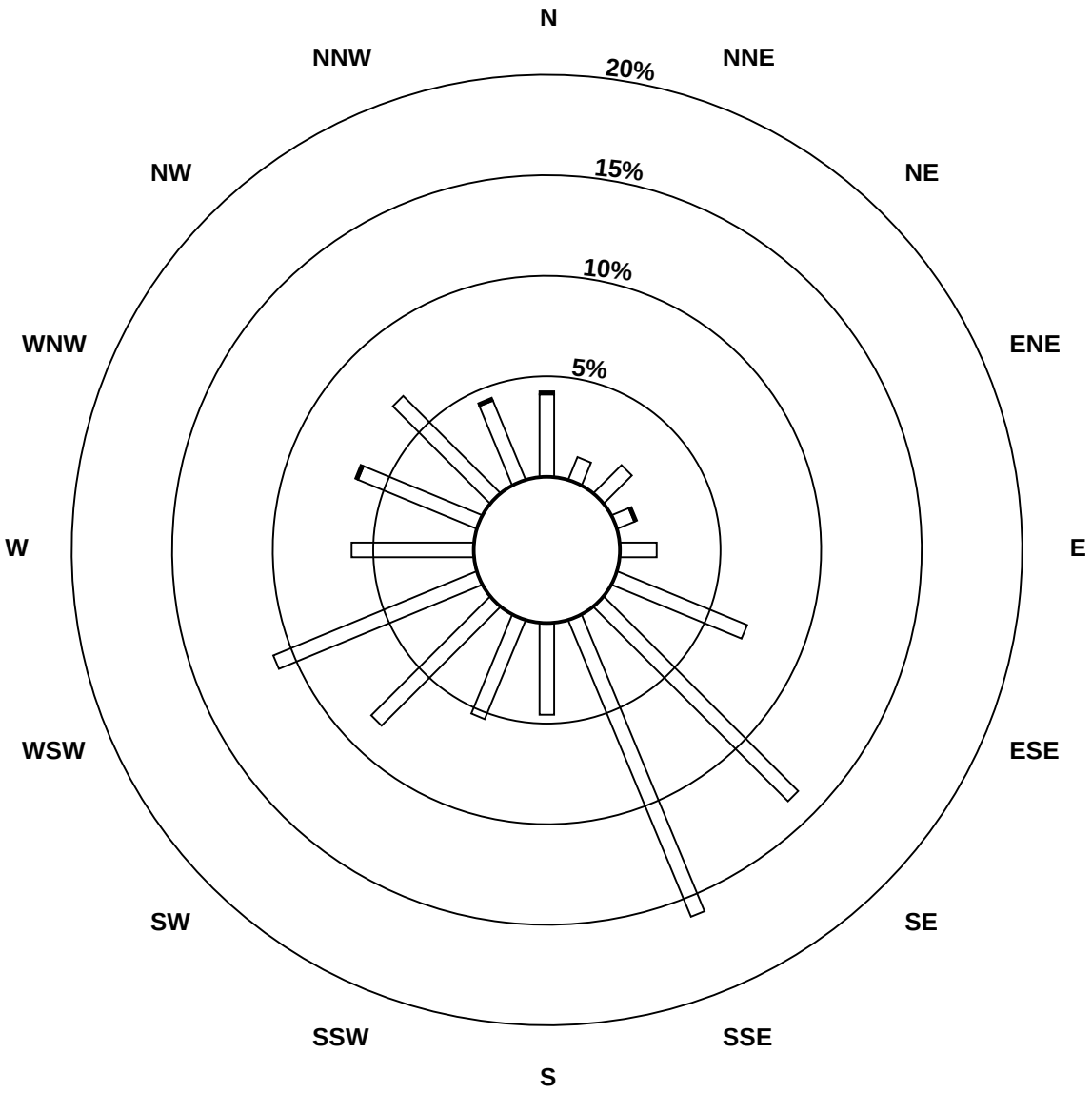
Total Number of Hours: 744

Wood Buffalo Environmental Association

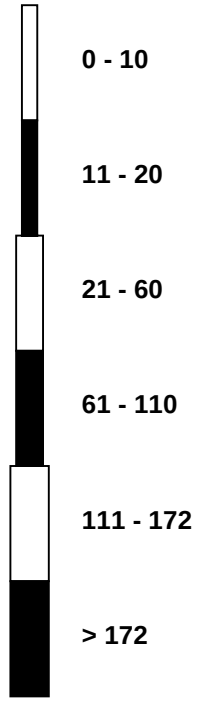
Wind Rose Aug 2015

Sulphur Dioxide (SO_2) - ppb

Buffalo Viewpoint (AMS 4)



Classes (ppb)



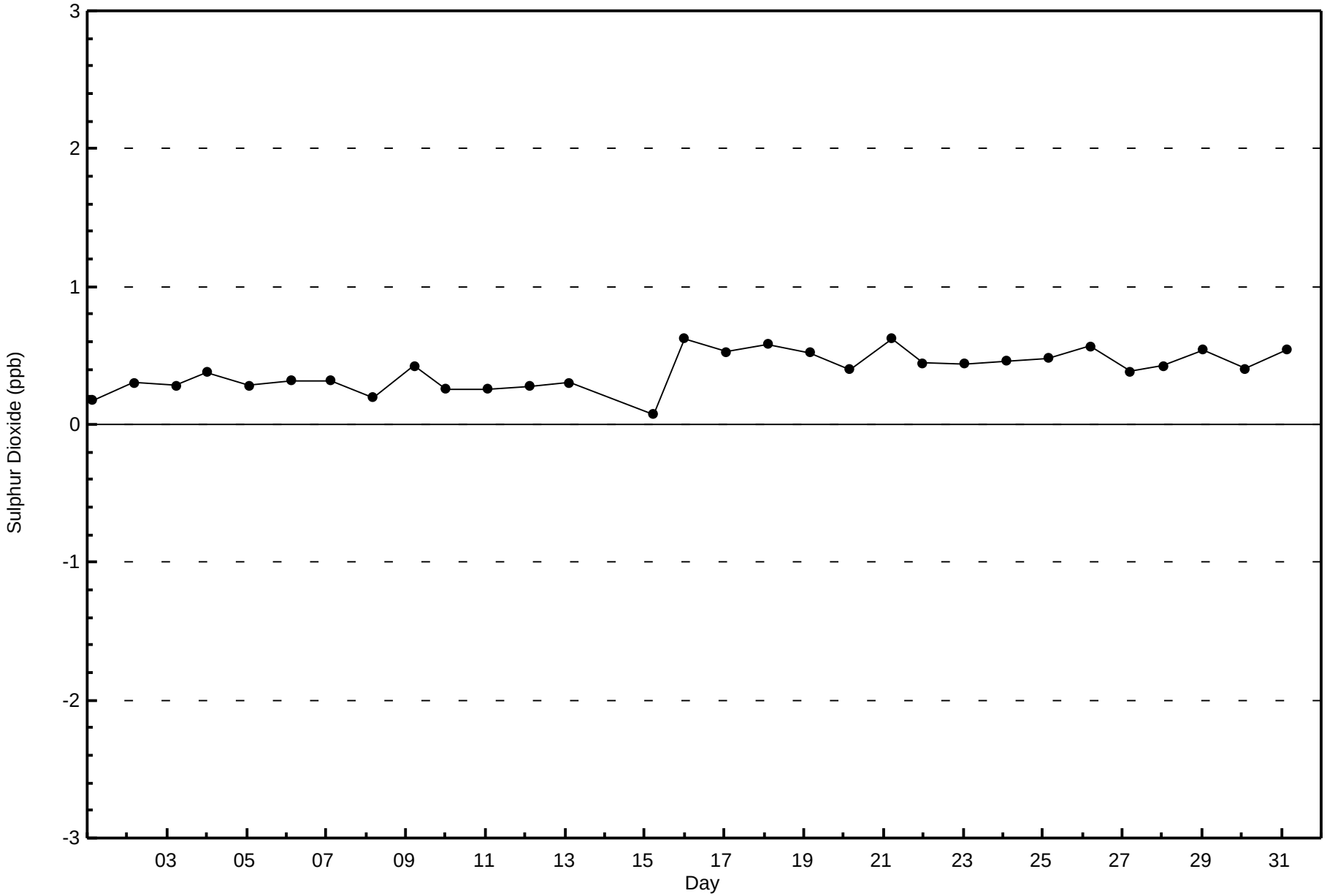
Total Number of Valid Hours: 658

Wood Buffalo Environmental Association

Zero Responses

Sulphur Dioxide (SO_2) - ppb

Buffalo Viewpoint - August 2015

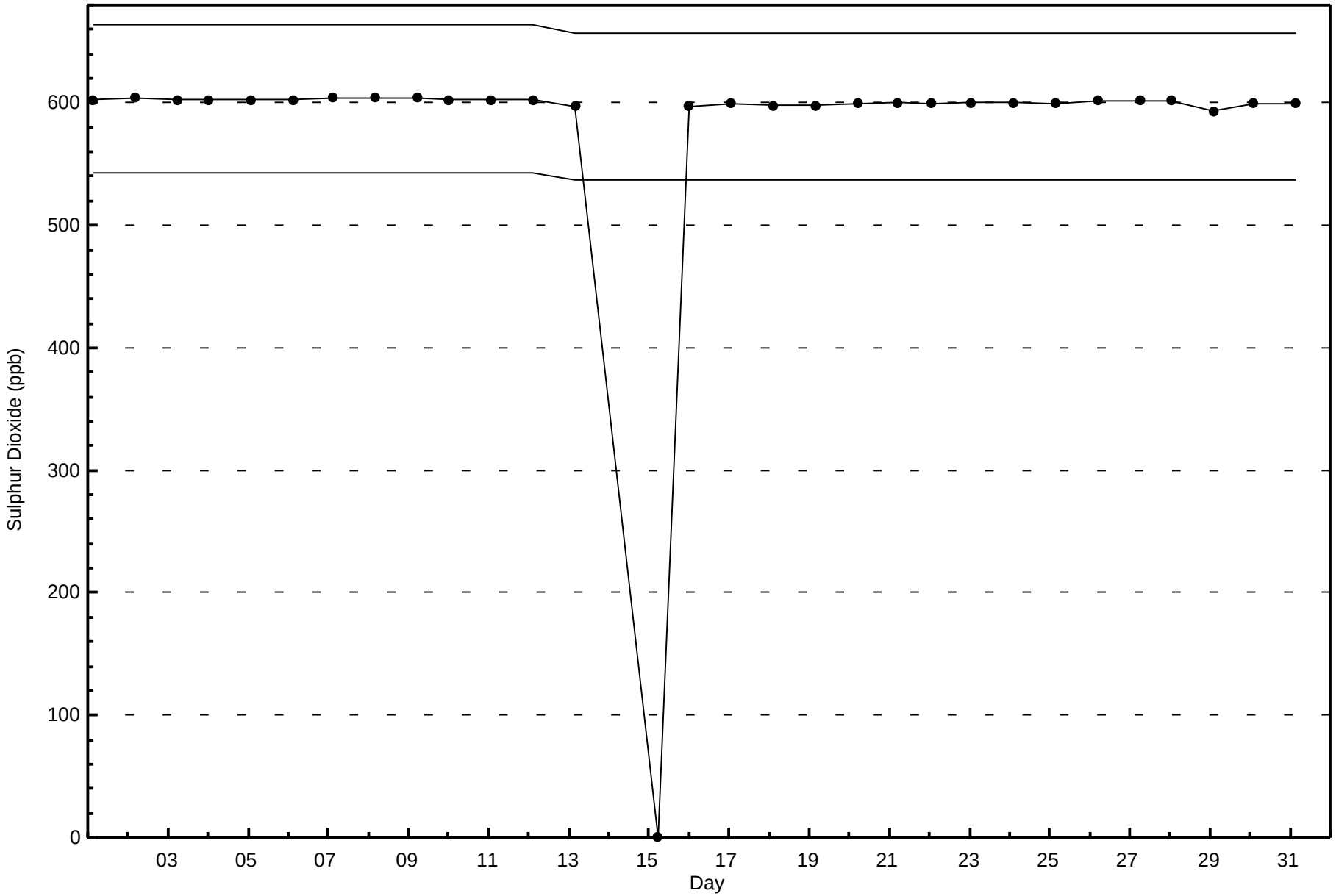


Wood Buffalo Environmental Association

Span Responses

Sulphur Dioxide (SO_2) - ppb

Buffalo Viewpoint - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Hydrogen Sulphide (H_2S) - ppb

Buffalo Viewpoint - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 6 ppb on Aug 3 21:00 Maximum Daily Average: 1.0 ppb on Aug 3

Minimum Value: 0 ppb on Aug 11 15:00 Minimum Daily Average: 0.1 ppb on Aug 11
Maximum Diurnal Average: 0.7 ppb at hour 6 Minimum Diurnal Average: 0.3 ppb at hour 19
Monthly Average: 0.5 ppb Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 1$ $P_{90} = 1$ $P_{99} = 2$

Hours in Service:	744
Hours of Data:	661
Hours of Missing Data:	83
Hours of Calibration:	33
Percent Operational Time:	93.3

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

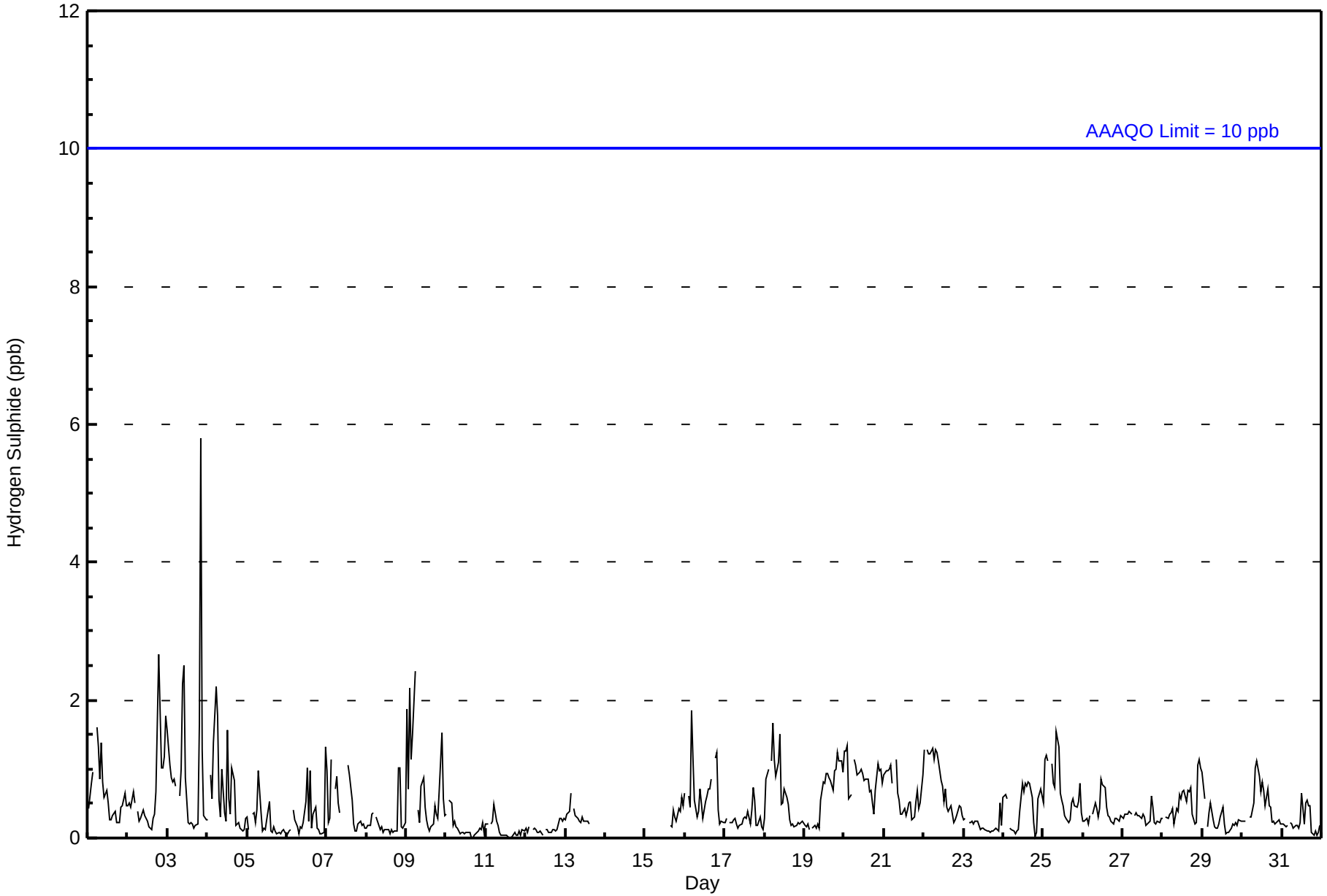
Z - zerospan C - Calibration M - Maintenance PF - Power Failure
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb

Wood Buffalo Environmental Association

Hourly Averages

Hydrogen Sulphide (H_2S) - ppb

Buffalo Viewpoint - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Hydrogen Sulphide (H_2S) - ppb

Buffalo Viewpoint - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	658	99.55	99.55
3 - 4	2	0.30	99.85
5 - 7	1	0.15	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 661

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Hydrogen Sulphide (H_2S) - ppb

Buffalo Viewpoint - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 2	28	6	12	7	12	46	87	109	28	35	56	76	39	42	44	27	654
3 - 4	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2
5 - 7	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	28	7	12	7	12	47	87	109	28	35	56	77	39	42	44	27	657

Total Number of Valid Hours: 657

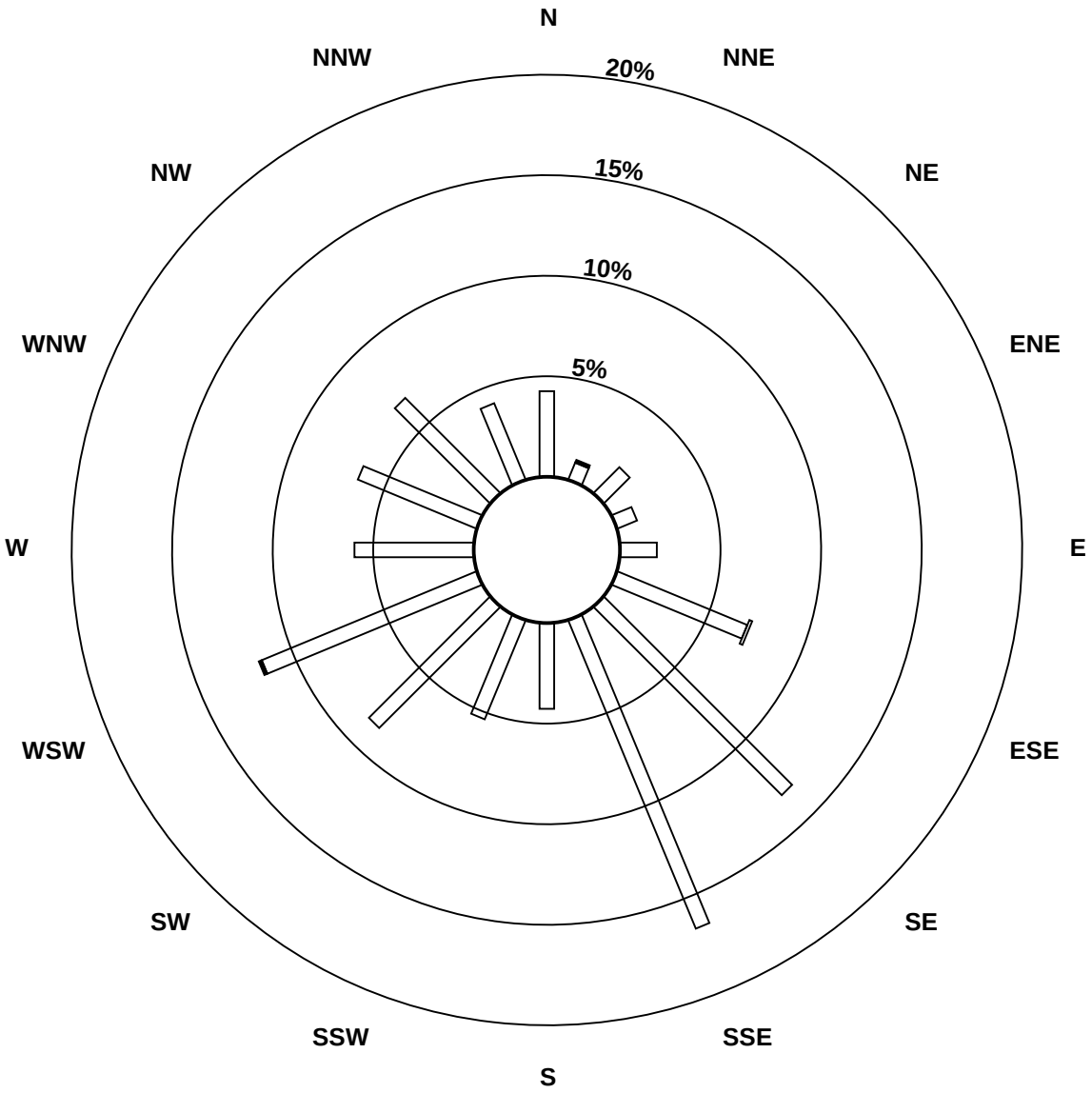
Total Number of Hours: 744

Wood Buffalo Environmental Association

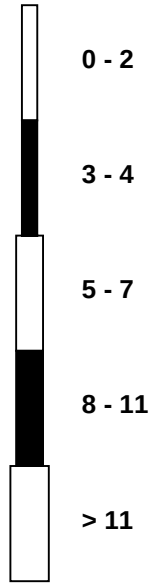
Wind Rose Aug 2015

Hydrogen Sulphide (H_2S) - ppb

Buffalo Viewpoint (AMS 4)



Classes (ppb)



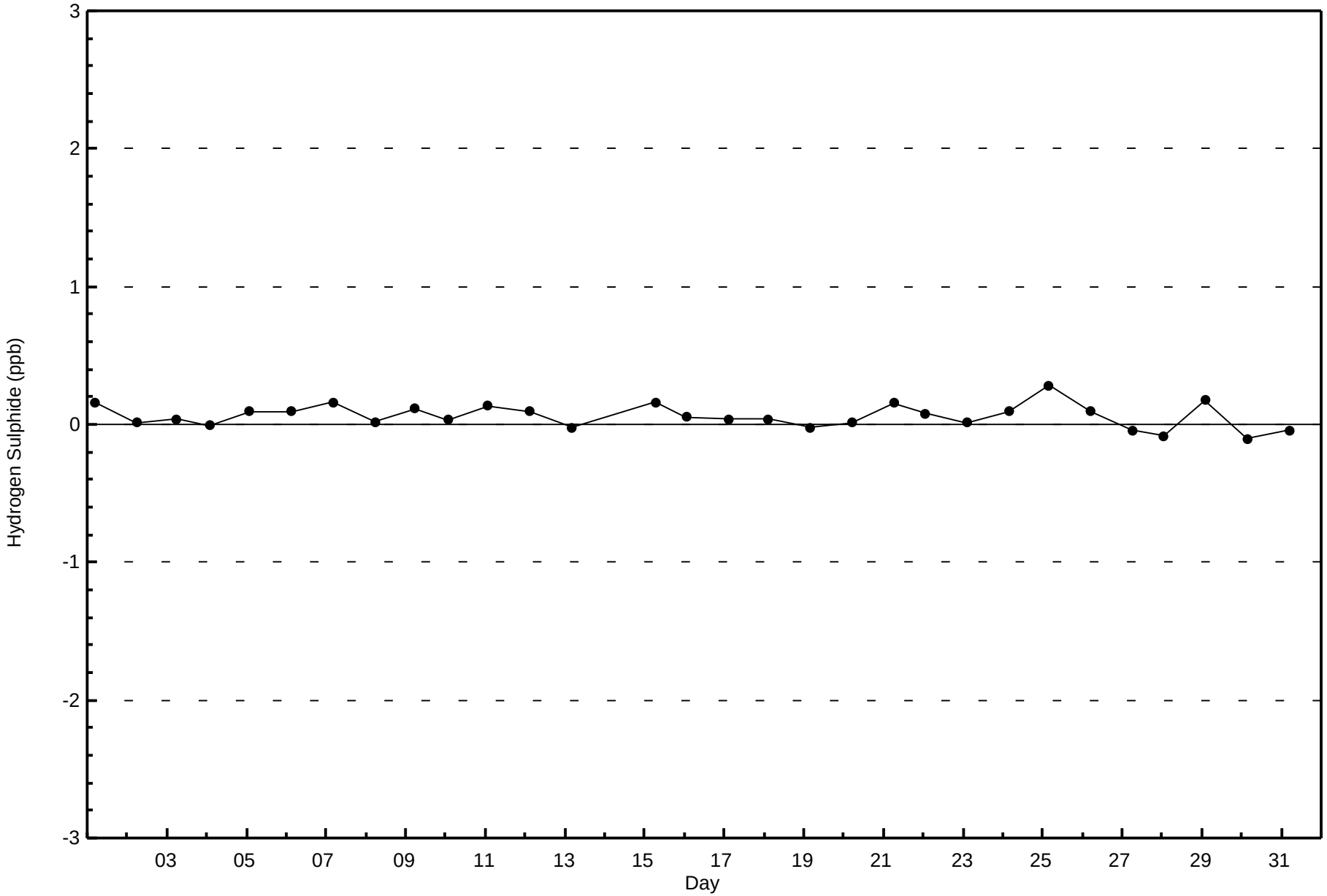
Total Number of Valid Hours: 657

Wood Buffalo Environmental Association

Zero Responses

Hydrogen Sulphide (H_2S) - ppb

Buffalo Viewpoint - August 2015

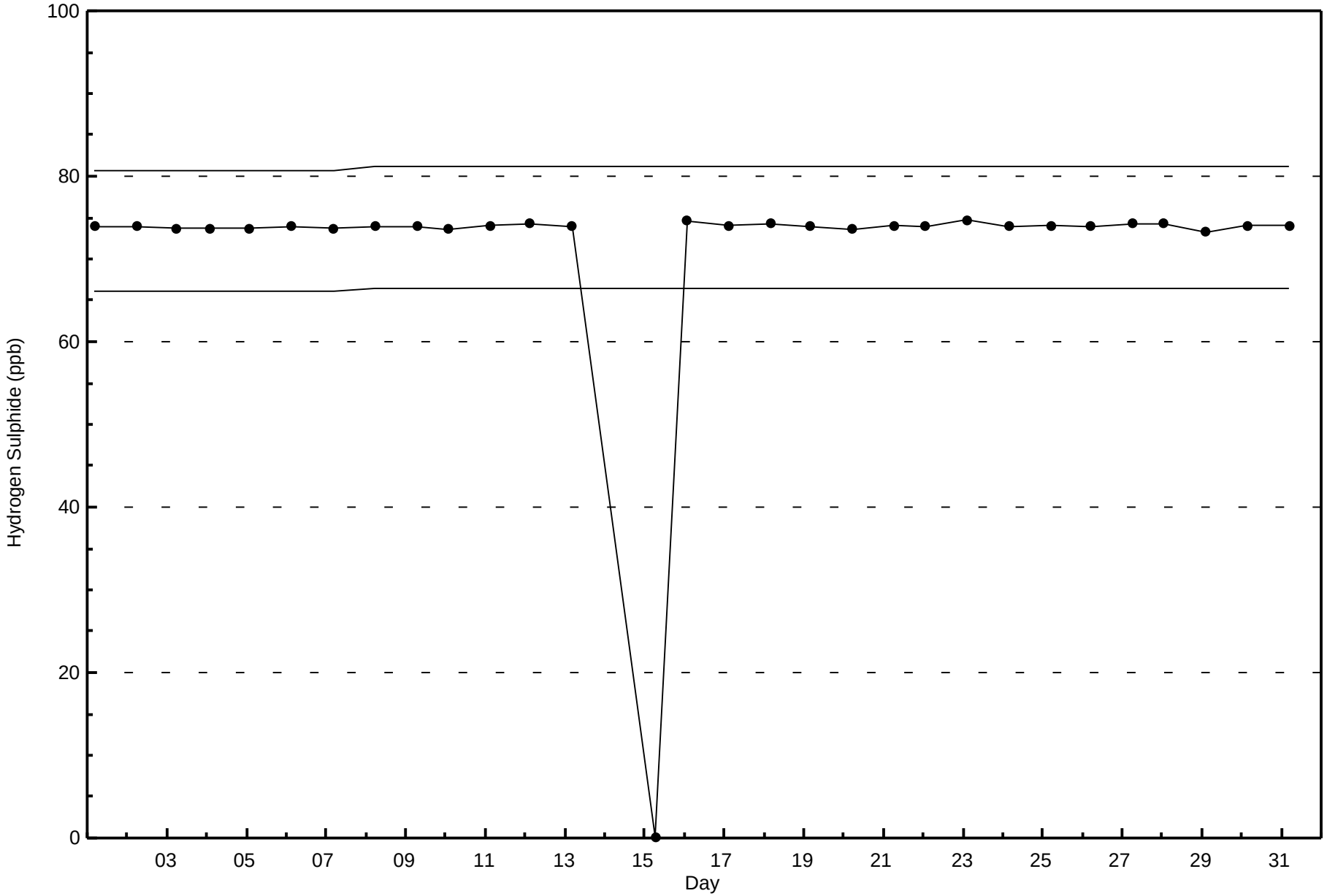


Wood Buffalo Environmental Association

Span Responses

Hydrogen Sulphide (H_2S) - ppb

Buffalo Viewpoint - August 2015



Maximum Value: 5.0 ppm on Aug 28 23:00

Maximum Daily Average: 3.3 ppm on Aug 25

Minimum Value: 2.0 ppm on Aug 12 16:00

Minimum Daily Average: 2.1 ppm on Aug 12

Maximum Diurnal Average: 2.5 ppm at hour 5

Minimum Diurnal Average: 2.3 ppm at hour 15

Monthly Average: 2.39 ppm

Percentiles: P_1 = 2.1 P_{10} = 2.1 Q_1 = 2.2 Median = 2.3 Q_3 = 2.5 P_{90} = 2.8 P_{99} = 4.0

Hours in Service:	744
Hours of Data:	662
Hours of Missing Data:	82
Hours of Calibration:	33
Percent Operational Time:	93.4

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	2.6	2.6	3.1	Z	2.7	3.7	3.0	2.9	3.1	2.9	2.2	2.4	2.3	2.2	2.3	2.2	2.2	2.2	2.2	2.1	2.4	2.5	2.7	2.5	2.6	3.7
2-Aug	2.6	2.6	2.4	2.6	Z	2.5	2.3	2.2	2.2	2.3	2.2	2.1	2.1	2.1	2.1	2.2	2.3	2.5	2.2	2.7	2.3	2.5	2.6	3.0	2.4	3.0
3-Aug	2.8	2.5	2.8	2.7	2.9	Z	2.8	2.6	2.7	3.0	2.9	2.5	2.2	2.1	2.1	2.2	2.2	2.1	2.2	2.7	4.0	2.6	2.3	2.2	2.6	4.0
4-Aug	Z	2.2	2.4	2.3	2.6	2.8	2.7	2.3	2.2	2.4	2.3	2.2	2.6	2.2	2.2	2.3	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.8
5-Aug	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.4	2.2	2.1	2.1	2.1	2.2	2.4	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.4
6-Aug	2.1	2.1	Z	2.2	2.2	2.2	2.1	2.1	2.2	2.1	2.2	2.2	2.2	2.1	2.3	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.5	2.2	2.5
7-Aug	2.4	2.2	2.3	Z	2.6	2.4	2.6	2.4	2.4	2.7	2.6	2.5	2.6	2.6	2.4	2.3	2.2	2.1	2.1	2.2	2.4	2.4	2.3	2.2	2.4	2.7
8-Aug	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.4	2.3	2.2	2.1	2.2	2.2	2.4
9-Aug	2.6	2.3	2.4	2.6	2.8	Z	2.8	2.4	2.2	2.5	2.6	2.3	2.2	2.1	2.1	2.2	2.2	2.3	2.3	2.2	2.5	2.8	2.6	2.3	2.4	2.8
10-Aug	Z	2.3	2.5	2.4	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.2	2.1	2.2	2.1	2.5
11-Aug	2.2	Z	2.4	2.3	2.4	2.4	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.2	2.4
12-Aug	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	C	C	C	C	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
13-Aug	2.3	2.2	2.3	Z	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.1	PF	PF	PF	PF	PF	PF	PF	PF	PF	--	2.3
14-Aug	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	--	--
15-Aug	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	2.5	2.4	2.4	2.5	2.4	2.6	2.5	2.8	2.6	--	2.8
16-Aug	Z	2.8	2.7	2.5	2.7	2.6	2.4	2.3	2.3	2.4	2.4	2.3	2.5	2.4	2.5	2.4	2.5	M	2.5	2.5	2.3	2.2	2.3	2.3	2.4	2.8
17-Aug	2.3	Z	2.4	2.3	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.3	2.2	2.3	2.1	2.3	2.5	2.5	2.3	2.2	2.3	2.2	2.2	2.3	2.5
18-Aug	2.4	3.1	Z	2.6	3.5	3.4	2.9	3.0	3.1	3.4	2.5	2.4	2.7	2.5	2.3	2.2	2.1	2.1	2.1	2.2	2.2	2.1	2.2	2.2	2.6	3.5
19-Aug	2.2	2.2	2.2	Z	2.2	2.1	2.1	2.1	2.1	2.1	2.3	2.5	2.5	2.5	2.5	2.5	2.4	2.4	2.6	2.6	2.7	2.7	2.7	2.6	2.4	2.7
20-Aug	2.9	2.7	2.6	2.3	Z	2.6	2.6	2.6	2.6	2.6	2.7	2.7	2.6	2.6	2.6	2.5	2.6	2.5	2.4	2.8	3.0	2.6	2.6	2.7	2.6	3.0
21-Aug	2.6	2.8	2.7	2.6	2.4	Z	2.3	2.5	2.3	2.3	2.2	2.2	2.3	2.3	2.4	2.3	2.3	2.2	2.3	2.4	2.5	2.3	2.3	2.3	2.4	2.8
22-Aug	Z	2.4	2.5	2.5	2.5	2.7	2.5	2.5	2.5	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.4	2.3	2.2	2.3	2.3	2.4	2.4	2.3	2.4	2.7
23-Aug	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	2.3	2.3	2.2	2.2	2.5	2.2	2.2	2.5
24-Aug	2.3	2.5	Z	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.2	2.3	2.3	2.4	2.5	2.4	2.2	2.1	2.3	2.4	2.9	3.3	2.3	3.3
25-Aug	3.1	3.7	3.9	Z	4.0	3.7	3.2	3.1	4.9	4.3	3.2	3.2	2.6	2.4	2.4	2.3	2.6	3.7	3.6	3.0	3.4	3.1	3.2	2.6	3.3	4.9
26-Aug	2.3	2.2	2.3	2.3	Z	2.8	2.8	2.6	2.8	2.8	2.6	2.8	2.8	2.6	2.4	2.2	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.5	2.8
27-Aug	2.3	2.3	2.4	2.5	2.4	Z	2.3	2.4	2.3	2.3	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.5	2.4	2.1	2.2	2.2	2.2	2.2	2.3	2.5
28-Aug	Z	2.3	2.2	2.2	2.3	2.3	2.4	2.1	2.3	2.2	2.3	2.3	2.4	2.4	2.3	2.6	2.8	3.1	3.5	2.8	3.0	3.8	5.0	4.2	2.7	5.0
29-Aug	4.0	Z	2.5	2.3	2.8	2.7	2.3	2.2	2.1	2.3	2.3	2.7	2.8	2.5	2.3	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.4	4.0
30-Aug	2.2	2.2	Z	2.2	2.2	2.4	2.4	2.5	2.7	2.8	2.7	2.6	2.6	2.4	2.2	2.5	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.1	2.3	2.8
31-Aug	2.1	2.2	2.1	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.6	2.2	2.4	2.5	2.4	2.5	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.6
	2.5	2.5	2.5	2.4	2.5	2.5	2.4	2.4	2.4	2.5	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.5	2.4	Diurnal Average	
	4.0	3.7	3.9	2.7	4.0	3.7	3.2	3.1	4.9	4.3	3.2	3.2	2.8	2.6	2.6	2.6	2.8	3.7	3.6	3.0	4.0	3.8	5.0	4.2	Diurnal Maximum	

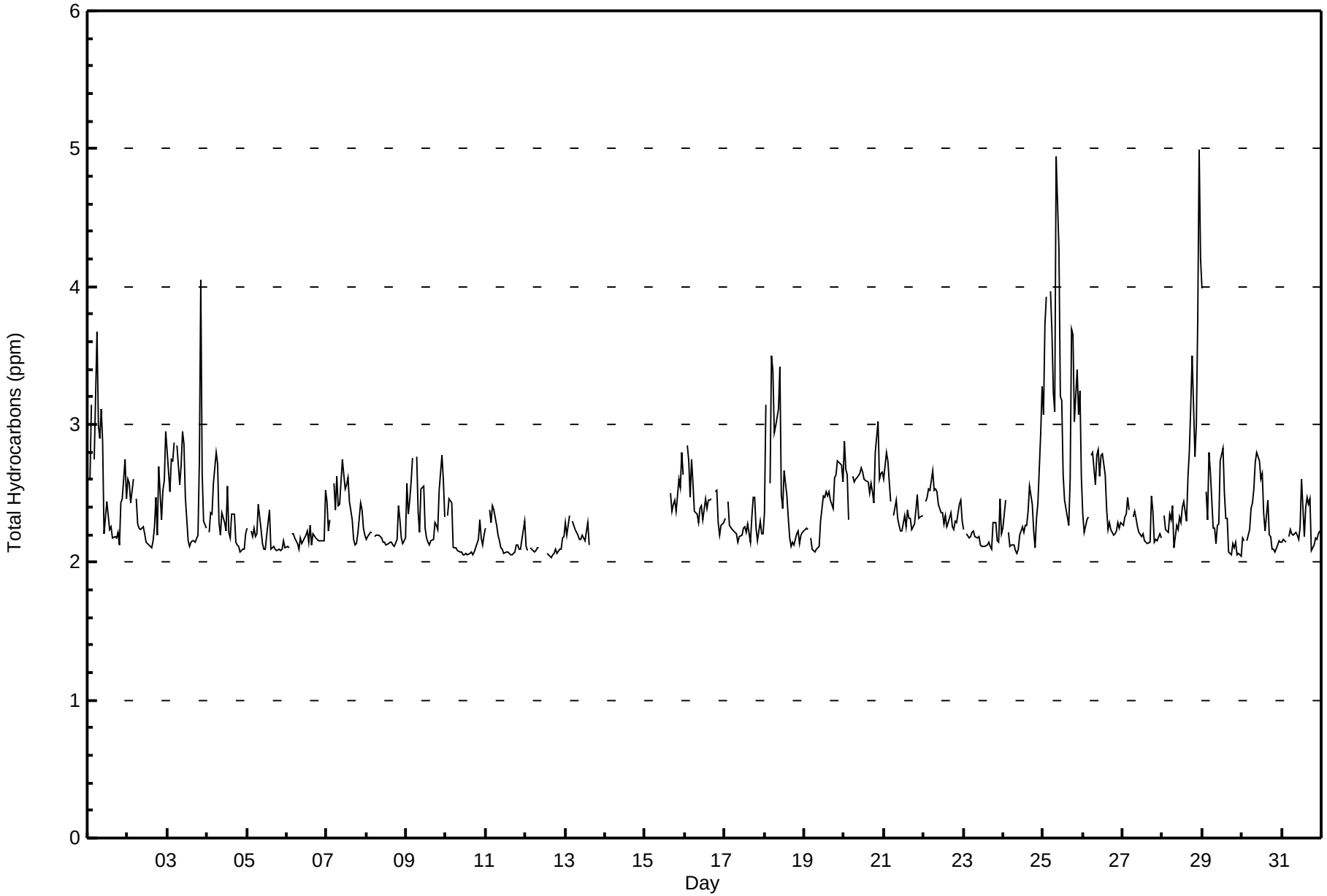
Z - zerospan C - Calibration M - Maintenance PF - Power Failure

Wood Buffalo Environmental Association

Hourly Averages

Total Hydrocarbons (THC) - ppm

Buffalo Viewpoint - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm

Buffalo Viewpoint - August 2015

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	4	0.60	0.60
2.1 - 3.0	626	94.56	95.17
3.1 - 10.0	32	4.83	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 662

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Total Hydrocarbons (THC) - ppm

Buffalo Viewpoint - August 2015

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	1	0	0	0	1	2	0	0	0	0	4
2.1 - 3.0	24	7	13	7	12	45	89	104	29	35	54	69	39	36	37	21	621
3.1 - 10.0	4	1	0	0	0	1	0	1	1	0	0	1	1	7	8	7	32
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	28	8	13	7	12	46	90	105	30	35	55	72	40	43	45	28	657

Total Number of Valid Hours: 657

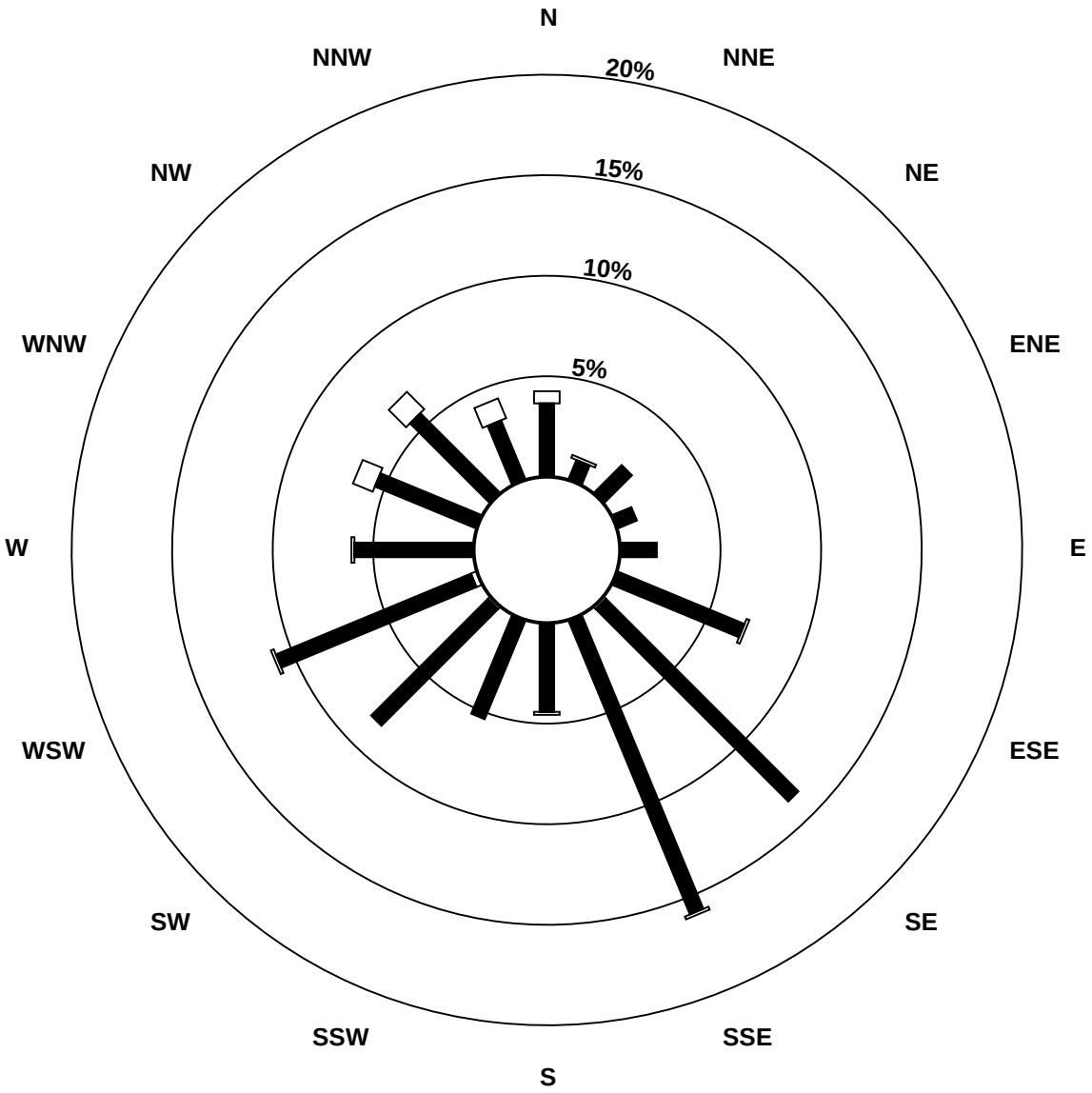
Total Number of Hours: 744

Wood Buffalo Environmental Association

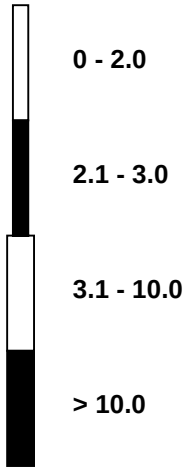
Wind Rose Aug 2015

Total Hydrocarbons (THC) - ppm

Buffalo Viewpoint (AMS 4)



Classes (ppm)



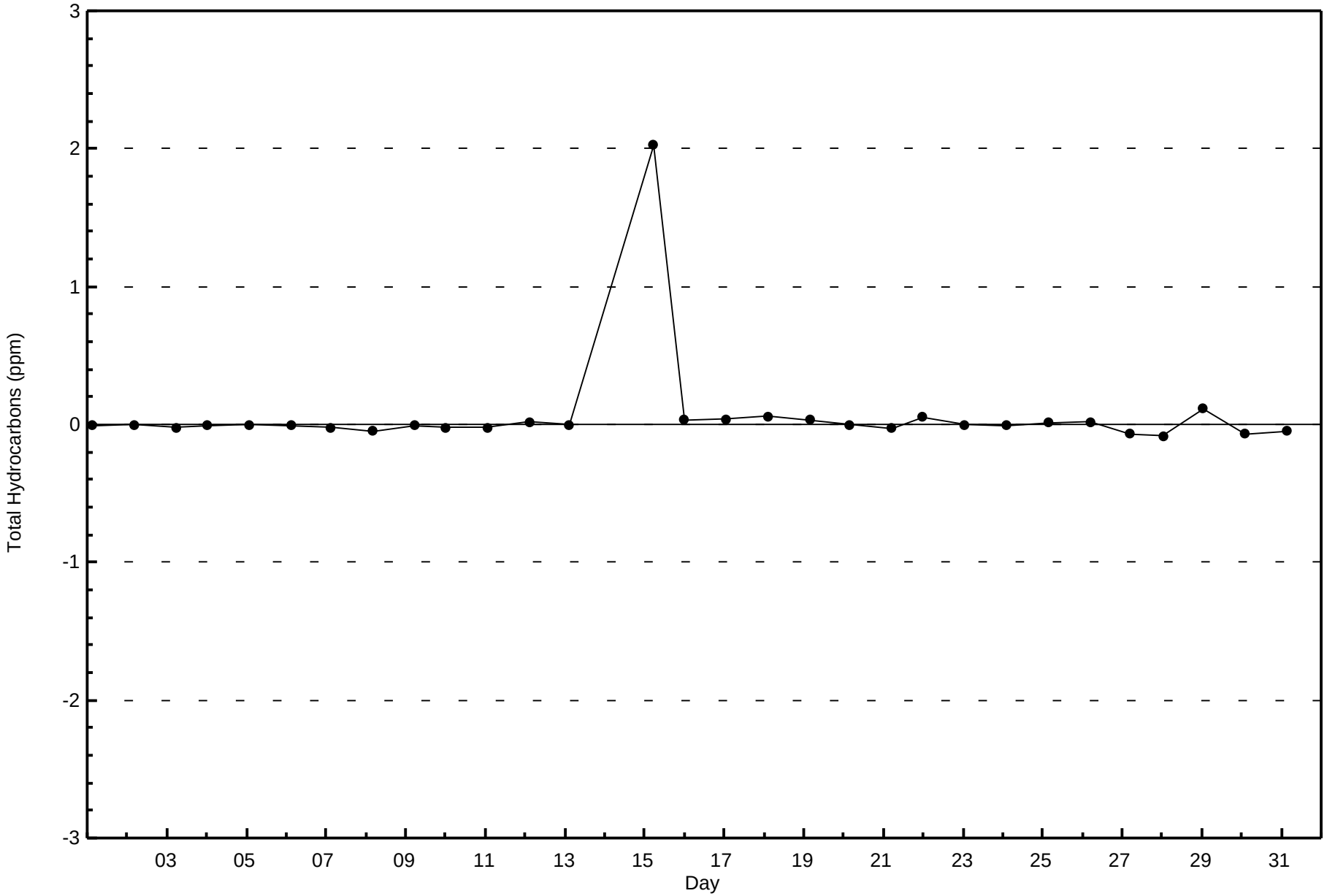
Total Number of Valid Hours: 657

Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Buffalo Viewpoint - August 2015

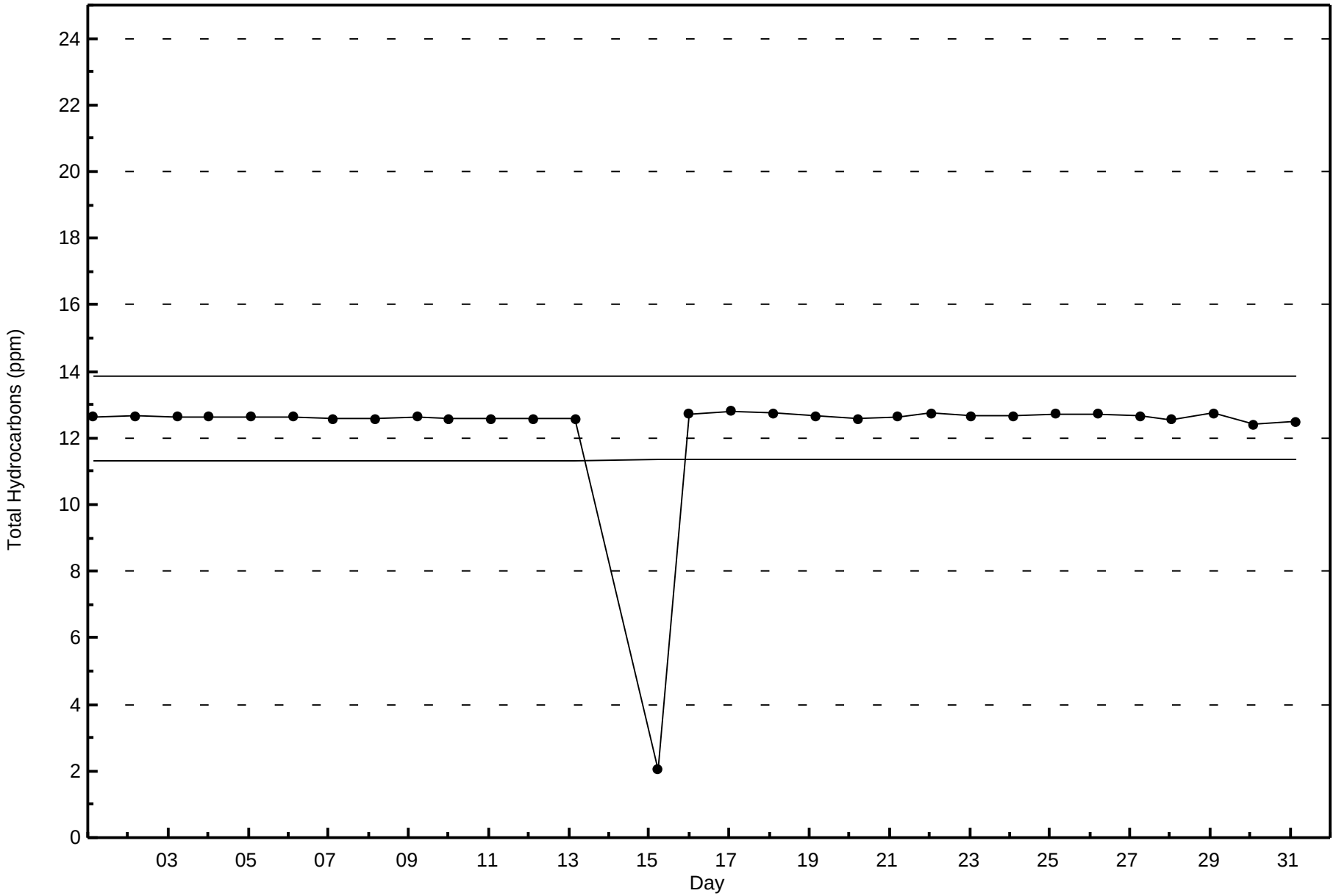


Wood Buffalo Environmental Association

Span Responses

Total Hydrocarbons (THC) - ppm

Buffalo Viewpoint - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

Buffalo Viewpoint - August 2015

Maximum Value: 29.7 C on Aug 9 16:00

Maximum Daily Average: 23.3 C on Aug 10

Minimum Value: 2.2 C on Aug 23 05:00

Minimum Daily Average: 11.1 C on Aug 21

Maximum Diurnal Average: 22.8 C at hour 15

Minimum Diurnal Average: 12.6 C at hour 5

Monthly Average: 17.61 C

Percentiles: P_1 = 6.2 P_{10} = 11.5 Q_1 = 14.0 Median = 17.5 Q_3 = 21.3 P_{90} = 24.3 P_{99} = 29.0

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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	13.4	13.6	13.0	12.7	12.2	12.5	13.0	13.8	15.0	16.0	18.6	21.6	22.3	23.6	22.5	23.4	23.7	23.9	23.9	20.8	18.5	16.1	15.5	15.6	17.7	23.9
2-Aug	13.8	11.9	10.7	9.2	9.0	9.0	10.9	14.5	17.7	20.3	22.3	23.7	24.5	25.3	26.0	25.6	21.0	17.1	18.9	18.7	18.3	17.7	17.5	17.1	17.5	26.0
3-Aug	16.3	15.9	14.5	13.7	12.1	12.7	13.5	15.4	17.2	20.9	23.9	25.1	26.1	26.5	27.2	25.9	24.7	23.4	22.9	22.0	21.4	20.4	19.5	18.5	20.0	27.2
4-Aug	18.3	17.8	17.8	17.4	18.4	18.5	18.7	18.6	17.9	19.0	21.0	20.7	21.5	21.0	19.3	18.3	17.7	17.4	17.2	16.4	15.2	15.0	15.3	15.5	18.1	21.5
5-Aug	15.3	15.2	15.3	14.9	14.9	14.7	14.9	15.4	16.4	17.2	18.5	19.7	21.4	21.2	21.3	22.0	22.1	21.5	19.5	17.7	16.1	14.8	14.7	14.4	17.5	22.1
6-Aug	14.2	14.3	14.2	14.1	13.9	13.8	14.1	14.5	14.9	15.0	16.1	17.6	18.5	19.6	20.0	19.9	20.5	19.4	18.4	17.4	16.3	15.3	14.7	14.9	16.3	20.5
7-Aug	15.1	15.1	14.5	14.3	14.1	14.3	14.8	15.7	16.7	17.3	18.8	20.2	21.6	22.6	22.8	23.1	23.2	23.2	22.0	20.0	19.0	17.2	16.3	16.2	18.3	23.2
8-Aug	16.1	15.5	15.1	14.7	14.3	14.0	14.1	16.4	18.5	20.8	22.6	23.6	24.8	25.5	26.7	25.5	21.9	22.1	23.1	21.6	19.4	17.6	16.6	16.0	19.4	26.7
9-Aug	15.8	14.4	13.9	13.4	12.3	12.7	12.7	15.3	18.6	20.9	23.4	24.8	25.9	26.8	27.6	29.7	29.7	29.1	28.1	25.9	24.0	21.3	18.4	18.0	20.9	29.7
10-Aug	19.5	20.1	18.9	18.0	17.6	16.9	17.9	19.9	20.7	23.0	25.0	26.5	27.7	28.5	29.1	29.2	29.3	29.1	28.1	26.0	23.4	23.0	22.1	19.8	23.3	29.3
11-Aug	18.8	17.3	16.1	15.9	16.0	17.2	16.7	17.5	21.6	24.2	25.9	26.4	26.6	27.4	27.4	27.3	27.0	26.5	25.1	24.1	22.8	21.4	19.9	18.3	22.0	27.4
12-Aug	17.7	18.0	17.9	17.5	18.1	17.7	17.7	18.6	20.0	20.7	22.4	23.5	24.4	25.6	26.1	26.4	26.5	26.3	25.6	23.6	21.6	20.2	18.7	17.7	21.3	26.5
13-Aug	16.4	16.2	14.5	13.9	12.7	13.3	14.3	16.3	18.5	18.7	19.8	22.0	23.7	22.0	22.2	18.1	20.3	22.5	23.3	22.0	20.1	18.1	17.9	19.1	18.6	23.7
14-Aug	18.5	16.7	15.8	14.8	13.5	12.7	13.4	14.9	16.7	17.3	17.9	19.2	20.2	20.4	21.2	20.7	19.6	18.8	18.1	16.7	15.2	14.3	14.2	13.8	16.9	21.2
15-Aug	13.3	13.4	13.4	13.1	12.8	12.9	12.7	13.5	14.2	15.0	16.3	17.8	18.7	18.5	18.4	17.9	17.6	18.3	16.8	16.0	14.9	14.5	13.7	13.4	15.3	18.7
16-Aug	13.2	13.3	13.1	12.6	13.0	12.7	13.0	14.4	14.7	16.2	18.0	17.1	19.4	20.3	21.1	20.1	20.2	M	18.9	17.7	15.5	13.2	13.1	12.7	15.8	21.1
17-Aug	10.7	10.9	11.8	10.2	8.6	7.9	9.3	12.1	14.5	17.5	20.7	22.5	23.3	23.9	23.7	24.6	22.9	22.8	21.5	20.1	18.5	17.4	15.2	14.2	16.9	24.6
18-Aug	14.7	13.5	13.1	12.1	11.0	11.5	13.0	15.7	17.7	18.5	21.1	22.6	23.4	24.5	24.4	23.4	23.1	23.6	23.9	21.0	18.4	17.0	14.7	14.4	18.2	24.5
19-Aug	14.2	14.2	14.6	15.2	15.7	16.1	16.5	17.0	18.3	20.8	22.1	23.1	24.2	24.3	25.0	24.3	22.5	21.7	19.6	17.8	16.9	16.4	15.7	15.1	18.8	25.0
20-Aug	14.6	14.1	13.8	12.8	12.9	13.1	13.4	13.5	13.6	13.7	14.4	14.5	14.6	13.4	13.3	14.3	14.8	14.8	14.3	13.9	13.7	13.0	12.2	10.9	13.6	14.8
21-Aug	10.3	9.7	9.0	8.5	8.1	8.2	8.7	9.6	10.3	11.1	11.3	12.1	13.0	13.6	13.9	12.9	13.3	13.2	12.8	12.1	11.6	11.2	10.6	10.3	11.1	13.9
22-Aug	10.0	9.9	9.6	9.1	8.4	8.4	8.0	8.5	9.0	9.9	11.0	13.0	13.9	14.6	16.0	16.4	17.5	18.1	17.4	15.3	11.2	8.7	7.1	6.2	11.5	18.1
23-Aug	5.2	4.3	3.4	2.7	2.2	2.2	3.8	6.2	9.0	13.8	17.6	18.7	20.4	21.3	23.1	24.1	24.3	23.5	22.2	19.2	19.2	18.6	16.5	14.5	14.0	24.3
24-Aug	13.5	13.5	13.4	12.6	12.6	12.3	13.1	14.9	16.9	18.6	20.1	21.3	22.7	23.4	23.7	24.2	24.1	24.0	22.7	21.9	19.6	17.0	15.9	14.2	18.2	24.2
25-Aug	13.1	12.9	12.3	12.1	10.4	10.5	10.8	12.5	15.6	18.8	21.2	23.4	24.4	21.9	19.7	20.4	19.9	18.8	17.5	17.5	16.6	16.6	15.4	14.5	16.5	24.4
26-Aug	13.5	13.3	12.4	12.1	11.2	11.5	11.9	13.5	15.0	16.1	16.9	19.0	19.8	20.3	19.9	20.1	20.4	20.5	20.0	17.1	15.6	14.0	12.8	11.7	15.8	20.5
27-Aug	10.3	10.0	9.2	8.4	7.3	6.7	7.5	10.5	14.2	17.6	20.9	23.2	24.2	24.9	25.7	25.9	25.8	25.8	25.0	22.2	19.8	18.2	17.6	19.1	17.5	25.9
28-Aug	18.6	18.9	18.2	17.7	17.5	16.9	17.2	16.7	18.6	19.9	21.1	22.7	23.8	24.3	24.1	24.8	25.3	25.1	22.9	20.3	20.2	18.5	19.2	17.4	20.4	25.3
29-Aug	17.2	15.4	15.1	13.8	13.8	14.1	13.4	14.3	17.3	19.9	21.9	22.8	24.0	24.4	24.8	25.2	25.3	24.5	22.6	21.3	20.9	20.8	20.3	19.6	19.7	25.3
30-Aug	17.8	18.4	18.6	18.3	18.1	18.3	16.2	17.5	19.0	21.7	23.7	25.1	26.2	27.0	27.3	25.8	25.8	20.6	16.4	15.6	13.8	12.7	11.5	10.8	19.4	27.3
31-Aug	10.2	9.8	9.2	9.0	8.7	8.8	9.3	10.0	12.9	15.5	18.0	21.1	21.8	22.5	22.7	22.6	22.4	21.9	20.6	18.6	16.2	14.0	12.1	11.1	15.4	22.7
	14.5	14.1	13.6	13.1	12.6	12.6	13.0	14.4	16.2	17.9	19.7	21.1	22.2	22.6	22.8	22.7	22.3	21.9	20.9	19.4	17.9	16.6	15.6	15.0	Diurnal Average	
	19.5	20.1	18.9	18.3	18.4	18.5	18.7	19.9	21.6	24.2	25.9	26.5	27.7	28.5	29.1	29.7	29.7	29.1	28.1	26.0	24.0	23.0	22.1	19.8	Diurnal Maximum	

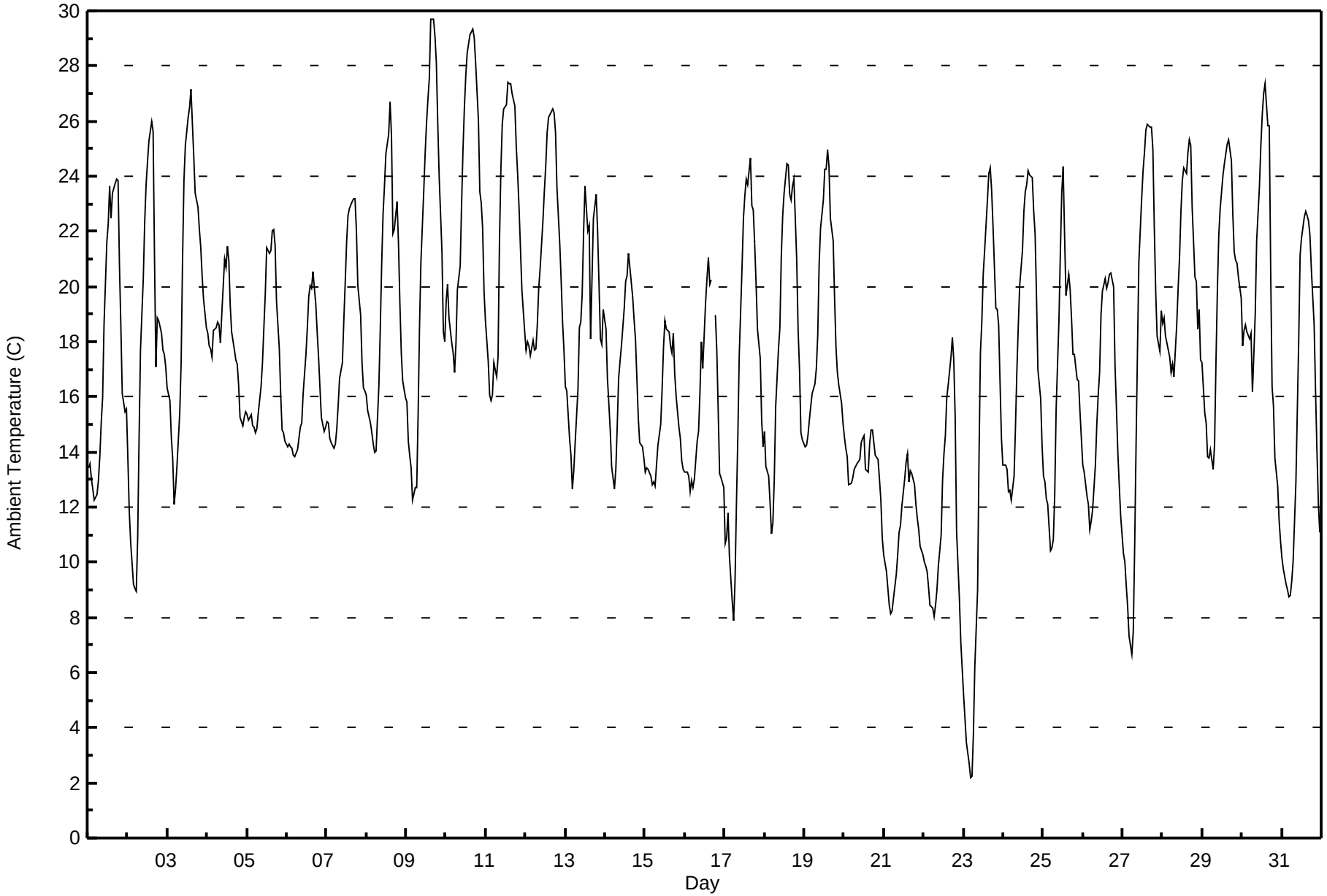
M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature (AT) - C

Buffalo Viewpoint - August 2015



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	46	6.19	6.19
10 - 20	456	61.37	67.56
> 20	241	32.44	100.00

Total Number of Valid Hours: 743

Total Number of Hours: 744

Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Buffalo Viewpoint - August 2015

Maximum Value: 99 % on Aug 9 06:00

Maximum Daily Average: 84.7 % on Aug 6

Minimum Value: 25 % on Aug 31 16:00

Minimum Daily Average: 44.6 % on Aug 28

Maximum Diurnal Average: 84.0 % at hour 5

Minimum Diurnal Average: 43.7 % at hour 15

Monthly Average: 65.1 %

Percentiles: $P_1 = 29$ $P_{10} = 37$ $Q_1 = 49$ Median = 66 $Q_3 = 81$ $P_{90} = 93$ $P_{99} = 98$

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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	95	97	97	98	98	98	97	93	86	81	66	56	54	47	49	46	43	43	42	52	60	70	75	72	71.5	98
2-Aug	87	93	93	96	95	94	88	79	71	61	52	47	43	41	38	39	65	87	68	71	74	80	82	87	72.1	96
3-Aug	89	87	97	98	98	98	96	89	81	69	58	48	45	43	41	47	52	57	60	61	63	70	73	77	70.7	98
4-Aug	77	79	81	80	65	59	56	58	63	61	58	60	57	61	69	78	84	90	91	94	94	96	96	95	75.0	96
5-Aug	95	96	96	98	98	98	97	94	90	86	78	73	67	66	60	59	54	56	65	73	83	95	95	95	81.9	98
6-Aug	95	93	92	93	95	96	94	93	92	95	90	82	77	71	68	68	66	70	74	77	83	88	90	90	84.7	96
7-Aug	89	92	96	98	98	98	96	91	86	83	76	69	63	61	57	52	52	52	59	70	79	82	86	86	77.9	98
8-Aug	85	87	89	90	91	92	92	82	74	66	59	55	49	47	44	45	60	61	60	65	70	80	85	88	71.5	92
9-Aug	88	93	95	97	98	99	98	90	77	70	61	52	45	41	38	35	34	34	36	41	52	73	83	78	66.9	99
10-Aug	70	64	68	75	76	84	80	72	69	60	52	45	39	34	31	29	28	30	34	42	53	52	55	65	54.4	84
11-Aug	70	75	83	82	86	77	78	77	58	45	37	32	32	31	30	32	32	32	37	40	40	42	47	54	52.1	86
12-Aug	54	51	51	55	53	55	56	55	52	52	47	43	40	36	34	33	33	34	36	43	50	54	60	64	47.5	64
13-Aug	73	69	83	83	85	85	86	79	74	75	73	67	62	71	59	80	71	59	55	56	62	69	70	60	71.0	86
14-Aug	61	67	69	71	76	81	79	74	66	63	60	53	47	44	42	43	44	47	51	57	62	66	67	70	60.9	81
15-Aug	74	74	74	76	78	80	86	81	75	69	58	50	44	46	48	52	53	53	57	61	68	70	76	77	65.8	86
16-Aug	78	79	80	83	83	86	85	79	78	67	60	63	48	41	35	37	37	M	41	46	58	70	71	72	64.3	86
17-Aug	81	76	68	73	81	83	79	72	63	57	45	32	30	30	30	28	35	37	42	48	54	60	69	73	56.1	83
18-Aug	71	72	72	76	83	80	76	66	62	61	50	44	38	35	36	38	40	38	38	50	57	58	66	68	57.3	83
19-Aug	70	69	66	65	65	65	64	63	61	54	51	48	45	40	31	34	38	41	48	55	58	58	63	69	55.1	70
20-Aug	71	72	71	76	76	71	65	67	67	67	65	65	63	73	75	64	60	60	61	64	65	69	72	77	68.1	77
21-Aug	78	80	81	82	83	81	79	78	78	74	73	69	64	60	61	66	61	60	62	67	72	69	73	76	71.9	83
22-Aug	76	75	76	78	80	82	88	88	85	80	72	60	52	49	42	40	38	36	39	44	71	82	90	85	67.0	90
23-Aug	87	88	94	95	96	96	92	84	73	58	44	39	37	36	32	31	31	32	40	51	47	47	63	75	61.1	96
24-Aug	82	87	90	94	92	93	89	84	77	66	58	46	38	35	32	30	29	29	33	36	43	56	58	68	60.2	94
25-Aug	73	77	80	79	87	84	85	81	67	57	48	42	38	45	54	51	52	59	67	67	71	73	78	80	66.5	87
26-Aug	82	82	90	89	92	92	91	83	75	70	64	56	54	50	51	52	50	48	54	65	72	80	85	90	71.6	92
27-Aug	94	95	96	97	97	98	98	90	80	68	57	44	40	37	35	34	37	35	34	39	47	51	54	47	62.7	98
28-Aug	47	44	45	45	45	49	50	55	50	48	44	38	33	31	33	30	29	30	36	52	50	62	56	68	44.6	68
29-Aug	68	80	84	91	91	90	95	92	77	65	57	54	48	44	42	39	37	41	49	51	52	52	55	59	63.0	95
30-Aug	71	68	65	65	66	67	78	71	67	56	46	39	34	31	30	34	34	53	75	77	90	93	94	94	62.5	94
31-Aug	95	95	96	96	95	94	93	93	85	74	62	40	33	29	27	25	25	27	33	41	45	50	54	60	61.2	96
	78.2	79.2	81.3	83.0	84.0	84.0	83.5	79.2	72.9	66.4	58.7	51.9	47.1	45.4	43.7	44.3	45.3	47.7	50.8	56.7	62.7	68.3	72.3	74.8	Diurnal Average	
	95	97	97	98	98	99	98	94	92	95	90	82	77	73	75	80	84	90	91	94	94	96	96	95	Diurnal Maximum	

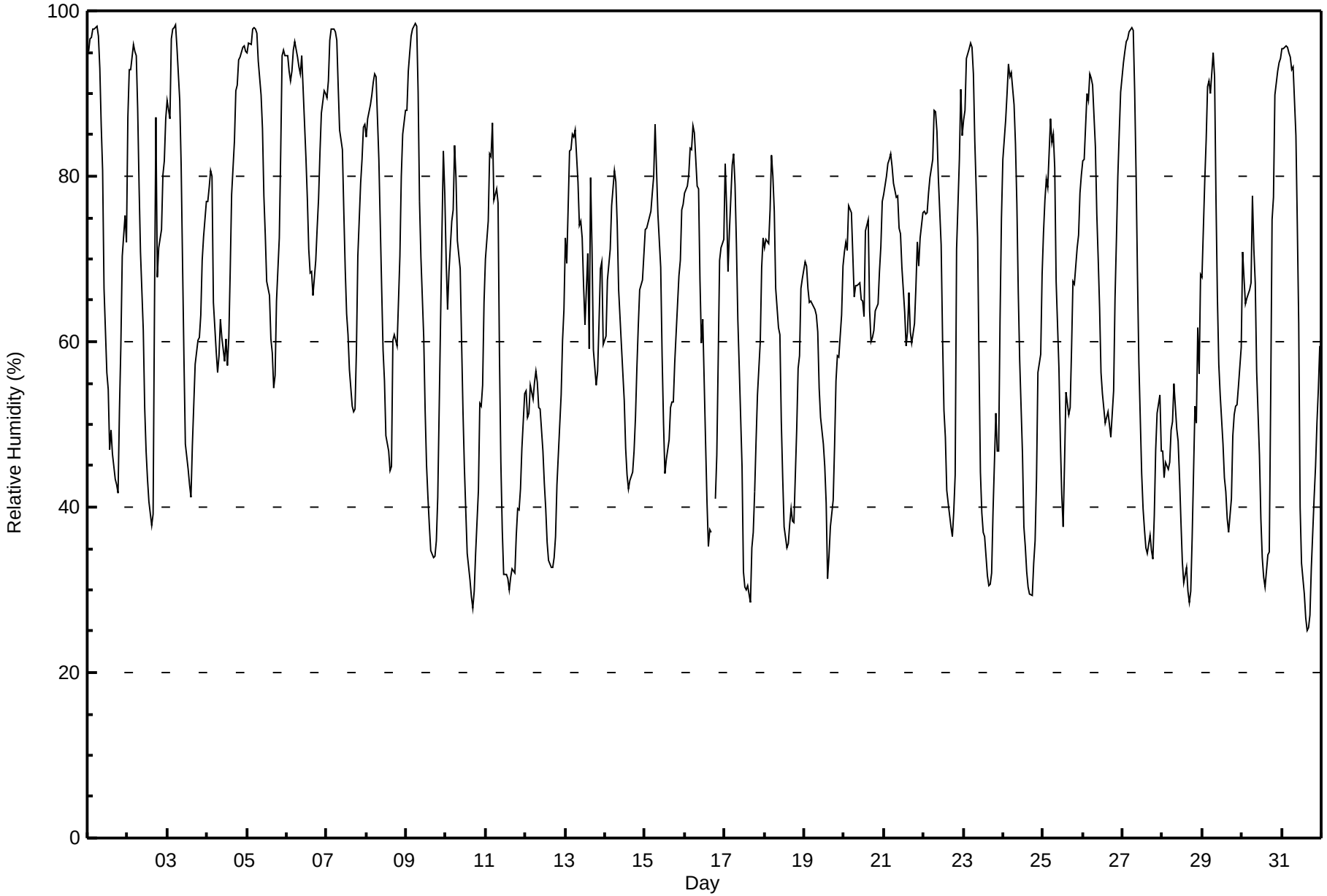
M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity (RH) - %

Buffalo Viewpoint - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Buffalo Viewpoint - August 2015

Maximum Speed: 24 km/h on Aug 15 11:00

Maximum Daily Speed Average: 16.8 km/h on Aug 14

Minimum Speed Value: 0 km/h on Aug 9 10:00

Minimum Daily Speed Average: 1.3 km/h on Aug 26

Maximum Diurnal Speed Average: 5.9 km/h at hour 15

Minimum Diurnal Speed Average: 2.2 km/h at hour 3

Monthly Average Velocity: 3.3 km/h 232.3 deg

Percentiles: P_1 = 1 P_{10} = 4 Q_1 = 6 Median = 8 Q_3 = 12 P_{90} = 16 P_{99} = 23

Hours in Service: 744

Hours of Data: 738

Hours of Missing Data: 6

Percent Operational Time: 99.9

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	NNW8	WSW4	W4	SW4	W3	NNW7	N7	NNW5	NW7	WNW7	WNW8	NNW6	NNW8	NW12	NNW17	NW13	WNW11	NW11	NW11	N13	N6	NNW8	WNW7	NW4	NW7.1	NNW17
2-Aug	SW4	SSE4	SSE6	SSE8	SSE6	SSE8	SSE8	SE6	SE6	SE8	ESE8	ESE9	SE6	ESE5	ESE7	SE5	NW10	NNE17	ENE12	WSW6	WSW6	NNW0	ESE4	N2	SE3.5	NNE17
3-Aug	NE3	NE2	S3	SSE4	SSE5	SSE2	SE3	SSW2	WNW1	N6	NNE6	SSE7	SE9	SSE11	SSE8	SE11	SE9	SE8	SE5	E6	ESE7	SE8	SE8	SE7	SE4.5	SSE11
4-Aug	SSE6	SE2	NNE6	ENE6	ESE7	E5	E5	ESE6	ESE8	E8	NE8	NE11	E10	ESE12	ESE12	ESE10	ESE10	SE9	ESE12	SE14	SE12	SE8	SE6	ESE7	ESE7.2	SE14
5-Aug	SE4	ESE2	NE6	ENE5	NE6	NE9	ENE8	E7	ESE7	SSE6	SSE7	S2	N6	E2	SE9	SE7	ESE10	SE13	SSE18	SSE16	SSE15	SE11	ESE10	SE12	ESE6.5	SSE18
6-Aug	SE9	ESE13	ESE13	ESE12	ESE11	ESE12	ESE11	SE11	ESE10	ESE8	ESE9	ESE12	E13	ESE14	ESE12	SE13	ESE13	ESE12	ESE10	ESE9	SE7	SE5	SE4	ESE6	ESE10.3	ESE14
7-Aug	ESE7	ESE6	ESE2	E4	E4	ENE5	SE1	SSW1	NW4	NNW4	NW6	NNW5	C	C	C	C	C	SW5	SSW5	SSE3	SE4	SE6	SE7	SSE7	SE1.9	ESE7
8-Aug	SE8	SSE7	SE6	SSE5	SSE7	SSE7	SSE5	SE7	SE7	ESE7	SE5	SE4	SSE5	WSW3	NW6	WSW4	S8	SSE5	S3	ESE6	SE9	SSE6	SSE4	ENE2	SSE4.6	SE9
9-Aug	NE6	NE5	ENE4	SSW2	SW2	SSE2	SSE3	S4	SE4	SSW0	SSE1	SE6	SE6	SSW6	W7	N7	N4	NE5	E3	ESE4	E4	SE4	SSE5	SSE6	ESE1.6	N7
10-Aug	WSW8	NW12	ESE2	SSW6	SW8	W11	WSW7	SW8	SW8	SW10	SW10	WSW9	WSW13	SW13	WSW15	WSW12	SW12	SW12	SSW9	SSW6	S6	SSW10	S7	S8	SW8.0	WSW15
11-Aug	SSE8	SSE10	SE8	SE7	SE6	S6	SE7	SSE7	SSW8	SW11	WSW16	WSW24	WSW23	SW19	WSW21	WSW18	WSW21	WSW18	WSW10	SW9	SW11	SW11	WSW7	WSW10	SW10.0	WSW24
12-Aug	SW12	SW12	SW9	SW9	SW15	WSW15	WSW16	WSW18	WSW19	WSW15	WSW16	WSW17	WSW17	W14	WSW14	WSW15	WSW15	WSW14	WSW13	SW9	SSW9	SW10	S6	S5	WSW12.5	WSW19
13-Aug	S6	SSW4	ESE7	SSE6	SSE7	SE6	SE5	SSE6	SE6	SSE7	SE8	ESE7	WNW1	NW6	W13	SW11	SSW11	SW11	SW9	SSW10	S8	SSE8	S9	SW11	S5.5	W13
14-Aug	WSW15	WSW13	WSW14	WSW16	WSW18	WSW17	WSW18	WSW18	WSW20	WSW23	WSW21	WSW20	W19	W17	WNW19	WNW22	WNW22	WNW19	WNW18	WNW16	WNW18	W12	W13	W13	W16.8	WSW23
15-Aug	W12	WNW14	NW16	NW16	NW14	NNW18	N16	NNW20	N22	N21	N24	N23	N24	N22	NNW20	NNW18	NNW17	NW14	NW15	NW13	NW13	NW11	NW10	NNW9	NNW15.6	N24
16-Aug	NW6	NW6	NNW8	NNW5	W4	WSW5	WSW4	S3	SSW3	WSW7	NW6	NNW11	NW7	WNW7	W9	WNW8	W8	M	W9	WSW7	SSW5	SSE6	S4	SSW4	W4.1	NNW11
17-Aug	SE6	SSE5	WNW6	SSE5	SE7	SSE8	SSE7	SSE6	SE7	SE6	SSE5	SW9	SSW8	SW9	SW8	SSW7	SW9	W7	W5	SSE3	SE4	SSW4	SE7	SSE6	S4.6	SW9
18-Aug	SW4	NW7	NNW6	N6	NW9	WNW9	WNW7	NW7	NNW5	NW5	N5	NNW5	NW5	NW6	N2	SSE5	SSE7	SSE4	S5	SSE4	SSE5	SSE5	SSE6	SSE7	WNW1.5	WNW9
19-Aug	SE7	SE10	SSE13	SSE13	SSE12	SSE14	SSE14	SSE14	SSE12	SSW11	SW13	WSW17	WSW15	WSW16	WSW23	WSW24	WSW20	W20	W22	W19	W15	W15	WSW13	WSW13	SW10.1	WSW24
20-Aug	WSW15	WSW15	W11	WSW11	WSW10	W16	W19	WSW20	W19	W20	W18	W19	WNW19	WNW16	WNW16	WNW18	WNW17	WNW16	NW18	WNW13	W11	WNW12	W11	WSW11	W14.6	WSW20
21-Aug	WSW13	WSW13	WSW13	WSW12	WSW12	WSW12	WSW11	W12	WNW13	WNW16	NW16	NW15	NW17	NW17	NNW18	NW15	WNW17	NW17	NW15	WNW15	WNW13	NW17	WNW15	WNW12	WNW12.9	NNW18
22-Aug	W11	W10	W11	WSW13	WSW15	WSW12	W10	W11	W11	W13	WNW12	WNW12	NW11	WNW11	NW16	NW14	NW13	NNW11	NNE5	NW3	SSE6	SSE7	SE8	SSE8	W7.4	NW16
23-Aug	SSE9	SSE6	SSE7	S8	S8	S7	SSE7	SSE9	SSE9	SE8	SE10	SSE11	SSE11	SE10	SSE12	SSE10	SSE10	SSE10	SE6	SE7	SE11	SSE10	NNW11	NE5	SSE7.4	SSE12
24-Aug	NE3	W5	WNW4	SE10	SSE7	S6	SSW5	SSE6	S7	SW8	WSW7	W10	W11	WNW12	W11	W9	WSW9	WSW8	SW7	SW5	WSW4	SW6	WNW7	NW7	WSW5.1	WNW12
25-Aug	N6	WNW3	NW3	W4	WNW4	W3	SSE2	S2	NW2	N6	N6	N9	N9	N11	N15	N13	N12	NNW9	NNW7	NNE3	NNW5	NW4	NNW9	N11	NNW5.7	N15
26-Aug	N10	NNW12	N7	NNE6	N7	NNE4	N4	NE4	N6	N6	N4	N6	NNW4	WNW5	SSW4	SSW5	SW5	SW5	SSW4	S5	S6	SSE7	SSE6	SE7	NNW1.3	NNW12
27-Aug	SSE7	SSE6	SSE6	SSE6	SSE7	SSE6	S6	SSE6	SE6	SE6	SE8	SSW8	SW11	SSW12	SSW14	SSW15	SSW15	SW14	SW13	SSW7	S7	S8	S7	SW12	S7.7	SSW15
28-Aug	SW13	SW15	SW15	SW14	SW14	SW13	SW13	SW12	SW14	SW14	WSW19	SW17	WSW17	WSW18	SW15	WSW15	WSW13	WSW9	WNW3	SE4	E1	WNW2	NNE1	NNW3	WSW10.7	WSW19
29-Aug	WNW5	NW6	S3	SSE5	WNW3	SSW2	SSE5	SSE4	S6	SSE6	SE6	WNW3	W5	S5	SE8	SE8	SE10	ESE7	SE9	ESE11	SE12	SE14	SE13	SE7	SE4.8	SE14
30-Aug	ESE9	SE12	SE13	SE11	SSE6	SW4	SSE5	SW7	W12	W12	WNW8	W7	WNW9	WNW7	SW6	WSW7	SW7	SSE12	SE13	SSE9	SSE10	SSE11	SSE12	SE13	S5.0	SE13
31-Aug	SE12	SE9	SSE9	SSE8	SSE7	SSE9	SSE9	SE9	SE8	SSE10	SSE10	SW14	WSW19	SW21	WSW20	SW24	WSW19	SW17	SSW11	SSW7	SSW10	S9	SSE8	SSE9	SSW9.4	SW24
	SSW2.7	SW2.9	SSW2.2	S3.4	SSW3.5	SW3.2	SSW3.1	SSW3.5	SW3.1	WSW3.2	W3.5	W4.6	W5.5	W5.6	W5.9	WSW5.7	WSW5.8	WSW4.4	WSW3.2	SSW2.5	S3.3	SSW3.7	S2.6	S2.8	Diurnal Average	
	WSW15	SW15	NW16	WSW16	WSW18	NNW18	W19	NNW20	N22	WSW23	N24	WSW24	N24	N22	WSW23	WSW24	WNW22	W20	W22	W19	WNW18	NW17	WNW15	SE13	Diurnal Maximum	

C - Calibration M - Maintenance

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

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Speed (WS) - km/h

Buffalo Viewpoint - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 8 km/h on Aug 2 17:00

Minimum Value: 1 km/h on Aug 16 22:00

Percentiles: $P_1 = 1$ $P_{10} = 1$ $Q_1 = 2$ Median = 2 $Q_3 = 4$ $P_{90} = 5$ $P_{99} = 6$

Hours in Service:	744
Hours of Data:	738
Hours of Missing Data:	6
Hours of Calibration:	5
Percent Operational Time:	99.9

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

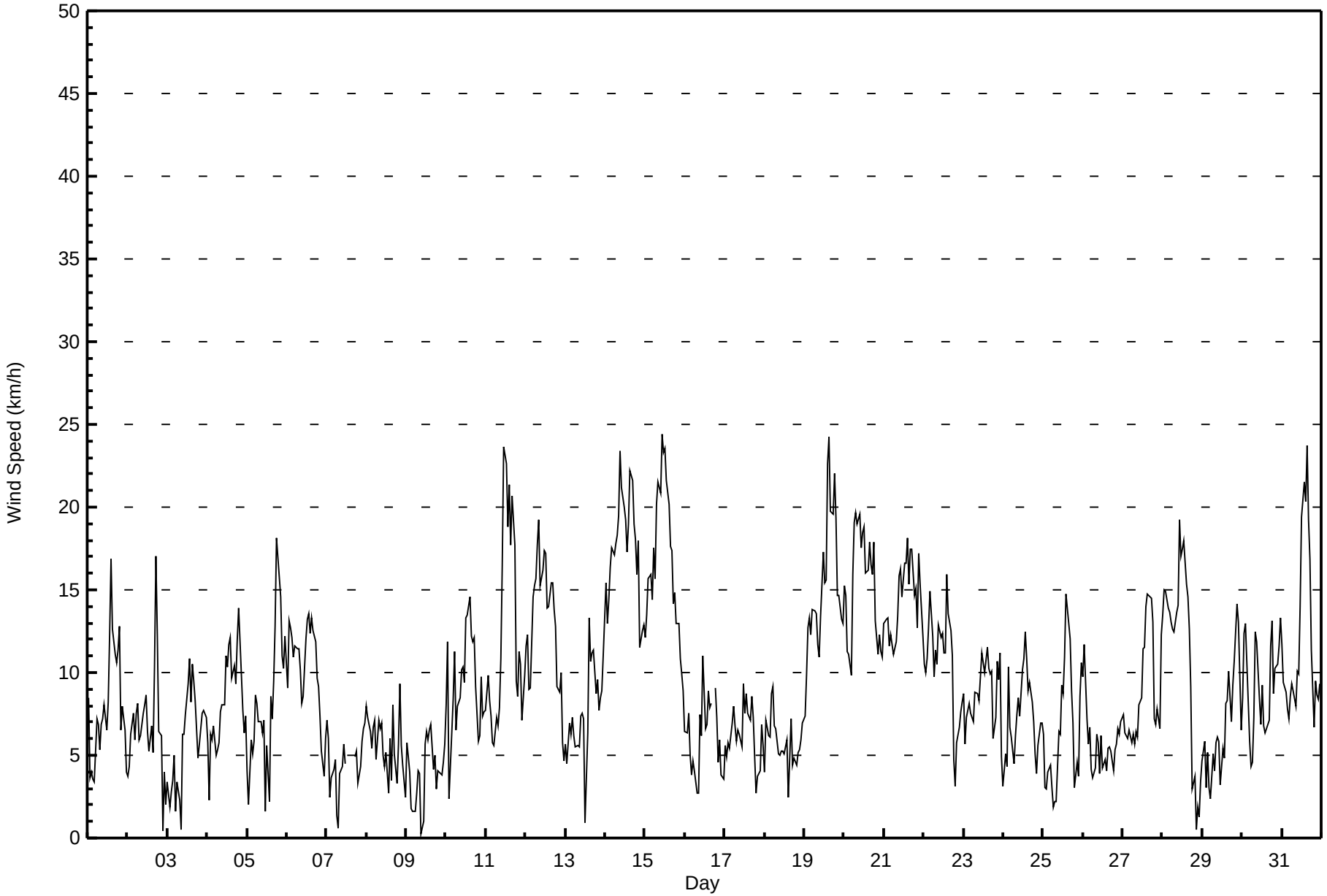
C - Calibration M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed (WS) - km/h

Buffalo Viewpoint - August 2015



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	158	21.41	21.41
6 - 11	355	48.10	69.51
12 - 19	197	26.69	96.21
20 - 28	28	3.79	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 738

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Wind Speed (WS) - km/h

Buffalo Viewpoint - August 2015

Wind Speed Ranges (km/h)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 5	6	4	7	4	8	6	15	30	11	15	9	6	7	12	8	10	158
6 - 11	19	3	6	2	4	30	64	74	21	18	26	21	19	14	20	14	355
12 - 19	5	1	0	1	1	12	12	14	0	4	25	51	19	24	22	6	197
20 - 28	6	0	0	0	0	0	0	0	0	0	2	13	3	2	0	2	28
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	36	8	13	7	13	48	91	118	32	37	62	91	48	52	50	32	738

Total Number of Valid Hours: 738

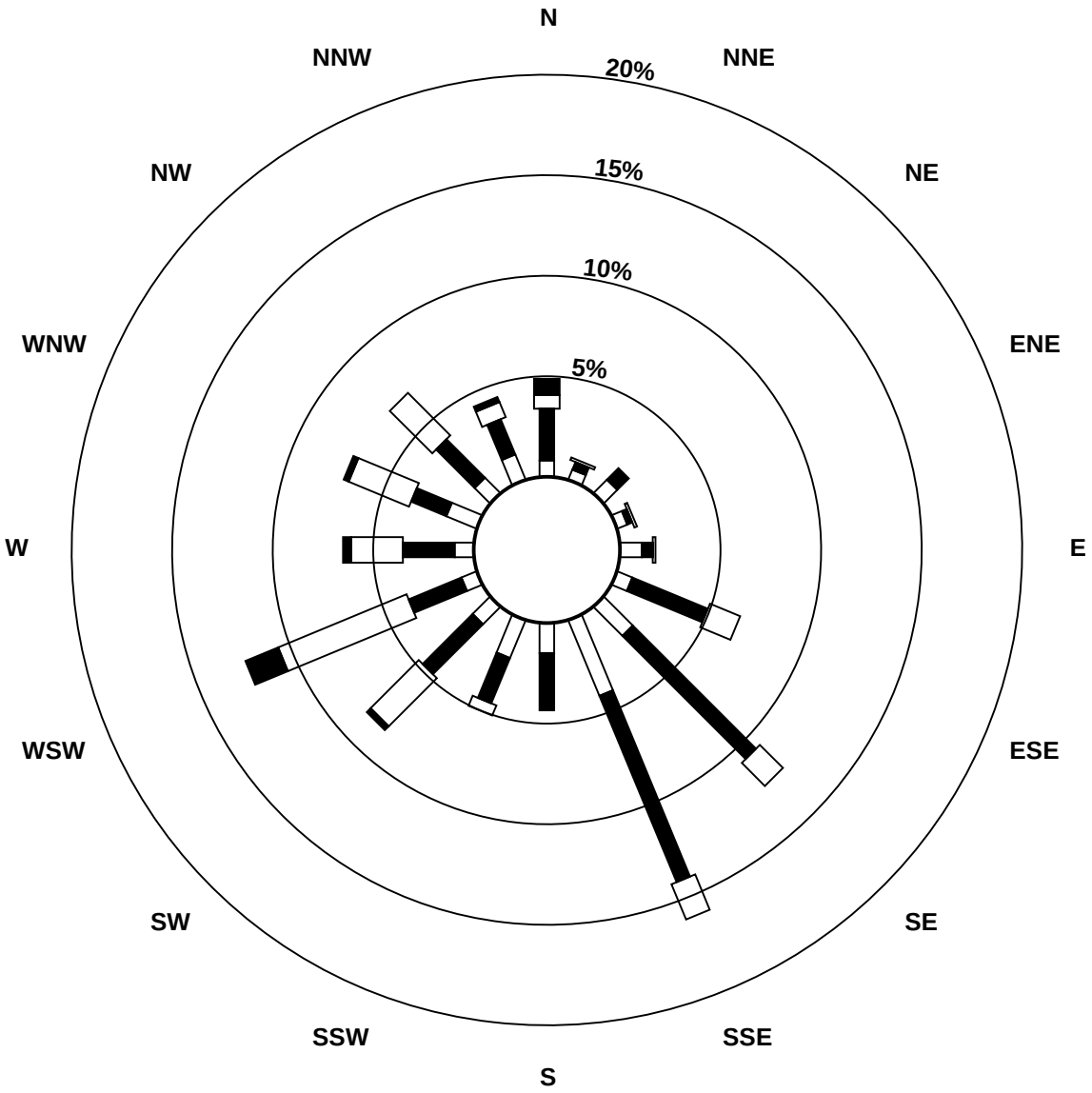
Total Number of Hours: 744

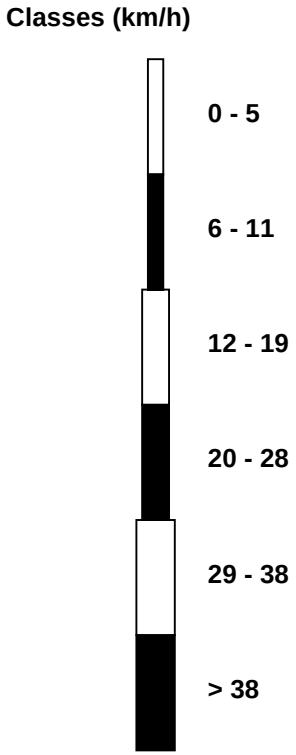
Wood Buffalo Environmental Association

Wind Rose Aug 2015

Wind Speed (WS) - km/h

Buffalo Viewpoint (AMS 4)





Total Number of Valid Hours: 738

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Buffalo Viewpoint - August 2015

Direction of Maximum Speed: 352 deg on Aug 15 11:00
Direction of Maximum Daily Speed Average: 267.5 deg on Aug 14

Direction of Minimum Speed: 205 deg on Aug 9 10:00

Direction of Minimum Daily Speed Average: 1.3 deg on Aug 26

Monthly Average Direction: 247.1 deg

Hours in Service:	744
Hours of Data:	738
Hours of Missing Data:	6
Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average
1-Aug	348	251	273	228	268	334	352	344	312	297	288	334	333	315	329	315	303	307	325	11	354	348	291	304	321.1
2-Aug	215	161	167	153	164	155	152	139	128	135	119	112	139	115	103	138	319	27	78	242	251	342	111	350	128.0
3-Aug	43	49	186	162	160	162	146	203	293	359	14	148	143	156	150	140	141	138	138	98	112	143	146	141	136.8
4-Aug	154	130	30	65	103	87	89	119	116	79	41	40	90	119	113	108	109	128	119	126	136	132	126	110	105.3
5-Aug	137	107	56	58	51	47	63	98	116	147	150	181	352	93	141	141	120	133	149	157	147	132	123	133	123.1
6-Aug	133	123	114	110	111	111	122	130	121	122	107	105	98	108	106	126	110	117	115	121	132	133	124	105	115.9
7-Aug	111	121	123	98	98	77	126	213	304	327	322	341	C	C	C	C	C	220	200	155	135	145	144	148	132.3
8-Aug	146	159	143	157	162	165	153	137	139	115	126	133	155	250	311	245	180	162	176	107	134	153	156	71	150.5
9-Aug	47	34	64	203	227	163	164	181	132	205	164	141	137	205	262	356	9	37	93	102	101	138	156	162	121.3
10-Aug	244	311	109	195	236	271	247	236	222	228	235	237	243	236	249	242	234	224	210	194	172	207	182	170	230.9
11-Aug	160	152	141	142	131	170	144	166	201	218	243	249	245	234	240	240	244	247	238	214	217	215	241	241	222.8
12-Aug	235	230	219	216	234	244	247	251	248	242	250	248	252	260	256	248	252	254	258	233	211	216	186	171	241.7
13-Aug	170	195	123	157	158	141	137	165	144	150	135	123	299	305	270	220	209	218	220	209	184	165	179	220	186.9
14-Aug	254	250	248	252	250	250	256	253	251	253	256	257	270	272	291	289	287	290	286	289	296	273	269	269	267.5
15-Aug	276	293	310	306	312	343	351	347	352	354	352	354	353	358	348	344	347	316	320	323	326	323	320	343	336.4
16-Aug	314	314	339	348	267	257	247	174	206	239	324	335	320	287	279	288	276	M	270	254	192	168	173	194	280.0
17-Aug	143	157	285	162	143	168	162	155	146	124	157	224	211	217	220	200	232	277	264	153	138	203	144	167	186.1
18-Aug	223	305	332	7	326	297	297	317	330	313	5	336	323	320	351	154	168	150	178	150	160	168	152	152	295.8
19-Aug	146	144	151	157	152	151	156	158	164	195	235	250	254	257	258	253	244	268	281	281	271	267	254	246	231.5
20-Aug	252	253	259	237	237	264	263	258	271	275	270	268	283	285	290	296	294	302	305	290	269	282	279	247	273.6
21-Aug	248	250	252	248	249	246	242	264	295	303	307	310	306	313	328	304	302	315	310	297	297	306	303	287	290.9
22-Aug	279	263	261	253	250	253	260	263	263	281	283	294	307	293	312	312	313	339	14	323	152	154	146	150	277.9
23-Aug	155	164	166	169	175	175	158	150	150	127	140	153	161	145	155	152	162	155	136	127	141	156	340	46	151.2
24-Aug	36	264	292	143	157	175	200	166	188	214	239	263	261	284	265	268	250	243	233	233	239	232	289	312	241.4
25-Aug	1	298	317	265	301	281	163	191	319	355	3	353	358	352	357	3	354	345	344	24	347	304	342	10	347.7
26-Aug	4	343	359	27	3	22	3	41	4	354	353	358	336	301	208	206	223	222	201	184	179	159	154	144	348.6
27-Aug	155	161	156	157	159	157	173	161	127	138	129	204	216	210	202	199	205	235	232	197	180	179	169	224	189.7
28-Aug	225	231	228	228	232	230	232	216	233	229	240	236	243	252	235	253	251	253	284	136	94	298	25	345	236.9
29-Aug	294	324	181	168	298	200	160	162	169	147	143	295	277	169	124	124	126	121	126	123	125	131	129	128	139.9
30-Aug	123	133	138	135	168	220	158	233	259	281	285	278	288	288	231	250	225	156	138	159	150	156	149	142	181.7
31-Aug	146	145	150	153	158	154	154	142	139	147	166	223	241	221	237	236	237	233	210	192	205	185	166	148	196.1
	209.9	223.8	206.9	188.4	209.0	219.3	205.4	208.1	223.9	243.1	258.8	264.5	266.3	261.3	265.0	253.6	251.2	253.9	241.7	210.4	189.2	194.5	190.8	187.6	
	Diurnal Average																								

C - Calibration M - Maintenance

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

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg

Buffalo Viewpoint - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 104 deg on Aug 9 10:00

Minimum Value: 8 deg on Aug 27 00:00

Percentiles: P_1 = 10 P_{10} = 16 Q_1 = 19 Median = 22 Q_3 = 30 P_{90} = 48 P_{99} = 90

Hours in Service:	744
Hours of Data:	738
Hours of Missing Data:	6
Hours of Calibration:	5
Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Aug	24	35	34	58	46	19	25	28	16	21	28	36	31	28	15	20	19	19	21	15	38	27	27	27	58
2-Aug	33	25	11	11	18	16	14	23	25	31	25	32	62	66	49	37	77	25	20	49	17	90	34	63	90
3-Aug	48	63	33	15	25	87	34	48	92	24	37	30	31	30	37	27	32	21	19	18	15	17	16	15	92
4-Aug	18	72	19	39	19	19	23	44	21	31	31	18	20	23	19	19	19	20	20	22	21	22	23	19	72
5-Aug	24	49	15	19	17	13	19	19	20	27	27	83	45	84	24	26	24	20	23	22	22	22	21	21	84
6-Aug	21	22	21	20	19	20	21	22	21	23	22	22	24	25	26	24	28	23	21	22	20	16	30	19	30
7-Aug	19	22	28	17	12	16	33	61	36	32	30	41	C	C	C	C	C	28	27	31	13	22	23	24	61
8-Aug	25	24	24	22	21	18	26	26	30	30	51	55	61	92	41	73	27	25	32	31	29	27	18	56	92
9-Aug	14	17	33	55	65	90	30	28	46	104	99	47	41	43	41	40	59	35	42	16	15	30	20	21	104
10-Aug	53	26	72	47	26	20	23	27	20	23	25	29	29	24	26	26	21	20	17	16	18	18	19	14	72
11-Aug	18	11	13	15	35	34	24	21	30	20	22	18	19	20	20	21	18	17	20	15	14	13	49	17	49
12-Aug	19	18	28	19	20	17	18	17	17	19	19	20	20	27	24	20	19	21	19	17	16	14	36	32	36
13-Aug	24	36	11	33	16	27	43	21	26	23	27	24	88	21	21	26	17	19	22	14	11	11	13	18	88
14-Aug	18	15	15	14	14	15	15	16	17	16	19	20	26	26	22	21	21	22	21	20	21	20	19	20	26
15-Aug	20	22	17	18	18	22	20	21	20	19	21	20	21	23	20	20	22	20	19	17	21	18	17	18	23
16-Aug	19	19	28	47	28	24	34	52	68	30	47	25	46	49	35	47	27	M	21	14	38	16	24	23	68
17-Aug	18	33	49	37	16	13	18	27	30	33	53	29	46	33	37	30	22	29	47	57	35	47	16	27	57
18-Aug	32	22	21	23	14	18	23	22	39	44	49	52	62	52	87	46	26	31	27	29	26	21	18	24	87
19-Aug	23	23	24	23	24	23	23	24	26	26	27	22	27	24	21	17	17	31	23	21	20	21	18	17	31
20-Aug	14	16	24	19	18	20	19	19	22	21	21	20	23	23	20	20	20	20	17	23	20	21	22	16	24
21-Aug	16	16	15	16	16	18	21	20	22	21	19	21	22	21	20	22	20	20	20	19	20	19	18	23	23
22-Aug	21	19	18	15	13	15	18	17	19	22	23	24	28	31	22	21	25	27	56	81	18	18	9	9	81
23-Aug	15	16	15	15	16	15	20	22	23	27	29	28	31	29	31	36	31	25	26	21	26	28	54	50	54
24-Aug	89	34	73	30	27	27	31	25	27	28	40	27	33	24	30	34	24	23	18	14	21	39	26	15	89
25-Aug	19	48	54	23	32	45	79	32	63	26	28	23	29	21	20	22	20	18	19	53	21	48	23	17	79
26-Aug	17	17	27	20	18	25	38	31	26	23	55	37	56	50	48	28	32	24	11	17	17	21	17	8	56
27-Aug	14	20	11	13	10	11	17	24	25	34	30	34	24	25	23	22	21	22	18	21	18	17	26	17	34
28-Aug	17	19	18	17	19	18	20	18	19	19	21	20	21	23	21	21	22	22	20	50	95	82	87	73	95
29-Aug	35	37	84	35	55	60	28	25	31	42	51	67	52	62	33	36	27	21	19	18	21	21	22	35	84
30-Aug	20	22	21	20	37	19	30	34	19	21	35	41	36	57	61	36	43	55	22	19	10	11	12	8	61
31-Aug	9	11	12	13	13	17	25	16	24	24	36	26	19	20	19	19	19	18	15	17	21	9	26	21	36
	89	72	84	58	65	90	79	61	92	104	99	83	88	92	87	73	77	55	56	81	95	90	87	73	
	Diurnal Maximum																								

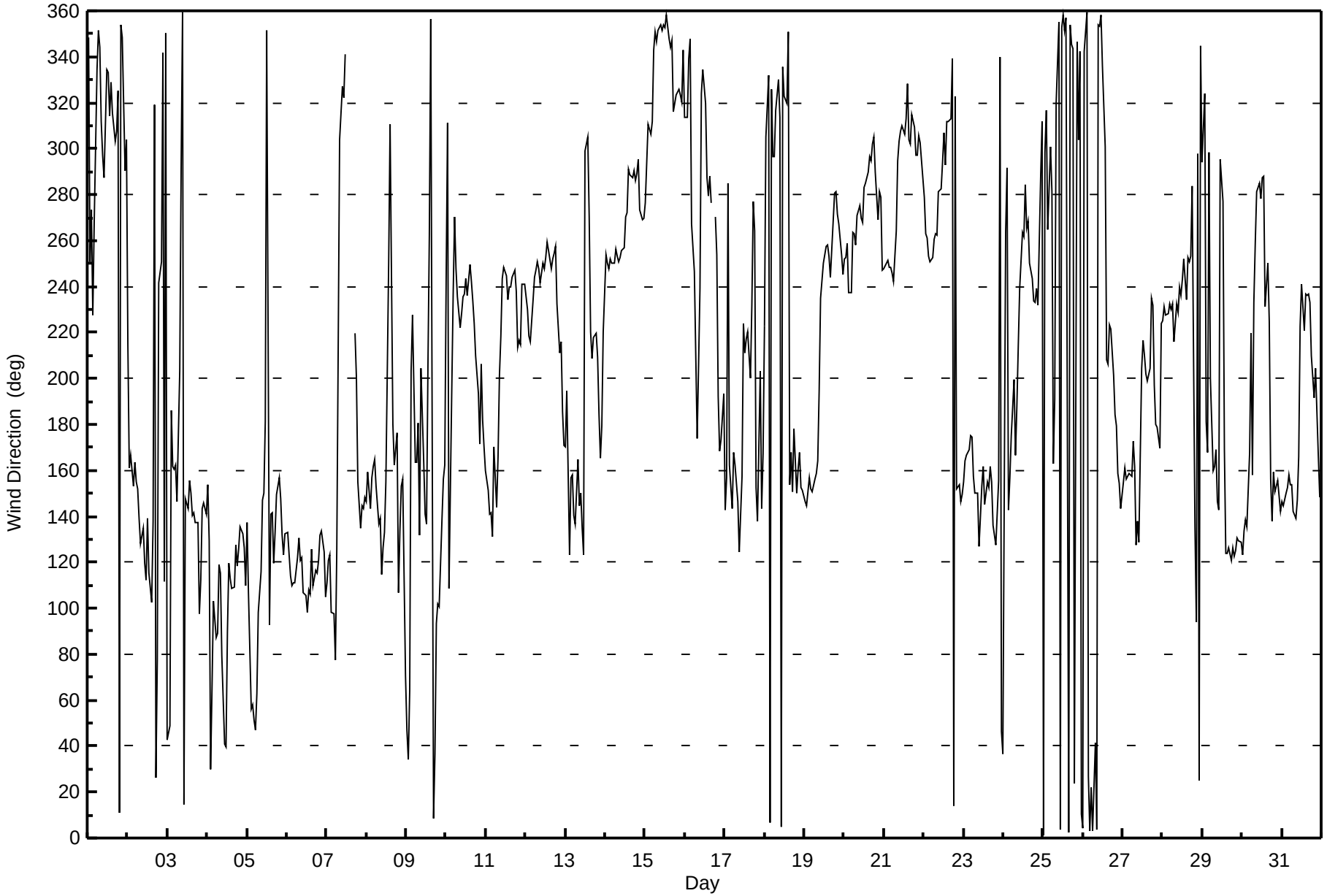
C - Calibration M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction (WD) - deg

Buffalo Viewpoint - August 2015



Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

Calibration Date	August 12, 2015	Last Calibration	July 7, 2015
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Reason:	Routine		
Start Time (MST)	9:30	End Time (MST)	12:25
Gas Cert Reference	LL107926	Station temp.	21 Deg C
Cal Gas Concentration	51 ppm	Cal Gas Exp Date	5/29/2014
Calibrator Make/Model	Sabio 4010	Serial Number	11551008
ZAG Make/Model	API 701	Serial Number	4297
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2636

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 1000 ppb		PMT voltage	-593	-592
Analyzer IP address	192.168.1.43		Lamp voltage	829	829
Calculated slope	0.988729	0.997630	Chamber temp	45.2	45.0
Calculated intercept	-0.416557	-0.340911	Pressure	700.0	689.2
Analyzer Background	10.0	10.0	Flow	0.492	0.488
Analyzer Coefficient	0.867	0.856	Intensity	85	85

Analyzer make	TEI 43i	Analyzer serial #	JC1327300932

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.3	----
as found span	5000	58.8	599.8	607.5	0.987
calibrator zero	5000	0.0	0.0	0.3	----
high point	5000	58.8	599.8	601.0	0.998
second point	5000	29.4	299.9	302.4	0.992
third point	5000	14.7	149.9	149.8	1.001
as left zero	5000	0.0	0.0	0.5	----
as left span	5000	58.8	599.8	601.0	0.998
				Average Correction Factor	0.997

Corrected As found	607.2	Previous response	607.0	% change	0.0%

Notes:

Inlet filter replaced after as founds. Adjusted span.

Calibration Performed By: Evan Magill

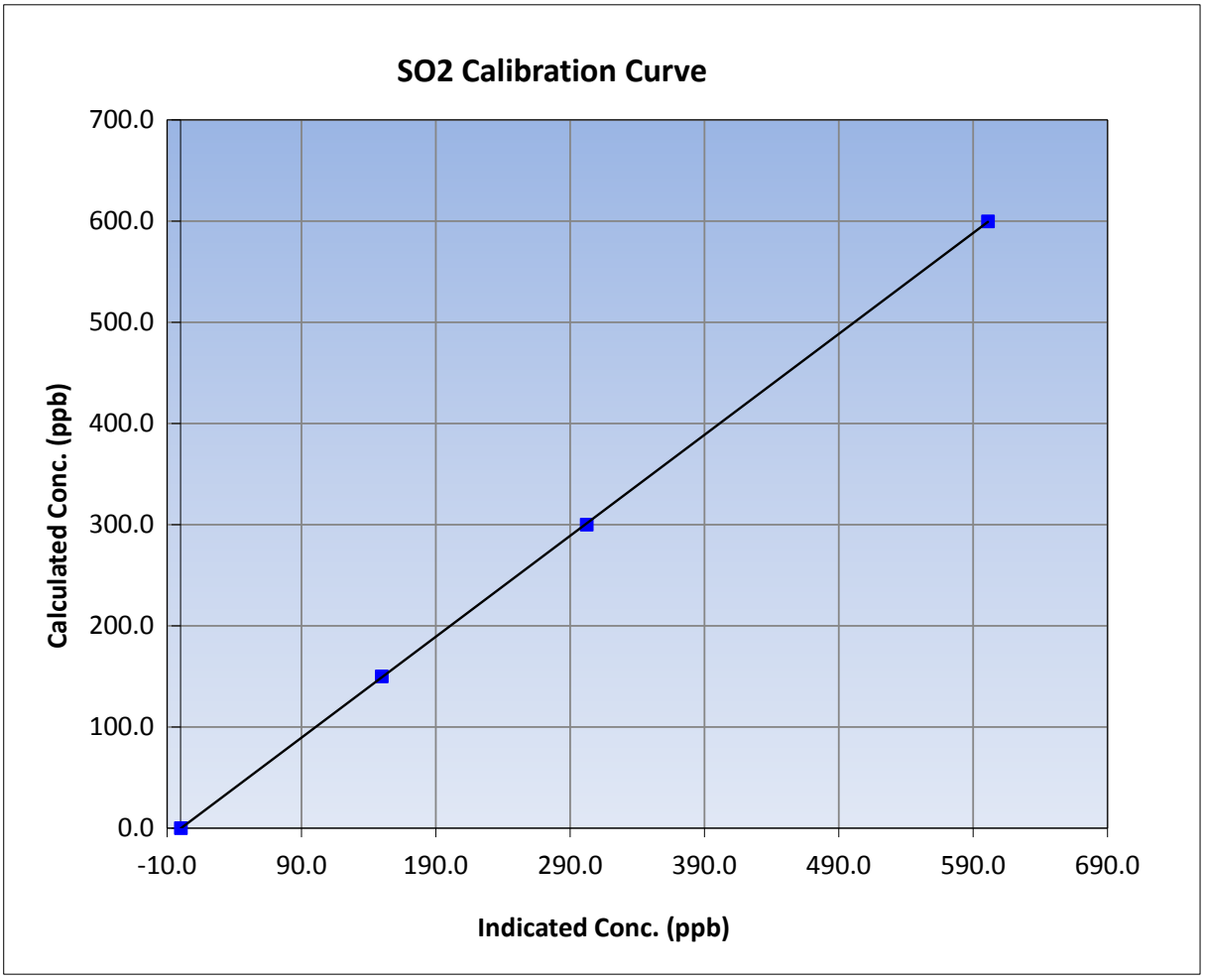
Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

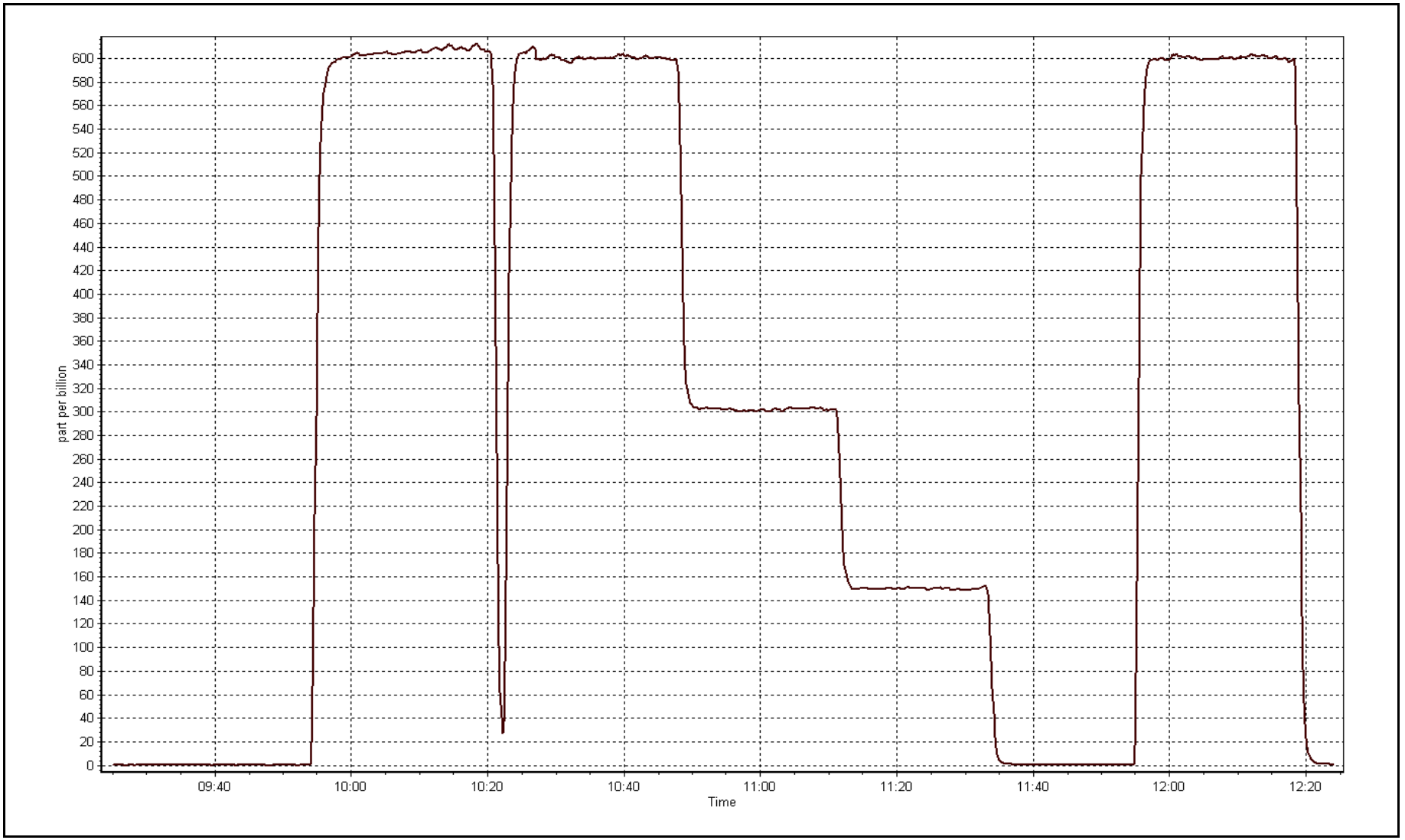
Calibration Date	August 12, 2015	Previous Calibration	July 7, 2015
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Start Time (MST)	9:30	End Time (MST)	12:25
Analyzer make	TEI 43i	Analyzer serial #	JC1327300932

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.3	----	Correlation Coefficient	0.999984
599.8	601.0	0.9979		
299.9	302.4	0.9916	Slope	0.997630
149.9	149.8	1.0011		
			Intercept	-0.340911



SO2 Calibration Plot Date: August 12, 2015



Wood Buffalo Environmental Association
H2S Calibration Report

Station Information

Calibration Date	August 7, 2015	Last Calibration	July 10, 2015
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Reason:	Routine		
Start Time (MST)	9:20	End Time (MST)	12:10
Gas Cert Reference	LL10590	Station temp.	21 Deg C
Cal Gas Concentration	9.75 ppm	Cal Gas Exp Date	21/12/2012
Calibrator Make/Model	Sabio 4010	Serial Number	11551008
ZAG air Make/Model	API 701	Serial Number	4297
DACS make/model	Campbell Scientific CR3000	Serial Number	2635
SO2 gas concentration	51 ppm	SO2 gas cert/exp	LL107926 5/29/2014

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-616	-616
Analyzer IP address	192.168.1.42		Lamp voltage	868	868
Calculated slope	0.999415	1.006660	Chamber temp	45	45
Calculated intercept	-0.098555	-0.366422	Pressure	550.2	539.4
Analyzer Background	13.8	14	Flow	1.047	1.031
Analyzer Coefficient	0.828	0.828	Intensity	94	94
			Converter temp.	330	330

Analyzer make/model	TEI 450i	Analyzer serial #	1336160094
Converter make/model	NA	Converter serial #	NA

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6000	0.0	0.0	0.1	----
as found span	6000	46.1	74.9	74.5	1.006
SO2 scrubber check	5000	14.7	149.9	1.9	----
calibrator zero	6000	0.0	0.0	0.1	----
high point	6000	46.1	74.9	74.5	1.006
second point	6000	25.8	41.9	42.4	0.989
third point	6000	15.4	25.0	25.4	0.985
as left zero	6000	0.0	0.0	0.2	----
as left span	6000	46.1	74.9	75.0	0.999
				Average Correction Factor	0.993

Corrected As found	74.4	Previous response	75.1	% change	0.9%

Notes:

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

Calibration Performed By: Evan Magill

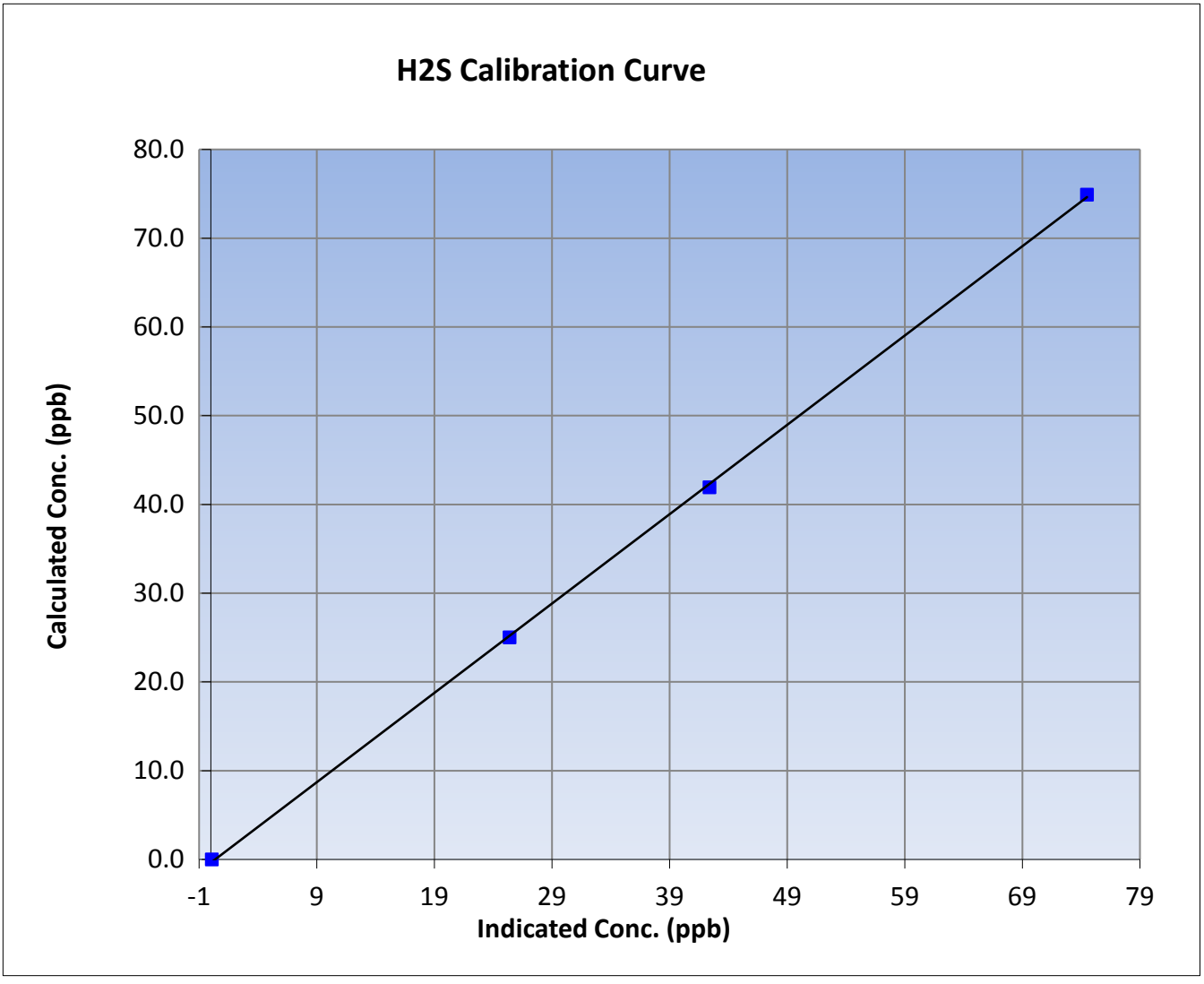
Wood Buffalo Environmental Association
H2S Calibration Report

Station Information

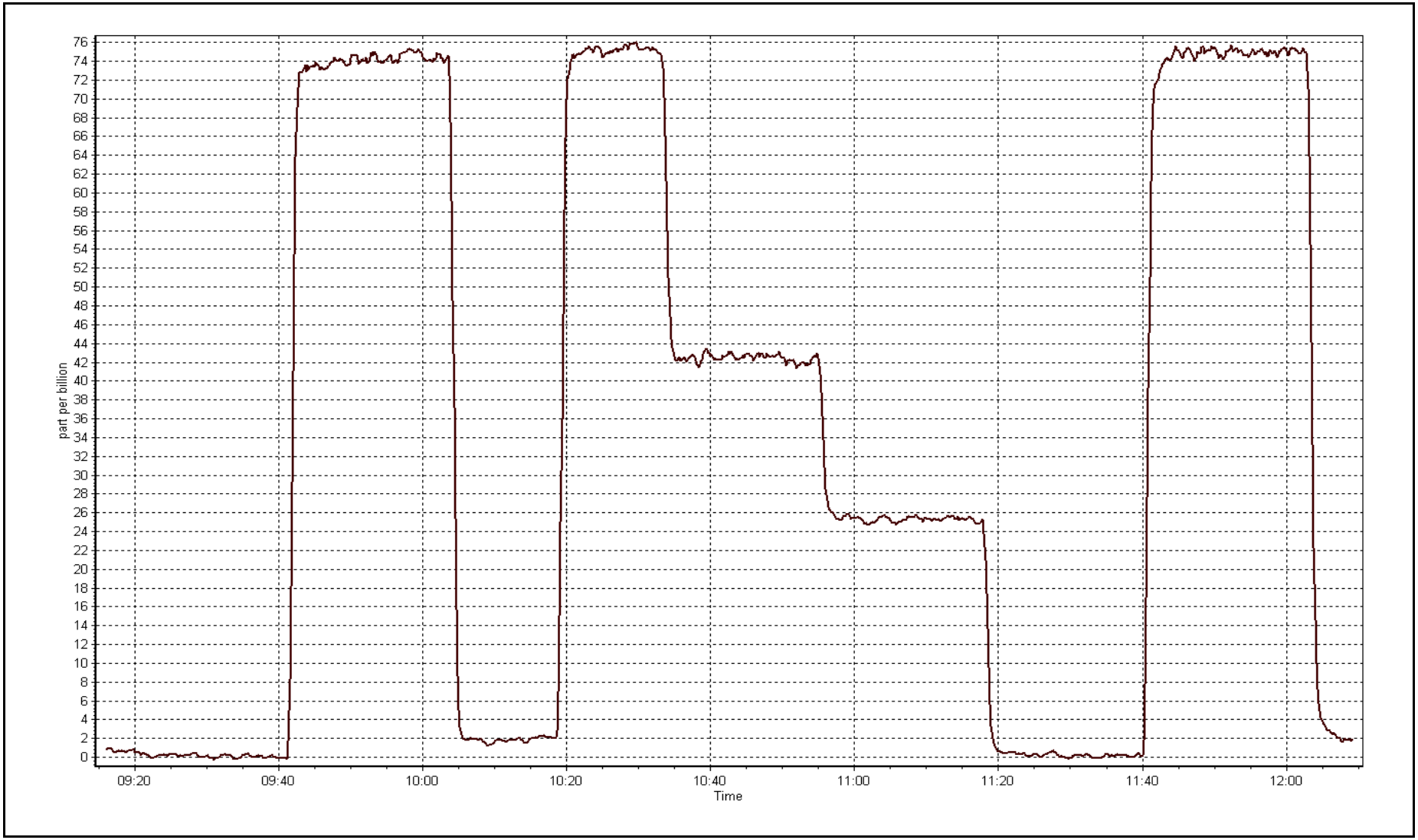
Calibration Date	August 7, 2015	Previous Calibration	July 10, 2015
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Start Time (MST)	9:20	End Time (MST)	12:10
Analyzer make	TEI 450i	Analyzer serial #	1336160094

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	0.999883
74.9	74.5	1.0055		
41.9	42.4	0.9888	Slope	1.006660
25.0	25.4	0.9852		
			Intercept	-0.366422



H2S Calibration Plot Date: August 7, 2015



Wood Buffalo Environmental Association
THC Calibration Report

W B E A

Station Information

Calibration Date	August-12-15	Last Calibration	July-07-15
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Reason:	Routine		
Start Time (MST)	9:30	End Time (MST)	12:25
Gas Cert Reference	LL107926	Cal Gas Expiry Date	5/29/2014
CH4 Cal Gas Conc.	515 ppm	CH4 Equiv Conc.	1067.8 ppm
C3H8 Cal Gas Conc.	201 ppm	Station temp.	21 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11551008
ZAG make/model	Teledyne API 701	Serial Number	4297
DACS make/model	Campbell Scientific CR3000	Serial Number	2635

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 50 ppm		Sample Pressure	8.5	8.5
Analyzer IP address	192.168.1.51		Air or Bypass Press	30.4	30.4
Calculated slope	0.999847	1.002261	Fuel Pressure	19.9	19.9
Calculated intercept	-0.045579	-0.013850	Analyzer Coeff	4.1	4.1
			Analyzer BKG	0.950	0.950

Analyzer make	TEI 51i-LT	Analyzer serial #	1201650671

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	-0.01	----
as found span	5000	58.8	12.56	12.52	1.003
calibrator zero	5000	0.0	0.00	-0.01	----
high point	5000	58.8	12.56	12.52	1.003
second point	5000	29.4	6.28	6.32	0.993
third point	5000	14.7	3.14	3.15	0.997
as left zero	5000	0.0	0.00	0.01	----
as left span	5000	58.8	12.56	12.54	1.001
				Average Correction Factor	0.998

Corrected As found	12.53	Previous response	12.60	% change	0.6%

Notes:

Inlet filter replaced after as founds. No adjustments.

Calibration Performed By: Evan Magill

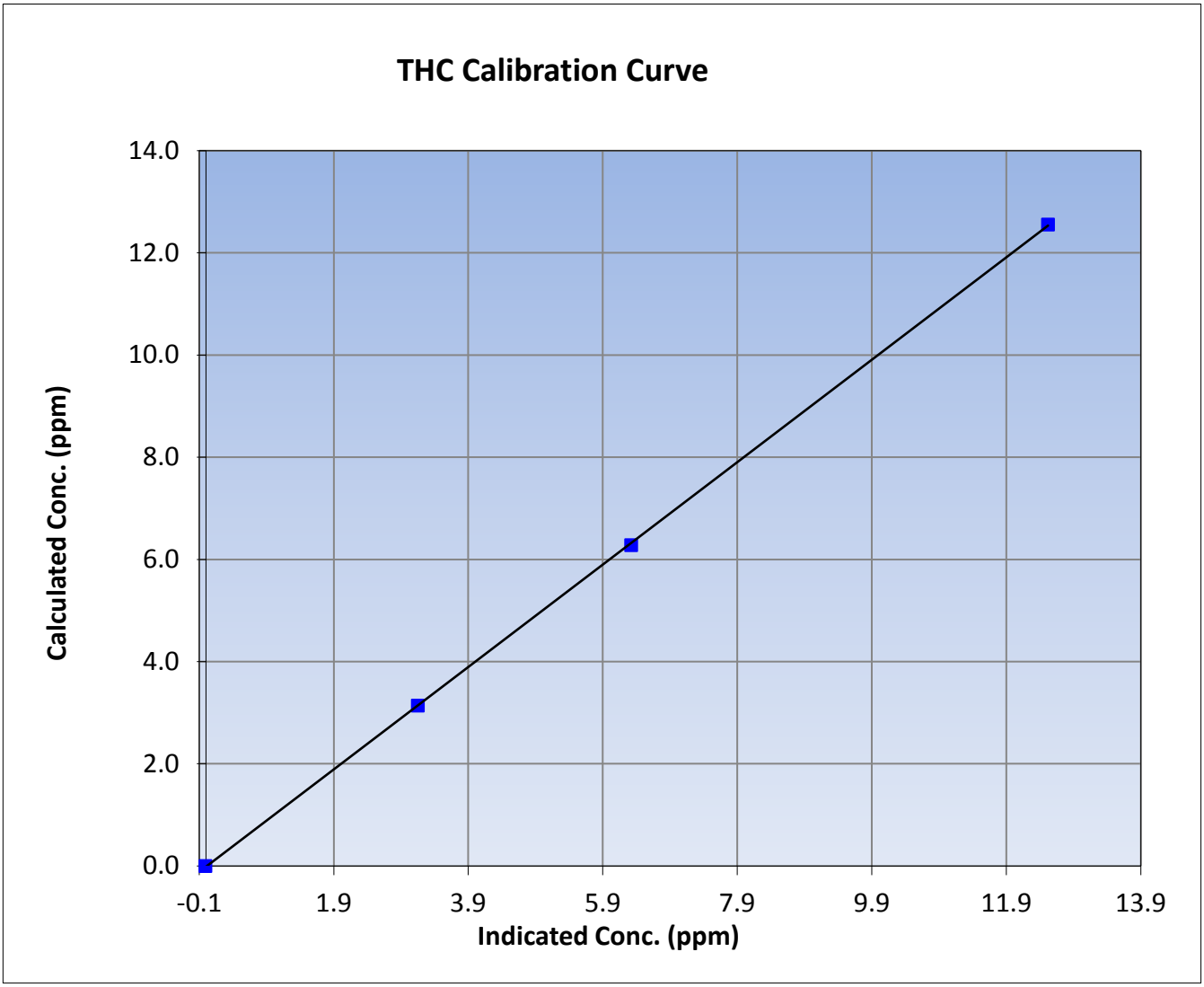
Wood Buffalo Environmental Association
THC Calibration Report

Station Information

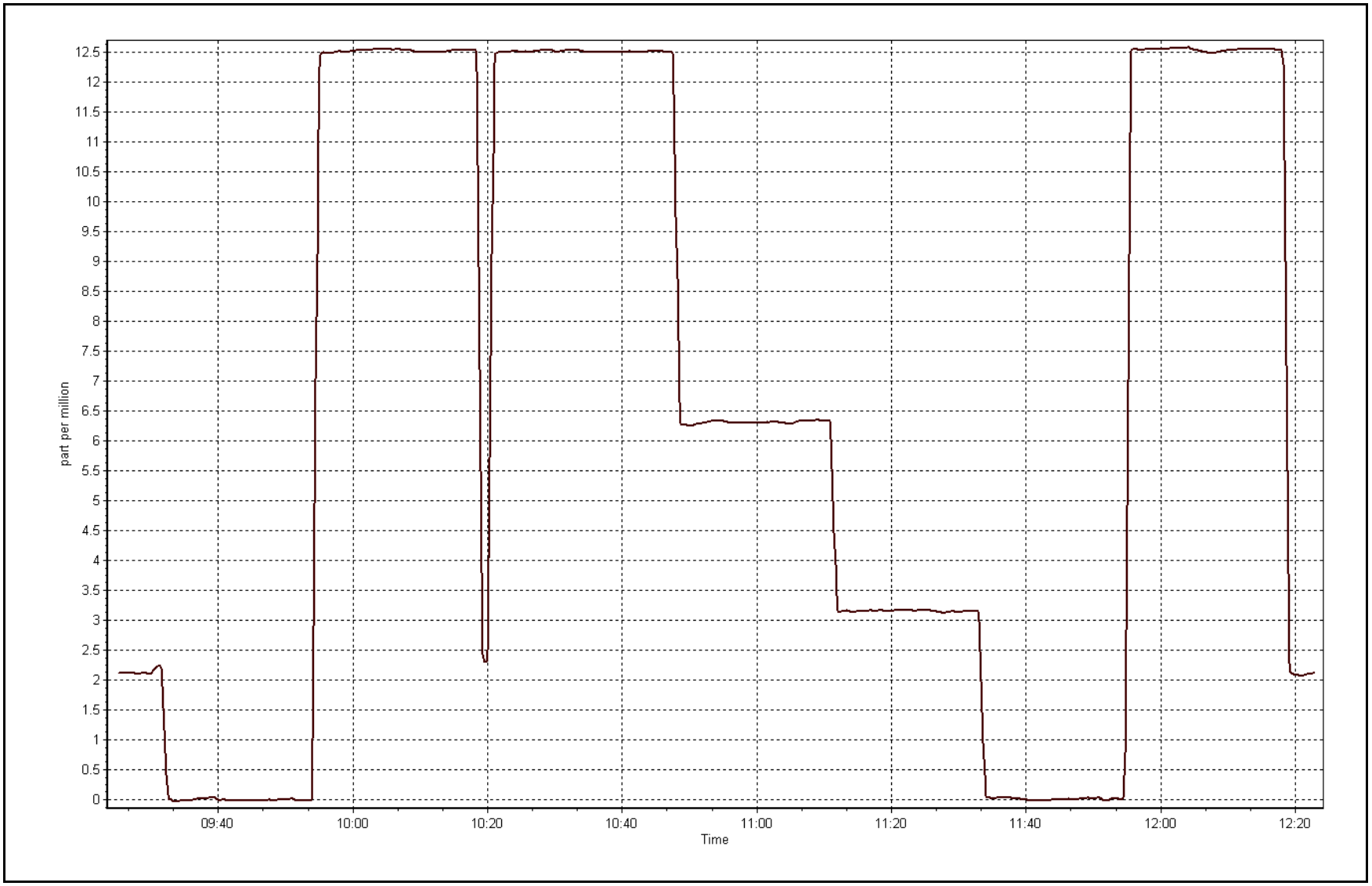
Calibration Date	August 12, 2015	Previous Calibration	July 7, 2015
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Start Time (MST)	9:30	End Time (MST)	12:25
Analyzer make	TEI 51i-LT	Analyzer serial #	1201650671

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	-0.01	----	Correlation Coefficient	0.999967
12.56	12.52	1.0029		
6.28	6.32	0.9934	Slope	1.002261
3.14	3.15	0.9966		
			Intercept	-0.013850



THC Calibration Plot Date: August 12, 2015



Wood Buffalo Environmental Association

WS/WD Calibration Report

Station Information

Calibration Date	August-07-15	Previous Calibration	August-27-14
Station Number	AMS 04	Station Location	Buffalo Viewpoint
Reason:	Routine Installation	Removal	Other:
Start Time (MST)	11:55	End Time (MST)	17:30
Barometric Pressure	756	Station Temperature	23 Deg C
WS Calibrator	MetOne 053	Serial Number	K13090

WIND SPEED

Sensor make/model	010C	Sensor serial #	E5130
DACS make	Campbel Scientific CR3000	DACS serial No.	N/A
DACS voltage range	5000	DACS channel #	N/A
	Before		After
DACS slope	0.9656	DACS slope	0.9656
DACS intercept	0.14396	DACS intercept	0.14396
Calculated slope	0.999182559	Calculated slope	1.000482
Calculated intercept	0.021069902	Calculated intercept	-0.085884

Wind Speed Calibration Data

Shaft RPM	Actual Speed (K/hr)	Indicated Speed (K/hr)	Correction factor
0	0	0.0	n/a
200	20.162	20.1	1.0026
400	39.359	39.8	0.9882
600	58.555	58.5	1.0003
800	77.752	77.7	1.0008
1000	96.948	97.0	0.9997
Average Correction Factor			0.9983

WIND DIRECTION

Sensor make/model	020C	Sensor serial #	P10612
DACS make	Campbel Scientific CR3000	DACS serial No.	2586
DACS voltage range	5000	DACS channel #	N/A
	Before		After
DACS slope	0.14396	DACS slope	0.14396
DACS intercept	0.9656	DACS intercept	0.9656
Calculated slope	1.002378729	Calculated slope	1.002145
Calculated intercept	1.396283823	Calculated intercept	1.557678

Wind Direction Calibration Data

Physical Direction (Degrees)	Indicated Direction (Degrees)	Correction factor
1	0.1	n/a
90	88.3	1.0196
180	177.5	1.0141
270	266.3	1.0140
360	359.1	1.0024
Average Correction Factor		1.0125

Notes: Wind direction heading found to be towards True North, did not need to adjust.
Replaced wind speed bearings.
Calibration took a long time because 'nick' marks prevented the replacement of the new bearings.
Had to go back to FOC to file rod down to allow the installation of the new bearing.

Calibration Performed By: Evan Magill

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 5
MANNIX
AUGUST 2015

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

September 28, 2015

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MANNIX (AMS 5)
AUGUST 2015

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	710	34	34	100.00	34	0	2	0
H2S (ppb) Average	697	34	47	98.25	36	7	6	1
THC (ppm) Average	709	34	35	99.87	3.6	-	2.6	-
Temperature 2 m (C) Average	744	0	0	100.00	29.5	-	23.3	-
Temperature 20 m (C) Average	744	0	0	100.00	29.2	-	23.6	-
Temperature 45 m (C) Average	744	0	0	100.00	28.8	-	23.5	-
Temperature 75 m (C) Average	744	0	0	100.00	28.5	-	23.4	-
Temperature 90 m (C) Average	547	0	197	73.52	28.4	-	24.8	-
Relative Humidity 2 m (%) Average	744	0	0	100.00	97	-	83	-
Relative Humidity 20 m (%) Average	744	0	0	100.00	98	-	82	-
Relative Humidity 45 m (%) Average	744	0	0	100.00	97	-	83	-
Relative Humidity 75 m (%) Average	744	0	0	100.00	96	-	84	-
Relative Humidity 90 m (%) Average	547	0	197	73.52	97	-	85	-
Wind Speed 20 m (km/h) Average	744	0	0	100.00	35	-	23	-
Wind Speed 45 m (km/h) Average	744	0	0	100.00	40	-	27	-
Wind Speed 75 m (km/h) Average	744	0	0	100.00	42	-	30	-
Wind Speed 90 m (km/h) Average	744	0	0	100.00	43	-	31	-
Wind Direction 20 m (deg) Average	744	0	0	100.00	-	-	-	-
Wind Direction 45 m (deg) Average	744	0	0	100.00	-	-	-	-
Wind Direction 75 m (deg) Average	744	0	0	100.00	-	-	-	-
Wind Direction 90 m (deg) Average	744	0	0	100.00	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	744	0	0	100.00	0.9	-	0.4	-
Vertical Wind Speed 45 m (km/h) Average	744	0	0	100.00	1.8	-	0.9	-
Vertical Wind Speed 75 m (km/h) Average	744	0	0	100.00	1.5	-	0.5	-
Vertical Wind Speed 90 m (km/h) Average	743	0	1	99.87	4.6	-	3.1	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MANNIX (AMS 5)
AUGUST 2015

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

					Percentile						
Parameter	Number	Mean	StnDev	Total	Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	710	0.6	2	-	0	0	0	0	0	1	34
H2S (ppb) Average	697	0.9	2	-	0	0	0	0	1	2	36
THC (ppm) Average	709	2.24	0.2	-	2	2.1	2.1	2.2	2.3	2.5	3.6
Temperature 2 m (C) Average	744	17.29	4.9	-	4.2	11.3	13.7	17	21	23.8	29.5
Temperature 20 m (C) Average	744	17.5	4.6	-	4.7	12	14.4	17.5	20.9	23.4	29.2
Temperature 45 m (C) Average	744	17.39	4.5	-	4.6	11.9	14.3	17.3	20.7	23.2	28.8
Temperature 75 m (C) Average	744	17.33	4.4	-	5.1	12	14.3	17.3	20.7	23	28.5
Temperature 90 m (C) Average	547	17.1	4.7	-	6.7	11.3	13.8	16.7	20.8	23.4	28.4
Relative Humidity 2 m (%) Average	744	66.3	18	-	28	40	52	67	81	91	97
Relative Humidity 20 m (%) Average	744	62.8	18	-	25	37	49	63	78	88	98
Relative Humidity 45 m (%) Average	744	61.8	18	-	25	36	48	62	77	88	97
Relative Humidity 75 m (%) Average	744	61.3	18	-	25	36	47	62	76	86	96
Relative Humidity 90 m (%) Average	547	62.7	18	-	25	35	49	64	77	88	97
Wind Speed 20 m (km/h) Average	744	10.4	6	-	0	4	6	9	14	19	35
Wind Speed 45 m (km/h) Average	744	14.7	7	-	0	6	9	14	20	25	40
Wind Speed 75 m (km/h) Average	744	16.3	9	-	0	6	9	15	23	28	42
Wind Speed 90 m (km/h) Average	744	17.5	9	-	0	6	10	17	24	29	43
Wind Direction 20 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-
Wind Direction 45 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-
Wind Direction 75 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-
Wind Direction 90 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	744	0.04	0.3	-	-0.9	-0.3	-0.2	0	0.2	0.4	0.9
Vertical Wind Speed 45 m (km/h) Average	744	0.21	0.4	-	-1	-0.3	-0.1	0.2	0.5	0.8	1.8
Vertical Wind Speed 75 m (km/h) Average	744	0.1	0.4	-	-1	-0.4	-0.1	0.1	0.3	0.6	1.5
Vertical Wind Speed 90 m (km/h) Average	743	0.95	1.1	-	-1	-0.3	0.1	0.7	1.7	2.6	4.6

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MANNIX (AMS 5)
AUGUST 2015

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
H2S	06 Aug 2015 13:00	06 Aug 2015 14:00	2	Maintenance - sample manifold cleaned
H2S	13 Aug 2015 22:00	14 Aug 2015 08:00	11	DAS collection error - data not recorded
Temperature, Relative Humidity 90 m	01 Aug 2015 22:00	02 Aug 2015 01:00	4	Flat line in sensor output signal
Temperature, Relative Humidity 90 m	03 Aug 2015 22:00	04 Aug 2015 23:00	26	Flat line in sensor output signal
Temperature, Relative Humidity 90 m	10 Aug 2015 03:00	10 Aug 2015 07:00	5	Flat line in sensor output signal
Temperature, Relative Humidity 90 m	11 Aug 2015 00:00	11 Aug 2015 09:00	10	Flat line in sensor output signal
Temperature, Relative Humidity 90 m	11 Aug 2015 19:00	11 Aug 2015 23:00	5	Flat line in sensor output signal
Temperature, Relative Humidity 90 m	12 Aug 2015 13:00	12 Aug 2015 14:00	2	Flat line in sensor output signal
Temperature, Relative Humidity 90 m	12 Aug 2015 22:00	13 Aug 2015 01:00	4	Flat line in sensor output signal
Temperature, Relative Humidity 90 m	13 Aug 2015 21:00	14 Aug 2015 01:00	5	Flat line in sensor output signal
Temperature, Relative Humidity 90 m	16 Aug 2015 09:00	16 Aug 2015 10:00	2	Flat line in sensor output signal
Temperature, Relative Humidity 90 m	16 Aug 2015 12:00	16 Aug 2015 13:00	2	Flat line in sensor output signal
Temperature, Relative Humidity 90 m	16 Aug 2015 16:00	17 Aug 2015 01:00	10	Flat line in sensor output signal
Temperature, Relative Humidity 90 m	18 Aug 2015 16:00	18 Aug 2015 17:00	2	Flat line in sensor output signal
Temperature, Relative Humidity 90 m	18 Aug 2015 19:00	19 Aug 2015 00:00	6	Flat line in sensor output signal
Temperature, Relative Humidity 90 m	19 Aug 2015 10:00	19 Aug 2015 13:00	4	Flat line in sensor output signal
Temperature, Relative Humidity 90 m	19 Aug 2015 17:00	19 Aug 2015 19:00	3	Flat line in sensor output signal
Temperature, Relative Humidity 90 m	22 Aug 2015 20:00	23 Aug 2015 02:00	7	Flat line in sensor output signal
Temperature, Relative Humidity 90 m	23 Aug 2015 21:00	24 Aug 2015 09:00	13	Flat line in sensor output signal
Temperature, Relative Humidity 90 m	24 Aug 2015 19:00	25 Aug 2015 06:00	12	Flat line in sensor output signal
Temperature, Relative Humidity 90 m	25 Aug 2015 15:00	26 Aug 2015 09:00	19	Flat line in sensor output signal
Temperature, Relative Humidity 90 m	27 Aug 2015 01:00	27 Aug 2015 09:00	9	Flat line in sensor output signal
Temperature, Relative Humidity 90 m	27 Aug 2015 20:00	28 Aug 2015 12:00	17	Flat line in sensor output signal
Temperature, Relative Humidity 90 m	28 Aug 2015 23:00	29 Aug 2015 01:00	3	Flat line in sensor output signal
Temperature, Relative Humidity 90 m	29 Aug 2015 09:00	29 Aug 2015 12:00	4	Flat line in sensor output signal
Temperature, Relative Humidity 90 m	29 Aug 2015 19:00	30 Aug 2015 11:00	17	Flat line in sensor output signal
Temperature, Relative Humidity 90 m	31 Aug 2015 11:00	31 Aug 2015 12:00	2	Flat line in sensor output signal
Temperature, Relative Humidity 90 m	31 Aug 2015 19:00	31 Aug 2015 22:00	4	Flat line in sensor output signal
Wind Speed. Wind Direction, Vertical Wind Speed 90 m	13 Aug 2015 16:00	13 Aug 2015 16:00	1	Sensor Failure

Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO_2) - ppb

Mannix - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 34 ppb on Aug 30 12:00 Maximum Daily Average: 2.5 ppb on Aug 30

Minimum Value: 0 ppb on Aug 12 06:00 Minimum Daily Average: 0.1 ppb on Aug 24

Maximum Diurnal Average: 1.7 ppb at hour 12 Minimum Diurnal Average: 0.3 ppb at hour 6

Monthly Average: 0.6 ppb Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 1$ $P_{99} = 6$

Hours in Service:	744
Hours of Data:	710
Hours of Missing Data:	34
Hours of Calibration:	34
Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0	1	0	0	Z	0	1	2	2	1	3	4	2	8	1	1	0	5	2	1	1	0	1	0	1.6	8
2-Aug	0	0	0	0	0	Z	0	0	0	1	2	2	1	0	0	0	1	7	4	2	2	2	5	3	1.5	7
3-Aug	2	1	1	1	1	1	1	1	Z	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0.7	2
4-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
5-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
6-Aug	0	0	Z	0	0	0	0	0	0	0	0	C	C	C	0	0	0	0	0	0	0	0	0	0	0.3	0
7-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	4	6	4	1	1	0	0	0	0	0.8	6
8-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
9-Aug	0	0	0	0	0	0	Z	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0.4	1
10-Aug	Z	2	5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	5
11-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
12-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
13-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
14-Aug	0	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
15-Aug	0	0	0	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0.4	2
16-Aug	Z	2	1	1	1	1	0	0	0	0	0	0	1	2	1	0	0	0	0	0	0	0	0	0	0.6	2
17-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
18-Aug	0	0	Z	5	2	1	1	1	3	1	2	2	1	1	1	1	1	0	0	0	0	0	0	0	1.1	5
19-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
20-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
21-Aug	0	0	0	0	0	Z	0	0	0	0	1	1	0	1	1	1	0	0	1	1	0	0	0	0	0.4	1
22-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	3	1	1	1	1	1	0	0	0	0.6	3
23-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.2	1
24-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
25-Aug	2	1	1	0	0	1	1	Z	1	8	10	2	2	1	1	1	1	1	2	5	1	0	1	2	1.8	10
26-Aug	1	4	1	1	1	0	0	Z	0	2	2	1	3	7	5	3	2	1	1	1	1	1	0	0	1.6	7
27-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
28-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	2	0.4	2
29-Aug	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
30-Aug	0	0	Z	0	0	0	0	0	0	0	13	34	4	1	1	1	0	0	0	0	0	0	0	0	2.5	34
31-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
	0.4	0.6	0.6	0.5	0.3	0.3	0.3	0.3	0.4	0.6	1.2	1.7	0.6	0.9	0.6	0.6	0.5	0.8	0.5	0.5	0.3	0.3	0.4	0.5	Diurnal Average	
	2	4	5	5	2	1	1	2	3	8	13	34	4	8	5	4	6	7	4	5	2	2	5	3	Diurnal Maximum	

Z - zerospan C - Calibration

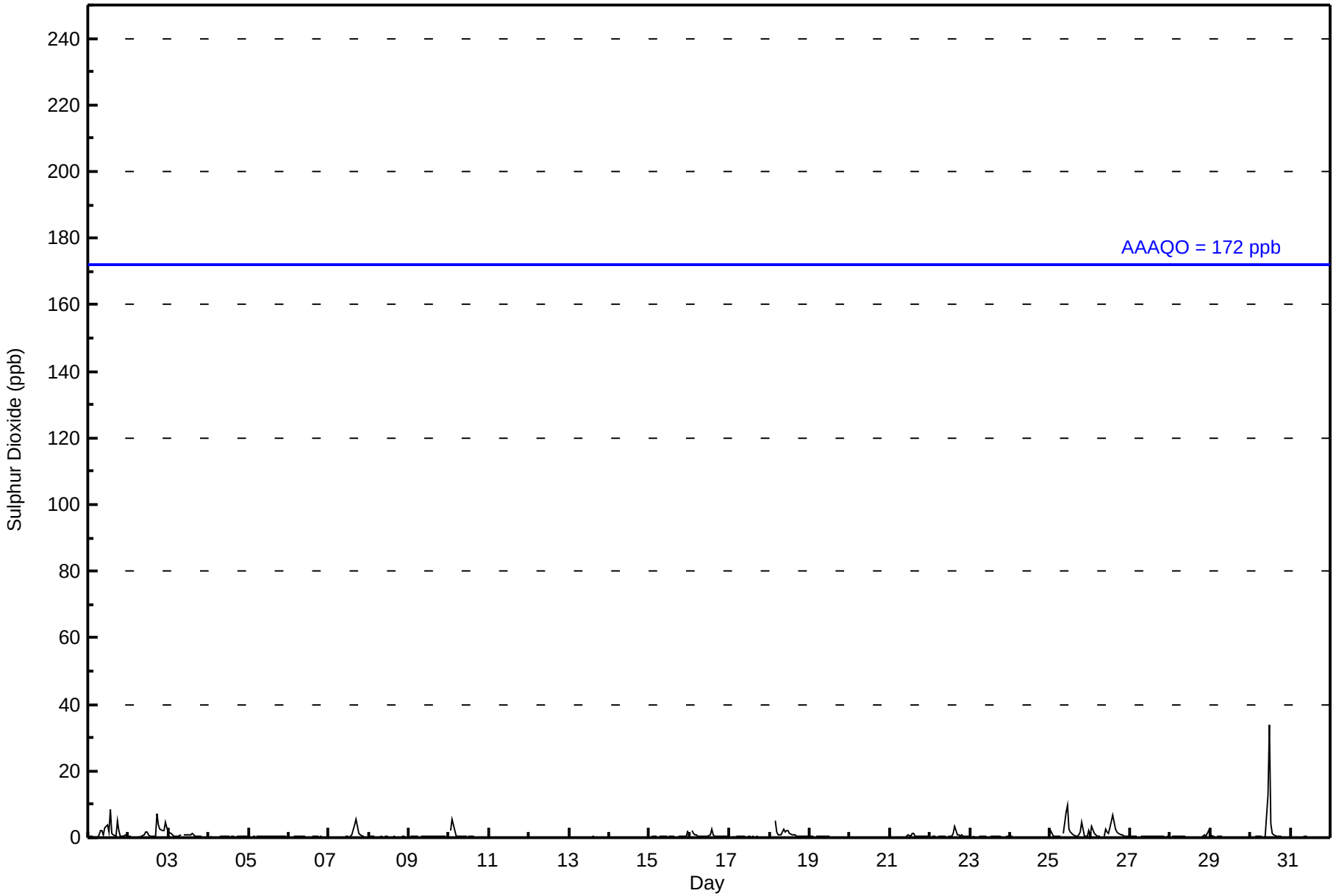
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb

Wood Buffalo Environmental Association

Hourly Averages

Sulphur Dioxide (SO_2) - ppb

Mannix - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

Mannix - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	708	99.72	99.72
11 - 20	1	0.14	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: 710

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

Mannix - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 10	24	11	9	9	22	52	77	104	33	37	52	86	95	46	24	27	708
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	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	24	11	9	9	22	52	77	104	33	37	52	86	97	46	24	27	710

Total Number of Valid Hours: 710

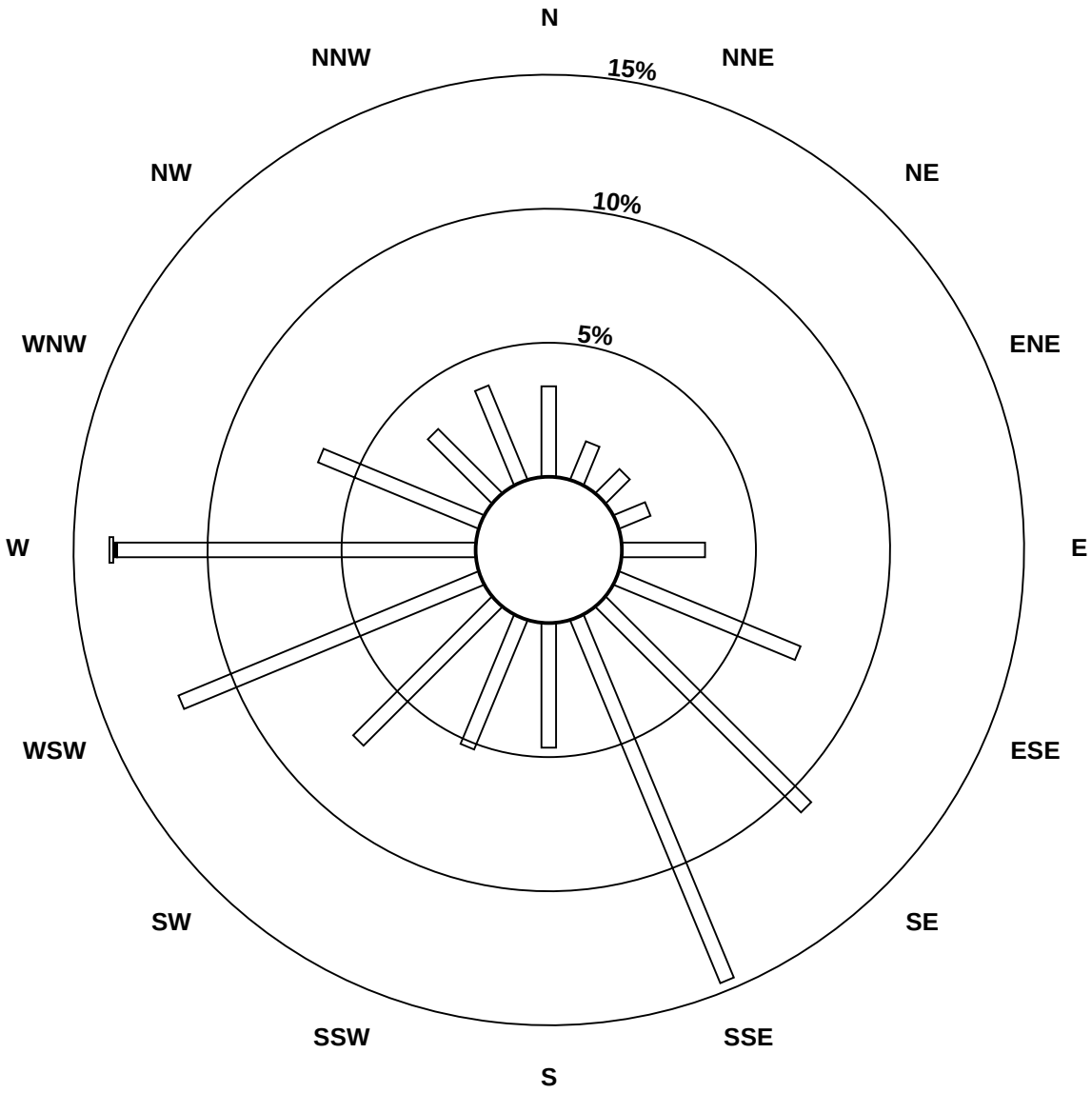
Total Number of Hours: 744

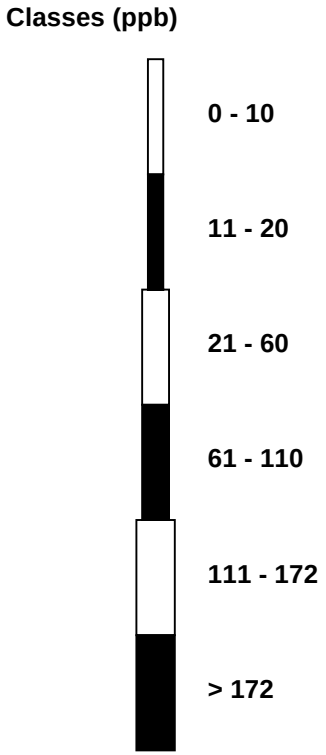
Wood Buffalo Environmental Association

Wind Rose Aug 2015

Sulphur Dioxide (SO_2) - ppb

Mannix (AMS 5)





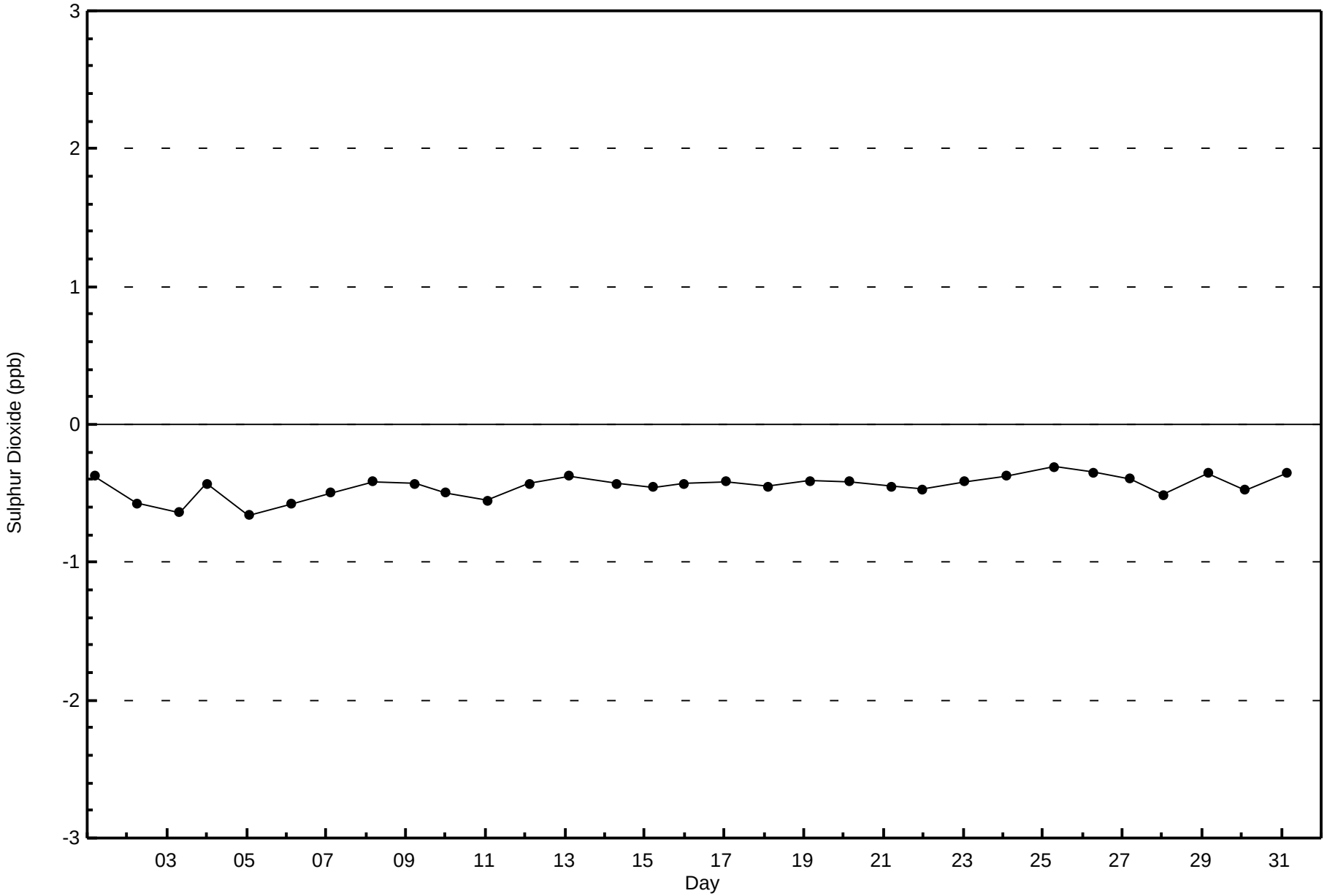
Total Number of Valid Hours: 710

Wood Buffalo Environmental Association

Zero Responses

Sulphur Dioxide (SO_2) - ppb

Mannix - August 2015

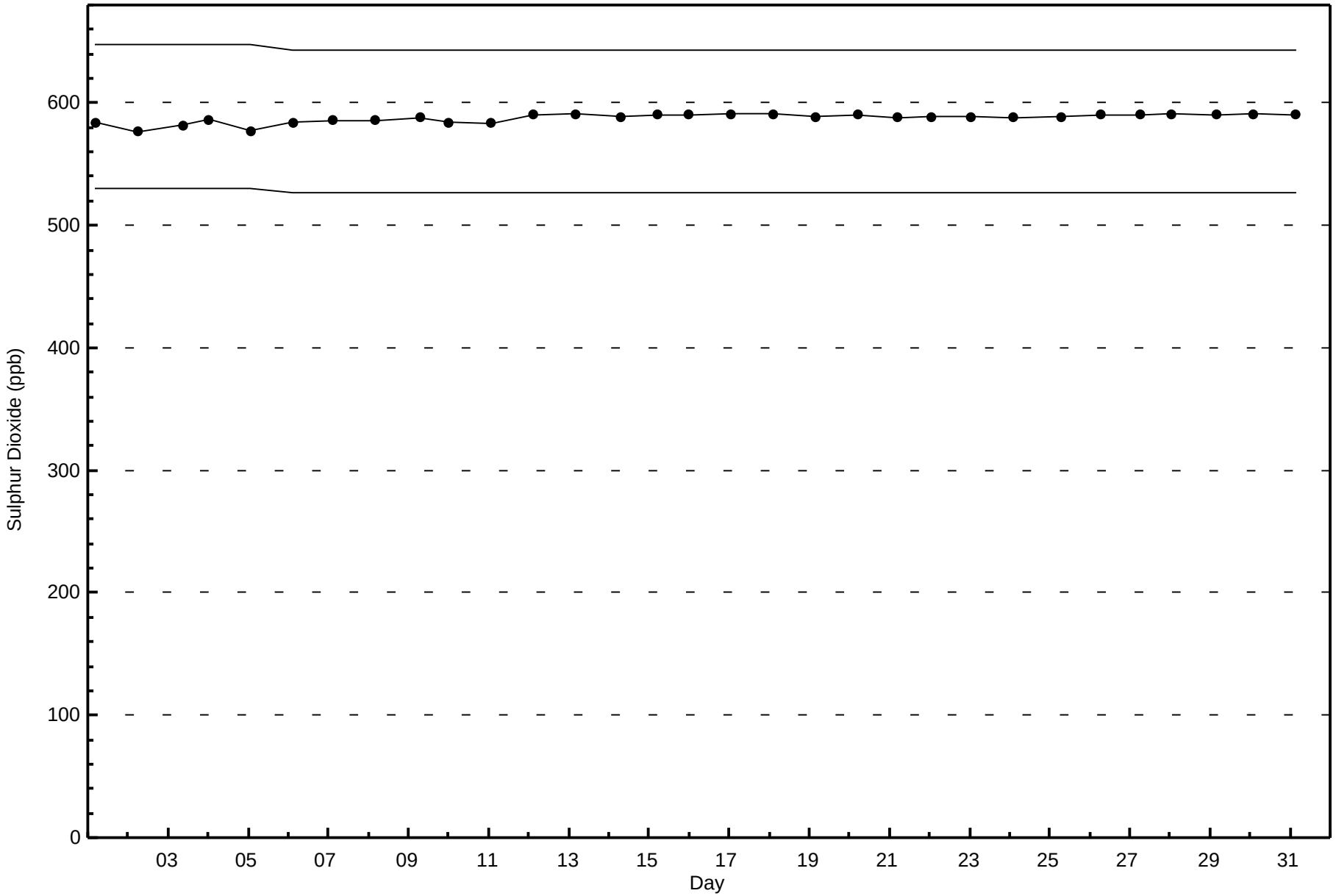


Wood Buffalo Environmental Association

Span Responses

Sulphur Dioxide (SO_2) - ppb

Mannix - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Hydrogen Sulphide (H_2S) - ppb

Mannix - August 2015

Number of Exceedences (AAAQO): 1-hr: 7 24-hr: 1

Maximum Value: 36 ppb on Aug 25 03:00 Maximum Daily Average: 6.2 ppb on Aug 25

Minimum Value: 0 ppb on Aug 28 17:00 Minimum Daily Average: 0.2 ppb on Aug 17

Maximum Diurnal Average: 2.7 ppb at hour 2 Minimum Diurnal Average: 0.4 ppb at hour 17

Monthly Average: 0.9 ppb Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 1$ $P_{90} = 2$ $P_{99} = 11$

Hours in Service:	744
Hours of Data:	697
Hours of Missing Data:	47
Hours of Calibration:	34
Percent Operational Time:	98.3

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	1	7	1	1	1	Z	6	7	5	3	1	1	1	1	2	1	1	1	1	1	0	3	11	1	2.5	11
2-Aug	1	1	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	8	1	1	1	1	7	3	1.3	8
3-Aug	17	16	4	1	1	1	1	1	1	Z	1	1	0	0	0	0	0	0	0	0	1	0	0	1	2.1	17
4-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
5-Aug	0	0	Z	1	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2
6-Aug	0	0	0	Z	0	0	0	1	C	C	C	C	M	M	0	0	0	0	0	0	0	1	1	0	--	1
7-Aug	0	0	0	1	Z	1	1	1	0	0	1	1	1	0	0	0	1	0	0	0	0	0	0	0	0.5	1
8-Aug	1	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
9-Aug	2	7	3	1	1	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.9	7
10-Aug	0	Z	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2
11-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
12-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
13-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	DF	DF	DF	0.3	1
14-Aug	DF	DF	DF	DF	DF	DF	DF	DF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	--	0
15-Aug	0	0	1	1	1	2	Z	2	1	1	1	2	3	3	1	1	1	1	1	2	3	3	3	3	1.5	3
16-Aug	3	Z	1	1	1	1	0	0	0	0	0	1	2	1	0	0	1	0	0	0	0	0	0	0	0.6	3
17-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
18-Aug	0	0	6	Z	5	4	1	2	4	3	2	1	1	0	0	0	0	0	0	0	0	0	0	0	1.4	6
19-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
20-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
21-Aug	0	0	0	0	0	0	Z	0	0	0	1	1	1	1	2	1	0	1	2	0	0	0	0	0	0.6	2
22-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0.5	1
23-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	0.4	3
24-Aug	4	2	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.6	4
25-Aug	15	21	36	11	1	4	2	2	Z	9	4	2	1	1	2	3	2	4	2	4	3	5	2	6	6.2	36
26-Aug	5	5	2	2	4	4	3	2	Z	3	2	1	1	1	1	0	0	0	0	0	0	0	1	1	1.7	5
27-Aug	1	1	1	1	1	1	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1
28-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	5	5	5	1.1	5
29-Aug	4	2	5	1	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	5
30-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
31-Aug	0	0	0	0	Z	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
	1.9	2.7	2.6	1.1	0.9	0.9	0.9	0.8	0.7	0.9	0.6	0.5	0.5	0.5	0.5	0.4	0.4	0.7	0.5	0.6	0.6	0.8	1.3	1.0	Diurnal Average	
	17	21	36	11	5	4	6	7	5	9	4	2	3	3	2	3	2	8	2	4	3	5	11	6	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance DF - DAS Failure

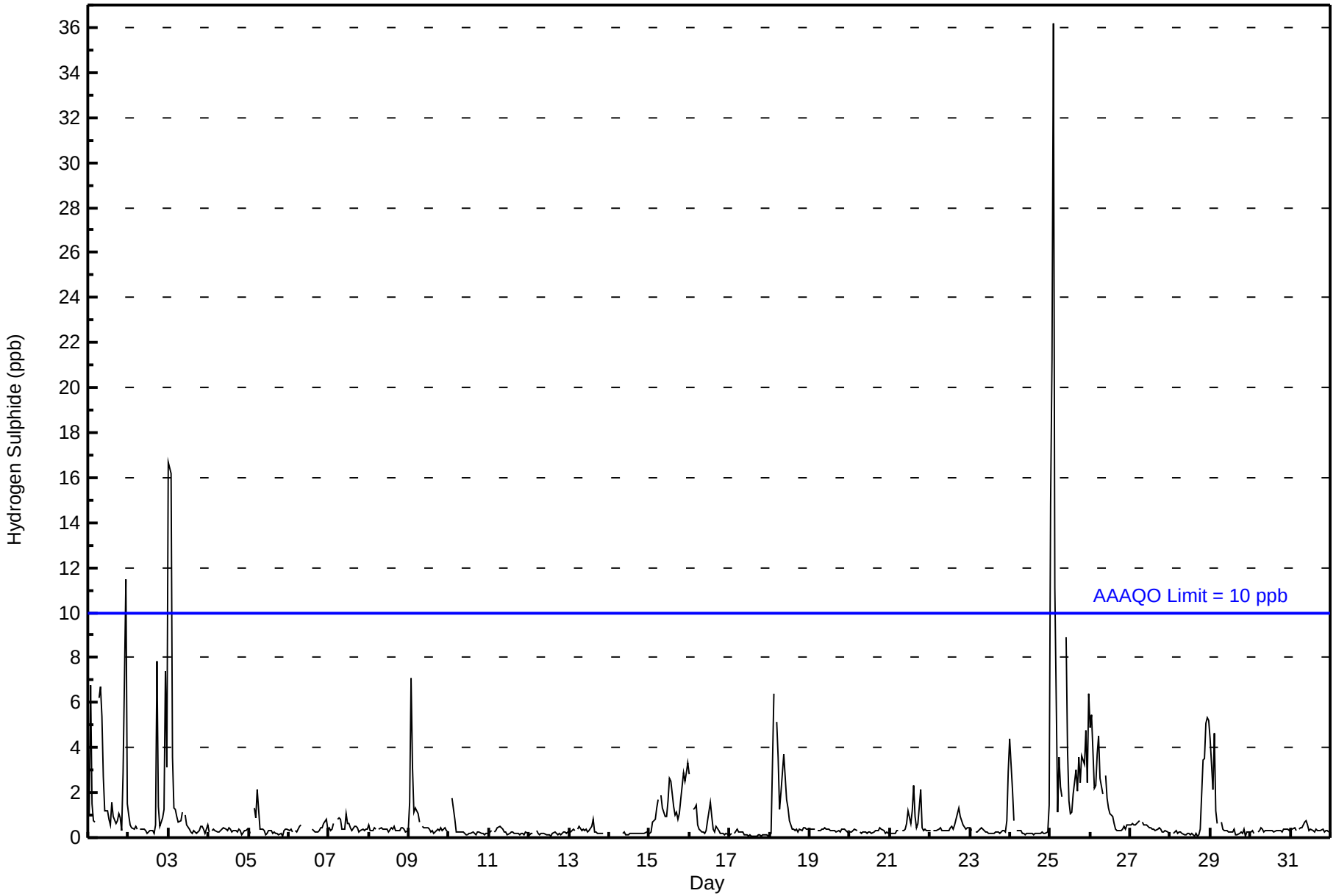
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb

Wood Buffalo Environmental Association

Hourly Averages

Hydrogen Sulphide (H_2S) - ppb

Mannix - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Hydrogen Sulphide (H_2S) - ppb

Mannix - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	642	92.11	92.11
3 - 4	30	4.30	96.41
5 - 7	16	2.30	98.71
8 - 11	2	0.29	99.00
> 11	7	1.00	100.00

Total Number of Valid Hours: 697

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Hydrogen Sulphide (H_2S) - ppb

Mannix - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 2	6	1	5	5	20	49	79	103	33	37	52	85	88	39	22	18	642
3 - 4	8	6	1	3	0	0	0	0	0	0	0	1	1	5	1	4	30
5 - 7	7	2	2	1	0	0	0	0	0	0	1	0	0	0	0	3	16
8 - 11	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
> 11	2	2	1	0	0	0	0	0	0	0	0	0	1	1	0	0	7
Totals	25	11	9	9	20	49	79	103	33	37	53	86	90	45	23	25	697

Total Number of Valid Hours: 697

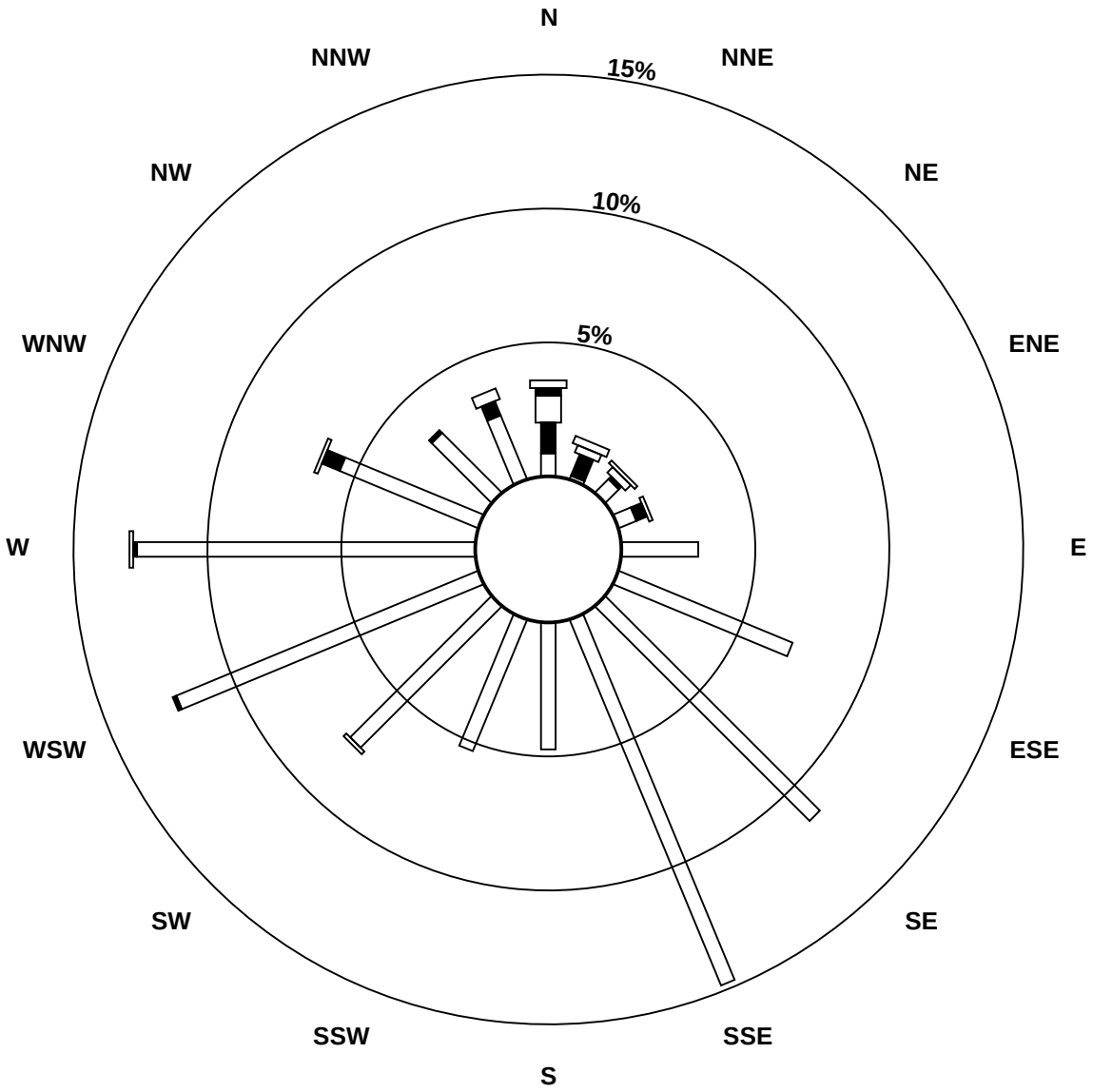
Total Number of Hours: 744

Wood Buffalo Environmental Association

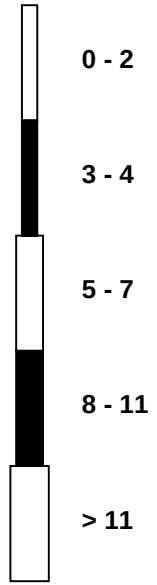
Wind Rose Aug 2015

Hydrogen Sulphide (H_2S) - ppb

Mannix (AMS 5)



Classes (ppb)



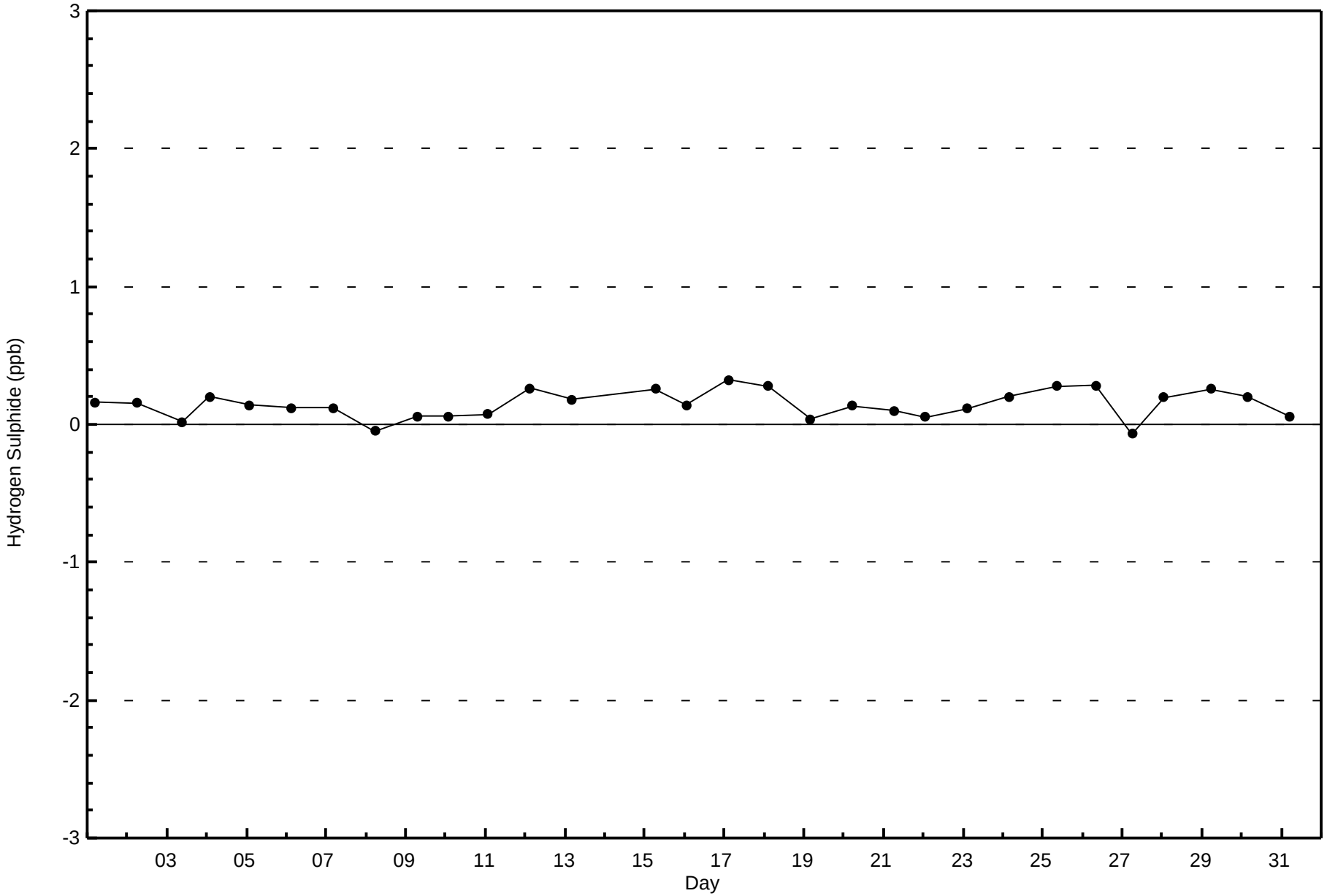
Total Number of Valid Hours: 697

Wood Buffalo Environmental Association

Zero Responses

Hydrogen Sulphide (H_2S) - ppb

Mannix - August 2015

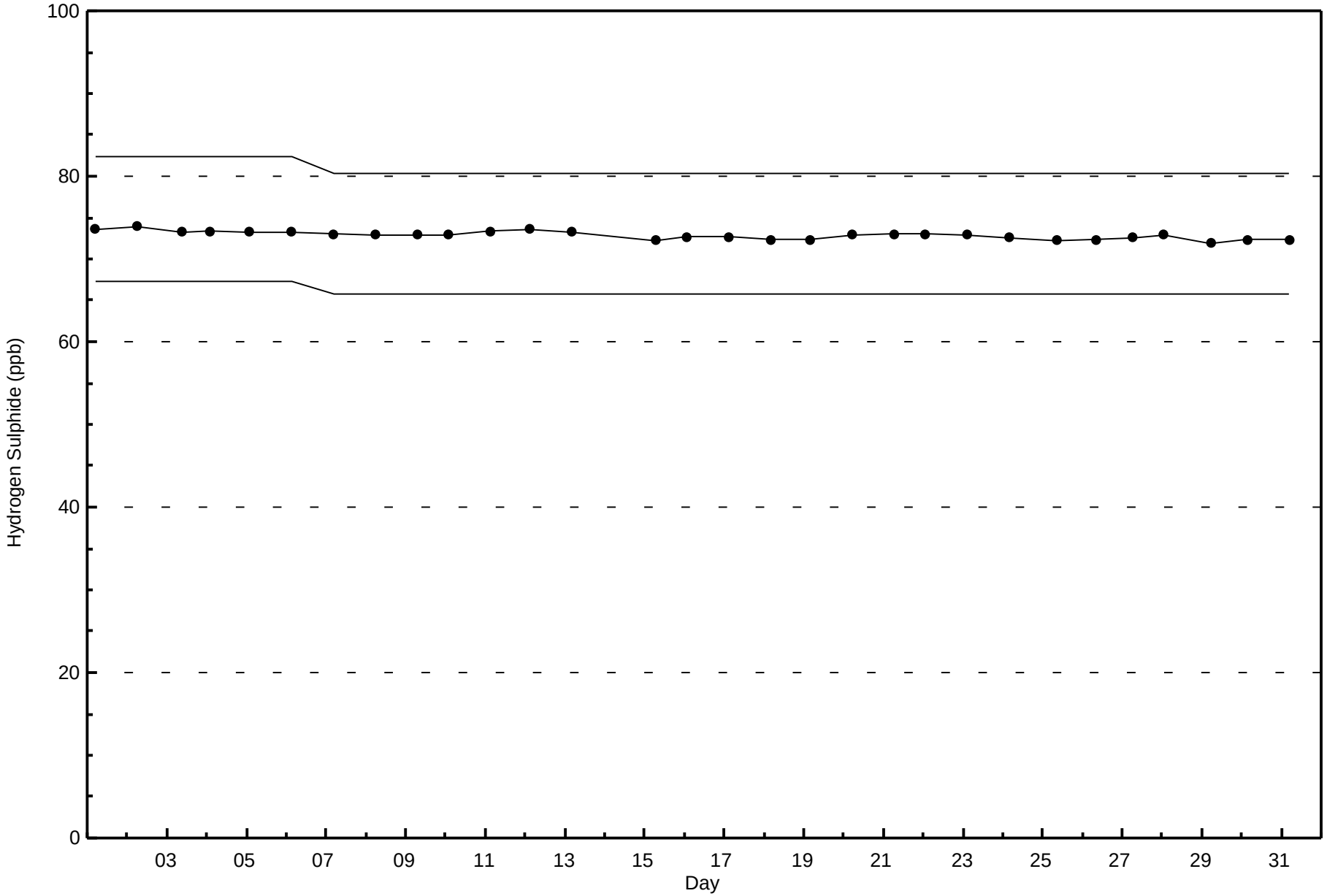


Wood Buffalo Environmental Association

Span Responses

Hydrogen Sulphide (H_2S) - ppb

Mannix - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Mannix - August 2015

Maximum Value: 3.6 ppm on Aug 28 20:00

Maximum Daily Average: 2.6 ppm on Aug 25

Minimum Value: 2.0 ppm on Aug 10 13:00

Minimum Daily Average: 2.0 ppm on Aug 10

Maximum Diurnal Average: 2.4 ppm at hour 3

Minimum Diurnal Average: 2.1 ppm at hour 17

Monthly Average: 2.24 ppm

Percentiles: P_1 = 2.0 P_{10} = 2.1 Q_1 = 2.1 Median = 2.2 Q_3 = 2.3 P_{90} = 2.5 P_{99} = 3.3

Hours in Service:	744
Hours of Data:	709
Hours of Missing Data:	35
Hours of Calibration:	34
Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	2.6	2.8	3.0	2.7	Z	2.8	2.6	3.4	3.1	3.2	2.8	2.5	2.3	2.3	2.3	2.2	2.2	2.2	2.3	2.3	2.1	2.3	3.0	3.0	2.6	3.4
2-Aug	2.7	2.4	2.2	2.2	2.2	Z	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.5	2.4	2.4	2.3	2.3	3.1	3.6	2.3	3.6
3-Aug	3.2	2.7	2.6	2.6	2.6	2.5	2.3	2.6	Z	2.6	2.6	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.5	2.3	2.1	2.4	2.4	3.2
4-Aug	Z	2.3	2.3	2.4	2.3	2.3	2.3	2.4	2.3	2.3	2.3	2.3	2.4	2.2	2.2	2.3	2.3	2.2	2.2	2.1	2.1	2.2	2.3	2.2	2.3	2.4
5-Aug	2.3	Z	2.3	2.4	2.4	2.5	2.6	2.4	2.5	2.2	2.1	2.1	2.2	2.2	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.2	2.3	2.2	2.3	2.6
6-Aug	2.2	2.2	Z	2.2	2.2	2.2	2.3	2.3	2.2	2.3	2.2	C	C	C	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.3
7-Aug	2.2	2.2	2.2	Z	2.5	2.5	2.8	2.8	2.2	2.1	2.4	2.4	2.3	2.3	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.8
8-Aug	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.2	2.3	2.2	2.1	2.2	2.1	2.3
9-Aug	2.5	3.1	3.2	2.9	2.8	2.6	Z	2.3	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.3	2.2	2.1	2.3	3.2
10-Aug	Z	2.5	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.5
11-Aug	2.0	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
12-Aug	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2
13-Aug	2.1	2.1	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4	2.1	2.0	2.0	2.0	2.1	2.0	2.0	2.1	2.0	2.1	2.4
14-Aug	2.1	2.1	2.1	2.1	2.1	2.1	DF	Z	2.1	2.1	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2
15-Aug	2.1	2.1	2.3	2.4	2.6	Z	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.3	2.8	2.4	2.6	2.3	2.3	2.8
16-Aug	Z	2.3	2.4	2.4	2.3	2.3	2.2	2.1	2.1	2.1	2.1	2.3	2.4	2.4	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.4
17-Aug	2.2	Z	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2
18-Aug	2.2	2.2	Z	2.5	2.6	3.3	3.1	2.9	2.5	2.6	2.6	2.5	2.3	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.4	3.3
19-Aug	2.1	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	2.0	2.0	2.1	2.0	2.1	2.0	2.0	2.0	2.1	2.2
20-Aug	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	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2
21-Aug	2.1	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.2	2.3	2.2	2.2	2.3	2.2	2.1	2.2	2.4	2.1	2.1	2.2	2.2	2.1	2.2	2.4
22-Aug	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.3
23-Aug	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.4	2.2	2.4
24-Aug	2.4	2.7	Z	2.4	2.1	2.1	2.1	2.1	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	2.8	2.2	2.8
25-Aug	2.7	2.8	3.3	3.2	2.9	3.0	2.8	Z	3.1	3.3	2.9	2.8	2.5	2.3	2.3	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.6	2.5	2.6	3.3
26-Aug	2.3	2.3	2.2	2.3	2.2	2.4	2.6	Z	2.4	2.7	2.6	2.5	2.5	2.6	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.7
27-Aug	2.2	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	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3
28-Aug	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.2	3.6	3.2	3.0	3.3	3.0	2.3	3.6
29-Aug	2.8	3.0	3.1	Z	2.4	2.4	2.4	2.2	2.2	2.3	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.3	3.1
30-Aug	2.2	2.2	Z	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2
31-Aug	2.1	2.2	2.2	Z	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3
	2.3	2.3	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.3	2.3	Diurnal Average	
	3.2	3.1	3.3	3.2	2.9	3.3	3.1	3.4	3.1	3.3	2.9	2.8	2.5	2.6	2.4	2.3	2.3	2.5	2.4	3.6	3.2	3.0	3.3	3.6	Diurnal Maximum	

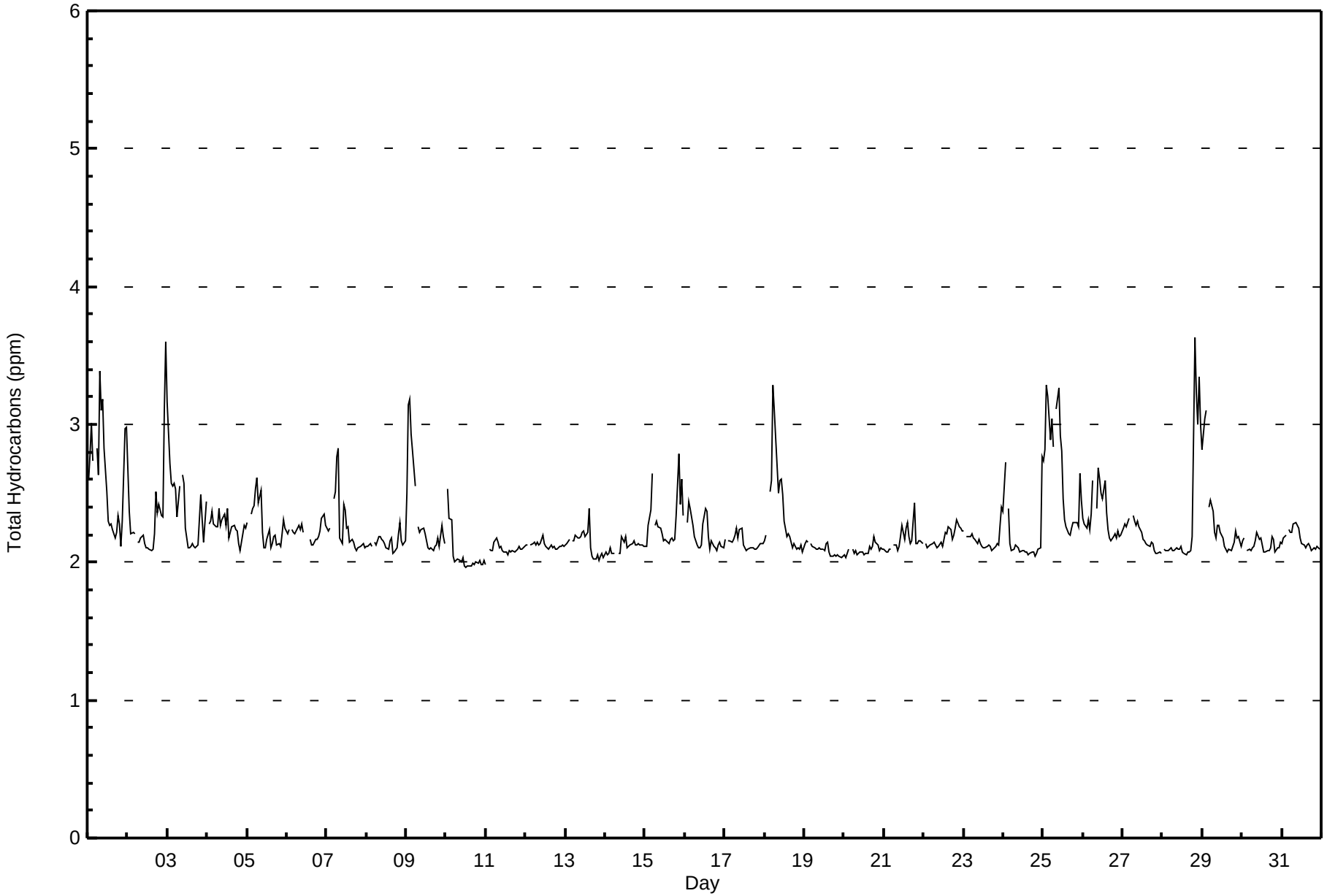
Z - zerospan C - Calibration DF - DAS Failure

Wood Buffalo Environmental Association

Hourly Averages

Total Hydrocarbons (THC) - ppm

Mannix - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm

Mannix - August 2015

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	36	5.08	5.08
2.1 - 3.0	655	92.38	97.46
3.1 - 10.0	18	2.54	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 - August 2015

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	4	2	12	11	7	0	0	0	36
2.1 - 3.0	19	11	8	6	22	52	77	104	29	35	39	75	87	44	23	24	655
3.1 - 10.0	5	0	1	3	0	0	0	0	0	0	1	0	2	2	1	3	18
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	24	11	9	9	22	52	77	104	33	37	52	86	96	46	24	27	709

Total Number of Valid Hours: 709

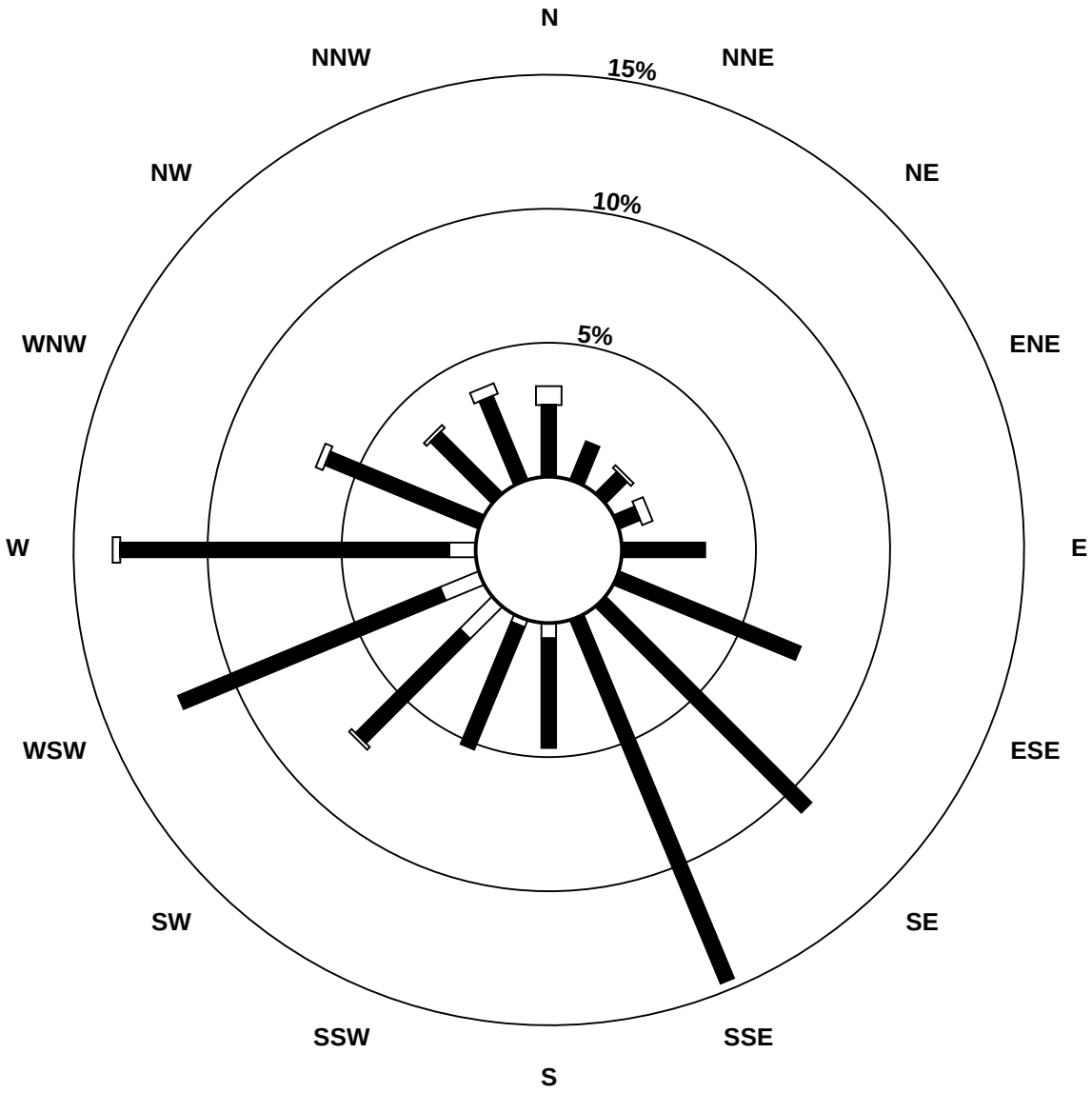
Total Number of Hours: 744

Wood Buffalo Environmental Association

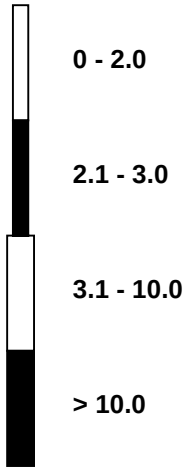
Wind Rose Aug 2015

Total Hydrocarbons (THC) - ppm

Mannix (AMS 5)



Classes (ppm)



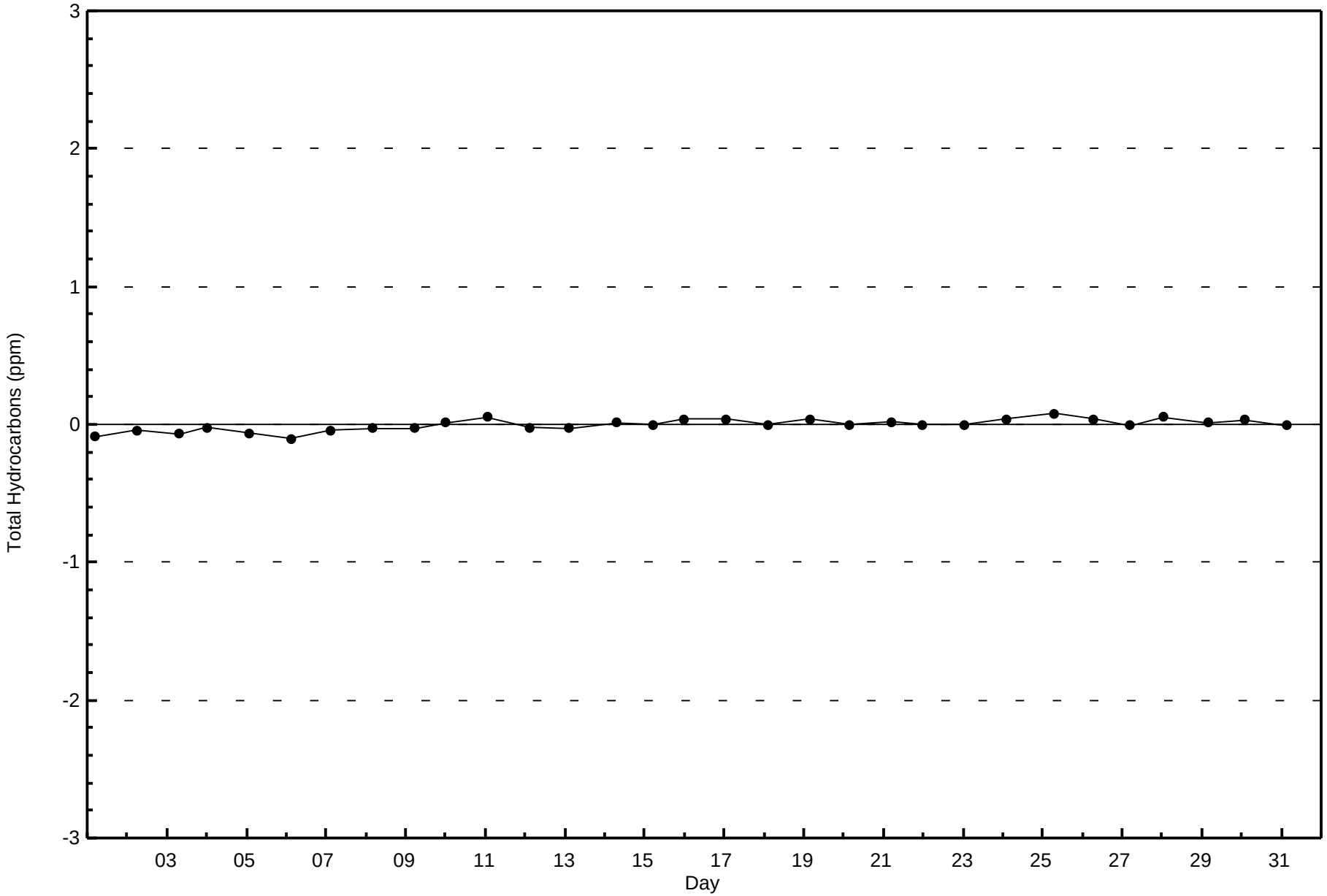
Total Number of Valid Hours: 709

Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Mannix - August 2015

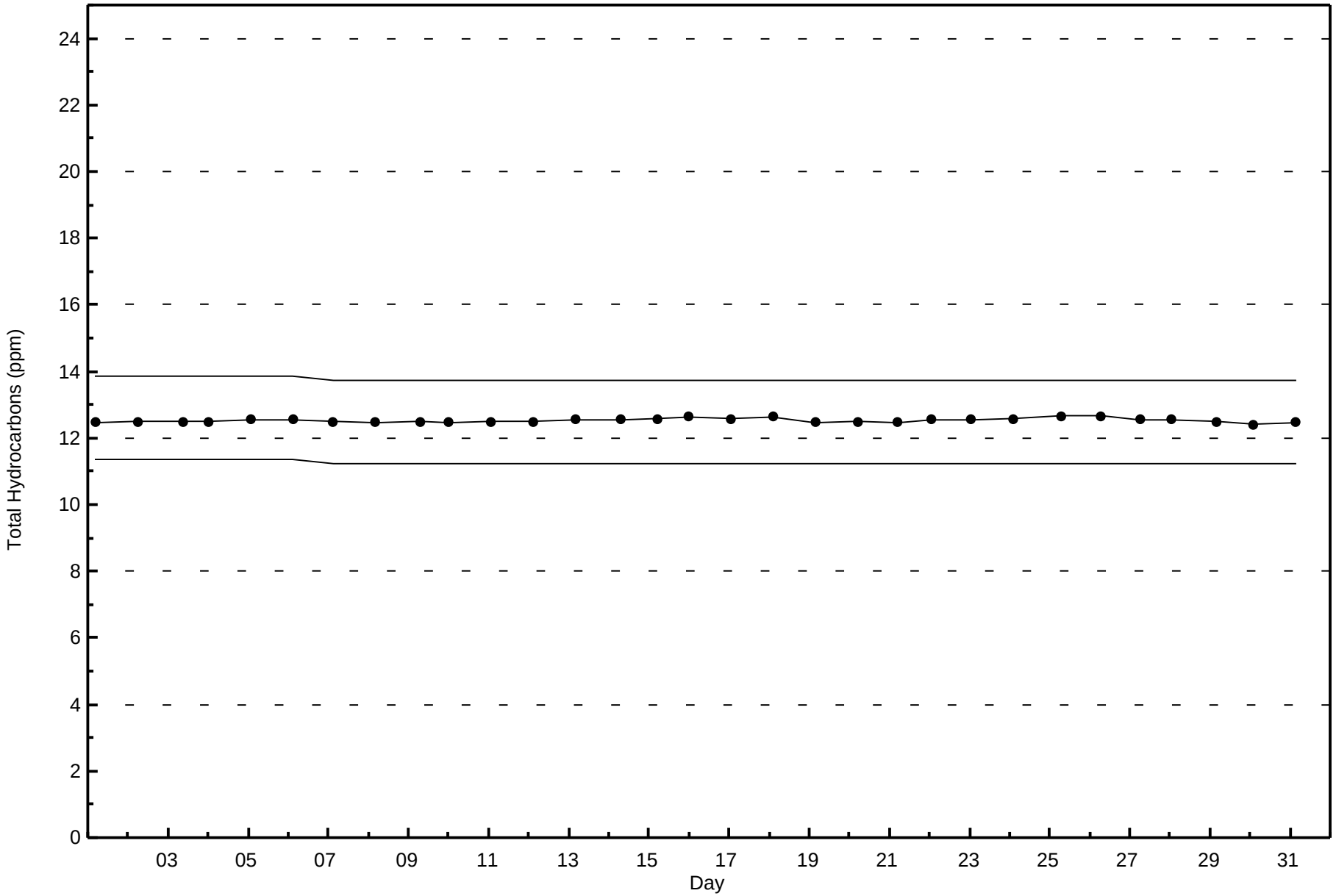


Wood Buffalo Environmental Association

Span Responses

Total Hydrocarbons (THC) - ppm

Mannix - August 2015



Maximum Value: 29.5 C on Aug 10 15:00

Maximum Daily Average: 23.3 C on Aug 10

Minimum Value: 4.2 C on Aug 23 05:00

Minimum Daily Average: 10.5 C on Aug 21

Maximum Diurnal Average: 22.3 C at hour 15

Minimum Diurnal Average: 12.5 C at hour 5

Monthly Average: 17.29 C

Percentiles: P_1 = 6.1 P_{10} = 11.3 Q_1 = 13.7 Median = 17.0 Q_3 = 21.0 P_{90} = 23.8 P_{99} = 27.6

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

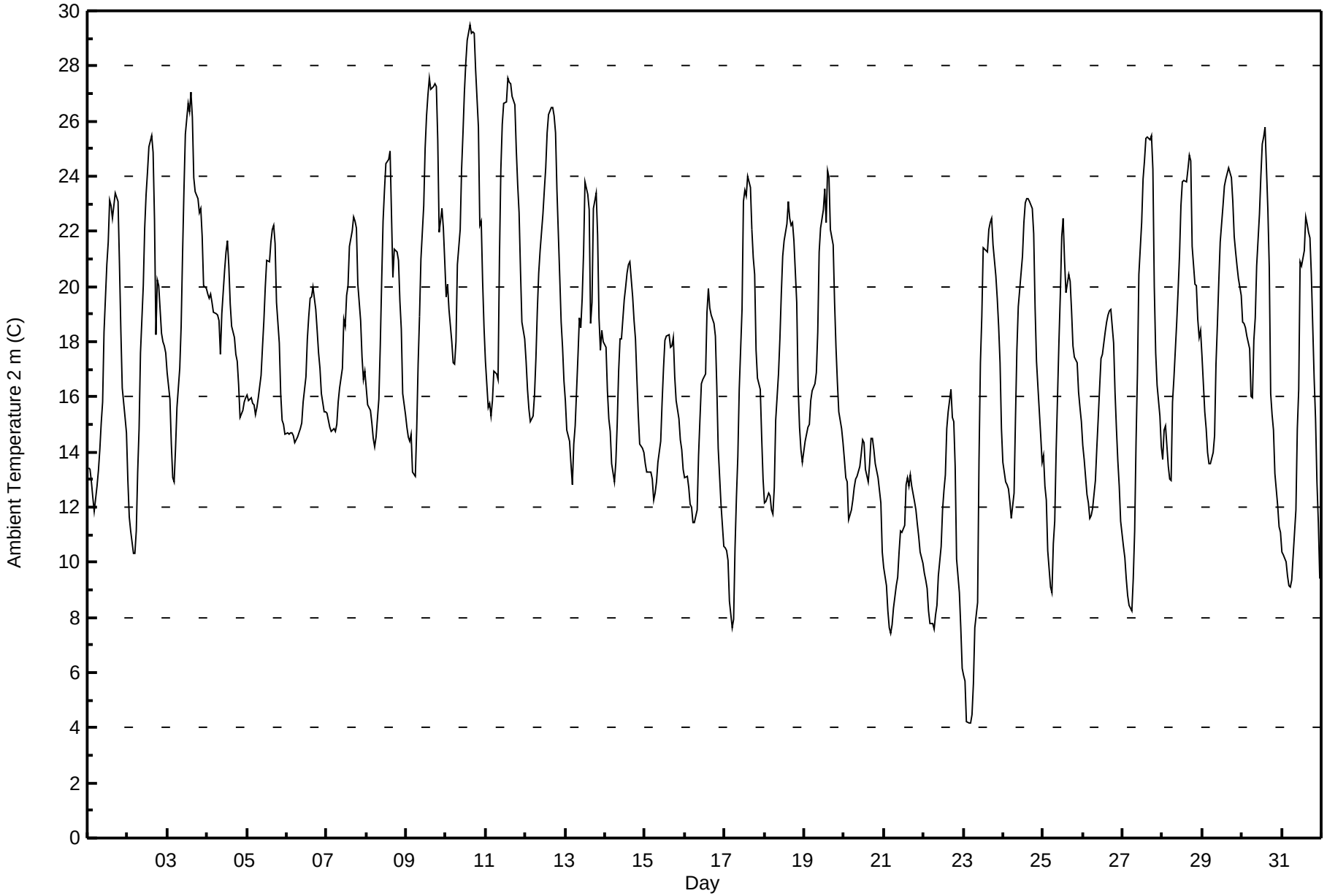
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	13.4	13.4	12.9	12.3	11.8	12.8	13.3	14.1	15.1	15.8	18.3	20.8	21.6	23.1	22.9	22.5	23.4	23.3	23.1	20.8	18.4	16.3	15.3	14.7	17.5	23.4
2-Aug	13.0	11.6	11.1	10.3	10.3	11.1	13.3	14.8	17.6	20.1	22.1	23.3	24.2	25.0	25.5	24.9	22.4	18.3	20.2	20.1	18.3	18.0	17.8	17.6	18.0	25.5
3-Aug	16.9	15.9	14.3	13.1	12.9	14.1	15.6	17.1	18.6	21.2	23.5	25.5	26.6	26.3	27.1	26.1	24.0	23.4	23.2	22.7	22.8	21.8	20.0	19.9	20.5	27.1
4-Aug	19.7	19.6	19.7	19.4	19.1	19.0	19.0	18.7	17.5	19.0	20.6	21.3	21.7	20.7	19.4	18.5	18.1	17.5	17.3	16.4	15.2	15.5	15.8	16.0	18.5	21.7
5-Aug	16.1	15.9	15.9	15.8	15.7	15.3	15.6	16.0	16.8	17.8	18.7	20.0	21.0	20.9	21.6	22.1	22.2	21.6	19.4	17.9	16.1	15.1	15.0	14.6	17.8	22.2
6-Aug	14.7	14.7	14.7	14.7	14.6	14.3	14.5	14.7	14.8	15.0	15.8	16.7	18.1	18.9	19.6	19.6	20.0	19.2	18.4	17.6	17.0	16.1	15.5	15.5	16.4	20.0
7-Aug	15.4	15.2	14.9	14.7	14.8	14.7	15.0	15.8	16.3	17.0	18.8	18.6	19.7	20.0	21.5	22.0	22.5	22.4	22.1	20.1	18.8	17.4	16.6	16.9	18.0	22.5
8-Aug	16.3	15.7	15.5	15.1	14.5	14.2	14.5	15.9	17.8	20.2	22.4	23.5	24.4	24.6	24.9	22.6	20.3	21.4	21.2	21.0	19.5	18.4	16.1	15.4	19.0	24.9
9-Aug	14.9	14.5	14.4	14.6	13.3	13.1	14.9	17.2	18.9	21.0	22.9	25.0	26.2	26.9	27.6	27.1	27.2	27.4	27.3	25.3	22.0	22.8	22.1	20.9	21.2	27.6
10-Aug	19.6	20.1	19.2	18.0	17.2	17.2	18.0	20.8	22.0	24.3	25.6	27.1	28.1	29.0	29.5	29.2	29.2	29.2	27.9	25.8	22.2	22.4	20.2	18.5	23.3	29.5
11-Aug	17.3	15.6	15.7	15.3	15.9	16.9	16.8	16.6	21.1	24.2	25.9	26.7	26.7	27.6	27.4	27.4	26.9	26.6	25.0	23.7	22.7	20.6	18.7	18.1	21.6	27.6
12-Aug	17.3	16.3	15.6	15.1	15.3	16.1	17.4	19.1	20.5	21.3	22.6	23.5	24.3	25.6	26.3	26.5	26.5	26.2	25.6	23.5	20.4	18.7	17.8	16.6	20.7	26.5
13-Aug	15.8	14.8	14.4	13.6	12.8	14.3	15.0	17.5	18.9	18.5	19.6	21.3	23.8	23.3	22.8	18.6	19.4	22.8	23.4	21.9	18.9	17.7	18.4	18.0	18.6	23.8
14-Aug	17.8	16.2	15.2	14.7	13.6	12.9	13.7	15.1	16.9	18.1	18.1	19.5	20.0	20.5	20.8	20.9	19.6	18.8	18.1	16.7	15.3	14.3	14.1	14.0	16.9	20.9
15-Aug	13.6	13.3	13.3	13.3	13.0	12.2	12.5	12.9	13.6	14.4	15.8	17.0	18.1	18.2	18.3	17.8	17.9	18.2	16.8	15.9	15.2	14.4	14.1	13.4	15.1	18.3
16-Aug	13.1	13.1	12.7	12.1	12.0	11.5	11.4	11.9	13.9	15.2	16.5	16.6	16.8	19.1	19.9	19.2	19.0	18.7	18.2	16.3	14.1	13.1	12.1	10.6	14.9	19.9
17-Aug	10.5	10.4	10.1	8.6	7.6	7.9	10.5	12.3	13.9	16.3	19.1	23.1	23.5	23.3	24.0	23.6	22.1	21.0	20.4	17.7	16.7	16.3	14.5	13.0	16.1	24.0
18-Aug	12.1	12.2	12.5	12.4	11.9	11.8	12.7	15.2	16.8	18.1	19.7	21.1	21.7	22.3	23.1	22.5	22.2	22.3	21.7	19.4	16.4	14.9	14.1	13.6	17.1	23.1
19-Aug	14.4	14.7	14.9	15.0	15.9	16.2	16.5	16.9	18.4	21.3	22.1	22.8	23.5	22.3	24.2	24.0	22.1	21.5	19.4	17.8	16.5	15.5	14.9	14.4	18.5	24.2
20-Aug	13.7	13.1	12.9	11.6	11.9	12.2	12.7	13.0	13.1	13.5	13.9	14.4	14.3	13.4	12.9	13.6	14.5	14.5	14.1	13.6	13.0	12.6	12.1	10.3	13.1	14.5
21-Aug	9.8	9.2	8.3	7.6	7.4	7.8	8.3	9.2	9.5	10.4	11.1	11.1	11.3	12.8	13.1	12.8	13.2	12.8	12.2	11.9	11.4	10.9	10.4	10.0	10.5	13.2
22-Aug	9.6	9.4	9.1	8.2	7.8	7.8	7.6	8.1	8.4	9.5	10.6	11.9	12.6	13.2	14.8	15.4	16.3	15.3	15.1	13.5	10.1	8.9	7.7	6.2	10.7	16.3
23-Aug	5.9	5.7	4.2	4.2	4.2	4.5	5.6	7.6	8.6	13.7	17.2	18.9	21.4	21.3	21.3	22.1	22.3	22.5	21.5	20.4	19.6	18.6	17.3	14.9	14.3	22.5
24-Aug	13.6	12.9	12.8	12.6	12.2	11.6	12.5	15.2	17.7	19.3	19.9	21.1	22.3	23.0	23.2	23.2	23.1	22.8	21.9	19.2	17.3	16.4	14.6	13.6	17.6	23.2
25-Aug	13.9	12.8	12.3	10.4	9.1	8.9	10.7	11.5	14.0	18.0	19.7	21.8	22.5	21.0	19.8	20.4	20.2	19.1	17.8	17.4	17.3	16.2	15.6	15.1	16.1	22.5
26-Aug	14.2	13.7	12.5	12.2	11.6	11.7	11.9	13.0	14.1	15.2	16.3	17.4	17.6	18.4	18.7	19.0	19.1	19.2	17.9	16.1	14.8	13.7	12.8	11.5	15.1	19.2
27-Aug	10.6	10.1	9.4	8.8	8.4	8.2	9.4	11.1	14.4	16.9	20.4	22.3	23.9	24.6	25.4	25.4	25.3	25.5	24.3	20.0	17.6	16.4	15.3	14.2	17.0	25.5
28-Aug	13.7	14.8	14.9	13.5	13.0	13.0	15.8	16.7	18.7	19.9	21.2	22.9	23.8	23.8	23.8	24.3	24.8	24.6	21.5	20.1	20.0	18.8	18.1	18.4	19.2	24.8
29-Aug	17.5	15.4	14.8	14.0	13.6	13.6	14.0	14.6	17.2	18.6	20.2	21.6	22.9	23.7	23.9	24.1	24.3	24.0	23.1	21.8	21.3	20.7	20.3	19.7	19.4	24.3
30-Aug	18.7	18.7	18.5	18.2	17.8	16.0	16.0	18.0	18.9	20.7	22.6	24.0	25.2	25.4	25.8	22.8	20.7	16.1	15.3	14.8	13.2	12.0	11.3	11.1	18.4	25.8
31-Aug	10.4	10.3	10.0	9.5	9.1	9.1	9.4	10.2	11.9	14.8	16.3	20.9	20.7	21.3	22.5	22.2	21.9	21.8	20.4	16.7	15.2	12.9	11.4	9.4	14.9	22.5
	14.3	13.8	13.4	12.9	12.5	12.6	13.4	14.5	16.0	17.7	19.3	20.7	21.6	21.9	22.3	22.0	21.6	21.2	20.4	18.9	17.3	16.4	15.5	14.7	Diurnal Average	
	19.7	20.1	19.7	19.4	19.1	19.0	19.0	20.8	22.0	24.3	25.9	27.1	28.1	29.0	29.5	29.2	29.2	29.2	27.9	25.8	22.8	22.8	22.1	20.9	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature 2 m (AT2m) - C

Mannix - August 2015



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	47	6.32	6.32
10 - 20	469	63.04	69.35
> 20	228	30.65	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

Maximum Value: 29.2 C on Aug 10 18:00 | Maximum Daily Average: 23.6 C on Aug 10

Minimum Value: 4.7 C on Aug 23 05:00 | Minimum Daily Average: 10.4 C on Aug 21

Maximum Diurnal Average: 21.6 C at hour 15 | Minimum Diurnal Average: 13.2 C at hour 6

Monthly Average: 17.50 C | Percentiles: P_1 = 7.4 P_{10} = 12.0 Q_1 = 14.4 Median = 17.5 Q_3 = 20.9 P_{90} = 23.4 P_{99} = 27.6

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

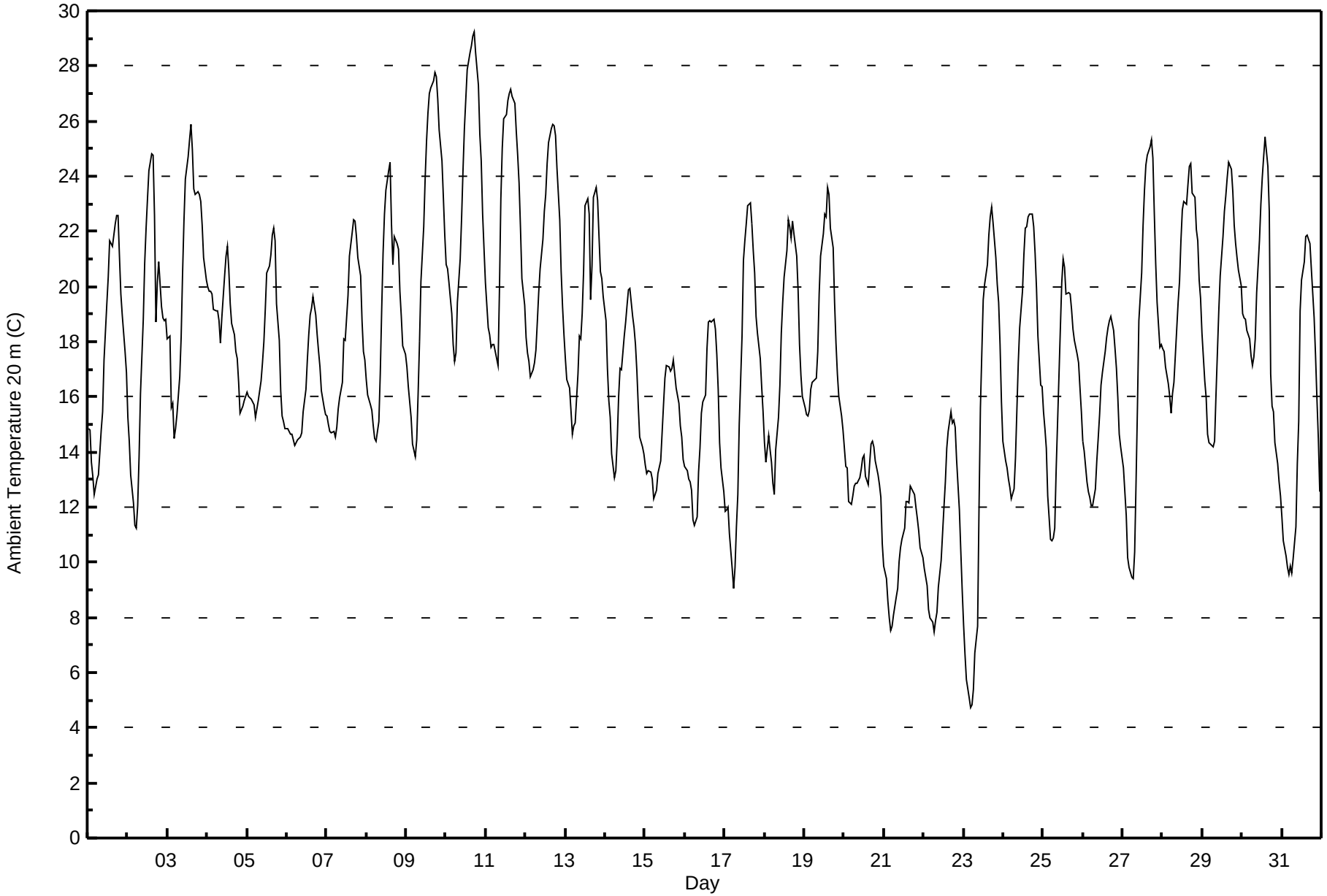
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	14.8	14.8	13.6	13.1	12.5	13.0	13.2	14.0	14.8	15.5	17.3	19.3	20.3	21.7	21.6	21.4	22.3	22.6	22.6	21.1	19.8	19.0	17.7	16.9	17.6	22.6
2-Aug	15.2	14.4	13.2	12.1	11.4	11.2	12.0	13.8	16.1	18.8	20.8	22.1	23.2	24.2	24.8	24.8	22.6	18.7	20.2	20.9	19.3	18.9	18.7	18.8	18.2	24.8
3-Aug	18.1	18.2	15.6	15.8	14.5	14.8	15.4	16.7	18.2	20.4	22.4	23.9	24.7	25.3	25.9	25.0	23.5	23.3	23.4	23.3	23.1	22.2	21.1	20.2	20.6	25.9
4-Aug	20.0	19.8	19.8	19.7	19.2	19.1	19.1	18.8	18.0	18.9	20.4	21.1	21.5	20.6	19.3	18.7	18.3	17.7	17.4	16.5	15.4	15.7	15.9	16.0	18.6	21.5
5-Aug	16.2	16.0	15.9	15.8	15.7	15.3	15.6	15.9	16.6	17.3	18.0	19.1	20.5	20.7	21.2	21.9	22.1	21.6	19.4	18.1	16.2	15.3	15.1	14.9	17.7	22.1
6-Aug	14.9	14.8	14.6	14.7	14.5	14.2	14.4	14.5	14.6	14.7	15.5	16.3	17.3	18.2	18.9	19.2	19.6	19.0	18.2	17.7	17.1	16.2	15.6	15.3	16.3	19.6
7-Aug	15.3	15.0	14.8	14.7	14.8	14.6	14.9	15.6	16.0	16.5	18.1	18.0	18.9	19.7	21.1	22.0	22.4	22.4	21.8	21.1	20.4	18.8	17.6	17.3	18.0	22.4
8-Aug	16.6	16.1	15.7	15.5	14.9	14.5	14.4	15.1	16.8	19.1	21.2	22.6	23.5	24.2	24.5	22.3	20.8	21.8	21.5	21.4	19.8	18.9	17.9	17.5	19.0	24.5
9-Aug	17.1	16.4	15.8	15.2	14.3	13.8	14.4	16.1	18.0	20.2	22.2	23.9	25.3	26.3	27.0	27.2	27.4	27.8	27.6	26.8	25.7	24.5	23.2	21.9	21.6	27.8
10-Aug	20.8	20.6	20.2	19.0	17.9	17.3	17.6	19.4	21.0	22.5	24.2	25.7	26.8	27.9	28.5	28.8	29.1	29.2	28.5	27.3	25.6	24.6	22.6	21.4	23.6	29.2
11-Aug	20.1	18.5	18.2	17.8	17.9	17.9	17.4	17.1	19.9	23.2	25.0	26.1	26.2	26.7	27.0	27.1	26.9	26.6	25.6	24.8	23.8	22.1	20.3	19.3	22.3	27.1
12-Aug	18.1	17.6	17.3	16.7	17.0	17.2	17.7	18.7	19.8	20.6	21.7	22.7	23.3	24.5	25.2	25.7	25.9	25.8	25.5	24.3	22.4	20.5	19.3	18.3	21.1	25.9
13-Aug	17.4	16.6	16.3	15.5	14.7	15.0	15.1	16.8	18.2	18.1	19.0	20.6	22.9	23.2	22.6	19.5	20.8	23.3	23.6	23.1	21.8	20.5	20.3	19.6	19.4	23.6
14-Aug	18.8	17.0	15.9	15.2	13.9	13.0	13.3	14.4	16.0	17.0	17.0	18.2	18.7	19.3	19.9	19.9	18.9	18.5	17.9	16.9	15.7	14.5	14.2	13.9	16.6	19.9
15-Aug	13.5	13.2	13.3	13.3	13.0	12.3	12.4	12.6	13.2	13.7	14.7	15.7	16.7	17.1	17.1	16.9	17.0	17.4	16.8	16.3	15.8	15.0	14.6	13.7	14.8	17.4
16-Aug	13.5	13.3	13.0	12.9	12.6	11.5	11.3	11.6	13.3	14.1	15.4	15.8	16.1	17.7	18.7	18.7	18.7	18.8	18.4	17.5	16.2	14.4	13.4	12.6	15.0	18.8
17-Aug	11.9	11.9	12.0	11.1	9.8	9.1	9.8	11.3	12.5	15.0	18.2	21.0	21.6	22.3	22.9	23.0	22.3	21.3	20.5	18.9	18.3	17.4	16.4	15.4	16.4	23.0
18-Aug	14.3	13.6	14.6	14.1	13.6	12.9	12.5	14.1	15.3	16.4	18.3	19.4	20.4	21.3	22.4	22.2	21.8	22.4	21.9	21.1	19.8	17.9	16.8	16.0	17.6	22.4
19-Aug	15.6	15.4	15.3	15.5	16.2	16.5	16.6	16.7	17.6	19.7	21.1	21.9	22.6	22.5	23.6	23.4	22.1	21.4	19.4	17.9	16.8	16.0	15.3	14.8	18.5	23.6
20-Aug	14.1	13.5	13.4	12.2	12.1	12.4	12.7	12.9	12.9	13.1	13.4	13.8	13.9	13.1	12.8	13.6	14.3	14.4	14.2	13.7	13.2	12.8	12.4	10.7	13.1	14.4
21-Aug	9.8	9.4	8.6	8.0	7.5	7.7	8.1	8.7	9.1	10.0	10.5	10.8	11.2	12.2	12.2	12.1	12.7	12.7	12.4	12.0	11.6	11.1	10.5	10.2	10.4	12.7
22-Aug	9.7	9.4	9.1	8.3	8.0	7.8	7.5	7.9	8.2	9.1	10.1	11.1	12.0	12.9	14.1	14.8	15.5	15.0	15.2	14.9	13.7	11.9	10.4	9.0	11.1	15.5
23-Aug	7.7	6.7	5.7	5.1	4.7	4.8	5.4	6.7	7.7	12.0	15.6	17.6	19.5	20.1	20.8	21.9	22.5	22.9	22.3	21.1	20.1	19.4	17.9	15.8	14.3	22.9
24-Aug	14.4	13.7	13.4	13.0	12.7	12.3	12.6	13.8	15.5	17.2	18.5	19.8	21.2	22.1	22.2	22.5	22.7	22.7	22.2	21.2	19.9	18.2	16.4	16.4	17.7	22.7
25-Aug	15.4	14.8	14.1	12.4	10.8	10.8	10.9	11.3	13.3	16.7	18.5	20.2	21.0	20.7	19.7	19.8	19.8	19.2	18.4	18.0	17.5	17.2	16.3	15.5	16.3	21.0
26-Aug	14.4	14.0	12.9	12.6	12.4	12.0	12.0	12.7	13.7	14.5	15.4	16.4	16.9	17.6	18.1	18.5	18.8	18.9	18.4	17.8	17.0	15.9	14.7	14.2	15.4	18.9
27-Aug	13.4	12.6	11.7	10.2	9.8	9.5	9.4	10.4	12.9	15.7	18.8	20.5	22.2	23.5	24.4	24.7	25.1	25.3	24.7	22.7	20.8	19.4	17.8	17.9	17.6	25.3
28-Aug	17.8	17.7	17.1	16.5	16.0	15.4	16.1	16.5	18.5	19.4	20.2	21.7	22.8	23.1	23.0	23.7	24.4	24.5	23.4	23.2	22.1	21.7	20.2	19.6	20.2	24.5
29-Aug	18.3	16.6	16.0	14.6	14.3	14.3	14.2	14.4	16.0	17.6	19.1	20.4	21.8	22.7	23.3	24.0	24.5	24.3	23.4	22.2	21.5	21.0	20.6	20.0	19.4	24.5
30-Aug	19.0	18.9	18.8	18.4	18.1	17.5	17.1	17.5	18.1	19.8	21.7	23.0	24.0	24.7	25.4	24.4	22.7	16.8	15.7	15.4	14.3	13.6	12.9	12.4	18.8	25.4
31-Aug	11.7	10.8	10.2	9.8	9.6	9.8	9.6	10.1	11.3	13.6	15.1	19.1	20.2	20.9	21.8	21.9	21.7	21.6	20.7	18.9	17.5	15.9	14.5	12.5	15.4	21.9
	15.4	14.9	14.4	13.8	13.4	13.2	13.3	14.1	15.3	16.8	18.3	19.6	20.6	21.2	21.6	21.6	21.5	21.2	20.7	19.9	18.8	17.8	16.8	16.1	Diurnal Average	
	20.8	20.6	20.2	19.7	19.2	19.1	19.1	19.4	21.0	23.2	25.0	26.1	26.8	27.9	28.5	28.8	29.1	29.2	28.5	27.3	25.7	24.6	23.2	21.9	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature 20 m (AT20m) - C

Mannix - August 2015



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	39	5.24	5.24
10 - 20	480	64.52	69.76
> 20	225	30.24	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

Maximum Value: 28.8 C on Aug 10 18:00

Maximum Daily Average: 23.5 C on Aug 10

Minimum Value: 4.6 C on Aug 23 05:00

Minimum Daily Average: 10.1 C on Aug 21

Maximum Diurnal Average: 21.2 C at hour 16

Minimum Diurnal Average: 13.2 C at hour 7

Monthly Average: 17.39 C

Percentiles: P_1 = 7.2 P_{10} = 11.9 Q_1 = 14.3 Median = 17.3 Q_3 = 20.7 P_{90} = 23.2 P_{99} = 27.3

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

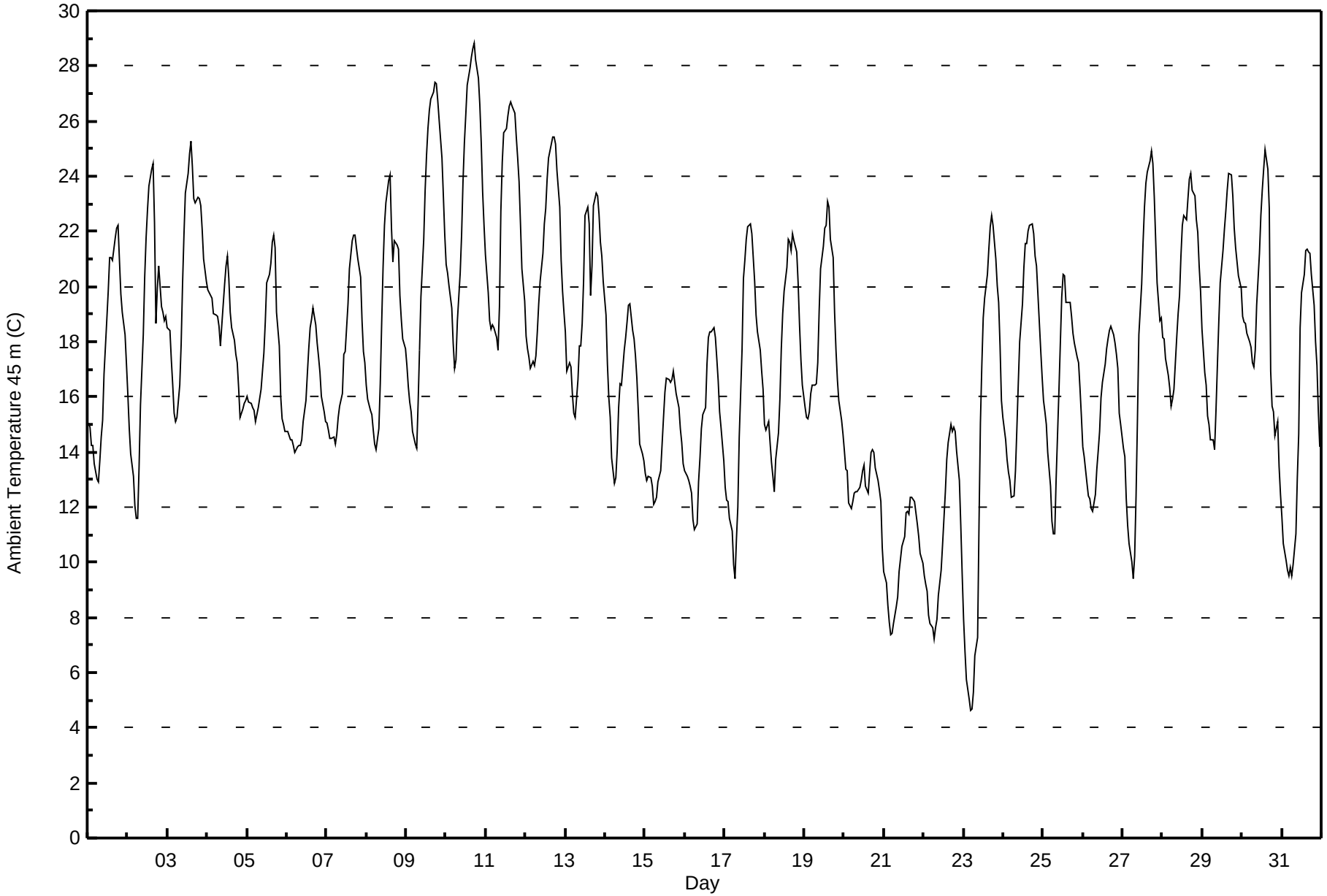
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	15.0	14.9	14.3	14.2	13.6	13.0	12.9	13.7	14.5	15.2	16.8	18.8	19.8	21.1	21.0	21.0	21.7	22.1	22.2	20.9	19.7	19.1	18.2	17.2	17.5	22.2
2-Aug	16.1	14.8	14.0	13.1	12.1	11.6	11.6	13.5	15.7	18.3	20.3	21.8	22.8	23.6	24.3	24.5	22.3	18.7	19.9	20.8	19.3	19.1	18.8	18.9	18.2	24.5
3-Aug	18.5	18.4	17.4	16.4	15.4	15.1	15.2	16.4	17.9	20.1	21.9	23.4	24.1	24.8	25.3	24.4	23.2	23.0	23.2	23.2	22.9	22.1	21.0	20.2	20.6	25.3
4-Aug	19.9	19.8	19.7	19.6	19.0	18.9	18.9	18.5	17.8	18.6	20.1	20.8	21.1	20.3	19.1	18.5	18.1	17.5	17.2	16.3	15.3	15.5	15.7	15.9	18.4	21.1
5-Aug	16.0	15.8	15.8	15.6	15.5	15.1	15.4	15.6	16.3	16.9	17.6	18.7	20.1	20.5	20.9	21.6	21.9	21.4	19.1	17.8	16.0	15.2	15.0	14.7	17.4	21.9
6-Aug	14.7	14.6	14.4	14.4	14.2	14.0	14.2	14.2	14.2	14.4	15.1	15.9	16.9	17.7	18.5	18.8	19.2	18.6	17.9	17.4	16.9	16.0	15.4	15.1	16.0	19.2
7-Aug	15.1	14.8	14.5	14.5	14.5	14.3	14.7	15.3	15.6	16.1	17.6	17.7	18.5	19.4	20.7	21.6	21.9	21.9	21.4	21.0	20.4	18.8	17.6	17.2	17.7	21.9
8-Aug	16.4	15.9	15.5	15.4	14.8	14.3	14.1	14.9	16.5	18.6	20.7	22.2	23.0	23.8	24.1	22.1	20.9	21.6	21.5	21.4	19.7	18.8	18.1	17.7	18.8	24.1
9-Aug	17.1	16.4	15.8	15.5	14.7	14.3	14.1	15.8	17.7	19.7	21.7	23.5	24.8	25.7	26.4	26.8	27.1	27.4	27.4	26.7	26.0	24.7	23.3	21.9	21.4	27.4
10-Aug	20.8	20.5	20.1	19.2	17.9	17.0	17.3	18.8	20.5	21.9	23.8	25.2	26.3	27.3	27.9	28.3	28.6	28.8	28.2	27.5	26.6	25.2	23.4	22.2	23.5	28.8
11-Aug	21.2	19.8	18.7	18.4	18.6	18.5	18.1	17.7	19.3	22.7	24.5	25.6	25.7	26.2	26.5	26.7	26.6	26.3	25.4	24.7	23.8	22.3	20.6	19.5	22.4	26.7
12-Aug	18.2	17.8	17.5	17.0	17.3	17.2	17.5	18.4	19.4	20.2	21.2	22.3	22.8	23.9	24.7	25.2	25.4	25.4	25.2	24.2	22.9	21.0	19.8	19.1	21.0	25.4
13-Aug	18.4	16.9	17.2	17.1	16.1	15.4	15.3	16.6	17.8	17.8	18.6	20.2	22.6	22.9	22.3	19.7	20.7	22.9	23.4	23.3	22.6	21.6	21.1	20.2	19.6	23.4
14-Aug	19.0	17.2	16.0	15.2	13.8	12.9	13.1	14.1	15.6	16.5	16.4	17.7	18.1	18.7	19.3	19.4	18.4	18.1	17.5	16.7	15.5	14.3	13.9	13.7	16.3	19.4
15-Aug	13.2	13.0	13.1	13.0	12.8	12.1	12.2	12.3	12.9	13.3	14.3	15.3	16.2	16.7	16.6	16.5	16.6	16.9	16.5	16.1	15.6	14.8	14.4	13.6	14.5	16.9
16-Aug	13.3	13.1	13.0	12.8	12.5	11.5	11.2	11.4	12.9	13.8	14.9	15.3	15.6	17.2	18.2	18.4	18.3	18.5	18.2	17.4	16.6	15.4	14.9	13.7	14.9	18.5
17-Aug	12.7	12.3	12.2	11.6	11.1	9.9	9.4	10.8	12.0	14.5	17.7	20.3	20.9	21.7	22.2	22.3	21.9	21.0	20.2	19.0	18.3	17.7	16.9	16.2	16.4	22.3
18-Aug	15.0	14.8	15.1	14.3	13.6	13.1	12.6	13.8	14.7	15.9	17.7	19.0	19.8	20.7	21.7	21.6	21.3	21.9	21.7	21.3	20.1	18.6	17.4	16.4	17.6	21.9
19-Aug	15.6	15.3	15.2	15.5	16.1	16.4	16.4	16.5	17.3	19.1	20.6	21.4	22.1	22.2	23.1	22.9	21.7	21.1	19.1	17.7	16.6	15.9	15.2	14.6	18.2	23.1
20-Aug	14.0	13.4	13.3	12.2	12.0	12.2	12.5	12.5	12.6	12.7	13.0	13.3	13.5	12.8	12.5	13.3	14.0	14.1	14.0	13.4	13.0	12.6	12.2	10.5	12.9	14.1
21-Aug	9.6	9.3	8.5	7.8	7.4	7.4	7.8	8.4	8.7	9.7	10.1	10.6	10.9	11.8	11.8	11.7	12.3	12.4	12.2	11.8	11.4	10.9	10.3	10.0	10.1	12.4
22-Aug	9.5	9.2	8.9	8.1	7.8	7.6	7.2	7.6	7.9	8.8	9.7	10.6	11.6	12.6	13.7	14.3	15.0	14.8	14.9	14.8	14.1	13.0	11.4	9.5	10.9	15.0
23-Aug	7.9	6.8	5.7	5.0	4.6	4.7	5.3	6.6	7.3	11.4	15.0	17.1	18.9	19.6	20.4	21.4	22.2	22.6	22.2	21.0	20.0	19.4	17.9	15.9	14.1	22.6
24-Aug	15.2	14.4	13.7	13.3	13.0	12.4	12.4	13.3	14.8	16.5	18.0	19.4	20.7	21.6	21.6	22.0	22.2	22.3	21.9	21.1	20.7	19.7	17.7	16.7	17.7	22.3
25-Aug	15.8	15.4	15.0	14.0	12.8	11.5	11.0	11.0	13.0	16.2	18.0	19.6	20.4	20.4	19.4	19.4	19.4	18.9	18.3	17.9	17.5	17.2	16.3	15.3	16.4	20.4
26-Aug	14.2	13.8	12.9	12.4	12.3	11.9	11.9	12.4	13.4	14.0	14.7	15.9	16.5	17.2	17.8	18.1	18.4	18.6	18.2	18.0	17.5	17.0	15.4	15.0	15.3	18.6
27-Aug	14.1	13.8	12.3	11.3	10.7	10.0	9.4	10.2	12.4	15.2	18.2	20.1	21.6	22.9	23.8	24.1	24.6	24.9	24.5	23.2	21.6	20.1	18.8	18.9	17.8	24.9
28-Aug	18.2	18.1	17.4	16.8	16.3	15.7	15.9	16.3	18.1	19.0	19.7	21.1	22.2	22.6	22.4	23.2	23.9	24.1	23.5	23.3	22.4	22.0	20.8	19.9	20.1	24.1
29-Aug	18.4	16.9	16.4	15.3	15.0	14.4	14.5	14.1	15.5	17.1	18.7	20.1	21.3	22.1	22.7	23.5	24.1	24.0	23.3	22.1	21.4	20.9	20.4	19.9	19.3	24.1
30-Aug	18.9	18.7	18.7	18.3	18.0	17.8	17.3	17.1	17.7	19.3	21.2	22.6	23.5	24.3	25.0	24.3	22.8	16.9	15.7	15.5	14.6	15.1	13.5	12.4	18.7	25.0
31-Aug	11.7	10.7	10.1	9.7	9.5	9.8	9.5	9.9	11.0	13.1	14.7	18.5	19.8	20.4	21.3	21.4	21.3	21.2	20.4	19.3	18.0	17.1	15.4	14.2	15.3	21.4
	15.6	15.0	14.6	14.1	13.6	13.2	13.2	13.8	14.9	16.3	17.8	19.2	20.1	20.7	21.1	21.2	21.2	20.9	20.5	19.8	18.9	18.1	17.1	16.3	Diurnal Average	
	21.2	20.5	20.1	19.6	19.0	18.9	18.9	18.8	20.5	22.7	24.5	25.6	26.3	27.3	27.9	28.3	28.6	28.8	28.2	27.5	26.6	25.2	23.4	22.2	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature 45 m (AT45m) - C

Mannix - August 2015



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	41	5.51	5.51
10 - 20	483	64.92	70.43
> 20	220	29.57	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

Maximum Value: 28.5 C on Aug 10 18:00 | Maximum Daily Average: 23.4 C on Aug 10

Minimum Value: 5.1 C on Aug 23 05:00 | Minimum Daily Average: 9.9 C on Aug 21

Maximum Diurnal Average: 20.9 C at hour 16 | Minimum Diurnal Average: 13.3 C at hour 7

Monthly Average: 17.33 C | Percentiles: P_1 = 7.2 P_{10} = 12.0 Q_1 = 14.3 Median = 17.3 Q_3 = 20.7 P_{90} = 23.0 P_{99} = 27.2

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

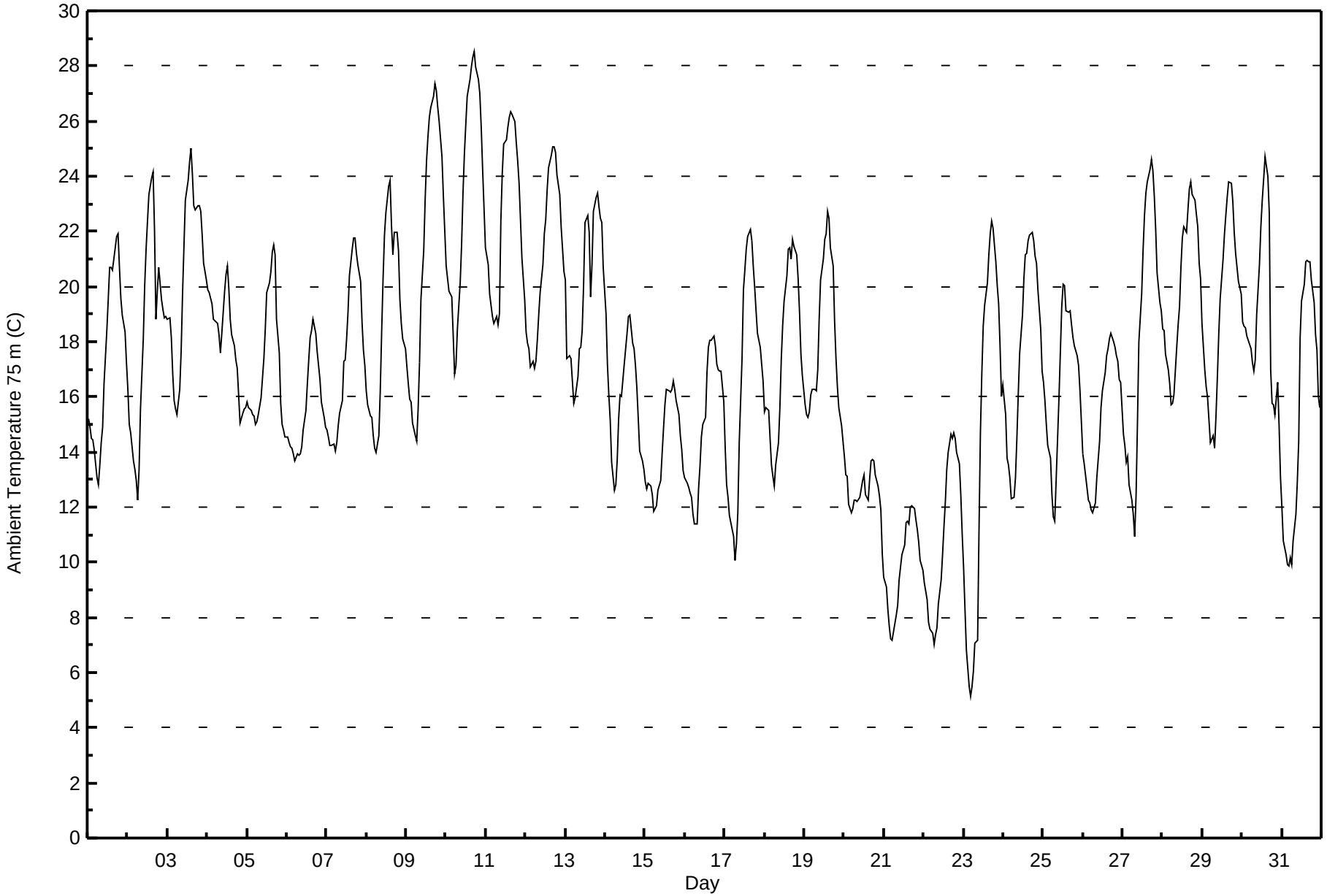
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	15.2	14.9	14.5	14.4	14.1	13.1	12.8	13.5	14.3	14.9	16.5	18.4	19.5	20.7	20.7	20.6	21.4	21.8	21.9	20.7	19.6	18.9	18.4	17.2	17.4	21.9
2-Aug	16.3	15.0	14.7	13.7	13.4	12.9	12.3	13.4	15.6	18.1	20.0	21.3	22.4	23.4	23.9	24.1	22.1	18.8	19.8	20.7	19.5	19.1	18.8	18.9	18.3	24.1
3-Aug	18.8	18.8	18.1	16.8	15.9	15.6	15.4	16.3	17.6	19.7	21.5	23.1	23.9	24.5	25.0	24.1	22.9	22.8	23.0	22.9	22.7	21.8	20.8	20.2	20.5	25.0
4-Aug	19.9	19.8	19.6	19.4	18.8	18.7	18.7	18.3	17.6	18.3	19.8	20.5	20.8	20.0	18.8	18.2	17.8	17.3	17.0	16.1	15.1	15.4	15.5	15.6	18.2	20.8
5-Aug	15.8	15.6	15.5	15.4	15.3	15.0	15.1	15.3	16.0	16.7	17.4	18.4	19.8	20.1	20.6	21.3	21.5	21.1	18.8	17.6	15.8	15.0	14.8	14.5	17.2	21.5
6-Aug	14.5	14.4	14.2	14.2	13.9	13.7	13.9	13.9	14.0	14.2	14.8	15.5	16.5	17.3	18.1	18.4	18.8	18.3	17.6	17.2	16.6	15.8	15.2	14.9	15.7	18.8
7-Aug	14.8	14.5	14.2	14.2	14.3	14.0	14.3	15.0	15.4	15.9	17.3	17.3	18.1	19.1	20.4	21.4	21.7	21.8	21.2	20.8	20.2	18.7	17.7	17.1	17.5	21.8
8-Aug	16.2	15.7	15.3	15.3	14.6	14.1	14.0	14.6	16.2	18.3	20.3	21.8	22.7	23.6	23.8	22.2	21.2	22.0	22.0	21.3	19.5	18.7	18.1	17.7	18.7	23.8
9-Aug	17.1	16.5	15.9	15.8	15.0	14.6	14.4	15.6	17.2	19.5	21.3	23.1	24.6	25.4	26.1	26.5	26.9	27.3	27.1	26.5	26.0	24.7	23.3	22.0	21.4	27.3
10-Aug	20.8	20.3	19.8	19.6	18.3	16.8	17.1	18.5	20.1	21.5	23.4	24.8	25.9	26.9	27.5	27.9	28.3	28.5	28.0	27.5	27.0	25.8	24.3	22.8	23.4	28.5
11-Aug	21.4	20.8	19.7	19.3	18.9	18.7	18.9	18.6	19.0	22.4	24.1	25.2	25.3	25.8	26.1	26.3	26.2	26.0	25.2	24.6	23.7	22.4	21.0	19.5	22.5	26.3
12-Aug	18.4	18.0	17.7	17.1	17.3	17.0	17.3	18.0	19.0	19.8	20.8	21.9	22.4	23.5	24.3	24.8	25.0	25.1	24.9	24.1	23.4	22.2	21.3	20.6	21.0	25.1
13-Aug	20.2	17.4	17.5	17.4	16.6	15.8	16.0	16.7	17.7	17.8	18.4	20.1	22.3	22.6	22.0	19.6	20.8	22.7	23.2	23.4	22.9	22.5	22.3	20.7	19.9	23.4
14-Aug	19.0	17.2	16.1	15.1	13.6	12.6	12.8	13.7	15.2	16.1	16.0	17.2	17.7	18.3	18.9	19.0	18.0	17.8	17.2	16.3	15.2	14.0	13.7	13.4	16.0	19.0
15-Aug	12.9	12.7	12.8	12.8	12.5	11.9	11.9	12.0	12.6	13.0	13.9	14.9	15.7	16.3	16.2	16.2	16.2	16.6	16.3	15.9	15.3	14.6	14.1	13.3	14.2	16.6
16-Aug	13.1	12.9	12.7	12.5	12.3	11.8	11.4	11.4	12.7	13.5	14.5	15.0	15.3	16.9	17.8	18.0	18.0	18.2	17.9	17.2	17.0	17.0	16.9	15.8	15.0	18.2
17-Aug	14.1	12.8	12.4	11.7	11.2	10.9	10.1	10.7	11.8	14.3	17.4	19.9	20.6	21.4	21.8	22.1	21.7	20.7	20.0	19.1	18.3	17.8	17.2	16.6	16.4	22.1
18-Aug	15.4	15.6	15.5	14.5	13.5	13.1	12.7	13.5	14.3	15.6	17.4	18.6	19.5	20.4	21.3	21.4	21.0	21.7	21.4	21.2	20.3	19.1	17.5	16.8	17.6	21.7
19-Aug	15.7	15.3	15.2	15.5	16.1	16.3	16.2	16.2	17.0	18.8	20.2	21.0	21.7	21.9	22.7	22.5	21.4	20.7	18.8	17.4	16.4	15.6	14.9	14.4	18.0	22.7
20-Aug	13.8	13.2	13.1	12.1	11.8	12.0	12.2	12.2	12.2	12.4	12.6	13.0	13.2	12.5	12.2	13.0	13.7	13.8	13.7	13.2	12.8	12.4	11.9	10.3	12.6	13.8
21-Aug	9.4	9.1	8.3	7.7	7.2	7.2	7.5	8.1	8.4	9.4	9.8	10.3	10.6	11.4	11.5	11.4	12.0	12.1	12.0	11.5	11.2	10.7	10.1	9.7	9.9	12.1
22-Aug	9.3	8.9	8.7	7.8	7.6	7.4	7.0	7.4	7.6	8.5	9.3	10.3	11.3	12.2	13.4	14.0	14.6	14.5	14.7	14.5	14.0	13.6	12.4	11.0	10.8	14.7
23-Aug	9.8	8.3	6.8	5.5	5.1	5.5	6.0	7.1	7.2	11.2	14.7	16.8	18.6	19.3	20.2	21.1	21.9	22.4	22.1	20.9	20.0	19.4	17.9	16.0	14.3	22.4
24-Aug	16.4	15.4	13.8	13.5	13.1	12.3	12.3	13.1	14.5	16.1	17.6	18.9	20.3	21.1	21.2	21.7	21.9	22.0	21.7	21.1	20.8	19.9	18.5	16.9	17.7	22.0
25-Aug	16.5	15.9	15.0	14.2	13.8	12.5	11.7	11.5	13.0	15.9	17.6	19.3	20.1	20.0	19.1	19.1	19.1	18.6	18.1	17.8	17.5	17.2	16.2	15.1	16.4	20.1
26-Aug	14.0	13.6	12.7	12.2	12.1	11.9	11.8	12.2	13.1	13.7	14.4	15.6	16.2	16.9	17.5	17.8	18.1	18.3	18.0	17.8	17.5	17.3	16.6	16.5	15.2	18.3
27-Aug	14.6	14.2	13.6	13.8	12.8	12.3	11.8	10.9	12.4	15.1	18.0	19.7	21.3	22.6	23.4	23.8	24.3	24.6	24.2	23.3	22.1	20.5	19.4	19.1	18.2	24.6
28-Aug	18.5	18.4	17.5	17.0	16.5	15.7	15.8	16.1	17.8	18.6	19.3	20.7	21.7	22.2	22.0	22.8	23.5	23.8	23.3	23.2	22.6	22.2	20.8	20.3	20.0	23.8
29-Aug	18.7	17.0	16.4	16.0	15.1	14.3	14.6	14.1	15.3	16.8	18.3	19.6	20.9	21.9	22.6	23.3	23.8	23.8	23.1	22.0	21.2	20.7	20.2	19.7	19.1	23.8
30-Aug	18.7	18.5	18.5	18.2	17.9	17.7	17.2	17.0	17.3	19.0	20.8	22.2	23.1	23.9	24.7	24.0	22.7	17.0	15.8	15.7	15.3	16.5	14.9	13.1	18.7	24.7
31-Aug	12.0	10.8	10.3	9.9	9.9	10.2	9.9	10.8	11.7	12.9	14.4	18.2	19.5	20.1	20.9	21.0	20.9	20.9	20.2	19.4	18.2	17.7	16.0	15.6	15.5	21.0
	15.9	15.2	14.7	14.3	13.8	13.4	13.3	13.7	14.6	16.1	17.5	18.8	19.7	20.4	20.8	20.9	20.9	20.7	20.3	19.7	19.0	18.3	17.5	16.6	Diurnal Average	
	21.4	20.8	19.8	19.6	18.9	18.7	18.9	18.6	20.1	22.4	24.1	25.2	25.9	26.9	27.5	27.9	28.3	28.5	28.0	27.5	27.0	25.8	24.3	22.8	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature 75 m (AT75m) - C

Mannix - August 2015



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	35	4.70	4.70
10 - 20	494	66.40	71.10
> 20	215	28.90	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

Maximum Value: 28.4 C on Aug 10 18:00 — Maximum Daily Average: 24.8 C on Aug 10

Minimum Value: 6.7 C on Aug 23 07:00 — Minimum Daily Average: 9.7 C on Aug 21

Maximum Diurnal Average: 21.0 C at hour 17 — Minimum Diurnal Average: 12.7 C at hour 7

Monthly Average: 17.10 C — Percentiles: P_1 = 7.1 P_{10} = 11.3 Q_1 = 13.8 Median = 16.7 Q_3 = 20.8 P_{90} = 23.4 P_{99} = 27.2

Hours in Service:	744
Hours of Data:	547
Hours of Missing Data:	197
Hours of Calibration:	0
Percent Operational Time:	73.5

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	15.2	14.9	14.5	14.4	14.1	13.1	12.9	13.6	14.2	14.8	16.4	18.3	19.4	20.5	20.5	20.5	21.3	21.7	21.8	20.6	19.6	AF	AF	AF	17.2	21.8
2-Aug	AF	15.0	14.8	13.9	13.5	13.2	12.5	13.5	15.4	17.9	19.8	21.2	22.3	23.2	23.8	24.0	22.1	18.9	20.0	20.7	19.5	19.1	18.9	18.9	18.4	24.0
3-Aug	18.8	19.0	18.2	17.0	15.9	15.6	15.4	16.3	17.5	19.7	21.3	23.0	23.7	24.4	24.8	23.9	22.8	22.7	22.8	22.8	22.6	AF	AF	AF	20.4	24.8
4-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	15.5	--	15.5
5-Aug	15.7	15.5	15.4	15.2	15.2	14.9	15.0	15.2	15.9	16.5	17.2	18.3	19.7	20.0	20.5	21.2	21.4	21.0	18.7	17.4	15.6	14.9	14.7	14.5	17.1	21.4
6-Aug	14.4	14.2	14.1	14.0	13.8	13.6	13.8	13.8	13.8	14.1	14.7	15.4	16.3	17.2	18.0	18.3	18.7	18.1	17.5	17.0	16.5	15.7	15.1	14.8	15.5	18.7
7-Aug	14.7	14.4	14.1	14.1	14.1	13.9	14.2	14.8	15.2	15.7	17.2	17.2	18.0	19.0	20.3	21.2	21.6	21.6	21.0	20.7	20.1	18.7	17.7	17.1	17.4	21.6
8-Aug	16.1	15.6	15.2	15.2	14.5	14.1	14.0	14.5	16.1	18.2	20.1	21.7	22.5	23.4	23.7	22.2	21.2	22.0	22.1	21.3	19.4	18.6	18.1	17.7	18.7	23.7
9-Aug	17.1	16.5	16.1	15.9	15.2	14.7	14.4	15.3	17.4	19.4	21.2	23.0	24.3	25.3	25.9	26.3	26.8	27.2	27.0	26.5	25.9	24.7	23.3	22.0	21.3	27.2
10-Aug	20.7	20.2	AF	AF	AF	AF	AF	18.3	20.0	21.3	23.2	24.7	25.7	26.7	27.3	27.8	28.1	28.4	27.9	27.5	27.0	25.9	24.8	AF	24.8	28.4
11-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	22.2	23.9	25.0	25.2	25.6	26.0	26.2	26.1	25.8	AF	AF	AF	AF	AF	19.5	--	26.2
12-Aug	18.4	18.1	17.9	17.1	17.3	16.9	17.2	17.9	18.8	19.6	20.6	21.7	AF	AF	24.1	24.6	24.9	24.9	24.7	24.0	23.4	AF	AF	AF	20.6	24.9
13-Aug	AF	17.6	17.5	17.3	16.5	15.8	16.0	16.8	17.6	17.9	18.3	20.0	22.2	22.5	21.9	19.7	20.8	22.6	23.2	23.4	AF	AF	AF	AF	19.3	23.4
14-Aug	AF	17.2	16.1	15.1	13.6	12.5	12.6	13.6	15.1	15.9	15.8	17.0	17.6	18.1	18.8	18.8	17.8	17.6	17.0	16.2	15.1	13.9	13.5	13.2	15.7	18.8
15-Aug	12.8	12.5	12.7	12.6	12.3	11.7	11.8	11.9	12.4	12.8	13.7	14.7	15.6	16.1	16.1	16.0	16.1	16.4	16.1	15.7	15.2	14.5	14.0	13.2	14.0	16.4
16-Aug	13.0	12.7	12.6	12.4	12.2	11.9	11.5	11.4	AF	AF	14.4	AF	AF	16.7	17.6	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	17.6
17-Aug	AF	13.2	12.5	11.8	11.2	11.0	10.5	10.5	11.7	14.1	17.2	19.7	20.4	21.2	21.6	21.8	21.5	20.6	19.9	19.1	18.4	17.7	17.2	16.9	16.5	21.8
18-Aug	15.7	15.8	15.6	14.5	13.4	13.1	12.7	13.4	14.3	15.5	17.2	18.5	19.3	20.2	21.1	AF	AF	21.5	AF	AF	AF	AF	AF	AF	--	21.5
19-Aug	15.8	15.5	15.3	15.5	16.0	16.3	16.2	16.1	16.8	AF	AF	AF	AF	21.9	22.6	22.4	AF	AF	AF	17.2	16.2	15.5	14.8	14.3	--	22.6
20-Aug	13.7	13.1	13.0	12.1	11.7	11.9	12.1	12.1	12.1	12.2	12.5	12.8	13.0	12.3	12.1	12.9	13.5	13.6	13.5	13.0	12.7	12.3	11.8	10.3	12.5	13.7
21-Aug	9.4	9.0	8.2	7.6	7.1	7.1	7.4	7.9	8.3	9.2	9.6	10.2	10.5	11.3	11.3	11.3	11.8	11.9	11.8	11.4	11.1	10.6	10.0	9.6	9.7	11.9
22-Aug	9.2	8.8	8.6	7.8	7.5	7.4	7.0	7.3	7.5	8.3	9.2	10.1	11.1	12.1	13.2	13.9	14.5	14.3	14.5	AF	AF	AF	AF	AF	10.1	14.5
23-Aug	AF	AF	8.2	6.8	6.9	7.0	6.7	7.3	7.2	8.5	9.2	16.7	18.4	19.1	20.0	21.0	21.8	22.2	22.0	20.9	AF	AF	AF	AF	13.9	22.2
24-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	15.9	17.4	18.8	20.1	21.0	21.0	21.5	21.7	21.8	AF	AF	AF	AF	AF	AF	--	21.8
25-Aug	AF	AF	AF	AF	AF	AF	12.1	12.6	13.2	15.8	17.5	19.1	19.9	19.9	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	19.9
26-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	13.6	14.3	15.5	16.1	16.7	17.3	17.6	17.9	18.1	17.9	17.7	17.5	17.3	16.7	16.8	--	18.1
27-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	15.0	17.8	19.7	21.2	22.4	23.2	23.7	24.1	24.5	24.1	AF	AF	AF	AF	AF	--	24.5
28-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	21.7	22.0	21.8	22.6	23.4	23.7	23.2	23.1	22.6	22.2	AF	AF	--	23.7
29-Aug	AF	16.9	16.3	16.1	15.1	14.2	14.6	14.2	AF	AF	AF	AF	20.8	21.7	22.4	23.0	23.6	23.7	AF	AF	AF	AF	AF	AF	--	23.7
30-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	22.1	23.0	23.8	24.6	24.0	22.6	17.1	15.9	15.8	15.9	17.0	15.4	13.6	--	24.6
31-Aug	12.5	11.2	10.7	10.4	10.6	10.7	10.7	11.8	12.5	12.8	AF	AF	19.3	19.9	20.7	20.8	20.8	20.7	AF	AF	AF	AF	16.1	15.9	14.9	20.8
	14.9	14.9	14.0	13.5	13.1	12.8	12.7	13.3	14.2	15.5	16.8	18.6	19.5	20.1	20.8	21.0	21.0	20.8	20.1	19.6	18.6	17.4	16.4	15.5	Diurnal Average	
	20.7	20.2	18.2	17.3	17.3	16.9	17.2	18.3	20.0	22.2	23.9	25.0	25.7	26.7	27.3	27.8	28.1	28.4	27.9	27.5	27.0	25.9	24.8	22.0	Diurnal Maximum	

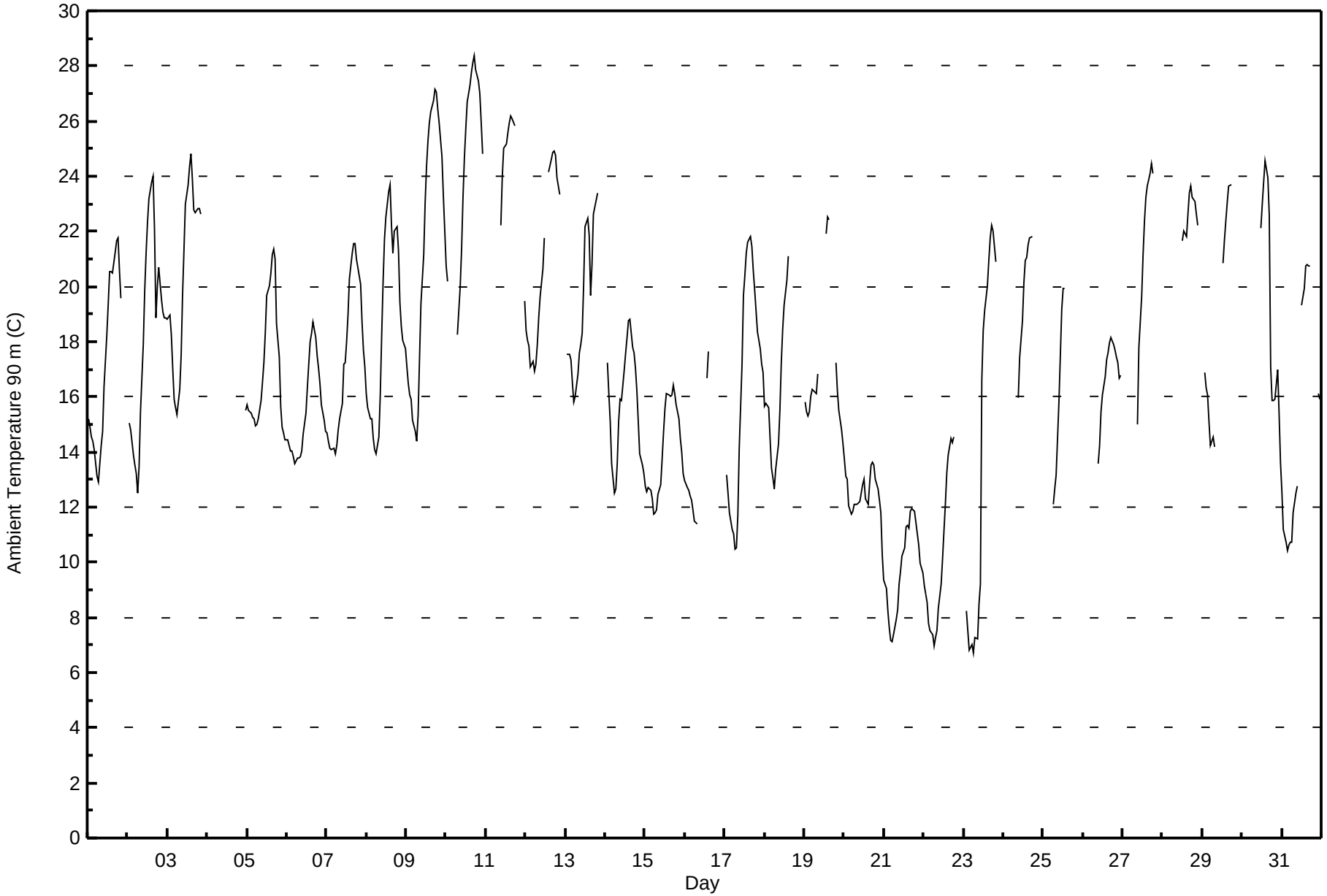
AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature 90 m (AT90m) - C

Mannix - August 2015



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	33	6.03	6.03
10 - 20	354	64.72	70.75
> 20	160	29.25	100.00

Total Number of Valid Hours: 547

Total Number of Hours: 744

Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Mannix - August 2015

Maximum Value: 97 % on Aug 1 06:00

Maximum Daily Average: 83.0 % on Aug 6

Minimum Value: 28 % on Aug 31 16:00

Minimum Daily Average: 48.3 % on Aug 28

Maximum Diurnal Average: 85.3 % at hour 6

Minimum Diurnal Average: 46.2 % at hour 15

Monthly Average: 66.3 %

Percentiles: $P_1 = 31$ $P_{10} = 40$ $Q_1 = 52$ Median = 67 $Q_3 = 81$ $P_{90} = 91$ $P_{99} = 97$

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

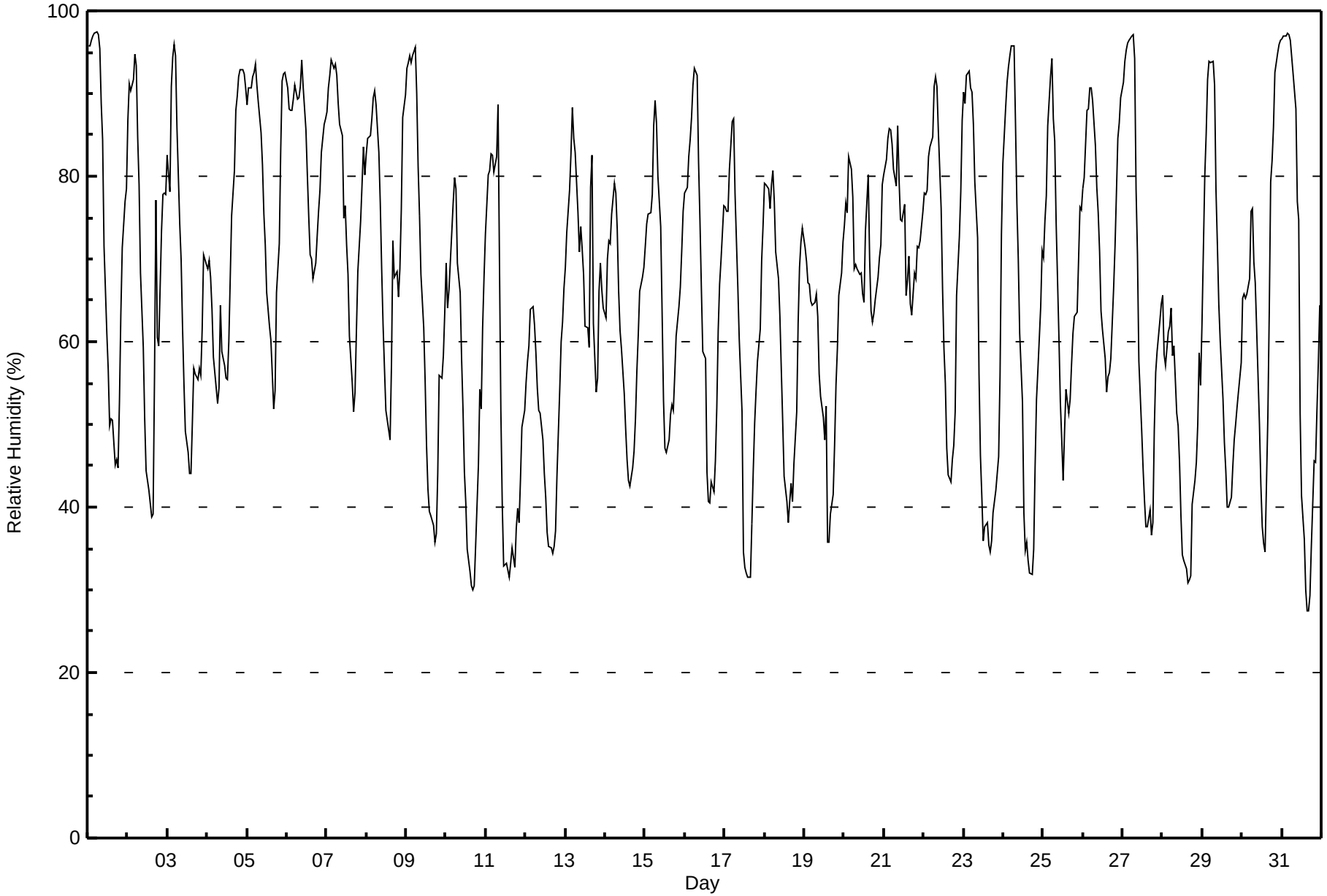
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	96	96	96	97	97	97	97	95	89	84	71	61	57	50	51	50	45	46	45	53	63	71	77	78	73.5	97
2-Aug	87	91	90	92	95	93	85	79	68	59	51	44	43	42	39	39	56	77	61	60	73	78	78	78	69.1	95
3-Aug	83	78	91	94	96	95	86	74	70	62	55	49	47	44	44	50	57	56	55	57	56	61	71	69	66.6	96
4-Aug	69	70	68	64	58	54	53	54	64	59	57	56	55	60	68	75	81	88	90	92	93	93	92	91	71.0	93
5-Aug	89	91	91	92	93	94	91	89	85	81	75	72	66	62	60	56	52	54	66	72	83	92	92	92	78.7	94
6-Aug	91	88	88	88	89	91	89	89	91	94	91	86	80	75	71	70	68	70	73	76	78	83	86	87	83.0	94
7-Aug	88	91	92	94	93	94	92	89	86	85	75	76	72	68	61	55	52	54	61	68	75	79	84	80	77.6	94
8-Aug	83	85	85	87	89	90	89	83	77	69	62	57	52	49	48	57	72	68	68	65	69	76	87	90	73.2	90
9-Aug	93	94	95	94	95	96	90	81	75	68	62	55	47	42	39	39	38	36	37	44	56	56	58	64	64.7	96
10-Aug	70	64	66	73	77	80	78	69	66	58	52	44	41	35	32	30	30	31	35	45	54	52	62	68	54.7	80
11-Aug	73	80	81	83	83	81	82	89	70	52	40	33	33	32	31	33	35	33	38	40	38	43	50	52	54.3	89
12-Aug	55	58	59	64	64	62	59	54	52	51	48	44	41	37	35	35	34	35	37	44	54	60	62	66	50.5	66
13-Aug	69	73	78	83	88	84	83	76	71	74	71	68	62	62	59	79	83	62	54	56	66	70	66	64	70.8	88
14-Aug	63	70	72	72	75	79	78	74	66	61	59	54	50	46	43	43	45	47	51	56	61	66	68	69	61.1	79
15-Aug	72	74	75	76	78	86	89	86	80	74	64	53	47	47	48	51	52	52	56	61	64	67	71	76	66.6	89
16-Aug	78	79	82	84	87	91	93	92	82	75	67	59	58	44	41	41	43	42	46	52	61	67	70	76	67.0	93
17-Aug	76	76	76	81	87	87	78	72	67	60	52	35	33	32	32	32	38	44	50	54	58	61	70	74	59.3	87
18-Aug	79	79	78	76	79	81	77	71	68	63	57	50	44	41	38	41	43	41	45	52	62	69	72	74	61.6	81
19-Aug	71	70	67	67	65	64	65	66	63	56	53	51	48	52	36	36	39	42	47	55	59	66	68	72	57.4	72
20-Aug	74	77	76	82	81	77	69	69	69	68	68	66	65	73	80	70	64	62	63	65	68	70	72	79	71.2	82
21-Aug	80	82	85	86	86	84	81	79	86	80	75	75	77	66	68	70	65	63	68	68	71	71	72	76	75.5	86
22-Aug	78	78	78	82	84	85	91	92	91	85	76	66	59	55	47	44	43	46	48	52	66	73	78	87	70.1	92
23-Aug	90	89	92	93	91	90	86	79	73	56	46	41	36	38	38	35	35	36	39	42	44	46	56	73	60.2	93
24-Aug	82	88	91	93	95	96	96	87	77	70	61	53	39	35	36	34	32	32	35	45	53	57	64	71	63.3	96
25-Aug	70	75	78	86	92	94	87	84	74	60	53	48	43	49	54	51	53	57	61	63	64	70	76	76	67.5	94
26-Aug	79	80	88	88	91	91	89	84	79	76	71	64	62	58	54	56	56	58	66	71	78	85	87	90	74.9	91
27-Aug	91	94	95	96	97	97	97	94	79	70	58	49	45	41	38	38	40	37	38	49	56	59	63	65	66.0	97
28-Aug	66	58	57	61	62	64	58	59	51	50	45	39	34	34	33	31	31	32	40	43	46	50	59	55	48.3	66
29-Aug	62	80	85	92	94	94	94	91	78	72	65	60	53	48	44	40	40	41	45	48	50	52	54	58	64.1	94
30-Aug	65	66	65	66	68	76	76	70	67	61	50	43	38	36	35	51	64	79	82	86	92	95	96	97	67.6	97
31-Aug	97	97	97	97	97	96	94	92	88	77	75	51	41	36	30	28	28	29	35	46	45	52	57	64	64.6	97
	77.9	79.6	81.3	83.3	84.6	85.3	83.0	79.5	74.2	68.1	61.4	54.9	50.5	48.0	46.2	47.1	48.7	49.9	52.8	57.4	63.1	67.4	71.5	74.5	Diurnal Average	
	97	97	97	97	97	97	97	95	91	94	91	86	80	75	80	79	83	88	90	92	93	95	96	97	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity (RH) - %

Mannix - August 2015



Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	74	9.95	9.95
40 - 60	202	27.15	37.10
60 - 80	274	36.83	73.92
80 - 100	194	26.08	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

Maximum Value: 98 % on Aug 27 06:00

Maximum Daily Average: 82.2 % on Aug 6

Minimum Value: 25 % on Aug 31 17:00

Minimum Daily Average: 41.4 % on Aug 28

Maximum Diurnal Average: 81.5 % at hour 6

Minimum Diurnal Average: 44.2 % at hour 16

Monthly Average: 62.8 %

Percentiles: P_1 = 29 P_{10} = 37 Q_1 = 49 Median = 63 Q_3 = 78 P_{90} = 88 P_{99} = 96

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

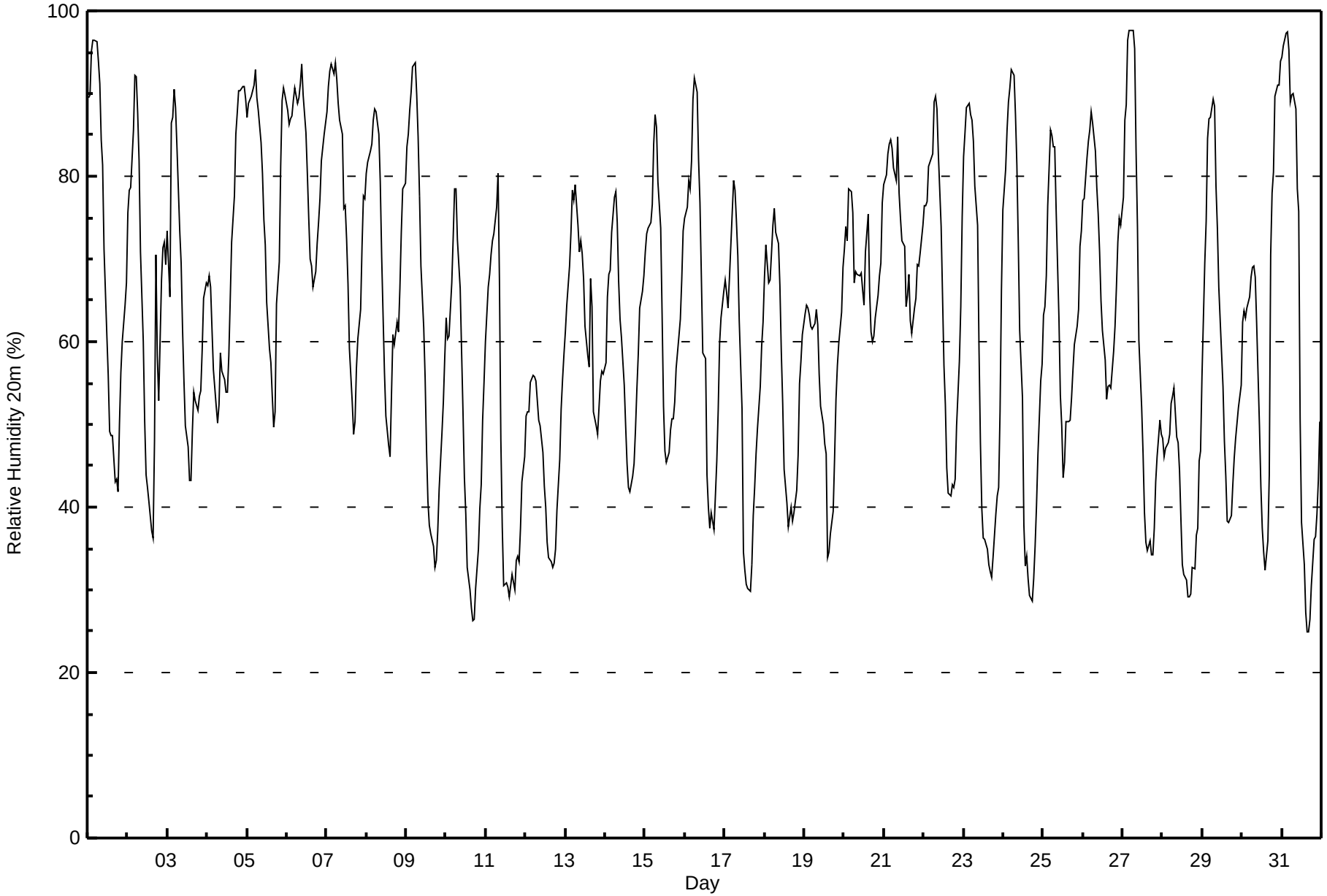
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	89	90	95	96	96	96	94	91	84	81	71	61	56	49	49	49	43	43	42	50	56	60	64	67	69.8	96
2-Aug	76	78	79	86	92	92	88	82	71	60	50	44	42	41	37	36	48	71	58	53	67	71	72	69	65.1	92
3-Aug	73	65	86	87	91	88	84	73	69	62	55	50	47	43	43	49	54	53	52	53	54	59	65	67	63.5	91
4-Aug	67	68	67	62	57	52	50	52	59	57	55	54	54	58	65	72	78	85	88	90	90	91	91	89	68.8	91
5-Aug	87	89	90	90	91	93	90	88	84	80	75	72	65	59	57	53	50	52	65	70	81	89	91	90	77.1	93
6-Aug	88	86	87	87	89	91	89	89	91	94	90	85	80	75	70	69	67	69	72	74	77	82	85	86	82.2	94
7-Aug	88	91	93	94	92	94	92	89	87	85	76	76	72	67	59	53	49	50	57	60	64	72	78	77	75.6	94
8-Aug	80	82	83	84	87	88	88	85	79	70	63	56	51	47	46	54	61	60	62	61	66	73	78	79	70.2	88
9-Aug	84	85	88	90	93	94	90	85	78	69	62	56	47	41	38	37	35	33	34	37	42	49	53	58	61.5	94
10-Aug	63	60	61	67	72	78	79	72	66	59	52	43	39	33	30	28	26	26	30	35	40	43	50	55	50.4	79
11-Aug	60	67	68	71	72	73	76	80	67	48	38	30	31	30	29	31	32	30	34	34	33	37	43	46	48.4	80
12-Aug	51	52	52	55	56	56	55	53	51	50	47	42	40	36	34	33	33	33	35	40	46	52	56	59	46.4	59
13-Aug	61	64	69	73	78	77	79	74	71	72	71	68	62	58	57	68	64	51	50	49	52	55	56	56	64.0	79
14-Aug	57	65	68	69	73	77	78	74	67	63	61	55	50	45	42	42	44	45	49	54	58	64	66	68	59.9	78
15-Aug	71	73	74	74	77	84	87	86	79	74	63	52	47	45	47	49	51	51	53	57	61	63	67	73	64.9	87
16-Aug	75	76	79	79	82	89	92	90	82	77	68	59	58	44	40	37	39	37	41	46	52	60	63	66	63.8	92
17-Aug	67	66	64	68	76	79	78	75	70	63	52	35	32	31	30	30	33	39	42	47	49	55	60	62	54.3	79
18-Aug	68	72	67	67	71	74	76	73	72	67	59	53	45	40	38	39	40	38	39	42	46	55	58	61	56.6	76
19-Aug	63	64	64	63	62	62	62	64	62	56	52	50	48	47	34	35	37	39	46	53	57	60	64	69	54.7	69
20-Aug	71	74	72	79	78	76	67	68	68	68	68	66	64	71	75	66	61	60	61	63	66	68	70	77	69.1	79
21-Aug	79	80	83	84	84	83	81	79	85	78	75	72	72	64	66	68	63	61	64	65	69	69	71	74	73.7	85
22-Aug	76	76	77	81	82	83	89	90	88	83	74	65	57	52	45	42	41	43	42	43	50	58	64	75	65.7	90
23-Aug	82	85	88	89	88	87	84	79	74	59	48	40	36	36	35	33	32	32	34	39	41	42	52	66	57.6	89
24-Aug	76	81	86	89	91	93	92	87	81	72	61	53	38	33	34	31	29	29	31	35	40	46	55	57	59.3	93
25-Aug	63	64	68	76	86	85	84	84	76	63	54	50	44	45	50	50	51	53	57	60	62	64	72	73	63.8	86
26-Aug	77	77	82	84	86	88	86	83	79	75	71	65	61	58	53	54	55	54	59	62	67	72	75	74	70.7	88
27-Aug	77	87	89	97	98	98	98	96	83	74	60	52	46	39	36	35	36	34	34	37	43	46	50	49	62.2	98
28-Aug	48	46	47	48	49	53	53	54	48	48	44	39	33	32	31	29	29	30	33	32	37	37	46	47	41.4	54
29-Aug	56	70	75	85	87	87	89	89	79	74	67	62	54	48	44	38	38	39	43	46	48	50	52	55	61.4	89
30-Aug	62	64	63	64	65	68	69	69	68	62	50	43	37	35	32	36	44	71	78	80	90	91	91	94	63.6	94
31-Aug	94	96	97	97	95	89	90	90	88	79	76	51	38	33	27	25	25	26	30	36	36	39	43	50	60.5	97
	72.0	74.0	76.1	78.5	80.5	81.5	80.9	78.9	74.4	68.4	61.5	54.8	49.9	46.3	44.3	44.2	44.7	46.4	48.8	51.8	56.2	60.4	64.5	67.5	Diurnal Average	
	94	96	97	97	98	98	98	96	91	94	90	85	80	75	75	72	78	85	88	90	90	91	91	94	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity 20m (RH20m) - %

Mannix - August 2015



Relative Humidity 20m (RH20m) - %

Mannix - August 2015

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	108	14.52	14.52
40 - 60	218	29.30	43.82
60 - 80	260	34.95	78.76
80 - 100	158	21.24	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

Maximum Value: 97 % on Aug 31 03:00

Maximum Daily Average: 82.5 % on Aug 6

Minimum Value: 25 % on Aug 31 17:00

Minimum Daily Average: 40.3 % on Aug 28

Maximum Diurnal Average: 80.1 % at hour 7

Minimum Diurnal Average: 44.0 % at hour 16

Monthly Average: 61.8 %

Percentiles: P_1 = 28 P_{10} = 36 Q_1 = 48 Median = 62 Q_3 = 77 P_{90} = 88 P_{99} = 94

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

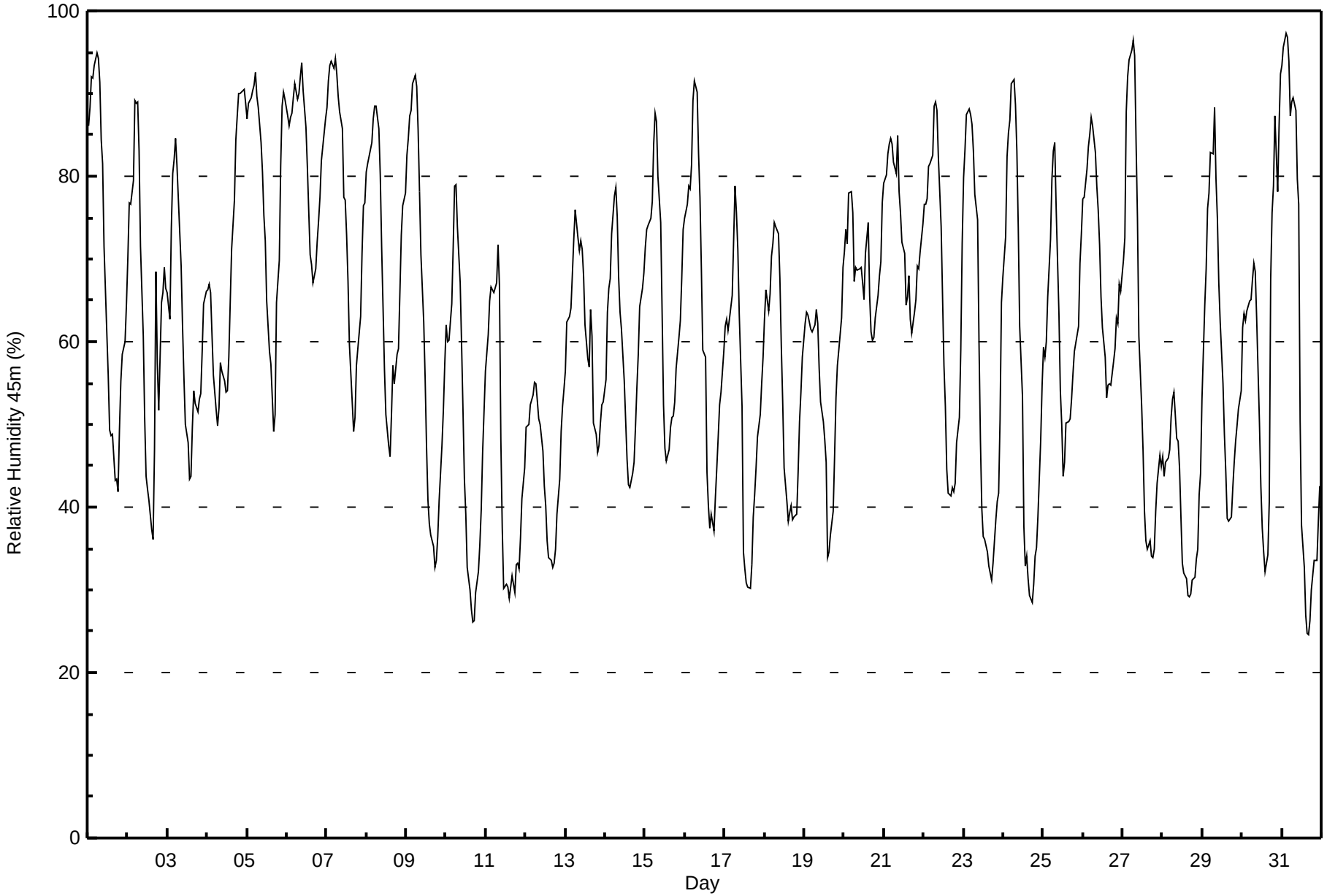
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	86	88	92	92	93	95	94	91	84	82	72	61	56	49	49	49	43	43	42	49	55	58	60	65	68.7	95
2-Aug	70	77	77	79	89	89	89	83	71	61	51	44	42	41	37	36	47	68	57	52	65	66	69	66	63.6	89
3-Aug	66	63	74	80	82	85	81	73	69	62	56	50	48	43	44	50	54	52	52	53	54	59	65	66	61.7	85
4-Aug	66	67	66	61	56	52	50	52	58	56	55	54	54	58	65	71	77	84	87	90	90	90	90	89	68.3	90
5-Aug	87	89	90	90	91	92	90	88	84	81	75	72	65	59	57	53	49	51	65	70	81	88	90	89	77.0	92
6-Aug	87	86	87	88	90	91	89	90	92	94	90	86	81	76	71	69	67	69	72	75	77	82	85	87	82.5	94
7-Aug	88	91	93	94	93	94	92	90	88	86	77	77	73	67	60	53	49	51	57	59	63	71	77	77	75.9	94
8-Aug	81	82	83	84	87	88	89	86	80	71	64	57	51	47	46	51	57	55	59	59	66	73	77	78	69.6	89
9-Aug	83	85	87	88	91	92	91	86	78	70	62	56	47	41	38	37	35	33	34	37	41	47	52	57	61.1	92
10-Aug	62	60	60	65	71	79	79	74	67	60	52	43	39	33	30	28	26	26	30	32	35	40	47	52	49.5	79
11-Aug	56	61	65	67	66	66	67	72	67	48	38	30	31	30	29	30	32	30	33	33	32	36	41	45	46.0	72
12-Aug	50	50	50	52	54	55	55	53	51	50	47	43	40	36	34	33	33	33	35	39	43	49	52	54	45.5	55
13-Aug	57	62	63	64	68	72	76	73	71	72	71	68	62	58	57	64	61	50	49	47	48	50	52	53	61.1	76
14-Aug	56	64	66	68	73	78	79	75	68	64	61	55	50	46	43	42	44	45	50	54	58	64	66	68	59.9	79
15-Aug	71	74	74	75	77	84	88	87	80	74	64	52	47	46	47	50	51	51	53	57	61	62	68	74	65.2	88
16-Aug	75	77	79	78	81	89	92	90	83	77	69	59	58	44	40	37	39	37	41	45	48	52	54	59	62.7	92
17-Aug	62	63	61	63	66	72	79	76	71	63	52	35	32	31	30	30	33	39	41	45	48	51	55	58	52.4	79
18-Aug	63	66	64	66	70	72	74	74	73	68	59	53	45	41	38	39	40	39	39	39	44	50	54	58	55.3	74
19-Aug	62	64	63	62	61	61	62	64	62	57	53	50	48	45	34	35	37	39	46	53	57	59	63	69	54.5	69
20-Aug	71	74	72	78	78	76	67	69	69	69	69	67	65	71	74	66	61	60	61	63	66	68	70	77	69.1	78
21-Aug	79	80	83	84	85	84	82	80	85	78	76	72	71	64	65	68	63	61	64	65	69	69	71	74	73.8	85
22-Aug	77	77	77	81	82	82	88	89	88	82	74	65	57	52	45	42	41	42	42	43	48	51	59	72	64.8	89
23-Aug	80	83	87	88	87	86	83	78	75	60	48	40	36	36	35	33	32	31	33	39	41	42	51	65	57.0	88
24-Aug	68	73	82	85	87	91	92	89	83	74	62	53	38	33	34	31	29	28	31	34	35	39	48	55	57.2	92
25-Aug	59	58	60	65	72	80	83	84	76	63	54	50	44	45	50	50	51	53	56	59	61	62	70	73	61.6	84
26-Aug	77	77	81	84	85	87	86	83	79	76	72	65	62	58	53	55	55	55	58	59	63	62	67	66	69.4	87
27-Aug	70	72	88	92	94	95	96	95	84	75	61	52	47	39	36	35	36	34	34	35	39	43	46	45	60.2	96
28-Aug	46	44	45	46	47	51	53	54	48	48	45	39	33	32	31	29	29	29	31	32	34	35	42	44	40.3	54
29-Aug	53	64	69	76	78	83	83	88	80	75	67	62	55	49	44	39	38	39	42	45	48	50	52	54	59.7	88
30-Aug	62	63	63	64	65	65	67	69	69	63	50	43	37	35	32	34	41	67	76	79	87	78	86	92	62.0	92
31-Aug	93	96	97	97	94	87	89	90	88	80	77	50	38	33	27	25	25	26	30	34	34	34	38	42	59.3	97
	69.7	71.9	74.2	76.0	77.9	79.8	80.1	78.8	74.9	69.0	62.0	55.0	50.1	46.4	44.4	44.0	44.4	45.9	48.3	50.7	54.6	57.5	61.8	65.2	Diurnal Average	
	93	96	97	97	94	95	96	95	92	94	90	86	81	76	74	71	77	84	87	90	90	90	90	92	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity 45m (RH45m) - %

Mannix - August 2015



Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	112	15.05	15.05
40 - 60	230	30.91	45.97
60 - 80	253	34.01	79.97
80 - 100	149	20.03	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity 75m (RH75m) - %

Mannix - August 2015

Maximum Value: 96 % on Aug 7 06:00

Maximum Daily Average: 83.8 % on Aug 6

Minimum Value: 25 % on Aug 31 17:00

Minimum Daily Average: 40.2 % on Aug 28

Maximum Diurnal Average: 78.4 % at hour 7

Minimum Diurnal Average: 44.6 % at hour 16

Monthly Average: 61.3 %

Percentiles: P_1 = 29 P_{10} = 36 Q_1 = 47 Median = 62 Q_3 = 76 P_{90} = 86 P_{99} = 94

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

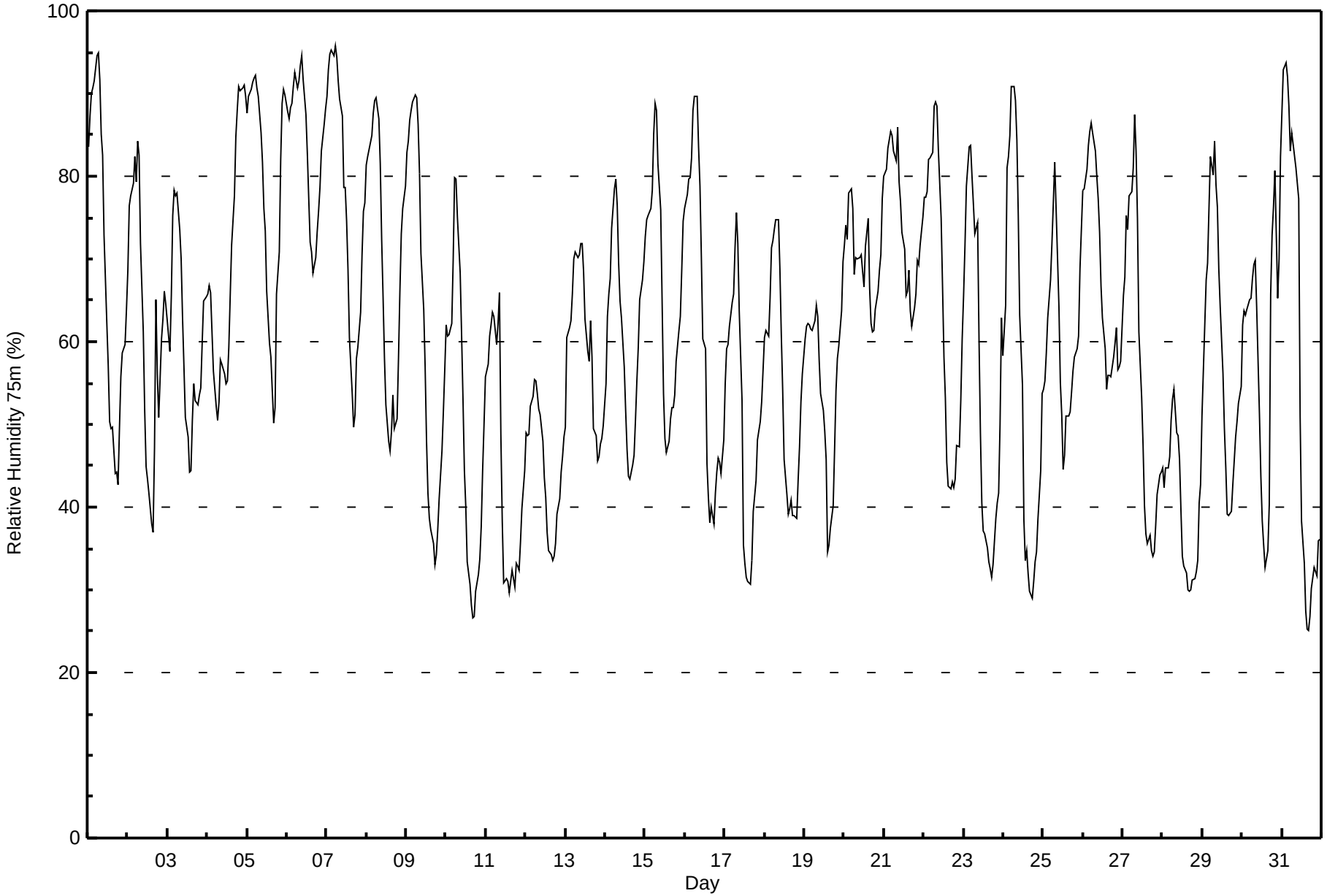
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	84	87	90	91	92	95	95	92	85	82	73	62	57	50	50	50	44	44	43	50	56	59	60	64	68.8	95
2-Aug	69	76	78	79	82	79	84	82	72	61	52	45	43	42	38	37	47	65	56	51	60	63	66	65	62.2	84
3-Aug	63	59	66	75	78	78	78	73	70	63	57	51	49	44	44	50	55	53	52	54	54	60	65	65	60.7	78
4-Aug	66	67	66	61	56	52	51	53	58	57	56	55	55	59	66	72	78	85	88	91	90	91	91	90	68.9	91
5-Aug	88	90	91	91	92	92	91	90	85	82	76	73	66	60	58	54	50	52	66	71	82	89	91	90	77.8	92
6-Aug	88	87	88	89	91	93	91	92	93	95	92	87	83	77	72	71	68	70	73	76	79	83	86	88	83.8	95
7-Aug	90	93	95	95	95	96	94	91	89	87	79	79	75	69	61	54	50	51	58	59	64	71	76	77	76.9	96
8-Aug	81	82	84	85	88	89	90	87	82	72	65	58	52	48	47	49	54	50	51	58	66	73	76	79	69.4	90
9-Aug	83	84	87	88	89	90	90	86	80	71	64	57	48	42	39	37	36	33	34	37	41	47	52	57	61.3	90
10-Aug	62	61	61	62	70	80	80	75	68	61	53	44	40	33	31	28	27	27	30	32	34	38	44	50	49.6	80
11-Aug	56	57	61	62	64	63	60	62	66	49	38	31	31	31	30	31	32	30	33	33	32	36	40	44	44.7	66
12-Aug	49	49	49	52	53	55	55	54	52	51	48	44	41	37	35	34	34	34	36	39	41	44	46	48	45.0	55
13-Aug	50	61	62	62	66	70	71	70	71	72	72	68	63	59	58	63	58	49	49	46	46	48	48	50	59.5	72
14-Aug	55	63	66	68	74	78	80	76	69	65	63	57	52	47	44	43	45	46	51	55	59	65	67	70	60.8	80
15-Aug	73	75	75	76	78	85	89	88	82	76	65	54	48	47	48	51	52	52	54	58	61	63	69	75	66.3	89
16-Aug	76	78	80	80	82	88	90	90	83	79	70	60	59	45	41	38	40	38	42	44	46	45	44	48	61.9	90
17-Aug	55	59	60	62	65	66	71	76	72	64	53	35	33	31	31	31	34	39	41	43	48	50	53	57	51.2	76
18-Aug	61	61	61	65	71	72	73	75	75	69	61	54	46	42	39	40	41	39	39	39	43	47	53	56	55.1	75
19-Aug	60	62	62	62	62	61	62	64	63	58	54	52	49	46	35	35	37	40	47	54	58	60	64	70	54.9	70
20-Aug	72	74	72	78	79	76	68	70	70	70	70	69	67	71	75	66	62	61	61	64	66	69	70	77	70.0	79
21-Aug	80	81	83	84	85	85	83	82	86	79	77	73	71	66	66	69	64	62	64	66	70	69	72	75	74.7	86
22-Aug	78	78	78	82	82	83	89	89	88	83	75	67	58	53	45	43	42	43	42	43	47	47	53	60	64.6	89
23-Aug	66	72	79	84	84	80	77	73	74	60	49	41	37	37	35	33	33	31	33	39	40	42	50	63	54.6	84
24-Aug	58	64	81	82	85	91	91	89	84	75	63	55	38	34	35	32	30	29	31	33	35	38	44	54	56.4	91
25-Aug	54	55	59	63	67	72	77	82	76	64	55	51	45	46	51	51	52	54	56	58	59	61	69	74	60.4	82
26-Aug	78	79	81	84	85	86	85	83	80	77	73	67	63	59	54	56	56	56	58	60	62	57	57	58	68.9	86
27-Aug	66	68	75	74	78	78	81	88	83	75	61	53	47	40	37	36	37	35	34	35	38	42	44	44	56.1	88
28-Aug	45	42	45	45	46	51	53	54	49	49	46	40	34	33	32	30	30	30	31	31	32	34	41	43	40.2	54
29-Aug	51	62	67	70	76	82	80	84	79	76	69	64	56	50	45	39	39	39	43	46	48	50	53	55	59.3	84
30-Aug	62	64	63	64	65	65	68	69	70	64	51	44	38	35	33	35	40	66	73	76	81	65	70	82	60.2	82
31-Aug	88	93	94	92	88	83	85	84	81	79	77	51	38	33	28	25	25	27	30	33	32	32	36	36	57.1	94
	67.8	70.4	72.8	74.4	76.4	77.9	78.4	78.2	75.4	69.9	63.1	56.1	51.1	47.3	45.1	44.6	44.8	46.2	48.3	50.7	53.9	56.0	59.6	63.3	Diurnal Average	
	90	93	95	95	95	96	95	92	93	95	92	87	83	77	75	72	78	85	88	91	90	91	91	90	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity 75m (RH75m) - %

Mannix - August 2015



Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	111	14.92	14.92
40 - 60	238	31.99	46.91
60 - 80	259	34.81	81.72
80 - 100	136	18.28	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity 90m (RH90m) - %

Mannix - August 2015

Maximum Value: 97 % on Aug 7 06:00

Maximum Daily Average: 84.6 % on Aug 6

Minimum Value: 25 % on Aug 31 17:00

Minimum Daily Average: 44.0 % on Aug 10

Maximum Diurnal Average: 80.6 % at hour 7

Minimum Diurnal Average: 44.2 % at hour 16

Monthly Average: 62.7 %

Percentiles: P_1 = 28 P_{10} = 35 Q_1 = 49 Median = 64 Q_3 = 77 P_{90} = 88 P_{99} = 95

Hours in Service:	744
Hours of Data:	547
Hours of Missing Data:	197
Hours of Calibration:	0
Percent Operational Time:	73.5

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	83	87	90	91	92	95	95	91	85	83	74	63	58	51	50	50	45	45	43	50	56	AF	AF	AF	70.3	95
2-Aug	AF	76	78	80	81	79	83	82	72	62	52	45	44	42	38	37	47	64	54	51	59	63	65	64	61.7	83
3-Aug	63	58	65	74	78	77	78	74	71	63	58	51	49	45	45	51	56	53	53	54	55	AF	AF	AF	60.5	78
4-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	90	--	90
5-Aug	88	90	91	92	93	93	91	91	86	82	77	74	67	60	59	55	51	52	66	71	83	89	91	90	78.4	93
6-Aug	88	88	89	90	92	94	92	92	94	95	93	88	84	78	73	72	69	71	74	76	79	84	87	89	84.6	95
7-Aug	90	94	96	96	96	97	95	93	90	88	80	79	75	69	61	54	50	52	59	60	64	70	76	77	77.6	97
8-Aug	82	83	85	86	88	90	90	88	82	73	66	59	53	49	47	49	53	49	48	57	66	73	76	78	69.6	90
9-Aug	83	85	87	88	89	89	90	88	80	72	65	57	49	42	39	38	36	33	34	38	41	47	52	56	61.5	90
10-Aug	62	61	AF	AF	AF	AF	AF	76	69	62	54	45	40	34	31	29	27	27	30	32	34	37	43	AF	44.0	76
11-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	49	39	31	32	31	30	31	33	31	AF	AF	AF	AF	AF	44	--	49
12-Aug	49	48	48	52	54	56	56	54	52	52	49	44	AF	AF	35	35	34	34	36	39	41	AF	AF	AF	45.7	56
13-Aug	AF	60	62	63	66	70	71	70	71	71	72	69	63	59	58	62	58	49	49	45	AF	AF	AF	AF	62.5	72
14-Aug	AF	63	65	68	74	79	81	78	70	66	64	58	52	48	44	44	46	47	51	56	60	66	68	70	61.6	81
15-Aug	73	76	76	77	79	86	90	89	82	77	66	54	49	47	49	51	53	53	54	58	62	63	69	75	67.0	90
16-Aug	77	79	80	81	83	87	89	89	AF	AF	71	AF	AF	46	42	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	89
17-Aug	AF	57	59	62	65	65	68	76	72	65	54	36	34	32	31	31	34	40	42	43	48	51	53	54	50.9	76
18-Aug	59	60	60	65	72	73	75	76	75	70	62	55	47	42	40	AF	AF	40	AF	AF	AF	AF	AF	AF	--	76
19-Aug	59	60	61	62	62	62	63	65	64	AF	AF	AF	AF	46	35	36	AF	AF	AF	55	59	60	64	70	--	70
20-Aug	72	75	73	78	79	77	69	71	71	71	71	69	67	72	75	67	63	62	62	65	66	69	71	78	70.6	79
21-Aug	81	81	84	85	86	86	84	83	87	80	78	74	72	66	67	69	65	62	64	66	70	70	72	76	75.3	87
22-Aug	78	78	79	82	83	83	89	89	89	84	76	67	59	54	46	43	43	43	43	AF	AF	AF	AF	AF	68.8	89
23-Aug	AF	AF	69	75	74	72	71	71	74	69	67	41	38	37	35	34	33	32	33	39	AF	AF	AF	AF	53.5	75
24-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	76	64	55	39	34	35	33	30	29	AF	AF	AF	AF	AF	AF	--	76
25-Aug	AF	AF	AF	AF	AF	AF	74	75	74	65	56	52	45	47	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	75
26-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	78	74	68	64	60	55	57	57	56	59	60	61	56	56	57	--	78
27-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	75	62	54	48	41	37	36	37	35	34	AF	AF	AF	AF	AF	--	75
28-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	34	33	32	30	30	30	31	31	32	33	AF	AF	--	34
29-Aug	AF	62	67	68	76	83	80	83	AF	AF	AF	AF	57	50	45	40	39	40	AF	AF	AF	AF	AF	AF	--	83
30-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	44	39	36	33	35	40	65	72	75	76	61	65	75	--	76
31-Aug	81	88	89	86	82	79	82	78	75	79	AF	AF	39	34	28	25	25	27	AF	AF	AF	AF	36	35	59.3	89
	74.7	73.1	75.1	77.3	79.2	80.4	80.6	80.1	76.7	72.3	65.6	57.3	51.6	47.8	44.8	44.2	44.3	45.3	49.6	53.4	58.6	62.0	65.2	69.4	Diurnal Average	
	90	94	96	96	96	97	95	93	94	95	93	88	84	78	75	72	69	71	74	76	83	89	91	90	Diurnal Maximum	

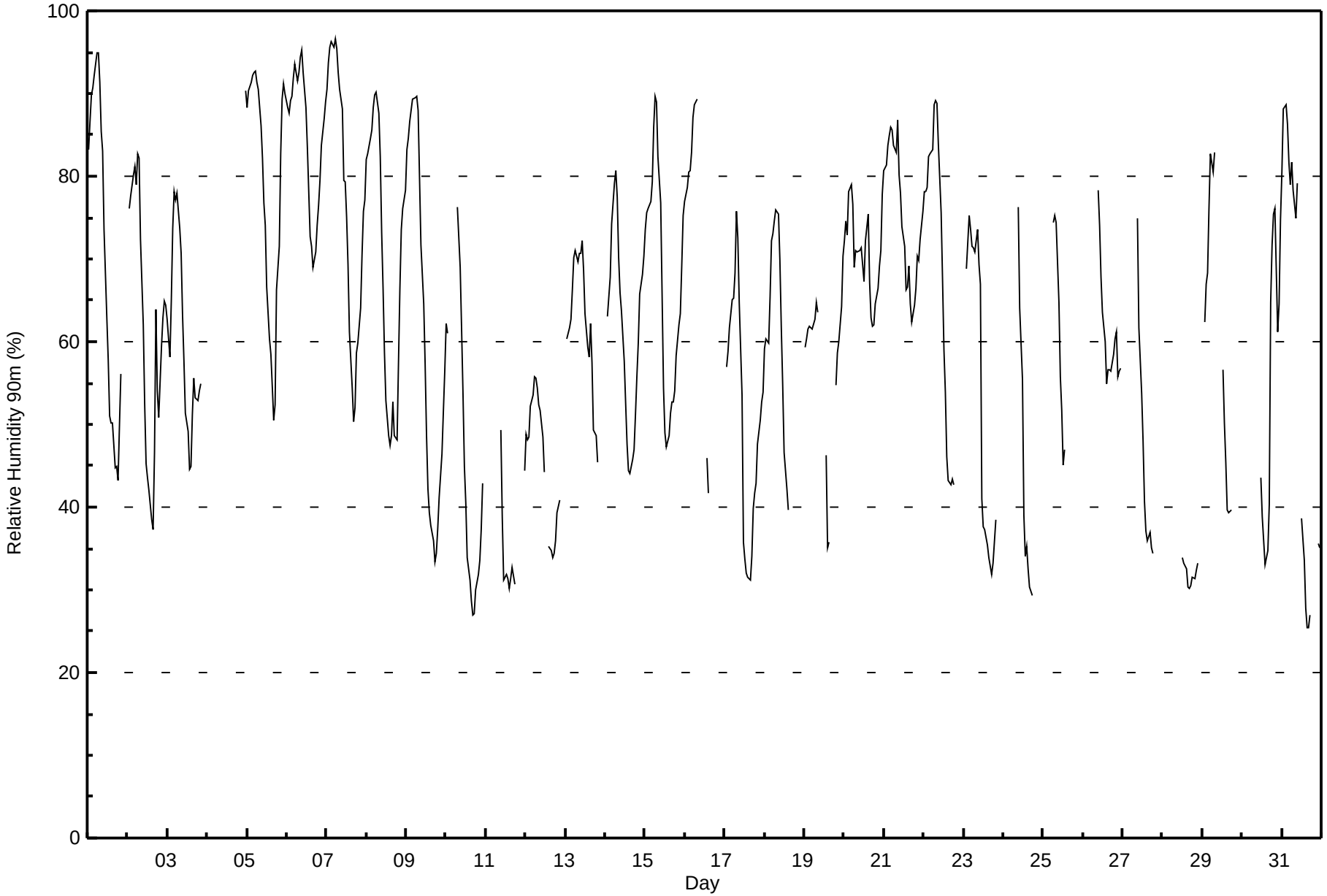
AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity 90m (RH90m) - %

Mannix - August 2015



Relative Humidity 90m (RH90m) - %

Mannix - August 2015

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	86	15.72	15.72
40 - 60	149	27.24	42.96
60 - 80	203	37.11	80.07
80 - 100	109	19.93	100.00

Total Number of Valid Hours: 547

Total Number of Hours: 744

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed 20 m (WS20m) - km/h

Mannix - August 2015

Maximum Speed: 35 km/h on Aug 19 16:00

Maximum Daily Speed Average: 22.4 km/h on Aug 14

Minimum Speed Value: 0 km/h on Aug 3 04:00

Minimum Daily Speed Average: 1.9 km/h on Aug 26

Maximum Diurnal Speed Average: 7.9 km/h at hour 16

Minimum Diurnal Speed Average: 2.4 km/h at hour 3

Monthly Average Velocity: 4.3 km/h 231.9 deg

Percentiles: $P_1 = 1$ $P_{10} = 4$ $Q_1 = 6$ Median = 9 $Q_3 = 14$ $P_{90} = 19$ $P_{99} = 29$

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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	NNW6	N2	WSW5	SW4	W5	NNW5	N6	NNW4	NNW6	W7	WNW7	NW8	NW9	WNW11	NNW13	NW11	NW10	WNW11	NW11	E4	SE3	ENE2	WNW5	NW3	NW5.3	NNW13
2-Aug	WSW3	WSW3	SW3	SSW5	SSW3	SSE5	S4	SSE5	SSE7	SE10	SE9	ESE9	ESE8	SE7	ESE8	ESE5	W11	N13	ENE12	SE4	W7	WNW2	ENE3	NNW0	SE2.6	N13
3-Aug	N3	NE1	WSW4	WSW0	SSW4	SSW2	SSE4	ESE4	ENE1	E4	E4	SSE7	SSE11	SE10	SSE10	SSE13	SSE10	SSE6	ESE4	E5	E9	SE8	SE7	ESE6	SE4.6	SSE13
4-Aug	SE9	ESE7	E9	ESE6	ESE9	E8	ESE9	ESE14	ESE9	E13	E11	E11	E11	ESE12	ESE11	ESE9	ESE11	SE11	SE11	SE14	SE12	SE9	ESE9	ESE10	ESE9.9	SE14
5-Aug	ESE9	SE8	E7	ENE5	ENE5	NE7	E9	ESE7	ESE8	SE8	SSE7	SSE5	ESE4	SE8	SE10	ESE9	ESE10	SE15	SSE18	SSE16	SE16	SE10	ESE8	SE9	SE8.1	SSE18
6-Aug	ESE10	ESE12	ESE11	ESE11	ESE11	ESE11	SE10	ESE11	ESE10	ESE8	E11	E12	E14	ESE14	ESE14	SE12	ESE13	ESE13	ESE12	ESE10	ESE10	ESE8	ESE6	E8	ESE10.8	E14
7-Aug	ESE8	ESE7	ESE5	E3	ENE5	E4	E1	WSW2	SSE2	WSW3	SSW1	E7	NE8	E6	ESE4	SE5	SSE5	SSE5	SSE7	SSE5	SSE8	SSE10	SSE10	SE12	SE4.2	SE12
8-Aug	SE9	SSE10	SE9	SE8	SSE8	SSE7	SSE7	SE8	SE6	SE7	SE6	SE4	SSE4	SW1	NW3	S11	SSW9	SW4	S2	E9	SE10	SE9	SSE6	SE3	SSE5.8	S11
9-Aug	NE4	NE4	E5	E5	SSE4	S2	SSW2	SSW2	SE3	ESE4	E4	SSE3	S3	SE4	SSE2	SE2	SE3	SSE1	ESE4	SE4	SSE6	SE6	SE10	SE10	SE3.3	SE10
10-Aug	SW9	WNW10	ENE2	SSW8	WSW11	W14	WSW6	S5	SW5	SW9	WSW10	SW10	SW13	SW18	WSW19	W19	WSW14	SW14	SW12	SSW7	S9	SW13	S8	SSW8	SW9.4	WSW19
11-Aug	S6	S6	SSE5	SE5	SE4	SSE6	SE6	SSE6	SSW7	SW12	WSW21	WSW31	WSW27	WSW26	WSW29	WSW24	WSW22	WSW24	WSW13	SW11	SW16	SW13	SW11	WSW13	SW12.6	WSW31
12-Aug	WSW14	WSW9	SW7	SSE6	SSW5	WSW8	WSW12	WSW18	WSW21	WSW17	WSW19	WSW21	W22	W20	WSW17	WSW18	W21	W21	W18	WSW14	SW9	WSW9	WSW9	WSW10	WSW13.8	W22
13-Aug	WSW11	S4	SE6	SSE7	S6	SSE6	SSE6	S5	SSE6	SSE9	SSE9	SSE8	SSE5	WNW8	W17	WSW15	SW9	SW11	WSW15	WSW14	SW8	SW10	SW13	SW13	SSW6.7	W17
14-Aug	W19	W16	W18	W21	W21	WSW19	W22	WSW23	WSW24	WSW29	W29	WSW27	W27	W25	W25	W30	WNW28	WNW25	W24	W21	WNW19	W17	W17	W20	W22.4	W30
15-Aug	W20	W15	WNW14	WNW13	NW14	NNW12	NNW10	NNW16	NNW16	NNW18	NNW17	N20	N19	N16	NNW19	NNW17	NNW17	NNW13	NNW13	NW11	NW12	NNW9	NNW10	N8	NNW13.4	W20
16-Aug	N7	N4	W4	NNW4	W3	SW6	WSW8	WSW6	WSW4	W6	NW4	NW9	NW4	WNW11	W13	W14	NW5	WNW7	W10	WSW9	WSW8	WSW9	WSW9	WSW7	W6.1	W14
17-Aug	SW7	SSW4	SSW5	S6	SSE8	SSE7	SSE7	SSE6	SSE8	SE6	ESE6	S10	SSW9	SW6	SSW8	S8	SSW9	SW8	SSW9	SSW8	S3	SSE6	S7	S6	S6.0	S10
18-Aug	SW6	W7	N9	NNW9	NNW6	WNW7	WNW5	NW4	NNW6	WNW6	NW4	WSW7	W5	WSW5	SSW2	SSE8	S8	SSE7	SSE7	S6	SSE11	SSE10	SSE9	SSE11	SW2.3	SSE11
19-Aug	SSE12	SSE14	SSE16	SSE17	SSE18	SSE16	SSE14	SSE17	S13	S12	SW14	WSW20	WSW21	W22	W32	W35	WSW24	W24	W29	W28	W20	W21	W18	WSW15	SW13.4	W35
20-Aug	WSW15	WSW14	WSW12	WSW13	WSW13	WSW19	W26	W22	W26	W28	W25	W29	W27	W23	W20	WNW20	WNW18	WNW17	WNW14	WNW17	W17	W18	W18	W14	W19.0	W29
21-Aug	W18	W17	W16	WSW15	W17	WSW15	W16	W18	W17	WNW17	WNW16	NW12	WNW17	WNW16	NW16	WNW17	WNW18	WNW16	WNW13	WNW16	WNW16	WNW19	WNW17	W16	WNW15.5	WNW19
22-Aug	W17	W17	W17	W16	W17	W16	W15	W14	W15	W16	W18	W18	WNW12	W11	WNW16	WNW16	NNW9	N6	N5	NNE1	SSE6	S6	S4	SSE6	W10.1	W18
23-Aug	SE7	SE7	SE7	SE8	SE10	SSE9	SSE9	SSE8	SE9	SSE11	SSE11	SSE12	SSE15	SSE12	SSE10	SSE10	SSE13	SSE12	SE9	SE14	SSE18	SSE15	NNW8	NNE6	SSE9.4	SSE18
24-Aug	NNE3	WSW7	WSW4	SE10	SSE7	SSW6	S6	SSE8	S9	SSW9	SW9	WSW7	WSW13	WSW16	W15	W16	W13	W14	W10	W5	W7	W9	W8	NNW5	WSW6.6	W16
25-Aug	NNE8	NNE8	N7	W4	W3	NE2	SSW1	SW2	NW1	N3	WNW7	NW8	NW8	NW9	N12	N13	N11	N9	NNW7	N8	NNE8	N3	NNW6	N14	NNW5.8	N14
26-Aug	NNE12	N8	N7	NE7	NNE10	NNE7	NNE6	NE4	NE4	WNW4	NW4	WNW3	WSW6	WSW6	W3	W5	W6	S4	S4	SSW4	SW5	SW6	SW6	SW5	NW1.9	NNE12
27-Aug	SSE4	S4	SSE2	SSE6	SSE7	SSE7	SSE7	SSE8	SSE9	SE7	SSE12	SE15	SSE11	SSW11	SSW13	SSW15	SSW15	SW17	WSW13	SSW8	SSW10	SSW10	SSE8	SSW7	S8.0	WSW17
28-Aug	SW9	WSW9	SW11	SW8	SW6	SW6	SW7	SW8	WSW17	WSW18	WSW23	WSW21	WSW24	WSW24	WSW22	WSW21	WSW17	W15	NW4	N3	ENE4	NE4	N2	NNE8	WSW10.3	WSW24
29-Aug	WNW7	NW8	SW3	S5	SW4	W4	SSW4	SW4	S5	SE6	SE7	SE8	SE8	SSE9	SSE10	SSE8	SE7	SE12	SE13	SE11	SE11	SE12	SE12	SE11	SSE5.8	SE13
30-Aug	ESE11	SE13	SE15	SE13	SE12	S4	SSW2	SW6	W17	W15	W12	W10	WNW9	WNW8	SW3	SW5	SE3	SSE14	SE12	SSE8	S5	S6	SSE7	SSE9	S4.4	W17
31-Aug	SSE8	SE9	SE8	SE8	SE8	SSE12	SSE10	SE7	SE10	SSE12	SSE11	SSW12	SW19	SW21	SW24	WSW29	WSW24	SW19	SW13	SSW10	SW12	SSW10	SSW9	S7	SSW10.1	WSW29
	SW3.1	SW2.9	SSW2.4	SSW3.2	SSW3.3	SW3.2	SSW3.5	SSW3.7	SW4.1	SW4.7	WSW5.0	WSW5.8	WSW6.4	WSW7.0	WSW7.4	WSW7.9	WSW6.6	WSW6.0	WSW4.1	SW3.8	SSW4.4	SSW4.6	SW3.7	SSW2.9	Diurnal Average	
	W20	W17	W18	W21	W21	WSW19	W26	WSW23	W26	WSW29	W29	WSW31	W27	WSW26	W32	W35	WNW28	WNW25	W29	W28	W20	W21	W18	W20	Diurnal Maximum	

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 10 km/h on Aug 2 17:00

Minimum Value: 1 km/h on Aug 28 20:00

Percentiles: $P_1 = 1$ $P_{10} = 2$ $Q_1 = 2$ Median = 3 $Q_3 = 5$ $P_{90} = 6$ $P_{99} = 8$

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

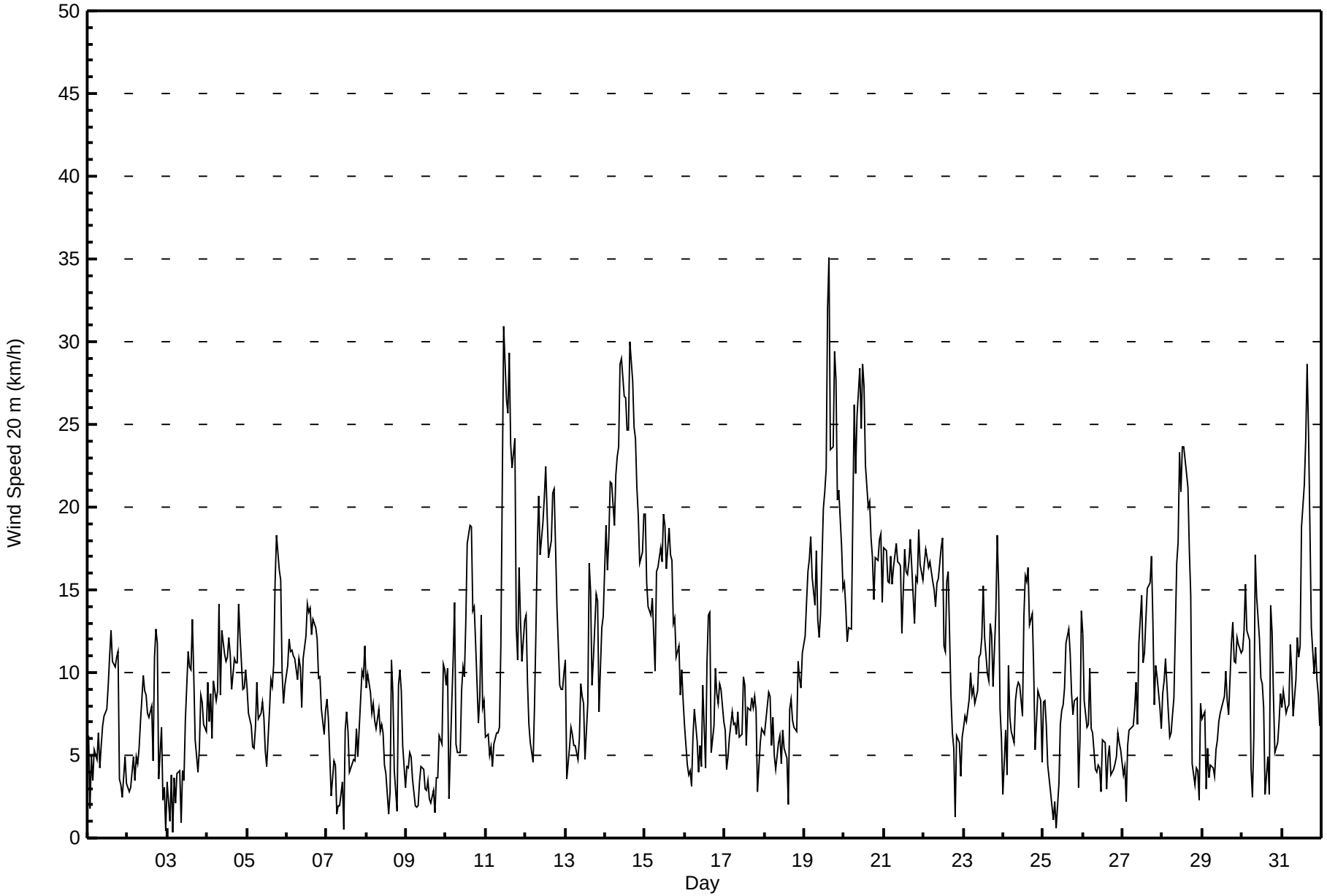
Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Aug	3	3	1	2	1	2	2	3	3	3	3	4	4	5	5	5	4	4	4	2	2	1	2	2	5
2-Aug	2	2	2	1	1	2	2	2	2	4	3	3	3	4	4	3	10	5	4	2	2	3	1	1	10
3-Aug	2	1	2	1	2	2	2	2	1	2	3	3	5	5	5	6	4	3	2	3	3	4	2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

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed 20 m (WS20m) - km/h

Mannix - August 2015



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	157	21.10	21.10
6 - 11	330	44.35	65.46
12 - 19	193	25.94	91.40
20 - 28	54	7.26	98.66
29 - 38	10	1.34	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

Mannix - August 2015

Wind Speed Ranges (km/h)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 5	8	2	7	9	9	9	12	17	16	15	13	10	9	6	10	5	157
6 - 11	11	8	3	0	13	37	53	70	17	20	26	23	13	14	10	12	330
12 - 19	6	1	0	1	3	8	17	22	2	4	15	32	45	22	4	11	193
20 - 28	1	0	0	0	0	0	0	0	0	0	2	21	26	4	0	0	54
29 - 38	0	0	0	0	0	0	0	0	0	0	0	4	6	0	0	0	10
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	26	11	10	10	25	54	82	109	35	39	56	90	99	46	24	28	744

Total Number of Valid Hours: 744

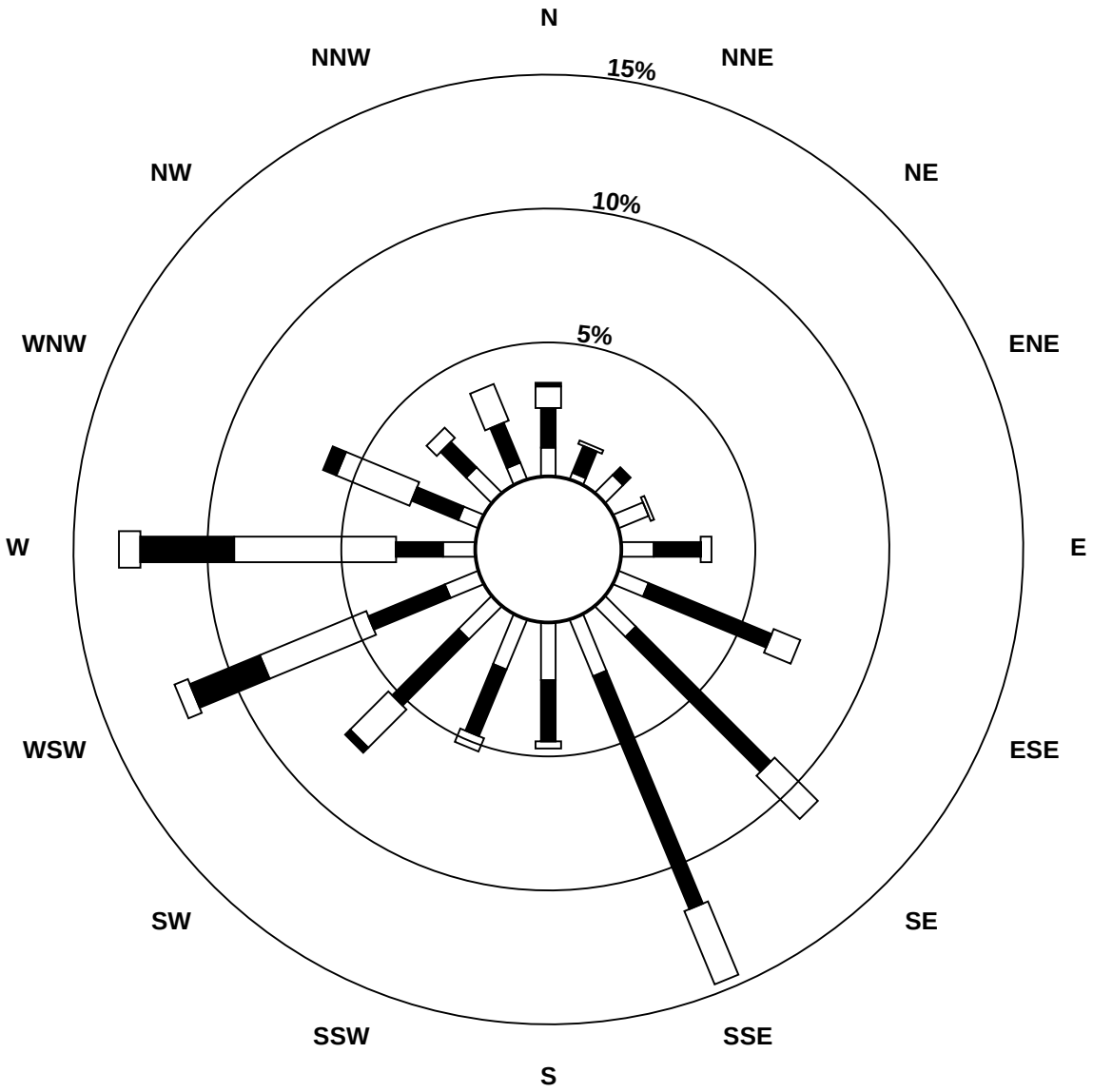
Total Number of Hours: 744

Wood Buffalo Environmental Association

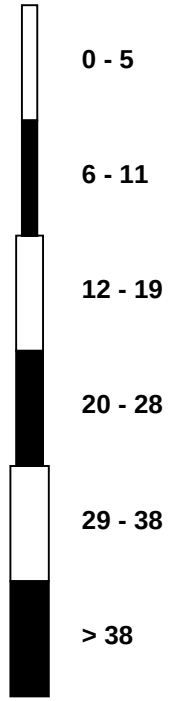
Wind Rose Aug 2015

Wind Speed 20 m (WS20m) - km/h

Mannix (AMS 5)



Classes (km/h)



Total Number of Valid Hours: 744

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed 45 m (WS45m) - km/h

Mannix - August 2015

Maximum Speed: 40 km/h on Aug 19 16:00

Maximum Daily Speed Average: 27.0 km/h on Aug 14

Minimum Speed Value: 0 km/h on Aug 7 11:00

Minimum Daily Speed Average: 2.5 km/h on Aug 26

Maximum Diurnal Speed Average: 9.6 km/h at hour 16

Minimum Diurnal Speed Average: 3.1 km/h at hour 3

Monthly Average Velocity: 5.8 km/h 227.2 deg

Percentiles: $P_1 = 1$ $P_{10} = 6$ $Q_1 = 9$ Median = 14 $Q_3 = 20$ $P_{90} = 25$ $P_{99} = 34$

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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	NNW11	NNE5	WNW5	W4	W9	NNW10	N9	NNW8	NNW10	WNW8	WNW9	NW11	NW13	NW15	NNW19	NW16	NW15	WNW15	NW17	E5	SE5	E3	NW10	NNW5	NW8.1	NNW19
2-Aug	NW3	ESE1	S1	S9	SSW6	S5	S6	SE6	SE9	SE13	SE11	ESE10	ESE9	SE10	ESE10	ESE6	WSW14	N20	NE16	SE5	WSW9	W4	ENE4	ENE1	SE3.2	N20
3-Aug	NNE6	ENE3	SSW4	SE3	S9	SSE6	SE6	ESE5	E1	E5	E4	SSE10	SSE16	SE14	SSE15	SSE20	SSE14	SSE8	ESE5	E8	E12	SE12	SE11	ESE10	SE7.3	SSE20
4-Aug	SE14	ESE11	E12	ESE8	ESE14	E11	ESE13	ESE19	ESE13	E15	E14	E13	E14	ESE16	ESE15	ESE13	ESE15	SE15	ESE14	SE20	SE17	SE12	ESE12	ESE14	ESE13.6	SE20
5-Aug	ESE12	SE12	E9	ENE7	ENE7	NE10	E11	ESE10	ESE10	SE11	SSE10	SSE8	ESE6	SE10	SE13	ESE12	ESE14	SE21	SSE26	SSE23	SE22	SE14	ESE11	SE13	SE11.3	SSE26
6-Aug	ESE14	ESE16	ESE16	ESE15	ESE14	ESE14	ESE12	ESE14	ESE14	ESE11	E14	E16	ESE18	ESE17	ESE18	SE15	ESE17	ESE17	ESE16	SE13	ESE13	ESE11	ESE9	E9	ESE14.2	ESE18
7-Aug	ESE11	ESE9	ESE7	E4	ENE6	E6	E2	WSW2	SSE2	WSW4	W0	E8	NE9	E8	ESE6	SE5	SSE7	SSE7	SSE10	SSE9	SSE13	SSE18	SSE15	SE17	SE6.2	SSE18
8-Aug	SE13	SSE16	SE13	SE11	SE12	SSE11	SSE9	SE9	SE8	SE8	SE8	SE6	SSE5	S2	NW4	SSE19	SSW15	SSW8	SSW2	E13	SE14	SE13	SSE11	SE7	SSE8.7	SSE19
9-Aug	ENE6	ENE6	E7	ESE7	SE6	SE5	SSE2	S2	SE4	ESE5	E5	SSE5	S5	SE5	SSE4	ESE3	SSE4	SSE2	ESE4	SE6	SSE12	SE10	SE17	SSE17	SE5.4	SSE17
10-Aug	SW14	WNW15	NE4	SSW13	SW18	W17	WSW7	SSW8	SSW7	SW13	WSW13	SW12	SW18	SW23	SW25	W21	WSW18	SW19	SW17	SSW15	SSW22	SW26	SSW20	SSW20	SW14.3	SW26
11-Aug	SSW13	S16	S10	SSE11	S8	S9	SSE12	S14	SSW12	SW16	SW27	WSW39	WSW33	WSW32	WSW36	WSW29	WSW28	WSW29	WSW17	SW17	SW24	SW22	SW20	WSW19	SW18.5	WSW39
12-Aug	WSW19	WSW15	WSW13	SSW9	SW10	WSW12	WSW17	WSW21	WSW25	WSW21	WSW23	WSW24	W25	W23	WSW20	WSW22	W23	W24	W20	WSW19	SW17	WSW17	WSW17	WSW17	WSW18.5	W25
13-Aug	WSW18	SW6	SSE9	S10	SSW14	S10	SSE9	S10	SSE8	SSE14	SSE12	SSE11	SSE6	WNW12	W20	SW22	SW17	SW17	WSW20	WSW22	SW16	SW24	SW26	SW24	SW12.0	SW26
14-Aug	W25	W21	W24	W27	W27	WSW24	W26	WSW26	WSW28	WSW34	W33	WSW31	W31	W28	W29	W35	WNW34	WNW31	WNW30	WNW26	WNW27	W21	W19	W21	W27.0	W35
15-Aug	W23	W18	WNW21	WNW21	NW23	NNW20	NNW17	NNW25	NNW26	NNW26	NNW25	N28	N26	N23	NNW27	NNW25	NNW25	NNW21	NNW20	NW18	NNW19	NNW15	NNW17	N12	NNW20.2	N28
16-Aug	N10	N5	WNW4	NNW7	NW4	WSW8	WSW10	WSW7	WSW5	W7	NW5	NW14	NW6	WNW13	W15	W16	NW7	WNW9	W12	W11	WSW12	WSW15	WSW16	WSW13	W8.2	WNW16
17-Aug	WSW12	SW8	SW8	SW10	SSW10	SSE13	SSE10	SSE8	SSE10	SE8	ESE7	S16	SSW14	SW9	SSW12	S11	SSW14	SW10	SSW16	SSW17	SSW6	SSE11	S13	S15	S9.8	SSW17
18-Aug	SW11	NW12	N16	N15	NNW10	NW13	NW8	NNW6	NNW8	NW8	NW6	WSW8	W6	WSW6	SSW4	SSE11	S13	SSE10	SSE11	S13	SSE19	SSE20	SSE21	SSE23	SSW3.3	SSE23
19-Aug	SSE22	SSE24	SSE27	SSE29	SSE28	SSE24	SSE22	SSE26	S23	SSW21	SW20	WSW25	WSW25	W26	W36	W40	WSW30	W30	W36	W33	W24	W24	W21	WSW19	SW17.1	W40
20-Aug	WSW21	WSW19	WSW16	WSW19	WSW18	WSW25	W30	W26	W29	W32	W28	W32	W31	W28	WNW26	WNW27	WNW23	WNW24	WNW22	WNW23	W20	W22	W22	W18	W23.5	W32
21-Aug	W21	W21	W19	W20	W21	W19	W19	W19	WNW20	WNW23	WNW23	NW19	WNW25	WNW23	NNW25	WNW22	WNW25	NW24	WNW20	WNW22	WNW21	WNW27	WNW24	WNW20	WNW20.6	WNW27
22-Aug	W20	W20	W20	W19	W20	W19	W17	W16	W17	W18	W21	W21	WNW15	WNW14	WNW22	WNW23	NNW13	N9	N8	NNE2	SE10	S15	SSE11	SSE14	W11.7	WNW23
23-Aug	SSE13	SSE13	SSE13	SSE14	SSE15	SSE15	SSE15	SSE12	SE13	SSE14	SSE15	SSE18	SSE22	SSE17	SSE15	SSE13	SE17	SSE18	SE15	SE21	SSE27	SSE23	NNW12	NE10	SSE14.3	SSE27
24-Aug	NE4	WSW11	W6	SE16	SSE14	S13	S14	S13	S15	SSW15	SW12	WSW9	WSW16	WSW19	WNW19	W19	W15	W15	W12	W8	W12	W15	WNW13	NNW9	WSW8.8	WSW19
25-Aug	NNE14	NNE14	NNE9	NW5	NNW5	N4	ENE1	SW2	NW1	NNW4	WNW8	NW11	NW12	NNW14	N18	N17	N16	N14	N12	NNE12	NNE14	N6	NNW10	N19	N9.3	N19
26-Aug	NNE18	N13	N12	NE10	NNE15	NNE11	NE9	ENE6	NE4	NW6	NW6	NW3	WSW7	WSW6	W4	W6	W7	S6	S9	SSW8	SW9	SW11	SW12	WSW8	NW2.5	NNE18
27-Aug	S7	S8	SSE6	S13	S14	SSE14	SSE11	SSE12	SSE12	SE8	SSE15	SE18	SSE15	SSW19	SSW21	SSW26	SSW26	SW23	WSW18	SSW17	SSW24	SSW22	S16	SW14	S13.9	SSW26
28-Aug	SW18	WSW17	SW19	SW16	SW14	SW13	WSW12	SW13	WSW21	WSW23	WSW30	WSW26	WSW29	WSW30	WSW26	WSW25	WSW21	W17	WNW8	N4	ENE8	NE8	NNE4	NNE13	WSW14.3	WSW30
29-Aug	NW10	NW14	WSW1	SSE9	S7	WNW7	SSW8	SW5	S8	SE7	SE8	SE9	SE10	SSE12	SSE13	SSE12	SE9	SE16	SE18	SE15	SE15	SE18	SE16	SE16	SE7.7	SE18
30-Aug	ESE15	SE18	SE22	SE19	SE18	S9	S6	SW9	W19	W16	W13	W11	WNW12	WNW9	SW4	SW7	SE3	SSE22	SE19	SSE15	S12	SSW16	SSE14	SSE15	S7.5	SE22
31-Aug	SSE14	SSE14	SE13	SSE12	SSE13	SSE19	SSE16	SSE12	SSE14	SSE17	SSE15	SSW19	SW26	SW29	SW31	WSW37	WSW32	SW26	SW21	SSW21	SW21	SW22	SSW20	SSW16	SSW16.2	WSW37
	SW4.3	SW3.8	SSW3.1	S5.0	SSW5.4	SSW4.6	SSW4.8	SSW4.9	SW5.1	SW5.9	WSW6.2	WSW6.9	WSW7.7	WSW8.5	WSW9.0	WSW9.6	WSW8.4	WSW7.5	WSW5.3	SW6.0	SSW7.1	SSW8.1	SW6.4	SSW5.1	Diurnal Average	
	W25	SSE24	SSE27	SSE29	SSE28	WSW25	W30	WSW26	W29	WSW34	W33	WSW39	WSW33	WSW32	W36	W40	WNW34	WNW31	W36	W33	SSE27	WNW27	SW26	SW24	Diurnal Maximum	

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 12 km/h on Aug 8 16:00

Minimum Value: 1 km/h on Aug 24 22:00

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

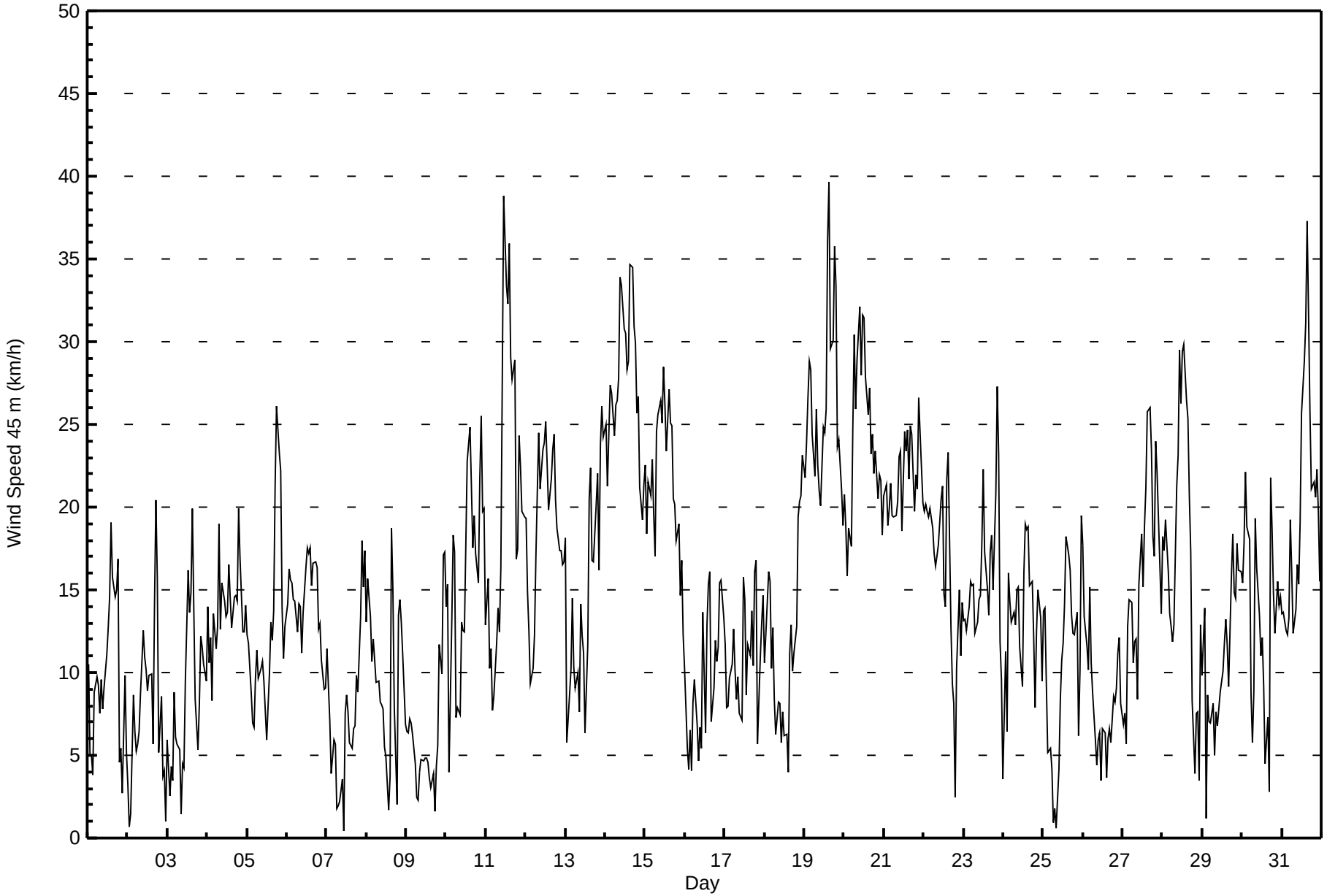
Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Aug	4	4	2	2	2	3	2	3	2	3	3	4	4	5	4	4	4	3	3	3	2	2	3	4	5
2-Aug	3	1	1	3	2	2	1	2	2	3	3	3	3	4	4	3	10	5	5	2	2	3	2	1	10
3-Aug	3	1	1	1	3	2	2	2	2	2	3	3	4	5	6	5	4	3	2	3	2	4	3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

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed 45 m (WS45m) - km/h

Mannix - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Wind Speed 45 m (WS45m) - km/h

Mannix - August 2015

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	73	9.81	9.81
6 - 11	193	25.94	35.75
12 - 19	290	38.98	74.73
20 - 28	154	20.70	95.43
29 - 38	32	4.30	99.73
> 38	2	0.27	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Wind Speed 45 m (WS45m) - km/h

Mannix - August 2015

Wind Speed Ranges (km/h)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 5	3	3	3	4	8	6	8	7	5	3	3	4	4	2	7	3	73
6 - 11	5	3	6	7	8	21	26	29	18	10	11	13	8	7	10	11	193
12 - 19	11	7	1	0	8	32	36	55	14	18	22	30	26	10	12	8	290
20 - 28	4	0	0	0	0	0	5	17	1	11	16	25	37	25	2	11	154
29 - 38	0	0	0	0	0	0	0	1	0	0	2	13	13	3	0	0	32
> 38	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	2
Totals	23	13	10	11	24	59	75	109	38	42	54	86	89	47	31	33	744

Total Number of Valid Hours: 744

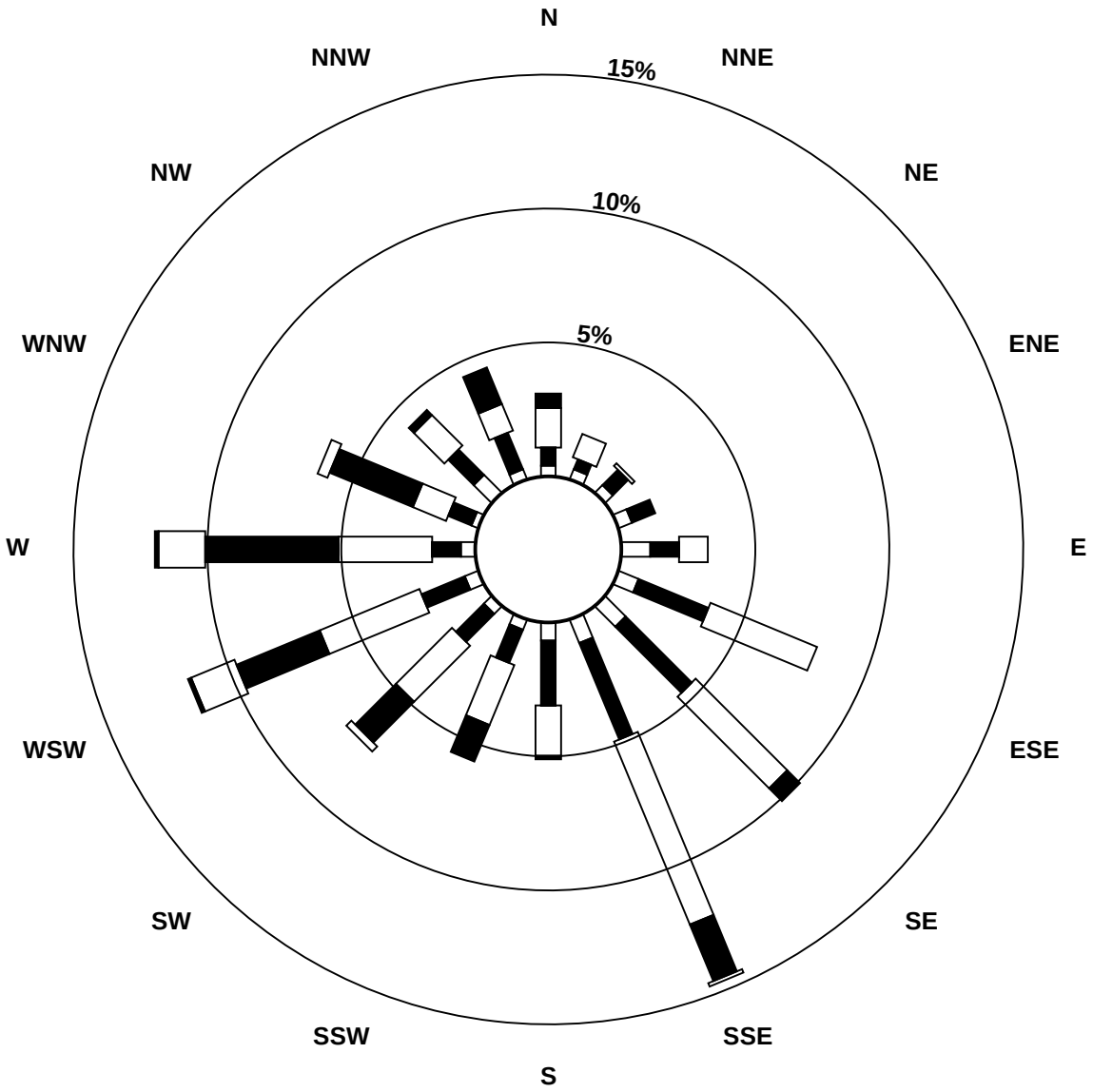
Total Number of Hours: 744

Wood Buffalo Environmental Association

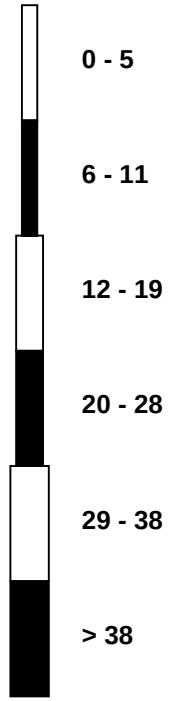
Wind Rose Aug 2015

Wind Speed 45 m (WS45m) - km/h

Mannix (AMS 5)



Classes (km/h)



Total Number of Valid Hours: 744

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed 75 m (WS75m) - km/h

Mannix - August 2015

Maximum Speed: 42 km/h on Aug 11 12:00

Maximum Daily Speed Average: 29.4 km/h on Aug 14

Minimum Speed Value: 0 km/h on Aug 7 11:00

Minimum Daily Speed Average: 3.0 km/h on Aug 26

Maximum Diurnal Speed Average: 10.4 km/h at hour 16

Minimum Diurnal Speed Average: 4.0 km/h at hour 3

Monthly Average Velocity: 6.9 km/h 230.6 deg

Percentiles: $P_1 = 2$ $P_{10} = 6$ $Q_1 = 9$ Median = 15 $Q_3 = 23$ $P_{90} = 28$ $P_{99} = 36$

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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	NNW12	NNE7	NW1	WSW1	W5	N12	N11	NNW8	NNW10	WNW8	WNW9	NW11	NW13	NW15	NNW20	NW16	NW15	WNW15	NW18	E4	SE6	SE3	NW10	NNW6	NW8.2	NNW20
2-Aug	NNW3	E2	ESE2	S8	SSW8	SSW4	SSE6	SE6	SSE9	SSE13	SE10	SE9	ESE8	SE10	SE10	E6	WSW14	N25	NE20	ESE5	SW7	WSW4	ENE3	ESE1	SE3.2	N25
3-Aug	NNE7	NE5	SE3	SE5	SSE8	SSE7	SE6	ESE5	E2	E5	E4	SSE10	SSE16	SE13	SSE16	SSE21	SSE14	SE8	ESE5	E7	E11	SE11	SE10	SE7	SE7.3	SSE21
4-Aug	SE10	ESE8	E11	ESE8	ESE11	ESE12	ESE10	ESE15	ESE10	E14	E13	E12	E13	ESE13	ESE12	ESE11	ESE11	SE11	ESE12	SE20	SE18	SE10	ESE9	ESE10	ESE11.6	SE20
5-Aug	ESE9	SE13	E9	ENE7	ENE7	ENE12	E12	ESE8	ESE9	SE10	SSE10	SSE9	ESE6	SE10	SE13	ESE10	ESE11	SE18	SSE29	SSE26	SE25	SE12	ESE9	SE11	SE11.2	SSE29
6-Aug	ESE12	ESE13	ESE13	ESE13	ESE11	ESE12	SE10	ESE11	ESE10	ESE9	ESE11	ESE13	ESE15	ESE14	ESE15	SE11	ESE13	ESE12	ESE12	SE10	ESE10	ESE8	ESE7	ESE8	ESE11.3	ESE15
7-Aug	ESE9	ESE7	ESE6	E4	ENE6	E5	E2	WSW2	SSE2	WSW3	W0	E7	ENE9	E7	ESE6	SE5	SSE7	SSE7	SSE10	SSE10	SE15	SSE23	SSE20	SE21	SE6.8	SSE23
8-Aug	SE16	SSE20	SE17	SE10	SE15	SE14	SE11	SE8	SSE8	SE7	SE8	SE6	S5	S2	NW4	SSE21	SSW18	SSW9	SW3	E13	ESE11	SE12	SSE14	SE8	SSE9.6	SSE21
9-Aug	ENE6	ENE7	E5	ESE5	SE5	SE5	SE4	SSE2	SE4	ESE4	E5	SSE5	SSE5	SE5	SSE4	ESE3	SSE4	SSE2	ESE4	SE6	SE14	SE9	SE20	SSE22	SE5.9	SSE22
10-Aug	SW17	NW18	NE5	SSW14	SW25	W20	WSW10	SSW8	SW8	SW14	SW13	SW14	SW19	SW25	SW27	W22	WSW19	SW21	SW21	SSW18	SSW25	SW32	SSW26	SSW27	SW16.7	SW32
11-Aug	SW18	SSW19	SSW13	S13	SSW9	SW9	S12	S17	SSW15	SW17	SW30	WSW42	WSW37	WSW35	WSW39	WSW32	WSW30	WSW32	WSW19	SW22	SW29	SW29	WSW26	WSW24	SW22.5	WSW42
12-Aug	WSW25	WSW22	WSW19	SW13	SW15	WSW16	WSW21	WSW23	WSW26	WSW23	WSW25	WSW25	W26	W23	WSW21	WSW23	W25	W26	W22	WSW22	WSW23	WSW26	WSW25	WSW23	WSW22.1	W26
13-Aug	WSW26	SW12	S7	SSW8	SW14	SSW12	SSW10	SSW13	SSE8	SSE16	SSE14	SSE12	SSE7	WNW12	W22	SW26	SW22	SW20	WSW24	WSW27	SW22	SW32	SW36	WSW32	SW15.6	SW36
14-Aug	W30	W26	W30	W32	W30	WSW29	W29	WSW29	WSW30	WSW36	W35	WSW33	W32	W29	W30	W36	WNW36	WNW32	WNW32	WNW27	WNW29	W23	W21	W23	W29.4	WSW36
15-Aug	W24	WNW20	NW23	NW22	NW25	NNW22	NNW19	NNW27	NNW28	NNW29	NNW28	N32	N29	N25	NNW29	NNW27	NNW27	NNW22	NNW23	NW19	NNW21	NNW18	NNW20	N14	NNW22.2	N32
16-Aug	N12	N5	NW4	N7	NW5	W10	W11	W7	WSW5	W7	NW5	NW14	NW8	WNW13	W16	W16	NW7	WNW9	W13	W13	W15	W20	W21	WSW22	WNW9.7	WSW22
17-Aug	WSW20	WSW15	WSW13	SW12	SSW11	S11	S12	SSE9	SSE10	SE8	SE6	S17	SSW15	SW9	SSW12	S12	SSW15	SW11	SSW18	SSW22	SSW9	SSE11	S12	S16	SSW11.1	SSW22
18-Aug	SW10	NW15	N22	N19	NNW14	NW15	NNW11	NNW7	NNW8	NW8	NW6	WSW8	W6	WSW6	SSW5	SSE12	S13	SSE10	SSE13	S15	SSE25	S25	S25	S29	SSW3.2	S29
19-Aug	SSE27	SSE30	SSE34	SSE35	SSE35	SSE31	SSE27	SSE30	S25	S23	SW22	WSW27	WSW26	W28	W38	W42	WSW33	W33	W38	W35	W25	W26	W23	WSW22	SW19.4	W42
20-Aug	WSW25	W23	W19	WSW23	WSW22	W28	W33	W28	W31	W34	W29	W32	W32	W30	WNW27	WNW29	WNW24	WNW26	WNW24	WNW25	W23	W25	W24	W22	W25.8	W34
21-Aug	W24	W25	W23	W24	W25	W23	W22	W20	WNW21	WNW24	WNW24	NW20	WNW26	WNW25	NNW27	WNW23	WNW26	NW26	NW22	WNW24	WNW24	WNW29	WNW27	WNW23	WNW22.6	WNW29
22-Aug	WNW21	W22	W22	W22	W23	W21	W19	W18	W18	W19	W21	WNW22	WNW15	WNW15	WNW23	WNW24	NNW13	N10	N10	NNE3	SE10	SSE18	S18	S20	W12.6	WNW24
23-Aug	SSE19	SSE20	SSE20	SSE21	SSE22	SSE24	SSE23	SSE18	SSE16	SSE15	SSE15	SSE19	SSE23	SSE18	SSE16	SSE14	SE18	SSE21	SE18	SE24	SSE35	SSE30	N13	NE11	SSE18.0	SSE35
24-Aug	SE6	SW15	WNW9	SSE17	SSE18	S17	S19	S14	S16	SSW16	SW12	WSW10	WSW17	WSW20	WNW19	W19	W16	W16	W14	W12	W14	WNW16	NW17	N14	WSW9.5	WSW20
25-Aug	NNE17	NE14	NE10	N5	NNW8	NNW8	N5	N3	NNW2	NNW5	NW8	NNW11	NW12	NNW15	N20	NNE19	N17	N15	N15	NNE16	NNE19	NNE8	N12	NNE23	N10.9	NNE23
26-Aug	NNE21	N16	N15	NE14	NNE18	NE15	NE12	ENE9	NE5	NW6	NW6	NW3	WSW6	WSW6	WSW4	W6	W6	S6	S10	SSW9	SW10	WSW12	WSW15	WSW13	NNW3.0	NNE21
27-Aug	SSW7	SSW5	S7	S6	S10	S14	SSE16	SSE17	SSE13	SSE8	SSE16	SE18	S16	SSW20	SSW23	SSW27	SSW29	SW26	WSW21	SW20	SSW30	SSW28	SSW20	SW19	SSW15.5	SSW30
28-Aug	SW25	WSW24	SW26	SW23	SW20	SW18	WSW15	SW16	WSW24	WSW25	WSW31	WSW28	WSW32	WSW32	WSW28	WSW27	WSW22	WSW18	WNW9	NNW4	NE8	NE10	N5	NNE17	WSW16.8	WSW32
29-Aug	NNW13	NW17	N2	SE8	SSE7	WNW6	S9	SW7	S8	SE7	SE7	SE8	SE9	SSE12	SSE13	SSE12	SE9	SE15	SE17	SE13	SE17	SE14	SE17	SE7.2	SE17
30-Aug	ESE13	SE16	SE24	SE17	SE20	S12	S10	SSW11	W20	W16	W14	WNW11	WNW13	WNW9	SW6	SW8	SSE3	SSE27	SE16	SSE21	SSW18	SW21	S17	SSE19	S8.9	SSE27
31-Aug	SSE19	SSE19	SSE18	SSE17	SSE20	SSE26	SSE21	S18	SSE19	SSE17	SSE16	SSW21	SW28	SW31	SW34	WSW41	WSW34	SW29	SW25	SSW26	SW27	SW28	SSW25	SW21	SSW20.3	WSW41
	SW6.1	SW5.3	SSW4.0	SSW5.5	SSW6.3	SW5.7	SSW5.8	SSW5.7	SW5.9	SW6.4	WSW6.7	WSW7.6	WSW8.3	WSW9.2	WSW9.6	WSW10.4	WSW9.3	WSW8.3	WSW6.2	SW7.2	SSW8.4	SW9.7	SW8.2	SW6.7	Diurnal Average	
	W30	SSE30	SSE34	SSE35	SSE35	SSE31	W33	SSE30	W31	WSW36	W35	WSW42	WSW37	WSW35	WSW39	W42	WNW36	W33	W38	W35	SSE35	SW32	SW36	WSW32	Diurnal Maximum	

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 14 km/h on Aug 8 16:00

Minimum Value: 1 km/h on Aug 27 06:00

Percentiles: $P_1 = 1$ $P_{10} = 2$ $Q_1 = 2$ Median = 3 $Q_3 = 4$ $P_{90} = 6$ $P_{99} = 8$

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

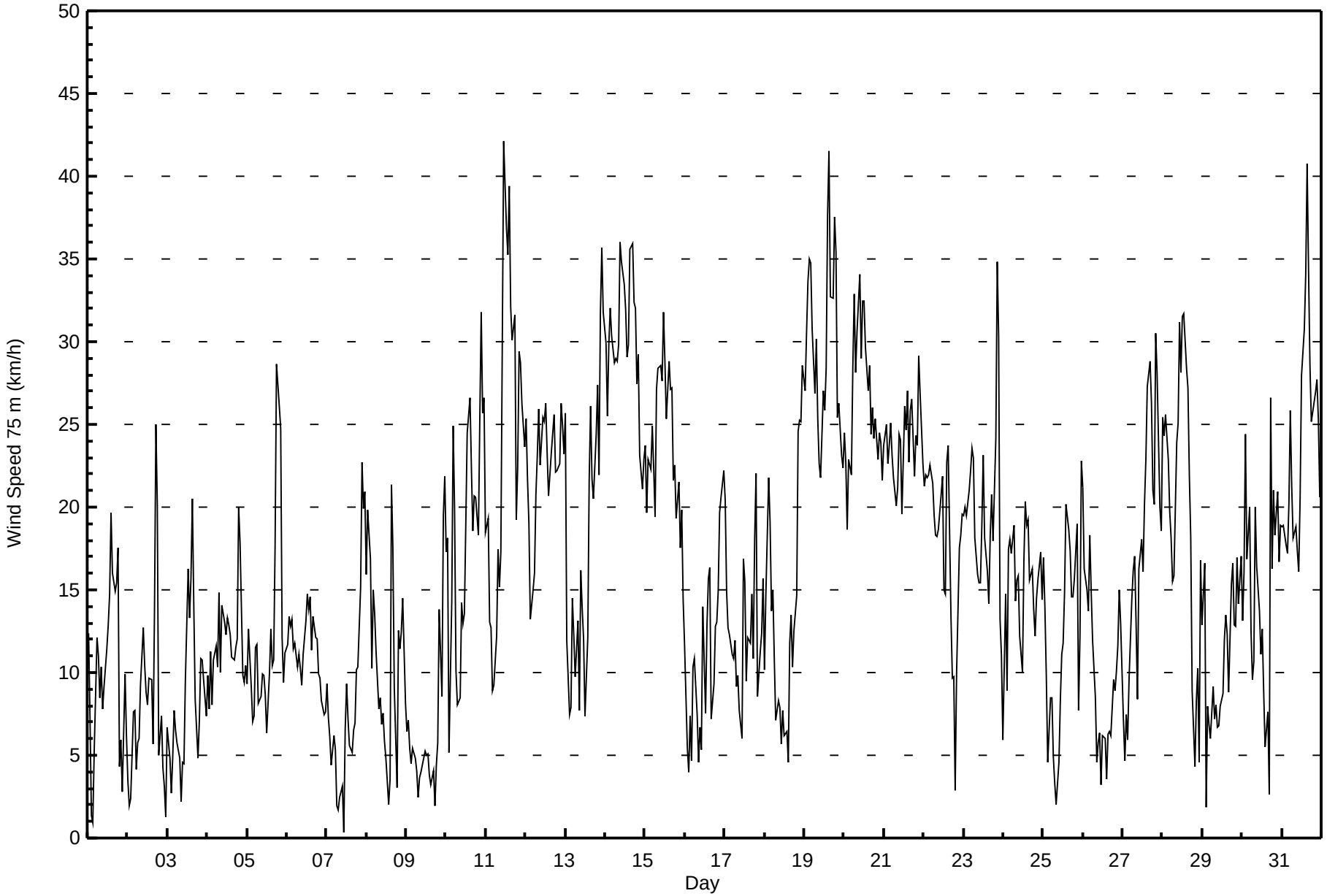
Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Aug	4	4	2	1	2	3	2	3	2	3	3	3	4	4	4	4	3	3	3	3	2	2	3	3	4
2-Aug	2	1	1	3	3	1	1	2	2	3	3	3	3	4	4	3	10	5	7	3	3	3	2	1	10
3-Aug	3	2	2	2	3	2	3	2	2	2	2	3	4	5	6	5	4	3	3	2	3	5	4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

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed 75 m (WS75m) - km/h

Mannix - August 2015



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	71	9.54	9.54
6 - 11	186	25.00	34.54
12 - 19	220	29.57	64.11
20 - 28	195	26.21	90.32
29 - 38	68	9.14	99.46
> 38	4	0.54	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Wind Speed 75 m (WS75m) - km/h

Mannix - August 2015

Wind Speed Ranges (km/h)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 5	6	1	3	1	10	9	9	8	2	3	1	6	2	0	6	4	71
6 - 11	4	3	4	7	7	33	37	20	11	12	8	7	7	8	9	9	186
12 - 19	12	6	4	1	6	18	25	39	19	14	17	13	17	9	13	7	220
20 - 28	4	2	1	0	0	0	7	23	5	12	22	38	41	22	6	12	195
29 - 38	2	0	0	0	0	0	0	9	1	2	9	16	21	6	0	2	68
> 38	0	0	0	0	0	0	0	0	0	0	0	3	1	0	0	0	4
Totals	28	12	12	9	23	60	78	99	38	43	57	83	89	45	34	34	744

Total Number of Valid Hours: 744

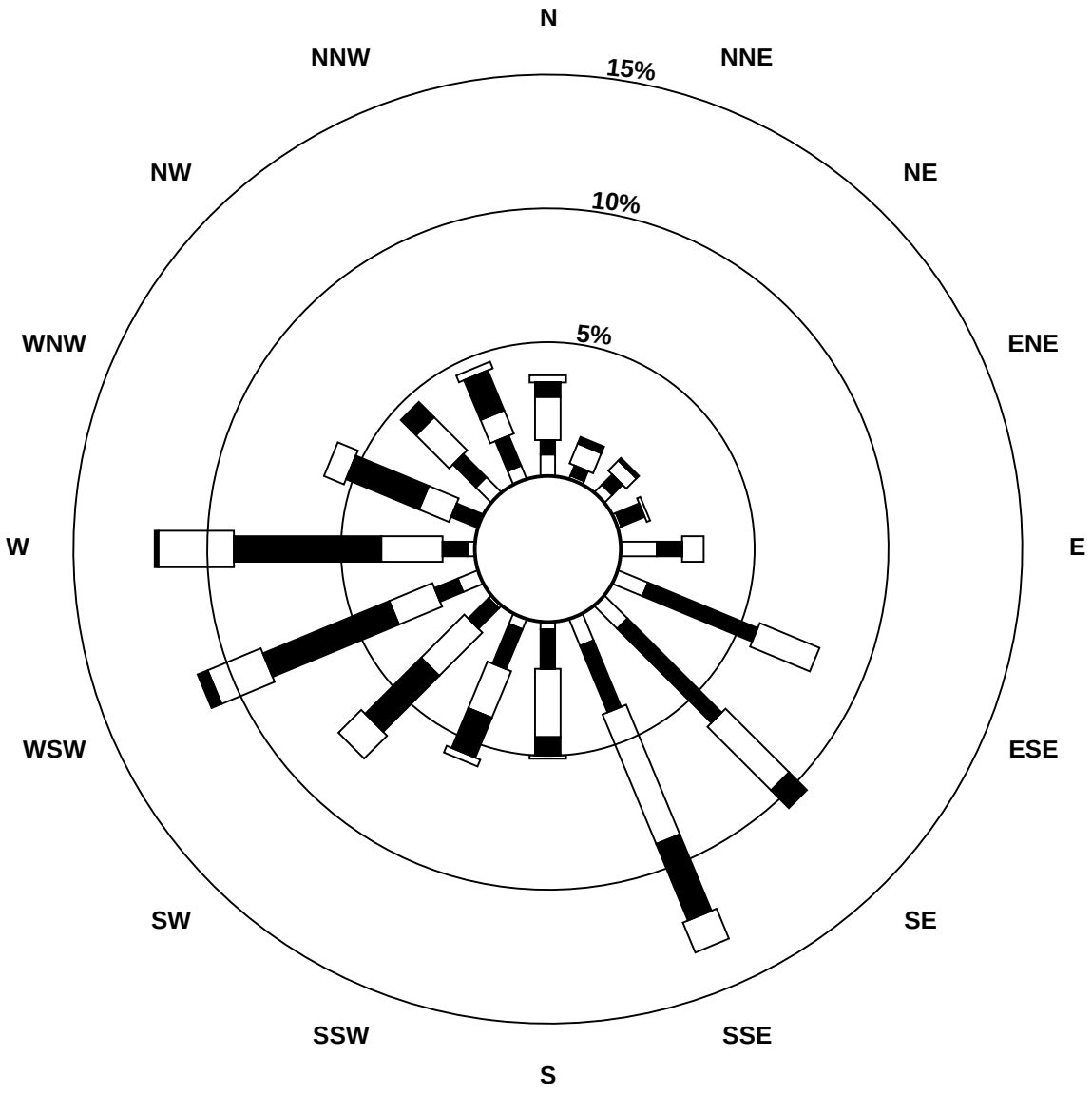
Total Number of Hours: 744

Wood Buffalo Environmental Association

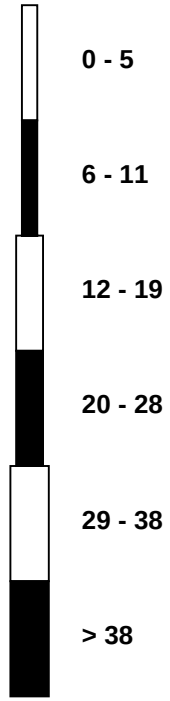
Wind Rose Aug 2015

Wind Speed 75 m (WS75m) - km/h

Mannix (AMS 5)



Classes (km/h)



Total Number of Valid Hours: 744

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed 90 m (WS90m) - km/h

Mannix - August 2015

Maximum Speed: 43 km/h on Aug 11 12:00

Maximum Daily Speed Average: 29.7 km/h on Aug 14

Minimum Speed Value: 0 km/h on Aug 7 11:00

Minimum Daily Speed Average: 3.3 km/h on Aug 18

Maximum Diurnal Speed Average: 10.1 km/h at hour 16

Minimum Diurnal Speed Average: 4.2 km/h at hour 3

Monthly Average Velocity: 6.9 km/h 222.2 deg

Percentiles: $P_1 = 2$ $P_{10} = 6$ $Q_1 = 10$ Median = 17 $Q_3 = 24$ $P_{90} = 29$ $P_{99} = 38$

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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	NNW13	NNE8	N1	WSW1	WSW4	NNW13	N12	NNW9	NNW11	WNW8	WNW9	NW11	NW13	WNW15	NW20	NW16	NW15	WNW15	NW18	ENE5	SE6	SE4	NW9	NNW7	NW8.3	NNW20
2-Aug	NNW5	ENE2	ESE2	SSE7	SSW7	S4	SE5	SE7	SE10	SE13	SE11	ESE10	ESE9	SE10	ESE11	E6	WSW14	N27	NE23	ESE7	SW7	WSW4	ENE3	SE1	ESE3.6	N27
3-Aug	NNE6	NNE6	ESE3	ESE6	SE7	SE7	ESE7	ESE6	E2	E5	E5	SSE10	SSE17	SE15	SSE16	SSE21	SSE15	SE9	ESE6	E10	E15	ESE14	ESE12	ESE12	SE8.4	SSE21
4-Aug	ESE16	ESE14	E16	E11	E18	E15	ESE17	ESE27	ESE16	E18	E17	E15	E16	ESE19	ESE19	E17	ESE19	ESE17	ESE18	SE25	SE20	ESE15	ESE16	ESE19	ESE17.2	ESE27
5-Aug	ESE15	SE14	ENE11	ENE8	ENE9	ENE12	E14	E12	ESE12	SE12	SE11	SSE9	ESE7	ESE12	SE14	ESE14	ESE18	ESE22	SE31	SE28	SE28	ESE17	ESE14	ESE16	ESE13.8	SE31
6-Aug	ESE18	ESE21	ESE21	ESE21	ESE18	ESE18	ESE15	ESE17	ESE16	ESE13	E15	E18	E20	ESE19	E20	ESE16	ESE19	ESE20	ESE19	ESE14	ESE15	ESE13	ESE11	ESE11	ESE16.9	ESE21
7-Aug	ESE13	ESE10	ESE8	E5	ENE6	E6	E2	WSW2	SSE3	WSW3	WSW0	E7	NE10	E8	ESE6	ESE6	SSE7	SSE7	SSE11	SSE11	SE16	SSE25	SSE22	SE23	SE7.5	SSE25
8-Aug	SE18	SE22	SE19	SE10	SE17	SE15	SE13	ESE11	SE9	SE9	SE8	SE6	SSE5	S2	NW4	SSE22	S18	SSW9	SW4	E17	ESE18	SE16	SE16	SE11	SE10.9	SSE22
9-Aug	E7	ENE7	E7	E7	ESE7	ESE6	SE5	SSE3	ESE4	ESE4	E5	SSE5	SSE5	SE5	SSE4	ESE4	SE4	SE2	ESE5	SE7	SE15	ESE13	SE22	SE24	SE6.9	SE24
10-Aug	SW18	WNW19	NNE6	S14	SW27	W21	WSW12	SSW8	SSW9	SW14	SW13	SW14	SW19	SW25	SW27	WSW22	SW19	SW21	SW22	SSW20	SSW27	SW34	SSW28	SSW30	SW17.7	SW34
11-Aug	SW22	SSW22	SSW16	SSW14	SSW11	SW11	S12	SSW18	SSW17	SW18	SW30	WSW43	WSW37	WSW36	WSW40	WSW33	WSW31	WSW32	WSW20	SW24	SW31	SW31	SW29	WSW25	SW24.1	WSW43
12-Aug	WSW28	WSW25	WSW22	SW15	SW17	WSW18	WSW22	WSW23	WSW26	WSW23	WSW25	WSW25	WSW26	W23	WSW21	WSW24	WSW24	W25	WSW22	WSW23	WSW24	WSW29	WSW27	WSW26	WSW23.3	WSW29
13-Aug	WSW27	WSW16	SSW8	SSW8	SW15	SSW13	SSW11	SSW15	SSE8	SSE17	SSE15	SSE13	SSE8	WNW12	W22	SW29	SSW24	SW22	WSW26	SW30	SW24	SW34	SW38	SW35	SW17.0	SW38
14-Aug	WSW31	W27	WSW32	WSW33	WSW31	WSW30	WSW29	WSW29	WSW30	WSW36	WSW34	WSW33	W31	W29	W30	W35	W35	W32	W32	W28	WNW30	W24	W22	W23	W29.7	WSW36
15-Aug	W24	W20	WNW23	WNW23	NW26	NNW23	NNW20	NNW28	NNW29	NNW29	NNW29	N33	N30	N26	NNW30	NNW28	NNW28	NW22	NNW23	NW20	NW22	NNW19	NNW21	N15	NNW23.1	N33
16-Aug	N13	NNW6	NW4	NNW8	NW5	W11	W11	W8	WSW5	W7	WNW6	NW14	NW8	WNW13	W16	W16	NW8	WNW9	W13	W14	W16	W19	W19	WSW25	W10.1	WSW25
17-Aug	WSW25	WSW19	WSW16	SW14	SW12	SSW10	S11	SSE10	SSE10	SE8	SE7	S17	SSW16	SW10	SSW12	S12	S16	SW11	S19	SSW23	SSW10	SSE11	SSE12	S15	SSW11.8	WSW25
18-Aug	SW9	NW15	N24	N20	NNW16	NW16	NW12	NNW7	NNW8	NW8	WNW6	WSW8	WSW6	WSW7	SSW5	SSE12	S14	SE11	SSE13	S15	SSE26	S28	S27	S31	SSW3.3	S31
19-Aug	SSE29	SSE33	SSE37	SSE38	SSE38	SSE34	SSE30	SSE33	SSE27	S23	SW22	WSW27	WSW26	WSW28	W37	W41	WSW33	WSW33	W37	W35	W26	W27	W23	WSW23	SW20.1	W41
20-Aug	WSW25	WSW24	WSW20	WSW24	WSW23	WSW29	W33	W28	W30	W34	W29	W32	W32	W30	W27	W28	W24	WNW26	WNW24	WNW26	W24	W25	W24	W23	W26.2	W34
21-Aug	W25	W26	W24	WSW25	WSW26	WSW24	WSW23	W20	W21	WNW24	WNW24	NW20	WNW26	WNW25	NW28	WNW23	WNW26	WNW27	WNW22	WNW25	WNW24	WNW29	WNW27	WNW23	WNW23.2	WNW29
22-Aug	W22	W22	W23	W23	W23	W22	W20	W19	W19	W19	W20	W21	WNW15	W15	WNW23	WNW24	NNW14	NNW10	N10	N3	SE10	SSE17	SSE20	S20	W13.0	WNW24
23-Aug	SSE18	SSE18	SSE18	SSE22	SSE24	SSE27	SSE26	SE21	SSE19	SSE16	SE16	SSE20	SSE24	SSE19	SSE17	SE15	SE20	SSE22	SE20	SE27	SE39	SE34	NNW13	NE12	SSE19.3	SE39
24-Aug	SE9	SW17	WNW10	SE19	SSE20	S19	S22	S16	S16	S16	SW12	WSW10	WSW17	WSW21	W19	W19	W16	W16	WSW14	WSW13	W15	WNW16	NW18	N16	SW9.7	S22
25-Aug	NNE18	NE14	NE11	NNE5	NNW7	NNW9	NNW6	NNW6	NNW4	NNW5	WNW8	NW11	NW12	NW15	N21	N19	N18	N15	N15	NNE17	NNE21	NNE8	NNW13	N24	N11.4	N24
26-Aug	N23	N18	N16	NNE15	N19	NNE16	NE14	ENE10	NNE5	NW6	NW6	WNW4	WSW6	WSW6	WSW4	WSW6	WSW6	S6	S10	SSW9	SW10	WSW12	WSW15	WSW14	NNW3.5	N23
27-Aug	SW8	SSW5	SSE5	SSW5	S6	S12	SSE13	SSE18	SSE14	SSE9	SSE17	SE20	SSE17	SSW21	SSW24	SSW28	SSW30	SW27	SW22	SSW21	SSW33	SSW31	SSW22	SW21	SSW15.9	SSW33
28-Aug	SW28	WSW27	SW29	SW26	SW22	SW21	SW18	SW17	SW25	SW26	SW32	WSW28	WSW32	SW32	WSW28	WSW27	WSW22	WSW18	WNW9	NNW4	NE8	NNE11	N6	N18	WSW17.9	SW32
29-Aug	NNW15	NW17	N3	SE9	SSE7	W6	S10	SSW8	SSE8	SE8	SE8	SE10	ESE10	SSE13	SE14	SSE13	ESE10	SE17	ESE21	ESE18	ESE18	SE21	ESE18	SE21	SE8.8	ESE21
30-Aug	ESE20	ESE21	SE27	ESE21	SE22	SSE14	SSE11	SSW11	W20	W16	W13	W11	WNW13	W9	SSW6	SSW8	SSE3	SE30	ESE22	SSE24	SSW21	SW23	SSW17	SSE20	S9.9	SE30
31-Aug	SSE21	SSE22	SSE21	SSE20	SSE23	SSE28	S23	S20	SSE20	SSE18	SSE17	SSW22	SW29	SW31	SW35	SW41	SW35	SW29	SSW27	SSW28	SW30	SW30	SSW27	SW23	SSW22.1	SW41
	SW6.3	SW5.8	SSW4.2	SSW5.7	SSW6.6	SSW6.0	SSW6.0	SSW6.0	SSW6.0	SW6.4	SW6.6	SW7.4	WSW8.1	WSW8.9	WSW9.4	WSW10.1	WSW9.1	WSW7.9	SW5.8	SSW7.4	SSW8.8	SSW10.0	SW8.5	SSW7.1	Diurnal Average	
	WSW31	SSE33	SSE37	SSE38	SSE38	SSE34	W33	SSE33	W30	WSW36	WSW34	WSW43	WSW37	WSW36	WSW40	SW41	W35	WSW33	W37	W35	SE39	SW34	SW38	SW35	Diurnal Maximum	

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 14 km/h on Aug 8 16:00

Minimum Value: 1 km/h on Aug 2 03:00

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

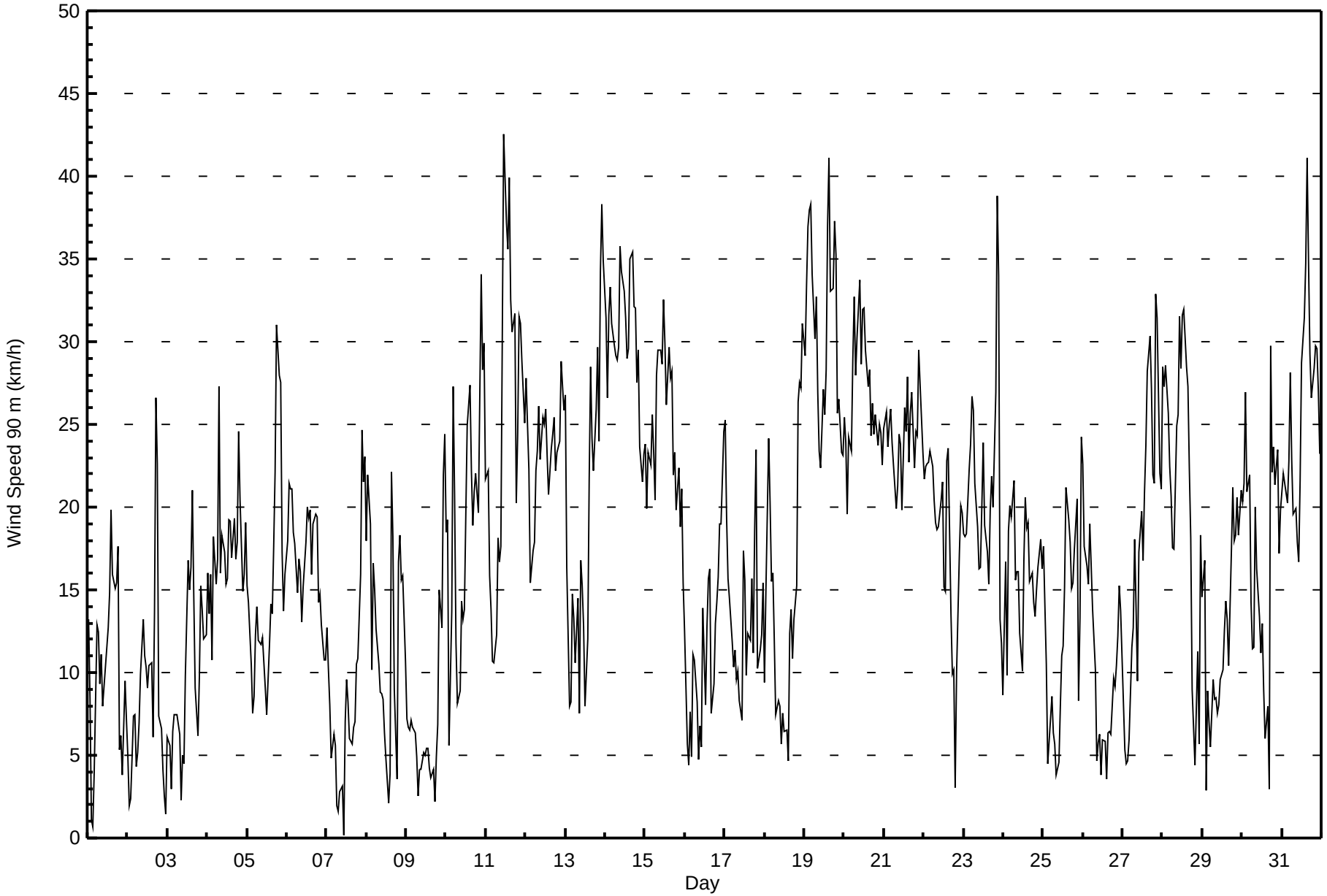
Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Aug	4	4	1	2	1	2	2	3	2	2	3	3	4	4	4	4	3	3	3	3	2	2	3	3	4
2-Aug	2	1	1	3	3	2	2	2	2	3	3	3	3	4	4	3	10	4	7	3	2	3	2	1	10
3-Aug	3	2	2	2	2	1	2	2	2	2	3	3	4	5	5	5	4	3	3	3	2	4	2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

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed 90 m (WS90m) - km/h

Mannix - August 2015



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	57	7.66	7.66
6 - 11	157	21.10	28.76
12 - 19	222	29.84	58.60
20 - 28	221	29.70	88.31
29 - 38	82	11.02	99.33
> 38	5	0.67	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Wind Speed 90 m (WS90m) - km/h

Mannix - August 2015

Wind Speed Ranges (km/h)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 5	3	2	0	4	5	6	7	8	2	3	1	8	0	1	3	4	57
6 - 11	2	6	3	6	9	20	25	16	5	16	6	8	7	9	7	12	157
12 - 19	12	4	3	1	13	46	17	27	15	9	16	14	17	8	12	8	222
20 - 28	7	1	1	0	2	11	17	24	7	16	21	45	36	19	6	8	221
29 - 38	2	0	0	0	0	0	3	8	1	4	20	21	17	2	0	4	82
> 38	0	0	0	0	0	0	1	0	0	0	1	2	1	0	0	0	5
Totals	26	13	7	11	29	83	70	83	30	48	65	98	78	39	28	36	744

Total Number of Valid Hours: 744

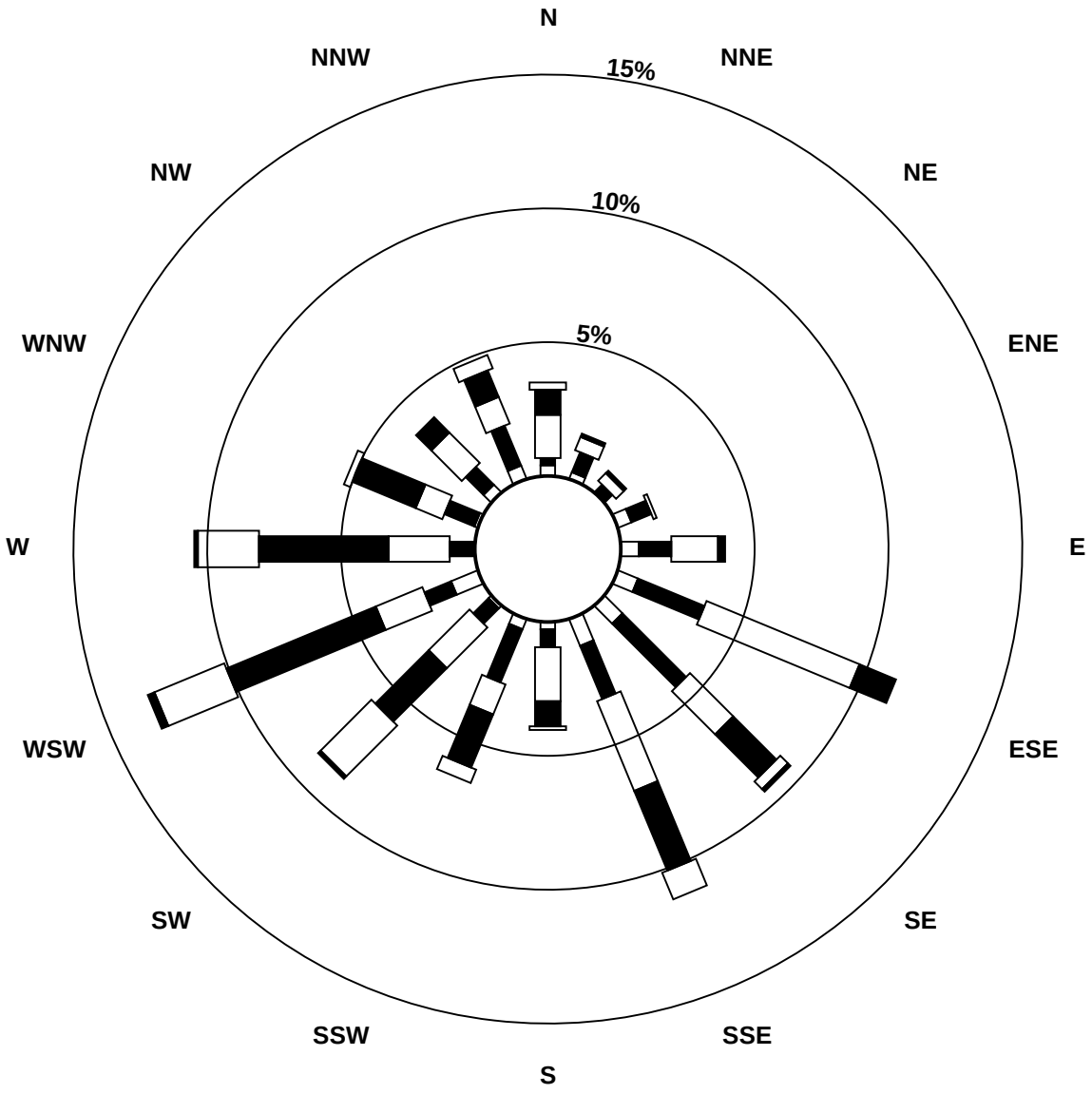
Total Number of Hours: 744

Wood Buffalo Environmental Association

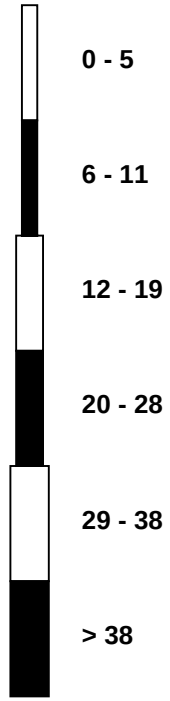
Wind Rose Aug 2015

Wind Speed 90 m (WS90m) - km/h

Mannix (AMS 5)



Classes (km/h)



Total Number of Valid Hours: 744

Direction of Maximum Speed: 265 deg on Aug 19 16:00
Direction of Maximum Daily Speed Average: 267.3 deg on Aug 14

Direction of Minimum Speed: 253 deg on Aug 3 04:00

Direction of Minimum Daily Speed Average: 1.9 deg on Aug 26

Monthly Average Direction: 241.0 deg

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
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average
1-Aug	337	6	257	236	264	341	354	327	336	275	283	304	310	298	328	313	310	298	315	88	136	58	292	306	309.4
2-Aug	244	241	218	194	195	161	178	149	147	144	142	123	118	139	118	102	260	360	60	135	263	290	59	331	144.1
3-Aug	359	47	239	253	201	192	151	108	67	90	98	163	160	137	162	167	160	148	122	93	91	131	135	117	141.1
4-Aug	133	115	94	102	102	98	115	108	120	88	96	92	90	112	107	104	108	128	124	135	141	125	114	106	111.1
5-Aug	116	139	83	58	64	40	84	105	117	143	148	165	112	125	139	122	114	133	152	153	144	126	123	129	125.2
6-Aug	122	119	108	106	107	107	124	123	110	121	98	99	99	106	107	127	107	107	104	123	118	115	105	92	110.4
7-Aug	109	102	108	91	69	93	85	249	155	254	207	89	49	93	119	125	168	154	166	159	148	155	147	144	127.3
8-Aug	144	154	146	145	148	150	152	136	138	126	133	132	166	219	311	170	203	223	183	96	126	134	161	124	147.3
9-Aug	53	49	79	97	153	191	207	202	124	107	86	165	169	133	168	133	134	153	119	131	151	124	139	146	128.7
10-Aug	227	292	76	202	237	272	246	189	216	217	239	236	223	234	237	263	240	233	231	200	190	216	188	197	231.4
11-Aug	177	176	149	146	142	159	146	164	199	225	237	245	249	243	246	250	248	255	248	230	232	229	236	255	234.4
12-Aug	256	248	236	168	199	244	248	257	254	245	245	255	261	272	254	245	262	266	260	250	226	237	246	238	251.3
13-Aug	242	173	140	160	178	161	156	178	148	158	151	150	160	293	276	241	219	232	248	238	222	214	217	232	213.2
14-Aug	259	263	261	260	259	253	260	258	256	255	263	257	265	273	275	273	282	283	281	280	285	275	267	269	267.3
15-Aug	276	275	298	295	315	337	334	335	337	340	343	351	0	357	337	340	339	327	337	319	324	336	331	1	330.0
16-Aug	351	359	265	346	279	235	246	244	251	266	312	313	308	287	271	278	304	286	266	257	243	244	247	244	273.5
17-Aug	226	198	203	190	164	158	158	148	150	138	108	183	198	225	207	175	192	231	195	199	182	168	169	188	182.2
18-Aug	228	274	356	348	327	290	287	324	340	299	307	257	260	257	202	156	174	150	161	173	157	163	165	165	221.1
19-Aug	160	157	158	161	158	154	154	157	170	191	221	244	257	262	266	265	250	261	280	277	271	268	263	254	235.3
20-Aug	253	256	254	240	245	254	263	263	265	266	264	268	273	278	281	287	282	291	293	286	266	273	276	259	269.0
21-Aug	263	260	262	258	260	257	261	266	279	289	296	309	290	298	325	289	292	303	299	286	284	291	290	280	282.3
22-Aug	275	273	271	263	265	264	263	264	264	268	275	278	289	279	298	298	333	355	3	32	153	183	169	154	273.9
23-Aug	143	142	146	145	145	154	150	158	141	150	147	160	162	162	156	152	147	160	143	139	149	150	343	32	148.8
24-Aug	19	253	247	142	168	193	179	167	171	195	234	258	245	256	281	271	273	265	260	271	260	263	269	328	244.5
25-Aug	13	12	11	280	281	38	194	234	308	351	292	322	309	325	350	7	355	349	345	10	21	352	339	9	348.6
26-Aug	16	351	351	34	13	25	28	53	44	298	304	302	249	253	260	279	269	183	178	208	223	220	228	221	315.9
27-Aug	164	179	168	167	164	162	148	148	151	134	148	143	165	203	211	205	208	236	238	204	194	194	164	195	184.9
28-Aug	226	239	234	225	215	216	234	220	238	239	239	242	247	239	250	253	248	260	307	1	66	47	358	28	244.1
29-Aug	285	306	222	178	223	277	196	232	178	127	128	127	124	157	150	150	130	138	134	132	133	142	136	138	149.0
30-Aug	115	135	142	133	139	182	194	221	268	273	277	277	286	283	234	234	135	153	126	153	171	170	154	151	182.2
31-Aug	150	143	139	143	146	155	155	146	145	148	157	196	228	233	235	239	237	236	218	207	228	207	199	177	201.6
	231.6	227.3	209.5	192.1	202.1	214.8	212.6	210.2	222.8	228.6	237.2	242.2	247.3	251.3	257.3	251.1	247.9	249.2	243.7	219.6	204.0	209.2	219.1	208.5	
	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

Mannix - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 99 deg on Aug 7 11:00

Minimum Value: 5 deg on Aug 16 23:00

Percentiles: P_1 = 7 P_{10} = 11 Q_1 = 13 Median = 18 Q_3 = 27 P_{90} = 44 P_{99} = 85

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

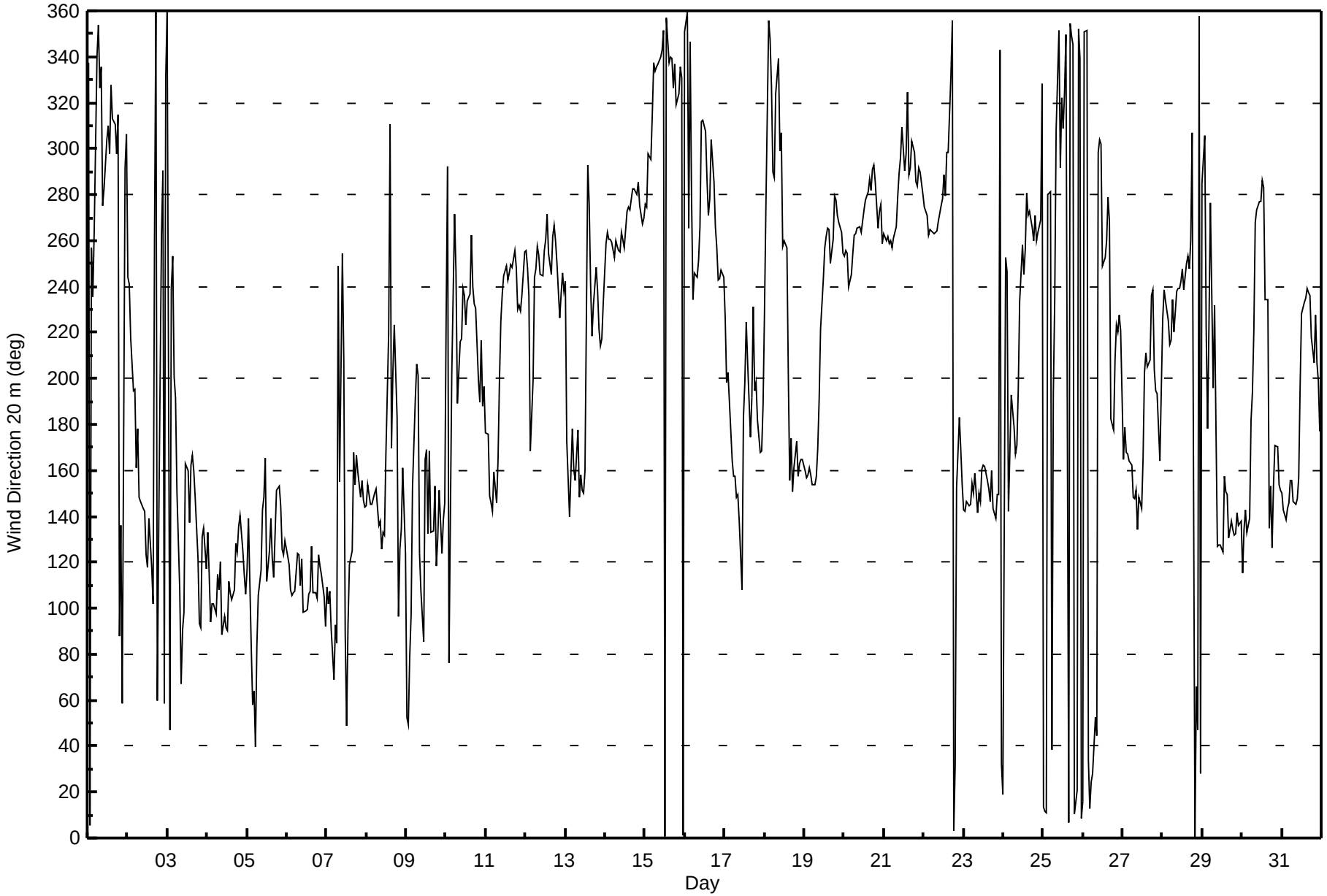
Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Aug	36	84	23	51	20	24	18	36	23	32	27	29	30	26	21	24	22	24	18	52	30	54	28	50	84
2-Aug	34	33	48	12	21	14	29	18	17	20	19	22	31	31	40	59	56	30	23	47	15	81	29	91	91
3-Aug	53	73	40	96	42	82	21	36	91	30	57	28	23	23	31	20	17	30	30	21	14	18	14	12	96
4-Aug	14	17	16	26	16	31	23	14	22	18	13	22	21	21	18	16	15	14	17	15	12	14	16	14	31
5-Aug	17	17	22	22	26	13	16	17	22	19	20	38	50	30	16	24	19	14	18	15	15	19	16	16	50
6-Aug	17	18	17	17	16	19	19	18	20	20	16	17	17	21	24	18	20	18	17	20	17	18	24	14	24
7-Aug	21	20	21	41	24	20	48	83	59	43	99	22	29	36	62	52	41	40	20	20	11	17	14	13	99
8-Aug	13	14	13	11	12	13	16	13	17	21	31	59	59	90	67	55	31	30	67	14	16	17	17	33	90
9-Aug	20	14	16	17	38	45	39	55	40	35	37	70	73	63	70	80	69	81	32	23	14	12	12	18	81
10-Aug	44	36	59	49	21	9	29	33	36	24	23	32	24	17	22	14	21	17	13	19	15	18	16	15	59
11-Aug	22	17	16	15	11	18	26	20	29	18	17	12	13	15	12	13	12	12	14	13	11	11	17	12	29
12-Aug	9	9	21	13	32	18	13	13	13	15	14	14	13	16	21	17	14	13	10	11	11	13	7	7	32
13-Aug	7	39	13	18	15	27	19	26	28	16	16	18	60	23	16	36	18	18	13	9	14	12	13	11	60
14-Aug	10	6	7	8	9	12	10	10	12	12	13	14	14	13	14	13	12	12	11	10	13	15	8	9	15
15-Aug	8	16	15	13	18	18	21	16	16	16	18	18	23	22	18	19	19	24	17	18	16	19	16	15	24
16-Aug	17	17	30	19	41	12	10	16	26	34	46	50	81	35	23	35	51	20	18	10	11	6	5	11	81
17-Aug	22	12	15	14	11	13	16	18	19	25	31	31	34	70	40	32	38	20	18	15	55	32	20	14	70
18-Aug	31	25	12	15	23	15	19	47	31	27	57	42	53	72	90	31	30	25	25	16	12	12	13	13	90
19-Aug	14	14	14	13	12	14	14	14	18	23	21	18	17	11	10	11	13	23	12	10	9	9	10	10	23
20-Aug	10	10	16	10	11	11	9	12	11	10	10	9	11	15	12	12	11	13	13	12	9	9	9	8	16
21-Aug	7	8	8	8	8	9	10	8	12	14	14	22	16	19	19	19	14	22	20	11	11	11	12	10	22
22-Aug	6	6	8	8	8	9	7	10	8	11	12	13	34	23	17	17	34	21	31	72	16	14	39	13	72
23-Aug	15	12	13	13	13	15	16	17	15	16	18	22	21	20	26	24	16	17	15	12	12	13	75	34	75
24-Aug	87	26	60	21	21	22	20	19	22	28	24	36	22	20	14	15	19	15	12	11	11	7	11	27	87
25-Aug	10	15	21	13	65	56	63	34	85	56	24	35	28	20	17	16	19	17	16	18	13	33	35	13	85
26-Aug	14	23	30	18	14	17	15	35	33	28	28	76	30	29	56	39	23	37	18	23	10	10	10	24	76
27-Aug	25	31	47	13	11	13	12	15	14	18	15	14	33	27	23	20	19	18	13	21	15	14	14	25	47
28-Aug	14	14	13	15	23	25	18	21	11	12	12	14	15	13	14	13	18	14	20	31	15	22	71	14	71
29-Aug	50	41	82	55	50	27	23	31	34	19	21	32	28	29	20	25	29	13	13	16	16	17	16	22	82
30-Aug	19	15	14	12	12	31	44	38	13	14	15	23	25	32	79	66	80	39	18	16	17	14	14	13	80
31-Aug	14	12	13	13	13	14	16	17	14	14	16	29	18	13	15	13	13	16	14	13	16	10	19	20	29
	87	84	82	96	65	82	63	83	91	56	99	76	81	90	90	80	80	81	67	72	55	81	75	91	
	Diurnal Maximum																								

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction 20 m (WD20m) - deg

Mannix - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction 45 m (WD45m) - deg

Mannix - August 2015

Direction of Maximum Speed: 265 deg on Aug 19 16:00
Direction of Maximum Daily Speed Average: 268.9 deg on Aug 14

Direction of Minimum Speed: 264 deg on Aug 7 11:00

Direction of Minimum Daily Speed Average: 2.5 deg on Aug 26

Monthly Average Direction: 242.9 deg

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
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average
1-Aug	337	23	282	269	275	347	357	331	336	282	287	311	314	304	332	319	316	302	318	89	136	87	308	328	318.4
2-Aug	313	106	182	185	197	171	170	143	145	144	140	122	121	140	123	105	258	359	56	128	256	281	61	61	136.8
3-Aug	19	75	197	132	175	167	138	105	83	90	99	159	158	140	164	166	158	147	116	96	95	131	131	119	139.1
4-Aug	130	116	97	103	105	101	115	110	119	90	98	95	91	112	109	106	110	127	123	133	136	125	116	109	112.2
5-Aug	118	135	82	63	66	48	87	107	115	137	149	162	107	127	138	121	113	130	151	151	143	124	121	127	125.0
6-Aug	121	118	110	107	109	109	123	122	111	120	101	100	102	106	108	124	108	108	107	124	118	116	111	99	111.3
7-Aug	112	105	107	92	72	92	83	249	161	241	264	92	54	95	119	125	165	159	167	162	147	157	150	141	131.3
8-Aug	142	152	145	140	143	149	147	132	142	127	135	144	166	190	311	168	196	213	193	97	124	133	156	131	147.3
9-Aug	67	60	85	102	134	143	163	184	125	117	91	167	174	143	166	121	149	163	118	130	147	126	138	147	130.2
10-Aug	222	301	52	203	232	274	248	193	210	217	237	234	220	233	235	262	238	232	230	200	195	217	196	203	227.1
11-Aug	204	191	174	161	173	183	158	176	202	225	236	245	249	243	246	249	248	255	248	231	234	231	235	254	231.4
12-Aug	255	245	239	201	223	248	250	257	254	246	245	254	261	272	253	244	261	267	260	250	234	237	242	243	250.4
13-Aug	244	216	157	172	195	184	167	184	155	157	153	154	162	299	278	234	215	228	246	237	227	219	220	234	215.6
14-Aug	260	265	261	262	261	255	261	258	255	255	263	257	265	273	276	276	286	285	285	283	289	279	271	271	268.9
15-Aug	279	280	303	301	320	341	338	338	342	344	347	356	4	1	342	343	343	329	342	324	329	339	335	3	334.8
16-Aug	356	1	295	348	307	257	257	252	247	270	311	313	314	291	275	281	308	290	268	259	255	249	252	248	279.1
17-Aug	240	232	233	214	192	167	157	152	148	138	119	185	200	222	205	175	193	233	193	198	192	165	174	182	189.0
18-Aug	222	304	0	356	338	311	308	337	344	307	309	256	259	253	206	154	175	150	165	181	157	167	167	167	210.1
19-Aug	161	158	159	164	158	154	155	158	172	192	219	243	256	263	266	265	250	261	281	280	273	269	265	255	226.9
20-Aug	256	258	257	243	248	257	263	264	266	267	265	269	275	281	285	289	285	295	298	290	268	277	280	260	271.5
21-Aug	264	261	263	260	261	259	262	268	284	293	299	314	295	302	328	293	295	307	303	290	289	296	295	286	287.2
22-Aug	280	277	274	264	267	267	265	268	265	270	277	281	295	282	302	302	336	357	1	31	146	171	167	162	274.6
23-Aug	150	149	150	148	149	154	152	152	145	150	148	159	163	161	158	154	146	159	144	139	150	150	347	34	149.6
24-Aug	52	242	271	144	165	191	182	171	173	194	231	257	243	256	283	272	274	265	261	267	263	275	293	347	240.4
25-Aug	14	23	27	326	337	357	61	234	309	340	300	326	315	330	353	10	358	353	353	13	24	10	346	10	355.9
26-Aug	16	355	357	35	14	29	35	61	43	308	309	312	247	257	260	275	268	183	177	205	218	228	226	237	316.1
27-Aug	183	179	161	169	170	164	153	149	150	138	151	142	168	201	211	204	207	235	239	208	199	199	182	217	188.8
28-Aug	230	240	234	231	227	230	237	222	238	239	239	242	248	238	249	252	247	259	303	354	61	46	18	24	244.3
29-Aug	312	315	257	160	188	292	195	225	176	128	128	124	126	155	149	150	127	135	131	128	129	137	133	137	144.5
30-Aug	117	131	140	132	136	177	185	214	269	275	280	280	288	288	224	222	146	153	126	152	180	194	164	154	175.3
31-Aug	155	148	143	148	151	157	158	152	151	149	158	197	227	235	235	239	237	236	218	209	230	216	203	197	201.7
	227.4	224.1	204.0	189.3	200.2	211.6	204.1	202.7	217.1	226.3	236.9	240.6	245.9	251.4	258.0	248.2	245.7	249.3	241.6	213.8	202.3	207.6	213.8	204.7	
	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 45 m (WD45m) - deg

Mannix - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 104 deg on Aug 7 11:00

Minimum Value: 3 deg on Aug 16 23:00

Percentiles: P_1 = 4 P_{10} = 7 Q_1 = 9 Median = 12 Q_3 = 20 P_{90} = 36 P_{99} = 82

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

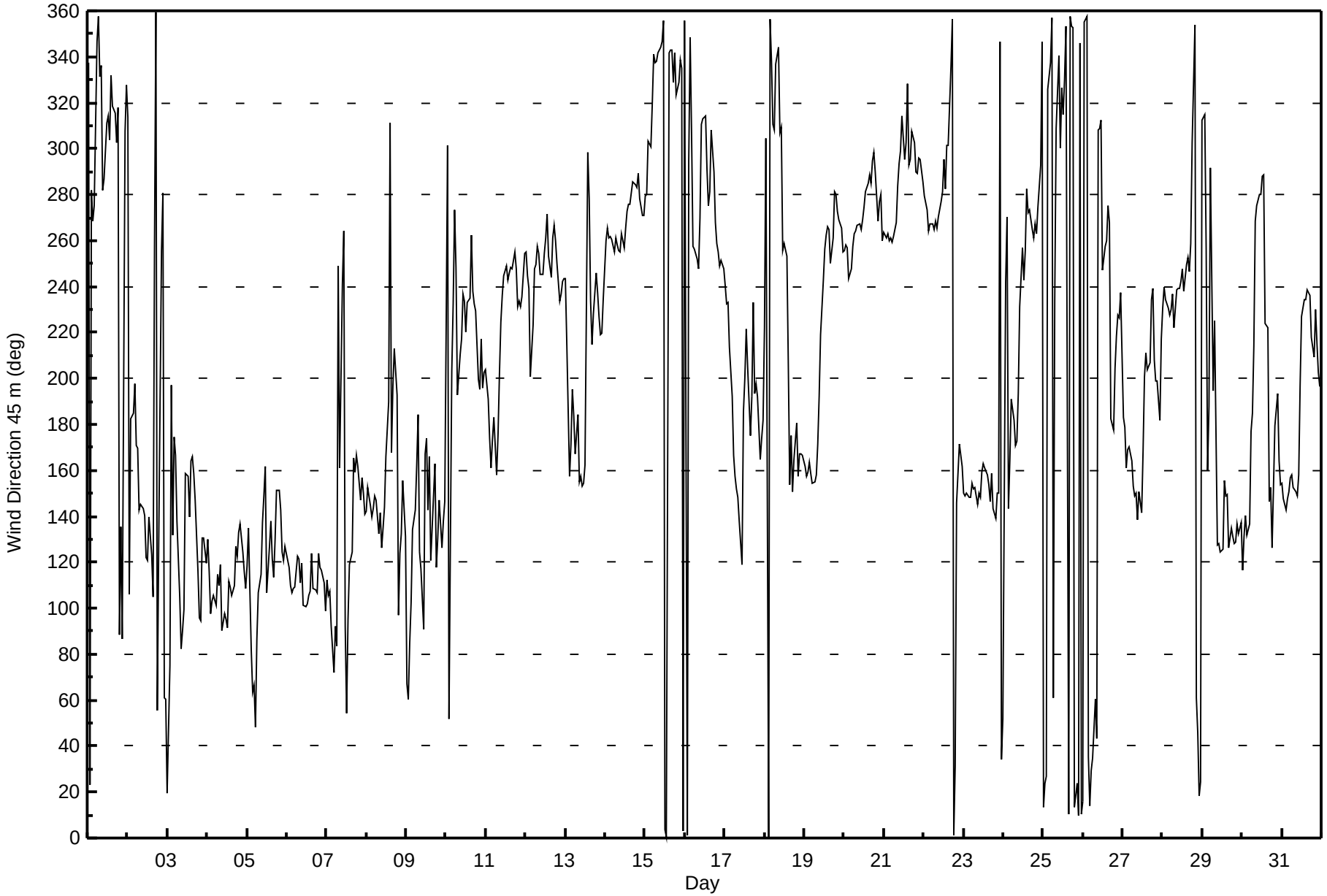
Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Aug	39	49	24	43	16	12	13	15	13	29	24	22	23	22	15	19	17	20	14	50	19	55	10	46	55
2-Aug	63	73	72	8	11	14	16	12	11	12	14	17	23	24	36	61	58	22	21	42	15	77	27	63	77
3-Aug	36	53	25	22	15	33	16	24	69	24	53	20	16	17	23	12	10	23	22	12	11	12	9	9	69
4-Aug	8	11	11	22	8	22	17	8	15	16	10	17	19	15	13	11	9	9	12	12	8	9	11	8	22
5-Aug	11	12	20	20	26	10	13	10	16	14	15	25	45	25	13	20	12	10	14	10	10	14	13	12	45
6-Aug	13	13	11	11	10	13	13	13	12	15	12	11	13	15	19	13	16	12	11	13	12	12	17	12	19
7-Aug	17	15	15	27	19	16	38	79	49	43	104	20	26	23	44	31	29	31	13	16	7	12	12	7	104
8-Aug	9	7	8	6	7	8	10	11	11	17	19	51	52	98	61	59	28	18	65	12	11	12	7	21	98
9-Aug	21	13	13	12	17	27	37	66	32	28	30	48	53	56	61	85	53	82	28	21	10	9	6	14	85
10-Aug	42	28	52	53	19	7	20	24	28	16	19	26	19	14	18	12	15	12	9	14	6	12	7	8	53
11-Aug	9	11	17	14	13	16	19	16	15	12	14	9	11	12	9	11	10	10	12	8	6	5	10	7	19
12-Aug	8	6	7	11	15	13	9	10	10	11	10	12	11	14	18	15	12	11	9	8	6	6	3	4	18
13-Aug	3	34	13	18	11	28	11	12	21	8	9	11	59	20	14	34	12	15	10	5	8	4	5	5	59
14-Aug	10	5	5	6	6	9	8	9	10	10	12	12	14	12	14	13	10	9	8	8	9	13	7	9	14
15-Aug	7	15	10	7	13	11	13	10	9	9	11	12	16	17	12	14	12	19	10	12	10	14	10	9	19
16-Aug	11	18	31	13	36	9	8	16	21	28	39	51	69	30	20	34	46	16	16	10	11	3	3	4	69
17-Aug	11	11	10	11	11	9	8	12	14	16	29	17	24	53	32	23	33	16	9	5	37	25	13	6	53
18-Aug	34	23	9	6	15	10	11	35	24	17	51	39	45	62	72	23	20	19	20	11	5	5	4	4	72
19-Aug	5	6	6	5	6	8	9	8	10	13	16	14	14	9	9	10	10	22	10	9	8	9	9	8	22
20-Aug	6	8	15	6	7	8	8	10	11	9	9	9	10	13	9	8	8	9	8	9	8	8	8	6	15
21-Aug	5	5	6	6	6	6	7	7	10	11	8	17	11	16	14	17	9	19	15	8	8	6	7	8	19
22-Aug	6	5	7	6	6	6	5	7	7	10	10	11	32	19	13	11	27	14	27	66	11	5	11	6	66
23-Aug	9	6	8	8	8	8	9	9	11	11	12	16	15	15	22	17	12	10	11	7	7	7	74	28	74
24-Aug	81	28	61	17	15	15	9	10	10	18	20	32	19	18	13	13	17	14	9	8	5	4	19	16	81
25-Aug	5	10	13	13	37	32	90	58	90	48	19	29	21	14	10	11	12	11	9	14	9	17	26	8	90
26-Aug	9	17	23	12	8	14	13	27	33	23	20	66	25	25	45	32	20	29	10	15	7	8	6	26	66
27-Aug	17	13	22	7	3	4	7	9	8	14	9	10	27	17	15	12	10	15	9	17	7	5	6	15	27
28-Aug	6	8	6	7	9	12	13	15	8	9	8	10	13	10	11	11	16	13	14	27	9	14	61	12	61
29-Aug	41	32	98	65	40	16	14	22	25	15	19	24	22	21	15	20	22	8	8	11	13	12	12	17	98
30-Aug	13	12	10	8	6	23	29	34	11	13	13	21	22	34	76	52	83	29	10	12	10	9	11	9	83
31-Aug	8	7	8	8	8	6	9	11	9	8	9	23	14	9	13	10	10	12	8	6	11	4	13	16	23
	81	73	98	65	40	33	90	79	90	48	104	66	69	98	76	85	83	82	65	66	37	77	74	63	
	Diurnal Maximum																								

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction 45 m (WD45m) - deg

Mannix - August 2015



Direction of Maximum Speed: 244 deg on Aug 11 12:00
Direction of Maximum Daily Speed Average: 268.8 deg on Aug 14

Direction of Minimum Speed: 262 deg on Aug 7 11:00

Direction of Minimum Daily Speed Average: 3.0 deg on Aug 26

Monthly Average Direction: 244.0 deg

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
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average
1-Aug	342	24	306	250	266	351	2	335	335	288	292	313	312	306	333	321	317	302	320	79	146	127	318	340	324.0
2-Aug	345	82	112	174	205	192	154	139	148	147	141	125	123	141	124	101	257	1	54	121	233	255	66	116	129.4
3-Aug	23	54	138	133	156	147	131	107	90	93	86	154	156	141	163	163	156	144	112	101	96	132	131	124	135.3
4-Aug	128	118	99	103	107	104	114	109	119	92	97	95	92	113	108	106	112	126	123	135	137	126	119	110	112.7
5-Aug	122	135	81	76	71	65	89	106	116	133	148	160	107	128	137	123	114	131	150	149	141	125	123	126	125.8
6-Aug	122	120	111	108	109	111	124	123	114	123	104	102	103	106	106	125	110	110	109	125	119	120	117	105	113.0
7-Aug	115	109	109	92	77	90	85	248	164	242	262	95	58	96	120	127	159	159	163	159	145	157	153	140	134.1
8-Aug	142	151	144	135	141	145	141	132	147	130	138	146	169	172	310	166	193	206	232	94	123	133	149	138	148.0
9-Aug	78	74	96	105	132	136	143	165	130	118	96	158	165	145	157	121	152	152	120	135	144	128	138	147	132.3
10-Aug	226	305	39	198	227	272	250	194	214	217	235	232	220	232	234	261	237	231	229	203	202	222	208	212	228.1
11-Aug	215	209	204	190	207	214	175	191	209	224	236	244	248	242	245	247	247	255	247	233	235	235	238	253	234.0
12-Aug	253	244	240	220	232	247	249	256	253	244	245	253	260	271	251	243	260	266	259	252	244	246	251	253	250.8
13-Aug	250	235	190	200	216	205	201	200	165	156	154	160	167	298	276	232	215	227	243	237	230	228	227	237	223.6
14-Aug	261	267	262	262	261	255	262	258	254	255	262	256	265	271	276	276	286	285	285	283	289	279	273	272	268.8
15-Aug	281	282	305	304	321	343	341	340	344	346	348	357	5	2	344	345	345	331	345	326	331	341	336	5	337.0
16-Aug	360	357	322	350	323	281	274	272	246	268	309	314	324	293	276	279	309	288	268	262	267	263	267	257	284.1
17-Aug	244	243	248	232	212	188	170	160	151	143	135	185	204	221	202	175	193	236	193	196	200	167	173	182	197.7
18-Aug	235	322	4	1	344	322	327	344	345	312	309	256	260	253	207	153	176	150	166	184	158	174	173	173	210.5
19-Aug	165	161	162	166	159	155	155	160	172	190	219	242	256	262	265	264	249	260	281	280	273	270	266	255	223.3
20-Aug	257	260	260	248	249	259	264	264	266	268	265	269	274	281	285	288	284	296	299	291	270	280	281	263	271.9
21-Aug	263	262	264	261	262	260	262	270	286	294	299	317	296	303	330	293	296	309	304	291	291	298	298	288	287.8
22-Aug	283	278	274	265	268	269	268	273	268	272	278	282	298	284	302	302	336	356	1	13	139	167	171	170	274.1
23-Aug	165	160	159	155	155	160	155	149	151	153	150	159	163	161	159	152	146	159	146	140	150	150	349	47	152.4
24-Aug	124	228	285	148	159	185	182	174	174	193	229	257	242	255	282	271	272	264	261	263	270	285	309	357	238.5
25-Aug	24	43	47	7	342	337	357	358	347	342	305	331	319	331	356	13	359	357	359	19	29	25	353	12	2.5
26-Aug	18	0	4	38	16	36	45	66	39	315	314	311	246	253	257	265	263	184	179	203	221	237	240	253	330.6
27-Aug	205	194	176	187	172	175	168	152	153	148	153	142	169	200	211	204	207	235	239	215	205	205	201	227	195.2
28-Aug	234	242	236	234	233	234	237	223	237	237	238	242	246	237	248	251	245	257	296	340	53	42	10	18	244.4
29-Aug	334	322	2	142	168	285	185	214	174	137	133	130	127	154	147	153	127	136	132	128	126	133	130	139	142.1
30-Aug	120	129	140	132	137	171	171	212	268	276	281	282	289	287	220	217	168	151	130	153	193	217	187	165	181.1
31-Aug	165	155	154	157	160	163	168	169	160	151	161	200	227	235	234	238	237	235	218	212	233	226	212	220	203.6
	234.8	231.0	213.0	199.9	206.9	217.6	207.1	207.4	220.2	227.8	237.8	241.7	246.5	251.7	258.0	247.7	246.0	250.5	244.9	218.2	209.1	217.4	225.5	218.9	
	Diurnal Average																								

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

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction 75 m (WD75m) - deg

Mannix - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 106 deg on Aug 7 11:00

Minimum Value: 2 deg on Aug 12 22:00

Percentiles: P_1 = 3 P_{10} = 5 Q_1 = 8 Median = 12 Q_3 = 19 P_{90} = 32 P_{99} = 84

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

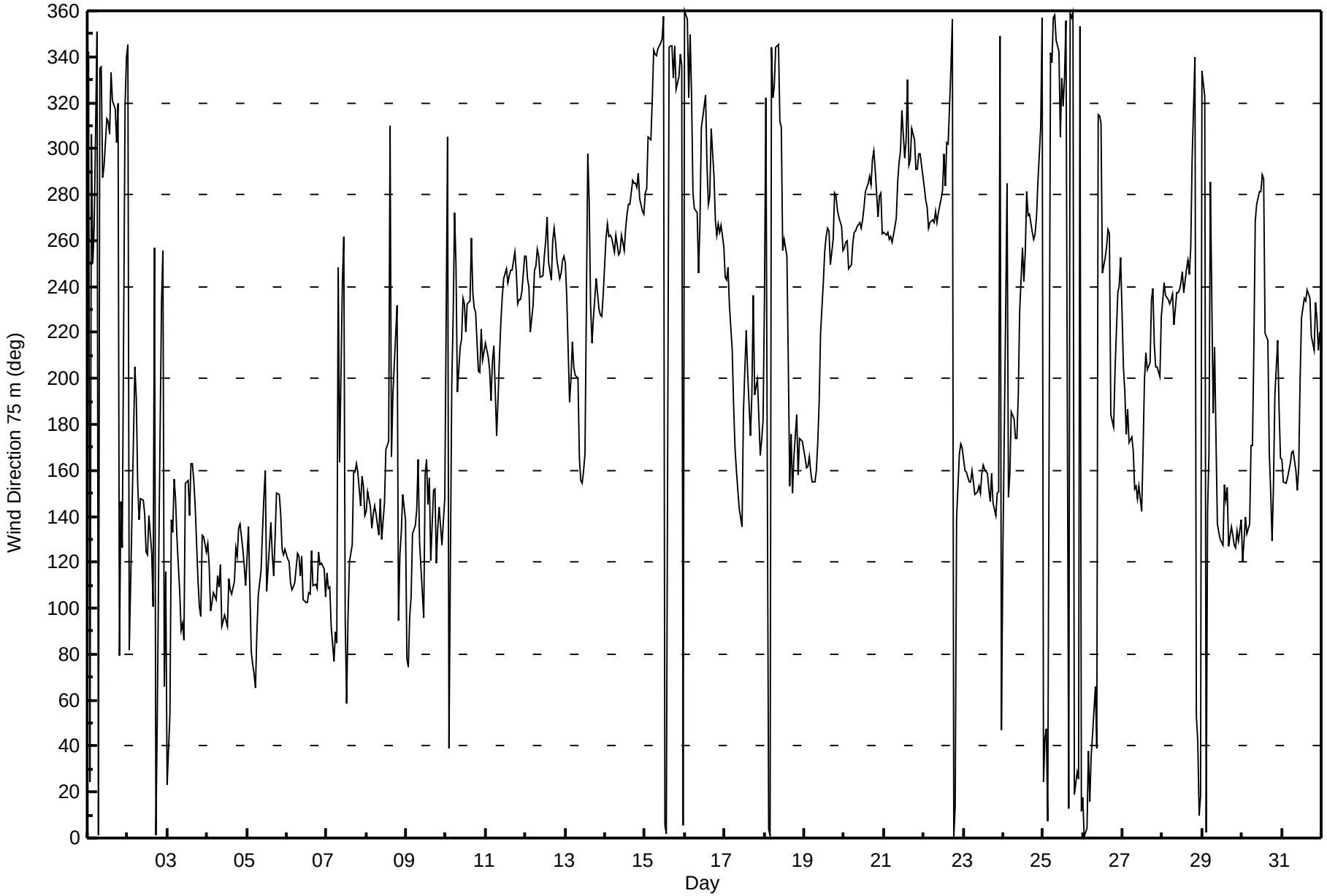
Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Aug	41	29	84	80	28	9	11	13	11	25	20	20	23	21	14	18	16	19	14	49	21	64	10	27	84
2-Aug	54	33	28	18	15	27	11	13	9	11	13	17	22	20	29	60	60	18	20	34	22	67	70	62	70
3-Aug	23	19	39	13	15	25	13	20	54	31	42	19	13	16	21	11	10	21	19	12	11	13	11	11	54
4-Aug	10	13	12	21	12	20	17	11	15	17	12	17	19	15	14	13	12	11	13	11	7	11	13	12	21
5-Aug	12	10	21	19	23	11	12	13	16	15	14	22	40	27	10	19	14	10	12	8	8	13	13	13	40
6-Aug	14	13	13	13	13	15	14	12	13	15	13	12	13	15	19	12	16	13	12	13	13	13	16	16	19
7-Aug	17	15	15	22	13	17	26	84	43	45	106	22	22	23	36	29	23	29	11	17	7	11	11	5	106
8-Aug	7	6	7	5	5	5	8	13	10	14	17	45	52	88	65	56	28	17	65	22	12	10	6	15	88
9-Aug	23	13	14	15	12	15	18	49	30	28	28	36	37	47	59	80	48	91	25	19	8	13	5	12	91
10-Aug	40	27	44	59	19	6	13	23	23	15	18	23	17	13	17	11	13	11	8	13	6	9	6	6	59
11-Aug	4	7	12	16	11	15	23	19	13	11	13	8	10	11	8	10	8	10	12	6	5	4	5	5	23
12-Aug	7	4	4	9	9	10	7	9	8	10	9	11	9	13	17	13	11	10	8	7	5	2	3	3	17
13-Aug	4	19	23	16	11	24	13	11	20	6	8	10	52	19	13	32	11	13	8	4	7	3	3	4	52
14-Aug	11	5	4	5	5	8	8	7	8	9	12	10	13	11	13	12	9	8	7	7	9	12	7	8	13
15-Aug	6	15	10	7	13	10	11	8	8	8	10	11	16	15	12	12	11	17	8	11	9	12	8	9	17
16-Aug	9	23	33	15	34	5	8	13	21	28	42	52	50	32	20	34	44	15	15	10	6	2	3	4	52
17-Aug	6	6	6	10	10	14	7	10	12	14	28	15	22	47	28	21	31	15	7	3	27	22	13	5	47
18-Aug	40	18	10	4	13	9	9	25	23	21	52	33	39	53	72	21	19	17	19	12	4	6	5	3	72
19-Aug	4	4	5	4	5	6	8	7	9	11	13	13	13	8	8	9	9	22	10	8	8	8	8	7	22
20-Aug	5	7	15	7	5	7	7	9	11	9	9	8	10	12	9	7	7	8	7	8	6	7	8	5	15
21-Aug	5	4	5	5	4	5	7	8	10	10	7	17	10	15	12	17	8	18	13	7	7	6	6	7	18
22-Aug	5	6	7	6	5	6	5	7	6	10	10	10	30	17	12	10	25	14	22	67	9	7	4	3	67
23-Aug	6	4	4	5	4	5	7	6	8	10	10	15	12	13	19	16	11	9	9	6	5	5	74	29	74
24-Aug	60	29	62	25	13	11	7	9	9	16	17	26	17	18	11	12	15	13	8	5	5	7	19	11	62
25-Aug	10	8	13	13	6	7	35	31	64	44	19	27	21	13	9	10	11	10	7	11	5	15	19	7	64
26-Aug	7	13	19	9	6	12	10	17	35	23	21	65	25	27	44	28	21	26	10	11	15	9	4	9	65
27-Aug	19	23	6	16	5	3	4	7	8	16	9	9	25	16	14	11	9	14	8	17	6	4	6	10	25
28-Aug	5	6	5	5	5	8	12	12	7	7	7	9	11	9	10	9	14	12	13	19	10	8	50	9	50
29-Aug	34	28	89	84	39	23	11	16	24	18	19	24	22	18	11	16	18	8	9	12	14	11	13	15	89
30-Aug	14	12	8	8	5	14	17	33	10	12	12	19	18	38	71	46	83	23	10	11	17	6	15	11	83
31-Aug	7	5	6	6	5	4	7	10	7	6	9	19	13	9	12	9	9	11	7	6	8	4	12	12	19
	60	33	89	84	39	27	35	84	64	45	106	65	52	88	72	80	83	91	65	67	27	67	74	62	
	Diurnal Maximum																								

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction 75 m (WD75m) - deg

Mannix - August 2015



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 104 deg on Aug 7 11:00

Minimum Value: 2 deg on Aug 12 23:00

Percentiles: P_1 = 3 P_{10} = 5 Q_1 = 7 Median = 11 Q_3 = 19 P_{90} = 32 P_{99} = 84

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

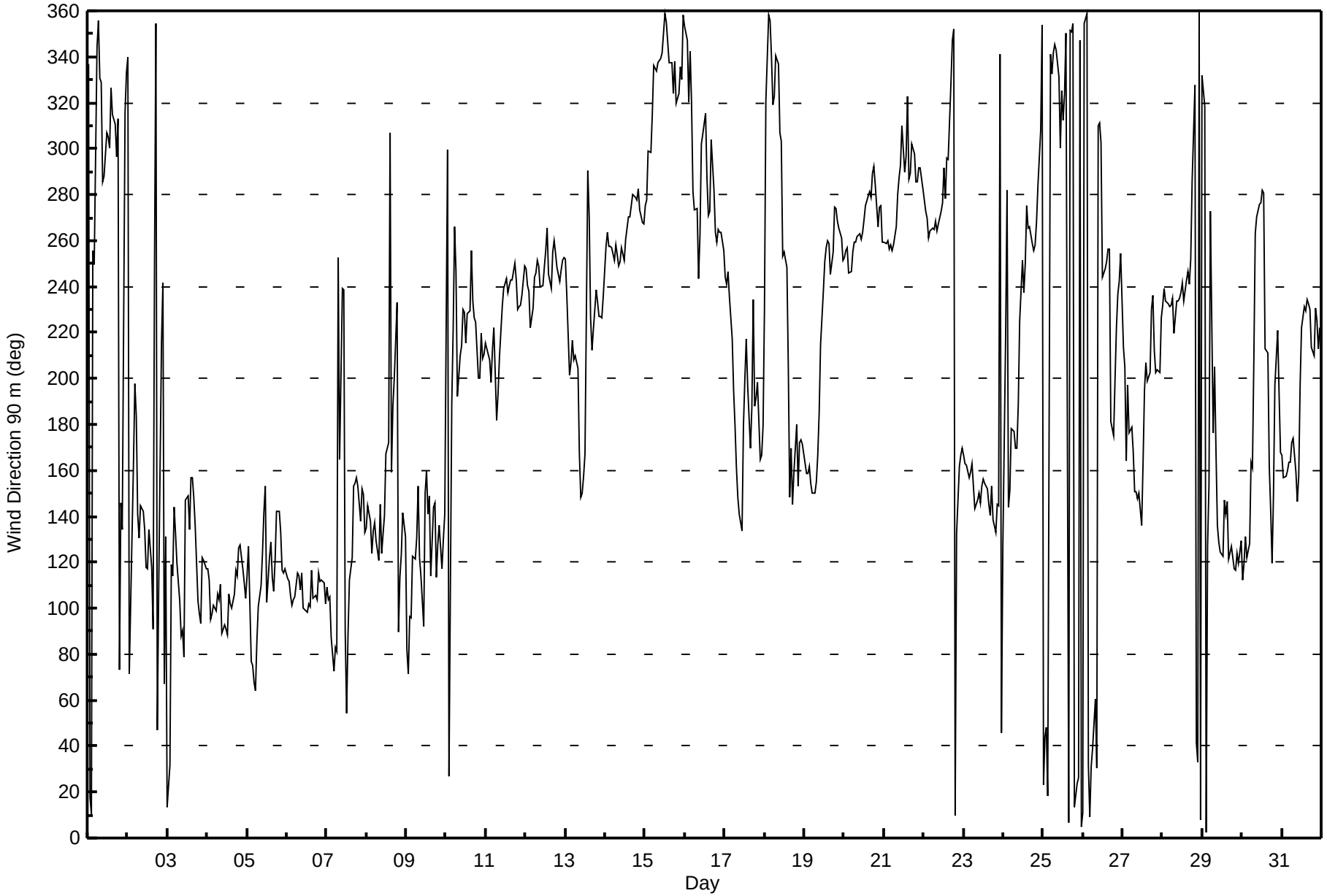
Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Aug	40	25	99	81	32	9	10	15	11	22	18	18	21	21	14	18	15	17	13	48	27	69	12	22	99
2-Aug	38	39	38	20	13	61	12	12	9	11	15	18	24	21	30	52	60	17	20	30	27	65	84	46	84
3-Aug	35	13	63	10	14	22	11	16	64	28	46	19	13	16	21	10	11	24	22	10	8	13	8	8	64
4-Aug	6	8	10	19	8	17	13	6	11	15	10	15	19	12	12	9	8	8	11	10	7	7	10	7	19
5-Aug	9	9	21	19	22	11	11	10	13	14	14	21	37	26	10	18	11	8	13	8	8	11	11	11	37
6-Aug	11	11	9	9	10	12	12	11	10	13	10	11	12	16	17	12	14	10	9	11	11	11	13	12	17
7-Aug	13	14	14	21	12	18	29	84	35	44	104	26	22	23	36	32	24	28	10	16	7	11	11	5	104
8-Aug	7	5	7	4	4	3	6	12	10	17	18	46	53	85	55	56	29	18	53	30	9	9	6	12	85
9-Aug	23	16	13	13	10	13	19	47	32	32	29	38	38	48	56	77	53	90	27	17	9	9	5	13	90
10-Aug	40	25	45	63	18	5	11	22	21	15	16	23	17	13	17	11	12	11	7	12	6	8	8	5	63
11-Aug	4	5	9	14	10	13	26	19	12	11	12	8	9	10	8	9	8	9	11	6	5	4	4	5	26
12-Aug	6	3	4	9	8	8	7	8	7	9	9	10	8	12	16	12	10	9	8	5	4	2	2	3	16
13-Aug	3	12	22	14	11	23	11	11	22	7	7	10	48	19	13	33	10	12	7	4	6	3	3	4	48
14-Aug	10	5	3	4	5	7	8	7	7	8	11	9	12	10	13	11	8	7	6	6	9	10	6	7	13
15-Aug	6	14	10	7	11	10	10	8	7	7	9	11	15	14	11	12	10	17	7	11	9	12	7	8	17
16-Aug	8	25	28	16	32	4	6	9	19	25	41	54	45	30	18	32	41	14	13	8	6	3	4	4	54
17-Aug	5	4	5	8	10	15	7	10	12	15	29	15	25	45	28	20	30	15	7	4	21	22	13	6	45
18-Aug	40	17	9	5	12	7	8	22	22	23	52	34	34	52	71	22	20	17	19	12	3	6	5	4	71
19-Aug	4	3	4	4	4	6	7	6	9	11	13	12	12	7	7	9	8	21	9	7	7	8	8	6	21
20-Aug	5	6	13	6	4	6	6	9	10	8	8	7	9	11	8	6	7	7	7	8	6	6	7	5	13
21-Aug	4	4	4	4	4	4	6	7	9	9	7	16	9	14	12	16	7	17	13	7	7	6	6	7	17
22-Aug	5	5	5	5	5	5	5	6	6	9	9	9	27	15	11	9	25	14	20	67	10	8	2	2	67
23-Aug	5	5	5	5	4	4	6	5	7	10	10	14	12	13	19	16	11	8	10	7	5	5	75	30	75
24-Aug	54	28	70	31	11	11	6	8	9	16	17	25	16	17	10	11	14	12	7	4	4	7	19	10	70
25-Aug	12	9	13	12	9	10	21	19	38	39	19	26	21	13	9	10	11	10	6	10	4	15	18	7	39
26-Aug	7	11	18	8	6	11	7	16	35	22	20	52	27	28	42	27	22	25	10	12	16	8	5	4	52
27-Aug	23	20	14	21	13	7	5	6	9	15	8	9	25	16	14	11	9	14	8	17	6	3	6	9	25
28-Aug	5	6	4	4	5	7	10	11	7	7	6	8	10	9	9	9	13	11	11	19	11	5	45	8	45
29-Aug	30	27	78	84	35	25	12	15	24	19	22	25	24	19	12	16	21	9	7	11	12	9	12	14	84
30-Aug	12	10	8	7	6	12	14	33	9	11	11	19	15	37	69	44	82	22	7	11	20	6	14	14	82
31-Aug	6	4	5	5	5	3	9	9	9	6	9	19	13	8	12	8	8	11	6	7	8	5	13	11	19
	54	39	99	84	35	61	29	84	64	44	104	54	53	85	71	77	82	90	53	67	27	69	84	46	
	Diurnal Maximum																								

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction 90 m (WD90m) - deg

Mannix - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

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

Mannix - August 2015

Maximum Value: 0.9 km/h on Aug 4 13:00

Maximum Daily Average: 0.4 km/h on Aug 6

Minimum Value: -0.9 km/h on Aug 21 22:00

Minimum Daily Average: -0.4 km/h on Aug 15

Maximum Diurnal Average: 0.1 km/h at hour 8

Minimum Diurnal Average: 0.0 km/h at hour 16

Monthly Average: 0.04 km/h

Percentiles: P_1 = -0.6 P_{10} = -0.3 Q_1 = -0.2 Median = 0.0 Q_3 = 0.2 P_{90} = 0.4 P_{99} = 0.7

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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	-0.2	-0.1	-0.2	-0.2	-0.1	0.0	-0.2	0.1	0.0	-0.1	-0.1	0.1	-0.2	-0.2	-0.3	-0.4	-0.4	-0.3	-0.6	0.3	0.1	0.0	-0.1	-0.1	-0.1	0.3
2-Aug	-0.1	-0.1	-0.3	-0.3	-0.2	0.0	0.1	0.0	0.1	0.1	0.1	0.3	0.3	0.3	0.4	0.3	-0.2	-0.3	0.4	0.0	0.1	0.1	0.2	-0.1	0.1	0.4
3-Aug	-0.1	-0.1	-0.2	0.0	-0.2	0.0	0.2	0.1	0.2	0.0	0.3	0.1	0.1	0.3	0.2	0.4	0.3	0.2	0.2	0.4	0.4	0.3	0.1	0.0	0.1	0.4
4-Aug	0.2	0.1	0.5	0.3	0.5	0.6	0.3	0.4	0.4	0.7	0.5	0.5	0.9	0.7	0.6	0.4	0.2	0.1	0.4	0.4	0.3	0.2	0.1	0.3	0.4	0.9
5-Aug	0.3	0.3	0.5	0.4	0.3	0.3	0.4	0.4	0.2	0.1	0.0	0.1	0.3	0.1	0.3	0.4	0.4	0.4	0.5	0.6	0.4	0.3	0.2	0.3	0.3	0.6
6-Aug	0.1	0.4	0.3	0.4	0.2	0.4	0.3	0.6	0.5	0.3	0.6	0.8	0.8	0.7	0.4	0.3	0.7	0.4	0.7	0.2	0.3	0.3	0.4	0.4	0.4	0.8
7-Aug	0.3	0.4	0.4	0.3	0.3	0.2	0.1	-0.2	0.0	0.0	0.5	0.4	0.2	0.4	0.3	0.1	0.2	0.1	0.1	0.2	0.3	0.4	0.2	0.2	0.2	0.5
8-Aug	0.2	0.3	0.2	0.1	0.1	0.2	0.1	0.0	-0.1	0.3	0.1	0.3	0.1	0.0	-0.2	0.4	0.0	0.2	0.0	0.4	0.3	0.1	0.1	0.1	0.1	0.4
9-Aug	0.2	0.1	0.2	0.1	0.1	-0.1	0.4	0.2	0.1	0.3	0.2	0.3	0.4	0.3	0.4	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.2	0.4
10-Aug	0.1	0.0	0.0	-0.1	-0.3	0.0	-0.2	0.2	0.1	-0.1	-0.3	0.1	-0.2	-0.3	-0.2	0.1	-0.1	-0.1	-0.2	0.0	-0.1	-0.2	-0.1	0.0	-0.1	0.2
11-Aug	-0.1	0.0	0.1	0.2	0.0	0.0	0.3	0.2	0.2	-0.2	-0.3	-0.5	0.1	-0.2	-0.4	-0.1	-0.1	0.0	0.0	-0.2	-0.4	-0.3	-0.2	-0.1	-0.1	0.3
12-Aug	0.0	-0.2	-0.2	-0.2	-0.1	-0.2	-0.3	0.2	-0.1	0.0	0.0	0.0	0.1	0.0	0.0	-0.1	0.3	0.2	0.3	-0.3	-0.3	-0.2	-0.2	-0.4	-0.1	0.3
13-Aug	-0.2	0.0	0.2	0.0	-0.1	0.1	0.0	0.3	0.1	0.4	0.3	0.2	-0.1	-0.1	0.0	-0.3	-0.1	-0.1	-0.1	-0.3	-0.2	-0.2	-0.3	-0.3	0.0	0.4
14-Aug	0.1	0.2	0.0	0.2	-0.1	-0.2	0.0	-0.2	0.0	0.0	-0.1	0.0	0.1	0.2	0.0	0.1	-0.4	-0.2	0.0	0.0	-0.3	-0.1	0.5	0.4	0.0	0.5
15-Aug	0.2	0.1	-0.5	-0.6	-0.4	-0.4	-0.2	-0.6	-0.4	-0.6	-0.4	-0.4	-0.3	-0.3	-0.6	-0.6	-0.6	-0.3	-0.5	-0.4	-0.4	-0.2	-0.3	-0.4	-0.4	0.2
16-Aug	-0.2	-0.2	0.1	-0.2	-0.1	-0.2	-0.2	-0.2	-0.1	-0.3	0.2	-0.1	0.2	-0.2	-0.1	-0.3	0.1	-0.2	0.1	0.0	-0.2	-0.3	-0.2	-0.1	-0.1	0.2
17-Aug	-0.3	-0.2	-0.4	-0.3	-0.3	0.2	0.2	0.1	0.0	0.2	0.3	0.2	-0.1	0.0	0.1	0.1	0.1	-0.2	0.0	0.0	0.1	0.1	0.1	-0.2	0.0	0.3
18-Aug	-0.1	-0.1	-0.4	-0.4	-0.3	-0.1	0.0	0.0	0.1	-0.2	0.1	-0.2	-0.2	-0.1	0.3	0.3	0.2	0.1	0.1	-0.1	0.5	0.4	0.4	0.5	0.0	0.5
19-Aug	0.7	0.6	0.7	0.7	0.5	0.5	0.4	0.7	0.4	0.0	-0.2	-0.2	-0.1	0.1	0.1	0.0	0.0	-0.2	-0.1	0.0	0.4	0.3	0.3	-0.1	0.2	0.7
20-Aug	-0.1	-0.1	0.1	-0.3	-0.4	-0.4	-0.1	0.2	0.2	0.2	0.3	0.2	0.1	-0.2	0.0	-0.5	-0.2	-0.3	-0.5	-0.3	0.4	0.3	0.1	0.1	0.0	0.4
21-Aug	0.3	0.1	0.3	0.0	0.1	0.0	0.1	0.3	0.2	-0.3	-0.6	-0.4	-0.3	-0.4	-0.3	-0.2	-0.5	-0.6	-0.4	-0.4	-0.3	-0.9	-0.5	0.2	-0.2	0.3
22-Aug	0.4	0.4	0.4	0.1	0.1	0.2	0.2	0.4	0.3	0.1	0.2	0.1	-0.1	0.0	-0.6	-0.5	0.1	-0.2	-0.1	0.0	0.2	-0.2	0.0	0.2	0.1	0.4
23-Aug	0.2	0.3	0.3	0.2	0.3	0.3	0.4	0.2	0.0	0.1	0.3	0.3	0.3	0.2	0.2	0.1	0.3	0.3	0.2	0.3	0.4	0.5	-0.1	0.0	0.2	0.5
24-Aug	-0.1	0.0	-0.1	0.4	0.1	0.0	0.3	0.2	0.4	0.0	-0.4	-0.1	-0.4	0.2	0.0	0.1	-0.1	0.0	0.1	0.1	0.0	0.0	-0.1	-0.2	0.0	0.4
25-Aug	-0.3	-0.2	-0.2	-0.2	-0.1	0.0	0.0	0.0	-0.1	0.5	-0.1	-0.1	0.0	-0.4	-0.3	-0.3	-0.2	-0.2	-0.2	-0.3	-0.1	-0.1	-0.2	-0.6	-0.1	0.5
26-Aug	-0.3	-0.2	-0.2	0.1	-0.3	-0.1	0.0	0.1	0.1	0.0	0.4	0.1	-0.3	-0.4	-0.1	0.0	-0.1	0.1	0.1	-0.1	-0.1	-0.2	-0.1	-0.2	-0.1	0.4
27-Aug	-0.1	-0.2	0.0	0.1	0.2	0.3	0.1	0.1	0.1	0.0	0.0	0.2	0.2	0.1	-0.1	-0.1	0.0	-0.1	-0.2	-0.2	-0.1	-0.1	0.2	-0.2	0.0	0.3
28-Aug	-0.1	-0.2	-0.3	-0.1	-0.2	-0.2	-0.2	-0.2	-0.3	-0.2	-0.3	-0.2	-0.2	-0.4	-0.3	-0.2	-0.2	0.1	-0.1	-0.1	0.2	0.0	0.0	-0.1	-0.2	0.2
29-Aug	0.0	-0.3	-0.2	0.0	-0.1	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.3	0.1	0.0	0.2	0.3	0.1	0.1	0.1	0.3	0.3	0.2	0.2	0.1	0.3
30-Aug	0.4	0.2	0.3	0.1	0.3	0.0	0.0	-0.1	0.0	-0.2	0.1	-0.1	-0.2	-0.1	0.1	0.0	0.2	0.5	0.3	0.2	0.0	0.0	0.2	0.3	0.1	0.5
31-Aug	0.4	0.4	0.3	0.3	0.3	0.5	0.4	0.2	0.2	0.5	0.4	0.1	-0.3	-0.4	-0.4	-0.4	-0.6	-0.2	-0.2	0.0	-0.3	-0.2	-0.2	0.0	0.0	0.5
	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	Diurnal Average	
	0.7	0.6	0.7	0.7	0.5	0.6	0.4	0.7	0.5	0.7	0.6	0.8	0.9	0.7	0.6	0.4	0.7	0.5	0.7	0.6	0.5	0.5	0.5	0.5	Diurnal Maximum	

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

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

Mannix - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 3.8 km/h on Aug 11 12:00

Minimum Value: 0.2 km/h on Aug 3 04:00

Percentiles: P_1 = 0.3 P_{10} = 0.6 Q_1 = 1.1 Median = 1.6 Q_3 = 2.1 P_{90} = 2.6 P_{99} = 3.2

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
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Aug	1.1	0.5	0.4	0.5	0.5	1.0	1.1	1.2	1.3	1.2	1.7	2.1	2.1	2.2	2.5	2.1	2.1	1.9	2.0	1.1	0.7	0.4	0.7	0.6	2.5
2-Aug	0.3	0.3	0.3	0.4	0.3	0.8	1.1	1.1	1.4	1.8	1.7	1.8	1.9	1.9	2.0	1.4	2.4	2.3	2.0	0.8	0.5	0.5	0.4	0.2	2.4
3-Aug	0.4	0.2	0.4	0.2	0.5	0.6	0.8	0.9	0.7	1.3	1.6	1.7	2.2	2.2	2.4	2.6	1.7	1.2	0.8	0.9	1.2	1.5	1.0	1.1	2.6
4-Aug	1.6	1.3	1.4	1.2	1.8	1.5	1.9	2.6	1.8	1.8	1.6	1.8	1.9	2.4	2.2	1.7	2.1	2.0	2.2	2.4	1.9	1.6	1.7	1.8	2.6
5-Aug	1.7	1.3	1.0	0.9	0.8	1.0	1.3	1.4	1.5	1.6	1.5	1.4	1.6	1.6	1.8	1.9	2.3	2.8	3.0	2.7	2.7	2.0	1.8	1.8	3.0
6-Aug	2.0	2.6	2.4	2.3	2.1	2.1	2.1	2.3	2.2	1.7	2.0	2.1	2.5	2.6	2.5	2.5	2.5	2.4	2.4	1.9	1.9	1.6	1.2	1.2	2.6
7-Aug	1.6	1.2	1.2	0.6	0.8	0.7	0.5	0.8	0.9	1.0	1.2	1.5	1.6	1.5	1.6	1.6	1.4	1.3	1.3	0.8	1.1	1.7	1.3	1.7	1.7
8-Aug	1.4	1.7	1.5	1.0	1.2	1.1	1.1	1.3	1.2	1.8	1.7	1.7	1.6	1.5	1.2	2.4	1.7	1.0	0.6	1.4	1.9	1.5	0.7	0.5	2.4
9-Aug	0.4	0.4	0.4	0.5	0.4	0.4	0.7	1.1	1.3	1.4	1.4	1.5	1.6	1.7	1.6	1.5	1.4	1.0	0.8	0.6	0.5	0.8	1.6	1.6	1.7
10-Aug	1.8	1.9	0.8	1.5	1.5	1.4	1.0	1.5	1.4	2.0	1.8	1.9	2.4	2.6	2.7	2.2	2.2	2.2	1.6	1.2	1.5	2.1	1.3	1.3	2.7
11-Aug	0.7	0.9	0.7	0.7	0.4	0.8	1.1	1.1	UO	UO	UO	3.8	3.5	3.3	3.5	3.0	2.9	2.9	1.6	1.6	1.9	1.7	1.3	1.3	3.8
12-Aug	1.3	1.0	0.7	0.8	0.9	1.2	1.7	2.0	2.6	2.3	2.6	2.5	2.5	2.3	2.3	2.7	2.3	2.1	1.9	1.6	1.0	1.0	0.7	0.6	2.7
13-Aug	0.5	0.5	0.7	0.9	0.9	1.0	0.9	1.3	1.1	1.7	1.6	1.5	1.3	1.6	2.0	2.4	1.7	1.9	2.1	1.6	0.8	1.5	1.9	1.6	2.4
14-Aug	1.8	1.2	1.7	2.1	2.2	2.4	2.5	2.5	2.7	3.2	2.9	3.2	2.8	2.8	2.7	3.0	3.2	2.8	2.7	2.3	2.5	2.0	1.5	1.8	3.2
15-Aug	1.8	1.7	2.2	2.1	2.5	2.4	2.2	3.0	3.0	3.2	3.2	3.5	3.4	3.1	3.2	3.2	3.1	2.5	2.4	2.0	2.0	1.8	2.0	1.4	3.5
16-Aug	1.2	0.7	0.6	0.6	0.6	0.7	0.8	0.8	1.0	1.3	1.6	2.1	1.4	2.1	2.1	2.0	1.4	1.1	1.1	0.7	0.5	0.4	0.4	0.2	2.1
17-Aug	0.6	0.5	0.5	0.6	0.8	1.1	1.3	1.3	1.4	1.5	1.6	2.5	2.2	1.9	2.0	1.8	2.0	1.2	1.6	1.4	0.6	1.0	1.0	0.8	2.5
18-Aug	0.7	0.6	1.3	1.4	1.1	1.1	1.0	1.3	1.7	1.6	1.7	1.8	1.8	1.9	1.8	1.8	1.8	1.5	1.3	1.0	1.7	1.6	1.5	1.9	1.9
19-Aug	2.1	2.5	2.8	2.9	2.9	2.6	2.4	2.9	2.6	2.7	2.4	2.6	2.5	2.5	2.8	3.1	3.0	3.1	3.0	2.8	1.8	1.9	1.8	1.8	3.1
20-Aug	1.9	1.8	1.3	1.4	1.6	2.2	2.6	2.4	2.4	2.6	2.4	2.5	2.6	2.5	2.4	2.5	2.3	2.5	2.2	2.2	1.5	1.7	1.7	1.5	2.6
21-Aug	1.4	1.6	1.5	1.6	1.7	1.8	1.8	1.6	2.1	2.3	2.4	2.2	2.5	2.5	2.9	2.2	2.5	2.7	2.0	2.1	2.0	2.3	2.3	1.9	2.9
22-Aug	1.4	1.3	1.4	1.5	1.4	1.5	1.3	1.4	1.4	1.6	1.9	2.1	1.9	1.7	2.3	2.4	2.1	1.3	1.1	0.6	0.6	0.8	0.4	0.9	2.4
23-Aug	1.1	1.0	1.1	1.3	1.5	1.5	1.6	1.5	1.7	2.0	2.1	2.4	2.8	2.2	2.0	1.9	2.1	2.2	1.4	2.1	2.8	2.4	2.4	1.0	2.8
24-Aug	0.9	0.7	0.7	1.7	1.3	1.2	1.4	1.8	2.1	2.2	1.7	1.8	2.0	2.3	2.2	2.0	1.7	1.5	1.2	0.5	0.3	0.3	0.4	0.7	2.3
25-Aug	0.8	0.9	0.5	0.4	0.5	0.2	0.5	0.6	1.0	1.6	1.6	2.0	1.9	1.8	2.2	2.1	2.1	1.7	1.3	1.2	1.2	0.5	1.1	2.0	2.2
26-Aug	1.9	1.7	1.4	1.1	1.4	1.0	0.9	1.0	1.0	1.2	1.4	1.4	1.4	1.4	1.1	1.3	1.1	1.0	0.8	0.5	0.4	0.7	0.5	0.3	1.9
27-Aug	0.3	0.5	0.3	0.7	0.9	1.1	1.0	1.4	1.6	1.4	2.0	2.3	2.3	2.4	2.6	3.0	2.9	2.6	1.8	1.3	1.8	1.6	1.1	1.0	3.0
28-Aug	1.5	1.1	1.5	1.3	1.0	1.1	1.3	1.6	2.1	2.4	2.8	2.8	2.9	2.9	2.7	2.7	2.3	1.6	0.7	0.3	0.4	0.3	0.6	1.0	2.9
29-Aug	1.0	1.3	0.7	1.2	0.6	0.7	0.8	0.7	1.4	1.5	1.7	2.0	2.0	1.9	1.9	1.8	1.7	1.9	2.1	2.0	2.1	2.4	2.2	2.0	2.4
30-Aug	2.3	2.4	2.5	2.1	1.8	0.6	0.6	1.3	1.8	1.8	1.8	1.7	1.9	1.8	1.7	1.3	1.1	2.7	2.3	1.4	0.9	0.7	1.0	1.3	2.7
31-Aug	1.3	1.4	1.2	1.3	1.3	2.0	1.6	1.4	1.6	2.0	2.0	2.5	2.7	2.8	3.1	3.6	2.9	2.6	2.2	1.7	1.4	1.2	1.2	0.9	3.6
	2.3	2.6	2.8	2.9	2.9	2.6	2.6	3.0	3.0	3.2	3.2	3.8	3.5	3.3	3.5	3.6	3.2	3.1	3.0	2.8	2.8	2.4	2.4	2.0	
	Diurnal Maximum																								

UO - Unstable Operation

Wood Buffalo Environmental Association

Summary of Hour Averages

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

Mannix - August 2015

Maximum Value: 1.8 km/h on Aug 6 08:00

Maximum Daily Average: 0.9 km/h on Aug 6

Minimum Value: -1.0 km/h on Aug 15 10:00

Minimum Daily Average: -0.4 km/h on Aug 15

Maximum Diurnal Average: 0.3 km/h at hour 11

Minimum Diurnal Average: 0.1 km/h at hour 24

Monthly Average: 0.21 km/h

Percentiles: P_1 = -0.7 P_{10} = -0.3 Q_1 = -0.1 Median = 0.2 Q_3 = 0.5 P_{90} = 0.8 P_{99} = 1.2

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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	-0.1	0.1	0.0	-0.1	-0.1	0.0	-0.1	0.1	-0.1	0.3	0.0	0.4	0.0	0.3	0.3	-0.2	-0.2	-0.1	-0.5	0.6	0.4	0.3	0.1	-0.1	0.1	0.6
2-Aug	0.0	0.1	0.1	0.0	-0.1	0.0	0.2	0.4	0.4	0.6	0.6	1.0	0.7	0.8	0.9	0.7	0.0	-0.2	0.4	0.2	0.2	0.1	0.3	0.1	0.3	1.0
3-Aug	0.0	0.1	0.1	0.2	0.1	0.2	0.5	0.5	0.6	0.0	0.9	0.4	0.6	0.7	0.8	1.0	0.9	0.7	0.7	0.8	0.5	0.9	0.4	0.4	0.5	1.0
4-Aug	0.6	0.6	0.7	0.7	0.6	0.8	0.7	0.6	0.9	0.8	0.7	0.7	1.2	1.1	1.1	0.8	0.4	0.5	1.0	0.9	0.9	0.7	0.8	0.6	0.8	1.2
5-Aug	0.9	0.6	0.6	0.5	0.5	0.3	0.4	0.4	0.6	0.5	0.2	0.4	0.5	0.5	0.6	0.8	1.0	0.7	1.1	1.2	0.9	0.8	1.2	1.1	0.7	1.2
6-Aug	0.6	1.1	0.5	0.6	0.4	0.6	1.3	1.8	1.0	0.9	0.9	1.2	1.1	1.2	0.6	0.9	1.3	0.7	0.9	0.9	0.8	1.0	0.9	0.6	0.9	1.8
7-Aug	0.6	0.7	0.8	0.6	0.4	0.4	0.2	0.4	0.2	0.5	1.2	0.3	0.3	0.4	0.5	0.3	0.3	0.3	0.5	0.4	0.6	0.7	0.6	0.7	0.5	1.2
8-Aug	0.6	0.8	0.6	0.5	0.5	0.4	0.4	0.3	0.2	0.6	0.5	0.8	0.5	0.5	0.1	1.0	0.3	0.1	0.2	0.5	0.6	0.3	0.3	0.4	0.5	1.0
9-Aug	0.3	0.2	0.2	0.2	0.3	0.2	0.8	0.4	0.3	0.6	0.1	0.7	0.9	0.7	0.9	0.5	0.4	0.5	0.4	0.3	0.5	0.4	0.8	0.9	0.5	0.9
10-Aug	0.2	0.0	0.1	-0.1	-0.4	-0.1	0.0	0.2	0.5	0.1	-0.1	0.5	-0.1	0.2	-0.2	-0.1	0.0	-0.2	-0.2	0.0	-0.1	-0.6	-0.1	-0.2	0.0	0.5
11-Aug	-0.1	0.0	0.2	0.4	0.1	0.1	0.6	0.1	0.1	0.1	-0.5	-1.0	-0.1	-0.3	-0.7	-0.3	-0.3	-0.1	-0.1	-0.2	-0.3	-0.3	-0.3	-0.3	-0.1	0.6
12-Aug	-0.4	-0.4	-0.3	-0.1	-0.1	0.0	-0.3	0.1	-0.4	0.6	-0.1	-0.1	-0.1	0.3	0.2	0.0	0.3	0.0	-0.1	-0.4	-0.5	-0.4	-0.5	-0.5	-0.1	0.6
13-Aug	-0.5	0.0	0.4	0.1	-0.1	0.2	0.1	0.4	0.3	0.6	1.0	0.5	0.5	0.2	0.1	-0.5	0.0	-0.1	-0.4	-0.4	-0.3	-0.5	-0.6	-0.5	0.0	1.0
14-Aug	-0.2	-0.1	-0.3	-0.3	-0.3	-0.2	-0.3	-0.5	-0.5	-0.3	-0.3	0.3	-0.1	0.3	-0.1	0.1	-0.1	-0.1	0.1	0.1	-0.2	-0.1	0.2	0.1	-0.1	0.3
15-Aug	0.1	0.2	-0.2	-0.3	-0.2	-0.5	-0.2	-0.7	-0.6	-1.0	-0.6	-0.7	0.3	-0.1	-0.6	-0.6	-0.7	-0.3	-0.7	-0.4	-0.3	-0.2	-0.4	-0.3	-0.4	0.3
16-Aug	-0.2	-0.1	0.3	-0.2	0.1	0.0	-0.1	0.0	0.2	0.0	0.6	0.2	0.4	-0.2	0.1	-0.3	0.4	-0.1	0.1	0.0	-0.2	-0.4	-0.3	-0.3	0.0	0.6
17-Aug	-0.3	-0.2	-0.3	-0.2	-0.1	0.4	0.7	0.4	0.3	0.5	0.7	0.6	-0.2	0.5	0.3	0.2	0.6	0.1	0.1	0.0	0.2	0.4	0.4	0.2	0.2	0.7
18-Aug	0.0	-0.2	-0.5	-0.5	-0.3	-0.2	0.3	0.5	0.2	-0.4	0.6	0.2	-0.3	0.2	0.8	1.0	0.5	0.6	0.3	0.3	0.9	0.8	0.7	0.7	0.3	1.0
19-Aug	1.0	0.9	1.0	1.1	1.0	1.0	0.9	1.0	0.9	0.4	0.1	-0.3	-0.2	-0.1	-0.4	-0.3	-0.3	-0.2	0.1	-0.2	0.1	0.1	0.0	0.0	0.3	1.1
20-Aug	-0.3	-0.3	0.0	-0.4	-0.4	-0.4	0.0	0.0	0.2	0.1	-0.1	-0.1	0.1	-0.3	0.0	-0.2	0.1	0.1	-0.1	-0.1	0.0	0.1	-0.1	-0.2	-0.1	0.2
21-Aug	-0.2	-0.3	-0.1	-0.3	-0.3	-0.1	0.0	0.0	0.2	-0.1	-0.2	-0.4	-0.2	-0.1	-0.6	0.1	-0.3	-0.5	-0.2	-0.1	-0.2	-0.5	-0.1	0.0	-0.2	0.2
22-Aug	0.1	0.1	0.0	-0.2	-0.1	-0.1	0.0	0.3	0.2	0.0	0.5	0.2	0.1	0.2	-0.1	-0.2	0.7	-0.1	-0.1	0.1	0.5	0.3	0.3	0.4	0.1	0.7
23-Aug	0.5	0.5	0.6	0.6	0.7	0.9	0.8	0.6	0.4	0.8	0.8	0.6	0.7	0.6	0.7	0.4	1.0	0.7	0.7	0.8	1.2	1.1	0.0	0.2	0.7	1.2
24-Aug	0.2	0.0	0.0	0.9	0.7	0.2	0.6	0.5	0.8	0.2	-0.1	0.4	-0.1	0.3	0.1	0.0	-0.1	0.1	0.0	0.0	-0.2	-0.2	-0.4	-0.2	0.2	0.9
25-Aug	-0.1	0.1	0.0	-0.1	-0.1	0.0	0.2	0.2	0.1	1.3	0.2	0.6	0.5	-0.3	-0.4	0.1	0.0	-0.1	-0.1	-0.2	0.0	0.1	0.0	-0.2	0.1	1.3
26-Aug	0.0	-0.1	-0.1	0.1	-0.1	0.1	0.2	0.4	0.2	0.1	0.6	0.2	0.0	-0.1	0.0	0.2	-0.1	0.3	0.3	0.1	0.0	-0.1	-0.3	-0.1	0.1	0.6
27-Aug	0.1	0.0	0.2	0.2	0.0	0.5	0.4	0.5	0.3	0.3	0.6	0.8	0.5	0.6	0.3	0.0	0.1	-0.3	-0.1	-0.1	-0.2	-0.2	0.2	-0.3	0.2	0.8
28-Aug	-0.2	-0.4	-0.3	-0.2	-0.2	-0.2	-0.2	-0.1	-0.3	0.2	-0.8	-0.5	-0.3	-0.7	-0.5	-0.4	-0.3	0.0	-0.1	0.0	0.2	0.2	0.0	-0.1	-0.2	0.2
29-Aug	0.0	-0.2	0.1	0.3	0.2	0.0	0.2	0.2	0.5	0.2	0.4	0.7	1.5	0.4	0.2	0.5	1.0	0.4	0.5	0.6	1.1	0.7	0.7	0.5	0.4	1.5
30-Aug	0.8	0.8	0.8	0.7	0.8	0.2	0.1	0.0	-0.3	-0.1	0.4	0.1	0.2	0.2	0.3	0.0	0.4	1.2	0.9	0.6	0.3	0.1	0.4	0.7	0.4	1.2
31-Aug	0.7	1.0	0.7	0.7	0.6	1.0	0.7	0.5	0.8	0.9	0.9	0.6	-0.3	-0.4	-0.3	-0.4	-0.9	-0.1	-0.2	-0.4	-0.4	-0.4	-0.2	-0.1	0.2	1.0
	0.1	0.2	0.2	0.2	0.1	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.1	Diurnal Average	
	1.0	1.1	1.0	1.1	1.0	1.0	1.3	1.8	1.0	1.3	1.2	1.2	1.5	1.2	1.1	1.0	1.3	1.2	1.1	1.2	1.2	1.1	1.2	1.1	Diurnal Maximum	

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

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

Mannix - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 3.9 km/h on Aug 31 16:00

Minimum Value: 0.2 km/h on Aug 27 00:00

Percentiles: P_1 = 0.2 P_{10} = 0.5 Q_1 = 1.0 Median = 1.7 Q_3 = 2.3 P_{90} = 2.8 P_{99} = 3.6

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
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Aug	1.0	0.6	0.3	0.2	0.3	0.9	1.0	1.1	1.1	1.2	2.0	2.5	2.5	2.8	3.1	2.5	2.2	2.0	2.0	1.2	1.0	0.6	0.5	0.5	3.1
2-Aug	0.3	0.2	0.3	0.2	0.2	0.4	0.9	1.2	1.6	1.8	2.1	2.2	2.2	2.5	2.5	1.9	2.2	2.1	2.0	0.8	0.4	0.4	0.6	0.3	2.5
3-Aug	0.4	0.3	0.3	0.3	0.3	0.4	0.8	0.8	0.9	1.4	1.9	2.0	2.5	2.6	2.9	2.4	1.8	1.3	1.1	1.1	1.0	1.7	0.9	1.1	2.9
4-Aug	1.3	1.2	1.3	1.5	1.6	1.7	2.0	2.3	1.9	1.8	1.5	1.9	2.3	2.4	2.5	1.9	2.0	2.1	2.5	2.5	1.9	1.7	1.8	1.7	2.5
5-Aug	1.7	1.4	1.3	1.0	0.9	1.0	1.4	1.4	1.7	1.8	1.8	1.7	2.1	1.9	2.0	2.1	2.4	2.7	3.0	2.8	2.9	2.2	2.0	2.1	3.0
6-Aug	2.2	3.1	2.4	2.4	2.2	2.3	2.4	2.6	2.1	1.9	2.0	2.1	2.7	2.7	2.5	2.6	2.7	2.3	2.2	1.9	1.9	1.5	1.3	1.3	3.1
7-Aug	1.7	1.2	1.2	0.8	0.8	0.8	0.6	1.0	1.1	1.3	1.4	1.7	2.0	1.8	2.2	2.0	1.9	1.7	1.3	0.6	0.8	1.4	1.2	1.6	2.2
8-Aug	1.5	1.5	1.5	0.8	1.2	1.0	1.0	1.2	1.4	2.0	2.2	2.1	2.2	1.9	1.6	2.0	1.5	0.7	0.5	1.2	1.9	1.7	0.6	0.4	2.2
9-Aug	0.5	0.5	0.4	0.4	0.4	0.4	0.8	1.2	1.5	1.6	1.9	2.1	2.1	2.2	1.8	1.9	2.0	1.3	1.1	0.7	0.4	0.8	1.5	1.4	2.2
10-Aug	1.9	2.3	0.9	1.1	1.1	1.3	1.2	1.6	1.6	2.5	2.3	2.5	2.8	3.2	3.1	2.5	2.4	2.2	1.7	0.8	0.6	1.6	0.6	0.8	3.2
11-Aug	0.5	0.3	0.9	0.7	0.6	0.6	0.9	0.9	UO	UO	UO	3.8	3.9	3.7	3.8	3.3	3.4	3.2	1.8	1.5	1.9	1.3	0.7	1.0	3.9
12-Aug	1.2	1.0	0.7	1.0	1.3	1.4	1.9	2.5	2.7	2.7	2.9	2.8	3.0	2.9	2.8	3.0	2.8	2.3	2.2	1.5	0.6	0.6	0.5	0.3	3.0
13-Aug	0.3	0.5	0.8	0.5	0.5	0.8	0.8	1.3	1.2	1.3	1.6	1.4	1.7	1.6	2.1	2.4	1.6	2.2	2.1	1.5	0.5	0.8	1.2	1.2	2.4
14-Aug	1.8	1.0	1.4	1.9	2.0	2.4	2.6	2.8	3.1	3.3	3.0	3.7	3.3	2.9	3.0	3.1	3.2	2.7	2.8	2.3	2.3	1.9	1.7	1.9	3.7
15-Aug	1.7	1.7	2.0	1.8	2.7	2.3	2.4	3.1	3.0	2.9	3.1	3.5	3.6	3.3	3.4	3.1	3.3	2.7	2.2	1.8	2.1	1.9	1.9	1.4	3.6
16-Aug	1.3	1.0	0.7	0.6	0.7	0.5	0.6	0.8	1.4	1.9	2.2	2.0	1.9	2.5	2.4	2.2	1.9	1.3	1.3	0.8	0.3	0.4	0.3	0.3	2.5
17-Aug	0.9	0.5	0.7	0.4	0.6	0.8	1.0	1.3	1.4	1.8	1.9	2.8	2.5	2.5	2.6	2.2	2.1	1.2	1.1	0.8	0.6	0.9	0.7	0.4	2.8
18-Aug	0.5	0.5	1.2	1.1	1.2	0.9	0.9	1.6	2.0	2.0	2.3	2.4	2.4	2.6	2.4	2.4	2.0	1.7	1.2	0.7	1.2	0.8	0.8	1.0	2.6
19-Aug	1.5	2.0	2.2	2.1	2.4	2.3	2.4	2.7	2.5	2.6	2.7	2.9	2.8	2.7	3.1	3.4	3.2	3.2	3.0	2.8	1.9	2.2	1.9	2.1	3.4
20-Aug	1.8	1.8	1.4	1.2	1.5	2.2	2.7	2.6	2.7	2.6	2.6	2.7	2.8	2.5	2.2	2.3	2.3	2.4	2.0	2.0	1.4	1.8	1.7	1.3	2.8
21-Aug	1.4	1.4	1.3	1.4	1.5	1.7	1.9	1.7	2.3	2.4	2.2	2.1	2.2	2.6	3.2	2.3	2.3	2.4	1.9	2.0	1.9	2.1	2.1	1.8	3.2
22-Aug	1.3	1.3	1.5	1.3	1.3	1.4	1.2	1.5	1.5	1.8	2.1	2.4	2.1	1.9	2.4	2.2	2.6	1.5	1.2	0.7	0.5	0.3	0.4	0.7	2.6
23-Aug	0.9	1.0	1.2	1.4	1.6	1.5	1.5	1.5	1.9	2.4	2.4	2.5	2.5	2.3	2.0	2.1	2.3	2.1	1.3	1.9	3.0	2.4	2.4	1.0	3.0
24-Aug	0.7	0.5	0.6	1.5	1.1	0.9	1.3	1.6	2.0	2.5	2.1	2.4	2.7	2.9	2.4	2.3	1.9	1.8	1.2	0.6	0.2	0.2	0.5	0.9	2.9
25-Aug	0.6	0.6	0.4	0.3	0.4	0.3	0.4	0.5	0.9	1.9	2.0	2.8	2.5	1.9	2.0	2.1	2.1	1.6	1.2	1.0	1.1	0.5	1.0	1.9	2.8
26-Aug	2.0	1.9	1.4	1.1	1.3	1.1	0.9	1.1	1.2	1.4	1.7	2.0	2.0	2.0	1.5	1.6	1.4	1.2	0.6	0.3	0.2	0.3	0.4	0.2	2.0
27-Aug	0.3	0.3	0.2	0.3	0.3	0.5	1.0	1.4	1.6	1.5	2.1	2.7	2.9	2.7	2.9	2.8	2.9	2.7	2.0	0.8	1.1	1.1	0.8	1.3	2.9
28-Aug	1.4	1.2	1.4	1.3	1.0	1.2	1.4	1.9	2.3	2.6	2.8	2.9	3.3	3.0	2.9	3.1	2.5	1.8	0.4	0.2	0.5	0.4	0.9	0.7	3.3
29-Aug	1.0	0.9	0.6	0.8	0.5	0.4	0.5	0.7	1.7	1.7	2.1	2.4	2.6	2.4	2.2	2.0	2.0	1.9	2.2	2.2	2.6	3.0	2.6	2.2	3.0
30-Aug	2.7	2.7	2.7	1.9	1.6	0.6	0.6	1.5	1.9	1.9	2.2	2.3	2.5	2.3	2.3	1.8	1.1	2.8	1.8	1.2	0.7	0.5	0.7	1.3	2.8
31-Aug	1.1	1.4	1.2	1.3	1.3	1.6	1.3	1.2	1.5	2.0	1.8	2.8	2.8	2.9	3.6	3.9	2.8	2.7	2.1	1.0	1.2	0.4	0.7	0.5	3.9
	2.7	3.1	2.7	2.4	2.7	2.4	2.7	3.1	3.1	3.3	3.1	3.8	3.9	3.7	3.8	3.9	3.4	3.2	3.0	2.8	3.0	3.0	2.6	2.2	
	Diurnal Maximum																								

UO - Unstable Operation

Wood Buffalo Environmental Association

Summary of Hour Averages

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

Mannix - August 2015

Maximum Value: 1.5 km/h on Aug 25 10:00

Maximum Daily Average: 0.5 km/h on Aug 6

Minimum Value: -1.0 km/h on Aug 31 17:00

Minimum Daily Average: -0.3 km/h on Aug 11

Maximum Diurnal Average: 0.2 km/h at hour 14

Minimum Diurnal Average: 0.0 km/h at hour 24

Monthly Average: 0.10 km/h

Percentiles: P_1 = -0.7 P_{10} = -0.4 Q_1 = -0.1 Median = 0.1 Q_3 = 0.3 P_{90} = 0.6 P_{99} = 1.0

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0.0	0.2	0.0	0.0	0.0	0.3	0.1	0.2	0.0	0.6	0.1	0.3	0.2	0.5	0.7	0.0	-0.1	0.3	-0.3	0.6	0.3	0.2	0.4	-0.1	0.2	0.7
2-Aug	0.1	0.1	0.1	0.1	-0.2	0.0	0.2	0.2	-0.1	0.3	0.3	0.7	0.3	0.8	0.7	0.8	0.2	-0.1	0.4	0.1	0.1	0.1	0.2	0.0	0.2	0.8
3-Aug	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.4	0.6	-0.4	0.6	0.0	0.4	0.0	0.5	0.7	0.6	0.6	0.4	0.5	-0.1	0.3	-0.1	0.2	0.3	0.7
4-Aug	-0.3	0.5	0.1	0.3	0.5	0.3	0.5	0.3	0.5	0.3	0.3	0.2	1.0	0.5	0.7	0.3	0.0	-0.1	0.7	0.0	0.0	0.2	0.5	0.4	0.3	1.0
5-Aug	0.6	-0.2	0.2	0.4	0.5	0.6	-0.1	0.0	0.3	0.1	-0.2	0.0	0.2	0.0	0.0	0.3	0.7	-0.2	0.3	0.6	0.0	0.7	1.0	0.5	0.3	1.0
6-Aug	0.1	0.6	0.0	0.3	0.2	0.2	0.9	1.2	0.7	0.4	0.6	0.7	0.4	0.9	-0.1	0.5	1.0	0.5	0.4	0.5	0.5	0.9	0.6	0.3	0.5	1.2
7-Aug	0.4	0.6	0.8	0.5	0.3	0.1	-0.1	0.6	0.2	0.8	1.4	0.0	0.0	-0.1	0.1	0.1	-0.1	0.2	0.6	0.2	0.1	0.3	0.1	-0.1	0.3	1.4
8-Aug	0.1	0.4	0.1	-0.1	0.0	0.0	0.0	-0.1	-0.1	0.4	0.0	0.8	0.2	0.6	0.0	0.8	0.0	0.0	0.1	0.1	-0.1	-0.2	0.1	0.1	0.1	0.8
9-Aug	0.1	0.0	-0.1	0.1	0.0	0.0	0.4	0.4	0.1	0.3	-0.5	0.6	0.8	0.6	1.0	0.4	0.2	0.5	0.2	0.1	0.1	0.0	-0.1	0.1	0.2	1.0
10-Aug	0.2	0.4	-0.2	-0.2	-0.5	0.0	-0.2	-0.2	0.3	-0.4	-0.1	0.5	-0.4	0.4	-0.3	-0.1	0.0	-0.3	-0.4	-0.2	-0.5	-0.7	-0.6	-0.6	-0.2	0.5
11-Aug	-0.4	-0.4	-0.1	0.1	-0.2	-0.1	0.2	-0.2	0.0	0.0	-0.7	-1.0	-0.1	-0.3	-0.5	-0.4	-0.5	-0.2	-0.2	-0.4	-0.6	-0.6	-0.5	-0.3	-0.3	0.2
12-Aug	-0.6	-0.7	-0.6	-0.3	-0.2	-0.2	-0.3	0.0	-0.4	0.9	-0.4	0.2	-0.1	0.5	0.4	0.2	0.4	0.1	0.0	-0.3	-0.5	-0.6	-0.5	-0.5	-0.1	0.9
13-Aug	-0.7	-0.2	0.1	-0.1	-0.2	-0.1	-0.2	-0.1	0.0	0.3	0.6	0.4	0.4	0.5	0.1	-0.5	-0.3	-0.2	-0.7	-0.5	-0.5	-0.7	-0.8	-0.6	-0.2	0.6
14-Aug	-0.2	0.0	-0.1	-0.2	-0.1	-0.3	-0.2	-0.4	-0.6	-0.2	-0.2	0.6	0.0	0.4	0.0	0.7	0.4	0.3	0.4	0.4	0.3	0.0	0.3	0.2	0.1	0.7
15-Aug	0.2	0.4	0.4	0.3	0.5	-0.3	0.1	-0.4	-0.4	-0.6	-0.4	-0.3	0.9	0.6	-0.2	-0.2	-0.3	0.0	-0.6	-0.1	0.0	0.0	-0.2	0.0	0.0	0.9
16-Aug	0.1	-0.3	0.2	-0.2	0.1	0.0	-0.1	0.0	0.0	-0.1	0.6	0.3	0.7	-0.2	0.2	0.0	0.5	-0.2	0.2	-0.1	-0.2	-0.3	-0.3	-0.4	0.0	0.7
17-Aug	-0.5	-0.5	-0.4	-0.3	-0.3	0.0	0.2	0.0	0.0	0.4	0.7	0.1	-0.9	0.4	0.3	-0.1	0.2	0.0	-0.1	-0.1	0.0	0.2	0.3	0.2	0.0	0.7
18-Aug	0.1	0.0	-0.4	-0.2	-0.2	-0.3	0.3	0.6	0.2	-0.3	1.1	0.1	-0.4	0.0	0.8	0.7	0.1	0.4	-0.1	0.1	0.7	0.5	0.6	0.3	0.2	1.1
19-Aug	0.7	0.8	0.7	0.8	0.7	0.5	0.4	0.7	0.6	-0.1	-0.3	-0.6	-0.3	0.0	-0.2	-0.3	-0.3	0.2	0.8	0.3	0.5	0.2	0.0	-0.1	0.2	0.8
20-Aug	-0.3	-0.3	0.0	-0.4	-0.3	-0.4	0.2	0.2	0.8	0.5	0.2	0.2	0.5	-0.1	0.2	0.3	0.8	0.6	0.5	0.3	0.1	0.3	0.2	-0.1	0.2	0.8
21-Aug	-0.2	-0.2	-0.1	-0.2	-0.3	-0.1	-0.1	0.2	0.3	0.2	0.2	-0.1	0.1	0.2	-0.1	0.6	0.2	0.0	0.3	0.1	0.2	0.2	0.2	0.3	0.1	0.6
22-Aug	0.2	0.2	0.1	-0.1	-0.1	-0.1	0.2	0.4	0.4	0.1	0.8	0.5	0.5	0.3	0.4	0.4	1.2	0.0	0.1	0.1	-0.1	0.4	0.2	0.1	0.3	1.2
23-Aug	0.3	0.3	0.5	0.1	0.2	0.7	0.3	-0.1	0.1	0.4	0.3	0.1	0.1	0.2	0.1	0.0	0.6	0.6	0.0	-0.2	0.2	0.4	0.2	0.3	0.2	0.7
24-Aug	0.2	-0.1	0.0	0.3	0.5	0.1	0.2	0.4	0.4	0.1	-0.3	0.5	-0.3	0.3	0.4	0.4	0.1	0.2	0.1	-0.1	-0.1	0.0	-0.2	-0.1	0.1	0.5
25-Aug	0.1	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.1	1.5	0.2	1.0	0.4	0.0	-0.2	0.3	0.4	0.2	0.1	0.1	0.3	0.2	0.0	0.1	0.2	1.5
26-Aug	0.4	0.2	0.0	0.1	0.0	0.3	0.2	0.5	0.3	0.2	0.6	0.2	-0.2	-0.1	0.1	0.2	0.0	0.3	0.1	0.0	-0.1	-0.1	-0.4	-0.1	0.1	0.6
27-Aug	0.0	0.0	0.1	0.0	0.1	0.2	0.1	0.2	-0.1	0.0	0.0	0.2	0.1	0.3	0.1	-0.4	-0.3	-0.1	0.0	-0.4	-0.7	-0.7	-0.4	-0.4	-0.1	0.3
28-Aug	-0.2	-0.5	-0.3	-0.2	-0.2	-0.3	-0.2	-0.2	-0.4	0.2	-0.9	-0.9	-0.5	-0.6	-0.6	-0.5	-0.2	0.0	0.0	-0.1	0.0	0.2	0.0	-0.1	-0.3	0.2
29-Aug	0.1	0.1	0.1	0.0	0.2	0.1	0.2	0.0	0.3	-0.1	0.1	0.5	1.5	0.1	-0.4	0.3	1.1	-0.5	-0.5	0.1	0.6	-0.1	0.2	-0.1	0.2	1.5
30-Aug	0.3	-0.2	-0.3	-0.3	-0.1	0.1	0.1	-0.3	-0.3	0.1	0.3	-0.2	0.3	0.2	0.2	-0.2	0.2	0.6	-0.1	0.4	0.0	-0.2	0.0	0.5	0.1	0.6
31-Aug	0.8	0.7	0.5	0.5	0.3	0.7	0.5	0.3	0.7	0.2	0.7	0.0	-0.4	-0.5	-0.3	-0.4	-1.0	-0.2	-0.5	-0.7	-0.5	-0.6	-0.5	-0.3	0.0	0.8
	0.0	0.1	0.1	0.0	0.0	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	Diurnal Average	
	0.8	0.8	0.8	0.8	0.7	0.7	0.9	1.2	0.8	1.5	1.4	1.0	1.5	0.9	1.0	0.8	1.2	0.6	0.8	0.6	0.7	0.9	1.0	0.5	Diurnal Maximum	

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

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

Mannix - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 4.0 km/h on Aug 11 15:00

Minimum Value: 0.2 km/h on Aug 13 00:00

Percentiles: P_1 = 0.2 P_{10} = 0.6 Q_1 = 0.9 Median = 1.8 Q_3 = 2.6 P_{90} = 3.0 P_{99} = 3.6

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
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Aug	0.9	0.6	0.3	0.2	0.2	0.7	0.9	1.0	1.0	1.3	2.3	2.9	2.9	3.4	3.4	2.8	2.9	2.4	2.1	1.6	1.0	0.8	0.6	0.6	3.4
2-Aug	0.4	0.2	0.2	0.2	0.2	0.2	0.6	1.1	1.3	1.8	2.3	2.7	2.6	2.9	3.1	2.5	2.1	1.7	1.8	1.2	0.5	0.4	0.6	0.3	3.1
3-Aug	0.3	0.3	0.3	0.6	0.3	0.7	0.9	1.0	1.1	1.7	2.2	2.3	2.8	3.0	3.2	2.5	1.9	1.6	1.3	1.6	1.6	1.9	1.2	1.5	3.2
4-Aug	1.4	1.9	2.1	2.0	2.6	2.4	2.6	3.5	2.5	2.3	2.2	2.4	2.7	3.0	3.0	2.7	2.8	2.2	3.0	2.5	1.8	2.1	2.4	2.6	3.5
5-Aug	2.2	1.4	1.7	1.3	1.3	1.1	1.8	2.1	2.2	2.0	2.0	1.9	2.2	2.2	1.9	2.6	2.9	2.6	3.1	2.7	3.1	2.6	2.4	2.4	3.1
6-Aug	2.6	3.5	3.2	3.3	3.0	3.1	2.6	2.8	2.7	2.2	2.7	3.0	3.5	3.5	3.2	2.7	3.4	3.1	3.0	2.2	2.4	2.2	1.7	1.9	3.5
7-Aug	2.1	1.8	1.7	0.9	1.0	0.9	0.6	1.1	1.3	1.5	1.5	2.1	2.3	2.3	2.6	2.6	2.2	1.9	1.5	0.5	0.6	1.1	0.6	1.4	2.6
8-Aug	1.3	1.3	1.3	0.8	0.7	0.6	0.8	1.2	1.4	2.1	2.5	2.5	2.6	2.1	1.9	1.9	1.5	0.5	0.4	1.8	2.2	1.7	0.6	0.7	2.6
9-Aug	0.8	0.4	0.9	0.9	0.6	0.7	0.8	1.3	1.6	1.6	2.0	2.4	2.4	2.6	2.2	2.4	2.4	1.4	1.4	0.8	0.6	1.3	1.5	1.2	2.6
10-Aug	2.1	2.4	1.0	0.9	0.6	1.3	1.2	1.6	1.7	2.6	2.7	2.9	3.2	3.6	3.1	2.9	2.5	2.3	1.6	0.7	0.6	1.5	0.4	0.9	3.6
11-Aug	0.6	0.5	1.1	0.9	0.8	0.8	0.9	0.8	2.0	2.7	3.1	3.6	3.7	3.6	4.0	3.3	3.5	3.3	2.0	1.3	1.8	1.1	0.5	1.0	4.0
12-Aug	1.1	1.0	0.8	1.1	1.4	1.6	1.9	2.7	2.8	2.8	2.8	3.2	3.0	3.2	3.1	3.3	3.2	2.5	2.3	1.2	0.4	0.3	0.3	0.2	3.3
13-Aug	0.3	0.5	1.1	0.6	0.5	0.7	0.8	1.0	1.0	1.1	1.4	1.3	1.8	1.9	2.2	2.7	1.7	2.1	2.1	1.6	0.6	0.4	0.7	1.1	2.7
14-Aug	1.9	0.9	1.2	1.7	1.9	2.4	2.7	2.8	3.1	3.3	3.0	3.6	3.6	3.3	3.2	3.6	3.4	2.9	2.7	2.3	2.3	1.8	1.8	2.1	3.6
15-Aug	1.8	1.9	2.2	1.8	2.8	2.3	2.4	2.8	2.8	2.8	3.1	3.3	4.0	3.6	3.7	3.2	3.4	2.9	2.0	1.8	1.9	1.8	1.8	1.6	4.0
16-Aug	1.5	1.1	0.9	0.8	0.9	0.4	0.4	0.5	1.4	2.0	2.4	2.2	2.3	2.8	2.8	2.7	2.2	1.6	1.4	0.7	0.3	0.3	0.3	0.2	2.8
17-Aug	1.0	0.7	0.9	0.6	0.9	0.8	0.6	1.0	1.4	1.7	2.0	3.0	2.8	2.9	3.1	2.4	2.2	1.2	0.9	0.5	0.7	0.8	0.6	0.5	3.1
18-Aug	0.4	0.6	1.3	1.1	1.3	1.0	0.9	1.6	2.1	2.2	2.5	2.7	2.8	3.1	3.0	2.7	2.1	2.1	1.2	0.6	0.8	0.9	0.8	0.7	3.1
19-Aug	0.9	1.3	1.8	1.8	1.9	2.0	2.2	2.5	2.5	2.7	2.7	2.9	3.1	2.8	3.4	3.4	3.1	3.5	3.4	3.0	2.3	2.5	2.2	2.0	3.5
20-Aug	1.7	1.7	1.4	1.3	1.2	2.1	3.0	2.9	3.2	2.9	3.0	3.0	3.2	2.5	2.3	2.5	2.5	2.3	2.2	2.0	1.4	1.9	1.8	1.0	3.2
21-Aug	1.4	1.1	1.4	1.2	1.3	1.4	1.8	1.8	2.5	2.3	2.3	2.2	2.3	2.6	3.1	2.4	2.5	2.3	1.9	1.8	1.9	2.0	2.0	1.7	3.1
22-Aug	1.4	1.4	1.4	1.2	1.3	1.3	1.2	1.5	1.4	2.0	2.5	2.8	2.4	2.0	2.6	2.7	2.9	1.8	1.3	0.9	0.6	0.2	0.3	0.3	2.9
23-Aug	0.5	0.6	0.8	0.9	1.0	1.1	1.2	1.4	1.7	2.1	2.3	2.6	2.7	2.5	2.2	2.2	2.4	2.2	1.1	1.7	2.5	2.1	2.4	1.0	2.7
24-Aug	0.9	0.8	0.7	1.8	0.9	0.9	1.3	1.6	2.1	2.7	2.5	2.8	3.0	3.3	2.7	2.6	2.3	1.9	1.2	0.6	0.3	0.3	0.5	0.8	3.3
25-Aug	0.5	0.7	0.6	0.3	0.3	0.2	0.3	0.3	0.8	2.1	2.3	3.2	2.9	2.0	1.9	2.1	2.1	1.7	1.0	0.9	0.7	0.6	1.0	1.8	3.2
26-Aug	1.9	1.9	1.5	0.8	0.9	0.9	0.7	1.2	1.3	1.4	1.9	2.0	2.2	2.3	1.8	1.8	1.7	1.4	0.5	0.3	0.4	0.5	0.2	0.2	2.3
27-Aug	0.3	0.2	0.3	0.2	0.3	0.3	0.6	1.0	1.2	1.4	1.8	2.8	3.2	3.1	3.0	3.0	2.9	2.9	2.1	0.8	0.8	1.0	0.9	1.6	3.2
28-Aug	1.4	1.3	1.5	1.2	1.0	1.4	1.4	2.0	2.2	2.6	2.8	2.9	3.3	3.2	2.9	3.1	2.8	1.9	0.4	0.2	0.4	0.3	1.2	0.6	3.3
29-Aug	1.1	0.9	0.7	0.7	0.7	0.5	0.4	0.6	1.5	1.7	2.3	2.7	3.0	2.8	2.4	2.2	2.5	1.8	2.1	2.5	3.0	2.8	2.7	2.6	3.0
30-Aug	3.2	2.9	2.5	1.9	1.5	0.6	0.8	1.5	2.1	2.3	2.3	2.6	2.8	2.6	2.7	2.3	1.1	2.9	2.1	0.9	0.7	0.5	0.7	1.1	3.2
31-Aug	0.7	1.0	1.0	0.9	0.9	1.1	1.0	1.0	1.2	1.6	1.8	2.8	2.8	3.0	3.5	3.9	2.7	2.8	1.8	0.9	1.0	0.4	0.8	0.6	3.9
	3.2	3.5	3.2	3.3	3.0	3.1	3.0	3.5	3.2	3.3	3.1	3.6	4.0	3.6	4.0	3.9	3.5	3.5	3.4	3.0	3.1	2.8	2.7	2.6	
	Diurnal Maximum																								

Wood Buffalo Environmental Association

Summary of Hour Averages

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

Mannix - August 2015

Maximum Value: 4.6 km/h on Aug 19 19:00

Maximum Daily Average: 3.1 km/h on Aug 14

Minimum Value: -1.0 km/h on Aug 30 04:00

Minimum Daily Average: -0.4 km/h on Aug 4

Maximum Diurnal Average: 1.4 km/h at hour 16

Minimum Diurnal Average: 0.6 km/h at hour 4

Monthly Average: 0.95 km/h

Percentiles: P_1 = -0.9 P_{10} = -0.3 Q_1 = 0.1 Median = 0.7 Q_3 = 1.7 P_{90} = 2.6 P_{99} = 3.9

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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0.8	0.0	0.1	0.1	0.3	0.9	0.3	0.8	0.6	1.4	0.9	1.3	1.3	1.7	2.2	1.3	1.1	1.8	1.2	0.4	0.3	0.1	1.2	0.3	0.8	2.2
2-Aug	0.4	0.0	0.0	0.3	0.2	0.2	0.2	0.0	0.0	0.4	0.3	-0.1	-0.3	0.5	0.2	0.5	2.1	0.6	-0.4	-0.1	0.4	0.4	0.1	-0.1	0.2	2.1
3-Aug	0.0	-0.1	0.0	-0.1	0.1	0.2	-0.1	0.1	0.4	-0.7	0.2	-0.1	0.7	-0.4	0.8	1.1	0.9	0.3	0.0	0.1	-0.5	-0.1	-0.5	-0.2	0.1	1.1
4-Aug	-0.6	-0.2	-0.5	-0.3	-0.5	-0.4	-0.3	-1.0	-0.3	-0.3	-0.4	-0.4	0.2	-0.3	-0.3	-0.6	-0.7	-0.8	-0.1	-0.4	-0.4	-0.7	-0.3	-0.6	-0.4	0.2
5-Aug	-0.1	-0.4	-0.2	0.0	0.0	0.0	-0.6	-0.7	-0.4	-0.3	-0.2	0.0	0.0	-0.1	-0.1	-0.3	-0.2	-0.9	0.5	1.0	-0.1	-0.1	0.1	-0.4	-0.1	1.0
6-Aug	-0.7	-0.4	-0.8	-0.7	-0.8	-0.6	0.0	0.1	-0.2	-0.3	-0.3	-0.2	-0.6	-0.3	-0.9	-0.3	-0.1	-0.5	-0.5	-0.1	-0.3	0.1	0.0	-0.3	-0.4	0.1
7-Aug	-0.3	-0.1	0.3	0.3	0.0	-0.2	-0.3	0.7	0.3	0.9	1.3	-0.5	-0.5	-0.5	-0.4	-0.4	-0.2	0.2	1.0	0.5	0.2	0.9	0.7	0.1	0.2	1.3
8-Aug	0.2	0.9	0.3	-0.5	0.2	0.3	-0.2	-0.4	0.0	-0.2	-0.3	0.5	0.1	0.7	0.1	1.5	0.9	0.5	0.3	-0.5	-0.8	-0.6	0.3	0.0	0.1	1.5
9-Aug	-0.2	-0.2	-0.3	-0.2	-0.1	-0.2	0.2	0.3	0.0	0.0	-1.0	0.3	0.8	0.4	0.7	0.1	-0.2	0.1	-0.1	-0.1	0.1	-0.4	-0.2	0.5	0.0	0.8
10-Aug	1.9	2.3	-0.2	0.3	1.0	1.9	0.8	0.1	0.8	0.4	0.8	1.5	0.4	2.1	1.7	2.1	1.4	1.1	0.9	0.7	0.6	1.1	0.6	0.7	1.0	2.3
11-Aug	0.6	0.5	0.4	0.5	0.2	0.3	0.6	0.5	0.7	1.0	1.5	2.4	3.3	2.5	2.9	2.4	2.2	2.9	1.5	1.2	1.6	1.6	1.8	2.0	1.5	3.3
12-Aug	1.8	1.1	1.1	0.5	1.0	1.4	1.7	2.1	1.8	3.1	1.7	2.7	2.5	2.6	2.3	2.2	2.9	2.7	2.1	1.9	1.5	2.1	2.1	1.9	1.9	3.1
13-Aug	2.0	0.9	0.3	0.1	0.5	0.5	0.2	0.4	0.2	0.6	0.9	0.7	0.7	1.6	2.5	UO	0.7	1.2	1.4	1.6	1.0	1.5	1.7	2.1	1.0	2.5
14-Aug	2.9	2.7	3.1	3.1	3.0	2.7	2.9	2.5	2.3	3.2	3.2	3.9	3.2	3.3	2.9	4.5	4.2	3.7	3.9	3.3	3.5	2.6	2.4	2.6	3.1	4.5
15-Aug	2.7	2.5	2.6	2.7	2.8	1.0	1.3	1.3	1.3	0.9	0.9	0.9	1.6	1.4	1.5	1.4	1.2	1.8	0.6	1.5	1.7	1.2	1.2	0.3	1.5	2.8
16-Aug	0.6	0.0	0.6	0.0	0.4	1.3	1.0	0.8	0.3	0.3	0.9	1.7	1.3	0.9	1.6	1.7	1.1	0.6	1.5	1.3	1.5	1.7	1.8	2.1	1.0	2.1
17-Aug	1.7	0.9	0.8	0.6	0.3	0.4	0.5	0.1	0.1	0.2	0.4	0.7	-0.2	1.1	0.8	0.2	0.9	0.8	0.7	1.0	0.4	0.5	0.6	0.7	0.6	1.7
18-Aug	1.0	1.2	0.0	0.3	0.5	0.9	1.2	1.0	0.6	0.2	1.7	0.8	0.1	0.5	0.9	1.0	0.6	0.5	0.2	0.7	1.3	1.4	1.5	1.3	0.8	1.7
19-Aug	1.7	1.9	2.0	2.1	1.9	1.5	1.2	1.7	1.5	0.7	0.9	1.8	2.2	2.9	3.4	3.7	2.8	3.4	4.6	4.0	3.1	2.8	2.4	2.1	2.3	4.6
20-Aug	2.2	2.0	1.9	1.8	1.8	2.5	3.6	3.0	4.1	4.0	3.3	3.4	3.9	3.0	3.0	3.3	3.4	3.2	3.0	3.0	2.5	2.9	2.8	2.2	2.9	4.1
21-Aug	2.1	2.4	2.3	2.3	2.3	2.2	2.1	2.1	2.5	2.6	2.6	1.8	2.9	2.7	1.9	2.9	2.9	2.7	2.6	2.7	2.7	3.3	3.1	2.7	2.5	3.3
22-Aug	2.5	2.5	2.4	2.3	2.2	2.2	2.1	2.2	2.1	2.0	2.9	2.7	1.9	1.8	2.7	2.7	2.1	0.2	0.3	0.3	-0.1	0.9	1.0	0.7	1.8	2.9
23-Aug	0.8	0.9	0.9	0.8	1.1	1.7	1.2	0.3	0.5	0.7	0.5	0.5	0.5	0.6	0.4	0.1	0.8	1.2	0.3	-0.1	1.3	1.2	1.4	0.0	0.7	1.7
24-Aug	0.2	1.1	1.1	0.6	1.0	0.9	1.1	0.8	0.9	0.6	0.3	1.4	1.2	2.3	2.2	2.3	1.6	1.9	1.5	1.3	1.4	1.8	1.6	0.5	1.2	2.3
25-Aug	-0.2	-0.2	-0.2	0.0	0.3	0.5	0.3	0.1	0.2	1.7	0.8	1.8	1.3	1.0	0.6	0.4	1.0	0.7	0.5	0.0	-0.1	0.1	0.5	0.3	0.5	1.8
26-Aug	0.4	0.6	0.4	-0.3	0.0	0.0	-0.1	0.0	0.1	0.6	0.9	0.3	0.1	0.3	0.4	0.6	0.4	0.5	0.4	0.3	0.5	0.7	0.8	1.2	0.4	1.2
27-Aug	0.4	0.1	0.2	0.1	0.2	0.5	0.4	0.7	0.1	0.2	0.3	0.3	0.7	1.2	1.3	1.0	1.1	1.9	1.7	0.8	0.7	0.5	0.5	1.0	0.7	1.9
28-Aug	1.9	1.8	1.8	1.7	1.4	1.1	1.1	0.8	1.4	2.2	1.4	1.3	2.3	1.9	1.7	2.0	1.5	1.6	1.0	0.2	-0.2	-0.1	0.1	-0.1	1.2	2.3
29-Aug	0.9	1.5	0.2	-0.1	0.3	0.6	0.5	0.3	0.5	-0.1	-0.3	0.1	0.8	0.0	-0.3	0.3	0.5	-0.8	-0.9	-0.7	-0.3	-0.6	-0.3	-0.4	0.1	1.5
30-Aug	-0.6	-0.9	-0.5	-1.0	-0.5	0.6	0.5	0.4	1.7	1.6	1.5	0.6	1.4	1.0	0.4	0.3	0.6	0.9	-0.9	1.1	1.0	1.1	0.6	1.2	0.5	1.7
31-Aug	1.6	1.5	1.2	1.1	1.0	1.8	1.2	1.0	1.2	0.5	1.1	0.9	1.4	1.8	2.3	3.0	1.7	2.1	0.8	0.6	1.5	1.2	0.9	1.0	1.3	3.0
	0.9	0.9	0.7	0.6	0.7	0.9	0.8	0.7	0.8	0.9	0.9	1.1	1.1	1.2	1.3	1.4	1.3	1.2	1.0	0.9	0.8	0.9	1.0	0.8	Diurnal Average	
	2.9	2.7	3.1	3.1	3.0	2.7	3.6	3.0	4.1	4.0	3.3	3.9	3.9	3.3	3.4	4.5	4.2	3.7	4.6	4.0	3.5	3.3	3.1	2.7	Diurnal Maximum	

UO - Unstable Operation

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

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

Mannix - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 4.3 km/h on Aug 15 13:00

Minimum Value: 0.2 km/h on Aug 2 02:00

Percentiles: P_1 = 0.3 P_{10} = 0.6 Q_1 = 1.0 Median = 1.7 Q_3 = 2.4 P_{90} = 3.1 P_{99} = 3.8

Hours in Service:	744
Hours of Data:	743
Hours of Missing Data:	1
Hours of Calibration:	0
Percent Operational Time:	99.9

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

UO - Unstable Operation

Wood Buffalo Environmental Association
SO2 Calibration Report

W B E A

Station Information

Calibration Date	August 6, 2015	Last Calibration	July 2, 2015
Station Name	Mannix	Station Number	AMS 5
Reason:	Routine		
Start Time (MST)	11:20	End Time (MST)	14:10
Gas Cert Reference	S9610161A	Station temp.	22 Deg C
Cal Gas Concentration	50 ppm	Cal Gas Exp Date	26-Sep-17
Calibrator Make/Model	Sabio 4010	Serial Number	11061107
ZAG Make/Model	API 701	Serial Number	1083
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2633

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 1000 ppb		PMT voltage	-635	-635
Analyzer IP address	192.168.1.43		Lamp voltage	866	862
Calculated slope	0.991984	1.001305	Chamber temp	44.9	45.0
Calculated intercept	0.717908	0.535966	Pressure	696.4	691.3
Analyzer Background	7.9	8.0	Flow	0.485	0.478
Analyzer Coefficient	1.015	1.015	Intensity	91	90

Analyzer make	TEI 43i	Analyzer serial #	1008841399

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.5	----
as found span	5000	60.0	600.0	598.0	1.003
calibrator zero	5000	0.0	0.0	-0.5	----
high point	5000	60.0	600.0	598.0	1.003
second point	5000	30.0	300.0	301.2	0.996
third point	5000	15.0	150.0	147.8	1.015
as left zero	5000	0.0	0.0	-0.3	----
as left span	5000	60.0	600.0	600.9	0.998
				Average Correction Factor	1.005

Corrected As found	598.4	Previous response	604.1	% change	1.0%

Notes:

Inlet filter replaced after as founds. No adjustments.

Calibration Performed By: Evan Magill

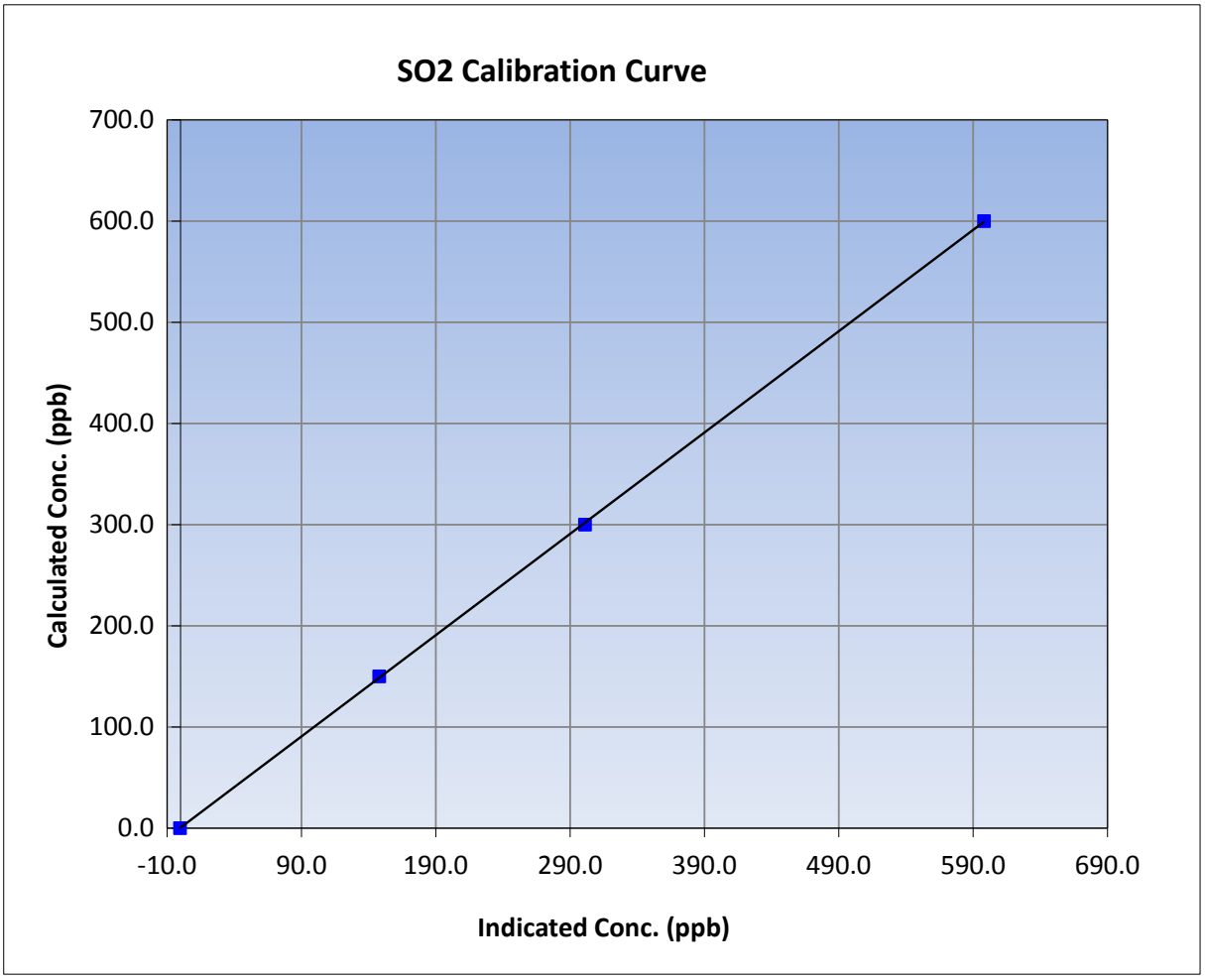
Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

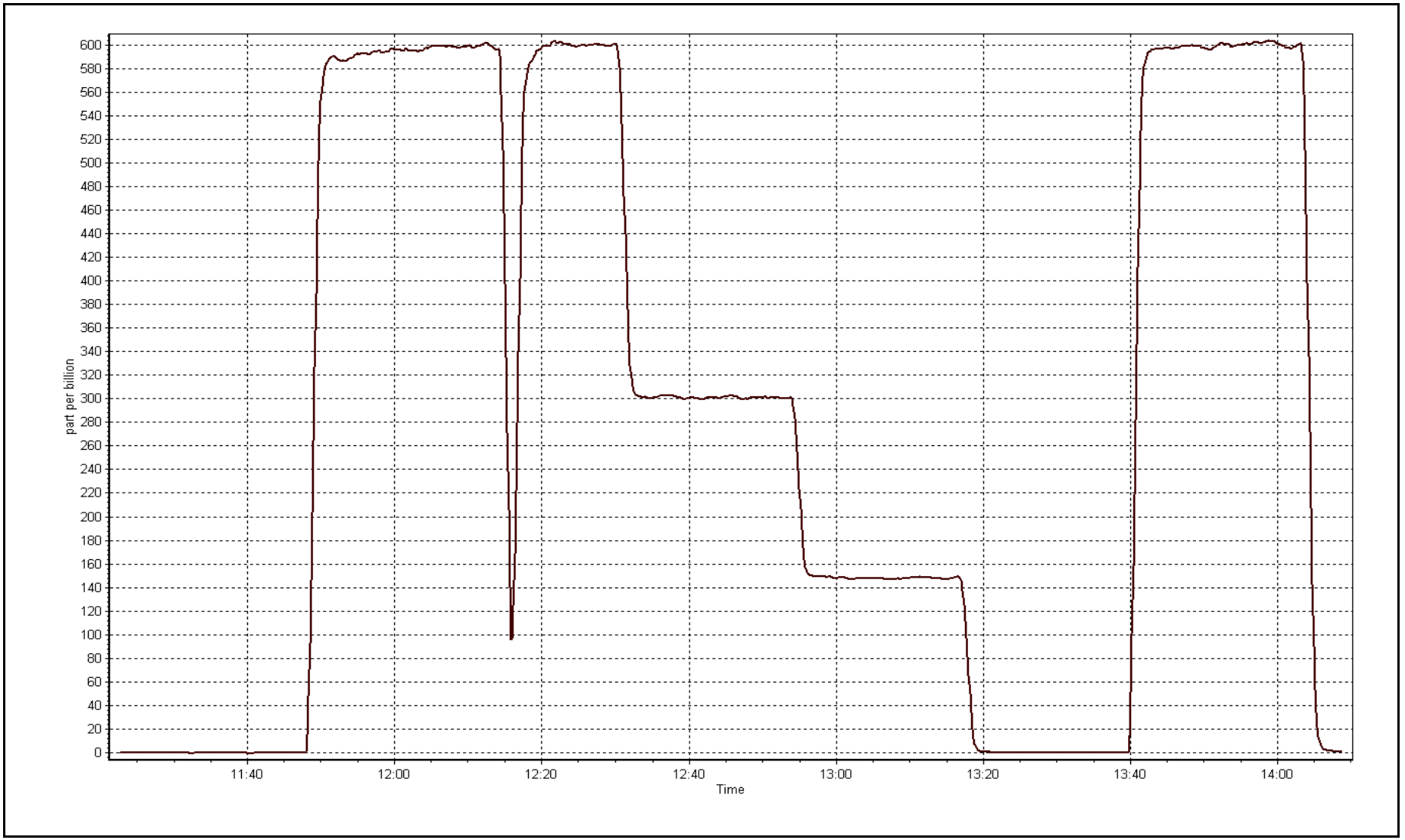
Calibration Date	August 6, 2015	Previous Calibration	July 2, 2015
Station Name	Mannix	Station Number	AMS 5
Start Time (MST)	11:20	End Time (MST)	14:10
Analyzer make	TEI 43i	Analyzer serial #	1008841399

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.5	----	Correlation Coefficient	0.999965
600.0	598.0	1.0033		
300.0	301.2	0.9962	Slope	1.001305
150.0	147.8	1.0149		
			Intercept	0.535966



SO2 Calibration Plot Date: August 6, 2015



Wood Buffalo Environmental Association
H2S Calibration Report

Station Information

Calibration Date	August 6, 2015	Last Calibration	July 3, 2015
Station Name	Mannix	Station Number	AMS 5
Reason:	Routine		
Start Time (MST)	8:00	End Time (MST)	11:10
Gas Cert Reference	CC62844	Station temp.	21 Deg C
Cal Gas Concentration	5.04 ppm	Cal Gas Exp Date	09/09/2017
Calibrator Make/Model	Sabio 4010	Serial Number	11061107
ZAG air Make/Model	API 701	Serial Number	1083
DACS make/model	Campbell Scientific CR3000	Serial Number	2633
SO2 gas concentration	50 ppm	SO2 gas cert/exp	S960161A September-09-17

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-624	-623
Analyzer IP address	192.168.1.42		Lamp voltage	885	878
Calculated slope	0.981805	0.999198	Chamber temp	45.0	45
Calculated intercept	0.056287	-0.157071	Pressure	519.2	517.7
Analyzer Background	17.5	17.6	Flow	1.068	1.064
Analyzer Coefficient	1.370	1.37	Intensity	115	115
			Converter temp.	323	328

Analyzer make/model	TEI 450i	Analyzer serial #	815129108
Converter make/model	N/A	Converter serial #	N/A

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.0	----
as found span	5000	74.4	75.0	75.1	0.999
SO2 scrubber check	5000	15.0	150.0	1.2	----
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	74.4	75.0	75.1	0.999
second point	5000	41.7	42.0	42.4	0.993
third point	5000	24.8	25.0	25.3	0.988
as left zero	5000	0.0	0.0	0.1	----
as left span	5000	74.4	75.0	75.6	0.993
				Average Correction Factor	0.993

Corrected As found	75.0	Previous response	76.3	% change	1.7%

Notes:

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

Calibration Performed By: Evan Magill

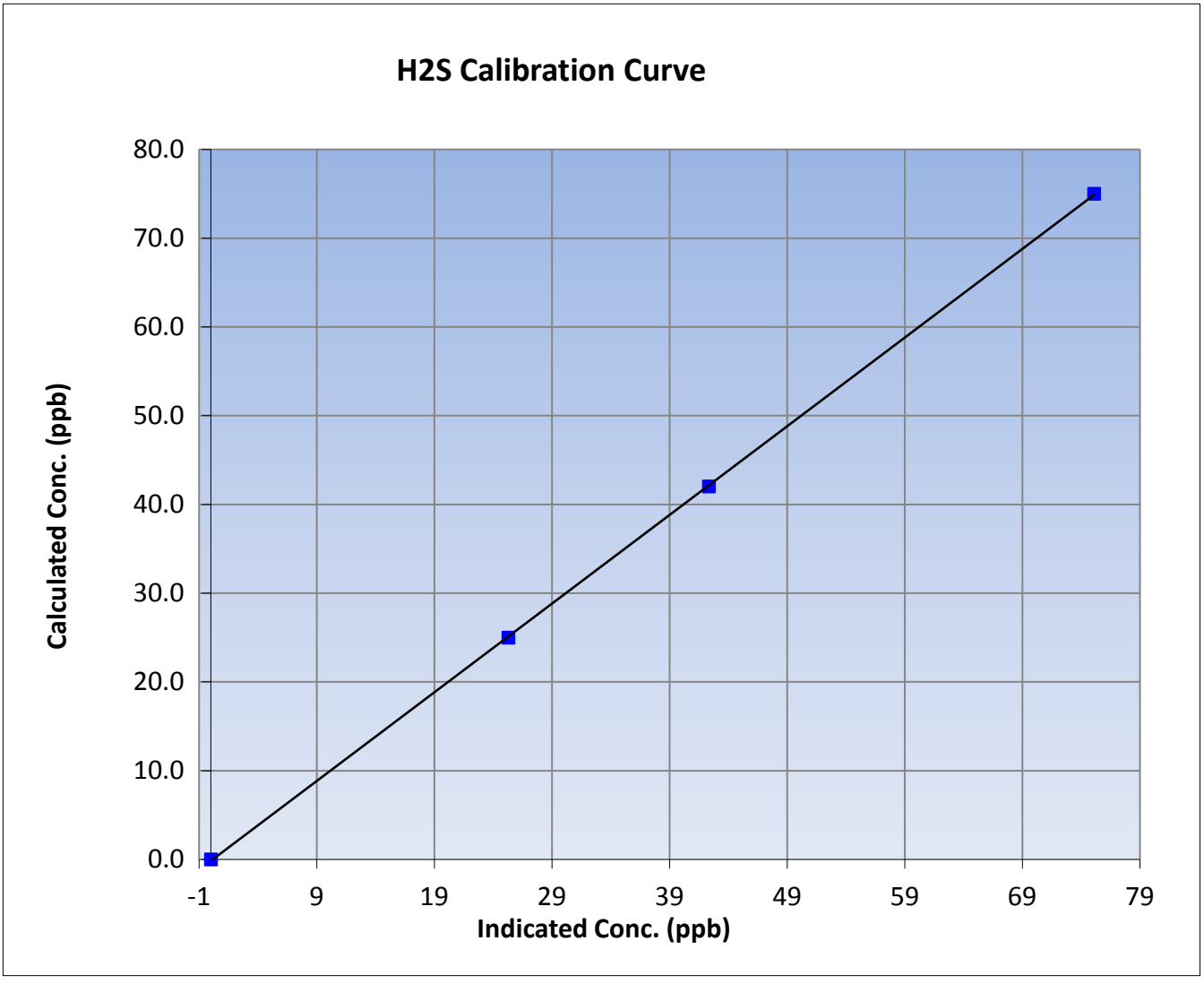
Wood Buffalo Environmental Association
H2S Calibration Report

Station Information

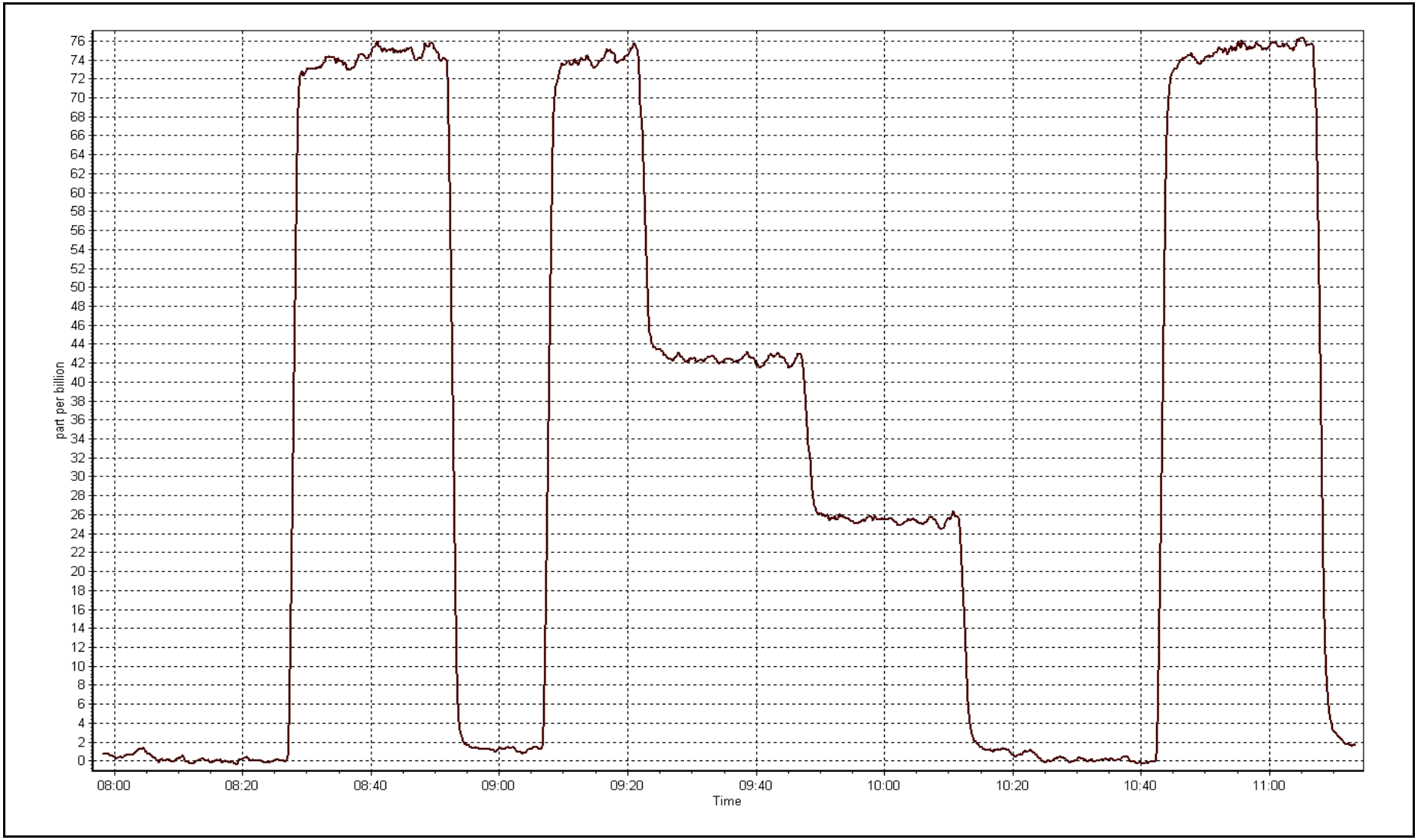
Calibration Date	August 6, 2015	Previous Calibration	July 3, 2015
Station Name	Mannix	Station Number	AMS 5
Start Time (MST)	8:00	End Time (MST)	11:10
Analyzer make	TEI 450i	Analyzer serial #	815129108

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999979
75.0	75.1	0.9986		
42.0	42.4	0.9925	Slope	0.999198
25.0	25.3	0.9881		
			Intercept	-0.157071



H2S Calibration Plot Date: August 6, 2015



Wood Buffalo Environmental Association
THC Calibration Report

W B E A

Station Information

Calibration Date	August-06-15	Last Calibration	July-02-15
Station Name	Mannix	Station Number	AMS 5
Reason:	Routine		
Start Time (MST)	11:20	End Time (MST)	14:10
Gas Cert Reference	S961061A	Cal Gas Expiry Date	Sept-26-2017
CH4 Cal Gas Conc.	499 ppm	CH4 Equiv Conc.	1038.0 ppm
C3H8 Cal Gas Conc.	196 ppm	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11061107
ZAG make/model	Teledyne API 701	Serial Number	1083
DACS make/model	Campbell Scientific CR3000	Serial Number	2633

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 50 ppm		Sample Pressure	9.4	9.4
Analyzer IP address	192.168.1.51		Air or Bypass Press	42.3	42.3
Calculated slope	0.995764	0.998797	Fuel Pressure	20.2	20.2
Calculated intercept	-0.049608	0.026030	Analyzer Coeff	3.836	3.836
			Analyzer BKG	3.280	3.280

Analyzer make	Thermo 51i-LT	Analyzer serial #	1317958295

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	-0.02	----
as found span	5000	60.0	12.46	12.44	1.001
calibrator zero	5000	0.0	0.00	-0.02	----
high point	5000	60.0	12.46	12.44	1.001
second point	5000	30.0	6.23	6.23	1.000
third point	5000	15.0	3.11	3.07	1.014
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	60.0	12.46	12.49	0.997
				Average Correction Factor	1.005

Corrected As found	12.46	Previous response	12.56	% change	0.8%

Notes:

Replaced inlet filter after as founds. No adjustments.

Calibration Performed By: Evan Magill

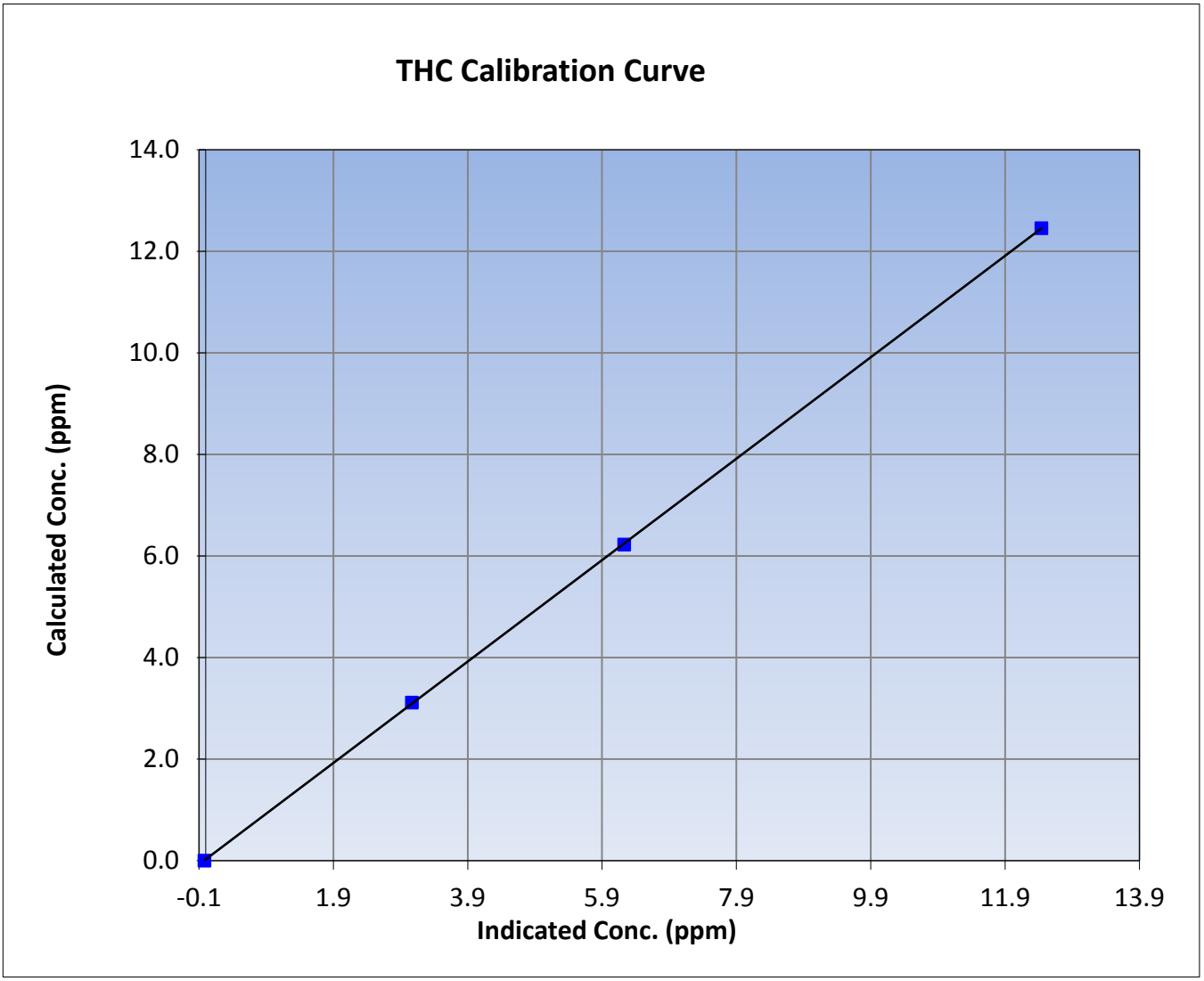
Wood Buffalo Environmental Association
THC Calibration Report

Station Information

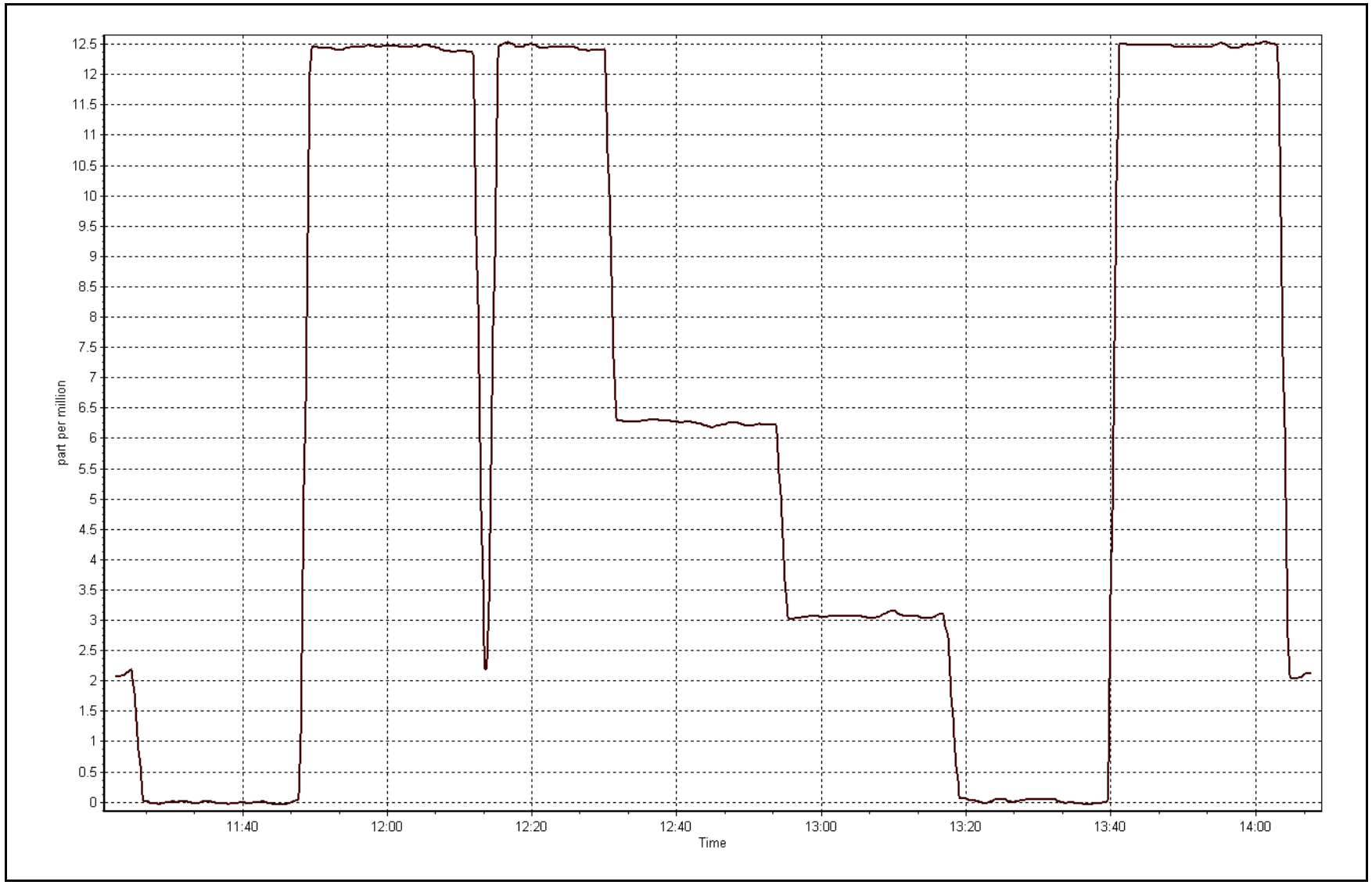
Calibration Date	August 6, 2015	Previous Calibration	July 2, 2015
Station Name	Mannix	Station Number	AMS 5
Start Time (MST)	11:20	End Time (MST)	14:10
Analyzer make	Thermo 51i-LT	Analyzer serial #	1317958295

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	-0.02	----	Correlation Coefficient	0.999989
12.46	12.44	1.0013		
6.23	6.23	0.9997	Slope	0.998797
3.11	3.07	1.0143		
			Intercept	0.026030



THC Calibration Plot Date: August 6, 2015



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 6
PATRICIA MCINNES
AUGUST 2015

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

September 28, 2015

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - PATRICIA McINNES (AMS 6)
AUGUST 2015

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	702	38	42	99.46	12	0	3	0
TRS (ppb) Average	704	36	40	99.46	2	0	1	0
THC (ppm) Average	700	38	44	99.19	2.6	-	2	-
NMHC(ppm) Average	700	38	44	99.19	0.14	-	0.013	-
CH4(ppm) Average	700	38	44	99.19	2.5	-	2	-
O3 (ppb) Average	706	35	38	99.60	43	0	30	-
NO2 (ppb) Average	701	39	43	99.46	19	0	5	-
NO (ppb) Average	701	39	43	99.46	34	-	3	-
NOX (ppb) Average	701	39	43	99.46	45	-	8	-
NH3 (ppb) Average	645	48	99	93.15	14	0	1	-
PM2.5 (ug/m3) Average	741	1	3	99.73	22.9	-	9.3	0
Temperature 2 m (C) Average	744	0	0	100.00	29.1	-	22.9	-
Relative Humidity (%) Average	744	0	0	100.00	99	-	82	-
Wind Speed 10 m (km/h) Average	741	2	3	99.87	28	-	17	-
Wind Direction 10 m (deg) Average	741	2	3	99.87	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - PATRICIA McINNES (AMS 6)
AUGUST 2015

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

					Percentile						
Parameter	Number	Mean	StnDev	Total	Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	702	0.4	1	-	0	0	0	0	0	1	12
TRS (ppb) Average	704	0.2	0	-	0	0	0	0	0	0	2
THC (ppm) Average	700	1.91	0.1	-	1.8	1.8	1.9	1.9	1.9	2	2.6
NMHC(ppm) Average	700	0.001	0.007	-	0	0	0	0	0	0	0.14
CH4(ppm) Average	700	1.91	0.1	-	1.8	1.8	1.9	1.9	1.9	2	2.5
O3 (ppb) Average	706	22.4	9	-	4	10	16	22	29	34	43
NO2 (ppb) Average	701	1.7	2	-	0	0	0	1	2	4	19
NO (ppb) Average	701	0.8	2	-	0	0	0	0	1	2	34
NOX (ppb) Average	701	2.5	3	-	0	0	1	1	3	5	45
NH3 (ppb) Average	645	0	1	-	0	0	0	0	0	0	14
PM2.5 (ug/m3) Average	741	4.38	3.2	-	0.1	1	2.2	3.6	6	8.2	22.9
Temperature 2 m (C) Average	744	16.93	5.2	-	2.2	10.4	13.5	16.8	20.7	23.7	29.1
Relative Humidity (%) Average	744	66.2	20	-	27	37	50	67	83	93	99
Wind Speed 10 m (km/h) Average	741	9.7	5	-	0	3	5	9	13	17	28
Wind Direction 10 m (deg) Average	741	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - PATRICIA McINNES (AMS 6)
AUGUST 2015

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2	21 Aug 2015 09:00	21 Aug 2015 11:00	3	Maintenance - internal WBEA audit
SO2	24 Aug 2015 15:00	24 Aug 2015 15:00	1	Maintenance - post audit check
TRS	12 Aug 2015 13:00	12 Aug 2015 13:00	1	Maintenance - sample manifold cleaned
TRS	21 Aug 2015 13:00	21 Aug 2015 14:00	2	Maintenance - internal WBEA audit
TRS	24 Aug 2015 16:00	24 Aug 2015 16:00	1	Maintenance - post audit check
NMHC, CH4, THC	07 Aug 2015 10:00	07 Aug 2015 11:00	2	Maintenance - replaced fuel cylinder
NMHC, CH4, THC	21 Aug 2015 11:00	21 Aug 2015 12:00	2	Maintenance - internal WBEA audit
NMHC, CH4, THC	24 Aug 2015 11:00	24 Aug 2015 12:00	2	Maintenance - replaced carrier gas
O3	12 Aug 2015 13:00	12 Aug 2015 13:00	1	Maintenance - sample manifold cleaned
O3	21 Aug 2015 14:00	21 Aug 2015 15:00	2	Maintenance - internal WBEA audit
NO2, NO, NOX	23 Aug 2015 11:00	23 Aug 2015 14:00	4	Maintenance - internal WBEA audit
NH3	01 Aug 2015 08:00	31 Aug 2015 08:00	43	Stabilization after daily span
NH3	23 Aug 2015 12:00	23 Aug 2015 19:00	8	Maintenance - internal WBEA audit
PM2.5	23 Aug 2015 15:00	23 Aug 2015 16:00	2	Maintenance - internal WBEA audit
Wind Speed, Wind Direction	02 Aug 2015 05:00	02 Aug 2015 05:00	1	Flat line in sensor output signal

Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO_2) - ppb

Patricia McInnes - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 12 ppb on Aug 2 19:00 Maximum Daily Average: 3.0 ppb on Aug 1

Minimum Value: 0 ppb on Aug 14 14:00 Minimum Daily Average: 0.0 ppb on Aug 21
Maximum Diurnal Average: 0.8 ppb at hour 12 Minimum Diurnal Average: 0.2 ppb at hour 2
Monthly Average: 0.4 ppb Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 1$ $P_{99} = 6$

Hours in Service:	744
Hours of Data:	702
Hours of Missing Data:	42
Hours of Calibration:	38
Percent Operational Time:	99.5

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0	0	1	Z	0	0	0	1	5	4	4	11	6	7	1	6	12	6	2	1	0	0	0	0	3.0	12
2-Aug	0	0	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	1	12	4	3	2	2	1	1.2	12
3-Aug	1	0	0	0	0	Z	0	0	0	0	1	1	2	1	0	0	0	0	0	0	0	0	0	0	0.4	2
4-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
5-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
6-Aug	0	0	Z	0	0	0	0	0	1	2	3	5	4	1	1	0	0	0	0	0	0	0	0	0	0.8	5
7-Aug	0	0	0	Z	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
8-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
9-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0.2	1
10-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
11-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
12-Aug	0	0	Z	0	0	0	0	0	0	C	C	C	C	C	C	C	0	0	0	0	0	0	0	0	--	0
13-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
14-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
15-Aug	0	0	0	0	0	Z	1	1	1	0	0	1	2	1	1	1	2	4	0	0	0	0	0	0	0.7	4
16-Aug	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
17-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
18-Aug	0	0	Z	1	0	0	0	3	5	5	3	2	1	1	1	1	0	0	0	0	0	0	0	1	1.1	5
19-Aug	0	0	0	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
20-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
21-Aug	0	0	0	0	0	Z	0	0	M	M	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
22-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
23-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0.3	1
24-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	M	0	0	0	0	0	0	0	0	0	0.1	0
25-Aug	0	0	0	Z	0	0	0	0	5	2	0	0	0	4	5	2	2	5	0	1	1	1	1	1	1.4	5
26-Aug	1	1	2	1	Z	1	1	0	0	0	0	0	1	2	4	7	5	2	2	1	1	1	0	0	1.5	7
27-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
28-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.1	1
29-Aug	0	Z	1	2	2	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.7	2
30-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
31-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.3	0.7	0.7	0.6	0.8	0.6	0.7	0.6	0.7	0.7	0.7	0.6	0.3	0.3	0.2	0.2	0.2	Diurnal Average	
	1	1	2	2	2	1	1	3	5	5	4	11	6	7	5	7	12	6	12	4	3	2	2	1	Diurnal Maximum	

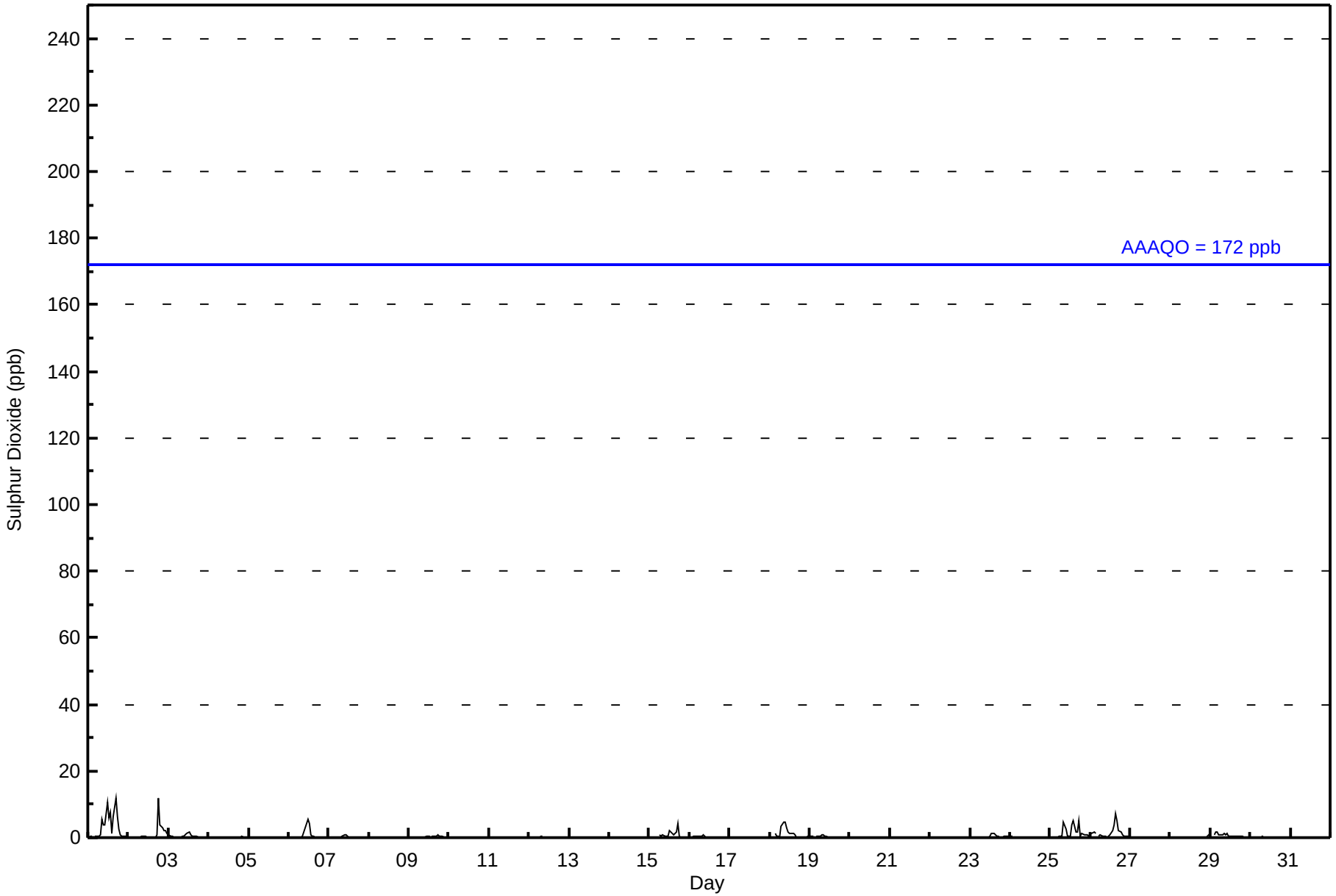
Z - zerospan C - Calibration M - Maintenance
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb

Wood Buffalo Environmental Association

Hourly Averages

Sulphur Dioxide (SO_2) - ppb

Patricia McInnes - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

Patricia McInnes - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	699	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: 702

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

Patricia McInnes - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 10	14	9	6	14	58	56	37	31	47	58	86	88	59	60	37	37	697
11 - 20	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	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	14	10	6	14	58	56	37	31	47	58	86	88	59	60	38	38	700

Total Number of Valid Hours: 700

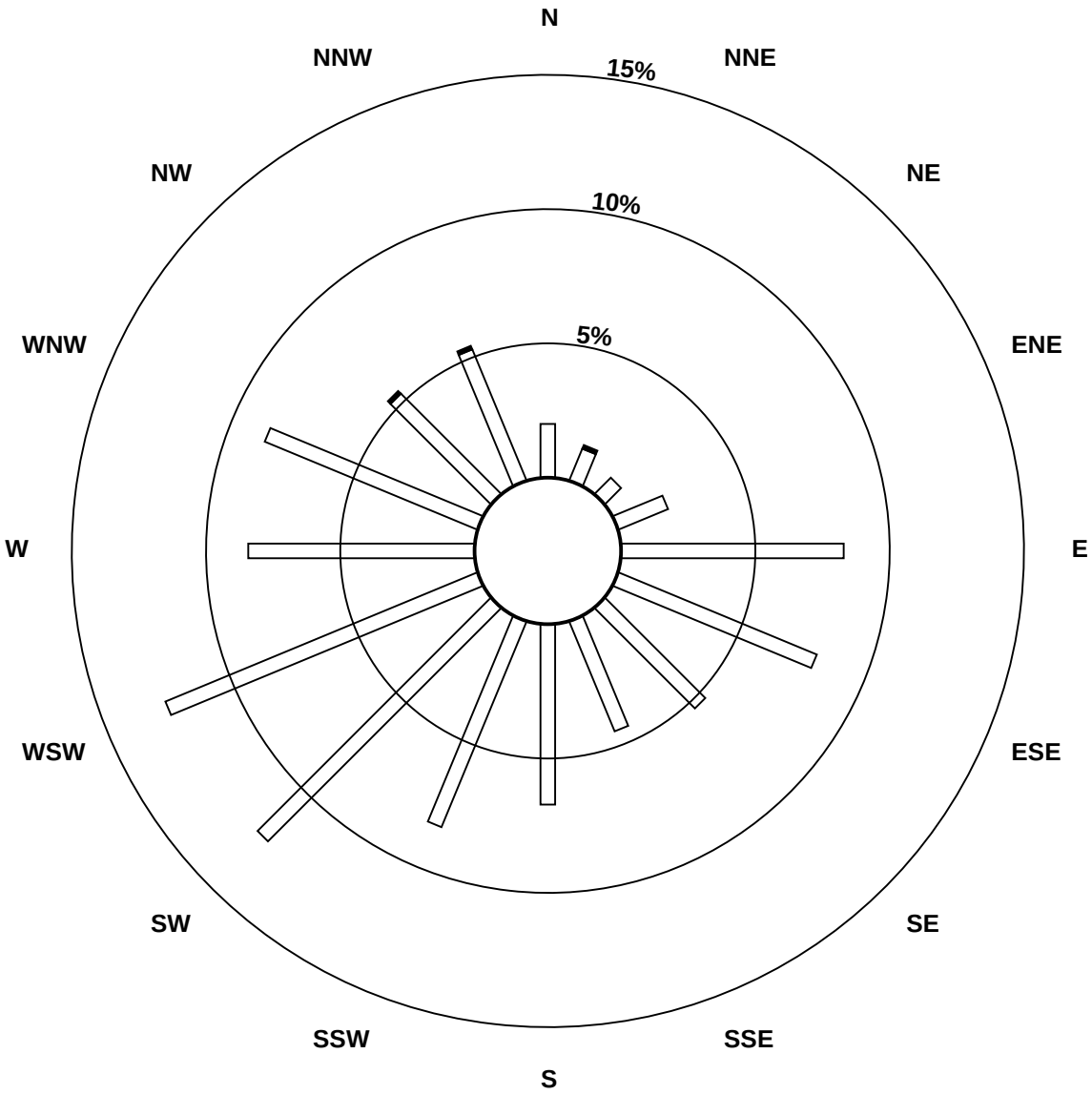
Total Number of Hours: 744

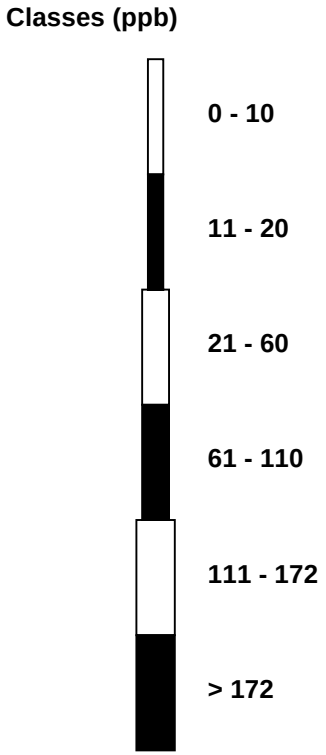
Wood Buffalo Environmental Association

Wind Rose Aug 2015

Sulphur Dioxide (SO_2) - ppb

Patricia McInnes (AMS 6)





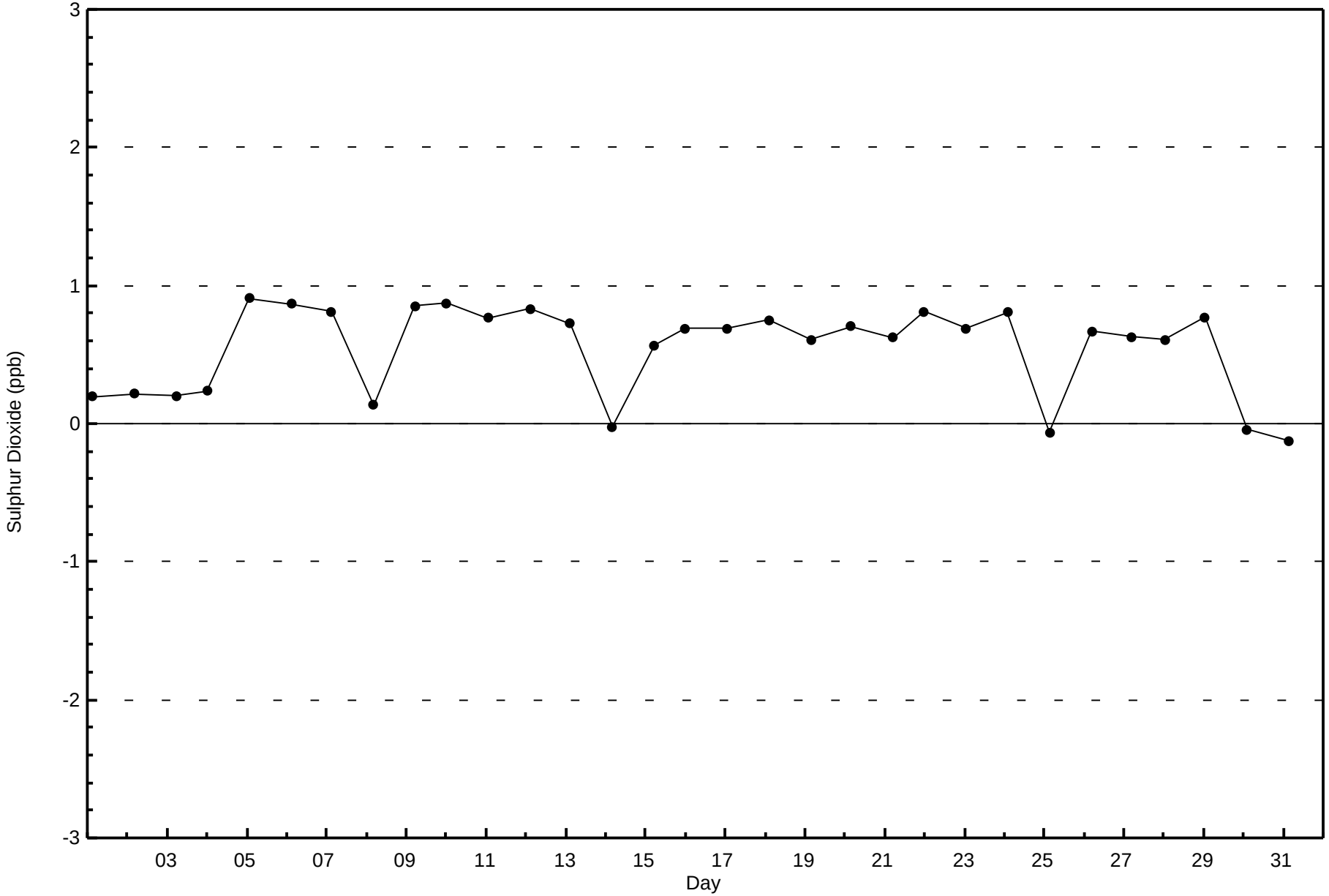
Total Number of Valid Hours: 700

Wood Buffalo Environmental Association

Zero Responses

Sulphur Dioxide (SO_2) - ppb

Patricia McInnes - August 2015

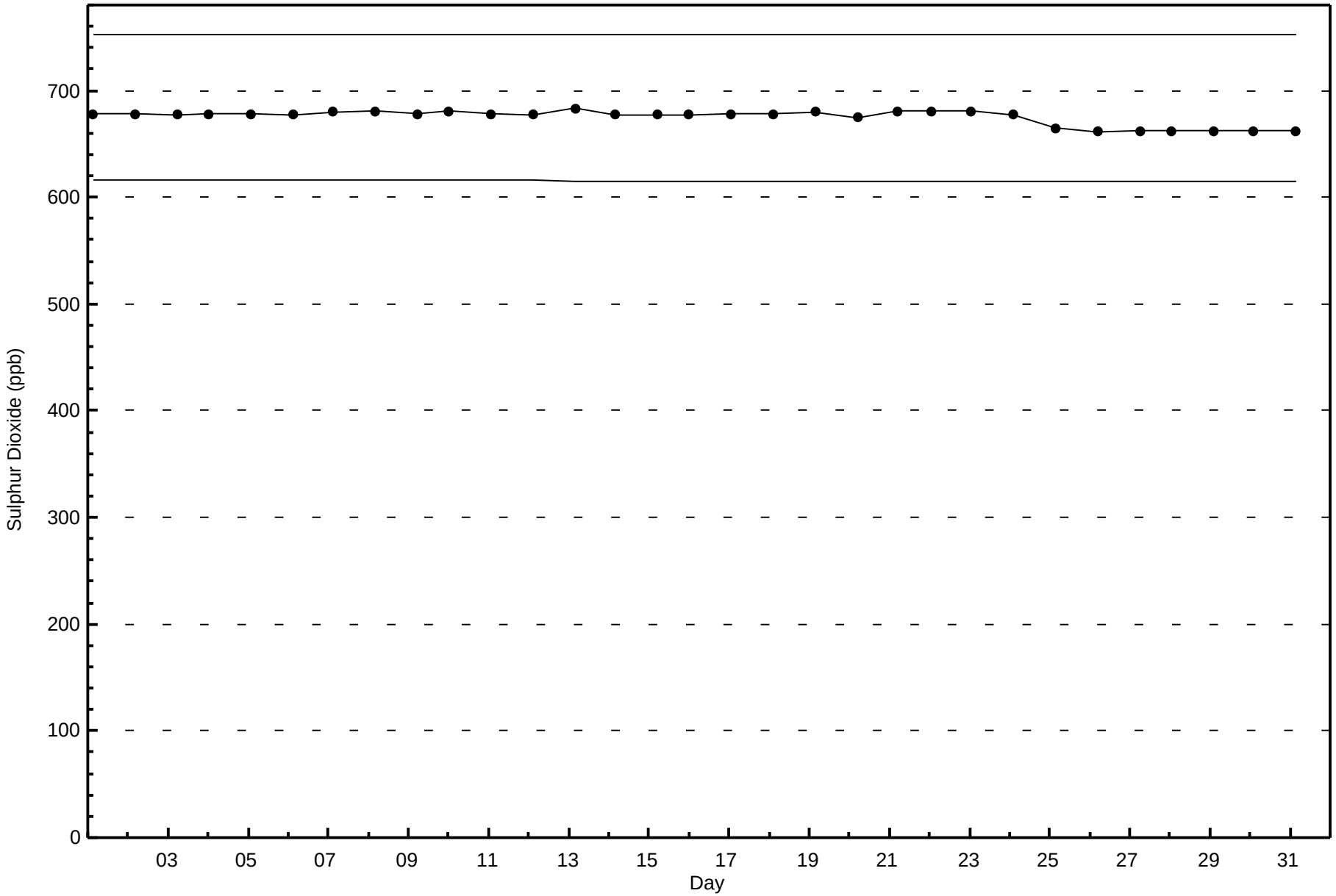


Wood Buffalo Environmental Association

Span Responses

Sulphur Dioxide (SO_2) - ppb

Patricia McInnes - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

Patricia McInnes - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 2 ppb on Aug 25 09:00 Maximum Daily Average: 0.6 ppb on Aug 25

Minimum Value: 0 ppb on Aug 17 14:00 Minimum Daily Average: 0.1 ppb on Aug 22
Maximum Diurnal Average: 0.3 ppb at hour 9 Minimum Diurnal Average: 0.2 ppb at hour 14
Monthly Average: 0.2 ppb Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 0$ $P_{99} = 1$

Hours in Service:	744
Hours of Data:	704
Hours of Missing Data:	40
Hours of Calibration:	36
Percent Operational Time:	99.5

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

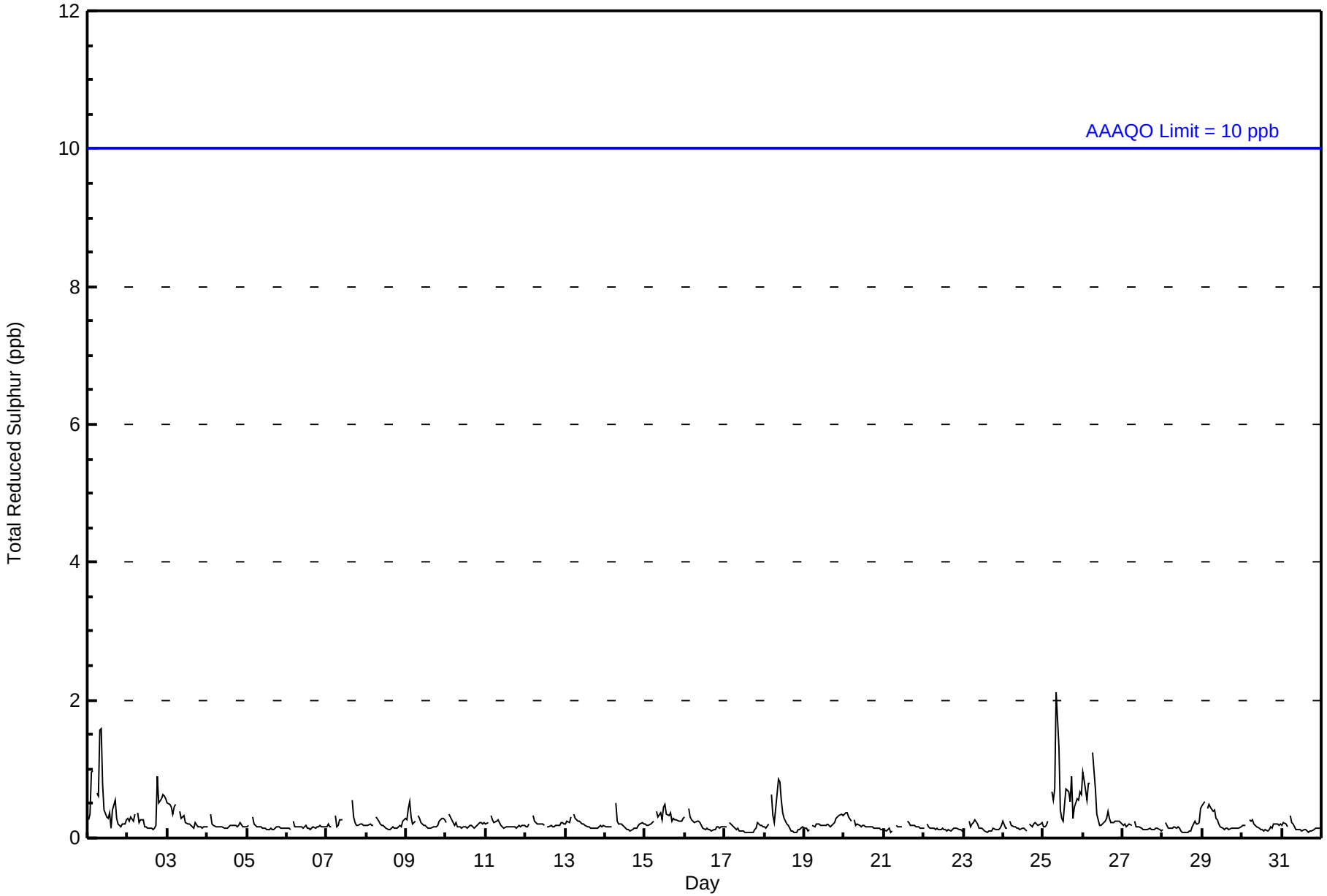
Z - zerospan C - Calibration M - Maintenance
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb

Wood Buffalo Environmental Association

Hourly Averages

Total Reduced Sulphur (TRS) - ppb

Patricia McInnes - August 2015



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

Total Reduced Sulphur (TRS) - ppb

Patricia McInnes - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 2	13	10	6	9	56	56	36	31	45	59	87	91	65	59	38	40	701
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	10	6	9	56	56	36	31	45	59	87	91	65	59	38	40	701

Total Number of Valid Hours: 701

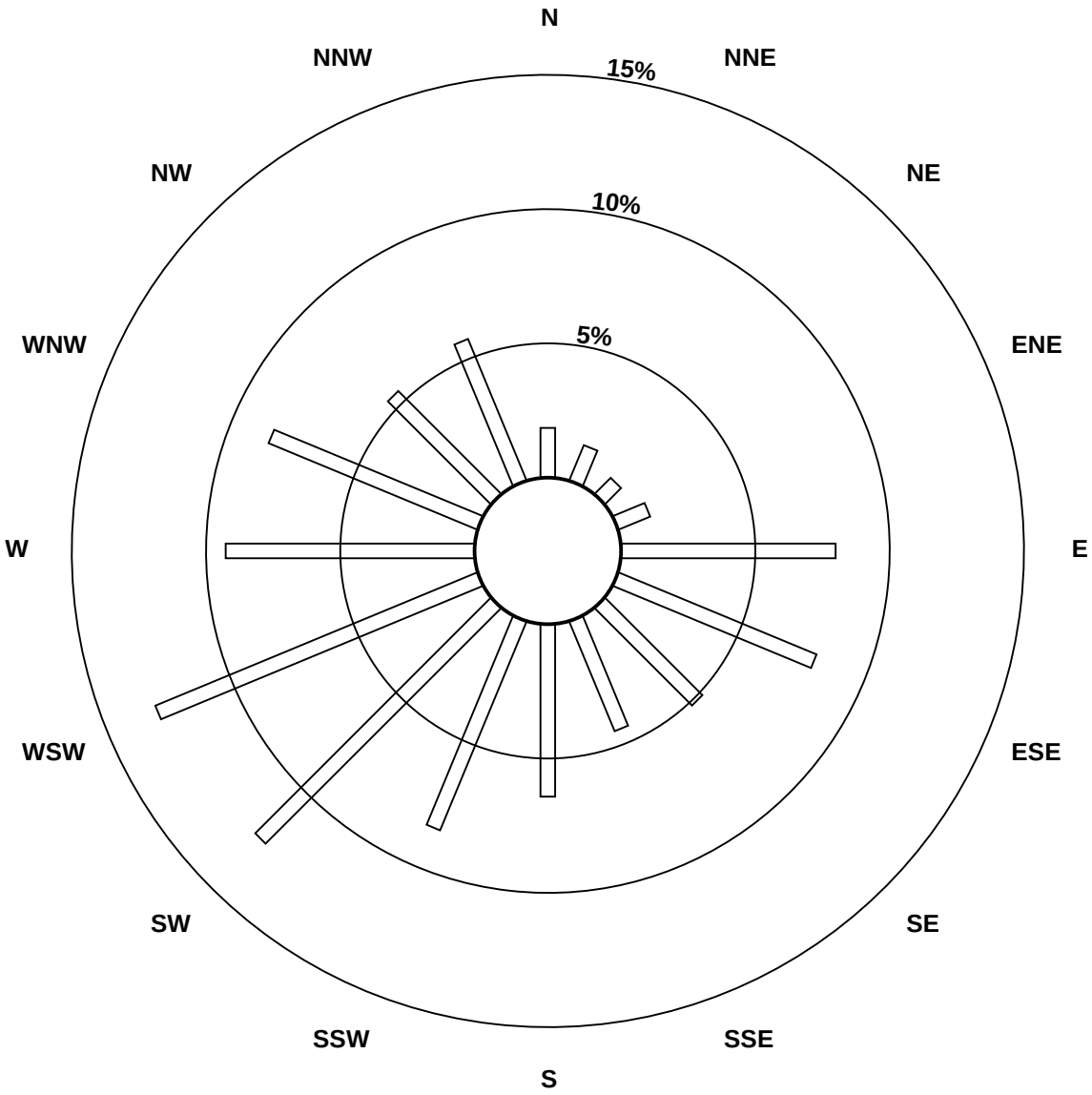
Total Number of Hours: 744

Wood Buffalo Environmental Association

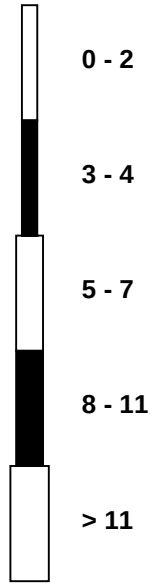
Wind Rose Aug 2015

Total Reduced Sulphur (TRS) - ppb

Patricia McInnes (AMS 6)



Classes (ppb)



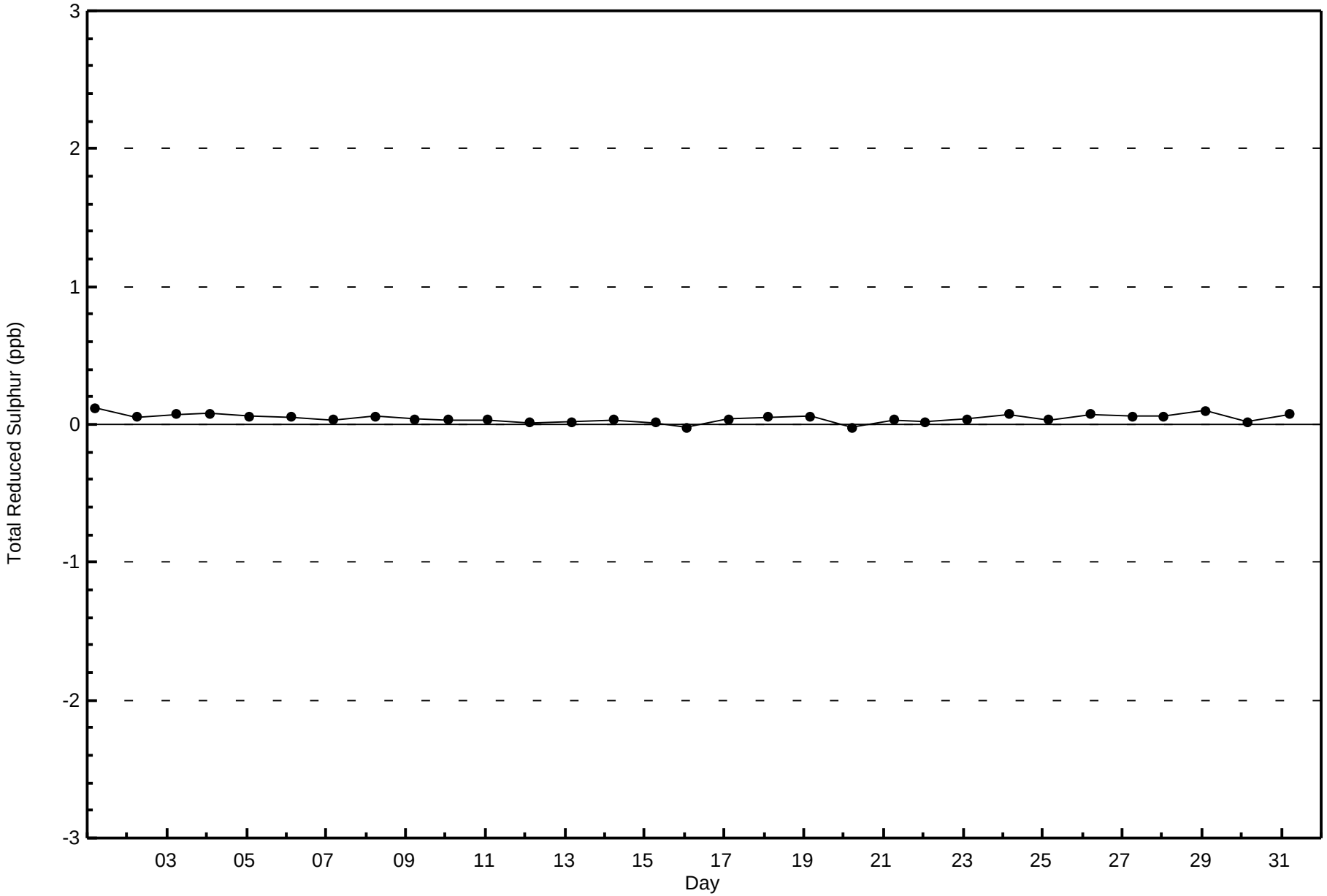
Total Number of Valid Hours: 701

Wood Buffalo Environmental Association

Zero Responses

Total Reduced Sulphur (TRS) - ppb

Patricia McInnes - August 2015

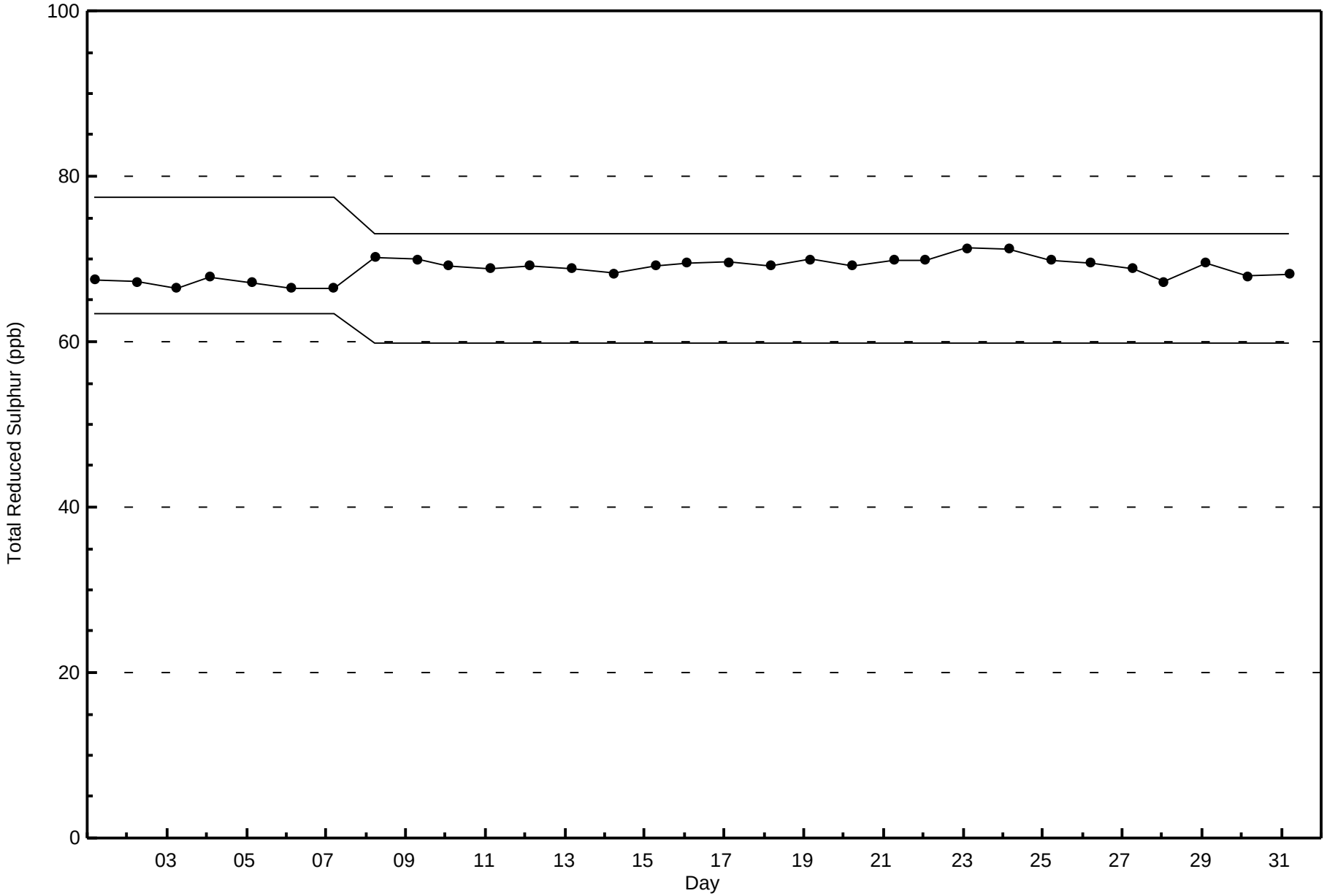


Wood Buffalo Environmental Association

Span Responses

Total Reduced Sulphur (TRS) - ppb

Patricia McInnes - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Patricia McInnes - August 2015

Maximum Value: 2.6 ppm on Aug 1 08:00

Maximum Daily Average: 2.0 ppm on Aug 1

Minimum Value: 1.8 ppm on Aug 28 13:00

Minimum Daily Average: 1.9 ppm on Aug 14

Maximum Diurnal Average: 2.0 ppm at hour 8

Minimum Diurnal Average: 1.9 ppm at hour 14

Monthly Average: 1.91 ppm

Percentiles: P_1 = 1.8 P_{10} = 1.8 Q_1 = 1.9 Median = 1.9 Q_3 = 1.9 P_{90} = 2.0 P_{99} = 2.2

Hours in Service:	744
Hours of Data:	700
Hours of Missing Data:	44
Hours of Calibration:	38
Percent Operational Time:	99.2

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	2.0	2.0	2.2	Z	2.2	2.2	2.3	2.6	2.4	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.6
2-Aug	2.0	2.0	2.0	2.0	Z	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.2	2.0	2.2
3-Aug	2.1	2.1	2.1	2.1	2.1	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1
4-Aug	Z	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
5-Aug	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
6-Aug	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
7-Aug	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	M	M	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
8-Aug	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1	1.9	2.1
9-Aug	2.1	2.1	2.1	2.0	2.0	Z	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.1
10-Aug	Z	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
11-Aug	1.9	Z	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	2.0
12-Aug	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	C	C	C	C	C	C	C	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	--	1.9
13-Aug	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9
14-Aug	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
15-Aug	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
16-Aug	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	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
17-Aug	1.9	Z	2.0	2.0	1.9	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.9	2.0
18-Aug	2.0	2.0	Z	2.0	2.1	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1
19-Aug	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9
20-Aug	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
21-Aug	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	M	M	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
22-Aug	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	2.0
23-Aug	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	2.0
24-Aug	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	M	M	1.8	1.9	1.9	1.8	1.8	1.8	1.9	1.9	1.9	1.9	2.0	2.0	1.9	2.0
25-Aug	2.0	2.0	2.0	Z	2.1	2.2	2.2	2.3	2.3	2.1	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.1	2.0	2.3
26-Aug	2.1	2.0	2.0	2.0	Z	1.9	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.1
27-Aug	2.0	2.0	2.0	2.1	2.1	Z	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1
28-Aug	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.0	1.9	1.9	2.0	2.0	1.9	2.0
29-Aug	2.0	Z	1.9	1.9	1.9	2.0	1.9	2.0	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	2.0
30-Aug	1.9	1.9	Z	1.9	1.9	1.9	2.0	2.0	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.0
31-Aug	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	2.0
	2.0	1.9	2.0	1.9	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	Diurnal Average	
	2.1	2.1	2.2	2.1	2.2	2.2	2.3	2.6	2.4	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.2	Diurnal Maximum	

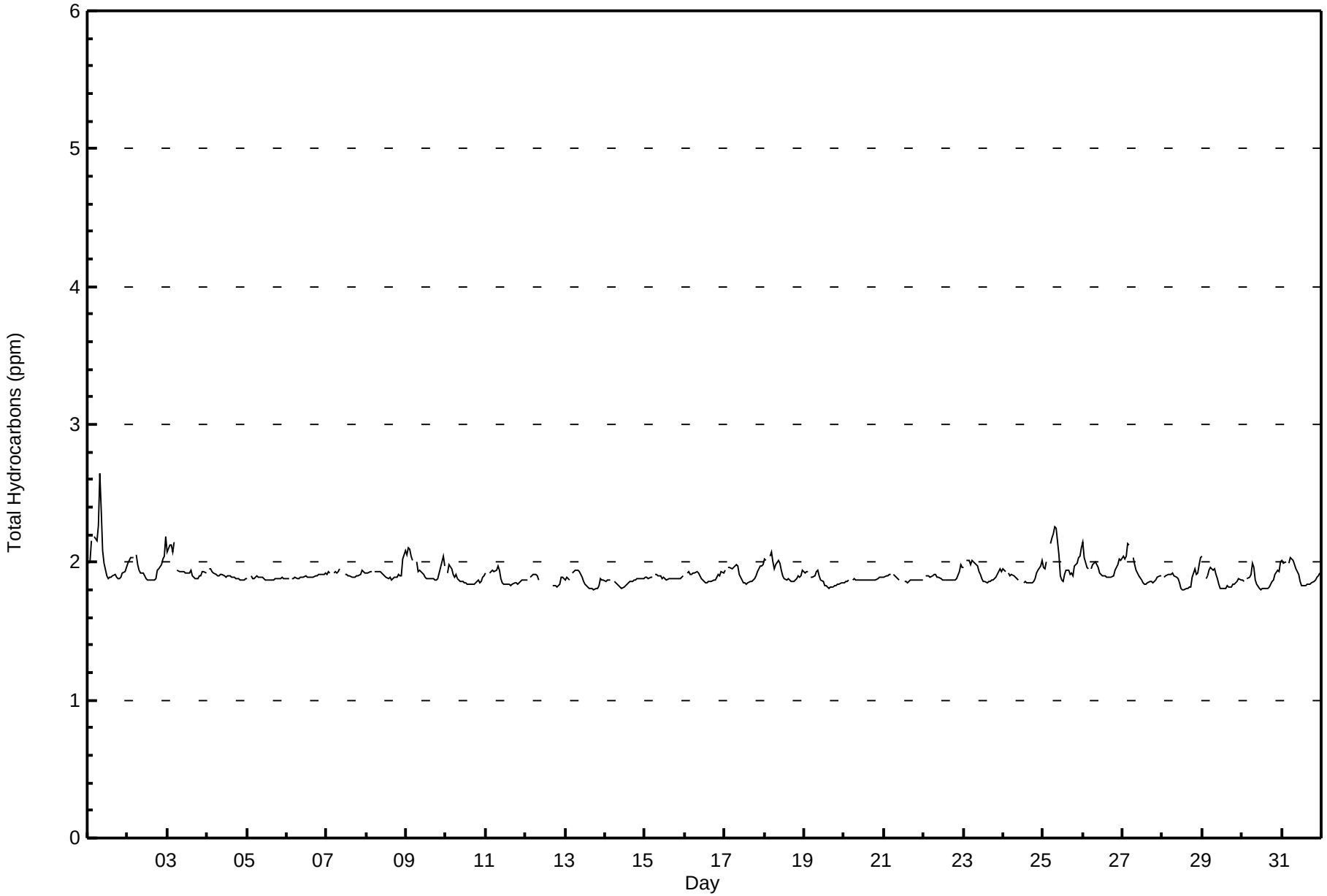
Z - zerospan C - Calibration M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Total Hydrocarbons (THC) - ppm

Patricia McInnes - August 2015



Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	671	95.86	95.86
2.1 - 3.0	29	4.14	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 700

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Total Hydrocarbons (THC) - ppm

Patricia McInnes - August 2015

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	14	9	5	13	58	55	37	30	45	56	85	89	55	54	32	32	669
2.1 - 3.0	0	1	0	0	0	1	0	1	2	1	0	0	4	7	6	6	29
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	14	10	5	13	58	56	37	31	47	57	85	89	59	61	38	38	698

Total Number of Valid Hours: 698

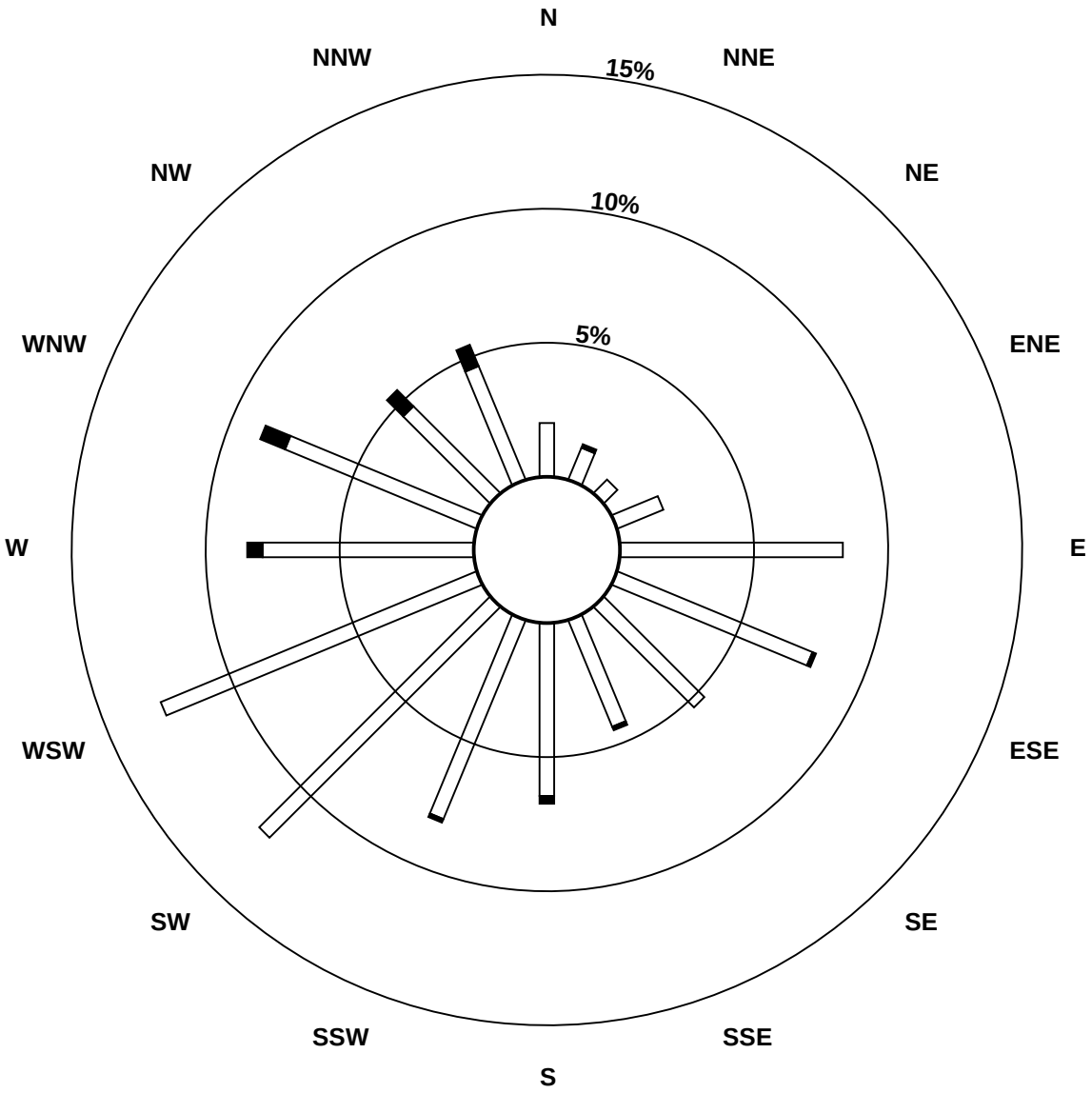
Total Number of Hours: 744

Wood Buffalo Environmental Association

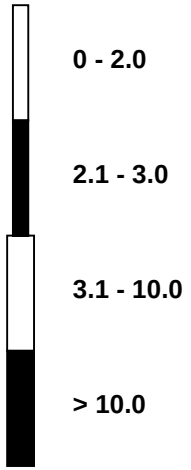
Wind Rose Aug 2015

Total Hydrocarbons (THC) - ppm

Patricia McInnes (AMS 6)



Classes (ppm)



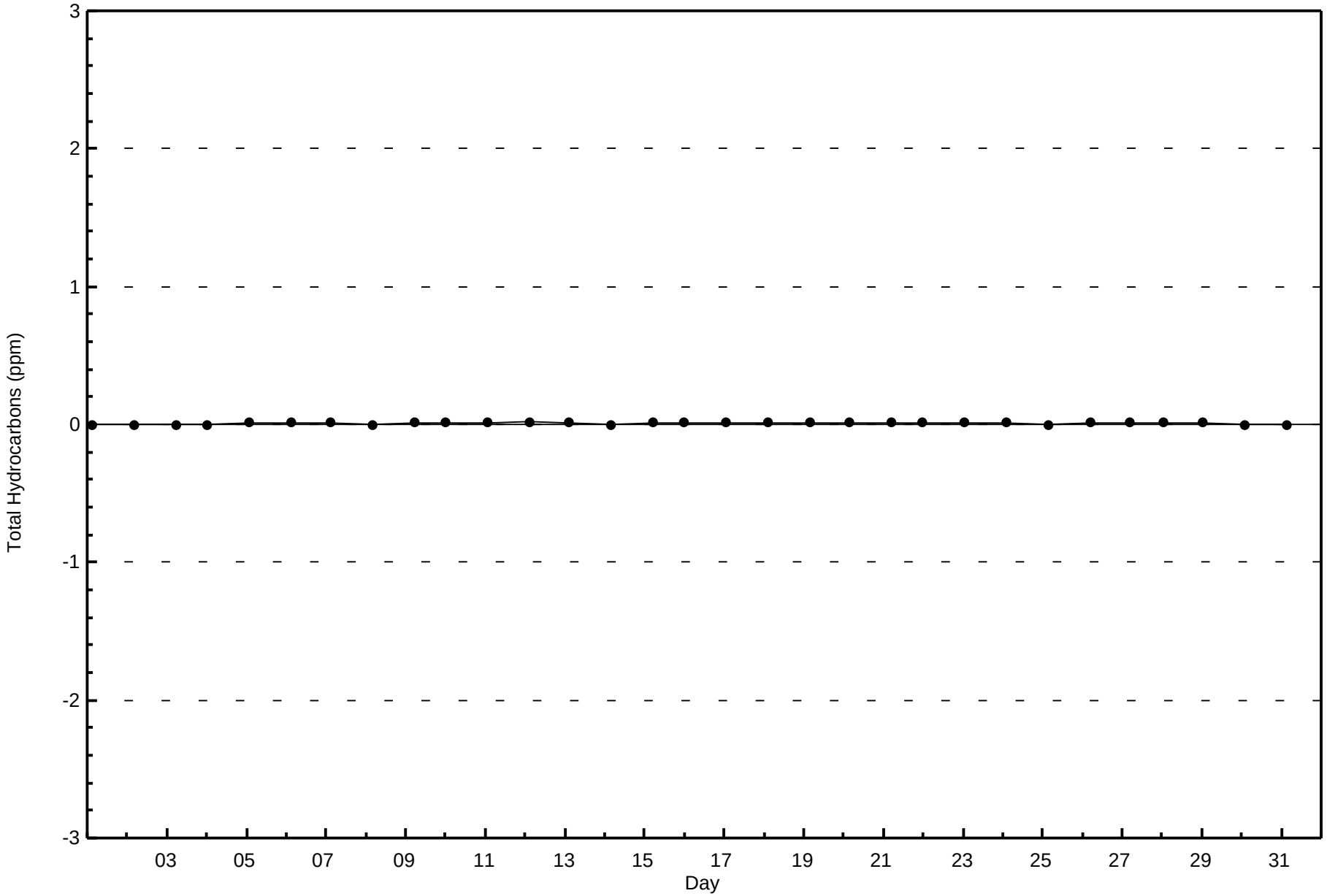
Total Number of Valid Hours: 698

Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Patricia McInnes - August 2015

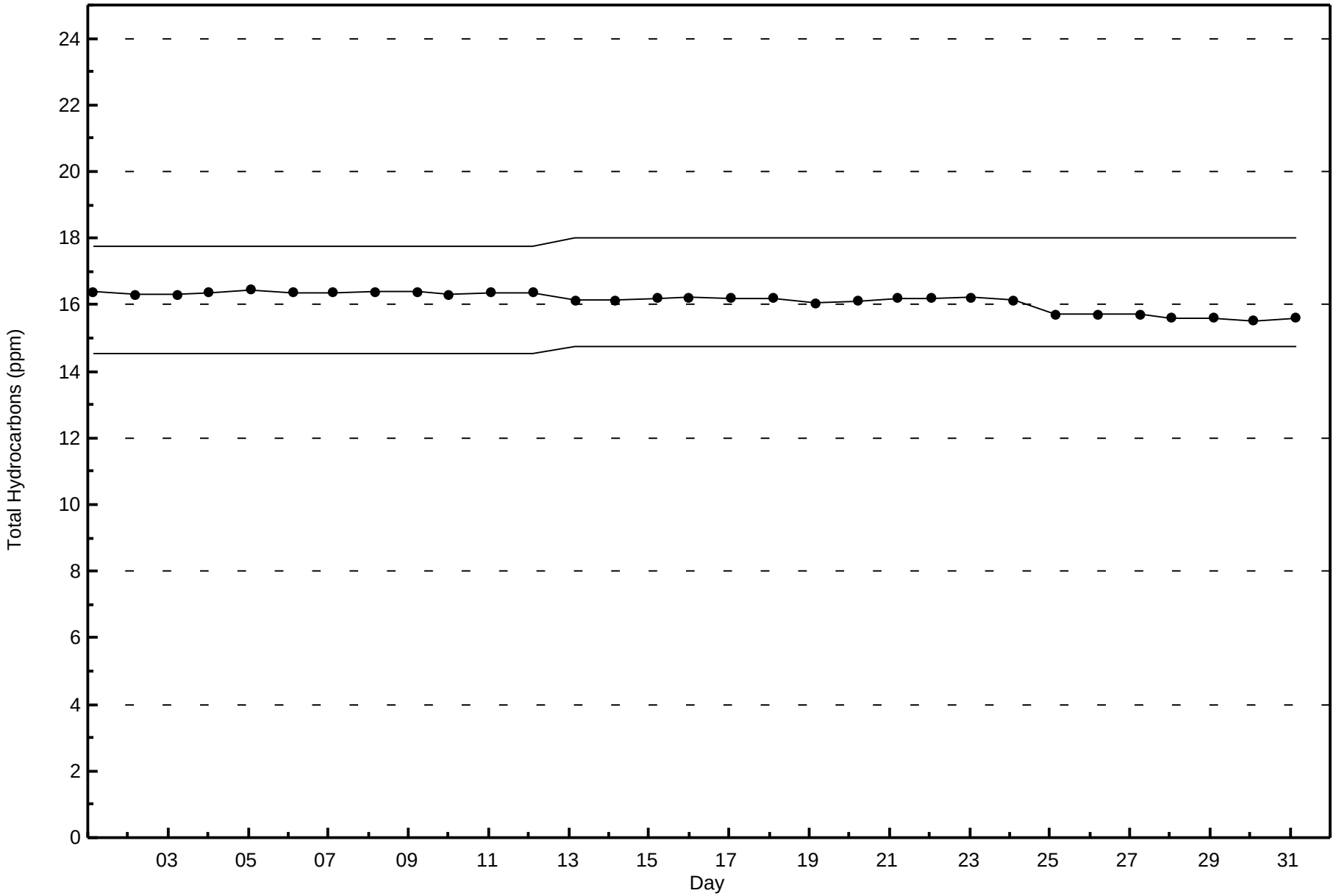


Wood Buffalo Environmental Association

Span Responses

Total Hydrocarbons (THC) - ppm

Patricia McInnes - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Non Methane Hydrocarbons (NMHC) - ppm

Patricia McInnes - August 2015

Maximum Value: 0.140 ppm on Aug 1 08:00

Maximum Daily Average: 0.013 ppm on Aug 1

Minimum Value: 0.000 ppm on Aug 1 01:00

Minimum Daily Average: 0.000 ppm on Aug 2

Maximum Diurnal Average: 0.005 ppm at hour 8

Minimum Diurnal Average: 0.000 ppm at hour 1

Monthly Average: 0.001 ppm

Percentiles: P_1 = 0.0 P_{10} = 0.0 Q_1 = 0.0 Median = 0.0 Q_3 = 0.0 P_{90} = 0.0 P_{99} = 0.0

Hours in Service:	744
Hours of Data:	700
Hours of Missing Data:	44
Hours of Calibration:	38
Percent Operational Time:	99.2

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0.000	0.000	0.006	Z	0.026	0.002	0.027	0.140	0.095	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.013	0.140
2-Aug	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3-Aug	0.000	0.000	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	0.001	0.000	0.000	0.000	0.000	0.001
4-Aug	Z	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
5-Aug	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
6-Aug	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7-Aug	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	M	M	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8-Aug	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.015	0.000	0.000	0.000	0.000	0.001	0.015
9-Aug	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.006
10-Aug	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11-Aug	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Aug	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	C	C	C	C	C	C	C	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	--	0.000
13-Aug	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
14-Aug	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
15-Aug	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
16-Aug	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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
17-Aug	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.014	0.000	0.000	0.000	0.001	0.014
18-Aug	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
19-Aug	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
20-Aug	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
21-Aug	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	M	M	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
22-Aug	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002
23-Aug	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Aug	0.000	0.000	Z	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	0.010	0.002	0.000	0.000	0.000	0.001	0.010
25-Aug	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
26-Aug	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
27-Aug	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
28-Aug	Z	0.000	0.000	0.000	0.000	0.000	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	0.014	0.000	0.000	0.000	0.001	0.014
29-Aug	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30-Aug	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Aug	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.005	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	Diurnal Average	
	0.000	0.000	0.006	0.000	0.026	0.002	0.027	0.140	0.095	0.008	0.000	0.000	0.002	0.000	0.006	0.000	0.000	0.006	0.000	0.015	0.014	0.000	0.000	0.000	Diurnal Maximum	

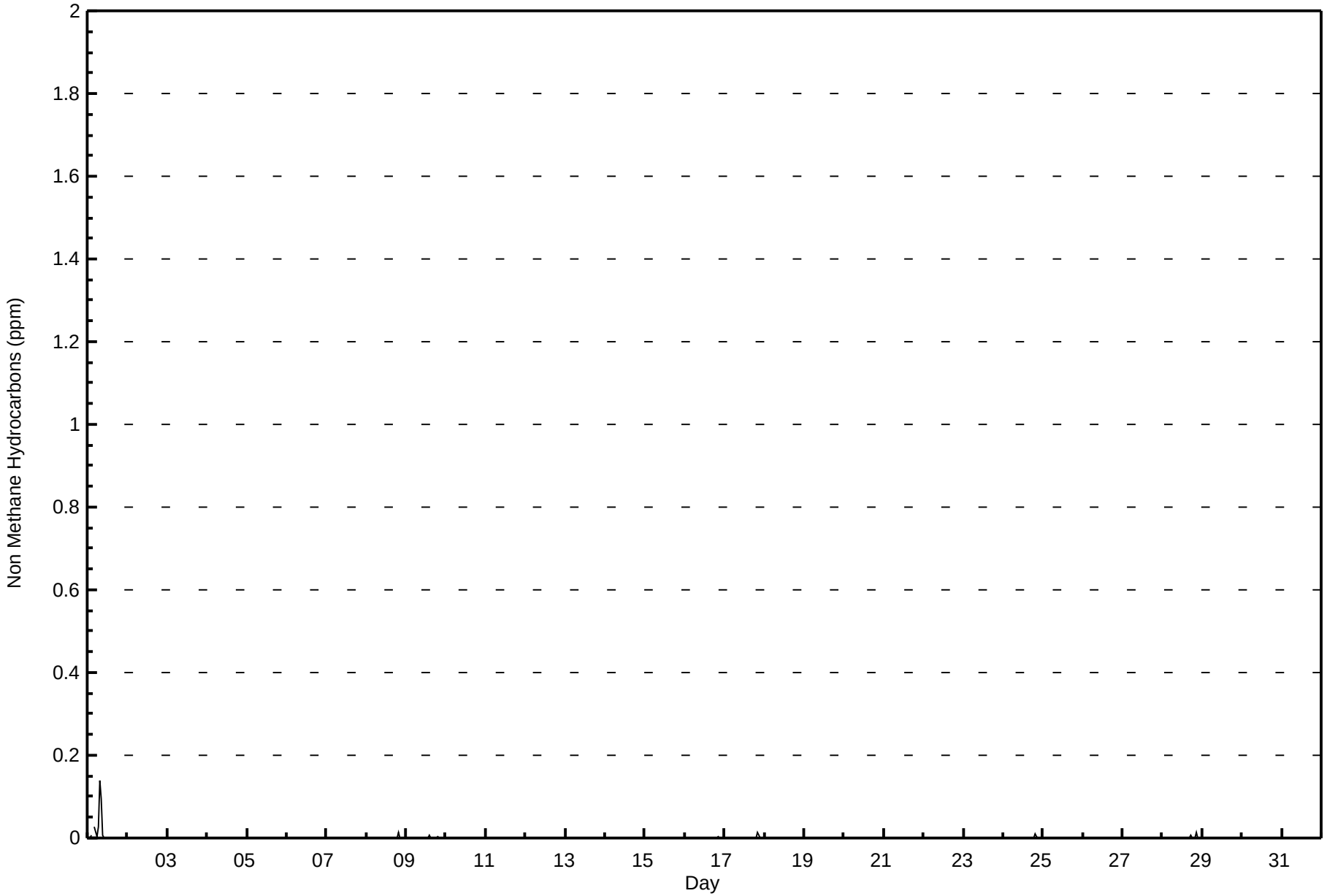
Z - zerospan C - Calibration M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Non Methane Hydrocarbons (NMHC) - ppm

Patricia McInnes - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm

Patricia McInnes - August 2015

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	688	98.29	98.29
0.006 - 0.05	10	1.43	99.71
0.06 - 0.1	2	0.29	100.00
> 0.1	0	0.00	100.00

Total Number of Valid Hours: 700

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm

Patricia McInnes - August 2015

Concentration Ranges (ppm)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 0.005	14	10	5	12	58	56	36	31	47	57	85	89	57	59	36	34	686
0.006 - 0.05	0	0	0	1	0	0	1	0	0	0	0	0	2	2	2	2	10
0.06 - 0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
> 0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	14	10	5	13	58	56	37	31	47	57	85	89	59	61	38	38	698

Total Number of Valid Hours: 698

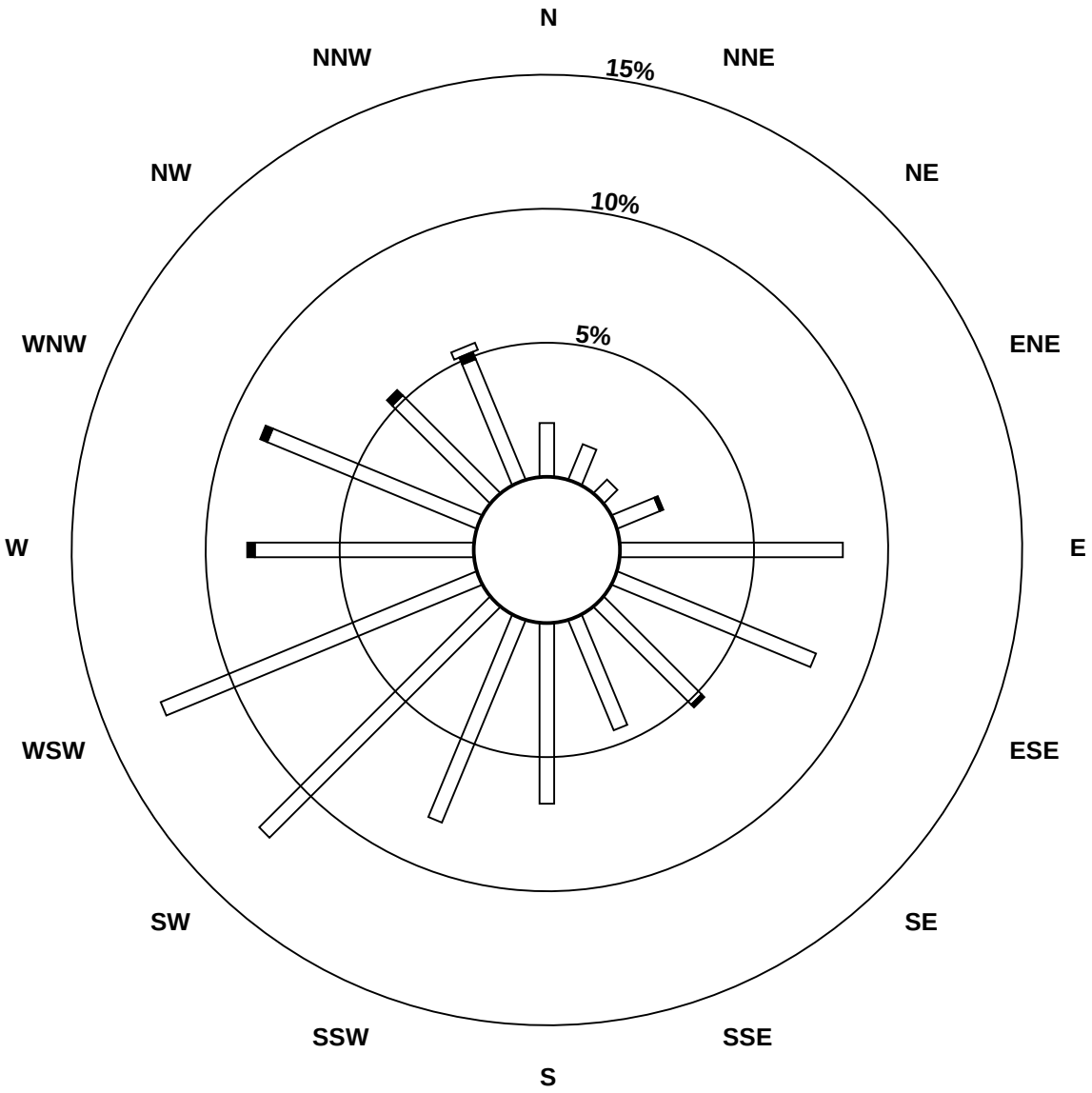
Total Number of Hours: 744

Wood Buffalo Environmental Association

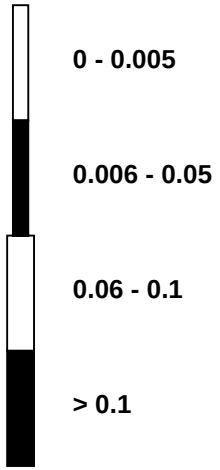
Wind Rose Aug 2015

Non Methane Hydrocarbons (NMHC) - ppm

Patricia McInnes (AMS 6)



Classes (ppm)



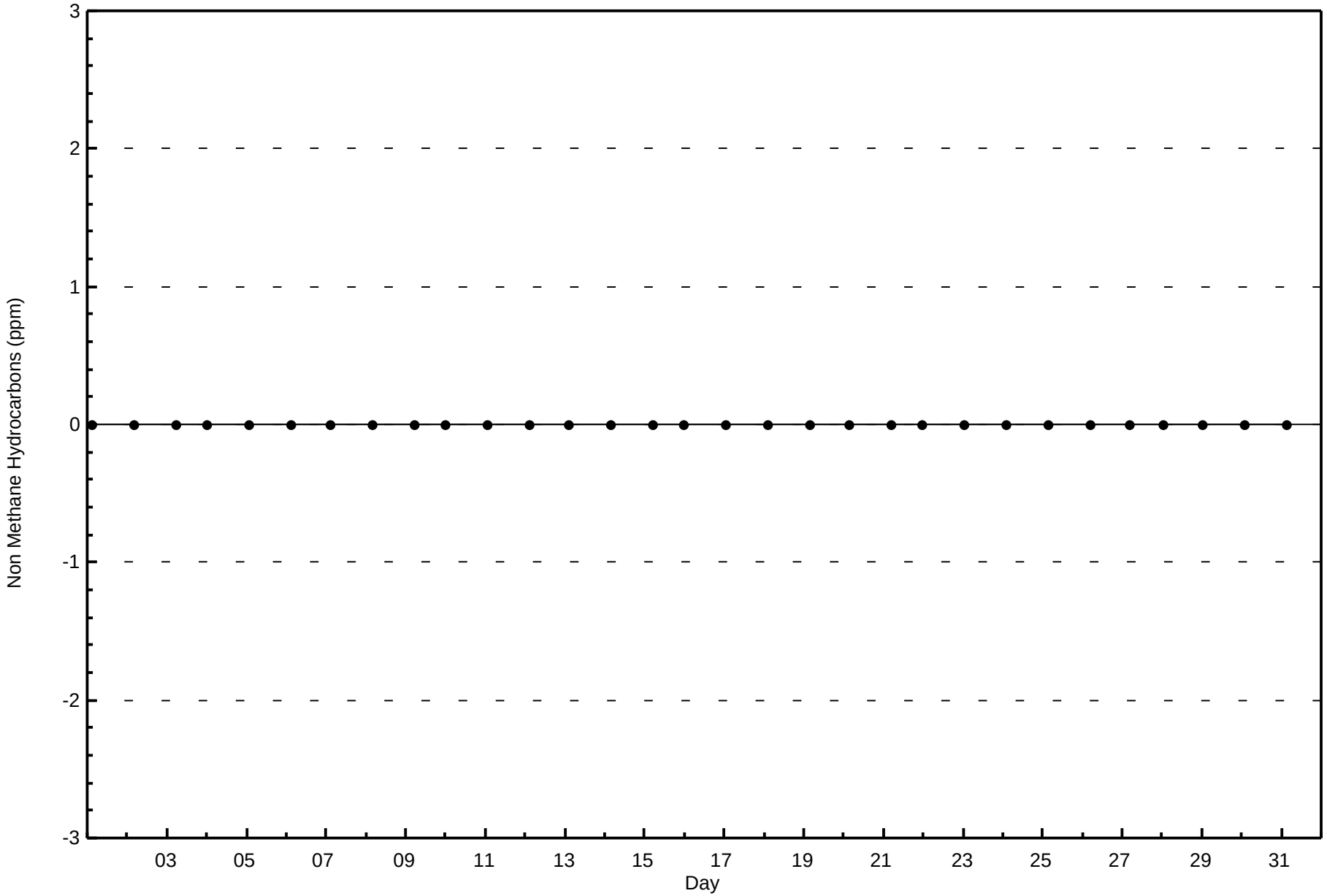
Total Number of Valid Hours: 698

Wood Buffalo Environmental Association

Zero Responses

Non Methane Hydrocarbons (NMHC) - ppm

Patricia McInnes - August 2015

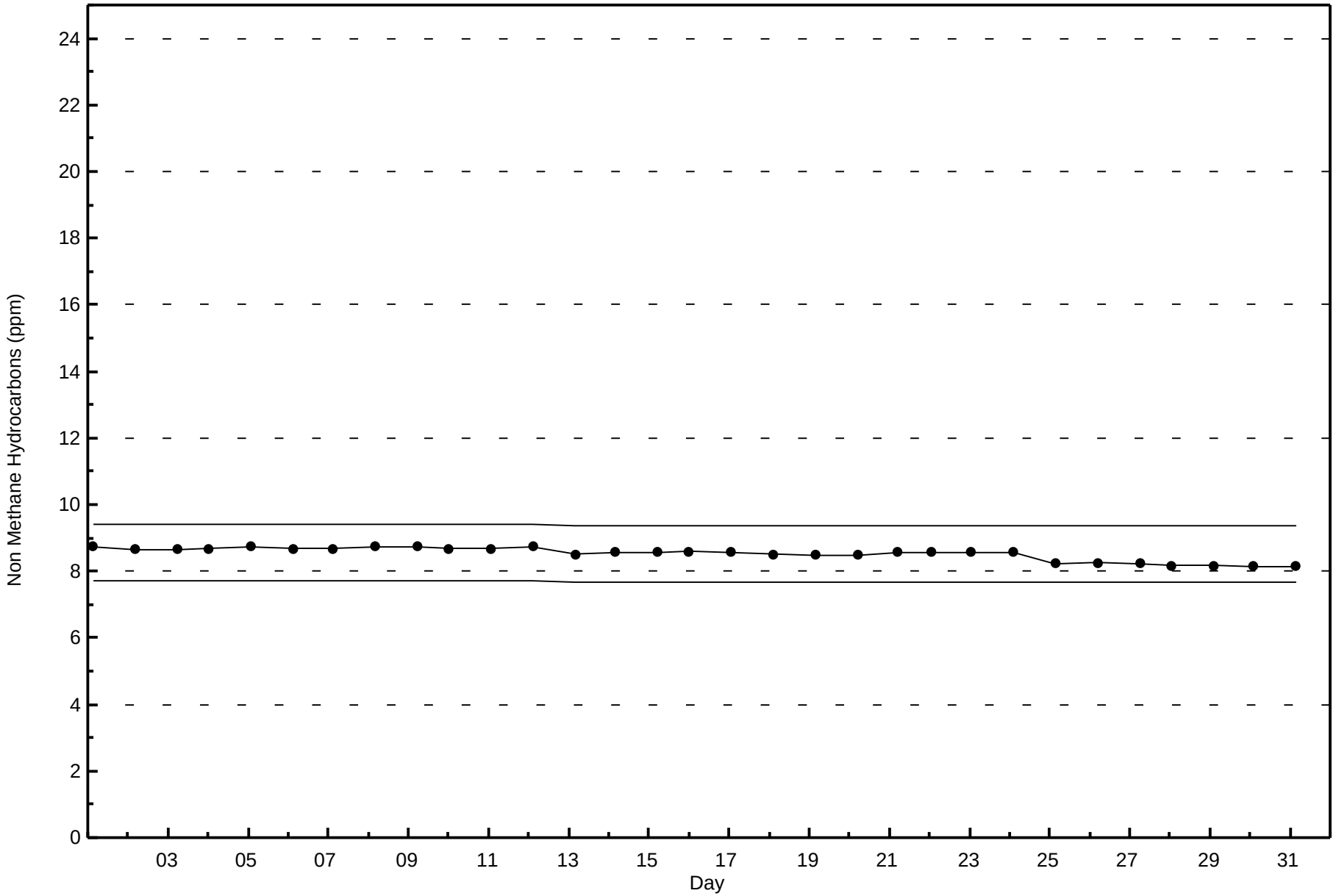


Wood Buffalo Environmental Association

Span Responses

Non Methane Hydrocarbons (NMHC) - ppm

Patricia McInnes - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Methane (CH_4) - ppm

Patricia McInnes - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 2.5 ppm on Aug 1 08:00

Maximum Daily Average: 2.0 ppm on Aug 25

Minimum Value: 1.8 ppm on Aug 28 13:00

Minimum Daily Average: 1.9 ppm on Aug 14

Maximum Diurnal Average: 2.0 ppm at hour 5

Minimum Diurnal Average: 1.9 ppm at hour 14

Monthly Average: 1.91 ppm

Percentiles: P_1 = 1.8 P_{10} = 1.8 Q_1 = 1.9 Median = 1.9 Q_3 = 1.9 P_{90} = 2.0 P_{99} = 2.2

Hours in Service:	744
Hours of Data:	700
Hours of Missing Data:	44
Hours of Calibration:	38
Percent Operational Time:	99.2

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	2.0	2.0	2.2	Z	2.2	2.2	2.2	2.5	2.3	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.5
2-Aug	2.0	2.0	2.0	2.0	Z	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.2	2.0	2.2
3-Aug	2.1	2.1	2.1	2.1	2.1	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1
4-Aug	Z	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
5-Aug	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
6-Aug	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
7-Aug	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	M	M	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
8-Aug	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1	1.9	2.1
9-Aug	2.1	2.1	2.1	2.0	2.0	Z	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.1
10-Aug	Z	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
11-Aug	1.9	Z	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	2.0
12-Aug	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	C	C	C	C	C	C	C	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	--	1.9
13-Aug	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9
14-Aug	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
15-Aug	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
16-Aug	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	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
17-Aug	1.9	Z	2.0	2.0	1.9	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.9	2.0
18-Aug	2.0	2.0	Z	2.0	2.1	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1
19-Aug	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9
20-Aug	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
21-Aug	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	M	M	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
22-Aug	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	2.0
23-Aug	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	2.0
24-Aug	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	M	M	1.8	1.9	1.9	1.8	1.8	1.8	1.9	1.9	1.9	1.9	2.0	2.0	1.9	2.0
25-Aug	2.0	2.0	2.0	Z	2.1	2.2	2.2	2.3	2.3	2.1	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.1	2.0	2.3
26-Aug	2.1	2.0	2.0	2.0	Z	1.9	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.1
27-Aug	2.0	2.0	2.0	2.1	2.1	Z	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1
28-Aug	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.0	1.9	1.9	2.0	2.0	1.9	2.0
29-Aug	2.0	Z	1.9	1.9	1.9	2.0	1.9	2.0	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	2.0
30-Aug	1.9	1.9	Z	1.9	1.9	1.9	2.0	2.0	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.0
31-Aug	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	2.0
	2.0	1.9	2.0	1.9	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	Diurnal Average	
	2.1	2.1	2.2	2.1	2.2	2.2	2.2	2.5	2.3	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.2	Diurnal Maximum	

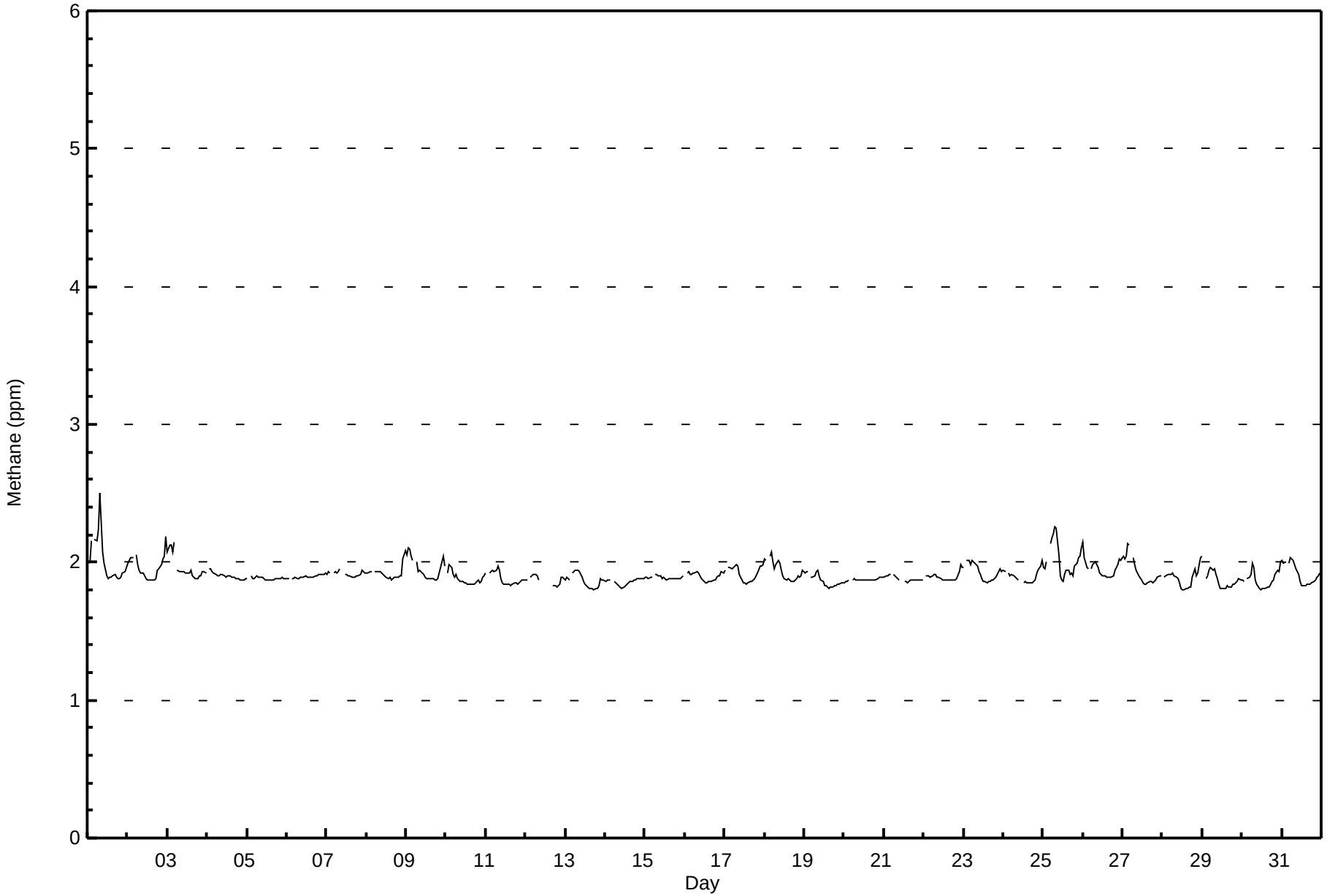
Z - zerospan C - Calibration M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Methane (CH_4) - ppm

Patricia McInnes - August 2015



Methane (CH_4) - ppm

Patricia McInnes - August 2015

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	671	95.86	95.86
2.1 - 3.0	29	4.14	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 700

Total Number of Hours: 744

Wood Buffalo Environmental Association | **Methane (CH_4) - ppm**

Frequency Distribution | **Patricia McInnes - August 2015**

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	14	9	5	13	58	55	37	30	45	56	85	89	55	54	32	32	669
2.1 - 3.0	0	1	0	0	0	1	0	1	2	1	0	0	4	7	6	6	29
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	14	10	5	13	58	56	37	31	47	57	85	89	59	61	38	38	698

Total Number of Valid Hours: 698

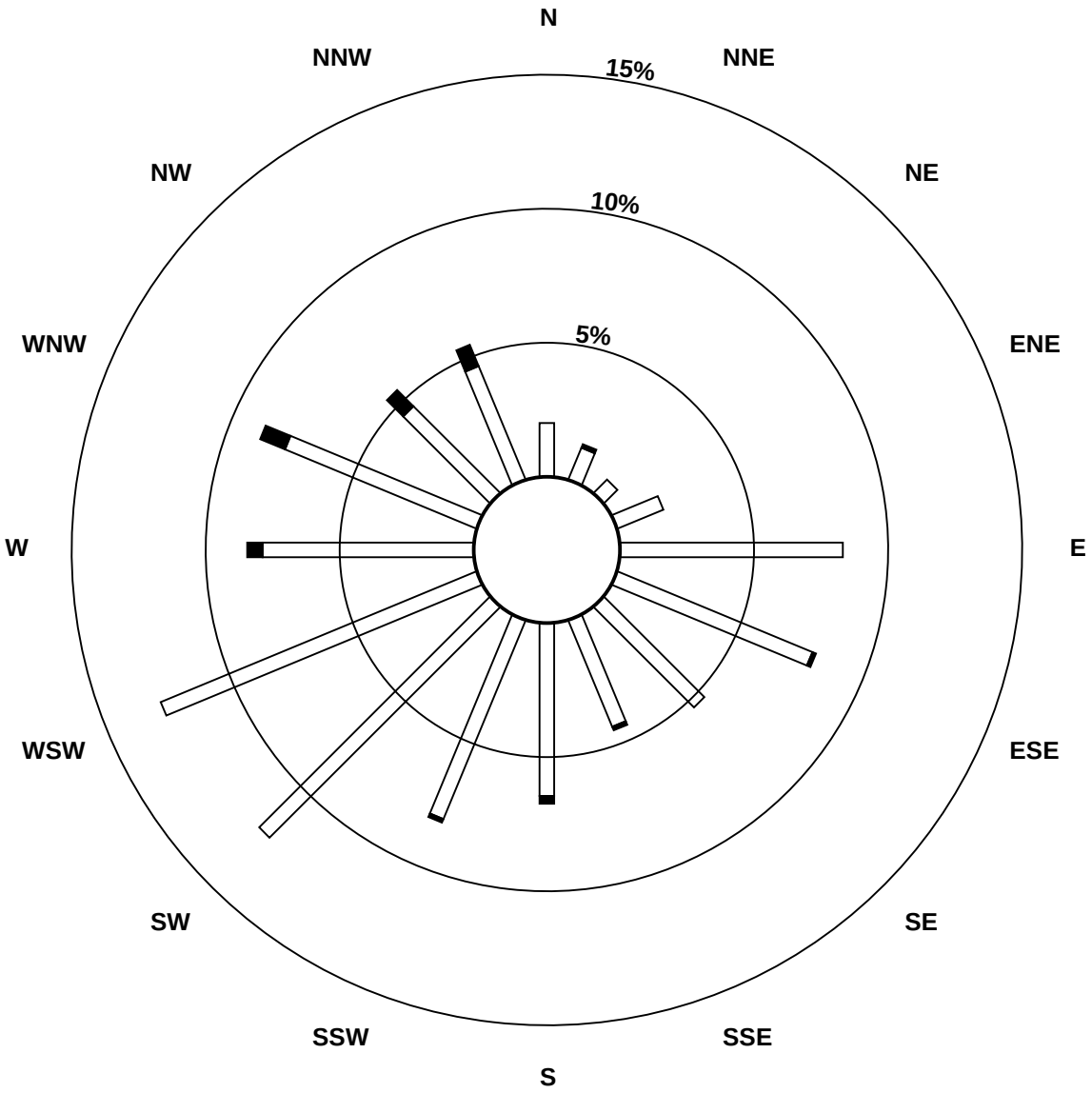
Total Number of Hours: 744

Wood Buffalo Environmental Association

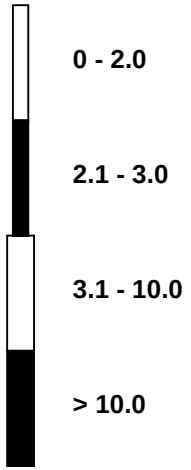
Wind Rose Aug 2015

Methane (CH_4) - ppm

Patricia McInnes (AMS 6)



Classes (ppm)



0 - 2.0

2.1 - 3.0

3.1 - 10.0

> 10.0

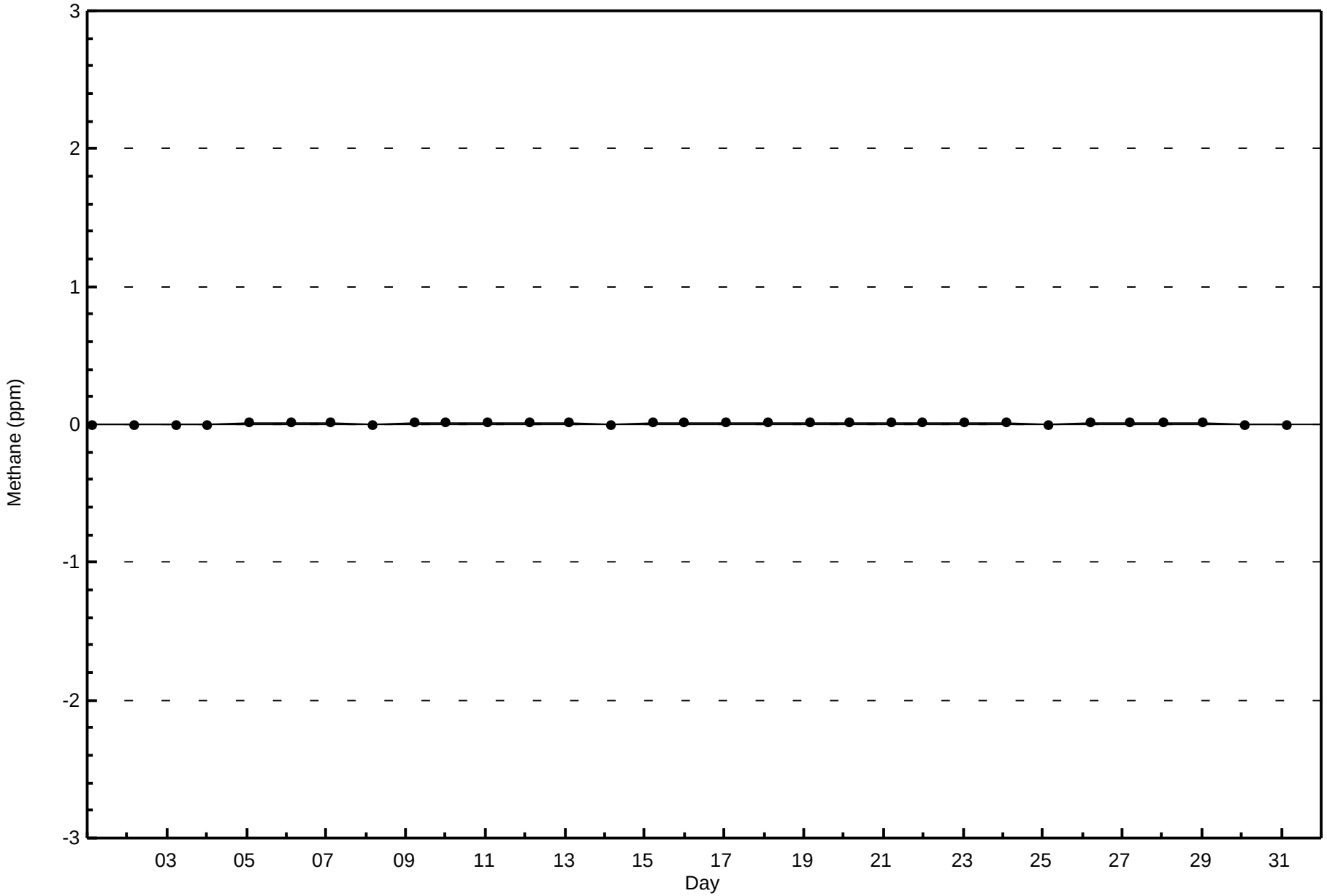
Total Number of Valid Hours: 698

Wood Buffalo Environmental Association

Zero Responses

Methane (CH_4) - ppm

Patricia McInnes - August 2015

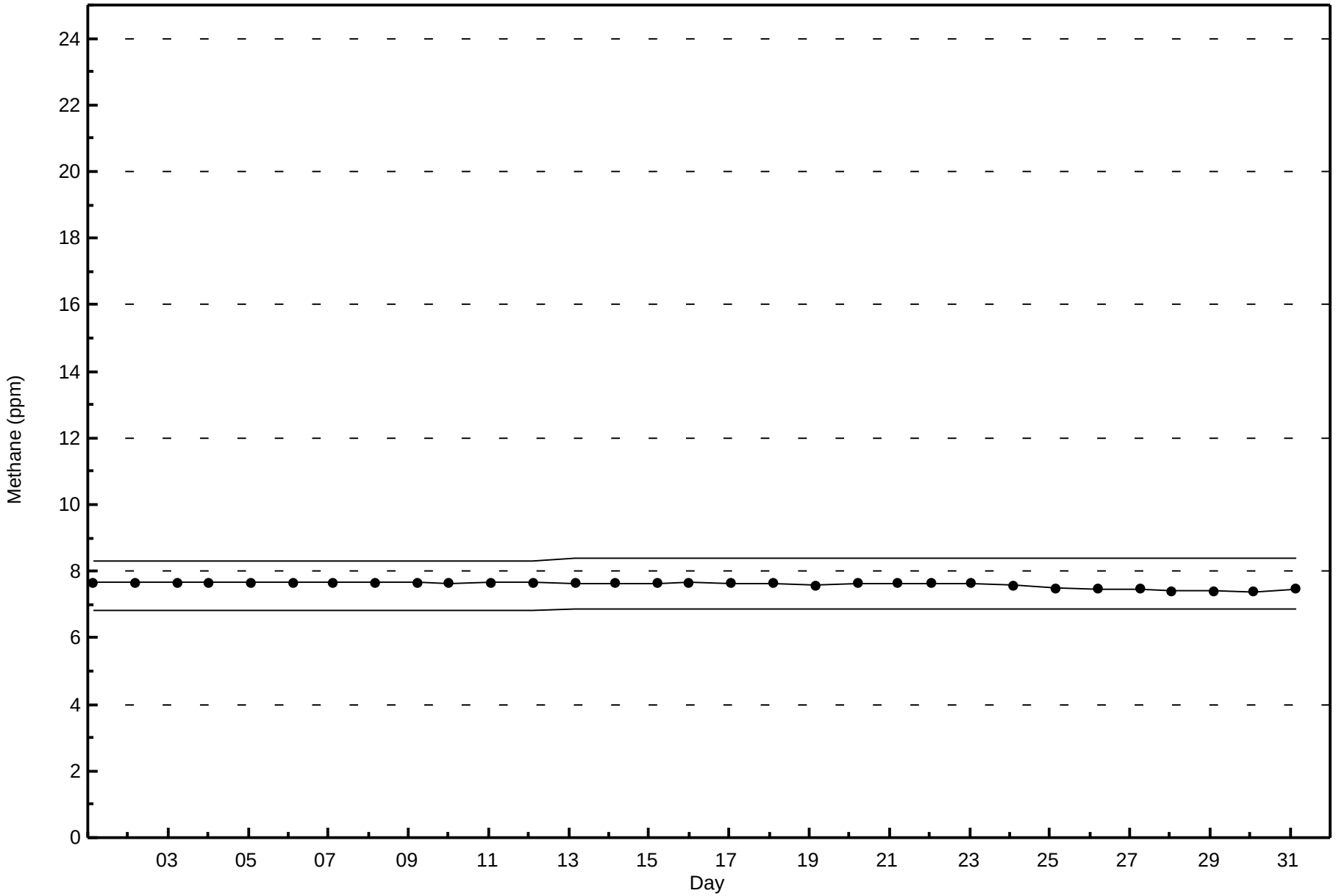


Wood Buffalo Environmental Association

Span Responses

Methane (CH_4) - ppm

Patricia McInnes - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O_3) - ppb

Patricia McInnes - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 43 ppb on Aug 27 18:00

Maximum Daily Average: 30.3 ppb on Aug 10

Minimum Value: 4 ppb on Aug 26 01:00

Minimum Daily Average: 14.3 ppb on Aug 7

Maximum Diurnal Average: 30.5 ppb at hour 15

Minimum Diurnal Average: 14.6 ppb at hour 7

Monthly Average: 22.4 ppb

Percentiles: $P_1 = 5$ $P_{10} = 10$ $Q_1 = 16$ Median = 22 $Q_3 = 29$ $P_{90} = 34$ $P_{99} = 40$

Hours in Service:	744
Hours of Data:	706
Hours of Missing Data:	38
Hours of Calibration:	35
Percent Operational Time:	99.6

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	15	14	9	6	6	Z	7	6	10	17	20	26	33	34	36	32	32	33	32	28	22	20	17	13	20.4	36
2-Aug	13	9	10	10	8	7	Z	13	21	23	25	27	28	28	28	28	28	26	29	26	21	17	17	13	19.8	29
3-Aug	12	10	9	8	6	5	11	Z	16	17	24	28	35	36	32	36	35	30	29	24	23	25	23	23	21.6	36
4-Aug	22	20	Z	20	20	19	19	17	20	22	23	24	23	22	20	18	21	24	22	24	24	22	19	19	21.0	24
5-Aug	18	16	17	Z	19	13	13	15	17	17	19	21	20	21	21	22	21	17	19	20	18	17	18	18	18.1	22
6-Aug	17	17	16	16	Z	16	15	16	15	15	19	20	21	18	16	15	14	12	11	10	9	9	9	9	14.6	21
7-Aug	9	9	9	9	8	Z	7	7	8	11	12	15	16	18	22	23	23	23	22	17	18	16	16	13	14.3	23
8-Aug	11	10	9	9	9	8	Z	9	13	18	23	24	24	24	25	28	24	23	26	23	21	21	14	9	17.6	28
9-Aug	8	6	5	6	5	5	6	Z	11	13	19	26	28	30	31	33	35	35	30	24	14	9	11	16	17.7	35
10-Aug	22	24	Z	19	25	24	19	26	32	34	35	34	34	35	35	37	40	40	37	32	30	29	27	27	30.3	40
11-Aug	26	26	26	Z	24	23	19	17	18	24	29	32	34	34	33	33	32	35	37	36	34	32	31	30	28.7	37
12-Aug	30	29	28	26	Z	23	23	24	26	28	29	31	M	32	33	34	35	36	35	33	31	28	27	26	29.4	36
13-Aug	26	24	22	19	17	Z	14	13	C	C	C	C	19	25	29	32	30	31	32	31	25	21	23	24	24.1	32
14-Aug	24	25	24	23	25	26	Z	27	27	26	26	25	23	22	23	23	21	20	20	19	20	19	18	19	22.8	27
15-Aug	19	19	20	18	17	17	16	Z	20	22	26	29	31	32	31	30	28	27	24	21	22	21	18	16	22.8	32
16-Aug	16	14	Z	13	12	11	11	11	13	18	21	26	26	27	28	28	28	28	27	23	21	20	17	19	19.8	28
17-Aug	19	19	17	Z	15	14	13	15	15	22	26	29	31	31	31	32	33	33	31	26	17	17	14	14	22.3	33
18-Aug	13	15	19	15	Z	14	15	17	21	24	27	31	36	38	39	37	31	32	31	27	25	26	26	25	25.3	39
19-Aug	25	25	25	29	32	Z	30	27	28	29	28	27	26	28	33	34	37	34	36	33	30	27	25	23	29.0	37
20-Aug	22	20	18	18	19	20	Z	23	24	24	23	22	21	21	21	21	22	22	22	22	21	20	20	20	21.2	24
21-Aug	19	17	17	14	13	12	13	Z	19	19	19	20	20	M	M	23	22	22	21	21	21	20	19	19	18.5	23
22-Aug	18	16	Z	17	15	15	13	14	16	18	21	22	23	25	26	27	28	28	27	21	16	13	11	12	19.1	28
23-Aug	10	9	9	Z	7	5	8	10	14	18	21	26	33	41	42	42	38	36	34	31	33	31	29	32	24.3	42
24-Aug	28	31	29	25	Z	24	21	23	24	26	28	29	31	33	33	33	33	30	25	19	16	14	14	10	25.2	33
25-Aug	15	14	11	7	5	Z	5	6	11	17	23	28	31	32	28	26	25	24	21	15	14	12	11	7	16.9	32
26-Aug	4	9	14	14	11	12	Z	11	12	16	22	24	27	32	34	32	34	31	30	18	15	13	12	13	19.2	34
27-Aug	11	12	12	9	6	5	6	Z	15	20	25	32	36	37	38	38	39	43	42	40	36	31	34	34	26.1	43
28-Aug	34	33	32	Z	28	27	27	27	28	28	29	31	34	35	35	34	34	34	26	17	16	16	14	8	27.2	35
29-Aug	6	15	23	17	Z	11	12	12	20	25	30	34	36	37	38	40	39	35	34	31	31	32	31	32	26.9	40
30-Aug	31	30	30	28	27	Z	21	24	29	35	38	38	38	39	38	38	35	32	27	21	12	12	13	10	28.0	39
31-Aug	10	11	12	12	10	8	Z	10	14	17	19	29	33	34	35	34	34	33	33	32	25	25	26	21	22.6	35
	17.8	17.6	17.5	15.6	14.9	14.6	14.6	16.1	18.5	21.4	24.2	27.0	28.3	30.0	30.5	30.4	30.0	29.2	28.2	24.7	21.9	20.5	19.4	18.4	Diurnal Average	
	34	33	32	29	32	27	30	27	32	35	38	38	38	41	42	42	40	43	42	40	36	32	34	34	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance

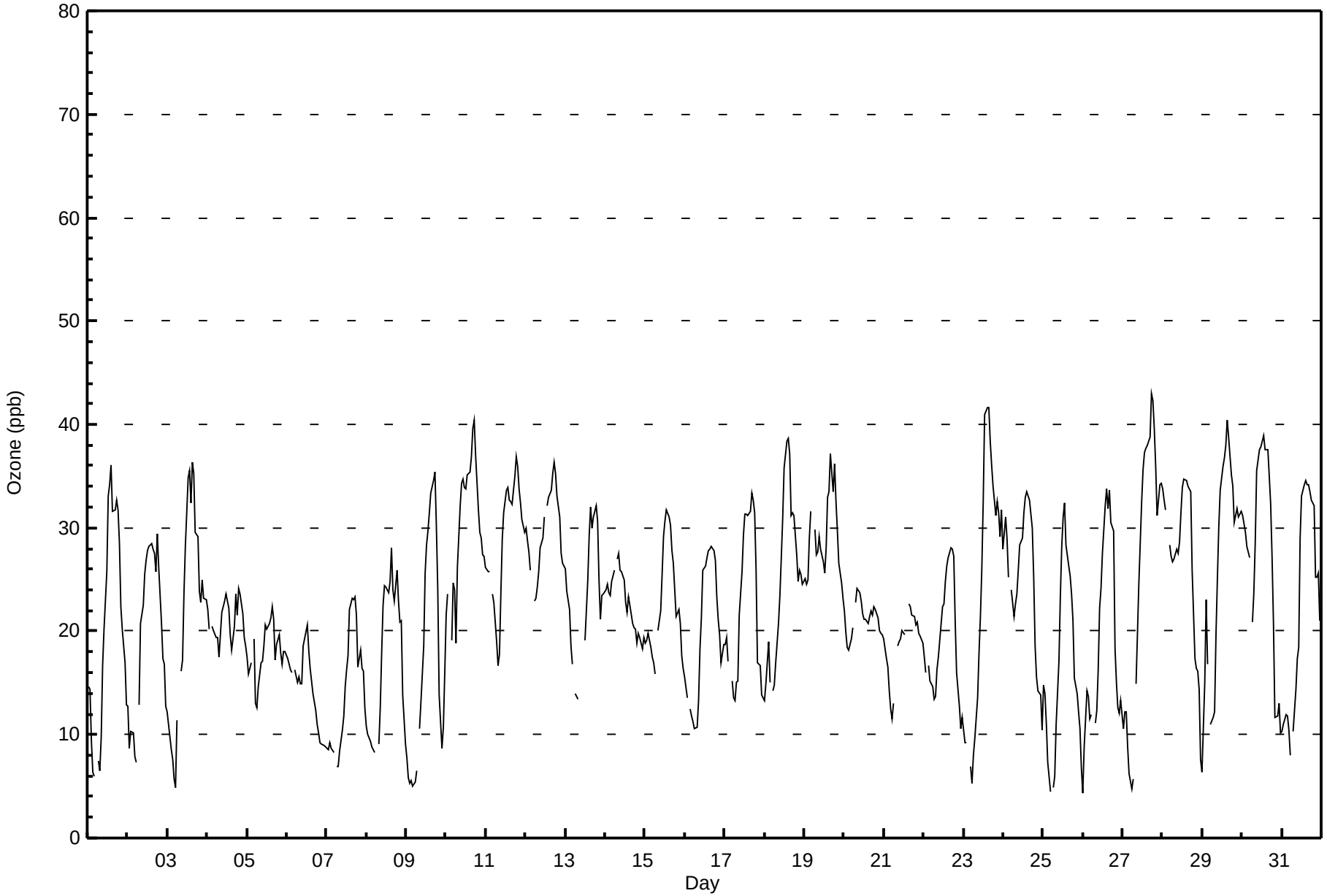
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb

Wood Buffalo Environmental Association

Hourly Averages

Ozone (O_3) - ppb

Patricia McInnes - August 2015



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	297	42.07	42.07
21 - 50	409	57.93	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 706

Total Number of Hours: 744

Wood Buffalo Environmental Association **Ozone (O_3) - ppb**

Frequency Distribution **Patricia McInnes - August 2015**

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	4	3	3	9	40	24	13	9	23	20	24	32	22	25	24	21	296
21 - 50	10	7	3	5	17	32	23	15	28	36	64	59	42	35	15	18	409
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	14	10	6	14	57	56	36	24	51	56	88	91	64	60	39	39	705

Total Number of Valid Hours: 705

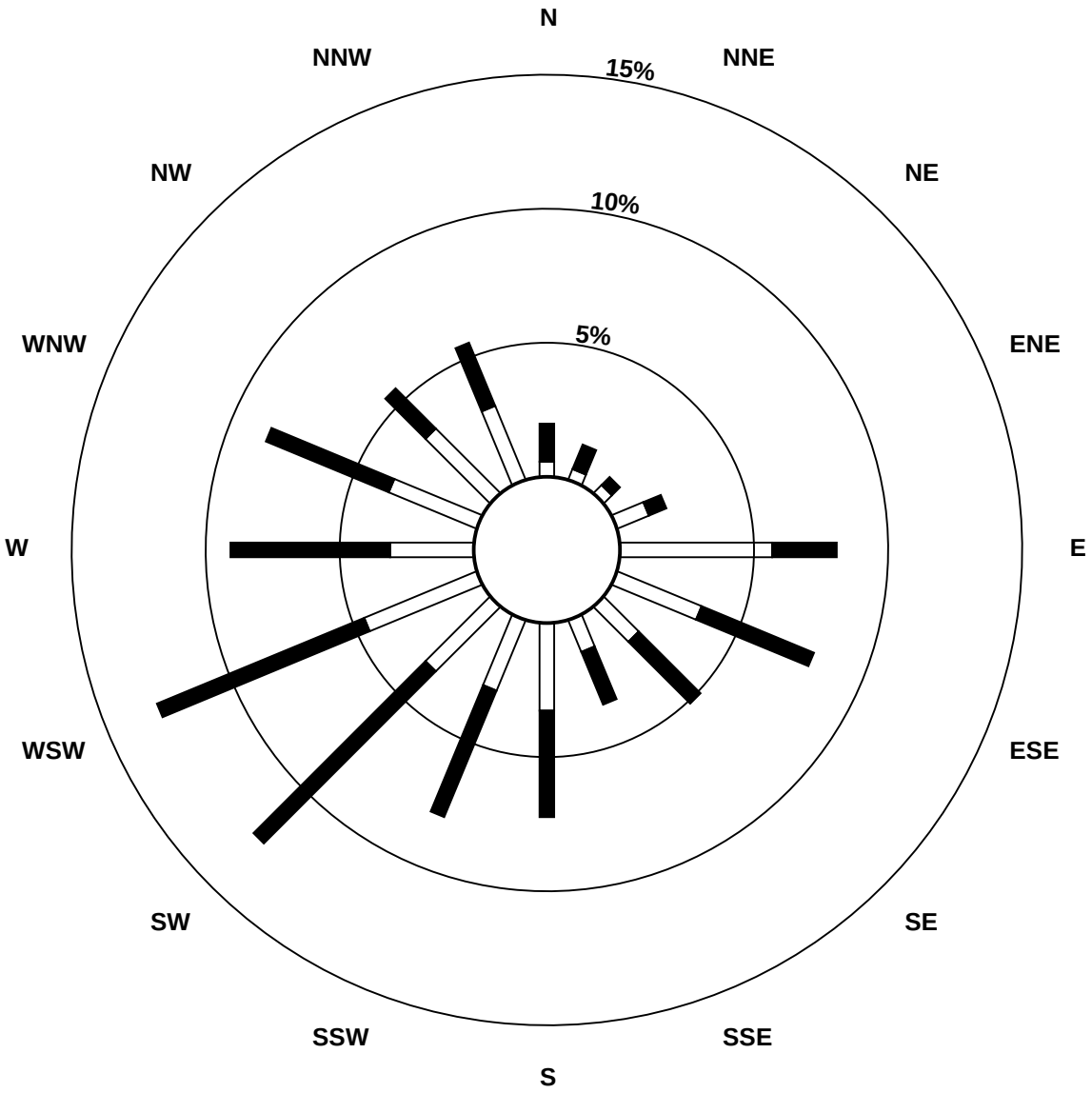
Total Number of Hours: 744

Wood Buffalo Environmental Association

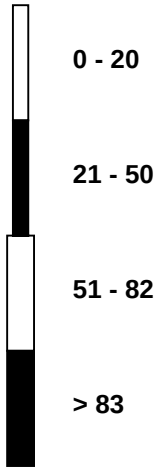
Wind Rose Aug 2015

Ozone (O_3) - ppb

Patricia McInnes (AMS 6)



Classes (ppb)



0 - 20

21 - 50

51 - 82

> 83

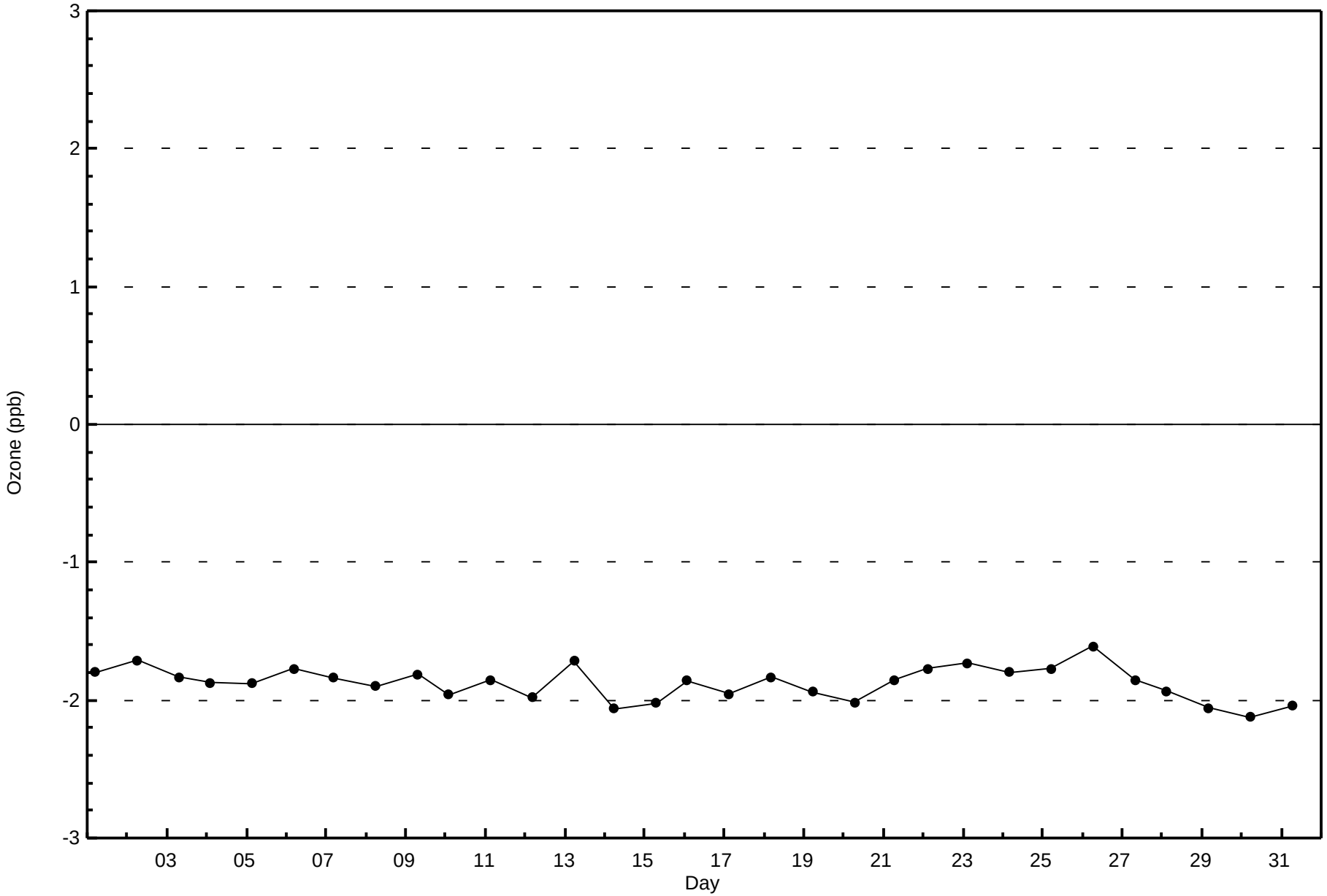
Total Number of Valid Hours: 705

Wood Buffalo Environmental Association

Zero Responses

Ozone (O_3) - ppb

Patricia McInnes - August 2015

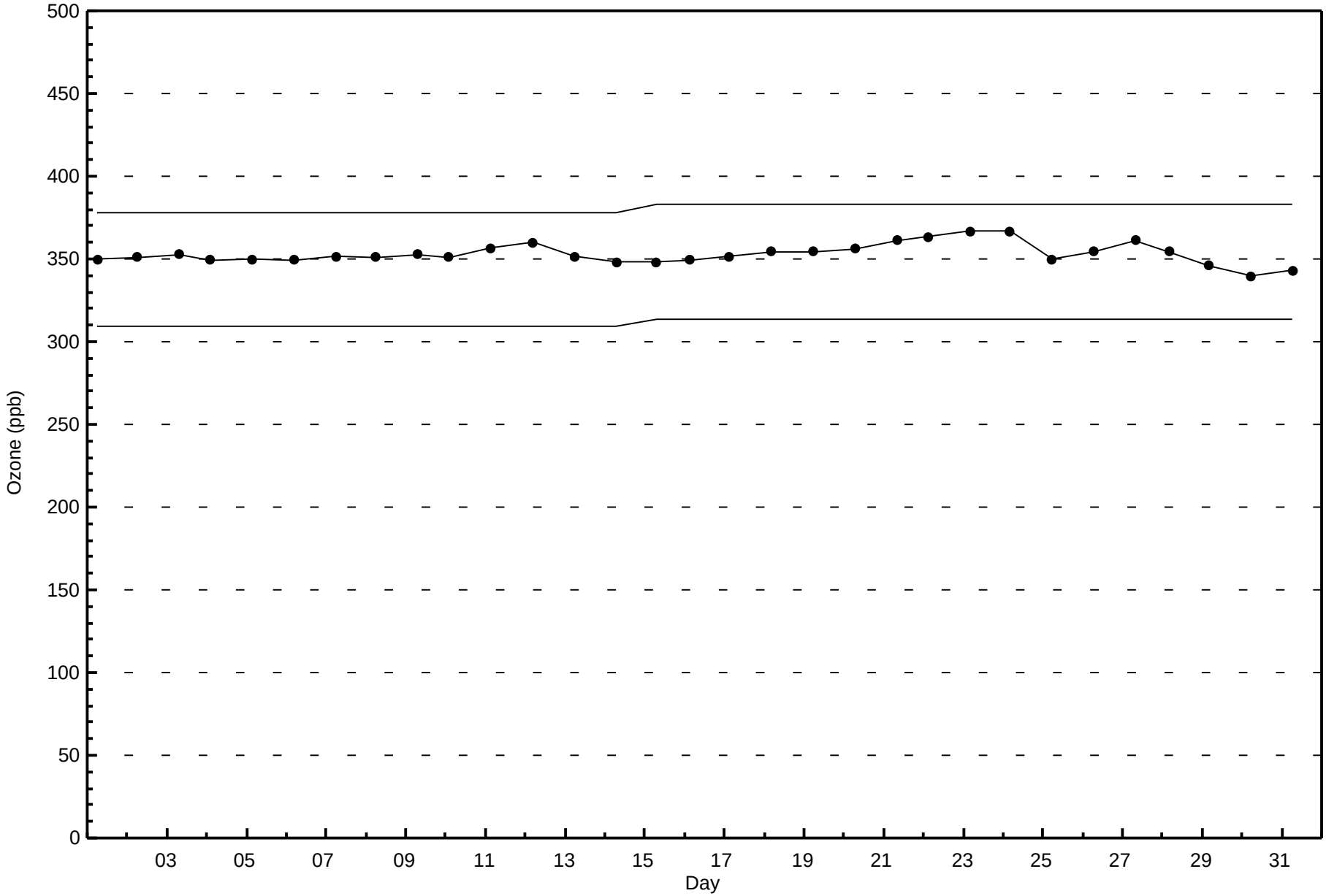


Wood Buffalo Environmental Association

Span Responses

Ozone (O_3) - ppb

Patricia McInnes - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

Patricia McInnes - August 2015

Maximum Value: 34 ppb on Aug 3 18:00

Maximum Daily Average: 2.9 ppb on Aug 25

Minimum Value: 0 ppb on Aug 19 17:00

Minimum Daily Average: 0.1 ppb on Aug 20

Maximum Diurnal Average: 1.9 ppb at hour 8

Minimum Diurnal Average: 0.2 ppb at hour 2

Monthly Average: 0.8 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 1$ $P_{90} = 2$ $P_{99} = 7$

Hours in Service:	744
Hours of Data:	701
Hours of Missing Data:	43
Hours of Calibration:	39
Percent Operational Time:	99.5

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0	0	0	Z	1	2	6	13	10	6	2	2	1	1	0	1	2	1	0	0	1	0	0	0	2.2	13
2-Aug	0	0	0	0	Z	1	1	1	1	1	0	0	0	0	0	1	0	0	1	1	1	0	0	0	0.5	1
3-Aug	0	0	0	0	0	Z	2	1	1	2	1	1	1	0	0	0	1	34	1	1	1	0	0	0	2.2	34
4-Aug	Z	0	0	1	1	3	2	2	1	1	1	1	1	1	2	2	1	1	1	1	1	0	0	1	1.1	3
5-Aug	0	Z	0	1	3	5	1	2	1	1	1	1	1	1	1	1	2	1	1	1	1	0	0	0	1.1	5
6-Aug	0	0	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	1	2	0	1.2	2
7-Aug	0	0	0	Z	3	2	1	2	2	2	2	1	1	1	1	1	2	1	1	2	0	0	1	0	1.2	3
8-Aug	0	0	0	1	Z	1	2	2	2	2	1	0	0	0	0	0	0	0	1	1	1	1	0	0	0.8	2
9-Aug	0	0	2	1	1	Z	2	1	2	2	1	1	1	0	0	0	1	1	1	2	1	5	1	0	1.2	5
10-Aug	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.3	1
11-Aug	0	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
12-Aug	0	0	Z	0	0	0	0	0	0	C	C	C	C	C	C	C	C	0	0	0	0	0	0	0	--	0
13-Aug	0	0	0	Z	0	0	0	0	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2
14-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.2	1
15-Aug	0	0	0	0	1	Z	0	1	0	1	0	0	1	1	0	0	1	1	1	0	0	1	2	2	0.6	2
16-Aug	Z	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2
17-Aug	0	Z	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	0.3	1
18-Aug	0	0	Z	0	1	1	1	2	3	2	2	1	0	0	0	0	1	0	0	1	1	0	0	0	0.8	3
19-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
20-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
21-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
22-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.1	1
23-Aug	0	Z	0	2	2	4	2	3	2	2	M	M	M	M	0	0	0	2	0	1	0	0	0	0	1.2	4
24-Aug	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0.3	2
25-Aug	0	0	0	Z	4	8	6	8	15	10	4	2	1	1	1	1	1	1	0	1	1	0	0	1	2.9	15
26-Aug	2	0	0	0	Z	1	1	4	5	4	3	2	1	1	1	1	0	1	0	0	0	0	1	0	1.2	5
27-Aug	0	0	0	1	1	Z	4	6	2	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0.7	6
28-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	0.3	1
29-Aug	1	Z	0	0	0	0	1	4	2	1	1	0	0	0	0	1	1	1	1	1	1	0	0	0	0.8	4
30-Aug	0	0	Z	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1	1	2	1	0	0	0.4	2
31-Aug	0	0	0	Z	1	2	2	4	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	4
	0.2	0.2	0.2	0.4	0.8	1.3	1.3	1.9	1.8	1.5	0.9	0.6	0.5	0.4	0.3	0.4	0.6	1.6	0.5	0.6	0.5	0.5	0.4	0.3	Diurnal Average	
	2	2	2	2	4	8	6	13	15	10	4	2	1	1	2	2	2	34	2	2	2	5	2	2	Diurnal Maximum	

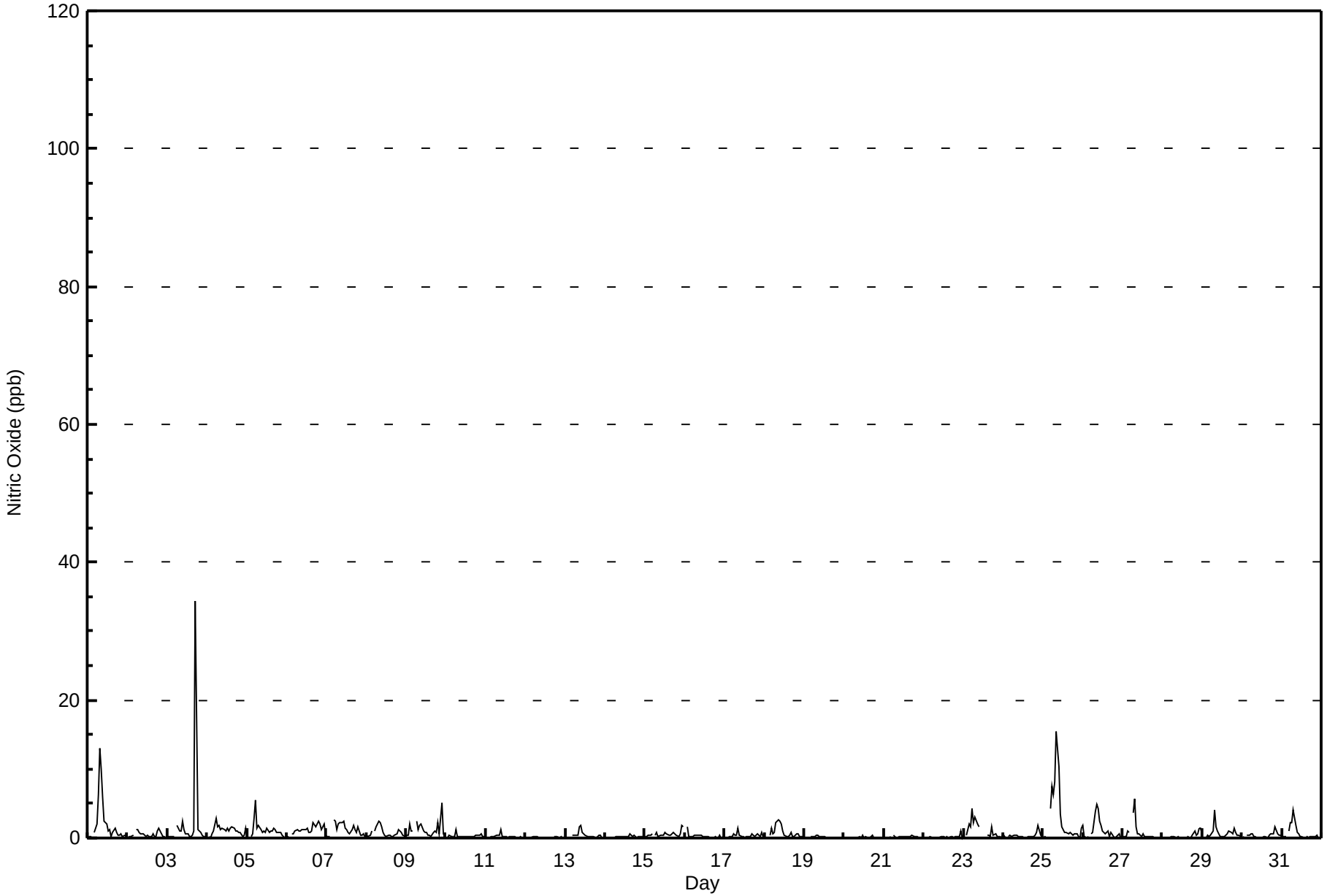
Z - zerospan C - Calibration M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Nitric Oxide (NO) - ppb

Patricia McInnes - August 2015



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

Patricia McInnes - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	14	10	6	14	57	53	37	31	46	58	86	89	58	61	40	38	698
21 - 40	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	14	10	6	14	58	53	37	31	46	58	86	89	58	61	40	38	699

Total Number of Valid Hours: 699

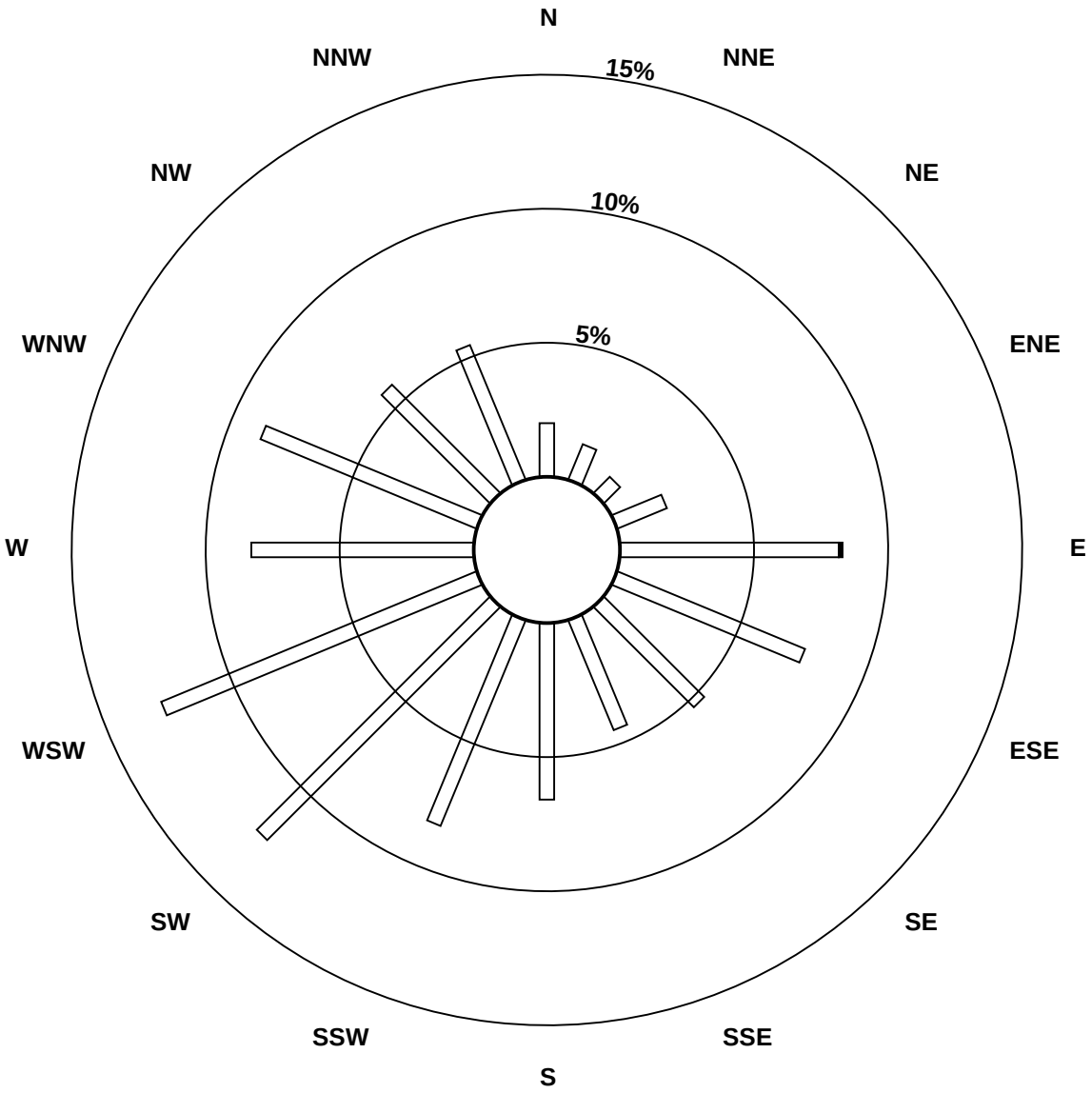
Total Number of Hours: 744

Wood Buffalo Environmental Association

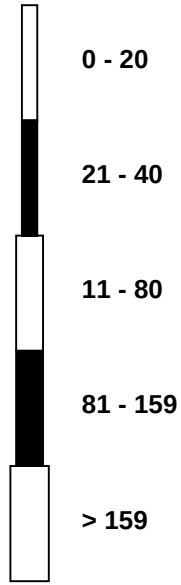
Wind Rose Aug 2015

Nitric Oxide (NO) - ppb

Patricia McInnes (AMS 6)



Classes (ppb)



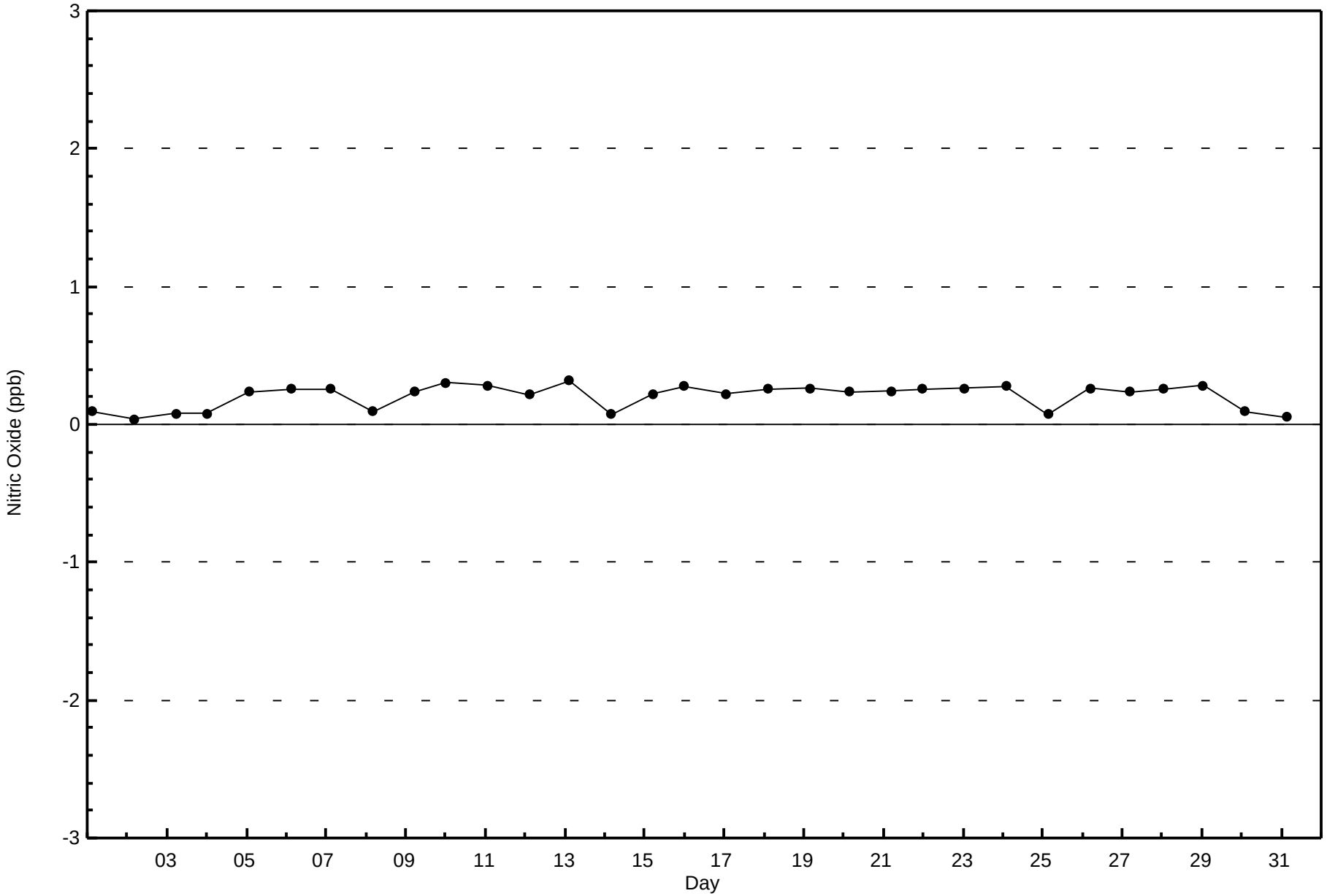
Total Number of Valid Hours: 699

Wood Buffalo Environmental Association

Zero Responses

Nitric Oxide (NO) - ppb

Patricia McInnes - August 2015

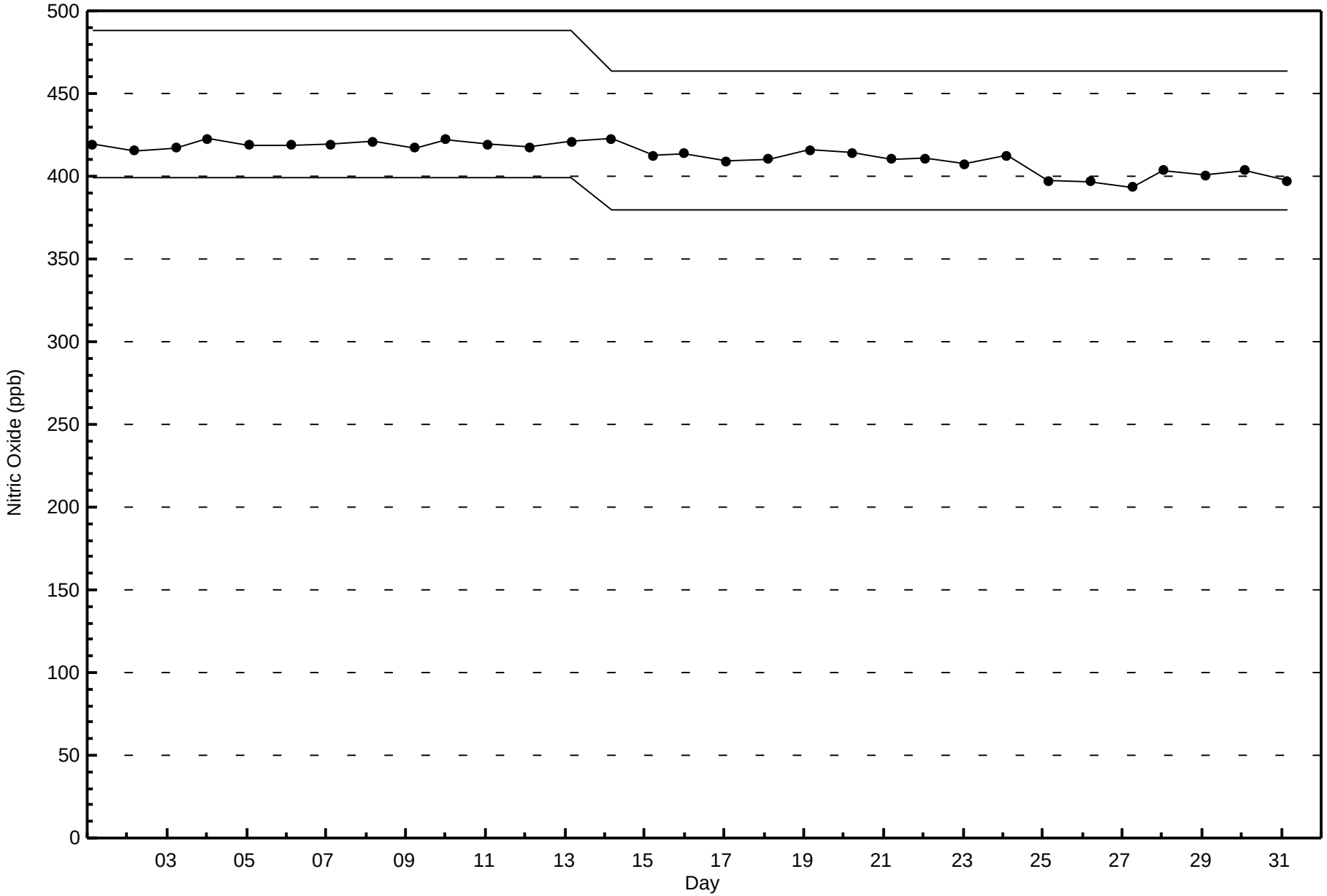


Wood Buffalo Environmental Association

Span Responses

Nitric Oxide (NO) - ppb

Patricia McInnes - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO_2) - ppb

Patricia McInnes - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 19 ppb on Aug 29 00:00 Maximum Daily Average: 5.4 ppb on Aug 25

Minimum Value: 0 ppb on Aug 2 12:00 Minimum Daily Average: 0.2 ppb on Aug 20

Maximum Diurnal Average: 2.8 ppb at hour 21 Minimum Diurnal Average: 0.8 ppb at hour 14

Monthly Average: 1.7 ppb Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 1 $Q_3 = 2$ $P_{90} = 4$ $P_{99} = 11$

Hours in Service:	744
Hours of Data:	701
Hours of Missing Data:	43
Hours of Calibration:	39
Percent Operational Time:	99.5

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	3	4	7	Z	7	5	7	10	10	8	5	4	2	3	1	4	5	3	2	2	3	1	1	1	4.1	10
2-Aug	1	2	1	1	Z	2	1	0	1	1	1	0	0	0	0	0	0	0	8	13	12	7	6	4	2.6	13
3-Aug	4	3	3	2	2	Z	2	2	2	3	2	2	2	1	1	1	2	11	2	3	2	1	1	1	2.3	11
4-Aug	Z	1	1	2	2	5	4	5	3	3	3	2	2	2	3	3	3	2	2	1	2	1	1	1	2.3	5
5-Aug	0	Z	0	1	4	4	2	3	1	1	1	1	0	0	0	1	2	2	1	1	1	1	0	0	1.1	4
6-Aug	0	0	Z	0	0	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	1	1	1	1	0.6	1
7-Aug	0	0	0	Z	1	2	1	2	2	2	2	1	1	0	1	1	2	1	2	4	2	3	3	1	1.4	4
8-Aug	0	1	1	1	Z	1	1	1	1	2	1	1	0	0	1	0	0	1	2	4	2	3	2	1	1.0	4
9-Aug	1	0	1	1	1	Z	1	1	1	1	1	1	1	0	0	0	1	2	2	4	5	7	4	2	1.6	7
10-Aug	Z	1	4	1	0	1	3	0	0	0	0	0	0	0	0	0	0	0	2	3	3	2	1	0	0.9	4
11-Aug	1	Z	0	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0.3	1
12-Aug	0	0	Z	0	0	1	0	0	0	C	C	C	C	C	C	C	C	0	1	2	1	2	1	0	--	2
13-Aug	0	0	0	Z	1	1	1	1	3	3	1	1	1	0	1	0	1	0	0	1	4	4	1	0	1.1	4
14-Aug	0	1	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0.3	1
15-Aug	0	0	1	1	1	Z	2	3	3	2	1	1	2	2	1	2	2	3	2	1	1	1	3	3	1.6	3
16-Aug	Z	3	2	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	0.8	3
17-Aug	1	Z	0	1	0	1	1	1	2	1	1	1	0	0	1	1	1	2	1	4	6	3	5	3	1.5	6
18-Aug	1	1	Z	7	7	4	2	4	4	4	4	2	2	2	2	2	1	1	1	3	4	2	1	2	2.7	7
19-Aug	1	1	1	Z	2	3	3	3	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.9	3
20-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.2	1
21-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0.2	1
22-Aug	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	2	1	2	1	0.5	2
23-Aug	2	Z	2	3	3	5	3	3	2	2	M	M	M	M	2	1	1	2	2	4	3	2	3	2	2.4	5
24-Aug	3	1	Z	2	2	2	2	1	1	1	1	0	0	0	0	0	1	0	1	2	4	2	3	5	1.4	5
25-Aug	1	1	2	Z	6	8	5	6	11	12	6	3	3	6	8	5	3	4	4	8	7	6	5	8	5.4	12
26-Aug	12	6	4	4	Z	5	4	6	6	6	4	3	3	3	3	6	4	3	3	2	2	3	3	2	4.2	12
27-Aug	2	1	2	4	4	Z	3	3	2	1	1	1	1	1	1	1	1	1	1	2	4	5	1	1	1.8	5
28-Aug	Z	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	2	4	2	3	7	19	2.0	19
29-Aug	15	Z	2	5	7	7	5	6	3	2	2	1	1	1	1	2	3	3	2	4	2	1	1	1	3.3	15
30-Aug	1	1	Z	1	2	5	3	1	0	0	0	0	0	0	0	0	2	2	3	5	7	3	1	2	1.7	7
31-Aug	1	1	1	Z	2	4	4	4	2	1	1	0	0	0	0	0	0	0	1	1	6	3	1	1	1.5	6
	1.9	1.1	1.3	1.7	2.2	2.6	2.1	2.2	2.1	1.9	1.3	0.9	0.8	0.8	0.9	1.0	1.2	1.5	1.6	2.6	2.8	2.2	2.0	2.0	Diurnal Average	
	15	6	7	7	7	8	7	10	11	12	6	4	3	6	8	6	5	11	8	13	12	7	7	19	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance

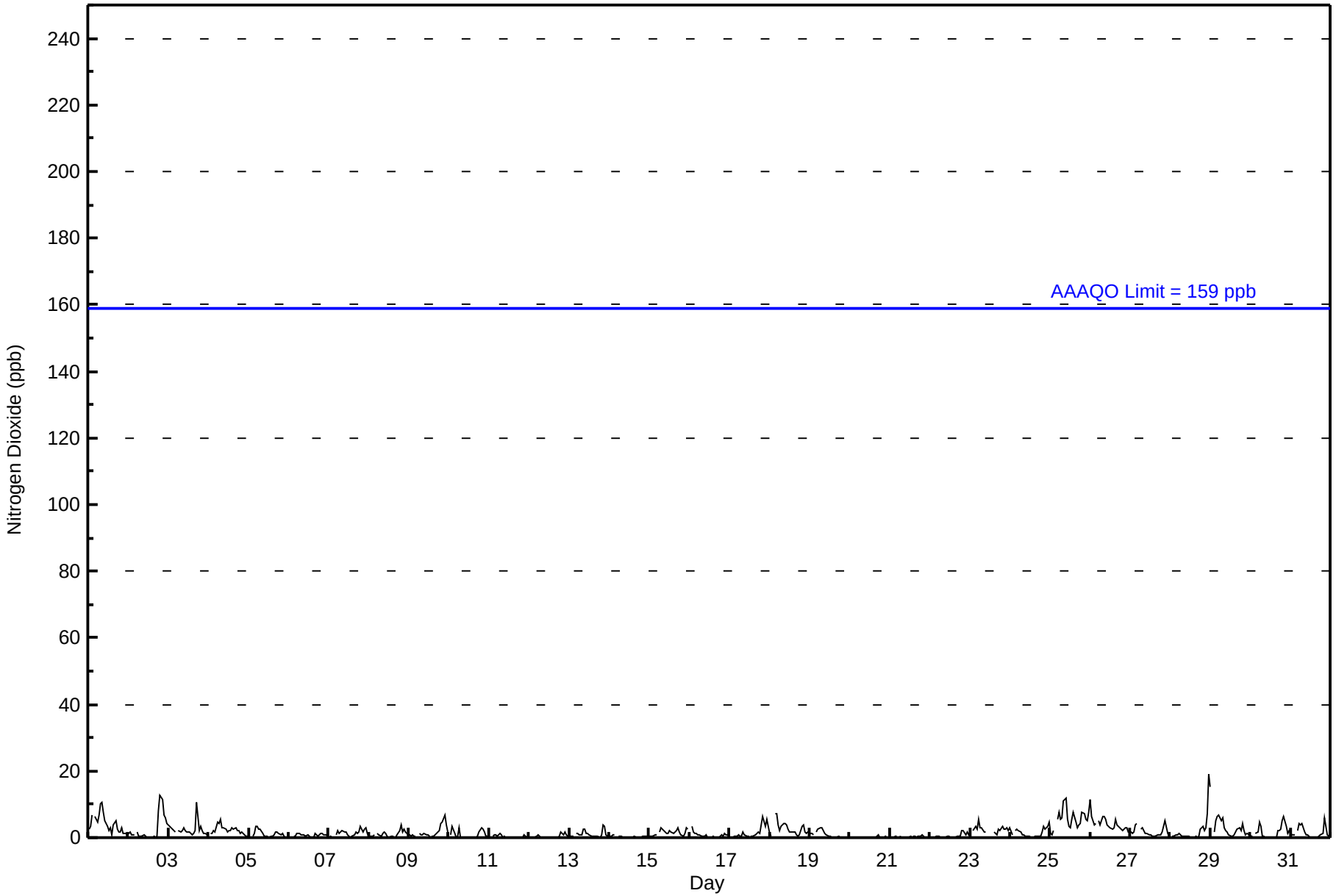
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Dioxide (NO_2) - ppb

Patricia McInnes - August 2015



Nitrogen Dioxide (NO_2) - ppb

Patricia McInnes - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	701	100.00	100.00
21 - 40	0	0.00	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

Nitrogen Dioxide (NO_2) - ppb

Patricia McInnes - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	14	10	6	14	58	53	37	31	46	58	86	89	58	61	40	38	699
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	14	10	6	14	58	53	37	31	46	58	86	89	58	61	40	38	699

Total Number of Valid Hours: 699

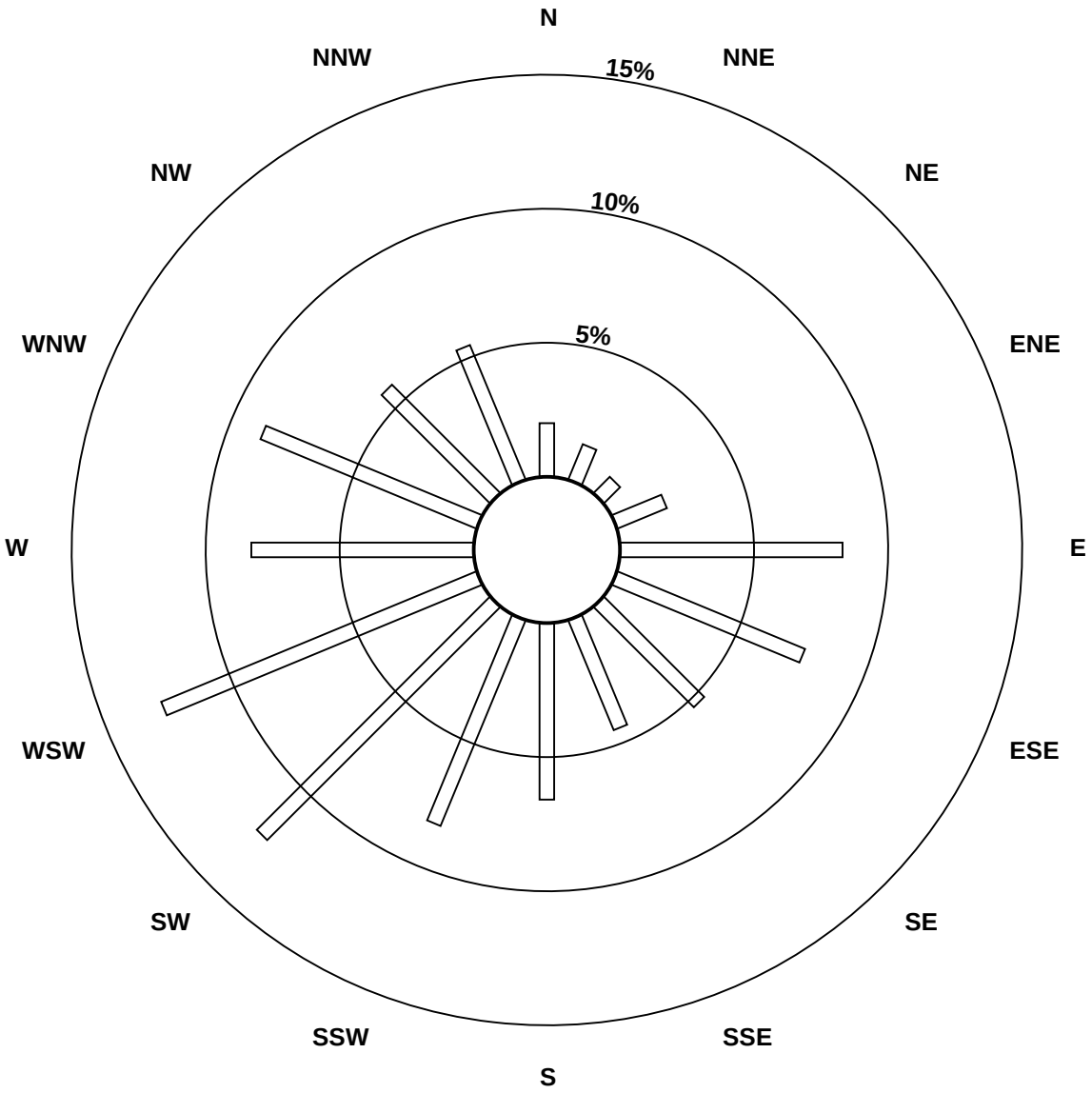
Total Number of Hours: 744

Wood Buffalo Environmental Association

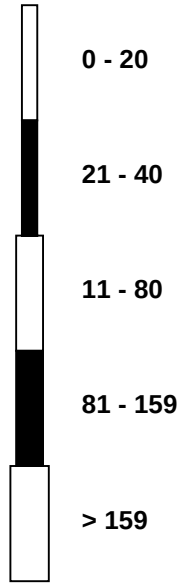
Wind Rose Aug 2015

Nitrogen Dioxide (NO_2) - ppb

Patricia McInnes (AMS 6)



Classes (ppb)



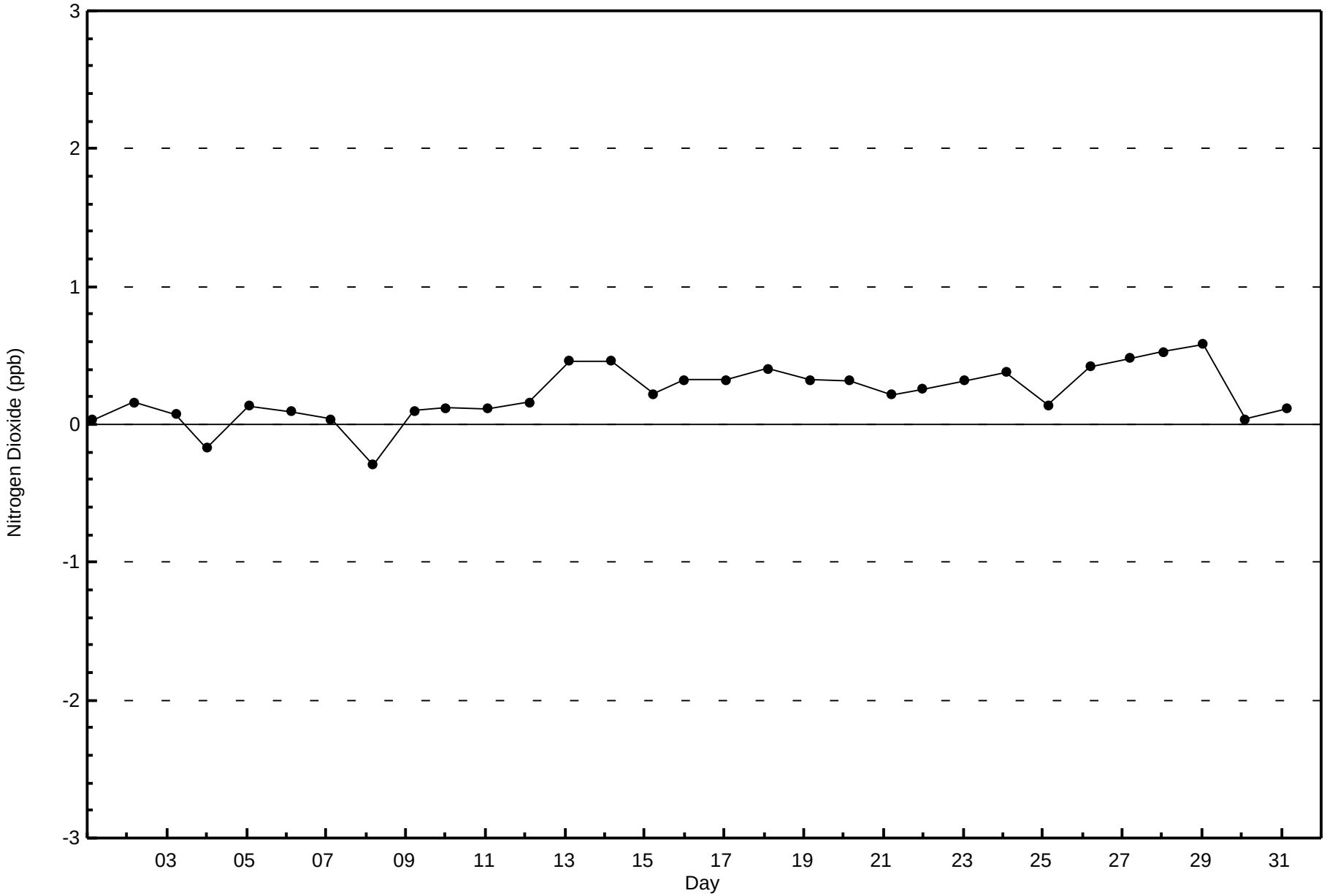
Total Number of Valid Hours: 699

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Dioxide (NO_2) - ppb

Patricia McInnes - August 2015

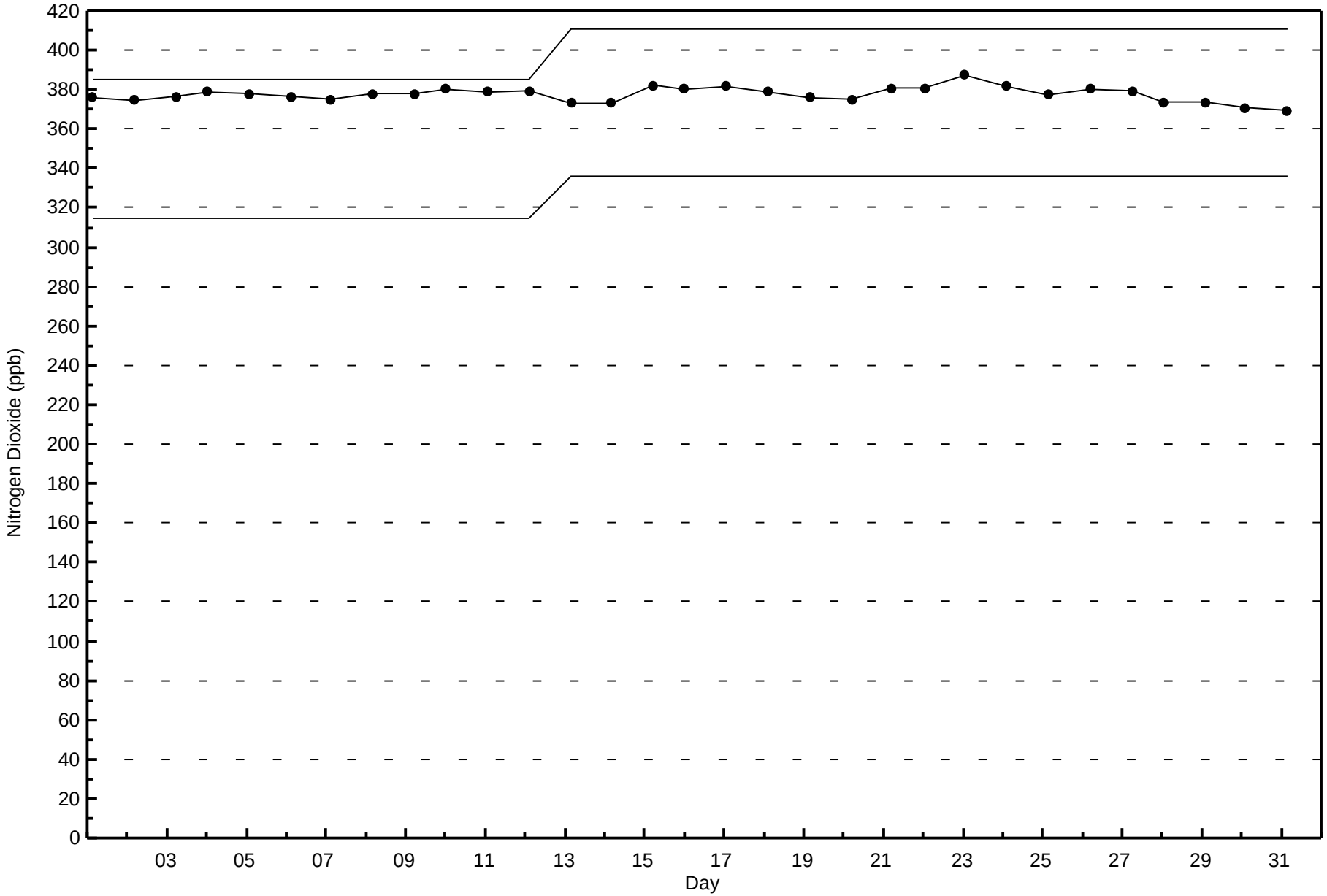


Wood Buffalo Environmental Association

Span Responses

Nitrogen Dioxide (NO_2) - ppb

Patricia McInnes - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_X) - ppb

Patricia McInnes - August 2015

Maximum Value: 45 ppb on Aug 3 18:00

Maximum Daily Average: 8.3 ppb on Aug 25

Minimum Value: 0 ppb on Aug 20 19:00

Minimum Daily Average: 0.2 ppb on Aug 20

Maximum Diurnal Average: 4.1 ppb at hour 8

Minimum Diurnal Average: 1.2 ppb at hour 14

Monthly Average: 2.5 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 1$ Median = 1 $Q_3 = 3$ $P_{90} = 5$ $P_{99} = 14$

Hours in Service:	744
Hours of Data:	701
Hours of Missing Data:	43
Hours of Calibration:	39
Percent Operational Time:	99.5

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	3	4	7	Z	7	7	13	23	20	13	7	6	3	4	1	5	6	4	2	2	3	1	2	1	6.3	23
2-Aug	1	2	1	1	Z	3	2	1	1	2	1	0	0	0	0	1	0	1	9	14	12	7	6	5	3.1	14
3-Aug	4	3	3	2	2	Z	4	2	3	5	3	2	2	1	1	2	3	45	3	4	3	2	2	1	4.5	45
4-Aug	Z	1	1	3	3	7	6	7	4	5	4	3	3	3	4	4	4	3	3	2	3	1	1	2	3.4	7
5-Aug	0	Z	1	2	6	9	4	4	2	1	2	1	2	1	1	2	3	3	2	2	2	1	0	0	2.3	9
6-Aug	0	0	Z	1	1	2	2	2	2	2	2	2	2	1	1	1	4	2	3	4	3	2	3	1	1.8	4
7-Aug	0	0	0	Z	4	4	2	4	4	4	4	2	2	1	1	2	4	3	3	5	2	3	3	1	2.6	5
8-Aug	1	1	1	2	Z	2	2	3	3	3	2	1	0	1	1	0	0	1	3	5	3	3	2	1	1.8	5
9-Aug	1	1	3	1	2	Z	4	2	3	3	2	2	1	1	1	1	2	2	3	6	5	12	5	2	2.8	12
10-Aug	Z	1	4	2	0	1	4	0	0	0	0	0	1	0	0	0	0	1	2	3	3	2	1	1	1.2	4
11-Aug	1	Z	0	1	1	1	2	1	1	2	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0.5	2
12-Aug	0	0	Z	0	1	1	0	0	0	C	C	C	C	C	C	C	C	0	1	2	1	2	1	0	--	2
13-Aug	0	0	1	Z	2	2	1	1	4	4	2	2	1	1	1	1	1	1	0	1	4	4	1	1	1.5	4
14-Aug	0	1	1	1	Z	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1	1	0	0.5	1
15-Aug	0	0	1	1	1	Z	2	4	3	2	1	2	3	2	2	2	3	4	2	1	1	2	5	4	2.1	5
16-Aug	Z	5	2	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	2	1	1	1.1	5
17-Aug	1	Z	0	1	1	2	1	1	3	1	1	1	0	1	1	1	2	2	1	4	7	3	6	4	1.9	7
18-Aug	1	1	Z	8	8	4	3	6	7	7	6	3	2	2	2	2	2	1	1	4	4	2	2	2	3.4	8
19-Aug	1	1	1	Z	2	3	3	4	3	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1.0	4
20-Aug	0	0	0	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0.2	1
21-Aug	0	0	0	0	1	Z	1	0	0	0	0	0	1	0	0	0	0	1	1	1	1	0	0	0	0.4	1
22-Aug	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	2	2	1	3	1	0.7	3
23-Aug	2	Z	2	5	4	10	5	6	4	3	M	M	M	M	2	2	1	4	3	4	3	3	3	2	3.6	10
24-Aug	3	1	Z	2	3	2	2	1	1	1	1	1	0	0	0	0	1	0	1	2	4	4	4	5	1.8	5
25-Aug	1	1	2	Z	10	15	12	14	27	22	9	5	4	6	8	5	4	5	4	8	8	6	5	9	8.3	27
26-Aug	13	6	4	5	Z	5	5	10	11	10	7	5	4	3	4	7	4	4	3	2	3	4	3	2	5.4	13
27-Aug	2	1	2	5	5	Z	6	9	4	2	2	1	1	1	1	1	1	1	1	2	3	5	1	0	2.5	9
28-Aug	Z	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	3	4	3	3	9	20	2.2	20
29-Aug	16	Z	2	5	7	7	6	10	4	3	2	1	1	1	1	3	4	4	3	5	3	1	2	1	4.0	16
30-Aug	1	1	Z	2	2	5	4	1	0	0	0	0	0	0	0	0	3	3	3	6	8	4	1	3	2.1	8
31-Aug	2	1	1	Z	3	6	6	8	4	2	1	0	0	0	0	0	0	1	1	1	6	4	1	0	2.2	8
	2.2	1.3	1.6	2.1	3.0	4.0	3.4	4.1	3.9	3.4	2.2	1.5	1.3	1.2	1.2	1.4	1.8	3.1	2.0	3.2	3.3	2.8	2.4	2.3	Diurnal Average	
	16	6	7	8	10	15	13	23	27	22	9	6	4	6	8	7	6	45	9	14	12	12	9	20	Diurnal Maximum	

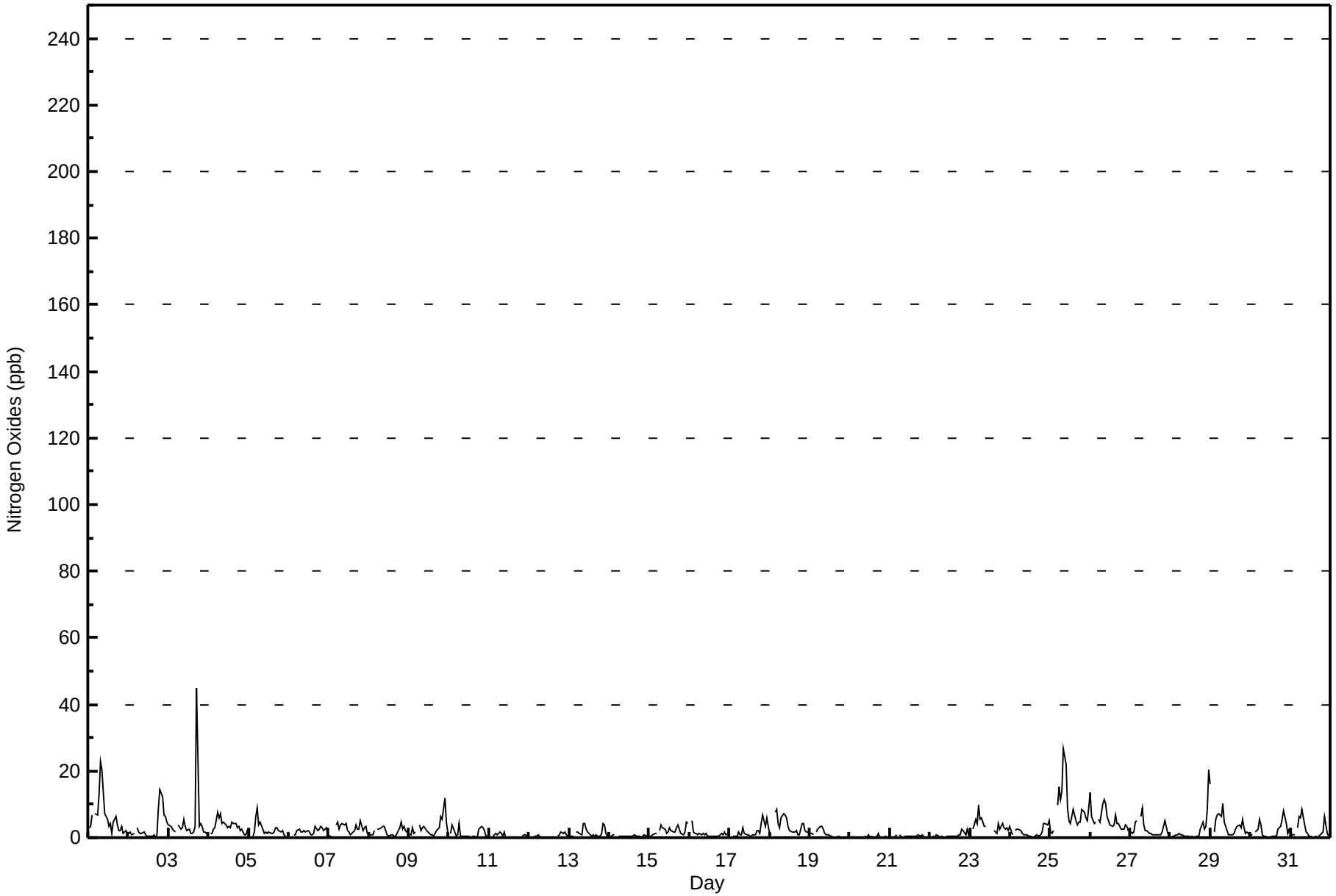
Z - zerospan C - Calibration M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Oxides (NO_X) - ppb

Patricia McInnes - August 2015



Nitrogen Oxides (NO_X) - ppb

Patricia McInnes - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	697	99.43	99.43
21 - 40	3	0.43	99.86
11 - 80	1	0.14	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

Patricia McInnes - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	14	9	6	14	57	52	37	31	46	58	86	89	58	61	40	37	695
21 - 40	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	1	3
11 - 80	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	14	10	6	14	58	53	37	31	46	58	86	89	58	61	40	38	699

Total Number of Valid Hours: 699

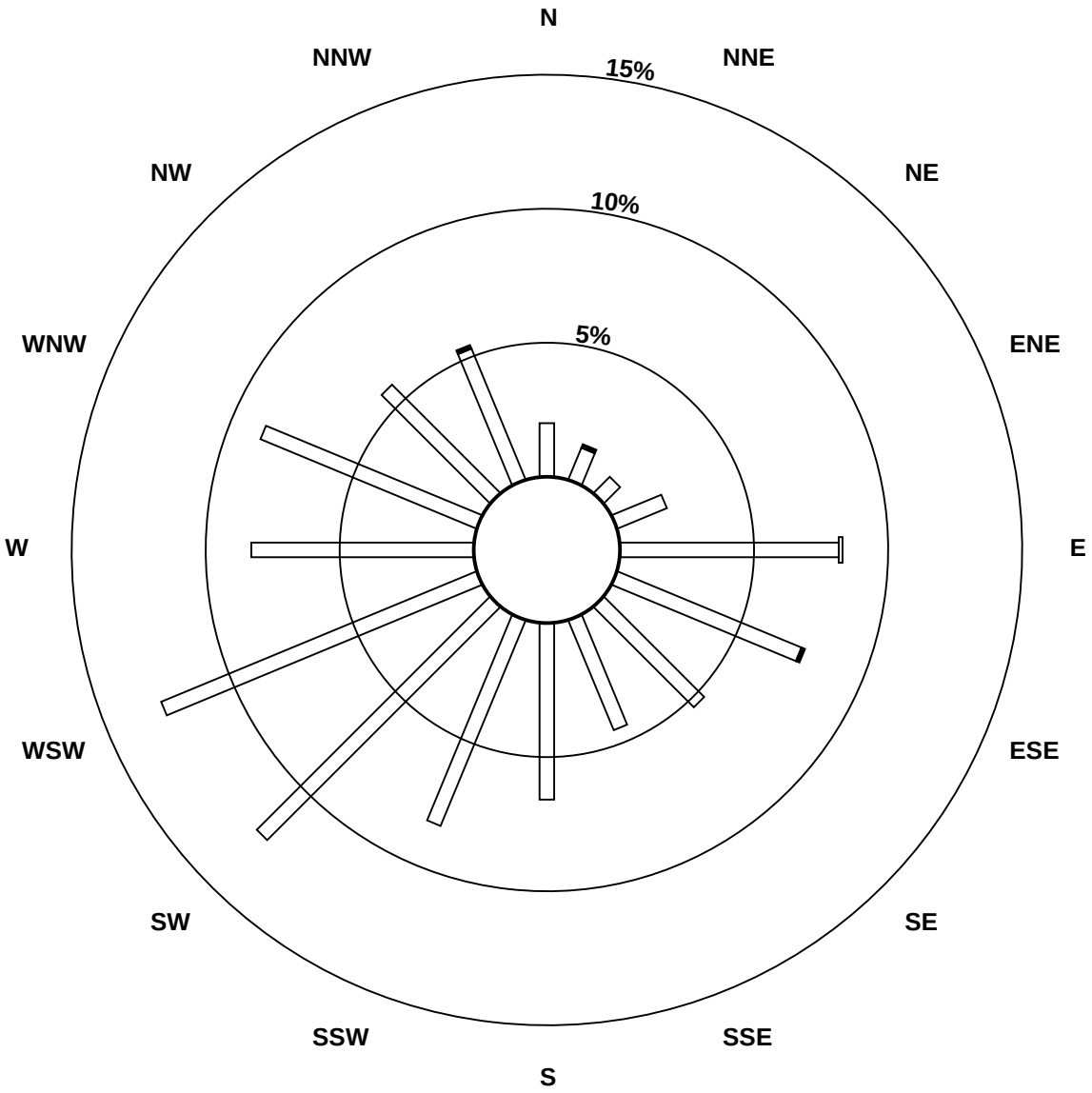
Total Number of Hours: 744

Wood Buffalo Environmental Association

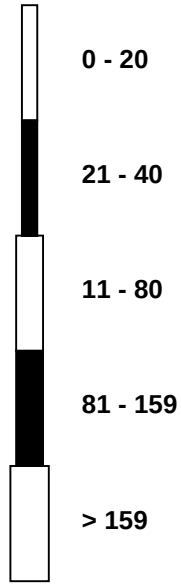
Wind Rose Aug 2015

Nitrogen Oxides (NO_X) - ppb

Patricia McInnes (AMS 6)



Classes (ppb)



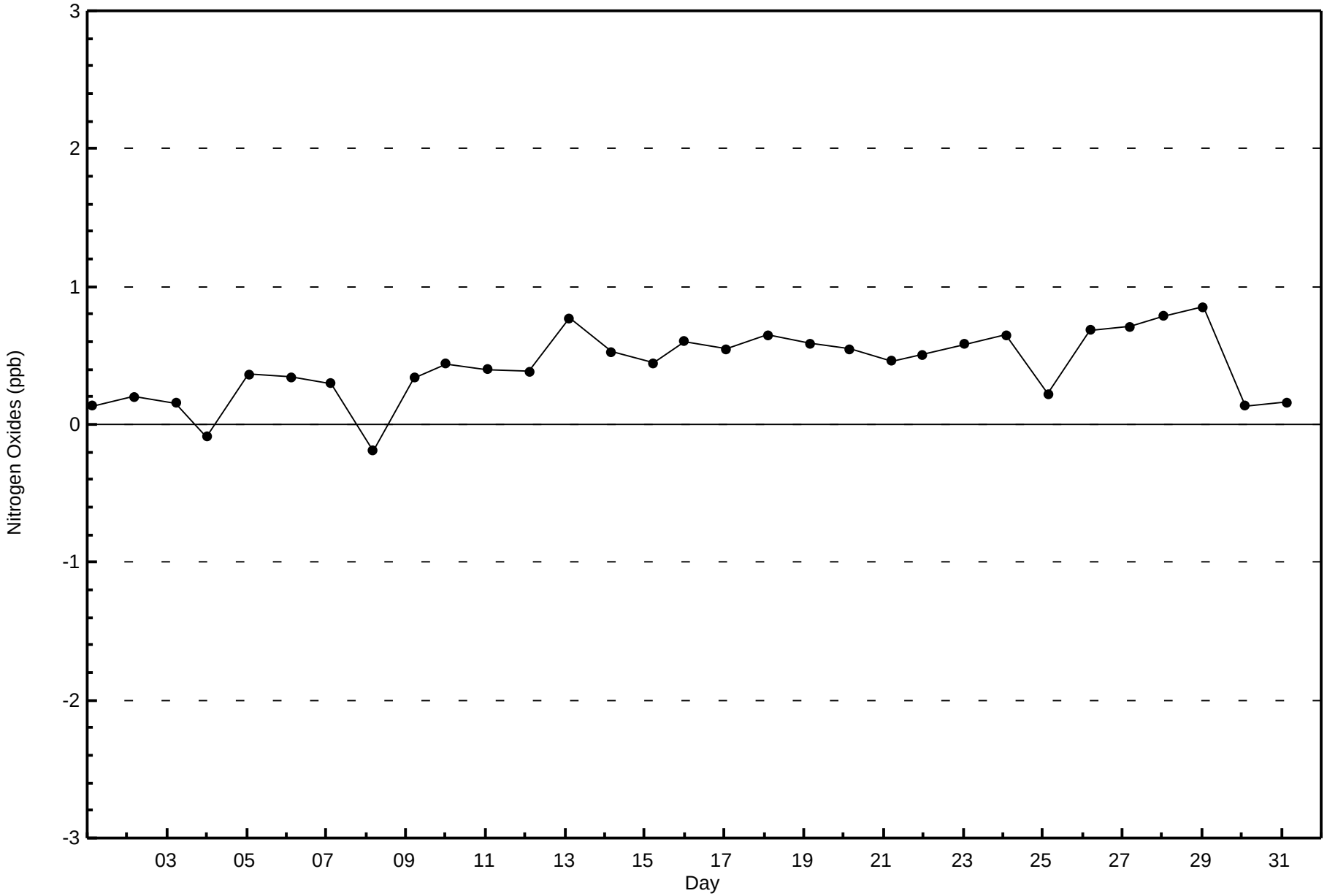
Total Number of Valid Hours: 699

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Oxides (NO_X) - ppb

Patricia McInnes - August 2015

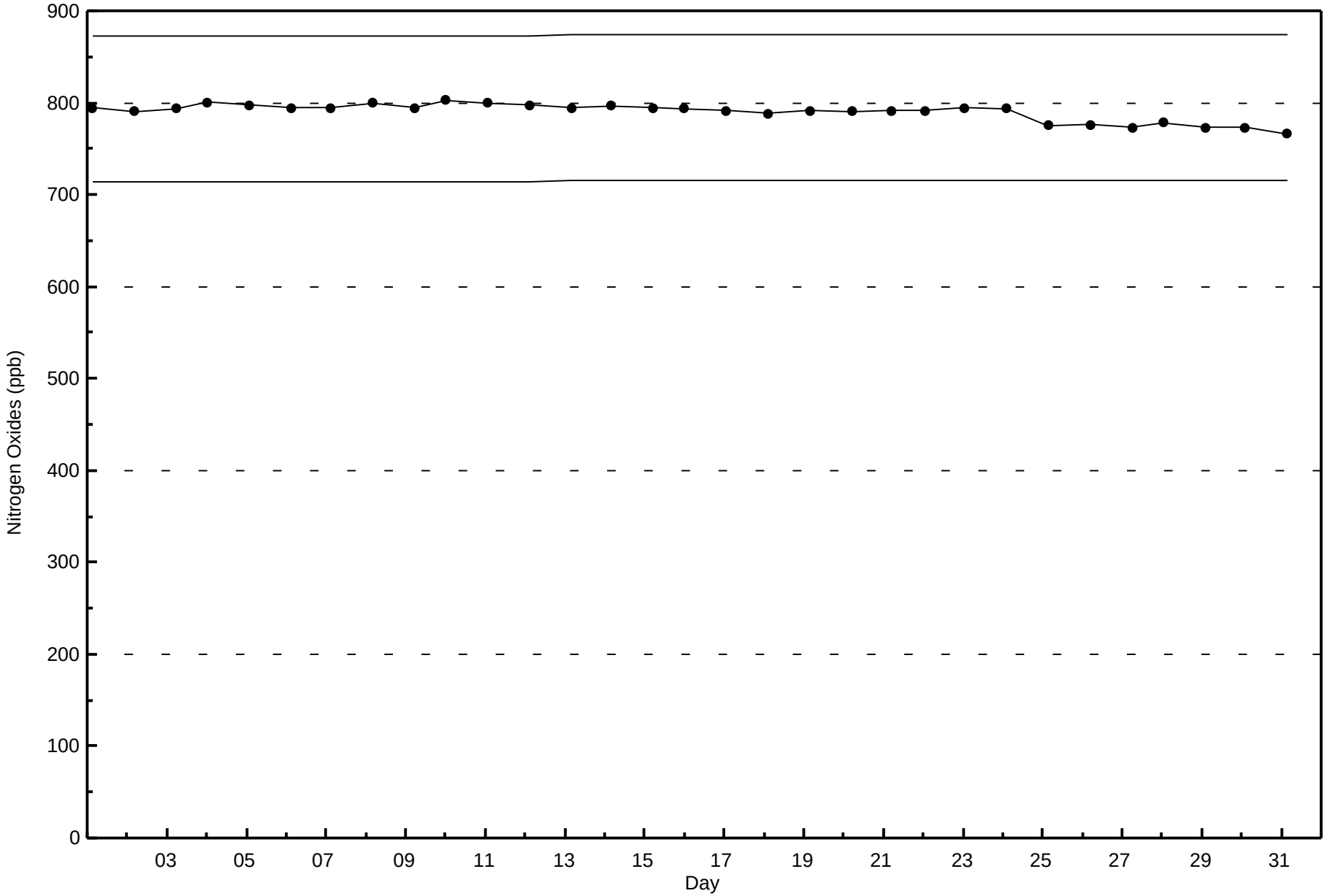


Wood Buffalo Environmental Association

Span Responses

Nitrogen Oxides (NO_X) - ppb

Patricia McInnes - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Ammonia (NH_3) - ppb

Patricia McInnes - August 2015

Number of Exceedences (AAAQO): 1-hr: 0

Maximum Value: 14 ppb on Aug 3 18:00

Maximum Daily Average: 0.6 ppb on Aug 3

Minimum Value: 0 ppb on Aug 1 01:00

Minimum Daily Average: 0.0 ppb on Aug 1

Maximum Diurnal Average: 0.5 ppb at hour 18

Minimum Diurnal Average: 0.0 ppb at hour 1

Monthly Average: 0.0 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 0$ $P_{99} = 0$

Hours in Service:	744
Hours of Data:	645
Hours of Missing Data:	99
Hours of Calibration:	48
Percent Operational Time:	93.2

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0	0	0	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2-Aug	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
3-Aug	0	0	0	0	0	0	0	0	Z	RE	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0.6	14
4-Aug	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
5-Aug	0	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
6-Aug	0	0	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
7-Aug	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
8-Aug	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
9-Aug	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
10-Aug	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
11-Aug	0	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
12-Aug	0	0	0	0	0	Z	RE	0	0	C	C	C	C	C	C	C	C	0	0	0	0	0	0	0	--	0
13-Aug	0	0	0	0	0	0	Z	RE	0	0	0	C	C	C	C	C	C	C	C	0	0	0	0	0	--	0
14-Aug	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
15-Aug	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
16-Aug	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
17-Aug	0	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
18-Aug	0	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
19-Aug	0	0	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
20-Aug	0	0	0	0	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
21-Aug	0	0	0	0	0	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
22-Aug	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
23-Aug	0	0	0	0	Z	RE	0	0	0	0	C	M	M	M	M	M	M	M	M	0	0	0	0	0	--	0
24-Aug	0	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
25-Aug	0	0	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
26-Aug	0	0	0	0	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
27-Aug	0	0	0	0	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
28-Aug	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
29-Aug	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
30-Aug	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
31-Aug	0	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	Diurnal Average	
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0	0	0	0	0	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance RE - Recovery

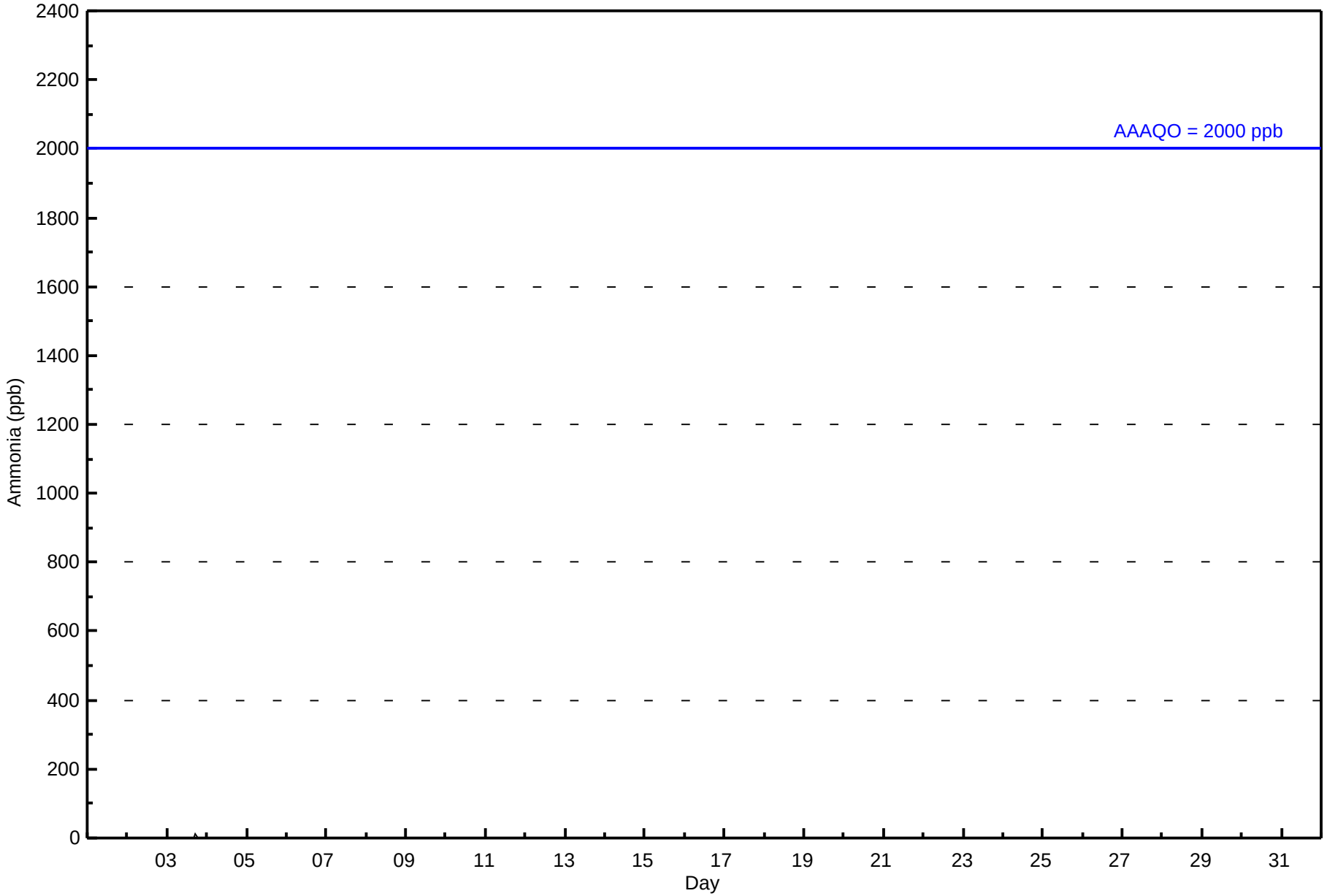
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 2000 ppb

Wood Buffalo Environmental Association

Hourly Averages

Ammonia (NH_3) - ppb

Patricia McInnes - August 2015



Ammonia (NH_3) - ppb

Patricia McInnes - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 5	644	99.84	99.85
6 - 10	0	0.00	99.85
11 - 15	1	0.16	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: 645

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Ammonia (NH_3) - ppb

Patricia McInnes - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 5	12	8	5	12	56	52	35	22	42	49	80	85	55	56	39	34	642
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	1	0	0	0	0	0	0	0	0	0	0	0	1
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	12	8	5	12	57	52	35	22	42	49	80	85	55	56	39	34	643

Total Number of Valid Hours: 643

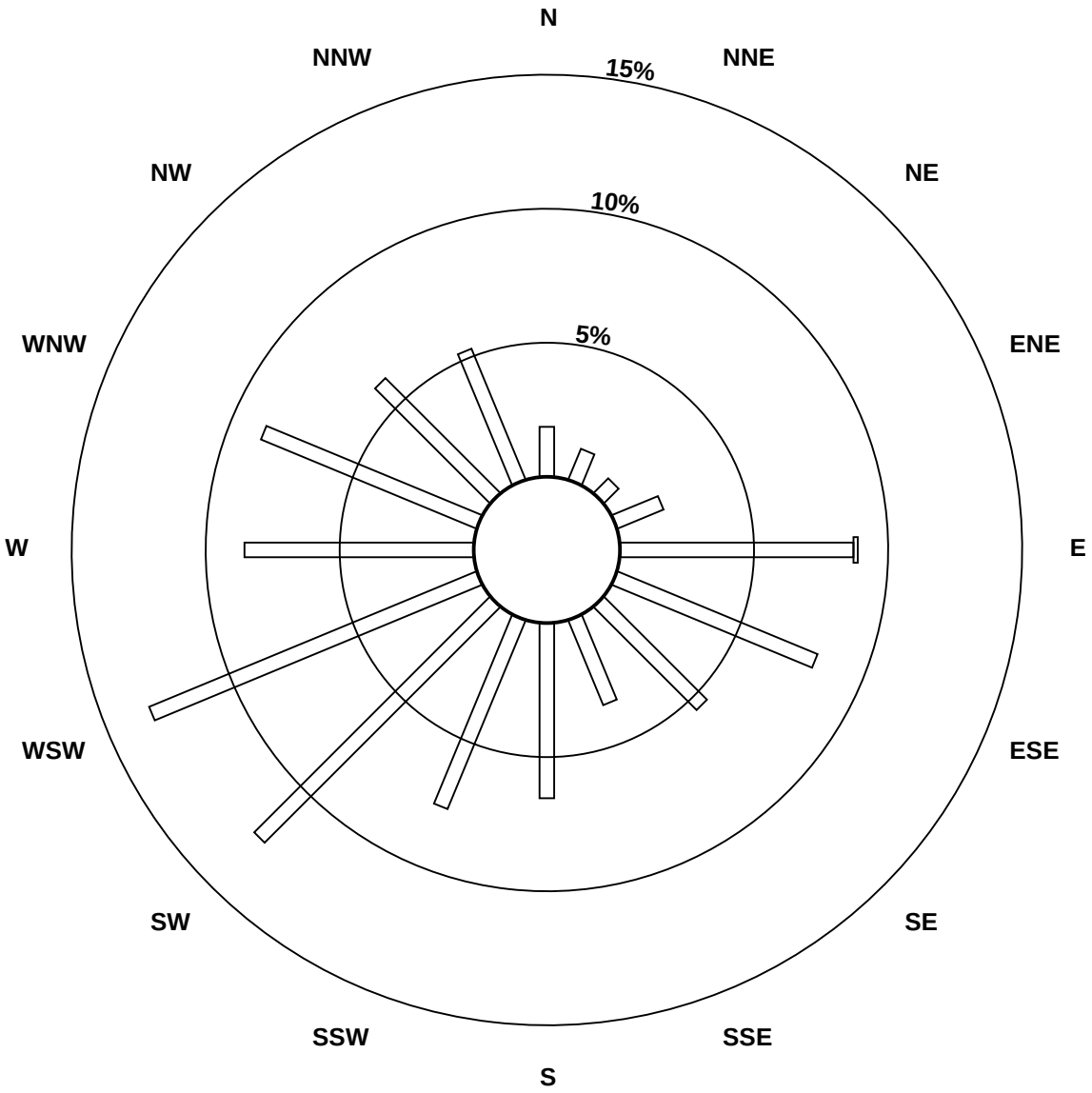
Total Number of Hours: 744

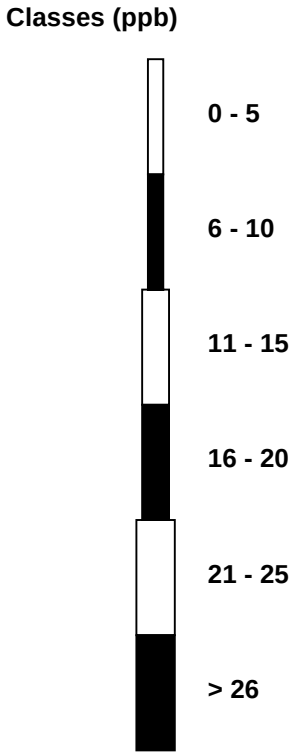
Wood Buffalo Environmental Association

Wind Rose Aug 2015

Ammonia (NH_3) - ppb

Patricia McInnes (AMS 6)





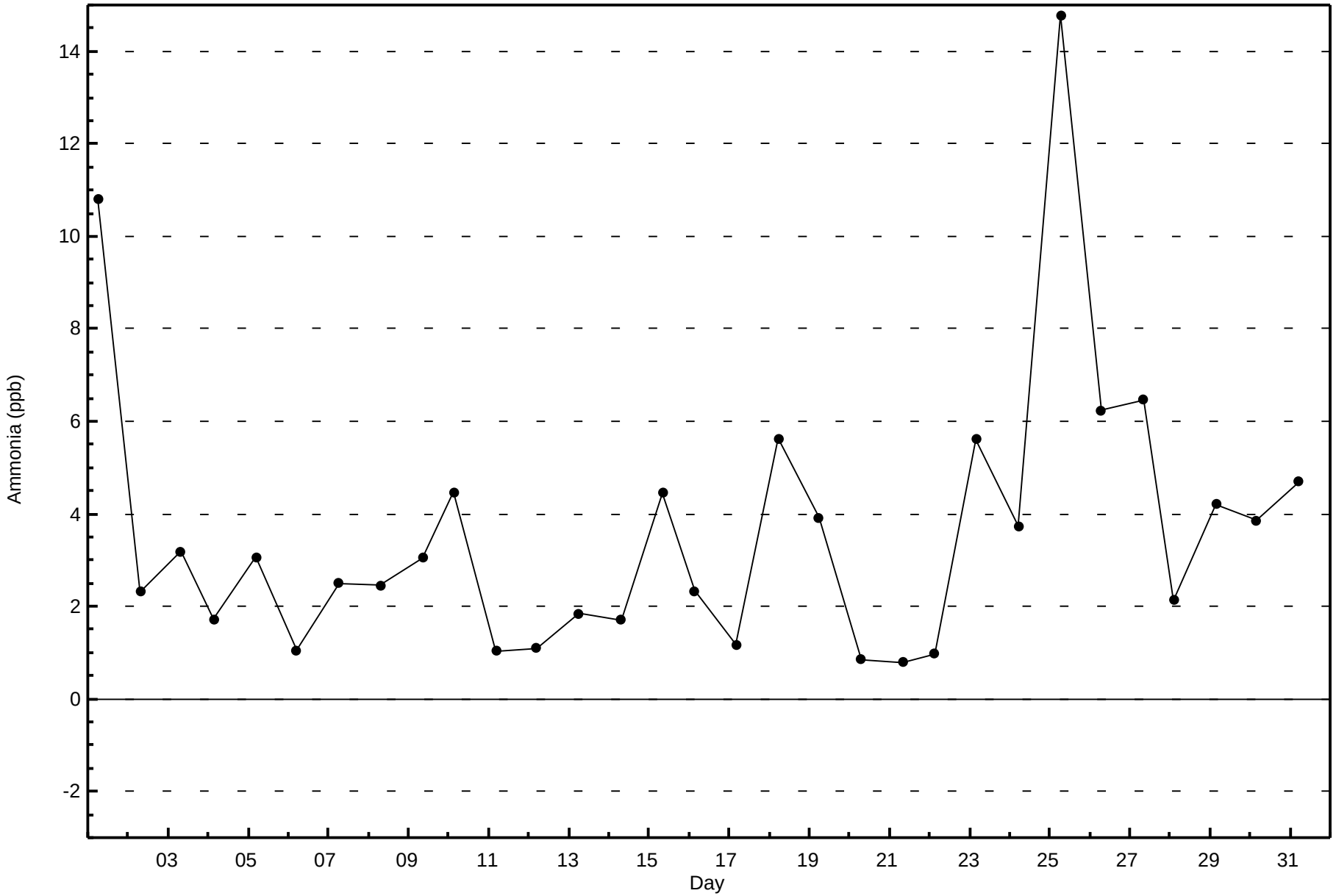
Total Number of Valid Hours: 643

Wood Buffalo Environmental Association

Zero Responses

Ammonia (NH_3) - ppb

Patricia McInnes - August 2015

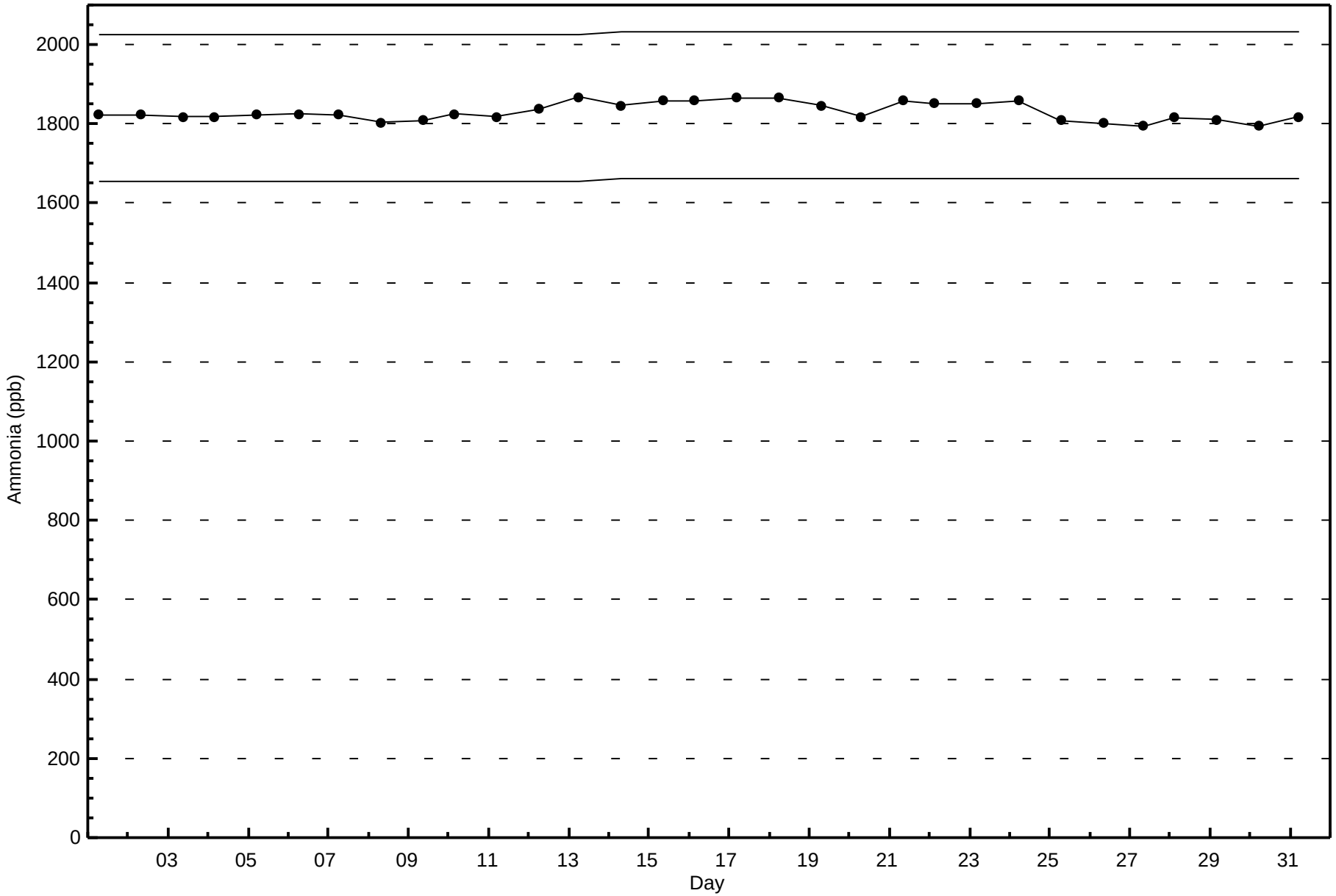


Wood Buffalo Environmental Association

Span Responses

Ammonia (NH_3) - ppb

Patricia McInnes - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

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

Patricia McInnes - August 2015

Number of Exceedences (AAAQO): 24-hr: 0

Maximum Value: 22.9 $\mu g/m^3$ on Aug 1 08:00

Maximum Daily Average: 9.3 $\mu g/m^3$ on Aug 3

Minimum Value: 0.1 $\mu g/m^3$ on Aug 14 19:00

Minimum Daily Average: 0.6 $\mu g/m^3$ on Aug 21

Maximum Diurnal Average: 5.7 $\mu g/m^3$ at hour 24

Minimum Diurnal Average: 3.0 $\mu g/m^3$ at hour 13

Monthly Average: 4.38 $\mu g/m^3$

Percentiles: P_1 = 0.5 P_{10} = 1.0 Q_1 = 2.2 Median = 3.6 Q_3 = 6.0 P_{90} = 8.2 P_{99} = 15.6

Hours in Service:	744
Hours of Data:	741
Hours of Missing Data:	3
Hours of Calibration:	1
Percent Operational Time:	99.7

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	8.9	9.3	9.1	8.2	10.8	8.9	9.0	22.9	15.9	6.6	6.9	7.0	7.4	7.8	5.6	7.7	10.2	6.4	5.0	4.4	6.9	6.0	6.5	7.3	8.5	22.9
2-Aug	6.9	7.7	6.2	4.6	4.6	5.2	4.2	1.7	2.2	3.5	2.4	2.5	3.1	3.9	4.0	4.1	3.5	2.5	5.5	6.8	14.6	13.8	10.7	15.7	5.8	15.7
3-Aug	18.5	17.0	18.5	20.4	20.6	18.5	8.9	7.7	9.1	9.3	4.9	5.3	6.9	6.7	6.2	3.4	4.5	5.7	4.8	5.8	3.1	3.4	6.9	6.3	9.3	20.6
4-Aug	6.3	6.4	8.2	8.9	7.4	9.9	11.8	13.8	11.5	7.1	9.3	10.5	6.8	6.2	7.4	6.6	5.0	5.4	8.1	5.8	7.2	7.7	4.5	5.1	7.8	13.8
5-Aug	5.8	2.9	3.3	5.1	3.5	4.3	5.6	4.0	3.7	3.5	3.2	4.4	4.3	3.1	2.9	3.2	4.1	3.1	0.9	1.0	2.5	1.7	1.3	2.9	3.3	5.8
6-Aug	2.2	1.2	1.9	1.7	1.3	1.1	1.0	1.0	1.1	1.3	1.6	2.6	1.9	1.7	1.6	1.7	2.1	2.7	1.8	1.9	3.2	1.9	2.7	2.1	1.8	3.2
7-Aug	1.6	1.8	1.7	2.2	2.6	2.5	2.5	3.3	9.3	6.5	4.9	4.1	3.4	2.8	3.6	2.5	2.4	2.2	2.6	5.3	3.0	3.1	6.3	5.6	3.6	9.3
8-Aug	3.0	3.3	4.5	3.4	2.7	4.4	3.8	2.0	2.3	2.3	2.3	2.2	1.8	3.1	4.3	3.1	1.7	1.8	1.8	4.4	6.3	8.8	7.9	4.9	3.6	8.8
9-Aug	6.0	7.0	9.6	9.8	7.4	5.6	2.8	2.1	2.3	3.2	5.7	3.3	3.5	4.4	6.4	5.5	6.6	7.6	8.4	5.5	6.1	12.7	3.9	6.4	5.9	12.7
10-Aug	5.9	5.7	4.8	3.2	4.0	4.1	4.0	2.6	2.3	3.2	3.1	2.7	3.4	3.4	3.6	4.4	4.5	5.9	11.3	12.5	7.2	6.2	3.1	4.8	4.8	12.5
11-Aug	7.6	7.9	5.5	7.0	7.8	5.8	7.7	6.0	2.5	2.1	2.2	2.1	2.2	2.1	2.1	2.5	3.3	3.9	3.7	3.2	2.3	2.6	3.6	3.1	4.1	7.9
12-Aug	2.5	2.6	3.1	4.1	3.4	2.0	3.4	3.8	2.8	1.7	1.6	1.6	1.9	2.2	C	4.7	4.8	5.2	6.0	5.1	2.4	2.3	4.1	5.5	3.3	6.0
13-Aug	6.4	6.7	3.5	4.6	6.4	6.0	2.3	2.4	3.2	3.2	3.1	3.1	3.1	2.2	2.3	2.1	3.7	3.0	2.8	3.6	8.3	2.1	1.8	3.5	3.7	8.3
14-Aug	5.2	8.4	6.4	4.1	3.6	3.1	3.2	3.4	3.1	2.9	2.4	2.5	2.3	1.8	0.8	0.6	1.8	0.5	0.1	0.2	0.5	0.3	0.4	0.8	2.4	8.4
15-Aug	0.9	1.2	1.5	1.4	1.2	1.3	3.3	4.4	9.7	4.7	5.4	5.8	3.7	2.9	4.1	3.5	6.1	6.6	2.9	1.8	2.0	3.2	4.6	4.5	3.6	9.7
16-Aug	5.8	4.6	3.4	4.2	4.0	4.3	3.7	2.5	2.7	2.5	2.0	1.6	1.1	0.6	0.6	0.6	0.6	0.7	0.8	1.1	2.0	2.1	2.0	2.3	2.3	5.8
17-Aug	2.5	3.0	3.6	3.9	3.6	3.6	2.7	1.6	2.6	2.1	1.5	1.6	1.7	1.7	1.8	1.8	2.0	3.3	4.0	7.6	10.4	3.8	4.1	6.7	3.4	10.4
18-Aug	7.4	8.8	8.0	9.7	9.8	8.2	6.4	8.8	3.3	3.0	4.7	5.4	6.0	7.5	9.3	6.6	3.9	3.5	2.6	4.3	5.4	4.6	5.8	5.8	6.2	9.8
19-Aug	4.3	4.1	4.7	3.6	2.8	3.0	3.6	3.3	2.2	2.3	2.4	1.9	1.6	1.7	2.2	3.5	2.4	3.0	7.9	2.9	2.6	2.3	1.4	1.3	3.0	7.9
20-Aug	1.3	1.3	1.3	1.3	1.0	0.9	0.8	0.8	0.8	2.3	0.5	0.6	0.6	0.6	0.7	0.8	0.7	0.7	0.7	0.5	0.6	0.8	0.9	0.8	0.9	2.3
21-Aug	0.7	0.7	0.7	0.7	0.6	0.7	0.7	0.5	0.7	0.7	0.6	0.4	0.6	0.6	0.5	0.5	0.4	0.7	0.8	0.9	0.5	0.5	0.5	0.5	0.6	0.9
22-Aug	1.1	1.3	1.0	0.5	0.6	0.5	0.5	0.7	1.0	1.1	1.2	1.1	1.2	0.8	1.0	1.7	1.6	2.4	2.3	7.0	6.2	7.9	8.5	6.1	2.4	8.5
23-Aug	5.8	4.5	3.2	2.8	1.8	2.2	2.0	3.6	2.8	2.1	2.2	1.7	1.9	1.9	M	M	1.9	2.8	3.2	4.9	6.0	5.4	5.8	5.1	3.3	6.0
24-Aug	5.9	5.4	2.9	3.0	3.3	4.8	5.3	2.2	2.3	2.3	2.2	2.2	2.4	2.9	3.4	3.2	2.7	3.4	3.6	2.6	3.6	3.6	10.9	13.7	4.1	13.7
25-Aug	5.1	4.0	4.8	6.0	8.5	10.9	10.1	6.0	6.2	6.9	5.3	5.3	3.6	5.3	7.7	6.4	3.3	5.4	7.1	10.1	8.8	5.5	6.2	7.2	6.5	10.9
26-Aug	7.1	5.8	4.1	4.5	4.6	5.3	6.0	3.1	2.5	2.9	2.7	2.2	2.2	2.6	4.1	7.0	8.5	5.2	2.6	5.4	6.2	8.8	11.6	13.2	5.3	13.2
27-Aug	14.2	13.4	12.9	12.9	12.3	11.5	6.7	2.5	2.6	3.7	3.1	3.4	3.8	3.9	4.8	7.4	10.5	10.8	6.3	5.4	6.3	7.6	5.8	5.2	7.4	14.2
28-Aug	4.7	4.5	4.7	4.8	5.0	5.0	4.6	4.2	4.1	3.8	3.4	3.4	4.0	3.8	2.4	2.1	2.4	2.6	3.9	3.0	2.1	3.2	7.2	13.2	4.3	13.2
29-Aug	11.7	7.3	3.8	4.2	2.9	5.5	7.7	6.7	3.8	5.8	6.5	4.2	3.3	3.7	4.6	5.3	6.0	7.2	7.1	9.6	7.0	4.4	7.0	7.2	5.9	11.7
30-Aug	4.2	2.2	4.8	7.2	9.9	8.0	7.3	7.8	6.6	2.8	2.9	2.5	2.8	2.7	3.3	3.4	7.2	5.9	2.0	2.3	6.9	8.9	6.4	8.4	5.3	9.9
31-Aug	7.2	5.9	4.1	4.2	4.8	4.8	5.1	4.0	2.0	1.9	2.5	1.8	1.6	1.4	1.3	1.2	1.1	0.6	0.7	1.1	6.9	3.4	2.0	1.8	3.0	7.2
	5.7	5.4	5.0	5.2	5.3	5.2	4.7	4.5	4.1	3.5	3.3	3.2	3.0	3.1	3.5	3.6	3.9	3.9	3.9	4.4	5.1	4.8	5.0	5.7	Diurnal Average	
	18.5	17.0	18.5	20.4	20.6	18.5	11.8	22.9	15.9	9.3	9.3	10.5	7.4	7.8	9.3	7.7	10.5	10.8	11.3	12.5	14.6	13.8	11.6	15.7	Diurnal Maximum	

C - Calibration M - Maintenance

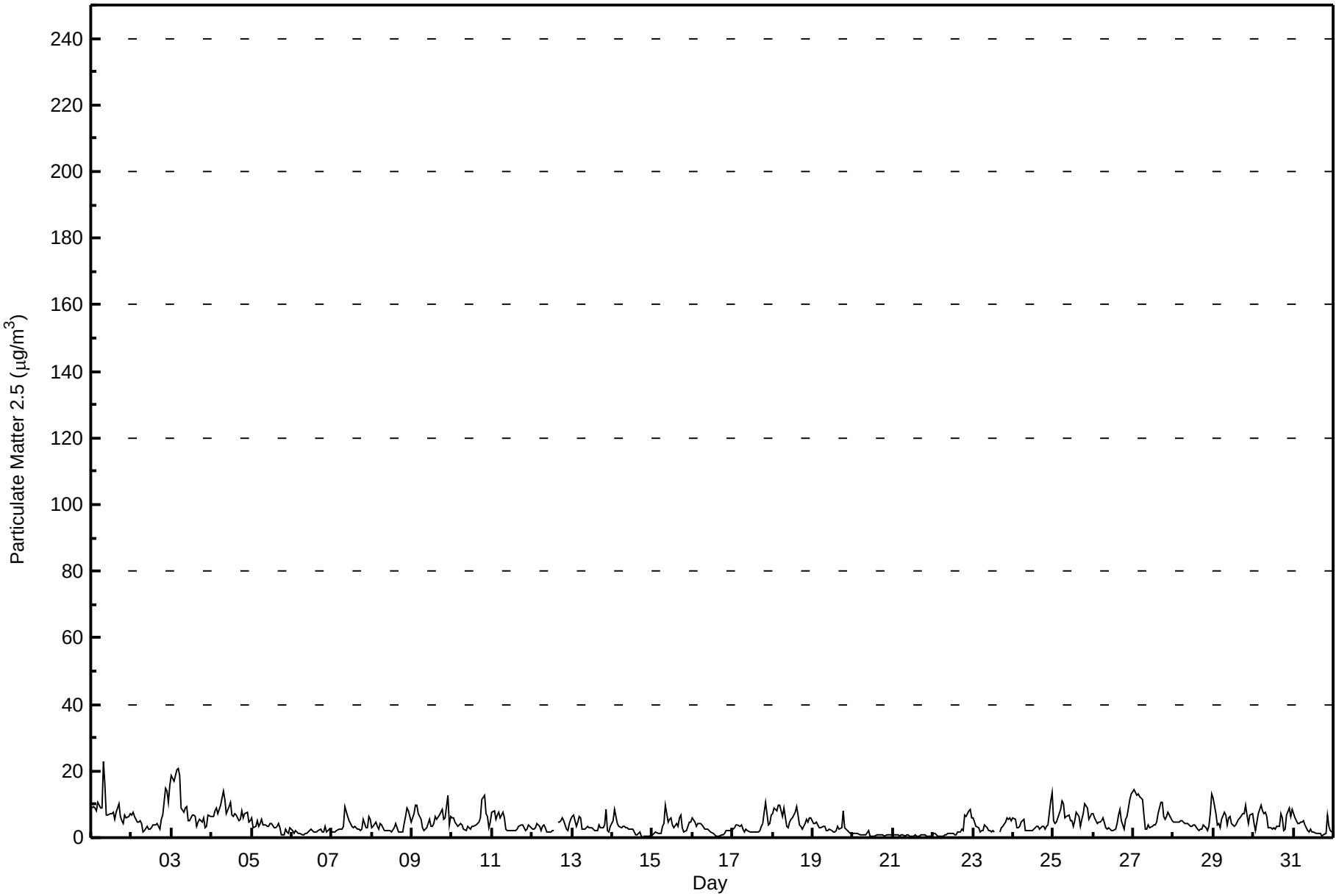
Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 $\mu g/m^3$

Wood Buffalo Environmental Association

Hourly Averages

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

Patricia McInnes - August 2015



Concentration Ranges ($\mu g/m^3$)	Number of Hours	%	Cumulative %
1 - 5	452	61.00	61.00
6 - 15	209	28.21	89.20
16 - 25	9	1.21	90.42
26 - 80	0	0.00	90.42
> 81.0	0	0.00	90.42

Total Number of Valid Hours: 741

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

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

Patricia McInnes - August 2015

Concentration Ranges ($\mu g/m^3$)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
1 - 5	11	8	3	8	40	36	27	26	32	35	66	68	30	25	21	13	449
6 - 15	3	2	3	6	21	20	11	4	18	25	22	14	13	14	10	23	209
16 - 25	0	0	0	0	0	0	0	0	0	0	0	0	2	3	1	3	9
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	14	10	6	14	61	56	38	30	50	60	88	82	45	42	32	39	667

Total Number of Valid Hours: 738

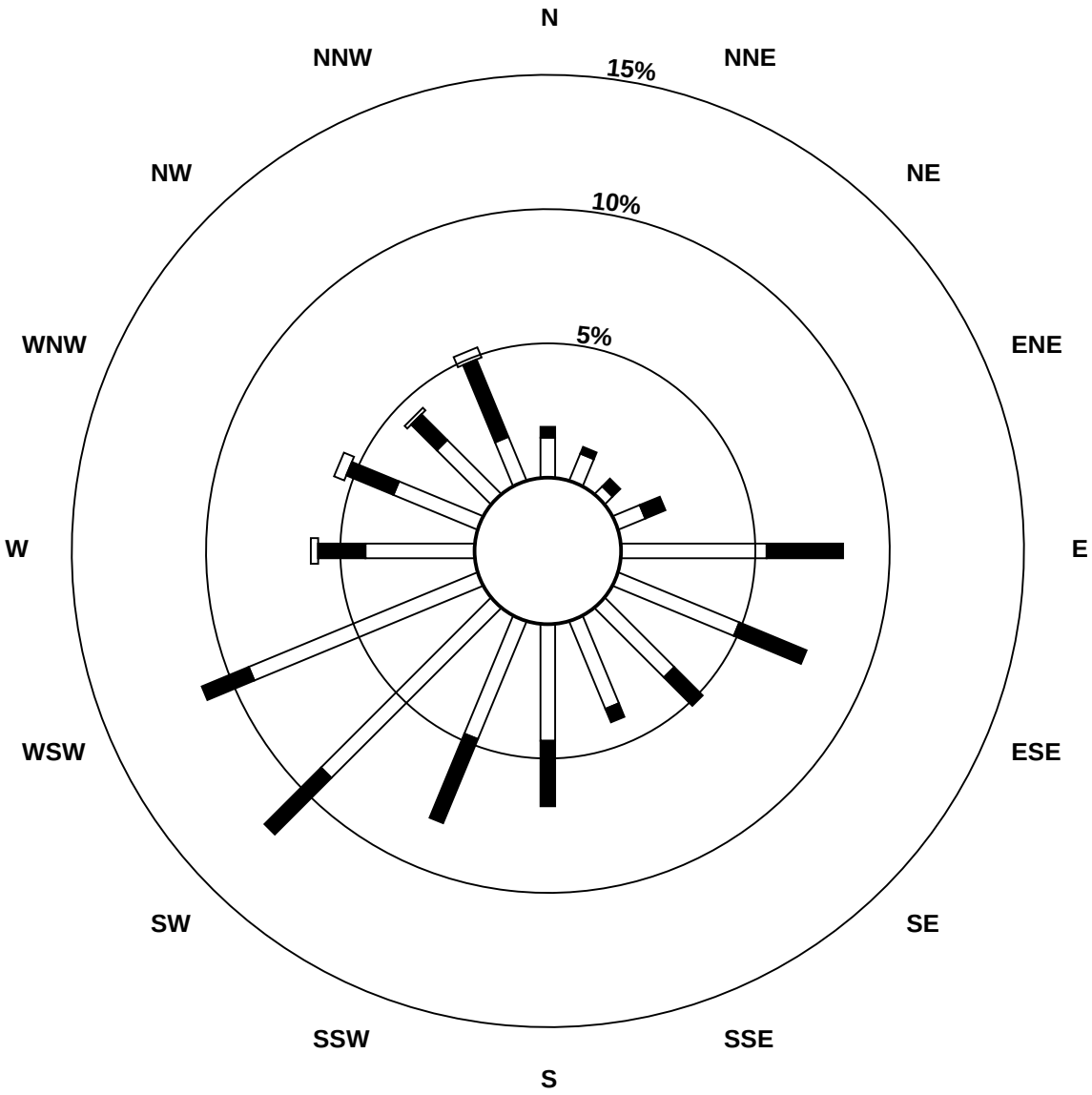
Total Number of Hours: 744

Wood Buffalo Environmental Association

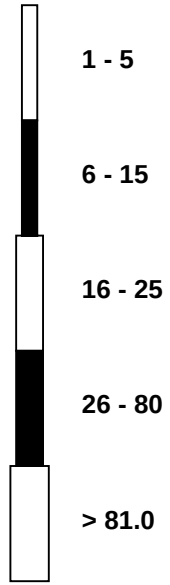
Wind Rose Aug 2015

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

Patricia McInnes (AMS 6)



Classes ($\mu g/m^3$)



1 - 5

6 - 15

16 - 25

26 - 80

> 81.0

Total Number of Valid Hours: 738

Maximum Value: 29.1 C on Aug 10 17:00

Maximum Daily Average: 22.9 C on Aug 10

Minimum Value: 2.2 C on Aug 23 06:00

Minimum Daily Average: 9.9 C on Aug 22

Maximum Diurnal Average: 22.0 C at hour 15

Minimum Diurnal Average: 11.8 C at hour 5

Monthly Average: 16.93 C

Percentiles: P_1 = 3.8 P_{10} = 10.4 Q_1 = 13.5 Median = 16.8 Q_3 = 20.7 P_{90} = 23.7 P_{99} = 28.0

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

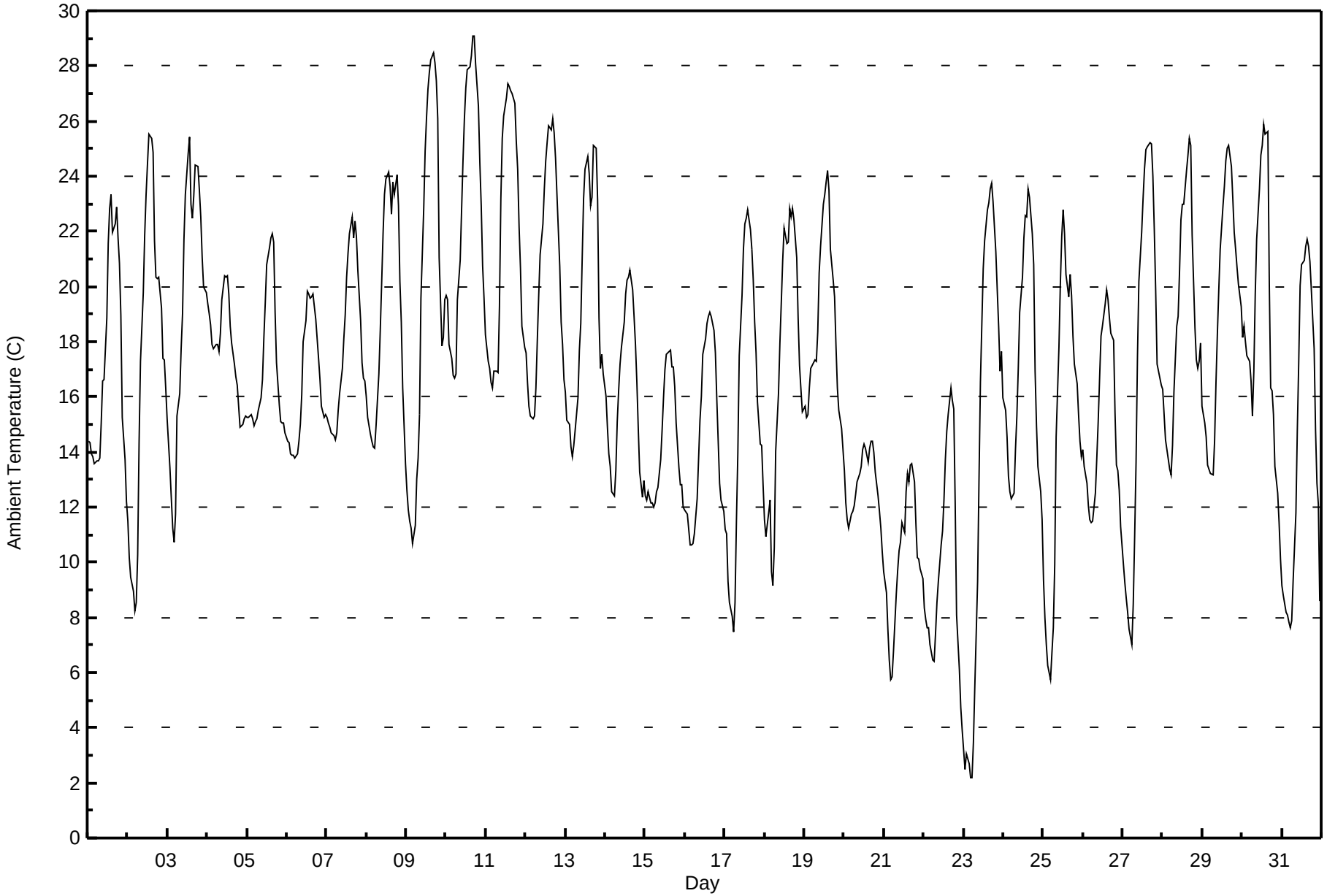
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	14.4	14.4	13.9	13.8	13.6	13.7	13.7	13.8	15.0	16.6	16.6	18.9	21.6	22.8	23.3	22.0	22.3	22.9	21.8	20.9	19.0	15.2	13.7	12.2	17.3	23.3
2-Aug	11.5	10.2	9.5	8.9	8.3	8.5	10.3	14.3	17.3	19.8	21.9	23.4	24.5	25.5	25.4	24.9	21.7	20.3	20.3	20.3	19.2	17.4	17.3	16.3	17.4	25.5
3-Aug	15.2	13.4	12.3	11.2	10.7	11.7	15.3	16.1	17.8	19.0	21.7	23.3	24.8	25.4	23.0	22.5	23.3	24.4	24.4	23.5	22.5	21.0	20.0	19.8	19.3	25.4
4-Aug	19.4	19.0	18.6	17.9	17.7	17.9	17.9	17.6	18.3	19.5	20.4	20.3	20.4	19.7	18.6	18.0	17.2	16.7	16.4	15.7	14.9	15.0	15.2	15.3	17.8	20.4
5-Aug	15.2	15.3	15.3	15.2	15.0	15.1	15.2	15.5	16.0	16.6	18.1	19.4	20.8	21.4	21.8	21.9	21.6	19.1	17.2	15.7	15.1	15.1	15.0	14.7	17.1	21.9
6-Aug	14.4	14.3	13.9	13.9	13.9	13.8	13.9	14.4	15.0	16.1	18.0	18.8	19.9	19.8	19.6	19.6	19.7	18.8	18.1	17.4	16.6	15.6	15.3	15.3	16.5	19.9
7-Aug	15.3	15.1	14.9	14.7	14.6	14.4	14.7	15.5	16.1	17.0	18.1	19.0	20.4	21.2	21.9	22.5	21.7	22.4	21.8	20.6	18.8	17.2	16.7	16.6	18.0	22.5
8-Aug	16.0	15.2	14.6	14.4	14.2	14.1	15.0	16.8	18.4	20.1	21.9	23.3	23.9	24.1	23.7	22.6	23.8	23.4	24.0	22.9	20.2	18.7	16.3	13.6	19.2	24.1
9-Aug	12.6	11.9	11.5	11.2	10.7	11.3	13.0	13.8	15.4	19.6	22.8	24.9	26.1	27.1	27.8	28.2	28.5	28.1	27.5	26.1	21.1	17.9	18.2	19.5	19.8	28.5
10-Aug	19.7	19.5	17.9	17.4	16.8	16.7	16.8	19.5	20.9	22.8	24.6	26.1	27.2	27.9	28.0	28.4	29.1	29.1	28.0	26.5	24.5	22.9	20.7	19.6	22.9	29.1
11-Aug	18.3	17.3	17.0	16.5	16.3	16.9	16.9	16.9	19.3	23.2	25.4	26.2	26.9	27.4	27.3	27.1	27.0	26.7	25.3	24.2	22.2	20.6	18.6	17.8	21.7	27.4
12-Aug	17.6	16.5	15.7	15.3	15.2	15.3	16.3	18.1	19.7	21.2	22.3	23.5	24.5	25.2	25.8	25.7	26.1	25.6	24.6	23.3	20.7	18.7	17.9	16.6	20.5	26.1
13-Aug	16.2	15.2	15.0	14.2	13.8	14.2	14.8	16.0	17.7	18.6	21.0	23.2	24.2	24.7	24.1	22.9	23.2	25.1	25.0	23.1	18.9	17.0	17.5	16.8	19.3	25.1
14-Aug	16.0	14.9	13.9	13.5	12.6	12.4	13.3	15.1	16.2	17.2	17.8	18.7	19.7	20.3	20.4	20.6	19.9	18.9	17.9	16.5	14.8	13.3	12.3	13.0	16.2	20.6
15-Aug	12.4	12.2	12.6	12.2	12.1	12.0	12.2	12.6	12.7	13.7	14.8	16.0	17.0	17.5	17.6	17.7	17.1	17.1	16.4	15.1	13.4	12.8	12.8	12.0	14.3	17.7
16-Aug	11.9	11.8	11.2	10.6	10.6	10.7	11.0	12.3	13.7	15.1	16.0	17.5	18.1	18.7	18.9	19.1	18.9	18.4	17.6	15.9	14.4	12.8	12.3	11.9	14.6	19.1
17-Aug	11.2	11.0	9.3	8.5	8.0	7.5	8.6	11.5	14.0	17.5	19.7	21.4	22.3	22.5	22.8	22.1	21.3	20.2	18.7	17.6	15.8	14.3	14.2	12.8	15.5	22.8
18-Aug	11.5	10.9	11.8	12.2	9.7	9.1	10.5	14.1	16.1	17.9	19.4	20.9	22.1	21.6	21.6	22.9	22.5	22.8	22.4	21.0	18.9	17.1	16.2	15.5	17.0	22.9
19-Aug	15.6	15.3	15.4	16.3	17.1	17.1	17.3	17.3	18.3	20.5	21.5	23.0	23.4	23.8	24.2	23.5	21.4	20.2	19.6	17.8	16.3	15.5	14.9	14.1	18.7	24.2
20-Aug	13.3	12.2	11.6	11.3	11.7	11.8	12.1	12.5	12.9	13.2	13.5	14.1	14.3	14.1	13.6	14.1	14.4	14.4	14.0	13.3	12.4	11.8	11.2	10.4	12.8	14.4
21-Aug	9.7	8.9	7.6	6.4	5.8	5.8	6.8	8.8	9.7	10.4	10.7	11.5	11.1	12.6	13.2	12.9	13.5	13.6	12.9	11.4	10.2	10.1	9.8	9.4	10.1	13.6
22-Aug	8.3	7.9	7.6	7.6	7.0	6.5	6.4	7.4	8.5	9.3	10.6	11.1	12.2	13.8	14.7	15.4	16.3	15.9	15.6	12.2	8.1	6.1	4.7	3.9	9.9	16.3
23-Aug	3.2	2.5	3.1	2.7	2.2	2.2	3.5	5.5	9.3	13.0	16.5	18.6	20.6	21.7	22.8	23.0	23.5	23.7	23.1	21.3	19.9	18.5	16.9	17.6	14.0	23.7
24-Aug	16.0	15.5	14.5	13.1	12.6	12.3	12.5	14.1	15.3	17.0	19.1	20.3	21.8	22.6	22.5	23.5	23.2	21.9	20.8	16.9	14.9	13.5	12.6	11.5	17.0	23.5
25-Aug	9.3	8.0	7.0	6.3	5.7	6.7	7.6	9.9	14.5	17.8	20.1	21.8	22.8	21.9	20.5	19.6	20.4	19.7	18.2	17.2	16.5	15.4	14.4	13.8	14.8	22.8
26-Aug	14.1	13.5	12.9	12.1	11.5	11.4	11.5	12.5	13.8	15.1	16.7	18.2	18.5	19.4	19.9	19.5	18.9	18.3	18.1	15.4	13.5	13.3	12.6	11.3	15.1	19.9
27-Aug	9.9	9.3	8.7	8.2	7.6	7.0	8.5	10.9	13.6	17.4	20.2	22.0	23.2	24.2	25.0	25.0	25.2	25.2	24.0	22.1	19.8	17.2	16.7	16.4	17.0	25.2
28-Aug	16.3	15.4	14.5	13.7	13.4	13.2	14.2	16.2	18.6	18.9	20.6	22.4	23.0	23.0	24.2	24.8	25.4	25.1	21.9	18.5	17.4	17.1	17.3	18.0	18.9	25.4
29-Aug	15.7	15.1	14.6	13.5	13.4	13.2	13.2	14.4	16.5	18.3	19.9	21.3	22.9	23.7	24.6	25.0	25.1	24.4	23.2	22.0	21.3	20.7	20.1	19.3	19.2	25.1
30-Aug	18.2	18.5	18.0	17.5	17.3	16.6	15.3	16.9	19.7	21.7	23.5	24.8	25.1	25.9	25.5	25.6	20.2	16.3	16.2	15.4	13.5	12.5	11.4	10.1	18.6	25.9
31-Aug	9.2	8.8	8.2	8.1	7.8	7.6	7.9	9.3	11.8	14.8	17.3	20.0	20.8	20.9	21.4	21.7	21.5	20.9	19.9	17.8	14.8	12.8	12.1	8.6	14.3	21.7
	13.8	13.2	12.7	12.2	11.8	11.8	12.5	13.9	15.6	17.4	19.0	20.4	21.4	21.9	22.0	22.0	21.7	21.3	20.5	19.0	17.1	15.7	15.0	14.3	Diurnal Average	
	19.7	19.5	18.6	17.9	17.7	17.9	17.9	19.5	20.9	23.2	25.4	26.2	27.2	27.9	28.0	28.4	29.1	29.1	28.0	26.5	24.5	22.9	20.7	19.8	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature (AT) - C

Patricia McInnes - August 2015



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	69	9.27	9.27
10 - 20	460	61.83	71.10
> 20	215	28.90	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Patricia McInnes - August 2015

Maximum Value: 99 % on Aug 9 07:00

Maximum Daily Average: 82.3 % on Aug 5

Minimum Value: 27 % on Aug 10 18:00

Minimum Daily Average: 50.5 % on Aug 12

Maximum Diurnal Average: 85.8 % at hour 5

Minimum Diurnal Average: 44.3 % at hour 16

Monthly Average: 66.2 %

Percentiles: $P_1 = 30$ $P_{10} = 37$ $Q_1 = 50$ Median = 67 $Q_3 = 83$ $P_{90} = 93$ $P_{99} = 97$

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

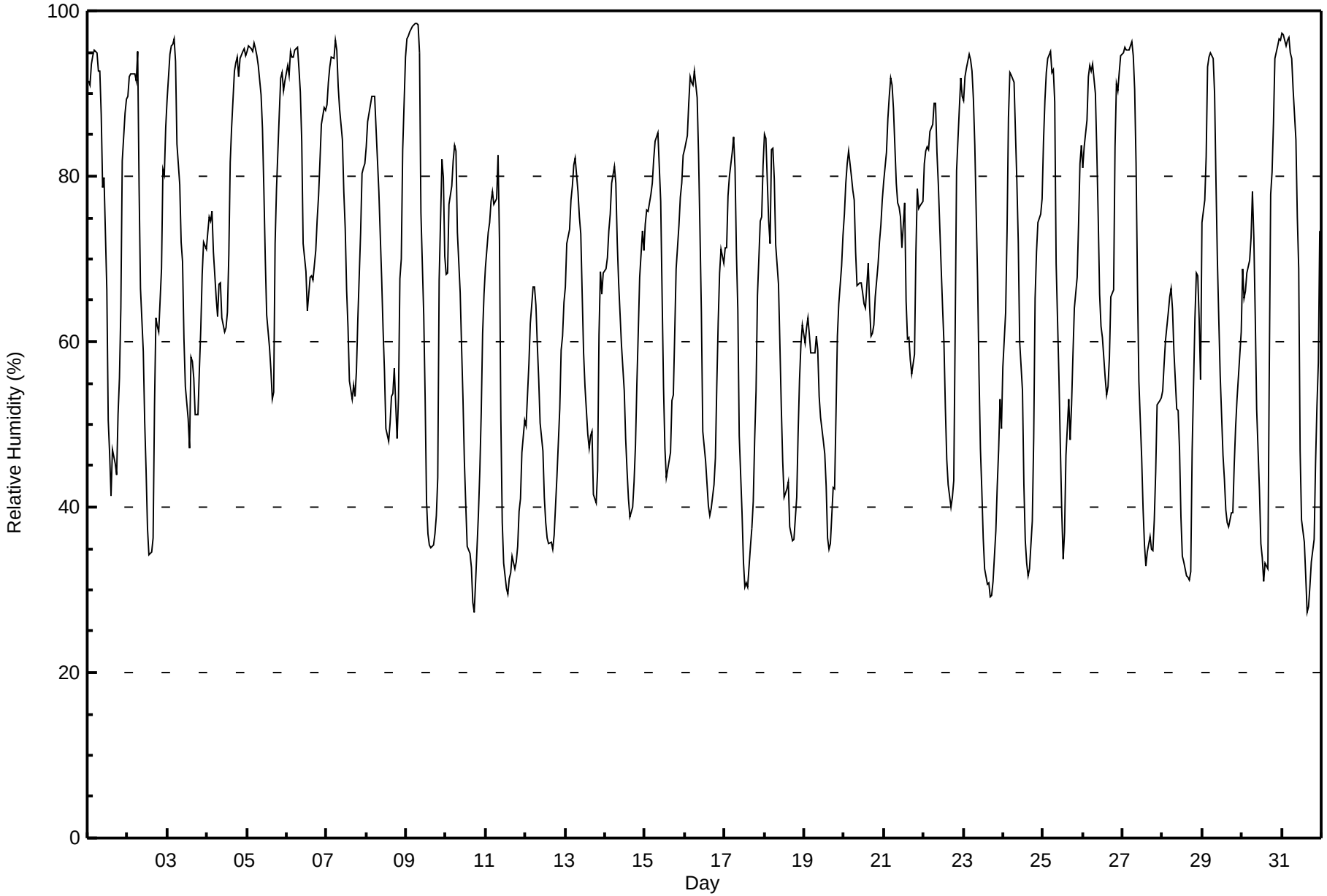
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	92	91	94	95	95	95	93	93	87	79	80	66	50	47	41	47	45	44	51	56	64	82	88	89	73.5	95
2-Aug	90	92	92	92	92	91	95	79	66	59	50	44	37	34	35	36	52	63	62	61	69	81	80	86	68.4	95
3-Aug	89	95	96	96	97	94	84	79	72	70	60	55	51	47	58	58	56	51	51	57	62	68	72	71	70.3	97
4-Aug	73	75	75	76	71	65	63	67	67	63	61	62	64	71	82	86	93	94	94	92	94	95	95	95	78.0	95
5-Aug	95	96	95	95	96	95	95	93	90	86	78	70	63	59	57	53	54	72	78	88	92	93	90	91	82.3	96
6-Aug	93	92	95	94	94	95	96	93	90	84	72	68	64	66	68	68	67	71	75	78	82	86	88	88	82.0	96
7-Aug	89	91	93	94	94	96	95	91	88	84	78	74	66	62	55	53	55	53	57	63	73	80	81	82	77.0	96
8-Aug	84	87	89	90	90	90	86	78	73	68	61	57	49	48	50	53	54	57	48	53	68	70	83	94	69.9	94
9-Aug	97	97	97	98	98	98	99	98	95	76	63	53	41	37	35	35	35	37	39	44	67	82	80	70	69.7	99
10-Aug	68	68	77	79	82	84	83	73	66	59	53	45	40	35	34	33	28	27	31	39	44	51	61	66	55.3	84
11-Aug	69	73	74	77	78	77	77	83	72	51	38	33	30	29	31	32	34	33	33	35	40	41	47	51	51.6	83
12-Aug	50	54	57	62	67	67	64	60	55	50	47	41	38	36	36	36	35	37	40	44	52	59	61	65	50.5	67
13-Aug	67	72	74	77	79	81	82	78	75	73	66	59	55	49	47	49	49	41	40	44	61	68	66	68	63.4	82
14-Aug	69	70	73	75	79	81	79	72	67	63	60	54	48	44	41	39	40	43	47	55	61	68	73	71	61.5	81
15-Aug	74	76	76	78	79	82	84	85	85	77	66	55	47	44	46	47	53	53	61	69	74	78	79	82	68.7	85
16-Aug	83	85	89	92	91	91	93	89	83	73	63	49	46	43	40	39	40	43	46	55	62	68	71	69	66.8	93
17-Aug	71	71	78	80	83	85	81	71	64	49	39	33	30	31	30	35	38	41	48	54	66	75	75	81	58.7	85
18-Aug	85	85	75	72	83	83	80	72	67	60	52	46	41	42	43	38	37	36	36	41	49	55	60	62	58.3	85
19-Aug	60	62	63	61	59	59	59	61	59	53	51	48	47	43	36	35	36	42	42	51	61	65	69	73	53.8	73
20-Aug	75	79	82	83	80	78	77	71	67	67	67	66	65	64	70	64	61	61	62	65	69	72	74	77	70.7	83
21-Aug	79	83	87	90	92	91	88	79	77	76	75	71	77	65	60	61	58	56	58	71	78	76	76	77	75.1	92
22-Aug	82	83	83	83	85	86	89	89	83	79	69	64	60	52	46	43	40	41	43	61	81	88	92	90	71.4	92
23-Aug	89	92	93	95	94	93	89	84	67	56	47	42	36	33	31	31	29	29	31	37	42	47	53	49	57.9	95
24-Aug	57	64	73	87	93	92	91	85	79	72	60	54	43	36	33	32	33	38	48	65	71	74	75	77	63.9	93
25-Aug	84	89	92	94	95	92	93	89	69	56	47	39	34	37	46	53	48	52	58	64	68	74	82	84	68.4	95
26-Aug	81	84	87	92	93	93	94	90	83	75	66	62	61	56	54	55	58	65	66	84	91	90	92	95	77.7	95
27-Aug	95	96	95	95	95	96	95	90	82	67	55	46	40	35	33	35	36	35	35	38	44	52	53	53	62.4	96
28-Aug	54	57	60	64	65	66	64	59	52	52	47	39	34	33	32	32	31	32	47	63	68	68	63	55	51.6	68
29-Aug	74	77	82	93	94	95	94	90	79	70	63	56	46	43	40	38	38	39	39	45	50	53	56	61	63.2	95
30-Aug	69	65	66	68	70	73	78	73	63	52	42	36	34	31	33	33	56	78	80	86	94	96	97	96	65.4	97
31-Aug	97	97	96	96	97	95	94	91	84	75	69	47	38	36	32	27	28	31	33	36	45	52	57	73	63.7	97
	78.5	80.6	82.5	84.6	85.8	85.8	85.0	80.7	74.5	66.9	59.6	52.7	47.6	44.8	44.4	44.3	45.7	48.3	51.1	57.9	65.9	71.3	73.9	75.6	Diurnal Average	
	97	97	97	98	98	98	99	98	95	86	80	74	77	71	82	86	93	94	94	92	94	96	97	96	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity (RH) - %

Patricia McInnes - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Patricia McInnes - August 2015

Maximum Speed: 28 km/h on Aug 11 14:00

Maximum Daily Speed Average: 16.2 km/h on Aug 14

Minimum Speed Value: 0 km/h on Aug 8 14:00

Minimum Daily Speed Average: 1.5 km/h on Aug 2

Maximum Diurnal Speed Average: 5.5 km/h at hour 14

Minimum Diurnal Speed Average: 2.2 km/h at hour 20

Monthly Average Velocity: 3.5 km/h 237.7 deg

Percentiles: $P_1 = 1$ $P_{10} = 3$ $Q_1 = 5$ Median = 9 $Q_3 = 13$ $P_{90} = 17$ $P_{99} = 24$

Hours in Service: 744

Hours of Data: 741

Hours of Missing Data: 3

Percent Operational Time: 99.9

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	WNW3	NNW8	NW4	W3	WNW2	WNW3	NNW9	NNW8	NNW7	NNW12	NNW8	NW6	NW11	NNW13	NNW14	N15	NNW8	S3	SSW8	SE9	SE4	WSW5	W3	WNW5	NW4.8	N15
2-Aug	NNW1	SW1	SW4	SW3	AF	S2	SSE4	SSE5	SSE7	SE8	SE7	SE5	SE5	SSE9	SSE7	SSE4	WNW11	NNW12	NNE9	ENE5	S3	W4	SSW2	NNW3	SSE1.5	NNW12
3-Aug	WNW3	NW4	WNW2	W3	WNW1	W0	E6	ESE4	ENE4	ENE5	E8	ESE9	SE8	SSE10	SSE14	SSE10	SE8	E11	E11	E9	ESE11	ESE11	ESE7	ESE8	ESE5.2	SSE14
4-Aug	E8	ENE6	E5	E7	E8	E8	E8	ESE8	E8	E9	E11	ESE13	E15	E15	E11	E13	ESE17	ESE16	ESE16	SE14	ESE12	ESE11	ESE8	ESE7	E10.5	ESE17
5-Aug	SE6	ESE5	E6	E8	NE5	NNE8	E8	E8	E10	E10	E9	E12	E15	E17	E16	ESE18	ESE13	SE12	ESE14	ESE16	E12	E12	E15	ESE15	E10.6	ESE18
6-Aug	E12	E14	E14	E13	ESE15	ESE14	ESE13	ESE14	ESE11	ESE12	ESE13	ESE14	E15	E16	E17	E14	E16	E17	ESE14	E12	E10	E8	E7	E5	E12.7	E17
7-Aug	ENE8	ENE7	E7	E6	ENE5	E5	E1	NNW2	NNW2	NE2	ENE6	ESE8	ENE9	E10	ESE8	E7	ESE6	ESE6	SE6	SE7	S8	S5	SE4	ESE9	E5.0	E10
8-Aug	ESE10	SE6	SE6	ESE5	ESE6	SE6	SE7	ESE7	SE6	SE6	SE8	SSE8	SW4	SW0	W5	WNW6	NW8	N6	NNE5	ENE8	E12	ESE6	NE2	NW2	ESE3.1	E12
9-Aug	WNW3	NW4	WNW4	WSW2	WSW1	W3	E2	E4	SE4	E3	ENE5	ESE7	SE7	SE4	W2	SE0	ESE4	ESE6	ESE9	E8	E2	E1	SE4	S7	ESE2.1	ESE9
10-Aug	SSW7	ENE4	SSE3	SSW10	WSW10	WSW8	SSE6	SW11	SW15	SW13	SW12	SSW9	SSW14	WSW15	WSW13	WSW10	WSW11	SW15	SSW9	S7	SSW8	SSW8	SW8	SW8	SW8.7	SW15
11-Aug	SW8	SW9	SW9	SW8	SW10	SW13	SSW7	SW9	SW13	SW14	SW20	WSW27	WSW24	WSW28	WSW25	WSW24	WSW21	WSW22	WSW17	WSW14	WSW11	SW10	SW9	SW14	SW15.0	WSW28
12-Aug	WSW18	WSW14	SW12	SW12	SW13	SW12	SW14	WSW19	WSW15	W15	WSW16	WSW20	WSW19	W16	WSW18	W16	W16	W17	W12	W10	WSW7	WSW8	SW9	SW10	WSW13.8	WSW20
13-Aug	SW11	SW11	SW10	S6	SSW7	SSW9	SW10	SSW7	SSE7	SSE7	C	C	SSW7	W14	WNW18	WNW13	SW9	SW15	WSW14	WSW9	SW5	SW7	SW8	SW10	SW8.2	WNW18
14-Aug	WSW11	WSW11	WSW11	WSW15	WSW15	WSW15	WSW16	W18	W22	W22	W20	W22	W20	W20	W20	WNW25	WNW25	WNW21	WNW18	WNW15	W13	WNW11	W9	W13	W16.2	WNW25
15-Aug	W11	WNW11	NW14	NW11	NW12	NW10	NW10	NW13	NNW14	NNW18	NNW22	N23	N22	N20	N17	NNW20	NNW20	NNW17	NW13	WNW10	WNW11	WNW10	NW9	NW8	NNW13.0	N23
16-Aug	NW8	NW7	NW5	W5	WNW5	WSW4	WSW4	SW2	SSW4	SSW2	WNW5	W11	NW10	NNW11	NNW3	W10	WNW12	W10	W9	WSW7	W6	WSW5	SW7	SW8	W5.8	WNW12
17-Aug	SW8	SW10	SW11	SW14	SW12	SSW10	SSW8	SSW9	SSE7	SSW10	S13	S13	SSW11	SW12	S5	SSW18	S13	S10	SW8	SSW4	SE2	WNW3	ESE1	SW2	SSW8.2	SSW18
18-Aug	WSW4	W5	NNW5	N4	SSW3	WSW7	SW5	NW5	NNW8	N6	NE6	NW1	WNW3	WNW6	WNW4	S3	SSW6	SW7	SW10	S8	S7	SSW7	SSW7	SSW7	WSW2.7	SSW10
19-Aug	S10	S8	S9	S14	S15	SSE11	SSE13	S16	S16	SW19	SW20	WSW21	WSW21	WSW22	W23	W26	W24	WSW16	W24	W14	WSW16	W12	WSW12	WSW11	SW12.9	W26
20-Aug	WSW10	SW9	SW9	WSW13	WSW14	WSW16	WSW16	W18	W20	W19	W19	W22	W21	WNW22	W18	WNW16	WNW14	WNW12	WNW12	WNW12	W9	WSW10	WSW10	W12	W13.9	W22
21-Aug	W12	WSW8	WSW9	SW10	WSW10	SW10	WSW10	W13	WNW15	NW19	NW18	NW17	WNW14	NW17	NW18	NW15	NW17	NW17	NW13	WNW11	W10	WNW12	WNW12	WNW11	WNW11.8	NW19
22-Aug	W10	WSW9	WSW8	W10	WSW10	WSW12	WSW11	W10	W12	WNW13	WNW17	WNW15	WNW12	WNW14	NW14	NW15	NNW12	NNW10	WNW6	WNW3	SW3	W3	SW2	SW3	WNW8.4	WNW17
23-Aug	S3	S4	S5	SSE5	S5	S4	SSE4	SSE5	SE5	SE5	ESE5	ESE7	ESE8	S10	SSE11	S9	SSW12	SSE10	SSE9	SE11	SE12	SE8	NE5	ENE7	SSE6.0	SE12
24-Aug	SSW4	SW10	SW5	S5	SE9	SSW7	SSW7	SSW7	S13	SSW13	SW12	SSW10	WSW11	WSW14	WSW11	SW9	WNW10	WNW7	WNW4	WNW4	SW4	WSW4	WNW2	WSW1	SW6.0	WSW14
25-Aug	WSW3	W3	W3	WSW3	W2	W2	W2	NW3	NNE3	ESE3	E3	NW3	NE9	NNE10	NNW13	NNW13	N13	NNW15	NNW11	NNW9	NNW7	NW6	WNW4	NW6	NNW4.9	NNW15
26-Aug	NNW9	NNW12	NNW15	N10	NNW8	NNW7	NNW7	N7	N5	NNE4	NNE6	NNE3	N7	N2	NNE4	NNE8	NW2	WSW3	SW3	WSW3	WSW3	WSW4	SW3	SSW3	NNW4.4	NNW15
27-Aug	S2	SW3	SSW4	SSE4	S3	S4	S2	SSW4	S7	SSE7	SSE9	S12	SSW13	SSW17	SSW20	SSW20	SSW18	SW17	SW17	SW11	SSW7	SSW6	SSW8	SW13	SSW9.0	SSW20
28-Aug	SW14	SW14	SW13	SW14	SW13	SW14	SW16	SW17	SW18	SW19	WSW18	WSW20	WSW24	W20	WSW16	W12	WSW9	W6	NW4	NW4	NW4	NW3	NNW8	NW4	WSW11.4	WSW24
29-Aug	SW4	NNW12	NW7	S3	WSW2	WNW3	WSW3	SSW3	SSW6	S9	S10	SW9	SSE8	SSW9	SE7	ESE10	ESE14	SE14	SE13	ESE13	ESE16	ESE15	ESE13	ESE12	SE5.4	ESE16
30-Aug	E13	ESE12	SE10	SE7	SE6	SSE6	SSW4	SW7	W11	WNW13	WNW9	WNW10	WNW10	W5	WSW7	SW9	S8	S14	SSE7	S5	S4	SSW5	S5	S4	SSW3.7	S14
31-Aug	S4	SSW5	SSW4	SSW6	S6	SSW4	SSW5	S5	SSE8	S9	SSE10	SW14	SW18	WSW19	WSW22	WSW21	WSW22	SW17	SW11	WSW9	SSW6	SSW7	SSW6	SW5	SW9.1	WSW22
	SW3.4	WSW2.9	SW2.9	SW3.7	SW4.0	SW4.2	SW3.7	SW3.8	SW4.0	WSW3.7	WSW3.4	WSW4.7	WSW4.5	W5.5	W5.4	W5.2	W4.9	WSW4.1	WSW3.4	SSW2.2	SSW2.5	SW2.6	SW2.2	SW3.0	Diurnal Average	
	WSW18	E14	NNW15	WSW15	WSW15	WSW16	SW16	WSW19	W22	W22	NNW22	WSW27	WSW24	WSW28	WSW25	W26	WNW25	WSW22	W24	ESE16	ESE16	ESE15	E15	ESE15	Diurnal Maximum	

C - Calibration AF - Analyzer Failure

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

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Speed (WS) - km/h

Patricia McInnes - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 9 km/h on Aug 30 17:00

Minimum Value: 1 km/h on Aug 12 21:00

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:	741
Hours of Missing Data:	3
Hours of Calibration:	2
Percent Operational Time:	99.9

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

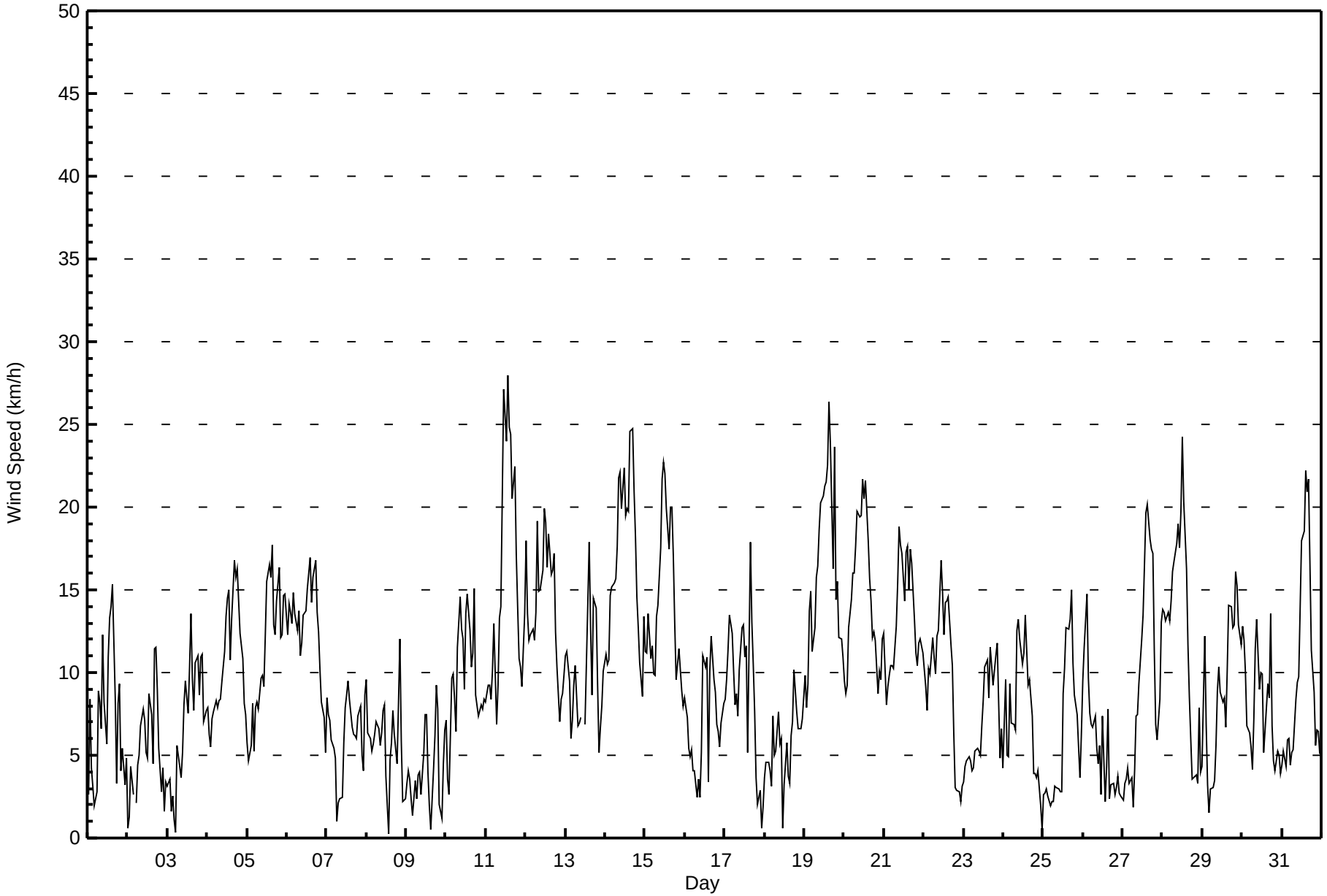
C - Calibration AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed (WS) - km/h

Patricia McInnes - August 2015



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	187	25.24	25.24
6 - 11	301	40.62	65.86
12 - 19	208	28.07	93.93
20 - 28	45	6.07	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

Patricia McInnes - August 2015

Wind Speed Ranges (km/h)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 5	3	5	4	7	9	7	11	8	23	16	18	19	16	21	14	6	187
6 - 11	5	5	2	7	29	26	22	21	18	35	37	33	14	16	14	17	301
12 - 19	3	0	0	0	23	25	5	2	10	7	35	28	21	20	14	15	208
20 - 28	3	0	0	0	0	0	0	0	0	2	2	16	15	4	0	3	45
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	14	10	6	14	61	58	38	31	51	60	92	96	66	61	42	41	741

Total Number of Valid Hours: 741

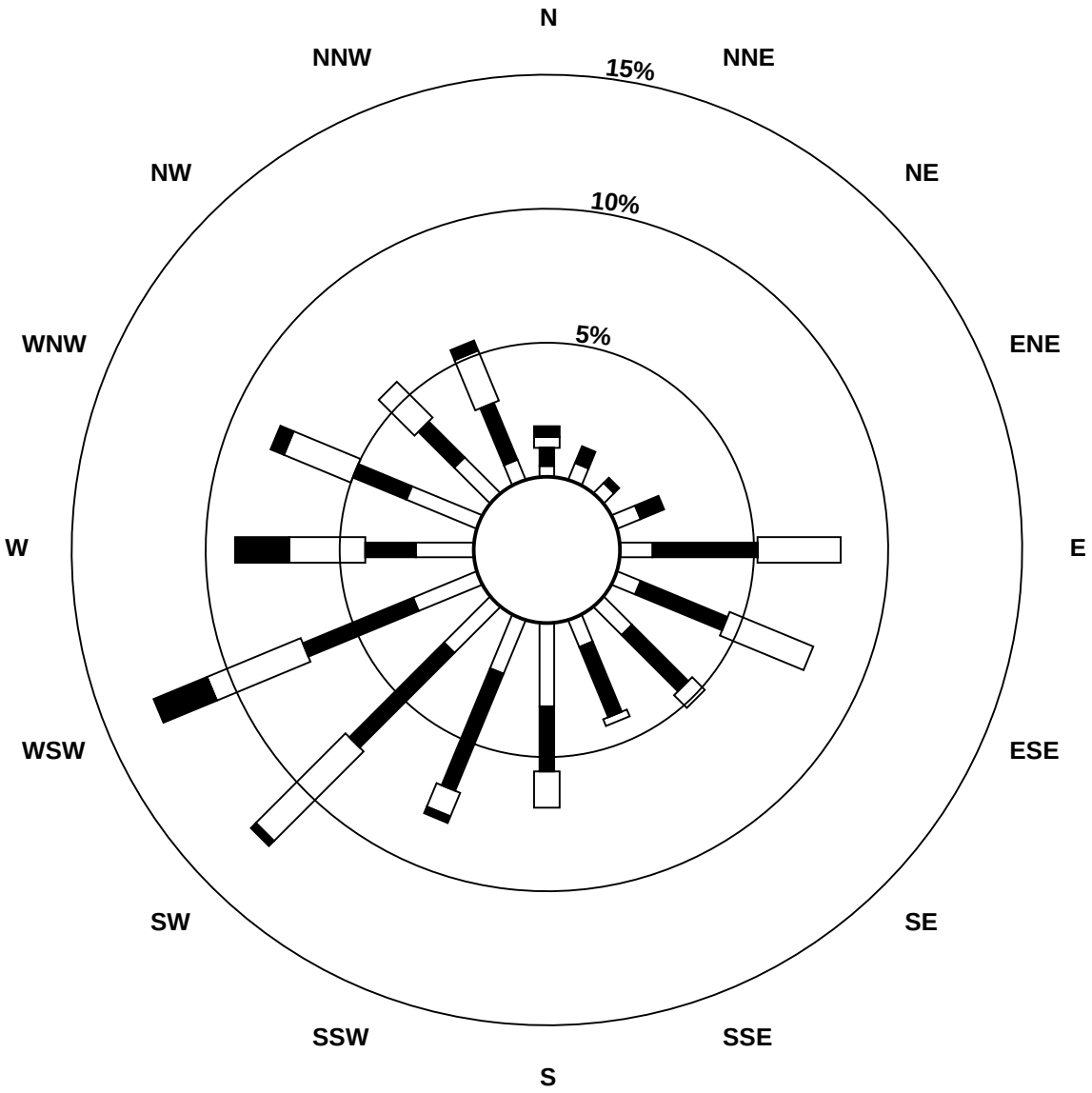
Total Number of Hours: 744

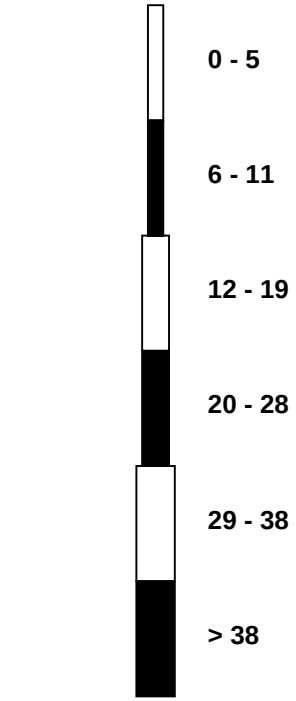
Wood Buffalo Environmental Association

Wind Rose Aug 2015

Wind Speed (WS) - km/h

Patricia McInnes (AMS 6)





Total Number of Valid Hours: 741

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Patricia McInnes - August 2015

Direction of Maximum Speed: 240 deg on Aug 11 14:00
Direction of Maximum Daily Speed Average: 271.3 deg on Aug 14

Direction of Minimum Speed: 232 deg on Aug 8 14:00

Direction of Minimum Daily Speed Average: 1.5 deg on Aug 2

Monthly Average Direction: 253.2 deg

Hours in Service:	744
Hours of Data:	741
Hours of Missing Data:	3
Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average
1-Aug	291	344	323	264	283	287	344	335	336	339	331	306	322	328	339	1	337	172	212	142	136	257	267	300	324.7
2-Aug	345	232	220	236	AF	183	163	160	167	141	131	129	129	150	148	167	294	342	14	58	188	272	201	332	159.9
3-Aug	285	304	293	279	283	272	96	108	78	60	94	111	138	152	168	150	137	99	98	93	108	115	111	110	117.5
4-Aug	97	62	85	97	89	83	92	107	101	82	97	103	99	97	95	100	106	106	112	129	107	113	107	103	100.9
5-Aug	124	107	93	79	51	30	84	87	90	93	96	96	93	92	101	106	117	141	117	117	99	97	101	103	99.6
6-Aug	91	97	100	96	108	110	111	115	116	107	114	104	92	93	79	90	95	97	102	95	90	86	83	93	98.8
7-Aug	72	72	85	84	78	100	96	343	343	39	77	102	76	95	102	96	103	122	125	129	181	172	130	115	100.0
8-Aug	120	128	124	117	120	135	126	116	140	141	128	148	236	232	259	292	320	351	25	67	88	111	47	316	113.1
9-Aug	288	317	301	256	248	263	90	81	144	82	60	112	124	134	268	134	114	111	113	100	92	80	125	189	117.2
10-Aug	196	69	147	208	244	249	166	232	231	235	229	205	203	237	257	243	245	216	195	186	201	200	216	218	221.0
11-Aug	219	223	220	228	218	229	201	218	223	223	231	238	246	240	246	244	255	247	250	238	241	228	223	233	236.0
12-Aug	248	240	227	229	231	230	233	240	253	262	257	254	244	266	250	267	269	264	261	260	243	250	230	236	248.9
13-Aug	233	222	226	188	199	212	222	197	159	153	C	C	210	263	286	286	236	235	252	253	229	223	229	233	233.1
14-Aug	239	243	247	241	250	255	258	270	260	260	270	279	276	278	280	289	286	291	290	284	272	298	275	276	271.3
15-Aug	271	289	308	309	309	315	318	326	334	347	348	355	5	9	354	342	339	328	308	294	293	299	306	313	329.5
16-Aug	310	310	320	268	284	252	257	221	200	213	294	271	312	336	328	279	286	277	267	241	260	252	236	236	277.9
17-Aug	227	226	228	230	223	213	201	208	167	198	191	185	208	218	180	207	181	179	232	196	134	301	116	218	206.1
18-Aug	246	280	338	2	210	240	233	326	345	349	39	318	296	282	287	179	199	228	214	186	190	200	197	199	241.3
19-Aug	187	180	177	180	170	163	165	177	186	219	231	243	257	257	270	264	262	251	280	271	256	264	258	245	235.3
20-Aug	244	222	225	243	243	253	252	266	268	276	266	271	277	286	279	293	297	296	287	283	267	251	257	264	268.1
21-Aug	272	249	251	230	238	229	242	275	298	307	311	309	299	304	325	321	319	315	317	295	277	283	292	284	292.0
22-Aug	268	247	240	259	243	248	247	261	279	285	301	298	298	302	314	318	338	336	297	300	235	259	223	216	284.0
23-Aug	189	177	176	165	190	180	168	157	128	143	122	119	110	177	149	174	194	161	158	143	142	128	51	71	150.8
24-Aug	196	229	234	179	141	195	212	204	187	196	220	211	252	250	256	231	283	294	299	299	215	244	290	257	226.7
25-Aug	258	265	273	255	263	259	274	324	22	104	79	314	35	13	340	339	353	343	340	343	336	309	297	320	338.6
26-Aug	334	334	339	355	329	339	345	356	1	27	16	13	3	358	16	17	304	243	235	255	258	245	236	201	340.2
27-Aug	176	231	192	163	178	180	190	194	175	164	155	181	197	207	212	212	209	234	232	221	206	194	208	226	204.9
28-Aug	230	231	228	229	230	234	233	236	236	234	251	253	250	261	254	263	250	266	309	325	308	311	344	320	247.9
29-Aug	236	330	315	178	238	286	254	198	192	174	184	215	164	197	142	115	111	124	133	108	109	115	112	120	140.7
30-Aug	100	113	125	131	139	160	208	231	274	283	290	301	282	268	240	227	180	180	157	169	185	197	188	173	201.2
31-Aug	184	195	192	196	186	194	199	174	165	175	164	220	229	241	243	248	244	236	227	239	211	208	204	221	220.0
	228.2	240.7	231.2	215.1	215.8	224.9	216.7	230.0	228.9	237.5	243.3	242.6	252.4	259.1	265.4	265.5	263.6	249.0	243.4	205.2	196.7	216.8	217.2	226.0	
	Diurnal Average																								

C - Calibration AF - Analyzer Failure

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

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg

Patricia McInnes - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 105 deg on Aug 9 16:00

Minimum Value: 6 deg on Aug 12 22:00

Percentiles: $P_1 = 7$ $P_{10} = 11$ $Q_1 = 14$ Median = 18 $Q_3 = 29$ $P_{90} = 51$ $P_{99} = 92$

Hours in Service:	744
Hours of Data:	741
Hours of Missing Data:	3
Hours of Calibration:	2
Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Aug	65	15	18	43	51	47	13	12	20	15	18	55	33	26	29	24	40	93	30	37	61	27	20	10	93
2-Aug	89	62	12	74	AF	57	22	28	28	30	39	82	69	41	52	65	20	23	15	31	54	18	79	36	89
3-Aug	30	23	50	36	77	80	20	34	34	26	32	27	40	42	19	19	24	20	18	13	16	13	13	13	80
4-Aug	19	21	15	17	15	14	17	16	27	26	16	17	16	14	15	15	14	14	14	18	14	15	16	15	27
5-Aug	13	18	17	14	25	14	18	15	16	17	19	20	19	16	16	17	15	20	14	17	15	14	15	15	25
6-Aug	15	15	15	13	14	14	14	14	15	18	19	17	19	18	14	16	19	13	15	14	14	14	14	18	19
7-Aug	11	14	14	16	20	20	65	63	69	74	29	27	27	34	36	57	26	36	28	12	18	26	46	15	74
8-Aug	14	12	10	20	12	13	16	20	38	36	38	36	67	101	81	55	50	31	39	20	16	24	57	34	101
9-Aug	22	15	23	28	73	29	74	32	33	60	49	38	47	69	86	105	58	48	18	13	45	59	22	29	105
10-Aug	32	53	42	52	21	36	22	17	13	21	23	42	28	27	27	22	28	19	20	14	14	14	13	11	53
11-Aug	10	7	9	12	12	14	27	13	11	17	20	16	18	15	15	15	14	14	13	12	12	11	10	10	27
12-Aug	10	11	8	9	9	10	11	11	14	16	17	17	22	23	22	15	17	15	11	9	7	6	14	8	23
13-Aug	11	11	17	24	20	17	14	20	23	17	C	C	33	19	14	15	24	18	17	11	6	7	9	7	33
14-Aug	9	7	15	9	10	10	13	14	14	17	20	18	20	19	18	19	16	20	14	12	11	17	10	12	20
15-Aug	15	14	12	13	12	17	15	13	13	15	15	17	21	18	24	15	13	15	12	10	9	7	8	11	24
16-Aug	11	10	14	29	13	19	19	56	44	86	53	34	44	34	79	38	20	18	10	15	9	20	9	8	86
17-Aug	11	7	8	8	11	14	17	22	23	21	27	26	42	34	65	22	17	15	18	32	71	70	101	69	101
18-Aug	45	14	26	39	44	14	19	54	21	48	47	105	86	50	59	74	49	40	21	15	15	13	16	15	105
19-Aug	15	13	14	13	14	19	16	13	16	21	16	20	18	21	17	14	13	17	14	15	12	14	13	11	21
20-Aug	14	14	11	11	11	12	11	15	14	15	16	16	16	16	15	20	15	17	12	12	16	12	14	10	20
21-Aug	13	16	13	9	8	8	12	16	14	13	14	18	20	16	16	17	15	14	14	15	11	11	11	12	20
22-Aug	12	10	11	13	8	9	9	14	13	15	13	18	27	23	21	22	23	18	20	18	16	27	36	27	36
23-Aug	23	18	24	16	24	21	21	16	25	32	40	33	33	25	36	38	23	26	14	12	13	11	59	40	59
24-Aug	72	23	33	44	31	19	14	24	17	18	23	29	38	25	21	33	28	13	12	11	12	18	79	87	87
25-Aug	40	44	39	46	62	48	48	24	59	54	82	94	41	30	11	10	16	12	11	15	15	11	34	16	94
26-Aug	15	15	15	20	9	13	14	16	34	39	45	80	37	92	60	37	70	34	20	41	20	17	20	18	92
27-Aug	54	27	23	10	10	15	37	22	17	23	25	31	26	25	23	18	20	22	16	12	13	11	11	9	54
28-Aug	8	9	9	8	9	10	10	11	14	13	18	21	15	19	20	25	32	24	26	16	15	28	19	63	63
29-Aug	49	14	54	67	73	76	54	37	31	25	21	26	44	40	53	27	17	16	15	14	14	14	21	18	76
30-Aug	14	16	17	18	13	21	13	27	16	15	32	27	33	65	58	30	78	45	31	27	37	12	31	27	78
31-Aug	11	15	13	14	14	16	30	23	17	16	20	34	21	20	17	20	17	13	13	14	9	12	13	19	34
	89	62	54	74	77	80	74	63	69	86	82	105	86	101	86	105	78	93	39	41	71	70	101	87	
	Diurnal Maximum																								

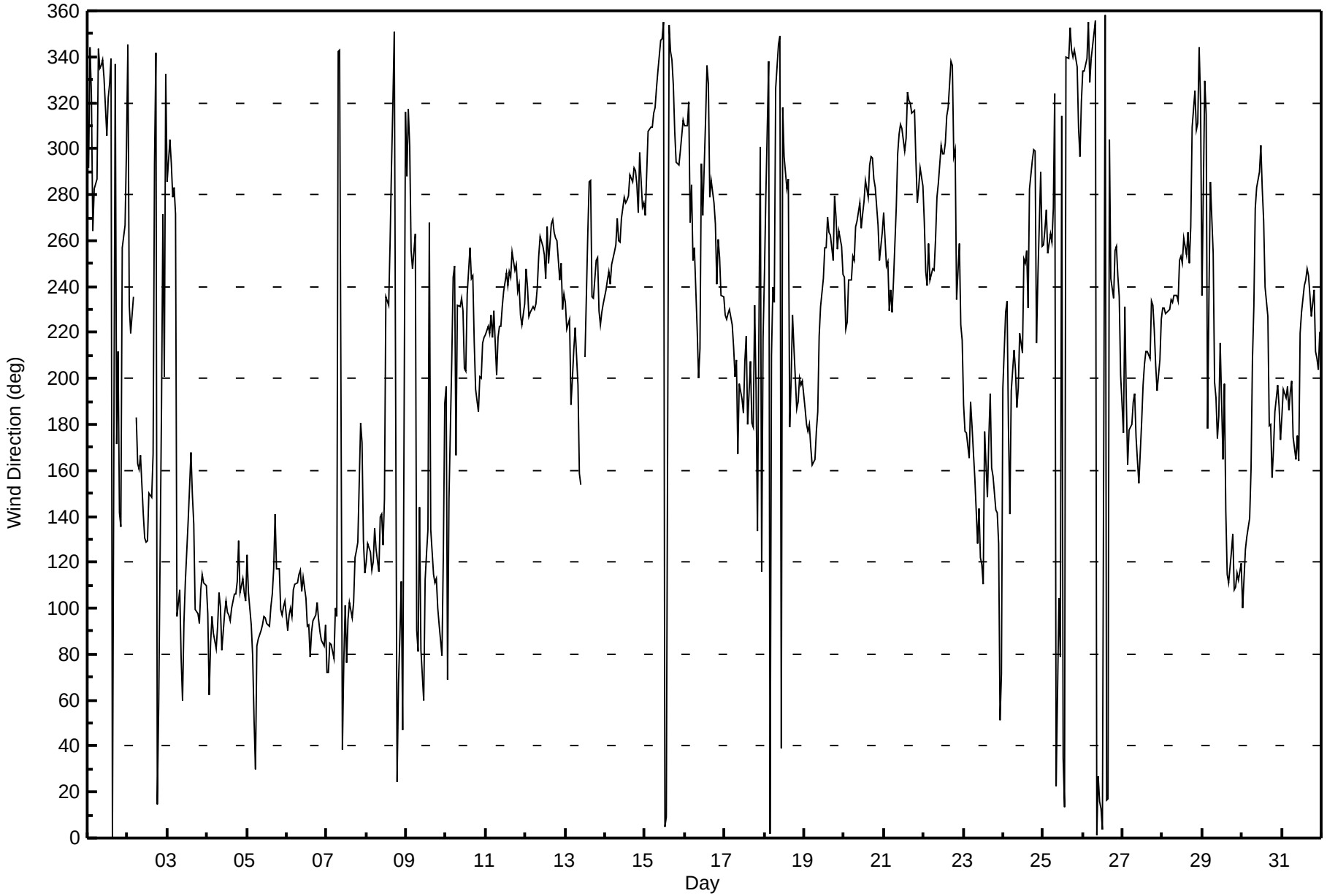
C - Calibration AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction (WD) - deg

Patricia McInnes - August 2015



Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

Calibration Date	August 12, 2015	Last Calibration	July 8, 2015
Station Name	Patricia McInnes	Station Number	AMS 6
Reason:	Routine		
Start Time (MST)	9:05	End Time (MST)	16:13
Gas Cert Reference	SA130110A	Station temp.	22 Deg C
Cal Gas Concentration	47 ppm	Cal Gas Exp Date	12/12/2016
Calibrator Make/Model	Sabio 4010	Serial Number	14300410
ZAG Make/Model	API 701	Serial Number	60
DACS make/model	Campbell Scientific CR3000	DACS serial No.	9036

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 1000 ppb		PMT voltage	-678	-678
Analyzer IP address	192.168.1.43		Lamp voltage	764	762
Calculated slope	1.001414	0.998593	Chamber temp	45.1	44.9
Calculated intercept	0.450365	1.403123	Pressure	688.6	691.9
Analyzer Background	5.1	5.3	Flow	0.441	0.441
Analyzer Coefficient	0.999	0.999	Intensity	90	90

Analyzer make	Termo 43i	Analyzer serial #	1008841397

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6000	0.0	0.0	0.3	----
as found span	6000	88.2	690.9	692.1	0.998
calibrator zero	6000	0.0	0.0	0.1	----
high point	6000	88.2	690.9	691.3	0.999
second point	6000	44.1	345.5	343.6	1.005
third point	6000	22.1	173.1	170.5	1.015
as left zero	6000	0.0	0.0	0.1	----
as left span	6000	88.2	690.9	684.8	1.009
				Average Correction Factor	1.007

Corrected As found	691.7	Previous response	689.5	% change	-0.3%

Notes:

Sample inlet filter replaced after as founds. Slight adjustment to zero

Calibration Performed By: Ryan Power

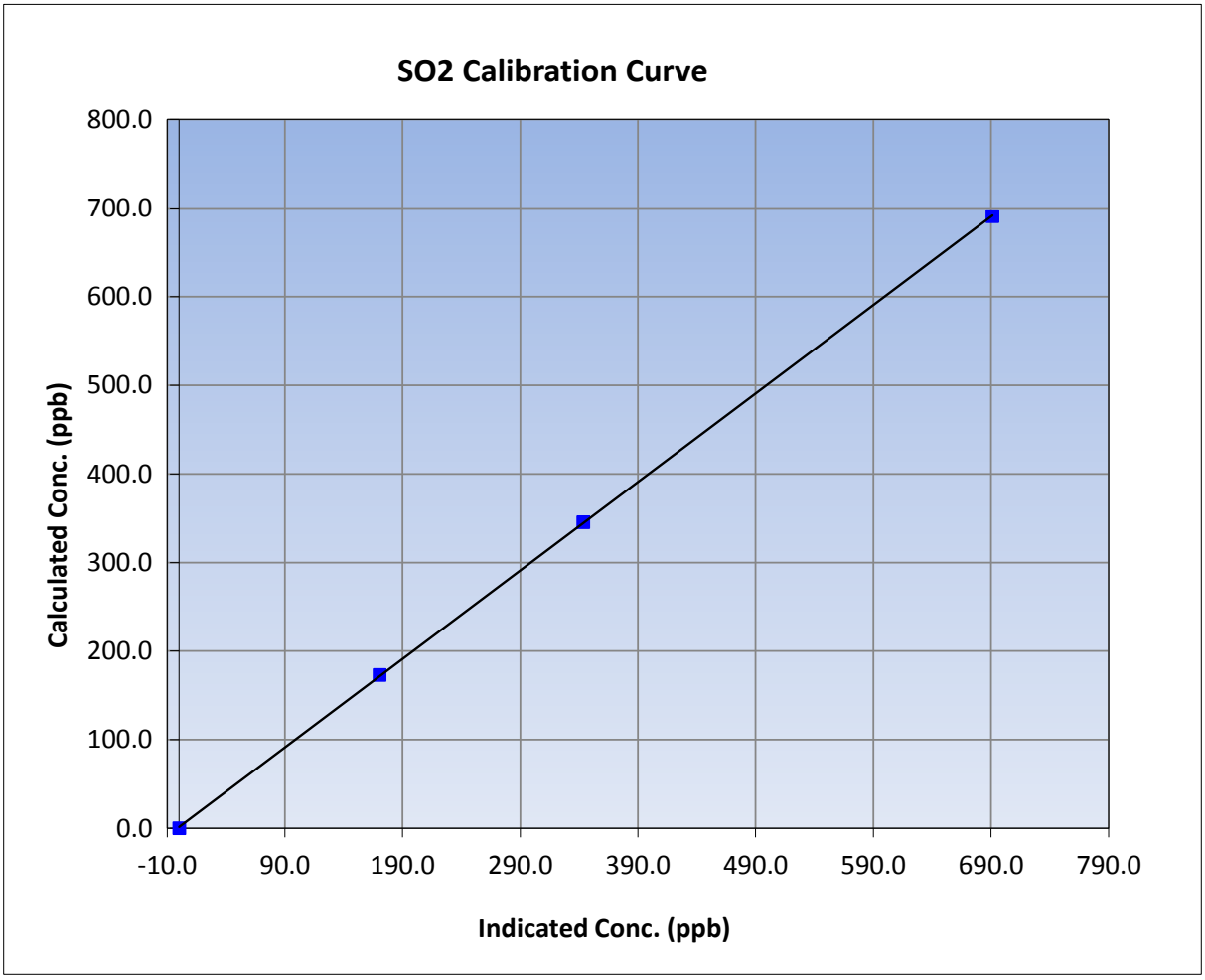
Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

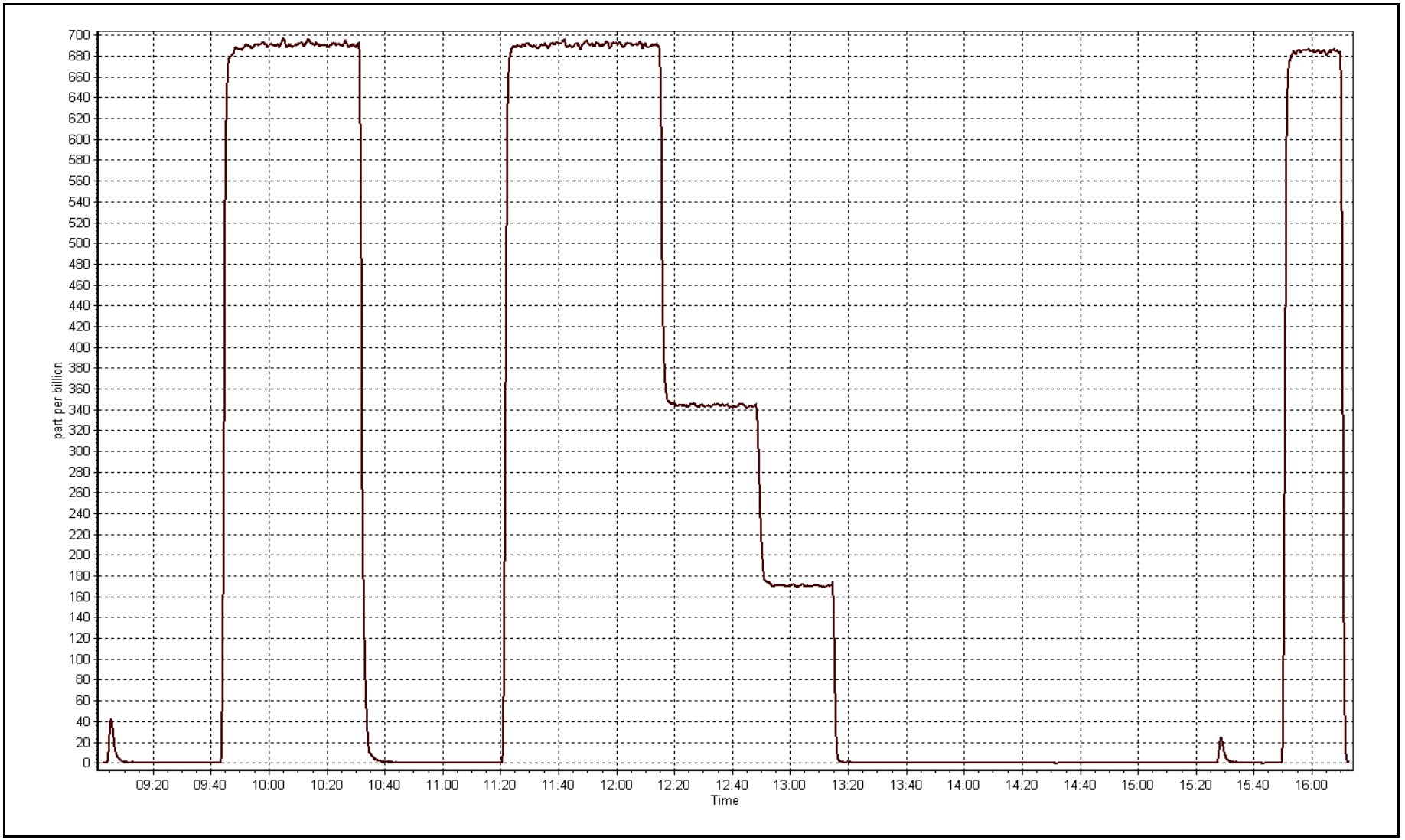
Calibration Date	August 12, 2015	Previous Calibration	July 8, 2015
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	9:05	End Time (MST)	16:13
Analyzer make	Termo 43i	Analyzer serial #	1008841397

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	0.999977
690.9	691.3	0.9995		
345.5	343.6	1.0053	Slope	0.998593
173.1	170.5	1.0153		
			Intercept	1.403123



SO2 Calibration Plot Date: August 12, 2015



Wood Buffalo Environmental Association
TRS Calibration Report

Station Information

Calibration Date	August 7, 2015	Last Calibration	July 15, 2015
Station Name	Patricia McInnes	Station Number	AMS 6
Reason:	Routine		
Start Time (MST)	10:30	End Time (MST)	14:05
Gas Cert Reference	ALM009562	Station temp.	22 Deg C
Cal Gas Concentration	4.84 ppm	Cal Gas Exp Date	05/02/2017
Calibrator Make/Model	Sabio 4010	Serial Number	14300410
Dil air Make/Model	API T701	Serial Number	60
DACS make/model	Campbell Scientific CR3000	DACS serial No.	9036
SO2 gas concentration	47 ppm	SO2 gas cert/exp	SA130110A December-12-16

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-720	-720
Analyzer IP address	192.168.1.42		Lamp voltage	980	985
Calculated slope	1.004959	0.997054	Chamber temp	45	45
Calculated intercept	-0.103104	-0.196881	Pressure	681.8	683.3
Analyzer Background	2.48	2.57	Flow	0.431	0.433
Analyzer Coefficient	1.367	1.409	Intensity	91	90
			Converter temp.	800	800

Analyzer make/model	Thermo 43i-TLE	Analyzer serial #	1218153358
Converter make/model	CDN-101	Converter serial #	520

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6000	0.0	0.0	0.0	----
as found span	6000	86.8	70.0	66.5	1.053
SO2 scrubber check	6000	22.1	173.1	1.4	----
calibrator zero	6000	0.0	0.0	0.0	----
high point	6000	86.8	70.0	70.2	0.997
second point	6000	43.4	35.0	35.7	0.980
third point	6000	22.3	18.0	18.2	0.988
as left zero	6000	0.0	0.0	0.6	----
as left span	6000	86.8	70.0	70.1	0.999
				Average Correction Factor	0.989

Corrected As found	66.5	Previous response	69.8	% change	4.9%

Notes:

Filter changed after As Founds. Scrubber check after the third point.

Calibration Performed By: Ryan Power

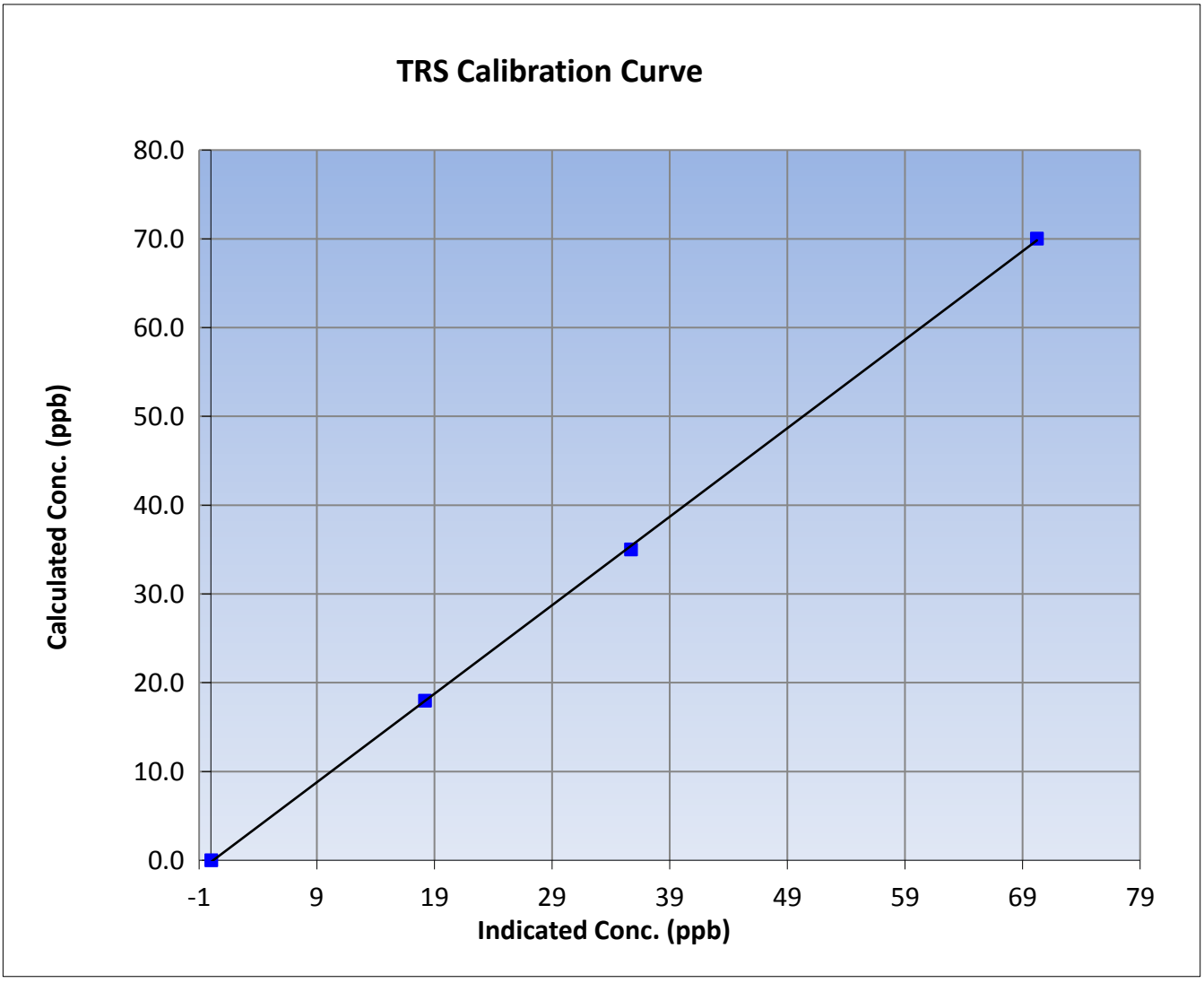
Wood Buffalo Environmental Association
TRS Calibration Report

Station Information

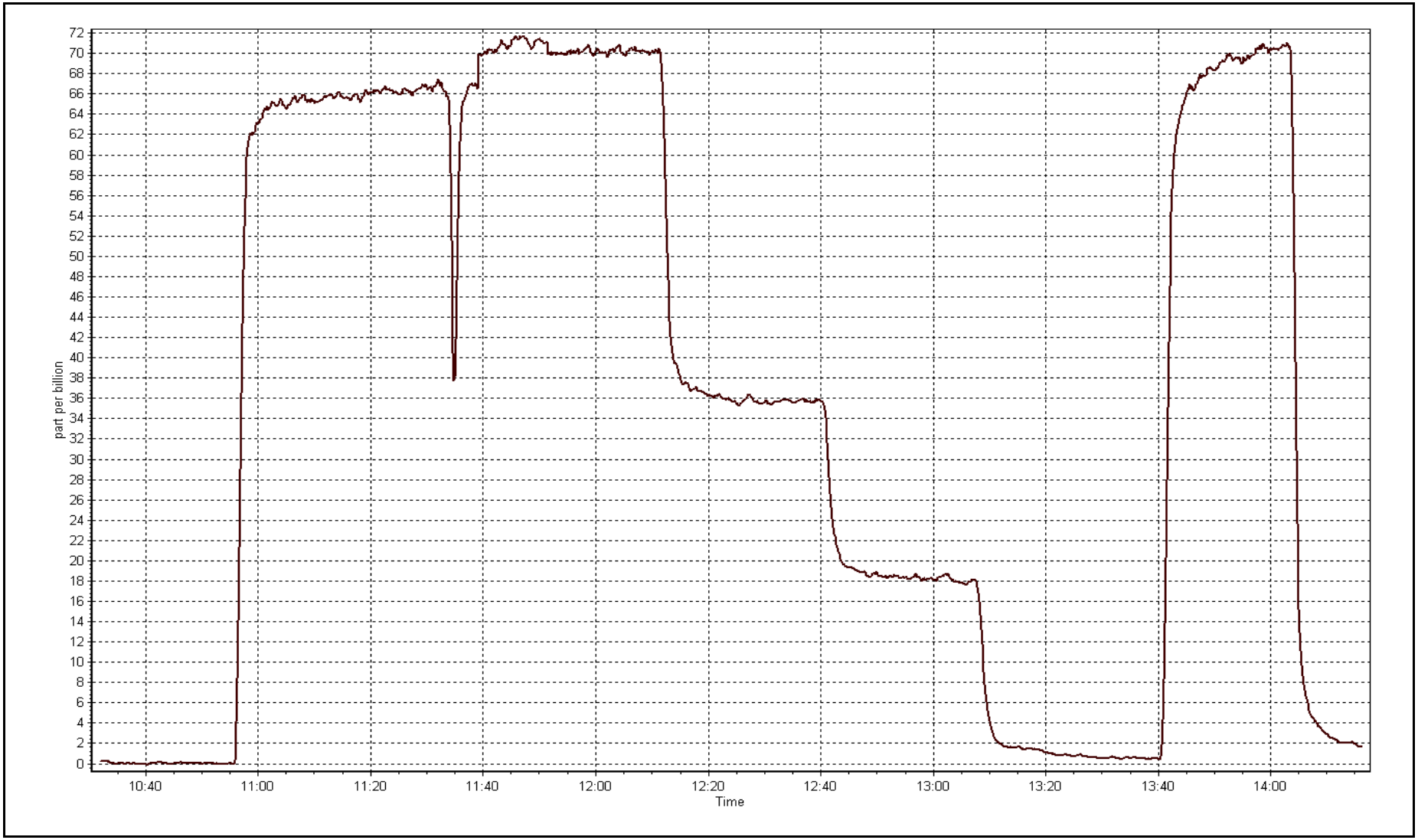
Calibration Date	August 7, 2015	Previous Calibration	July 15, 2015
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	10:30	End Time (MST)	14:05
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1218153358

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999916
70.0	70.2	0.9970		
35.0	35.7	0.9804	Slope	0.997054
18.0	18.2	0.9884		
			Intercept	-0.196881



TRS Calibration Plot Date: August 7, 2015



Wood Buffalo Environmental Association
THC / NMHC Calibration Report

W B E A

Station Information

Calibration Date	August-12-15	Last Calibration	July-08-15
Station Name	Patricia McInnes	Station Number	AMS 6

Reason: Routine

Start Time (MST)	9:05	End Time (MST)	16:12
Gas Cert Reference	SA130110A	Cal Gas Expiry Date	December-12-16
CH4 Cal Gas Conc.	512.0 ppm	CH4 Equiv Conc.	1092.3 ppm
C3H8 Cal Gas Conc.	211.0 ppm	Station temp.	22 Deg C
Calibrator Model	Sabio 4010	Serial Number	14300410
ZAG make/model	Teledyne API 701	Serial Number	60
DACS make/model	Campbell Scientific CR3000	Serial Number	9036

Analyzer Information

	Before	*After*		*Before*	*After*
THC Range (ppm)	0 - 50 ppm		Column Temp	75.3	75.1
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	175.1	175.1
Analyzer IP address	192.168.1.55		Flame Temp	405.0	405.0
THC Calc slope	0.994968	0.995117	Carrier Pressure	34.5	34.5
THC Calc intercept	0.039645	0.033625	Fuel Pressure	42.3	42.3
NMHC Calc slope	0.994118	0.994118	Air Pressure	32.4	32.4
NMHC Calc intercept	0.019912	0.019912			

Analyzer make	Thermo 55i	Analyzer serial #	1331259521

THC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6000	0.0	0.00	0.00	----
as found span	6000	88.2	16.06	16.28	0.986
calibrator zero	6000	0.0	0.00	0.00	----
high point	6000	88.2	16.06	16.12	0.996
second point	6000	44.1	8.03	8.01	1.002
third point	6000	22.1	4.02	3.98	1.011
as left zero	6000	0.0	0.00	0.00	----
as left span	6000	88.2	16.06	16.07	0.999
				Average Correction Factor	1.003

Corrected As found	16.28	Previous response	16.10	% change	-1.1%

Notes:

Inlet filter replaced after as founds. Span adjusted

Calibration Performed By: Ryan Power

Wood Buffalo Environmental Association

THC / NMHC Calibration Report

NMHC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6000	0	0.00	0.00	----
as found span	6000	88.2	8.53	8.72	0.978
calibrator zero	6000	0.0	0.00	0.00	----
high point	6000	88.2	8.53	8.57	0.995
second point	6000	44.1	4.26	4.26	1.001
third point	6000	22.1	2.14	2.11	1.013
as left zero	6000	0.0	0.00	0.00	----
as left span	6000	88.2	8.53	8.50	1.003
				Average Correction Factor	1.003

Corrected As found	8.72	Previous response	8.56	% change	-1.8%

CH4 Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6000	0	0.00	0.00	----
as found span	6000	88.2	7.53	7.56	0.996
calibrator zero	6000	0.0	0.00	0.00	----
high point	6000	88.2	7.53	7.55	0.997
second point	6000	44.1	3.76	3.76	1.001
third point	6000	22.1	1.89	1.87	1.008
as left zero	6000	0.0	0.00	0.00	----
as left span	6000	88.2	7.53	7.57	0.994
				Average Correction Factor	1.002

Corrected As found	7.56	Previous response	7.54	% change	-0.3%

Wood Buffalo Environmental Association

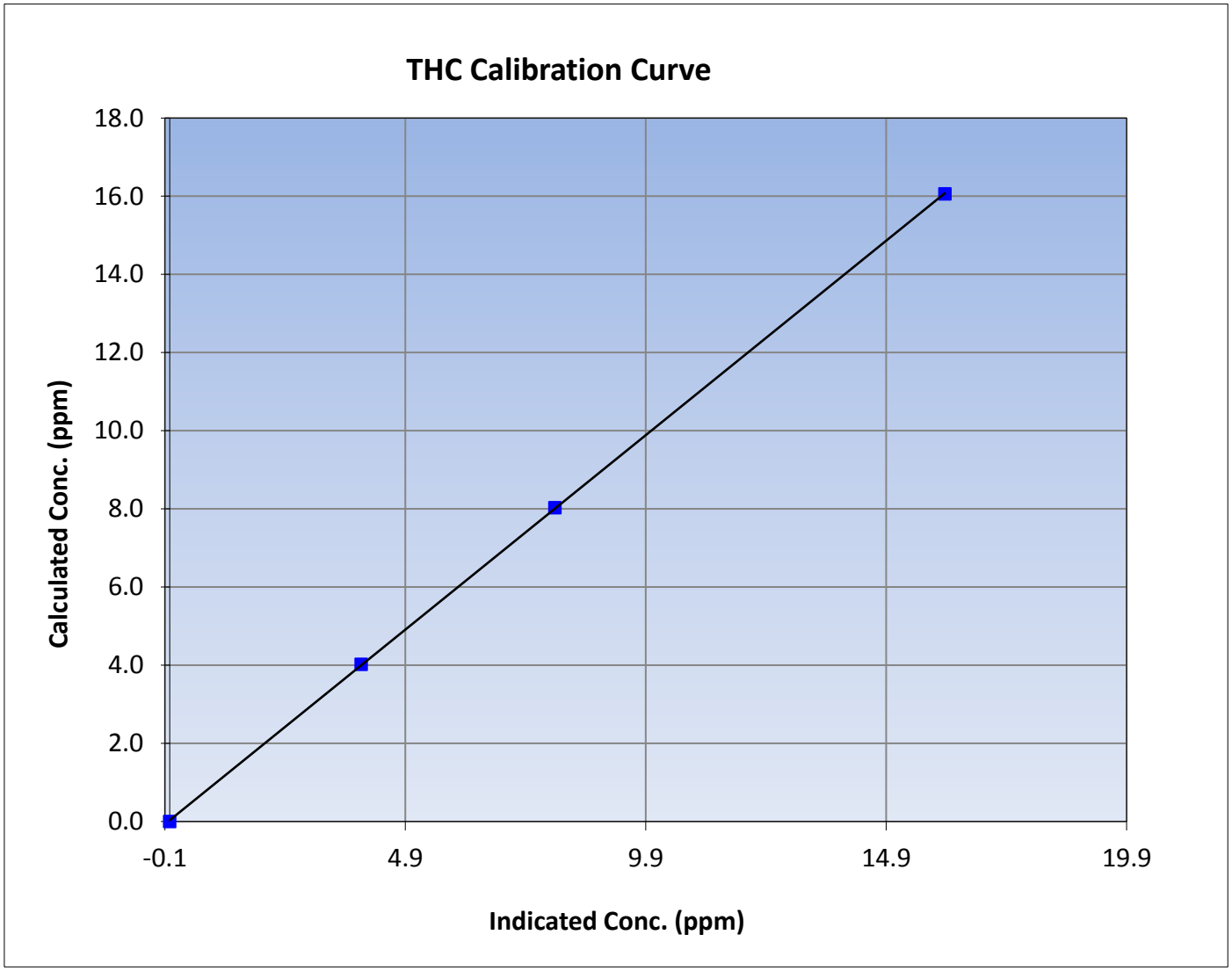
THC Calibration Summary

Station Information

Calibration Date	August 12, 2015	Previous Calibration	July 8, 2015
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	9:05	End Time (MST)	16:12
Analyzer make	Thermo 55i	Analyzer serial #	1331259521

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999980
16.06	16.12	0.9960		
8.03	8.01	1.0023	Slope	0.995117
4.02	3.98	1.0108		
			Intercept	0.033625



Wood Buffalo Environmental Association

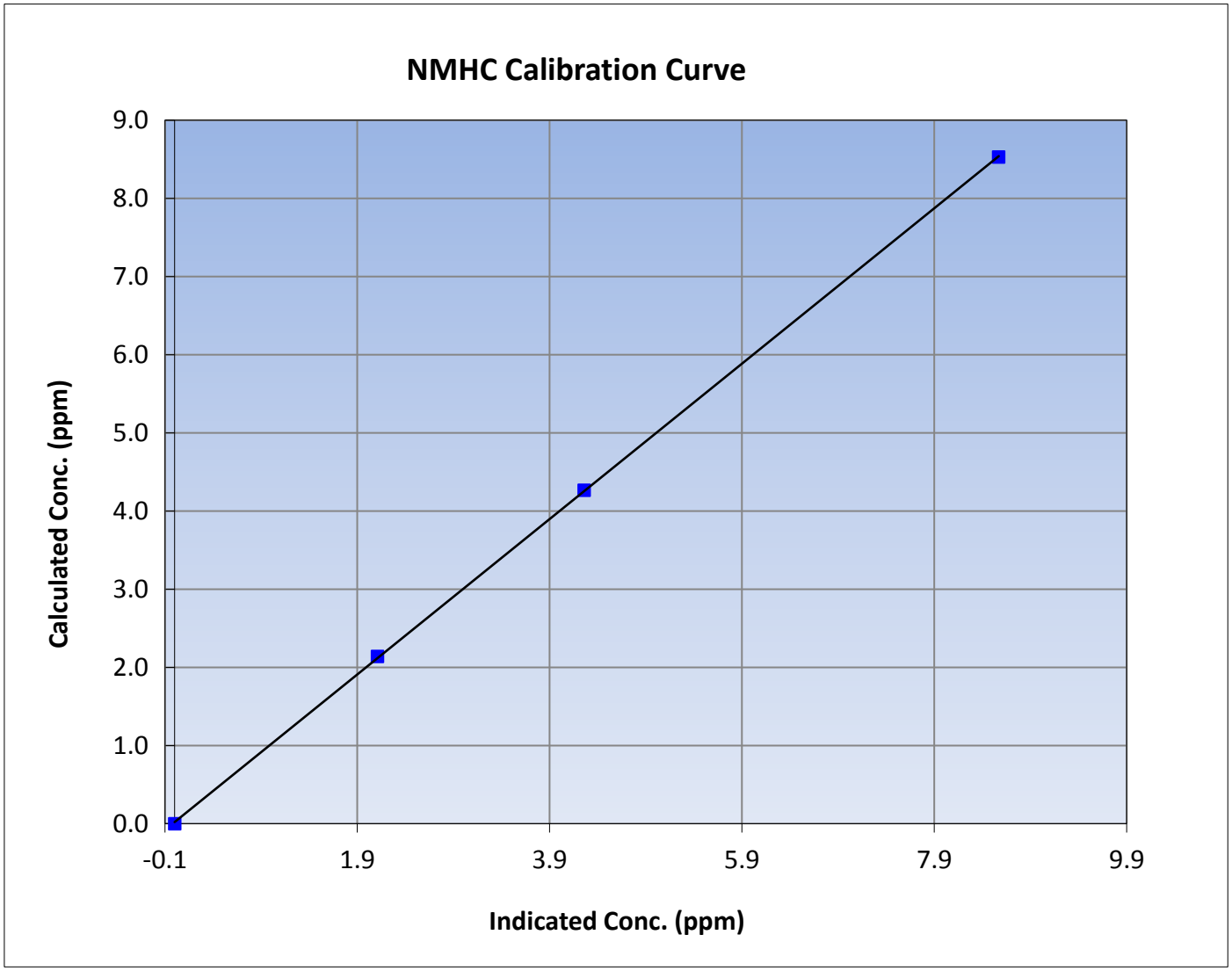
NMHC Calibration Summary

Station Information

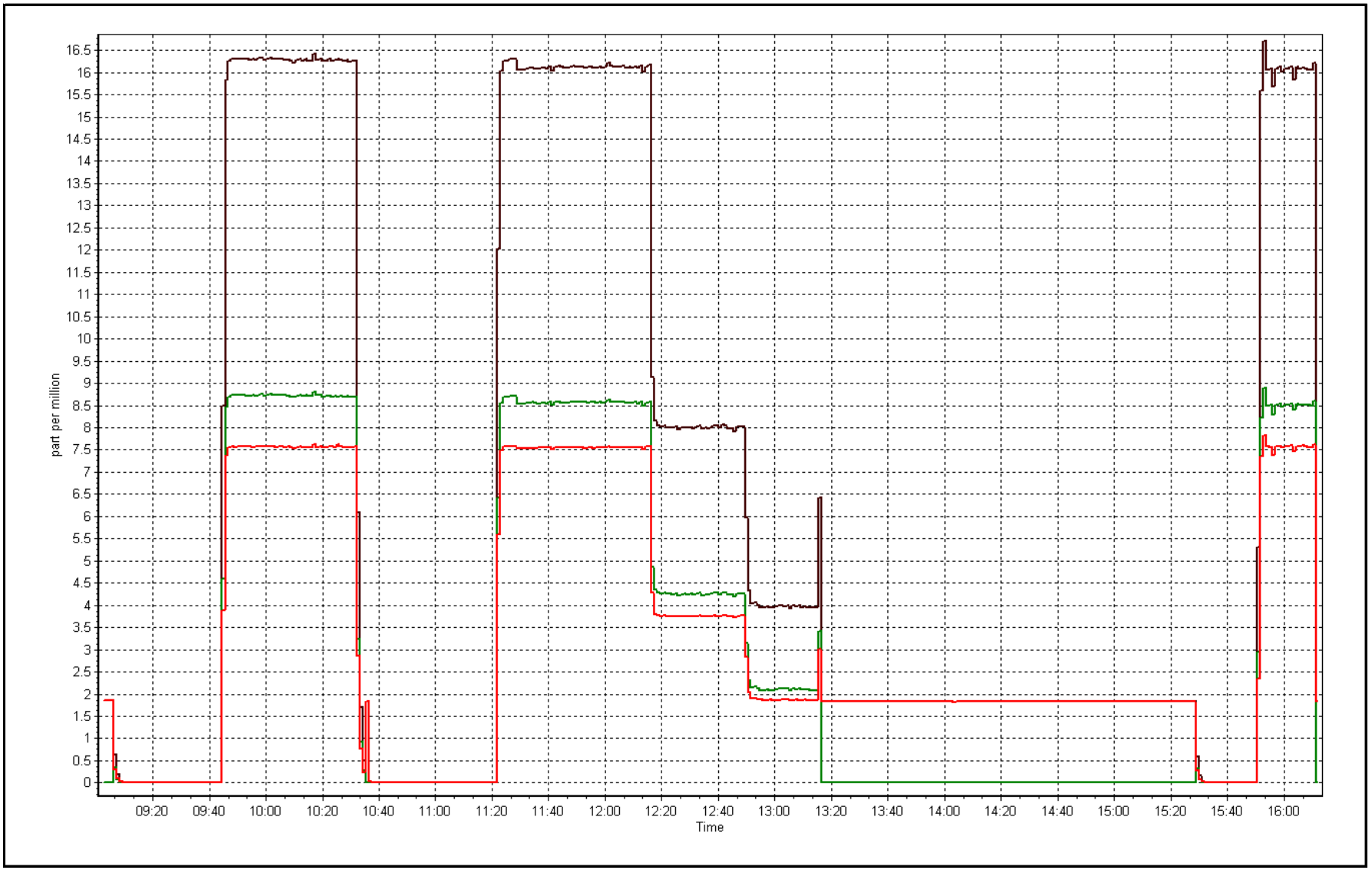
Calibration Date	August 12, 2015	Previous Calibration	July 8, 2015
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	9:05	End Time (MST)	16:12
Analyzer make	Thermo 55i	Analyzer serial #	1331259521

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999975
8.53	8.57	0.9953		
4.26	4.26	1.0011	Slope	0.994118
2.14	2.11	1.0129		
			Intercept	0.019912



THC / NMHC Calibration Plot Date: August 12, 2015



Wood Buffalo Environmental Association
O_3 Calibration Report

Station Information

Calibration Date	August 13, 2015	Previous Calibration	July 13, 2015
Station Name	Patricia McInnes	Station Number	AMS 6
Reason:	Routine		
Start Time (MST)	8:05	End Time (MST)	11:44
NO2 GPT Ref date	August-12-15	Transfer Standard	NO2
		Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	14300410
ZAG make/model	Teledyne API 701	Serial Number	60
DACS make/model	Campbell Scientific CR3000	Serial Number	9036

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 500 ppb		Bench temp.	27.7	24.8
Analyzer IP address	192.168.1.48		Lamp temp.	53.5	53.5
Calculated slope	1.007251	0.999466	Pressure	660.5	662.0
Calculated intercept	-0.859818	-0.468291	Flow cell A	0.703	0.705
Analyzer Background	-1.5	-1.5	Flow cell B	0.725	0.725
Analyzer Coefficient	0.925	0.915	Cell A Intensity	80750	80212
			Cell B Intensity	75450	75180

Analyzer make	Thermo 49i	Analyzer serial #	1300156234

Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator Lamp Intensity (mA)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6000	0.00	0.0	-0.1	----
as found span	6000	0.783	349.8	354.6	0.986
calibrator zero	6000	0.00	0.0	0.5	----
high point	6000	0.783	349.8	350.8	0.997
second point	6000	0.522	221.3	221.2	1.001
third point	6000	0.261	94.7	95.5	0.992
as left zero	6000	0.00	0.0	0.1	----
as left span	6000	0.783	349.8	348.3	1.004
				Average Correction Factor	0.996

Corrected As found	354.7	Previous response	348.1	% change	-1.8%

Notes:

Filter changed after As Founds. Span adjusted

Calibration Performed By: Ryan Power

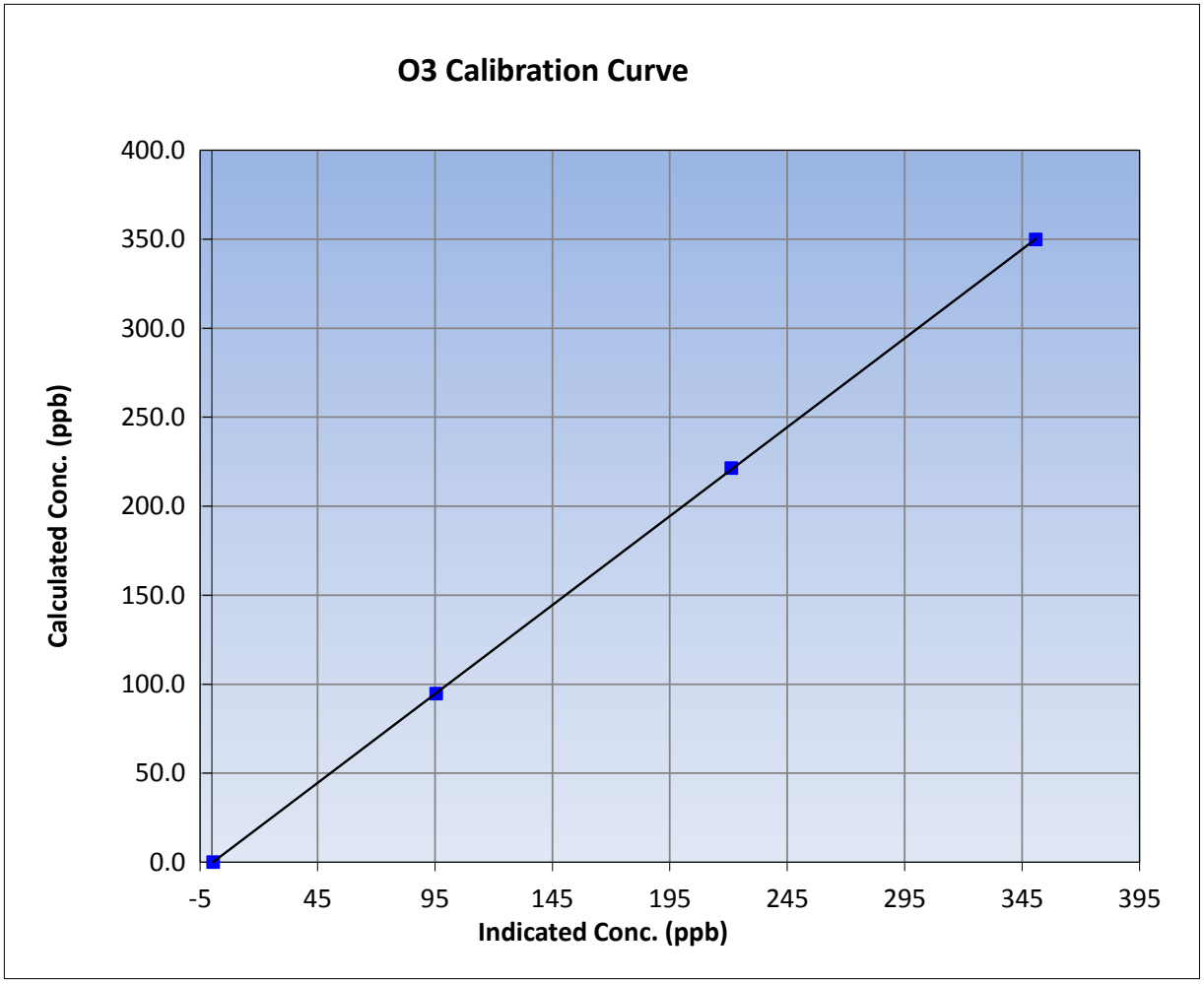
Wood Buffalo Environmental Association
O3 Calibration Report

Station Information

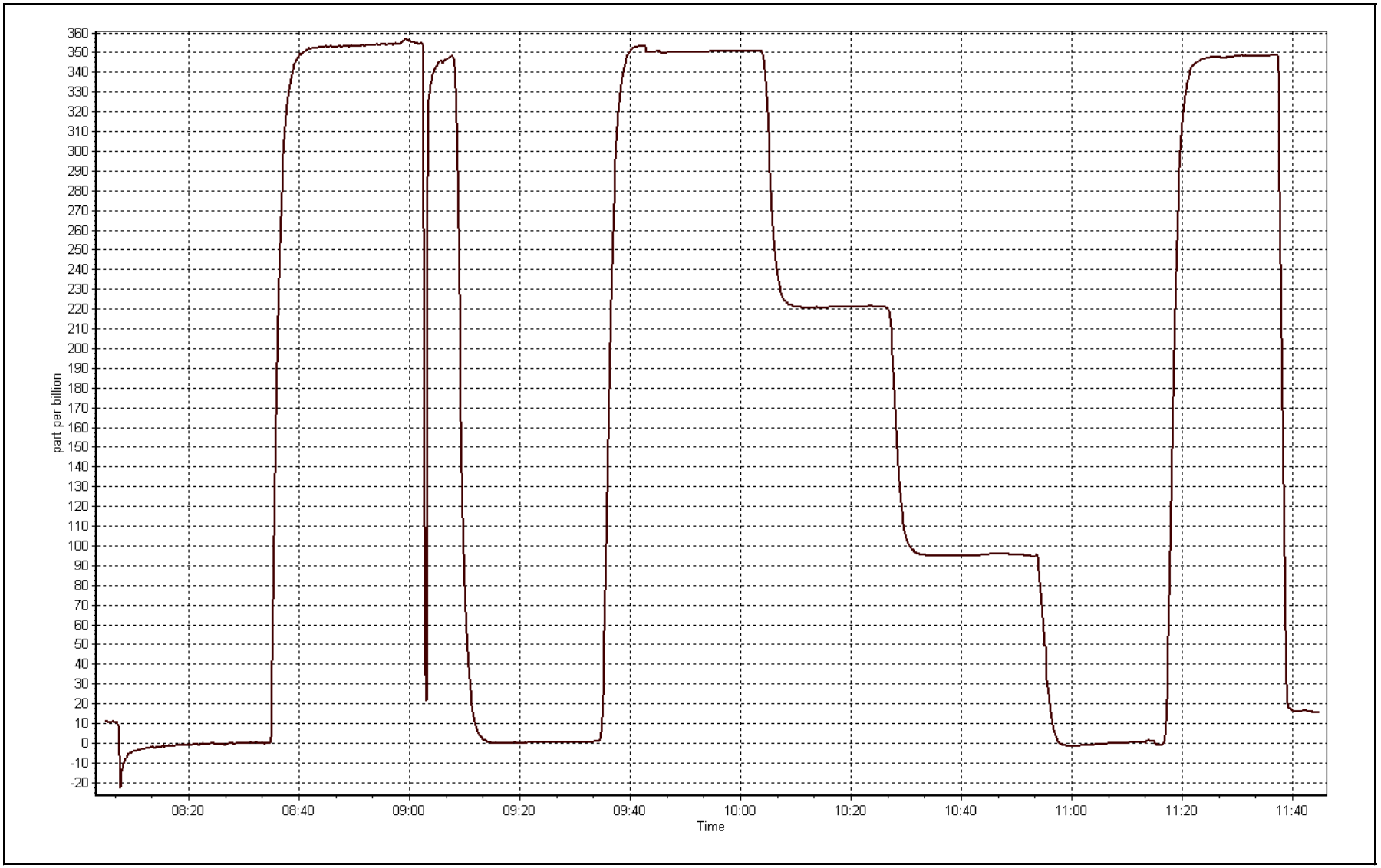
Calibration Date	August-13-15	Previous Calibration	July 13, 2015
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	8:05	End Time (MST)	11:44
Analyzer make	Thermo 49i	Analyzer serial #	1300156234

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.5	----	Correlation Coefficient	0.999990
349.8	350.8	0.9971		
221.3	221.2	1.0005	Slope	0.999466
94.7	95.5	0.9918		
			Intercept	-0.468291



O3 Calibration Plot Date: August 13, 2015



Wood Buffalo Environmental Association
NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	August 12, 2015		Previous Calibration	July 8, 2015	
Station Name	Patricia McInnes		Station Number	AMS 6	
Reason:	Routine				
Start Time (MST)	9:05		End Time (MST)	16:13	
NO Cal Gas Conc	54.4	ppm	Gas Cert Reference	SA130110A	
NOx Cal Gas Conc	54.4	ppm	Cal Gas Expiry Date	12/12/2016	
Calibrator	Sabio 4010		Serial Number	14300410	
Zero air Generator	Teledyne API T701		Serial Number	60	

DACS Information

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

Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.999149	1.001944	0.996724
	Data Offset	0.648300	1.126563	-0.737203
Current Calibration	Data Slope	0.997678	0.998663	0.996554
	Data Offset	1.294967	2.091447	0.015480

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1218153460

Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
NO coefficient	0.938		0.932	
NOX coefficient	1.000		1.000	
NO2 coefficient	1.000		1.000	
NO bkgrnd	2.3		2.3	
NOX bkgrnd	2.9		2.6	
Chamber Temp	50.4	Deg C	50.7	Deg C
Moly Temp	325.3	Deg C	322.4	Deg C
PMT voltage	-761.5	V	-761.5	V
PMT Temp	-3	Deg C	-3	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	162	mmHg	165.5	mmHg
R Cell Press Nox	162	mmHg	165.5	mmHg
NO sample flow	0.842	lpm	0.864	lpm
Nox sample Flow	0.842	lpm	0.864	lpm

Notes:

Sample inlet fitler replaced after as founds. Small adjustments to zero and span

Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: August 12, 2015 Station Number: AMS 6

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	6000	0.0	0.0	0.0	0.0	-0.2	0.0	-0.2	----	----
as found span	6000	88.2	799.7	799.7	0.0	808.7	806.7	2.0	0.9889	0.9913
calibrator zero	6000	0.0	0.0	0.0	0.0	0.1	0.1	0.0	----	----
high point	6000	88.2	799.7	799.7	0.0	800.9	799.8	1.1	0.9985	0.9999
second point	6000	44.1	399.8	399.8	0.0	399.0	397.1	1.9	1.0021	1.0070
third point	6000	22.1	200.4	200.4	0.0	198.0	196.5	1.5	1.0120	1.0198
as left zero	6000	0.0	0.0	0.0	0.0	0.4	0.2	0.2	----	----
as left span	6000	88.2	799.7	441.9	357.8	793.5	446.9	346.6	1.0078	0.9888
								Average Correction Factor	1.0042	1.0089

Corrcted As found NO_X= 808.9 NO= 806.7 Percent Change NO_X= -1.1% NO= -1.2%

Previous Response NO_X= 799.7 NO= 797.0

GPT Calibration Data

Dilution Flow 6000 ccm Source Gas Flow 88.20 ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
Cal zero			0.0			0.0			N/A	
1st NO2 (300)	----	441.9	349.8	793.1	441.9	351.1	0.9937	1.0000	0.9963	100.4%
2nd NO2 (200)	----	570.5	221.3	792.3	570.5	221.9	0.9947	1.0000	0.9974	100.3%
3rd NO2 (100)	----	697.1	94.7	792.1	697.1	95.0	0.9950	1.0000	0.9964	100.4%
4th NO2 (0)	791.8	----	1.7	793.5	791.8	1.7	0.9932	1.0000	N/A	----
					Average Correction Factor		0.9941	1.0000	0.9967	100.3%

Calibration Performed By: Ryan Power

Wood Buffalo Environmental Association

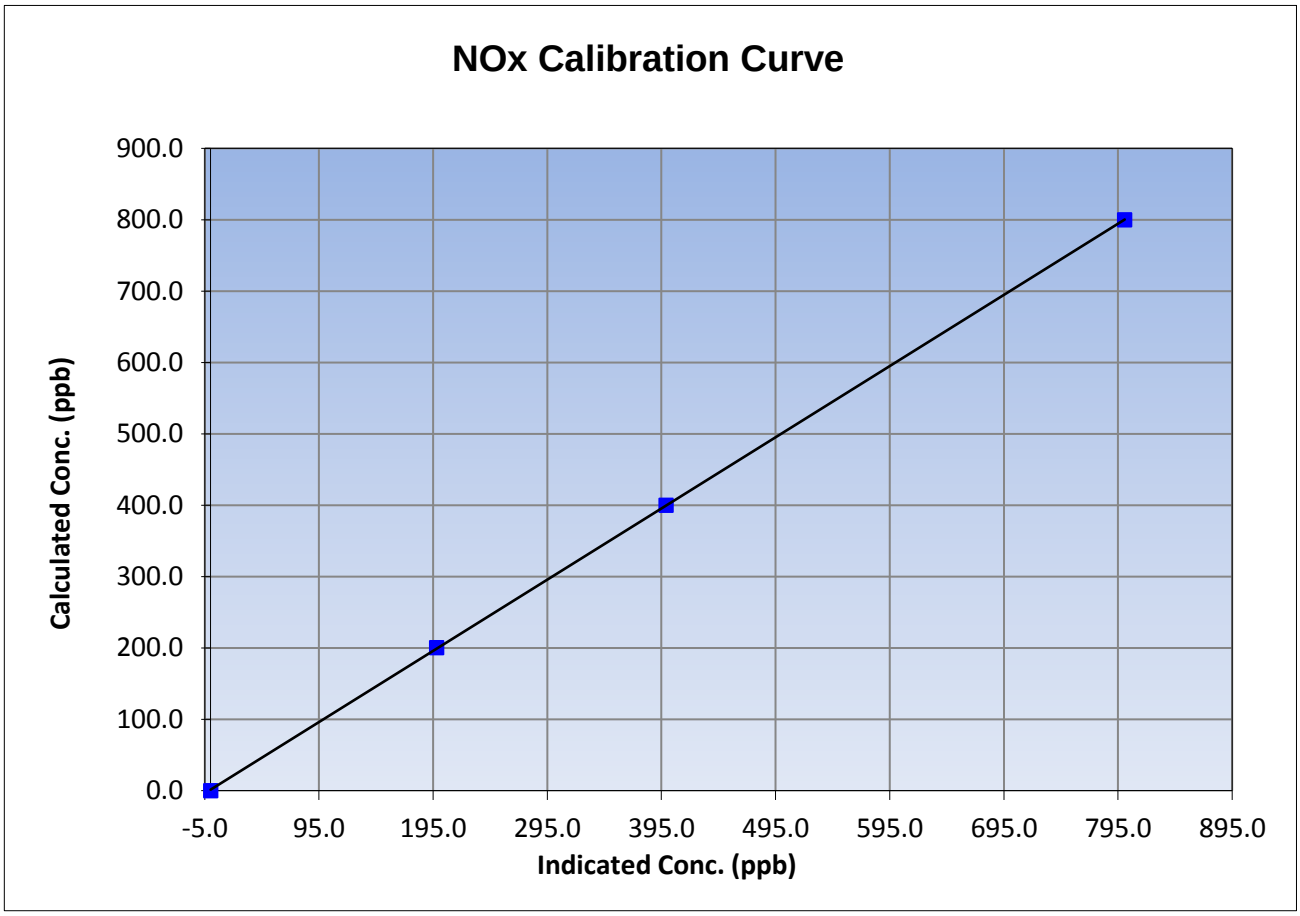
NO_X Calibration Summary

Station Information

Calibration Date	August 12, 2015	Previous Calibration	July 8, 2015
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	9:05	End Time (MST)	16:13
Analyzer make	Thermo 42i	Analyzer serial #	1218153460

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	0.999986
799.7	800.9	0.9985		
399.8	399.0	1.0021	Slope	0.997678
200.4	198.0	1.0120		
			Intercept	1.294967



Wood Buffalo Environmental Association

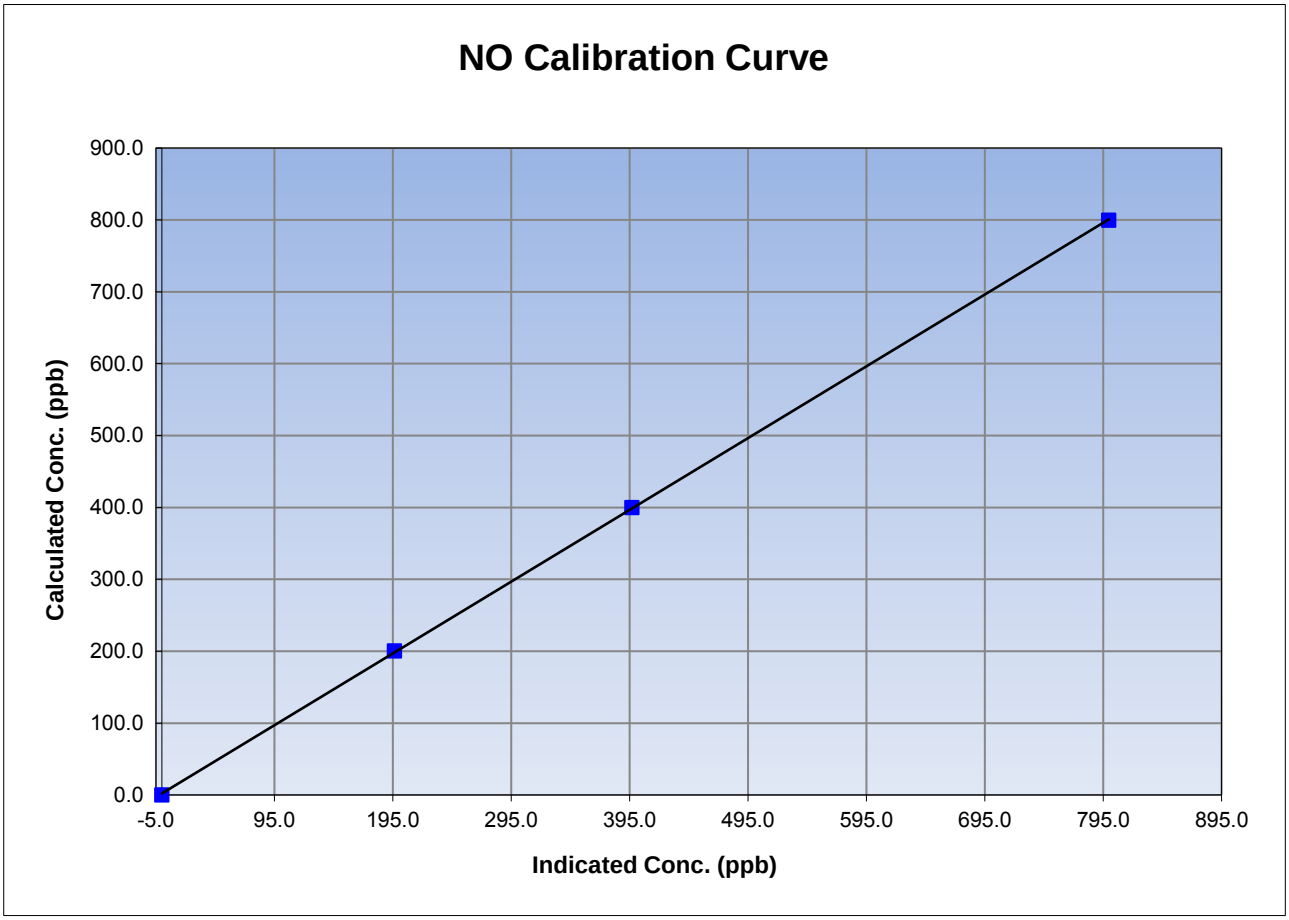
NO Calibration Summary

Station Information

Calibration Date	August 12, 2015	Previous Calibration	July 8, 2015
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	9:05	End Time (MST)	16:13
Analyzer make	Thermo 42i	Analyzer serial #	1218153460

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	N/A	Correlation Coefficient	0.999967
799.7	799.8	0.9999		
399.8	397.1	1.0070	Slope	0.998663
200.4	196.5	1.0198		
			Intercept	2.091447



Wood Buffalo Environmental Association

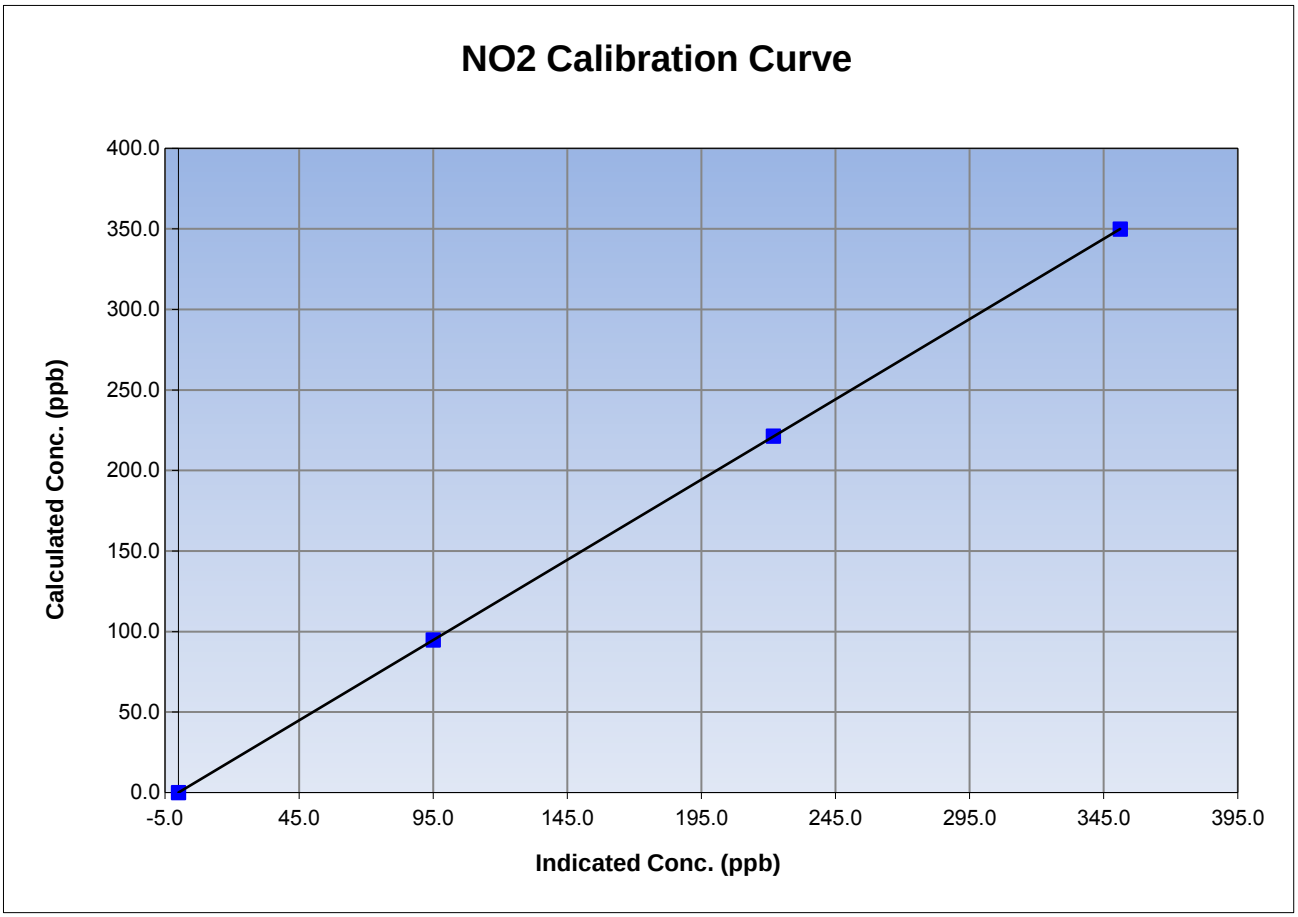
NO_2 Calibration Summary

Station Information

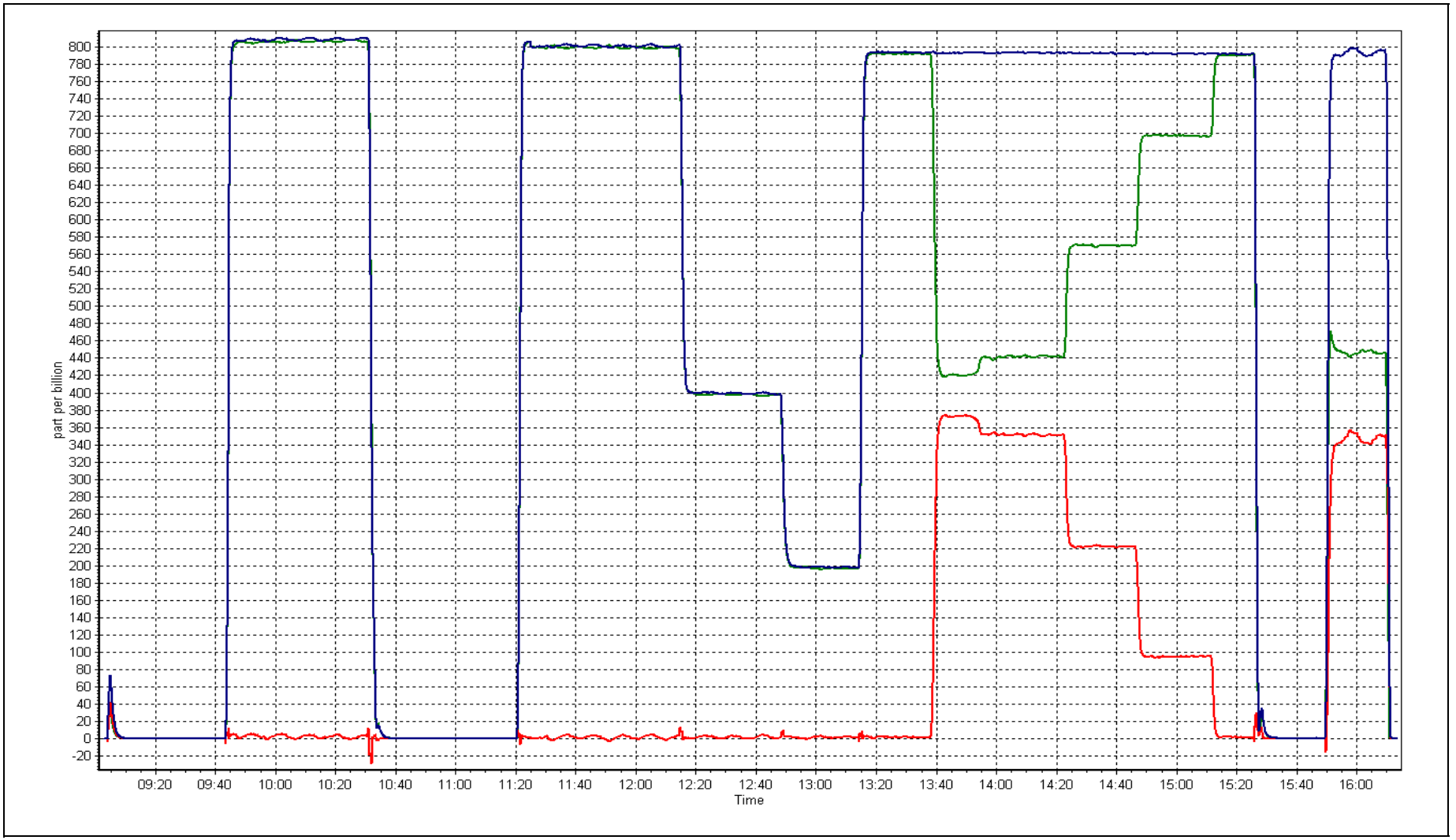
Calibration Date	August 12, 2015	Previous Calibration	July 8, 2015
Station Number	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	9:05	End Time (MST)	16:13
Analyzer make	Thermo 42i	Analyzer serial #	1218153460

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999999
349.8	351.1	0.9963		
221.3	221.9	0.9974	Slope	0.996554
94.7	95.0	0.9964		
			Intercept	0.015480



NOx, NO & NO_2 Calibration Plot Date: August 12, 2015



Wood Buffalo Environmental Association
N_t-NO_X-NH_3 Calibration Report

Station Information

Station Name	Patricia McInnis	Station Number	AMS 6
NOX Calibration Date	August 12, 2015	NOX Previous Cal Date	July 14, 2015
NH3 Calibration Date	August 13, 2015	NH3 Previous Cal Date	July 14, 2015

Reason: Routine

Start Time (MST)	11:40		End Time (MST)	16:00	
Barometric Pressure	720	mmHg	Station Temperature	21.0	Deg C
Calibrator	Sabio 4010		Serial Number	14300410	
NH3 Cal Gas Conc	75.1	ppm	NH3 Expiry Date / SN	August 4, 2015	SGAL-3617
NOx Cal Gas Conc	54.4	ppm	NO Expiry Date / SN	December 12, 2016	SA130110A
NO Cal Gas Conc	54.4	ppm			

DACS Information

DACS make & model: Campbell Scientific CR3000 — DACS serial No.: 9036

Parameter		NH3	Nt	NOx	NO	NO2
Cal Stats As Found	Data Slope	0.995123	0.983724	0.995479	0.994494	1.027233
	Data Offset	2.169513	2.177552	1.548379	2.618854	-0.822596
Cal Stats After	Data Slope	0.994575	0.982417	0.997313	0.997547	1.013295
	Data Offset	-1.661543	-2.137959	1.193183	2.253364	-0.100392
IP address		192.168.1.17				

Analyzer Information

Analyzer make/model	API T201	Analyzer serial #	215
Converter	API 501 NH#	Converter serial #	217

Test Point	before		after	
NH3 Conc range	2500	ppb	2500	ppb
NOX Conc range	1000	ppb	1000	ppb
NO BKG	-0.1	ppb	-1.2	ppb
NOx BKG	0.2	ppb	-0.6	ppb
Nt BKG	2.1		-0.4	
NO coefficient	0.969		0.970	
NO2 coefficient	1.000	ppb	1.000	ppb
NOx coefficient	0.977		0.981	
NH3 coefficient	NA		NA	
Nt coefficient	0.953		0.970	
NH3 conv temp	825	DegC	825	Deg C
Chamber Temp	50.0	Deg C	50.0	Deg C
Moly Temp	316.1	Deg C	315.9	Deg C
PMT Temp	7.0	Deg C	7.0	Deg C
O3 flow	85.0	ccm	85.0	ccm
R Cell Press	4.5	mmHg	4.4	mmHg
HVPS	693.0	v	693.0	v
Sample Flow 1 NO	547.0	ccm	544.0	ccm
Sample Flow 2 Nox	546.0	ccm	544.0	ccm
Sample Flow 3 Nt	546.0	ccm	544.0	ccm

Filter changed after As Founds. Nt and Nox with zero and span adjustments. NH3 span with a small adjustment

Wood Buffalo Environmental Association

$Nt\text{-}NO_x\text{-}NH_3$ Calibration Report

Station Information

Calibration Date: August 13, 2015 Station Number: AMS 6

NH3 Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated Nt conc (ppb)	Calculated NOx conc (ppb)	Calculated NH3 conc (ppb)	Indicated Nt conc (ppb)	Indicated NOx conc (ppb)	Indicated NH3 conc (ppb)	Nt Correction factor	NH3 Correction factor
as found zero	6000	0.0	0.0	0.0	0.0	0.6	0.5	0.1	----	----
as found NO	6000	88.2	799.7	799.7	----	797.0	796.0	1.0	1.003	----
calibrator zero	6000	0.0	0.0	0.0	0.0	0.6	0.5	0.1	----	----
high NO point	6000	88.2	799.7	799.7	----	799.3	801.4	-2.1	1.000	----
NO/O3 point	6000	88.2	799.7	799.7	----	804.0	802.1	2.0	0.995	----
as found NH3	3500	93.2	1999.8	NA	1999.8	2041.0	25.1	2015.9	0.980	0.992
first NH3	3500	93.2	1999.8	NA	1999.8	2035.4	25.4	2010.0	0.983	0.995
second NH3	3500	46.6	999.9	NA	999.9	1025.4	13.0	1012.4	0.975	0.988
third NH3	3500	23.3	500.0	NA	500.0	509.6	6.6	502.9	0.981	0.994
								Average Correction Factor	0.9975	0.9922

NH3 Corrected As Found	NH3 = ##### ppb	Previous Response	NH3 = ##### ppb	NH3 percent change	0.4%
Nt Corrected As Found	NH3 = 796.4 ppb	Previous Response	Nt = 807.4 ppb	Nt percent change	1.4%
NOx Corrected As Found	NH3 = 795.5 ppb	Previous Response	NOx = 797.5 ppb	NOx percent change	0.3%

Wood Buffalo Environmental Association

$NO_X(NH_3)$ Calibration Report

Station Information

Calibration Date: August 12, 2015 Station Number: AMS 6

NOX / NO / Nt Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated Nt conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated Nt conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	6000	0.0	0.0	0.0	0.0	0.1	0.1	-0.6	----	----
as found span	6000	88.2	799.7	799.7	799.7	792.4	795.0	776.3	1.0093	1.0060
calibrator zero	6000	0.0	0.0	0.0	0.0	0.5	0.6	0.6	----	----
high point	6000	88.2	799.7	799.7	799.7	801.4	800.5	799.3	0.9979	0.9990
second point	6000	44.1	399.8	399.8	399.8	399.2	398.1	397.4	1.0017	1.0045
third point	6000	22.1	200.4	200.4	200.4	197.8	195.2	195.1	1.0130	1.0263
calibrator zero										
as left zero										
as left span										
								Average Correction Factor	1.0042	1.0099

	Nt	NOX	NO	NO2
Corrected As found	776.96	795.48	794.81	352.21
Previous Response	810.7	801.8	801.5	344.3
Percent Change	4.3%	0.8%	0.8%	-2.2%

GPT Calibration Data

Dilution Flow 6000 ccm Source Gas Flow 88.20 ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
Cal zero			0.0			0.6			----	
1st NO2 (300)	----	444.6	356.9	797.4	444.6	352.8	1.0029	1.0000	1.0115	98.9%
2nd NO2 (200)	----	575.8	225.6	797.9	575.8	222.1	1.0022	1.0000	1.0160	98.4%
3rd NO2 (100)	----	703.6	97.9	799.9	703.6	96.3	0.9997	1.0000	1.0159	98.4%
4th NO2 (0)	801.5	----	0.6	802.1	801.5	0.6	0.9970	1.0000	----	----
					Average Correction Factor		1.0004	1.0000	1.0145	98.6%

Calibration Performed By: Ryan Power

Wood Buffalo Environmental Association

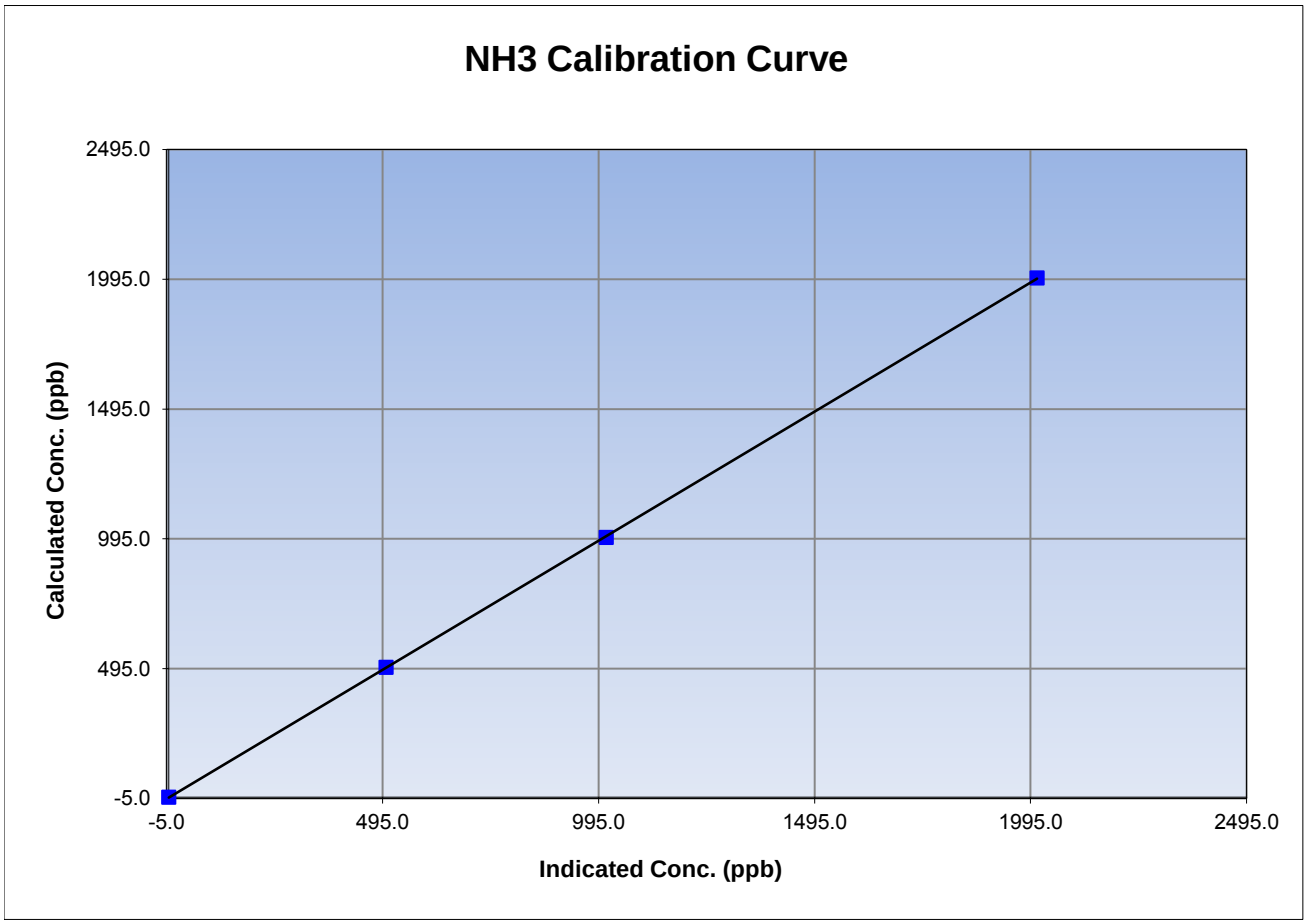
NH3 Calibration Summary

Station Information

Calibration Date	August 13, 2015	Previous Calibration	July 14, 2015
Station Name	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	11:40	End Time (MST)	16:00
Analyzer make	API T201	Analyzer serial #	215

NH3 Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	0.999982
1999.8	2010.0	0.9949		
999.9	1012.4	0.9877	Slope	0.994575
500.0	502.9	0.9941		
			Intercept	-1.661543



Wood Buffalo Environmental Association

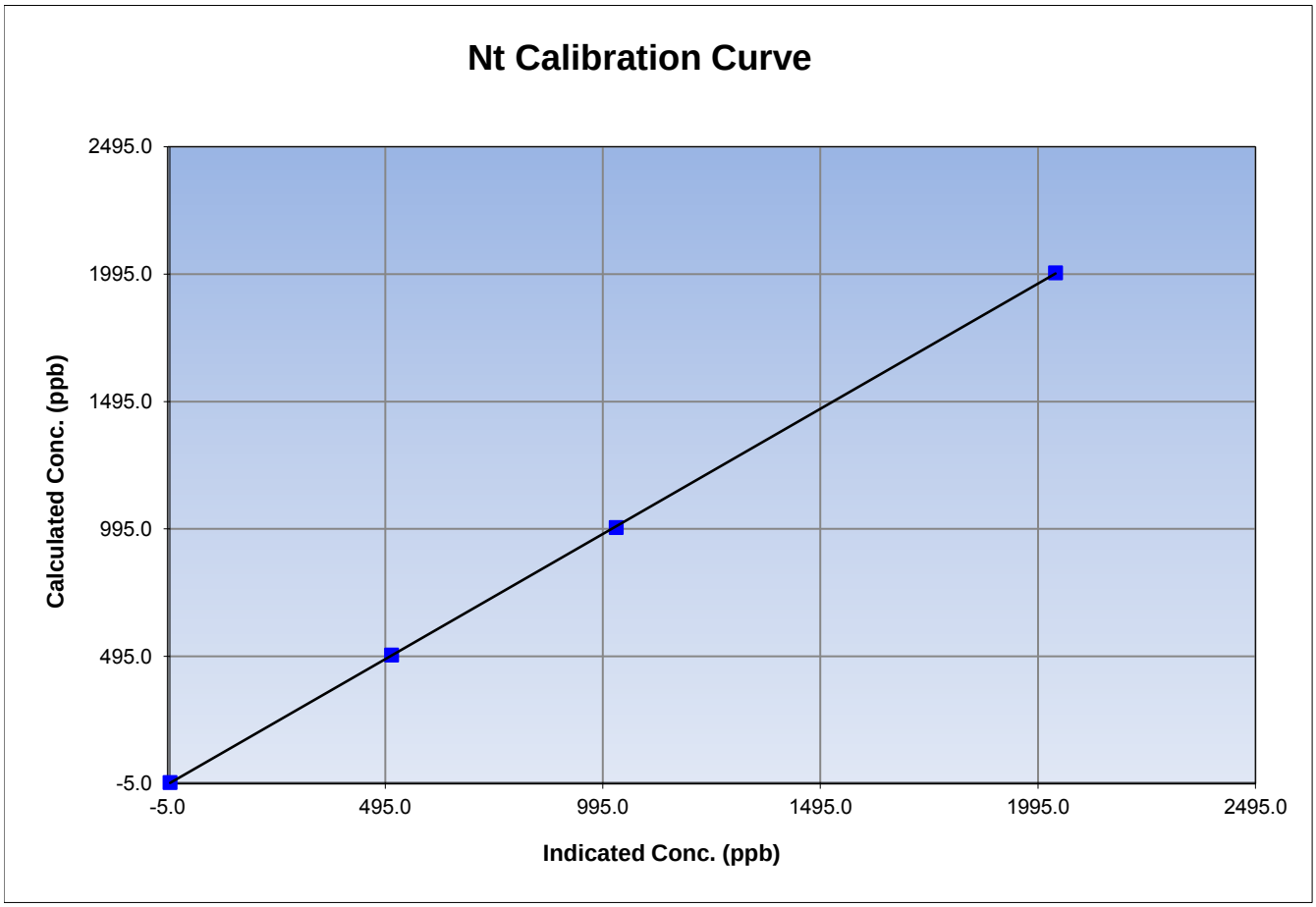
Nt Calibration Summary

Station Information

Calibration Date	August 13, 2015	Previous Calibration	July 14, 2015
Station Name	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	11:40	End Time (MST)	16:00
Analyzer make	API T201	Analyzer serial #	215

Nt (NH_3) Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.6	----	Correlation Coefficient	0.999982
1999.8	2035.4	0.9825		
999.9	1025.4	0.9751	Slope	0.982417
500.0	509.6	0.9811		
			Intercept	-2.137959



Wood Buffalo Environmental Association

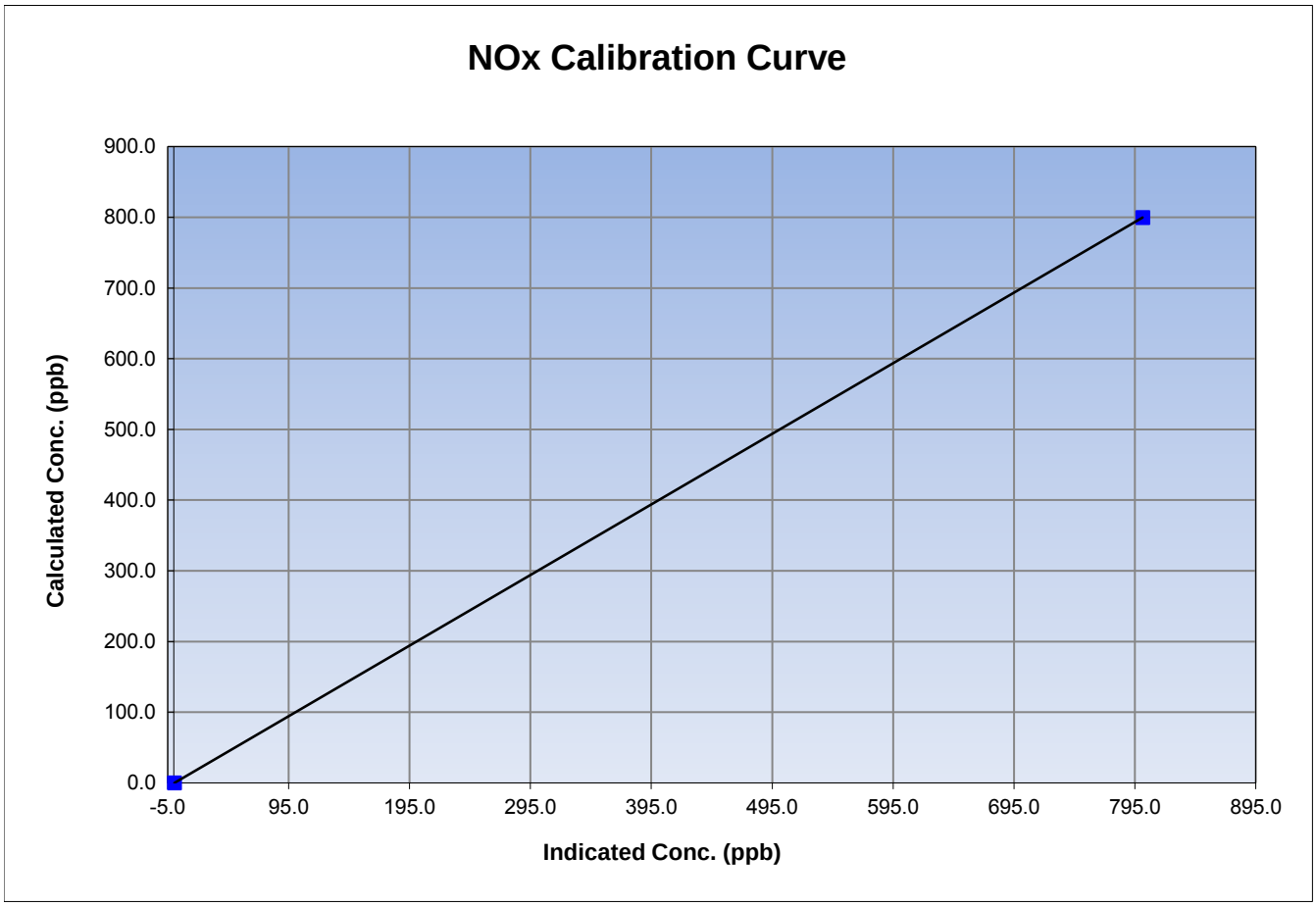
NOx Calibration Summary

Station Information

Calibration Date	August 12, 2015	Previous Calibration	July 14, 2015
Station Name	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	11:40	End Time (MST)	16:00
Analyzer make	API T201	Analyzer serial #	215

NO_X Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.5	----	Correlation Coefficient	0.999979
799.7	801.4	0.9979		
399.8	399.2	1.0017	Slope	0.997313
200.4	197.8	1.0130		
			Intercept	1.193183



Wood Buffalo Environmental Association

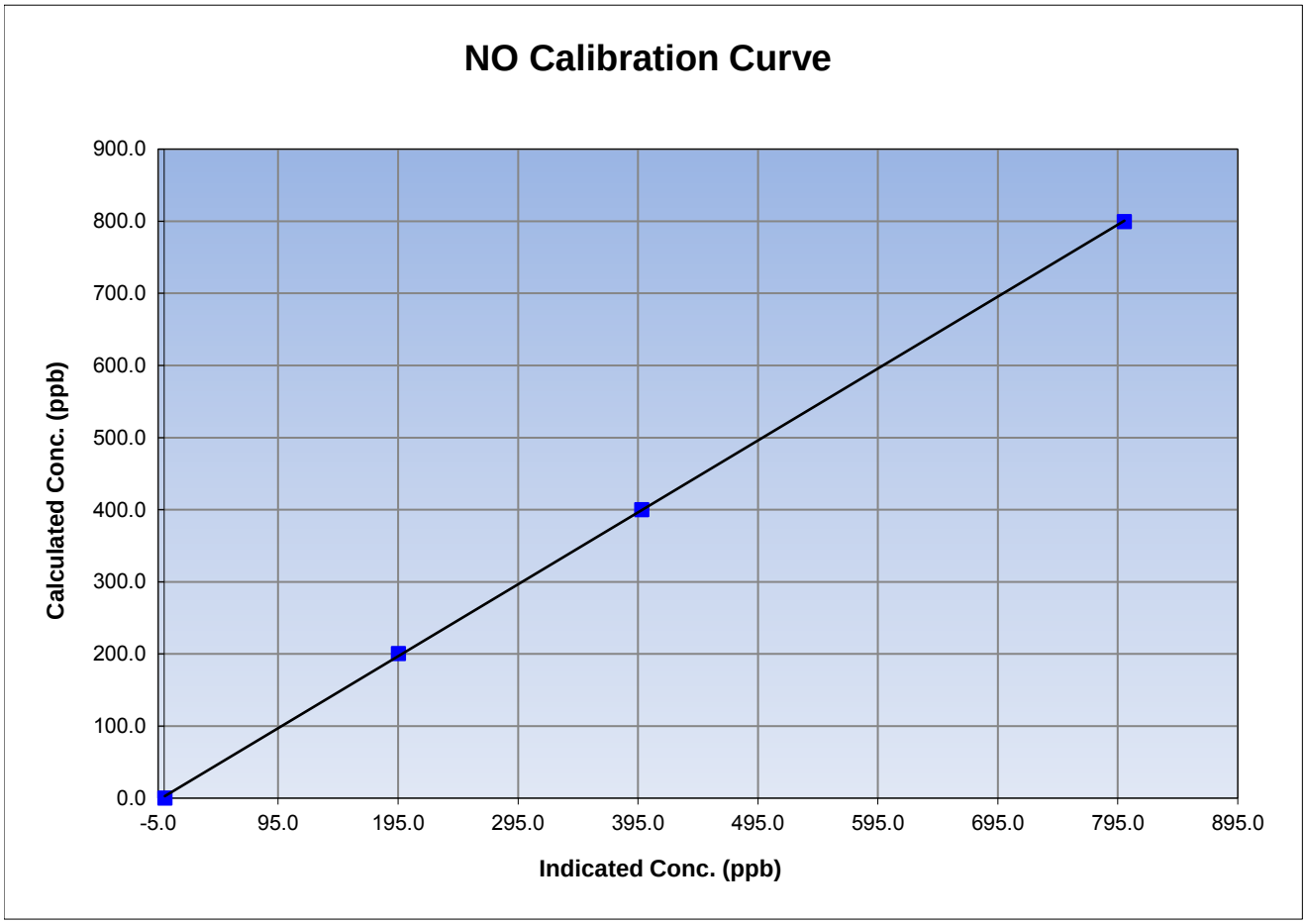
NO Calibration Summary

Station Information

Calibration Date	August 12, 2015	Previous Calibration	July 14, 2015
Station Name	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	11:40	End Time (MST)	16:00
Analyzer make	API T201	Analyzer serial #	215

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.6	----	Correlation Coefficient	0.999941
799.7	800.5	0.9990		
399.8	398.1	1.0045	Slope	0.997547
200.4	195.2	1.0263		
			Intercept	2.253364



Wood Buffalo Environmental Association

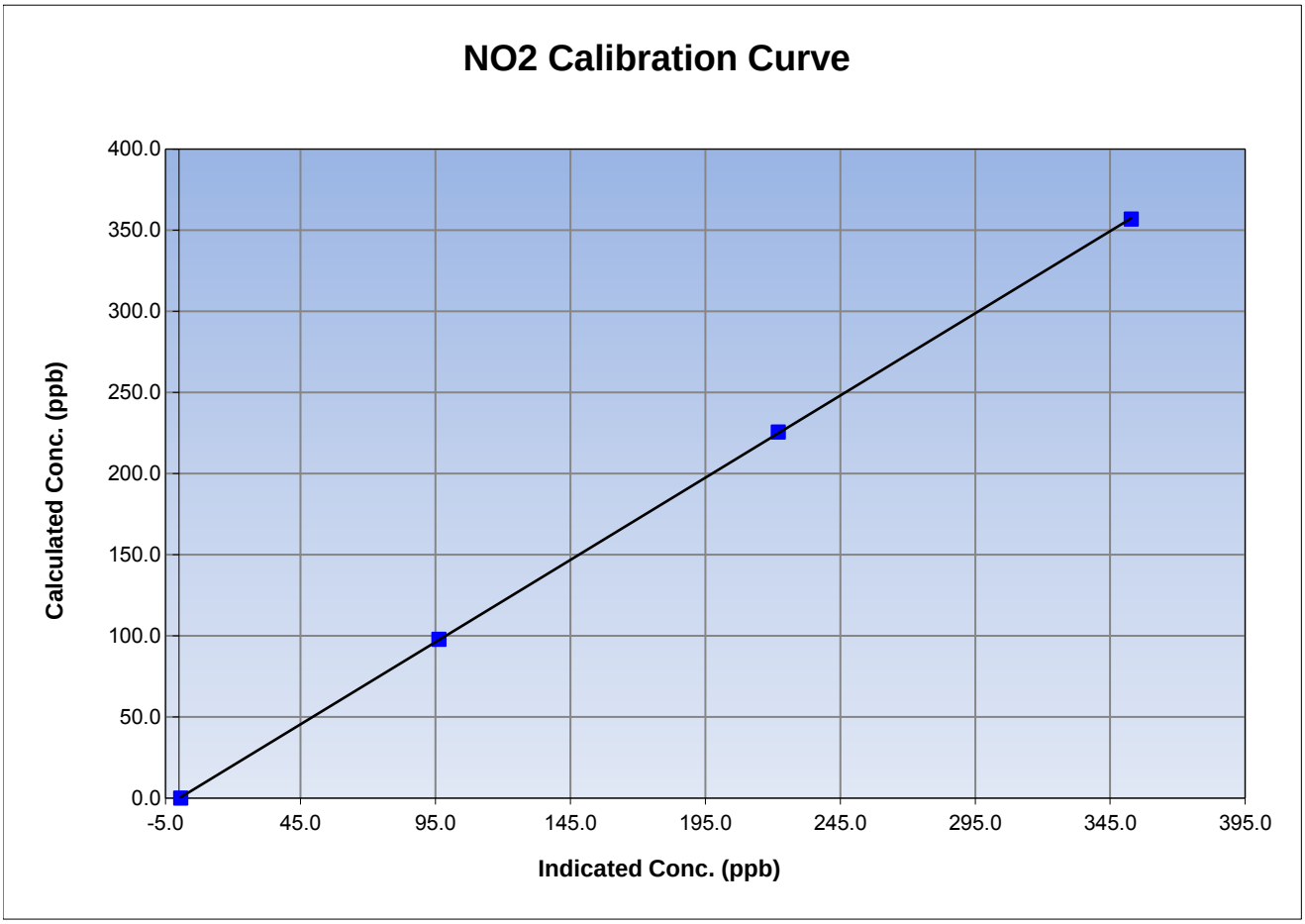
NO_2 Calibration Summary

Station Information

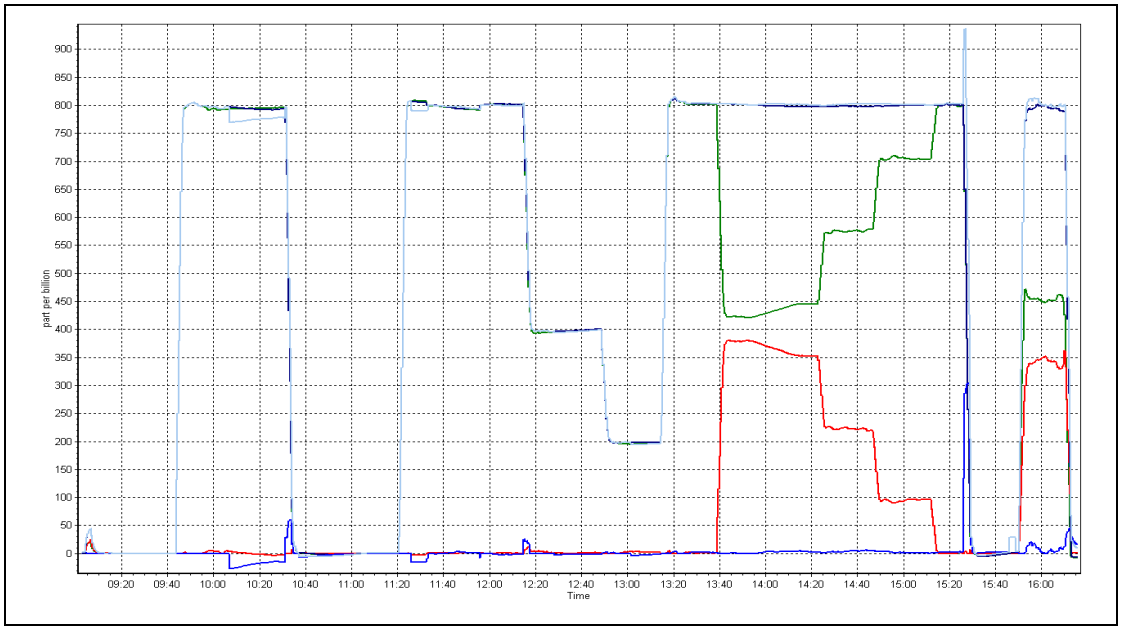
Calibration Date	August 12, 2015	Previous Calibration	July 14, 2015
Station Number	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	11:40	End Time (MST)	16:00
Analyzer make	API T201	Analyzer serial #	215

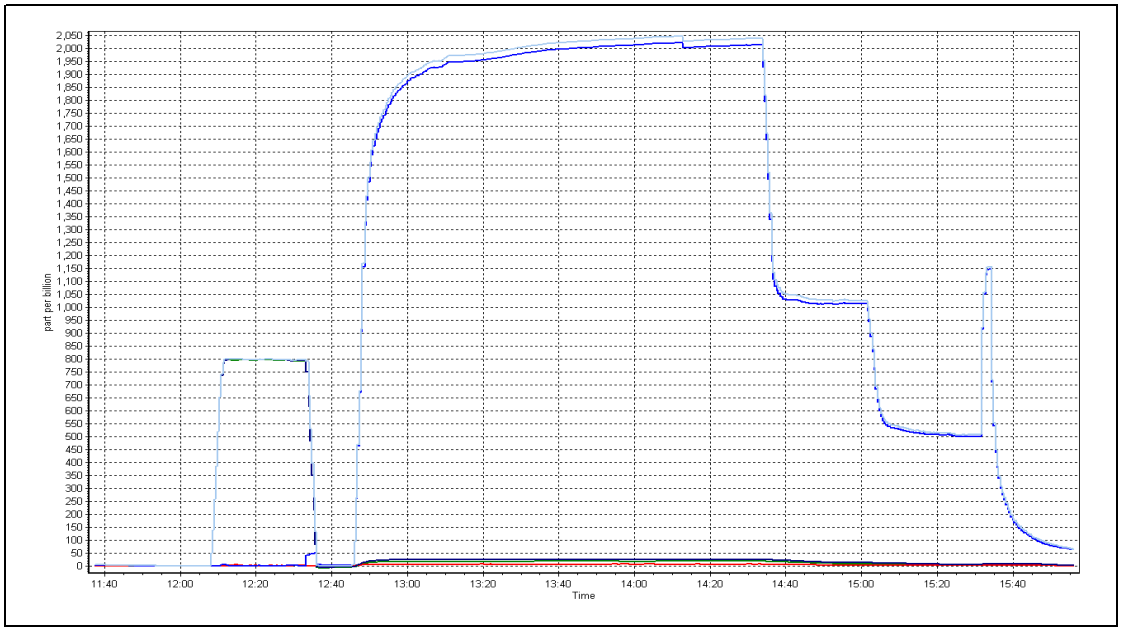
Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.6	----	Correlation Coefficient	0.999984
356.9	352.8	1.0115		
225.6	222.1	1.0160	Slope	1.013295
97.9	96.3	1.0159		
			Intercept	-0.100392



NH_3 Calibration Plot Date: August 12, 2015





Wood Buffalo Environmental Association

SHARP CALIBRATION

STATION INFORMATION

Calibration Date:	August 12, 2015	Previous Calibration:	July 15, 2015
Station Name:	Patricia McInnis	Station Number:	AMS 6
Start Time (MST):	13:50	End Time (MST):	14:40
Calibrator Make/Model:	Delta Cal	Calibrator Serial Number:	1212

SHARP INFORMATION

Particulate Fraction:	PM2.5
Make/Model:	Thermo / SHARP 5030
Serial Number	E-1475
Source SN:	5680
HEPA PN:	12144
Time Correct (MST):	Yes
Paremeters Checked:	T1, T2, T2,T4, P3, Main Flow, Beta, Neph

CALIBRATION DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	25.0	25.7	0.7	25.0
T2	26.0	na	na	26.0
T3	26.0	na	na	26.0
T4	23.0	na	na	23.0
RH (%)	34.0	na	na	34.0

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	967	966.0	-1.0	967

Main Flow (Lph)

Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
1000	997	-3	997	1000

Nephalometer Calibration

Parameter	As Founds	Zeroed (Limit +or- 2.0ug/m3)	As Left
Analog	202		202
Neph	0.5		0.5
C14	240.2		240.2
Indicated Concentration (ug/m3)	**0.3**	**no**	**0.3**
Offset 1	200.8		200.8
Offset 2	32.1		32.1

Leak Check (Quarterly)

Leak Check Date:	August 12, 2015	Previous Leak Check Date:	May 20, 2015

	Measured	Difference LPM (Limit +/- 0.42 LPM)
Flow without adaptor (LPM):	16.62	0.00
Flow with adaptor [turn off pump first](LPM):	16.62	

Mass Foil Calibration (Annualy)

Foil Calibration Date:	May 20, 2015	Previous Foil Calibration:	May 20, 2015
Zeroed?:	Yes		
Foil Mass:	1167	Mass foil set S/N:	2597
Previous Correction Factor:	7038		
New Correction Factor:	6978		

INSPECTION DATA

Item	Condition	Date of install or rebuild
Cyclone	Good / cleaned	12/08/2015
Pump	Good	NA
Filter Tape	Good	NA
Mass Foil Cal Set	Good	NA
HEPA filter	Good	NA

NOTES:

No adjustments, cyclone head cleaned, quartlerly leak check performed.

Calibration Performed By: **Ryan Power**

Wood Buffalo Environmental Association

WS/WD Calibration Report

Station Information

Calibration Date	August-13-15	Previous Calibration	October-08-14
Station Number	AMS 06	Station Location	Patricia McInnes
Reason:	Routine / Installation	Removal	Other:
Start Time (MST)	9:50	End Time (MST)	11:26
Barometric Pressure	730 mm Hg	Station Temperature	23 Deg C
WS Calibrator	MetOne 053	Serial Number	K13090

WIND SPEED

Sensor make/model	Metone 010C	Sensor serial #	E5132
DACS make	Campbel Scientific CR3000	DACS serial No.	2582
DACS voltage range	Pulse	DACS channel #	P 2
	Before		After
DACS slope	0.14396	DACS slope	0.14396
DACS intercept	0.9656	DACS intercept	0.96560
Calculated slope	0.998126167	Calculated slope	1.005994
Calculated intercept	0.047518017	Calculated intercept	-0.187534

Wind Speed Calibration Data

Shaft RPM	Actual Speed (K/hr)	Indicated Speed (K/hr)	Correction factor
0	0	0.0	n/a
200	20.162	20.2	0.9981
400	39.359	39.4	0.9987
600	58.555	58.6	0.9992
800	77.752	77.8	0.9989
990	96.948	96.1	1.0088
Average Correction Factor			1.0008

WIND DIRECTION

Sensor make/model	020C-1	Sensor serial #	E4854
DACS make	Campbel Scientific CR3000	DACS serial No.	2582
DACS voltage range	5000mV	DACS channel #	SE 20
	Before		After
DACS slope	0.072	DACS slope	0.072
DACS intercept	0	DACS intercept	0
Calculated slope	0.995252814	Calculated slope	1.002189
Calculated intercept	0.623686376	Calculated intercept	-1.548328

Wind Direction Calibration Data

Physical Direction (Degrees)	Indicated Direction (Degrees)	Correction factor
0	2.9	n/a
90	89.6	1.0048
180	180.3	0.9983
270	272.7	0.9901
355	355.3	0.9992
Average Correction Factor		0.9981

Notes:

bearings were in good condition - not replaced.

cross arm orientation verified with compass set to 14 degrees declination

Calibration Performed By: Ryan Power

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 7
ATHABASCA VALLEY
AUGUST 2015

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

September 28, 2015

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ATHABASCA VALLEY (AMS 7)
AUGUST 2015

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	701	34	43	98.79	11	0	2	0
TRS (ppb) Average	707	34	37	99.60	1	0	1	0
THC (ppm) Average	702	34	42	98.92	2.6	-	2.1	-
NMHC (ppm) Average	702	34	42	98.92	0.383	-	0.118	-
CH4(ppm) Average	702	34	42	98.92	2.2	-	2	-
O3 (ppb) Average	706	35	38	99.60	39	0	25	-
NO2 (ppb) Average	699	37	45	98.92	18	0	7	-
NO (ppb) Average	699	37	45	98.92	33	-	4	-
NOX (ppb) Average	699	37	45	98.92	51	-	10	-
PM2.5 (ug/m3) Average	740	1	4	99.60	26.6	-	10.4	0
CO(ppm) Average	710	34	34	100.00	0.3	0	0.1	-
Temperature 2 m (C) Average	744	0	0	100.00	30.3	-	23.8	-
Barometric Pressure (inHg) Average	744	0	0	100.00	29.2	-	29.1	-
Relative Humidity (%) Average	744	0	0	100.00	99	-	81	-
Wind Speed 10 m (km/h) Average	744	0	0	100.00	35	-	21	-
Wind Direction 10 m (deg) Average	744	0	0	100.00	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ATHABASCA VALLEY (AMS 7)
AUGUST 2015

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

					Percentile						
Parameter	Number	Mean	StnDev	Total	Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	701	1	1	-	0	1	1	1	1	1	11
TRS (ppb) Average	707	0.3	0	-	0	0	0	0	0	0	1
THC (ppm) Average	702	1.9	0.1	-	1.8	1.8	1.9	1.9	1.9	2	2.6
NMHC (ppm) Average	702	0.011	0.041	-	0	0	0	0	0	0	0.383
CH4(ppm) Average	702	1.89	0.1	-	1.8	1.8	1.9	1.9	1.9	2	2.2
O3 (ppb) Average	706	17.3	9	-	1	5	10	17	25	30	39
NO2 (ppb) Average	699	3.2	3	-	0	1	1	2	5	7	18
NO (ppb) Average	699	1.1	2	-	0	0	0	0	1	2	33
NOX (ppb) Average	699	4.3	4	-	0	1	2	3	6	9	51
PM2.5 (ug/m3) Average	740	5.11	3.3	-	0	2.1	3	4.4	6.4	8.9	26.6
CO(ppm) Average	710	0.04	0	-	0	0	0	0	0.1	0.1	0.3
Temperature 2 m (C) Average	744	17.82	5	-	2.6	11.6	14.7	17.4	21.3	24.6	30.3
Barometric Pressure (inHg) Average	744	28.87	0.2	-	28.4	28.6	28.8	28.9	29	29.1	29.2
Relative Humidity (%) Average	744	66	19	-	27	37	51	67	82	92	99
Wind Speed 10 m (km/h) Average	744	9.4	6	-	0	3	5	8	13	18	35
Wind Direction 10 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ATHABASCA VALLEY (AMS 7)
AUGUST 2015

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2, TRS, THC, O3, NO2	13 Aug 2015 08:00	13 Aug 2015 08:00	1	Maintenance - cleaned glass manifold
SO2, THC	24 Aug 2015 10:00	24 Aug 2015 14:00	5	Maintenance on daily auto zero and span system
SO2	11 Aug 2015 15:00	11 Aug 2015 17:00	3	Maintenance - internal WBEA audit
TRS	11 Aug 2015 13:00	11 Aug 2015 14:00	2	Maintenance - internal WBEA audit
THC	12 Aug 2015 13:00	12 Aug 2015 14:00	2	Maintenance - internal WBEA audit
O3	12 Aug 2015 12:00	12 Aug 2015 13:00	2	Maintenance - internal WBEA audit
NO2	12 Aug 2015 09:00	12 Aug 2015 14:00	6	Maintenance - internal WBEA audit
NO2	26 Aug 2015 12:00	26 Aug 2015 12:00	1	Maintenance - confirmed calibration points for Ozone
PM2.5	12 Aug 2015 14:00	12 Aug 2015 14:00	1	Maintenance - internal WBEA audit
PM2.5	13 Aug 2015 14:00	13 Aug 2015 15:00	2	Unstable operation - excessive baseline drift

Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO_2) - ppb

Athabasca Valley - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 11 ppb on Aug 1 14:00

Maximum Daily Average: 2.2 ppb on Aug 1

Minimum Value: 0 ppb on Aug 5 15:00

Minimum Daily Average: 0.6 ppb on Aug 5

Maximum Diurnal Average: 1.5 ppb at hour 14

Minimum Diurnal Average: 0.7 ppb at hour 2

Monthly Average: 1.0 ppb

Percentiles: $P_1 = 1$ $P_{10} = 1$ $Q_1 = 1$ Median = 1 $Q_3 = 1$ $P_{90} = 1$ $P_{99} = 5$

Hours in Service:	744
Hours of Data:	701
Hours of Missing Data:	43
Hours of Calibration:	34
Percent Operational Time:	98.8

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	1	1	1	Z	1	1	1	1	1	2	2	3	8	11	6	4	1	2	2	1	1	1	1	1	2.2	11
2-Aug	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	3	4	2	2	2	1	1.2	4
3-Aug	1	1	1	1	1	Z	1	1	1	1	1	1	2	2	1	1	1	1	1	1	1	1	1	1	1.0	2
4-Aug	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.6	1
5-Aug	1	Z	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	0	1	1	1	0.6	1
6-Aug	1	1	Z	1	1	1	1	1	1	1	6	5	4	1	1	1	1	1	1	1	1	1	1	1	1.3	6
7-Aug	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1
8-Aug	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.8	1
9-Aug	1	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.9	1
10-Aug	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.8	1
11-Aug	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	M	M	M	1	1	1	1	1	1	1	0.8	1
12-Aug	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.8	1
13-Aug	1	1	1	Z	1	1	1	M	1	1	C	C	C	1	1	1	1	1	1	1	1	1	1	1	0.8	1
14-Aug	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1
15-Aug	1	1	1	1	1	Z	2	1	1	1	3	4	1	1	1	3	2	3	3	1	1	1	1	1	1.5	4
16-Aug	Z	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.9	2
17-Aug	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.8	1
18-Aug	1	1	Z	1	1	1	1	1	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1.3	2
19-Aug	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.8	1
20-Aug	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1
21-Aug	1	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1
22-Aug	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1
23-Aug	1	Z	1	1	1	1	1	1	1	1	1	1	1	3	2	1	1	1	1	1	1	1	1	1	1.0	3
24-Aug	1	1	Z	1	1	1	1	1	1	M	M	M	M	M	1	1	1	1	1	1	1	1	1	1	0.8	1
25-Aug	1	1	1	Z	1	1	1	1	1	2	1	1	2	5	4	2	1	2	1	2	2	1	1	1	1.4	5
26-Aug	1	1	3	3	Z	1	1	1	1	1	1	1	1	2	3	6	7	5	5	2	2	1	1	1	2.1	7
27-Aug	1	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.8	1
28-Aug	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.8	1
29-Aug	1	Z	1	1	2	1	1	1	2	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1.2	2
30-Aug	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1
31-Aug	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1
	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.9	1.0	1.2	1.2	1.3	1.5	1.2	1.2	1.1	1.1	1.1	1.0	0.9	0.8	0.8	0.8	Diurnal Average	
	1	1	3	3	2	1	2	1	2	2	6	5	8	11	6	6	7	5	5	4	2	2	2	1	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance

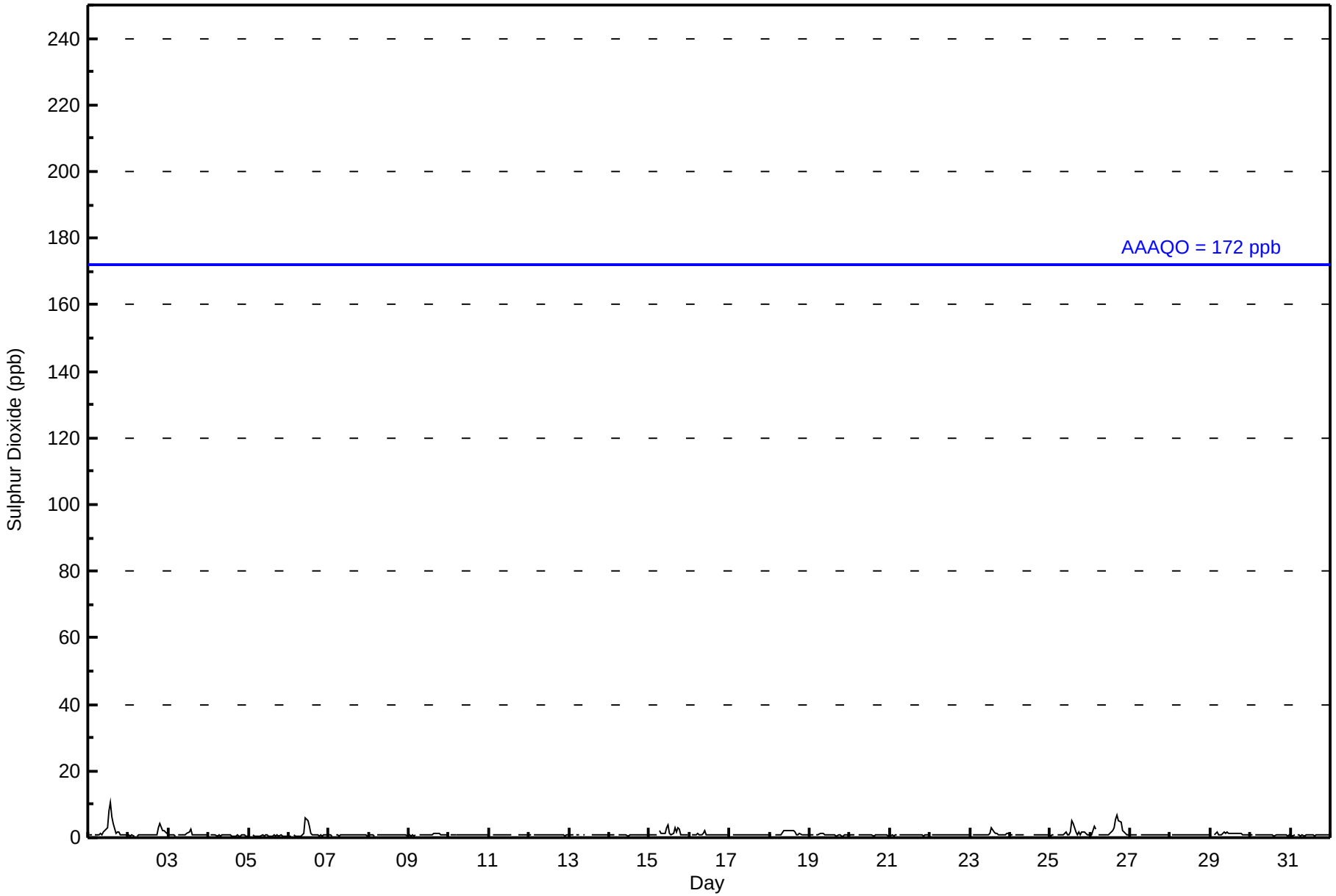
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb

Wood Buffalo Environmental Association

Hourly Averages

Sulphur Dioxide (SO_2) - ppb

Athabasca Valley - August 2015



Sulphur Dioxide (SO_2) - ppb
Athabasca Valley - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	700	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: 701

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

Athabasca Valley - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 10	20	5	4	10	54	76	122	39	24	25	63	75	44	44	40	55	700
11 - 20	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	21	5	4	10	54	76	122	39	24	25	63	75	44	44	40	55	701

Total Number of Valid Hours: 701

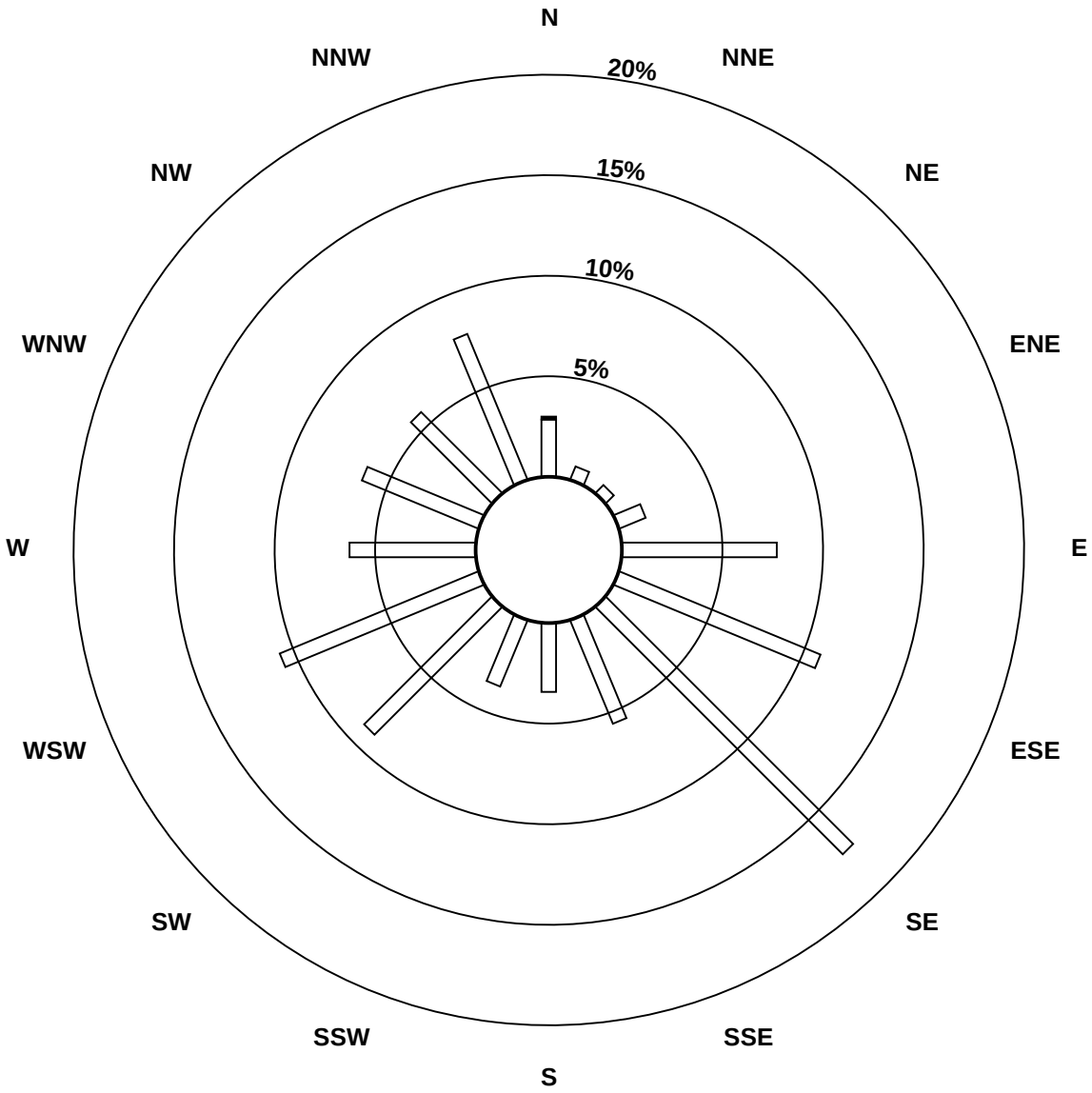
Total Number of Hours: 744

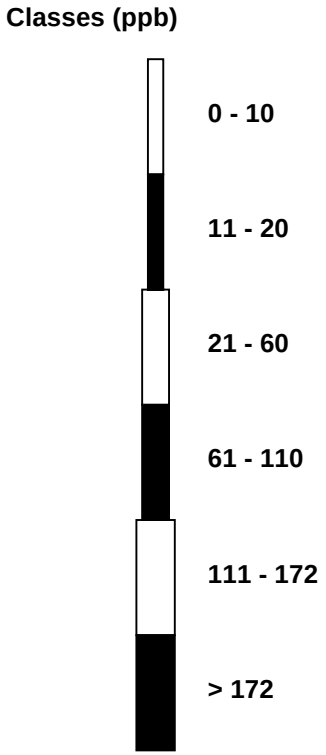
Wood Buffalo Environmental Association

Wind Rose Aug 2015

Sulphur Dioxide (SO_2) - ppb

Athabasca Valley (AMS 7)





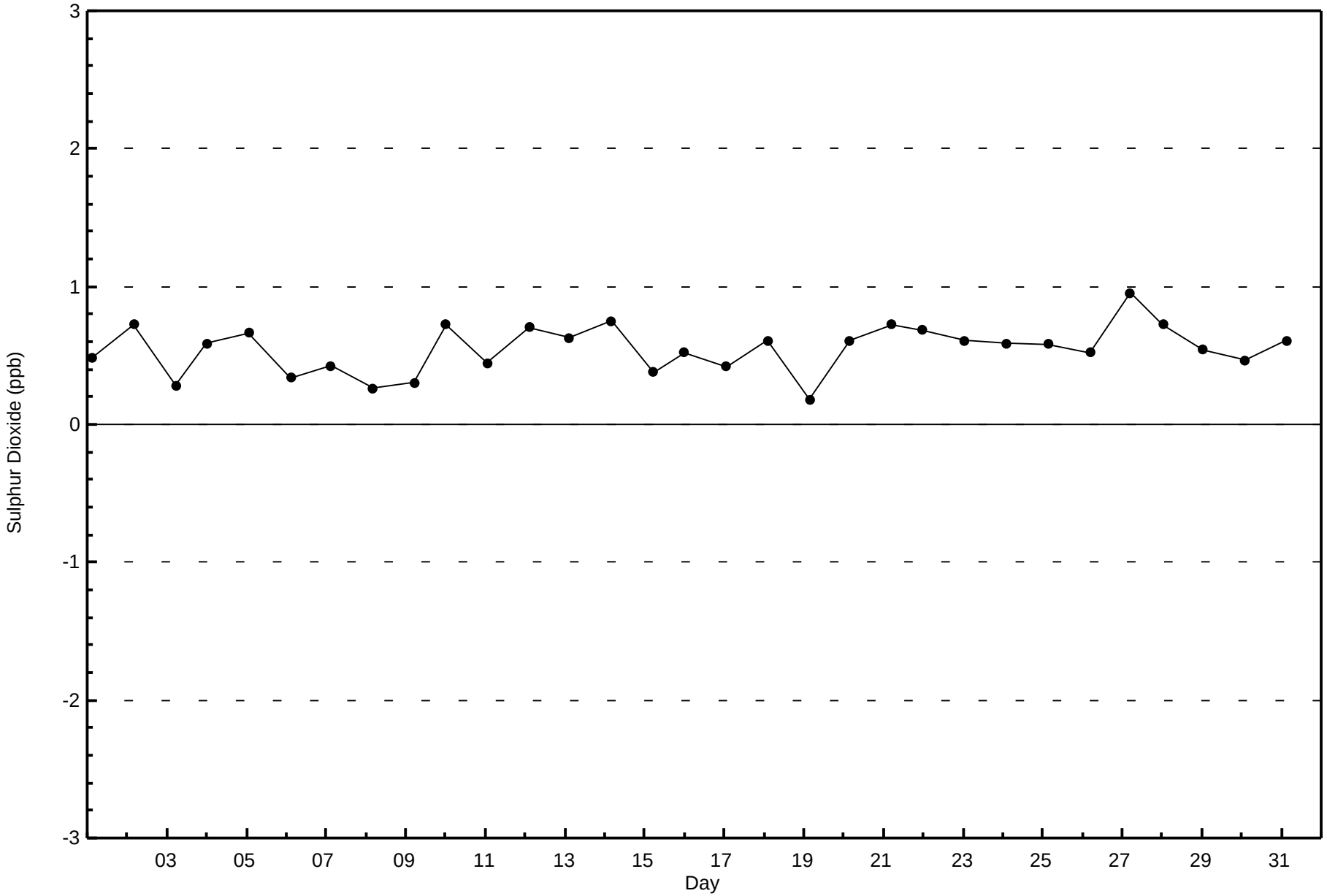
Total Number of Valid Hours: 701

Wood Buffalo Environmental Association

Zero Responses

Sulphur Dioxide (SO_2) - ppb

Athabasca Valley - August 2015

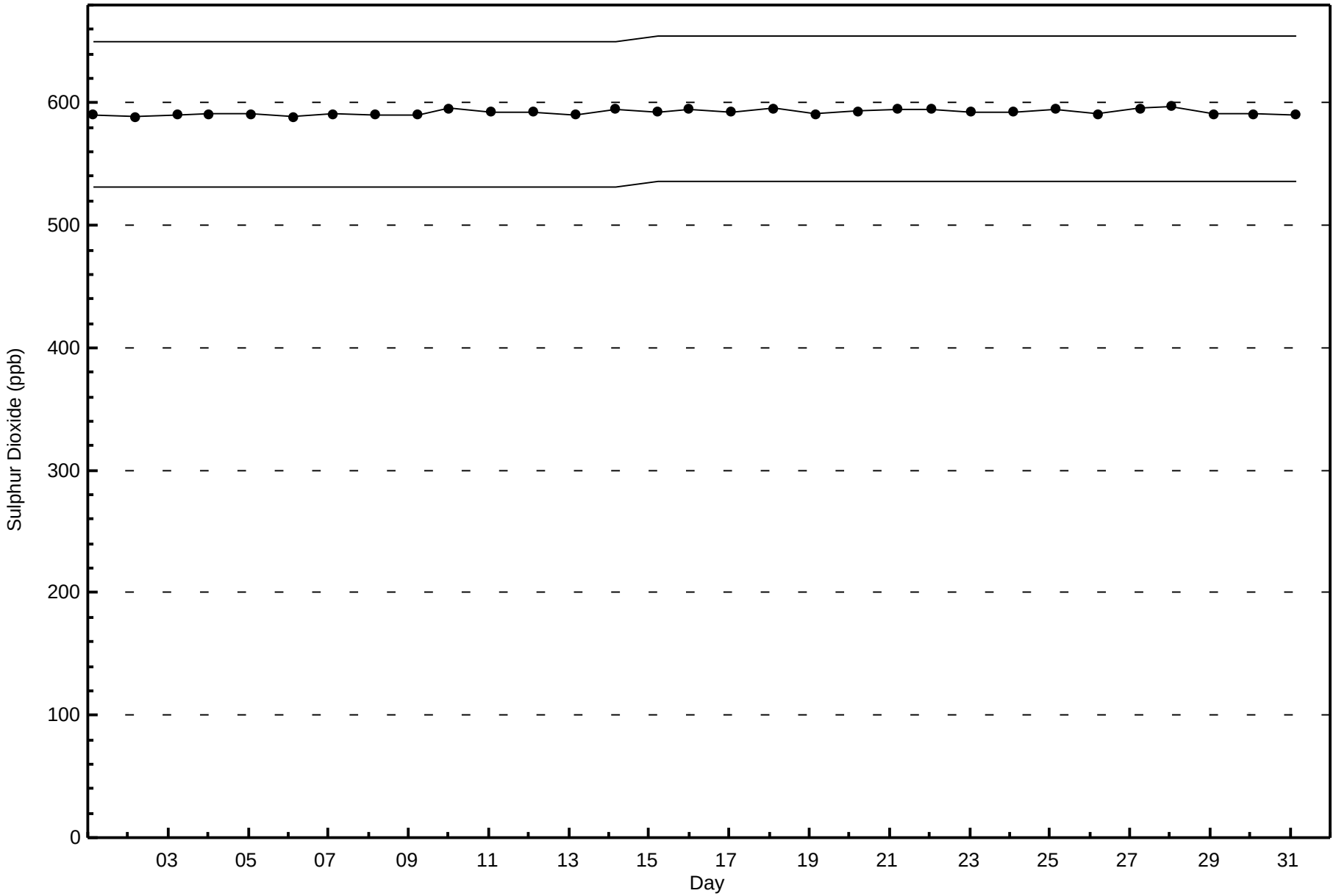


Wood Buffalo Environmental Association

Span Responses

Sulphur Dioxide (SO_2) - ppb

Athabasca Valley - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

Athabasca Valley - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 1 ppb on Aug 1 10:00 Maximum Daily Average: 0.6 ppb on Aug 1

Minimum Value: 0 ppb on Aug 28 16:00 Minimum Daily Average: 0.1 ppb on Aug 5
Maximum Diurnal Average: 0.3 ppb at hour 3 Minimum Diurnal Average: 0.2 ppb at hour 17
Monthly Average: 0.3 ppb Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 0$ $P_{99} = 1$

Hours in Service:	744
Hours of Data:	707
Hours of Missing Data:	37
Hours of Calibration:	34
Percent Operational Time:	99.6

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

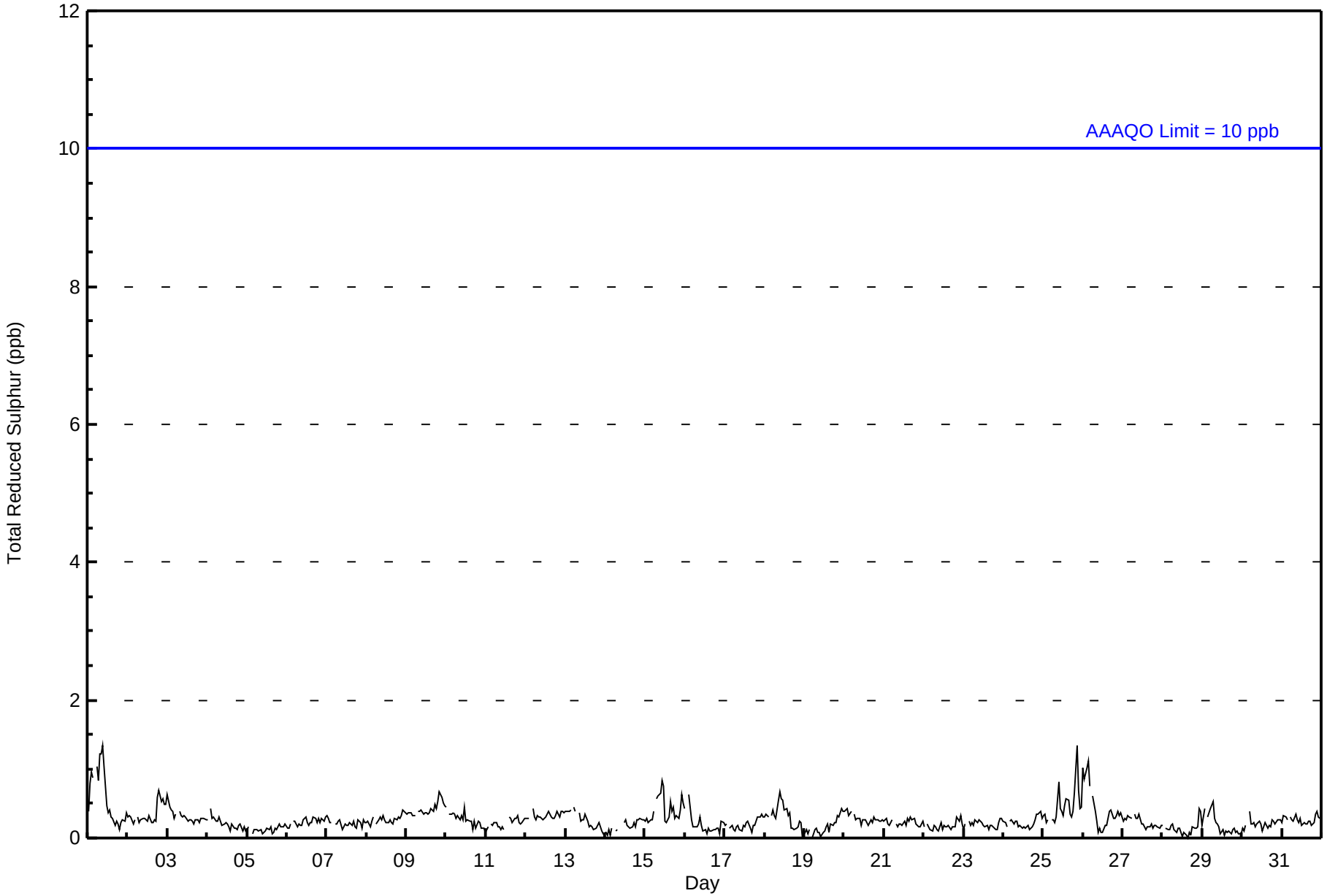
Z - zerospan C - Calibration M - Maintenance
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb

Wood Buffalo Environmental Association

Hourly Averages

Total Reduced Sulphur (TRS) - ppb

Athabasca Valley - August 2015



Total Reduced Sulphur (TRS) - ppb
Athabasca Valley - August 2015

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

Total Reduced Sulphur (TRS) - ppb

Athabasca Valley - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 2	21	4	4	10	56	74	126	39	22	26	67	75	44	43	41	55	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	21	4	4	10	56	74	126	39	22	26	67	75	44	43	41	55	707

Total Number of Valid Hours: 707

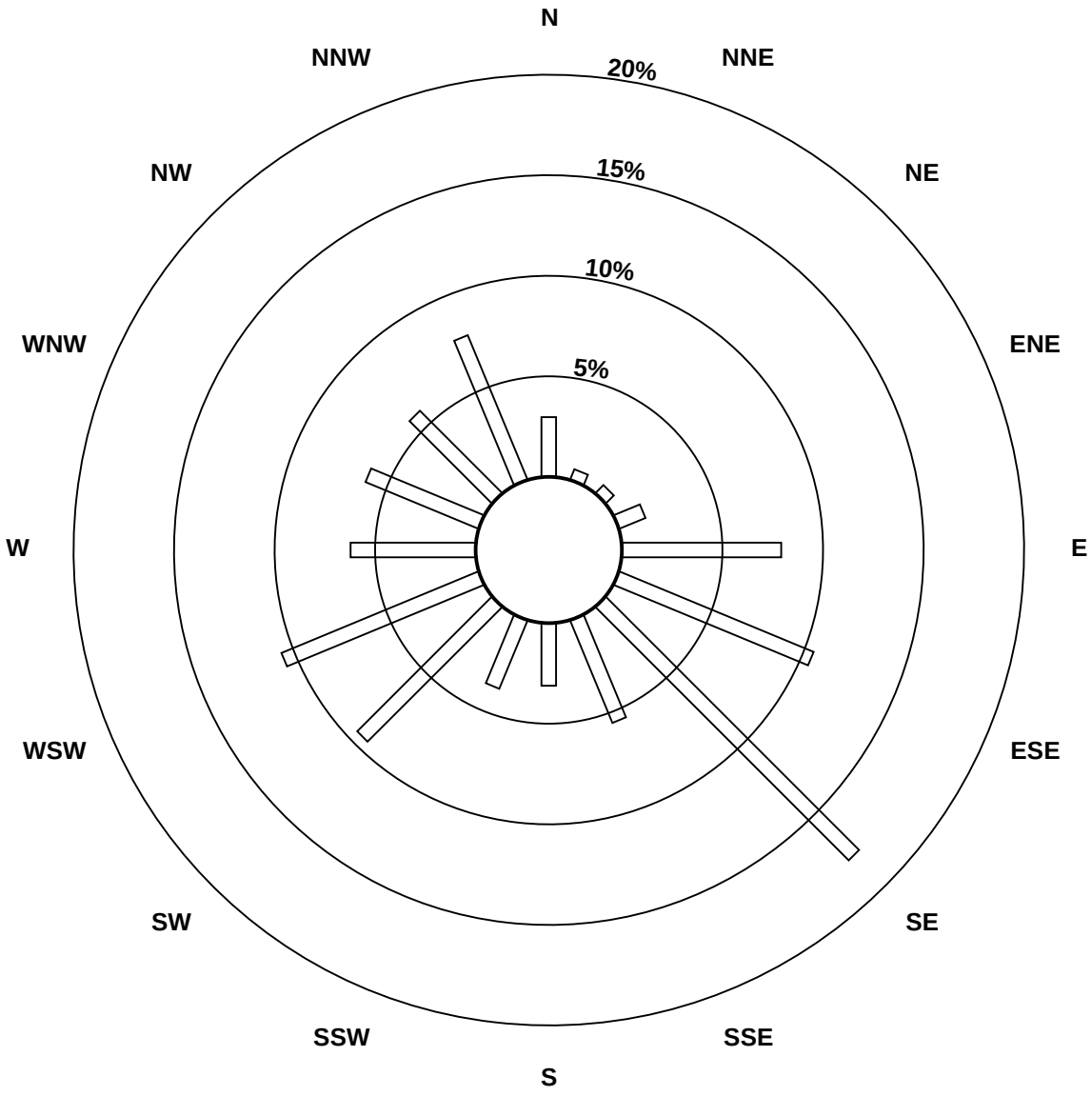
Total Number of Hours: 744

Wood Buffalo Environmental Association

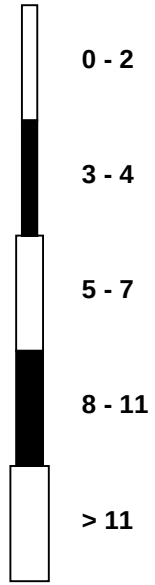
Wind Rose Aug 2015

Total Reduced Sulphur (TRS) - ppb

Athabasca Valley (AMS 7)



Classes (ppb)



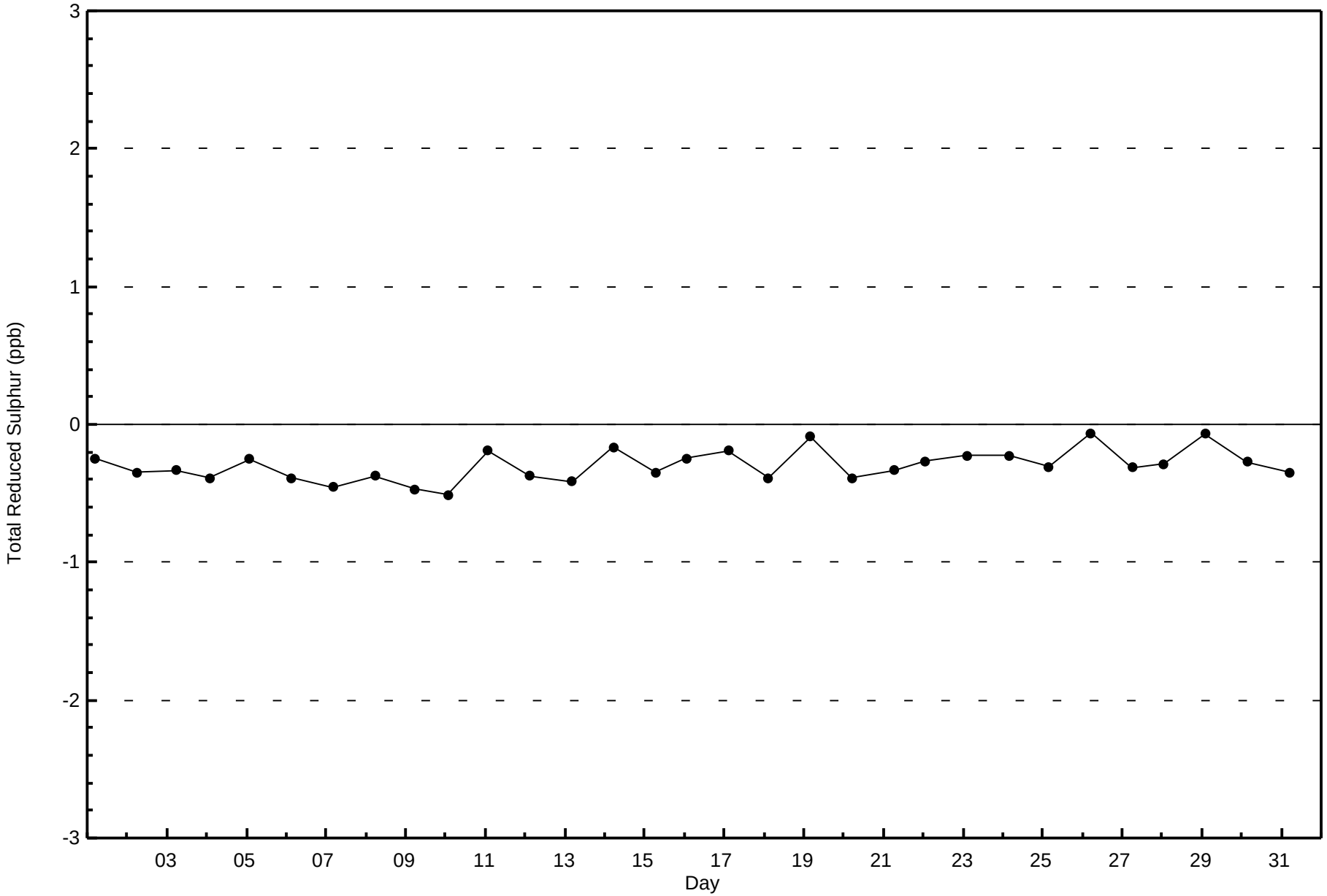
Total Number of Valid Hours: 707

Wood Buffalo Environmental Association

Zero Responses

Total Reduced Sulphur (TRS) - ppb

Athabasca Valley - August 2015

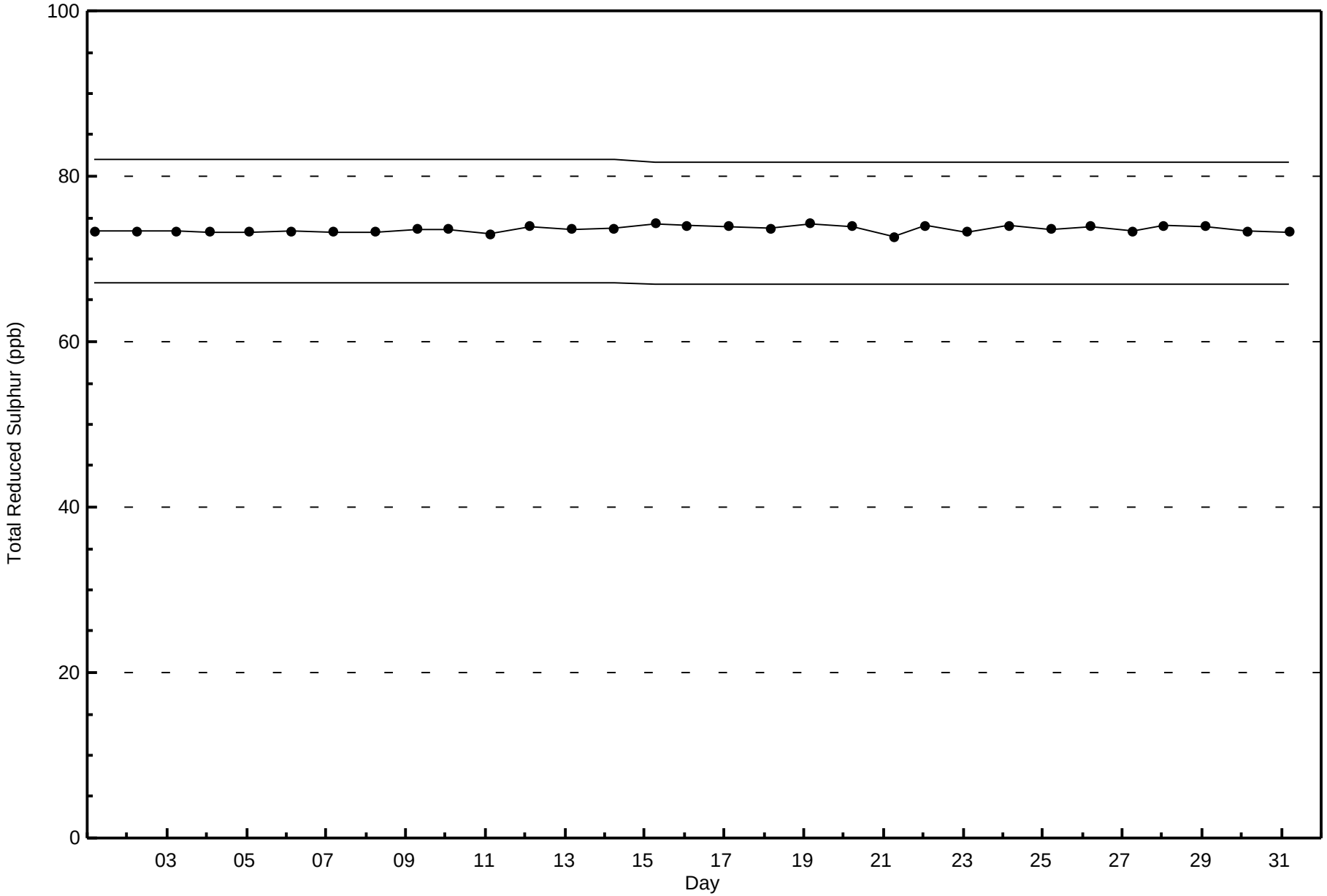


Wood Buffalo Environmental Association

Span Responses

Total Reduced Sulphur (TRS) - ppb

Athabasca Valley - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Athabasca Valley - August 2015

Maximum Value: 2.6 ppm on Aug 1 09:00

Maximum Daily Average: 2.1 ppm on Aug 1

Minimum Value: 1.8 ppm on Aug 30 17:00

Minimum Daily Average: 1.8 ppm on Aug 12

Maximum Diurnal Average: 2.0 ppm at hour 3

Minimum Diurnal Average: 1.8 ppm at hour 17

Monthly Average: 1.90 ppm

Percentiles: P_1 = 1.8 P_{10} = 1.8 Q_1 = 1.9 Median = 1.9 Q_3 = 1.9 P_{90} = 2.0 P_{99} = 2.3

Hours in Service:	744
Hours of Data:	702
Hours of Missing Data:	42
Hours of Calibration:	34
Percent Operational Time:	98.9

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	2.0	2.1	2.3	Z	2.3	2.4	2.4	2.5	2.6	2.5	2.4	2.2	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1	2.6
2-Aug	1.9	1.9	1.9	1.9	Z	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.9	2.0	2.1	2.1	2.1	2.0	2.0	1.9	2.1
3-Aug	2.1	2.0	2.0	2.0	2.0	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1
4-Aug	Z	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
5-Aug	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.9	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
6-Aug	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
7-Aug	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
8-Aug	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
9-Aug	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.9	1.9	2.0	2.0	2.0	1.9	1.9	2.0
10-Aug	Z	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.0
11-Aug	1.9	Z	1.9	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.0
12-Aug	1.8	1.8	Z	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	M	M	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.8	1.9
13-Aug	1.9	1.9	1.9	Z	1.9	1.9	2.0	M	2.0	1.9	C	C	C	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.8	1.9	2.0
14-Aug	1.8	1.8	1.8	1.8	Z	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.9
15-Aug	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
16-Aug	Z	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
17-Aug	1.9	Z	2.0	1.9	2.1	2.1	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1
18-Aug	1.9	1.9	Z	2.0	2.1	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	1.9	1.9	1.9	1.9	2.0	2.0	1.9	2.1
19-Aug	2.0	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.0
20-Aug	1.8	1.8	1.8	1.8	Z	1.8	1.8	1.8	1.8	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.8	1.9
21-Aug	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.9	1.8	1.9	1.8	1.8	1.9	1.9	1.9	1.9	1.9
22-Aug	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.0
23-Aug	2.1	Z	2.0	2.0	2.0	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.1
24-Aug	1.9	2.0	Z	1.9	1.9	1.9	1.9	1.9	1.9	M	M	M	M	M	1.9	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.0
25-Aug	2.1	2.2	2.2	Z	2.1	2.1	2.0	2.1	2.0	2.3	2.0	2.0	1.9	1.9	1.9	2.0	1.9	1.9	1.9	2.1	2.1	2.1	2.1	2.1	2.0	2.3
26-Aug	2.2	2.2	2.1	2.1	Z	2.1	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.2
27-Aug	2.1	2.2	2.2	2.2	2.2	Z	2.1	2.0	1.9	1.9	2.0	1.9	1.9	1.8	1.8	1.8	1.8	1.9	1.8	1.8	1.9	1.9	1.9	1.9	2.0	2.2
28-Aug	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.8	1.9	1.9	1.9	1.9
29-Aug	1.9	Z	2.2	2.1	2.1	2.2	2.1	2.0	1.9	2.0	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	2.2
30-Aug	1.9	1.8	Z	1.9	1.9	1.9	2.0	2.0	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	2.0
31-Aug	1.9	1.9	2.0	Z	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	2.0
	1.9	1.9	2.0	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	Diurnal Average	
	2.2	2.2	2.3	2.2	2.3	2.4	2.4	2.5	2.6	2.5	2.4	2.2	1.9	1.9	1.9	2.0	1.9	1.9	2.0	2.1	2.1	2.1	2.1	2.1	Diurnal Maximum	

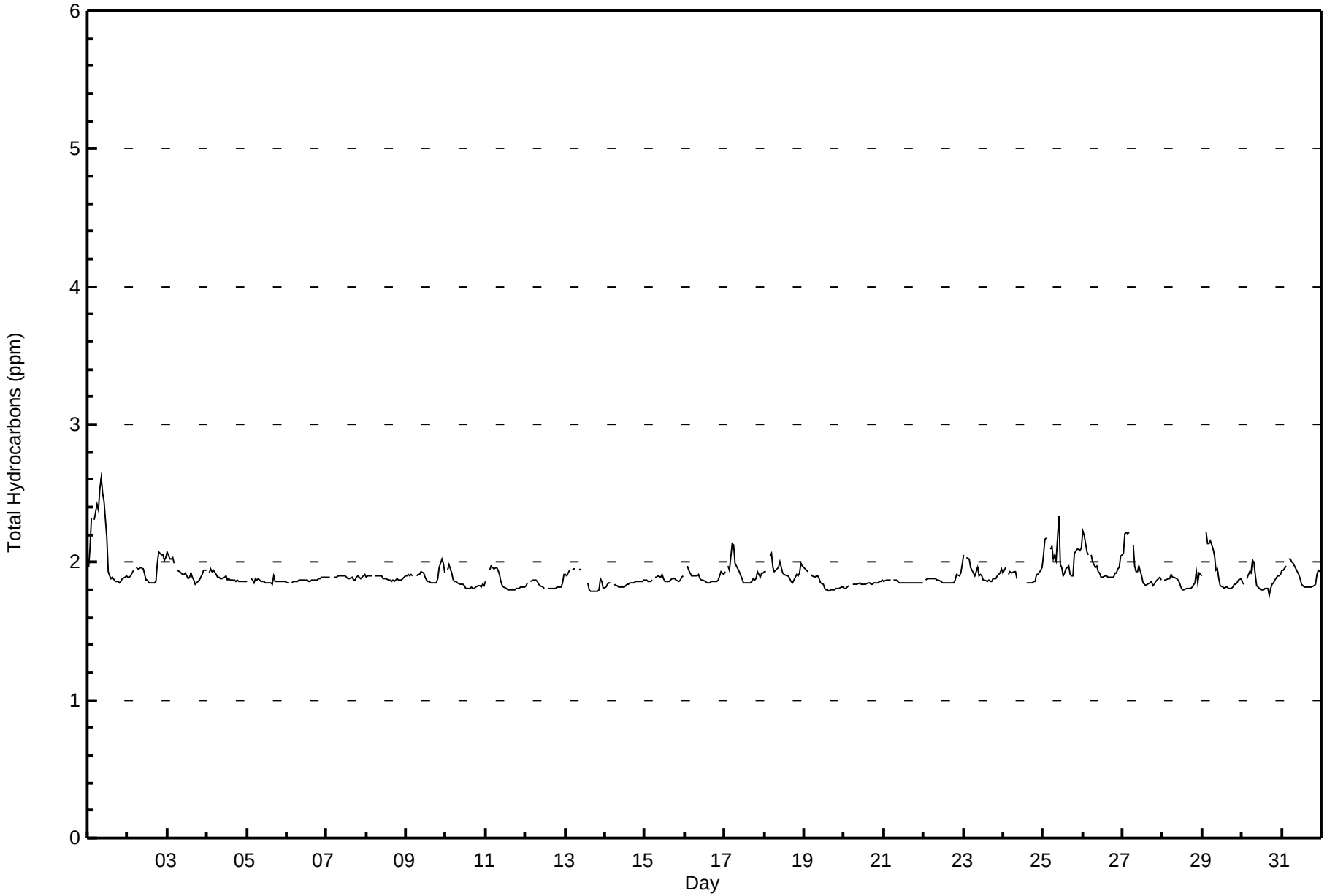
Z - zerospan C - Calibration M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Total Hydrocarbons (THC) - ppm

Athabasca Valley - August 2015



Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	656	93.45	93.45
2.1 - 3.0	46	6.55	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 702

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Total Hydrocarbons (THC) - ppm

Athabasca Valley - August 2015

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	19	5	3	8	50	71	115	37	24	25	60	75	42	43	34	45	656
2.1 - 3.0	2	0	1	2	4	5	7	2	0	0	3	1	2	1	6	10	46
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	21	5	4	10	54	76	122	39	24	25	63	76	44	44	40	55	702

Total Number of Valid Hours: 702

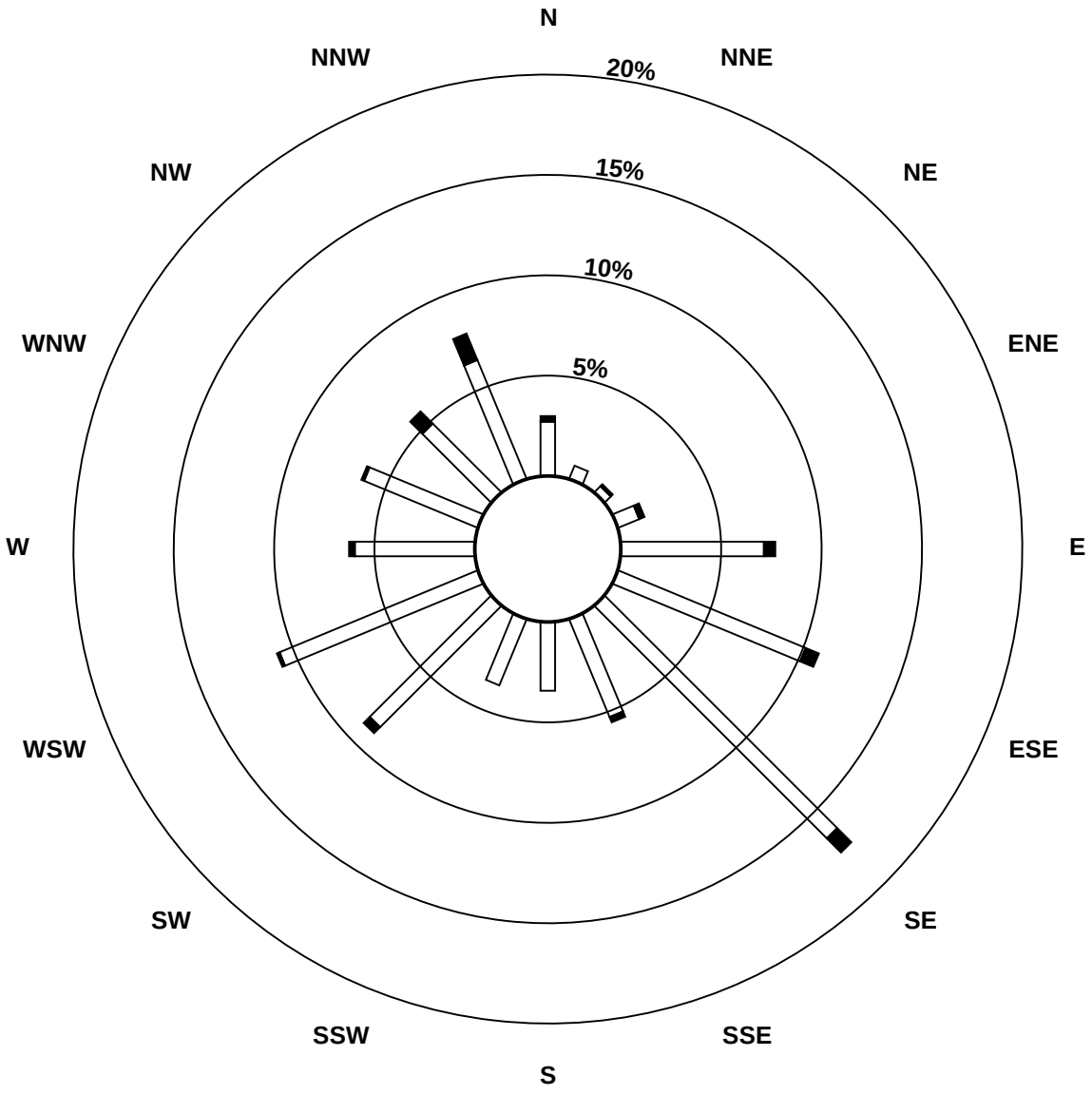
Total Number of Hours: 744

Wood Buffalo Environmental Association

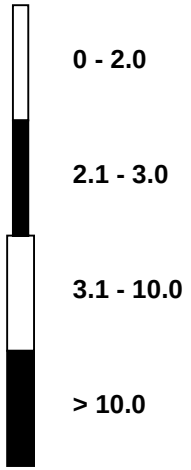
Wind Rose Aug 2015

Total Hydrocarbons (THC) - ppm

Athabasca Valley (AMS 7)



Classes (ppm)



0 - 2.0

2.1 - 3.0

3.1 - 10.0

> 10.0

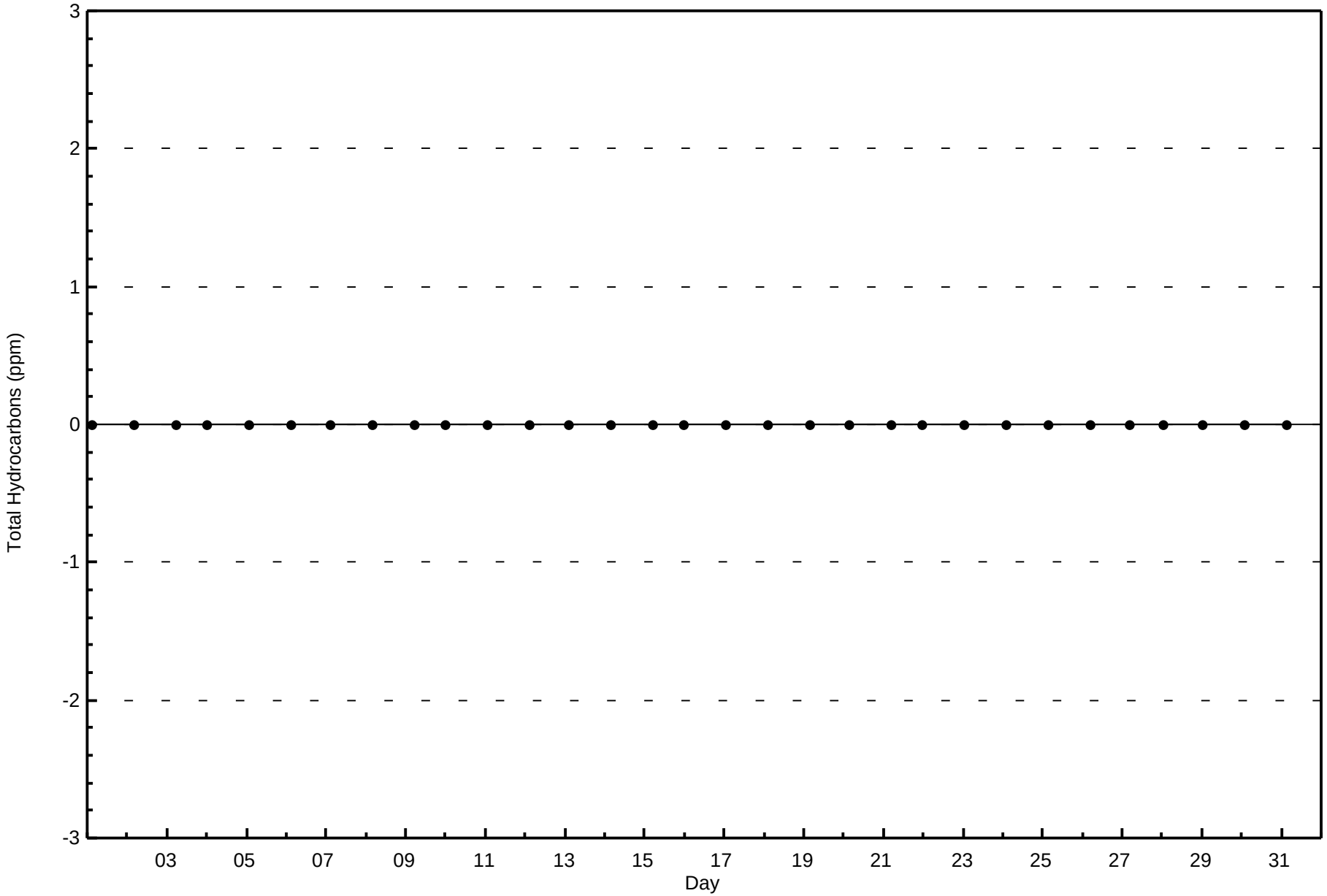
Total Number of Valid Hours: 702

Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Athabasca Valley - August 2015

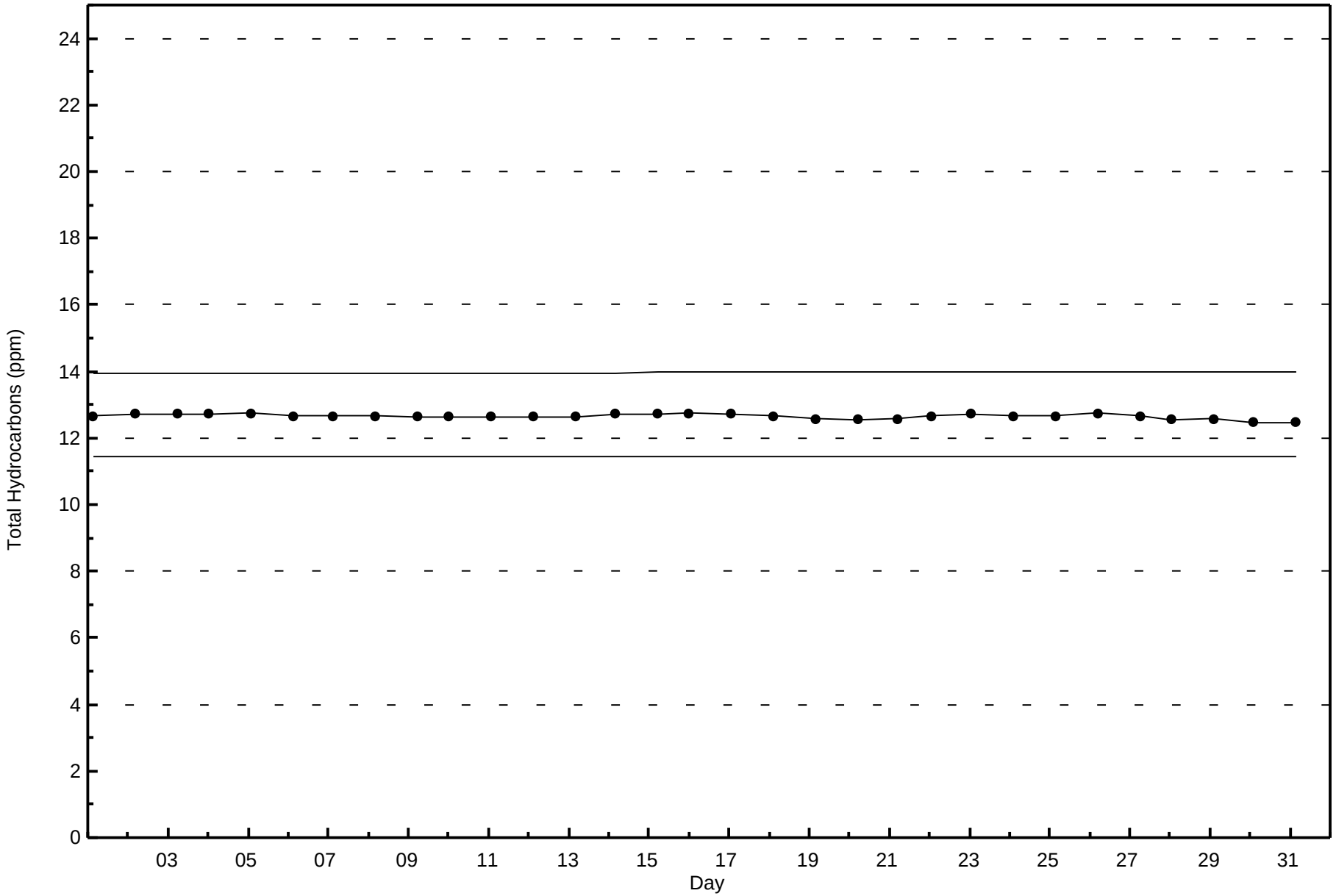


Wood Buffalo Environmental Association

Span Responses

Total Hydrocarbons (THC) - ppm

Athabasca Valley - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Non Methane Hydrocarbons (NMHC) - ppm

Athabasca Valley - August 2015

Maximum Value: 0.383 ppm on Aug 1 09:00

Maximum Daily Average: 0.118 ppm on Aug 1

Minimum Value: 0.000 ppm on Aug 1 15:00

Minimum Daily Average: 0.000 ppm on Aug 14

Maximum Diurnal Average: 0.024 ppm at hour 6

Minimum Diurnal Average: 0.000 ppm at hour 18

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 in Service:	744
Hours of Data:	702
Hours of Missing Data:	42
Hours of Calibration:	34
Percent Operational Time:	98.9

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0.040	0.118	0.222	Z	0.218	0.262	0.251	0.333	0.383	0.335	0.296	0.173	0.029	0.014	0.000	0.011	0.004	0.000	0.007	0.000	0.004	0.000	0.003	0.012	0.118	0.383
2-Aug	0.002	0.000	0.000	0.000	Z	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	0.078	0.135	0.123	0.123	0.094	0.099	0.029	0.135
3-Aug	0.105	0.076	0.074	0.057	0.017	Z	0.000	0.000	0.000	0.000	0.000	0.020	0.000	0.000	0.001	0.000	0.013	0.000	0.001	0.000	0.001	0.000	0.000	0.001	0.016	0.105
4-Aug	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.010	0.025	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.025
5-Aug	0.000	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	0.002	0.000	0.056	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.056
6-Aug	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.002	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005
7-Aug	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.014	0.000	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.001	0.014
8-Aug	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002
9-Aug	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.023	0.014	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.012	0.049	0.112	0.090	0.028	0.015	0.112
10-Aug	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.005	0.005	0.000	0.000	0.000	0.001	0.005
11-Aug	0.000	Z	0.000	0.000	0.000	0.000	0.002	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	0.002
12-Aug	0.000	0.000	Z	0.000	0.000	0.003	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	0.001	0.000	0.003
13-Aug	0.000	0.000	0.001	Z	0.000	0.000	0.000	M	0.000	0.001	C	C	C	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.002	0.000	0.001	0.010
14-Aug	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
15-Aug	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.005	0.003	0.007	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	0.001	0.007
16-Aug	Z	0.023	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.023
17-Aug	0.000	Z	0.000	0.000	0.153	0.127	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	0.001	0.000	0.000	0.000	0.000	0.012	0.153
18-Aug	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.001	0.005	0.034	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.002	0.000	0.000	0.000	0.002	0.034
19-Aug	0.000	0.000	0.000	Z	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.010
20-Aug	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009
21-Aug	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
22-Aug	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.001	0.000	0.000	0.001	0.012
23-Aug	0.000	Z	0.001	0.000	0.000	0.000	0.002	0.000	0.065	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.065
24-Aug	0.000	0.002	Z	0.000	0.000	0.000	0.000	0.000	0.000	M	M	M	M	M	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.002	0.001	0.000	0.002
25-Aug	0.000	0.000	0.000	Z	0.001	0.000	0.000	0.000	0.013	0.226	0.033	0.015	0.000	0.003	0.025	0.050	0.001	0.000	0.002	0.110	0.113	0.124	0.117	0.127	0.042	0.226
26-Aug	0.178	0.150	0.092	0.075	Z	0.053	0.043	0.007	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	0.005	0.000	0.002	0.026	0.178
27-Aug	0.001	0.000	0.000	0.001	0.000	Z	0.112	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.005	0.112
28-Aug	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.042	0.000	0.051	0.025	0.005	0.051
29-Aug	0.001	Z	0.194	0.157	0.161	0.171	0.137	0.107	0.044	0.053	0.013	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.006	0.045	0.194
30-Aug	0.001	0.000	Z	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002
31-Aug	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.007	0.002	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.007
	0.013	0.014	0.023	0.012	0.021	0.024	0.018	0.015	0.017	0.023	0.013	0.009	0.001	0.001	0.001	0.003	0.002	0.000	0.003	0.009	0.011	0.012	0.012	0.010	Diurnal Average	
	0.178	0.150	0.222	0.157	0.218	0.262	0.251	0.333	0.383	0.335	0.296	0.173	0.029	0.014	0.025	0.050	0.056	0.002	0.078	0.135	0.123	0.124	0.117	0.127	Diurnal Maximum	

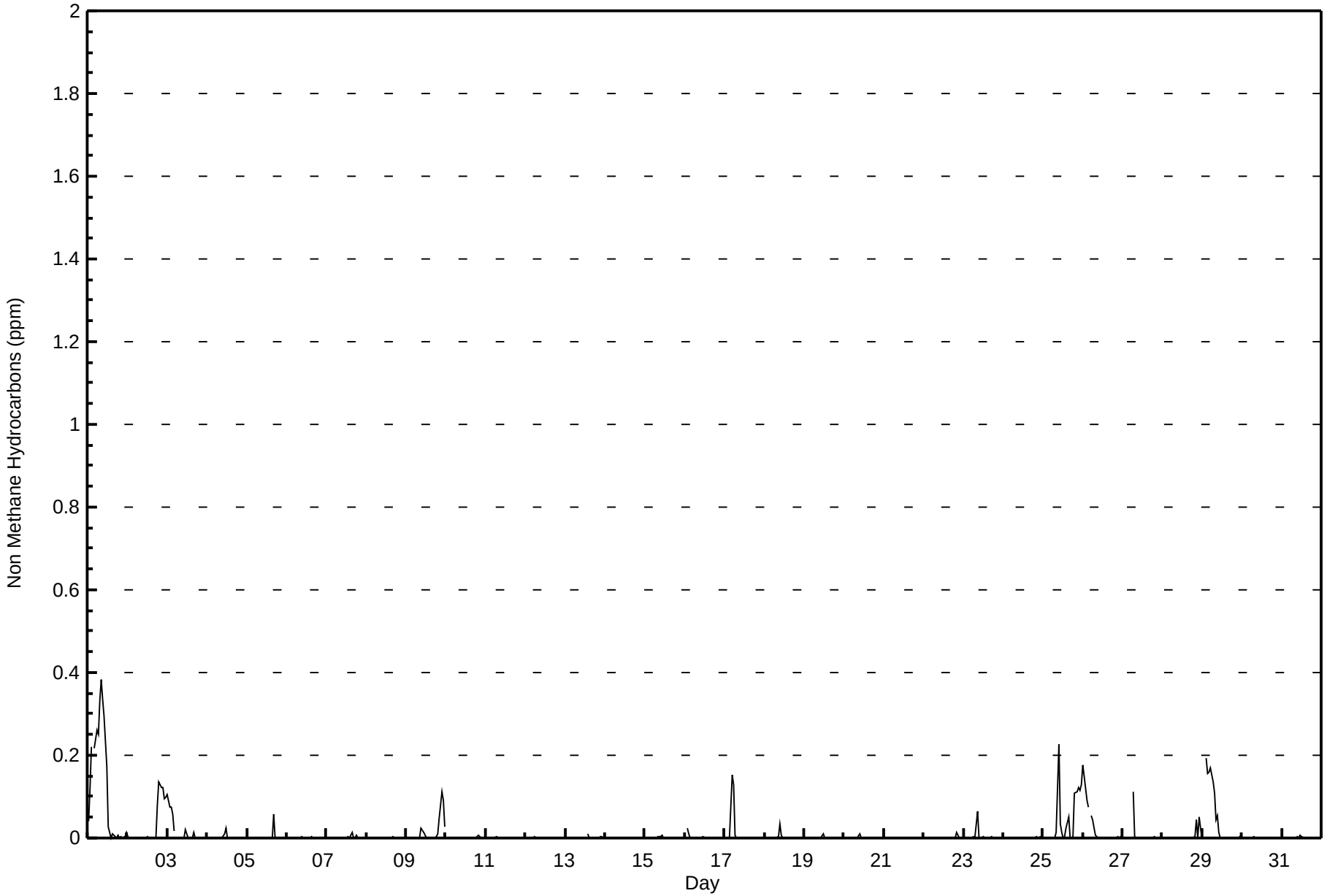
Z - zerospan C - Calibration M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Non Methane Hydrocarbons (NMHC) - ppm

Athabasca Valley - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm

Athabasca Valley - August 2015

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	615	87.61	87.61
0.006 - 0.05	44	6.27	93.87
0.06 - 0.1	26	3.70	97.58
> 0.1	17	2.42	100.00

Total Number of Valid Hours: 702

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm

Athabasca Valley - August 2015

Concentration Ranges (ppm)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 0.005	17	4	3	9	48	68	112	36	21	22	59	73	39	39	31	34	615
0.006 - 0.05	2	1	0	0	4	5	4	1	2	2	1	2	3	4	3	10	44
0.06 - 0.1	0	0	0	1	2	3	5	1	1	1	2	1	2	0	0	7	26
> 0.1	2	0	1	0	0	0	1	1	0	0	1	0	0	1	6	4	17
Totals	21	5	4	10	54	76	122	39	24	25	63	76	44	44	40	55	702

Total Number of Valid Hours: 702

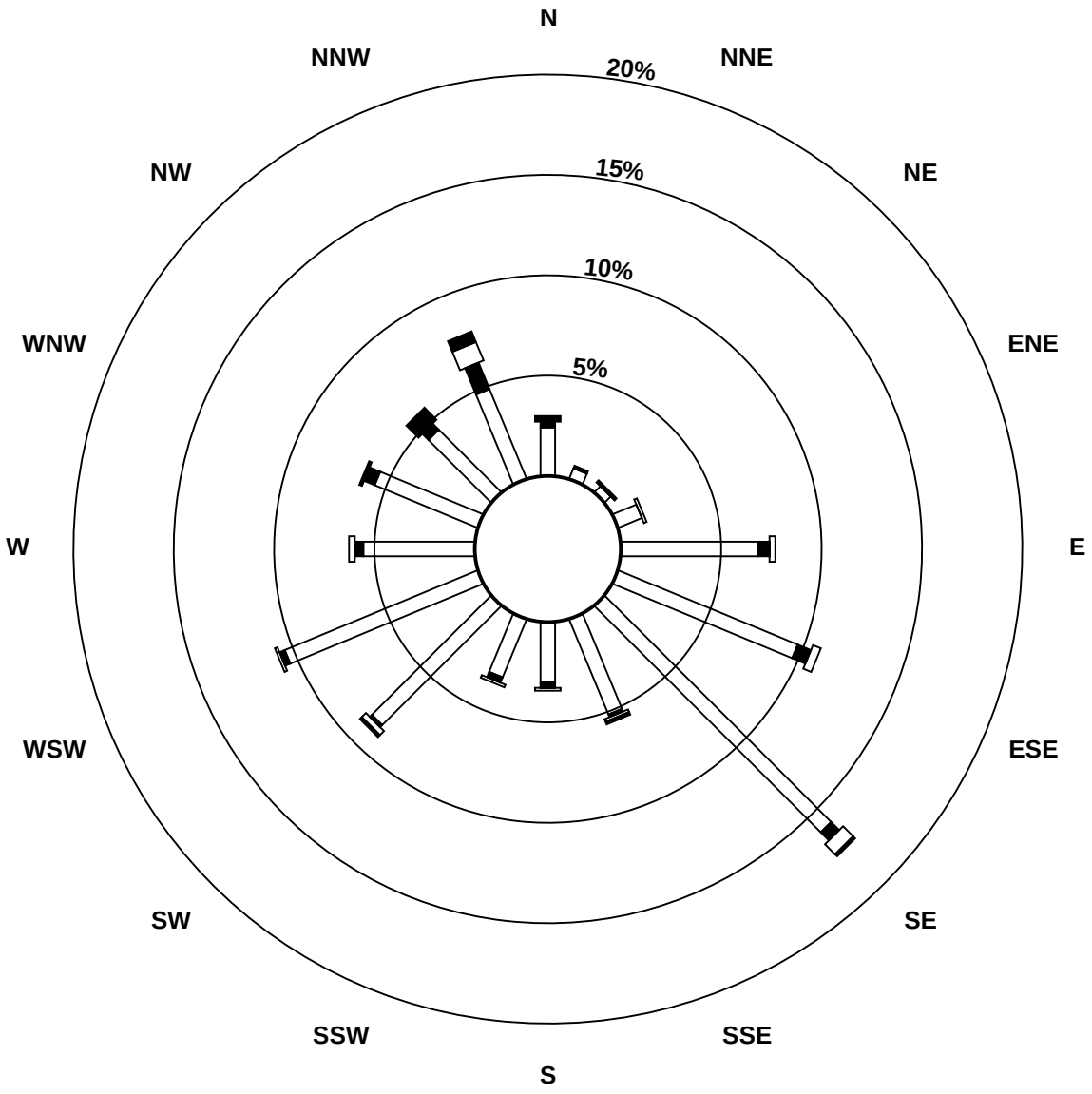
Total Number of Hours: 744

Wood Buffalo Environmental Association

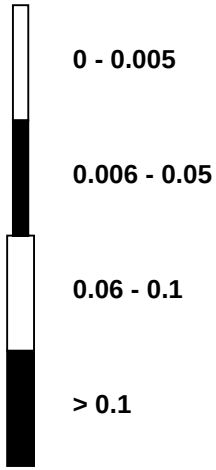
Wind Rose Aug 2015

Non Methane Hydrocarbons (NMHC) - ppm

Athabasca Valley (AMS 7)



Classes (ppm)



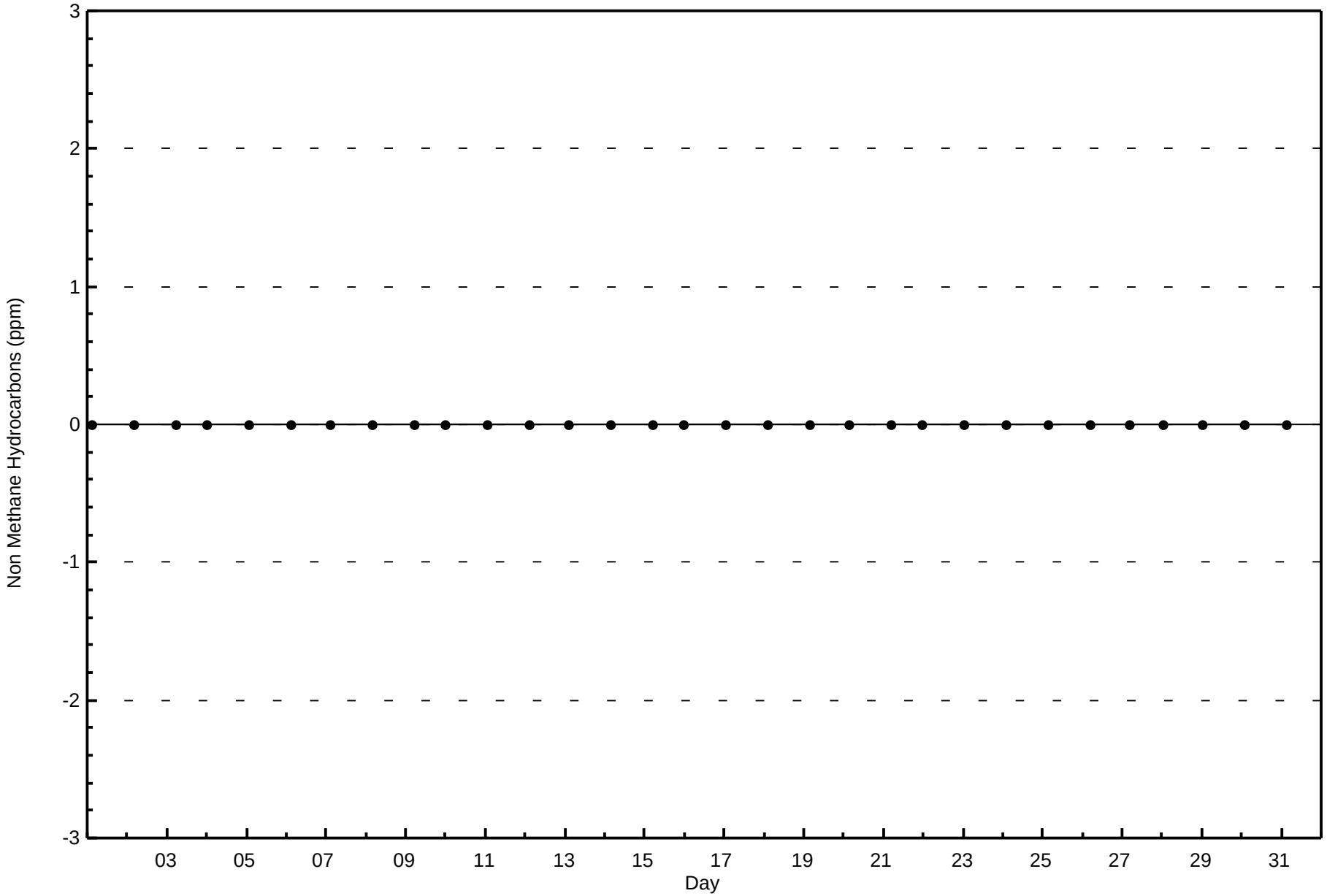
Total Number of Valid Hours: 702

Wood Buffalo Environmental Association

Zero Responses

Non Methane Hydrocarbons (NMHC) - ppm

Athabasca Valley - August 2015



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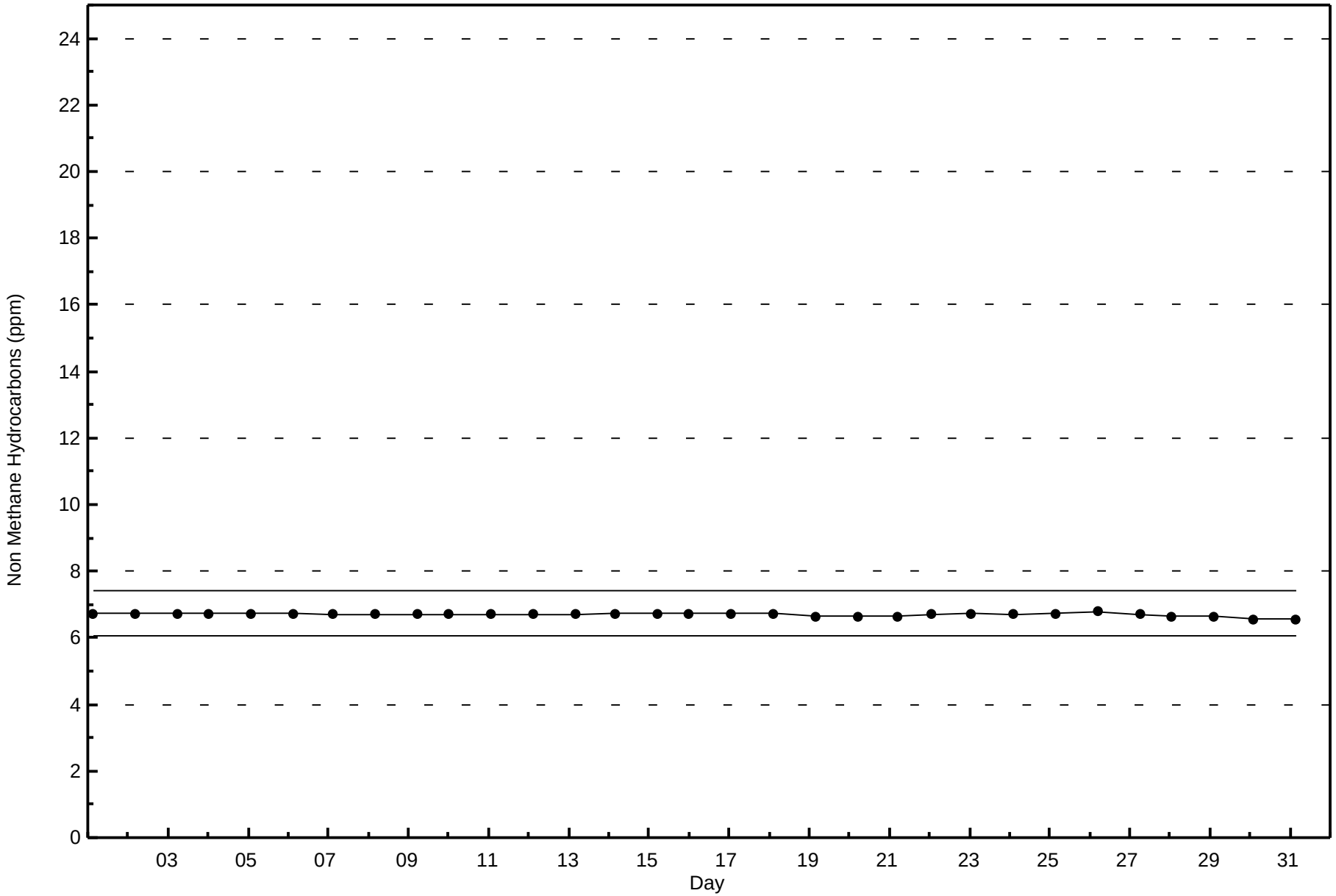
Span Responses

Non Methane Hydrocarbons (NMHC) - ppm

Athabasca Valley - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Methane (CH_4) - ppm

Athabasca Valley - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 2.2 ppm on Aug 1 09:00

Maximum Daily Average: 2.0 ppm on Aug 25

Minimum Value: 1.8 ppm on Aug 13 18:00

Minimum Daily Average: 1.8 ppm on Aug 12

Maximum Diurnal Average: 2.0 ppm at hour 3

Minimum Diurnal Average: 1.8 ppm at hour 17

Monthly Average: 1.89 ppm

Percentiles: $P_1 = 1.8$ $P_{10} = 1.8$ $Q_1 = 1.9$ Median = 1.9 $Q_3 = 1.9$ $P_{90} = 2.0$ $P_{99} = 2.2$

Hours in Service:	744
Hours of Data:	702
Hours of Missing Data:	42
Hours of Calibration:	34
Percent Operational Time:	98.9

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	1.9	2.0	2.1	Z	2.1	2.2	2.1	2.2	2.2	2.2	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.2
2-Aug	1.9	1.9	1.9	1.9	Z	2.0	2.0	2.0	2.0	1.9	1.9	1.9	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	2.0
3-Aug	2.0	1.9	1.9	2.0	2.0	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
4-Aug	Z	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
5-Aug	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
6-Aug	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
7-Aug	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
8-Aug	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
9-Aug	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
10-Aug	Z	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.0
11-Aug	1.9	Z	1.9	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.0
12-Aug	1.8	1.8	Z	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	M	M	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.8	1.9
13-Aug	1.9	1.9	1.9	Z	1.9	1.9	2.0	M	2.0	1.9	C	C	C	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.8	1.9	2.0
14-Aug	1.8	1.8	1.8	1.8	Z	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.9
15-Aug	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
16-Aug	Z	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
17-Aug	1.9	Z	2.0	1.9	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
18-Aug	1.9	1.9	Z	2.0	2.1	2.0	1.9	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	2.1
19-Aug	2.0	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.0
20-Aug	1.8	1.8	1.8	1.8	Z	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	1.9	1.9	1.9	1.8	1.9
21-Aug	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.9	1.8	1.9	1.8	1.8	1.9	1.9	1.9	1.9	1.9
22-Aug	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.0
23-Aug	2.1	Z	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.1
24-Aug	1.9	2.0	Z	1.9	1.9	1.9	1.9	1.9	1.9	M	M	M	M	M	1.9	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.0
25-Aug	2.1	2.2	2.2	Z	2.1	2.1	2.0	2.1	2.0	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.2
26-Aug	2.1	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	2.1
27-Aug	2.1	2.2	2.2	2.2	2.2	Z	2.0	2.0	1.9	1.9	2.0	1.9	1.9	1.8	1.8	1.8	1.8	1.9	1.8	1.8	1.9	1.9	1.9	1.9	2.0	2.2
28-Aug	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.8	1.9	1.9	1.9
29-Aug	1.9	Z	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	2.0
30-Aug	1.9	1.8	Z	1.9	1.9	1.9	2.0	2.0	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	2.0
31-Aug	1.9	1.9	2.0	Z	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	2.0
	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	Diurnal Average	
	2.1	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	Diurnal Maximum	

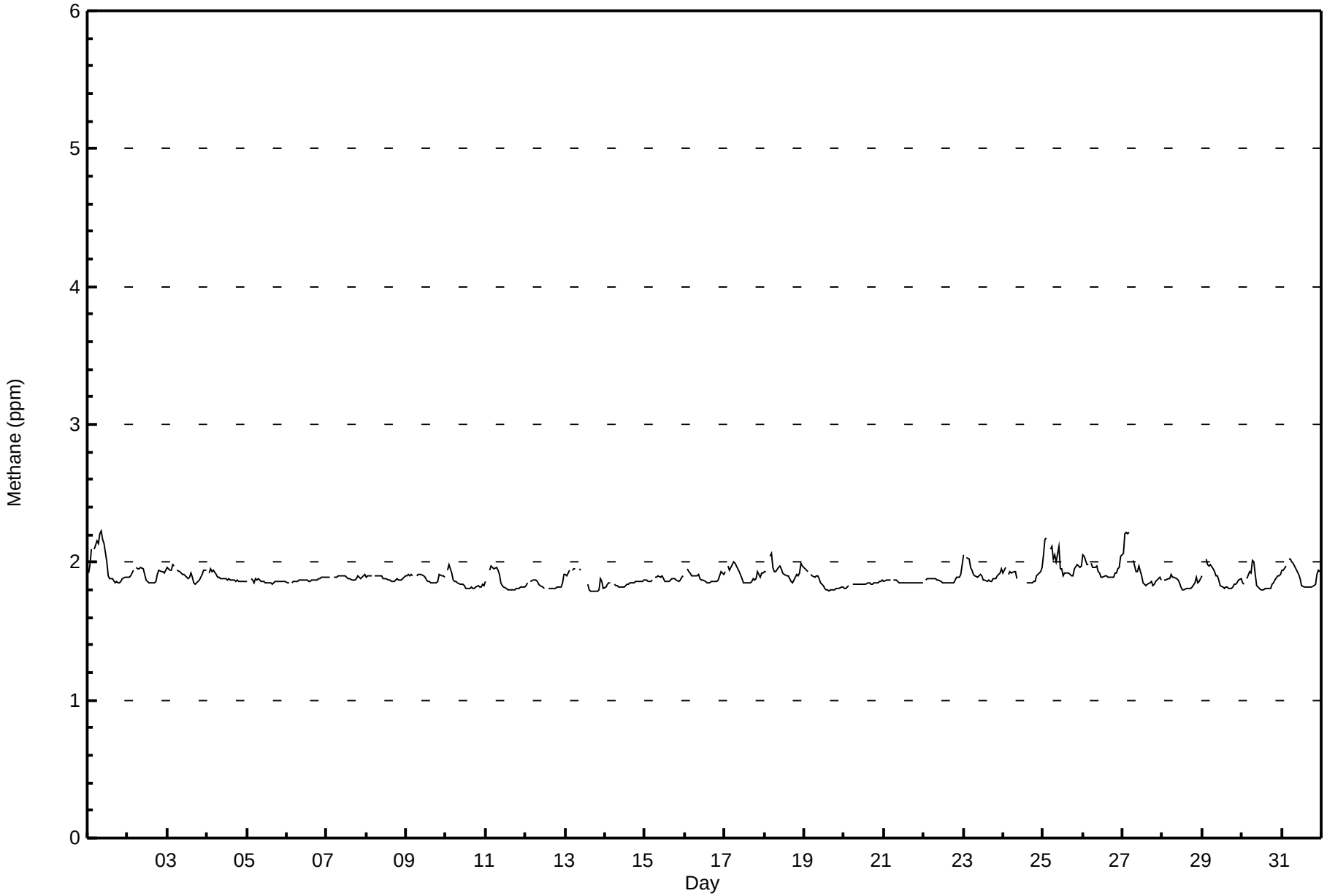
Z - zerospan C - Calibration M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Methane (CH_4) - ppm

Athabasca Valley - August 2015



Methane (CH_4) - ppm
Athabasca Valley - August 2015

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	679	96.72	96.72
2.1 - 3.0	23	3.28	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 702

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Methane (CH_4) - ppm

Athabasca Valley - August 2015

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	19	5	3	9	51	72	117	39	24	25	63	76	44	44	36	52	679
2.1 - 3.0	2	0	1	1	3	4	5	0	0	0	0	0	0	0	4	3	23
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	21	5	4	10	54	76	122	39	24	25	63	76	44	44	40	55	702

Total Number of Valid Hours: 702

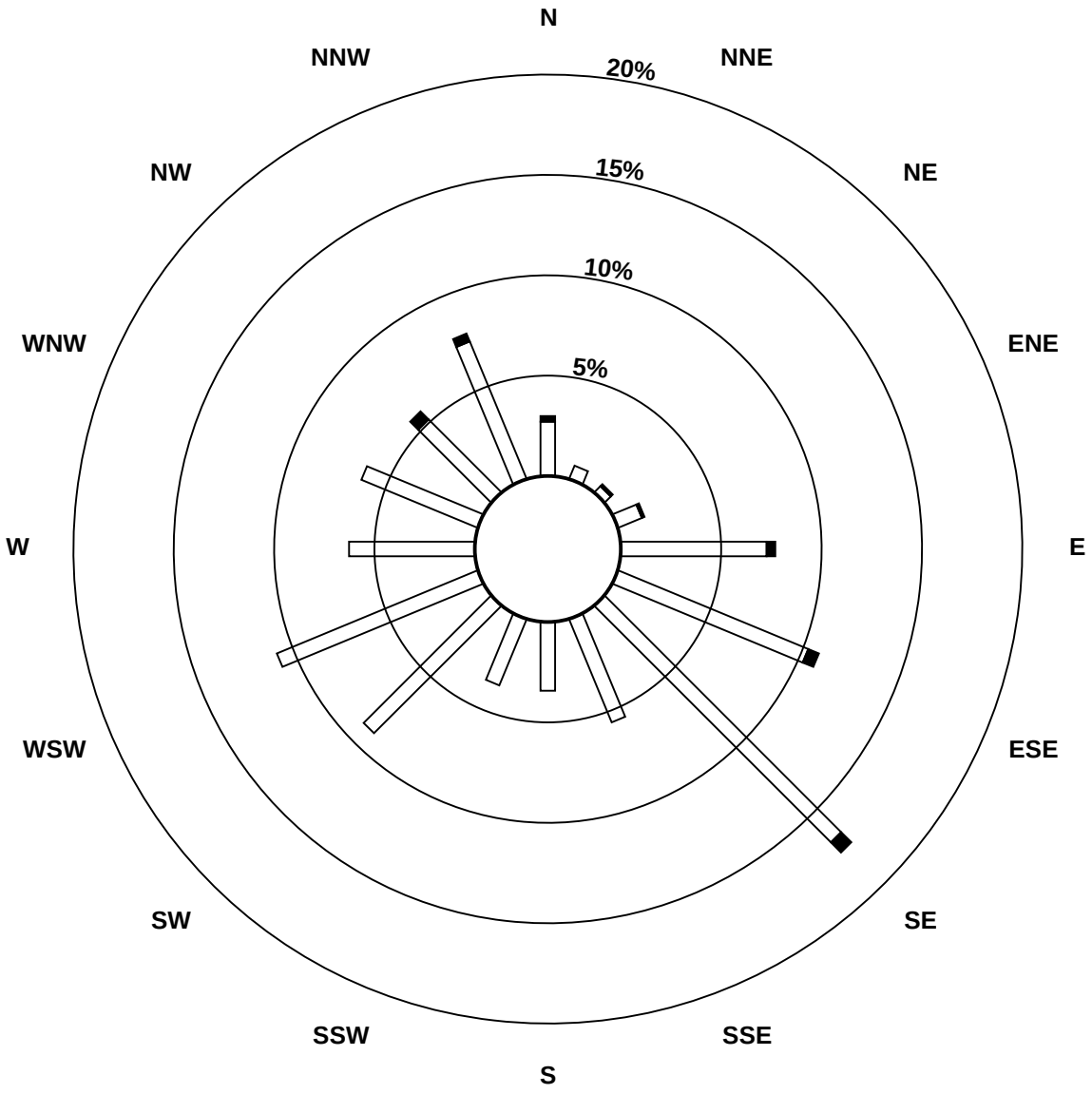
Total Number of Hours: 744

Wood Buffalo Environmental Association

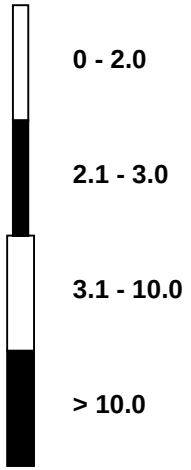
Wind Rose Aug 2015

Methane (CH_4) - ppm

Athabasca Valley (AMS 7)



Classes (ppm)



0 - 2.0

2.1 - 3.0

3.1 - 10.0

> 10.0

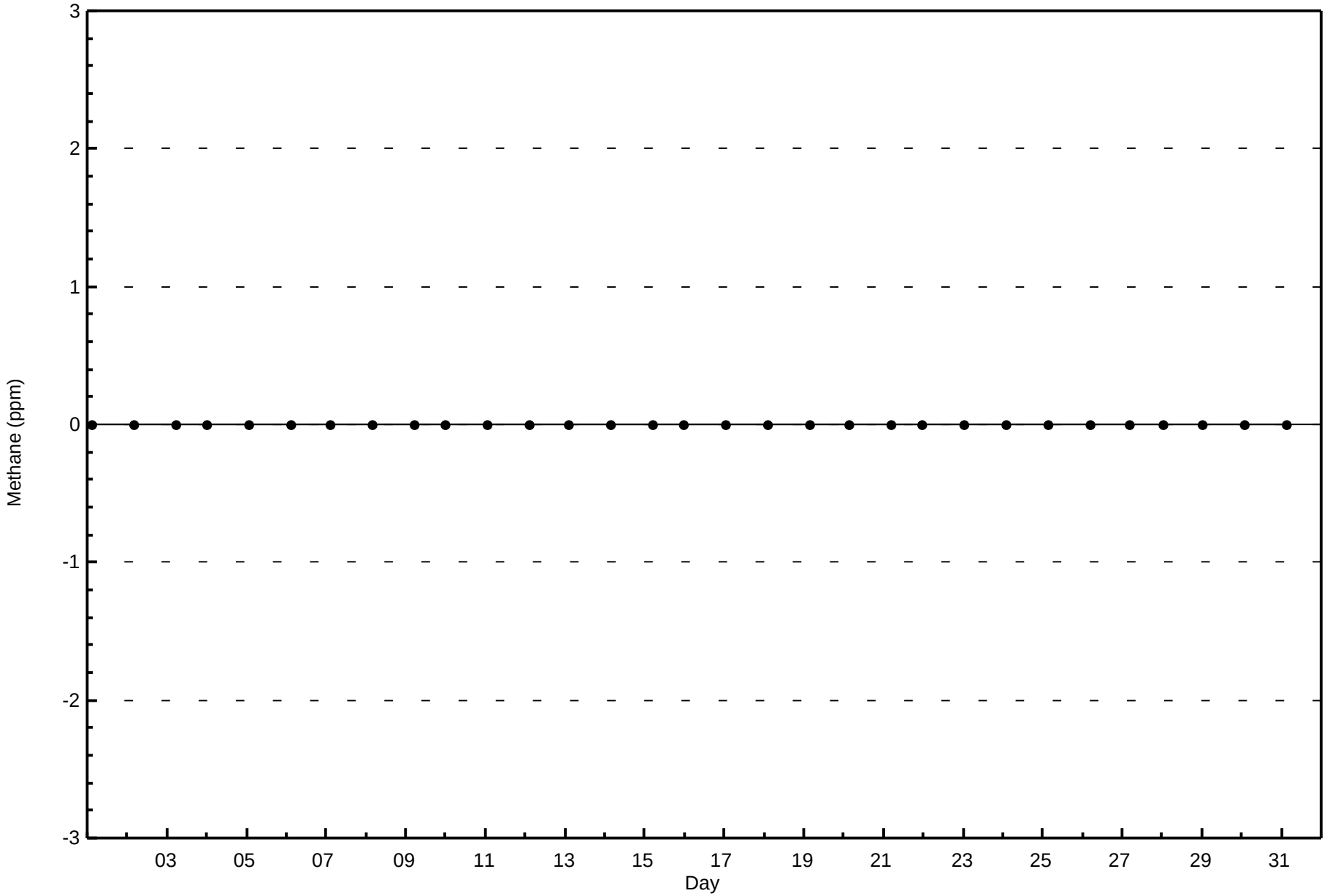
Total Number of Valid Hours: 702

Wood Buffalo Environmental Association

Zero Responses

Methane (CH_4) - ppm

Athabasca Valley - August 2015

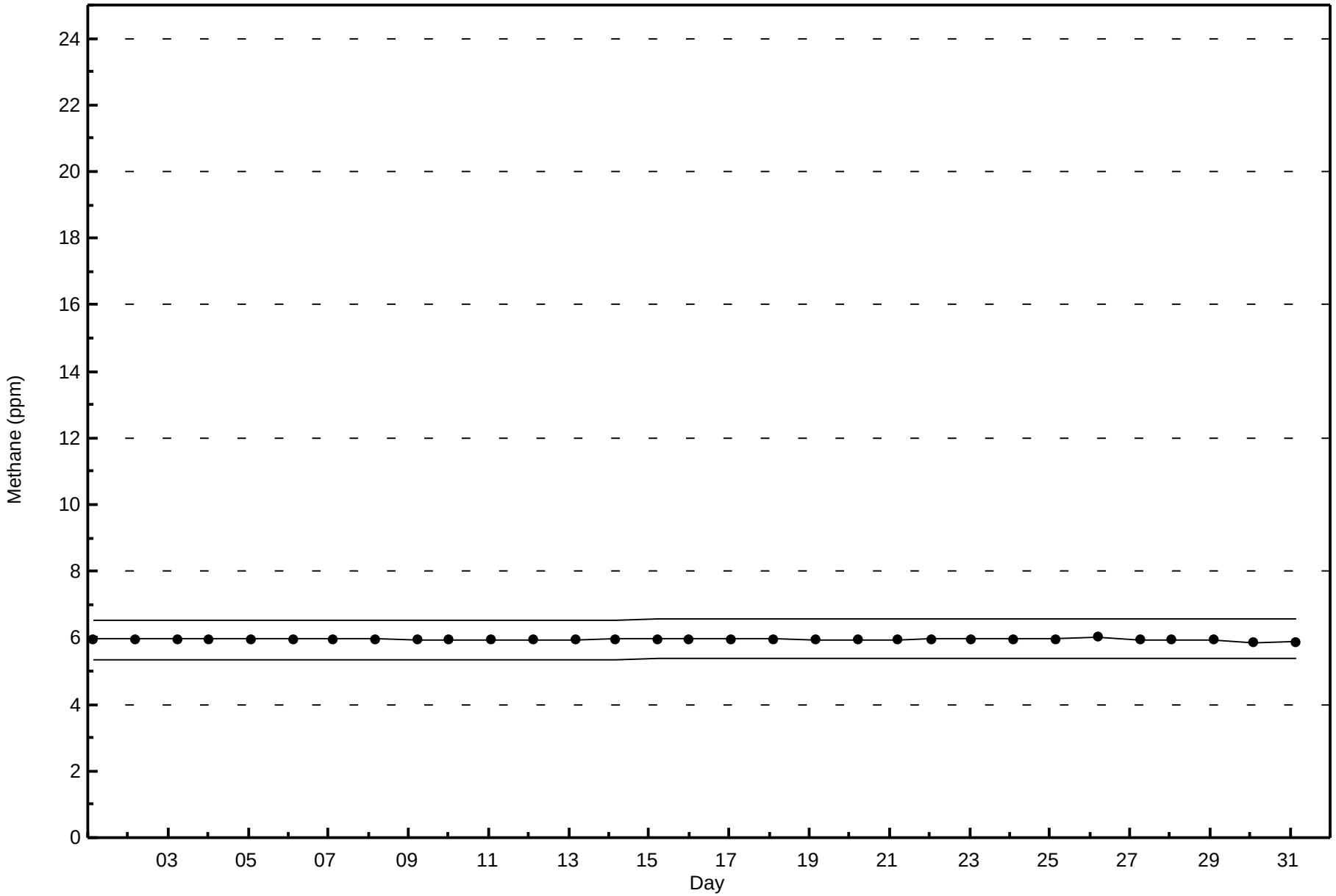


Wood Buffalo Environmental Association

Span Responses

Methane (CH_4) - ppm

Athabasca Valley - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O_3) - ppb

Athabasca Valley - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 39 ppb on Aug 27 19:00

Maximum Daily Average: 24.8 ppb on Aug 10

Minimum Value: 1 ppb on Aug 25 05:00

Minimum Daily Average: 8.8 ppb on Aug 7

Maximum Diurnal Average: 26.9 ppb at hour 16

Minimum Diurnal Average: 8.5 ppb at hour 7

Monthly Average: 17.3 ppb

Percentiles: $P_1 = 1$ $P_{10} = 5$ $Q_1 = 10$ Median = 17 $Q_3 = 25$ $P_{90} = 30$ $P_{99} = 37$

Hours in Service:	744
Hours of Data:	706
Hours of Missing Data:	38
Hours of Calibration:	35
Percent Operational Time:	99.6

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	11	9	3	1	1	Z	4	3	4	11	14	19	27	30	34	28	24	26	24	24	21	18	12	8	15.5	34
2-Aug	6	4	3	2	2	2	Z	6	9	15	23	26	27	26	27	26	24	23	23	22	18	16	14	10	15.5	27
3-Aug	8	7	5	2	2	2	3	Z	7	11	16	22	25	31	28	30	32	31	25	21	16	17	14	14	16.0	32
4-Aug	13	14	Z	10	8	10	10	11	14	16	17	18	19	19	16	14	17	20	17	19	19	16	13	13	14.9	20
5-Aug	10	9	9	Z	15	9	9	10	13	13	14	16	16	17	18	19	17	13	15	15	14	13	15	14	13.6	19
6-Aug	14	13	12	12	Z	12	12	12	11	11	14	14	15	14	11	11	10	9	8	7	6	6	5	5	10.6	15
7-Aug	4	5	5	5	5	Z	3	3	4	6	8	9	10	12	14	16	16	16	13	10	13	10	8	7	8.8	16
8-Aug	7	7	6	5	4	4	Z	5	6	13	17	19	22	23	22	21	22	20	20	19	18	14	11	9	13.8	23
9-Aug	6	4	4	4	4	3	4	Z	4	7	15	21	24	25	29	32	33	27	25	17	10	8	8	9	14.1	33
10-Aug	10	10	Z	14	23	20	19	21	25	29	29	27	28	30	31	31	35	36	32	24	22	24	24	25	24.8	36
11-Aug	20	18	15	Z	9	7	6	9	16	20	25	26	29	30	29	28	28	31	32	31	32	27	23	25	22.3	32
12-Aug	26	24	17	18	Z	15	18	20	22	24	25	M	M	29	29	30	32	32	32	30	26	22	18	14	23.9	32
13-Aug	13	13	9	9	5	Z	4	M	7	9	12	16	17	21	27	29	27	27	26	24	15	13	12	19	16.0	29
14-Aug	19	22	21	21	21	21	Z	23	24	23	23	22	20	19	20	20	18	17	17	15	16	17	16	15	19.6	24
15-Aug	15	14	17	16	14	12	11	Z	15	17	19	23	28	29	28	27	25	24	22	20	19	18	15	14	19.2	29
16-Aug	12	10	Z	9	8	8	8	7	9	17	18	20	23	24	26	25	25	25	25	22	19	14	10	8	16.2	26
17-Aug	8	8	6	Z	3	4	7	9	11	14	19	25	27	27	27	28	29	28	27	22	16	15	12	13	16.8	29
18-Aug	9	9	7	5	Z	7	12	13	15	17	24	28	33	38	39	39	28	27	29	20	18	17	11	13	19.9	39
19-Aug	13	15	16	16	20	Z	18	16	19	25	25	24	23	23	29	30	33	30	32	29	27	24	22	20	23.0	33
20-Aug	19	18	17	17	17	17	Z	18	20	20	20	18	18	18	17	17	18	18	19	18	18	17	16	16	17.9	20
21-Aug	15	14	13	12	10	10	10	Z	15	15	16	17	17	17	18	19	17	18	17	18	18	17	17	16	15.4	19
22-Aug	15	13	Z	13	13	12	10	9	11	14	18	20	20	22	24	25	25	25	25	17	11	8	5	6	15.6	25
23-Aug	5	5	4	Z	3	3	4	4	7	9	12	18	31	37	38	38	36	32	25	25	26	24	26	23	18.8	38
24-Aug	23	20	22	18	Z	10	11	12	18	21	26	26	27	27	28	29	28	26	20	13	11	8	5	3	18.8	29
25-Aug	2	3	2	1	1	Z	1	1	4	7	18	19	27	29	27	22	19	20	19	13	9	6	7	6	11.4	29
26-Aug	1	2	8	8	4	1	Z	7	C	C	C	C	25	30	32	33	30	29	27	16	14	13	9	4	15.4	33
27-Aug	5	3	2	1	1	1	1	Z	4	11	16	28	32	33	34	35	35	38	39	30	21	25	22	27	19.3	39
28-Aug	30	29	Z	26	23	14	20	23	24	24	25	27	30	31	31	30	30	28	19	14	14	12	8	8	22.7	31
29-Aug	9	5	9	Z	5	3	5	8	14	16	23	31	33	35	37	37	35	31	28	23	25	26	24	27	21.3	37
30-Aug	26	25	23	19	Z	12	10	16	20	31	35	35	35	35	34	33	29	28	21	13	9	6	6	7	22.1	35
31-Aug	7	7	7	5	2	Z	1	3	4	8	11	18	28	31	31	31	30	30	28	19	15	8	10	12	15.0	31
	12.2	11.6	10.1	10.3	8.5	8.8	8.5	10.8	12.6	15.9	19.1	21.8	24.5	26.2	26.9	26.9	26.1	25.3	23.6	19.7	17.2	15.4	13.4	13.1	Diurnal Average	
	30	29	23	26	23	21	20	23	25	31	35	35	35	38	39	39	36	38	39	31	32	27	26	27	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance

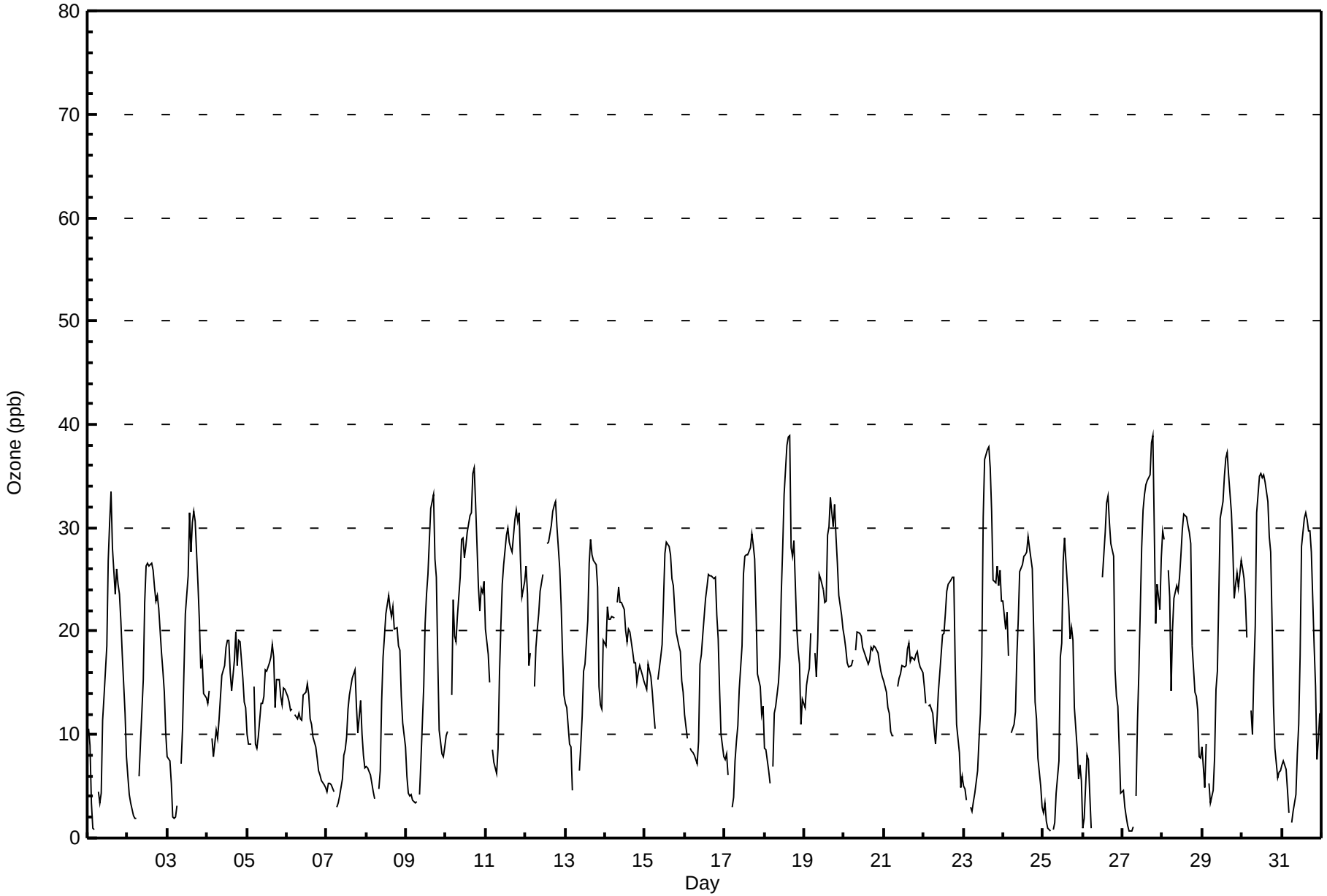
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb

Wood Buffalo Environmental Association

Hourly Averages

Ozone (O_3) - ppb

Athabasca Valley - August 2015



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	452	64.02	64.02
21 - 50	254	35.98	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 706

Total Number of Hours: 744

Wood Buffalo Environmental Association **Ozone (O_3) - ppb**

Frequency Distribution **Athabasca Valley - August 2015**

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	7	2	3	7	45	69	107	25	15	8	23	33	18	29	29	32	452
21 - 50	14	3	2	2	10	9	16	12	9	16	45	43	27	15	11	20	254
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	21	5	5	9	55	78	123	37	24	24	68	76	45	44	40	52	706

Total Number of Valid Hours: 706

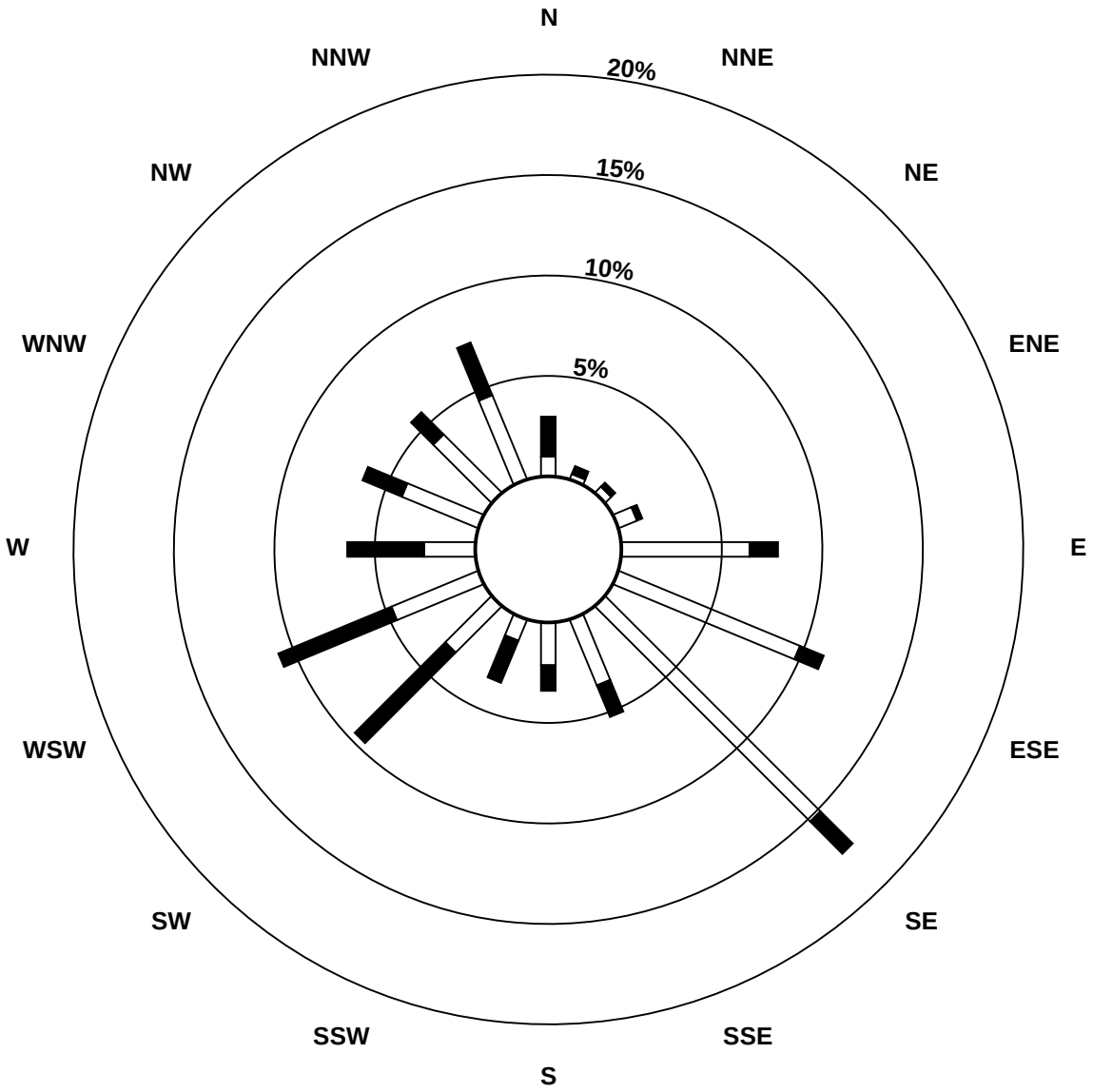
Total Number of Hours: 744

Wood Buffalo Environmental Association

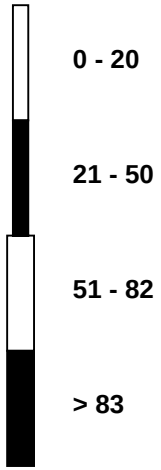
Wind Rose Aug 2015

Ozone (O_3) - ppb

Athabasca Valley (AMS 7)



Classes (ppb)



0 - 20

21 - 50

51 - 82

> 83

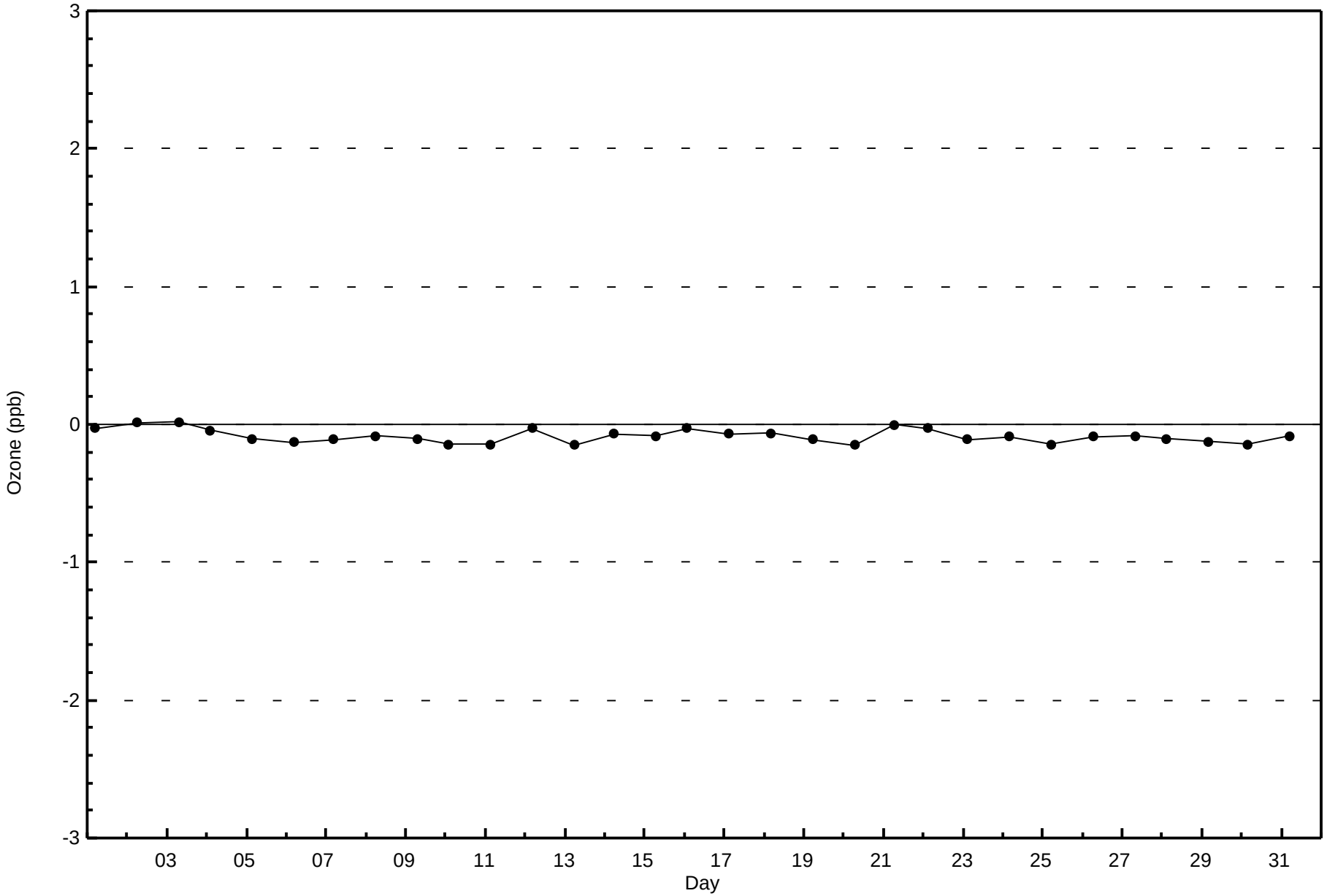
Total Number of Valid Hours: 706

Wood Buffalo Environmental Association

Zero Responses

Ozone (O_3) - ppb

Athabasca Valley - August 2015

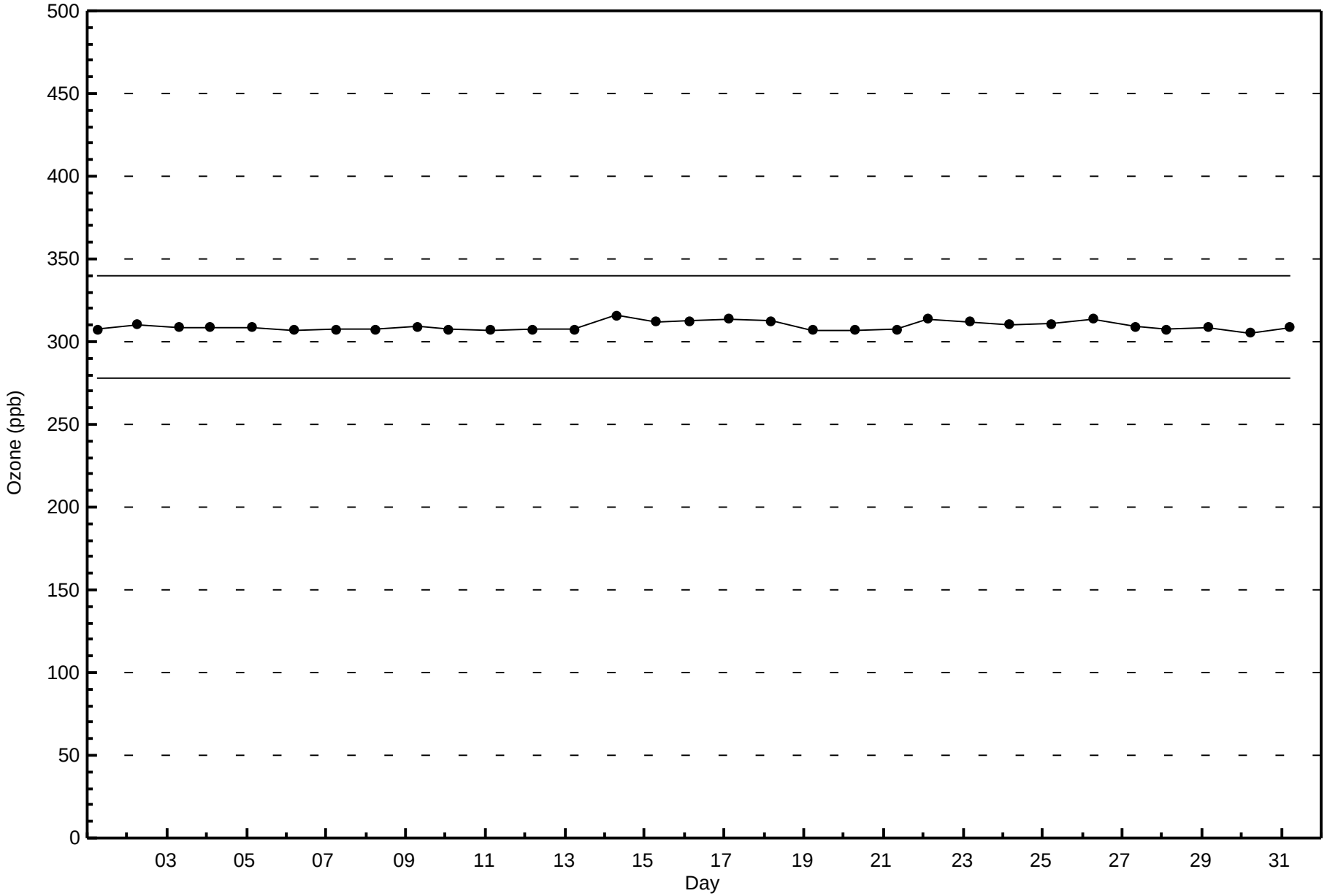


Wood Buffalo Environmental Association

Span Responses

Ozone (O_3) - ppb

Athabasca Valley - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

Athabasca Valley - August 2015

Maximum Value: 33 ppb on Aug 10 12:00

Maximum Daily Average: 4.2 ppb on Aug 25

Minimum Value: 0 ppb on Aug 3 01:00

Minimum Daily Average: 0.1 ppb on Aug 14

Maximum Diurnal Average: 3.0 ppb at hour 9

Minimum Diurnal Average: 0.2 ppb at hour 24

Monthly Average: 1.1 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 1$ $P_{90} = 2$ $P_{99} = 12$

Hours in Service:	744
Hours of Data:	699
Hours of Missing Data:	45
Hours of Calibration:	37
Percent Operational Time:	98.9

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0	0	0	Z	1	6	3	8	13	7	5	3	2	1	1	1	2	1	0	0	0	0	0	0	2.4	13
2-Aug	0	1	1	1	Z	3	3	2	2	2	1	0	2	1	0	0	0	0	1	1	0	0	0	0	0.9	3
3-Aug	0	0	0	1	1	Z	4	3	2	1	1	1	0	0	1	0	0	0	0	0	0	0	1	0	0.7	4
4-Aug	Z	0	0	0	0	1	2	2	2	2	2	1	1	1	1	1	1	0	1	0	0	0	0	0	0.7	2
5-Aug	0	Z	0	0	0	0	1	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0	0	0.4	1
6-Aug	0	0	Z	0	0	0	1	1	1	1	1	1	1	0	0	1	1	0	1	1	1	1	0	0	0.6	1
7-Aug	0	0	0	Z	0	0	1	1	2	2	2	0	1	0	1	1	2	2	4	4	1	5	1	0	1.3	5
8-Aug	1	2	0	0	Z	2	2	2	2	2	1	0	0	3	1	1	2	0	0	1	1	1	0	0	1.2	3
9-Aug	0	0	0	0	0	Z	1	2	2	1	1	1	0	0	1	1	1	2	2	2	2	1	0	0	0.9	2
10-Aug	Z	0	0	0	0	0	1	1	1	2	7	33	13	12	2	1	1	1	1	2	1	0	0	0	3.5	33
11-Aug	0	Z	0	1	1	1	5	5	2	1	1	1	0	1	1	1	2	1	1	0	0	0	1	0	1.2	5
12-Aug	0	0	Z	0	1	3	1	1	M	M	M	M	M	M	1	1	1	1	0	0	0	0	0	0	--	3
13-Aug	1	0	0	Z	2	5	5	M	6	4	3	2	2	1	0	0	1	0	0	0	1	1	1	0	1.6	6
14-Aug	0	0	0	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
15-Aug	0	0	0	0	0	Z	0	0	1	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0.3	1
16-Aug	Z	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0.3	1
17-Aug	0	Z	1	1	4	5	3	2	2	2	1	0	0	0	0	0	1	1	0	1	1	0	0	0	1.2	5
18-Aug	0	0	Z	1	2	3	2	3	3	3	2	1	1	0	0	0	1	1	1	1	1	0	1	1	1.2	3
19-Aug	0	0	0	Z	0	0	1	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2
20-Aug	0	0	0	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
21-Aug	0	0	0	0	1	Z	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.2	1
22-Aug	Z	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0.3	1
23-Aug	1	Z	1	1	1	2	2	2	2	2	3	1	1	1	0	0	0	1	2	0	0	0	0	0	1.0	3
24-Aug	0	0	Z	0	1	2	2	3	C	C	C	C	C	C	1	1	1	0	1	1	1	1	0	1	--	3
25-Aug	0	0	1	Z	3	11	11	14	15	23	6	5	2	1	0	1	1	0	0	0	0	1	0	0	4.2	23
26-Aug	2	1	0	0	Z	6	5	5	5	2	2	M	1	1	0	1	0	0	1	1	0	0	0	1	1.7	6
27-Aug	0	1	0	1	4	Z	10	9	9	4	3	1	0	0	0	0	0	0	0	1	5	0	1	0	2.3	10
28-Aug	Z	0	0	0	1	6	1	1	1	1	0	0	0	0	0	0	1	1	2	1	0	0	0	0	0.7	6
29-Aug	0	Z	0	1	2	3	3	6	3	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	6
30-Aug	0	0	Z	0	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0.5	2
31-Aug	0	0	0	Z	2	6	6	7	7	5	5	6	1	0	0	0	0	0	0	2	0	2	1	0	2.3	7
	0.3	0.2	0.2	0.4	1.1	2.6	2.7	3.0	3.0	2.5	1.7	2.1	1.0	0.9	0.5	0.5	0.6	0.5	0.6	0.8	0.6	0.6	0.4	0.2	Diurnal Average	
	2	2	1	1	4	11	11	14	15	23	7	33	13	12	2	1	2	2	4	4	5	5	1	1	Diurnal Maximum	

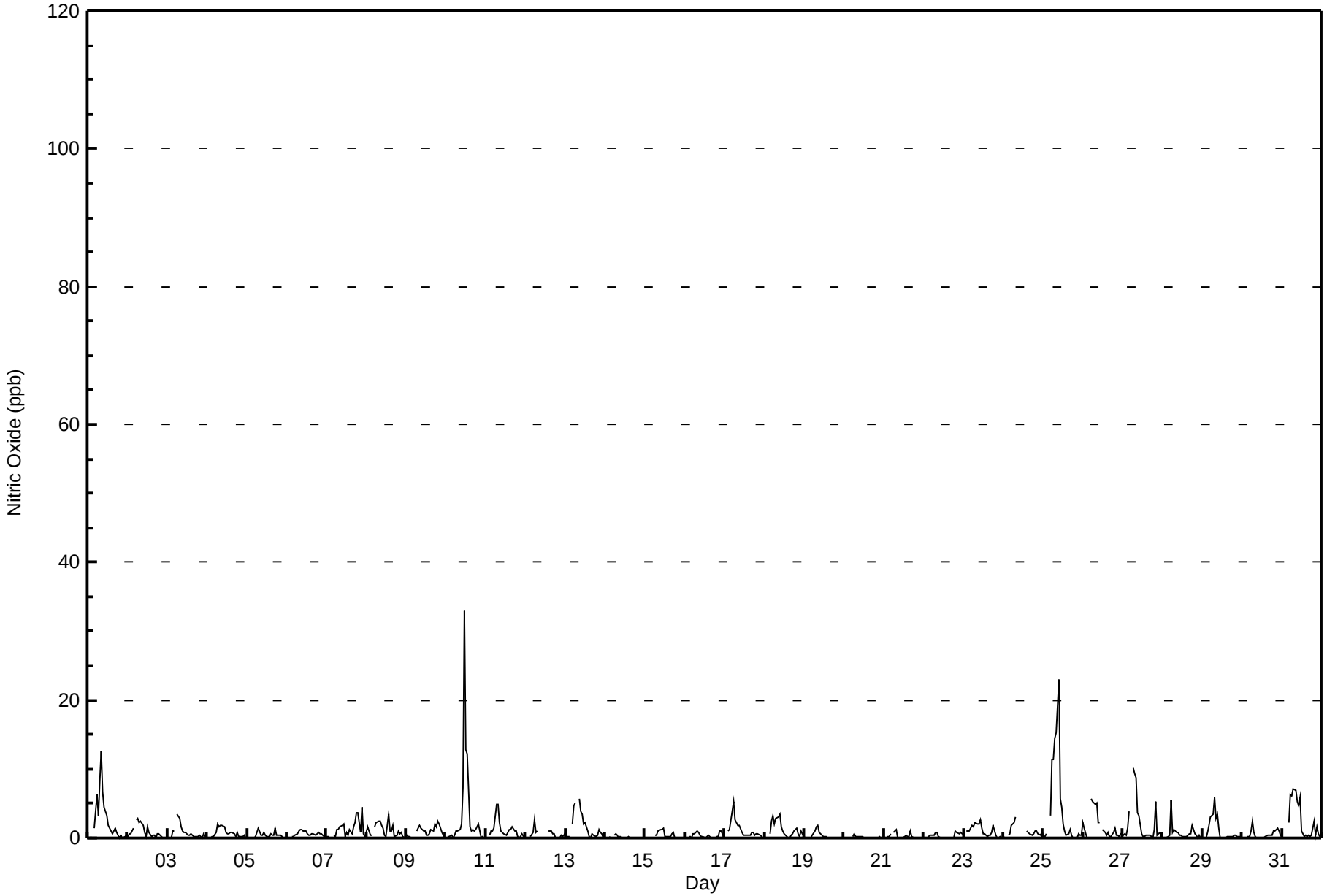
Z - zerospan C - Calibration M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Nitric Oxide (NO) - ppb

Athabasca Valley - August 2015



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	697	99.71	99.71
21 - 40	2	0.29	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: 699

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Nitric Oxide (NO) - ppb

Athabasca Valley - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	21	5	4	10	54	77	124	39	24	25	61	75	41	44	39	54	697
21 - 40	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	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	21	5	4	10	54	77	124	39	24	25	62	75	41	44	40	54	699

Total Number of Valid Hours: 699

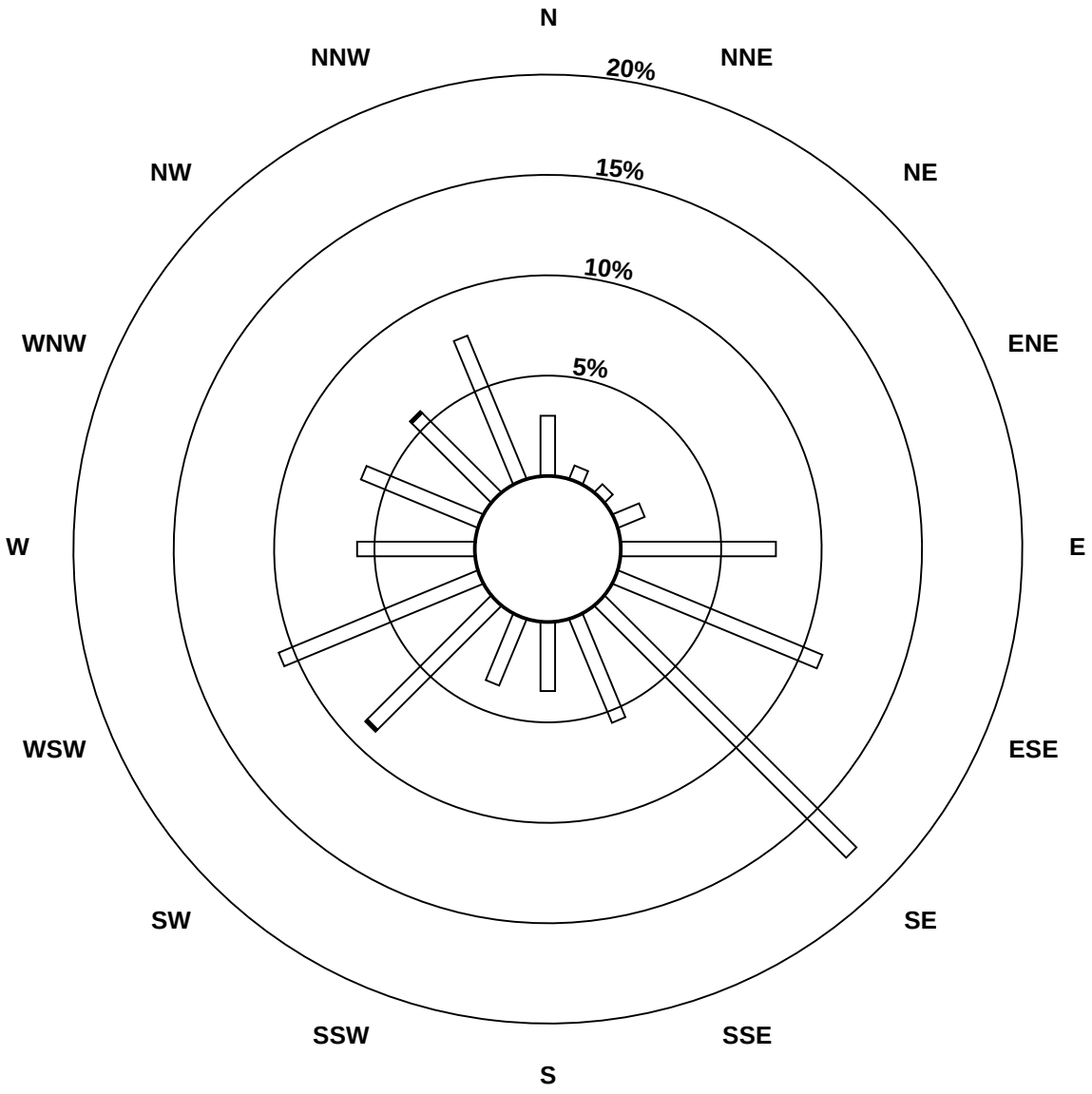
Total Number of Hours: 744

Wood Buffalo Environmental Association

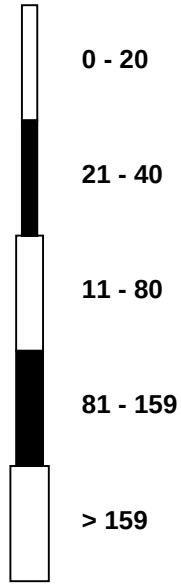
Wind Rose Aug 2015

Nitric Oxide (NO) - ppb

Athabasca Valley (AMS 7)



Classes (ppb)



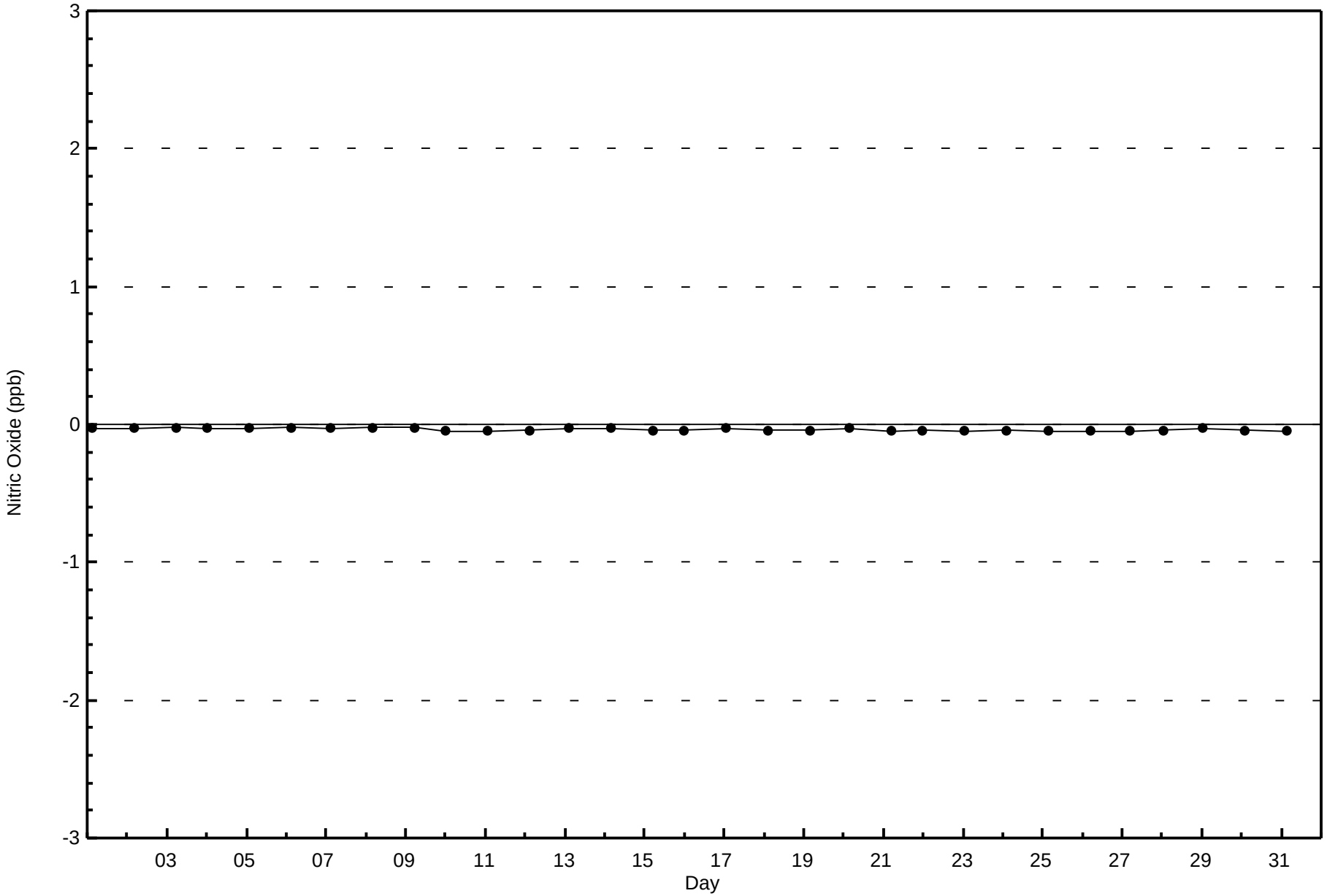
Total Number of Valid Hours: 699

Wood Buffalo Environmental Association

Zero Responses

Nitric Oxide (NO) - ppb

Athabasca Valley - August 2015

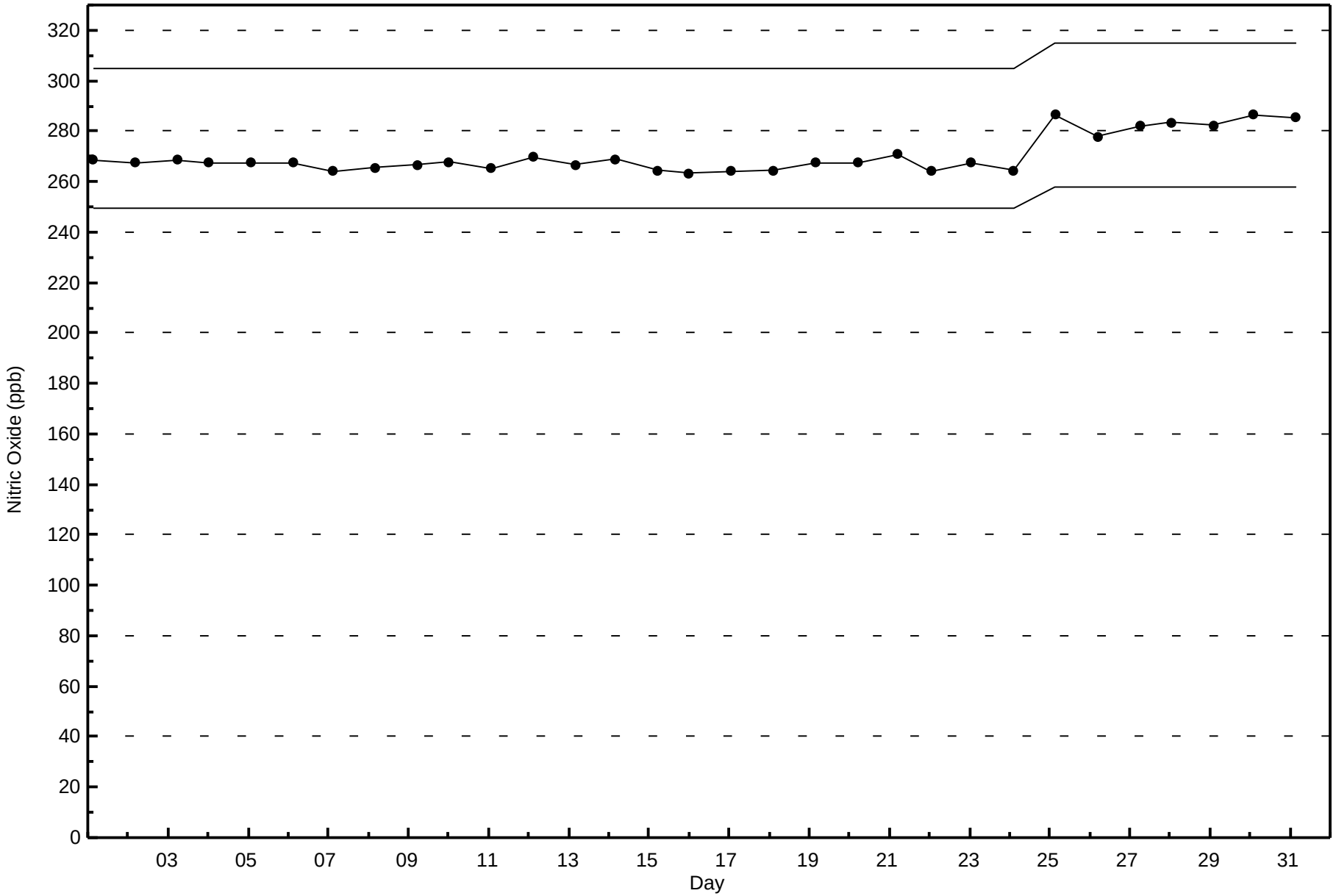


Wood Buffalo Environmental Association

Span Responses

Nitric Oxide (NO) - ppb

Athabasca Valley - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO_2) - ppb

Athabasca Valley - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 18 ppb on Aug 10 12:00 Maximum Daily Average: 6.6 ppb on Aug 26

Minimum Value: 0 ppb on Aug 7 03:00 Minimum Daily Average: 0.8 ppb on Aug 14

Maximum Diurnal Average: 5.4 ppb at hour 6 Minimum Diurnal Average: 1.6 ppb at hour 15

Monthly Average: 3.2 ppb Percentiles: $P_1 = 0$ $P_{10} = 1$ $Q_1 = 1$ Median = 2 $Q_3 = 5$ $P_{90} = 7$ $P_{99} = 12$

Hours in Service:	744
Hours of Data:	699
Hours of Missing Data:	45
Hours of Calibration:	37
Percent Operational Time:	98.9

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	3	5	12	Z	12	11	7	9	11	8	9	6	5	5	3	4	4	3	3	1	4	3	4	6	5.9	12
2-Aug	4	2	2	3	Z	3	2	2	2	3	2	1	0	1	1	2	2	2	5	8	8	7	6	5	3.2	8
3-Aug	5	3	3	4	3	Z	3	2	2	2	2	3	2	2	3	3	3	2	1	2	3	3	4	2	2.6	5
4-Aug	Z	1	2	3	3	6	8	6	5	4	4	3	2	2	2	2	2	2	3	3	3	3	2	2	3.1	8
5-Aug	2	Z	1	0	1	3	2	3	1	1	1	1	1	1	1	1	2	4	1	2	1	1	1	0	1.3	4
6-Aug	0	0	Z	1	2	2	2	2	2	1	1	1	1	1	0	1	1	1	1	1	1	1	1	0	0.9	2
7-Aug	1	0	0	Z	0	1	1	1	1	1	2	1	1	1	1	1	2	2	6	6	3	7	5	3	2.0	7
8-Aug	2	2	2	2	Z	2	2	1	2	2	2	2	2	3	2	3	2	1	2	3	2	4	4	2	2.1	4
9-Aug	4	3	2	2	1	Z	1	1	1	1	2	2	1	1	1	1	1	4	2	6	5	7	4	2	2.3	7
10-Aug	Z	3	4	2	2	3	2	2	2	3	5	18	7	6	2	2	2	2	4	8	6	2	4	2	3.9	18
11-Aug	4	Z	4	8	8	7	10	10	4	2	1	1	1	1	1	1	2	1	2	2	1	4	4	1	3.5	10
12-Aug	0	1	Z	4	5	7	3	2	M	M	M	M	M	M	1	1	1	1	1	2	2	3	5	6	--	7
13-Aug	5	4	5	Z	7	8	7	M	7	5	5	5	6	3	1	1	2	2	2	4	7	5	6	1	4.4	8
14-Aug	0	0	1	1	Z	1	2	2	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	0.8	2
15-Aug	0	0	0	1	1	Z	4	4	5	4	3	3	2	1	1	2	2	3	3	2	2	2	2	2	2.1	5
16-Aug	Z	5	4	4	3	3	1	1	1	1	1	1	1	1	1	1	0	1	1	3	3	6	7	6	2.4	7
17-Aug	5	Z	4	5	9	8	4	2	2	2	1	1	1	1	1	1	3	4	3	5	6	6	5	4	3.8	9
18-Aug	4	2	Z	4	6	5	3	3	4	5	4	3	3	3	3	3	2	2	6	12	10	6	10	6	4.7	12
19-Aug	4	2	2	Z	3	6	7	8	6	2	2	1	1	1	1	1	2	2	1	1	1	1	1	0	2.4	8
20-Aug	0	0	0	1	Z	1	1	2	2	2	1	1	1	1	1	1	1	2	1	1	1	1	1	0	1.0	2
21-Aug	1	0	0	1	1	Z	1	2	1	1	1	1	1	1	1	2	2	1	2	1	1	1	1	1	0.9	2
22-Aug	Z	0	0	0	1	1	1	1	1	1	1	0	1	0	0	1	1	1	1	6	6	7	8	6	1.9	8
23-Aug	5	Z	4	3	2	2	2	1	1	1	2	2	2	3	2	2	3	4	9	7	4	5	4	6	3.4	9
24-Aug	4	3	Z	4	5	8	6	4	C	C	C	C	C	C	2	2	2	3	5	5	3	5	6	8	--	8
25-Aug	5	3	4	Z	4	5	5	6	6	13	8	8	5	6	6	7	6	4	3	8	11	11	7	7	6.3	13
26-Aug	11	11	6	7	Z	14	11	8	6	3	3	M	4	3	3	4	6	6	7	8	7	5	6	8	6.6	14
27-Aug	6	5	5	4	4	Z	5	4	3	4	5	2	2	2	1	2	2	3	2	10	18	11	9	4	4.8	18
28-Aug	Z	0	1	3	4	13	5	2	2	2	2	1	1	1	1	2	2	3	11	8	4	5	9	7	3.9	13
29-Aug	8	Z	10	10	12	11	10	8	4	5	4	2	1	1	2	2	2	3	6	7	5	3	4	2	5.2	12
30-Aug	1	1	Z	3	6	5	8	2	1	1	1	1	0	1	1	3	4	4	6	10	9	7	4	3	3.5	10
31-Aug	2	2	2	Z	4	5	5	4	4	4	4	3	2	1	1	1	2	2	3	11	8	14	9	6	4.4	14
	3.3	2.4	3.0	3.0	4.2	5.4	4.2	3.5	3.1	2.9	2.7	2.7	1.8	1.8	1.6	1.8	2.2	2.3	3.4	4.9	4.7	4.7	4.5	3.4	Diurnal Average	
	11	11	12	10	12	14	11	10	11	13	9	18	7	6	6	7	6	6	11	12	18	14	10	8	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance

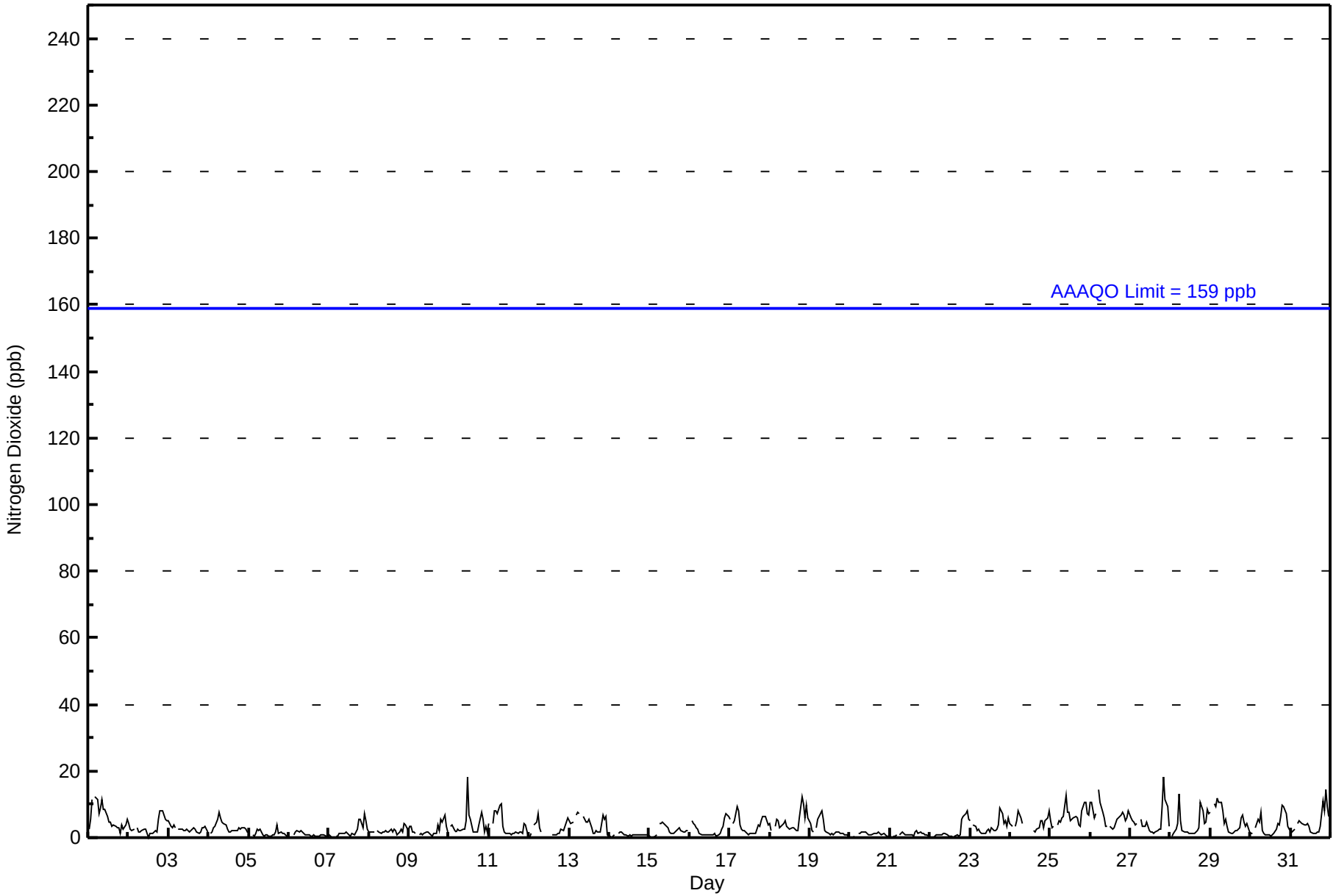
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Dioxide (NO_2) - ppb

Athabasca Valley - August 2015



Nitrogen Dioxide (NO_2) - ppb
Athabasca Valley - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	699	100.00	100.00
21 - 40	0	0.00	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: 699

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Dioxide (NO_2) - ppb

Athabasca Valley - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	21	5	4	10	54	77	124	39	24	25	62	75	41	44	40	54	699
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	21	5	4	10	54	77	124	39	24	25	62	75	41	44	40	54	699

Total Number of Valid Hours: 699

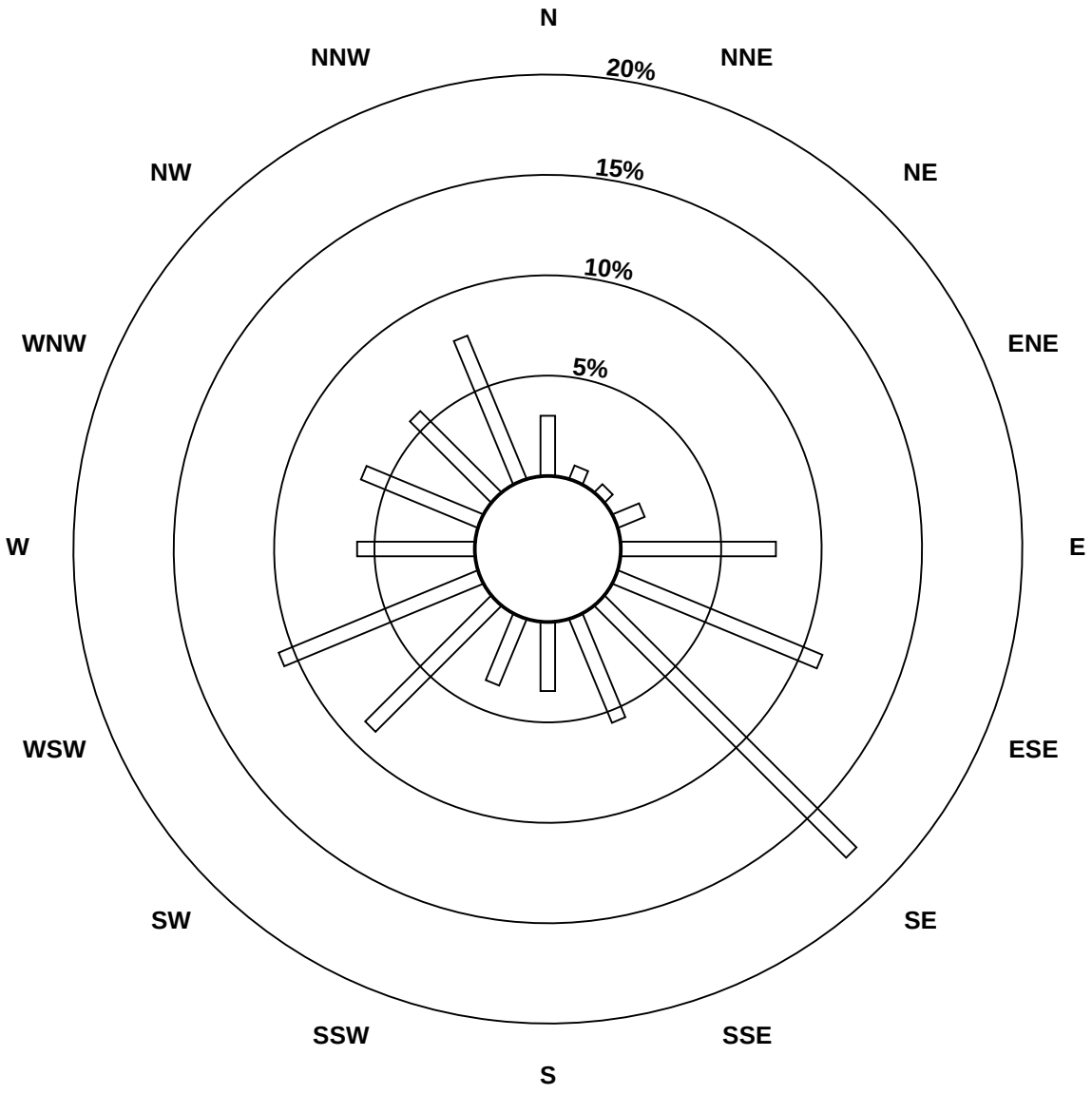
Total Number of Hours: 744

Wood Buffalo Environmental Association

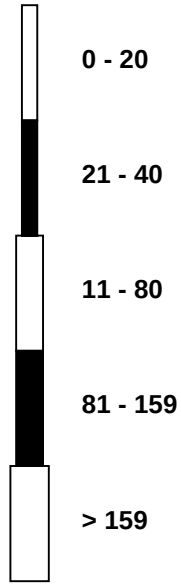
Wind Rose Aug 2015

Nitrogen Dioxide (NO_2) - ppb

Athabasca Valley (AMS 7)



Classes (ppb)



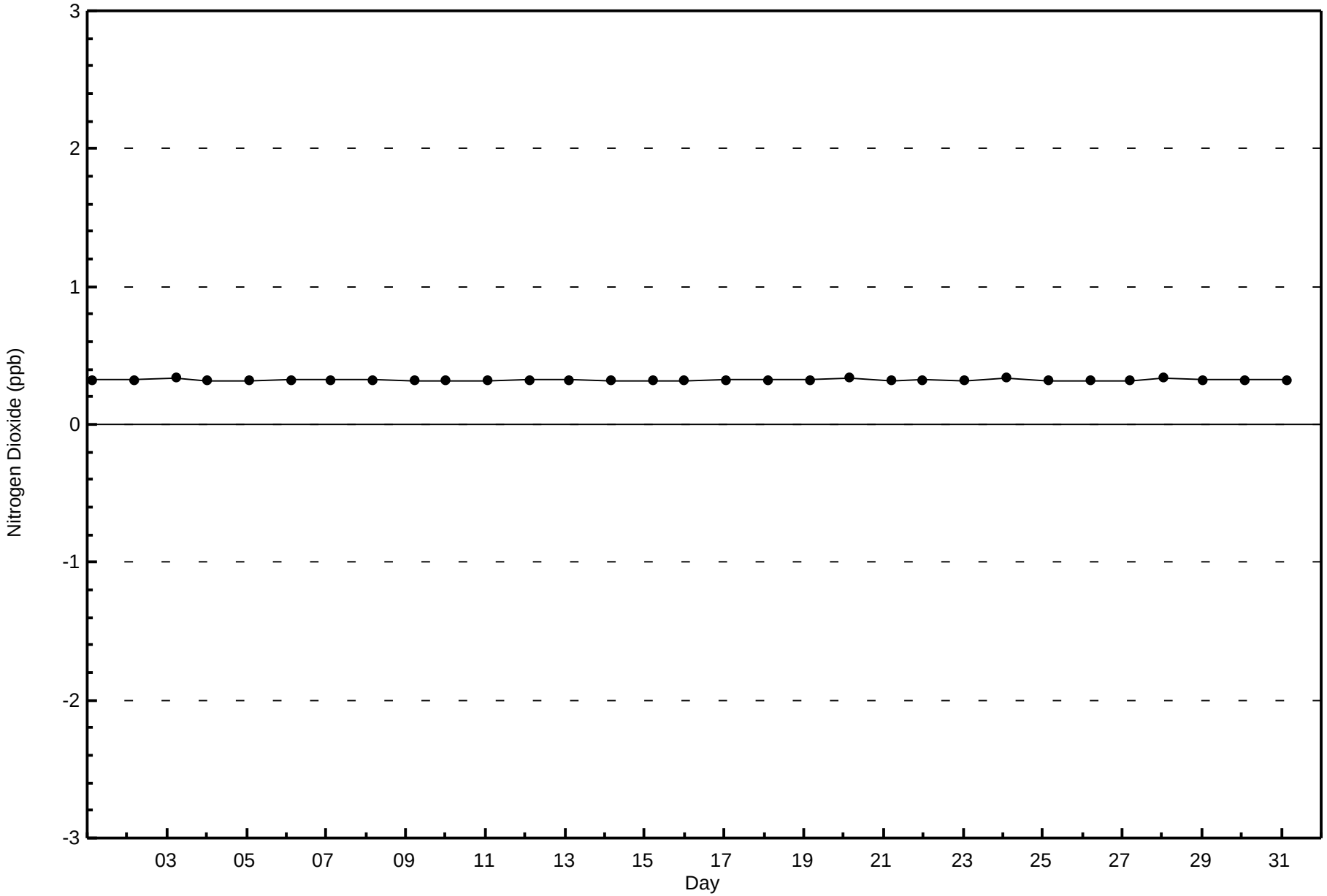
Total Number of Valid Hours: 699

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Dioxide (NO_2) - ppb

Athabasca Valley - August 2015

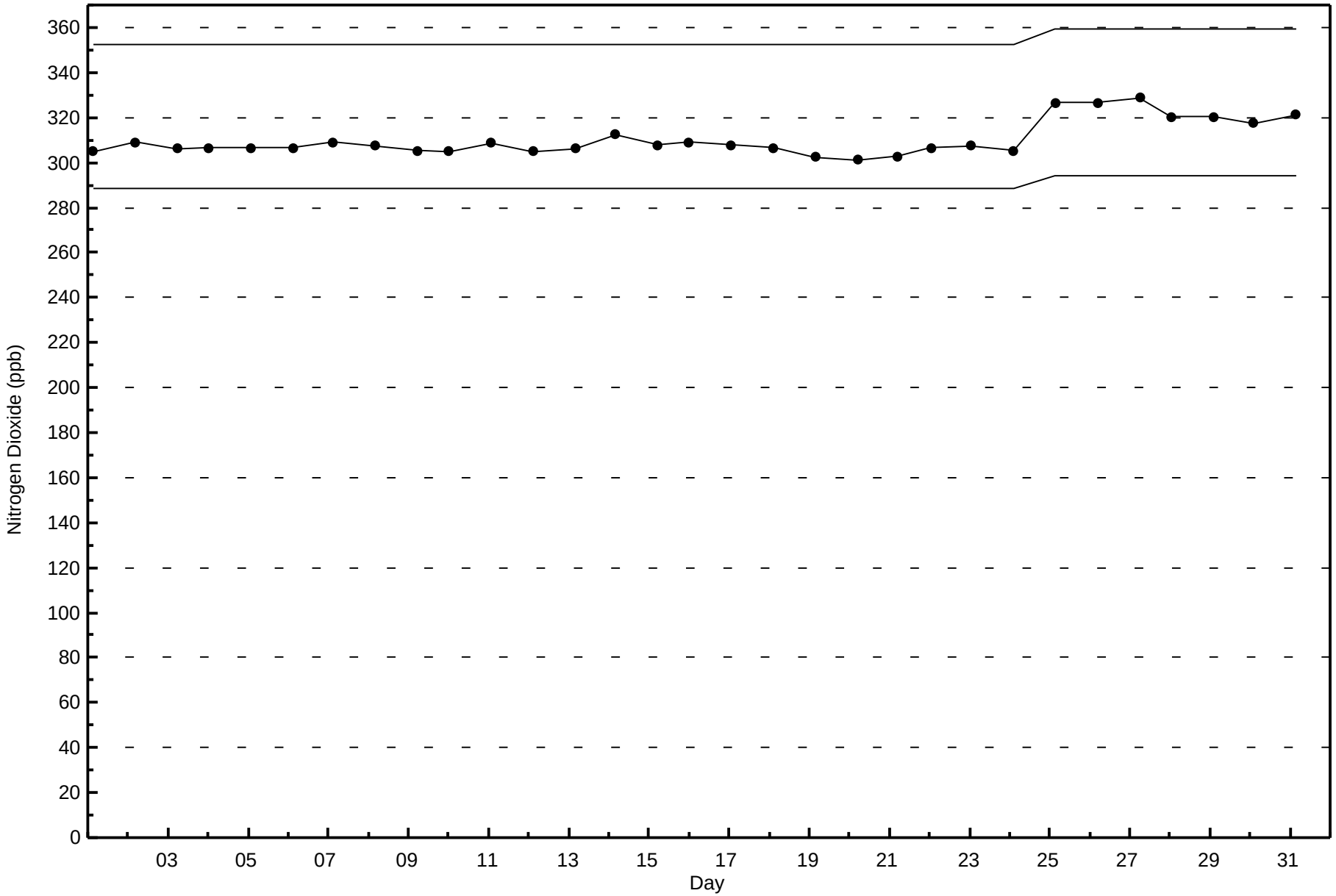


Wood Buffalo Environmental Association

Span Responses

Nitrogen Dioxide (NO_2) - ppb

Athabasca Valley - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_X) - ppb

Athabasca Valley - August 2015

Maximum Value: 51 ppb on Aug 10 12:00

Maximum Daily Average: 10.5 ppb on Aug 25

Minimum Value: 0 ppb on Aug 7 03:00

Minimum Daily Average: 0.9 ppb on Aug 14

Maximum Diurnal Average: 8.1 ppb at hour 6

Minimum Diurnal Average: 2.1 ppb at hour 15

Monthly Average: 4.3 ppb

Percentiles: $P_1 = 0$ $P_{10} = 1$ $Q_1 = 2$ Median = 3 $Q_3 = 6$ $P_{90} = 9$ $P_{99} = 20$

Hours in Service:	744
Hours of Data:	699
Hours of Missing Data:	45
Hours of Calibration:	37
Percent Operational Time:	98.9

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	3	5	12	Z	14	18	10	17	24	15	13	10	6	6	4	4	5	4	3	1	4	3	4	6	8.3	24
2-Aug	4	3	3	4	Z	5	5	4	5	5	3	1	2	2	1	2	3	2	6	9	8	7	5	5	4.1	9
3-Aug	5	3	3	5	4	Z	6	5	4	3	3	3	2	2	3	3	3	2	1	2	3	3	4	2	3.3	6
4-Aug	Z	1	2	3	4	6	10	8	7	6	5	3	2	2	3	3	3	2	4	3	3	3	3	2	3.8	10
5-Aug	2	Z	1	0	1	3	3	4	1	1	2	1	1	1	2	1	2	5	2	2	2	1	1	0	1.7	5
6-Aug	0	0	Z	1	2	3	2	3	3	2	2	2	1	1	1	1	1	1	1	2	1	2	1	0	1.5	3
7-Aug	1	0	0	Z	1	1	2	2	3	3	4	1	2	1	2	1	3	5	9	9	4	12	6	3	3.3	12
8-Aug	2	3	2	2	Z	4	4	4	4	4	3	2	2	6	3	3	4	1	2	4	2	5	4	2	3.2	6
9-Aug	4	3	2	2	1	Z	2	3	3	3	2	3	2	1	1	2	2	6	4	8	7	7	4	2	3.2	8
10-Aug	Z	3	4	2	2	3	3	3	4	5	12	51	20	18	3	3	3	3	5	10	7	2	4	2	7.4	51
11-Aug	5	Z	5	9	9	8	15	15	6	3	2	2	2	2	2	3	3	2	3	2	1	5	4	1	4.6	15
12-Aug	0	1	Z	4	6	10	4	3	M	M	M	M	M	M	2	2	1	2	1	2	2	4	5	6	--	10
13-Aug	6	5	5	Z	9	12	12	M	12	9	8	7	8	4	1	1	3	2	2	5	8	6	7	1	6.0	12
14-Aug	0	0	1	1	Z	2	2	2	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	0.9	2
15-Aug	0	0	0	0	1	Z	5	4	5	5	5	4	2	1	2	2	3	4	3	2	2	1	2	2	2.5	5
16-Aug	Z	5	4	4	3	3	2	2	2	2	1	1	1	1	1	1	0	1	1	3	3	7	8	7	2.8	8
17-Aug	6	Z	5	6	13	13	7	5	4	4	2	1	2	2	2	2	3	5	4	6	7	7	5	4	4.9	13
18-Aug	5	2	Z	4	8	8	5	6	7	8	5	4	3	3	3	3	3	3	7	14	11	6	11	6	5.9	14
19-Aug	4	2	2	Z	3	6	8	10	7	3	2	2	1	1	1	1	2	2	1	1	1	1	1	0	2.7	10
20-Aug	0	0	0	1	Z	1	2	2	2	2	1	1	1	1	2	1	1	2	1	1	1	1	1	0	1.1	2
21-Aug	1	0	1	1	1	Z	2	3	1	1	1	1	1	1	1	2	3	2	2	1	1	1	1	1	1.2	3
22-Aug	Z	0	0	1	1	1	1	2	2	1	1	0	0	0	0	0	1	1	1	7	7	8	9	6	2.2	9
23-Aug	5	Z	5	4	4	4	3	4	3	3	5	4	2	3	2	3	3	5	11	7	4	5	4	6	4.4	11
24-Aug	4	3	Z	4	6	10	8	7	C	C	C	C	C	C	3	2	3	3	6	6	4	6	6	9	--	10
25-Aug	5	3	4	Z	7	17	16	20	21	36	13	12	7	6	6	7	7	4	3	8	11	11	8	7	10.5	36
26-Aug	13	12	6	7	Z	20	16	12	11	6	5	M	5	3	4	5	6	6	7	9	7	5	6	9	8.2	20
27-Aug	6	6	5	5	8	Z	15	13	12	7	8	3	2	2	2	2	2	3	2	11	23	12	10	4	7.1	23
28-Aug	Z	0	1	3	5	19	6	3	3	3	2	2	2	1	1	2	3	4	12	9	5	5	9	7	4.6	19
29-Aug	8	Z	10	10	14	14	14	14	7	9	5	2	1	1	2	2	2	3	6	7	5	3	4	2	6.3	14
30-Aug	1	1	Z	3	6	6	10	3	2	1	1	1	0	1	2	3	5	4	6	11	10	8	5	3	4.0	11
31-Aug	2	2	2	Z	6	11	11	12	11	9	9	9	3	1	2	1	2	2	4	13	9	16	10	6	6.7	16
	3.6	2.6	3.2	3.5	5.3	8.1	6.8	6.5	6.1	5.5	4.4	4.8	2.8	2.7	2.1	2.3	2.8	2.8	4.0	5.6	5.3	5.3	4.9	3.6	Diurnal Average	
	13	12	12	10	14	20	16	20	24	36	13	51	20	18	6	7	7	6	12	14	23	16	11	9	Diurnal Maximum	

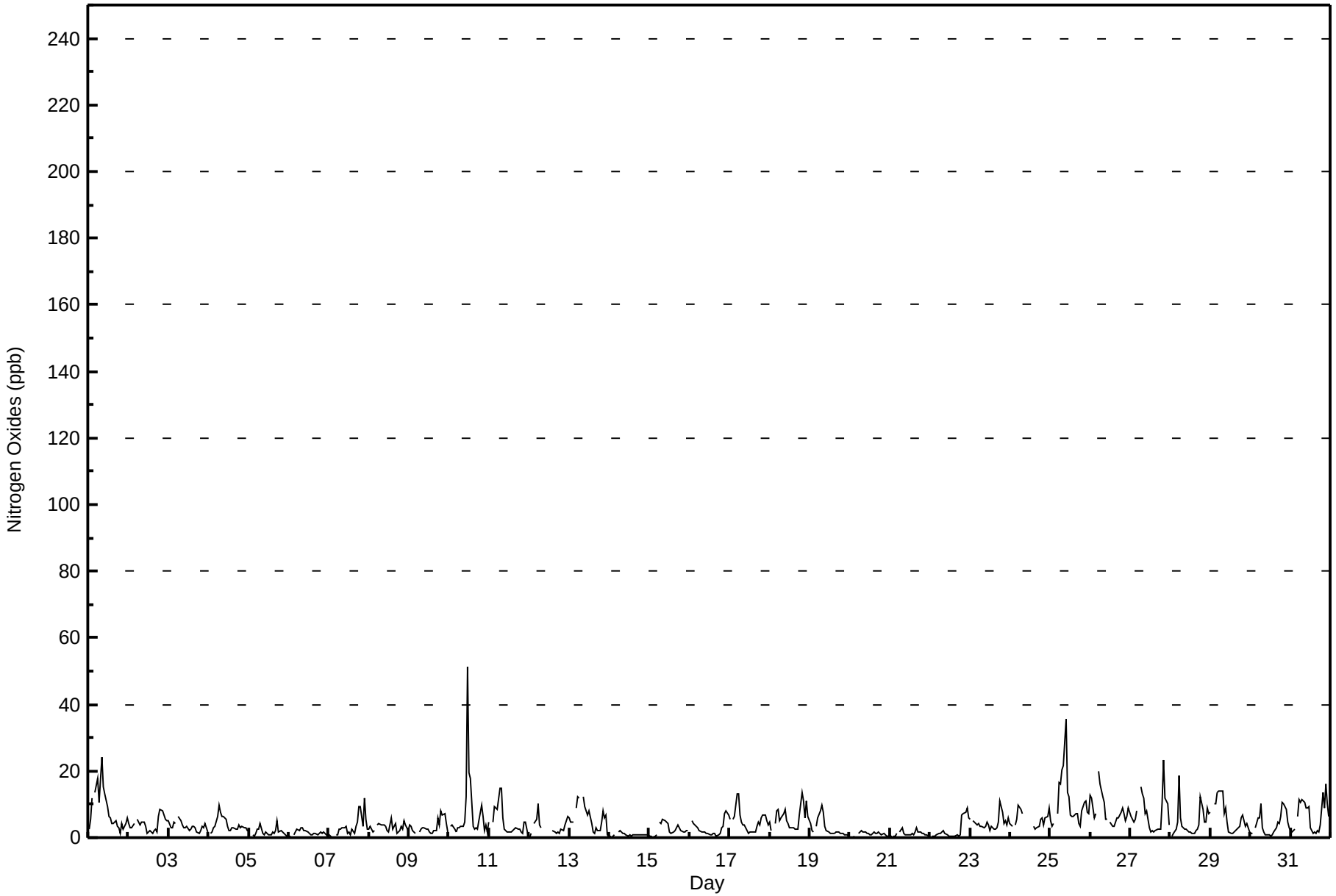
Z - zerospan C - Calibration M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Oxides (NO_X) - ppb

Athabasca Valley - August 2015



Nitrogen Oxides (NO_X) - ppb
Athabasca Valley - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	694	99.28	99.28
21 - 40	4	0.57	99.86
11 - 80	1	0.14	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 699

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Oxides (NO_X) - ppb

Athabasca Valley - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	21	5	4	10	53	77	124	39	23	25	61	75	41	44	39	53	694
21 - 40	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1	1	4
11 - 80	0	0	0	0	0	0	0	0	0	0	1	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	21	5	4	10	54	77	124	39	24	25	62	75	41	44	40	54	699

Total Number of Valid Hours: 699

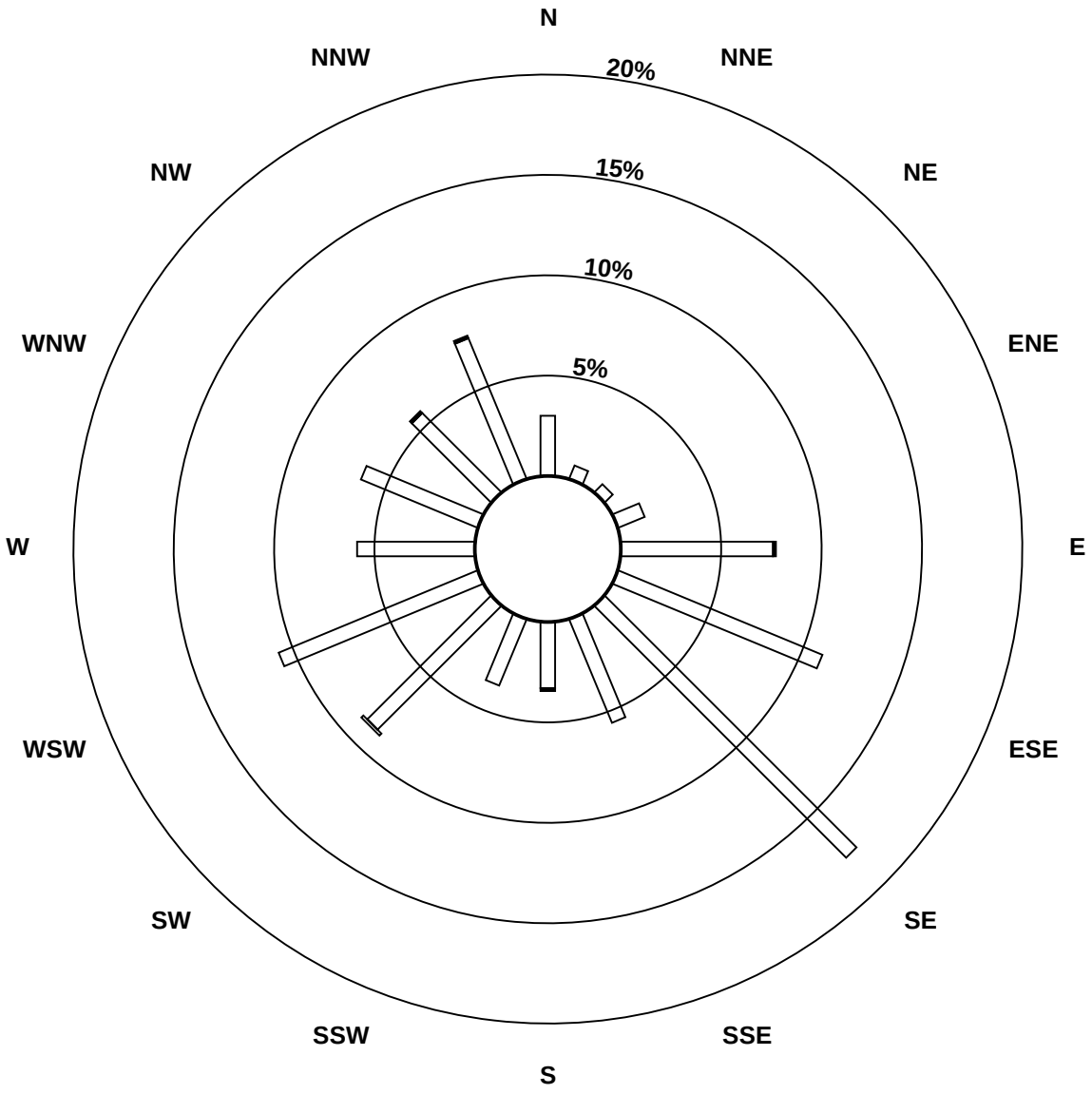
Total Number of Hours: 744

Wood Buffalo Environmental Association

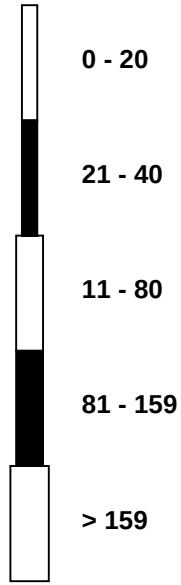
Wind Rose Aug 2015

Nitrogen Oxides (NO_X) - ppb

Athabasca Valley (AMS 7)



Classes (ppb)



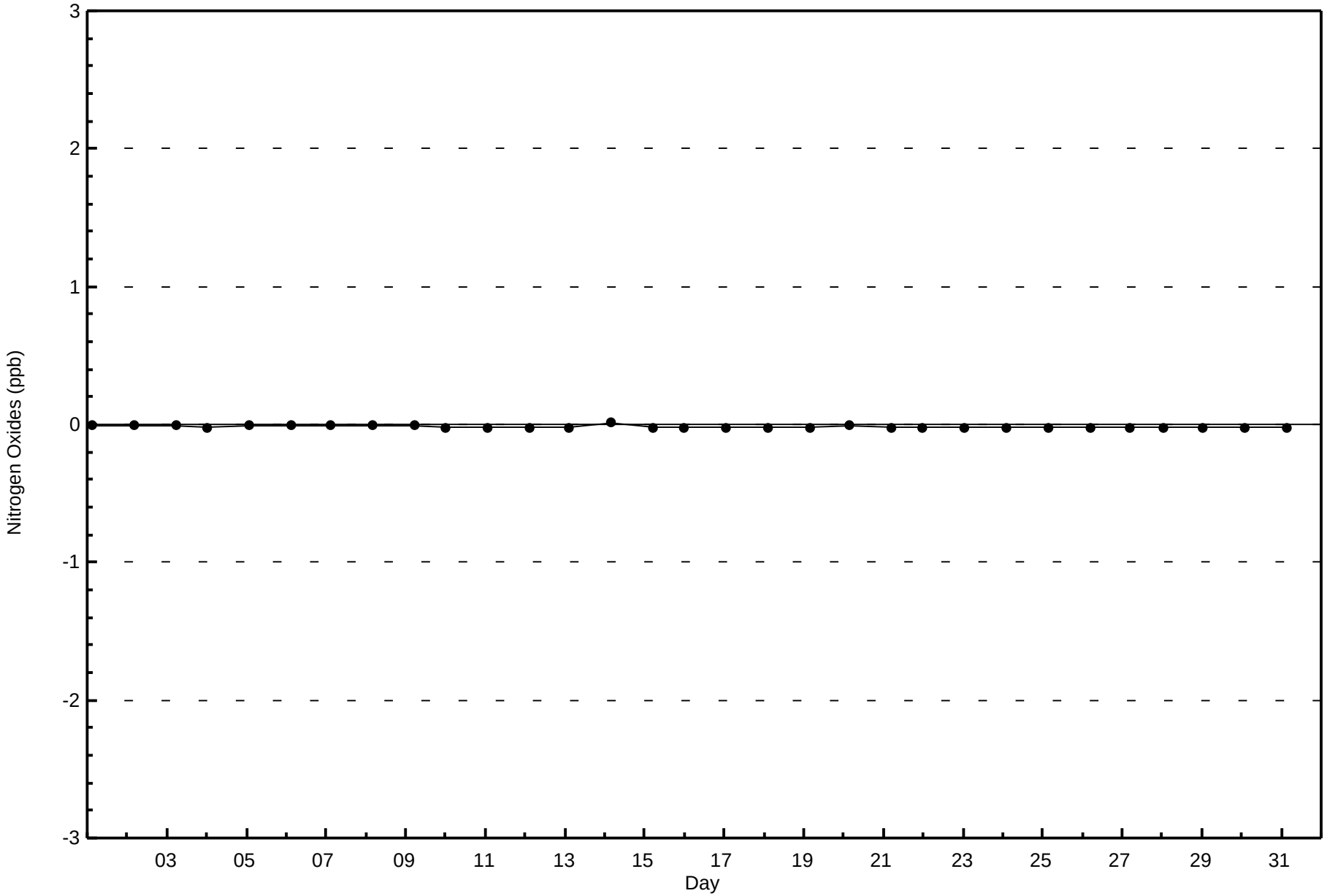
Total Number of Valid Hours: 699

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Oxides (NO_X) - ppb

Athabasca Valley - August 2015

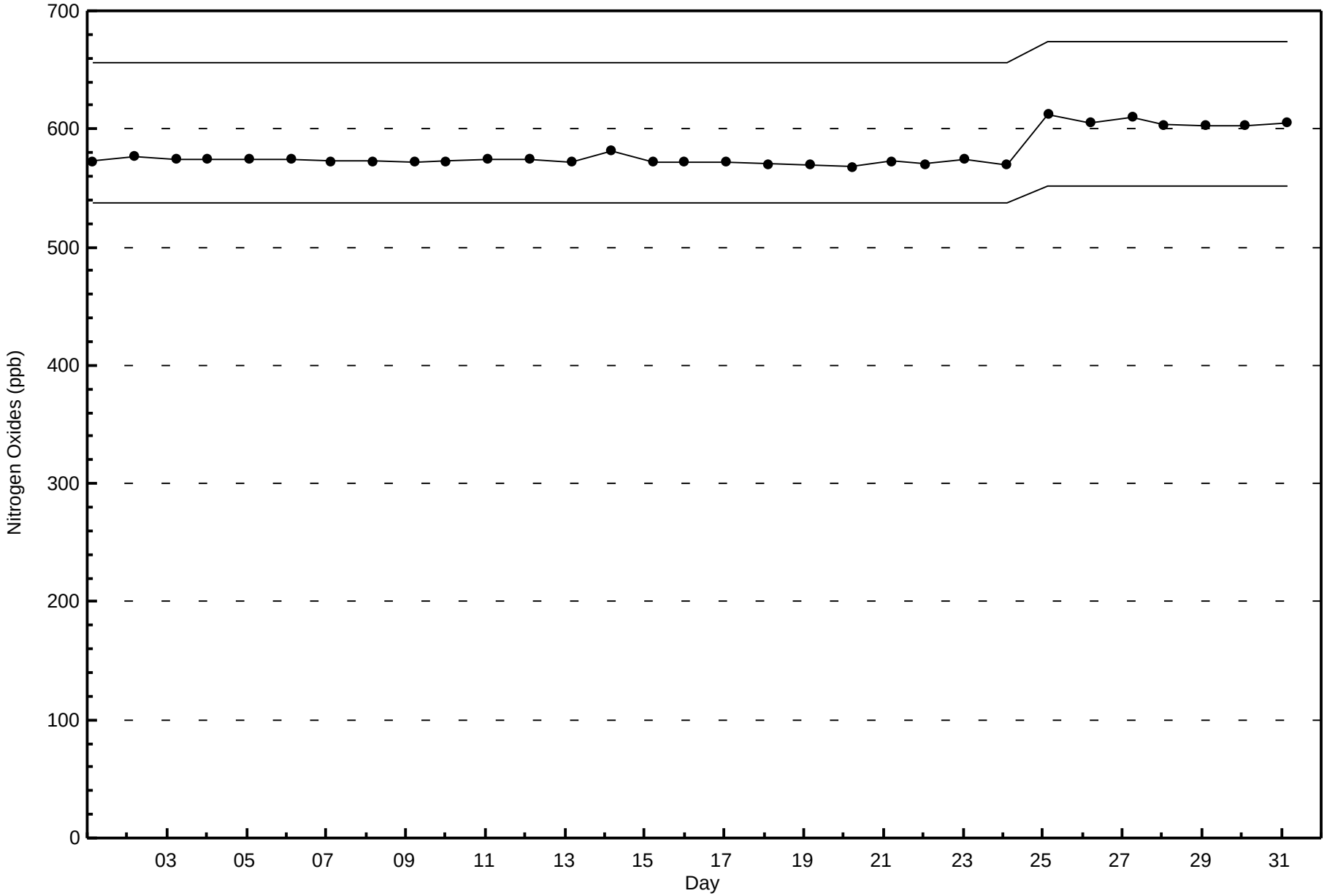


Wood Buffalo Environmental Association

Span Responses

Nitrogen Oxides (NO_X) - ppb

Athabasca Valley - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

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

Athabasca Valley - August 2015

Number of Exceedences (AAAQO): 24-hr: 0

Maximum Value: 26.6 $\mu g/m^3$ on Aug 1 08:00

Maximum Daily Average: 10.4 $\mu g/m^3$ on Aug 27

Minimum Value: 0.0 $\mu g/m^3$ on Aug 29 13:00

Minimum Daily Average: 1.2 $\mu g/m^3$ on Aug 6

Maximum Diurnal Average: 6.2 $\mu g/m^3$ at hour 3

Minimum Diurnal Average: 3.7 $\mu g/m^3$ at hour 13

Monthly Average: 5.11 $\mu g/m^3$

Percentiles: P_1 = 0.8 P_{10} = 2.1 Q_1 = 3.0 Median = 4.4 Q_3 = 6.4 P_{90} = 8.9 P_{99} = 17.1

Hours in Service:	744
Hours of Data:	740
Hours of Missing Data:	4
Hours of Calibration:	1
Percent Operational Time:	99.6

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	4.1	5.4	6.8	6.1	5.1	9.0	8.6	26.6	21.4	7.4	5.7	4.6	4.0	5.9	6.7	7.4	5.4	4.9	5.9	4.6	6.0	6.8	4.1	5.5	7.4	26.6
2-Aug	8.1	10.2	9.2	8.2	6.9	6.0	4.0	2.7	2.8	2.7	2.2	2.7	4.0	6.6	7.4	7.1	8.1	6.5	5.3	7.8	13.0	14.1	14.0	13.4	7.2	14.1
3-Aug	13.2	15.7	16.1	16.1	14.2	11.5	12.2	11.1	9.6	10.0	9.5	5.6	6.3	9.1	8.9	9.6	7.2	4.4	5.4	5.4	5.2	6.1	6.8	4.2	9.3	16.1
4-Aug	4.3	5.4	16.1	10.3	7.6	9.9	13.4	13.3	9.3	5.0	7.7	10.1	6.8	7.7	8.2	7.8	3.2	3.4	4.8	2.2	4.9	5.3	2.7	4.2	7.2	16.1
5-Aug	5.7	5.6	6.0	5.8	6.0	4.7	8.2	6.7	4.0	10.1	8.3	7.0	7.1	5.8	4.4	5.0	4.7	3.4	1.4	1.1	1.2	1.0	0.9	1.5	4.8	10.1
6-Aug	1.3	1.3	1.8	1.4	1.5	1.3	1.2	1.1	1.3	0.9	1.4	1.9	1.5	1.3	1.0	0.9	0.9	1.0	1.0	1.1	1.1	1.1	1.2	0.9	1.2	1.9
7-Aug	1.2	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.3	0.8	1.2	1.4	0.8	0.5	1.0	1.4	1.8	2.5	3.4	3.1	1.7	2.7	2.6	1.8	1.5	3.4
8-Aug	1.6	2.7	2.1	2.0	2.2	2.5	2.7	2.9	2.8	2.6	3.3	3.6	3.9	5.5	5.4	5.1	4.6	3.5	2.9	3.1	3.0	4.4	3.5	2.6	3.3	5.5
9-Aug	3.3	3.2	4.7	4.3	3.5	3.5	3.9	4.6	4.8	4.2	3.1	3.1	0.8	0.6	1.5	4.2	4.4	5.9	6.0	8.6	7.1	4.3	2.3	2.1	3.9	8.6
10-Aug	5.9	9.6	5.1	2.7	2.2	3.5	2.2	2.7	2.2	2.6	5.2	12.0	6.3	20.4	4.1	3.5	4.9	5.5	5.6	7.4	8.6	5.4	2.6	4.0	5.6	20.4
11-Aug	4.7	4.5	6.9	6.8	7.7	7.4	6.7	9.2	6.0	3.1	1.7	1.6	1.6	2.7	1.5	1.3	1.6	2.9	3.9	3.7	3.2	3.0	3.5	3.4	4.1	9.2
12-Aug	3.2	3.2	3.6	3.7	4.5	5.5	3.4	3.1	2.5	2.4	2.4	2.7	2.8	M	2.4	2.3	2.6	3.1	3.4	3.5	4.1	2.5	2.6	3.3	3.2	5.5
13-Aug	4.1	4.0	3.5	2.9	3.5	3.6	2.6	3.2	3.5	3.4	2.3	2.9	3.1	UO	UO	2.0	4.6	4.6	3.2	3.1	4.3	3.6	2.6	2.4	3.3	4.6
14-Aug	5.0	6.3	5.8	4.8	3.6	3.7	3.8	3.5	3.3	3.3	3.3	3.3	3.3	3.3	3.4	3.4	3.4	3.4	3.4	3.7	3.9	3.8	3.9	3.9	3.9	6.3
15-Aug	3.8	3.8	4.0	3.9	4.0	4.3	3.6	3.0	4.5	5.2	5.1	4.5	3.6	3.2	2.9	2.9	4.4	5.7	5.6	5.7	4.8	4.7	4.8	4.9	4.3	5.7
16-Aug	5.7	6.5	5.5	5.8	4.6	5.3	5.5	4.7	4.4	5.8	5.7	4.5	3.7	3.6	3.4	2.8	3.0	3.1	2.8	3.1	2.9	3.1	3.8	4.4	4.3	6.5
17-Aug	4.5	4.2	4.1	4.0	4.2	3.9	2.9	2.6	2.6	2.6	2.5	2.6	2.8	3.2	3.4	3.9	4.6	4.8	4.8	5.6	4.1	4.1	7.3	8.3	4.1	8.3
18-Aug	8.8	7.0	4.8	5.8	6.9	7.1	6.4	6.2	5.5	3.6	3.5	5.8	7.3	8.6	10.1	10.2	6.9	5.9	7.4	8.9	8.9	7.2	5.3	7.0	6.9	10.2
19-Aug	8.2	8.0	7.7	7.3	6.3	5.8	5.4	4.6	5.2	5.4	4.8	4.1	3.7	4.4	4.8	5.2	5.4	4.8	4.1	3.4	3.2	2.8	2.5	2.9	5.0	8.2
20-Aug	3.4	3.9	3.9	3.7	3.3	2.7	2.7	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.7	2.7	2.8	3.2	3.2	3.1	3.2	2.9	3.0	2.7	3.0	3.9
21-Aug	2.9	2.8	2.7	2.8	2.9	3.0	3.0	3.0	3.0	3.0	2.8	2.7	2.7	2.8	2.7	2.7	3.2	3.4	3.5	3.4	3.4	3.3	3.0	2.8	3.0	3.5
22-Aug	3.9	4.2	3.5	3.1	2.8	2.8	2.9	3.2	3.4	3.2	3.1	2.9	3.1	3.3	3.6	3.8	4.0	4.3	3.9	4.5	6.7	6.9	7.4	6.6	4.0	7.4
23-Aug	4.4	3.4	3.3	3.1	3.0	3.0	2.9	2.9	2.8	2.6	3.0	3.6	3.9	4.7	4.9	5.3	4.6	4.7	5.9	7.4	6.4	6.2	5.5	5.4	4.3	7.4
24-Aug	6.1	6.8	4.4	6.2	5.3	5.8	7.5	7.9	6.3	5.8	6.4	7.0	6.9	7.2	7.4	6.9	5.3	3.5	3.5	3.4	2.6	3.4	6.9	9.4	5.9	9.4
25-Aug	10.1	8.8	8.1	7.0	5.5	4.3	3.8	4.2	4.6	5.5	4.6	6.3	6.4	7.5	9.5	8.9	7.5	6.6	7.3	9.1	7.7	8.1	8.0	8.5	7.0	10.1
26-Aug	7.8	6.4	7.0	7.1	5.6	6.6	7.6	C	2.8	3.1	2.4	1.7	3.4	5.9	6.3	5.5	6.4	5.0	4.8	6.9	7.0	10.5	16.4	19.5	6.8	19.5
27-Aug	18.2	16.8	20.3	15.9	12.4	9.3	6.3	7.3	5.7	7.3	8.5	5.7	4.9	5.4	6.4	12.8	16.2	21.0	10.4	8.5	8.8	8.1	6.9	5.9	10.4	21.0
28-Aug	5.4	5.4	5.3	5.5	5.9	7.8	6.2	5.8	6.0	6.0	5.7	4.9	5.0	4.9	3.9	3.9	3.4	3.1	4.6	5.0	2.5	3.1	6.8	8.3	5.2	8.3
29-Aug	9.6	9.6	3.8	5.8	7.1	5.5	5.2	8.9	6.8	7.9	3.3	0.5	0.0	1.1	3.0	4.1	4.6	6.2	8.2	8.0	4.9	4.4	5.9	5.6	5.4	9.6
30-Aug	3.8	2.4	4.9	7.7	8.6	4.8	7.1	11.3	13.6	7.4	3.9	1.8	2.1	2.1	2.1	2.8	6.6	7.5	4.6	2.1	1.7	4.0	4.4	4.9	5.1	13.6
31-Aug	5.6	7.4	9.4	9.5	10.6	11.7	12.4	12.4	9.9	7.5	7.3	3.3	0.0	0.5	1.5	2.6	4.5	5.1	5.9	9.2	11.0	15.9	13.8	11.2	7.8	15.9
	5.7	6.0	6.2	5.8	5.4	5.4	5.3	6.1	5.3	4.6	4.3	4.1	3.7	4.8	4.5	4.8	4.9	4.9	4.7	5.0	5.1	5.3	5.3	5.5	Diurnal Average	
	18.2	16.8	20.3	16.1	14.2	11.7	13.4	26.6	21.4	10.1	9.5	12.0	7.3	20.4	10.1	12.8	16.2	21.0	10.4	9.2	13.0	15.9	16.4	19.5	Diurnal Maximum	

C - Calibration M - Maintenance UO - Unstable Operation

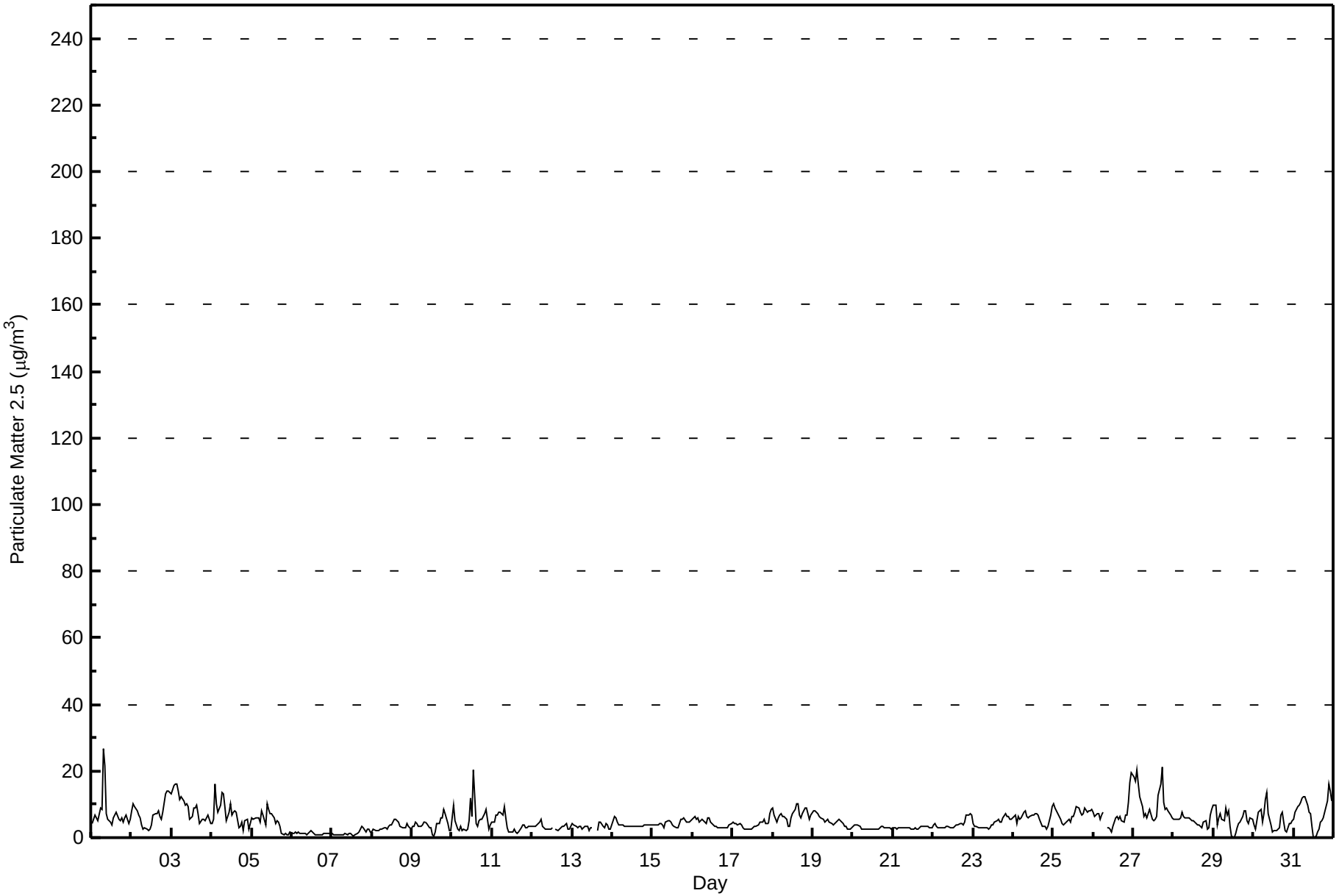
Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 $\mu g/m^3$

Wood Buffalo Environmental Association

Hourly Averages

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

Athabasca Valley - August 2015



Concentration Ranges ($\mu g/m^3$)	Number of Hours	%	Cumulative %
1 - 5	459	62.03	62.03
6 - 15	245	33.11	95.14
16 - 25	15	2.03	97.16
26 - 80	1	0.14	97.30
> 81.0	0	0.00	97.30

Total Number of Valid Hours: 740

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

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

Athabasca Valley - August 2015

Concentration Ranges ($\mu g/m^3$)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
1 - 5	12	4	4	6	27	44	72	22	13	12	38	67	41	40	32	25	459
6 - 15	9	1	1	5	18	29	58	18	11	14	26	9	3	3	11	29	245
16 - 25	0	0	0	0	3	4	4	0	0	0	2	1	0	0	0	1	15
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	21	5	5	11	48	77	134	40	24	26	66	77	44	43	43	56	720

Total Number of Valid Hours: 740

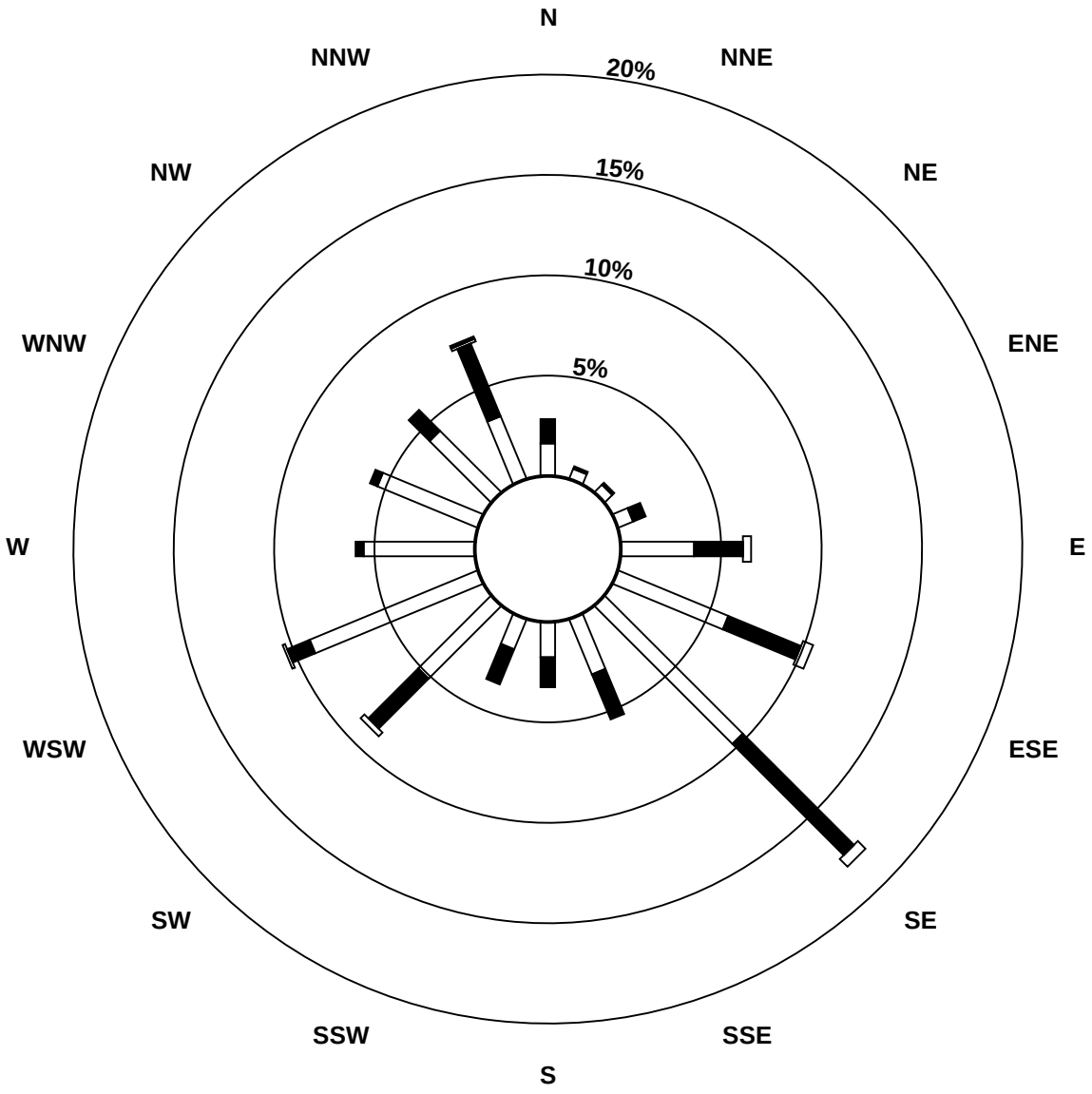
Total Number of Hours: 744

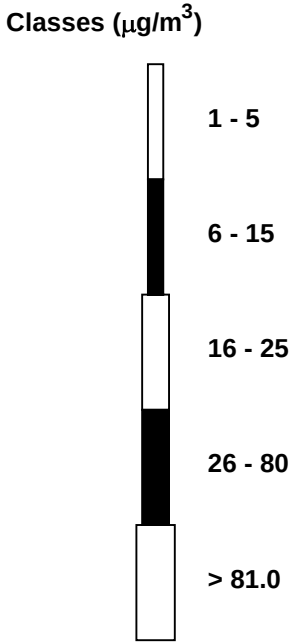
Wood Buffalo Environmental Association

Wind Rose Aug 2015

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

Athabasca Valley (AMS 7)





Total Number of Valid Hours: 740

Wood Buffalo Environmental Association

Summary of Hour Averages

Carbon Monoxide (CO) - ppm

Athabasca Valley - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 0.3 ppm on Aug 17 20:00

Maximum Daily Average: 0.1 ppm on Aug 27

Minimum Value: 0.0 ppm on Aug 10 13:00

Minimum Daily Average: 0.0 ppm on Aug 21

Maximum Diurnal Average: 0.1 ppm at hour 21

Minimum Diurnal Average: 0.0 ppm at hour 15

Monthly Average: 0.04 ppm

Percentiles: P_1 = 0.0 P_{10} = 0.0 Q_1 = 0.0 Median = 0.0 Q_3 = 0.1 P_{90} = 0.1 P_{99} = 0.1

Hours in Service:	744
Hours of Data:	710
Hours of Missing Data:	34
Hours of Calibration:	34
Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0.0	0.0	0.0	0.0	0.0	0.1	0.0	Z	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.1
2-Aug	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0	Z	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1
3-Aug	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1
4-Aug	0.1	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	0.0	0.0	0.0	0.1	0.1
5-Aug	0.0	0.0	0.0	0.0	0.0	Z	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
6-Aug	0.0	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	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
8-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1
9-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.1
10-Aug	0.1	0.1	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	0.1	0.1	0.0	0.1	0.1	0.0	0.1
11-Aug	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
12-Aug	0.0	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.1
13-Aug	0.1	0.1	0.0	0.0	0.1	0.1	0.1	C	C	C	C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.1
14-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16-Aug	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.1
17-Aug	0.1	0.0	0.0	0.0	0.1	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.1	0.1	0.1	0.1	0.1	0.3
18-Aug	0.1	0.0	0.0	0.0	0.1	0.1	Z	0.0	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
19-Aug	0.0	0.0	0.0	0.0	0.0	0.0	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	0.1
20-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22-Aug	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	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	0.0	0.1
23-Aug	0.1	0.1	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.1
24-Aug	0.1	0.0	0.0	0.0	0.0	0.1	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1
25-Aug	0.1	0.0	0.0	0.1	0.0	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	0.1	0.0	0.0	0.0	0.1
26-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1
27-Aug	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	Z	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.2	0.1	0.1	0.0	0.1	0.2
28-Aug	0.0	0.0	0.0	0.0	Z	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.1	0.1	0.1	0.0	0.2
29-Aug	0.1	0.1	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1
30-Aug	0.0	0.0	0.0	0.0	0.0	0.0	Z	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
31-Aug	0.0	0.1	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	0.1	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	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0	Diurnal Average	
	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	0.3	0.2	0.1	0.1	0.1	Diurnal Maximum	

Z - zerospan C - Calibration

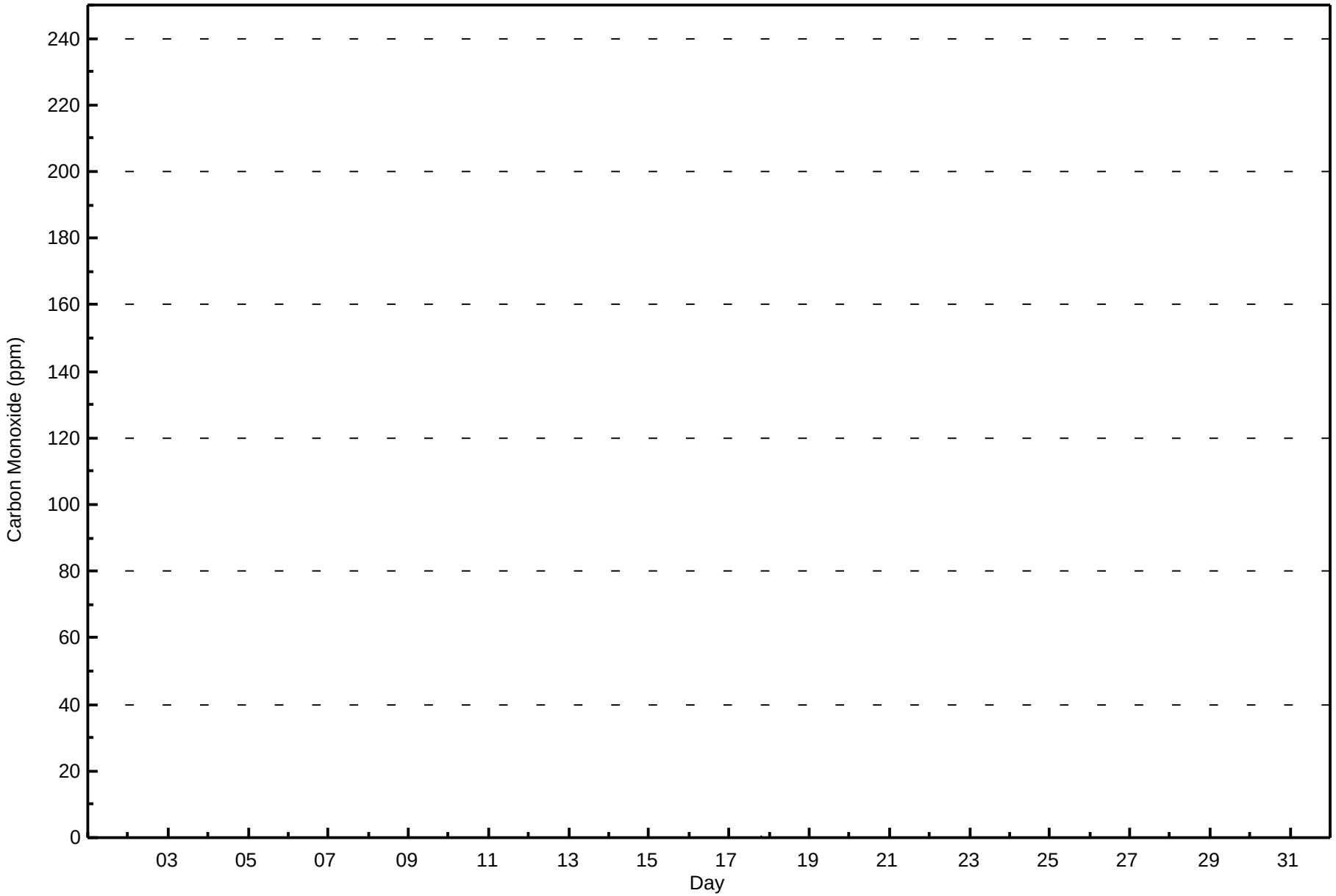
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 13 ppm

Wood Buffalo Environmental Association

Hourly Averages

Carbon Monoxide (CO) - ppm

Athabasca Valley - August 2015



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

Athabasca Valley - August 2015

Concentration Ranges (ppm)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 0.3	20	4	5	11	55	79	123	40	23	24	66	79	44	42	42	53	710
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	20	4	5	11	55	79	123	40	23	24	66	79	44	42	42	53	710

Total Number of Valid Hours: 710

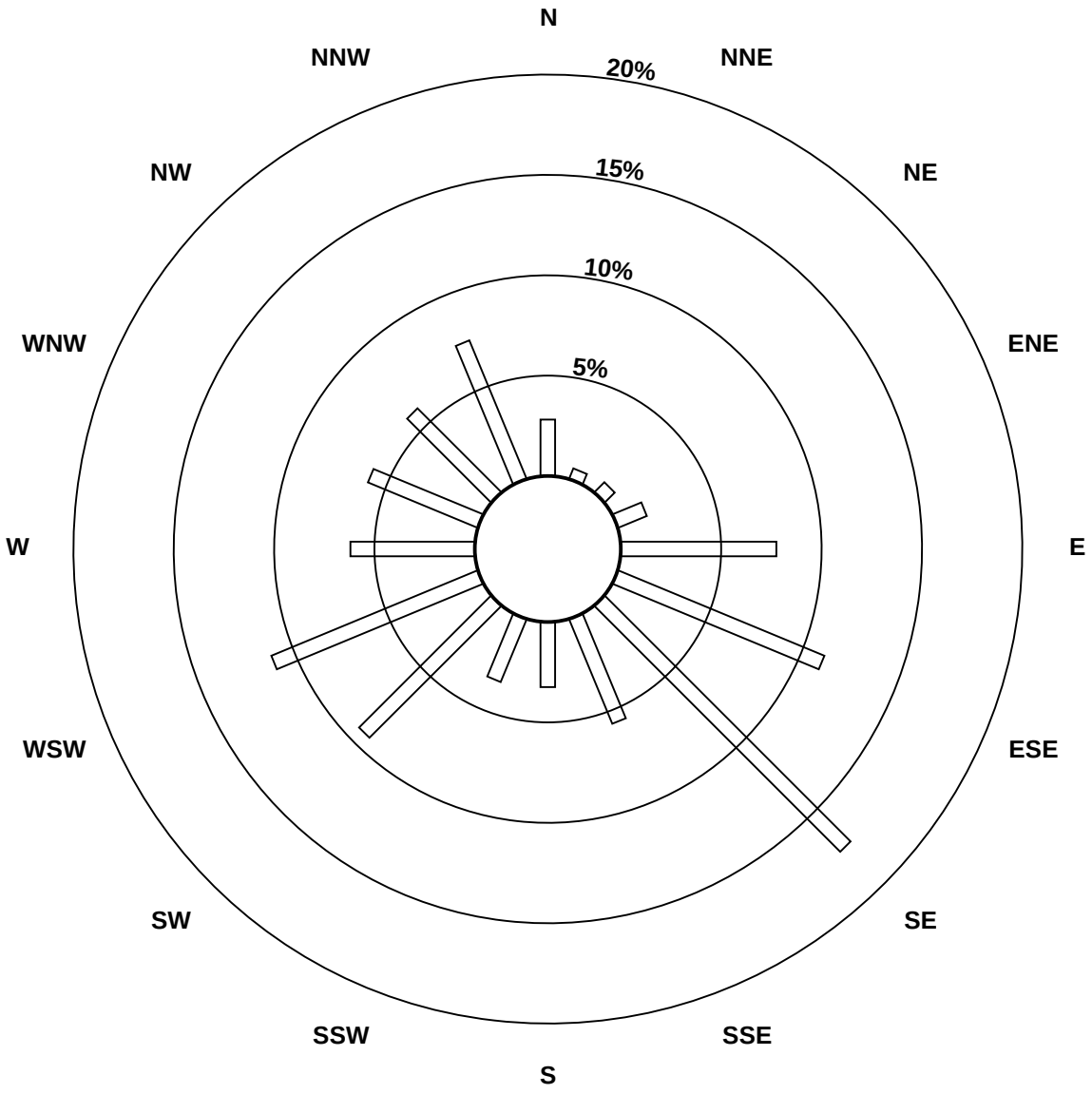
Total Number of Hours: 744

Wood Buffalo Environmental Association

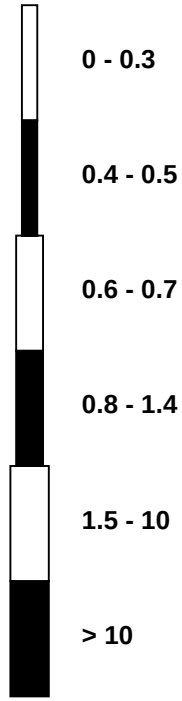
Wind Rose Aug 2015

Carbon Monoxide (CO) - ppm

Athabasca Valley (AMS 7)



Classes (ppm)



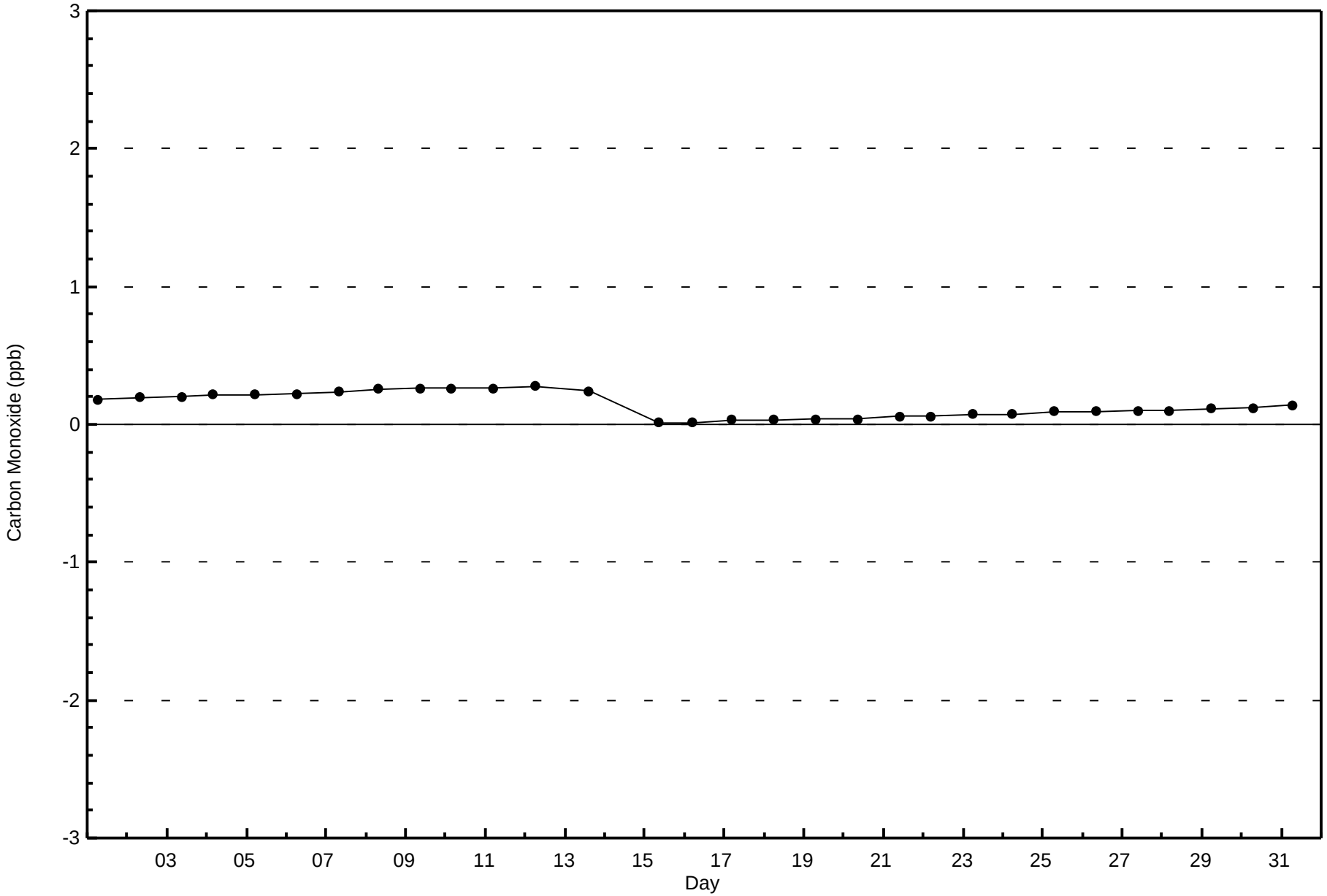
Total Number of Valid Hours: 710

Wood Buffalo Environmental Association

Zero Responses

Carbon Monoxide (CO) - ppb

Athabasca Valley - August 2015

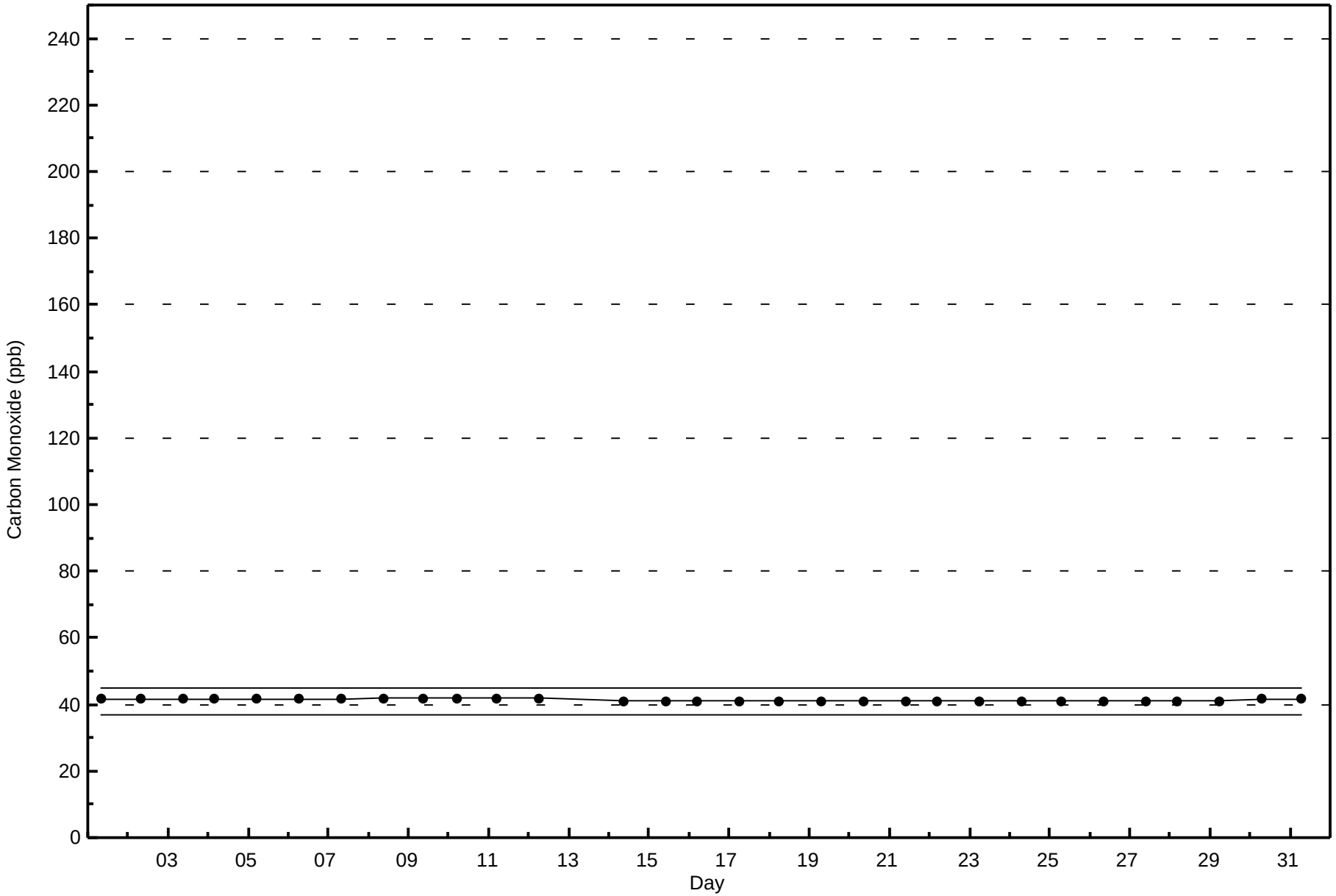


Wood Buffalo Environmental Association

Span Responses

Carbon Monoxide (CO) - ppb

Athabasca Valley - August 2015



Maximum Value: 30.3 C on Aug 10 17:00

Maximum Daily Average: 23.8 C on Aug 10

Minimum Value: 2.6 C on Aug 23 06:00

Minimum Daily Average: 11.3 C on Aug 21

Maximum Diurnal Average: 22.7 C at hour 16

Minimum Diurnal Average: 13.0 C at hour 6

Monthly Average: 17.82 C

Percentiles: P_1 = 6.5 P_{10} = 11.6 Q_1 = 14.7 Median = 17.4 Q_3 = 21.3 P_{90} = 24.6 P_{99} = 28.6

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

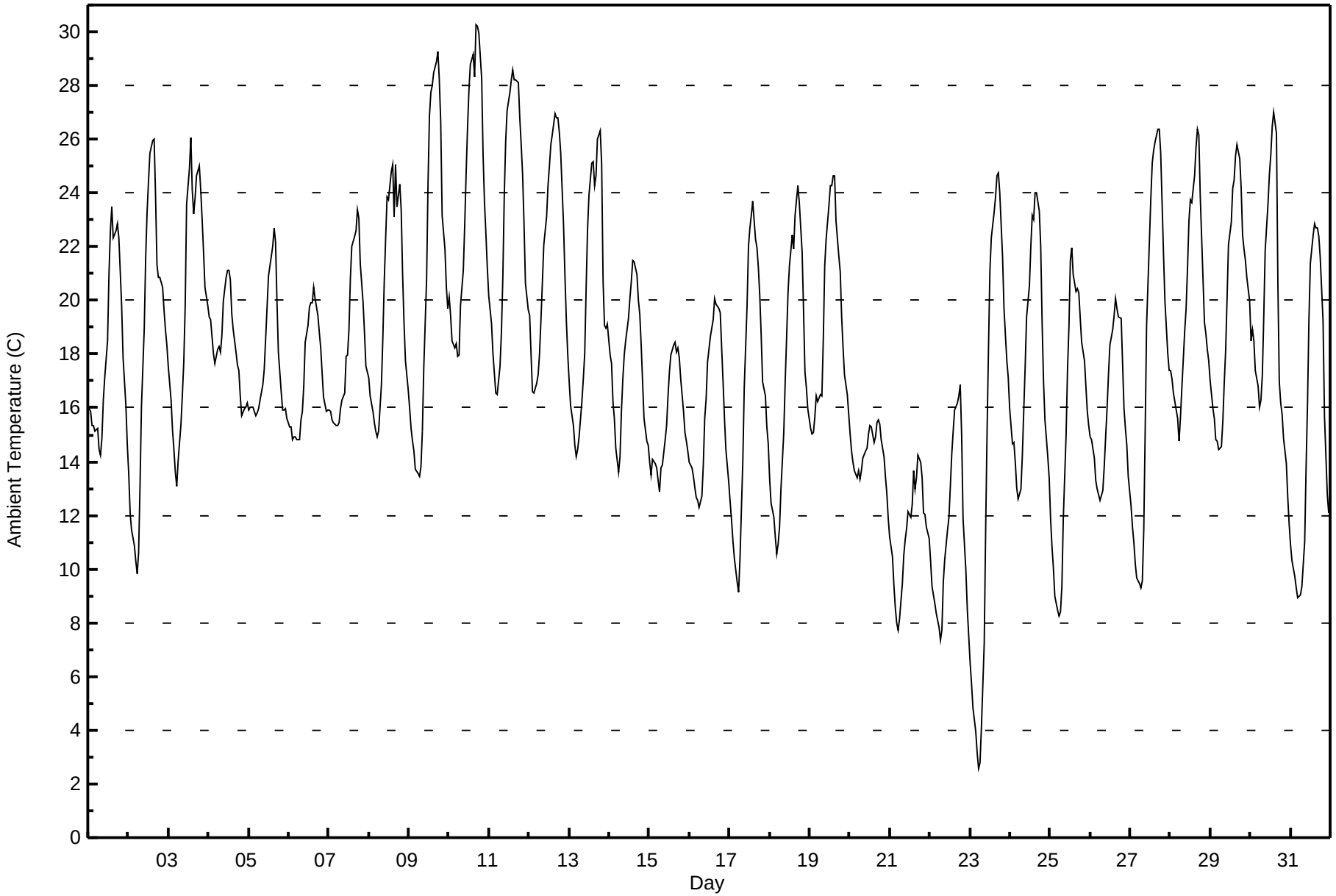
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	16.0	15.9	15.4	15.3	15.1	15.3	14.5	14.2	14.9	16.3	17.1	18.5	21.0	22.6	23.5	22.3	22.6	22.9	22.3	21.1	19.7	17.9	16.1	14.6	18.1	23.5
2-Aug	13.5	12.1	11.5	10.9	10.3	9.8	10.6	13.1	16.0	19.0	21.6	23.3	24.4	25.5	26.0	26.0	23.9	21.3	20.8	20.8	20.5	19.7	18.9	18.4	18.3	26.0
3-Aug	17.6	16.3	15.2	14.5	13.6	13.1	14.0	15.4	16.5	17.7	19.8	23.6	24.9	26.1	24.1	23.2	23.8	24.6	25.0	24.1	23.0	21.8	20.5	19.8	19.9	26.1
4-Aug	19.4	19.3	18.7	18.0	17.7	18.2	18.3	18.1	18.7	19.9	20.9	21.1	21.1	20.7	19.5	18.9	18.1	17.6	17.4	16.5	15.7	16.0	16.0	16.2	18.4	21.1
5-Aug	15.9	16.0	16.0	15.9	15.7	15.8	16.0	16.3	16.8	17.4	18.6	19.7	20.9	21.6	22.0	22.7	22.2	20.0	18.1	16.6	15.9	15.9	16.0	15.6	17.8	22.7
6-Aug	15.3	15.3	14.8	14.9	14.9	14.8	14.8	15.5	15.9	16.8	18.4	19.1	19.8	19.9	19.9	20.5	20.1	19.5	18.8	18.2	17.3	16.4	15.9	15.9	17.2	20.5
7-Aug	15.9	15.8	15.6	15.5	15.3	15.3	15.4	16.0	16.3	16.6	17.9	18.0	18.9	20.8	22.0	22.4	22.6	23.4	23.1	21.4	19.9	18.8	17.6	17.4	18.4	23.4
8-Aug	17.1	16.4	15.9	15.4	15.2	14.9	15.2	16.8	18.6	20.7	22.4	23.8	23.8	24.8	25.1	23.1	25.1	23.5	24.3	23.4	21.0	19.2	17.8	16.6	20.0	25.1
9-Aug	16.0	15.3	14.7	14.4	13.7	13.5	13.5	13.8	15.2	17.5	20.8	24.3	26.8	27.7	28.0	28.5	28.9	29.3	28.2	26.6	23.2	21.9	20.5	19.7	20.9	29.3
10-Aug	20.1	19.4	18.5	18.2	18.4	17.9	18.0	19.8	21.1	22.8	24.7	26.4	27.9	28.8	29.1	28.3	30.3	30.2	30.0	28.3	25.5	23.7	22.5	21.2	23.8	30.3
11-Aug	20.2	19.1	18.0	17.3	16.6	16.5	17.5	18.8	20.9	23.9	25.9	27.1	27.8	28.2	28.6	28.2	28.2	28.1	26.8	25.8	24.7	22.8	20.6	19.7	23.0	28.6
12-Aug	19.5	18.0	16.6	16.6	16.9	17.2	18.0	19.3	20.6	22.1	23.1	24.3	25.0	25.8	26.2	26.9	26.8	26.8	26.3	25.5	22.8	20.9	19.2	17.9	21.8	26.9
13-Aug	16.9	16.1	15.3	14.6	14.2	14.5	14.9	16.2	17.1	18.0	20.5	22.6	23.9	25.1	25.2	24.3	24.6	26.0	26.3	25.1	20.8	19.1	18.9	19.1	20.0	26.3
14-Aug	18.0	17.6	16.2	15.6	14.5	13.6	14.2	15.9	17.1	18.0	18.5	19.3	20.1	20.7	21.5	21.4	21.0	20.0	19.5	18.3	17.0	15.6	14.7	14.6	17.6	21.5
15-Aug	14.0	13.5	14.1	13.9	13.8	13.3	12.9	13.8	13.9	14.8	15.3	16.4	17.3	18.0	18.4	18.4	18.1	18.2	17.9	17.1	15.9	15.1	14.8	14.4	15.5	18.4
16-Aug	14.0	13.8	13.4	13.0	12.6	12.6	12.3	12.7	13.9	15.6	16.3	17.7	18.7	19.0	19.3	20.1	19.9	19.7	19.5	18.2	17.0	15.6	14.4	13.2	15.9	20.1
17-Aug	12.5	11.8	11.0	10.4	9.5	9.1	10.4	12.2	14.0	16.8	19.8	22.0	22.7	23.2	23.7	22.3	21.9	21.2	20.2	18.7	17.0	16.4	15.3	14.7	16.5	23.7
18-Aug	13.4	12.5	11.9	11.2	10.6	10.9	11.6	13.0	15.1	17.0	18.6	20.3	21.3	22.4	21.9	23.2	23.7	24.2	23.7	21.8	19.7	17.3	16.7	16.0	17.4	24.2
19-Aug	15.2	15.0	15.1	15.7	16.5	16.2	16.5	16.4	18.6	21.3	22.3	23.5	24.3	24.3	24.6	24.6	22.9	21.7	21.1	19.4	18.2	17.2	16.5	15.8	19.3	24.6
20-Aug	15.0	14.4	14.0	13.6	13.4	13.6	13.3	13.6	14.1	14.4	14.5	15.0	15.3	15.3	14.7	14.9	15.5	15.5	15.4	14.8	14.2	13.5	12.8	11.9	14.3	15.5
21-Aug	11.2	10.4	9.4	8.6	8.0	7.7	8.1	9.4	10.5	11.1	11.5	12.1	11.9	12.4	13.7	13.0	13.4	14.2	14.0	13.4	12.1	12.0	11.6	11.2	11.3	14.2
22-Aug	10.3	9.3	9.0	8.7	8.4	7.8	7.3	7.7	9.5	10.4	11.4	12.0	13.1	14.3	15.1	15.9	16.2	16.4	16.9	15.0	11.9	9.9	8.5	7.5	11.4	16.9
23-Aug	6.5	5.7	4.8	4.0	3.2	2.6	2.8	4.1	7.2	11.4	15.1	18.2	21.1	22.3	23.3	23.9	24.7	24.8	24.0	21.6	19.7	18.7	17.8	17.1	14.4	24.8
24-Aug	15.9	14.7	14.7	14.0	13.0	12.6	13.0	14.2	15.9	17.6	19.4	20.6	22.0	23.2	23.0	24.0	24.0	23.4	22.0	19.2	17.0	15.6	14.2	13.4	17.8	24.0
25-Aug	11.9	10.8	10.0	9.0	8.4	8.2	8.4	9.4	11.8	15.0	17.5	19.0	21.5	21.9	21.0	20.4	20.5	20.3	19.3	18.5	17.7	16.8	15.9	15.3	15.4	21.9
26-Aug	14.9	14.8	14.1	13.3	13.0	12.8	12.6	12.9	13.8	14.9	16.0	17.2	18.3	18.9	19.5	20.0	19.7	19.4	19.3	17.6	16.0	15.2	14.6	13.5	15.9	20.0
27-Aug	12.4	11.6	11.0	10.2	9.7	9.5	9.3	9.5	11.4	15.1	19.1	22.2	23.8	25.1	25.6	25.9	26.4	26.4	25.5	23.6	21.7	20.0	18.0	17.4	17.9	26.4
28-Aug	17.4	17.1	16.6	15.9	15.6	14.7	15.7	16.8	18.8	19.7	21.2	23.0	23.8	23.7	24.6	25.7	26.4	26.2	23.9	20.8	19.2	18.7	18.2	17.7	20.1	26.4
29-Aug	17.0	16.0	15.6	14.8	14.8	14.4	14.6	15.5	16.9	18.2	20.1	22.1	22.9	24.2	24.5	25.4	25.8	25.3	24.2	22.5	21.9	21.5	20.9	20.0	19.9	25.8
30-Aug	18.5	18.9	18.5	17.4	16.8	16.0	16.3	17.2	19.4	21.9	23.6	24.7	25.5	26.5	27.0	26.2	20.7	17.0	16.2	15.8	14.9	13.9	12.7	11.6	19.0	27.0
31-Aug	10.9	10.3	9.7	9.3	8.9	9.0	9.0	9.4	11.1	13.8	16.2	19.3	21.4	22.4	22.8	22.7	22.7	22.4	21.6	19.3	15.7	14.2	12.7	12.1	15.3	22.8
	15.2	14.6	14.0	13.5	13.2	13.0	13.2	14.1	15.5	17.3	19.0	20.5	21.6	22.4	22.7	22.7	22.6	22.2	21.7	20.3	18.6	17.5	16.5	15.8	Diurnal Average	
	20.2	19.4	18.7	18.2	18.4	18.2	18.3	19.8	21.1	23.9	25.9	27.1	27.9	28.8	29.1	28.5	30.3	30.2	30.0	28.3	25.5	23.7	22.5	21.2	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature (AT) - C

Athabasca Valley - August 2015



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	44	5.91	5.91
10 - 20	463	62.23	68.15
> 20	237	31.85	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

Maximum Value: 29.2 % on Aug 26 08:00

Maximum Daily Average: 29.1 % on Aug 26

Minimum Value: 28.4 % on Aug 30 07:00

Minimum Daily Average: 28.4 % on Aug 30

Maximum Diurnal Average: 28.9 % at hour 8

Minimum Diurnal Average: 28.8 % at hour 18

Monthly Average: 28.87 %

Percentiles: P_1 = 28.4 P_{10} = 28.6 Q_1 = 28.8 Median = 28.9 Q_3 = 29.0 P_{90} = 29.1 P_{99} = 29.2

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

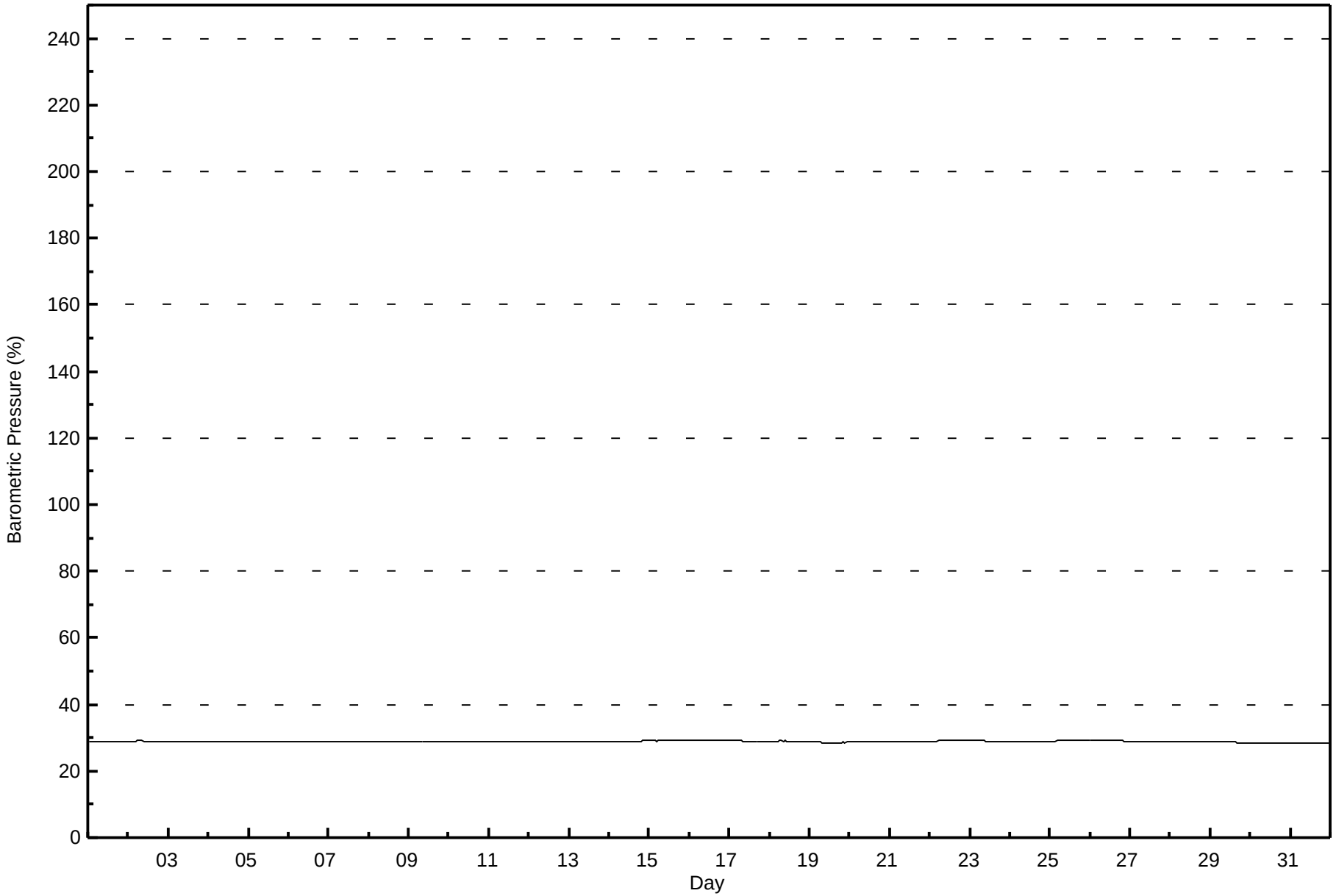
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.0	28.9	29.0
2-Aug	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	28.9	28.9	28.9	29.0	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.0
3-Aug	29.0	29.0	29.0	28.9	29.0	29.0	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0
4-Aug	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	28.9	29.0
5-Aug	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	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
6-Aug	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.9
7-Aug	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8
8-Aug	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	28.8	28.9
9-Aug	28.9	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0
10-Aug	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.9
11-Aug	28.8	28.8	28.8	28.8	28.8	28.9	28.8	28.8	28.9	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9
12-Aug	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.8	28.9
13-Aug	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9
14-Aug	28.8	28.8	28.8	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	28.9	29.0
15-Aug	29.0	29.0	29.0	29.0	29.0	29.0	29.1	29.0	29.1	29.1	29.1	29.1	29.0	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1
16-Aug	29.1	29.1	29.1	29.1	29.1	29.2	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.2
17-Aug	29.1	29.1	29.1	29.1	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.1
18-Aug	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.8	29.0	29.0	29.0
19-Aug	28.8	28.8	28.8	28.7	28.7	28.7	28.6	28.6	28.6	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.8
20-Aug	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	28.7	28.7	28.7	28.7	28.7
21-Aug	28.7	28.7	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.0	28.8	29.0
22-Aug	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	29.0	29.0	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.0	29.1
23-Aug	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	28.9	29.0	29.1
24-Aug	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.0	29.0	28.9	29.0
25-Aug	29.0	29.0	29.0	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.1	29.1	29.0	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
26-Aug	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	29.1	29.1	29.1	29.1	29.1	29.0	29.0	29.0	29.0	29.0	29.0	29.1	29.2
27-Aug	29.0	29.0	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.8	29.0
28-Aug	28.6	28.6	28.6	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.6	28.6	28.7	28.7	28.7	28.7	28.7	28.7	28.7
29-Aug	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.6	28.6	28.6	28.6	28.6	28.6	28.5	28.5	28.5	28.5	28.6	28.7
30-Aug	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.5	28.5	28.5	28.5	28.4	28.5
31-Aug	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.6	28.6	28.6	28.6	28.5	28.6
	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	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	Diurnal Average	
	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	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Barometric Pressure (BP) - %

Athabasca Valley - August 2015



Maximum Value: 99 inHg on Aug 31 07:00

Maximum Daily Average: 81.5 inHg on Aug 5

Minimum Value: 27 inHg on Aug 10 18:00

Minimum Daily Average: 49.1 inHg on Aug 12

Maximum Diurnal Average: 85.4 inHg at hour 6

Minimum Diurnal Average: 44.3 inHg at hour 15

Monthly Average: 66.0 inHg

Percentiles: P_1 = 29 P_{10} = 37 Q_1 = 51 Median = 67 Q_3 = 82 P_{90} = 92 P_{99} = 99

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

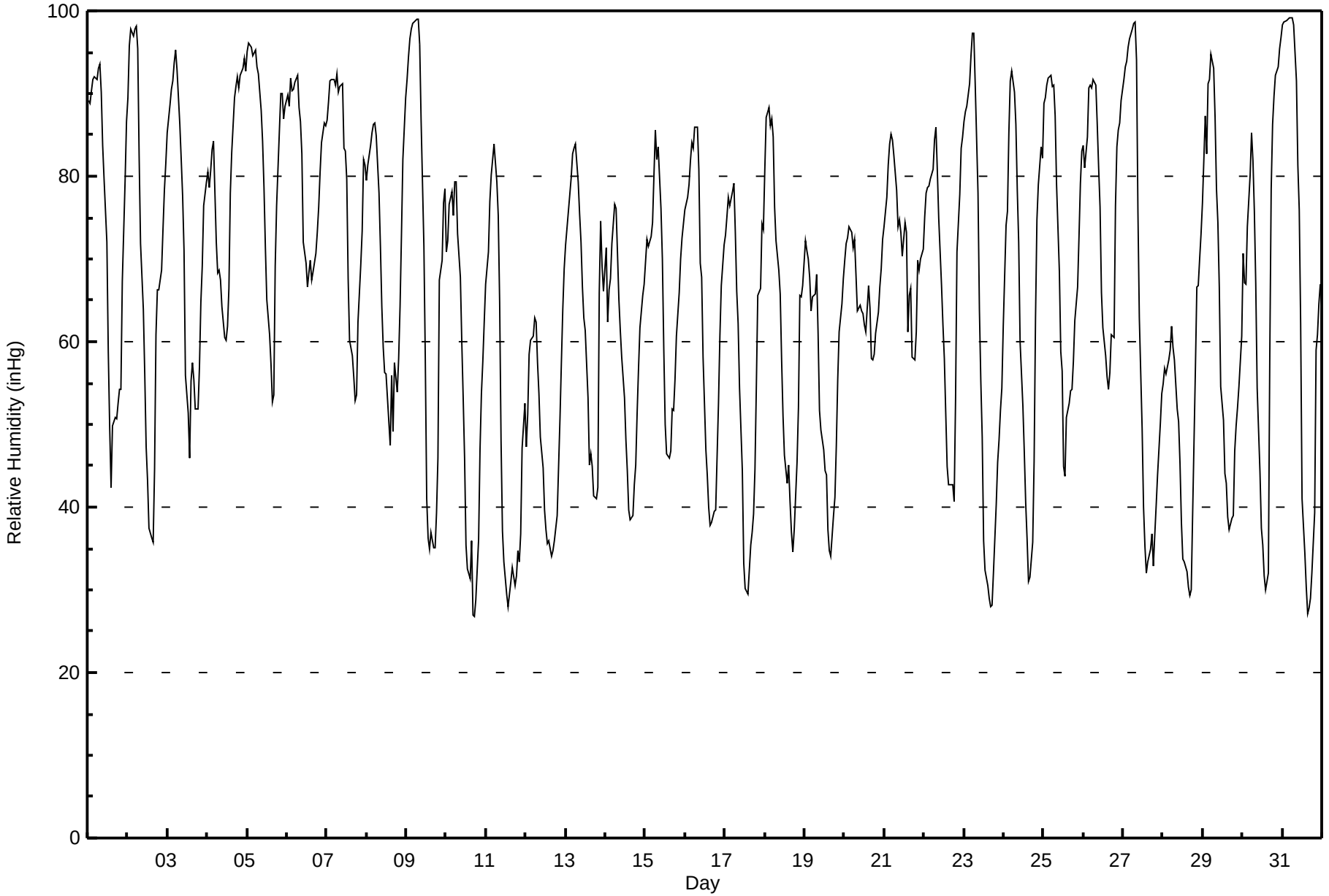
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	89	89	90	92	92	92	93	94	90	84	80	72	59	50	42	50	51	51	53	54	54	67	80	87	73.0	94
2-Aug	89	96	98	97	98	98	96	82	72	64	56	47	43	37	36	36	45	61	66	66	69	74	78	82	70.2	98
3-Aug	85	89	90	92	94	95	93	86	82	78	71	56	51	46	55	58	55	52	52	57	65	69	76	79	71.9	95
4-Aug	81	79	81	83	84	72	68	69	67	64	61	60	62	67	78	83	89	91	92	91	92	93	94	93	78.9	94
5-Aug	95	96	96	95	95	95	93	92	88	84	79	71	65	61	57	53	54	69	76	86	90	90	87	88	81.5	96
6-Aug	90	88	92	90	91	91	92	88	87	83	72	69	67	68	70	68	68	71	73	76	80	84	86	86	80.5	92
7-Aug	87	89	91	92	92	91	92	90	91	91	83	83	80	68	60	58	56	53	54	62	69	73	82	81	77.9	92
8-Aug	80	81	84	85	86	86	85	78	72	64	59	56	56	50	47	56	49	58	54	58	64	73	82	89	68.9	89
9-Aug	92	94	97	98	98	99	99	99	96	87	72	58	41	36	35	37	35	35	39	46	68	70	77	78	70.2	99
10-Aug	71	72	77	78	75	79	79	73	68	60	53	46	36	33	31	36	27	27	29	36	47	54	58	62	54.4	79
11-Aug	67	71	77	80	82	84	79	75	65	48	37	33	29	28	30	31	33	30	32	35	33	37	47	53	50.7	84
12-Aug	47	51	58	60	61	63	62	57	54	48	45	40	37	36	36	34	35	36	37	39	51	57	64	69	49.1	69
13-Aug	72	74	78	80	83	83	84	79	75	72	67	63	61	53	45	46	45	41	41	42	66	75	69	66	65.0	84
14-Aug	71	62	66	68	72	77	76	71	65	61	58	53	48	44	40	38	39	43	45	51	57	62	66	67	58.3	77
15-Aug	70	72	72	73	74	80	86	82	83	76	70	59	50	46	46	47	52	52	55	61	66	70	72	74	66.2	86
16-Aug	76	77	79	82	84	83	86	86	81	70	68	58	47	44	40	38	38	40	40	46	53	61	67	72	63.1	86
17-Aug	73	75	77	76	78	79	73	66	62	54	44	33	30	30	30	35	37	39	45	55	66	66	74	74	57.2	79
18-Aug	81	87	88	86	87	85	76	72	69	66	58	51	46	43	45	41	37	35	37	45	52	66	66	67	61.9	88
19-Aug	72	71	70	68	64	65	66	68	61	52	49	47	44	44	37	35	34	39	41	48	55	61	64	68	55.2	72
20-Aug	70	72	73	74	73	71	72	68	64	64	64	63	62	61	67	64	58	58	58	61	64	67	69	72	66.2	74
21-Aug	74	77	81	84	85	84	82	78	74	75	73	70	74	73	61	66	66	58	58	61	70	69	70	71	72.4	85
22-Aug	75	78	79	79	80	81	84	86	81	75	67	62	58	51	45	43	43	43	41	53	71	78	83	85	67.4	86
23-Aug	87	88	89	91	95	97	97	91	78	64	55	48	36	32	31	29	28	28	32	40	45	48	52	54	59.8	97
24-Aug	62	74	76	85	91	93	90	86	78	72	60	52	47	40	36	31	32	36	46	63	75	79	84	82	65.4	93
25-Aug	89	89	91	92	92	91	91	87	79	69	59	56	45	44	51	53	54	54	58	63	67	73	79	83	71.2	92
26-Aug	84	81	85	91	91	91	92	91	86	81	76	66	62	58	56	54	56	61	61	76	84	86	87	89	76.8	92
27-Aug	92	93	94	96	97	98	98	99	94	76	63	50	40	35	32	33	35	37	33	37	40	44	50	54	63.2	99
28-Aug	55	57	56	58	59	62	59	58	52	50	45	38	34	33	32	30	29	30	39	57	67	67	70	73	50.5	73
29-Aug	77	87	83	91	92	95	93	87	78	74	67	55	50	44	43	39	37	39	39	47	50	52	55	61	63.9	95
30-Aug	71	67	67	74	80	85	82	76	67	54	44	37	35	32	30	32	58	78	86	90	92	93	95	97	67.7	97
31-Aug	98	99	99	99	99	99	99	98	92	81	76	62	41	34	30	27	28	29	32	39	59	61	65	67	67.2	99
	78.0	79.9	81.7	83.4	84.6	85.4	84.5	81.1	75.8	69.1	62.3	55.4	49.6	45.9	44.3	44.5	45.3	47.4	49.8	56.2	63.8	68.3	72.5	74.9	Diurnal Average	
	98	99	99	99	99	99	99	99	96	91	83	83	80	73	78	83	89	91	92	91	92	93	95	97	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity (RH) - inHg

Athabasca Valley - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Athabasca Valley - August 2015

Maximum Speed: 35 km/h on Aug 19 16:00

Maximum Daily Speed Average: 19.3 km/h on Aug 14

Minimum Speed Value: 0 km/h on Aug 28 21:00

Minimum Daily Speed Average: 1.6 km/h on Aug 18

Maximum Diurnal Speed Average: 6.4 km/h at hour 15

Minimum Diurnal Speed Average: 2.0 km/h at hour 20

Monthly Average Velocity: 2.9 km/h 241.9 deg

Percentiles: P_1 = 1 P_{10} = 3 Q_1 = 5 Median = 8 Q_3 = 13 P_{90} = 18 P_{99} = 28

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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	WNW3	NNW10	NW7	NNW2	NE3	NW5	NNW12	NNW11	NNW7	N9	N8	NW2	NW3	N11	N13	NNE9	S10	SW9	SE8	E9	ESE7	ESE1	ESE3	ESE4	N2.9	N13
2-Aug	SE6	SE9	SE7	SE7	SE7	SE7	ESE7	SE7	SE7	E5	ENE6	N3	N3	E6	E9	E9	WNW9	NNW11	NNW5	ENE2	E1	SW3	S3	NNW1	ESE2.8	NNW11
3-Aug	ESE1	E3	ESE3	SE3	ESE4	SE6	ESE1	ENE3	NNW3	N4	WNW3	SSE7	ESE8	SSE9	SSW11	ESE7	ESE8	E8	ESE10	E7	ESE7	SE8	ESE3	E3	ESE4.0	SSW11
4-Aug	ENE4	N2	E4	SE5	E2	ESE3	SE5	SE7	ESE5	SE5	SE9	SE9	ESE12	ESE12	ESE8	ESE9	ESE11	SE11	SE11	SE11	SE8	SE7	ESE4	SSE4	ESE6.6	ESE12
5-Aug	S4	NE2	ENE2	ENE2	N4	NNE4	ESE3	ESE4	ESE7	ESE7	ESE5	E10	E13	E14	ESE13	ESE14	ESE11	SE11	ESE9	SE10	ESE6	ESE9	ESE10	ESE10	ESE7.0	E14
6-Aug	ESE9	ESE10	ESE8	ESE8	SE9	SE9	SE9	SE11	SE11	ESE9	SE13	ESE13	ESE14	E18	E18	E14	E15	E13	ESE12	ESE8	E9	E5	E4	E4	ESE10.2	E18
7-Aug	NE4	E5	E6	E6	E5	E4	ENE3	NNW4	ENE3	SW1	SE5	N7	E8	E12	E9	E12	ESE6	SE5	S9	SE6	SSW7	S6	S2	ESE6	ESE4.0	E12
8-Aug	SE8	SSE8	SSE8	SE6	SE6	SE7	SE10	SE9	SE7	SE5	SSE9	E2	NW1	E8	E3	WNW10	E4	NNW10	N5	E7	ESE9	SE5	ENE3	ESE3	SE4.0	WNW10
9-Aug	ESE4	E4	ESE4	E3	E5	E5	ESE5	SSE5	WSW7	W3	WNW3	SSW2	SSE7	WSW5	NW3	NNW2	NNE2	S8	ESE8	ESE4	E3	SE4	SE4	SSW3	SE2.1	S8
10-Aug	SE8	SE8	SE5	SSW10	SSW8	SW7	SW9	SW8	SW13	SW12	SW12	SW12	SW14	SW18	SW12	NW8	WSW15	WSW14	SSW8	S6	SSW5	SSW6	SSW7	SW10	SW8.3	SW18
11-Aug	ESE1	ESE1	ESE5	SSE5	SE6	ESE6	SE7	SE3	SSW6	SW13	SW20	WSW20	WSW23	WSW27	WSW24	W22	W24	WSW24	W15	WSW11	WSW14	WSW11	SW10	SW14	WSW10.5	WSW27
12-Aug	WSW22	SSW9	SSE5	S2	SSW5	SW7	SW8	WSW15	WSW15	W16	W18	W22	W20	W17	W15	W18	W22	W18	WNW17	W14	WSW8	SW8	S5	SSE4	WSW11.4	W22
13-Aug	SE5	SSE5	SE6	SE5	SE6	SE7	SE7	ESE6	SE10	SE10	SE8	SE6	ESE5	W8	WNW22	WNW16	WSW1	SW11	WSW9	WSW9	SW4	SSE2	SSE4	SW13	SSW3.0	WNW22
14-Aug	WSW13	WSW15	SW10	WSW20	WSW15	WSW13	WSW13	W19	W25	W25	W27	WNW28	WNW26	WNW29	WNW24	WNW30	WNW29	NW27	WNW24	WNW20	WNW17	WNW19	WNW14	W16	W19.3	WNW30
15-Aug	WSW15	WSW10	NW14	NW14	NW16	NW13	NW10	NW17	NNW18	NNW20	NNW19	NNW20	N19	N17	N15	NNW21	NNW21	NNW18	NW18	NW16	WNW12	NW10	NNW8	NNW8	NNW13.8	NNW21
16-Aug	NNW8	NNW8	NNW7	W4	W6	WSW7	SW8	SW8	SW6	SW7	NW5	ENE3	NW11	N12	N6	WSW6	WNW16	WNW12	W13	WSW9	SW4	SSE3	SE4	SE6	WNW4.2	WNW16
17-Aug	SE6	SE6	SE6	SE7	SE7	SE7	SSE4	S3	SE1	ESE2	WSW6	SW10	SW10	SW7	WSW5	SW19	S12	S10	SSW6	SSE2	ESE4	SSE3	ESE6	SE5	S4.7	SW19
18-Aug	SE4	S1	ESE3	SE7	SE4	SW6	SW9	SW8	NNW5	NNW5	NNW7	NW6	NNW5	NNW6	NW5	NNW3	WSW7	SSW5	SSE9	SSE9	SSE7	SE6	SSE7	SSE8	S1.6	SW9
19-Aug	SE8	SE9	SE10	SE9	SE13	SE12	SE14	SE14	SSE9	SW14	WSW18	WSW20	W22	W22	WNW26	WNW35	W30	W19	W25	W18	W17	WNW17	W13	WSW13	WSW10.4	WNW35
20-Aug	WSW12	WSW16	WSW18	WSW18	WSW17	W20	WSW17	W19	W20	W25	W25	W28	WNW28	WNW24	WNW20	WNW17	WNW19	NW15	WNW16	WNW16	W13	WSW14	WSW15	WSW13	W17.4	WNW28
21-Aug	WSW6	WSW8	SW9	WSW15	WSW12	WSW13	WSW12	WSW11	NW14	NW17	NW22	NW19	NW17	NW13	NW20	NNW19	NNW12	NNW18	NNW16	NW15	W15	W17	WNW15	WNW16	WNW12.3	NW22
22-Aug	W17	WSW14	WSW17	WSW18	WSW16	WSW16	WSW14	WSW14	W13	WNW15	NW18	NW17	WNW17	WNW18	NW21	NNW21	NNW12	NNW10	N8	ESE1	ESE4	ESE4	SE3	SE5	W9.4	NW21
23-Aug	SE4	SE7	SE8	SE9	SE10	SSE9	SE9	SE8	SE9	ESE7	ESE4	E5	SE6	S4	SW8	SSE9	S9	S8	SSE8	SE11	SE12	SE10	ESE6	SE4	SE7.0	SE12
24-Aug	SSW6	E2	WSW7	S5	SE13	SE6	SE7	E5	SW6	SW8	SW12	SW11	SW12	SW12	SW13	SW12	SW9	WSW4	W4	SW3	SE2	E2	E4	SE4	SSW4.9	SE13
25-Aug	ENE4	E4	E3	E3	ESE3	ESE4	ESE4	E3	E5	NW1	WNW3	NW3	NNW7	NNW11	N10	NNW15	NNW13	NNW12	N9	NNW9	NNW5	W3	SW5	WSW5	N3.6	NNW15
26-Aug	NW6	NNW10	NNW15	NNW10	NW7	NNW6	NNW7	NNW8	NNW6	NW5	NNW6	NW5	N8	NNW7	NNW6	NNW5	N5	NNE3	ESE1	S0	SSW0	E3	E2	ESE3	NNW4.8	NNW15
27-Aug	ESE4	SE3	ESE2	SE3	SE6	SE7	SSE8	SE8	SE9	SE9	ESE7	E4	WSW8	SW10	WSW17	SW19	SW17	WSW15	WSW14	SW7	S5	SSE8	SSE7	SW10	SSW5.6	SW19
28-Aug	SW16	SW17	SSW8	SSW6	SSW4	ESE3	S6	SW15	SW18	SW17	WSW19	WSW17	W22	W21	W17	WSW10	SW8	SW8	WSW3	W2	NW0	WSW2	NNW4	W1	WSW9.1	W22
29-Aug	S5	NW4	NW4	SSE5	SW3	WNW2	W3	SSW3	SW5	E1	WSW4	WSW4	W3	NE2	NE5	ESE8	SE12	SE11	SE10	SE8	SE9	SE10	SSE7	SE9	SE3.2	SE12
30-Aug	SE9	SE11	SSE8	ESE2	SE2	SSE2	S2	SSW6	WSW10	WNW12	NW7	N10	NW7	WSW7	SW11	SSW7	SSE13	SSW9	SE5	SE6	SSE8	SE9	SE11	SSE11	S3.7	SSE13
31-Aug	SE11	SE10	SE8	SE8	SSE8	SSE6	SSE6	SE9	SE9	SE10	SE9	S6	SW14	SW20	SW23	WSW22	WSW17	WSW15	WSW10	SW5	SSW1	SE5	SE6	SE7	SSW6.7	SW23
	SSW3.3	S2.6	S2.2	S3.2	S3.1	S2.8	S3.3	SSW3.2	SW3.3	WSW3.7	W4.5	W4.8	W5.5	W5.3	WNW6.4	WNW6.1	W5.2	W4.8	W3.3	SW2.0	SSW2.3	SSW2.4	S2.2	SSW3.2	Diurnal Average	
	WSW22	SW17	WSW18	WSW20	WSW17	W20	WSW17	W19	W25	W25	WNW27	WNW28	WNW28	WNW29	WNW26	WNW35	W30	NW27	W25	WNW20	WNW17	WNW19	WNW15	WNW16	Diurnal Maximum	

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 10 km/h on Aug 8 16:00

Minimum Value: 1 km/h on Aug 9 11:00

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:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

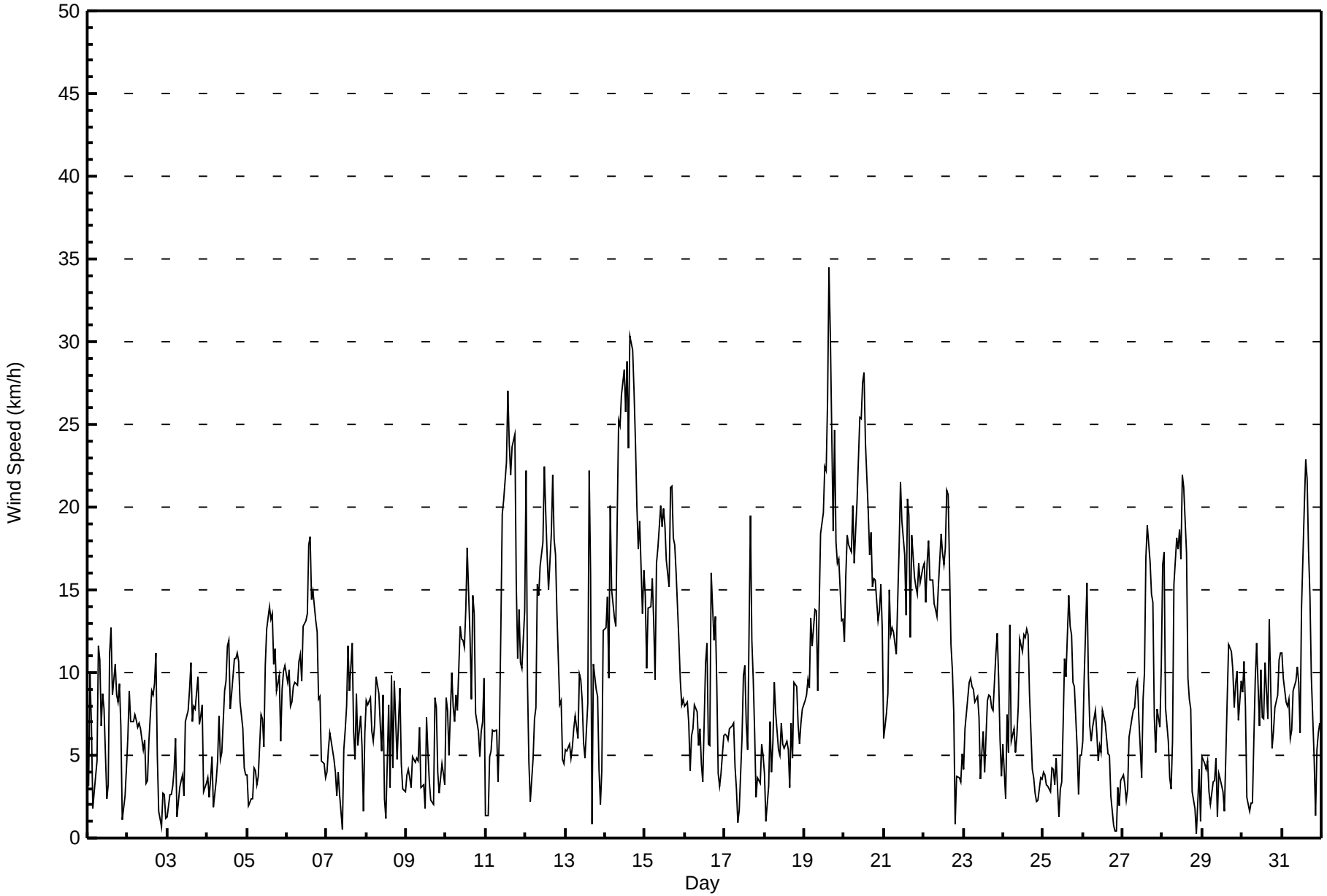
Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Aug	2	2	1	2	2	3	2	3	2	2	2	2	2	3	4	4	3	3	3	2	2	1	2	1	4
2-Aug	2	2	1	1	1	1	1	1	2	1	2	2	2	3	3	3	8	5	3	1	2	2	2	1	8
3-Aug	2	1	2	1	2	2	1	1	1	1	1	3	3	5	4	3	2	2	3	2	2	2	2	2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

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed (WS) - km/h

Athabasca Valley - August 2015



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	222	29.84	29.84
6 - 11	302	40.59	70.43
12 - 19	166	22.31	92.74
20 - 28	49	6.59	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

Athabasca Valley - August 2015

Wind Speed Ranges (km/h)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 5	6	4	5	10	34	39	29	15	13	9	8	10	7	6	13	14	222
6 - 11	10	1	0	1	14	35	97	25	10	16	33	21	2	2	10	25	302
12 - 19	5	0	0	0	9	7	8	1	1	1	24	40	20	21	16	13	166
20 - 28	0	0	0	0	0	0	0	0	0	0	3	9	17	11	4	5	49
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	1	4	0	0	5
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	21	5	5	11	57	81	134	41	24	26	68	80	47	44	43	57	744

Total Number of Valid Hours: 744

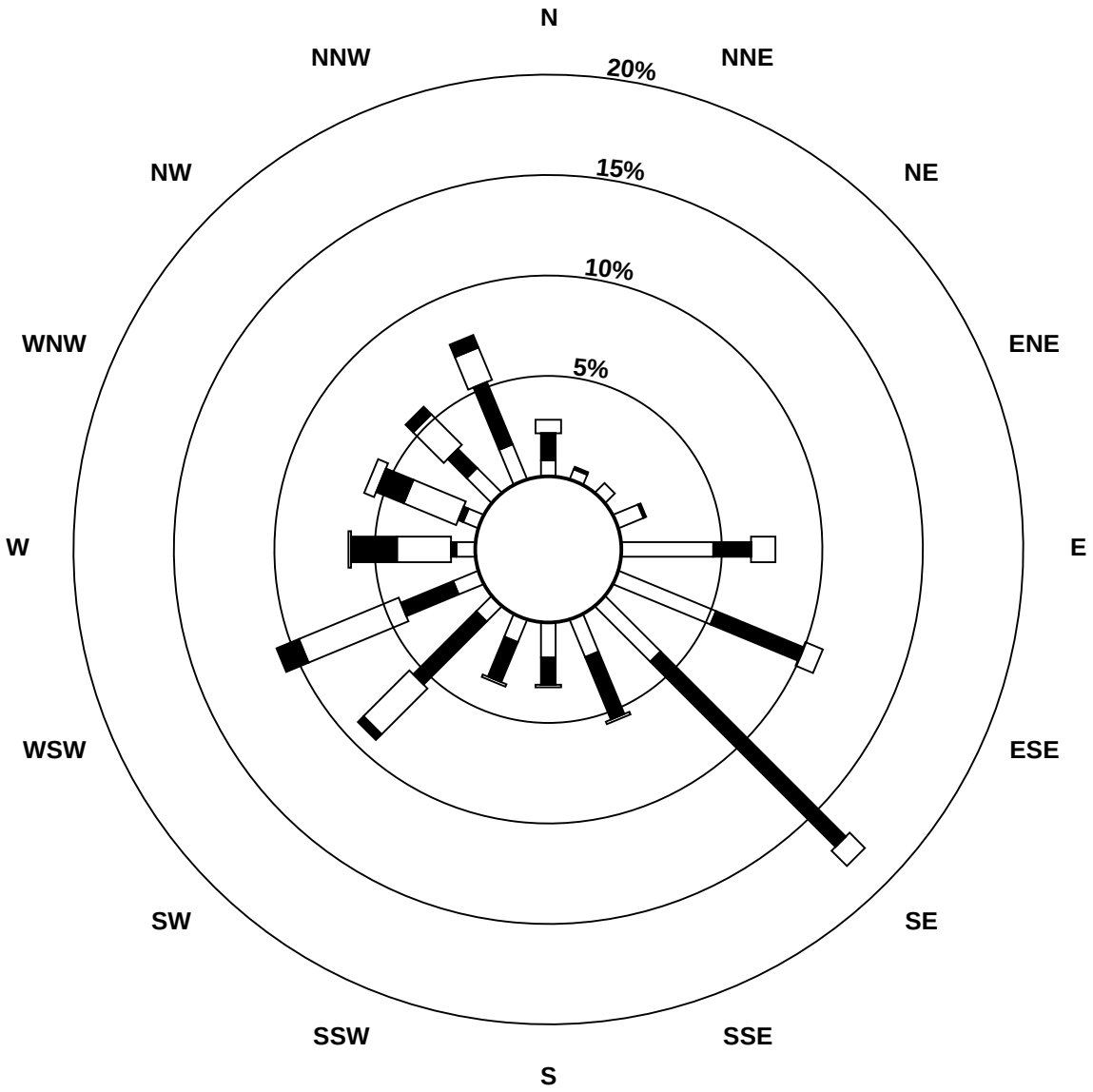
Total Number of Hours: 744

Wood Buffalo Environmental Association

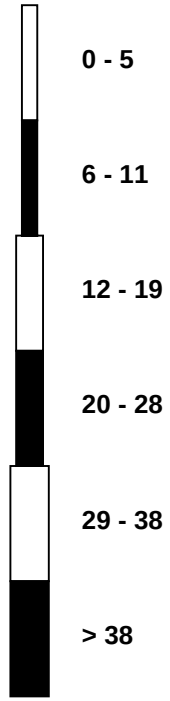
Wind Rose Aug 2015

Wind Speed (WS) - km/h

Athabasca Valley (AMS 7)



Classes (km/h)



Total Number of Valid Hours: 744

Direction of Maximum Speed: 282 deg on Aug 19 16:00
Direction of Maximum Daily Speed Average: 278.0 deg on Aug 14

Direction of Minimum Speed: 307 deg on Aug 28 21:00

Direction of Minimum Daily Speed Average: 1.6 deg on Aug 18

Monthly Average Direction: 255.3 deg

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
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average
1-Aug	283	331	324	335	45	326	340	334	333	350	357	323	317	354	356	25	186	215	143	97	122	108	107	123	353.4
2-Aug	128	136	141	138	143	142	123	132	124	90	68	357	5	97	86	89	301	342	328	70	98	233	189	348	105.7
3-Aug	105	91	122	124	111	130	102	73	333	349	301	154	123	160	194	123	119	98	103	101	123	134	105	91	122.5
4-Aug	69	11	98	136	80	122	140	139	118	139	140	127	108	116	108	116	120	125	133	127	125	136	109	150	122.3
5-Aug	185	56	76	60	2	19	107	107	102	102	113	96	100	96	106	105	119	141	110	126	107	112	118	120	107.3
6-Aug	115	120	120	115	134	129	125	135	134	116	126	112	104	88	89	99	97	100	104	102	94	95	94	93	109.2
7-Aug	50	84	93	89	92	87	78	341	75	236	129	353	87	90	90	93	103	143	174	139	198	173	175	122	104.9
8-Aug	137	149	149	138	137	142	137	143	137	142	147	92	310	94	95	293	91	345	356	86	119	139	71	118	125.1
9-Aug	117	93	123	99	91	91	106	159	237	281	298	202	162	244	312	348	21	172	105	115	87	132	127	192	137.7
10-Aug	131	129	135	205	213	226	223	216	220	218	218	223	225	223	235	306	237	240	208	183	209	207	194	219	216.2
11-Aug	118	102	115	155	139	116	139	127	204	225	224	242	258	250	250	260	274	258	263	253	254	238	218	235	241.4
12-Aug	244	206	161	170	192	218	230	242	258	275	270	270	271	275	272	264	279	279	287	268	244	226	174	153	258.2
13-Aug	146	155	140	132	138	142	137	122	140	142	131	124	105	273	302	300	253	231	250	251	223	165	162	229	194.8
14-Aug	239	240	230	237	244	245	247	270	268	265	281	283	289	288	286	298	300	304	299	291	283	302	282	271	278.0
15-Aug	256	244	307	306	308	317	306	325	334	340	345	348	353	354	352	341	337	339	316	304	300	324	339	333	326.4
16-Aug	334	335	334	264	264	240	232	225	231	230	304	61	320	8	358	242	292	295	281	244	220	163	131	131	282.7
17-Aug	145	145	143	137	145	140	159	189	127	107	239	234	233	215	237	235	190	183	206	166	115	150	113	133	185.1
18-Aug	131	177	114	130	128	214	222	221	338	336	337	314	335	337	317	335	241	212	151	149	151	128	151	149	186.5
19-Aug	146	145	134	134	134	139	144	141	150	222	237	258	264	272	284	282	275	259	280	277	269	282	269	254	250.7
20-Aug	244	242	245	253	252	266	256	272	278	281	279	276	290	295	291	298	303	309	292	287	272	246	244	244	273.6
21-Aug	255	238	224	242	240	244	243	246	305	321	314	316	318	322	323	331	332	330	329	305	280	281	290	287	296.3
22-Aug	266	244	244	243	244	246	239	238	269	283	313	309	288	300	310	327	332	343	355	105	107	105	132	134	280.2
23-Aug	127	136	139	145	146	149	140	137	138	119	117	84	126	181	216	154	172	178	150	132	134	146	103	133	142.9
24-Aug	210	98	242	189	143	140	126	96	231	230	226	226	214	229	231	225	227	256	268	234	126	82	98	125	207.1
25-Aug	78	82	98	89	115	109	104	95	83	326	301	305	333	346	350	342	342	346	351	346	343	270	235	256	353.7
26-Aug	306	337	338	339	325	339	344	346	336	315	329	326	351	340	333	341	0	14	105	170	205	79	96	115	340.8
27-Aug	117	133	111	124	133	146	149	137	138	129	114	99	237	235	239	233	229	242	252	230	172	155	167	218	196.7
28-Aug	234	234	213	195	202	119	190	228	228	227	257	243	261	272	275	246	227	232	238	266	307	252	344	274	242.1
29-Aug	191	325	326	154	232	299	272	192	217	80	256	251	279	45	38	115	126	124	134	130	141	144	147	130	145.1
30-Aug	138	146	158	102	137	167	182	204	243	295	322	354	320	253	232	195	167	199	127	138	147	141	140	147	179.0
31-Aug	146	141	138	145	150	159	151	135	135	139	134	176	229	231	236	257	240	243	242	221	211	139	124	126	192.1
	198.5	188.0	182.9	187.7	182.2	189.6	190.1	208.7	235.3	258.6	267.8	274.9	276.5	279.4	283.1	286.0	266.9	267.4	266.9	235.0	204.1	196.0	178.4	194.6	
	Diurnal Average																								

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

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg

Athabasca Valley - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 102 deg on Aug 29 00:00

Minimum Value: 8 deg on Aug 20 23:00

Percentiles: P_1 = 10 P_{10} = 13 Q_1 = 16 Median = 21 Q_3 = 36 P_{90} = 63 P_{99} = 94

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

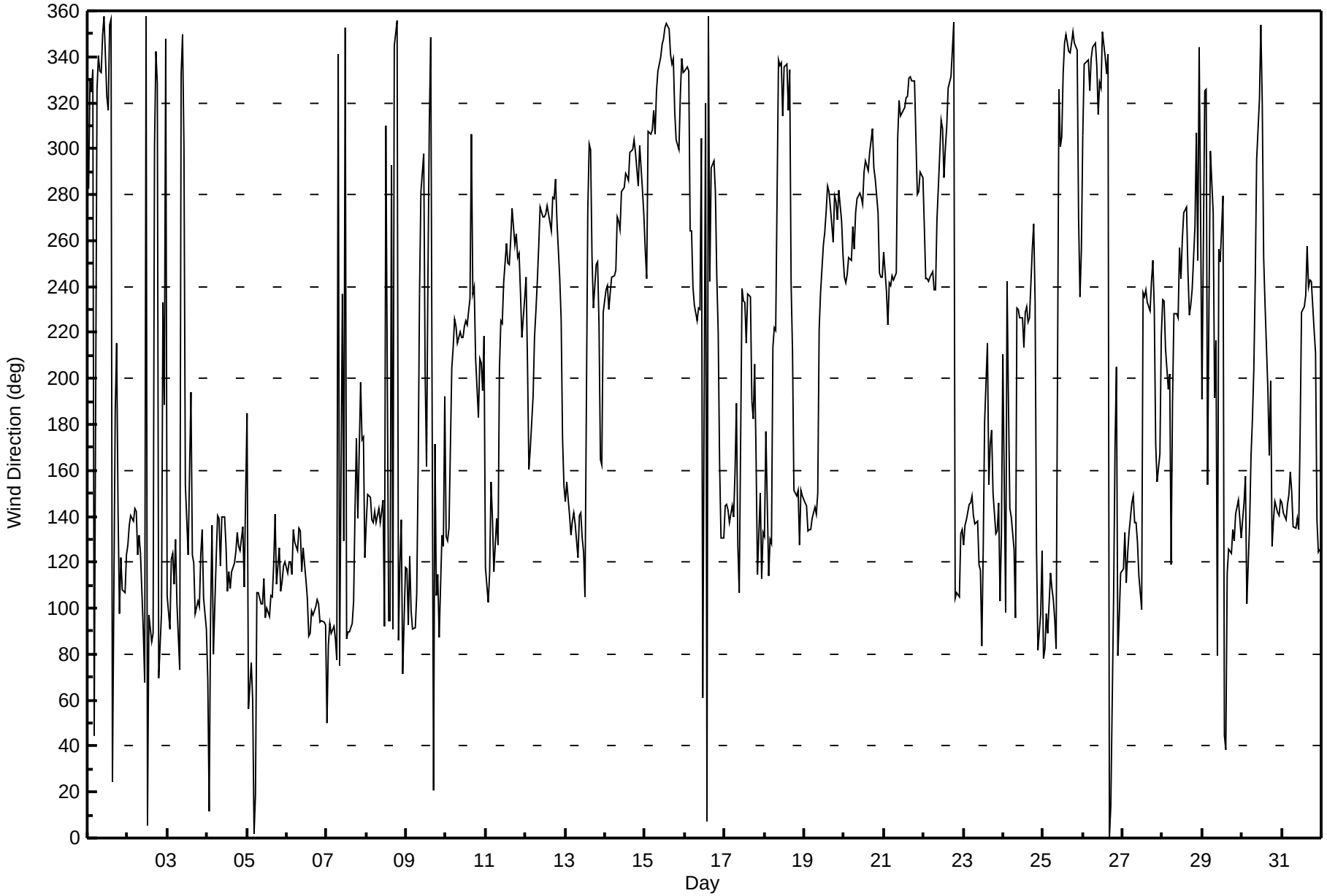
Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Aug	66	14	16	61	42	42	15	14	20	19	22	74	78	26	24	55	31	25	45	18	34	90	69	31	90
2-Aug	19	15	17	14	14	12	23	20	25	34	25	63	74	53	24	21	68	16	29	70	91	85	68	73	91
3-Aug	73	62	66	36	26	23	73	53	25	26	57	71	34	53	36	36	27	27	20	17	21	17	70	49	73
4-Aug	38	34	38	35	45	54	37	24	53	54	21	24	22	21	22	21	19	20	17	19	19	18	25	38	54
5-Aug	32	26	35	52	20	30	32	29	24	25	35	21	22	18	22	24	24	25	22	22	23	26	21	21	52
6-Aug	23	22	23	23	20	19	20	19	19	24	22	24	26	14	13	22	18	20	19	20	15	34	25	26	34
7-Aug	19	18	14	13	14	22	54	30	37	85	49	49	14	14	37	21	41	52	16	29	28	26	79	21	85
8-Aug	23	20	16	23	18	18	16	20	27	58	34	98	72	37	82	89	59	19	29	32	22	43	28	38	98
9-Aug	23	22	29	39	14	23	31	42	24	46	22	84	37	57	73	69	76	23	24	41	41	34	48	80	84
10-Aug	28	19	39	45	28	23	16	27	12	11	12	13	17	14	21	22	26	15	33	34	32	15	22	18	45
11-Aug	93	79	29	24	14	22	23	67	71	14	13	16	19	17	17	20	14	17	18	16	12	20	21	11	93
12-Aug	10	42	21	86	68	31	19	12	20	15	21	17	20	23	23	21	18	17	13	12	12	18	42	27	86
13-Aug	28	17	14	26	30	27	15	24	11	14	20	29	29	87	14	19	100	17	17	18	15	74	56	13	100
14-Aug	11	19	38	13	12	12	16	17	13	16	14	18	18	13	19	18	16	18	16	14	10	17	20	12	38
15-Aug	13	14	21	12	12	18	23	11	11	15	15	17	21	21	30	15	15	16	13	11	30	17	11	11	30
16-Aug	12	14	15	55	25	19	11	11	17	21	54	68	48	26	48	76	21	17	10	21	53	53	39	17	76
17-Aug	11	18	16	13	14	12	40	56	99	85	28	26	21	54	59	16	33	28	25	57	51	64	24	41	99
18-Aug	39	82	62	16	32	39	9	13	45	39	19	28	41	45	30	81	27	54	28	17	33	20	14	15	82
19-Aug	13	14	15	16	15	19	13	12	34	31	16	21	20	19	15	12	13	15	18	15	14	14	17	12	34
20-Aug	11	10	10	12	11	12	14	16	16	13	15	12	12	15	17	21	18	16	14	10	16	9	8	12	21
21-Aug	32	20	18	11	14	11	13	21	24	14	12	18	19	15	20	14	27	16	14	19	10	11	12	11	32
22-Aug	12	11	9	9	10	11	11	11	22	14	15	17	20	18	16	14	18	19	23	95	37	27	38	29	95
23-Aug	27	18	16	16	15	16	17	21	16	25	69	33	55	73	36	27	33	27	20	15	14	15	60	63	73
24-Aug	43	80	24	55	22	33	16	34	36	20	15	16	16	21	18	13	13	34	48	61	58	84	25	31	84
25-Aug	34	26	35	23	56	25	20	28	19	88	24	22	26	17	17	11	12	15	16	15	23	70	52	21	88
26-Aug	35	21	18	34	13	19	16	14	17	34	17	16	23	20	15	47	24	40	83	96	94	52	59	27	96
27-Aug	31	39	31	23	10	16	15	14	13	14	25	84	25	30	18	17	20	20	16	32	29	13	21	24	84
28-Aug	9	10	90	79	99	65	77	14	11	12	16	21	17	17	21	32	20	15	43	68	99	78	57	102	102
29-Aug	65	49	76	53	62	95	60	43	26	93	55	59	81	86	58	34	24	20	19	18	18	19	27	25	95
30-Aug	20	17	19	51	67	62	71	42	29	21	39	21	56	43	33	46	54	59	39	22	19	13	13	12	71
31-Aug	11	11	17	14	18	22	27	14	12	12	13	56	19	20	16	18	20	15	17	54	90	30	29	21	90
	93	82	90	86	99	95	77	67	99	93	69	98	81	87	82	89	100	59	83	96	99	90	79	102	
	Diurnal Maximum																								

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction (WD) - deg

Athabasca Valley - August 2015



Wood Buffalo Environmental Association
SO2 Calibration Report

W B E A

Station Information

Calibration Date	August 13, 2015	Last Calibration	July 8, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Routine		
Start Time (MST)	10:40	End Time (MST)	12:55
Gas Cert Reference	S970259A	Station temp.	18 Deg C
Cal Gas Concentration	50 ppm	Cal Gas Exp Date	26/09/2017
Calibrator Make/Model	Sabio 4010	Serial Number	11021107
ZAG Make/Model	API 701	Serial Number	1864
DACS make/model	Campbell Scientific CR3000	DACS serial No.	5564

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 1000 ppb		PMT voltage	-681	-681
Analyzer IP address	192.168.1.103		Lamp voltage	812	807
Calculated slope	1.007677	1.010933	Chamber temp	43.5	43.7
Calculated intercept	0.602535	-0.357964	Pressure	700.1	704.2
Analyzer Background	10.5	10.5	Flow	0.547	0.549
Analyzer Coefficient	0.829	0.829	Intensity	48500	48500

Analyzer make	Thermo 43C	Analyzer serial #	6074175781

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.6	----
as found span	5000	60.7	607.0	601.0	1.010
calibrator zero	5000	0.0	0.0	0.6	----
high point	5000	60.7	607.0	601.0	1.010
second point	5000	30.4	304.0	300.7	1.011
third point	5000	15.2	152.0	150.6	1.009
as left zero	5000	0.0	0.0	0.7	----
as left span	5000	60.7	607.0	604.7	1.004
				Average Correction Factor	1.010

Corrected As found	600.4	Previous response	601.8	% change	0.2%

Notes:

No adjustments or mainenance done, filter changed out

Calibration Performed By: Melissa Lemay

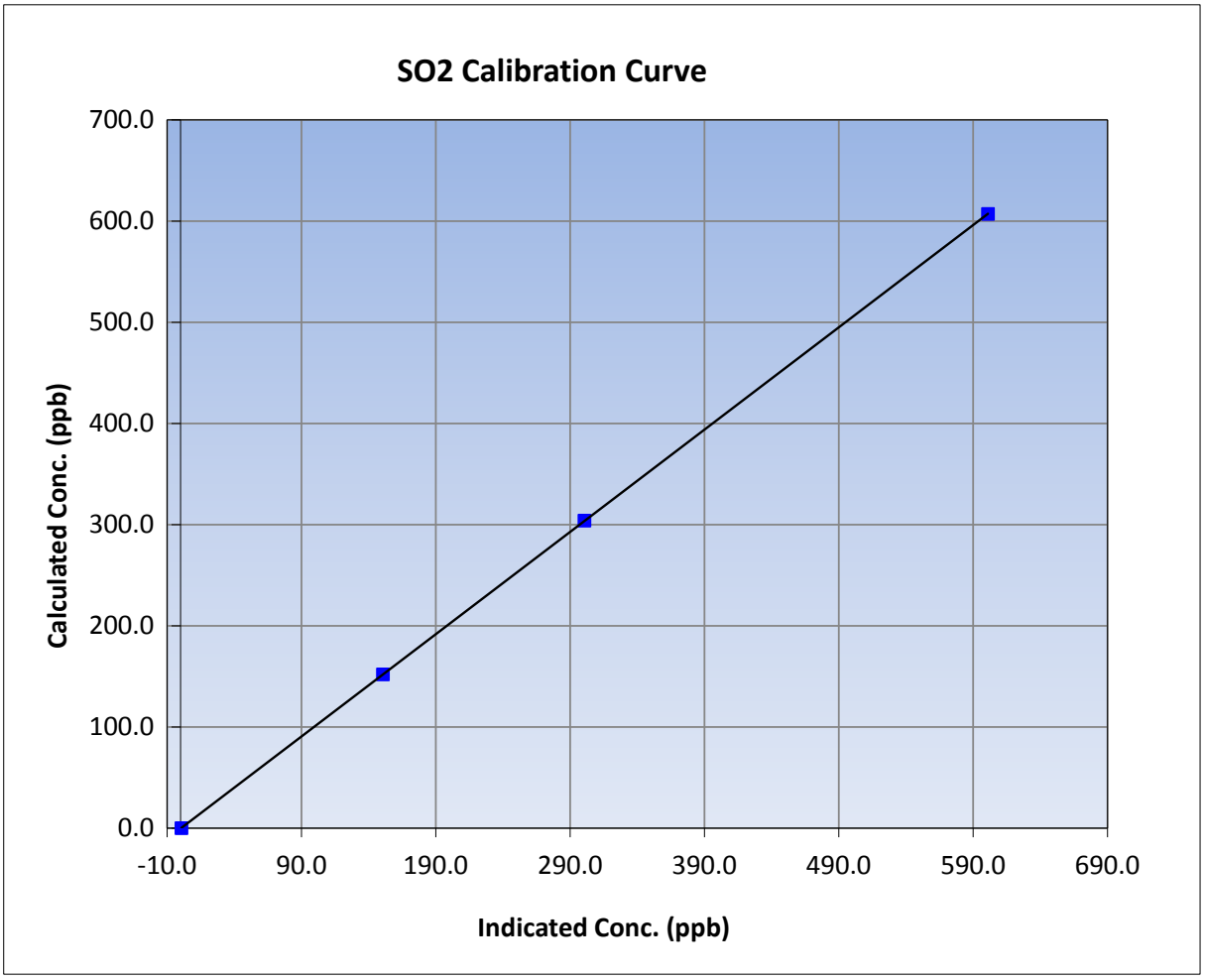
Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

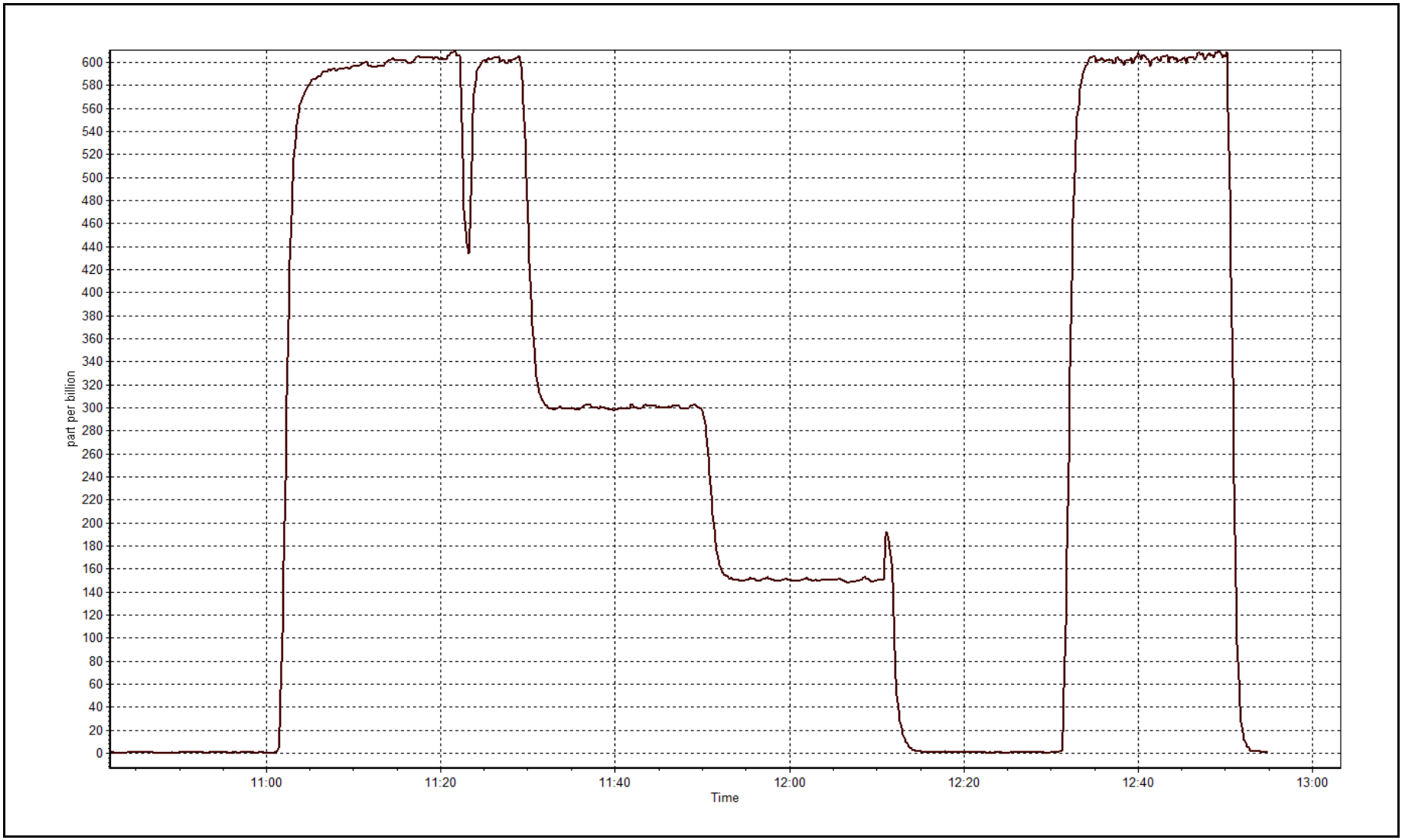
Calibration Date	August 13, 2015	Previous Calibration	July 8, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	10:40	End Time (MST)	12:55
Analyzer make	Thermo 43C	Analyzer serial #	6074175781

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.6	----	Correlation Coefficient	0.999999
607.0	601.0	1.0100		
304.0	300.7	1.0110	Slope	1.010933
152.0	150.6	1.0093		
			Intercept	-0.357964



SO2 Calibration Plot Date: August 13, 2015



Wood Buffalo Environmental Association
TRS Calibration Report

Station Information

Calibration Date	August 14, 2015	Last Calibration	July 23, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Routine		
Start Time (MST)	8:36	End Time (MST)	10:45
Gas Cert Reference	ALMO52589	Station temp.	22 Deg C
Cal Gas Concentration	5.02 ppm	Cal Gas Exp Date	21/12/2012
Calibrator Make/Model	Sabio 4010	Serial Number	8400311
Dil air Make/Model	API 701	Serial Number	1864
DACS make/model	Campbell Scientific CR3000	DACS serial No.	5564
SO2 gas concentration	50.8 ppm	SO2 gas cert/exp	8400311 September 9, 2017

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-619	-619
Analyzer IP address	192.168.1.42		Lamp voltage	805	804
Calculated slope	1.001072	0.990032	Chamber temp	44	44
Calculated intercept	0.165241	0.072230	Pressure	679.1	681.3
Analyzer Background	19.5	19.5	Flow	0.472	0.473
Analyzer Coefficient	1.108	1.108	Intensity	43500	43500
			Converter temp.	800	800

Analyzer make/model	TEI 45C	Analyzer serial #	630718530
Converter make/model	Model 26 Thermal Oxidizer	Converter serial #	20101-14

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6000	0.0	0.0	-0.1	----
as found span	6000	89.6	75.0	75.4	0.994
SO2 scrubber check	5000	14.7	149.4	0.2	----
calibrator zero	6000	0.0	0.0	-0.1	----
high point	6000	89.6	75.0	75.4	0.994
second point	6000	50.2	42.0	43.0	0.978
third point	6000	29.9	25.0	24.8	1.009
as left zero	6000	0.0	0.0	-0.2	----
as left span	6000	89.6	75.0	75.0	1.000
				Average Correction Factor	0.993

Corrected As found	75.5	Previous response	74.7	% change	-1.0%

Notes:

No adjustments or maintenance done, filter changed out

Calibration Performed By: Melissa Lemay

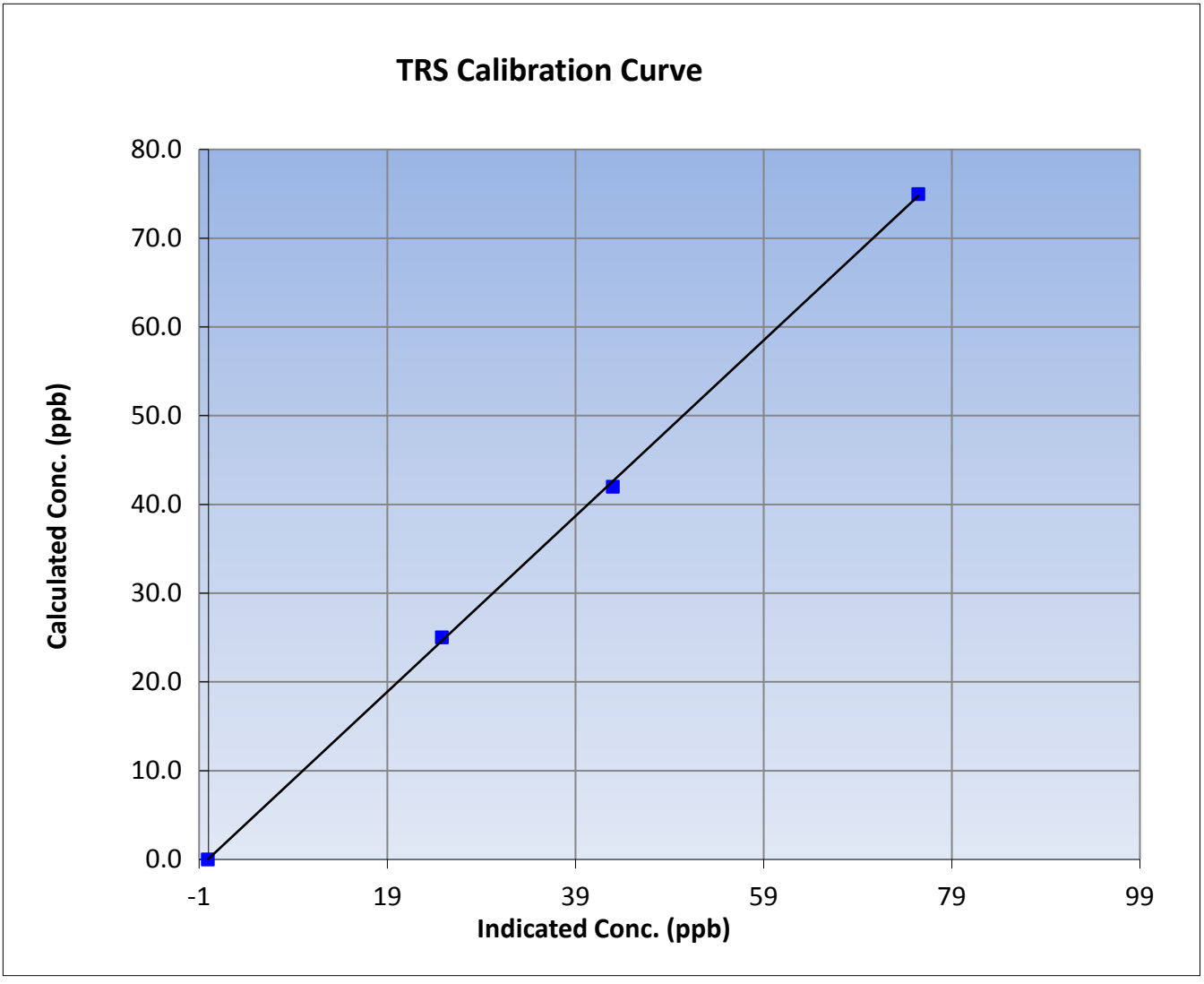
Wood Buffalo Environmental Association
TRS Calibration Report

Station Information

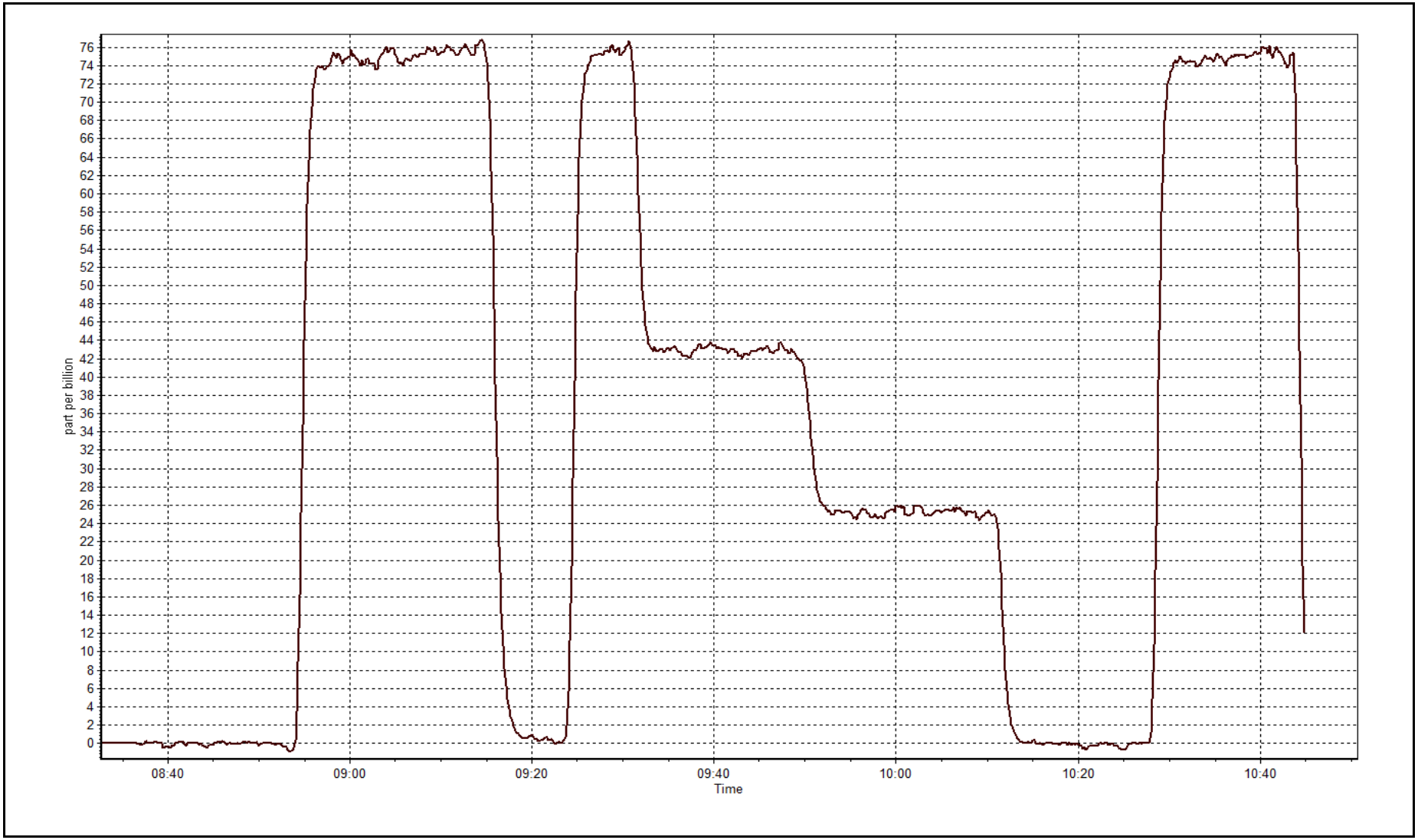
Calibration Date	August 14, 2015	Previous Calibration	July 23, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	8:36	End Time (MST)	10:45
Analyzer make	TEI 45C	Analyzer serial #	630718530

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999810
75.0	75.4	0.9938		
42.0	43.0	0.9777	Slope	0.990032
25.0	24.8	1.0087		
			Intercept	0.072230



TRS Calibration Plot Date: August 14, 2015



Wood Buffalo Environmental Association
THC / NMHC Calibration Report

W B E A

Station Information

Calibration Date	August-13-15	Last Calibration	July-08-15
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Routine		
Start Time (MST)	10:40	End Time (MST)	12:55
Gas Cert Reference	S970259A	Cal Gas Expiry Date	
CH4 Cal Gas Conc.	490.0 ppm	CH4 Equiv Conc.	1040.0 ppm
C3H8 Cal Gas Conc.	200.0 ppm	Station temp.	22 Deg C
Calibrator Model	Sabio 4010	Serial Number	
ZAG make/model	Teledyne API 701	Serial Number	1864
DACS make/model	Campbell Scientific CR3000	Serial Number	5564

Analyzer Information

	Before	*After*		*Before*	*After*
THC Range (ppm)	0 - 50 ppm		Column Temp	75.0	75.0
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	175.1	175.1
Analyzer IP address	192.168.1.55		Flame Temp	295.0	293.0
THC Calc slope	0.998877	0.996455	Carrier Pressure	36.8	36.8
THC Calc intercept	0.006306	0.002255	Fuel Pressure	42.1	42.1
NMHC Calc slope	0.998275	0.997070	Air Pressure	32.2	32.2
NMHC Calc intercept	-0.011678	-0.015614			

Analyzer make	Thermo 55i	Analyzer serial #	1426262594

THC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	0.00	----
as found span	5000	60.7	12.63	12.68	0.996
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	60.7	12.63	12.68	0.996
second point	5000	30.4	6.32	6.31	1.002
third point	5000	15.2	3.16	3.19	0.991
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	60.7	12.63	12.71	0.993
				Average Correction Factor	0.996

Corrected As found	12.68	Previous response	12.63	% change	-0.4%

Notes:

Filter changed out Span adjusted

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

THC / NMHC Calibration Report

NMHC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0	0.00	0.00	----
as found span	5000	60.7	6.68	6.71	0.995
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	60.7	6.68	6.71	0.995
second point	5000	30.4	3.34	3.36	0.995
third point	5000	15.2	1.67	1.72	0.972
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	60.7	6.68	6.73	0.992
				Average Correction Factor	0.987

Corrected As found	6.71	Previous response	6.70	% change	-0.1%

CH4 Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0	0.00	0.00	----
as found span	5000	60.7	5.95	5.97	0.996
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	60.7	5.95	5.97	0.996
second point	5000	30.4	2.98	2.95	1.010
third point	5000	15.2	1.49	1.47	1.013
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	60.7	5.95	5.98	0.995
				Average Correction Factor	1.007

Corrected As found	5.97	Previous response	5.93	% change	-0.6%

Wood Buffalo Environmental Association

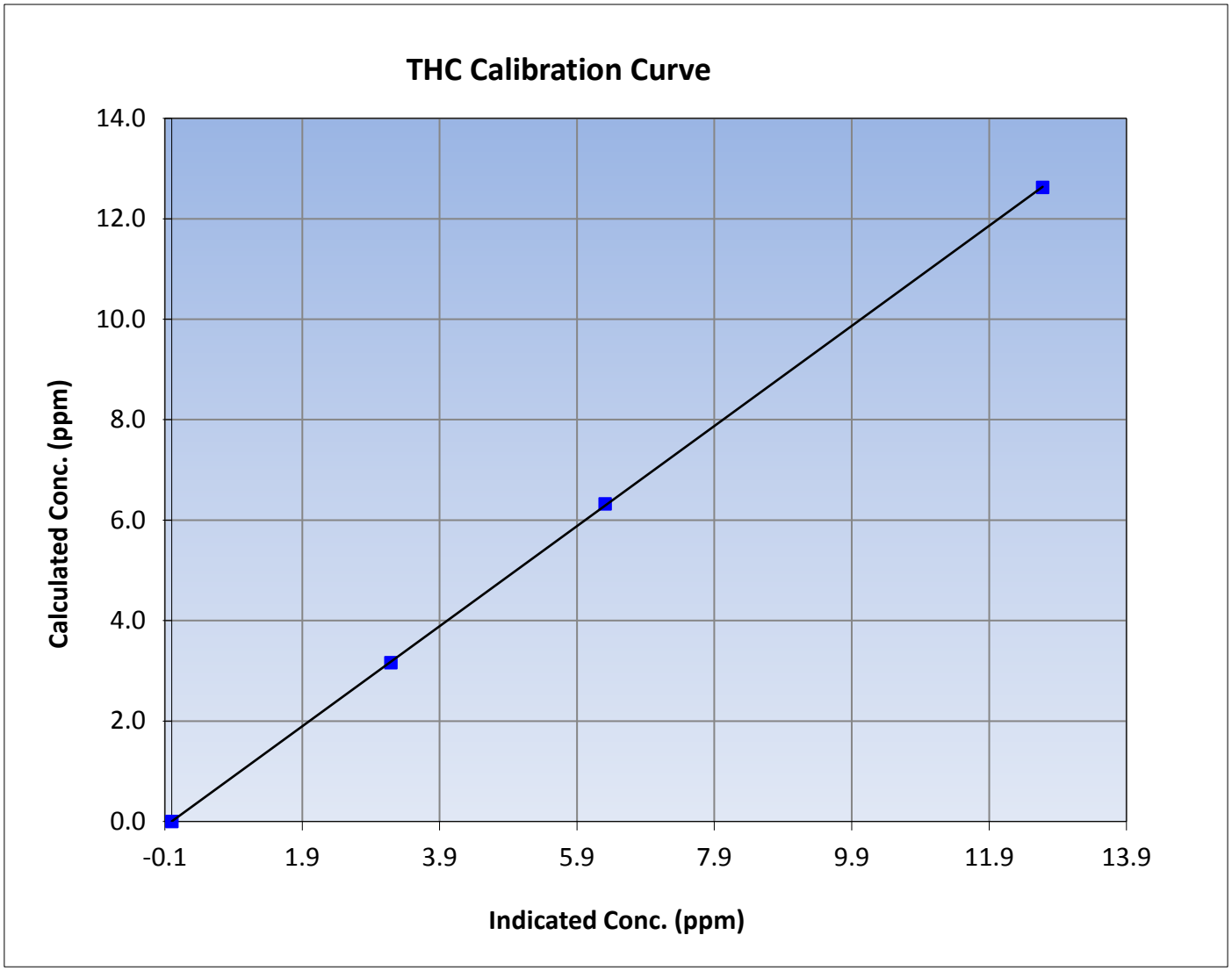
THC Calibration Summary

Station Information

Calibration Date	August 13, 2015	Previous Calibration	July 8, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	10:40	End Time (MST)	12:55
Analyzer make	Thermo 55i	Analyzer serial #	1426262594

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999981
12.63	12.68	0.9957		
6.32	6.31	1.0021	Slope	0.996455
3.16	3.19	0.9911		
			Intercept	0.002255



Wood Buffalo Environmental Association

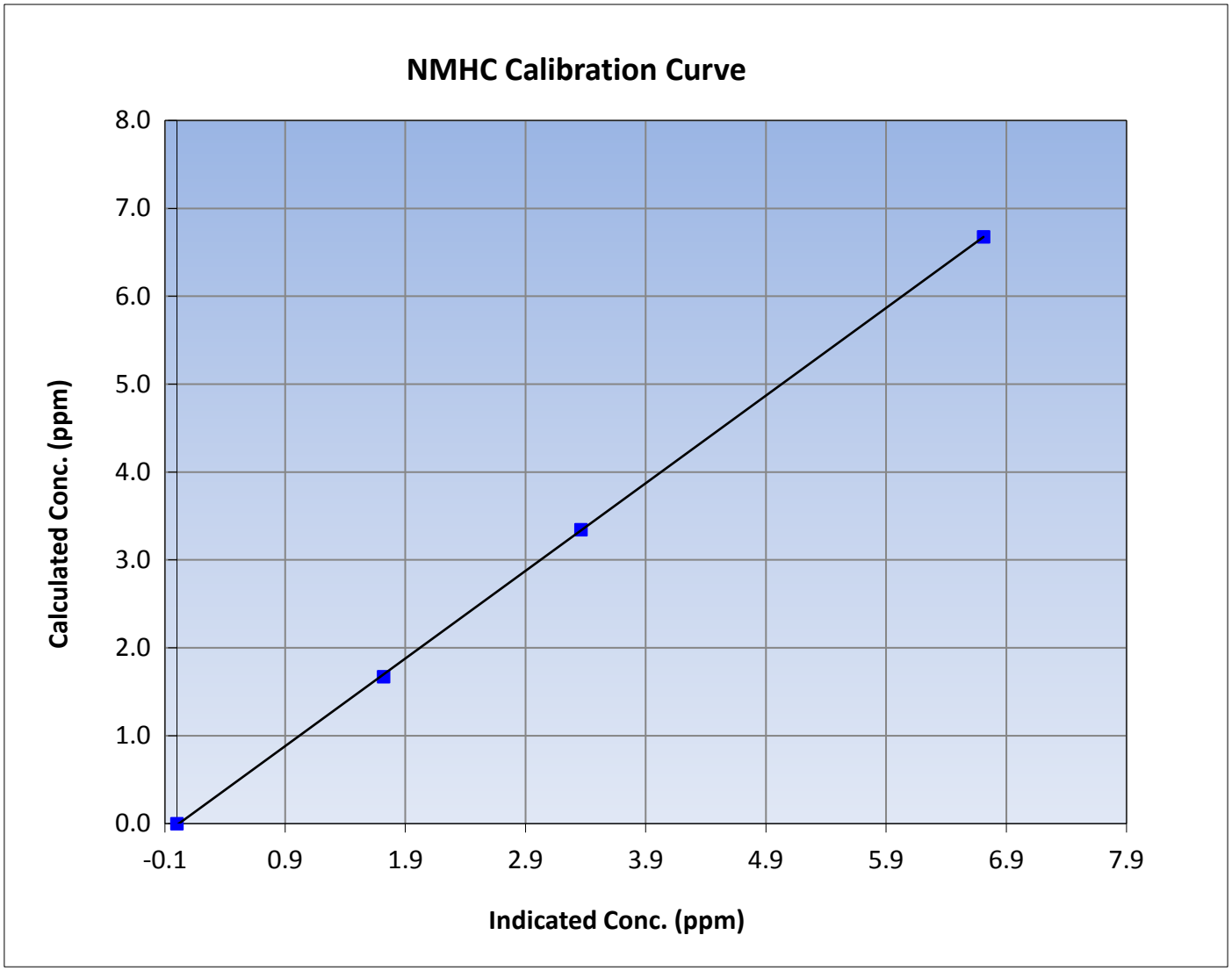
NMHC Calibration Summary

Station Information

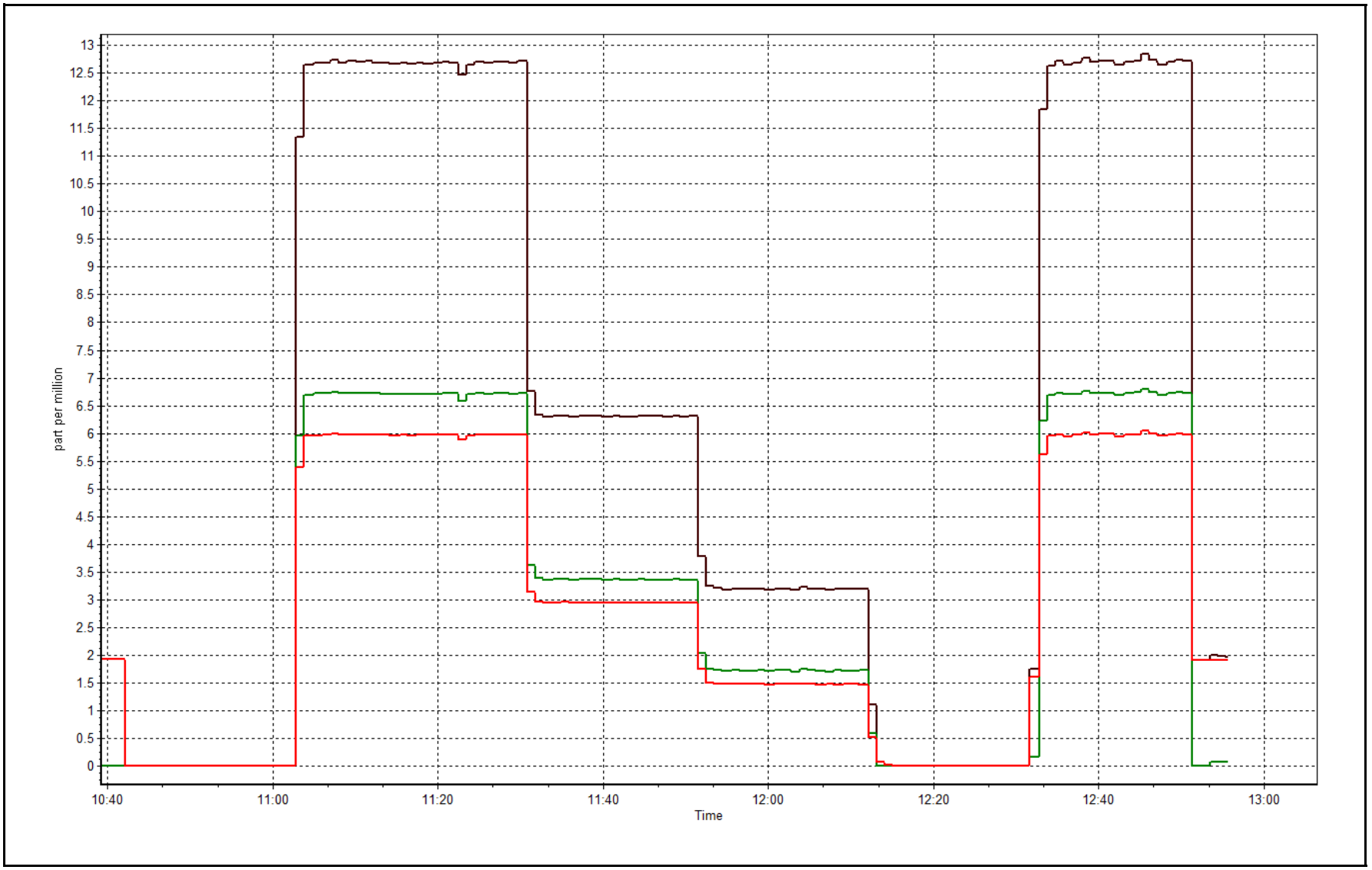
Calibration Date	August 13, 2015	Previous Calibration	July 8, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	10:40	End Time (MST)	12:55
Analyzer make	Thermo 55i	Analyzer serial #	1426262594

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999955
6.68	6.71	0.9951		
3.34	3.36	0.9952	Slope	0.997070
1.67	1.72	0.9721		
			Intercept	-0.015614



THC / NMHC Calibration Plot Date: August 13, 2015



Wood Buffalo Environmental Association
O_3 Calibration Report

Station Information

Calibration Date	August 26, 2015	Previous Calibration	July 30, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Routine		
Start Time (MST)	8:38	End Time (MST)	11:10
NO2 GPT Ref date	August-24-15	Transfer Standard	Nox GPT
		Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	5564
ZAG make/model	Teledyne API 701	Serial Number	1864
DACS make/model	Campbell Scientific CR3000	Serial Number	5564

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 500 ppb		Bench temp.	27.1	28.6
Analyzer IP address	192.168.1.49		Lamp temp.	67.8	67.9
Calculated slope	1.001206	1.004528	Pressure	718.6	721.9
Calculated intercept	-0.152626	0.132515	Flow cell A	0.739	0.742
Analyzer Background	0.2	0.2	Flow cell B	0.749	0.753
Analyzer Coefficient	0.925	0.925	Cell A Intensity	92500	91895
			Cell B Intensity	100557	97808

Analyzer make	TEI 49i	Analyzer serial #	1507964700

Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator Lamp Intensity (mA)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.00	0.0	-0.1	----
as found span	5000	1.22	323.1	322.6	1.002
calibrator zero	5000	0.00	0.0	-0.1	----
high point	5000	1.22	323.1	322.6	1.002
second point	5000	0.70	166.9	162.8	1.025
third point	5000	0.43	80.7	82.3	0.981
as left zero	5000	0.00	0.0	-0.2	----
as left span	5000	1.22	323.1	312.5	1.034
				Average Correction Factor	1.002

Corrected As found	322.7	Previous response	322.9	% change	0.1%

Notes:

no adjustments made, filter changed out

Calibration Performed By: Melissa Lemay

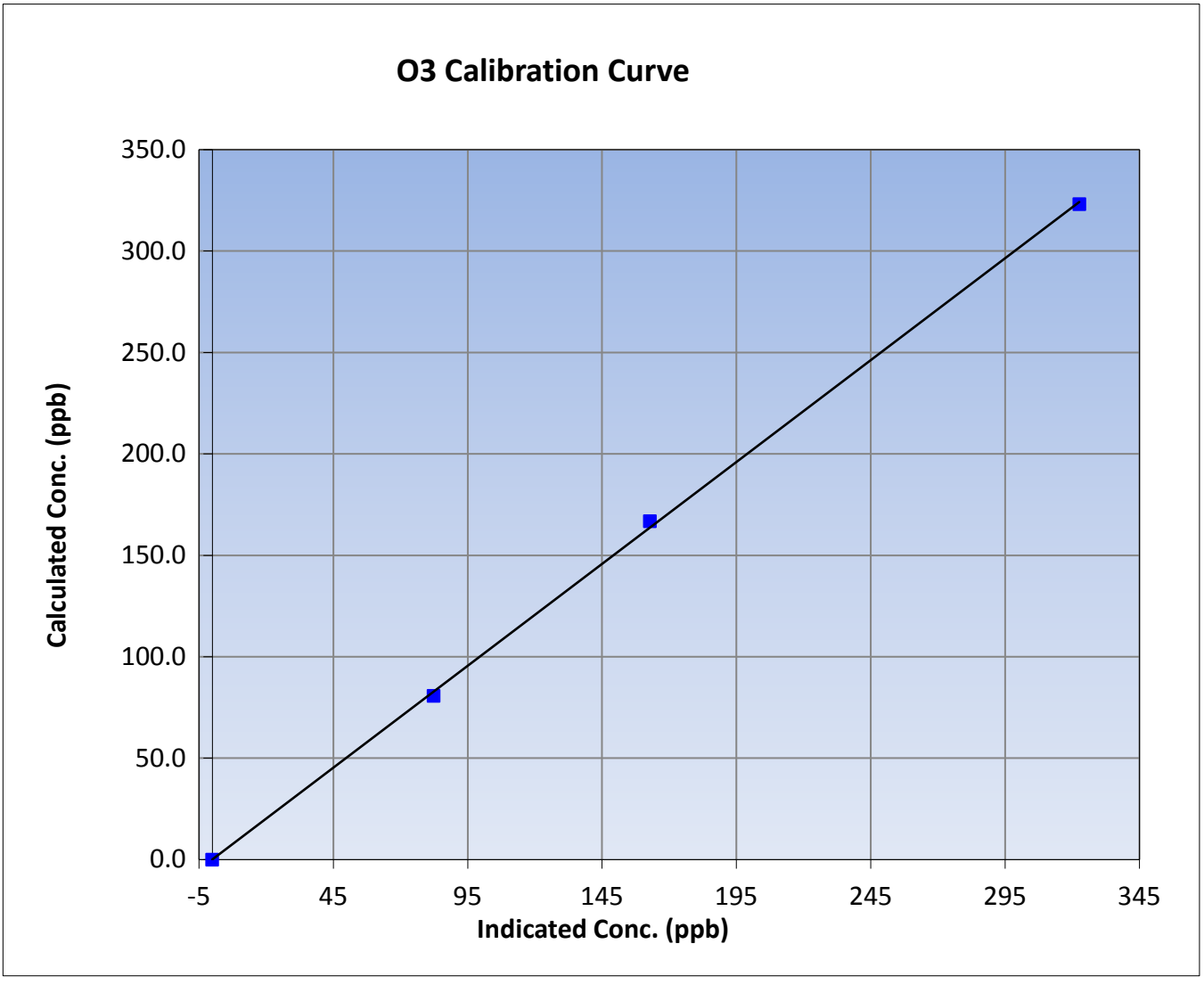
Wood Buffalo Environmental Association
O3 Calibration Report

Station Information

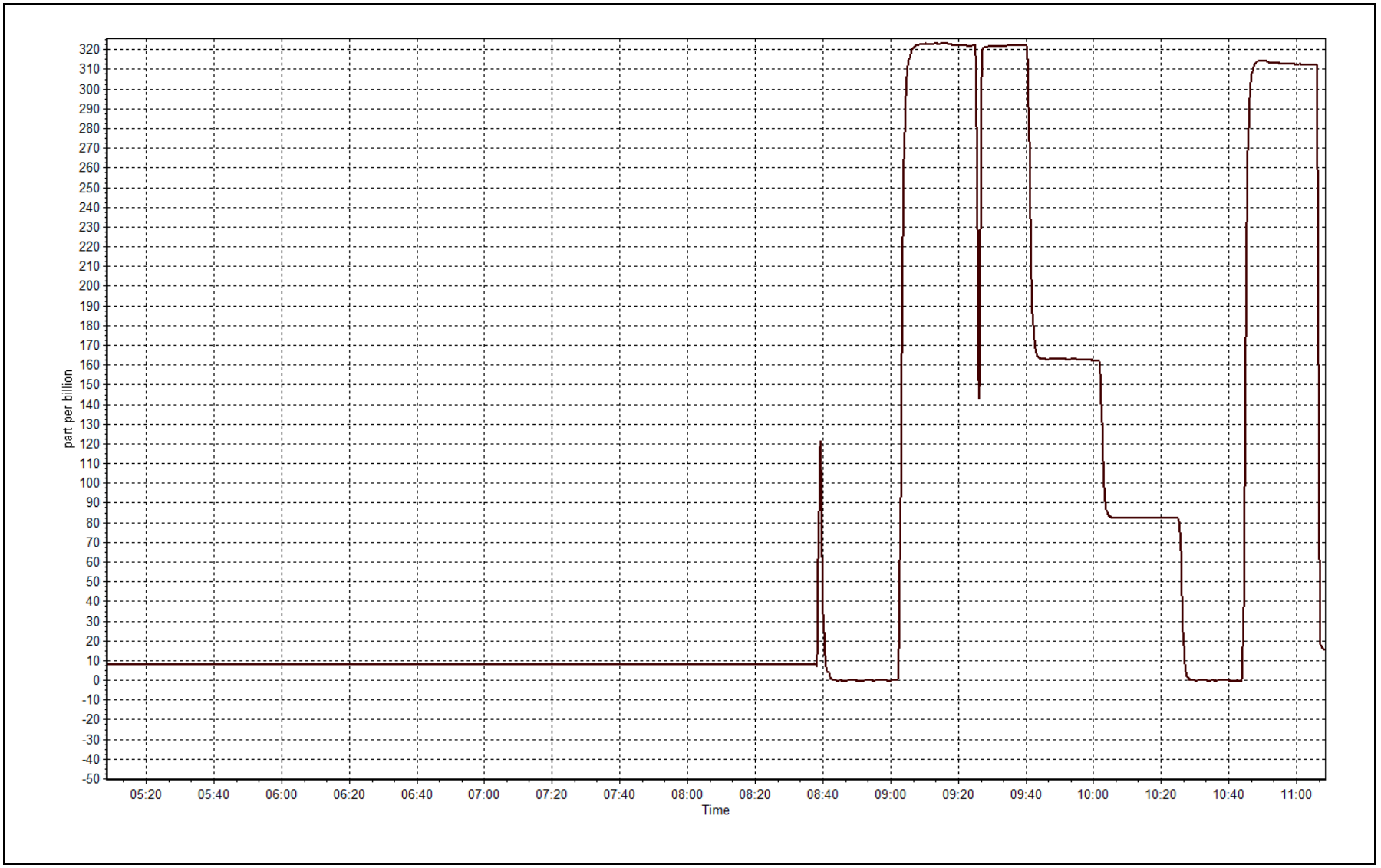
Calibration Date	August-26-15	Previous Calibration	July 30, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	8:38	End Time (MST)	11:10
Analyzer make	TEI 49i	Analyzer serial #	1507964700

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999720
323.1	322.6	1.0015		
166.9	162.8	1.0252	Slope	1.004528
80.7	82.3	0.9806		
			Intercept	0.132515



O3 Calibration Plot Date: August 26, 2015



Wood Buffalo Environmental Association
NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	August 24, 2015	Previous Calibration	July 8, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Routine		
Start Time (MST)	8:33	End Time (MST)	13:50
NO Cal Gas Conc	49.4 ppm	Gas Cert Reference	S970259A
NOx Cal Gas Conc	49.4 ppm	Cal Gas Expiry Date	9/26/2017
Calibrator	Sabio 4010	Serial Number	11021107
Zero air Generator	Teledyne API T701	Serial Number	1864

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	5564

Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	1.000504	0.997498	1.006121
	Data Offset	0.934209	1.029621	0.027752
Current Calibration	Data Slope	1.001801	1.001978	1.003454
	Data Offset	2.425873	2.660489	-1.724564

Analyzer Information

Analyzer make/model	Thermo 42C	Analyzer serial #	601114773

Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
NO coefficient	0.989		0.820	
NOX coefficient	0.999		1.000	
NO2 coefficient	1.000		1.000	
NO bkgrnd	3.4		2.8	
NOX bkgrnd	3.5		2.9	
Chamber Temp	49.5	Deg C	49.7	Deg C
Moly Temp	323	Deg C	323	Deg C
PMT voltage	-805	V	-805	V
PMT Temp	-3.6	Deg C	-3.6	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	188.7	mmHg	142.8	mmHg
R Cell Press Nox	188.7	mmHg	142.9	mmHg
NO sample flow	0.744	lpm	0.889	lpm
Nox sample Flow	0.744	lpm	0.888	lpm

Notes:

span adjusted, pump and charcoal changed out, filter changed

Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: August 24, 2015 Station Number: AMS 7

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.3	----	----
as found span	5000	60.7	599.7	599.7	0.0	581.0	581.7	-0.4	1.0322	1.0310
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.3	----	----
high point	5000	60.7	599.7	599.7	0.0	598.1	597.8	0.7	1.0027	1.0032
second point	5000	30.4	300.4	300.4	0.0	294.0	293.8	0.4	1.0216	1.0223
third point	5000	15.2	150.2	150.2	0.0	146.6	146.0	0.6	1.0244	1.0286
as left zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.3	----	----
as left span	5000	60.7	599.7	267.7	332.0	592.0	280.0	314.0	1.0130	0.9561
								Average Correction Factor	1.0162	1.0180

Corrcted As found NO_X= 581.0 NO= 581.8 Percent Change NO_X= 3.0% NO= 3.2%

Previous Response NO_X= 598.5 NO= 600.2

GPT Calibration Data

Dilution Flow 5000 ccm Source Gas Flow 60.70 ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
Cal zero			0.0			0.3			N/A	
1st NO2 (300)	----	267.7	323.1	590.6	267.7	323.4	1.0033	1.0000	0.9991	100.1%
2nd NO2 (200)	----	423.9	166.9	591.2	423.9	167.5	1.0022	1.0000	0.9964	100.4%
3rd NO2 (100)	----	510.1	80.7	594.3	510.1	84.4	0.9970	1.0000	0.9562	104.6%
4th NO2 (0)	590.8	----	0.5	591.3	590.8	0.9	1.0021	1.0000	N/A	----
					Average Correction Factor		1.0011	1.0000	0.9839	101.7%

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

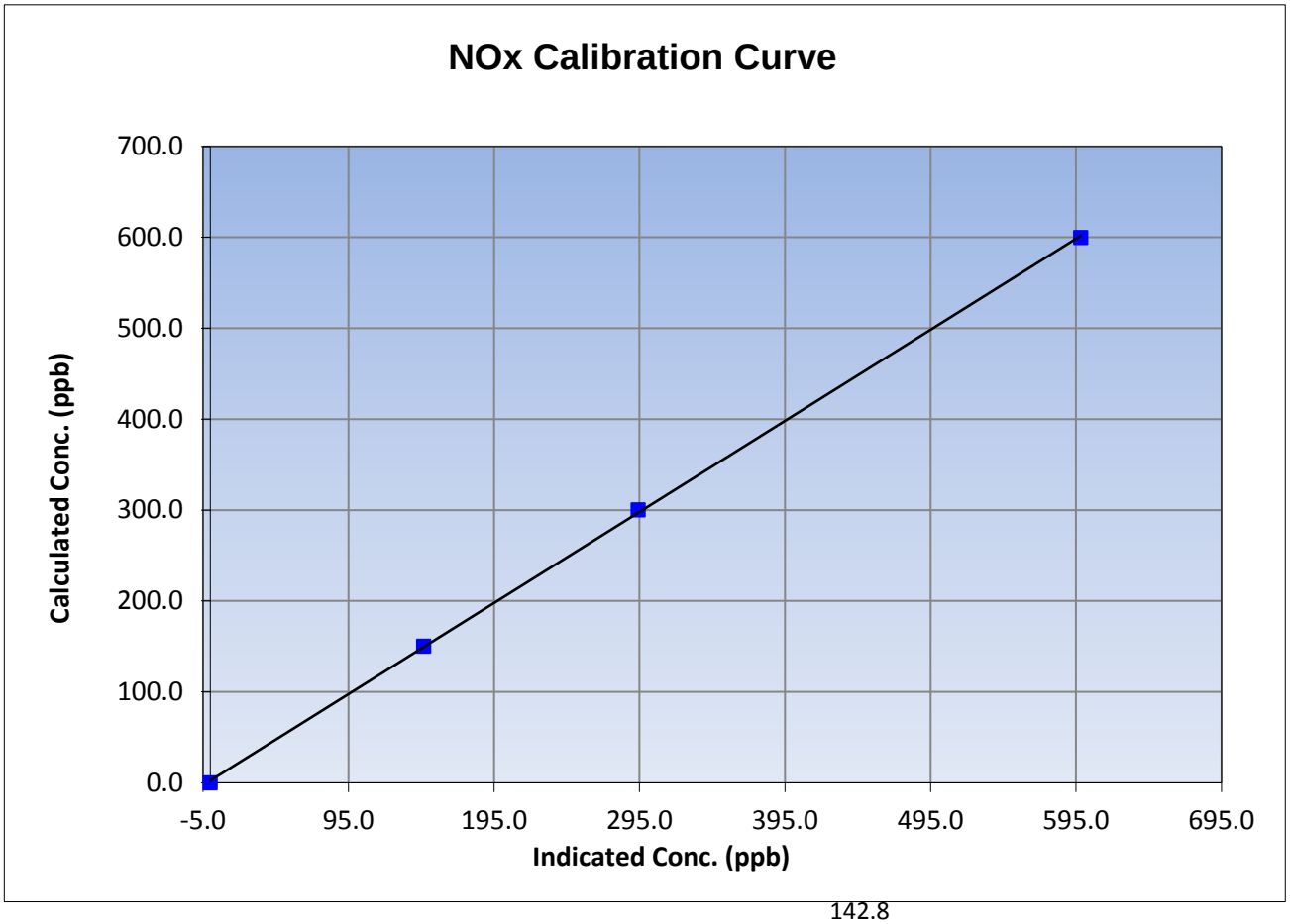
NO_X Calibration Summary

Station Information

Calibration Date	August 24, 2015	Previous Calibration	July 8, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	8:33	End Time (MST)	13:50
Analyzer make	Thermo 42C	Analyzer serial #	601114773

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999890
599.7	598.1	1.0027		
300.4	294.0	1.0216	Slope	1.001801
150.2	146.6	1.0244		
			Intercept	2.425873



142.8

Wood Buffalo Environmental Association

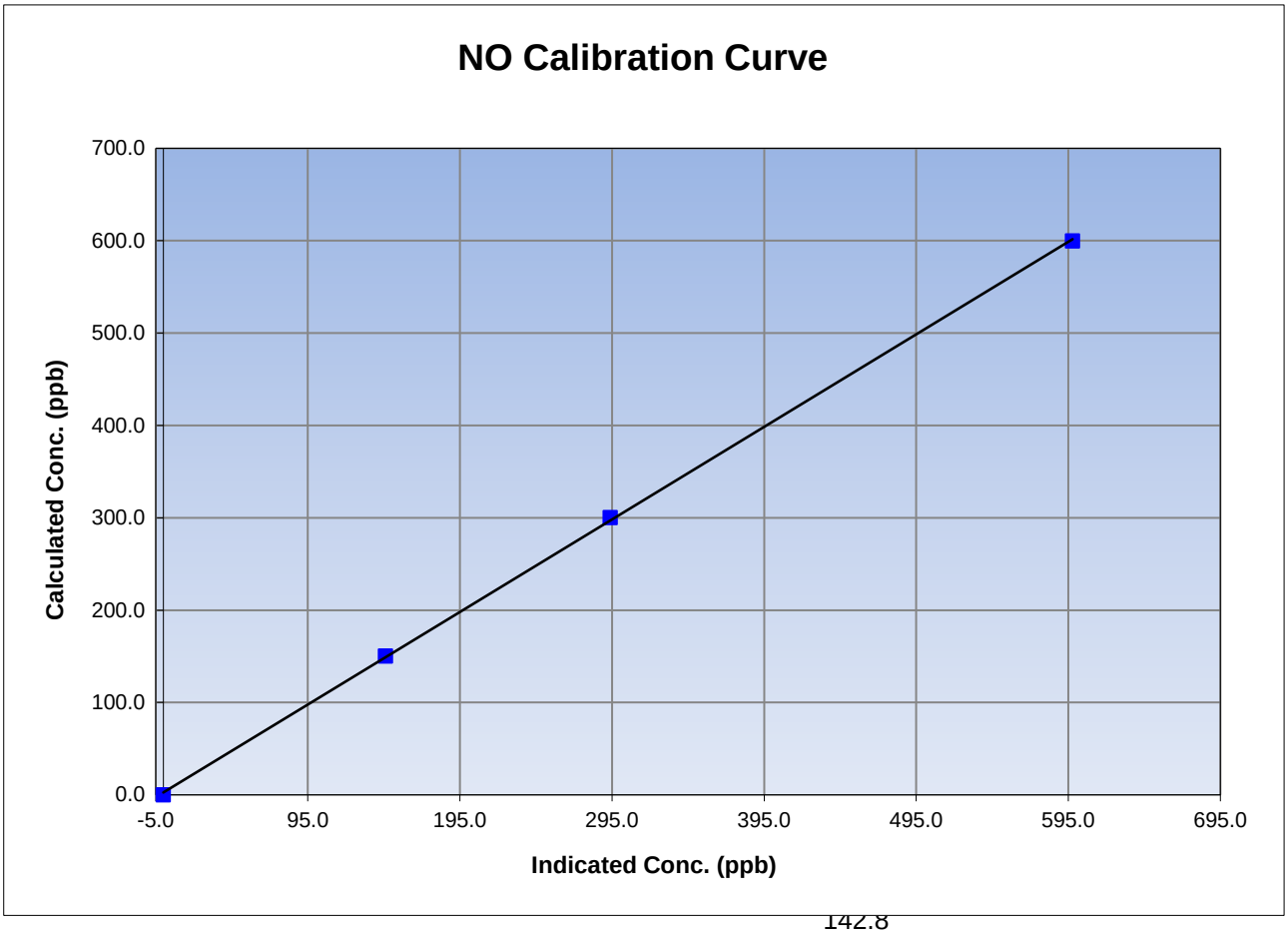
NO Calibration Summary

Station Information

Calibration Date	August 24, 2015	Previous Calibration	July 8, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	8:33	End Time (MST)	13:50
Analyzer make	Thermo 42C	Analyzer serial #	601114773

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999883
599.7	597.8	1.0032		
300.4	293.8	1.0223	Slope	1.001978
150.2	146.0	1.0286		
			Intercept	2.660489



142.8

Wood Buffalo Environmental Association

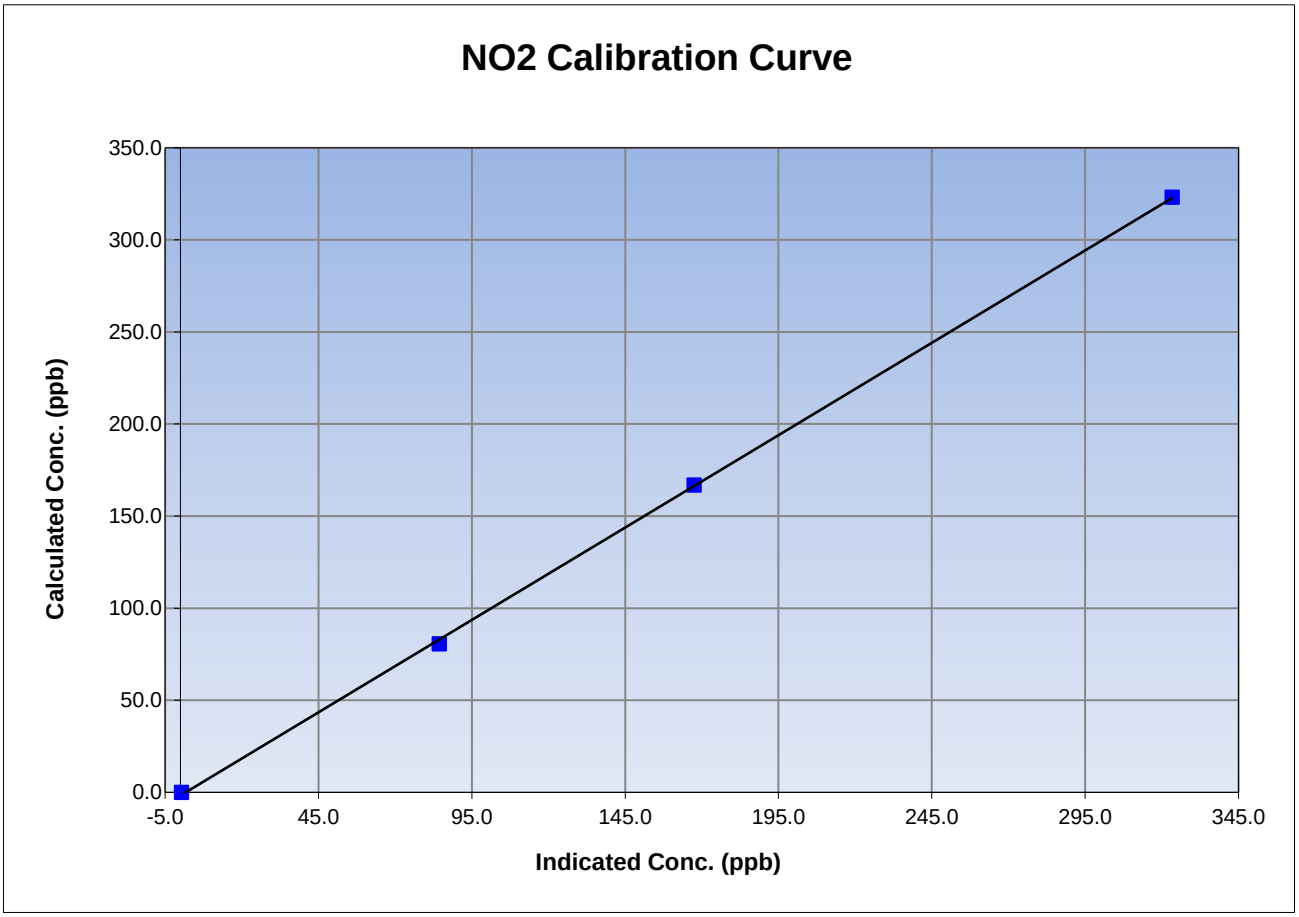
NO_2 Calibration Summary

Station Information

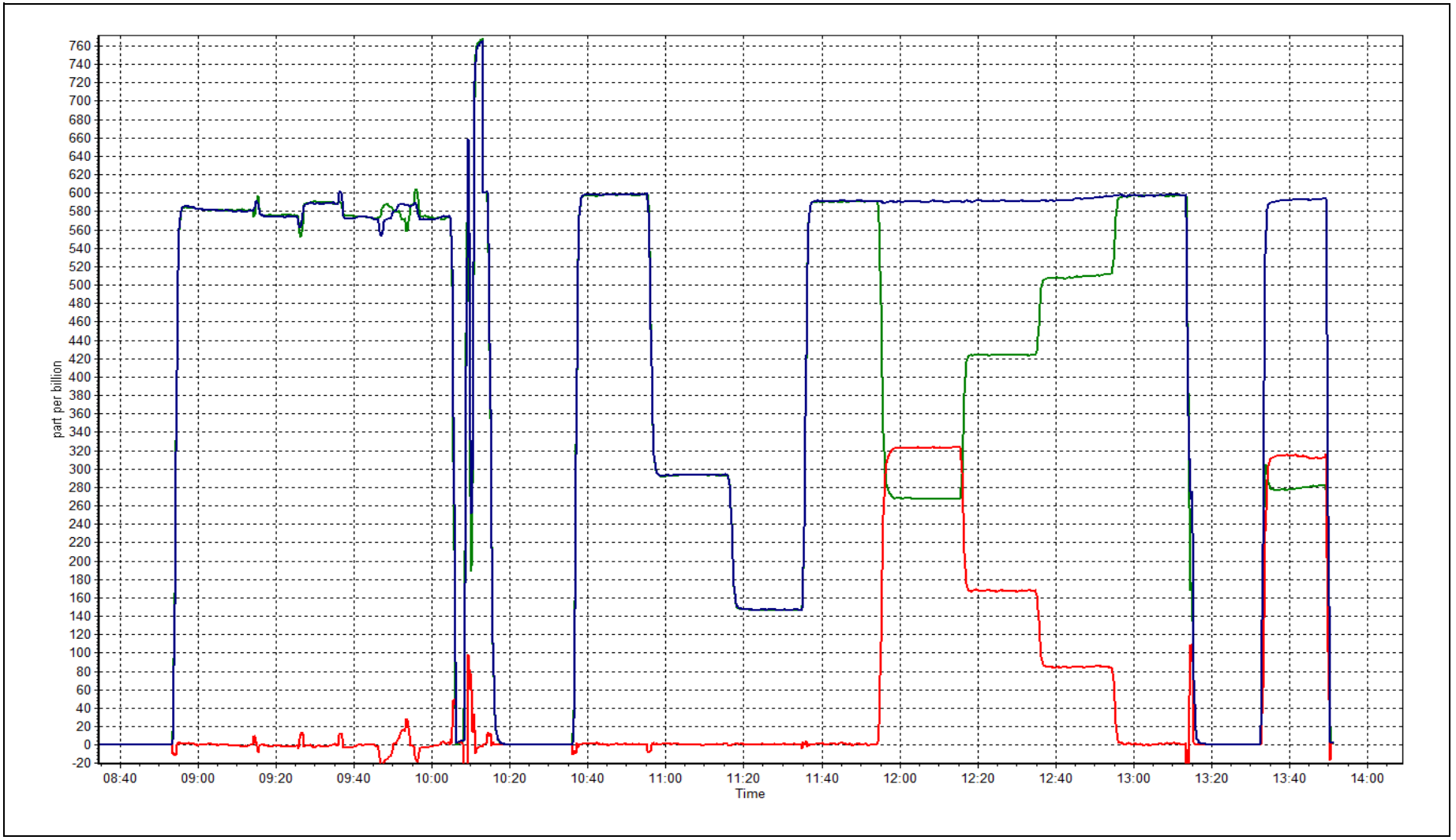
Calibration Date	August 24, 2015	Previous Calibration	July 8, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	8:33	End Time (MST)	13:50
Analyzer make	Thermo 42C	Analyzer serial #	601114773

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.3	N/A	Correlation Coefficient	0.999869
323.1	323.4	0.9991		
166.9	167.5	0.9964	Slope	1.003454
80.7	84.4	0.9562		
			Intercept	-1.724564



NOx, NO & NO_2 Calibration Plot Date: August 24, 2015



Wood Buffalo Environmental Association

SHARP CONFORMANCE TEST

STATION INFORMATION

Calibration Date:	August 26, 2015	Previous Calibration:	July 22, 2015
Station Name:	Athabasca Valley	Station Number:	AMS 7
Start Time (MST):	7:09	End Time (MST):	7:51
Calibrator Make/Model:	Delta Cal	Calibrator Serial Number:	1097

SHARP INFORMATION

Particulate Fraction:	PM2.5
Make/Model:	Thermo / SHARP 5030
Serial Number	E-515
Source SN:	
HEPA PN:	12144
Time Correct (MST):	Yes
Paremeters Checked:	T1, P3, Main Flow, Neph

AUDIT DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	12.0	13.6	1.6	14.0
T2	19.0	na	na	19.0
T3	21.0	na	na	21.0
T4	34.0	na	na	34.0
RH (%)	37.0	na	na	37.0

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	990	992.0	2.0	992

Main Flow (Lph)

Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
1003	1010	7	1010	1003

Nephalometer Calibration

Parameter	As Founds	adjusted(Limit +or- 2.0ug/m3)	As Left
Analog	236		233
Neph	4.7		-0.5
C14	-12.9	yes	-15.1
Indicated Concentration (ug/m3)	2.5		-0.4
Offset 1	239		238
Offset 2	35		34.6

Leak Check (Quarterly)

Leak Check Date:	June 22, 2015	Previous Leak Check Date:	
	Measured	Difference LPM (Limit +/- 0.42 LPM)	
Flow without adaptor (LPM):	16.90	0.09	
Flow with adaptor [turn off pump first](LPM):	16.81		

Mass Foil Calibration (Annualy)

Foil Calibration Date:		Previous Foil Calibration:	
Zeroed?:	NO		
Foil Mass:		Mass foil set S/N:	2518
Previous Correction Factor:			
New Correction Factor:			

INSPECTION DATA

Item	Condition	Date of install or rebuild
Cyclone	Good / cleaned	
Pump	Good	
Filter Tape	Good	
Mass Foil Cal Set	na	
HEPA filter	Good	.

NOTES:

zero and T1 adjusted, cyclone head cleaned

Audit Performed By: Melissa Lemay

Wood Buffalo Environmental Association
CO Calibration Report

W B E A

Station Information

Calibration Date	August 13, 2015	Last Calibration	July 10, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Routine		
Start Time (MST)	7:45	End Time (MST)	10:44
Gas Cert Reference	CC101396	Station temp.	18 Deg C
Cal Gas Concentration	2970 ppm	Cal Gas Exp Date	02/02/2023
Calibrator Make/Model	Sabio 4010	Serial Number	11021107
ZAG Make/Model	API 701	Serial Number	5564
DACS make/model	Campbell Scientific CR3000	Serial Number	1864

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 1000 ppb		Chamber temp.	48.2	48.0
Analyzer IP address	192.168.1.48		Pressure	731.6	731.6
Calculated slope	1.002558	1.004479	Flow	0.485	0.484
Calculated intercept	0.054480	0.045523	Intensity	199439	199431
Analyzer Background	2.955	3.248	S/R ratio	1.177269	1.176730
Analyzer Coefficient	1.040	1.040			

Analyzer make	Thermo 48i-TLE	Analyzer serial #	1408761381

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.3	----
as found span	5000	69.7	41.4	42.0	0.985
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	69.7	41.4	41.2	1.005
second point	5000	35.2	20.9	20.7	1.009
third point	5000	15.2	9.0	8.9	1.011
as left zero	5000	0.0	0.0	0.0	----
as left span	5000	69.7	41.4	40.9	1.011
				Average Correction Factor	1.008

Corrected As found	41.8	Previous response	41.2	% change	-1.2%

Notes:

Zero adjusted, filter changed out, no maintenance done

Calibration Performed By: Melissa Lemay

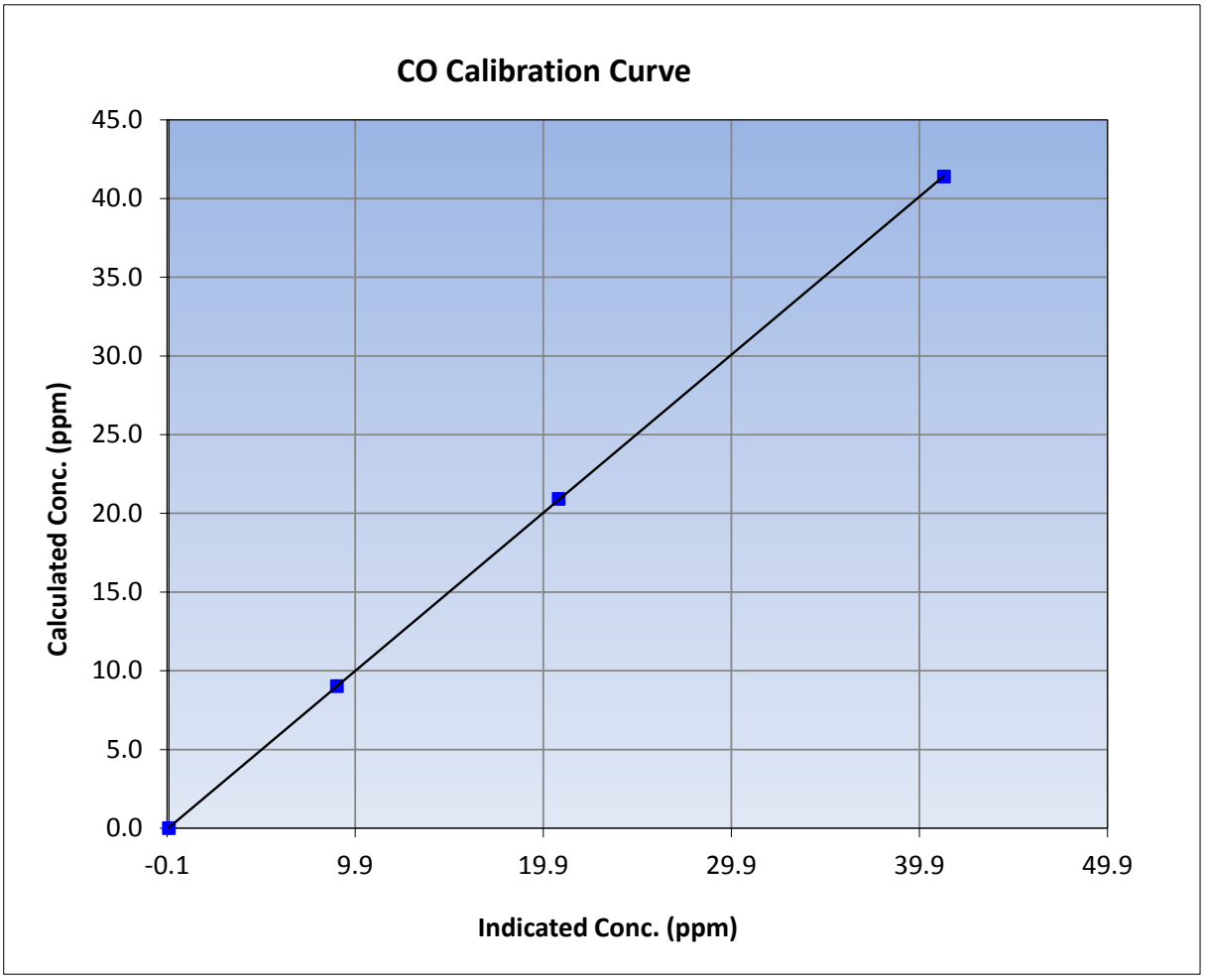
Wood Buffalo Environmental Association
CO Calibration Report

Station Information

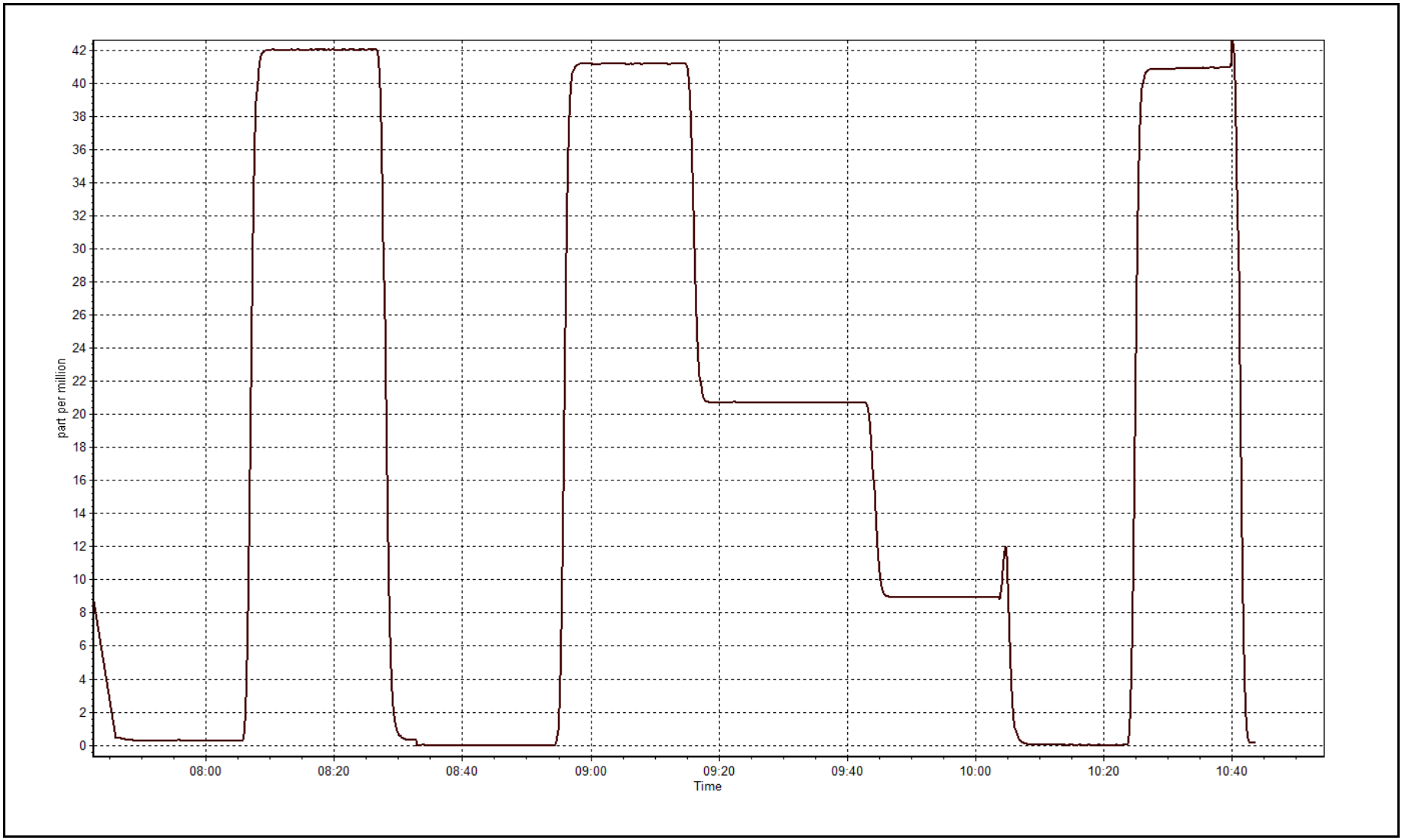
Calibration Date	August 13, 2015	Previous Calibration	July 10, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	7:45	End Time (MST)	10:44
Analyzer make	Thermo 48i-TLE	Analyzer serial #	1408761381

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999995
41.4	41.2	1.0049		
20.9	20.7	1.0091	Slope	1.004479
9.0	8.9	1.0111		
			Intercept	0.045523



CO Calibration Plot Date: August 13, 2015



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 8
FORT CHIPEWYAN
AUGUST 2015

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

September 28, 2015

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS 8)
AUGUST 2015

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	706	37	38	99.87	2	0	0	0
O3(ppb) Average	701	35	43	98.92	47	0	35	-
NO2(ppb) Average	706	37	38	99.87	7	0	1	-
NO(ppb) Average	706	37	38	99.87	3	-	1	-
NOX(ppb) Average	706	37	38	99.87	7	-	2	-
PM2.5(ug/m3) Average	741	1	3	99.73	20	-	7.5	0
Wind Speed 10 m (km/h) Average	741	0	3	99.60	38	-	31	-
Wind Direction 10 m (deg) Average	741	0	3	99.60	-	-	-	-
Temperature 2 m (C) Average	743	0	1	99.87	28.7	-	21.5	-
Relative Humidity (%) Average	743	0	1	99.87	99	-	89	-
Precipitation (mm) Total	743	0	1	99.87	9.1	-	17.5	-
Leaf Wetness (% of range) Average	630	0	114	84.68	19	-	4	-
Global Solar Radiation (W/m2) Average	635	0	109	85.35	872	-	311	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS 8)
AUGUST 2015

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

					Percentile						
Parameter	Number	Mean	StnDev	Total	Min	P10	Q1	Median	Q3	P90	Max
SO2(ppb) Average	706	0	0	-	0	0	0	0	0	0	2
O3(ppb) Average	701	23.1	7	-	7	14	17	23	28	32	47
NO2(ppb) Average	706	0.3	1	-	0	0	0	0	0	1	7
NO(ppb) Average	706	0.1	0	-	0	0	0	0	0	0	3
NOX(ppb) Average	706	0.4	1	-	0	0	0	0	0	1	7
PM2.5(ug/m3) Average	741	3.81	2	-	1.2	1.9	2.5	3.3	4.7	6.2	20
Wind Speed 10 m (km/h) Average	741	15.2	7	-	2	6	9	15	20	25	38
Wind Direction 10 m (deg) Average	741	-	-	-	-	-	-	-	-	-	-
Temperature 2 m (C) Average	743	16.91	3.9	-	7.3	11.6	14	17.2	19.5	21.6	28.7
Relative Humidity (%) Average	743	69.6	16	-	30	48	58	71	82	91	99
Precipitation (mm) Total	743	-	-	53.09	-	-	-	-	-	-	-
Leaf Wetness (% of range) Average	630	0.7	3	-	0	0	0	0	0	0	19
Global Solar Radiation (W/m2) Average	635	216.9	258	-	0	0	0	83	394	645	872

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS 8)
AUGUST 2015

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
ALL PARAMETERS	16 Aug 2015 11:00	16 Aug 2015 11:00	1	Data logger program uploaded - data not recorded
O3	02 Aug 2015 03:00	02 Aug 2015 04:00	2	Unstable Operation - Lamp Instability
O3	03 Aug 2015 06:00	03 Aug 2015 07:00	2	Unstable Operation - Lamp Instability
O3	04 Aug 2015 20:00	04 Aug 2015 21:00	2	Unstable Operation - Lamp Instability
O3	30 Aug 2015 09:00	30 Aug 2015 09:00	1	Power spike followed by stabilization period
PM2.5	31 Aug 2015 02:00	31 Aug 2015 02:00	1	Unstable Operation
Wind Speed, Wind Direction	13 Aug 2015 04:00	13 Aug 2015 04:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	28 Aug 2015 20:00	28 Aug 2015 20:00	1	Flat line in sensor output signal
Surface Leaf Wetness	01 Aug 2015 01:00	05 Aug 2015 11:00	107	Analyzer Failure - wiring issue
Surface Leaf Wetness	05 Aug 2015 12:00	05 Aug 2015 15:00	4	Maintenance - New sensor and wiring install
Surface Leaf Wetness	06 Aug 2015 09:00	06 Aug 2015 10:00	2	Maintenance - Response Testing
Solar Global Radiation	01 Aug 2015 01:00	05 Aug 2015 12:00	108	Sensor malfunction - removed for service/repair

Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO_2) - ppb

Fort Chipewyan - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 2 ppb on Aug 23 12:00

Maximum Daily Average: 0.4 ppb on Aug 23

Minimum Value: 0 ppb on Aug 1 16:00

Minimum Daily Average: 0.0 ppb on Aug 22

Maximum Diurnal Average: 0.1 ppb at hour 11

Minimum Diurnal Average: 0.0 ppb at hour 4

Monthly Average: 0.0 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 0$ $P_{99} = 1$

Hours in Service:	744
Hours of Data:	706
Hours of Missing Data:	38
Hours of Calibration:	37
Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
4-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
5-Aug	0	Z	0	0	0	0	0	0	0	0	C	C	C	C	C	C	0	0	0	0	0	0	0	0	--	0
6-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
7-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
8-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
9-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
10-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
11-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
12-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
13-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
14-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
15-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
16-Aug	Z	0	0	0	0	0	0	0	0	0	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
17-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
18-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
19-Aug	0	0	0	Z	0	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
20-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
21-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
22-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
23-Aug	0	Z	0	0	0	0	0	0	0	0	1	2	2	1	1	1	0	0	0	0	0	0	0	0	0.4	2
24-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
25-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
26-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
27-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
28-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
29-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
30-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
31-Aug	1	1	1	Z	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	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	Diurnal Average	
	1	1	1	0	0	1	1	0	1	1	1	2	2	1	1	1	0	0	0	0	0	0	0	0	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance

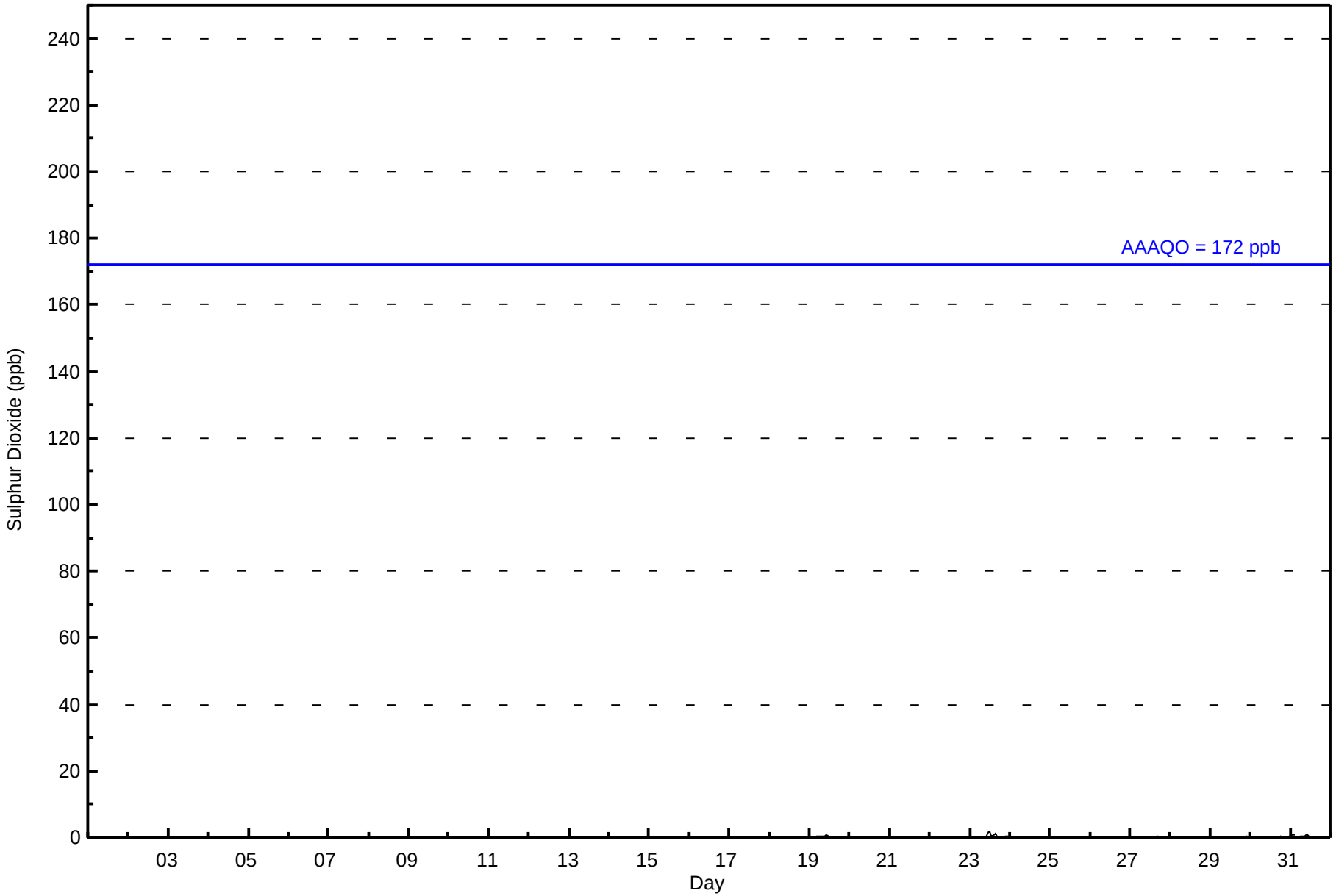
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb

Wood Buffalo Environmental Association

Hourly Averages

Sulphur Dioxide (SO_2) - ppb

Fort Chipewyan - August 2015



Sulphur Dioxide (SO_2) - ppb
Fort Chipewyan - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	706	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: 706

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

Fort Chipewyan - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 10	17	6	21	67	120	56	26	25	21	18	43	75	88	71	13	38	705
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	17	6	21	67	120	56	26	25	21	18	43	75	88	71	13	38	705

Total Number of Valid Hours: 705

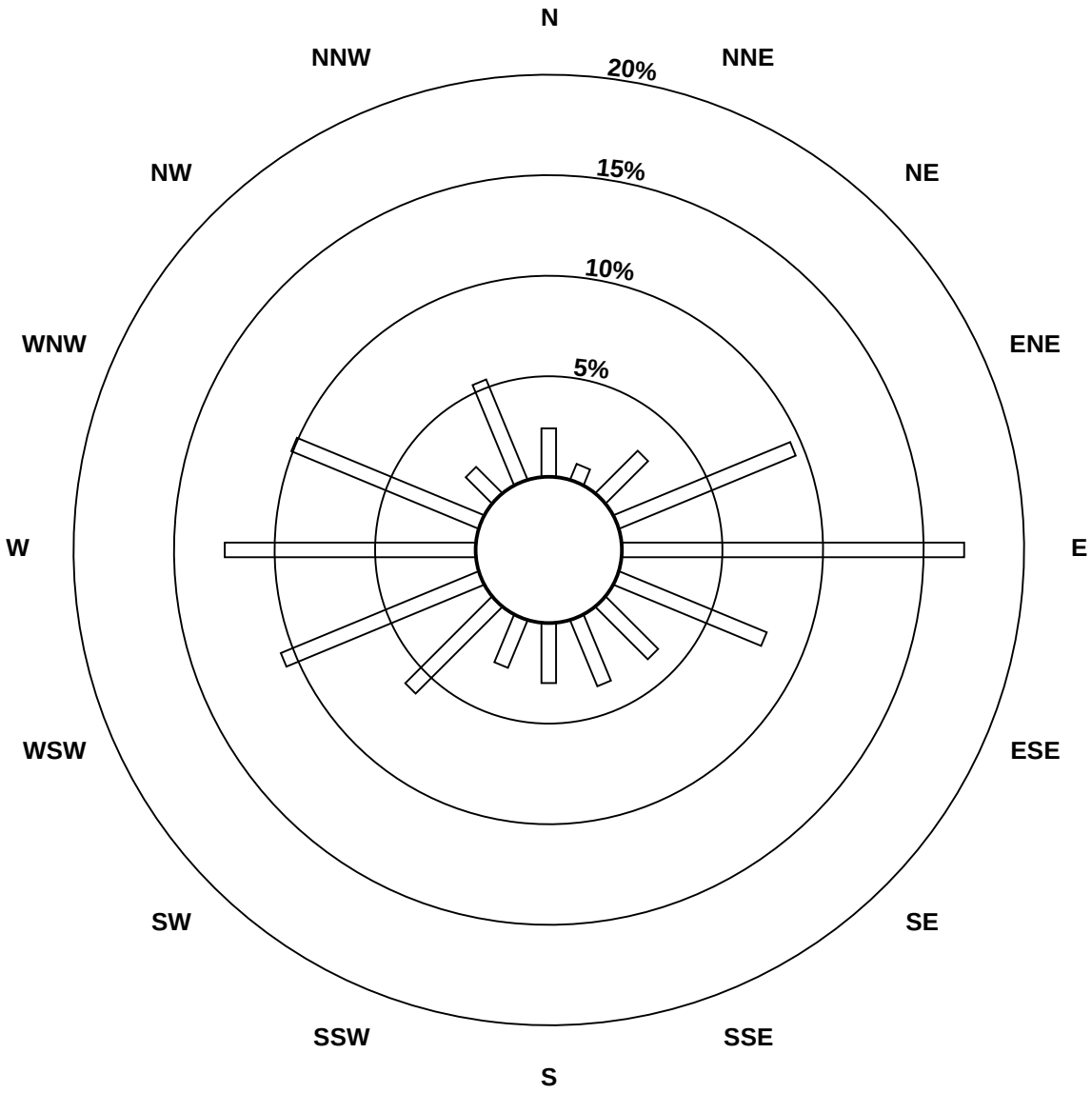
Total Number of Hours: 744

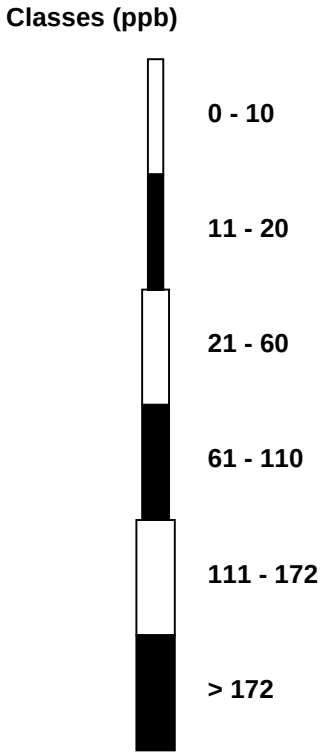
Wood Buffalo Environmental Association

Wind Rose Aug 2015

Sulphur Dioxide (SO_2) - ppb

Fort Chipewyan (AMS 8)





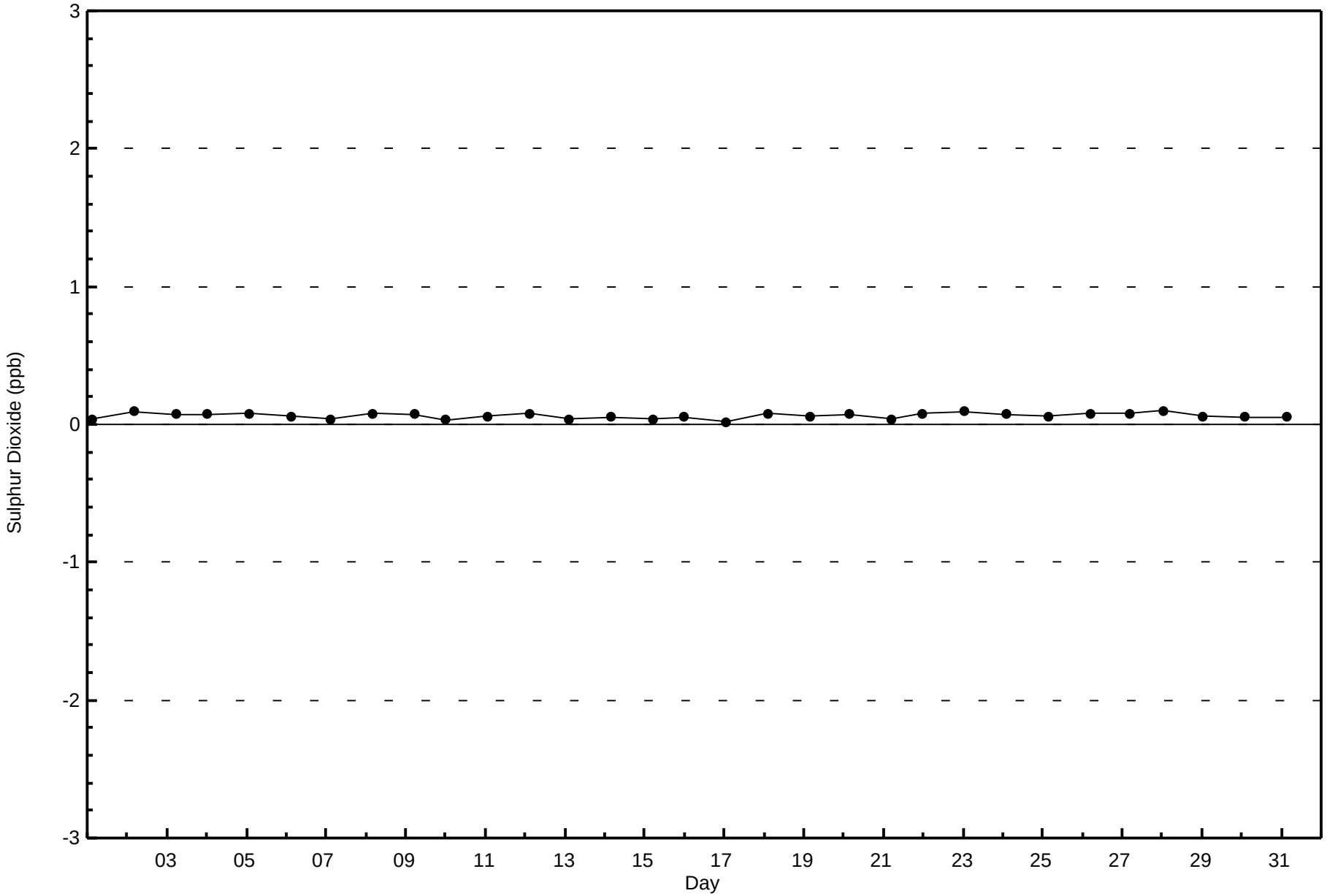
Total Number of Valid Hours: 705

Wood Buffalo Environmental Association

Zero Responses

Sulphur Dioxide (SO_2) - ppb

Fort Chipewyan - August 2015

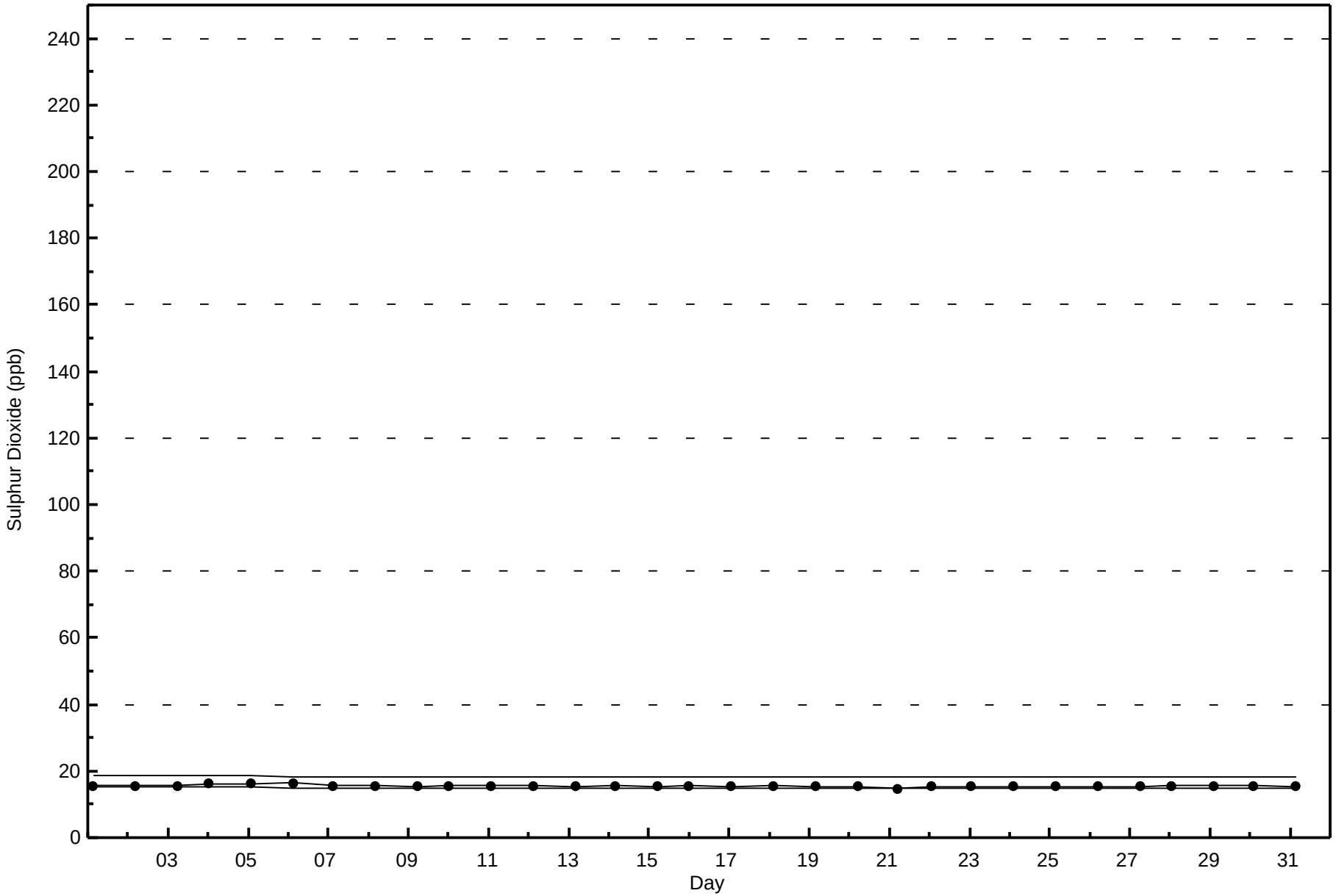


Wood Buffalo Environmental Association

Span Responses

Sulphur Dioxide (SO_2) - ppb

Fort Chipewyan - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

Fort Chipewyan - August 2015

Maximum Value: 3 ppb on Aug 23 09:00

Maximum Daily Average: 0.6 ppb on Aug 23

Minimum Value: 0 ppb on Aug 2 20:00

Minimum Daily Average: 0.0 ppb on Aug 18

Maximum Diurnal Average: 0.2 ppb at hour 9

Minimum Diurnal Average: 0.0 ppb at hour 22

Monthly Average: 0.1 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 0$ $P_{99} = 1$

Hours in Service:	744
Hours of Data:	706
Hours of Missing Data:	38
Hours of Calibration:	37
Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.2	1
2-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
4-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
5-Aug	0	Z	0	0	0	0	0	0	0	0	C	C	C	C	C	C	1	0	0	0	0	0	0	0	--	1
6-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
7-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
8-Aug	0	0	0	0	Z	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
9-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
10-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.1	1
11-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
12-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
13-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
14-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
15-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
16-Aug	Z	0	0	0	0	0	0	0	0	0	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
17-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
18-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
19-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
20-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
21-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
22-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
23-Aug	0	Z	0	0	0	0	1	2	3	3	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0.6	3
24-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
25-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
26-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
27-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
28-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
29-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
30-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
31-Aug	0	0	0	Z	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
	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	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	Diurnal Average	
	0	0	0	0	0	0	1	2	3	3	2	1	1	0	0	0	1	0	0	1	0	0	0	1	Diurnal Maximum	

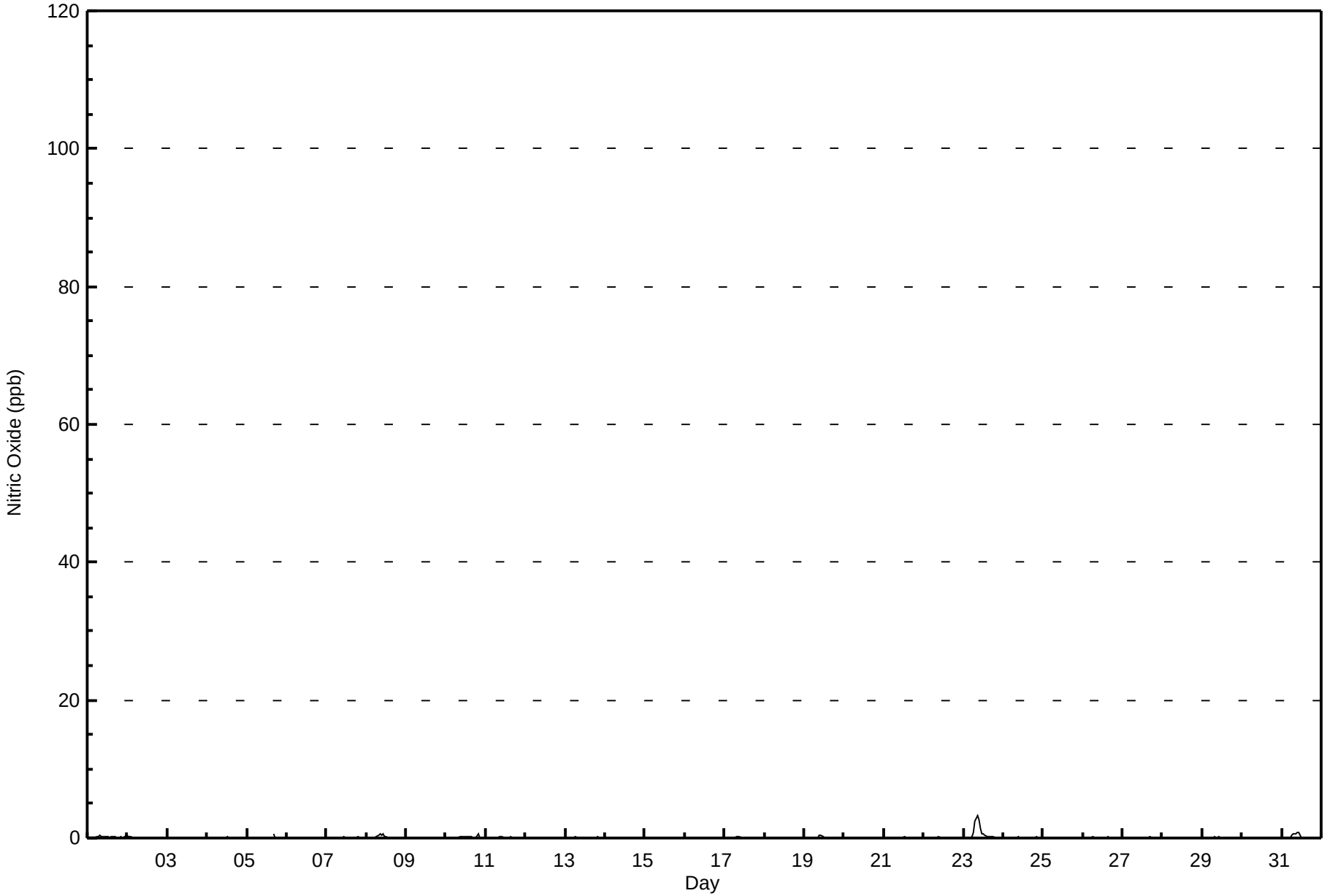
Z - zerospan C - Calibration M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Nitric Oxide (NO) - ppb

Fort Chipewyan - August 2015



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	706	100.00	100.00
21 - 40	0	0.00	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: 706

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Nitric Oxide (NO) - ppb

Fort Chipewyan - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	17	6	21	67	120	56	26	25	21	18	43	75	88	71	13	38	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	17	6	21	67	120	56	26	25	21	18	43	75	88	71	13	38	705

Total Number of Valid Hours: 705

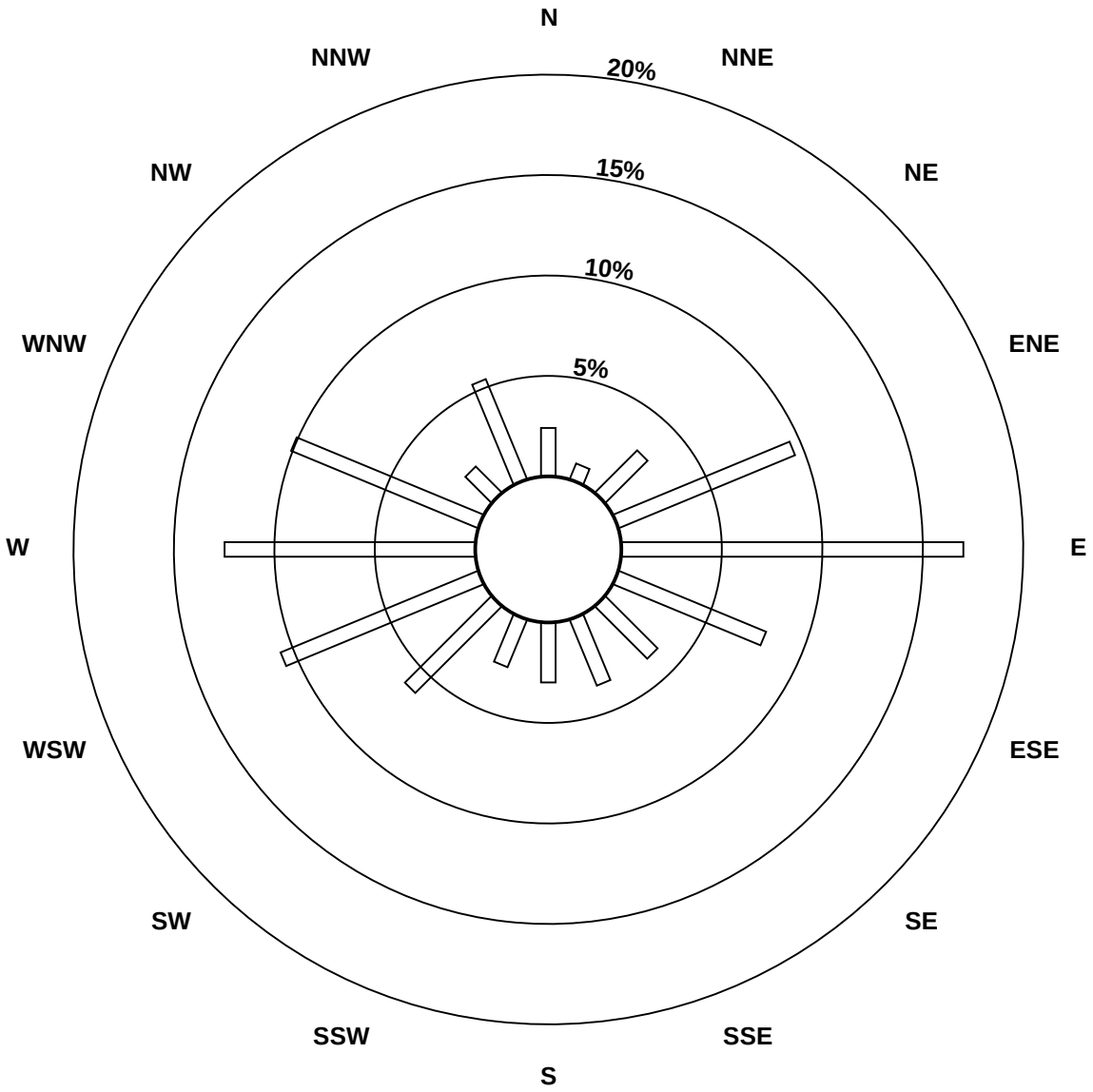
Total Number of Hours: 744

Wood Buffalo Environmental Association

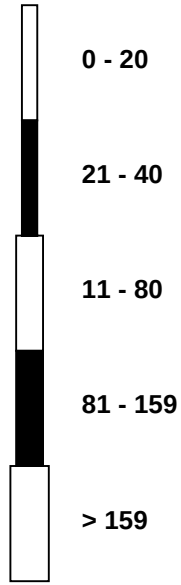
Wind Rose Aug 2015

Nitric Oxide (NO) - ppb

Fort Chipewyan (AMS 8)



Classes (ppb)



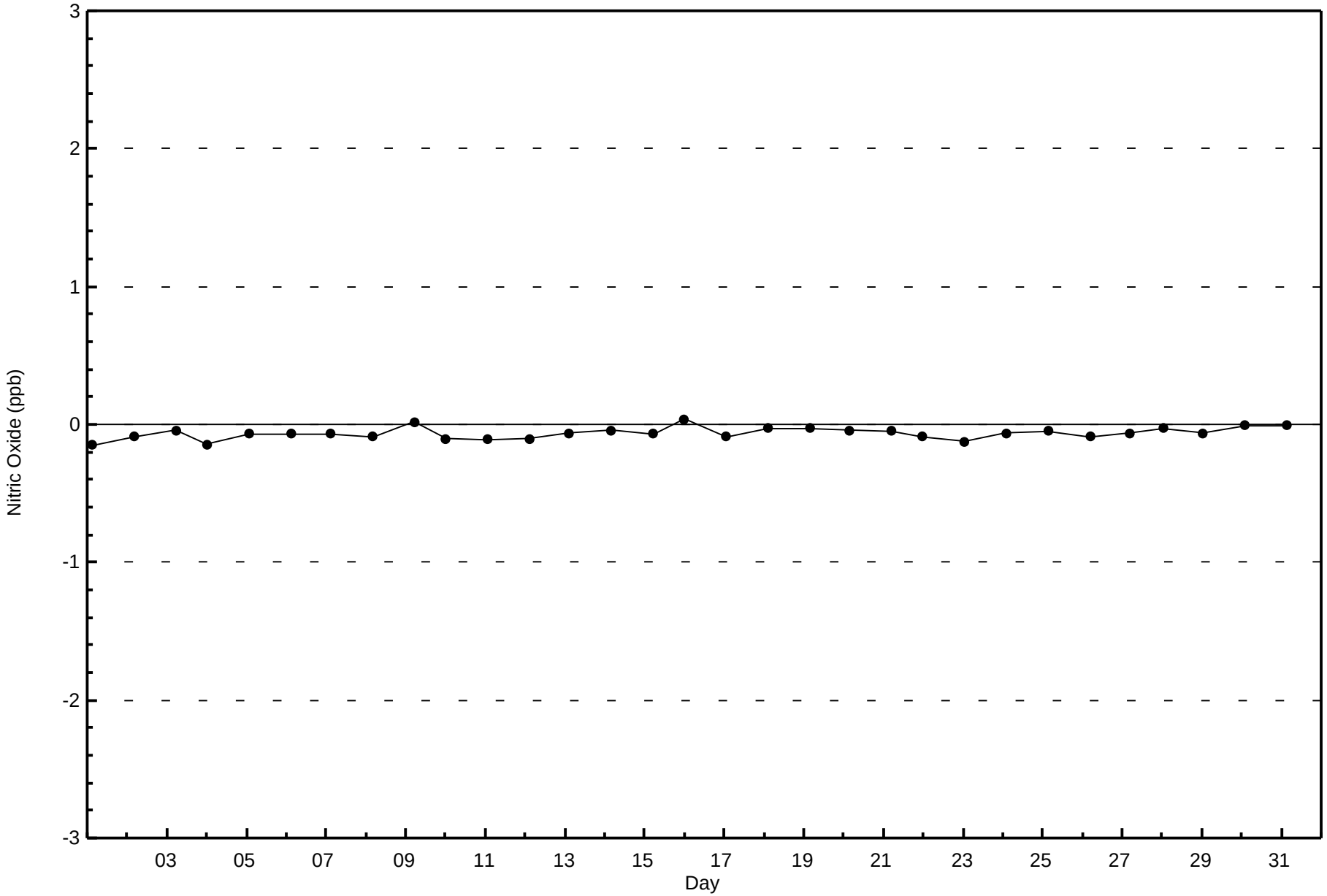
Total Number of Valid Hours: 705

Wood Buffalo Environmental Association

Zero Responses

Nitric Oxide (NO) - ppb

Fort Chipewyan - August 2015

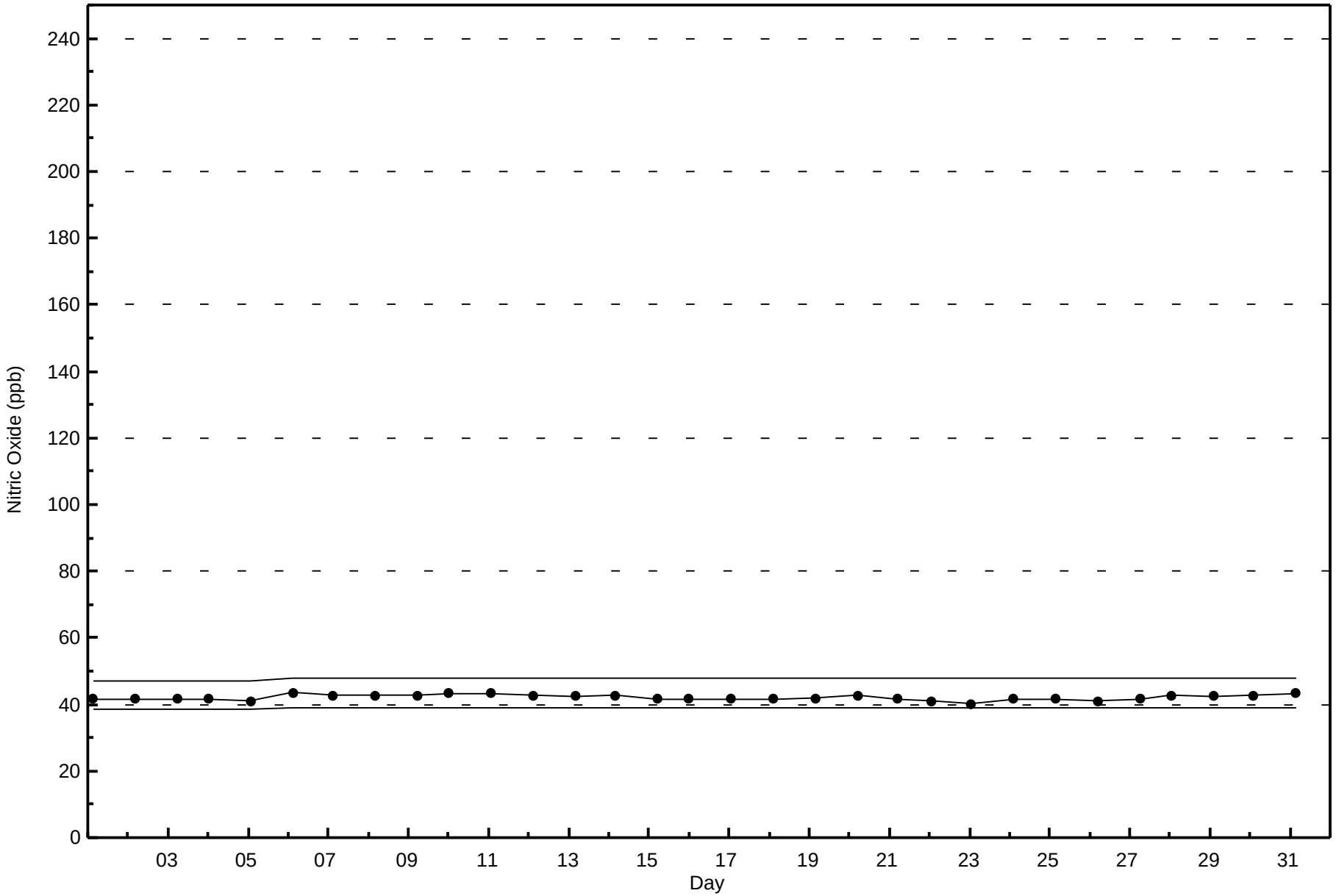


Wood Buffalo Environmental Association

Span Responses

Nitric Oxide (NO) - ppb

Fort Chipewyan - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO_2) - ppb

Fort Chipewyan - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 7 ppb on Aug 24 21:00 Maximum Daily Average: 1.2 ppb on Aug 31

Minimum Value: 0 ppb on Aug 1 14:00
Maximum Diurnal Average: 0.7 ppb at hour 21
Monthly Average: 0.3 ppb

Minimum Daily Average: 0.1 ppb on Aug 3
Minimum Diurnal Average: 0.1 ppb at hour 18
Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 1$ $P_{99} = 3$

Hours in Service:	744
Hours of Data:	706
Hours of Missing Data:	38
Hours of Calibration:	37
Percent Operational Time:	99.9

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

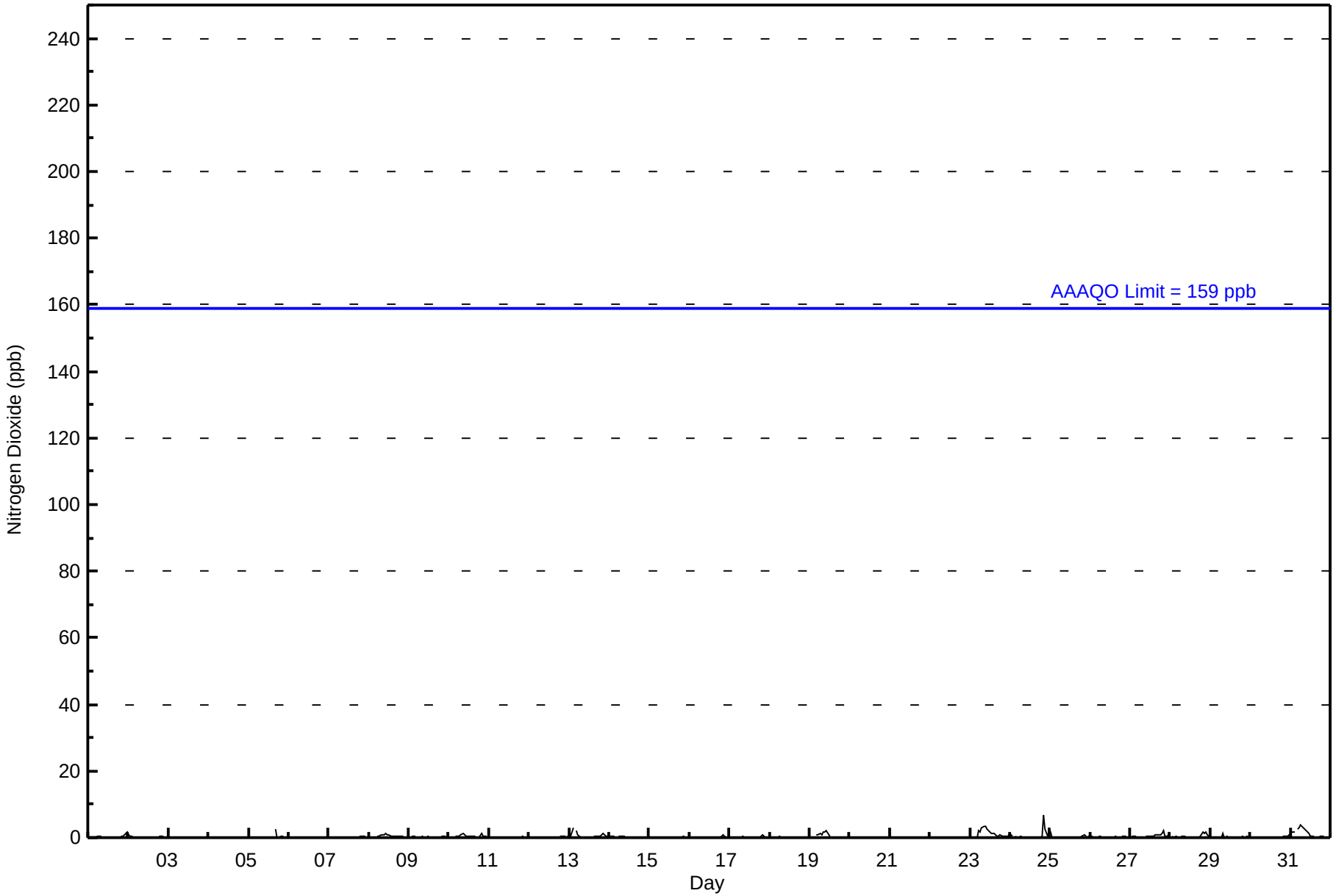
Z - zerospan C - Calibration M - Maintenance
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Dioxide (NO_2) - ppb

Fort Chipewyan - August 2015



Nitrogen Dioxide (NO_2) - ppb
Fort Chipewyan - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	706	100.00	100.00
21 - 40	0	0.00	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: 706

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Dioxide (NO_2) - ppb

Fort Chipewyan - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	17	6	21	67	120	56	26	25	21	18	43	75	88	71	13	38	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	17	6	21	67	120	56	26	25	21	18	43	75	88	71	13	38	705

Total Number of Valid Hours: 705

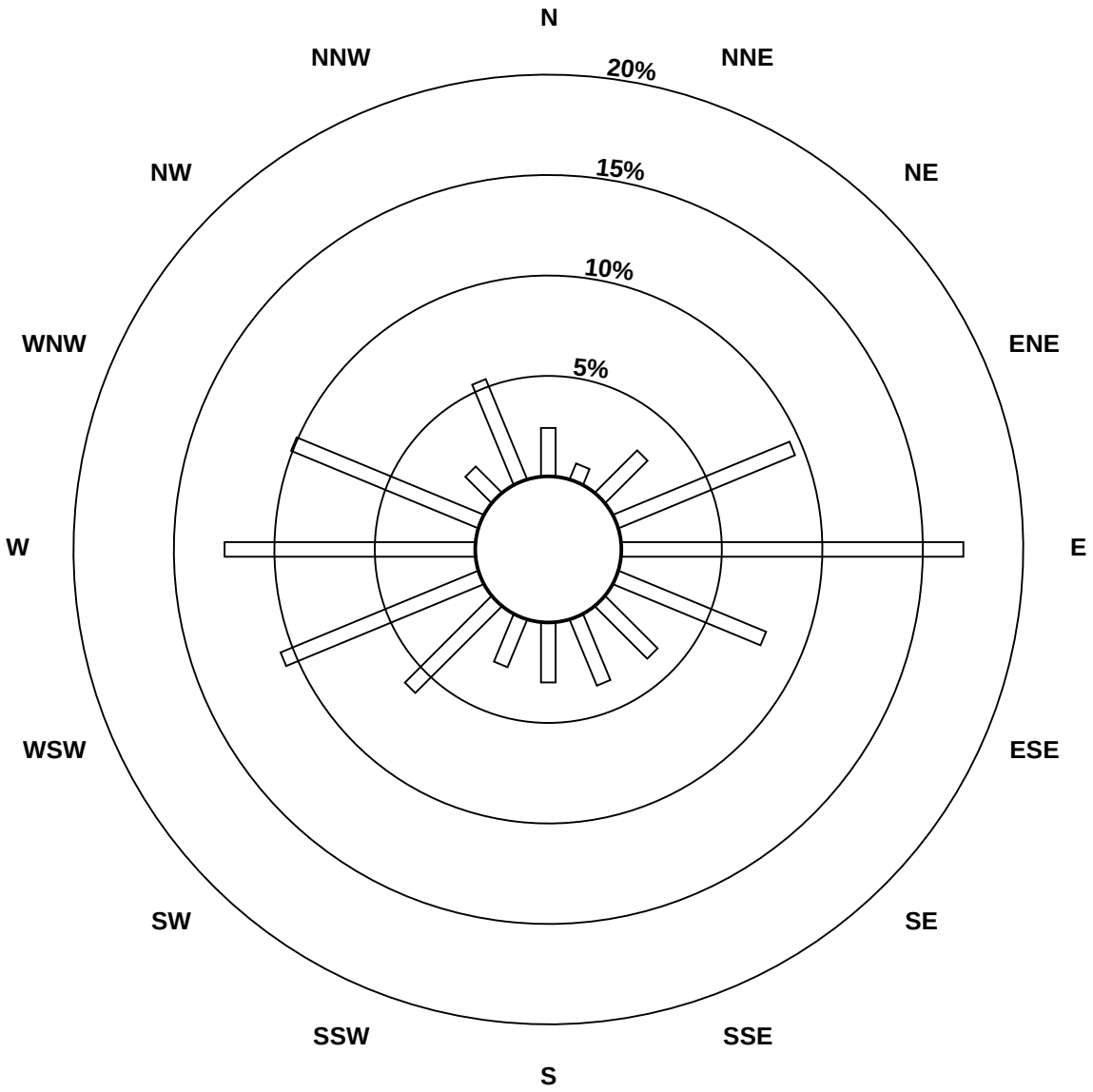
Total Number of Hours: 744

Wood Buffalo Environmental Association

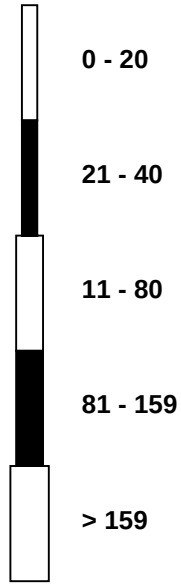
Wind Rose Aug 2015

Nitrogen Dioxide (NO_2) - ppb

Fort Chipewyan (AMS 8)



Classes (ppb)



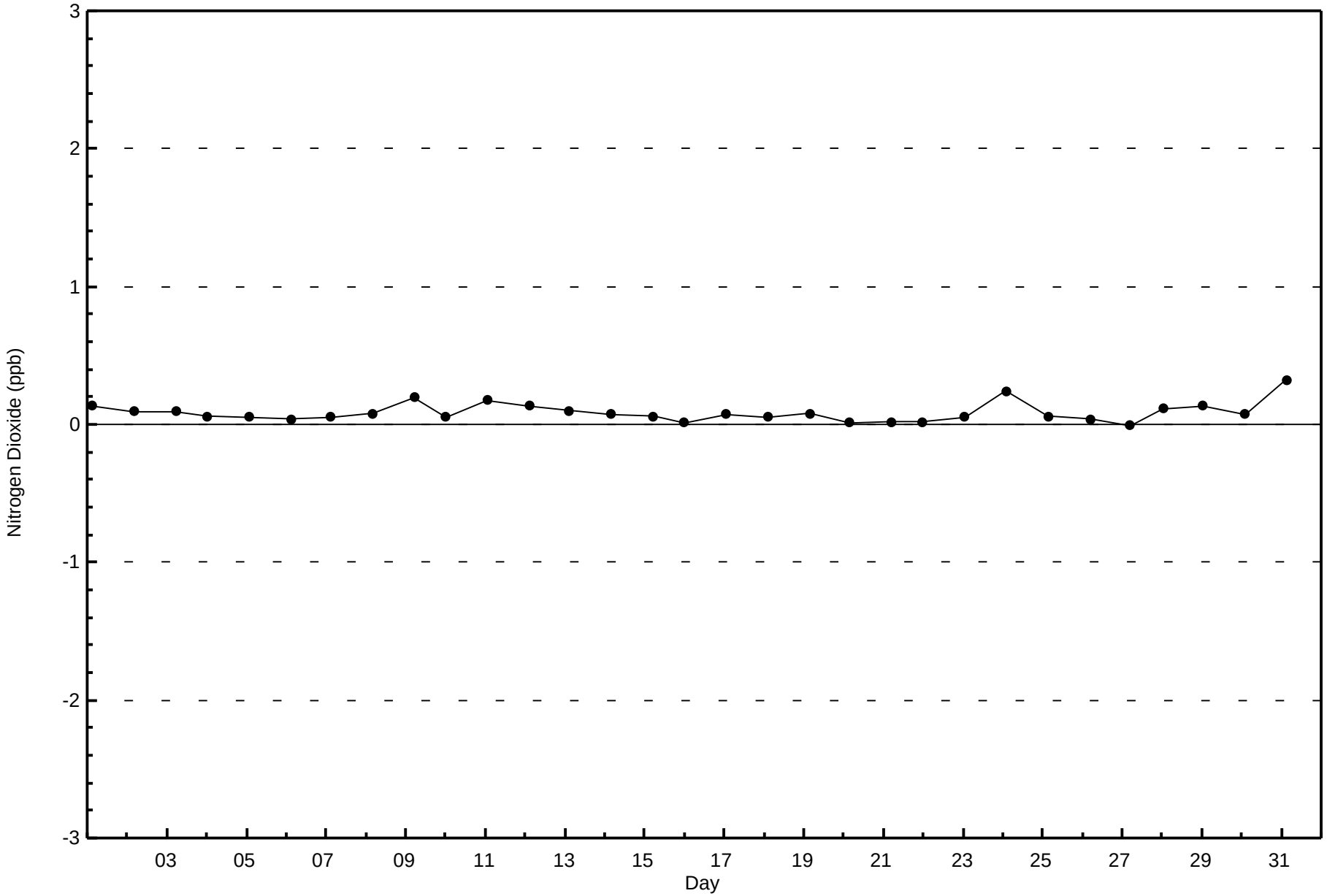
Total Number of Valid Hours: 705

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Dioxide (NO_2) - ppb

Fort Chipewyan - August 2015

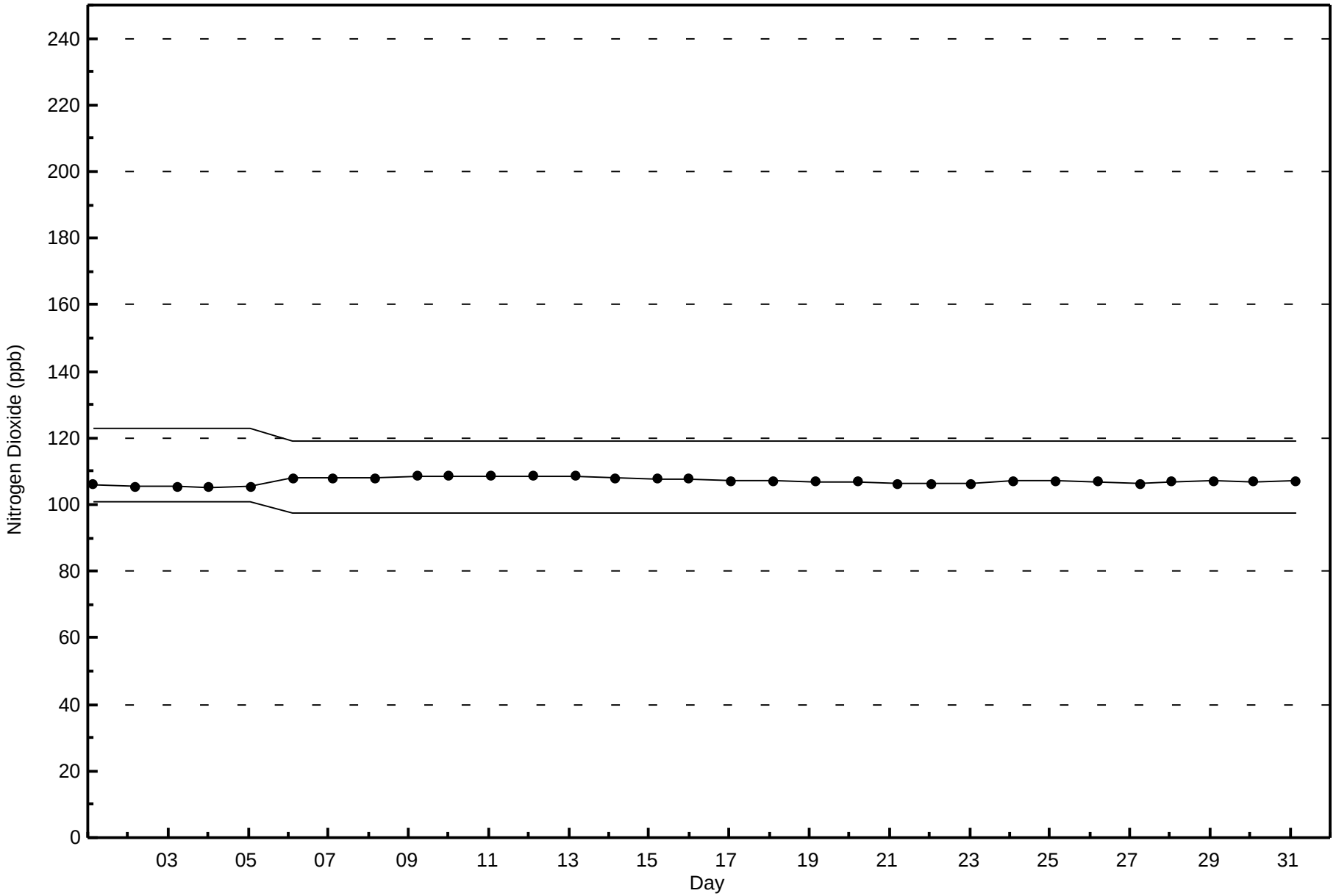


Wood Buffalo Environmental Association

Span Responses

Nitrogen Dioxide (NO_2) - ppb

Fort Chipewyan - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_X) - ppb

Fort Chipewyan - August 2015

Maximum Value: 7 ppb on Aug 24 21:00

Maximum Daily Average: 1.8 ppb on Aug 23

Minimum Value: 0 ppb on Aug 3 03:00

Minimum Daily Average: 0.1 ppb on Aug 18

Maximum Diurnal Average: 0.7 ppb at hour 21

Minimum Diurnal Average: 0.2 ppb at hour 18

Monthly Average: 0.4 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 1$ $P_{99} = 3$

Hours in Service:	744
Hours of Data:	706
Hours of Missing Data:	38
Hours of Calibration:	37
Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0	0	0	Z	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	2	0.4	2
2-Aug	1	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
3-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
4-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
5-Aug	0	Z	0	0	0	0	0	0	0	0	C	C	C	C	C	C	3	0	0	0	0	0	0	0	--	3
6-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
7-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.1	1
8-Aug	0	0	0	0	Z	0	1	1	2	2	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0.6	2
9-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
10-Aug	Z	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	2	1	1	0	0	0.6	2
11-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
12-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
13-Aug	0	0	3	Z	2	1	1	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0.6	3
14-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
15-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
16-Aug	Z	0	0	0	0	0	0	0	0	0	M	0	0	0	0	0	0	0	0	0	1	0	0	0	0.2	1
17-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0.2	1
18-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
19-Aug	0	0	0	Z	1	1	1	1	2	2	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0.6	3
20-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
21-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
22-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
23-Aug	0	Z	0	0	0	2	3	5	7	6	4	3	2	2	1	1	1	0	1	0	0	0	1	1	1.8	7
24-Aug	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	7	2	0	3	0.8	7
25-Aug	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0.3	1
26-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
27-Aug	0	0	0	0	0	Z	0	0	0	0	1	1	1	1	1	1	1	1	1	1	2	1	0	2	0.6	2
28-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	2	1	1	0.4	2
29-Aug	1	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
30-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.2	1
31-Aug	1	2	2	Z	2	3	4	4	3	3	3	2	1	1	0	0	0	0	0	0	0	0	0	0	1.3	4
	0.3	0.3	0.3	0.2	0.3	0.4	0.5	0.6	0.6	0.6	0.6	0.4	0.3	0.2	0.2	0.2	0.3	0.2	0.2	0.4	0.7	0.4	0.3	0.4	Diurnal Average	
	1	2	3	0	2	3	4	5	7	6	4	3	2	2	1	1	3	1	1	2	7	2	2	3	Diurnal Maximum	

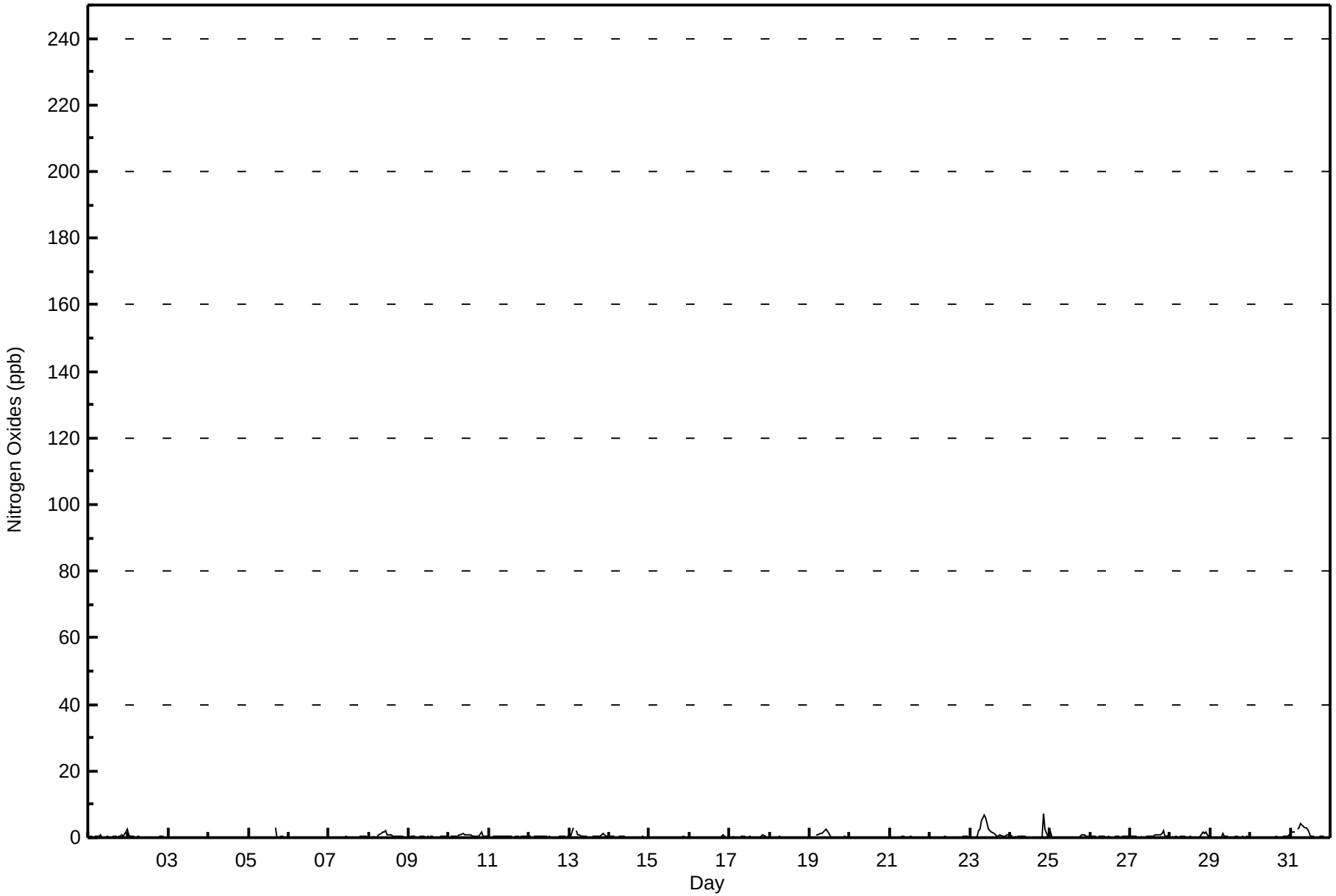
Z - zerospan C - Calibration M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Oxides (NO_X) - ppb

Fort Chipewyan - August 2015



Nitrogen Oxides (NO_X) - ppb
Fort Chipewyan - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	706	100.00	100.00
21 - 40	0	0.00	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: 706

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Oxides (NO_X) - ppb

Fort Chipewyan - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	17	6	21	67	120	56	26	25	21	18	43	75	88	71	13	38	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	17	6	21	67	120	56	26	25	21	18	43	75	88	71	13	38	705

Total Number of Valid Hours: 705

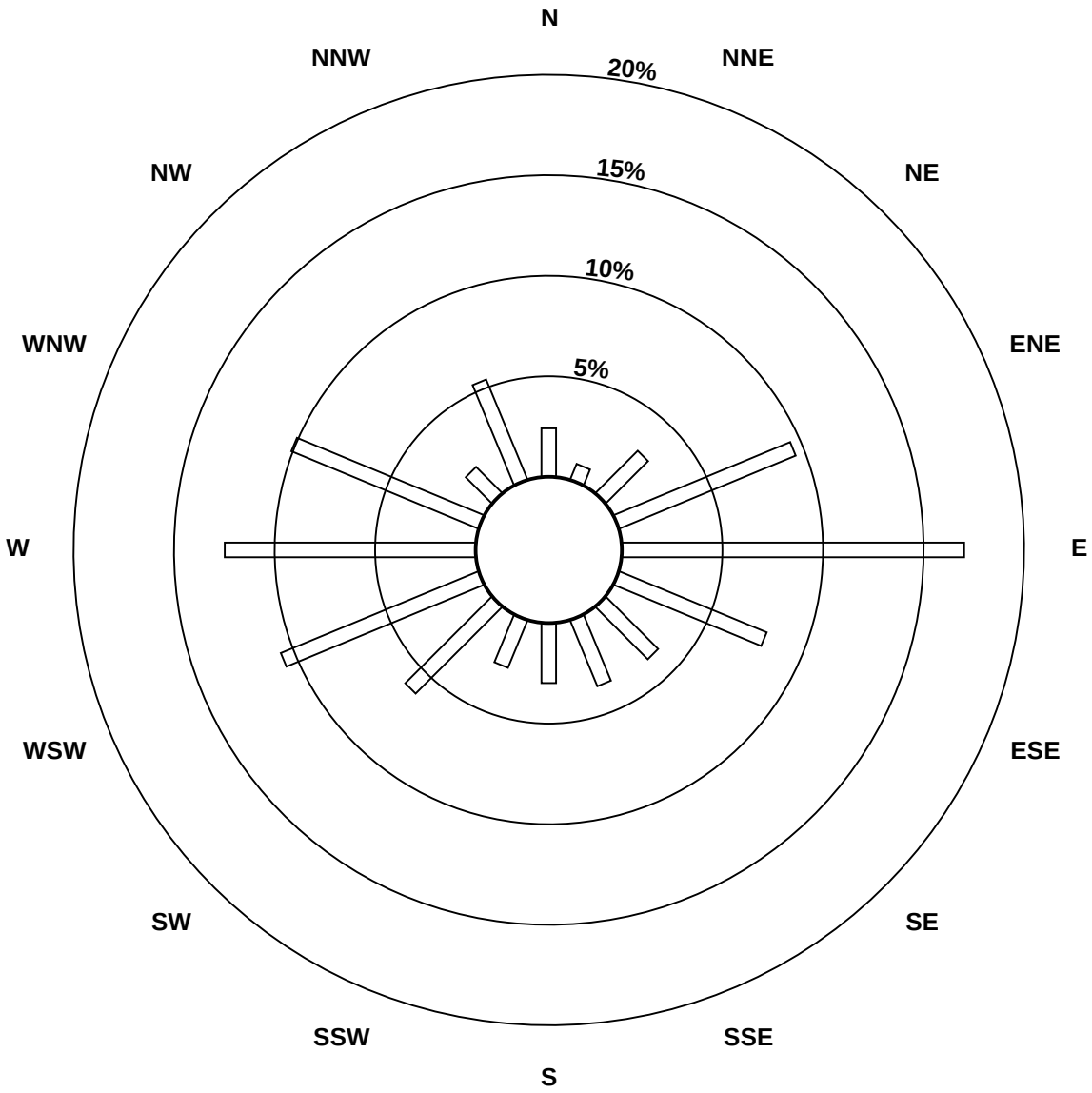
Total Number of Hours: 744

Wood Buffalo Environmental Association

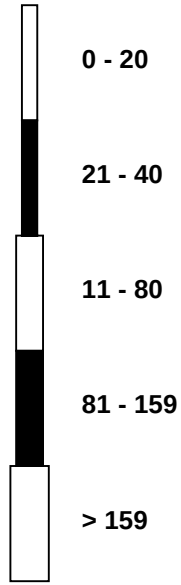
Wind Rose Aug 2015

Nitrogen Oxides (NO_X) - ppb

Fort Chipewyan (AMS 8)



Classes (ppb)



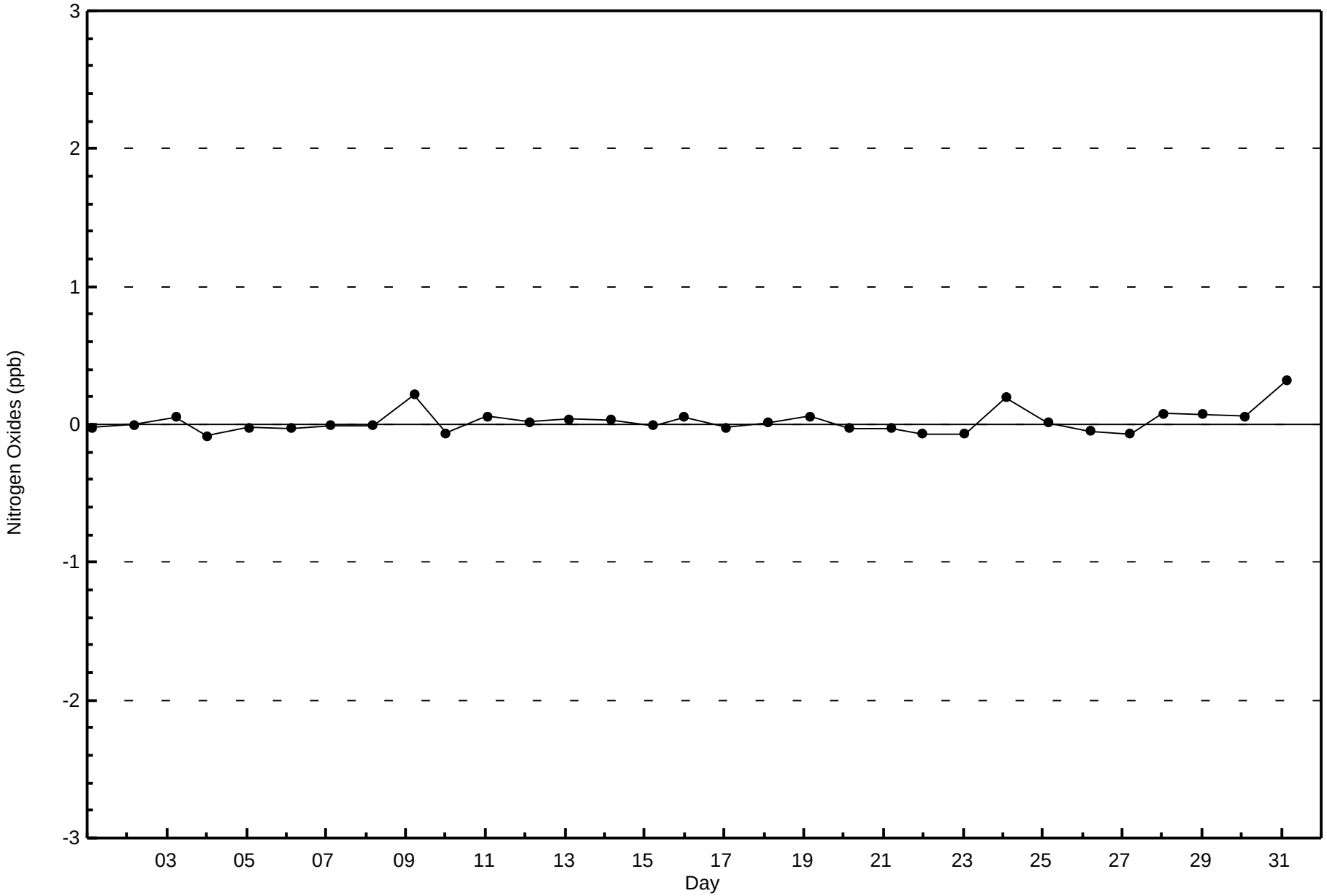
Total Number of Valid Hours: 705

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Oxides (NO_X) - ppb

Fort Chipewyan - August 2015

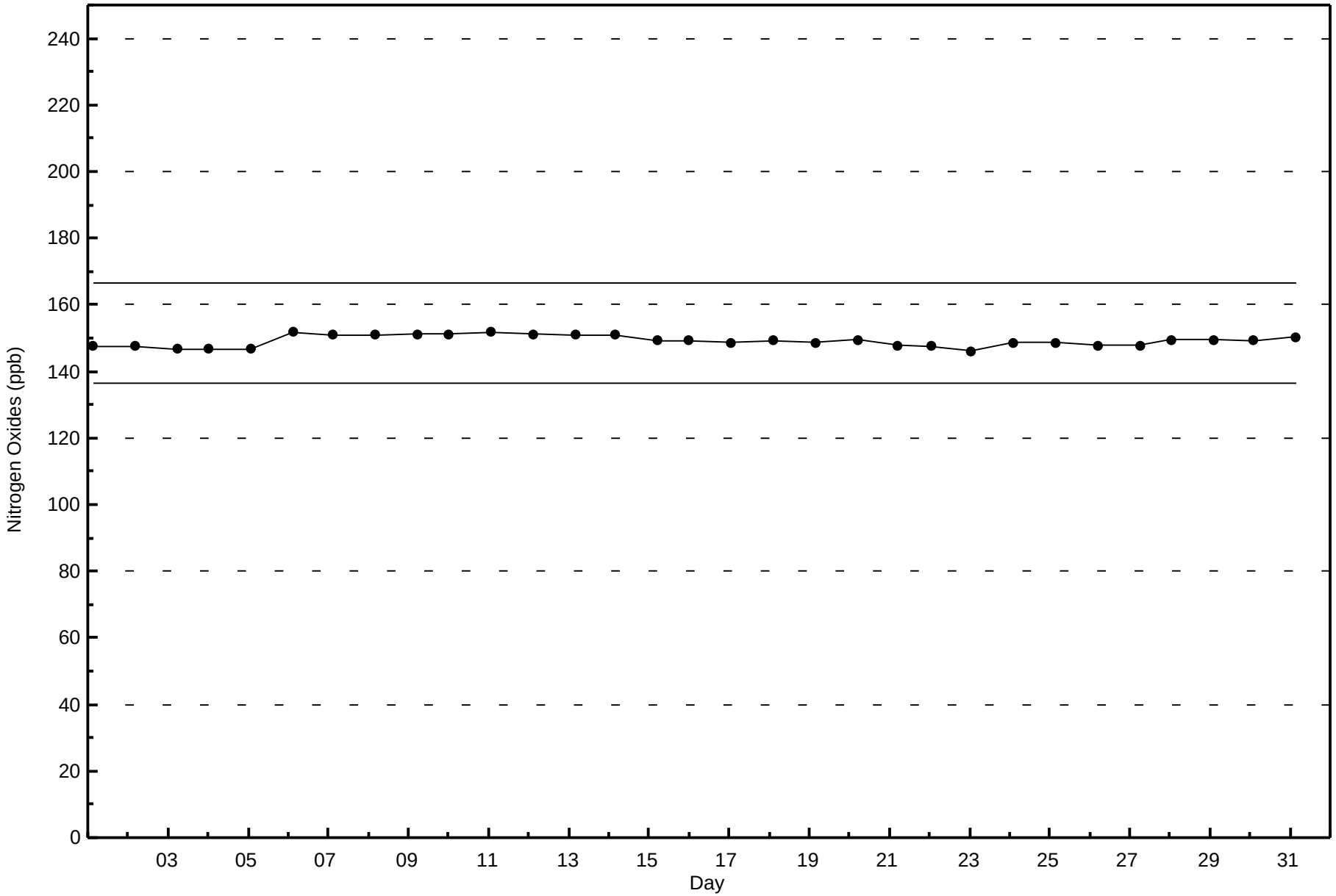


Wood Buffalo Environmental Association

Span Responses

Nitrogen Oxides (NO_X) - ppb

Fort Chipewyan - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O_3) - ppb

Fort Chipewyan - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 47 ppb on Aug 2 17:00

Maximum Daily Average: 35.1 ppb on Aug 3

Minimum Value: 7 ppb on Aug 9 06:00

Minimum Daily Average: 11.7 ppb on Aug 7

Maximum Diurnal Average: 29.0 ppb at hour 17

Minimum Diurnal Average: 16.8 ppb at hour 6

Monthly Average: 23.1 ppb

Percentiles: $P_1 = 9$ $P_{10} = 14$ $Q_1 = 17$ Median = 23 $Q_3 = 28$ $P_{90} = 32$ $P_{99} = 43$

Hours in Service:	744
Hours of Data:	701
Hours of Missing Data:	43
Hours of Calibration:	35
Percent Operational Time:	98.9

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	17	16	15	14	17	Z	12	15	27	27	27	27	26	25	26	30	31	30	29	26	22	21	19	16	22.4	31
2-Aug	16	12	UO	UO	16	22	Z	22	21	23	27	30	34	36	37	39	47	46	46	45	46	45	44	42	33.1	47
3-Aug	41	39	38	36	36	UO	UO	Z	34	37	38	37	37	36	35	35	36	35	36	32	31	30	30	28	35.1	41
4-Aug	27	25	Z	24	24	23	23	22	21	20	21	22	21	21	21	23	25	27	29	UO	UO	30	29	25	23.9	30
5-Aug	24	24	24	Z	22	21	19	19	19	25	28	29	30	29	28	C	C	C	C	19	25	25	25	22	24.0	30
6-Aug	19	19	18	17	Z	16	15	14	17	17	19	20	21	19	18	17	16	16	16	16	16	16	16	14	16.9	21
7-Aug	13	12	12	11	10	Z	9	8	9	9	10	10	11	11	12	12	13	13	13	13	14	15	15	15	11.7	15
8-Aug	13	12	11	10	9	9	Z	8	9	11	13	18	22	23	21	20	22	23	19	18	17	16	15	15	15.4	23
9-Aug	17	17	15	15	13	7	8	Z	19	24	25	29	29	28	29	28	26	25	25	25	24	24	24	22	21.7	29
10-Aug	26	23	Z	17	15	13	23	29	26	22	24	30	32	31	30	30	34	32	30	26	22	23	24	24	25.5	34
11-Aug	27	26	23	Z	21	21	20	22	25	26	26	28	28	28	29	31	30	29	29	28	27	26	27	27	26.2	31
12-Aug	26	24	25	26	Z	22	21	21	22	24	25	26	28	31	33	34	34	33	30	27	27	26	26	24	26.8	34
13-Aug	21	25	21	18	19	Z	18	18	21	23	23	25	26	28	29	30	27	25	25	21	22	22	23	22	23.2	30
14-Aug	20	19	18	16	17	20	Z	23	17	21	21	23	19	14	17	15	13	13	13	15	16	13	11	11	16.8	23
15-Aug	15	15	14	14	11	11	13	Z	17	23	30	28	30	31	29	28	29	33	35	32	28	20	17	15	22.5	35
16-Aug	14	14	Z	12	9	10	10	12	13	16	M	24	28	28	28	27	26	26	26	25	22	21	19	19	19.5	28
17-Aug	19	17	17	Z	17	17	17	17	19	21	24	26	29	32	31	31	32	32	33	29	25	20	19	20	23.7	33
18-Aug	20	20	18	17	Z	16	15	25	24	25	27	28	29	29	30	32	32	32	31	32	31	27	26	25	25.7	32
19-Aug	25	25	24	23	24	Z	25	26	26	25	24	24	32	33	34	32	32	31	26	24	19	15	14	13	25.1	34
20-Aug	12	13	13	14	17	18	Z	18	17	16	16	18	18	23	26	27	24	24	23	23	20	20	18	17	19.0	27
21-Aug	17	16	16	15	14	13	16	Z	16	16	17	18	19	20	20	21	19	19	19	20	18	16	14	14	17.1	21
22-Aug	14	15	Z	14	14	14	19	21	20	22	24	23	24	26	27	28	27	27	27	24	21	20	21	21	21.3	28
23-Aug	20	20	17	Z	16	14	13	12	12	13	20	26	28	30	34	39	39	35	34	32	29	31	34	29	25.0	39
24-Aug	24	26	26	28	Z	24	23	24	23	23	26	28	25	28	32	33	33	33	30	26	18	19	22	20	25.8	33
25-Aug	18	22	21	20	16	Z	13	15	16	19	20	22	23	23	23	24	24	24	22	18	17	19	19	15	19.7	24
26-Aug	14	12	14	14	14	14	Z	17	19	23	27	26	26	26	27	27	26	25	25	22	21	19	20	20	20.6	27
27-Aug	17	16	15	14	13	13	13	Z	17	22	31	37	39	38	39	42	40	38	35	33	28	25	27	25	26.8	42
28-Aug	26	27	Z	21	21	18	19	17	19	22	22	24	26	30	33	35	34	33	31	27	25	22	24	24	25.3	35
29-Aug	23	24	24	Z	21	19	14	13	11	17	20	23	25	28	27	29	30	32	33	30	28	30	34	31	24.6	34
30-Aug	28	28	29	28	Z	28	26	26	PF	26	26	26	25	24	24	25	25	23	25	27	27	26	22	22	25.8	29
31-Aug	23	22	20	17	18	Z	16	17	18	20	24	31	37	39	42	42	42	41	35	31	31	32	32	30	28.6	42
	20.5	20.1	19.5	18.2	17.0	16.8	16.8	18.5	19.1	21.3	23.5	25.4	26.6	27.4	28.0	28.8	29.0	28.5	27.7	25.6	23.9	23.1	22.8	21.5	Diurnal Average	
	41	39	38	36	36	28	26	29	34	37	38	37	39	39	42	42	47	46	46	45	46	45	44	42	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance UO - Unstable Operation PF - Power Failure

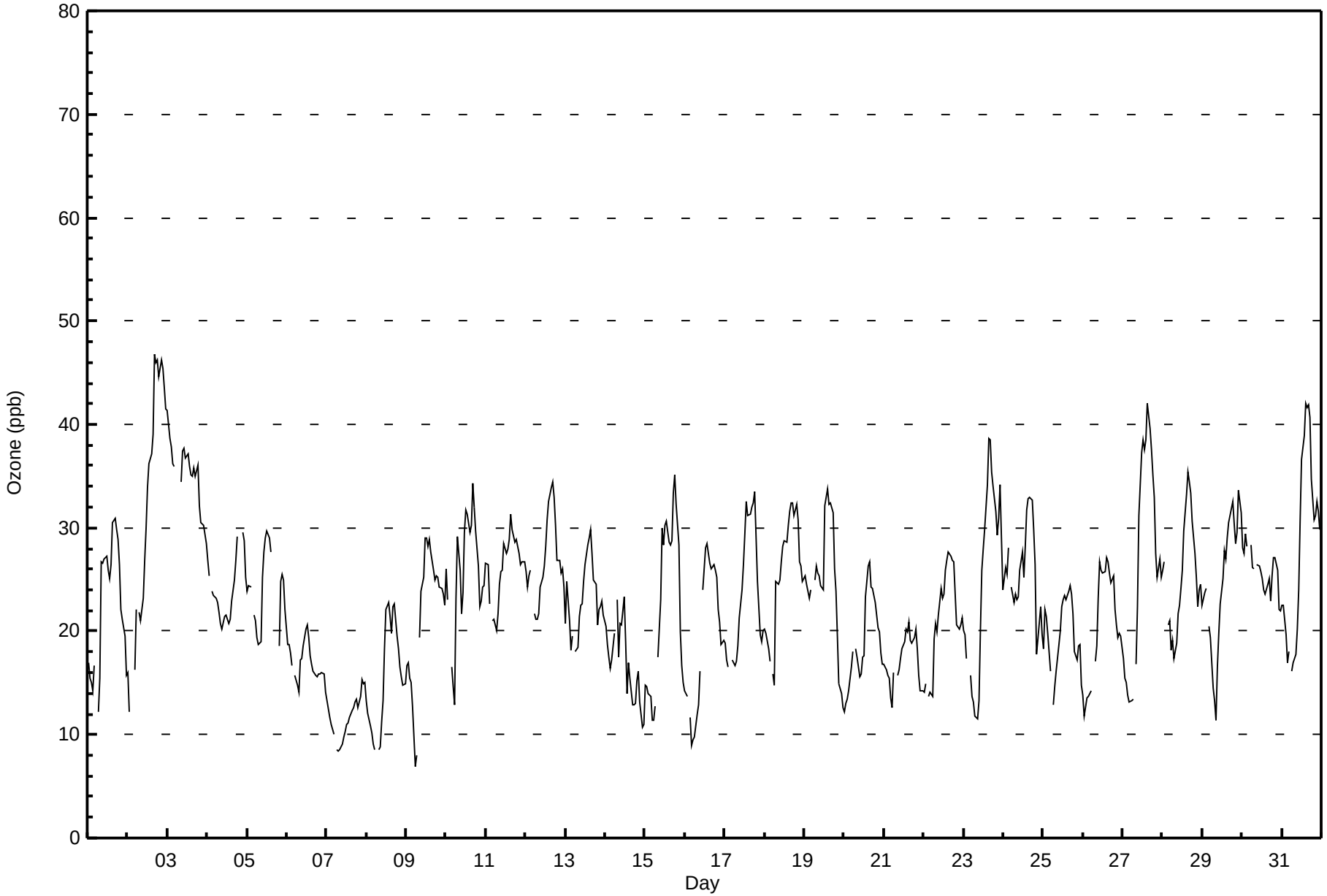
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb

Wood Buffalo Environmental Association

Hourly Averages

Ozone (O_3) - ppb

Fort Chipewyan - August 2015



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	266	37.95	37.95
21 - 50	435	62.05	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 701

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Ozone (O_3) - ppb

Fort Chipewyan - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	10	4	4	21	19	29	15	5	6	5	9	18	47	41	10	22	265
21 - 50	7	3	13	47	100	27	9	19	13	14	35	58	42	29	3	15	434
51 - 82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	17	7	17	68	119	56	24	24	19	19	44	76	89	70	13	37	699

Total Number of Valid Hours: 699

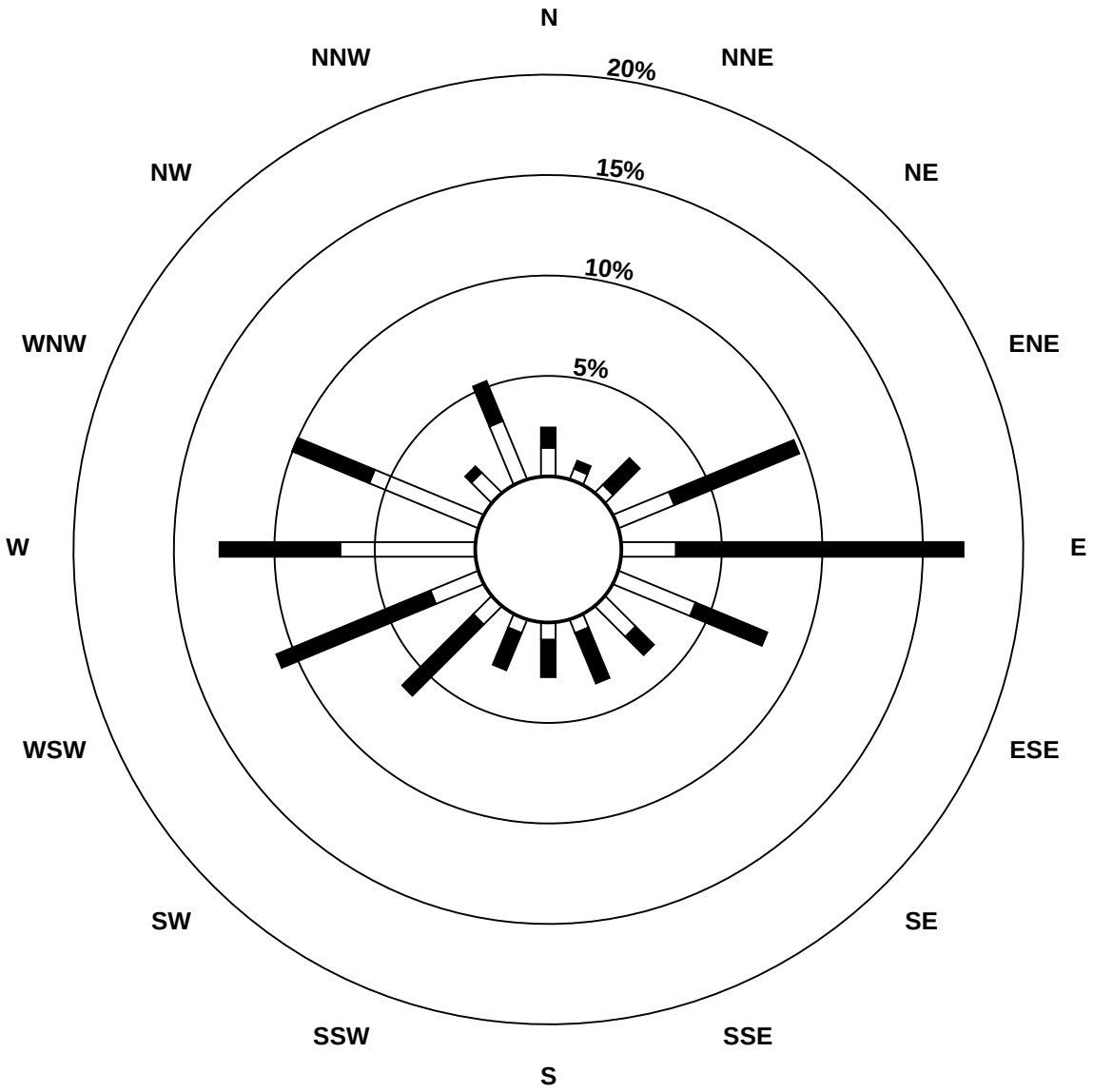
Total Number of Hours: 744

Wood Buffalo Environmental Association

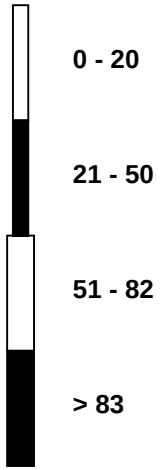
Wind Rose Aug 2015

Ozone (O_3) - ppb

Fort Chipewyan (AMS 8)



Classes (ppb)



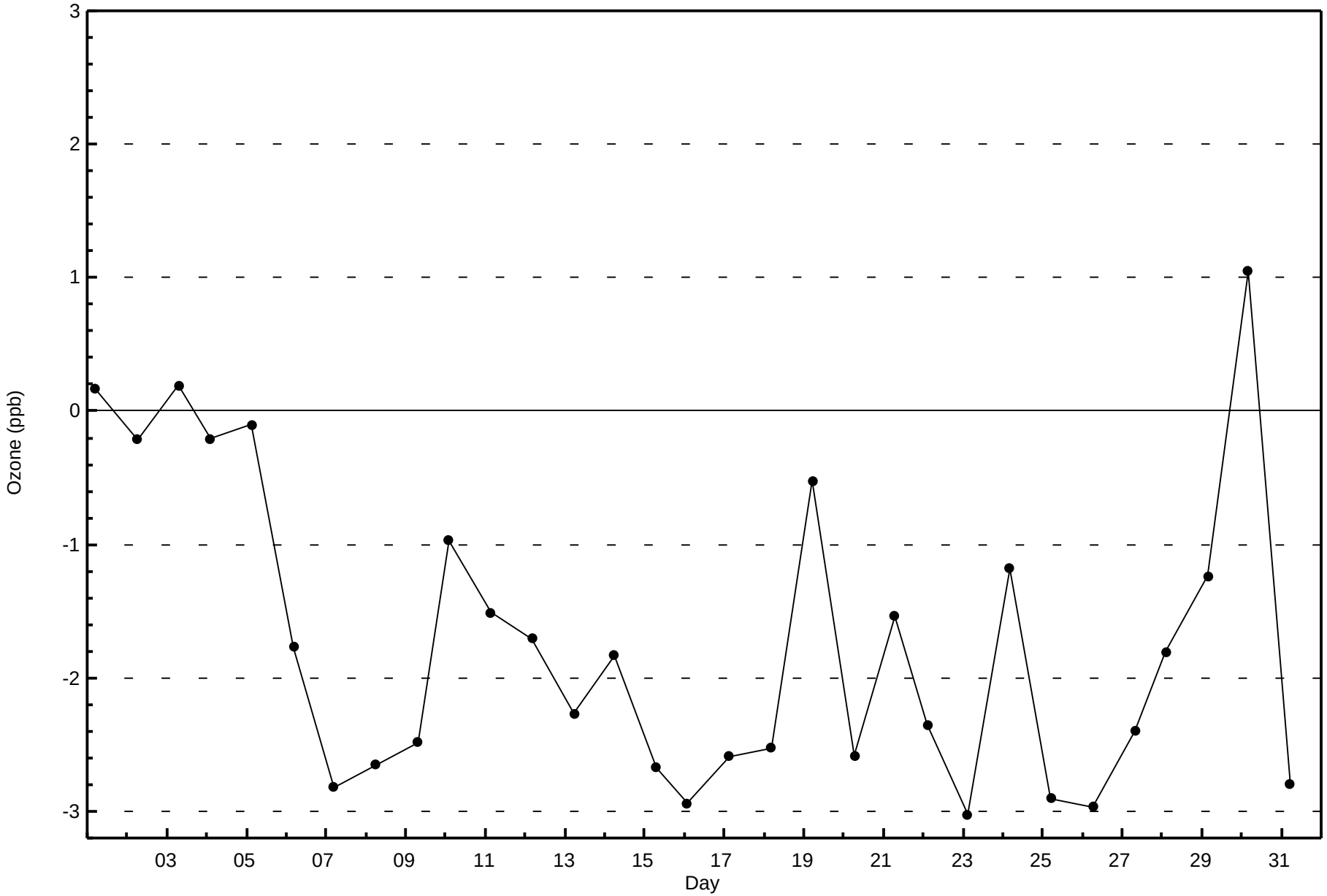
Total Number of Valid Hours: 699

Wood Buffalo Environmental Association

Zero Responses

Ozone (O_3) - ppb

Fort Chipewyan - August 2015

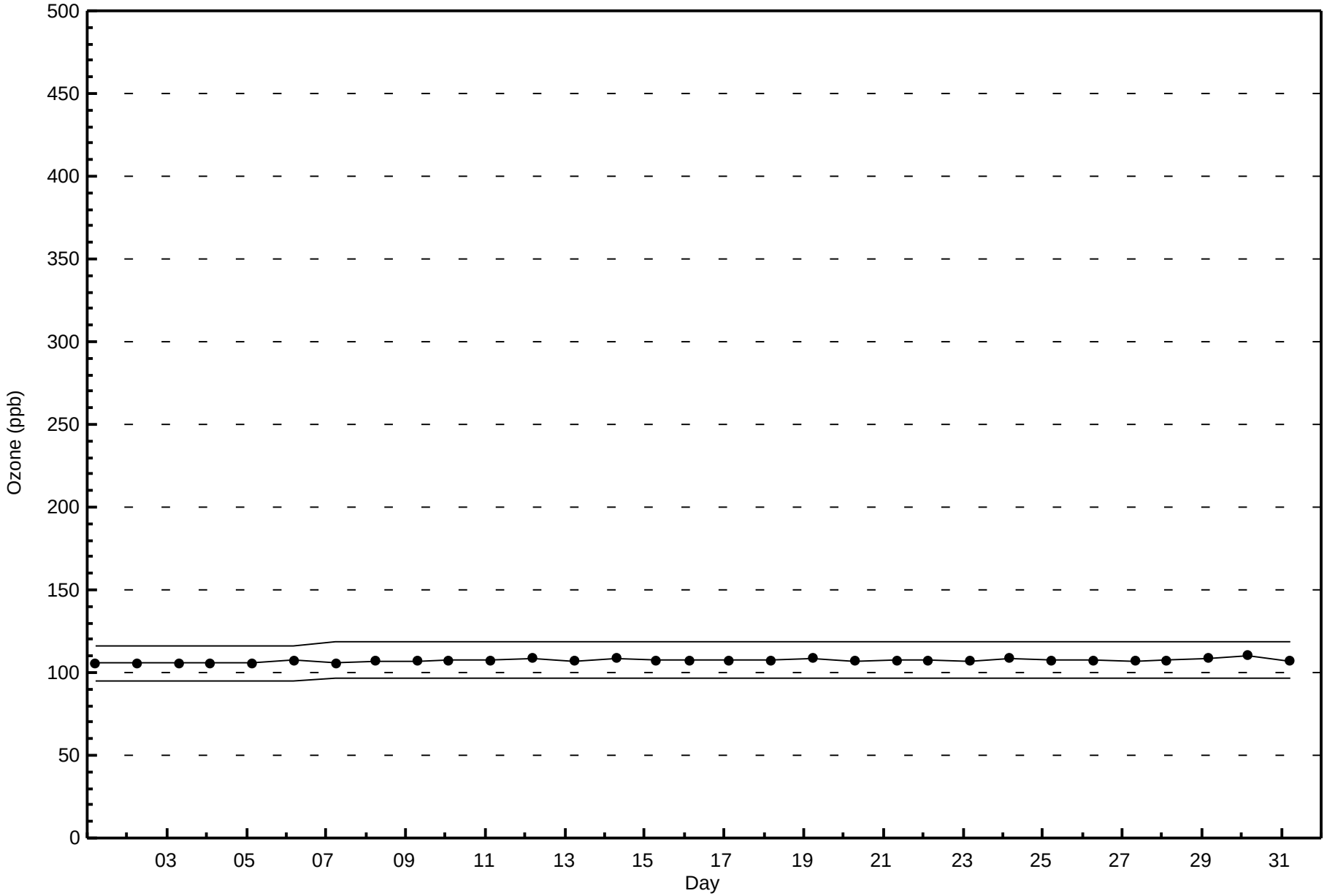


Wood Buffalo Environmental Association

Span Responses

Ozone (O_3) - ppb

Fort Chipewyan - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

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

Fort Chipewyan - August 2015

Number of Exceedences (AAAQO): 24-hr: 0

Maximum Value: 20.0 $\mu g/m^3$ on Aug 13 05:00

Maximum Daily Average: 7.5 $\mu g/m^3$ on Aug 28

Minimum Value: 1.2 $\mu g/m^3$ on Aug 21 04:00

Minimum Daily Average: 1.4 $\mu g/m^3$ on Aug 21

Maximum Diurnal Average: 4.7 $\mu g/m^3$ at hour 5

Minimum Diurnal Average: 3.4 $\mu g/m^3$ at hour 19

Monthly Average: 3.81 $\mu g/m^3$

Percentiles: P_1 = 1.3 P_{10} = 1.9 Q_1 = 2.5 Median = 3.3 Q_3 = 4.7 P_{90} = 6.2 P_{99} = 11.1

Hours in Service:	744
Hours of Data:	741
Hours of Missing Data:	3
Hours of Calibration:	1
Percent Operational Time:	99.7

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	3.1	3.2	3.2	2.8	3.4	3.2	2.8	2.5	2.4	2.5	2.5	2.6	2.4	2.3	2.1	2.3	2.4	2.6	2.7	2.9	3.2	3.5	4.8	6.3	3.0	6.3
2-Aug	8.2	5.7	6.7	6.4	6.0	5.3	3.6	2.6	2.4	2.4	2.4	2.7	2.9	3.0	3.3	3.5	5.0	5.5	5.9	6.2	6.1	5.5	5.0	4.6	4.6	8.2
3-Aug	4.3	4.3	4.7	4.6	4.4	3.8	3.3	3.2	2.8	2.6	2.6	2.6	2.8	2.7	2.5	2.4	2.5	2.9	3.2	2.9	2.4	2.2	2.1	2.0	3.1	4.7
4-Aug	2.0	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.3	2.5	2.5	2.5	2.4	2.5	2.7	3.1	3.0	3.0	2.6	2.4	3.1
5-Aug	2.4	2.6	2.6	2.7	2.7	2.8	2.7	2.7	2.7	2.6	2.8	2.9	3.1	3.7	4.7	3.7	2.8	2.8	C	1.9	2.0	1.7	1.6	1.6	2.7	4.7
6-Aug	1.5	1.6	2.6	3.2	3.1	3.0	3.1	3.1	4.4	4.7	4.3	5.0	4.0	3.1	2.6	2.6	3.9	4.6	3.5	2.9	2.7	2.7	2.4	2.2	3.2	5.0
7-Aug	2.1	2.4	2.4	2.4	2.5	2.4	2.5	2.5	2.5	2.5	2.5	2.9	2.9	2.8	2.7	2.6	2.5	2.8	3.7	4.4	5.0	4.7	4.5	3.9	3.0	5.0
8-Aug	3.8	3.9	3.8	3.3	3.1	3.4	3.4	3.8	4.3	5.1	5.3	5.3	5.8	5.7	5.2	4.8	5.4	5.5	5.2	5.0	4.9	4.6	4.7	4.1	4.6	5.8
9-Aug	3.1	2.9	3.3	3.7	3.8	2.2	2.3	3.0	3.0	2.7	2.8	3.2	3.1	3.5	3.5	3.9	3.6	3.7	4.2	4.2	4.6	4.6	4.3	3.9	3.5	4.6
10-Aug	4.0	4.5	5.0	5.3	5.2	5.3	5.3	3.7	2.3	2.8	3.2	3.5	3.7	3.4	3.3	3.1	2.5	2.3	2.6	2.5	2.5	3.2	4.1	4.7	3.7	5.3
11-Aug	4.5	5.1	6.0	5.8	5.6	5.2	4.4	3.5	3.9	4.4	4.2	4.5	4.4	4.9	4.8	5.0	5.3	4.6	4.6	5.4	5.8	4.2	3.9	3.7	4.7	6.0
12-Aug	5.9	5.5	4.3	4.1	4.1	4.3	4.6	4.8	5.2	4.2	4.3	4.0	4.8	4.3	4.3	4.6	4.3	4.3	4.0	3.7	3.3	3.2	3.2	3.1	4.3	5.9
13-Aug	3.4	4.5	8.9	8.4	20.0	18.6	13.2	5.5	5.5	6.5	4.6	4.7	6.1	5.6	5.8	5.8	3.6	2.3	2.2	2.4	2.4	4.2	4.6	5.2	6.4	20.0
14-Aug	5.4	6.5	6.5	7.5	6.2	7.0	6.9	5.0	4.3	5.7	4.0	3.3	2.8	2.8	2.2	2.1	2.5	2.7	2.7	2.8	3.0	3.2	2.9	2.6	4.2	7.5
15-Aug	2.0	2.1	2.4	3.2	5.1	4.5	2.9	2.3	2.1	1.9	1.9	2.0	1.9	1.9	1.4	1.3	1.3	1.4	1.5	1.5	1.7	2.3	2.5	2.9	2.3	5.1
16-Aug	4.0	4.7	5.2	4.8	2.9	2.3	2.7	2.9	2.9	2.3	M	1.9	1.8	2.0	2.0	2.1	2.4	2.5	2.6	2.8	2.9	3.0	3.5	3.6	3.0	5.2
17-Aug	3.3	3.3	3.4	3.8	7.2	4.7	3.7	3.1	3.1	2.6	2.5	2.5	2.6	2.8	3.5	4.2	4.6	4.7	4.1	4.6	4.4	4.1	3.9	3.6	3.8	7.2
18-Aug	4.0	4.0	4.3	4.0	3.8	3.4	3.0	1.8	1.7	1.7	2.1	2.3	2.2	2.2	2.1	2.2	3.0	3.5	3.7	3.5	3.6	4.1	4.8	4.3	3.1	4.8
19-Aug	4.5	4.6	5.0	5.0	5.0	4.7	4.6	4.5	4.2	3.9	3.8	3.8	2.2	2.6	2.5	2.9	2.9	2.3	2.1	2.1	2.0	1.9	2.1	2.2	3.4	5.0
20-Aug	2.1	2.1	2.0	1.8	1.7	1.7	1.7	1.8	1.8	1.9	2.1	1.9	1.9	2.0	1.9	1.9	2.0	1.9	1.5	1.5	1.8	1.4	1.3	1.3	1.8	2.1
21-Aug	1.3	1.4	1.2	1.2	1.4	1.5	1.2	1.2	1.3	1.3	1.4	1.3	1.4	1.4	1.4	1.3	1.3	1.4	1.4	1.3	1.3	1.5	1.6	2.5	1.4	2.5
22-Aug	1.7	1.6	1.8	1.7	1.6	1.9	1.3	1.3	1.4	1.3	1.4	1.4	1.4	1.5	1.5	1.6	1.8	1.9	1.7	1.7	1.7	1.8	2.0	2.3	1.6	2.3
23-Aug	2.5	3.8	2.8	2.6	2.7	2.8	2.7	2.9	3.0	3.0	4.4	4.7	5.4	5.1	4.6	4.0	3.0	3.2	2.9	2.9	3.0	3.6	3.7	4.3	3.5	5.4
24-Aug	4.2	3.9	3.9	3.4	3.2	3.2	3.1	3.4	6.4	9.2	6.2	5.0	6.7	5.3	3.2	2.3	2.4	2.5	2.7	3.2	7.7	3.8	3.0	2.7	4.2	9.2
25-Aug	3.0	3.1	3.7	4.9	5.4	4.7	4.6	3.3	2.6	2.9	2.3	1.9	1.9	1.7	1.9	2.0	2.0	2.4	2.9	4.4	6.4	3.2	3.1	2.9	3.2	6.4
26-Aug	2.7	5.8	3.5	3.1	3.9	5.7	5.3	3.8	2.6	2.5	2.5	2.7	2.5	2.8	2.9	3.3	3.6	3.9	3.6	3.8	4.0	4.0	4.1	4.3	3.6	5.8
27-Aug	4.6	5.3	6.3	6.9	5.5	5.3	4.7	4.3	3.9	3.8	4.0	4.3	5.3	5.2	5.2	6.1	8.6	8.5	8.0	8.2	9.4	7.1	6.3	6.6	6.0	9.4
28-Aug	6.8	7.5	7.7	7.5	8.0	7.0	7.8	15.5	13.1	8.1	6.3	5.1	5.7	6.2	7.8	8.1	6.7	5.4	5.0	6.9	7.9	7.8	5.7	6.9	7.5	15.5
29-Aug	7.8	7.2	7.1	6.6	5.4	5.1	5.5	5.9	4.4	3.2	2.8	2.5	2.8	3.1	3.4	3.9	4.8	4.6	4.5	5.2	5.2	4.4	3.5	3.8	4.7	7.8
30-Aug	5.0	5.0	4.5	4.9	5.1	5.6	6.5	7.1	8.6	8.5	8.4	9.3	10.0	10.9	11.4	11.3	3.6	3.7	4.2	4.0	3.7	3.3	3.0	3.2	6.3	11.4
31-Aug	3.7	UO	4.6	4.8	4.7	5.8	6.6	6.8	8.6	9.2	7.6	8.1	6.9	4.9	4.9	4.8	5.9	5.2	3.7	3.3	3.3	4.0	4.4	4.5	5.5	9.2
	3.8	4.0	4.2	4.3	4.7	4.5	4.1	3.9	3.9	3.8	3.6	3.5	3.7	3.6	3.6	3.6	3.5	3.5	3.4	3.6	3.9	3.6	3.5	3.6	Diurnal Average	
	8.2	7.5	8.9	8.4	20.0	18.6	13.2	15.5	13.1	9.2	8.4	9.3	10.0	10.9	11.4	11.3	8.6	8.5	8.0	8.2	9.4	7.8	6.3	6.9	Diurnal Maximum	

C - Calibration M - Maintenance UO - Unstable Operation

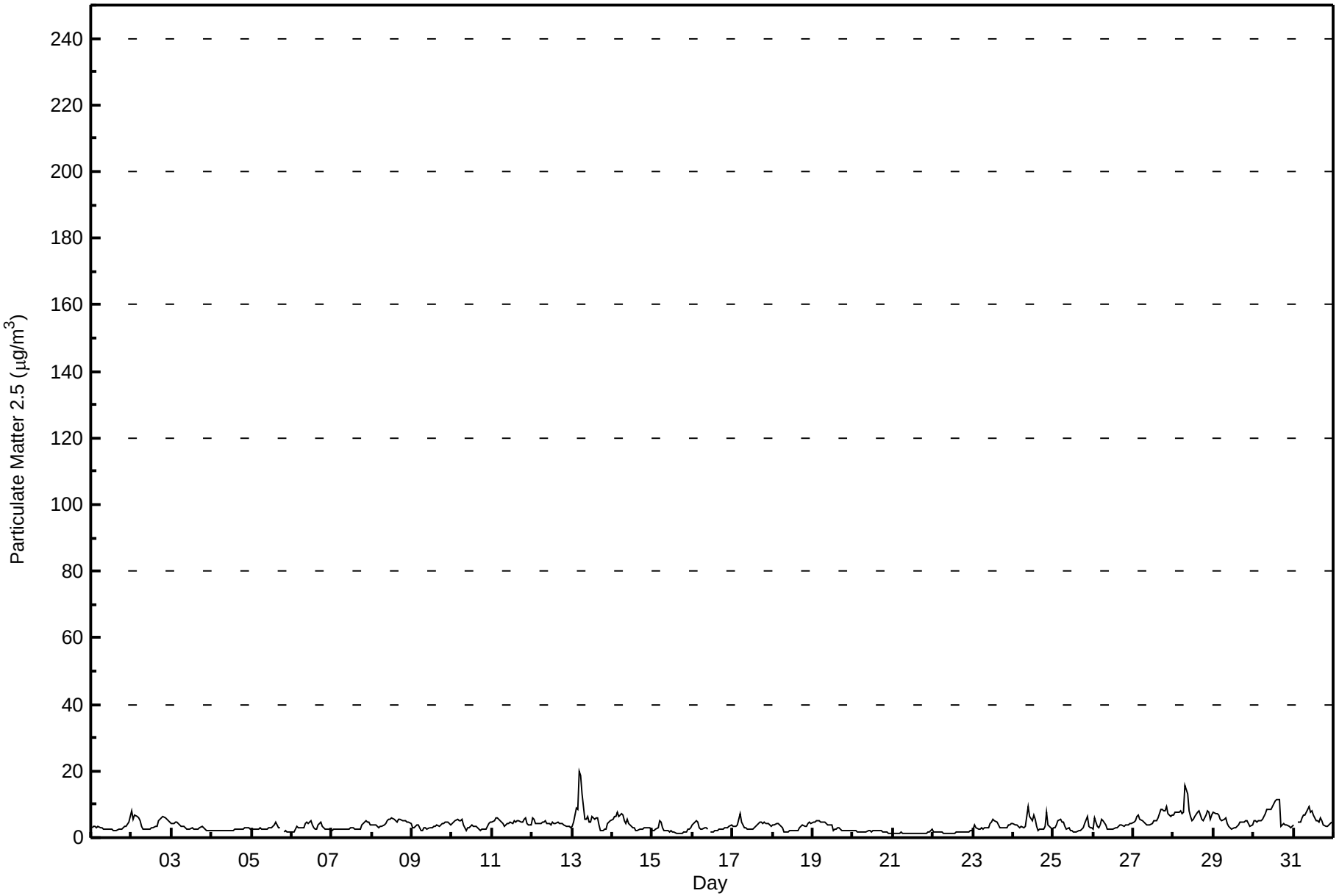
Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 $\mu g/m^3$

Wood Buffalo Environmental Association

Hourly Averages

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

Fort Chipewyan - August 2015



Concentration Ranges ($\mu g/m^3$)	Number of Hours	%	Cumulative %
1 - 5	636	85.83	85.83
6 - 15	102	13.77	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: 741

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

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

Fort Chipewyan - August 2015

Concentration Ranges ($\mu g/m^3$)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
1 - 5	14	6	19	62	105	52	26	22	16	15	36	64	80	66	12	41	636
6 - 15	4	1	2	7	21	7	0	5	5	4	9	14	11	8	1	1	100
16 - 25	0	0	0	2	0	0	0	0	0	0	0	0	1	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	18	7	21	71	126	59	26	27	21	19	45	78	92	74	13	42	739

Total Number of Valid Hours: 739

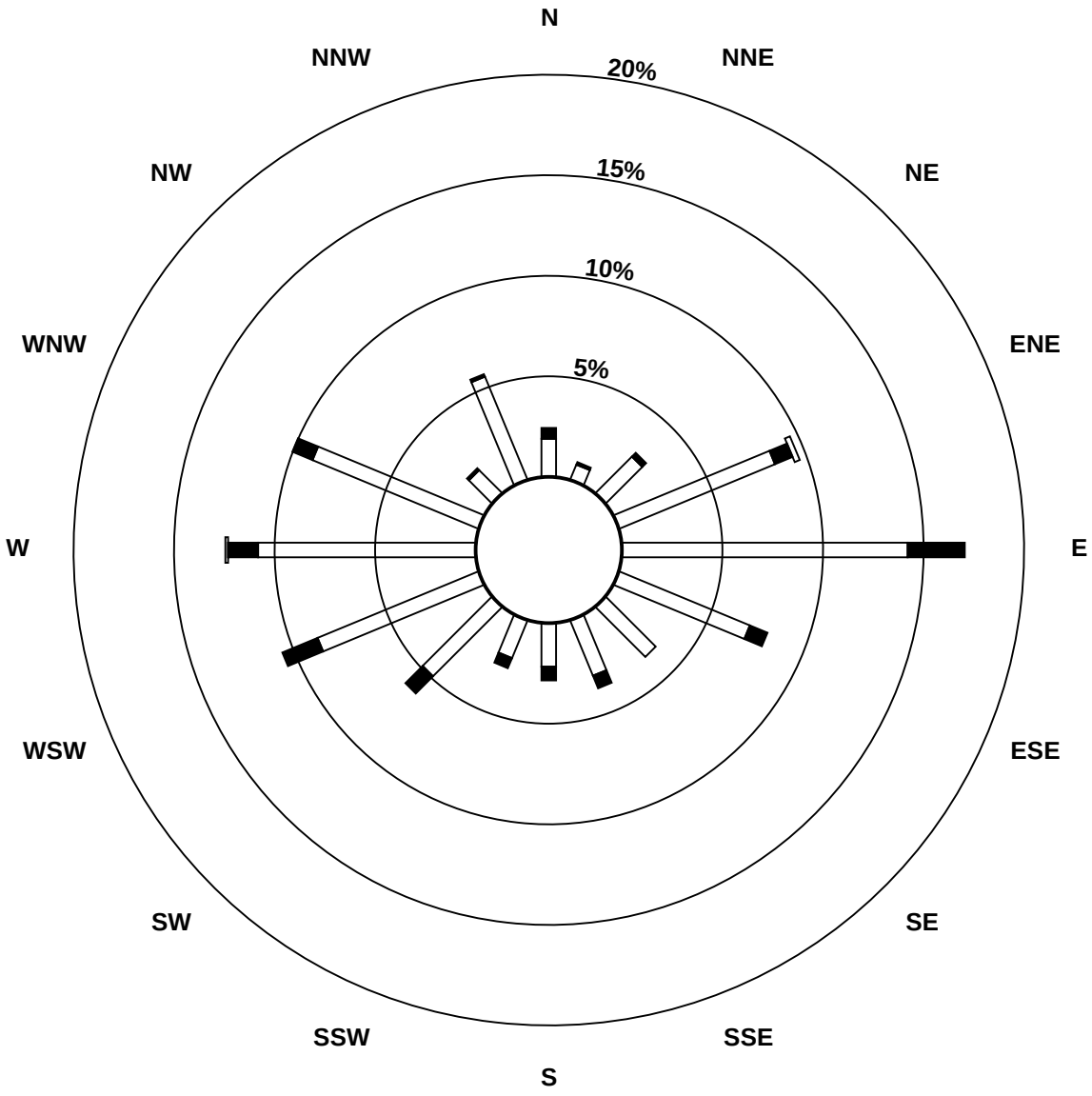
Total Number of Hours: 744

Wood Buffalo Environmental Association

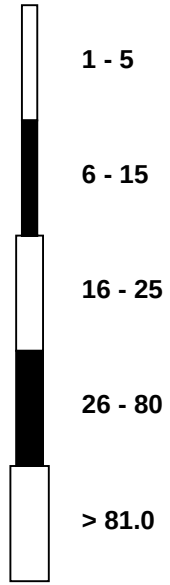
Wind Rose Aug 2015

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

Fort Chipewyan (AMS 8)



Classes ($\mu g/m^3$)



Total Number of Valid Hours: 739

Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature 2m (AT 2m) - C

Fort Chipewyan - August 2015

Maximum Value: 28.7 C on Aug 10 17:00

Maximum Daily Average: 21.5 C on Aug 10

Minimum Value: 7.3 C on Aug 23 03:00

Minimum Daily Average: 10.4 C on Aug 22

Maximum Diurnal Average: 20.3 C at hour 17

Minimum Diurnal Average: 13.5 C at hour 5

Monthly Average: 16.91 C

Percentiles: P_1 = 8.5 P_{10} = 11.6 Q_1 = 14.0 Median = 17.2 Q_3 = 19.5 P_{90} = 21.6 P_{99} = 26.4

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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	13.9	13.5	13.0	12.7	13.4	13.2	13.9	17.4	18.6	19.1	19.5	19.4	20.1	20.0	20.4	20.8	20.6	21.0	21.3	20.8	19.1	17.5	16.5	14.9	17.5	21.3
2-Aug	14.3	13.2	12.6	13.5	13.3	15.4	17.7	18.5	18.5	18.8	19.7	19.8	20.0	20.3	20.3	20.5	21.0	20.8	20.4	19.6	19.0	18.4	18.3	18.3	18.0	21.0
3-Aug	19.6	18.2	17.7	17.0	16.6	16.8	17.0	17.5	18.4	19.4	19.9	20.5	21.3	21.5	21.6	21.9	21.8	21.0	20.9	20.2	19.6	19.1	18.8	18.7	19.4	21.9
4-Aug	19.0	18.6	18.1	17.7	17.6	17.7	17.7	17.9	18.4	19.0	19.7	20.8	21.0	21.3	21.9	22.1	21.5	21.0	20.5	20.2	19.9	19.6	19.4	19.0	19.6	22.1
5-Aug	18.4	18.4	18.1	17.0	16.1	16.4	16.8	17.3	18.2	19.6	20.4	21.0	21.6	21.6	21.4	21.4	21.6	21.7	21.5	21.1	20.3	20.8	20.2	19.3	19.6	21.7
6-Aug	17.8	17.8	16.8	15.8	15.8	15.5	15.7	16.5	17.5	18.3	18.3	18.4	19.0	19.0	18.6	18.6	18.7	18.7	18.7	18.4	18.2	17.9	17.4	16.8	17.7	19.0
7-Aug	16.5	16.3	16.0	15.7	15.8	16.0	16.2	16.4	16.9	17.7	18.1	17.9	17.6	18.3	18.7	18.9	18.8	19.2	18.5	17.9	17.5	17.4	18.0	19.0	17.5	19.2
8-Aug	18.2	17.9	17.4	16.6	15.6	15.6	17.1	17.2	17.1	18.1	18.9	19.5	20.1	19.5	19.5	20.2	19.9	19.7	19.3	19.8	19.0	18.3	17.7	17.4	18.3	20.2
9-Aug	17.5	17.3	16.7	16.7	15.7	14.2	15.7	17.3	18.5	19.5	20.6	21.6	21.9	22.3	22.5	22.6	22.9	22.7	22.3	21.7	21.0	20.9	20.4	20.4	19.7	22.9
10-Aug	21.3	19.9	18.3	17.9	17.2	17.3	17.2	16.2	17.6	17.5	18.2	20.1	23.2	25.6	27.3	27.7	28.7	27.8	26.9	25.3	23.1	21.8	20.2	19.7	21.5	28.7
11-Aug	19.0	18.4	16.9	16.3	16.1	16.5	17.9	20.5	21.4	22.2	23.2	24.1	25.0	25.2	25.1	25.4	24.7	24.2	24.1	22.5	20.8	19.6	18.9	17.8	21.1	25.4
12-Aug	17.3	16.2	16.0	15.7	15.2	15.1	15.7	17.1	18.8	20.8	21.9	23.1	24.3	25.4	26.2	26.4	26.5	25.4	24.4	22.9	21.9	20.7	18.7	17.0	20.5	26.5
13-Aug	15.4	16.4	16.4	15.6	16.3	16.8	18.3	19.5	19.4	20.3	21.4	22.0	22.4	23.3	23.2	23.1	21.4	20.9	21.6	20.7	20.1	18.6	17.0	15.7	19.4	23.3
14-Aug	15.8	14.7	13.5	13.1	12.9	13.5	14.4	14.7	14.5	14.9	16.4	17.0	15.9	15.6	15.9	14.6	16.0	15.4	15.1	13.8	13.1	12.6	12.7	13.2	14.6	17.0
15-Aug	13.1	12.7	12.4	12.0	11.6	11.0	11.1	12.4	14.2	15.6	16.4	16.4	17.3	17.5	17.6	17.6	18.1	18.3	17.9	16.5	14.6	12.9	12.4	12.3	14.7	18.3
16-Aug	12.4	12.1	12.0	11.6	10.9	11.1	11.3	12.3	13.1	13.3	M	16.1	16.1	16.1	17.0	17.7	18.9	18.7	18.1	17.1	15.6	14.3	13.3	12.9	14.4	18.9
17-Aug	12.5	11.6	11.7	11.3	11.3	11.2	12.1	14.2	16.4	18.3	20.1	21.3	22.3	23.1	23.2	23.7	23.5	23.6	20.2	19.3	18.1	17.0	16.5	16.1	17.4	23.7
18-Aug	15.0	13.9	12.7	12.0	11.9	12.1	13.1	15.1	15.0	15.5	16.3	16.3	16.7	17.3	17.6	18.0	18.1	17.7	17.5	17.8	18.5	17.7	17.0	16.2	15.8	18.5
19-Aug	16.8	17.0	16.8	16.8	17.0	17.2	17.1	17.4	16.3	16.6	18.3	19.5	20.4	21.8	22.8	22.6	21.6	19.2	17.0	16.6	14.4	13.9	13.2	13.1	17.6	22.8
20-Aug	13.0	13.2	12.9	12.5	12.4	11.6	11.3	11.0	11.3	11.6	12.8	13.6	14.0	15.0	15.3	14.8	14.6	14.1	13.4	12.6	12.0	11.7	10.3	9.9	12.7	15.3
21-Aug	9.8	9.7	9.6	9.3	9.4	9.7	9.6	9.4	9.2	9.6	10.4	11.2	11.8	12.5	13.1	13.1	12.7	12.5	12.2	11.4	10.4	9.6	9.2	8.5	10.6	13.1
22-Aug	8.4	8.8	8.7	8.8	8.6	8.6	9.1	9.3	9.5	10.2	10.4	10.0	11.0	11.7	12.4	12.7	13.1	13.5	13.7	12.9	11.2	9.8	9.3	9.1	10.4	13.7
23-Aug	8.5	8.1	7.3	7.3	7.3	7.6	8.6	8.9	10.1	12.0	14.6	16.2	16.7	17.4	17.6	19.2	19.8	19.1	18.5	17.2	16.5	16.1	16.1	14.9	13.6	19.8
24-Aug	13.3	14.0	13.6	13.7	13.4	12.6	12.8	14.3	14.6	15.3	16.6	17.4	18.8	19.9	20.5	21.1	21.1	21.0	20.4	18.5	16.5	15.7	15.7	14.5	16.5	21.1
25-Aug	12.9	13.2	12.4	11.6	10.2	9.7	9.8	12.4	13.9	14.9	17.0	18.0	18.9	19.2	19.9	19.5	19.4	19.1	18.1	16.6	15.8	15.2	14.6	13.3	15.2	19.9
26-Aug	12.7	12.0	12.2	11.5	10.6	10.1	10.9	12.7	13.9	15.6	16.7	17.2	17.7	18.0	18.4	18.3	18.3	18.6	18.2	16.7	15.4	14.2	13.8	13.4	14.9	18.6
27-Aug	12.1	11.3	11.4	11.0	10.0	9.8	10.8	12.1	15.4	17.9	20.1	20.7	22.3	23.4	23.0	22.7	22.9	21.2	20.8	20.0	18.8	17.9	16.8	16.3	17.0	23.4
28-Aug	16.0	15.2	15.1	13.9	13.6	13.0	14.0	14.7	16.2	17.7	18.8	20.6	21.9	21.9	22.3	22.1	21.6	22.3	22.1	19.9	18.6	17.0	17.3	17.2	18.0	22.3
29-Aug	16.3	16.1	16.0	15.4	14.7	15.2	13.6	14.5	14.3	17.6	18.0	18.0	18.2	19.2	19.5	20.5	21.0	20.7	20.0	19.5	19.4	18.9	19.0	18.8	17.7	21.0
30-Aug	18.5	18.0	17.9	16.9	17.0	17.4	16.8	16.3	15.6	15.7	16.2	16.8	17.3	17.7	18.1	18.2	18.4	17.8	17.9	18.0	17.1	16.0	15.5	15.0	17.1	18.5
31-Aug	14.2	13.5	12.3	11.3	11.5	11.9	12.1	12.9	14.0	15.1	16.9	19.5	20.8	21.7	22.0	21.8	21.3	20.9	19.4	16.7	15.6	14.9	13.7	12.7	16.1	22.0
	15.1	14.8	14.3	13.8	13.5	13.6	14.1	15.0	15.7	16.7	17.9	18.5	19.2	19.8	20.1	20.3	20.3	19.9	19.4	18.5	17.5	16.6	16.1	15.5	Diurnal Average	
	21.3	19.9	18.3	17.9	17.6	17.7	18.3	20.5	21.4	22.2	23.2	24.1	25.0	25.6	27.3	27.7	28.7	27.8	26.9	25.3	23.1	21.8	20.4	20.4	Diurnal Maximum	

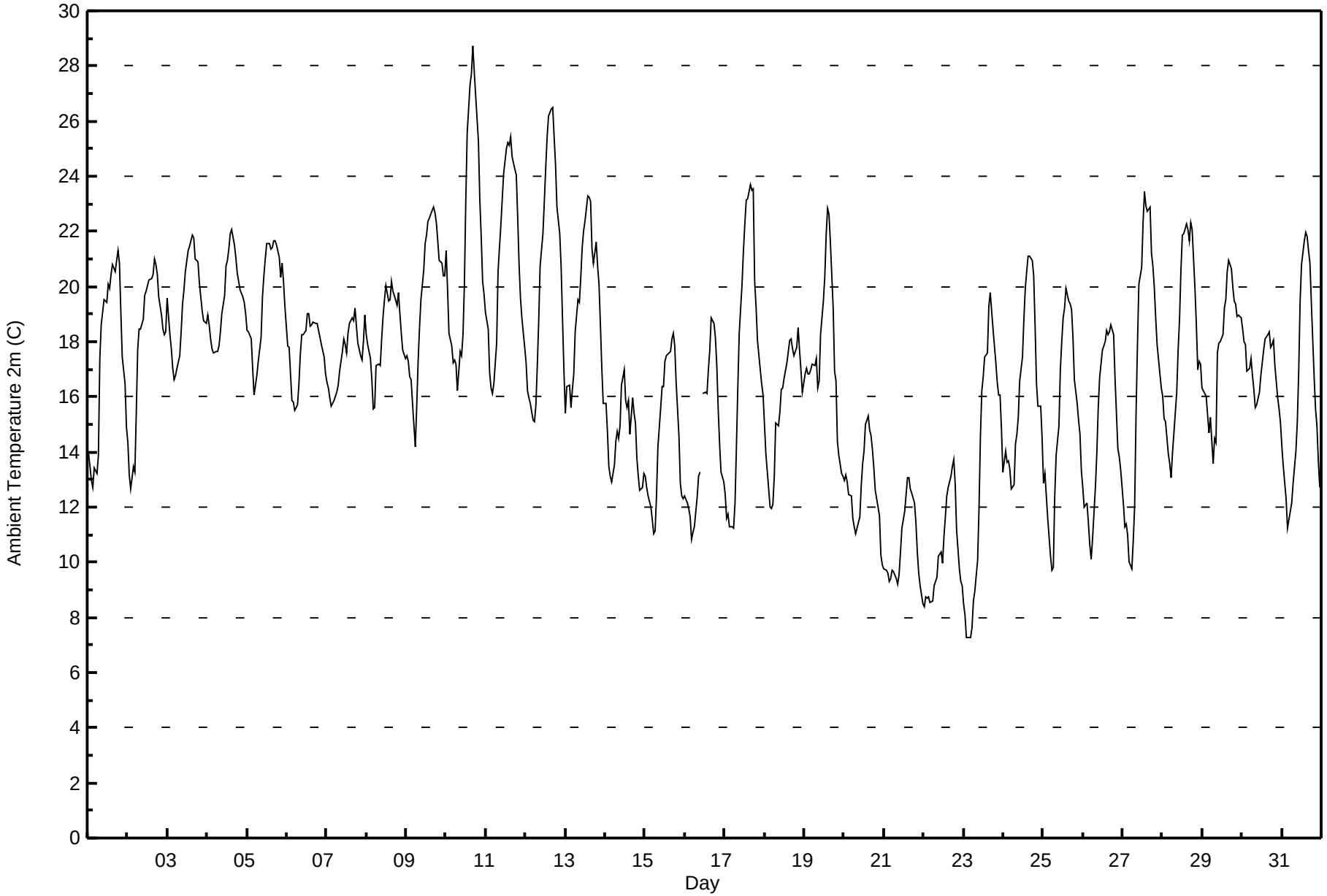
M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature 2m (AT 2m) - C

Fort Chipewyan - August 2015



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	38	5.11	5.11
10 - 20	547	73.62	78.73
> 20	158	21.27	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 Chipewyan - August 2015

Maximum Value: 99 % on Aug 1 04:00

Maximum Daily Average: 89.3 % on Aug 14

Minimum Value: 30 % on Aug 31 17:00

Minimum Daily Average: 52.6 % on Aug 3

Maximum Diurnal Average: 84.2 % at hour 6

Minimum Diurnal Average: 52.9 % at hour 17

Monthly Average: 69.6 %

Percentiles: P_1 = 32 P_{10} = 48 Q_1 = 58 Median = 71 Q_3 = 82 P_{90} = 91 P_{99} = 98

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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	94	94	96	99	93	95	93	80	68	68	64	64	62	59	55	47	49	49	49	53	66	74	79	92	72.5	99
2-Aug	92	94	93	86	89	86	81	81	80	73	65	63	58	52	49	44	36	38	35	41	45	53	59	53	64.4	94
3-Aug	47	50	52	59	62	62	61	59	61	52	48	45	40	46	46	45	42	43	41	49	55	62	68	69	52.6	69
4-Aug	68	68	70	72	72	72	72	72	71	71	65	62	62	60	58	55	54	53	53	54	54	58	61	68	63.5	72
5-Aug	67	70	70	71	75	73	75	76	74	63	57	53	47	49	49	51	49	51	54	61	69	62	61	62	62.0	76
6-Aug	70	69	73	77	78	78	77	74	69	67	67	64	64	66	68	69	69	69	69	71	72	73	76	81	71.3	81
7-Aug	83	83	85	87	87	86	85	84	82	79	78	81	82	79	77	78	78	75	78	82	83	82	83	74	81.2	87
8-Aug	74	77	80	82	86	86	79	81	84	80	79	76	76	80	79	75	77	78	82	75	79	79	82	86	79.7	86
9-Aug	88	90	94	94	94	98	98	90	84	78	73	67	66	67	67	65	58	55	52	54	59	62	68	74	74.8	98
10-Aug	64	69	74	76	81	83	87	96	89	93	89	81	69	59	50	48	35	37	42	51	61	59	62	62	67.4	96
11-Aug	62	61	71	72	70	67	64	56	52	49	49	46	42	39	40	38	41	44	44	50	59	63	63	66	54.4	72
12-Aug	69	75	76	76	78	79	78	74	67	56	52	48	42	36	33	32	32	36	40	48	49	54	62	70	56.7	79
13-Aug	79	72	71	80	74	80	81	70	71	71	68	67	65	58	56	55	74	76	70	78	76	81	84	87	72.7	87
14-Aug	88	94	96	98	97	95	92	91	93	90	81	76	84	86	81	89	79	81	83	91	91	95	96	97	89.3	98
15-Aug	93	94	94	94	95	96	93	85	75	64	53	58	52	51	52	51	49	43	42	49	58	75	85	90	70.5	96
16-Aug	90	92	92	94	96	95	93	86	84	84	M	58	51	50	48	47	46	46	48	53	64	67	72	71	70.7	96
17-Aug	73	79	82	83	79	82	78	71	63	54	48	43	37	31	33	32	31	31	53	54	55	61	63	64	57.5	83
18-Aug	69	74	81	84	84	84	83	80	79	76	71	71	69	65	60	59	60	63	66	67	63	62	62	66	70.8	84
19-Aug	63	63	64	65	64	63	63	64	75	78	70	66	56	51	42	40	43	50	64	69	87	91	96	95	66.0	96
20-Aug	93	91	87	87	85	91	94	97	95	94	87	82	80	70	67	67	67	66	71	74	78	79	92	94	82.8	97
21-Aug	95	94	95	98	99	97	92	92	93	90	85	79	77	73	70	69	75	74	73	73	78	83	86	88	84.4	99
22-Aug	89	88	89	89	92	91	82	80	80	74	74	81	73	64	61	60	59	58	56	64	75	77	77	75	75.3	92
23-Aug	79	80	86	85	87	84	81	81	83	78	65	53	51	51	58	44	38	47	56	63	66	60	66	70	67.2	87
24-Aug	84	81	80	78	79	85	85	75	74	72	67	64	57	49	43	40	40	39	44	53	62	75	74	75	65.7	85
25-Aug	79	72	75	79	87	89	89	80	74	70	63	59	54	53	52	51	49	50	56	67	68	67	69	78	67.9	89
26-Aug	83	94	95	96	98	98	96	91	87	76	67	66	61	59	58	60	59	60	61	71	76	81	80	81	77.3	98
27-Aug	87	91	90	93	95	92	86	83	70	60	53	50	45	43	46	48	51	63	64	63	70	66	64	65	68.3	95
28-Aug	63	66	66	80	76	78	76	78	70	60	56	49	45	42	41	39	40	42	46	54	62	69	64	63	59.3	80
29-Aug	69	67	64	71	80	86	89	83	86	69	74	82	75	66	66	57	50	49	49	56	63	72	71	67	69.2	89
30-Aug	68	70	74	80	78	77	81	84	90	88	86	83	83	83	83	83	84	86	87	86	81	84	85	84	82.0	90
31-Aug	85	82	85	88	85	83	83	81	79	75	66	52	43	38	30	31	30	32	48	54	49	51	62	58	61.2	88
	77.7	78.9	80.6	82.9	83.6	84.2	82.8	79.8	77.3	72.6	67.4	64.1	60.3	57.2	55.4	53.8	52.9	54.3	57.3	62.2	66.9	70.2	73.3	75.0	Diurnal Average	
	95	94	96	99	99	98	98	97	95	94	89	83	84	86	83	89	84	86	87	91	91	95	96	97	Diurnal Maximum	

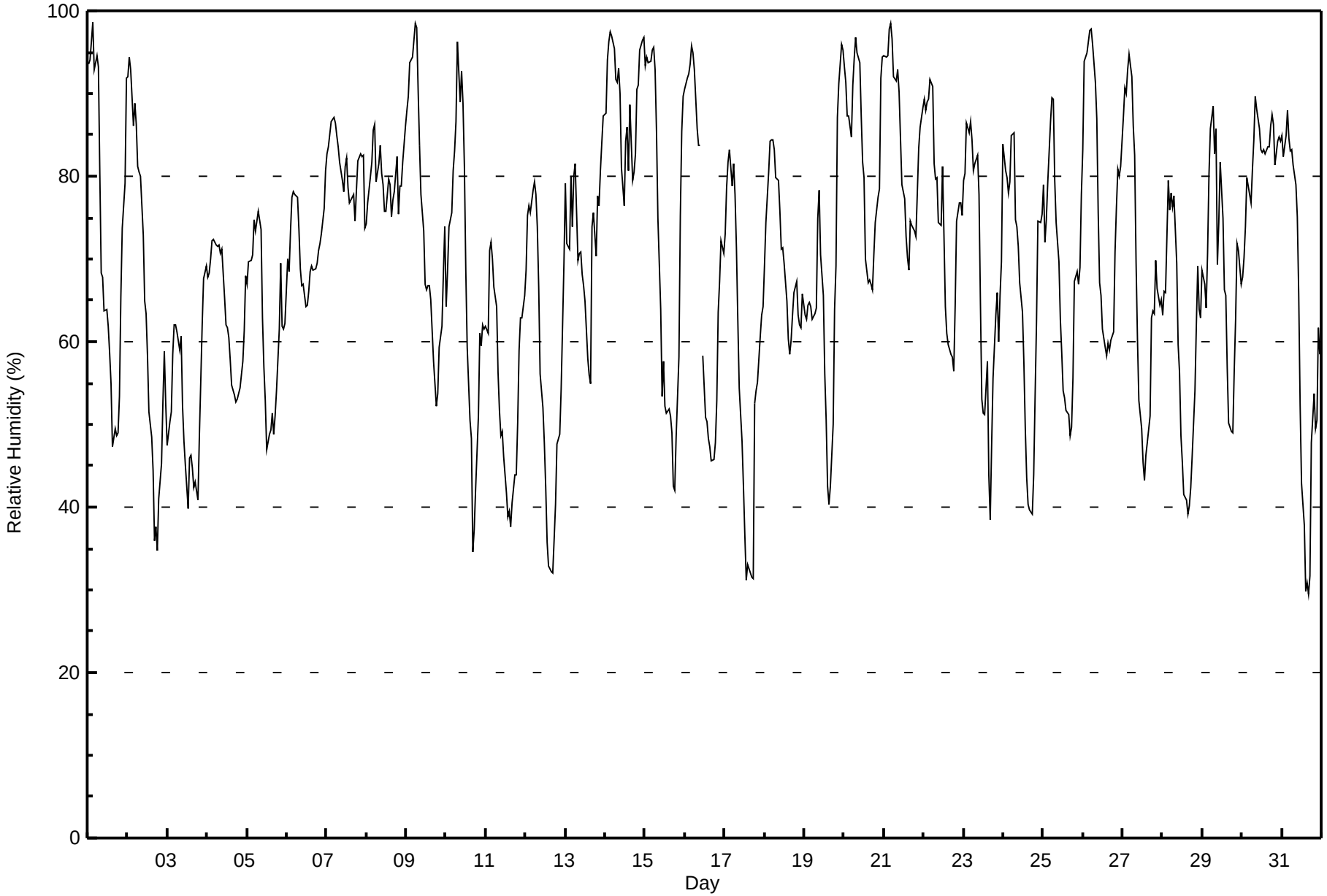
M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity (RH) - %

Fort Chipewyan - August 2015



Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	29	3.90	3.90
40 - 60	173	23.28	27.19
60 - 80	321	43.20	70.39
80 - 100	220	29.61	100.00

Total Number of Valid Hours: 743

Total Number of Hours: 744

Wood Buffalo Environmental Association

Summary of Hour Averages

Precipitation (PC) - mm

Fort Chipewyan - August 2015

Maximum Value: 9.1 mm on Aug 10 07:00

Maximum Daily Total: 17.5 mm on Aug 5

Minimum Value: 0.0 mm on Aug 1 01:00

Minimum Daily Total: 0.0 mm on Aug 2

Maximum Diurnal Total: 10.9 mm at hour 7

Minimum Diurnal Total: 0.0 mm at hour 6

Monthly Total: 53.09 mm

Percentiles: P_1 = 0.0 P_{10} = 0.0 Q_1 = 0.0 Median = 0.0 Q_3 = 0.0 P_{90} = 0.0 P_{99} = 1.6

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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3
2-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.1	0.0	3.0	0.0	6.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.5	8.1
6-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10-Aug	0.0	0.0	0.0	0.0	0.0	0.0	9.1	3.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.7	9.1
11-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14-Aug	1.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3	1.0	0.0	0.5	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	6.6	3.3
15-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3
17-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	2.0	0.0	3.8	2.0
20-Aug	0.3	0.0	0.0	0.0	0.0	0.0	1.5	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	5.1	2.3
21-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5
22-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.8	0.8
24-Aug	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3
25-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26-Aug	0.3	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.3
27-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30-Aug	0.0	0.0	0.5	1.5	0.3	0.0	0.3	1.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.6	1.5
31-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1.8	0.5	0.8	1.8	0.3	0.0	10.9	7.9	0.8	0.0	8.1	0.0	6.4	1.0	6.4	0.5	0.0	0.3	0.3	0.0	0.0	1.8	2.0	1.8	Diurnal Average	
	1.0	0.3	0.5	1.5	0.3	0.0	9.1	3.6	0.5	0.0	8.1	0.0	3.3	1.0	6.4	0.5	0.0	0.3	0.3	0.0	0.0	1.8	2.0	1.0	Diurnal Maximum	

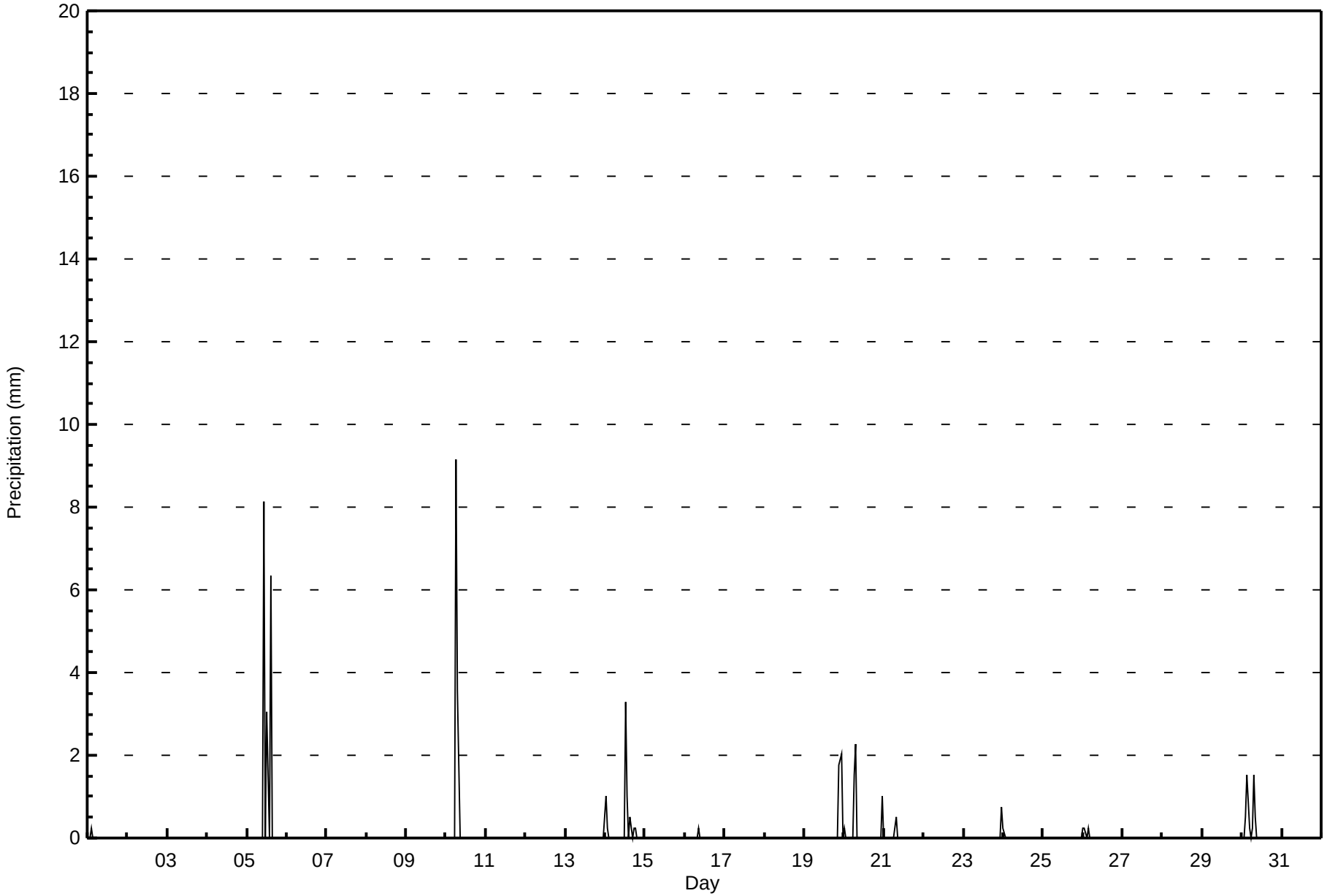
M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Precipitation (PC) - mm

Fort Chipewyan - August 2015



Concentration Ranges (mm)	Number of Hours	%	Cumulative %
0 - 0.3	723	97.31	97.31
0.4 - 0.5	4	0.54	97.85
0.6 - 0.7	0	0.00	97.85
0.8 - 1.4	4	0.54	98.39
1.5 - 10	12	1.62	100.00
> 10	0	0.00	100.00

Total Number of Valid Hours: 743

Total Number of Hours: 744

Wood Buffalo Environmental Association

Summary of Hour Averages

Leaf Wetness (SW) - %

Fort Chipewyan - August 2015

Maximum Value: 19 % on Aug 10 08:00

Maximum Daily Average: 4.3 % on Aug 14

Minimum Value: 0 % on Aug 5 16:00

Minimum Daily Average: 0.0 % on Aug 6

Maximum Diurnal Average: 1.8 % at hour 2

Minimum Diurnal Average: 0.0 % at hour 13

Monthly Average: 0.7 %

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 0$ $P_{99} = 13$

Hours in Service:	744
Hours of Data:	630
Hours of Missing Data:	114
Hours of Calibration:	0
Percent Operational Time:	84.7

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--
2-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--
3-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--
4-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--
5-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	M	M	0	0	0	0	0	0	0	0	0	--	0
6-Aug	0	0	0	0	0	0	0	0	M	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
7-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
8-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
9-Aug	0	0	0	5	5	6	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	6
10-Aug	0	0	0	0	0	0	6	19	13	9	6	3	0	0	0	0	0	0	0	0	0	0	0	0	2.3	19
11-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
12-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
13-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
14-Aug	0	13	13	13	12	10	5	0	0	0	0	0	0	9	7	8	3	0	0	6	3	0	0	0	4.3	13
15-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
16-Aug	0	0	0	0	0	0	0	0	4	7	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	7
17-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
18-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
19-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	17	16	1.5	17
20-Aug	13	9	4	0	0	0	6	15	11	6	0	0	0	0	0	0	0	0	0	0	0	0	0	10	3.0	15
21-Aug	10	8	4	4	4	4	0	6	9	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.2	10
22-Aug	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0.1	4
23-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0.2	5
24-Aug	10	6	4	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.9	10
25-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
26-Aug	0	11	10	10	12	13	11	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.9	13
27-Aug	0	0	0	0	3	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	4
28-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
29-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
30-Aug	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	3
31-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
	1.3	1.8	1.4	1.3	1.4	1.4	1.2	1.7	1.6	1.0	0.2	0.3	0.0	0.4	0.3	0.3	0.1	0.0	0.0	0.2	0.1	0.1	0.6	1.1	Diurnal Average	
	13	13	13	13	12	13	11	19	13	9	6	4	0	9	7	8	3	0	0	6	3	4	17	16	Diurnal Maximum	

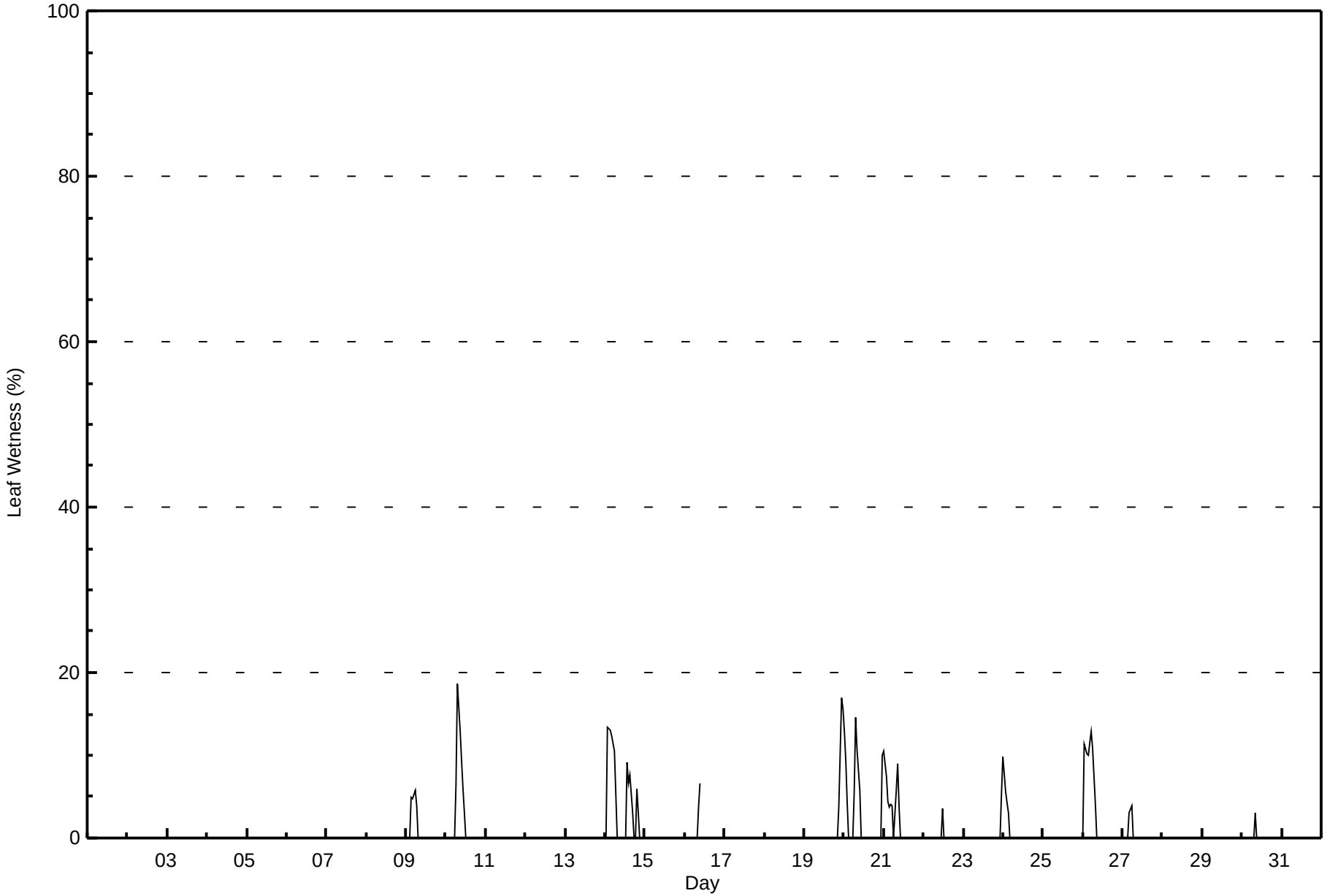
M - Maintenance AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Leaf Wetness (SW) - %

Fort Chipewyan - August 2015



Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 0.3	570	90.48	90.48
0.4 - 0.5	0	0.00	90.48
0.6 - 0.7	0	0.00	90.48
0.8 - 1.4	0	0.00	90.48
1.5 - 10	42	6.67	97.14
> 10	18	2.86	100.00

Total Number of Valid Hours: 630

Total Number of Hours: 744

Wood Buffalo Environmental Association

Summary of Hour Averages

Global Radiation (GR) - W/m2

Fort Chipewyan - August 2015

Maximum Value: 872 W/m2 on Aug 5 13:00

Maximum Daily Average: 310.9 W/m2 on Aug 9

Minimum Value: 0 W/m2 on Aug 6 00:00

Minimum Daily Average: 106.2 W/m2 on Aug 21

Maximum Diurnal Average: 618.7 W/m2 at hour 13

Minimum Diurnal Average: 0.0 W/m2 at hour 3

Monthly Average: 216.9 W/m2

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 83 $Q_3 = 394$ $P_{90} = 645$ $P_{99} = 826$

Hours in Service:	744
Hours of Data:	635
Hours of Missing Data:	109
Hours of Calibration:	0
Percent Operational Time:	85.4

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--
2-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--
3-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--
4-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--
5-Aug	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	872	848	781	678	546	392	235	101	14	0	0	0	--	872
6-Aug	0	0	0	0	14	114	180	386	543	613	443	222	265	271	280	315	204	133	81	42	7	0	0	0	171.3	613
7-Aug	0	0	0	0	3	61	89	160	283	465	464	321	297	529	631	700	312	335	80	28	4	0	0	0	198.5	700
8-Aug	0	0	0	0	4	50	168	175	189	282	596	743	818	428	319	527	338	185	117	106	8	0	0	0	210.6	818
9-Aug	0	0	0	0	8	45	186	391	511	636	738	806	837	810	735	645	503	344	208	52	7	0	0	0	310.9	837
10-Aug	0	0	0	0	5	84	24	25	90	121	538	800	833	799	750	651	509	309	210	76	4	0	0	0	242.9	833
11-Aug	0	0	0	0	7	79	261	387	471	646	749	815	830	694	570	581	377	261	209	66	5	0	0	0	291.9	830
12-Aug	0	0	0	0	10	76	156	298	516	645	746	815	840	817	714	638	507	170	101	27	2	0	0	0	294.9	840
13-Aug	0	0	0	0	8	70	216	380	452	633	734	627	514	669	484	278	96	169	186	42	4	0	0	0	231.7	734
14-Aug	0	0	0	0	1	72	208	84	74	262	441	505	245	578	490	171	306	96	62	26	1	0	0	0	150.9	578
15-Aug	0	0	0	0	4	49	167	346	486	567	670	563	637	545	543	367	437	336	186	60	3	0	0	0	248.5	670
16-Aug	0	0	0	0	2	18	80	254	193	360	M	665	484	401	610	439	561	337	173	53	2	0	0	0	201.3	665
17-Aug	0	0	0	0	2	58	183	339	483	614	718	753	811	799	617	612	421	348	129	19	1	0	0	0	287.8	811
18-Aug	0	0	0	0	1	17	122	239	252	493	740	640	672	778	708	602	476	224	83	42	1	0	0	0	253.7	778
19-Aug	0	0	0	0	0	4	23	77	64	273	363	496	751	766	539	415	424	249	73	15	0	0	0	0	188.8	766
20-Aug	0	0	0	0	0	11	27	25	55	92	204	219	285	355	585	420	275	200	66	15	1	0	0	0	118.1	585
21-Aug	0	0	0	0	0	6	34	100	74	118	183	242	355	349	386	239	217	141	78	24	1	0	0	0	106.2	386
22-Aug	0	0	0	0	0	20	78	120	160	333	306	285	326	201	232	159	162	134	97	35	0	0	0	0	110.4	333
23-Aug	0	0	0	0	1	49	192	302	376	358	438	358	482	400	427	576	325	271	122	21	0	0	0	0	195.8	576
24-Aug	0	0	0	0	0	19	128	306	448	572	673	744	773	738	622	575	433	280	130	24	0	0	0	0	269.4	773
25-Aug	0	0	0	0	1	18	122	301	354	480	658	666	654	618	551	360	283	202	57	7	0	0	0	0	222.2	666
26-Aug	0	0	0	0	0	34	151	263	282	497	603	605	583	446	489	307	256	220	114	19	0	0	0	0	202.9	605
27-Aug	0	0	0	0	0	37	149	252	432	564	691	369	731	755	395	321	332	163	130	13	0	0	0	0	222.2	755
28-Aug	0	0	0	0	0	18	81	133	374	515	542	673	645	630	584	354	228	277	109	14	0	0	0	0	215.8	673
29-Aug	0	0	0	0	0	7	36	30	98	463	649	715	737	715	643	536	397	225	56	9	0	0	0	0	221.5	737
30-Aug	0	0	0	0	0	0	7	8	50	236	468	629	711	691	623	497	347	61	33	12	0	0	0	0	182.2	711
31-Aug	0	0	0	0	0	17	58	109	156	322	490	737	716	650	648	496	373	210	92	8	0	0	0	0	211.7	737
	0.0	0.0	0.0	0.0	2.8	39.7	120.2	211.2	287.1	429.2	553.9	577.3	618.7	603.0	553.9	461.4	357.3	232.3	119.1	35.4	2.5	0.0	0.0	0.0	Diurnal Average	
	0	0	0	0	14	114	261	391	543	646	749	815	872	848	781	700	561	392	235	106	14	0	0	0	Diurnal Maximum	

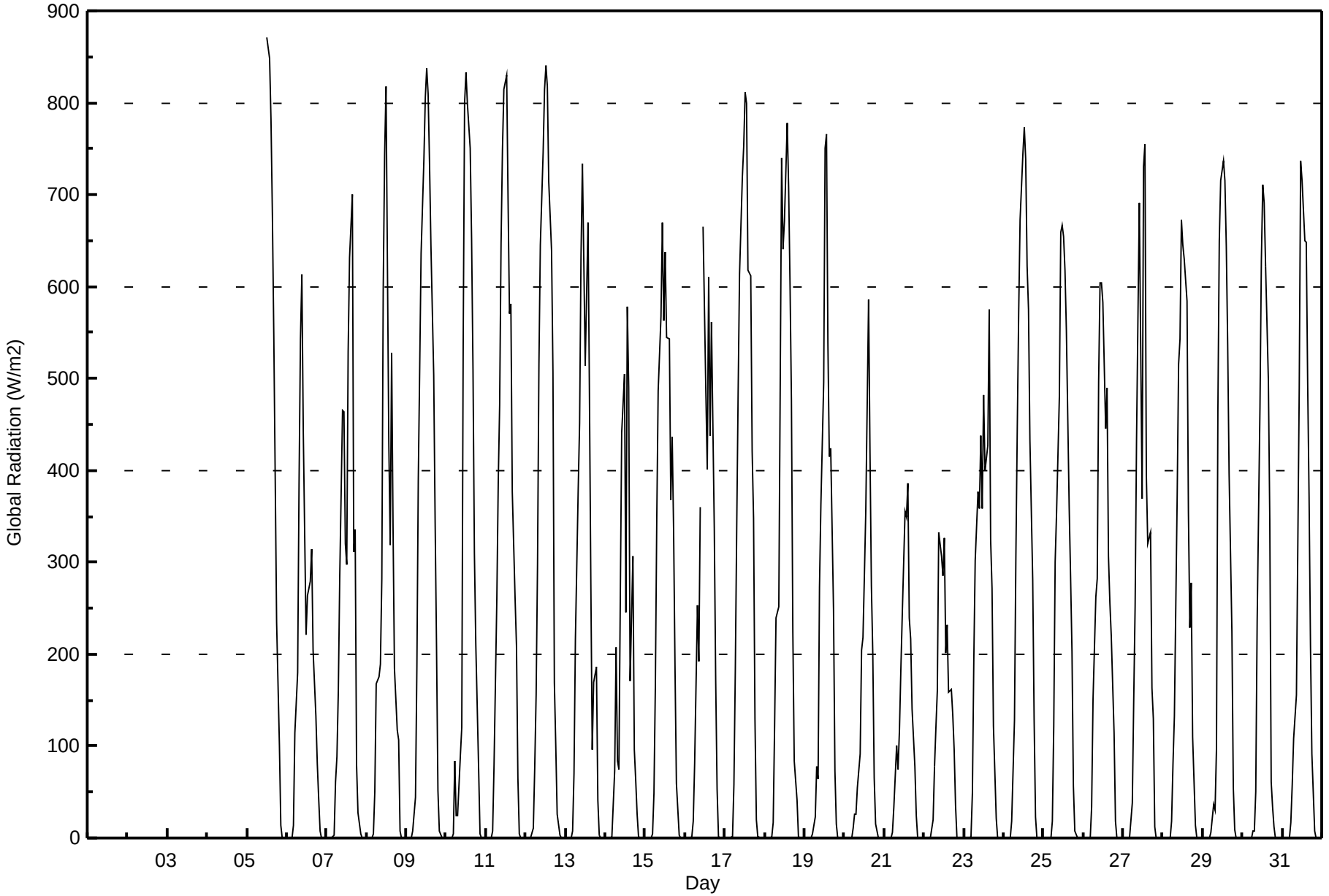
M - Maintenance AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Global Radiation (GR) - W/m2

Fort Chipewyan - August 2015



Concentration Ranges (W/m2)	Number of Hours	%	Cumulative %
0 - 20	262	41.26	41.26
21 - 100	67	10.55	51.81
101 - 300	99	15.59	67.40
301 - 600	121	19.06	86.46
601 - 900	86	13.54	100.00
> 900	0	0.00	100.00

Total Number of Valid Hours: 635

Total Number of Hours: 744

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Fort Chipewyan - August 2015

Maximum Speed: 38 km/h on Aug 4 03:00

Maximum Daily Speed Average: 30.6 km/h on Aug 4

Minimum Speed Value: 2 km/h on Aug 29 02:00

Minimum Daily Speed Average: 3.8 km/h on Aug 1

Maximum Diurnal Speed Average: 4.1 km/h at hour 11

Minimum Diurnal Speed Average: 1.6 km/h at hour 17

Monthly Average Velocity: 1.9 km/h 113.4 deg

Percentiles: $P_1 = 3$ $P_{10} = 6$ $Q_1 = 9$ Median = 15 $Q_3 = 20$ $P_{90} = 25$ $P_{99} = 32$

Hours in Service: 744

Hours of Data: 741

Hours of Missing Data: 3

Percent Operational Time: 99.6

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Aug	NNW8	NNW3	W4	WNW6	NNW9	NNW7	N8	NE4	E12	E13	ESE13	E13	E16	E14	E16	ESE14	E14	E8	ESE3	W3	WNW7	WNW8	WNW8	WNW7	ENE3.8	E16
2-Aug	WNW9	WNW8	WNW6	N4	NNE5	ENE4	E5	E14	E15	E16	E16	E21	E25	E27	E28	E26	ENE22	ENE21	ENE18	ENE15	NE13	NE13	NE13	ENE14	ENE12.6	E28
3-Aug	ESE23	ESE22	ESE23	E22	E20	E22	ESE19	E16	E22	E26	E27	ENE24	ENE25	ENE25	ENE24	ENE23	NE23	NE23	NE24	NE21	NE22	ENE22	ENE23	ENE26	ENE21.7	E27
4-Aug	E31	E38	E38	E37	E35	E33	E31	E29	ENE29	ENE33	ENE35	ENE34	ENE33	ENE32	ENE32	NE31	NE32	NE31	NE30	NE30	NE28	ENE28	ENE25	E19	ENE30.6	E38
5-Aug	ESE18	E24	E27	E23	E17	E20	E19	E23	E25	E26	E26	ENE25	ENE29	ENE30	ENE33	ENE30	NE30	NE28	ENE26	ENE22	ENE18	E25	E29	ESE30	E24.0	ENE33
6-Aug	ESE24	ESE23	ESE24	ESE25	ESE23	ESE25	ESE23	SE22	ESE22	E20	E24	ENE22	ESE22	SE23	SE26	SE26	SE25	SE24	SE22	ESE21	ESE20	ESE21	ESE21	ESE17	ESE22.0	SE26
7-Aug	ESE19	SE20	SE19	ESE16	SE18	SE19	SE15	SE13	ESE12	ESE13	E15	E20	E22	E20	E22	E23	E20	ENE17	ENE15	ENE12	ENE15	ENE13	ENE15	E15	E15.5	E23
8-Aug	ESE9	ESE8	SE6	S6	SSW4	S3	S4	SE3	ESE6	ESE5	E8	ESE11	E18	E20	E20	E19	E20	E17	ENE12	ENE8	ENE8	NE7	ENE8	ENE8	E8.7	E20
9-Aug	NE9	ENE9	NE5	ENE8	ENE6	E2	ESE4	ESE10	ESE10	E12	E14	E15	E16	E15	E18	E21	E21	ENE21	ENE22	ENE20	ENE18	ENE18	ENE16	E16	E13.1	ENE22
10-Aug	ESE16	ESE11	SE4	SSE4	ENE9	E7	WSW18	NNE5	ENE3	S10	SSE16	SE17	SE14	SSE13	S17	S11	SW17	SW17	WSW13	SW9	SW9	SW11	SW11	SW11	S6.8	WSW18
11-Aug	SW12	SW10	SW11	SW10	SW9	SW10	SW9	SW12	WSW18	WSW22	SW20	WSW17	WSW22	WSW23	W21	W22	WSW21	WSW18	WSW15	WSW11	WSW13	WSW15	WSW14	WSW16	WSW15.3	WSW23
12-Aug	WSW14	WSW13	W16	WSW17	W16	W12	WSW14	W13	W12	WSW14	WSW16	W17	W19	W20	WSW19	WSW19	W18	W12	W9	W7	WNW7	NNW10	NW4	WNW6	W13.0	W20
13-Aug	W6	NNW4	N5	AF	ENE3	ENE5	ESE9	SSE8	ESE10	E14	E17	E17	E17	E21	E20	E19	SE9	S2	E4	E3	E8	ENE8	N13	NNE12	E7.9	E21
14-Aug	W7	NNW9	WNW10	WNW10	W11	W16	W17	W16	W15	W18	W19	W23	WSW26	W26	W23	W19	W20	W21	W17	W13	W13	W10	WNW10	NNW11	W15.1	W26
15-Aug	N13	NNW11	NNW12	NNW12	NNW12	NNW12	NNW12	NNW12	NNW10	N11	NNW13	NNW13	NNW13	NNW12	NNW12	NNW11	N11	NNW11	NNW8	NNW6	NNW5	NNW9	NW10	NNW10	NNW10.8	NNW13
16-Aug	NNW10	NNW10	NNW11	WNW8	WNW10	NW12	NW10	NW10	WNW11	WNW10	M	WSW14	WSW16	W13	W13	WNW12	WNW10	WSW7	WSW8	SW6	SSW5	SW8	SW9	WSW9	WNW8.3	WSW16
17-Aug	SW10	WSW11	WSW14	W12	W12	W12	WSW10	W12	WSW12	W14	W15	W15	WSW16	WSW18	W16	WSW15	W14	W11	ENE17	ENE5	NNW7	N9	NNW10	NNE12	W8.9	WSW18
18-Aug	N9	N10	NNW9	NW6	NNW8	N9	NNE8	E18	E18	E17	E19	E21	E20	E20	E20	E21	E22	E22	ENE19	E21	ESE25	SE23	SE22	SSE21	E13.1	ESE25
19-Aug	SSE23	SSE24	SSE23	SSE23	SSE26	SSE30	SSE32	SSE30	S28	S28	SSW24	WSW23	WSW21	WSW23	WSW22	W26	W32	W31	W30	W21	W16	W7	WNW10	W10	SSW15.6	W32
20-Aug	W10	WSW12	W15	W15	W17	WSW17	WSW19	W21	W20	W18	WNW19	W20	W20	WNW25	WNW28	WNW27	WNW21	WNW25	WNW21	WNW20	WNW18	W20	W18	W18	W18.9	WNW28
21-Aug	W19	W19	W17	W17	W13	WNW15	WNW18	WNW18	WNW16	WNW16	WNW20	WNW18	WNW19	WNW21	WNW21	WNW19	WNW16	WNW14	WNW14	WNW17	WNW14	WNW12	W13	W14	WNW16.4	WNW21
22-Aug	W13	WNW15	WNW14	W14	W13	WNW12	WNW16	WNW15	WNW16	NW17	WNW18	WNW16	WNW15	WNW15	WNW15	WNW14	WNW12	WNW9	WNW6	SW6	SW7	SW5	SW7	WSW10	WNW11.7	WNW18
23-Aug	WSW9	WSW8	SSW5	S5	ESE6	SSE7	SSE7	ESE11	ESE12	E12	ESE14	SSE17	SSE18	SSE17	ESE20	SE22	SE21	ESE20	E21	E21	E19	ESE17	ESE14	NNE6	SE11.2	SE22
24-Aug	ENE12	ESE14	SSE11	S22	SSW19	SW12	SW13	WSW17	WSW18	WSW15	SW16	SW17	SW19	WSW21	WSW20	WSW18	WSW17	W15	W7	N5	ENE5	E4	NE5	NNE8	SW8.6	S22
25-Aug	N6	N8	NNW11	NNW12	NNW14	NNW12	N7	N7	NNW7	NW8	NW2	SSE2	WNW7	WNW8	NNW5	WNW8	NW8	WNW6	WNW6	WNW7	NW7	NW8	NW8	W7	NW6.8	NNW14
26-Aug	W10	WNW11	WNW11	WNW9	WNW9	WNW9	WNW8	WSW8	W11	WSW11	WSW15	WSW16	WSW14	WSW16	SW17	SW16	WSW12	SW11	SW11	SSW6	SSW6	SW7	WSW9	WSW11	WSW10.0	SW17
27-Aug	SW8	WSW6	WSW8	WSW7	SW6	SSW7	SE7	SSE8	S14	S20	S20	SSW16	SSW14	SSW15	S16	SSE18	SSE16	ESE13	E8	E5	S3	WSW12	W9	WSW9	S8.2	S20
28-Aug	WSW10	WSW8	WSW5	E6	SSW6	WSW8	WSW13	W15	W17	W16	W13	W9	SW12	SW16	SW18	WSW13	W8	SW9	SW4	AF	E3	SSE2	ESE3	E4	WSW7.6	SW18
29-Aug	ENE4	N2	ENE7	ENE10	ENE12	ENE10	W3	N5	NNW6	SSE4	ESE10	E16	E15	E18	E20	E21	ENE22	ENE24	ENE23	ENE22	ENE21	E17	ESE21	ESE23	E12.3	ENE24
30-Aug	SE22	ESE23	E27	E25	E20	E27	ESE23	ESE26	E24	E25	E24	E22	E18	ESE14	E13	E17	E19	E17	E22	ESE19	SE10	SSE8	S6	SSW13	ESE18.1	E27
31-Aug	SSW13	SSW12	SW12	SW12	SSW9	SSE9	S15	SSW15	S16	S19	S23	SSW24	SSW23	SW21	WSW20	W19	W16	W13	SW7	SW12	SW14	W13	WSW8	SSW6	SW12.7	SSW24
	SE2.1	SE2.0	SE1.6	SSE2.1	SE1.6	SE2.0	S2.3	SSE2.3	SSE2.2	SE3.1	SE4.1	SE2.8	SE2.8	SSE1.9	ESE1.7	E2.0	ENE1.6	NE2.1	ENE3.9	ENE3.7	ENE3.1	ENE2.2	ENE2.2	ESE1.7	Diurnal Average	
	E31	E38	E38	E37	E35	E33	SSE32	SSE30	ENE29	ENE33	ENE35	ENE34	ENE33	ENE32	ENE33	NE31	W32	W31	W30	NE30	NE28	ENE28	E29	ESE30	Diurnal Maximum	

M - Maintenance AF - Analyzer Failure

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

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Speed (WS) - km/h

Fort Chipewyan - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 9 km/h on Aug 14 01:00

Minimum Value: 0 km/h on Aug 29 00:00

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:	741
Hours of Missing Data:	3
Hours of Calibration:	0
Percent Operational Time:	99.6

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

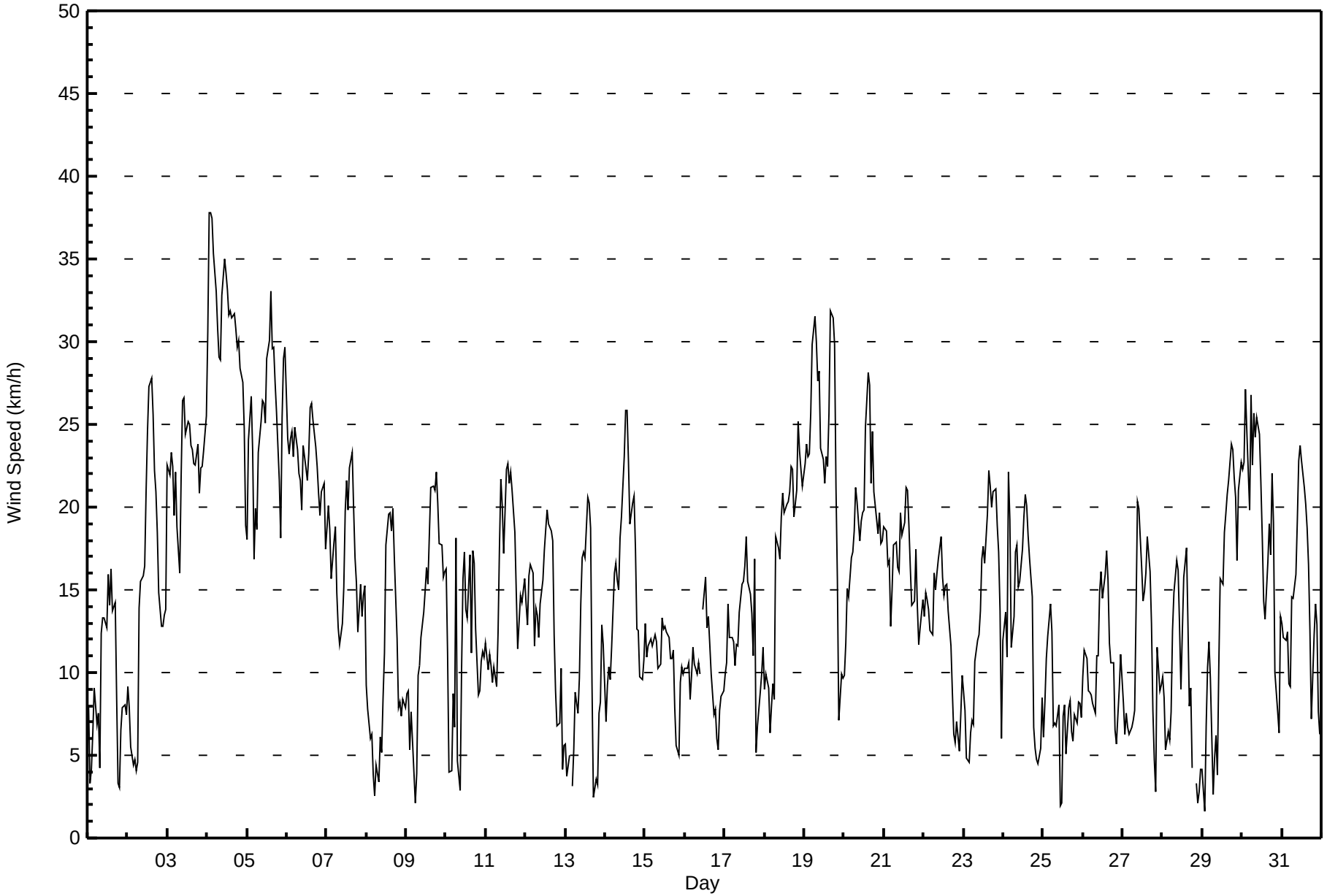
M - Maintenance AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed (WS) - km/h

Fort Chipewyan - August 2015



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	55	7.42	7.42
6 - 11	196	26.45	33.87
12 - 19	279	37.65	71.52
20 - 28	178	24.02	95.55
29 - 38	33	4.45	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 741

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Wind Speed (WS) - km/h

Fort Chipewyan - August 2015

Wind Speed Ranges (km/h)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 5	5	2	3	7	8	4	2	4	5	3	2	1	3	0	2	4	55
6 - 11	11	3	2	12	6	12	4	7	4	6	24	22	16	34	9	24	196
12 - 19	2	2	3	18	47	18	7	7	6	8	18	41	56	30	2	14	279
20 - 28	0	0	7	24	56	24	13	6	6	3	1	14	14	10	0	0	178
29 - 38	0	0	6	11	9	1	0	3	0	0	0	0	3	0	0	0	33
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	18	7	21	72	126	59	26	27	21	20	45	78	92	74	13	42	741

Total Number of Valid Hours: 741

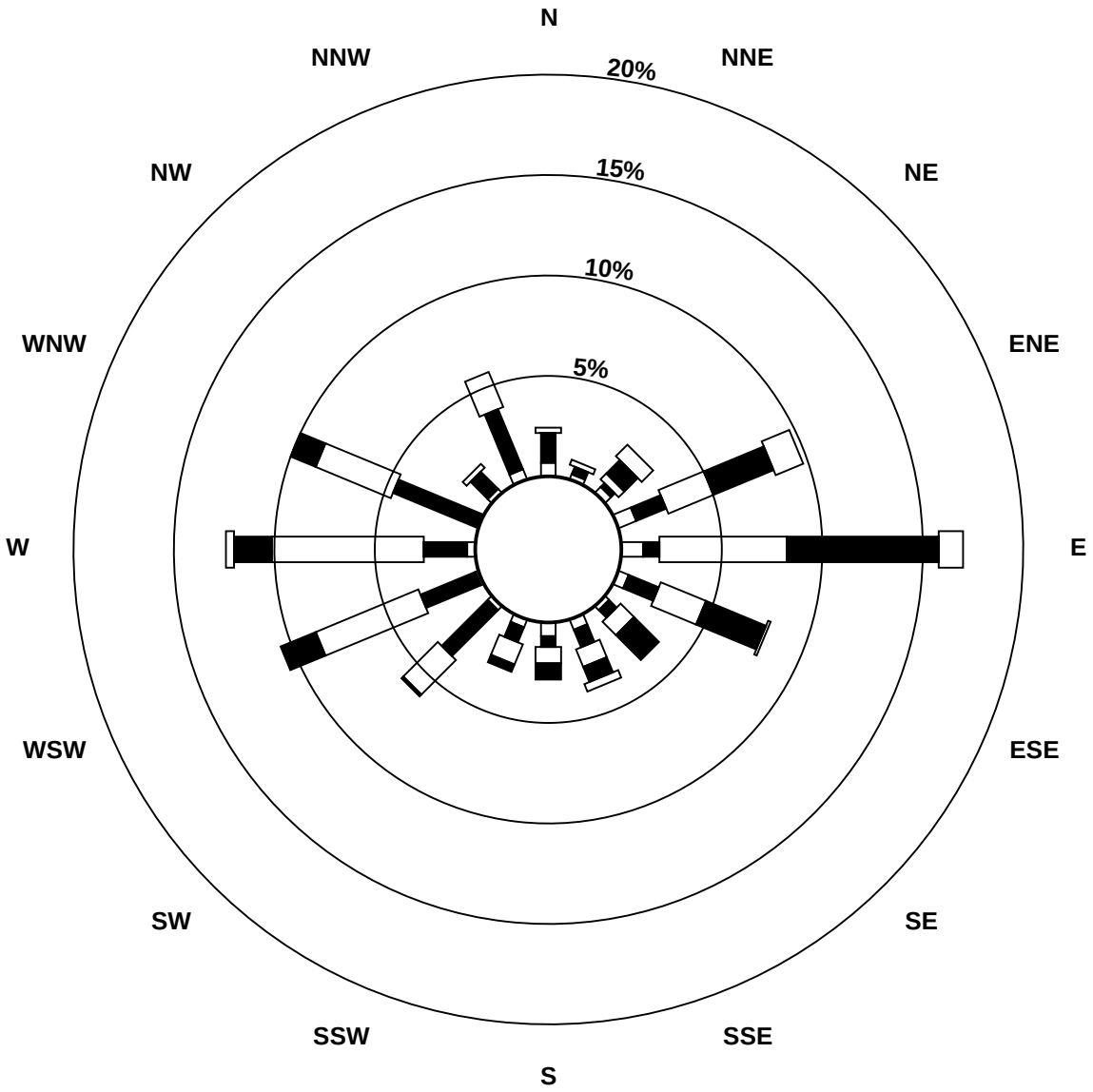
Total Number of Hours: 744

Wood Buffalo Environmental Association

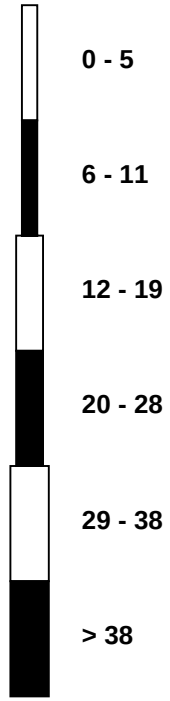
Wind Rose Aug 2015

Wind Speed (WS) - km/h

Fort Chipewyan (AMS 8)



Classes (km/h)



Total Number of Valid Hours: 741

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Fort Chipewyan - August 2015

Direction of Maximum Speed: 83 deg on Aug 4 03:00
Direction of Maximum Daily Speed Average: 69.7 deg on Aug 4

Direction of Minimum Speed: 353 deg on Aug 29 02:00
Direction of Minimum Daily Speed Average: 3.8 deg on Aug 1

Monthly Average Direction: 271.3 deg

Hours in Service:	744
Hours of Data:	741
Hours of Missing Data:	3
Percent Operational Time:	99.6

Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average
1-Aug	333	328	260	294	342	338	350	54	91	99	102	100	94	93	99	104	93	95	121	269	291	295	296	287	71.2
2-Aug	291	290	297	357	24	70	79	89	91	93	93	90	88	87	86	81	78	71	63	60	53	48	52	66	74.0
3-Aug	104	102	104	96	94	95	106	86	84	84	81	68	76	68	64	66	50	53	55	55	55	63	67	71	76.4
4-Aug	81	83	83	84	85	86	79	79	76	71	66	62	63	62	60	55	55	50	51	54	55	63	70	100	69.7
5-Aug	102	87	96	98	86	93	90	89	91	90	79	76	65	65	63	63	54	56	60	67	73	96	98	114	80.3
6-Aug	122	116	119	122	118	112	120	124	123	92	81	77	103	129	135	128	132	125	127	118	113	111	111	122	116.4
7-Aug	122	124	125	123	130	132	130	132	121	113	96	90	86	85	83	87	83	75	66	59	62	58	73	101	98.0
8-Aug	106	111	139	182	199	179	173	133	120	103	93	102	96	95	80	85	90	87	76	71	62	41	59	58	92.7
9-Aug	52	62	54	58	74	97	108	111	102	91	94	95	96	95	92	90	83	71	64	61	64	71	75	87	80.3
10-Aug	105	117	133	161	75	86	242	20	59	184	151	129	146	158	175	184	233	236	240	218	225	225	226	232	182.5
11-Aug	230	236	231	234	235	232	220	230	251	241	236	255	237	258	264	259	255	246	251	253	250	250	253	250	246.1
12-Aug	253	257	260	258	260	264	258	269	277	250	255	262	260	260	257	257	264	277	277	271	291	329	312	296	264.9
13-Aug	273	343	8	AF	76	69	109	161	113	92	89	90	88	88	83	83	126	184	83	100	99	71	0	23	83.4
14-Aug	265	332	294	290	268	276	275	269	260	263	261	261	254	265	274	275	262	275	266	268	280	281	293	335	272.3
15-Aug	354	335	335	344	328	341	344	337	341	357	346	344	344	347	342	344	356	339	341	336	342	330	325	333	341.4
16-Aug	340	339	335	300	298	309	320	311	290	293	M	253	258	277	276	291	287	257	246	232	213	227	233	238	282.4
17-Aug	235	240	257	261	270	262	257	261	256	260	259	262	255	249	264	257	267	271	68	71	341	351	348	13	268.8
18-Aug	354	358	347	326	348	357	15	90	84	91	95	90	89	90	89	88	85	80	78	83	113	133	144	150	88.2
19-Aug	156	162	155	154	152	159	159	163	188	181	202	237	257	244	248	264	266	262	262	261	272	280	287	266	211.5
20-Aug	270	257	260	259	260	254	255	260	272	272	282	279	275	282	282	287	289	286	287	289	282	276	268	268	274.5
21-Aug	265	271	271	271	271	288	302	297	285	285	285	290	291	285	287	299	292	294	301	300	300	286	280	276	286.3
22-Aug	275	282	282	276	280	287	302	303	293	304	295	298	303	300	300	300	298	298	293	236	225	234	225	240	287.2
23-Aug	239	246	208	188	121	155	155	119	102	92	119	149	148	148	121	131	137	122	98	96	91	122	104	12	124.8
24-Aug	61	119	162	188	200	220	216	241	254	256	229	235	235	246	256	255	258	263	280	7	57	101	56	16	233.5
25-Aug	353	3	348	345	346	344	351	355	334	320	326	154	297	286	335	293	311	303	292	295	315	316	321	281	325.2
26-Aug	279	286	289	286	284	293	285	250	270	250	237	239	247	252	235	233	237	226	221	209	203	228	245	237	250.0
27-Aug	220	240	252	251	220	203	130	153	177	185	184	198	201	193	171	151	148	117	88	90	174	247	260	252	186.4
28-Aug	253	256	238	100	200	242	243	268	268	269	267	272	224	231	234	251	264	215	219	AF	82	159	116	83	245.2
29-Aug	78	353	60	58	61	74	269	353	331	156	108	96	97	93	93	87	72	66	61	66	72	82	105	121	80.9
30-Aug	131	114	97	99	92	98	115	109	101	99	94	88	93	102	96	94	86	81	100	105	137	155	177	192	104.3
31-Aug	192	201	220	220	200	151	184	202	181	182	179	196	206	230	253	263	262	260	220	224	233	261	246	209	215.1
	142.6	124.0	138.6	148.7	134.0	127.2	174.7	149.3	147.1	141.3	130.6	128.1	138.1	153.0	116.0	91.9	68.4	47.8	57.6	61.3	64.7	72.5	75.4	119.6	
	Diurnal Average																								

M - Maintenance AF - Analyzer Failure

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

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg

Fort Chipewyan - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 92 deg on Aug 25 11:00

Minimum Value: 4 deg on Aug 6 01:00

Percentiles: $P_1 = 5$ $P_{10} = 7$ $Q_1 = 9$ Median = 14 $Q_3 = 19$ $P_{90} = 29$ $P_{99} = 74$

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
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Aug	22	60	21	19	12	29	25	66	8	6	6	7	8	8	7	9	8	15	40	70	11	6	11	8	70
2-Aug	5	20	47	40	56	19	58	13	7	6	6	5	6	6	7	9	11	13	10	8	7	6	6	11	58
3-Aug	9	7	6	6	7	5	9	11	6	6	9	12	9	11	10	11	11	10	9	10	9	9	9	8	12
4-Aug	8	6	6	6	6	7	7	9	9	9	9	9	10	11	12	11	10	10	9	9	9	9	9	11	12
5-Aug	6	10	8	7	7	11	9	9	8	10	8	10	11	11	10	11	11	11	10	9	11	6	5	7	11
6-Aug	4	6	5	4	6	6	6	7	6	15	8	8	12	12	7	7	6	7	6	7	6	6	7	6	15
7-Aug	4	4	5	5	5	7	9	11	8	13	8	7	6	8	8	6	8	9	12	9	9	10	13	8	13
8-Aug	11	9	19	18	13	57	18	43	11	22	9	8	7	7	11	12	6	7	11	14	21	15	8	10	57
9-Aug	6	9	22	9	26	46	27	10	9	8	6	5	5	5	6	5	7	11	9	9	8	7	6	6	46
10-Aug	8	15	58	40	9	60	52	58	71	15	11	11	17	21	14	44	15	12	12	13	11	12	13	12	71
11-Aug	8	12	13	14	14	12	16	14	17	15	14	22	15	17	16	17	16	14	15	13	14	13	13	13	22
12-Aug	14	14	13	13	13	13	12	17	20	19	20	18	18	20	20	20	18	16	13	13	21	28	40	47	47
13-Aug	23	24	66	AF	28	17	38	18	9	9	6	5	6	6	7	10	69	76	75	75	29	21	40	30	76
14-Aug	81	24	29	16	14	15	15	16	17	16	17	15	16	16	18	16	15	19	17	16	15	15	23	27	81
15-Aug	23	23	22	22	21	21	22	22	28	30	31	34	33	31	32	34	33	27	28	22	43	19	18	19	43
16-Aug	19	17	20	26	15	13	18	19	21	19	M	24	24	22	25	25	36	33	20	12	13	9	11	10	36
17-Aug	10	12	13	11	12	10	12	14	19	19	20	19	21	21	19	22	20	31	16	17	22	18	21	19	31
18-Aug	21	20	19	55	40	24	28	8	7	7	7	7	8	7	7	6	6	7	8	7	9	9	8	7	55
19-Aug	9	9	8	8	7	8	8	10	8	7	12	14	18	18	17	17	16	15	16	15	16	20	20	16	20
20-Aug	17	16	15	15	15	16	15	17	15	15	16	16	18	16	16	16	18	16	15	16	15	16	15	15	18
21-Aug	15	15	14	15	15	19	17	16	15	16	15	17	19	16	17	20	21	18	18	17	18	17	15	15	21
22-Aug	15	14	14	14	15	16	19	20	17	21	19	20	21	18	19	18	18	18	26	15	9	25	21	13	26
23-Aug	12	15	24	27	18	15	21	13	12	7	19	11	11	12	5	11	7	9	6	7	10	19	52	57	57
24-Aug	21	32	15	7	16	14	10	16	18	18	15	17	18	21	18	20	17	16	34	22	36	9	20	15	36
25-Aug	43	25	25	20	17	23	33	37	32	31	92	92	48	41	72	32	33	25	25	14	9	9	12	20	92
26-Aug	12	13	13	11	12	12	13	25	14	21	19	20	23	19	16	14	14	14	8	10	15	20	11	9	25
27-Aug	7	12	14	15	9	18	18	33	9	10	11	14	17	16	18	10	8	13	9	21	49	20	12	13	49
28-Aug	12	9	48	26	39	14	13	17	15	16	21	31	25	18	16	21	17	17	17	AF	20	50	29	15	50
29-Aug	17	59	7	6	6	24	79	39	48	75	14	8	8	5	5	8	9	9	9	9	8	10	8	5	79
30-Aug	10	11	7	7	7	8	15	7	6	6	6	6	7	9	8	6	6	9	14	14	15	20	28	8	28
31-Aug	10	10	15	12	17	27	11	11	10	8	9	11	12	17	20	18	16	15	13	8	12	16	24	15	27
	81	60	66	55	56	60	79	66	71	75	92	92	48	41	72	44	69	76	75	75	49	50	52	57	
	Diurnal Maximum																								

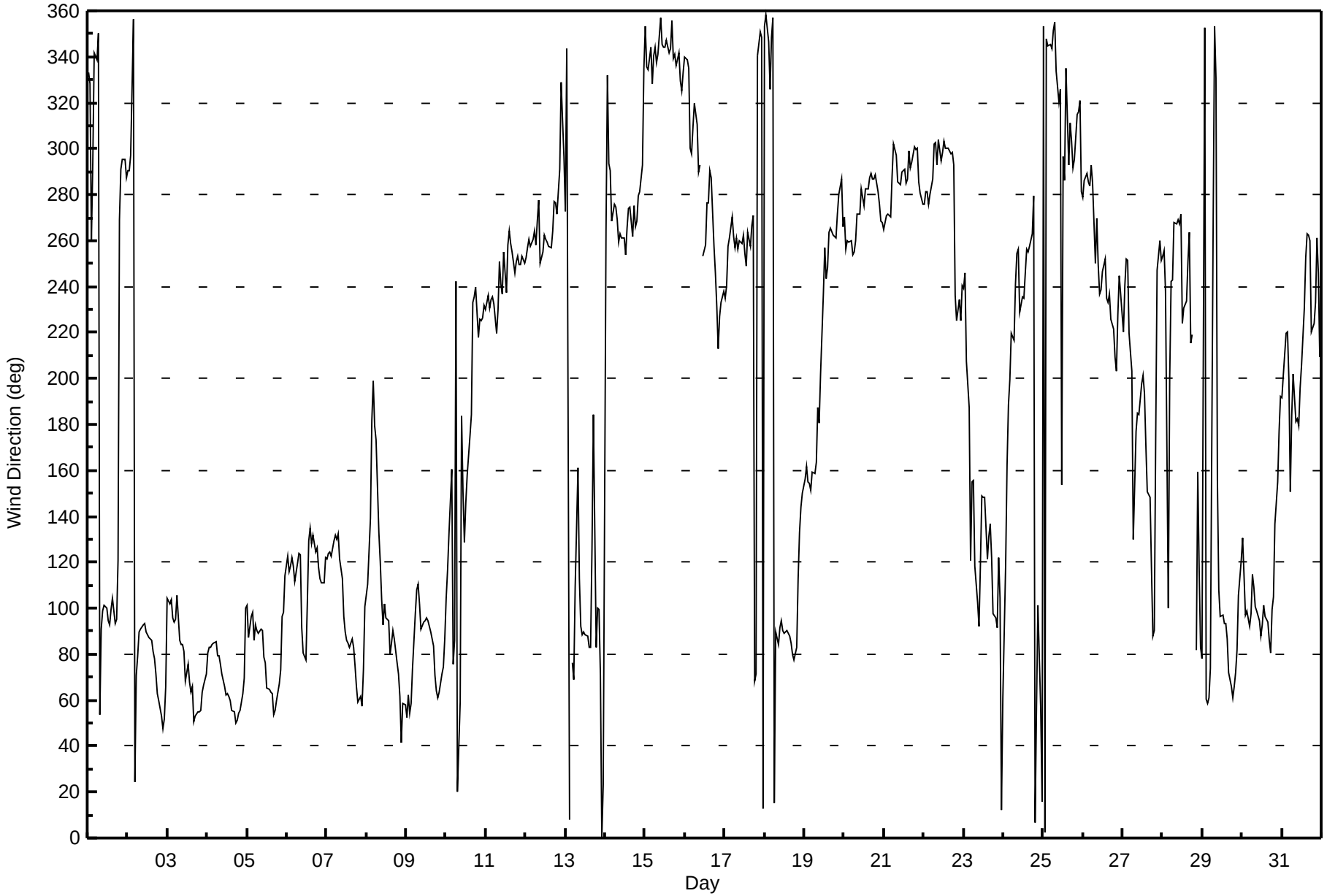
M - Maintenance AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction (WD) - deg

Fort Chipewyan - August 2015



Wood Buffalo Environmental Association
SO2 Calibration Report

W B E A

Station Information

Calibration Date	August 5, 2015	Last Calibration	July 1, 2015
Station Name	Fort Chipewyan	Station Number	AMS 8
Reason:	Routine		
Start Time (MST)	10:05	End Time (MST)	15:15
Gas Cert Reference	LL103809	Station temp.	22 Deg C
Cal Gas Concentration	2.45 ppm	Cal Gas Exp Date	16-Sep-16
Calibrator Make/Model	Teledyne API T700	Serial Number	747
ZAG Make/Model	Teledyne API 701	Serial Number	4698
DACS make/model	Campbell Scientific CR3000	DACS serial No.	8205

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 20 ppb		PMT voltage	-829	-827
Analyzer IP address	192.168.1.43		Lamp voltage	980	973
Calculated slope	0.993309	1.006687	Chamber temp	45.0	45.0
Calculated intercept	-0.030508	-0.058154	Pressure	715.0	707.9
Analyzer Background	1.15	1.12	Flow	0.435	0.431
Analyzer Coefficient	1.035	1.004	Intensity	91	93

Analyzer make	Thermo 43i-TLE	Analyzer serial #	1136451241

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6000	0.0	0.0	0.1	----
as found span	6000	44.6	18.2	18.7	0.975
calibrator zero	6000	0.0	0.0	0.1	----
high point	6000	44.6	18.2	18.1	1.003
second point	6000	23.8	9.7	9.7	1.001
third point	6000	11.9	4.9	4.9	1.001
as left zero	6000	0.0	0.0	0.0	----
as left span	6000	44.6	18.2	17.9	1.015
				Average Correction Factor	1.002

Corrected As found	18.6	Previous response	18.3	% change	-1.2%

Notes:

Routine monthly calibration. Inlet filter changed after as founds. Span slightly adjusted

Calibration Performed By: Ryan Power

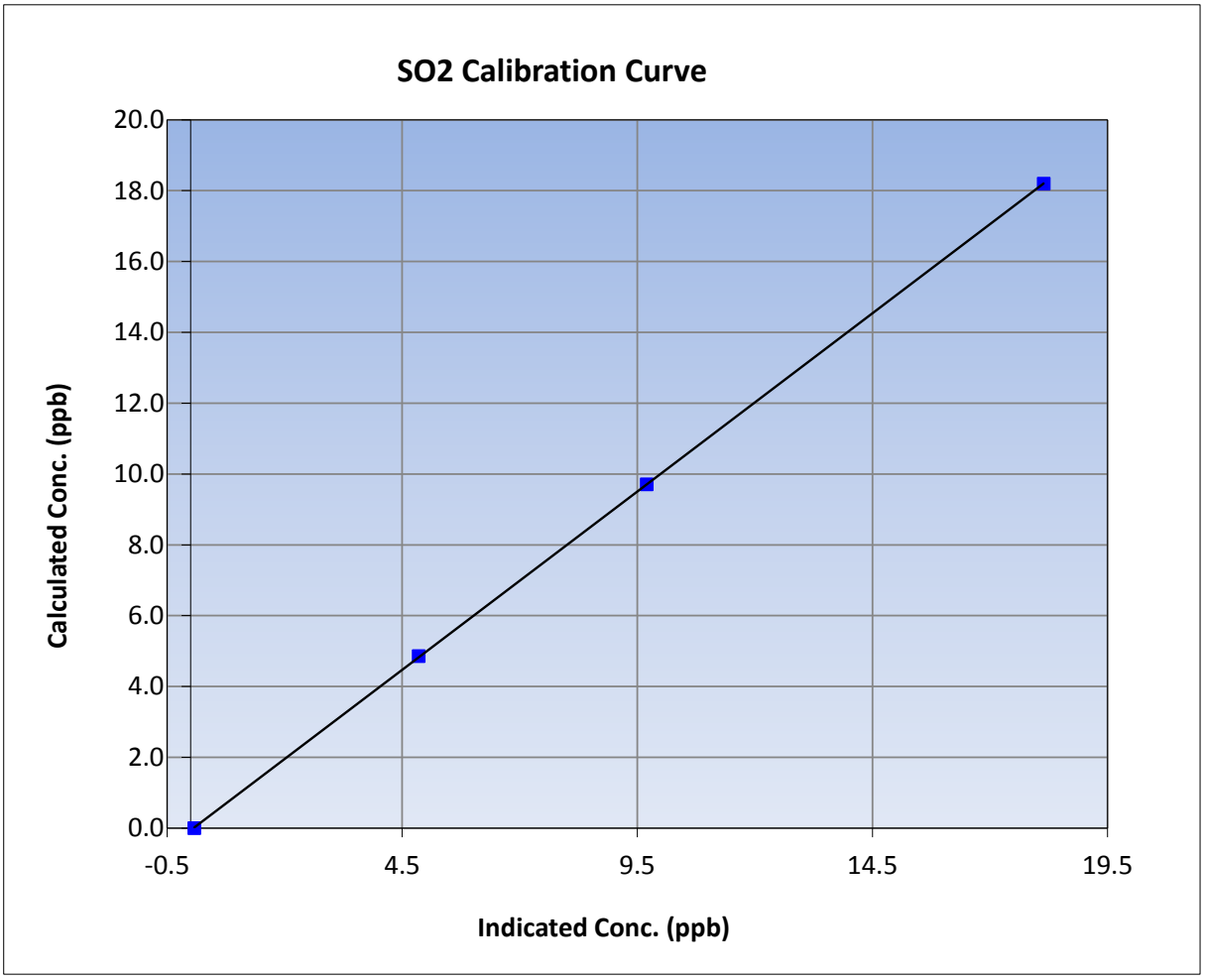
Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

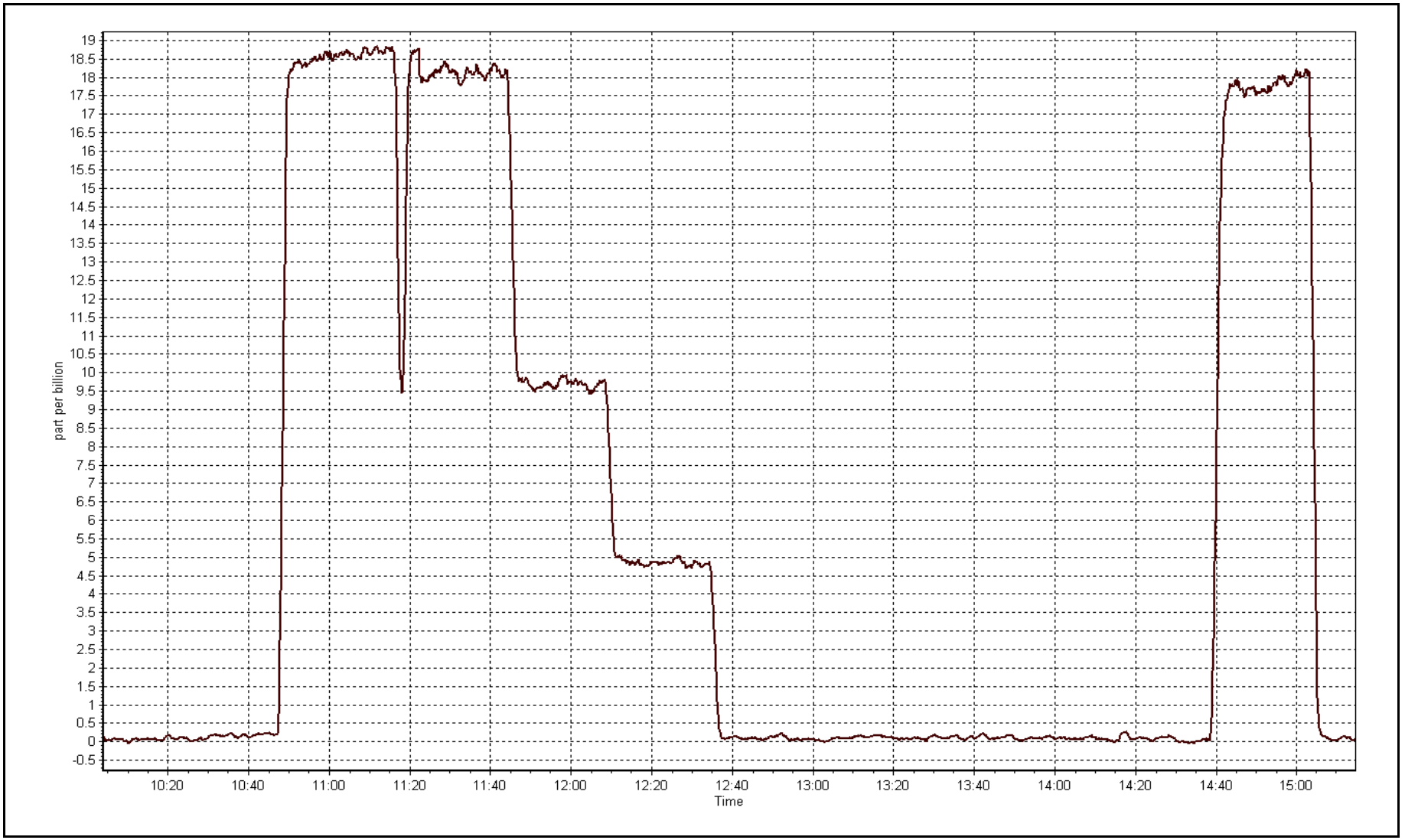
Calibration Date	August 5, 2015	Previous Calibration	July 1, 2015
Station Name	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	10:05	End Time (MST)	15:15
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1136451241

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	0.999992
18.2	18.1	1.0031		
9.7	9.7	1.0006	Slope	1.006687
4.9	4.9	1.0010		
			Intercept	-0.058154



SO2 Calibration Plot Date: August 5, 2015



Wood Buffalo Environmental Association
O_3 Calibration Report

W B E A

Station Information

Calibration Date	August 5, 2015	Previous Calibration	July 2, 2015
Station Name	Fort Chipewyan	Station Number	AMS 8
Reason:	Removal		
Start Time (MST)	15:05	End Time (MST)	16:00
NO2 GPT Ref date	August-05-15	Transfer Standard	NO2
		Station temp.	23 Deg C
Calibrator Make/Model	Teledyne API T700	Serial Number	735
ZAG make/model	Teledyne API 701	Serial Number	4698
DACS make/model	Campbell Scientific CR3000	Serial Number	8205

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 500 ppb		Bench temp.	36.0	NA
Analyzer IP address	192.168.1.48		Lamp temp.	58.0	NA
Calculated slope	1.001479	0.989416	Pressure	27.3	NA
Calculated intercept	0.058560	0.197883	Flow cell A	0.775	NA
Analyzer Background	-0.1	NA	Flow cell B	0.775	NA
Analyzer Coefficient	1.007	NA	Cell A Intensity	NA	NA
			Cell B Intensity	NA	NA

Analyzer make	Teledyne API T400	Analyzer serial #	1020

Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator Lamp Intensity (mA) GenRef-GenDrv (mv)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6000	0.00	0.0	-0.2	----
as found span	6000	235.0 - 832.2	104.7	105.6	0.991
calibrator zero	6000	0.00	0.0	-0.2	----
high point	6000	235.0 - 832.2	104.7	105.6	0.991
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	0.991

Corrected As found	105.8	Previous response	104.5	% change	-1.3%

Notes:

Was looking into the lamp stability warning and the occasional noise. Looks like I maybe shorted something. No calibration possible after As Founds. All diagnostics not stable. All warnings showing. Replaced analyzer with spare

Calibration Performed By: Ryan Power

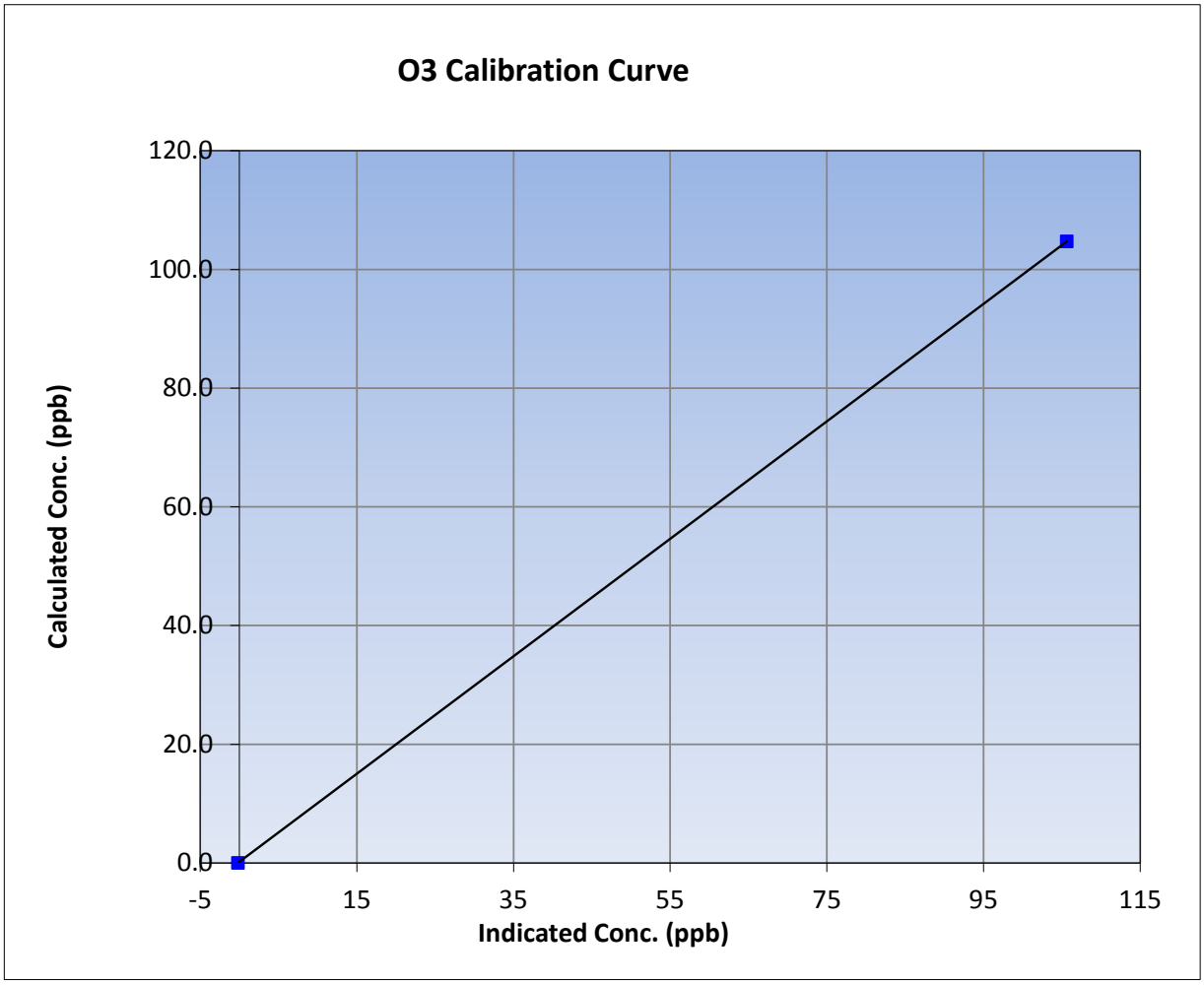
Wood Buffalo Environmental Association
O3 Calibration Report

Station Information

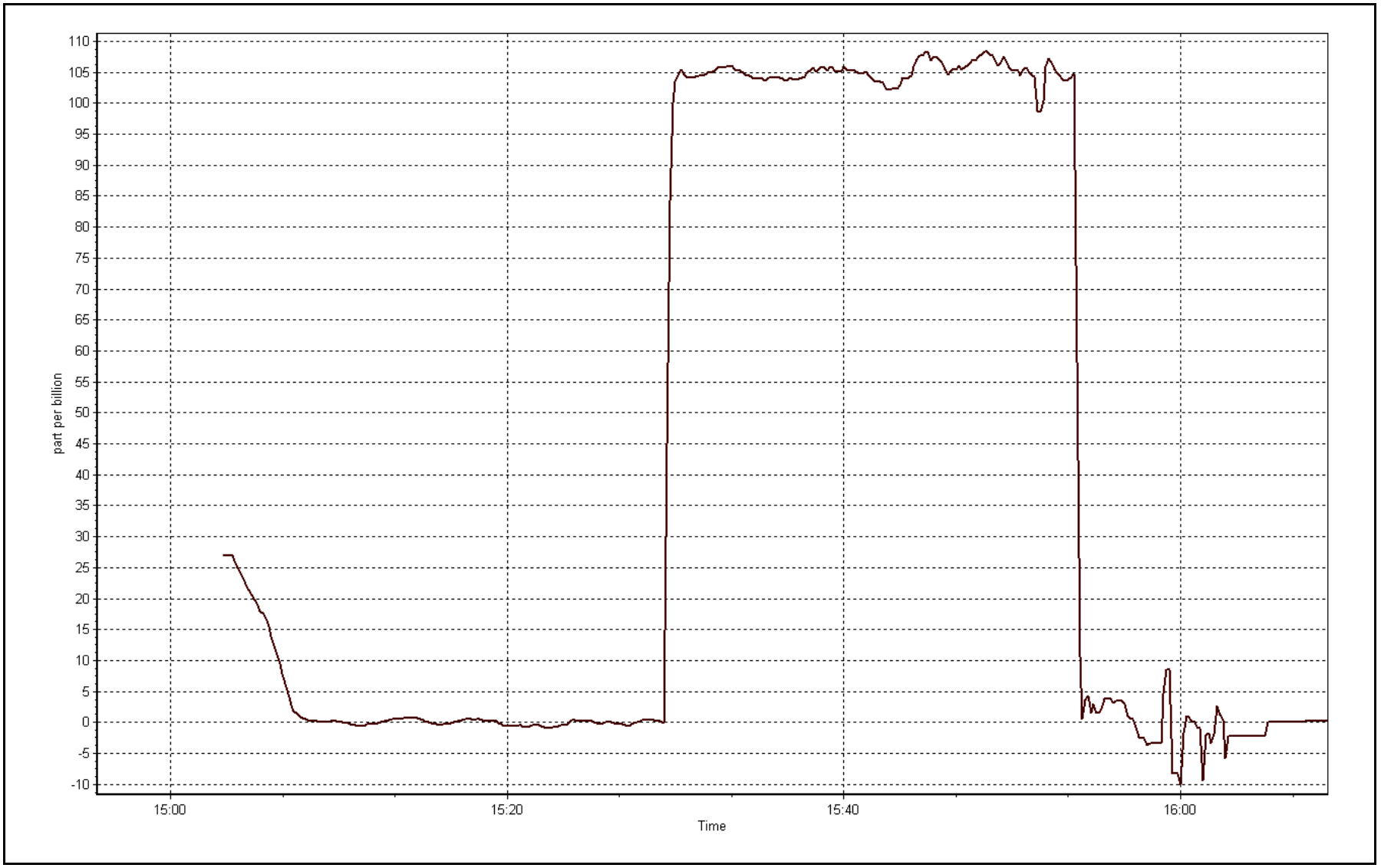
Calibration Date	August-05-15	Previous Calibration	July 2, 2015
Station Name	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	15:05	End Time (MST)	16:00
Analyzer make	Teledyne API T400	Analyzer serial #	1020

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	----	Correlation Coefficient	1.000000
104.7	105.6	0.9913		
			Slope	0.989416
			Intercept	0.197883



O3 Calibration Plot Date: August 5, 2015



Wood Buffalo Environmental Association
O_3 Calibration Report

W B E A

Station Information

Calibration Date	August 5, 2015	Previous Calibration	July 2, 2015
Station Name	Fort Chipewyan	Station Number	AMS 8
Reason:	Install		
Start Time (MST)	16:40	End Time (MST)	19:05
NO2 GPT Ref date	August-05-15	Transfer Standard	NO2
		Station temp.	23 Deg C
Calibrator Make/Model	Teledyne API T700	Serial Number	735
ZAG make/model	Teledyne API 701	Serial Number	4698
DACS make/model	Campbell Scientific CR3000	Serial Number	8205

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 500 ppb		Bench temp.	NA	37.2
Analyzer IP address	192.168.1.48		Lamp temp.	NA	58.0
Calculated slope	NA	0.981901	Pressure	NA	27.4
Calculated intercept	NA	-0.151125	Flow cell A	NA	0.837
Analyzer Background	NA	3.0	Flow cell B	NA	0.837
Analyzer Coefficient	NA	1.300	Cell A Intensity	NA	NA
			Cell B Intensity	NA	NA

Analyzer make	Teledyne API T400	Analyzer serial #	1107

Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator Lamp Intensity (mA) GenRef-GenDrv (mv)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero					
as found span					
calibrator zero	6000	0.00	0.0	0.1	----
high point	6000	235.0 - 832.2	104.7	106.7	0.981
second point	6000	178.2 - 792.9	80.0	81.7	0.979
third point	6000	114.1 - 736.9	53.7	54.9	0.978
as left zero	6000	0.00	0.0	0.5	----
as left span	6000	235.0 - 832.2	104.7	108.9	0.962
				Average Correction Factor	0.980

Corrected As found	NA	Previous response	NA	% change	NA

Notes:

Install calibration

Calibration Performed By: Ryan Power

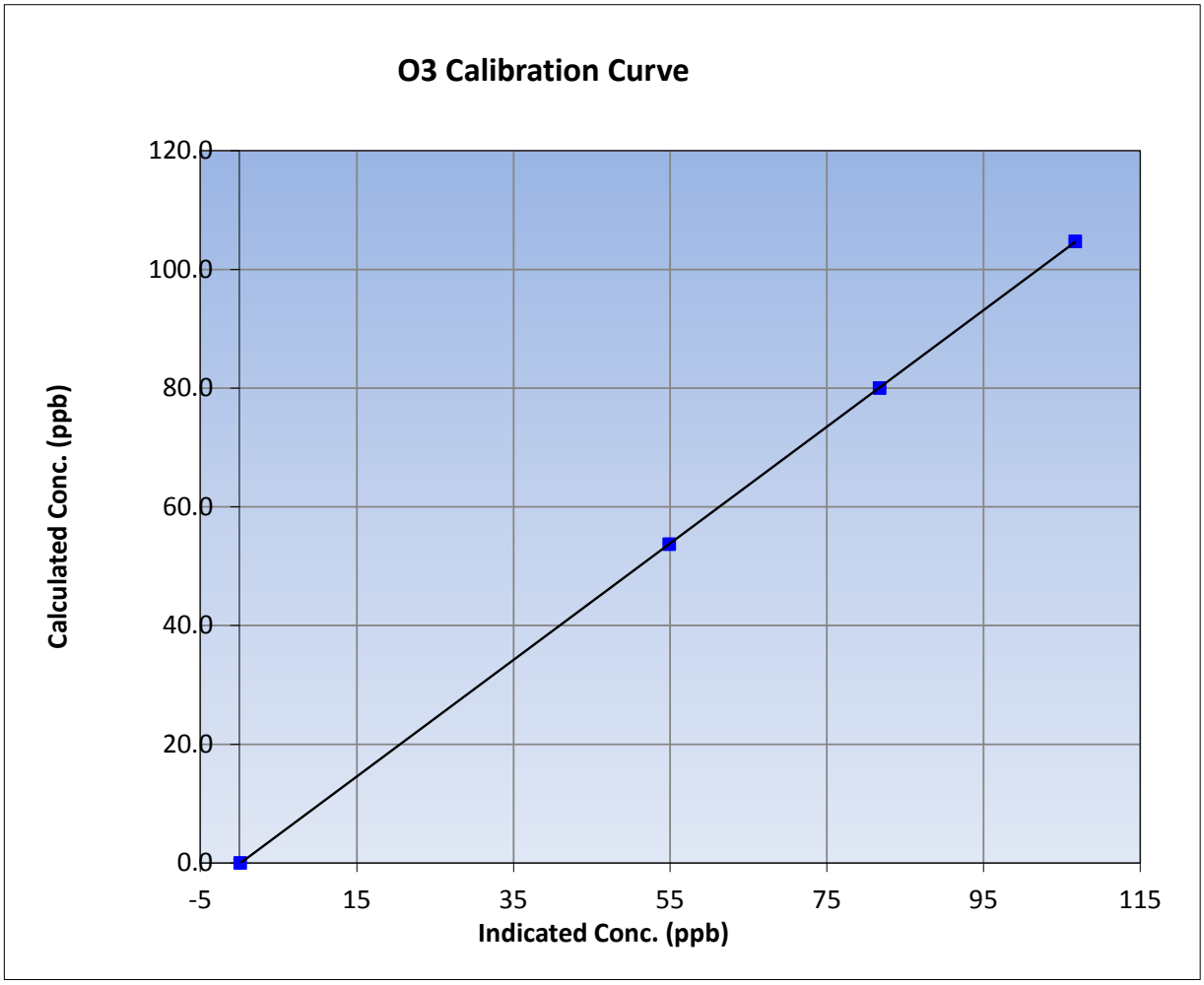
Wood Buffalo Environmental Association
O3 Calibration Report

Station Information

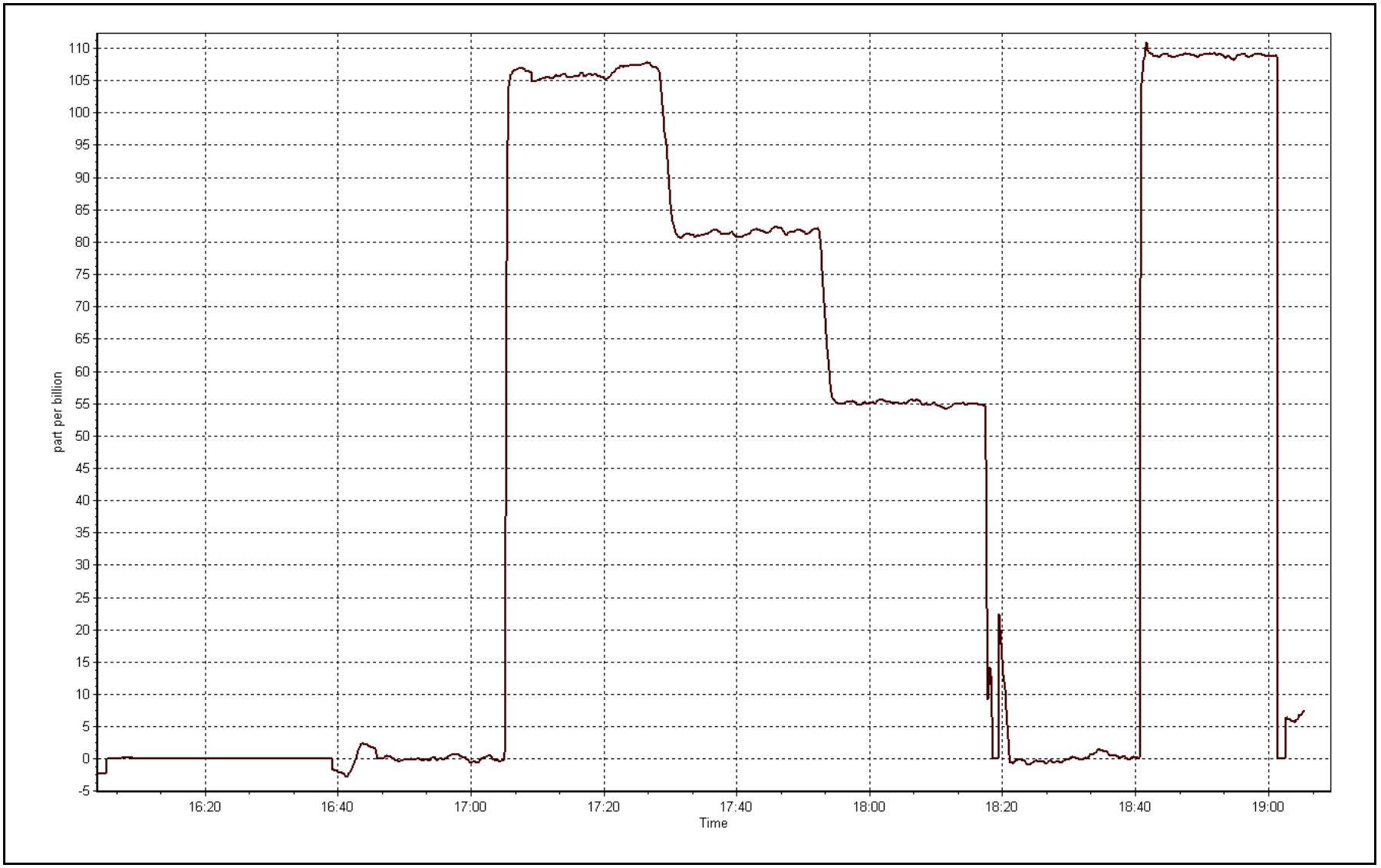
Calibration Date	August-05-15	Previous Calibration	July 2, 2015
Station Name	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	16:40	End Time (MST)	19:05
Analyzer make	Teledyne API T400	Analyzer serial #	1107

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	0.999997
104.7	106.7	0.9813		
80.0	81.7	0.9790	Slope	0.981901
53.7	54.9	0.9783		
			Intercept	-0.151125



O3 Calibration Plot Date: August 5, 2015



Wood Buffalo Environmental Association
NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	August 5, 2015	Previous Calibration	July 2, 2015
Station Name	Fort Chipewyan	Station Number	AMS 8
Reason:	Routine		
Start Time (MST)	10:05	End Time (MST)	15:15
NO Cal Gas Conc	20.2 ppm	Gas Cert Reference	LL103809
NOx Cal Gas Conc	20.2 ppm	Cal Gas Expiry Date	16-Sep-16
Calibrator	Teledyne API T700	Serial Number	747
Zero air Generator	Teledyne API T701	Serial Number	4698

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	8205

Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.979151	0.979096	0.998345
	Data Offset	0.800499	1.018313	0.127628
Current Calibration	Data Slope	0.993844	1.003344	0.989399
	Data Offset	0.595523	0.615494	-0.082995

Analyzer Information

Analyzer make/model	Teledyne API T200u	Analyzer serial #	172

Test Point	before		after	
Concentration range	0-200	ppb	0-200	ppb
NO coefficient	1.123		1.143	
NOX coefficient	1.135		1.165	
NO2 coefficient	1.000		1.000	
NO bkgrnd	0.1		0.1	
NOX bkgrnd	0.2		0.2	
Chamber Temp	40	Deg C	40	Deg C
Moly Temp	315.4	Deg C	314.9	Deg C
HVPS	502	V	502	V
PMT Temp	5.1	Deg C	5.1	Deg C
O3 flow	83	ccm	88	ccm
R Cell press NO	3.8	"Hg	3.9	"Hg
R Cell Press Nox	3.8	"Hg	3.8	"Hg
NO sample flow	1122	ccm	1126	ccm
Nox sample Flow	1122	ccm	1103	ccm

Notes:

Inlet filter changed after As Founds. Slight span adjustment, calibration stable, no issues noted with instrument during calibration.

Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: August 5, 2015 Station Number: AMS 8

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	6000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
as found span	6000	44.6	150.0	150.0	0.0	146.7	146.3	0.4	1.0228	1.0253
calibrator zero	6000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
high point	6000	44.6	150.0	150.0	0.0	150.7	149.3	1.4	0.9953	1.0048
second point	6000	23.8	80.0	80.0	0.0	79.4	78.6	0.8	1.0078	1.0181
third point	6000	11.9	40.0	40.0	0.0	39.3	38.9	0.4	1.0188	1.0298
as left zero	6000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
as left span	6000	44.6	150.0	43.9	106.1	149.2	43.4	105.8	1.0054	1.0104
								Average Correction Factor	1.0073	1.0176

Corrcted As found NO_X= 146.8 NO= 146.4 Percent Change NO_X= 3.9% NO= 4.0%

Previous Response NO_X= 152.4 NO= 152.2

GPT Calibration Data

Dilution Flow 6000 ccm Source Gas Flow 44.6 ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
Cal zero			0.0			0.0			N/A	
1st NO2 (100)	----	43.9	104.7	149.7	43.9	105.8	0.9949	1.0000	0.9898	101.0%
2nd NO2 (75)	----	68.7	80.0	149.6	68.7	80.9	0.9955	1.0000	0.9880	101.2%
3rd NO2 (50)	----	94.9	53.7	149.5	94.9	54.6	0.9963	1.0000	0.9842	101.6%
4th NO2 (0)	148.6	----	1.0	149.7	148.6	1.1	0.9950	1.0000	N/A	----
					Average Correction Factor		0.9954	1.0000	0.9874	101.3%

Calibration Performed By: Ryan Power

Wood Buffalo Environmental Association

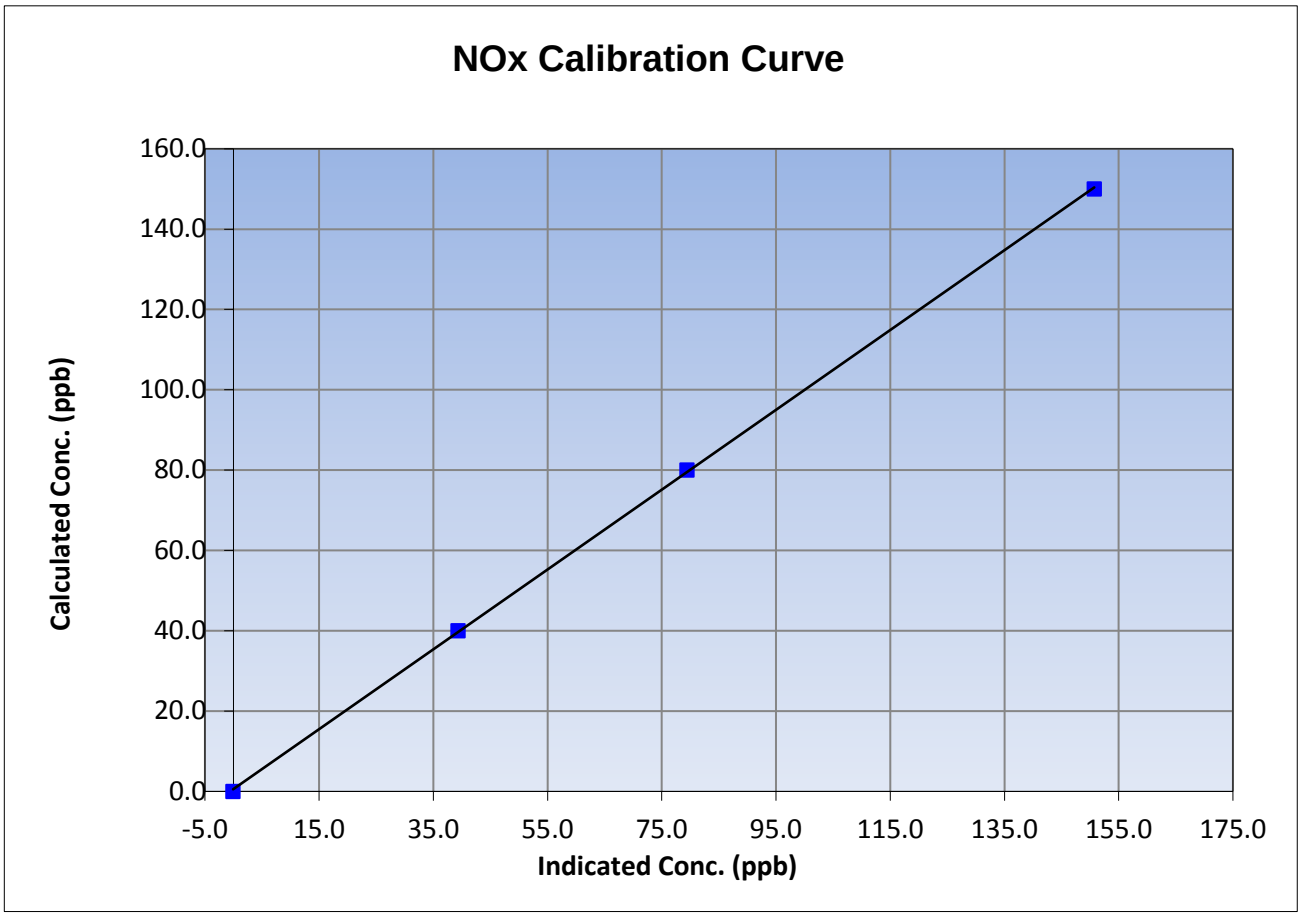
NO_X Calibration Summary

Station Information

Calibration Date	August 5, 2015	Previous Calibration	July 2, 2015
Station Name	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	10:05	End Time (MST)	15:15
Analyzer make	Teledyne API T200u	Analyzer serial #	172

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999933
150.0	150.7	0.9953		
80.0	79.4	1.0078	Slope	0.993844
40.0	39.3	1.0188		
			Intercept	0.595523



Wood Buffalo Environmental Association

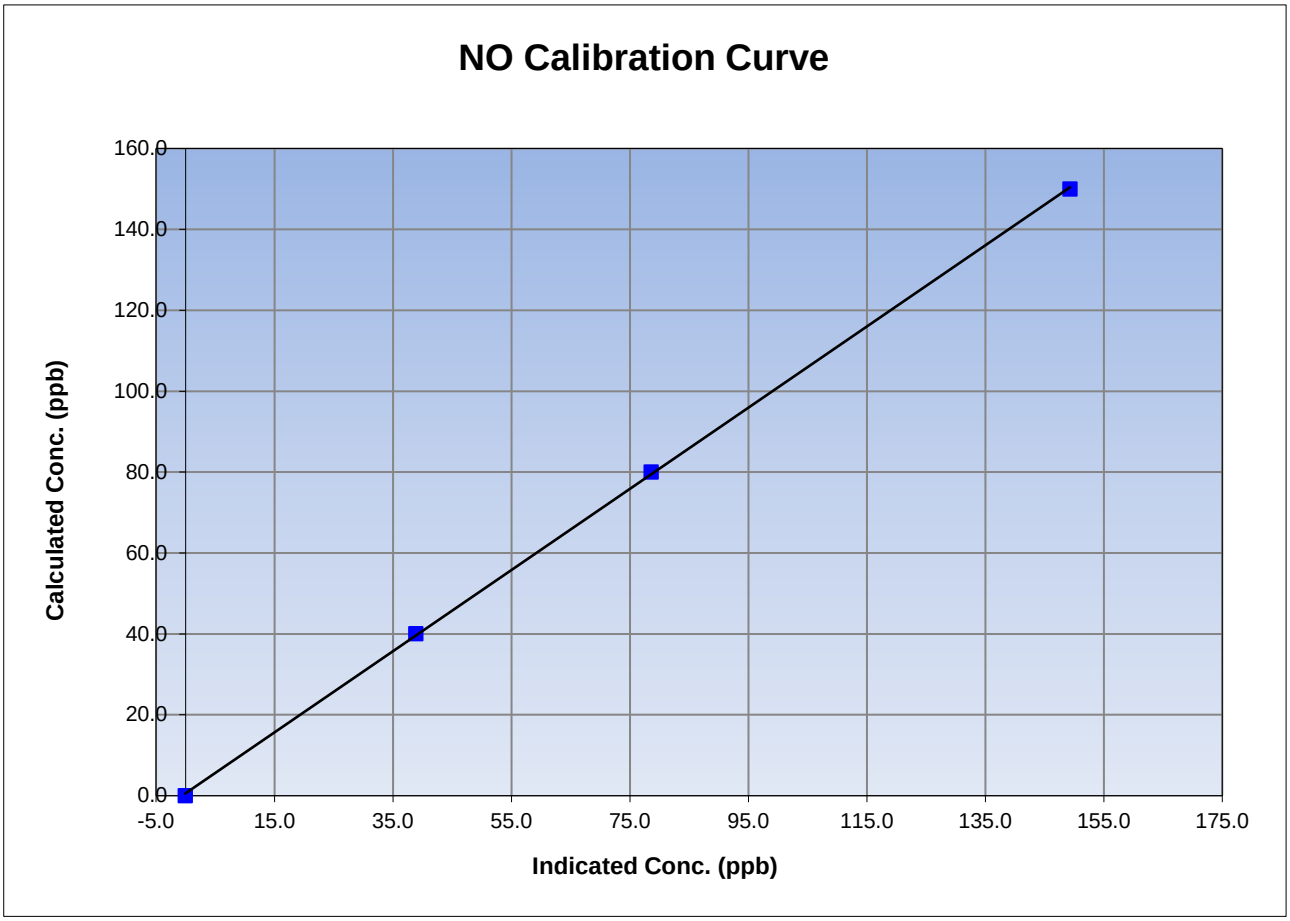
NO Calibration Summary

Station Information

Calibration Date	August 5, 2015	Previous Calibration	July 2, 2015
Station Name	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	10:05	End Time (MST)	15:15
Analyzer make	Teledyne API T200u	Analyzer serial #	172

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999923
150.0	149.3	1.0048		
80.0	78.6	1.0181	Slope	1.003344
40.0	38.9	1.0298		
			Intercept	0.615494



Wood Buffalo Environmental Association

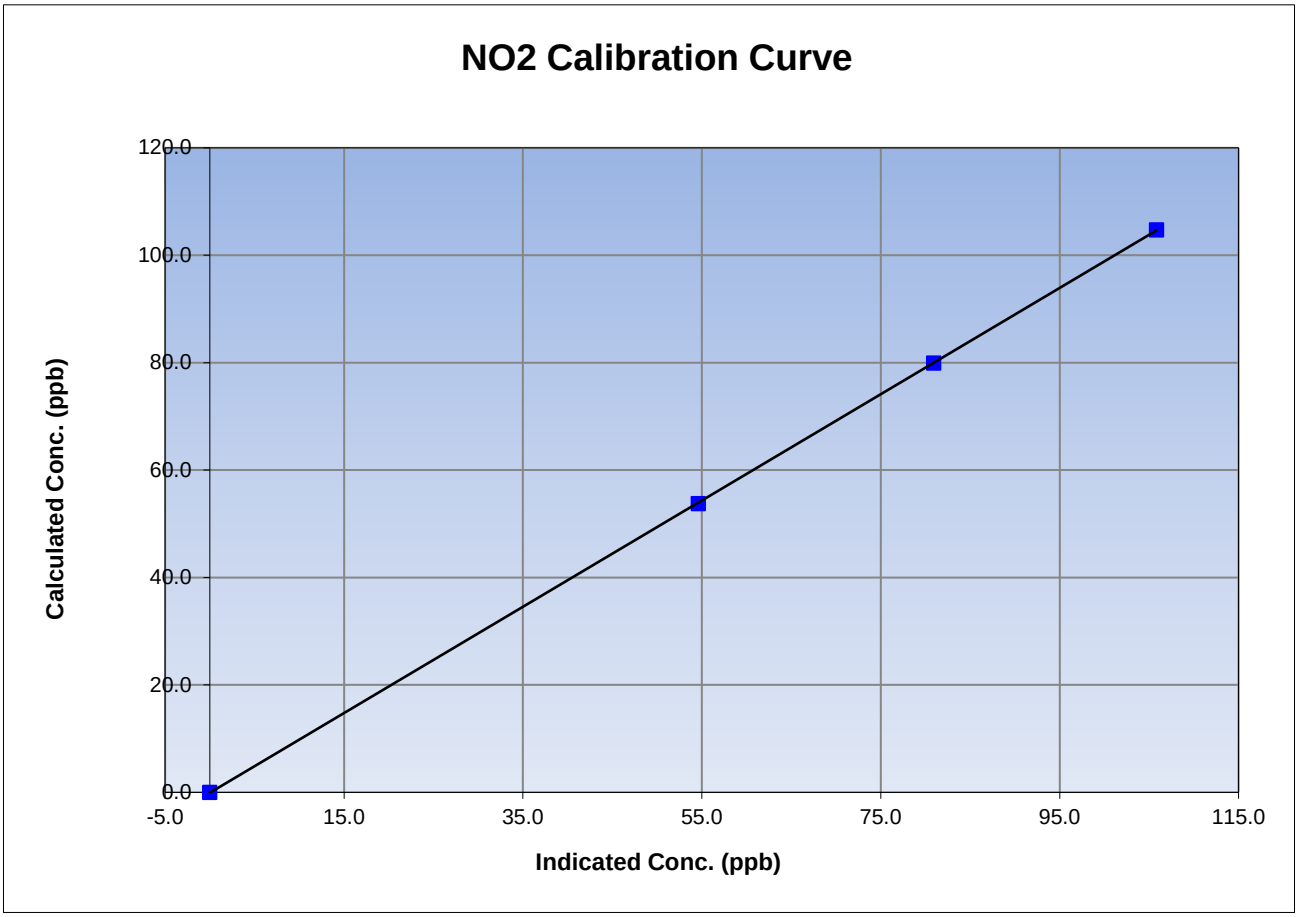
NO_2 Calibration Summary

Station Information

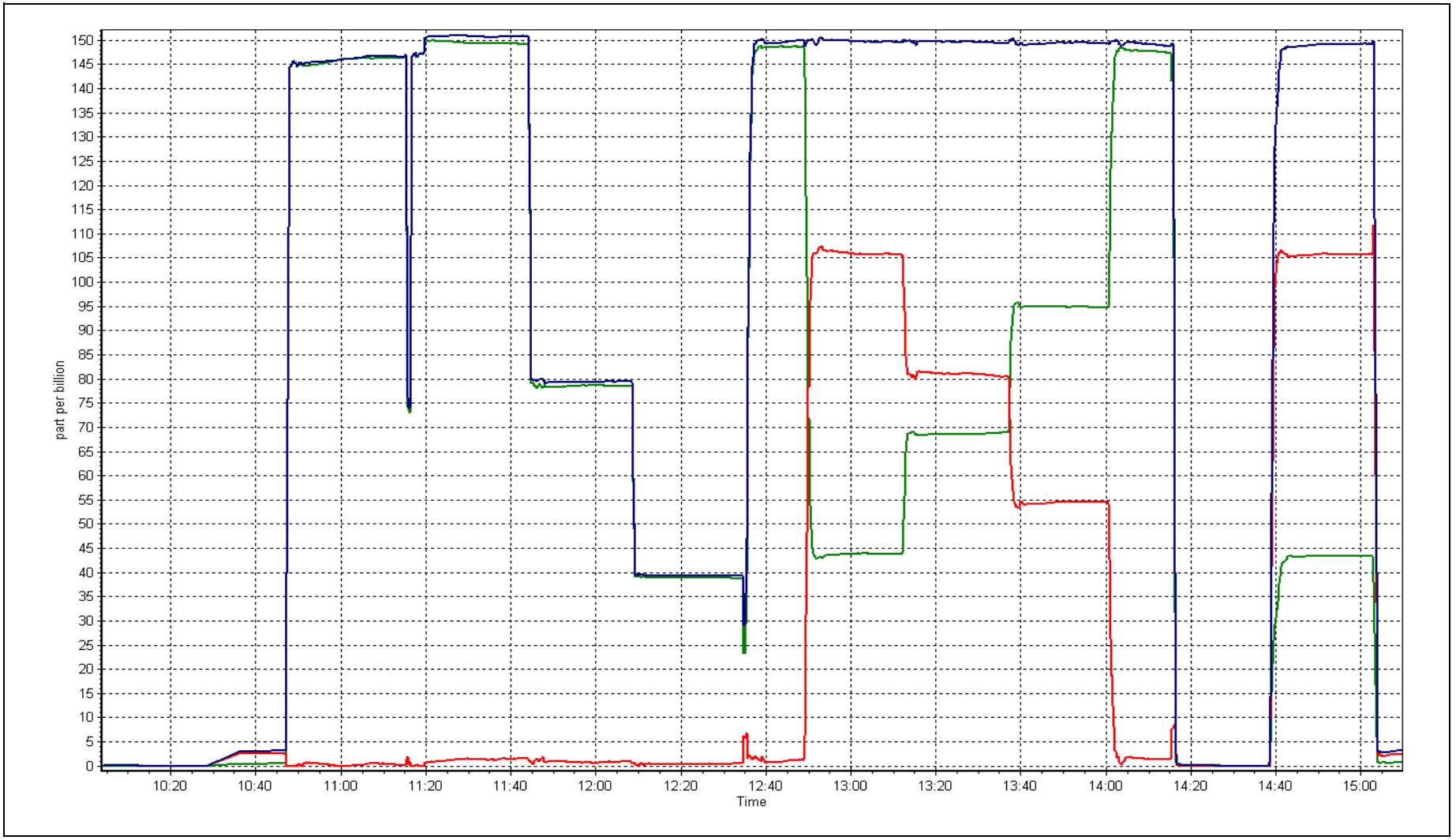
Calibration Date	August 5, 2015	Previous Calibration	July 2, 2015
Station Name	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	10:05	End Time (MST)	15:15
Analyzer make	Teledyne API T200u	Analyzer serial #	172

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999989
104.7	105.8	0.9898		
80.0	80.9	0.9880	Slope	0.989399
53.7	54.6	0.9842		
			Intercept	-0.082995



NOx, NO & NO_2 Calibration Plot Date: August 5, 2015



Wood Buffalo Environmental Association

SHARP CALIBRATION

STATION INFORMATION

Calibration Date:	August 5, 2015	Previous Calibration:	July 1, 2015
Station Name:	Fort Chipewyan	Station Number:	AMS 8
Start Time (MST):	17:45	End Time (MST):	18:45
Calibrator Make/Model:	Delta Cal	Calibrator Serial Number:	1212

SHARP INFORMATION

Particulate Fraction:	PM2.5
Make/Model:	Thermo / SHARP 5030
Serial Number	E-2025
Source SN:	7414
HEPA PN:	9064
Time Correct (MST):	YES
Paremeters Checked:	T1, T2, T2,T4, P3, Main Flow, Beta, Neph

CALIBRATION DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	22.0	21.8	-0.2	22.0
T2	30.0	na	na	36.0
T3	26.0	na	na	29.0
T4	42.0	na	na	61.0
RH (%)	34.0	na	na	36.0

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	986	987.0	1.0	986

Main Flow (Lph)

Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
1000	990	-10	996	1000

Nephalometer Calibration

Parameter	As Founds	Zeroed (Limit +or- 2.0ug/m3)	As Left
Analog	162		163
Neph	2		0.2
C14	8.5		0.1
Indicated Concentration (ug/m3)	**1**	**yes**	**0.1**
Offset 1	160.4		162.3
Offset 2	28.9		28.8

Leak Check (Quarterly)

Leak Check Date:	August 5, 2015	Previous Leak Check Date:	May 6, 2015

	Measured	Difference LPM (Limit +/- 0.42 LPM)
Flow without adaptor (LPM):	16.55	0.05
Flow with adaptor [turn off pump first](LPM):	16.50	

Mass Foil Calibration (Annualy)

Foil Calibration Date:	May 6, 2015	Previous Foil Calibration:	NA
Zeroed?:			
Foil Mass:	1324	**Mass foil set S/N:**	5868
Previous Correction Factor:	7081		
New Correction Factor:	7022		

INSPECTION DATA

Item	Condition	Date of install or rebuild
Cyclone	Good / cleaned	05/08/2015
Pump	Good	NA
Filter Tape	Good	NA
Mass Foil Cal Set	Good	NA
HEPA filter	Good	NA

NOTES:

Leak check performed, flow with a small adjustment, nephalometer zeroed

Calibration Performed By: Ryan Power

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 9
BARGE LANDING
AUGUST 2015

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

September 28, 2015

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BARGE LANDING (AMS 9)
AUGUST 2015

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
TRS(ppb) Average	710	34	34	100.00	3	0	1	0
THC(ppm) Average	709	35	35	100.00	3.9	-	2.4	-
Temperature (C) Average	744	0	0	100.00	30.2	-	23.8	-
Relative Humidity (%) Average	744	0	0	100.00	99	-	86	-
Wind Speed 10 m (km/h) Average	742	0	2	99.73	20	-	11	-
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 - BARGE LANDING (AMS 9)
AUGUST 2015

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

					Percentile						
Parameter	Number	Mean	StnDev	Total	Min	P10	Q1	Median	Q3	P90	Max
TRS(ppb) Average	710	0.3	0	-	0	0	0	0	0	1	3
THC(ppm) Average	709	2.19	0.2	-	2	2	2.1	2.1	2.3	2.4	3.9
Temperature (C) Average	744	17.41	5.3	-	1.7	10.7	13.8	17.2	21.3	24.7	30.2
Relative Humidity (%) Average	744	66.9	20	-	25	38	51	67	82	96	99
Wind Speed 10 m (km/h) Average	742	5.8	3	-	0	2	3	5	8	11	20
Wind Direction 10 m (deg) Average	742	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BARGE LANDING (AMS 9)
AUGUST 2015

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
Wind Speed, Wind Direction	03 Aug 2015 03:00	03 Aug 2015 03:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	09 Aug 2015 06:00	09 Aug 2015 06:00	1	Flat line in sensor output signal

Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

Barge Landing - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 3 ppb on Aug 9 09:00 Maximum Daily Average: 0.6 ppb on Aug 9

Minimum Value: 0 ppb on Aug 10 17:00 Minimum Daily Average: 0.2 ppb on Aug 21
Maximum Diurnal Average: 0.6 ppb at hour 10 Minimum Diurnal Average: 0.2 ppb at hour 15
Monthly Average: 0.3 ppb Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 1$ $P_{99} = 2$

Hours in Service:	744
Hours of Data:	710
Hours of Missing Data:	34
Hours of Calibration:	34
Percent Operational Time:	100.0

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

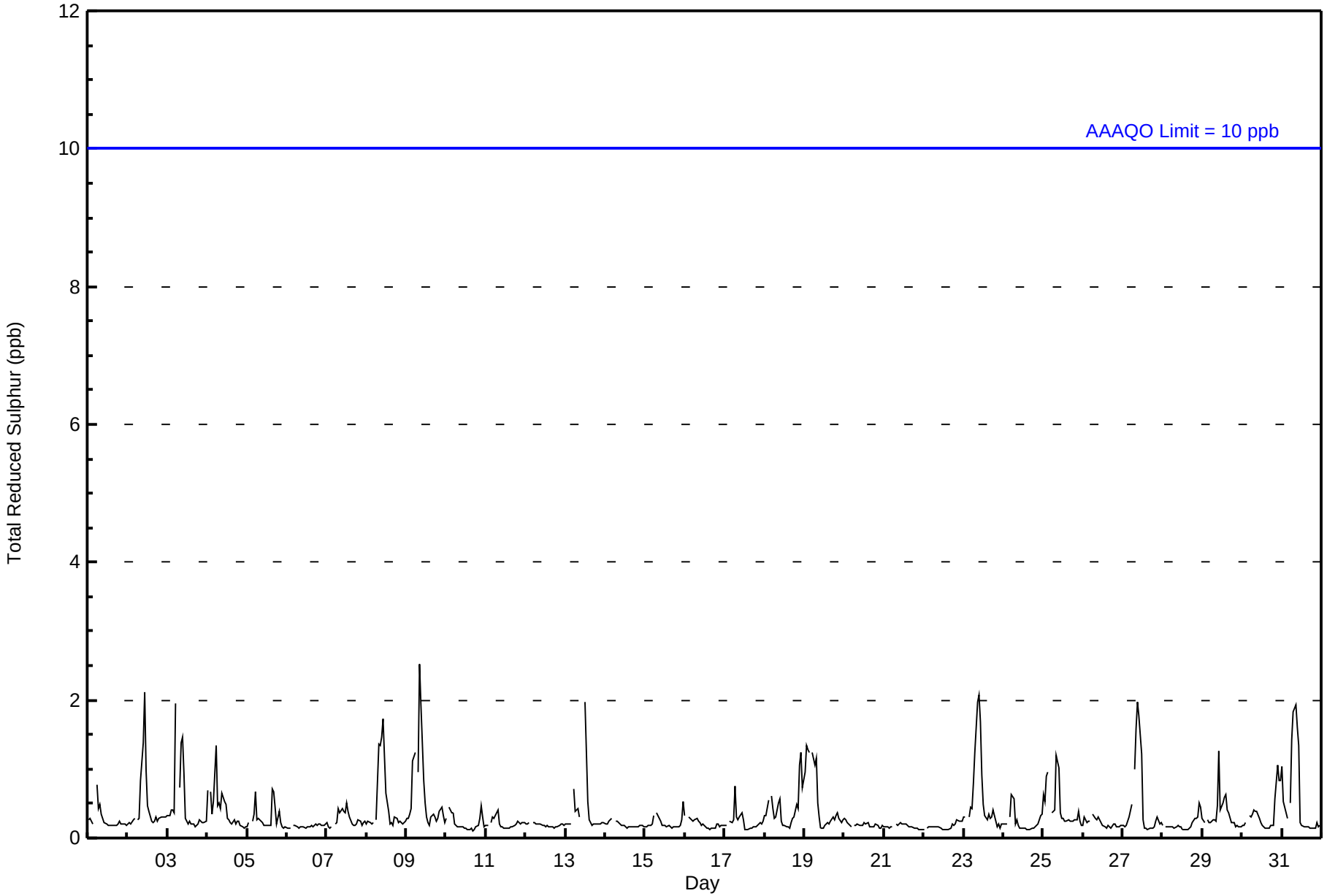
Z - zerospan C - Calibration
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb

Wood Buffalo Environmental Association

Hourly Averages

Total Reduced Sulphur (TRS) - ppb

Barge Landing - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb

Barge Landing - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	709	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: 710

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Total Reduced Sulphur (TRS) - ppb

Barge Landing - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 2	23	11	8	12	28	34	52	50	52	76	74	98	44	38	50	57	707
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	1	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	23	11	8	12	28	34	52	50	52	76	74	98	45	38	50	57	708

Total Number of Valid Hours: 708

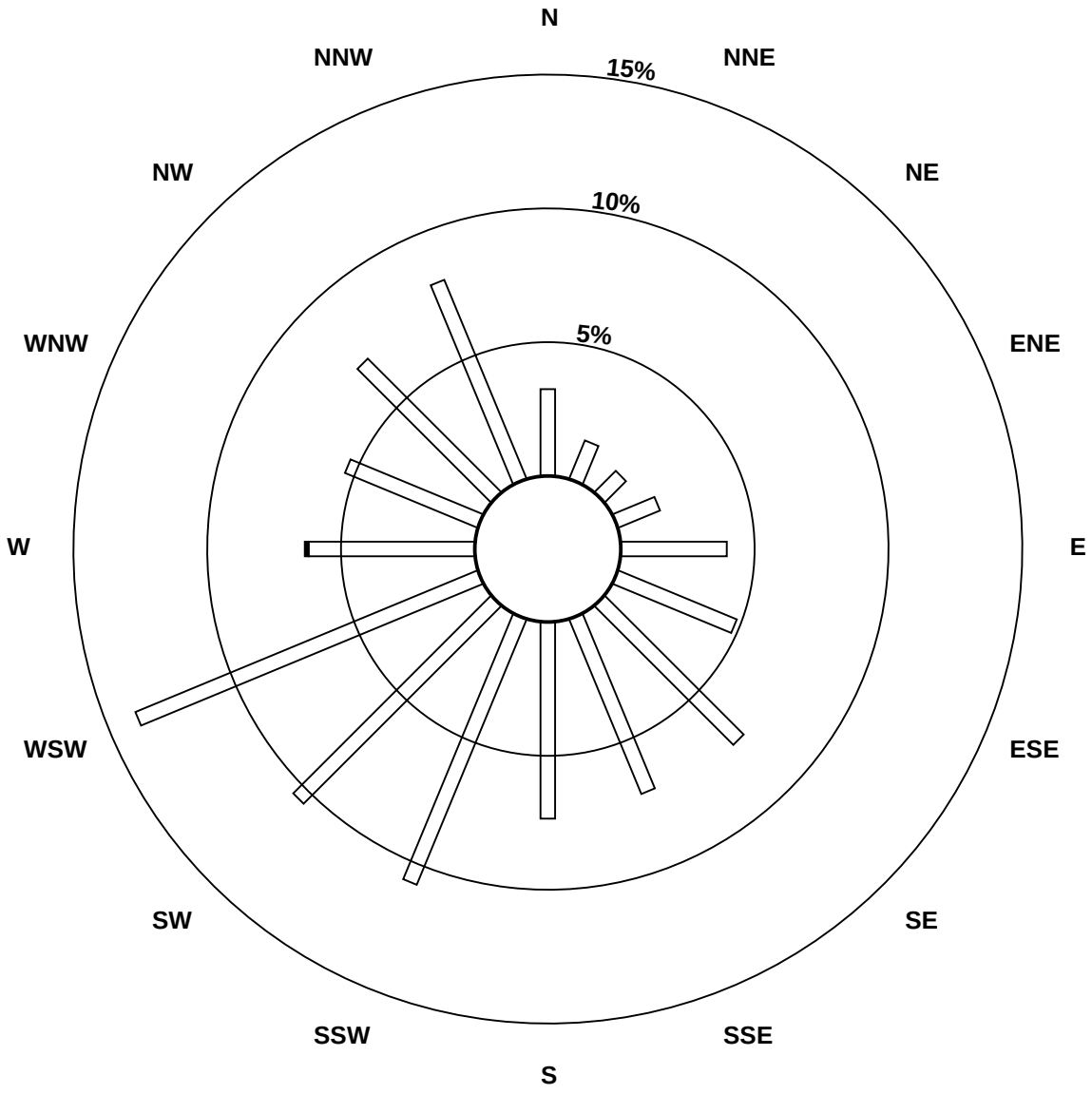
Total Number of Hours: 744

Wood Buffalo Environmental Association

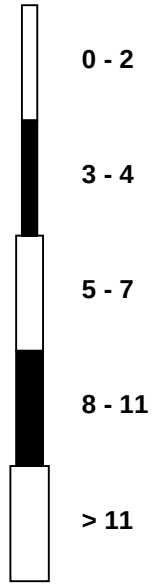
Wind Rose Aug 2015

Total Reduced Sulphur (TRS) - ppb

Barge Landing (AMS 9)



Classes (ppb)



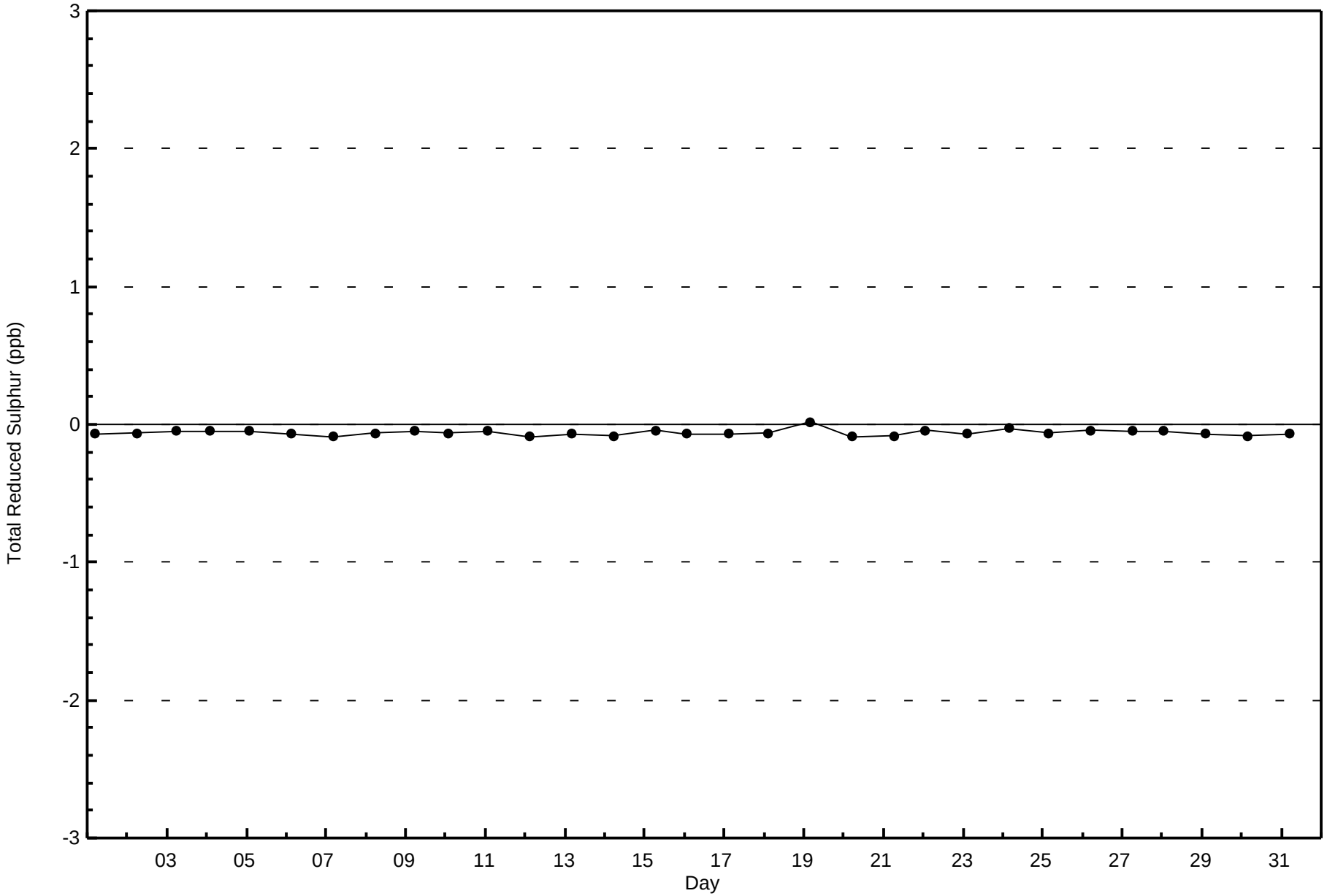
Total Number of Valid Hours: 708

Wood Buffalo Environmental Association

Zero Responses

Total Reduced Sulphur (TRS) - ppb

Barge Landing - August 2015

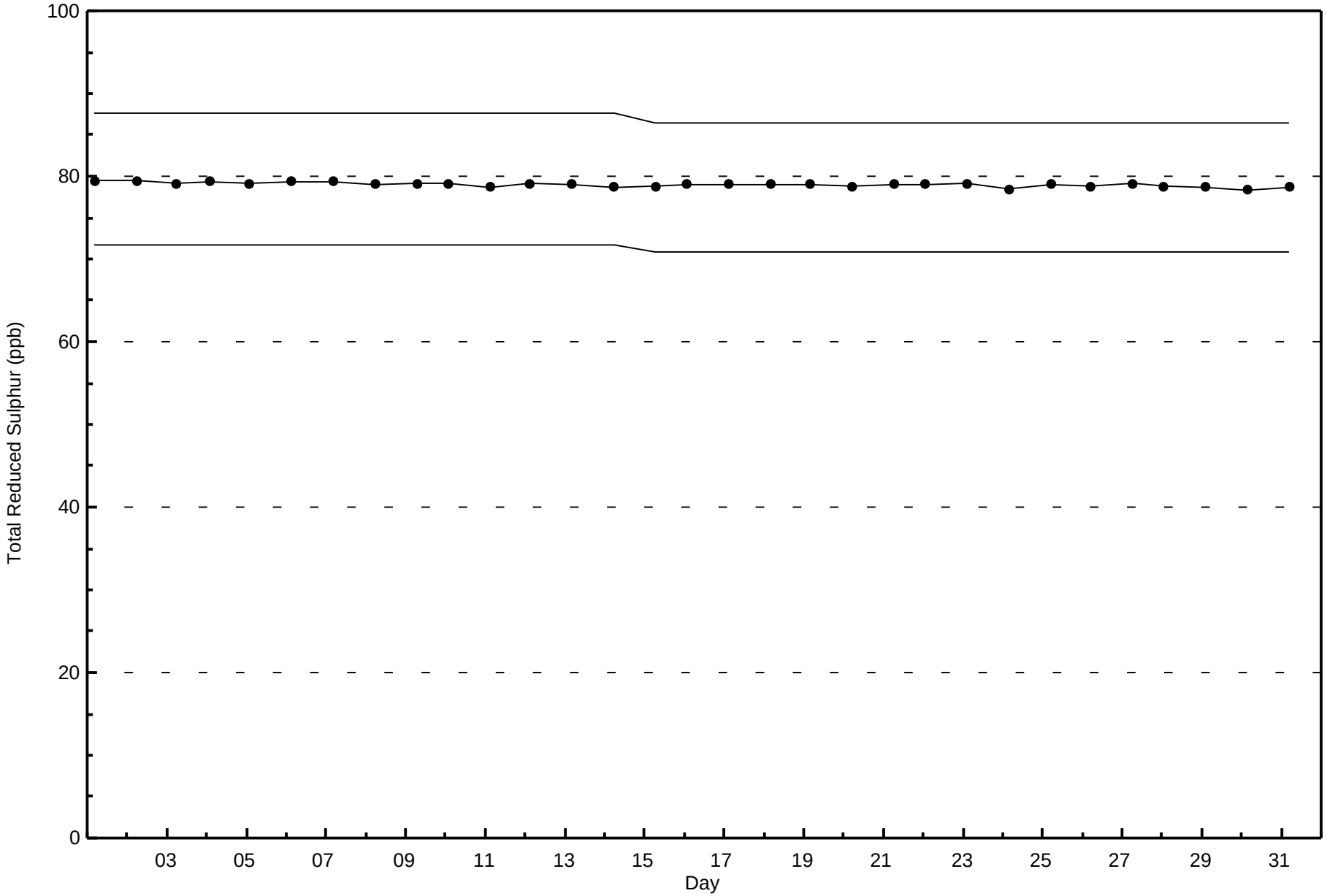


Wood Buffalo Environmental Association

Span Responses

Total Reduced Sulphur (TRS) - ppb

Barge Landing - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Barge Landing - August 2015

Maximum Value: 3.9 ppm on Aug 25 10:00

Maximum Daily Average: 2.4 ppm on Aug 9

Minimum Value: 2.0 ppm on Aug 10 17:00

Minimum Daily Average: 2.0 ppm on Aug 14

Maximum Diurnal Average: 2.4 ppm at hour 10

Minimum Diurnal Average: 2.1 ppm at hour 18

Monthly Average: 2.19 ppm

Percentiles: P_1 = 2.0 P_{10} = 2.0 Q_1 = 2.1 Median = 2.1 Q_3 = 2.3 P_{90} = 2.4 P_{99} = 3.1

Hours in Service:	744
Hours of Data:	709
Hours of Missing Data:	35
Hours of Calibration:	35
Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	2.4	2.4	2.4	Z	2.3	2.4	2.5	2.9	2.7	2.4	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.0	2.3	2.5	2.2	2.2	2.1	2.1	2.3	2.9
2-Aug	2.1	2.1	2.1	2.2	Z	2.3	2.2	2.2	2.8	3.2	2.3	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.2	2.2	3.2
3-Aug	2.2	2.3	2.3	2.4	2.4	Z	2.4	2.6	2.7	2.8	3.5	2.6	2.2	2.2	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.2	2.3	2.4	2.3	3.5
4-Aug	Z	2.5	2.6	2.5	2.4	2.4	2.3	2.4	2.3	2.4	3.1	3.2	2.5	2.2	2.1	2.1	2.1	2.1	2.2	2.1	2.0	2.0	2.0	2.1	2.3	3.2
5-Aug	2.1	Z	2.2	2.2	2.4	2.4	2.3	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.4	2.4	2.3	2.1	2.1	2.1	2.1	2.0	2.0	2.2	2.4
6-Aug	2.1	2.1	Z	2.2	2.1	2.2	2.0	2.0	2.0	2.1	2.1	2.0	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.2
7-Aug	2.2	2.1	2.1	Z	2.1	2.1	2.2	2.4	2.6	2.4	2.2	2.3	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.2	2.6
8-Aug	2.3	2.2	2.3	2.3	Z	2.4	2.3	2.5	2.4	2.4	2.3	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.1	2.2	2.1	2.1	2.3	2.2	2.5
9-Aug	2.4	2.4	2.4	2.4	2.5	Z	2.5	2.5	2.9	2.6	2.5	2.4	2.5	2.3	2.1	2.2	2.2	2.2	2.2	2.3	2.6	2.9	2.2	2.2	2.4	2.9
10-Aug	Z	2.5	2.8	2.6	2.3	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.4	2.2	2.0	2.1	2.8
11-Aug	2.0	Z	2.2	2.2	2.2	2.1	2.2	2.5	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.1	2.1	2.5
12-Aug	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1
13-Aug	2.1	2.1	2.1	Z	2.2	2.8	2.3	2.3	2.3	2.5	2.4	C	C	C	C	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.2	2.2	2.8
14-Aug	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1
15-Aug	2.1	2.2	2.2	2.2	2.1	Z	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.2
16-Aug	Z	2.2	2.3	2.2	2.2	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3
17-Aug	2.1	Z	2.1	2.1	2.1	2.2	2.8	2.6	2.3	2.4	2.4	2.2	2.1	2.1	2.0	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.2	2.2	2.8
18-Aug	2.3	2.3	Z	2.3	2.4	2.4	2.2	2.3	2.4	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.4	2.4	2.4	2.3	2.4
19-Aug	2.4	2.4	2.2	Z	2.3	2.2	2.1	2.2	2.2	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.4
20-Aug	2.0	2.0	2.1	2.1	Z	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.1	2.1	2.0	2.1	2.1	2.1	2.1
21-Aug	2.0	2.1	2.1	2.1	2.1	Z	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.1	2.0	2.0	2.1	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.1
22-Aug	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.1	2.0	2.1	2.1	2.2	2.2	2.1	2.3	2.1	2.3
23-Aug	2.4	Z	2.4	2.5	2.6	2.6	2.6	2.5	2.4	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.0	2.4	2.3	2.6
24-Aug	2.2	2.1	Z	2.2	2.3	2.4	2.5	2.3	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.5
25-Aug	2.2	2.3	2.4	Z	2.7	2.6	2.4	2.3	3.1	3.9	2.5	2.1	2.3	2.3	2.2	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.4	3.9
26-Aug	2.5	2.2	2.2	2.4	Z	2.4	2.3	2.2	2.4	2.5	2.7	2.3	2.3	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.7
27-Aug	2.1	2.1	2.2	2.4	2.5	Z	2.7	2.9	3.1	3.2	2.7	2.4	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.3	2.5	2.2	2.2	2.4	3.2
28-Aug	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.2	2.4	2.1	2.4
29-Aug	2.4	Z	2.3	2.3	2.1	2.1	2.1	2.3	2.3	2.8	3.4	2.3	2.5	2.3	2.2	2.1	2.0	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.3	3.4
30-Aug	2.0	2.0	Z	2.1	2.1	2.2	2.2	2.2	2.2	2.5	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.3	2.4	2.4	2.1	2.5
31-Aug	2.3	2.4	2.4	Z	2.5	2.5	2.6	2.5	2.5	2.5	2.3	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.1	2.1	2.2	2.6
	2.2	2.2	2.3	2.2	2.3	2.3	2.3	2.3	2.4	2.4	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2	Diurnal Average	
	2.5	2.5	2.8	2.6	2.7	2.8	2.8	2.9	3.1	3.9	3.5	3.2	2.5	2.3	2.2	2.4	2.4	2.3	2.3	2.5	2.6	2.9	2.4	2.4	Diurnal Maximum	

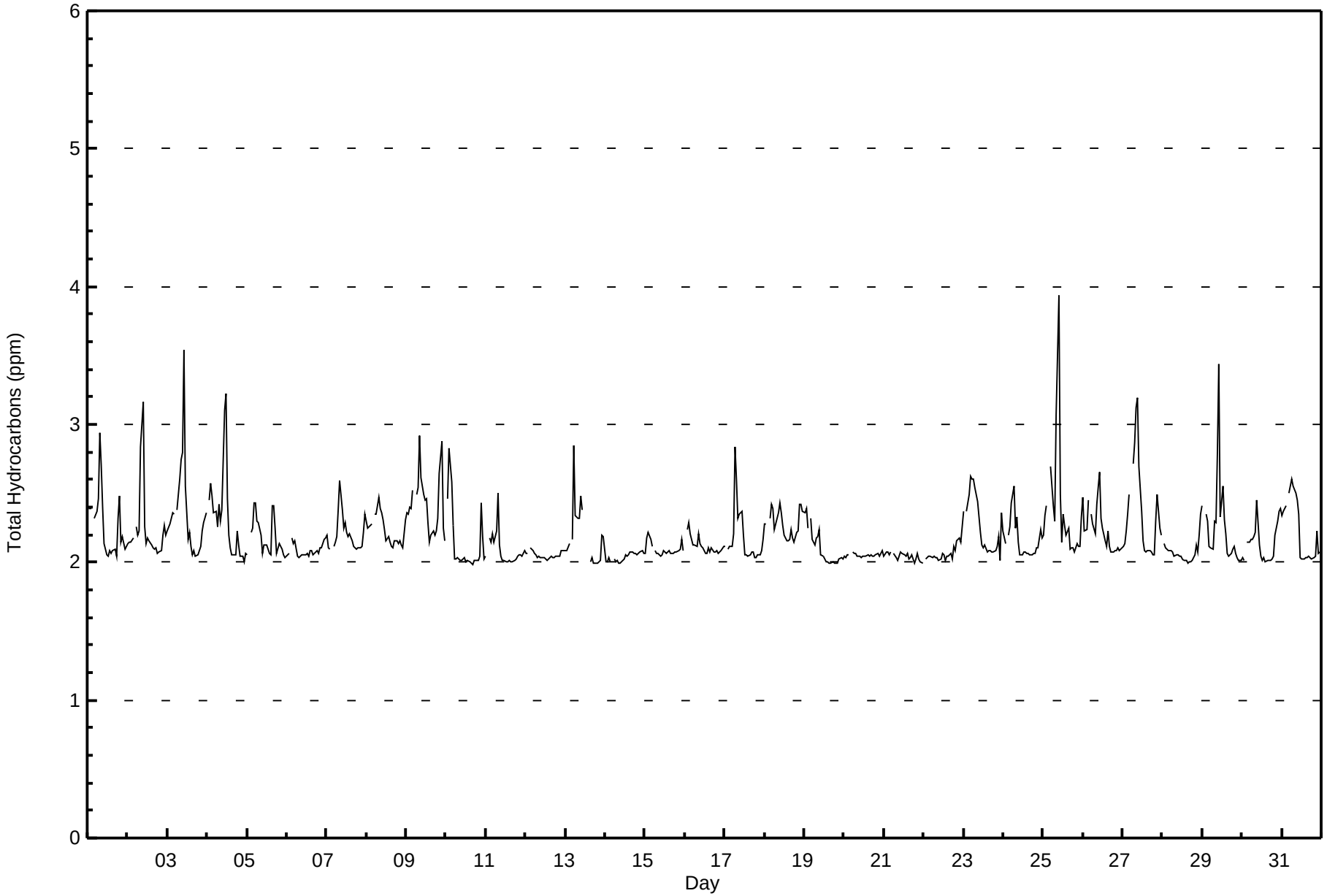
Z - zerospan C - Calibration

Wood Buffalo Environmental Association

Hourly Averages

Total Hydrocarbons (THC) - ppm

Barge Landing - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm

Barge Landing - August 2015

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	170	23.98	23.98
2.1 - 3.0	530	74.75	98.73
3.1 - 10.0	9	1.27	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Total Hydrocarbons (THC) - ppm

Barge Landing - August 2015

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	2	1	0	0	4	4	7	5	4	13	33	55	21	12	7	2	170
2.1 - 3.0	20	7	8	13	24	29	47	45	43	64	38	47	21	26	44	53	529
3.1 - 10.0	1	3	0	0	0	0	0	0	2	1	1	0	0	0	0	1	9
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	23	11	8	13	28	33	54	50	49	78	72	102	42	38	51	56	708

Total Number of Valid Hours: 708

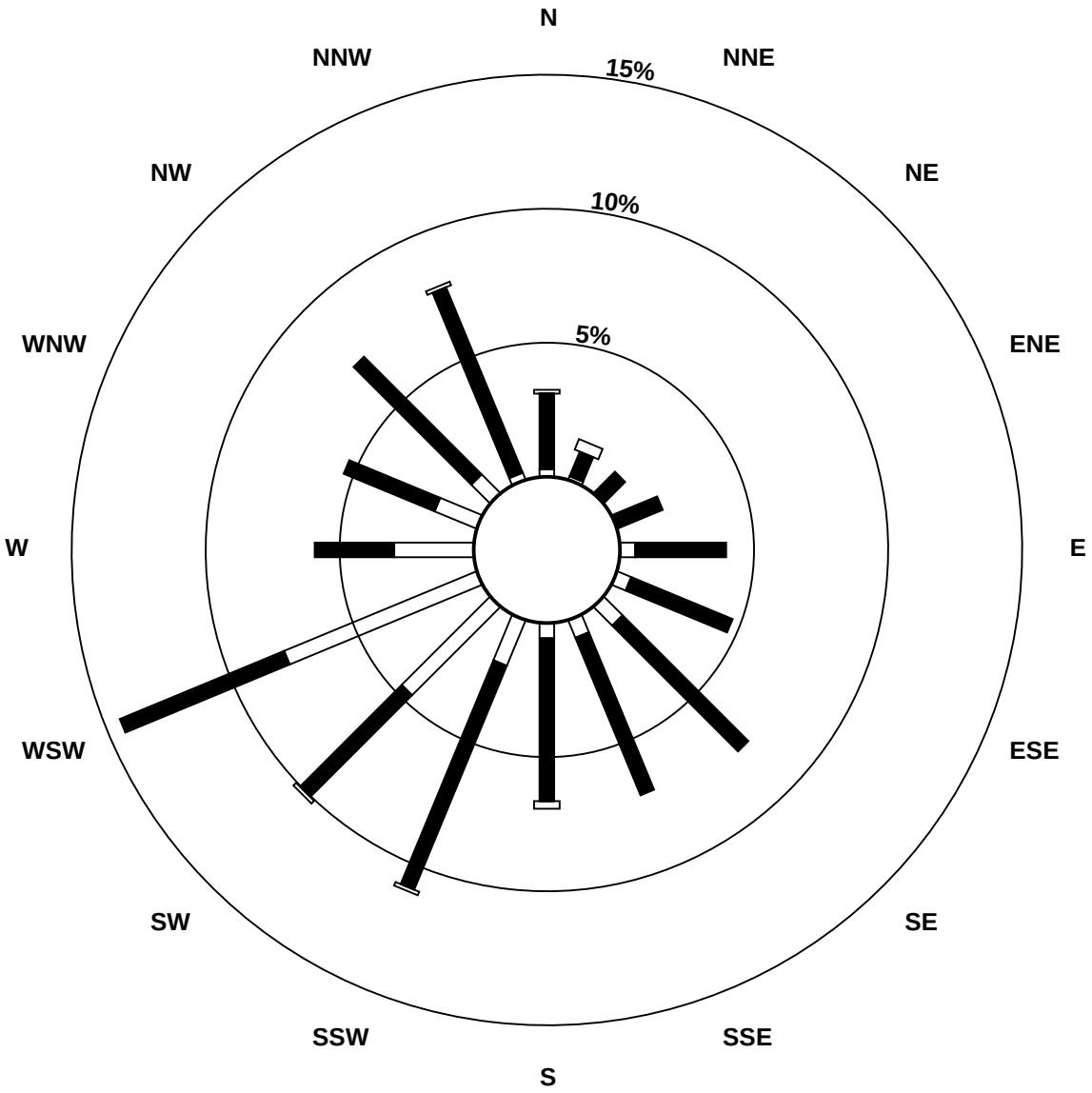
Total Number of Hours: 744

Wood Buffalo Environmental Association

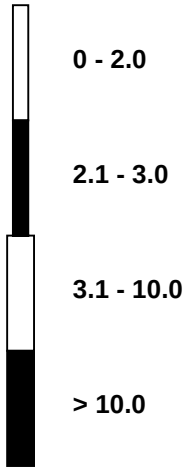
Wind Rose Aug 2015

Total Hydrocarbons (THC) - ppm

Barge Landing (AMS 9)



Classes (ppm)



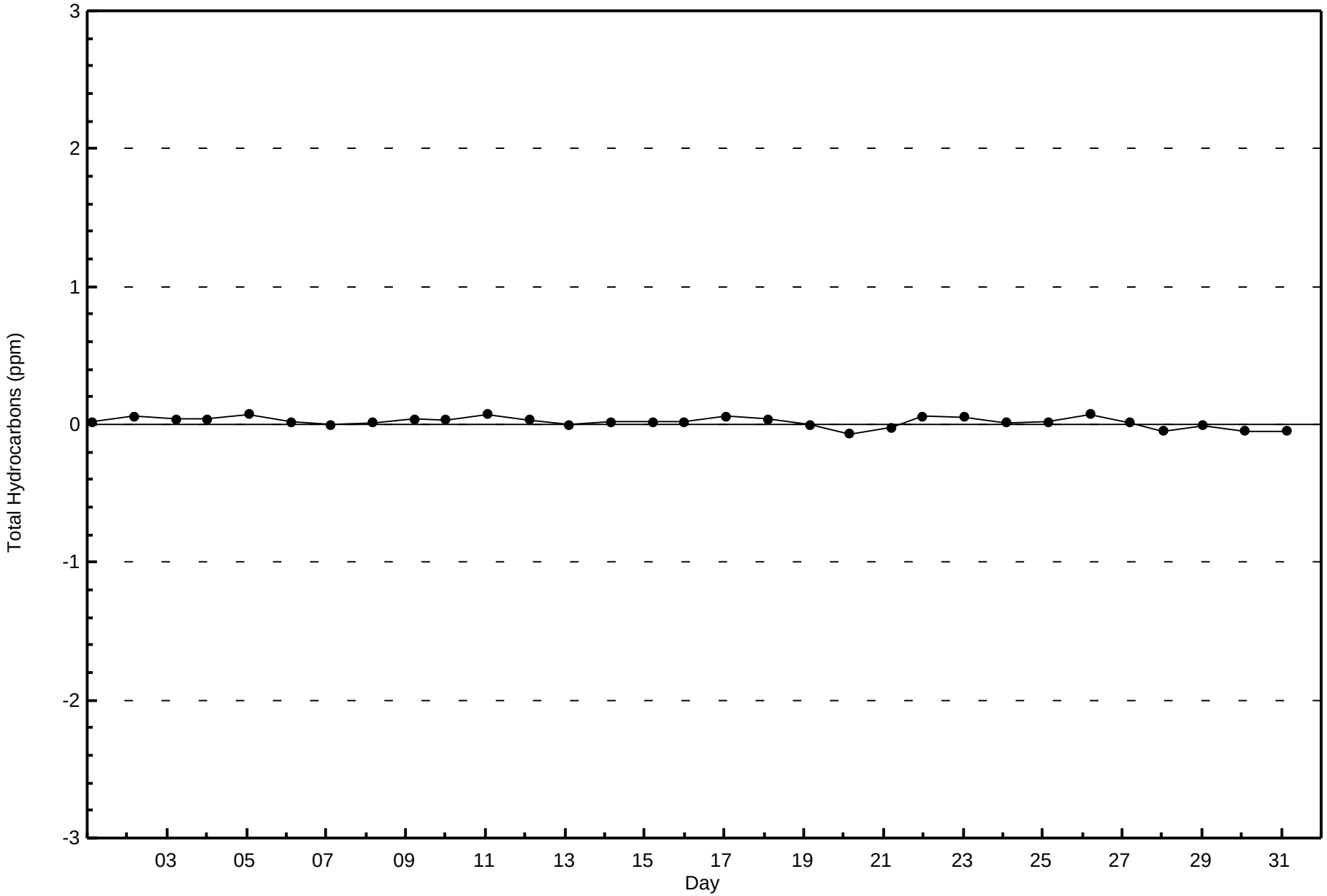
Total Number of Valid Hours: 708

Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Barge Landing - August 2015

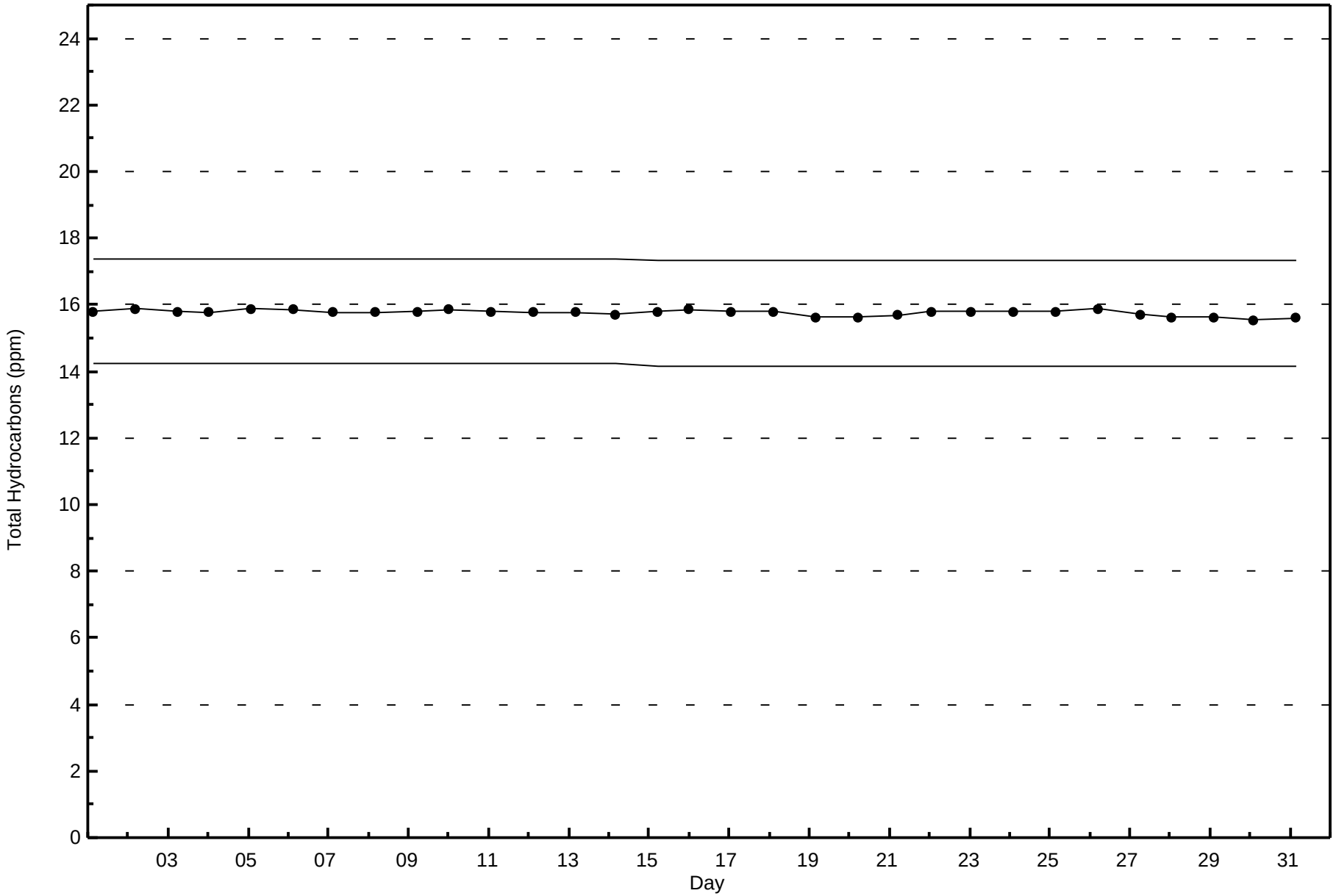


Wood Buffalo Environmental Association

Span Responses

Total Hydrocarbons (THC) - ppm

Barge Landing - August 2015



Maximum Value: 30.2 C on Aug 10 16:00

Maximum Daily Average: 23.8 C on Aug 10

Minimum Value: 1.7 C on Aug 23 05:00

Minimum Daily Average: 10.5 C on Aug 21

Maximum Diurnal Average: 22.7 C at hour 15

Minimum Diurnal Average: 12.0 C at hour 6

Monthly Average: 17.41 C

Percentiles: P_1 = 5.6 P_{10} = 10.7 Q_1 = 13.8 Median = 17.2 Q_3 = 21.3 P_{90} = 24.7 P_{99} = 28.3

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

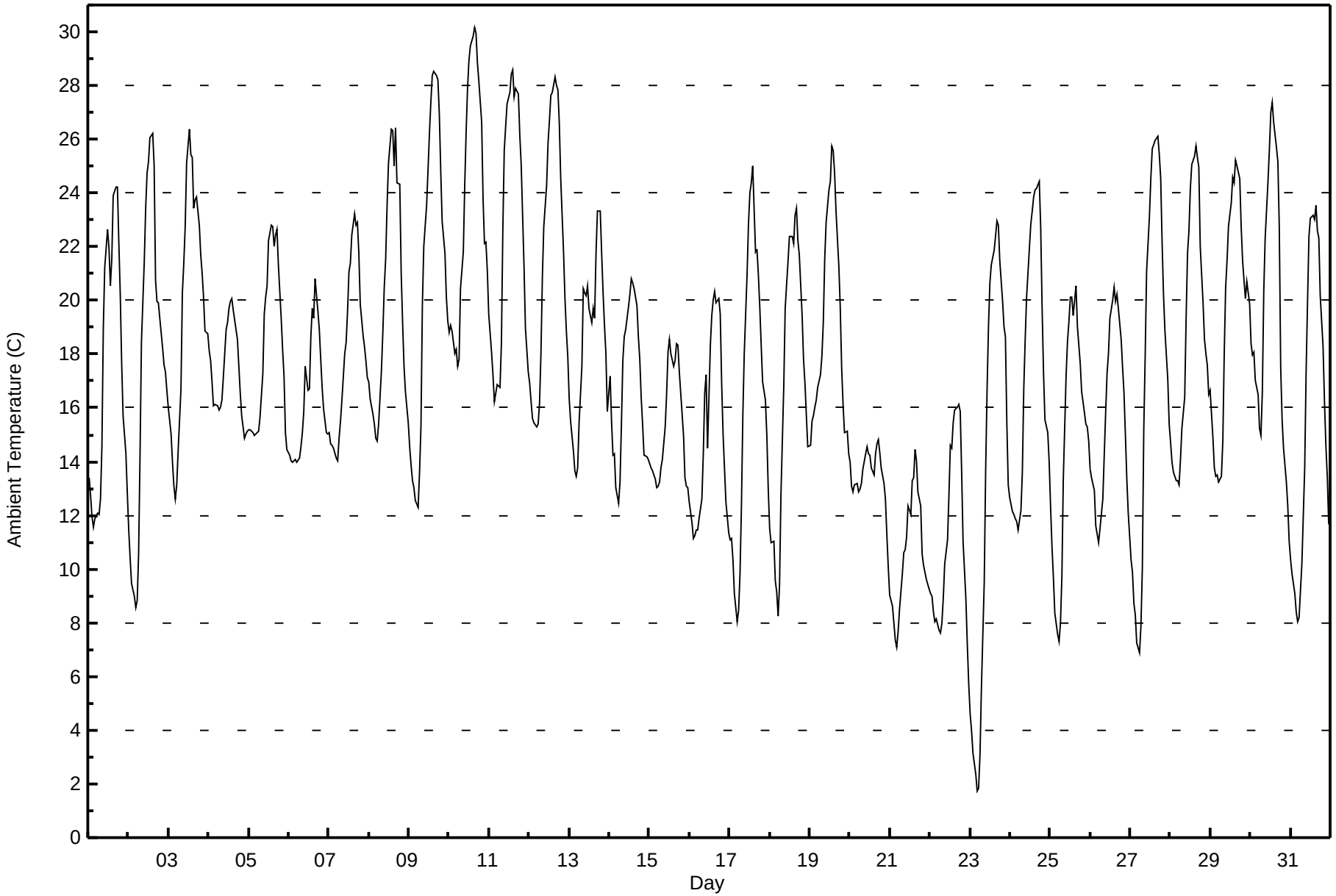
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	13.4	12.7	12.0	11.6	11.9	12.1	12.0	12.6	14.6	19.0	21.2	22.7	21.9	20.6	21.5	23.9	24.2	24.2	22.1	20.2	17.7	15.7	14.3	12.8	17.3	24.2
2-Aug	11.4	10.4	9.4	9.0	8.6	8.8	10.6	14.2	18.5	21.4	23.4	24.7	25.2	26.1	26.2	25.0	20.7	20.0	19.9	19.3	18.2	17.6	17.3	16.6	17.6	26.2
3-Aug	16.0	15.0	14.0	13.1	12.6	13.1	14.4	16.7	20.3	21.4	22.8	25.1	26.4	25.4	25.3	23.4	23.8	23.9	22.8	21.7	21.0	20.1	18.9	18.7	19.8	26.4
4-Aug	18.1	17.7	17.0	16.1	16.1	16.1	15.9	16.0	16.3	17.1	18.9	19.2	19.7	19.9	20.1	19.6	18.9	18.5	17.6	16.5	15.7	14.8	15.0	15.2	17.3	20.1
5-Aug	15.2	15.2	15.1	15.0	15.0	15.1	15.1	15.7	17.3	19.5	20.1	20.5	22.2	22.8	22.7	22.0	22.4	22.7	21.3	19.3	18.2	17.2	15.1	14.4	18.3	22.8
6-Aug	14.2	14.0	14.0	14.0	14.1	14.0	14.2	14.6	15.1	15.9	17.5	16.7	16.7	18.7	19.7	19.3	20.8	19.6	18.9	17.8	16.8	15.9	15.1	15.0	16.4	20.8
7-Aug	15.1	14.7	14.6	14.5	14.1	14.1	14.9	15.5	16.3	18.0	18.5	19.6	21.1	21.4	22.4	23.2	22.8	22.9	21.7	19.9	18.7	18.3	17.8	17.1	18.2	23.2
8-Aug	16.9	16.4	15.8	15.4	14.9	14.7	15.4	17.4	18.8	20.5	21.5	23.5	25.1	26.4	26.3	25.0	26.4	24.4	24.3	21.0	19.2	17.6	16.6	15.5	20.0	26.4
9-Aug	14.6	13.9	13.3	13.0	12.6	12.3	13.6	15.3	19.8	22.0	23.5	24.9	26.2	27.4	28.4	28.5	28.4	28.2	27.0	24.9	23.0	21.8	20.1	19.2	20.9	28.5
10-Aug	18.8	19.1	18.8	18.0	18.2	17.6	17.8	20.4	21.8	24.3	26.3	27.9	28.9	29.5	29.9	30.2	29.9	28.8	28.2	26.7	23.8	22.1	22.2	21.1	23.8	30.2
11-Aug	19.5	18.1	17.2	16.2	16.5	16.9	16.8	18.4	22.6	25.6	26.5	27.3	27.7	28.4	28.6	27.6	27.9	27.7	26.2	25.1	23.2	21.3	19.0	17.3	22.6	28.6
12-Aug	16.9	16.2	15.6	15.4	15.3	15.4	16.2	18.0	20.9	22.8	24.3	25.8	26.7	27.7	27.7	28.3	28.0	27.8	26.6	24.5	21.8	20.1	18.9	17.9	21.6	28.3
13-Aug	16.3	15.5	14.4	13.6	13.5	13.7	15.4	17.5	20.4	20.3	20.2	20.6	19.7	19.2	19.7	19.4	21.8	23.3	23.3	21.8	20.3	19.1	18.0	15.9	18.5	23.3
14-Aug	17.2	15.5	14.2	14.3	13.0	12.4	13.3	15.4	17.8	18.7	18.9	19.8	20.2	20.8	20.7	20.4	19.8	18.7	17.8	16.4	15.4	14.2	14.2	14.1	16.8	20.8
15-Aug	13.9	13.7	13.7	13.4	13.1	13.1	13.2	13.7	14.1	15.3	16.5	18.1	18.5	18.0	17.5	17.8	18.4	18.4	17.3	16.5	15.0	13.4	13.1	13.0	15.4	18.5
16-Aug	12.5	11.7	11.2	11.3	11.4	11.4	11.9	12.6	14.3	16.6	17.2	14.5	18.4	19.4	20.0	20.3	19.9	20.1	19.5	16.9	15.0	13.8	12.5	11.3	15.2	20.3
17-Aug	11.1	11.1	10.4	9.1	8.1	8.4	9.8	12.3	15.7	18.0	21.0	22.9	24.0	24.4	25.0	21.8	21.9	21.0	19.7	18.3	17.0	16.3	15.0	13.0	16.5	25.0
18-Aug	11.5	11.0	11.0	9.5	9.1	8.3	9.4	12.8	16.8	19.7	20.6	21.4	22.4	22.4	22.1	23.2	23.4	22.2	21.7	19.5	17.8	16.9	15.7	14.6	16.8	23.4
19-Aug	14.6	15.5	15.7	16.0	16.3	16.8	17.3	17.9	19.2	21.6	22.9	24.1	24.4	25.8	25.6	24.7	23.3	21.3	19.8	17.5	16.1	15.1	15.2	14.3	19.2	25.8
20-Aug	14.0	13.1	12.9	13.2	13.2	12.9	13.0	13.2	13.7	14.3	14.5	14.3	14.2	13.8	13.5	14.3	14.7	14.8	14.3	13.8	13.2	12.6	11.3	10.1	13.4	14.8
21-Aug	9.0	8.6	8.0	7.4	7.1	7.7	8.5	9.8	10.6	10.7	11.2	12.3	12.0	13.3	13.4	14.4	14.0	12.9	12.3	10.5	10.1	9.9	9.6	9.2	10.5	14.4
22-Aug	9.1	9.0	8.4	8.0	8.2	7.7	7.6	8.0	8.9	10.2	11.1	12.7	14.6	14.5	15.4	15.9	16.0	16.1	15.9	13.6	11.0	8.9	7.2	5.7	11.0	16.1
23-Aug	4.6	4.0	3.1	2.4	1.7	1.8	3.1	5.6	9.5	13.7	16.7	19.0	20.6	21.3	21.9	22.4	23.0	22.8	21.5	20.0	19.0	18.6	15.4	13.1	13.5	23.0
24-Aug	12.7	12.1	12.0	11.9	11.8	11.4	12.2	13.6	16.7	18.5	20.1	22.0	22.9	23.3	23.9	24.1	24.2	24.4	22.7	19.7	17.3	15.5	15.1	14.0	17.6	24.4
25-Aug	12.3	10.8	9.7	8.3	7.6	7.3	8.0	9.7	13.4	17.3	18.5	19.2	20.1	20.1	19.4	20.5	19.0	18.3	17.6	16.6	15.8	15.4	15.3	14.8	14.8	20.5
26-Aug	13.7	13.4	12.9	11.6	11.3	11.0	11.5	12.6	14.3	15.8	17.3	18.0	19.4	20.0	20.5	20.0	20.2	19.7	18.5	17.5	16.5	15.0	13.3	12.1	15.7	20.5
27-Aug	10.4	9.9	8.7	8.3	7.3	6.9	7.9	10.1	15.2	17.9	21.1	23.1	24.6	25.6	25.8	26.0	26.1	25.4	24.5	22.1	20.2	18.9	17.1	15.4	17.4	26.1
28-Aug	14.7	14.0	13.6	13.3	13.3	13.1	14.1	15.2	16.4	19.3	21.8	22.6	24.1	25.1	25.4	25.8	25.3	25.0	22.0	19.9	18.5	18.0	17.6	16.5	18.9	25.8
29-Aug	16.6	14.9	13.8	13.5	13.5	13.2	13.4	14.8	18.0	20.5	21.5	22.8	23.7	24.6	24.4	25.2	25.0	24.5	22.7	21.5	20.8	20.1	20.7	19.9	19.6	25.2
30-Aug	18.4	18.0	18.1	17.0	16.5	15.3	15.0	16.6	20.3	22.3	24.4	25.7	27.0	27.4	26.6	25.7	25.2	22.7	17.5	15.6	14.5	13.3	12.4	11.0	19.4	27.4
31-Aug	10.3	9.8	9.1	8.4	8.0	8.2	9.2	10.2	13.8	17.3	19.9	22.4	23.1	23.2	23.0	23.5	22.6	22.3	20.2	18.3	16.2	14.6	13.5	11.7	15.8	23.5
	14.0	13.4	12.8	12.3	12.1	12.0	12.6	14.1	16.5	18.6	20.0	21.1	22.0	22.5	22.7	22.6	22.5	22.0	20.8	19.1	17.6	16.5	15.6	14.5	Diurnal Average	
	19.5	19.1	18.8	18.0	18.2	17.6	17.8	20.4	22.6	25.6	26.5	27.9	28.9	29.5	29.9	30.2	29.9	28.8	28.2	26.7	23.8	22.1	22.2	21.1	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature (AT) - C

Barge Landing - August 2015



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	62	8.33	8.33
10 - 20	446	59.95	68.28
> 20	236	31.72	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Barge Landing - August 2015

Maximum Value: 99 % on Aug 1 05:00

Maximum Daily Average: 85.7 % on Aug 6

Minimum Value: 25 % on Aug 31 16:00

Minimum Daily Average: 48.0 % on Aug 12

Maximum Diurnal Average: 87.8 % at hour 6

Minimum Diurnal Average: 46.0 % at hour 16

Monthly Average: 66.9 %

Percentiles: P_1 = 29 P_{10} = 38 Q_1 = 51 Median = 67 Q_3 = 82 P_{90} = 96 P_{99} = 98

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

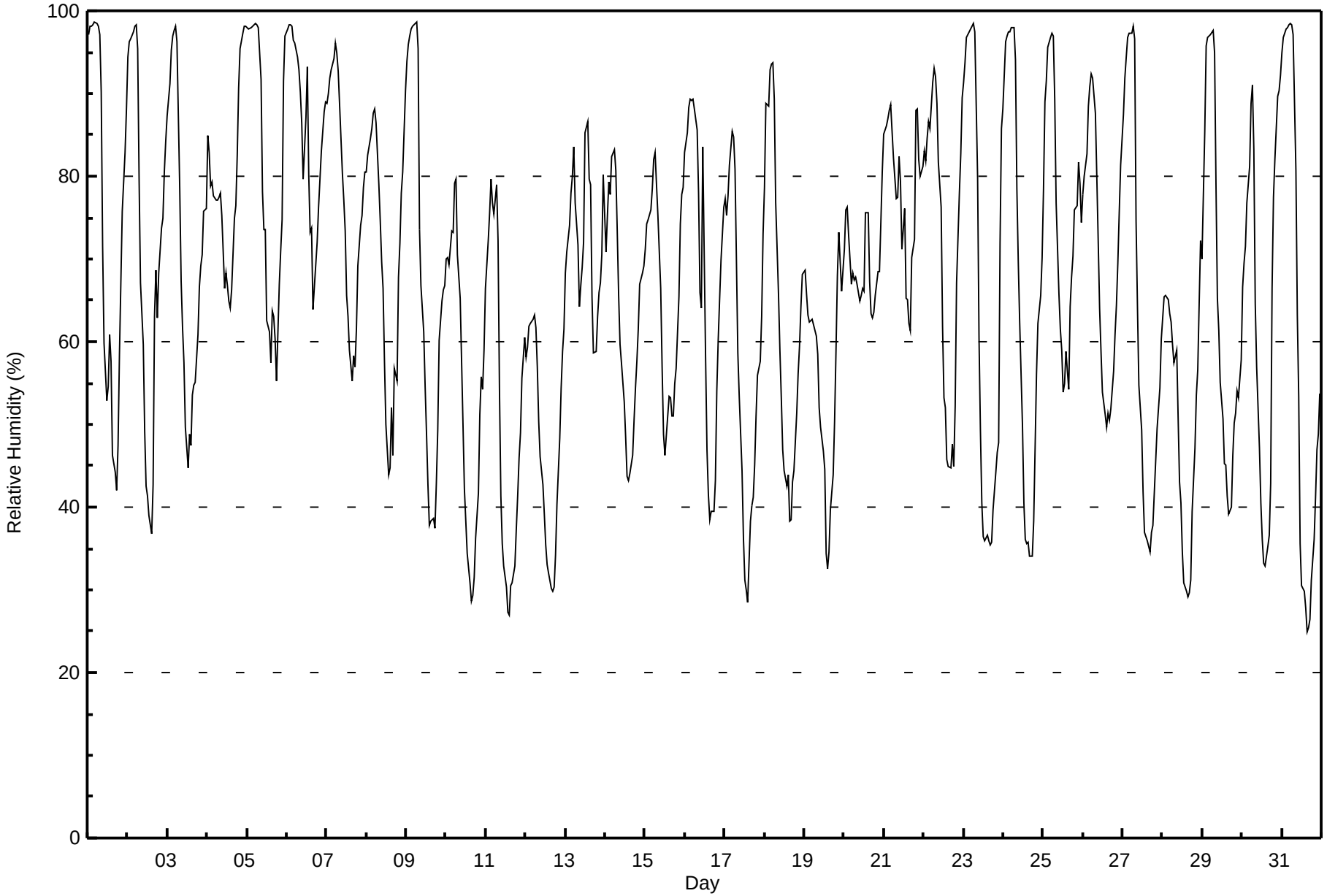
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	97	98	98	98	99	99	98	97	90	72	60	53	55	61	58	46	44	42	47	59	67	76	83	88	74.3	99
2-Aug	94	96	97	97	98	98	95	80	67	60	49	43	41	39	37	43	63	69	63	68	74	75	81	84	71.3	98
3-Aug	87	91	95	97	98	98	96	79	67	62	57	50	45	49	47	54	55	55	61	67	69	71	76	76	70.9	98
4-Aug	85	83	79	79	78	77	77	77	78	75	66	68	67	65	64	66	75	76	83	91	95	97	98	98	79.1	98
5-Aug	98	98	98	98	98	98	98	98	92	78	74	74	63	61	57	64	63	60	55	67	71	75	92	97	80.3	98
6-Aug	98	98	98	98	96	96	94	93	90	86	80	87	93	80	73	74	64	69	72	76	80	83	88	89	85.7	98
7-Aug	89	90	92	93	94	96	95	93	89	80	77	73	66	63	59	55	58	57	62	69	74	75	79	81	77.4	96
8-Aug	80	83	85	86	88	88	86	79	74	70	67	58	50	44	45	52	46	57	55	68	72	78	81	90	70.0	90
9-Aug	94	96	97	98	98	98	99	95	74	67	61	55	49	43	38	38	39	38	43	49	60	65	66	67	67.7	99
10-Aug	70	70	69	73	73	79	80	71	65	58	50	42	38	34	31	29	29	32	36	42	51	56	54	59	53.8	80
11-Aug	66	72	76	80	77	75	79	72	54	41	36	33	30	27	27	30	31	33	37	41	46	49	56	60	51.2	80
12-Aug	58	59	62	62	63	63	62	57	50	46	43	39	35	33	32	30	30	30	34	40	48	54	59	62	48.0	63
13-Aug	68	71	74	78	80	83	77	72	64	67	69	72	85	87	80	79	65	59	59	63	66	67	71	80	72.3	87
14-Aug	71	75	79	78	82	83	81	73	66	60	57	53	48	44	43	44	46	50	54	58	62	67	68	69	63.0	83
15-Aug	71	74	75	76	78	82	83	79	75	66	57	49	46	49	53	53	51	51	55	57	65	74	78	79	65.7	83
16-Aug	83	85	88	89	89	89	88	86	78	66	64	84	58	47	42	39	40	39	43	54	60	65	70	76	67.6	89
17-Aug	77	75	78	81	85	85	81	70	59	53	44	36	31	30	28	38	40	41	45	51	56	58	63	73	57.5	85
18-Aug	79	89	88	93	93	94	89	77	66	59	53	47	44	42	44	38	38	43	44	51	56	59	64	68	63.4	94
19-Aug	69	66	63	62	63	63	61	61	59	52	50	47	45	34	33	34	40	44	50	59	68	73	66	69	55.4	73
20-Aug	71	76	76	73	67	68	67	68	67	65	66	66	66	76	76	67	63	63	64	66	69	69	74	80	69.3	80
21-Aug	85	86	87	88	89	85	82	77	77	82	79	71	76	65	65	62	61	70	72	88	88	82	80	81	78.4	89
22-Aug	83	82	85	87	86	91	93	92	89	82	76	62	53	52	46	45	45	48	45	52	67	78	83	89	71.2	93
23-Aug	91	94	97	97	98	98	98	97	80	61	49	40	36	36	37	36	35	36	40	44	47	48	72	86	64.7	98
24-Aug	88	96	97	97	97	98	98	94	78	70	62	50	40	36	36	36	34	34	38	47	56	62	66	70	65.9	98
25-Aug	79	89	91	96	97	97	97	89	77	66	61	59	54	55	59	54	64	68	70	76	76	82	79	74	75.4	97
26-Aug	78	80	83	88	91	92	92	88	80	72	64	59	54	51	50	51	50	52	56	61	64	69	76	81	70.1	92
27-Aug	87	92	94	97	97	97	98	97	75	64	55	49	42	37	37	36	35	37	38	42	46	49	54	60	63.1	98
28-Aug	63	65	66	65	63	62	60	57	59	51	43	40	35	31	30	29	30	31	39	47	53	57	65	72	50.6	72
29-Aug	70	86	96	97	97	97	98	95	79	65	61	55	51	45	45	41	39	40	46	50	51	54	53	58	65.4	98
30-Aug	67	69	71	77	81	89	91	83	65	57	47	41	36	33	33	35	37	43	66	78	82	90	90	92	64.7	92
31-Aug	95	97	98	98	98	98	98	97	81	63	53	36	31	30	28	25	25	26	31	36	41	47	49	54	59.8	98
	80.4	83.3	84.9	86.4	86.8	87.8	86.9	82.0	73.0	65.0	59.1	54.5	50.4	47.7	46.1	46.0	46.4	48.2	51.8	58.6	63.9	67.9	72.0	76.3	Diurnal Average	
	98	98	98	98	99	99	99	98	92	86	80	87	93	87	80	79	75	76	83	91	95	97	98	98	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity (RH) - %

Barge Landing - August 2015



Maximum Speed: 20 km/h on Aug 11 14:00

Maximum Daily Speed Average: 9.0 km/h on Aug 14

Minimum Speed Value: 0 km/h on Aug 9 02:00

Minimum Daily Speed Average: 0.7 km/h on Aug 9

Maximum Diurnal Speed Average: 4.9 km/h at hour 14

Minimum Diurnal Speed Average: 1.0 km/h at hour 24

Monthly Average Velocity: 2.6 km/h 230.4 deg

Percentiles: P_1 = 1 P_{10} = 2 Q_1 = 3 Median = 5 Q_3 = 8 P_{90} = 11 P_{99} = 16

Hours in Service: 744

Hours of Data: 742

Hours of Missing Data: 2

Percent Operational Time: 99.7

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Aug	W2	WSW2	SW3	NW3	NNW4	NW4	WNW3	WNW3	WNW3	W3	WNW4	NW3	NW6	WNW5	NW6	NW6	NW6	NW6	NNE6	NNW4	NNW4	WNW4	WNW3	WNW2	NW3.5	NW6
2-Aug	WSW2	SW1	S2	S1	SSW3	SSE2	SSW3	WSW3	WSW4	SW5	SSW5	SSW4	SSW6	SSW4	SSW2	NNW6	NW6	S8	ESE6	WSW3	W3	ENE2	SW3	ESE1	SW2.1	S8
3-Aug	SE1	NW1	AF	SE1	NNW2	NNW2	ESE0	SE2	NW2	NNE4	NNE5	NNE5	NE5	NNE3	ESE5	ESE6	ESE6	SE9	SE5	SE4	E4	E2	ENE3	NE2	E2.2	SE9
4-Aug	NNW2	NNW4	NNW3	NNW2	NNW4	NNW5	NNW4	NNW3	NW3	NNW4	NNE6	NE6	NE5	ENE6	E6	E6	ESE5	ESE6	E4	E5	SE9	ESE5	E3	ENE3	NE2.4	SE9
5-Aug	NE3	NE3	NE5	ENE3	N3	N3	NE2	ENE4	E4	ESE3	NNE1	SW5	NNE2	SSW6	SE5	SW6	W3	N1	SE10	SSE9	SSE8	SE7	SE6	ESE2	SE2.0	SE10
6-Aug	E3	E3	E3	ENE4	E5	E5	E4	E5	ESE8	ESE11	SE9	SSE5	SE3	ESE7	ENE7	ENE6	ESE8	ESE8	SE8	SE6	ESE6	ESE4	E3	E3	ESE5.2	ESE11
7-Aug	ESE5	SE4	ESE5	ESE3	E2	E1	WNW1	NNW3	N3	WNW4	NW4	NW4	NNW4	NE4	SE5	ENE3	E4	ESE4	SE6	SE5	SE5	S3	ESE3	SE6	ESE1.7	SE6
8-Aug	SSE9	SSE5	SE7	SE5	ESE4	SE5	SE5	S6	S5	SW5	NW3	W4	WSW5	WSW5	W4	W5	WSW4	NW3	ENE5	E7	ESE1	E1	ESE2	E1	S1.9	SSE9
9-Aug	E2	NE0	NW0	NW2	NNW1	AF	NW1	WSW2	W3	NW3	WNW5	NW4	NW5	WNW4	WSW5	W6	SSE3	N1	ENE3	ENE3	E3	E4	SE4	SSE5	WNW0.7	W6
10-Aug	SSE5	NW7	ESE2	S4	WSW10	WSW7	SW5	SW8	SW9	SW10	WSW10	SW11	SW13	WSW14	WSW13	SW12	SW10	WSW8	WSW5	SSW3	SSE3	S6	SSW6	SSW6	SW7.0	WSW14
11-Aug	S5	S4	SSW4	S4	S4	S5	SSE2	S4	SSW8	SW11	WSW17	WSW15	WSW19	WSW20	WSW19	WSW14	WSW12	WSW11	W6	SW4	SW6	W5	SSW2	SSW4	SW7.7	WSW20
12-Aug	SSW5	SSW5	SSW4	SSW5	SSW6	SW6	SW8	SW7	SW7	SW10	WSW11	SW11	WSW11	WSW9	SW10	SW10	SW10	WSW11	WSW11	WSW8	SW5	WSW6	SW2	WSW4	SW7.4	WSW11
13-Aug	SSE1	SSW4	S4	S4	SSW4	S3	SSW6	SSW6	SSW5	SSE7	S6	SSE3	S3	SSW5	WSW10	S9	SSW9	SW10	SSW7	SSW7	SSW5	SSW5	SSW4	SSW2	SSW5.1	SW10
14-Aug	W7	WSW3	SW6	WSW10	SW7	WSW8	WSW8	WSW10	W10	W13	W12	W12	W14	WNW12	WNW13	WNW14	WNW12	WNW12	WNW9	WNW8	WNW7	WSW7	WSW9	W7	W9.0	W14
15-Aug	WNW6	NW7	NW6	NW6	NNW6	N9	N8	NNW10	NNW10	N10	N11	N11	N11	N11	NNW9	NNW9	NNW8	NNW7	NNW7	NNW7	NNW5	NW5	NNW4	NNW3	NNW7.5	N11
16-Aug	W2	WSW4	WSW4	WSW4	WSW3	W4	W4	W2	SSE0	WSW3	NW3	S5	S5	SW1	NNW4	NW6	NW7	WSW5	WSW5	SW4	SSW2	WSW2	WSW2	S2	WSW2.7	NW7
17-Aug	SE3	SW4	SSW3	S3	SSE4	S5	SSW7	SSW7	SSW8	S7	SSW8	S9	SSW9	SW7	WSW7	NNW5	NW4	W4	WNW4	NW3	S2	S4	S1	ESE2	SSW3.7	SSW9
18-Aug	N1	NNW2	W1	SW3	WSW4	WSW3	W4	W3	NNW2	WNW4	N4	ESE2	NW3	SW4	SE3	SE3	SSE8	SE7	SSE6	SE5	SSE5	SSE6	SE6	SE7	S1.8	SSE8
19-Aug	SE7	SE9	SSE11	SSE11	SSE10	SSE11	SSE13	SSE13	S12	SSW12	WSW11	WSW12	WSW11	WSW12	WSW12	WSW15	WSW14	W15	WNW11	W12	WSW8	WSW7	WSW9	WSW7	SW7.6	WSW15
20-Aug	WSW8	SW8	WSW8	WSW9	WSW10	WSW12	WSW11	W10	W10	W12	W12	W10	W10	W9	W9	W8	WNW9	WNW7	WNW7	W7	WSW8	WNW6	WSW6	WSW6	W8.6	W12
21-Aug	SW6	SW7	WSW8	SW7	SW7	SW8	WSW6	W7	WNW7	WNW7	NW6	WNW7	NW7	NW10	NW7	NW7	NW7	WNW6	WNW6	WNW4	NW5	WNW6	WNW6	W4	WNW5.5	NW10
22-Aug	WSW4	WSW6	SSW3	S3	WSW5	WSW5	WSW7	WSW7	WSW7	WSW10	WSW6	NW8	NNW6	NNE5	NW8	NNW7	NNW4	N2	NNW2	N0	SE2	SE4	ESE1	SE3	W2.7	WSW10
23-Aug	SE3	S3	SSE3	SSE2	SSE2	S3	SSE2	S3	SSW4	S5	S6	SSE9	SSE10	S8	SSE9	SSE9	SSE9	SSE10	SE7	SE9	SE11	S5	NNW5	E5	SSE5.1	SE11
24-Aug	SE3	W3	S2	SE6	SW2	SSW4	SSW5	SSW6	SSW8	SSW9	WSW8	SW9	SW11	WSW10	WSW10	SW8	SW9	SW7	SSW4	SSW3	WSW3	NNW4	NNW5	NNW5	SW4.6	SW11
25-Aug	NW4	NW4	NW2	W2	WSW3	WSW1	SW3	W2	N3	NNW5	NW7	NW8	N6	NNW7	NNW6	NNW5	NW6	NW4	NNW4	NNW3	NNW4	NNW4	NNW6	N7	NNW3.9	NW8
26-Aug	N4	N5	N3	NNW2	NNW2	WSW1	SSW2	NW3	NW3	NNW3	N3	NNW2	WSW3	SSW3	SSW6	S5	SW6	SSW5	SSW3	SSW4	SSW4	SSW4	SSW2	WNW2	WSW1.3	SW6
27-Aug	SSW2	SW5	SSW3	SW4	S3	SSE3	SSW2	SSE3	S5	S6	SSW8	S9	S10	SSW12	SW12	SSW13	SW13	SW13	SW7	SSW7	S7	SSW6	S4	S5	SSW6.4	SW13
28-Aug	SSE4	S3	S5	S5	SSW5	SSW5	SW5	SSW7	SSW7	SW10	SW14	WSW15	WSW13	SW15	SW13	WSW12	WSW11	WSW9	SSE1	E2	SSE2	WSW1	N4	NW5	SW6.1	WSW15
29-Aug	NW6	SW1	SW1	SE3	SW4	SSW1	SSE3	SSW5	SW5	SSW6	SSW7	SSW8	SSE8	SSE8	SSE6	SSE7	SSE7	SSE8	ESE6	ESE8	ESE10	SE7	SE11	S5	SSE4.4	SE11
30-Aug	E5	SE3	NNW2	NNW4	NNE2	NNW3	NNW3	NW2	SW7	WSW7	W6	W5	WSW5	SW10	SSW8	SW5	W10	SW3	SE14	SSE6	SSE6	SE5	SE4	ESE4	SSW2.4	SE14
31-Aug	ESE5	SE5	SE3	SE3	SE4	SE4	SSE3	SSE5	SSE8	SSE10	S10	SW15	WSW17	SW15	SW14	WSW16	SW16	SW14	SW9	SW8	SSW6	SSW4	SSW4	S3	SSW6.6	WSW17
	S1.2	SW1.6	SSW1.6	SSW1.9	SW2.1	SW2.2	SW2.5	SW2.8	SW3.2	SW4.0	WSW4.2	WSW4.5	WSW4.6	WSW4.9	WSW4.5	WSW4.2	WSW4.2	WSW3.6	SSW1.7	SSW1.8	S2.2	SSW1.8	SSW1.0	S1.0		Diurnal Average	
	SSE9	SE9	SSE11	SSE11	WSW10	WSW12	SSE13	SSE13	S12	W13	WSW17	SW15	WSW19	WSW20	WSW19	WSW16	SW16	W15	SE14	W12	SE11	WSW7	SE11	SE7		Diurnal Maximum	

AF - Analyzer Failure

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

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Speed (WS) - km/h

Barge Landing - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 7 km/h on Aug 11 13:00

Minimum Value: 1 km/h on Aug 27 05:00

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

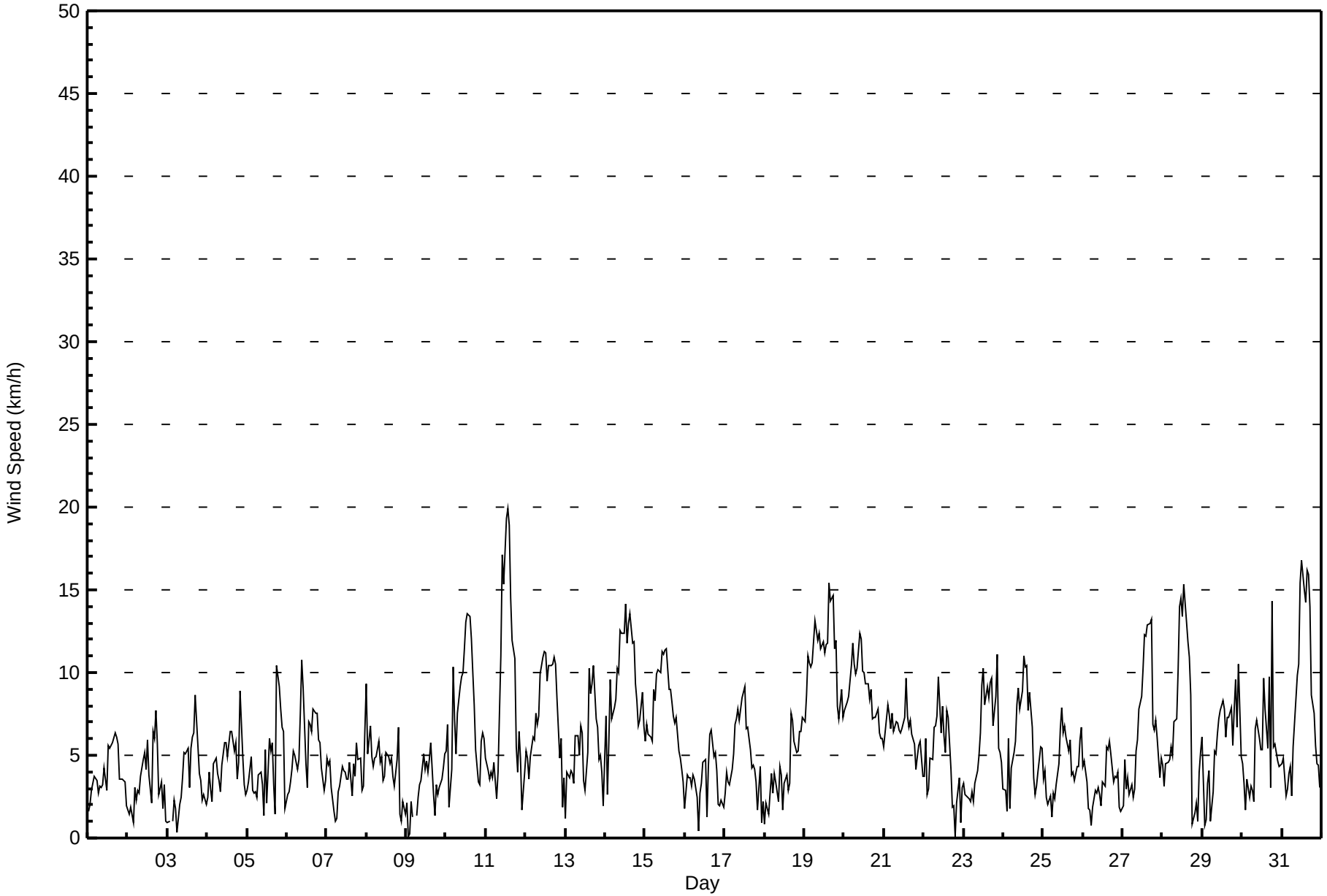
AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed (WS) - km/h

Barge Landing - August 2015



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	407	54.85	54.85
6 - 11	282	38.01	92.86
12 - 19	52	7.01	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: 742

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Wind Speed (WS) - km/h

Barge Landing - August 2015

Wind Speed Ranges (km/h)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 5	15	8	9	10	26	22	32	26	39	48	26	35	21	17	28	45	407
6 - 11	9	3	0	3	3	13	22	27	14	30	38	49	16	16	24	15	282
12 - 19	0	0	0	0	0	0	1	2	1	3	12	20	8	5	0	0	52
20 - 28	0	0	0	0	0	0	0	0	0	0	0	1	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	24	11	9	13	29	35	55	55	54	81	76	105	45	38	52	60	742

Total Number of Valid Hours: 742

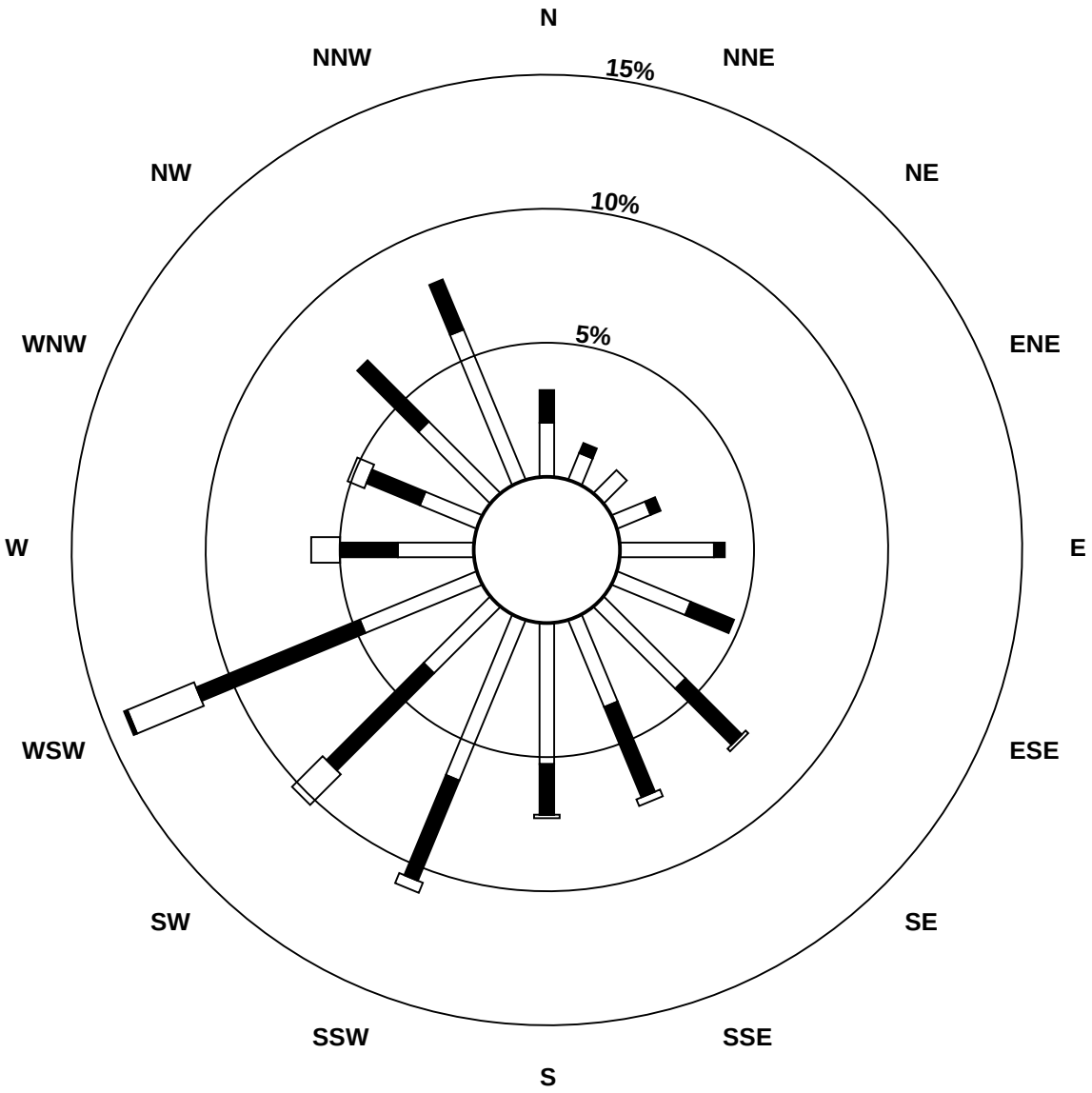
Total Number of Hours: 744

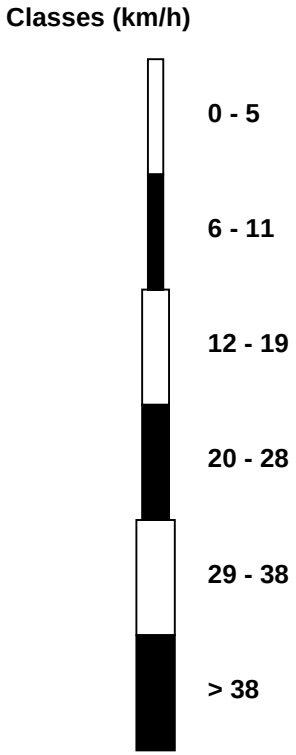
Wood Buffalo Environmental Association

Wind Rose Aug 2015

Wind Speed (WS) - km/h

Barge Landing (AMS 9)





Total Number of Valid Hours: 742

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Barge Landing - August 2015

Direction of Maximum Speed: 244 deg on Aug 11 14:00
Direction of Maximum Daily Speed Average: 267.8 deg on Aug 14

Direction of Minimum Speed: 35 deg on Aug 9 02:00

Direction of Minimum Daily Speed Average: 0.7 deg on Aug 9

Monthly Average Direction: 253.2 deg

Hours in Service:	744
Hours of Data:	742
Hours of Missing Data:	2
Percent Operational Time:	99.7

Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average
1-Aug	278	250	235	304	329	317	296	301	296	276	286	310	311	301	318	320	320	321	20	329	341	297	302	287	310.0
2-Aug	245	235	183	176	206	160	196	249	239	228	194	197	210	201	197	330	316	177	115	251	268	70	221	117	214.2
3-Aug	129	324	AF	136	333	331	120	124	304	32	22	28	38	12	106	107	114	125	136	137	96	87	69	50	81.7
4-Aug	334	337	334	333	332	336	327	332	324	335	12	34	34	58	97	98	116	102	84	84	131	110	96	64	48.7
5-Aug	45	48	55	59	352	359	49	66	80	102	29	234	31	199	126	223	271	357	135	162	157	146	129	110	125.5
6-Aug	87	94	81	75	89	90	97	99	109	121	128	160	135	110	68	77	108	116	127	126	117	103	95	94	106.6
7-Aug	107	135	115	105	95	82	298	329	360	288	322	304	336	40	133	77	79	111	136	125	129	173	119	140	105.8
8-Aug	149	151	146	144	121	139	135	175	187	224	318	263	251	242	259	276	237	326	59	85	105	81	115	89	169.7
9-Aug	89	35	312	323	334	AF	314	248	263	311	300	325	314	283	257	263	152	352	68	65	87	89	142	150	295.7
10-Aug	166	311	117	186	244	253	229	235	223	231	241	232	228	239	237	232	225	237	245	197	163	181	207	202	228.4
11-Aug	179	178	194	186	179	188	166	182	207	229	241	255	237	244	246	243	256	258	273	223	222	261	212	192	233.7
12-Aug	206	192	196	196	212	223	227	234	234	236	241	236	245	238	234	232	234	242	240	238	222	244	232	250	231.9
13-Aug	157	195	176	176	204	173	203	194	196	168	176	153	186	205	238	186	206	221	210	210	212	194	196	204	198.4
14-Aug	271	242	234	251	231	238	249	246	264	261	266	263	266	282	290	282	293	293	293	294	290	249	244	268	267.8
15-Aug	282	308	316	313	335	352	349	348	344	351	352	1	1	355	344	347	334	337	341	341	345	315	329	331	341.2
16-Aug	268	244	249	252	243	260	261	268	157	254	307	191	187	227	333	307	305	256	239	230	202	238	240	181	254.3
17-Aug	146	219	209	191	168	188	192	204	209	188	200	189	212	231	238	331	317	276	302	325	189	189	181	110	212.0
18-Aug	358	341	281	228	255	248	265	261	327	290	4	122	309	231	138	134	166	137	151	145	153	157	131	136	173.2
19-Aug	143	146	149	158	158	158	168	165	176	198	237	238	250	257	258	254	249	265	290	274	243	246	252	237	219.8
20-Aug	242	233	242	238	248	248	258	263	276	279	262	276	269	267	267	274	289	285	284	262	257	290	254	246	263.2
21-Aug	230	236	244	230	227	234	245	272	285	300	307	302	308	311	313	320	304	296	297	285	311	303	303	270	281.3
22-Aug	251	252	204	183	252	243	251	244	253	254	258	309	327	15	326	327	346	356	331	3	127	128	109	126	275.5
23-Aug	141	184	160	160	148	174	148	179	208	190	175	161	152	183	148	153	151	151	146	126	132	181	336	91	155.5
24-Aug	130	271	179	146	229	201	198	198	209	213	237	235	235	253	242	236	234	236	213	211	246	332	332	330	231.5
25-Aug	319	320	312	275	256	240	216	265	353	327	326	325	2	336	336	341	325	321	330	332	346	328	348	358	329.1
26-Aug	2	356	7	339	343	240	198	322	304	338	4	342	238	206	195	180	214	210	201	200	202	198	212	290	240.8
27-Aug	210	226	203	223	187	165	200	161	185	180	194	175	189	204	217	213	219	226	224	199	184	192	172	169	201.2
28-Aug	167	173	177	190	208	211	231	212	213	231	234	238	245	236	235	240	237	242	153	92	158	237	350	324	229.5
29-Aug	319	218	228	141	226	195	166	201	226	201	205	200	162	155	164	164	147	149	120	113	119	134	124	172	161.7
30-Aug	96	136	331	347	15	337	338	311	231	248	263	272	249	233	212	216	263	236	143	159	152	140	140	117	212.4
31-Aug	114	134	138	135	137	143	168	153	154	156	176	224	237	233	236	242	235	233	220	220	198	206	196	172	207.7
	187.4	222.4	198.3	200.6	224.2	221.3	223.4	226.0	231.0	235.1	248.3	245.9	247.4	246.2	243.4	248.8	245.1	237.2	204.8	201.5	178.1	199.9	203.4	183.9	
	Diurnal Average																								

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

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg

Barge Landing - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 106 deg on Aug 16 14:00

Minimum Value: 9 deg on Aug 31 01:00

Percentiles: P_1 = 12 P_{10} = 18 Q_1 = 23 Median = 30 Q_3 = 40 P_{90} = 63 P_{99} = 90

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
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Aug	56	40	37	25	20	19	36	26	35	51	55	76	33	29	35	44	33	27	31	33	19	21	25	27	76
2-Aug	46	50	40	82	29	31	38	42	33	38	46	62	56	73	91	80	51	36	33	36	40	37	55	83	91
3-Aug	74	39	AF	49	47	43	91	66	62	46	32	40	42	52	26	25	17	15	20	27	23	74	34	42	91
4-Aug	21	20	29	42	20	18	26	31	33	28	23	21	26	27	22	20	15	21	20	21	17	17	19	19	42
5-Aug	31	61	26	30	21	26	30	29	29	66	86	31	74	42	44	28	37	81	22	25	23	21	15	36	86
6-Aug	28	20	24	19	24	23	21	21	17	16	23	51	69	24	31	30	26	20	14	14	12	19	15	18	69
7-Aug	20	22	13	13	54	49	49	25	35	41	33	50	72	51	50	81	29	22	16	10	16	52	71	15	81
8-Aug	20	18	15	22	12	15	19	35	37	51	50	70	57	63	47	45	67	16	52	21	68	68	30	26	70
9-Aug	54	91	28	33	36	AF	53	39	46	53	38	58	44	69	57	37	78	85	25	19	15	15	26	15	91
10-Aug	31	43	68	50	26	29	28	27	23	25	26	25	25	25	26	27	24	23	29	30	35	19	25	26	68
11-Aug	21	23	34	29	33	28	81	60	31	25	21	32	24	23	26	25	30	31	31	25	24	34	75	20	81
12-Aug	20	21	25	22	25	23	20	25	28	24	28	24	26	33	33	36	28	24	20	18	18	19	84	50	84
13-Aug	71	26	26	20	31	46	30	31	46	29	31	50	52	27	30	27	27	24	27	24	23	27	25	91	91
14-Aug	42	75	43	29	23	34	32	28	33	34	35	34	36	36	34	35	33	33	33	31	33	25	18	30	75
15-Aug	29	25	24	24	28	27	26	25	24	26	27	31	31	28	27	27	29	29	26	24	26	13	21	27	31
16-Aug	43	20	13	17	49	26	29	50	100	73	55	65	46	106	68	46	33	37	21	22	72	78	45	36	106
17-Aug	28	37	27	24	18	19	21	26	26	42	33	38	42	55	55	21	35	32	33	17	68	28	95	67	95
18-Aug	75	31	76	29	12	24	24	39	65	43	68	89	74	75	69	69	33	22	21	10	12	16	11	11	89
19-Aug	13	15	18	22	22	23	24	25	27	29	30	27	34	37	36	26	25	33	35	34	25	23	26	22	37
20-Aug	21	19	23	22	25	23	30	33	35	35	32	34	32	38	33	34	32	34	35	30	29	34	29	28	38
21-Aug	19	19	21	22	23	23	24	33	34	30	28	36	37	29	31	44	35	34	37	32	30	31	33	37	44
22-Aug	39	25	64	51	31	26	24	21	25	27	34	35	40	42	29	33	50	57	79	92	36	20	60	26	92
23-Aug	17	30	47	37	30	24	37	43	37	47	38	31	29	40	26	30	24	21	16	12	14	57	59	22	59
24-Aug	77	68	98	51	57	39	34	30	30	28	33	29	30	32	27	44	28	27	21	19	37	23	14	15	98
25-Aug	13	11	28	30	15	69	33	36	46	33	23	21	34	28	27	35	18	16	17	17	16	17	27	24	69
26-Aug	21	27	28	35	39	89	45	26	44	52	72	89	75	87	47	41	33	29	21	19	17	15	79	53	89
27-Aug	58	14	32	15	24	29	32	42	35	41	33	39	36	33	29	29	28	23	23	23	21	21	35	19	58
28-Aug	25	56	35	28	34	26	39	26	27	27	22	23	25	24	26	28	25	22	80	17	64	95	31	23	95
29-Aug	17	94	91	52	45	84	39	36	32	36	40	46	36	37	52	35	31	25	16	13	15	19	18	45	94
30-Aug	32	58	89	43	54	18	21	45	20	35	49	54	64	33	35	54	40	62	19	25	17	16	23	13	89
31-Aug	9	17	27	39	18	30	43	26	23	25	29	29	24	26	26	23	22	21	24	22	23	24	21	38	43
	77	94	98	82	57	89	91	66	100	73	86	89	75	106	91	81	78	85	80	92	72	95	95	91	
	Diurnal Maximum																								

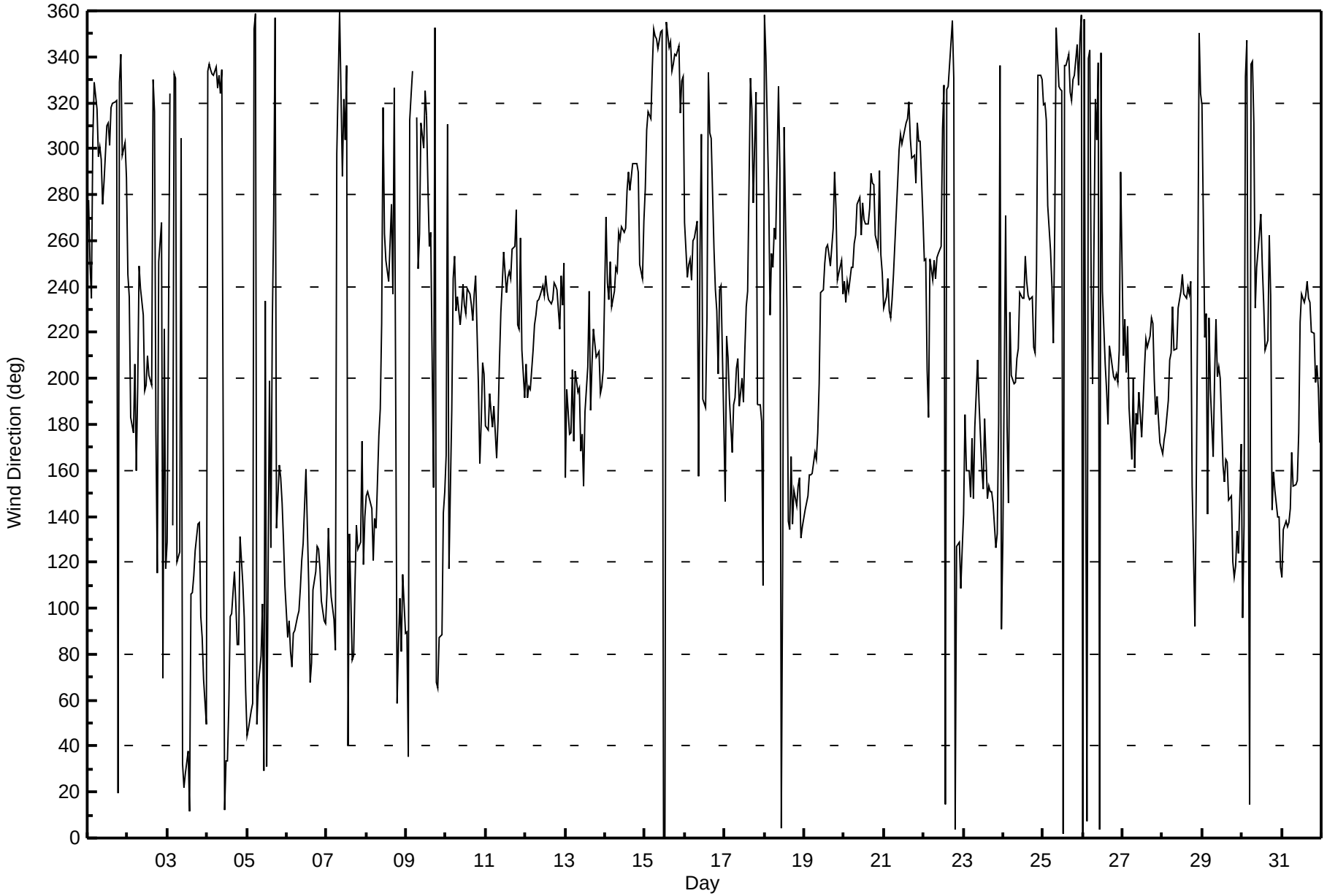
AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction (WD) - deg

Barge Landing - August 2015



Wood Buffalo Environmental Association
TRS Calibration Report

Station Information

Calibration Date	August 13, 2015	Last Calibration	July 13, 2015
Station Name	Barge Landing	Station Number	AMS 9
Reason:	Routine		
Start Time (MST)	9:00	End Time (MST)	12:05
Gas Cert Reference	CC62993	Station temp.	22 Deg C
Cal Gas Concentration	4.77 ppm	Cal Gas Exp Date	10/06/2014
Calibrator Make/Model	Sabio 4010	Serial Number	11071107
Dil air Make/Model	API 701	Serial Number	4888
DACS make/model	Campbell Scientific CR3000	DACS serial No.	6466
SO2 gas concentration	59 ppm	SO2 gas cert/exp	FF54535 July 6, 2014

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-689	-689
Analyzer IP address	192.168.1.42		Lamp voltage	984	988
Calculated slope	0.985849	1.003150	Chamber temp	45	45
Calculated intercept	-0.018761	-0.158694	Pressure	688.2	683.9
Analyzer Background	1.96	1.97	Flow	0.437	0.434
Analyzer Coefficient	1.033	1.033	Intensity	90	91
			Converter temp.	800	800

Analyzer make/model	Thermo 43i-TLE	Analyzer serial #	1218153461
Converter make/model	CDN-101	Converter serial #	519

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.1	----
as found span	5000	83.7	79.8	79.6	1.003
SO2 scrubber check	6000	12.2	120.0	0.1	----
calibrator zero	5000	0.0	0.0	-0.1	----
high point	5000	83.7	79.8	79.6	1.003
second point	5000	41.9	40.0	40.2	0.994
third point	5000	21.0	20.0	20.3	0.986
as left zero	6000	0.0	0.0	0.0	----
as left span	5000	83.7	79.8	80.2	0.996
				Average Correction Factor	0.994

Corrected As found	79.7	Previous response	81.0	% change	1.7%

Notes:

Changed Inlet filter and performed scrubber check after as founds. No adjustments.

Calibration Performed By: Evan Magill

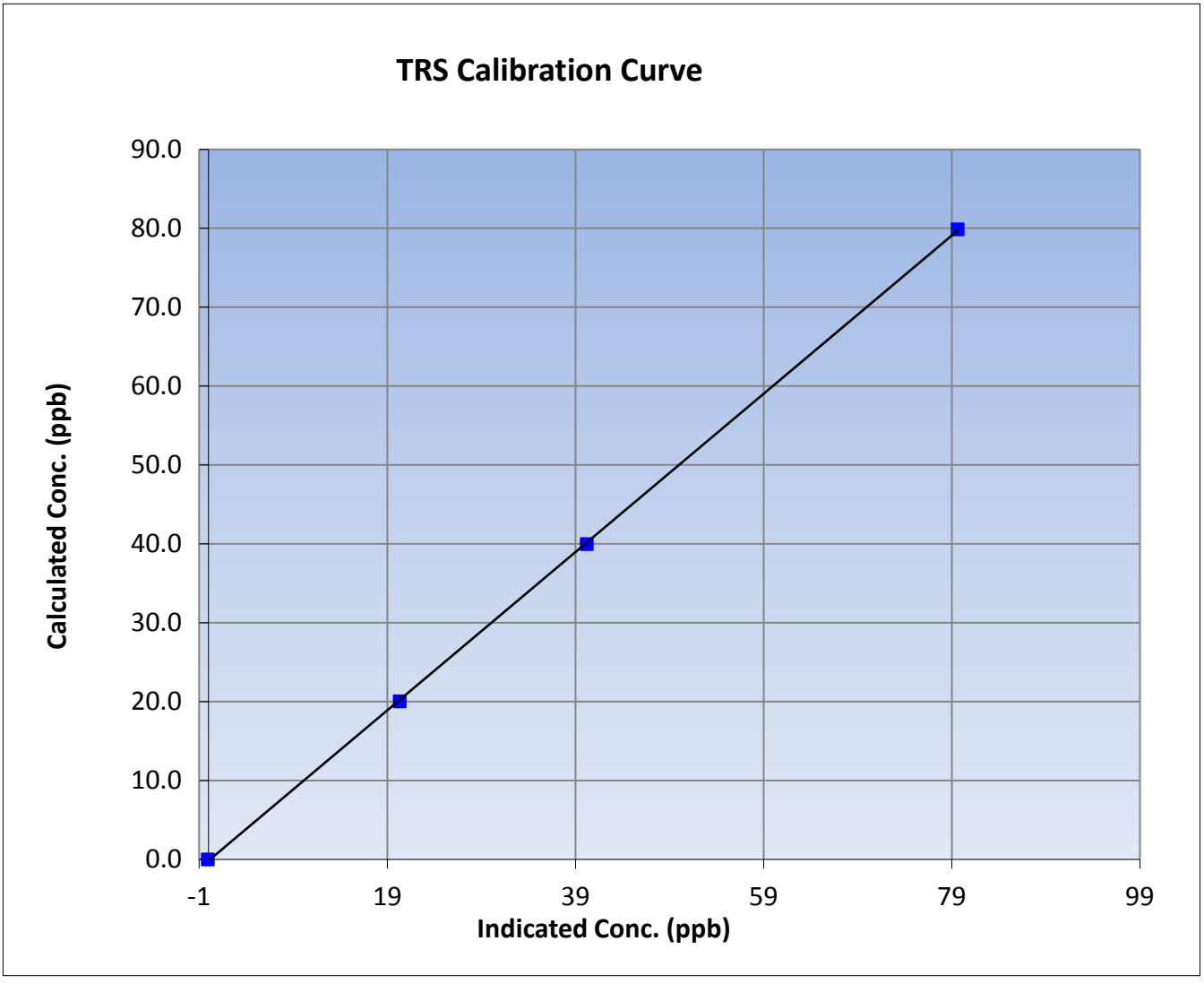
Wood Buffalo Environmental Association
TRS Calibration Report

Station Information

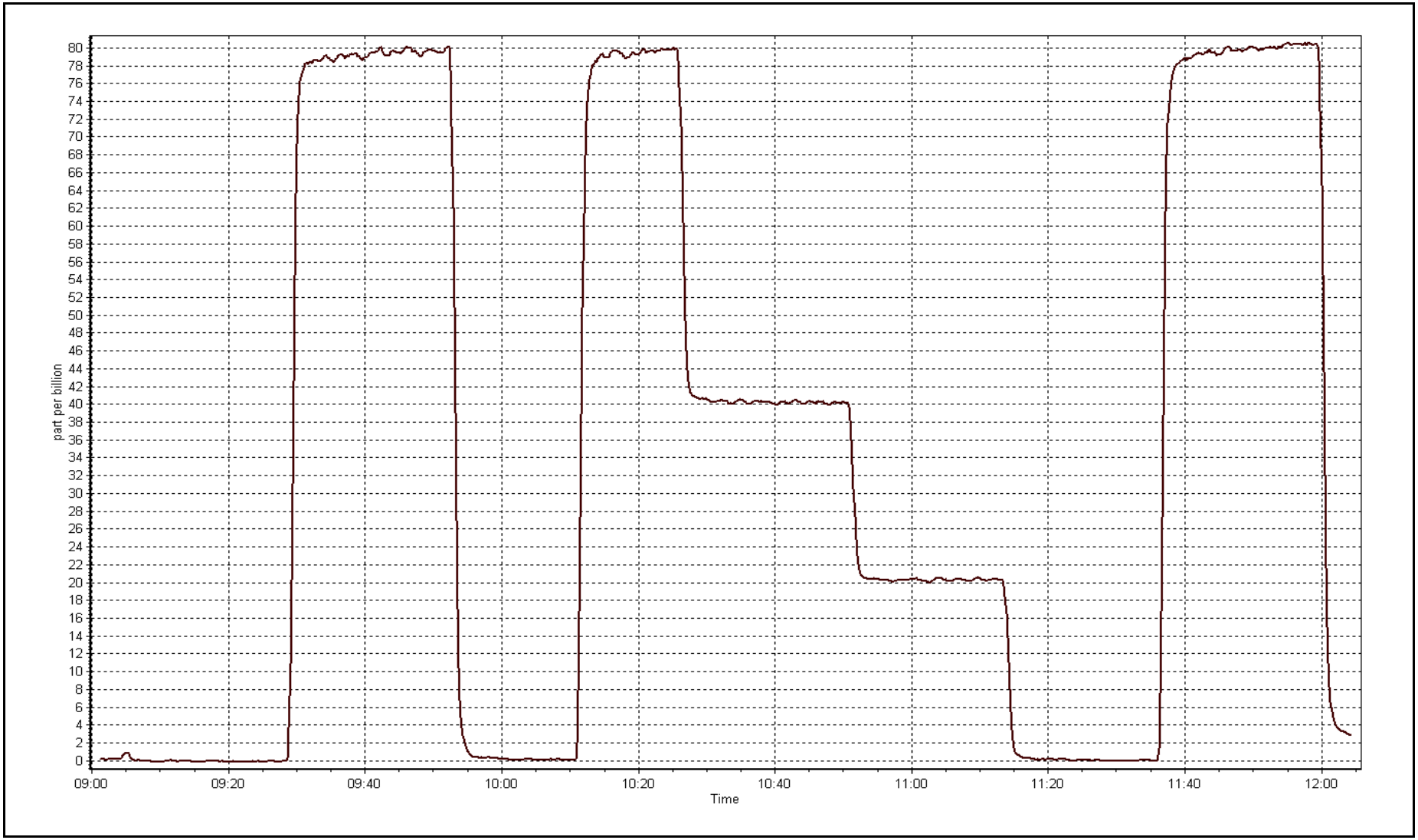
Calibration Date	August 13, 2015	Previous Calibration	July 13, 2015
Station Name	AMS 9	Station Number	AMS 9
Start Time (MST)	9:00	End Time (MST)	12:05
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1218153461

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999956
79.8	79.6	1.0030		
40.0	40.2	0.9943	Slope	1.003150
20.0	20.3	0.9859		
			Intercept	-0.158694



TRS Calibration Plot Date: August 13, 2015



Wood Buffalo Environmental Association
THC Calibration Report

W B E A

Station Information

Calibration Date	August-13-15	Last Calibration	July-09-15
Station Name	Barge Landing	Station Number	AMS 9
Reason:	Routine		
Start Time (MST)	12:08	End Time (MST)	14:32
Gas Cert Reference	LL104180	Cal Gas Expiry Date	12/02/2018
CH4 Cal Gas Conc.	490 ppm	CH4 Equiv Conc.	1023.5 ppm
C3H8 Cal Gas Conc.	194 ppm	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11071107
ZAG make/model	Teledyne API 701	Serial Number	4888
DACS make/model	Campbell Scientific CR3000	Serial Number	6466

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 50 ppm		Sample Pressure	9.1	9.2
Analyzer IP address	192.168.1.51		Air or Bypass Press	34.7	34.7
Calculated slope	1.001968	1.000137	Fuel Pressure	24.1	24.1
Calculated intercept	0.014693	-0.015397	Analyzer Coeff	4.3	4.3
			Analyzer BKG	5.680	5.680

Analyzer make	Thermo 51i-LT	Analyzer serial #	1327059296

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6000	0.0	0.00	0.00	----
as found span	6000	92.0	15.69	15.71	0.999
calibrator zero	6000	0.0	0.00	0.00	----
high point	6000	92.0	15.69	15.71	0.999
second point	6000	49.2	8.39	8.39	1.000
third point	6000	18.5	3.16	3.20	0.986
as left zero	6000	0.0	0.00	0.04	----
as left span	6000	92.0	15.69	15.71	0.999
				Average Correction Factor	0.995

Corrected As found	15.71	Previous response	15.65	% change	-0.4%

Notes:

Changed inlet filter after as founds. No adjustments.

Calibration Performed By: Evan Magill

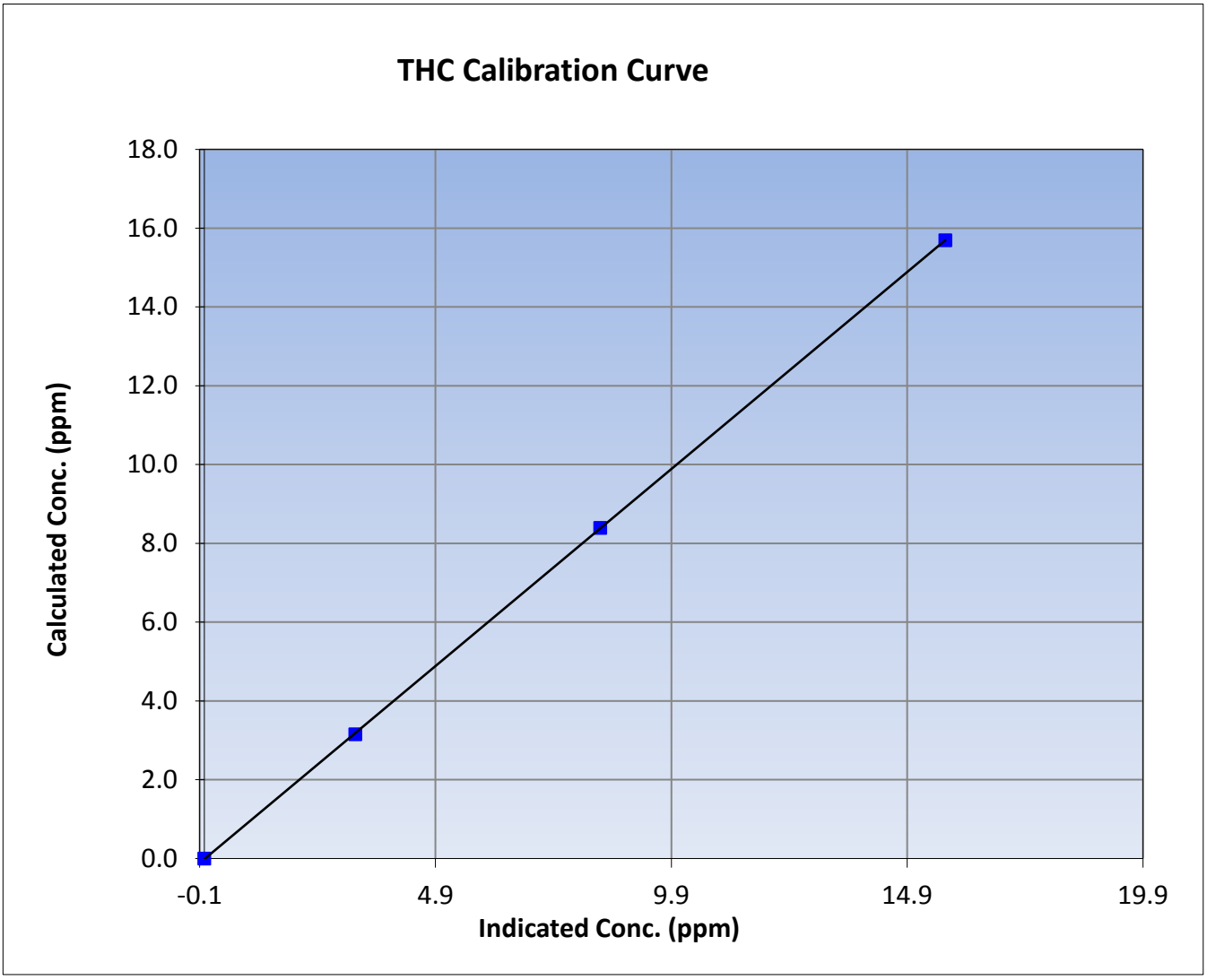
Wood Buffalo Environmental Association
THC Calibration Report

Station Information

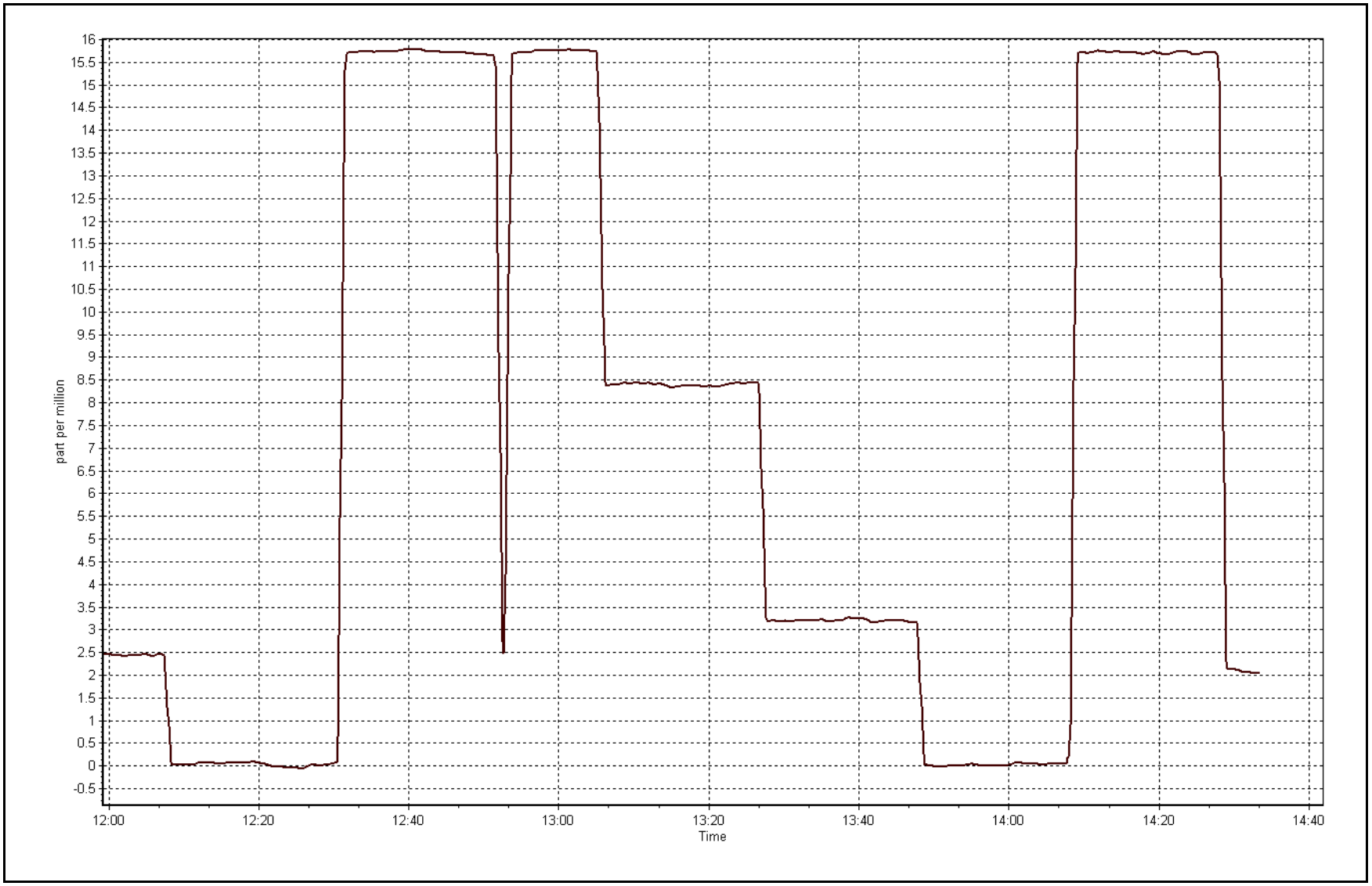
Calibration Date	August 13, 2015	Previous Calibration	July 9, 2015
Station Name	Barge Landing	Station Number	AMS 9
Start Time (MST)	12:08	End Time (MST)	14:32
Analyzer make	Thermo 51i-LT	Analyzer serial #	1327059296

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999990
15.69	15.71	0.9990		
8.39	8.39	1.0003	Slope	1.000137
3.16	3.20	0.9862		
			Intercept	-0.015397



THC Calibration Plot Date: August 13, 2015



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 11
LOWER CAMP
AUGUST 2015

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

September 28, 2015

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP (AMS 11)
AUGUST 2015

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	710	34	34	100.00	146	0	17	0
H2S (ppb) Average	703	36	41	99.33	8	0	1	0
THC (ppm) Average	710	34	34	100.00	4.7	-	2.7	-
Temperature (C) Average	744	0	0	100.00	30.6	-	24.7	-
Relative Humidity (%) Average	744	0	0	100.00	99	-	83	-
Wind Speed 10 m (km/h) Average	744	0	0	100.00	29	-	21	-
Wind Direction 10 m (deg) Average	744	0	0	100.00	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP (AMS 11)
AUGUST 2015

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

					Percentile						
Parameter	Number	Mean	StnDev	Total	Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	710	2.9	8	-	0	0	0	1	3	7	146
H2S (ppb) Average	703	0.7	1	-	0	0	0	0	1	2	8
THC (ppm) Average	710	2.31	0.3	-	2	2.1	2.1	2.2	2.4	2.7	4.7
Temperature 2 m (C) Average	744	18.04	4.9	-	5.4	11.9	14.6	17.8	21.5	24.6	30.6
Relative Humidity (%) Average	744	66.7	20	-	24	37	52	68	84	93	99
Wind Speed 10 m (km/h) Average	744	9.6	6	-	0	2	4	8	14	19	29
Wind Direction 10 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP (AMS 11)
AUGUST 2015

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
H2S	05 Aug 2015 09:00	05 Aug 2015 13:00	5	Maintenance - recalibration

Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO_2) - ppb

Lower Camp - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 146 ppb on Aug 30 10:00 Maximum Daily Average: 17.2 ppb on Aug 30

Minimum Value: 0 ppb on Aug 5 01:00 Minimum Daily Average: 0.2 ppb on Aug 25
Maximum Diurnal Average: 7.5 ppb at hour 10 Minimum Diurnal Average: 1.6 ppb at hour 1
Monthly Average: 2.9 ppb Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 1 $Q_3 = 3$ $P_{90} = 7$ $P_{99} = 28$

Hours in Service:	744
Hours of Data:	710
Hours of Missing Data:	34
Hours of Calibration:	34
Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	1	3	1	Z	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0.5	3
2-Aug	0	0	0	0	Z	0	0	0	0	1	2	2	2	2	1	2	4	2	2	1	1	0	0	0	1.0	4
3-Aug	0	0	0	0	0	Z	0	0	1	1	1	1	7	1	4	1	0	0	0	0	0	0	0	0	0.9	7
4-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
5-Aug	0	Z	0	0	0	0	0	0	0	0	0	C	C	C	1	0	0	0	8	15	16	1	0	0	2.1	16
6-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
7-Aug	0	0	0	Z	0	0	0	0	0	2	3	4	3	3	1	1	1	1	0	0	0	0	0	0	0.9	4
8-Aug	0	1	0	0	Z	0	0	0	0	0	0	1	1	2	1	2	6	4	1	0	0	0	0	0	1.0	6
9-Aug	0	0	0	0	0	Z	0	2	13	16	7	3	1	4	4	2	2	1	1	1	1	1	1	0	2.6	16
10-Aug	Z	2	2	16	14	1	1	1	3	2	1	0	1	1	1	0	1	1	7	22	5	9	4	3	4.2	22
11-Aug	3	Z	5	2	2	1	1	1	7	5	1	0	1	1	1	1	1	1	1	3	31	16	6	5	4.2	31
12-Aug	4	5	Z	3	7	5	2	0	2	1	1	1	1	1	1	1	1	1	0	3	26	19	6	4	4.1	26
13-Aug	8	11	3	Z	1	1	1	1	3	1	4	1	0	1	0	2	11	5	3	26	22	3	7	18	5.7	26
14-Aug	2	6	5	2	Z	1	0	0	0	1	0	1	2	2	2	8	2	8	1	1	2	6	3	8	2.7	8
15-Aug	9	1	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	9
16-Aug	Z	0	0	0	0	0	0	0	1	3	2	4	0	0	4	0	2	3	0	1	4	4	2	1	1.5	4
17-Aug	2	Z	3	2	1	0	0	0	5	3	3	1	1	0	2	2	2	1	1	0	0	7	1	1	1.6	7
18-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	1	8	11	3	2	1	0	4	2	0	0	0	1.6	11
19-Aug	0	2	3	Z	1	4	7	5	1	3	5	1	1	2	1	1	2	2	5	13	4	1	1	2	2.8	13
20-Aug	1	0	3	2	Z	1	0	1	5	8	12	7	9	6	4	5	3	0	0	1	3	4	5	1	3.6	12
21-Aug	0	0	0	0	0	Z	3	4	3	0	0	0	0	0	0	3	1	0	0	0	0	0	0	2	0.8	4
22-Aug	Z	5	3	2	1	1	2	2	3	6	8	3	0	0	0	0	0	0	0	0	0	0	0	0	1.7	8
23-Aug	1	Z	1	1	4	25	14	2	16	21	10	4	5	1	5	8	8	2	1	2	8	8	1	1	6.5	25
24-Aug	1	3	Z	1	2	4	2	2	1	1	1	0	0	0	0	0	0	1	2	1	2	0	0	0	1.1	4
25-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
26-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	9	14	3	1	1	9	16	41	4	2	1	4.5	41
27-Aug	0	0	0	0	0	Z	0	0	0	0	1	3	6	7	5	7	12	8	3	24	3	1	1	1	3.6	24
28-Aug	Z	4	4	4	2	4	3	2	2	1	1	1	1	1	1	0	0	0	0	1	0	0	1	0	1.5	4
29-Aug	0	Z	2	1	1	0	3	1	3	5	3	4	5	4	3	3	3	2	3	0	0	1	1	36	3.7	36
30-Aug	1	1	Z	7	2	21	28	10	23	146	12	92	29	4	1	1	2	6	1	1	1	0	2	5	17.2	146
31-Aug	7	10	4	Z	12	16	2	11	3	4	3	3	2	3	1	2	2	2	19	12	9	5	29	3	7.1	29
	1.6	2.1	1.6	1.8	2.0	3.3	2.4	1.6	3.1	7.5	2.6	4.5	2.7	2.2	2.2	1.9	2.3	1.8	2.3	4.8	5.9	3.0	2.4	3.1	Diurnal Average	
	9	11	5	16	14	25	28	11	23	146	12	92	29	9	14	8	12	8	19	26	41	19	29	36	Diurnal Maximum	

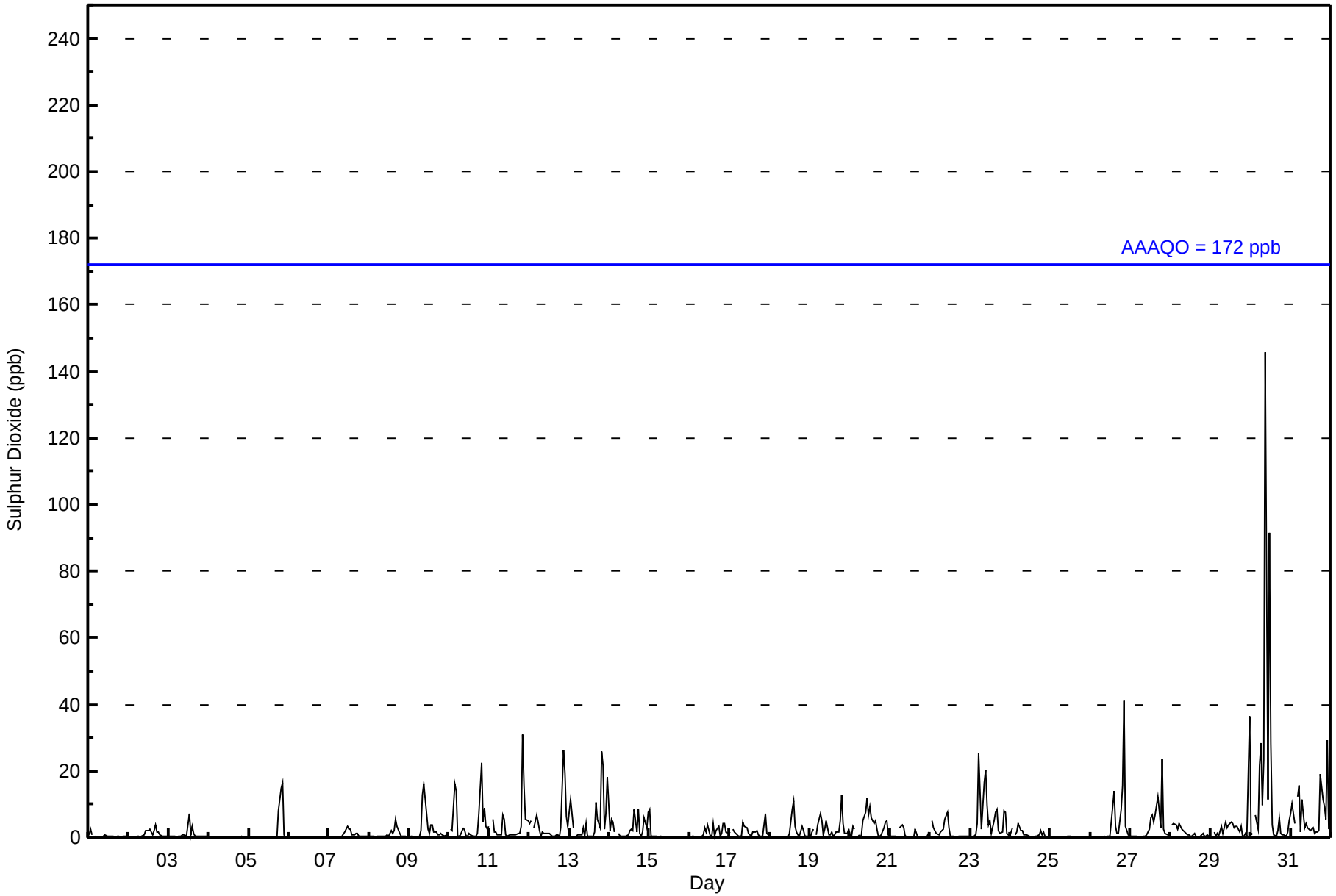
Z - zerospan C - Calibration
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb

Wood Buffalo Environmental Association

Hourly Averages

Sulphur Dioxide (SO_2) - ppb

Lower Camp - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

Lower Camp - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	668	94.08	94.08
11 - 20	25	3.52	97.61
21 - 60	15	2.11	99.72
61 - 110	1	0.14	99.86
111 - 172	1	0.14	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 (SO_2) - ppb

Lower Camp - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 10	32	17	20	19	21	74	91	41	8	9	14	77	72	69	61	43	668
11 - 20	0	0	0	0	0	1	5	2	0	2	5	3	2	2	0	3	25
21 - 60	0	0	0	0	0	0	3	0	1	2	6	2	1	0	0	0	15
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	32	17	20	19	21	75	99	43	9	13	25	82	77	71	61	46	710

Total Number of Valid Hours: 710

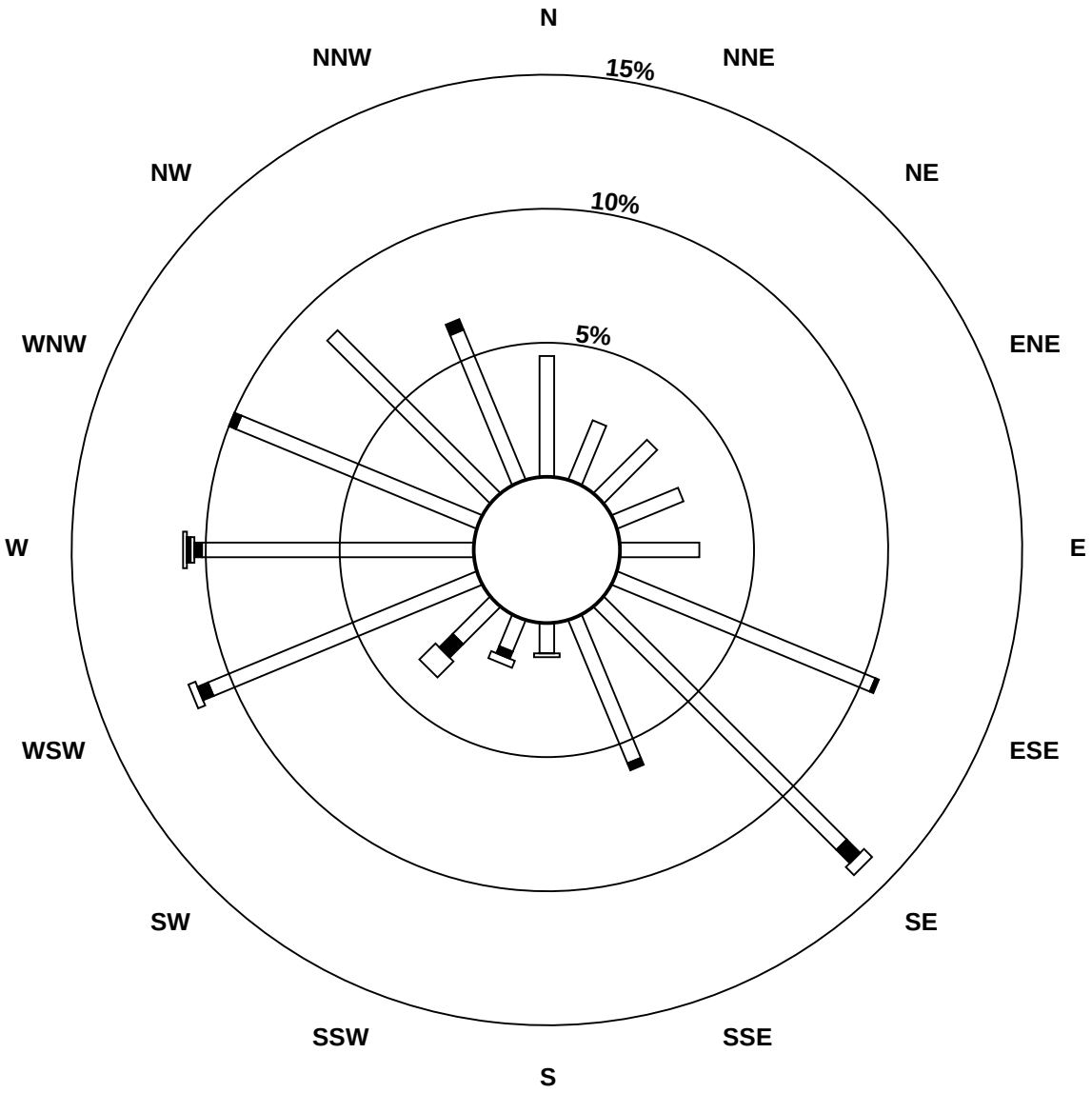
Total Number of Hours: 744

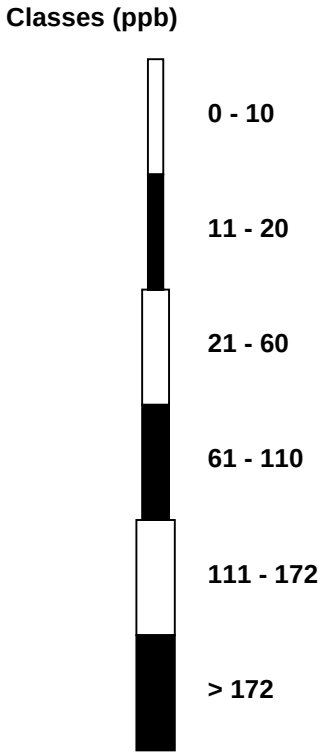
Wood Buffalo Environmental Association

Wind Rose Aug 2015

Sulphur Dioxide (SO_2) - ppb

Lower Camp (AMS 11)





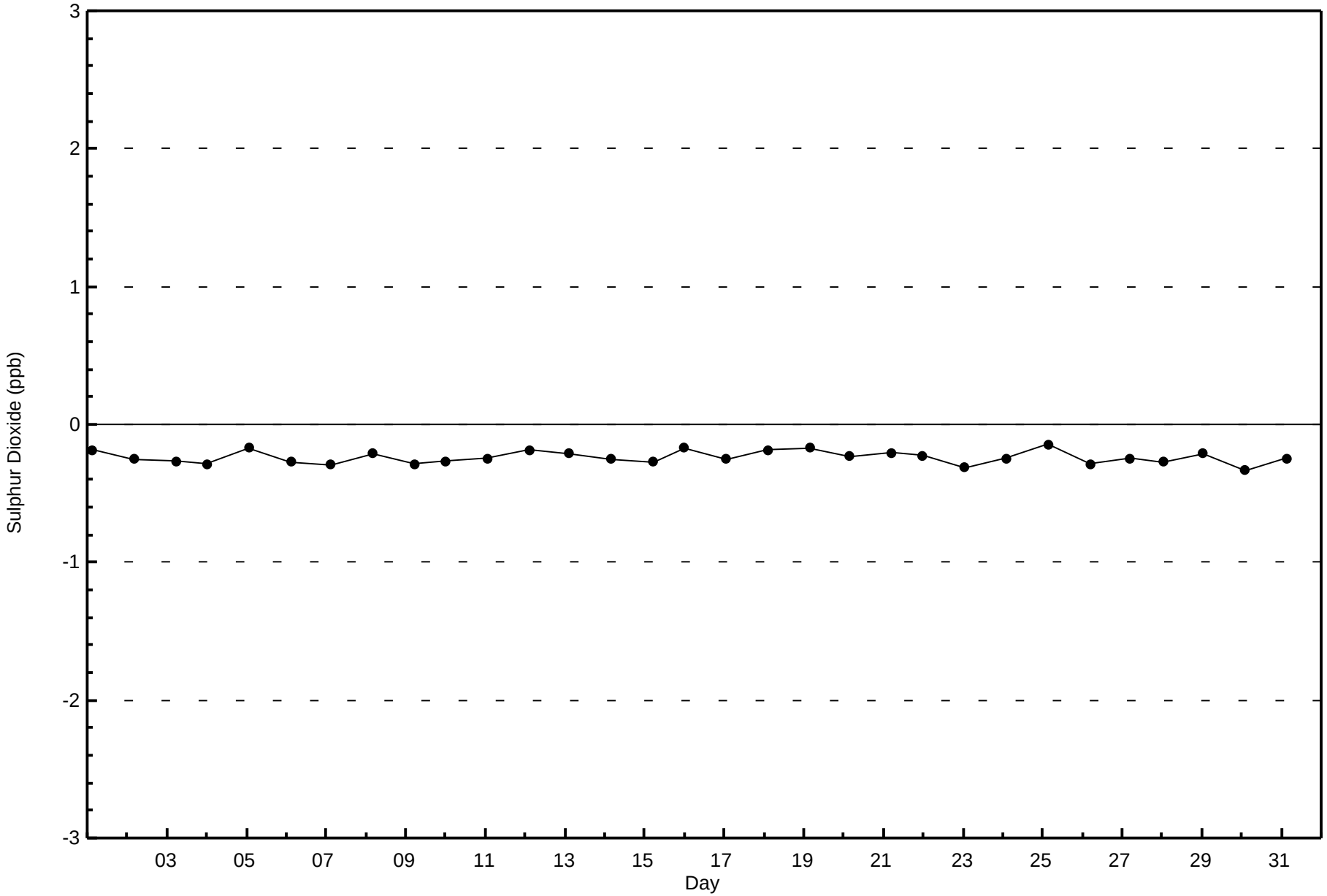
Total Number of Valid Hours: 710

Wood Buffalo Environmental Association

Zero Responses

Sulphur Dioxide (SO_2) - ppb

Lower Camp - August 2015

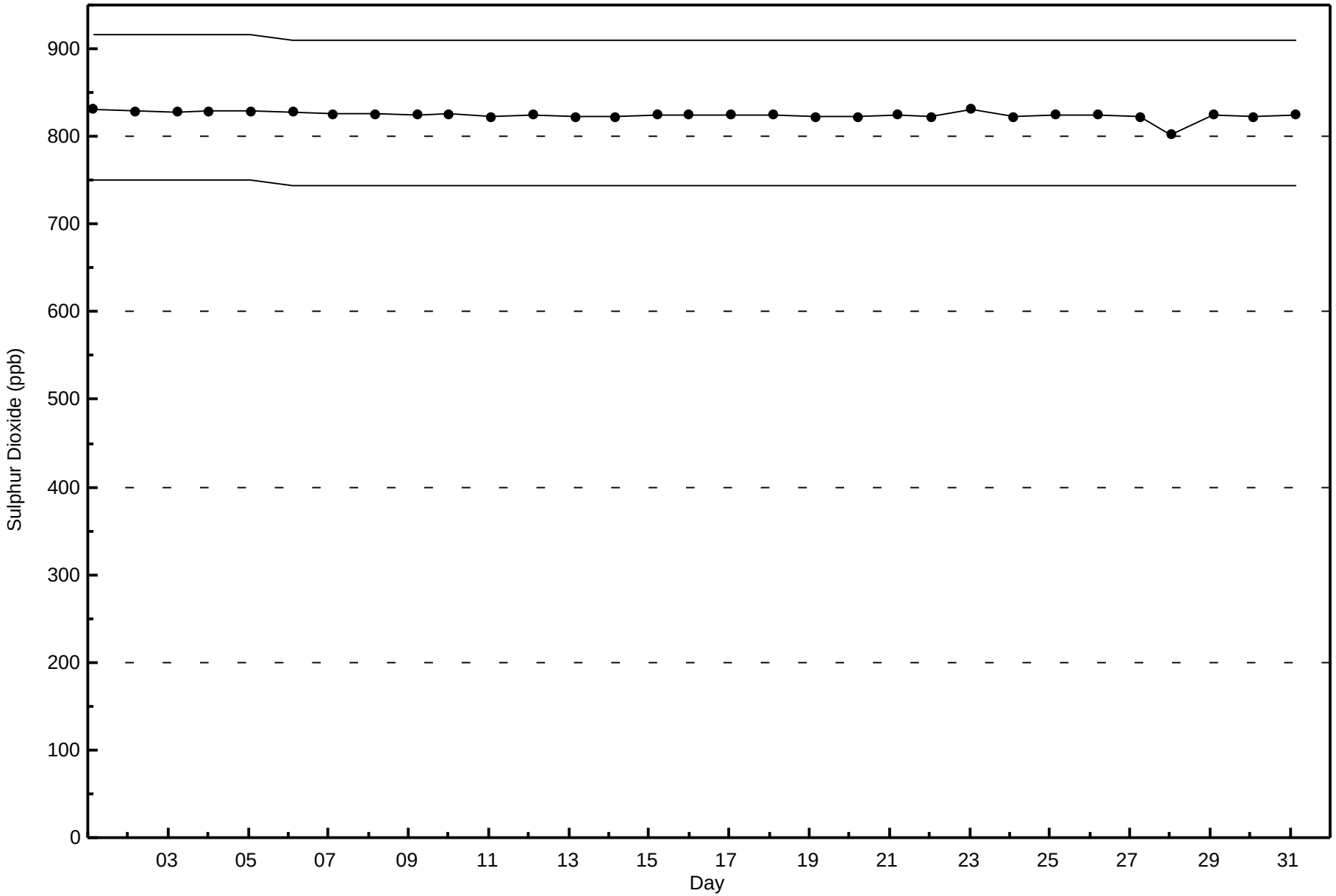


Wood Buffalo Environmental Association

Span Responses

Sulphur Dioxide (SO_2) - ppb

Lower Camp - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Hydrogen Sulphide (H_2S) - ppb

Lower Camp - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 8 ppb on Aug 10 21:00

Maximum Daily Average: 1.3 ppb on Aug 19

Minimum Value: 0 ppb on Aug 21 05:00

Minimum Daily Average: 0.2 ppb on Aug 6

Maximum Diurnal Average: 1.4 ppb at hour 21

Minimum Diurnal Average: 0.2 ppb at hour 16

Monthly Average: 0.7 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 1$ $P_{90} = 2$ $P_{99} = 4$

Hours in Service:	744
Hours of Data:	703
Hours of Missing Data:	41
Hours of Calibration:	36
Percent Operational Time:	99.3

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	1	1	1	1	Z	1	1	1	1	1	1	0	0	0	1	0	0	0	1	0	1	1	1	1	0.7	1
2-Aug	1	1	1	1	1	Z	3	2	2	1	1	1	1	1	0	0	0	1	0	0	1	1	1	1	0.9	3
3-Aug	1	1	0	0	0	1	Z	1	1	1	0	0	0	1	0	0	0	0	0	0	0	1	1	1	0.5	1
4-Aug	1	Z	1	1	0	0	1	1	1	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0.4	1
5-Aug	0	0	Z	0	0	0	0	0	M	M	M	M	M	1	0	0	0	0	1	2	2	0	0	0	0.5	2
6-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
7-Aug	0	0	0	0	Z	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	1	2	0	0.4	2
8-Aug	0	1	0	0	0	Z	0	1	0	0	0	0	0	0	0	0	1	2	2	1	0	0	0	1	0.6	2
9-Aug	2	1	0	1	1	0	Z	2	4	3	2	1	0	1	1	0	0	0	0	1	1	1	1	1	1.0	4
10-Aug	2	Z	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	8	4	2	2	1.2	8
11-Aug	1	2	Z	2	3	1	2	2	3	2	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1.0	3
12-Aug	1	1	1	Z	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.6	2
13-Aug	1	1	1	2	Z	2	4	2	2	1	1	0	0	1	0	0	1	1	0	1	1	0	1	1	1.1	4
14-Aug	0	1	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
15-Aug	0	0	0	0	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0.3	1
16-Aug	0	Z	1	1	1	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1	1	1	1	0.6	1
17-Aug	2	2	Z	2	2	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	0	2	3	3	1.0	3
18-Aug	2	1	1	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	1	1	4	4	2	2	2	1.1	4
19-Aug	1	4	4	2	Z	4	3	3	3	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1.3	4
20-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
21-Aug	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
22-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.2	1
23-Aug	1	1	Z	1	1	2	1	1	1	1	0	1	0	0	0	1	0	1	2	0	1	1	0	0	0.7	2
24-Aug	0	1	0	Z	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	0.6	2
25-Aug	1	0	1	0	Z	0	1	1	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0.5	1
26-Aug	0	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	1	2	4	1	1	1	0.6	4
27-Aug	1	2	1	1	1	1	Z	1	1	1	0	0	0	0	0	1	1	0	0	2	4	3	2	1	1.1	4
28-Aug	1	Z	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	7	1	1	1	0.8	7
29-Aug	1	1	Z	1	2	1	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0.8	2
30-Aug	0	1	2	Z	1	3	3	2	1	0	1	0	0	0	0	0	1	1	0	0	0	1	1	1	0.9	3
31-Aug	1	1	1	1	Z	1	1	2	1	0	2	1	0	0	0	0	0	0	1	1	1	1	2	1	0.9	2
	0.8	0.9	0.8	0.8	0.9	1.0	1.0	0.9	0.9	0.6	0.5	0.3	0.3	0.3	0.3	0.2	0.3	0.4	0.5	0.7	1.4	0.9	0.9	0.9	Diurnal Average	
	2	4	4	2	3	4	4	3	4	3	2	1	1	1	1	1	1	2	2	4	8	4	3	3	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance

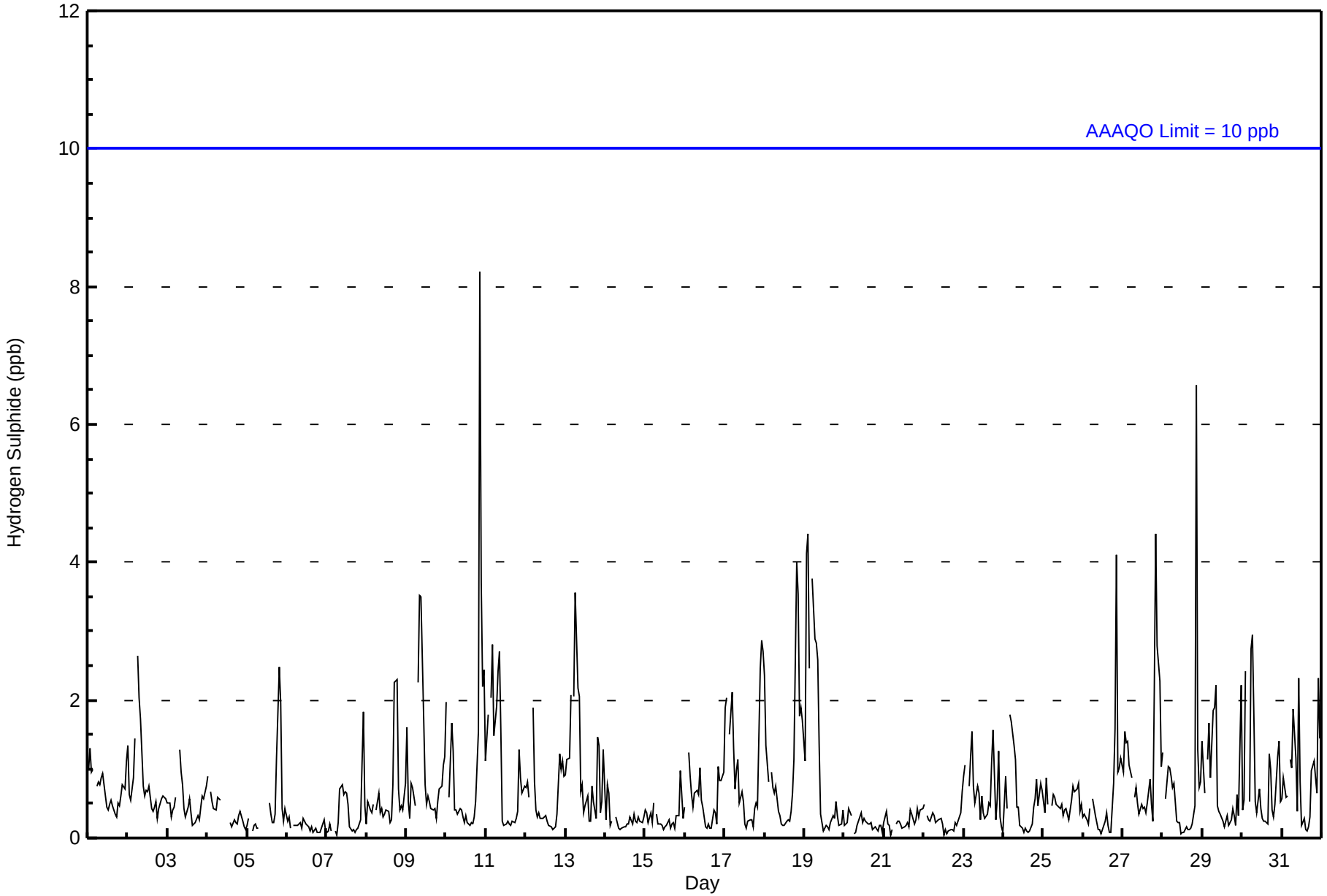
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb

Wood Buffalo Environmental Association

Hourly Averages

Hydrogen Sulphide (H_2S) - ppb

Lower Camp - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Hydrogen Sulphide (H_2S) - ppb

Lower Camp - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	679	96.59	96.59
3 - 4	22	3.13	99.72
5 - 7	1	0.14	99.86
8 - 11	1	0.14	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

Hydrogen Sulphide (H_2S) - ppb

Lower Camp - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 2	31	19	20	17	19	70	93	36	4	12	24	84	74	71	60	45	679
3 - 4	0	0	0	0	0	0	5	8	4	2	1	0	0	0	0	2	22
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
8 - 11	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	31	19	20	17	19	70	98	44	9	14	25	84	74	71	60	48	703

Total Number of Valid Hours: 703

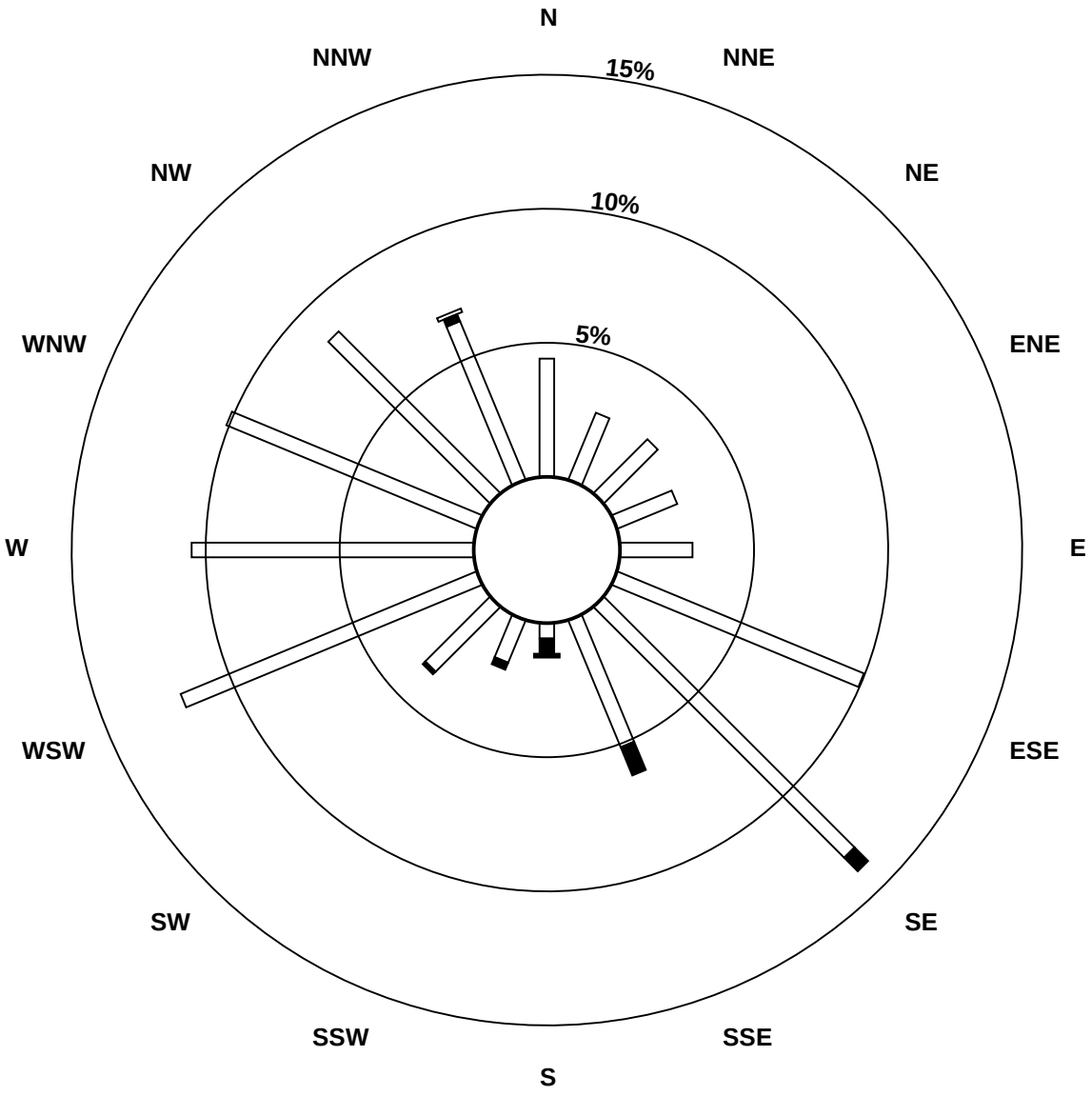
Total Number of Hours: 744

Wood Buffalo Environmental Association

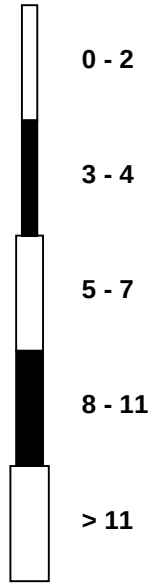
Wind Rose Aug 2015

Hydrogen Sulphide (H_2S) - ppb

Lower Camp (AMS 11)



Classes (ppb)



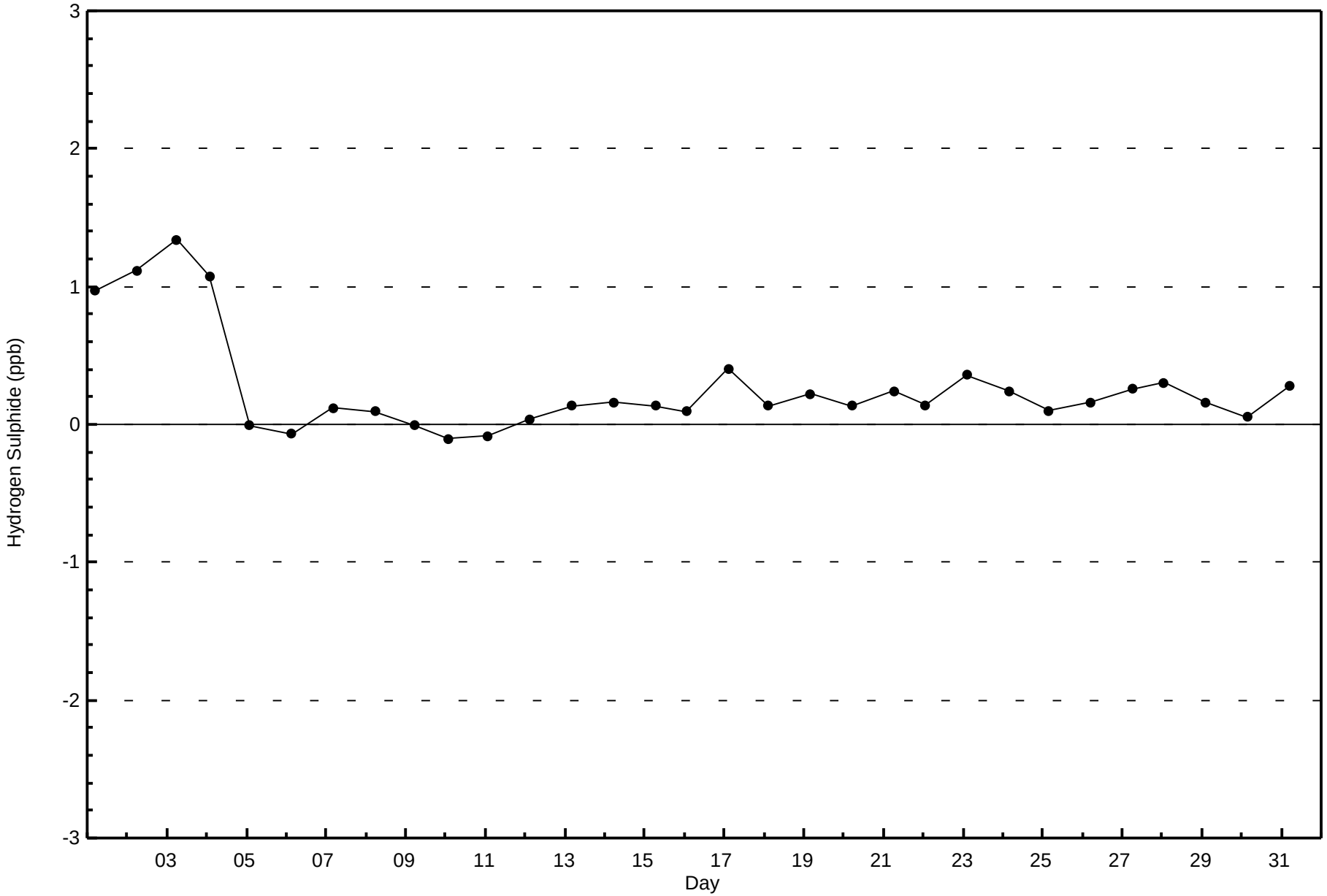
Total Number of Valid Hours: 703

Wood Buffalo Environmental Association

Zero Responses

Hydrogen Sulphide (H_2S) - ppb

Lower Camp - August 2015

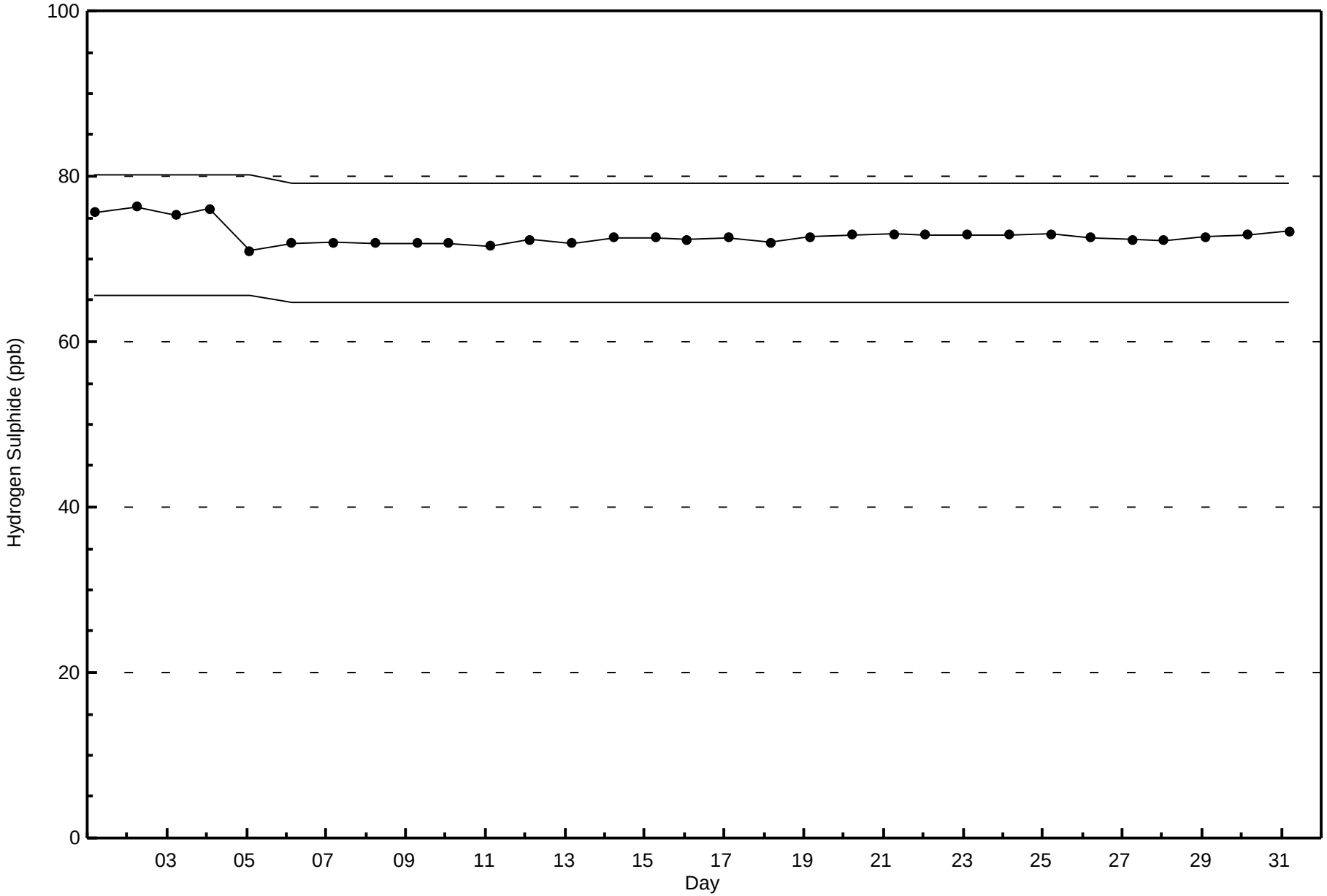


Wood Buffalo Environmental Association

Span Responses

Hydrogen Sulphide (H_2S) - ppb

Lower Camp - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Lower Camp - August 2015

Maximum Value: 4.7 ppm on Aug 27 21:00

Maximum Daily Average: 2.7 ppm on Aug 27

Minimum Value: 2.0 ppm on Aug 28 17:00

Minimum Daily Average: 2.1 ppm on Aug 19

Maximum Diurnal Average: 2.5 ppm at hour 24

Minimum Diurnal Average: 2.1 ppm at hour 16

Monthly Average: 2.31 ppm

Percentiles: P_1 = 2.0 P_{10} = 2.1 Q_1 = 2.1 Median = 2.2 Q_3 = 2.4 P_{90} = 2.7 P_{99} = 3.3

Hours in Service:	744
Hours of Data:	710
Hours of Missing Data:	34
Hours of Calibration:	34
Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	2.7	2.7	2.7	Z	2.6	2.4	2.4	2.5	2.7	2.6	2.5	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.3	2.4	2.5	2.6	2.4	2.7
2-Aug	3.0	2.5	2.4	2.5	Z	3.2	2.9	2.8	2.9	2.3	2.2	2.2	2.2	2.2	2.1	2.2	2.3	2.3	2.2	2.2	2.3	2.4	2.5	2.5	2.4	3.2
3-Aug	2.5	2.5	2.5	2.5	2.6	Z	2.9	3.0	2.9	2.8	2.5	2.3	2.2	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.3	2.4	2.6	2.4	3.0
4-Aug	Z	2.4	2.2	2.1	2.1	2.2	2.3	2.3	2.2	2.2	2.0	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.0	2.1	2.1	2.4
5-Aug	2.2	Z	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.3	2.2	C	C	C	2.2	2.1	2.2	2.3	2.1	2.2	2.2	2.3	2.1	2.4	2.2	2.4
6-Aug	2.2	2.2	Z	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.2
7-Aug	2.2	2.2	2.2	Z	2.1	2.1	2.1	2.2	2.3	2.5	2.4	2.4	2.4	2.3	2.2	2.2	2.2	2.1	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.5
8-Aug	2.1	2.2	2.2	2.2	Z	2.2	2.3	2.3	2.3	2.3	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.5	2.9	2.3	2.3	2.4	2.5	2.5	2.3	2.9
9-Aug	2.5	2.4	2.2	2.4	2.6	Z	2.4	2.7	2.9	2.8	2.5	2.4	2.4	2.3	2.2	2.2	2.1	2.2	2.1	2.4	2.4	2.7	2.7	2.8	2.5	2.9
10-Aug	Z	2.4	2.2	2.6	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.6	4.6	3.4	3.1	3.3	2.4	4.6
11-Aug	2.6	Z	2.7	2.5	2.6	2.6	2.9	2.7	2.6	2.4	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.2	2.3	2.2	2.4	2.4	2.4	2.9
12-Aug	2.3	2.2	Z	2.9	2.7	2.3	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.2	2.2	2.1	2.1	2.2	2.2	2.9
13-Aug	2.2	2.3	2.3	Z	3.0	2.5	2.5	2.5	2.4	2.2	2.2	2.1	2.2	2.3	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.3	2.1	2.1	2.2	3.0
14-Aug	2.2	2.3	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	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.3
15-Aug	2.3	2.4	2.2	2.3	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.4
16-Aug	Z	2.2	2.3	2.4	2.3	2.4	2.5	2.6	2.7	2.7	2.3	2.1	2.1	2.2	2.3	2.1	2.1	2.3	2.2	2.3	2.7	2.5	2.7	2.6	2.4	2.7
17-Aug	2.8	Z	2.7	2.6	2.8	2.4	2.3	2.5	2.3	2.3	2.4	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.4	2.3	2.3	2.7	2.9	2.6	2.4	2.9
18-Aug	3.0	2.8	Z	2.7	2.5	2.5	2.5	2.4	2.3	2.3	2.3	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	3.0	2.5	2.3	2.4	2.4	2.4	3.0
19-Aug	2.2	2.2	2.3	Z	2.2	2.2	2.2	2.2	2.2	2.4	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.1	2.0	2.1	2.1	2.1	2.4
20-Aug	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	2.2	2.2	2.1	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.1	2.2
21-Aug	2.3	2.2	2.2	2.1	2.1	Z	2.1	2.1	2.2	2.3	2.1	2.0	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.3	2.6	2.4	2.5	2.3	2.2	2.6
22-Aug	Z	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	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.4	2.6	2.8	2.2	2.8
23-Aug	2.8	Z	2.6	2.5	2.3	2.4	2.3	2.4	2.5	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.3	2.3	2.3	2.2	2.1	2.3	2.8
24-Aug	2.1	2.3	Z	2.6	2.4	2.7	2.7	2.7	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.3	2.4	2.5	2.9	2.8	2.4	2.9
25-Aug	2.7	2.6	2.6	Z	2.7	2.7	2.6	2.6	2.7	2.7	2.7	2.7	2.3	2.2	2.3	2.2	2.1	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.4	2.7
26-Aug	2.2	2.1	2.1	2.1	Z	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.4	2.2	2.1	2.1	2.1	2.6	2.7	2.6	2.8	2.9	2.3	2.9
27-Aug	2.8	3.0	3.1	3.1	2.8	Z	2.7	2.5	2.7	2.5	2.2	2.1	2.1	2.1	2.1	2.2	2.3	2.2	2.2	2.8	4.7	3.7	3.3	2.6	2.7	4.7
28-Aug	Z	2.3	2.3	2.6	2.8	2.8	2.6	2.4	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.3	3.1	2.8	2.4	2.6	2.3	3.1
29-Aug	2.6	Z	2.8	2.8	2.9	2.6	2.8	3.3	3.0	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.4	2.2	2.6	2.3	2.7	2.4	3.3
30-Aug	2.4	2.3	Z	2.2	2.2	2.6	2.9	2.8	2.3	2.3	2.7	2.4	2.1	2.1	2.1	2.2	2.5	2.2	2.3	2.2	2.2	2.2	2.3	2.4	2.3	2.9
31-Aug	2.5	2.4	2.5	Z	2.4	2.4	2.3	2.4	2.3	2.2	2.3	2.1	2.1	2.1	2.0	2.1	2.1	2.0	2.1	2.8	2.3	2.4	2.5	2.9	2.3	2.9
	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.3	2.5	2.4	2.4	2.5	Diurnal Average	
	3.0	3.0	3.1	3.1	3.0	3.2	2.9	3.3	3.0	2.8	2.7	2.7	2.4	2.3	2.4	2.2	2.5	2.5	2.9	3.0	4.7	3.7	3.3	3.3	Diurnal Maximum	

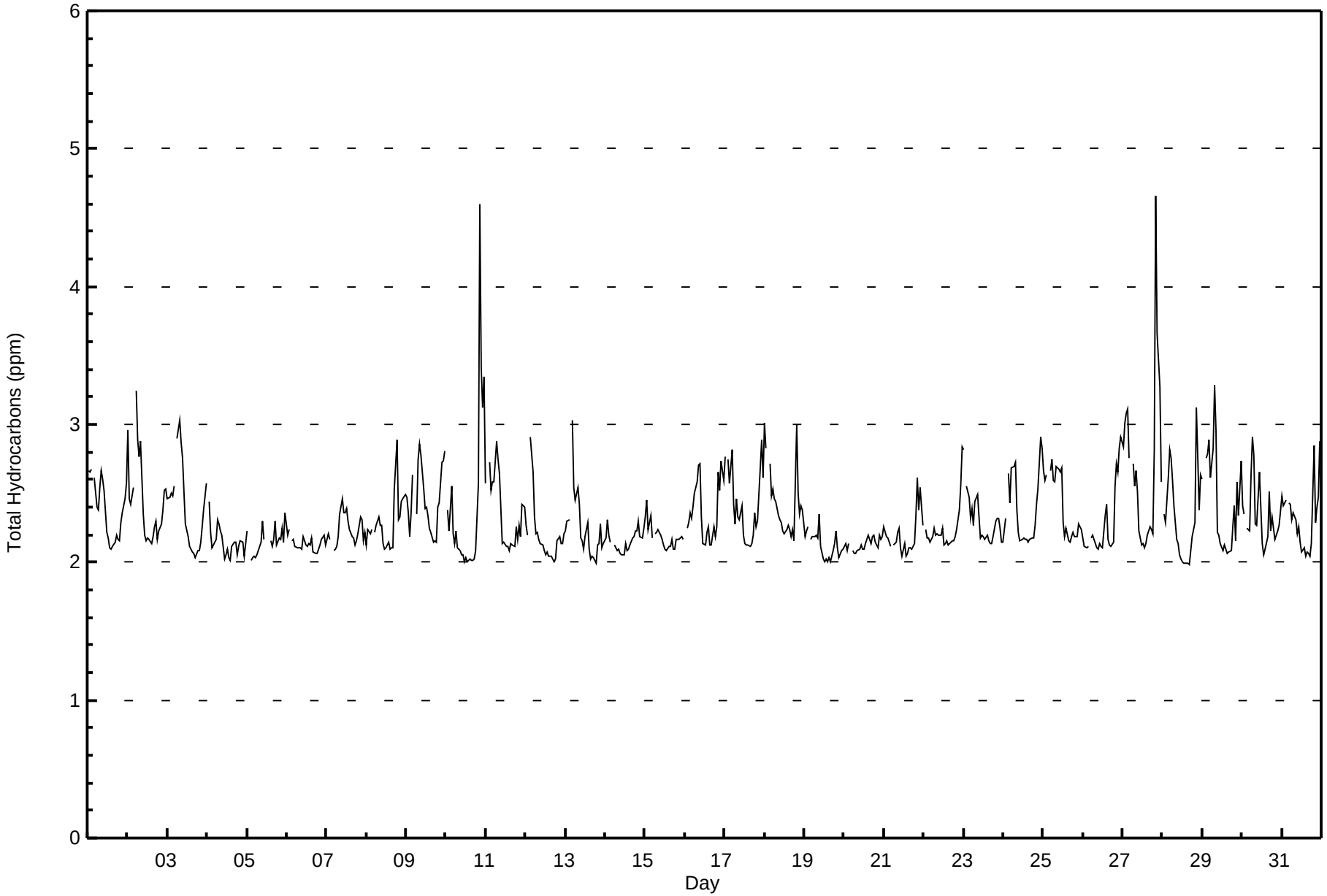
Z - zerospan C - Calibration

Wood Buffalo Environmental Association

Hourly Averages

Total Hydrocarbons (THC) - ppm

Lower Camp - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm

Lower Camp - August 2015

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	42	5.92	5.92
2.1 - 3.0	656	92.39	98.31
3.1 - 10.0	12	1.69	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

Lower Camp - August 2015

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	1	4	0	0	2	2	0	0	0	0	2	23	6	0	2	0	42
2.1 - 3.0	31	12	20	18	19	71	98	43	5	11	23	59	71	71	59	45	656
3.1 - 10.0	0	1	0	1	0	2	1	0	4	2	0	0	0	0	0	1	12
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	32	17	20	19	21	75	99	43	9	13	25	82	77	71	61	46	710

Total Number of Valid Hours: 710

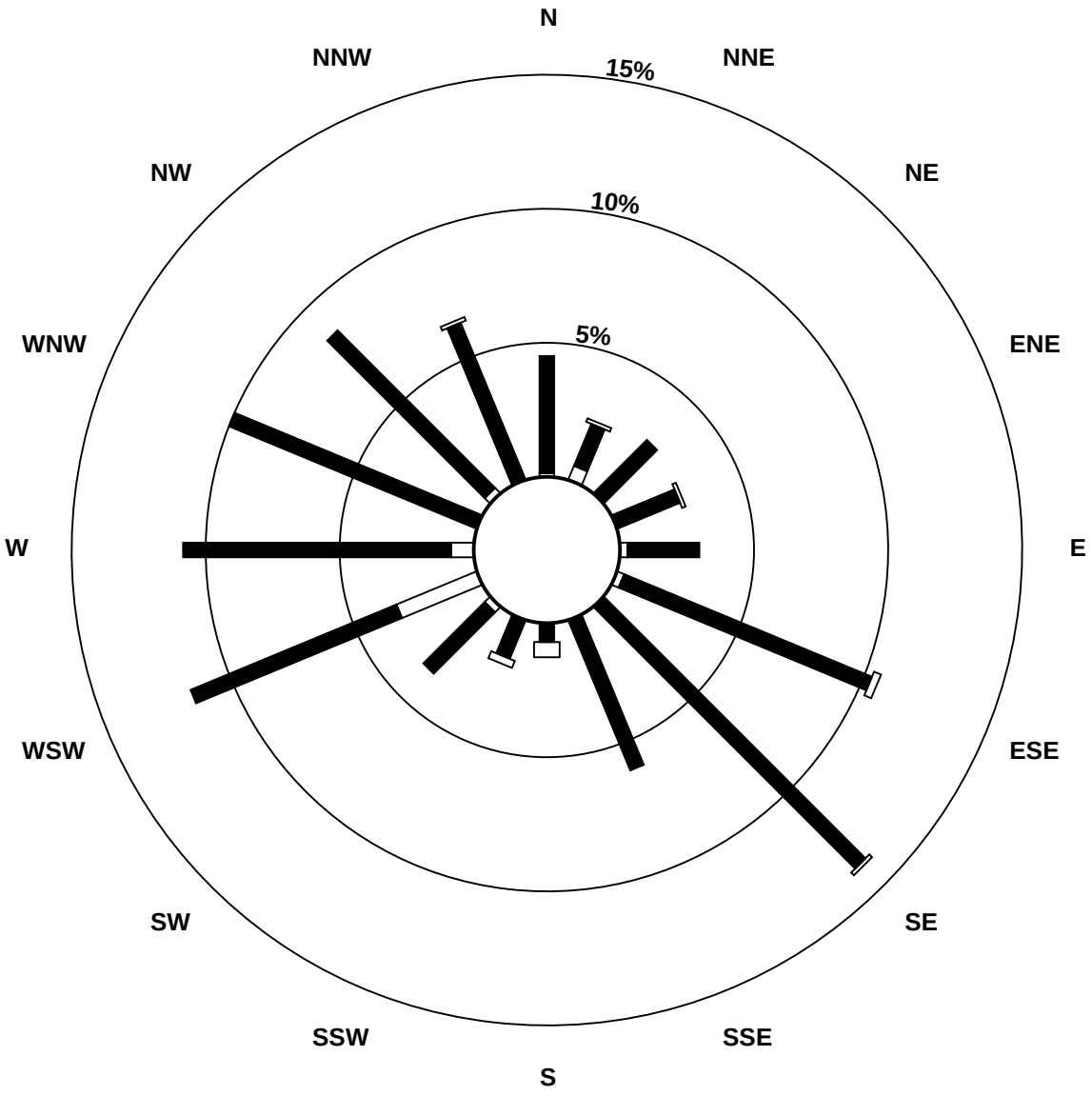
Total Number of Hours: 744

Wood Buffalo Environmental Association

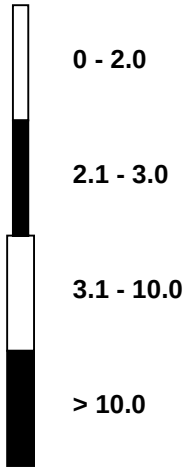
Wind Rose Aug 2015

Total Hydrocarbons (THC) - ppm

Lower Camp (AMS 11)



Classes (ppm)



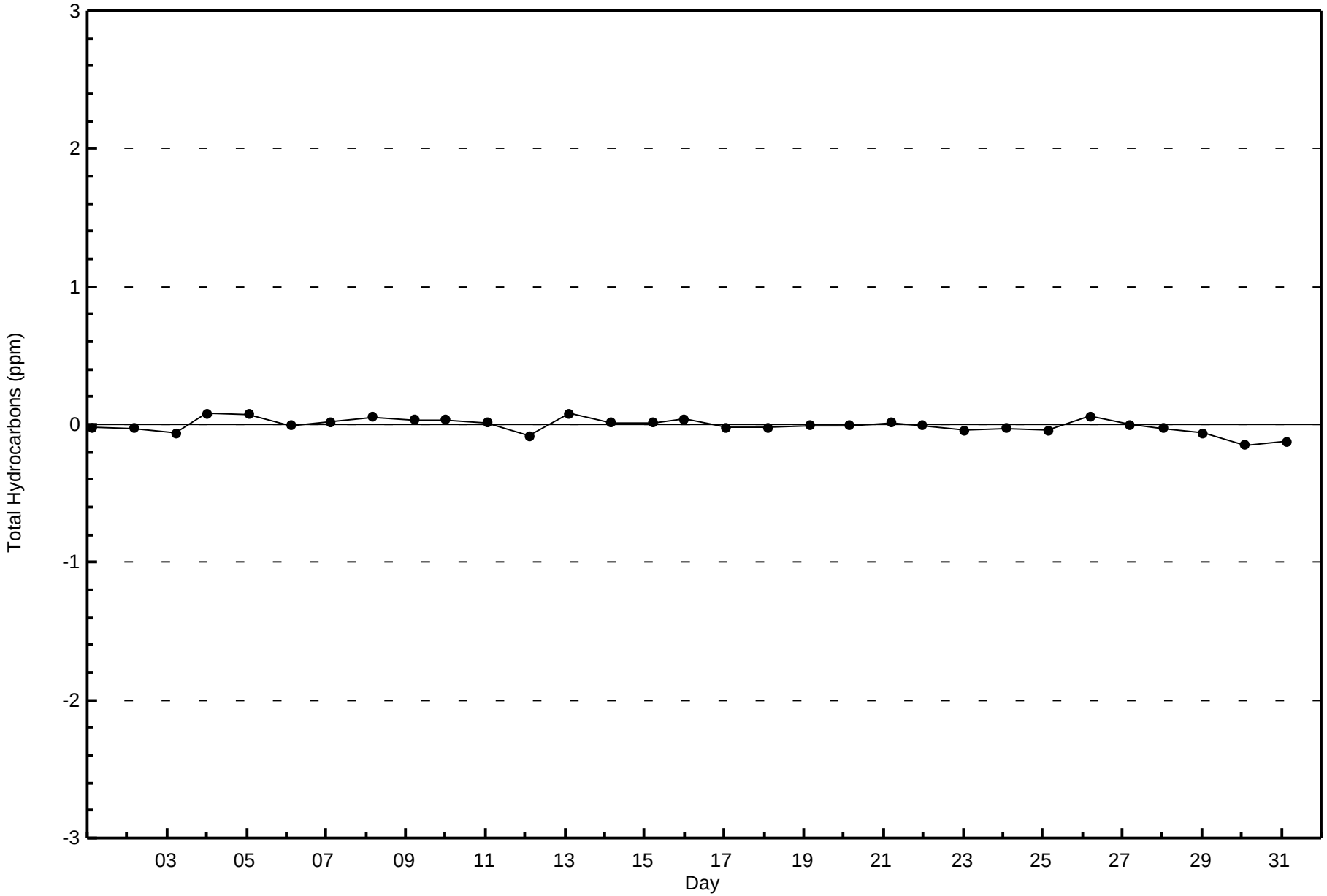
Total Number of Valid Hours: 710

Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Lower Camp - August 2015

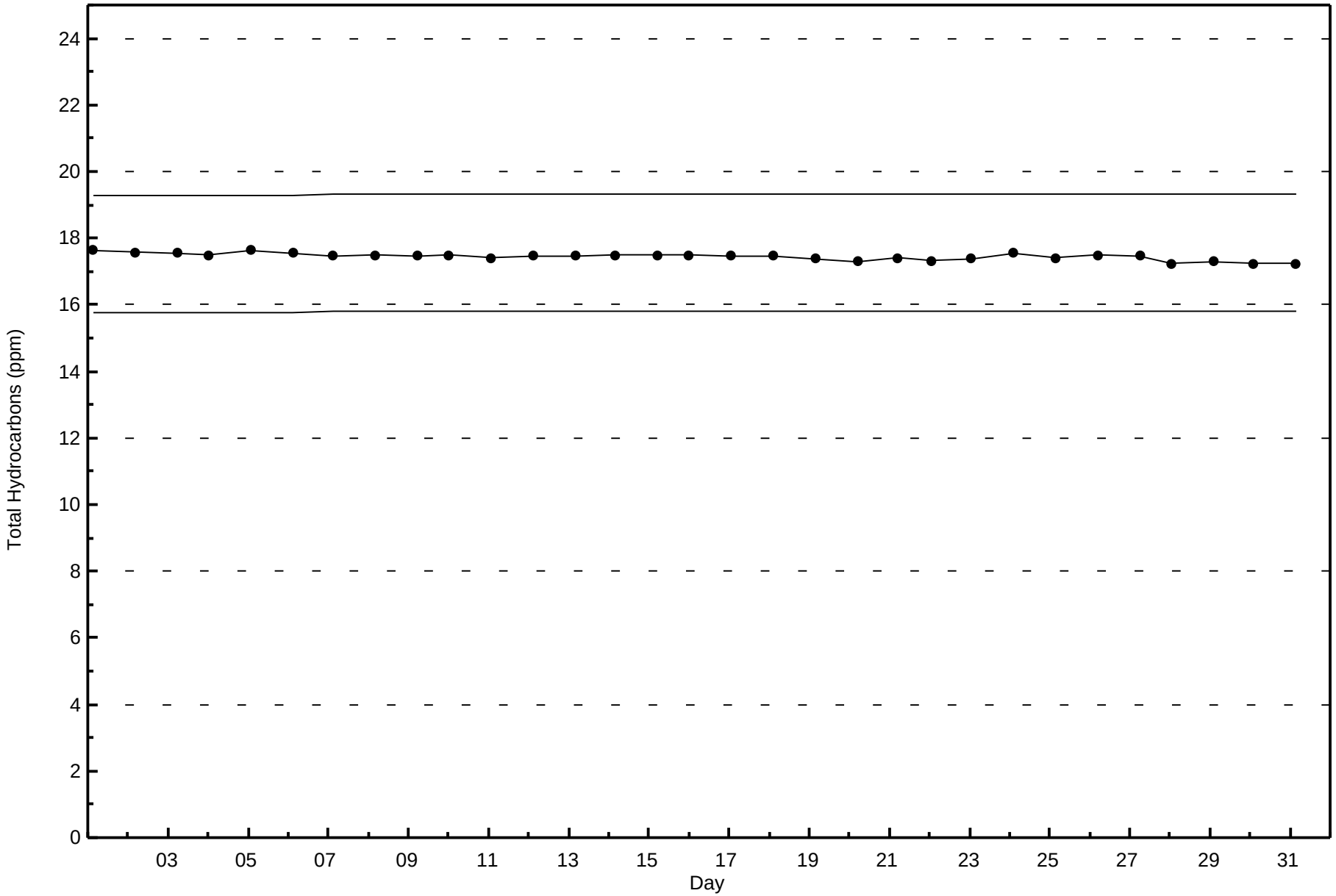


Wood Buffalo Environmental Association

Span Responses

Total Hydrocarbons (THC) - ppm

Lower Camp - August 2015



Maximum Value: 30.6 C on Aug 10 17:00 | Maximum Daily Average: 24.7 C on Aug 10

Minimum Value: 5.4 C on Aug 23 05:00 | Minimum Daily Average: 11.4 C on Aug 22

Maximum Diurnal Average: 23.0 C at hour 15 | Minimum Diurnal Average: 13.4 C at hour 5

Monthly Average: 18.04 C | Percentiles: P_1 = 7.3 P_{10} = 11.9 Q_1 = 14.6 Median = 17.8 Q_3 = 21.5 P_{90} = 24.6 P_{99} = 27.5

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

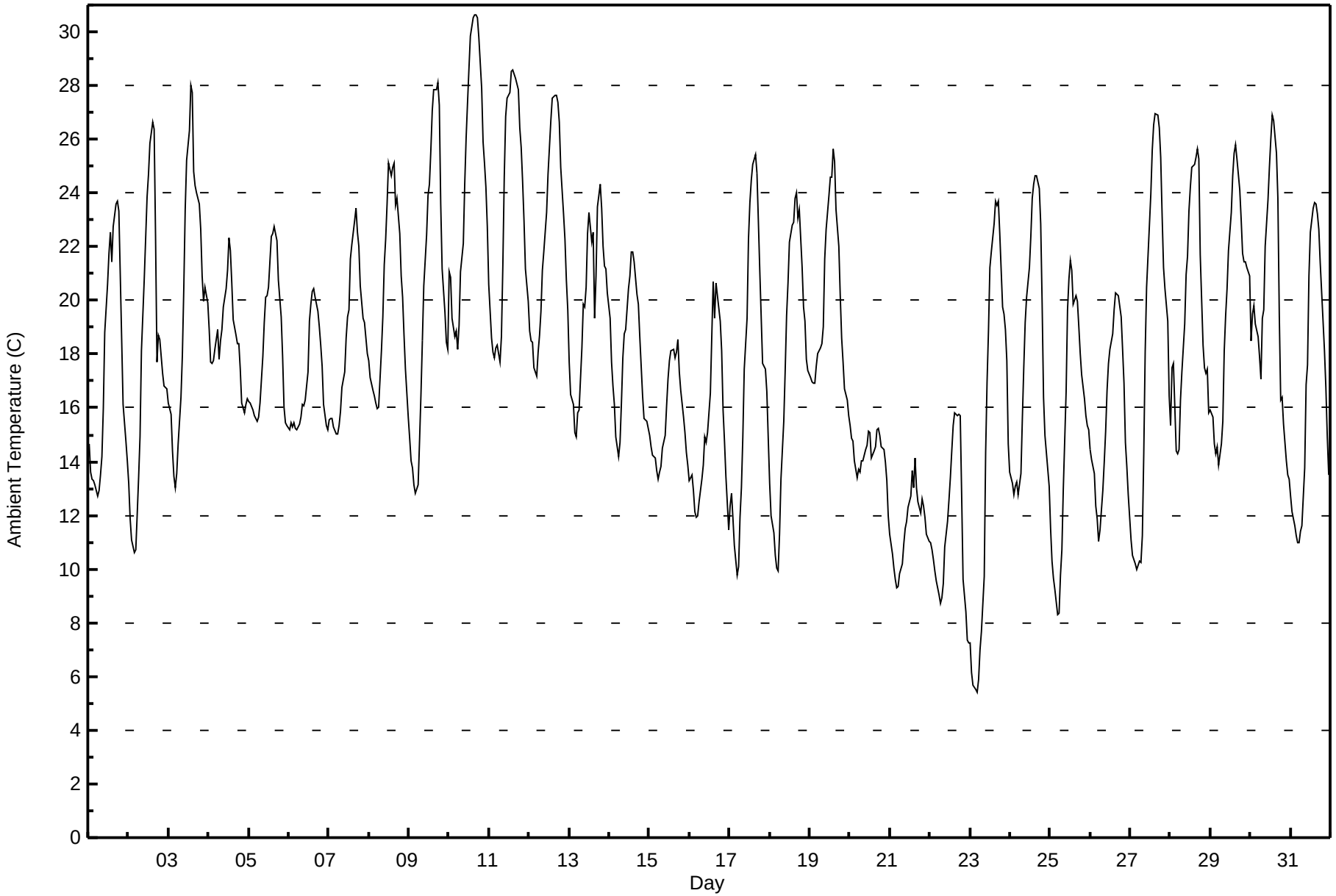
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	14.6	13.6	13.4	13.3	13.1	12.7	12.9	13.5	14.2	16.0	18.8	20.6	21.7	22.5	21.5	22.7	23.6	23.7	23.3	21.0	18.6	16.1	14.8	14.0	17.5	23.7
2-Aug	13.2	11.9	11.1	10.6	10.7	12.1	13.4	14.9	18.1	20.8	22.4	23.8	24.7	25.9	26.6	26.4	22.4	17.7	18.7	18.6	17.3	16.8	16.8	16.7	18.0	26.6
3-Aug	16.2	15.8	14.4	13.4	13.0	13.5	14.6	16.4	18.0	20.5	23.4	25.2	26.3	28.0	27.7	24.8	24.3	24.0	23.6	22.7	20.9	20.0	20.5	19.9	20.3	28.0
4-Aug	18.9	17.7	17.7	17.8	18.2	18.9	17.8	18.5	18.9	19.7	20.5	21.1	22.4	21.9	20.7	19.3	18.7	18.4	18.4	17.4	16.2	15.8	16.1	16.3	18.6	22.4
5-Aug	16.2	16.2	15.9	15.7	15.6	15.5	15.6	16.2	17.9	19.2	20.1	20.2	20.5	22.4	22.5	22.7	22.5	22.2	20.8	19.4	17.9	16.0	15.5	15.4	18.4	22.7
6-Aug	15.2	15.5	15.3	15.4	15.3	15.2	15.4	15.7	16.1	16.1	16.3	17.3	19.2	19.9	20.3	20.4	20.1	19.6	19.0	18.3	17.6	16.1	15.3	15.2	17.1	20.4
7-Aug	15.5	15.6	15.6	15.3	15.0	15.0	15.3	15.9	16.7	17.4	18.6	19.4	19.6	21.5	22.1	23.0	23.4	22.6	22.0	20.5	19.3	19.2	18.6	18.0	18.6	23.4
8-Aug	17.7	17.1	16.7	16.4	16.2	16.0	16.0	18.1	19.4	21.3	22.3	23.6	25.1	24.7	25.0	25.1	23.5	23.8	22.5	20.9	20.1	18.7	17.4	15.6	20.1	25.1
9-Aug	14.9	14.0	13.8	13.1	12.8	13.2	14.8	16.5	18.5	20.5	22.4	23.9	24.3	25.6	27.1	27.9	27.8	28.1	27.3	23.6	21.2	19.6	18.4	18.2	20.3	28.1
10-Aug	21.1	20.9	19.4	18.7	18.9	18.2	19.1	21.1	22.1	24.3	26.1	27.4	28.6	29.9	30.5	30.6	30.6	30.5	29.8	27.9	25.9	25.1	24.2	22.7	24.7	30.6
11-Aug	20.6	18.6	18.1	17.9	18.2	18.3	17.7	18.6	21.3	24.6	26.8	27.5	27.7	28.5	28.6	28.4	28.3	27.8	26.4	25.7	24.4	23.0	21.2	20.0	23.3	28.6
12-Aug	18.9	18.5	18.4	17.5	17.2	18.1	18.7	19.6	21.1	21.8	23.3	24.7	25.7	26.7	27.6	27.7	27.6	27.4	26.6	25.0	23.2	22.3	20.7	19.7	22.4	27.7
13-Aug	17.7	16.5	16.1	15.1	14.9	15.8	15.9	18.3	19.9	19.8	20.5	22.5	23.3	22.2	22.5	19.3	20.9	23.5	24.4	23.4	22.0	21.3	21.2	20.3	19.9	24.4
14-Aug	19.3	17.7	16.8	16.1	14.9	14.2	14.7	16.2	17.9	18.8	18.9	20.4	20.9	21.8	21.8	21.4	20.2	19.8	18.7	17.6	16.5	15.6	15.5	15.2	18.0	21.8
15-Aug	15.0	14.6	14.2	14.1	13.6	13.4	13.6	13.8	14.5	15.0	16.1	17.1	17.8	18.1	18.2	17.8	18.1	18.6	17.4	16.6	15.6	15.1	14.3	13.9	15.7	18.6
16-Aug	13.3	13.5	12.9	12.1	11.9	12.0	12.5	13.4	13.9	14.9	14.7	15.1	16.5	18.6	20.7	19.3	20.7	19.7	19.2	18.1	15.9	14.8	13.4	11.5	15.4	20.7
17-Aug	12.4	12.8	11.9	10.9	9.8	10.1	12.0	13.0	14.9	17.4	19.3	22.3	23.6	24.5	25.1	25.4	24.7	23.0	21.1	19.4	17.6	17.4	16.6	14.9	17.5	25.4
18-Aug	13.2	12.0	11.4	10.5	10.0	9.9	11.3	13.3	15.5	17.4	19.5	20.7	22.2	22.8	22.9	23.8	24.0	23.1	23.4	21.2	19.8	19.3	17.8	17.4	17.6	24.0
19-Aug	17.1	17.0	16.9	16.9	17.5	18.0	18.2	18.4	19.0	21.5	22.6	23.9	24.6	24.6	25.7	25.2	23.4	22.0	20.2	18.6	17.7	16.7	16.3	15.7	19.9	25.7
20-Aug	15.3	14.8	14.8	14.0	13.4	13.7	13.6	14.0	14.0	14.5	14.6	15.1	15.1	14.1	14.4	14.6	15.2	15.2	15.0	14.6	14.4	14.0	13.3	12.0	14.3	15.3
21-Aug	11.3	10.5	10.0	9.6	9.3	9.3	9.8	10.2	10.9	11.5	11.8	12.3	12.7	13.7	13.0	14.1	13.0	12.5	12.1	12.6	12.4	11.9	11.3	11.0	11.5	14.1
22-Aug	11.0	10.7	10.3	9.9	9.5	9.0	8.7	8.9	9.5	10.8	11.8	12.6	13.4	14.4	15.3	15.8	15.7	15.8	15.7	12.8	9.6	8.4	7.4	7.3	11.4	15.8
23-Aug	7.3	6.2	5.7	5.5	5.4	5.9	7.0	7.7	9.7	14.4	17.0	18.9	21.3	21.8	22.8	23.7	23.6	23.7	22.5	19.8	19.5	18.9	17.7	14.7	15.0	23.7
24-Aug	13.6	13.2	12.8	13.1	13.2	12.8	13.6	15.6	17.5	19.2	20.1	21.2	22.4	23.8	24.3	24.6	24.6	24.2	22.8	19.9	16.4	15.0	13.7	13.1	17.9	24.6
25-Aug	11.5	10.3	9.7	9.2	8.3	8.4	9.8	10.7	13.0	16.6	19.6	20.8	21.5	21.1	19.9	20.2	20.0	19.0	18.0	17.2	16.3	15.7	15.4	15.2	15.3	21.5
26-Aug	14.5	14.1	13.5	12.4	11.8	11.0	11.5	12.9	14.0	15.1	16.7	17.7	18.2	18.8	19.7	20.3	20.2	20.2	19.4	18.2	16.9	14.7	13.8	12.8	15.8	20.3
27-Aug	11.1	10.5	10.3	10.2	10.0	10.3	10.3	11.3	14.3	18.1	20.5	22.8	24.0	25.6	26.6	27.0	26.9	26.4	25.3	23.2	21.2	20.4	19.2	16.4	18.4	27.0
28-Aug	15.4	17.5	17.6	14.4	14.3	14.5	16.3	17.4	19.1	21.0	21.6	23.3	24.2	25.0	25.1	25.3	25.7	25.3	21.7	18.4	17.5	17.3	17.4	15.8	19.6	25.7
29-Aug	15.9	15.7	14.7	14.3	14.6	13.9	14.7	15.5	18.1	19.4	20.5	21.9	23.3	24.7	25.5	25.8	25.3	24.1	23.0	21.7	21.5	21.5	21.2	20.9	19.9	25.8
30-Aug	18.5	19.5	19.8	19.1	18.6	17.9	17.1	19.3	19.6	22.0	23.7	24.9	26.0	26.9	26.7	25.5	23.8	19.4	16.3	16.4	15.4	14.0	13.5	13.3	19.9	26.9
31-Aug	12.7	12.1	11.6	11.3	11.0	11.0	11.4	11.6	13.8	16.9	17.6	20.9	22.5	23.5	23.7	23.6	23.2	22.6	21.4	19.2	18.1	16.8	14.9	13.5	16.9	23.7
	15.1	14.7	14.2	13.7	13.4	13.5	14.0	15.0	16.5	18.3	19.6	20.9	21.9	22.7	23.0	23.0	22.6	22.1	21.2	19.7	18.3	17.3	16.6	15.7	Diurnal Average	
	21.1	20.9	19.8	19.1	18.9	18.9	19.1	21.1	22.1	24.6	26.8	27.5	28.6	29.9	30.5	30.6	30.6	30.5	29.8	27.9	25.9	25.1	24.2	22.7	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature (AT) - C

Lower Camp - August 2015



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	31	4.17	4.17
10 - 20	462	62.10	66.26
> 20	251	33.74	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Lower Camp - August 2015

Maximum Value: 99 % on Aug 27 07:00

Maximum Daily Average: 82.9 % on Aug 6

Minimum Value: 24 % on Aug 31 17:00

Minimum Daily Average: 46.4 % on Aug 12

Maximum Diurnal Average: 85.3 % at hour 6

Minimum Diurnal Average: 45.0 % at hour 15

Monthly Average: 66.7 %

Percentiles: $P_1 = 27$ $P_{10} = 37$ $Q_1 = 52$ Median = 68 $Q_3 = 84$ $P_{90} = 93$ $P_{99} = 99$

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

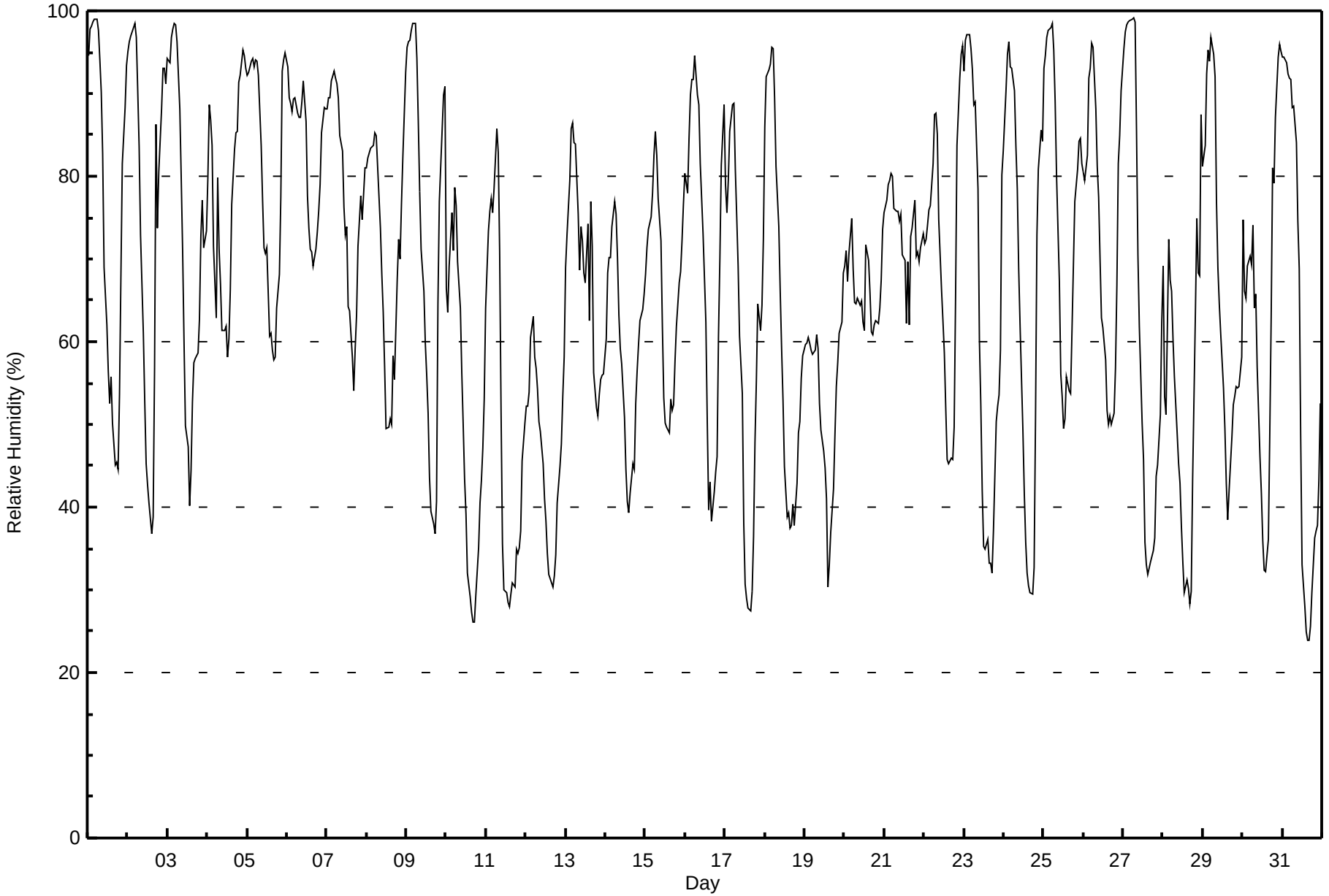
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	95	98	98	99	99	99	98	94	90	83	69	62	56	52	56	50	45	45	45	54	68	82	88	93	75.7	99
2-Aug	95	96	97	98	99	97	90	84	73	61	53	45	43	41	37	39	57	86	74	81	88	93	93	91	75.4	99
3-Aug	94	94	97	98	98	98	96	88	80	71	60	50	47	40	44	53	58	58	59	63	73	77	71	73	72.5	98
4-Aug	80	89	87	84	71	63	80	71	67	61	61	62	58	60	66	77	83	85	85	91	92	95	95	93	77.4	95
5-Aug	92	93	94	94	93	94	94	92	84	77	71	71	71	61	61	59	58	58	64	68	77	93	94	95	79.5	95
6-Aug	93	90	89	88	89	90	88	87	87	89	92	87	78	74	71	71	69	71	73	76	79	85	88	88	82.9	93
7-Aug	88	90	89	92	93	92	91	89	85	83	76	73	74	64	64	58	54	59	63	72	78	75	78	81	77.5	93
8-Aug	81	82	83	84	84	85	85	77	74	68	64	57	50	50	51	50	58	55	68	72	70	77	82	93	70.8	93
9-Aug	96	96	96	98	98	99	94	87	78	71	66	60	56	51	44	39	38	37	41	64	77	86	90	91	73.0	99
10-Aug	66	64	69	76	71	79	77	70	64	56	50	43	39	32	29	27	26	26	29	35	41	43	47	53	50.5	79
11-Aug	64	73	76	77	76	78	86	83	71	52	36	30	30	28	28	29	31	30	35	34	35	37	46	50	50.6	86
12-Aug	52	52	54	60	63	58	57	54	50	49	45	41	38	34	32	31	30	32	34	40	45	48	53	58	46.4	63
13-Aug	69	73	79	86	87	84	84	75	69	74	72	68	67	74	63	77	72	56	52	51	54	55	56	56	68.9	87
14-Aug	60	68	70	70	74	77	75	70	63	59	57	51	45	41	39	42	45	45	53	56	60	63	64	66	58.9	77
15-Aug	68	71	73	75	78	82	85	83	77	72	62	53	50	50	49	53	52	52	58	62	67	69	72	77	66.3	85
16-Aug	80	78	85	90	92	92	95	90	89	82	77	73	62	50	40	43	38	42	44	46	61	70	81	89	70.3	95
17-Aug	79	76	79	85	89	89	81	75	69	61	54	38	31	29	28	27	30	36	48	55	65	61	64	72	59.2	89
18-Aug	86	92	93	94	96	95	89	81	74	66	59	53	45	39	39	37	38	40	38	43	49	50	56	58	62.9	96
19-Aug	60	60	61	60	59	59	59	61	59	52	49	47	45	41	30	33	37	42	49	55	57	61	62	68	52.7	68
20-Aug	69	71	67	71	75	69	65	65	65	64	65	62	61	72	70	66	61	61	62	63	62	64	67	74	66.3	75
21-Aug	76	77	79	80	80	80	76	76	76	75	75	71	70	62	70	62	73	74	77	70	71	70	71	73	73.4	80
22-Aug	72	72	74	76	76	82	87	88	85	75	66	62	59	52	46	45	46	46	50	65	84	92	95	96	70.4	96
23-Aug	93	96	97	97	95	93	89	89	79	60	52	42	35	35	36	33	33	32	37	50	52	54	59	80	63.3	97
24-Aug	83	91	95	96	93	93	90	84	79	69	62	49	42	36	32	30	30	30	33	51	73	81	86	84	66.2	96
25-Aug	93	95	97	98	98	98	95	89	80	67	56	53	50	51	56	54	54	61	69	77	81	84	85	81	75.9	98
26-Aug	81	80	83	92	93	96	96	88	81	77	70	63	62	58	52	50	51	50	51	57	67	81	85	90	73.0	96
27-Aug	95	97	98	99	99	99	99	99	85	71	62	50	46	36	33	32	33	34	35	36	44	45	51	63	64.2	99
28-Aug	69	53	51	72	67	66	60	56	49	45	43	38	33	30	31	30	28	30	43	64	75	68	68	87	52.4	87
29-Aug	81	84	92	95	94	97	95	92	77	69	65	61	54	49	43	39	42	48	52	53	55	54	55	58	66.9	97
30-Aug	75	66	65	69	70	69	74	64	66	57	46	42	36	32	32	36	49	63	81	79	87	94	96	95	64.4	96
31-Aug	94	94	94	92	92	92	88	88	84	75	69	49	33	28	25	24	24	26	30	36	37	38	43	53	58.6	94
	80.0	81.0	82.6	85.2	85.2	85.3	84.5	80.3	74.5	67.5	61.4	55.0	50.5	46.8	45.0	45.1	46.5	48.8	52.6	58.7	65.2	69.2	72.3	76.8	Diurnal Average	
	96	98	98	99	99	99	99	99	90	89	92	87	78	74	71	77	83	86	85	91	92	95	96	96	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity (RH) - %

Lower Camp - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Lower Camp - August 2015

Maximum Speed: 29 km/h on Aug 19 16:00

Maximum Daily Speed Average: 20.1 km/h on Aug 14

Minimum Speed Value: 0 km/h on Aug 27 04:00

Minimum Daily Speed Average: 0.8 km/h on Aug 18

Maximum Diurnal Speed Average: 6.6 km/h at hour 15

Minimum Diurnal Speed Average: 1.6 km/h at hour 7

Monthly Average Velocity: 3.1 km/h 250.6 deg

Percentiles: P_1 = 1 P_{10} = 2 Q_1 = 4 Median = 8 Q_3 = 14 P_{90} = 19 P_{99} = 26

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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	NW5	WSW3	NW1	NE0	NW4	NW7	NNW5	NW7	NW5	NW4	NW4	NNW8	NW9	N13	NNW12	NW10	NW10	WNW11	NW10	N6	NNW2	WNW3	WNW2	NW2	NW5.5	N13
2-Aug	N1	NNE2	NE2	NNE1	NNE1	ESE3	SE8	SE7	SE8	ESE9	ESE13	ESE8	ESE8	ESE8	ESE5	ENE6	NW11	N7	ESE3	NW4	NW3	SW2	ENE1	NW4	E2.7	ESE13
3-Aug	WNW3	WNW3	WNW2	NE2	NW2	WNW3	NNW2	NW3	NNW4	NNW3	NNW3	NNE4	ESE7	SSE9	ESE13	ENE12	ENE12	E11	ESE12	E8	N1	WNW2	ESE5	ESE5	E2.8	ESE13
4-Aug	NNE0	WNW4	WNW4	N3	ENE6	NE4	NNW6	NNW6	ENE4	ENE7	N9	ENE10	E11	ESE17	ESE15	ESE11	E10	ESE16	ESE15	ESE18	SE11	ESE8	E10	E9	E6.6	ESE18
5-Aug	NE3	NNW7	NNE7	NNE6	NNE4	NNE6	NE5	NE8	E10	ESE7	SE4	W3	WNW5	SSE3	SE8	ESE8	ESE11	SE13	SE14	SSE13	SE12	ESE14	E16	ESE13	ESE5.6	E16
6-Aug	E14	ESE19	ESE15	ESE14	ESE12	ESE13	ESE17	ESE18	ESE19	ESE17	ESE12	ESE17	ESE15	ESE15	ESE13	ESE12	ESE17	ESE16	ESE16	ESE15	E15	ESE10	ENE2	ENE4	ESE13.8	ESE19
7-Aug	E7	ESE4	ENE3	NNE4	NE3	ENE3	ENE5	NNW4	NW3	NW4	N1	SE2	ESE5	ESE3	ESE5	E5	E2	E8	NE2	NE5	ESE5	SE6	SE7	SE9	E3.1	SE9
8-Aug	SE11	SE7	SSE6	SE6	SSE8	SE6	SSE5	SE7	SE8	SE8	ESE10	E5	SE3	N4	NNE5	N5	SSW5	SSE2	SE4	ESE11	SE9	ESE5	NNW2	WNW3	SE4.5	ESE11
9-Aug	NW3	WNW1	N1	W2	WNW4	WNW1	WNW3	NNE3	NNW3	NNW4	NNE5	N4	NW4	N4	NNW4	NE3	NE4	ESE3	NE2	NW2	NNE1	NW2	ENE2	N2	N2.0	NNE5
10-Aug	SSW7	WNW8	SSE3	SW7	SW14	W13	W7	WSW11	WSW9	WSW10	W12	W14	W13	WSW17	WSW18	WSW16	WSW15	WSW17	SW13	SSW7	S6	SSW10	S8	SSW8	WSW9.8	WSW18
11-Aug	SSE4	SE6	SSE7	SSE7	SE6	SE6	SE9	ESE6	SE9	SSW8	WSW20	W27	WSW27	WSW26	WSW26	WSW24	WSW25	WSW23	WSW14	SW11	SW13	WSW14	W12	WSW15	WSW11.1	W27
12-Aug	WSW17	WSW14	WSW9	SE5	SSE5	WSW10	WSW17	W22	WSW21	WSW18	WSW19	WSW18	WSW19	WSW18	WSW16	WSW17	WSW19	WSW18	W18	WSW14	SW12	WSW14	WSW12	WSW8	WSW14.4	W22
13-Aug	SE2	SSE4	SE6	SE5	SE4	SE6	SSE5	SE6	SSE5	SE9	SE8	SE8	ESE5	NW6	W15	WSW10	SW8	SW14	WSW12	SW12	SW8	SW9	SW13	WSW14	SSW5.0	W15
14-Aug	W18	WSW14	WSW18	W21	W21	W22	W19	W20	W21	W26	W24	W23	W24	W23	W24	WNW27	WNW23	WNW22	WNW19	WNW20	WNW19	WNW17	W16	WNW18	W20.1	WNW27
15-Aug	WNW17	WNW14	WNW12	WNW13	NW12	NNW10	NNW12	NNW14	NNW16	NNW15	N18	N20	N21	N19	NNW16	NNW17	NNW15	NNW14	N10	WNW9	NW10	NW7	NNW7	N6	NNW12.5	N21
16-Aug	NNW3	NW4	NNW3	NW2	NW2	WNW4	N1	NE2	ENE4	E4	N5	NW9	NNE5	NNE5	WNW9	NW10	W8	WNW6	W8	W10	WNW4	WNW3	E3	SE3	NW3.0	W10
17-Aug	SE4	SSE5	SSE4	SSE5	SE5	SE8	SE8	SE9	SE9	SE9	ESE10	SSE4	W8	W11	SW10	WSW6	WSW11	W11	N5	NNE2	E2	SSE4	SE4	SE3	S3.1	W11
18-Aug	NNW2	WNW4	N2	N2	WNW5	WNW5	NNW3	NNW4	N6	NNW5	NW5	NNW3	WNW5	NW7	NNW6	WSW3	SSE7	SE5	SSE6	S5	SSE6	SSE7	SSE8	SSE9	W0.8	SSE9
19-Aug	SSE10	SSE11	SSE13	SSE13	SSE15	SSE13	SSE13	SSE12	SSE12	S9	WSW14	WSW19	WSW19	WSW21	W26	WSW29	WSW26	W23	WNW25	WNW21	W20	W19	W17	WSW16	WSW11.4	WSW29
20-Aug	W18	W18	W17	WSW17	WSW15	W22	W22	W22	W24	W23	W22	W22	WNW24	WNW22	WNW20	WNW20	WNW21	WNW19	WNW17	WNW17	W17	WNW19	WNW18	W16	W19.1	W24
21-Aug	WSW19	W18	W20	W19	W19	WSW19	W18	W16	WNW16	WNW17	WNW16	NW12	NW17	NW17	NW16	WNW15	NW12	NW13	NW9	NW11	WNW13	WNW17	WNW18	WNW17	WNW14.8	W20
22-Aug	WNW16	W14	W14	WSW18	W18	W16	W15	W15	W15	W17	WNW18	WNW16	NNW11	NW9	NW15	NNW11	NNW9	NNW7	NNE3	ESE1	NE1	NE1	NE1	ESE2	WNW9.1	WNW18
23-Aug	ESE2	NW1	SE4	SE5	SSE6	SE6	SE10	ESE11	ESE9	SE8	SE12	SSE9	SSE9	SSE8	SE10	SE9	SSE9	SSE9	SSE7	SE6	SE9	SE9	N7	NNE6	SE6.3	SE12
24-Aug	ENE2	WNW2	SE1	SE11	S4	SSW5	SSW3	SE6	SE8	S6	W9	W13	W12	W14	W13	WSW12	WSW10	WSW11	WSW11	WSW3	ENE2	N1	WNW3	WNW2	WSW4.4	W14
25-Aug	NE1	NE2	NW3	NNW2	WNW2	NW3	NE3	N3	NNW4	NW6	NW9	NNW10	N11	NW12	NNW10	NNW9	NW8	NW7	NW6	NW5	WNW2	WNW4	NW4	NW6	NNW5.2	NNW12
26-Aug	NW6	NW8	NW5	NW1	NW4	NW1	NNW2	WNW2	NNW5	WNW9	WNW6	N5	N7	NNW6	W5	W7	W8	W7	SW6	SSW5	SW2	NE2	E3	E3	WNW3.2	WNW9
27-Aug	ENE2	N1	ENE2	NNE0	SE4	ESE6	ESE8	ESE7	SE8	SE8	SE11	SE10	SSE8	SW12	SW14	SSW15	SW16	WSW18	WSW14	SW8	S8	S9	SE5	SE6	S5.3	WSW18
28-Aug	SE6	W11	WSW9	SE5	SSE6	SSE5	SSW6	SW8	WSW15	WSW18	WSW23	WSW21	W20	WSW23	WSW19	W17	W16	W13	N0	E1	NNW2	W3	WSW1	WNW2	WSW8.8	WSW23
29-Aug	WNW4	WNW3	ESE1	ESE2	NW4	SE1	SE3	ESE2	SE6	SE9	SE12	ESE11	ESE10	SE10	SE8	SE8	ESE11	SE10	ESE13	ESE14	SE14	SE11	SE12	SE13	SE7.1	SE14
30-Aug	ESE12	SE13	SE14	ESE13	SE10	S4	SSW2	SW9	WSW14	W12	WNW10	W7	W12	W9	W8	WNW3	SE7	SE14	SE15	SSE9	SE6	ESE7	SE8	SE10	SSE4.4	SE15
31-Aug	SE8	SE9	SE11	SE10	SE10	SE11	ESE10	SE13	SE11	SE13	SE10	SW9	WSW21	WSW24	WSW25	WSW25	WSW23	WSW21	SW13	SSW7	SW10	SSW8	SW8	SE3	SSW8.1	WSW25
	WSW2.1	WSW2.8	SW2.0	SSW2.0	SW2.5	SW2.6	SW1.6	SW2.1	SW2.1	WSW3.0	W3.8	W4.5	W5.2	W6.1	W6.6	W6.1	W5.7	W4.9	WSW2.8	SW2.1	SW2.4	SW2.9	SW2.0	SW1.8	Diurnal Average	
	WSW19	ESE19	W20	WSW21	W21	W22	W22	W22	W24	W26	W24	W27	WSW27	WSW26	WSW26	WSW29	WSW26	WSW23	WNW25	WNW21	W20	WNW19	WNW18	WNW18	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 - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 11 km/h on Aug 13 15:00

Minimum Value: 1 km/h on Aug 7 14:00

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:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

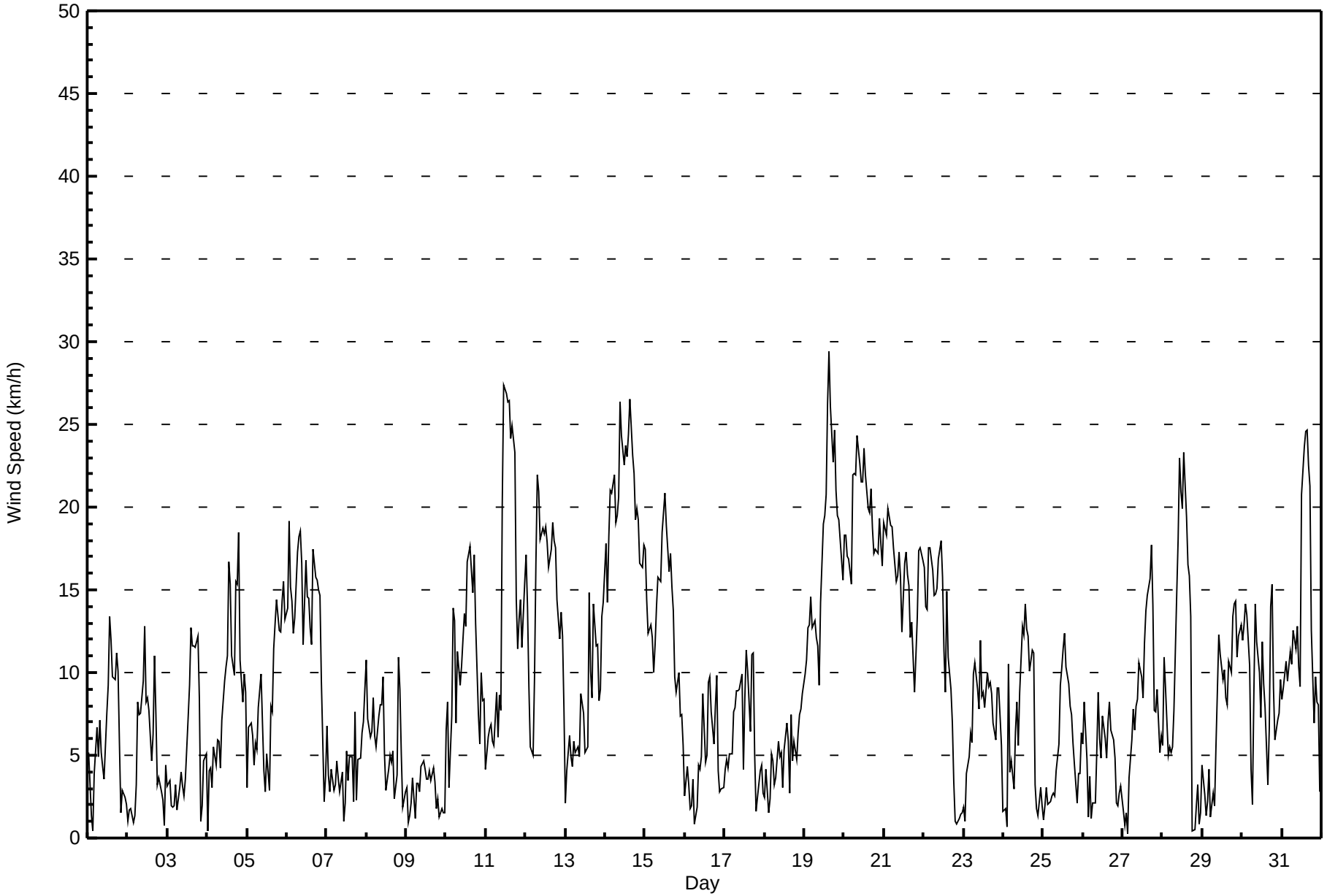
Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Aug	2	1	1	2	3	1	1	1	1	2	2	3	3	4	3	2	3	3	3	4	2	1	2	1	4
2-Aug	2	1	1	1	1	2	2	2	2	4	3	3	3	3	2	3	8	3	4	2	2	2	1	1	8
3-Aug	1	1	2	1	1	1	1	1	1	1	1	2	4	3	5	4	3	2	2	3	1	1	2	2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

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed (WS) - km/h

Lower Camp - August 2015



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	241	32.39	32.39
6 - 11	246	33.06	65.46
12 - 19	199	26.75	92.20
20 - 28	57	7.66	99.87
29 - 38	1	0.13	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 - August 2015

Wind Speed Ranges (km/h)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 5	19	16	20	13	9	19	22	16	3	5	2	4	4	33	32	24	241
6 - 11	9	4	1	4	9	25	69	23	6	8	12	14	15	8	23	16	246
12 - 19	3	0	0	2	3	33	14	8	0	1	11	44	38	24	8	10	199
20 - 28	2	0	0	0	0	0	0	0	0	0	0	22	22	11	0	0	57
29 - 38	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	33	20	21	19	21	77	105	47	9	14	25	85	79	76	63	50	744

Total Number of Valid Hours: 744

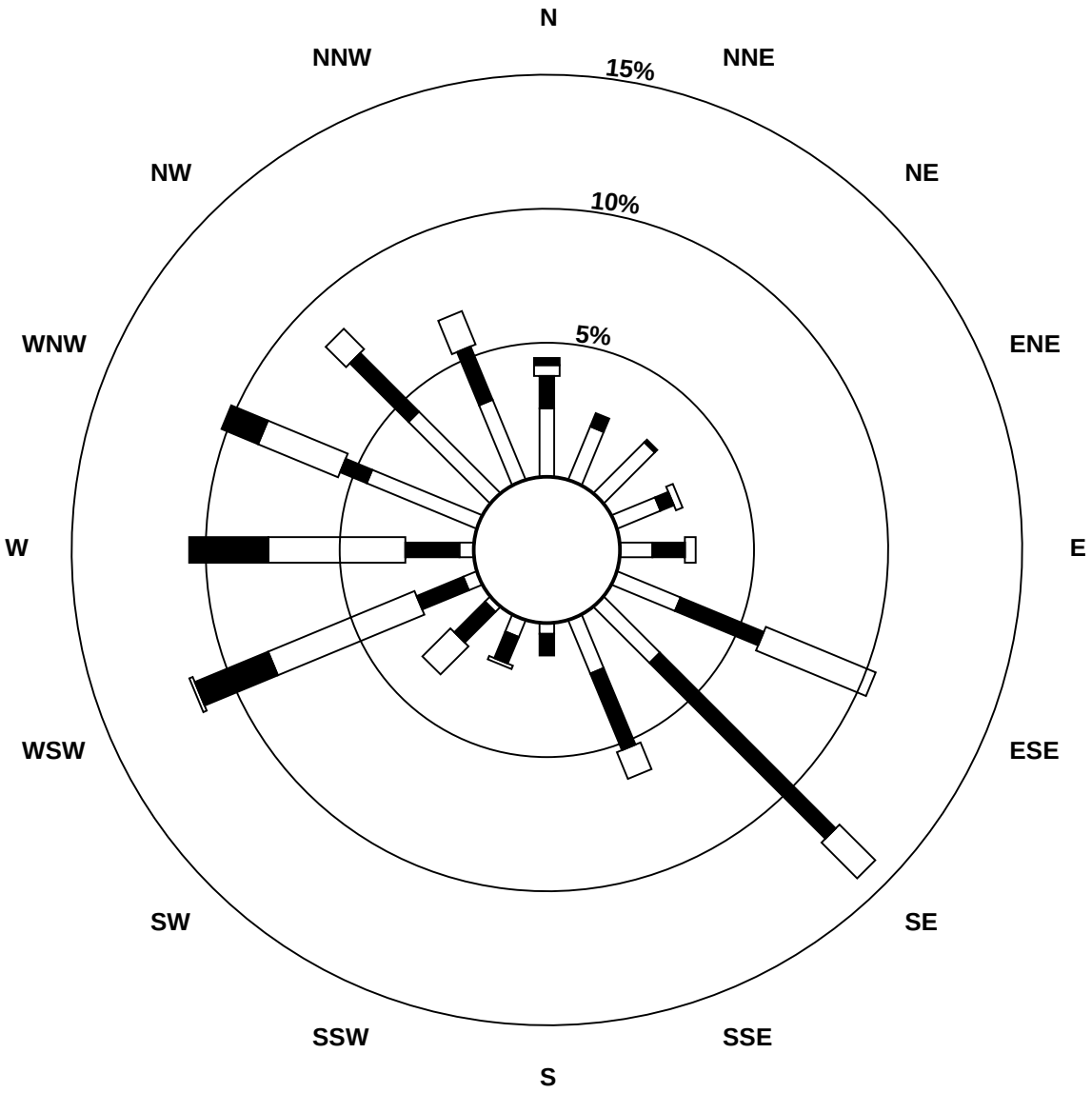
Total Number of Hours: 744

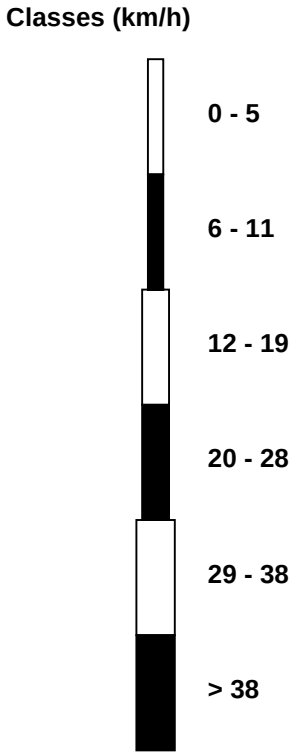
Wood Buffalo Environmental Association

Wind Rose Aug 2015

Wind Speed (WS) - km/h

Lower Camp (AMS 11)





Total Number of Valid Hours: 744

Direction of Maximum Speed: 256 deg on Aug 19 16:00
Direction of Maximum Daily Speed Average: 271.6 deg on Aug 14

Direction of Minimum Speed: 16 deg on Aug 27 04:00

Direction of Minimum Daily Speed Average: 0.8 deg on Aug 18

Monthly Average Direction: 279.3 deg

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
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average
1-Aug	307	237	312	50	319	305	340	306	304	320	325	339	312	350	342	326	308	302	324	4	339	291	287	316	321.4
2-Aug	351	28	49	18	27	113	124	128	130	123	114	117	107	112	112	78	307	8	121	321	324	236	70	311	99.3
3-Aug	289	301	300	46	306	297	345	326	337	341	343	23	123	160	119	68	77	97	102	80	349	302	113	117	83.4
4-Aug	25	296	288	358	78	50	333	336	60	59	9	59	99	116	115	111	96	102	102	115	126	103	97	91	91.0
5-Aug	55	341	19	32	18	17	40	55	91	121	131	267	285	152	124	117	119	124	141	151	141	119	101	105	105.3
6-Aug	99	109	109	104	107	113	106	110	119	109	122	109	121	106	113	123	105	108	108	107	100	106	60	77	108.9
7-Aug	90	116	76	19	53	78	70	332	322	323	7	128	116	102	105	83	80	85	50	54	105	134	138	128	89.8
8-Aug	134	144	147	140	147	133	148	133	130	132	119	88	142	353	16	4	202	154	126	109	129	102	328	291	127.1
9-Aug	316	284	0	281	284	296	302	16	338	327	17	3	324	353	348	43	48	111	55	316	18	308	59	352	350.1
10-Aug	209	299	149	215	235	269	267	257	240	246	262	269	259	250	256	256	258	247	233	206	174	207	188	198	243.9
11-Aug	158	144	149	149	146	145	130	123	132	207	258	259	256	253	258	257	257	255	258	232	229	239	264	251	240.9
12-Aug	249	247	243	141	149	246	258	263	255	257	253	254	253	251	253	254	255	257	261	250	235	245	251	247	251.1
13-Aug	146	149	143	139	140	146	148	140	147	124	136	132	122	323	271	252	228	232	240	225	215	214	214	245	202.2
14-Aug	259	253	253	259	259	259	265	263	263	261	260	263	268	266	271	283	297	284	300	302	296	284	271	282	271.6
15-Aug	290	296	298	298	309	334	328	331	344	341	352	356	5	1	345	345	337	342	353	303	311	319	329	6	333.7
16-Aug	333	318	341	309	308	287	11	39	58	96	349	323	22	16	286	318	265	296	278	278	285	288	96	135	313.8
17-Aug	145	152	148	150	144	137	128	127	130	131	123	148	262	267	235	237	243	271	356	21	101	165	134	145	173.1
18-Aug	336	288	350	351	300	303	338	344	359	327	321	337	299	308	344	244	166	145	159	175	165	164	154	153	264.0
19-Aug	150	152	150	154	155	155	152	153	154	189	243	257	252	255	259	256	253	279	285	285	273	269	264	254	239.7
20-Aug	259	262	269	258	245	266	272	268	270	277	281	278	286	295	294	294	298	295	301	293	273	289	289	264	278.6
21-Aug	257	261	263	263	261	257	264	261	295	295	298	310	306	315	324	300	313	316	309	306	298	295	293	291	287.0
22-Aug	288	274	268	257	265	264	266	260	259	276	283	294	346	309	310	338	346	347	13	110	53	50	35	119	286.1
23-Aug	111	309	135	136	150	139	129	117	116	137	127	149	159	156	141	141	151	158	160	142	138	142	349	18	136.9
24-Aug	72	299	138	134	172	201	206	140	133	191	270	262	278	266	265	257	256	249	243	258	78	1	297	292	243.6
25-Aug	44	41	307	342	299	310	35	1	341	326	311	333	352	326	331	347	325	319	326	317	282	297	306	323	329.3
26-Aug	317	318	323	326	306	322	329	289	332	303	300	358	4	344	280	259	269	271	231	202	227	43	97	88	303.5
27-Aug	60	2	67	16	127	116	112	107	133	138	130	139	152	216	224	212	219	242	251	221	169	181	146	131	182.1
28-Aug	137	259	244	131	152	155	201	224	254	251	257	257	259	257	247	262	265	267	351	80	328	276	239	301	250.2
29-Aug	291	296	120	102	306	134	146	117	125	127	125	120	121	126	141	137	122	126	121	117	126	134	136	126	126.7
30-Aug	111	134	134	123	126	191	198	220	254	265	287	268	261	272	279	286	130	133	135	147	138	119	137	139	168.1
31-Aug	138	135	132	138	142	135	118	138	133	132	143	215	249	240	251	249	244	246	224	195	224	207	236	142	202.5
	240.5	248.2	223.3	195.8	215.3	229.3	220.8	227.8	228.3	243.9	264.8	274.0	272.3	270.8	268.8	271.0	262.1	260.3	248.5	230.2	214.2	226.8	235.6	227.4	
	Diurnal Average																								

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

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg

Lower Camp - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 101 deg on Aug 24 03:00

Minimum Value: 9 deg on Aug 6 21:00

Percentiles: P_1 = 11 P_{10} = 13 Q_1 = 17 Median = 28 Q_3 = 42 P_{90} = 67 P_{99} = 94

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

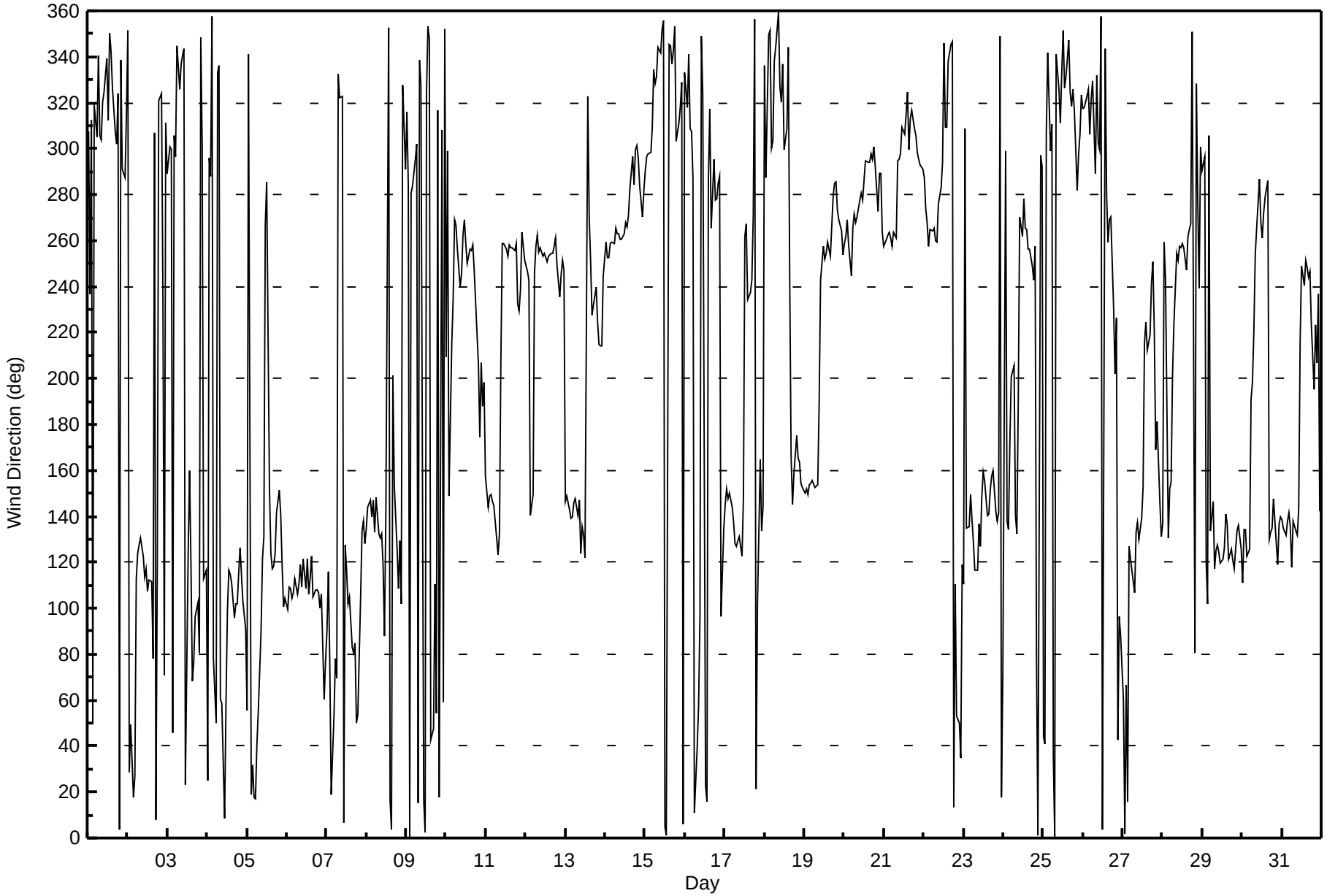
Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Aug	33	40	71	91	41	15	38	15	23	39	59	35	26	24	21	25	24	22	19	47	85	35	78	60	91
2-Aug	83	54	39	65	48	71	26	26	31	27	16	32	24	34	70	49	59	49	77	61	63	66	97	21	97
3-Aug	48	25	68	33	59	31	58	40	29	44	60	56	40	41	28	31	20	13	11	49	79	75	33	34	79
4-Aug	94	44	42	62	68	61	42	33	61	35	19	32	18	19	14	14	18	9	13	23	34	25	14	14	94
5-Aug	55	20	25	25	21	15	20	11	19	32	34	72	29	80	34	30	27	27	36	33	36	28	9	13	80
6-Aug	11	11	12	13	15	16	11	14	17	18	30	13	26	27	31	29	19	18	15	10	9	16	86	69	86
7-Aug	47	74	72	43	47	37	20	36	39	31	93	72	16	17	24	38	85	61	86	53	59	32	34	37	93
8-Aug	37	44	37	41	30	39	37	31	32	33	21	52	81	77	43	81	83	85	54	27	34	62	76	49	85
9-Aug	39	69	56	46	28	60	26	41	50	43	19	31	28	39	47	43	38	34	59	72	76	51	72	60	76
10-Aug	52	44	51	56	20	13	26	19	30	26	19	16	28	19	17	18	17	15	19	28	26	27	31	40	56
11-Aug	55	27	20	23	22	26	30	43	33	60	16	13	14	16	13	13	14	14	16	14	16	13	18	12	60
12-Aug	11	11	42	34	49	45	14	12	14	14	15	15	14	15	16	16	14	14	12	12	15	13	12	65	65
13-Aug	70	30	20	30	27	37	31	43	53	26	40	36	35	33	44	33	29	16	19	18	23	25	23	18	70
14-Aug	12	13	11	12	12	12	12	13	14	13	14	14	18	16	13	14	14	17	14	13	14	12	12	12	18
15-Aug	12	16	13	14	18	21	21	17	20	20	22	21	21	22	22	23	21	28	20	15	13	12	12	26	28
16-Aug	51	22	22	54	43	15	90	78	27	31	49	39	32	50	32	34	62	32	30	14	58	94	51	58	94
17-Aug	36	26	30	22	23	32	37	25	34	29	21	94	57	31	42	65	39	24	31	84	60	36	27	38	94
18-Aug	59	32	67	31	22	25	43	40	30	39	40	67	64	37	37	87	40	38	35	23	29	26	22	22	87
19-Aug	24	28	29	27	27	29	31	30	31	40	30	14	16	16	14	13	12	32	17	14	12	12	14	13	40
20-Aug	12	11	12	16	13	12	12	14	13	14	16	15	14	15	17	15	13	13	12	12	13	12	13	13	17
21-Aug	12	12	12	12	12	12	12	14	17	14	15	20	17	16	17	27	21	16	22	17	13	11	12	12	27
22-Aug	12	13	12	12	11	11	12	12	13	15	13	16	28	24	22	27	23	23	37	75	61	81	44	68	81
23-Aug	96	80	48	48	43	57	35	22	26	37	24	37	47	38	30	31	31	31	29	37	35	34	81	46	96
24-Aug	86	80	101	37	54	39	54	45	36	60	28	19	17	16	17	20	22	15	12	70	62	69	40	67	101
25-Aug	75	35	35	62	46	38	27	45	37	29	20	23	18	19	16	20	15	15	17	21	77	26	43	18	77
26-Aug	22	22	24	72	50	92	61	54	37	13	28	50	17	32	49	25	19	32	25	16	85	63	44	40	92
27-Aug	30	74	37	82	45	28	16	23	30	36	30	34	47	30	37	29	23	23	14	36	30	37	39	28	82
28-Aug	47	54	49	30	54	31	58	67	15	14	13	14	14	14	15	15	13	13	88	77	27	68	86	80	88
29-Aug	31	85	85	79	47	98	60	69	29	21	18	18	28	27	29	35	20	24	19	13	20	27	25	27	98
30-Aug	22	26	27	19	31	40	79	33	18	18	27	38	30	38	39	84	27	39	23	32	30	22	28	23	84
31-Aug	24	25	22	27	22	29	42	21	24	28	27	58	23	17	15	15	14	14	21	23	31	26	30	80	80
	96	85	101	91	68	98	90	78	61	60	93	94	81	80	70	87	85	85	88	84	85	94	97	80	
	Diurnal Maximum																								

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction (WD) - deg

Lower Camp - August 2015



Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

Calibration Date	August 5, 2015	Last Calibration	July 14, 2015
Station Name	Lower Camp	Station Number	AMS 11
Reason:	Routine		
Start Time (MST)	11:25	End Time (MST)	13:46
Gas Cert Reference	LL110099	Station temp.	21 Deg C
Cal Gas Concentration	51.3 ppm	Cal Gas Exp Date	25/03/2016
Calibrator Make/Model	Sabio 4010	Serial Number	11051107
ZAG Make/Model	API 701	Serial Number	3411
DACS make/model	Campbell Scientific CR3000	DACS serial No.	3492

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 1000 ppb		PMT voltage	-675	-675
Analyzer IP address	192.168.1.43		Lamp voltage	798	800
Calculated slope	0.995354	0.994614	Chamber temp	45.2	44.8
Calculated intercept	0.908864	2.074679	Pressure	706.9	708.1
Analyzer Background	11.1	11.1	Flow	0.486	0.489
Analyzer Coefficient	1.013	1.013	Intensity	90	90

Analyzer make	TEI 43i	Analyzer serial #	100841398

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.3	----
as found span	5000	80.9	830.0	829.9	1.000
calibrator zero	5000	0.0	0.0	-0.2	----
high point	5000	80.9	830.0	833.4	0.996
second point	5000	40.9	419.6	418.8	1.002
third point	5000	20.5	210.3	207.6	1.013
as left zero	5000	0.0	0.0	0.0	----
as left span	5000	80.9	830.0	833.2	0.996
				Average Correction Factor	1.004

Corrected As found	830.2	Previous response	833.0	% change	0.3%

Notes:

Inlet filter changed after as founds. No adjustments.

Calibration Performed By: Asad Hidayat

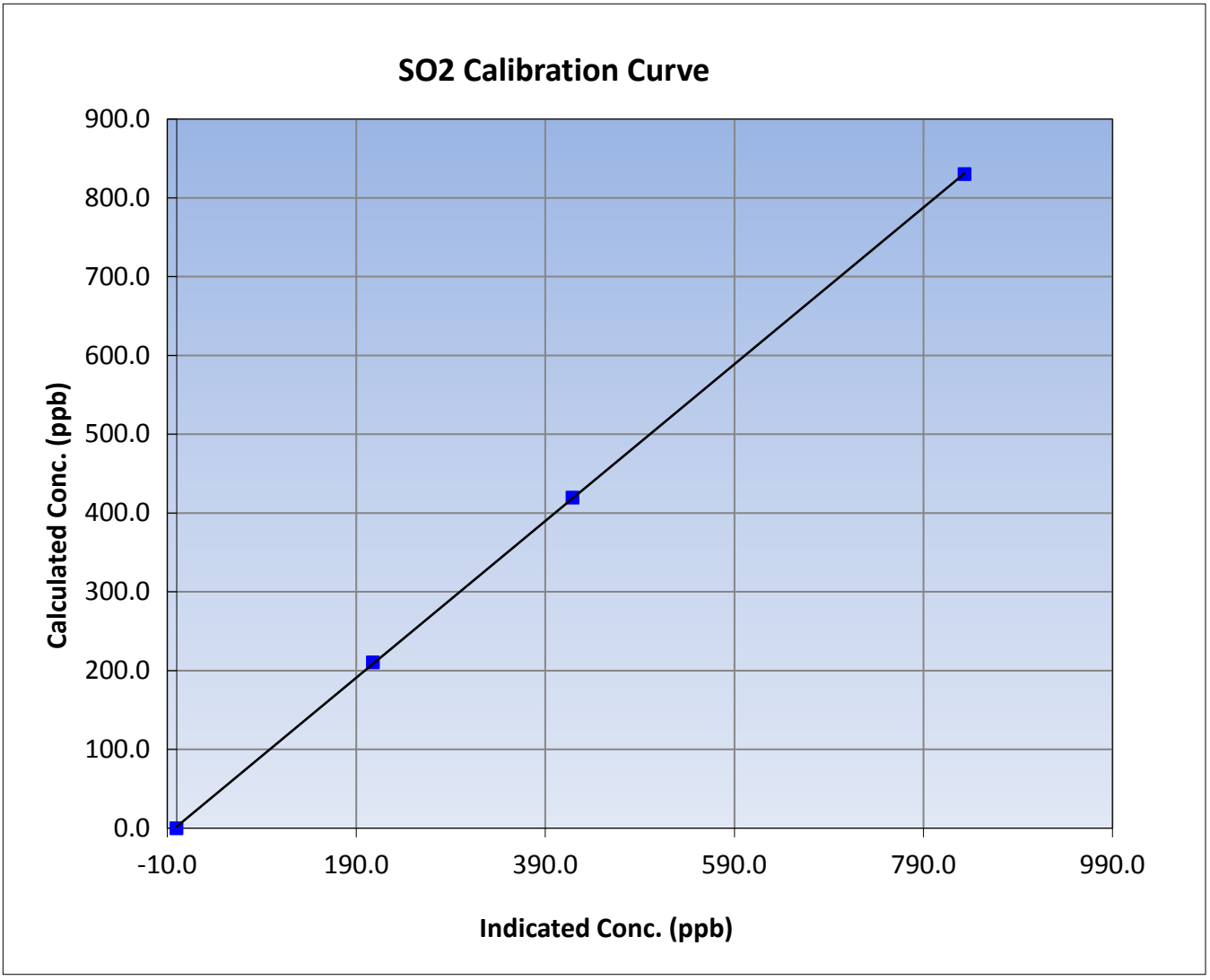
Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

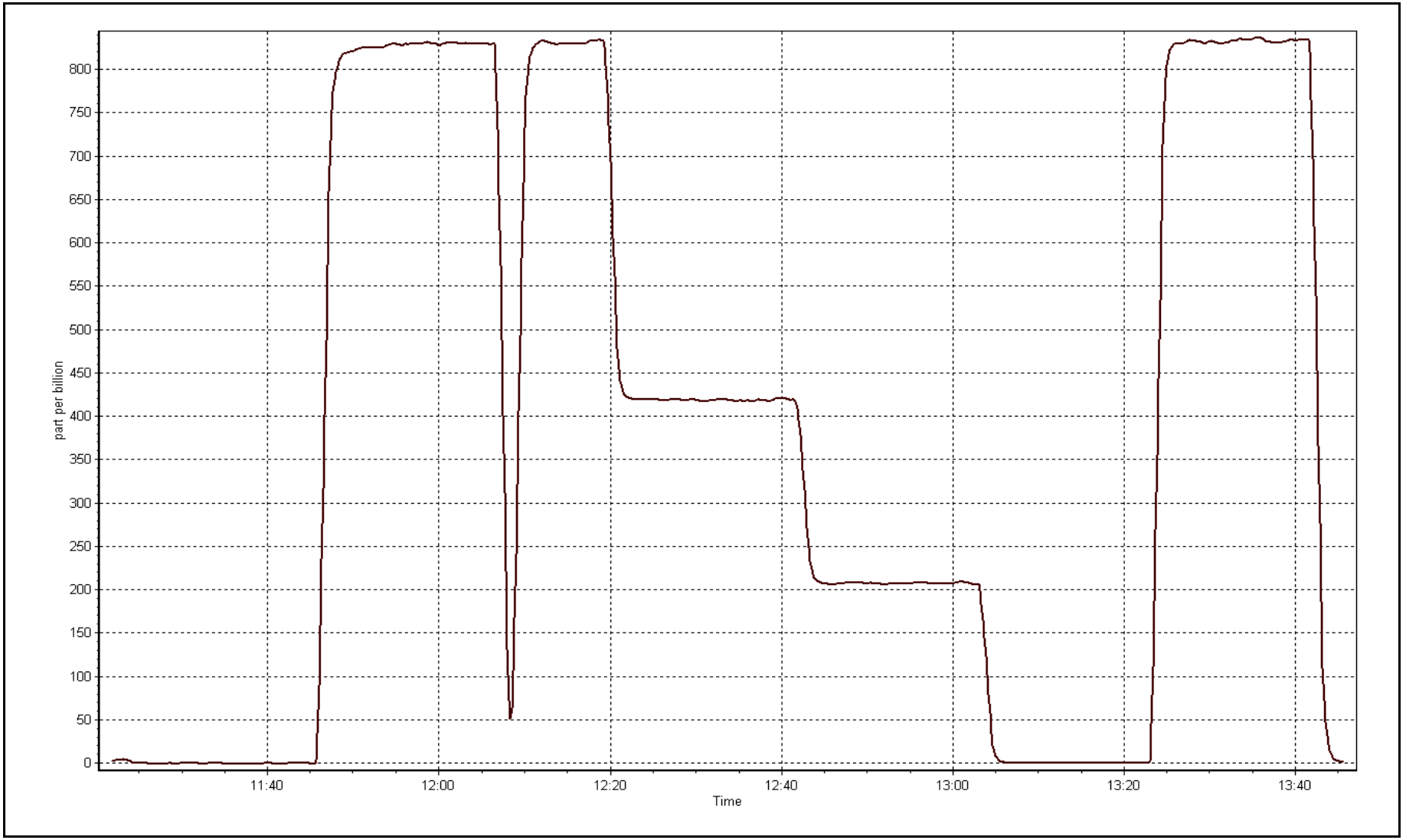
Calibration Date	August 5, 2015	Previous Calibration	July 14, 2015
Station Name	Lower Camp	Station Number	AMS 11
Start Time (MST)	11:25	End Time (MST)	13:46
Analyzer make	TEI 43i	Analyzer serial #	100841398

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	----	Correlation Coefficient	0.999978
830.0	833.4	0.9960		
419.6	418.8	1.0020	Slope	0.994614
210.3	207.6	1.0132		
			Intercept	2.074679



SO2 Calibration Plot Date: August 5, 2015



Wood Buffalo Environmental Association
H2S Calibration Report

Station Information

Calibration Date	August 4, 2015	Last Calibration	July 14, 2015
Station Name	Lower Camp	Station Number	AMS 11
Reason:	Routine		
Start Time (MST)	9:20	End Time (MST)	13:05
Gas Cert Reference	ALM061435	Station temp.	22 Deg C
Cal Gas Concentration	5.15 ppm	Cal Gas Exp Date	09/09/2017
Calibrator Make/Model	Sabio 4010	Serial Number	11051107
ZAG air Make/Model	API 701	Serial Number	3411
DACS make/model	Campbell Scientific CR3000	Serial Number	3492
SO2 gas concentration	51.4 ppm	SO2 gas cert/exp	LL110099 25/03/2016

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-634	-633
Analyzer IP address	192.168.1.45		Lamp voltage	883	886
Calculated slope	1.002147	1.000707	Chamber temp	45	45
Calculated intercept	-0.300399	-0.056363	Pressure	572.5	573.7
Analyzer Background	20.8	20.7	Flow	1.115	1.112
Analyzer Coefficient	1.249	1.187	Intensity	60	61
			Converter temp.	341	340

Analyzer make/model	Thermo 450i	Analyzer serial #	922436966
Converter make/model	NA	Converter serial #	NA

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	1.1	----
as found span	5000	72.8	75.0	77.0	0.973
SO2 scrubber check	5000	20.5	210.7	2.5	----
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	72.8	75.0	74.9	1.001
second point	5000	38.8	40.0	40.1	0.996
third point	5000	19.4	20.0	20.0	0.998
as left zero	5000	0.0	0.0	0.1	----
as left span	5000	72.8	75.0	75.8	0.989
				Average Correction Factor	0.998

Corrected As found	75.9	Previous response	75.1	% change	-1.1%

Notes:

Scrubber check and inlet filter replaced after as founds. Zero and span adjusted.

Calibration Performed By: Evan Magill

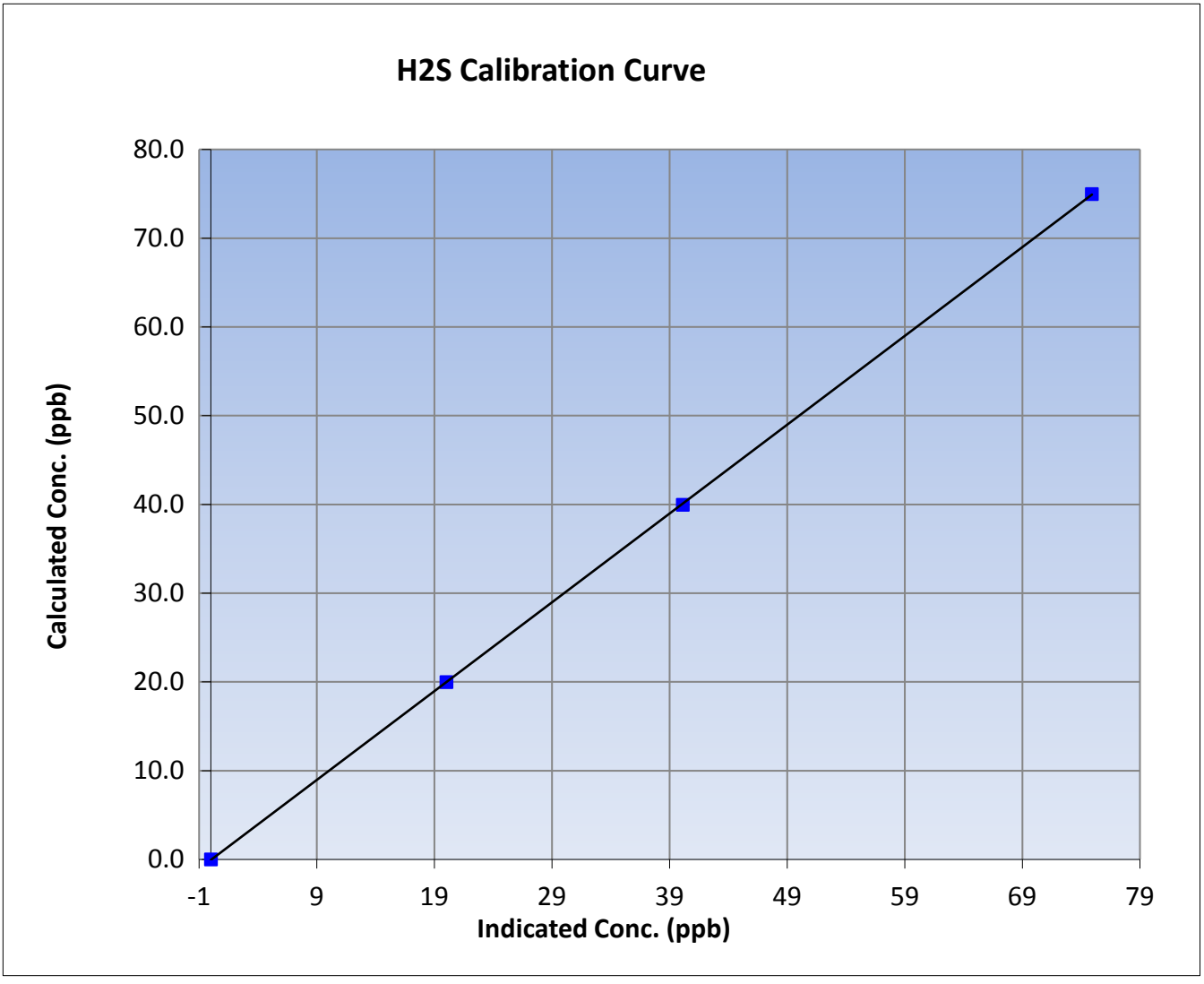
Wood Buffalo Environmental Association
H2S Calibration Report

Station Information

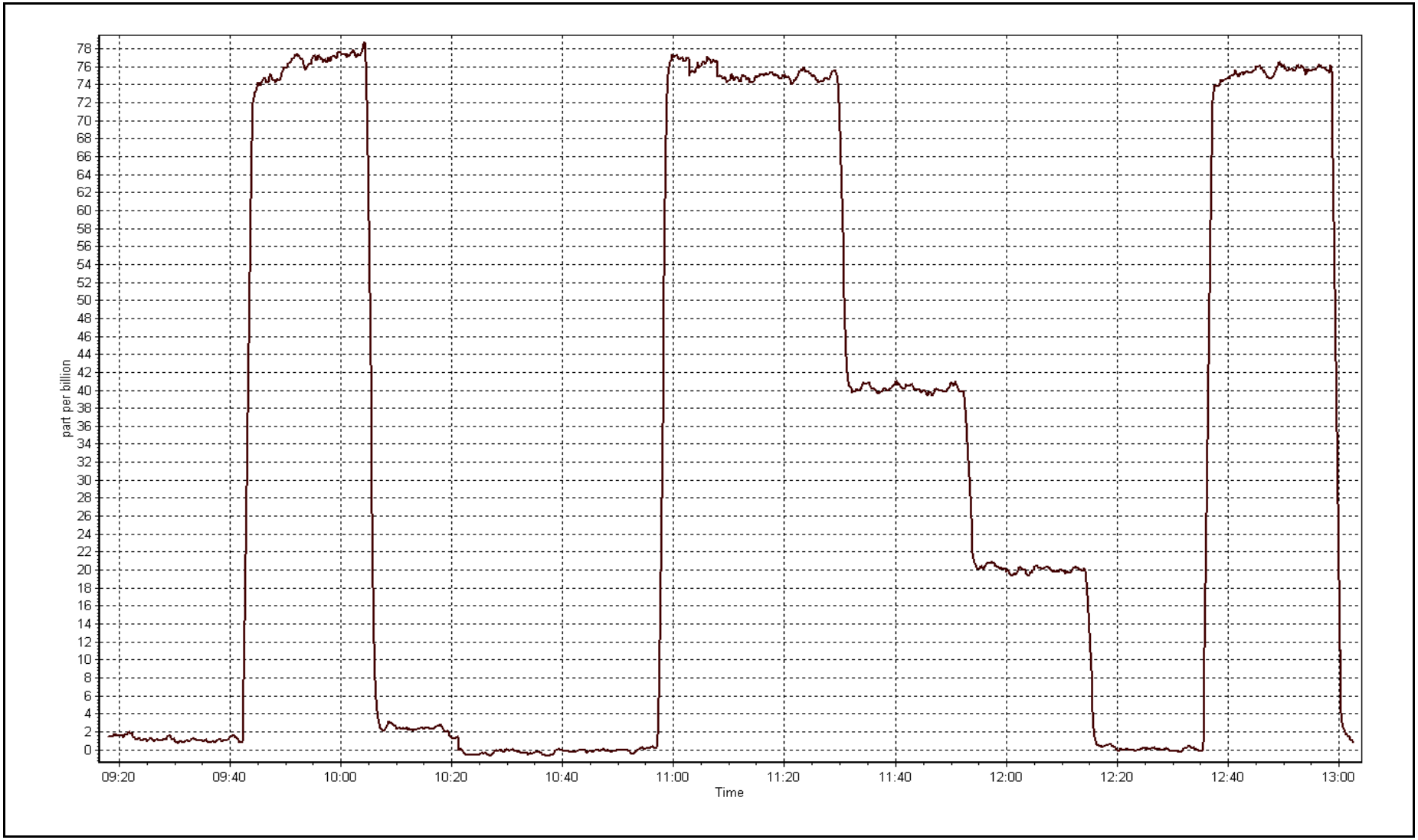
Calibration Date	August 4, 2015	Previous Calibration	July 14, 2015
Station Name	Lower Camp	Station Number	AMS 11
Start Time (MST)	9:20	End Time (MST)	13:05
Analyzer make	Thermo 450i	Analyzer serial #	922436966

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999992
75.0	74.9	1.0009		
40.0	40.1	0.9961	Slope	1.000707
20.0	20.0	0.9981		
			Intercept	-0.056363



H2S Calibration Plot Date: August 4, 2015



Wood Buffalo Environmental Association
H2S Calibration Report

W B E A

Station Information

Calibration Date	August 5, 2015	Last Calibration	August 4, 2015
Station Name	Lower Camp	Station Number	AMS 11
Reason:	Other:		
Start Time (MST)	8:20	End Time (MST)	11:25
Gas Cert Reference	ALM061435	Station temp.	22 Deg C
Cal Gas Concentration	5.15 ppm	Cal Gas Exp Date	09/09/2017
Calibrator Make/Model	Sabio 4010	Serial Number	11051107
ZAG air Make/Model	API 701	Serial Number	3411
DACS make/model	Campbell Scientific CR3000	Serial Number	3492
SO2 gas concentration	51.4 ppm	SO2 gas cert/exp	LL110099 25/03/2016

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-633	-633
Analyzer IP address	192.168.1.45		Lamp voltage	886	885
Calculated slope	1.000707	0.999411	Chamber temp	45	45
Calculated intercept	-0.056363	-0.142539	Pressure	573.7	576.1
Analyzer Background	20.7	21	Flow	1.112	1.119
Analyzer Coefficient	1.187	1.214	Intensity	61	60
			Converter temp.	340	340

Analyzer make/model	Thermo 450i	Analyzer serial #	922436966
Converter make/model	NA	Converter serial #	NA

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.1	----
as found span	5000	72.8	75.0	71.5	1.048
SO2 scrubber check	5000	20.5	210.7	1.3	----
calibrator zero	5000	0.0	0.0	-0.1	----
high point	5000	72.8	75.0	75.0	1.000
second point	5000	38.8	40.0	40.4	0.988
third point	5000	19.4	20.0	20.3	0.986
as left zero	5000	0.0	0.0	0.0	----
as left span	5000	72.8	75.0	76.6	0.979
				Average Correction Factor	0.992

Corrected As found	71.6	Previous response	75.0	% change	4.7%

Notes:

Calibration conducted to assess some sensitivity loss overnight. Diagnostics unchanged; Scrubber check done after as founds. Adjusted span.

Calibration Performed By: Evan Magill

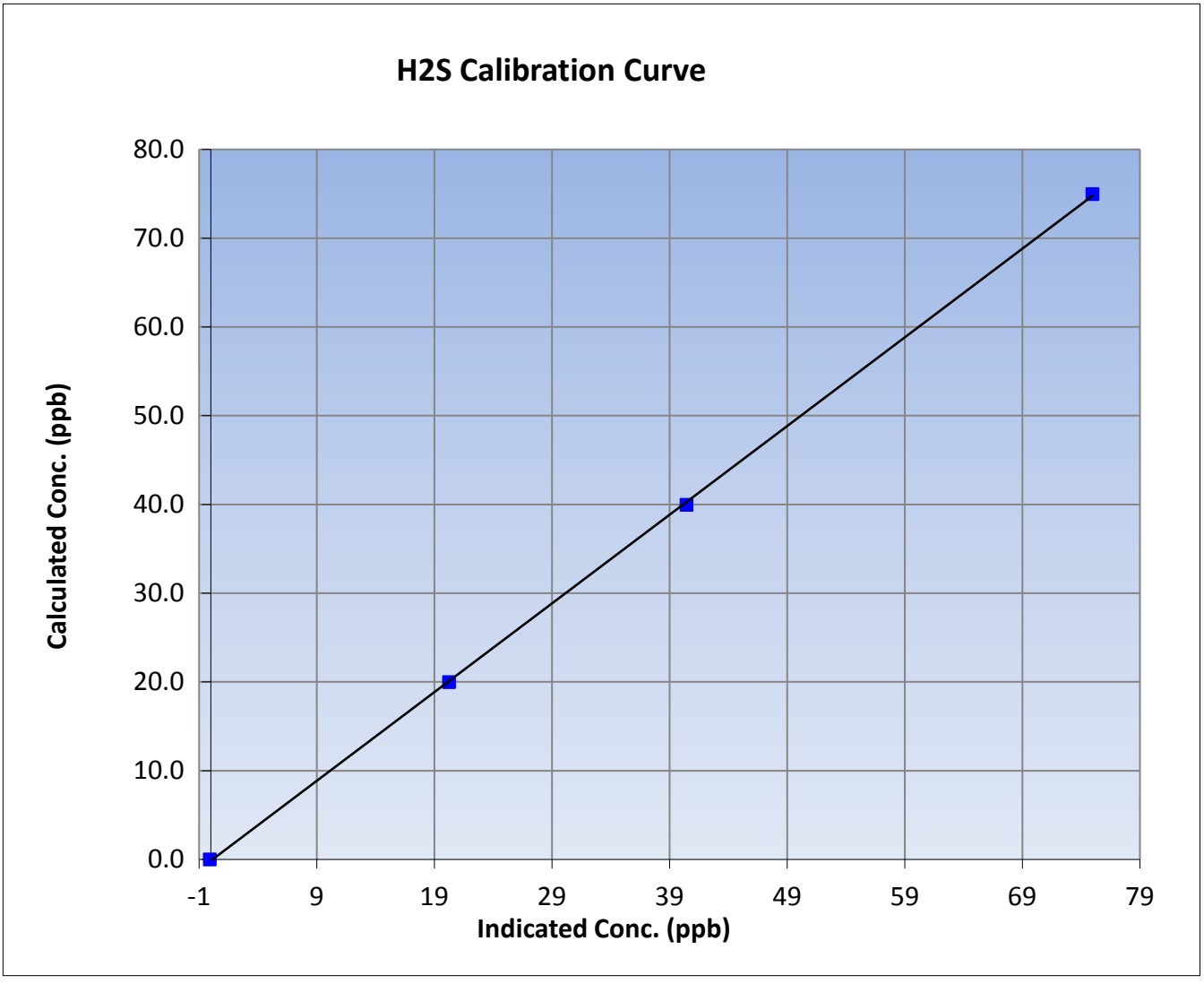
Wood Buffalo Environmental Association
H2S Calibration Report

Station Information

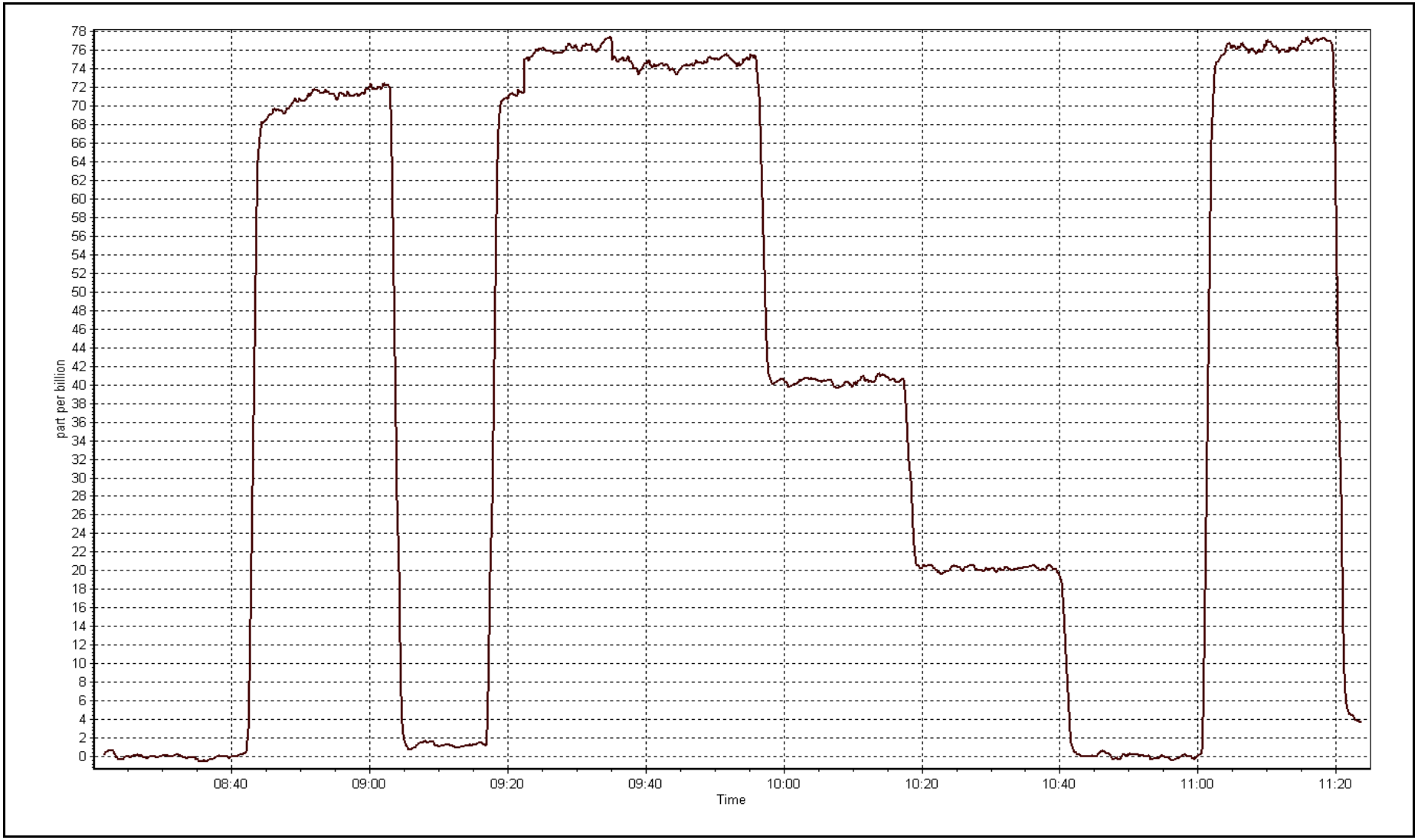
Calibration Date	August 5, 2015	Previous Calibration	August 4, 2015
Station Name	Lower Camp	Station Number	AMS 11
Start Time (MST)	8:20	End Time (MST)	11:25
Analyzer make	Thermo 450i	Analyzer serial #	922436966

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999933
75.0	75.0	1.0002		
40.0	40.4	0.9882	Slope	0.999411
20.0	20.3	0.9863		
			Intercept	-0.142539



H2S Calibration Plot Date: August 5, 2015



Wood Buffalo Environmental Association
THC Calibration Report

W B E A

Station Information

Calibration Date	August-05-15	Last Calibration	July-14-15
Station Name	Lower Camp	Station Number	AMS 11
Reason:	Routine		
Start Time (MST)	11:25	End Time (MST)	13:45
Gas Cert Reference	LL110099	Cal Gas Expiry Date	25/03/2016
CH4 Cal Gas Conc.	515 ppm	CH4 Equiv Conc.	1070.5 ppm
C3H8 Cal Gas Conc.	202 ppm	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11051107
ZAG make/model	Teledyne API 701	Serial Number	3411
DACS make/model	Campbell Scientific CR3000	Serial Number	3492

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 50 ppm		Sample Pressure	8.5	8.5
Analyzer IP address	192.168.1.51		Air or Bypass Press	37.4	37.4
Calculated slope	0.996252	0.994832	Fuel Pressure	24.0	24.0
Calculated intercept	0.022304	0.031017	Analyzer Coeff	4.2	4.2
			Analyzer BKG	6.290	6.290

Analyzer make	51i-LT	Analyzer serial #	1410661326

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	0.00	----
as found span	5000	80.9	17.32	17.41	0.995
calibrator zero	5000	0.0	0.00	-0.03	----
high point	5000	80.9	17.32	17.37	0.997
second point	5000	40.9	8.76	8.80	0.995
third point	5000	20.5	4.39	4.36	1.007
as left zero	5000	0.0	0.00	0.05	----
as left span	5000	80.9	17.32	17.51	0.989
				Average Correction Factor	1.000

Corrected As found	17.41	Previous response	17.36	% change	-0.3%

Notes:

Inlet filter relplaced after as founds. No adjustments.

Calibration Performed By: Asad Hidayat

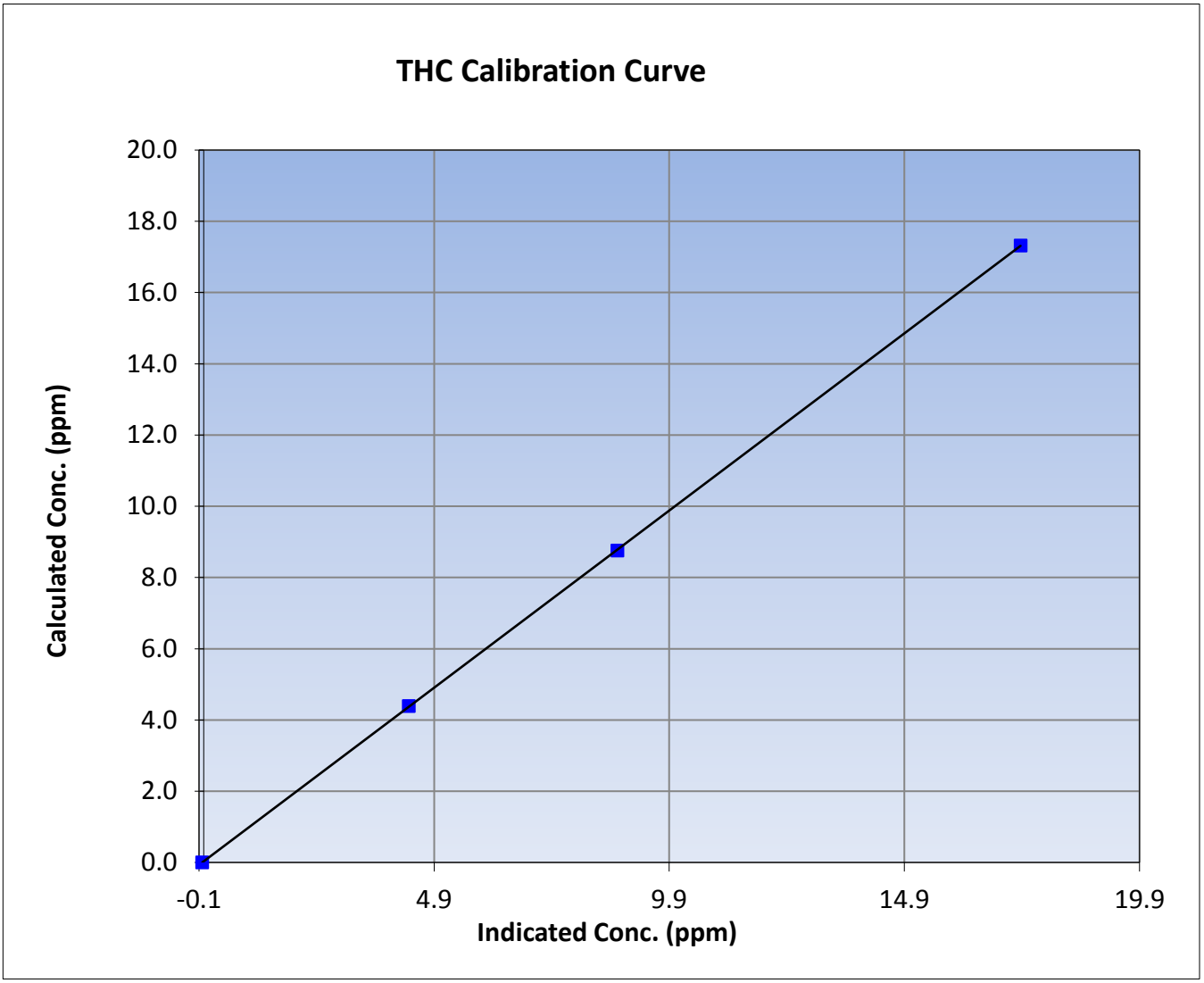
Wood Buffalo Environmental Association
THC Calibration Report

Station Information

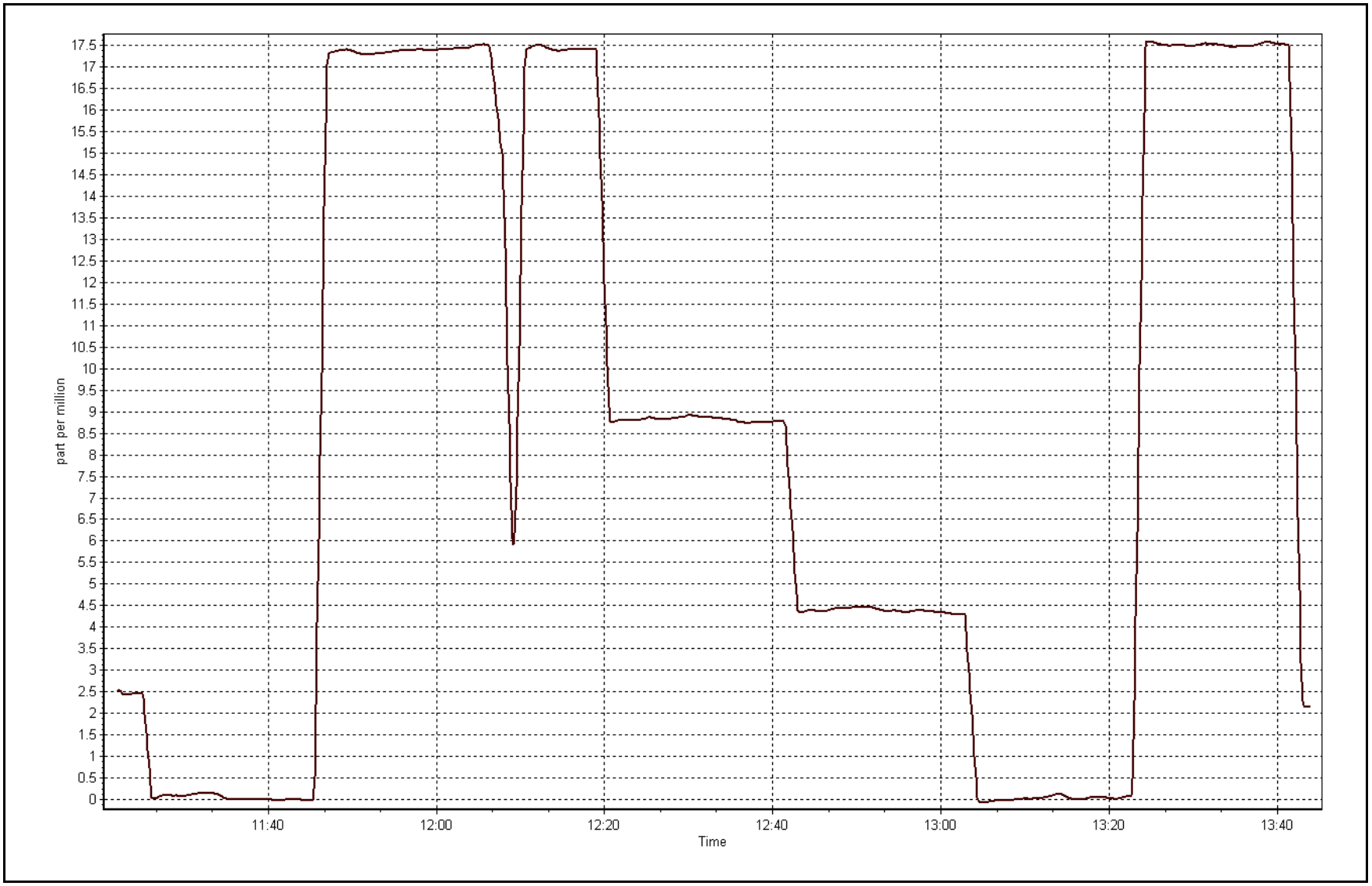
Calibration Date	August 5, 2015	Previous Calibration	July 14, 2015
Station Name	Lower Camp	Station Number	AMS 11
Start Time (MST)	11:25	End Time (MST)	13:45
Analyzer make	51i-LT	Analyzer serial #	1410661326

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	-0.03	----	Correlation Coefficient	0.999992
17.32	17.37	0.9972		
8.76	8.80	0.9951	Slope	0.994832
4.39	4.36	1.0067		
			Intercept	0.031017



THC Calibration Plot Date: August 5, 2015



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 12
MILLENNIUM MINE
AUGUST 2015

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

September 28, 2015

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MILLENNIUM MINE (AMS 12)
AUGUST 2015

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	627	33	117	88.71	20	0	4	0
TRS(ppb) Average	624	34	120	88.44	5	0	1	0
THC(ppm) Average	627	34	117	88.84	6	-	2.9	-
NO2(ppb) Average	618	33	126	87.50	27	0	11	-
NO(ppb) Average	618	33	126	87.50	98	-	14	-
NOX(ppb) Average	618	33	126	87.50	116	-	23	-
PM2.5(ug/m3) Average	656	1	88	88.31	38.8	-	14.6	0
Temperature 2 m (C) Average	666	0	78	89.52	29.7	-	23.5	-
Relative Humidity (%) Average	666	0	78	89.52	99	-	85	-
Wind Speed 10 m (km/h) Average	665	0	79	89.38	22	-	14	-
Wind Direction 10 m (deg) Average	665	0	79	89.38	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MILLENNIUM MINE (AMS 12)
AUGUST 2015

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

					Percentile						
Parameter	Number	Mean	StnDev	Total	Min	P10	Q1	Median	Q3	P90	Max
SO2(ppb) Average	627	0.8	2	-	0	0	0	0	0	1	20
TRS(ppb) Average	624	0.5	1	-	0	0	0	0	1	1	5
THC(ppm) Average	627	2.45	0.5	-	2	2.1	2.2	2.3	2.5	3	6
NO2(ppb) Average	618	6.8	5	-	1	1	2	5	10	15	27
NO(ppb) Average	618	5.6	11	-	0	0	0	1	5	17	98
NOX(ppb) Average	618	12.4	14	-	1	1	3	7	17	30	116
PM2.5(ug/m3) Average	656	7.62	5	-	1.7	3	4.1	6.3	9.4	14.4	38.8
Temperature 2 m (C) Average	666	17.43	4.9	-	4.8	11.6	14	17.2	21.1	24.1	29.7
Relative Humidity (%) Average	666	65.8	19	-	27	38	51	67	80	93	99
Wind Speed 10 m (km/h) Average	665	7.7	4	-	0	3	5	7	10	13	22
Wind Direction 10 m (deg) Average	665	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION -MILLENNIUM MINE (AMS 12)
AUGUST 2015

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
ALL PARAMETERS	29 Aug 2015 01:00	01 Sep 2015 00:00	78	Station offline due to fire
AIR QUALITY ANALYZERS	19 Aug 2015 13:00	19 Aug 2015 15:00	3	Station power failure
AIR QUALITY ANALYZERS	20 Aug 2015 11:00	20 Aug 2015 11:00	1	Station power failure
AIR QUALITY ANALYZERS	25 Aug 2015 16:00	25 Aug 2015 16:00	1	Station power failure
SO2	21 Aug 2015 16:00	21 Aug 2015 16:00	1	Maintenance - calibrator replaced
TRS	11 Aug 2015 10:00	11 Aug 2015 10:00	1	Maintenance - manifold cleaning
TRS	21 Aug 2015 16:00	21 Aug 2015 17:00	2	Maintenance - calibrator replaced
NO2	21 Aug 2015 11:00	21 Aug 2015 16:00	6	Maintenance - calibrator replaced
NO2	22 Aug 2015 09:00	22 Aug 2015 12:00	4	Maintenance - recalibration due to drift
PM2.5	21 Aug 2015 15:00	21 Aug 2015 18:00	4	Maintenance - tech activity
Wind Speed, Wind Direction	01 Aug 2015 23:00	01 Aug 2015 23:00	1	Flat line in sensor output signal

Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO_2) - ppb

Millennium - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 20 ppb on Aug 26 14:00 Maximum Daily Average: 3.9 ppb on Aug 21

Minimum Value: 0 ppb on Aug 6 01:00 Minimum Daily Average: 0.1 ppb on Aug 6
Maximum Diurnal Average: 1.9 ppb at hour 14 Minimum Diurnal Average: 0.2 ppb at hour 8
Monthly Average: 0.8 ppb Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 1$ $P_{99} = 9$

Hours in Service:	744
Hours of Data:	627
Hours of Missing Data:	117
Hours of Calibration:	33
Percent Operational Time:	88.7

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0	0	0	Z	0	0	0	0	0	0	4	1	1	2	0	1	2	3	0	0	0	1	0	0	0.8	4
2-Aug	0	0	0	0	Z	0	0	0	0	1	1	1	1	0	0	0	1	6	2	1	1	1	1	1	0.8	6
3-Aug	1	1	0	0	0	Z	1	1	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0.5	1
4-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
5-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
6-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
7-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0.3	1
8-Aug	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
9-Aug	0	0	0	0	0	Z	1	0	0	0	0	0	1	1	1	1	1	0	0	0	0	1	0	0	0.4	1
10-Aug	Z	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2
11-Aug	0	Z	0	0	0	0	0	0	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0.2	0
12-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
13-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0.2	2
14-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0.3	2
15-Aug	1	1	2	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2
16-Aug	Z	0	0	0	0	0	0	0	0	0	0	5	4	7	8	3	5	2	1	0	0	0	0	0	1.8	8
17-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
18-Aug	0	0	Z	0	0	0	0	0	0	1	1	5	15	7	8	2	1	1	0	0	0	0	0	0	1.9	15
19-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	PF	PF	PF	0	0	1	3	0	0	0	0	0	0.4	3
20-Aug	0	0	0	0	Z	0	0	0	0	0	PF	0	0	0	0	0	1	1	5	2	1	0	2	0	0.7	5
21-Aug	0	0	0	0	0	Z	0	0	2	8	9	3	4	3	1	M	5	2	4	4	5	9	14	10	3.9	14
22-Aug	Z	3	1	0	0	0	0	0	0	0	3	5	2	5	3	0	0	0	0	0	1	0	1	0	1.2	5
23-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	4	1	0.6	4
24-Aug	0	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
25-Aug	0	0	0	Z	0	0	0	0	7	8	3	2	1	0	0	PF	0	0	0	0	0	0	0	0	1.2	8
26-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	12	20	17	6	3	2	2	1	1	1	1	1	3.0	20
27-Aug	1	1	0	0	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
28-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	PF	PF	PF	PF	PF	PF	--	0
29-Aug	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	--	--
30-Aug	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	--	--
31-Aug	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	--	--
	0.3	0.5	0.3	0.3	0.3	0.3	0.3	0.2	0.5	0.8	1.0	1.0	1.7	1.9	1.7	0.7	0.9	0.9	0.8	0.6	0.6	0.7	1.0	0.6	Diurnal Average	
	1	3	2	1	1	1	1	1	7	8	9	5	15	20	17	6	5	6	5	4	5	9	14	10	Diurnal Maximum	

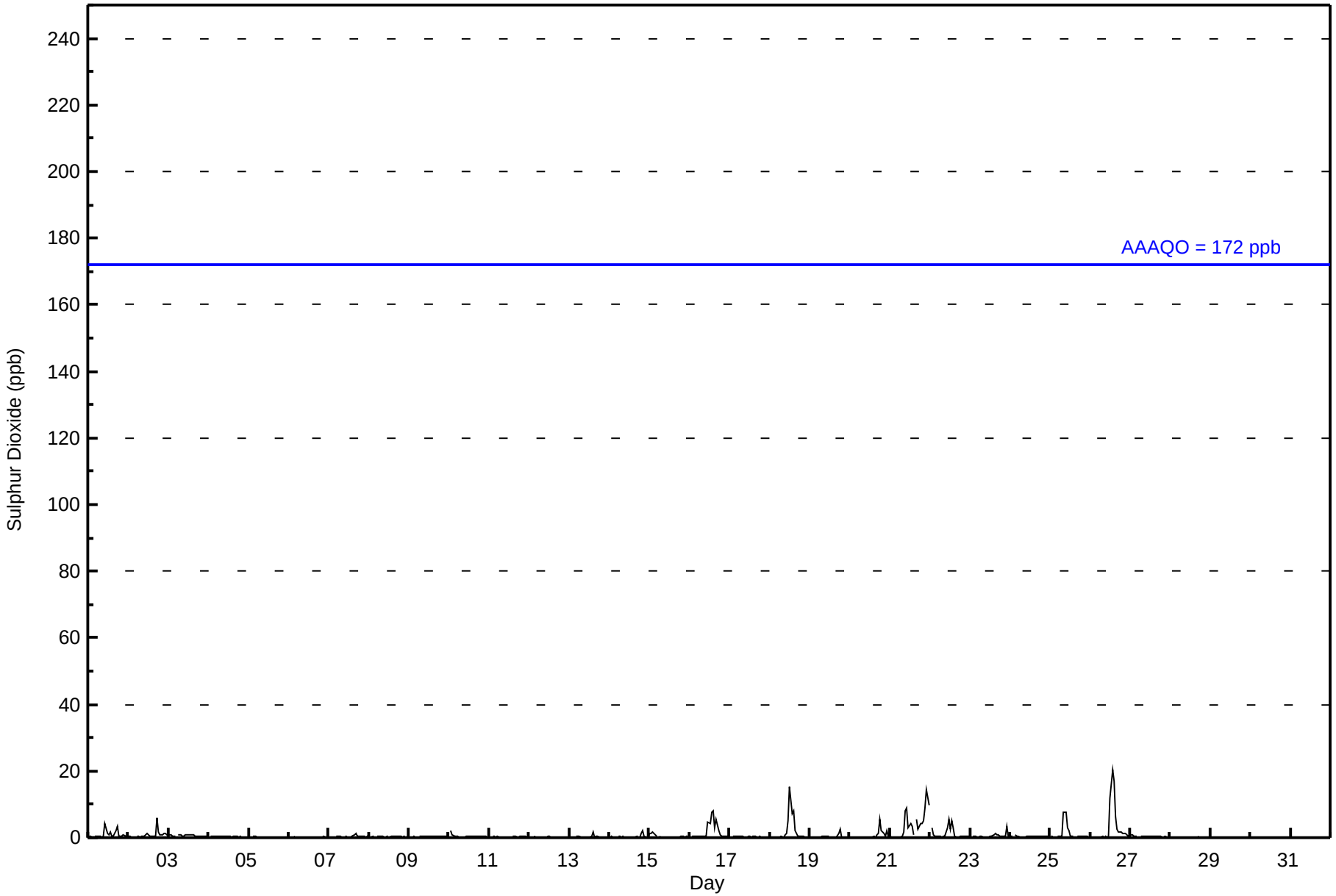
Z - zerospan C - Calibration M - Maintenance PF - Power Failure
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb

Wood Buffalo Environmental Association

Hourly Averages

Sulphur Dioxide (SO_2) - ppb

Millennium - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

Millennium - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	622	99.20	99.20
11 - 20	5	0.80	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: 627

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

Millennium - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 10	45	13	10	8	10	49	68	48	61	59	39	52	58	43	32	26	621
11 - 20	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	5
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	46	13	10	8	10	49	68	48	61	59	39	53	59	44	33	26	626

Total Number of Valid Hours: 626

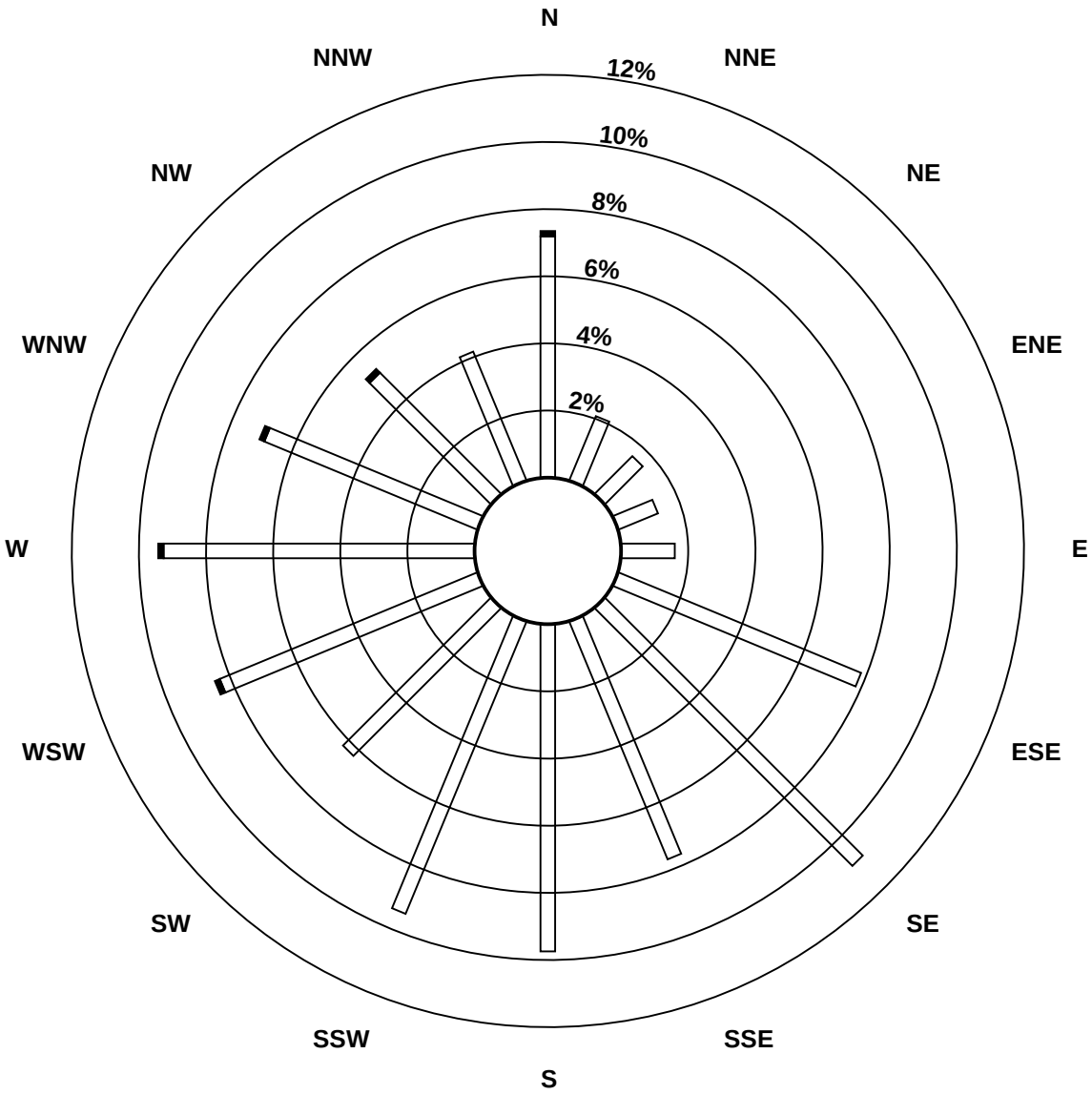
Total Number of Hours: 744

Wood Buffalo Environmental Association

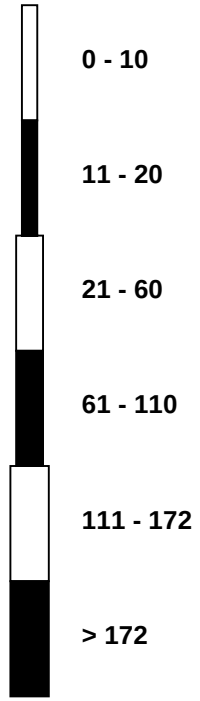
Wind Rose Aug 2015

Sulphur Dioxide (SO_2) - ppb

Millennium (AMS 12)



Classes (ppb)



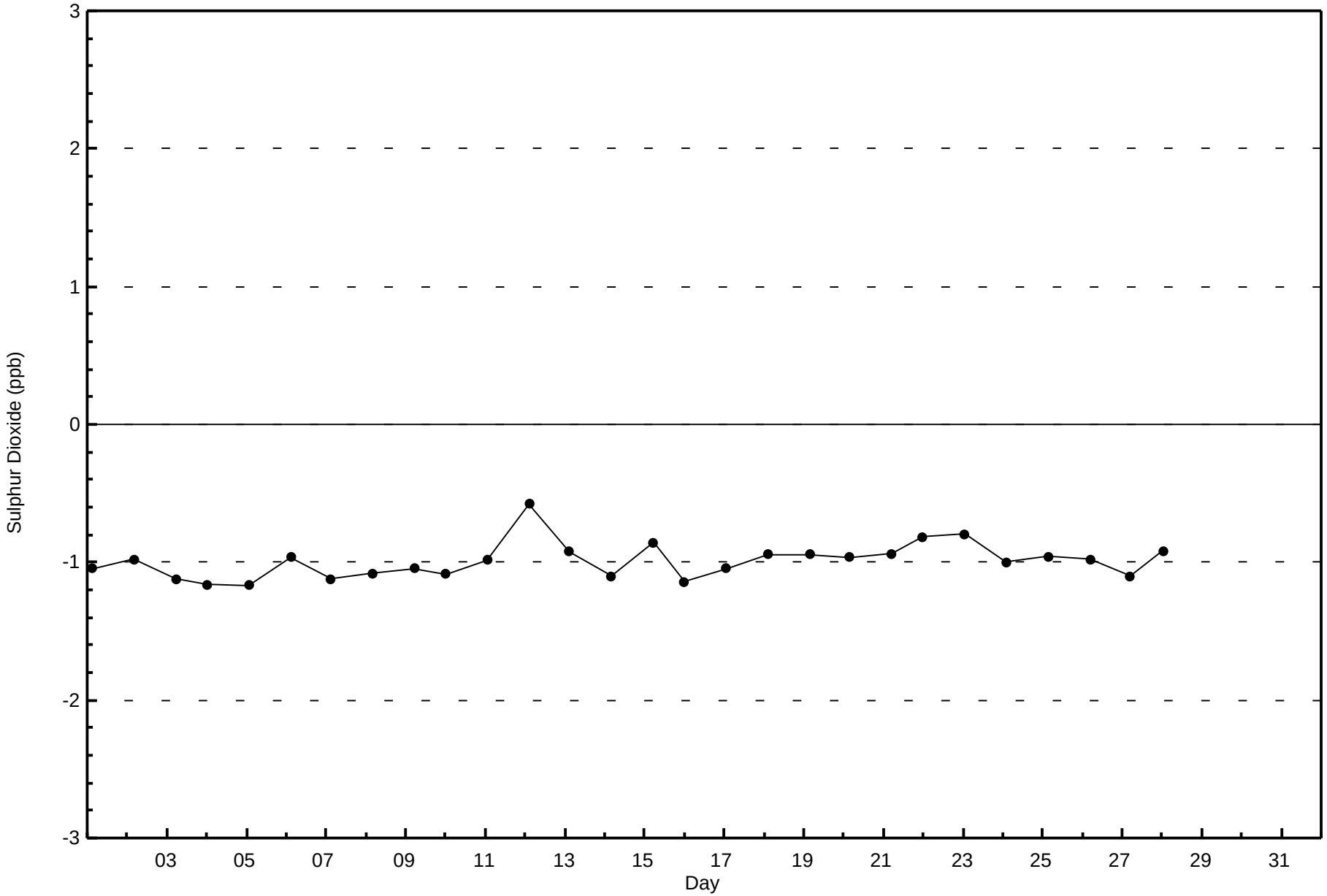
Total Number of Valid Hours: 626

Wood Buffalo Environmental Association

Zero Responses

Sulphur Dioxide (SO_2) - ppb

Millennium - August 2015

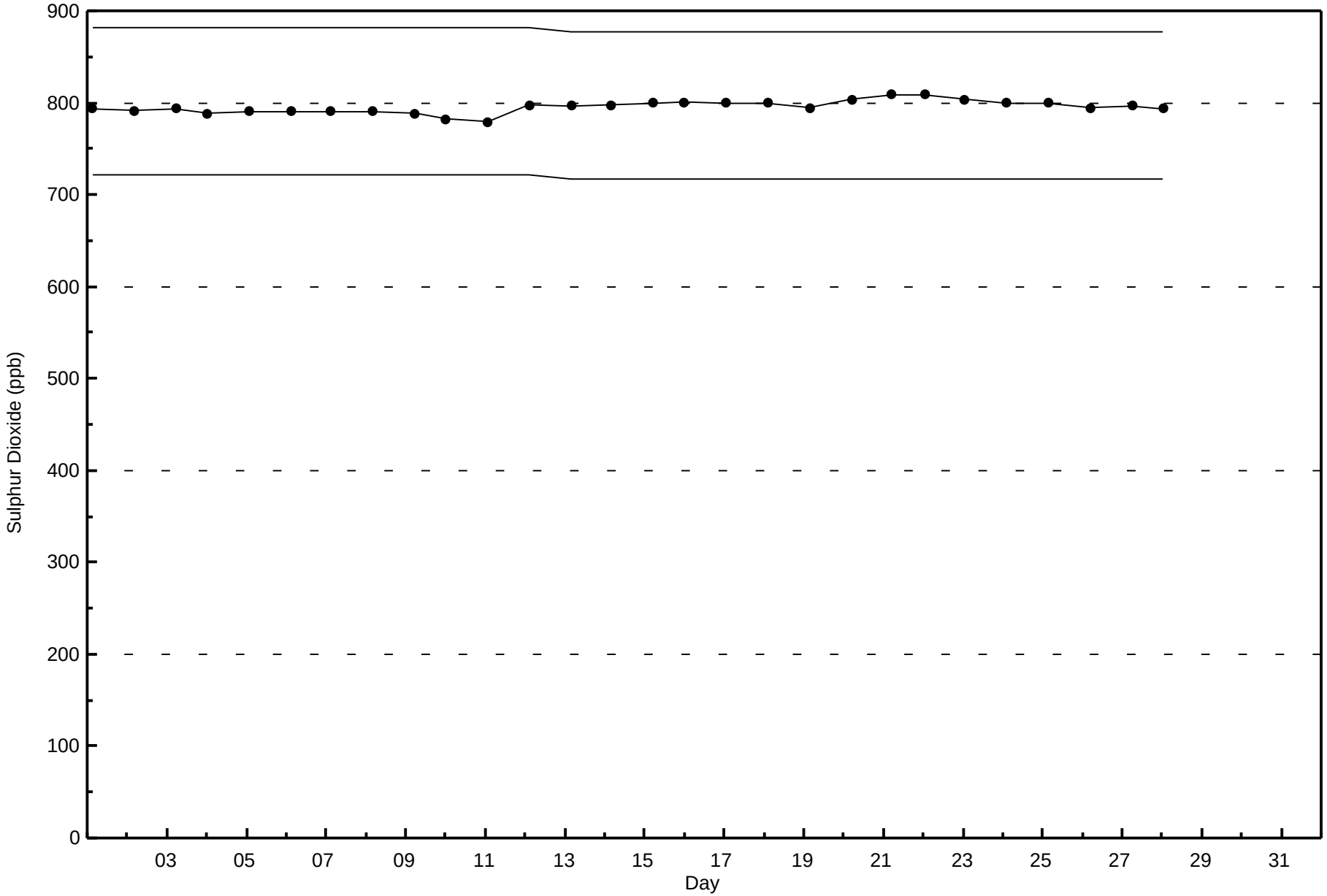


Wood Buffalo Environmental Association

Span Responses

Sulphur Dioxide (SO_2) - ppb

Millennium - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

Millennium - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 5 ppb on Aug 2 03:00 Maximum Daily Average: 0.9 ppb on Aug 25

Minimum Value: 0 ppb on Aug 1 16:00 Minimum Daily Average: 0.2 ppb on Aug 4
Maximum Diurnal Average: 0.8 ppb at hour 1 Minimum Diurnal Average: 0.3 ppb at hour 12
Monthly Average: 0.5 ppb Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 1$ $P_{90} = 1$ $P_{99} = 3$

Hours in Service:	744
Hours of Data:	624
Hours of Missing Data:	120
Hours of Calibration:	34
Percent Operational Time:	88.4

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

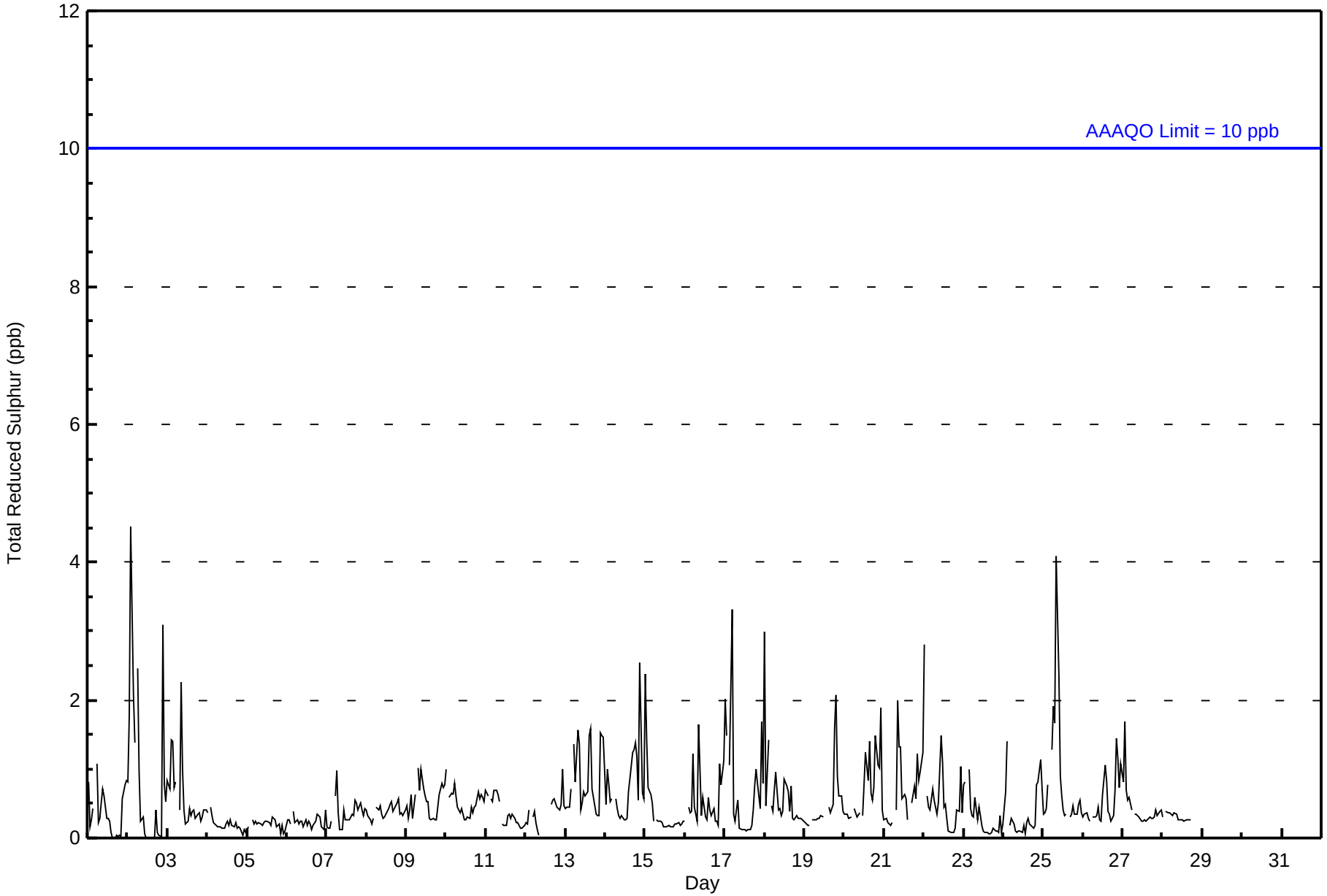
Z - zerospan C - Calibration M - Maintenance PF - Power Failure
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb

Wood Buffalo Environmental Association

Hourly Averages

Total Reduced Sulphur (TRS) - ppb

Millennium - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb

Millennium - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	617	98.88	98.88
3 - 4	6	0.96	99.84
5 - 7	1	0.16	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 624

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Total Reduced Sulphur (TRS) - ppb

Millennium - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 2	48	13	9	7	11	47	68	47	62	60	40	52	57	41	30	24	616
3 - 4	0	0	0	0	0	0	0	0	1	0	1	0	0	2	1	1	6
5 - 7	0	0	0	0	0	0	0	0	0	0	1	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	48	13	9	7	11	47	68	47	63	60	42	52	57	43	31	25	623

Total Number of Valid Hours: 623

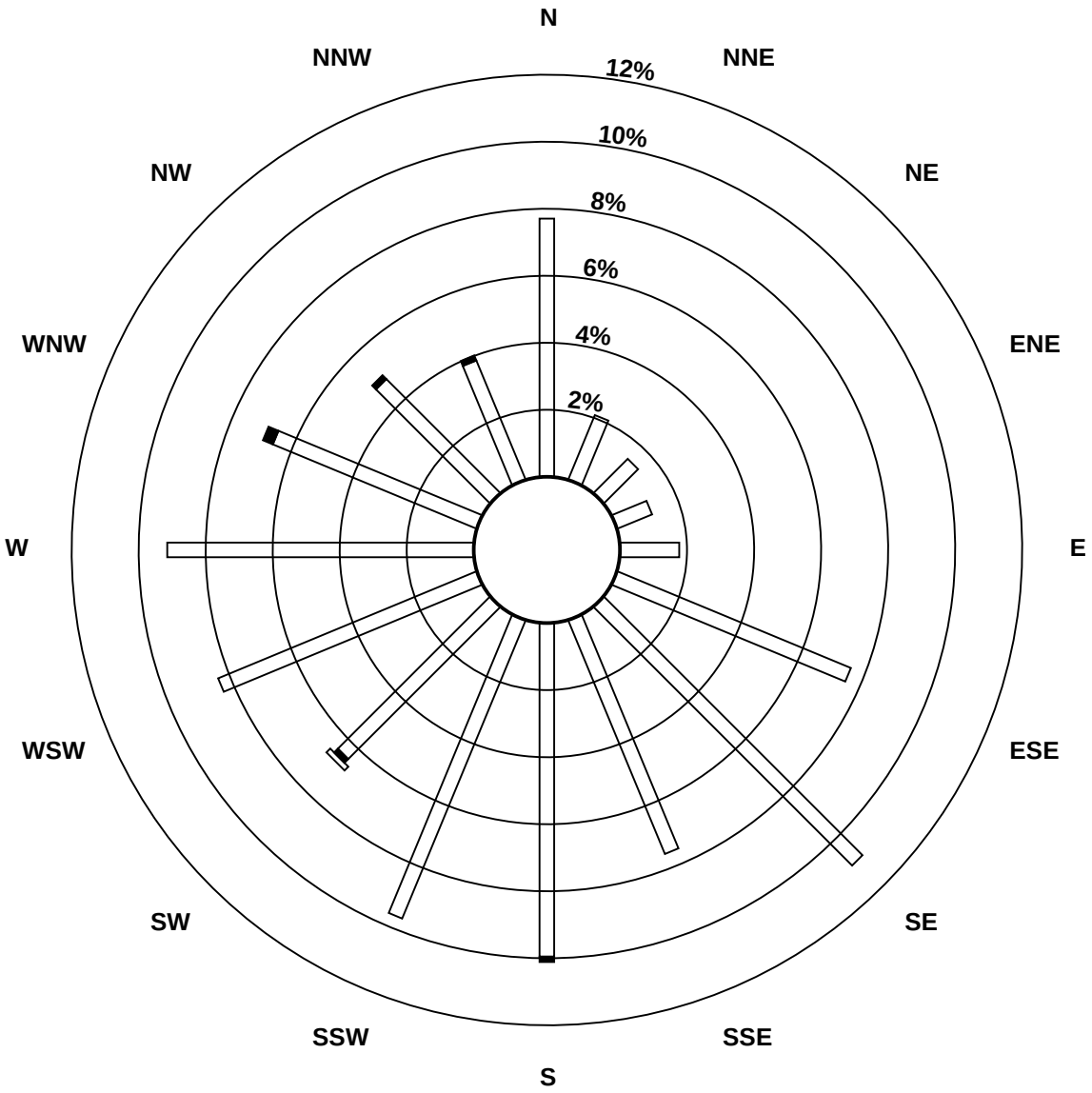
Total Number of Hours: 744

Wood Buffalo Environmental Association

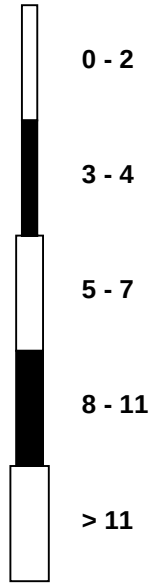
Wind Rose Aug 2015

Total Reduced Sulphur (TRS) - ppb

Millennium (AMS 12)



Classes (ppb)



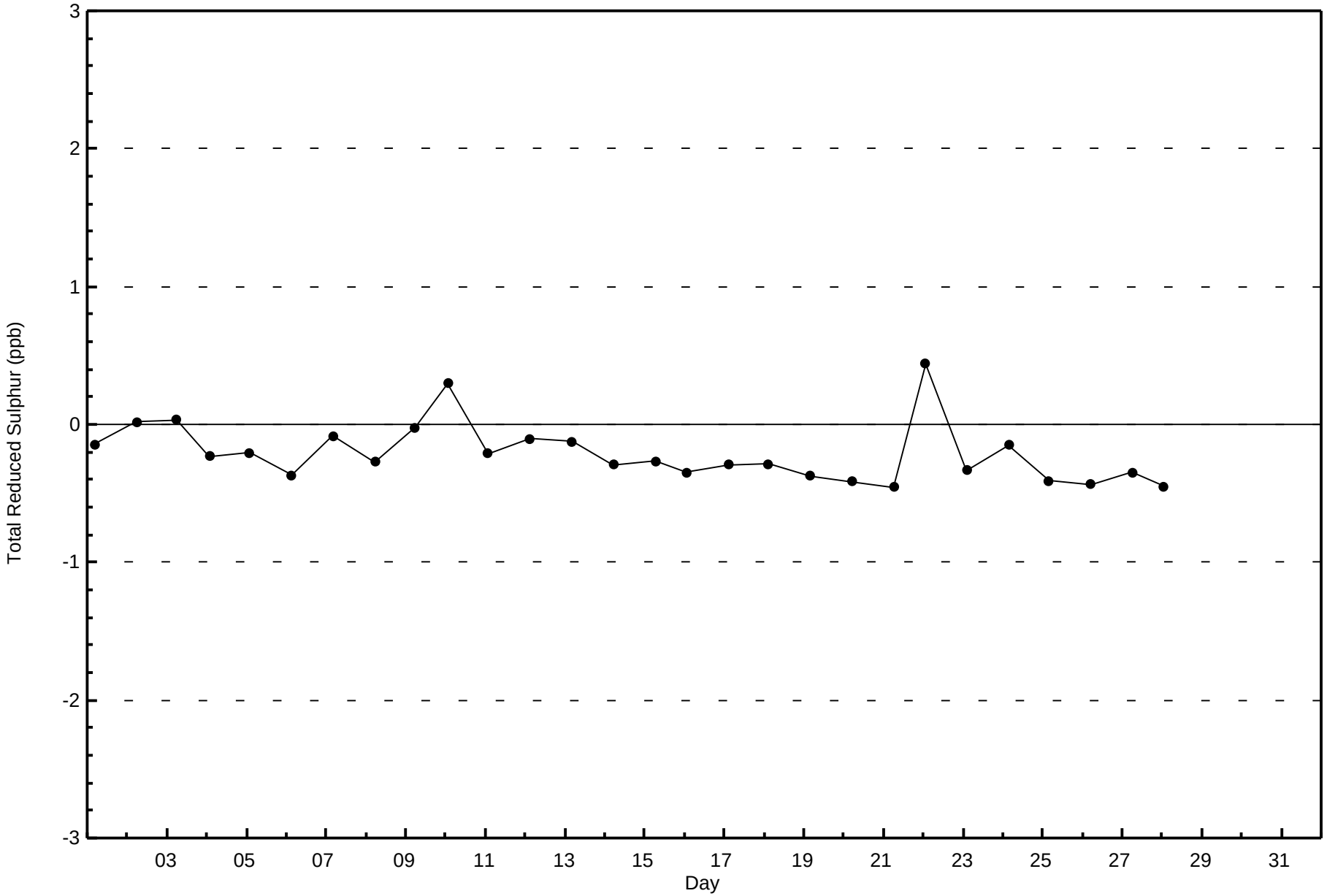
Total Number of Valid Hours: 623

Wood Buffalo Environmental Association

Zero Responses

Total Reduced Sulphur (TRS) - ppb

Millennium - August 2015

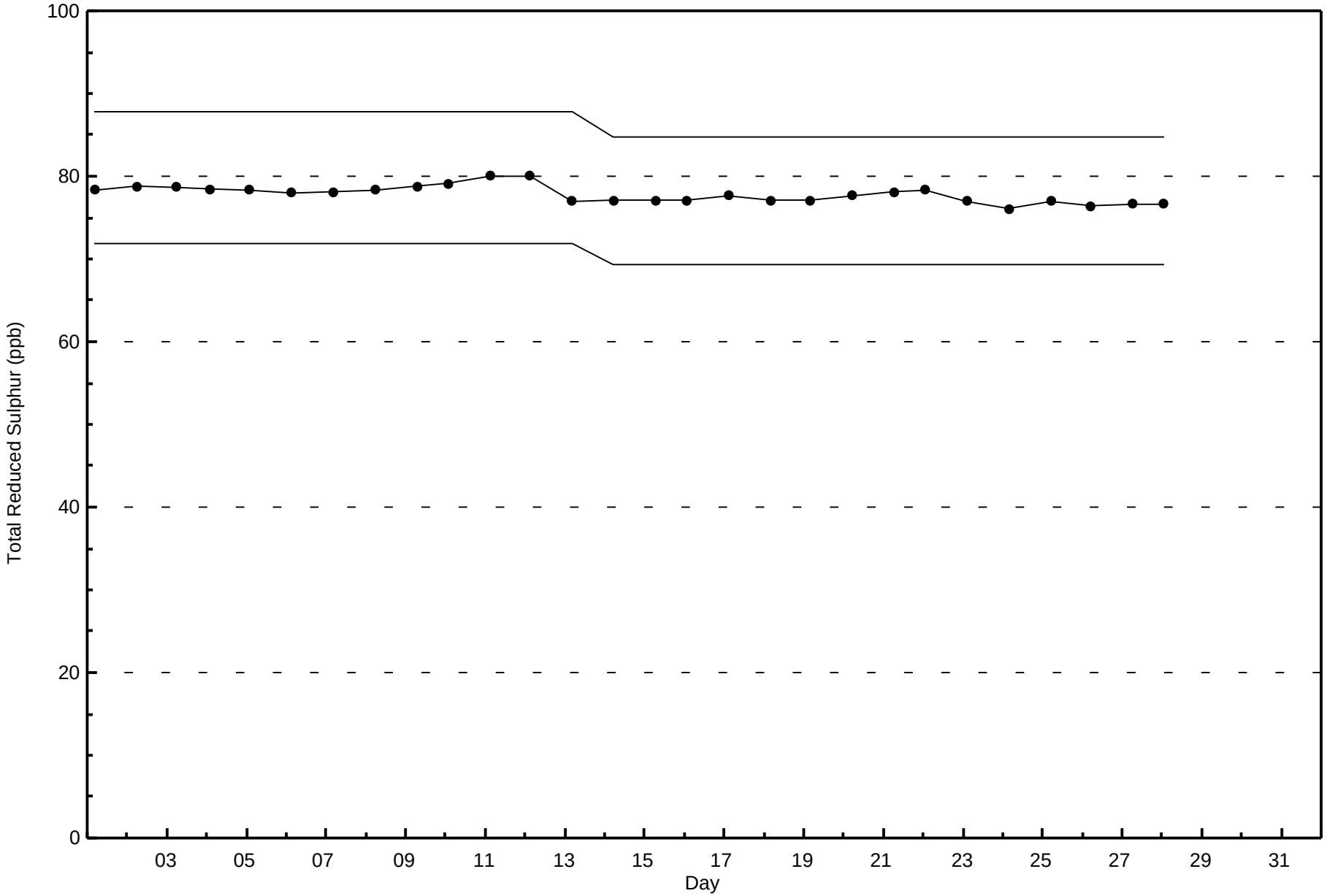


Wood Buffalo Environmental Association

Span Responses

Total Reduced Sulphur (TRS) - ppb

Millennium - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Millennium - August 2015

Maximum Value: 6.0 ppm on Aug 27 02:00

Maximum Daily Average: 2.9 ppm on Aug 3

Minimum Value: 2.0 ppm on Aug 10 07:00

Minimum Daily Average: 2.1 ppm on Aug 14

Maximum Diurnal Average: 2.7 ppm at hour 5

Minimum Diurnal Average: 2.2 ppm at hour 12

Monthly Average: 2.45 ppm

Percentiles: P_1 = 2.0 P_{10} = 2.1 Q_1 = 2.2 Median = 2.3 Q_3 = 2.5 P_{90} = 3.0 P_{99} = 4.2

Hours in Service:	744
Hours of Data:	627
Hours of Missing Data:	117
Hours of Calibration:	34
Percent Operational Time:	88.8

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	2.7	2.6	2.9	Z	3.5	3.0	2.6	2.9	3.1	3.0	2.5	2.4	2.3	2.4	2.3	2.2	2.2	2.2	2.3	2.4	2.8	4.0	3.9	3.1	2.7	4.0
2-Aug	2.8	3.4	4.5	4.2	Z	4.8	3.2	2.6	2.4	2.5	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.5	2.4	2.7	2.5	3.3	2.8	3.3	2.9	4.8
3-Aug	3.7	4.3	3.8	3.5	3.5	Z	3.2	3.0	2.8	2.8	2.5	2.2	2.3	2.3	2.4	2.4	2.4	2.4	2.5	2.7	3.3	2.7	2.7	2.8	2.9	4.3
4-Aug	Z	2.6	2.7	2.4	2.3	2.5	2.3	2.4	2.4	2.6	2.4	2.4	2.4	2.3	2.4	2.5	2.3	2.3	2.3	2.2	2.2	2.2	2.3	2.5	2.4	2.7
5-Aug	2.4	Z	2.3	2.4	2.4	2.6	2.5	2.4	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.1	2.2	2.3	2.6
6-Aug	2.2	2.1	Z	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.1	2.1	2.2	2.3	2.3	2.3	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.7	2.3	2.7
7-Aug	2.3	2.3	2.2	Z	2.3	2.7	3.0	2.4	2.1	2.2	2.5	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.6	2.4	2.5	2.4	2.4	2.3	2.4	3.0
8-Aug	2.3	2.3	2.2	2.3	Z	2.3	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.5	2.5	2.5	2.8	2.9	2.5	2.5	2.5	2.5	2.4	2.9
9-Aug	3.2	2.8	3.2	3.1	2.8	Z	4.0	3.1	2.6	2.6	2.6	2.4	2.4	2.3	2.3	2.3	2.3	2.4	2.4	2.5	3.1	4.0	2.8	2.5	2.8	4.0
10-Aug	Z	2.4	2.2	2.3	2.6	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.1	2.1	2.1	2.2	2.2	2.3	2.3	2.5	2.5	2.5	2.4	2.3	2.2	2.6
11-Aug	2.5	Z	2.3	2.2	2.5	2.6	2.5	2.3	2.3	C	C	C	C	C	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.3	2.6
12-Aug	2.2	2.2	Z	2.5	2.2	2.3	2.1	2.0	2.0	2.1	2.1	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.5	3.0	2.4	2.3	3.0
13-Aug	2.5	2.4	2.7	Z	3.6	2.9	2.5	2.8	2.5	2.2	2.3	2.4	2.3	2.3	2.4	2.2	2.3	2.4	2.1	2.1	2.2	3.4	4.0	3.7	2.6	4.0
14-Aug	2.2	2.2	2.1	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.4	2.2	2.1	2.1	2.4
15-Aug	2.4	2.3	2.3	2.3	2.3	Z	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.3	2.2	2.4
16-Aug	Z	2.2	2.3	2.2	2.6	3.1	2.3	2.2	2.6	2.5	2.1	2.3	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.6	2.8	3.6	2.4	3.6
17-Aug	3.4	Z	2.8	3.5	3.0	2.3	2.3	2.6	2.6	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.4	2.5	2.7	2.7	2.5	2.8	2.7	2.5	3.5
18-Aug	3.2	2.4	Z	2.3	2.6	2.5	3.0	3.0	2.5	2.4	2.3	2.3	2.3	2.4	2.4	2.3	2.4	2.3	2.3	2.4	2.5	2.5	2.3	2.3	2.5	3.2
19-Aug	2.3	2.3	2.3	Z	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.1	PF	PF	PF	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.1	2.2	2.3
20-Aug	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	PF	2.1	2.1	2.2	2.1	2.2	2.1	2.1	2.2	2.2	2.2	2.3	2.4	2.1	2.1	2.4
21-Aug	2.1	2.1	2.1	2.1	2.1	Z	2.1	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.1	C	2.2	2.3	2.4	2.3	2.4	2.4	2.4	2.4	2.2	2.4
22-Aug	Z	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.1	2.2	2.2	2.1	2.2	2.2	2.3	2.8	2.8	3.7	2.8	2.3	3.7
23-Aug	3.2	Z	2.8	2.7	2.5	2.6	3.0	3.4	2.5	2.7	2.5	2.3	2.2	2.2	2.2	2.3	2.3	2.3	2.4	2.5	2.4	2.4	2.4	2.5	2.5	3.4
24-Aug	2.6	2.8	Z	2.6	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.4	2.5	2.4	2.9	2.8	2.3	2.9
25-Aug	2.6	2.7	2.6	Z	3.2	3.7	4.8	4.1	3.2	3.1	2.5	2.7	2.4	2.3	2.3	PF	2.3	2.4	2.4	2.3	2.4	2.6	2.5	2.4	2.8	4.8
26-Aug	2.3	2.3	2.4	2.3	Z	2.2	2.4	2.3	2.3	2.4	2.2	2.2	2.3	2.5	2.5	2.3	2.3	2.3	2.4	2.8	4.1	4.3	3.3	4.1	2.6	4.3
27-Aug	4.2	6.0	3.8	3.6	4.4	Z	3.0	2.6	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.8	2.6	2.9	2.7	2.9	6.0
28-Aug	Z	2.8	2.8	2.6	2.6	2.4	2.3	2.4	2.2	2.0	2.0	2.1	2.1	2.1	2.1	2.2	2.2	2.2	PF	PF	PF	PF	PF	PF	--	2.8
29-Aug	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	--	--
30-Aug	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	--	--
31-Aug	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	--	--
	2.7	2.7	2.6	2.6	2.7	2.6	2.6	2.5	2.4	2.3	2.3	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.5	2.7	2.7	2.6	Diurnal Average	
	4.2	6.0	4.5	4.2	4.4	4.8	4.8	4.1	3.2	3.1	2.6	2.7	2.4	2.5	2.5	2.5	2.5	2.5	2.8	2.9	4.1	4.3	4.0	4.1	Diurnal Maximum	

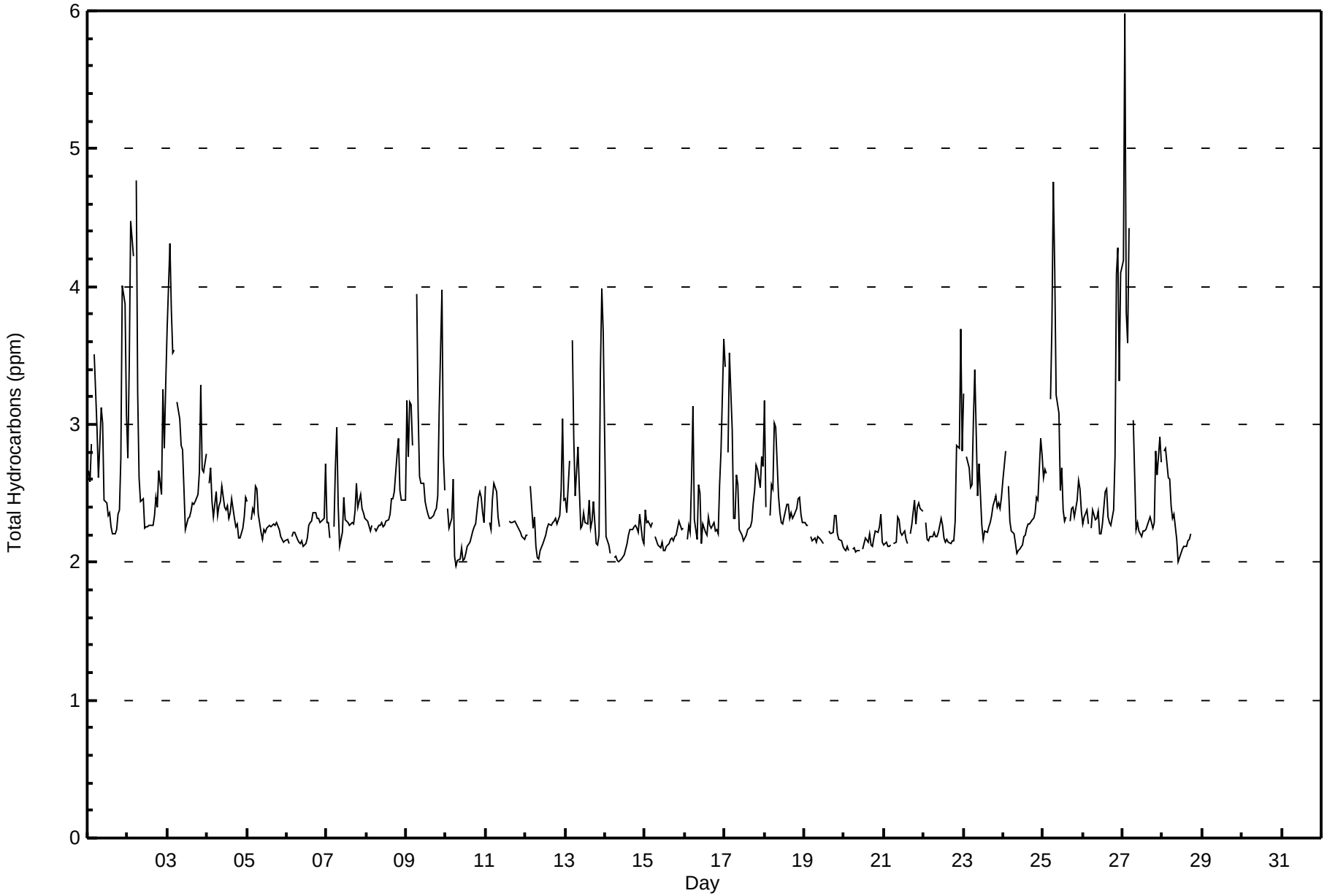
Z - zerospan C - Calibration PF - Power Failure

Wood Buffalo Environmental Association

Hourly Averages

Total Hydrocarbons (THC) - ppm

Millennium - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm

Millennium - August 2015

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	16	2.55	2.55
2.1 - 3.0	558	89.00	91.55
3.1 - 10.0	53	8.45	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 627

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Total Hydrocarbons (THC) - ppm

Millennium - August 2015

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	2	3	4	6	1	0	0	16
2.1 - 3.0	45	13	8	8	7	46	65	47	58	39	29	45	53	42	30	23	558
3.1 - 10.0	1	0	2	0	3	3	3	1	3	18	7	4	0	1	3	3	52
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	46	13	10	8	10	49	68	48	61	59	39	53	59	44	33	26	626

Total Number of Valid Hours: 626

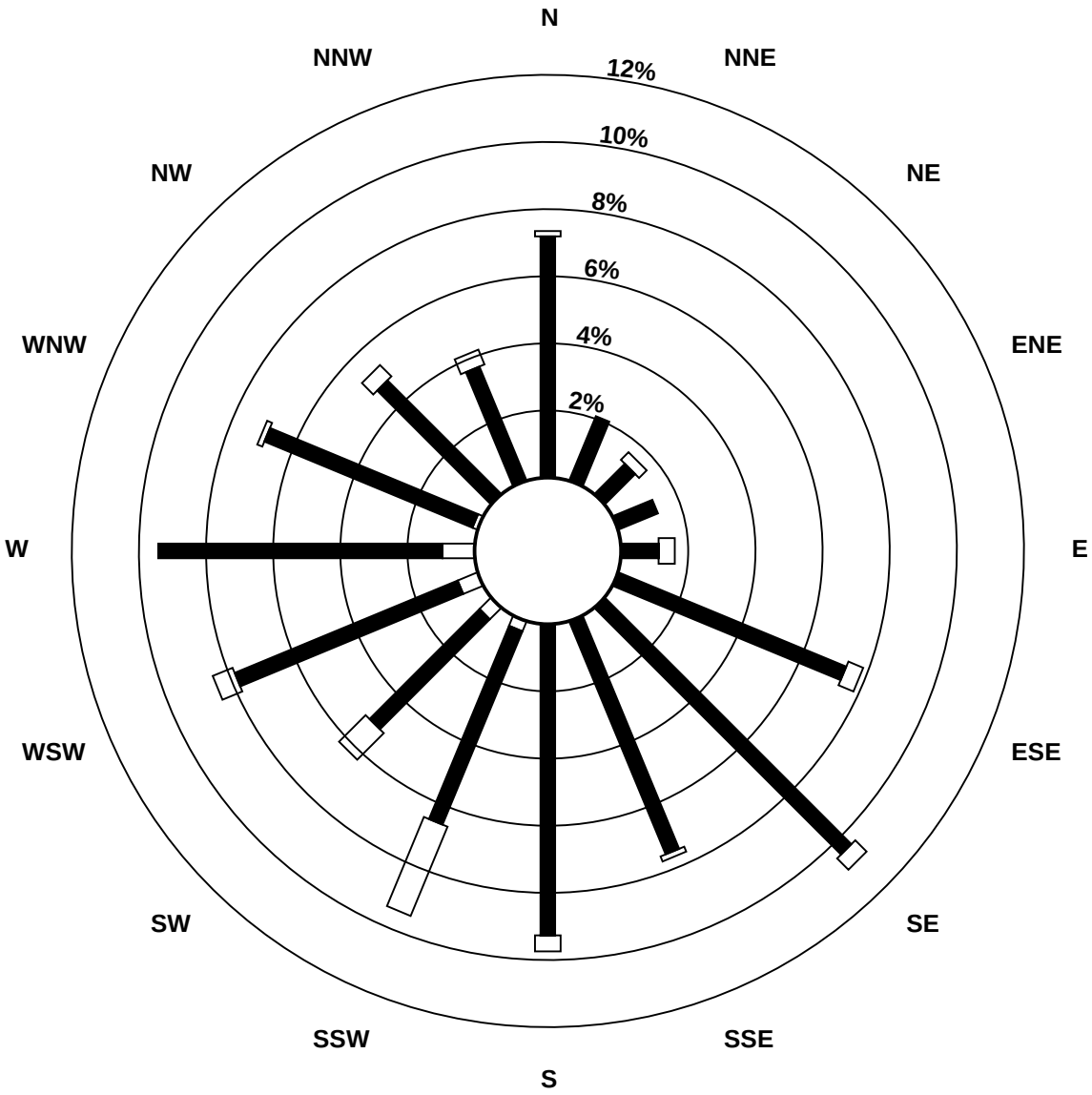
Total Number of Hours: 744

Wood Buffalo Environmental Association

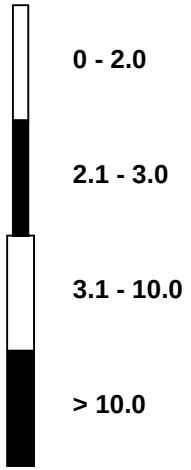
Wind Rose Aug 2015

Total Hydrocarbons (THC) - ppm

Millennium (AMS 12)



Classes (ppm)



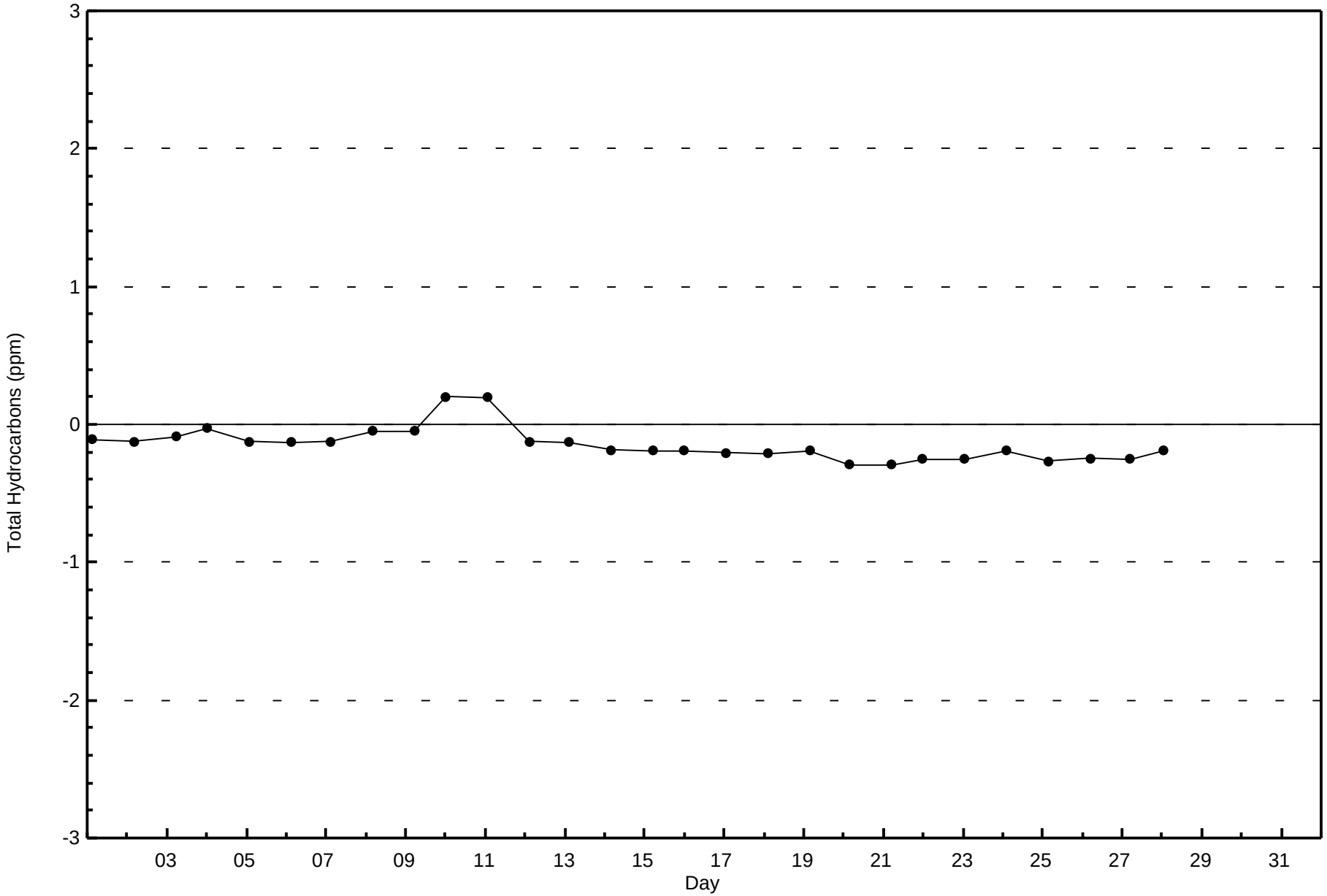
Total Number of Valid Hours: 626

Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Millennium - August 2015

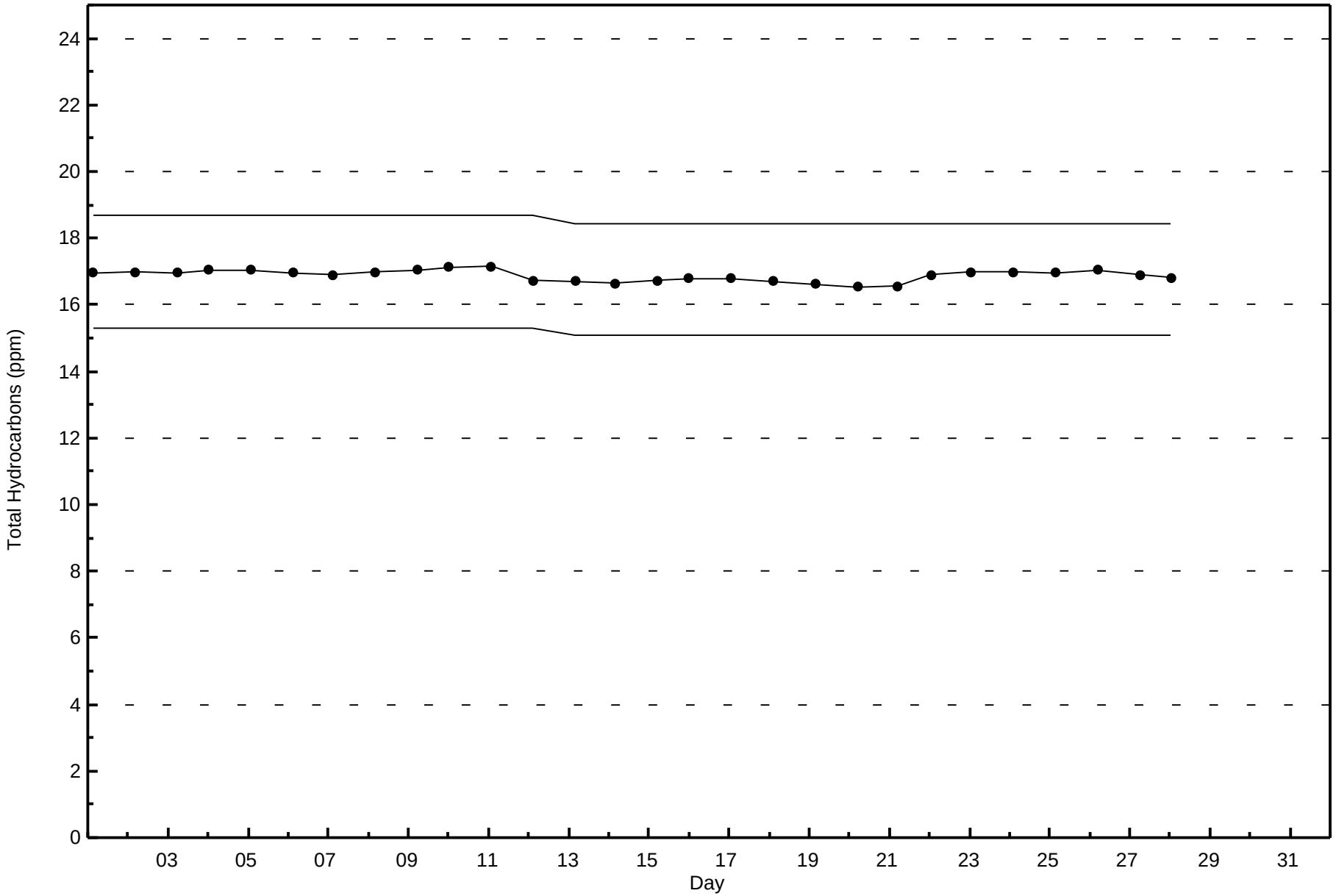


Wood Buffalo Environmental Association

Span Responses

Total Hydrocarbons (THC) - ppm

Millennium - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

Millennium - August 2015

Maximum Value: 98 ppb on Aug 27 02:00

Maximum Daily Average: 14.2 ppb on Aug 9

Minimum Value: 0 ppb on Aug 10 03:00

Minimum Daily Average: 0.2 ppb on Aug 14

Maximum Diurnal Average: 12.3 ppb at hour 7

Minimum Diurnal Average: 0.5 ppb at hour 20

Monthly Average: 5.6 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 1 $Q_3 = 5$ $P_{90} = 17$ $P_{99} = 54$

Hours in Service:	744
Hours of Data:	618
Hours of Missing Data:	126
Hours of Calibration:	33
Percent Operational Time:	87.5

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	3	11	14	Z	7	24	14	14	14	11	4	2	1	0	0	0	0	0	1	1	14	91	61	21	13.4	91
2-Aug	18	36	14	13	Z	28	10	9	10	9	1	1	1	1	1	0	1	0	1	0	0	0	0	21	7.7	36
3-Aug	34	16	19	17	19	Z	39	26	16	14	10	2	0	2	3	3	2	3	4	0	1	3	1	3	10.3	39
4-Aug	Z	1	1	0	0	1	2	3	6	7	4	6	4	2	5	5	5	7	1	0	0	0	1	4	2.9	7
5-Aug	2	Z	0	1	1	3	4	2	2	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	1.0	4
6-Aug	0	0	Z	0	1	3	1	0	2	2	1	1	1	1	1	1	1	1	1	1	5	6	9	15	2.4	15
7-Aug	7	7	3	Z	2	10	30	18	2	6	12	11	10	6	3	2	2	3	4	1	28	5	0	8	7.9	30
8-Aug	10	3	8	13	Z	30	26	16	21	8	4	1	1	0	0	2	4	1	3	2	1	4	6	16	7.8	30
9-Aug	16	4	18	29	18	Z	41	20	32	28	12	4	2	1	0	0	0	0	1	1	17	52	13	18	14.2	52
10-Aug	Z	0	0	12	1	0	0	1	2	2	0	0	0	0	0	0	1	1	1	2	14	17	9	14	3.5	17
11-Aug	8	Z	9	4	4	22	24	12	11	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	5.3	24
12-Aug	1	0	Z	15	5	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5	0	1.6	15
13-Aug	1	4	20	Z	27	27	17	15	15	8	7	8	5	1	1	2	1	2	0	0	0	7	4	2	7.6	27
14-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.2	1
15-Aug	0	0	0	0	0	Z	1	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0.3	1
16-Aug	Z	0	0	0	3	4	1	1	2	4	0	2	2	1	3	1	1	0	0	0	0	0	1	13	1.7	13
17-Aug	14	Z	1	17	28	14	19	10	11	3	2	0	0	0	0	0	0	0	0	0	0	18	9	4	6.7	28
18-Aug	5	0	Z	2	5	6	12	5	6	4	2	2	3	1	1	0	0	0	0	0	0	0	0	1	2.4	12
19-Aug	0	0	0	Z	0	0	0	0	1	1	0	0	PF	PF	PF	0	0	0	0	0	0	0	0	0	0.3	1
20-Aug	0	0	0	0	Z	0	0	0	0	0	PF	1	1	1	1	1	0	0	1	0	1	1	0	2	0.5	2
21-Aug	1	3	5	5	5	Z	3	1	2	3	M	M	M	M	M	M	2	0	0	0	1	0	0	0	--	5
22-Aug	Z	1	1	2	3	1	1	1	M	M	M	M	1	2	1	0	0	0	0	1	54	55	72	35	12.2	72
23-Aug	34	Z	40	36	19	20	28	27	15	14	8	3	3	1	1	1	1	3	3	1	1	1	2	0	11.4	40
24-Aug	5	4	Z	1	1	3	2	4	2	2	2	1	1	2	1	1	1	1	1	0	5	0	5	3	2.1	5
25-Aug	3	14	12	Z	8	18	29	28	24	30	7	9	2	0	1	PF	1	1	1	1	10	12	4	4	10.0	30
26-Aug	2	2	0	2	Z	3	6	3	4	4	2	1	4	5	4	2	1	0	0	0	2	22	6	19	4.1	22
27-Aug	53	98	23	36	46	Z	29	19	5	6	3	0	1	0	0	0	0	0	0	0	0	0	0	0	14.0	98
28-Aug	Z	0	2	0	0	1	3	5	1	0	0	0	0	0	0	0	0	0	PF	PF	PF	PF	PF	PF	--	5
29-Aug	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	--	--
30-Aug	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	--	--
31-Aug	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	--	--
	9.5	8.6	8.0	8.9	8.8	9.8	12.3	8.6	7.7	6.5	3.5	2.4	1.8	1.2	1.2	1.0	1.0	1.0	1.0	0.5	5.8	10.9	7.8	7.5	Diurnal Average	
	53	98	40	36	46	30	41	28	32	30	12	11	10	6	5	5	5	7	4	2	54	91	72	35	Diurnal Maximum	

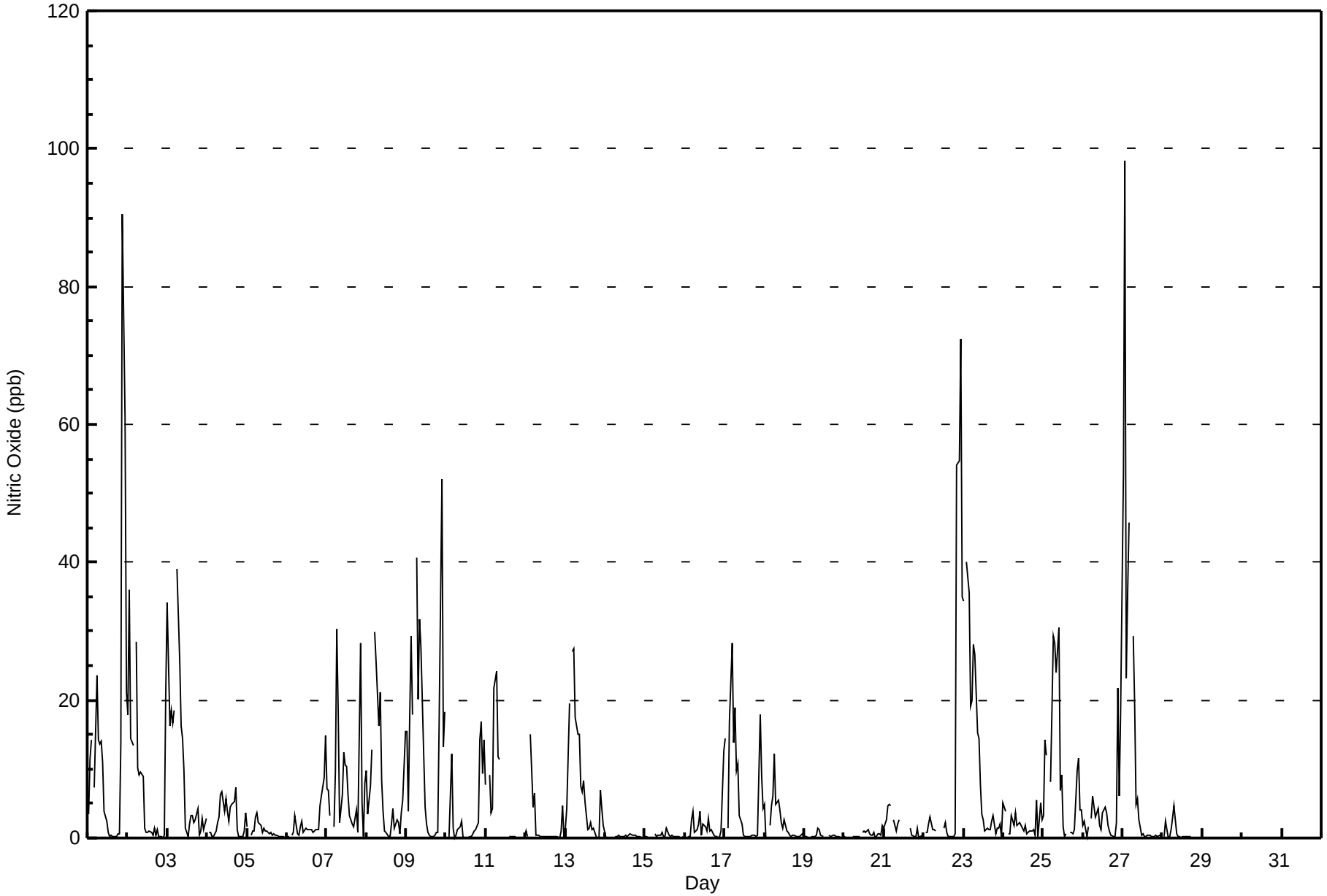
Z - zerospan C - Calibration M - Maintenance PF - Power Failure

Wood Buffalo Environmental Association

Hourly Averages

Nitric Oxide (NO) - ppb

Millennium - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb

Millennium - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	573	92.72	92.72
21 - 40	35	5.66	98.38
11 - 80	8	1.29	99.68
81 - 159	2	0.32	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 618

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Nitric Oxide (NO) - ppb

Millennium - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	44	12	9	7	8	46	61	44	53	51	38	51	57	41	28	23	573
21 - 40	2	1	1	1	1	2	5	3	7	5	1	2	0	1	1	2	35
11 - 80	0	0	0	0	0	1	2	1	1	2	0	0	0	0	0	0	7
81 - 159	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	2
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	46	13	10	8	10	49	68	48	61	59	39	53	57	42	29	25	617

Total Number of Valid Hours: 617

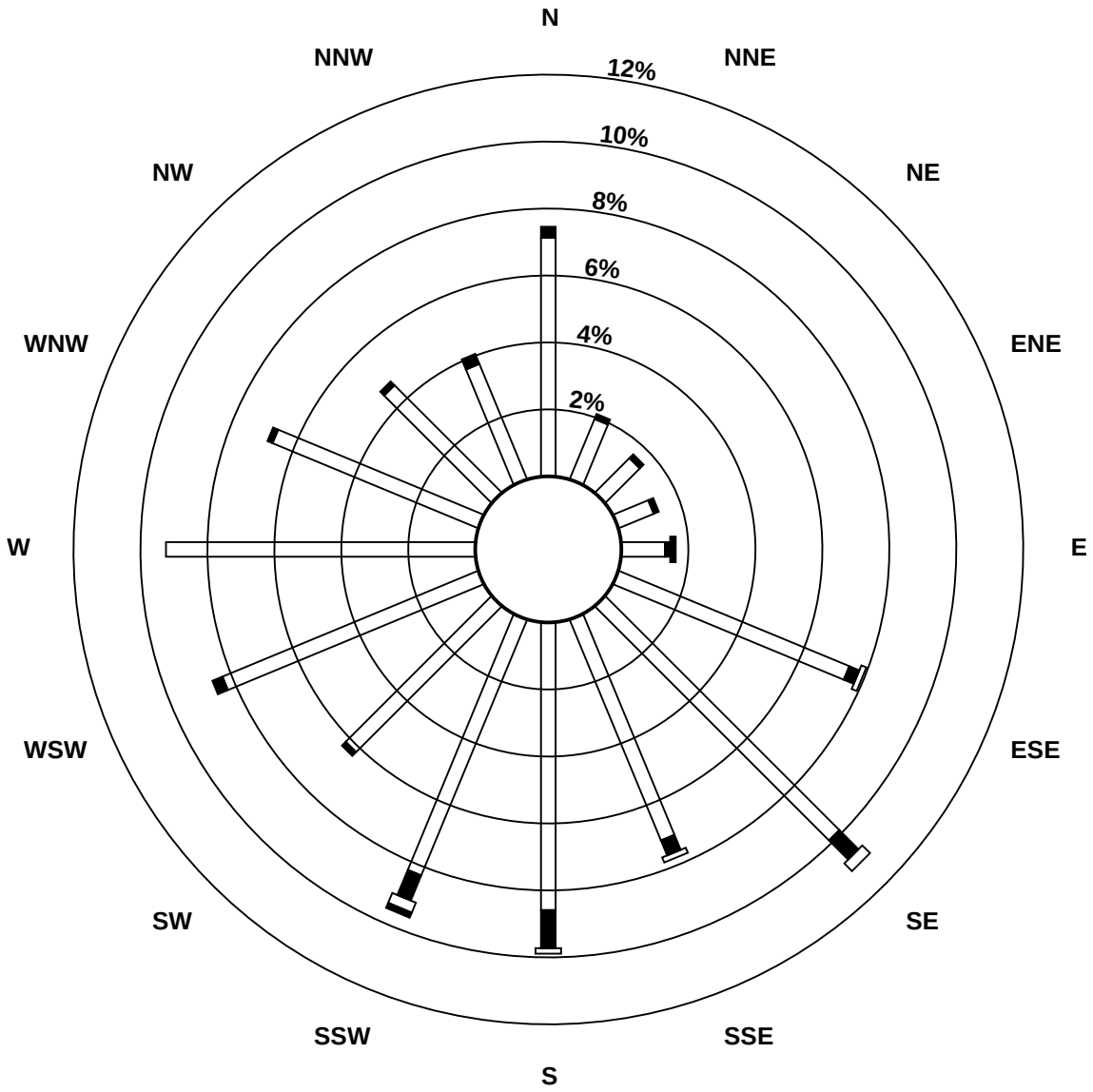
Total Number of Hours: 744

Wood Buffalo Environmental Association

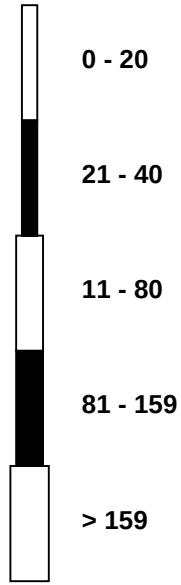
Wind Rose Aug 2015

Nitric Oxide (NO) - ppb

Millennium (AMS 12)



Classes (ppb)



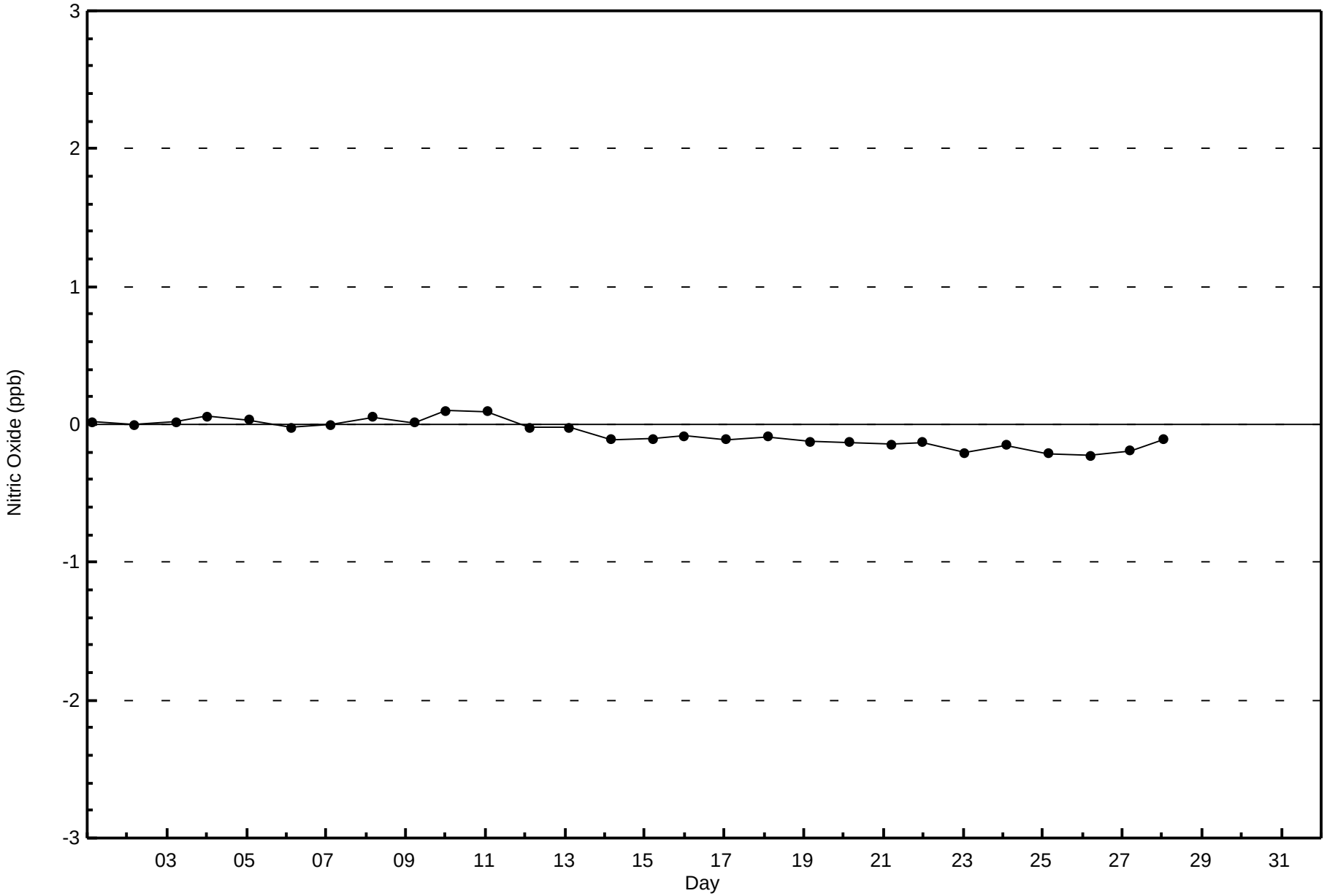
Total Number of Valid Hours: 617

Wood Buffalo Environmental Association

Zero Responses

Nitric Oxide (NO) - ppb

Millennium - August 2015

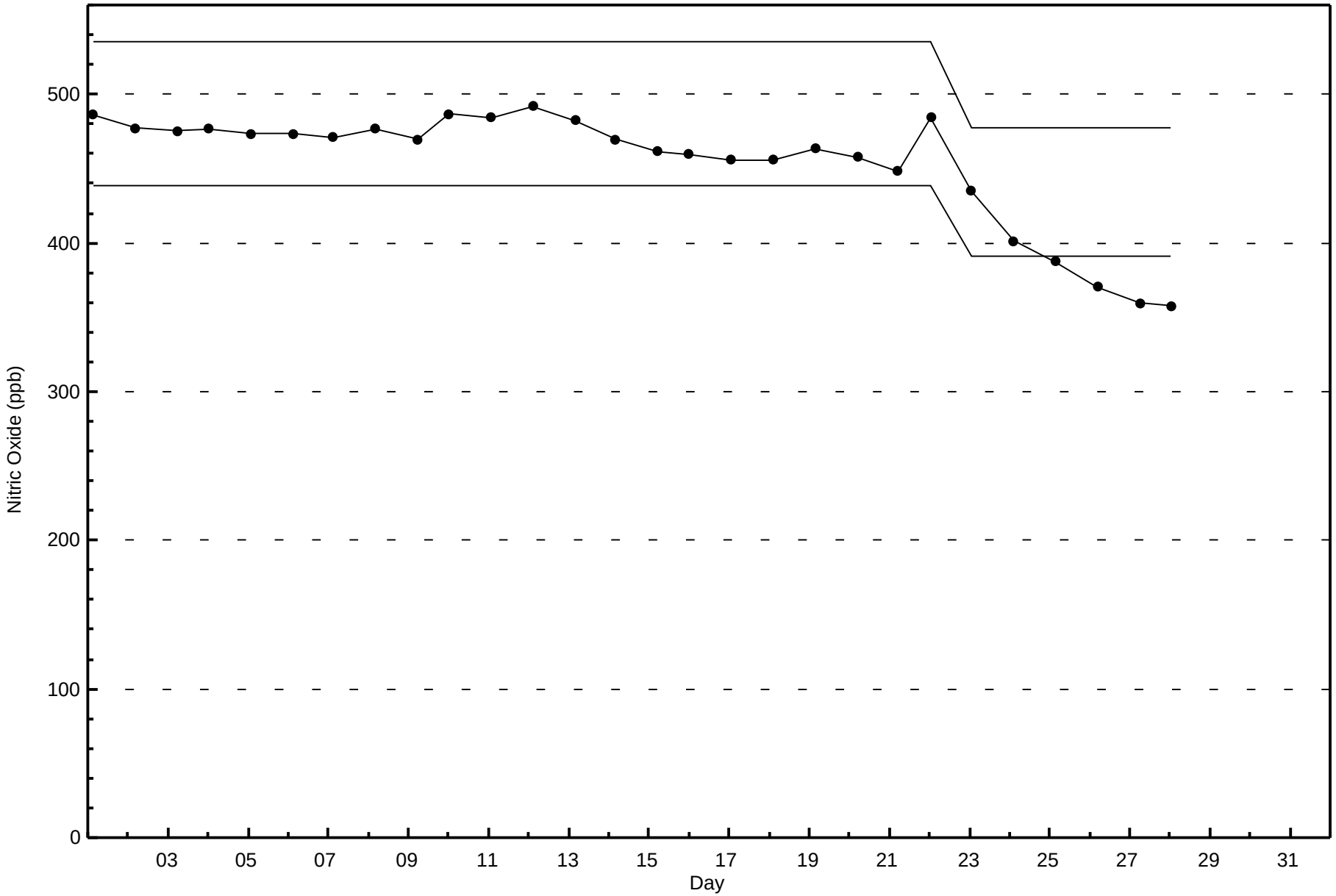


Wood Buffalo Environmental Association

Span Responses

Nitric Oxide (NO) - ppb

Millennium - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO_2) - ppb

Millennium - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 27 ppb on Aug 26 22:00

Maximum Daily Average: 11.2 ppb on Aug 3

Minimum Value: 1 ppb on Aug 14 14:00

Minimum Daily Average: 1.7 ppb on Aug 14

Maximum Diurnal Average: 11.9 ppb at hour 22

Minimum Diurnal Average: 2.7 ppb at hour 16

Monthly Average: 6.8 ppb

Percentiles: $P_1 = 1$ $P_{10} = 1$ $Q_1 = 2$ Median = 5 $Q_3 = 10$ $P_{90} = 15$ $P_{99} = 22$

Hours in Service:	744
Hours of Data:	618
Hours of Missing Data:	126
Hours of Calibration:	33
Percent Operational Time:	87.5

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	14	14	12	Z	8	11	12	11	10	9	7	5	4	2	2	1	1	1	3	7	17	20	17	17	8.8	20
2-Aug	14	12	9	7	Z	6	4	6	9	8	4	3	3	3	2	2	5	9	9	4	13	10	14	18	7.5	18
3-Aug	20	17	15	12	10	Z	14	15	13	13	12	5	2	4	6	7	6	9	9	6	13	17	15	17	11.2	20
4-Aug	Z	13	12	11	9	11	13	11	14	11	9	10	8	5	8	9	8	9	5	2	5	6	8	12	9.0	14
5-Aug	11	Z	6	6	5	7	9	6	4	2	3	3	3	2	2	2	2	3	3	2	4	3	3	2	3.9	11
6-Aug	3	2	Z	4	4	5	2	1	3	3	1	1	1	1	1	1	1	2	2	3	6	7	6	6	2.9	7
7-Aug	6	6	6	Z	2	3	6	6	3	4	6	5	6	5	4	5	4	6	9	4	13	8	5	7	5.5	13
8-Aug	9	7	7	8	Z	7	6	5	7	6	4	3	2	1	1	5	7	4	8	7	12	16	13	12	6.7	16
9-Aug	10	6	7	7	6	Z	7	7	11	12	11	9	7	4	2	1	1	2	2	3	15	22	15	17	7.9	22
10-Aug	Z	7	5	15	10	3	3	4	5	6	1	1	1	1	1	1	1	1	1	9	24	23	19	20	7.0	24
11-Aug	20	Z	17	15	15	17	15	11	9	C	C	C	C	C	1	1	1	1	2	1	2	2	2	5	7.5	20
12-Aug	13	5	Z	19	16	13	4	2	2	1	1	1	1	1	1	1	1	1	2	2	4	11	15	6	5.4	19
13-Aug	11	15	19	Z	15	14	12	10	10	8	7	8	7	5	6	4	6	5	1	2	5	17	17	14	9.4	19
14-Aug	3	4	3	2	Z	2	1	1	1	1	1	1	1	1	1	1	1	1	2	2	4	2	2	2	1.7	4
15-Aug	4	4	2	2	2	Z	4	2	1	1	2	1	1	2	1	1	2	2	3	5	9	9	6	9	3.2	9
16-Aug	Z	6	9	6	8	9	3	2	3	4	1	4	4	2	5	3	4	3	3	4	5	9	14	18	5.6	18
17-Aug	18	Z	11	14	12	12	10	7	8	4	4	1	1	1	1	1	2	4	5	6	12	20	18	15	8.1	20
18-Aug	14	6	Z	15	16	14	13	8	7	6	4	3	6	5	5	3	3	3	4	5	7	8	13	13	7.7	16
19-Aug	9	8	6	Z	5	6	5	4	5	4	2	1	PF	PF	PF	1	1	2	3	2	3	2	2	3	3.5	9
20-Aug	3	3	2	1	Z	2	2	1	2	1	PF	1	2	2	3	3	2	3	6	3	4	4	4	3	2.6	6
21-Aug	3	4	5	5	5	Z	3	2	5	7	M	M	M	M	M	M	3	2	2	4	13	3	6	8	--	13
22-Aug	Z	5	4	3	4	4	2	2	M	M	M	M	3	4	2	1	1	1	2	9	19	22	20	18	6.6	22
23-Aug	16	Z	15	14	14	14	10	8	8	8	6	4	4	3	4	4	4	8	18	14	21	23	16	8	10.6	23
24-Aug	21	19	Z	12	13	10	8	7	4	3	3	2	2	2	1	1	2	3	4	4	17	5	16	15	7.4	21
25-Aug	15	12	11	Z	8	8	9	10	13	15	8	12	4	2	3	PF	2	4	7	7	17	15	11	12	9.3	17
26-Aug	9	9	9	12	Z	10	14	7	5	6	4	3	8	12	14	8	5	4	5	8	23	27	22	21	10.6	27
27-Aug	20	18	13	12	11	Z	9	8	8	8	5	2	2	1	2	2	2	2	3	5	17	16	16	16	8.5	20
28-Aug	Z	18	19	15	17	18	14	11	3	1	1	1	1	1	1	1	1	1	PF	PF	PF	PF	PF	PF	--	19
29-Aug	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	--	--
30-Aug	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	--	--
31-Aug	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	--	--
	11.5	9.1	9.2	9.4	9.3	8.9	7.6	6.2	6.4	5.9	4.4	3.5	3.2	2.7	3.1	2.7	2.7	3.3	4.5	4.8	11.2	11.9	11.6	11.6	Diurnal Average	
	21	19	19	19	17	18	15	15	14	15	12	12	8	12	14	9	8	9	18	14	24	27	22	21	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance PF - Power Failure

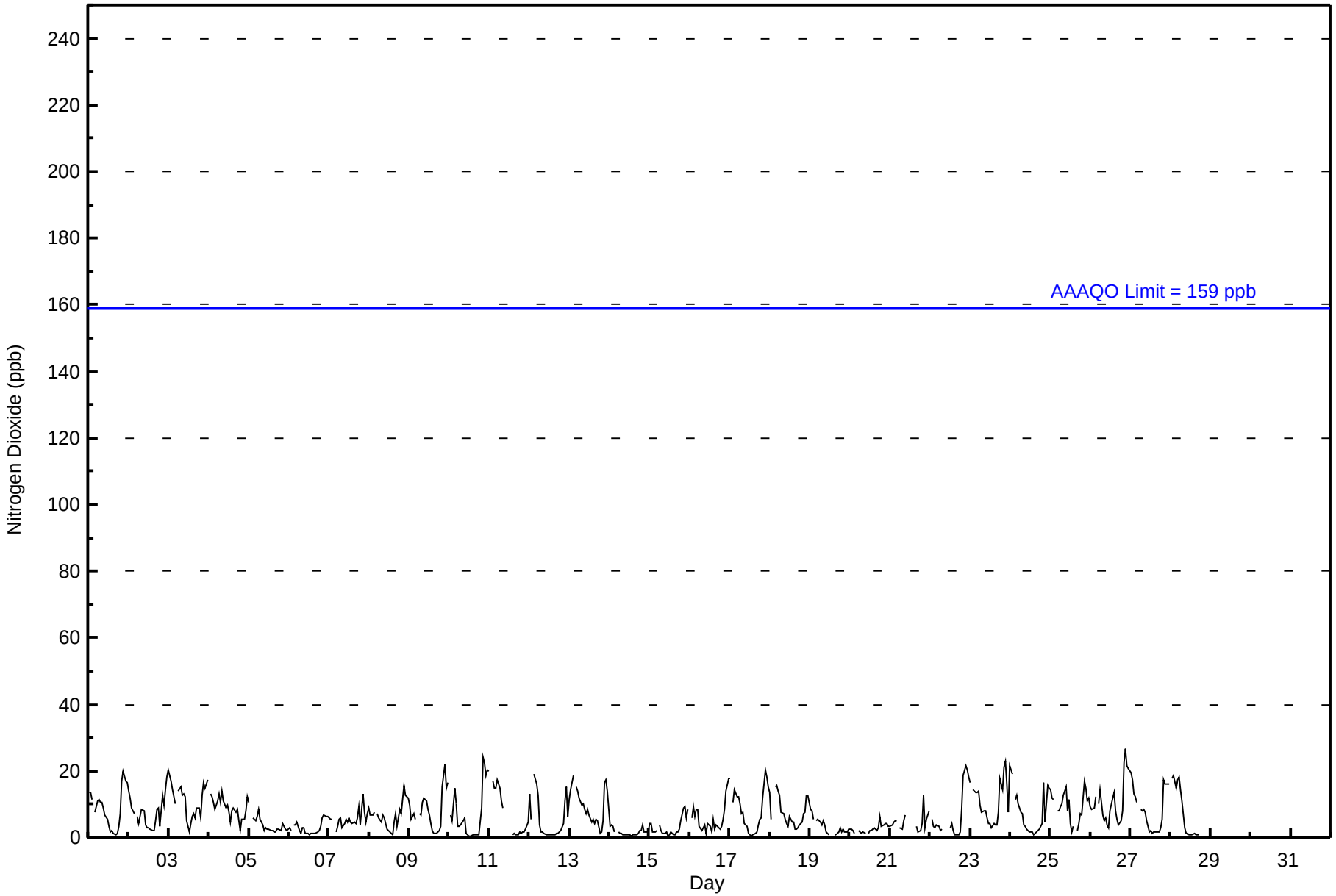
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Dioxide (NO_2) - ppb

Millennium - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Nitrogen Dioxide (NO_2) - ppb

Millennium - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	607	98.22	98.22
21 - 40	11	1.78	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: 618

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Dioxide (NO_2) - ppb

Millennium - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	46	13	10	8	10	48	67	45	60	55	38	53	57	42	29	25	606
21 - 40	0	0	0	0	0	1	1	3	1	4	1	0	0	0	0	0	11
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	46	13	10	8	10	49	68	48	61	59	39	53	57	42	29	25	617

Total Number of Valid Hours: 617

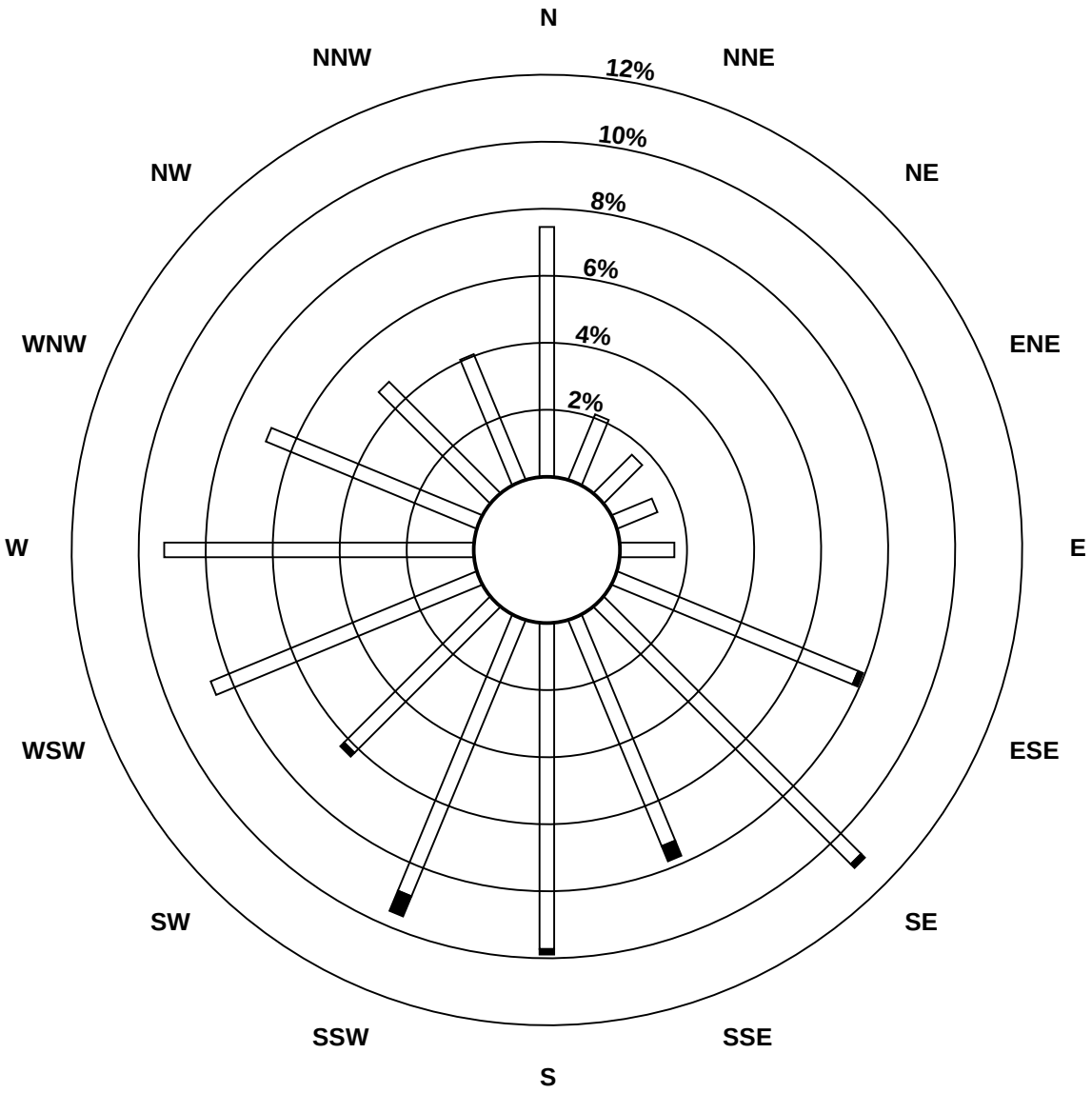
Total Number of Hours: 744

Wood Buffalo Environmental Association

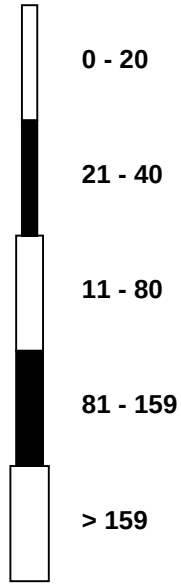
Wind Rose Aug 2015

Nitrogen Dioxide (NO_2) - ppb

Millennium (AMS 12)



Classes (ppb)



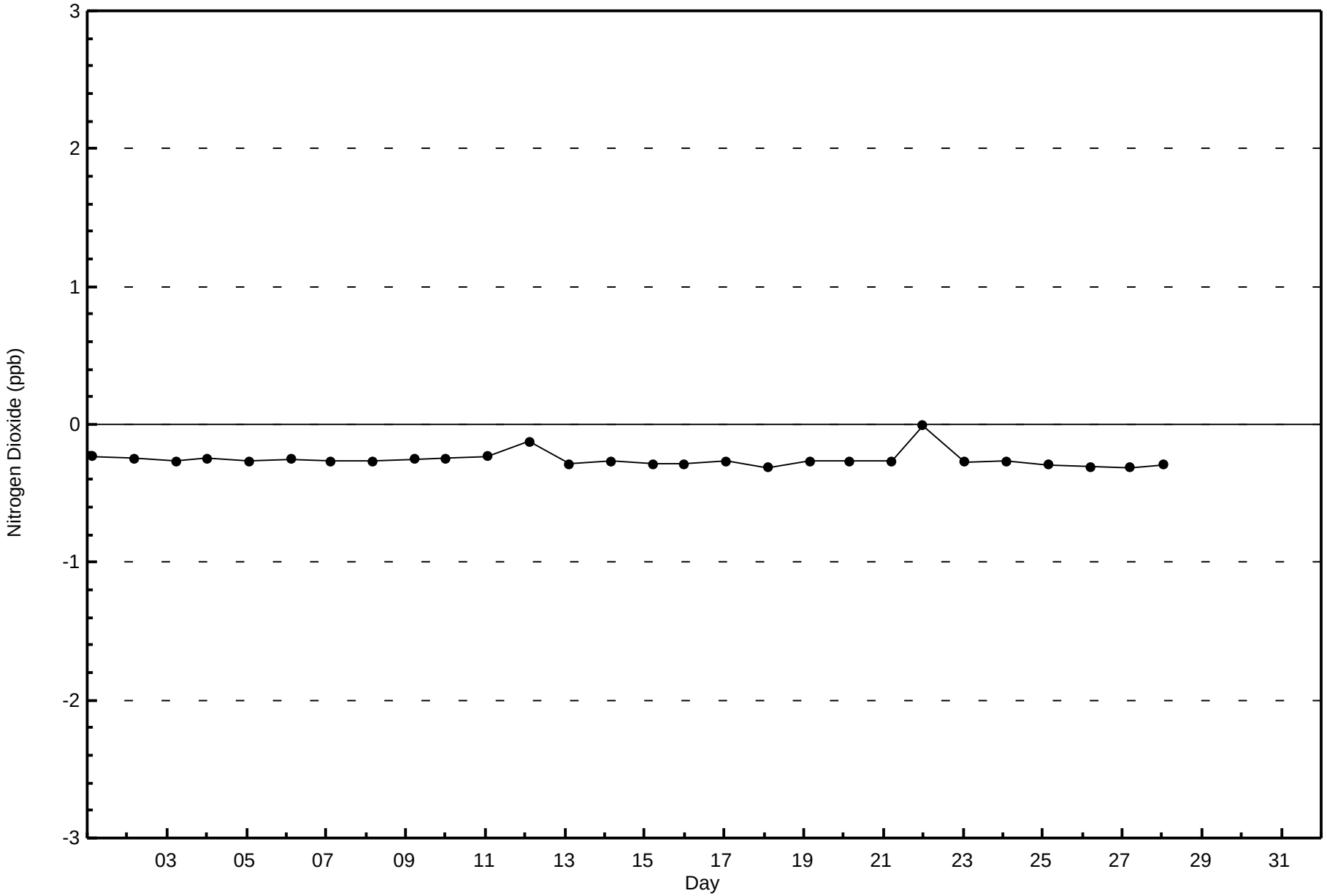
Total Number of Valid Hours: 617

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Dioxide (NO_2) - ppb

Millennium - August 2015

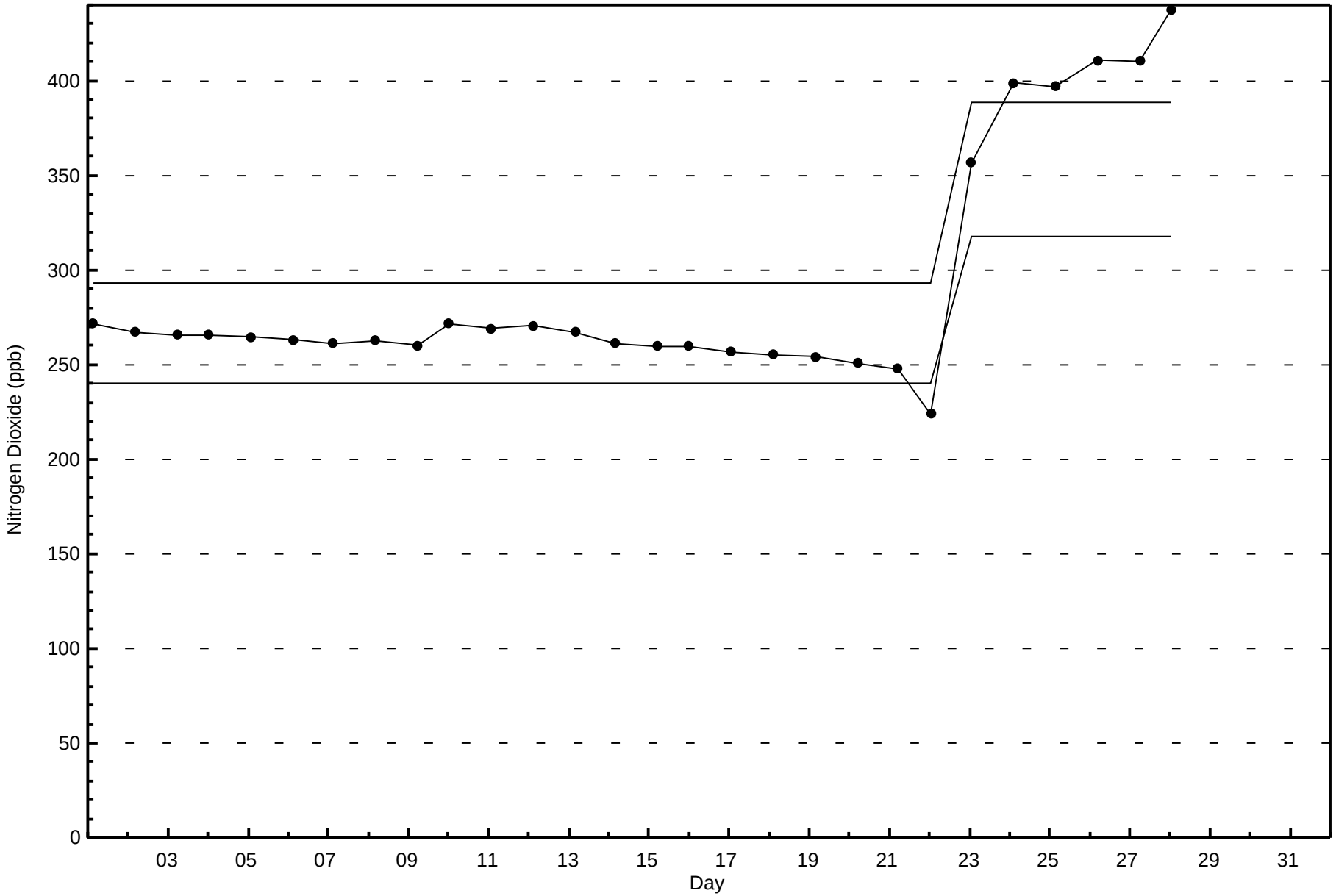


Wood Buffalo Environmental Association

Span Responses

Nitrogen Dioxide (NO_2) - ppb

Millennium - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_X) - ppb

Millennium - August 2015

Maximum Value: 116 ppb on Aug 27 02:00

Maximum Daily Average: 22.5 ppb on Aug 27

Minimum Value: 1 ppb on Aug 10 13:00

Minimum Daily Average: 1.9 ppb on Aug 14

Maximum Diurnal Average: 22.8 ppb at hour 22

Minimum Diurnal Average: 3.7 ppb at hour 16

Monthly Average: 12.4 ppb

Percentiles: $P_1 = 1$ $P_{10} = 1$ $Q_1 = 3$ Median = 7 $Q_3 = 17$ $P_{90} = 30$ $P_{99} = 73$

Hours in Service:	744
Hours of Data:	618
Hours of Missing Data:	126
Hours of Calibration:	33
Percent Operational Time:	87.5

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	17	25	26	Z	15	35	26	24	24	20	10	8	4	2	2	2	1	2	4	8	31	110	78	38	22.3	110
2-Aug	32	48	24	21	Z	35	15	15	18	17	5	4	4	4	3	3	6	9	10	4	13	10	15	39	15.2	48
3-Aug	55	33	33	29	29	Z	53	41	29	27	22	6	2	6	10	11	8	12	13	7	14	19	16	20	21.5	55
4-Aug	Z	14	13	11	9	12	15	14	20	18	13	15	11	7	13	14	13	16	6	2	6	6	9	16	11.8	20
5-Aug	12	Z	7	7	6	9	12	8	6	3	4	3	4	3	3	2	2	3	3	2	5	3	3	2	4.9	12
6-Aug	3	2	Z	4	5	8	3	2	4	5	2	3	2	2	2	3	2	3	3	4	11	13	15	21	5.3	21
7-Aug	13	12	9	Z	3	13	36	24	5	11	18	15	16	11	7	7	6	9	13	5	41	13	5	15	13.4	41
8-Aug	19	10	14	21	Z	37	32	21	28	15	8	4	3	1	1	7	12	5	11	10	12	19	18	27	14.5	37
9-Aug	25	10	24	36	23	Z	48	27	42	39	23	13	9	5	2	1	1	2	3	4	32	74	28	35	22.1	74
10-Aug	Z	7	5	27	12	3	4	5	7	8	1	1	1	1	1	1	1	2	2	11	39	39	28	35	10.5	39
11-Aug	28	Z	26	18	19	39	39	23	20	C	C	C	C	C	1	1	1	1	2	1	2	2	2	5	12.8	39
12-Aug	14	6	Z	34	20	19	4	2	2	1	1	1	1	1	1	1	1	2	2	2	5	12	20	6	7.0	34
13-Aug	13	19	38	Z	42	41	29	25	25	16	14	17	12	6	7	7	7	6	1	2	5	24	22	16	17.1	42
14-Aug	3	4	3	2	Z	2	1	1	1	1	1	1	1	1	1	1	1	2	2	2	4	2	2	2	1.9	4
15-Aug	4	5	2	2	2	Z	4	2	2	1	3	1	1	3	1	1	2	2	3	5	9	9	6	9	3.4	9
16-Aug	Z	6	10	6	11	12	4	4	5	8	2	6	5	3	8	4	5	3	3	4	5	9	15	30	7.3	30
17-Aug	32	Z	12	31	40	26	29	17	18	7	6	2	1	1	1	1	2	4	6	6	12	38	27	20	14.8	40
18-Aug	18	6	Z	17	20	20	25	13	13	10	6	5	9	6	6	3	3	4	4	5	7	8	13	13	10.1	25
19-Aug	9	8	6	Z	5	6	5	4	7	5	2	1	PF	PF	PF	1	1	2	4	2	3	2	2	3	3.8	9
20-Aug	3	3	2	1	Z	2	2	2	2	1	PF	2	3	3	4	3	2	3	7	3	4	5	5	5	3.1	7
21-Aug	5	6	9	10	10	Z	6	4	7	9	M	M	M	M	M	M	5	2	3	5	14	3	6	9	--	14
22-Aug	Z	6	4	5	7	5	3	3	M	M	M	M	4	7	3	1	1	1	2	9	73	76	93	53	18.8	93
23-Aug	51	Z	55	49	33	34	38	35	23	23	14	8	7	4	6	5	5	10	21	15	23	24	18	8	22.0	55
24-Aug	27	23	Z	12	13	14	10	11	6	5	5	3	2	4	1	2	3	4	5	5	22	5	20	17	9.5	27
25-Aug	18	26	23	Z	16	26	38	38	36	46	15	21	6	2	4	PF	3	5	8	8	27	26	15	16	19.3	46
26-Aug	11	11	9	14	Z	13	20	10	9	10	6	4	12	16	17	10	6	4	5	8	25	49	28	39	14.7	49
27-Aug	72	116	36	48	57	Z	38	27	13	13	8	2	3	2	2	2	2	2	3	6	18	16	17	16	22.5	116
28-Aug	Z	18	21	15	17	19	17	16	4	2	1	1	1	1	1	1	1	1	PF	PF	PF	PF	PF	PF	--	21
29-Aug	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	--	--
30-Aug	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	--	--
31-Aug	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	--	--
	21.0	17.6	17.2	18.3	18.1	18.7	19.9	14.9	14.0	12.4	7.9	5.9	5.0	4.0	4.2	3.7	3.8	4.3	5.5	5.3	17.0	22.8	19.4	19.1	Diurnal Average	
	72	116	55	49	57	41	53	41	42	46	23	21	16	16	17	14	13	16	21	15	73	110	93	53	Diurnal Maximum	

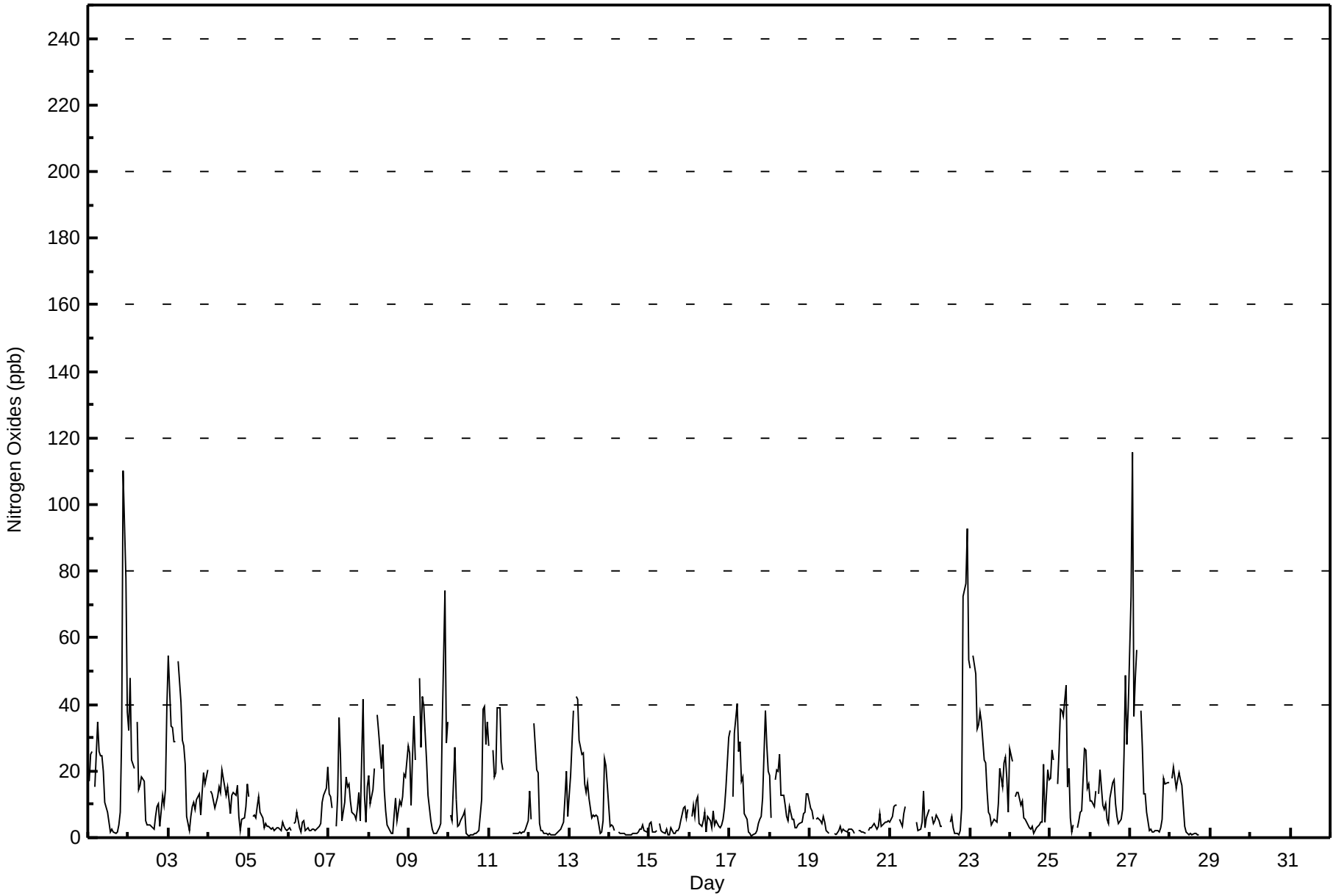
Z - zerospan C - Calibration M - Maintenance PF - Power Failure

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Oxides (NO_X) - ppb

Millennium - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Nitrogen Oxides (NO_X) - ppb

Millennium - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	500	80.91	80.91
21 - 40	93	15.05	95.95
11 - 80	22	3.56	99.51
81 - 159	3	0.49	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 618

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Oxides (NO_X) - ppb

Millennium - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	42	8	8	6	7	43	49	38	42	35	33	51	55	38	24	21	500
21 - 40	4	5	1	1	2	3	15	7	16	18	5	2	2	4	5	3	93
11 - 80	0	0	1	1	0	3	3	3	3	5	1	0	0	0	0	1	21
81 - 159	0	0	0	0	1	0	1	0	0	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	46	13	10	8	10	49	68	48	61	59	39	53	57	42	29	25	617

Total Number of Valid Hours: 617

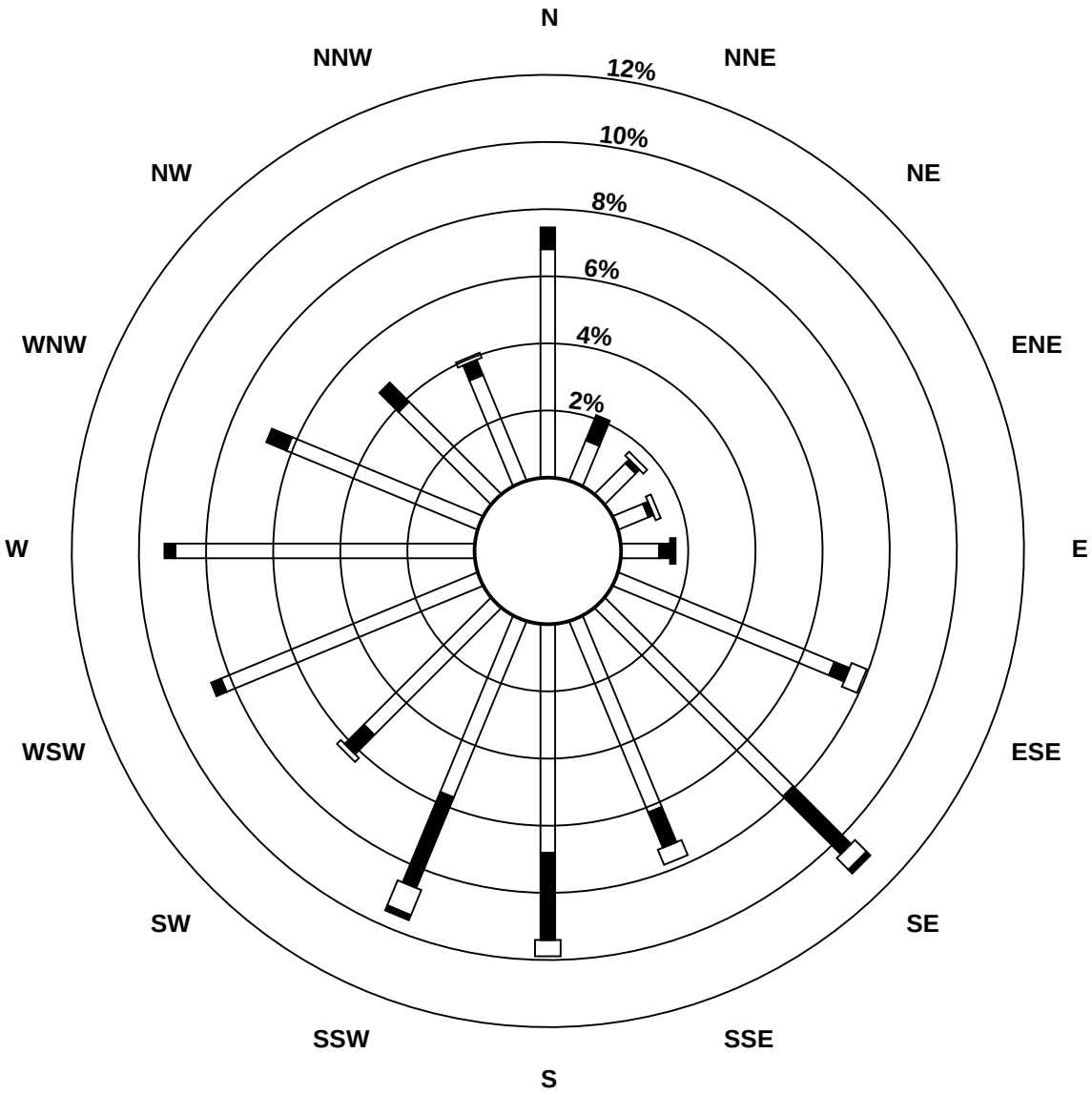
Total Number of Hours: 744

Wood Buffalo Environmental Association

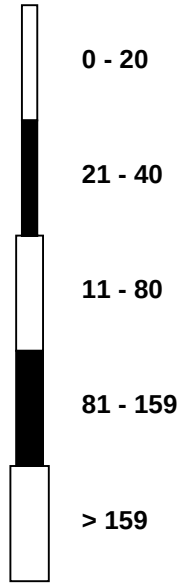
Wind Rose Aug 2015

Nitrogen Oxides (NO_X) - ppb

Millennium (AMS 12)



Classes (ppb)



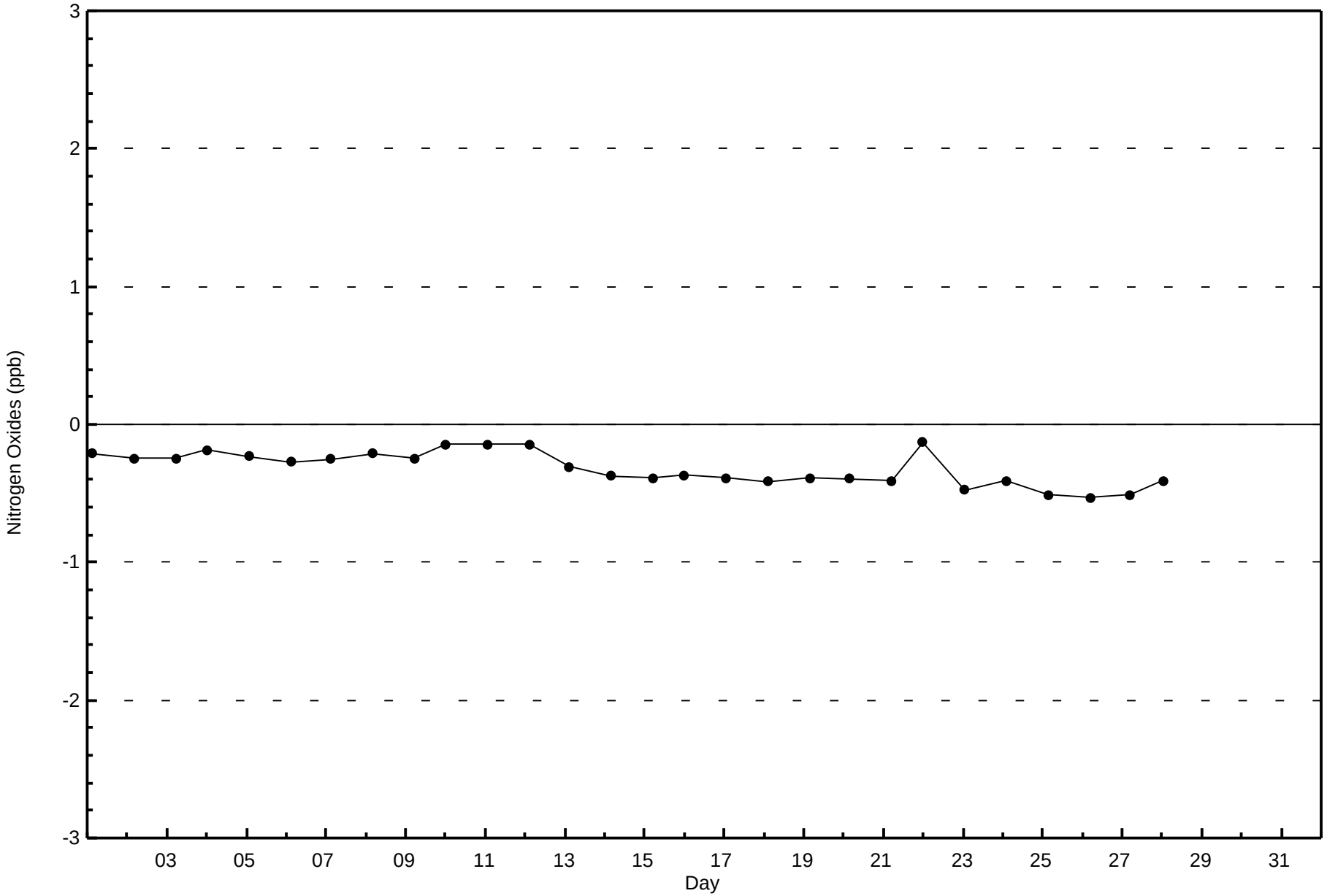
Total Number of Valid Hours: 617

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Oxides (NO_X) - ppb

Millennium - August 2015

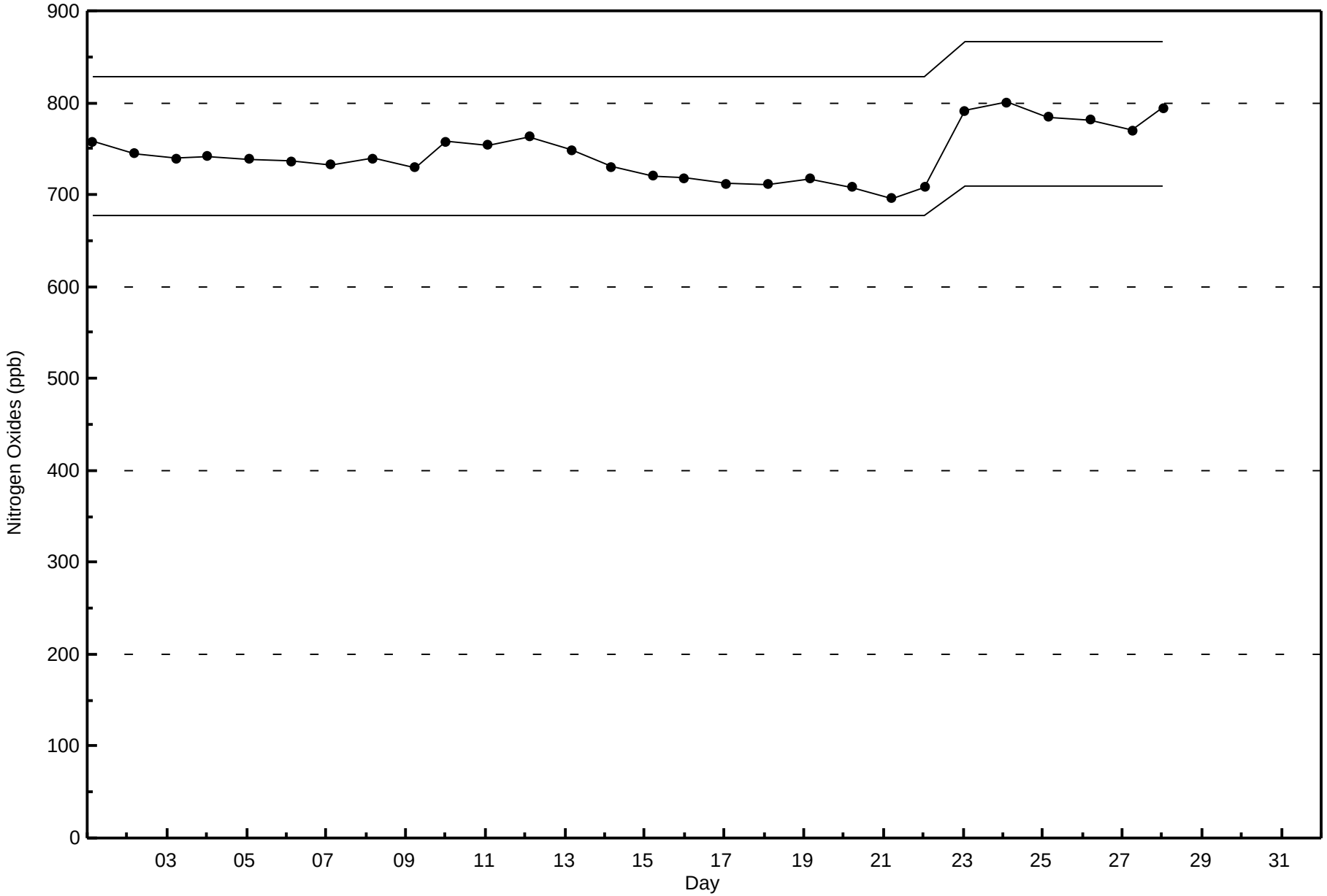


Wood Buffalo Environmental Association

Span Responses

Nitrogen Oxides (NO_X) - ppb

Millennium - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

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

Millennium - August 2015

Number of Exceedences (AAAQO): 24-hr: 0

Maximum Value: 38.8 $\mu g/m^3$ on Aug 10 21:00

Maximum Daily Average: 14.6 $\mu g/m^3$ on Aug 20

Minimum Value: 1.7 $\mu g/m^3$ on Aug 10 12:00

Minimum Daily Average: 2.6 $\mu g/m^3$ on Aug 6

Maximum Diurnal Average: 9.9 $\mu g/m^3$ at hour 21

Minimum Diurnal Average: 5.8 $\mu g/m^3$ at hour 11

Monthly Average: 7.62 $\mu g/m^3$

Percentiles: P_1 = 2.1 P_{10} = 3.0 Q_1 = 4.1 Median = 6.3 Q_3 = 9.4 P_{90} = 14.4 P_{99} = 24.0

Hours in Service:	744
Hours of Data:	656
Hours of Missing Data:	88
Hours of Calibration:	1
Percent Operational Time:	88.3

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	6.1	5.8	6.3	6.1	6.1	7.3	6.8	7.2	6.3	5.9	5.2	5.1	5.8	5.1	7.8	7.0	4.2	5.3	7.3	5.8	4.9	8.6	7.6	5.7	6.2	8.6
2-Aug	5.9	9.1	8.4	7.5	8.2	10.5	9.1	8.0	8.5	13.5	9.3	12.4	17.0	14.4	12.7	11.6	22.7	15.7	10.6	8.8	8.3	10.2	9.4	9.8	10.9	22.7
3-Aug	9.7	12.0	12.9	14.1	16.2	16.1	14.9	11.2	14.1	12.1	9.9	8.0	6.8	13.3	25.7	20.0	12.7	8.7	12.4	9.9	10.5	9.4	7.1	6.6	12.3	25.7
4-Aug	8.1	8.5	8.1	9.2	12.7	17.9	21.4	13.5	8.6	7.8	7.2	9.9	13.8	10.5	9.5	9.3	8.8	8.5	9.3	6.3	5.7	5.5	5.5	5.4	9.6	21.4
5-Aug	4.8	4.3	4.5	5.0	4.7	4.9	5.1	4.9	4.6	4.7	5.2	6.3	5.2	4.3	3.8	4.2	5.6	5.6	4.3	3.0	3.2	3.4	2.8	2.4	4.4	6.3
6-Aug	2.4	2.5	2.4	2.4	2.6	2.7	2.4	2.3	2.5	2.5	2.3	2.4	2.0	1.8	2.1	2.2	2.2	2.6	3.3	3.4	3.5	3.1	2.9	3.0	2.6	3.5
7-Aug	3.0	3.0	3.0	3.3	2.7	2.9	3.6	3.5	3.5	4.1	4.3	3.8	4.5	5.9	7.3	13.3	19.1	23.1	9.6	5.3	15.3	6.7	4.7	4.3	6.7	23.1
8-Aug	4.7	4.2	4.6	4.9	4.8	5.0	5.1	5.1	8.2	6.6	6.5	13.3	8.5	5.3	9.6	19.8	18.9	5.7	4.0	3.1	5.2	9.2	7.5	5.2	7.3	19.8
9-Aug	4.1	3.1	3.3	3.2	3.1	3.1	3.9	4.2	6.0	6.6	6.5	6.5	8.1	7.6	6.4	8.3	11.2	10.0	19.2	18.2	23.6	32.0	15.3	31.6	10.2	32.0
10-Aug	11.6	6.8	8.8	13.8	8.8	4.9	3.9	3.2	3.4	3.9	2.3	1.7	2.0	3.3	4.4	4.7	4.4	4.8	6.5	18.5	38.8	16.5	8.3	11.0	8.2	38.8
11-Aug	10.1	9.4	8.4	8.2	6.7	8.3	9.4	5.6	5.5	4.2	1.9	C	2.7	3.4	4.4	4.9	5.6	6.0	6.2	5.7	4.4	3.7	3.9	3.9	5.8	10.1
12-Aug	4.2	3.6	4.2	4.9	4.2	4.0	3.6	3.7	3.2	2.9	2.6	3.8	5.5	6.4	6.0	6.6	6.9	6.9	6.5	6.7	4.3	4.5	5.2	4.4	4.8	6.9
13-Aug	3.3	3.1	3.5	3.1	3.7	4.7	4.4	6.9	7.9	5.8	5.6	7.1	6.4	5.3	6.4	4.7	5.5	4.7	2.4	3.9	8.0	9.0	5.1	3.0	5.1	9.0
14-Aug	2.4	3.8	3.3	3.0	3.1	3.3	3.4	3.3	3.0	2.7	2.9	3.0	3.0	4.0	5.3	5.9	5.5	4.4	4.3	3.3	2.9	3.1	2.8	2.7	3.5	5.9
15-Aug	2.8	3.0	2.5	2.2	2.5	2.7	2.3	2.5	2.5	2.9	5.8	8.2	9.1	8.2	4.8	3.5	3.1	3.6	4.4	2.7	3.2	4.0	3.0	2.6	3.8	9.1
16-Aug	2.4	2.5	2.9	4.1	4.2	4.0	3.6	3.5	3.5	3.8	4.3	6.7	7.2	8.0	9.1	7.0	6.4	5.5	5.6	3.6	3.4	3.5	3.2	4.6	4.7	9.1
17-Aug	6.2	3.7	4.1	6.8	5.9	5.0	7.2	7.1	4.5	4.0	4.8	5.2	6.2	6.3	6.4	6.8	7.0	8.3	7.0	6.0	14.0	9.0	7.0	5.8	6.4	14.0
18-Aug	5.8	5.4	6.8	6.4	8.5	7.2	6.3	6.4	5.8	4.3	4.2	6.7	17.6	21.3	25.4	18.0	15.6	13.1	11.5	13.0	11.2	7.2	5.8	8.8	10.1	25.4
19-Aug	9.4	6.7	6.1	7.6	6.6	5.2	5.2	5.2	6.1	6.9	6.5	6.3	PF	PF	PF	22.4	14.8	24.1	26.9	18.8	15.0	11.4	10.7	11.5	11.1	26.9
20-Aug	10.7	10.0	9.6	11.3	12.1	11.6	12.2	14.4	16.0	16.7	PF	19.7	21.3	19.6	15.5	13.8	14.4	15.1	17.5	16.4	14.4	13.7	15.1	14.2	14.6	21.3
21-Aug	14.1	14.2	15.6	15.9	16.1	17.4	16.8	17.2	19.5	23.5	15.9	13.4	17.2	15.7	M	M	M	M	14.3	14.7	8.6	2.9	3.3	3.3	14.0	23.5
22-Aug	2.7	3.3	4.8	3.7	2.5	3.0	3.3	2.6	2.5	2.3	3.5	6.1	5.7	3.5	3.0	3.4	4.0	3.3	3.1	3.2	3.2	3.4	3.0	4.7	3.5	6.1
23-Aug	6.7	5.5	5.4	7.1	5.8	6.2	6.7	6.9	5.8	7.0	7.0	6.2	6.7	6.2	6.8	6.1	6.4	7.0	9.2	7.3	6.3	7.7	9.6	6.9	6.8	9.6
24-Aug	5.6	5.1	5.2	5.6	5.2	4.9	5.1	4.9	4.5	4.3	3.9	3.6	4.6	5.7	7.6	8.5	8.6	8.9	8.2	8.7	9.7	5.9	3.8	3.3	5.9	9.7
25-Aug	3.0	3.1	4.1	4.1	3.2	4.9	6.7	6.8	6.9	6.9	5.7	6.6	6.5	9.1	12.5	PF	19.6	20.6	17.8	15.2	12.3	11.7	10.9	9.7	9.0	20.6
26-Aug	9.4	9.5	9.7	10.2	10.6	10.5	10.7	10.4	10.5	10.9	9.8	9.0	11.0	22.1	18.8	9.2	7.1	4.3	5.0	6.1	7.6	8.7	8.2	8.9	9.9	22.1
27-Aug	10.7	12.1	10.2	10.4	11.3	12.7	12.3	11.4	9.9	9.4	7.3	7.1	8.9	9.0	11.6	14.2	16.3	12.0	9.6	11.4	19.1	14.1	9.1	8.8	11.2	19.1
28-Aug	9.3	6.7	4.5	5.5	5.0	4.0	3.4	4.9	3.6	5.0	6.9	6.0	6.5	8.1	8.9	8.6	7.5	6.9	PF	PF	PF	PF	PF	PF	6.2	9.3
29-Aug	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	--	--
30-Aug	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	--	--
31-Aug	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	--	--
	6.4	6.1	6.2	6.8	6.7	7.0	7.1	6.7	6.7	6.8	5.8	7.2	8.1	8.6	9.3	9.4	9.8	9.1	9.1	8.5	9.9	8.4	6.7	7.1	Diurnal Average	
	14.1	14.2	15.6	15.9	16.2	17.9	21.4	17.2	19.5	23.5	15.9	19.7	21.3	22.1	25.7	22.4	22.7	24.1	26.9	18.8	38.8	32.0	15.3	31.6	Diurnal Maximum	

C - Calibration M - Maintenance PF - Power Failure

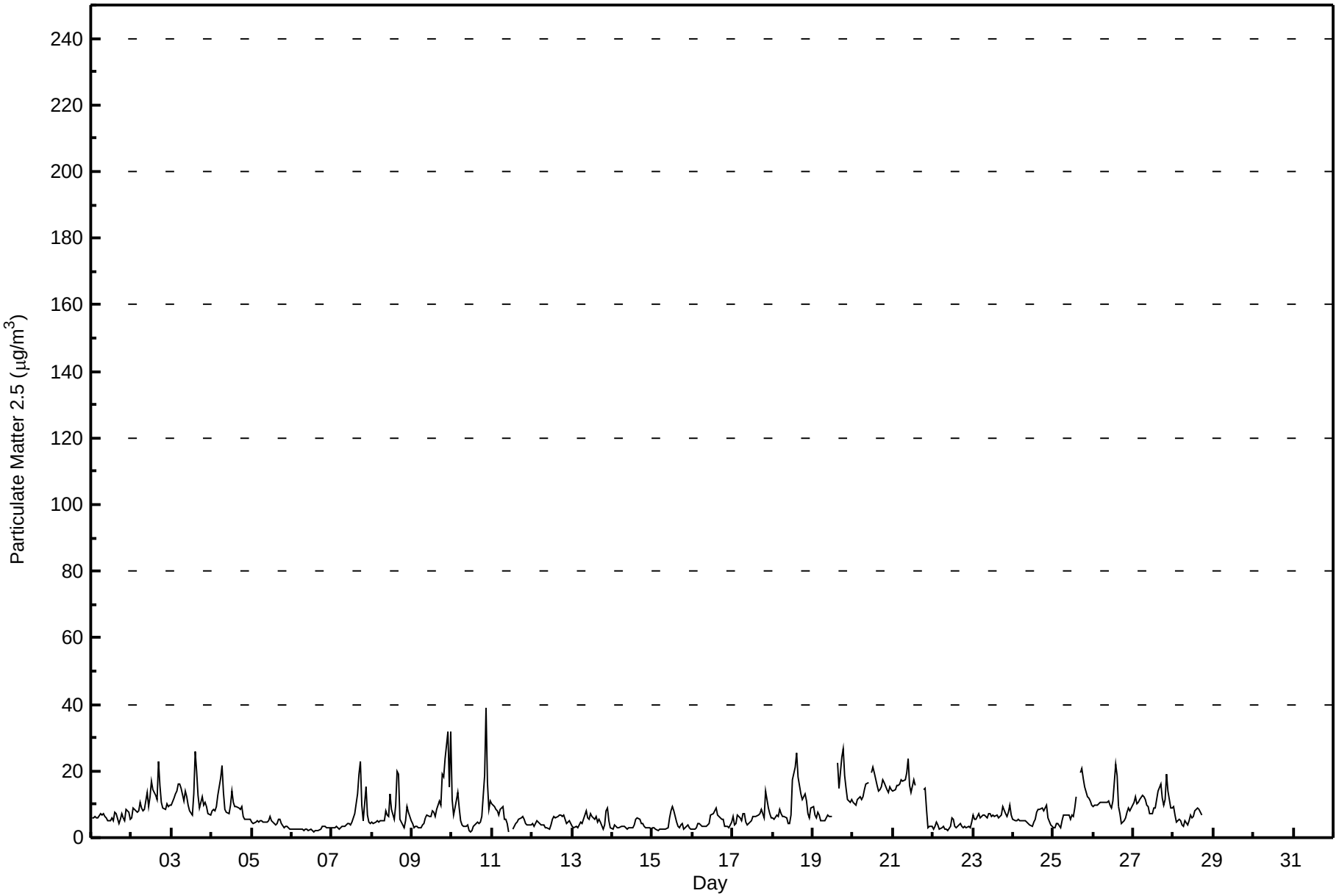
Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 $\mu g/m^3$

Wood Buffalo Environmental Association

Hourly Averages

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

Millennium - August 2015



Concentration Ranges ($\mu g/m^3$)	Number of Hours	%	Cumulative %
1 - 5	273	41.62	41.62
6 - 15	327	49.85	91.46
16 - 25	51	7.77	99.24
26 - 80	5	0.76	100.00
> 81.0	0	0.00	100.00

Total Number of Valid Hours: 656

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

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

Millennium - August 2015

Concentration Ranges ($\mu g/m^3$)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
1 - 5	21	3	3	4	8	26	42	15	15	21	24	24	29	17	11	10	273
6 - 15	23	10	7	4	3	21	24	35	45	35	17	28	25	19	16	14	326
16 - 25	6	0	0	0	0	2	4	0	4	9	1	4	8	8	4	1	51
26 - 80	0	0	0	0	0	1	1	1	1	0	0	0	0	1	0	0	5
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	50	13	10	8	11	50	71	51	65	65	42	56	62	45	31	25	655

Total Number of Valid Hours: 655

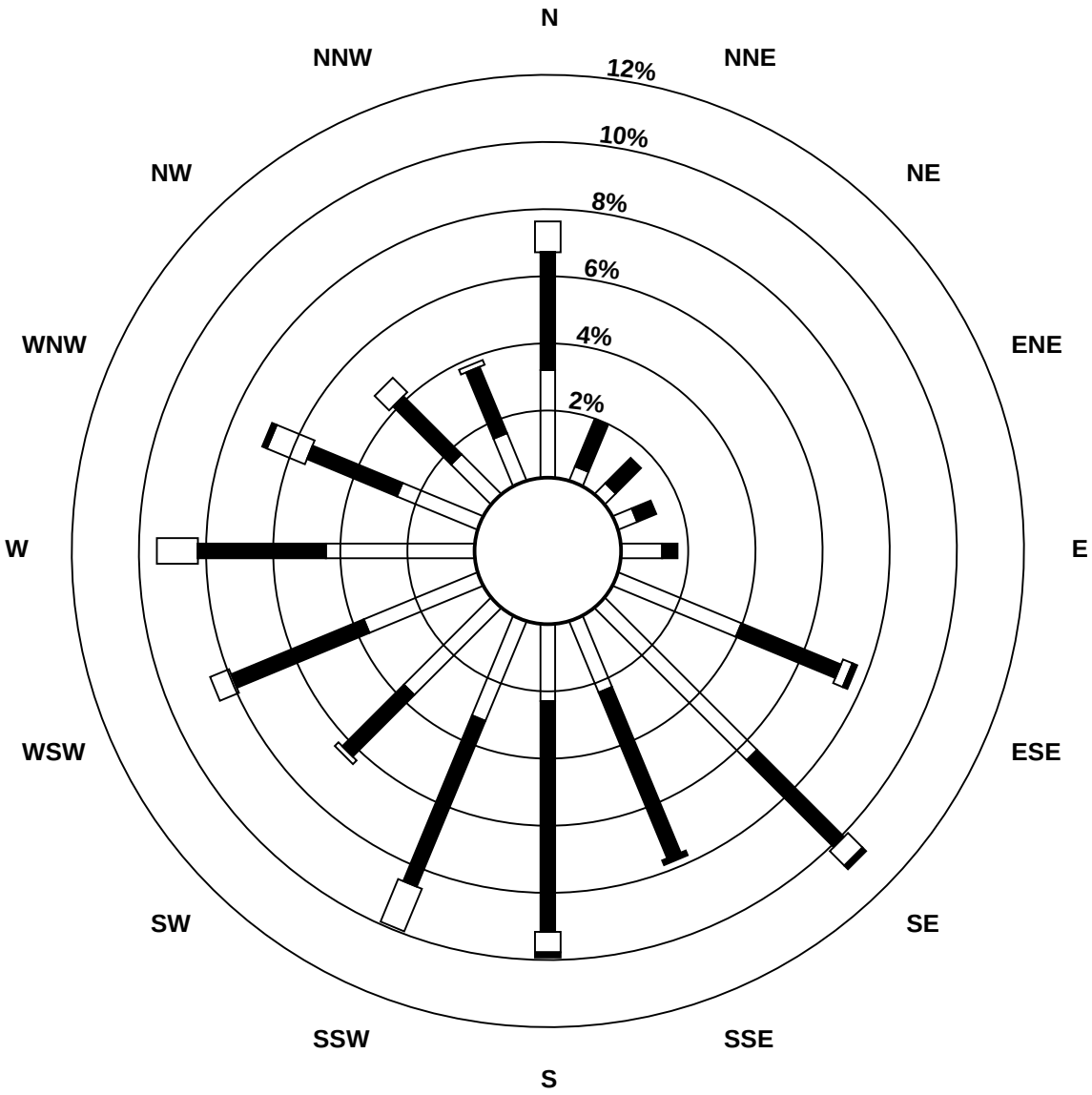
Total Number of Hours: 744

Wood Buffalo Environmental Association

Wind Rose Aug 2015

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

Millennium (AMS 12)



Classes ($\mu g/m^3$)

1 - 5

6 - 15

16 - 25

26 - 80

> 81.0

Total Number of Valid Hours: 655

Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

Millennium - August 2015

Maximum Value: 29.7 C on Aug 10 16:00

Maximum Daily Average: 23.5 C on Aug 10

Minimum Value: 4.8 C on Aug 23 05:00

Minimum Daily Average: 10.5 C on Aug 21

Maximum Diurnal Average: 22.3 C at hour 15

Minimum Diurnal Average: 12.7 C at hour 6

Monthly Average: 17.43 C

Percentiles: P_1 = 6.4 P_{10} = 11.6 Q_1 = 14.0 Median = 17.2 Q_3 = 21.1 P_{90} = 24.1 P_{99} = 28.2

Hours in Service:	744
Hours of Data:	666
Hours of Missing Data:	78
Hours of Calibration:	0
Percent Operational Time:	89.5

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	14.4	13.6	13.0	12.7	12.2	13.0	13.6	14.3	14.6	15.8	17.9	19.8	21.3	23.3	21.7	22.3	23.3	23.7	22.6	19.6	17.6	15.8	14.7	15.6	17.4	23.7
2-Aug	13.1	12.1	11.9	11.0	10.3	10.3	10.9	14.0	18.1	20.3	22.6	23.7	25.1	25.3	26.2	26.0	23.4	19.3	20.2	20.5	18.8	18.2	18.0	17.3	18.2	26.2
3-Aug	16.9	16.0	14.5	13.9	13.2	13.8	15.1	17.5	18.3	20.4	24.4	25.8	26.7	27.1	28.0	26.3	24.6	24.2	23.4	22.4	21.7	21.2	19.9	19.3	20.6	28.0
4-Aug	19.9	19.5	19.2	18.7	18.7	18.5	18.7	18.7	18.3	19.5	21.3	21.2	21.7	20.5	19.4	18.3	17.8	17.2	17.3	16.1	15.1	15.3	15.5	15.7	18.4	21.7
5-Aug	15.6	15.6	15.6	15.5	15.3	15.1	15.4	16.1	17.5	18.7	20.1	20.3	21.3	21.1	22.4	22.3	22.3	21.5	19.5	18.1	16.3	14.7	14.4	14.2	17.9	22.4
6-Aug	14.0	14.0	14.2	14.3	14.2	14.0	14.2	14.6	14.9	15.4	16.0	17.3	18.6	20.4	20.1	21.2	20.1	19.1	18.2	17.4	16.4	15.6	14.8	14.8	16.4	21.2
7-Aug	15.1	14.9	14.8	14.8	14.6	14.7	15.2	15.7	16.3	16.9	17.8	19.8	20.0	21.8	22.9	23.1	23.7	22.7	22.0	20.6	19.6	18.8	17.8	17.3	18.4	23.7
8-Aug	16.6	16.1	15.8	15.4	14.9	14.6	14.9	17.1	18.0	20.3	23.0	24.1	24.8	24.5	24.8	22.5	21.2	21.2	21.9	20.8	19.1	18.0	16.8	15.9	19.3	24.8
9-Aug	15.5	14.5	14.2	13.7	13.2	13.3	14.0	15.7	18.5	20.2	22.0	24.1	25.4	27.0	27.7	28.0	27.4	28.2	27.8	25.2	22.5	22.2	21.8	20.7	20.9	28.2
10-Aug	20.4	20.3	19.3	17.9	17.6	17.4	17.7	19.1	20.7	22.7	25.0	26.5	27.6	28.4	29.5	29.7	29.6	29.6	28.7	26.8	24.2	23.4	21.5	21.0	23.5	29.7
11-Aug	19.6	18.7	18.0	17.6	17.6	17.9	16.6	16.6	19.2	22.6	25.3	26.7	27.0	27.7	27.5	27.6	27.1	26.8	25.5	24.6	23.7	22.1	20.5	18.3	22.3	27.7
12-Aug	17.1	17.3	17.1	16.1	15.9	16.1	17.1	18.9	20.6	21.2	22.6	23.9	24.5	25.7	26.4	26.7	26.7	26.5	25.8	24.2	21.8	19.7	18.6	18.1	21.2	26.7
13-Aug	16.6	16.0	15.6	14.8	13.7	14.6	15.7	16.9	19.0	19.6	20.4	22.0	23.7	23.8	22.7	20.3	20.5	23.0	24.1	22.9	21.1	18.9	18.6	17.4	19.3	24.1
14-Aug	18.3	17.0	15.5	15.2	14.0	13.1	13.4	15.0	16.8	17.7	17.8	19.0	19.9	20.3	20.7	21.1	20.0	19.2	18.3	17.1	15.9	14.6	14.3	14.1	17.0	21.1
15-Aug	13.9	13.5	13.5	13.5	13.0	12.1	12.7	12.8	13.5	14.1	15.0	16.1	16.9	17.6	17.8	17.5	17.3	17.2	16.8	16.2	15.7	15.0	14.6	13.7	15.0	17.8
16-Aug	13.3	13.2	12.9	12.8	12.7	12.0	11.8	11.6	12.7	14.4	15.5	15.9	15.9	18.4	19.8	20.1	19.0	19.0	18.4	17.1	14.6	13.5	12.5	11.5	14.9	20.1
17-Aug	11.9	12.2	11.2	9.9	8.7	8.4	9.6	11.5	13.5	16.8	19.8	21.6	22.9	23.5	23.8	24.3	23.5	21.4	20.2	18.6	17.2	16.6	15.7	14.2	16.5	24.3
18-Aug	13.2	12.3	13.0	14.1	12.8	12.2	12.4	13.6	14.9	16.7	18.7	20.2	20.9	21.7	22.4	23.5	21.8	23.1	22.0	20.3	18.7	18.0	17.2	16.5	17.5	23.5
19-Aug	16.3	16.1	16.3	16.4	16.8	17.0	17.1	17.2	18.1	20.3	21.5	22.7	23.8	22.7	24.3	24.3	22.4	21.6	19.6	18.1	16.8	15.6	14.8	14.5	18.9	24.3
20-Aug	13.9	13.3	13.3	12.1	12.0	12.2	12.4	13.0	12.9	13.2	13.6	14.0	14.0	13.7	13.2	13.3	14.4	14.4	14.1	13.7	13.3	12.8	12.5	11.2	13.2	14.4
21-Aug	10.1	9.5	8.5	7.8	7.3	7.4	8.4	9.1	9.1	10.2	11.0	11.1	11.3	12.4	12.9	12.8	12.7	12.5	11.7	12.1	11.7	11.5	11.0	10.4	10.5	12.9
22-Aug	9.8	9.7	9.2	8.5	7.7	7.8	7.7	7.9	8.3	9.2	10.5	11.4	12.5	13.0	14.6	15.1	15.1	15.2	14.9	12.5	10.6	9.5	8.4	7.6	10.7	15.2
23-Aug	6.8	5.7	5.3	5.2	4.8	5.9	5.8	6.8	10.0	13.8	17.1	18.9	21.4	21.1	22.9	23.7	24.1	23.5	21.7	20.0	19.1	18.3	17.9	16.1	14.8	24.1
24-Aug	14.9	14.3	13.5	12.9	12.5	12.2	12.0	13.7	15.6	17.4	19.1	20.6	21.7	23.1	23.3	23.6	23.5	23.2	22.2	20.3	19.1	17.6	15.6	14.6	17.8	23.6
25-Aug	13.2	10.7	10.7	9.6	8.7	8.5	9.6	10.7	12.8	16.0	19.4	21.2	22.3	21.3	20.2	19.9	20.0	19.2	18.5	17.7	17.1	16.1	16.1	15.3	15.6	22.3
26-Aug	14.3	13.7	12.7	11.7	11.8	11.5	11.9	12.9	14.2	14.7	15.6	16.7	17.6	18.5	18.6	19.0	19.2	19.3	18.1	16.6	15.6	14.8	14.0	12.8	15.2	19.3
27-Aug	11.8	11.3	10.7	10.2	9.3	9.1	9.4	12.0	15.2	18.1	20.7	22.3	23.6	24.6	25.0	25.3	25.6	25.5	24.6	22.1	19.7	18.8	17.8	16.3	17.9	25.6
28-Aug	15.2	14.5	14.6	13.9	13.4	13.1	14.6	15.7	18.4	20.1	21.3	22.8	24.1	23.9	24.2	24.6	25.2	24.9	PF	PF	PF	PF	PF	PF	19.1	25.2
29-Aug	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	--	--
30-Aug	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	--	--
31-Aug	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	--	--
	14.7	14.1	13.7	13.2	12.7	12.7	13.1	14.2	15.7	17.4	19.1	20.3	21.3	21.9	22.3	22.2	21.8	21.5	20.7	19.3	17.9	16.9	16.1	15.3	Diurnal Average	
	20.4	20.3	19.3	18.7	18.7	18.5	18.7	19.1	20.7	22.7	25.3	26.7	27.6	28.4	29.5	29.7	29.6	29.6	28.7	26.8	24.2	23.4	21.8	21.0	Diurnal Maximum	

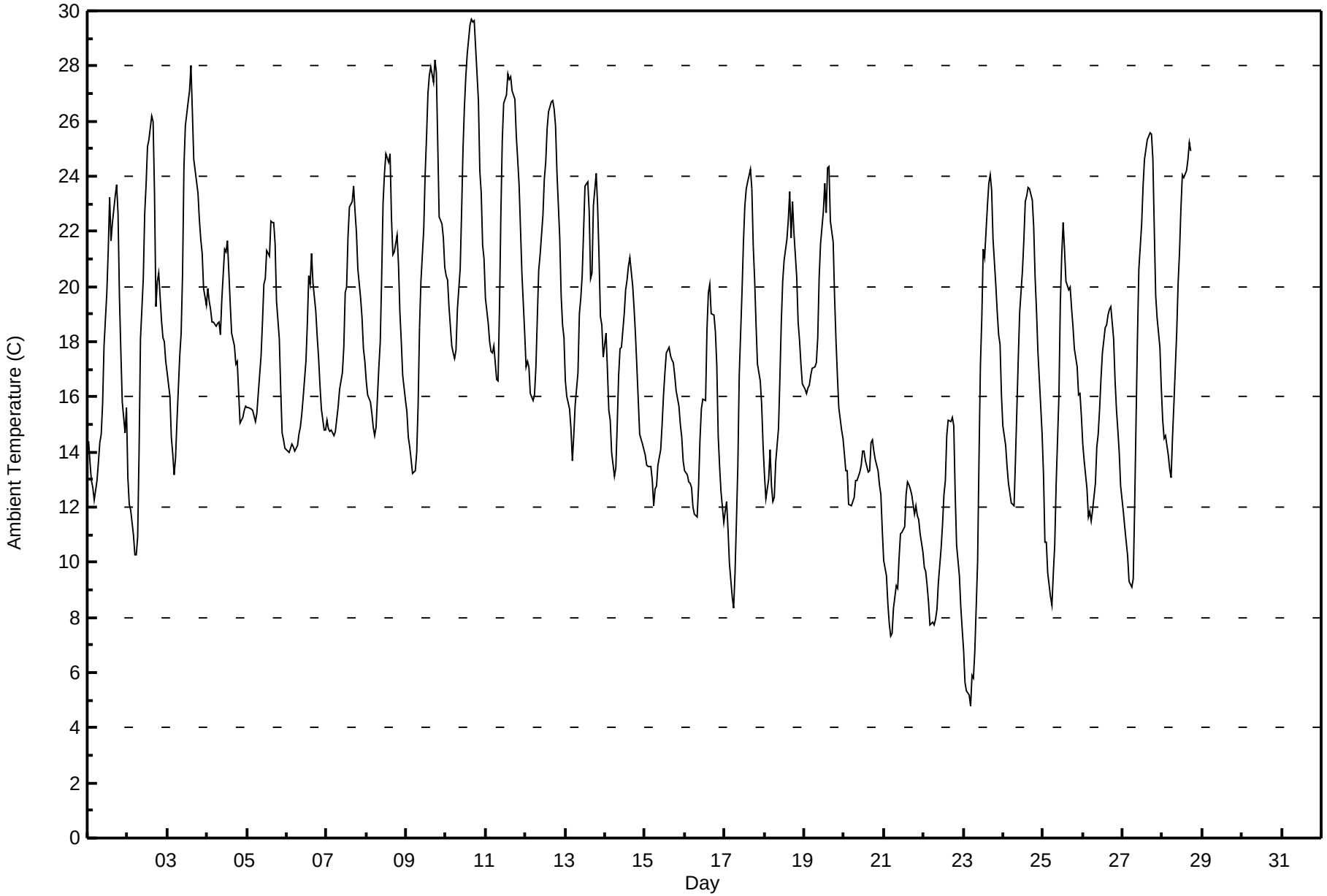
PF - Power Failure

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature (AT) - C

Millennium - August 2015



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	40	6.01	6.01
10 - 20	420	63.06	69.07
> 20	206	30.93	100.00

Total Number of Valid Hours: 666

Total Number of Hours: 744

Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Millennium - August 2015

Maximum Value: 99 % on Aug 1 06:00

Maximum Daily Average: 84.9 % on Aug 6

Minimum Value: 27 % on Aug 10 18:00

Minimum Daily Average: 48.4 % on Aug 12

Maximum Diurnal Average: 85.0 % at hour 6

Minimum Diurnal Average: 45.4 % at hour 15

Monthly Average: 65.8 %

Percentiles: P_1 = 29 P_{10} = 38 Q_1 = 51 Median = 67 Q_3 = 80 P_{90} = 93 P_{99} = 98

Hours in Service:	744
Hours of Data:	666
Hours of Missing Data:	78
Hours of Calibration:	0
Percent Operational Time:	89.5

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	92	95	97	98	98	99	97	94	92	84	70	63	57	47	52	49	44	42	46	62	67	78	85	78	74.4	99
2-Aug	88	93	95	97	98	98	99	87	69	59	49	44	40	38	36	35	45	68	61	57	66	74	76	79	68.8	99
3-Aug	80	81	91	95	96	94	85	72	73	64	50	45	44	42	41	48	53	54	57	59	61	64	70	70	66.3	96
4-Aug	67	70	69	64	57	54	53	55	60	58	57	57	57	61	69	79	85	91	92	94	95	96	96	94	72.1	96
5-Aug	93	93	93	94	94	95	93	91	84	77	71	70	65	62	57	55	54	55	67	72	84	96	97	97	79.6	97
6-Aug	97	95	94	92	93	94	93	92	92	91	90	87	80	72	71	67	68	71	74	78	82	86	90	90	84.9	97
7-Aug	90	93	93	93	94	93	91	90	86	83	80	74	71	64	56	53	51	57	59	64	70	73	79	79	76.5	94
8-Aug	81	82	83	85	86	88	87	79	77	69	59	54	48	46	46	57	61	67	67	68	70	77	84	88	71.3	88
9-Aug	90	94	95	96	96	96	94	87	76	72	66	57	52	44	38	36	36	35	39	46	57	57	59	65	65.9	96
10-Aug	67	65	67	75	77	78	80	74	69	62	52	44	38	35	30	28	27	27	30	37	44	49	55	57	52.7	80
11-Aug	64	68	72	76	77	78	91	93	78	62	43	33	31	30	29	31	33	31	34	35	34	38	43	51	52.2	93
12-Aug	57	54	54	62	64	63	60	55	50	49	46	41	39	35	33	33	32	33	35	41	48	57	61	61	48.4	64
13-Aug	67	69	77	82	86	83	80	75	69	70	68	64	60	60	60	66	67	58	48	50	54	62	64	69	67.1	86
14-Aug	61	67	72	71	74	78	79	73	66	62	59	54	49	44	42	40	42	43	49	53	57	64	66	68	59.8	79
15-Aug	70	74	76	76	80	90	89	88	82	74	65	54	49	45	46	49	51	51	55	58	60	64	68	75	66.2	90
16-Aug	77	80	81	81	82	87	93	95	91	81	73	66	60	44	40	38	42	40	44	47	59	66	68	72	66.8	95
17-Aug	71	70	72	80	86	86	80	73	68	57	46	36	33	30	30	30	33	40	44	48	55	58	65	72	56.8	86
18-Aug	77	80	78	70	76	78	77	74	71	66	58	51	46	43	39	37	42	39	42	47	54	58	61	62	59.5	80
19-Aug	62	61	60	60	61	62	64	65	62	56	53	49	46	51	34	34	37	40	46	53	58	64	68	72	54.9	72
20-Aug	73	76	74	80	80	78	71	69	69	68	69	66	65	69	74	72	61	61	63	63	66	68	69	75	69.9	80
21-Aug	79	81	84	86	87	87	82	79	87	81	75	75	76	66	64	67	70	70	74	69	70	70	70	73	75.9	87
22-Aug	77	76	78	81	86	85	90	91	90	85	73	66	60	56	47	45	45	44	48	60	66	75	79	81	70.2	91
23-Aug	85	90	91	89	90	85	89	87	75	60	49	40	36	37	33	32	32	33	39	44	48	49	52	64	59.5	91
24-Aug	71	76	86	95	97	96	98	91	84	77	65	55	44	31	34	32	29	30	32	38	42	50	58	67	61.6	98
25-Aug	73	84	85	89	94	96	93	88	79	67	54	51	43	42	48	52	50	55	58	63	66	72	72	74	68.8	96
26-Aug	81	83	88	94	92	93	90	87	81	81	72	66	61	57	54	53	54	54	61	69	75	80	84	90	74.9	94
27-Aug	94	97	98	98	98	98	99	93	78	67	54	47	45	39	36	34	36	36	35	40	48	49	53	56	63.7	99
28-Aug	61	64	62	64	68	69	64	62	53	47	44	38	32	31	30	29	29	30	PF	PF	PF	PF	PF	PF	48.6	69
29-Aug	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	--	--
30-Aug	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	--	--
31-Aug	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	--	--
	76.7	78.9	80.9	82.9	84.6	85.0	84.3	80.7	75.4	68.8	61.2	55.3	51.0	47.2	45.4	45.6	46.7	48.4	51.8	56.1	61.4	66.5	70.1	73.3	Diurnal Average	
	97	97	98	98	98	99	99	95	92	91	90	87	80	72	74	79	85	91	92	94	95	96	97	97	Diurnal Maximum	

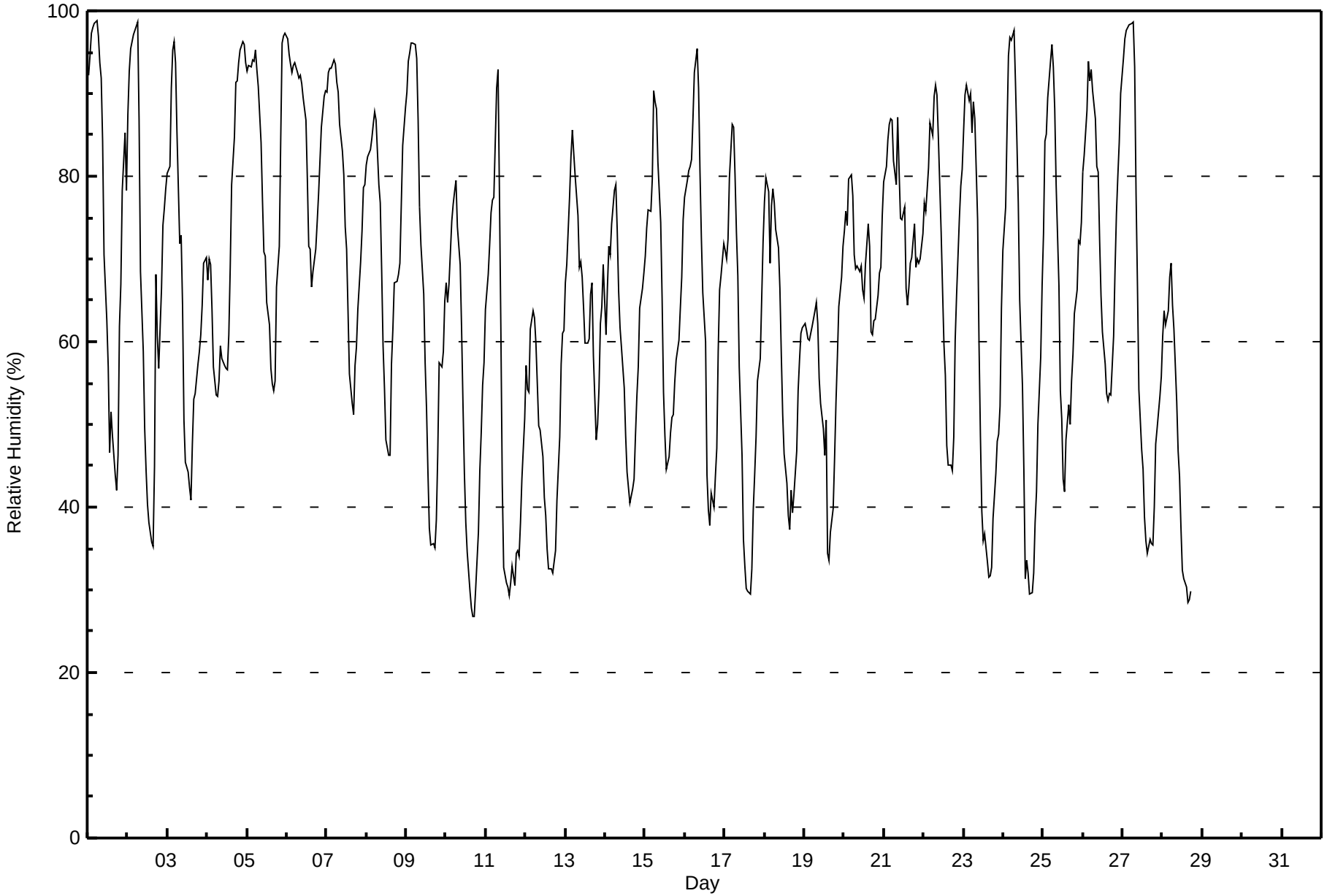
PF - Power Failure

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity (RH) - %

Millennium - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Millennium - August 2015

Maximum Speed: 22 km/h on Aug 15 13:00

Maximum Daily Speed Average: 13.4 km/h on Aug 15

Minimum Speed Value: 0 km/h on Aug 7 07:00

Minimum Daily Speed Average: 1.4 km/h on Aug 18

Maximum Diurnal Speed Average: 4.0 km/h at hour 16

Minimum Diurnal Speed Average: 1.0 km/h at hour 1

Monthly Average Velocity: 2.0 km/h 229.5 deg

Percentiles: $P_1 = 1$ $P_{10} = 3$ $Q_1 = 5$ Median = 7 $Q_3 = 10$ $P_{90} = 13$ $P_{99} = 18$

Hours in Service: 744

Hours of Data: 665

Hours of Missing Data: 79

Percent Operational Time: 89.4

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	N6	ENE2	W2	SSW1	WSW4	N6	N8	NNW5	NW4	NW6	NNW6	NNW7	NW8	NNW10	N12	NNW8	NW9	NW8	NNE6	SE6	SE5	E2	AF	N5	NNW4.2	N12
2-Aug	NNE1	SW2	SW4	SW6	SSW4	SSW4	SW5	S4	S6	S6	SSE6	SSE5	SE6	SSE6	SE5	SSE3	WSW7	N13	NE13	SE3	WSW4	NNW3	NE4	NNW1	S1.7	NE13
3-Aug	NE3	SE1	SSW3	SSW1	SSW3	SSW2	ESE2	ESE3	WNW2	NNE3	ESE4	S7	S9	S10	SSE9	S11	S8	SE5	ENE7	ESE6	E5	SE8	SE6	SE6	SE3.9	S11
4-Aug	SE8	SE6	ESE8	ESE9	ESE12	ESE10	ESE8	ESE9	ESE9	ESE8	ESE7	ESE8	E8	ESE11	ESE11	ESE9	ESE11	SE12	ESE12	SE15	SE11	SE10	ESE8	ESE7	ESE9.3	SE15
5-Aug	ESE6	SE7	ESE7	E4	NE5	NE5	E6	ESE5	SE8	SE9	SSE6	SW4	ESE3	SE6	SE9	SE9	SE11	SE15	SE15	SSE11	SE12	SE12	SE11	SE10	SE7.5	SE15
6-Aug	SE11	SE14	ESE11	ESE10	ESE10	ESE13	SE13	ESE14	SE12	ESE11	SE12	ESE11	ESE12	ESE11	ESE11	ESE10	ESE11	ESE10	ESE11	SE9	SE9	SE8	SE6	E5	ESE10.5	SE14
7-Aug	ESE7	SE6	SE6	E4	ENE3	E3	NNE0	WNW3	WSW3	W3	ENE4	ESE7	E6	ESE6	S4	S4	S6	SE6	ESE7	SE7	SE9	SSE7	SSE6	SE11	SE4.1	SE11
8-Aug	SE11	SE10	SE9	SE9	SE9	SE8	SE7	SE6	SSE5	SSE6	SSE6	SSE6	S4	W3	N7	SSW9	SSW9	SW5	SE2	ESE7	ESE12	SE9	SSE4	SE5	SSE5.6	ESE12
9-Aug	NE4	ENE4	ESE4	E4	SE4	SSE1	SSW3	SW4	ENE2	WNW4	N6	N6	N6	ESE3	SSW5	NNE3	NNE6	S4	S2	SE4	SE3	ESE6	ESE8	SE6	E1.7	ESE8
10-Aug	SSW5	NW6	NNW1	SSW5	SSW8	WNW7	W5	SSW6	SSW5	SSW6	SW7	SW8	WSW9	SW11	WSW13	WSW10	WSW9	SW10	SW9	SSW7	S7	SSW8	S6	SSW8	SW6.3	WSW13
11-Aug	SSW9	S7	SSE5	SSE6	SSE4	S4	SE6	S6	S7	SSW7	SW11	WSW16	WSW15	WSW14	WSW18	WSW14	WSW14	WSW15	WSW8	SW8	SW11	SW8	SW6	SW3	SW7.9	WSW18
12-Aug	ENE1	SW5	SW5	S4	SSE3	SSW5	SW5	WSW5	WSW8	WSW9	WSW9	WSW11	W11	W11	W11	WSW11	W12	W11	W11	WSW7	SW6	SSW5	SSW3	WSW4	WSW6.5	W12
13-Aug	SSW3	SSW3	SSE4	S5	SSW6	S4	S3	SSW6	SSW5	SSE6	S7	S5	S5	WNW6	WNW9	WSW8	SSW9	SSW7	WSW8	WSW8	SW5	SSW7	SSW8	SSW8	SSW4.9	WNW9
14-Aug	W9	W6	WNW4	WNW6	W7	WSW9	W9	W9	W10	W14	W13	W14	W14	W15	WNW13	WNW16	WNW17	WNW15	WNW13	WNW13	WNW13	WNW11	W9	W10	W11.1	WNW17
15-Aug	WNW11	NW8	NW13	NW11	NNW11	N12	NNW11	N15	N17	N21	N18	N21	N22	N19	N18	N16	N14	N15	N12	N10	N11	N11	N11	NNE11	N13.4	N22
16-Aug	N10	N9	NNW5	N7	NNW5	WSW4	SW4	SW4	S2	SSW4	N2	NNW7	N6	N9	WNW9	WNW8	NNW4	W7	WSW5	WSW5	WSW2	SW4	SW5	SSW3	WNW3.1	N10
17-Aug	SSW4	SSW4	SSW4	S4	S4	S4	SSW5	SSW6	S6	SSE7	S7	SSW10	S9	SW6	SSW9	S5	SSW10	SW8	SSW9	SSW8	SW1	S4	S5	SSW5	SSW5.8	SSW10
18-Aug	SW7	W4	N7	N14	NNW8	NNW6	NW5	NW6	NW5	NW5	WNW4	NNW6	N6	NNW6	N3	S6	SSW7	SSE5	SSE5	S5	SSE7	S7	S7	S8	WNW1.4	N14
19-Aug	S8	S9	SSE10	S14	SSE12	SSE10	SSE10	SSE10	S11	S12	SW11	WSW11	WSW11	W11	W17	W17	WSW15	W13	WNW15	WNW15	WNW12	W10	W8	WSW7	SW7.6	W17
20-Aug	WSW7	WSW7	WSW7	SW7	WSW8	W10	W10	W12	W14	W14	W11	W15	WNW15	WNW12	WNW12	WNW11	WNW13	WNW13	WNW12	WNW13	W9	W8	WNW11	W8	W10.4	W15
21-Aug	W7	W7	WSW8	WSW7	WSW6	SW6	W8	W10	WNW9	NW10	NW12	NW10	NW9	NW11	NNW13	NW11	NW11	NW11	NW9	NW10	NW9	NW13	NW14	NW10	WNW8.5	NW14
22-Aug	WNW9	WNW9	W8	W7	WSW6	W8	W8	W9	W9	W9	WNW11	WNW10	NW9	W6	NNW9	N11	N10	N8	NNE5	E3	SE5	SSE4	SE5	S4	WNW4.9	WNW11
23-Aug	SSE4	SSE4	SSE6	SE6	SE5	SSE5	S5	SSW5	S5	S6	S7	SSW10	SSE9	SSE8	SSE8	SSE9	SSE9	SSE9	SE9	SE12	SE12	SE13	N6	NE5	SSE6.4	SE13
24-Aug	SSE1	SW6	W3	SSE7	SE7	SSW5	S7	S7	S9	S9	SW7	WSW6	W5	WSW10	WNW11	WNW9	W9	W8	W7	W5	W4	NW5	W4	NW7	WSW4.1	WNW11
25-Aug	NNW4	NNW3	N3	W5	WNW3	NW2	WSW3	WSW3	NW3	NNW5	WNW6	NW9	NNW8	N7	N14	N14	N14	N10	N9	NNE7	NNE7	WNW3	N7	NNE12	NNW5.7	N14
26-Aug	NNE13	N7	N6	NE4	N8	NE4	NE6	ENE5	N3	WNW5	NW4	NNW5	WSW3	W5	WNW2	WSW4	WNW4	SW3	SW5	SW5	SW5	SSW6	SW7	SSW4	NW1.7	NNE13
27-Aug	S3	SSW3	S3	SSW4	SSW5	S5	S5	SSE5	SSE6	SSE6	S9	S10	S10	SSW11	SSW12	SSW15	SSW14	SW12	WSW8	SSW8	SSW8	SSW9	S7	S5	SSW7.2	SSW15
28-Aug	SE4	SE4	SE4	SE5	SE5	SSE4	SSE4	S6	SW6	SW10	WSW13	WSW13	WSW12	WSW14	W13	W12	WSW11	WSW8	PF	PF	PF	PF	PF	PF	SW6.2	WSW14
29-Aug	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	----	----
30-Aug	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	----	----
31-Aug	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	----	----
	SSW1.0	SSW1.6	S1.3	S1.7	S1.8	SSW1.6	SSW1.7	SSW2.3	SSW2.4	SW2.8	WSW2.9	WSW3.4	W2.7	W3.4	W3.8	W4.0	WSW3.9	W3.2	WSW1.6	SSW2.2	S2.4	S2.6	SSW1.7	S1.3	Diurnal Average	
	NNE13	SE14	NW13	S14	SSE12	ESE13	SE13	N15	N17	N21	N18	N21	N22	N19	N18	W17	WNW17	WNW15	SE15	WNW15	WNW13	NW13	NW14	NNE12	Diurnal Maximum	

AF - Analyzer Failure PF - Power Failure

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

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Speed (WS) - km/h

Millennium - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 7 km/h on Aug 11 15:00

Minimum Value: 1 km/h on Aug 17 00:00

Percentiles: $P_1 = 1$ $P_{10} = 1$ $Q_1 = 2$ Median = 3 $Q_3 = 4$ $P_{90} = 4$ $P_{99} = 6$

Hours in Service:	744
Hours of Data:	665
Hours of Missing Data:	79
Hours of Calibration:	0
Percent Operational Time:	89.4

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

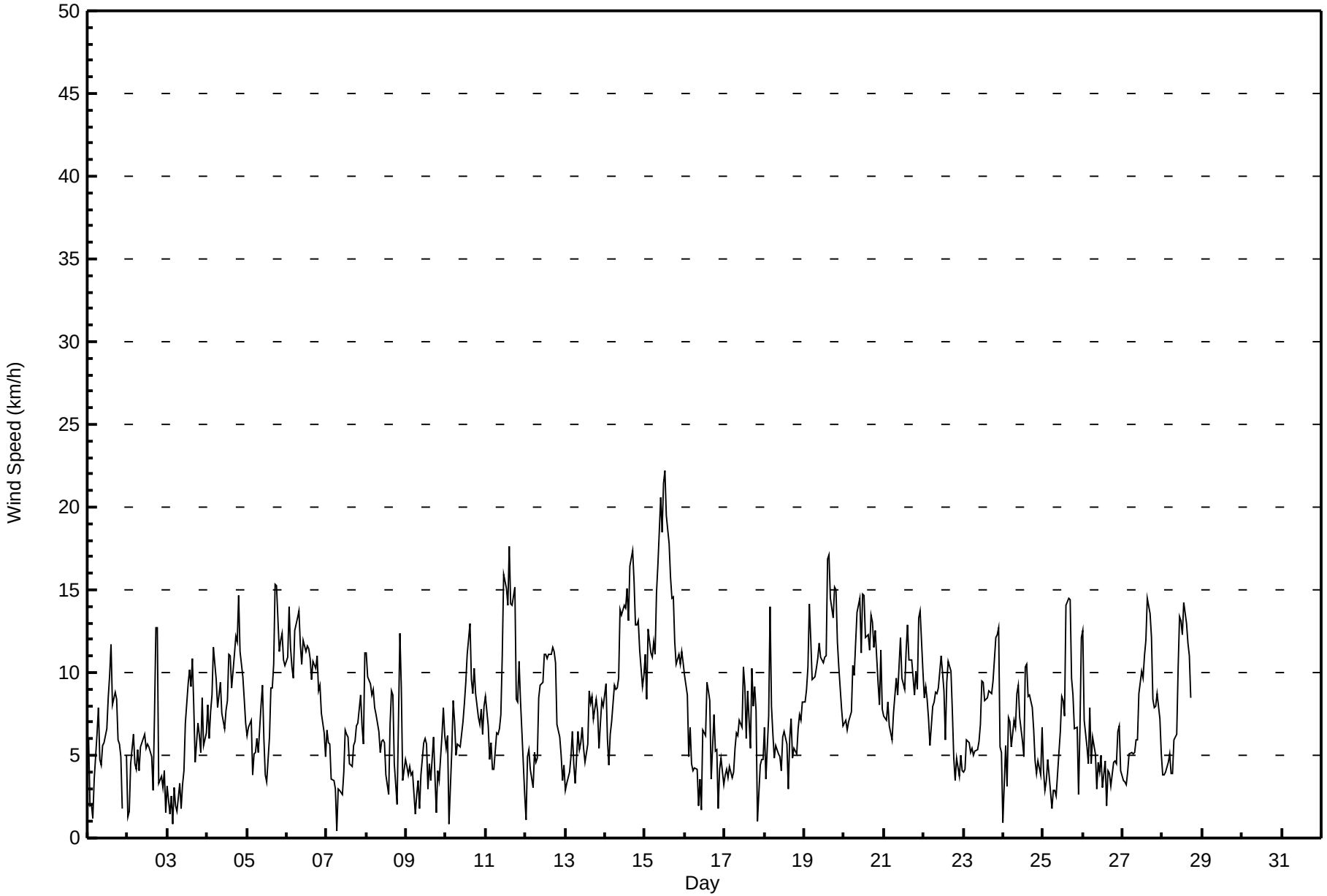
AF - Analyzer Failure PF - Power Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed (WS) - km/h

Millennium - August 2015



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	211	31.73	31.73
6 - 11	356	53.53	85.26
12 - 19	95	14.29	99.55
20 - 28	3	0.45	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 665

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Wind Speed (WS) - km/h

Millennium - August 2015

Wind Speed Ranges (km/h)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 5	5	5	8	7	8	7	17	20	29	31	20	13	12	10	8	11	211
6 - 11	27	6	1	1	3	36	43	29	34	31	21	32	38	18	22	14	356
12 - 19	16	2	1	0	0	7	11	2	2	3	1	13	15	17	4	1	95
20 - 28	3	0	0	0	0	0	0	0	0	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	51	13	10	8	11	50	71	51	65	65	42	58	65	45	34	26	665

Total Number of Valid Hours: 665

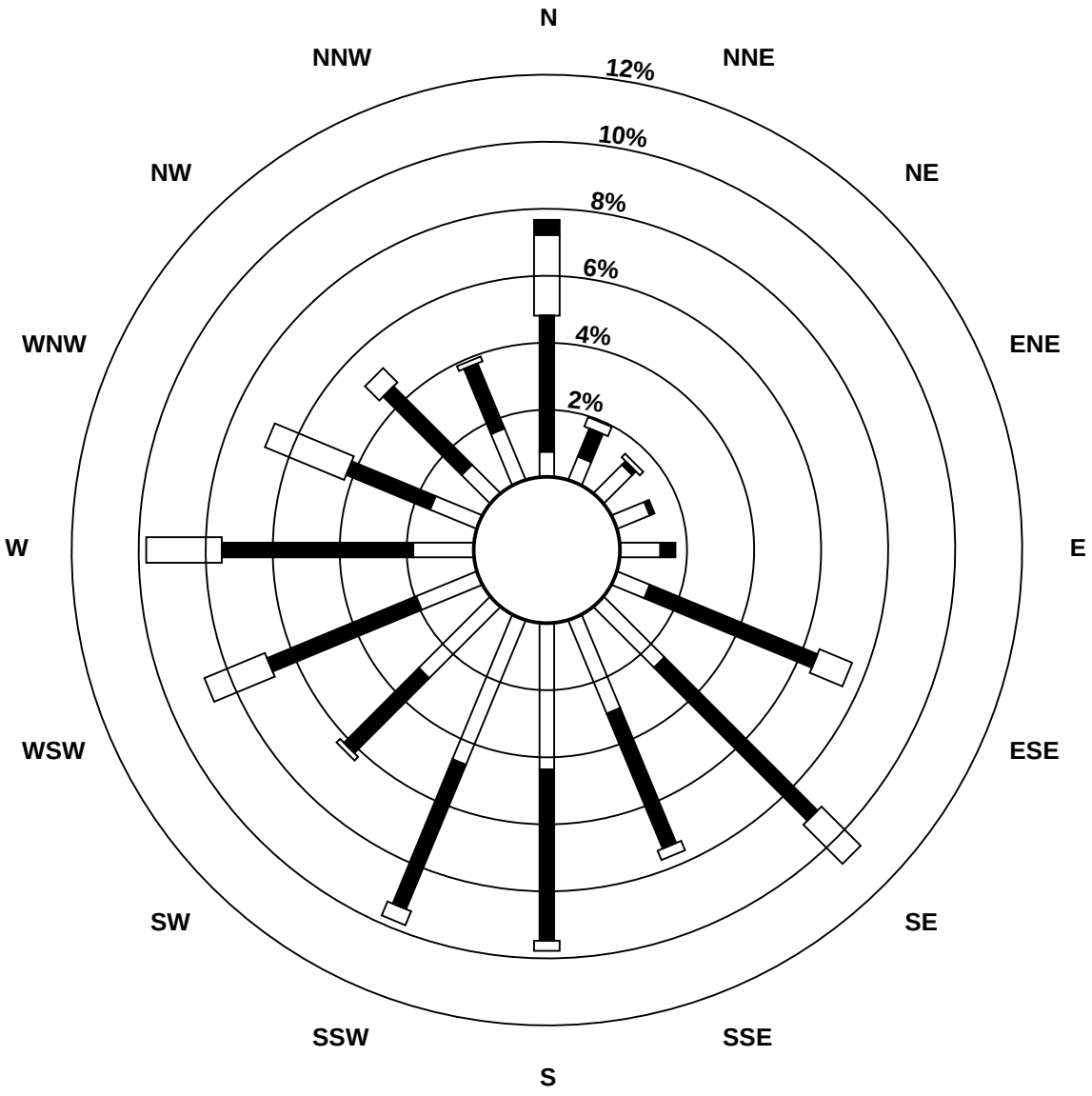
Total Number of Hours: 744

Wood Buffalo Environmental Association

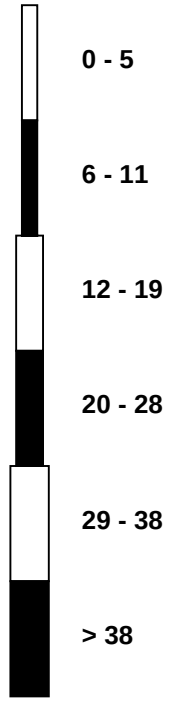
Wind Rose Aug 2015

Wind Speed (WS) - km/h

Millennium (AMS 12)



Classes (km/h)



Total Number of Valid Hours: 665

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Millennium - August 2015

Direction of Maximum Speed: 8 deg on Aug 15 13:00
Direction of Maximum Daily Speed Average: 353.5 deg on Aug 15

Direction of Minimum Speed: 18 deg on Aug 7 07:00

Direction of Minimum Daily Speed Average: 1.4 deg on Aug 18

Monthly Average Direction: 248.9 deg

Hours in Service:	744
Hours of Data:	665
Hours of Missing Data:	79
Percent Operational Time:	89.4

Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average
1-Aug	358	58	277	195	242	356	11	334	318	310	329	346	315	327	351	328	320	322	28	131	124	98	AF	359	340.4
2-Aug	23	228	216	216	209	205	216	187	175	184	159	163	128	165	130	154	242	0	52	124	249	336	36	332	175.1
3-Aug	47	136	206	192	209	204	123	120	291	30	114	174	174	172	161	180	170	127	78	111	91	125	128	130	145.4
4-Aug	131	128	106	117	117	114	118	118	123	104	107	109	99	118	114	107	122	129	123	136	131	125	121	109	118.9
5-Aug	118	133	102	88	40	54	97	109	125	134	159	218	114	137	124	127	127	131	146	154	143	127	129	128	127.7
6-Aug	126	125	119	110	112	119	124	122	124	122	130	119	117	118	117	123	109	114	122	124	129	126	124	99	120.2
7-Aug	122	125	134	100	67	84	18	284	250	264	71	122	94	118	170	183	183	133	112	139	133	156	155	135	132.9
8-Aug	139	145	138	133	137	137	138	136	153	160	155	159	175	263	7	200	205	226	146	102	123	131	160	128	146.4
9-Aug	50	66	110	92	130	156	202	219	69	301	358	350	10	117	196	33	18	178	186	142	126	116	123	140	98.0
10-Aug	206	309	348	200	213	297	268	192	194	200	230	218	244	232	237	250	249	233	230	199	189	195	177	194	224.7
11-Aug	197	186	162	149	150	175	142	180	184	200	235	243	246	247	246	249	250	258	251	233	234	233	234	215	227.6
12-Aug	62	232	219	172	164	205	231	255	254	249	255	254	268	273	263	251	260	270	266	250	219	205	201	237	248.2
13-Aug	213	196	155	188	198	169	174	202	194	166	175	188	184	294	301	254	208	207	256	238	224	198	199	200	209.8
14-Aug	263	273	295	294	274	254	274	276	264	266	267	266	273	276	284	283	290	291	288	297	298	291	273	280	279.2
15-Aug	296	305	321	318	328	353	348	356	359	1	2	8	8	11	360	357	353	359	352	352	354	5	1	13	353.5
16-Aug	5	355	335	356	331	243	234	222	190	201	3	338	349	353	287	303	331	264	250	256	252	218	225	196	301.9
17-Aug	204	204	193	186	173	175	197	201	187	164	180	199	187	230	199	189	194	216	205	211	219	172	170	211	194.9
18-Aug	228	261	359	1	346	330	310	315	321	310	302	345	358	344	353	180	207	158	158	187	168	170	173	173	288.4
19-Aug	170	169	168	174	168	162	157	163	171	185	218	242	253	265	276	275	254	267	289	289	282	275	271	256	232.4
20-Aug	257	255	256	236	249	261	280	277	271	274	272	275	282	288	283	294	302	299	300	296	277	279	293	265	278.7
21-Aug	264	259	247	245	237	221	261	278	284	305	318	324	323	323	329	308	307	321	305	318	304	314	314	305	299.5
22-Aug	284	284	275	266	258	275	274	274	274	277	289	299	322	277	330	349	354	356	24	88	139	157	139	173	294.9
23-Aug	164	160	147	143	144	168	172	202	171	185	176	198	155	167	164	166	164	163	145	140	146	145	360	56	158.3
24-Aug	151	222	260	147	142	208	182	184	176	177	214	252	270	248	291	282	279	275	264	272	281	307	266	321	239.8
25-Aug	345	336	355	277	294	307	241	249	318	329	298	316	329	351	3	11	3	356	358	14	27	293	358	18	347.8
26-Aug	16	350	349	54	2	39	35	63	8	298	315	336	241	277	301	250	300	228	214	215	216	211	214	197	318.6
27-Aug	190	206	186	206	194	185	190	164	161	162	180	175	186	204	207	211	206	228	240	209	194	195	188	183	196.9
28-Aug	146	131	144	138	137	150	162	188	220	235	238	242	256	246	267	259	240	258	PF	PF	PF	PF	PF	PF	230.3
29-Aug	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	--
30-Aug	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	--
31-Aug	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	--
	193.7	202.9	182.8	170.7	180.0	195.5	199.3	208.4	211.2	229.5	241.4	253.8	266.8	262.8	277.7	261.3	255.7	262.4	249.8	205.5	186.1	186.0	199.7	179.9	

Diurnal Average

AF - Analyzer Failure PF - Power Failure

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 96 deg on Aug 16 11:00

Minimum Value: 10 deg on Aug 26 23:00

Percentiles: P_1 = 12 P_{10} = 18 Q_1 = 22 Median = 29 Q_3 = 35 P_{90} = 53 P_{99} = 87

Hours in Service:	744
Hours of Data:	665
Hours of Missing Data:	79
Hours of Calibration:	0
Percent Operational Time:	89.4

Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Aug	39	77	52	73	24	23	19	32	33	34	39	39	36	34	27	34	32	32	60	21	20	53	AF	15	77
2-Aug	61	87	22	11	21	32	16	33	27	35	34	48	54	59	65	81	55	35	21	55	29	40	23	72	87
3-Aug	42	76	32	79	73	84	59	34	82	58	55	37	26	25	30	25	27	56	22	28	22	17	17	20	84
4-Aug	21	18	29	28	24	29	30	22	26	33	33	34	31	24	25	28	20	19	21	18	19	20	20	27	34
5-Aug	24	21	26	33	15	23	29	28	23	24	33	52	80	86	30	25	21	19	22	23	22	20	20	19	86
6-Aug	21	21	25	27	25	22	19	19	20	20	20	23	26	29	29	34	28	27	21	23	20	21	18	28	34
7-Aug	26	22	21	29	28	28	88	37	48	60	55	38	44	44	68	69	44	35	29	24	17	21	20	18	88
8-Aug	18	19	17	17	17	16	17	25	33	31	47	53	79	70	58	38	31	41	48	34	17	19	21	23	79
9-Aug	19	15	17	19	23	58	56	46	81	51	29	34	34	91	74	81	27	58	79	36	30	19	18	23	91
10-Aug	43	43	88	43	25	24	31	30	35	34	40	36	37	33	34	43	34	27	25	16	15	19	17	17	88
11-Aug	15	17	16	12	15	22	24	31	24	27	34	31	31	32	32	33	31	30	31	24	26	25	29	77	77
12-Aug	91	48	30	25	24	23	26	50	39	34	38	33	38	35	37	39	32	33	32	29	18	15	70	28	91
13-Aug	31	40	14	28	14	33	30	22	24	22	22	28	36	38	39	48	19	27	30	25	22	13	14	14	48
14-Aug	35	30	55	51	43	32	35	39	36	34	32	33	34	32	34	33	32	30	31	28	29	29	31	31	55
15-Aug	29	36	28	27	31	23	29	23	21	18	20	18	18	16	22	25	27	23	25	25	23	25	18	14	36
16-Aug	18	23	30	24	38	28	21	19	47	49	96	39	37	35	39	41	66	28	29	23	77	16	13	21	96
17-Aug	17	21	19	11	13	14	19	21	28	27	36	29	35	71	33	54	29	28	18	16	89	35	21	26	89
18-Aug	21	34	30	18	26	26	31	31	45	47	62	39	40	61	86	37	22	38	26	23	18	19	17	19	86
19-Aug	19	19	20	18	21	22	22	23	23	22	27	36	36	32	32	33	30	38	32	31	30	32	31	31	38
20-Aug	34	30	32	25	26	28	33	32	30	30	30	30	30	34	31	30	29	31	27	28	28	30	29	29	34
21-Aug	29	27	24	23	26	24	28	31	32	29	29	31	35	33	31	39	40	34	31	32	28	28	28	29	40
22-Aug	29	30	27	26	30	27	29	29	27	30	30	33	34	38	34	32	26	33	28	25	13	19	12	17	38
23-Aug	36	23	18	26	21	21	28	26	26	31	36	27	28	29	26	29	28	24	16	17	17	17	85	66	85
24-Aug	88	31	47	39	21	25	20	23	21	22	43	57	76	37	35	43	34	32	26	20	26	20	22	19	88
25-Aug	70	41	48	14	27	55	32	29	52	36	41	32	33	28	18	16	16	20	20	17	21	58	29	15	70
26-Aug	16	35	35	42	17	43	16	27	52	37	45	39	76	56	76	44	51	53	15	11	13	10	10	22	76
27-Aug	31	58	24	21	19	12	12	24	25	31	25	24	32	30	30	23	25	27	27	22	18	18	18	18	58
28-Aug	20	33	30	19	16	19	27	24	32	31	29	31	36	32	33	34	30	32	PF	PF	PF	PF	PF	PF	36
29-Aug	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	--
30-Aug	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	--
31-Aug	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	--
	91	87	88	79	73	84	88	50	82	60	96	57	80	91	86	81	66	58	79	55	89	58	85	77	

Diurnal Maximum

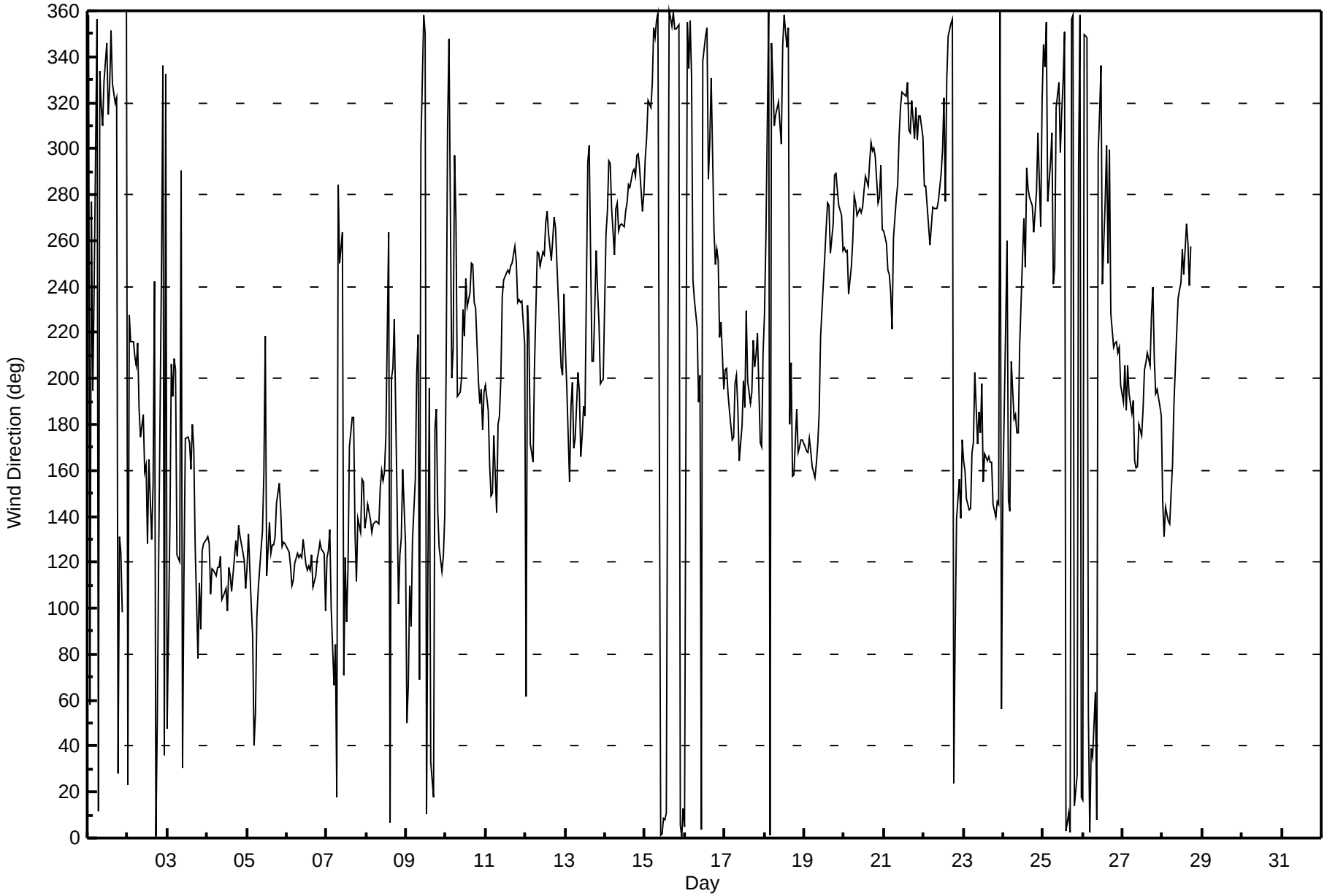
AF - Analyzer Failure PF - Power Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction (WD) - deg

Millennium - August 2015



Wood Buffalo Environmental Association
SO2 Calibration Report

W B E A

Station Information

Calibration Date	August 11, 2015	Last Calibration	July 14, 2015
Station Name	Millennium	Station Number	AMS 12
Reason:	Routine		
Start Time (MST)	9:00	End Time (MST)	14:10
Gas Cert Reference	LL104223	Station temp.	22 Deg C
Cal Gas Concentration	48.3 ppm	Cal Gas Exp Date	12/02/2018
Calibrator Make/Model	Sabio 4010	Serial Number	11091107
ZAG Make/Model	API 701	Serial Number	4889
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2581

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 1000 ppb		PMT voltage	-666	-665
Analyzer IP address	192.168.1.43		Lamp voltage	776	779
Calculated slope	0.992004	1.000668	Chamber temp	44.9	45.1
Calculated intercept	-0.070334	-0.452885	Pressure	703.0	706.1
Analyzer Background	9.8	9.7	Flow	0.428	0.405
Analyzer Coefficient	1.261	1.253	Intensity	91	91

Analyzer make	Thermo 43i	Analyzer serial #	1118148499

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-1.0	----
as found span	5000	82.8	799.8	796.8	1.004
calibrator zero	5000	0.0	0.0	-0.2	----
high point	5000	82.8	799.8	799.0	1.001
second point	5000	41.4	399.9	401.7	0.996
third point	5000	20.7	200.0	200.1	0.999
as left zero	5000	0.0	0.0	-0.3	----
as left span	5000	82.8	799.8	793.5	1.008
				Average Correction Factor	0.999

Corrected As found	797.8	Previous response	806.4	% change	1.1%

Notes:

Filter changed after as founds. Pump changed after as founds for preventative maintenance. Span adjusted.

Calibration Performed By: Devin Russell

Wood Buffalo Environmental Association
SO2 Calibration Report

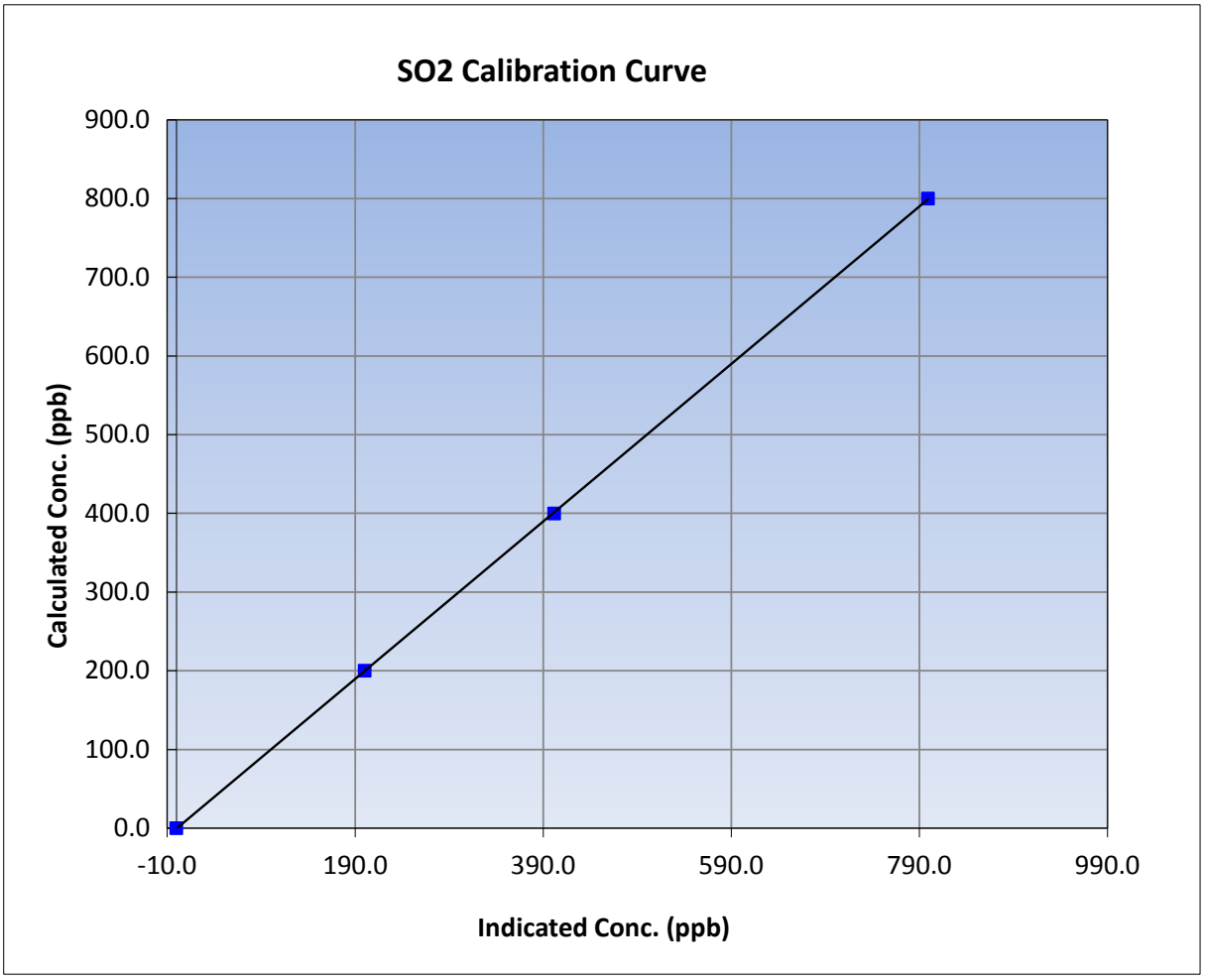
W B E A

Station Information

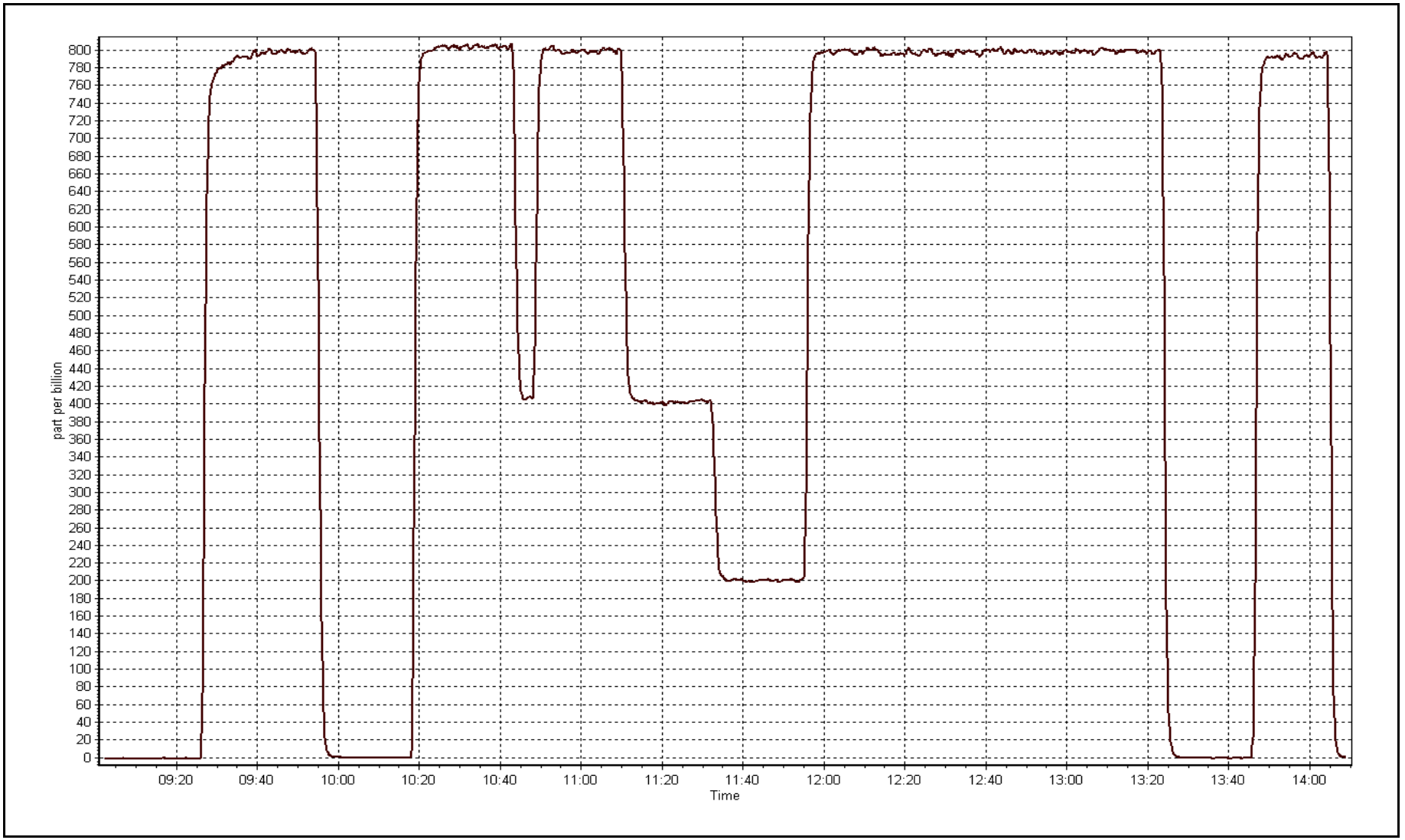
Calibration Date	August 11, 2015	Previous Calibration	July 14, 2015
Station Name	Millennium	Station Number	AMS 12
Start Time (MST)	9:00	End Time (MST)	14:10
Analyzer make	Thermo 43i	Analyzer serial #	1118148499

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	----	Correlation Coefficient	0.999990
799.8	799.0	1.0010		
399.9	401.7	0.9957	Slope	1.000668
200.0	200.1	0.9994		
			Intercept	-0.452885



SO2 Calibration Plot Date: August 11, 2015



Wood Buffalo Environmental Association
TRS Calibration Report

Station Information

Calibration Date	August 12, 2015	Last Calibration	July 29, 2015
Station Name	Millenium Mine	Station Number	AMS 12
Reason:	Removal		
Start Time (MST)	9:00	End Time (MST)	11:00
Gas Cert Reference	LL84557	Station temp.	22 Deg C
Cal Gas Concentration	10.4 ppm	Cal Gas Exp Date	30/05/2013
Calibrator Make/Model	Sabio 4010	Serial Number	11091107
Dil air Make/Model	API 701	Serial Number	4889
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2581
SO2 gas concentration	48.3 ppm	SO2 gas cert/exp	LL104223 12/02/2018

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-597	
Analyzer IP address	192.168.1.42		Lamp voltage	877	
Calculated slope	1.001416	0.986985	Chamber temp	44	
Calculated intercept	0.056584	0.345440	Pressure	682.2	
Analyzer Background	20.7		Flow	0.604	
Analyzer Coefficient	0.665		Intensity	46xxx	
			Converter temp.	817	

Analyzer make/model	TEI 43C	Analyzer serial #	0509110887
Converter make/model	CDN-101	Converter serial #	375

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.3	----
as found span	5000	38.4	79.9	80.8	0.988
SO2 scrubber check	5000	20.7	200.0	0.8	----
calibrator zero	5000	0.0	0.0	-0.3	----
high point	5000	38.5	80.1	80.8	0.991
second point	5000	19.2	39.9	40.0	0.997
third point	5000	9.6	20.0	19.9	1.004
as left zero					
as left span					
				Average Correction Factor	0.997

Corrected As found	81.1	Previous response	79.7	% change	-1.8%

Notes:

Removal Calibration. Scrubber check completed after third point. 43C analyzer being upgraded to a 43I-TLE.

Calibration Performed By: Devin Russell

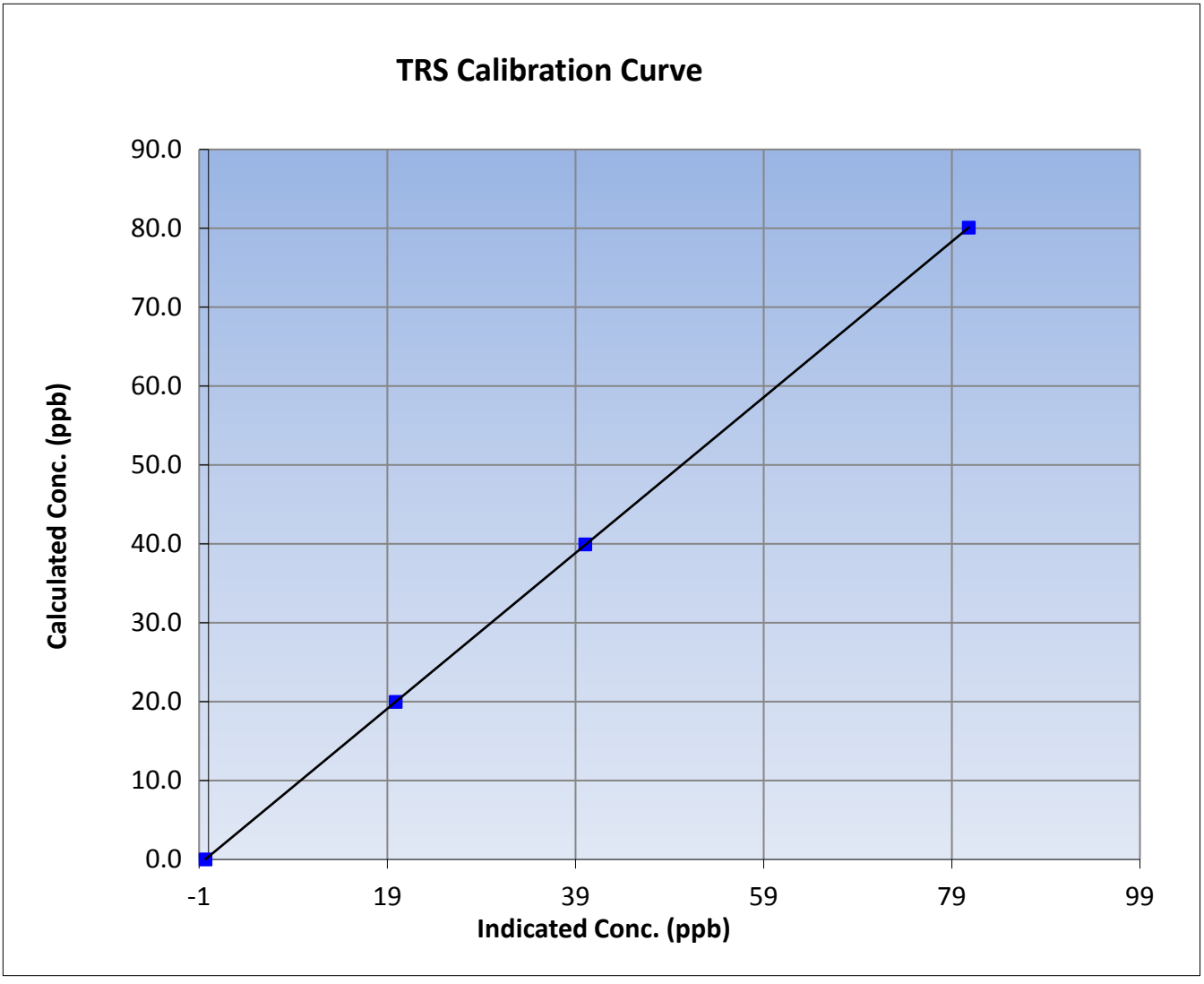
Wood Buffalo Environmental Association
TRS Calibration Report

Station Information

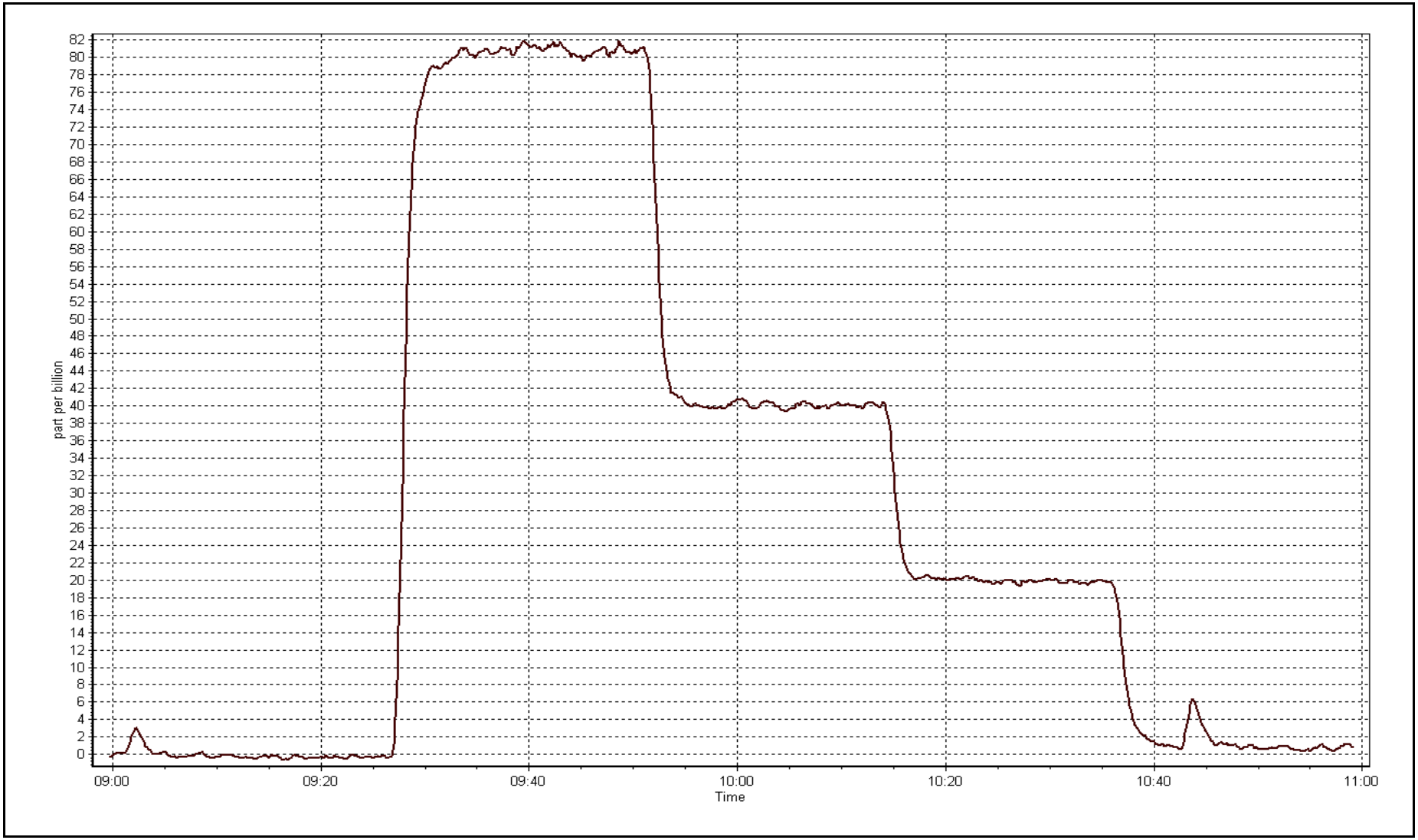
Calibration Date	August 12, 2015	Previous Calibration	July 29, 2015
Station Name	Millenium Mine	Station Number	AMS 12
Start Time (MST)	9:00	End Time (MST)	11:00
Analyzer make	TEI 43C	Analyzer serial #	0509110887

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.3	----	Correlation Coefficient	0.999998
80.1	80.8	0.9908		
39.9	40.0	0.9974	Slope	0.986985
20.0	19.9	1.0039		
			Intercept	0.345440



TRS Calibration Plot Date: August 12, 2015



Wood Buffalo Environmental Association
TRS Calibration Report

W B E A

Station Information

Calibration Date	August 12, 2015	Last Calibration	NA
Station Name	Millenium Mine	Station Number	AMS 12
Reason:	Install		
Start Time (MST)	11:15	End Time (MST)	14:20
Gas Cert Reference	LL84557	Station temp.	22 Deg C
Cal Gas Concentration	10.4 ppm	Cal Gas Exp Date	30/05/2013
Calibrator Make/Model	Sabio 4010	Serial Number	11091107
Dil air Make/Model	API 701	Serial Number	4889
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2581
SO2 gas concentration	48.3 ppm	SO2 gas cert/exp	LL104223 12/02/2018

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	NA	-684
Analyzer IP address	192.168.1.42		Lamp voltage	NA	974
Calculated slope	NA	0.996559	Chamber temp	NA	45
Calculated intercept	NA	-0.172563	Pressure	NA	688.0
Analyzer Background	NA	1.45	Flow	NA	0.423
Analyzer Coefficient	NA	0.984	Intensity	NA	92
			Converter temp.	NA	817

Analyzer make/model	TEI 43i-TLE	Analyzer serial #	1150840011
Converter make/model	CDN-101	Converter serial #	375

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero					
as found span					
SO2 scrubber check	5000	20.7	200.0	1.2	----
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	38.5	80.1	80.5	0.995
second point	5000	19.2	39.9	40.2	0.993
third point	5000	9.6	20.0	20.4	0.978
as left zero	5000	0.0	0.0	0.2	----
as left span	5000	38.4	79.9	80.1	0.998
				Average Correction Factor	0.989

Corrected As found	NA	Previous response	NA	% change	NA

Notes:

Install Calibration. Srubber check completed after third point.

Calibration Performed By: Devin Russell

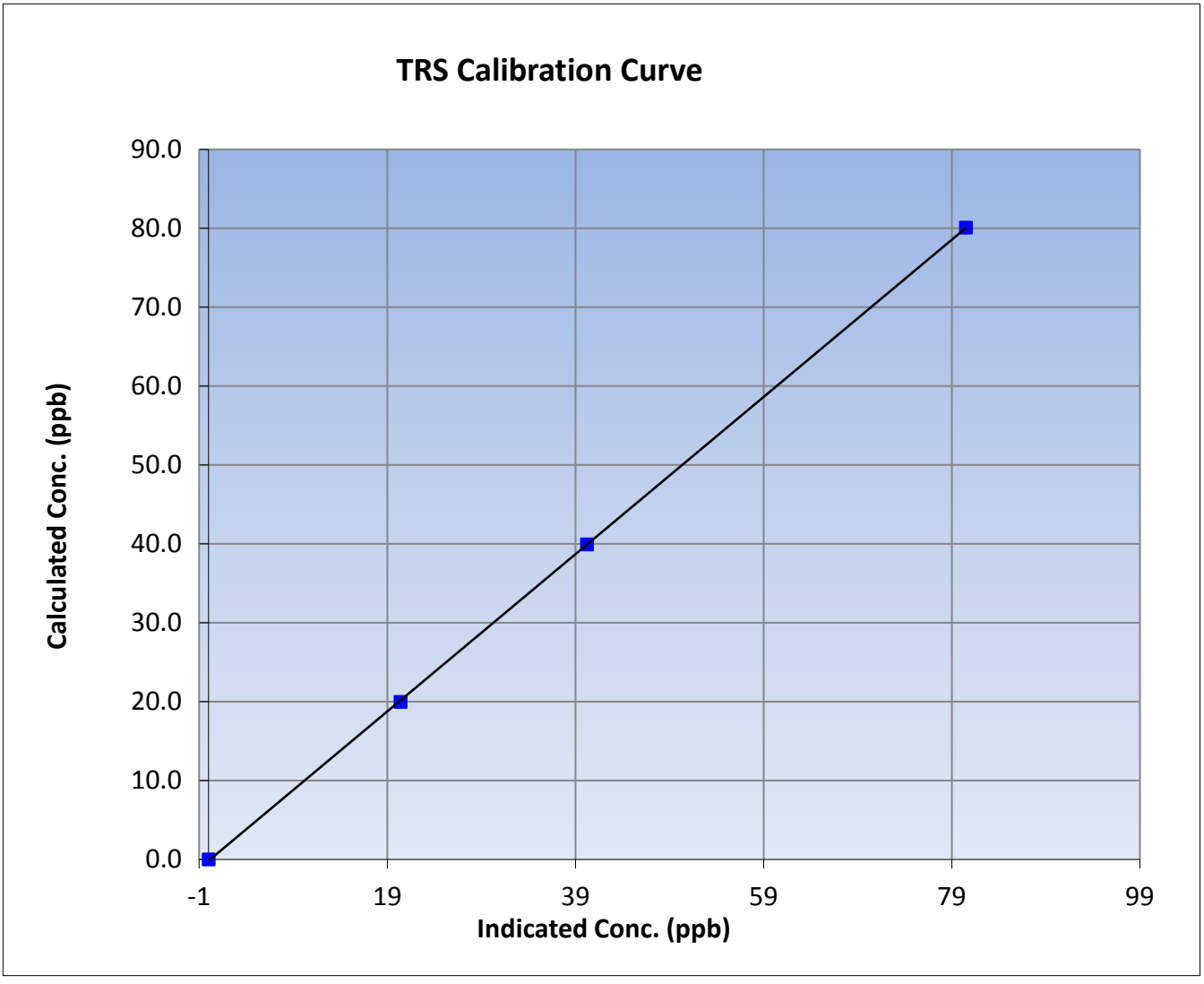
Wood Buffalo Environmental Association
TRS Calibration Report

Station Information

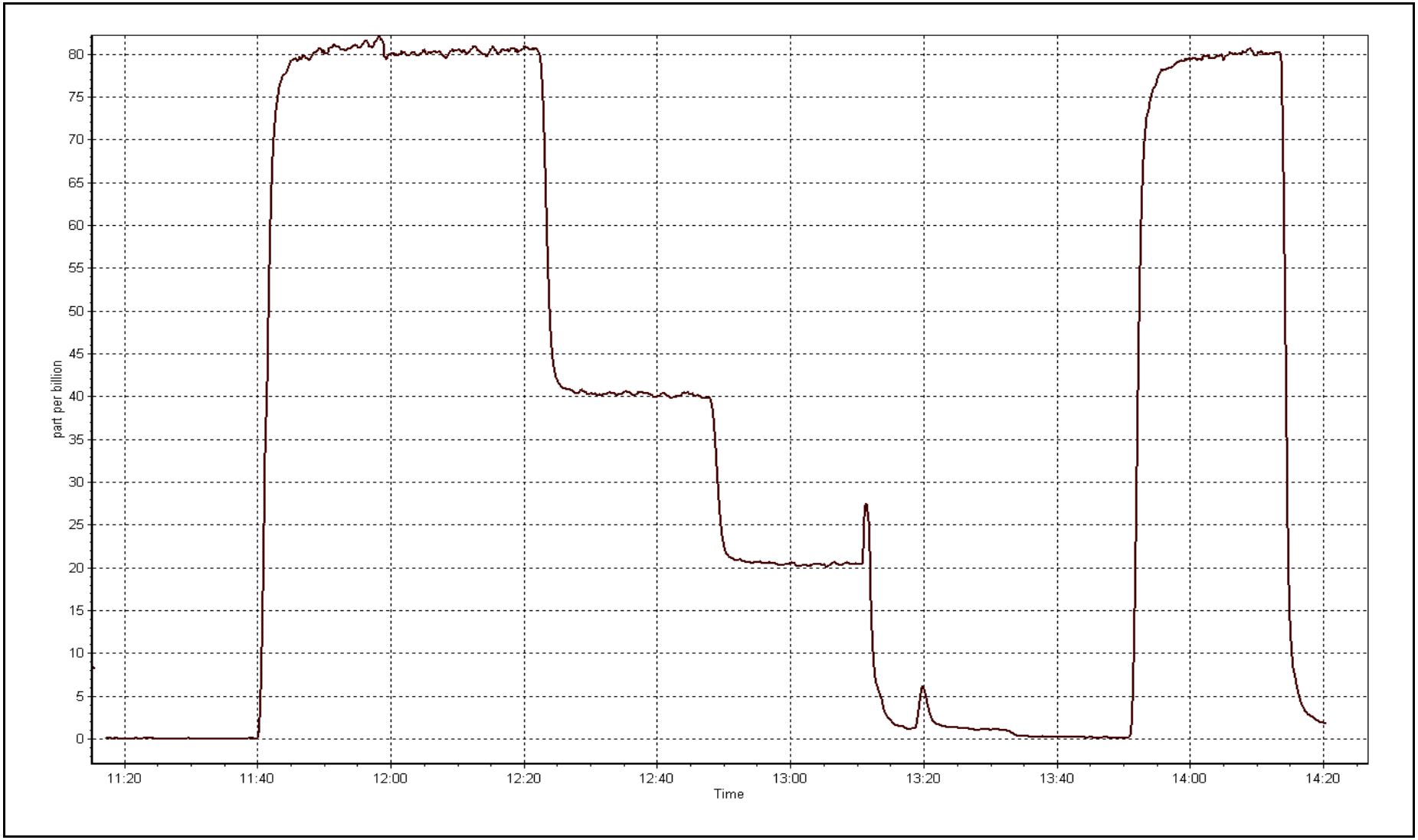
Calibration Date	August 12, 2015	Previous Calibration	NA
Station Name	Millenium Mine	Station Number	AMS 12
Start Time (MST)	11:15	End Time (MST)	14:20
Analyzer make	TEI 43i-TLE	Analyzer serial #	1150840011

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999981
80.1	80.5	0.9949		
39.9	40.2	0.9929	Slope	0.996559
20.0	20.4	0.9779		
			Intercept	-0.172563



TRS Calibration Plot Date: August 12, 2015



Wood Buffalo Environmental Association
THC Calibration Report

W B E A

Station Information

Calibration Date	August-11-15	Last Calibration	July-14-15
Station Name	Millennium	Station Number	AMS 12
Reason:	Routine		
Start Time (MST)	9:00	End Time (MST)	14:10
Gas Cert Reference	LL104223	Cal Gas Expiry Date	12/02/2018
CH4 Cal Gas Conc.	489 ppm	CH4 Equiv Conc.	1017.0 ppm
C3H8 Cal Gas Conc.	192 ppm	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11091107
ZAG make/model	Teledyne API 701	Serial Number	4889
DACS make/model	Campbell Scientific CR3000	Serial Number	2581

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 50 ppm		Sample Pressure	11.8	11.8
Analyzer IP address	192.168.1.51		Air or Bypass Press	42.9	42.9
Calculated slope	0.998715	0.998813	Fuel Pressure	19.3	19.3
Calculated intercept	-0.029814	-0.015561	Analyzer Coeff	2.3	2.3
			Analyzer BKG	4.070	4.050

Analyzer make	Thermo 51i-LT	Analyzer serial #	1317958296

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	0.01	----
as found span	5000	82.8	16.84	16.96	0.993
calibrator zero	5000	0.0	0.00	-0.04	----
high point	5000	82.8	16.84	16.84	1.000
second point	5000	41.4	8.42	8.50	0.991
third point	5000	20.7	4.21	4.27	0.986
as left zero	5000	0.0	0.00	0.10	----
as left span	5000	82.8	16.84	16.93	0.995
				Average Correction Factor	0.992

Corrected As found	16.95	Previous response	16.89	% change	-0.3%

Notes:

Filter changed after as founds. Span adjusted.

Calibration Performed By: Devin Russell

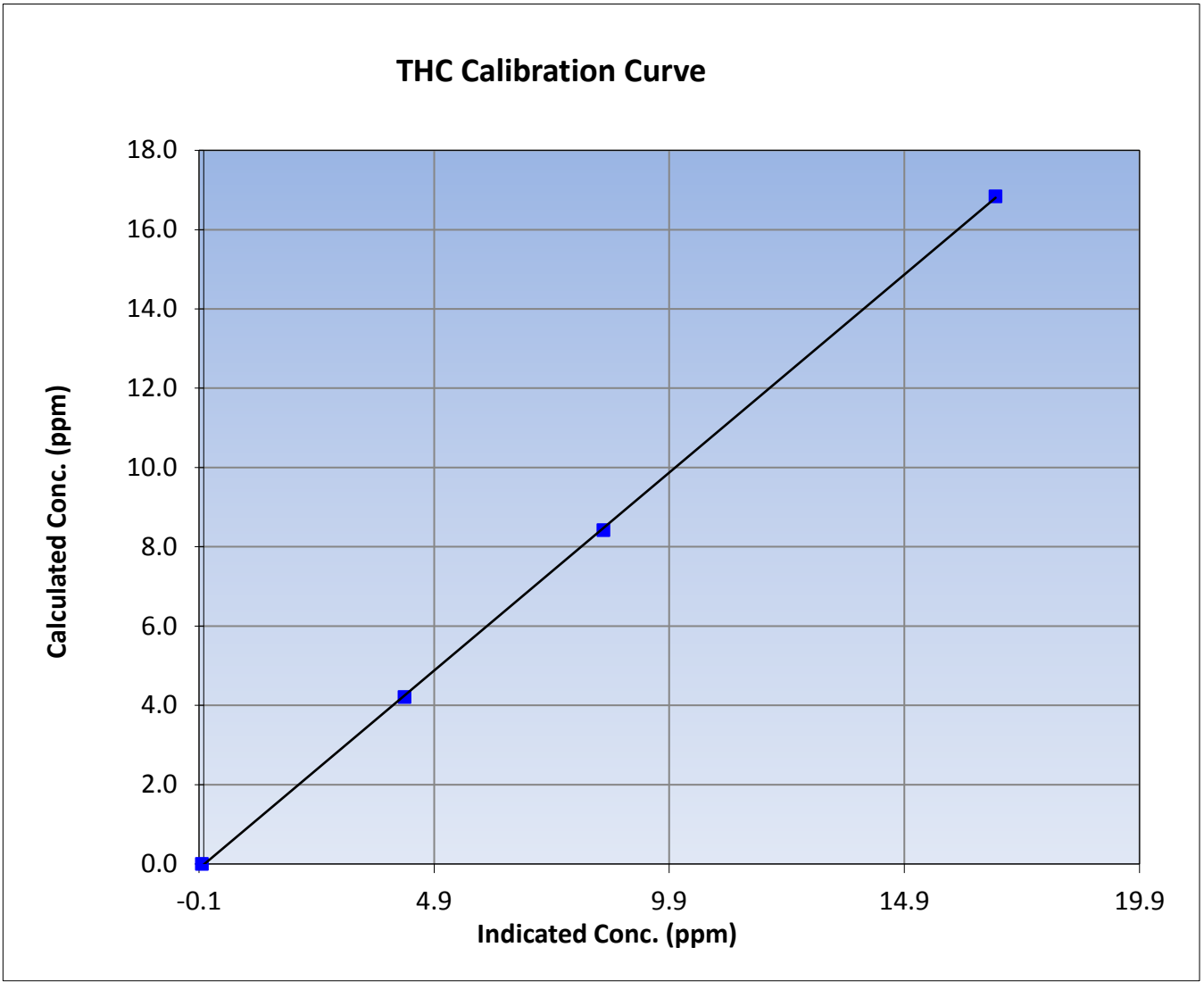
Wood Buffalo Environmental Association
THC Calibration Report

Station Information

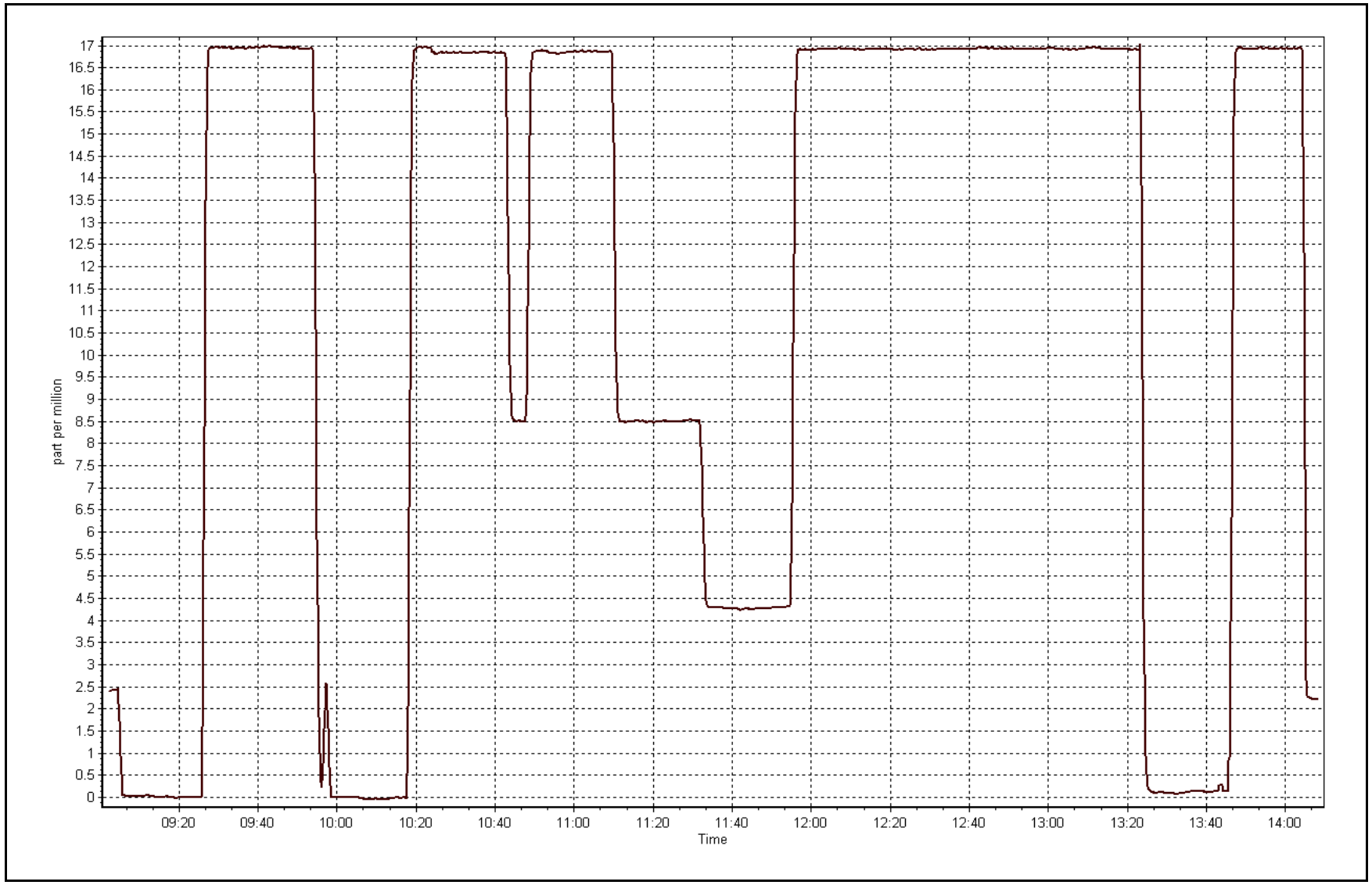
Calibration Date	August 11, 2015	Previous Calibration	July 14, 2015
Station Name	Millennium	Station Number	AMS 12
Start Time (MST)	9:00	End Time (MST)	14:10
Analyzer make	Thermo 51i-LT	Analyzer serial #	1317958296

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	-0.04	----	Correlation Coefficient	0.999943
16.84	16.84	1.0001		
8.42	8.50	0.9907	Slope	0.998813
4.21	4.27	0.9860		
			Intercept	-0.015561



THC Calibration Plot Date: August 11, 2015



Wood Buffalo Environmental Association
NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	August 11, 2015		Previous Calibration	July 28, 2015	
Station Name	Millennium		Station Number	AMS 12	
Reason:	Routine				
Start Time (MST)	9:00		End Time (MST)	14:10	
NO Cal Gas Conc	48.3	ppm	Gas Cert Reference	LL104223	
NOx Cal Gas Conc	48.3	ppm	Cal Gas Expiry Date	12/02/2018	
Calibrator	Sabio 4010		Serial Number	11091107	
Zero air Generator	Teledyne API T701		Serial Number	4889	

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	2581

Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.994716	0.995340	0.994486
	Data Offset	-1.091704	-0.886379	1.341318
Current Calibration	Data Slope	0.998609	0.999446	0.995207
	Data Offset	-0.950147	-1.044506	-1.526489

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1501663732

Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
NO coefficient	0.975		1.021	
NOX coefficient	0.999		0.999	
NO2 coefficient	1		1.000	
NO bkgrnd	6.6		6.9	
NOX bkgrnd	6.9		7.2	
Chamber Temp	50.6	Deg C	50.4	Deg C
Moly Temp	325.3	Deg C	322.4	Deg C
HVPS voltage	-797.7	V	-797.7	V
PMT Temp	-2.8	Deg C	-3	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	191.2	mmHg	196.4	mmHg
R Cell Press Nox	191.2	mmHg	196.4	mmHg
NO sample flow	0.661	lpm	0.651	lpm
Nox sample Flow	0.661	lpm	0.654	lpm

Notes:

Filter changed after as founds. Analyzer still settling from installation. Span adjusted, moved onto second point, then back to high point to adjust again.

Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: August 11, 2015 Station Number: AMS 12

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1	----	----
as found span	5000	82.8	799.8	799.8	0.0	738.9	738.1	0.8	1.0825	1.0836
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	0.1	0.0	----	----
high point	5000	82.8	799.8	799.8	0.0	801.3	800.7	0.6	0.9982	0.9990
second point	5000	41.4	399.9	399.9	0.0	402.4	402.3	0.1	0.9938	0.9942
third point	5000	20.7	200.0	200.0	0.0	201.8	201.7	0.1	0.9910	0.9913
as left zero	5000	0.0	0.0	0.0	0.0	0.0	0.2	-0.2	----	----
as left span	5000	82.8	799.8	510.1	289.7	808.7	518.7	290.0	0.9891	0.9835
								Average Correction Factor	0.9943	0.9948

Corrcted As found NO_X= 739.0 NO= 738.1 Percent Change NO_X= 9.0% NO= 9.0%

Previous Response NO_X= 805.2 NO= 804.5

GPT Calibration Data

Dilution Flow 5000 ccm Source Gas Flow 82.80 ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
Cal zero			0.0			0.0			N/A	
1st NO2 (300)	----	510.1	296.1	807.1	510.1	297.0	0.9749	1.0000	0.9969	100.3%
2nd NO2 (200)	----	615.5	190.7	811.2	615.5	195.7	0.9699	1.0000	0.9742	102.6%
3rd NO2 (100)	----	710.5	95.7	809.2	710.5	98.7	0.9723	1.0000	0.9693	103.2%
4th NO2 (0)	806.2	----	0.2	806.4	806.2	0.2	0.9758	1.0000	N/A	----
					Average Correction Factor		0.9732	1.0000	0.9802	102.0%

Calibration Performed By: Devin Russell

Wood Buffalo Environmental Association

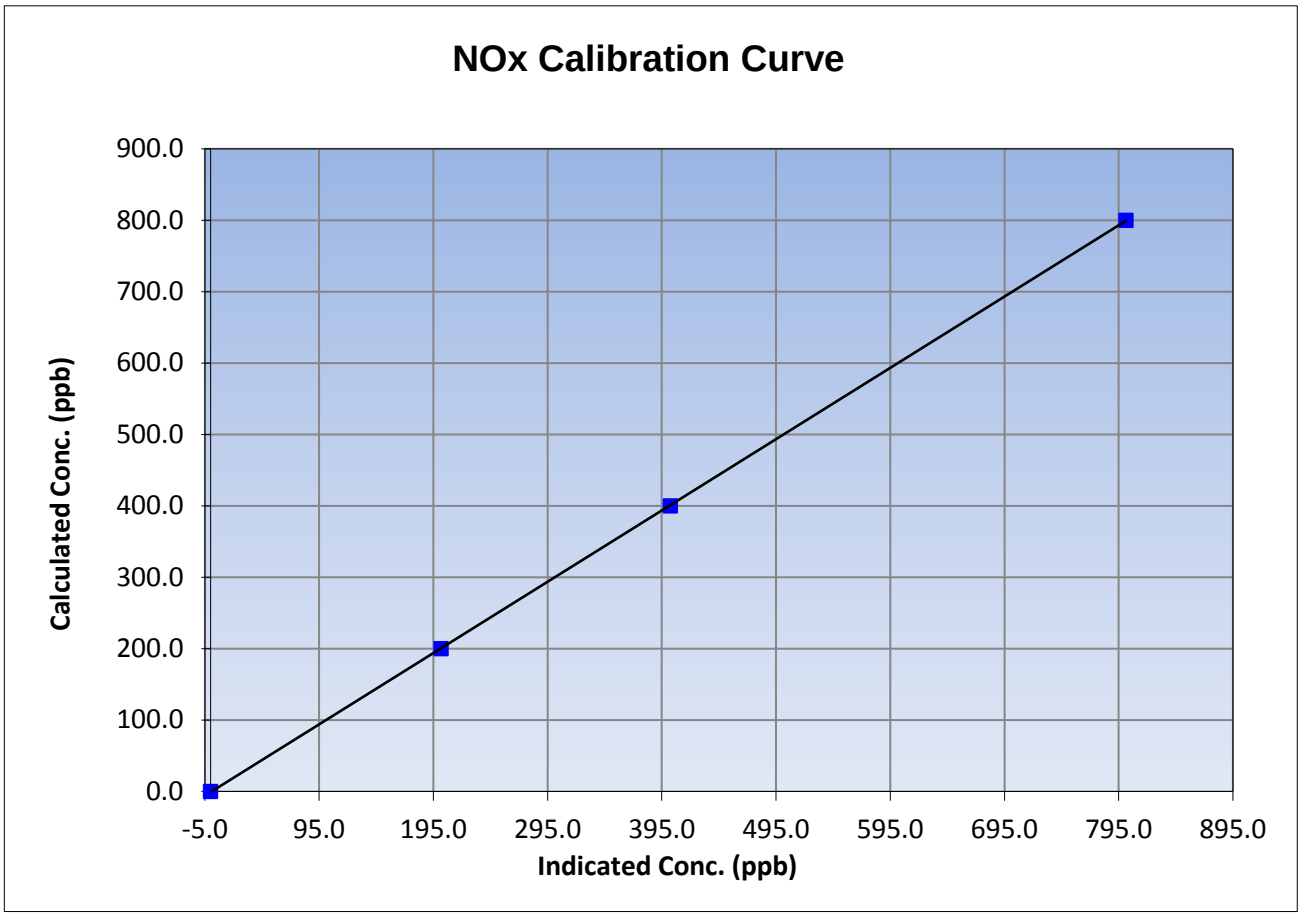
NO_X Calibration Summary

Station Information

Calibration Date	August 11, 2015	Previous Calibration	July 28, 2015
Station Name	Millennium	Station Number	AMS 12
Start Time (MST)	9:00	End Time (MST)	14:10
Analyzer make	Thermo 42i	Analyzer serial #	1501663732

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999993
799.8	801.3	0.9982		
399.9	402.4	0.9938	Slope	0.998609
200.0	201.8	0.9910		
			Intercept	-0.950147



Wood Buffalo Environmental Association

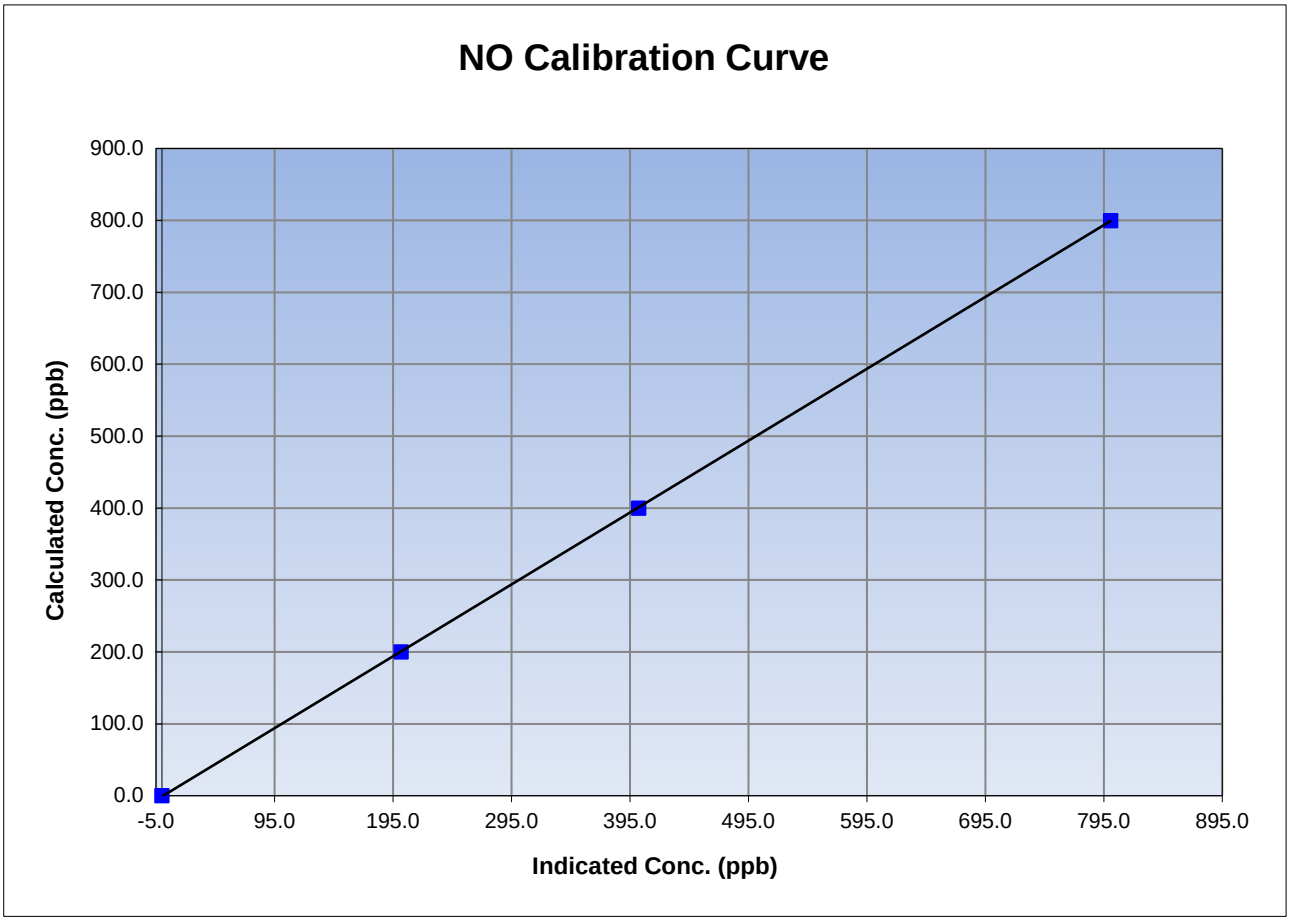
NO Calibration Summary

Station Information

Calibration Date	August 11, 2015	Previous Calibration	July 28, 2015
Station Name	Millennium	Station Number	AMS 12
Start Time (MST)	9:00	End Time (MST)	14:10
Analyzer make	Thermo 42i	Analyzer serial #	1501663732

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	N/A	Correlation Coefficient	0.999992
799.8	800.7	0.9990		
399.9	402.3	0.9942	Slope	0.999446
200.0	201.7	0.9913		
			Intercept	-1.044506



Wood Buffalo Environmental Association

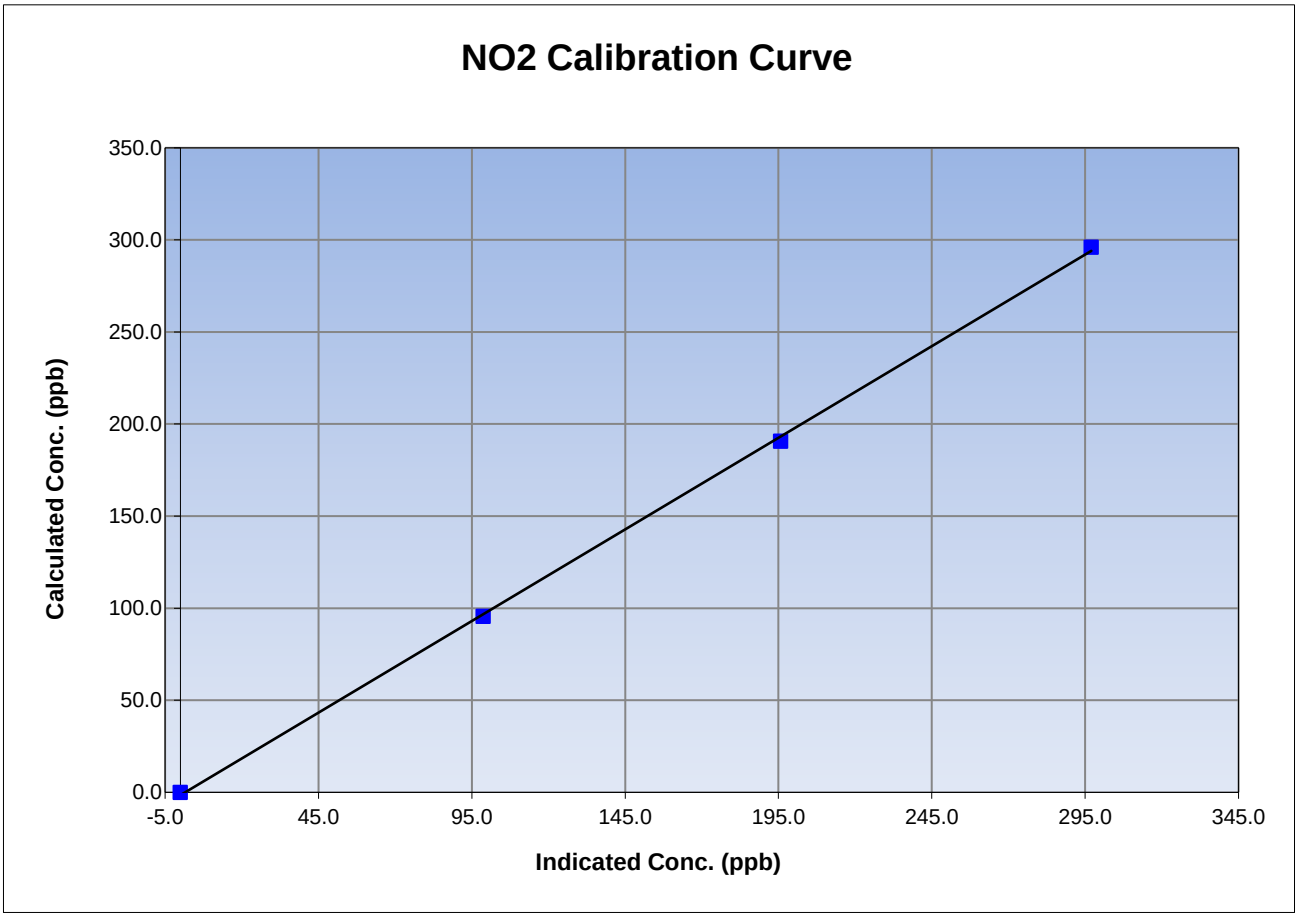
NO_2 Calibration Summary

Station Information

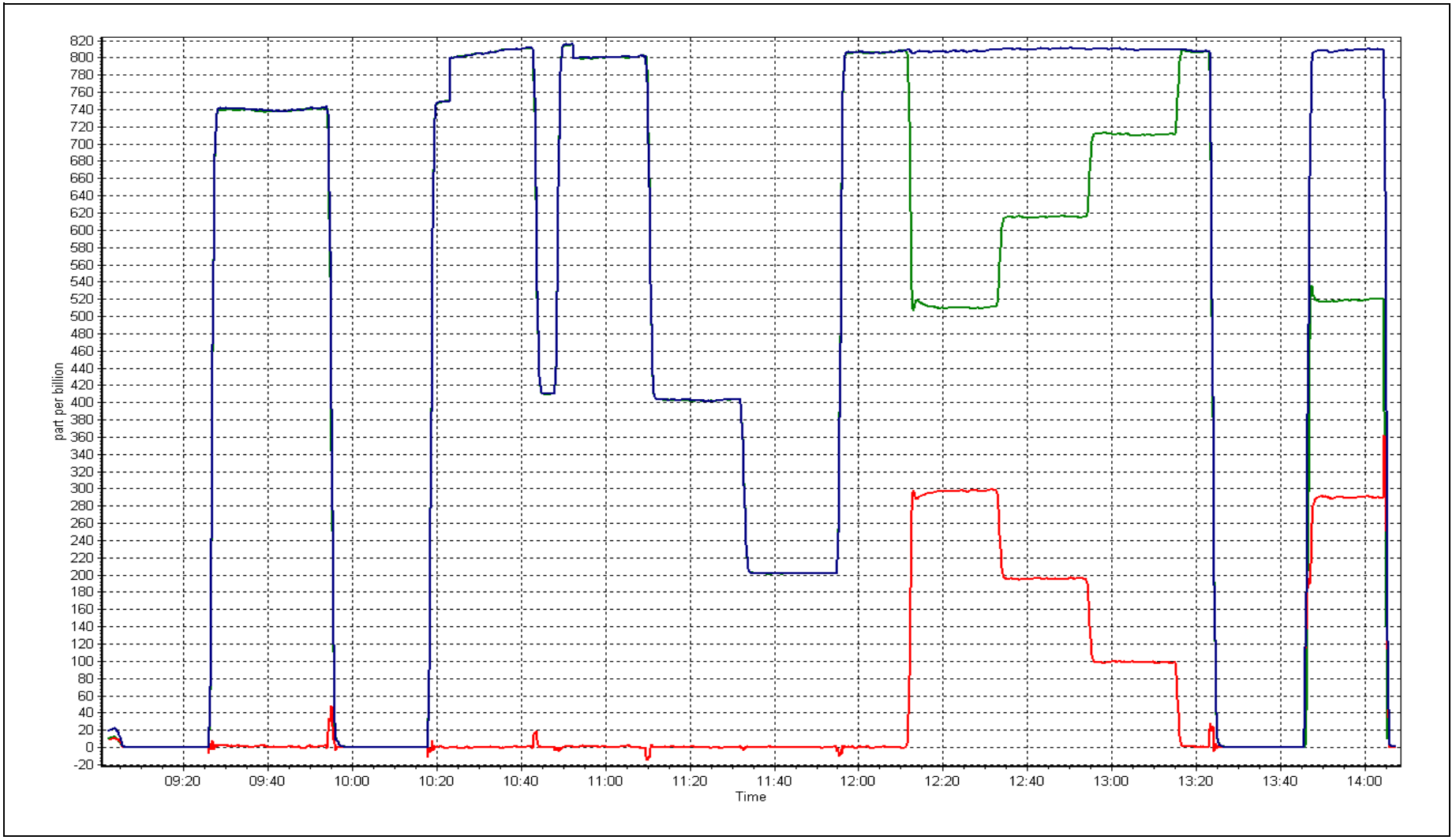
Calibration Date	August 11, 2015	Previous Calibration	July 28, 2015
Station Name	Millennium	Station Number	AMS 12
Start Time (MST)	9:00	End Time (MST)	14:10
Analyzer make	Thermo 42i	Analyzer serial #	1501663732

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999704
296.1	297.0	0.9969		
190.7	195.7	0.9742	Slope	0.995207
95.7	98.7	0.9693		
			Intercept	-1.526489



NOx, NO & NO_2 Calibration Plot Date: August 11, 2015



Wood Buffalo Environmental Association
NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	August 22, 2015	Previous Calibration	August 11, 2015
Station Name	Millennium	Station Number	AMS 12
Reason:	As Found — Response check and adjustment		
Start Time (MST)	8:15	End Time (MST)	11:45
NO Cal Gas Conc	48.3 ppm	Gas Cert Reference	LL104223
NOx Cal Gas Conc	48.3 ppm	Cal Gas Expiry Date	12/02/2018
Calibrator	Sabio 4010	Serial Number	11091107
Zero air Generator	Teledyne API T701	Serial Number	4889

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	2581

Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.998609	0.999446	0.995207
	Data Offset	-0.950147	-1.044506	-1.526489
Current Calibration	Data Slope	1.004078	1.002956	1.003013
	Data Offset	1.736779	1.589502	0.963272

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1501663732

Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
NO coefficient	0.975		1.153	
NOX coefficient	0.999		0.999	
NO2 coefficient	1		1.000	
NO bkgrnd	6.6		7.9	
NOX bkgrnd	6.9		8.2	
Chamber Temp	50.6	Deg C	50.1	Deg C
Moly Temp	325.3	Deg C	322.4	Deg C
HVPS voltage	-797.7	V	-797.7	V
PMT Temp	-2.8	Deg C	-3	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	191.2	mmHg	222.9	mmHg
R Cell Press Nox	191.2	mmHg	230.3	mmHg
NO sample flow	0.661	lpm	0.548	lpm
Nox sample Flow	0.661	lpm	0.546	lpm

Notes:

Response change due to slight vacuum change; span adjusted analyzer.

Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: August 22, 2015 Station Number: AMS 12

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	-0.4	-0.2	-0.2	----	----
as found span	5000	82.8	799.8	799.8	0.0	709.5	708.8	0.7	1.1273	1.1285
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	0.1	0.0	----	----
high point	5000	82.8	799.8	799.8	0.0	795.7	796.7	-1.0	1.0052	1.0040
second point	5000	41.4	399.9	399.9	0.0	395.8	396.4	-0.7	1.0104	1.0089
third point	5000	20.7	200.0	200.0	0.0	195.6	196.1	-0.5	1.0223	1.0197
as left zero										
as left span										
								Average Correction Factor	1.0126	1.0108

Corrcted As found NO_X= 709.9 NO= 709.0 Percent Change NO_X= 13.0% NO= 13.0%

Previous Response NO_X= 801.9 NO= 801.3

GPT Calibration Data

Dilution Flow 5000 ccm Source Gas Flow 82.80 ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
Cal zero			0.0			0.0			N/A	
1st NO2 (300)	----	458.6	340.1	797.2	458.6	338.7	0.9870	1.0000	1.0041	99.6%
2nd NO2 (200)	----	625.8	172.9	796.4	625.8	170.6	0.9880	1.0000	1.0135	98.7%
3rd NO2 (100)	----	713.0	85.7	796.9	713.0	83.8	0.9873	1.0000	1.0227	97.8%
4th NO2 (0)	798.7	----	-0.8	797.9	798.7	-0.7	0.9861	1.0000	N/A	----
					Average Correction Factor		0.9871	1.0000	1.0134	98.7%

Calibration Performed By: Kelly Baragar

Wood Buffalo Environmental Association

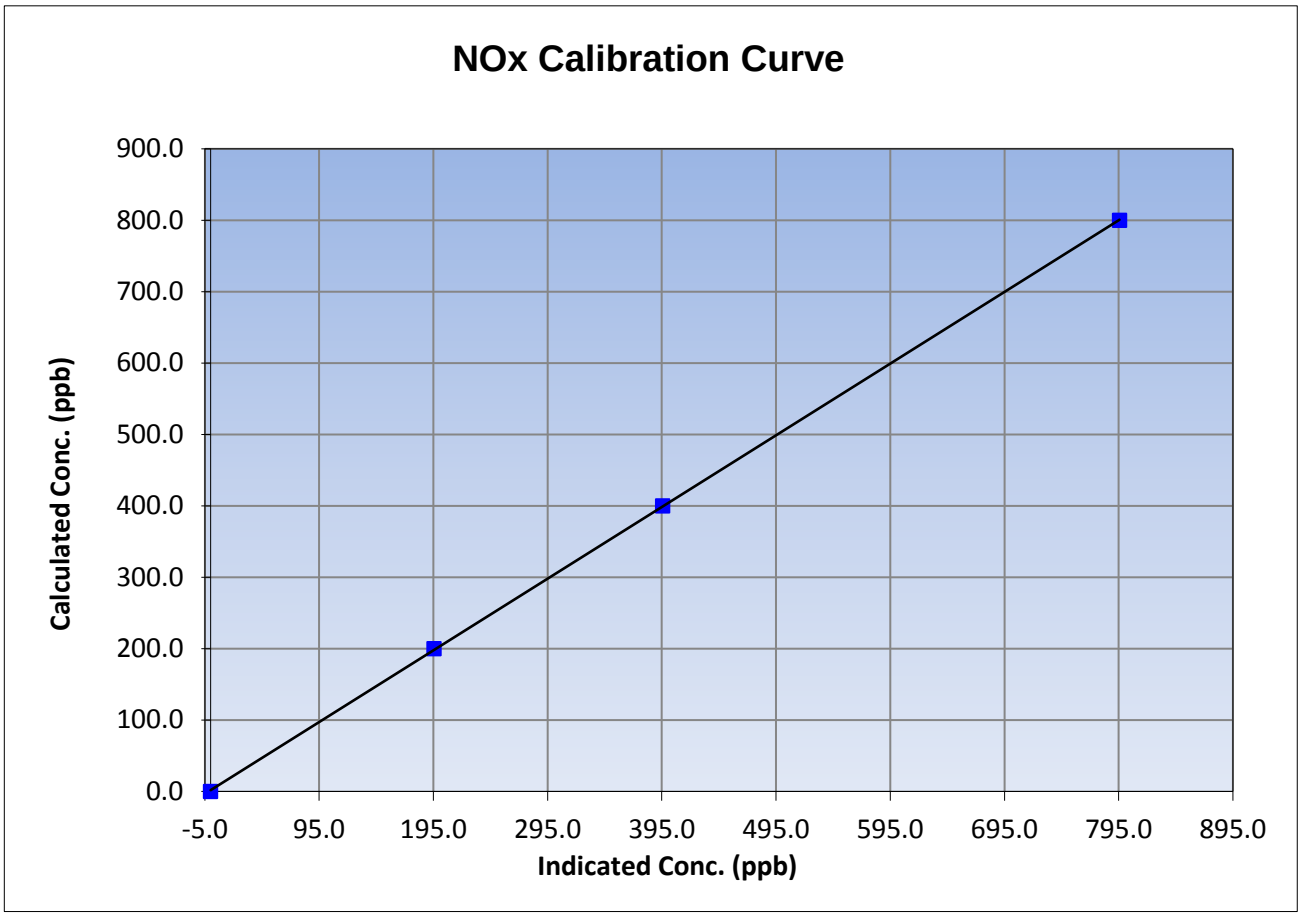
NO_X Calibration Summary

Station Information

Calibration Date	August 22, 2015	Previous Calibration	August 11, 2015
Station Name	Millennium	Station Number	AMS 12
Start Time (MST)	8:15	End Time (MST)	11:45
Analyzer make	Thermo 42i	Analyzer serial #	1501663732

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999978
799.8	795.7	1.0052		
399.9	395.8	1.0104	Slope	1.004078
200.0	195.6	1.0223		
			Intercept	1.736779



Wood Buffalo Environmental Association

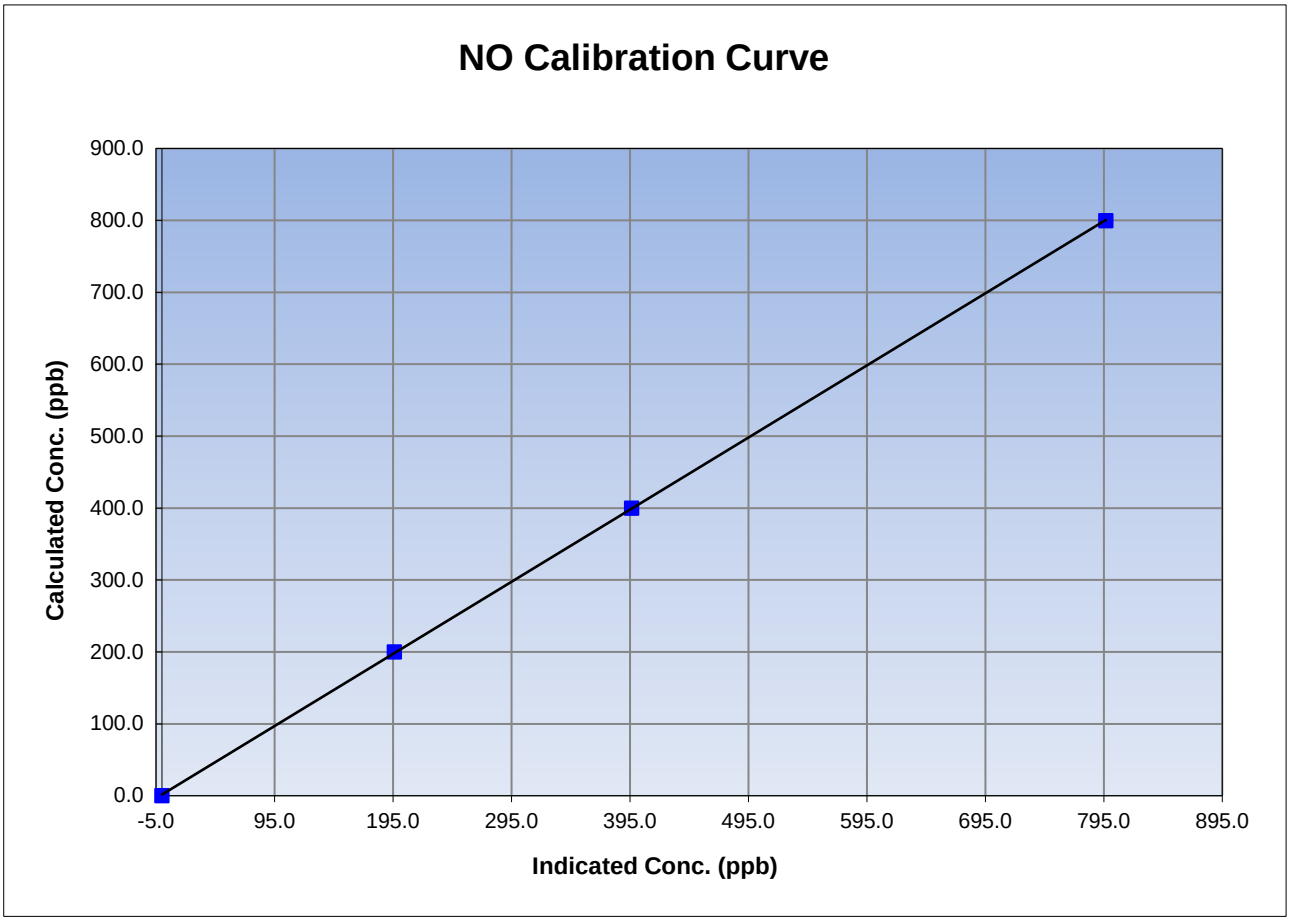
NO Calibration Summary

Station Information

Calibration Date	August 22, 2015	Previous Calibration	August 11, 2015
Station Name	Millennium	Station Number	AMS 12
Start Time (MST)	8:15	End Time (MST)	11:45
Analyzer make	Thermo 42i	Analyzer serial #	1501663732

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	N/A	Correlation Coefficient	0.999980
799.8	796.7	1.0040		
399.9	396.4	1.0089	Slope	1.002956
200.0	196.1	1.0197		
			Intercept	1.589502



Wood Buffalo Environmental Association

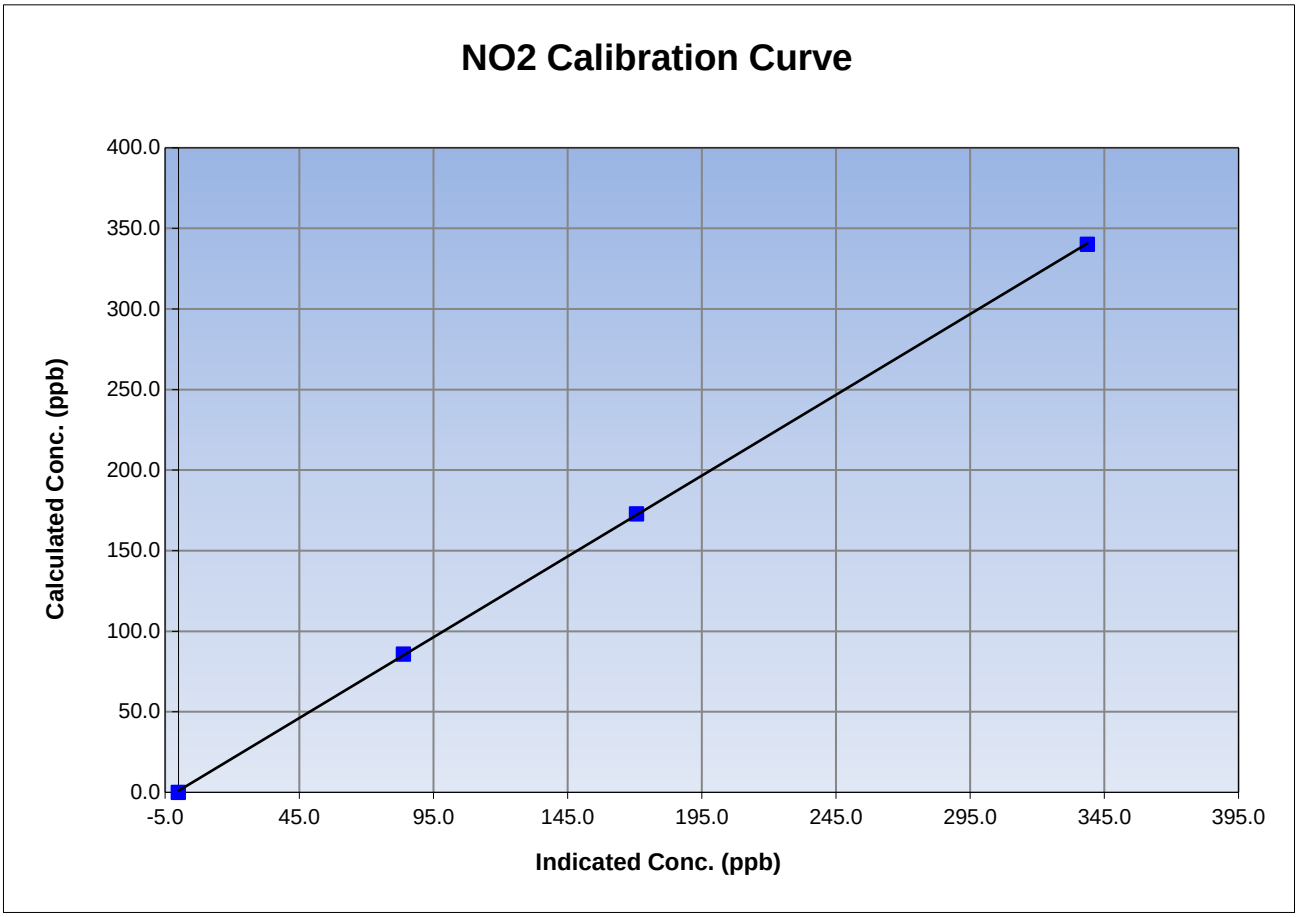
NO_2 Calibration Summary

Station Information

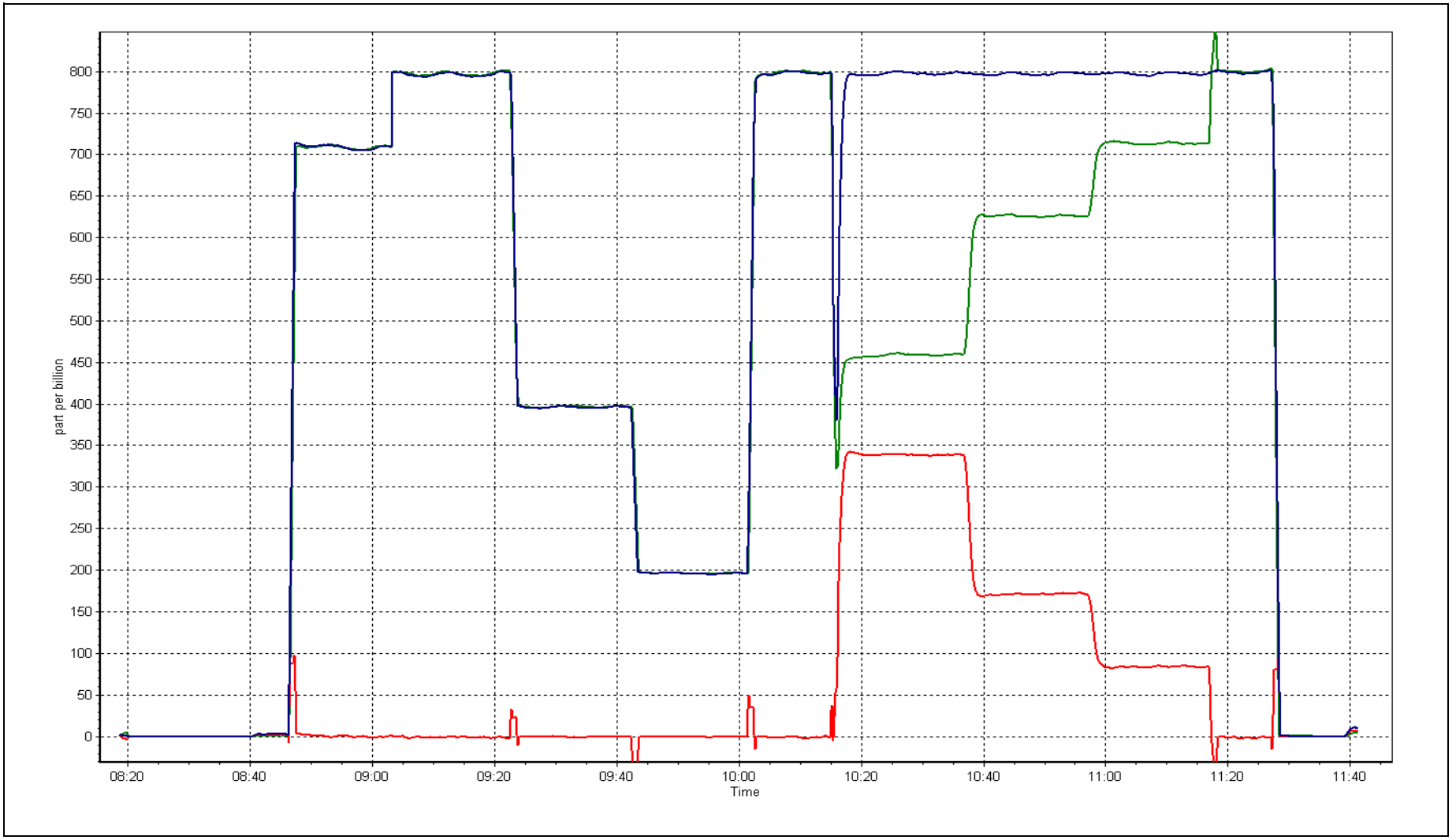
Calibration Date	August 22, 2015	Previous Calibration	August 11, 2015
Station Name	Millennium	Station Number	AMS 12
Start Time (MST)	8:15	End Time (MST)	11:45
Analyzer make	Thermo 42i	Analyzer serial #	1501663732

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999963
340.1	338.7	1.0041		
172.9	170.6	1.0135	Slope	1.003013
85.7	83.8	1.0227		
			Intercept	0.963272



NOx, NO & NO_2 Calibration Plot Date: August 22, 2015



Wood Buffalo Environmental Association

SHARP CONFORMANCE TEST

STATION INFORMATION

Calibration Date:	August 11, 2015	Previous Calibration:	July 14, 2015
Station Name:	Millennium	Station Number:	AMS 12
Start Time (MST):	11:10	End Time (MST):	12:05
Calibrator Make/Model:	Delta Cal	Calibrator Serial Number:	1212

SHARP INFORMATION

Particulate Fraction:	PM2.5
Make/Model:	Thermo / SHARP 5030
Serial Number	E-509
Source SN:	3534
HEPA PN:	12144
Time Correct (MST):	Yes
Paremeters Checked:	T1, T2, T2,T4, P3, Main Flow, Beta, Neph

AUDIT DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	29.0	28.8	-0.2	29.0
T2	43.0	na	na	43.0
T3	37.0	na	na	37.0
T4	64.0	na	na	64.0
RH (%)	33.0	na	na	33.0

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	967	967.9	0.9	967

Main Flow (Lph)

Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
1000	1007	7	1007	1000

Nephalometer Calibration

Parameter	As Founds	adjusted(Limit +or- 2.0ug/m3)	As Left
Analog	348		348
Neph	-0.7		0
C14	21.3	yes	25.6
Indicated Concentration (ug/m3)	-0.6		0
Offset 1	360.4		347.7
Offset 2	46.6		44.6

Leak Check (Quarterly)

Leak Check Date:	July 14, 2015	Previous Leak Check Date:	June 24, 2015
	Measured	**Difference LPM (Limit +/- 0.42 LPM)**	
Flow without adaptor (LPM):	16.64	0.02	
Flow with adaptor [turn off pump first](LPM):	16.62		

Mass Foil Calibration (Annualy)

Foil Calibration Date:	NA	Previous Foil Calibration:	March 27, 2015
Zeroed?:	No		
Foil Mass:		**Mass foil set S/N:**	
Previous Correction Factor:			
New Correction Factor:			

INSPECTION DATA

Item	Condition	Date of install or rebuild
Cyclone	Good/cleaned	11/08/2015
Pump	Good	NA
Filter Tape	Good	NA
Mass Foil Cal Set	Good	NA
HEPA filter	Good	NA

NOTES:

Neph Zero adjusted. Cyclone head cleaned.

Audit Performed By: Devin Russell

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 13
FORT MCKAY SOUTH
AUGUST 2015

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

September 28, 2015

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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT McKAY SOUTH (AMS 13)
AUGUST 2015

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	674	36	70	95.43	34	0	5	0
TRS(ppb) Average	682	34	62	96.24	3	0	1	0
THC(ppm) Average	680	35	64	96.10	4.1	-	2.4	-
O3(ppb) Average	683	33	61	96.24	41	0	23	-
NO2(ppb) Average	681	35	63	96.24	24	0	5	-
NO(ppb) Average	681	35	63	96.24	36	-	4	-
NOX(ppb) Average	681	35	63	96.24	54	-	8	-
PM2.5(ug/m3) Average	715	1	29	96.24	21.7	-	9.1	0
ET(C) Average	731	0	13	98.25	30.3	-	24	-
RH(%) Average	731	0	13	98.25	98	-	86	-
WS(km/h) Average	729	0	15	97.98	18	-	8	-
WD(deg) Average	729	0	15	97.98	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT McKAY SOUTH (AMS 13)
AUGUST 2015

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

					Percentile						
Parameter	Number	Mean	StnDev	Total	Min	P10	Q1	Median	Q3	P90	Max
SO2(ppb) Average	674	0.9	3	-	0	0	0	0	0	2	34
TRS(ppb) Average	682	0.3	0	-	0	0	0	0	0	0	3
THC(ppm) Average	680	2.15	0.2	-	1.9	2	2	2.1	2.2	2.4	4.1
O3(ppb) Average	683	14.2	10	-	0	1	5	14	22	29	41
NO2(ppb) Average	681	1.9	3	-	0	0	0	1	3	6	24
NO(ppb) Average	681	0.9	3	-	0	0	0	0	0	3	36
NOX(ppb) Average	681	2.9	5	-	0	0	0	1	3	8	54
PM2.5(ug/m3) Average	715	4.6	3.5	-	0	1.2	1.9	3.6	6.7	8.9	21.7
Temperature 2 m (C) Average	731	16.27	5.9	-	-1.6	8.7	12.6	15.7	20.4	24.4	30.3
Relative Humidity (%) Average	731	71.2	20	-	26	41	55	74	89	96	98
Wind Speed 10 m (km/h) Average	729	4.8	3	-	0	1	2	4	7	9	18
Wind Direction 10 m (deg) Average	729	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION -FORT McKAY SOUTH (AMS 13)
AUGUST 2015

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
AIR QUALITY ANALYZERS	09 Aug 2015 13:00	10 Aug 2015 16:00	28	Power Failure
SO2	10 Aug 2015 17:00	10 Aug 2015 22:00	6	Power failure recovery
THC	10 Aug 2015 16:00	10 Aug 2015 17:00	1	Power Failure
Temperature/ Relative Humidity	09 Aug 2015 16:00	10 Aug 2015 04:00	13	Power Failure
Wind Speed, Wind Direction	07 Aug 2015 03:00	07 Aug 2015 03:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	07 Aug 2015 05:00	07 Aug 2015 05:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	09 Aug 2015 16:00	10 Aug 2015 04:00	13	Power Failure

Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO_2) - ppb

Fort McKay South - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 34 ppb on Aug 29 15:00 Maximum Daily Average: 4.6 ppb on Aug 29

Minimum Value: 0 ppb on Aug 1 01:00 Minimum Daily Average: 0.0 ppb on Aug 24
Maximum Diurnal Average: 3.2 ppb at hour 11 Minimum Diurnal Average: 0.1 ppb at hour 1
Monthly Average: 0.9 ppb Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 2$ $P_{99} = 15$

Hours in Service:	744
Hours of Data:	674
Hours of Missing Data:	70
Hours of Calibration:	36
Percent Operational Time:	95.4

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0	0	0	Z	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
2-Aug	0	0	0	0	Z	0	0	0	2	10	15	9	10	7	4	4	2	0	0	0	0	0	0	0	2.8	15
3-Aug	0	0	0	0	0	Z	0	0	6	13	3	1	1	1	3	1	0	0	0	0	0	0	0	0	1.4	13
4-Aug	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
5-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2	0	0	1	0	1	0	0	0.5	4
6-Aug	0	0	Z	0	0	0	0	C	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	--	0
7-Aug	0	0	0	Z	0	0	0	0	0	1	8	10	8	6	4	3	2	4	2	0	0	0	0	0	2.1	10
8-Aug	0	0	0	0	Z	0	0	2	4	10	18	25	15	4	2	1	1	1	1	1	0	0	0	0	3.8	25
9-Aug	0	0	0	0	0	Z	0	0	1	2	2	1	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	--	2
10-Aug	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	RE	RE	RE	RE	RE	RE	0	0	--	0
11-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
12-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
13-Aug	0	0	0	Z	0	0	0	0	0	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0.3	2
14-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
15-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.2	1
16-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
17-Aug	0	Z	0	0	0	0	0	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.4	1
18-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	4	9	4	0	0	0	0	0	0	0.8	9
19-Aug	0	0	1	Z	4	1	2	4	5	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1.0	5
20-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
21-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
22-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
23-Aug	0	Z	0	0	0	0	0	0	1	12	17	10	11	14	3	7	4	2	1	1	1	4	0	0	3.9	17
24-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
25-Aug	0	0	0	Z	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
26-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0.1	1
27-Aug	0	0	0	0	0	Z	0	1	1	3	12	6	1	0	0	0	0	0	0	0	0	0	0	0	1.2	12
28-Aug	Z	1	0	1	1	0	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
29-Aug	0	Z	0	0	0	0	0	0	0	1	2	1	8	28	34	16	4	5	2	1	1	0	0	0	4.6	34
30-Aug	0	0	Z	0	0	0	0	1	5	7	5	2	1	0	0	0	0	1	3	3	1	0	0	0	1.3	7
31-Aug	0	0	0	Z	0	0	0	0	1	4	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	6
	0.1	0.1	0.2	0.1	0.3	0.2	0.2	0.4	1.0	2.3	3.2	2.4	2.1	2.2	1.9	1.5	1.0	0.7	0.4	0.4	0.2	0.3	0.1	0.1	Diurnal Average	
	0	1	1	1	4	1	2	4	6	13	18	25	15	28	34	16	9	5	3	3	1	4	0	0	Diurnal Maximum	

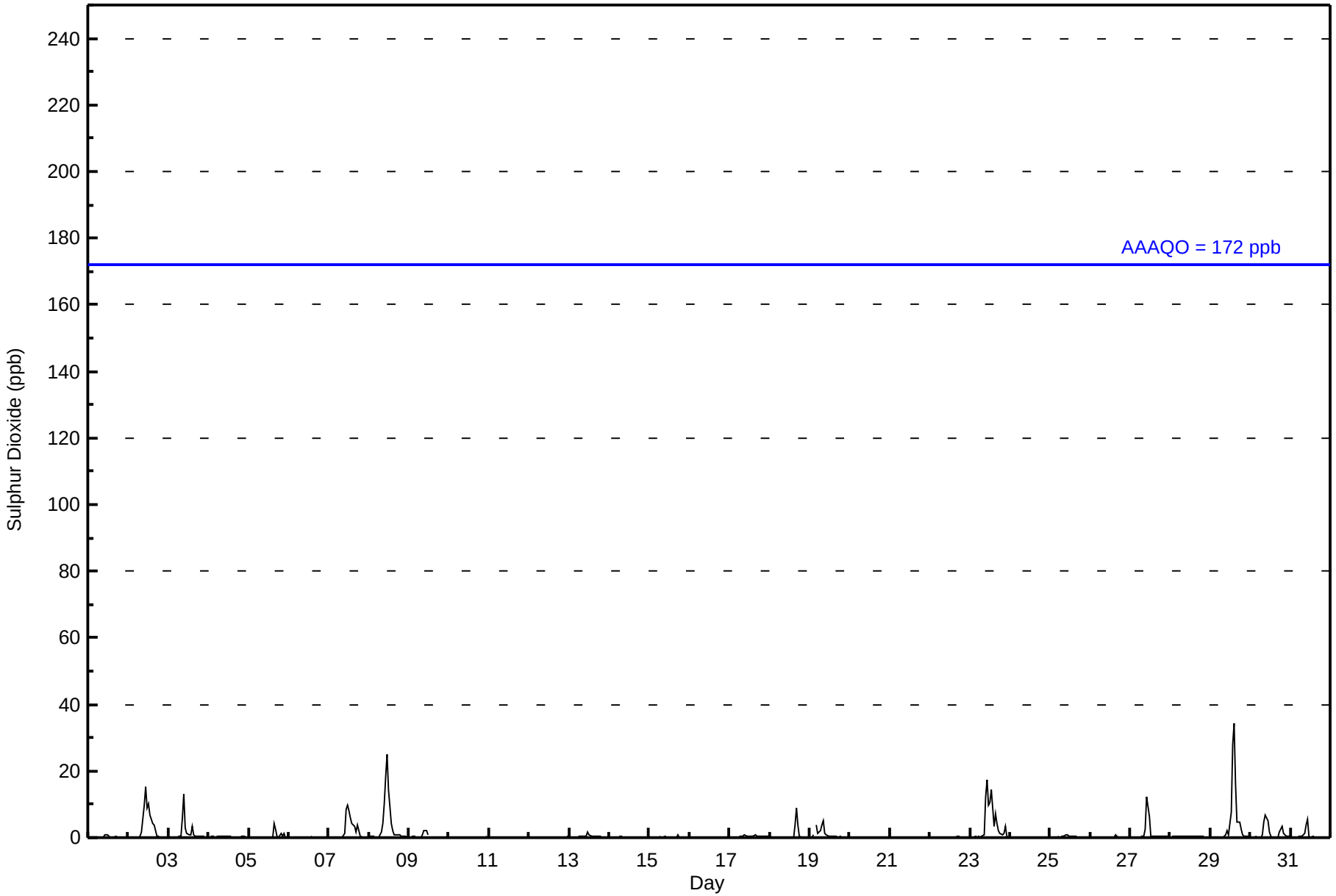
Z - zerospan C - Calibration PF - Power Failure RE - Recovery
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb

Wood Buffalo Environmental Association

Hourly Averages

Sulphur Dioxide (SO_2) - ppb

Fort McKay South - August 2015



Sulphur Dioxide (SO_2) - ppb
Fort McKay South - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	661	98.07	98.07
11 - 20	10	1.48	99.55
21 - 60	3	0.45	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: 674

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

Fort McKay South - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 10	48	19	7	10	11	19	26	37	47	78	94	111	48	44	26	34	659
11 - 20	0	1	0	0	1	1	4	2	1	0	0	0	0	0	0	0	10
21 - 60	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	3
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	48	20	7	10	12	21	31	40	48	78	94	111	48	44	26	34	672

Total Number of Valid Hours: 672

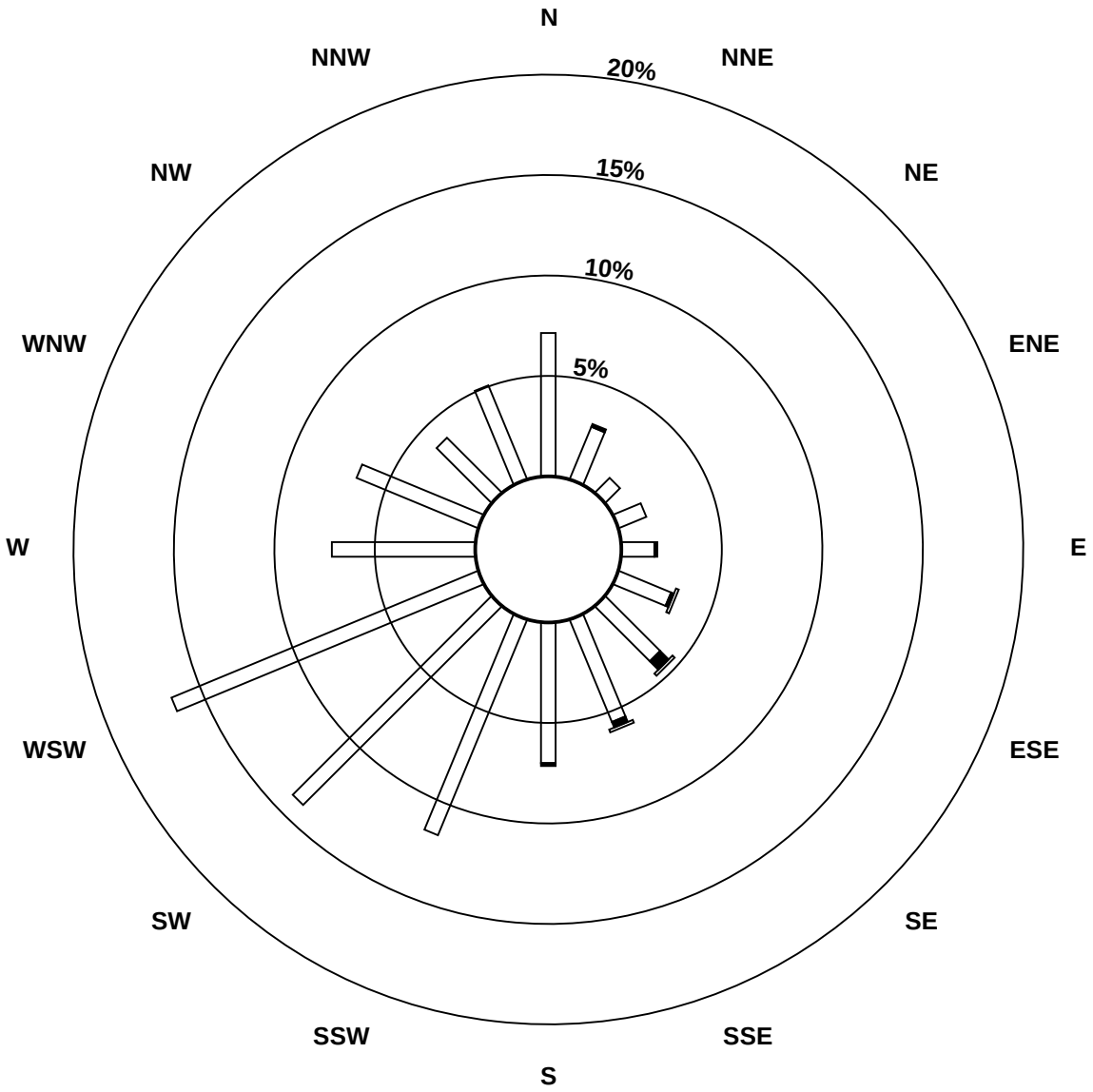
Total Number of Hours: 744

Wood Buffalo Environmental Association

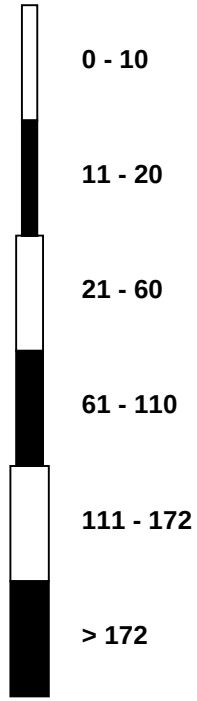
Wind Rose Aug 2015

Sulphur Dioxide (SO_2) - ppb

Fort McKay South (AMS 13)



Classes (ppb)



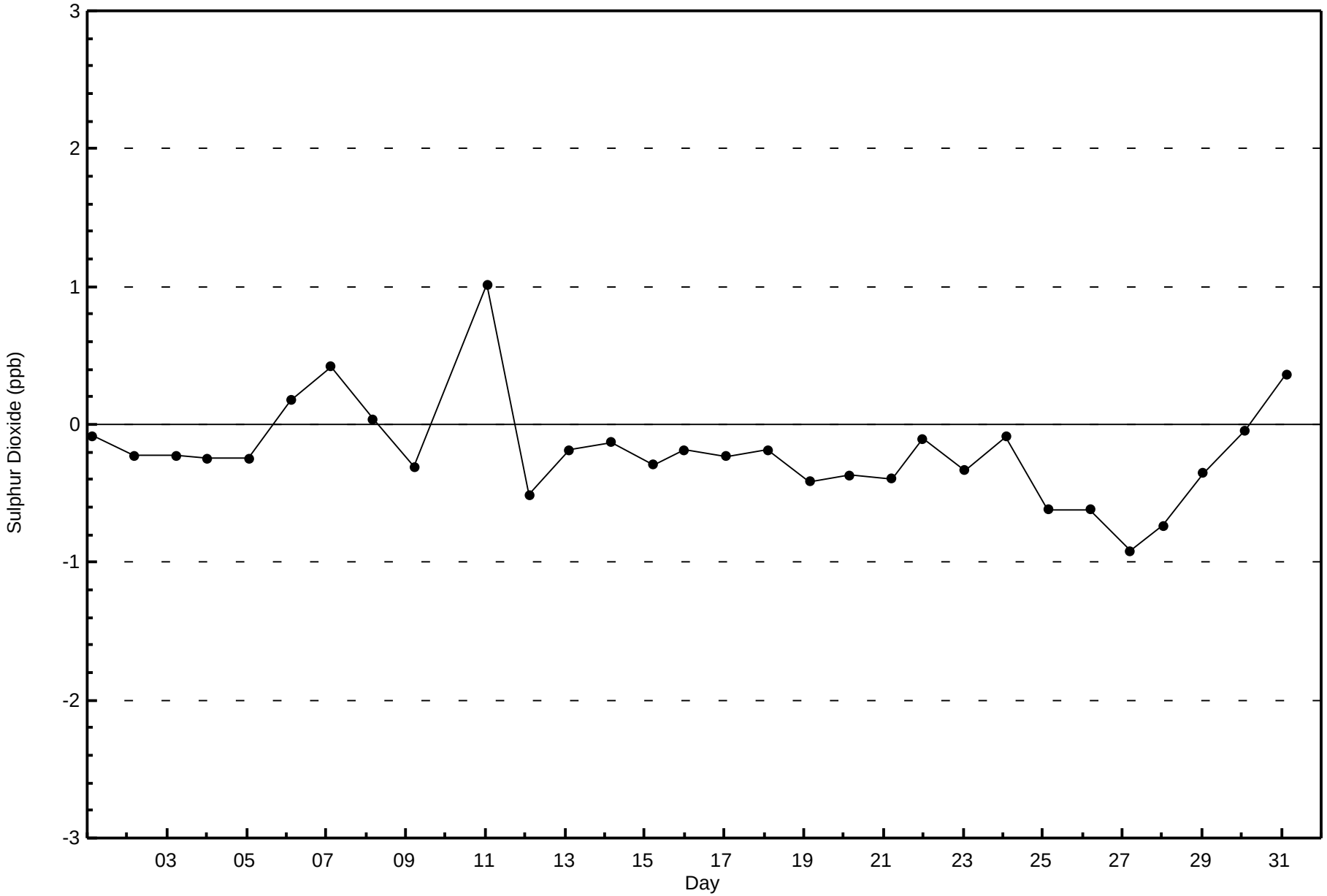
Total Number of Valid Hours: 672

Wood Buffalo Environmental Association

Zero Responses

Sulphur Dioxide (SO_2) - ppb

Fort McKay South - August 2015

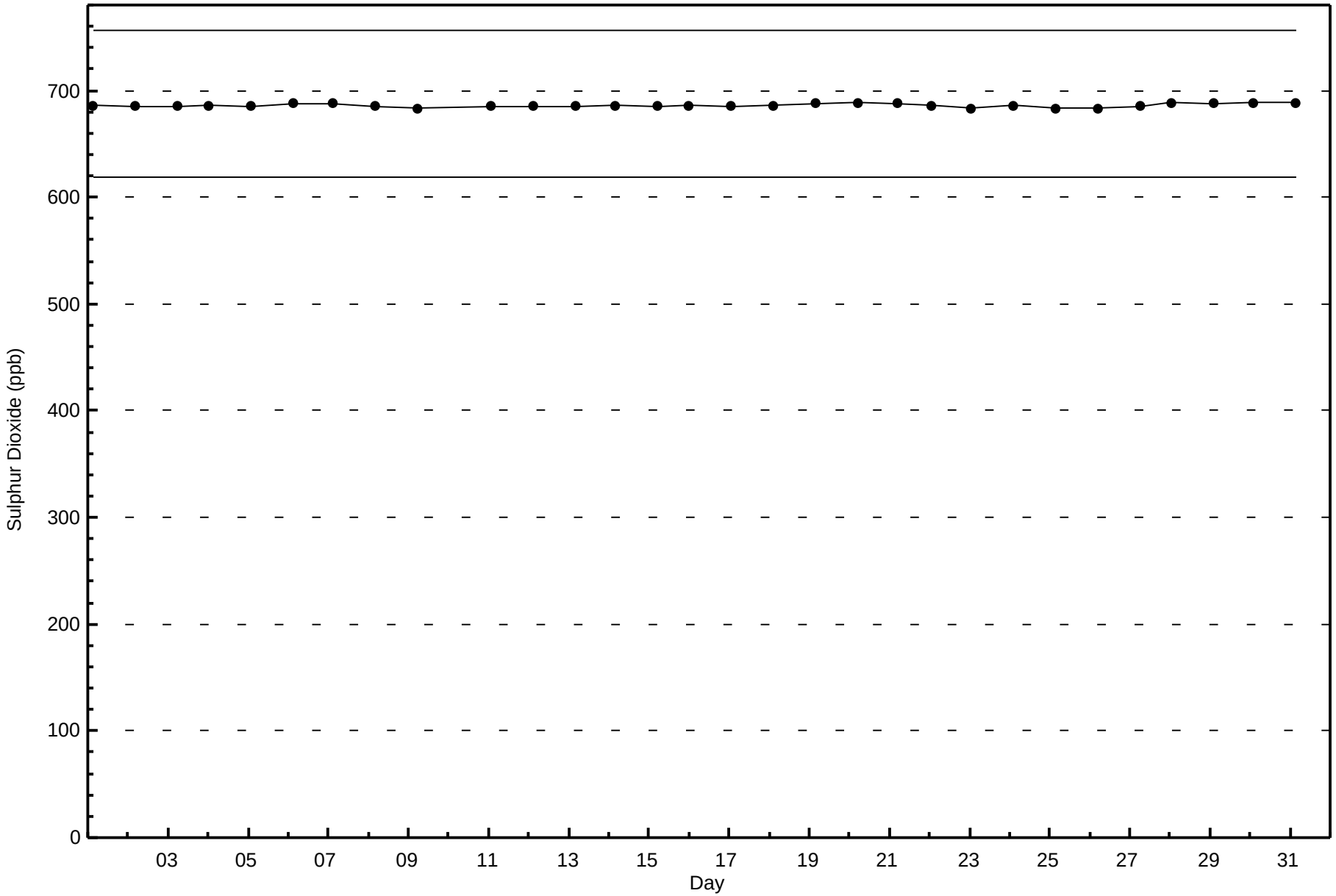


Wood Buffalo Environmental Association

Span Responses

Sulphur Dioxide (SO_2) - ppb

Fort McKay South - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

Fort McKay South - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 3 ppb on Aug 27 11:00 Maximum Daily Average: 0.7 ppb on Aug 8

Minimum Value: 0 ppb on Aug 23 05:00 Minimum Daily Average: 0.1 ppb on Aug 20
Maximum Diurnal Average: 0.6 ppb at hour 10 Minimum Diurnal Average: 0.1 ppb at hour 15
Monthly Average: 0.3 ppb Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 0$ $P_{99} = 2$

Hours in Service:	744
Hours of Data:	682
Hours of Missing Data:	62
Hours of Calibration:	34
Percent Operational Time:	96.2

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

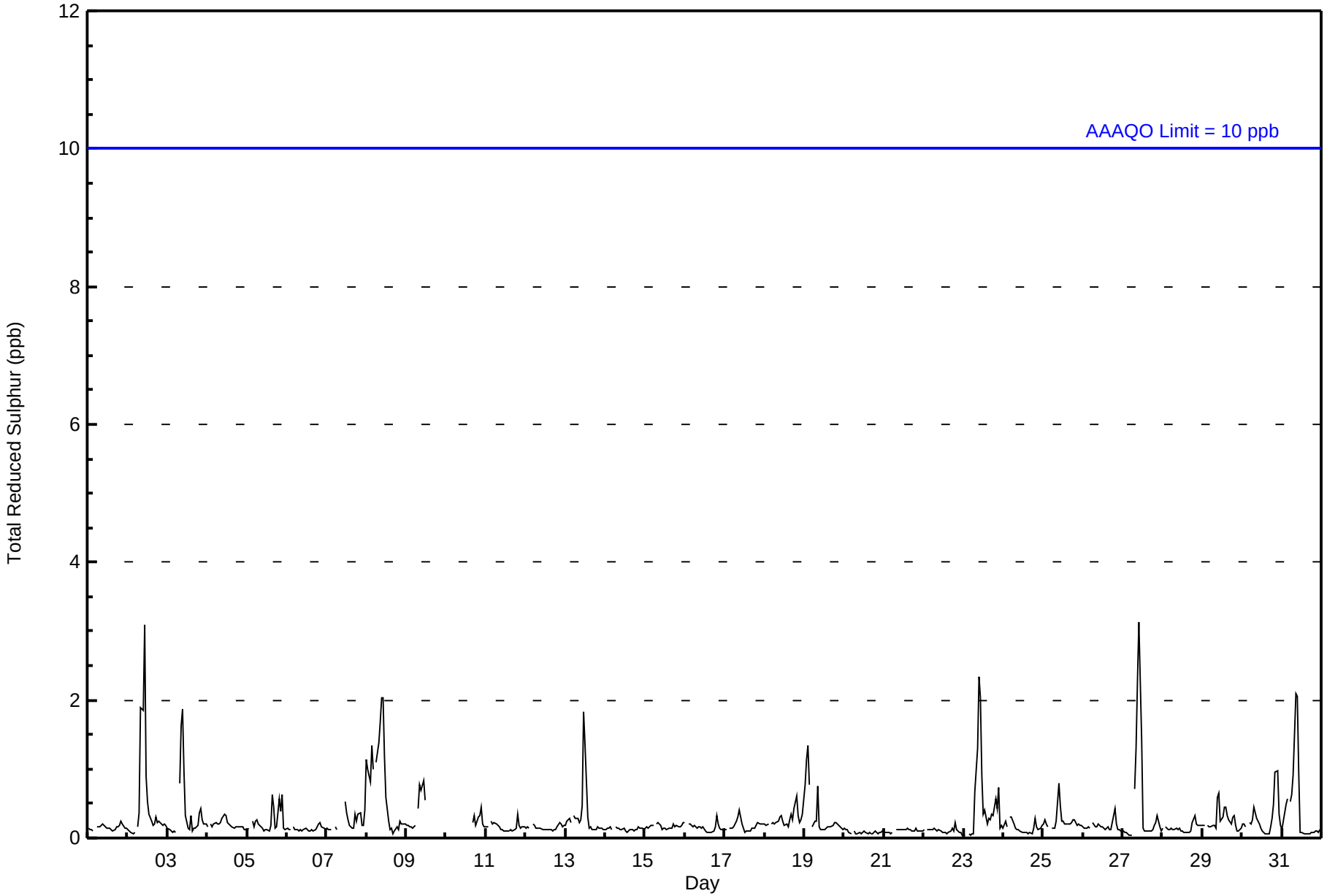
Z - zerospan C - Calibration PF - Power Failure
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb

Wood Buffalo Environmental Association

Hourly Averages

Total Reduced Sulphur (TRS) - ppb

Fort McKay South - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb

Fort McKay South - August 2015

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

Total Number of Valid Hours: 682

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Total Reduced Sulphur (TRS) - ppb

Fort McKay South - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 2	43	19	8	11	13	21	31	40	49	78	101	111	52	44	26	32	679
3 - 4	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	43	19	8	11	13	21	33	40	49	78	101	111	52	44	26	32	681

Total Number of Valid Hours: 681

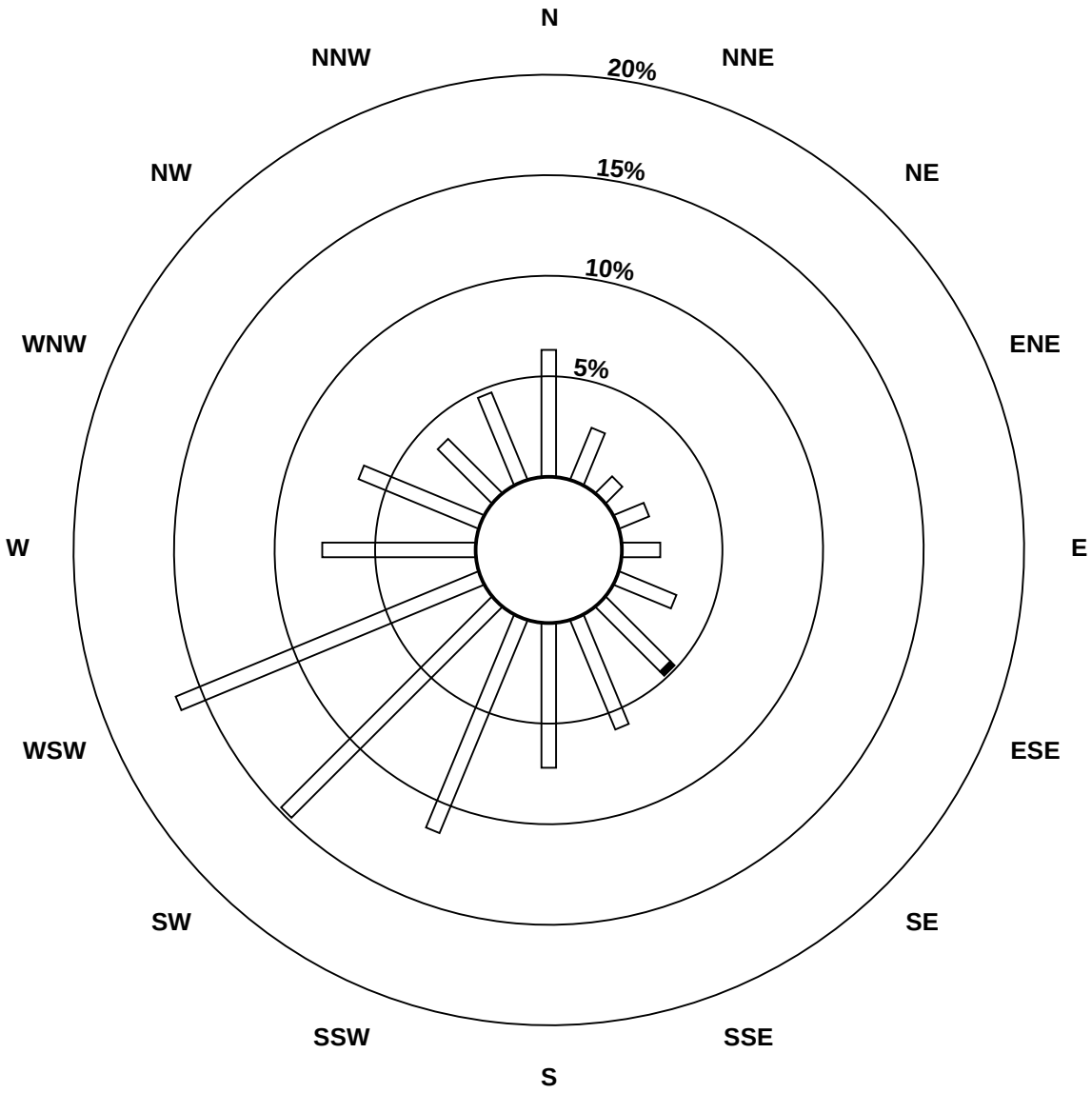
Total Number of Hours: 744

Wood Buffalo Environmental Association

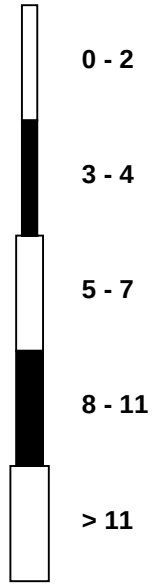
Wind Rose Aug 2015

Total Reduced Sulphur (TRS) - ppb

Fort McKay South (AMS 13)



Classes (ppb)



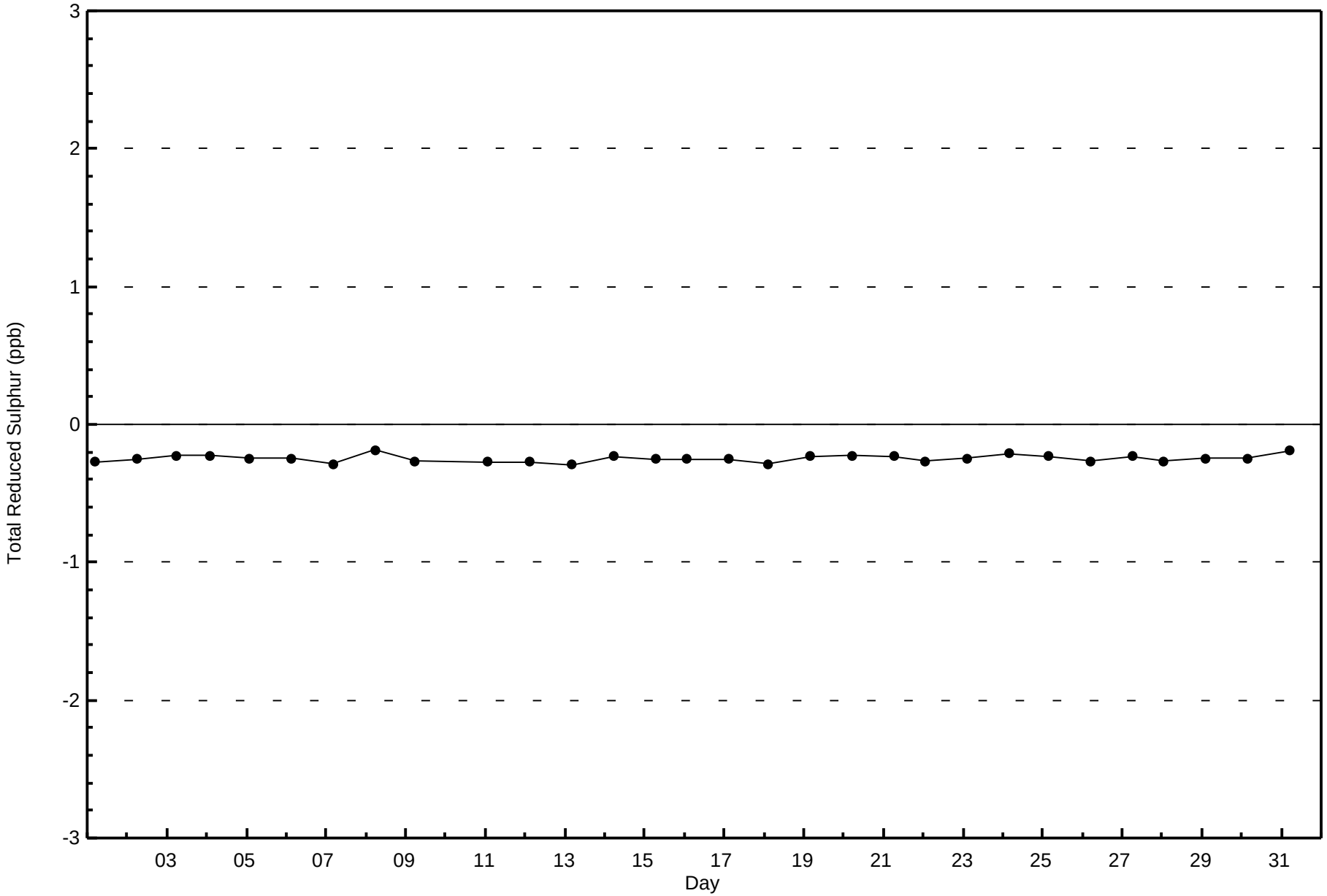
Total Number of Valid Hours: 681

Wood Buffalo Environmental Association

Zero Responses

Total Reduced Sulphur (TRS) - ppb

Fort McKay South - August 2015

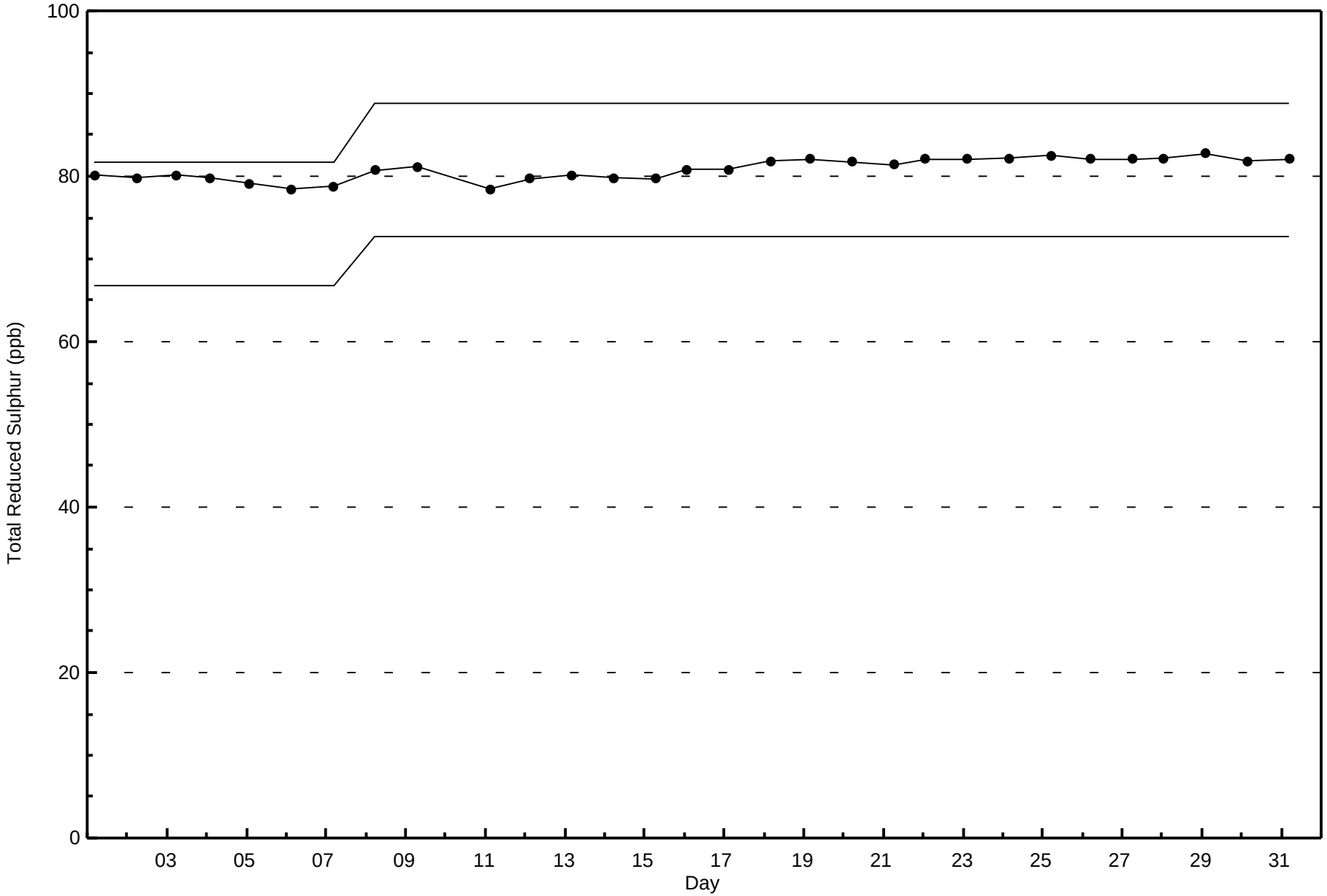


Wood Buffalo Environmental Association

Span Responses

Total Reduced Sulphur (TRS) - ppb

Fort McKay South - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Fort McKay South - August 2015

Maximum Value: 4.1 ppm on Aug 2 09:00

Maximum Daily Average: 2.4 ppm on Aug 25

Minimum Value: 1.9 ppm on Aug 19 18:00

Minimum Daily Average: 2.0 ppm on Aug 20

Maximum Diurnal Average: 2.4 ppm at hour 9

Minimum Diurnal Average: 2.0 ppm at hour 18

Monthly Average: 2.15 ppm

Percentiles: P_1 = 1.9 P_{10} = 2.0 Q_1 = 2.0 Median = 2.1 Q_3 = 2.2 P_{90} = 2.4 P_{99} = 2.8

Hours in Service:	744
Hours of Data:	680
Hours of Missing Data:	64
Hours of Calibration:	35
Percent Operational Time:	96.1

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	2.3	2.3	2.3	Z	2.3	2.2	2.2	2.3	2.4	2.2	2.2	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.2	2.4
2-Aug	2.1	2.1	2.1	2.2	Z	2.2	2.2	2.7	4.1	2.9	2.5	2.3	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.3	4.1
3-Aug	2.2	2.3	2.3	2.3	2.3	Z	2.4	2.5	2.8	2.5	2.8	2.7	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.3	2.8
4-Aug	Z	2.2	2.3	2.4	2.5	2.4	2.3	2.4	2.4	2.4	2.5	2.7	2.5	2.5	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.7
5-Aug	2.1	Z	2.2	2.2	2.2	2.5	2.4	C	C	C	C	C	2.1	2.0	2.1	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.5
6-Aug	2.1	2.1	Z	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.0	2.1
7-Aug	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2
8-Aug	2.2	2.2	2.2	2.3	Z	2.4	2.4	2.6	2.5	2.3	2.3	2.2	2.2	2.2	2.2	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.6
9-Aug	2.2	2.2	2.2	2.3	2.3	Z	2.4	2.3	2.5	2.4	2.5	2.3	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	--	2.5
10-Aug	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	2.0	2.0	2.1	2.1	2.4	2.2	2.0	--	2.4
11-Aug	2.0	Z	2.1	2.1	2.1	2.1	2.1	2.2	2.0	2.0	2.0	1.9	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2
12-Aug	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.1
13-Aug	2.0	2.1	2.1	Z	2.1	2.2	2.3	2.3	2.1	2.4	2.4	2.5	2.5	2.0	1.9	2.0	2.0	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.1	2.5
14-Aug	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1	2.0	2.0	2.1
15-Aug	2.0	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	2.1	2.1	2.2	2.1	2.1	2.3	2.3	2.1	2.3
16-Aug	Z	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2
17-Aug	2.1	Z	2.1	2.2	2.2	2.2	2.4	2.6	2.5	2.5	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	2.6
18-Aug	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.2	2.1	2.2	2.2	2.1	2.2	2.3	2.3	2.4	2.4	2.6	2.2	2.6
19-Aug	2.8	2.7	2.5	Z	2.8	2.0	2.1	2.1	2.6	2.1	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1	2.8
20-Aug	2.0	2.0	1.9	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
21-Aug	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
22-Aug	Z	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
23-Aug	2.1	Z	2.2	2.2	2.2	2.2	2.3	2.4	2.5	2.4	2.3	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.0	2.2	2.5
24-Aug	2.0	2.5	Z	2.2	2.3	2.4	2.4	2.3	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.2	2.4	2.2	2.5
25-Aug	2.5	2.5	2.5	Z	2.4	2.3	2.3	2.2	2.7	3.6	3.1	2.2	2.3	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.4	3.6
26-Aug	2.2	2.1	2.1	2.1	Z	2.2	2.1	2.1	2.2	2.4	2.3	2.2	2.2	2.1	2.2	2.1	2.1	2.1	2.4	2.1	2.1	2.1	2.1	2.1	2.2	2.4
27-Aug	2.1	2.1	2.2	2.2	2.2	Z	2.3	2.7	3.0	3.1	2.6	2.3	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.3	2.5	2.1	2.0	2.3	3.1
28-Aug	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.1
29-Aug	2.2	Z	2.2	2.1	2.0	2.1	2.1	2.4	2.2	3.0	2.5	2.2	2.3	2.3	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.0	2.2	3.0
30-Aug	2.0	2.0	Z	2.0	2.1	2.1	2.1	2.3	2.4	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.3	2.5	2.3	2.2	2.1	2.5
31-Aug	2.2	2.3	2.4	Z	2.5	2.7	2.7	2.6	2.7	2.5	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.1	2.2	2.2	2.7
	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.3	2.4	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	Diurnal Average	
	2.8	2.7	2.5	2.4	2.8	2.7	2.7	2.7	4.1	3.6	3.1	2.7	2.5	2.5	2.2	2.3	2.2	2.1	2.4	2.3	2.3	2.5	2.4	2.6	Diurnal Maximum	

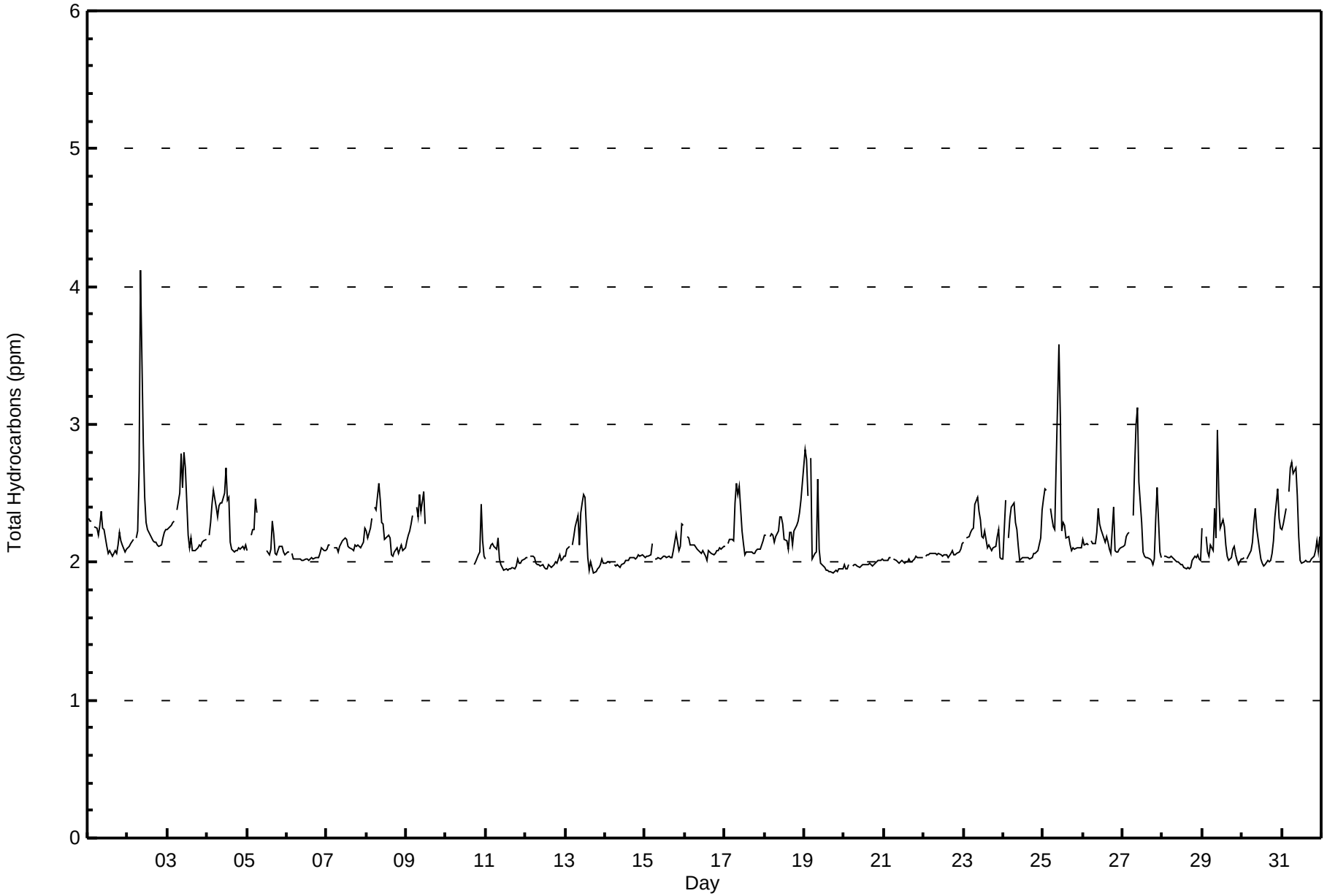
Z - zerospan C - Calibration PF - Power Failure

Wood Buffalo Environmental Association

Hourly Averages

Total Hydrocarbons (THC) - ppm

Fort McKay South - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm

Fort McKay South - August 2015

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	243	35.74	35.74
2.1 - 3.0	433	63.68	99.41
3.1 - 10.0	4	0.59	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

Fort McKay South - August 2015

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	9	2	2	1	2	3	8	6	3	21	59	65	27	23	7	5	243
2.1 - 3.0	38	16	4	10	11	15	24	35	46	59	36	47	22	21	19	28	431
3.1 - 10.0	0	2	0	0	0	1	1	0	0	0	0	0	0	0	0	0	4
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	47	20	6	11	13	19	33	41	49	80	95	112	49	44	26	33	678

Total Number of Valid Hours: 678

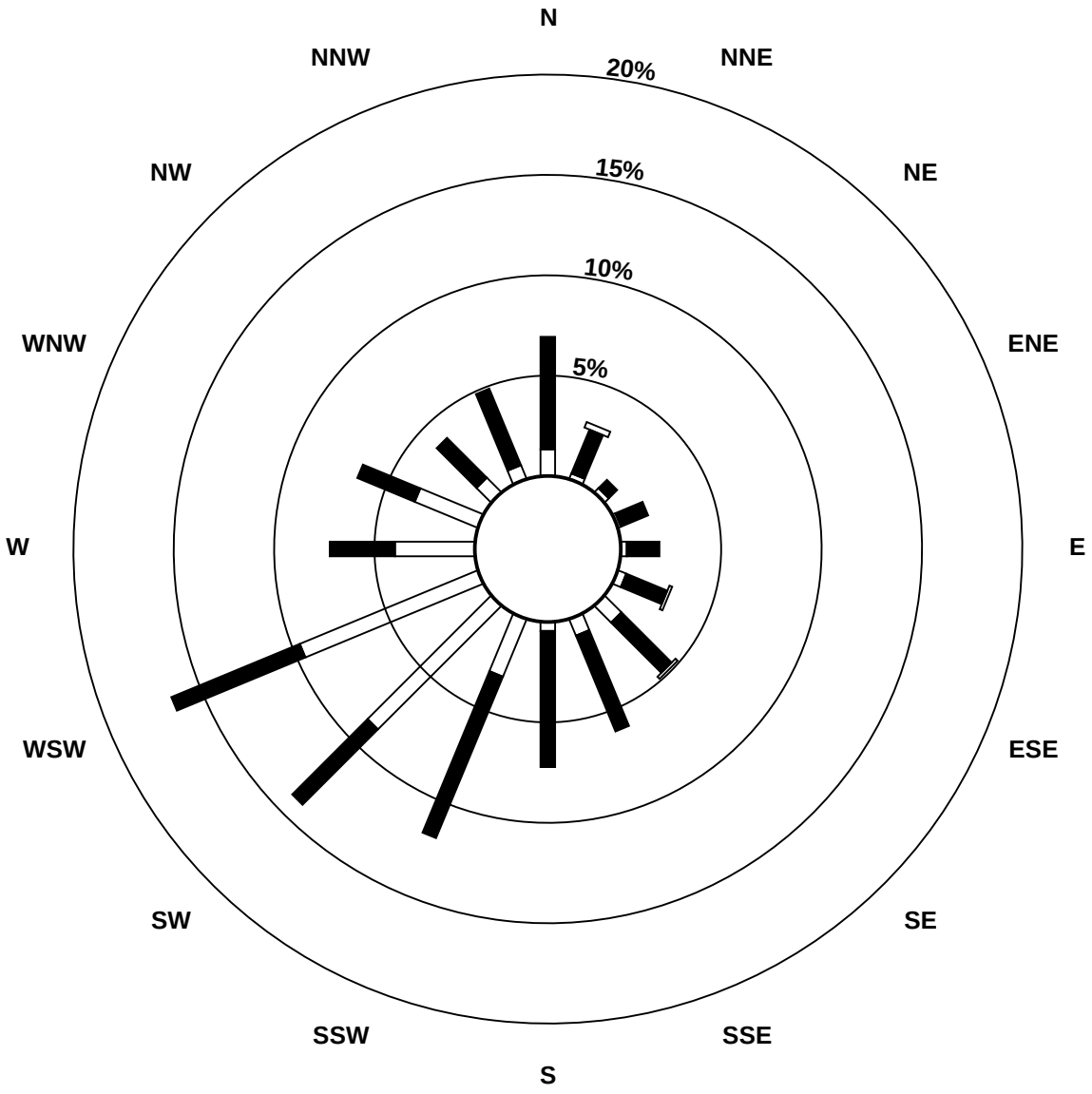
Total Number of Hours: 744

Wood Buffalo Environmental Association

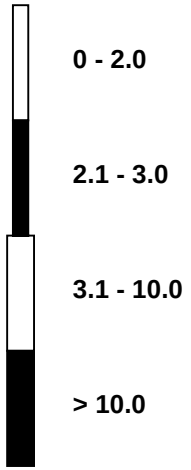
Wind Rose Aug 2015

Total Hydrocarbons (THC) - ppm

Fort McKay South (AMS 13)



Classes (ppm)



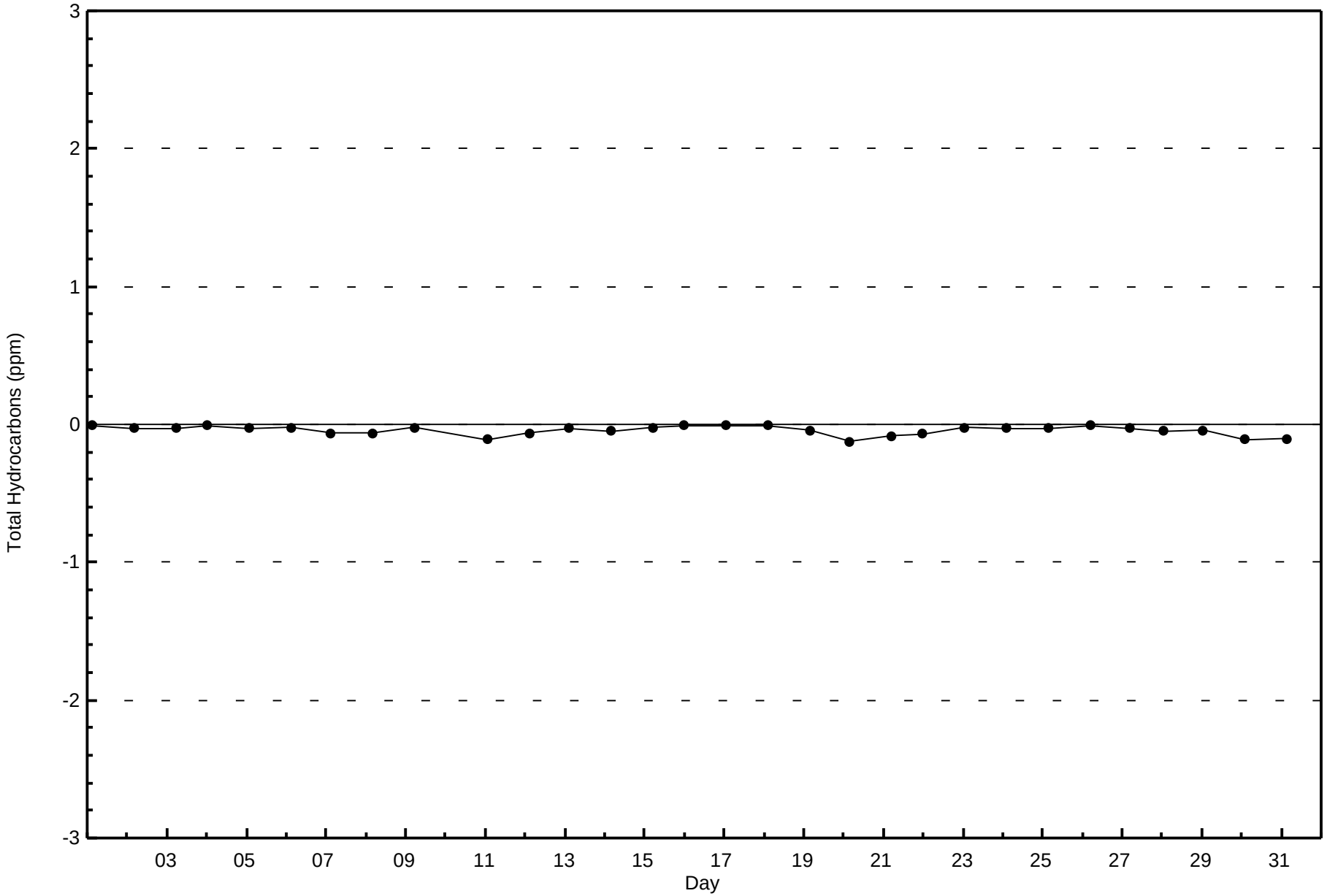
Total Number of Valid Hours: 678

Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Fort McKay South - August 2015

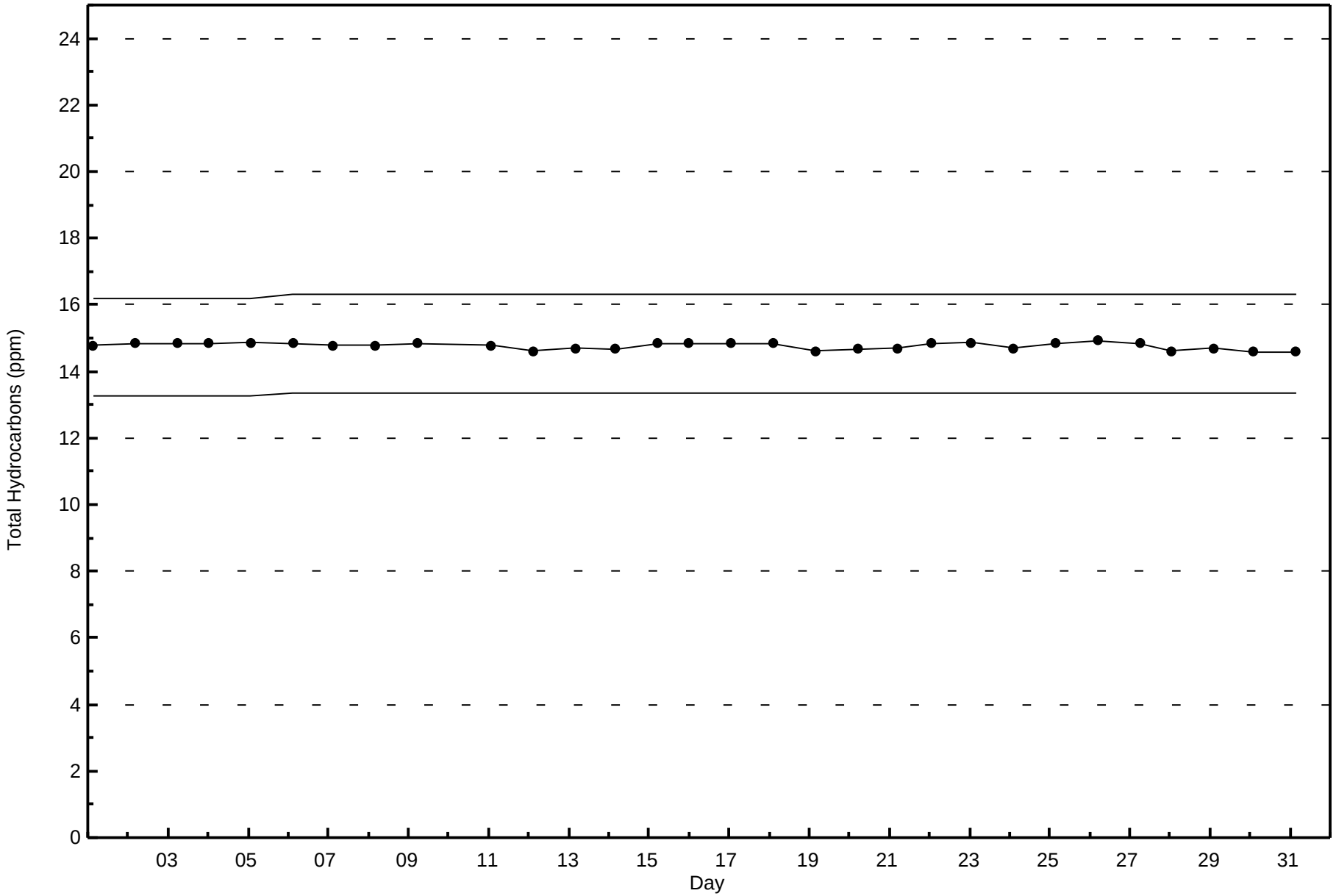


Wood Buffalo Environmental Association

Span Responses

Total Hydrocarbons (THC) - ppm

Fort McKay South - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O_3) - ppb

Fort McKay South - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 41 ppb on Aug 3 15:00

Maximum Daily Average: 22.7 ppb on Aug 12

Minimum Value: 0 ppb on Aug 23 07:00

Minimum Daily Average: 6.1 ppb on Aug 6

Maximum Diurnal Average: 25.9 ppb at hour 17

Minimum Diurnal Average: 5.1 ppb at hour 5

Monthly Average: 14.2 ppb

Percentiles: $P_1 = 0$ $P_{10} = 1$ $Q_1 = 5$ Median = 14 $Q_3 = 22$ $P_{90} = 29$ $P_{99} = 36$

Hours in Service:	744
Hours of Data:	683
Hours of Missing Data:	61
Hours of Calibration:	33
Percent Operational Time:	96.2

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	1	0	1	0	1	Z	3	4	4	13	20	24	23	22	20	23	25	24	22	12	7	4	7	2	11.4	25
2-Aug	1	0	0	0	0	1	Z	3	7	15	24	34	37	36	33	32	32	18	16	6	4	1	2	1	13.2	37
3-Aug	0	0	0	0	0	0	3	Z	10	15	23	26	33	31	41	28	24	22	17	9	4	2	2	1	12.7	41
4-Aug	1	1	Z	0	1	2	3	3	3	6	7	9	12	12	13	14	15	14	7	4	14	13	6	4	7.1	15
5-Aug	4	5	3	Z	1	1	2	2	8	14	14	14	19	18	20	18	17	18	15	14	14	10	8	8	10.7	20
6-Aug	6	5	6	5	Z	7	6	6	C	C	C	3	7	11	11	10	10	9	8	7	3	1	0	0	6.1	11
7-Aug	1	1	0	0	0	Z	1	2	5	6	6	8	12	19	25	30	31	27	17	5	2	1	0	0	8.7	31
8-Aug	2	3	5	3	1	1	Z	6	6	6	11	16	26	31	31	15	22	28	21	21	13	3	2	1	11.9	31
9-Aug	0	0	0	0	0	0	2	Z	7	16	22	32	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	--	32
10-Aug	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	33	32	28	15	6	3	18	22	--	33
11-Aug	20	18	10	Z	3	2	2	8	17	23	25	26	27	30	30	29	29	28	26	15	22	21	15	17	19.3	30
12-Aug	21	20	20	19	Z	17	21	21	21	23	24	25	27	28	28	30	30	29	28	24	12	17	18	20	22.7	30
13-Aug	13	8	5	3	3	Z	2	5	10	6	8	14	7	13	17	18	24	23	22	16	9	5	9	15	11.1	24
14-Aug	17	16	17	19	19	22	Z	21	21	22	21	21	20	18	16	14	14	15	16	16	15	14	15	15	17.6	22
15-Aug	14	14	15	13	10	14	19	Z	18	20	24	26	27	26	24	24	24	21	19	16	17	12	6	3	17.6	27
16-Aug	4	6	Z	5	6	6	5	5	9	12	15	12	20	22	24	25	25	21	18	11	9	8	3	8	12.1	25
17-Aug	14	8	7	Z	2	1	1	7	8	14	20	26	28	28	28	29	25	24	25	16	12	7	4	3	14.7	29
18-Aug	3	3	2	1	Z	3	7	10	13	15	18	23	26	25	31	35	33	30	18	9	4	2	3	1	13.7	35
19-Aug	3	5	14	15	19	Z	21	19	20	21	22	21	23	30	30	29	29	26	19	13	9	7	9	7	17.8	30
20-Aug	11	10	11	12	11	16	Z	17	18	18	17	16	15	15	15	17	17	18	18	14	14	15	10	10	14.6	18
21-Aug	12	13	12	10	9	10	11	Z	13	13	14	16	17	18	17	17	16	14	13	8	10	15	14	11	13.1	18
22-Aug	10	10	Z	12	12	11	10	10	10	12	13	19	22	23	24	23	23	22	18	7	2	1	1	1	12.9	24
23-Aug	0	0	0	Z	0	0	0	3	12	12	15	23	25	23	30	34	38	35	24	12	14	18	22	3	14.9	38
24-Aug	3	5	9	10	Z	1	3	10	12	17	21	24	25	26	26	26	26	25	14	8	6	8	6	3	13.8	26
25-Aug	1	1	0	0	0	Z	0	2	5	5	7	15	16	16	15	14	14	12	7	4	3	2	7	14	7.1	16
26-Aug	11	11	10	3	1	1	Z	6	12	15	20	21	24	29	29	31	31	26	14	6	5	10	10	5	14.4	31
27-Aug	3	1	0	0	0	0	0	Z	10	16	20	28	32	32	33	33	37	37	32	20	4	3	26	28	17.2	37
28-Aug	29	23	Z	25	20	21	22	22	22	24	26	27	30	32	31	31	31	30	16	9	7	9	9	4	21.6	32
29-Aug	3	6	6	Z	7	3	4	5	18	20	26	30	36	37	36	34	36	36	18	10	13	24	27	22	19.8	37
30-Aug	8	3	5	5	Z	1	1	7	16	24	31	33	32	33	34	33	33	30	28	23	9	4	6	2	17.4	34
31-Aug	1	1	1	1	1	Z	1	2	9	16	21	30	32	32	32	32	32	31	29	24	12	14	22	2	16.3	32
	7.3	6.7	6.1	6.6	5.1	5.9	6.0	8.3	11.8	15.1	18.4	21.4	23.4	24.5	25.6	25.1	25.9	24.2	19.1	12.5	9.2	8.5	9.5	7.7	Diurnal Average	
	29	23	20	25	20	22	22	22	22	24	31	34	37	37	41	35	38	37	32	24	22	24	27	28	Diurnal Maximum	

Z - zerospan C - Calibration PF - Power Failure

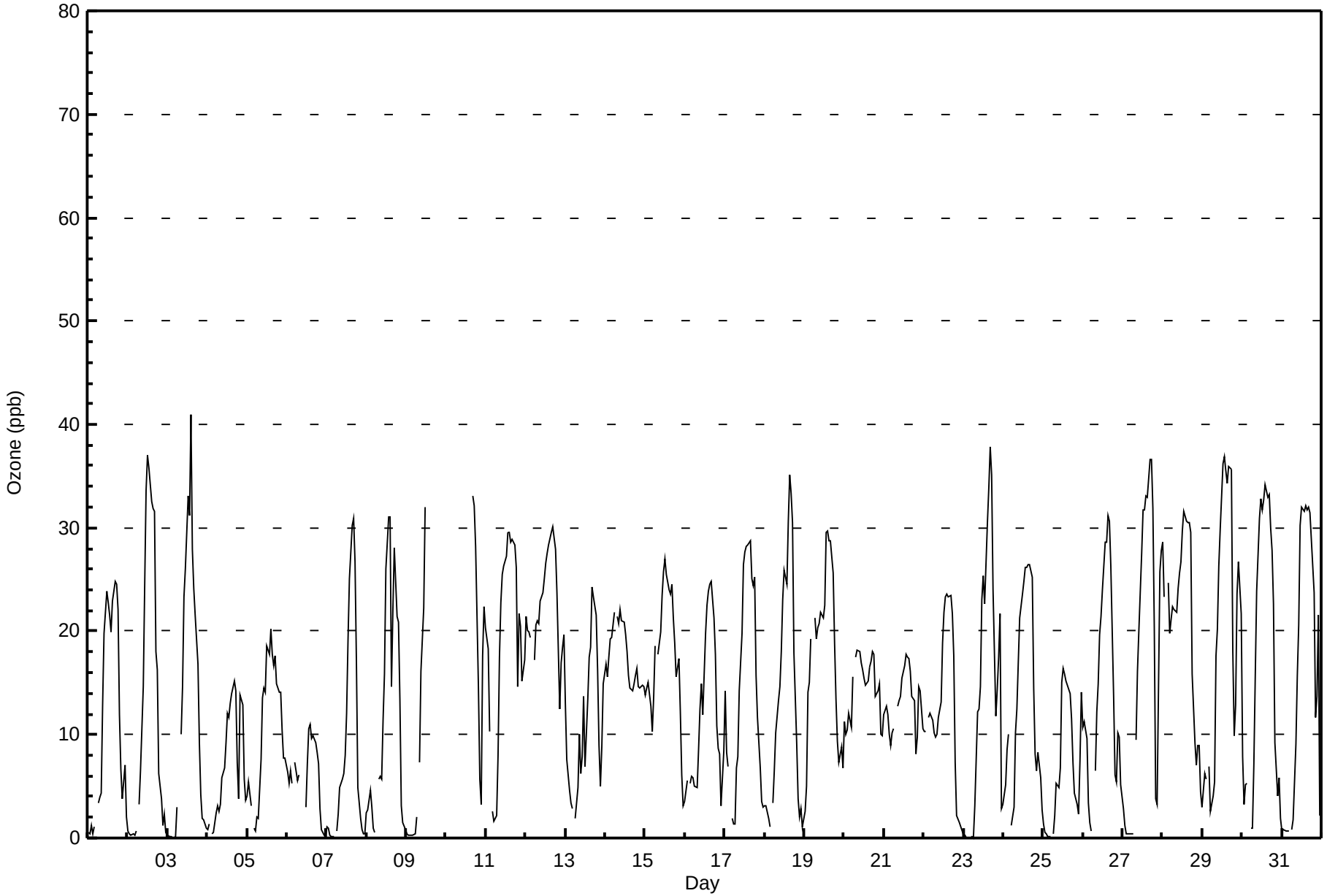
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb

Wood Buffalo Environmental Association

Hourly Averages

Ozone (O_3) - ppb

Fort McKay South - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Ozone (O_3) - ppb

Fort McKay South - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	481	70.42	70.42
21 - 50	202	29.58	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 683

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Ozone (O_3) - ppb

Fort McKay South - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	35	13	7	6	8	15	16	25	39	60	58	77	37	38	18	27	479
21 - 50	11	7	0	5	5	5	14	15	7	21	41	36	13	6	9	7	202
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	46	20	7	11	13	20	30	40	46	81	99	113	50	44	27	34	681

Total Number of Valid Hours: 681

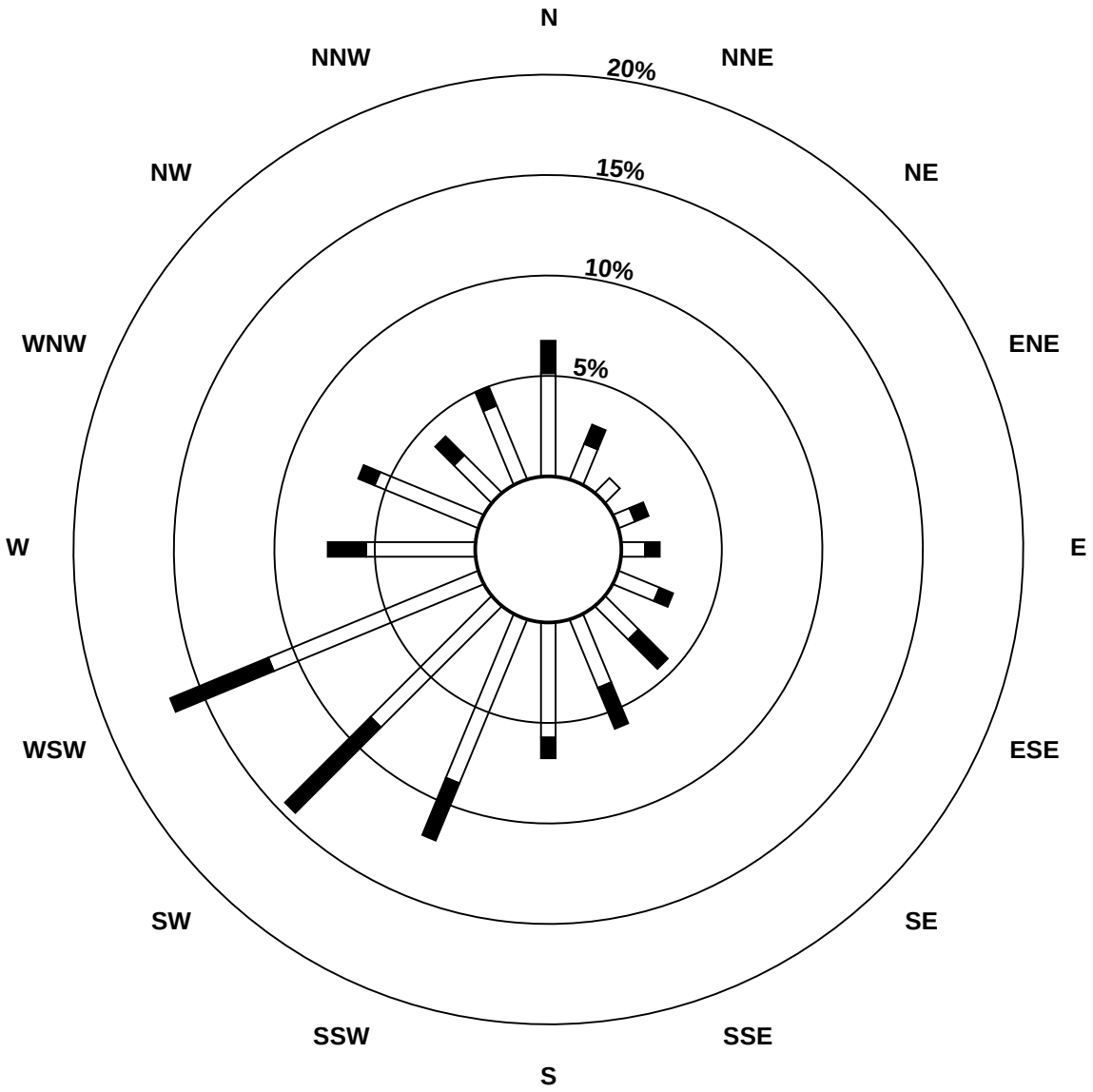
Total Number of Hours: 744

Wood Buffalo Environmental Association

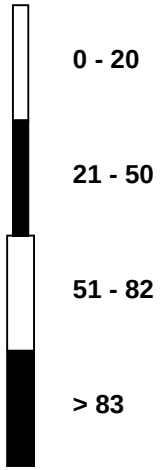
Wind Rose Aug 2015

Ozone (O_3) - ppb

Fort McKay South (AMS 13)



Classes (ppb)



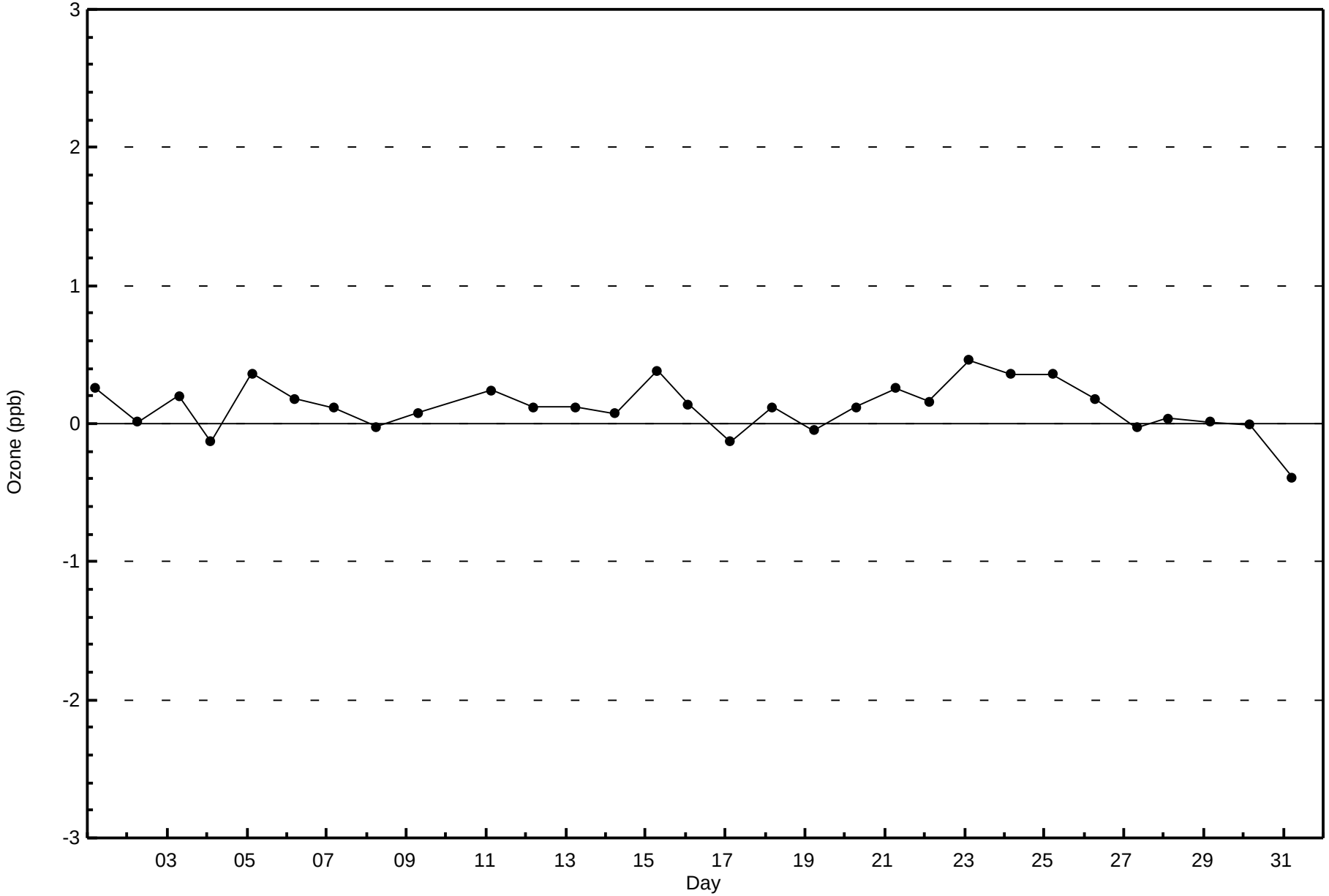
Total Number of Valid Hours: 681

Wood Buffalo Environmental Association

Zero Responses

Ozone (O_3) - ppb

Fort McKay South - August 2015

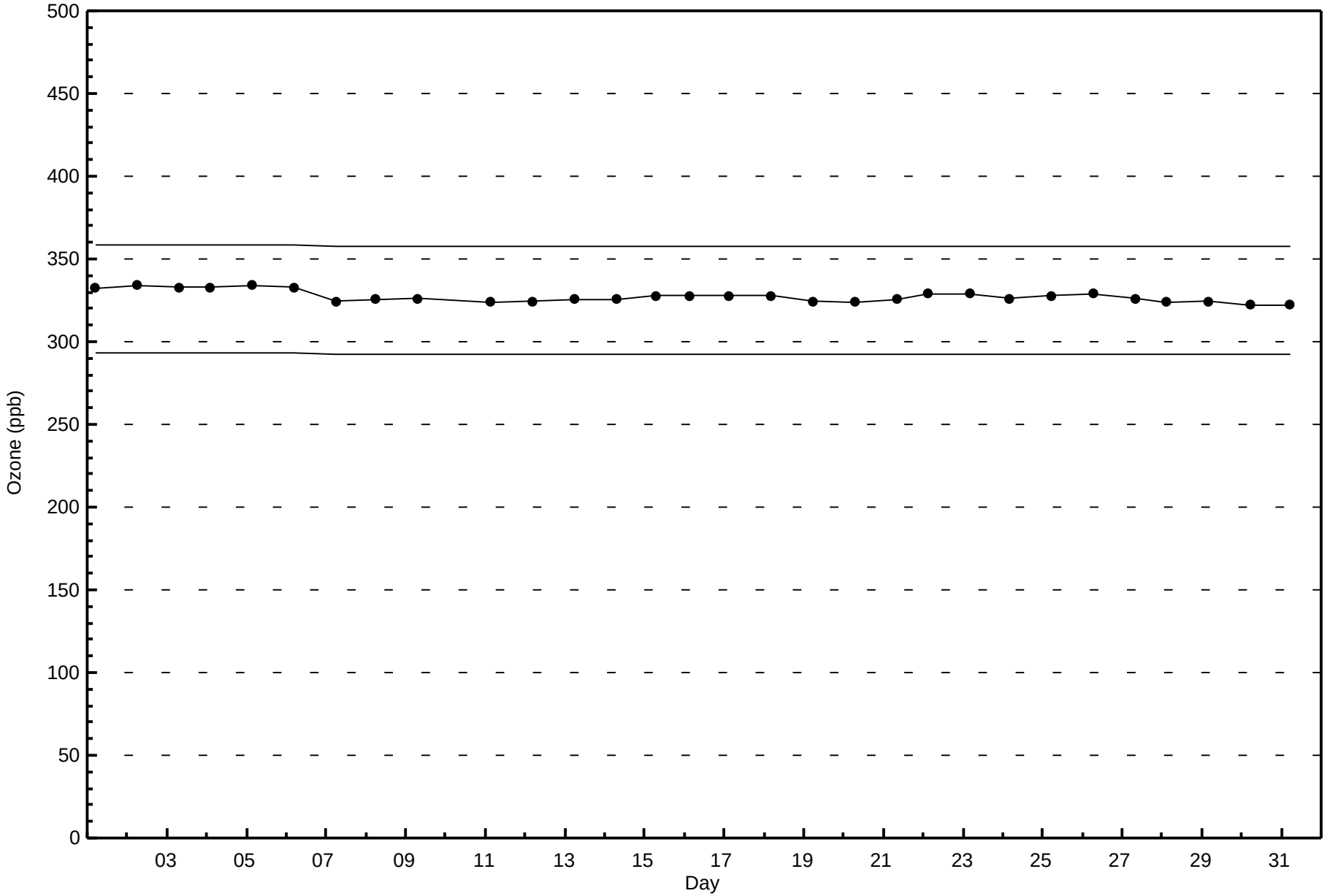


Wood Buffalo Environmental Association

Span Responses

Ozone (O_3) - ppb

Fort McKay South - August 2015



Maximum Value: 36 ppb on Aug 25 10:00

Maximum Daily Average: 4.1 ppb on Aug 25

Minimum Value: 0 ppb on Aug 1 16:00

Minimum Daily Average: 0.0 ppb on Aug 14

Maximum Diurnal Average: 4.3 ppb at hour 10

Minimum Diurnal Average: 0.0 ppb at hour 20

Monthly Average: 0.9 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 3$ $P_{99} = 11$

Hours in Service:	744
Hours of Data:	681
Hours of Missing Data:	63
Hours of Calibration:	35
Percent Operational Time:	96.2

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0	0	0	Z	0	0	0	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2
2-Aug	0	0	0	0	Z	0	0	18	31	9	5	1	1	0	0	0	0	0	0	0	0	0	0	0	2.9	31
3-Aug	0	0	0	0	0	Z	2	3	9	9	5	5	1	0	0	0	0	0	0	0	0	0	0	0	1.5	9
4-Aug	Z	0	0	1	2	1	1	4	4	8	12	10	4	3	0	0	0	0	0	0	0	0	0	0	2.2	12
5-Aug	0	Z	0	0	0	2	2	C	C	C	C	C	0	0	0	1	1	0	0	0	0	0	0	0	0.4	2
6-Aug	0	0	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
7-Aug	0	0	0	Z	0	0	0	1	1	3	4	6	3	2	1	0	0	0	0	0	0	0	0	1	1.0	6
8-Aug	0	0	0	0	Z	0	2	5	7	13	9	7	2	0	0	0	0	0	0	0	0	0	0	0	2.0	13
9-Aug	0	0	0	0	0	Z	3	4	6	3	4	1	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	--	6
10-Aug	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	0	0	0	0	0	6	0	0	--	6
11-Aug	0	Z	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	2
12-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
13-Aug	0	0	0	Z	0	1	2	6	3	6	4	1	1	0	0	1	0	0	0	0	0	0	0	0	1.1	6
14-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
15-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
16-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
17-Aug	0	Z	0	0	0	0	11	11	9	4	3	1	0	0	0	0	0	0	0	0	0	0	0	0	1.7	11
18-Aug	0	0	Z	0	0	0	0	1	3	5	4	3	1	0	0	1	1	0	0	0	0	0	0	2	0.9	5
19-Aug	0	0	0	Z	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
20-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
21-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
22-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
23-Aug	0	Z	0	0	0	0	0	1	1	6	6	2	2	2	0	1	0	0	0	0	0	0	0	0	0.9	6
24-Aug	0	0	Z	0	0	0	4	4	5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	5
25-Aug	0	0	0	Z	0	0	0	2	8	36	30	5	4	3	2	2	1	0	0	0	0	0	0	0	4.1	36
26-Aug	0	0	0	0	Z	0	0	1	4	6	3	3	2	1	1	1	0	0	0	0	0	0	0	0	1.0	6
27-Aug	0	0	0	0	0	Z	2	18	7	5	4	1	0	0	0	0	0	0	0	0	6	10	0	0	2.4	18
28-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
29-Aug	0	Z	0	0	0	0	0	3	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0.5	3
30-Aug	0	0	Z	0	0	0	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.3	2
31-Aug	4	1	0	Z	2	4	5	4	4	3	2	0	0	0	0	0	0	0	0	0	2	3	0	4	1.6	5
	0.2	0.1	0.1	0.1	0.2	0.4	1.3	3.1	3.8	4.3	3.3	1.6	0.7	0.4	0.2	0.2	0.1	0.1	0.0	0.0	0.3	0.7	0.1	0.3	Diurnal Average	
	4	1	0	1	2	4	11	18	31	36	30	10	4	3	2	2	1	0	0	0	6	10	0	4	Diurnal Maximum	

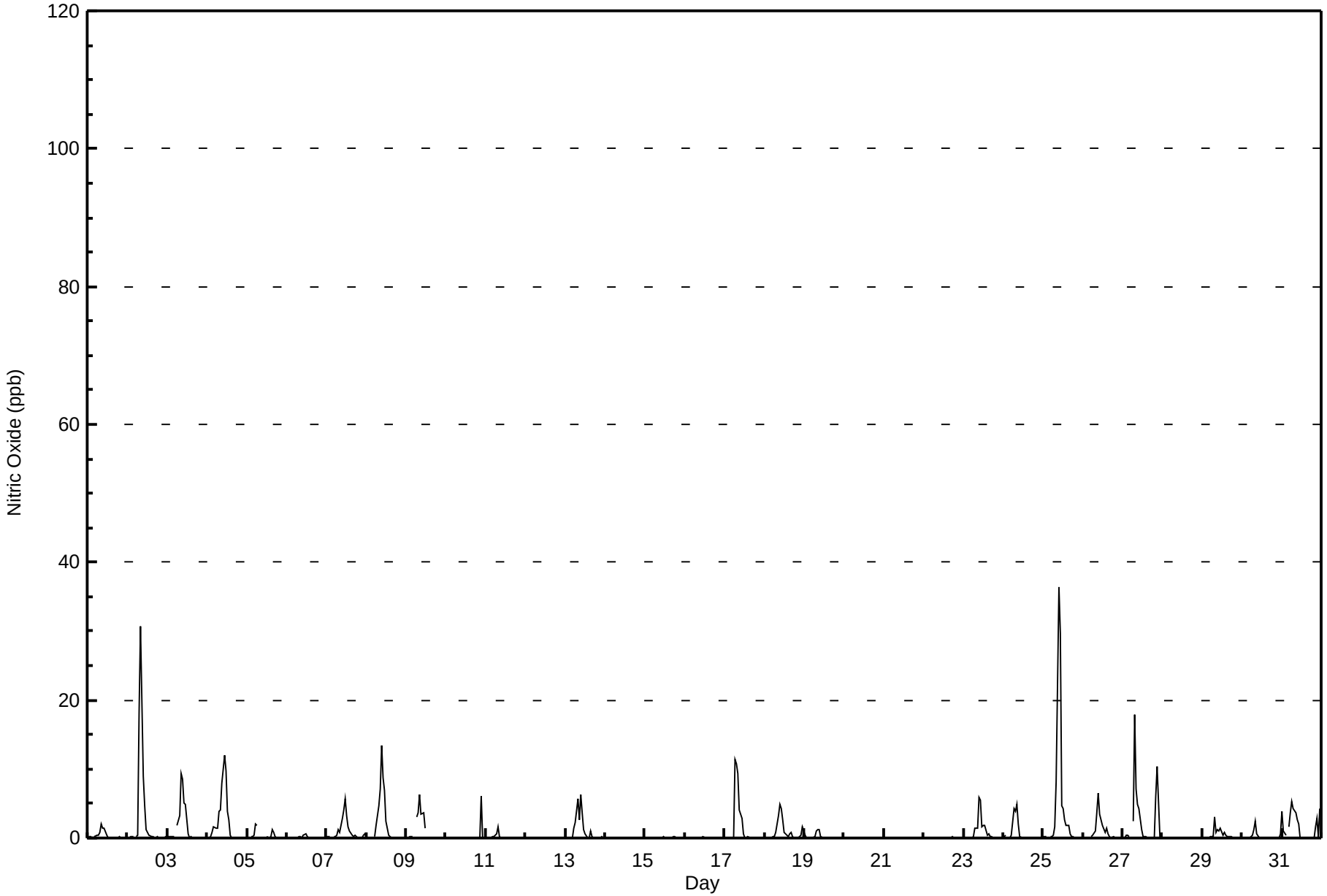
Z - zerospan C - Calibration PF - Power Failure

Wood Buffalo Environmental Association

Hourly Averages

Nitric Oxide (NO) - ppb

Fort McKay South - August 2015



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	678	99.56	99.56
21 - 40	3	0.44	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: 681

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Nitric Oxide (NO) - ppb

Fort McKay South - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	47	18	6	11	13	18	33	41	49	80	96	112	49	44	26	33	676
21 - 40	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	3
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	47	20	6	11	13	19	33	41	49	80	96	112	49	44	26	33	679

Total Number of Valid Hours: 679

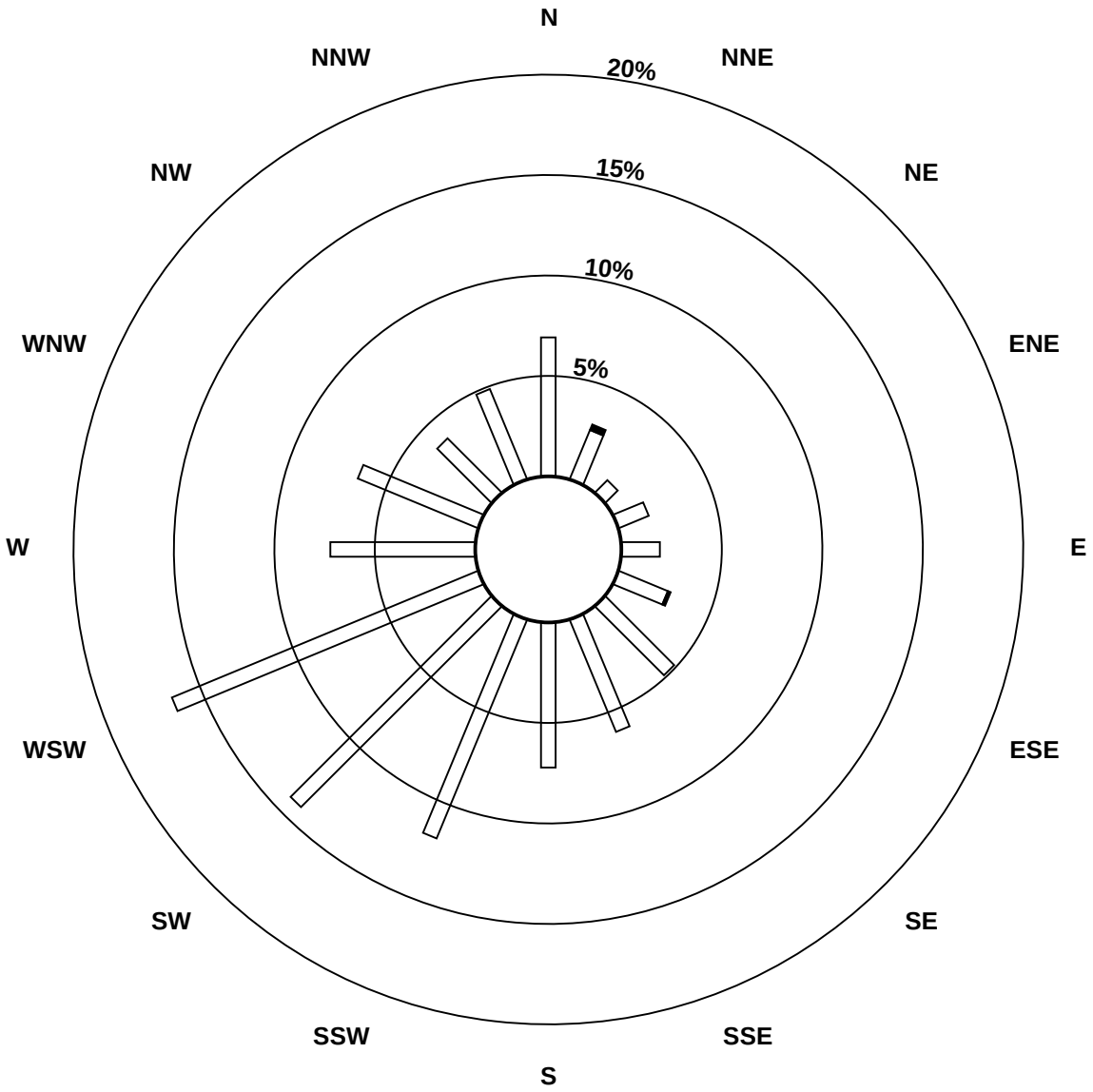
Total Number of Hours: 744

Wood Buffalo Environmental Association

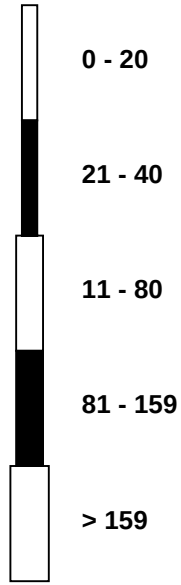
Wind Rose Aug 2015

Nitric Oxide (NO) - ppb

Fort McKay South (AMS 13)



Classes (ppb)



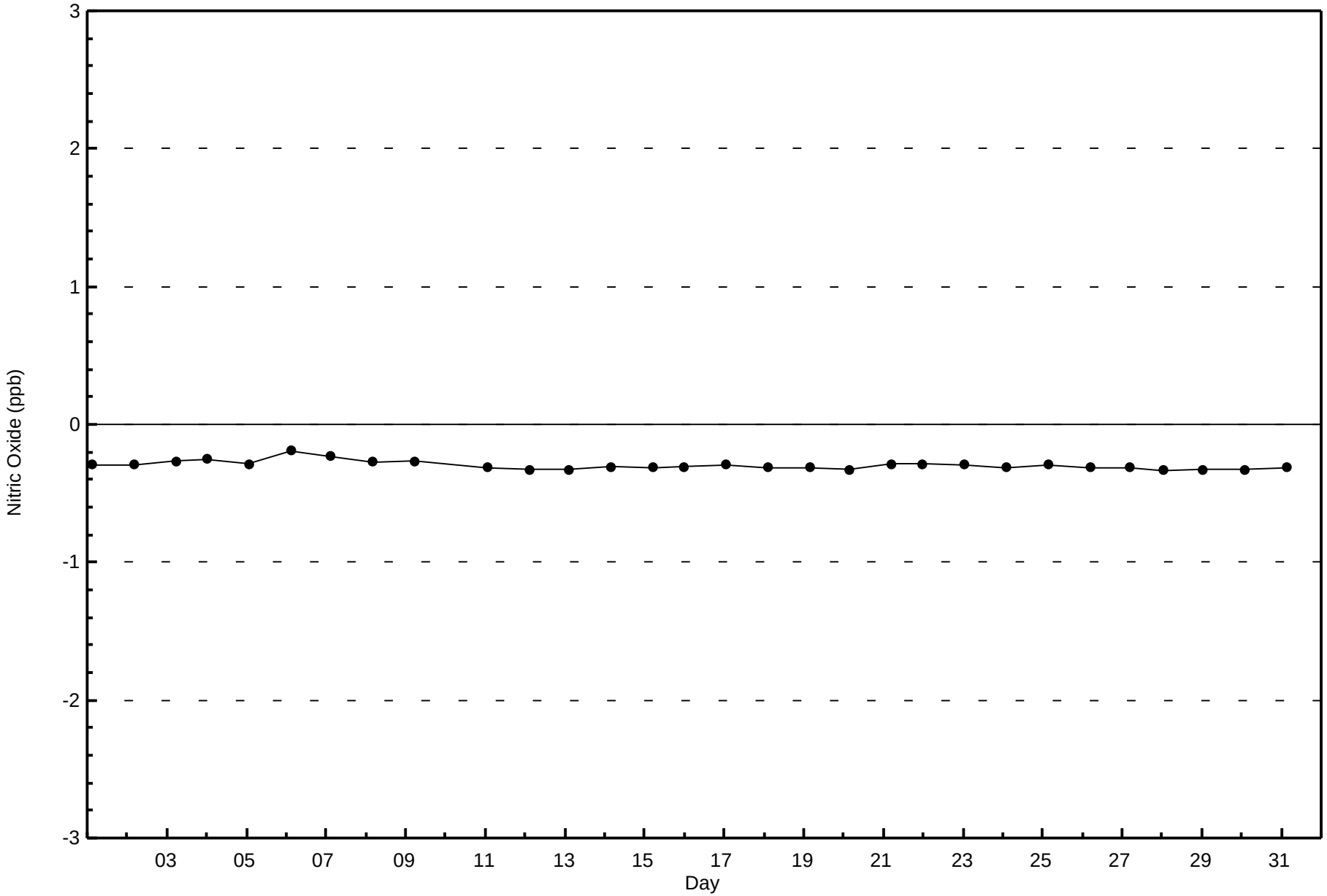
Total Number of Valid Hours: 679

Wood Buffalo Environmental Association

Zero Responses

Nitric Oxide (NO) - ppb

Fort McKay South - August 2015

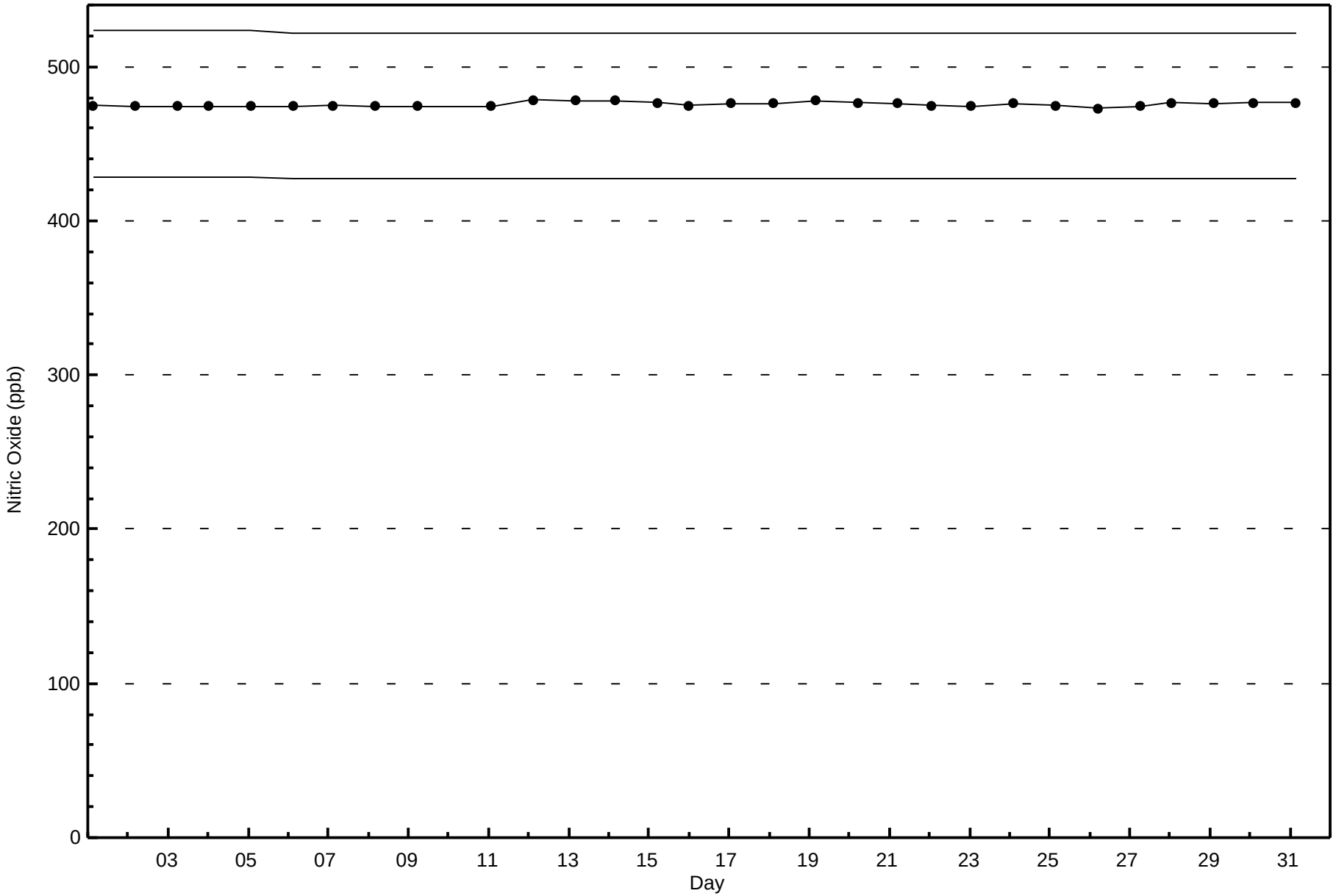


Wood Buffalo Environmental Association

Span Responses

Nitric Oxide (NO) - ppb

Fort McKay South - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO_2) - ppb

Fort McKay South - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 24 ppb on Aug 27 22:00 Maximum Daily Average: 4.8 ppb on Aug 4

Minimum Value: 0 ppb on Aug 2 01:00
Maximum Diurnal Average: 4.7 ppb at hour 10
Monthly Average: 1.9 ppb

Minimum Daily Average: 0.1 ppb on Aug 14
Minimum Diurnal Average: 0.9 ppb at hour 20
Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 1 $Q_3 = 3$ $P_{90} = 6$ $P_{99} = 14$

Hours in Service:	744
Hours of Data:	681
Hours of Missing Data:	63
Hours of Calibration:	35
Percent Operational Time:	96.2

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	1	0	1	Z	1	1	1	2	2	2	3	2	1	1	0	0	1	0	1	2	1	0	0	0	0.9	3
2-Aug	0	0	0	0	Z	0	0	7	15	13	11	5	5	3	2	2	3	2	2	1	1	1	1	1	3.2	15
3-Aug	0	0	0	0	0	Z	2	4	10	12	11	11	3	1	2	1	1	1	1	1	1	1	1	1	2.8	12
4-Aug	Z	1	5	5	8	9	6	8	7	9	12	12	8	7	2	1	1	1	1	1	2	3	1	1	4.8	12
5-Aug	1	Z	7	8	6	7	7	C	C	C	C	C	1	0	1	5	3	1	1	1	1	4	3	1	3.2	8
6-Aug	2	1	Z	0	0	0	1	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2
7-Aug	0	0	0	Z	0	0	0	1	1	2	4	4	4	3	3	2	2	4	3	1	1	1	2	4	1.8	4
8-Aug	5	3	1	1	Z	1	1	4	6	8	9	10	6	3	2	1	1	1	1	1	1	1	1	0	3.0	10
9-Aug	0	0	0	0	0	Z	2	3	5	6	8	6	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	--	8
10-Aug	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	0	0	0	0	1	14	8	1	--	14
11-Aug	1	Z	2	2	3	1	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	3
12-Aug	0	1	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
13-Aug	0	0	0	Z	0	2	2	5	4	8	6	5	4	1	0	3	1	1	1	0	0	1	3	0	2.1	8
14-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
15-Aug	0	0	0	0	2	Z	1	1	0	0	0	1	0	0	0	1	1	2	2	2	1	1	4	3	0.9	4
16-Aug	Z	1	1	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0.3	1
17-Aug	0	Z	0	0	0	0	4	7	9	6	5	2	1	1	1	1	1	0	0	0	1	1	2	2	1.9	9
18-Aug	1	0	Z	0	1	1	0	1	4	6	6	5	4	3	1	4	7	3	2	1	3	6	10	11	3.5	11
19-Aug	7	4	3	Z	5	3	5	6	5	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2.0	7
20-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
21-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
22-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0.2	1
23-Aug	0	Z	0	0	0	0	0	2	3	7	7	4	4	7	2	4	3	2	2	1	4	7	1	0	2.6	7
24-Aug	0	9	Z	2	2	2	7	6	8	4	1	0	0	0	0	0	0	0	0	0	0	0	2	5	2.1	9
25-Aug	4	3	3	Z	1	1	0	1	5	18	16	7	7	7	5	6	4	3	3	1	1	1	1	2	4.3	18
26-Aug	3	3	3	1	Z	0	1	2	6	10	6	6	5	3	5	3	2	0	1	0	0	0	0	0	2.7	10
27-Aug	0	0	1	1	0	Z	1	5	7	9	9	4	2	1	1	1	1	1	0	1	14	24	3	1	3.8	24
28-Aug	Z	1	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	1	1	0.4	1
29-Aug	4	Z	1	1	3	3	1	4	2	4	4	5	3	4	3	2	2	3	2	2	1	1	0	2	2.4	5
30-Aug	1	1	Z	1	1	1	1	2	5	3	1	1	0	0	0	1	1	1	3	5	4	5	3	6	2.0	6
31-Aug	10	5	3	Z	1	1	1	2	4	5	3	0	0	0	0	0	0	0	0	1	3	9	4	17	3.1	17
	1.6	1.4	1.3	1.0	1.4	1.4	1.6	2.7	3.9	4.7	4.3	3.2	2.0	1.6	1.2	1.3	1.1	0.9	0.9	0.9	1.5	2.7	1.7	1.9	Diurnal Average	
	10	9	7	8	8	9	7	8	15	18	16	12	8	7	5	6	7	4	3	5	14	24	10	17	Diurnal Maximum	

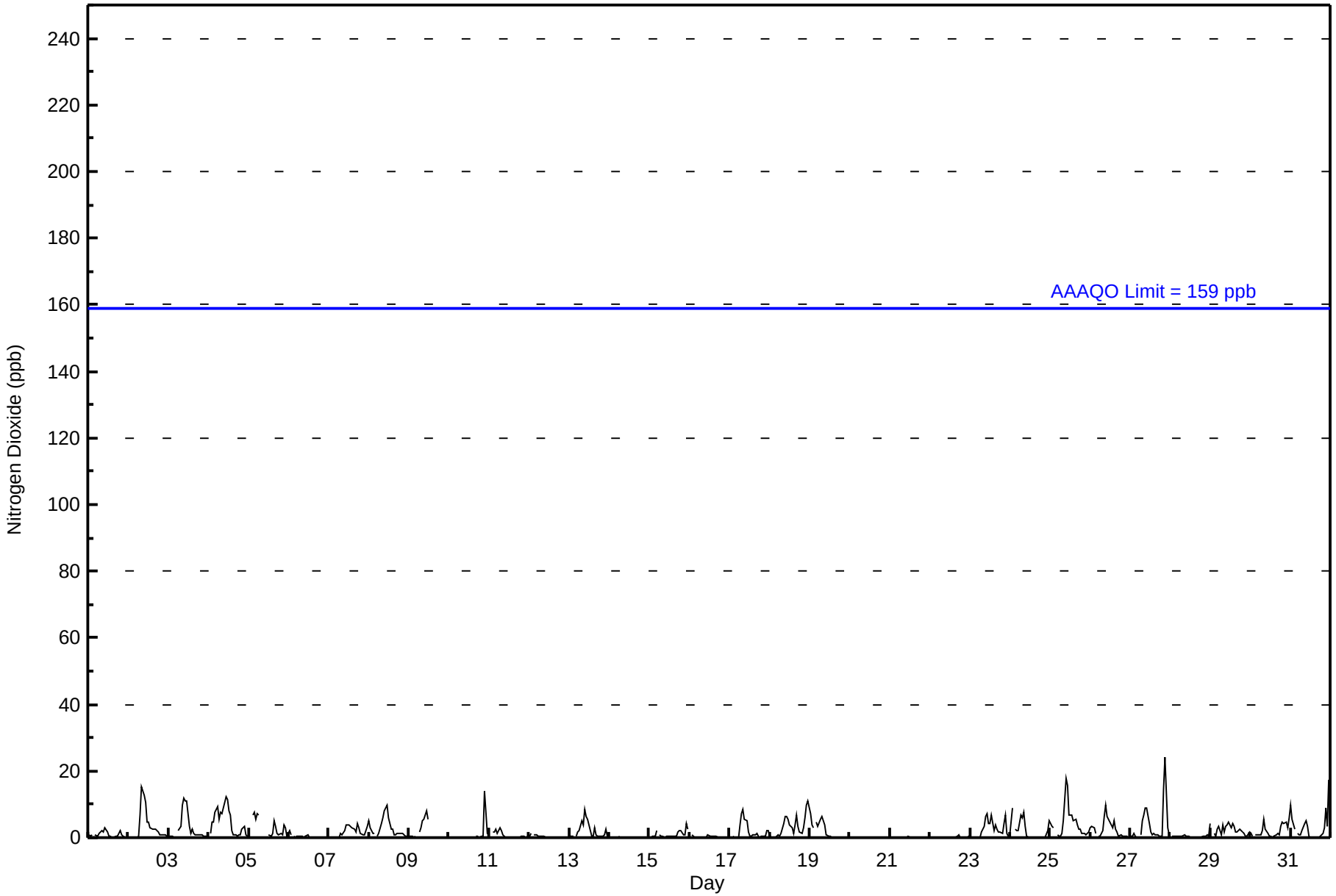
Z - zerospan C - Calibration PF - Power Failure
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Dioxide (NO_2) - ppb

Fort McKay South - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Nitrogen Dioxide (NO_2) - ppb

Fort McKay South - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	680	99.85	99.85
21 - 40	1	0.15	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: 681

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Dioxide (NO_2) - ppb

Fort McKay South - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	47	20	6	11	13	19	33	41	49	79	96	112	49	44	26	33	678
21 - 40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	47	20	6	11	13	19	33	41	49	80	96	112	49	44	26	33	679

Total Number of Valid Hours: 679

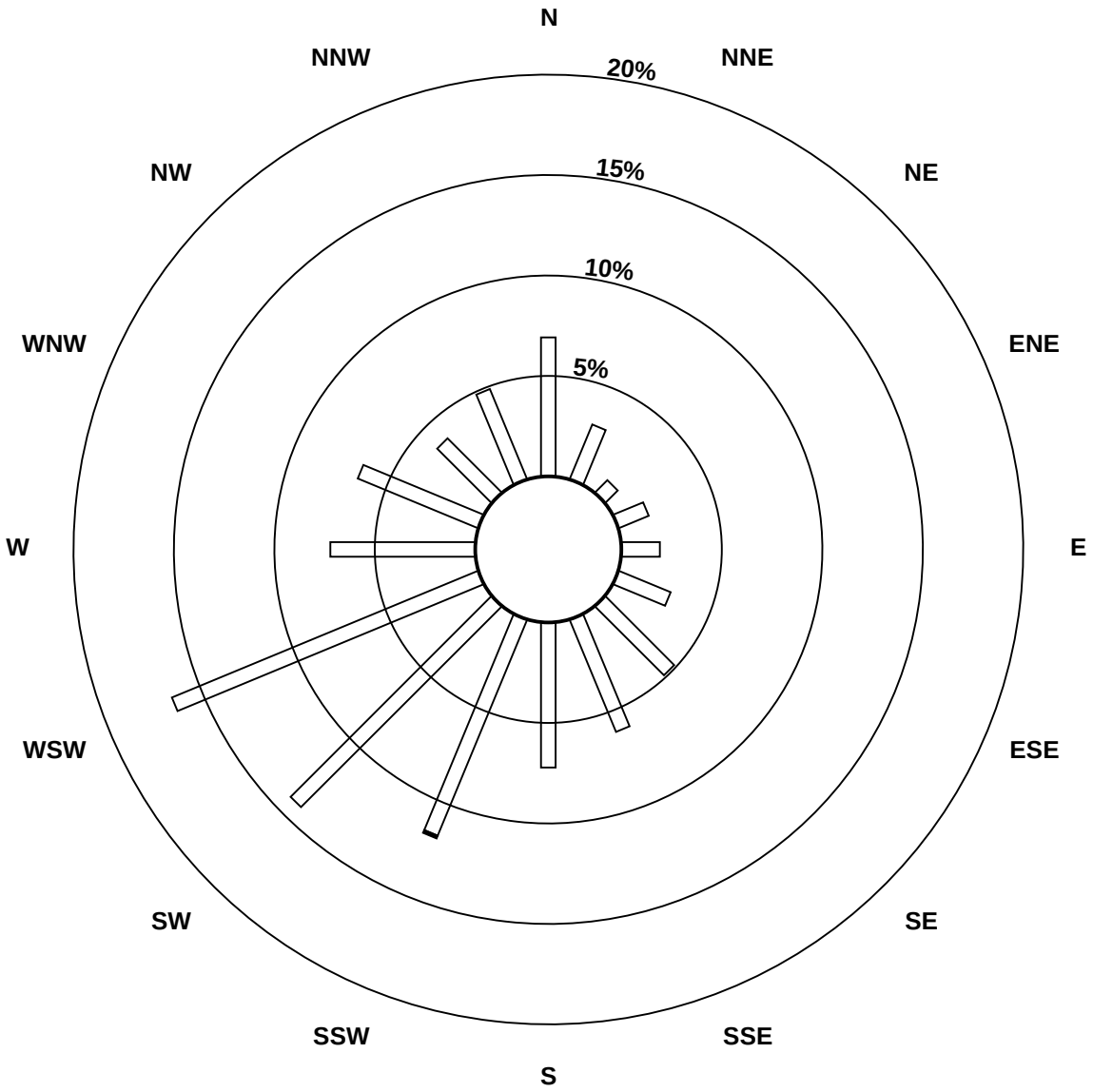
Total Number of Hours: 744

Wood Buffalo Environmental Association

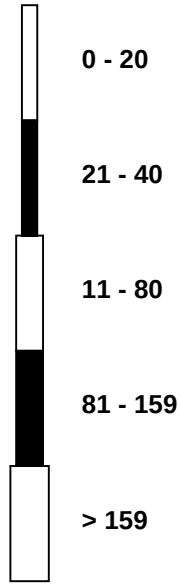
Wind Rose Aug 2015

Nitrogen Dioxide (NO_2) - ppb

Fort McKay South (AMS 13)



Classes (ppb)



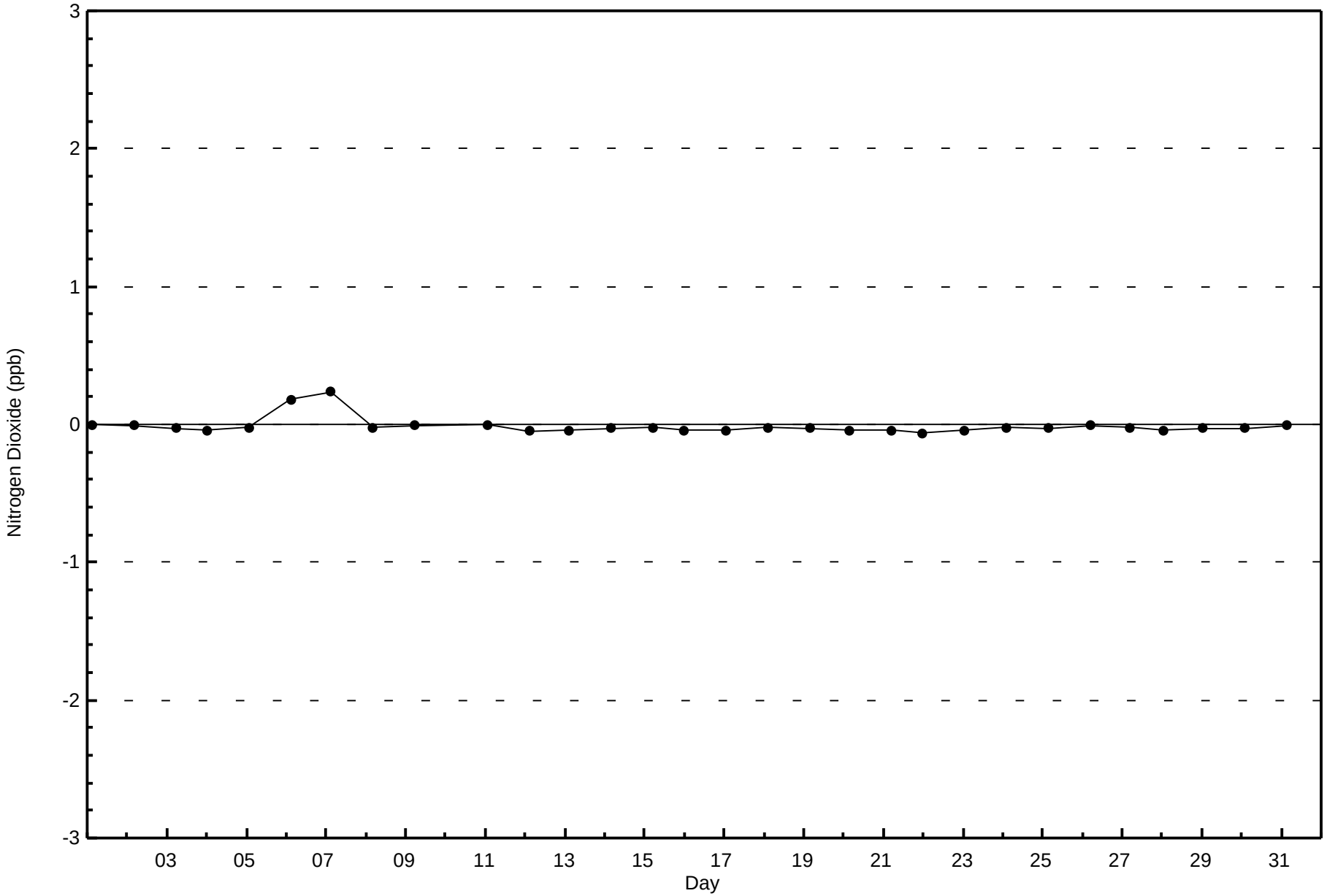
Total Number of Valid Hours: 679

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Dioxide (NO_2) - ppb

Fort McKay South - August 2015

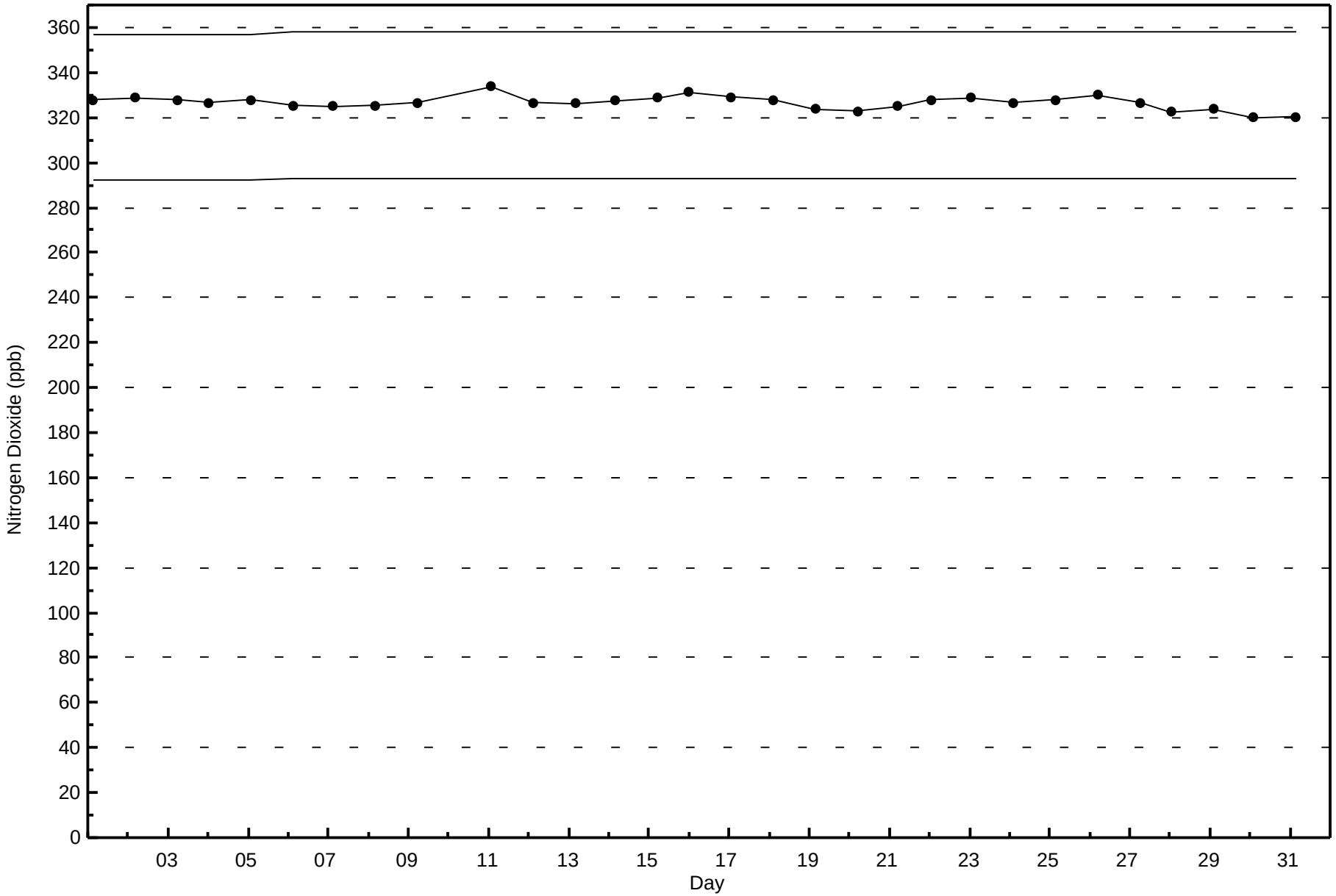


Wood Buffalo Environmental Association

Span Responses

Nitrogen Dioxide (NO_2) - ppb

Fort McKay South - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_X) - ppb

Fort McKay South - August 2015

Maximum Value: 54 ppb on Aug 25 10:00

Maximum Daily Average: 8.3 ppb on Aug 25

Minimum Value: 0 ppb on Aug 6 14:00

Minimum Daily Average: 0.1 ppb on Aug 14

Maximum Diurnal Average: 8.9 ppb at hour 10

Minimum Diurnal Average: 0.9 ppb at hour 20

Monthly Average: 2.9 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 1 $Q_3 = 3$ $P_{90} = 8$ $P_{99} = 23$

Hours in Service:	744
Hours of Data:	681
Hours of Missing Data:	63
Hours of Calibration:	35
Percent Operational Time:	96.2

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	1	1	1	Z	1	1	2	2	4	3	4	2	1	1	0	0	1	0	1	2	1	0	0	0	1.3	4
2-Aug	0	0	0	0	Z	0	1	25	46	22	15	6	5	4	3	3	3	2	2	1	1	1	1	1	6.1	46
3-Aug	0	0	0	0	0	Z	4	7	19	20	16	16	4	1	3	1	1	1	1	1	1	1	1	1	4.3	20
4-Aug	Z	2	5	6	9	11	7	11	11	17	24	21	12	9	2	1	1	1	1	1	2	3	1	1	6.9	24
5-Aug	1	Z	7	8	6	9	9	C	C	C	C	C	1	0	1	6	4	1	1	1	1	4	3	1	3.6	9
6-Aug	2	1	Z	0	0	0	1	1	1	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2
7-Aug	0	0	0	Z	0	0	1	3	2	5	8	10	7	5	4	3	2	5	3	1	1	1	2	4	2.9	10
8-Aug	5	3	1	1	Z	1	3	9	13	22	17	17	8	3	3	1	1	1	1	1	1	1	1	1	5.0	22
9-Aug	0	0	0	0	1	Z	5	6	11	9	12	7	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	--	12
10-Aug	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	0	0	0	0	1	20	7	1	--	20
11-Aug	1	Z	2	1	3	2	3	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	4
12-Aug	0	1	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
13-Aug	0	0	0	Z	1	3	4	11	7	15	10	7	4	1	0	4	1	0	0	0	0	1	3	0	3.2	15
14-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
15-Aug	0	0	0	0	2	Z	1	1	0	0	1	1	1	0	0	0	0	2	2	2	1	1	4	2	1.0	4
16-Aug	Z	1	1	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0.3	1
17-Aug	0	Z	0	0	0	0	15	18	18	10	8	2	0	1	1	1	1	0	0	0	1	1	2	2	3.6	18
18-Aug	1	0	Z	0	1	1	1	2	8	11	11	8	5	3	2	5	7	4	2	1	3	6	10	13	4.5	13
19-Aug	8	4	3	Z	5	3	6	7	6	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2.2	8
20-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
21-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
22-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0.2	1
23-Aug	0	Z	0	0	0	0	0	3	5	12	13	6	6	9	2	5	3	2	2	1	4	7	1	0	3.6	13
24-Aug	0	9	Z	2	2	2	11	10	12	6	1	0	0	0	0	0	0	0	0	0	0	0	2	5	2.8	12
25-Aug	5	4	3	Z	1	1	1	3	13	54	46	11	11	9	7	8	4	3	3	1	1	1	1	2	8.3	54
26-Aug	3	3	3	1	Z	1	1	3	10	16	10	8	6	4	7	3	2	0	1	0	0	0	0	0	3.6	16
27-Aug	0	0	2	1	0	Z	3	23	14	14	13	5	2	1	1	1	1	1	0	0	20	35	3	1	6.2	35
28-Aug	Z	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.4	1
29-Aug	4	Z	1	1	3	3	1	7	3	5	5	6	3	5	4	2	2	3	2	2	1	0	0	1	2.8	7
30-Aug	1	1	Z	1	1	1	1	4	8	3	1	0	0	0	0	1	1	1	3	5	4	5	3	7	2.3	8
31-Aug	13	6	3	Z	3	5	6	7	8	8	5	0	0	0	0	0	0	0	0	1	5	12	4	21	4.7	21
	1.8	1.5	1.3	1.1	1.6	1.8	2.9	5.8	7.6	8.9	7.7	4.8	2.7	2.0	1.4	1.6	1.2	1.0	0.9	0.9	1.7	3.3	1.7	2.2	Diurnal Average	
	13	9	7	8	9	11	15	25	46	54	46	21	12	9	7	8	7	5	3	5	20	35	10	21	Diurnal Maximum	

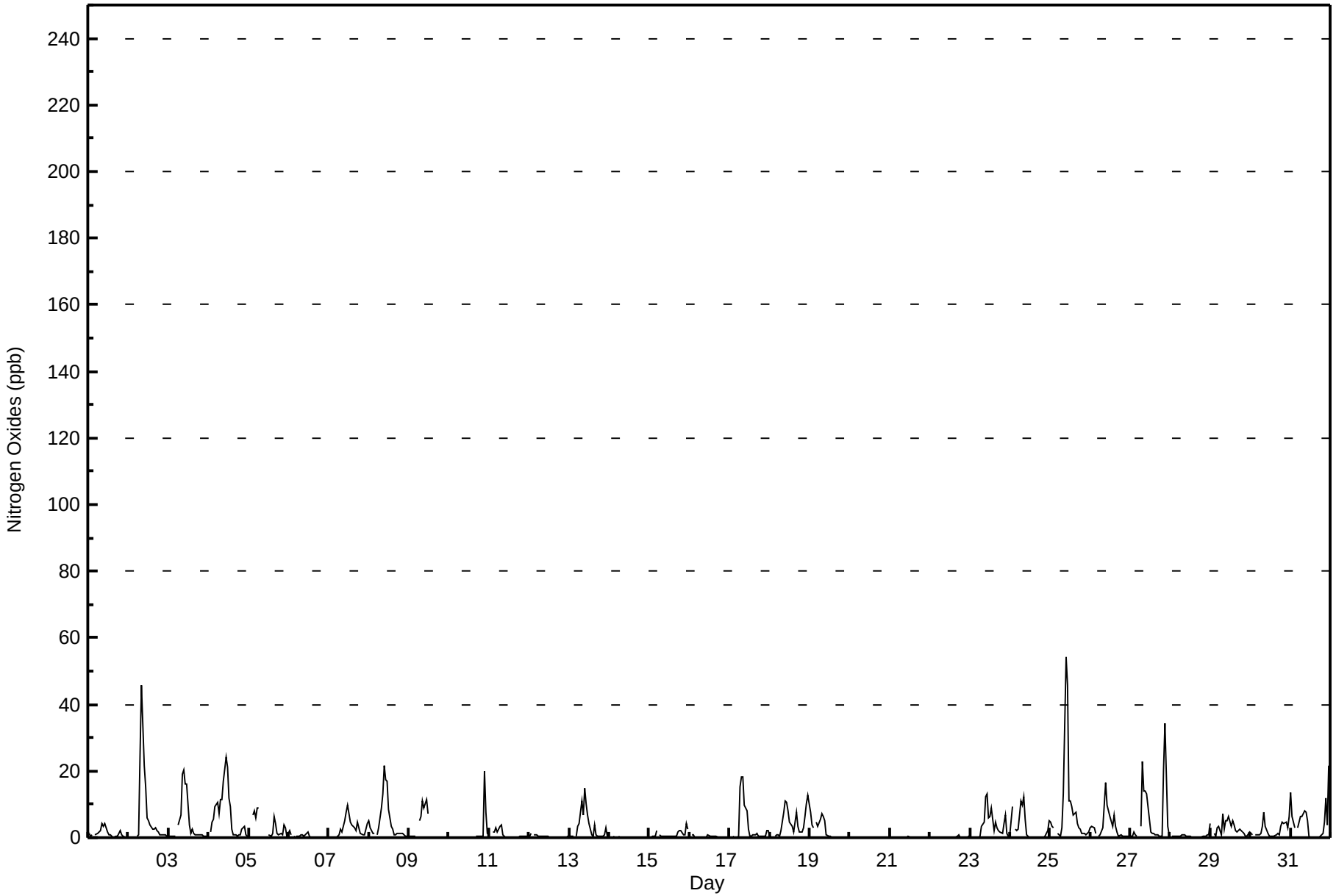
Z - zerospan C - Calibration PF - Power Failure

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Oxides (NO_X) - ppb

Fort McKay South - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Nitrogen Oxides (NO_X) - ppb

Fort McKay South - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	670	98.38	98.38
21 - 40	8	1.17	99.56
11 - 80	3	0.44	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 681

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Oxides (NO_X) - ppb

Fort McKay South - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	46	17	6	11	13	17	30	41	49	79	95	112	49	44	26	33	668
21 - 40	1	1	0	0	0	1	3	0	0	1	1	0	0	0	0	0	8
11 - 80	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	3
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	47	20	6	11	13	19	33	41	49	80	96	112	49	44	26	33	679

Total Number of Valid Hours: 679

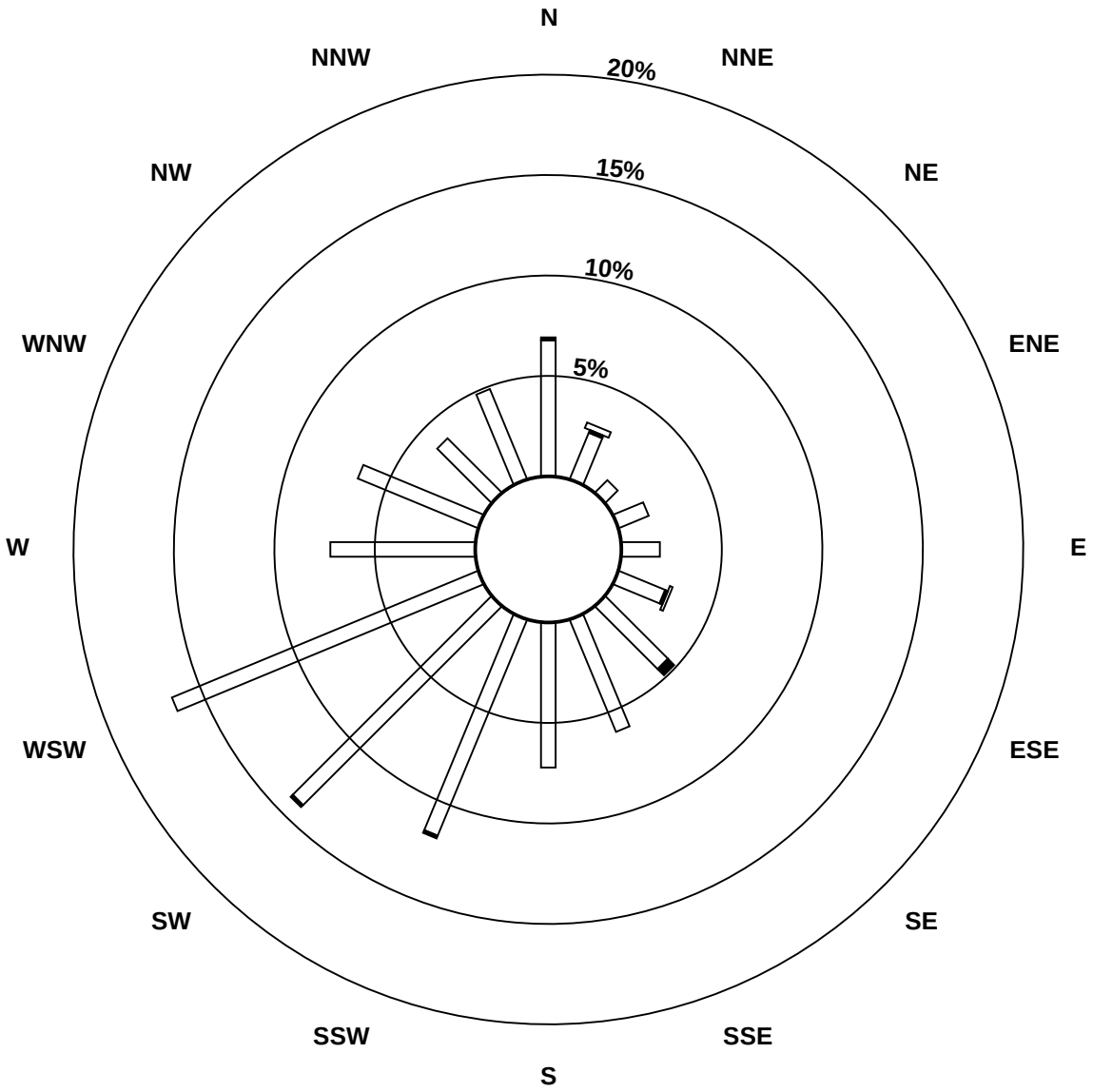
Total Number of Hours: 744

Wood Buffalo Environmental Association

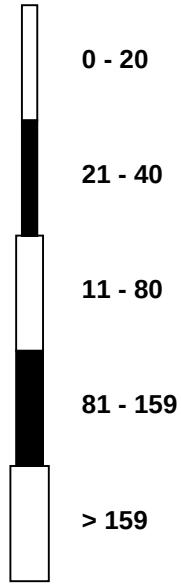
Wind Rose Aug 2015

Nitrogen Oxides (NO_X) - ppb

Fort McKay South (AMS 13)



Classes (ppb)



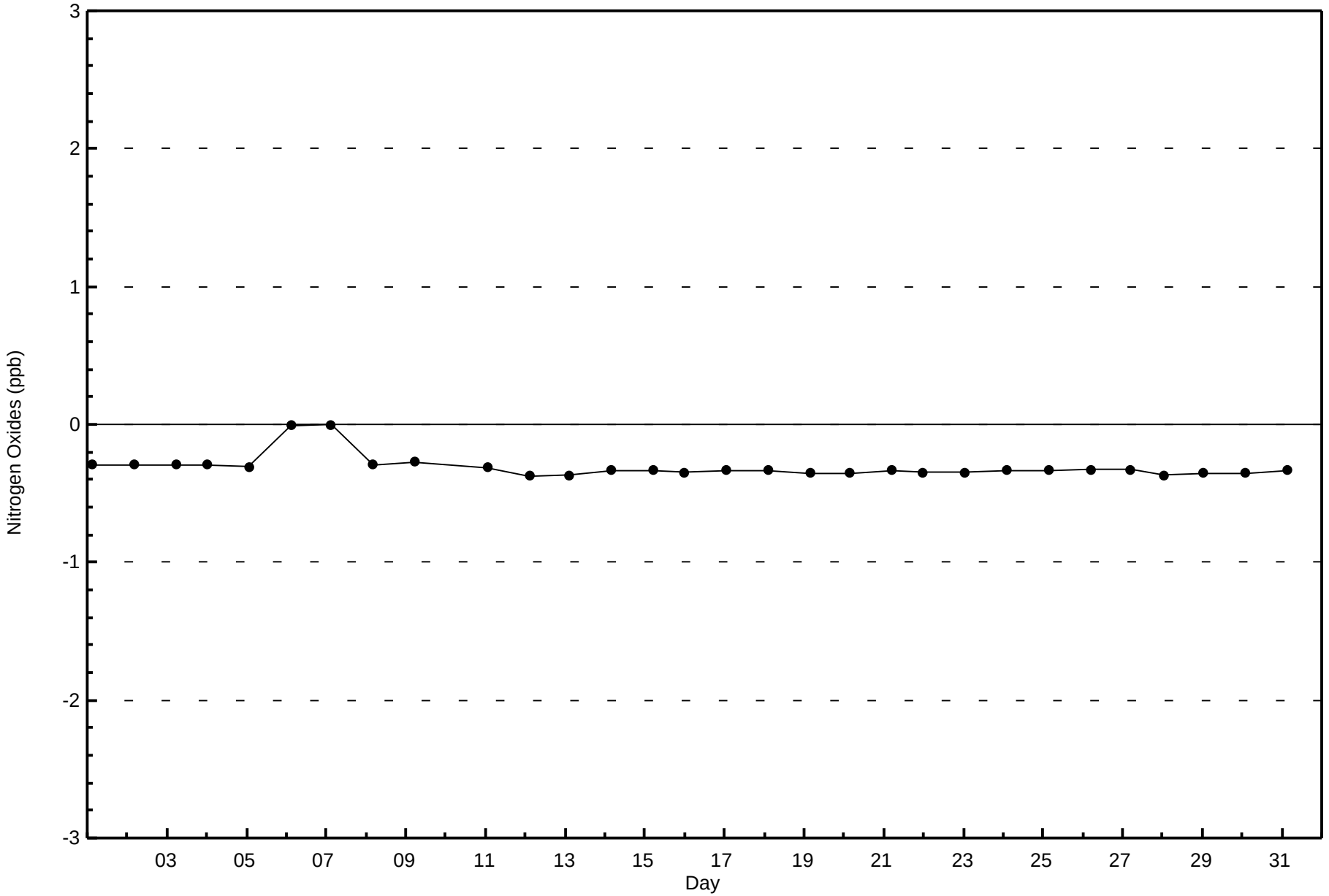
Total Number of Valid Hours: 679

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Oxides (NO_X) - ppb

Fort McKay South - August 2015

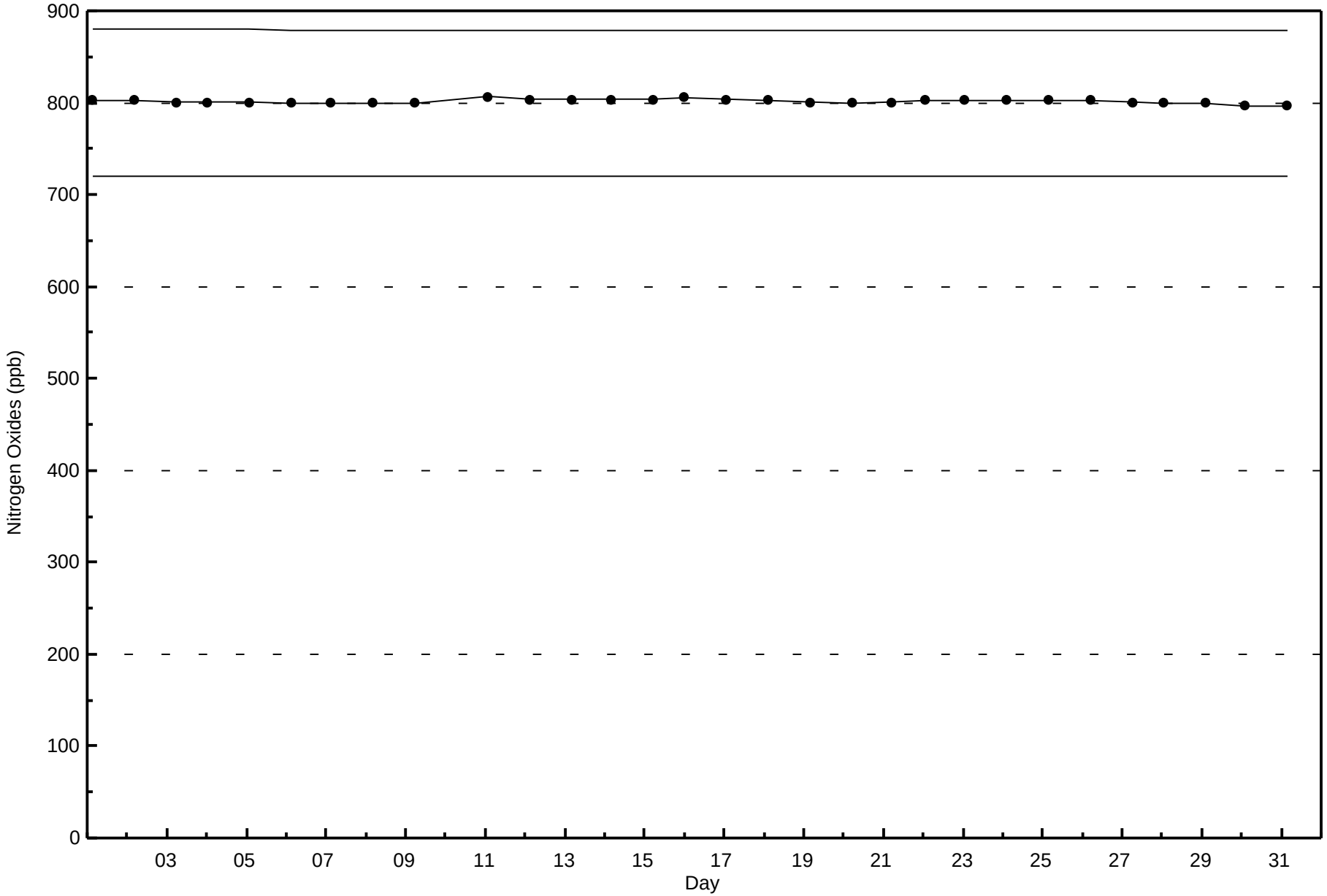


Wood Buffalo Environmental Association

Span Responses

Nitrogen Oxides (NO_X) - ppb

Fort McKay South - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

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

Fort McKay South - August 2015

Number of Exceedences (AAAQO): 24-hr: 0

Maximum Value: 21.7 $\mu g/m^3$ on Aug 18 17:00

Maximum Daily Average: 9.1 $\mu g/m^3$ on Aug 3

Minimum Value: 0.0 $\mu g/m^3$ on Aug 8 02:00

Minimum Daily Average: 1.7 $\mu g/m^3$ on Aug 14

Maximum Diurnal Average: 6.3 $\mu g/m^3$ at hour 8

Minimum Diurnal Average: 3.2 $\mu g/m^3$ at hour 14

Monthly Average: 4.60 $\mu g/m^3$

Percentiles: P_1 = 0.0 P_{10} = 1.2 Q_1 = 1.9 Median = 3.6 Q_3 = 6.7 P_{90} = 8.9 P_{99} = 16.2

Hours in Service:	744
Hours of Data:	715
Hours of Missing Data:	29
Hours of Calibration:	1
Percent Operational Time:	96.2

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	3.2	4.2	6.9	7.2	8.1	5.5	4.0	3.8	3.9	3.2	1.9	1.4	1.6	2.0	2.0	0.8	1.5	1.9	4.0	7.1	4.5	3.8	1.9	1.5	3.6	8.1
2-Aug	3.3	5.4	7.1	8.3	9.1	9.4	11.1	4.5	6.3	7.8	6.4	4.6	5.4	6.9	6.5	7.6	13.0	16.7	11.3	9.7	8.2	7.6	7.8	6.9	8.0	16.7
3-Aug	6.2	5.9	5.7	7.7	11.4	15.5	19.3	15.7	14.7	11.5	13.2	12.1	8.5	5.1	5.9	3.9	4.8	5.7	6.6	7.5	8.0	7.7	7.3	7.4	9.1	19.3
4-Aug	7.4	7.2	6.7	6.3	6.0	6.3	7.2	7.9	7.9	9.9	11.9	13.3	11.0	10.6	8.6	6.4	6.1	6.6	6.9	7.6	6.2	5.7	5.2	6.1	7.7	13.3
5-Aug	6.8	6.6	7.3	7.1	6.8	7.2	7.2	8.2	8.8	6.9	6.2	6.9	7.2	5.8	5.7	7.9	8.0	3.4	3.9	4.3	3.7	3.7	4.3	3.4	6.1	8.8
6-Aug	2.9	2.6	2.3	2.3	2.1	2.0	2.0	2.1	2.1	2.7	2.3	1.9	1.8	1.2	1.0	1.2	1.2	1.2	2.2	1.6	1.6	1.3	1.1	1.1	1.8	2.9
7-Aug	1.3	1.1	0.9	0.9	0.6	0.5	1.0	1.6	4.4	6.7	C	6.0	7.2	5.7	3.7	4.1	5.2	9.2	6.5	8.6	6.4	4.7	3.5	2.2	4.0	9.2
8-Aug	1.4	0.0	0.0	0.0	0.0	0.0	0.4	4.3	13.2	9.6	7.4	14.4	7.8	2.4	2.3	9.1	5.0	2.7	5.9	6.2	8.4	7.6	5.8	3.0	4.9	14.4
9-Aug	1.8	4.3	8.9	13.4	16.6	15.6	15.8	12.1	10.1	7.6	8.7	8.4	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	--	16.6
10-Aug	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	3.5	3.3	3.6	5.6	6.4	12.7	6.6	3.6	--	12.7
11-Aug	3.6	3.5	3.1	2.3	3.8	4.5	4.9	4.1	1.3	0.0	0.0	0.2	0.8	1.3	2.1	3.2	2.8	2.1	1.8	3.6	1.5	0.6	1.9	3.1	2.3	4.9
12-Aug	3.3	4.4	4.0	4.2	4.6	4.3	3.6	3.3	3.0	2.1	1.8	1.3	1.1	1.5	2.0	1.7	2.0	2.2	2.5	3.0	2.7	1.9	1.3	1.4	2.6	4.6
13-Aug	1.3	1.6	2.2	4.0	5.9	4.9	3.8	4.2	3.5	4.8	6.4	7.3	6.7	3.0	2.1	2.6	1.7	0.9	1.2	1.9	1.8	1.6	1.5	0.9	3.2	7.3
14-Aug	1.0	1.6	2.6	4.6	4.3	3.3	3.8	1.6	0.7	0.2	0.4	0.6	0.7	0.6	0.7	1.3	1.5	1.8	1.4	1.2	1.3	2.2	2.5	1.9	1.7	4.6
15-Aug	1.8	1.9	1.4	1.2	1.3	1.5	1.7	1.3	1.4	1.9	3.1	3.4	3.5	4.0	5.0	3.3	2.3	3.0	2.5	2.6	1.8	2.5	5.1	4.1	2.6	5.1
16-Aug	3.9	2.7	4.5	5.4	3.1	1.9	1.6	1.4	1.3	1.3	2.3	3.0	1.0	0.2	0.3	0.8	1.3	3.1	3.0	3.0	2.6	2.6	3.3	6.1	2.5	6.1
17-Aug	6.7	6.4	6.6	6.0	6.0	5.8	6.9	5.3	3.1	3.1	2.4	1.5	0.9	1.2	1.9	3.5	6.9	3.7	1.6	2.1	1.8	1.7	3.4	5.1	3.9	6.9
18-Aug	6.3	8.4	9.0	8.7	8.7	9.0	10.2	9.3	3.8	3.0	2.5	1.9	3.6	7.4	4.1	11.8	21.7	11.4	6.7	6.8	5.9	7.0	9.2	11.4	7.8	21.7
19-Aug	10.7	8.7	5.5	14.6	17.6	9.5	10.1	11.8	7.0	3.4	2.3	1.7	1.2	0.0	0.2	1.0	2.3	6.4	7.2	3.1	1.5	1.0	0.5	0.4	5.3	17.6
20-Aug	0.7	1.6	1.7	1.0	1.1	1.9	2.5	3.4	2.3	1.5	1.4	1.5	2.0	2.4	1.8	1.2	1.2	1.6	2.5	3.0	2.4	2.0	2.7	2.7	1.9	3.4
21-Aug	2.5	2.5	2.4	2.7	2.7	2.9	2.9	2.8	2.8	2.6	1.8	1.1	1.1	1.1	1.8	1.4	1.8	2.1	1.6	1.5	1.7	2.3	3.2	4.9	2.3	4.9
22-Aug	6.7	6.5	7.5	7.4	6.1	5.7	4.8	2.9	2.4	2.2	1.9	1.3	1.1	0.9	1.1	1.5	1.8	2.0	2.4	3.5	3.2	3.5	3.8	4.1	3.5	7.5
23-Aug	4.7	4.4	4.2	4.2	4.2	4.1	3.7	7.7	8.4	4.6	8.3	3.6	5.1	8.2	3.9	5.6	3.8	3.5	3.4	2.5	1.4	2.1	3.9	3.0	4.5	8.4
24-Aug	2.3	2.8	2.3	1.9	2.5	3.0	6.3	9.5	5.5	3.4	1.9	0.8	0.7	0.5	1.2	2.0	2.8	2.8	3.3	3.4	2.6	1.8	2.5	5.0	3.0	9.5
25-Aug	7.0	8.3	8.8	8.1	8.1	7.7	7.9	7.7	3.5	4.0	3.8	2.0	2.6	3.8	3.0	3.1	3.0	2.3	2.8	2.8	2.5	2.7	1.9	1.8	4.5	8.8
26-Aug	3.8	5.3	3.1	2.4	4.3	7.1	9.1	6.3	3.0	2.5	1.8	2.2	2.6	2.1	5.4	7.8	8.3	4.3	4.2	3.8	3.1	2.5	4.8	7.4	4.5	9.1
27-Aug	8.9	9.9	10.4	10.7	10.1	9.7	10.9	20.9	16.3	7.4	5.6	4.7	2.7	3.8	6.2	7.0	10.4	7.0	4.0	5.7	7.6	8.4	6.4	7.2	8.4	20.9
28-Aug	7.6	7.6	8.2	7.9	7.6	7.1	6.7	5.5	3.3	1.5	1.6	2.8	2.8	2.7	3.4	4.1	4.8	4.0	4.8	2.8	2.2	1.8	1.6	1.7	4.3	8.2
29-Aug	1.4	1.2	1.1	1.2	1.1	1.0	1.2	2.3	2.1	3.0	3.4	3.4	3.9	4.7	7.8	5.8	3.1	7.1	12.8	10.8	6.9	6.1	6.2	8.0	4.4	12.8
30-Aug	8.5	7.5	6.6	5.7	5.5	5.1	6.1	8.2	6.8	7.6	5.8	2.9	3.7	3.4	4.0	5.6	6.8	4.7	4.3	3.2	3.0	4.2	6.5	10.5	5.7	10.5
31-Aug	13.3	12.7	12.4	13.5	14.6	13.8	12.3	10.3	7.2	2.2	1.0	0.0	0.0	0.1	0.2	0.3	0.4	0.6	1.2	2.2	6.0	8.0	4.6	9.1	6.1	14.6
	4.7	4.9	5.1	5.7	6.1	5.9	6.3	6.3	5.3	4.3	4.0	3.9	3.4	3.2	3.2	4.0	4.6	4.3	4.2	4.4	3.9	4.1	4.0	4.5	Diurnal Average	
	13.3	12.7	12.4	14.6	17.6	15.6	19.3	20.9	16.3	11.5	13.2	14.4	11.0	10.6	8.6	11.8	21.7	16.7	12.8	10.8	8.4	12.7	9.2	11.4	Diurnal Maximum	

C - Calibration PF - Power Failure

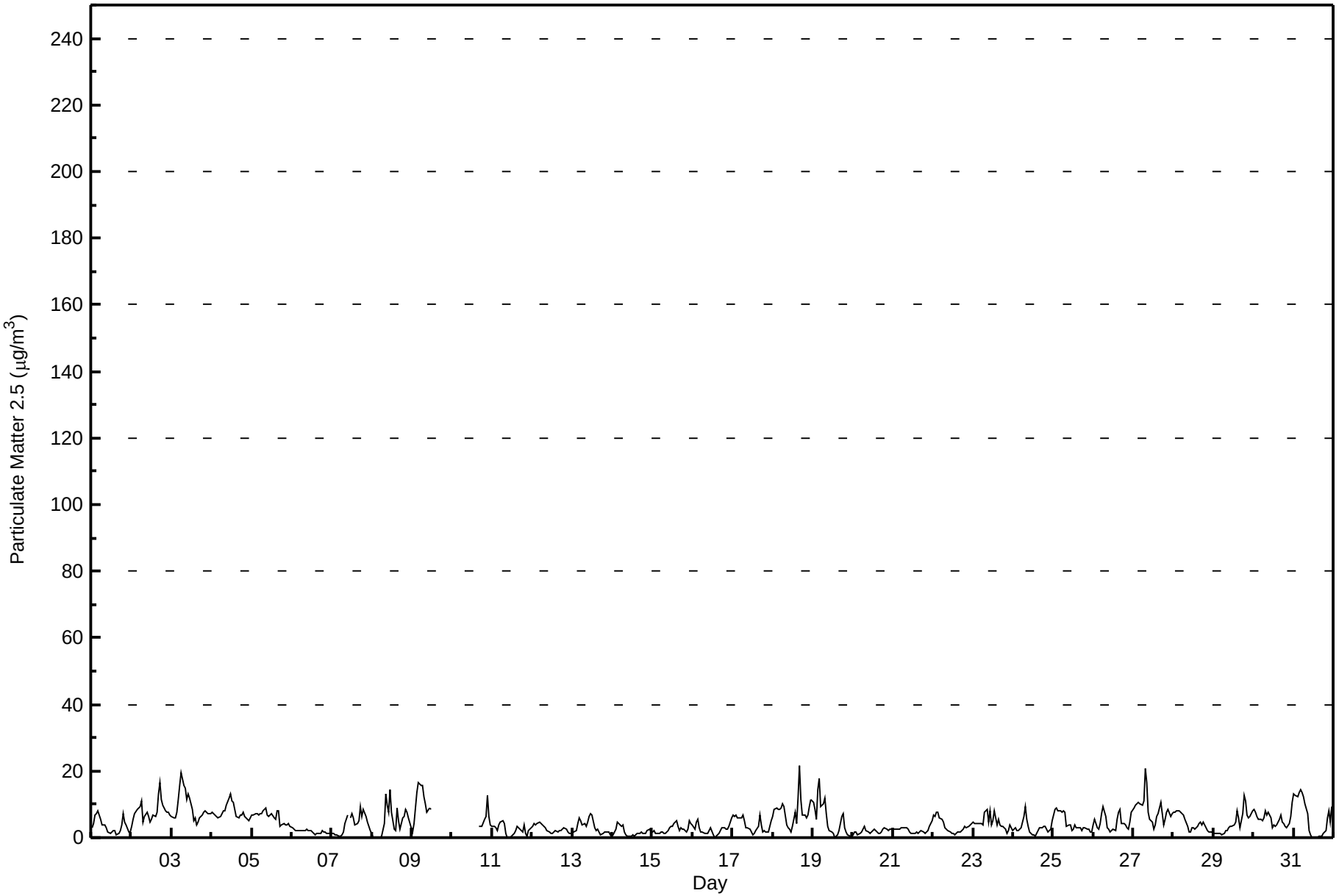
Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 $\mu g/m^3$

Wood Buffalo Environmental Association

Hourly Averages

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

Fort McKay South - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

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

Fort McKay South - August 2015

Concentration Ranges ($\mu g/m^3$)	Number of Hours	%	Cumulative %
1 - 5	420	58.74	58.74
6 - 15	237	33.15	91.89
16 - 25	10	1.40	93.29
26 - 80	0	0.00	93.29
> 81.0	0	0.00	93.29

Total Number of Valid Hours: 715

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

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

Fort McKay South - August 2015

Concentration Ranges ($\mu g/m^3$)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
1 - 5	27	11	4	9	6	9	17	21	26	42	60	85	31	36	17	19	420
6 - 15	19	9	4	2	7	9	15	20	19	41	27	25	11	8	7	14	237
16 - 25	2	1	0	0	0	2	1	1	1	1	0	0	1	0	0	0	10
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	48	21	8	11	13	20	33	42	46	84	87	110	43	44	24	33	667

Total Number of Valid Hours: 713

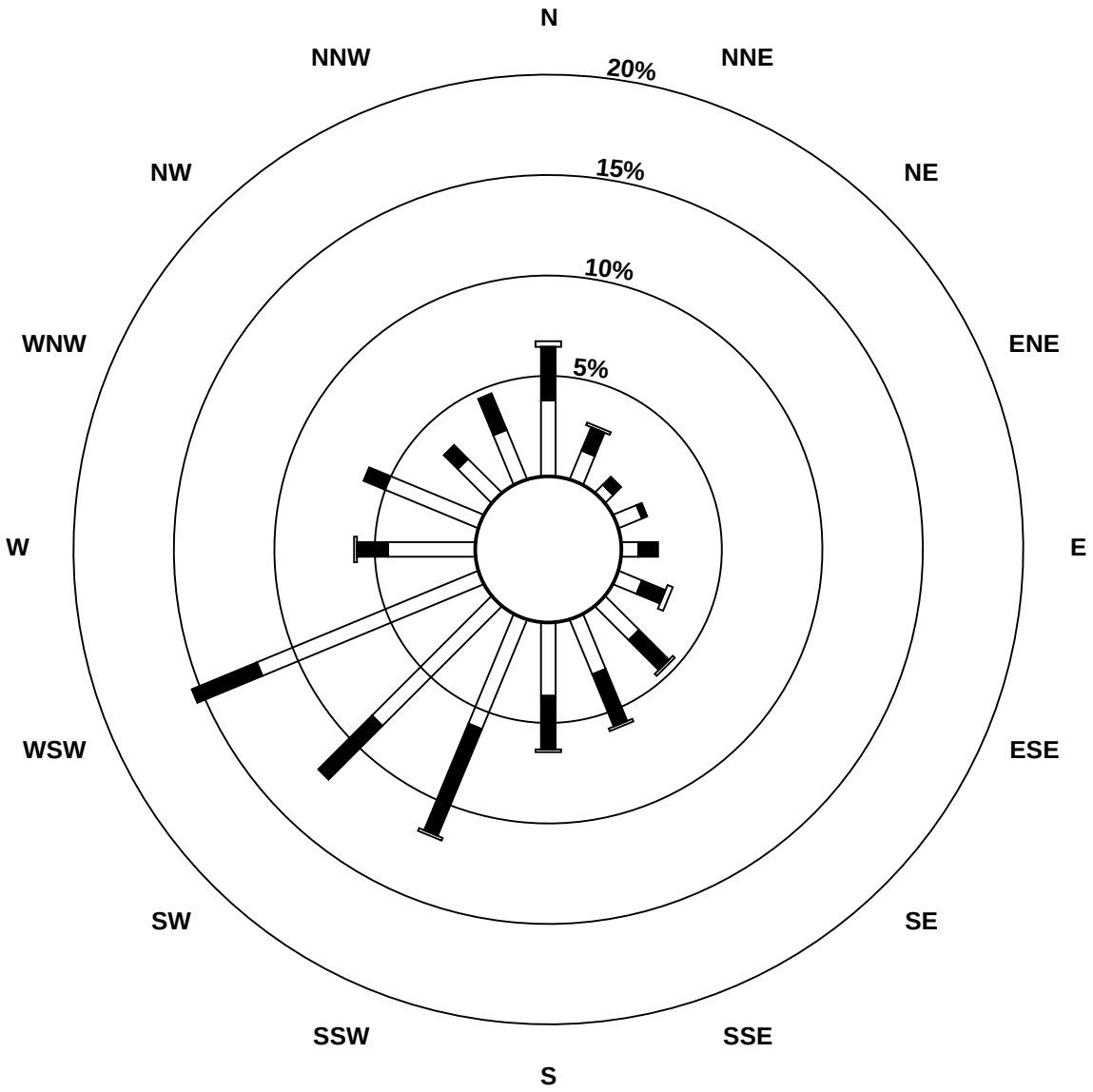
Total Number of Hours: 744

Wood Buffalo Environmental Association

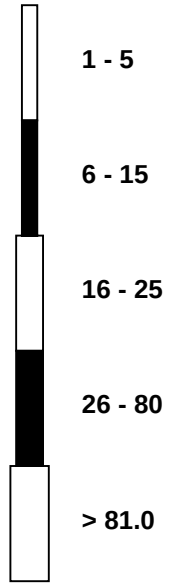
Wind Rose Aug 2015

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

Fort McKay South (AMS 13)



Classes ($\mu g/m^3$)



Total Number of Valid Hours: 713

Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

Fort McKay South - August 2015

Maximum Value: 30.3 C on Aug 10 16:00

Maximum Daily Average: 24.0 C on Aug 10

Minimum Value: -1.6 C on Aug 23 05:00

Minimum Daily Average: 9.9 C on Aug 22

Maximum Diurnal Average: 22.8 C at hour 15

Minimum Diurnal Average: 10.1 C at hour 5

Monthly Average: 16.27 C

Percentiles: P_1 = 1.4 P_{10} = 8.7 Q_1 = 12.6 Median = 15.7 Q_3 = 20.4 P_{90} = 24.4 P_{99} = 28.1

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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	11.4	10.0	10.4	9.5	10.0	10.3	11.4	12.5	14.1	17.6	20.0	21.1	21.7	21.0	21.2	23.6	24.0	23.6	22.4	18.8	16.0	13.1	12.6	9.9	16.1	24.0
2-Aug	8.4	7.4	6.4	5.7	5.2	6.3	12.2	15.5	17.7	20.2	22.5	23.9	24.9	25.9	25.5	25.4	20.5	17.9	18.3	17.3	16.2	15.5	15.3	14.9	16.2	25.9
3-Aug	14.2	13.2	11.5	10.0	9.1	10.0	13.9	15.9	18.9	20.7	22.2	24.4	26.2	27.4	27.7	26.5	25.2	24.2	22.9	21.5	19.4	17.8	17.1	15.8	19.0	27.7
4-Aug	15.3	15.7	15.4	14.6	14.6	15.2	15.4	15.6	16.2	17.4	18.7	19.8	19.7	20.1	20.4	20.1	19.0	18.6	17.4	16.6	16.0	15.1	15.0	14.9	16.9	20.4
5-Aug	15.0	15.2	15.1	15.1	14.9	15.1	15.2	15.5	17.2	20.1	20.0	20.0	21.8	22.0	22.5	22.4	22.8	23.2	20.9	19.1	17.9	16.6	15.1	14.7	18.2	23.2
6-Aug	14.5	14.3	14.1	14.1	14.1	14.1	14.2	14.5	15.0	15.4	15.8	17.0	18.6	19.6	21.1	20.4	21.4	19.9	19.0	17.9	16.1	14.4	12.7	12.5	16.3	21.4
7-Aug	13.8	14.1	13.6	13.6	13.0	12.7	13.9	15.2	16.2	17.3	18.3	19.4	20.0	22.3	23.1	24.0	23.6	23.5	21.7	18.9	16.9	15.9	15.3	15.0	17.6	24.0
8-Aug	15.6	15.8	15.5	14.7	14.0	13.6	14.8	18.1	19.2	20.5	22.0	23.3	24.7	25.3	25.6	21.0	25.7	26.2	24.1	21.8	18.7	15.6	13.9	12.5	19.3	26.2
9-Aug	11.5	10.6	9.8	9.1	8.5	8.8	13.1	17.2	18.7	20.9	23.0	24.5	25.5	26.8	27.5	PF	PF	PF	PF	PF	PF	PF	PF	PF	--	27.5
10-Aug	PF	PF	PF	PF	17.6	16.9	18.0	20.9	21.3	23.9	25.8	27.3	28.1	29.2	30.2	30.3	30.2	29.0	27.5	23.4	19.2	19.3	21.5	20.2	24.0	30.3
11-Aug	18.8	17.4	15.6	12.8	13.2	13.7	14.8	17.3	22.3	25.1	26.2	26.7	27.2	28.1	28.5	27.4	27.8	27.5	25.2	23.3	21.5	18.8	15.5	15.6	21.3	28.5
12-Aug	16.3	16.0	15.6	15.5	15.0	14.9	16.8	18.9	20.4	22.5	23.6	24.8	25.9	27.0	27.8	28.3	27.9	27.3	25.4	22.3	17.6	16.5	16.5	16.9	20.8	28.3
13-Aug	15.0	12.0	10.5	9.1	8.8	10.5	13.2	17.2	20.3	20.1	20.2	21.5	20.4	20.2	20.6	19.7	22.0	23.4	22.9	20.3	16.7	15.1	14.9	15.1	17.1	23.4
14-Aug	15.4	14.8	14.0	13.5	12.6	12.6	14.0	15.9	17.6	18.5	19.0	20.0	20.2	21.4	21.5	20.7	19.6	19.0	17.7	15.9	14.2	13.2	13.5	13.5	16.6	21.5
15-Aug	13.1	13.1	13.4	13.0	12.8	13.0	13.3	13.8	14.3	15.2	16.5	17.6	18.1	17.9	17.3	17.5	17.9	18.0	16.6	15.3	14.4	11.9	11.8	10.9	14.9	18.1
16-Aug	11.0	10.7	10.0	10.5	10.9	11.1	11.3	12.5	14.2	15.7	16.5	14.6	17.6	19.8	20.0	19.9	20.2	19.2	17.9	13.5	11.5	11.3	8.2	9.1	14.0	20.2
17-Aug	11.3	10.2	8.6	5.6	3.5	3.1	6.9	12.4	14.9	17.8	20.7	22.5	23.4	24.4	24.9	23.4	21.2	20.1	19.6	17.4	15.5	13.8	12.2	10.0	15.1	24.9
18-Aug	8.5	7.7	7.6	6.1	5.2	5.7	8.5	13.9	16.3	18.0	19.4	20.6	20.5	19.9	21.9	23.2	22.9	22.9	20.3	16.0	12.9	11.9	11.1	10.8	14.7	23.2
19-Aug	11.2	12.1	14.1	15.1	16.3	16.5	17.0	17.9	19.4	21.0	22.5	23.4	24.5	25.4	26.0	25.3	23.6	17.9	15.2	14.1	13.2	12.9	12.5	11.5	17.9	26.0
20-Aug	11.7	11.4	11.0	11.2	10.5	11.6	11.9	12.8	13.3	13.7	14.1	14.3	13.9	13.2	13.5	14.2	14.7	14.7	14.1	13.0	12.3	11.8	9.3	8.0	12.5	14.7
21-Aug	8.6	8.4	7.5	6.4	6.0	7.3	8.1	9.5	10.7	11.1	11.4	12.3	12.6	13.6	13.2	13.9	13.4	11.7	11.7	10.8	10.0	10.0	9.6	8.7	10.3	13.9
22-Aug	8.9	8.4	8.1	8.1	7.8	7.6	7.4	7.9	8.7	9.8	11.2	12.7	14.2	15.0	15.6	15.8	16.0	15.9	14.2	9.5	6.2	4.2	2.7	1.6	9.9	16.0
23-Aug	0.5	-0.5	-1.2	-1.5	-1.6	-0.9	0.7	5.2	9.7	13.0	15.5	18.8	21.0	20.6	21.7	22.9	23.5	23.4	20.6	17.0	15.7	16.9	14.0	10.7	11.9	23.5
24-Aug	10.1	11.8	12.0	11.8	11.2	9.8	10.7	13.9	16.3	18.2	19.7	21.3	22.2	23.3	24.0	24.3	24.6	23.9	20.0	15.5	13.1	12.8	11.5	10.2	16.3	24.6
25-Aug	8.4	6.8	5.5	4.3	3.9	4.5	5.9	9.2	12.8	16.3	18.0	19.1	19.7	20.0	19.4	19.8	19.1	17.9	17.1	15.7	14.3	13.8	14.6	15.0	13.4	20.0
26-Aug	13.5	13.0	12.4	9.9	8.4	8.2	9.6	12.2	13.9	15.2	16.6	17.8	18.6	19.4	20.3	20.9	20.5	19.5	17.8	15.3	13.6	11.9	10.5	8.9	14.5	20.9
27-Aug	7.1	5.8	4.7	3.7	3.0	2.6	4.2	9.0	14.1	17.5	20.4	22.6	24.3	25.0	25.9	26.3	26.1	25.2	23.3	18.7	14.9	14.5	15.6	15.0	15.4	26.3
28-Aug	15.3	13.0	10.4	12.6	11.1	10.5	13.4	15.2	16.3	19.1	21.2	22.5	24.3	25.1	25.6	25.7	25.6	24.4	20.0	16.7	15.8	16.0	15.8	14.5	17.9	25.7
29-Aug	14.2	13.9	13.3	13.1	13.1	12.7	13.0	14.5	17.9	19.4	20.8	22.0	23.6	24.6	24.4	25.2	25.5	24.6	20.7	17.8	17.1	19.2	20.2	19.3	18.8	25.5
30-Aug	16.2	15.5	15.7	15.8	14.8	13.4	12.9	16.4	20.0	21.4	23.3	24.8	25.9	27.0	27.2	25.6	25.1	22.2	18.2	16.4	13.4	10.7	9.3	7.4	18.3	27.2
31-Aug	6.2	5.4	4.8	4.6	4.4	4.7	6.7	9.2	14.6	17.6	19.7	21.4	22.2	23.2	23.4	23.2	23.0	21.8	18.9	15.7	10.8	11.0	11.3	8.2	13.8	23.4
	12.0	11.4	10.8	10.2	10.1	10.2	11.7	14.1	16.2	18.1	19.5	20.7	21.7	22.4	22.8	22.6	22.4	21.5	19.7	17.2	15.0	14.0	13.3	12.4	Diurnal Average	
	18.8	17.4	15.7	15.8	17.6	16.9	18.0	20.9	22.3	25.1	26.2	27.3	28.1	29.2	30.2	30.3	30.2	29.0	27.5	23.4	21.5	19.3	21.5	20.2	Diurnal Maximum	

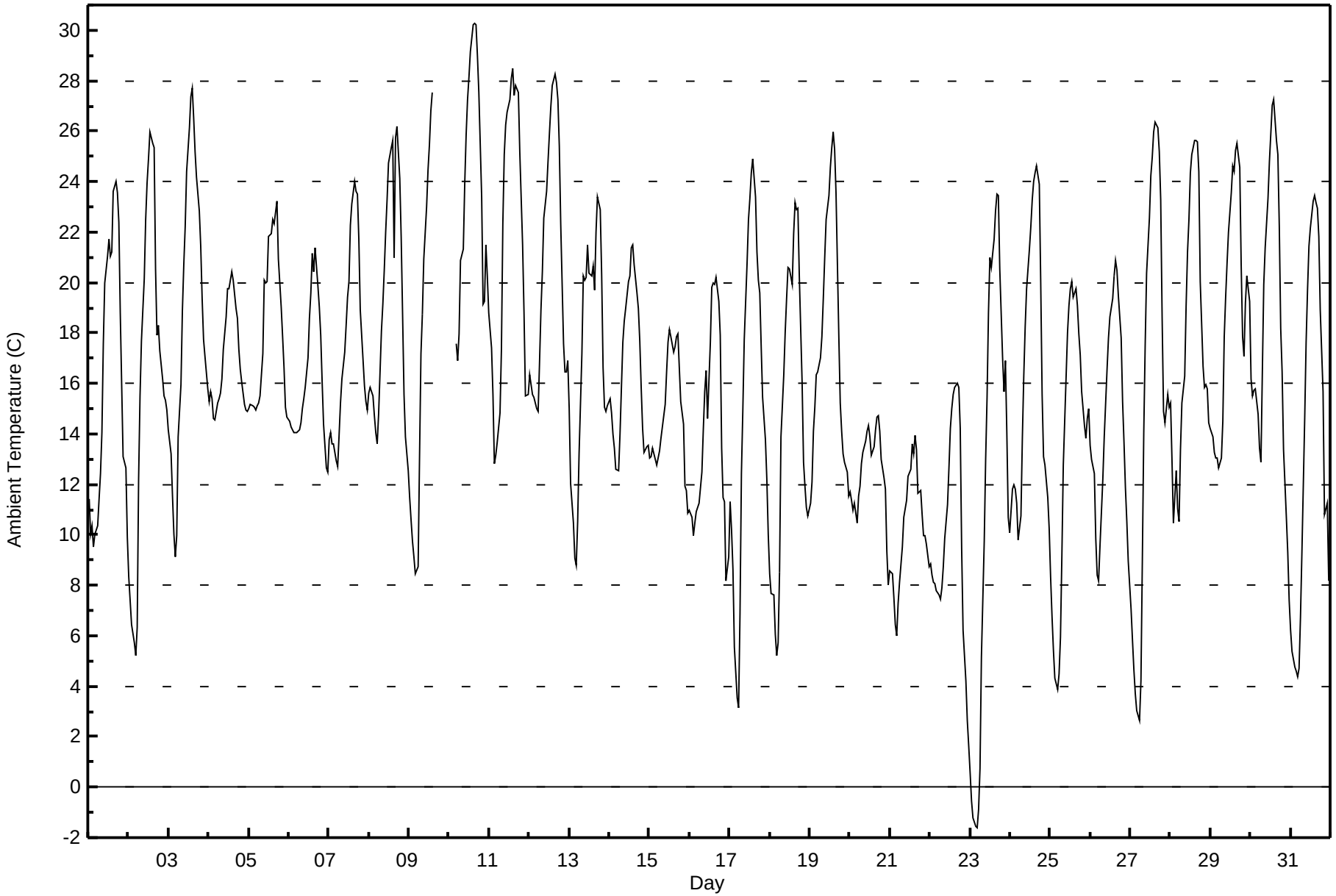
PF - Power Failure

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature (AT) - C

Fort McKay South - August 2015



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	5	0.68	0.68
0 - 10	97	13.27	13.95
10 - 20	419	57.32	71.27
> 20	210	28.73	100.00

Total Number of Valid Hours: 731

Total Number of Hours: 744

Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Fort McKay South - August 2015

Maximum Value: 98 % on Aug 1 06:00

Maximum Daily Average: 86.0 % on Aug 6

Minimum Value: 26 % on Aug 31 17:00

Minimum Daily Average: 51.3 % on Aug 12

Maximum Diurnal Average: 90.6 % at hour 6

Minimum Diurnal Average: 46.4 % at hour 15

Monthly Average: 71.2 %

Percentiles: P_1 = 29 P_{10} = 41 Q_1 = 55 Median = 74 Q_3 = 89 P_{90} = 96 P_{99} = 98

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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	97	98	98	98	98	98	98	97	94	79	68	60	57	61	60	47	45	42	46	66	78	87	87	92	77.1	98
2-Aug	95	96	96	97	97	98	86	76	71	65	55	47	43	41	40	42	65	90	82	90	93	94	95	95	77.0	98
3-Aug	96	96	96	97	97	98	94	87	75	66	61	53	47	43	42	45	51	57	63	72	81	86	87	90	74.1	98
4-Aug	91	91	89	90	89	82	83	82	81	73	66	66	68	68	67	69	74	76	86	95	95	96	97	98	82.1	98
5-Aug	98	98	98	98	98	98	98	98	90	76	74	75	68	65	61	62	62	55	61	69	74	81	94	96	81.1	98
6-Aug	96	97	96	97	96	96	96	95	92	92	93	89	80	73	65	67	63	68	72	75	86	90	94	95	86.0	97
7-Aug	94	93	94	95	95	97	96	92	87	82	76	72	68	58	55	51	52	55	64	82	89	91	92	93	80.0	97
8-Aug	90	88	88	90	92	94	91	77	74	69	64	58	51	47	48	82	54	47	59	63	75	87	91	94	73.8	94
9-Aug	95	96	96	97	97	97	93	79	77	69	61	54	50	46	42	PF	PF	PF	PF	PF	PF	PF	PF	PF	--	97
10-Aug	PF	PF	PF	PF	76	82	79	69	67	59	51	45	41	35	30	29	29	32	39	59	76	70	57	63	54.3	82
11-Aug	70	75	82	89	91	95	92	80	57	43	37	34	31	28	29	33	33	35	41	55	52	55	66	66	57.0	95
12-Aug	60	61	62	63	65	68	60	55	52	47	45	41	38	35	33	31	30	32	38	49	66	68	67	66	51.3	68
13-Aug	74	83	87	91	93	92	89	78	66	69	76	71	86	79	74	78	63	58	60	71	83	86	85	81	78.0	93
14-Aug	77	78	80	80	82	82	78	71	66	61	58	53	49	43	42	44	46	50	55	61	68	71	72	72	64.2	82
15-Aug	75	76	75	78	79	80	82	79	75	68	59	52	48	50	54	55	53	56	61	69	71	81	83	87	68.6	87
16-Aug	88	89	91	93	92	92	93	88	79	72	69	88	65	49	43	41	41	47	54	73	80	79	88	85	74.1	93
17-Aug	75	80	85	91	94	96	92	71	62	55	43	36	32	31	29	33	44	47	48	60	68	75	79	84	63.0	96
18-Aug	88	91	91	93	95	95	90	73	68	63	57	51	50	60	45	41	42	42	54	72	82	83	85	87	70.8	95
19-Aug	87	84	74	69	65	65	64	63	59	55	52	50	46	36	33	35	38	67	87	90	92	92	90	92	66.0	92
20-Aug	89	88	89	85	87	80	78	74	73	71	70	68	70	79	76	68	66	65	66	74	75	74	84	89	76.5	89
21-Aug	87	86	88	91	92	88	84	81	77	83	81	73	70	63	70	64	69	84	80	84	87	80	79	84	80.2	92
22-Aug	84	85	85	84	86	89	94	93	91	85	78	64	53	47	46	45	45	48	57	80	89	92	94	95	75.4	95
23-Aug	95	96	96	97	97	97	97	96	76	62	55	44	37	41	38	36	35	36	48	67	66	58	83	95	68.7	97
24-Aug	97	96	96	97	97	97	98	93	81	72	62	49	44	37	35	34	34	36	54	72	79	76	81	84	70.9	98
25-Aug	88	92	94	95	96	97	97	90	77	65	60	57	54	55	58	57	63	69	75	82	85	87	82	76	77.1	97
26-Aug	80	82	84	91	94	95	94	88	80	74	67	63	59	56	52	49	51	55	70	81	84	85	88	90	75.5	95
27-Aug	94	95	96	96	97	97	97	98	81	69	60	51	42	39	37	35	36	38	42	58	70	68	61	63	67.5	98
28-Aug	61	68	77	68	73	74	66	62	60	52	46	42	35	31	31	31	31	33	52	65	69	70	75	88	56.7	88
29-Aug	85	92	96	97	98	98	98	96	79	71	63	58	51	45	45	42	38	42	62	73	72	60	55	62	70.0	98
30-Aug	87	92	89	89	91	93	94	83	66	61	51	43	40	35	33	36	38	48	65	72	82	89	88	91	69.0	94
31-Aug	94	95	96	97	97	97	97	97	78	63	53	38	33	31	27	27	26	28	36	47	65	62	57	68	62.8	97
	86.2	87.9	88.9	89.7	90.2	90.6	88.7	82.6	74.6	67.4	61.7	56.2	51.9	48.6	46.4	46.9	47.2	51.2	59.2	70.8	77.7	79.1	81.2	84.0	Diurnal Average	
	98	98	98	98	98	98	98	98	94	92	93	89	86	79	76	82	74	90	87	95	95	96	97	98	Diurnal Maximum	

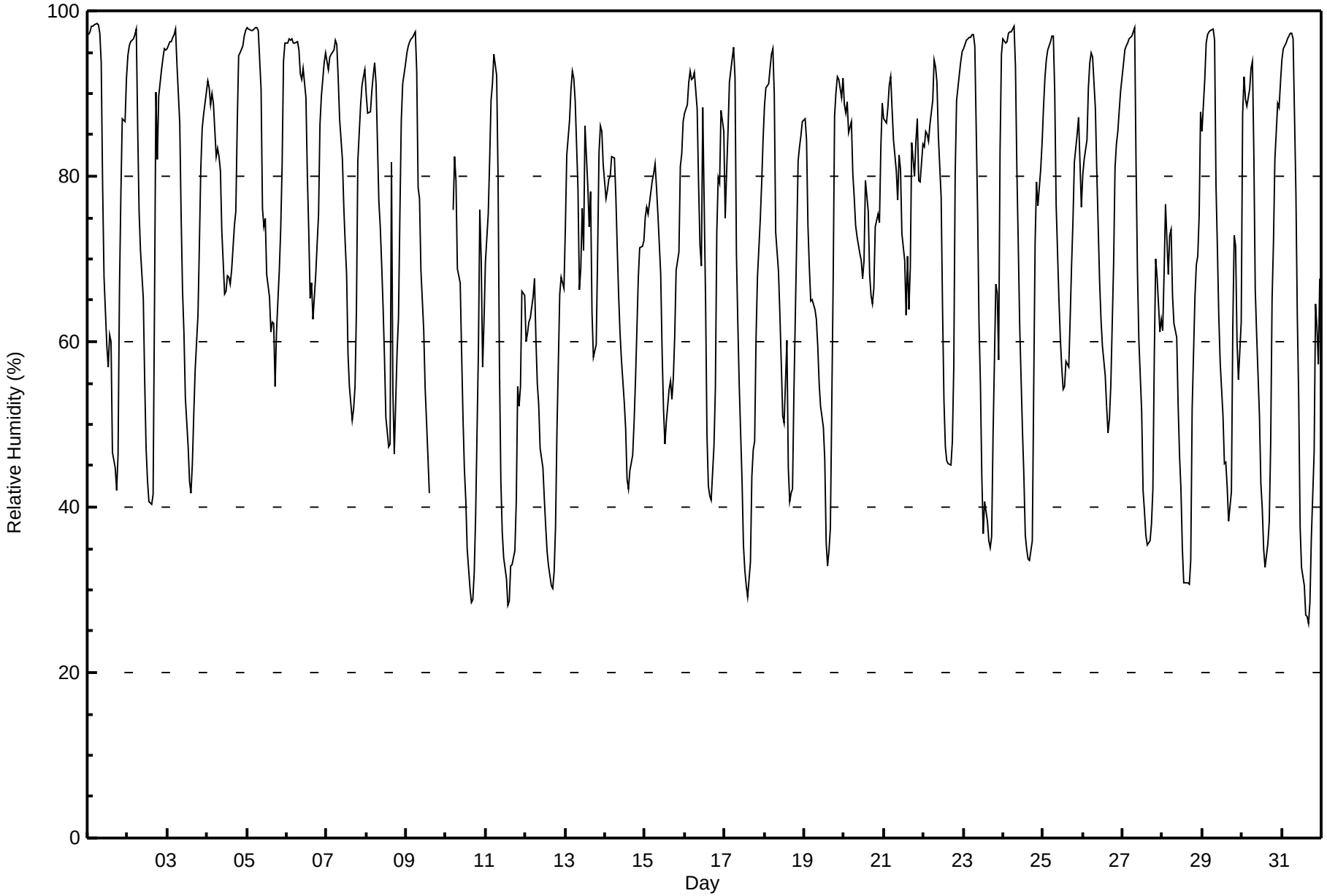
PF - Power Failure

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity (RH) - %

Fort McKay South - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Fort McKay South - August 2015

Maximum Speed: 18 km/h on Aug 11 14:00

Maximum Daily Speed Average: 8.2 km/h on Aug 14

Minimum Speed Value: 0 km/h on Aug 13 03:00

Minimum Daily Speed Average: 0.0 km/h on Aug 7

Maximum Diurnal Speed Average: 3.7 km/h at hour 14

Minimum Diurnal Speed Average: 1.8 km/h at hour 7

Monthly Average Velocity: 2.4 km/h 238.7 deg

Percentiles: $P_1 = 1$ $P_{10} = 1$ $Q_1 = 2$ Median = 4 $Q_3 = 7$ $P_{90} = 9$ $P_{99} = 14$

Hours in Service:	744
Hours of Data:	729
Hours of Missing Data:	15
Percent Operational Time:	98.0

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	WSW2	SW2	SW2	NW1	NNW2	W1	NNW2	NW2	N1	W2	NW3	ENE3	NW2	WNW6	WNW7	NW6	NW6	N6	N7	WNW3	NW1	W3	ESE0	SW1	NW2.2	WNW7
2-Aug	WSW2	SSW1	SSW1	S1	SSW2	SSE2	S2	SE1	ESE3	ESE4	SE4	SE5	SE5	SE5	E5	NNE3	NW4	S3	SSE1	WSW1	NW2	SSW1	SW2	WSW1	SSE1.5	SE5
3-Aug	WSW2	WNW1	SW2	SSW1	SW1	WSW1	NNE2	N2	NE2	NNE4	N7	N7	NNW6	E3	ESE5	ENE7	ENE3	SE5	SSE3	SSW1	WSW1	WNW2	NNW2	WNW1	NNE1.0	N7
4-Aug	NNW2	N4	N4	NNW3	NNW3	N5	NNW3	NNW3	NNW2	N6	N8	NNE7	N7	N6	ENE4	E4	ESE5	E4	NNE2	ENE2	SE5	E3	NNE1	N3	NNE2.8	N8
5-Aug	N3	NNE4	N5	NNE4	N3	N3	N3	N3	NE3	ESE5	ESE1	NNW2	S3	SSW5	S5	SW4	WSW2	SSE4	SSE7	SSE8	S7	SSE6	SE3	SE3	SE1.2	SSE8
6-Aug	E3	E3	NE3	NNE3	NE3	NE3	NNE2	ENE3	SE5	SE5	S5	SSE6	E7	E8	ESE7	ESE6	SE7	ESE6	SE5	SE5	ESE2	ESE1	WNW1	N2	ESE3.1	E8
7-Aug	ENE2	ESE1	AF	WSW1	AF	NNW1	NNW2	NNW2	N2	N4	NW2	NNW4	NNW1	SSE4	ESE4	SSE3	SE1	S2	SE2	WSW1	WSW2	WSW2	SW1	S3	S0.0	NNW4
8-Aug	S5	S3	S4	S3	S1	W1	S2	SSE5	SE4	SE5	E5	ESE3	SSE3	ENE4	NNW4	NW4	WNW3	SE3	NNE4	E4	S1	NW2	WNW1	WSW2	SE1.2	E5
9-Aug	W1	SW2	SW1	W1	SSW1	W1	N1	ESE1	NE3	NNE2	NNE2	E2	ENE2	E4	N1	PF	PF	PF	PF	PF	PF	PF	PF	PF	----	E4
10-Aug	PF	PF	PF	PF	WSW8	WSW7	WSW7	WSW7	SW8	SW9	SW9	SW9	SW11	SW12	SW11	SW10	SW9	SW6	W4	SW3	SSW3	SSW7	SSW7	SSW7	SW7.6	SW12
11-Aug	SW7	SW7	S1	SSE2	SSE2	SSW2	SSW1	SW4	SSW6	SW10	WSW13	WSW14	SW18	SW18	SW16	WSW9	W8	WSW10	WSW4	SSW3	SSW6	WSW4	WSW5	SW7	SW7.0	SW18
12-Aug	SW7	SW8	SW8	SW6	SW4	SW5	WSW9	WSW8	WSW9	WSW10	WSW9	WSW11	WSW11	WSW10	SW8	WSW8	WSW8	WSW9	WSW7	SW5	SW4	WSW5	WSW6	WSW7	WSW7.5	WSW11
13-Aug	SW2	S1	SSW0	S3	SSW2	SSW2	S2	S4	S5	S6	S4	SE1	NW1	SW5	WSW7	S8	SSW10	SW9	SSW7	SSW6	SSW5	SSW5	SW5	SW5	SSW4.2	SSW10
14-Aug	W6	WSW7	WSW8	WSW7	WSW6	WSW8	WSW7	WSW9	W10	W12	W12	W11	W11	W11	W12	WNW12	WNW11	WNW9	WNW8	WNW6	W5	WSW5	WSW6	WSW5	W8.2	W12
15-Aug	WSW5	WNW5	NW6	WNW5	NW6	N8	N9	N11	NNW10	N11	N12	NNE14	N13	N14	N10	N9	NNW8	NW7	NNW6	WNW4	NNW4	WNW4	NW2	W2	NNW6.7	NNE14
16-Aug	WSW2	WSW3	WSW2	WSW4	WSW4	W4	W3	NNW1	NNW3	NW2	SSE2	SSE3	SE4	SW2	N6	NNW4	WNW6	W2	W3	WSW4	WSW5	WSW3	WSW3	WSW5	W2.2	N6
17-Aug	WSW6	WSW1	SSW2	S1	SW1	WSW2	S3	S7	S7	S8	S9	SSW8	SSW8	SW8	SSW7	NNE5	NW5	W5	W3	NNW1	SSW2	SSW2	SSW1	SW2	SSW3.3	S9
18-Aug	W1	WSW0	SW2	S1	SW1	WSW1	W3	W2	N4	NE5	N4	NNE3	NNE3	WNW3	ENE3	ESE5	ESE5	SE5	SSW3	SW2	S2	S3	SSE2	S2	SE0.4	NE5
19-Aug	S2	SSE2	SSE6	SSE6	SSE8	SSE7	SSE9	SSE10	S10	SSW10	WSW9	WSW10	WSW12	W10	WSW12	WSW15	WSW11	W11	W7	WSW6	SW4	SW4	SW4	SW4	SW6.1	WSW15
20-Aug	WSW6	SSW5	WSW5	SW5	SW5	WSW7	WSW7	WSW8	W7	W10	W9	W10	W7	W7	W7	W7	WNW6	WNW8	WNW6	WSW4	WSW6	W5	WSW4	WSW5	W6.1	W10
21-Aug	WSW6	WSW6	WSW7	WSW6	SW6	SW6	WSW4	W4	W6	WNW5	WNW5	WNW5	WNW8	NW10	WNW7	WNW8	WNW6	WNW4	WNW5	W2	WNW5	WNW6	WNW5	WSW4	W5.1	NW10
22-Aug	W4	WSW5	WSW6	WSW6	WSW6	WSW5	WSW5	WSW5	WSW6	WSW7	W5	NW7	NNW8	NW8	NW8	NNW7	N5	NNW3	WNW3	WSW3	SW2	SSW1	WSW2	SSW3	W3.9	NW8
23-Aug	SSW2	SW2	SW2	SSW2	SW2	SW2	SW1	S2	SSE4	ESE5	SE5	SE6	S8	SSE6	SE6	SSE7	SSE7	SE6	SSE3	S2	SSE4	SSW3	NW3	SW1	SSE3.1	S8
24-Aug	SSW3	W4	SSW1	S5	SW2	SSW3	S4	SSW5	SSW8	SSW8	SW7	SW8	SW9	WSW10	SW8	WSW6	WSW6	WSW3	WSW2	SW3	WSW4	NW3	NNW2	NW3	SW4.2	WSW10
25-Aug	WNW1	SW1	SW2	SSW2	SSW1	SW1	SW2	NE1	NNE4	NNE6	NNE8	NNE8	N9	N8	N8	N7	NNW6	NW3	WNW1	NNW2	NW2	WNW2	N6	N8	N3.2	N9
26-Aug	N4	N5	N3	W1	W2	WSW2	SSW1	NNW3	N2	ENE4	ENE3	SE1	E3	SSE1	SSE4	SSW7	SSW6	WSW3	SW2	WSW3	SW4	SW5	WSW4	S1	WSW0.9	SSW7
27-Aug	WSW2	SSW2	SSW2	SSW2	SSW2	SSW2	SSW1	SE1	ESE4	SE5	SE6	S6	SSW11	SSW10	SSW13	SSW12	SSW12	SW10	SW5	SSW5	SSW5	SSW6	SW6	SW6	SSW5.1	SSW13
28-Aug	SW7	SW5	SW4	SW7	SW3	SW6	SW5	SW8	SW10	SW12	SW10	WSW10	WSW11	WSW12	WSW9	SW10	SW8	SW6	SW1	SW1	SW2	W2	NNW3	NW3	WSW6.1	WSW12
29-Aug	WNW2	SW1	SSW1	S2	SW4	SSW2	S2	S3	SW5	SSE5	S6	SSW7	S6	SSE6	SE6	SE5	SE6	SSE5	SSW0	SE3	SSE3	SSE6	SSE5	SSE3	S3.3	SSW7
30-Aug	N1	SW1	W1	NNW2	W1	WNW1	W1	N1	WSW5	W6	WNW4	WNW4	WSW5	SSW8	SW6	SSW7	W7	S3	SSE10	S5	S3	SSW4	SSW3	SSW1	SW2.7	SSE10
31-Aug	WSW3	SW2	WSW1	SSW1	SSW2	SSW2	SW1	S3	SSE5	SSE8	SSW8	SW13	SW14	SW15	SW15	SW14	SW13	SW11	SSW7	SSW5	SSW5	SSW6	SW6	SW4	SW6.4	SW15
	WSW2.3	WSW1.9	WSW1.9	SW2.0	WSW2.1	WSW2.0	WSW1.8	SW1.8	SW2.1	SW2.1	WSW2.2	WSW2.6	WSW3.1	WSW3.7	WSW3.3	WSW3.2	WSW3.3	SW2.9	WSW2.0	SW2.0	SW2.5	SW2.5	WSW2.0	WSW2.2		Diurnal Average
	SW7	SW8	WSW8	WSW7	WSW8	WSW8	SSE9	N11	SW10	W12	WSW13	NNE14	SW18	SW18	SW16	WSW15	SW13	SW11	SSE10	SSE8	S7	SSW7	SSW7	N8		Diurnal Maximum

AF - Analyzer Failure PF - Power Failure

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

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Speed (WS) - km/h

Fort McKay South - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 7 km/h on Aug 19 18:00

Minimum Value: 0 km/h on Aug 26 20:00

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:	729
Hours of Missing Data:	15
Hours of Calibration:	0
Percent Operational Time:	98.0

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

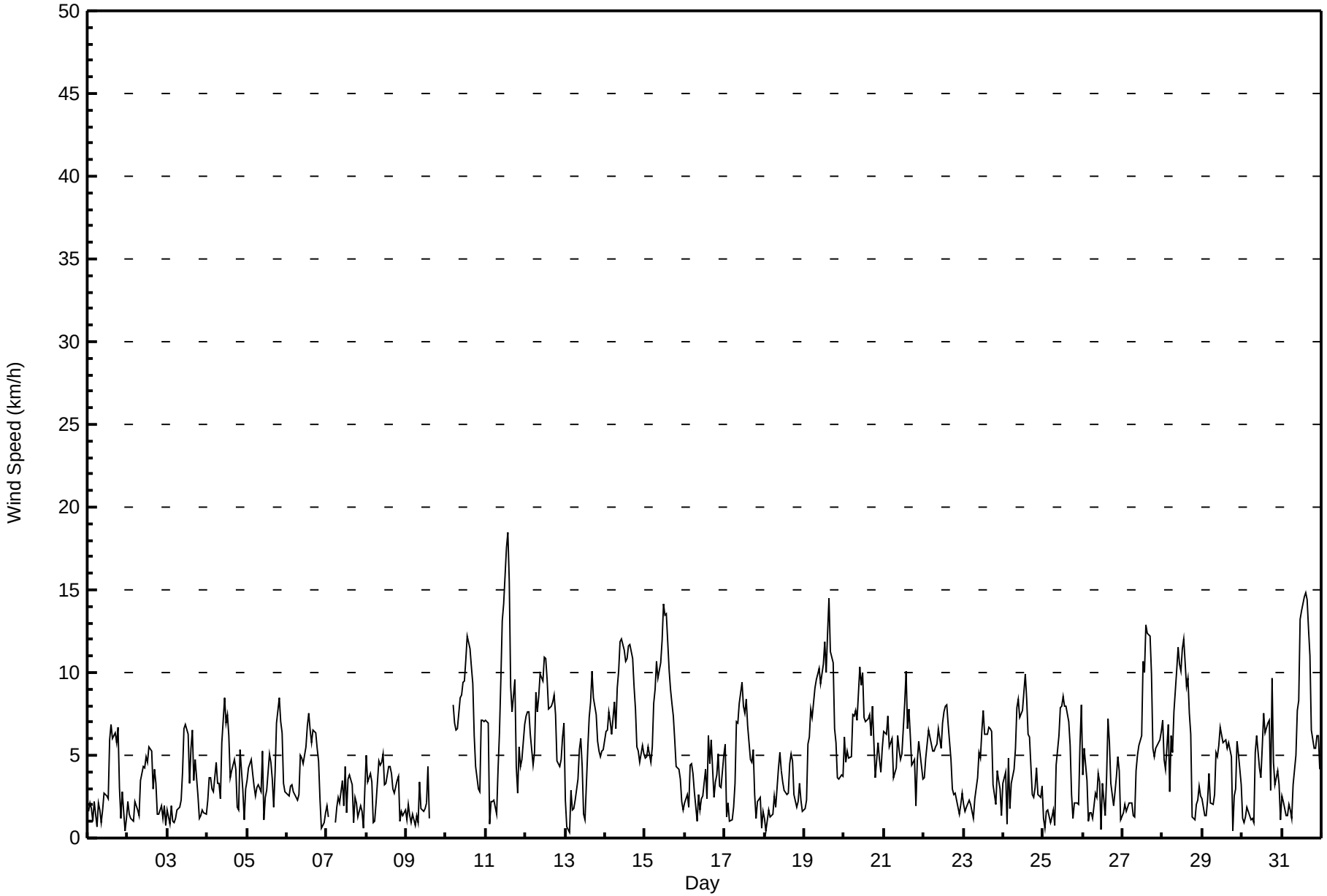
AF - Analyzer Failure PF - Power Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed (WS) - km/h

Fort McKay South - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Wind Speed (WS) - km/h

Fort McKay South - August 2015

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	463	63.51	63.51
6 - 11	238	32.65	96.16
12 - 19	28	3.84	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: 729

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Wind Speed (WS) - km/h

Fort McKay South - August 2015

Wind Speed Ranges (km/h)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 5	26	16	8	11	12	18	26	25	39	57	61	60	30	28	18	28	463
6 - 11	21	4	0	1	2	3	7	17	12	25	40	55	20	15	9	7	238
12 - 19	3	1	0	0	0	0	0	0	0	3	11	6	3	1	0	0	28
20 - 28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	50	21	8	12	14	21	33	42	51	85	112	121	53	44	27	35	729

Total Number of Valid Hours: 729

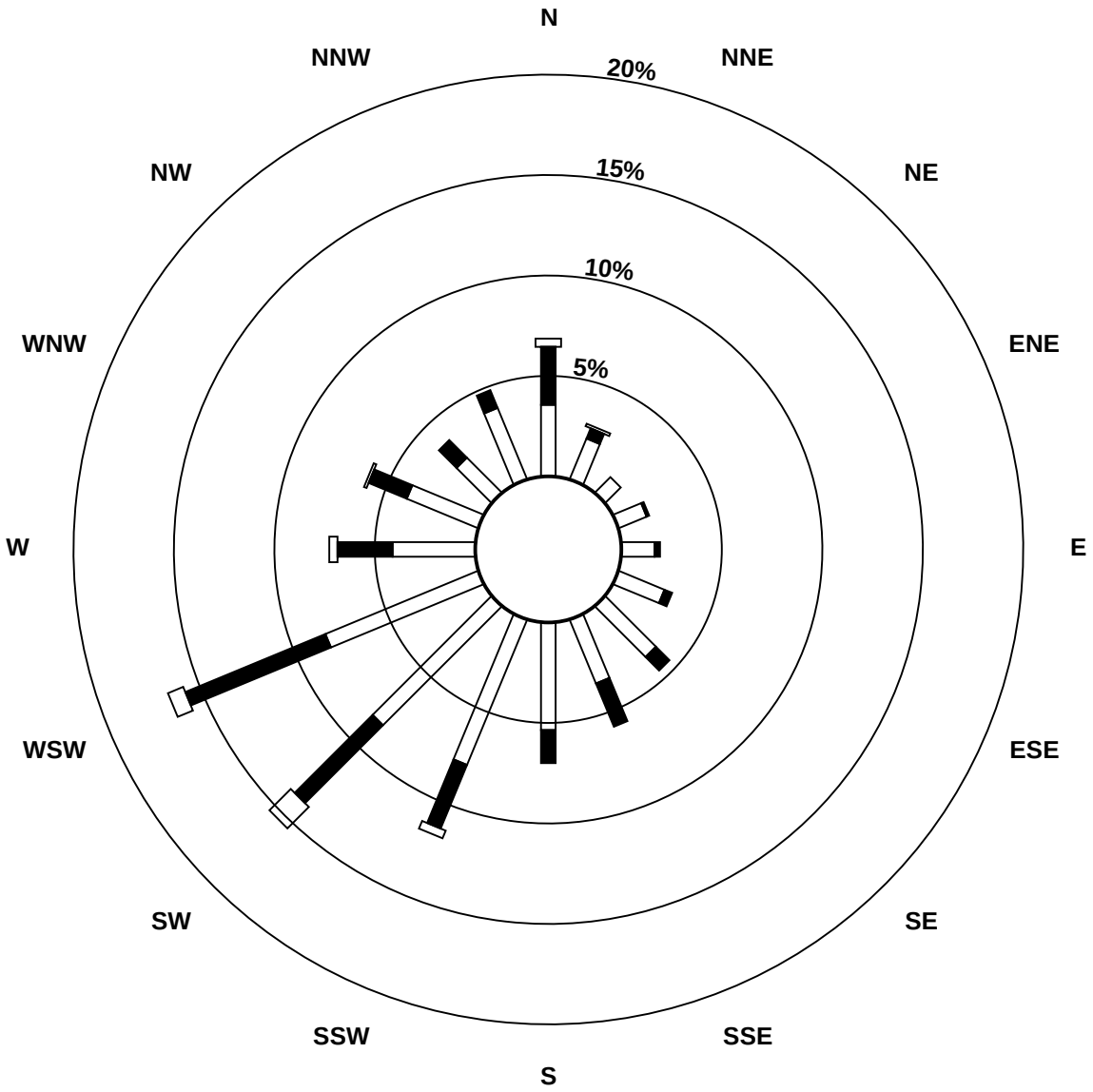
Total Number of Hours: 744

Wood Buffalo Environmental Association

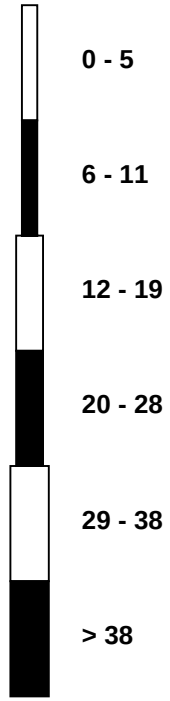
Wind Rose Aug 2015

Wind Speed (WS) - km/h

Fort McKay South (AMS 13)



Classes (km/h)



Total Number of Valid Hours: 729

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Fort McKay South - August 2015

Direction of Maximum Speed: 236 deg on Aug 11 14:00
Direction of Maximum Daily Speed Average: 264.8 deg on Aug 14

Direction of Minimum Speed: 208 deg on Aug 13 03:00
Direction of Minimum Daily Speed Average: 0.0 deg on Aug 7

Monthly Average Direction: 247.4 deg

Hours in Service:	744
Hours of Data:	729
Hours of Missing Data:	15
Percent Operational Time:	98.0

Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average
1-Aug	253	229	225	305	343	276	345	326	10	273	308	65	319	296	297	324	314	355	4	297	304	279	116	230	314.9
2-Aug	244	197	194	189	193	167	184	146	110	115	136	145	137	141	99	29	320	169	151	255	310	194	234	247	150.4
3-Aug	246	295	228	205	224	257	21	6	43	15	5	2	347	84	122	74	69	143	162	210	238	294	337	302	32.0
4-Aug	337	353	353	341	332	352	330	334	334	6	11	17	5	1	63	90	117	96	33	59	141	82	20	9	18.8
5-Aug	3	19	7	14	360	9	8	5	55	122	106	342	171	203	190	232	240	147	156	165	175	161	124	141	138.8
6-Aug	90	81	41	25	48	48	33	72	142	141	188	152	95	96	105	115	126	121	137	135	110	104	291	5	109.0
7-Aug	68	106	AF	246	AF	334	330	341	1	3	311	327	327	149	118	160	124	178	127	247	243	254	224	179	186.9
8-Aug	175	179	176	184	175	266	187	148	138	129	87	116	147	65	340	310	286	135	21	92	170	305	302	237	141.5
9-Aug	271	235	229	270	211	280	10	115	39	32	20	80	63	93	6	PF	PF	PF	PF	PF	PF	PF	PF	PF	--
10-Aug	PF	PF	PF	PF	249	257	249	246	226	229	227	231	226	225	236	236	217	233	263	236	207	205	207	213	230.4
11-Aug	228	232	191	161	166	192	205	215	203	217	246	240	232	236	236	249	268	253	242	207	208	238	250	236	233.3
12-Aug	235	230	234	230	223	230	243	250	244	246	246	251	243	247	236	238	250	245	244	228	217	240	251	252	241.2
13-Aug	216	174	208	189	211	199	181	189	189	178	171	134	325	223	237	191	210	218	206	200	204	202	215	226	204.2
14-Aug	262	252	248	244	239	249	258	257	266	263	263	264	269	267	272	284	282	287	290	287	270	247	245	252	264.8
15-Aug	246	286	305	293	309	349	352	350	348	357	7	16	11	359	354	351	347	317	327	298	330	298	319	259	343.2
16-Aug	245	246	241	252	258	259	266	346	336	309	166	166	134	214	354	337	300	279	261	246	250	247	238	250	263.5
17-Aug	243	247	193	184	214	240	184	186	190	186	191	200	210	219	206	33	315	268	274	336	210	204	204	223	211.6
18-Aug	264	258	230	189	215	257	265	276	354	35	8	31	21	298	74	119	122	130	195	215	174	178	163	188	125.6
19-Aug	186	157	163	167	160	162	168	168	182	197	249	248	238	270	243	248	257	263	266	249	221	229	232	223	221.9
20-Aug	237	207	237	222	224	242	252	251	272	263	270	278	272	271	272	275	297	292	287	253	253	272	247	249	261.2
21-Aug	248	251	247	240	236	234	251	270	277	295	303	291	298	311	301	295	294	301	289	281	288	287	282	244	277.3
22-Aug	264	249	249	251	253	254	255	249	251	255	260	317	327	312	320	330	352	344	303	243	220	210	241	207	278.0
23-Aug	211	219	224	212	227	228	226	189	154	119	127	138	176	167	145	152	155	145	167	190	165	195	325	223	165.4
24-Aug	207	261	203	180	225	207	184	194	201	201	224	231	232	245	234	238	237	255	256	235	256	315	343	318	229.0
25-Aug	288	231	218	211	206	235	217	52	29	21	20	22	5	1	357	355	341	316	297	328	326	297	350	8	357.0
26-Aug	356	350	355	267	261	238	192	337	349	58	74	138	83	151	163	213	204	239	227	237	228	229	251	191	240.3
27-Aug	247	204	212	197	209	197	202	142	122	131	130	178	200	208	202	202	212	229	215	197	198	204	220	217	199.6
28-Aug	219	234	221	231	230	230	231	217	226	234	234	240	247	252	247	233	235	228	234	235	222	263	344	319	236.8
29-Aug	298	222	211	185	231	204	171	173	220	168	183	205	177	158	140	140	132	148	200	138	159	147	149	159	170.0
30-Aug	1	226	280	332	276	303	268	4	243	263	298	285	250	213	224	205	272	188	163	169	191	212	201	198	229.3
31-Aug	243	235	246	212	210	213	214	186	163	153	194	224	229	225	235	231	229	221	210	213	205	207	225	231	217.8
	243.3	243.6	241.0	228.4	236.3	243.8	244.5	234.8	225.9	219.9	245.9	251.4	246.2	244.8	242.1	245.0	251.4	235.5	237.3	221.5	218.2	225.8	243.1	238.9	
	Diurnal Average																								

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

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg

Fort McKay South - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 103 deg on Aug 26 12:00

Minimum Value: 7 deg on Aug 26 20:00

Percentiles: P_1 = 12 P_{10} = 19 Q_1 = 27 Median = 36 Q_3 = 48 P_{90} = 71 P_{99} = 95

Hours in Service:	744
Hours of Data:	729
Hours of Missing Data:	15
Hours of Calibration:	0
Percent Operational Time:	98.0

Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Aug	22	32	42	76	25	69	33	59	82	83	69	85	91	34	42	50	45	44	24	27	55	31	93	58	93
2-Aug	28	60	37	48	30	20	39	85	44	50	58	66	70	68	49	76	67	50	66	49	48	92	43	71	92
3-Aug	45	65	16	76	76	63	77	69	72	50	30	35	47	77	54	44	61	31	27	45	15	44	58	34	77
4-Aug	22	18	25	16	55	20	27	32	28	28	24	27	25	26	46	49	41	41	43	54	37	39	68	17	68
5-Aug	15	18	20	23	31	34	47	28	48	44	90	54	70	34	45	57	69	42	33	26	27	31	44	42	90
6-Aug	50	42	24	25	41	39	35	39	37	41	41	39	46	42	56	41	45	42	34	37	39	86	41	33	86
7-Aug	35	44	AF	81	AF	58	30	33	78	51	76	62	90	66	81	71	103	50	61	41	16	43	90	41	103
8-Aug	19	31	17	15	76	56	68	36	41	41	47	66	73	77	63	45	66	73	47	65	80	26	40	46	80
9-Aug	44	15	50	57	43	65	72	65	36	90	100	90	88	65	95	PF	PF	PF	PF	PF	PF	PF	PF	PF	100
10-Aug	PF	PF	PF	PF	24	27	24	43	30	34	36	37	33	29	33	38	34	37	29	12	20	14	15	18	43
11-Aug	18	17	89	49	40	51	87	30	30	34	29	29	27	27	29	36	39	34	32	21	17	28	12	16	89
12-Aug	16	17	17	20	44	33	24	36	35	32	37	34	31	41	47	39	39	32	25	19	12	13	15	17	47
13-Aug	60	90	93	25	34	49	38	37	33	25	32	97	77	33	41	23	26	28	21	14	14	11	16	16	97
14-Aug	32	21	21	22	25	28	40	36	36	35	38	40	39	43	42	42	42	41	38	40	31	29	27	28	43
15-Aug	20	32	35	33	33	29	31	29	32	30	30	29	30	29	31	33	32	37	32	32	34	25	33	34	37
16-Aug	37	27	26	24	25	23	62	82	56	82	87	81	45	86	44	52	41	30	33	12	11	26	31	21	87
17-Aug	30	74	64	39	31	27	17	23	26	31	29	39	46	42	59	69	41	28	74	70	46	35	80	43	80
18-Aug	61	87	45	72	47	59	49	89	62	41	68	75	56	64	71	53	27	39	46	26	21	15	34	40	89
19-Aug	49	62	25	27	26	28	24	24	29	26	39	36	31	43	34	32	33	32	33	27	28	32	27	32	62
20-Aug	20	32	24	24	21	20	31	37	41	36	34	34	38	36	43	43	42	38	40	27	25	26	17	18	43
21-Aug	18	22	19	19	19	43	42	44	42	46	47	49	45	40	46	40	40	37	33	48	32	30	33	32	49
22-Aug	36	19	19	19	19	21	22	22	24	28	40	48	46	40	43	39	49	61	26	16	39	56	39	23	61
23-Aug	30	44	46	39	43	26	35	22	24	43	41	45	40	31	46	36	39	32	33	39	24	56	88	63	88
24-Aug	41	46	89	37	47	36	27	27	27	29	43	40	35	35	41	55	39	63	31	7	16	55	29	15	89
25-Aug	47	93	58	29	51	50	45	64	31	31	28	32	29	30	30	29	27	42	45	27	59	32	37	25	93
26-Aug	25	25	25	45	44	60	75	62	87	53	78	103	66	97	63	31	31	25	18	7	10	12	19	74	103
27-Aug	60	33	53	25	26	19	37	39	34	34	43	49	31	29	27	27	28	27	27	12	11	14	18	18	60
28-Aug	19	17	18	19	43	17	23	25	23	26	31	35	35	37	38	33	37	29	35	32	27	58	33	44	58
29-Aug	32	82	86	62	29	38	38	29	32	45	46	37	53	45	40	44	38	28	83	30	26	31	38	61	86
30-Aug	98	83	96	68	55	53	35	72	44	46	66	78	59	37	55	32	46	71	27	33	19	20	29	74	98
31-Aug	16	24	49	55	23	54	64	23	28	33	41	29	32	31	30	30	29	27	21	18	11	14	16	37	64
	98	93	96	81	76	69	87	89	87	90	100	103	91	97	95	76	103	73	83	70	80	92	93	74	
	Diurnal Maximum																								

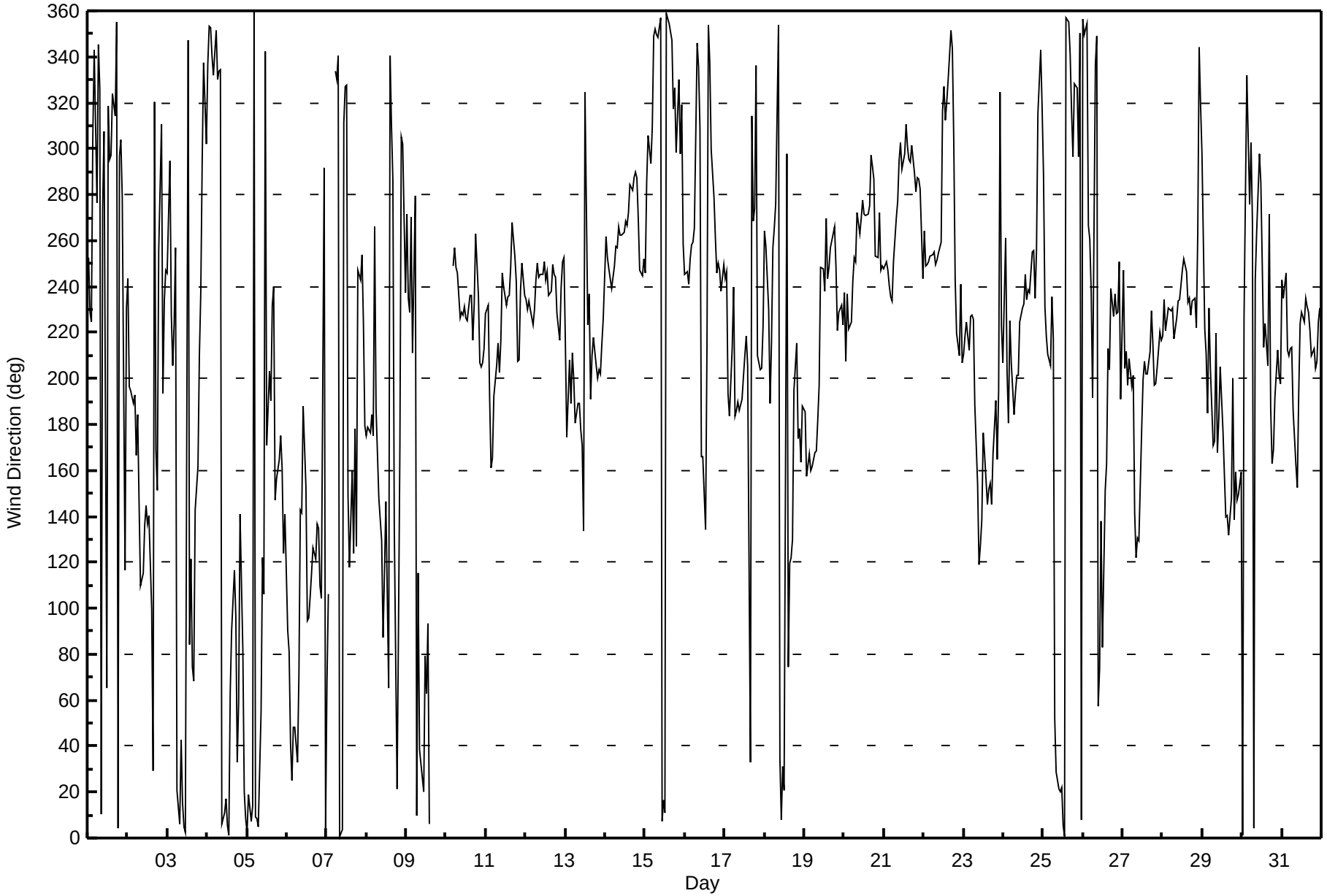
AF - Analyzer Failure PF - Power Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction (WD) - deg

Fort McKay South - August 2015



Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

Calibration Date	August 6, 2015	Last Calibration	July 15, 2015
Station Name	Fort McKay South	Station Number	AMS 13
Reason:	Routine		
Start Time (MST)	6:45	End Time (MST)	12:57
Gas Cert Reference	S980455A	Station temp.	22 Deg C
Cal Gas Concentration	50 ppm	Cal Gas Exp Date	26/09/2017
Calibrator Make/Model	Sabio 4010	Serial Number	11041107
ZAG Make/Model	API 701	Serial Number	3410
DACS make/model	Campbell Scientific CR3000	DACS serial No.	1850

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 1000 ppb		HVPS voltage	512	547
Analyzer IP address	192.168.1.44		Lamp voltage	1793	1814
Calculated slope	1.000984	0.999724	Chamber temp	50.0	50.0
Calculated intercept	0.410578	0.944753	Pressure	26.2	26.1
Analyzer Background	24.2	42.1	Flow	690	689
Analyzer Coefficient	1.770	1.022	Intensity	60.5	61.2

Analyzer make	API T100	Analyzer serial #	599

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.0	----
as found span	5000	70.3	703.0	699.6	1.005
calibrator zero	5000	0.0	0.0	-0.6	----
high point	5000	70.3	703.0	702.1	1.001
second point	5000	35.1	351.0	350.9	1.000
third point	5000	17.6	176.0	174.2	1.010
as left zero	5000	0.0	0.0	-0.1	----
as left span	5000	70.3	703.0	692.0	1.016
				Average Correction Factor	1.004

Corrected As found	699.6	Previous response	701.9	% change	0.3%

Notes:

Lamp adjusted, HVPS adjusted, pump replaced, filter replaced, zero and span adjusted

Calibration Performed By: Melissa Lemay

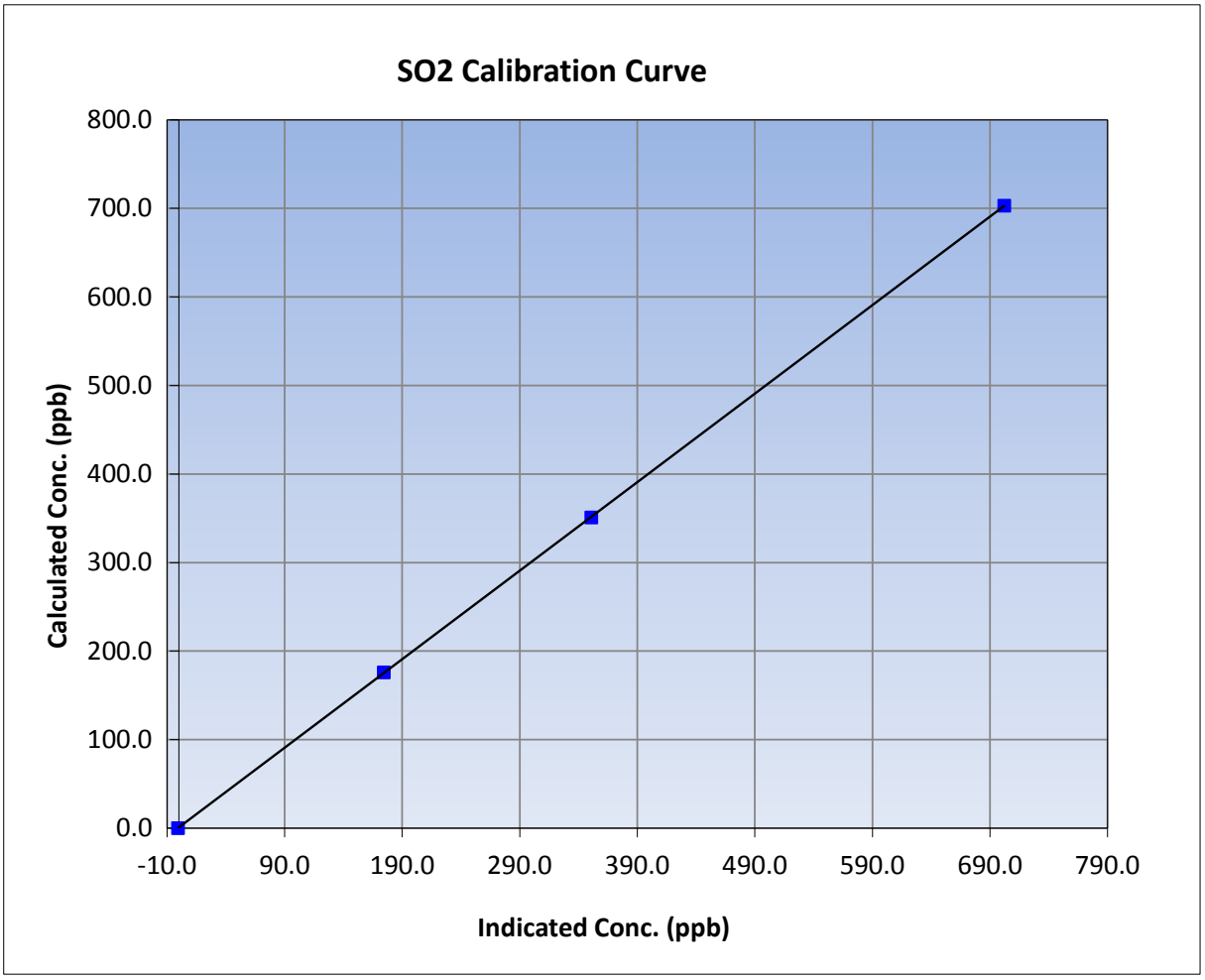
Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

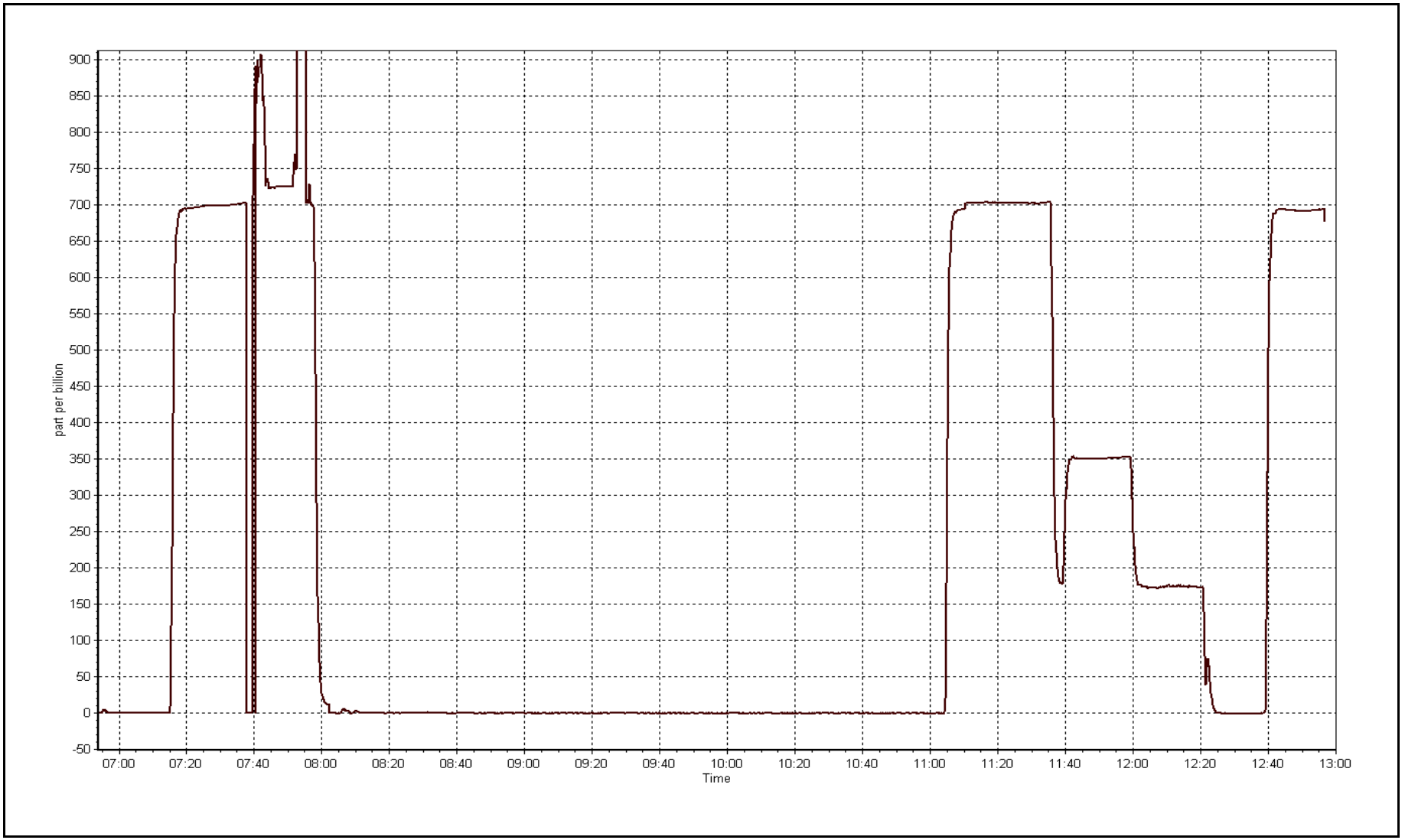
Calibration Date	August 6, 2015	Previous Calibration	July 15, 2015
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	6:45	End Time (MST)	12:57
Analyzer make	API T100	Analyzer serial #	599

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.6	----	Correlation Coefficient	0.999994
703.0	702.1	1.0013		
351.0	350.9	1.0003	Slope	0.999724
176.0	174.2	1.0103		
			Intercept	0.944753



SO2 Calibration Plot Date: August 6, 2015



Wood Buffalo Environmental Association
TRS Calibration Report

Station Information

Calibration Date	August 7, 2015	Last Calibration	July 14, 2015
Station Name	Fort McKay South	Station Number	AMS 13
Reason:	Routine		
Start Time (MST)	7:36	End Time (MST)	10:11
Gas Cert Reference	CC178364	Station temp.	22 Deg C
Cal Gas Concentration	5.07 ppm	Cal Gas Exp Date	30/05/2013
Calibrator Make/Model	Sabio 4010	Serial Number	11041107
Dil air Make/Model	API 701	Serial Number	3410
DACS make/model	Campbell Scientific CR3000	DACS serial No.	1850
SO2 gas concentration	51.1 ppm	SO2 gas cert/exp	S980455A 09/26/17

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-727	-727
Analyzer IP address	192.168.1.44		Lamp voltage	996	994
Calculated slope	0.984571	1.006490	Chamber temp	45	45
Calculated intercept	0.291656	0.299342	Pressure	683.5	685.9
Analyzer Background	1.08	1.08	Flow	0.440	0.447
Analyzer Coefficient	2.240	2.240	Intensity	90	90
			Converter temp.	800	800

Analyzer make/model	Thermo 43i-TLE	Analyzer serial #	1218153359
Converter make/model	CDN-101	Converter serial #	456

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.3	----
as found span	5000	78.9	80.0	79.1	1.011
SO2 scrubber check	5000	17.6	179.9	0.1	----
calibrator zero	5000	0.0	0.0	-0.3	----
high point	5000	78.9	80.0	79.1	1.011
second point	5000	39.4	40.0	39.7	1.006
third point	5000	19.7	20.0	19.3	1.035
as left zero	5000	0.0	0.0	-0.2	----
as left span	5000	78.9	80.0	80.0	1.000
				Average Correction Factor	1.018

Corrected As found	79.4	Previous response	81.0	% change	2.0%

Notes:

filter changed out, no adjustments or maintenance done

Calibration Performed By: Melissa Lemay

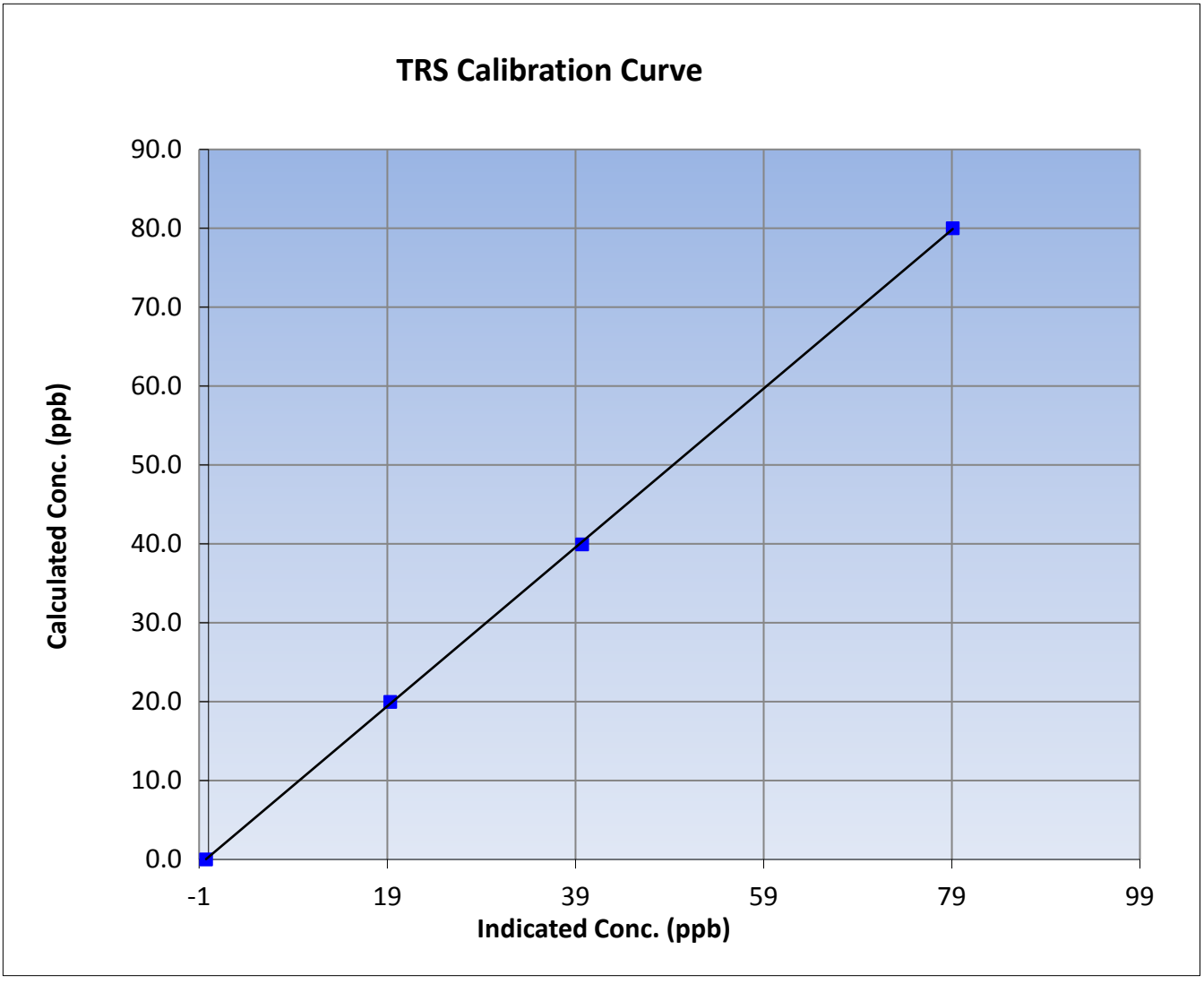
Wood Buffalo Environmental Association
TRS Calibration Report

Station Information

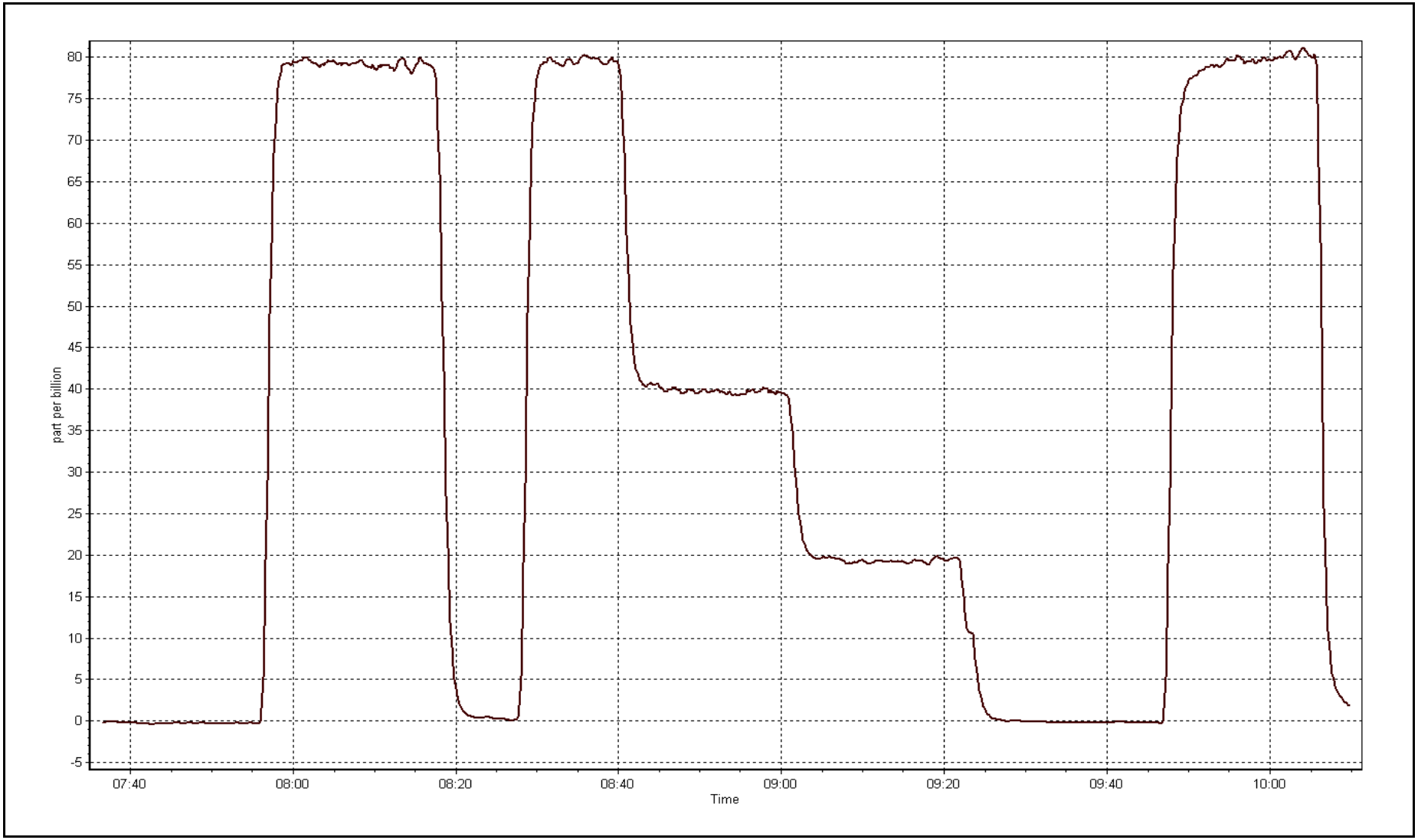
Calibration Date	August 7, 2015	Previous Calibration	July 14, 2015
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	7:36	End Time (MST)	10:11
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1218153359

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.3	----	Correlation Coefficient	0.999953
80.0	79.1	1.0114		
40.0	39.7	1.0063	Slope	1.006490
20.0	19.3	1.0350		
			Intercept	0.299342



TRS Calibration Plot Date: August 7, 2015



Wood Buffalo Environmental Association
THC Calibration Report

Station Information

Calibration Date	August-05-15	Last Calibration	July-15-15
Station Name	Fort McKay South	Station Number	AMS 13
Reason:	Routine		
Start Time (MST)	7:45	End Time (MST)	11:56
Gas Cert Reference	S980455A	Cal Gas Expiry Date	26/09/2017
CH4 Cal Gas Conc.	497 ppm	CH4 Equiv Conc.	1033.3 ppm
C3H8 Cal Gas Conc.	195 ppm	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11041107
ZAG make/model	Teledyne API 701	Serial Number	3410/5613
DACS make/model	Campbell Scientific CR3000	Serial Number	1850

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 50 ppm		Sample Pressure	9.2	9.2
Analyzer IP address	192.168.1.51		Air or Bypass Press	23.1	23.1
Calculated slope	0.995854	0.988046	Fuel Pressure	34.2	34.2
Calculated intercept	0.035605	0.023359	Analyzer Coeff	2.998	2.998
			Analyzer BKG	1.500	1.500

Analyzer make	51i-LT	Analyzer serial #	1505164380

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	-0.02	----
as found span	5000	70.3	14.53	14.68	0.990
calibrator zero	5000	0.0	0.00	-0.02	----
high point	5000	70.3	14.53	14.68	0.990
second point	5000	35.1	7.25	7.32	0.991
third point	5000	17.5	3.62	3.63	0.996
as left zero	5000	0.0	0.00	-0.04	----
as left span	5000	70.3	14.53	14.78	0.983
				Average Correction Factor	0.992

Corrected As found	14.70	Previous response	14.55	% change	-1.0%

Notes:

No maintenance or adjustments done, filter change out

Calibration Performed By: Melissa Lemay

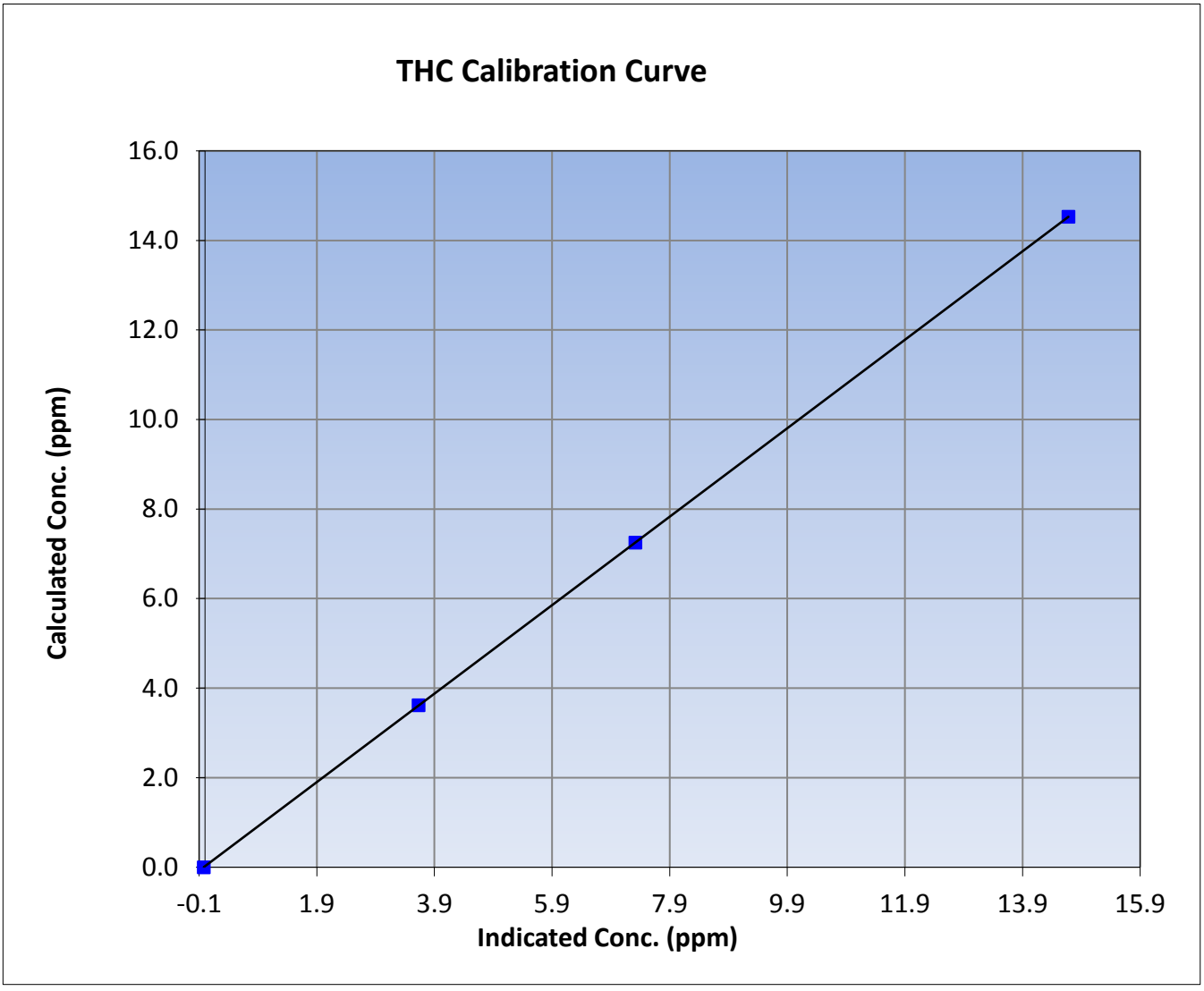
Wood Buffalo Environmental Association
THC Calibration Report

Station Information

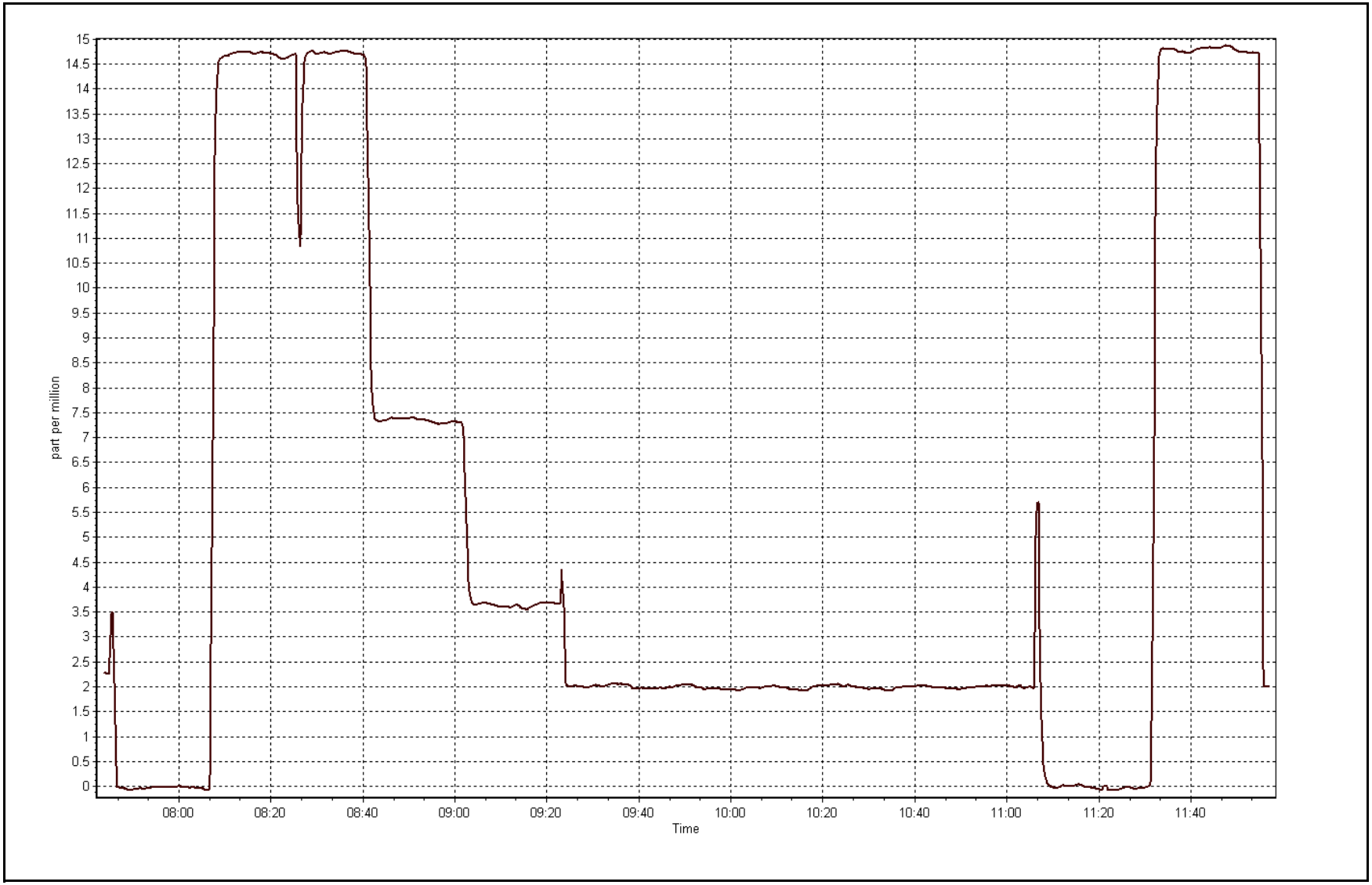
Calibration Date	August 5, 2015	Previous Calibration	July 15, 2015
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	7:45	End Time (MST)	11:56
Analyzer make	51i-LT	Analyzer serial #	1505164380

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	-0.02	----	Correlation Coefficient	0.999999
14.53	14.68	0.9896		
7.25	7.32	0.9909	Slope	0.988046
3.62	3.63	0.9962		
			Intercept	0.023359



THC Calibration Plot Date: August 5, 2015



Wood Buffalo Environmental Association
O_3 Calibration Report

Station Information

Calibration Date	August 6, 2015	Previous Calibration	July 20, 2015
Station Name	Fort McKay South	Station Number	AMS 13
Reason:	Routine		
Start Time (MST)	8:05	End Time (MST)	10:54
NO2 GPT Ref date	August-05-15	Transfer Standard	Sabio 4010
		Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11041107
ZAG make/model	Teledyne API 701	Serial Number	3410
DACS make/model	Campbell Scientific CR3000	Serial Number	1850

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 500 ppb		Box temp.	24.2	23.5
Analyzer IP address	192.168.1.79		Lamp temp.	58.0	58.0
Calculated slope	1.001313	1.000445	Pressure	26.6	26.4
Calculated intercept	-0.097425	0.324578	Flow	752	753
Analyzer Background	0.2	0.2	Intensity	2834.0	2878.0
Analyzer Coefficient	0.934	0.916			

Analyzer make	API T400	Analyzer serial #	825

Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator Lamp Intensity (mA)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.00	0.0	-0.2	----
as found span	5000	0.90	320.4	329.3	0.973
calibrator zero	5000	0.00	0.0	-0.2	----
high point	5000	0.90	320.4	320.0	1.001
second point	5000	0.58	190.9	190.5	1.002
third point	5000	0.36	101.0	100.4	1.006
as left zero	5000	0.00	0.0	-0.2	----
as left span	5000	0.89	320.4	326.7	0.981
				Average Correction Factor	1.003

Corrected As found	329.5	Previous response	320.1	% change	-2.9%

Notes:

span adjusted, filter changed out, no maintenance done

Calibration Performed By: Melissa Lemay

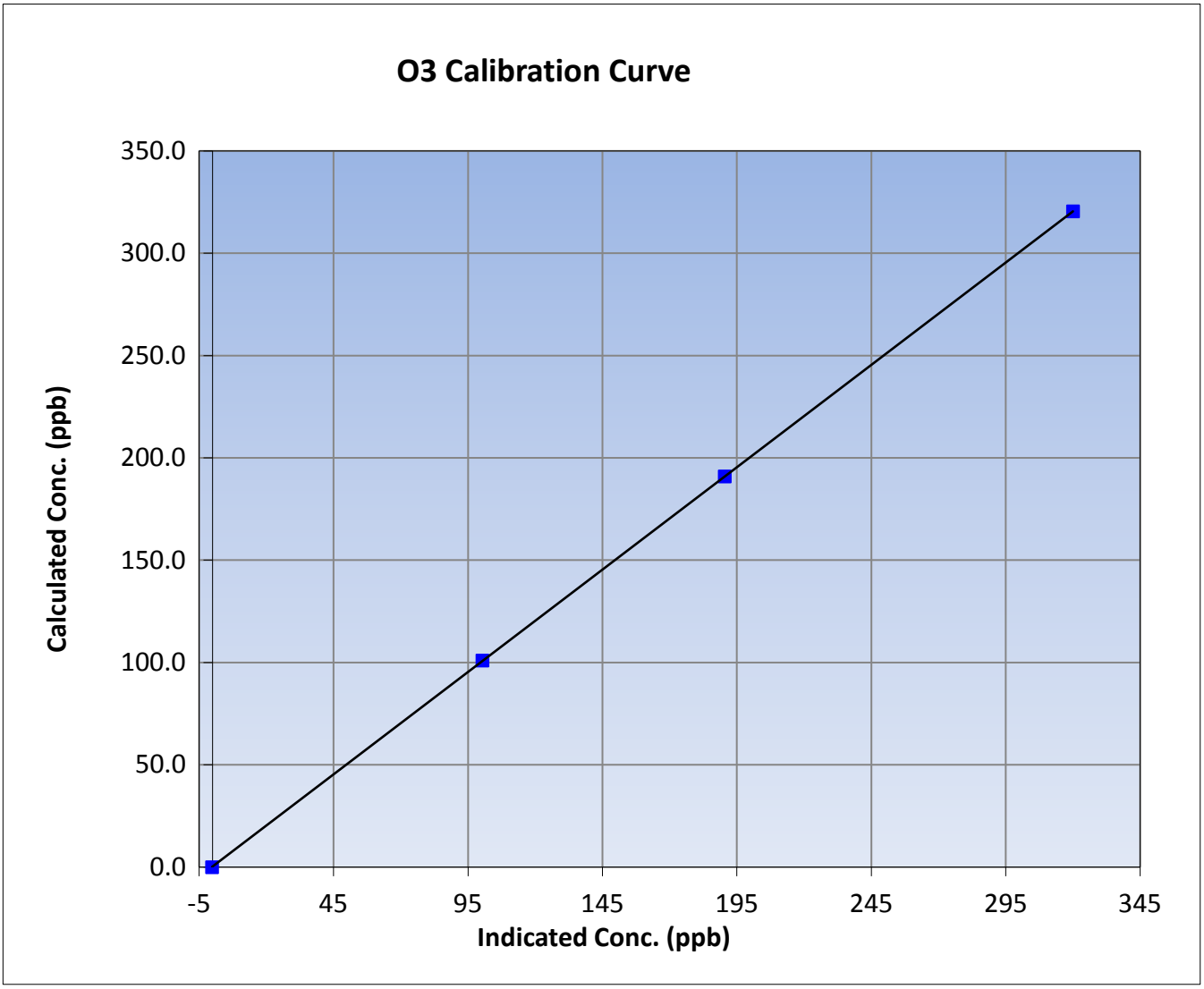
Wood Buffalo Environmental Association
O3 Calibration Report

Station Information

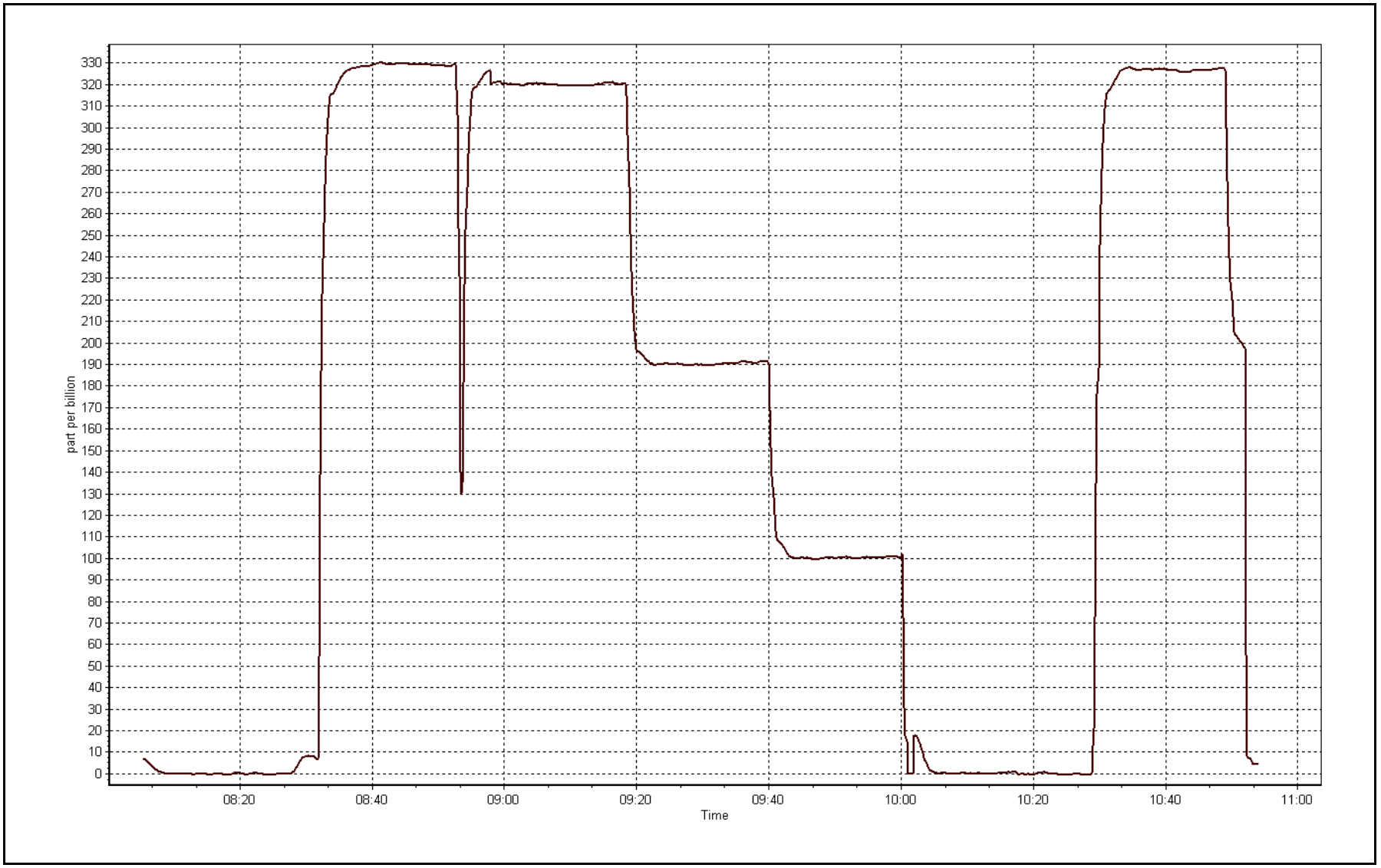
Calibration Date	August-06-15	Previous Calibration	July 20, 2015
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	8:05	End Time (MST)	10:54
Analyzer make	API T400	Analyzer serial #	825

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	----	Correlation Coefficient	0.999999
320.4	320.0	1.0013		
190.9	190.5	1.0021	Slope	1.000445
101.0	100.4	1.0060		
			Intercept	0.324578



O3 Calibration Plot Date: August 6, 2015



Wood Buffalo Environmental Association
NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	August 5, 2015	Previous Calibration	July 15, 2015
Station Name	Fort McKay South	Station Number	AMS 13
Reason:	Routine		
Start Time (MST)	7:45	End Time (MST)	11:58
NO Cal Gas Conc	56.9 ppm	Gas Cert Reference	S980455A
NOx Cal Gas Conc	56.9 ppm	Cal Gas Expiry Date	26/9/2017
Calibrator	Sabio 4010	Serial Number	11041107
Zero air Generator	Teledyne API T701	Serial Number	3410

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	1850

Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	1.001310	1.002249	0.996890
	Data Offset	0.117337	0.027170	-0.568842
Current Calibration	Data Slope	1.006949	1.008807	0.995993
	Data Offset	0.450607	0.252158	-0.126180

Analyzer Information

Analyzer make/model	42i	Analyzer serial #	1410661329

Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
NO coefficient	0.726		0.726	
NOX coefficient	0.998		0.998	
NO2 coefficient	0.999		0.999	
NO bkgrnd	6.4		6.4	
NOX bkgrnd	6.5		6.5	
Chamber Temp	50.4	Deg C	50.2	Deg C
Moly Temp	324	Deg C	325.8	Deg C
PMT voltage	-846.6	V	-846.2	V
PMT Temp	-3.1	Deg C	-3	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	178.8	mmHg	180.9	mmHg
R Cell Press Nox	179.4	mmHg	180.6	mmHg
NO sample flow	0.884	lpm	0.889	lpm
Nox sample Flow	0.885	lpm	0.888	lpm

Notes:

No maintenance or adjustments done, filter changed out

Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: August 5, 2015 Station Number: AMS 13

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.3	0.0	----	----
as found span	5000	70.3	800.0	800.0	0.0	793.7	792.3	1.4	1.0080	1.0097
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.3	0.0	----	----
high point	5000	70.3	800.0	800.0	0.0	793.7	792.3	1.4	1.0080	1.0097
second point	5000	35.1	399.4	399.4	0.0	397.4	397.1	0.3	1.0051	1.0059
third point	5000	17.6	200.3	200.3	0.0	197.5	197.4	0.1	1.0141	1.0146
as left zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.2	0.0	----	----
as left span	5000	70.3	800.0	474.1	325.9	806.4	480.0	326.2	0.9921	0.9877
								Average Correction Factor	1.0091	1.0101

Corrcted As found NO_X= 794.0 NO= 792.6 Percent Change NO_X= 0.6% NO= 0.7%

Previous Response NO_X= 798.9 NO= 798.2

GPT Calibration Data

Dilution Flow 5000 ccm Source Gas Flow 70.30 ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
Cal zero			0.0			0.0			N/A	
1st NO2 (300)	----	474.1	320.4	795.8	474.1	321.7	0.9914	1.0000	0.9960	100.4%
2nd NO2 (200)	----	603.6	190.9	795.6	603.6	191.9	0.9916	1.0000	0.9948	100.5%
3rd NO2 (100)	----	693.5	101.0	795.1	693.5	101.7	0.9922	1.0000	0.9931	100.7%
4th NO2 (0)	794.5	----	0.4	794.9	794.5	0.4	0.9925	1.0000	N/A	----
					Average Correction Factor		0.9919	1.0000	0.9946	100.5%

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

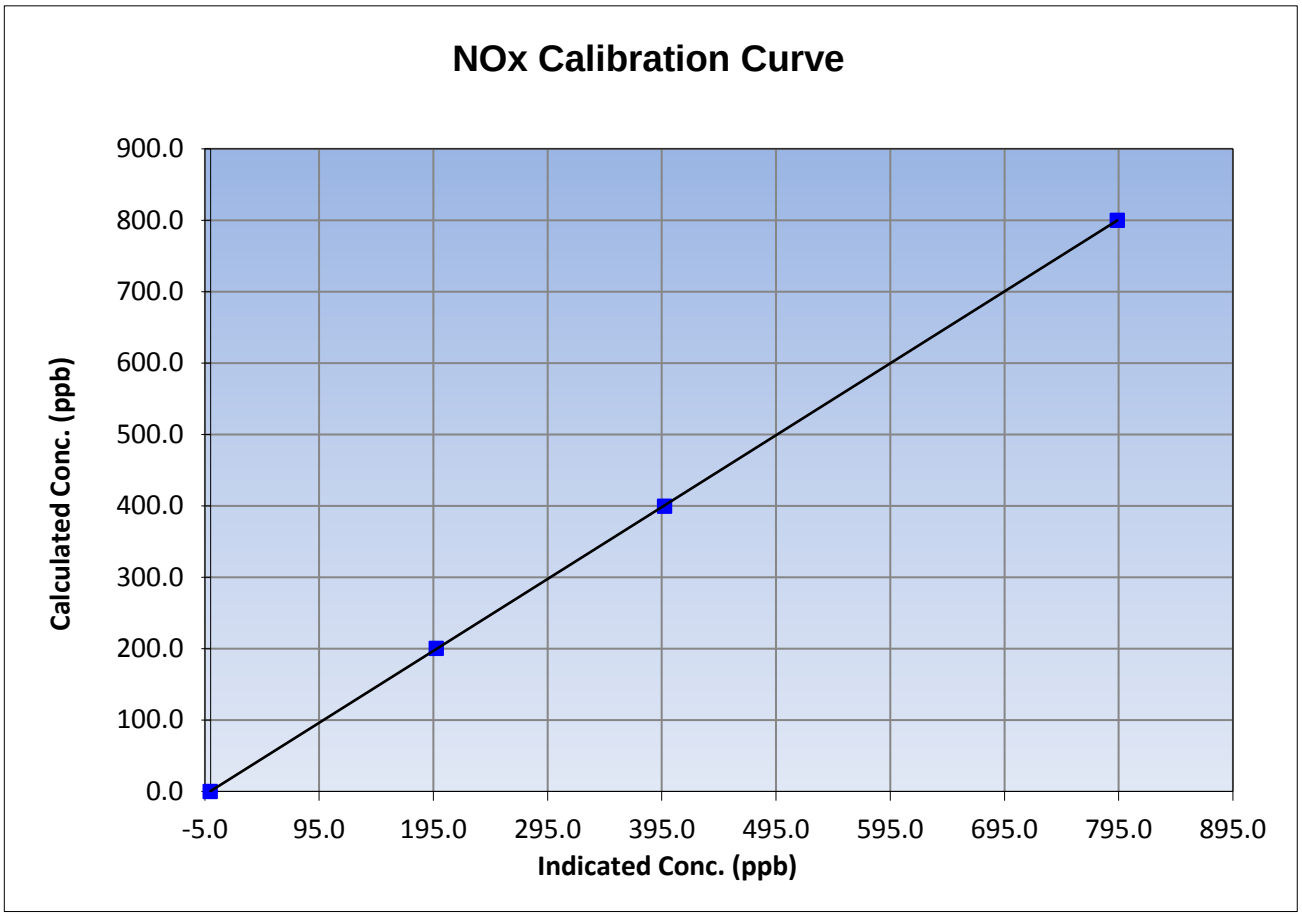
NO_X Calibration Summary

Station Information

Calibration Date	August 5, 2015	Previous Calibration	July 15, 2015
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	7:45	End Time (MST)	11:58
Analyzer make	42i	Analyzer serial #	1410661329

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.3	----	Correlation Coefficient	0.999993
800.0	793.7	1.0080		
399.4	397.4	1.0051	Slope	1.006949
200.3	197.5	1.0141		
			Intercept	0.450607



Wood Buffalo Environmental Association

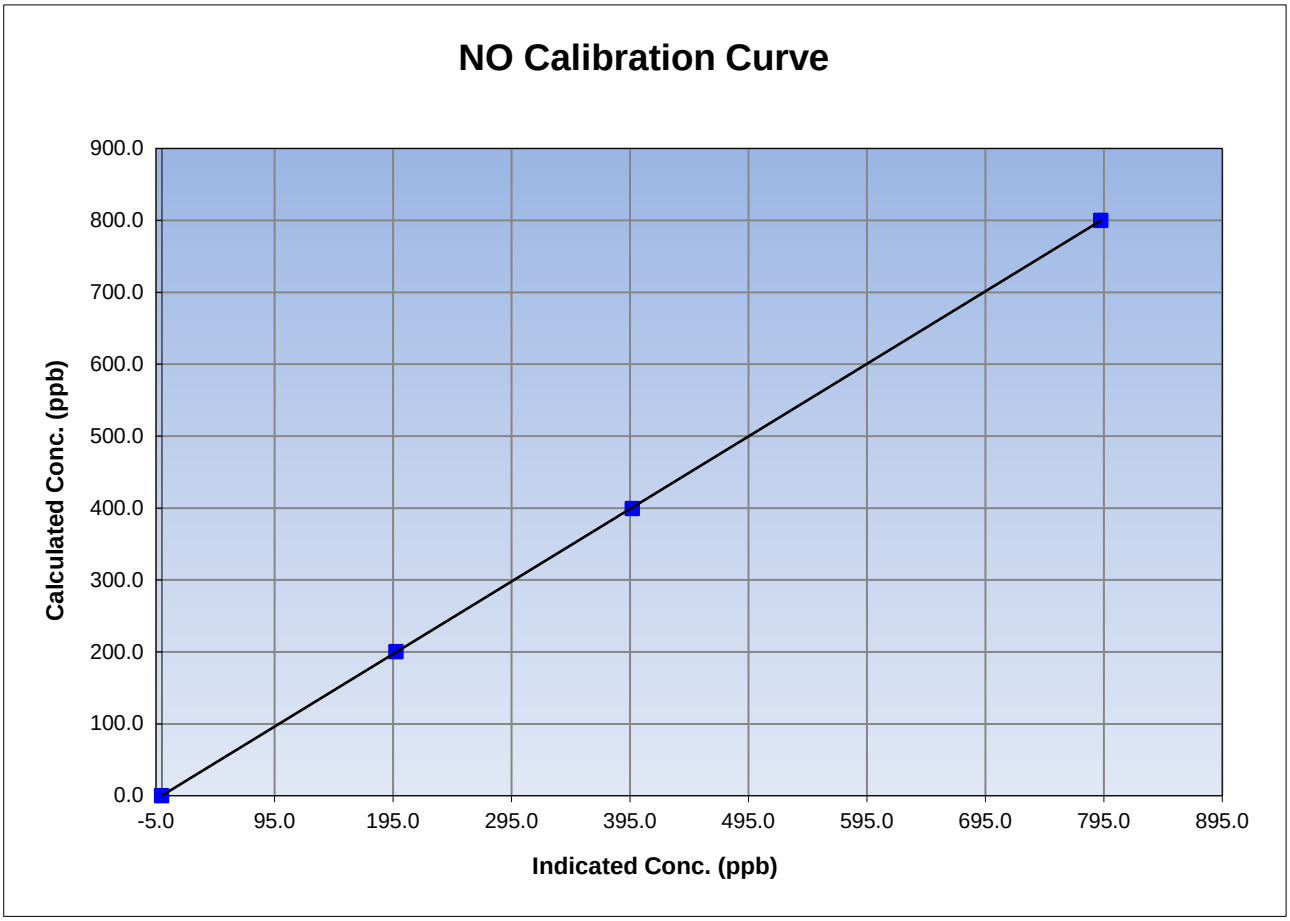
NO Calibration Summary

Station Information

Calibration Date	August 5, 2015	Previous Calibration	July 15, 2015
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	7:45	End Time (MST)	11:58
Analyzer make	42i	Analyzer serial #	1410661329

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.3	N/A	Correlation Coefficient	0.999991
800.0	792.3	1.0097		
399.4	397.1	1.0059	Slope	1.008807
200.3	197.4	1.0146		
			Intercept	0.252158



Wood Buffalo Environmental Association

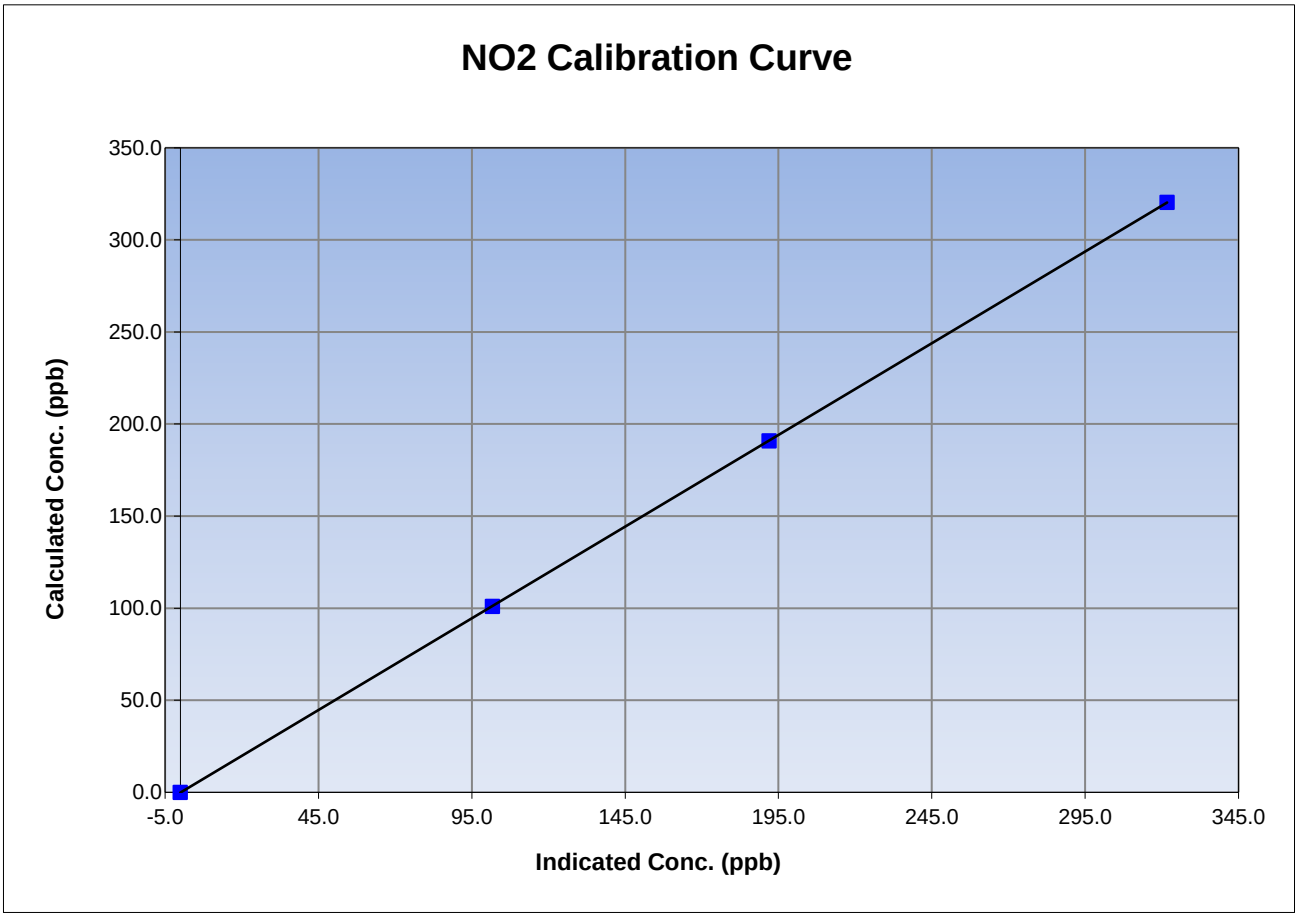
NO_2 Calibration Summary

Station Information

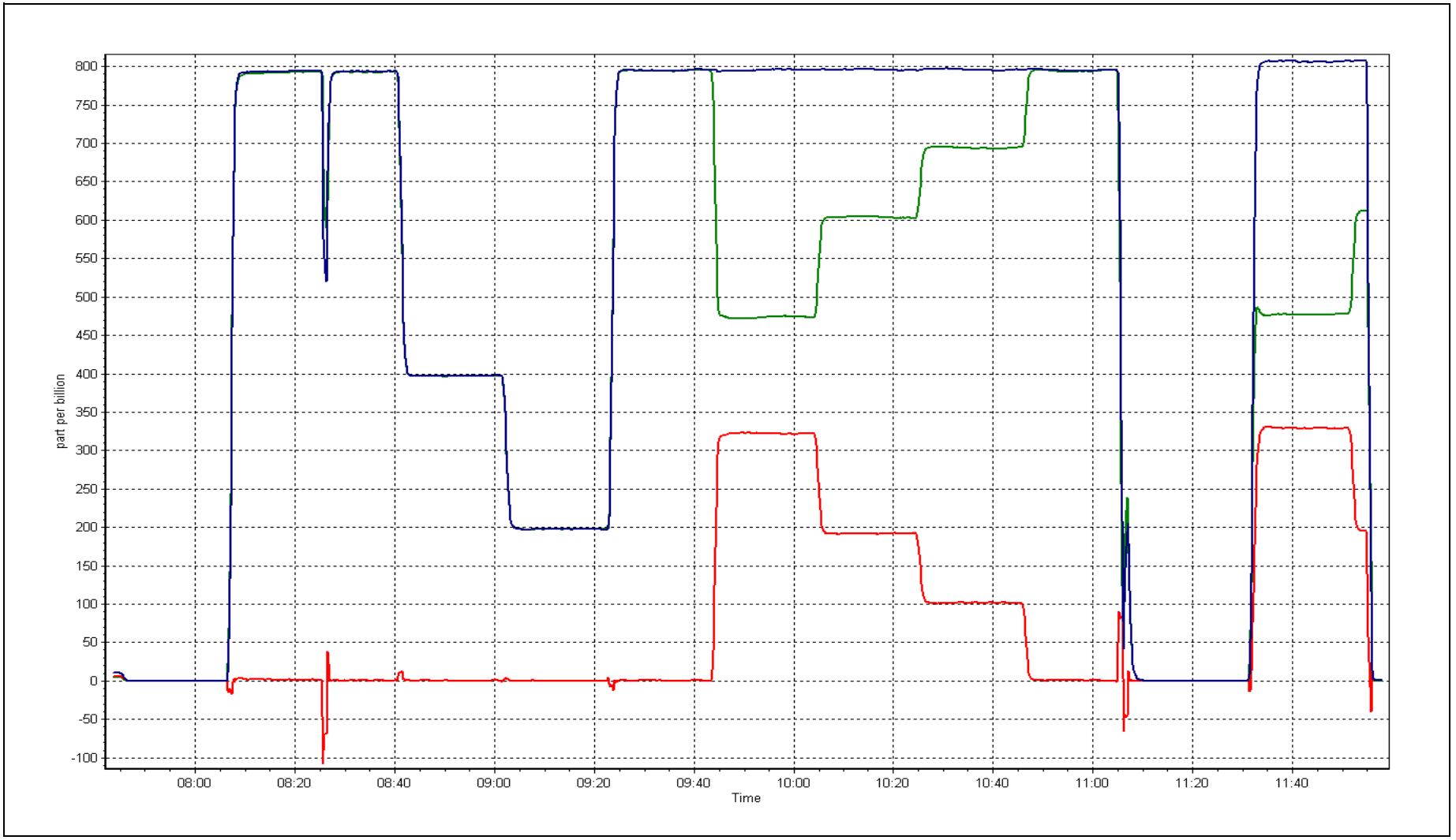
Calibration Date	August 5, 2015	Previous Calibration	July 15, 2015
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	7:45	End Time (MST)	11:58
Analyzer make	42i	Analyzer serial #	1410661329

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999999
320.4	321.7	0.9960		
190.9	191.9	0.9948	Slope	0.995993
101.0	101.7	0.9931		
			Intercept	-0.126180



NOx, NO & NO_2 Calibration Plot Date: August 5, 2015



Wood Buffalo Environmental Association

SHARP CONFORMANCE TEST

STATION INFORMATION

Calibration Date:	August 7, 2015	Previous Calibration:	July 14, 2015
Station Name:	Fort McKay South	Station Number:	AMS 13
Start Time (MST):	10:18	End Time (MST):	10:48
Calibrator Make/Model:	Delta Cal	Calibrator Serial Number:	1097

SHARP INFORMATION

Particulate Fraction:	PM2.5
Make/Model:	Thermo / SHARP 5030
Serial Number	E-803
Source SN:	4173
HEPA PN:	12144
Time Correct (MST):	Yes
Paremeters Checked:	T1, P3, Main Flow, Neph,

AUDIT DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	18.0	19.1	1.1	18.0
T2	28.0	na	na	28.0
T3	25.0	na	na	25.0
T4	36.0	na	na	36.0
RH (%)	48.0	na	na	48.0

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	974	975.0	1.0	974

Main Flow (Lph)

Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
1000	1005	5	1000	1000

Nephalometer Calibration

Parameter	As Founds	adjusted(Limit +or- 2.0ug/m3)	As Left
Analog	405		396
Neph	3		1.1
C14	-18.4	yes	-18.9
Indicated Concentration (ug/m3)	2.5		0.5
Offset 1	451		451.3
Offset 2	51		52

Leak Check (Quarterly)

Leak Check Date:	July 14, 2015	Previous Leak Check Date:	
	Measured	Difference LPM (Limit +/- 0.42 LPM)	
Flow without adaptor (LPM):	16.80	0.10	
Flow with adaptor [turn off pump first](LPM):	16.70		

Mass Foil Calibration (Annualy)

Foil Calibration Date:	July 14, 2015	Previous Foil Calibration:	
Zeroed?:	Yes		
Foil Mass:	1337	Mass foil set S/N:	
Previous Correction Factor:	6970		
New Correction Factor:	7080		

INSPECTION DATA

Item	Condition	Date of install or rebuild
Cyclone	Good / cleaned	
Pump	Good	
Filter Tape	Good	
Mass Foil Cal Set	na	
HEPA filter	Good	

NOTES:

zero adjusted, sample head cleaned

Audit Performed By: Melissa Lemay

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 14
ANZAC
AUGUST 2015

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

September 28, 2015

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ANZAC (AMS 14)
AUGUST 2015

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	707	36	37	99.87	14	0	1	0
TRS(ppb) Average	708	35	36	99.87	7	0	1	0
THC(ppm) Average	703	36	41	99.33	2.5	-	2	-
NMHC(ppm) Average	703	36	41	99.33	0.295	-	0.104	-
CH4(ppm) Average	703	36	41	99.33	2.5	-	2	-
NO2(ppb) Average	707	36	37	99.87	9	0	2	-
NO(ppb) Average	707	36	37	99.87	6	-	0	-
NOX(ppb) Average	707	36	37	99.87	10	-	2	-
O3(ppb) Average	708	34	36	99.73	47	0	33	-
PM2.5(ug/m3) Average	742	2	2	100.00	63.3	-	8.5	0
AT 2m(C) Average	744	0	0	100.00	28.3	-	22.4	-
RH(%) Average	744	0	0	100.00	99	-	92	-
Leaf Wetness (% of range) Average	744	0	0	100.00	63	-	17	-
WS(km/h) Average	741	2	3	99.87	19	-	12	-
WD(deg) Average	741	2	3	99.87	-	-	-	-
PC(mm) Total	744	0	0	100.00	1.3	-	4.6	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ANZAC (AMS 14)
AUGUST 2015

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

					Percentile						
Parameter	Number	Mean	StnDev	Total	Min	P10	Q1	Median	Q3	P90	Max
SO2(ppb) Average	707	0.3	1	-	0	0	0	0	0	1	14
TRS(ppb) Average	708	0.3	0	-	0	0	0	0	0	0	7
THC(ppm) Average	703	1.93	0.1	-	1.8	1.8	1.9	1.9	2	2.1	2.5
NMHC (ppm) Average	703	0.023	0.036	-	0	0	0	0	0	0.1	0.295
CH4(ppm) Average	703	1.9	0.1	-	1.8	1.8	1.9	1.9	1.9	2	2.5
NO2(ppb) Average	707	0.8	1	-	0	0	0	1	1	2	9
NO(ppb) Average	707	0.2	0	-	0	0	0	0	0	0	6
NOX(ppb) Average	707	1	1	-	0	0	0	1	1	2	10
O3(ppb) Average	708	24.5	9	-	5	11	18	24	32	37	47
PM2.5(ug/m3) Average	742	4.86	4.1	-	0.5	1.5	2.1	4	6.4	9.8	63.3
Temperature 2 m (C) Average	744	16.33	5.1	-	0.9	10.2	12.9	16	20.1	23	28.3
Relative Humidity (%) Average	744	68.5	19	-	29	40	53	71	86	93	99
Leaf Wetness (% of range) Average	744	4.5	11	-	0	0	0	0	0	17	63
Wind Speed 20 m (km/h) Average	741	7.2	3	-	0	3	5	7	9	12	19
Wind Direction 20 m (deg) Average	741	-	-	-	-	-	-	-	-	-	-
Precipitation (mm) Total	744	-	-	9.4	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ANZAC (AMS 14)
AUGUST 2015

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2, THC, NO2, O3	14 Aug 2015 08:00	14 Aug 2015 08:00	1	Maintenance - verified operation of the daily QA checks
TRS, O3	17 Aug 2015 15:00	17 Aug 2015 15:00	1	Maintenance - cleaned glass manifold
THC	04 Aug 2015 10:00	04 Aug 2015 11:00	2	Maintenance - replaced carrier gas
THC	18 Aug 2015 13:00	18 Aug 2015 13:00	1	Maintenance - Station operator on site
THC	30 Aug 2015 17:00	30 Aug 2015 17:00	1	Power spike
Wind Speed, Wind Direction	28 Aug 2015 20:00	28 Aug 2015 20:00	1	Flat line in sensor output signal

Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO_2) - ppb

Anzac - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 14 ppb on Aug 6 08:00

Maximum Daily Average: 1.4 ppb on Aug 7

Minimum Value: 0 ppb on Aug 5 22:00

Minimum Daily Average: 0.0 ppb on Aug 14

Maximum Diurnal Average: 0.7 ppb at hour 8

Minimum Diurnal Average: 0.1 ppb at hour 3

Monthly Average: 0.3 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 1$ $P_{99} = 4$

Hours in Service:	744
Hours of Data:	707
Hours of Missing Data:	37
Hours of Calibration:	36
Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	2	0	0	0	1	0	0	0	0	0	0.4	2
2-Aug	0	0	0	Z	0	0	0	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2
3-Aug	0	0	0	0	Z	0	0	0	0	1	1	1	0	0	1	0	0	0	0	0	1	1	0	0	0.4	1
4-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
5-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
6-Aug	0	Z	0	0	0	0	12	14	2	0	0	2	1	1	0	0	0	0	0	0	0	0	0	0	1.4	14
7-Aug	0	0	Z	0	0	0	0	0	0	0	0	3	2	5	8	4	3	5	0	0	0	0	0	0	1.4	8
8-Aug	0	0	0	Z	0	0	0	0	1	2	4	0	0	0	0	0	0	1	0	0	0	0	0	0	0.4	4
9-Aug	0	0	0	0	Z	0	0	0	0	3	5	2	3	2	2	2	1	1	0	1	0	1	1	0	1.0	5
10-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
11-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
12-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
13-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
14-Aug	0	0	0	0	0	0	0	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
15-Aug	0	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
16-Aug	Z	0	0	0	0	0	0	0	2	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	3
17-Aug	0	Z	0	0	0	0	0	0	0	C	C	C	C	C	C	0	0	0	0	0	0	0	0	0	--	0
18-Aug	0	0	Z	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
19-Aug	0	0	0	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
20-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
21-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
22-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
23-Aug	0	Z	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	1	1	0.4	1
24-Aug	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
25-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
26-Aug	0	0	0	0	Z	0	0	0	1	2	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0.5	2
27-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
28-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
29-Aug	1	Z	1	1	1	0	0	1	1	1	1	0	0	1	1	0	0	0	0	0	0	0	2	3	0.7	3
30-Aug	0	2	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2
31-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
	0.2	0.2	0.1	0.2	0.2	0.2	0.6	0.7	0.4	0.6	0.6	0.5	0.4	0.5	0.6	0.4	0.3	0.4	0.2	0.2	0.2	0.2	0.2	0.2	Diurnal Average	
	1	2	1	1	1	1	12	14	2	3	5	3	3	5	8	4	3	5	1	1	1	1	2	3	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance

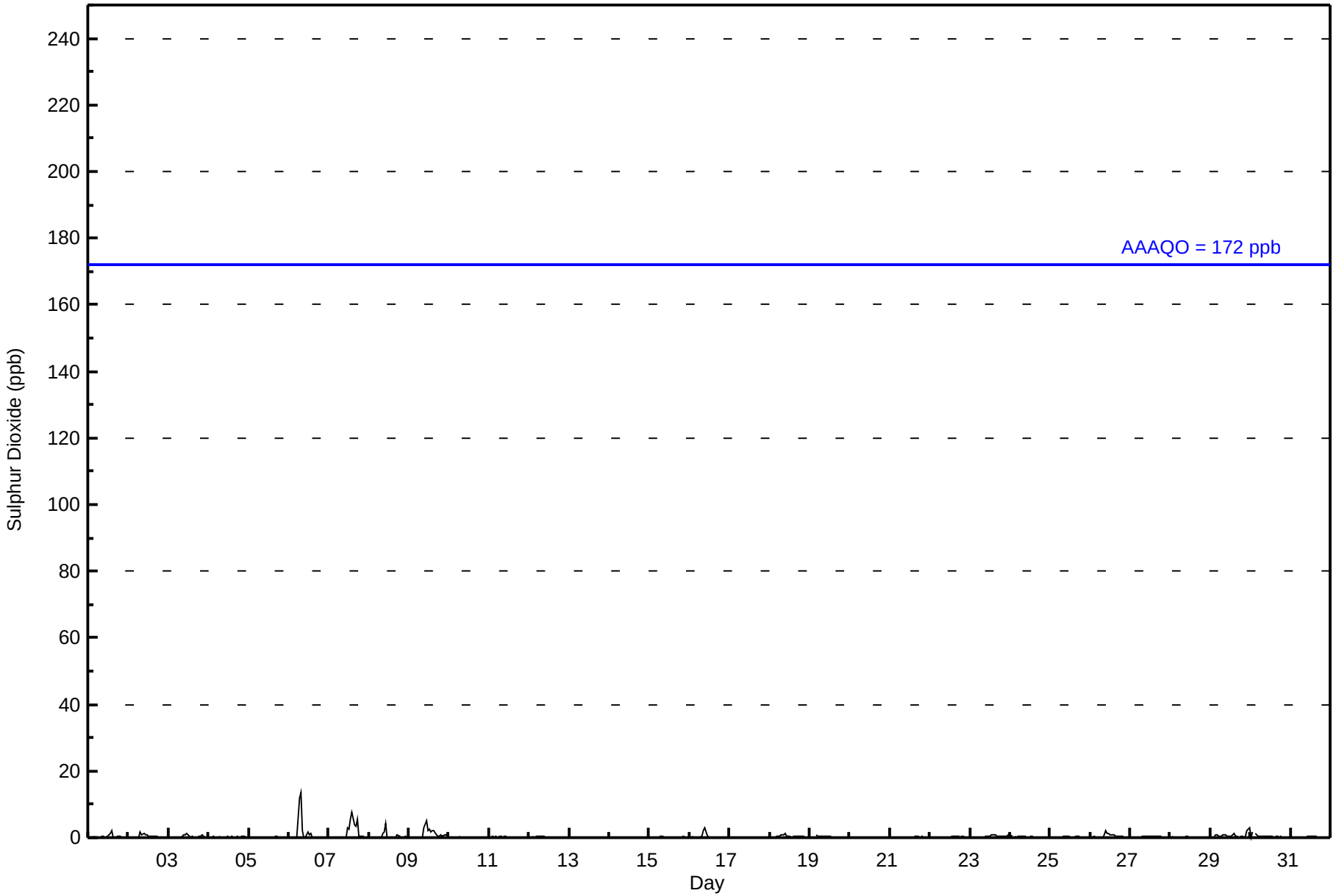
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb

Wood Buffalo Environmental Association

Hourly Averages

Sulphur Dioxide (SO_2) - ppb

Anzac - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

Anzac - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	705	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: 707

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

Anzac - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 10	14	7	8	13	16	61	46	71	57	30	40	56	68	110	76	31	704
11 - 20	0	0	0	0	0	0	2	0	0	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	14	7	8	13	16	61	48	71	57	30	40	56	68	110	76	31	706

Total Number of Valid Hours: 706

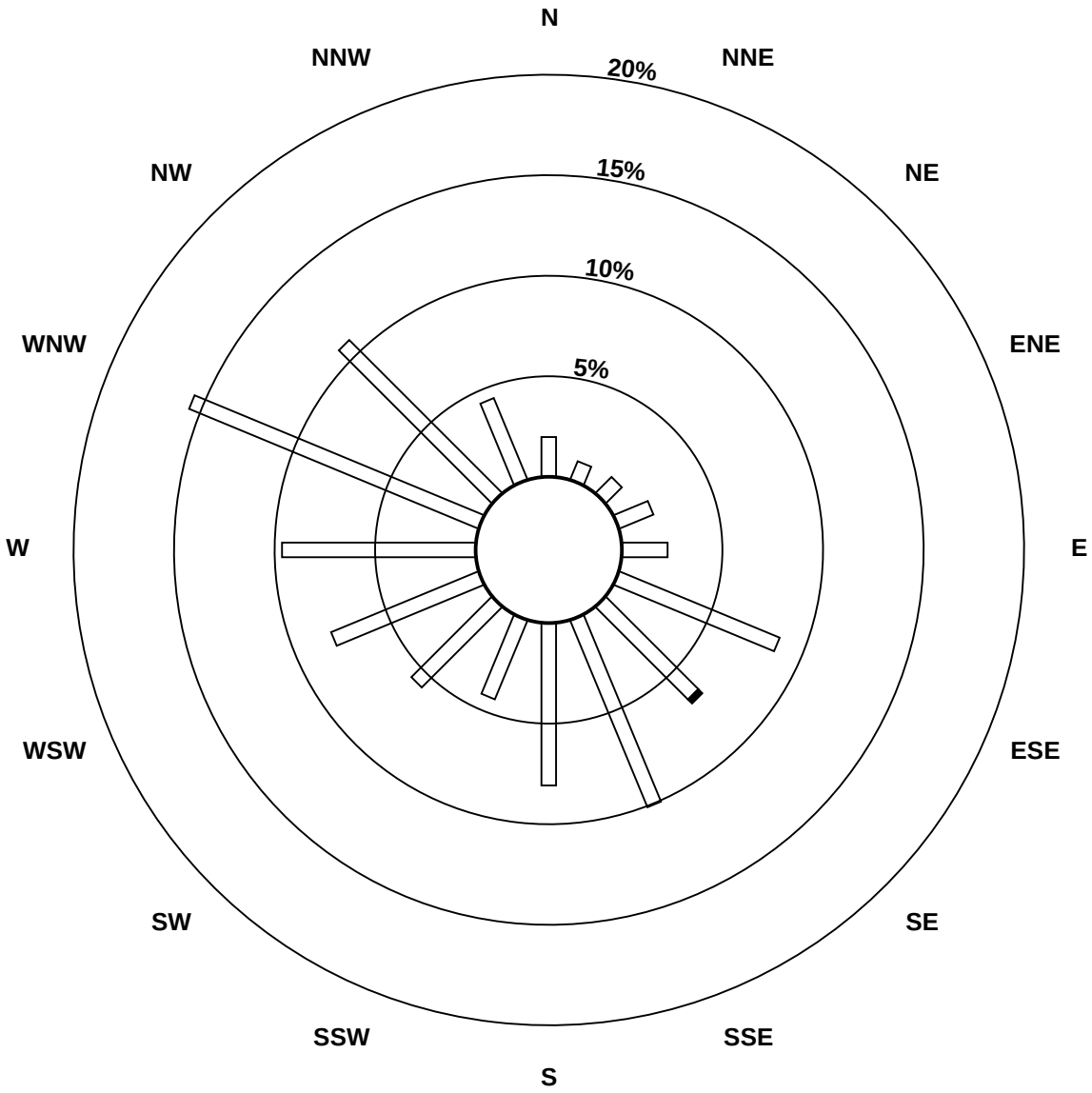
Total Number of Hours: 744

Wood Buffalo Environmental Association

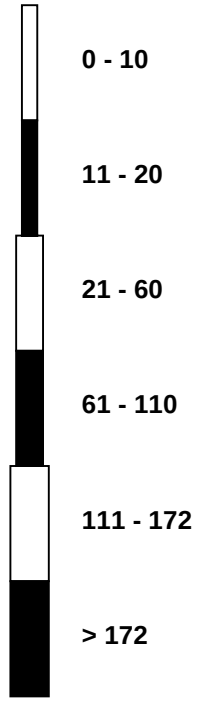
Wind Rose Aug 2015

Sulphur Dioxide (SO_2) - ppb

Anzac (AMS 14)



Classes (ppb)



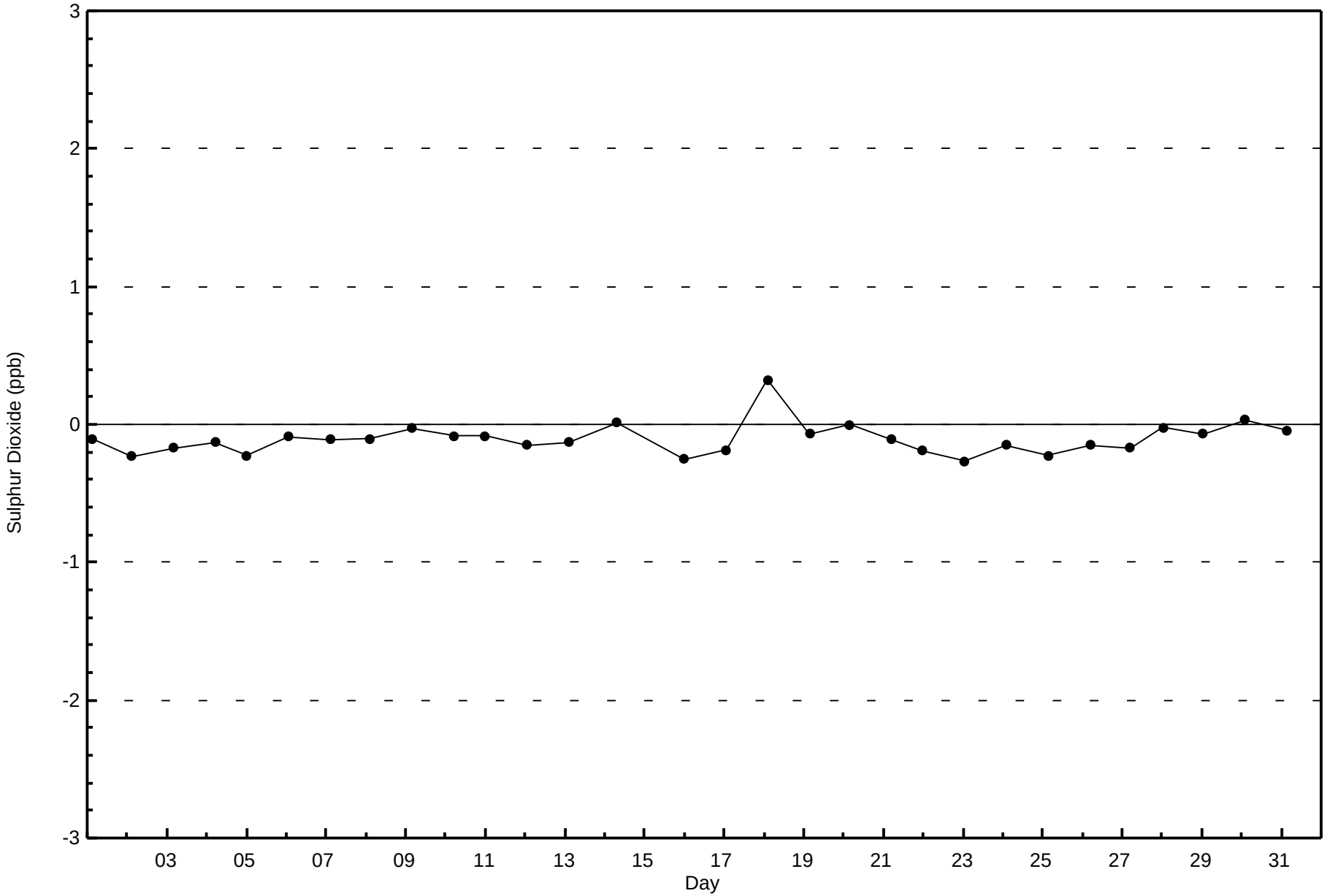
Total Number of Valid Hours: 706

Wood Buffalo Environmental Association

Zero Responses

Sulphur Dioxide (SO_2) - ppb

Anzac - August 2015

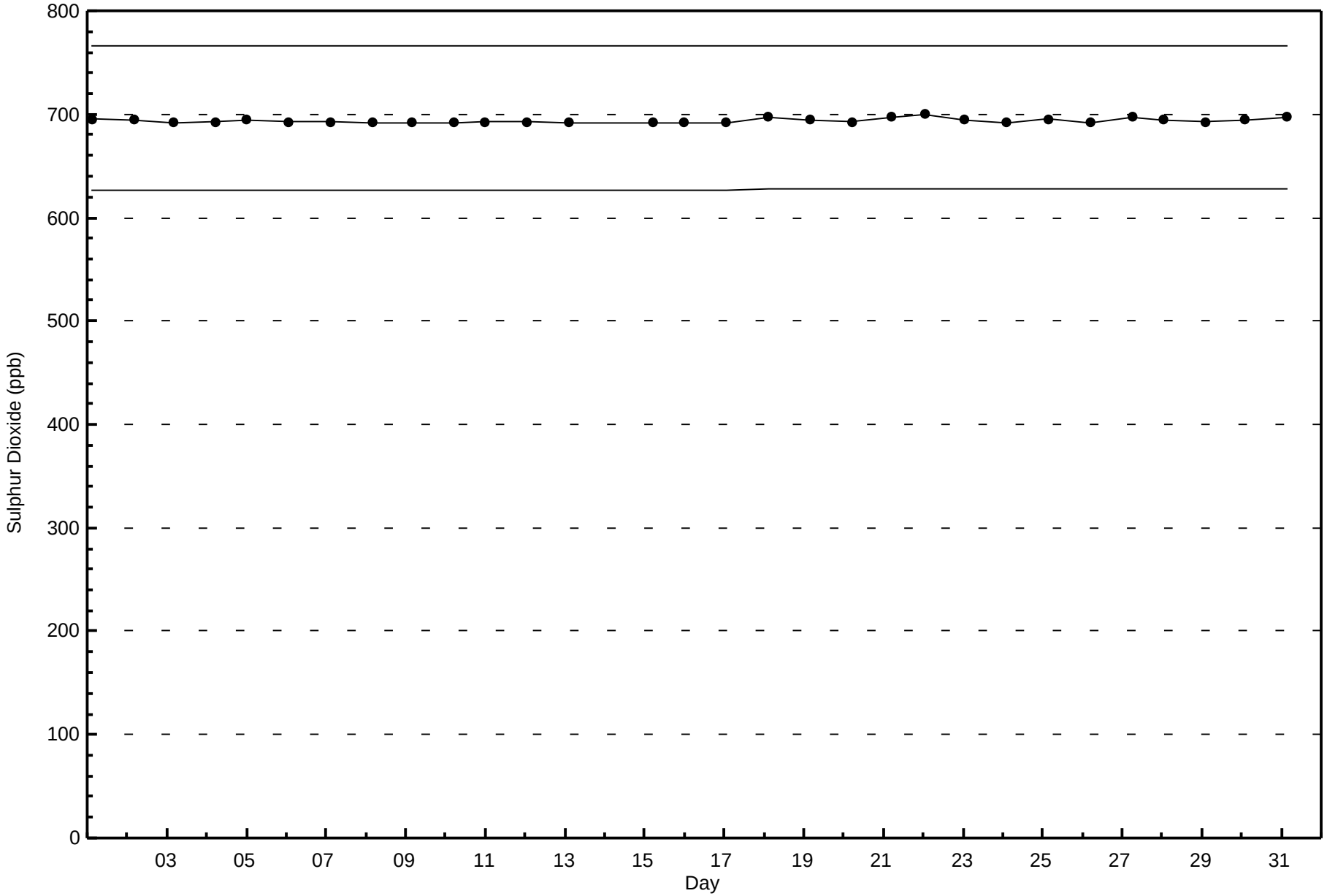


Wood Buffalo Environmental Association

Span Responses

Sulphur Dioxide (SO_2) - ppb

Anzac - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

Anzac - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 7 ppb on Aug 10 08:00

Maximum Daily Average: 0.5 ppb on Aug 10

Minimum Value: 0 ppb on Aug 23 06:00

Minimum Daily Average: 0.2 ppb on Aug 23

Maximum Diurnal Average: 0.5 ppb at hour 8

Minimum Diurnal Average: 0.2 ppb at hour 16

Monthly Average: 0.3 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 0$ $P_{99} = 1$

Hours in Service:	744
Hours of Data:	708
Hours of Missing Data:	36
Hours of Calibration:	35
Percent Operational Time:	99.9

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

Z - zerospan C - Calibration M - Maintenance

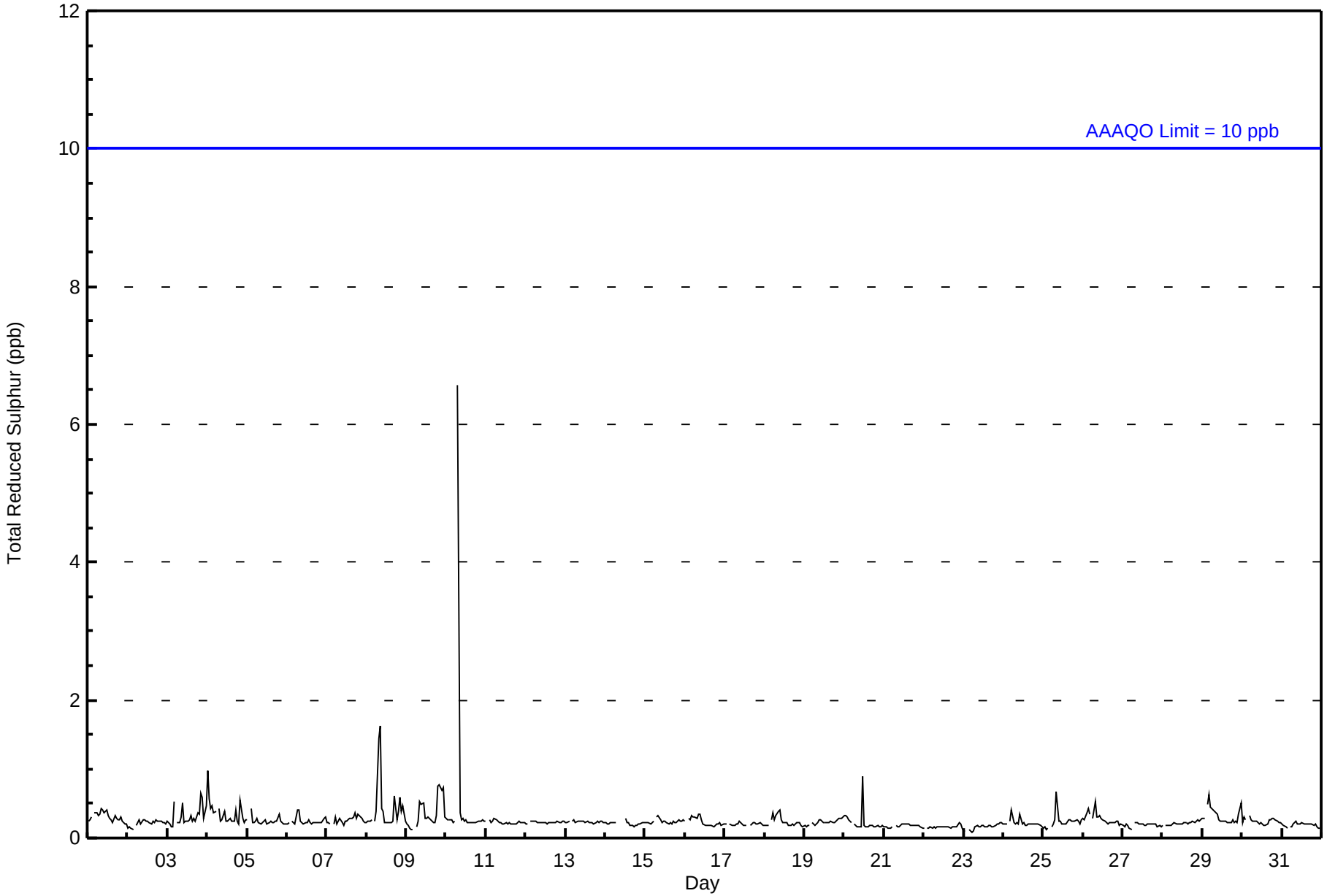
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb

Wood Buffalo Environmental Association

Hourly Averages

Total Reduced Sulphur (TRS) - ppb

Anzac - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb

Anzac - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	707	99.86	99.86
3 - 4	0	0.00	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: 708

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Total Reduced Sulphur (TRS) - ppb

Anzac - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 2	14	6	8	14	15	62	47	70	58	33	40	55	68	107	76	31	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	1	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	14	6	8	14	15	62	47	70	58	33	40	55	68	108	76	31	705

Total Number of Valid Hours: 705

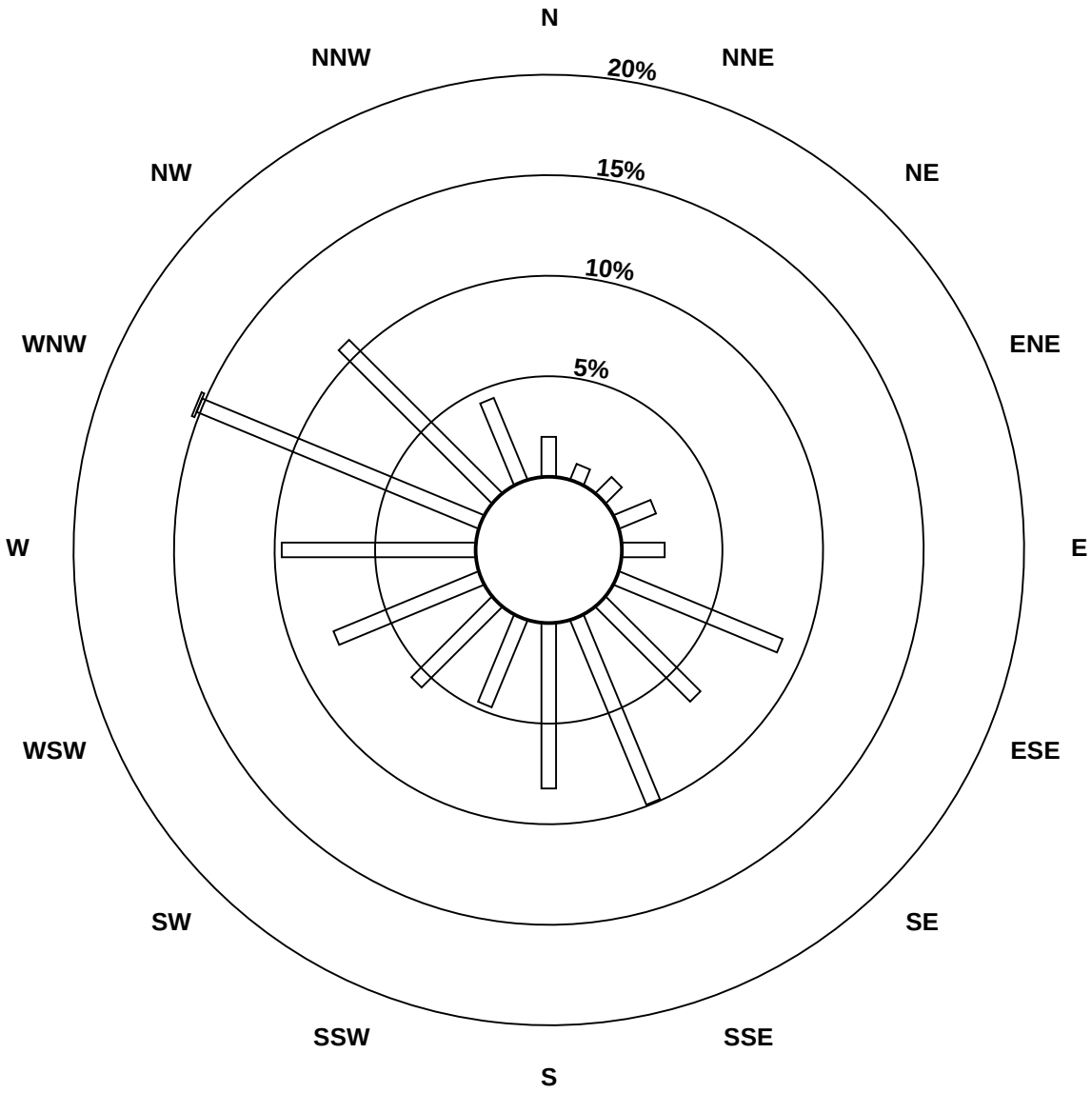
Total Number of Hours: 744

Wood Buffalo Environmental Association

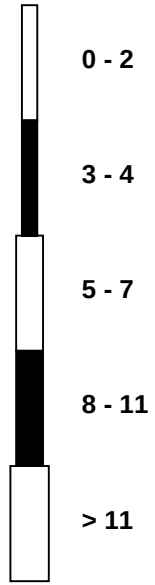
Wind Rose Aug 2015

Total Reduced Sulphur (TRS) - ppb

Anzac (AMS 14)



Classes (ppb)



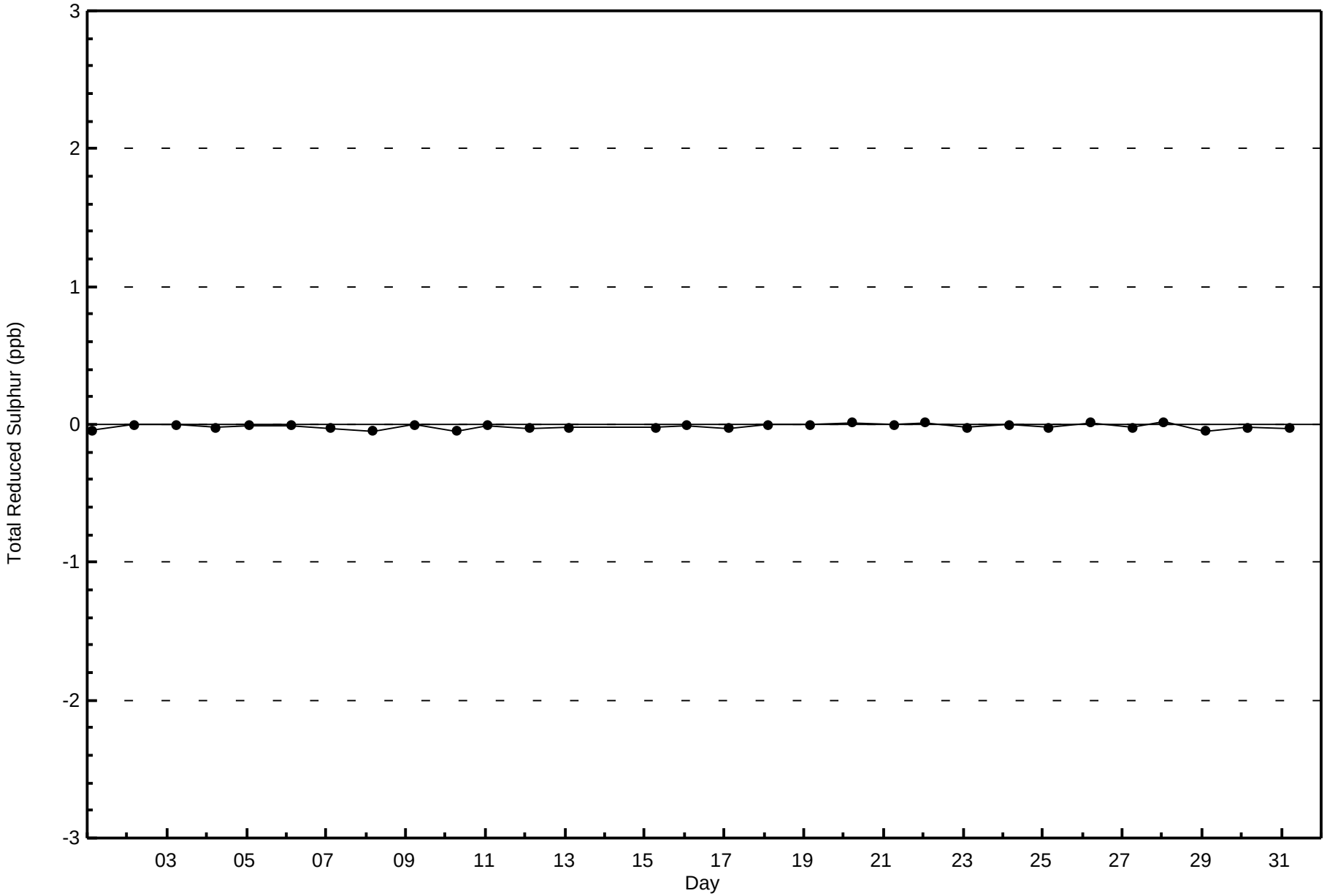
Total Number of Valid Hours: 705

Wood Buffalo Environmental Association

Zero Responses

Total Reduced Sulphur (TRS) - ppb

Anzac - August 2015

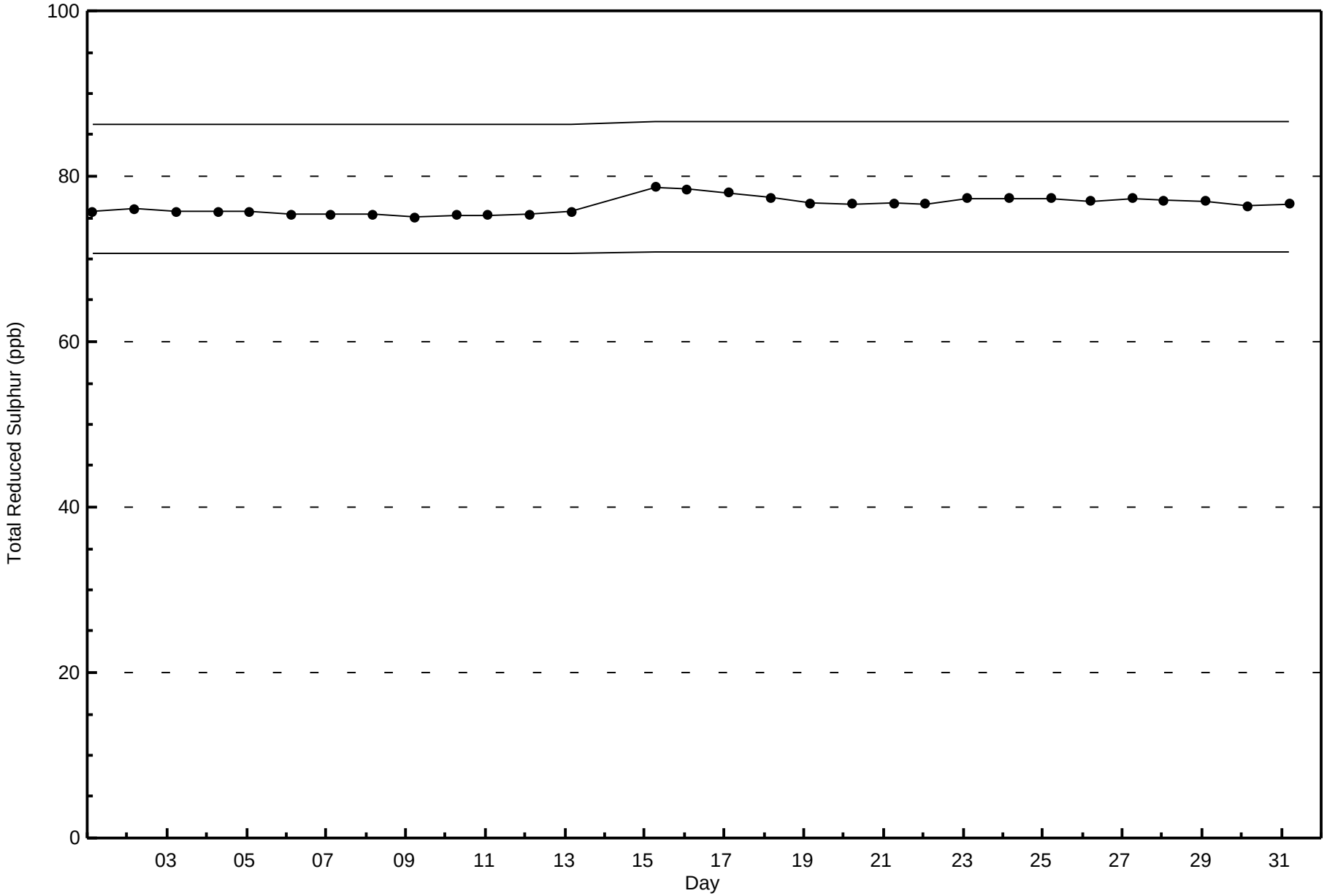


Wood Buffalo Environmental Association

Span Responses

Total Reduced Sulphur (TRS) - ppb

Anzac - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Anzac - August 2015

Maximum Value: 2.5 ppm on Aug 13 04:00

Maximum Daily Average: 2.0 ppm on Aug 1

Minimum Value: 1.8 ppm on Aug 30 14:00

Minimum Daily Average: 1.9 ppm on Aug 28

Maximum Diurnal Average: 2.0 ppm at hour 6

Minimum Diurnal Average: 1.9 ppm at hour 15

Monthly Average: 1.93 ppm

Percentiles: P_1 = 1.8 P_{10} = 1.8 Q_1 = 1.9 Median = 1.9 Q_3 = 2.0 P_{90} = 2.1 P_{99} = 2.3

Hours in Service:	744
Hours of Data:	703
Hours of Missing Data:	41
Hours of Calibration:	36
Percent Operational Time:	99.3

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	2.1	2.4	Z	2.0	2.1	2.3	2.1	2.0	2.0	2.1	2.0	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1	2.1	2.3	2.0	2.4
2-Aug	2.1	1.9	2.0	Z	2.2	2.4	2.1	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.9	2.0	2.4
3-Aug	2.1	2.2	2.0	1.9	Z	2.2	2.1	1.9	1.9	2.0	1.9	1.9	1.9	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2
4-Aug	2.0	2.1	2.0	2.0	2.1	Z	2.0	2.1	1.9	M	M	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1
5-Aug	Z	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	2.0
6-Aug	1.9	Z	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.0
7-Aug	1.9	1.9	Z	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.9	1.9	1.9	2.0
8-Aug	1.9	1.9	2.0	Z	2.1	2.2	2.2	2.2	2.3	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.3
9-Aug	2.0	2.0	2.0	2.1	Z	2.2	2.1	2.1	2.2	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1	2.1	2.0	2.1	2.1	2.0	2.2
10-Aug	2.0	2.0	2.0	2.0	2.0	Z	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.9	1.9	1.9	1.9	2.0	2.0	1.9	2.0	2.0	1.9	2.0
11-Aug	Z	1.9	2.0	2.0	2.0	2.2	2.0	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.9	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.8	1.9	2.2
12-Aug	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	2.1	2.0	1.9	2.1
13-Aug	2.3	2.0	Z	2.5	2.1	2.3	2.4	2.0	1.9	2.0	1.8	1.8	1.8	1.9	1.9	1.8	1.8	1.8	1.8	1.9	1.9	2.0	1.9	1.9	2.0	2.5
14-Aug	1.9	1.9	1.9	1.9	1.9	1.9	1.9	M	1.9	1.9	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
15-Aug	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
16-Aug	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.2	2.0	2.2	1.9	2.2
17-Aug	2.1	Z	2.0	1.9	2.1	2.3	2.3	2.0	1.9	C	C	C	C	C	C	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1	1.9	--	2.3
18-Aug	2.0	1.9	Z	1.9	1.9	2.0	2.0	2.0	2.0	2.0	1.9	1.9	M	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
19-Aug	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9
20-Aug	1.8	1.8	1.8	1.8	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
21-Aug	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
22-Aug	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1	2.0	1.9	2.1
23-Aug	2.1	Z	2.1	2.2	2.1	2.1	2.4	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.4
24-Aug	2.0	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
25-Aug	1.9	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	1.9	2.0
26-Aug	2.0	2.0	2.1	2.1	Z	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.2	2.0	2.2
27-Aug	2.3	2.2	2.3	2.2	2.1	Z	2.4	2.0	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.9	1.9	1.9	1.9	1.8	1.9	1.9	1.9	1.8	2.0	2.4
28-Aug	Z	1.9	1.9	1.8	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	1.9	1.8	1.9	1.9	1.9	1.9
29-Aug	1.9	Z	1.9	2.0	2.1	2.0	2.0	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.1
30-Aug	1.8	1.8	Z	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	PF	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	2.0
31-Aug	2.2	2.0	1.9	Z	2.1	2.1	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	2.2
	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	Diurnal Average	
	2.3	2.4	2.3	2.5	2.2	2.4	2.4	2.2	2.3	2.1	2.0	2.1	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.1	2.1	2.2	2.1	2.3	Diurnal Maximum	

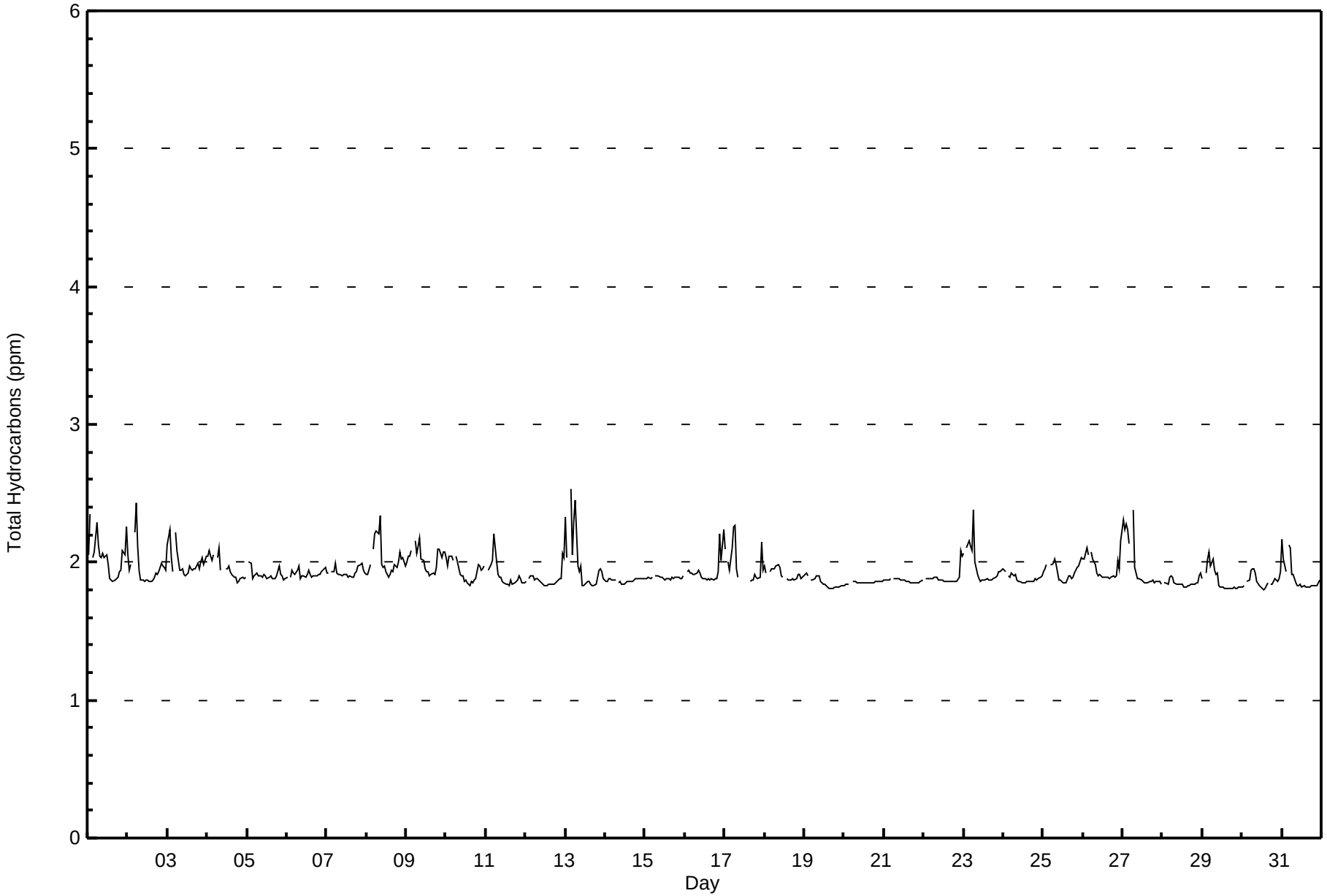
Z - zerospan C - Calibration M - Maintenance PF - Power Failure

Wood Buffalo Environmental Association

Hourly Averages

Total Hydrocarbons (THC) - ppm

Anzac - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm

Anzac - August 2015

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	632	89.90	89.90
2.1 - 3.0	71	10.10	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 703

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Total Hydrocarbons (THC) - ppm

Anzac - August 2015

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	14	6	7	11	13	57	44	65	40	24	28	46	63	108	74	31	631
2.1 - 3.0	0	1	1	2	2	3	4	6	17	5	12	10	4	2	2	0	71
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	14	7	8	13	15	60	48	71	57	29	40	56	67	110	76	31	702

Total Number of Valid Hours: 702

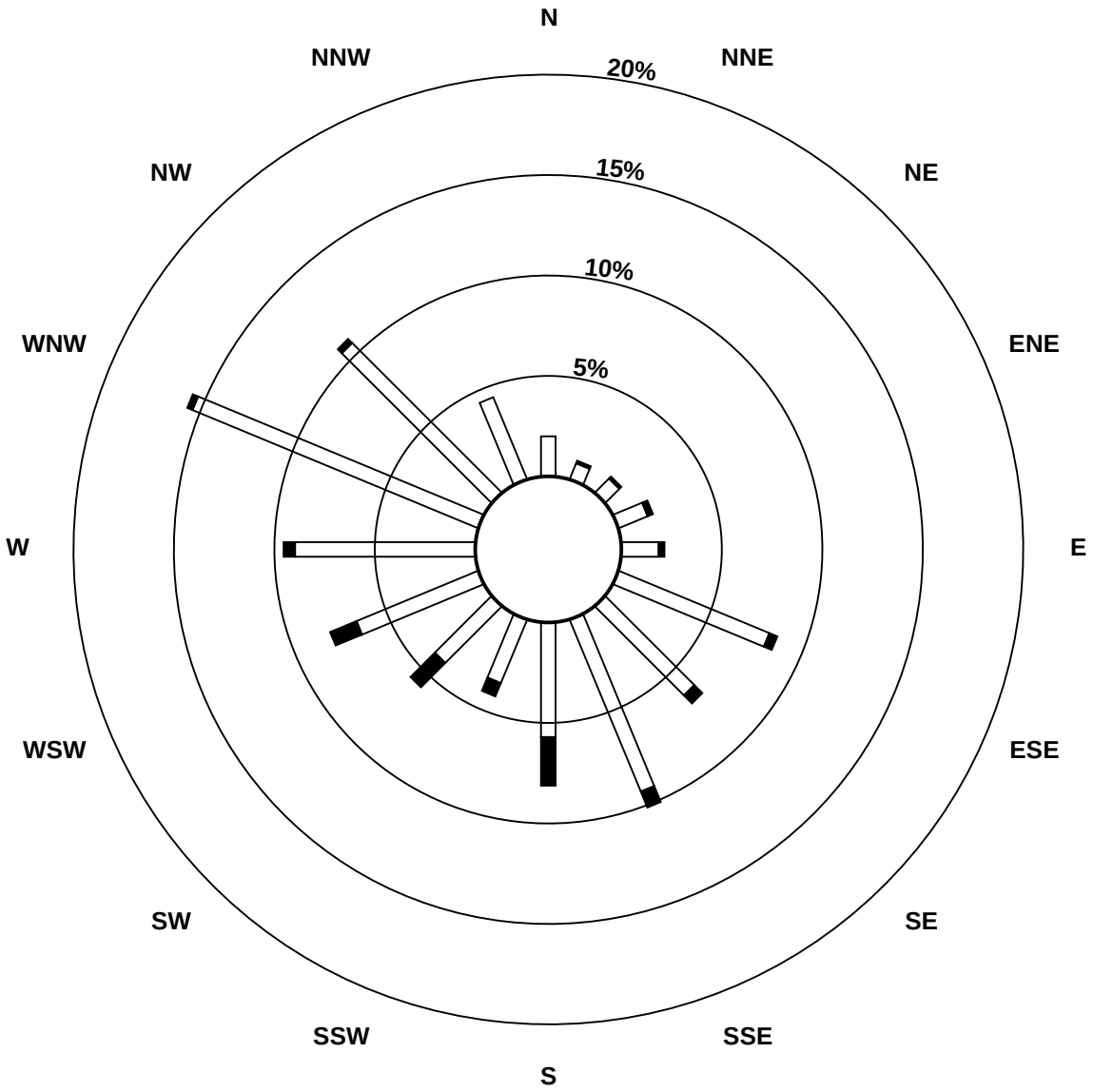
Total Number of Hours: 744

Wood Buffalo Environmental Association

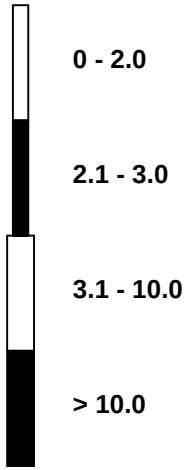
Wind Rose Aug 2015

Total Hydrocarbons (THC) - ppm

Anzac (AMS 14)



Classes (ppm)



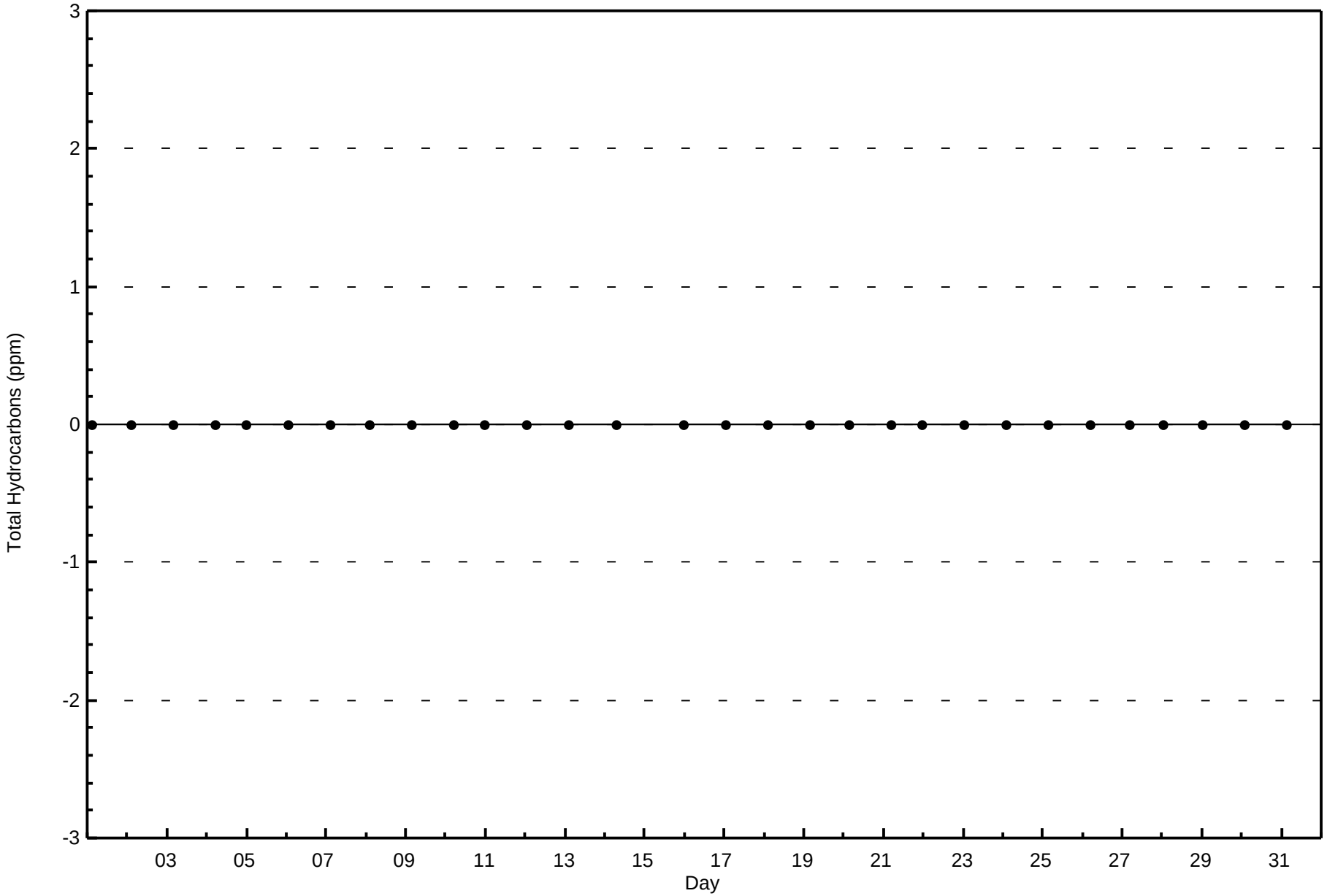
Total Number of Valid Hours: 702

Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Anzac - August 2015

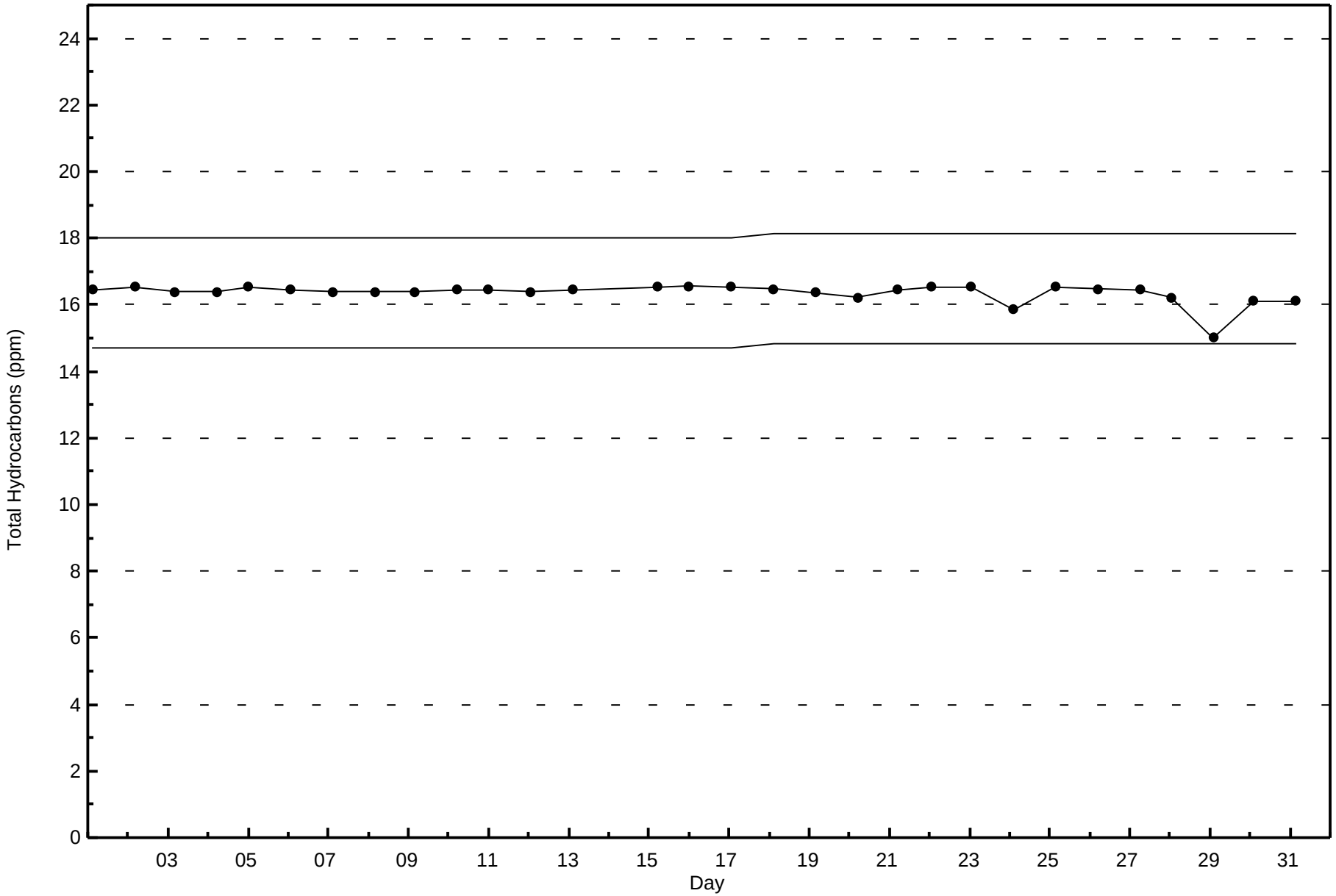


Wood Buffalo Environmental Association

Span Responses

Total Hydrocarbons (THC) - ppm

Anzac - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Non Methane Hydrocarbons (NMHC) - ppm

Anzac - August 2015

Maximum Value: 0.295 ppm on Aug 8 07:00

Maximum Daily Average: 0.104 ppm on Aug 9

Minimum Value: 0.000 ppm on Aug 1 16:00

Minimum Daily Average: 0.000 ppm on Aug 21

Maximum Diurnal Average: 0.038 ppm at hour 6

Minimum Diurnal Average: 0.011 ppm at hour 15

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 in Service:	744
Hours of Data:	703
Hours of Missing Data:	41
Hours of Calibration:	36
Percent Operational Time:	99.3

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0.083	0.112	Z	0.076	0.089	0.097	0.085	0.081	0.081	0.109	0.096	0.102	0.069	0.019	0.010	0.000	0.010	0.018	0.021	0.048	0.034	0.061	0.048	0.101	0.063	0.112
2-Aug	0.054	0.020	0.017	Z	0.016	0.023	0.034	0.034	0.004	0.002	0.004	0.010	0.010	0.006	0.009	0.017	0.025	0.053	0.051	0.074	0.080	0.069	0.080	0.065	0.033	0.080
3-Aug	0.063	0.047	0.041	0.030	Z	0.076	0.049	0.023	0.051	0.060	0.044	0.024	0.026	0.074	0.043	0.063	0.066	0.067	0.080	0.063	0.084	0.092	0.065	0.086	0.057	0.092
4-Aug	0.096	0.104	0.084	0.068	0.086	Z	0.067	0.100	0.020	M	M	0.047	0.044	0.059	0.033	0.021	0.010	0.016	0.000	0.008	0.008	0.012	0.007	0.009	0.043	0.104
5-Aug	Z	0.059	0.063	0.004	0.006	0.014	0.024	0.016	0.012	0.015	0.026	0.028	0.020	0.017	0.025	0.015	0.019	0.009	0.019	0.058	0.018	0.019	0.008	0.007	0.022	0.063
6-Aug	0.011	Z	0.006	0.021	0.015	0.017	0.018	0.034	0.001	0.014	0.012	0.010	0.018	0.037	0.026	0.011	0.016	0.015	0.013	0.011	0.014	0.013	0.018	0.029	0.016	0.037
7-Aug	0.009	0.010	Z	0.020	0.015	0.042	0.007	0.006	0.010	0.006	0.009	0.004	0.013	0.010	0.017	0.010	0.017	0.038	0.043	0.077	0.060	0.069	0.037	0.010	0.023	0.077
8-Aug	0.010	0.009	0.070	Z	0.172	0.278	0.295	0.201	0.243	0.069	0.062	0.064	0.048	0.018	0.037	0.059	0.056	0.100	0.085	0.111	0.153	0.090	0.084	0.060	0.103	0.295
9-Aug	0.085	0.123	0.133	0.134	Z	0.133	0.148	0.156	0.183	0.101	0.103	0.072	0.053	0.059	0.037	0.039	0.053	0.047	0.089	0.152	0.154	0.115	0.115	0.109	0.104	0.183
10-Aug	0.087	0.056	0.061	0.058	0.055	Z	0.083	0.068	0.033	0.028	0.030	0.013	0.026	0.013	0.004	0.026	0.014	0.030	0.045	0.111	0.111	0.081	0.058	0.051	0.050	0.111
11-Aug	Z	0.048	0.051	0.060	0.064	0.100	0.047	0.044	0.040	0.032	0.012	0.010	0.006	0.010	0.006	0.041	0.013	0.022	0.020	0.030	0.052	0.020	0.008	0.003	0.032	0.100
12-Aug	0.004	Z	0.012	0.012	0.013	0.006	0.007	0.008	0.007	0.004	0.003	0.001	0.003	0.004	0.005	0.008	0.007	0.003	0.006	0.013	0.038	0.021	0.023	0.030	0.010	0.038
13-Aug	0.038	0.031	Z	0.027	0.038	0.043	0.027	0.034	0.060	0.057	0.016	0.023	0.026	0.032	0.040	0.018	0.012	0.014	0.018	0.046	0.110	0.071	0.056	0.025	0.038	0.110
14-Aug	0.007	0.003	0.009	0.008	0.006	0.006	0.005	M	0.009	0.013	0.002	0.004	0.003	0.001	0.001	0.002	0.001	0.000	0.001	0.001	0.002	0.001	0.002	0.000	0.004	0.013
15-Aug	0.001	0.001	0.004	0.001	0.001	Z	0.005	0.003	0.008	0.004	0.005	0.005	0.003	0.002	0.001	0.001	0.007	0.002	0.005	0.004	0.008	0.002	0.000	0.008	0.004	0.008
16-Aug	Z	0.018	0.016	0.009	0.011	0.005	0.008	0.007	0.017	0.014	0.005	0.004	0.002	0.003	0.006	0.000	0.006	0.003	0.002	0.002	0.023	0.062	0.013	0.028	0.011	0.062
17-Aug	0.006	Z	0.008	0.005	0.015	0.011	0.008	0.005	0.004	C	C	C	C	C	C	0.000	0.001	0.008	0.003	0.006	0.001	0.002	0.015	0.004	--	0.015
18-Aug	0.010	0.003	Z	0.001	0.006	0.009	0.005	0.011	0.021	0.023	0.001	0.000	M	0.000	0.000	0.000	0.006	0.008	0.001	0.007	0.015	0.014	0.003	0.000	0.007	0.023
19-Aug	0.002	0.002	0.002	Z	0.000	0.002	0.001	0.001	0.002	0.009	0.005	0.007	0.004	0.003	0.004	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.009
20-Aug	0.000	0.000	0.000	0.000	Z	0.001	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.002
21-Aug	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002
22-Aug	Z	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005
23-Aug	0.000	Z	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.004	0.000	0.004
24-Aug	0.001	0.000	Z	0.007	0.012	0.015	0.001	0.007	0.003	0.002	0.005	0.001	0.003	0.000	0.002	0.006	0.001	0.004	0.007	0.021	0.016	0.008	0.005	0.002	0.006	0.021
25-Aug	0.000	0.003	0.001	Z	0.000	0.001	0.011	0.036	0.037	0.001	0.003	0.000	0.000	0.000	0.001	0.008	0.008	0.004	0.010	0.030	0.034	0.029	0.034	0.044	0.013	0.044
26-Aug	0.049	0.046	0.053	0.047	Z	0.044	0.028	0.011	0.004	0.002	0.002	0.004	0.004	0.002	0.005	0.009	0.004	0.007	0.010	0.005	0.014	0.031	0.017	0.021	0.018	0.053
27-Aug	0.013	0.006	0.005	0.005	0.009	Z	0.005	0.005	0.006	0.005	0.003	0.003	0.004	0.002	0.002	0.005	0.006	0.004	0.006	0.002	0.001	0.000	0.000	0.000	0.004	0.013
28-Aug	Z	0.000	0.000	0.000	0.010	0.002	0.000	0.000	0.001	0.001	0.001	0.002	0.002	0.001	0.006	0.007	0.005	0.017	0.023	0.034	0.040	0.036	0.031	0.021	0.010	0.040
29-Aug	0.013	Z	0.012	0.056	0.089	0.046	0.047	0.030	0.025	0.038	0.004	0.003	0.006	0.003	0.004	0.003	0.004	0.001	0.002	0.003	0.001	0.000	0.004	0.000	0.017	0.089
30-Aug	0.002	0.001	Z	0.010	0.009	0.007	0.017	0.009	0.008	0.009	0.000	0.002	0.006	0.000	0.000	0.026	PF	0.013	0.012	0.009	0.013	0.007	0.004	0.001	0.007	0.026
31-Aug	0.003	0.000	0.002	Z	0.018	0.001	0.001	0.007	0.004	0.001	0.001	0.007	0.000	0.000	0.001	0.002	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.002	0.018
	0.025	0.027	0.026	0.025	0.028	0.038	0.033	0.031	0.029	0.021	0.016	0.015	0.014	0.013	0.011	0.013	0.012	0.016	0.018	0.030	0.035	0.030	0.024	0.023	Diurnal Average	
	0.096	0.123	0.133	0.134	0.172	0.278	0.295	0.201	0.243	0.109	0.103	0.102	0.069	0.074	0.043	0.063	0.066	0.100	0.089	0.152	0.154	0.115	0.115	0.109	Diurnal Maximum	

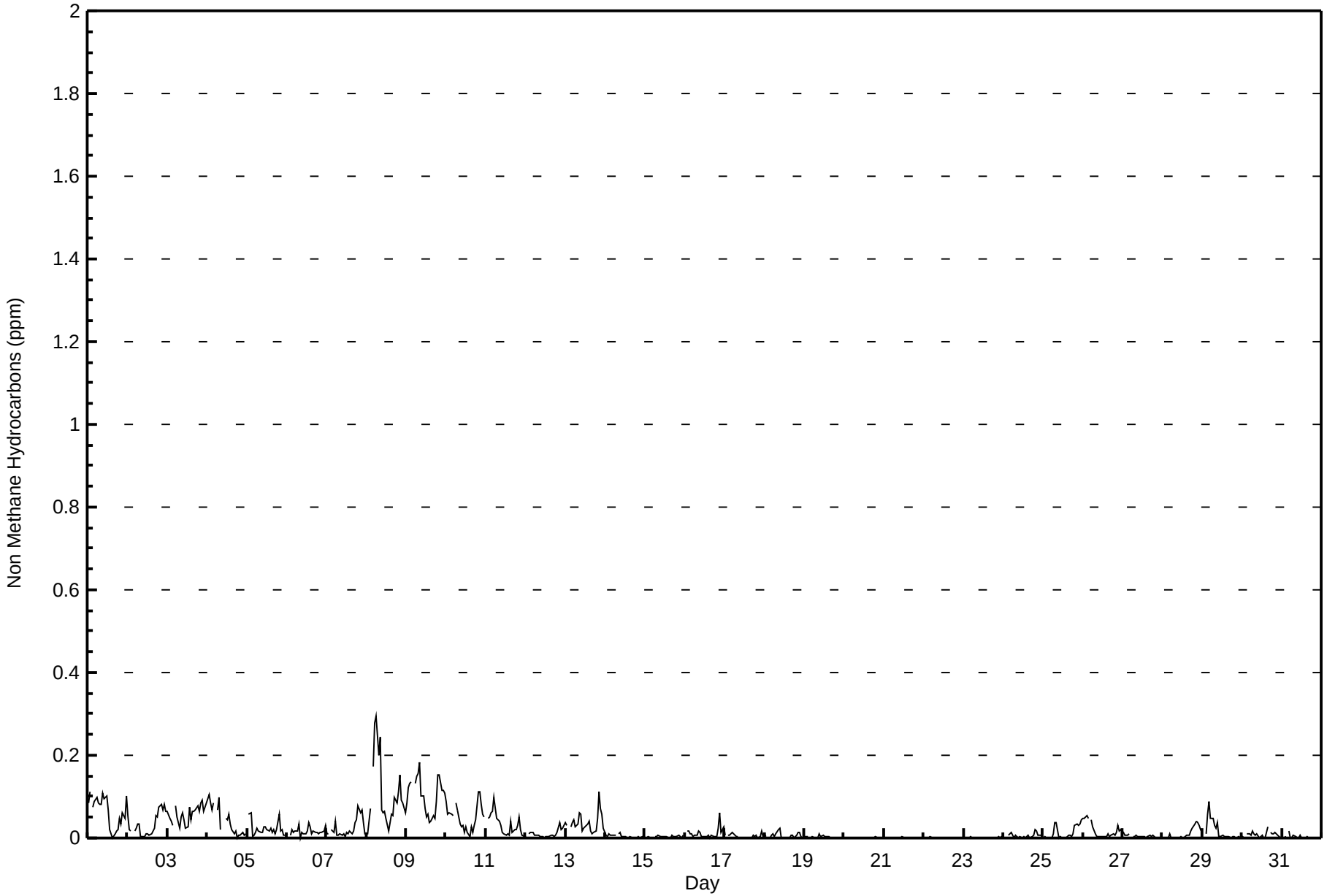
Z - zerospan C - Calibration M - Maintenance PF - Power Failure

Wood Buffalo Environmental Association

Hourly Averages

Non Methane Hydrocarbons (NMHC) - ppm

Anzac - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm

Anzac - August 2015

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	302	42.96	42.96
0.006 - 0.05	297	42.25	85.21
0.06 - 0.1	94	13.37	98.58
> 0.1	10	1.42	100.00

Total Number of Valid Hours: 703

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm

Anzac - August 2015

Concentration Ranges (ppm)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 0.005	5	3	5	2	2	7	6	28	28	10	8	21	31	75	50	21	302
0.006 - 0.05	7	3	1	8	9	42	22	26	18	13	24	31	31	31	20	10	296
0.06 - 0.1	2	1	2	3	3	8	16	15	11	6	8	4	5	4	6	0	94
> 0.1	0	0	0	0	1	3	4	2	0	0	0	0	0	0	0	0	10
Totals	14	7	8	13	15	60	48	71	57	29	40	56	67	110	76	31	702

Total Number of Valid Hours: 702

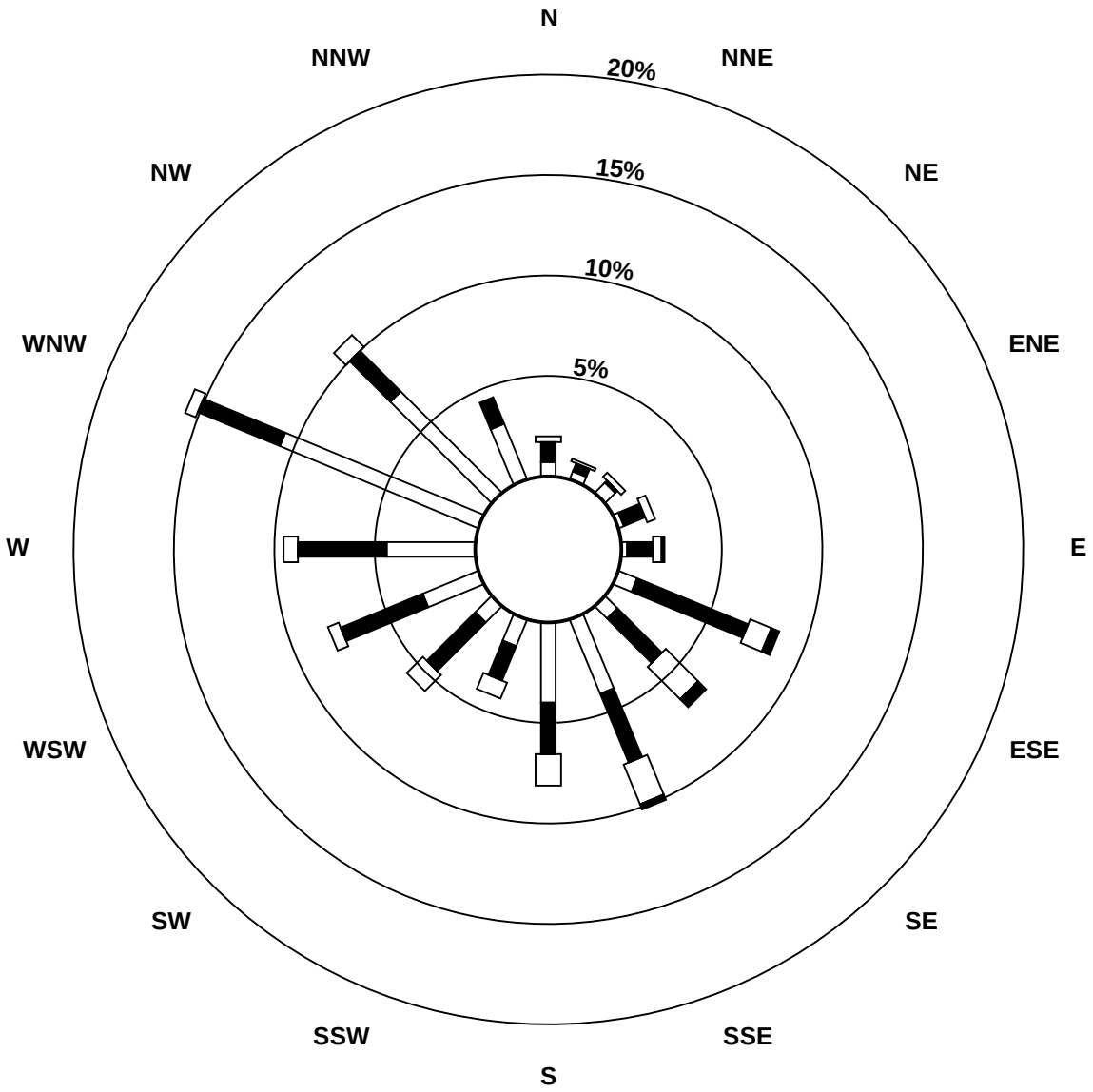
Total Number of Hours: 744

Wood Buffalo Environmental Association

Wind Rose Aug 2015

Non Methane Hydrocarbons (NMHC) - ppm

Anzac (AMS 14)



Classes (ppm)

0 - 0.005

0.006 - 0.05

0.06 - 0.1

> 0.1

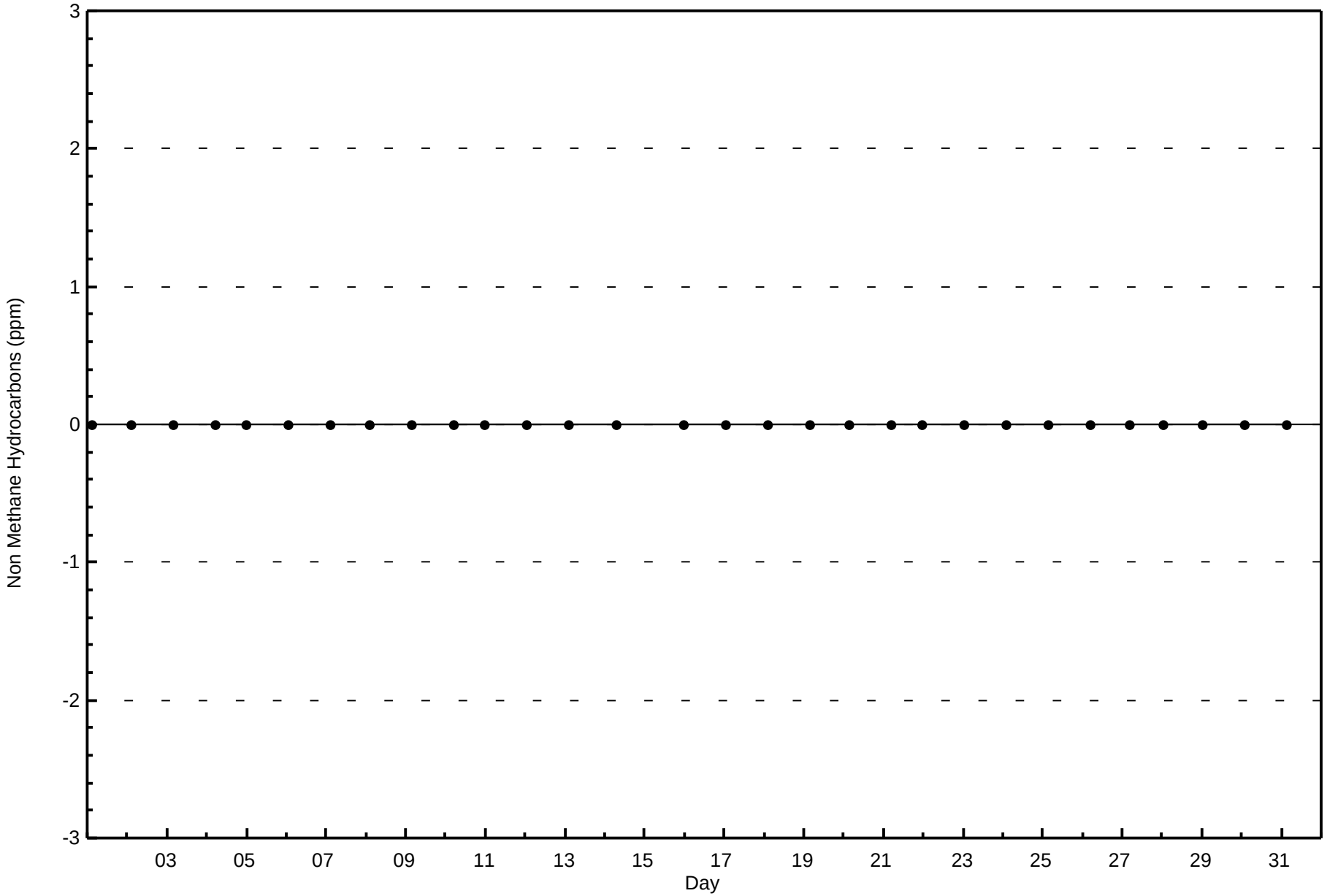
Total Number of Valid Hours: 702

Wood Buffalo Environmental Association

Zero Responses

Non Methane Hydrocarbons (NMHC) - ppm

Anzac - August 2015

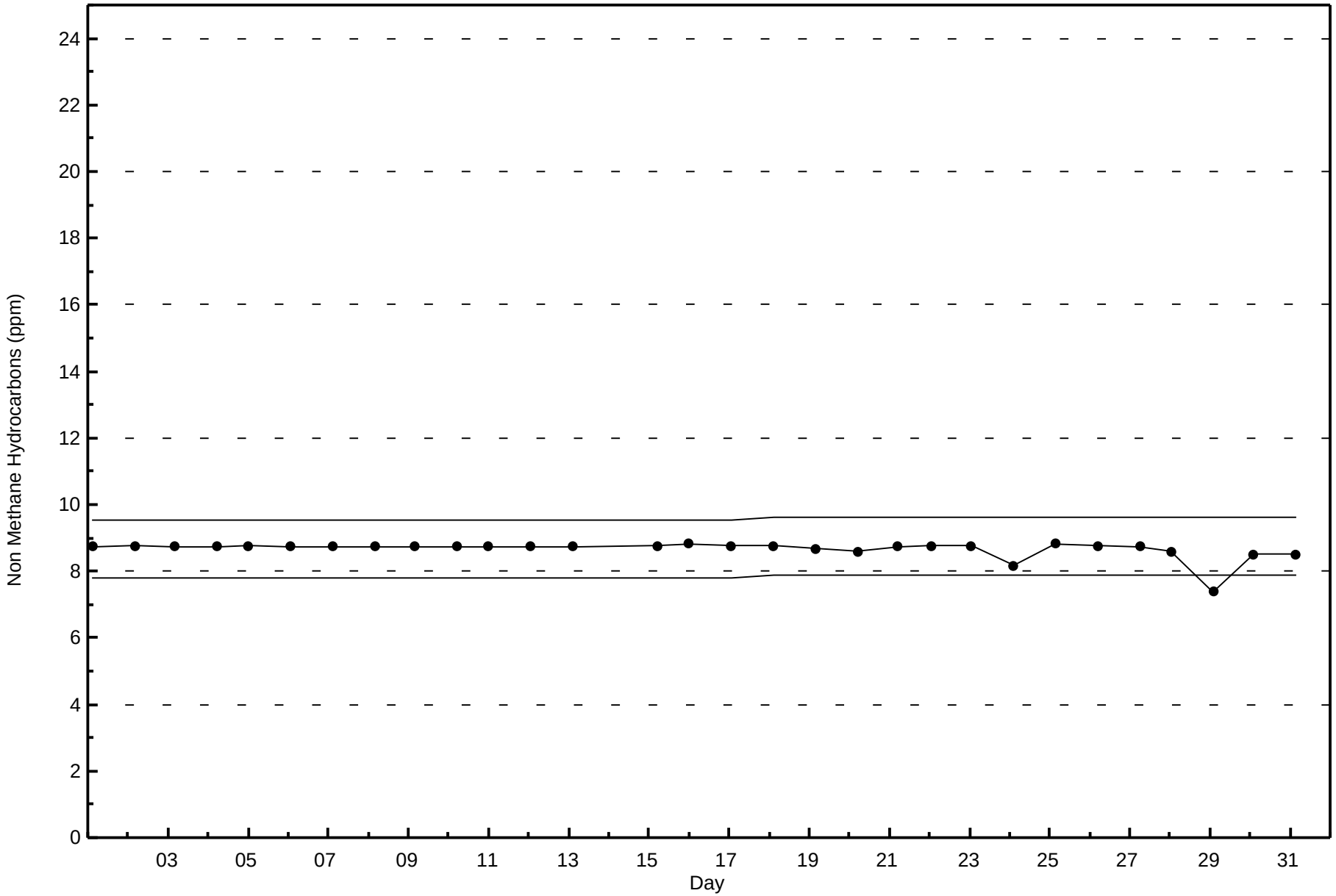


Wood Buffalo Environmental Association

Span Responses

Non Methane Hydrocarbons (NMHC) - ppm

Anzac - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Methane (CH_4) - ppm

Anzac - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 2.5 ppm on Aug 13 04:00

Maximum Daily Average: 2.0 ppm on Aug 27

Minimum Value: 1.8 ppm on Aug 30 14:00

Minimum Daily Average: 1.8 ppm on Aug 28

Maximum Diurnal Average: 2.0 ppm at hour 6

Minimum Diurnal Average: 1.9 ppm at hour 15

Monthly Average: 1.90 ppm

Percentiles: P_1 = 1.8 P_{10} = 1.8 Q_1 = 1.9 Median = 1.9 Q_3 = 1.9 P_{90} = 2.0 P_{99} = 2.3

Hours in Service:	744
Hours of Data:	703
Hours of Missing Data:	41
Hours of Calibration:	36
Percent Operational Time:	99.3

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	2.0	2.2	Z	2.0	2.0	2.2	2.0	2.0	2.0	2.0	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.2	2.0	2.2
2-Aug	2.0	1.9	2.0	Z	2.2	2.4	2.1	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.4
3-Aug	2.1	2.2	2.0	1.9	Z	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.2
4-Aug	2.0	2.0	2.0	1.9	2.0	Z	2.0	2.0	1.9	M	M	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
5-Aug	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
6-Aug	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
7-Aug	1.9	1.9	Z	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
8-Aug	1.9	1.9	1.9	Z	1.9	1.9	1.9	2.0	2.1	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	2.1
9-Aug	1.9	1.9	1.9	1.9	Z	2.0	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	2.0
10-Aug	2.0	1.9	2.0	2.0	2.0	Z	2.0	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	2.0
11-Aug	Z	1.9	1.9	1.9	1.9	2.1	2.0	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.8	1.8	1.9	2.1
12-Aug	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.0	2.0	1.9	2.0
13-Aug	2.3	2.0	Z	2.5	2.0	2.3	2.4	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	1.9	1.9	1.9	2.0	2.5
14-Aug	1.9	1.9	1.9	1.9	1.9	1.9	1.9	M	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
15-Aug	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
16-Aug	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1	2.0	2.2	1.9	2.2
17-Aug	2.1	Z	2.0	1.9	2.1	2.3	2.3	2.0	1.9	C	C	C	C	C	C	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1	1.9	--	2.3
18-Aug	2.0	1.9	Z	1.9	1.9	1.9	1.9	2.0	2.0	1.9	1.9	1.9	M	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
19-Aug	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9
20-Aug	1.8	1.8	1.8	1.8	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
21-Aug	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
22-Aug	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1	2.0	1.9	2.1
23-Aug	2.1	Z	2.1	2.2	2.1	2.1	2.4	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.4
24-Aug	2.0	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
25-Aug	1.9	2.0	2.0	Z	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	2.0
26-Aug	2.0	2.0	2.1	2.0	Z	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.1	1.9	2.1
27-Aug	2.3	2.2	2.3	2.2	2.1	Z	2.4	2.0	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.9	1.9	1.9	1.8	1.9	1.9	1.9	1.8	2.0	2.4
28-Aug	Z	1.9	1.9	1.8	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.8	1.9
29-Aug	1.9	Z	1.9	2.0	2.0	1.9	2.0	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.0
30-Aug	1.8	1.8	Z	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	PF	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9
31-Aug	2.2	2.0	1.9	Z	2.1	2.1	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	2.2
	2.0	2.0	1.9	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	Diurnal Average	
	2.3	2.2	2.3	2.5	2.2	2.4	2.4	2.0	2.1	2.0	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1	2.1	2.2	Diurnal Maximum	

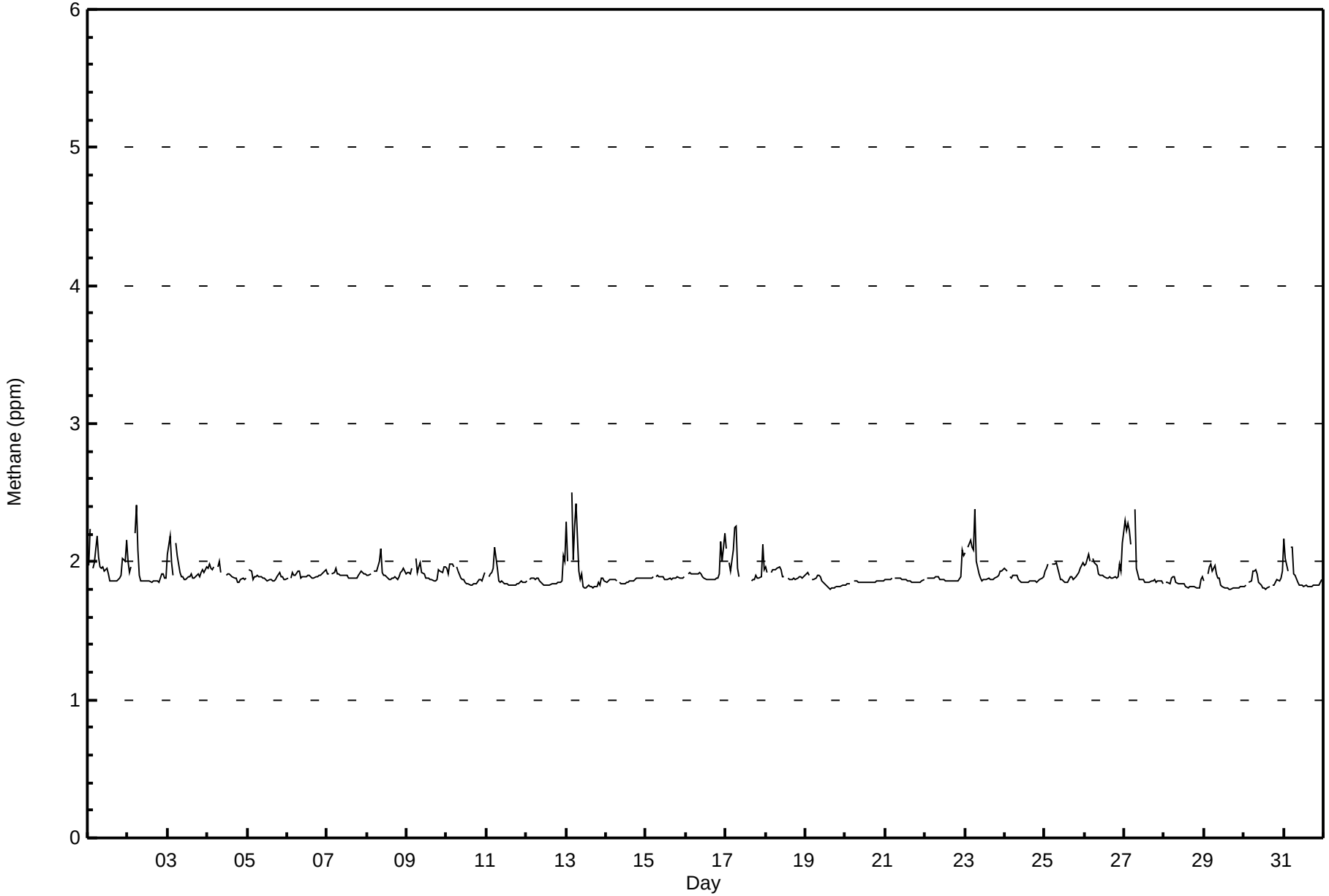
Z - zerospan C - Calibration M - Maintenance PF - Power Failure

Wood Buffalo Environmental Association

Hourly Averages

Methane (CH_4) - ppm

Anzac - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Methane (CH_4) - ppm

Anzac - August 2015

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	663	94.31	94.31
2.1 - 3.0	40	5.69	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 703

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Methane (CH_4) - ppm

Anzac - August 2015

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	14	7	8	13	15	60	47	70	42	24	30	51	65	109	76	31	662
2.1 - 3.0	0	0	0	0	0	0	1	1	15	5	10	5	2	1	0	0	40
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	14	7	8	13	15	60	48	71	57	29	40	56	67	110	76	31	702

Total Number of Valid Hours: 702

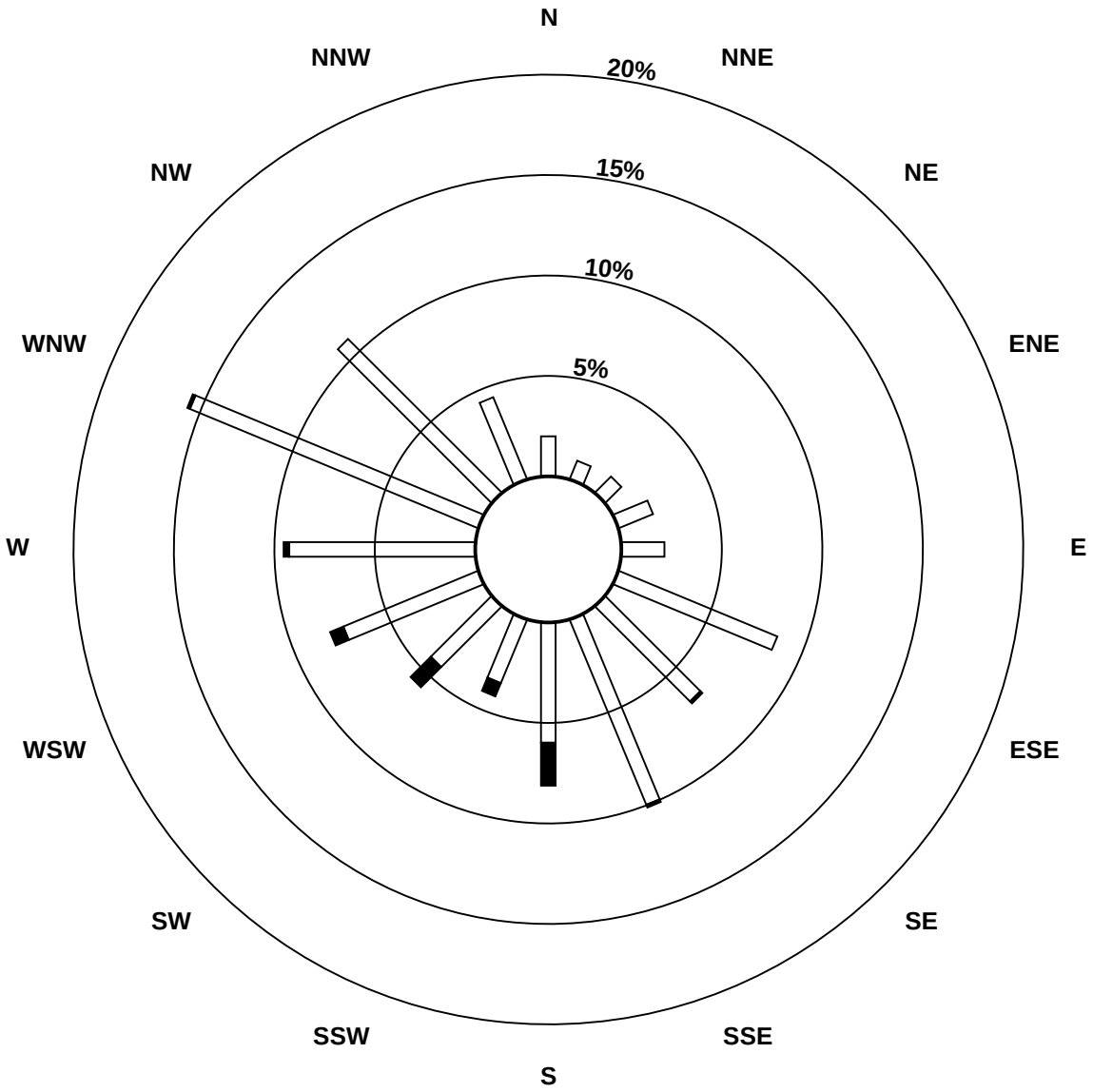
Total Number of Hours: 744

Wood Buffalo Environmental Association

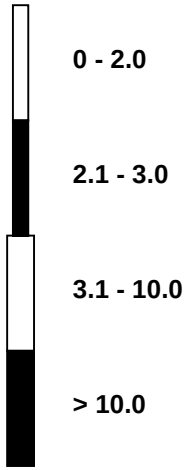
Wind Rose Aug 2015

Methane (CH_4) - ppm

Anzac (AMS 14)



Classes (ppm)



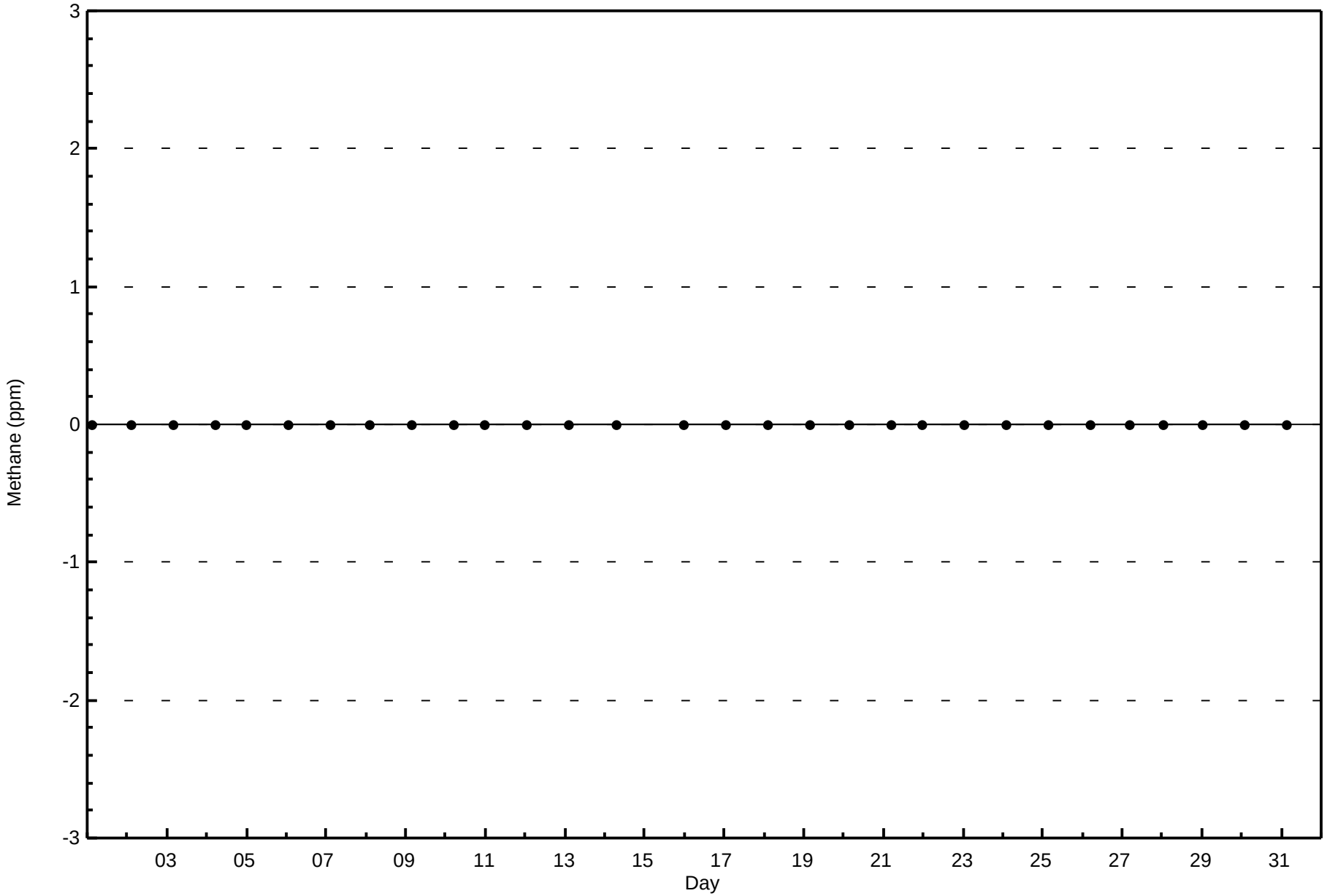
Total Number of Valid Hours: 702

Wood Buffalo Environmental Association

Zero Responses

Methane (CH_4) - ppm

Anzac - August 2015

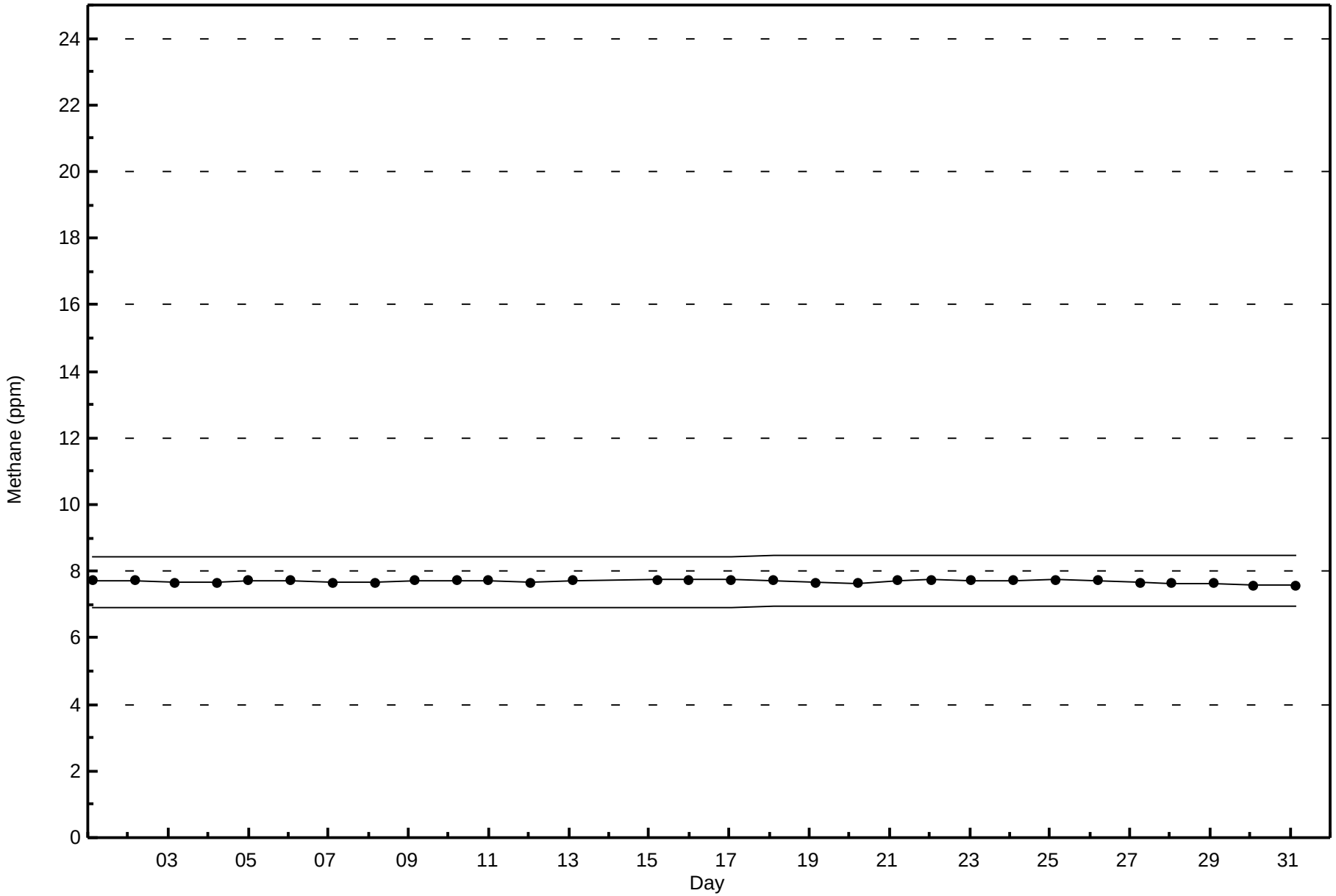


Wood Buffalo Environmental Association

Span Responses

Methane (CH_4) - ppm

Anzac - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

Anzac - August 2015

Maximum Value: 6 ppb on Aug 3 03:00

Maximum Daily Average: 0.4 ppb on Aug 1

Minimum Value: 0 ppb on Aug 3 23:00

Minimum Daily Average: 0.0 ppb on Aug 20

Maximum Diurnal Average: 0.4 ppb at hour 9

Minimum Diurnal Average: 0.0 ppb at hour 20

Monthly Average: 0.2 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 0$ $P_{99} = 2$

Hours in Service:	744
Hours of Data:	707
Hours of Missing Data:	37
Hours of Calibration:	36
Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0	0	Z	0	0	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.4	1
2-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.2	1
3-Aug	0	0	6	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	6
4-Aug	0	0	0	0	0	Z	3	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	2	0.3	3
5-Aug	Z	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
6-Aug	0	Z	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0.3	3
7-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0.3	1
8-Aug	0	0	0	Z	0	0	0	2	1	0	1	0	0	0	0	2	0	0	0	0	0	0	0	0	0.3	2
9-Aug	2	0	0	0	Z	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2
10-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
11-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
12-Aug	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
13-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
14-Aug	0	0	0	0	0	0	0	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
15-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
16-Aug	Z	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
17-Aug	0	Z	0	0	0	0	0	0	0	C	C	C	C	C	C	0	0	0	0	0	0	3	0	0	--	3
18-Aug	0	0	Z	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
19-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
20-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
21-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
22-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
23-Aug	0	Z	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
24-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.1	1
25-Aug	0	0	0	Z	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
26-Aug	0	0	0	0	Z	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
27-Aug	0	0	0	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
28-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
29-Aug	0	Z	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
30-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0.3	4
31-Aug	1	2	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2
	0.2	0.1	0.3	0.1	0.2	0.2	0.3	0.3	0.4	0.3	0.2	0.2	0.1	0.1	0.1	0.2	0.1	0.1	0.2	0.0	0.1	0.1	0.1	0.1	Diurnal Average	
	2	2	6	1	1	1	3	2	3	1	1	1	1	1	1	2	1	1	4	0	2	3	3	2	Diurnal Maximum	

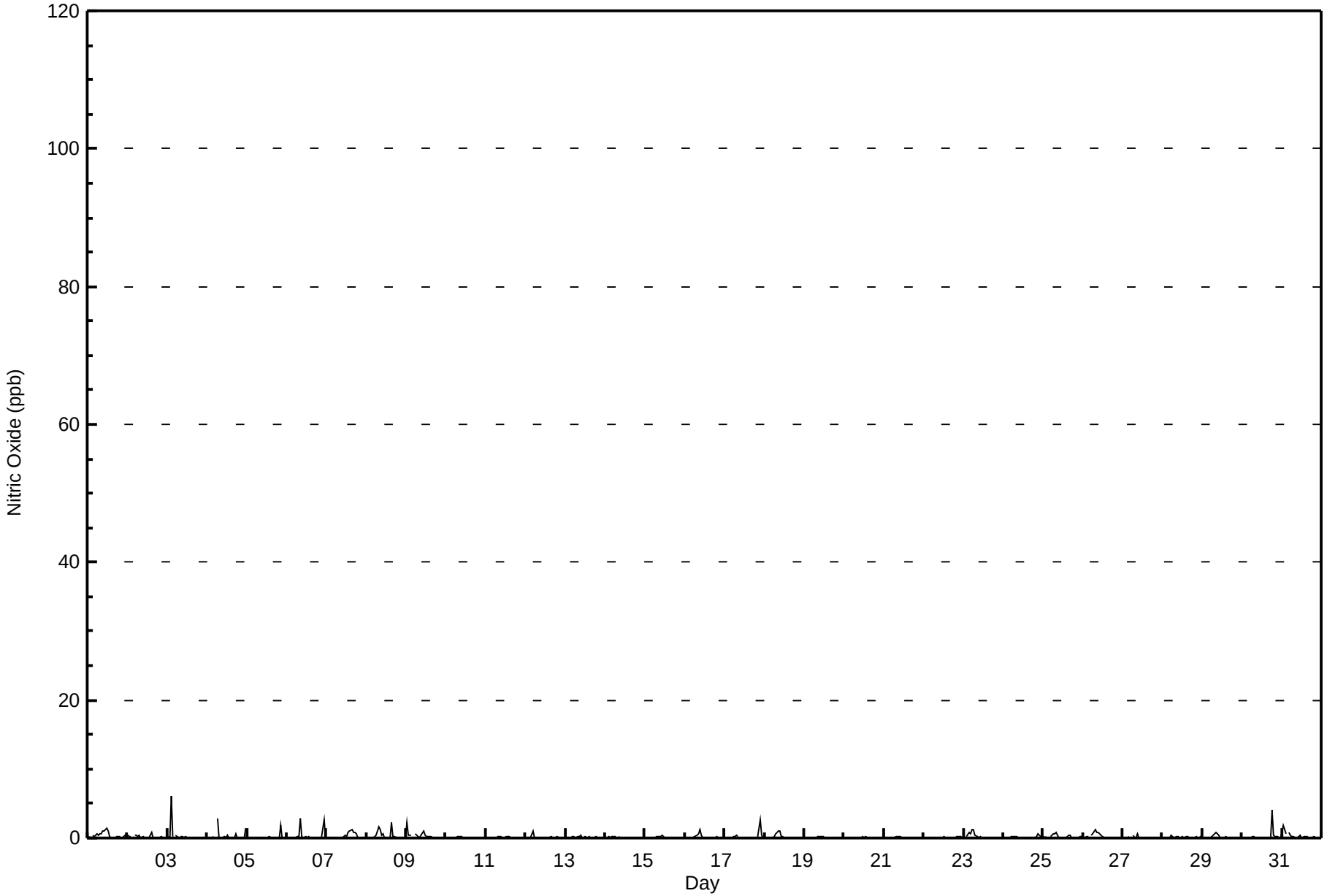
Z - zerospan C - Calibration M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Nitric Oxide (NO) - ppb

Anzac - August 2015



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	707	100.00	100.00
21 - 40	0	0.00	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

Nitric Oxide (NO) - ppb

Anzac - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	14	7	8	13	16	61	48	71	57	30	40	56	68	110	76	31	706
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	14	7	8	13	16	61	48	71	57	30	40	56	68	110	76	31	706

Total Number of Valid Hours: 706

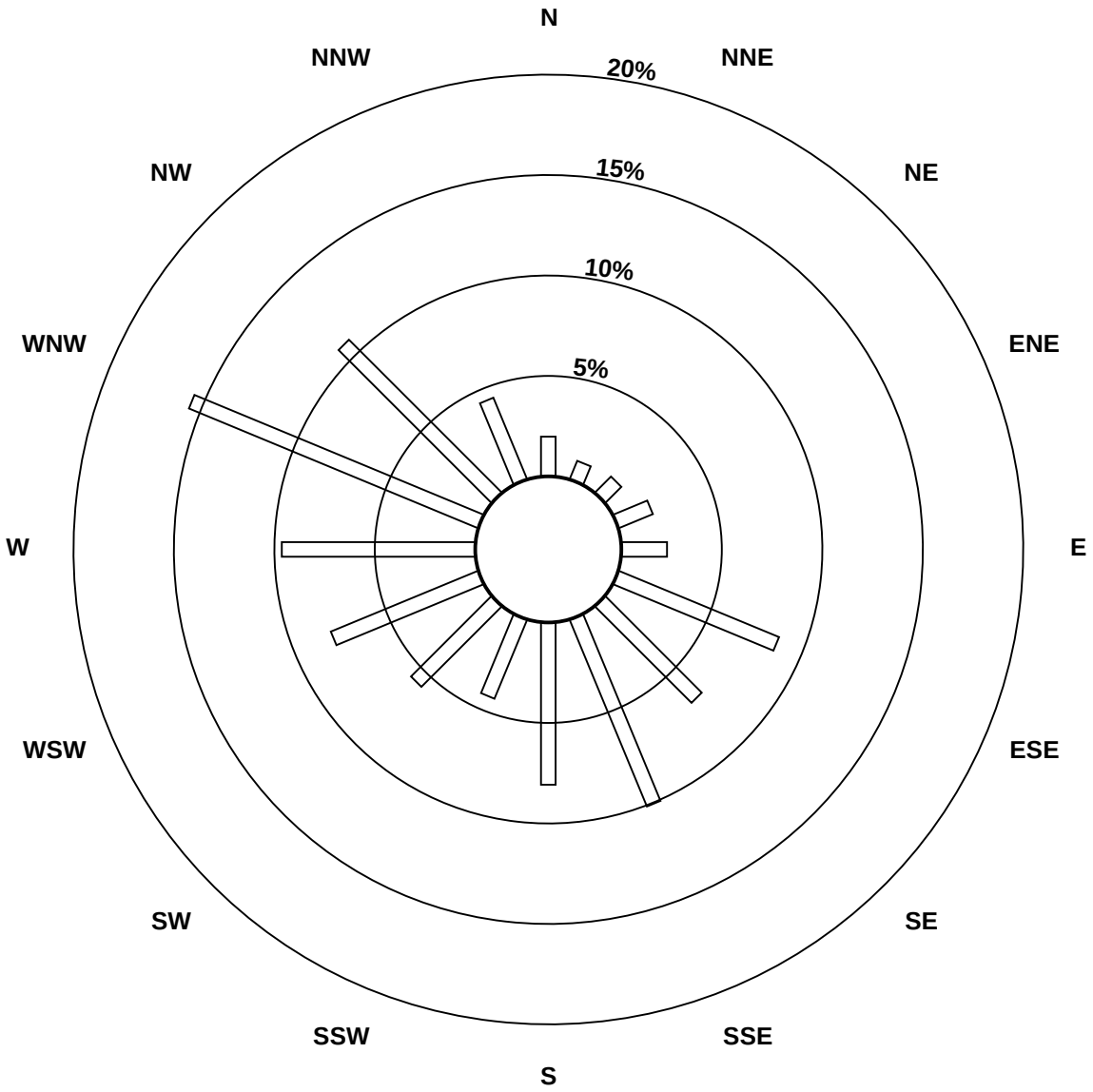
Total Number of Hours: 744

Wood Buffalo Environmental Association

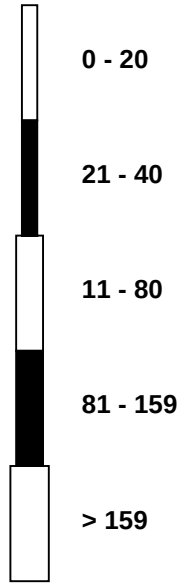
Wind Rose Aug 2015

Nitric Oxide (NO) - ppb

Anzac (AMS 14)



Classes (ppb)



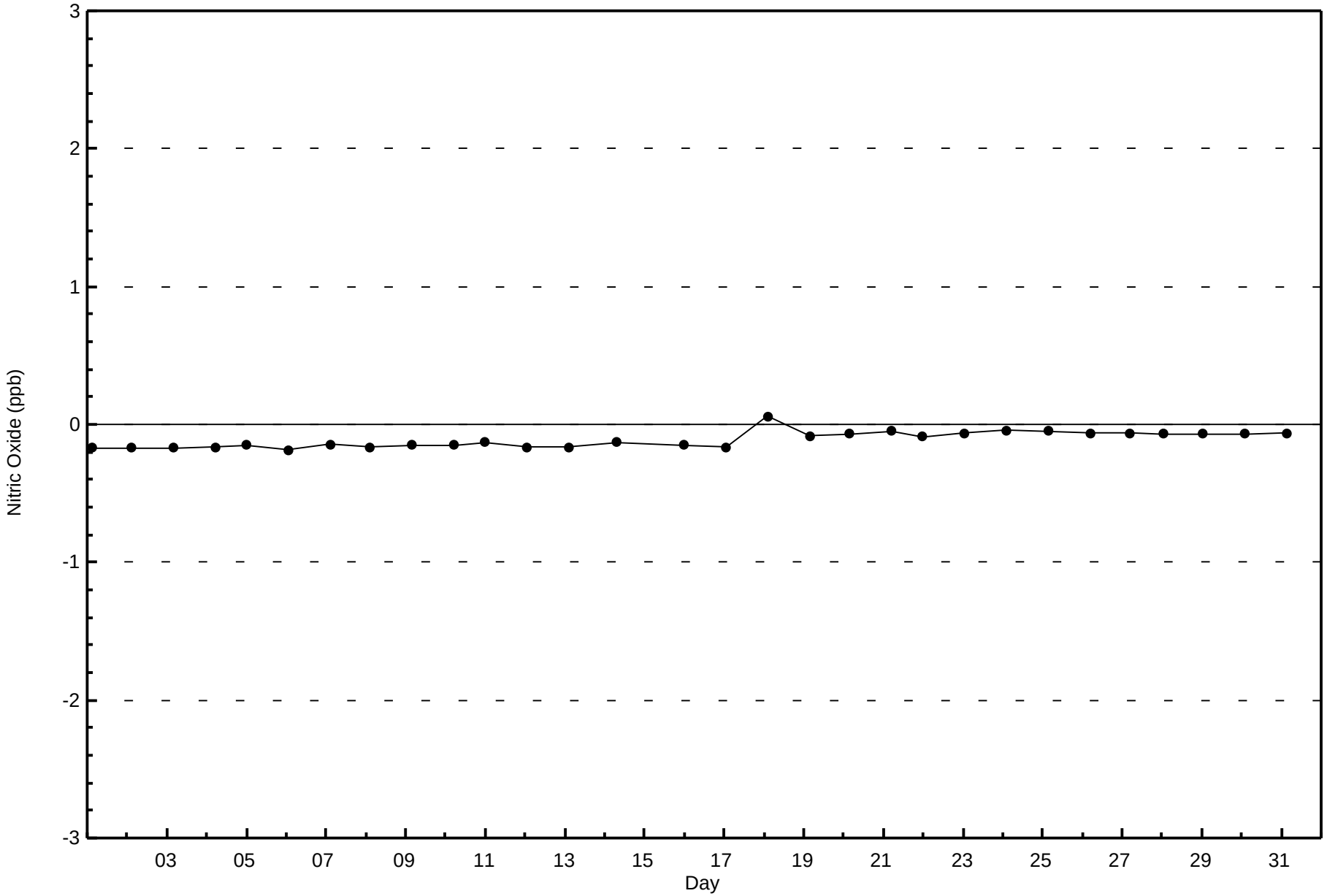
Total Number of Valid Hours: 706

Wood Buffalo Environmental Association

Zero Responses

Nitric Oxide (NO) - ppb

Anzac - August 2015

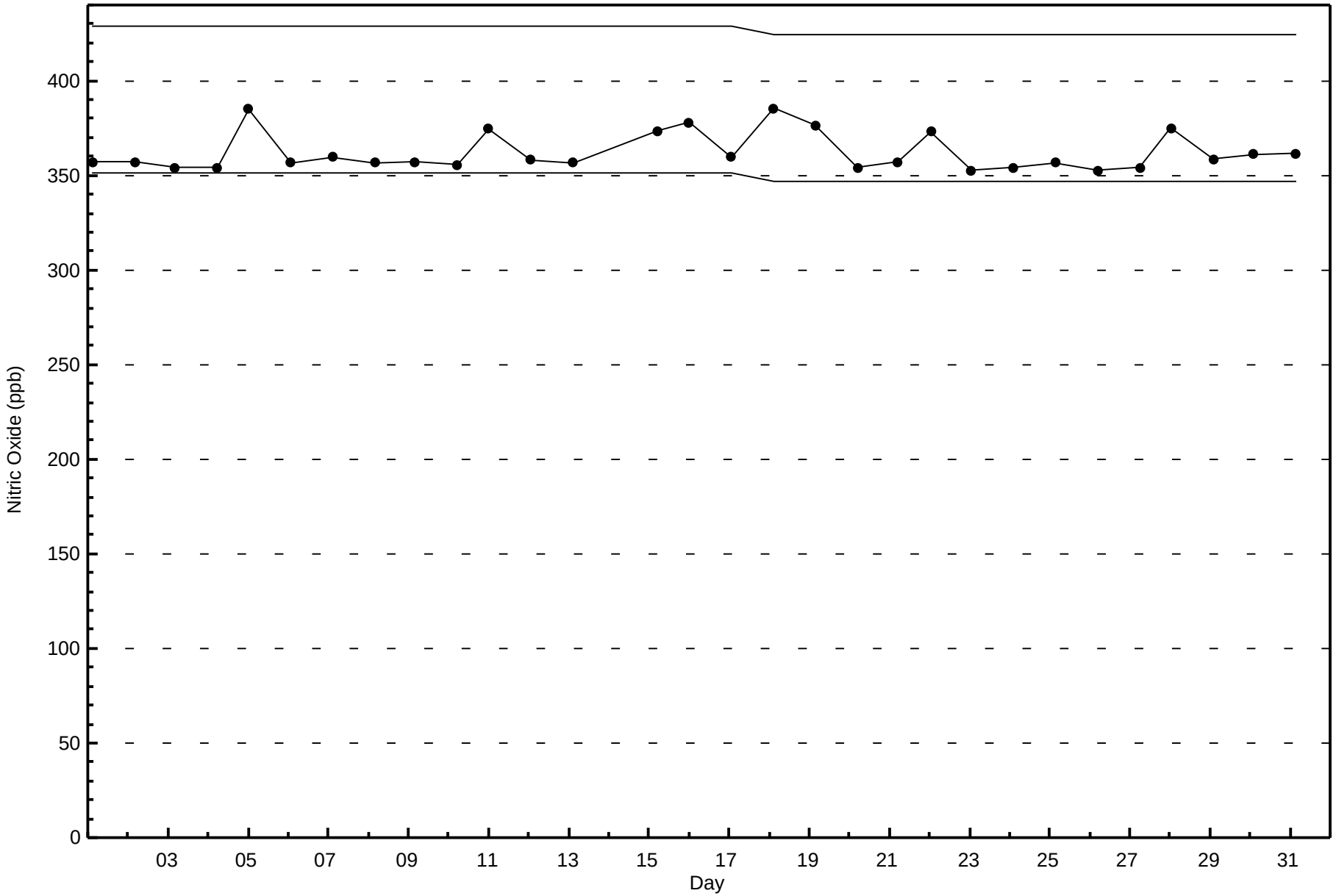


Wood Buffalo Environmental Association

Span Responses

Nitric Oxide (NO) - ppb

Anzac - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO_2) - ppb

Anzac - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 9 ppb on Aug 29 05:00

Maximum Daily Average: 2.1 ppb on Aug 1

Minimum Value: 0 ppb on Aug 5 22:00

Minimum Daily Average: 0.1 ppb on Aug 5

Maximum Diurnal Average: 1.1 ppb at hour 6

Minimum Diurnal Average: 0.5 ppb at hour 14

Monthly Average: 0.8 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 1 $Q_3 = 1$ $P_{90} = 2$ $P_{99} = 4$

Hours in Service:	744
Hours of Data:	707
Hours of Missing Data:	37
Hours of Calibration:	36
Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	1	1	Z	2	2	3	3	3	3	4	4	5	3	1	1	1	1	1	1	2	1	1	3	2	2.1	5
2-Aug	1	0	0	Z	0	0	1	2	1	1	1	1	1	0	3	1	1	1	1	0	1	0	0	0	0.7	3
3-Aug	1	1	3	2	Z	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	0	1	0.9	3
4-Aug	1	1	1	1	0	Z	1	1	0	0	1	0	1	0	0	0	0	1	0	0	1	0	0	1	0.5	1
5-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
6-Aug	0	Z	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.2	1
7-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	2	2	3	1	1	0	0	0	0	0.6	3
8-Aug	0	0	0	Z	1	0	1	1	2	1	1	1	0	0	0	2	1	1	1	1	0	0	1	0	0.7	2
9-Aug	2	1	0	0	Z	0	0	0	1	1	2	2	1	1	1	1	1	1	1	0	1	1	2	1	0.9	2
10-Aug	1	1	1	1	1	Z	1	1	1	1	1	1	1	0	0	0	1	1	1	2	1	0	1	1	0.7	2
11-Aug	Z	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0	1	1	1	1	1	1	0	0	0.7	1
12-Aug	0	Z	0	0	4	1	1	1	1	0	0	0	0	0	0	1	0	0	1	2	2	1	1	3	0.8	4
13-Aug	1	1	Z	1	1	1	1	1	1	1	0	0	0	1	0	0	0	0	1	1	1	1	1	0	0.6	1
14-Aug	0	1	1	1	1	1	1	M	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
15-Aug	0	0	0	0	0	Z	1	1	2	1	2	1	0	0	0	0	1	1	1	2	1	1	1	2	0.7	2
16-Aug	Z	2	3	2	2	2	2	2	2	2	1	0	0	0	0	0	0	0	0	2	4	2	1	1	1.4	4
17-Aug	0	Z	0	1	0	1	1	1	0	C	C	C	C	C	C	0	1	1	1	0	2	4	4	0	--	4
18-Aug	0	0	Z	0	1	2	1	2	2	2	1	1	1	1	1	1	1	1	0	1	1	1	1	0	0.9	2
19-Aug	0	0	1	Z	2	1	1	1	1	1	1	1	1	0	1	0	0	1	0	1	0	0	0	0	0.7	2
20-Aug	0	0	0	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0.3	1
21-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
22-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	3	2	1	0.5	3
23-Aug	0	Z	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	2	0.8	2
24-Aug	2	1	Z	1	1	2	1	1	1	1	1	1	1	1	0	0	0	0	1	2	3	2	2	1	1.1	3
25-Aug	0	0	0	Z	0	1	2	2	2	0	0	0	0	0	0	4	4	1	1	1	5	4	4	4	1.5	5
26-Aug	3	2	4	8	Z	4	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1.9	8
27-Aug	1	1	1	1	0	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1
28-Aug	Z	0	1	1	1	3	2	1	1	1	1	0	1	0	0	1	0	0	1	1	3	0	0	2	0.8	3
29-Aug	1	Z	1	5	9	5	3	3	2	2	1	1	1	1	1	1	0	0	1	0	0	0	2	2	1.9	9
30-Aug	0	1	Z	1	1	1	2	1	1	1	1	0	0	0	0	1	1	1	6	4	1	1	1	1	1.1	6
31-Aug	1	2	1	Z	0	0	0	1	1	1	1	1	0	1	1	1	1	0	1	1	1	1	0	0	0.7	2
	0.7	0.7	0.8	1.1	1.0	1.1	1.0	1.1	0.9	1.0	0.8	0.8	0.6	0.5	0.6	0.6	0.6	0.6	0.8	0.9	1.1	0.9	0.9	0.8	Diurnal Average	
	3	2	4	8	9	5	3	3	3	4	4	5	3	1	3	4	4	3	6	4	5	4	4	4	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance

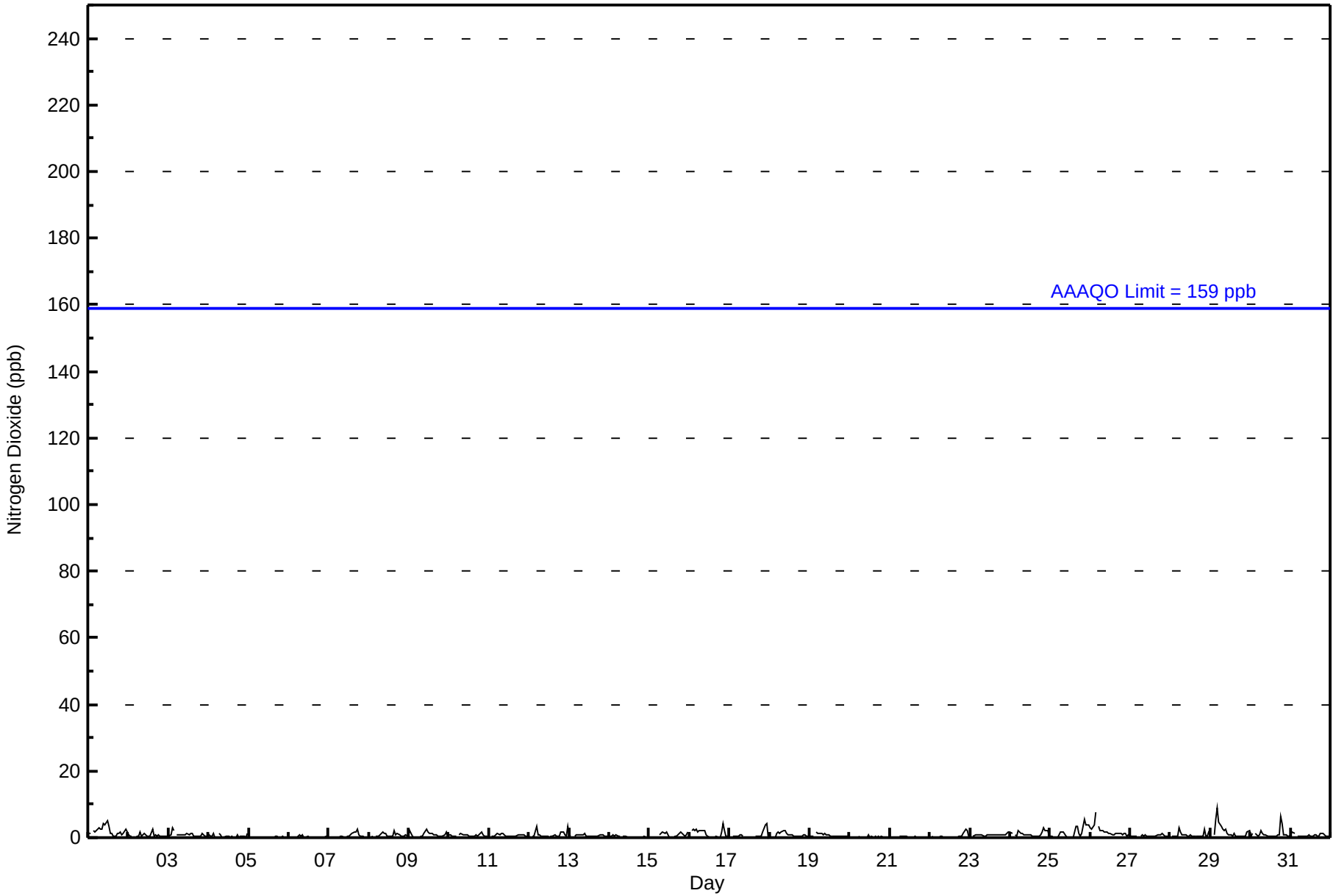
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Dioxide (NO_2) - ppb

Anzac - August 2015



Nitrogen Dioxide (NO_2) - ppb
Anzac - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	707	100.00	100.00
21 - 40	0	0.00	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 (NO_2) - ppb

Anzac - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	14	7	8	13	16	61	48	71	57	30	40	56	68	110	76	31	706
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	14	7	8	13	16	61	48	71	57	30	40	56	68	110	76	31	706

Total Number of Valid Hours: 706

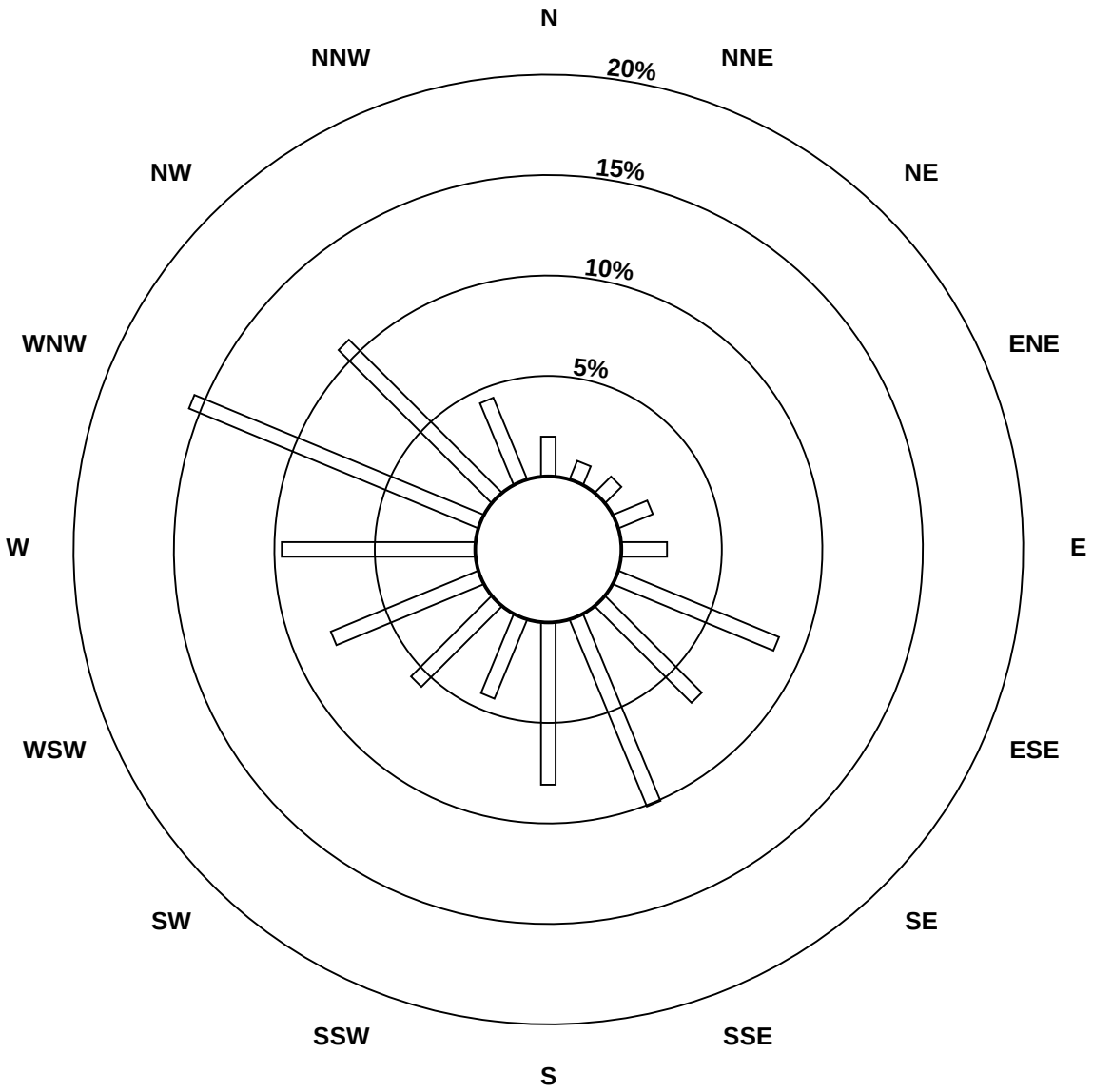
Total Number of Hours: 744

Wood Buffalo Environmental Association

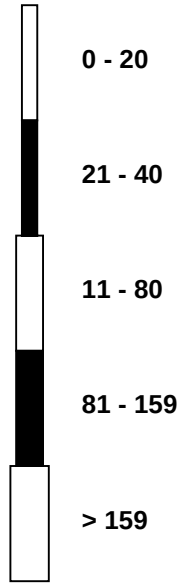
Wind Rose Aug 2015

Nitrogen Dioxide (NO_2) - ppb

Anzac (AMS 14)



Classes (ppb)



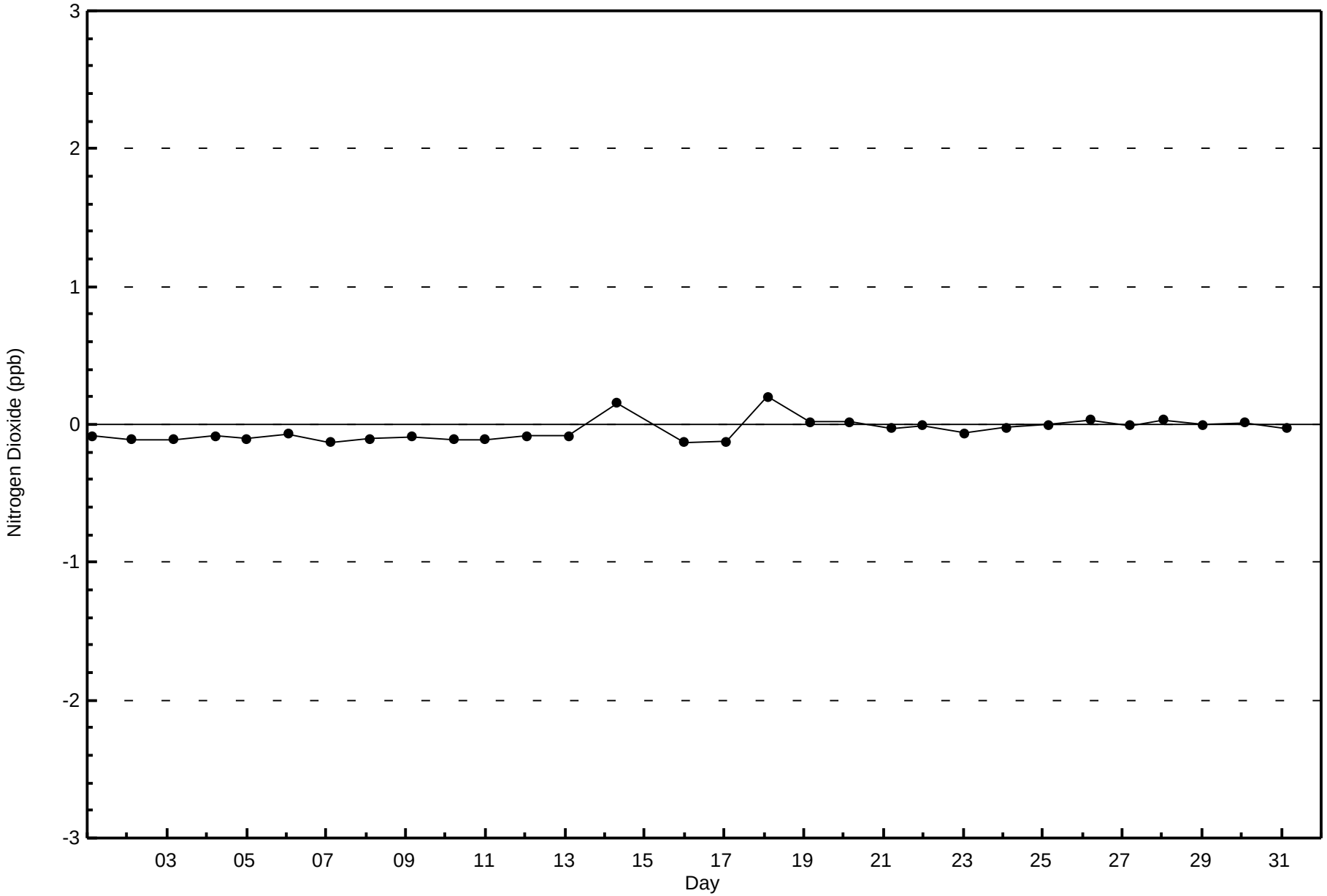
Total Number of Valid Hours: 706

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Dioxide (NO_2) - ppb

Anzac - August 2015

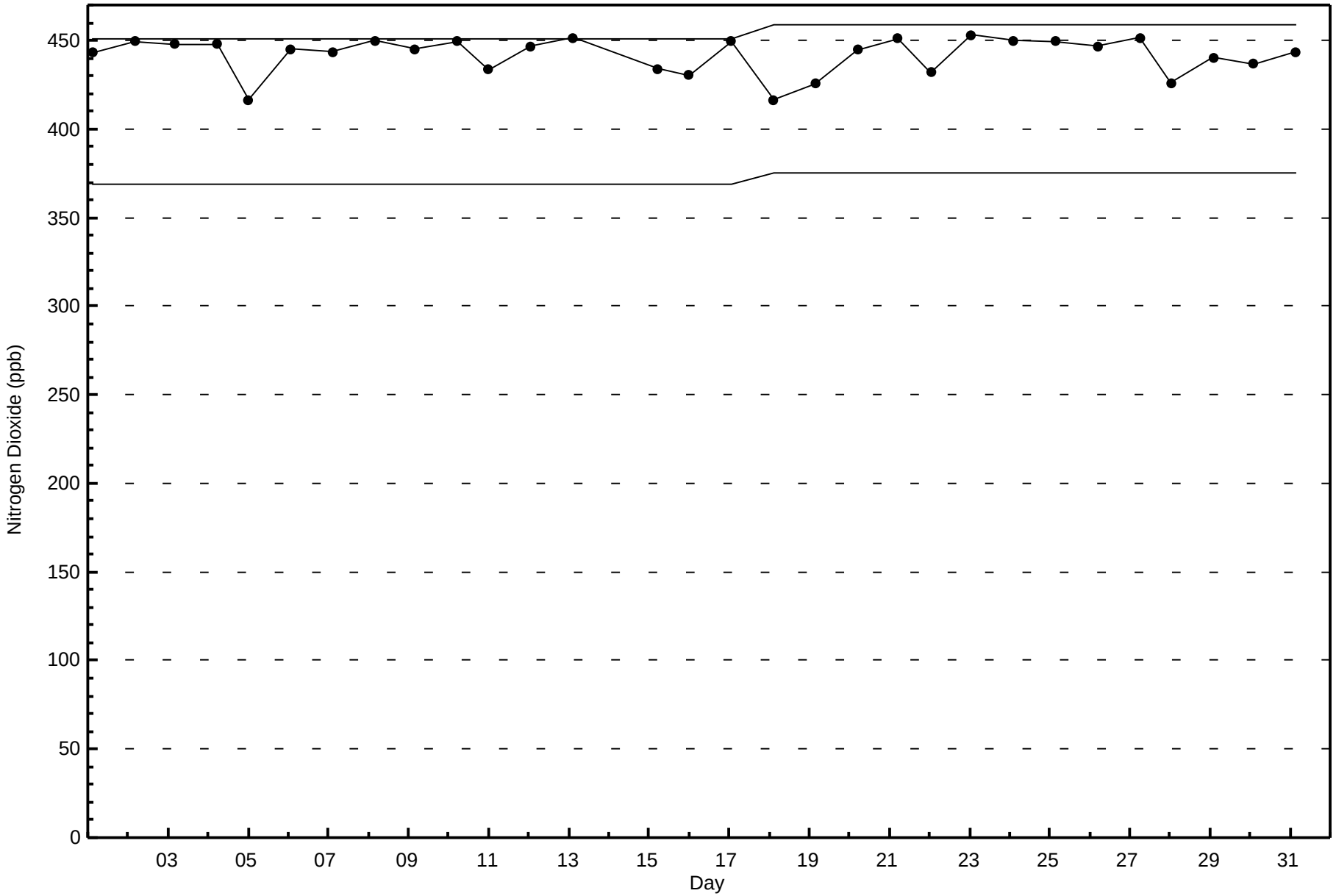


Wood Buffalo Environmental Association

Span Responses

Nitrogen Dioxide (NO_2) - ppb

Anzac - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_X) - ppb

Anzac - August 2015

Maximum Value: 10 ppb on Aug 30 19:00

Maximum Daily Average: 2.4 ppb on Aug 1

Minimum Value: 0 ppb on Aug 18 02:00

Minimum Daily Average: 0.2 ppb on Aug 5

Maximum Diurnal Average: 1.4 ppb at hour 6

Minimum Diurnal Average: 0.6 ppb at hour 14

Monthly Average: 1.0 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 1 $Q_3 = 1$ $P_{90} = 2$ $P_{99} = 5$

Hours in Service:	744
Hours of Data:	707
Hours of Missing Data:	37
Hours of Calibration:	36
Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	1	1	Z	2	2	3	3	3	3	5	5	7	4	1	1	0	1	1	2	2	1	1	3	2	2.4	7
2-Aug	1	0	1	Z	1	1	1	2	1	1	1	1	0	0	3	0	1	1	1	0	1	1	1	0	0.8	3
3-Aug	1	1	9	2	Z	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	0	1	1.3	9
4-Aug	1	1	1	1	0	Z	4	1	0	0	1	0	1	0	0	0	0	2	0	0	1	0	0	3	0.8	4
5-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0.2	2
6-Aug	0	Z	0	0	0	0	1	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0.5	3
7-Aug	0	0	Z	0	0	0	0	0	0	0	0	1	1	2	2	3	3	3	1	0	0	0	0	0	0.8	3
8-Aug	0	0	0	Z	0	1	1	3	3	2	2	1	0	0	1	4	1	1	1	1	0	0	1	0	1.0	4
9-Aug	5	2	1	1	Z	1	1	1	1	2	3	2	1	1	1	1	1	1	0	0	1	1	1	1	1.2	5
10-Aug	1	1	1	1	1	Z	1	1	1	1	1	1	1	0	0	0	1	1	1	2	1	0	1	1	0.8	2
11-Aug	Z	1	1	1	1	1	1	2	1	1	1	1	1	1	1	0	0	1	1	1	1	1	0	0	0.7	2
12-Aug	0	Z	0	0	4	1	1	1	1	1	0	0	0	0	0	1	0	0	0	2	2	1	1	3	0.9	4
13-Aug	1	1	Z	1	1	1	1	1	1	2	0	0	1	1	1	0	0	1	1	1	1	1	1	0	0.8	2
14-Aug	0	0	1	1	1	1	1	M	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
15-Aug	0	0	0	0	0	Z	1	1	2	1	2	1	0	0	0	0	1	1	1	2	1	0	1	2	0.8	2
16-Aug	Z	2	3	2	2	2	2	2	3	3	1	0	0	0	0	0	0	0	0	2	4	2	1	0	1.5	4
17-Aug	0	Z	0	0	0	1	1	1	1	C	C	C	C	C	C	0	0	0	0	0	2	6	5	0	--	6
18-Aug	0	0	Z	0	1	1	1	2	3	3	1	1	1	1	1	1	0	1	0	1	1	1	1	0	1.0	3
19-Aug	0	0	0	Z	2	1	1	1	1	1	1	1	1	0	0	1	0	0	0	1	0	0	0	0	0.7	2
20-Aug	0	0	0	0	Z	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0.3	1
21-Aug	0	0	0	0	0	Z	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
22-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	2	1	0.5	3
23-Aug	0	Z	1	2	1	2	2	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1.0	2
24-Aug	1	1	Z	1	1	2	1	2	1	1	1	1	1	1	0	0	0	0	1	2	3	3	2	1	1.2	3
25-Aug	0	1	0	Z	0	1	2	2	2	0	0	0	0	0	0	4	4	1	1	1	5	4	4	4	1.7	5
26-Aug	3	3	4	8	Z	4	3	4	2	3	2	2	1	1	1	1	1	1	1	1	1	1	1	1	2.2	8
27-Aug	1	1	1	0	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0.8	1
28-Aug	Z	0	0	1	1	3	2	1	1	1	1	1	1	0	1	1	0	1	1	1	3	0	0	2	0.9	3
29-Aug	1	Z	1	5	9	5	4	3	3	3	2	1	1	1	1	0	0	0	0	0	0	0	2	2	2.0	9
30-Aug	0	1	Z	1	1	1	2	1	1	1	1	0	1	0	0	0	1	1	10	5	1	1	1	1	1.4	10
31-Aug	2	3	2	Z	1	1	0	1	1	1	1	1	0	1	1	1	0	0	1	1	1	0	0	0	0.9	3
	0.8	0.8	1.1	1.2	1.2	1.4	1.3	1.4	1.3	1.3	1.0	0.9	0.7	0.6	0.7	0.8	0.7	0.7	1.0	0.9	1.2	1.1	1.1	0.9	Diurnal Average	
	5	3	9	8	9	5	4	4	3	5	5	7	4	2	3	4	4	3	10	5	5	6	5	4	Diurnal Maximum	

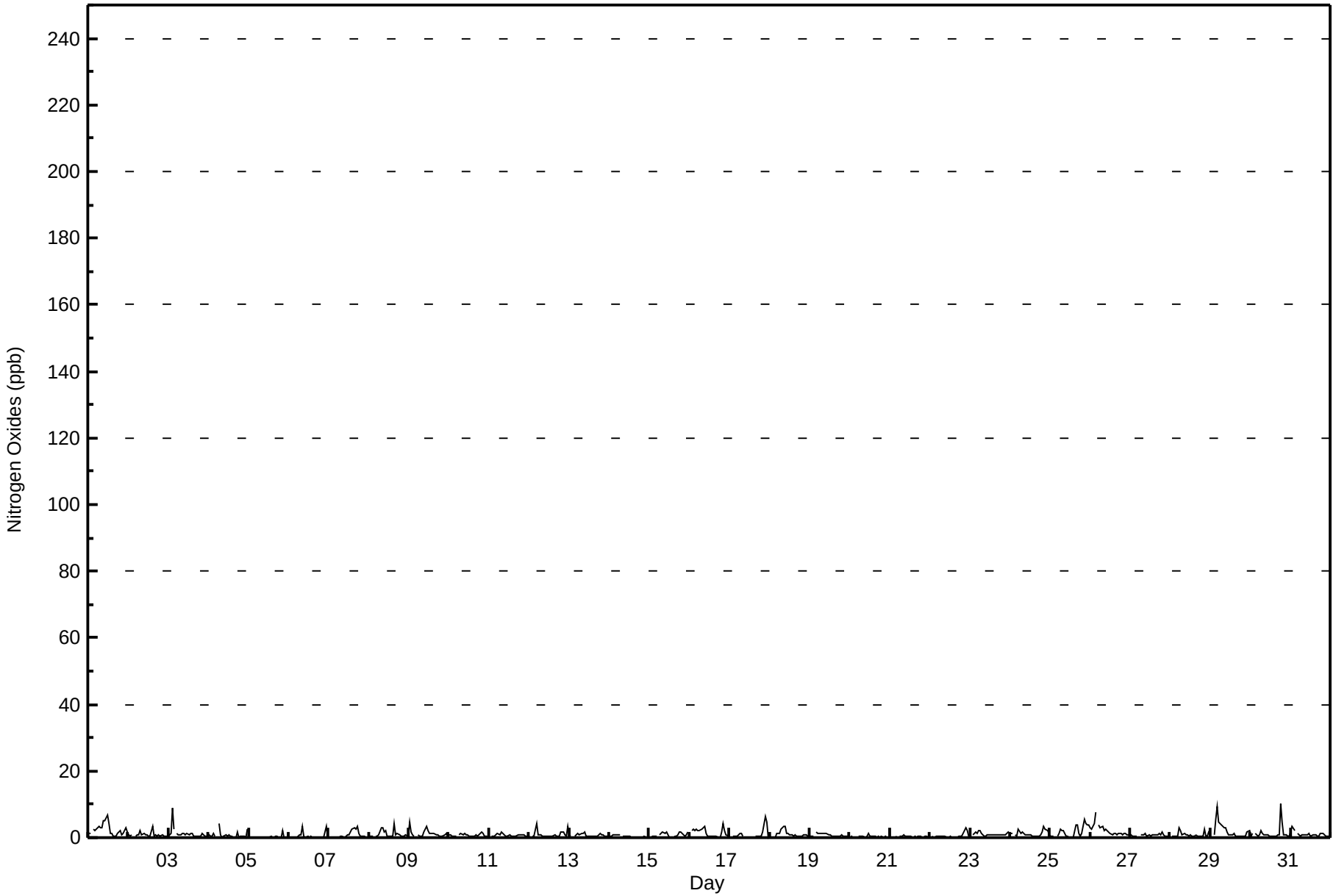
Z - zerospan C - Calibration M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Oxides (NO_X) - ppb

Anzac - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Nitrogen Oxides (NO_X) - ppb

Anzac - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	707	100.00	100.00
21 - 40	0	0.00	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

Anzac - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	14	7	8	13	16	61	48	71	57	30	40	56	68	110	76	31	706
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	14	7	8	13	16	61	48	71	57	30	40	56	68	110	76	31	706

Total Number of Valid Hours: 706

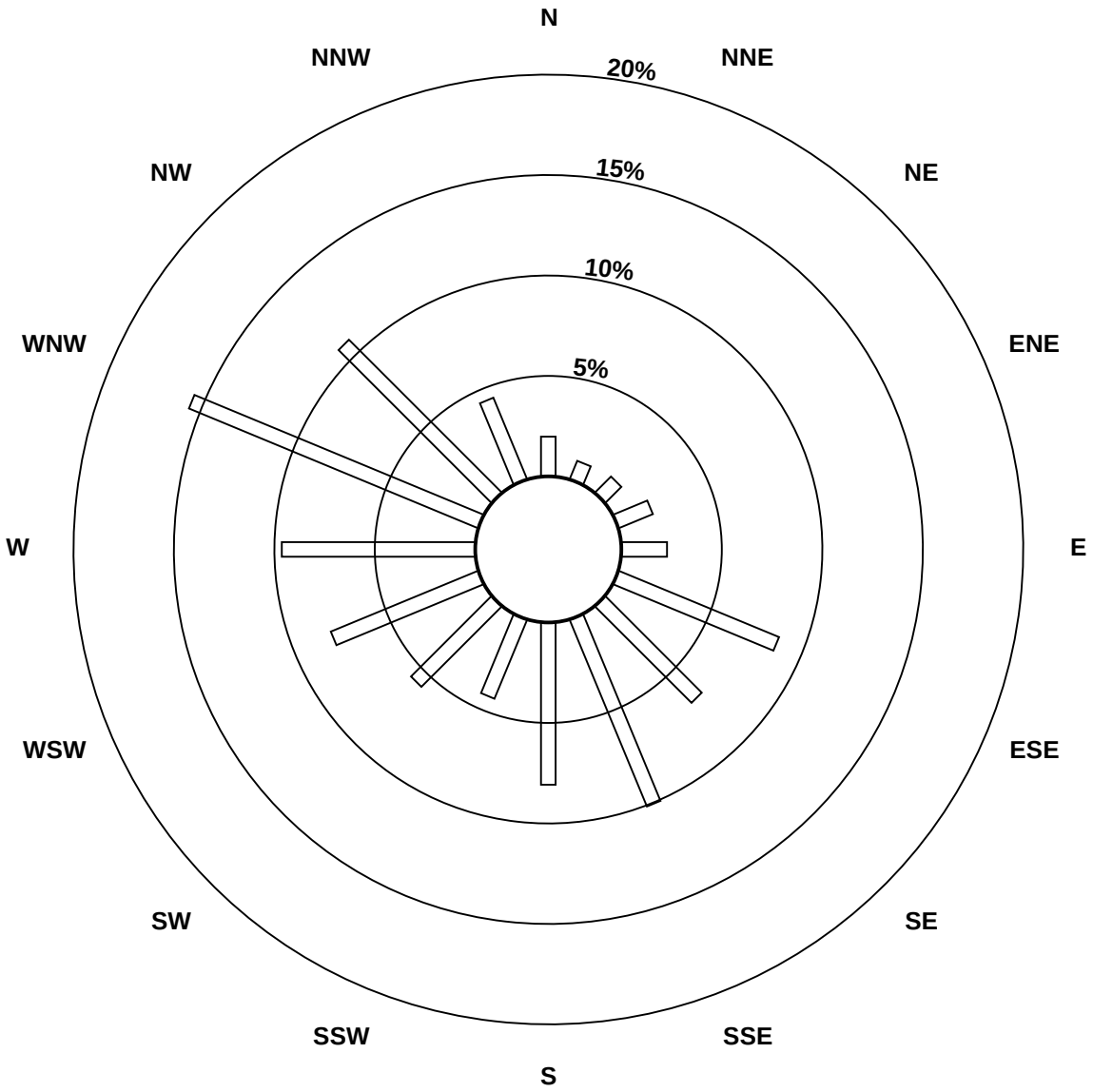
Total Number of Hours: 744

Wood Buffalo Environmental Association

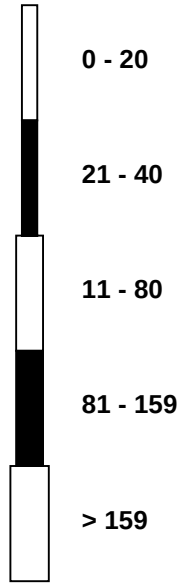
Wind Rose Aug 2015

Nitrogen Oxides (NO_X) - ppb

Anzac (AMS 14)



Classes (ppb)



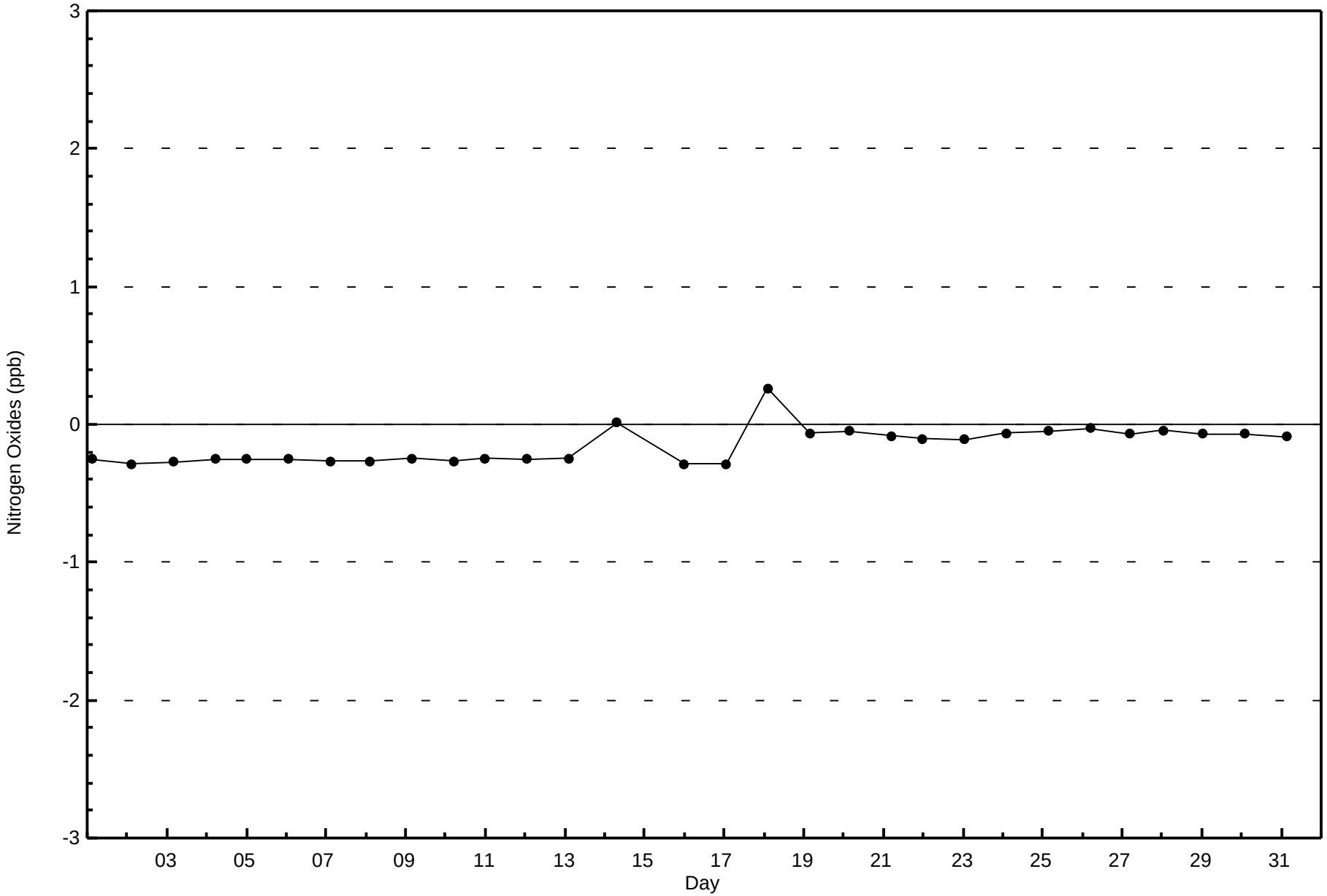
Total Number of Valid Hours: 706

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Oxides (NO_X) - ppb

Anzac - August 2015

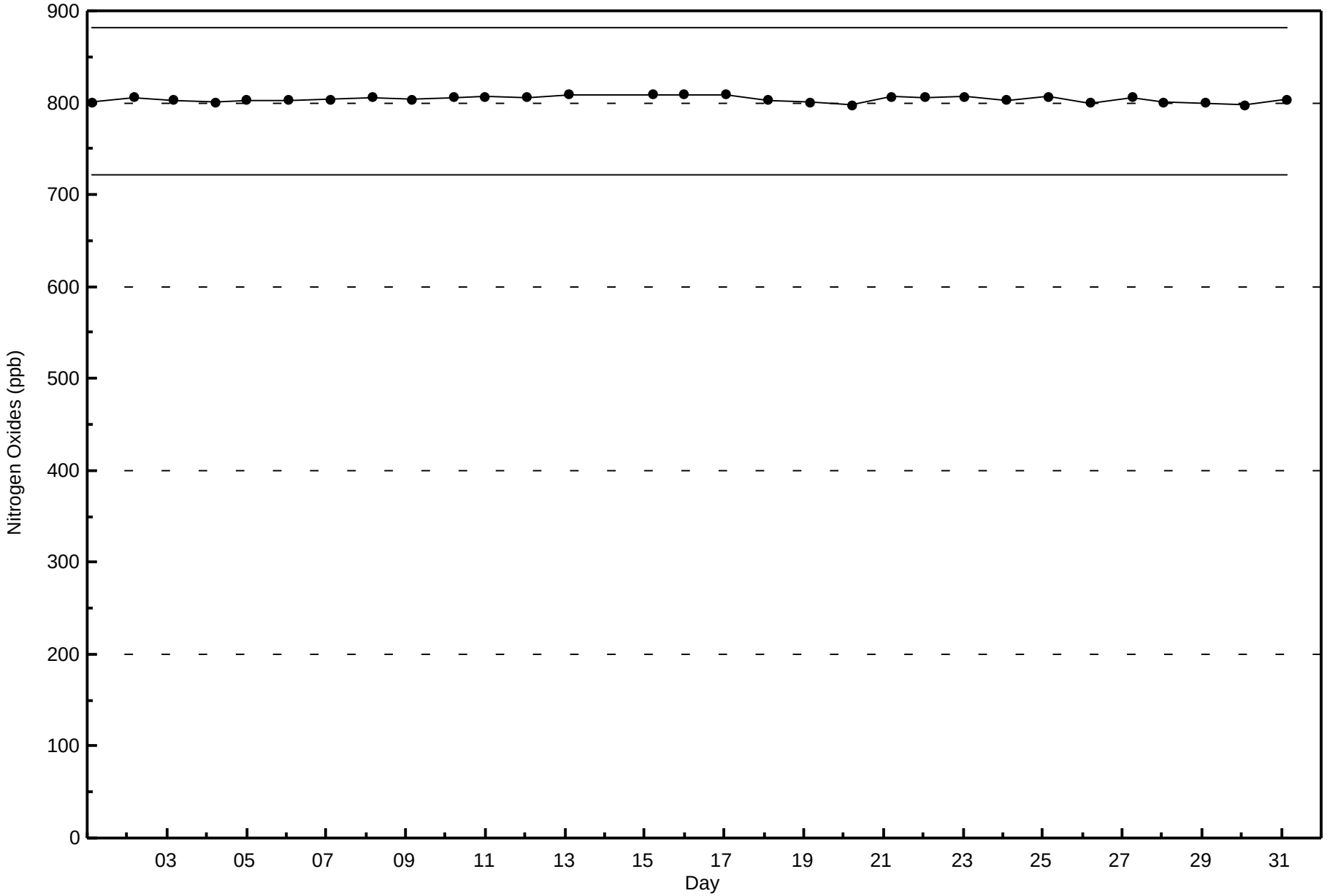


Wood Buffalo Environmental Association

Span Responses

Nitrogen Oxides (NO_X) - ppb

Anzac - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O_3) - ppb

Anzac - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 47 ppb on Aug 27 18:00

Maximum Daily Average: 33.2 ppb on Aug 11

Minimum Value: 5 ppb on Aug 9 06:00

Minimum Daily Average: 14.3 ppb on Aug 7

Maximum Diurnal Average: 31.9 ppb at hour 15

Minimum Diurnal Average: 16.3 ppb at hour 5

Monthly Average: 24.5 ppb

Percentiles: $P_1 = 6$ $P_{10} = 11$ $Q_1 = 18$ Median = 24 $Q_3 = 32$ $P_{90} = 37$ $P_{99} = 42$

Hours in Service:	744
Hours of Data:	708
Hours of Missing Data:	36
Hours of Calibration:	34
Percent Operational Time:	99.7

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	10	11	13	13	Z	11	11	13	18	23	28	30	33	36	39	33	30	33	33	29	19	16	10	11	21.8	39
2-Aug	6	7	7	5	5	Z	12	23	31	34	34	33	32	33	33	33	30	25	26	19	16	12	10	8	20.6	34
3-Aug	9	8	5	6	7	7	Z	24	27	27	29	31	37	27	32	29	29	27	28	27	25	25	23	21	22.2	37
4-Aug	18	18	20	17	17	16	15	Z	14	15	18	22	21	26	23	22	21	24	29	27	23	22	20	19	20.4	29
5-Aug	20	20	Z	22	19	21	21	21	19	19	20	21	22	20	22	21	18	20	20	19	19	20	19	18	20.0	22
6-Aug	19	20	19	Z	18	17	16	16	15	17	18	17	17	17	16	14	13	13	12	12	11	11	10	11	15.1	20
7-Aug	10	9	8	8	Z	9	11	11	12	13	12	14	15	18	20	20	23	22	21	16	17	14	13	13	14.3	23
8-Aug	13	12	11	10	9	Z	10	12	16	23	26	25	26	27	26	23	26	25	25	21	22	22	19	13	19.2	27
9-Aug	7	6	5	5	5	5	Z	14	22	26	30	30	30	32	35	34	32	33	31	27	23	23	19	19	21.4	35
10-Aug	26	22	22	23	16	20	32	Z	38	40	43	41	38	41	41	40	40	41	39	32	29	30	29	34	32.8	43
11-Aug	35	38	Z	23	27	25	32	31	29	31	33	36	36	37	37	35	34	34	34	35	35	33	36	37	33.2	38
12-Aug	36	35	30	Z	23	31	31	31	31	32	32	32	34	35	38	37	37	40	36	33	26	26	24	20	31.7	40
13-Aug	19	15	14	16	Z	16	14	19	16	20	25	27	29	29	29	33	33	34	33	29	22	18	16	24	23.2	34
14-Aug	34	33	31	30	31	31	30	M	31	30	31	29	28	27	26	28	27	23	22	21	20	20	20	21	27.2	34
15-Aug	21	21	21	21	20	19	18	Z	16	18	21	24	27	29	30	31	32	32	30	24	24	23	23	21	23.7	32
16-Aug	19	17	Z	15	15	16	17	16	18	20	26	26	29	30	31	30	30	29	26	22	16	17	17	17	21.7	31
17-Aug	18	17	23	Z	17	15	16	23	25	30	33	33	34	35	M	33	29	26	23	24	26	16	14	19	24.1	35
18-Aug	16	25	24	19	Z	21	22	22	21	C	C	C	C	38	38	39	35	36	36	31	29	25	24	23	27.6	39
19-Aug	25	24	28	33	35	Z	30	31	32	32	33	33	31	30	30	33	33	38	37	38	36	33	31	28	31.9	38
20-Aug	26	25	24	23	23	24	Z	23	25	26	26	25	24	23	23	22	22	22	22	22	22	21	21	21	23.4	26
21-Aug	21	21	21	21	19	20	19	Z	20	20	19	19	20	22	21	21	23	24	21	19	21	22	22	21	20.9	24
22-Aug	20	19	Z	20	21	21	20	19	20	22	22	23	26	28	27	28	29	29	24	20	16	9	13	9	21.1	29
23-Aug	6	6	9	Z	6	6	8	20	26	31	34	34	36	40	41	41	40	41	39	38	35	37	38	38	28.1	41
24-Aug	38	38	36	33	Z	26	26	28	33	35	37	38	38	38	36	33	33	34	28	21	18	14	9	9	29.6	38
25-Aug	7	8	6	6	6	Z	7	9	20	30	31	32	32	34	32	35	32	32	27	20	17	11	7	9	19.5	35
26-Aug	9	9	9	7	8	8	Z	13	18	20	20	24	29	32	35	36	36	34	33	24	19	17	9	11	20.0	36
27-Aug	10	7	11	11	8	7	9	Z	26	32	35	37	41	42	42	43	45	47	47	42	38	35	36	40	30.0	47
28-Aug	42	42	Z	35	31	28	30	32	33	33	34	34	34	35	37	38	38	37	30	23	18	16	20	22	31.3	42
29-Aug	23	24	19	Z	15	19	18	26	29	32	38	39	39	39	40	39	39	39	36	34	35	36	35	33	31.5	40
30-Aug	36	35	34	34	Z	28	18	27	32	36	40	39	40	42	42	35	34	30	21	14	13	15	16	15	29.3	42
31-Aug	10	6	7	6	6	Z	13	17	25	29	28	28	37	37	38	38	38	37	33	23	22	16	15	19	22.9	38
	19.6	19.2	17.6	17.8	16.3	17.9	18.7	20.9	23.9	26.4	28.5	29.2	30.5	31.6	31.9	31.5	31.1	31.0	29.1	25.4	22.9	21.1	19.9	20.1	Diurnal Average	
	42	42	36	35	35	31	32	32	38	40	43	41	41	42	42	43	45	47	47	42	38	37	38	40	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance

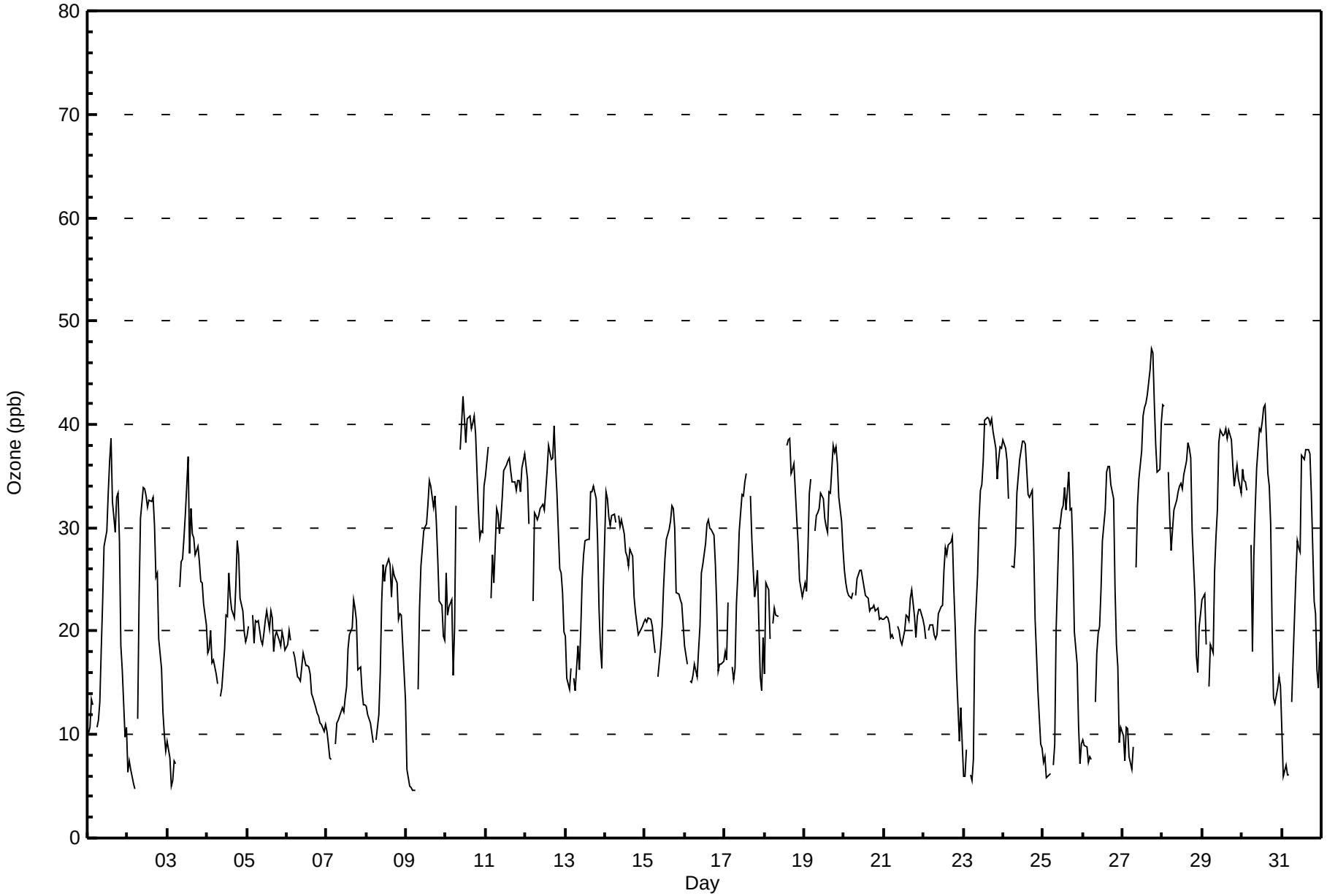
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb

Wood Buffalo Environmental Association

Hourly Averages

Ozone (O_3) - ppb

Anzac - August 2015



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	251	35.45	35.45
21 - 50	457	64.55	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 (O_3) - ppb

Anzac - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	4	3	2	8	10	38	19	25	31	17	21	17	5	14	31	6	251
21 - 50	9	3	5	6	4	25	28	44	28	14	19	40	63	96	47	23	454
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	6	7	14	14	63	47	69	59	31	40	57	68	110	78	29	705

Total Number of Valid Hours: 705

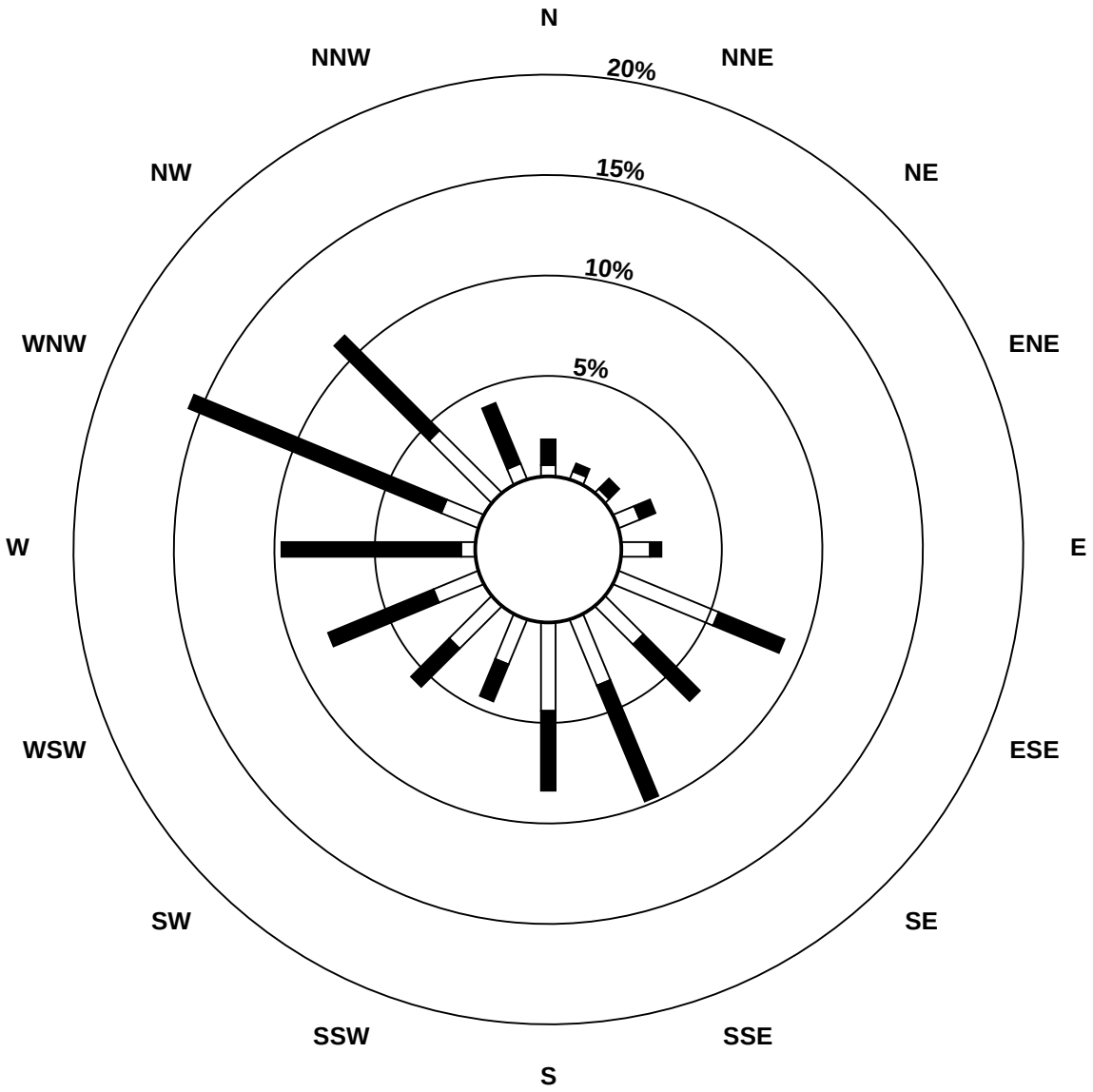
Total Number of Hours: 744

Wood Buffalo Environmental Association

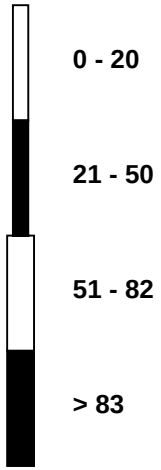
Wind Rose Aug 2015

Ozone (O_3) - ppb

Anzac (AMS 14)



Classes (ppb)



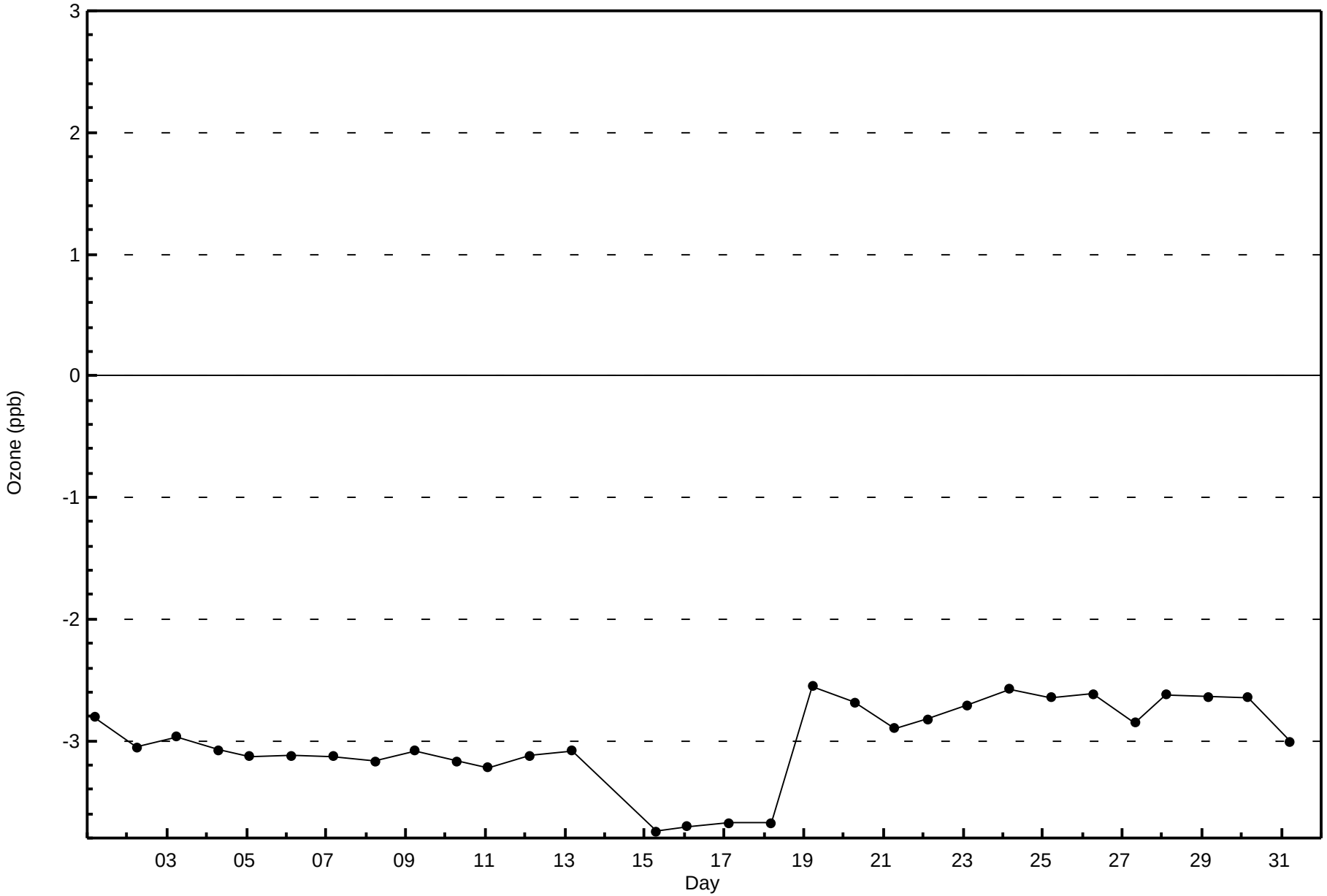
Total Number of Valid Hours: 705

Wood Buffalo Environmental Association

Zero Responses

Ozone (O_3) - ppb

Anzac - August 2015

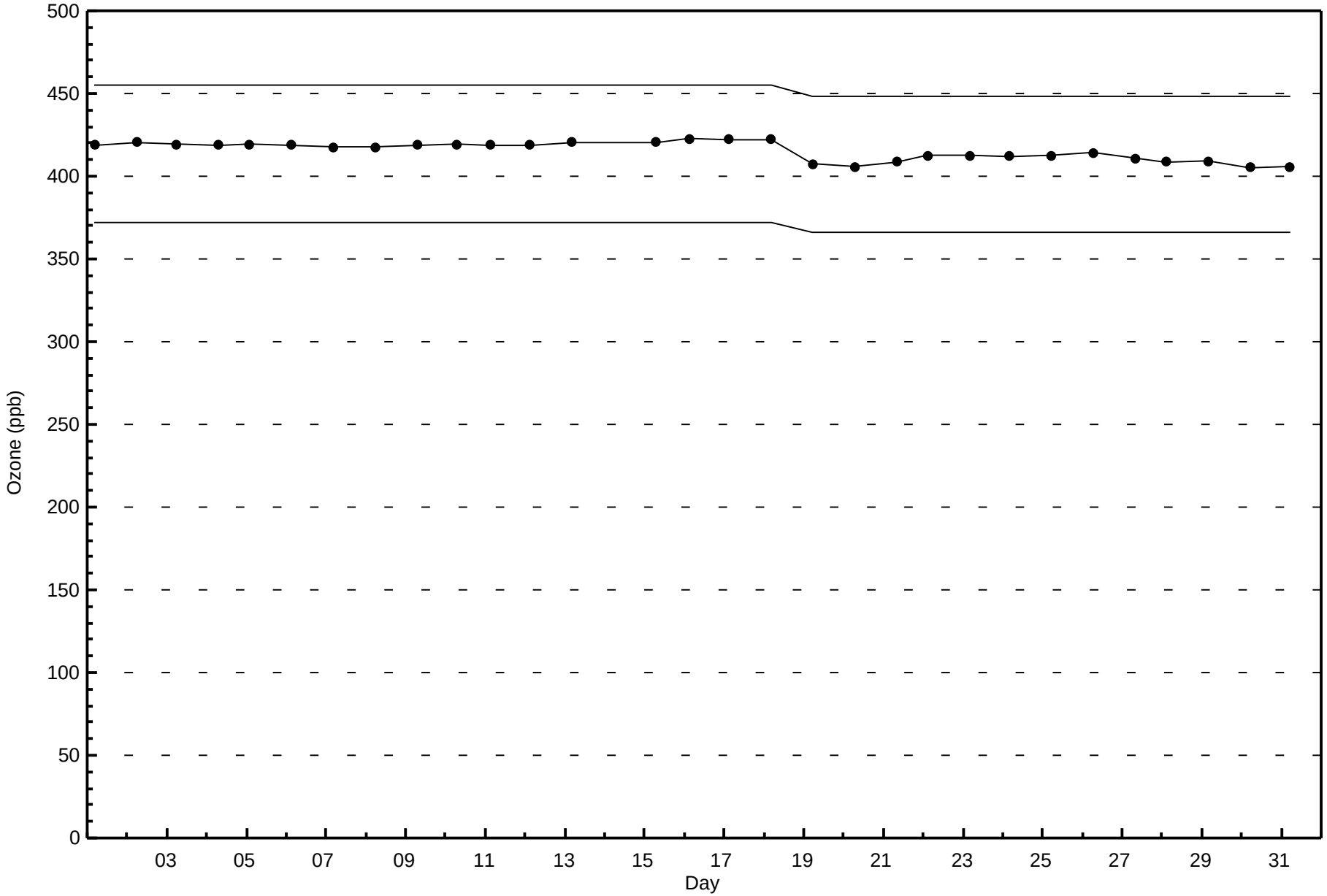


Wood Buffalo Environmental Association

Span Responses

Ozone (O_3) - ppb

Anzac - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

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

Anzac - August 2015

Number of Exceedences (AAAQO): 24-hr: 0

Maximum Value: 63.3 $\mu g/m^3$ on Aug 10 08:00

Maximum Daily Average: 8.5 $\mu g/m^3$ on Aug 26

Minimum Value: 0.5 $\mu g/m^3$ on Aug 31 15:00

Minimum Daily Average: 1.6 $\mu g/m^3$ on Aug 21

Maximum Diurnal Average: 7.6 $\mu g/m^3$ at hour 22

Minimum Diurnal Average: 2.0 $\mu g/m^3$ at hour 15

Monthly Average: 4.86 $\mu g/m^3$

Percentiles: P_1 = 0.7 P_{10} = 1.5 Q_1 = 2.1 Median = 4.0 Q_3 = 6.4 P_{90} = 9.8 P_{99} = 16.7

Hours in Service:	744
Hours of Data:	742
Hours of Missing Data:	2
Hours of Calibration:	2
Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	8.5	10.3	10.4	9.3	8.7	10.2	10.1	7.6	9.9	8.1	5.5	7.4	4.3	2.7	3.3	2.4	3.5	6.0	6.7	7.8	4.6	4.9	6.0	12.9	7.1	12.9
2-Aug	14.0	11.8	12.1	13.1	12.1	11.2	8.2	4.3	1.6	1.5	1.4	1.6	2.4	1.9	1.8	1.8	2.5	4.5	3.8	2.2	2.4	3.6	5.0	5.4	5.4	14.0
3-Aug	7.0	9.4	10.8	11.1	12.9	11.5	8.2	4.4	3.3	4.0	4.1	4.4	4.6	4.3	2.0	2.0	2.0	1.9	2.3	3.9	3.5	3.1	3.6	5.2	5.4	12.9
4-Aug	6.0	5.1	5.4	6.6	9.3	10.6	12.3	13.5	11.6	10.3	8.0	5.8	6.1	4.0	2.4	2.2	4.1	4.2	4.4	6.6	7.9	9.5	8.3	7.8	7.2	13.5
5-Aug	8.2	7.2	6.1	7.2	4.1	5.2	6.3	6.2	5.8	6.4	4.7	2.0	1.3	1.3	1.5	2.7	4.5	3.7	3.7	4.0	4.7	3.9	4.1	4.6	4.6	8.2
6-Aug	5.6	4.8	4.3	4.0	3.8	3.4	4.0	3.6	3.0	2.9	3.2	3.0	3.0	3.0	3.0	3.0	3.5	4.0	4.3	4.3	4.2	4.3	4.0	4.0	3.8	5.6
7-Aug	3.5	2.9	2.2	1.8	2.0	3.2	4.4	3.4	2.6	2.3	2.1	2.0	1.4	1.3	1.5	1.9	2.9	4.8	4.9	5.3	4.7	3.8	3.7	4.2	3.0	5.3
8-Aug	4.5	4.2	4.4	4.8	5.7	6.7	5.9	4.1	2.5	2.5	2.8	2.7	2.0	2.3	2.4	2.5	2.7	1.9	1.9	2.0	2.1	2.9	4.7	4.2	3.4	6.7
9-Aug	5.5	7.5	9.1	10.7	12.4	12.6	9.9	4.4	2.2	2.3	2.4	2.2	2.3	3.6	4.9	5.7	7.1	8.8	9.6	11.6	11.0	10.1	9.8	9.3	7.3	12.6
10-Aug	6.0	5.7	6.2	7.5	8.5	8.4	6.4	63.3	3.0	1.8	1.9	1.8	1.7	1.7	1.9	2.1	2.8	3.8	6.5	7.4	7.7	8.6	8.7	6.7	7.5	63.3
11-Aug	5.1	4.9	5.3	7.1	7.9	7.3	3.6	1.6	1.3	1.5	1.4	1.6	2.5	2.2	2.6	3.1	3.5	5.4	6.8	7.5	10.2	6.6	6.0	5.9	4.6	10.2
12-Aug	6.0	6.5	6.8	7.2	7.4	6.4	5.5	4.7	3.9	2.6	1.6	1.4	1.5	1.4	1.4	1.4	1.4	1.8	2.3	4.2	7.2	5.8	5.0	6.1	4.1	7.4
13-Aug	6.0	6.8	6.7	6.0	6.2	6.1	4.0	1.7	1.8	2.1	1.8	2.1	2.1	1.9	1.9	1.8	1.6	2.2	3.7	4.5	10.3	6.4	5.8	5.3	4.1	10.3
14-Aug	5.2	6.0	6.0	6.0	6.0	5.9	5.7	4.9	3.8	2.8	1.8	1.5	1.4	1.4	1.4	1.5	1.6	1.5	1.5	2.3	3.4	4.0	3.7	3.5	3.5	6.0
15-Aug	3.6	3.8	3.7	3.6	3.6	4.0	4.4	2.8	3.7	2.9	2.2	2.1	2.2	2.2	2.4	2.3	2.6	2.6	3.5	4.9	5.3	5.1	5.4	5.3	3.5	5.4
16-Aug	4.3	3.5	3.5	3.4	3.8	3.9	4.0	4.0	5.3	5.2	2.5	1.4	1.0	0.9	1.0	1.0	1.0	1.0	1.4	2.6	10.0	23.7	5.4	5.6	4.1	23.7
17-Aug	4.5	6.0	4.2	3.5	6.4	6.8	4.2	3.5	2.0	1.6	1.5	1.5	1.6	1.7	1.8	1.7	1.9	2.9	2.2	2.3	2.5	3.8	5.2	5.4	3.3	6.8
18-Aug	6.0	6.3	7.1	7.1	7.3	7.7	6.6	6.2	6.1	5.5	C	C	1.7	1.7	1.5	1.6	1.8	3.1	3.8	5.2	7.2	8.6	8.0	6.9	5.3	8.6
19-Aug	6.5	6.7	7.0	5.5	4.9	4.6	4.5	4.4	5.1	5.8	4.9	3.5	2.2	1.3	1.9	2.1	3.5	3.6	3.8	2.7	2.4	2.6	2.6	2.3	3.9	7.0
20-Aug	2.3	2.5	2.5	2.2	2.1	2.0	2.1	1.8	1.8	1.6	1.5	8.6	1.3	1.4	1.5	1.2	1.5	2.0	1.6	1.5	1.4	1.3	1.3	1.4	2.0	8.6
21-Aug	1.5	1.5	1.5	1.6	1.6	1.8	1.8	1.6	1.5	1.5	0.8	1.1	1.5	1.1	1.4	1.7	1.7	1.9	2.2	2.6	2.0	1.7	2.1	1.9	1.6	2.6
22-Aug	2.0	2.1	1.6	1.5	1.6	1.6	1.7	1.8	2.2	2.3	2.2	2.0	2.5	2.4	2.2	2.3	2.7	3.5	4.7	5.2	6.6	9.6	7.1	8.1	3.3	9.6
23-Aug	8.2	7.7	6.1	5.6	5.4	5.2	4.7	4.3	4.3	5.0	5.4	4.6	4.1	3.4	2.9	2.3	2.2	2.5	3.1	4.3	5.2	6.8	6.7	6.7	4.9	8.2
24-Aug	6.0	5.7	5.0	5.2	4.0	2.3	1.8	1.7	1.7	1.3	4.0	1.8	1.9	2.0	2.0	2.2	2.8	4.2	7.3	10.0	13.6	16.6	17.0	14.2	5.6	17.0
25-Aug	14.3	14.8	12.8	10.7	9.4	8.2	8.3	7.0	6.2	0.9	0.9	0.8	0.9	0.8	0.9	2.3	3.0	4.3	5.3	11.8	13.3	16.9	16.8	13.1	7.7	16.9
26-Aug	7.4	4.6	4.2	4.9	5.2	6.1	6.5	6.9	5.3	5.3	6.0	6.2	6.3	6.9	6.4	6.1	7.5	8.7	10.1	12.0	17.6	26.3	15.5	10.8	8.5	26.3
27-Aug	9.4	11.9	10.5	9.5	9.8	10.4	9.9	6.4	3.1	1.7	1.5	1.5	1.6	1.4	2.7	6.0	9.2	10.4	11.8	5.8	6.7	6.5	6.4	5.6	6.7	11.9
28-Aug	5.1	5.1	5.0	5.0	5.4	6.1	6.2	5.2	4.9	3.8	3.0	2.3	1.3	1.1	1.0	1.0	0.6	0.9	0.8	1.9	4.8	5.9	7.0	8.4	3.8	8.4
29-Aug	7.2	6.6	7.5	7.8	7.5	5.8	6.0	5.3	3.7	2.5	1.5	1.2	1.0	0.9	1.0	1.2	1.4	1.8	3.5	6.8	9.8	8.6	7.8	8.0	4.8	9.8
30-Aug	8.8	10.9	10.7	12.3	15.1	15.4	15.2	9.9	3.8	2.2	1.3	0.8	0.6	0.6	0.5	0.9	1.7	1.6	2.3	2.5	3.0	3.2	3.0	2.8	5.4	15.4
31-Aug	12.6	15.0	12.4	11.2	9.3	7.9	6.6	5.2	2.1	1.1	0.9	0.9	0.7	0.7	0.5	0.6	0.5	0.7	2.1	3.7	4.5	10.1	8.2	6.8	5.2	15.0
	6.5	6.7	6.5	6.5	6.8	6.7	6.1	6.6	3.8	3.3	2.8	2.7	2.2	2.1	2.0	2.3	2.9	3.6	4.3	5.1	6.4	7.6	6.6	6.4	Diurnal Average	
	14.3	15.0	12.8	13.1	15.1	15.4	15.2	63.3	11.6	10.3	8.0	8.6	6.3	6.9	6.4	6.1	9.2	10.4	11.8	12.0	17.6	26.3	17.0	14.2	Diurnal Maximum	

C - Calibration

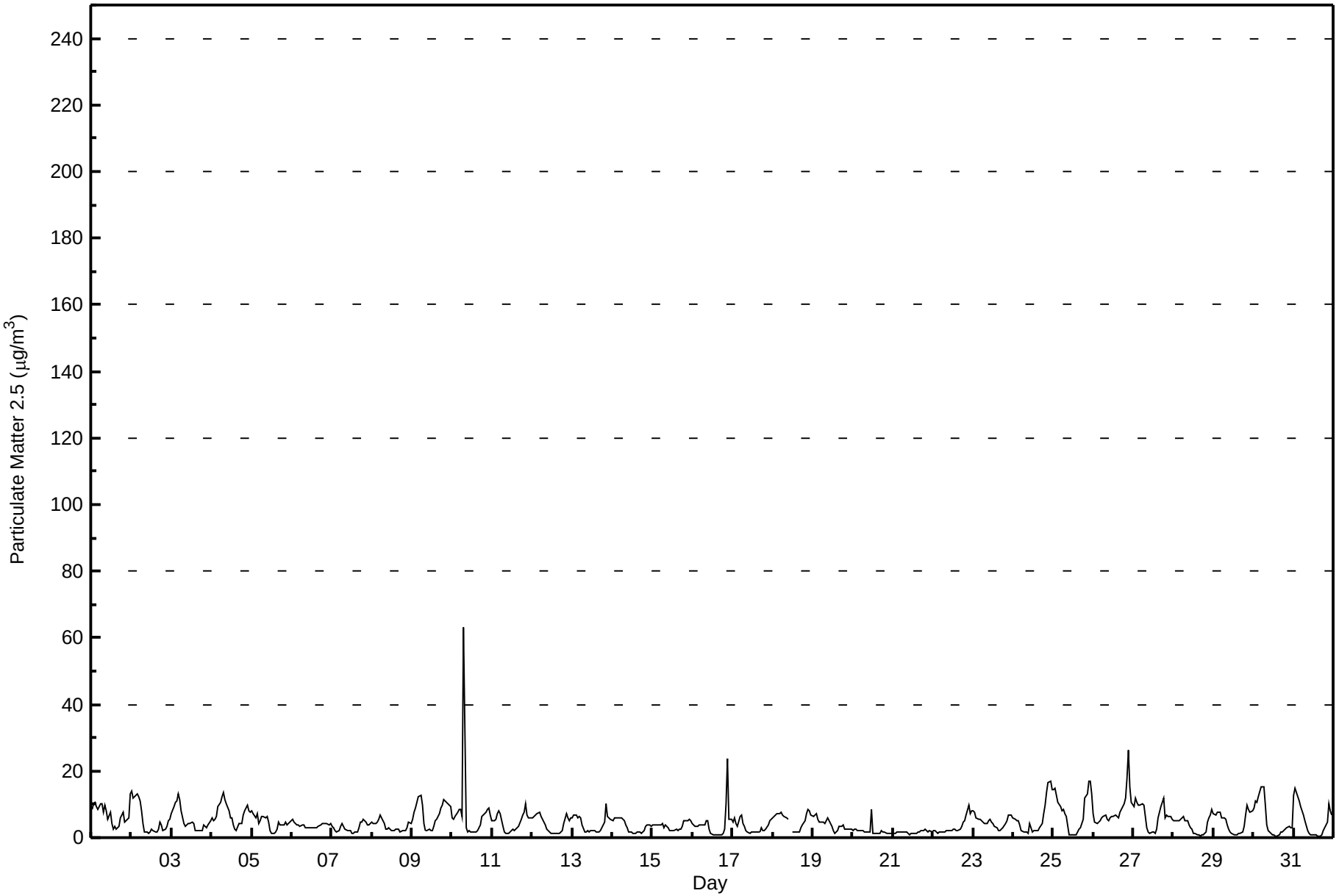
Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 $\mu g/m^3$

Wood Buffalo Environmental Association

Hourly Averages

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

Anzac - August 2015



Concentration Ranges ($\mu g/m^3$)	Number of Hours	%	Cumulative %
1 - 5	464	62.53	62.53
6 - 15	240	32.35	94.88
16 - 25	6	0.81	95.69
26 - 80	2	0.27	95.96
> 81.0	0	0.00	95.96

Total Number of Valid Hours: 742

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

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

Anzac - August 2015

Concentration Ranges ($\mu g/m^3$)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
1 - 5	7	4	3	3	12	44	30	54	25	13	21	22	40	92	68	23	461
6 - 15	5	3	2	11	3	19	18	17	36	17	21	34	20	18	11	5	240
16 - 25	1	0	0	0	0	1	0	0	0	1	1	1	0	1	0	0	6
26 - 80	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	2
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	13	7	5	14	15	64	48	71	61	32	43	57	60	112	79	28	709

Total Number of Valid Hours: 739

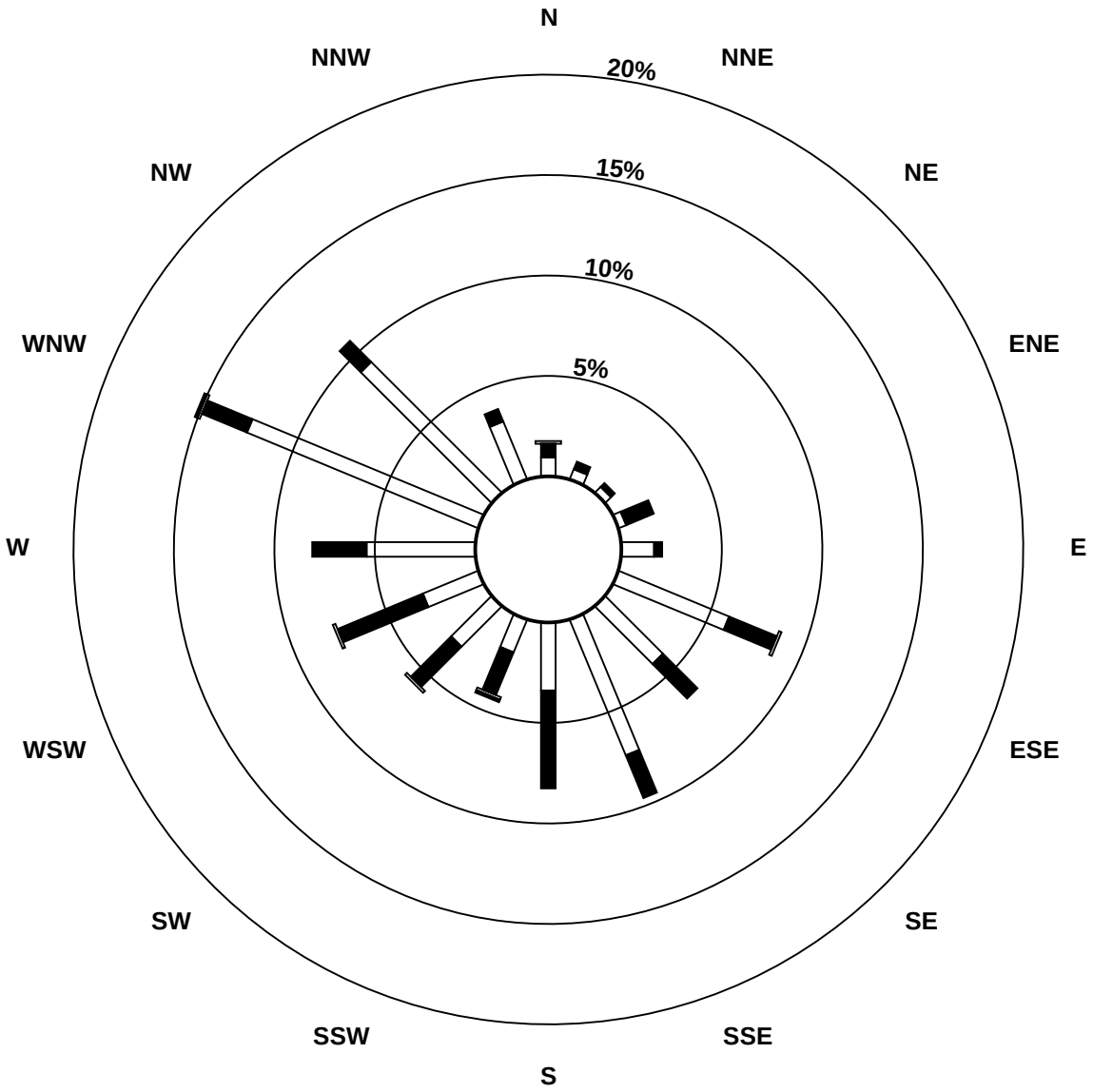
Total Number of Hours: 744

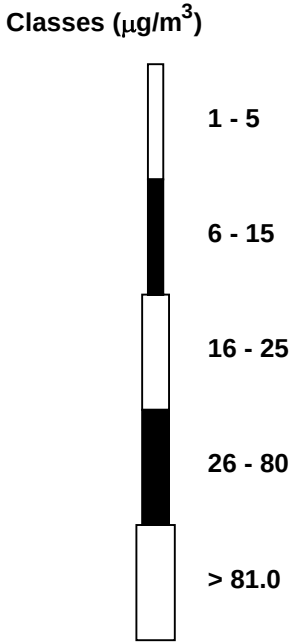
Wood Buffalo Environmental Association

Wind Rose Aug 2015

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

Anzac (AMS 14)





Total Number of Valid Hours: 739

Maximum Value: 28.3 C on Aug 10 17:00

Maximum Daily Average: 22.4 C on Aug 11

Minimum Value: 0.9 C on Aug 23 06:00

Minimum Daily Average: 9.2 C on Aug 22

Maximum Diurnal Average: 21.4 C at hour 15

Minimum Diurnal Average: 11.6 C at hour 5

Monthly Average: 16.33 C

Percentiles: P_1 = 4.1 P_{10} = 10.2 Q_1 = 12.9 Median = 16.0 Q_3 = 20.1 P_{90} = 23.0 P_{99} = 27.6

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

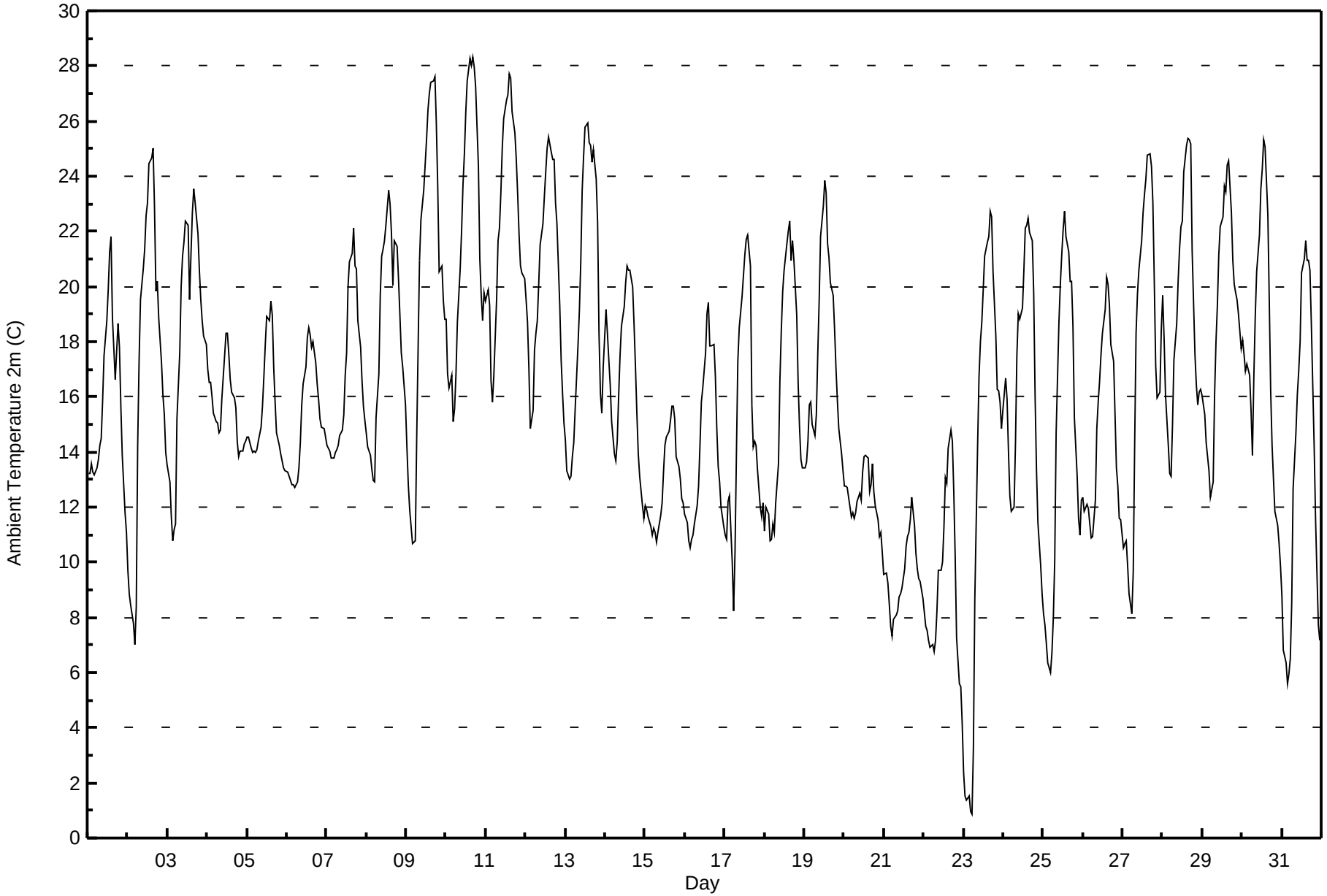
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	13.2	13.2	13.6	13.3	13.1	13.4	13.7	14.2	14.5	15.9	17.5	18.7	19.9	21.2	21.8	18.9	16.6	17.6	18.6	17.8	15.7	13.9	11.8	11.1	15.8	21.8
2-Aug	9.7	8.9	8.4	7.8	7.0	8.4	14.2	17.3	19.5	20.6	21.3	22.6	23.0	24.5	24.7	25.0	22.9	19.8	20.2	18.9	17.2	16.0	15.3	14.0	17.0	25.0
3-Aug	13.5	12.9	11.6	10.8	11.2	11.4	15.2	17.6	20.0	21.1	21.6	22.4	22.2	19.5	21.1	22.7	23.5	23.1	21.9	20.6	19.5	18.8	18.2	17.9	18.3	23.5
4-Aug	17.0	16.5	16.5	16.0	15.4	15.1	15.1	14.7	14.8	15.9	17.5	18.3	18.3	17.5	16.6	16.2	15.9	15.6	14.4	13.8	14.0	14.0	14.3	14.4	15.8	18.3
5-Aug	14.6	14.5	14.2	14.0	14.1	14.0	14.1	14.4	14.9	15.7	16.7	17.9	18.9	18.8	19.5	19.0	17.1	15.8	14.7	14.2	13.9	13.7	13.4	13.3	15.5	19.5
6-Aug	13.3	13.1	13.0	12.8	12.8	12.7	12.9	13.4	14.4	15.7	16.5	17.1	18.2	18.5	18.3	17.8	18.0	17.2	16.5	15.9	15.2	14.9	14.9	14.6	15.3	18.5
7-Aug	14.2	14.1	14.0	13.8	13.8	14.0	14.1	14.3	14.6	14.8	15.3	16.8	17.6	20.0	20.9	21.2	22.1	20.7	20.6	18.7	17.8	16.6	15.6	15.2	16.7	22.1
8-Aug	14.7	14.2	13.9	13.4	13.0	12.9	15.3	16.8	19.7	21.1	21.4	21.7	22.2	23.5	23.0	21.9	20.0	21.6	21.4	20.3	19.0	17.6	17.1	15.7	18.4	23.5
9-Aug	14.2	12.8	11.9	11.3	10.7	10.8	14.5	17.8	20.9	22.4	23.5	24.4	25.3	26.4	27.0	27.4	27.5	27.6	25.9	23.6	20.6	20.7	19.5	18.8	20.2	27.6
10-Aug	18.8	16.8	16.3	16.8	15.1	15.5	16.8	18.7	20.6	22.0	23.7	24.8	26.4	27.5	28.3	28.0	28.3	27.9	27.3	24.4	21.0	19.7	18.8	19.8	21.8	28.3
11-Aug	19.5	19.9	19.3	16.6	15.8	16.8	19.6	21.6	22.1	23.4	25.0	26.1	26.8	27.0	27.7	27.6	26.4	25.6	24.6	23.3	21.9	20.7	20.5	20.3	22.4	27.7
12-Aug	19.5	18.7	17.0	14.8	15.5	17.7	18.3	18.8	20.1	21.5	22.3	23.2	24.1	25.0	25.4	24.9	24.6	24.6	23.1	22.3	19.3	17.3	16.1	15.0	20.4	25.4
13-Aug	14.4	13.3	13.0	13.1	13.8	14.3	15.5	17.8	19.1	20.9	23.5	24.7	25.8	25.9	25.2	25.1	24.5	25.0	23.9	22.3	18.3	16.1	15.4	17.1	19.5	25.9
14-Aug	19.2	18.3	17.3	16.4	15.1	13.9	13.7	14.4	16.0	17.5	18.6	19.3	20.1	20.8	20.6	20.6	20.0	18.6	17.1	15.4	13.9	13.1	12.0	11.6	16.8	20.8
15-Aug	12.1	11.9	11.6	11.3	11.0	11.3	11.1	10.7	11.1	11.7	12.1	13.3	14.3	14.5	14.7	15.1	15.6	15.7	15.2	13.8	13.5	13.0	12.3	12.1	12.9	15.7
16-Aug	11.8	11.4	10.8	10.5	10.8	11.0	11.4	12.0	12.8	14.2	15.8	16.3	17.6	19.0	19.4	17.8	17.9	17.9	16.7	14.9	13.5	12.9	12.0	11.3	14.2	19.4
17-Aug	11.0	10.8	12.2	12.4	10.0	8.2	10.4	13.9	17.3	18.5	19.6	20.4	21.1	21.7	21.9	20.7	15.7	14.2	14.4	14.2	13.4	12.0	11.6	12.2	14.9	21.9
18-Aug	11.1	12.0	11.7	10.8	10.8	11.4	11.1	12.2	13.6	16.6	18.4	19.8	20.6	21.5	22.0	22.4	20.9	21.7	21.0	18.9	16.5	14.9	13.7	13.4	16.1	22.4
19-Aug	13.4	13.6	14.4	15.7	15.8	15.0	14.6	15.4	17.5	19.5	21.8	22.9	23.9	23.4	21.6	21.1	20.1	19.7	18.5	17.0	15.9	14.9	13.9	13.3	17.6	23.9
20-Aug	12.8	12.8	12.7	12.3	11.6	11.8	11.6	11.8	12.2	12.5	12.3	13.3	13.8	13.9	13.8	12.6	12.8	13.6	12.6	12.1	11.5	10.9	11.1	10.4	12.4	13.9
21-Aug	9.5	9.6	9.3	8.5	7.7	7.3	7.9	8.1	8.2	8.7	8.8	9.0	9.8	10.6	10.9	11.1	11.5	12.3	11.4	10.3	9.8	9.4	9.3	8.7	9.5	12.3
22-Aug	8.2	7.7	7.5	7.2	6.9	7.0	6.8	7.2	8.2	9.7	9.7	10.0	11.3	13.1	12.9	14.1	14.8	14.4	12.5	10.2	7.3	5.6	5.5	4.2	9.2	14.8
23-Aug	2.4	1.5	1.4	1.5	0.9	0.9	3.2	8.7	14.2	16.7	18.0	18.7	19.9	21.1	21.6	21.8	22.7	22.5	20.5	18.2	16.3	16.2	15.8	14.8	13.3	22.7
24-Aug	15.5	16.7	15.9	14.0	12.4	11.9	12.0	14.3	17.5	19.0	18.8	19.2	20.6	22.1	22.2	22.5	21.9	21.6	19.8	16.0	13.3	11.5	9.8	8.9	16.6	22.5
25-Aug	8.1	7.7	7.1	6.4	6.0	6.7	8.0	10.0	14.7	18.7	20.1	21.2	22.1	22.7	21.8	21.3	20.2	20.2	18.6	15.3	13.1	11.6	11.0	12.3	14.4	22.7
26-Aug	12.4	11.8	12.1	12.0	11.4	10.9	10.9	12.2	14.9	15.8	16.6	17.5	18.3	19.2	20.4	20.1	19.3	17.9	17.3	15.3	13.4	12.8	11.6	11.6	14.8	20.4
27-Aug	10.5	10.7	10.8	9.9	8.9	8.2	9.7	14.2	18.3	19.8	20.6	21.6	22.7	23.3	23.9	24.8	24.8	24.4	23.0	20.2	17.1	16.0	16.2	18.5	17.4	24.8
28-Aug	19.7	18.1	16.1	14.2	13.2	13.1	15.0	17.4	18.7	20.2	21.4	22.2	22.4	24.1	25.1	25.4	25.3	25.2	21.3	17.5	16.4	15.7	16.1	16.3	19.2	25.4
29-Aug	16.1	15.4	14.3	13.8	13.3	12.4	12.9	16.1	18.0	19.3	21.1	22.2	22.5	23.6	23.5	24.4	24.6	22.7	21.0	20.1	19.8	19.5	19.0	17.8	18.9	24.6
30-Aug	18.1	17.6	16.9	17.2	16.8	15.5	13.9	16.7	18.9	20.5	21.9	23.5	24.2	25.3	25.1	22.6	19.5	16.2	14.2	13.0	11.9	11.3	10.7	9.9	17.6	25.3
31-Aug	8.8	6.8	6.4	5.6	6.0	6.5	8.5	12.7	14.7	16.1	16.9	18.0	20.5	21.0	21.7	20.9	21.0	20.6	18.7	14.2	11.6	9.6	7.7	7.1	13.4	21.7
	13.5	13.0	12.6	12.1	11.6	11.6	12.6	14.4	16.2	17.6	18.7	19.6	20.5	21.2	21.4	21.1	20.5	20.0	18.9	17.2	15.5	14.5	13.9	13.6	Diurnal Average	
	19.7	19.9	19.3	17.2	16.8	17.7	19.6	21.6	22.1	23.4	25.0	26.1	26.8	27.5	28.3	28.0	28.3	27.9	27.3	24.4	21.9	20.7	20.5	20.3	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature 2m (AT 2m) - C

Anzac - August 2015



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	71	9.54	9.54
10 - 20	480	64.52	74.06
> 20	193	25.94	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

Maximum Value: 63 % on Aug 9 07:00

Maximum Daily Average: 16.8 % on Aug 9

Minimum Value: 0 % on Aug 1 01:00

Minimum Daily Average: 0.0 % on Aug 10

Maximum Diurnal Average: 13.1 % at hour 5

Minimum Diurnal Average: 0.4 % at hour 13

Monthly Average: 4.5 %

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 17$ $P_{99} = 60$

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

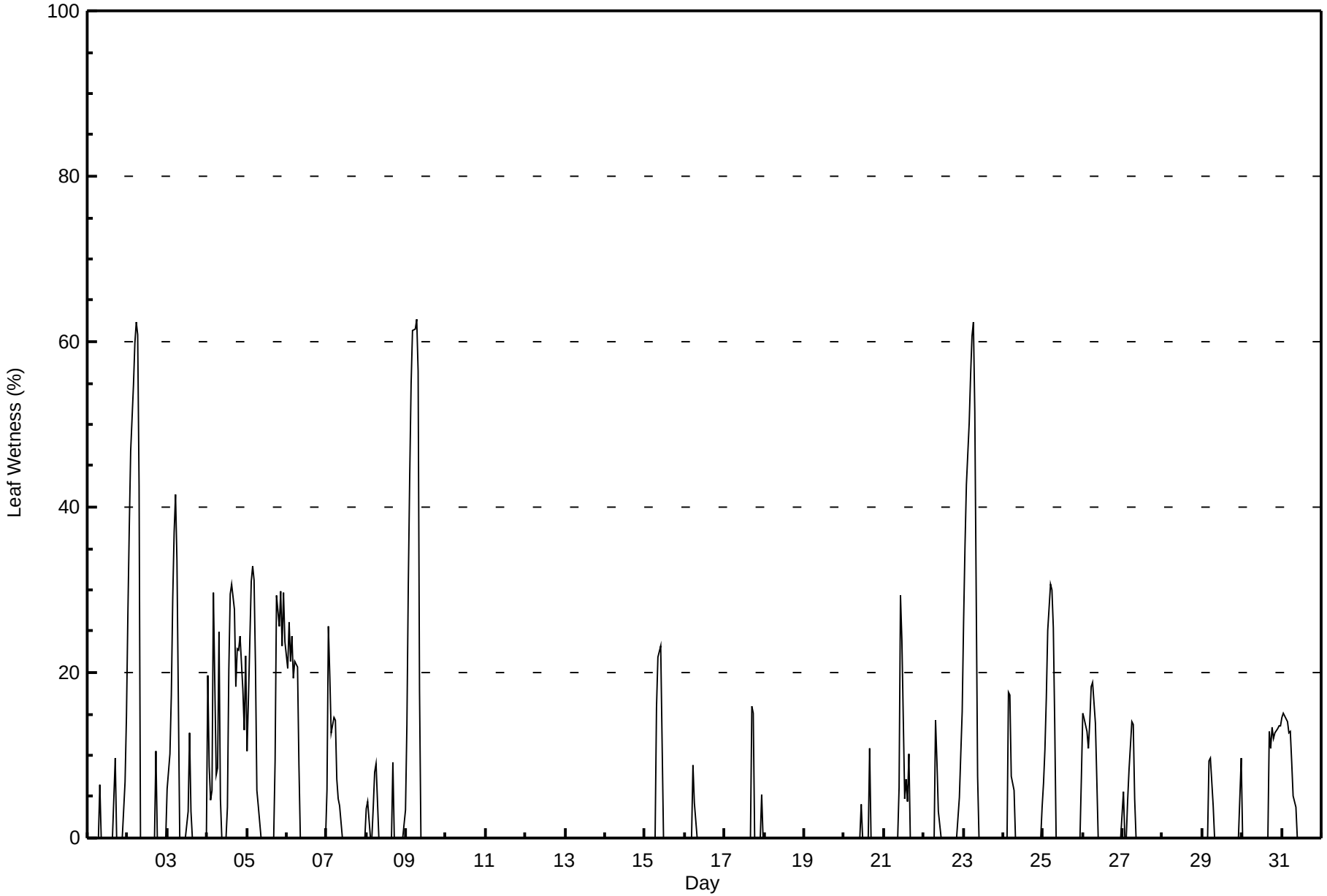
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	10	0	0	0	0	0	7	15	1.6	15
2-Aug	27	37	47	55	60	62	61	43	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	16.8	62
3-Aug	6	10	17	29	37	42	34	0	0	0	0	0	3	13	3	0	0	0	0	0	0	0	0	0	8.1	42
4-Aug	20	9	5	6	30	8	8	25	5	0	0	0	4	20	29	31	28	18	23	23	24	18	13	22	15.3	31
5-Aug	10	17	31	33	31	21	6	4	0	0	0	0	0	0	0	0	0	9	29	26	30	23	30	24	13.5	33
6-Aug	21	26	21	24	19	21	21	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.8	26
7-Aug	6	26	20	13	15	14	7	5	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.5	26
8-Aug	4	4	0	0	4	8	9	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	3	1.7	9
9-Aug	14	31	44	55	61	62	63	57	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16.8	63
10-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
11-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
12-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
13-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
14-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
15-Aug	0	0	0	0	0	0	0	16	22	23	12	0	0	0	0	0	0	0	0	0	0	0	0	0	3.0	23
16-Aug	0	0	0	0	0	9	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	9
17-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	15	0	0	0	0	5	0	1.5	16
18-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
19-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
20-Aug	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	11	0	0	0	0	0	0	0	0	0.6	11
21-Aug	0	0	0	0	0	0	0	0	0	6	29	24	5	7	4	10	0	0	0	0	0	0	0	0	3.6	29
22-Aug	0	0	0	0	0	0	0	14	9	3	0	0	0	0	0	0	0	0	0	0	0	5	10	15	2.4	15
23-Aug	26	35	43	50	56	61	62	52	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16.3	62
24-Aug	0	0	0	18	17	7	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2.2	18
25-Aug	7	11	17	25	31	30	25	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	6.9	31
26-Aug	15	14	13	11	14	18	19	14	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.2	19
27-Aug	6	0	0	5	8	14	14	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.1	14
28-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
29-Aug	0	0	0	0	9	10	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	1.4	10
30-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	11	13	12	13	13	14	13	4.3	14
31-Aug	15	15	14	14	13	13	9	5	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.2	15
	5.6	7.6	8.8	10.9	13.1	12.9	11.3	8.6	2.4	1.1	1.4	0.8	0.4	1.3	1.2	1.7	2.4	2.1	2.1	1.9	2.2	1.9	2.5	3.7	Diurnal Average	
	27	37	47	55	61	62	63	57	22	23	29	24	5	20	29	31	28	18	29	26	30	23	30	24	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Leaf Wetness (SW) - %

Anzac - August 2015



Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 0.3	569	76.48	76.48
0.4 - 0.5	0	0.00	76.48
0.6 - 0.7	0	0.00	76.48
0.8 - 1.4	0	0.00	76.48
1.5 - 10	57	7.66	84.14
> 10	118	15.86	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Anzac - August 2015

Maximum Value: 99 % on Aug 7 06:00

Maximum Daily Average: 91.6 % on Aug 4

Minimum Value: 29 % on Aug 28 16:00

Minimum Daily Average: 48.5 % on Aug 28

Maximum Diurnal Average: 85.8 % at hour 6

Minimum Diurnal Average: 48.3 % at hour 15

Monthly Average: 68.5 %

Percentiles: $P_1 = 32$ $P_{10} = 40$ $Q_1 = 53$ Median = 71 $Q_3 = 86$ $P_{90} = 93$ $P_{99} = 98$

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

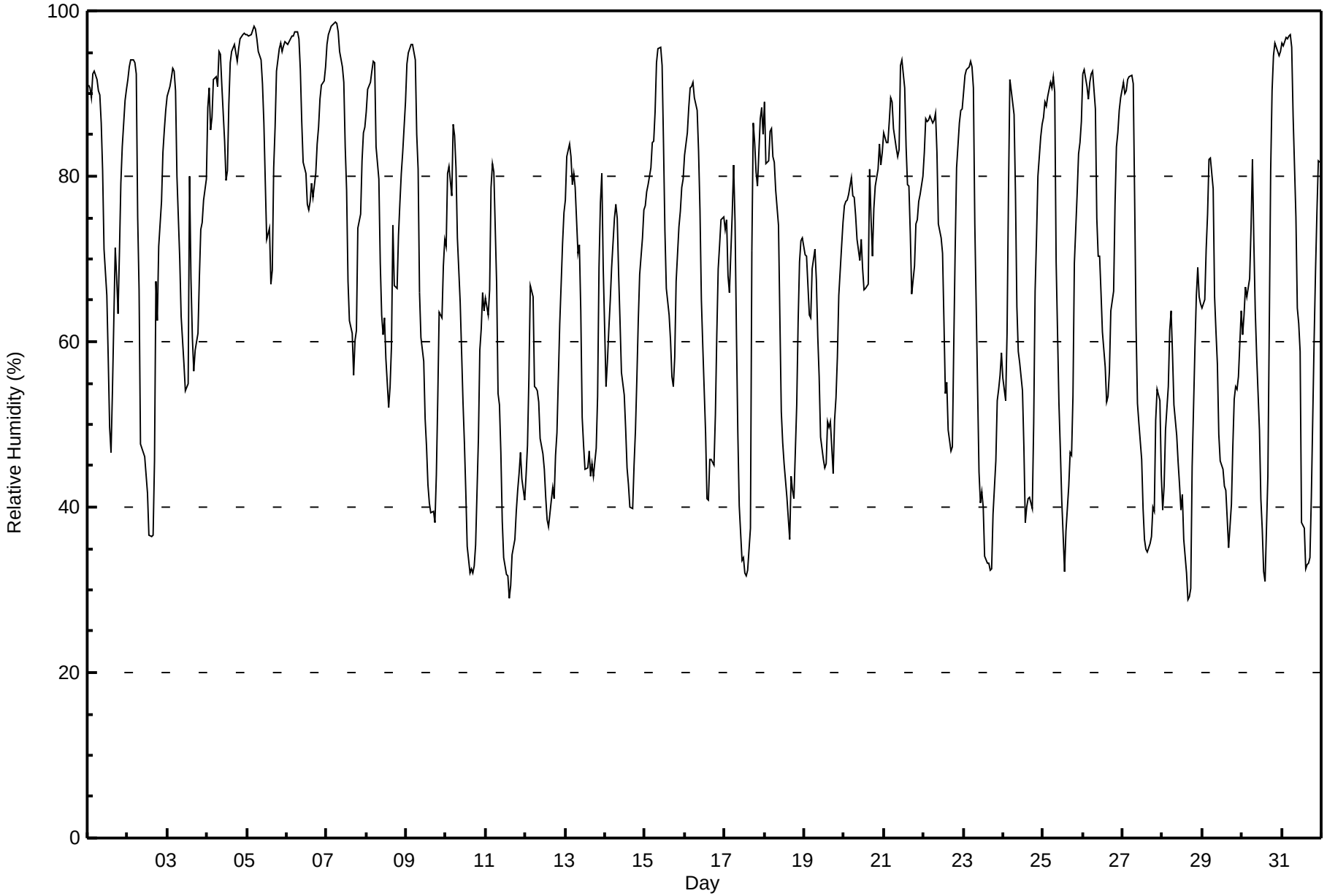
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	91	91	90	92	93	92	90	90	87	81	71	66	58	50	47	54	71	68	63	71	79	84	89	90	77.3	93
2-Aug	92	93	94	94	94	92	75	66	48	47	46	44	42	37	36	37	46	67	63	71	77	83	86	88	67.4	94
3-Aug	90	91	92	93	93	90	80	70	63	60	57	54	55	80	68	60	56	59	61	68	73	74	77	80	72.7	93
4-Aug	88	91	86	87	92	92	91	95	95	91	84	80	81	89	94	95	96	95	94	95	97	97	97	97	91.6	97
5-Aug	97	97	97	98	98	98	97	95	94	91	86	79	72	74	67	69	81	86	93	95	96	95	96	96	89.5	98
6-Aug	96	96	97	97	97	97	97	97	93	87	82	80	77	76	77	79	77	80	84	86	89	91	92	93	88.2	97
7-Aug	96	97	98	98	98	99	99	97	95	93	91	84	78	67	63	61	56	60	61	74	75	82	85	86	83.1	99
8-Aug	88	90	91	93	94	94	84	80	70	63	61	63	58	52	55	60	74	67	66	73	77	80	83	89	75.1	94
9-Aug	93	95	95	96	96	94	85	81	66	61	58	51	47	43	41	39	39	38	44	53	64	63	69	72	65.9	96
10-Aug	72	80	81	78	86	85	81	73	65	59	53	48	42	35	32	33	32	33	35	48	59	62	66	64	58.3	86
11-Aug	65	63	66	79	82	80	67	54	52	47	38	34	32	32	29	31	34	36	40	42	44	47	43	41	49.0	82
12-Aug	44	48	56	67	65	55	54	54	53	48	46	45	41	38	38	41	42	41	46	49	62	67	72	76	52.0	76
13-Aug	77	82	84	82	79	80	79	71	72	64	51	48	45	45	47	44	45	44	47	53	69	77	80	69	63.9	84
14-Aug	55	58	62	65	69	75	77	75	68	62	56	54	49	45	43	40	40	45	49	56	63	68	73	76	59.2	77
15-Aug	76	78	79	81	84	84	88	94	95	96	93	84	73	66	63	60	56	55	58	67	74	76	79	80	76.7	96
16-Aug	82	85	88	91	91	91	89	88	83	76	65	60	49	41	41	46	46	45	51	61	69	72	75	75	69.2	91
17-Aug	74	75	68	66	75	81	75	61	49	40	34	34	32	32	32	37	71	86	84	81	79	87	88	85	63.6	88
18-Aug	89	82	82	85	86	82	82	78	74	63	52	48	45	41	39	36	44	42	41	52	62	70	72	73	63.3	89
19-Aug	71	70	67	63	63	69	71	67	61	56	48	46	45	45	50	50	50	44	50	53	58	66	71	74	58.7	74
20-Aug	76	77	77	78	80	78	77	75	72	70	72	69	66	66	67	81	75	70	76	79	81	84	81	83	75.5	84
21-Aug	85	84	84	87	89	89	86	83	82	83	93	94	91	83	79	79	73	66	69	74	75	77	78	80	81.9	94
22-Aug	83	87	87	87	87	86	87	88	83	74	72	71	62	54	55	49	47	47	60	71	81	87	88	88	74.2	88
23-Aug	90	92	93	93	94	93	91	74	54	44	40	42	40	34	33	33	32	33	39	46	53	54	56	59	58.9	94
24-Aug	56	53	61	78	92	90	87	78	64	59	57	54	47	38	40	41	41	40	50	66	73	80	85	86	63.2	92
25-Aug	87	89	88	90	91	91	92	90	70	53	47	41	37	32	37	42	47	46	53	69	78	83	84	87	67.7	92
26-Aug	92	93	91	89	91	92	93	88	75	70	70	66	61	57	53	53	56	64	66	77	83	85	88	90	76.9	93
27-Aug	91	90	90	92	92	92	91	77	62	53	50	46	40	36	35	35	36	36	40	39	50	54	53	44	59.4	92
28-Aug	40	43	49	55	61	64	58	52	49	45	43	40	42	36	32	29	29	30	45	59	66	69	65	65	48.5	69
29-Aug	64	65	71	75	82	82	78	65	61	57	49	46	45	42	42	39	35	40	47	53	54	54	56	64	57.0	82
30-Aug	61	63	67	65	68	74	82	72	64	58	49	41	37	32	31	44	62	81	90	95	96	95	95	95	67.4	96
31-Aug	96	96	97	97	97	97	96	87	75	64	62	59	38	38	33	33	33	34	41	60	69	76	82	82	68.3	97
	79.3	80.4	81.5	83.5	85.8	85.8	83.2	77.9	70.7	65.0	60.6	56.9	52.5	49.6	48.3	49.3	52.4	54.1	58.4	65.7	71.8	75.4	77.5	78.2	Diurnal Average	
	97	97	98	98	98	99	99	97	95	96	93	94	91	89	94	95	96	95	94	95	97	97	97	97	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity (RH) - %

Anzac - August 2015



Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	68	9.14	9.14
40 - 60	185	24.87	34.01
60 - 80	229	30.78	64.79
80 - 100	262	35.22	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

Anzac - August 2015

Maximum Speed: 19 km/h on Aug 11 15:00

Maximum Daily Speed Average: 11.9 km/h on Aug 20

Minimum Speed Value: 0 km/h on Aug 9 06:00

Minimum Daily Speed Average: 1.9 km/h on Aug 2

Maximum Diurnal Speed Average: 4.5 km/h at hour 14

Minimum Diurnal Speed Average: 1.4 km/h at hour 20

Monthly Average Velocity: 2.2 km/h 248.8 deg

Percentiles: $P_1 = 1$ $P_{10} = 3$ $Q_1 = 5$ Median = 7 $Q_3 = 9$ $P_{90} = 12$ $P_{99} = 16$

Hours in Service: 744

Hours of Data: 741

Hours of Missing Data: 3

Percent Operational Time: 99.9

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	W1	WSW4	NW3	N1	SW1	SW3	W2	NW3	NW5	NW5	WNW6	WNW7	NW8	WNW9	NNW7	NE11	N4	W3	W3	W3	NNW3	WSW4	WSW4	WSW5	WNW3.1	NE11
2-Aug	WSW4	ENE4	SSE2	SSW3	SW3	SSW3	SSW2	SSE3	SSE7	SE4	NNE1	NE1	WNW4	WNW4	SW3	S6	SSW8	WSW3	WSW5	ENE2	S3	SW1	SSW1	NE1	SSW1.9	SSW8
3-Aug	S3	S5	ESE3	SE3	S5	S5	SSE6	SSE8	SSE6	SSE8	SSE7	SSE8	SSW7	NW3	NNE5	ESE9	ESE10	SE9	SE8	SSE6	SE4	SE6	ESE6	SSE6	SE5.0	ESE10
4-Aug	SE5	SSE6	SE8	SE5	E6	ESE7	SE8	ENE4	ENE7	E7	ESE10	ESE11	ESE10	ESE10	ESE11	ESE13	ESE12	SE13	SSE14	SSE11	SE9	SE8	SE8	ESE7	ESE8.2	SSE14
5-Aug	ESE8	ESE8	E7	ENE7	ENE5	ESE8	ESE8	ESE9	ESE8	ESE9	ESE10	ESE12	ESE12	ESE10	ESE12	SE11	SSE10	ESE12	ESE10	ESE10	E11	ESE13	ESE12	ESE12	ESE9.6	ESE13
6-Aug	ESE15	ESE13	ESE10	ESE11	ESE9	ESE9	SE9	SE10	SSE10	SE8	SSE7	ESE7	ESE9	ESE10	E10	E11	E11	ESE10	E9	ESE8	ESE7	ESE6	ESE6	ESE5	ESE8.7	ESE15
7-Aug	ESE4	E3	ENE4	E4	E4	SE4	SSE5	SE5	SE5	SSE6	SSE5	ESE6	ESE6	SE8	ESE8	E8	SE7	SE6	SE6	SE4	SSE4	SSE6	SSE8	SSE8	SE5.1	SE8
8-Aug	SSE8	SSE7	SSE7	SSE7	SSE5	SSE4	SE5	SE4	SE5	ESE7	SSE8	S10	S9	S8	S3	NW2	S4	SE5	SSE4	ESE5	ESE7	SE7	SSE7	SSE5	SSE5.4	S10
9-Aug	SSE4	S3	SSE2	S2	S2	ENE0	NNE1	ESE2	E4	SE6	SE7	SE6	SE6	E6	ESE5	SSE4	S7	SSE6	SE6	ESE6	SE7	SE7	SSE8	S7	SE4.2	SSE8
10-Aug	W6	WNW2	S5	SSE7	S1	NW5	W9	WNW9	WNW8	WNW7	WNW6	WNW6	WNW7	W10	W9	W6	WNW5	W6	SW9	SSW6	SSW6	S6	SSW7	SW8	WSW4.9	W10
11-Aug	SW9	SW11	WSW7	SW5	WSW6	W5	W8	WSW6	WSW7	W10	W11	W14	W18	W16	W19	W17	W12	W13	W9	WSW9	WSW8	WSW9	WSW9	WSW11	WSW10.1	WSW19
12-Aug	W9	W7	WSW6	SW4	WSW6	WSW9	W9	W9	W10	W12	WNW13	WNW11	WNW10	WNW12	WNW13	WNW10	WNW9	W11	WNW8	W6	W4	WSW5	WSW5	WSW5	W8.1	WNW13
13-Aug	SW5	WSW4	SW4	SW6	SW5	WSW6	SW5	SW5	SW3	SW3	W4	WNW5	NW6	WNW7	NW9	NW11	NNW8	WNW5	SW7	SW7	SW2	SSW4	SSW4	WSW7	WSW4.2	NW11
14-Aug	WSW7	W11	W10	WNW12	W13	W13	WNW16	WNW16	WNW14	WNW12	WNW15	WNW14	WNW13	WNW12	NW11	NW12	NW12	NW11	NW11	NW9	NW8	NW8	NW8	NW8	WNW11.0	WNW16
15-Aug	NW8	NW8	NW8	NW9	NW7	NW6	NW6	NW6	NW6	NNW9	NNW9	NNW10	NNW11	N10	N10	N10	N10	NNW9	NNW8	NW5	NW6	NW6	NNW6	NNW6	NNW7.6	NNW11
16-Aug	NW4	NW5	NW5	NW4	NW4	NW4	NW4	NW5	WNW6	WNW7	WNW8	WNW7	WNW8	WNW10	NW8	NNW5	NW5	NNW5	NW4	NW1	SW3	SW5	SW4	SW5	WNW4.6	WNW10
17-Aug	SW6	WSW5	W7	W7	WSW6	SW5	SW5	SW6	WSW5	WSW7	SW7	C	C	WNW4	S6	SSE7	WNW5	SSE4	S7	SSE8	SSE9	SSW4	W5	NNW3	SW4.1	SSE9
18-Aug	NW5	WNW7	WNW7	NW5	WNW7	NW8	WNW11	NW9	WNW7	NW6	NE4	NNW1	W7	WSW8	WNW6	W6	WNW2	S4	SSE8	SSE6	S6	S6	S6	S6	W3.5	WNW11
19-Aug	SSW7	S6	SSE8	SSW10	SSE12	SSE12	SSE13	S14	S14	SSW11	WSW15	WSW15	W14	W14	W14	SW14	WNW12	W14	W14	WNW12	WNW14	WNW14	WNW11	WNW11	WSW8.2	WSW15
20-Aug	W8	W9	W13	WNW15	WNW14	WNW15	WNW17	WNW15	WNW16	WNW15	WNW14	WNW14	WNW13	WNW14	WNW12	NW10	NW9	NW7	NW8	WNW8	WNW10	WNW9	WNW11	WNW12	WNW11.9	WNW17
21-Aug	WNW11	WNW11	WNW11	WNW12	WNW11	WNW11	WNW10	WNW13	WNW10	WNW9	NW8	NW8	NW7	NNW9	NNW8	NNW7	NNW9	NW9	NNW7	NW6	NW8	NW7	NW10	NW9	NW9.0	WNW13
22-Aug	NW8	NW9	WNW11	NW11	NW11	WNW12	WNW12	WNW11	NW10	NW9	NW9	NW8	NW10	WNW12	NW9	NW9	NW8	NNW7	NNW3	ESE2	SSE4	S5	S5	S4	NW6.7	WNW12
23-Aug	S4	SSW4	WSW3	SSW3	SSW4	S5	S4	S5	S6	SSE10	SSE11	SSE10	SSE11	SSW9	SW7	S9	S8	S11	SSE9	SSE7	SSE7	SSE10	SSE12	SSE11	S7.1	SSE12
24-Aug	S11	WSW7	W8	WNW5	SE6	SSE11	SSE11	S9	S5	NW5	WNW6	W6	NW7	WNW6	WNW6	WNW7	WNW6	WNW6	W1	N0	S2	SSW2	WSW2	WSW2	WSW3.0	SSE11
25-Aug	W2	W3	WNW2	NW1	NW2	NNW2	NNW2	S1	SE2	ENE7	E8	NE8	NE6	N7	N7	N9	NNW9	N9	N6	NNW4	N3	N1	WNW2	WSW3	N2.9	N9
26-Aug	SW1	NW1	WNW5	NW4	N1	WSW2	N3	NNW4	NNE1	NNE2	WNW4	WNW5	WNW6	WNW6	WNW7	WNW5	NNW6	NNE5	ENE3	NE2	ESE0	SSW4	SW2	SSW3	NW2.2	WNW7
27-Aug	S4	S2	S2	S3	SSE4	S4	S4	S5	SSE4	SSE4	S3	W5	WNW4	WSW8	WSW12	WSW11	WSW13	WSW16	WSW12	WSW7	WSW6	SW7	SW10	WSW14	SW5.8	WSW16
28-Aug	W11	W7	W6	SSW5	SW7	SW6	SW7	WSW7	WSW10	W11	WNW11	W11	WNW8	WNW9	NW7	WNW8	W9	W5	W2	AF	ESE1	ENE4	ENE7	ENE4	W5.1	W11
29-Aug	ENE2	ENE3	NNE1	N6	NE5	SE5	SSW4	SSW4	WSW5	SW3	SSE5	SW6	SSW5	SE2	E7	SE10	SSE11	SSE9	SE6	ESE10	ESE14	ESE14	SE12	ESE11	SE4.7	ESE14
30-Aug	ESE13	SE9	SE8	SE9	SE9	S4	W1	W8	WNW12	WNW10	WNW9	WNW8	W8	W6	WSW4	NNW1	SSW2	WSW9	SSE3	SSW3	SSW4	S6	S7	S6	SSW2.7	ESE13
31-Aug	S5	SW3	SSW4	S4	S6	S6	SSE6	SW3	NW6	WNW3	SSE5	S7	W11	W12	W14	W11	W10	W10	W5	WSW2	SSW3	SSW4	SSW4	SW5	WSW4.7	W14
	SW2.5	WSW2.3	WSW2.2	WSW1.9	SW2.0	SW2.5	WSW2.9	WSW3.1	WSW2.9	W2.5	W2.6	W2.8	W3.8	WNW4.5	WNW3.5	WNW2.1	W2.6	WSW2.2	SW2.0	SSW1.4	S1.7	S2.4	SSW2.5	SW2.6	Diurnal Average	
	ESE15	ESE13	W13	WNW15	WNW14	WNW15	WNW17	WNW16	WNW16	WNW15	WSW15	WSW15	W18	W16	WSW19	W17	WSW13	WSW16	SSE14	WNW12	WNW14	WNW14	ESE12	WSW14	Diurnal Maximum	

C - Calibration AF - Analyzer Failure

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

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Speed (WS) - km/h

Anzac - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 9 km/h on Aug 30 18:00

Minimum Value: 1 km/h on Aug 24 23:00

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:	741
Hours of Missing Data:	3
Hours of Calibration:	2
Percent Operational Time:	99.9

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

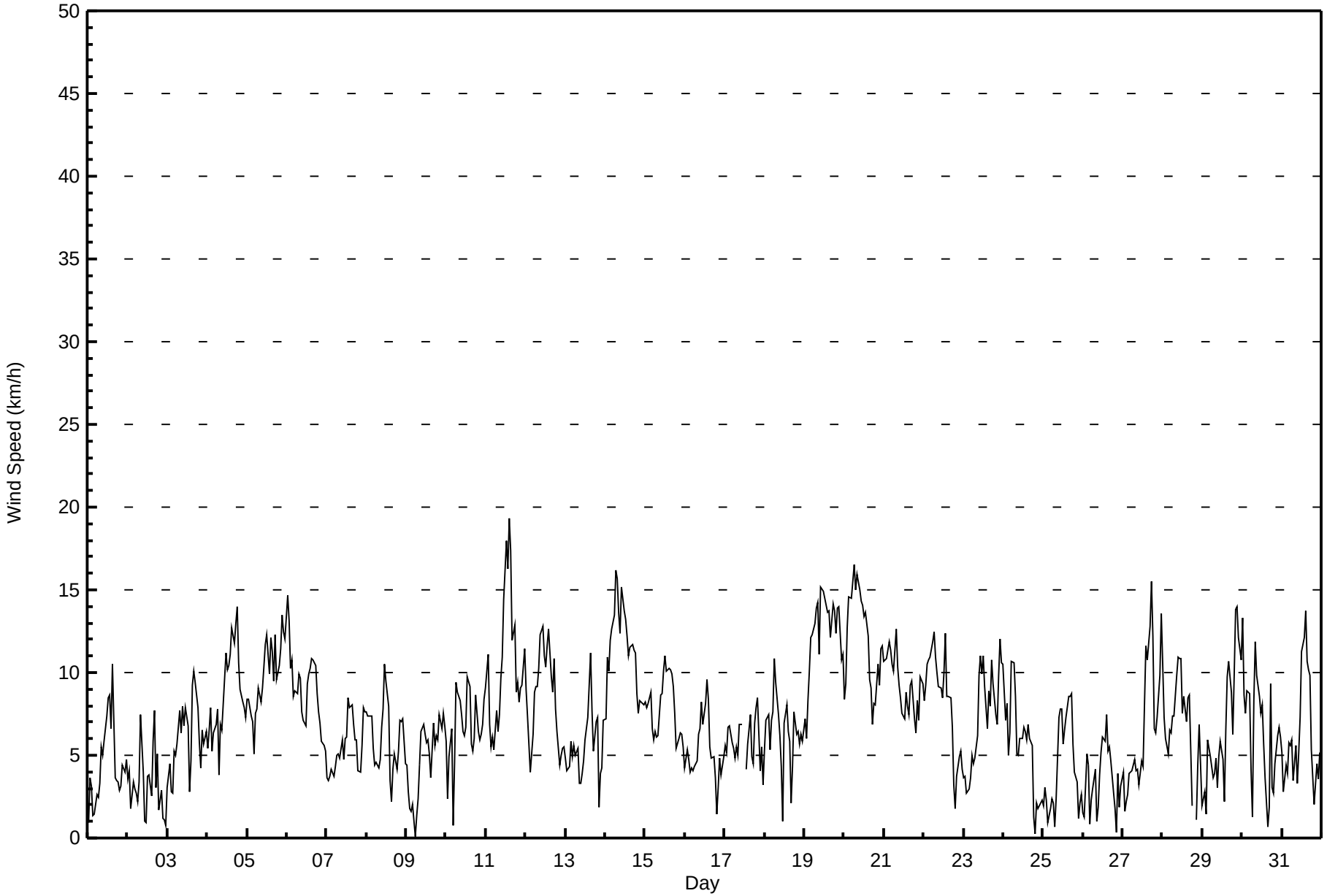
C - Calibration AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed (WS) - km/h

Anzac - August 2015



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	257	34.68	34.68
6 - 11	398	53.71	88.39
12 - 19	86	11.61	100.00
20 - 28	0	0.00	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 741

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Wind Speed (WS) - km/h

Anzac - August 2015

Wind Speed Ranges (km/h)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 5	7	7	5	11	4	9	16	20	34	24	26	23	16	19	25	11	257
6 - 11	8	0	3	4	12	41	31	47	26	9	16	27	39	61	54	20	398
12 - 19	0	0	0	0	0	14	2	5	2	0	1	8	16	36	2	0	86
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	15	7	8	15	16	64	49	72	62	33	43	58	71	116	81	31	741

Total Number of Valid Hours: 741

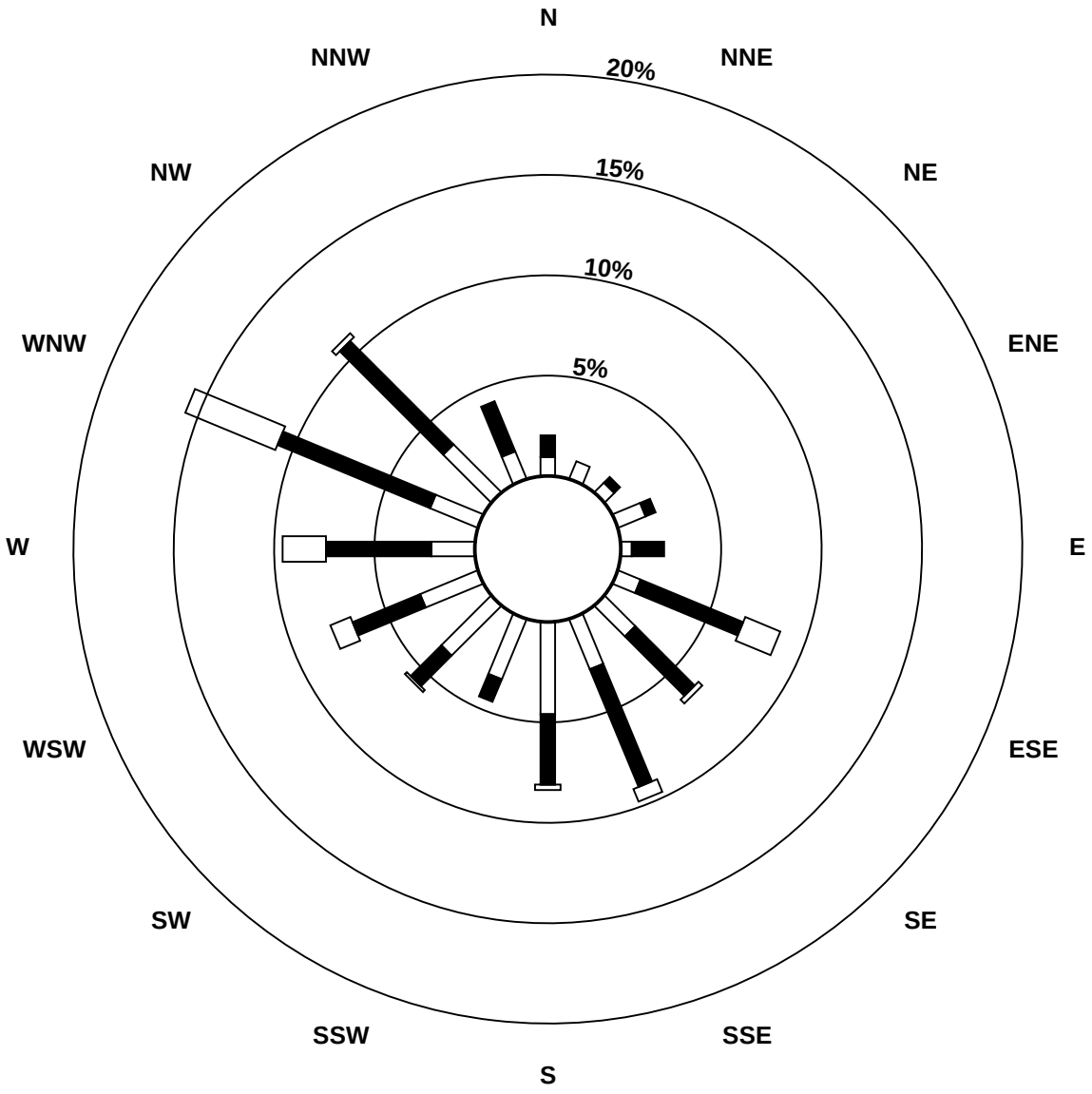
Total Number of Hours: 744

Wood Buffalo Environmental Association

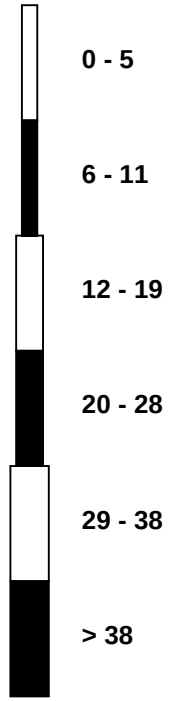
Wind Rose Aug 2015

Wind Speed (WS) - km/h

Anzac (AMS 14)



Classes (km/h)



Total Number of Valid Hours: 741

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Anzac - August 2015

Direction of Maximum Speed: 259 deg on Aug 11 15:00
Direction of Maximum Daily Speed Average: 292.9 deg on Aug 20

Direction of Minimum Speed: 78 deg on Aug 9 06:00

Direction of Minimum Daily Speed Average: 1.9 deg on Aug 2

Monthly Average Direction: 269.2 deg

Hours in Service:	744
Hours of Data:	741
Hours of Missing Data:	3
Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average
1-Aug	278	249	319	358	230	215	264	326	321	323	300	302	316	295	334	54	349	267	266	276	344	257	256	244	303.4
2-Aug	255	66	150	209	216	207	205	155	162	140	26	38	298	284	215	185	211	257	240	76	185	217	192	53	201.8
3-Aug	173	177	123	133	179	175	167	161	149	154	148	147	200	315	29	102	113	127	140	148	138	126	119	151	143.4
4-Aug	133	147	143	132	100	109	132	63	65	95	106	113	111	121	122	116	114	138	154	147	130	125	127	112	121.9
5-Aug	114	109	92	77	71	114	120	121	114	113	105	104	110	115	108	130	155	123	111	104	101	108	113	116	111.5
6-Aug	122	118	121	123	116	122	131	144	147	138	151	113	104	102	90	84	99	105	100	103	102	110	121	115	115.4
7-Aug	107	95	69	85	87	127	153	140	136	163	153	120	116	127	122	93	142	128	138	131	165	153	148	148	129.4
8-Aug	147	152	148	151	157	147	131	135	135	111	162	183	186	179	190	308	183	142	156	114	114	133	159	161	152.9
9-Aug	165	169	149	180	182	78	33	110	87	124	135	128	126	97	106	148	184	165	135	122	133	138	152	177	138.6
10-Aug	279	290	170	165	169	304	276	285	286	286	292	285	293	279	264	274	289	263	224	209	199	186	198	214	256.0
11-Aug	217	222	237	228	241	261	280	246	257	264	279	274	260	272	259	260	267	264	260	252	240	239	257	258	256.5
12-Aug	269	266	250	221	245	250	262	265	281	279	291	291	291	291	287	287	289	277	283	266	260	238	245	247	273.3
13-Aug	215	246	221	221	233	244	221	234	229	222	274	291	304	296	307	321	338	292	231	231	217	195	208	238	258.3
14-Aug	254	276	273	284	274	280	284	293	292	293	293	298	300	300	311	307	319	314	322	322	320	315	320	315	297.2
15-Aug	307	312	311	317	312	311	313	312	313	331	335	340	342	353	357	349	349	347	339	320	319	323	328	342	330.6
16-Aug	317	313	323	320	309	317	326	312	298	288	295	300	298	293	307	327	313	330	313	314	216	234	220	231	299.5
17-Aug	235	249	275	268	258	234	230	227	251	238	228	C	C	286	191	156	283	155	177	161	164	197	270	330	225.2
18-Aug	316	289	297	308	302	305	303	304	299	314	49	338	266	254	284	276	286	178	164	166	173	173	181	188	271.4
19-Aug	192	177	168	201	168	155	161	181	181	205	241	242	277	281	261	230	283	276	273	293	287	288	297	294	240.6
20-Aug	280	279	279	284	288	289	289	286	296	291	293	292	289	300	302	313	314	313	304	298	292	299	290	295	292.9
21-Aug	297	294	293	294	302	303	301	300	286	301	308	322	316	328	333	336	331	324	327	321	322	318	316	314	310.0
22-Aug	314	306	302	305	304	300	299	301	304	319	320	323	317	299	325	322	326	340	347	103	162	182	175	187	307.2
23-Aug	187	199	237	194	193	183	178	182	176	165	161	152	155	204	214	186	185	175	160	159	158	159	156	160	172.4
24-Aug	185	258	276	287	146	167	168	178	187	309	297	279	306	301	299	295	297	301	279	357	187	201	245	247	246.7
25-Aug	271	276	282	319	325	329	346	174	125	73	92	49	47	9	356	349	346	359	357	337	3	351	290	252	5.4
26-Aug	234	313	298	323	1	254	356	347	22	30	302	286	289	293	294	285	329	24	67	40	118	198	216	207	305.8
27-Aug	186	189	191	182	168	182	186	173	160	158	185	281	289	258	237	254	251	241	245	247	251	230	223	237	230.6
28-Aug	265	270	262	211	220	232	236	245	242	270	285	275	293	299	304	290	280	280	265	AF	117	75	73	59	269.0
29-Aug	58	73	26	352	52	124	210	196	239	233	158	217	192	138	98	131	149	151	130	116	121	123	131	121	133.9
30-Aug	119	133	136	132	145	171	259	279	285	298	290	300	265	277	246	331	208	241	161	207	196	169	177	186	213.0
31-Aug	190	235	212	181	185	190	164	236	307	300	164	188	267	268	271	275	278	273	260	245	193	208	208	236	241.6
	218.5	240.9	249.8	246.4	232.5	231.2	243.2	248.0	254.9	264.6	264.5	271.7	280.2	285.2	288.0	287.3	281.2	255.0	221.2	194.7	181.8	184.2	195.0	214.6	
	Diurnal Average																								

C - Calibration AF - Analyzer Failure

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

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg

Anzac - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 105 deg on Aug 2 12:00

Minimum Value: 7 deg on Aug 16 22:00

Percentiles: P_1 = 12 P_{10} = 18 Q_1 = 23 Median = 29 Q_3 = 36 P_{90} = 54 P_{99} = 84

Hours in Service:	744
Hours of Data:	741
Hours of Missing Data:	3
Hours of Calibration:	2
Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Aug	59	29	60	74	79	20	36	26	27	34	36	36	28	35	56	29	77	52	31	41	32	18	18	13	79
2-Aug	32	20	34	18	27	21	30	35	24	62	93	105	79	73	81	50	38	66	37	42	62	89	62	78	105
3-Aug	20	15	39	49	18	16	21	17	27	26	31	31	38	42	41	32	27	25	23	23	23	22	21	26	49
4-Aug	36	18	18	31	25	28	23	41	27	26	25	26	29	24	25	24	26	25	20	21	22	22	21	25	41
5-Aug	25	31	26	23	20	29	23	24	27	27	30	30	29	30	32	31	26	27	28	31	27	29	26	26	32
6-Aug	23	24	26	24	29	25	21	23	23	26	29	29	28	29	31	31	30	29	26	30	26	29	27	23	31
7-Aug	28	30	20	18	24	32	19	23	28	22	33	27	29	29	40	39	38	31	21	28	56	27	19	20	56
8-Aug	20	17	16	19	22	21	23	30	37	38	39	33	35	40	75	85	52	37	26	35	23	19	18	19	85
9-Aug	19	18	73	63	37	71	42	50	46	37	40	48	49	58	59	73	42	42	27	16	15	16	16	42	73
10-Aug	33	44	28	52	99	29	29	32	34	38	41	37	37	37	41	41	44	42	27	21	23	19	22	18	99
11-Aug	17	14	25	19	15	23	27	28	31	33	34	33	30	32	34	34	32	28	28	27	24	21	27	27	34
12-Aug	29	24	25	26	25	28	30	32	36	35	30	33	34	30	32	32	31	32	32	29	23	15	16	18	36
13-Aug	20	15	12	19	17	12	14	22	18	30	54	40	36	36	32	30	36	44	26	28	28	17	20	37	54
14-Aug	27	32	28	30	31	31	28	29	30	32	32	31	30	32	31	30	26	26	25	23	25	23	22	24	32
15-Aug	28	28	27	24	29	26	26	26	23	21	24	23	25	26	26	25	27	25	23	19	22	22	22	20	29
16-Aug	23	21	19	27	24	23	23	29	30	43	40	36	38	37	44	39	34	32	24	57	15	7	9	13	57
17-Aug	11	21	22	21	15	18	9	17	42	34	54	C	C	63	68	22	77	82	16	14	16	25	42	54	82
18-Aug	29	29	30	25	23	24	29	25	30	45	69	104	48	42	45	45	76	33	17	16	18	18	19	21	104
19-Aug	22	20	21	30	24	21	19	22	23	31	28	30	33	34	37	23	35	35	33	32	30	30	30	29	37
20-Aug	28	29	31	30	32	30	27	30	31	30	32	33	36	30	31	28	28	31	33	32	31	30	30	31	36
21-Aug	33	32	33	29	30	30	32	29	34	33	30	27	31	29	31	28	24	25	24	21	24	24	26	25	34
22-Aug	24	27	30	28	30	28	28	30	30	32	28	26	28	29	27	31	31	31	26	46	16	12	15	16	46
23-Aug	13	16	18	23	12	14	17	26	29	25	29	29	29	46	47	30	36	28	19	17	17	17	18	20	47
24-Aug	24	47	30	51	29	18	15	26	47	49	32	35	36	36	38	32	32	28	62	76	23	18	19	16	76
25-Aug	24	26	28	76	44	28	24	86	83	34	40	38	56	50	33	28	26	24	25	18	29	47	27	66	86
26-Aug	74	80	28	25	77	59	20	37	86	79	72	35	27	31	30	49	35	31	32	25	69	10	40	13	86
27-Aug	13	58	53	28	10	13	15	22	31	61	77	54	61	39	30	36	34	24	30	23	22	25	19	24	77
28-Aug	33	27	24	25	15	18	19	23	23	37	33	34	36	33	42	38	35	38	77	AF	63	19	23	39	77
29-Aug	65	68	58	28	25	49	28	34	51	70	57	48	50	86	45	39	26	22	18	24	23	24	22	25	86
30-Aug	24	24	20	19	23	53	68	31	31	32	37	36	41	49	56	74	91	61	72	44	17	14	17	12	91
31-Aug	17	19	22	16	12	18	19	60	35	56	47	39	36	32	34	35	37	36	31	52	49	18	31	21	60
	74	80	73	76	99	71	68	86	86	79	93	105	79	86	81	85	91	82	77	76	69	89	62	78	
	Diurnal Maximum																								

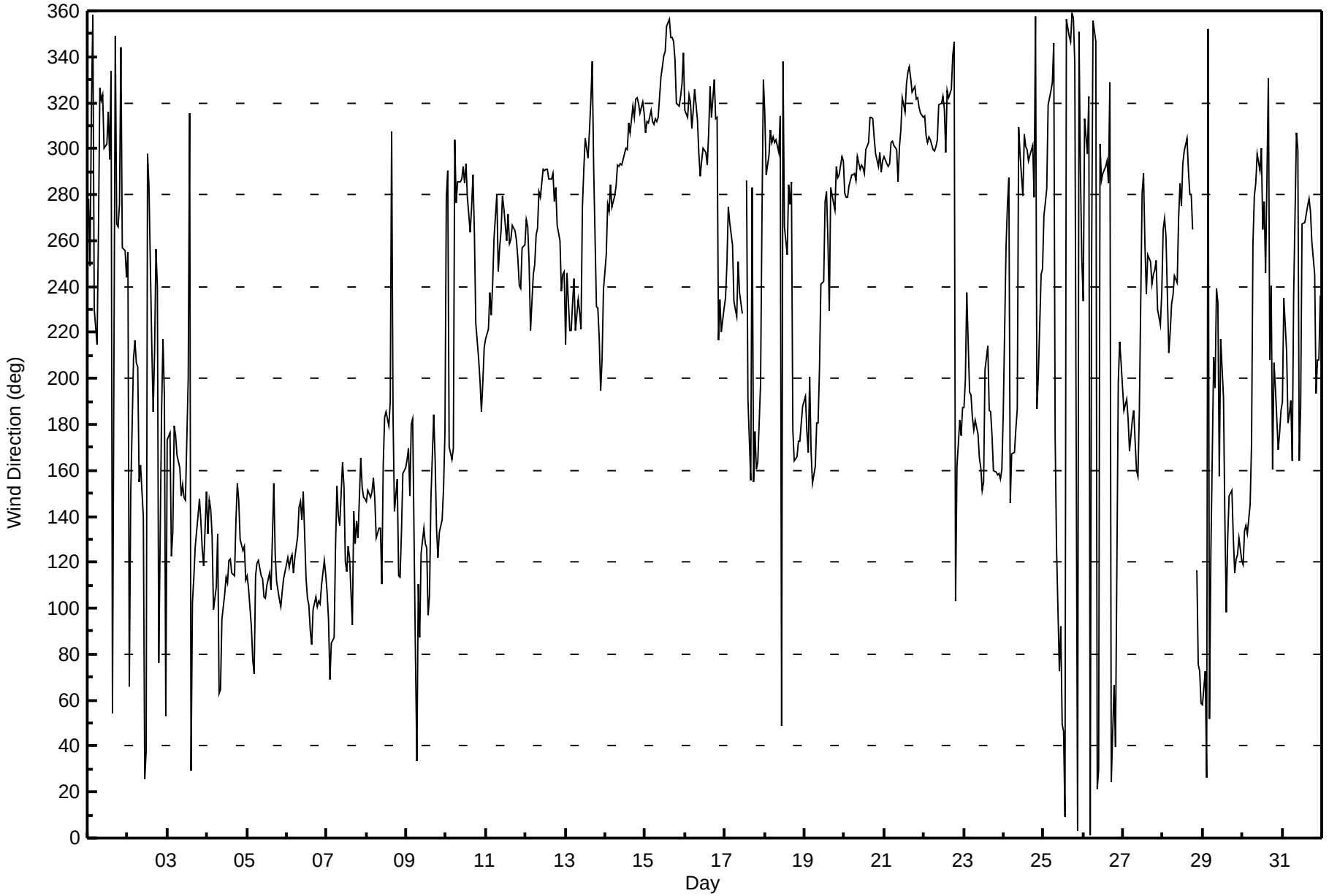
C - Calibration AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction (WD) - deg

Anzac - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Precipitation (PC) - mm

Anzac - August 2015

Maximum Value: 1.3 mm on Aug 4 16:00

Maximum Daily Total: 4.6 mm on Aug 4

Minimum Value: 0.0 mm on Aug 1 01:00

Minimum Daily Total: 0.0 mm on Aug 2

Maximum Diurnal Total: 1.8 mm at hour 17

Minimum Diurnal Total: 0.0 mm at hour 1

Monthly Total: 9.40 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} = 0.5

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

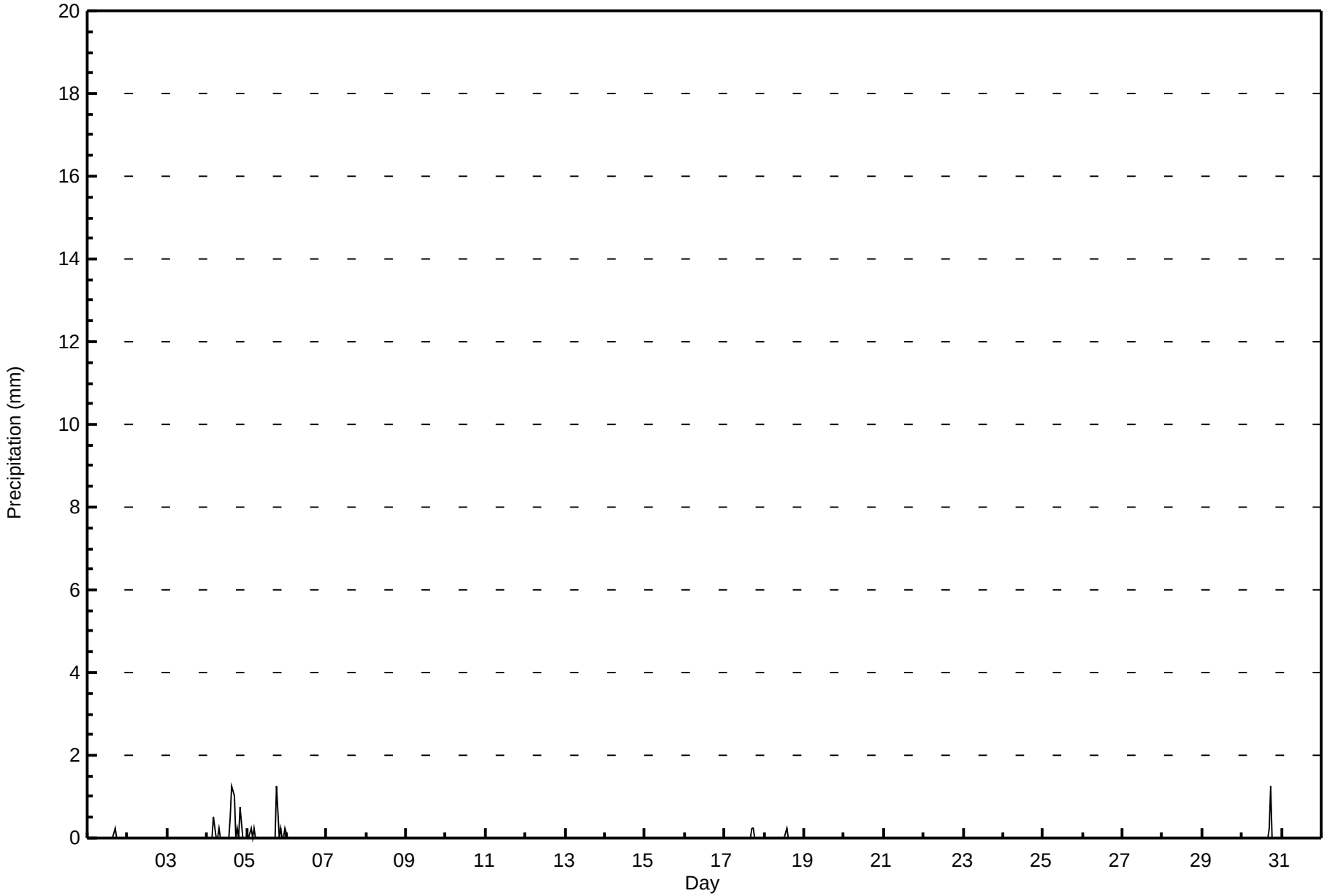
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3
2-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4-Aug	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.3	1.0	0.0	0.3	0.0	0.8	0.0	0.0	0.0	4.6	1.3
5-Aug	0.0	0.0	0.3	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	1.3	0.0	0.3	0.0	0.0	0.3	2.3	1.3
6-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.3
18-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3
19-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.3	0.0	0.0	0.0	0.0	0.0	0.0	1.5	1.3
31-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.8	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.3	0.5	1.3	1.8	1.5	1.5	0.0	1.0	0.0	0.0	0.3	Diurnal Average	
	0.0	0.0	0.3	0.0	0.5	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.3	0.5	1.3	1.0	1.3	1.3	0.0	0.8	0.0	0.0	0.3	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Precipitation (PC) - mm

Anzac - August 2015



14-93

Wood Buffalo Environmental Association
SO2 Calibration Report

W B E A

Station Information

Calibration Date	August 17, 2015	Last Calibration	July 20, 2015
Station Name	Anzac	Station Number	AMS 14
Reason:	Routine		
Start Time (MST)	9:15	End Time (MST)	15:00
Gas Cert Reference	SA130026A	Station temp.	20 Deg C
Cal Gas Concentration	47.2 ppm	Cal Gas Exp Date	12/12/2016
Calibrator Make/Model	Sabio 4010	Serial Number	8400311
ZAG Make/Model	API 701	Serial Number	764
DACS make/model	Campbell Scientific CR3000	DACS serial No.	8790

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 1000 ppb		HVPS voltage	524	524
Analyzer IP address	192.168.1.43		Lamp voltage	2833	2784
Calculated slope	0.995802	0.995309	Chamber temp	50.0	50.0
Calculated intercept	0.087364	-0.145161	Pressure	25.2	25.1
Analyzer Background	19.5	19.4	Flow	656	654
Analyzer Coefficient	1.011	1.011	Intensity	70	69.0

Analyzer make	API T100	Analyzer serial #	723

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.2	----
as found span	5000	74.9	707.1	703.6	1.005
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	74.9	707.1	710.9	0.995
second point	5000	37.5	354.0	354.6	0.998
third point	5000	18.7	176.5	178.5	0.989
as left zero	5000	0.0	0.0	-0.2	----
as left span	5000	74.9	707.1	701.3	1.008
				Average Correction Factor	0.994

Corrected As found	703.8	Previous response	709.9	% change	0.9%

Notes:

Filter changed after As Founds. Slight adjustment to zero

Calibration Performed By: Ryan Power

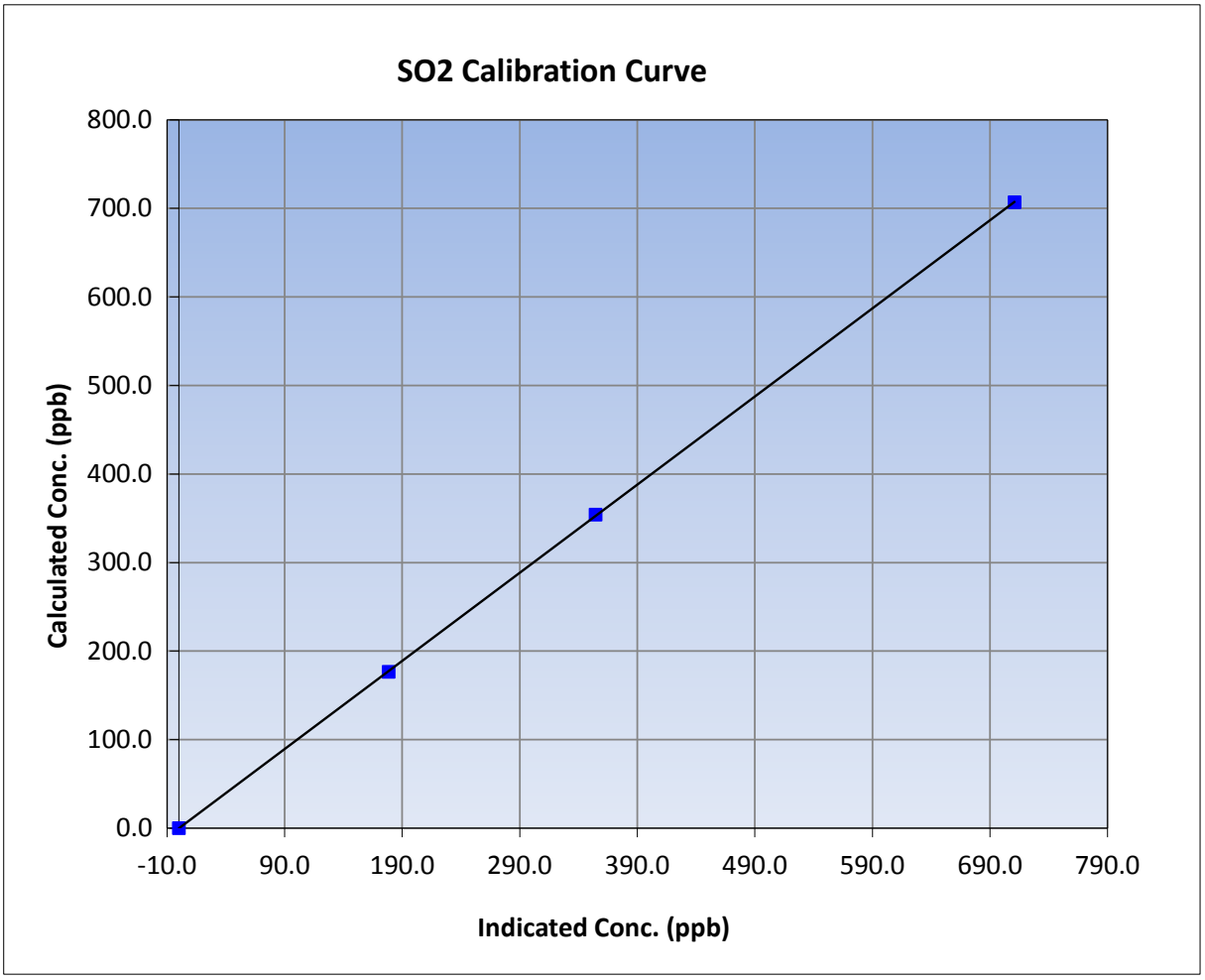
Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

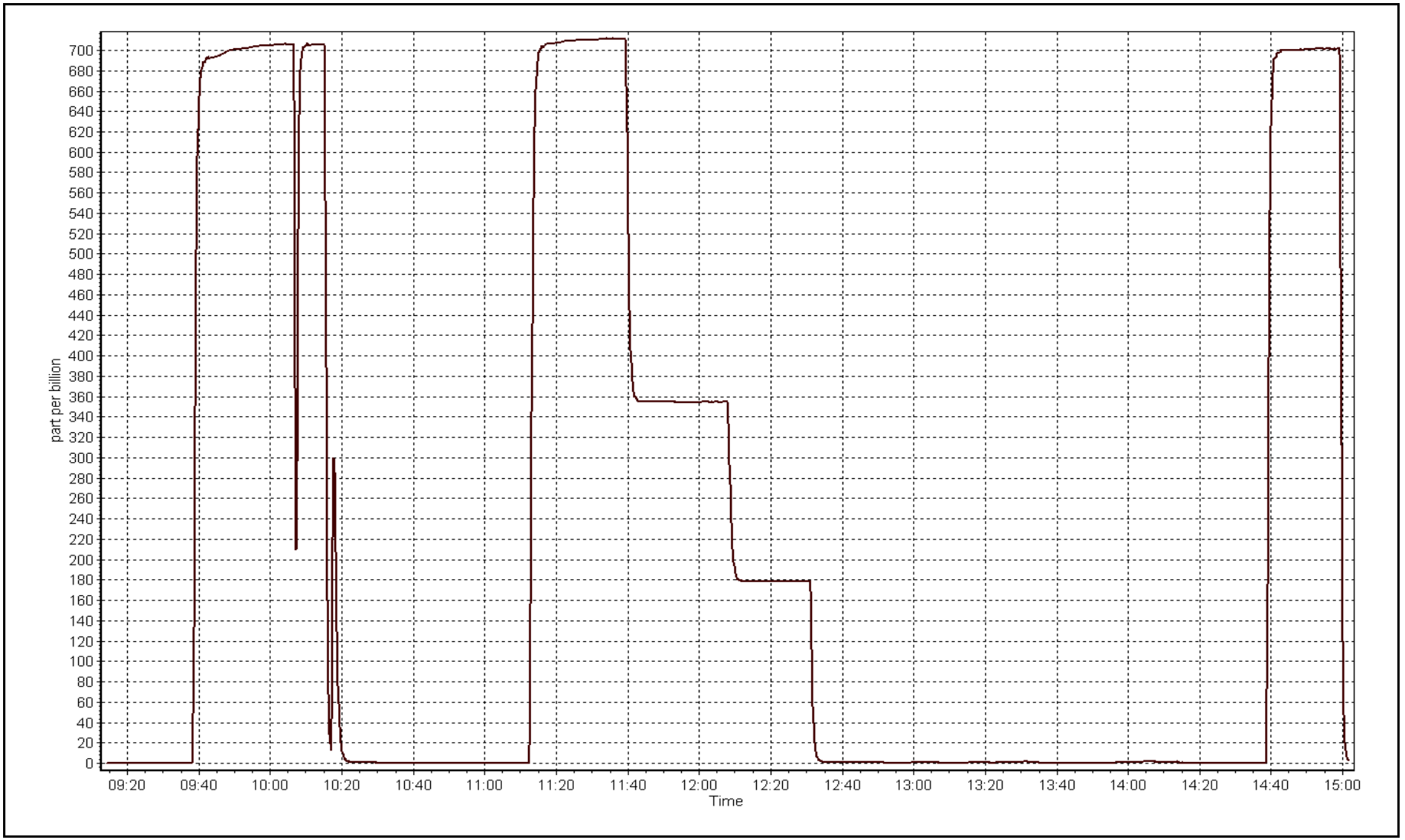
Calibration Date	August 17, 2015	Previous Calibration	July 20, 2015
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	9:15	End Time (MST)	15:00
Analyzer make	API T100	Analyzer serial #	723

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999990
707.1	710.9	0.9946		
354.0	354.6	0.9984	Slope	0.995309
176.5	178.5	0.9887		
			Intercept	-0.145161



SO2 Calibration Plot Date: August 17, 2015



Wood Buffalo Environmental Association
TRS Calibration Report

Station Information

Calibration Date	August 14, 2015	Last Calibration	July 21, 2015
Station Name	Anzac	Station Number	AMS 14
Reason:	Routine		
Start Time (MST)	6:55	End Time (MST)	10:55
Gas Cert Reference	56532297-003	Station temp.	22 Deg C
Cal Gas Concentration	5.05 ppm	Cal Gas Exp Date	09/09/2017
Calibrator Make/Model	Sabio 4010	Serial Number	8400311
Dil air Make/Model	API 701	Serial Number	4764
DACS make/model	Campbell Scientific CR3000	DACS serial No.	8790
SO2 gas concentration	47.2 ppm	SO2 gas cert/exp	SA130026A December-12-16

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-731	-731
Analyzer IP address	192.168.1.42		Lamp voltage	976	973
Calculated slope	0.996959	0.994989	Chamber temp	45	45
Calculated intercept	0.084481	0.041567	Pressure	655.3	656.8
Analyzer Background	1.78	1.77	Flow	0.390	0.390
Analyzer Coefficient	1.225	1.225	Intensity	98	98
			Converter temp.	800	800

Analyzer make/model	Thermo 43i-TLE	Analyzer serial #	1300156232
Converter make/model	CDN-101	Converter serial #	510

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.0	----
as found span	5000	74.3	75.0	75.4	0.995
SO2 scrubber check	5000	18.7	176.5	0.5	----
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	74.3	75.0	75.4	0.995
second point	5000	39.6	40.0	40.1	0.997
third point	5000	19.8	20.0	20.1	0.997
as left zero	5000	0.0	0.0	0.2	----
as left span	5000	74.3	75.0	76.3	0.983
				Average Correction Factor	0.997

Corrected As found	75.4	Previous response	75.2	% change	-0.3%

Notes:

No adjustments, filter changed after As Found. Scrubber check after third point. Purge point mistakenly triggered after srubber check.

Calibration Performed By: Ryan Power

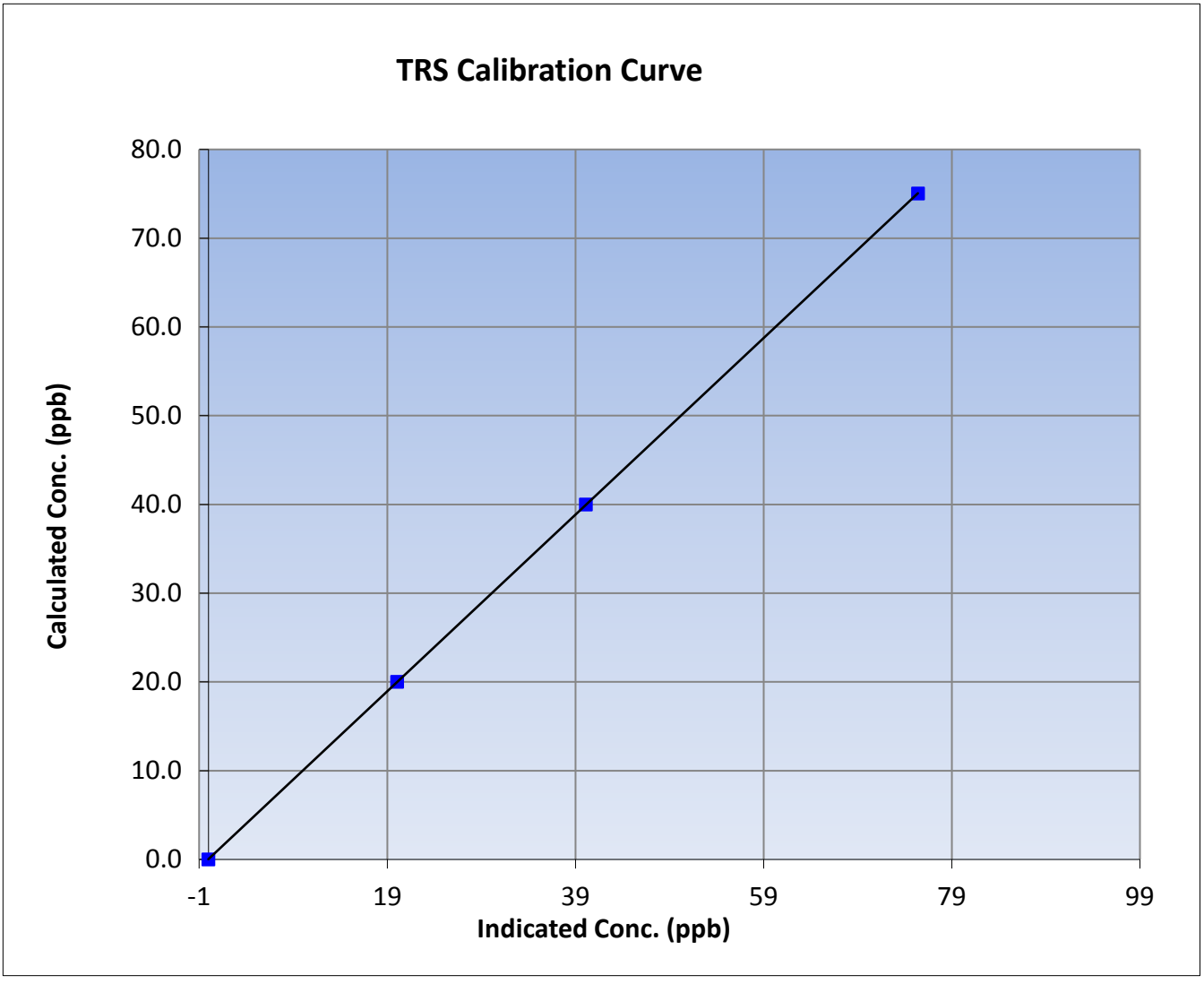
Wood Buffalo Environmental Association
TRS Calibration Report

Station Information

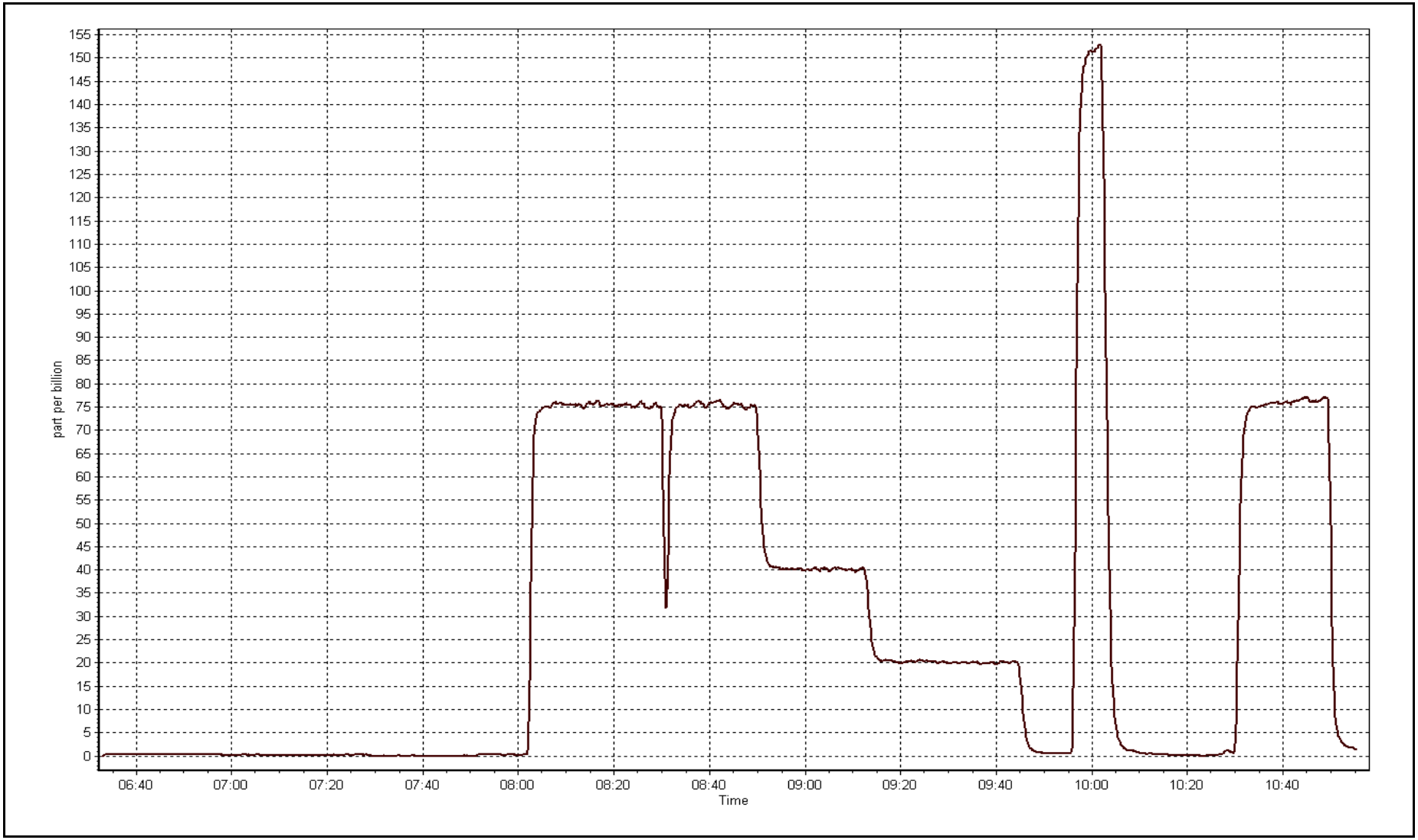
Calibration Date	August 14, 2015	Previous Calibration	July 21, 2015
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	6:55	End Time (MST)	10:55
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1300156232

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999999
75.0	75.4	0.9953		
40.0	40.1	0.9969	Slope	0.994989
20.0	20.1	0.9974		
			Intercept	0.041567



TRS Calibration Plot Date: August 14, 2015



Wood Buffalo Environmental Association
THC / NMHC Calibration Report

W B E A

Station Information

Calibration Date	August-17-15	Last Calibration	July-20-15
Station Name	Anzac	Station Number	AMS 14

Reason: Routine

Start Time (MST)	9:00	End Time (MST)	15:00
Gas Cert Reference	SA130026A	Cal Gas Expiry Date	December-12-16
CH4 Cal Gas Conc.	512.0 ppm	CH4 Equiv Conc.	1092.3 ppm
C3H8 Cal Gas Conc.	211.0 ppm	Station temp.	20 Deg C
Calibrator Model	Sabio 4010	Serial Number	8400311
ZAG make/model	Teledyne API 701	Serial Number	4764
DACS make/model	Campbell Scientific CR3000	Serial Number	8790

Analyzer Information

	Before	*After*		*Before*	*After*
THC Range (ppm)	0 - 50 ppm		Column Temp	75.1	75.0
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	175.0	175.0
Analyzer IP address	192.168.1.55		Flame Temp	395.0	394.0
THC Calc slope	0.999729	0.999234	Carrier Pressure	31.8	31.9
THC Calc intercept	0.004141	0.020174	Fuel Pressure	41.4	41.4
NMHC Calc slope	1.000645	0.999736	Air Pressure	32.6	32.6
NMHC Calc intercept	-0.013921	0.002043			

Analyzer make	Thermo 55i	Analyzer serial #	1218153355

THC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	0.00	----
as found span	5000	74.9	16.36	16.45	0.995
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	74.9	16.36	16.38	0.999
second point	5000	37.5	8.19	8.12	1.009
third point	5000	18.7	4.09	4.08	1.001
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	74.9	16.36	16.37	1.000
				Average Correction Factor	1.003

Corrected As found	16.45	Previous response	16.36	% change	-0.5%

Notes:

Filter changed after As Founds. Span adjusted

Calibration Performed By: Ryan Power

Wood Buffalo Environmental Association

THC / NMHC Calibration Report

NMHC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0	0.00	0.00	----
as found span	5000	74.9	8.69	8.75	0.993
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	74.9	8.69	8.70	0.999
second point	5000	37.5	4.35	4.33	1.005
third point	5000	18.7	2.17	2.18	0.995
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	74.9	8.69	8.69	1.000
				Average Correction Factor	1.000

Corrected As found	8.75	Previous response	8.70	% change	-0.6%

CH4 Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0	0.00	0.00	----
as found span	5000	74.9	7.67	7.71	0.995
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	74.9	7.67	7.68	0.999
second point	5000	37.5	3.84	3.79	1.013
third point	5000	18.7	1.91	1.90	1.008
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	74.9	7.67	7.68	0.999
				Average Correction Factor	1.007

Corrected As found	7.71	Previous response	7.66	% change	-0.6%

Wood Buffalo Environmental Association

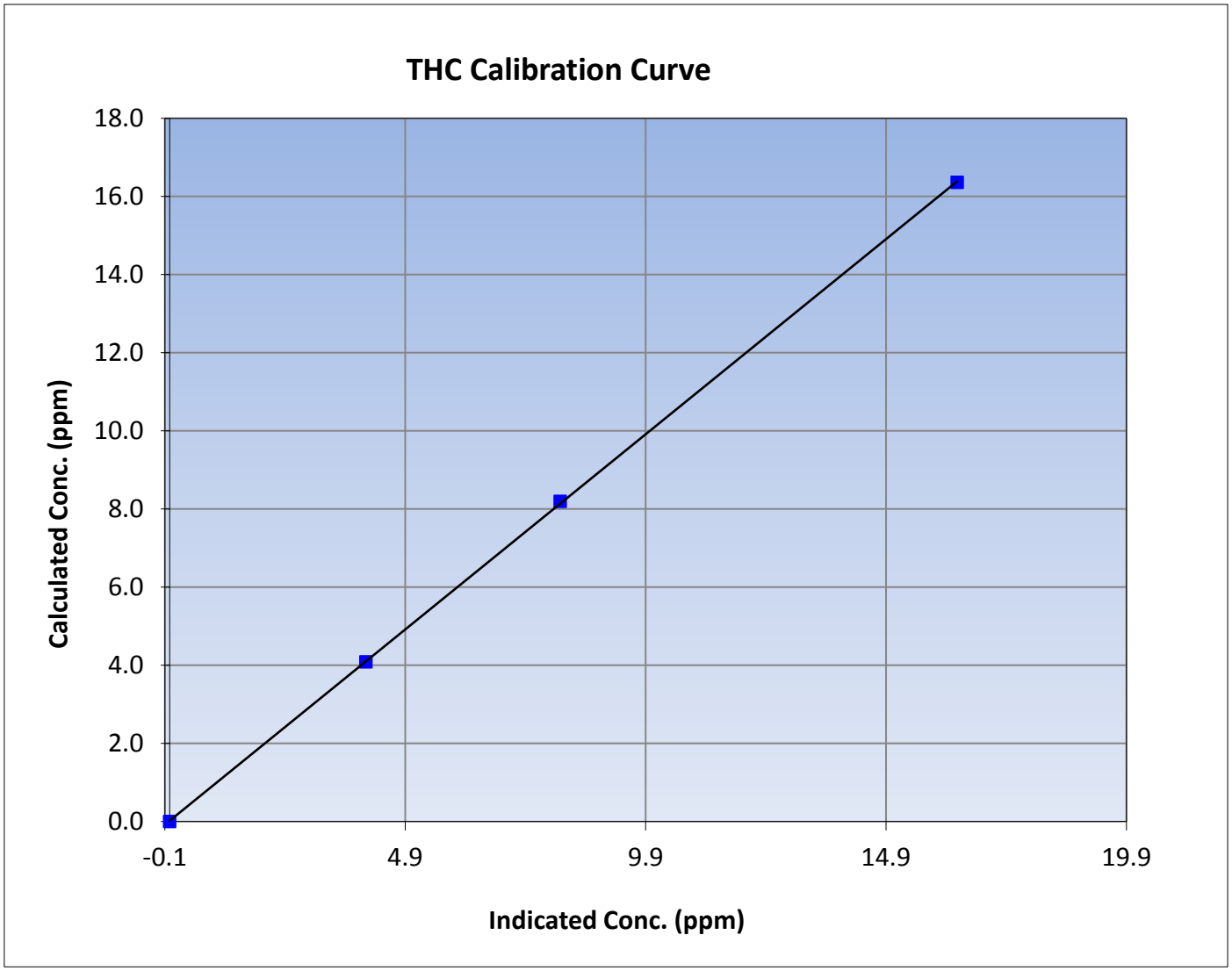
THC Calibration Summary

Station Information

Calibration Date	August 17, 2015	Previous Calibration	July 20, 2015
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	9:00	End Time (MST)	15:00
Analyzer make	Thermo 55i	Analyzer serial #	1218153355

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999969
16.36	16.38	0.9989		
8.19	8.12	1.0089	Slope	0.999234
4.09	4.08	1.0012		
			Intercept	0.020174



Wood Buffalo Environmental Association

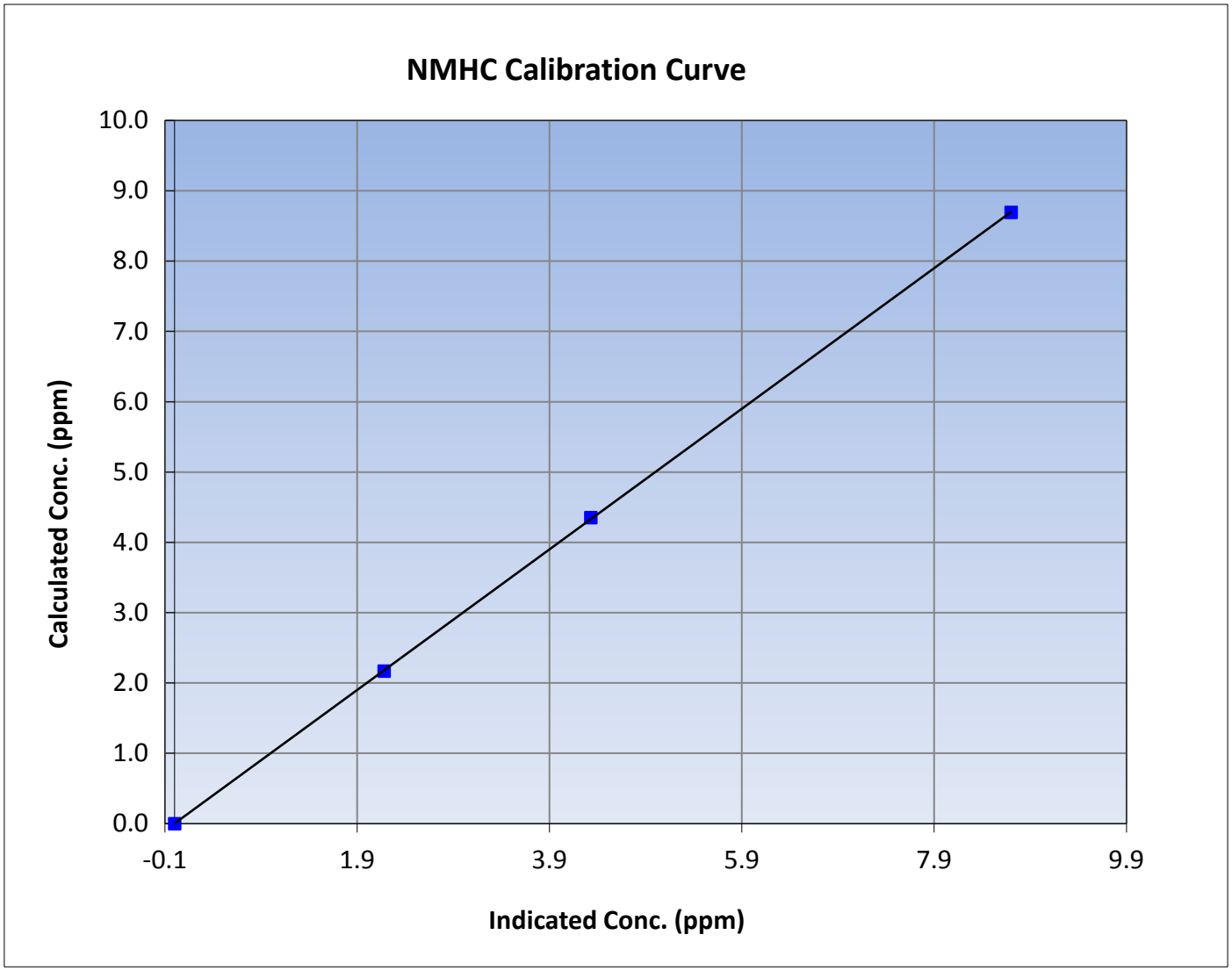
NMHC Calibration Summary

Station Information

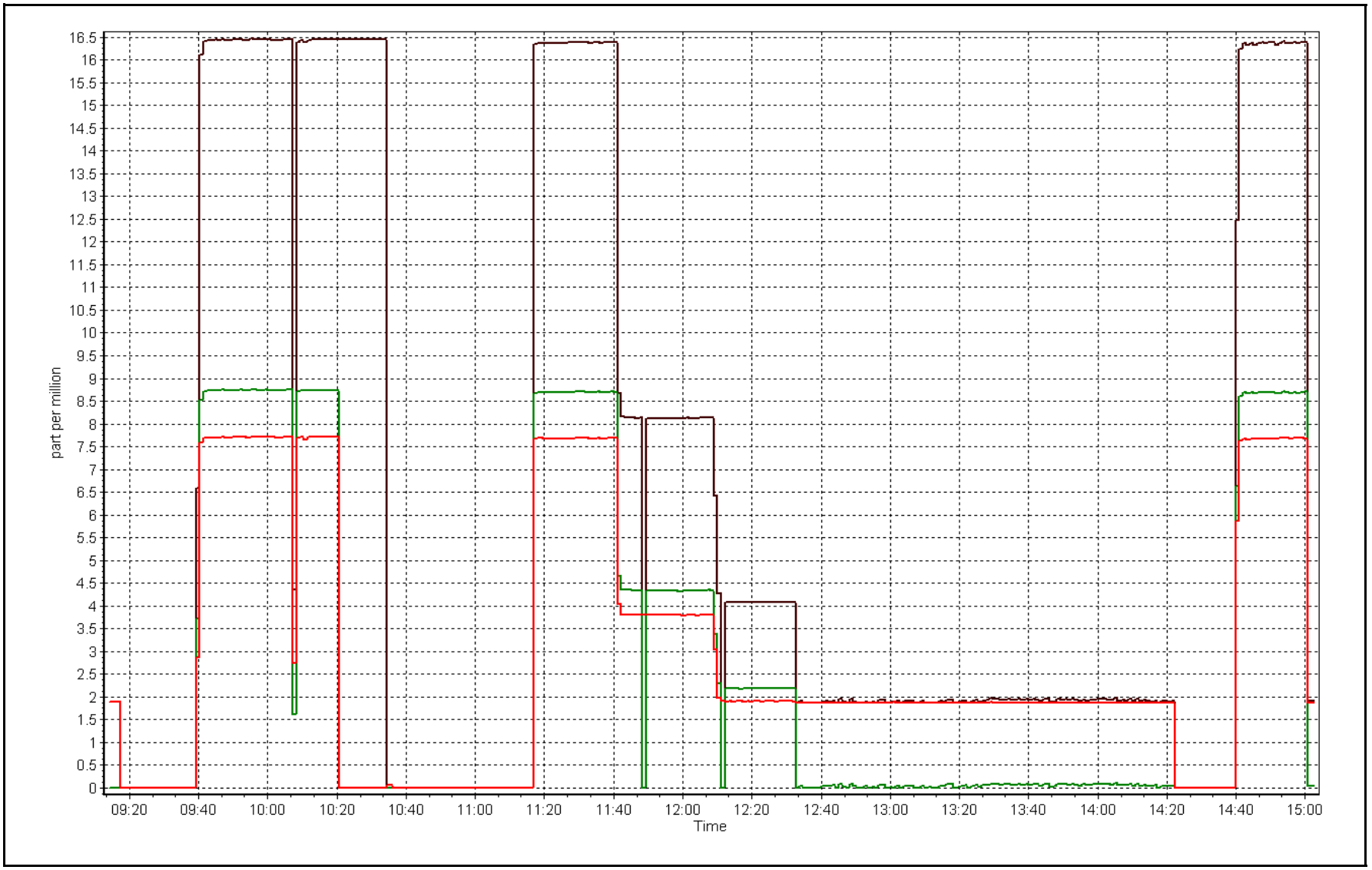
Calibration Date	August 17, 2015	Previous Calibration	July 20, 2015
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	9:00	End Time (MST)	15:00
Analyzer make	Thermo 55i	Analyzer serial #	1218153355

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999985
8.69	8.70	0.9991		
4.35	4.33	1.0051	Slope	0.999736
2.17	2.18	0.9955		
			Intercept	0.002043



THC / NMHC Calibration Plot Date: August 17, 2015



Wood Buffalo Environmental Association
O_3 Calibration Report

W B E A

Station Information

Calibration Date	August 18, 2015	Previous Calibration	July 21, 2015
Station Name	Anzac	Station Number	AMS 14
Reason:	Routine		
Start Time (MST)	8:50	End Time (MST)	12:34
NO2 GPT Ref date	August-17-15	Transfer Standard	NO2
		Station temp.	23 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	8400311
ZAG make/model	Teledyne API 701	Serial Number	4764
DACS make/model	Campbell Scientific CR3000	Serial Number	8790

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 500 ppb		Bench temp.	27.6	27.2
Analyzer IP address	192.168.1.48		Lamp temp.	53.8	53.8
Calculated slope	0.993650	0.999747	Pressure	649.8	654.9
Calculated intercept	-0.289569	-0.971684	Flow cell A	0.698	0.701
Analyzer Background	-1.0	-2.0	Flow cell B	0.701	0.703
Analyzer Coefficient	0.988	0.961	Cell A Intensity	128500	127000
			Cell B Intensity	130400	129000

Analyzer make	Thermo 49i	Analyzer serial #	1426262596

Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator Lamp Intensity (mA)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.00	0.0	-0.8	----
as found span	5000	1.190	410.2	420.5	0.976
calibrator zero	5000	0.00	0.0	0.6	----
high point	5000	1.190	410.2	411.0	0.998
second point	5000	0.847	281.8	283.0	0.996
third point	5000	0.505	147.2	148.7	0.990
as left zero	5000	0.00	0.0	0.8	----
as left span	5000	1.190	410.2	414.0	0.991
				Average Correction Factor	0.995

Corrected As found	421.3	Previous response	413.1	% change	-1.9%

Notes:

Filter changed after As Founds, small adjustments made to both zero and span

Calibration Performed By: Ryan Power

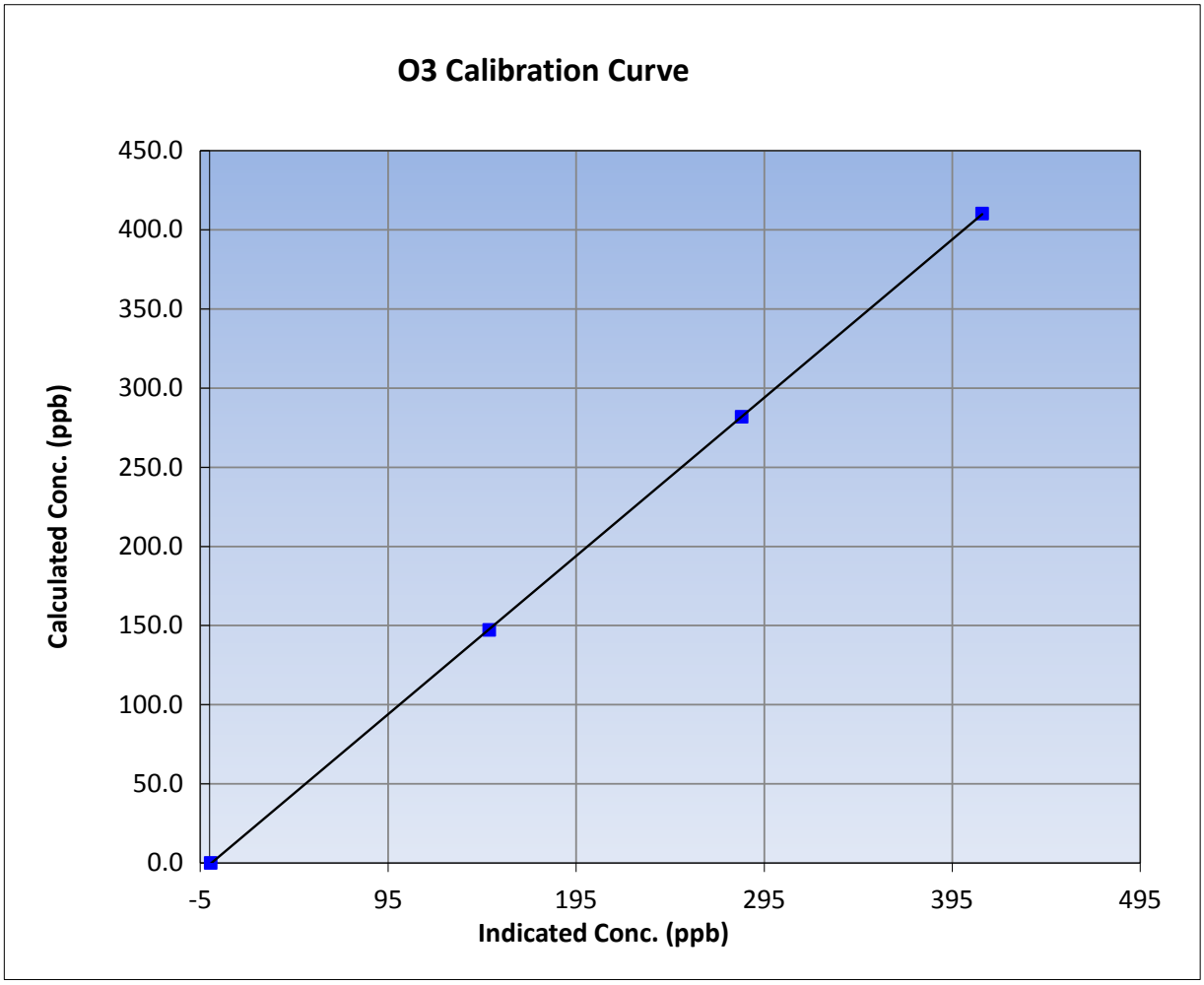
Wood Buffalo Environmental Association
O3 Calibration Report

Station Information

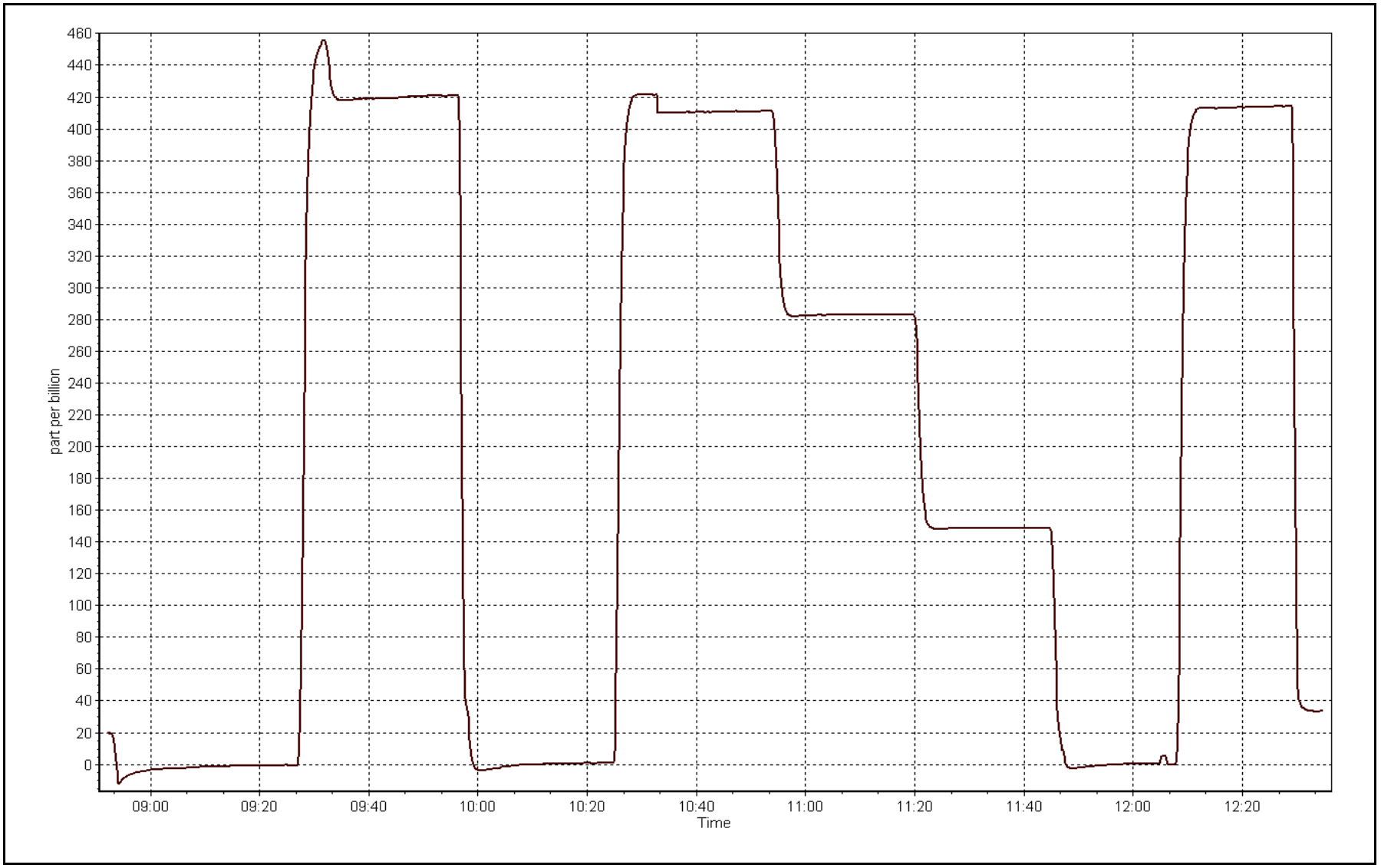
Calibration Date	August-18-15	Previous Calibration	June 16, 2015
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	9:05	End Time (MST)	12:34
Analyzer make	Thermo 49i	Analyzer serial #	1426262596

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.6	----	Correlation Coefficient	0.999995
410.2	411.0	0.9981		
281.8	283.0	0.9957	Slope	0.999747
147.2	148.7	0.9899		
			Intercept	-0.971684



O3 Calibration Plot Date: August 18, 2015



Wood Buffalo Environmental Association
NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	August 17, 2015	Previous Calibration	July 20, 2015
Station Name	Anzac	Station Number	AMS 14
Reason:	Routine		
Start Time (MST)	9:15	End Time (MST)	15:00
NO Cal Gas Conc	53.4 ppm	Gas Cert Reference	SA130026A
NOx Cal Gas Conc	53.4 ppm	Cal Gas Expiry Date	12/12/2016
Calibrator	Sabio 4010	Serial Number	8400311
Zero air Generator	Teledyne API T701	Serial Number	4764

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	8790

Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.998033	1.000059	0.996745
	Data Offset	-0.255067	-0.193525	-0.940555
Current Calibration	Data Slope	0.997035	0.998579	0.996146
	Data Offset	-0.358479	-0.186985	-0.618463

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1426262592

Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
NO coefficient	1.000		0.989	
NOX coefficient	1.000		1.000	
NO2 coefficient	1.000		1.000	
NO bkgrnd	3.4		3.2	
NOX bkgrnd	3.6		3.3	
Chamber Temp	50.3	Deg C	49.9	Deg C
Moly Temp	328	Deg C	325	Deg C
PMT voltage	-802.9	V	-802.9	V
PMT Temp	-3	Deg C	-3	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	156.4	mmHg	156.1	mmHg
R Cell Press Nox	156.7	mmHg	156.4	mmHg
NO sample flow	0.818	lpm	0.825	lpm
Nox sample Flow	0.820	lpm	0.827	lpm

Notes:

Filter changed after As Founds. Slight adjustment to zero and span

Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: August 17, 2015 Station Number: AMS 14

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.2	-0.1	----	----
as found span	5000	74.9	799.9	799.9	0.0	810.3	807.7	2.6	0.9872	0.9904
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
high point	5000	74.9	799.9	799.9	0.0	802.7	801.5	1.2	0.9966	0.9981
second point	5000	37.5	400.5	400.5	0.0	401.6	400.5	1.2	0.9972	1.0001
third point	5000	18.7	199.7	199.7	0.0	201.4	201.0	0.4	0.9915	0.9936
as left zero	5000	0.0	0.0	0.0	0.0	0.2	0.0	0.1	----	----
as left span	5000	74.9	799.9	392.0	408.0	806.8	388.9	417.9	0.9915	1.0078
								Average Correction Factor	0.9951	0.9973

Corrcted As found NO_X= 810.6 NO= 807.8 Percent Change NO_X= -1.1% NO= -1.0%

Previous Response NO_X= 801.8 NO= 800.1

GPT Calibration Data

Dilution Flow 5000 ccm Source Gas Flow 74.9 ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
Cal zero			0.0			0.0			N/A	
1st NO2 (300)	----	392.0	410.2	803.9	392.0	411.9	0.9804	1.0000	0.9958	100.4%
2nd NO2 (200)	----	520.4	281.8	804.1	520.4	283.8	0.9801	1.0000	0.9931	100.7%
3rd NO2 (100)	----	655.0	147.2	804.7	655.0	149.1	0.9794	1.0000	0.9867	101.4%
4th NO2 (0)	802.2	----	1.4	803.6	802.2	1.4	0.9808	1.0000	N/A	----
					Average Correction Factor		0.9802	1.0000	0.9918	100.8%

Calibration Performed By: Ryan Power

Wood Buffalo Environmental Association

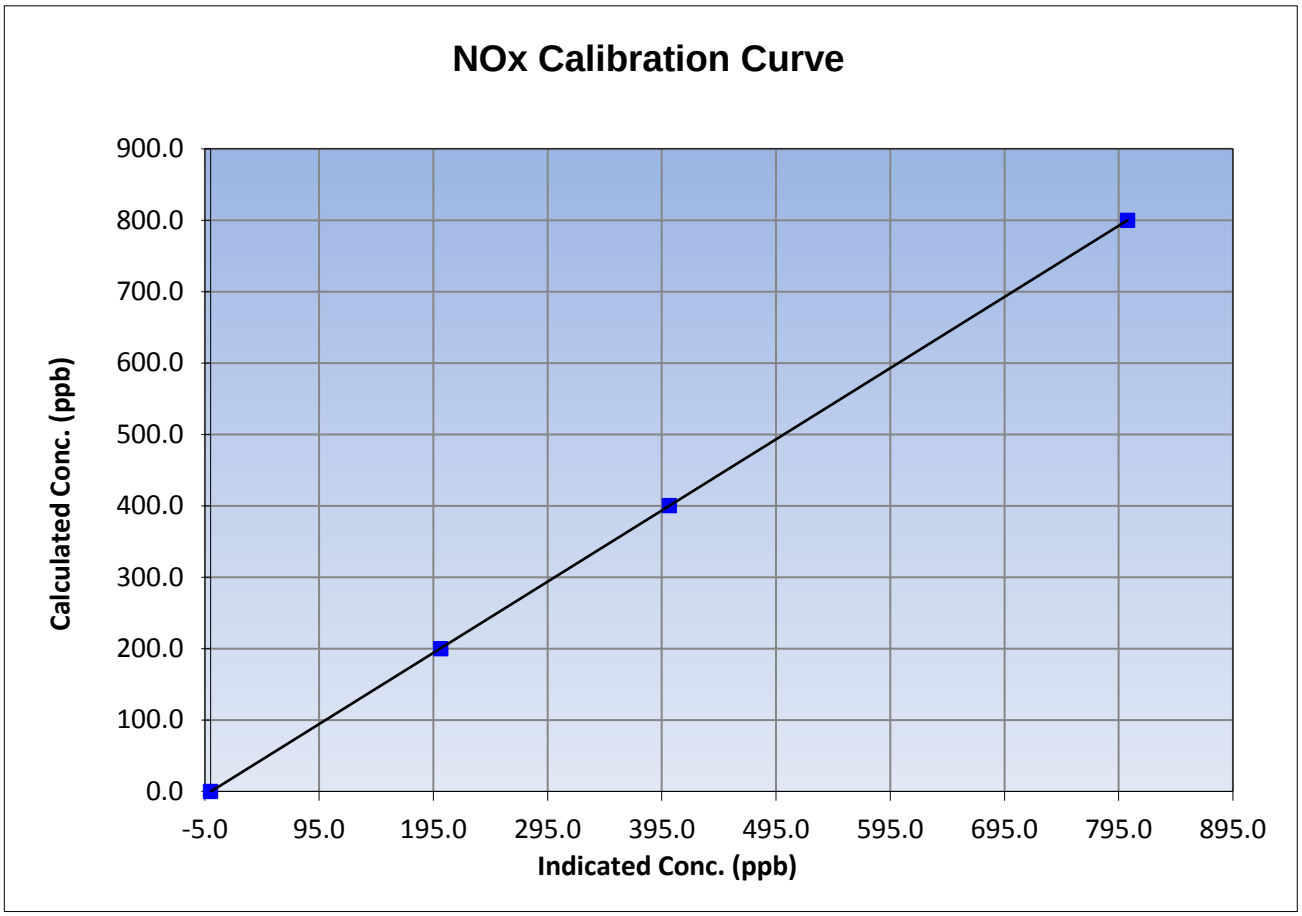
NO_X Calibration Summary

Station Information

Calibration Date	August 17, 2015	Previous Calibration	July 20, 2015
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	9:15	End Time (MST)	15:00
Analyzer make	Thermo 42i	Analyzer serial #	1426262592

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999997
799.9	802.7	0.9966		
400.5	401.6	0.9972	Slope	0.997035
199.7	201.4	0.9915		
			Intercept	-0.358479



Wood Buffalo Environmental Association

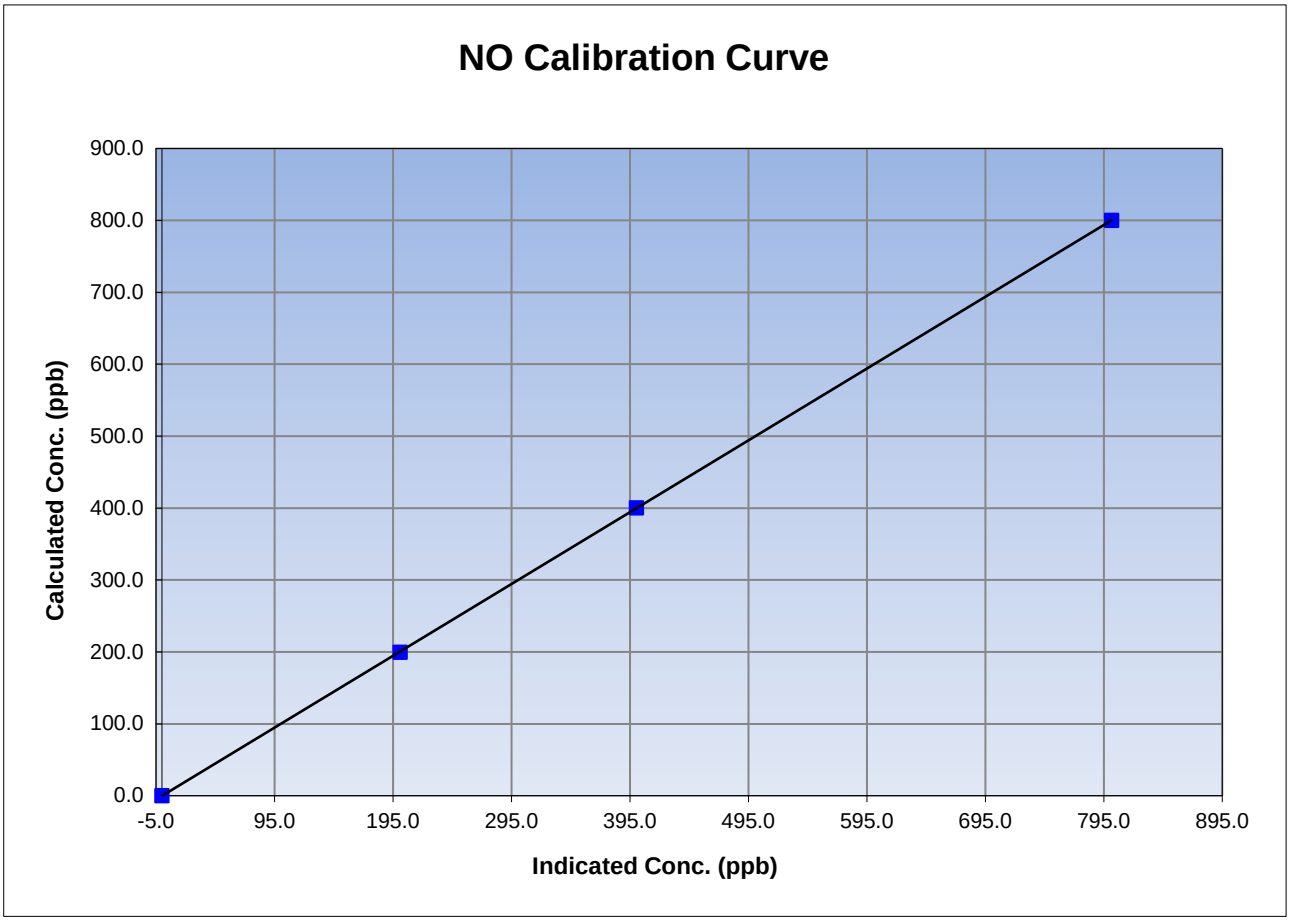
NO Calibration Summary

Station Information

Calibration Date	August 17, 2015	Previous Calibration	July 20, 2015
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	9:15	End Time (MST)	15:00
Analyzer make	Thermo 42i	Analyzer serial #	1426262592

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999996
799.9	801.5	0.9981		
400.5	400.5	1.0001	Slope	0.998579
199.7	201.0	0.9936		
			Intercept	-0.186985



Wood Buffalo Environmental Association

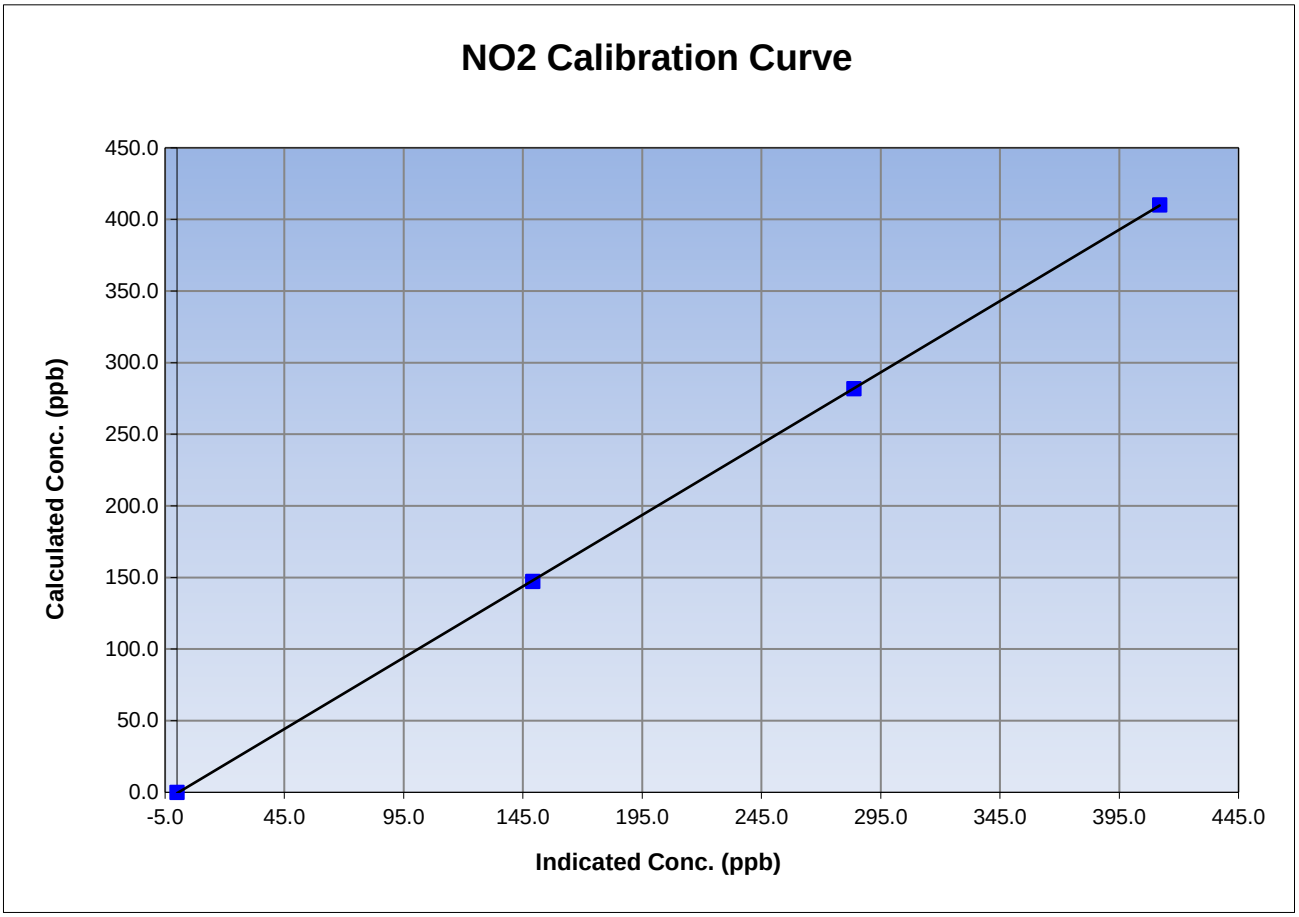
NO_2 Calibration Summary

Station Information

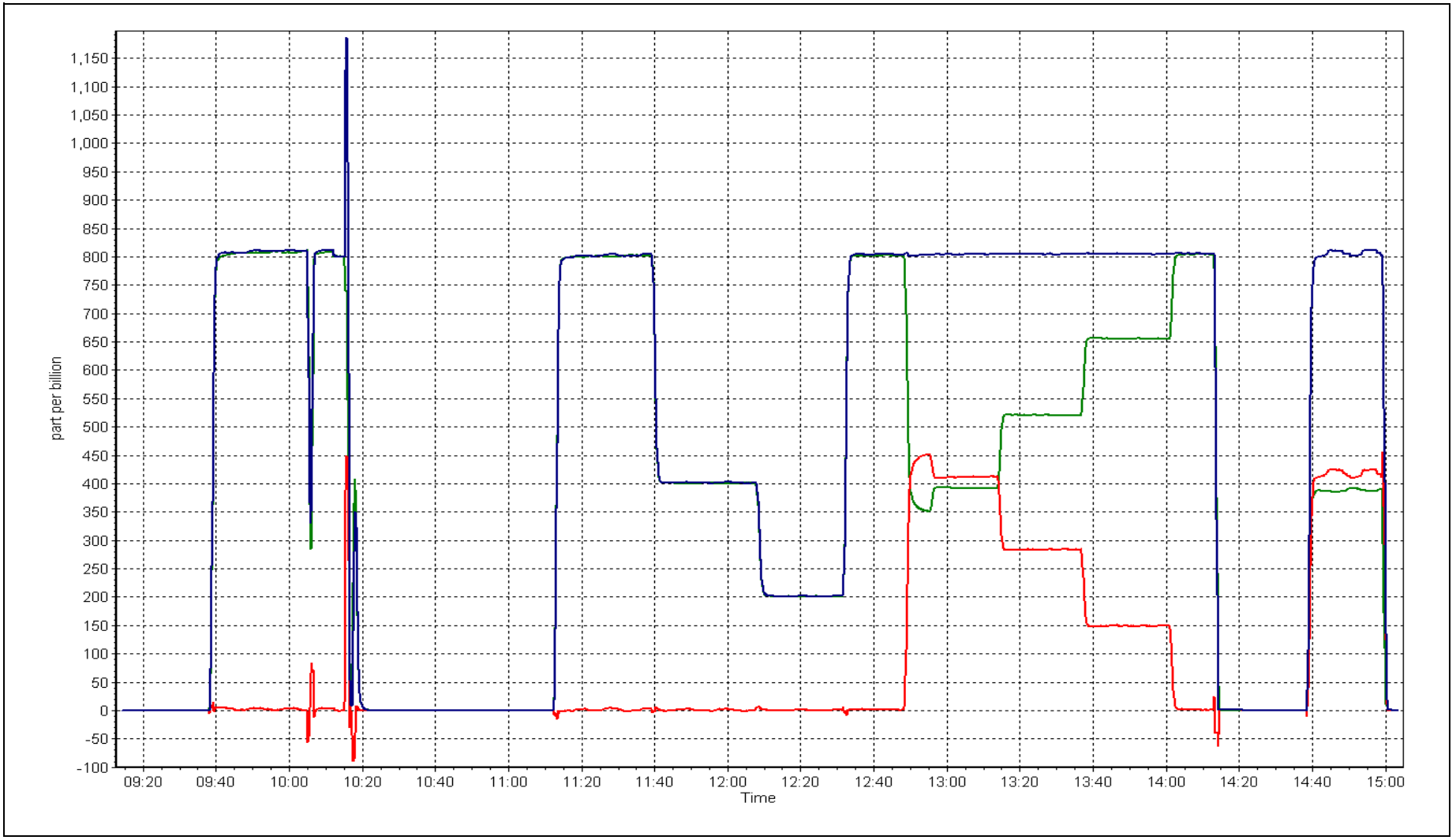
Calibration Date	August 17, 2015	Previous Calibration	July 20, 2015
Station Number	Anzac	Station Number	AMS 14
Start Time (MST)	9:15	End Time (MST)	15:00
Analyzer make	Thermo 42i	Analyzer serial #	1426262592

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999986
410.2	411.9	0.9958		
281.8	283.8	0.9931	Slope	0.996146
147.2	149.1	0.9867		
			Intercept	-0.618463



NOx, NO & NO_2 Calibration Plot Date: August 17, 2015



Wood Buffalo Environmental Association

SHARP CALIBRATION

STATION INFORMATION

Calibration Date:	August 18, 2015	Previous Calibration:	July 21, 2015
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	10:45	End Time (MST):	12:00
Calibrator Make/Model:	Delta Cal	Calibrator Serial Number:	1212

SHARP INFORMATION

Particulate Fraction:	PM2.5
Make/Model:	Thermo / SHARP 5030
Serial Number	E-2025
Source SN:	4933
HEPA PN:	12144
Time Correct (MST):	YES
Paremeters Checked:	T1, T2, T2,T4, P3, Main Flow, Beta, Neph

CALIBRATION DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	20.0	18.7	-1.3	20.0
T2	30.0	na	na	30.0
T3	27.0	na	na	27.0
T4	25.0	na	na	25.0
RH (%)	28.0	na	na	28.0

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	957	957.0	0.0	957

Main Flow (Lph)

Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
1000	1009	9	1002	1000

Nephalometer Calibration

Parameter	As Founds	Zeroed (Limit +or- 2.0ug/m3)	As Left
Analog	189		189
Neph	1.8		-0.3
C14	4.3		5.7
Indicated Concentration (ug/m3)	**0.6**	**no**	**-0.2**
Offset 1	190		190.1
Offset 2	31.4		31.7

Leak Check (Quarterly)

Leak Check Date:	August 18, 2015	Previous Leak Check Date:	April 27, 2015

	Measured	Difference LPM (Limit +/- 0.42 LPM)
Flow without adaptor (LPM):	16.82	0.13
Flow with adaptor [turn off pump first](LPM):	16.69	

Mass Foil Calibration (Annualy)

Foil Calibration Date:	June 17, 2015	Previous Foil Calibration:	NA
Zeroed?:			
Foil Mass:	1278	Mass foil set S/N:	2520
Previous Correction Factor:	7020		
New Correction Factor:	6936		

INSPECTION DATA

Item	Condition	Date of install or rebuild
Cyclone	Good / cleaned	18/08/2015
Pump	Good	NA
Filter Tape	Good	NA
Mass Foil Cal Set	Good	NA
HEPA filter	Good	NA

NOTES:

Flow with a small adjustment, nephalometer zeroed, leak check carried out, passed. Cyclone head replaced

Calibration Performed By: Ryan Power

Wood Buffalo Environmental Association

WS/WD Calibration Report

Station Information

Calibration Date	August-17-14	Previous Calibration	July-07-14
Station Number	AMS 14	Station Location	Anzac
Reason:	Routine	Removal	Other:
Start Time (MST)	11:20	End Time (MST)	13:00
Barometric Pressure	NA	Station Temperature	22 Deg C
WS Calibrator	MetOne 053	Serial Number	P15103

WIND SPEED

Sensor make/model	010-c	Sensor serial #	B4129
DACS make	Campbel Scientific CR3000	DACS serial No.	8790
DACS voltage range	5000	DACS channel #	P2
	Before		After
DACS slope	N/A	DACS slope	N/A
DACS intercept	N/A	DACS intercept	N/A
Calculated slope	0.987754732	Calculated slope	0.999369
Calculated intercept	0.116655049	Calculated intercept	-0.009222

Wind Speed Calibration Data

Shaft RPM	Actual Speed (K/hr)	Indicated Speed (K/hr)	Correction factor
0	0	0.0	n/a
200	20.162	20.2	0.9981
400	39.352	39.4	0.9988
600	58.555	58.6	0.9992
800	77.752	77.8	0.9994
Average Correction Factor			0.9989

WIND DIRECTION

Sensor make/model	020C-1	Sensor serial #	P22886
DACS make	Campbel Scientific CR3000	DACS serial No.	8079
DACS voltage range	5000	DACS channel #	SE24
	Before		After
DACS slope	N/A	DACS slope	N/A
DACS intercept	N/A	DACS intercept	N/A
Calculated slope	1.004992821	Calculated slope	0.998863
Calculated intercept	-0.752983894	Calculated intercept	-1.054966

Wind Direction Calibration Data

Physical Direction (Degrees)	Indicated Direction (Degrees)	Correction factor
0	1.5	n/a
90	90.7	0.9923
180	180.8	0.9956
270	271.9	0.9930
355	356.4	0.9961
Average Correction Factor		0.9942

Notes:

Declination confirmed with compass, 14 degrees West of magnetic North

Sensors cleaned out around moving parts, dusty

Bearings feel good for Wind Speed, ok for Wind Direction

Calibration Performed By: Ryan Power

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 15
CNRL HORIZON
AUGUST 2015

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

September 28, 2015

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CNRL HORIZON (AMS 15)
AUGUST 2015

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	707	37	37	100.00	34	0	3	0
TRS (ppb) Average	707	36	37	99.87	2	0	1	0
THC (ppm) Average	707	37	37	100.00	5.3	-	2.6	-
NO2 (ppb) Average	707	37	37	100.00	26	0	8	-
NO (ppb) Average	707	37	37	100.00	56	-	8	-
NOX (ppb) Average	707	37	37	100.00	64	-	14	-
PM2.5 (ug/m3) Average	743	1	1	100.00	198.1	-	22.4	0
Temperature 2 m (C) Average	744	0	0	100.00	30	-	23	-
Wind Speed 10 m (km/h) Average	743	0	1	99.87	22	-	14	-
Wind Direction 10 m (deg) Average	743	0	1	99.87	-	-	-	-
Precipitation (mm) Total	744	0	0	100.00	2.3	-	6.1	-
Relative Humidity (%) Average	744	0	0	100.00	99	-	87	-
Global Solar Radiation (W/m2) Average	744	0	0	100.00	897	-	283	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CNRL HORIZON (AMS 15)
AUGUST 2015

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

					Percentile						
Parameter	Number	Mean	StnDev	Total	Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	707	0.6	2	-	0	0	0	0	0	2	34
TRS (ppb) Average	707	0.2	0	-	0	0	0	0	0	0	2
THC (ppm) Average	707	2.15	0.3	-	1.8	1.9	2	2.1	2.2	2.4	5.3
NO2 (ppb) Average	707	3.1	4	-	0	0	1	2	4	8	26
NO (ppb) Average	707	1.5	5	-	0	0	0	0	1	3	56
NOX (ppb) Average	707	4.6	8	-	0	0	1	2	6	11	64
PM2.5 (ug/m3) Average	743	6.47	10.2	-	0	1	2.1	4.3	8.2	12.5	198.1
Temperature 2 m (C) Average	744	16.68	5.5	-	0.2	9.8	13.2	16.4	20.4	24.4	30
Wind Speed 10 m (km/h) Average	743	7.8	4	-	0	3	5	7	10	14	22
Wind Direction 10 m (deg) Average	743	-	-	-	-	-	-	-	-	-	-
Precipitation (mm) Total	744	-	-	25.65	-	-	-	-	-	-	-
Relative Humidity (%) Average	744	67.3	20	-	24	38	52	68	83	95	99
Global Solar Radiation (W/m2) Average	744	195.2	244	-	0	0	0	70	348	609	897

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CNRL HORIZON (AMS 15)
AUGUST 2015

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
TRS	30 Aug 2015 12:00	30 Aug 2015 12:00	1	Maintenance - replaced calibration gas cylinder
Wind Speed, Wind Direction	03 Aug 2015 00:00	03 Aug 2015 00:00	1	Flat line in sensor output signal

Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO_2) - ppb

CNRL Horizon - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 34 ppb on Aug 29 17:00 Maximum Daily Average: 2.9 ppb on Aug 29

Minimum Value: 0 ppb on Aug 1 01:00 Minimum Daily Average: 0.0 ppb on Aug 14
Maximum Diurnal Average: 1.9 ppb at hour 17 Minimum Diurnal Average: 0.1 ppb at hour 1
Monthly Average: 0.6 ppb Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 2$ $P_{99} = 8$

Hours in Service:	744
Hours of Data:	707
Hours of Missing Data:	37
Hours of Calibration:	37
Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0	0	0	Z	0	0	0	0	2	8	6	1	1	0	0	3	6	2	0	0	0	0	0	0	1.3	8
2-Aug	0	0	0	0	Z	0	0	0	2	6	3	6	2	1	2	7	1	3	2	1	1	0	0	0	1.6	7
3-Aug	0	0	0	0	0	Z	0	1	1	2	1	1	1	0	0	0	0	0	0	0	0	0	1	0	0.4	2
4-Aug	Z	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	2
5-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	2	1	4	2	3	1	0	0.7	4
6-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
7-Aug	0	0	0	Z	0	0	0	0	0	1	1	2	5	5	4	3	2	2	1	1	1	1	1	0	1.3	5
8-Aug	0	1	3	1	Z	0	0	0	0	0	1	2	13	10	13	12	4	2	1	0	0	0	0	0	2.8	13
9-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	1	1	0	1	2	4	9	3	2	4	2	1	1.4	9
10-Aug	Z	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	2
11-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
12-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
13-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
14-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
15-Aug	0	0	0	0	2	Z	0	0	1	2	2	1	3	1	0	2	2	1	0	4	0	0	2	0	1.0	4
16-Aug	Z	0	0	0	0	0	0	0	0	3	5	1	0	1	0	0	0	0	0	0	0	0	0	0	0.4	5
17-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0.2	5
18-Aug	0	0	Z	0	0	0	0	0	0	0	0	1	0	0	0	2	0	1	3	2	1	0	0	0	0.4	3
19-Aug	0	0	2	Z	2	2	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	3
20-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
21-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.0	1
22-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
23-Aug	0	Z	0	0	0	0	0	0	0	1	2	4	7	2	6	3	4	4	2	1	2	5	0	0	1.9	7
24-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
25-Aug	0	0	0	Z	0	0	0	0	1	C	C	C	C	C	C	0	0	0	0	0	0	0	0	0	--	1
26-Aug	0	0	0	0	Z	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.2	1
27-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
28-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.0	1
29-Aug	0	Z	0	0	0	0	0	0	0	1	1	0	0	0	0	9	34	14	5	1	0	0	0	0	2.9	34
30-Aug	0	0	Z	1	0	0	0	1	4	8	5	1	0	0	0	0	0	0	1	3	15	2	0	0	1.8	15
31-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
	0.1	0.1	0.3	0.1	0.2	0.1	0.1	0.1	0.4	1.1	0.9	0.8	1.2	0.7	1.0	1.4	1.9	1.1	0.8	0.6	0.8	0.6	0.3	0.1	Diurnal Average	
	0	1	3	1	2	2	3	1	4	8	6	6	13	10	13	12	34	14	9	4	15	5	2	1	Diurnal Maximum	

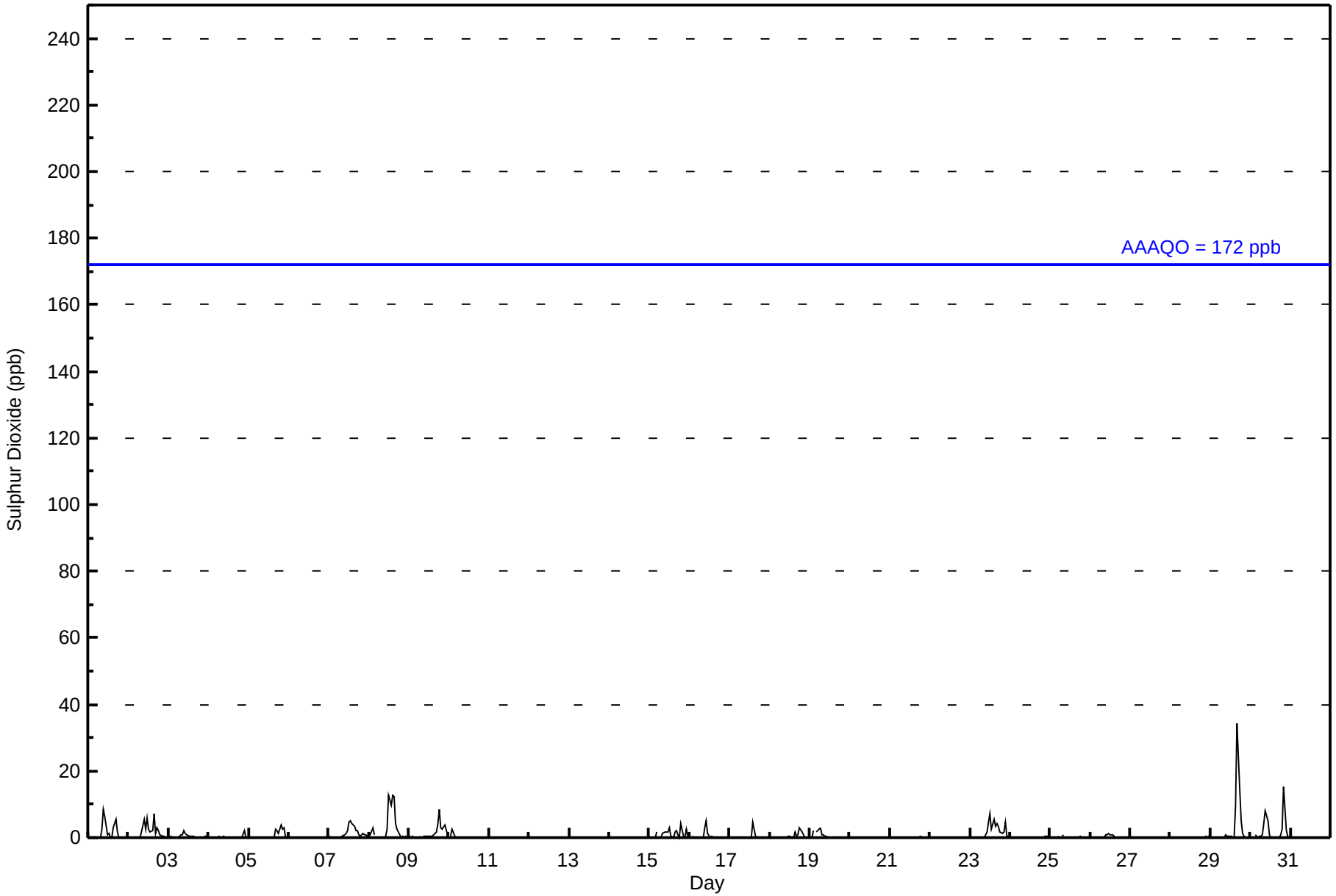
Z - zerospan C - Calibration
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb

Wood Buffalo Environmental Association

Hourly Averages

Sulphur Dioxide (SO_2) - ppb

CNRL Horizon - August 2015



Sulphur Dioxide (SO_2) - ppb

CNRL Horizon - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	701	99.15	99.15
11 - 20	5	0.71	99.86
21 - 60	1	0.14	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

CNRL Horizon - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 10	61	26	15	28	18	19	21	36	67	89	120	56	49	45	25	25	700
11 - 20	0	1	0	0	0	0	1	1	1	0	0	0	0	1	0	0	5
21 - 60	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	61	27	15	28	18	19	23	37	68	89	120	56	49	46	25	25	706

Total Number of Valid Hours: 706

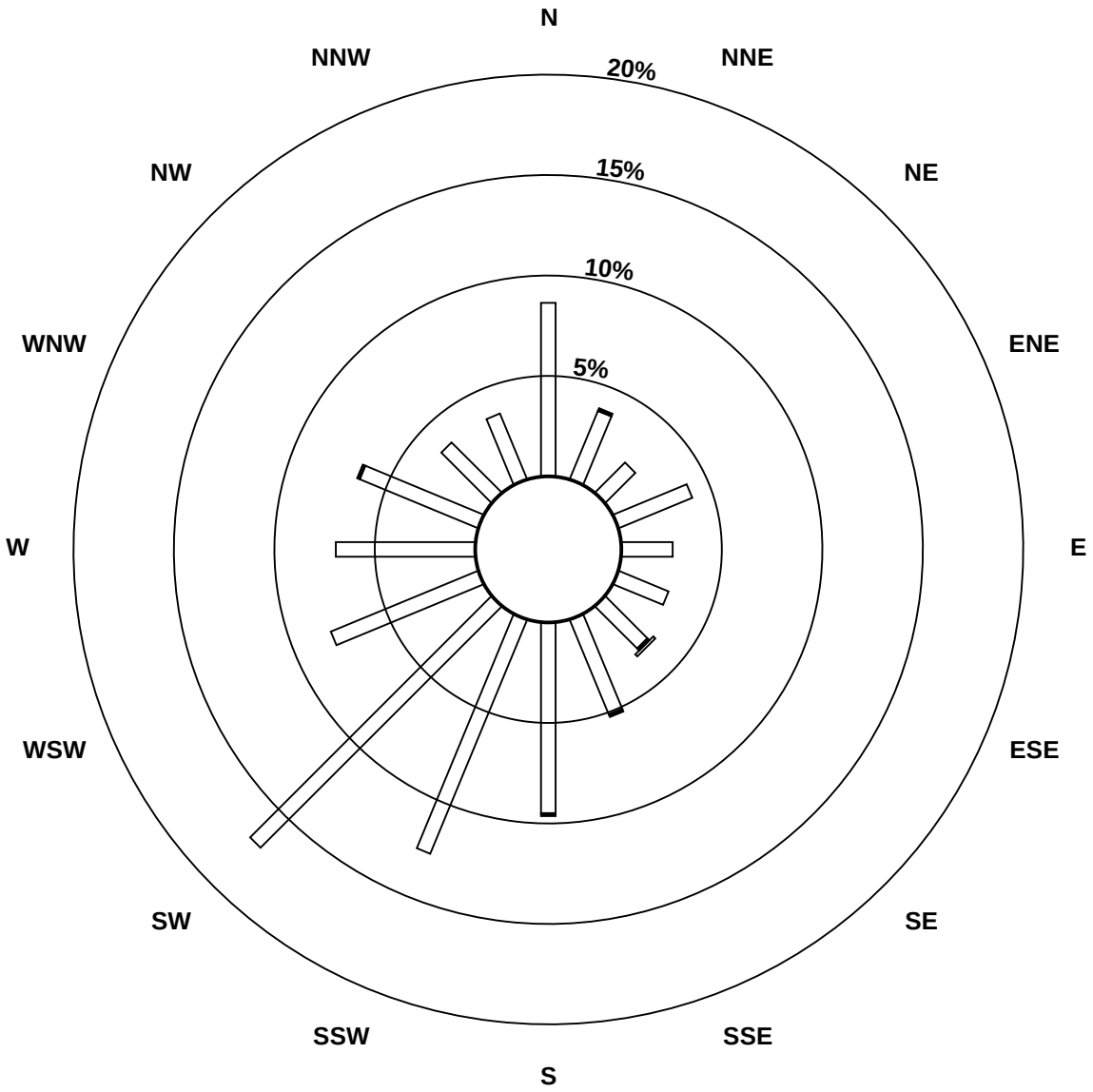
Total Number of Hours: 744

Wood Buffalo Environmental Association

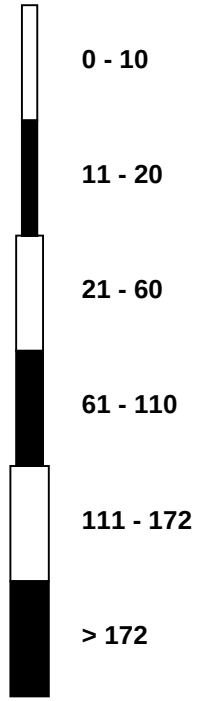
Wind Rose Aug 2015

Sulphur Dioxide (SO_2) - ppb

CNRL Horizon (AMS 15)



Classes (ppb)



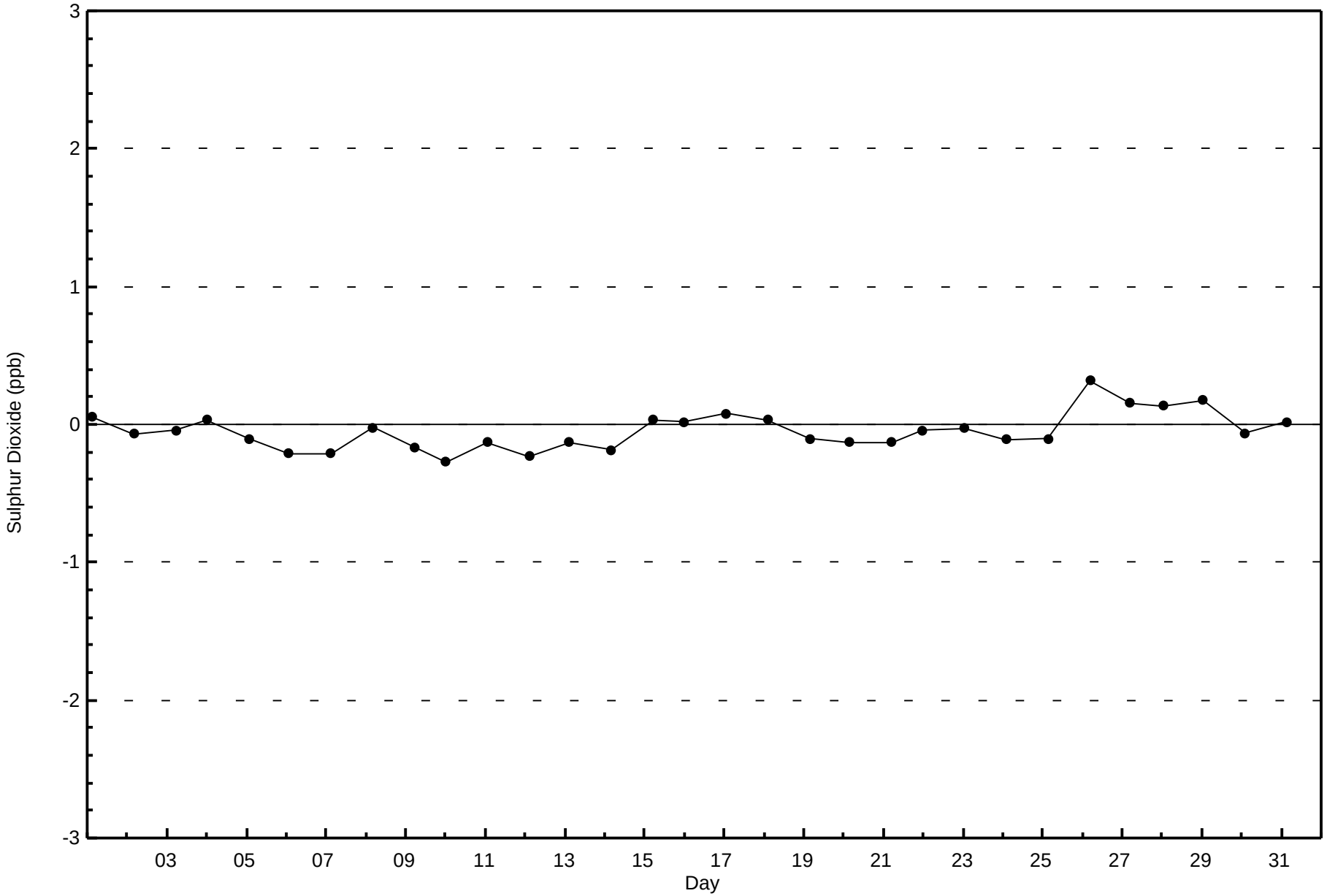
Total Number of Valid Hours: 706

Wood Buffalo Environmental Association

Zero Responses

Sulphur Dioxide (SO_2) - ppb

CNRL Horizon - August 2015

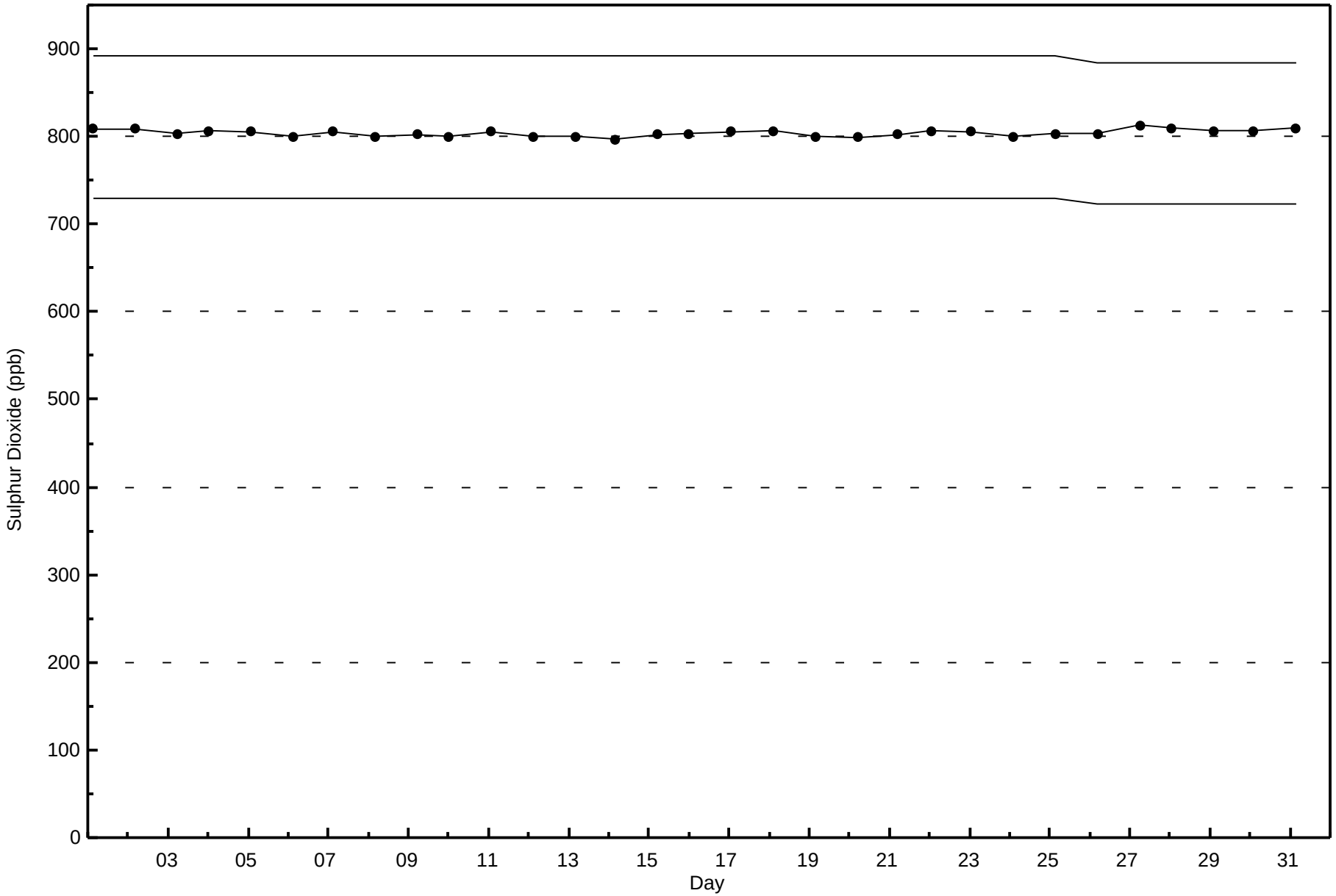


Wood Buffalo Environmental Association

Span Responses

Sulphur Dioxide (SO_2) - ppb

CNRL Horizon - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

CNRL Horizon - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 2 ppb on Aug 30 21:00

Maximum Daily Average: 0.5 ppb on Aug 8

Minimum Value: 0 ppb on Aug 6 11:00

Minimum Daily Average: 0.1 ppb on Aug 6

Maximum Diurnal Average: 0.3 ppb at hour 6

Minimum Diurnal Average: 0.2 ppb at hour 15

Monthly Average: 0.2 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 0$ $P_{99} = 1$

Hours in Service:	744
Hours of Data:	707
Hours of Missing Data:	37
Hours of Calibration:	36
Percent Operational Time:	99.9

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

Z - zerospan C - Calibration M - Maintenance

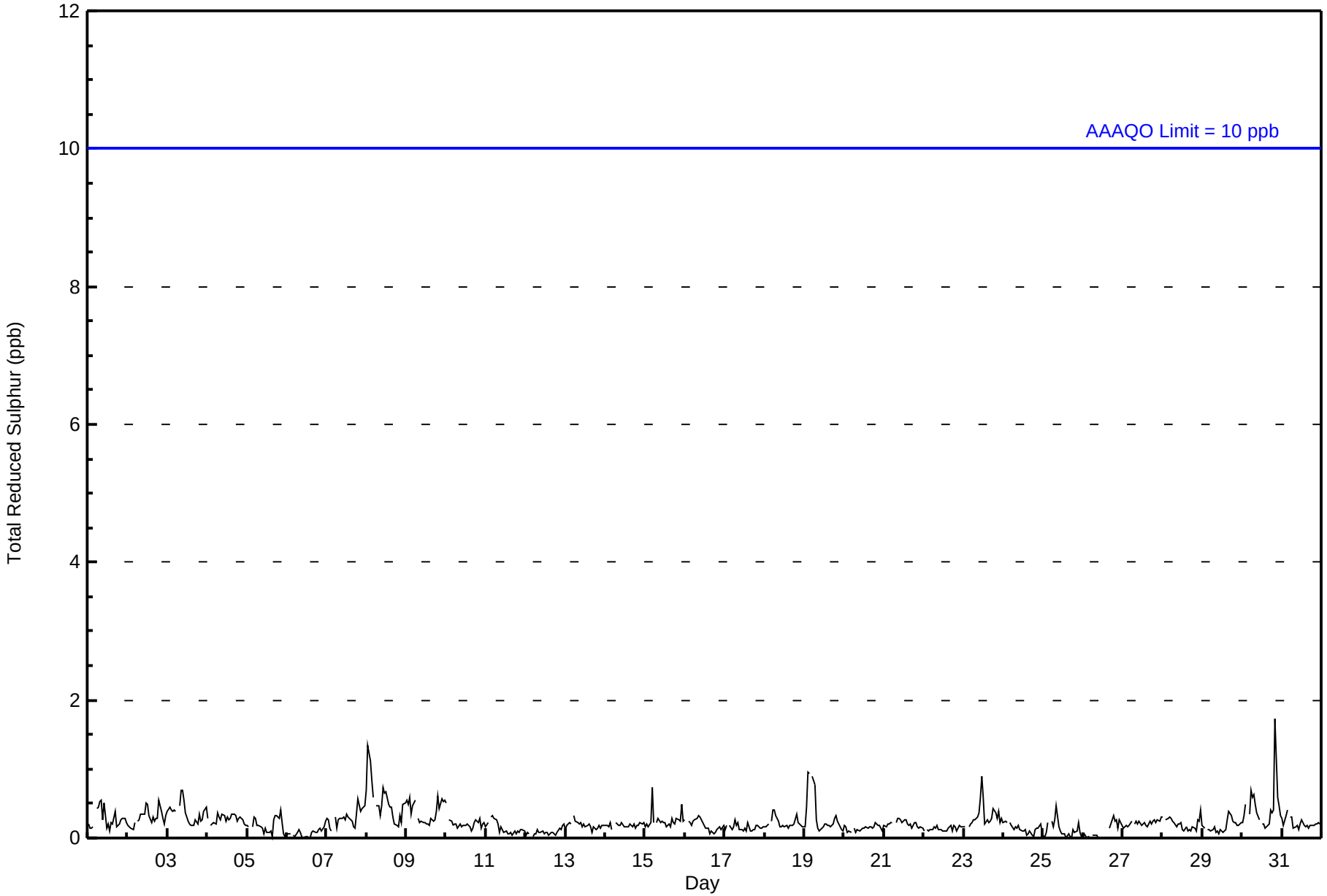
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb

Wood Buffalo Environmental Association

Hourly Averages

Total Reduced Sulphur (TRS) - ppb

CNRL Horizon - August 2015



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

Total Reduced Sulphur (TRS) - ppb

CNRL Horizon - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 2	62	30	15	27	19	19	23	38	67	85	117	60	49	44	24	27	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	62	30	15	27	19	19	23	38	67	85	117	60	49	44	24	27	706

Total Number of Valid Hours: 706

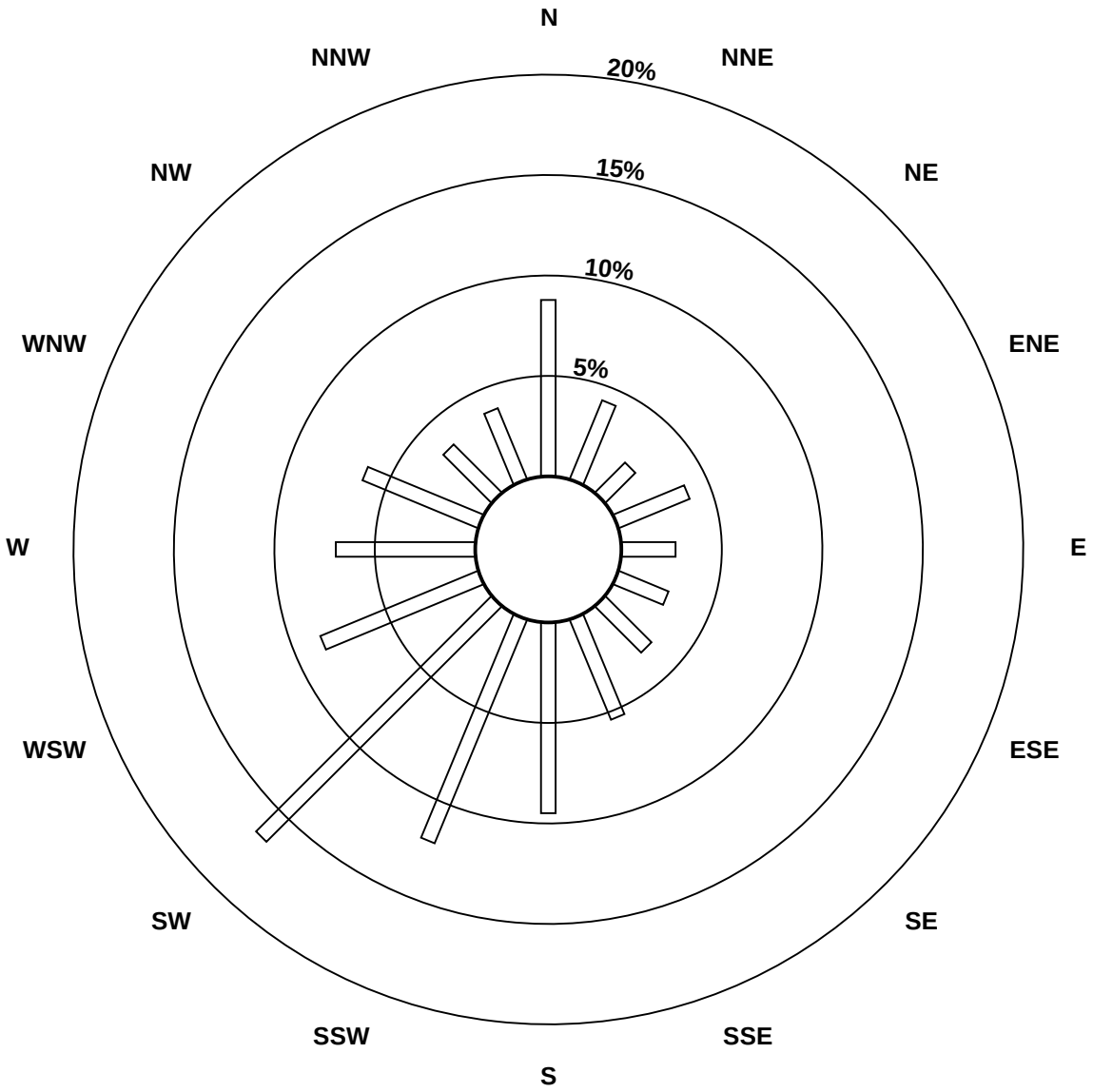
Total Number of Hours: 744

Wood Buffalo Environmental Association

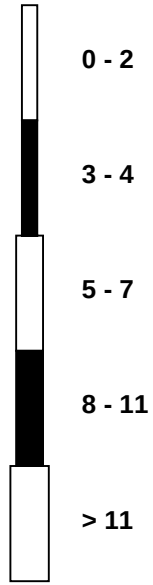
Wind Rose Aug 2015

Total Reduced Sulphur (TRS) - ppb

CNRL Horizon (AMS 15)



Classes (ppb)



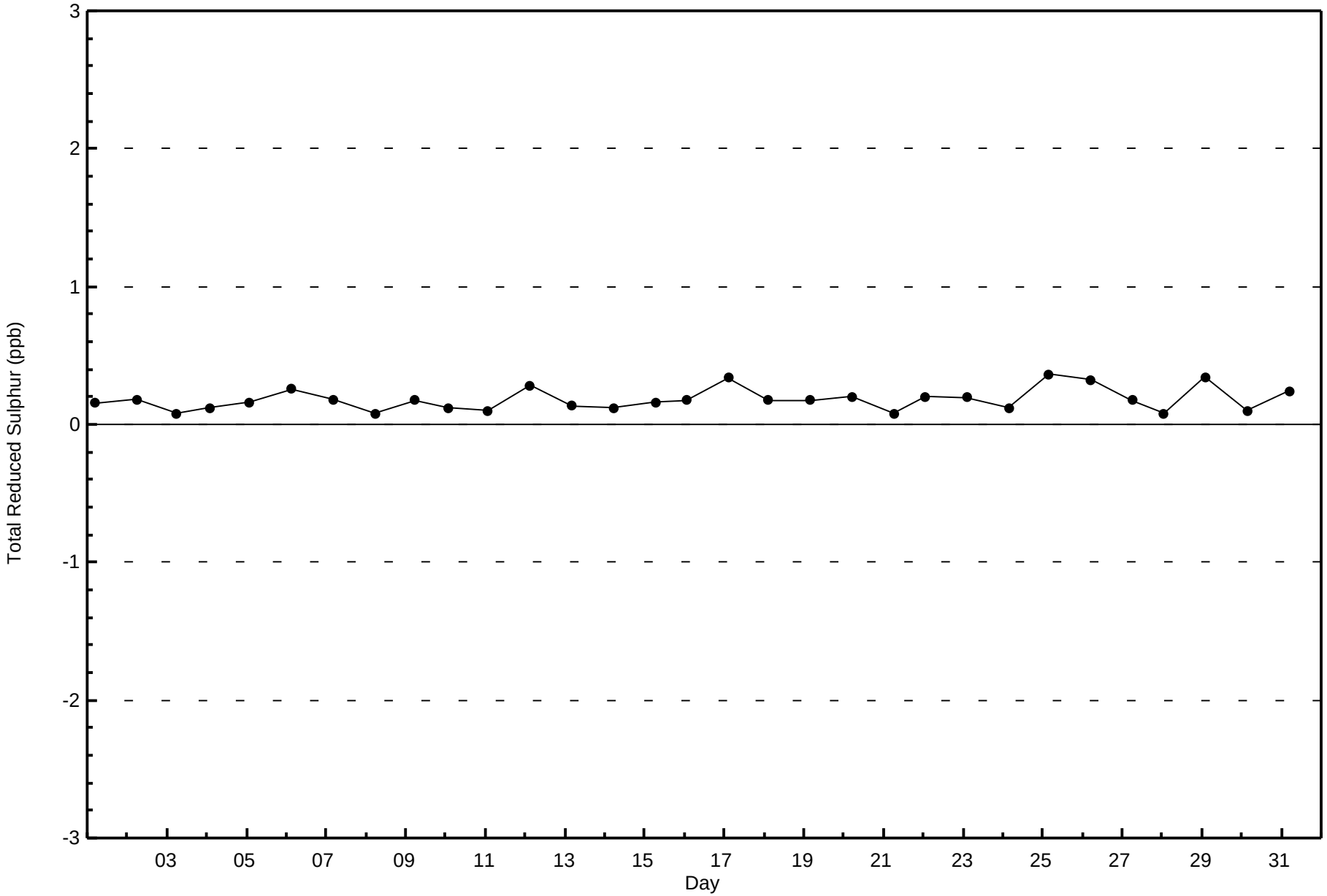
Total Number of Valid Hours: 706

Wood Buffalo Environmental Association

Zero Responses

Total Reduced Sulphur (TRS) - ppb

CNRL Horizon - August 2015

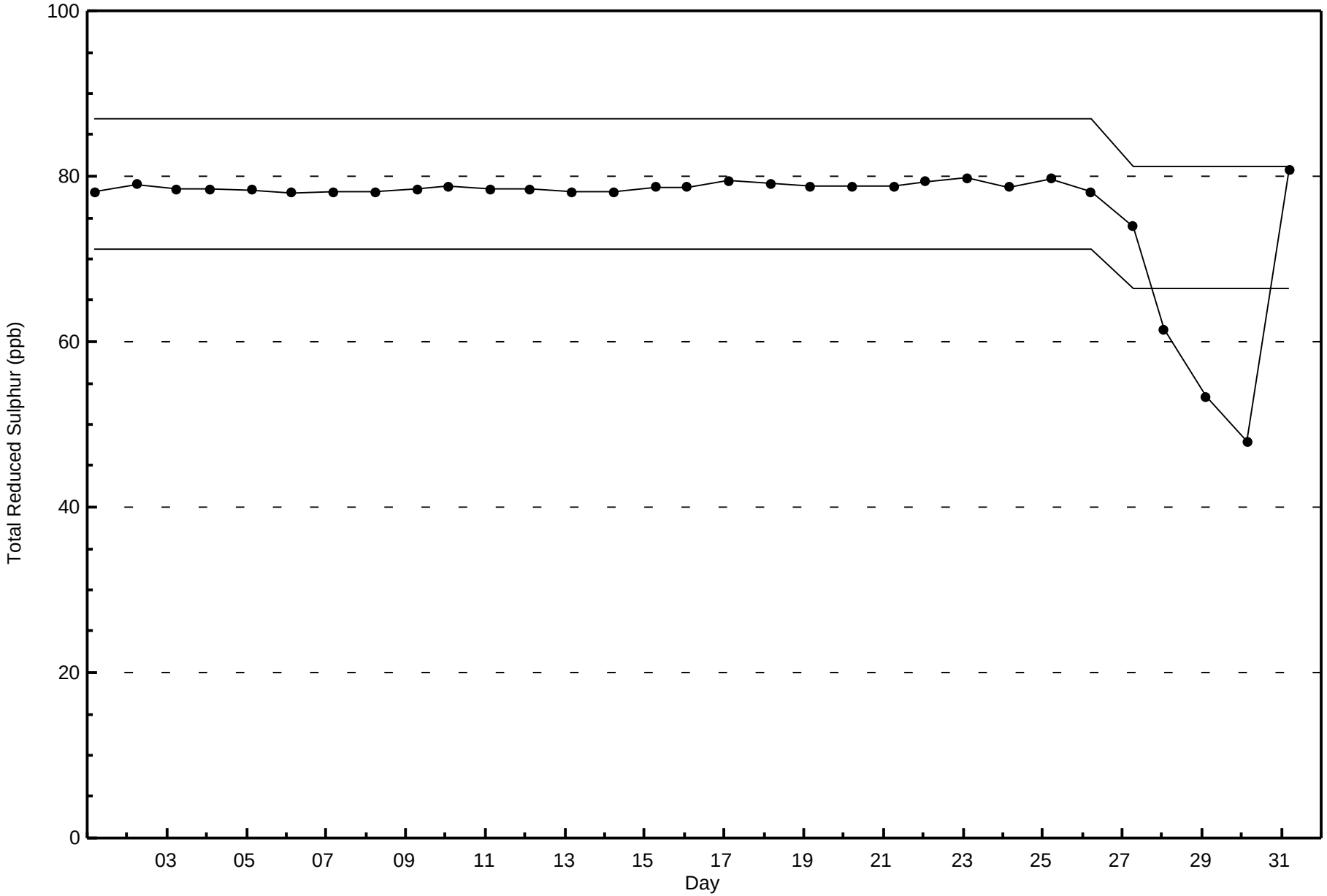


Wood Buffalo Environmental Association

Span Responses

Total Reduced Sulphur (TRS) - ppb

CNRL Horizon - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

CNRL Horizon - August 2015

Maximum Value: 5.3 ppm on Aug 25 05:00

Maximum Daily Average: 2.6 ppm on Aug 1

Minimum Value: 1.8 ppm on Aug 13 18:00

Minimum Daily Average: 2.0 ppm on Aug 13

Maximum Diurnal Average: 2.3 ppm at hour 5

Minimum Diurnal Average: 2.0 ppm at hour 14

Monthly Average: 2.15 ppm

Percentiles: P_1 = 1.9 P_{10} = 1.9 Q_1 = 2.0 Median = 2.1 Q_3 = 2.2 P_{90} = 2.4 P_{99} = 3.4

Hours in Service:	744
Hours of Data:	707
Hours of Missing Data:	37
Hours of Calibration:	37
Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	2.3	2.1	2.5	Z	3.1	3.7	3.4	3.6	2.8	2.1	2.0	2.0	2.2	2.2	3.1	2.2	2.0	2.0	2.0	2.5	2.6	3.1	2.7	2.4	2.6	3.7
2-Aug	2.2	2.2	2.2	2.3	Z	2.1	2.2	2.4	2.3	2.1	2.1	2.2	2.2	2.1	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.4
3-Aug	2.3	2.4	2.4	2.5	2.6	Z	2.2	2.5	3.4	3.1	3.0	2.3	2.2	2.1	2.1	2.1	2.1	2.2	2.0	2.0	2.0	2.1	2.4	2.1	2.4	3.4
4-Aug	Z	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	2.2	2.2	2.2	2.3	2.0	2.4	2.2	2.0	2.0	2.0	2.1	2.4
5-Aug	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.0	2.0	1.9	1.9	2.1	2.1	2.1	2.0	2.0	2.1	2.0	2.0	2.0	2.1
6-Aug	2.0	2.0	Z	2.1	2.2	2.2	2.2	2.4	2.2	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.2	2.4	2.1	2.4
7-Aug	2.8	2.5	2.1	Z	2.1	2.3	2.2	2.5	2.7	2.5	2.4	2.4	2.4	2.1	2.1	2.0	2.1	2.1	2.1	2.2	3.2	3.4	3.3	2.6	2.4	3.4
8-Aug	2.2	2.3	2.6	2.4	Z	2.2	2.3	2.4	2.3	2.2	2.4	2.3	2.1	2.1	2.1	2.2	2.3	2.2	2.0	2.0	2.1	2.1	2.3	2.4	2.2	2.6
9-Aug	2.7	2.5	2.8	2.3	2.4	Z	2.2	2.1	2.1	2.1	2.3	2.3	2.4	2.2	2.1	2.0	2.0	2.1	2.1	2.2	2.2	2.4	2.4	2.5	2.3	2.8
10-Aug	Z	3.0	2.1	2.1	2.1	2.0	2.0	1.9	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	3.0
11-Aug	2.0	Z	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1	2.6	2.5	2.0	2.0	2.6
12-Aug	2.0	2.0	Z	2.1	2.0	2.0	2.0	2.0	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.1
13-Aug	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	1.9	1.9	1.9	1.8	1.8	1.9	1.9	1.9	1.9	2.0	1.9	2.0	2.1
14-Aug	2.2	2.1	2.0	1.9	Z	1.9	2.0	2.1	2.0	2.0	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.3	2.2	2.0	2.0	2.3	2.0	2.3
15-Aug	2.1	2.0	2.1	2.1	2.1	Z	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.0	1.9	1.9	2.0	2.1	2.0	2.0	2.2	2.2	2.2	2.1	2.0	2.2
16-Aug	Z	2.4	2.4	2.2	2.1	2.1	2.3	2.6	2.9	2.7	2.2	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.2	2.3	2.2	2.1	2.1	2.1	2.2	2.9
17-Aug	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	2.0	2.0	2.2	2.5	2.0	2.2	2.4	2.1	2.1	2.1	2.1	2.1	2.5
18-Aug	2.1	2.1	Z	3.0	3.3	3.8	3.1	2.5	2.2	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	2.3	3.8
19-Aug	2.1	2.3	2.5	Z	2.4	2.4	2.3	2.2	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.5
20-Aug	1.9	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	2.1	2.1	2.2	2.1	2.1	2.2	2.2	2.0	1.9	2.0	2.2
21-Aug	1.9	1.9	2.0	2.0	2.0	Z	2.0	2.2	2.2	2.0	2.0	2.1	2.2	2.1	2.2	2.1	2.3	2.2	2.2	2.2	2.3	2.8	3.0	2.4	2.2	3.0
22-Aug	Z	2.1	2.4	2.2	2.6	2.4	2.2	2.4	2.4	2.5	2.2	2.1	2.1	2.1	2.2	2.0	2.1	2.1	2.1	2.1	2.3	2.4	2.4	2.5	2.3	2.6
23-Aug	2.2	Z	2.1	2.0	2.0	2.0	2.1	2.4	2.4	2.3	2.5	2.4	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.1	2.0	2.1	2.5
24-Aug	2.1	2.0	Z	2.3	2.0	2.0	2.0	1.9	2.0	2.0	1.9	1.9	1.9	2.0	1.9	2.0	2.2	2.2	2.0	2.5	3.1	3.1	3.1	2.7	2.2	3.1
25-Aug	2.7	2.9	3.4	Z	5.3	2.7	2.3	2.5	2.2	C	C	C	C	C	C	2.0	2.0	2.0	2.2	2.0	2.1	2.1	2.1	2.1	--	5.3
26-Aug	2.0	2.1	2.0	2.0	Z	2.0	2.0	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.3	2.1	2.1	2.3
27-Aug	2.1	2.1	2.1	2.1	2.1	Z	2.2	2.2	2.2	2.1	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.1	2.0	2.1	2.2
28-Aug	Z	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	3.1	3.2	3.1	2.1	3.2
29-Aug	2.2	Z	2.1	2.0	1.9	2.0	2.0	2.0	1.9	1.9	2.0	2.0	1.9	1.9	1.9	2.0	2.0	2.0	1.9	2.1	2.1	2.1	2.2	2.1	2.0	2.2
30-Aug	2.0	2.1	Z	2.3	2.1	2.3	2.3	2.5	2.8	2.3	2.1	2.0	1.9	1.9	1.9	1.9	2.2	2.7	2.1	2.0	2.5	2.2	2.1	2.1	2.2	2.8
31-Aug	2.0	2.0	2.0	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	1.9	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.1
	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.1	2.2	2.3	2.3	2.2	Diurnal Average	
	2.8	3.0	3.4	3.0	5.3	3.8	3.4	3.6	3.4	3.1	3.0	2.4	2.4	2.2	3.1	2.2	2.5	2.7	2.2	2.5	3.2	3.4	3.3	3.1	Diurnal Maximum	

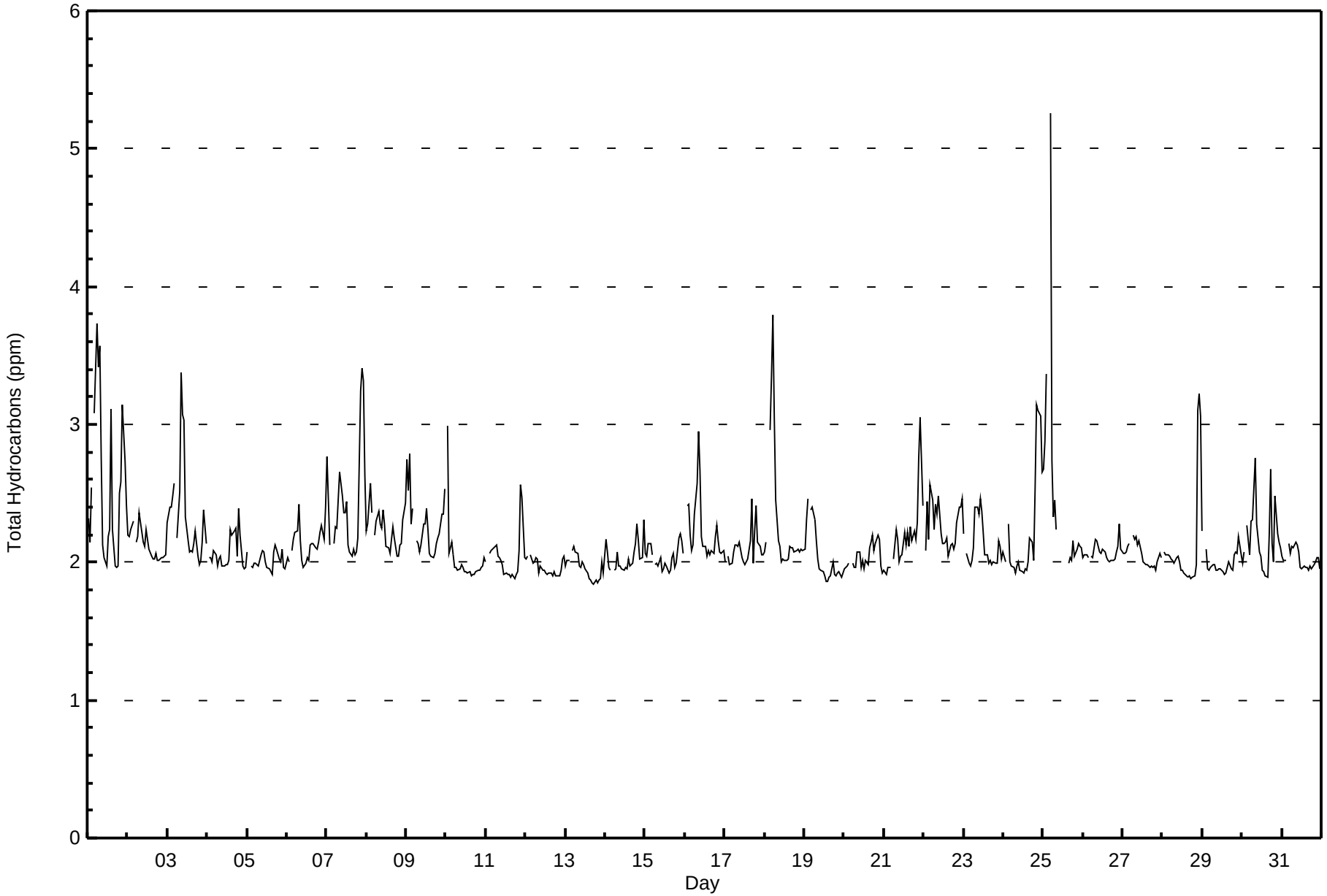
Z - zerospan C - Calibration

Wood Buffalo Environmental Association

Hourly Averages

Total Hydrocarbons (THC) - ppm

CNRL Horizon - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm

CNRL Horizon - August 2015

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	323	45.69	45.69
2.1 - 3.0	362	51.20	96.89
3.1 - 10.0	22	3.11	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

CNRL Horizon - August 2015

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	25	13	4	9	7	3	13	14	25	55	89	33	22	3	3	5	323
2.1 - 3.0	36	13	11	19	10	15	10	23	42	32	30	21	25	36	21	17	361
3.1 - 10.0	0	1	0	0	1	1	0	0	1	2	1	2	2	7	1	3	22
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	61	27	15	28	18	19	23	37	68	89	120	56	49	46	25	25	706

Total Number of Valid Hours: 706

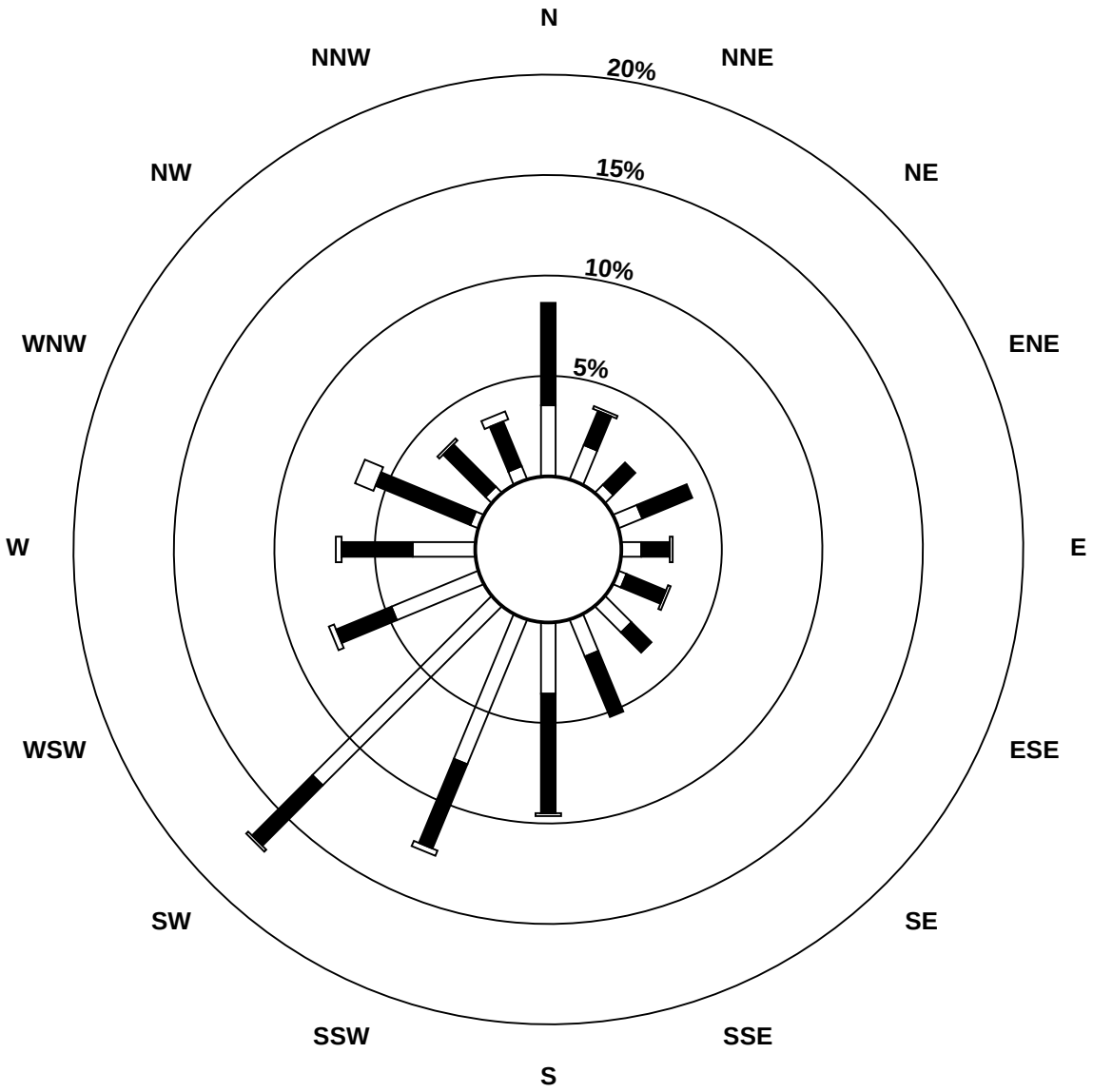
Total Number of Hours: 744

Wood Buffalo Environmental Association

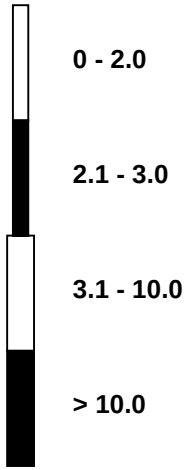
Wind Rose Aug 2015

Total Hydrocarbons (THC) - ppm

CNRL Horizon (AMS 15)



Classes (ppm)



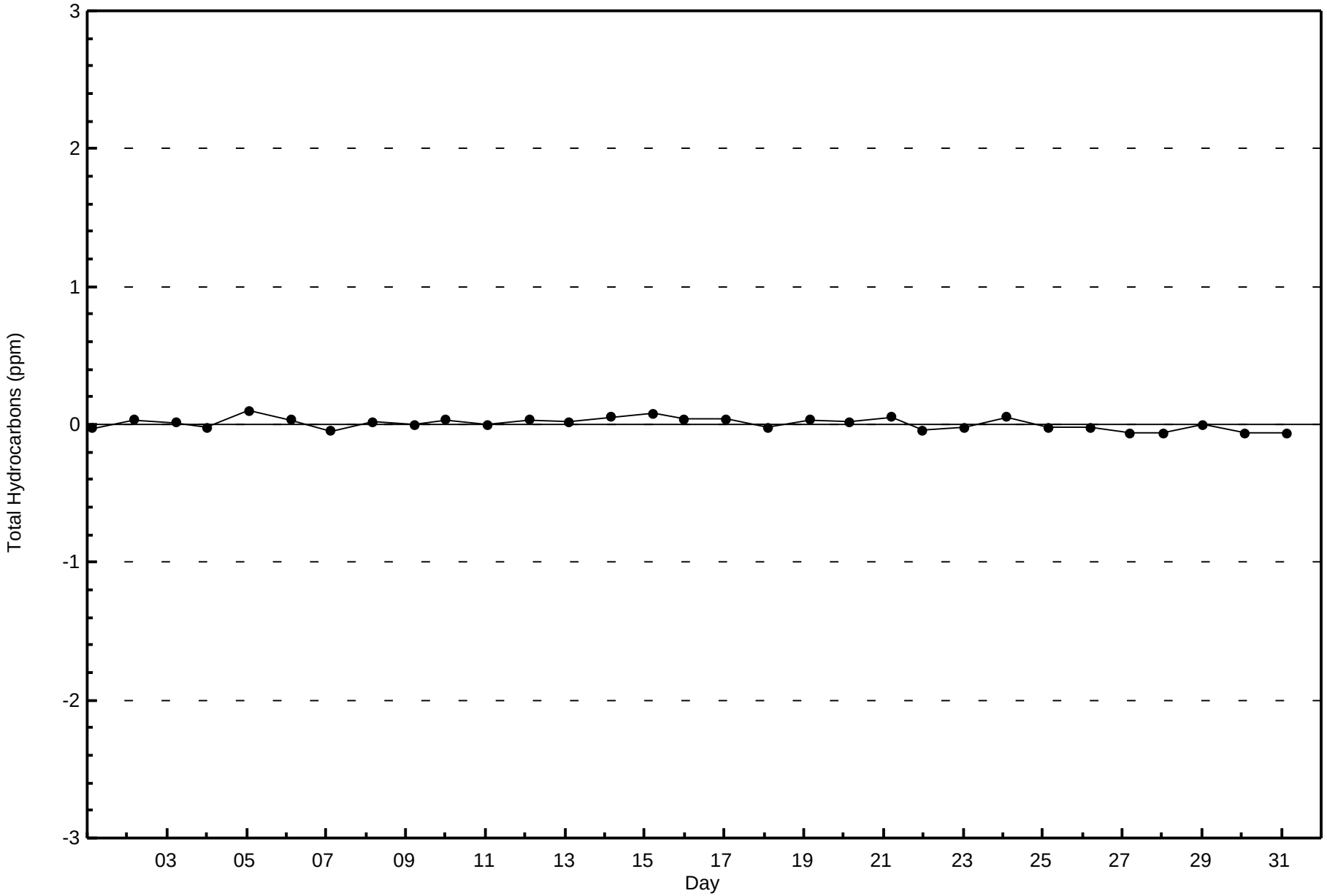
Total Number of Valid Hours: 706

Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

CNRL Horizon - August 2015

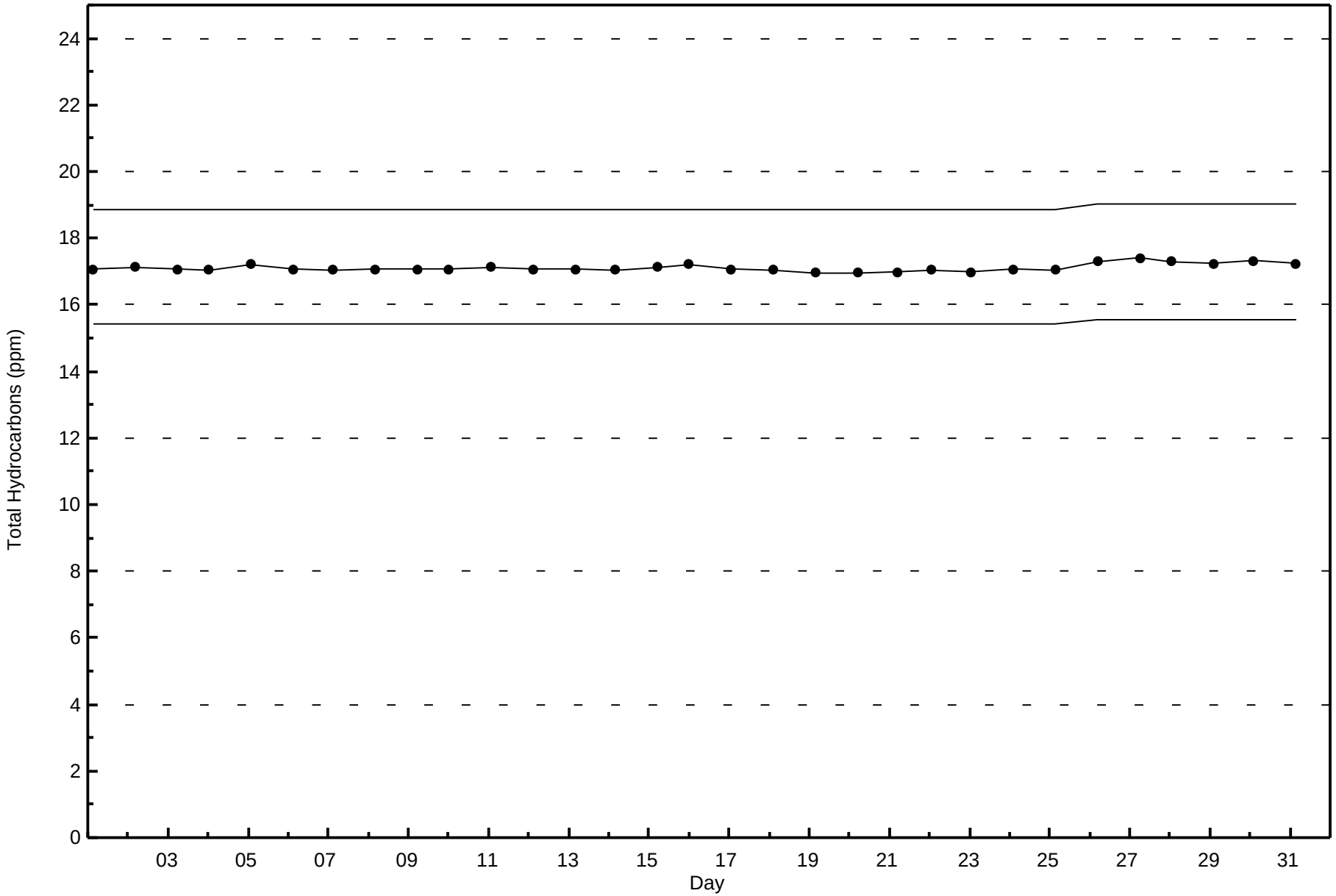


Wood Buffalo Environmental Association

Span Responses

Total Hydrocarbons (THC) - ppm

CNRL Horizon - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

CNRL Horizon - August 2015

Maximum Value: 56 ppb on Aug 25 05:00

Maximum Daily Average: 8.1 ppb on Aug 1

Minimum Value: 0 ppb on Aug 1 19:00

Minimum Daily Average: 0.0 ppb on Aug 12

Maximum Diurnal Average: 4.6 ppb at hour 8

Minimum Diurnal Average: 0.2 ppb at hour 19

Monthly Average: 1.5 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 1$ $P_{90} = 3$ $P_{99} = 26$

Hours in Service:	744
Hours of Data:	707
Hours of Missing Data:	37
Hours of Calibration:	37
Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0	0	9	Z	28	47	37	27	10	3	1	0	0	1	10	2	1	0	0	2	1	3	3	1	8.1	47
2-Aug	0	1	1	3	Z	1	2	6	3	2	1	2	0	0	0	1	0	0	0	0	0	0	0	0	1.2	6
3-Aug	1	3	1	5	4	Z	1	16	41	24	18	4	0	0	0	0	0	1	0	0	0	0	2	0	5.3	41
4-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	2	4	3	2	1	3	1	0	0	0	0.8	4
5-Aug	0	Z	0	0	0	0	0	1	3	4	3	0	0	0	0	0	1	1	0	0	0	0	0	0	0.7	4
6-Aug	0	0	Z	0	0	1	2	5	2	0	0	0	0	0	2	4	2	1	1	0	1	2	1	14	1.7	14
7-Aug	39	12	0	Z	0	1	2	20	32	19	12	9	6	2	1	0	0	0	0	0	0	0	0	0	6.8	39
8-Aug	0	0	0	0	Z	1	5	17	7	3	2	1	2	1	1	1	0	0	0	0	0	0	1	3	2.1	17
9-Aug	19	22	22	2	1	Z	1	1	2	2	4	3	4	2	0	0	0	0	0	0	0	0	0	0	3.6	22
10-Aug	Z	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	3
11-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
12-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
13-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
14-Aug	0	0	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.2	1
15-Aug	0	0	1	0	2	Z	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	2	0	0.5	2
16-Aug	Z	0	1	0	0	1	4	5	9	5	2	1	1	1	0	0	0	0	0	0	0	0	0	0	1.4	9
17-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0.2	1
18-Aug	0	0	Z	0	5	24	14	3	1	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	2.2	24
19-Aug	0	0	0	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
20-Aug	0	0	0	0	Z	0	0	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0.2	1
21-Aug	0	0	0	0	0	Z	0	1	1	0	1	1	2	1	2	1	1	1	1	1	0	1	3	1	0.8	3
22-Aug	Z	0	0	0	0	0	0	2	2	2	1	1	1	0	1	0	0	0	0	0	0	2	1	3	0.8	3
23-Aug	0	Z	0	0	0	0	1	20	12	5	3	2	1	1	1	0	0	0	0	0	0	0	0	0	2.1	20
24-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	7	2	0	0.5	7
25-Aug	0	2	12	Z	56	8	2	6	3	C	C	C	C	C	C	0	0	0	1	0	0	0	0	0	--	56
26-Aug	0	0	0	0	Z	0	0	3	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.4	3
27-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
28-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	6	9	0.8	9
29-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
30-Aug	0	0	Z	0	0	0	3	7	6	1	0	0	0	0	0	0	1	2	0	0	0	0	0	0	1.0	7
31-Aug	0	0	0	Z	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
	2.3	1.7	1.8	0.5	3.8	3.3	2.5	4.6	4.6	2.5	1.7	0.9	0.7	0.4	0.7	0.6	0.5	0.3	0.2	0.3	0.2	0.6	0.7	1.1	Diurnal Average	
	39	22	22	5	56	47	37	27	41	24	18	9	6	2	10	4	3	2	1	3	1	7	6	14	Diurnal Maximum	

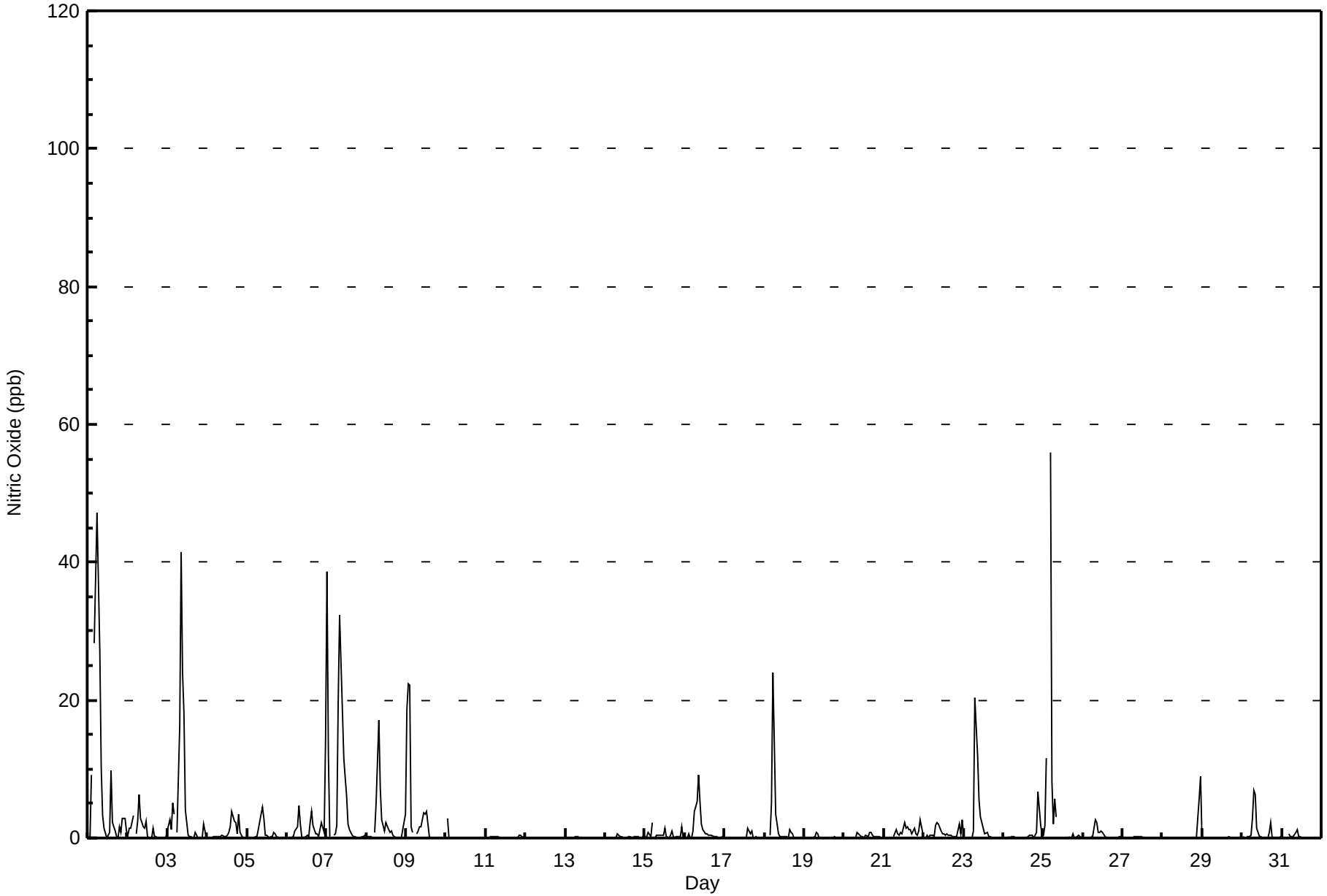
Z - zerospan C - Calibration

Wood Buffalo Environmental Association

Hourly Averages

Nitric Oxide (NO) - ppb

CNRL Horizon - August 2015



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	695	98.30	98.30
21 - 40	9	1.27	99.58
11 - 80	3	0.42	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Nitric Oxide (NO) - ppb

CNRL Horizon - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	60	26	15	28	18	17	23	37	68	87	120	56	48	43	24	24	694
21 - 40	1	1	0	0	0	1	0	0	0	1	0	0	1	2	1	1	9
11 - 80	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	3
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	61	27	15	28	18	19	23	37	68	89	120	56	49	46	25	25	706

Total Number of Valid Hours: 706

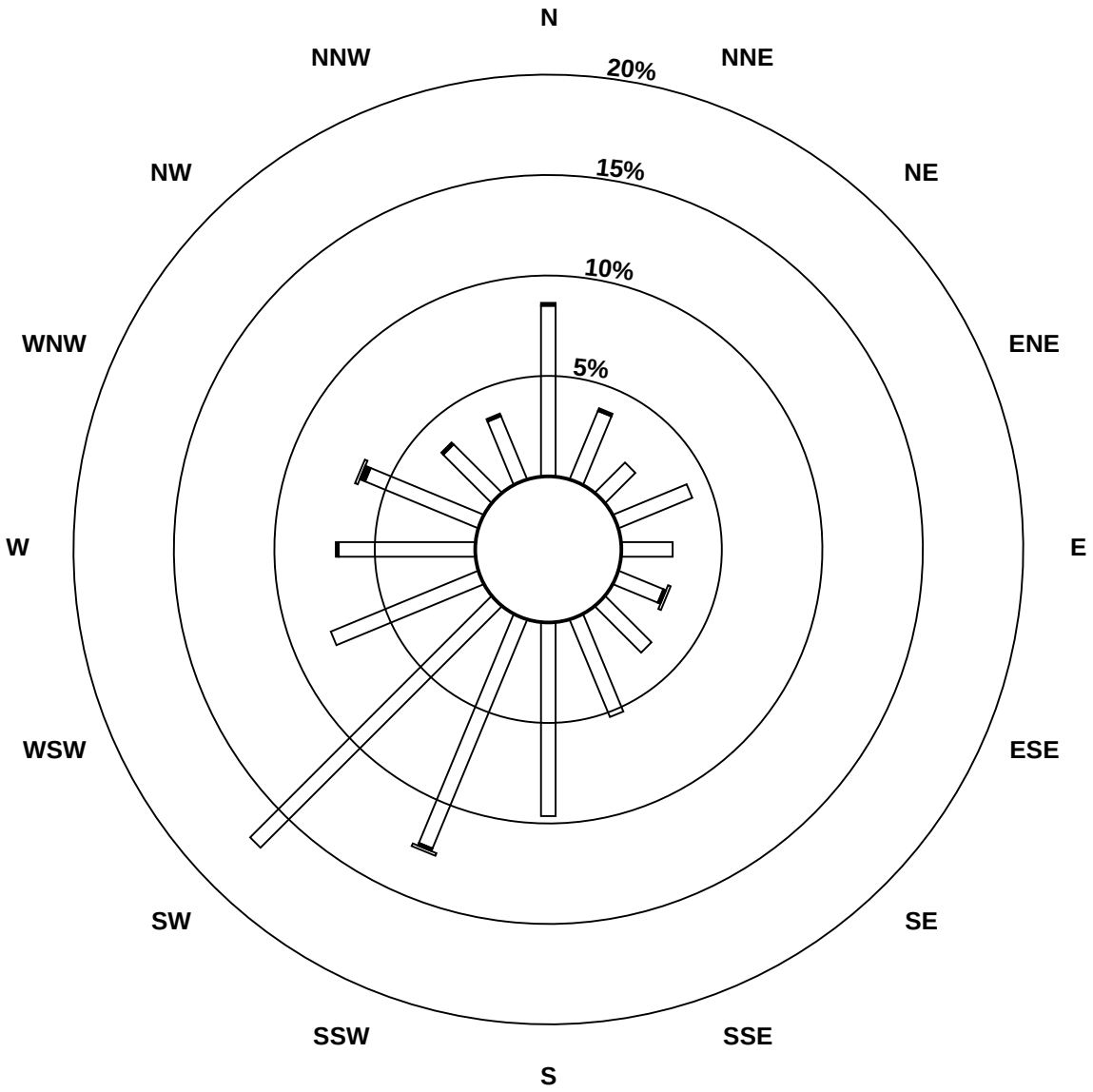
Total Number of Hours: 744

Wood Buffalo Environmental Association

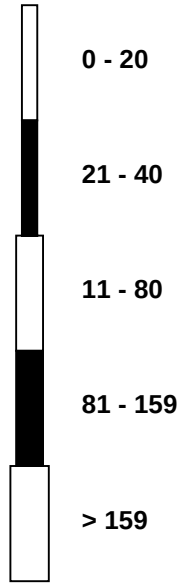
Wind Rose Aug 2015

Nitric Oxide (NO) - ppb

CNRL Horizon (AMS 15)



Classes (ppb)



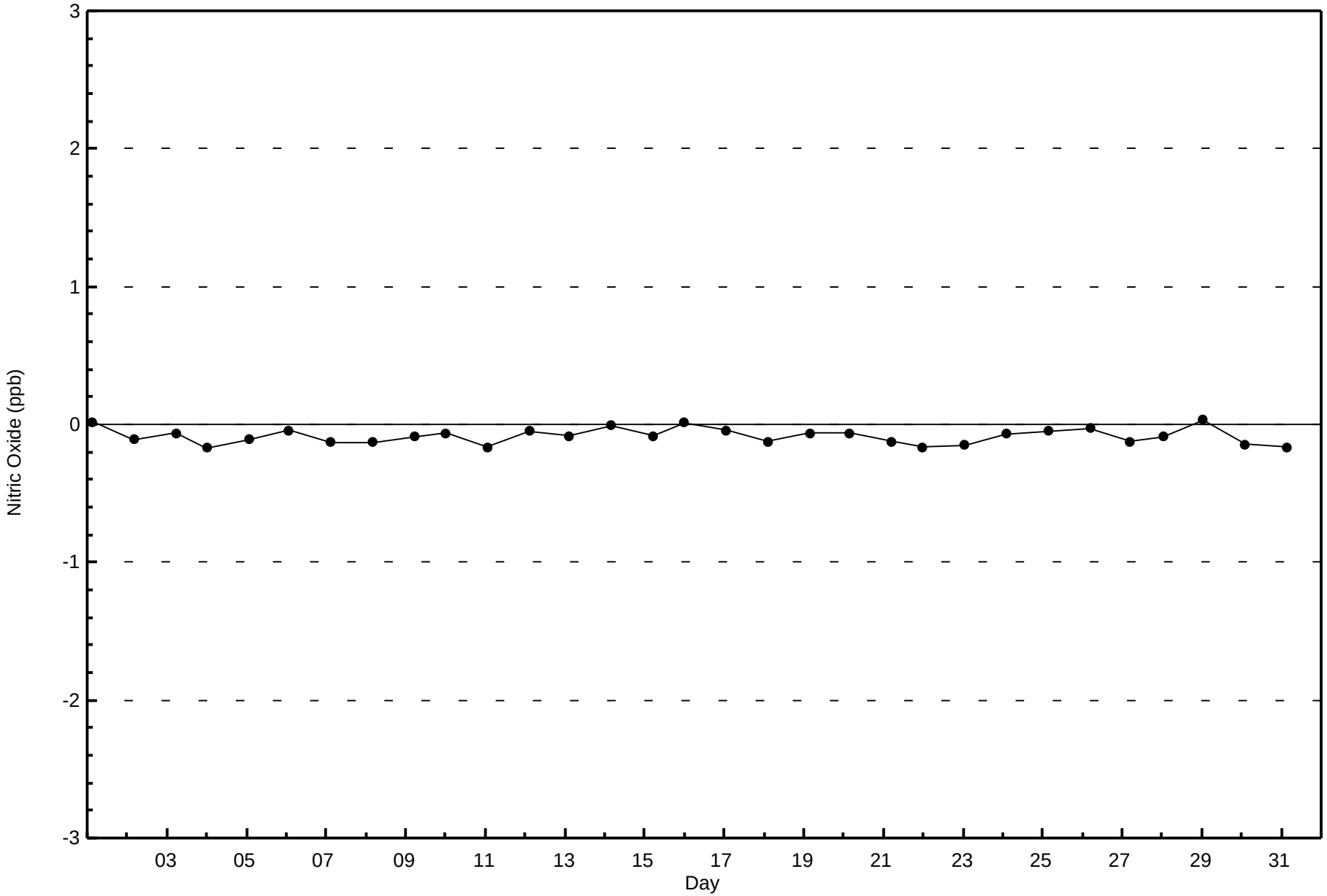
Total Number of Valid Hours: 706

Wood Buffalo Environmental Association

Zero Responses

Nitric Oxide (NO) - ppb

CNRL Horizon - August 2015

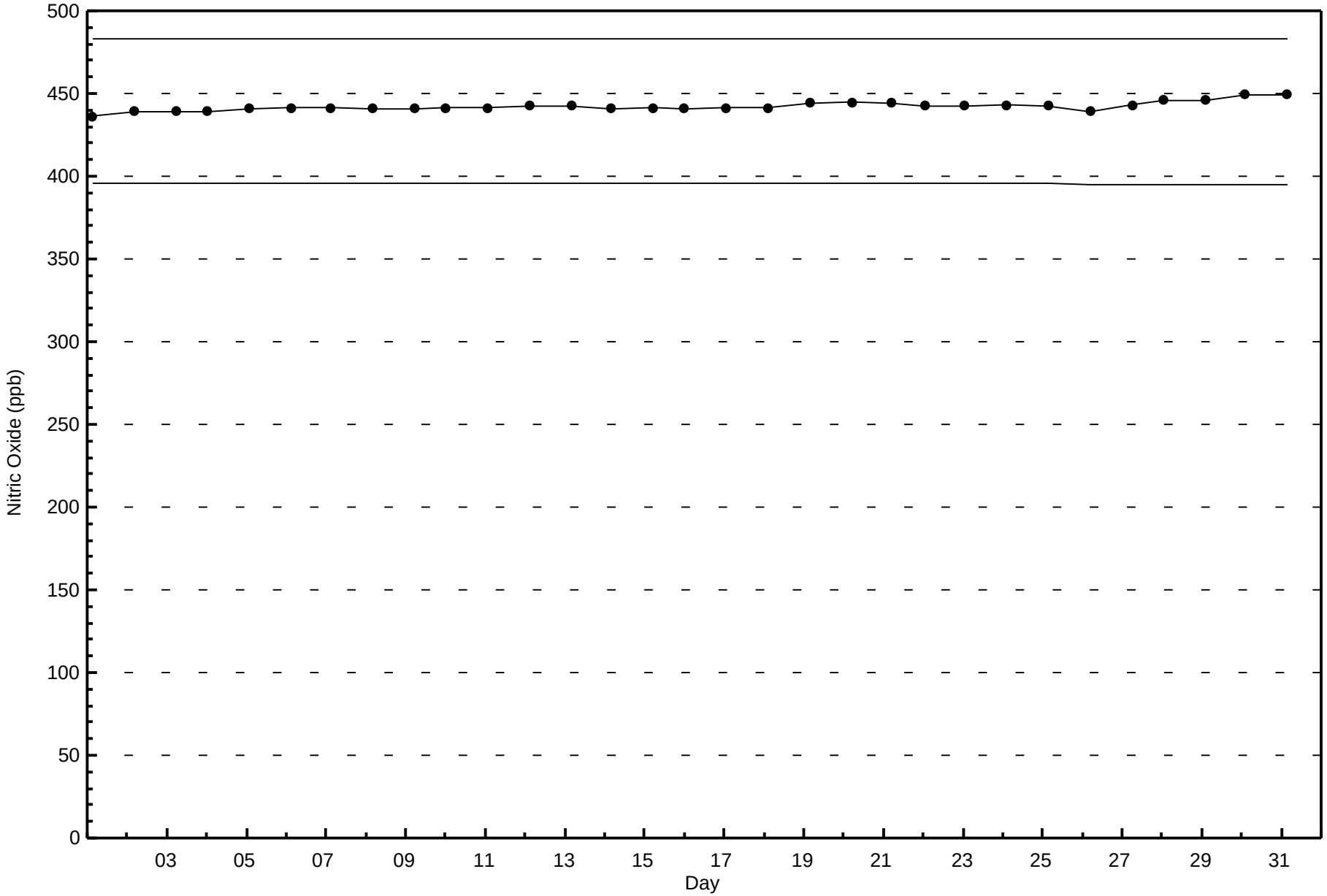


Wood Buffalo Environmental Association

Span Responses

Nitric Oxide (NO) - ppb

CNRL Horizon - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO_2) - ppb

CNRL Horizon - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 26 ppb on Aug 3 11:00

Maximum Daily Average: 7.8 ppb on Aug 9

Minimum Value: 0 ppb on Aug 12 18:00

Minimum Daily Average: 0.2 ppb on Aug 12

Maximum Diurnal Average: 5.3 ppb at hour 22

Minimum Diurnal Average: 1.7 ppb at hour 14

Monthly Average: 3.1 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 1$ Median = 2 $Q_3 = 4$ $P_{90} = 8$ $P_{99} = 19$

Hours in Service:	744
Hours of Data:	707
Hours of Missing Data:	37
Hours of Calibration:	37
Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	4	1	7	Z	11	9	7	9	9	6	4	1	3	4	12	5	3	1	1	11	9	13	7	4	6.0	13
2-Aug	3	2	2	2	Z	1	1	4	4	4	4	8	4	3	3	9	3	5	3	2	2	2	1	2	3.2	9
3-Aug	6	7	5	6	6	Z	2	10	22	24	26	14	4	3	3	2	1	5	1	1	1	4	12	3	7.3	26
4-Aug	Z	1	1	1	2	1	1	3	3	2	1	1	2	4	7	12	12	11	8	15	11	3	1	2	4.6	15
5-Aug	9	Z	3	4	5	2	1	3	4	6	5	2	2	1	1	1	6	6	4	3	3	6	2	0	3.4	9
6-Aug	0	2	Z	6	7	7	6	9	5	0	0	1	1	1	2	4	3	3	2	3	4	6	2	6	3.5	9
7-Aug	9	5	1	Z	1	1	3	7	10	9	8	6	6	4	3	3	3	3	2	3	8	8	10	9	5.2	10
8-Aug	8	5	6	3	Z	1	3	6	4	4	4	4	6	5	6	8	6	4	2	3	5	5	10	12	5.3	12
9-Aug	16	13	13	4	7	Z	2	2	3	4	8	9	12	9	3	2	2	3	6	4	6	13	20	19	7.8	20
10-Aug	Z	10	7	4	4	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	0	1.5	10
11-Aug	1	Z	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	3	12	9	1	1.4	12
12-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.2	1
13-Aug	0	0	0	Z	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	1	0	0.4	1
14-Aug	3	4	0	0	Z	0	0	2	2	1	1	1	0	1	1	1	1	1	1	3	3	1	1	8	1.6	8
15-Aug	1	1	2	2	4	Z	0	2	1	1	1	1	2	1	0	2	3	1	1	2	3	4	6	2	1.9	6
16-Aug	Z	6	6	3	1	3	4	4	8	7	5	3	2	2	2	2	2	2	2	6	3	1	2	4	3.4	8
17-Aug	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	4	4	8	0	3	8	5	1	1	1	1.7	8
18-Aug	2	3	Z	11	10	9	6	5	2	1	1	2	1	2	1	6	6	5	3	3	3	2	1	1	3.5	11
19-Aug	2	7	5	Z	6	4	4	5	3	1	1	1	1	0	0	0	0	1	3	2	0	0	0	0	2.0	7
20-Aug	0	0	0	0	Z	0	0	0	3	1	1	1	0	1	1	3	3	3	3	4	5	6	2	0	1.7	6
21-Aug	0	0	0	0	0	Z	1	5	2	1	2	2	4	3	3	2	3	2	6	5	4	12	14	7	3.3	14
22-Aug	Z	1	6	1	6	8	3	7	5	6	3	1	1	1	1	1	1	1	1	2	6	9	7	8	3.7	9
23-Aug	3	Z	1	0	0	0	1	8	7	7	7	6	5	3	3	3	3	3	2	2	3	7	4	4	3.6	8
24-Aug	6	2	Z	5	1	3	1	0	0	0	0	0	0	0	0	1	3	3	1	8	19	20	15	9	4.3	20
25-Aug	10	12	10	Z	8	4	2	6	5	C	C	C	C	C	C	1	0	0	3	1	2	5	1	1	--	12
26-Aug	0	1	1	0	Z	1	1	5	5	3	2	3	3	2	2	1	1	1	1	1	1	1	2	1	1.6	5
27-Aug	1	1	0	0	1	Z	1	0	1	1	1	1	1	0	0	0	0	1	0	0	0	1	1	1	0.5	1
28-Aug	Z	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	12	12	12	1.8	12
29-Aug	4	Z	2	0	0	0	0	0	0	1	1	1	1	0	0	2	3	2	3	2	1	1	1	1	1.1	4
30-Aug	1	6	Z	7	5	10	8	11	11	5	2	2	1	0	0	0	5	11	5	4	9	7	3	1	5.0	11
31-Aug	1	1	1	Z	5	2	1	2	2	3	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0.9	5
	3.4	3.6	3.1	2.5	3.5	2.7	2.0	3.8	4.0	3.3	3.0	2.4	2.2	1.7	2.0	2.4	2.6	2.5	2.1	3.2	3.8	5.3	4.8	3.7	Diurnal Average	
	16	13	13	11	11	10	8	11	22	24	26	14	12	9	12	12	12	11	8	15	19	20	20	19	Diurnal Maximum	

Z - zerospan C - Calibration

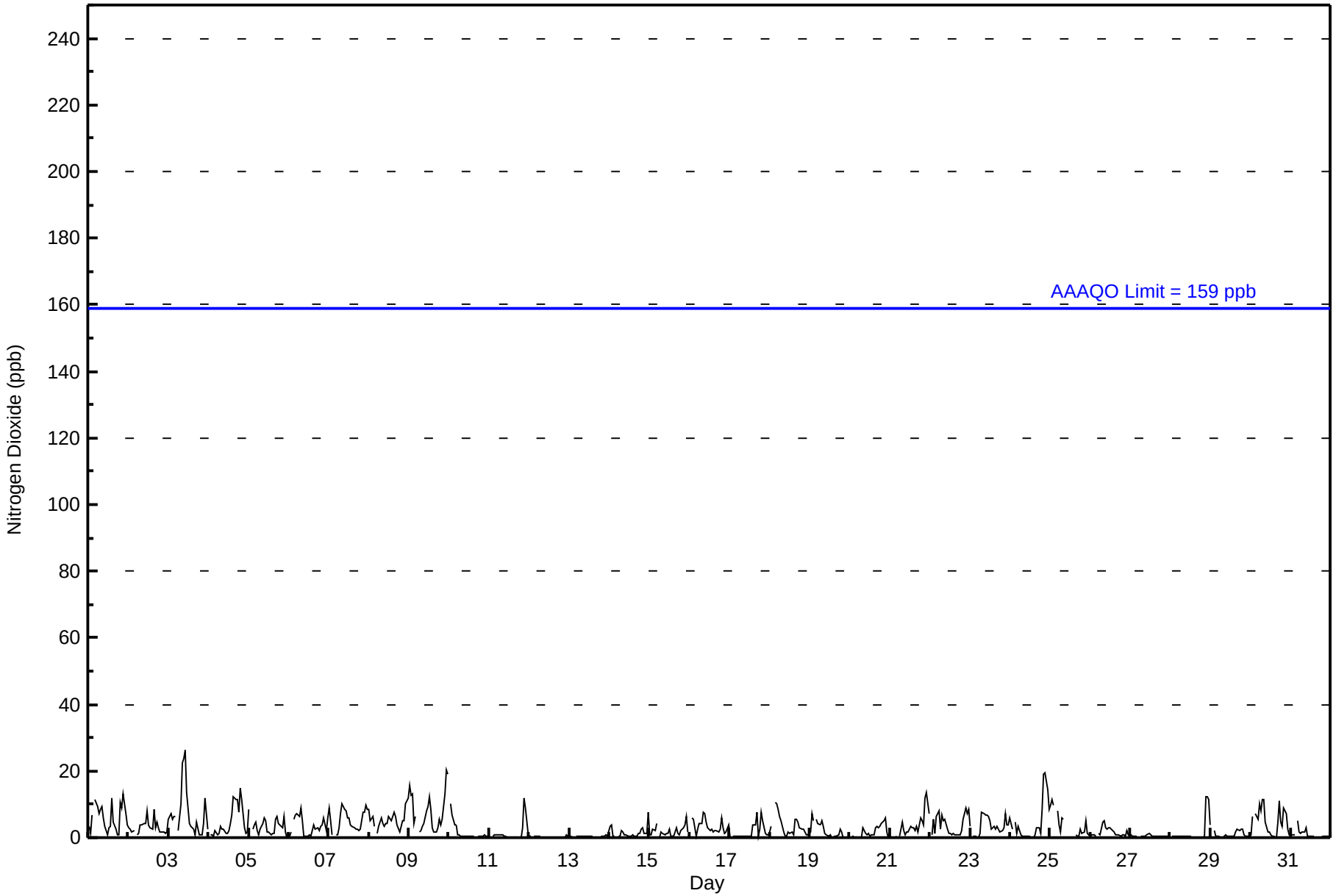
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Dioxide (NO_2) - ppb

CNRL Horizon - August 2015



Nitrogen Dioxide (NO_2) - ppb

CNRL Horizon - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	704	99.58	99.58
21 - 40	3	0.42	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 (NO_2) - ppb

CNRL Horizon - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	61	26	14	28	18	18	23	37	68	89	120	56	49	46	25	25	703
21 - 40	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	3
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	61	27	15	28	18	19	23	37	68	89	120	56	49	46	25	25	706

Total Number of Valid Hours: 706

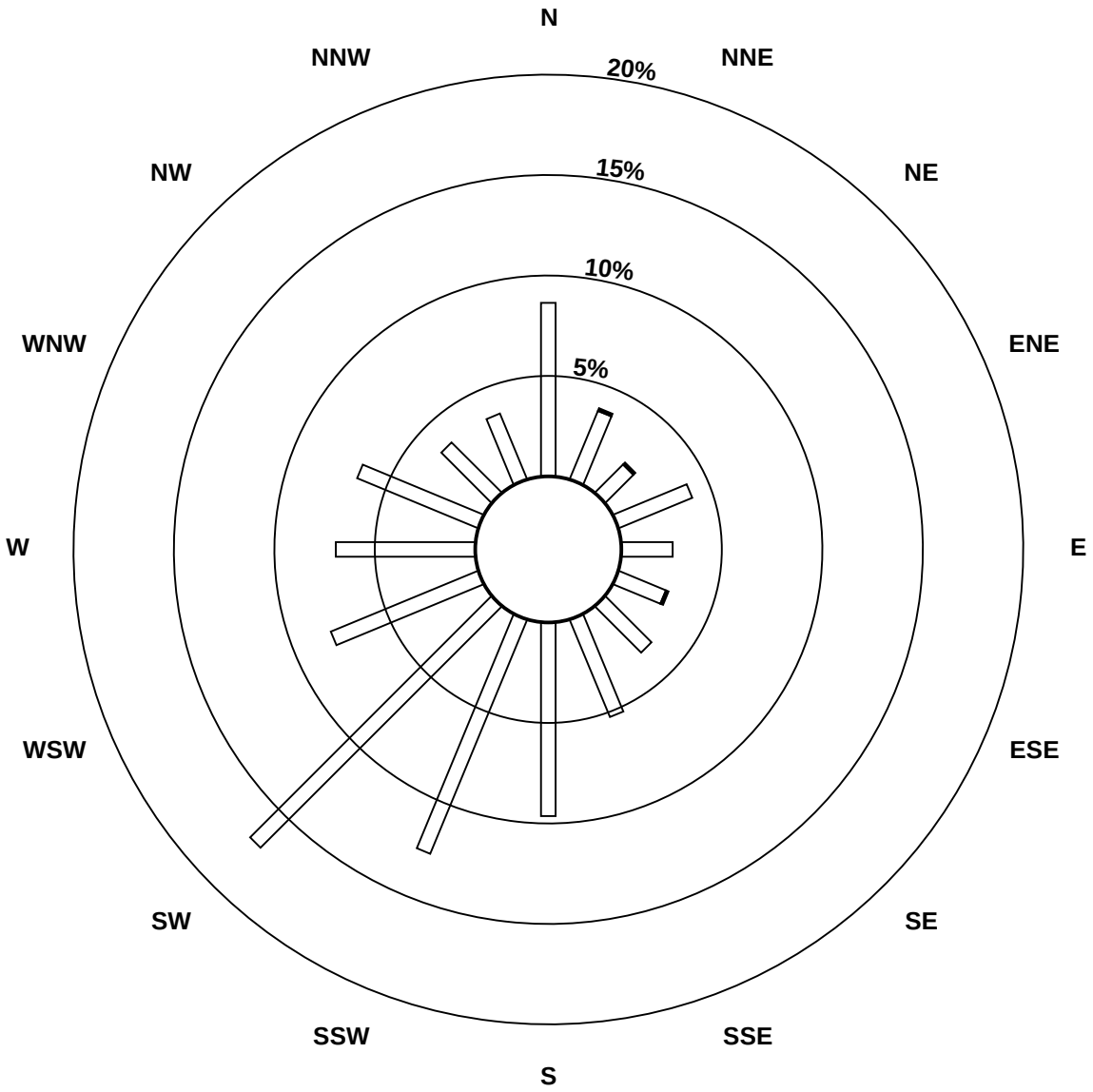
Total Number of Hours: 744

Wood Buffalo Environmental Association

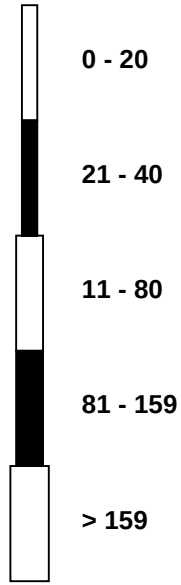
Wind Rose Aug 2015

Nitrogen Dioxide (NO_2) - ppb

CNRL Horizon (AMS 15)



Classes (ppb)



0 - 20

21 - 40

11 - 80

81 - 159

> 159

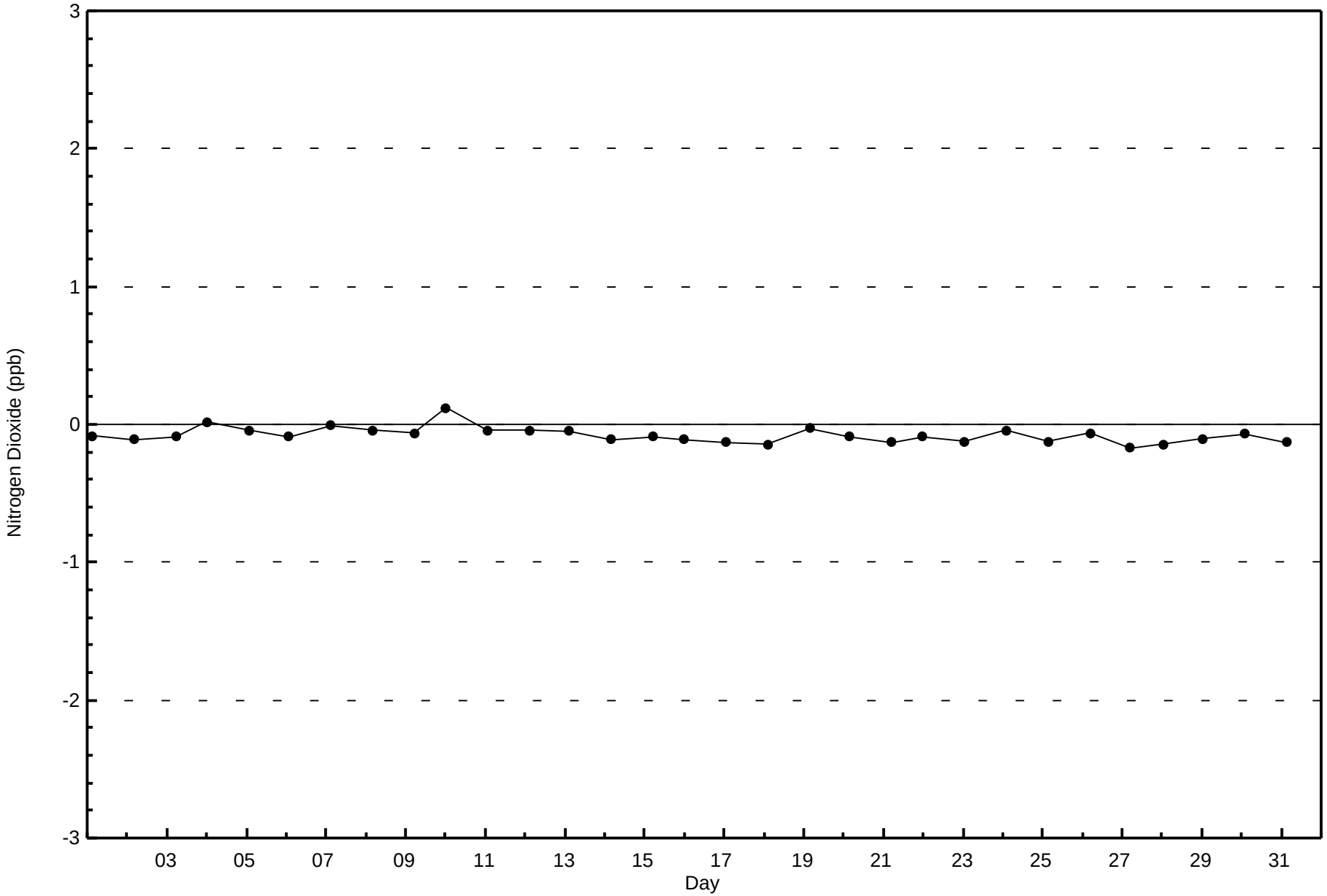
Total Number of Valid Hours: 706

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Dioxide (NO_2) - ppb

CNRL Horizon - August 2015

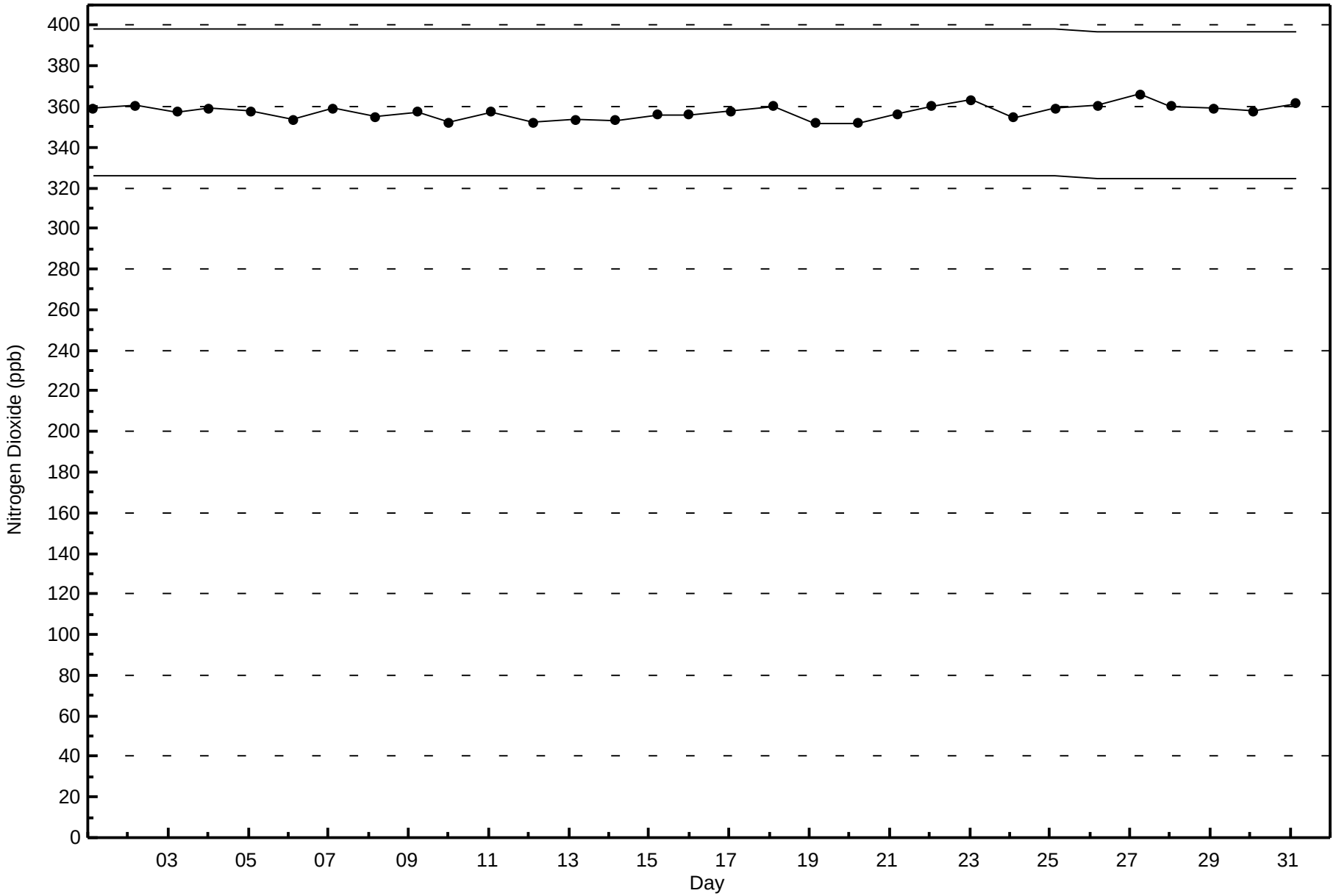


Wood Buffalo Environmental Association

Span Responses

Nitrogen Dioxide (NO_2) - ppb

CNRL Horizon - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_X) - ppb

CNRL Horizon - August 2015

Maximum Value: 64 ppb on Aug 25 05:00

Maximum Daily Average: 14.2 ppb on Aug 1

Minimum Value: 0 ppb on Aug 28 18:00

Minimum Daily Average: 0.3 ppb on Aug 12

Maximum Diurnal Average: 8.6 ppb at hour 9

Minimum Diurnal Average: 2.1 ppb at hour 14

Monthly Average: 4.6 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 1$ Median = 2 $Q_3 = 6$ $P_{90} = 11$ $P_{99} = 44$

Hours in Service:	744
Hours of Data:	707
Hours of Missing Data:	37
Hours of Calibration:	37
Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	4	1	16	Z	40	56	45	36	19	9	5	1	3	4	22	7	4	1	1	12	9	16	10	5	14.2	56
2-Aug	3	4	3	6	Z	1	4	10	7	6	6	11	4	3	3	10	3	5	3	2	2	2	1	2	4.3	11
3-Aug	7	10	7	11	10	Z	3	26	64	48	44	17	5	3	3	2	1	6	1	1	1	4	14	3	12.6	64
4-Aug	Z	1	1	1	2	1	1	4	3	3	2	1	3	5	9	16	14	14	8	18	12	3	1	2	5.4	18
5-Aug	9	Z	3	4	5	2	1	4	8	10	8	2	2	1	2	1	6	7	5	3	3	6	2	0	4.1	10
6-Aug	0	2	Z	6	7	8	8	14	7	1	0	1	1	1	4	8	5	3	3	4	5	8	3	21	5.2	21
7-Aug	48	17	1	Z	1	2	5	27	42	27	19	15	12	6	5	3	3	3	2	3	8	8	10	9	12.0	48
8-Aug	9	5	7	4	Z	2	8	23	12	6	6	5	9	6	7	9	7	4	2	3	5	5	11	15	7.4	23
9-Aug	34	35	35	6	7	Z	2	3	5	6	12	13	16	11	3	2	2	3	6	4	6	13	20	19	11.4	35
10-Aug	Z	13	7	4	4	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	0	0	1.6	13
11-Aug	1	Z	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	3	12	9	1	1.5	12
12-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.3	1
13-Aug	0	0	0	Z	0	1	1	1	0	0	0	1	0	0	0	0	0	0	0	0	1	0	1	0	0.4	1
14-Aug	3	4	0	0	Z	0	0	3	2	1	1	1	0	1	1	1	1	1	2	3	3	1	1	8	1.7	8
15-Aug	1	1	3	2	7	Z	0	2	1	1	2	2	4	1	0	2	4	1	1	2	3	4	8	2	2.4	8
16-Aug	Z	6	6	3	1	4	8	10	17	13	7	4	3	3	2	3	2	2	3	6	3	1	2	4	4.8	17
17-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	5	5	9	0	3	8	5	1	1	1	1.8	9
18-Aug	2	3	Z	11	16	32	21	8	2	1	1	2	1	2	1	7	6	5	3	2	3	2	1	1	5.8	32
19-Aug	2	8	5	Z	6	4	4	6	4	1	1	1	1	0	0	0	0	1	3	2	0	0	0	0	2.1	8
20-Aug	0	0	0	0	Z	0	0	0	4	2	1	2	0	1	1	4	4	3	4	4	5	6	2	0	2.0	6
21-Aug	0	0	0	0	0	Z	1	6	3	1	3	2	6	4	4	3	5	2	7	6	4	13	16	8	4.1	16
22-Aug	Z	1	6	1	6	9	3	9	7	8	3	2	2	1	2	1	1	1	1	2	6	11	8	11	4.5	11
23-Aug	4	Z	0	0	0	0	2	28	19	12	10	9	7	3	4	3	3	3	2	2	3	7	4	4	5.6	28
24-Aug	6	2	Z	5	1	3	1	0	0	0	0	0	0	0	0	1	3	3	1	9	20	26	16	9	4.8	26
25-Aug	10	13	21	Z	64	12	4	12	8	C	C	C	C	C	C	1	1	0	3	1	2	5	1	1	--	64
26-Aug	0	1	1	0	Z	1	1	7	7	4	3	4	4	2	2	1	1	1	0	1	1	1	2	1	2.0	7
27-Aug	1	1	0	0	1	Z	1	1	1	1	1	2	1	0	0	0	0	1	0	0	0	1	1	1	0.6	2
28-Aug	Z	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	15	18	20	2.6	20
29-Aug	4	Z	2	0	0	0	0	0	0	1	1	1	0	0	0	2	3	2	2	2	1	1	1	1	1.1	4
30-Aug	1	7	Z	8	6	11	11	18	18	6	2	2	1	0	0	0	6	13	5	4	9	8	3	1	6.0	18
31-Aug	1	1	1	Z	6	2	1	2	2	4	1	0	0	0	0	0	0	0	0	0	0	1	1	0	1.1	6
	5.8	5.3	4.9	3.0	7.3	6.0	4.5	8.4	8.6	5.8	4.7	3.4	2.9	2.1	2.8	3.0	3.1	2.8	2.3	3.4	4.0	5.9	5.5	4.8	Diurnal Average	
	48	35	35	11	64	56	45	36	64	48	44	17	16	11	22	16	14	14	8	18	20	26	20	21	Diurnal Maximum	

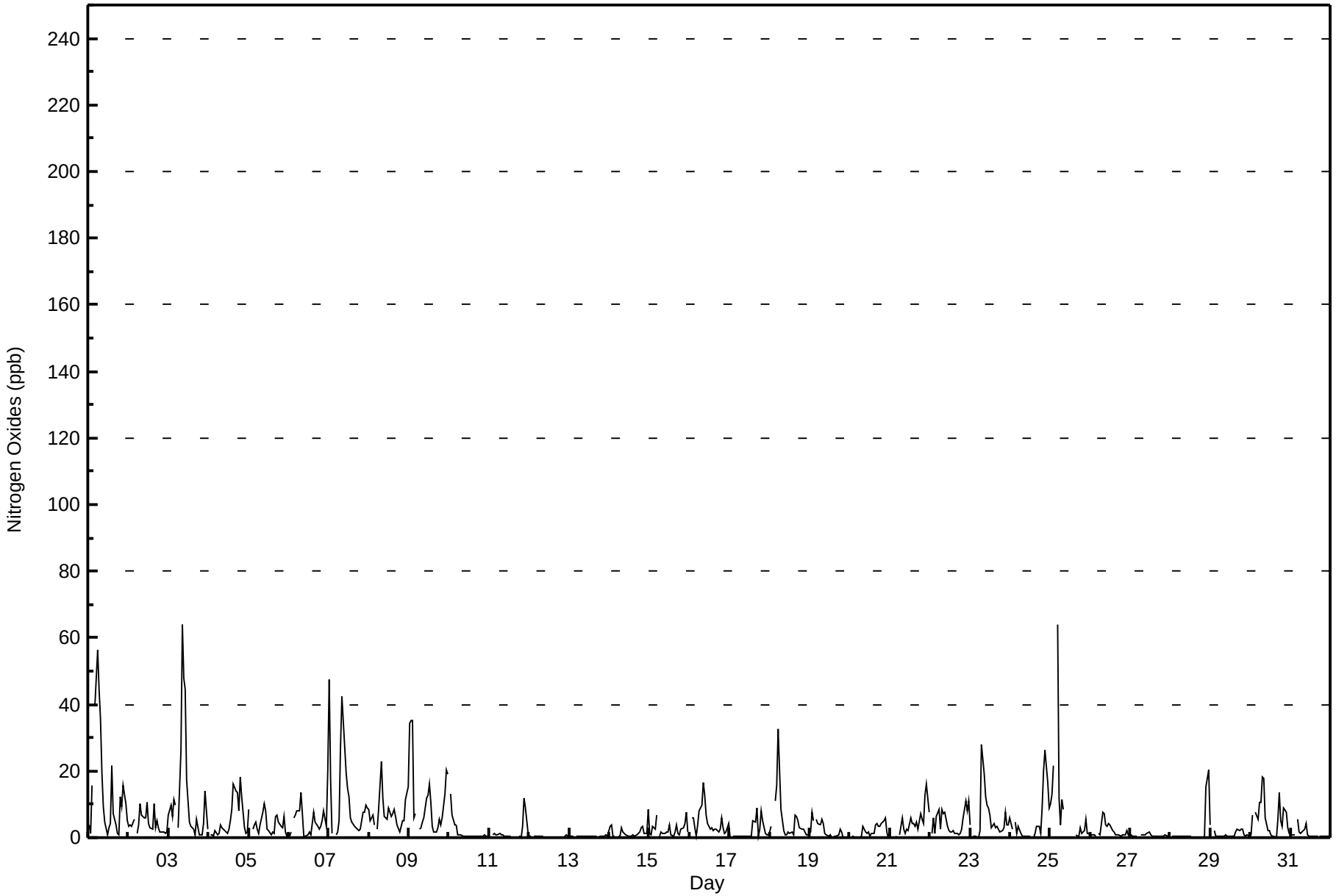
Z - zerospan C - Calibration

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Oxides (NO_X) - ppb

CNRL Horizon - August 2015



Nitrogen Oxides (NO_X) - ppb

CNRL Horizon - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	683	96.61	96.61
21 - 40	16	2.26	98.87
11 - 80	8	1.13	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

CNRL Horizon - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	58	25	14	28	17	17	23	37	65	87	120	56	48	41	24	22	682
21 - 40	3	1	0	0	1	0	0	0	3	0	0	0	1	4	0	3	16
11 - 80	0	1	1	0	0	2	0	0	0	2	0	0	0	1	1	0	8
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	61	27	15	28	18	19	23	37	68	89	120	56	49	46	25	25	706

Total Number of Valid Hours: 706

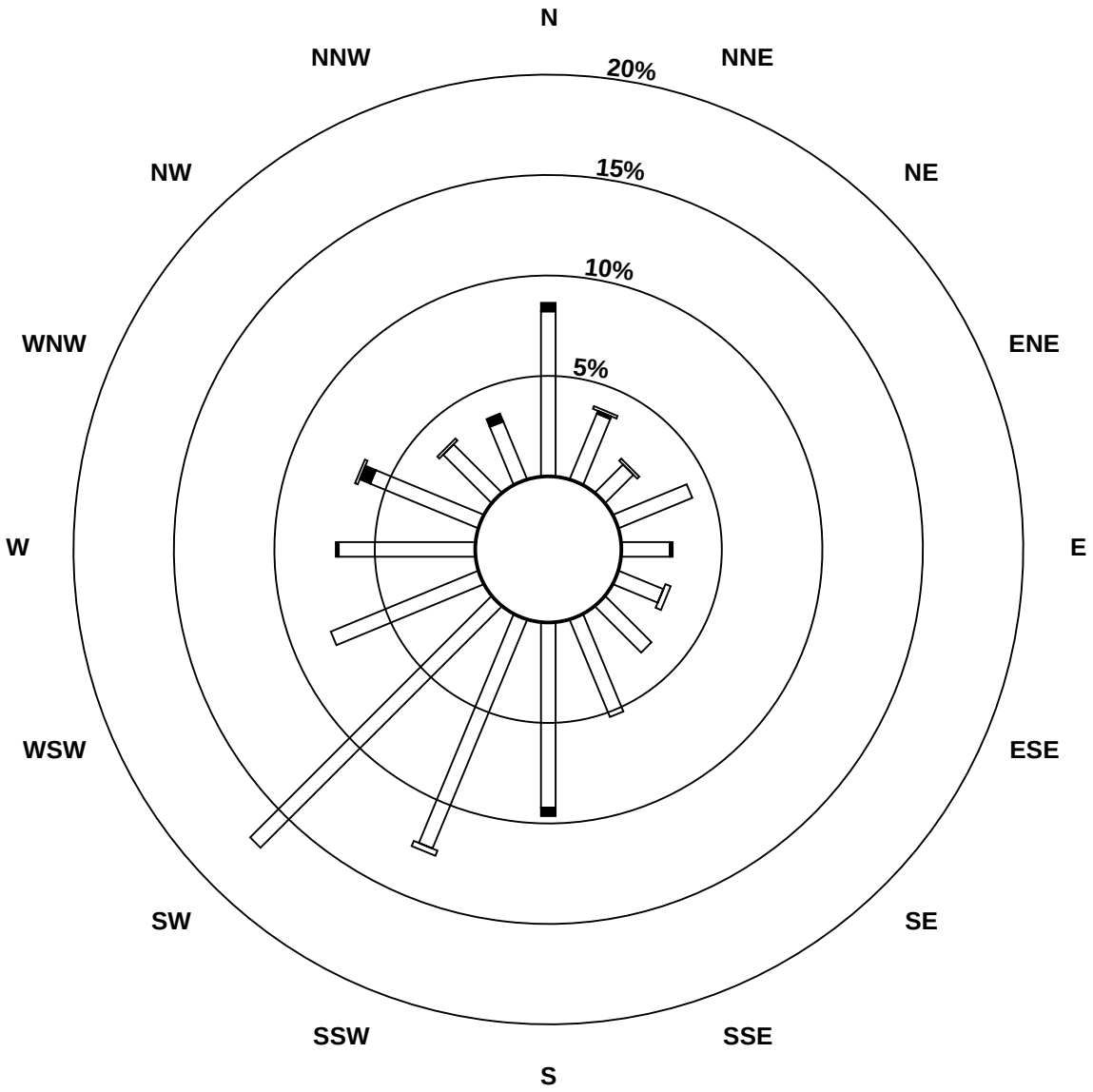
Total Number of Hours: 744

Wood Buffalo Environmental Association

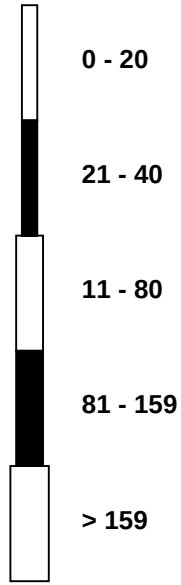
Wind Rose Aug 2015

Nitrogen Oxides (NO_X) - ppb

CNRL Horizon (AMS 15)



Classes (ppb)



0 - 20

21 - 40

11 - 80

81 - 159

> 159

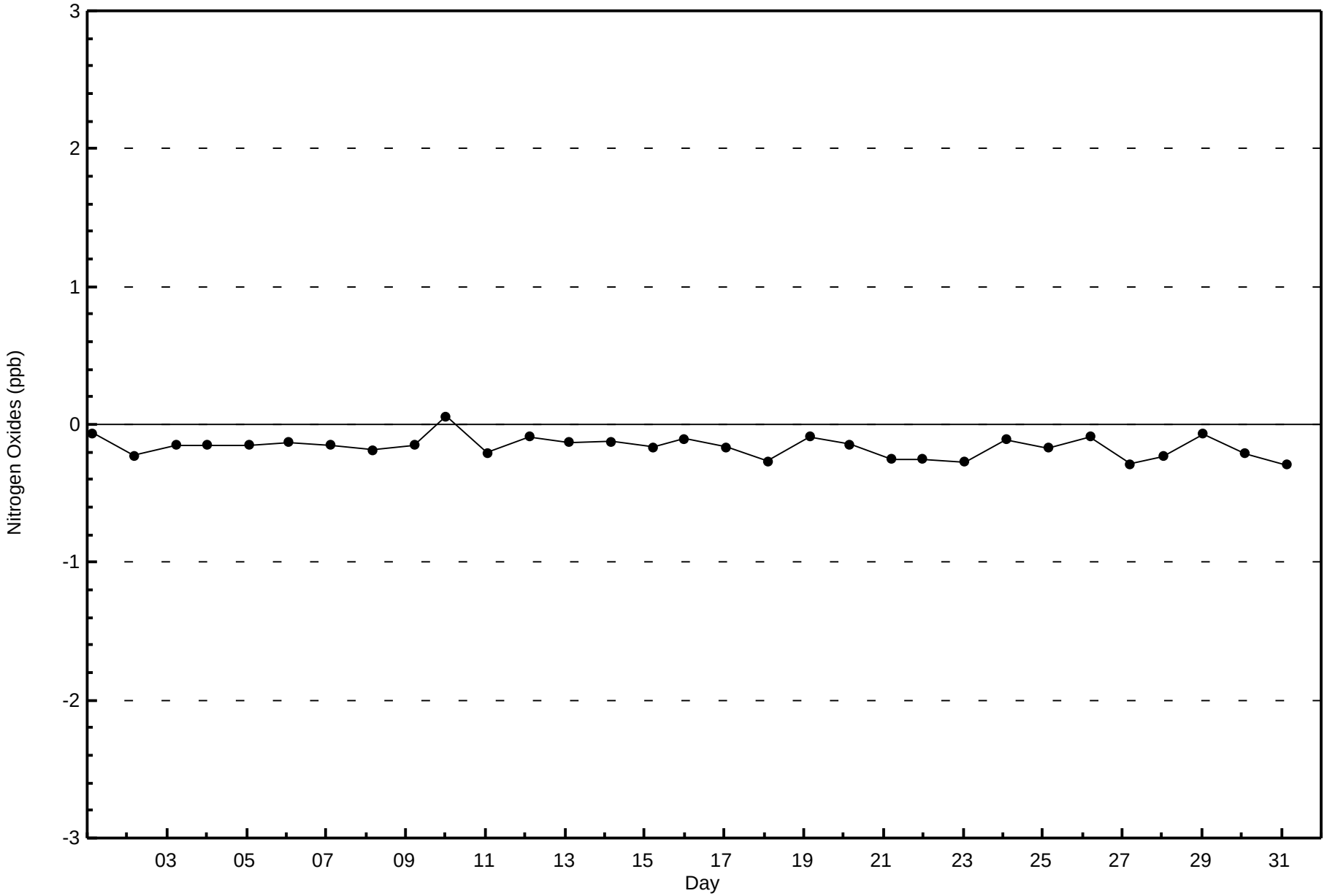
Total Number of Valid Hours: 706

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Oxides (NO_X) - ppb

CNRL Horizon - August 2015

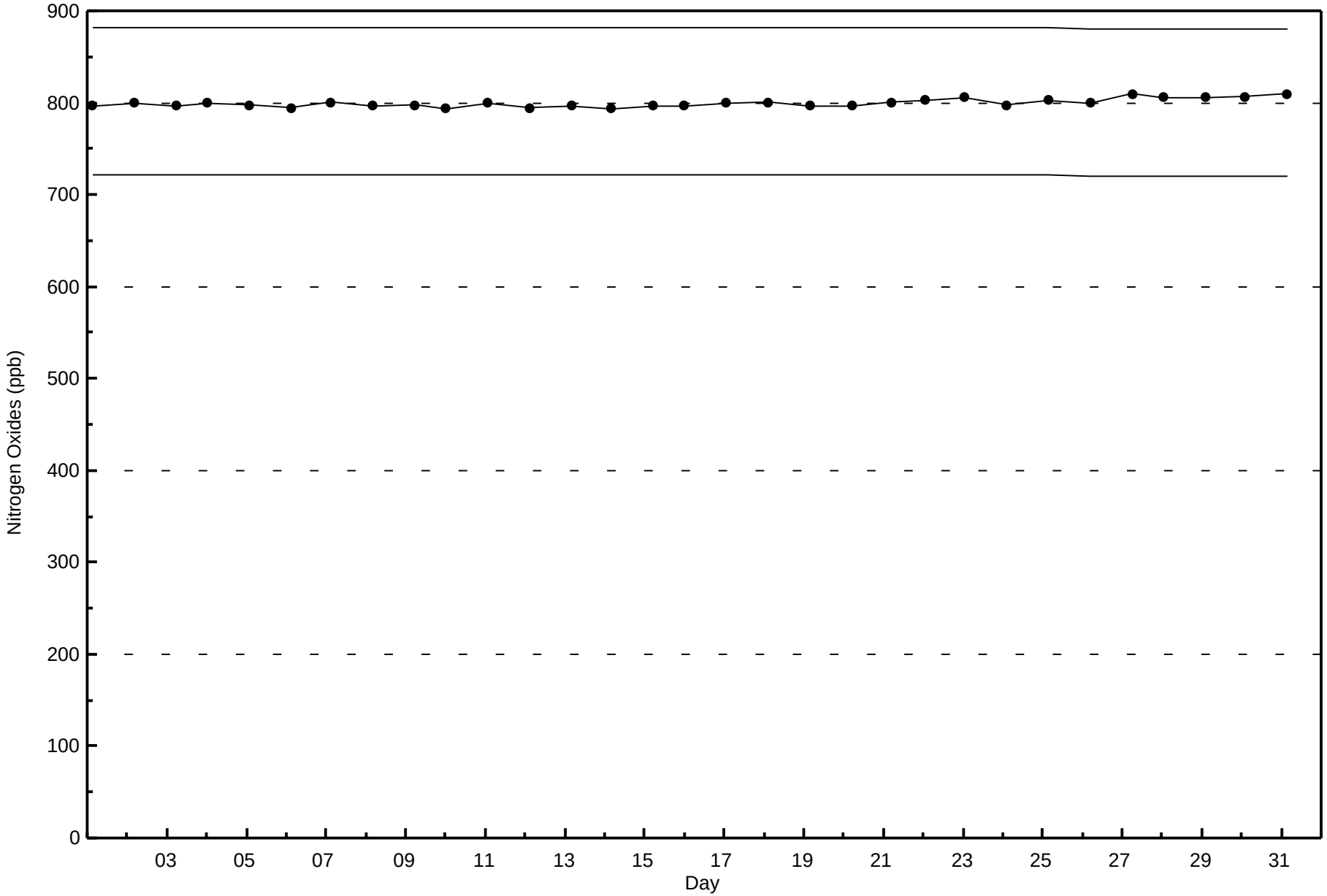


Wood Buffalo Environmental Association

Span Responses

Nitrogen Oxides (NO_X) - ppb

CNRL Horizon - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

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

CNRL Horizon - August 2015

Number of Exceedences (AAAQO): 24-hr: 0

Maximum Value: 198.1 $\mu g/m^3$ on Aug 18 07:00

Maximum Daily Average: 22.4 $\mu g/m^3$ on Aug 18

Minimum Value: 0.0 $\mu g/m^3$ on Aug 21 03:00

Minimum Daily Average: 1.0 $\mu g/m^3$ on Aug 21

Maximum Diurnal Average: 12.9 $\mu g/m^3$ at hour 6

Minimum Diurnal Average: 3.8 $\mu g/m^3$ at hour 11

Monthly Average: 6.47 $\mu g/m^3$

Percentiles: P_1 = 0.1 P_{10} = 1.0 Q_1 = 2.1 Median = 4.3 Q_3 = 8.2 P_{90} = 12.5 P_{99} = 34.0

Hours in Service:	744
Hours of Data:	743
Hours of Missing Data:	1
Hours of Calibration:	1
Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	5.1	5.5	7.2	7.1	7.9	7.4	6.0	4.8	3.1	2.2	2.7	2.4	3.9	2.7	4.0	2.1	2.5	2.7	3.7	5.3	5.5	10.7	5.7	4.2	4.8	10.7
2-Aug	3.8	5.3	5.9	6.2	6.1	5.5	4.7	5.4	4.5	6.6	7.2	10.7	10.4	11.9	12.8	10.4	9.2	8.8	9.2	9.1	9.1	8.8	8.5	9.2	7.9	12.8
3-Aug	11.3	12.0	11.8	13.4	13.8	13.5	10.7	12.6	19.4	18.1	19.4	19.4	15.5	12.0	14.1	9.4	5.9	10.8	5.4	6.0	5.6	7.0	8.0	6.7	11.7	19.4
4-Aug	6.4	4.2	3.5	4.8	10.9	5.5	7.9	8.9	9.7	22.3	7.2	6.1	8.1	10.2	13.4	16.8	13.7	10.8	10.4	9.7	7.7	5.1	5.1	4.8	8.9	22.3
5-Aug	6.8	6.9	6.4	6.5	6.7	6.6	6.3	6.2	6.1	5.4	5.7	5.1	4.6	4.5	4.6	3.4	8.5	10.4	8.5	5.1	2.9	4.1	2.0	1.5	5.6	10.4
6-Aug	1.5	1.5	1.7	4.1	4.3	2.9	2.6	2.5	3.0	3.1	2.2	1.6	1.5	1.4	1.2	1.1	1.0	1.0	0.9	0.9	0.9	1.1	0.8	1.4	1.9	4.3
7-Aug	1.6	1.1	0.7	0.6	0.5	0.6	0.9	1.4	3.2	3.3	3.6	3.7	5.1	5.9	6.3	8.2	7.8	8.6	9.3	10.0	19.3	22.2	21.6	11.3	6.5	22.2
8-Aug	4.2	4.5	4.4	4.2	3.9	3.8	4.0	4.1	3.7	3.8	4.9	7.9	9.0	10.4	10.0	13.8	12.8	9.7	7.0	6.9	6.4	6.6	9.1	9.7	6.9	13.8
9-Aug	11.3	10.5	11.5	8.3	8.9	9.9	8.5	7.2	7.2	7.2	8.0	10.9	14.0	12.4	10.4	9.1	12.0	15.9	22.4	24.3	34.3	46.1	44.8	32.1	16.1	46.1
10-Aug	22.2	8.8	4.5	11.1	5.9	11.7	5.1	3.4	3.0	3.5	3.2	2.5	3.6	3.8	3.5	3.9	9.3	14.0	7.1	10.8	10.4	9.4	6.7	8.1	7.3	22.2
11-Aug	10.2	9.1	9.2	22.2	31.0	32.0	11.0	11.8	5.2	3.6	2.4	2.3	2.4	1.4	2.8	3.5	3.0	4.4	11.3	10.2	6.7	6.7	41.4	6.7	10.4	41.4
12-Aug	3.9	2.4	2.3	7.8	17.3	18.2	5.3	5.7	3.0	2.3	1.5	1.7	1.9	1.6	1.6	2.5	6.8	4.9	2.1	4.2	4.4	2.2	4.1	3.2	4.6	18.2
13-Aug	3.8	2.7	3.0	11.0	21.5	12.6	3.7	2.4	2.0	1.5	1.1	1.0	0.9	0.7	0.6	0.4	0.7	0.9	0.9	0.8	0.7	0.8	0.9	0.9	3.2	21.5
14-Aug	1.4	1.7	1.7	2.4	1.7	1.7	1.6	1.0	0.8	0.7	0.9	1.0	0.5	8.3	3.4	0.8	0.8	1.6	1.2	1.3	1.6	2.9	2.7	1.0	1.8	8.3
15-Aug	1.6	0.5	0.8	0.4	0.8	0.4	1.6	2.5	2.6	2.2	2.6	3.2	3.3	3.8	2.6	3.6	4.0	3.1	3.0	4.8	4.4	6.9	5.8	4.6	2.9	6.9
16-Aug	9.5	9.2	10.4	12.9	22.9	10.6	5.9	3.8	4.7	2.8	2.5	2.7	2.5	2.5	2.0	2.1	2.5	2.2	3.2	4.3	11.1	13.9	11.2	6.6	6.7	22.9
17-Aug	4.2	2.3	2.4	6.7	5.9	6.6	7.0	2.7	2.8	2.5	1.6	2.0	2.7	1.6	3.9	3.1	11.9	12.3	4.0	11.4	6.8	17.4	10.8	4.2	5.7	17.4
18-Aug	5.3	6.0	12.6	9.3	34.3	123.2	198.1	7.9	3.6	2.2	2.1	2.9	3.3	3.8	3.4	7.4	7.3	8.5	9.6	29.9	32.8	12.8	6.7	3.6	22.4	198.1
19-Aug	5.9	6.5	9.5	14.5	11.1	12.9	8.9	6.3	4.2	3.2	2.9	2.6	2.0	1.9	1.5	1.9	3.5	4.6	3.8	3.5	1.3	1.0	0.4	0.2	4.8	14.5
20-Aug	0.2	0.2	0.6	3.5	3.4	4.4	0.3	0.2	1.4	1.0	0.8	1.1	1.3	0.9	1.5	1.4	1.5	1.2	1.4	1.6	1.2	1.0	0.5	1.1	1.3	4.4
21-Aug	1.0	0.1	0.0	0.5	3.5	5.6	7.4	0.9	0.2	0.0	0.0	0.0	0.0	0.3	0.2	0.2	0.4	0.1	0.3	0.3	0.1	0.8	1.0	0.5	1.0	7.4
22-Aug	0.0	0.0	0.3	1.0	1.4	2.1	2.0	1.7	1.7	1.2	0.8	1.0	1.1	1.2	1.5	1.2	1.2	1.1	1.7	3.2	8.2	12.1	9.0	5.0	2.5	12.1
23-Aug	1.7	0.3	0.3	2.1	2.5	4.2	3.8	4.8	4.3	3.2	3.8	8.6	9.3	3.4	5.2	4.0	6.5	4.8	4.0	4.2	4.1	5.8	2.8	2.9	4.0	9.3
24-Aug	4.0	4.4	4.1	4.0	3.4	3.8	3.7	2.7	1.8	1.7	2.0	2.2	2.2	2.6	2.4	2.9	4.2	4.7	3.8	10.7	19.8	16.6	8.6	6.6	5.1	19.8
25-Aug	7.1	7.3	11.1	13.8	34.6	8.1	16.0	7.1	6.0	4.5	4.9	3.5	2.6	2.4	2.7	3.3	2.6	2.6	5.4	5.0	3.2	4.1	2.6	2.6	6.8	34.6
26-Aug	2.6	3.4	2.4	2.4	8.6	24.9	14.0	4.8	1.6	1.5	1.9	2.4	2.7	2.6	C	5.7	15.5	25.2	13.6	11.7	13.6	10.1	5.8	5.9	7.9	25.2
27-Aug	7.3	10.2	5.6	15.8	15.9	31.4	16.1	6.6	7.4	7.3	7.4	8.6	7.1	6.9	6.2	8.0	14.3	17.9	10.4	8.2	8.5	7.3	8.9	8.8	10.5	31.4
28-Aug	7.7	7.3	7.1	10.7	19.0	13.7	8.7	6.6	5.3	5.8	4.7	4.8	4.3	3.2	2.9	3.8	4.9	2.8	12.6	22.7	18.9	22.1	12.0	4.3	9.0	22.7
29-Aug	1.7	2.5	1.3	1.0	0.9	1.1	1.3	1.4	1.5	1.9	1.8	2.0	1.8	1.7	1.7	4.2	5.7	3.5	4.9	6.4	6.7	7.4	8.5	9.4	3.3	9.4
30-Aug	8.1	7.8	7.4	7.8	8.5	10.9	10.0	9.2	7.7	8.1	6.0	3.5	2.0	2.2	2.5	4.6	6.8	6.5	4.0	3.9	7.2	7.4	5.0	4.3	6.3	10.9
31-Aug	4.2	4.3	4.8	5.3	5.2	3.2	4.1	5.3	5.1	4.3	2.2	1.2	1.2	1.1	1.3	1.3	1.4	1.5	1.3	1.4	1.4	1.5	1.6	1.4	2.7	5.3
	5.3	4.8	5.0	7.1	10.4	12.9	12.5	4.9	4.4	4.4	3.8	4.1	4.2	4.2	4.3	4.6	6.1	6.7	6.0	7.7	8.5	9.1	8.5	5.6	Diurnal Average	
	22.2	12.0	12.6	22.2	34.6	123.2	198.1	12.6	19.4	22.3	19.4	19.4	15.5	12.4	14.1	16.8	15.5	25.2	22.4	29.9	34.3	46.1	44.8	32.1	Diurnal Maximum	

C - Calibration

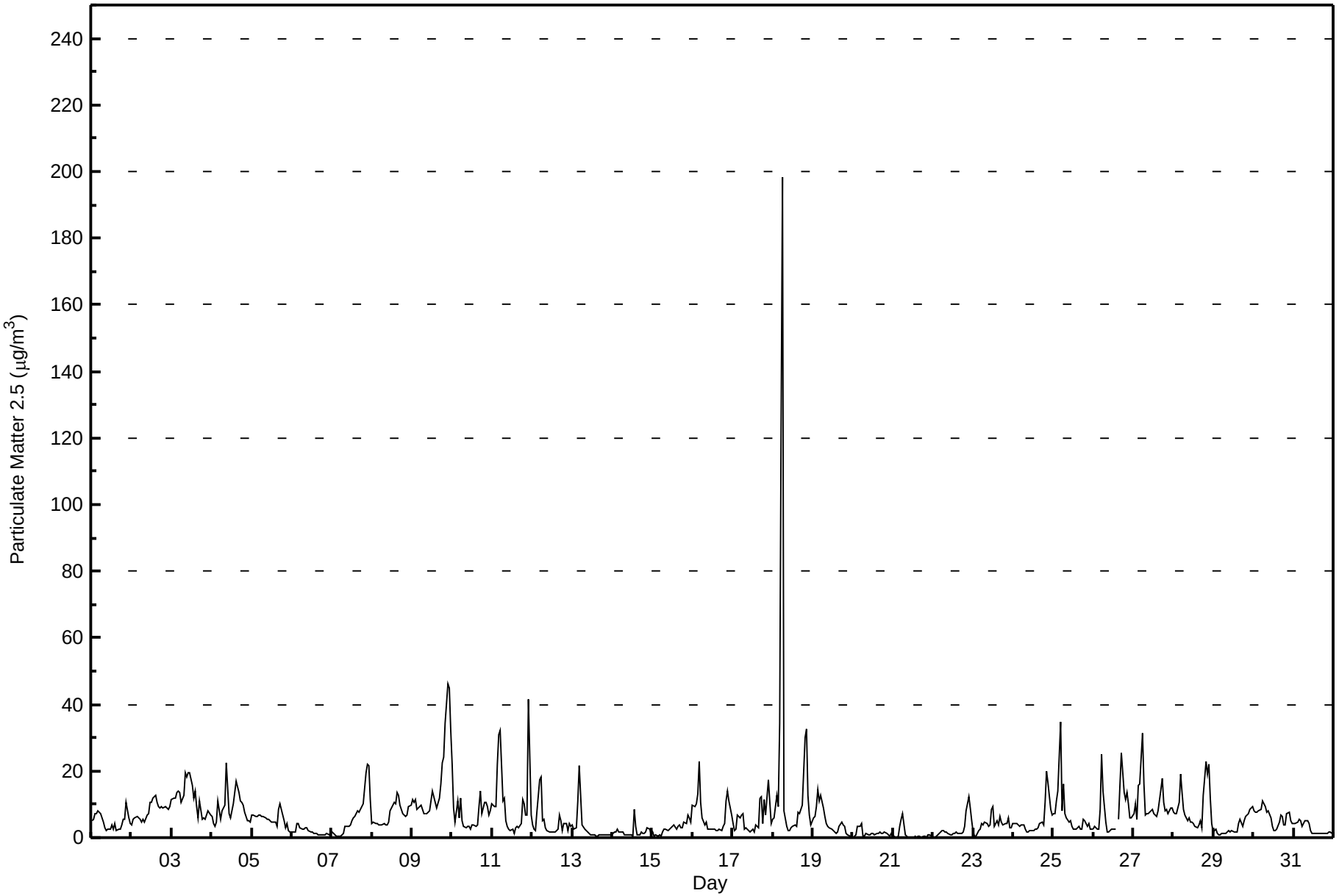
Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 $\mu g/m^3$

Wood Buffalo Environmental Association

Hourly Averages

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

CNRL Horizon - August 2015



Concentration Ranges ($\mu g/m^3$)	Number of Hours	%	Cumulative %
1 - 5	364	48.99	48.99
6 - 15	254	34.19	83.18
16 - 25	34	4.58	87.75
26 - 80	12	1.62	89.37
> 81.0	2	0.27	89.64

Total Number of Valid Hours: 743

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

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

CNRL Horizon - August 2015

Concentration Ranges ($\mu g/m^3$)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
1 - 5	32	13	3	15	9	4	11	25	35	42	72	28	29	21	11	14	364
6 - 15	31	14	9	9	5	11	13	12	26	29	35	23	7	11	7	11	253
16 - 25	0	3	1	3	1	3	0	0	5	7	7	1	1	1	0	1	34
26 - 80	0	2	0	1	0	0	0	1	2	2	2	0	0	1	0	1	12
> 81.0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	2
Totals	63	32	13	28	15	18	24	38	69	80	116	52	38	34	18	27	665

Total Number of Valid Hours: 742

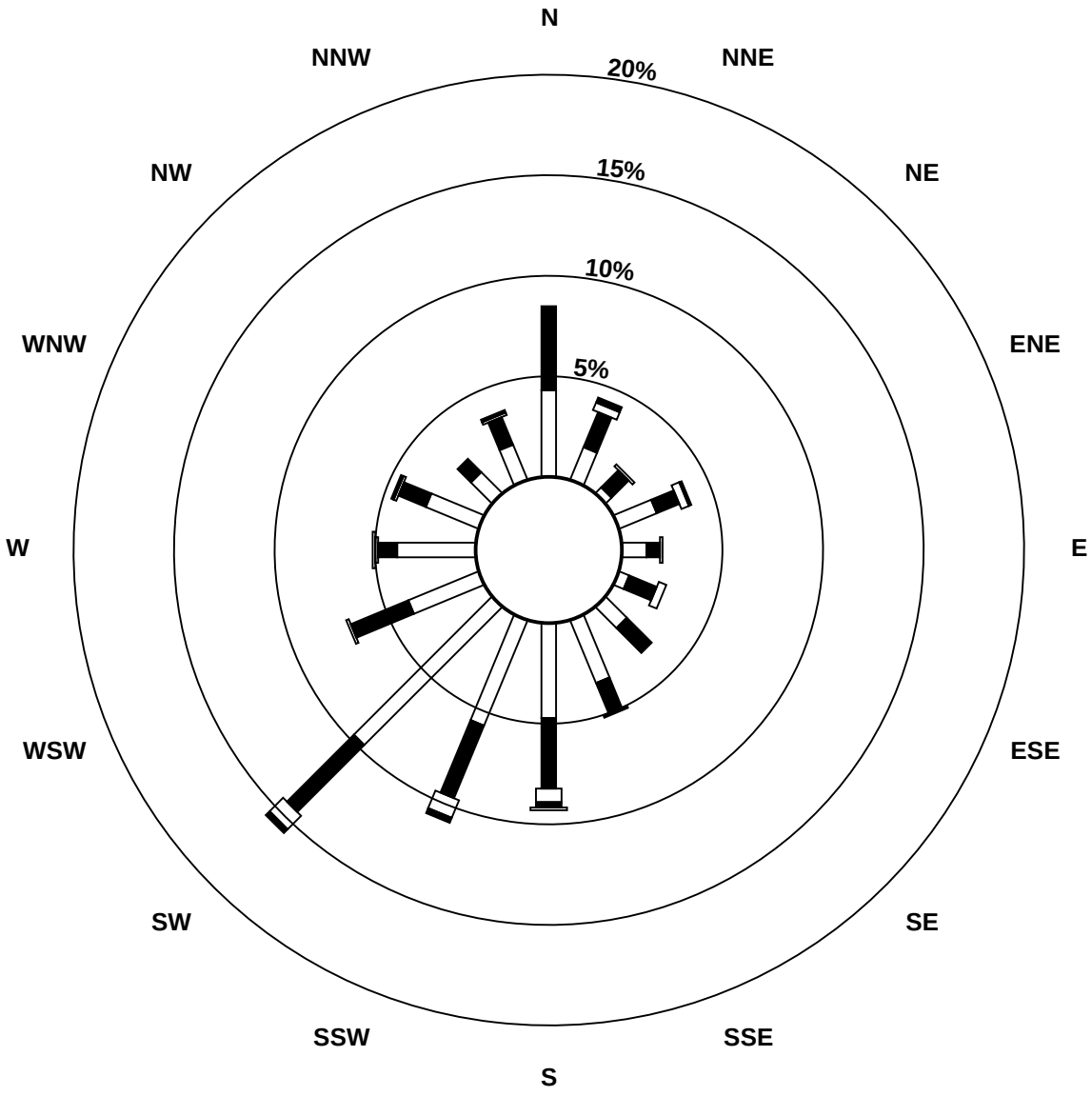
Total Number of Hours: 744

Wood Buffalo Environmental Association

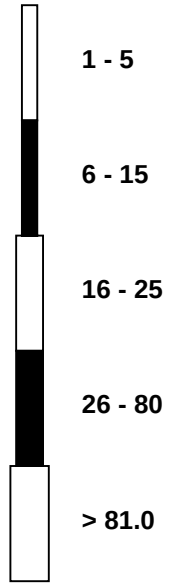
Wind Rose Aug 2015

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

CNRL Horizon (AMS 15)



Classes ($\mu g/m^3$)



Total Number of Valid Hours: 742

Maximum Value: 30.0 C on Aug 10 15:00

Maximum Daily Average: 23.0 C on Aug 10

Minimum Value: 0.2 C on Aug 23 04:00

Minimum Daily Average: 10.4 C on Aug 21

Maximum Diurnal Average: 22.3 C at hour 15

Minimum Diurnal Average: 10.9 C at hour 5

Monthly Average: 16.68 C

Percentiles: P_1 = 2.3 P_{10} = 9.8 Q_1 = 13.2 Median = 16.4 Q_3 = 20.4 P_{90} = 24.4 P_{99} = 27.9

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

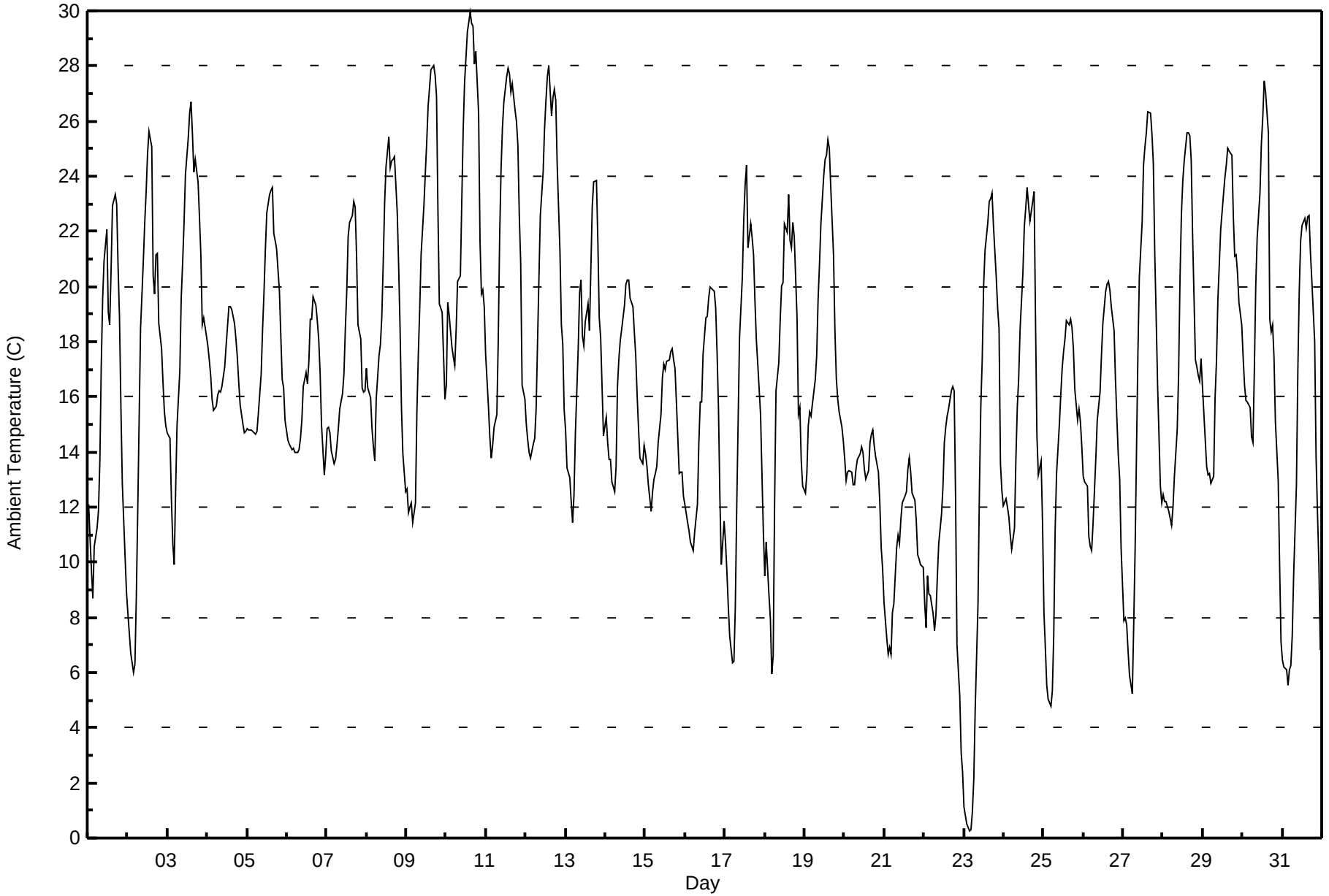
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	12.1	10.9	9.7	8.7	10.6	11.2	11.9	13.7	17.1	19.6	20.9	22.1	19.1	18.6	20.6	22.9	23.3	23.0	20.7	18.9	15.7	12.8	10.2	8.9	16.0	23.3
2-Aug	8.1	7.4	6.7	6.0	6.3	8.7	11.8	15.2	18.5	20.9	22.3	23.4	24.8	25.6	25.1	20.4	19.7	21.2	21.2	18.7	17.7	16.5	15.5	14.9	16.5	25.6
3-Aug	14.7	14.5	12.3	10.7	9.9	12.6	14.9	16.9	19.6	20.8	22.3	24.1	25.4	26.3	26.7	25.5	24.2	24.6	23.8	22.6	21.1	18.6	18.9	18.2	19.5	26.7
4-Aug	17.8	17.3	16.8	15.9	15.5	15.7	16.1	16.2	16.1	16.4	17.1	17.8	18.5	19.3	19.3	19.2	18.7	18.1	17.5	16.5	15.7	15.0	14.7	14.8	16.9	19.3
5-Aug	14.8	14.8	14.8	14.7	14.7	14.6	14.7	15.4	16.8	18.5	19.8	21.4	22.7	23.4	23.5	23.6	21.9	21.7	21.3	19.8	18.2	16.6	16.3	15.2	18.3	23.6
6-Aug	14.4	14.3	14.2	14.1	14.1	14.0	14.0	14.1	14.5	15.1	16.4	16.9	16.5	17.3	18.8	18.8	19.6	19.3	18.8	18.1	16.9	15.0	13.2	13.9	15.9	19.6
7-Aug	14.9	14.9	14.7	14.0	13.6	13.7	14.2	14.8	15.6	16.1	16.8	18.5	19.8	21.8	22.3	22.6	23.1	22.9	21.1	18.6	18.1	16.3	16.2	16.2	17.5	23.1
8-Aug	17.0	16.3	16.0	14.9	14.2	13.7	15.9	17.5	17.9	18.9	20.8	23.0	24.3	25.4	24.3	24.6	24.6	24.7	22.7	20.7	18.5	15.6	14.0	12.6	19.1	25.4
9-Aug	12.7	11.8	12.0	12.2	11.5	12.1	15.5	17.5	19.2	21.1	22.9	24.1	25.2	26.5	27.2	27.9	28.0	27.7	26.9	22.8	19.4	19.0	17.5	15.9	19.9	28.0
10-Aug	16.4	19.4	18.9	17.8	17.5	17.1	18.5	20.2	20.4	23.1	25.7	27.4	28.3	29.3	30.0	29.6	29.4	28.1	28.5	26.3	21.6	19.7	19.9	19.3	23.0	30.0
11-Aug	17.5	15.7	14.5	13.8	14.2	14.9	15.4	18.0	21.8	24.3	25.8	26.7	27.6	27.9	27.7	27.0	27.4	26.4	26.0	25.1	22.6	20.8	16.4	15.9	21.4	27.9
12-Aug	15.0	14.4	14.0	13.8	14.3	14.5	15.6	17.9	20.3	22.6	24.1	25.7	26.7	27.6	28.0	26.2	26.9	27.2	26.8	24.4	21.3	18.6	17.9	15.5	20.8	28.0
13-Aug	14.8	13.4	13.1	12.2	11.4	12.4	14.7	17.8	19.8	20.3	18.2	17.8	18.7	19.4	18.4	20.6	22.9	23.8	23.9	21.7	18.9	18.2	16.4	14.6	17.6	23.9
14-Aug	15.3	14.3	13.7	13.7	12.9	12.6	13.5	16.4	17.4	18.1	18.5	19.3	20.1	20.2	20.2	19.6	19.3	18.4	17.5	16.1	14.9	13.8	13.6	14.2	16.4	20.2
15-Aug	13.9	13.5	12.8	11.9	12.6	13.0	13.2	13.5	14.3	15.4	16.7	17.2	17.0	17.3	17.3	17.7	17.7	17.3	17.0	15.8	13.2	13.3	13.3	12.4	14.9	17.7
16-Aug	12.1	11.4	11.1	10.7	10.6	10.4	11.1	12.1	14.3	15.8	15.8	17.5	18.9	18.9	19.6	20.0	19.9	19.8	19.2	17.6	15.5	12.3	9.9	11.5	14.8	20.0
17-Aug	10.7	9.7	8.4	7.3	6.3	6.4	8.4	12.0	15.1	18.1	20.3	22.4	23.7	24.4	21.4	22.3	21.8	21.2	19.5	18.0	17.2	15.4	13.2	11.1	15.6	24.4
18-Aug	9.5	10.7	8.8	8.0	6.0	6.6	12.2	16.2	17.3	18.8	20.0	20.1	22.3	22.0	23.4	21.7	21.4	22.3	21.8	18.9	15.4	15.6	13.7	12.8	16.1	23.4
19-Aug	12.5	13.2	15.0	15.5	15.3	15.8	16.6	17.5	19.5	20.8	22.3	24.0	24.6	24.7	25.3	25.0	23.7	21.2	18.4	16.7	15.9	15.5	14.9	14.4	18.7	25.3
20-Aug	13.7	13.0	13.3	13.3	13.3	12.8	12.8	13.4	13.7	13.9	14.2	14.0	13.4	13.0	13.3	14.3	14.6	14.8	14.3	13.8	13.3	12.1	10.5	9.8	13.3	14.8
21-Aug	8.6	7.2	6.7	6.9	6.7	8.2	8.5	10.5	11.0	10.7	11.5	12.1	12.4	12.5	13.4	13.8	13.3	12.5	12.2	11.5	10.3	10.1	9.9	9.8	10.4	13.8
22-Aug	8.5	7.6	9.5	8.8	8.8	8.1	7.5	8.1	9.5	10.7	11.8	12.7	14.4	14.9	15.3	15.6	16.2	16.4	16.2	12.4	7.0	5.1	3.1	2.4	10.4	16.4
23-Aug	1.1	0.8	0.5	0.2	0.3	1.0	2.1	4.7	8.5	12.6	15.7	17.3	20.0	21.3	22.3	23.1	23.2	23.4	22.2	20.3	19.2	18.5	13.6	12.6	12.7	23.4
24-Aug	12.1	12.3	12.0	11.7	11.0	10.5	11.2	13.7	15.6	16.7	18.5	20.5	22.2	22.8	23.6	23.0	22.4	23.1	23.4	18.8	14.6	13.2	13.7	11.4	16.6	23.6
25-Aug	8.2	6.9	5.5	5.0	4.8	5.3	7.4	11.2	13.2	15.0	16.1	17.0	17.7	18.1	18.7	18.6	18.8	18.5	17.7	16.3	15.2	15.5	15.1	14.2	13.3	18.8
26-Aug	13.1	12.9	12.7	10.9	10.6	10.4	11.4	13.8	15.2	15.6	16.2	17.5	18.7	19.9	20.1	20.2	19.9	19.3	18.4	16.6	15.2	13.9	13.0	10.5	15.2	20.2
27-Aug	7.9	8.0	7.7	6.8	5.9	5.2	7.7	10.5	14.1	17.6	20.3	22.3	24.4	25.1	25.6	26.4	26.3	25.5	24.5	21.2	18.9	16.5	12.7	12.1	16.4	26.4
28-Aug	12.5	12.2	12.2	11.9	11.6	11.3	12.0	13.1	14.8	16.8	20.3	22.6	23.9	24.5	25.6	25.6	25.5	24.6	21.8	17.3	17.1	16.8	16.6	17.4	17.8	25.6
29-Aug	16.4	14.5	13.5	13.2	13.2	12.8	13.1	16.0	17.3	19.5	20.8	22.1	23.3	23.9	24.4	25.0	24.9	24.8	22.6	21.1	21.1	20.5	19.4	18.6	19.3	25.0
30-Aug	17.5	16.4	15.8	15.8	15.6	14.5	14.4	17.0	20.1	21.8	23.4	25.2	26.2	27.4	27.0	25.6	18.8	18.4	18.6	17.5	15.1	13.0	9.9	7.1	18.4	27.4
31-Aug	6.5	6.2	6.1	5.5	6.1	6.2	7.3	9.5	12.8	16.9	19.8	21.7	22.2	22.5	22.1	22.5	22.6	21.2	20.2	18.0	13.8	11.8	10.0	6.8	14.1	22.6
	12.6	12.1	11.7	11.2	10.9	11.2	12.4	14.3	16.2	17.8	19.2	20.5	21.4	22.0	22.3	22.2	21.9	21.6	20.8	18.8	16.7	15.3	14.0	13.1	Diurnal Average	
	17.8	19.4	18.9	17.8	17.5	17.1	18.5	20.2	21.8	24.3	25.8	27.4	28.3	29.3	30.0	29.6	29.4	28.1	28.5	26.3	22.6	20.8	19.9	19.3	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature (AT) - C

CNRL Horizon - August 2015



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	80	10.75	10.75
10 - 20	460	61.83	72.58
> 20	204	27.42	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

Wood Buffalo Environmental Association

Summary of Hour Averages

Precipitation (PC) - mm

CNRL Horizon - August 2015

Maximum Value: 2.3 mm on Aug 24 03:00

Maximum Daily Total: 6.1 mm on Aug 4

Minimum Value: 0.0 mm on Aug 1 01:00

Minimum Daily Total: 0.0 mm on Aug 3

Maximum Diurnal Total: 3.3 mm at hour 3

Minimum Diurnal Total: 0.0 mm at hour 8

Monthly Total: 25.65 mm

Percentiles: P_1 = 0.0 P_{10} = 0.0 Q_1 = 0.0 Median = 0.0 Q_3 = 0.0 P_{90} = 0.0 P_{99} = 1.3

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

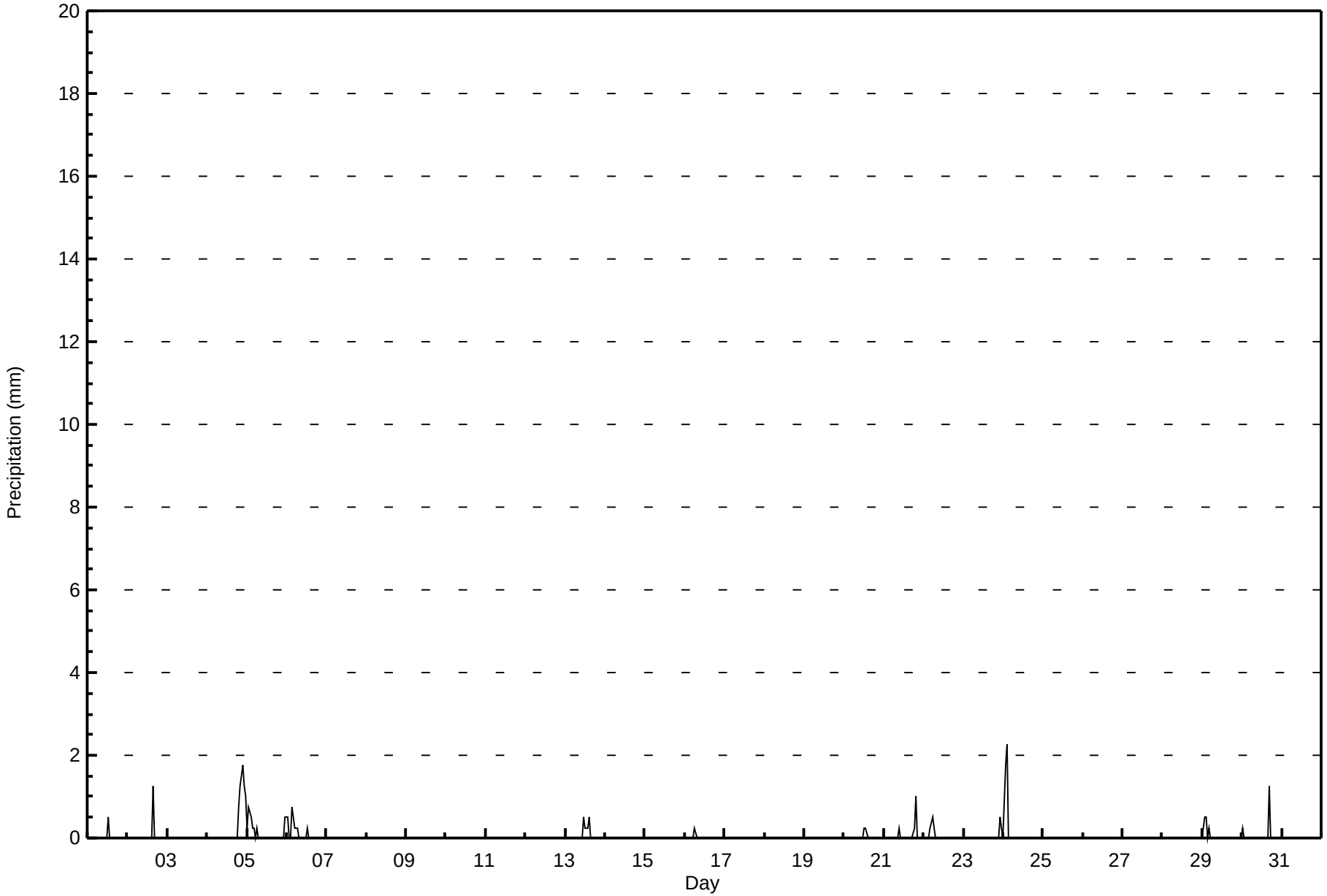
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5
2-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	1.3
3-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	1.3	1.8	1.3	1.0	6.1	1.8
5-Aug	0.3	0.8	0.5	0.3	0.3	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	0.5	2.8	0.8
6-Aug	0.5	0.0	0.0	0.8	0.5	0.3	0.3	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	2.5	0.8
7-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.3	0.3	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.5
14-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3
17-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.3
21-Aug	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	0.3	1.0	0.0	0.0	0.0	0.0	1.5	1.0
22-Aug	0.0	0.0	0.0	0.0	0.3	0.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.5
23-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.3	0.8	0.5
24-Aug	0.0	1.8	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.1	2.3
25-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29-Aug	0.0	0.5	0.5	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.5
30-Aug	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	1.3
31-Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	3.3	1.0	1.3	0.8	1.0	0.0	0.0	0.3	0.0	0.5	1.3	0.5	0.5	1.3	1.3	0.0	0.3	1.8	1.3	1.8	1.8	1.8	Diurnal Average	
	0.5	1.8	2.3	0.8	0.5	0.5	0.3	0.0	0.0	0.3	0.0	0.5	0.5	0.3	0.5	1.3	1.3	0.0	0.3	1.0	1.3	1.8	1.3	1.0	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Precipitation (PC) - mm

CNRL Horizon - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

CNRL Horizon - August 2015

Maximum Value: 99 % on Aug 5 05:00

Maximum Daily Average: 87.1 % on Aug 6

Minimum Value: 24 % on Aug 31 17:00

Minimum Daily Average: 51.4 % on Aug 12

Maximum Diurnal Average: 88.0 % at hour 5

Minimum Diurnal Average: 45.2 % at hour 16

Monthly Average: 67.3 %

Percentiles: P_1 = 28 P_{10} = 38 Q_1 = 52 Median = 68 Q_3 = 83 P_{90} = 95 P_{99} = 99

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

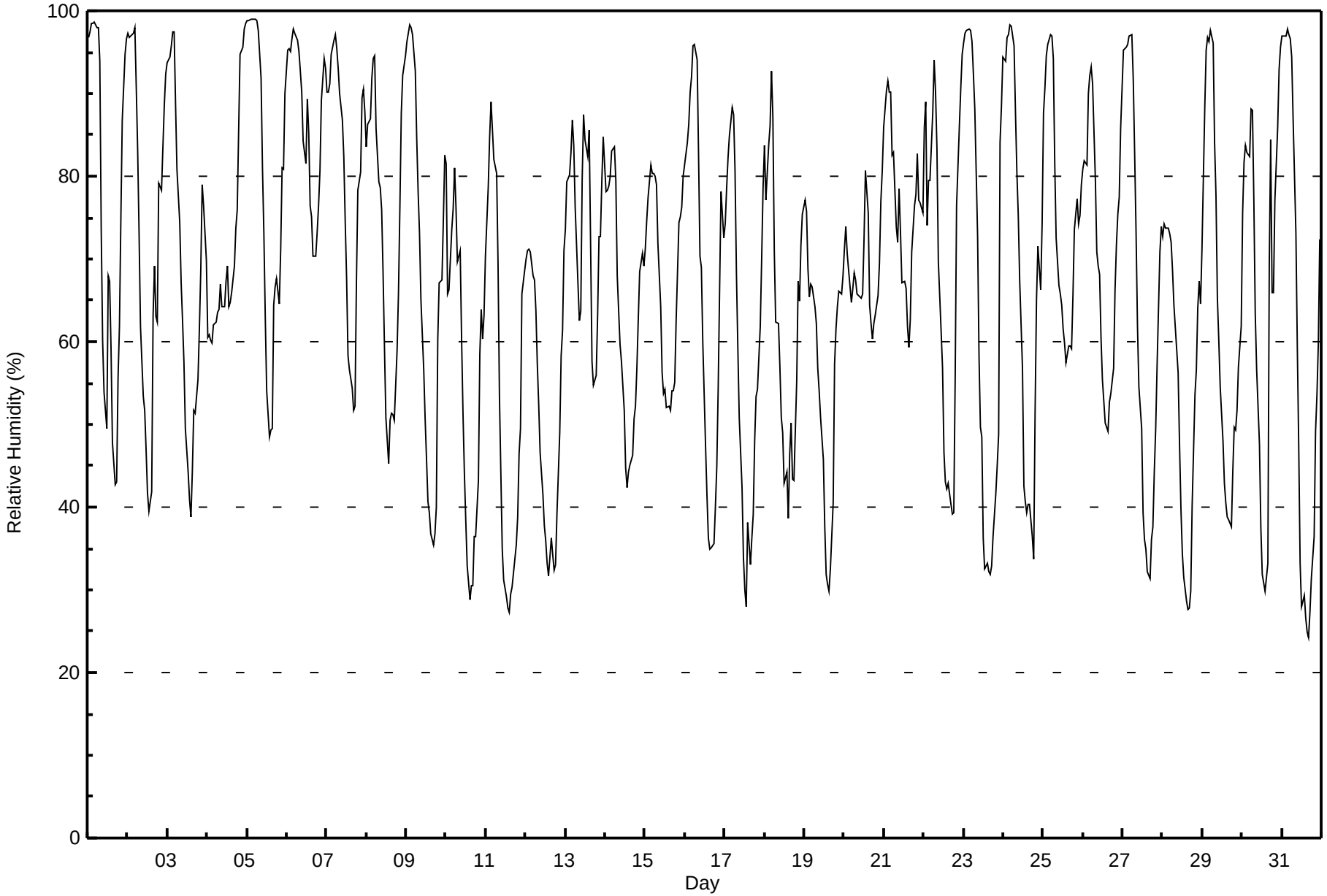
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	97	98	99	98	99	98	98	94	74	60	54	50	68	67	59	48	43	43	56	62	75	87	95	97	75.6	99
2-Aug	97	97	97	97	98	91	83	73	62	53	52	47	42	39	42	63	69	63	62	79	78	84	89	92	72.9	98
3-Aug	94	94	96	97	98	89	81	74	67	63	58	50	44	41	39	44	52	51	55	62	69	79	76	70	68.4	98
4-Aug	60	61	60	60	62	62	64	64	67	64	64	67	69	64	65	66	69	74	76	85	95	96	98	98	71.3	98
5-Aug	99	99	99	99	99	99	99	98	92	81	73	63	54	49	49	49	64	67	68	65	71	81	81	90	78.6	99
6-Aug	95	95	95	97	98	97	96	95	93	90	84	82	89	85	76	75	70	70	73	76	81	89	94	93	87.1	98
7-Aug	90	90	91	95	96	97	95	93	90	87	82	75	68	58	57	54	52	52	67	78	81	90	91	88	79.9	97
8-Aug	84	86	87	92	94	95	86	79	79	76	68	59	51	45	51	51	51	51	59	66	76	88	92	95	73.3	95
9-Aug	96	97	98	98	97	93	85	78	73	65	57	51	46	41	39	37	35	37	40	60	67	68	75	83	67.3	98
10-Aug	81	66	66	74	76	81	76	70	71	60	51	44	38	33	29	31	30	37	36	43	58	64	60	63	55.8	81
11-Aug	70	79	85	89	86	82	80	69	53	44	35	31	29	28	27	29	30	34	36	39	46	49	66	69	53.6	89
12-Aug	70	71	71	71	68	67	64	57	52	47	41	38	36	33	32	36	34	32	33	39	49	58	61	71	51.4	71
13-Aug	74	79	80	83	87	84	76	67	62	64	80	87	84	82	86	72	58	55	56	63	73	73	79	85	74.5	87
14-Aug	78	78	79	80	83	83	80	68	64	60	58	52	45	42	44	45	46	51	52	57	63	69	71	69	63.1	83
15-Aug	71	75	78	81	80	80	80	79	72	64	56	54	54	52	52	52	54	54	55	62	74	75	76	80	67.1	81
16-Aug	81	84	86	90	92	96	96	94	83	70	69	60	47	41	36	35	35	36	40	45	54	66	78	73	66.2	96
17-Aug	74	79	82	85	88	88	81	68	59	51	42	34	30	28	38	33	36	39	48	53	54	62	70	79	58.4	88
18-Aug	84	77	84	86	93	87	71	62	62	57	51	49	43	44	39	46	50	43	43	55	67	65	72	75	62.8	93
19-Aug	77	76	69	65	67	67	64	62	57	54	51	46	38	32	31	30	33	40	57	62	64	66	66	68	55.9	77
20-Aug	71	74	71	69	65	66	68	67	66	65	65	66	72	81	76	64	62	60	62	63	66	70	77	81	68.6	81
21-Aug	86	90	92	90	90	83	83	74	72	78	73	67	67	66	62	59	63	71	76	78	83	77	77	76	76.4	92
22-Aug	86	89	74	79	80	88	94	90	83	70	61	57	47	43	42	43	40	39	39	56	76	86	91	95	68.7	95
23-Aug	96	97	98	98	98	96	92	88	73	58	50	49	36	33	33	32	32	33	37	42	45	49	84	88	64.0	98
24-Aug	94	94	97	97	98	98	96	88	80	75	67	57	43	41	39	40	40	36	34	52	65	71	66	74	68.5	98
25-Aug	88	91	95	96	97	97	94	82	73	67	66	64	61	60	58	60	59	59	66	74	77	74	75	79	75.4	97
26-Aug	81	82	81	90	92	93	91	79	71	69	68	60	55	50	50	49	53	54	57	66	72	75	77	86	71.0	93
27-Aug	95	96	96	96	97	97	92	83	73	62	55	50	39	36	35	32	31	36	38	44	49	57	71	74	63.9	97
28-Aug	73	74	74	74	73	72	69	64	59	56	48	40	34	32	29	28	28	30	40	53	57	64	67	65	54.2	74
29-Aug	71	88	95	97	96	98	96	84	78	65	60	55	48	43	40	39	39	38	44	50	49	52	57	62	64.3	98
30-Aug	76	82	84	83	82	88	88	77	63	57	48	38	32	31	30	33	69	84	66	66	77	86	93	96	67.8	96
31-Aug	97	97	97	98	97	97	94	87	73	59	47	33	28	29	27	25	24	27	31	36	49	54	60	72	60.0	98
	83.5	85.0	85.6	87.2	88.0	87.4	84.3	77.7	70.8	64.3	59.2	53.9	49.6	46.8	45.5	45.2	46.9	48.3	51.7	59.1	66.5	71.7	76.9	80.1	Diurnal Average	
	99	99	99	99	99	99	99	98	93	90	84	87	89	85	86	75	70	84	76	85	95	96	98	98	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity (RH) - %

CNRL Horizon - August 2015



Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	93	12.50	12.50
40 - 60	165	22.18	34.68
60 - 80	260	34.95	69.62
80 - 100	226	30.38	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

Wood Buffalo Environmental Association

Summary of Hour Averages

Global Radiation (GR) - W/m2

CNRL Horizon - August 2015

Maximum Value: 897 W/m2 on Aug 18 13:00

Maximum Daily Average: 282.6 W/m2 on Aug 9

Minimum Value: 0 W/m2 on Aug 1 01:00

Minimum Daily Average: 50.3 W/m2 on Aug 4

Maximum Diurnal Average: 579.3 W/m2 at hour 13

Minimum Diurnal Average: 0.0 W/m2 at hour 1

Monthly Average: 195.2 W/m2

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 70 $Q_3 = 348$ $P_{90} = 609$ $P_{99} = 764$

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

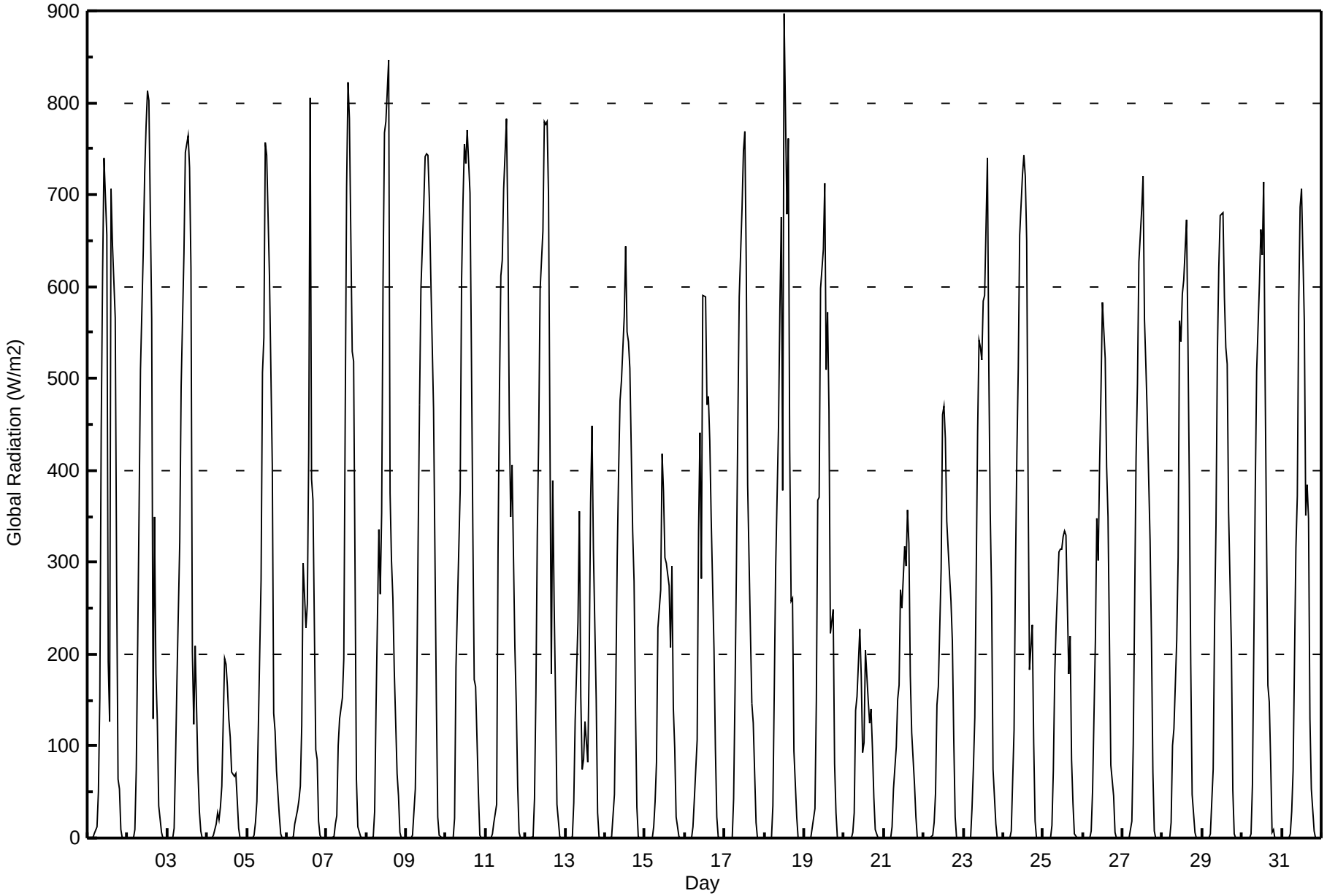
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0	0	0	0	5	12	50	153	446	616	740	656	192	126	706	647	567	280	64	53	9	0	0	0	221.7	740
2-Aug	0	0	0	0	9	75	209	357	510	639	724	775	813	803	564	130	350	179	129	35	6	0	0	0	262.7	813
3-Aug	0	0	0	0	11	85	170	321	491	564	636	746	765	729	620	203	123	210	72	29	8	0	0	0	240.9	765
4-Aug	0	0	0	0	3	15	27	20	33	57	195	189	165	130	111	72	68	70	41	11	0	0	0	0	50.3	195
5-Aug	0	0	0	0	4	17	39	116	281	507	545	756	742	610	508	406	135	116	73	25	5	0	0	0	203.5	756
6-Aug	0	0	0	0	1	16	30	41	57	122	299	228	254	423	806	391	367	96	86	18	4	0	0	0	134.9	806
7-Aug	0	0	0	0	2	15	24	100	130	153	195	458	708	822	783	530	518	294	65	12	1	0	0	0	200.3	822
8-Aug	0	0	0	0	2	29	144	335	266	354	609	767	780	847	376	302	261	182	70	46	6	0	0	0	224.0	847
9-Aug	0	0	0	0	3	54	157	323	472	598	688	741	745	743	695	613	467	308	149	23	3	0	0	0	282.6	745
10-Aug	0	0	0	0	1	21	186	251	378	607	692	755	733	771	702	528	338	172	165	48	3	0	0	0	264.7	771
11-Aug	0	0	0	0	5	17	37	313	484	611	629	707	783	664	460	349	406	207	145	57	5	0	0	0	245.0	783
12-Aug	0	0	0	0	1	43	157	331	438	596	661	779	777	779	699	178	389	254	153	37	2	0	0	0	261.4	779
13-Aug	0	0	0	0	2	39	128	235	355	154	75	86	127	83	192	364	448	314	151	28	2	0	0	0	115.9	448
14-Aug	0	0	0	0	2	48	166	306	400	477	498	568	643	551	540	510	335	279	142	34	1	0	0	0	229.1	643
15-Aug	0	0	0	0	0	13	40	83	229	270	418	377	305	299	275	207	295	142	98	23	1	0	0	0	128.1	418
16-Aug	0	0	0	0	0	12	43	107	334	441	282	590	588	471	481	432	347	207	97	22	1	0	0	0	185.6	590
17-Aug	0	0	0	0	1	42	159	295	450	588	684	747	769	626	384	222	147	126	70	16	0	0	0	0	221.9	769
18-Aug	0	0	0	0	0	35	161	295	446	577	676	378	897	679	761	422	257	261	95	22	0	0	0	0	248.5	897
19-Aug	0	0	0	0	0	10	33	150	368	371	598	641	713	509	572	465	223	248	81	27	0	0	0	0	208.7	713
20-Aug	0	0	0	0	0	7	27	139	154	227	177	93	104	205	149	125	140	98	45	10	0	0	0	0	70.8	227
21-Aug	0	0	0	0	0	13	53	99	151	167	270	250	318	296	357	321	176	115	58	24	0	0	0	0	111.1	357
22-Aug	0	0	0	0	0	3	16	49	145	164	292	461	469	435	344	314	257	214	107	23	0	0	0	0	137.3	469
23-Aug	0	0	0	0	0	32	77	132	441	542	534	520	584	590	740	512	354	263	75	16	0	0	0	0	225.4	740
24-Aug	0	0	0	0	0	8	117	289	419	511	656	721	743	720	650	388	183	232	104	19	0	0	0	0	240.0	743
25-Aug	0	0	0	0	0	14	73	177	231	311	314	314	328	333	330	179	219	86	39	5	0	0	0	0	123.0	333
26-Aug	0	0	0	0	0	7	52	216	348	302	405	488	582	521	404	349	218	79	45	7	0	0	0	0	167.6	582
27-Aug	0	0	0	0	0	18	102	256	413	495	627	683	720	564	514	459	323	215	72	7	0	0	0	0	227.8	720
28-Aug	0	0	0	0	0	17	101	118	215	305	563	541	591	607	673	542	384	189	48	6	0	0	0	0	204.3	673
29-Aug	0	0	0	0	0	5	75	234	340	526	621	677	680	588	534	515	354	207	52	4	0	0	0	0	225.5	680
30-Aug	0	0	0	0	0	4	59	213	376	508	604	661	634	714	505	167	148	82	7	10	0	0	0	0	195.5	714
31-Aug	0	0	0	0	0	4	29	73	316	372	579	686	707	561	351	384	348	129	53	8	0	0	0	0	191.7	707
	0.0	0.0	0.0	0.0	1.6	23.5	88.5	197.6	326.4	410.7	499.5	549.6	579.3	541.9	509.2	362.1	295.0	188.8	85.4	22.7	1.9	0.0	0.0	0.0	Diurnal Average	
	0	0	0	0	11	85	209	357	510	639	740	779	897	847	806	647	567	314	165	57	9	0	0	0	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Global Radiation (GR) - W/m2

CNRL Horizon - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

CNRL Horizon - August 2015

Maximum Speed: 22 km/h on Aug 19 18:00

Maximum Daily Speed Average: 13.5 km/h on Aug 14

Minimum Speed Value: 0 km/h on Aug 3 09:00

Minimum Daily Speed Average: 0.9 km/h on Aug 7

Maximum Diurnal Speed Average: 4.9 km/h at hour 14

Minimum Diurnal Speed Average: 2.1 km/h at hour 1

Monthly Average Velocity: 3.3 km/h 235.5 deg

Percentiles: P_1 = 1 P_{10} = 3 Q_1 = 5 Median = 7 Q_3 = 10 P_{90} = 14 P_{99} = 19

Hours in Service: 744

Hours of Data: 743

Hours of Missing Data: 1

Percent Operational Time: 99.9

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	NNE5	NNW2	WSW5	WSW5	WNW5	WNW3	SSW2	WNW1	NNW4	NNW5	N4	NE3	WSW7	W9	WNW12	NW8	NNW6	N6	NNE5	WNW8	WNW4	WSW4	WSW3	SW4	WNW3.4	WNW12
2-Aug	SW2	WSW1	SW3	SSW2	SSW5	SSW4	SSE4	SSE3	S5	S5	SE5	SSE3	SSE6	S4	ESE7	NNW16	N11	SSW3	SSE5	S1	WSW4	E3	WSW3	AF	S1.7	NNW16
3-Aug	N3	N5	N3	NW4	N3	N3	NNW3	N3	ESE0	NNE4	NE8	NNE8	ENE6	ENE6	NE6	ESE9	ESE6	ESE8	SSE7	SE4	E4	ENE3	N6	N5	NE2.9	ESE9
4-Aug	NNE6	N6	NNE8	N8	N6	N8	N8	N7	NNE7	NNE9	NNE12	NNE10	NNE8	NE11	NE9	ENE8	E8	ENE5	ENE6	ENE5	ESE8	SE8	E2	NNE4	NE6.0	NNE12
5-Aug	N5	NNE6	NNE6	NNE5	N5	N6	N5	N5	NE6	ENE6	NE7	ENE11	ENE12	ENE14	E8	SE9	SSW6	SSW2	SE4	SSE14	SSE10	SSW3	SSE9	SE5	ENE3.6	SSE14
6-Aug	ENE4	ENE4	E5	ENE6	NE6	ENE6	ENE6	ENE6	E7	ESE9	ESE9	E9	SSE6	ENE5	ENE14	ENE12	NE9	E6	E7	E6	ESE6	E4	E5	E5	E6.3	ENE14
7-Aug	ESE5	SSE5	SSE2	NNE1	N2	N2	NE3	NNE3	NW4	NNW3	NNW2	WNW4	NNW4	SSW5	ENE5	SE5	ESE7	ESE4	SSE3	SW3	W3	NNW1	E2	SE6	ESE0.9	ESE7
8-Aug	SSE7	S7	SSE4	S4	SSE3	SSW3	S5	S6	SE5	SE3	ESE5	S4	SSE4	W2	NNE7	WNW3	WNW3	NNE4	NE9	NE6	ENE5	N3	N4	NNW2	SE1.4	NE9
9-Aug	N4	NNW4	N4	N5	NNW4	NNW3	NNE3	NE3	N4	N5	NNE4	NE6	ENE5	SE5	SE4	SSE4	SE2	ESE3	ESE4	ENE4	ENE2	NNE5	NNW4	NNE1	NE2.2	NE6
10-Aug	SW3	NW11	ENE3	S6	SW10	WSW8	SW8	SW11	SW12	SW12	SW11	SSW11	SW16	SW16	WSW15	SW14	SW12	SW7	SW7	SSW7	S8	S7	SSW8	SW9	SW8.7	SW16
11-Aug	SW5	WSW6	SW6	SSW7	SSW7	SW7	SW5	S9	SSW10	SW13	SW19	SW19	SW19	SW19	SW19	SW17	WSW15	WSW11	WSW7	SW5	WSW6	W7	SW7	SW7	SW10.1	SW19
12-Aug	WSW7	SW8	SW7	SW8	SW10	SW11	SW11	SW11	SW13	SW12	SW12	SW12	SW11	SSW12	SW11	SW9	WSW10	WSW9	WSW10	SW8	SW7	WSW7	SW7	SSW8	SW9.4	SW13
13-Aug	SW8	SSW8	SW8	SW8	S9	SSW11	SSW6	S7	SSW8	S10	S8	S9	SSW10	SSW10	SSW13	SSW14	SSW14	SW12	SSW9	SSW8	SSW8	SSW7	WSW6	WSW8	SSW8.7	SSW14
14-Aug	WSW9	SW9	SW12	WSW13	WSW10	SW11	SW12	WSW14	W18	W18	W16	W18	W17	W18	W17	W18	W18	W19	W17	W13	WNW13	WSW7	WSW7	WNW12	W13.5	W19
15-Aug	NW14	NW11	NW9	WNW6	NNW12	N12	N13	N16	N15	N14	N16	N16	N18	N18	N15	N14	NW12	NW14	NNW11	N12	NW5	NW9	NNW6	N3	NNW11.3	N18
16-Aug	NNW4	WNW4	WSW2	SSW5	SSW6	WSW6	SW4	WSW0	SSE3	NNW1	SSE1	S8	SW3	NW9	W10	WNW11	W7	WNW9	W7	W5	WSW6	WSW5	SW7	SW8	WSW4.1	WNW11
17-Aug	SW8	SSW9	SSW8	SSW10	SSW10	SSW8	S11	S11	SSW11	S11	SSW11	SSW12	SSW14	SW9	NNW13	NNW5	SW7	WSW7	W7	WSW5	WSW6	SSW6	S4	SW5	SSW6.9	SSW14
18-Aug	WNW1	NNW4	W1	NW5	WNW6	W3	S3	ESE2	NNE5	NE5	ENE5	SE5	S7	E6	S5	NNE8	NNE8	E6	SE6	SSE5	S7	S8	S7	S6	SE1.3	NNE8
19-Aug	S5	SSE5	SSE8	S9	SSE5	SSE8	S12	S13	S14	SSW12	SW13	SW12	W14	WSW15	WSW18	W16	WSW17	W22	W15	W15	WSW11	SW9	WSW9	WSW9	SW9.2	W22
20-Aug	SW8	WSW9	SW8	SW8	WSW11	WSW12	WSW12	WSW14	W15	W18	W15	W14	WSW12	W11	WSW11	WNW14	W14	WNW15	W11	W7	W9	W8	WSW9	SW8	W10.9	W18
21-Aug	SW8	SW9	SW9	SW9	SW8	WSW9	SW6	WNW9	WNW13	WNW10	WNW10	NW12	WNW14	WNW14	WNW14	NW13	WNW13	NW10	NW3	WNW8	WNW8	W10	W10	W7	W8.4	WNW14
22-Aug	S4	SSW4	W10	WSW6	WNW8	WSW6	WSW6	W7	W7	WNW9	NW13	NW12	NW13	WNW15	WNW13	NNW11	NW12	NW11	NW9	W4	SW5	W2	SSW4	SW5	WNW6.7	WNW15
23-Aug	SSW6	SSW6	SSW7	SSW6	S7	S6	S5	S7	S7	SSE7	S8	SE6	SSE9	SSE11	SSE10	SSE11	SSE12	SE11	SSE7	SE7	SE9	SW8	WNW3	E6	SSE6.7	SSE12
24-Aug	S5	WSW8	SSE8	SW4	S6	SSW6	S8	S9	SSW10	SSW9	SSW10	SSW10	SSW12	SW11	SW10	W8	WNW6	SW2	W4	WNW3	WSW3	WNW6	WNW7	WNW5	SW5.6	SSW12
25-Aug	WNW3	WNW5	NNW1	NNW2	SSW4	SW3	SSW3	N3	N5	N8	NNE6	N8	N9	NNE9	NNE9	N9	NNE6	NNE4	N6	N4	N5	N8	N11	N8	N4.7	N11
26-Aug	N6	N7	N7	SSW0	SE1	SSW2	W2	NNW2	N2	N3	N4	NNE3	SE2	S6	S7	S6	S9	S7	SSW6	SSW6	SSW6	WSW7	SW9	WSW5	SSW1.7	S9
27-Aug	SSW6	SSW8	SSW10	SW9	SSW7	S7	S9	S10	S10	S9	S8	S12	SSW14	SSW15	SSW16	SSW15	SSW15	SW13	SSW9	S10	S10	SW5	WSW4	SSW7	SSW9.5	SSW16
28-Aug	SW8	SW11	SW11	SW10	SW11	SW11	SW10	SW10	SW10	SW14	SW14	SW14	SW14	SW15	SW14	SW14	SW12	WSW9	SW3	S4	SSW4	SW5	NW5	NNW10	SW9.4	SW15
29-Aug	WNW7	S4	SW8	SW6	SSW6	SSW7	SW6	SW6	SW8	S9	SSW11	SSW10	S9	SSW8	SSE7	SSE10	SE9	SE8	SE5	ESE7	ESE8	SE6	E3	ESE4	S5.4	SSW11
30-Aug	ENE4	N5	NW7	N7	N5	N5	N5	NW4	SW5	WSW8	WNW7	W8	WNW6	SSW11	SW12	SSW8	W10	SSW3	SSE13	SSE11	S9	S8	SSW5	S4	SW3.0	SSE13
31-Aug	SSE6	S7	S6	SSW6	SSW6	SSW7	S9	S11	S11	S10	SSW12	SW17	SW19	SW15	SW15	SW16	SW15	SW12	SSW10	SSW8	SSW7	SSW7	W7	SW6	SSW9.5	SW19
	WSW2.1	WSW2.9	SW3.0	SW3.4	SW3.5	SW3.5	SW3.3	SW3.1	SW3.6	WSW3.2	WSW3.1	SW3.6	SW4.7	WSW4.9	WSW4.3	WSW4.1	WSW4.4	WSW3.6	SW2.5	SW2.6	SSW3.2	SW3.0	WSW2.9	WSW2.7	Diurnal Average	
	NW14	NW11	SW12	WSW13	NNW12	N12	N13	N16	W18	W18	SW19	SW19	SW19	SW19	SW19	W18	W18	W22	W17	W15	WNW13	W10	N11	WNW12	Diurnal Maximum	

AF - Analyzer Failure

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

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Speed (WS) - km/h

CNRL Horizon - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 8 km/h on Aug 19 17:00

Minimum Value: 1 km/h on Aug 3 04:00

Percentiles: P_1 = 1 P_{10} = 1 Q_1 = 2 Median = 2 Q_3 = 3 P_{90} = 5 P_{99} = 7

Hours in Service:	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
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Aug	1	1	1	1	1	1	1	1	2	2	2	3	3	2	4	3	3	2	3	3	2	1	1	1	4
2-Aug	2	1	2	2	3	2	1	1	2	2	3	2	3	3	3	6	4	3	2	1	1	2	1	AF	6
3-Aug	2	1	1	1	1	1	2	2	2	2	2	3	3	3	3	4	2	2	2	1	1	2	2	1	4
4-Aug	2	2	2	2	1	2	2	2	2	3	3	3	2	2	3	2	2	1	1	1	3	4	1	1	4
5-Aug	1	1	2	1	1	1	1	1	1	2	3	3	4	4	3	3	2	2	4	4	4	2	3	2	4
6-Aug	1	1	1	2	1	2	2	2	2	3	3	3	3	3	4	3	3	3	2	2	1	1	1	1	4
7-Aug	1	1	2	2	1	1	1	1	1	1	2	2	2	3	3	2	3	2	1	2	1	2	2	2	3
8-Aug	2	2	2	1	2	1	1	2	1	2	2	2	3	3	2	2	2	3	4	2	1	1	1	2	4
9-Aug	1	1	1	1	1	2	1	1	2	2	2	2	3	3	3	3	2	3	2	1	1	1	1	1	3
10-Aug	2	5	2	3	4	2	3	4	4	4	4	5	5	5	6	5	4	3	2	1	1	1	2	2	6
11-Aug	2	1	1	1	2	2	2	3	4	4	7	7	7	7	7	6	5	5	2	2	2	1	2	1	7
12-Aug	2	2	2	2	2	3	3	4	4	4	4	4	4	4	4	3	4	4	3	2	1	3	2	2	4
13-Aug	1	2	2	1	2	3	3	2	2	3	3	3	3	3	4	4	4	4	3	2	1	2	1	2	4
14-Aug	2	2	3	3	2	3	3	5	5	6	5	6	6	6	6	6	6	6	6	5	6	2	3	4	6
15-Aug	4	3	2	2	4	4	4	4	4	4	5	5	5	5	4	4	4	4	3	3	1	2	2	2	5
16-Aug	1	1	1	1	1	1	1	1	1	2	2	2	3	4	5	4	3	3	3	1	1	1	2	2	5
17-Aug	2	2	1	2	2	2	2	3	3	3	3	4	5	5	6	4	3	3	3	2	1	1	1	1	6
18-Aug	1	1	2	1	1	1	1	1	2	3	3	2	3	3	4	4	2	2	2	1	1	2	1	1	4
19-Aug	1	1	2	2	2	2	3	3	4	4	4	5	5	5	5	6	8	7	5	5	4	3	3	3	8
20-Aug	3	2	3	3	4	4	4	5	5	5	5	5	4	4	5	4	4	5	4	3	3	3	2	2	5
21-Aug	2	2	2	2	2	4	2	3	3	2	3	3	4	5	5	5	4	5	4	5	3	3	3	4	5
22-Aug	1	1	3	2	2	2	1	2	2	3	4	4	4	5	4	3	3	3	3	1	1	2	2	2	5
23-Aug	1	1	2	1	1	1	1	2	2	2	3	2	3	4	4	4	4	3	2	2	2	7	6	3	7
24-Aug	4	3	4	3	1	2	2	2	3	3	3	3	4	4	4	4	2	2	1	1	2	2	1	2	4
25-Aug	2	1	1	1	1	1	1	3	2	2	2	2	2	2	2	2	2	2	1	2	1	2	3	2	3
26-Aug	2	2	3	1	2	1	1	1	2	2	2	2	2	3	3	3	2	2	1	1	1	2	2	2	3
27-Aug	2	2	2	1	1	1	2	2	2	3	3	4	5	5	5	5	5	5	3	2	2	2	1	1	5
28-Aug	2	3	3	3	3	3	2	3	4	4	5	5	5	5	5	5	4	4	1	1	1	2	3	3	5
29-Aug	2	2	2	1	2	1	1	2	3	3	4	3	4	4	4	4	3	2	1	2	2	3	3	2	4
30-Aug	2	2	2	2	1	1	1	1	2	3	3	3	3	5	5	2	5	2	6	3	2	1	1	2	6
31-Aug	2	1	1	1	1	2	1	2	3	3	5	6	6	6	5	6	6	6	3	2	1	2	2	2	6
	4	5	4	3	4	4	4	5	5	6	7	7	7	7	7	6	8	7	6	5	6	7	6	4	
	Diurnal Maximum																								

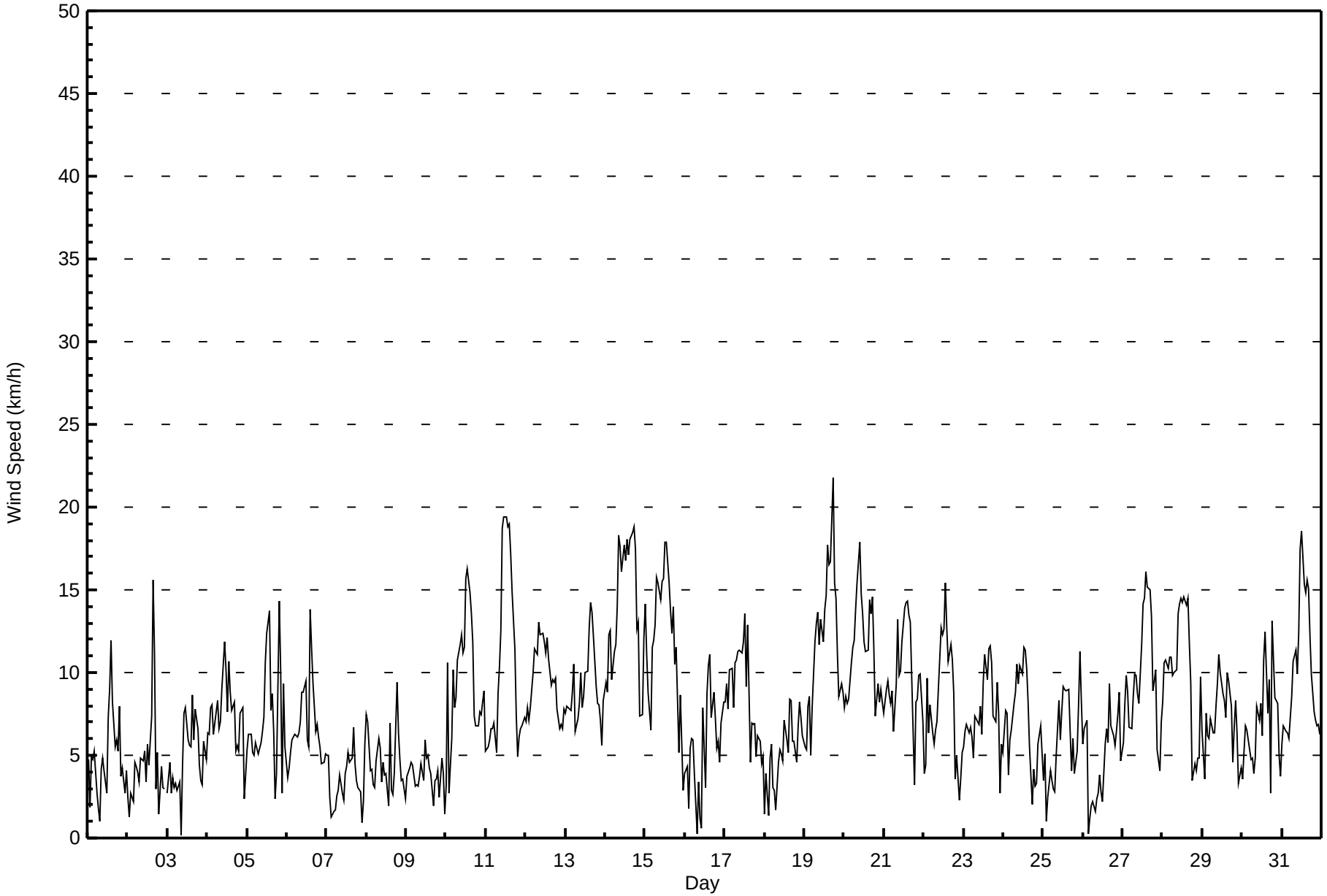
AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed (WS) - km/h

CNRL Horizon - August 2015



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	233	31.36	31.36
6 - 11	376	50.61	81.97
12 - 19	133	17.90	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: 743

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Wind Speed (WS) - km/h

CNRL Horizon - August 2015

Wind Speed Ranges (km/h)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 5	33	15	4	14	9	8	13	17	17	19	20	14	9	14	7	20	233
6 - 11	21	17	11	10	10	11	11	19	51	60	65	36	20	19	10	5	376
12 - 19	12	1	0	4	0	0	0	3	4	14	39	11	20	13	9	3	133
20 - 28	0	0	0	0	0	0	0	0	0	0	0	0	1	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	66	33	15	28	19	19	24	39	72	93	124	61	50	46	26	28	743

Total Number of Valid Hours: 743

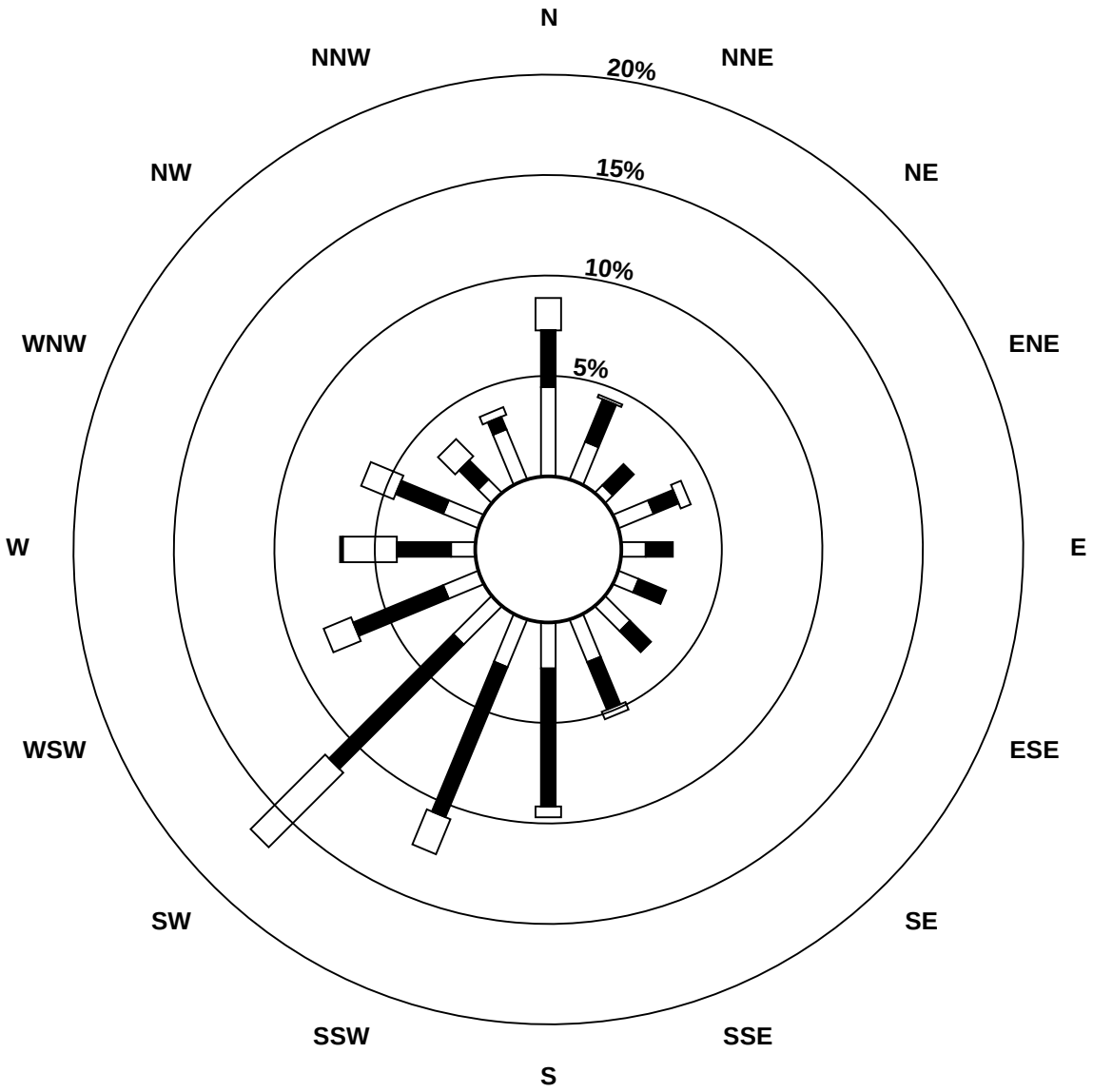
Total Number of Hours: 744

Wood Buffalo Environmental Association

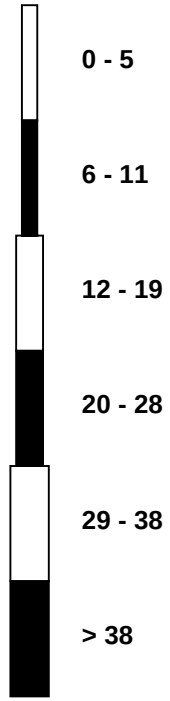
Wind Rose Aug 2015

Wind Speed (WS) - km/h

CNRL Horizon (AMS 15)



Classes (km/h)



Total Number of Valid Hours: 743

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

CNRL Horizon - August 2015

Direction of Maximum Speed: 277 deg on Aug 19 18:00
Direction of Maximum Daily Speed Average: 263.3 deg on Aug 14

Direction of Minimum Speed: 115 deg on Aug 3 09:00

Direction of Minimum Daily Speed Average: 0.9 deg on Aug 7

Monthly Average Direction: 244.5 deg

Hours in Service:	744
Hours of Data:	743
Hours of Missing Data:	1
Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average
1-Aug	23	340	253	240	283	294	208	284	328	342	351	36	253	270	291	318	332	11	30	284	291	254	243	235	298.8
2-Aug	216	237	227	205	210	204	167	161	178	169	130	164	159	190	123	333	0	212	156	189	250	91	241	AF	186.6
3-Aug	349	6	353	304	349	8	348	0	115	31	48	30	59	71	41	117	117	116	155	141	84	65	8	359	52.6
4-Aug	12	10	15	1	356	3	5	5	12	16	16	20	12	49	56	74	85	72	59	57	108	138	81	28	34.1
5-Aug	2	23	24	13	2	10	10	6	34	67	48	71	57	60	89	131	209	198	133	161	168	206	151	124	77.1
6-Aug	62	70	88	66	51	71	57	68	99	110	108	98	154	77	68	72	50	99	86	93	102	98	100	91	83.8
7-Aug	107	150	150	30	353	353	35	30	322	342	343	286	343	194	69	129	122	102	155	232	265	344	94	137	104.5
8-Aug	159	178	164	170	167	194	174	179	146	131	107	177	168	264	15	297	288	18	44	48	63	4	357	338	126.0
9-Aug	353	342	357	355	337	344	16	44	7	356	15	52	68	140	135	163	144	114	107	70	59	30	331	20	35.4
10-Aug	214	310	70	172	230	238	230	222	222	230	230	211	218	229	239	236	232	217	219	192	183	189	204	227	223.5
11-Aug	226	248	229	193	209	214	215	190	212	216	232	236	230	229	234	235	253	253	238	231	254	274	229	234	230.9
12-Aug	241	231	224	216	218	217	215	220	229	231	234	235	218	210	222	232	253	239	243	231	221	257	234	213	227.7
13-Aug	222	205	215	219	190	193	200	190	195	177	182	174	192	206	211	198	208	215	198	195	194	209	252	237	202.3
14-Aug	251	235	235	252	243	236	232	258	275	274	265	266	264	265	266	268	269	278	273	275	283	242	245	300	263.3
15-Aug	308	305	307	291	339	357	3	356	358	358	355	358	353	358	0	355	325	318	337	358	319	312	337	351	343.1
16-Aug	327	291	258	210	207	239	227	249	161	337	148	181	214	322	281	291	280	289	273	260	237	247	220	234	256.5
17-Aug	226	213	207	207	202	197	182	188	193	184	192	210	205	214	346	329	232	251	270	243	239	197	188	215	212.2
18-Aug	286	335	269	313	286	280	190	105	33	42	69	144	173	86	181	14	30	86	140	163	177	184	183	180	134.6
19-Aug	177	162	161	172	156	155	171	172	186	206	229	226	273	258	251	262	257	277	266	262	246	229	245	238	231.4
20-Aug	235	239	231	220	251	247	247	257	271	275	267	271	253	262	258	282	281	293	276	259	269	270	248	231	261.2
21-Aug	220	217	218	218	217	244	231	289	301	299	302	311	297	293	295	309	298	306	307	293	292	279	281	266	280.1
22-Aug	177	199	279	248	286	258	241	261	260	292	312	310	316	299	299	330	324	308	312	274	228	270	205	232	288.8
23-Aug	195	208	206	192	189	186	184	178	188	164	173	135	161	160	158	164	151	142	147	134	139	214	282	96	167.2
24-Aug	189	244	152	235	188	207	189	173	195	208	210	200	211	227	220	259	288	232	268	292	253	301	301	289	221.3
25-Aug	285	297	337	332	204	217	197	360	5	8	16	10	10	18	15	2	23	27	355	7	349	355	9	7	1.6
26-Aug	9	7	8	210	142	192	259	335	351	3	7	31	136	183	173	179	178	188	198	193	198	240	230	254	208.8
27-Aug	198	211	212	219	209	186	180	182	178	186	170	174	194	206	199	200	210	215	202	187	186	227	252	207	198.1
28-Aug	236	229	222	226	225	232	233	227	220	228	228	221	225	233	229	227	233	255	214	175	200	228	305	329	230.9
29-Aug	303	185	218	214	192	202	221	223	216	191	193	192	184	192	167	152	144	139	132	104	110	128	85	117	176.9
30-Aug	64	10	308	8	360	350	352	326	235	240	288	270	287	211	217	203	267	212	151	168	186	185	209	188	233.6
31-Aug	154	182	188	197	202	205	180	180	181	182	203	227	226	223	233	228	225	219	203	202	195	201	267	226	209.5
	241.3	244.9	229.8	227.6	232.0	228.7	214.8	220.6	230.3	236.4	241.5	233.6	234.5	237.9	245.9	252.5	253.5	252.6	228.7	214.4	212.0	232.2	247.7	240.6	
	Diurnal Average																								

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

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg

CNRL Horizon - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 105 deg on Aug 23 23:00

Minimum Value: 6 deg on Aug 28 20:00

Percentiles: P_1 = 10 P_{10} = 15 Q_1 = 19 Median = 24 Q_3 = 32 P_{90} = 53 P_{99} = 85

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
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Aug	14	72	23	17	24	45	49	72	29	49	59	83	31	18	23	40	42	30	21	22	38	38	38	28	83
2-Aug	43	57	47	66	20	20	18	38	33	51	45	75	71	73	35	48	21	80	23	70	25	33	44	AF	80
3-Aug	48	20	27	14	14	33	54	70	102	49	29	34	47	58	53	30	21	27	19	29	37	16	13	20	102
4-Aug	18	18	17	17	16	20	19	19	20	19	20	20	25	16	16	18	18	22	14	13	24	22	41	13	41
5-Aug	17	18	17	18	17	18	20	19	26	33	37	28	32	27	47	44	27	66	59	20	22	47	25	25	66
6-Aug	24	23	17	17	16	20	16	17	19	21	25	26	46	50	21	21	26	30	20	21	18	14	11	12	50
7-Aug	17	23	69	58	50	53	25	32	30	40	51	62	63	57	72	44	36	39	37	54	47	67	26	21	72
8-Aug	20	16	28	22	39	40	19	32	27	55	52	69	76	92	29	64	46	53	26	16	16	33	22	31	92
9-Aug	18	16	12	16	22	20	23	38	52	47	65	36	49	52	56	60	85	41	25	14	26	12	21	61	85
10-Aug	52	29	67	49	21	20	23	25	26	25	32	32	27	26	29	26	29	23	26	15	9	11	15	18	67
11-Aug	20	28	16	18	18	22	45	21	25	27	27	26	27	28	27	26	25	26	25	18	28	16	17	17	45
12-Aug	17	15	15	17	17	20	20	26	22	24	30	31	35	33	35	28	29	31	25	19	16	31	24	14	35
13-Aug	16	14	16	14	17	17	23	29	26	19	20	20	25	22	26	24	23	24	21	15	12	31	32	21	32
14-Aug	19	18	18	18	18	19	24	24	22	26	26	25	25	27	25	25	25	24	22	22	24	25	26	20	27
15-Aug	16	18	18	22	26	20	22	20	22	23	24	27	24	24	22	23	23	19	33	21	29	17	30	35	35
16-Aug	25	24	65	13	15	19	25	92	39	102	103	30	79	47	39	28	38	24	24	17	13	43	16	16	103
17-Aug	18	13	11	10	13	17	15	19	22	24	30	30	29	42	34	63	27	26	23	26	15	16	20	23	63
18-Aug	82	26	52	28	10	23	24	69	45	54	65	47	62	59	80	61	18	41	20	14	8	13	10	9	82
19-Aug	10	18	18	19	23	20	18	18	23	26	27	34	31	30	25	29	28	22	21	22	25	25	25	24	34
20-Aug	22	20	25	27	28	22	23	27	24	23	24	24	23	24	24	22	21	19	22	26	22	21	17	20	28
21-Aug	17	16	15	18	22	28	25	28	17	19	21	22	21	24	24	29	23	25	85	56	19	18	16	32	85
22-Aug	22	25	19	22	18	20	14	20	23	23	21	22	28	25	28	23	23	20	19	27	13	66	30	26	66
23-Aug	18	10	17	13	12	16	18	15	26	33	28	38	32	30	35	28	25	23	20	17	20	58	105	40	105
24-Aug	68	30	54	59	24	14	20	19	26	29	27	29	31	35	32	33	22	55	24	42	51	22	10	36	68
25-Aug	47	13	54	39	15	28	28	87	23	20	28	23	23	24	25	23	28	26	20	15	11	19	19	18	87
26-Aug	25	24	22	84	64	52	27	60	57	68	50	79	88	58	43	49	22	20	16	10	11	23	16	32	88
27-Aug	17	12	13	11	14	12	14	17	19	28	32	28	26	28	26	29	25	25	20	16	14	33	38	10	38
28-Aug	22	17	18	17	18	25	18	20	27	24	26	27	28	27	30	28	28	27	22	6	47	50	40	18	50
29-Aug	25	44	16	18	30	16	25	25	28	28	26	31	38	39	42	34	29	26	24	15	18	26	54	48	54
30-Aug	60	37	15	25	19	17	18	37	41	35	40	38	57	39	32	28	23	55	19	16	14	11	13	20	60
31-Aug	11	13	11	12	14	18	14	15	18	24	31	27	27	28	26	30	27	24	21	17	11	29	24	19	31
	82	72	69	84	64	53	54	92	102	102	103	83	88	92	80	64	85	80	85	70	51	67	105	61	
	Diurnal Maximum																								

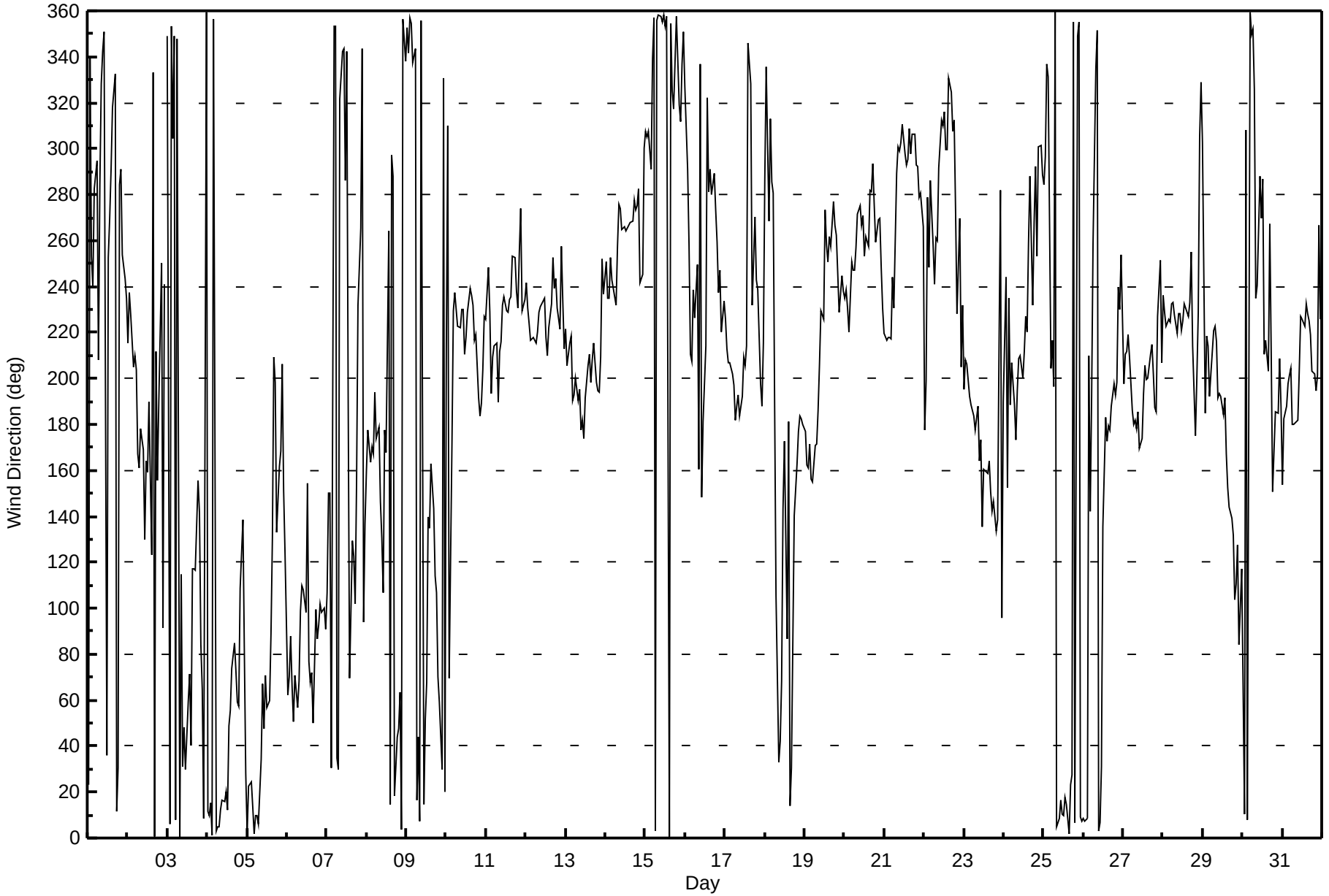
AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction (WD) - deg

CNRL Horizon - August 2015



Wood Buffalo Environmental Association
SO2 Calibration Report

W B E A

Station Information

Calibration Date	August 25, 2015	Last Calibration	July 30, 2015
Station Name	CNRL Horizon	Station Number	AMS 15
Reason:	Routine		
Start Time (MST)	9:00	End Time (MST)	14:45
Gas Cert Reference	S0002486	Station temp.	21 Deg C
Cal Gas Concentration	50 ppm	Cal Gas Exp Date	26/09/2017
Calibrator Make/Model	Teledyne API T700	Serial Number	1223
ZAG Make/Model	Teledyne API 701	Serial Number	1004
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2580

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 1000 ppb		PMT voltage	-622	-622
Analyzer IP address	192.168.1.43		Lamp voltage	836	840
Calculated slope	0.991550	0.997714	Chamber temp	45.1	45.0
Calculated intercept	1.798384	1.411385	Pressure	711.2	708.1
Analyzer Background	17.9	18.0	Flow	0.425	0.430
Analyzer Coefficient	0.989	0.992	Intensity	91	91

Analyzer make	Thermo 43i	Analyzer serial #	10710321322

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.0	----
as found span	5000	81.8	818.0	807.9	1.013
calibrator zero	5000	0.0	0.0	0.2	----
high point	5000	81.8	818.0	819.3	0.998
second point	5000	40.9	409.0	407.7	1.003
third point	5000	20.4	204.0	201.5	1.013
as left zero	5000	0.0	0.0	1.5	----
as left span	5000	81.8	818.0	816.4	1.002
				Average Correction Factor	1.005

Corrected As found	807.9	Previous response	823.2	% change	1.9%

Notes:

Filter changed after As Founds. Span adjusted. Work on calibrator to confirm flows after As Founds

Calibration Performed By: Ryan Power

Wood Buffalo Environmental Association
SO2 Calibration Report

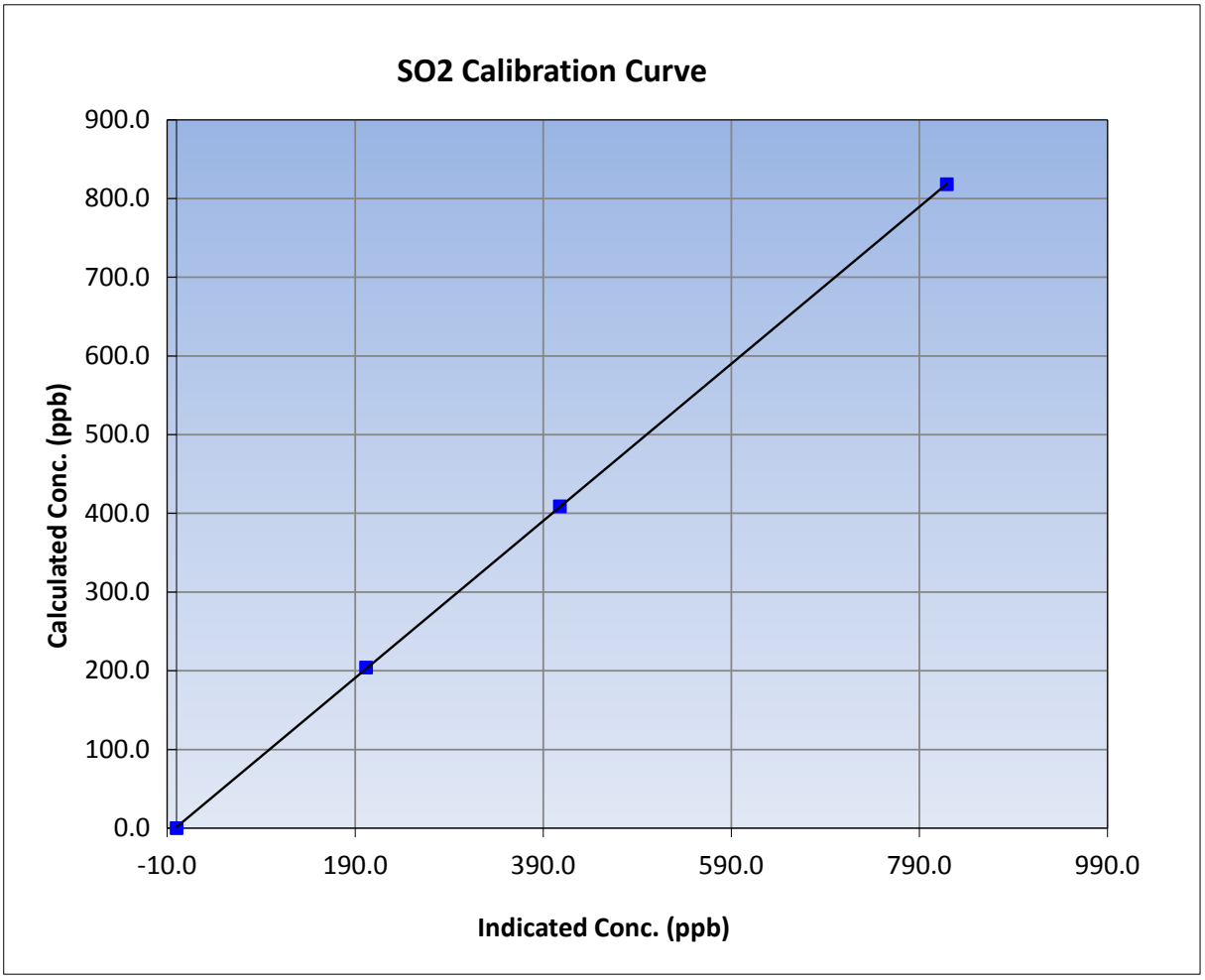
W B E A

Station Information

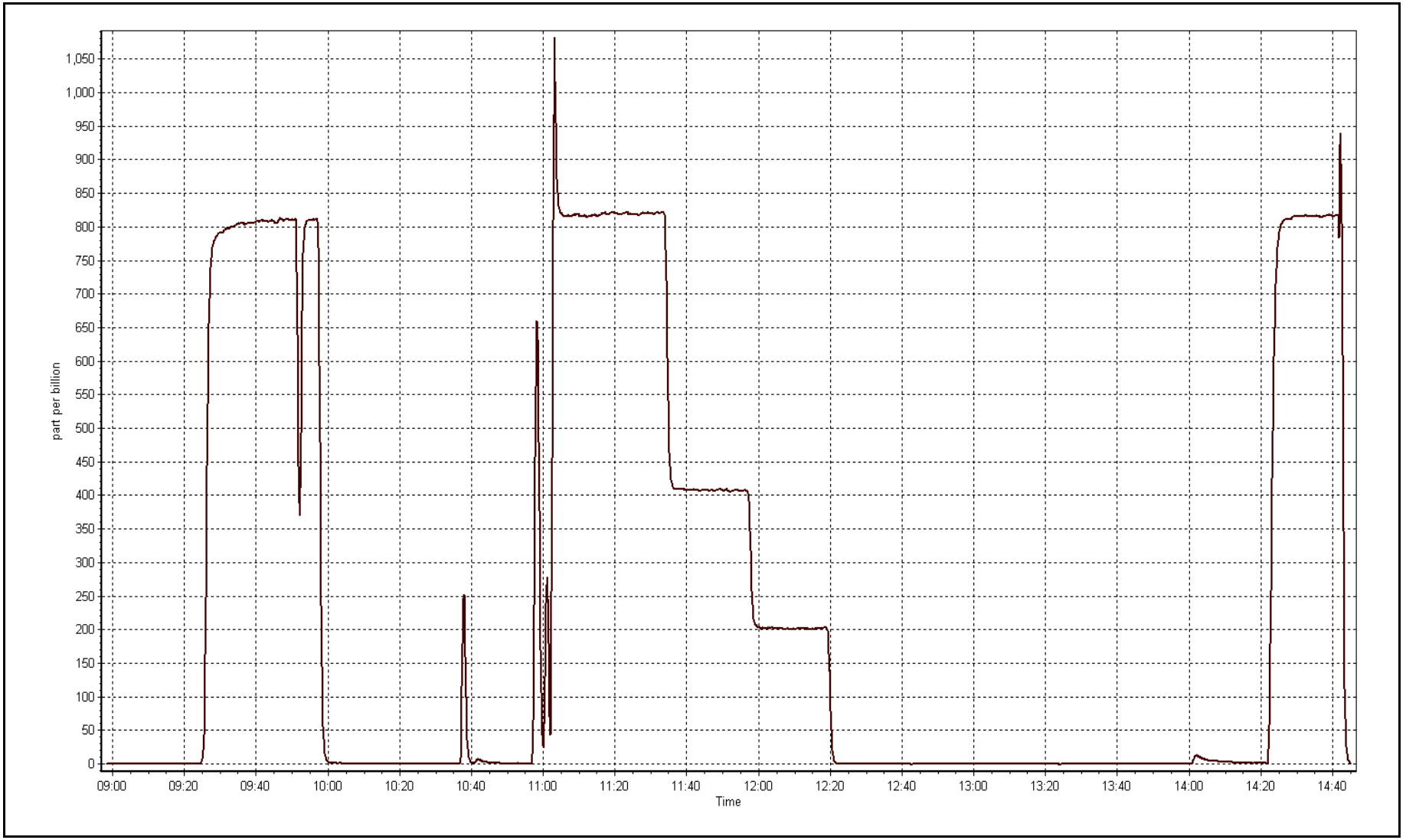
Calibration Date	August 25, 2015	Previous Calibration	July 30, 2015
Station Name	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	9:00	End Time (MST)	14:45
Analyzer make	Thermo 43i	Analyzer serial #	10710321322

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	----	Correlation Coefficient	0.999982
818.0	819.3	0.9984		
409.0	407.7	1.0033	Slope	0.997714
204.0	201.5	1.0125		
			Intercept	1.411385



SO2 Calibration Plot Date: August 25, 2015



Wood Buffalo Environmental Association
TRS Calibration Report

Station Information

Calibration Date	August 26, 2015	Last Calibration	July 29, 2015
Station Name	CNRL Horizon	Station Number	AMS 15
Reason:	Routine		
Start Time (MST)	11:16	End Time (MST)	16:00
Gas Cert Reference	LL155297	Station temp.	21 Deg C
Cal Gas Concentration	10.4 ppm	Cal Gas Exp Date	30/05/2013
Calibrator Make/Model	API T700	Serial Number	1223
Dil air Make/Model	API 701	Serial Number	1004
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2580
SO2 gas concentration	50 ppm	SO2 gas cert/exp	S0002486 September-26-17

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-672	-672
Analyzer IP address	192.168.1.42		Lamp voltage	752	755
Calculated slope	0.994005	0.992686	Chamber temp	46	45
Calculated intercept	0.009436	-0.307733	Pressure	693.6	690.6
Analyzer Background	9.3	10.5	Flow	0.422	0.420
Analyzer Coefficient	0.917	1.03	Intensity	90	90
			Converter temp.	809	809

Analyzer make/model	Thermo 43i	Analyzer serial #	0710321323
Converter make/model	CDN-101	Converter serial #	363

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6000	0.0	0.0	0.3	----
as found span	6000	46.2	80.1	81.0	0.989
SO2 scrubber check	6000	24.5	204.2		----
calibrator zero	6000	0.0	0.0	0.3	----
high point	6000	46.2	80.1	81.0	0.989
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	0.989

Corrected As found	80.7	Previous response	80.6	% change	-0.1%

Notes:

Single point performed prior to calibration gas change.

Calibration Performed By: Ryan Power

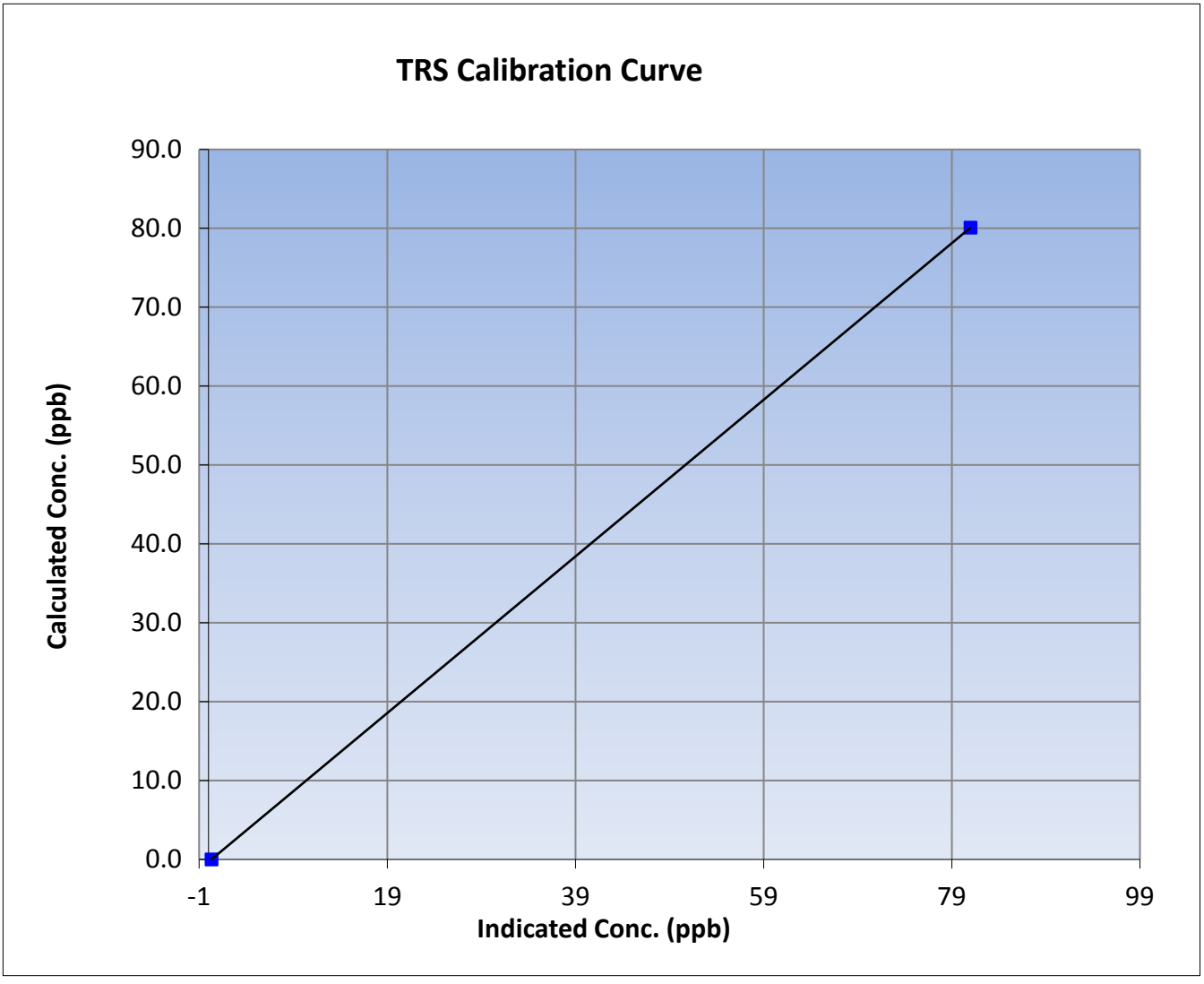
Wood Buffalo Environmental Association
TRS Calibration Report

Station Information

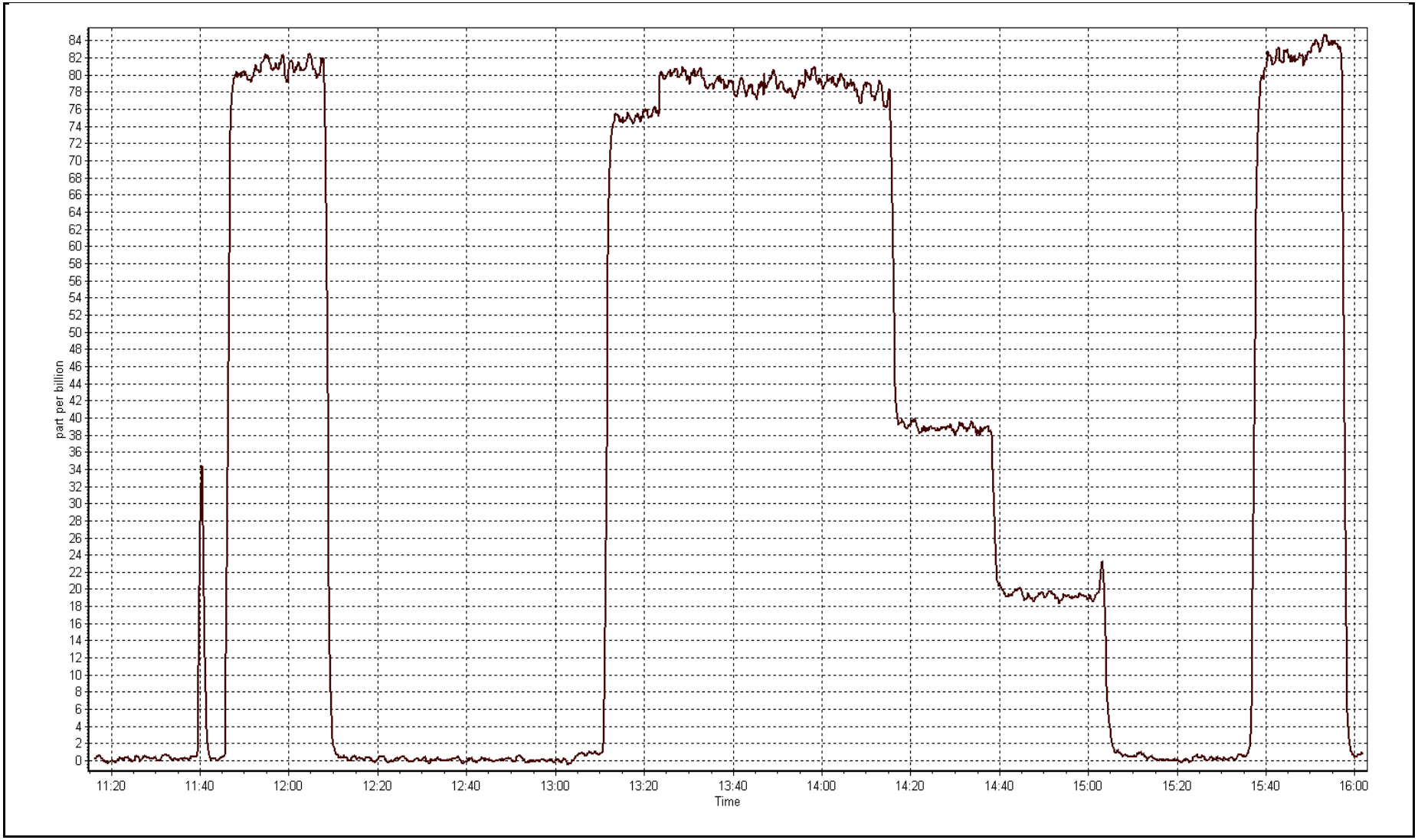
Calibration Date	August 26, 2015	Previous Calibration	July 29, 2015
Station Name	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	11:16	End Time (MST)	16:00
Analyzer make	Thermo 43i	Analyzer serial #	0710321323

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.3	----	Correlation Coefficient	1.000000
80.1	81.0	0.9889		
			Slope	0.992686
			Intercept	-0.307733



TRS Calibration Plot Date: August 26, 2015



Wood Buffalo Environmental Association
TRS Calibration Report

Station Information

Calibration Date	August 26, 2015	Last Calibration	July 29, 2015
Station Name	CNRL Horizon	Station Number	AMS 15
Reason:	Routine		
Start Time (MST)	11:15	End Time (MST)	16:00
Gas Cert Reference	LL82745	Station temp.	21 Deg C
Cal Gas Concentration	9.6 ppm	Cal Gas Exp Date	2/22/16
Calibrator Make/Model	API T700	Serial Number	1223
Dil air Make/Model	API 701	Serial Number	1004
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2580
SO2 gas concentration	50 ppm	SO2 gas cert/exp	S0002486 September-26-17

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-672	-672
Analyzer IP address	192.168.1.42		Lamp voltage	752	755
Calculated slope	0.992686	1.022132	Chamber temp	46	45
Calculated intercept	-0.307733	0.071204	Pressure	693.6	690.6
Analyzer Background	9.3	10.5	Flow	0.422	0.420
Analyzer Coefficient	0.917	1.03	Intensity	90	90
			Converter temp.	809	809

Analyzer make/model	Thermo 43i	Analyzer serial #	0710321323
Converter make/model	CDN-101	Converter serial #	363

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6000	0.0	0.0	0.3	----
as found span	6000	50.0	80.0	75.2	1.064
SO2 scrubber check	6000	24.5	204.2	0.6	----
calibrator zero	6000	0.0	0.0	0.3	----
high point	6000	50.0	80.0	78.4	1.020
second point	6000	25.0	40.0	38.8	1.030
third point	6000	12.5	20.0	19.2	1.044
as left zero	5000	0.0	0.0	0.3	----
as left span	5000	41.7	80.1	83.1	0.963
				Average Correction Factor	1.032

Corrected As found	74.9	Previous response	80.9	% change	8.0%

Notes:

Inlet filter changed after as founds. Calibration gas changed out. Scrubber check after third point.

Calibration Performed By: Ryan Power

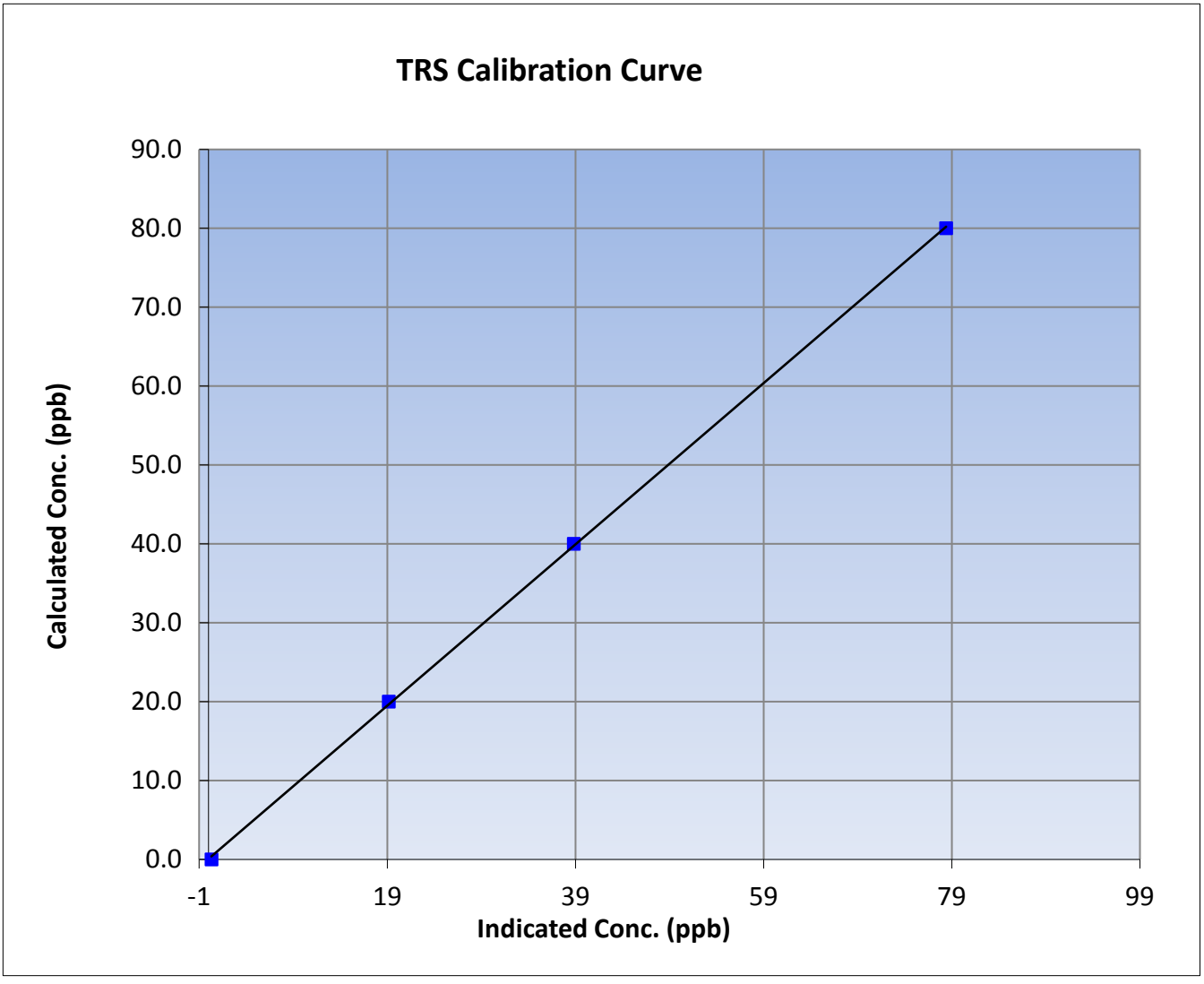
Wood Buffalo Environmental Association
TRS Calibration Report

Station Information

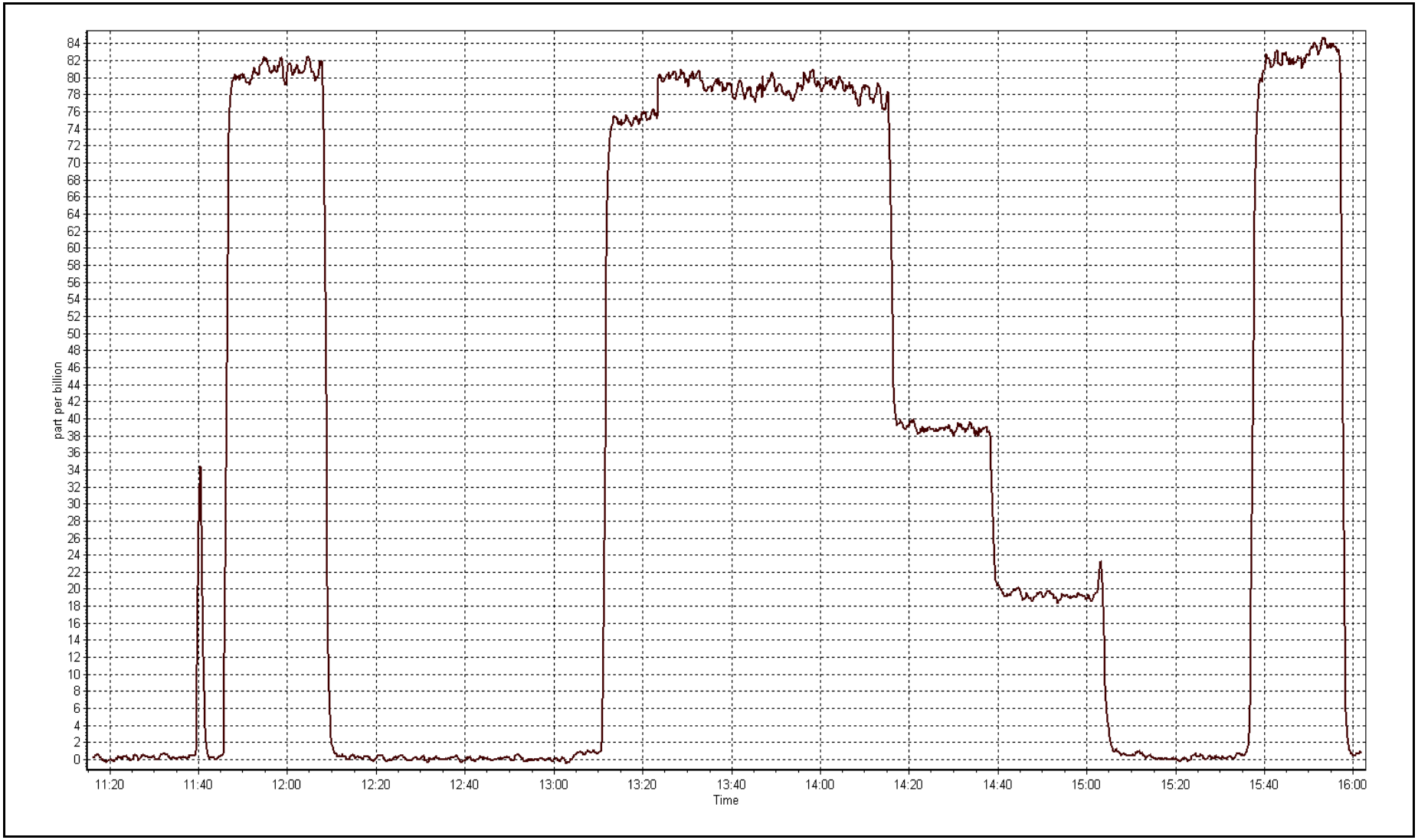
Calibration Date	August 26, 2015	Previous Calibration	July 29, 2015
Station Name	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	11:15	End Time (MST)	16:00
Analyzer make	Thermo 43i	Analyzer serial #	0710321323

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.3	----	Correlation Coefficient	0.999893
80.0	78.4	1.0204		
40.0	38.8	1.0304	Slope	1.022132
20.0	19.2	1.0438		
			Intercept	0.071204



TRS Calibration Plot Date: August 26, 2015



Wood Buffalo Environmental Association
THC Calibration Report

W B E A

Station Information

Calibration Date	August-25-15	Last Calibration	July-30-15
Station Name	CNRL Horizon	Station Number	AMS 15
Reason:	Routine		
Start Time (MST)	9:00	End Time (MST)	14:45
Gas Cert Reference	S0002486	Cal Gas Expiry Date	26/09/2017
CH4 Cal Gas Conc.	505 ppm	CH4 Equiv Conc.	1046.8 ppm
C3H8 Cal Gas Conc.	197 ppm	Station temp.	22 Deg C
Calibrator Make/Model	Teledyne API T700	Serial Number	1223
ZAG make/model	Teledyne API 701	Serial Number	1004
DACS make/model	Campbell Scientific CR3000	Serial Number	2580

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 50 ppm		Sample Pressure	8.8	8.8
Analyzer IP address	192.168.1.51		Air or Bypass Press	37.1	38.0
Calculated slope	1.000398	0.999203	Fuel Pressure	26.3	26.3
Calculated intercept	0.054035	0.047930	Analyzer Coeff	3.017	3.060
			Analyzer BKG	0.08	0.080

Analyzer make	Thermo 51i-LT	Analyzer serial #	1327059295

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	0.01	----
as found span	5000	81.8	17.12	16.99	1.008
calibrator zero	5000	0.0	0.00	-0.04	----
high point	5000	81.8	17.12	17.11	1.001
second point	5000	40.9	8.56	8.47	1.011
third point	5000	20.4	4.27	4.25	1.005
as left zero	5000	0.0	0.00	-0.07	----
as left span	5000	81.8	17.12	17.17	0.997
				Average Correction Factor	1.006

Corrected As found	16.98	Previous response	17.06	% change	0.5%

Notes:

Filter changed after As Founds. Span slightly adjusted. Work on calibrator to confirm flows after As Founds

Calibration Performed By: Ryan Power

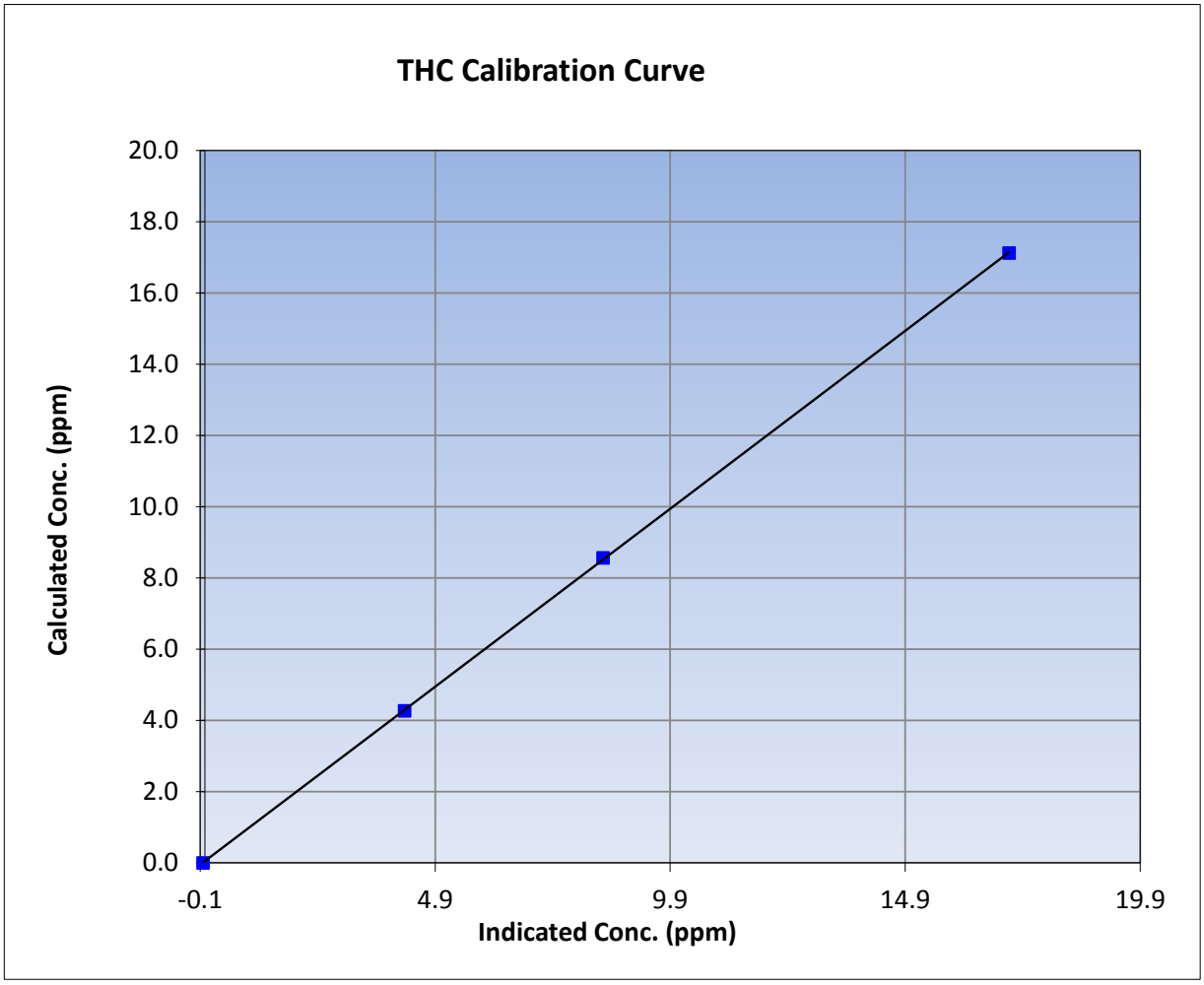
Wood Buffalo Environmental Association
THC Calibration Report

Station Information

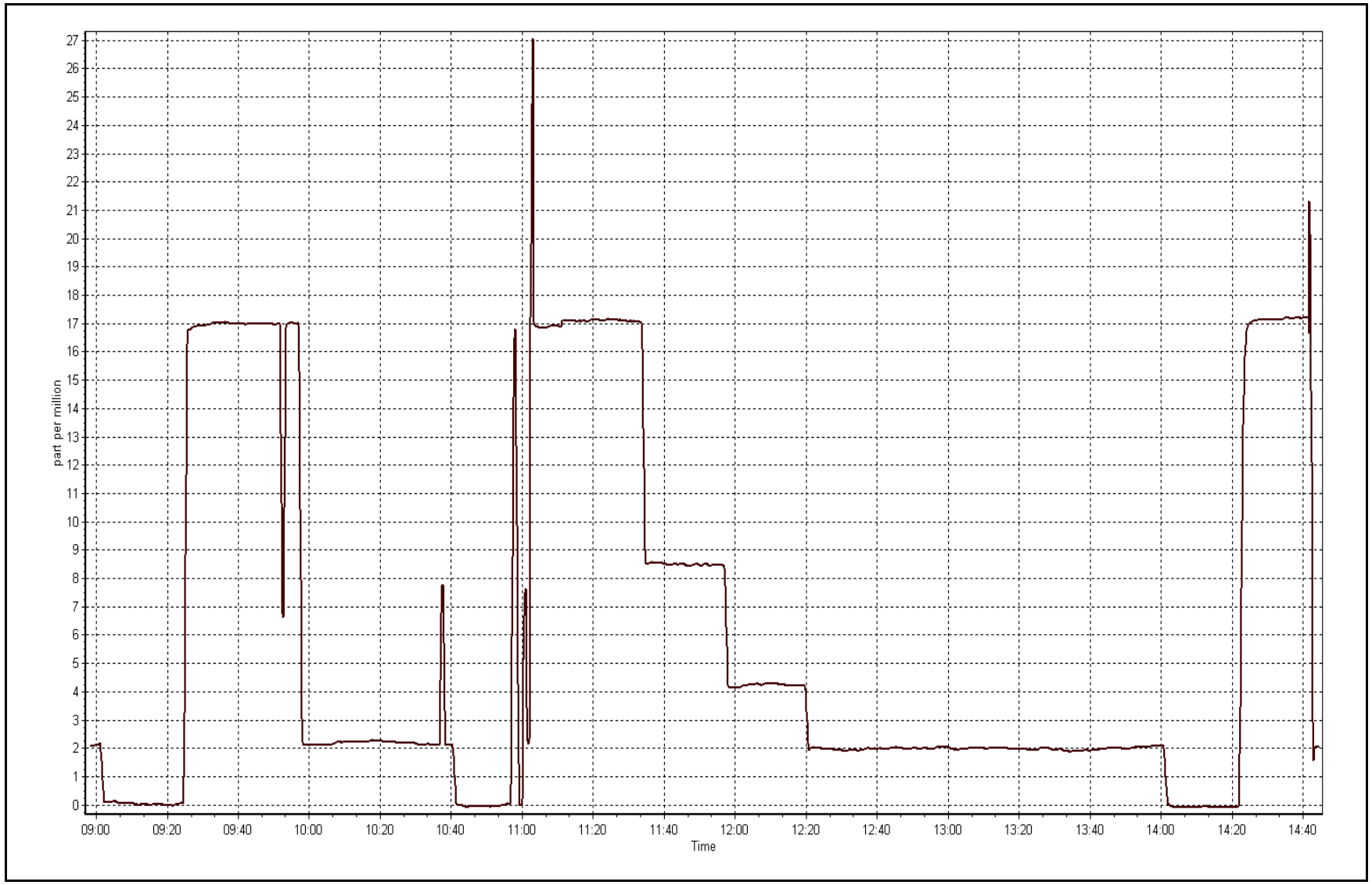
Calibration Date	August 25, 2015	Previous Calibration	July 30, 2015
Station Name	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	9:00	End Time (MST)	14:45
Analyzer make	Thermo 51i-LT	Analyzer serial #	1327059295

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	-0.04	----	Correlation Coefficient	0.999977
17.12	17.11	1.0009		
8.56	8.47	1.0109	Slope	0.999203
4.27	4.25	1.0049		
			Intercept	0.047930



THC Calibration Plot Date: August 25, 2015



Wood Buffalo Environmental Association
NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	August 25, 2015	Previous Calibration	July 30, 2015
Station Name	CNRL Horizon	Station Number	AMS 15
Reason:	Routine		
Start Time (MST)	9:00	End Time (MST)	14:45
NO Cal Gas Conc	48.9 ppm	Gas Cert Reference	S0002486
NOx Cal Gas Conc	48.9 ppm	Cal Gas Expiry Date	26/09/2017
Calibrator	Teledyne API T700	Serial Number	1223
Zero air Generator	Teledyne API T701	Serial Number	1004

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	2580

Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.998297	0.997120	0.998895
	Data Offset	1.169430	1.279034	0.170953
Current Calibration	Data Slope	1.000442	1.000163	0.995775
	Data Offset	1.182998	1.187550	-0.304535

Analyzer Information

Analyzer make/model	Termo 42i	Analyzer serial #	710321429

Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
NO coefficient	0.776		0.776	
NOX coefficient	0.999		0.999	
NO2 coefficient	1.000		1.000	
NO bkgrnd	9.7		9.8	
NOX bkgrnd	9.9		10.0	
Chamber Temp	50	Deg C	49.7	Deg C
Moly Temp	323.7	Deg C	325	Deg C
PMT voltage	-784.4	V	-784.4	V
PMT Temp	-3.1	Deg C	-3.1	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	162.6	mmHg	160.5	mmHg
R Cell Press Nox	162.9	mmHg	161.8	mmHg
NO sample flow	0.694	lpm	0.686	lpm
Nox sample Flow	0.696	lpm	0.688	lpm

Notes:

Filter changed after As Founds. Extended break from cal after As Founds to confirm flows of calibrator

Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: August 25, 2015 Station Number: AMS 15

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1	----	----
as found span	5000	81.8	800.0	800.0	0.0	800.5	799.7	0.9	0.9994	1.0004
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	0.1	-0.1	----	----
high point	5000	81.8	800.0	800.0	0.0	799.0	799.2	-0.2	1.0013	1.0010
second point	5000	40.9	400.0	400.0	0.0	398.3	398.5	-0.2	1.0043	1.0038
third point	5000	20.4	199.5	199.5	0.0	197.0	196.8	0.2	1.0130	1.0138
as left zero	5000	0.0	0.0	0.0	0.0	0.0	0.1	-0.1	----	----
as left span	5000	81.8	800.0	443.4	356.6	797.1	441.1	354.3	1.0037	1.0054
								Average Correction Factor	1.0062	1.0062

Corrcted As found NO_X= 800.6 NO= 799.7 Percent Change NO_X= 0.0% NO= 0.2%

Previous Response NO_X= 800.2 NO= 801.0

GPT Calibration Data

Dilution Flow 5000 ccm Source Gas Flow 81.80 ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
Cal zero			0.0			-0.1			N/A	
1st NO2 (300)	----	443.4	352.2	797.5	443.4	354.1	0.9870	1.0000	0.9946	100.5%
2nd NO2 (200)	----	553.6	242.0	796.2	553.6	242.6	0.9886	1.0000	0.9974	100.3%
3rd NO2 (100)	----	669.3	126.3	797.4	669.3	128.1	0.9871	1.0000	0.9856	101.5%
4th NO2 (0)	795.6	----	1.3	796.9	795.6	1.3	0.9878	1.0000	N/A	----
					Average Correction Factor		0.9876	1.0000	0.9925	100.8%

Calibration Performed By: Ryan Power

Wood Buffalo Environmental Association

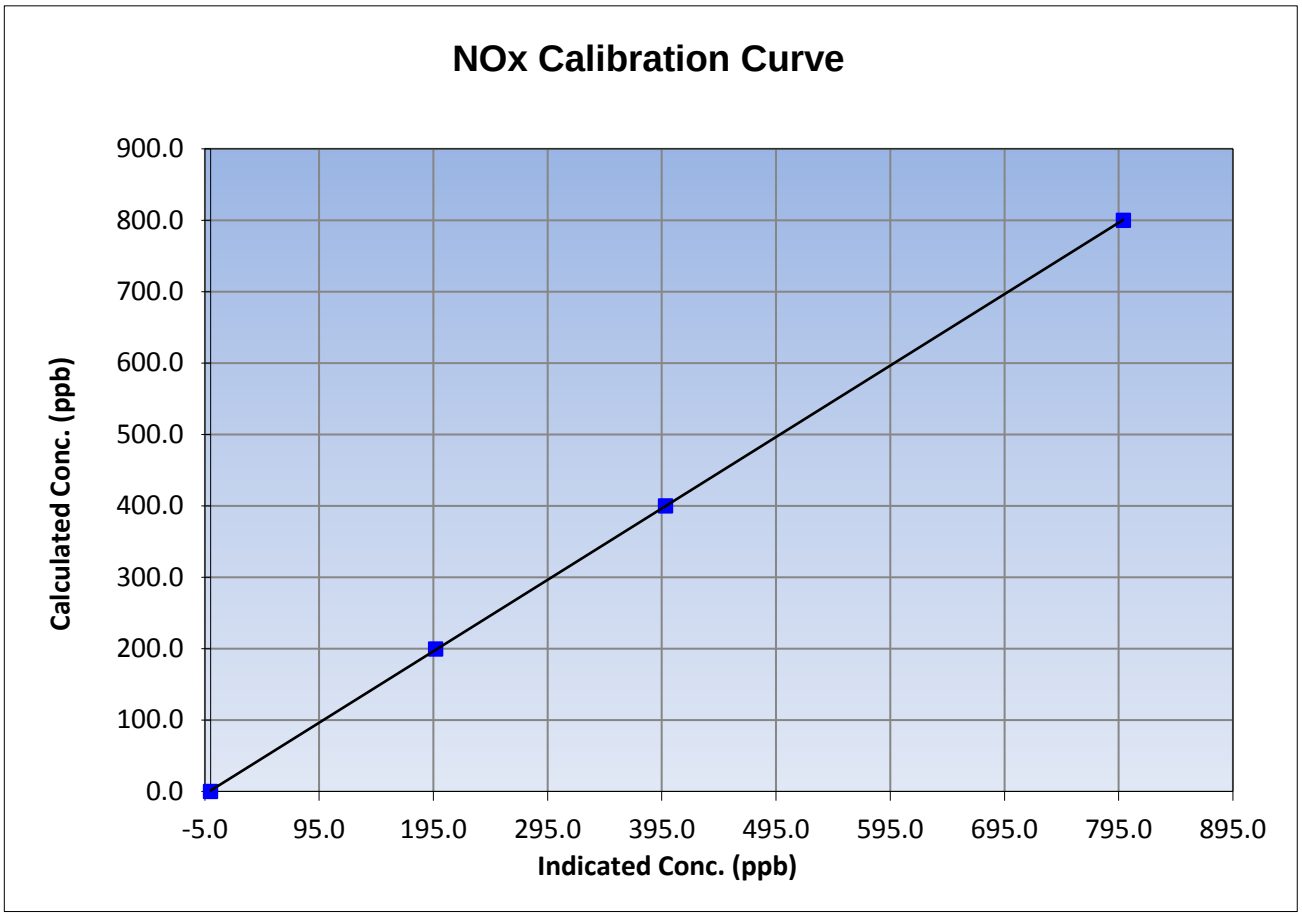
NO_X Calibration Summary

Station Information

Calibration Date	August 25, 2015	Previous Calibration	July 30, 2015
Station Name	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	9:00	End Time (MST)	14:45
Analyzer make	Termo 42i	Analyzer serial #	710321429

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999990
800.0	799.0	1.0013		
400.0	398.3	1.0043	Slope	1.000442
199.5	197.0	1.0130		
			Intercept	1.182998



Wood Buffalo Environmental Association

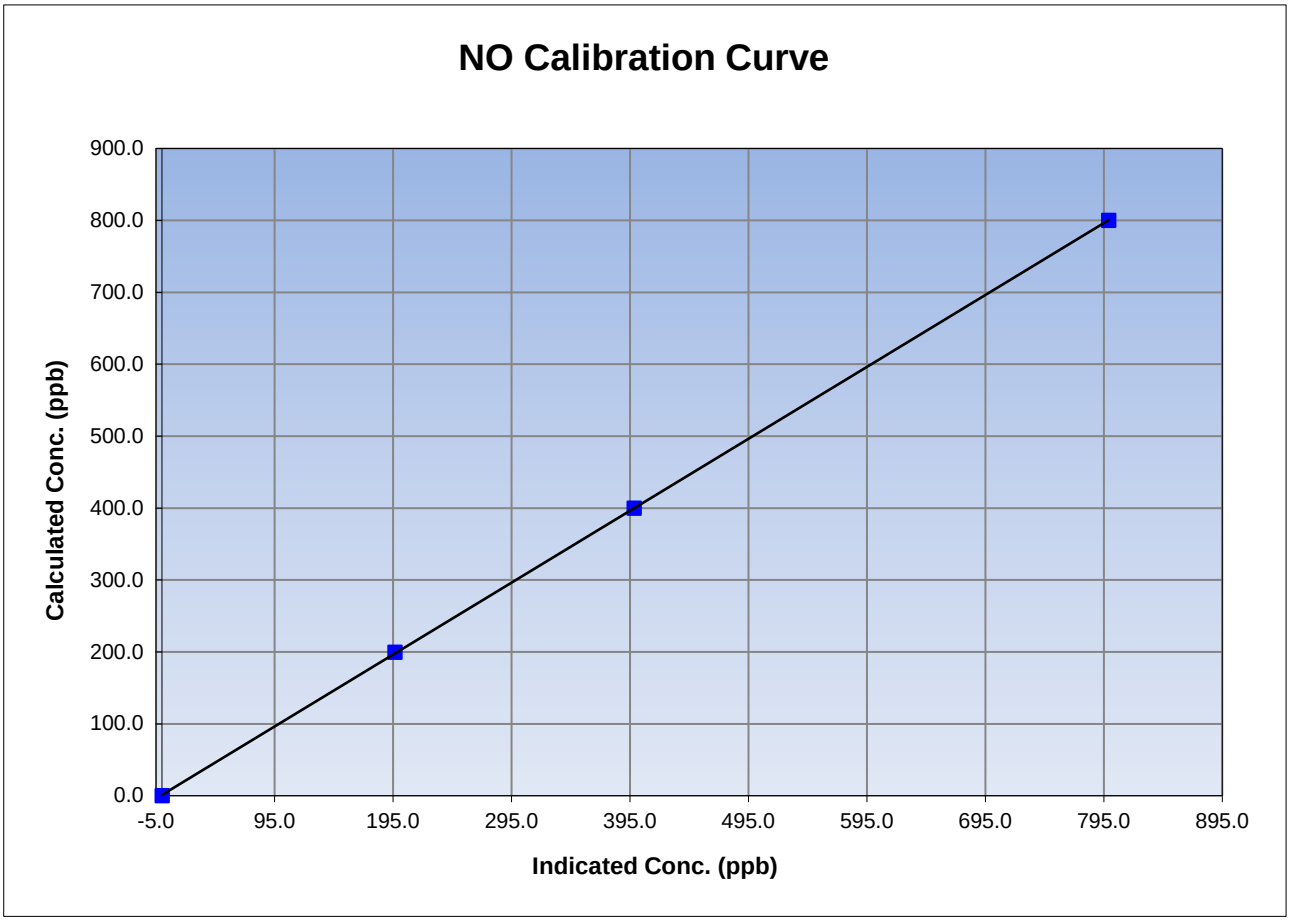
NO Calibration Summary

Station Information

Calibration Date	August 25, 2015	Previous Calibration	July 30, 2015
Station Name	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	9:00	End Time (MST)	14:45
Analyzer make	Termo 42i	Analyzer serial #	710321429

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	N/A	Correlation Coefficient	0.999988
800.0	799.2	1.0010		
400.0	398.5	1.0038	Slope	1.000163
199.5	196.8	1.0138		
			Intercept	1.187550



Wood Buffalo Environmental Association

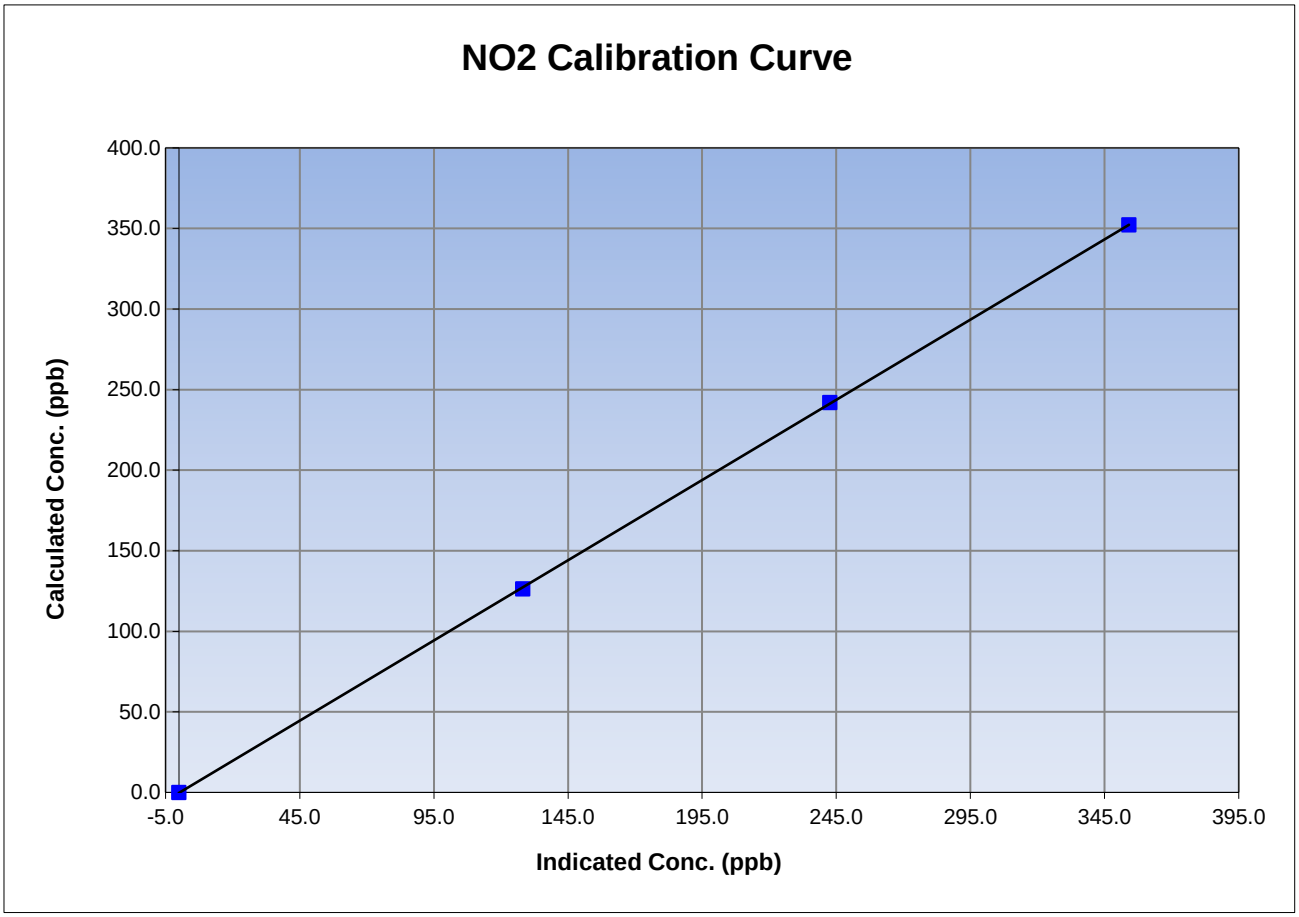
NO_2 Calibration Summary

Station Information

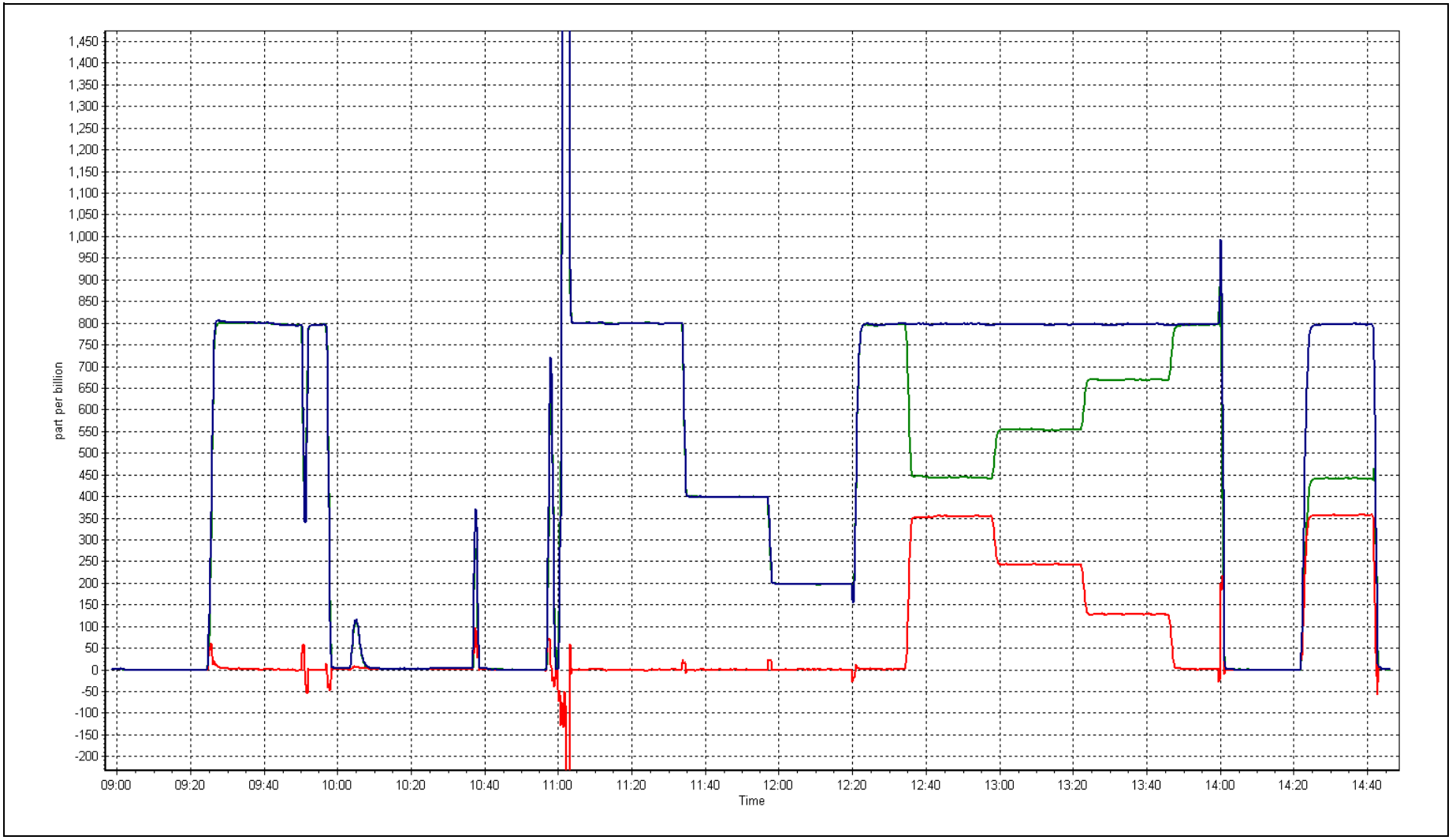
Calibration Date	August 25, 2015	Previous Calibration	July 30, 2015
Station Name	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	9:00	End Time (MST)	14:45
Analyzer make	Termo 42i	Analyzer serial #	710321429

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999976
352.2	354.1	0.9946		
242.0	242.6	0.9974	Slope	0.995775
126.3	128.1	0.9856		
			Intercept	-0.304535



NOx, NO & NO_2 Calibration Plot Date: August 25, 2015



Wood Buffalo Environmental Association

SHARP CALIBRATION

STATION INFORMATION

Calibration Date:	August 26, 2015	Previous Calibration:	July 29, 2015
Station Name:	CNRL Horizon	Station Number:	AMS 15
Start Time (MST):	14:00	End Time (MST):	14:30
Calibrator Make/Model:	Delta Cal	Calibrator Serial Number:	1212

SHARP INFORMATION

Particulate Fraction:	PM2.5
Make/Model:	Thermo / SHARP 5030
Serial Number	E-2020
Source SN:	7409
HEPA PN:	12144
Time Correct (MST):	Yes
Paremeters Checked:	T1, T2, T2,T4, P3, Main Flow, Beta, Neph

CALIBRATION DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	19.0	19.5	0.5	19.0
T2	27.0	na	na	27.0
T3	24.0	na	na	24.0
T4	24.0	na	na	24.0
RH (%)	37.0	na	na	37.0

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	980	983.0	3.0	980

Main Flow (Lph)

Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
1000	1003	3	1003	1000

Nephalometer Calibration

Parameter	As Founds	Zeroed (Limit +or- 2.0ug/m3)	As Left
Analog	167		167
Neph	0.1		0.1
C14	67.5		67.5
Indicated Concentration (ug/m3)	**0.1**	**no**	**0.1**
Offset 1	NA		NA
Offset 2	NA		NA

Leak Check (Quarterly)

Leak Check Date:	August 26, 2015	Previous Leak Check Date:	May 14, 2015

	Measured	Difference LPM (Limit +/- 0.42 LPM)
Flow without adaptor (LPM):	16.72	0.04
Flow with adaptor [turn off pump first](LPM):	16.68	

Mass Foil Calibration (Annualy)

Foil Calibration Date:	June 22, 2015	Previous Foil Calibration:	NA
Zeroed?:	Yes		
Foil Mass:	1507	Mass foil set S/N:	2022
Previous Correction Factor:	7091		
New Correction Factor:	7029		

INSPECTION DATA

Item	Condition	Date of install or rebuild
Cyclone	Good / cleaned	26/08/2015
Pump	Good	09/06/2014
Filter Tape	Good	09/06/2014
Mass Foil Cal Set	Good	NA
HEPA filter	Good	09/06/2014

NOTES:

No adjustments, quarterly leak check carried out, passed.

Calibration Performed By: **Ryan Power**

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 16
SHELL MUSKEG RIVER
AUGUST 2015

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

September 28, 2015

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SHELL MUSKEG RIVER (AMS 16)
AUGUST 2015

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	708	36	36	100.00	31	0	5	0
THC (ppm) Average	708	36	36	100.00	5.5	-	2.8	-
NO2 (ppb) Average	708	36	36	100.00	38	0	12	-
NO (ppb) Average	708	36	36	100.00	110	-	17	-
NOX (ppb) Average	708	36	36	100.00	139	-	27	-
PM2.5 (ug/m3) Average	743	1	1	100.00	45.6	-	15	0
Temperature 2 m (C) Average	744	0	0	100.00	28.9	-	22.5	-
Relative Humidity (%) Average	744	0	0	100.00	99	-	85	-
Barometric Pressure (inHg) Average	744	0	0	100.00	29.1	-	29	-
Wind Speed 10 m (km/h) Average	732	2	12	98.66	32	-	19	-
Wind Direction 10 m (deg) Average	732	2	12	98.66	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SHELL MUSKEG RIVER (AMS 16)
AUGUST 2015

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

					Percentile						
Parameter	Number	Mean	StnDev	Total	Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	708	0.8	2	-	0	0	0	0	0	1	31
THC (ppm) Average	708	2.34	0.4	-	1.9	2	2.1	2.3	2.5	2.7	5.5
NO2 (ppb) Average	708	4.6	5	-	0	0	1	3	7	11	38
NO (ppb) Average	708	3.7	9	-	0	0	0	0	3	11	110
NOX (ppb) Average	708	8.4	13	-	0	0	1	3	10	23	139
PM2.5 (ug/m3) Average	743	7.03	5.5	-	0.4	1.9	3.2	5.5	9.1	14.1	45.6
Temperature 2 m (C) Average	744	16.78	5.1	-	1	10.2	13.4	16.7	20.3	23.8	28.9
Relative Humidity (%) Average	744	69.2	19	-	27	41	55	71	84	95	99
Barometric Pressure (inHg) Average	744	28.77	0.2	-	28.3	28.5	28.7	28.8	28.9	29	29.1
Wind Speed 10 m (km/h) Average	732	9.5	6	-	0	3	5	8	13	18	32
Wind Direction 10 m (deg) Average	732	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SHELL MUSKEG RIVER (AMS 16)
AUGUST 2015

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
Wind Speed, Wind Direction	09 Aug 2015 07:00	09 Aug 2015 07:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	09 Aug 2015 21:00	10 Aug 2015 00:00	4	Flat line in sensor output signal
Wind Speed, Wind Direction	10 Aug 2015 04:00	10 Aug 2015 04:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	10 Aug 2015 07:00	10 Aug 2015 07:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	10 Aug 2015 20:00	10 Aug 2015 21:00	2	Flat line in sensor output signal
Wind Speed, Wind Direction	11 Aug 2015 03:00	11 Aug 2015 03:00	1	Flat line in sensor output signal

Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO_2) - ppb

Shell Muskeg River - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 31 ppb on Aug 29 15:00 Maximum Daily Average: 4.6 ppb on Aug 29

Minimum Value: 0 ppb on Aug 14 01:00
Maximum Diurnal Average: 2.4 ppb at hour 11
Monthly Average: 0.8 ppb

Minimum Daily Average: 0.0 ppb on Aug 14
Minimum Diurnal Average: 0.2 ppb at hour 4
Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 1$ $P_{99} = 12$

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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	1	0	0	0.4	1
2-Aug	0	0	0	0	Z	0	0	0	1	6	13	12	12	5	4	3	1	1	1	1	1	1	1	0	2.8	13
3-Aug	0	0	0	0	0	Z	0	0	2	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.6	2
4-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
5-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	0	0	0	0	0	0	0.4	2
6-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
7-Aug	0	0	0	Z	0	0	0	0	0	1	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0.5	1
8-Aug	0	0	0	0	Z	0	0	1	5	6	5	4	9	8	6	6	5	4	1	1	1	1	1	0	2.8	9
9-Aug	0	0	0	1	0	Z	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0.6	1
10-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
11-Aug	0	Z	0	0	1	1	0	0	0	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0.3	1
12-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
13-Aug	0	0	0	Z	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1
14-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
15-Aug	0	0	0	0	0	Z	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1
16-Aug	Z	0	0	0	0	0	0	0	0	0	2	1	1	1	1	1	1	0	1	0	0	0	0	0	0.4	2
17-Aug	0	Z	0	0	0	0	0	0	0	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0.3	2
18-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	5	3	1	1	0	0	0	0.7	5
19-Aug	1	1	1	Z	5	1	1	2	6	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	6
20-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
21-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0.4	1
22-Aug	Z	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1
23-Aug	0	Z	0	0	0	0	0	1	6	11	10	9	8	4	3	6	4	3	1	1	1	1	0	0	3.1	11
24-Aug	0	0	Z	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
25-Aug	0	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
26-Aug	0	0	0	0	Z	0	0	0	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	0	0.4	1
27-Aug	0	0	0	0	0	Z	0	1	1	4	12	5	4	1	0	0	0	0	0	0	0	1	0	0	1.5	12
28-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.3	1
29-Aug	0	Z	0	0	0	0	0	0	0	1	4	3	11	30	31	15	6	1	1	1	0	0	0	0	4.6	31
30-Aug	0	0	Z	0	0	0	0	2	3	7	6	4	1	0	0	0	0	0	0	0	0	0	0	0	1.2	7
31-Aug	0	0	0	Z	0	0	0	1	3	6	9	2	0	0	0	0	0	0	0	0	0	0	0	0	1.2	9
	0.2	0.2	0.3	0.2	0.4	0.3	0.3	0.4	1.1	1.8	2.4	1.7	1.9	1.9	1.8	1.2	0.9	0.7	0.5	0.3	0.3	0.3	0.3	0.3	Diurnal Average	
	1	1	1	1	5	1	1	2	6	11	13	12	12	30	31	15	6	5	3	1	1	1	1	1	Diurnal Maximum	

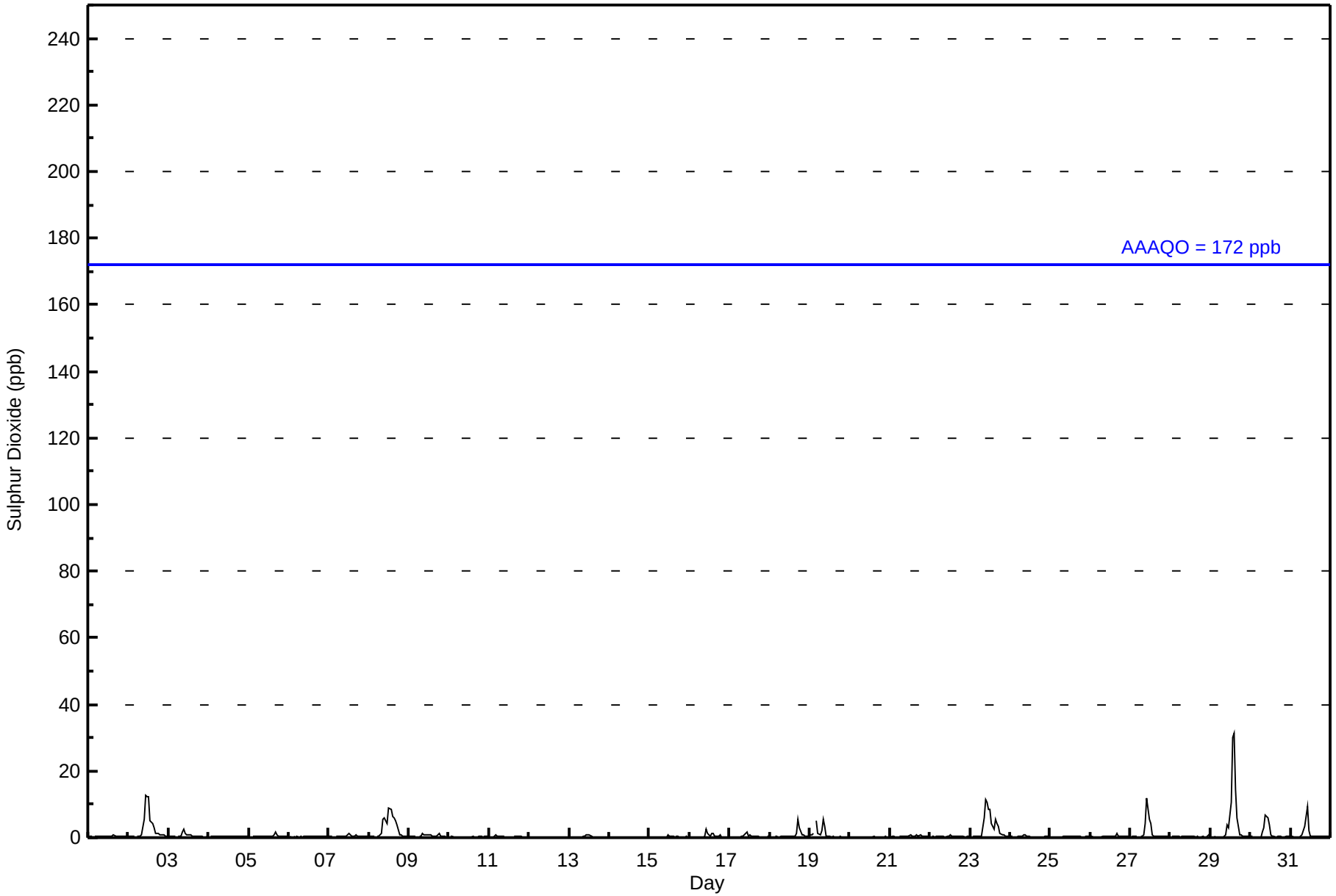
Z - zerospan C - Calibration
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb

Wood Buffalo Environmental Association

Hourly Averages

Sulphur Dioxide (SO_2) - ppb

Shell Muskeg River - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

Shell Muskeg River - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	699	98.73	98.73
11 - 20	7	0.99	99.72
21 - 60	2	0.28	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

Shell Muskeg River - August 2015

Concentration	**Wind Direction**																
Ranges (ppb)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 10	23	22	30	29	22	24	34	54	90	82	60	76	59	33	30	21	689
11 - 20	0	0	0	0	0	0	0	0	1	3	3	0	0	0	0	0	7
21 - 60	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	23	22	30	29	22	24	34	54	91	87	63	76	59	33	30	21	698

Total Number of Valid Hours: 698

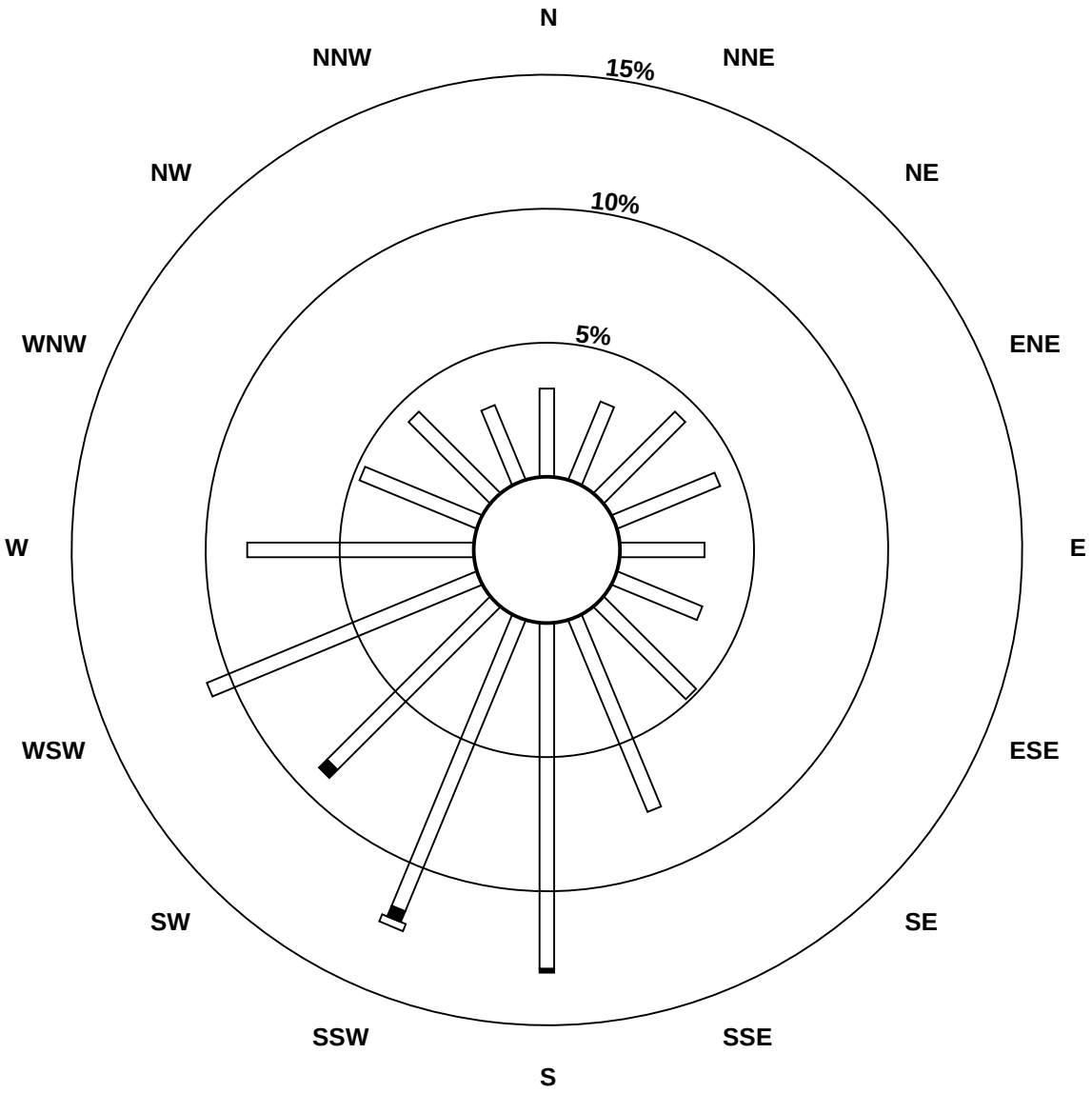
Total Number of Hours: 744

Wood Buffalo Environmental Association

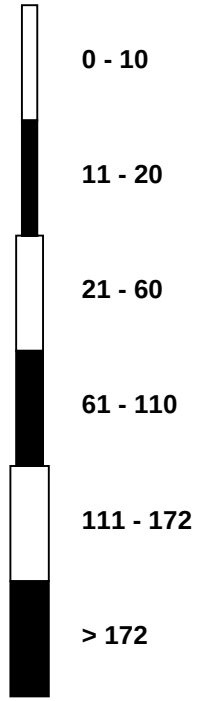
Wind Rose Aug 2015

Sulphur Dioxide (SO_2) - ppb

Shell Muskeg River (AMS 16)



Classes (ppb)



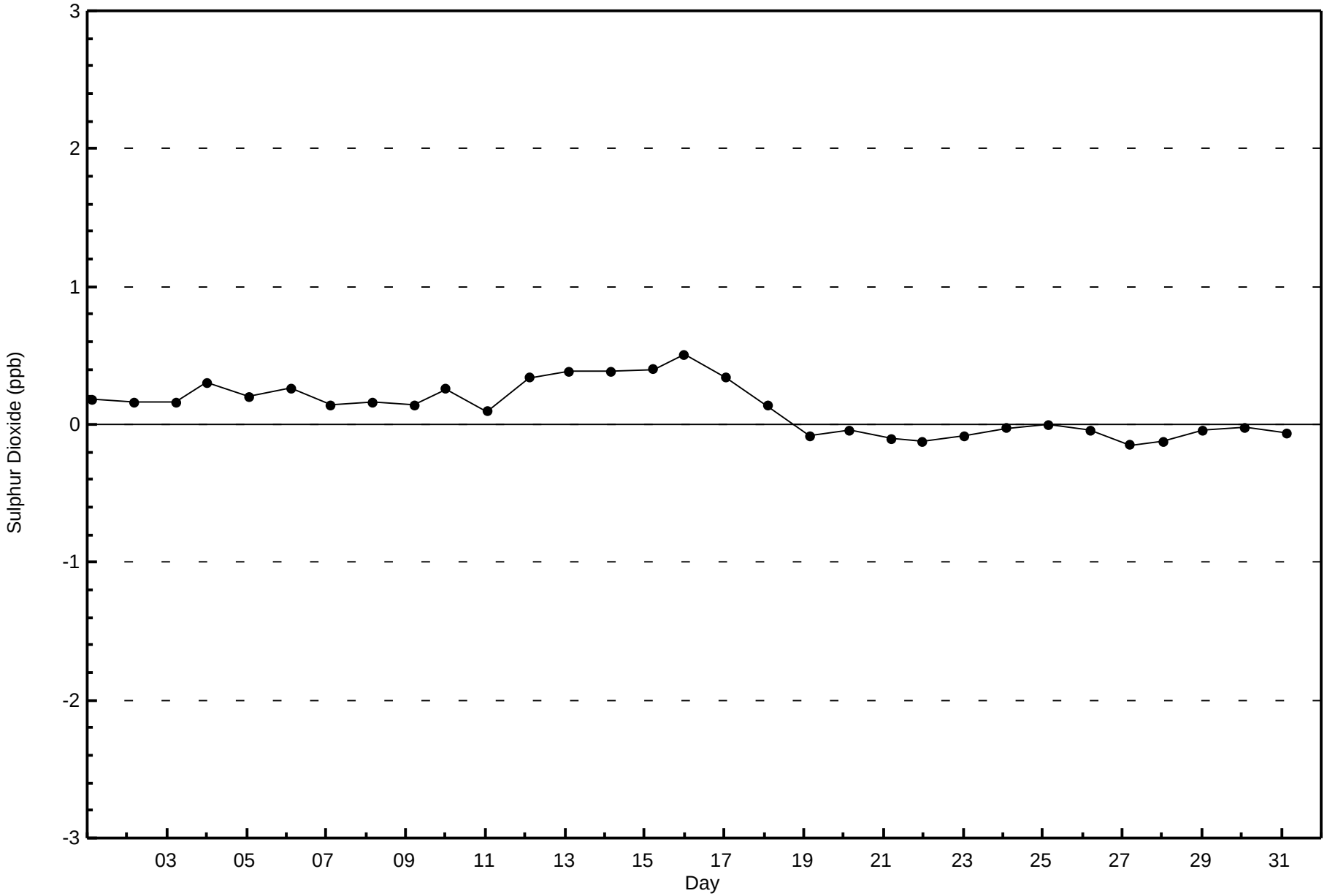
Total Number of Valid Hours: 698

Wood Buffalo Environmental Association

Zero Responses

Sulphur Dioxide (SO_2) - ppb

Shell Muskeg River - August 2015

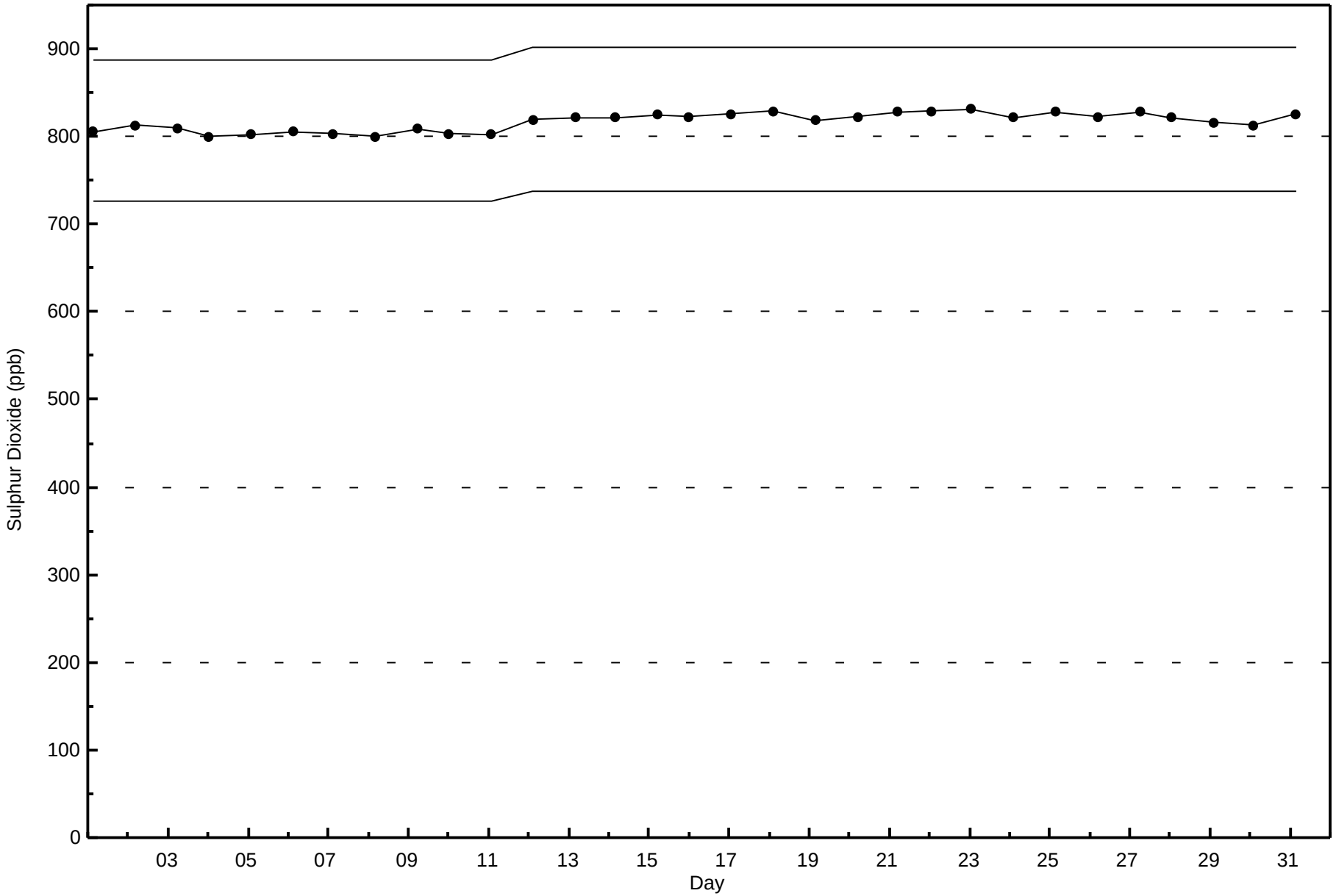


Wood Buffalo Environmental Association

Span Responses

Sulphur Dioxide (SO_2) - ppb

Shell Muskeg River - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Shell Muskeg River - August 2015

Maximum Value: 5.5 ppm on Aug 29 00:00

Maximum Daily Average: 2.8 ppm on Aug 9

Minimum Value: 1.9 ppm on Aug 20 08:00

Minimum Daily Average: 2.0 ppm on Aug 20

Maximum Diurnal Average: 2.5 ppm at hour 23

Minimum Diurnal Average: 2.2 ppm at hour 6

Monthly Average: 2.34 ppm

Percentiles: P_1 = 1.9 P_{10} = 2.0 Q_1 = 2.1 Median = 2.3 Q_3 = 2.5 P_{90} = 2.7 P_{99} = 3.7

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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	3.4	2.2	2.2	Z	2.5	2.6	2.6	2.5	2.6	2.7	2.4	2.6	2.4	2.4	2.4	2.5	2.3	2.6	2.5	2.7	2.7	2.8	2.7	2.8	2.6	3.4
2-Aug	2.7	2.7	2.6	2.3	Z	2.3	2.2	2.7	3.0	2.8	2.6	2.4	2.4	2.4	2.4	2.7	3.7	2.9	2.4	2.5	2.6	2.5	2.7	2.7	2.6	3.7
3-Aug	2.8	2.9	2.8	2.9	2.9	Z	2.8	2.4	2.5	3.5	2.8	2.5	2.4	2.3	2.2	2.2	2.1	2.0	2.0	2.1	2.2	2.3	2.3	2.2	2.5	3.5
4-Aug	Z	2.9	2.7	2.2	2.3	2.4	2.5	2.2	2.5	2.9	2.7	2.3	2.1	2.1	2.1	2.0	2.0	2.1	2.2	2.3	2.1	1.9	2.0	2.0	2.3	2.9
5-Aug	2.1	Z	2.0	2.0	2.2	2.0	2.1	2.2	2.2	2.2	2.1	2.2	2.1	2.1	2.0	2.2	2.7	2.3	2.0	2.1	2.1	2.0	2.0	2.0	2.1	2.7
6-Aug	2.0	2.0	Z	2.0	2.0	2.0	2.0	1.9	1.9	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	2.3	2.5	2.1	2.5
7-Aug	2.5	2.0	2.0	Z	2.1	2.1	2.4	2.2	2.8	2.8	3.1	2.3	2.3	2.4	2.2	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.3	3.1
8-Aug	2.1	2.0	2.0	2.0	Z	2.0	2.0	2.1	2.3	2.2	2.2	2.6	2.4	2.2	2.3	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.6	2.2	2.6
9-Aug	2.7	2.6	2.7	3.0	2.6	Z	2.6	2.4	2.7	3.6	5.2	4.3	2.7	2.5	2.5	2.4	2.5	2.5	2.4	2.4	2.4	2.8	2.5	2.3	2.8	5.2
10-Aug	Z	2.7	3.1	2.9	2.7	2.0	2.2	2.2	2.1	2.1	2.0	2.0	2.1	2.1	2.2	2.1	2.1	2.3	2.4	2.5	2.1	2.4	2.6	2.1	2.3	3.1
11-Aug	2.1	Z	2.4	2.5	2.3	2.3	2.2	2.5	2.2	2.2	C	C	C	C	C	2.2	2.1	2.0	2.0	2.3	2.3	2.4	2.2	2.6	2.3	2.6
12-Aug	2.2	2.3	Z	2.1	2.0	2.1	2.1	2.3	2.3	2.4	2.2	2.0	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.7	2.9	2.8	2.1	2.3	2.2	2.9
13-Aug	2.3	2.2	2.1	Z	2.5	2.6	2.6	2.3	2.4	2.5	2.5	2.4	2.4	2.3	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.2	2.5	2.6	2.3	2.6
14-Aug	2.2	2.1	2.2	2.0	Z	2.2	2.1	2.0	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
15-Aug	2.1	2.1	2.1	2.1	2.8	Z	2.6	2.7	2.4	2.4	2.5	2.5	2.4	2.5	2.6	2.8	2.5	2.6	2.7	2.7	2.7	3.2	3.8	3.3	2.6	3.8
16-Aug	Z	2.6	2.2	2.1	2.1	2.1	1.9	2.1	2.7	2.5	2.6	2.3	2.2	2.3	2.4	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.3	2.3	2.7
17-Aug	2.2	Z	2.1	2.0	2.0	2.3	2.7	2.5	2.4	2.5	2.5	2.5	2.4	2.3	2.3	2.6	2.4	2.4	2.4	2.4	2.6	2.4	2.3	2.3	2.4	2.7
18-Aug	2.4	2.5	Z	3.3	3.4	2.5	2.4	2.5	2.5	2.5	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.2	2.3	2.3	2.2	2.2	2.4	3.4
19-Aug	2.1	2.2	2.1	Z	2.1	2.0	2.1	2.1	2.2	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.3	2.1	2.4	2.1	2.4
20-Aug	2.4	2.5	2.1	2.2	Z	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.9	2.0	2.1	2.0	2.1	2.0	2.0	2.1	2.0	2.0	2.0	2.5
21-Aug	2.0	2.2	2.0	2.3	2.2	Z	2.0	2.0	2.0	1.9	1.9	1.9	2.1	2.1	2.1	2.7	2.0	2.0	2.0	2.0	2.0	2.0	2.3	2.2	2.1	2.7
22-Aug	Z	2.0	2.1	2.3	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.4	2.3	2.4	2.4	2.4	2.5	2.4	2.3	2.3	2.4	2.3	2.2	2.5
23-Aug	2.4	Z	2.1	2.3	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	3.1	2.9	2.3	3.1
24-Aug	2.4	2.3	Z	2.1	2.0	2.1	2.0	2.1	2.1	2.3	2.4	2.4	2.3	2.3	2.3	2.2	2.2	2.3	2.3	2.4	2.5	3.4	4.1	3.1	2.4	4.1
25-Aug	3.1	2.9	2.7	Z	2.6	2.5	2.6	2.6	3.9	2.8	2.5	2.6	2.7	2.7	2.6	2.4	2.8	2.5	2.7	2.7	2.7	3.3	3.3	2.6	2.8	3.9
26-Aug	2.2	2.7	2.7	2.1	Z	2.0	2.0	2.2	2.2	2.3	2.7	2.9	2.5	2.6	2.5	2.3	2.5	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.9
27-Aug	2.2	2.1	2.2	2.5	2.6	Z	2.8	2.9	3.0	2.6	2.4	2.4	2.4	2.3	2.3	2.3	2.4	2.5	2.6	2.3	2.3	3.0	2.9	2.5	2.5	3.0
28-Aug	Z	2.3	2.1	2.0	1.9	1.9	2.1	2.1	2.2	2.3	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.6	2.5	2.6	3.3	5.5	2.4	5.5
29-Aug	3.4	Z	2.3	2.3	2.3	2.2	2.1	2.2	2.4	2.3	3.8	2.5	2.4	2.2	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	1.9	2.3	3.8
30-Aug	1.9	1.9	Z	2.2	2.1	2.0	2.0	2.2	2.5	2.4	2.2	2.1	2.1	2.1	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.4	2.4	2.3	2.2	2.5
31-Aug	2.3	2.2	2.0	Z	2.1	2.1	2.3	2.2	2.2	2.3	2.4	2.4	2.4	2.4	2.5	2.5	2.5	2.5	2.4	2.3	2.3	2.3	2.2	2.1	2.3	2.5
	2.4	2.3	2.3	2.3	2.3	2.2	2.3	2.3	2.4	2.4	2.5	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.5	2.5	Diurnal Average	
	3.4	2.9	3.1	3.3	3.4	2.6	2.8	2.9	3.9	3.6	5.2	4.3	2.7	2.7	2.6	2.8	3.7	2.9	2.7	2.7	2.9	3.4	4.1	5.5	Diurnal Maximum	

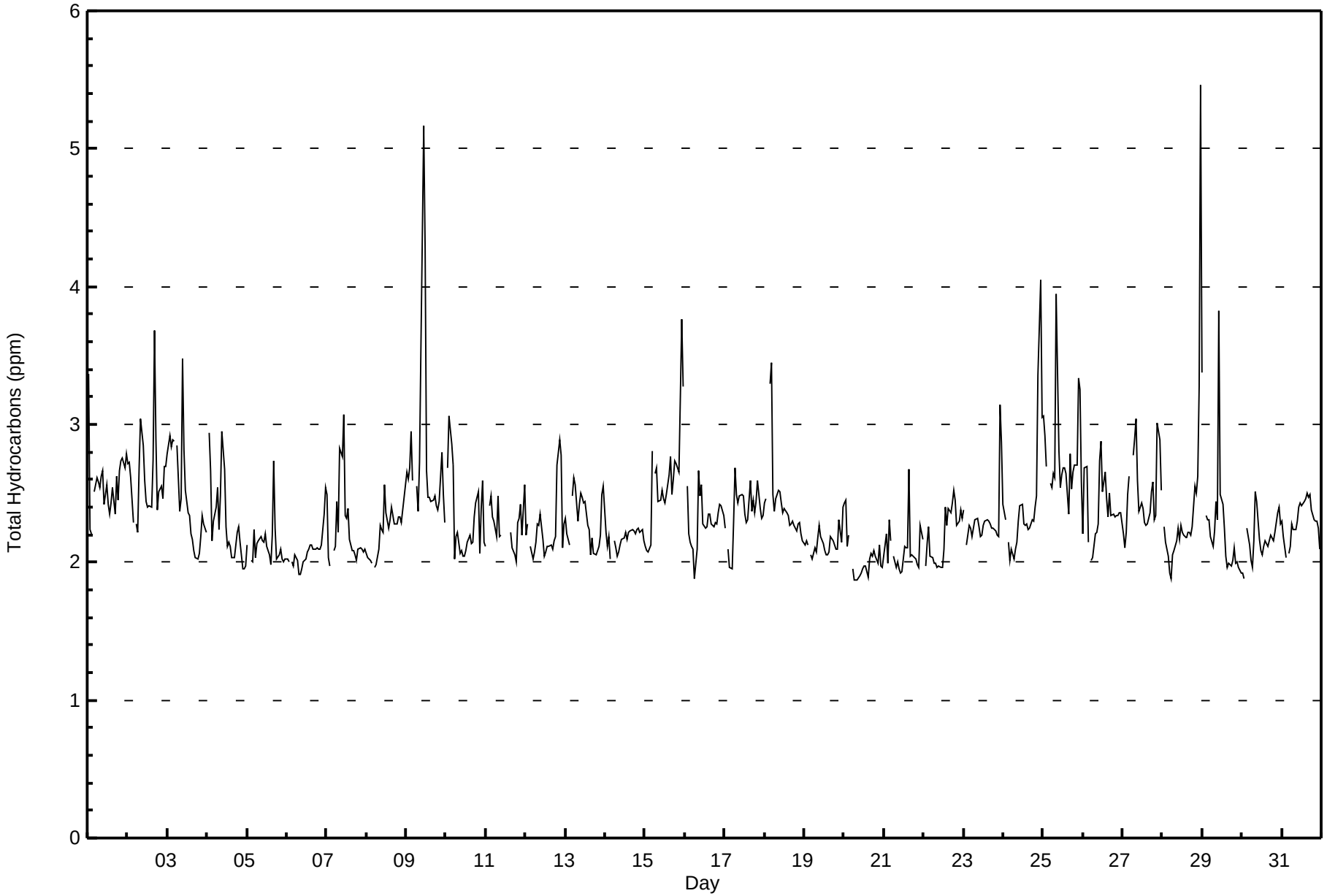
Z - zerospan C - Calibration

Wood Buffalo Environmental Association

Hourly Averages

Total Hydrocarbons (THC) - ppm

Shell Muskeg River - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm

Shell Muskeg River - August 2015

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	107	15.11	15.11
2.1 - 3.0	576	81.36	96.47
3.1 - 10.0	25	3.53	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Total Hydrocarbons (THC) - ppm

Shell Muskeg River - August 2015

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	6	5	9	10	13	10	6	3	14	19	7	5	0	107
2.1 - 3.0	17	18	28	23	17	15	23	41	81	80	60	62	40	26	22	13	566
3.1 - 10.0	6	4	2	0	0	0	1	0	0	1	0	0	0	0	3	8	25
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	23	22	30	29	22	24	34	54	91	87	63	76	59	33	30	21	698

Total Number of Valid Hours: 698

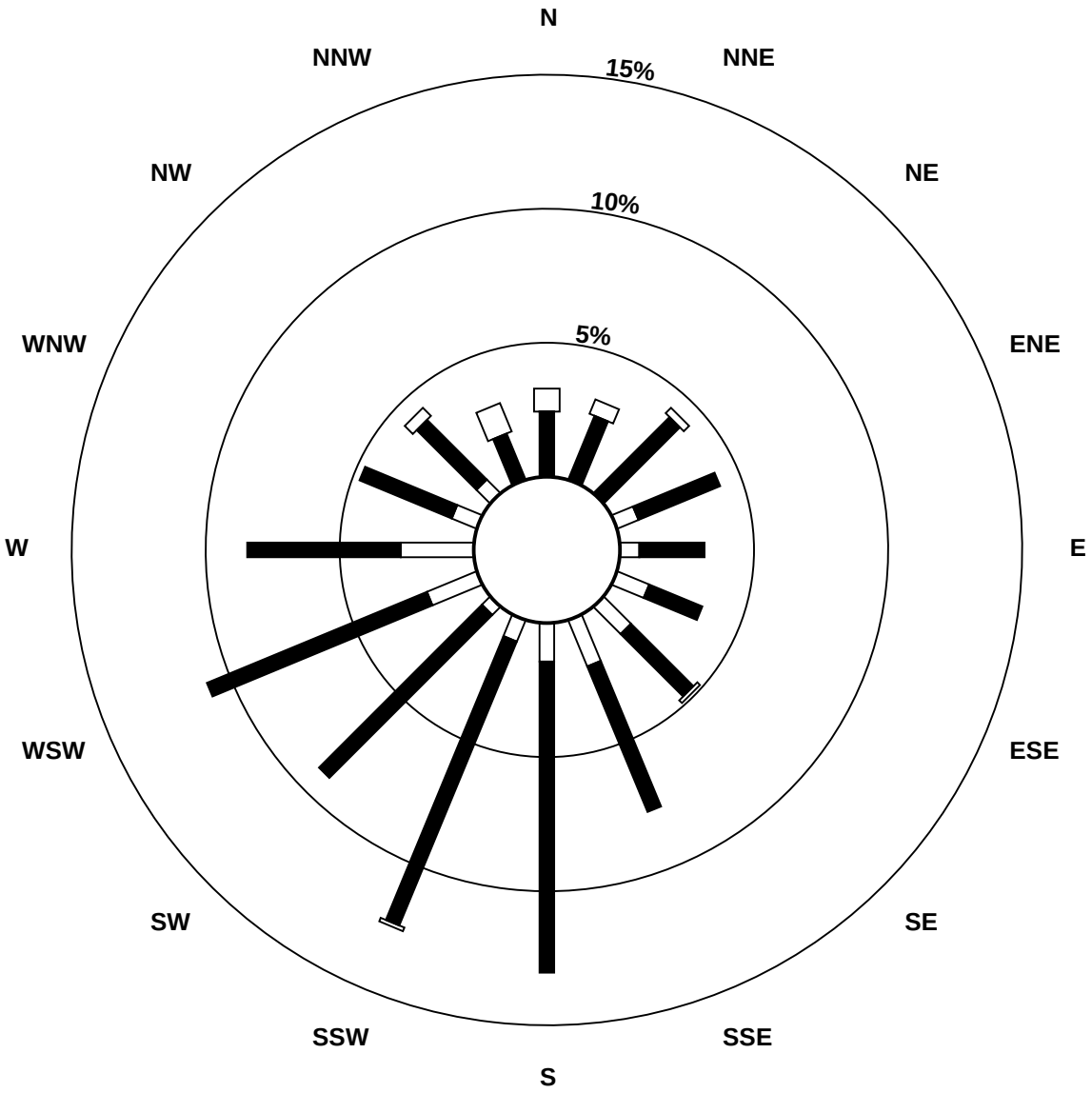
Total Number of Hours: 744

Wood Buffalo Environmental Association

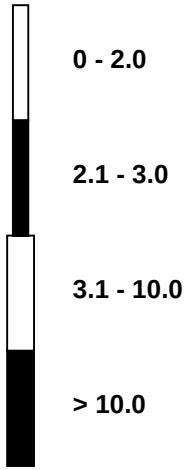
Wind Rose Aug 2015

Total Hydrocarbons (THC) - ppm

Shell Muskeg River (AMS 16)



Classes (ppm)



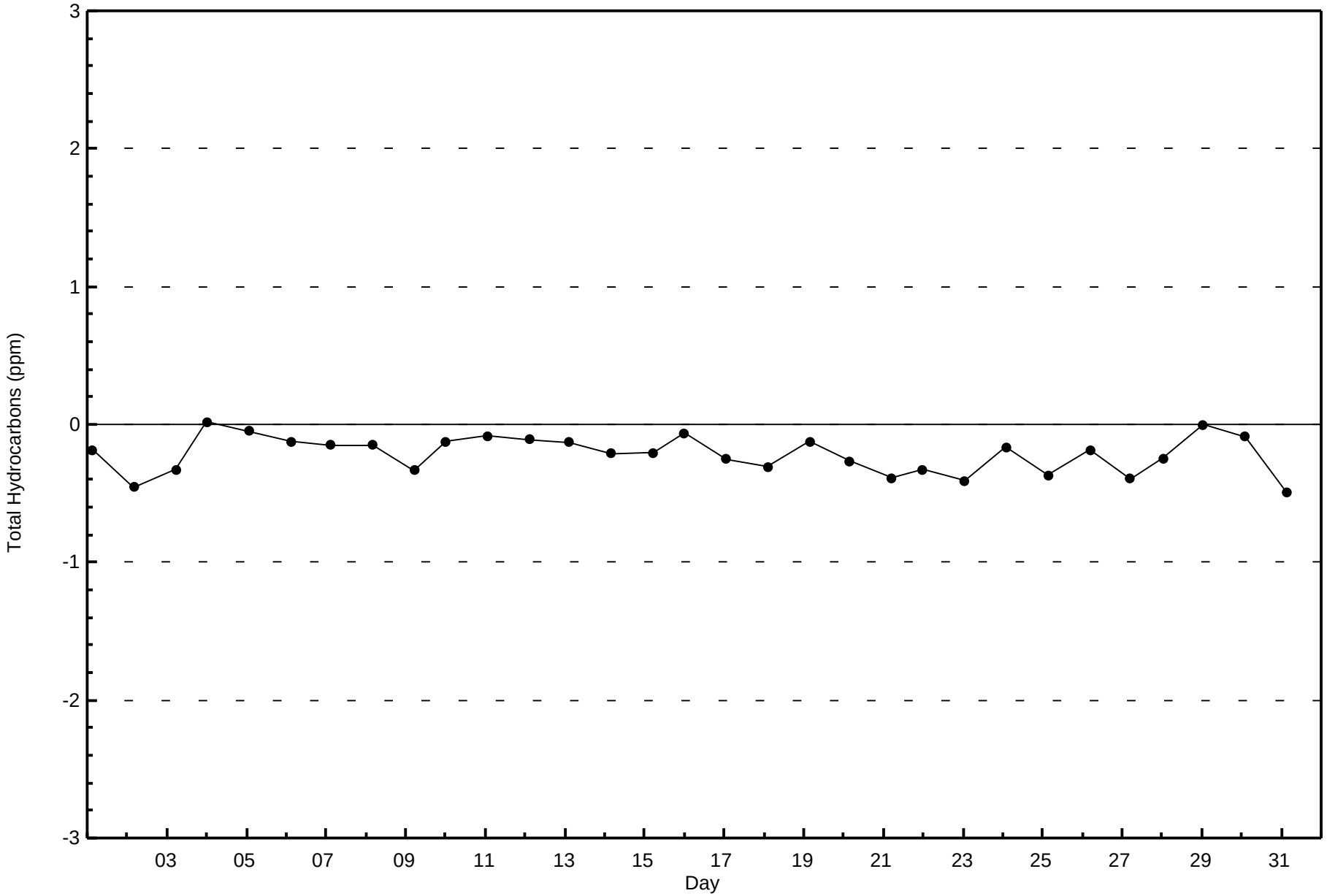
Total Number of Valid Hours: 698

Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Shell Muskeg River - August 2015

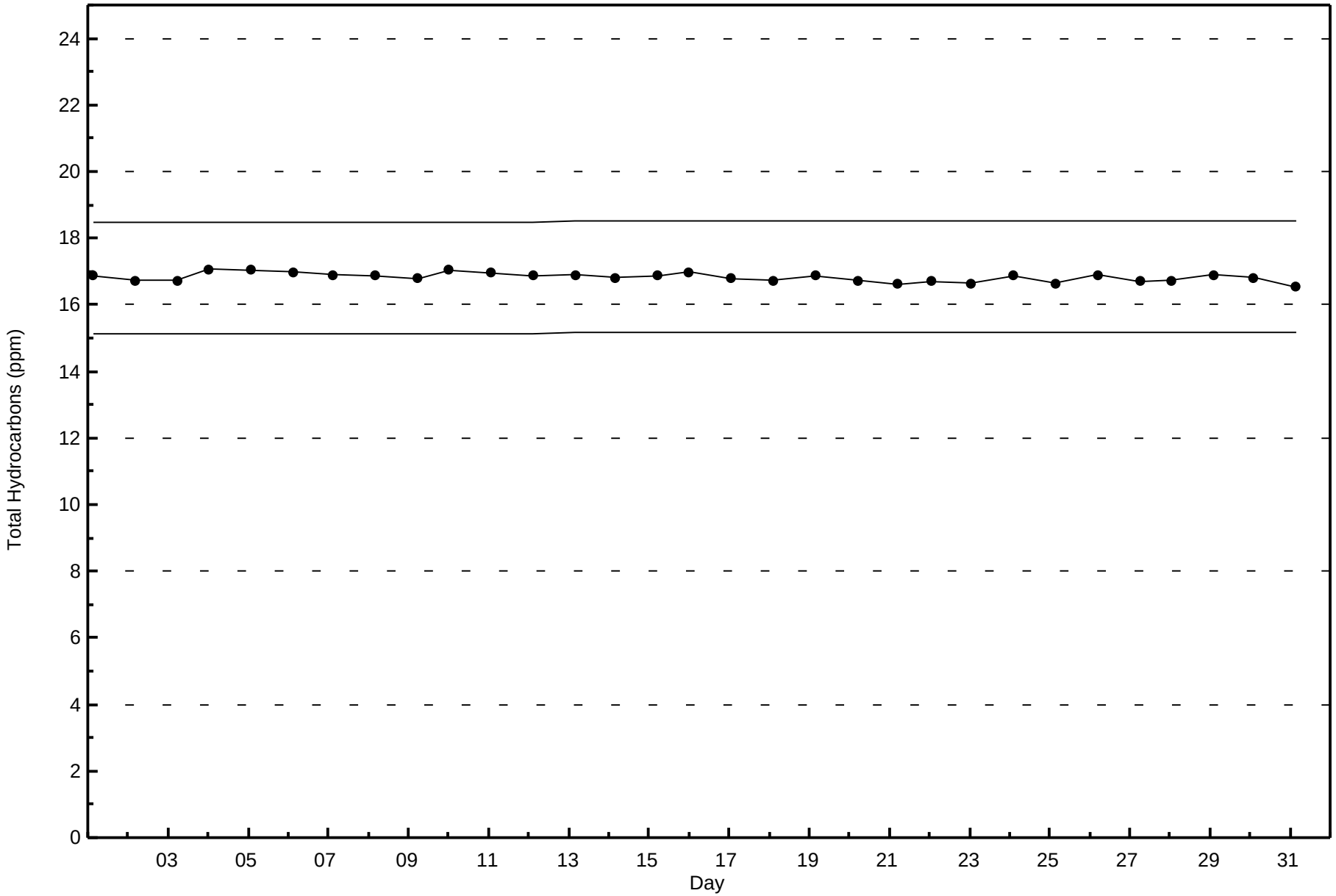


Wood Buffalo Environmental Association

Span Responses

Total Hydrocarbons (THC) - ppm

Shell Muskeg River - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

Shell Muskeg River - August 2015

Maximum Value: 110 ppb on Aug 29 00:00

Maximum Daily Average: 16.5 ppb on Aug 9

Minimum Value: 0 ppb on Aug 17 04:00

Minimum Daily Average: 0.1 ppb on Aug 12

Maximum Diurnal Average: 9.8 ppb at hour 9

Minimum Diurnal Average: 0.6 ppb at hour 21

Monthly Average: 3.7 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 3$ $P_{90} = 11$ $P_{99} = 44$

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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	19	1	1	Z	3	10	11	17	21	11	3	6	1	0	1	3	0	6	4	2	0	0	0	1	5.3	21
2-Aug	1	2	1	1	Z	3	3	17	11	7	4	2	2	0	0	3	12	2	0	0	0	0	0	0	3.1	17
3-Aug	0	0	14	13	8	Z	33	3	4	18	16	12	4	4	0	0	0	0	0	0	0	0	0	0	5.6	33
4-Aug	Z	16	9	1	1	2	6	1	5	10	13	3	3	3	0	0	0	1	1	9	1	0	0	0	3.7	16
5-Aug	1	Z	3	2	2	2	5	7	8	5	4	5	3	1	0	1	1	0	0	0	0	0	0	0	2.2	8
6-Aug	0	0	Z	0	0	1	1	0	0	0	0	0	0	1	2	2	0	0	0	0	0	0	14	37	2.6	37
7-Aug	34	0	0	Z	0	4	21	9	34	35	20	6	4	5	1	0	0	0	0	0	0	0	0	0	7.6	35
8-Aug	0	0	0	0	Z	0	1	5	9	5	3	8	3	1	1	1	1	0	1	0	0	0	0	3	1.9	9
9-Aug	9	6	20	60	42	Z	47	17	13	21	74	36	6	3	1	0	0	0	0	0	4	20	0	0	16.5	74
10-Aug	Z	1	9	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	9
11-Aug	0	Z	0	0	0	0	1	4	2	1	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0.5	4
12-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
13-Aug	0	0	0	Z	0	1	2	2	2	1	1	0	1	0	0	0	1	0	0	0	0	0	4	0	0.8	4
14-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
15-Aug	0	0	0	0	8	Z	11	8	7	8	11	33	23	20	15	7	16	13	6	5	6	22	52	40	13.6	52
16-Aug	Z	9	2	0	0	0	0	1	8	5	6	1	0	1	1	1	0	0	0	0	0	0	0	0	1.6	9
17-Aug	0	Z	0	0	0	1	4	7	3	2	2	1	0	0	0	3	0	0	0	0	0	0	0	0	1.1	7
18-Aug	0	1	Z	17	27	8	6	11	18	14	5	7	2	1	1	0	0	0	0	0	0	0	0	0	5.1	27
19-Aug	0	0	0	Z	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
20-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
21-Aug	0	0	0	0	0	Z	1	0	1	1	1	1	3	2	1	13	1	0	0	0	0	0	0	0	1.1	13
22-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	2	6	3	8	2	3	3	1	0	0	1	2	1.4	8
23-Aug	7	Z	0	12	11	8	18	23	28	23	8	2	1	0	0	1	0	0	0	0	0	0	3	1	6.4	28
24-Aug	0	0	Z	0	0	0	1	3	2	2	1	0	0	0	0	0	0	0	0	0	0	22	53	4	3.9	53
25-Aug	10	10	9	Z	8	7	9	11	83	16	13	7	16	8	7	7	4	4	2	4	4	27	16	12	12.9	83
26-Aug	1	8	7	2	Z	0	1	12	18	9	17	10	3	2	1	0	1	0	0	0	0	0	0	0	4.0	18
27-Aug	0	0	0	2	2	Z	33	24	10	7	6	1	1	0	0	0	0	0	0	0	0	0	0	0	3.8	33
28-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	110	5.6	110
29-Aug	40	Z	0	0	0	0	1	6	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.4	40
30-Aug	0	0	Z	0	0	0	0	1	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	3
31-Aug	0	0	0	Z	0	1	8	6	4	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	1.1	8
	4.7	2.1	3.0	4.5	4.4	1.9	7.3	6.3	9.8	6.6	7.1	4.8	2.7	2.0	1.3	1.7	1.4	1.1	0.7	0.8	0.6	3.0	5.2	6.8	Diurnal Average	
	40	16	20	60	42	10	47	24	83	35	74	36	23	20	15	13	16	13	6	9	6	27	53	110	Diurnal Maximum	

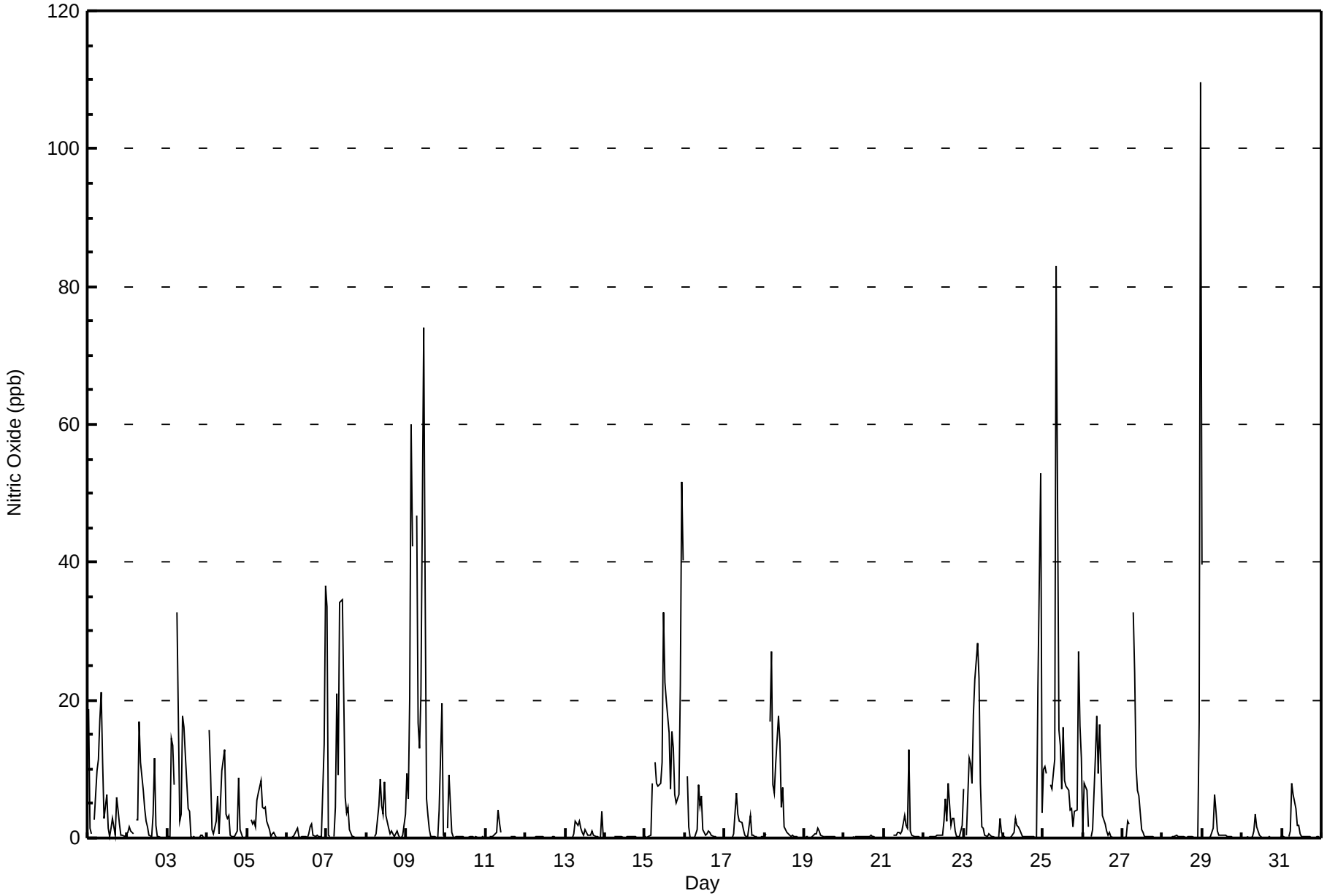
Z - zerospan C - Calibration

Wood Buffalo Environmental Association

Hourly Averages

Nitric Oxide (NO) - ppb

Shell Muskeg River - August 2015



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	678	95.76	95.76
21 - 40	22	3.11	98.87
11 - 80	6	0.85	99.72
81 - 159	2	0.28	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Nitric Oxide (NO) - ppb

Shell Muskeg River - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	19	18	30	29	18	23	33	54	88	85	63	76	59	32	26	16	669
21 - 40	4	2	0	0	2	1	1	0	3	2	0	0	0	1	3	3	22
11 - 80	0	1	0	0	2	0	0	0	0	0	0	0	0	0	1	1	5
81 - 159	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	23	22	30	29	22	24	34	54	91	87	63	76	59	33	30	21	698

Total Number of Valid Hours: 698

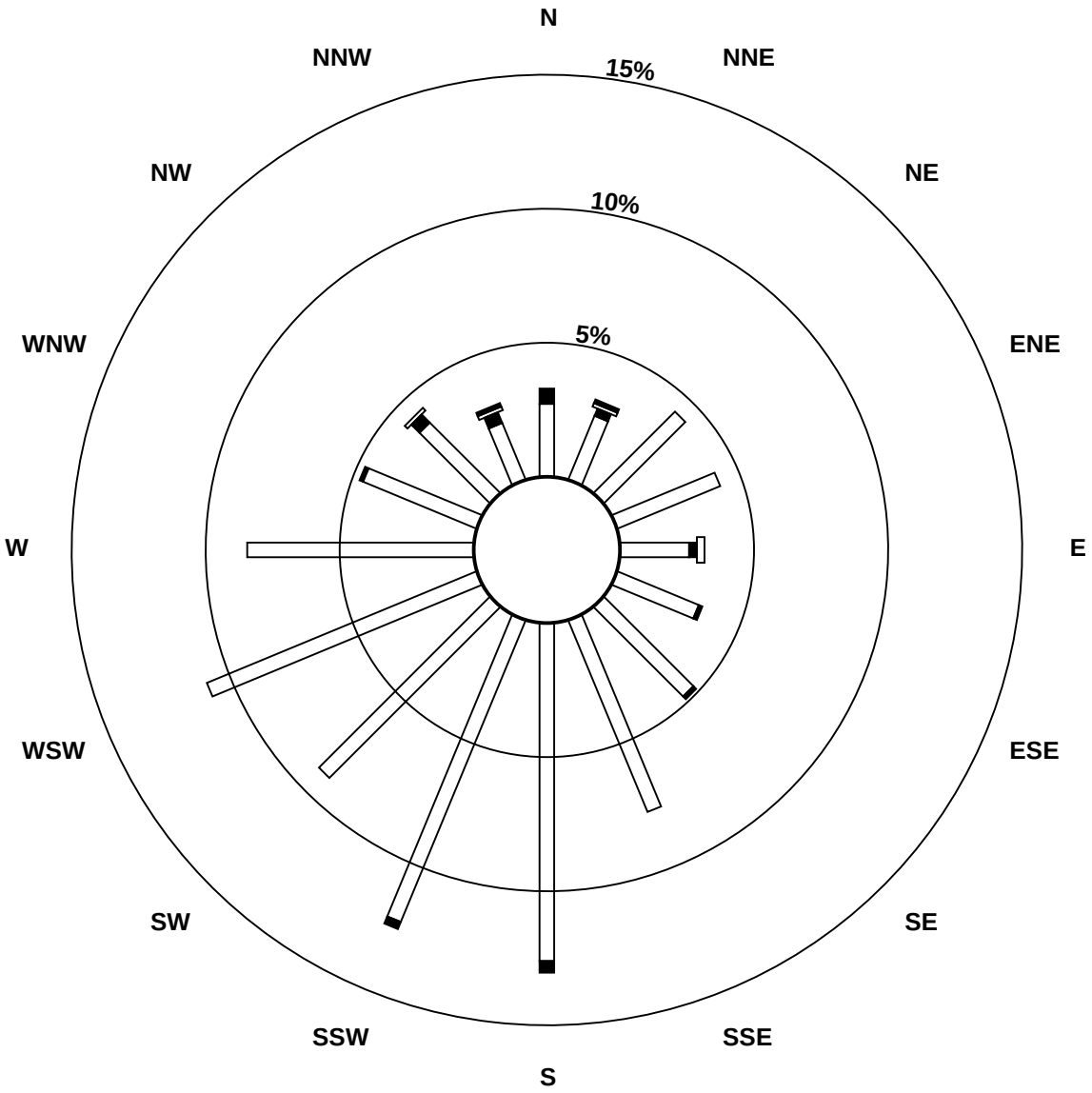
Total Number of Hours: 744

Wood Buffalo Environmental Association

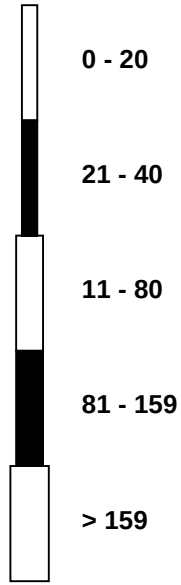
Wind Rose Aug 2015

Nitric Oxide (NO) - ppb

Shell Muskeg River (AMS 16)



Classes (ppb)



0 - 20

21 - 40

11 - 80

81 - 159

> 159

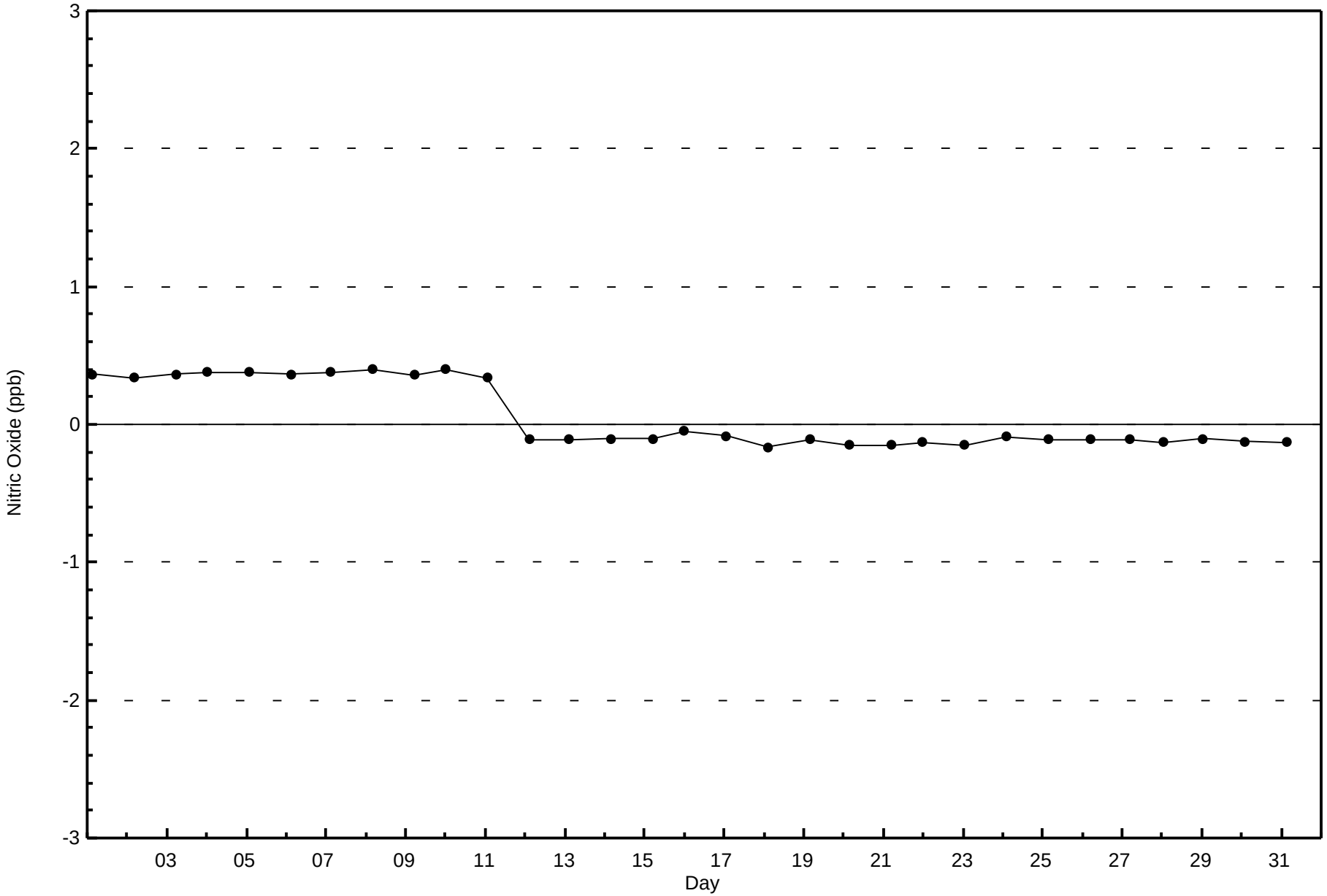
Total Number of Valid Hours: 698

Wood Buffalo Environmental Association

Zero Responses

Nitric Oxide (NO) - ppb

Shell Muskeg River - August 2015

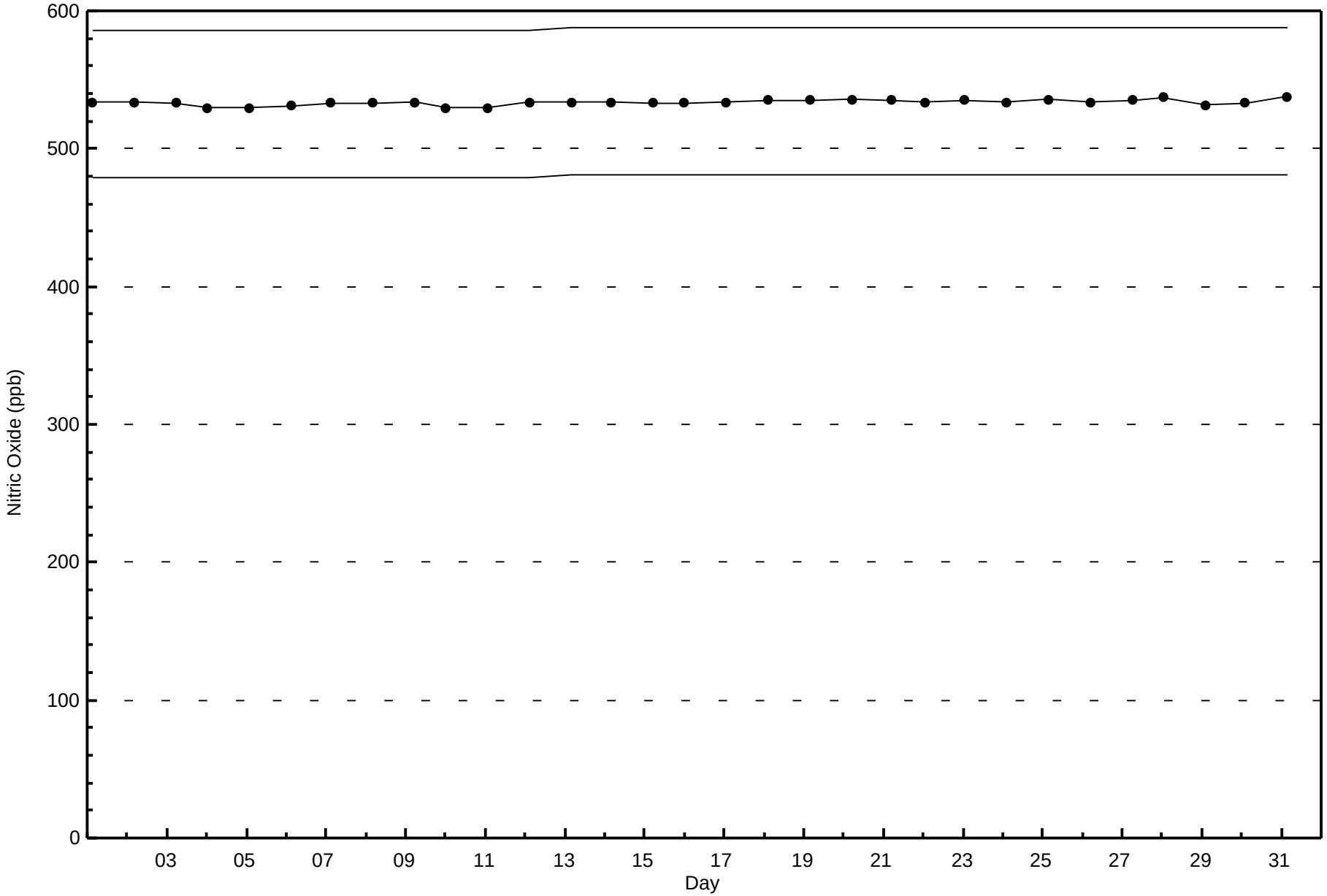


Wood Buffalo Environmental Association

Span Responses

Nitric Oxide (NO) - ppb

Shell Muskeg River - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO_2) - ppb

Shell Muskeg River - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 38 ppb on Aug 9 11:00 Maximum Daily Average: 11.9 ppb on Aug 15

Minimum Value: 0 ppb on Aug 4 23:00 Minimum Daily Average: 0.4 ppb on Aug 20
Maximum Diurnal Average: 6.5 ppb at hour 9 Minimum Diurnal Average: 2.1 ppb at hour 15
Monthly Average: 4.6 ppb Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 1$ Median = 3 $Q_3 = 7$ $P_{90} = 11$ $P_{99} = 21$

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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	18	7	9	Z	9	10	11	12	13	10	4	9	4	1	3	4	1	7	4	6	9	10	5	8	7.6	18
2-Aug	6	5	4	4	Z	3	2	8	11	10	8	5	5	2	2	10	25	10	2	2	2	2	3	3	5.8	25
3-Aug	5	5	9	7	8	Z	10	4	6	17	15	11	7	8	2	0	1	0	0	1	6	11	7	6	6.3	17
4-Aug	Z	16	12	8	11	7	11	4	11	14	11	7	6	8	2	1	2	4	9	14	6	0	0	1	7.2	16
5-Aug	7	Z	8	8	5	6	7	6	5	4	3	4	2	2	0	3	6	3	0	0	1	0	0	0	3.6	8
6-Aug	0	0	Z	3	3	4	4	0	0	0	0	0	0	0	1	2	0	0	1	0	1	2	6	8	1.6	8
7-Aug	5	1	1	Z	2	2	5	5	8	9	8	4	4	5	2	1	1	0	0	0	1	1	0	0	2.8	9
8-Aug	0	0	0	0	Z	0	0	2	5	4	4	7	7	4	3	6	5	3	6	5	1	1	9	12	3.7	12
9-Aug	12	11	9	8	7	Z	7	8	9	16	38	33	13	9	5	2	2	3	2	3	14	18	6	2	10.3	38
10-Aug	Z	11	24	18	7	1	1	1	1	0	0	0	0	0	0	0	0	0	1	0	1	4	15	7	4.0	24
11-Aug	7	Z	11	7	7	6	6	7	4	2	C	C	C	C	C	1	0	0	0	1	2	1	1	3	3.7	11
12-Aug	2	3	Z	4	3	1	1	0	1	0	0	0	0	0	0	0	0	0	0	1	4	4	1	2	1.3	4
13-Aug	2	2	2	Z	5	6	8	5	5	5	4	3	5	2	1	1	3	2	1	1	1	5	17	4	3.9	17
14-Aug	1	1	2	0	Z	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0.5	2
15-Aug	1	1	1	4	14	Z	13	11	10	9	10	17	14	14	13	12	12	13	13	17	16	20	20	20	11.9	20
16-Aug	Z	15	9	6	4	2	0	2	7	5	7	3	1	2	3	3	1	1	1	1	1	1	1	2	3.4	15
17-Aug	2	Z	1	1	4	5	5	7	5	4	4	3	2	0	1	7	2	2	1	1	2	1	1	5	2.9	7
18-Aug	8	10	Z	20	21	11	7	9	13	11	4	6	4	3	2	2	2	4	3	2	4	4	4	5	6.9	21
19-Aug	9	12	11	Z	5	5	10	5	5	4	1	0	0	0	0	0	0	0	0	0	0	1	0	1	3.1	12
20-Aug	1	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	2	0	0	0.4	2
21-Aug	2	1	1	1	1	Z	2	1	2	1	1	1	4	2	2	11	2	1	2	1	2	1	5	4	2.2	11
22-Aug	Z	0	1	1	1	3	1	1	1	1	1	1	4	9	6	10	4	7	10	13	10	11	9	9	4.8	13
23-Aug	12	Z	7	12	10	9	8	10	11	13	9	4	3	2	1	3	3	2	2	2	1	1	7	13	6.2	13
24-Aug	13	4	Z	4	3	5	5	6	4	3	2	0	0	0	0	0	0	0	1	1	4	19	22	13	4.8	22
25-Aug	16	15	10	Z	7	5	4	5	20	13	10	8	10	7	7	6	6	5	5	9	8	17	15	12	9.5	20
26-Aug	2	12	11	9	Z	6	6	15	14	10	17	14	7	6	4	2	6	2	1	1	2	3	3	3	6.7	17
27-Aug	3	4	5	14	12	Z	10	11	12	12	10	4	3	1	1	1	1	1	1	1	3	5	7	13	5.7	14
28-Aug	Z	3	1	1	3	2	2	1	2	1	1	0	0	0	0	0	0	0	1	2	3	2	9	30	2.8	30
29-Aug	28	Z	3	3	4	3	5	8	7	2	3	3	3	4	3	2	2	2	1	0	0	1	0	0	3.8	28
30-Aug	0	1	Z	7	3	1	2	4	8	5	2	1	0	0	0	0	1	1	2	1	1	4	5	4	2.2	8
31-Aug	7	8	3	Z	4	8	9	7	5	4	4	1	0	0	0	0	0	0	0	1	3	12	11	5	4.1	12
	6.5	5.6	6.0	6.0	6.2	4.4	5.3	5.4	6.5	6.0	6.1	5.0	3.6	3.1	2.1	2.9	2.9	2.5	2.3	2.9	3.5	5.2	6.2	6.3	Diurnal Average	
	28	16	24	20	21	11	13	15	20	17	38	33	14	14	13	12	25	13	13	17	16	20	22	30	Diurnal Maximum	

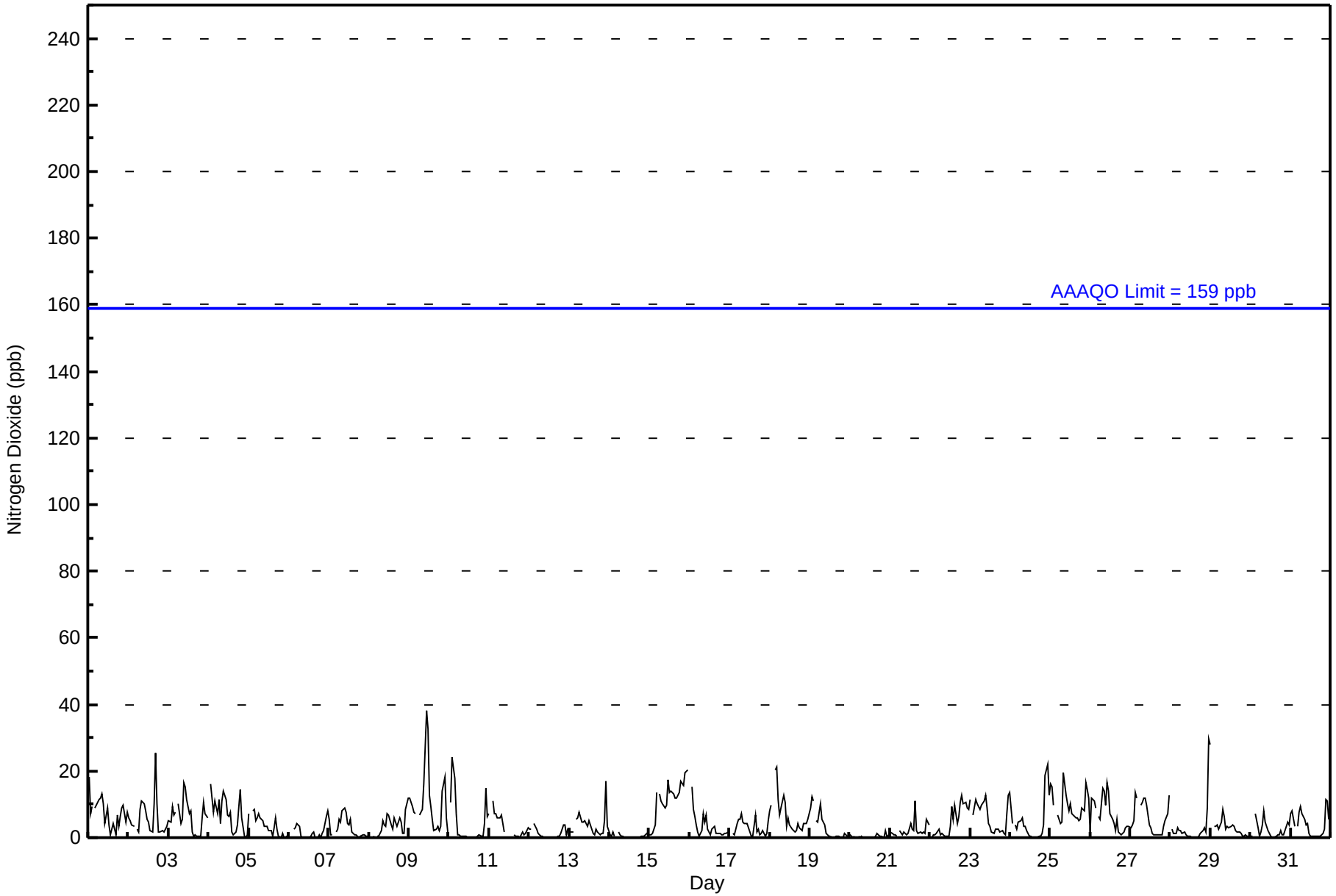
Z - zerospan C - Calibration
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Dioxide (NO_2) - ppb

Shell Muskeg River - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Nitrogen Dioxide (NO_2) - ppb

Shell Muskeg River - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	700	98.87	98.87
21 - 40	8	1.13	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: 708

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Dioxide (NO_2) - ppb

Shell Muskeg River - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	21	21	29	29	22	24	34	54	91	87	63	76	59	33	29	18	690
21 - 40	2	1	1	0	0	0	0	0	0	0	0	0	0	0	1	3	8
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	23	22	30	29	22	24	34	54	91	87	63	76	59	33	30	21	698

Total Number of Valid Hours: 698

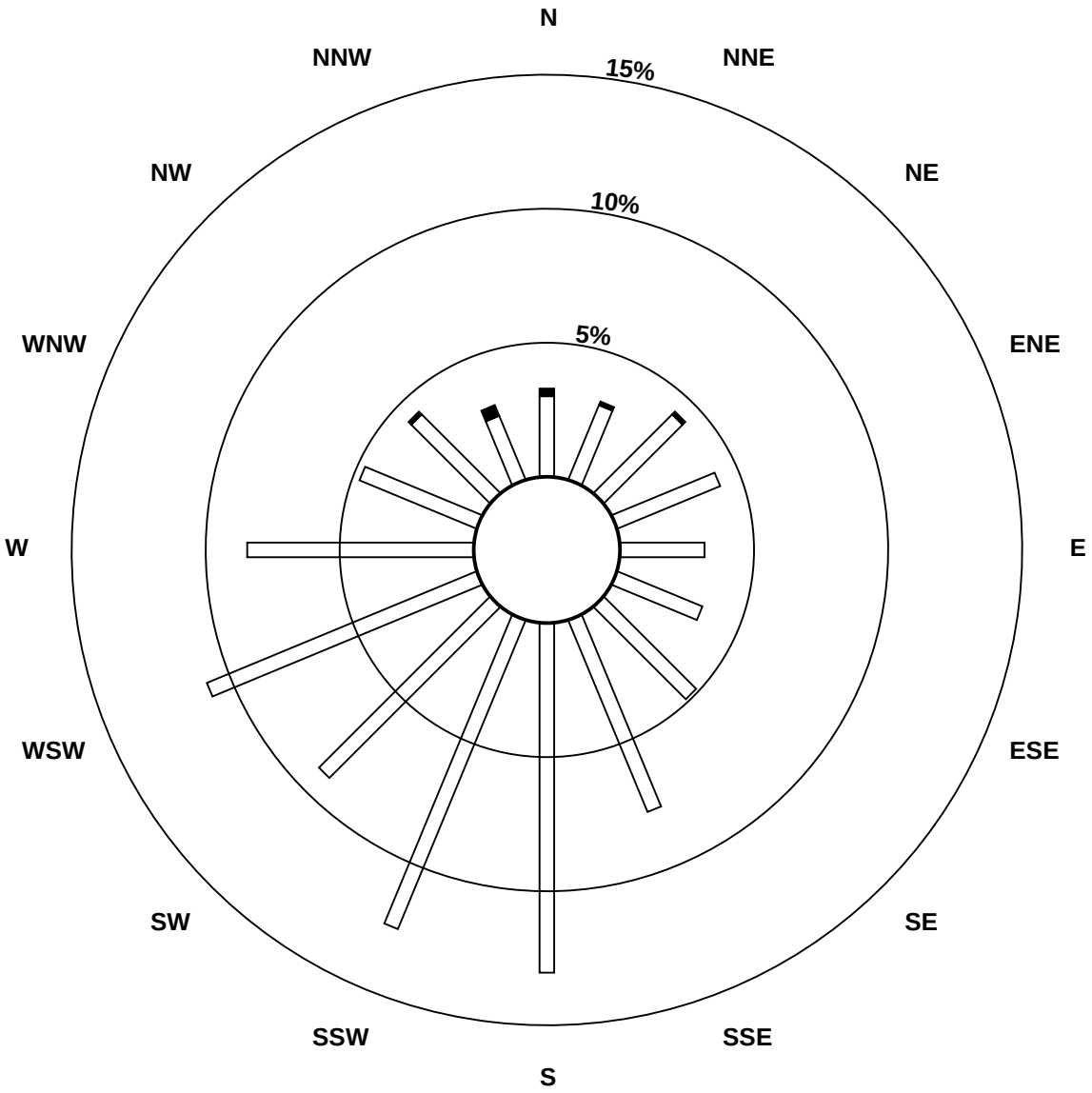
Total Number of Hours: 744

Wood Buffalo Environmental Association

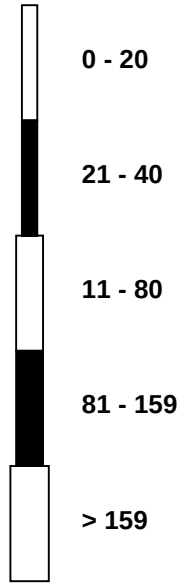
Wind Rose Aug 2015

Nitrogen Dioxide (NO_2) - ppb

Shell Muskeg River (AMS 16)



Classes (ppb)



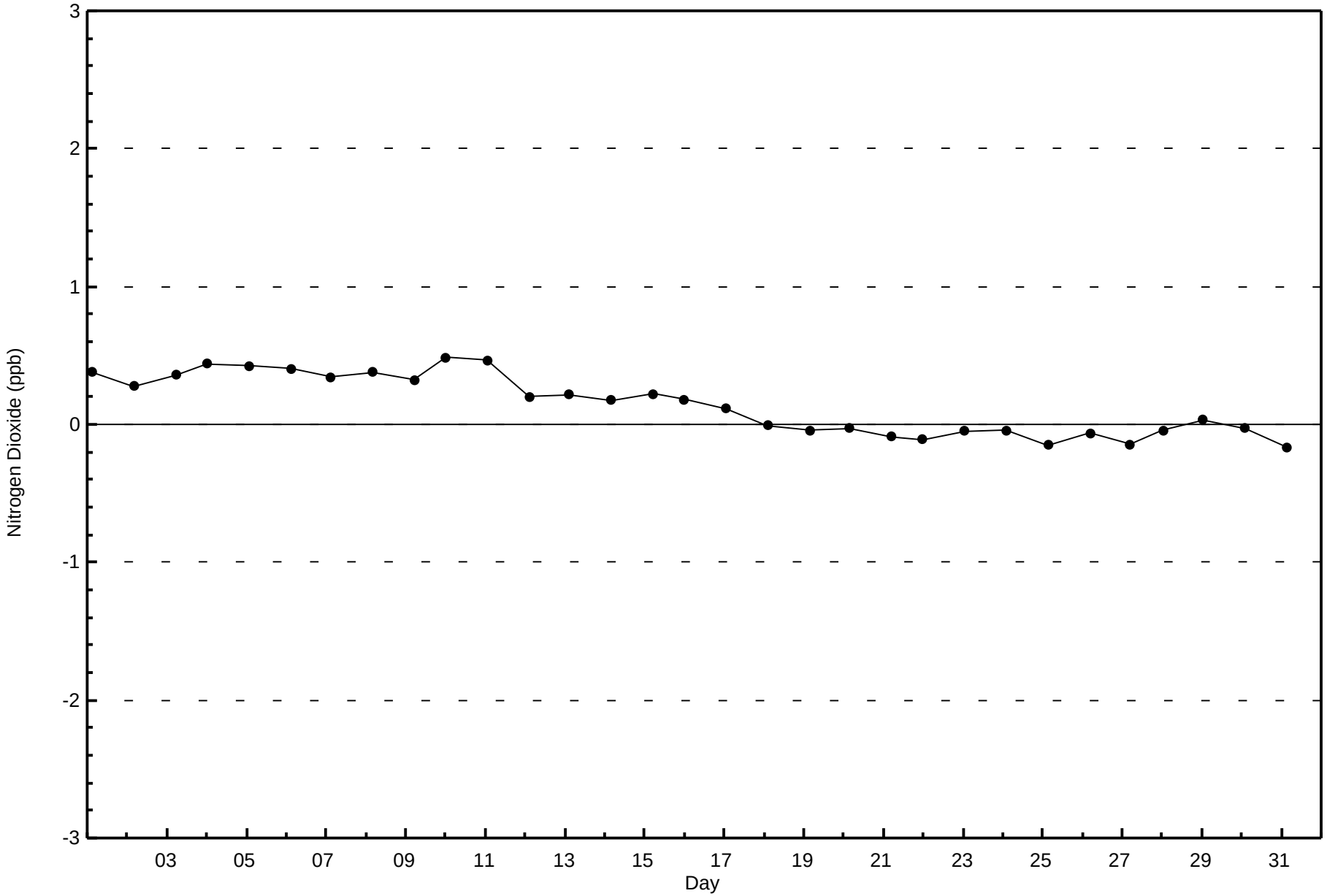
Total Number of Valid Hours: 698

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Dioxide (NO_2) - ppb

Shell Muskeg River - August 2015

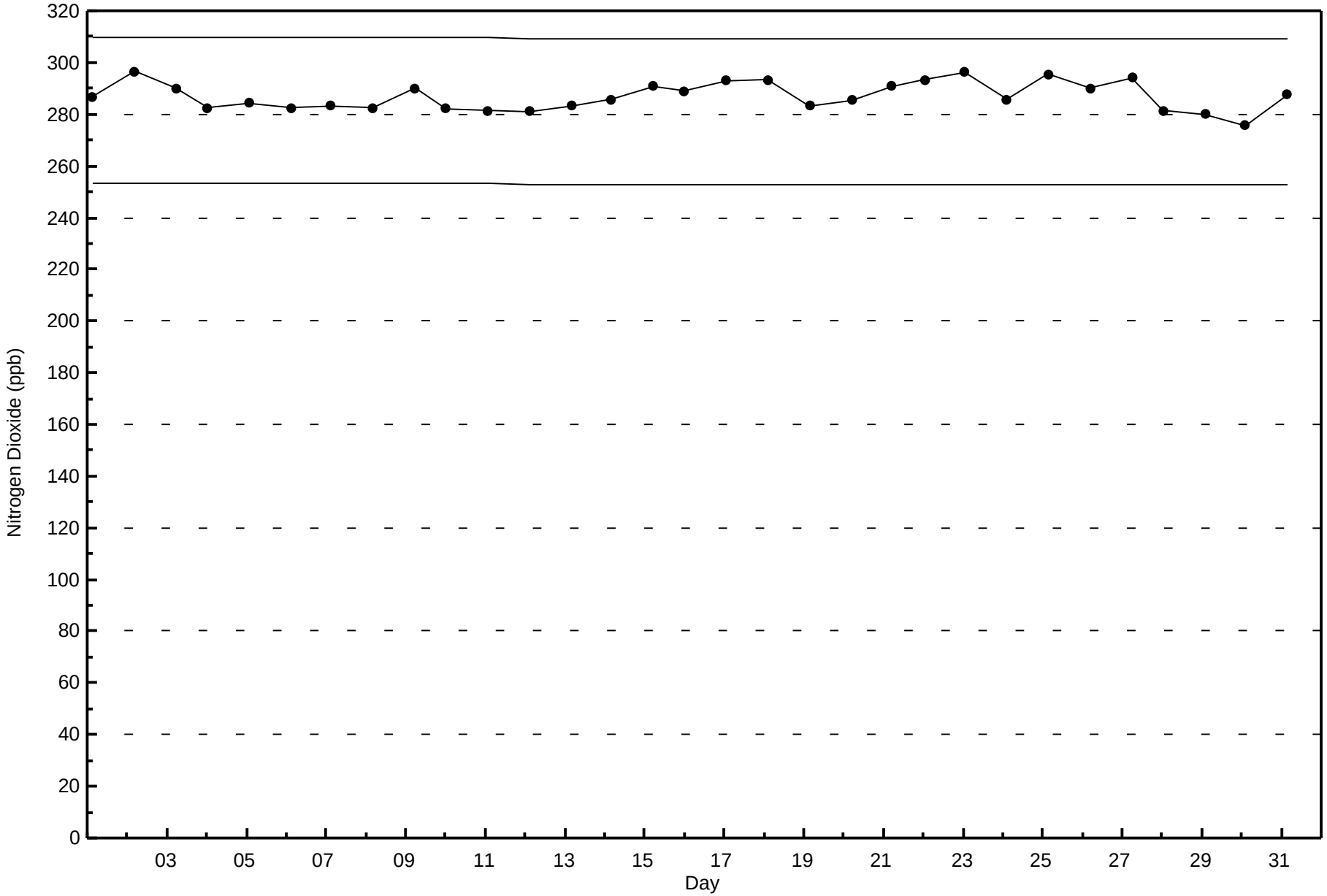


Wood Buffalo Environmental Association

Span Responses

Nitrogen Dioxide (NO_2) - ppb

Shell Muskeg River - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_X) - ppb

Shell Muskeg River - August 2015

Maximum Value: 139 ppb on Aug 29 00:00

Maximum Daily Average: 26.8 ppb on Aug 9

Minimum Value: 0 ppb on Aug 4 23:00

Minimum Daily Average: 0.5 ppb on Aug 20

Maximum Diurnal Average: 16.3 ppb at hour 9

Minimum Diurnal Average: 3.0 ppb at hour 19

Monthly Average: 8.4 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 1$ Median = 3 $Q_3 = 10$ $P_{90} = 23$ $P_{99} = 67$

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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	37	8	10	Z	11	20	23	29	34	21	7	15	5	1	4	7	1	13	8	8	9	10	5	8	12.9	37
2-Aug	7	7	5	4	Z	5	4	25	22	17	12	8	6	3	2	14	37	12	2	2	2	2	3	3	8.8	37
3-Aug	5	5	24	20	15	Z	43	7	9	34	31	23	11	12	2	1	1	1	0	1	6	11	7	6	12.0	43
4-Aug	Z	32	21	9	12	9	17	5	16	24	24	10	9	11	2	1	2	5	10	23	7	0	0	1	10.9	32
5-Aug	8	Z	11	11	8	8	13	13	13	8	8	8	5	3	1	4	7	3	0	0	1	0	0	1	5.7	13
6-Aug	0	0	Z	3	3	5	5	1	0	0	0	0	0	1	3	4	1	0	1	0	1	2	20	45	4.2	45
7-Aug	39	1	1	Z	2	7	26	14	42	43	28	10	7	10	3	1	1	0	0	1	1	1	1	0	10.4	43
8-Aug	0	0	0	0	Z	0	1	7	14	9	7	16	10	5	3	7	5	3	7	5	2	1	9	15	5.6	16
9-Aug	21	16	30	68	50	Z	53	24	22	37	112	69	18	12	6	2	3	4	2	3	18	38	7	2	26.8	112
10-Aug	Z	12	33	18	7	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	5	15	7	4.6	33
11-Aug	7	Z	11	7	7	6	7	11	6	2	C	C	C	C	C	1	0	0	0	1	2	1	1	3	4.2	11
12-Aug	2	3	Z	4	3	2	1	1	1	0	0	0	0	0	0	0	0	0	0	1	4	4	1	3	1.4	4
13-Aug	2	2	2	Z	5	6	10	7	7	7	5	4	6	3	1	1	4	2	1	1	2	5	21	4	4.7	21
14-Aug	1	1	2	0	Z	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.6	2
15-Aug	1	1	1	5	21	Z	24	19	18	17	21	50	36	34	28	19	27	26	20	22	22	42	72	61	25.5	72
16-Aug	Z	24	10	6	4	2	1	3	15	9	13	4	1	3	4	4	2	2	1	1	1	1	1	2	5.0	24
17-Aug	1	Z	1	1	4	6	9	14	8	7	6	4	2	0	1	10	2	3	1	1	2	1	1	5	4.0	14
18-Aug	8	11	Z	37	48	19	13	20	31	25	8	13	6	3	3	2	2	5	3	2	4	4	5	5	12.1	48
19-Aug	9	12	11	Z	5	5	11	6	6	5	2	1	1	0	0	0	1	0	0	0	0	1	1	1	3.4	12
20-Aug	1	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	1	2	1	1	1	0	2	0	1	0.5	2
21-Aug	2	1	1	1	1	Z	2	1	3	2	2	2	7	4	3	24	3	2	2	1	2	1	5	4	3.4	24
22-Aug	Z	0	1	1	2	3	1	2	2	1	1	1	6	15	8	18	6	9	13	14	10	11	10	10	6.3	18
23-Aug	19	Z	7	23	21	17	26	33	39	36	17	6	5	2	2	3	3	3	2	2	1	1	10	13	12.7	39
24-Aug	14	4	Z	4	3	5	6	9	5	5	3	1	0	0	0	0	0	1	1	1	4	40	75	16	8.6	75
25-Aug	26	26	19	Z	14	13	14	16	103	28	24	15	26	16	14	13	10	10	7	13	12	44	31	23	22.4	103
26-Aug	2	20	18	10	Z	6	7	27	32	19	33	24	11	8	5	2	6	2	1	1	2	3	4	3	10.7	33
27-Aug	3	4	5	16	14	Z	42	35	22	19	16	5	4	2	1	1	1	1	1	1	3	5	7	13	9.6	42
28-Aug	Z	3	1	1	3	2	2	2	2	1	1	1	0	0	0	0	0	0	2	2	3	2	26	139	8.5	139
29-Aug	68	Z	3	3	4	3	6	15	10	3	4	3	4	4	4	3	2	2	1	1	0	1	0	0	6.3	68
30-Aug	0	0	Z	7	3	1	2	5	11	6	2	1	0	0	0	0	1	1	2	1	1	4	5	4	2.6	11
31-Aug	8	8	3	Z	4	9	17	14	10	6	6	2	1	0	1	1	1	1	0	1	3	12	11	5	5.3	17
	11.2	7.7	9.0	10.4	10.5	6.2	12.5	11.7	16.3	12.7	13.1	9.9	6.3	5.2	3.4	4.6	4.3	3.6	3.0	3.7	4.1	8.2	11.4	13.1	Diurnal Average	
	68	32	33	68	50	20	53	35	103	43	112	69	36	34	28	24	37	26	20	23	22	44	75	139	Diurnal Maximum	

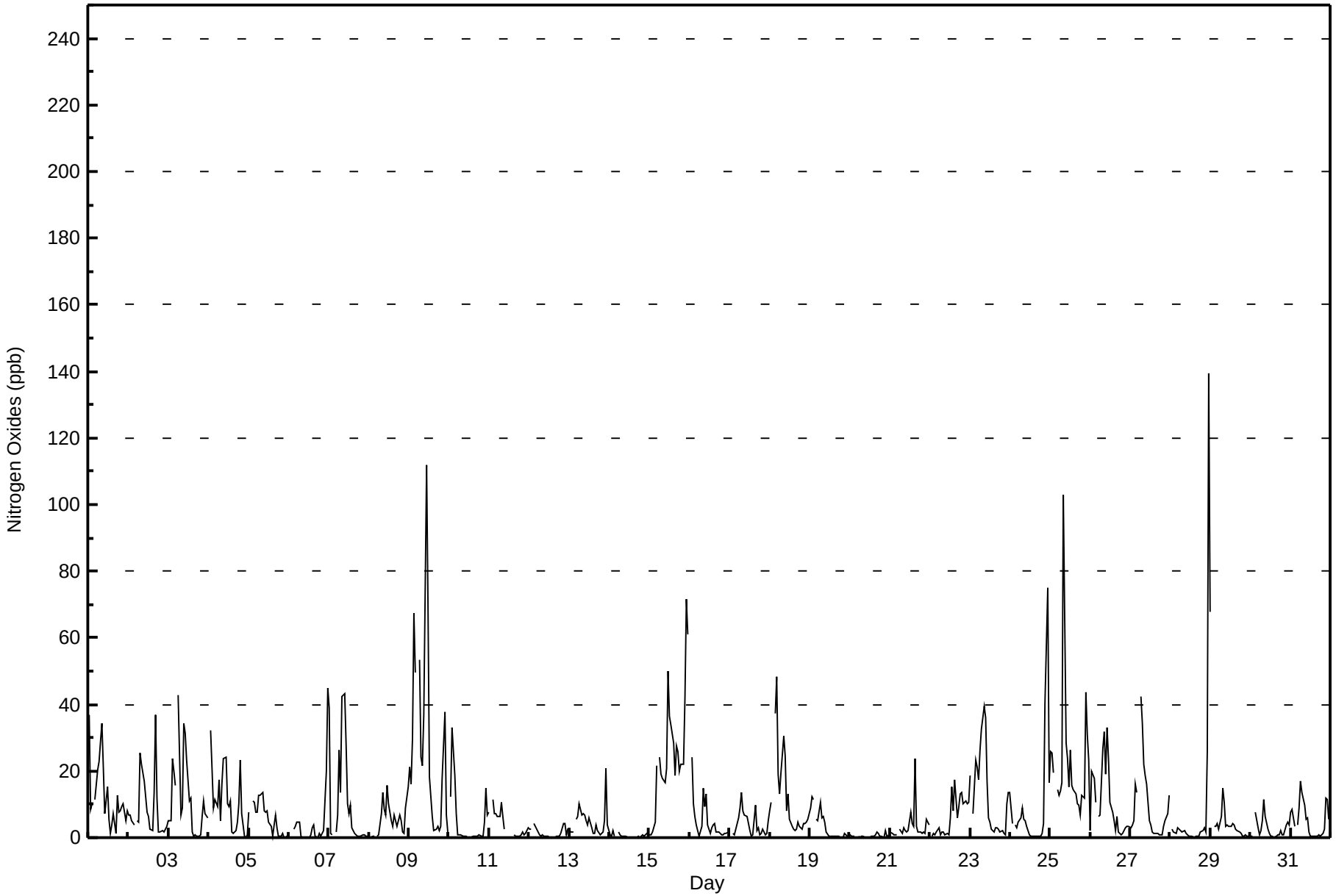
Z - zerospan C - Calibration

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Oxides (NO_X) - ppb

Shell Muskeg River - August 2015



Nitrogen Oxides (NO_X) - ppb
Shell Muskeg River - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	624	88.14	88.14
21 - 40	64	9.04	97.18
11 - 80	17	2.40	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

Nitrogen Oxides (NO_X) - ppb

Shell Muskeg River - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	12	8	22	27	18	22	31	52	85	85	58	76	59	28	24	9	616
21 - 40	8	11	8	2	1	1	3	2	5	2	5	0	0	4	4	7	63
11 - 80	3	2	0	0	3	1	0	0	1	0	0	0	0	1	1	4	16
81 - 159	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	3
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	23	22	30	29	22	24	34	54	91	87	63	76	59	33	30	21	698

Total Number of Valid Hours: 698

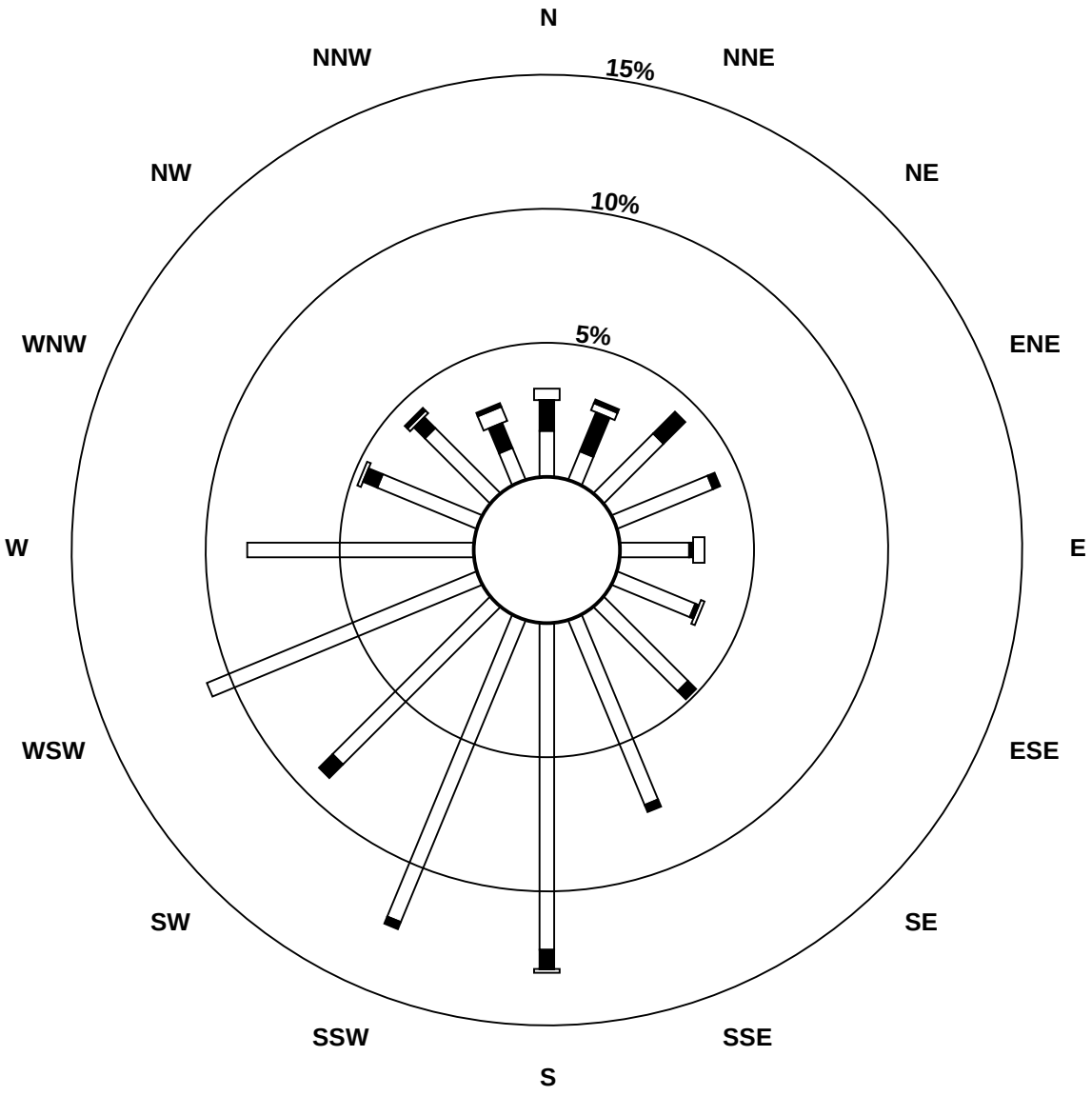
Total Number of Hours: 744

Wood Buffalo Environmental Association

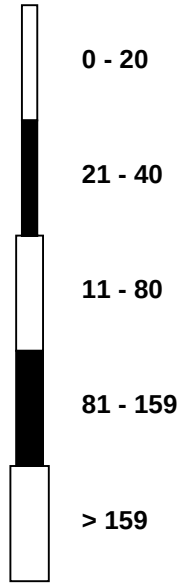
Wind Rose Aug 2015

Nitrogen Oxides (NO_X) - ppb

Shell Muskeg River (AMS 16)



Classes (ppb)



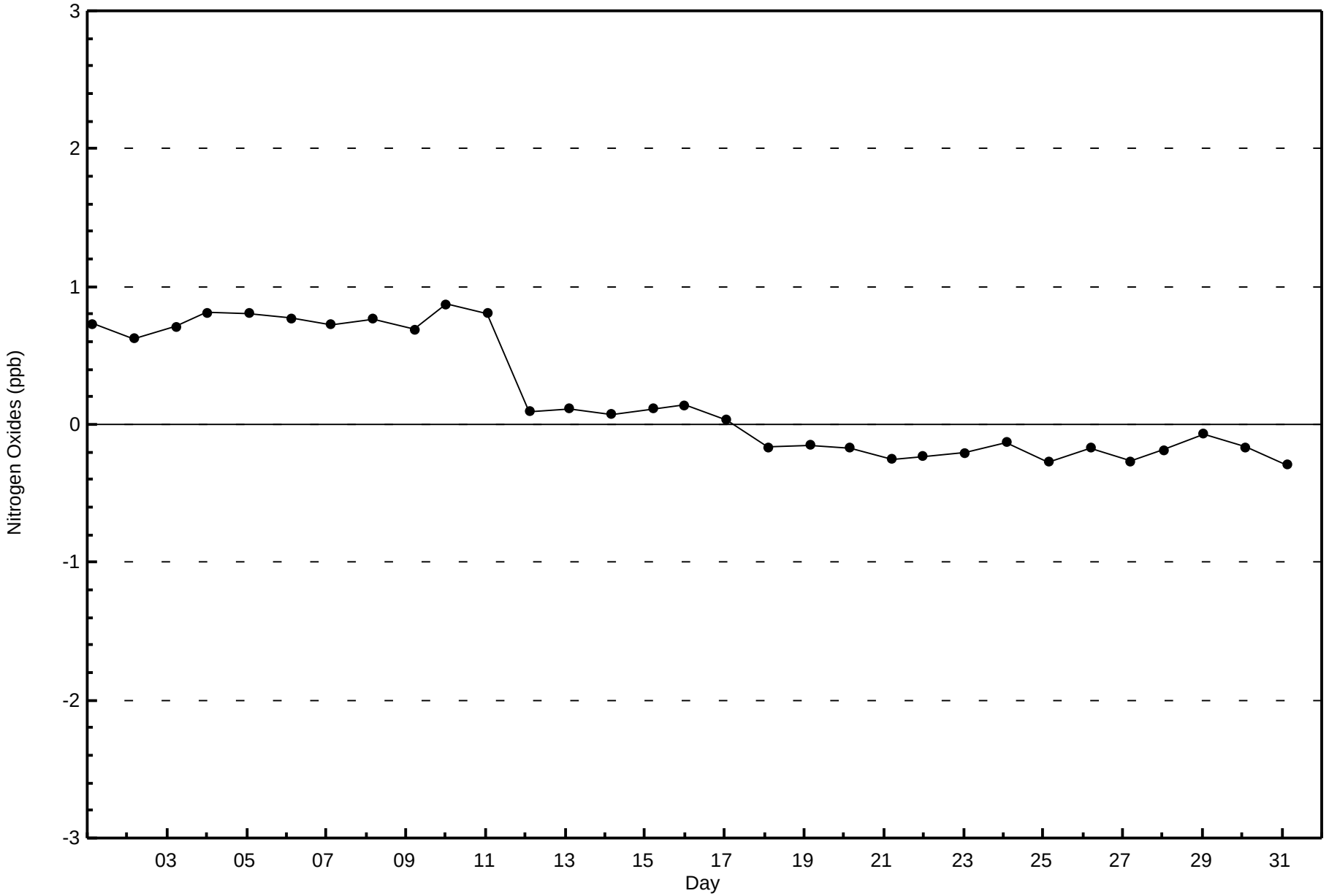
Total Number of Valid Hours: 698

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Oxides (NO_X) - ppb

Shell Muskeg River - August 2015

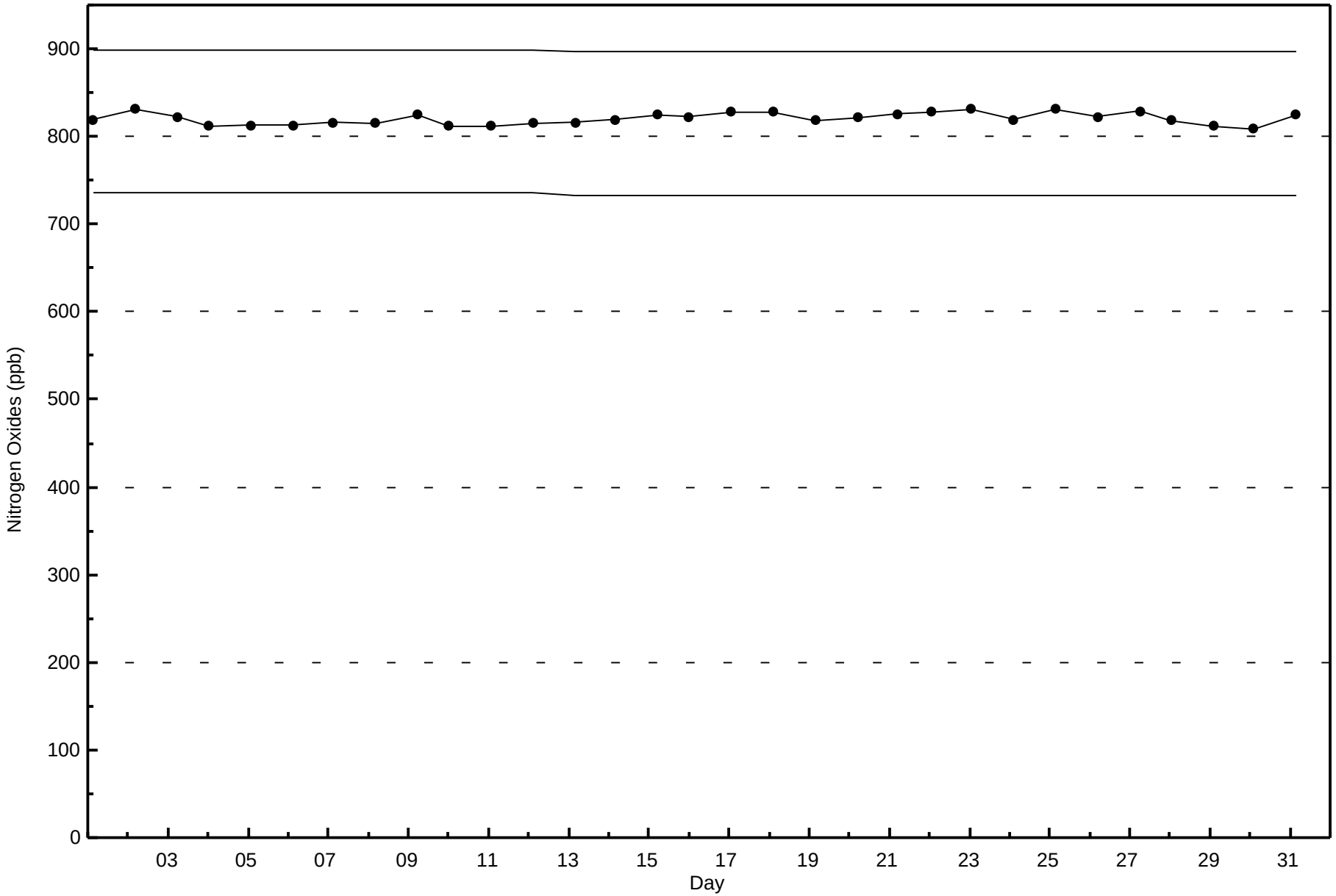


Wood Buffalo Environmental Association

Span Responses

Nitrogen Oxides (NO_X) - ppb

Shell Muskeg River - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

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

Shell Muskeg River - August 2015

Number of Exceedences (AAAQO): 24-hr: 0

Maximum Value: 45.6 $\mu g/m^3$ on Aug 11 14:00

Maximum Daily Average: 15.0 $\mu g/m^3$ on Aug 9

Minimum Value: 0.4 $\mu g/m^3$ on Aug 6 17:00

Minimum Daily Average: 1.7 $\mu g/m^3$ on Aug 6

Maximum Diurnal Average: 9.2 $\mu g/m^3$ at hour 22

Minimum Diurnal Average: 4.2 $\mu g/m^3$ at hour 9

Monthly Average: 7.03 $\mu g/m^3$

Percentiles: P_1 = 0.9 P_{10} = 1.9 Q_1 = 3.2 Median = 5.5 Q_3 = 9.1 P_{90} = 14.1 P_{99} = 29.2

Hours in Service:	744
Hours of Data:	743
Hours of Missing Data:	1
Hours of Calibration:	1
Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	8.3	7.3	6.1	4.4	7.7	4.9	2.0	2.2	4.4	5.1	5.0	6.3	7.1	6.0	2.7	1.8	3.2	4.0	5.2	6.1	6.8	2.3	4.3	8.5	5.1	8.5
2-Aug	8.6	9.6	4.3	3.7	6.0	4.6	2.0	3.6	4.1	3.9	6.8	9.0	13.3	14.3	13.8	18.7	20.6	7.9	5.1	8.3	15.6	12.3	12.1	11.1	9.1	20.6
3-Aug	15.2	18.5	19.2	14.7	18.0	19.2	10.5	5.2	10.1	21.3	16.6	10.6	10.9	9.6	7.8	5.1	5.1	3.0	4.8	4.1	5.8	12.9	12.8	10.1	11.3	21.3
4-Aug	9.6	11.2	8.5	11.0	14.5	16.7	14.8	13.6	17.7	17.5	12.6	4.6	3.8	8.6	13.6	13.4	8.8	6.3	9.0	12.5	8.2	4.3	6.5	6.7	10.6	17.7
5-Aug	4.3	6.0	7.5	5.0	5.7	4.9	6.2	5.7	3.6	4.7	8.5	10.6	9.9	7.1	5.0	5.0	7.5	2.2	0.8	1.3	2.4	1.4	1.0	1.9	4.9	10.6
6-Aug	1.0	1.1	3.0	3.1	1.3	3.1	3.1	1.7	2.5	2.4	1.1	1.6	1.9	1.7	1.2	0.8	0.4	0.6	1.2	1.1	0.7	0.9	2.0	2.3	1.7	3.1
7-Aug	2.0	0.9	0.9	0.7	1.0	1.9	2.0	1.9	3.5	3.7	3.7	4.1	4.3	3.4	2.3	3.3	6.7	7.2	3.4	1.5	2.7	4.7	5.1	2.1	3.0	7.2
8-Aug	1.7	3.3	3.5	1.3	1.8	3.7	2.0	3.5	7.6	4.3	4.2	8.5	6.4	7.2	10.8	25.8	21.6	16.1	8.9	4.5	3.3	7.2	11.9	13.2	7.6	25.8
9-Aug	7.9	10.2	9.4	12.3	11.7	11.4	5.0	1.7	2.0	13.1	31.5	29.5	17.4	15.9	15.3	14.5	23.8	30.3	23.6	18.6	18.9	23.0	7.8	6.3	15.0	31.5
10-Aug	9.9	14.9	9.4	15.2	12.4	3.4	3.8	4.0	3.3	4.5	4.4	2.4	7.4	11.9	19.2	9.5	8.2	13.8	11.5	5.6	5.4	13.6	19.1	17.4	9.6	19.2
11-Aug	12.8	10.1	13.8	15.8	12.4	9.2	6.9	8.1	6.4	5.5	16.7	24.0	29.3	45.6	C	6.3	4.6	4.6	6.3	6.1	5.0	3.3	7.3	7.4	11.6	45.6
12-Aug	9.4	12.6	7.7	7.9	4.2	5.1	6.0	5.7	4.1	4.9	7.7	5.0	4.8	4.5	4.4	4.9	7.6	6.0	5.9	17.5	31.1	29.8	13.0	16.4	9.4	31.1
13-Aug	6.8	5.8	5.3	5.6	6.8	6.2	3.2	2.9	5.2	5.5	8.2	6.6	5.8	3.1	2.0	1.6	4.0	1.9	1.9	2.1	2.5	5.1	8.0	2.5	4.5	8.2
14-Aug	2.3	4.5	6.2	7.9	4.1	2.3	4.0	2.7	1.6	1.2	2.4	3.2	4.8	3.7	3.3	4.1	4.6	6.2	5.1	5.3	8.7	4.7	2.7	1.6	4.0	8.7
15-Aug	2.0	2.1	1.7	2.0	2.9	2.7	2.4	2.8	5.3	6.8	7.4	5.1	5.0	5.2	7.4	6.8	5.9	5.7	7.6	8.5	5.1	4.1	3.6	5.3	4.7	8.5
16-Aug	7.5	7.9	6.0	5.0	2.2	4.2	2.3	1.5	1.7	2.1	3.2	3.5	3.5	4.4	5.5	5.0	5.3	4.5	7.0	5.9	7.4	7.2	7.3	5.4	4.8	7.9
17-Aug	2.4	2.2	2.9	3.5	3.1	3.2	3.3	2.4	2.5	3.2	3.4	4.1	4.3	3.3	4.8	6.2	11.9	11.2	8.3	8.8	11.0	5.6	7.1	9.4	5.3	11.9
18-Aug	12.4	13.2	5.6	2.2	2.7	8.5	14.3	12.1	3.6	3.0	5.5	7.2	11.0	12.0	12.3	11.5	14.3	22.1	14.4	11.0	13.5	13.1	10.2	10.5	10.3	22.1
19-Aug	8.7	5.1	5.8	6.8	8.2	7.6	4.3	5.8	6.8	5.9	3.9	5.1	5.2	3.8	7.3	11.4	11.2	19.5	9.1	8.2	6.1	3.0	0.6	0.9	6.7	19.5
20-Aug	2.1	2.9	3.8	3.4	2.0	1.8	2.4	2.9	2.2	2.0	2.6	3.9	5.9	3.4	1.8	1.7	3.1	4.2	4.9	5.5	5.9	5.4	3.8	2.1	3.3	5.9
21-Aug	3.8	3.4	3.1	2.8	1.8	2.7	4.6	2.2	2.0	1.5	1.6	1.8	2.8	2.1	1.8	2.1	1.3	1.2	1.3	2.0	1.4	1.5	2.4	3.2	2.3	4.6
22-Aug	2.6	1.7	1.7	1.8	2.5	2.7	2.4	2.3	2.4	2.7	2.1	1.7	2.0	2.1	2.0	2.4	2.3	2.8	2.9	7.1	10.4	9.2	13.5	11.9	4.0	13.5
23-Aug	7.3	5.9	6.3	6.4	5.6	5.5	5.3	3.5	3.1	3.7	2.4	1.6	3.0	4.0	3.4	4.7	5.1	5.8	7.4	7.2	6.2	6.6	7.4	2.8	5.0	7.4
24-Aug	1.4	3.6	5.0	2.2	2.7	7.6	8.8	2.3	1.8	1.9	3.3	4.6	4.8	3.9	5.0	5.3	5.7	7.0	6.2	11.4	16.5	22.2	14.7	5.1	6.4	22.2
25-Aug	4.7	12.8	12.8	10.6	9.0	6.3	3.3	2.1	2.9	2.9	4.1	6.0	6.4	7.9	9.2	9.9	8.5	6.9	5.2	4.5	4.1	4.6	5.7	5.3	6.5	12.8
26-Aug	5.1	4.5	2.0	2.6	4.5	3.5	2.0	2.7	1.9	4.4	10.1	11.7	11.0	12.4	8.8	8.2	16.4	10.6	6.1	5.7	10.1	4.2	6.5	8.5	6.8	16.4
27-Aug	8.9	8.3	3.3	5.8	9.1	7.8	11.6	5.4	4.2	6.1	23.4	12.6	12.7	9.4	11.0	13.0	15.3	23.1	11.9	12.0	21.5	21.7	19.2	19.5	12.4	23.4
28-Aug	11.0	8.5	7.9	6.0	4.9	5.7	7.8	8.2	5.4	1.7	2.6	4.6	5.6	6.8	5.2	8.9	8.3	7.5	8.3	16.6	14.2	9.5	3.6	5.9	7.3	16.6
29-Aug	5.0	4.7	3.0	1.3	2.4	3.7	3.2	1.6	1.2	2.8	8.5	10.3	10.5	10.3	11.5	10.2	7.7	7.8	8.9	4.5	5.9	9.3	15.8	14.6	6.9	15.8
30-Aug	10.2	4.7	3.4	8.5	11.8	14.1	14.1	7.4	3.9	9.8	11.1	9.4	5.7	4.9	3.5	3.9	7.6	9.0	6.0	2.1	1.6	4.7	7.6	9.9	7.3	14.1
31-Aug	9.5	4.5	2.8	4.9	6.9	7.6	3.5	1.9	1.7	1.3	3.7	11.8	12.2	13.2	18.4	34.9	11.0	14.3	7.6	9.0	15.9	27.4	21.3	12.2	10.7	34.9
	6.6	6.8	5.9	5.9	6.1	6.2	5.4	4.2	4.2	5.1	7.4	7.4	7.7	8.1	7.3	8.4	8.6	8.8	7.0	7.2	8.8	9.2	8.5	7.8	Diurnal Average	
	15.2	18.5	19.2	15.8	18.0	19.2	14.8	13.6	17.7	21.3	31.5	29.5	29.3	45.6	19.2	34.9	23.8	30.3	23.6	18.6	31.1	29.8	21.3	19.5	Diurnal Maximum	

C - Calibration

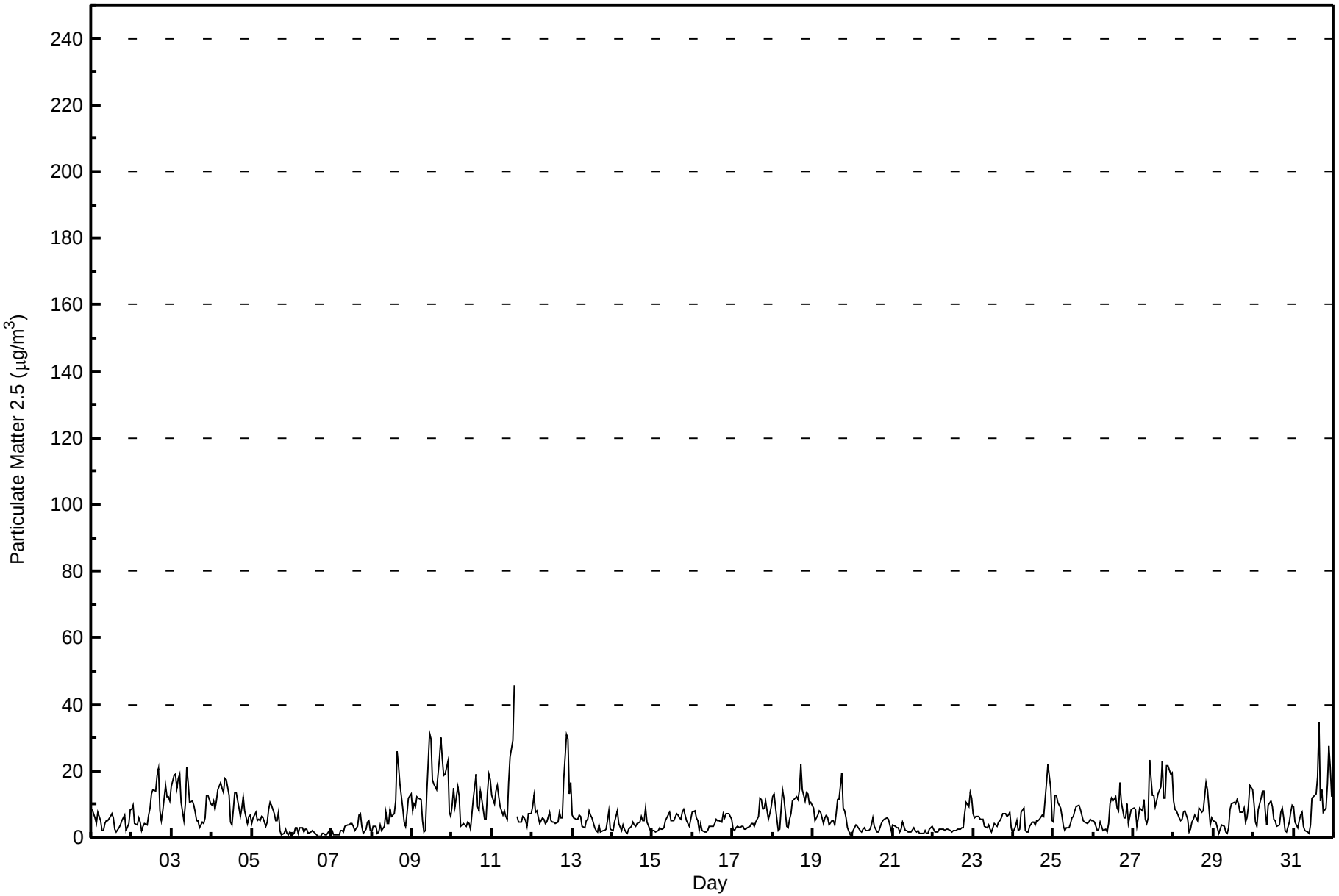
Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 $\mu g/m^3$

Wood Buffalo Environmental Association

Hourly Averages

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

Shell Muskeg River - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

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

Shell Muskeg River - August 2015

Concentration Ranges ($\mu g/m^3$)	Number of Hours	%	Cumulative %
1 - 5	359	48.32	48.32
6 - 15	316	42.53	90.85
16 - 25	45	6.06	96.90
26 - 80	10	1.35	98.25
> 81.0	0	0.00	98.25

Total Number of Valid Hours: 743

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

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

Shell Muskeg River - August 2015

Concentration Ranges ($\mu g/m^3$)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
1 - 5	11	13	7	15	10	11	15	18	53	35	35	38	38	23	21	13	356
6 - 15	12	8	16	14	12	9	18	28	47	45	25	33	21	10	6	7	311
16 - 25	1	2	7	2	0	1	2	4	1	9	3	5	3	0	1	2	43
26 - 80	1	0	0	0	0	0	0	0	0	1	2	2	0	0	2	0	8
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	25	23	30	31	22	21	35	50	101	90	65	78	62	33	30	22	718

Total Number of Valid Hours: 731

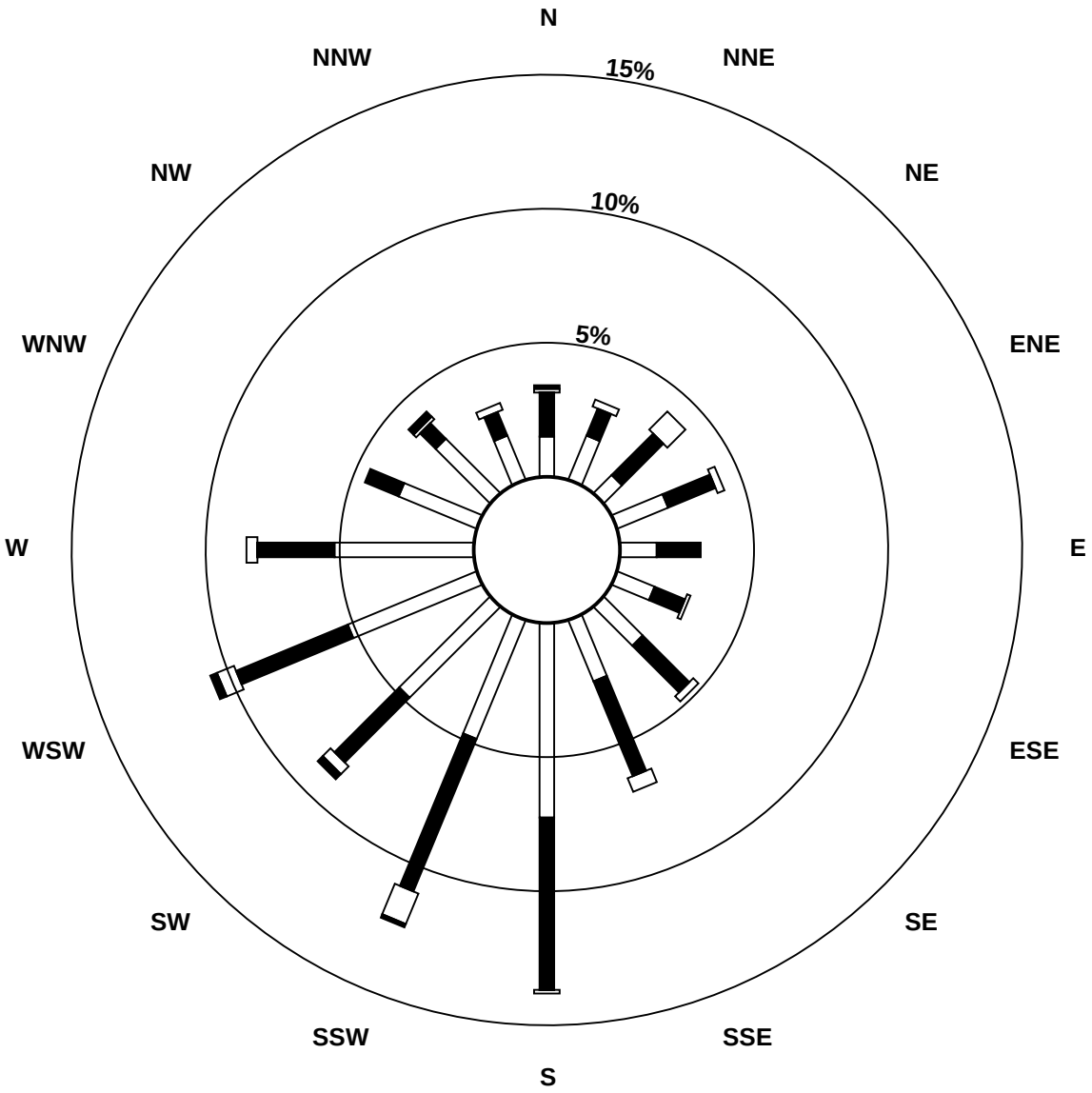
Total Number of Hours: 744

Wood Buffalo Environmental Association

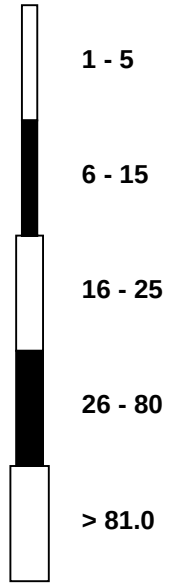
Wind Rose Aug 2015

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

Shell Muskeg River (AMS 16)



Classes ($\mu g/m^3$)



Total Number of Valid Hours: 731

Maximum Value: 99 % on Aug 27 07:00

Maximum Daily Average: 85.1 % on Aug 6

Minimum Value: 27 % on Aug 31 17:00

Minimum Daily Average: 54.9 % on Aug 12

Maximum Diurnal Average: 88.2 % at hour 6

Minimum Diurnal Average: 47.5 % at hour 16

Monthly Average: 69.2 %

Percentiles: P_1 = 32 P_{10} = 41 Q_1 = 55 Median = 71 Q_3 = 84 P_{90} = 95 P_{99} = 99

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

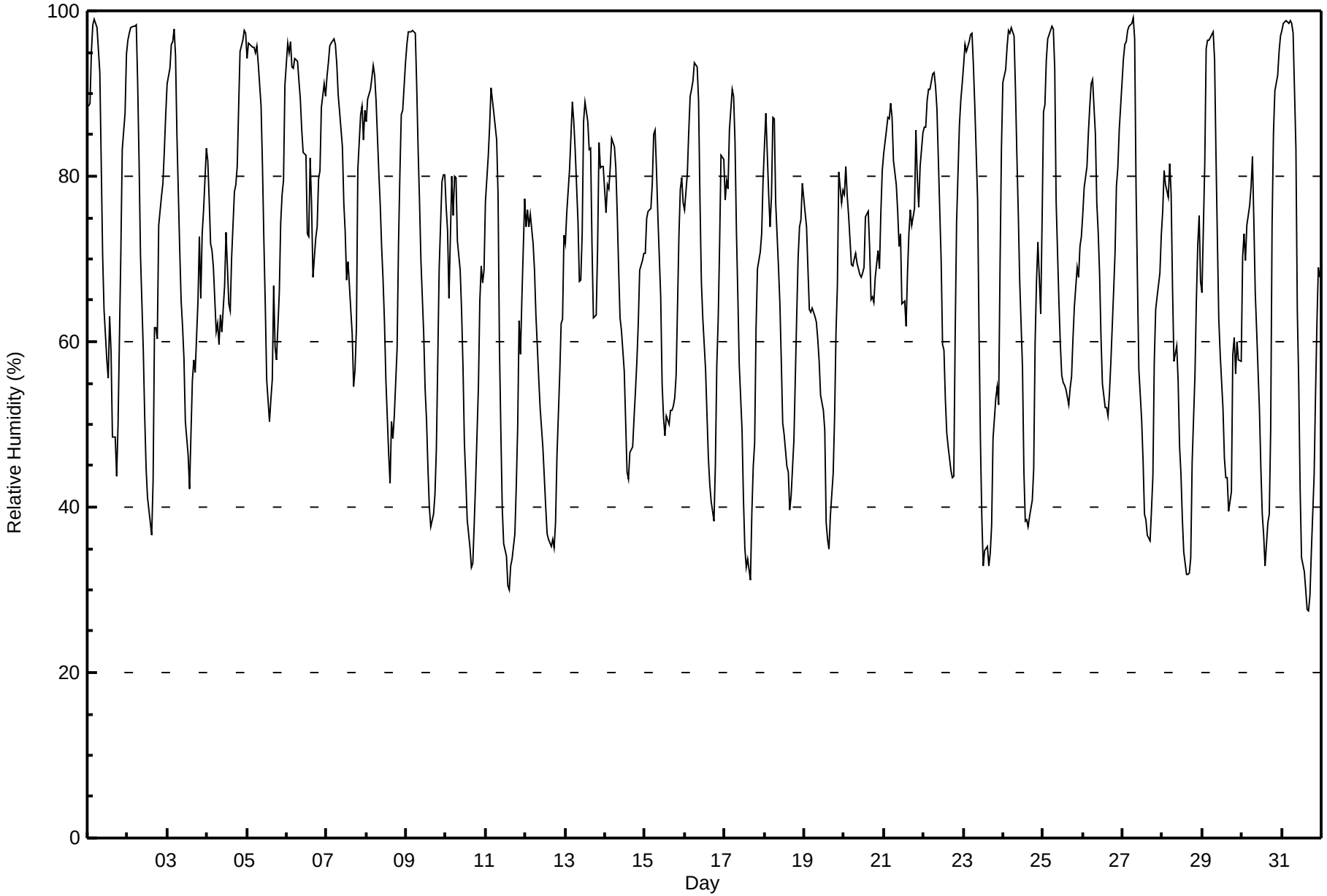
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	88	89	95	98	99	98	95	93	82	70	64	58	56	63	59	49	48	44	50	61	71	83	88	95	74.8	99
2-Aug	97	97	98	98	98	98	91	82	71	59	51	45	41	40	37	43	62	62	60	74	78	79	83	88	72.1	98
3-Aug	91	93	96	96	98	95	85	71	65	62	58	50	46	42	49	55	58	56	65	73	65	73	76	83	70.9	98
4-Aug	82	77	72	71	69	61	62	60	63	61	67	73	69	65	64	70	78	79	81	88	95	96	98	97	75.0	98
5-Aug	94	96	96	96	96	95	96	94	88	81	72	64	55	50	53	55	67	59	58	66	74	78	80	91	77.3	96
6-Aug	96	95	96	93	93	94	94	92	89	86	83	82	73	73	82	77	68	72	74	80	81	88	91	90	85.1	96
7-Aug	92	94	96	96	97	96	93	90	88	84	77	73	68	70	67	61	55	57	62	81	87	88	84	88	80.9	97
8-Aug	87	89	91	92	93	92	89	80	76	71	67	62	55	46	43	50	48	51	59	72	80	87	88	94	73.6	94
9-Aug	96	97	97	98	98	97	91	83	77	70	61	54	51	45	40	38	39	41	47	58	69	79	80	80	70.3	98
10-Aug	76	73	65	80	75	80	80	72	69	64	57	48	43	38	35	33	33	38	43	54	65	69	67	69	59.5	80
11-Aug	77	82	86	91	89	88	84	78	59	49	40	36	34	31	30	33	34	37	42	50	63	58	65	77	58.9	91
12-Aug	74	76	74	75	72	69	63	59	56	52	47	44	40	37	36	35	36	35	38	46	56	62	63	73	54.9	76
13-Aug	72	76	81	85	89	87	83	75	67	67	73	87	89	87	83	83	72	63	63	71	84	81	81	81	78.3	89
14-Aug	76	79	78	81	85	84	81	75	69	63	61	56	50	44	43	47	47	51	54	58	62	69	70	71	64.7	85
15-Aug	71	75	76	76	79	85	86	81	75	65	55	51	49	51	50	52	52	52	53	56	73	78	80	77	66.5	86
16-Aug	76	80	86	90	91	92	94	93	89	77	67	63	57	51	46	43	41	38	45	57	63	72	82	82	69.8	94
17-Aug	77	79	79	86	90	90	84	73	66	57	49	41	35	33	34	31	39	45	48	62	69	71	73	79	62.1	90
18-Aug	84	88	78	74	78	87	87	77	69	65	58	50	49	45	44	40	41	45	48	63	70	74	75	79	65.3	88
19-Aug	76	74	69	64	64	64	63	62	60	58	54	52	49	38	36	35	39	44	51	61	67	81	77	78	58.9	81
20-Aug	78	81	78	75	69	69	70	71	69	68	68	68	69	75	76	71	65	65	65	68	71	69	76	81	71.5	81
21-Aug	83	86	87	87	89	87	82	79	76	72	73	65	65	62	68	73	76	74	76	86	80	76	81	85	77.8	89
22-Aug	86	86	89	91	90	92	92	91	88	82	70	60	59	53	49	47	44	44	44	61	74	86	89	91	73.3	92
23-Aug	93	96	95	96	97	97	93	88	77	62	48	39	33	35	35	33	34	38	48	53	55	52	69	83	64.7	97
24-Aug	91	93	96	98	97	98	97	91	83	76	68	57	44	38	38	38	39	41	44	60	67	72	63	75	69.3	98
25-Aug	88	89	94	97	98	98	98	93	77	65	60	56	55	55	54	52	54	56	60	64	69	68	72	73	72.6	98
26-Aug	76	79	81	85	88	91	92	85	77	73	68	60	55	52	52	51	54	57	66	71	79	81	86	89	72.8	92
27-Aug	94	96	96	98	98	99	99	97	78	67	57	51	46	39	38	37	36	40	44	58	64	65	68	73	68.2	99
28-Aug	76	81	79	77	82	78	67	58	60	55	47	44	39	35	32	32	32	34	45	56	65	72	75	67	57.8	82
29-Aug	66	82	95	96	96	97	97	94	83	72	63	59	52	46	44	44	40	42	58	60	56	60	58	58	67.4	97
30-Aug	70	73	70	74	76	79	82	75	66	61	52	45	39	37	33	38	39	49	74	85	90	92	95	97	66.3	97
31-Aug	98	98	99	99	98	99	99	97	83	64	55	42	34	32	30	28	27	29	35	44	54	62	69	68	64.3	99
	83.2	85.5	86.0	87.5	88.1	88.2	86.1	80.9	74.0	67.0	60.9	56.0	51.6	48.6	47.8	47.5	48.3	49.6	54.9	64.3	70.8	75.0	77.5	81.0	Diurnal Average	
	98	98	99	99	99	99	99	97	89	86	83	87	89	87	83	83	78	79	81	88	95	96	98	97	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity (RH) - %

Shell Muskeg River - August 2015



Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	69	9.27	9.27
40 - 60	167	22.45	31.72
60 - 80	266	35.75	67.47
80 - 100	242	32.53	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

Maximum Value: 28.9 C on Aug 10 16:00

Maximum Daily Average: 22.5 C on Aug 10

Minimum Value: 1.0 C on Aug 23 05:00

Minimum Daily Average: 10.4 C on Aug 22

Maximum Diurnal Average: 22.1 C at hour 16

Minimum Diurnal Average: 11.6 C at hour 5

Monthly Average: 16.78 C

Percentiles: P_1 = 4.6 P_{10} = 10.2 Q_1 = 13.4 Median = 16.7 Q_3 = 20.3 P_{90} = 23.8 P_{99} = 27.6

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

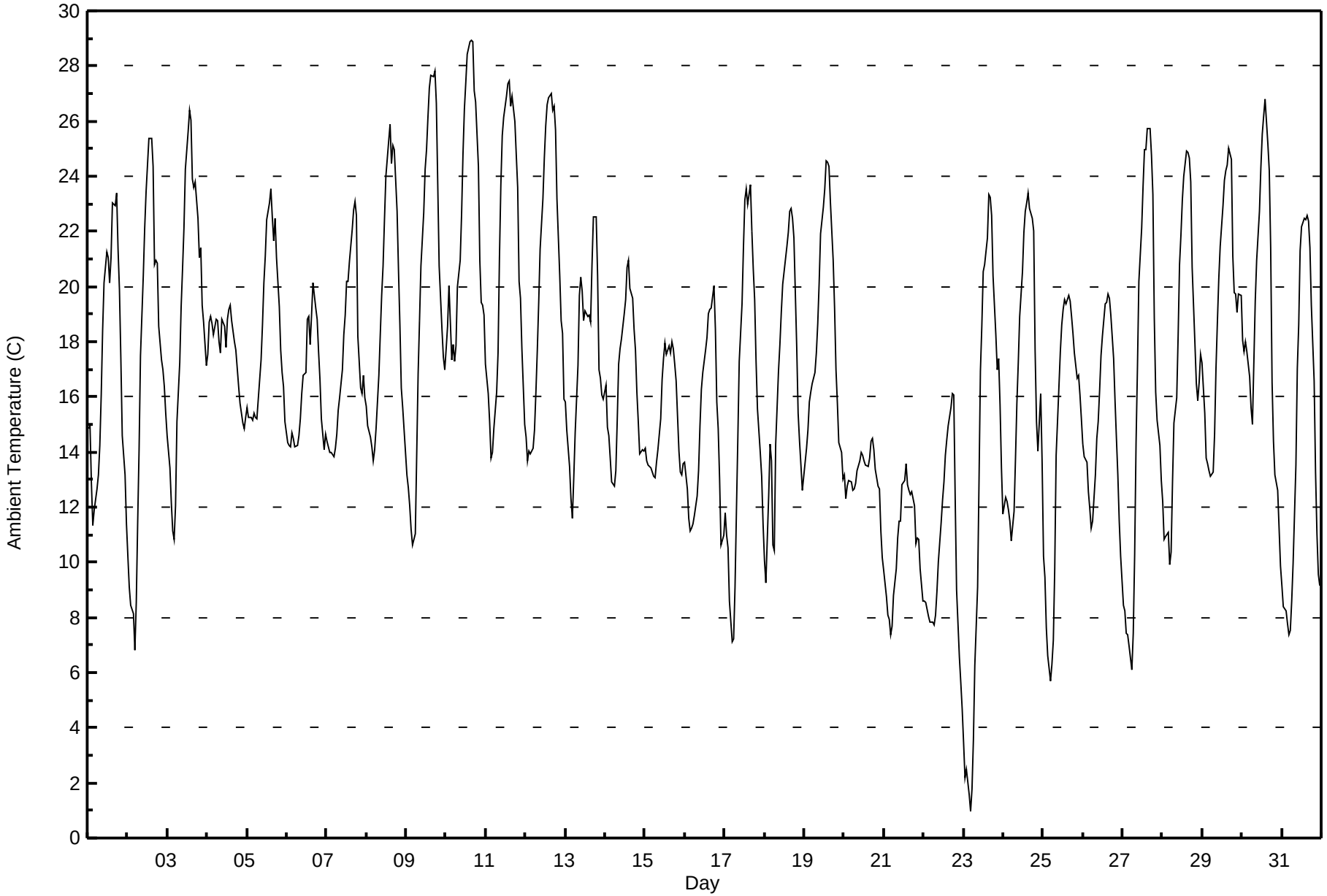
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	14.9	14.9	12.9	11.3	11.9	12.7	13.2	14.3	16.1	18.4	20.1	21.3	21.1	20.1	21.1	23.0	22.9	23.4	21.4	19.9	17.4	14.6	13.2	11.4	17.1	23.4
2-Aug	10.2	9.1	8.5	8.1	6.8	8.5	11.5	14.1	17.5	20.4	22.1	23.4	24.4	25.4	25.4	24.4	20.8	20.9	20.8	18.6	17.3	17.0	16.4	15.4	17.0	25.4
3-Aug	14.6	13.4	12.1	11.1	10.8	12.1	15.1	17.2	19.3	20.7	22.1	24.2	25.6	26.4	26.0	23.9	23.6	23.8	22.5	21.0	21.4	19.3	18.7	17.1	19.3	26.4
4-Aug	17.5	18.7	18.9	18.7	18.3	18.8	18.8	18.0	17.6	18.8	18.5	17.8	18.8	19.2	19.3	18.8	18.0	17.7	17.0	16.4	15.8	15.0	14.9	15.3	17.8	19.3
5-Aug	15.6	15.3	15.3	15.1	15.4	15.3	15.2	15.9	17.3	18.6	20.1	21.1	22.4	23.1	23.6	22.5	21.7	22.5	21.0	19.3	17.7	16.9	16.4	15.1	18.4	23.6
6-Aug	14.4	14.2	14.2	14.7	14.5	14.2	14.3	14.6	15.2	16.1	16.8	16.9	18.8	18.9	17.9	19.0	20.2	19.2	18.8	17.6	16.6	15.2	14.1	14.6	16.3	20.2
7-Aug	14.4	14.2	14.0	14.0	13.8	14.2	14.6	15.5	16.0	17.0	18.3	19.0	20.2	20.2	20.9	22.1	22.8	23.1	22.6	18.2	16.3	16.1	16.8	16.0	17.5	23.1
8-Aug	15.7	14.9	14.5	14.2	13.7	14.1	14.8	16.8	18.2	19.7	20.8	22.4	24.0	25.3	25.9	24.4	25.1	25.0	22.7	20.6	18.6	16.3	15.6	14.0	19.1	25.9
9-Aug	13.2	12.7	12.1	11.2	10.7	11.1	13.9	16.8	18.8	20.7	22.7	24.3	25.0	26.2	27.2	27.6	27.6	27.8	26.6	23.7	20.7	18.5	17.4	17.0	19.7	27.8
10-Aug	17.8	18.6	20.0	17.3	17.9	17.3	17.8	20.0	21.0	22.6	24.8	26.4	27.4	28.4	28.9	28.9	28.9	27.1	26.7	24.4	21.0	19.4	19.3	19.0	22.5	28.9
11-Aug	17.2	16.1	15.1	13.8	14.0	14.9	16.2	17.6	21.0	23.7	25.5	26.1	26.9	27.4	27.5	26.6	26.9	26.0	24.8	23.6	20.2	19.6	17.8	15.0	21.0	27.5
12-Aug	14.6	13.7	14.0	13.9	14.2	14.8	16.1	17.7	19.4	21.4	23.2	24.7	25.8	26.6	26.9	27.0	26.4	26.5	25.7	23.2	20.4	18.8	18.3	15.9	20.4	27.0
13-Aug	15.8	14.8	13.5	12.3	11.6	13.1	14.7	17.1	19.7	20.3	19.8	18.7	19.1	18.9	19.0	18.7	20.8	22.5	22.5	20.4	17.0	16.7	16.1	15.9	17.5	22.5
14-Aug	16.4	14.9	14.6	13.8	12.9	12.8	13.3	15.1	17.2	17.8	18.1	19.0	19.5	20.7	21.0	19.9	19.6	18.5	17.7	16.2	15.1	14.0	14.1	14.0	16.5	21.0
15-Aug	14.2	13.7	13.5	13.4	13.3	13.1	13.1	13.6	14.1	15.2	16.6	17.4	17.9	17.5	17.8	17.6	18.0	17.8	17.2	16.6	14.0	13.3	13.2	13.6	15.2	18.0
16-Aug	13.6	12.7	11.6	11.1	11.2	11.4	11.7	12.4	13.3	14.9	16.3	16.9	17.7	18.2	19.0	19.2	19.2	20.0	18.5	15.8	14.9	13.0	10.6	11.0	14.8	20.0
17-Aug	11.8	11.0	10.5	8.6	7.1	7.2	9.1	11.9	14.5	17.3	19.4	21.4	23.1	23.6	23.0	23.7	22.0	20.6	19.5	17.3	15.5	14.0	13.1	11.4	15.7	23.7
18-Aug	10.1	9.3	12.4	14.3	13.7	10.6	10.4	14.3	17.0	17.9	19.1	20.1	20.5	21.5	22.0	22.7	22.8	22.5	21.8	17.8	15.4	14.4	13.5	12.6	16.5	22.8
19-Aug	13.6	14.1	14.8	15.8	16.2	16.5	16.9	17.6	18.7	20.1	21.9	22.9	23.5	24.6	24.5	24.4	23.1	20.9	19.2	17.0	15.8	14.3	14.0	13.0	18.5	24.6
20-Aug	13.1	12.3	12.8	13.0	12.9	12.6	12.7	12.8	13.3	13.7	14.0	13.9	13.7	13.5	13.5	13.8	14.4	14.5	14.1	13.4	12.8	12.7	11.1	10.2	13.1	14.5
21-Aug	9.7	8.7	8.1	7.9	7.4	7.7	8.8	9.7	10.9	11.5	11.5	12.8	13.0	13.6	12.8	12.6	12.4	12.6	12.0	10.7	10.9	10.8	9.7	8.6	10.6	13.6
22-Aug	8.6	8.5	8.3	8.0	7.8	7.8	7.7	8.1	9.0	10.0	11.4	12.3	12.9	13.9	14.4	15.0	15.6	16.1	16.0	12.4	9.0	6.6	5.7	4.7	10.4	16.1
23-Aug	3.4	2.2	2.5	1.6	1.0	1.8	3.5	6.3	9.1	12.9	16.9	18.6	20.5	20.8	21.8	23.4	23.2	22.6	20.4	18.2	17.0	17.4	15.7	13.4	13.1	23.4
24-Aug	11.7	12.4	12.2	11.9	11.5	10.8	11.9	13.7	15.7	17.2	18.9	20.5	21.9	22.7	23.0	23.4	22.9	22.5	22.0	17.7	15.1	14.0	16.1	13.6	16.8	23.4
25-Aug	10.2	9.5	7.7	6.6	5.7	6.3	7.2	9.8	13.9	16.4	17.6	18.6	19.2	19.5	19.4	19.7	19.5	18.9	18.3	17.6	16.7	16.8	16.1	15.2	14.4	19.7
26-Aug	14.3	13.8	13.6	12.5	11.9	11.2	11.5	13.2	14.5	15.1	16.2	17.5	18.2	19.3	19.4	19.7	19.6	19.0	17.4	15.9	14.5	13.2	11.5	10.2	15.1	19.7
27-Aug	8.5	8.2	7.4	7.3	6.9	6.1	7.4	10.3	14.4	17.1	20.2	22.1	23.7	24.9	25.0	25.7	25.7	24.8	23.3	18.9	16.2	15.2	14.3	13.0	16.1	25.7
28-Aug	12.2	10.8	11.0	11.1	9.9	10.4	12.9	15.0	16.0	18.2	20.8	21.9	23.1	24.0	24.9	24.9	24.7	23.8	20.7	17.9	16.5	15.9	16.5	17.5	17.5	24.9
29-Aug	17.2	15.4	13.8	13.6	13.3	13.1	13.3	14.6	17.0	18.7	20.3	21.5	22.9	23.9	24.2	24.4	25.0	24.6	21.1	19.8	19.8	19.0	19.7	19.7	19.0	25.0
30-Aug	18.0	17.6	18.0	17.6	16.7	15.6	15.0	17.2	19.5	21.0	22.7	24.3	25.5	26.2	26.8	25.2	24.2	21.4	16.5	14.4	13.2	12.6	11.2	9.9	18.8	26.8
31-Aug	9.2	8.4	8.2	7.8	7.4	7.5	8.6	9.9	13.5	17.0	18.6	21.3	22.2	22.5	22.4	22.6	22.4	21.4	19.3	16.6	13.3	11.1	9.6	9.1	14.6	22.6
	13.3	12.7	12.5	12.0	11.6	11.7	12.6	14.2	16.1	17.8	19.2	20.3	21.2	21.8	22.1	22.1	21.9	21.5	20.3	18.1	16.3	15.2	14.5	13.6	Diurnal Average	
	18.0	18.7	20.0	18.7	18.3	18.8	18.8	20.0	21.0	23.7	25.5	26.4	27.4	28.4	28.9	28.9	28.9	27.8	26.7	24.4	21.4	19.6	19.7	19.7	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature (AT) - C

Shell Muskeg River - August 2015



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	68	9.14	9.14
10 - 20	477	64.11	73.25
> 20	199	26.75	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

Maximum Value: 29.1 inHg on Aug 26 08:00

Maximum Daily Average: 29.0 inHg on Aug 26

Minimum Value: 28.3 inHg on Aug 30 08:00

Minimum Daily Average: 28.3 inHg on Aug 30

Maximum Diurnal Average: 28.8 inHg at hour 8

Minimum Diurnal Average: 28.7 inHg at hour 18

Monthly Average: 28.77 inHg

Percentiles: P_1 = 28.3 P_{10} = 28.5 Q_1 = 28.7 Median = 28.8 Q_3 = 28.9 P_{90} = 29.0 P_{99} = 29.1

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

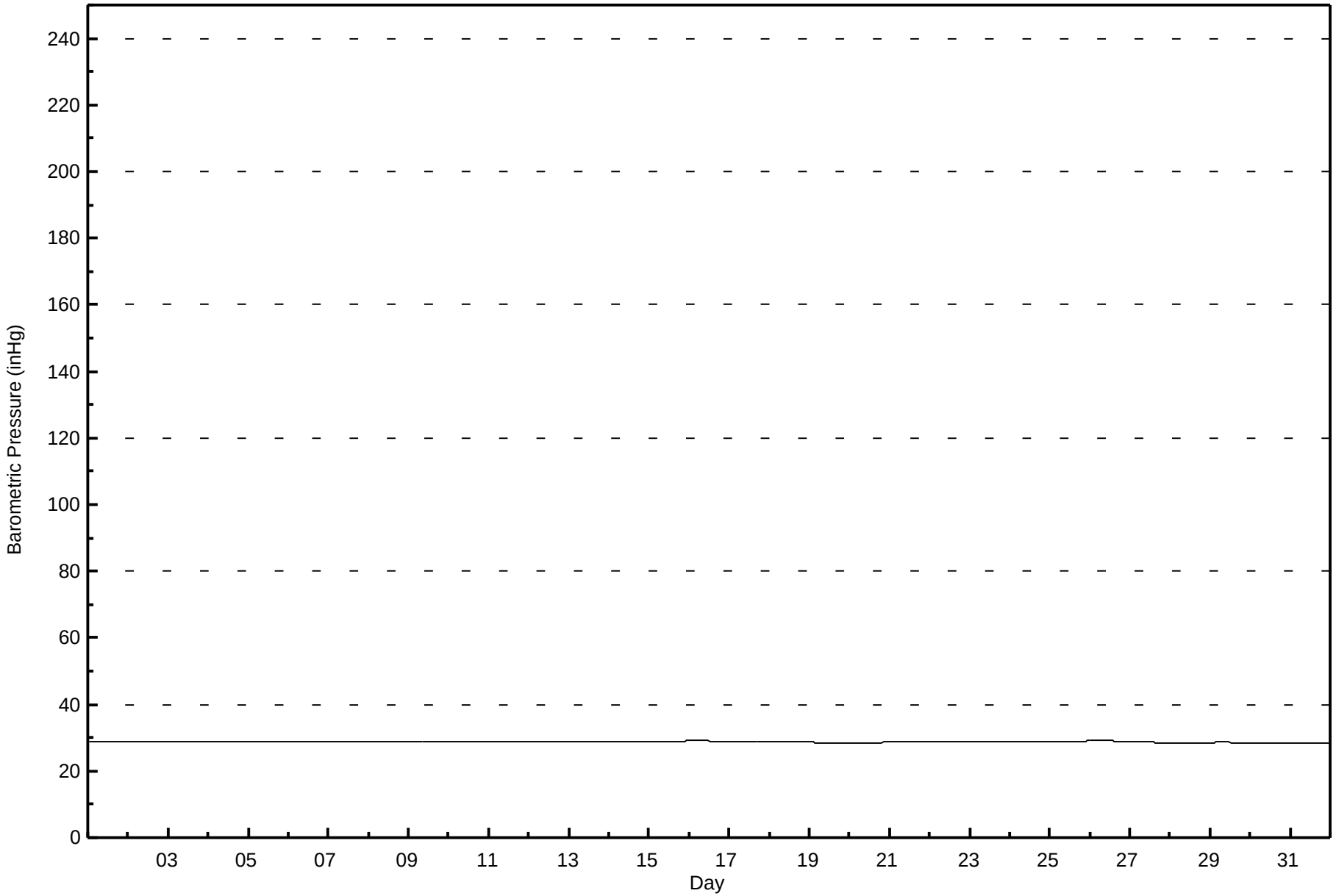
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	28.9	28.9	28.8	28.8	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9
2-Aug	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9
3-Aug	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.8	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
4-Aug	28.8	28.8	28.8	28.8	28.8	28.9	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
5-Aug	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	28.9	28.9
6-Aug	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8
7-Aug	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	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.8
8-Aug	28.7	28.7	28.7	28.7	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	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8
9-Aug	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	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9
10-Aug	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	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
11-Aug	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7
12-Aug	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.8	28.8	28.7	28.8
13-Aug	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.8
14-Aug	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	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.9
15-Aug	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0
16-Aug	29.0	29.0	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.1	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.1
17-Aug	29.0	29.0	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	29.0
18-Aug	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.9	28.9
19-Aug	28.7	28.7	28.6	28.6	28.6	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	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.7
20-Aug	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.5	28.6
21-Aug	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	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.7	28.9
22-Aug	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	28.9	28.9	28.9	29.0	29.0	29.0	29.0	28.9	29.0
23-Aug	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	29.0
24-Aug	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.9
25-Aug	28.9	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0
26-Aug	29.0	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.0	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.1
27-Aug	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	28.6	28.6	28.6	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.7	28.9
28-Aug	28.5	28.5	28.5	28.5	28.5	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6
29-Aug	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.5	28.5	28.5	28.5	28.5	28.4	28.4	28.4	28.4	28.6	28.6
30-Aug	28.4	28.3	28.3	28.3	28.3	28.3	28.3	28.3	28.3	28.3	28.3	28.3	28.3	28.3	28.3	28.3	28.3	28.3	28.3	28.3	28.3	28.3	28.3	28.4	28.3	28.4
31-Aug	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.5	28.5	28.5	28.4	28.5
	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.8	Diurnal Average	
	29.0	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Barometric Pressure (BP) - inHg

Shell Muskeg River - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Shell Muskeg River - August 2015

Maximum Speed: 32 km/h on Aug 11 15:00

Maximum Daily Speed Average: 18.4 km/h on Aug 14

Minimum Speed Value: 0 km/h on Aug 9 17:00

Minimum Daily Speed Average: 0.6 km/h on Aug 9

Maximum Diurnal Speed Average: 7.5 km/h at hour 15

Minimum Diurnal Speed Average: 1.5 km/h at hour 1

Monthly Average Velocity: 3.9 km/h 234.1 deg

Percentiles: $P_1 = 1$ $P_{10} = 3$ $Q_1 = 5$ Median = 8 $Q_3 = 13$ $P_{90} = 18$ $P_{99} = 26$

Hours in Service: 744

Hours of Data: 732

Hours of Missing Data: 12

Percent Operational Time: 98.7

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Aug	NNE8	NE10	S3	W6	NW4	WNW1	NW2	WNW0	NW5	WNW5	WNW5	WNW2	WNW9	WNW13	WNW14	NW10	NW9	N10	NE15	NNE4	NW7	NNW5	WNW2	S3	NW4.2	NE15
2-Aug	S3	S4	S6	S4	S6	S6	S4	SW4	SW3	SSW5	SW6	SW5	SW4	SW6	ENE1	NNW8	NNW12	SSW7	SSE6	SE2	W8	W3	SE3	S3	SSW2.7	NNW12
3-Aug	SE3	SE4	S3	SE4	W1	ESE3	ESE4	SE3	WSW2	NNE5	NE11	NE9	ENE7	ENE7	SSE7	SE8	ESE6	ESE8	SSE6	SE3	E6	E5	E5	E2	E3.7	NE11
4-Aug	N1	NE7	NE12	ENE11	NE6	NE9	NE14	NE11	NE6	NNE9	NE16	NE15	ENE12	ENE13	E11	ESE8	ESE5	E7	E6	ENE9	SE8	SE5	ESE3	E5	ENE7.7	NE16
5-Aug	ENE12	ENE13	ENE13	ENE10	NE8	ENE10	ENE9	ENE9	ENE8	ENE9	ENE9	NE12	NE16	E11	SE5	SSE4	WSW6	SE3	SSE11	S13	S8	SSE9	SSE11	SE4	E6.4	NE16
6-Aug	E3	ESE5	E7	ENE12	ENE10	ENE9	E8	ESE9	SE10	SE11	SE8	SE8	ESE12	ESE10	E12	E10	ESE10	ESE8	ESE8	ESE7	ESE8	ESE5	E6	E7	ESE8.0	E12
7-Aug	SE5	SSE6	SSE4	SSE4	SSE2	E3	E2	W3	WNW3	NW5	NNW5	WNW5	W1	ENE4	ENE8	SE3	S3	SE2	SSE4	SSE4	SSE6	S4	S4	SSE9	SSE2.0	SSE9
8-Aug	SSE9	S8	S7	SSE3	S6	S5	SSE6	S6	S5	SE3	N0	NNW2	WNW3	W3	W4	NW7	NW4	NE0	ENE18	ESE9	SSE3	ENE2	ESE4	E4	SSE2.2	ENE18
9-Aug	ESE4	E1	SE1	E4	E3	SE3	AF	SW3	SW4	NW3	NW3	N3	NE5	NE3	W3	W3	NE0	SW1	ENE1	ENE6	AF	AF	AF	AF	NE0.6	ENE6
10-Aug	S2	NNW5	NE5	AF	WSW17	W11	AF	SW9	SW10	SW15	SW13	SW12	WSW19	SW19	WSW21	WSW20	WSW14	WSW12	WSW6	AF	AF	SSW4	SSW5	SSW6	WSW10.2	WSW21
11-Aug	SSW3	SSW1	AF	SSE3	S4	SSW6	S2	S4	SW10	SW17	WSW27	WSW31	C	C	WSW32	WSW28	WSW21	WSW19	W11	WSW8	SSW9	W13	W8	SSW7	WSW11.7	WSW32
12-Aug	SSW7	SSW7	S7	SSE7	S8	S6	SSW9	SW12	SW11	SW17	WSW20	SW17	SW15	SW15	SW16	SW15	SW16	SW19	WSW17	WSW16	SW12	WSW12	WSW12	SW5	SW11.8	WSW20
13-Aug	SSW4	S7	S8	S7	S9	S7	S6	S6	S8	S8	S8	SSW5	SSW6	SSW11	SW17	SSW13	SSW13	SW14	SSW10	SSW8	SSW10	SSW10	SW10	WSW14	SSW8.6	SW17
14-Aug	W15	W13	WSW18	WSW19	WSW17	WSW14	WSW15	WSW15	W16	W22	W20	W23	W24	W25	W25	W26	W22	WNW25	W23	WNW19	WNW17	W13	WSW14	WNW12	W18.4	W26
15-Aug	NW15	NW13	NW11	NW10	NNW13	N16	N15	N16	N15	N18	N18	NNE21	NNE21	NNE20	N17	N16	NNE16	N15	N12	N14	NNW9	NNW8	NNW8	NNW9	N13.5	NNE21
16-Aug	NNW8	NW5	W4	SSW3	SSW4	WSW6	WSW5	SSW3	S3	W3	NNW4	SW7	SSW9	N2	N3	NW6	WNW12	WNW8	W9	W10	W9	WSW8	SSW6	SSW6	W4.3	WNW12
17-Aug	SSW7	SSW7	S8	SSW7	S7	S9	S7	SSW10	SSW10	S10	SSW12	SSW13	SSW12	SW12	WNW9	NW7	WSW6	W9	WNW12	SW5	S4	S6	SSW7	SSE5	SSW6.6	SSW13
18-Aug	ESE2	WSW1	N10	N10	N7	NW6	SE1	SE3	NNE6	NE8	NE9	NE7	WNW6	SE3	SSW4	SSE3	SSE4	SSE8	SSE7	SSE5	S5	S7	SSE8	SSE8	E1.3	N10
19-Aug	SSE10	SSE10	SSE13	S15	S14	S13	SSE16	S18	S19	SSW15	SW19	SW19	WSW18	W20	WSW21	WSW27	WSW25	W26	W25	W21	W18	WSW15	WSW14	WSW12	SW13.4	WSW27
20-Aug	WSW13	SW14	WSW17	WSW19	WSW23	W20	W19	WSW19	W18	W20	W21	W19	W20	W18	W18	W16	WNW15	WNW14	W15	W14	W11	W16	W13	WSW13	W16.4	WSW23
21-Aug	WSW14	WSW13	WSW13	SW10	S7	SW9	WSW11	W11	WNW9	NW15	WNW15	NW16	NW13	NW16	WNW12	NNW8	NW9	WNW12	WNW14	W9	WNW12	NW13	WNW10	W8	WNW9.9	NW16
22-Aug	W9	WSW9	WSW9	SW8	WSW8	WSW11	W13	W11	W12	W15	WNW13	NW14	NW9	NNW7	NW9	N7	NNW9	NW6	NW7	SE2	SE4	S5	SSE5	SSE7	W6.0	W15
23-Aug	SSE7	S7	S8	SSE6	SSE6	S6	S6	S5	SSW5	SSW7	S8	S12	S12	SSW12	S11	S13	SSE11	SSE11	SSE7	SE10	SE11	S9	NW13	ENE7	S7.1	NW13
24-Aug	SSE4	WSW6	S4	SSE8	SSW4	SSW8	SSW9	SSW9	SSW10	SSW12	SW14	SW13	WSW17	WSW18	WSW15	WSW14	SW8	WSW8	WSW5	SSW6	WSW3	N5	NNE10	NE5	SW6.6	WSW18
25-Aug	SE2	WNW3	SSE2	SSE2	SSW4	SSW3	S5	SSW2	NNE5	NNE8	NNE10	N9	NNE11	N10	NNE11	NE14	NNE10	NE11	NNE8	NNE9	NNE11	N10	N13	NNE15	NNE5.9	NNE15
26-Aug	NE16	NNE13	NNE11	ENE10	ENE6	E4	E4	ENE2	NE8	NE7	NNW4	WNW5	NW3	SW4	SSW4	S5	SSW8	SSW7	SSW6	S6	S7	S7	SSW6	SSW1	ENE1.1	NE16
27-Aug	S8	SSW7	S6	SSE6	S6	S6	S6	S6	S6	SSW7	SSW11	SSW13	S13	SSW14	SSW17	SSW18	SW18	SW21	SW12	SSW9	SSW9	SSW10	SSW8	SSE6	SSW9.8	SW21
28-Aug	SSW7	SSW5	SSW8	SSW9	S7	S8	SW10	SW18	SW20	SW21	WSW24	SW24	WSW21	WSW22	WSW20	SW21	WSW19	WSW18	WSW7	SSE4	SE4	SW5	NNW4	NNW8	SW11.4	WSW24
29-Aug	NNW12	W5	S4	S6	SW8	SSW4	SSE5	SSW7	WSW10	SSW8	SSW10	SW10	SSW10	SSW9	SSW7	S8	SSE8	SSE7	SE6	ESE9	ESE11	SE9	SE12	SSE8	S5.4	NNW12
30-Aug	ESE6	ESE5	SW3	W4	S4	S5	SSE3	S4	SW11	WSW14	W9	WSW10	WSW11	WSW8	SW14	SSW9	W13	WSW9	SSE17	S9	S8	S8	SSE6	S5	SSW5.9	SSE17
31-Aug	SSE5	S5	SSW6	S7	S6	S6	S5	S7	S8	S11	S13	SW21	WSW27	SW27	SW28	WSW27	SW26	SW24	SW15	SSW11	SSW10	SSW8	SSW7	S5	SW12.0	SW28
	SSW1.5	SW2.0	SSW2.6	S2.8	SSW3.4	SSW3.2	SSW3.1	SSW4.2	SW4.3	WSW4.8	WSW5.4	WSW6.0	WSW5.4	WSW5.8	WSW7.5	WSW6.3	WSW6.5	WSW6.1	WSW3.3	SW3.2	SW3.5	SW3.9	SW2.8	SSW2.1		Diurnal Average
	NE16	SW14	WSW18	WSW19	WSW23	W20	WSW19	WSW19	SW20	W22	WSW27	WSW31	WSW27	SW27	WSW32	WSW28	SW26	W26	W25	W21	W18	W16	WSW14	NNE15		Diurnal Maximum

C - Calibration AF - Analyzer Failure

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 11 km/h on Aug 23 23:00

Minimum Value: 1 km/h on Aug 16 23:00

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:	2
Percent Operational Time:	98.7

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

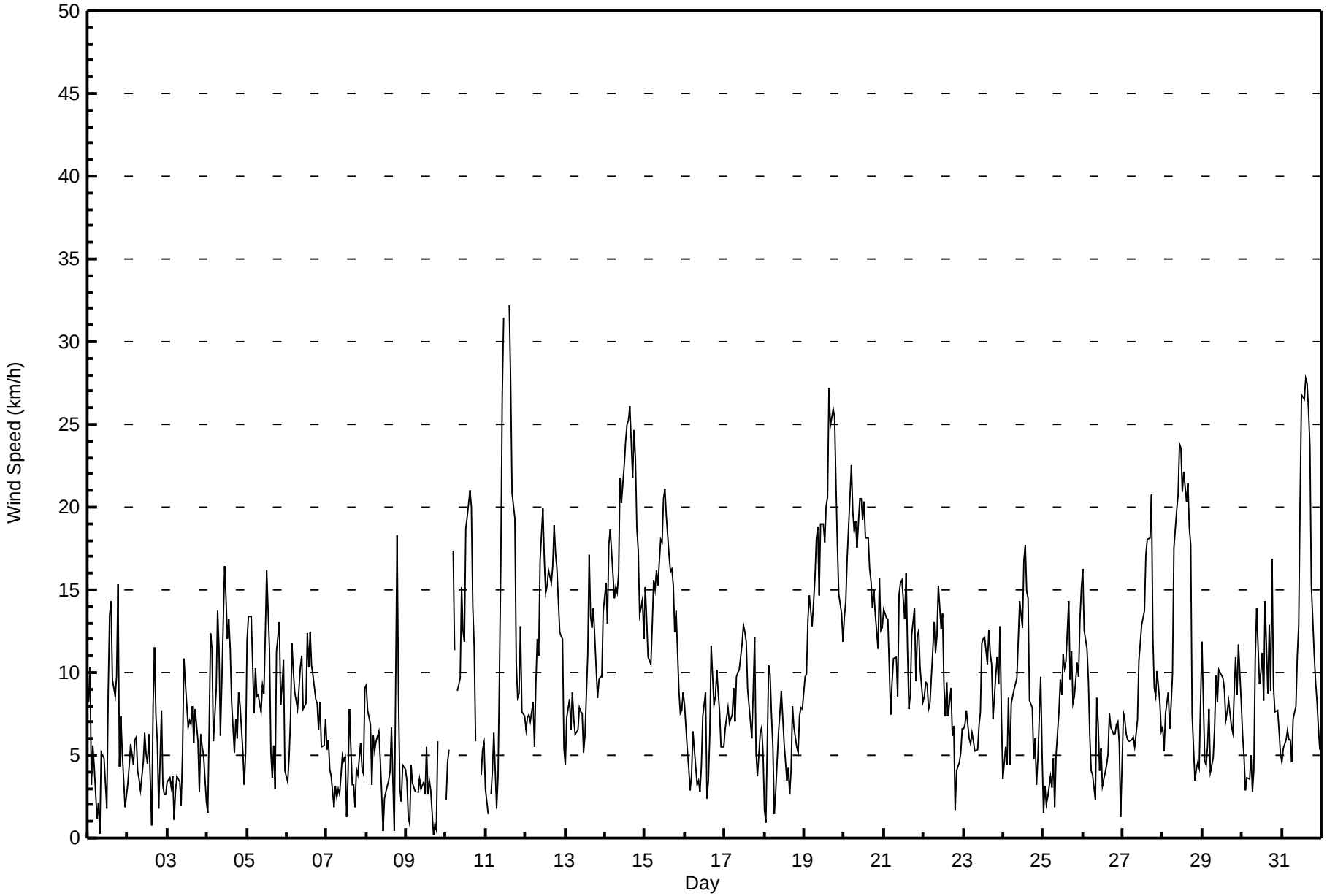
C - Calibration AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed (WS) - km/h

Shell Muskeg River - August 2015



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	197	26.91	26.91
6 - 11	315	43.03	69.95
12 - 19	171	23.36	93.31
20 - 28	47	6.42	99.73
29 - 38	2	0.27	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 732

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Wind Speed (WS) - km/h

Shell Muskeg River - August 2015

Wind Speed Ranges (km/h)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 5	5	4	6	5	13	10	24	21	33	20	12	5	12	11	9	7	197
6 - 11	8	13	15	19	9	14	10	32	57	57	16	19	16	6	12	12	315
12 - 19	12	3	9	7	1	1	1	3	11	13	27	39	17	15	9	3	171
20 - 28	0	3	0	0	0	0	0	0	0	0	10	16	17	1	0	0	47
29 - 38	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	25	23	30	31	23	25	35	56	101	90	65	81	62	33	30	22	732

Total Number of Valid Hours: 732

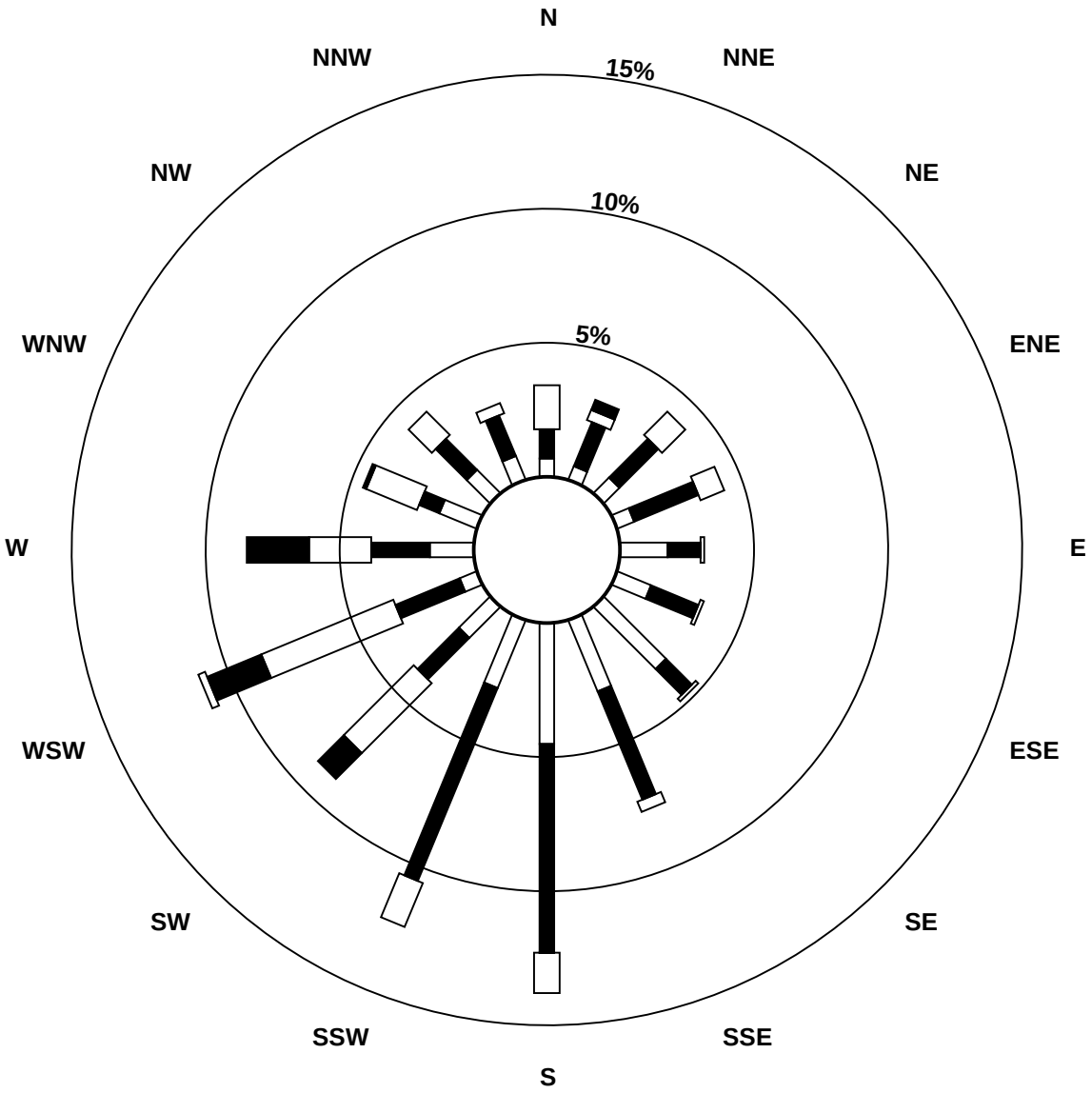
Total Number of Hours: 744

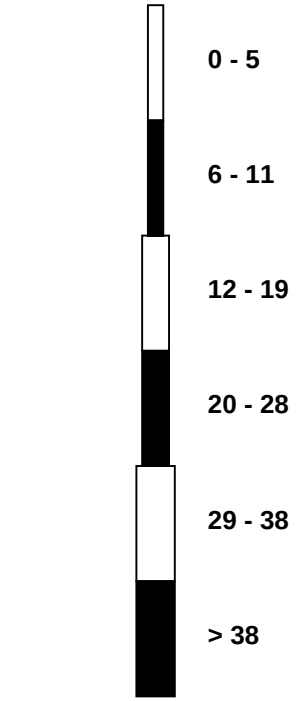
Wood Buffalo Environmental Association

Wind Rose Aug 2015

Wind Speed (WS) - km/h

Shell Muskeg River (AMS 16)





Total Number of Valid Hours: 732

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Shell Muskeg River - August 2015

Direction of Maximum Speed: 240 deg on Aug 11 15:00
Direction of Maximum Daily Speed Average: 267.4 deg on Aug 14

Direction of Minimum Speed: 44 deg on Aug 9 17:00

Direction of Minimum Daily Speed Average: 0.6 deg on Aug 9

Monthly Average Direction: 234.7 deg

Hours in Service:	744
Hours of Data:	732
Hours of Missing Data:	12
Percent Operational Time:	98.7

Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average
1-Aug	20	54	172	263	321	302	305	285	307	294	293	297	302	284	296	325	319	356	46	27	314	328	289	184	325.9
2-Aug	177	172	176	178	182	177	173	218	224	206	222	218	220	226	75	343	348	204	149	125	266	281	131	169	207.6
3-Aug	140	124	175	142	259	118	123	135	242	26	45	45	64	57	147	133	112	120	151	138	79	97	93	100	100.7
4-Aug	11	45	46	58	55	45	44	49	39	33	41	50	62	75	98	112	113	81	81	77	142	143	121	86	65.4
5-Aug	67	58	70	69	44	63	69	64	64	62	60	56	56	82	134	162	247	141	148	172	181	160	151	142	88.9
6-Aug	89	105	86	69	74	77	80	114	126	134	132	131	118	102	85	80	107	112	110	120	114	105	89	86	101.9
7-Aug	131	160	149	150	160	98	97	261	290	318	330	296	277	77	74	135	171	144	155	161	158	172	170	154	148.6
8-Aug	165	169	173	166	169	178	167	187	187	143	358	332	289	262	266	315	305	50	69	102	149	68	103	96	148.8
9-Aug	119	80	128	81	94	139	AF	225	231	308	314	349	46	37	278	263	44	215	77	71	AF	AF	AF	AF	54.9
10-Aug	190	329	38	AF	248	264	AF	234	223	231	235	231	238	236	243	249	247	245	246	AF	AF	192	208	212	240.0
11-Aug	204	193	AF	158	190	197	187	190	218	228	242	252	C	C	240	248	257	258	267	241	209	260	268	211	240.9
12-Aug	205	209	171	161	177	174	212	223	224	225	238	232	233	224	226	222	234	236	243	238	234	248	258	222	226.2
13-Aug	208	185	191	173	185	188	181	175	187	174	184	194	193	208	233	193	207	216	213	199	210	209	221	245	202.9
14-Aug	265	263	251	258	245	242	245	241	264	278	266	269	269	272	270	277	277	282	280	283	287	259	251	282	267.4
15-Aug	311	317	312	319	346	359	356	353	350	355	358	21	21	16	4	357	15	11	1	354	329	331	336	340	353.9
16-Aug	340	308	270	205	206	250	248	212	183	279	342	216	198	354	350	306	289	292	275	260	264	247	205	207	262.2
17-Aug	196	197	189	192	183	181	188	204	193	182	204	213	207	227	282	326	251	277	285	230	177	191	212	147	212.4
18-Aug	114	257	1	10	356	326	139	141	21	35	53	40	295	146	204	147	151	163	158	150	173	181	164	163	99.3
19-Aug	168	163	162	171	175	170	168	173	181	199	229	236	244	271	253	257	249	269	278	271	263	247	255	238	230.5
20-Aug	242	233	247	239	251	259	259	258	270	271	268	270	273	271	268	270	289	283	280	267	261	277	266	258	263.7
21-Aug	248	241	255	228	190	221	245	265	298	314	303	305	307	312	293	342	305	295	291	266	302	307	282	263	282.2
22-Aug	260	254	247	234	257	255	260	259	259	259	295	306	321	343	322	360	331	322	324	129	140	184	149	167	275.7
23-Aug	162	180	173	166	160	180	181	190	208	202	191	179	189	203	173	184	164	162	152	143	143	179	306	76	175.9
24-Aug	159	250	190	149	192	204	203	203	193	208	226	232	244	242	239	244	232	255	250	211	237	2	18	36	226.1
25-Aug	142	286	150	162	199	199	174	206	31	12	23	5	20	11	19	43	15	34	26	24	31	7	357	28	22.2
26-Aug	43	12	19	60	66	84	97	72	40	40	342	302	311	226	211	190	206	206	206	184	188	179	195	204	75.1
27-Aug	191	200	182	165	180	190	179	179	189	197	209	202	187	201	209	209	214	223	219	202	194	200	212	162	200.7
28-Aug	197	197	204	206	175	180	234	232	226	236	240	231	248	247	242	236	242	240	256	150	137	225	343	345	233.1
29-Aug	341	269	184	176	222	211	166	195	239	210	203	217	197	205	193	174	157	147	136	121	121	127	126	163	179.6
30-Aug	107	102	220	276	187	182	153	181	224	246	275	240	238	245	216	197	261	258	155	179	179	186	168	179	211.2
31-Aug	167	190	201	187	177	181	185	175	175	182	189	217	240	233	235	238	235	236	219	212	205	203	209	174	216.9
	208.9	216.8	202.4	184.6	206.4	205.4	204.1	213.5	227.9	244.3	254.0	250.5	250.9	251.8	245.8	248.7	252.7	250.7	243.4	215.5	216.5	225.4	231.2	198.0	
	Diurnal Average																								

C - Calibration AF - Analyzer Failure

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

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg

Shell Muskeg River - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 100 deg on Aug 18 02:00

Minimum Value: 7 deg on Aug 12 21:00

Percentiles: P_1 = 9 P_{10} = 12 Q_1 = 16 Median = 21 Q_3 = 31 P_{90} = 51 P_{99} = 90

Hours in Service:	744
Hours of Data:	732
Hours of Missing Data:	12
Hours of Calibration:	2
Percent Operational Time:	98.7

Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Aug	27	23	39	23	24	96	68	96	28	37	42	84	24	14	17	35	26	32	11	43	18	44	81	56	96
2-Aug	24	12	9	13	15	12	22	32	41	39	31	40	48	45	82	69	25	60	27	68	20	72	65	36	82
3-Aug	34	19	27	21	57	42	18	22	40	36	17	23	48	48	24	19	17	22	25	46	16	16	21	59	59
4-Aug	58	26	14	12	21	18	8	11	23	16	12	15	17	15	19	18	21	16	17	17	30	28	21	23	58
5-Aug	13	19	11	9	20	21	14	13	19	25	28	26	20	45	52	69	37	69	21	18	21	18	21	21	69
6-Aug	33	21	26	9	15	18	19	19	20	22	23	22	22	35	20	22	26	26	25	17	16	17	13	13	35
7-Aug	22	17	14	17	63	17	52	26	36	27	36	37	97	46	26	46	43	69	46	14	16	16	32	17	97
8-Aug	18	18	17	22	16	18	16	29	29	53	88	75	59	66	44	38	31	90	16	21	40	81	20	20	90
9-Aug	22	59	84	25	28	41	AF	29	32	40	34	50	18	71	77	41	81	87	50	9	AF	AF	AF	AF	87
10-Aug	66	64	25	AF	15	13	AF	15	20	17	15	19	16	17	17	14	16	10	8	AF	AF	16	16	17	66
11-Aug	16	60	AF	14	15	16	68	18	20	17	12	13	C	C	14	13	15	15	11	14	18	13	27	20	68
12-Aug	23	26	16	16	17	45	20	18	20	16	12	17	22	22	19	23	18	11	10	7	7	11	9	28	45
13-Aug	54	26	20	13	15	19	26	23	28	25	29	30	29	19	19	21	22	19	19	17	16	17	21	11	54
14-Aug	15	9	9	11	9	14	18	17	19	15	15	16	17	18	16	18	17	15	14	13	18	13	10	23	23
15-Aug	18	24	18	25	28	23	22	24	25	26	26	19	24	21	25	27	24	25	25	24	21	21	21	23	28
16-Aug	32	36	71	43	43	19	11	30	32	67	60	42	36	78	74	53	22	44	24	10	12	15	17	23	78
17-Aug	18	18	16	16	12	13	20	23	26	29	27	27	34	30	30	67	47	14	22	31	50	16	15	34	67
18-Aug	73	100	32	21	28	29	91	54	44	30	23	31	45	65	69	82	63	24	21	14	21	21	16	16	100
19-Aug	16	16	17	20	20	20	18	19	21	25	27	17	17	17	16	18	13	21	16	14	13	9	10	13	27
20-Aug	9	9	20	10	14	12	13	13	15	14	14	15	15	17	15	19	18	16	15	12	12	12	11	10	20
21-Aug	9	9	12	26	20	25	12	15	33	23	17	24	35	28	33	43	28	19	18	10	17	16	11	11	43
22-Aug	9	10	10	13	9	10	9	11	11	13	24	21	36	44	31	48	32	34	30	87	21	19	22	22	87
23-Aug	12	17	11	17	14	20	17	23	28	33	34	26	27	26	29	29	24	22	16	16	16	44	64	32	64
24-Aug	56	59	51	28	35	20	22	24	25	25	18	21	16	17	21	21	28	29	35	13	40	42	32	30	59
25-Aug	64	65	59	46	14	39	21	56	29	27	31	29	24	28	27	14	27	20	28	23	13	28	25	17	65
26-Aug	7	24	27	22	25	44	35	73	27	28	59	50	69	80	61	37	25	25	20	13	14	12	21	96	96
27-Aug	17	16	18	11	12	15	15	26	32	33	27	28	29	29	24	24	25	16	15	17	16	18	17	12	33
28-Aug	29	43	34	26	26	25	36	17	12	11	12	12	12	13	21	13	14	11	9	44	25	45	49	27	49
29-Aug	21	69	45	21	22	47	28	27	21	35	29	31	35	47	41	39	28	26	18	16	17	17	19	31	69
30-Aug	35	40	76	51	27	20	49	36	19	13	32	26	28	55	22	28	40	47	18	22	19	19	14	15	76
31-Aug	18	15	15	23	19	19	39	23	26	26	24	30	15	16	13	12	15	13	16	16	16	17	19	33	39
	73	100	84	51	63	96	91	96	44	67	88	84	97	80	82	82	81	90	50	87	50	81	81	96	
	Diurnal Maximum																								

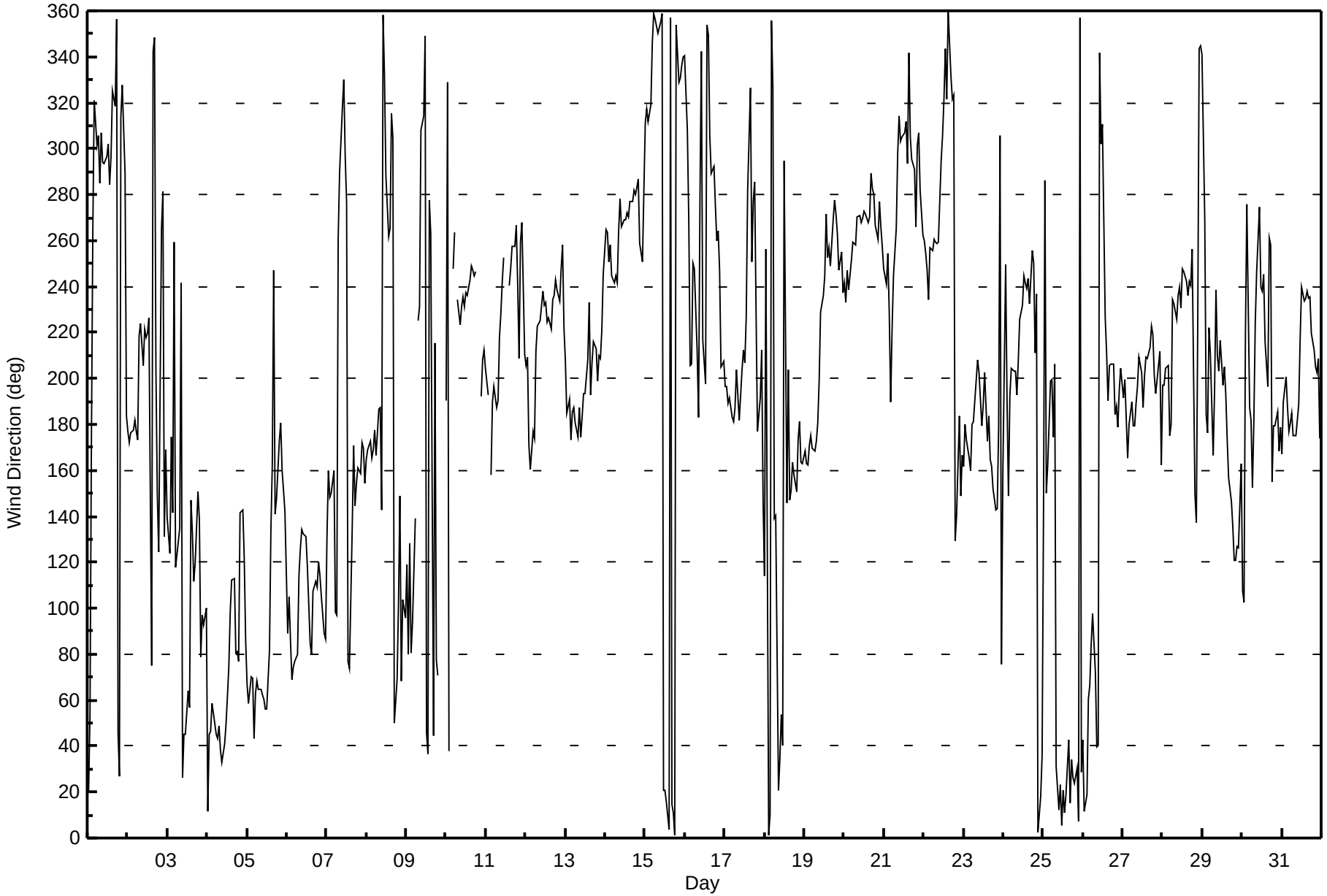
C - Calibration AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction (WD) - deg

Shell Muskeg River - August 2015



Wood Buffalo Environmental Association
SO2 Calibration Report

W B E A

Station Information

Calibration Date	August 11, 2015	Last Calibration	July 14, 2015
Station Name	Shell Muskeg River	Station Number	AMS 16
Reason:	Routine		
Start Time (MST)	9:57	End Time (MST)	15:02
Gas Cert Reference	LL104193	Station temp.	22 Deg C
Cal Gas Concentration	48.3 ppm	Cal Gas Exp Date	12-Feb-18
Calibrator Make/Model	Sabio 4010	Serial Number	11081107
ZAG Make/Model	API 701	Serial Number	2155
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2632

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 1000 ppb		PMT voltage	-710	-710
Analyzer IP address	192.168.1.43		Lamp voltage	787	789
Calculated slope	0.997950	0.996167	Chamber temp	45.0	45.0
Calculated intercept	1.619135	1.130565	Pressure	708.4	702.1
Analyzer Background	6.1	6.1	Flow	0.443	0.442
Analyzer Coefficient	1.243	1.243	Intensity	92	90

Analyzer make	Thermo 43i	Analyzer serial #	1118148498

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.1	----
as found span	5000	82.8	799.8	802.4	0.997
calibrator zero	5000	0.0	0.0	-0.1	----
high point	5000	82.8	799.8	802.4	0.997
second point	5000	41.4	399.9	399.4	1.001
third point	5000	20.7	200.0	198.8	1.006
as left zero	5000	0.0	0.0	0.2	----
as left span	5000	82.8	799.8	801.0	0.999
				Average Correction Factor	1.001

Corrected As found	802.5	Previous response	799.9	% change	-0.3%

Notes:

Changed inlet filter after as founds. No adjustments.

Calibration Performed By: Evan Magill

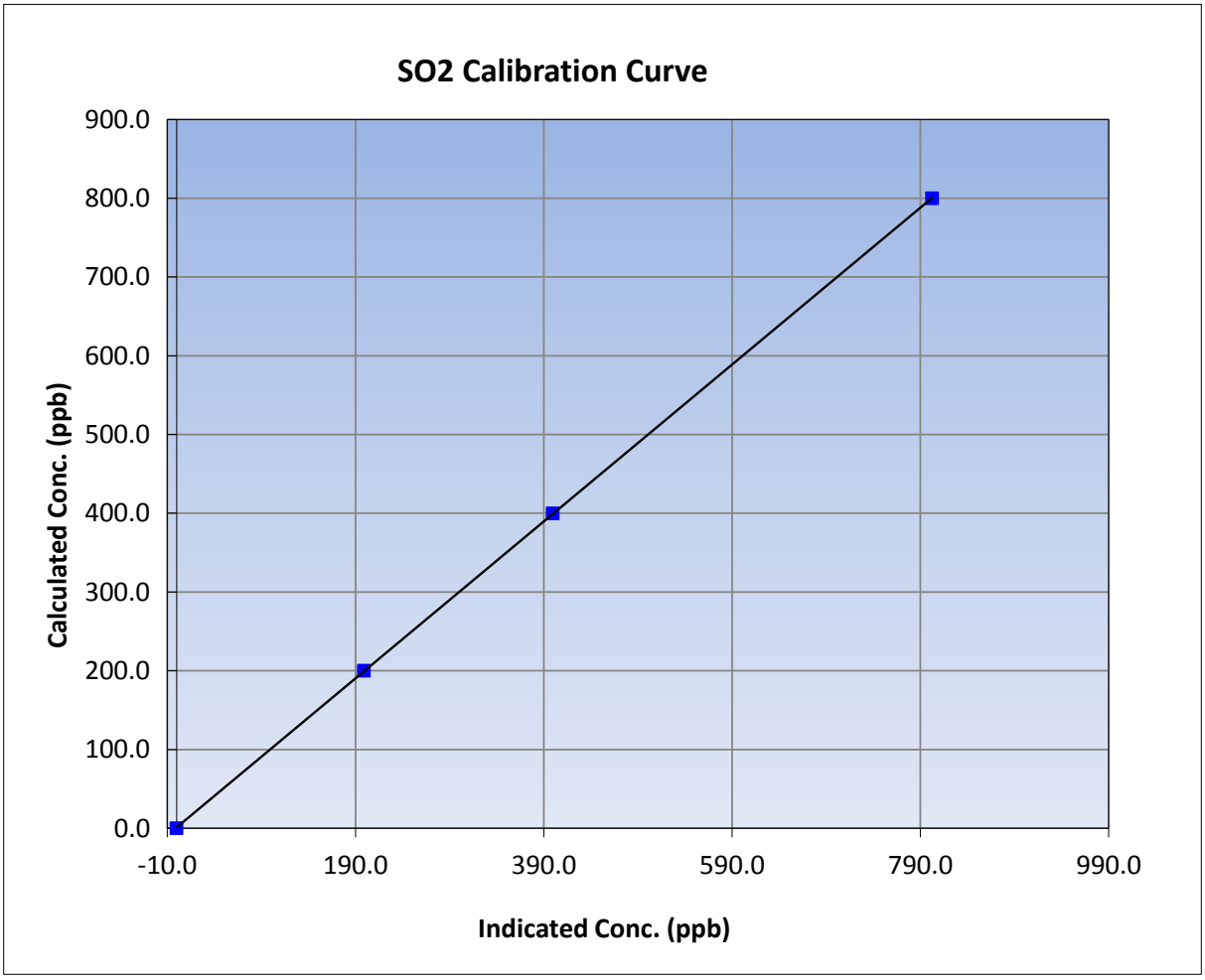
Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

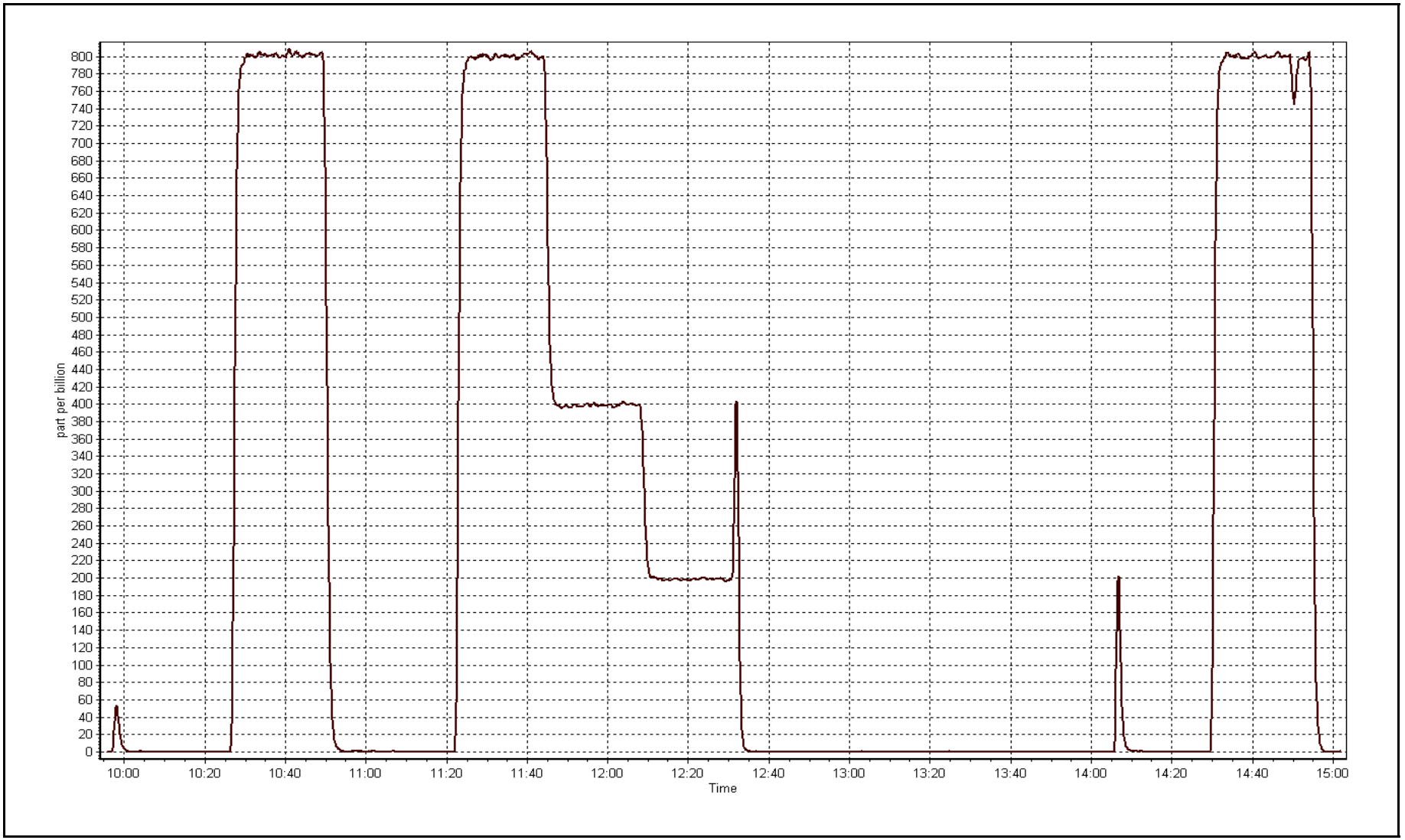
Calibration Date	August 11, 2015	Previous Calibration	July 14, 2015
Station Name	Shell Muskeg River	Station Number	AMS 16
Start Time (MST)	9:57	End Time (MST)	15:02
Analyzer make	Thermo 43i	Analyzer serial #	1118148498

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999992
799.8	802.4	0.9968		
399.9	399.4	1.0013	Slope	0.996167
200.0	198.8	1.0056		
			Intercept	1.130565



SO2 Calibration Plot Date: August 11, 2015



Wood Buffalo Environmental Association
THC Calibration Report

W B E A

Station Information

Calibration Date	August-11-15	Last Calibration	July-14-15
Station Name	Shell Muskeg River	Station Number	AMS 16
Reason:	Routine		
Start Time (MST)	9:57	End Time (MST)	15:02
Gas Cert Reference	LL104193	Cal Gas Expiry Date	12-Feb-18
CH4 Cal Gas Conc.	487 ppm	CH4 Equiv Conc.	1017.8 ppm
C3H8 Cal Gas Conc.	193 ppm	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11081107
ZAG make/model	Teledyne API 701	Serial Number	2155
DACS make/model	Campbell Scientific CR3000	Serial Number	2632

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 50 ppm		Sample Pressure	8.2	8.2
Analyzer IP address	192.168.1.51		Air or Bypass Press	34.9	34.9
Calculated slope	1.004334	1.004019	Fuel Pressure	24.2	24.2
Calculated intercept	-0.076048	-0.066184	Analyzer Coeff	4.355	4.341
			Analyzer BKG	2.92	2.820

Analyzer make	Thermo 51i-LT	Analyzer serial #	1218153458

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	-0.07	----
as found span	5000	82.8	16.85	16.81	1.003
calibrator zero	5000	0.0	0.00	0.04	----
high point	5000	82.8	16.85	16.84	1.001
second point	5000	41.4	8.43	8.47	0.995
third point	5000	20.7	4.21	4.29	0.982
as left zero	5000	0.0	0.00	0.23	----
as left span	5000	82.8	16.85	17.11	0.985
				Average Correction Factor	0.993

Corrected As found	16.88	Previous response	16.86	% change	-0.1%

Notes:

Changed inlet filter after as founds. Adjusted zero and span.

Calibration Performed By: Evan Magill

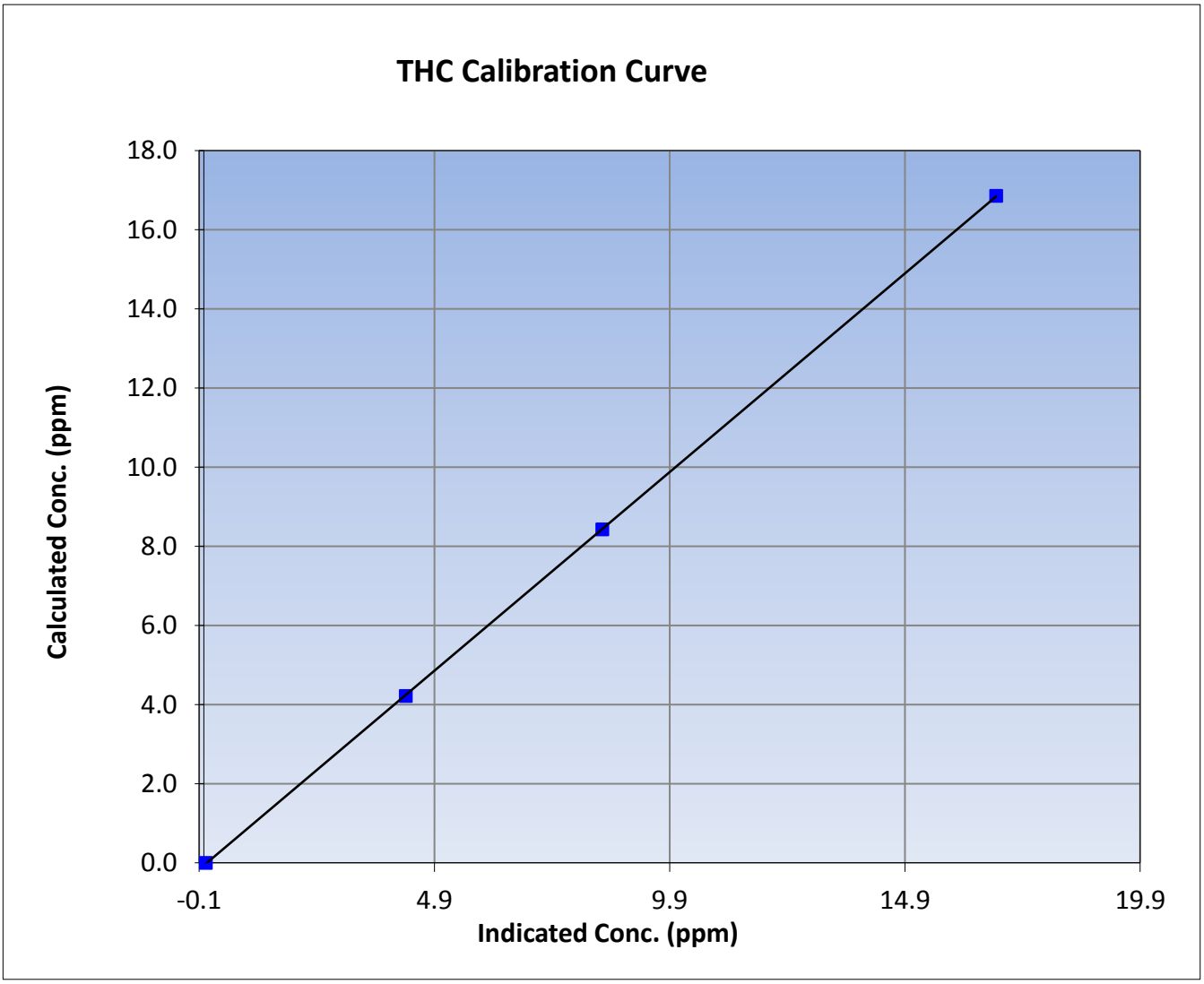
Wood Buffalo Environmental Association
THC Calibration Report

Station Information

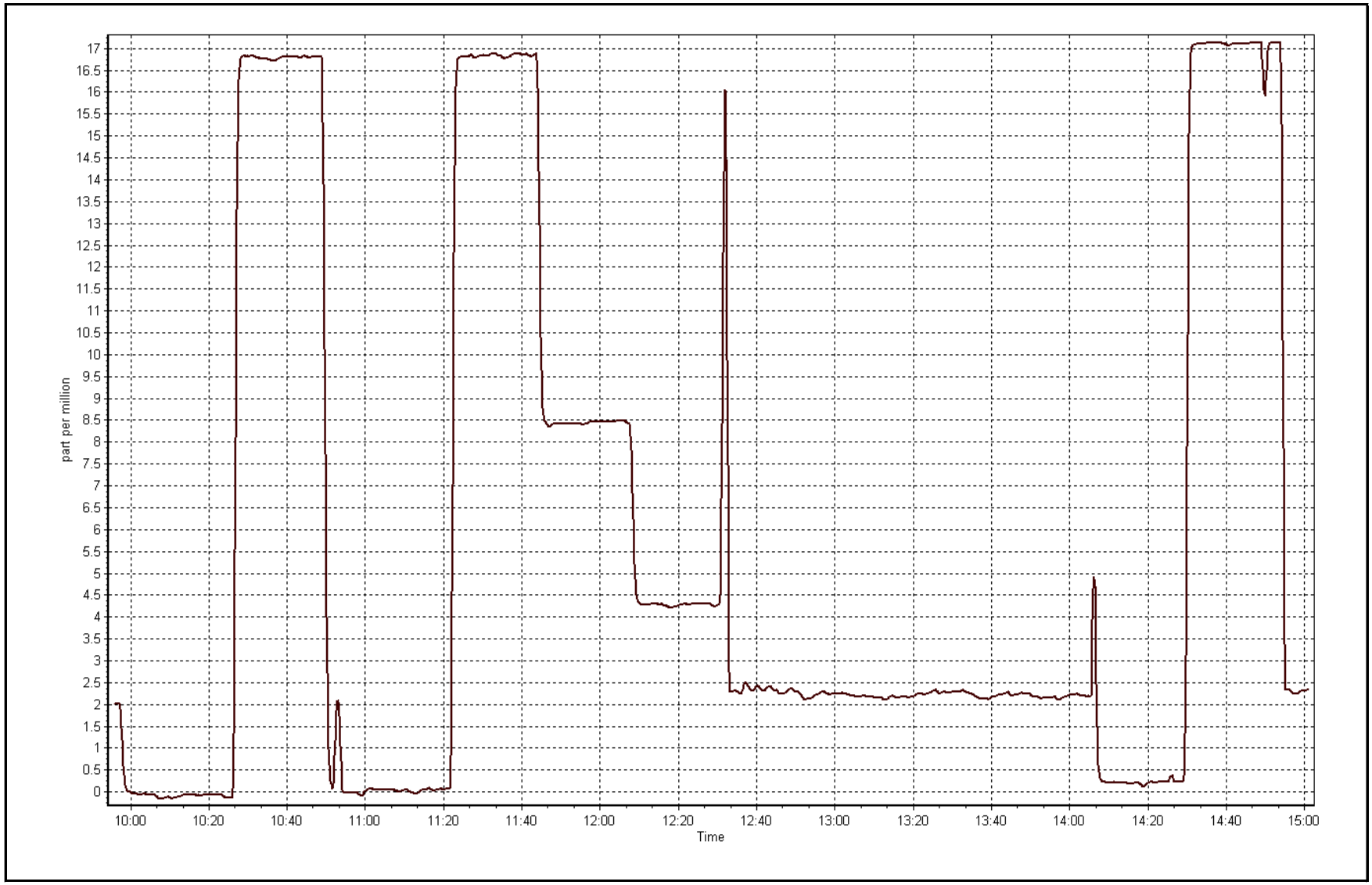
Calibration Date	August 11, 2015	Previous Calibration	July 14, 2015
Station Name	Shell Muskeg River	Station Number	AMS 16
Start Time (MST)	9:57	End Time (MST)	15:02
Analyzer make	Thermo 51i-LT	Analyzer serial #	1218153458

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.04	----	Correlation Coefficient	0.999989
16.85	16.84	1.0008		
8.43	8.47	0.9949	Slope	1.004019
4.21	4.29	0.9822		
			Intercept	-0.066184



THC Calibration Plot Date: August 11, 2015



Wood Buffalo Environmental Association
NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	August 11, 2015	Previous Calibration	July 14, 2015
Station Name	Shell Muskeg River	Station Number	AMS 16
Reason:	Routine		
Start Time (MST)	9:57	End Time (MST)	15:02
NO Cal Gas Conc	48 ppm	Gas Cert Reference	LL104193
NOx Cal Gas Conc	48 ppm	Cal Gas Expiry Date	February 12, 2018
Calibrator	Sabio 4010	Serial Number	11081107
Zero air Generator	Teledyne API T701	Serial Number	2155

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	2632

Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.999778	1.000043	1.004033
	Data Offset	0.132105	1.057735	0.863684
Current Calibration	Data Slope	0.993776	0.996189	1.001813
	Data Offset	1.389424	1.489616	1.182506

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1426262593

Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
NO coefficient	0.788		0.788	
NOX coefficient	0.997		0.997	
NO2 coefficient	1.000		1.000	
NO bkgrnd	8.3		8.7	
NOX bkgrnd	8.3		9.0	
Chamber Temp	50.5	Deg C	50.2	Deg C
Moly Temp	325	Deg C	322	Deg C
PMT voltage	-774	V	-775	V
PMT Temp	-3	Deg C	-3	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	174	mmHg	173.7	mmHg
R Cell Press Nox	174	mmHg	173.4	mmHg
NO sample flow	0.864	lpm	0.855	lpm
Nox sample Flow	0.867	lpm	0.858	lpm

Notes:

Changed inlet filter after as founds. Adjusted zero.

Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: August 11, 2015 Station Number: AMS 16

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	0.6	0.4	0.2	----	----
as found span	5000	82.8	794.9	794.9	0.0	799.2	797.2	2.0	0.9946	0.9971
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1	----	----
high point	5000	82.8	794.9	794.9	0.0	799.2	797.2		0.9946	0.9971
second point	5000	41.4	397.4	397.4	0.0	397.6	396.6	1.0	0.9997	1.0022
third point	5000	20.7	198.7	198.7	0.0	197.6	196.7	0.9	1.0059	1.0105
as left zero	5000	0.0	0.0	0.0	0.0	0.3	0.0	0.3	----	----
as left span	5000	82.8	794.9	519.2	275.7	795.3	527.0	268.3	0.9995	0.9852
								Average Correction Factor	1.0001	1.0033

Corrcted As found NO_X= 798.7 NO= 796.8 Percent Change NO_X= -0.5% NO= -0.4%

Previous Response NO_X= 794.9 NO= 793.8

GPT Calibration Data

Dilution Flow 5000 ccm Source Gas Flow 82.80 ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
Cal zero			0.0			-0.1			N/A	
1st NO2 (300)	----	519.2	274.3	792.5	519.2	273.3	0.9867	1.0000	1.0035	99.6%
2nd NO2 (200)	----	604.2	189.3	791.7	604.2	187.5	0.9876	1.0000	1.0094	99.1%
3rd NO2 (100)	----	694.2	99.3	790.6	694.2	96.4	0.9891	1.0000	1.0302	97.1%
4th NO2 (0)	793.5	----	0.0	793.5	793.5	0.0	0.9855	1.0000	N/A	----
					Average Correction Factor		0.9872	1.0000	1.0144	98.6%

Calibration Performed By: Evan Magill

Wood Buffalo Environmental Association

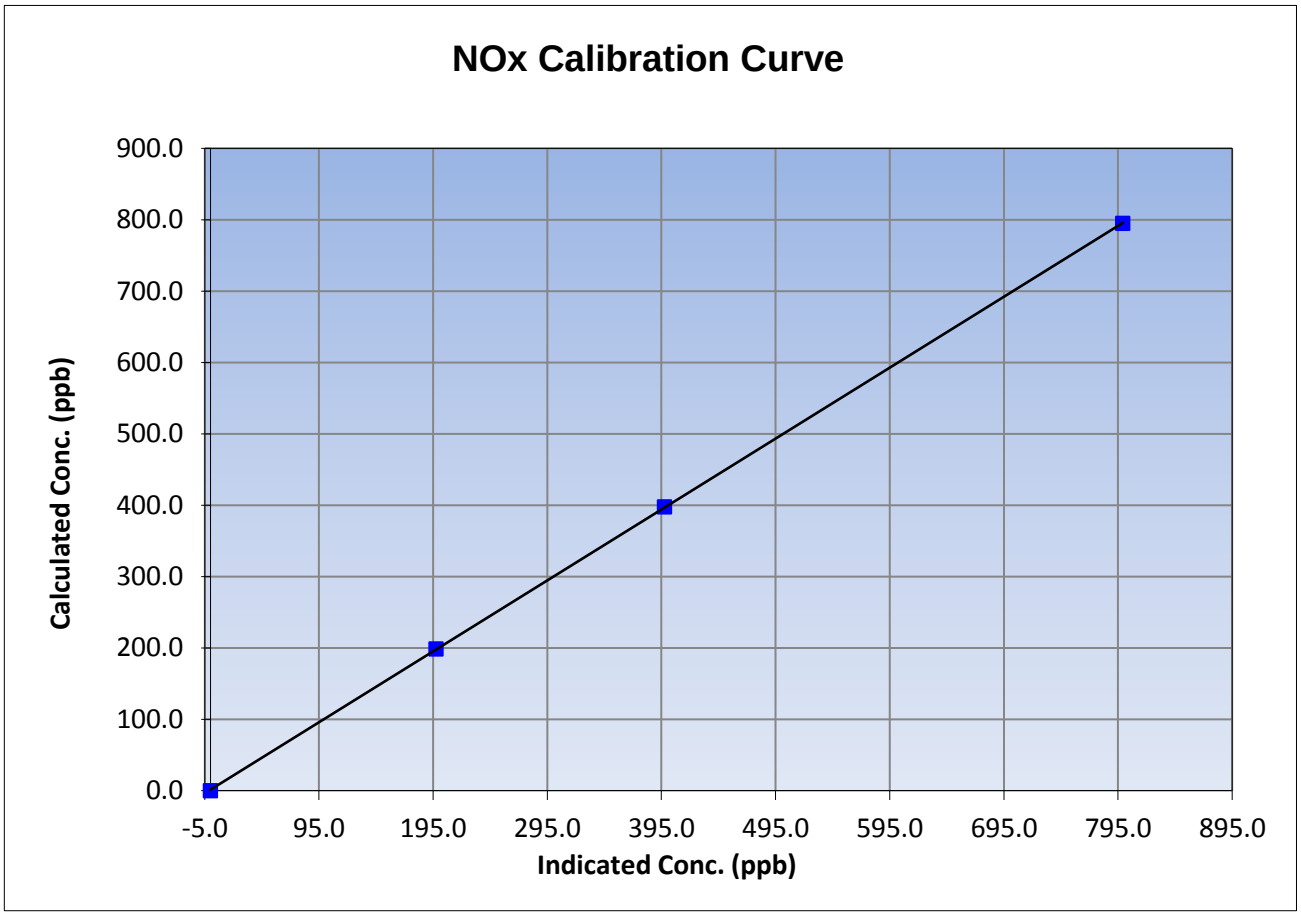
NO_X Calibration Summary

Station Information

Calibration Date	August 11, 2015	Previous Calibration	July 14, 2015
Station Name	Shell Muskeg River	Station Number	AMS 16
Start Time (MST)	9:57	End Time (MST)	15:02
Analyzer make	Thermo 42i	Analyzer serial #	1426262593

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999988
794.9	799.2	0.9946		
397.4	397.6	0.9997	Slope	0.993776
198.7	197.6	1.0059		
			Intercept	1.389424



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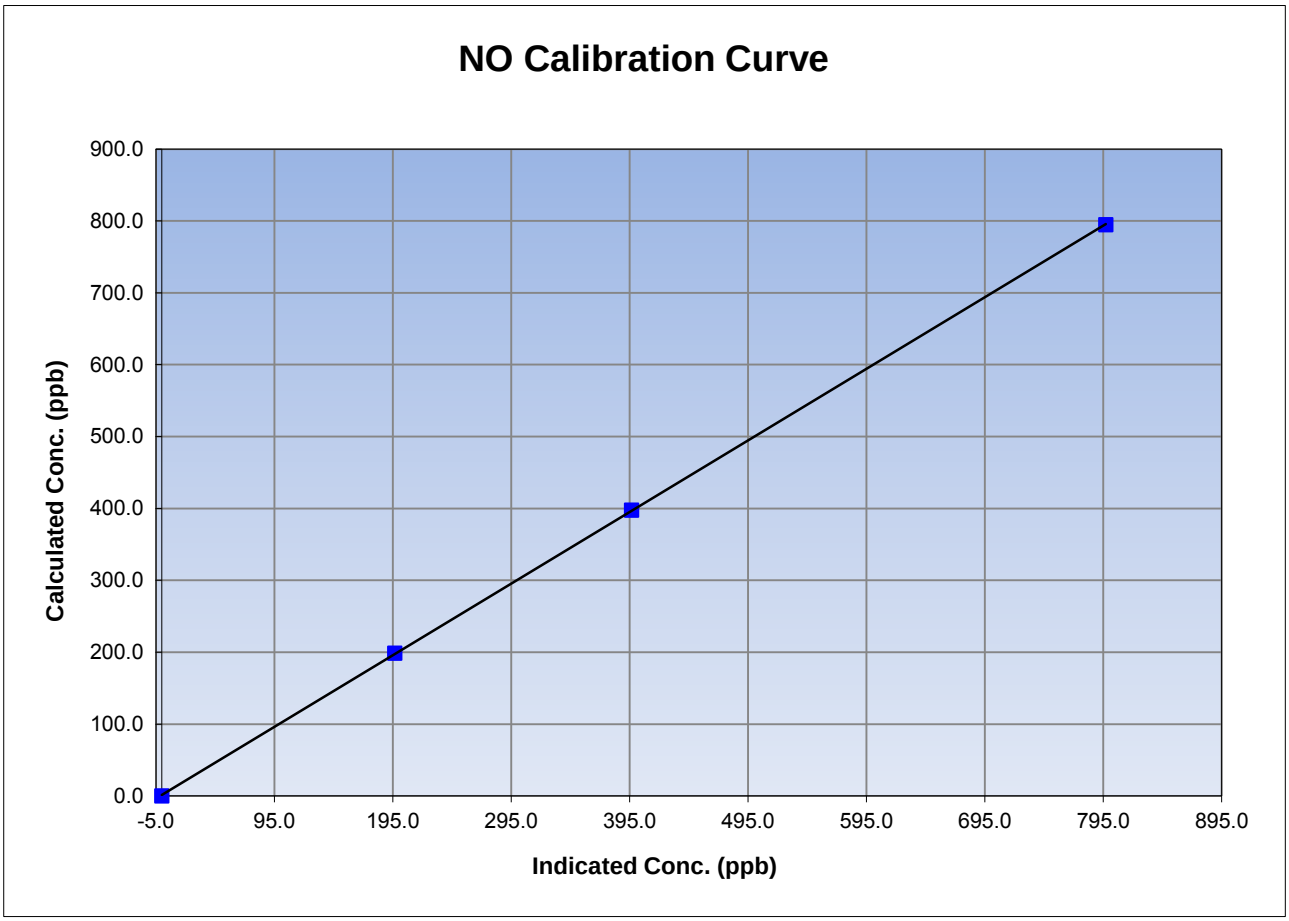
NO Calibration Summary

Station Information

Calibration Date	August 11, 2015	Previous Calibration	July 14, 2015
Station Name	Shell Muskeg River	Station Number	AMS 16
Start Time (MST)	9:57	End Time (MST)	15:02
Analyzer make	Thermo 42i	Analyzer serial #	1426262593

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999985
794.9	797.2	0.9971		
397.4	396.6	1.0022	Slope	0.996189
198.7	196.7	1.0105		
			Intercept	1.489616



Wood Buffalo Environmental Association

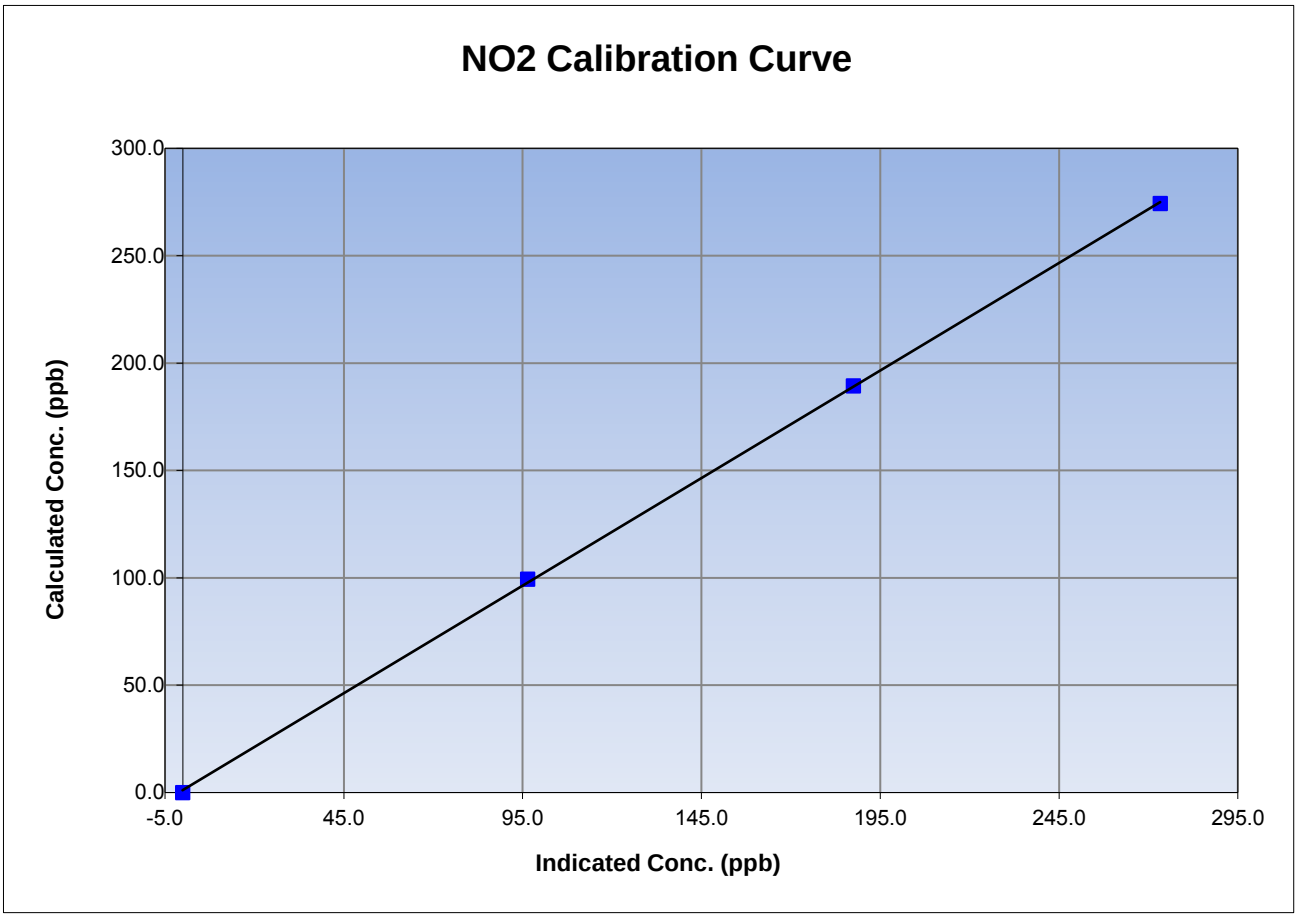
NO_2 Calibration Summary

Station Information

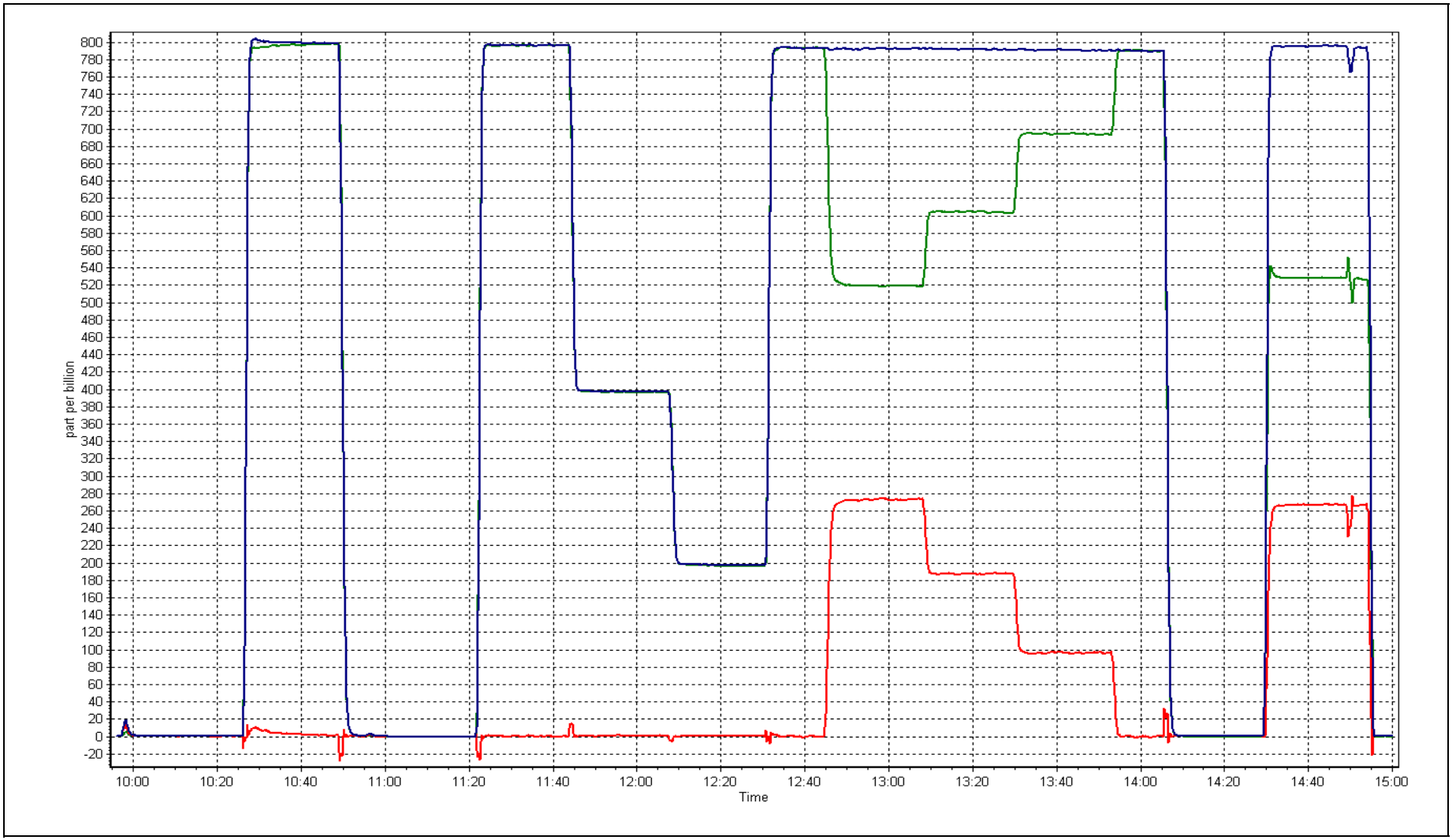
Calibration Date	August 11, 2015	Previous Calibration	July 14, 2015
Station Name	Shell Muskeg River	Station Number	AMS 16
Start Time (MST)	9:57	End Time (MST)	15:02
Analyzer make	Thermo 42i	Analyzer serial #	1426262593

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999900
274.3	273.3	1.0035		
189.3	187.5	1.0094	Slope	1.001813
99.3	96.4	1.0302		
			Intercept	1.182506



NOx, NO & NO_2 Calibration Plot Date: August 11, 2015



Wood Buffalo Environmental Association

SHARP CONFORMANCE TEST

STATION INFORMATION

Calibration Date:	August 11, 2015	Previous Calibration:	July 28, 2015
Station Name:	Shell Muskeg River	Station Number:	AMS 16
Start Time (MST):	14:11	End Time (MST):	14:50
Calibrator Make/Model:	Delta Cal	Calibrator Serial Number:	1019

SHARP INFORMATION

Particulate Fraction:	PM2.5
Make/Model:	Thermo / SHARP 5030
Serial Number	E-798
Source SN:	4142
HEPA PN:	12144
Time Correct (MST):	Yes
Paremeters Checked:	T1, P3, Main Flow, Beta, Neph

AUDIT DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	26.0	28.2	2.2	28.0
T2	27.0	na	na	27.0
T3	28.0	na	na	28.0
T4	24.0	na	na	24.0
RH (%)	31.0	na	na	31.0

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	971	973.0	2.0	971

Main Flow (Lph)

Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
1002	1000	-2	1000	1002

Nephalometer Calibration

Parameter	As Founds	adjusted(Limit +or- 2.0ug/m3)	As Left
Analog	536	No	536
Neph	0.1		0.1
C14	125.4		125.4
Indicated Concentration (ug/m3)	0.1		0.1
Offset 1	537.7		535.7
Offset 2	68.1		68.1

Leak Check (Quarterly)

Leak Check Date:	August 11, 2015	Previous Leak Check Date:	May 25, 2015

	Measured	Difference LPM (Limit +/- 0.42 LPM)
Flow without adaptor (LPM):	16.67	0.10
Flow with adaptor [turn off pump first](LPM):	16.57	

Mass Foil Calibration (Annualy)

Foil Calibration Date:	May 25, 2015	Previous Foil Calibration:	n/a
Zeroed?:	Yes		
Foil Mass:	1337	Mass foil set S/N:	2518
Previous Correction Factor:	7029		
New Correction Factor:	7067		

INSPECTION DATA

Item	Condition	Date of install or rebuild
Cyclone	Good / cleaned	
Pump	Good	
Filter Tape	Good	
Mass Foil Cal Set	na	
HEPA filter	Good	

NOTES:

Temperature adjusted. Sample head replaced.

Mass Foil Cal Set — **Ryan Power**

Wood Buffalo Environmental Association

WS/WD Calibration Report

Station Information

Calibration Date	August-11-15	Previous Calibration	December-05-14
Station Number	AMS 16	Station Location	Muskeg River
Reason:	Routine / Installation	Removal	Other:
Start Time (MST)	12:30	End Time (MST)	13:30
Barometric Pressure	n/a	Station Temperature	22 Deg C
WS Calibrator	MetOne 053	Serial Number	J6774

WIND SPEED

Sensor make/model	Met One 010C-1	Sensor serial #	N10022
DACS make	Campbel Scientific CR3000	DACS serial No.	2632
DACS voltage range	5000	DACS channel #	P2
	Before		After
DACS slope	N/A	DACS slope	N/A
DACS intercept	N/A	DACS intercept	N/A
Calculated slope	1.002122327	Calculated slope	0.999451
Calculated intercept	-0.019981501	Calculated intercept	-0.015727

Wind Speed Calibration Data

Shaft RPM	Actual Speed (K/hr)	Indicated Speed (K/hr)	Correction factor
0	0.0	0.0	n/a
200	20.2	20.3	0.9957
400	39.4	39.4	0.9990
600	58.6	58.5	1.0003
800	77.8	77.8	0.9989
Average Correction Factor			0.9984

WIND DIRECTION

Sensor make/model	Met One 020C-1	Sensor serial #	N12035
DACS make	Campbel Scientific CR3000	DACS serial No.	2632
DACS voltage range	5000	DACS channel #	SE 24
	Before		After
DACS slope	N/A	DACS slope	N/A
DACS intercept	N/A	DACS intercept	N/A
Calculated slope	N/A	Calculated slope	0.996676
Calculated intercept	N/A	Calculated intercept	1.016960

Wind Direction Calibration Data

Physical Direction (Degrees)	Indicated Direction (Degrees)	Correction factor
0	0.3	n/a
90	88.6	1.0164
180	178.3	1.0098
270	269.6	1.0014
357	358.2	0.9966
Average Correction Factor		1.0061

Notes:

Replaced WS sensor bearings

Declination found with solar noon, confirmed with compass.

As found WS values unchanged after bearing change out.

Calibration Performed By: Evan Magill and Ryan Power

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 17
WAPASU
AUGUST 2015

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

September 28, 2015

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WAPASU (AMS 17)
AUGUST 2015

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	708	36	36	100.00	60	0	6	0
H2S (ppb) Average	704	37	40	99.60	2	0	0	0
THC (ppm) Average	708	36	36	100.00	2.6	-	2.2	-
O3 (ppb) Average	709	35	35	100.00	44	0	30	-
NO2 (ppb) Average	708	36	36	100.00	15	0	7	-
NO (ppb) Average	708	36	36	100.00	7	-	2	-
NOX (ppb) Average	708	36	36	100.00	20	-	8	-
PM2.5 (ug/m3) Average	743	1	1	100.00	33.1	-	9	0
Temperature 2 m (C) Average	744	0	0	100.00	27.6	-	21.6	-
Relative Humidity (%) Average	744	0	0	100.00	99	-	87	-
Wind Speed 10 m (km/h) Average	744	0	0	100.00	20	-	14	-
Wind Direction 10 m (deg) Average	744	0	0	100.00	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WAPASU (AMS 17)
AUGUST 2015

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

					Percentile						
Parameter	Number	Mean	StnDev	Total	Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	708	1.3	3	-	0	0	0	0	1	3	60
H2S (ppb) Average	704	0.2	0	-	0	0	0	0	0	0	2
THC (ppm) Average	708	2.08	0.1	-	1.9	2	2	2.1	2.1	2.2	2.6
O3 (ppb) Average	709	20.8	9	-	1	9	14	20	28	34	44
NO2 (ppb) Average	708	1.7	2	-	0	0	0	1	2	5	15
NO (ppb) Average	708	0.6	1	-	0	0	0	0	1	1	7
NOX (ppb) Average	708	2.3	3	-	0	0	0	1	3	6	20
PM2.5 (ug/m3) Average	743	5.06	3.8	-	0.5	1.5	2.5	4.2	6.6	9.6	33.1
Temperature 2 m (C) Average	744	15.69	5	-	3.4	9.2	11.8	15.6	19.5	22.4	27.6
Relative Humidity (%) Average	744	68.4	19	-	29	41	53	67	86	94	99
Wind Speed 10 m (km/h) Average	744	8	4	-	0	4	5	7	11	13	20
Wind Direction 10 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WAPASU (AMS 17)
AUGUST 2015

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
H2S	01 Aug 2015 13:00	01 Aug 2015 15:00	3	Intermittent unstable operation - excessive baseline drift

Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO_2) - ppb

Wapasu - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 60 ppb on Aug 29 09:00 Maximum Daily Average: 5.9 ppb on Aug 31

Minimum Value: 0 ppb on Aug 31 02:00 Minimum Daily Average: 0.1 ppb on Aug 15
Maximum Diurnal Average: 3.6 ppb at hour 9 Minimum Diurnal Average: 0.4 ppb at hour 1
Monthly Average: 1.3 ppb Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 1$ $P_{90} = 3$ $P_{99} = 15$

Hours 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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
2-Aug	0	0	0	Z	0	0	0	0	0	0	0	1	2	2	2	3	2	1	2	2	1	1	1	0	1.0	3
3-Aug	0	1	1	1	Z	2	2	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1	0.8	2
4-Aug	1	2	2	1	1	Z	2	2	1	1	1	1	2	1	1	1	0	1	0	0	0	0	0	0	0.9	2
5-Aug	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
6-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
7-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
8-Aug	0	0	0	Z	0	1	1	1	1	1	1	1	0	1	1	1	2	0	1	0	0	0	0	0	0.6	2
9-Aug	0	0	0	0	Z	0	0	0	1	1	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0.4	1
10-Aug	0	0	1	1	1	Z	1	0	0	4	6	5	3	3	1	1	1	2	1	1	0	0	1	0	1.5	6
11-Aug	Z	2	1	1	2	2	3	3	8	5	4	1	0	0	0	0	0	0	0	0	0	1	2	1	1.7	8
12-Aug	1	Z	4	5	4	4	5	3	1	1	0	0	0	0	0	0	1	0	0	0	0	1	1	0	1.4	5
13-Aug	1	1	Z	6	7	4	3	5	5	C	C	C	C	C	2	0	1	3	3	3	2	3	4	4	3.2	7
14-Aug	2	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.4	2
15-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
16-Aug	0	0	0	0	0	Z	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0.2	1
17-Aug	0	Z	1	2	3	3	5	13	11	17	13	5	3	3	2	1	1	1	1	2	1	1	0	1	3.8	17
18-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	0	0	0	0	0	0.4	2
19-Aug	0	0	0	Z	0	1	1	0	1	1	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0.6	3
20-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
21-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
22-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.3	1
23-Aug	1	Z	1	1	1	1	1	1	0	0	1	0	0	1	1	1	1	1	1	1	1	1	1	0	0.7	1
24-Aug	0	0	Z	1	1	0	1	1	1	2	1	3	3	1	1	0	0	0	0	0	0	0	0	0	0.8	3
25-Aug	0	0	0	Z	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
26-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	2	6	6	5	4	2	1	1.4	6
27-Aug	1	1	1	1	3	Z	1	8	1	1	1	0	1	1	1	2	1	1	1	2	2	1	2	2	1.5	8
28-Aug	Z	5	3	3	4	4	6	4	9	8	7	7	0	0	0	0	1	0	0	0	0	0	0	0	2.9	9
29-Aug	0	Z	0	0	0	0	0	0	60	15	28	3	1	1	1	1	0	0	0	1	0	0	0	0	4.9	60
30-Aug	0	0	Z	0	0	0	0	0	4	12	4	4	2	1	1	3	18	4	0	0	0	0	1	0	2.5	18
31-Aug	0	0	0	Z	0	0	0	1	5	28	31	16	10	2	2	9	6	3	3	1	2	9	6	2	5.9	31
	0.4	0.6	0.7	1.0	1.1	1.0	1.1	1.5	3.6	3.4	3.5	1.9	1.1	0.7	0.7	1.0	1.4	0.8	0.9	0.8	0.7	0.9	0.8	0.6	Diurnal Average	
	2	5	4	6	7	4	6	13	60	28	31	16	10	3	2	9	18	4	6	6	5	9	6	4	Diurnal Maximum	

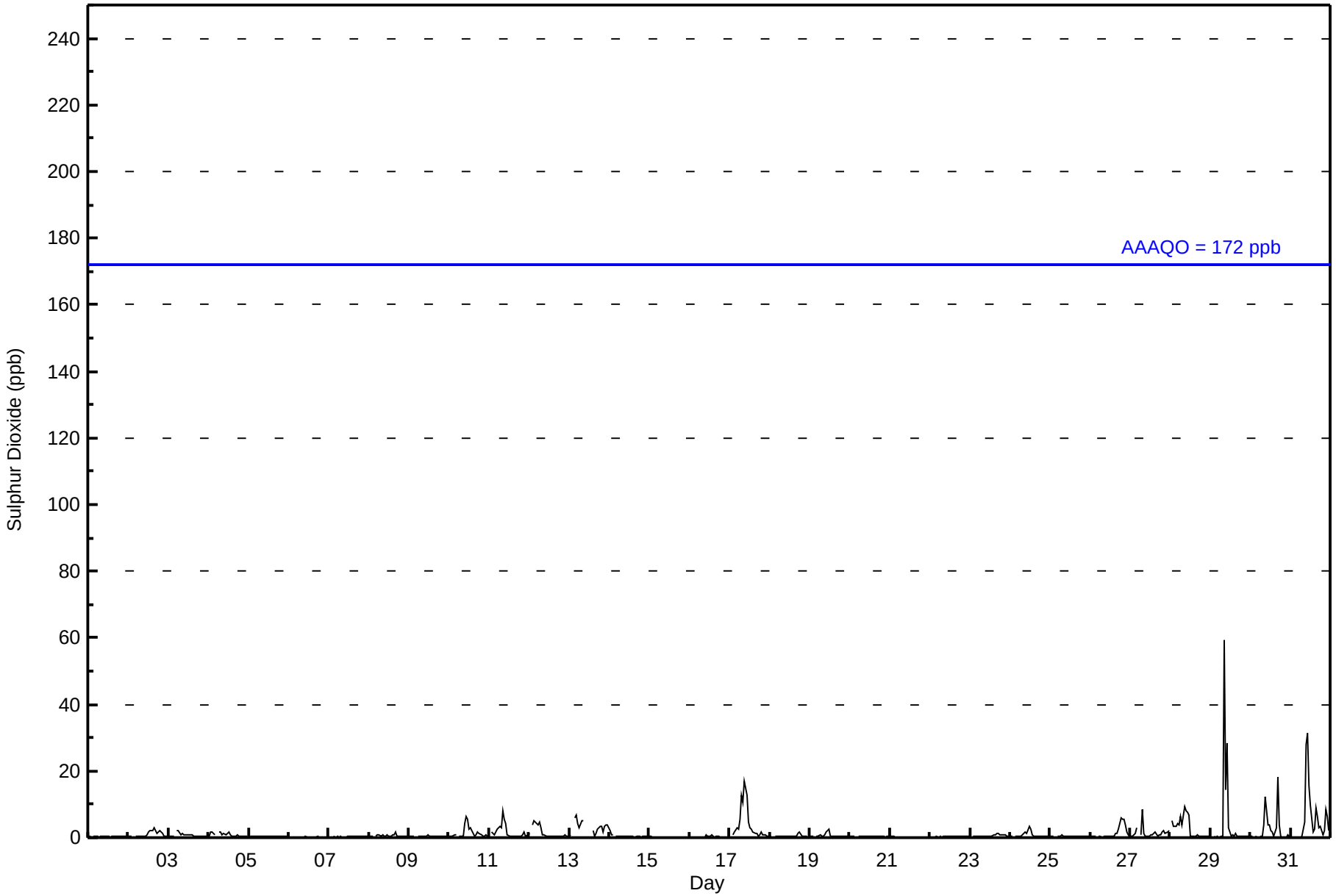
Z - zerospan C - Calibration
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb

Wood Buffalo Environmental Association

Hourly Averages

Sulphur Dioxide (SO_2) - ppb

Wapasu - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

Wapasu - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	696	98.31	98.31
11 - 20	8	1.13	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: 708

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

Wapasu - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 10	19	10	9	16	37	74	101	83	35	47	68	58	47	21	34	37	696
11 - 20	0	0	0	0	0	0	0	0	1	1	5	1	0	0	0	0	8
21 - 60	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	4
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	19	10	9	16	37	74	101	83	37	49	74	60	47	21	34	37	708

Total Number of Valid Hours: 708

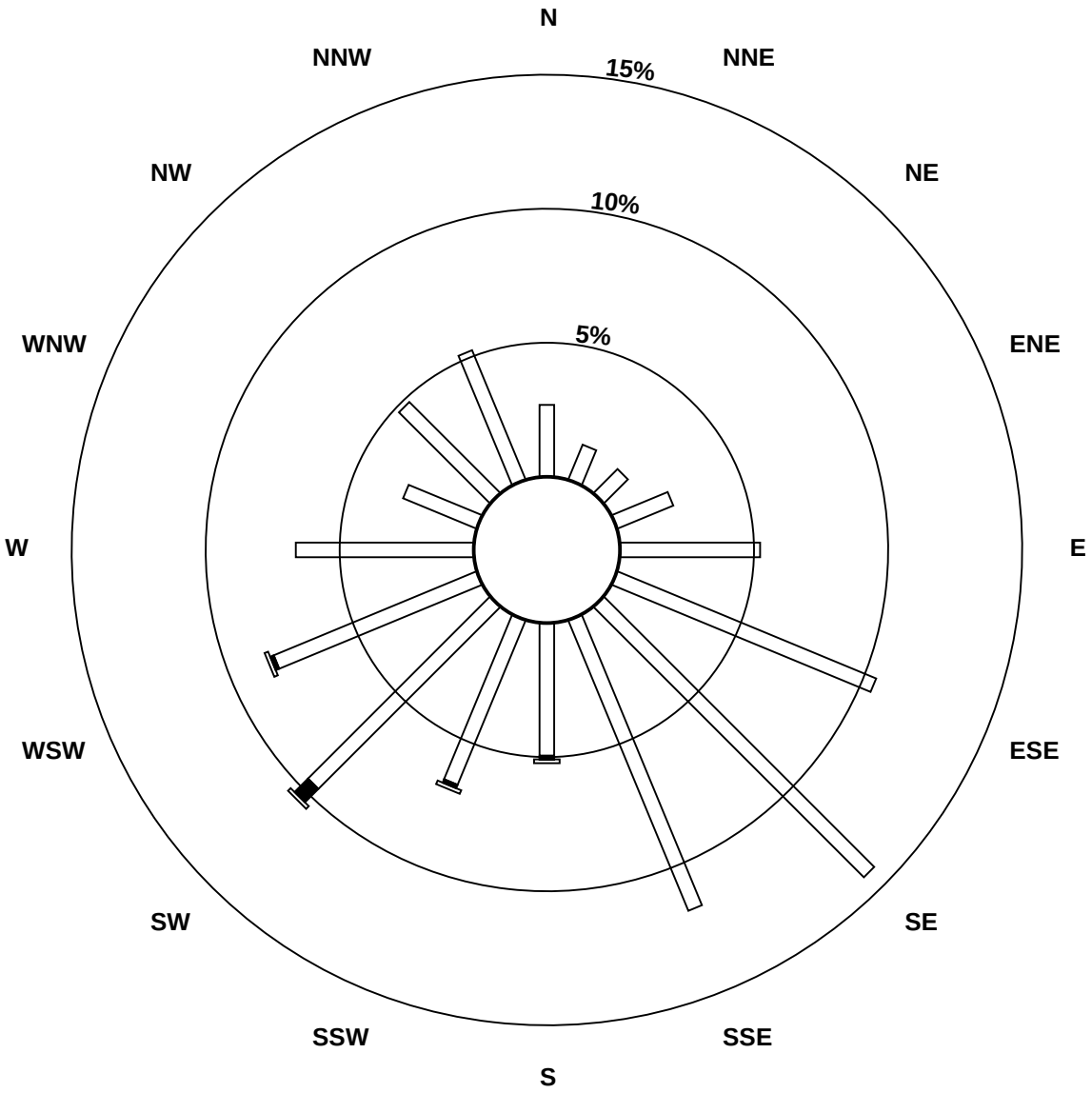
Total Number of Hours: 744

Wood Buffalo Environmental Association

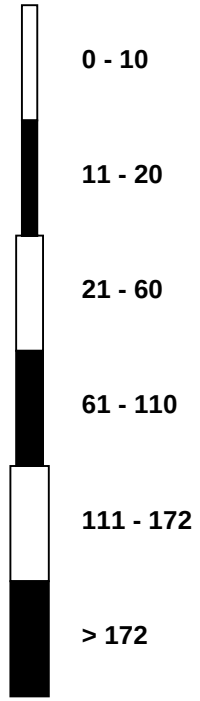
Wind Rose Aug 2015

Sulphur Dioxide (SO_2) - ppb

Wapasu (AMS 17)



Classes (ppb)



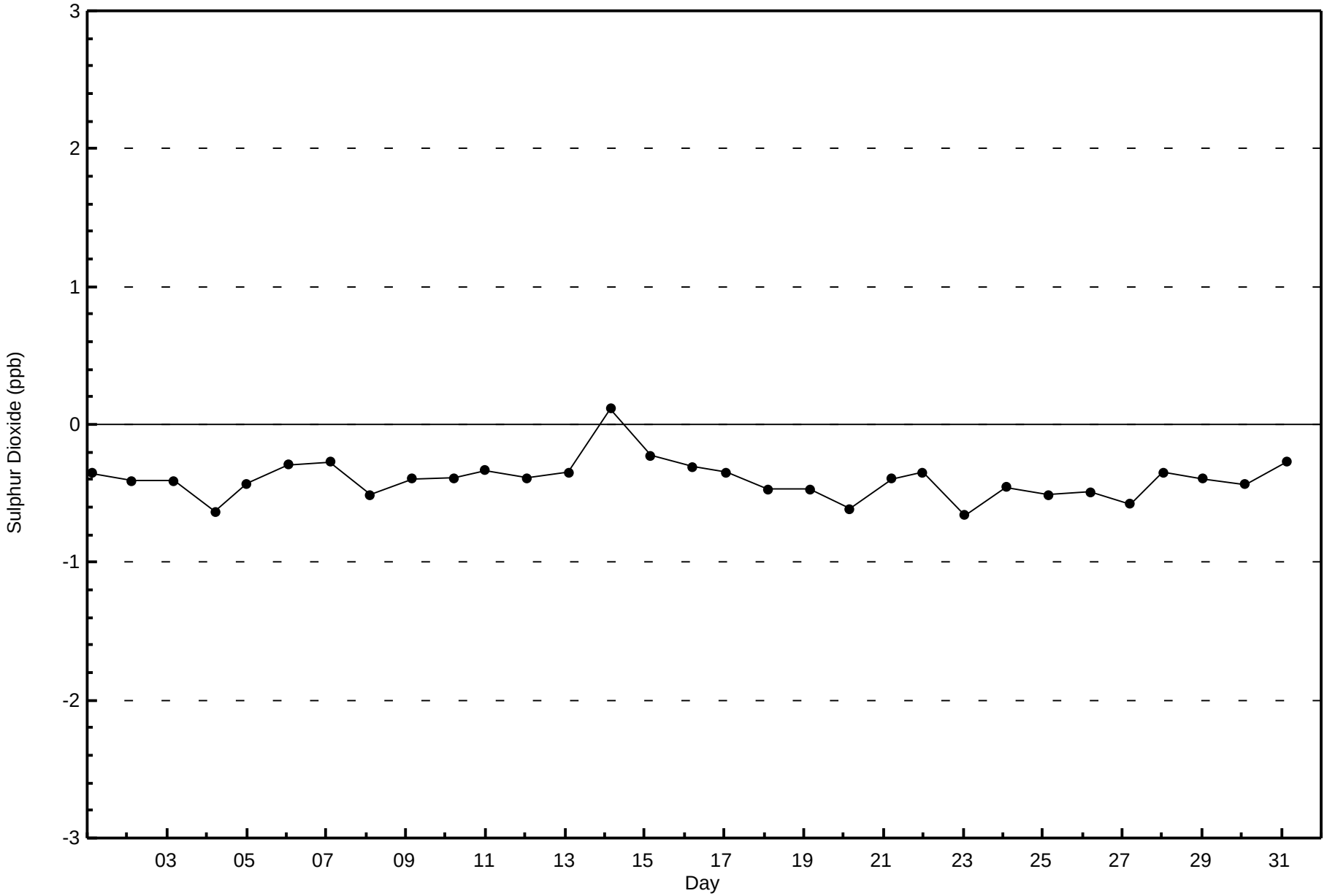
Total Number of Valid Hours: 708

Wood Buffalo Environmental Association

Zero Responses

Sulphur Dioxide (SO_2) - ppb

Wapasu - August 2015

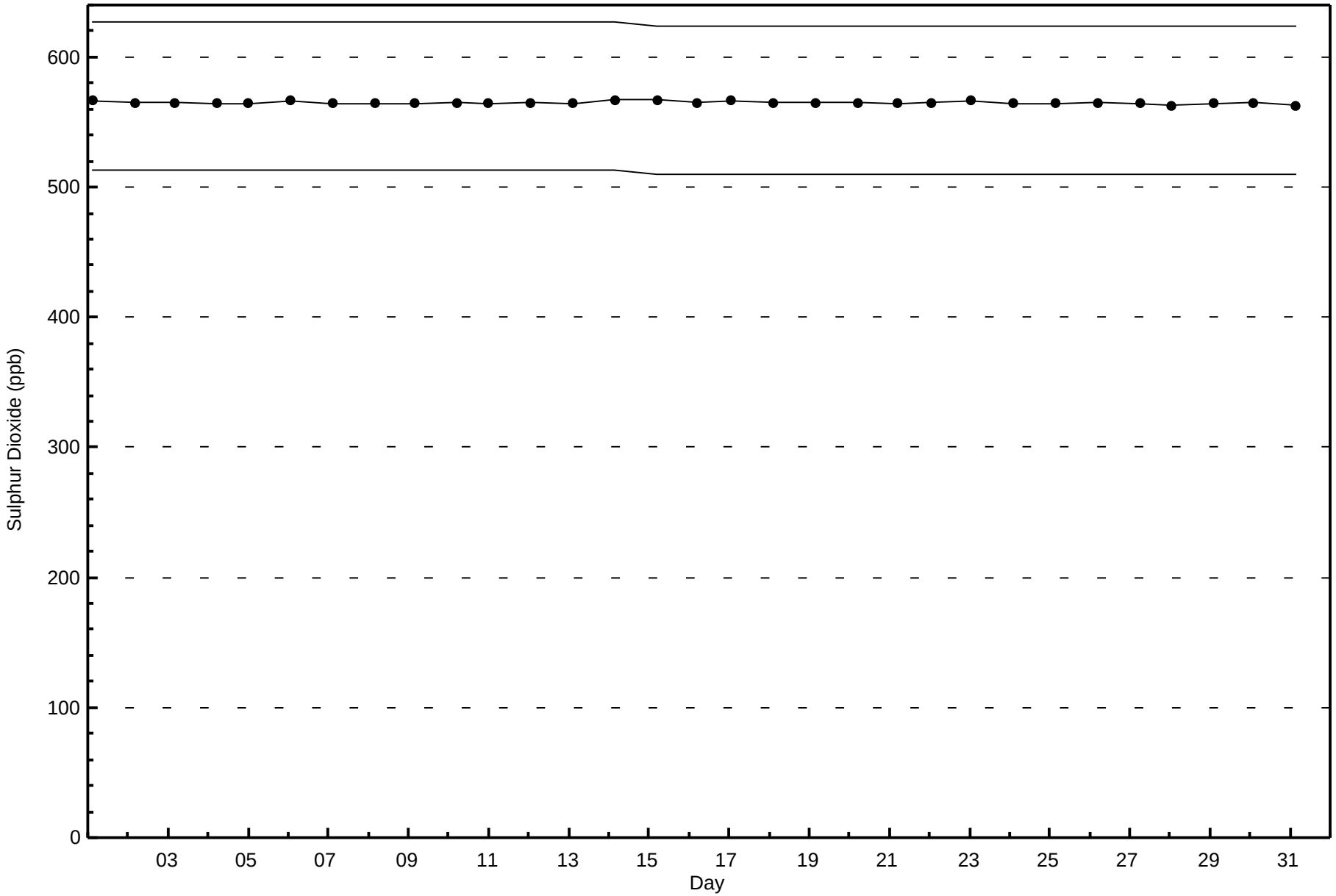


Wood Buffalo Environmental Association

Span Responses

Sulphur Dioxide (SO_2) - ppb

Wapasu - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Hydrogen Sulphide (H_2S) - ppb

Wapasu - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 2 ppb on Aug 29 09:00

Maximum Daily Average: 0.4 ppb on Aug 13

Minimum Value: 0 ppb on Aug 30 21:00

Minimum Daily Average: 0.1 ppb on Aug 31

Maximum Diurnal Average: 0.3 ppb at hour 6

Minimum Diurnal Average: 0.2 ppb at hour 15

Monthly Average: 0.2 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 0$ $P_{99} = 1$

Hours in Service:	744
Hours of Data:	704
Hours of Missing Data:	40
Hours of Calibration:	37
Percent Operational Time:	99.6

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

Z - zerospan C - Calibration UO - Unstable Operation

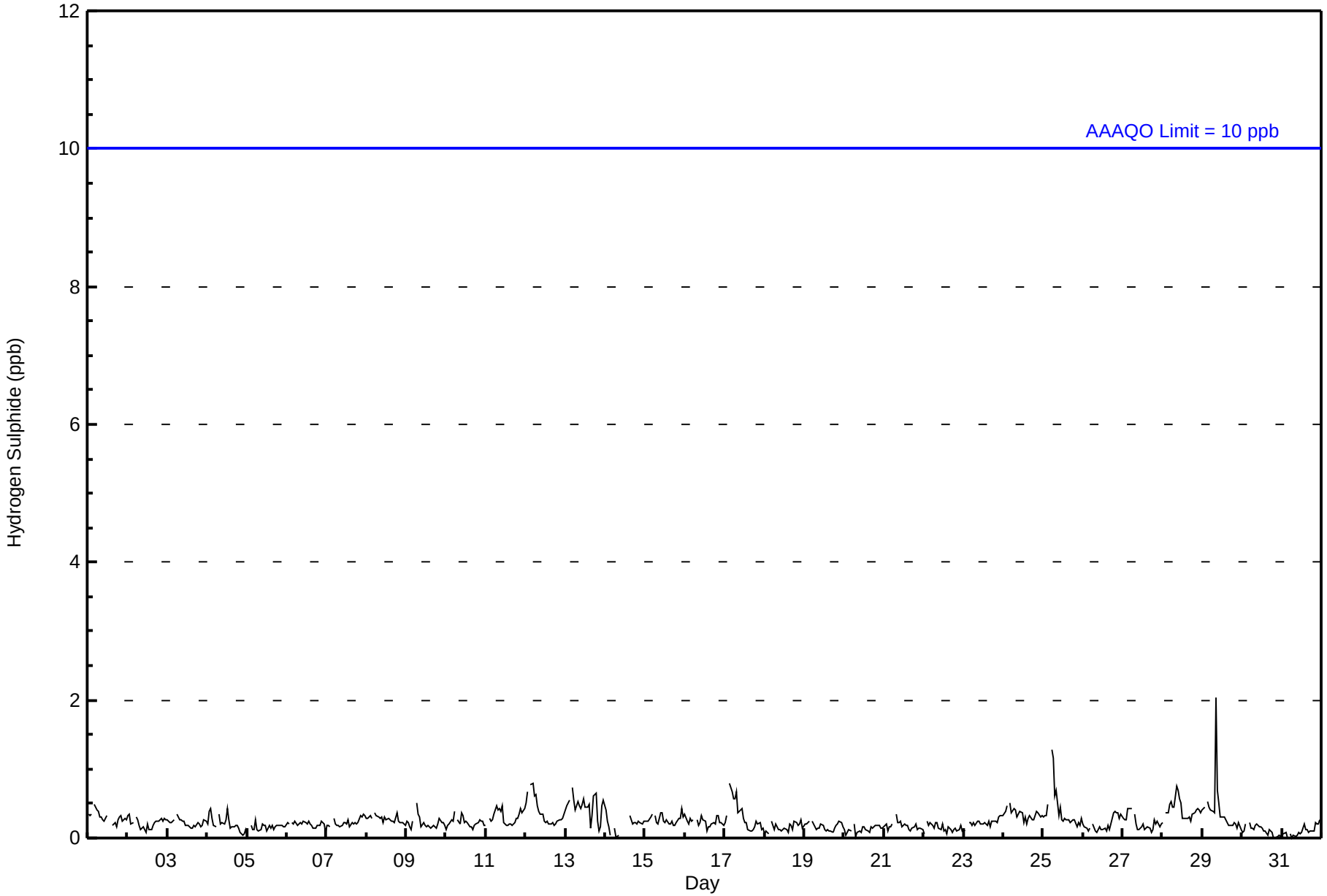
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb

Wood Buffalo Environmental Association

Hourly Averages

Hydrogen Sulphide (H_2S) - ppb

Wapasu - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Hydrogen Sulphide (H_2S) - ppb

Wapasu - August 2015

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 (H_2S) - ppb

Wapasu - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 2	18	11	10	15	37	74	99	82	39	51	78	60	41	21	34	34	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	18	11	10	15	37	74	99	82	39	51	78	60	41	21	34	34	704

Total Number of Valid Hours: 704

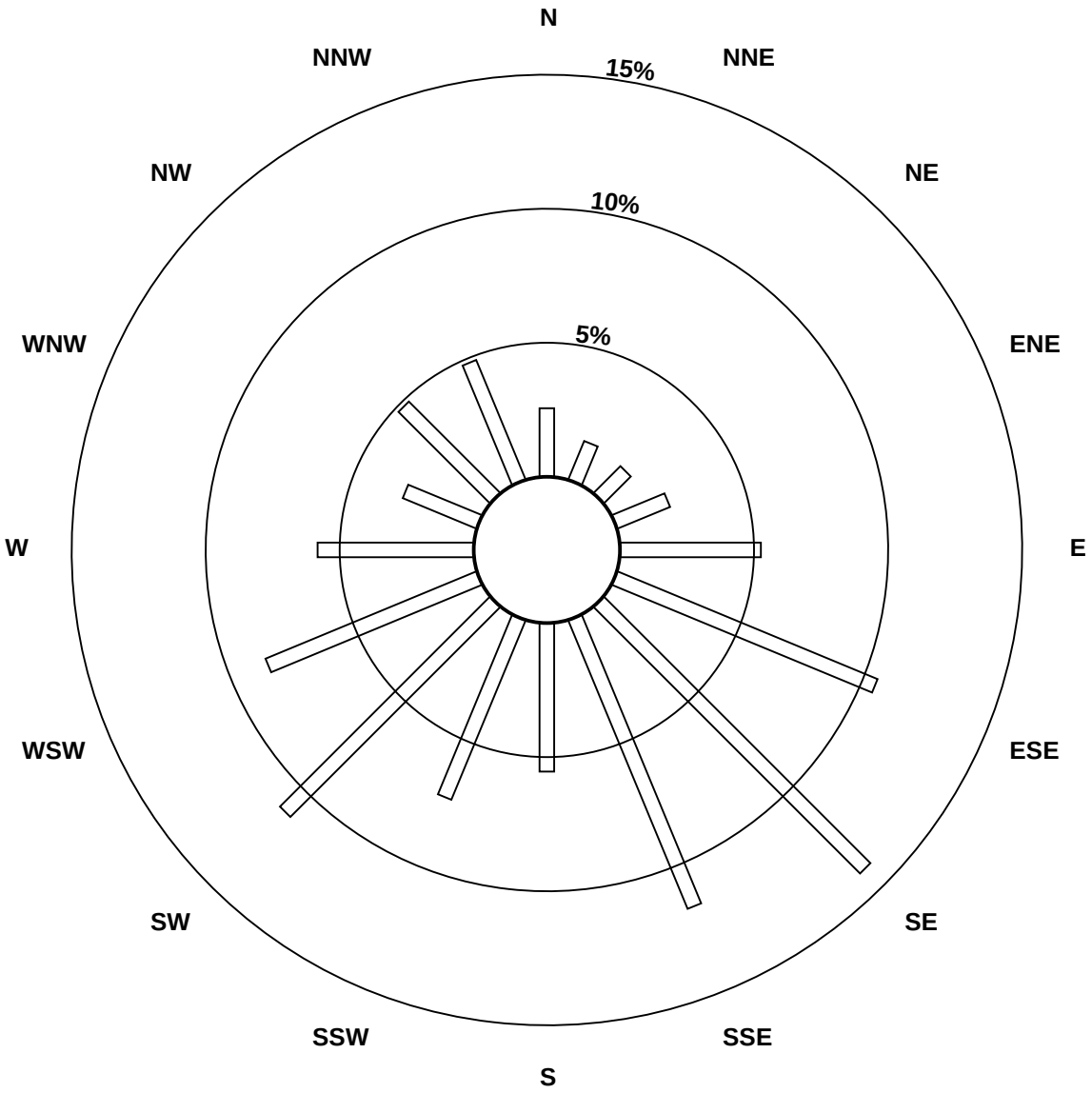
Total Number of Hours: 744

Wood Buffalo Environmental Association

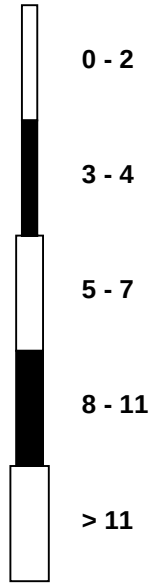
Wind Rose Aug 2015

Hydrogen Sulphide (H_2S) - ppb

Wapasu (AMS 17)



Classes (ppb)



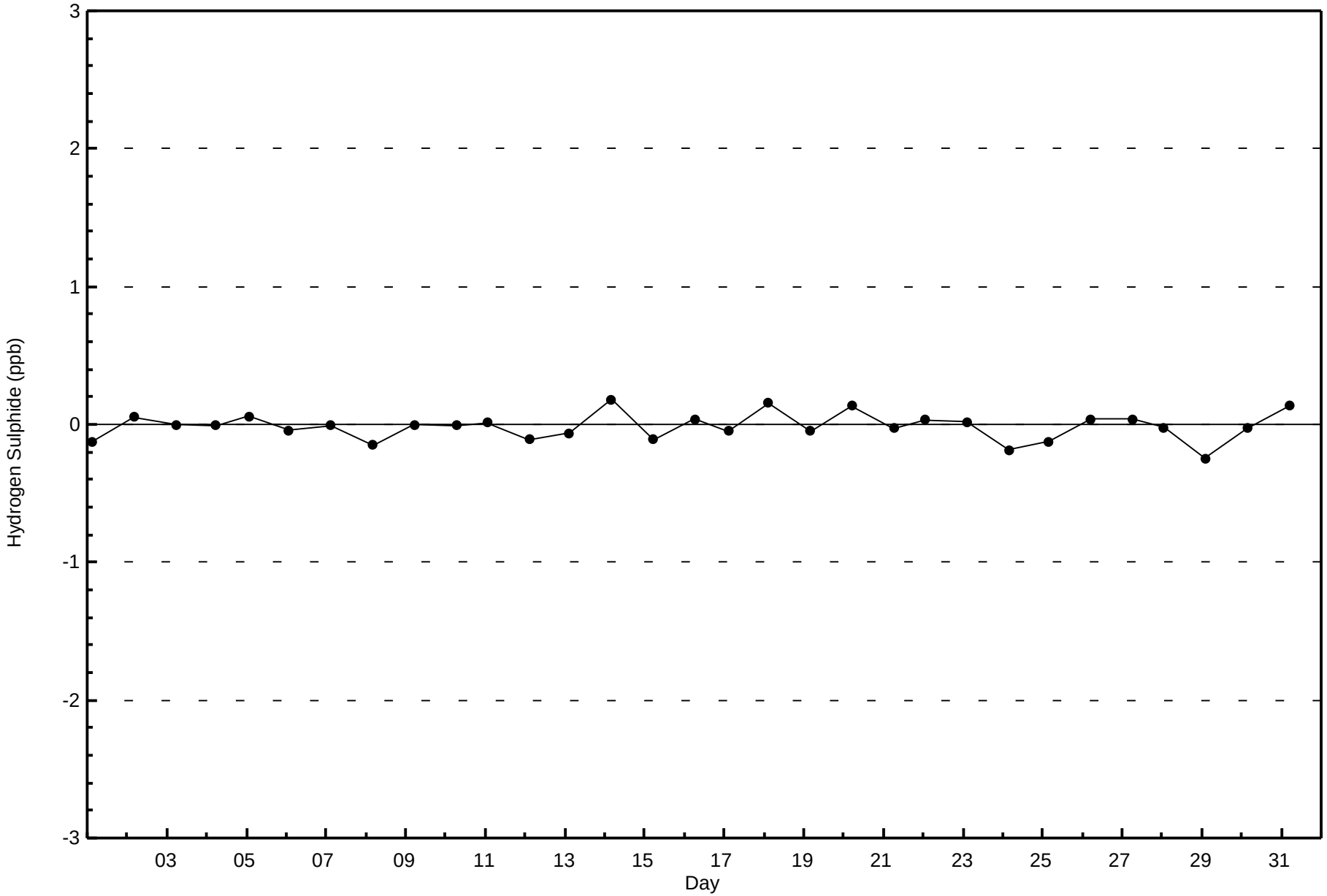
Total Number of Valid Hours: 704

Wood Buffalo Environmental Association

Zero Responses

Hydrogen Sulphide (H_2S) - ppb

Wapasu - August 2015

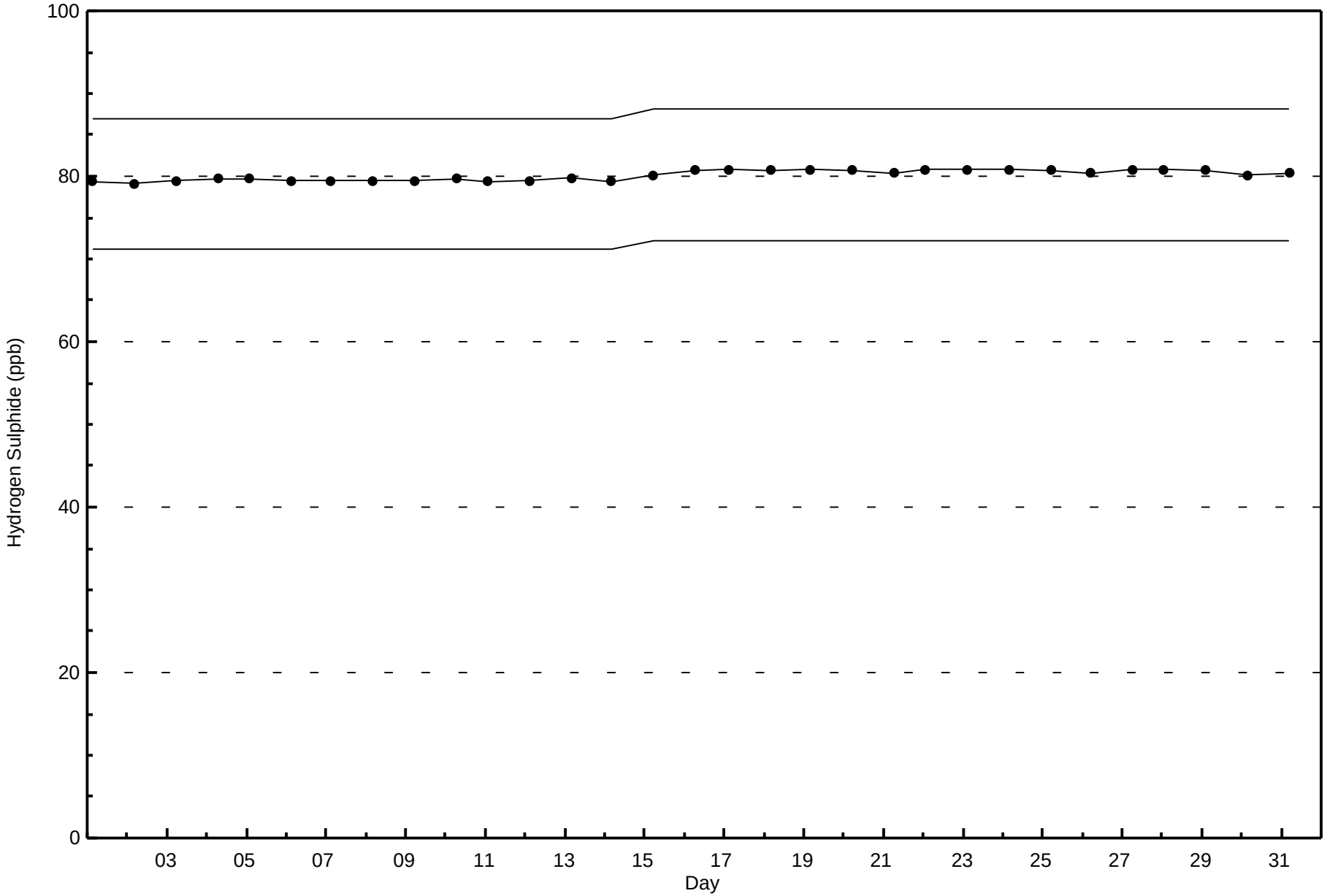


Wood Buffalo Environmental Association

Span Responses

Hydrogen Sulphide (H_2S) - ppb

Wapasu - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Wapasu - August 2015

Maximum Value: 2.6 ppm on Aug 17 03:00

Maximum Daily Average: 2.2 ppm on Aug 17

Minimum Value: 1.9 ppm on Aug 19 17:00

Minimum Daily Average: 2.0 ppm on Aug 19

Maximum Diurnal Average: 2.2 ppm at hour 4

Minimum Diurnal Average: 2.0 ppm at hour 17

Monthly Average: 2.08 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} = 2.4

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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	2.2	2.2	Z	2.2	2.4	2.2	2.2	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.1	2.1	2.2	2.2	2.1	2.4
2-Aug	2.2	2.2	2.1	Z	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.3	2.2	2.1	2.3
3-Aug	2.2	2.2	2.2	2.1	Z	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.2
4-Aug	2.1	2.1	2.1	2.0	2.0	Z	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
5-Aug	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
6-Aug	2.0	Z	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.1
7-Aug	2.0	2.1	Z	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.1
8-Aug	2.0	2.0	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	2.1	2.0	2.1	2.0	2.1
9-Aug	2.1	2.1	2.1	2.1	Z	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.2
10-Aug	2.1	2.1	2.1	2.1	2.1	Z	2.2	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	2.1	2.1	2.1	2.1	2.2
11-Aug	Z	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	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.3	2.5	2.1	2.5
12-Aug	2.5	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	2.0	2.0	2.0	2.0	2.1	2.2	2.4	2.1	2.5
13-Aug	2.3	2.3	Z	2.4	2.3	2.2	2.1	2.2	2.1	C	C	C	C	C	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.1	2.4
14-Aug	2.2	2.3	2.2	Z	2.0	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.3
15-Aug	2.1	2.0	2.0	2.0	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.1	2.1	2.2
16-Aug	2.1	2.1	2.1	2.2	2.2	Z	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.2	2.1	2.0	2.0	2.0	2.1	2.2	2.2	2.5	2.4	2.2	2.1	2.5
17-Aug	2.2	Z	2.6	2.5	2.4	2.4	2.2	2.2	2.1	2.1	2.1	2.1	2.0	2.1	2.0	2.0	2.0	2.0	2.1	2.2	2.4	2.2	2.1	2.1	2.2	2.6
18-Aug	2.1	2.2	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	2.0	2.1	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.3
19-Aug	2.1	2.1	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	1.9	1.9	1.9	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.1
20-Aug	2.0	2.0	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	2.0	2.1	2.1	2.0	2.2	2.2	2.3	2.1	2.3
21-Aug	2.2	2.1	2.1	2.1	2.1	Z	2.3	2.2	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.3
22-Aug	Z	2.1	2.1	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.1	2.1	2.1	2.2
23-Aug	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1
24-Aug	2.1	2.2	Z	2.2	2.1	2.1	2.1	2.1	2.1	2.0	2.0	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	2.2
25-Aug	2.0	2.1	2.1	Z	2.2	2.2	2.2	2.1	2.1	2.0	2.3	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.2	2.1	2.3
26-Aug	2.0	2.0	2.0	2.1	Z	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.3	2.2	2.2	2.2	2.3	2.1	2.3
27-Aug	2.4	2.3	2.2	2.2	2.1	Z	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.4
28-Aug	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.2
29-Aug	2.1	Z	2.3	2.2	2.1	2.1	2.1	2.1	2.3	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.3
30-Aug	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
31-Aug	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.0	2.2	2.4	2.4	2.3	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.4
	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	Diurnal Average
	2.5	2.3	2.6	2.5	2.4	2.4	2.3	2.2	2.3	2.2	2.3	2.1	2.2	2.4	2.4	2.3	2.1	2.1	2.1	2.3	2.4	2.5	2.4	2.5		Diurnal Maximum

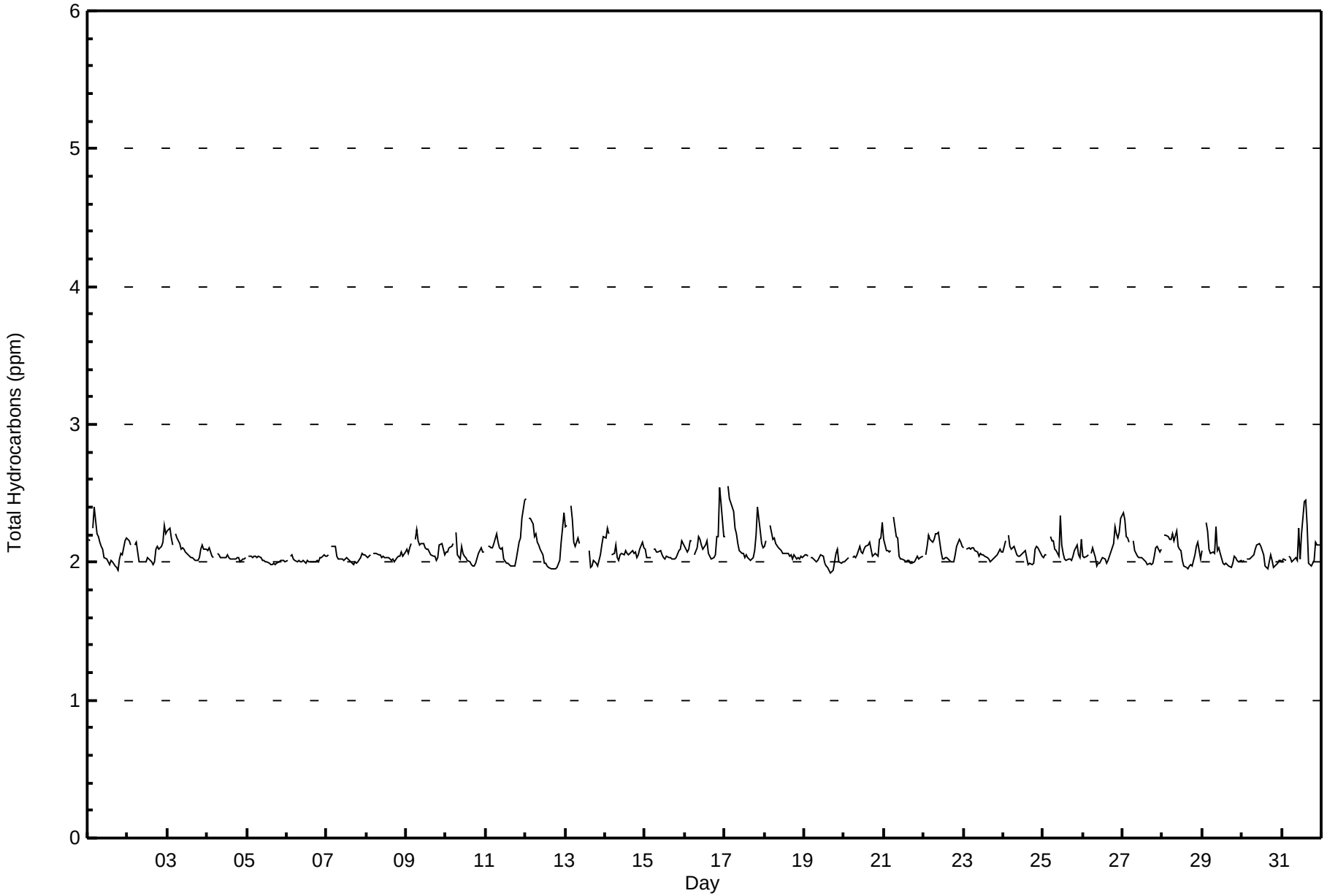
Z - zerospan C - Calibration

Wood Buffalo Environmental Association

Hourly Averages

Total Hydrocarbons (THC) - ppm

Wapasu - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm

Wapasu - August 2015

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	338	47.74	47.74
2.1 - 3.0	370	52.26	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Total Hydrocarbons (THC) - ppm

Wapasu - August 2015

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	11	7	2	9	16	48	45	27	14	20	38	37	14	14	22	14	338
2.1 - 3.0	8	3	7	7	21	26	56	56	23	29	36	23	33	7	12	23	370
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	19	10	9	16	37	74	101	83	37	49	74	60	47	21	34	37	708

Total Number of Valid Hours: 708

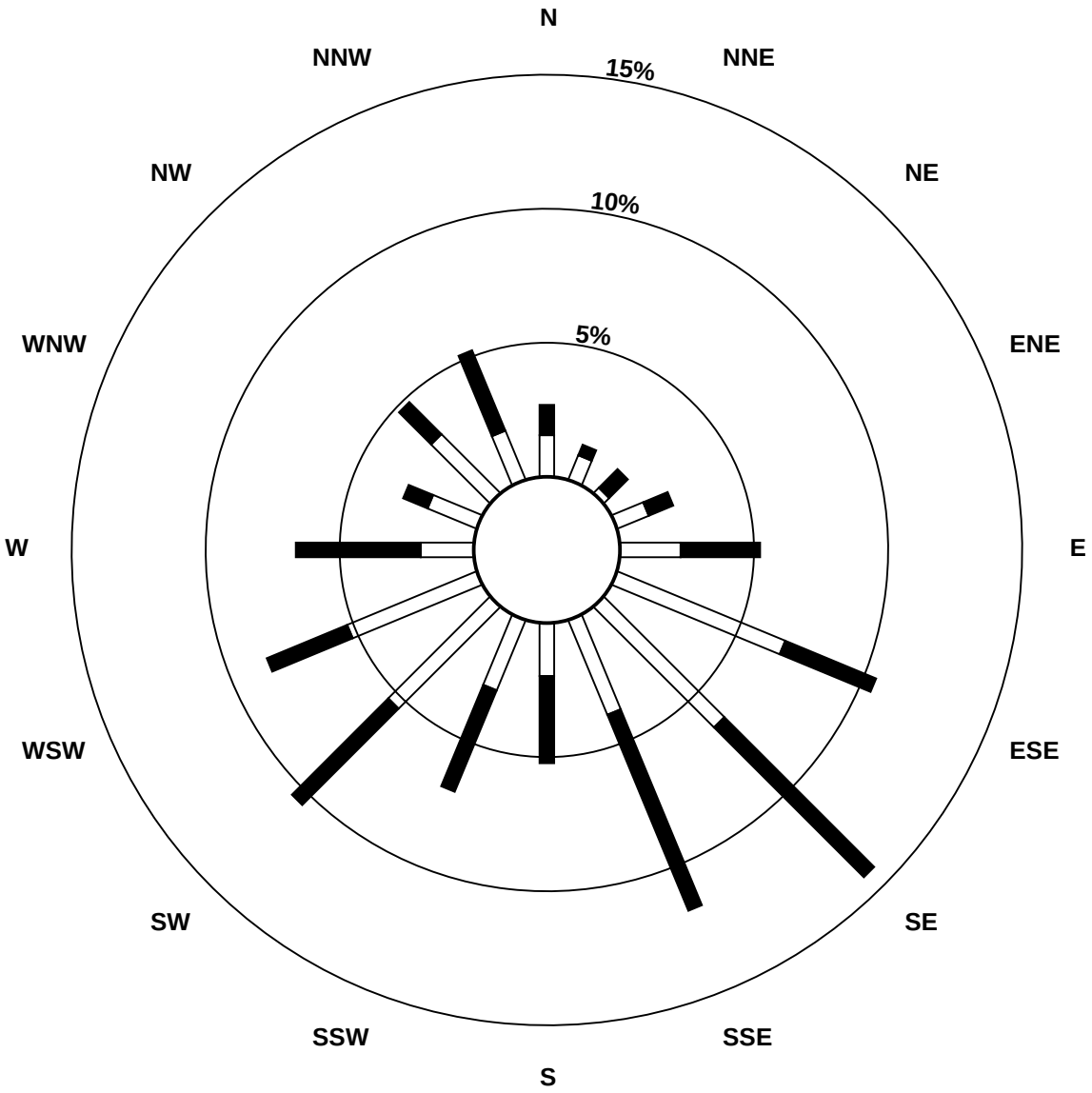
Total Number of Hours: 744

Wood Buffalo Environmental Association

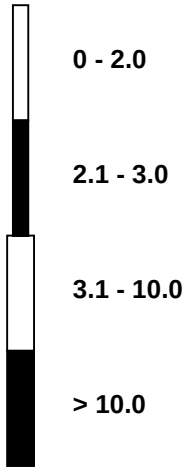
Wind Rose Aug 2015

Total Hydrocarbons (THC) - ppm

Wapasu (AMS 17)



Classes (ppm)



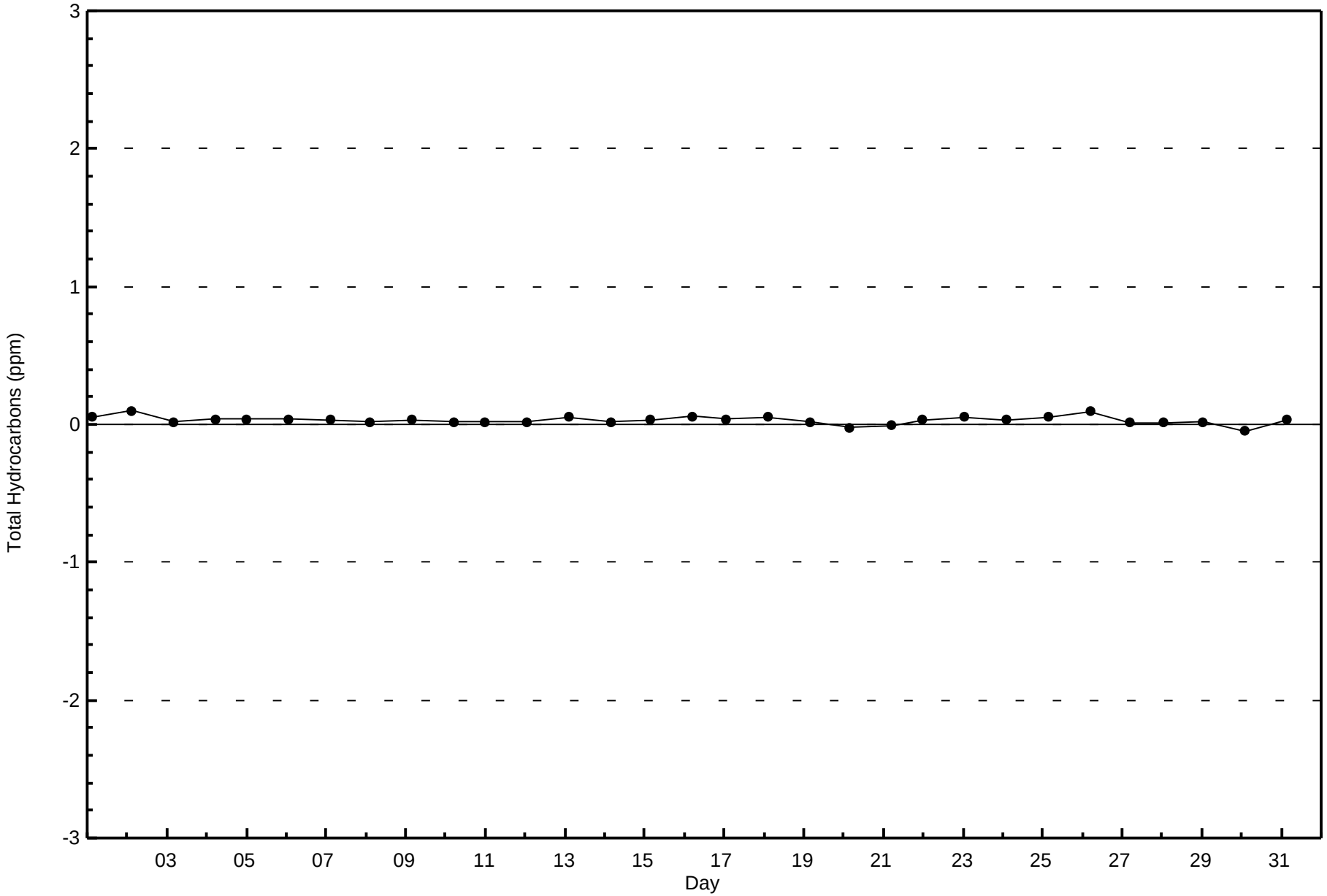
Total Number of Valid Hours: 708

Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Wapasu - August 2015

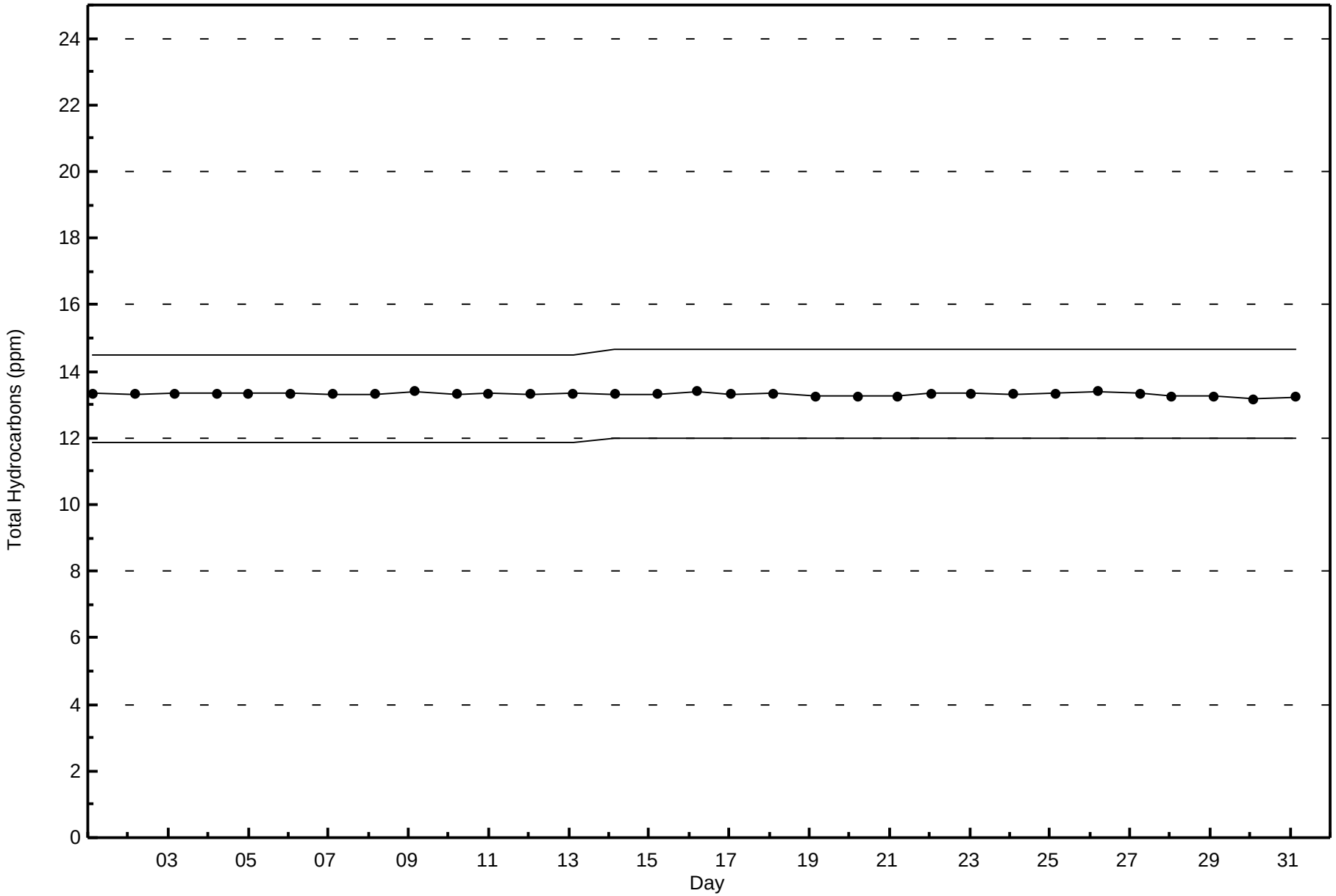


Wood Buffalo Environmental Association

Span Responses

Total Hydrocarbons (THC) - ppm

Wapasu - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O_3) - ppb

Wapasu - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 44 ppb on Aug 30 14:00

Maximum Daily Average: 30.0 ppb on Aug 30

Minimum Value: 1 ppb on Aug 16 05:00

Minimum Daily Average: 10.7 ppb on Aug 7

Maximum Diurnal Average: 29.6 ppb at hour 17

Minimum Diurnal Average: 13.0 ppb at hour 6

Monthly Average: 20.8 ppb

Percentiles: $P_1 = 3$ $P_{10} = 9$ $Q_1 = 14$ Median = 20 $Q_3 = 28$ $P_{90} = 34$ $P_{99} = 41$

Hours in Service:	744
Hours of Data:	709
Hours of Missing Data:	35
Hours of Calibration:	35
Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	4	6	5	4	Z	3	6	12	18	22	25	25	22	21	24	25	25	27	24	16	7	4	2	2	14.3	27
2-Aug	5	5	6	6	5	Z	15	22	26	28	28	28	33	39	40	41	40	31	32	31	22	12	8	6	22.1	41
3-Aug	7	10	21	24	23	20	Z	22	25	26	30	30	30	29	28	27	25	26	25	25	20	20	20	20	23.3	30
4-Aug	23	20	23	26	27	26	27	Z	25	24	22	22	18	21	25	26	27	25	20	17	23	20	16	10	22.3	27
5-Aug	10	10	Z	12	10	10	13	14	18	22	23	25	25	24	24	24	24	25	22	17	16	16	16	16	18.0	25
6-Aug	13	11	8	Z	11	11	13	14	14	13	13	13	12	11	11	12	12	11	11	10	9	9	9	9	11.3	14
7-Aug	9	8	6	2	Z	3	7	10	10	8	8	8	10	12	14	16	17	16	18	16	14	13	11	11	10.7	18
8-Aug	12	11	11	10	9	Z	8	9	12	14	18	23	24	23	24	30	36	24	21	24	20	17	16	15	17.9	36
9-Aug	8	4	4	3	4	5	Z	16	22	26	32	35	41	43	39	34	35	33	28	21	17	19	21	22	22.2	43
10-Aug	22	20	18	16	14	9	21	Z	34	35	37	39	40	39	38	38	38	38	36	29	22	21	26	20	28.2	40
11-Aug	20	19	Z	21	19	15	13	13	21	26	31	32	31	33	34	33	32	32	29	24	24	25	18	16	24.3	34
12-Aug	16	14	14	Z	8	13	16	23	26	29	30	29	30	31	33	34	36	34	30	28	26	22	15	8	23.7	36
13-Aug	10	13	8	6	Z	12	12	11	15	17	14	17	17	14	16	23	23	25	23	20	18	19	14	13	15.6	25
14-Aug	17	13	13	18	20	Z	19	21	24	C	C	C	C	22	20	17	16	17	17	18	18	16	14	15	17.7	24
15-Aug	16	17	15	14	13	14	Z	17	15	15	18	21	22	25	29	30	29	27	26	22	15	14	4	9	18.5	30
16-Aug	12	13	12	2	1	4	12	Z	12	14	17	20	20	22	26	27	26	25	21	9	6	6	5	7	13.9	27
17-Aug	7	6	5	Z	1	3	7	11	17	19	23	29	31	35	35	35	36	34	27	20	14	17	21	23	19.9	36
18-Aug	15	9	4	6	Z	11	12	16	18	21	23	27	30	31	32	33	35	35	33	26	25	25	25	24	22.6	35
19-Aug	23	23	23	26	27	Z	29	30	29	28	28	28	26	25	33	32	31	30	27	22	21	20	17	16	25.9	33
20-Aug	16	16	17	16	17	20	Z	20	20	18	19	17	16	16	15	15	15	18	18	17	15	7	10	8	15.9	20
21-Aug	13	13	13	12	12	9	9	Z	10	15	17	18	18	18	19	20	20	19	17	13	13	14	8	11	14.4	20
22-Aug	12	10	Z	7	7	8	8	8	9	9	17	20	22	25	25	25	25	25	23	11	4	7	9	14	14.3	25
23-Aug	15	17	17	Z	17	18	19	20	23	27	29	30	32	34	33	37	40	39	37	36	36	35	34	27	28.4	40
24-Aug	20	23	21	16	Z	22	21	25	29	31	31	31	34	37	34	32	31	30	28	17	10	10	16	21	24.8	37
25-Aug	21	21	18	15	12	Z	15	19	19	24	17	25	25	25	22	22	22	22	17	13	10	12	14	9	18.3	25
26-Aug	13	18	16	15	15	12	Z	18	25	24	24	27	28	31	33	34	35	33	23	15	14	16	17	12	21.8	35
27-Aug	8	6	10	11	12	14	19	Z	28	30	31	34	37	36	36	37	37	35	37	32	31	29	31	29	26.4	37
28-Aug	26	23	Z	23	21	22	19	24	17	24	29	31	34	33	34	34	35	34	30	18	11	13	19	23	25.1	35
29-Aug	14	8	6	Z	15	12	13	16	18	30	31	35	38	40	42	42	40	39	36	32	31	31	32	32	27.4	42
30-Aug	31	30	29	30	Z	26	25	24	26	31	36	40	43	44	39	38	38	30	30	24	23	21	17	16	30.0	44
31-Aug	16	16	17	18	19	Z	21	18	17	23	28	29	30	33	35	34	33	33	31	27	22	25	22	19	24.6	35
	14.7	14.0	13.3	13.7	13.5	13.0	15.4	17.4	20.1	22.3	24.2	26.3	27.4	28.1	28.7	29.3	29.6	28.1	25.7	20.9	17.9	17.2	16.3	15.6	Diurnal Average	
	31	30	29	30	27	26	29	30	34	35	37	40	43	44	42	42	40	39	37	36	36	35	34	32	Diurnal Maximum	

Z - zerospan C - Calibration

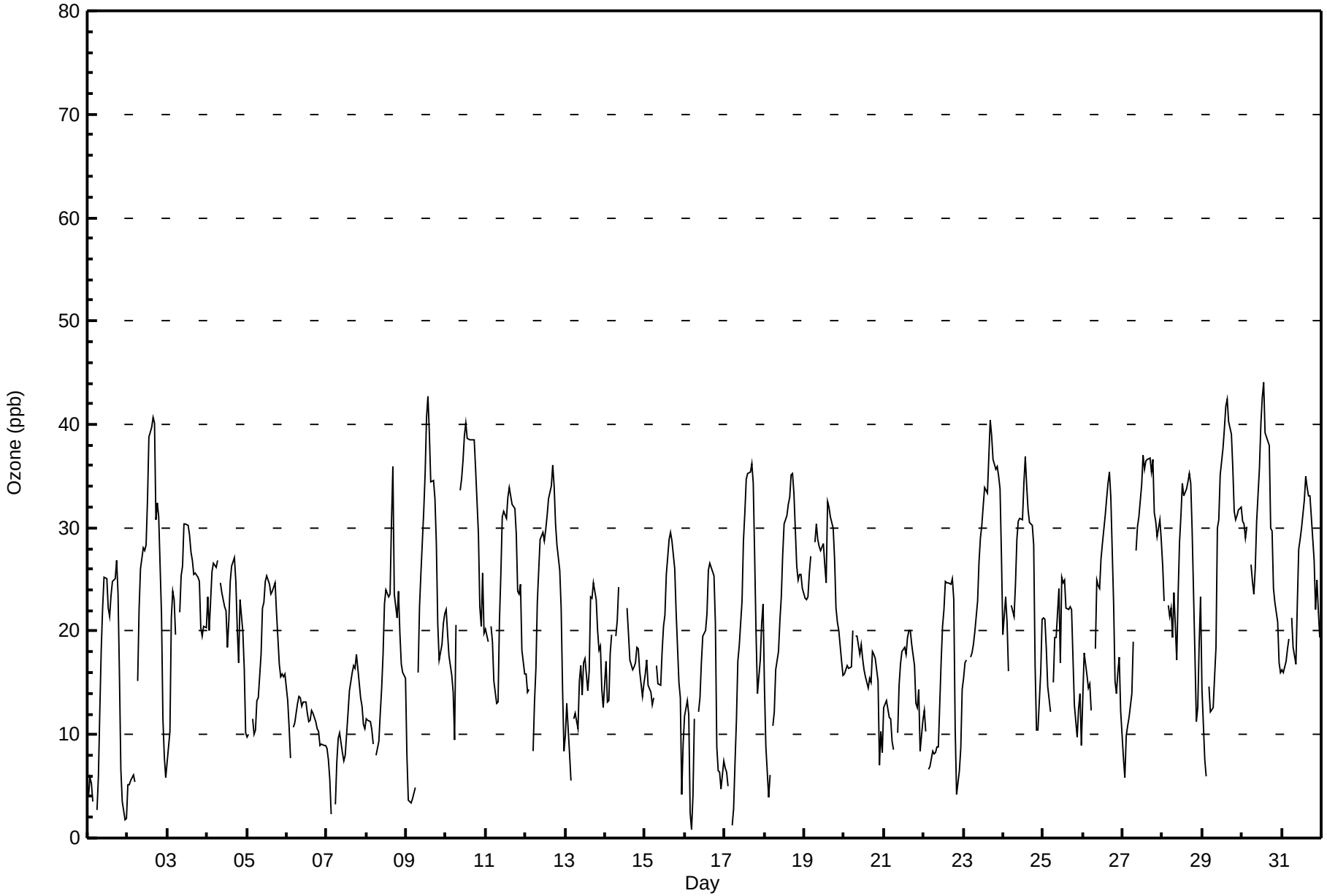
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb

Wood Buffalo Environmental Association

Hourly Averages

Ozone (O_3) - ppb

Wapasu - August 2015



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	360	50.78	50.78
21 - 50	349	49.22	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 (O_3) - ppb

Wapasu - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	8	6	9	8	21	42	73	49	15	19	20	21	26	10	19	14	360
21 - 50	12	4	1	7	15	35	25	32	23	33	58	38	18	10	16	22	349
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	20	10	10	15	36	77	98	81	38	52	78	59	44	20	35	36	709

Total Number of Valid Hours: 709

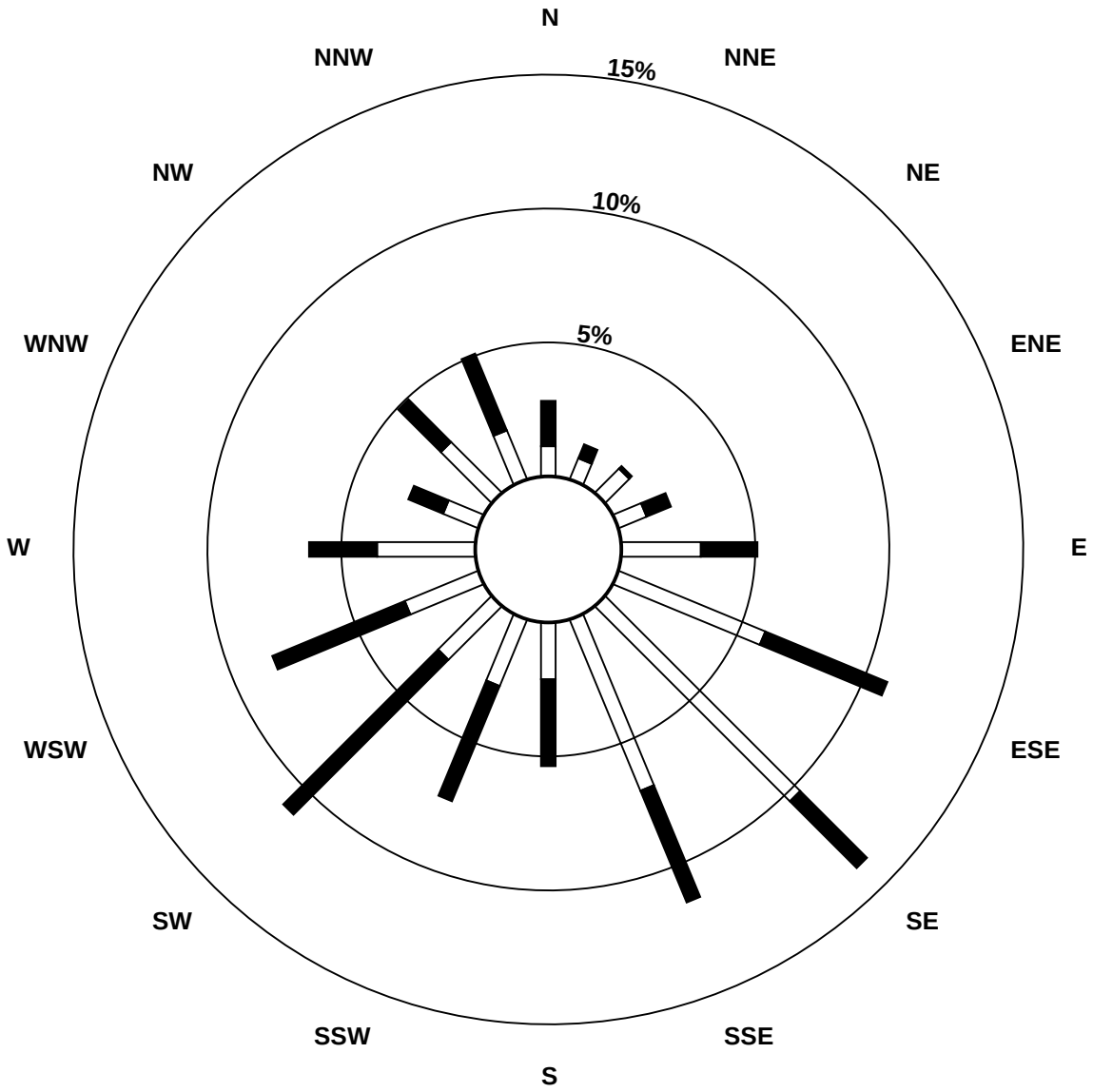
Total Number of Hours: 744

Wood Buffalo Environmental Association

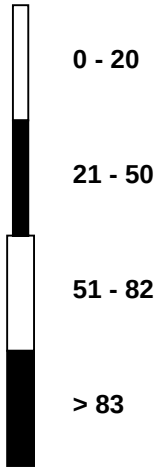
Wind Rose Aug 2015

Ozone (O_3) - ppb

Wapasu (AMS 17)



Classes (ppb)



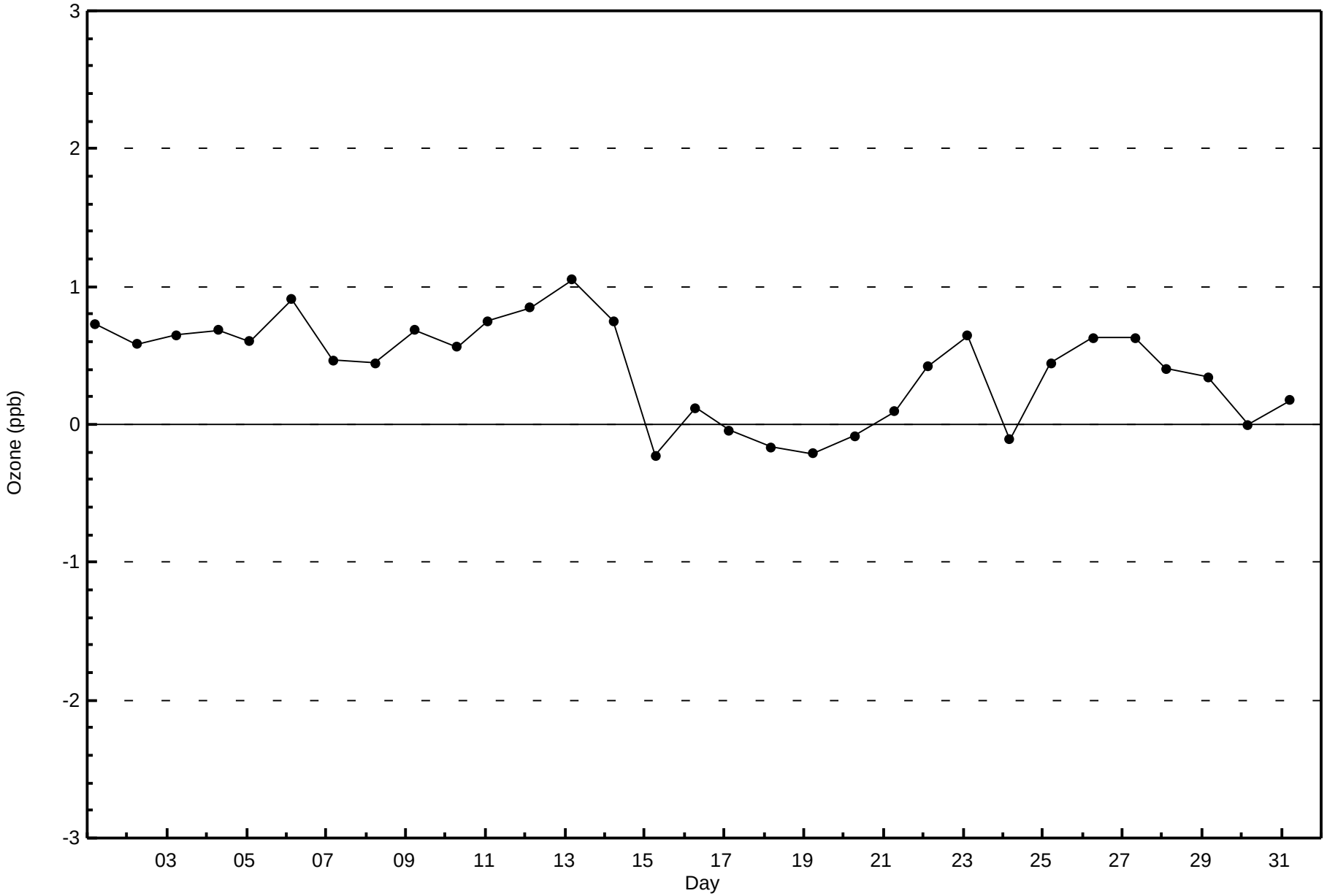
Total Number of Valid Hours: 709

Wood Buffalo Environmental Association

Zero Responses

Ozone (O_3) - ppb

Wapasu - August 2015

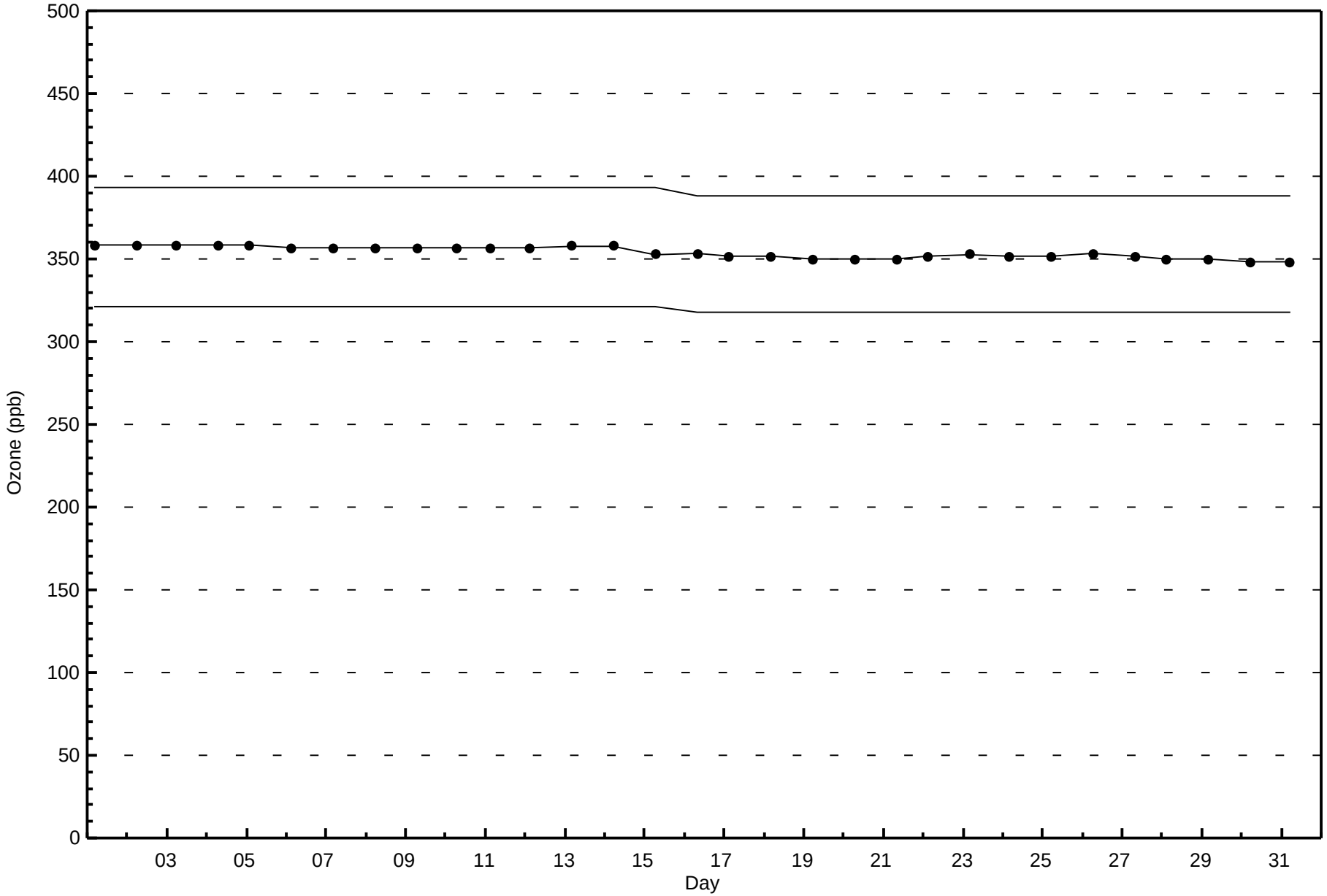


Wood Buffalo Environmental Association

Span Responses

Ozone (O_3) - ppb

Wapasu - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

Wapasu - August 2015

Maximum Value: 7 ppb on Aug 25 11:00

Maximum Daily Average: 1.9 ppb on Aug 17

Minimum Value: 0 ppb on Aug 2 22:00

Minimum Daily Average: 0.2 ppb on Aug 3

Maximum Diurnal Average: 1.3 ppb at hour 9

Minimum Diurnal Average: 0.3 ppb at hour 21

Monthly Average: 0.6 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 1$ $P_{90} = 1$ $P_{99} = 4$

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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0	0	Z	0	1	1	1	1	2	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0.6	2
2-Aug	0	0	0	Z	0	1	2	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.4	2
3-Aug	0	0	0	0	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
4-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0.3	1
5-Aug	Z	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
6-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
7-Aug	0	0	Z	1	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0.4	1
8-Aug	0	0	0	Z	0	0	1	1	1	1	0	1	0	0	1	0	0	0	1	0	0	0	0	0	0.5	1
9-Aug	0	0	0	0	Z	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0.5	1
10-Aug	0	0	0	0	0	Z	1	0	0	1	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0.5	1
11-Aug	Z	0	0	0	0	1	1	2	4	3	1	0	0	0	0	1	0	1	1	1	0	0	1	1	0.8	4
12-Aug	0	Z	0	0	1	1	3	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	3
13-Aug	0	0	Z	0	0	1	1	4	3	C	C	C	C	C	2	0	1	1	1	1	0	0	0	1	1.0	4
14-Aug	0	0	1	Z	0	0	1	0	1	1	1	0	1	0	1	1	1	0	0	0	0	0	0	0	0.5	1
15-Aug	0	0	0	0	Z	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	2	0	0.4	2
16-Aug	0	0	0	0	1	Z	0	1	2	2	2	1	2	2	1	0	0	0	0	0	0	0	1	1	0.8	2
17-Aug	1	Z	1	2	4	7	6	6	4	4	4	1	1	1	0	0	0	0	0	0	0	0	0	0	1.9	7
18-Aug	0	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
19-Aug	0	0	0	Z	0	0	0	0	0	1	1	1	0	0	0	1	0	0	0	1	0	0	0	0	0.4	1
20-Aug	0	0	1	0	Z	0	1	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0.6	1
21-Aug	0	0	0	0	0	Z	1	1	2	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.5	2
22-Aug	Z	0	0	0	1	0	1	1	2	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	3
23-Aug	0	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
24-Aug	0	0	Z	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1	0	0.5	1
25-Aug	0	0	0	Z	1	1	1	1	1	1	7	1	1	0	0	1	0	0	0	0	0	0	0	1	0.8	7
26-Aug	0	1	0	0	Z	0	0	1	0	0	0	0	1	1	0	1	1	1	1	0	0	0	0	0	0.5	1
27-Aug	1	1	0	1	1	Z	1	1	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0.5	1
28-Aug	Z	1	0	0	0	0	2	2	5	3	2	2	1	1	0	1	1	1	1	0	1	0	1	1	1.1	5
29-Aug	1	Z	1	0	0	0	1	2	6	2	2	1	0	0	0	1	0	0	0	0	0	0	0	0	0.8	6
30-Aug	0	0	Z	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1
31-Aug	0	0	0	Z	0	0	0	1	1	2	2	1	1	1	1	1	0	1	0	1	1	1	0	1	0.7	2
	0.3	0.3	0.4	0.4	0.5	0.7	1.0	1.1	1.3	1.1	1.1	0.7	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.4	0.3	Diurnal Average	
	1	1	1	2	4	7	6	6	6	4	7	2	2	2	2	1	1	1	1	1	1	1	2	1	Diurnal Maximum	

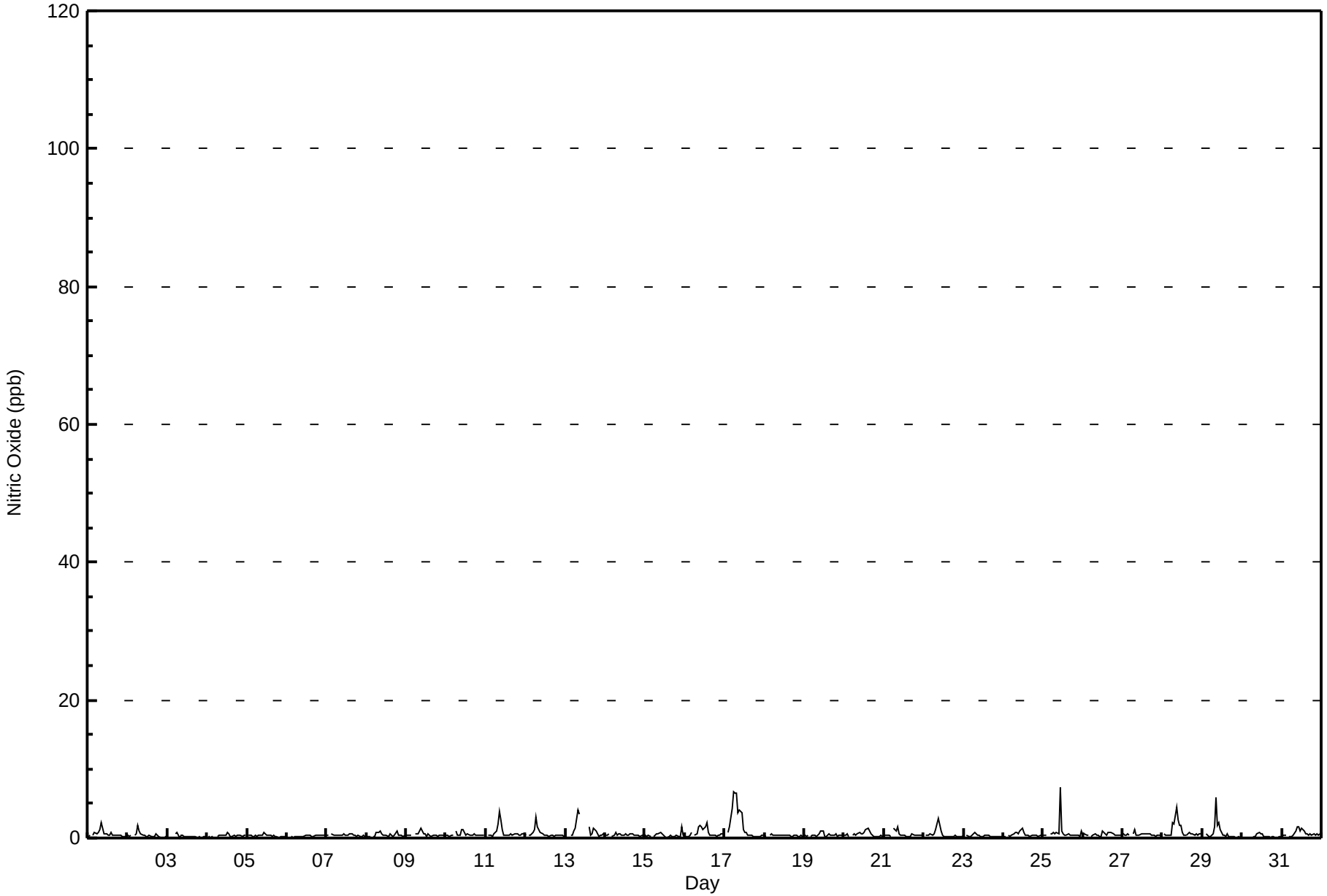
Z - zerospan C - Calibration

Wood Buffalo Environmental Association

Hourly Averages

Nitric Oxide (NO) - ppb

Wapasu - August 2015



Wood Buffalo Environmental Association | **Nitric Oxide (NO) - ppb**

Cumulative Frequency Distribution | **Wapasu - August 2015**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	708	100.00	100.00
21 - 40	0	0.00	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: 708

Total Number of Hours: 744

Wood Buffalo Environmental Association | **Nitric Oxide (NO) - ppb**

Frequency Distribution | **Wapasu - August 2015**

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	19	10	9	16	37	74	101	83	37	49	74	60	47	21	34	37	708
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	19	10	9	16	37	74	101	83	37	49	74	60	47	21	34	37	708

Total Number of Valid Hours: 708

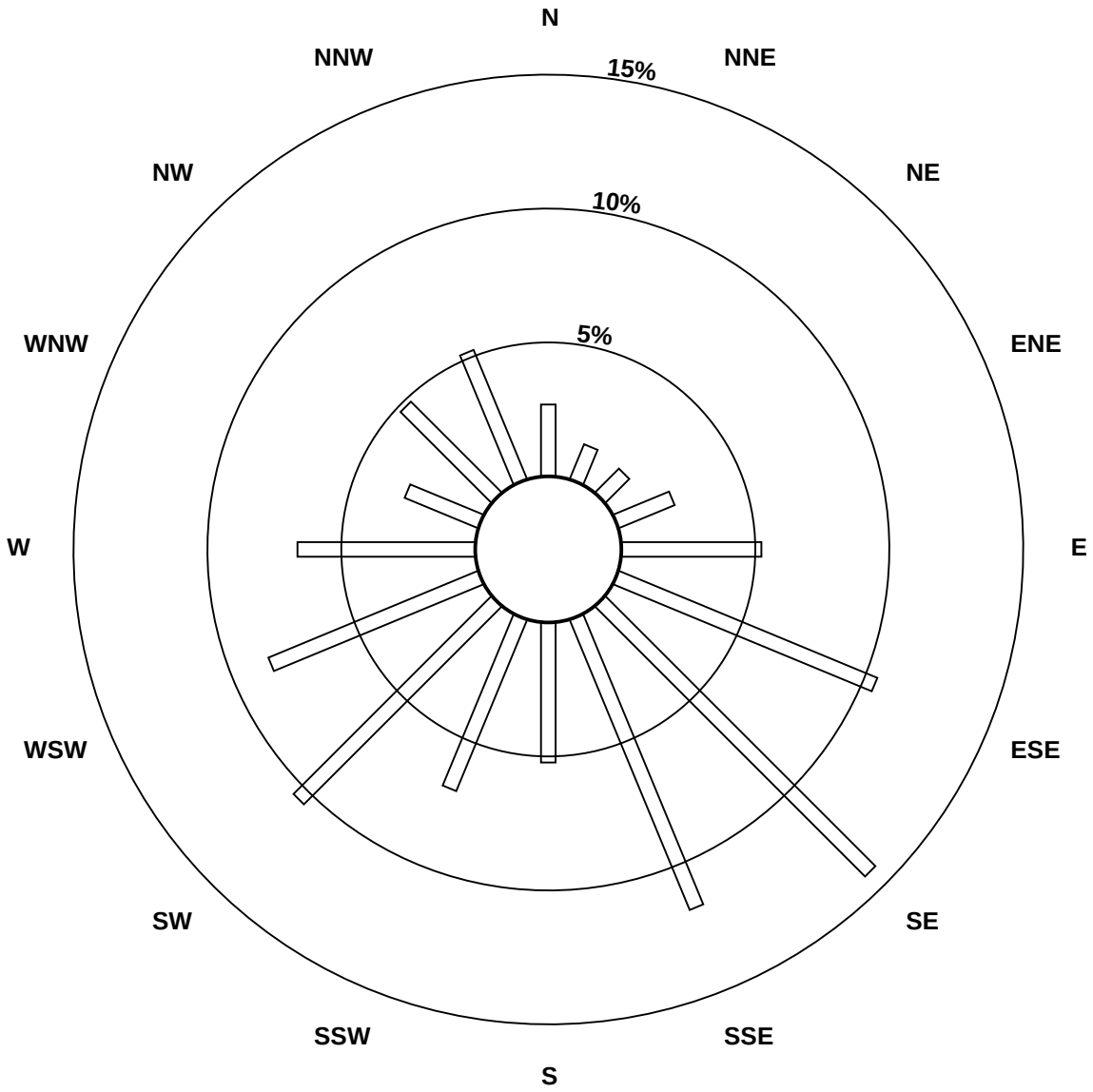
Total Number of Hours: 744

Wood Buffalo Environmental Association

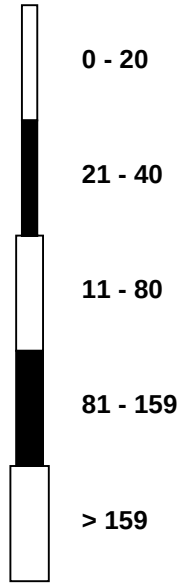
Wind Rose Aug 2015

Nitric Oxide (NO) - ppb

Wapasu (AMS 17)



Classes (ppb)



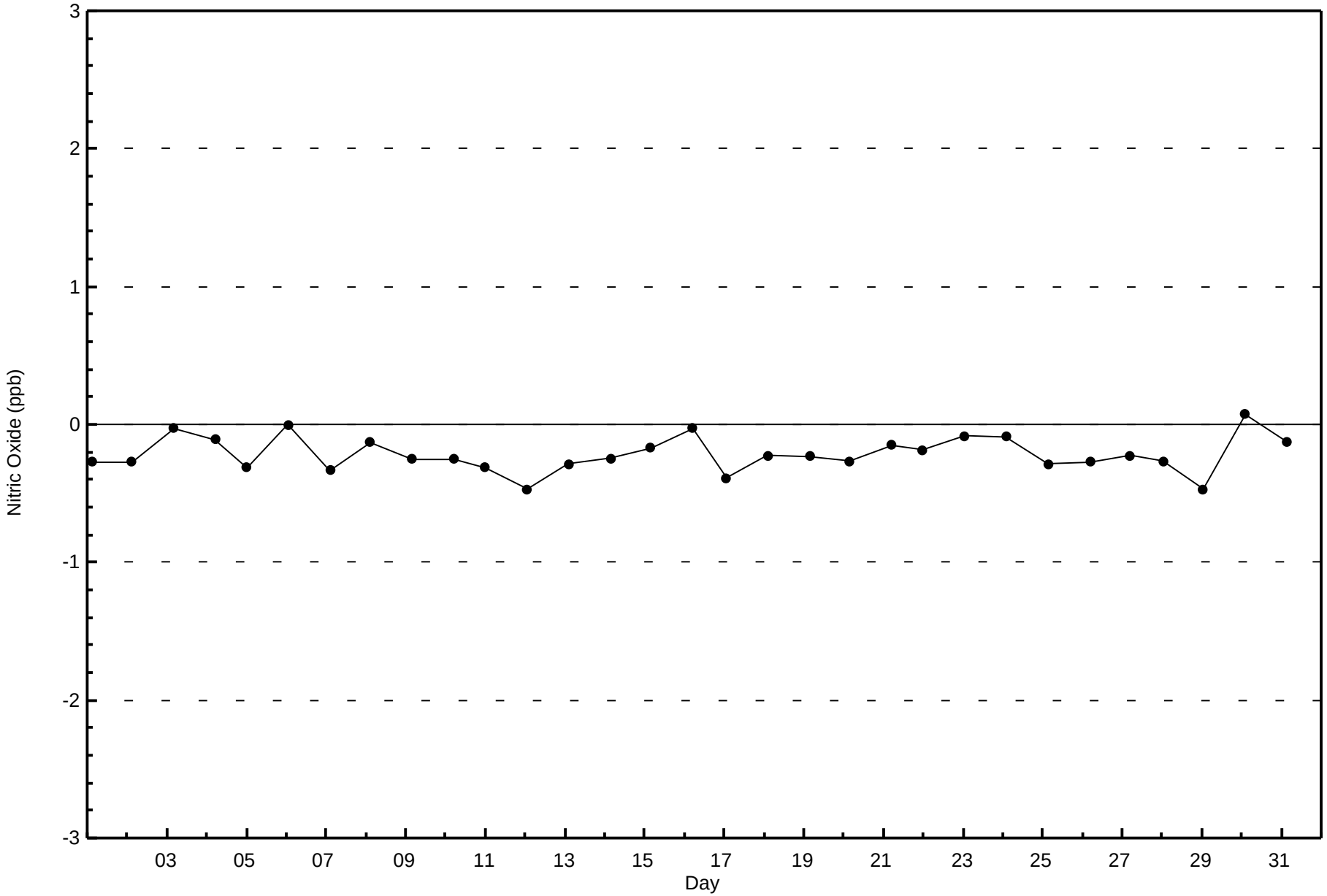
Total Number of Valid Hours: 708

Wood Buffalo Environmental Association

Zero Responses

Nitric Oxide (NO) - ppb

Wapasu - August 2015

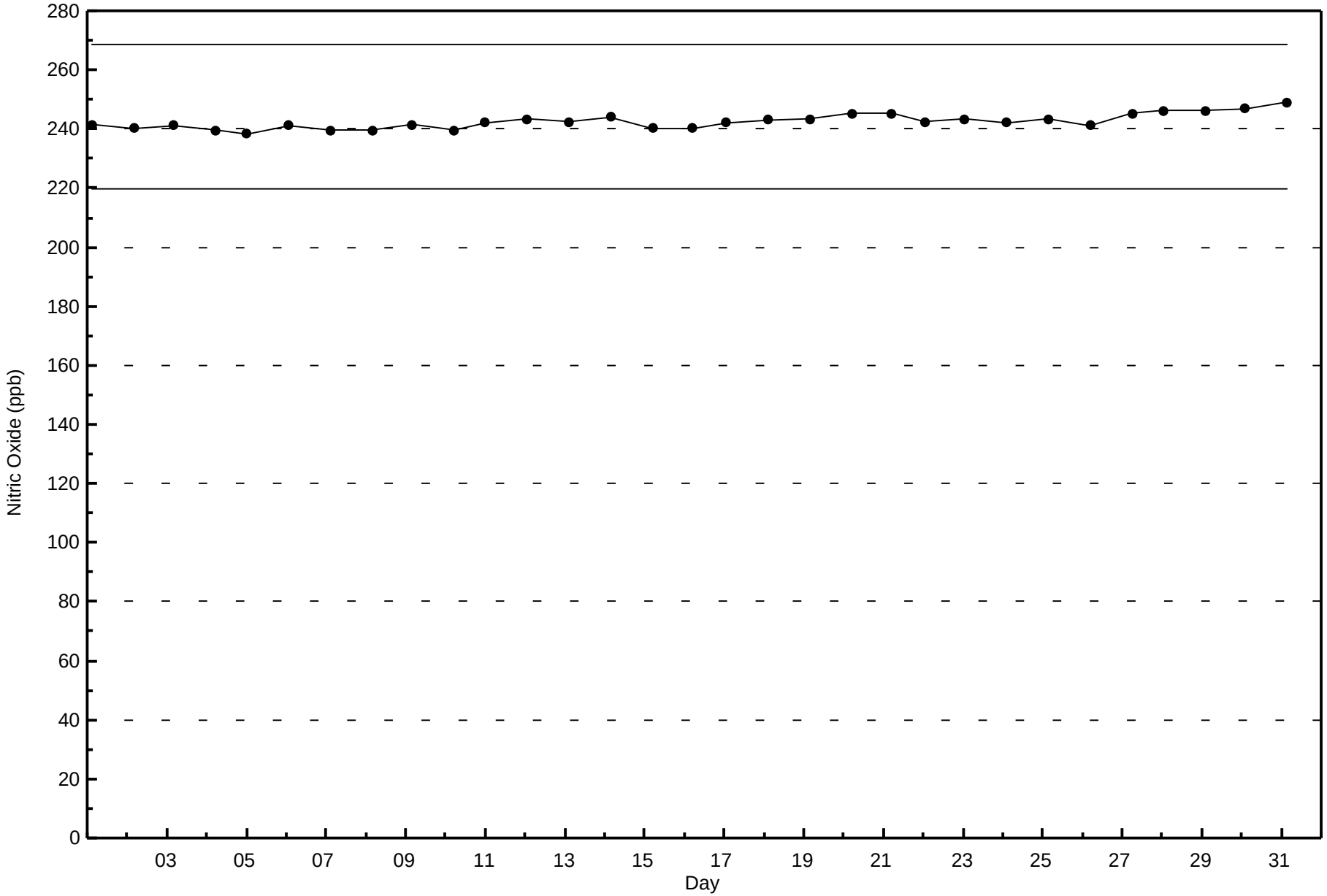


Wood Buffalo Environmental Association

Span Responses

Nitric Oxide (NO) - ppb

Wapasu - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO_2) - ppb

Wapasu - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 15 ppb on Aug 17 05:00

Maximum Daily Average: 7.0 ppb on Aug 13

Minimum Value: 0 ppb on Aug 1 18:00

Minimum Daily Average: 0.0 ppb on Aug 7

Maximum Diurnal Average: 3.2 ppb at hour 5

Minimum Diurnal Average: 0.6 ppb at hour 16

Monthly Average: 1.7 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 1 $Q_3 = 2$ $P_{90} = 5$ $P_{99} = 12$

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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	1	2	Z	2	3	2	2	3	3	3	1	0	0	0	1	0	0	0	0	0	0	0	0	0	1.0	3
2-Aug	1	1	0	Z	0	1	4	2	1	0	0	0	0	1	1	1	1	4	4	3	1	1	3	3	1.4	4
3-Aug	2	1	1	1	Z	5	4	1	1	2	1	1	1	1	1	1	1	0	0	0	1	1	1	0	1.1	5
4-Aug	0	2	1	1	0	Z	1	1	1	1	1	1	3	1	0	0	0	0	0	0	0	0	0	0	0.6	3
5-Aug	Z	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0.2	1
6-Aug	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
7-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
8-Aug	0	0	0	Z	0	0	1	1	1	1	0	0	0	0	1	1	1	0	5	0	0	0	0	0	0.6	5
9-Aug	0	0	0	0	Z	1	1	1	2	3	2	1	2	2	1	1	1	1	0	0	0	1	0	0	0.8	3
10-Aug	0	1	1	1	2	Z	4	1	1	4	3	3	1	1	1	0	1	1	1	1	4	6	4	6	2.1	6
11-Aug	Z	6	5	3	4	7	8	7	7	5	3	1	0	0	0	0	0	0	1	4	3	4	5	5	3.3	8
12-Aug	7	Z	8	9	14	9	8	4	2	1	1	0	0	0	0	0	0	0	0	0	1	3	5	4	3.3	14
13-Aug	9	7	Z	14	14	9	6	8	6	C	C	C	C	C	6	2	2	4	5	4	4	6	9	11	7.0	14
14-Aug	6	5	5	Z	1	2	3	1	1	1	2	1	1	1	0	1	1	1	1	0	0	1	4	2	1.8	6
15-Aug	2	0	0	0	Z	3	3	2	2	3	1	0	0	0	0	0	0	1	0	0	5	2	12	7	1.9	12
16-Aug	5	2	2	11	7	Z	1	2	5	4	2	2	3	4	1	1	1	1	1	0	1	2	2	6	2.7	11
17-Aug	7	Z	11	13	15	13	9	7	5	5	5	2	1	1	1	1	1	1	1	3	7	3	2	1	4.9	15
18-Aug	0	0	Z	1	2	1	0	0	0	0	0	0	0	1	0	1	1	1	2	0	0	0	0	0	0.4	2
19-Aug	0	0	0	Z	1	1	1	1	1	1	2	2	1	0	0	0	0	0	2	4	4	1	0	1	1.0	4
20-Aug	1	1	0	0	Z	0	0	0	1	3	2	2	2	2	3	3	2	1	1	1	1	1	3	7	1.5	7
21-Aug	3	1	1	1	1	Z	5	2	4	1	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0.9	5
22-Aug	Z	0	2	4	3	2	2	4	5	5	2	0	0	0	0	0	0	0	0	1	0	0	0	1	1.4	5
23-Aug	1	Z	1	0	0	0	1	1	1	0	0	0	0	0	1	1	1	1	1	1	1	0	1	2	0.6	2
24-Aug	1	2	Z	5	3	3	2	2	2	2	2	3	2	1	1	0	0	0	0	1	1	1	0	0	1.4	5
25-Aug	0	0	0	Z	0	4	3	1	1	1	9	2	1	0	0	0	0	0	0	0	0	0	0	5	1.2	9
26-Aug	0	0	1	0	Z	0	0	0	0	0	0	0	1	1	1	2	3	3	7	8	8	6	5	6	2.2	8
27-Aug	6	9	7	6	5	Z	2	3	1	1	1	1	1	2	1	2	1	2	2	4	3	4	3	3	3.0	9
28-Aug	Z	8	5	6	7	6	10	7	13	7	4	4	1	0	0	0	1	1	0	1	1	1	1	2	3.6	13
29-Aug	3	Z	7	3	2	1	1	3	10	4	5	3	1	1	1	1	0	0	0	0	0	0	0	0	2.1	10
30-Aug	0	0	Z	0	0	0	0	0	1	2	4	3	3	2	1	1	2	3	1	1	1	1	2	2	1.3	4
31-Aug	1	0	0	Z	1	1	1	1	2	2	3	2	2	2	0	1	1	0	1	2	6	4	5	7	1.9	7
	2.1	1.8	2.3	3.2	3.2	2.7	2.7	2.1	2.5	2.0	1.9	1.2	0.9	0.8	0.7	0.6	0.7	0.8	1.1	1.2	1.7	1.6	2.2	2.6	Diurnal Average	
	9	9	11	14	15	13	10	8	13	7	9	4	3	4	6	3	3	4	7	8	8	6	12	11	Diurnal Maximum	

Z - zerospan C - Calibration

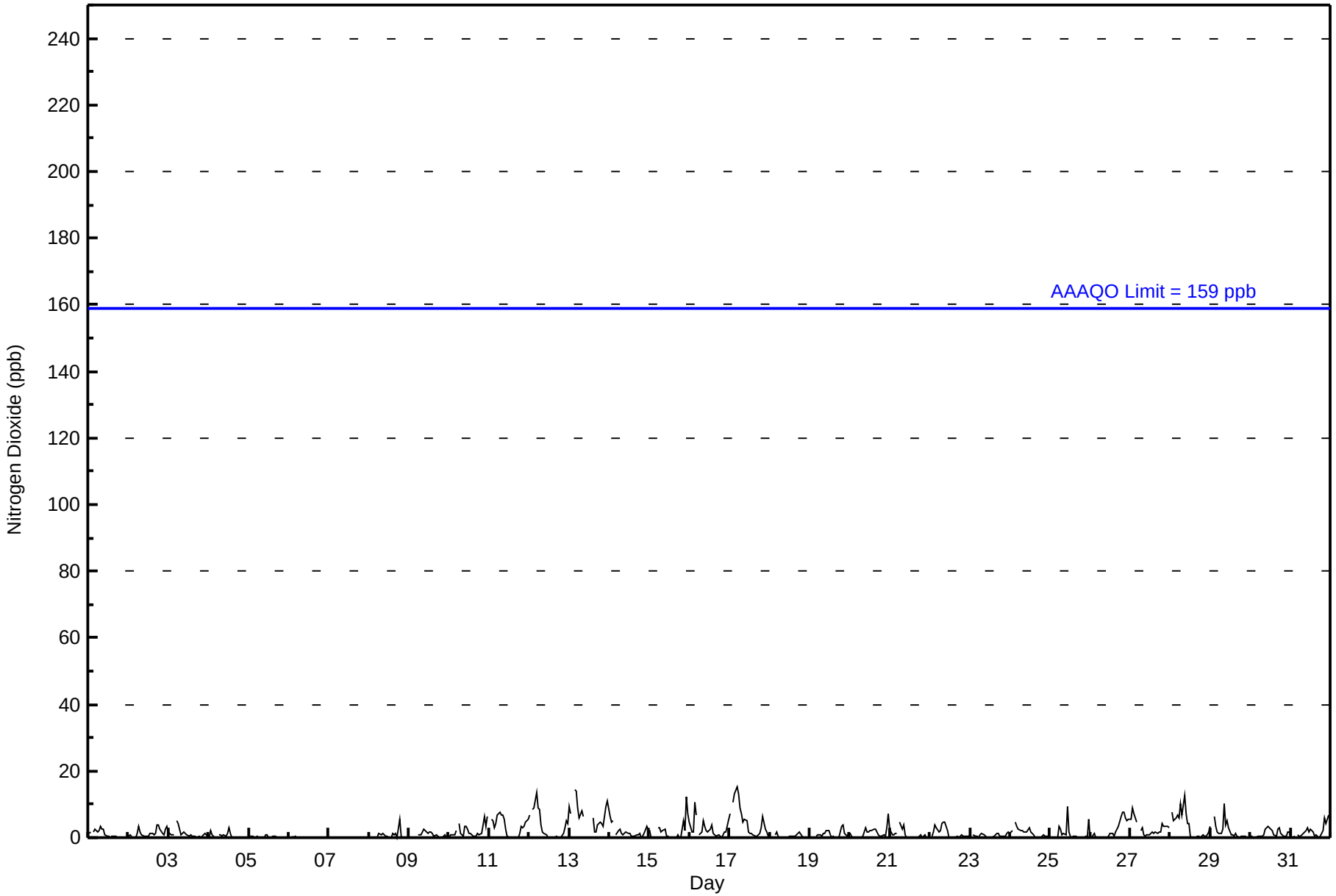
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Dioxide (NO_2) - ppb

Wapasu - August 2015



Nitrogen Dioxide (NO_2) - ppb
Wapasu - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	708	100.00	100.00
21 - 40	0	0.00	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: 708

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Dioxide (NO_2) - ppb

Wapasu - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	19	10	9	16	37	74	101	83	37	49	74	60	47	21	34	37	708
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	19	10	9	16	37	74	101	83	37	49	74	60	47	21	34	37	708

Total Number of Valid Hours: 708

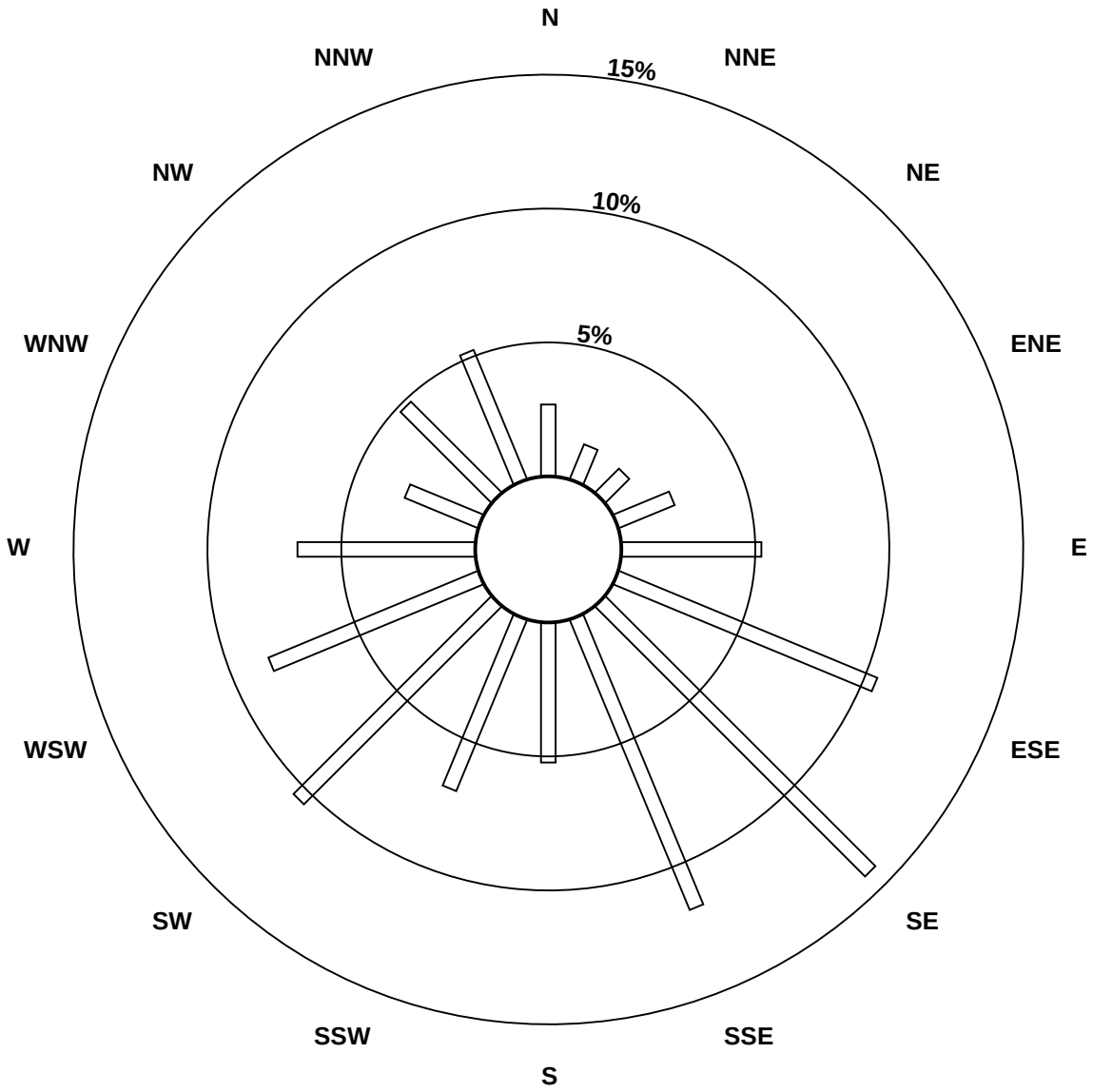
Total Number of Hours: 744

Wood Buffalo Environmental Association

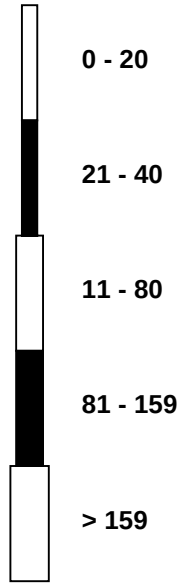
Wind Rose Aug 2015

Nitrogen Dioxide (NO_2) - ppb

Wapasu (AMS 17)



Classes (ppb)



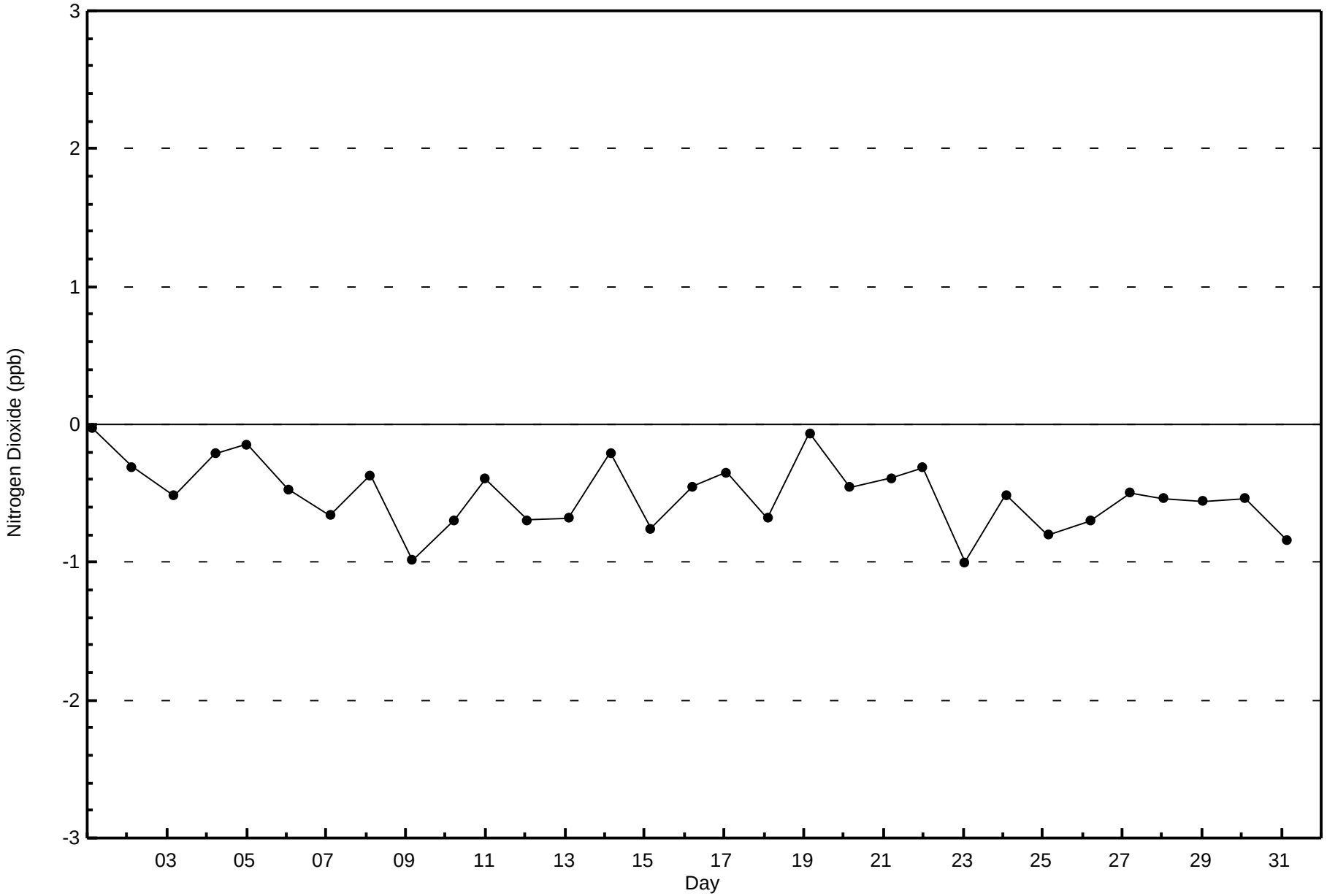
Total Number of Valid Hours: 708

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Dioxide (NO_2) - ppb

Wapasu - August 2015

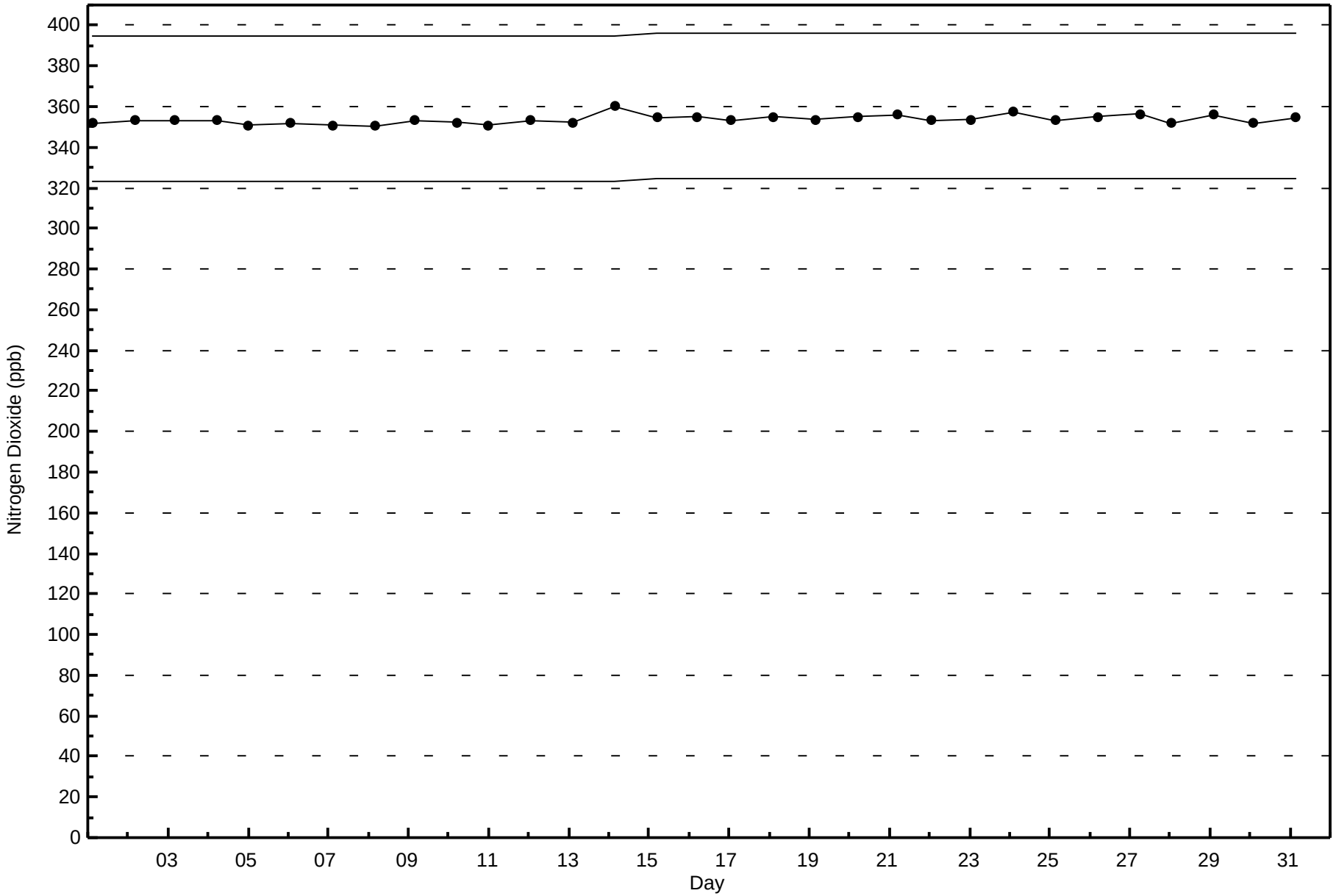


Wood Buffalo Environmental Association

Span Responses

Nitrogen Dioxide (NO_2) - ppb

Wapasu - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_X) - ppb

Wapasu - August 2015

Maximum Value: 20 ppb on Aug 17 06:00

Maximum Daily Average: 8.1 ppb on Aug 13

Minimum Value: 0 ppb on Aug 4 05:00

Minimum Daily Average: 0.3 ppb on Aug 6

Maximum Diurnal Average: 3.8 ppb at hour 9

Minimum Diurnal Average: 1.0 ppb at hour 16

Monthly Average: 2.3 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 1 $Q_3 = 3$ $P_{90} = 6$ $P_{99} = 15$

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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	1	2	Z	2	4	2	3	5	5	4	2	1	1	0	1	1	1	0	0	0	0	0	0	0	1.6	5
2-Aug	1	1	1	Z	0	2	5	3	2	1	1	1	1	2	1	1	2	4	4	3	1	1	3	3	1.8	5
3-Aug	2	1	1	1	Z	6	5	1	2	2	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1.3	6
4-Aug	0	2	1	1	0	Z	1	1	1	1	1	2	4	2	0	0	0	0	0	0	0	0	0	0	0.9	4
5-Aug	Z	1	1	0	0	1	0	1	0	1	2	1	0	1	1	1	1	0	0	0	0	0	0	0	0.5	2
6-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
7-Aug	0	0	Z	1	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0.4	1
8-Aug	0	0	0	Z	0	0	2	2	2	1	1	1	1	0	2	1	2	1	6	1	1	0	0	0	1.1	6
9-Aug	0	0	0	1	Z	2	1	2	3	4	2	2	2	2	2	1	1	1	1	0	1	1	1	0	1.3	4
10-Aug	0	1	1	1	3	Z	5	2	1	5	5	3	2	2	1	1	1	2	1	2	4	7	4	6	2.6	7
11-Aug	Z	6	5	3	4	7	8	9	11	8	4	1	0	0	0	1	0	1	2	4	3	4	5	6	4.1	11
12-Aug	7	Z	9	9	14	10	11	5	3	2	1	0	0	0	0	0	1	0	0	0	1	3	5	4	4.0	14
13-Aug	10	7	Z	15	15	10	8	12	10	C	C	C	C	C	7	2	3	5	6	5	4	7	10	12	8.1	15
14-Aug	7	5	5	Z	1	2	4	2	1	2	2	2	2	1	1	1	1	1	2	0	1	2	4	2	2.2	7
15-Aug	2	0	0	0	Z	3	3	2	3	3	1	1	0	0	0	0	0	1	0	1	5	2	14	7	2.3	14
16-Aug	5	2	2	11	7	Z	1	3	7	5	4	3	4	6	2	1	1	1	1	1	1	2	2	6	3.4	11
17-Aug	8	Z	11	15	20	20	15	14	8	9	9	3	2	2	1	1	1	1	2	3	7	3	2	1	6.8	20
18-Aug	1	0	Z	1	2	1	1	0	0	1	1	0	1	1	1	1	1	2	2	1	0	0	0	0	0.8	2
19-Aug	0	0	0	Z	1	1	1	1	2	2	3	3	1	0	1	1	1	0	2	4	4	2	1	1	1.4	4
20-Aug	2	1	1	0	Z	0	1	1	1	4	2	2	3	4	4	4	2	1	1	1	1	1	3	8	2.0	8
21-Aug	3	1	1	1	2	Z	6	3	6	1	1	0	0	0	0	0	0	1	1	0	1	1	1	1	1.4	6
22-Aug	Z	1	2	4	4	2	3	6	7	8	3	0	0	0	0	0	0	0	1	1	1	1	1	1	2.0	8
23-Aug	1	Z	1	1	1	1	1	2	1	1	0	0	0	1	1	1	2	1	1	1	1	1	1	2	1.0	2
24-Aug	1	2	Z	5	3	3	3	3	2	2	3	5	2	2	1	0	0	0	0	1	1	1	1	0	1.9	5
25-Aug	0	0	0	Z	1	4	4	1	2	1	17	3	1	0	1	1	0	0	0	0	0	1	0	6	2.0	17
26-Aug	0	1	2	1	Z	0	0	1	0	0	0	1	2	2	1	3	3	4	7	8	8	6	6	6	2.7	8
27-Aug	6	9	7	7	5	Z	3	4	1	1	1	1	2	2	2	2	2	2	2	5	3	4	4	3	3.5	9
28-Aug	Z	8	6	6	7	7	13	9	17	10	6	6	1	1	0	1	1	1	1	1	1	1	1	2	4.6	17
29-Aug	4	Z	7	4	2	1	2	4	16	6	7	4	1	1	1	2	1	0	0	0	0	0	0	0	2.9	16
30-Aug	0	0	Z	0	0	0	0	1	1	3	4	4	3	2	1	1	3	3	2	1	1	1	2	2	1.5	4
31-Aug	1	1	1	Z	1	1	1	1	3	4	5	3	4	3	1	1	1	1	1	3	6	5	6	7	2.6	7
	2.4	2.1	2.7	3.6	3.8	3.4	3.6	3.2	3.8	3.1	3.0	1.8	1.4	1.3	1.2	1.0	1.1	1.2	1.5	1.6	2.0	1.9	2.5	2.9	Diurnal Average	
	10	9	11	15	20	20	15	14	17	10	17	6	4	6	7	4	3	5	7	8	8	7	14	12	Diurnal Maximum	

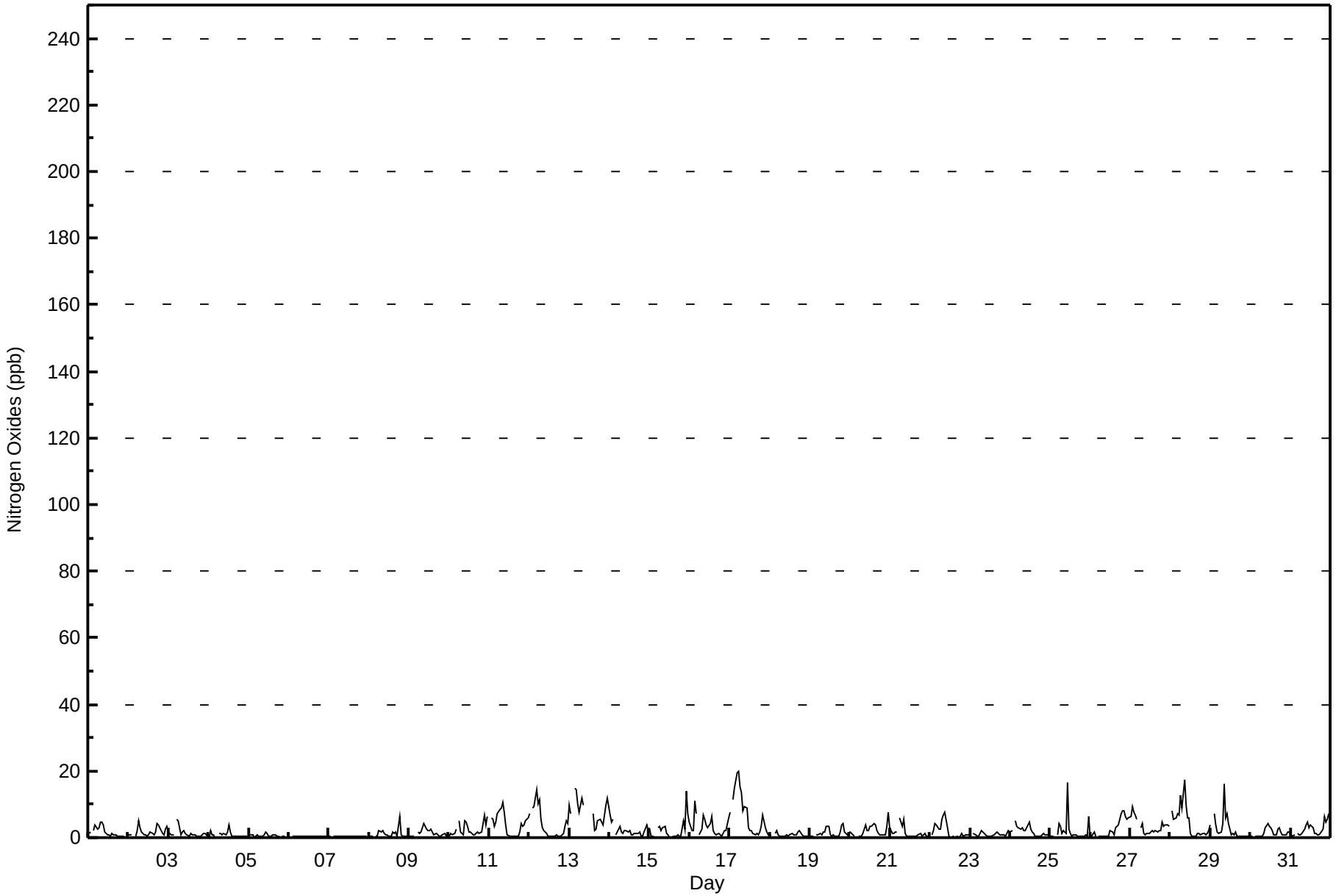
Z - zerospan C - Calibration

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Oxides (NO_X) - ppb

Wapasu - August 2015



Nitrogen Oxides (NO_X) - ppb
Wapasu - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	708	100.00	100.00
21 - 40	0	0.00	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: 708

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Oxides (NO_X) - ppb

Wapasu - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	19	10	9	16	37	74	101	83	37	49	74	60	47	21	34	37	708
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	19	10	9	16	37	74	101	83	37	49	74	60	47	21	34	37	708

Total Number of Valid Hours: 708

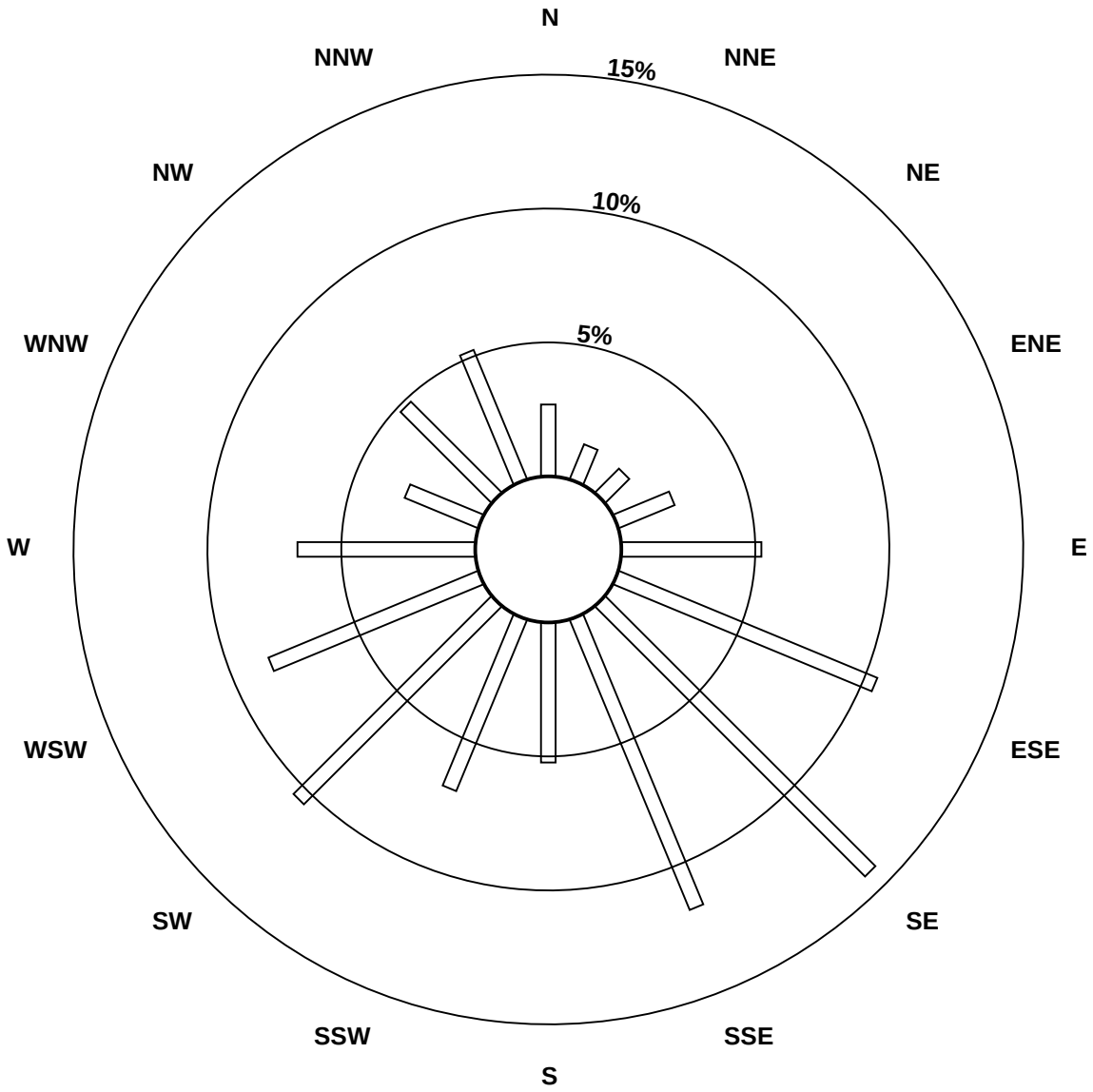
Total Number of Hours: 744

Wood Buffalo Environmental Association

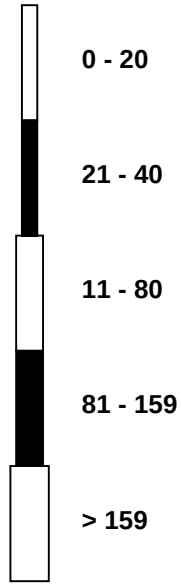
Wind Rose Aug 2015

Nitrogen Oxides (NO_X) - ppb

Wapasu (AMS 17)



Classes (ppb)



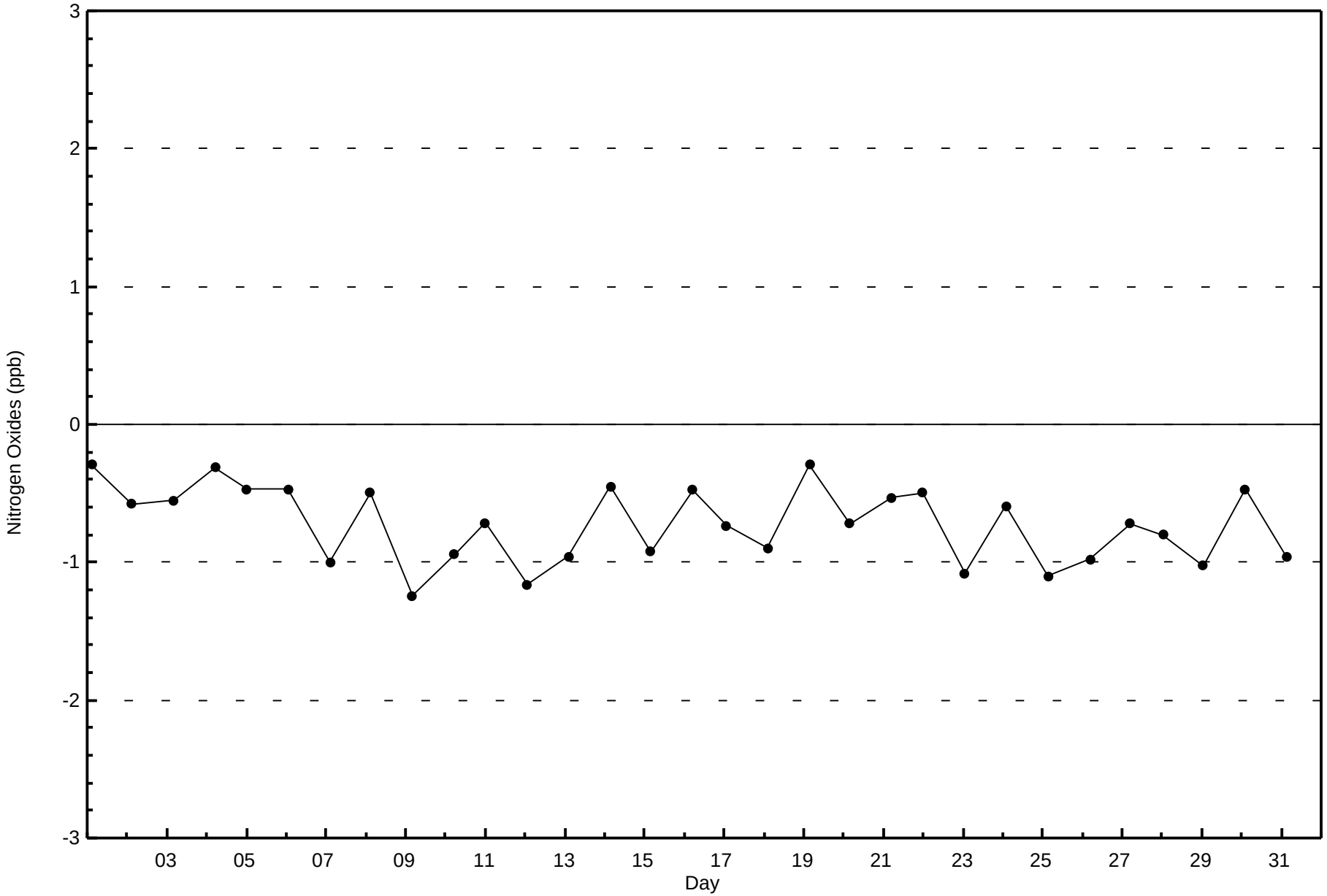
Total Number of Valid Hours: 708

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Oxides (NO_X) - ppb

Wapasu - August 2015

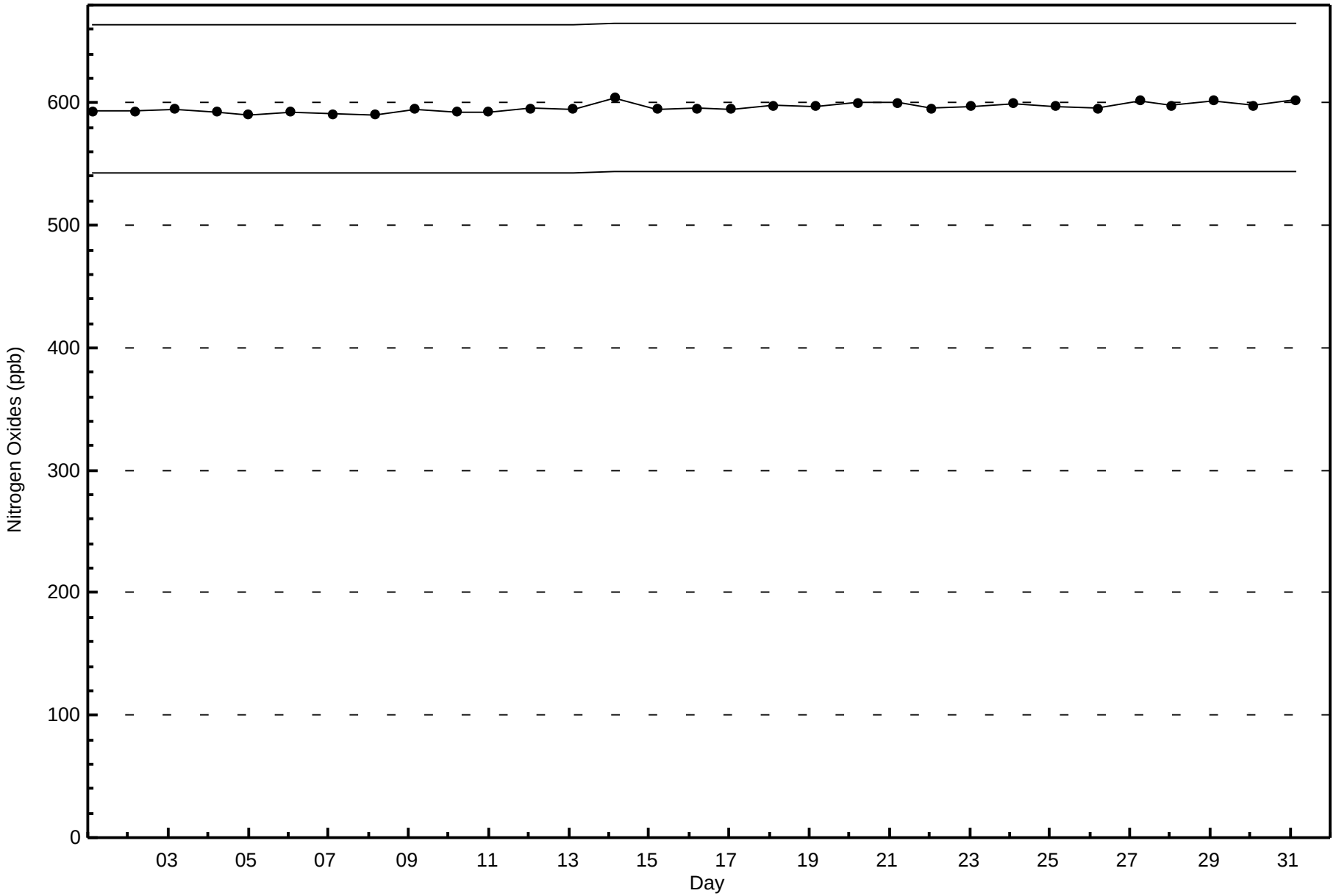


Wood Buffalo Environmental Association

Span Responses

Nitrogen Oxides (NO_X) - ppb

Wapasu - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

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

Wapasu - August 2015

Number of Exceedences (AAAQO): 24-hr: 0

Maximum Value: 33.1 $\mu g/m^3$ on Aug 26 20:00

Maximum Daily Average: 9.0 $\mu g/m^3$ on Aug 26

Minimum Value: 0.5 $\mu g/m^3$ on Aug 7 06:00

Minimum Daily Average: 1.5 $\mu g/m^3$ on Aug 20

Maximum Diurnal Average: 6.1 $\mu g/m^3$ at hour 6

Minimum Diurnal Average: 3.9 $\mu g/m^3$ at hour 15

Monthly Average: 5.06 $\mu g/m^3$

Percentiles: $P_1 = 0.7$ $P_{10} = 1.5$ $Q_1 = 2.5$ Median = 4.2 $Q_3 = 6.6$ $P_{90} = 9.6$ $P_{99} = 17.2$

Hours in Service:	744
Hours of Data:	743
Hours of Missing Data:	1
Hours of Calibration:	1
Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	5.5	6.5	7.1	7.5	6.9	4.6	4.5	2.8	1.9	2.1	3.2	3.4	3.4	4.4	4.4	3.3	3.6	2.0	2.0	2.6	1.7	1.9	2.1	2.4	3.7	7.5
2-Aug	3.2	4.0	3.7	3.7	3.2	11.0	7.7	1.5	1.3	0.9	1.2	1.9	3.6	5.8	6.8	8.2	11.1	10.2	13.8	14.1	13.7	13.9	16.8	17.0	7.4	17.0
3-Aug	16.6	17.0	12.3	9.8	8.7	30.3	9.2	5.9	4.1	5.0	5.9	6.2	6.0	6.5	7.2	6.0	6.5	4.3	5.0	7.0	8.7	9.3	6.2	6.0	8.7	30.3
4-Aug	6.9	8.9	7.1	6.1	6.0	5.5	6.6	9.4	13.0	13.1	12.0	8.7	8.4	9.2	10.0	9.9	11.0	11.0	8.1	4.1	4.1	5.6	6.8	5.4	8.2	13.1
5-Aug	5.8	6.1	5.7	6.2	5.3	6.5	5.1	6.9	6.8	5.3	5.6	5.3	4.3	3.3	3.1	1.9	1.4	1.5	1.8	1.6	1.4	1.7	3.1	4.0	4.2	6.9
6-Aug	3.6	2.6	3.2	4.7	4.6	5.1	4.9	5.2	6.6	4.5	1.9	2.2	2.5	1.6	1.0	1.2	2.7	3.0	2.3	2.5	1.8	1.7	2.4	1.8	3.1	6.6
7-Aug	1.7	2.4	1.9	1.4	1.2	0.5	1.4	1.4	1.4	1.3	1.2	1.2	1.3	1.6	2.0	2.3	2.9	2.6	2.8	3.7	3.7	4.5	4.6	2.5	2.2	4.6
8-Aug	2.2	2.3	2.2	1.9	1.9	2.3	2.7	2.9	3.2	2.9	2.8	3.1	3.2	4.4	4.4	5.0	6.4	3.3	2.0	2.4	4.4	5.7	5.1	4.3	3.4	6.4
9-Aug	3.1	3.4	3.9	4.6	5.4	4.1	2.4	2.2	2.3	3.4	5.8	7.8	10.0	10.5	10.1	9.0	9.7	9.5	6.9	6.6	5.1	6.7	7.2	6.7	6.1	10.5
10-Aug	6.2	5.4	6.0	8.3	8.1	7.4	5.7	4.4	4.6	11.7	7.0	6.7	7.4	6.9	6.9	6.1	7.3	5.6	8.3	11.3	16.6	10.0	7.8	7.9	7.6	16.6
11-Aug	7.4	9.7	10.4	9.4	8.5	10.3	10.2	6.4	7.9	7.5	7.8	4.3	3.6	5.3	4.3	3.5	3.3	2.4	5.3	10.8	8.1	8.9	6.8	8.3	7.1	10.8
12-Aug	10.8	18.2	17.3	12.9	7.3	5.2	7.1	6.2	4.6	4.9	4.5	3.0	2.4	2.5	2.6	3.1	3.4	2.6	3.8	4.7	3.0	5.1	8.5	8.3	6.3	18.2
13-Aug	8.0	5.3	7.4	10.9	14.8	8.0	2.7	5.3	7.0	5.8	7.1	6.9	6.5	4.6	2.0	1.1	2.5	3.5	4.2	5.2	2.2	5.3	5.6	7.8	5.8	14.8
14-Aug	6.3	5.8	5.5	3.4	3.5	4.0	3.6	3.5	1.7	1.4	C	2.5	3.1	1.9	1.5	2.5	3.5	3.9	3.6	1.8	2.0	3.5	2.2	1.9	3.1	6.3
15-Aug	1.7	1.3	0.6	0.7	0.6	1.5	1.9	2.4	4.3	5.3	4.5	1.9	1.9	1.8	1.6	1.6	1.9	2.0	2.0	2.5	3.8	4.6	5.9	2.5	2.5	5.9
16-Aug	3.0	4.4	5.8	6.4	6.1	6.6	3.2	3.0	3.4	4.7	2.7	2.0	2.2	2.9	2.5	2.3	2.0	2.6	2.9	3.4	4.3	4.9	4.9	5.4	3.8	6.6
17-Aug	6.6	8.4	11.0	16.2	17.0	11.1	9.4	16.6	6.9	5.6	3.4	2.5	2.9	3.8	3.5	3.4	4.0	4.3	4.9	7.4	8.4	6.6	5.5	5.7	7.3	17.0
18-Aug	7.0	7.5	7.3	6.5	6.6	5.9	6.0	2.3	1.8	2.5	3.5	3.1	3.6	4.1	4.0	5.8	8.0	10.6	13.4	5.3	4.9	4.9	5.1	5.6	5.6	13.4
19-Aug	6.5	6.7	6.6	6.1	5.5	5.1	4.7	4.4	5.9	5.5	5.1	9.3	5.7	4.8	3.8	3.4	6.9	9.3	10.9	11.5	5.1	3.5	1.5	0.8	5.8	11.5
20-Aug	0.6	0.7	0.8	1.0	1.0	1.1	0.5	0.7	0.9	1.9	1.9	1.8	1.9	2.3	1.4	1.2	1.9	2.0	1.7	1.9	1.6	1.7	2.7	2.7	1.5	2.7
21-Aug	2.6	2.1	1.8	1.7	1.8	2.2	2.9	2.7	3.3	1.5	1.2	1.1	1.1	1.2	1.2	1.0	1.1	1.4	1.5	1.4	1.7	1.3	1.2	1.3	1.7	3.3
22-Aug	1.5	1.6	1.7	1.6	1.4	1.8	3.5	4.2	3.6	3.1	1.4	0.9	1.1	1.0	0.8	0.9	1.1	1.1	1.2	1.5	1.7	1.5	1.4	1.4	1.7	4.2
23-Aug	1.7	1.9	2.6	2.6	1.8	1.5	1.5	1.4	1.2	1.1	1.1	1.0	1.0	1.0	1.4	2.1	2.5	3.0	2.9	3.8	4.2	4.0	10.2	11.0	2.8	11.0
24-Aug	3.4	5.6	6.6	8.7	7.8	7.4	7.6	3.7	2.5	3.1	4.3	6.5	8.2	4.1	2.8	1.7	2.2	2.5	2.8	4.9	6.0	5.6	5.4	4.7	4.9	8.7
25-Aug	4.5	4.2	4.1	4.3	4.5	4.8	4.4	3.1	3.8	2.5	6.6	5.0	4.5	4.0	4.5	4.8	3.1	2.5	2.6	2.9	2.6	2.1	2.6	4.3	3.9	6.6
26-Aug	4.0	4.1	4.5	4.2	3.9	2.8	2.7	2.4	1.9	2.0	2.7	3.4	4.2	4.9	5.6	9.4	9.9	13.9	29.2	33.1	25.1	15.9	12.9	12.7	9.0	33.1
27-Aug	11.7	11.2	11.7	11.3	10.5	8.9	8.7	4.3	3.3	3.8	4.0	4.6	6.1	6.3	7.1	7.1	8.7	12.6	13.2	12.7	10.8	8.8	7.5	7.1	8.4	13.2
28-Aug	8.5	9.7	8.8	8.7	6.9	7.4	8.6	7.6	9.1	13.8	17.4	13.8	4.1	3.4	3.4	3.5	5.0	3.9	3.9	5.2	4.9	4.4	3.3	2.7	7.0	17.4
29-Aug	3.1	2.9	3.0	2.6	2.4	2.5	2.5	1.5	3.1	3.6	5.6	5.1	4.1	4.2	3.8	3.3	2.3	3.1	4.0	5.6	6.8	10.5	10.6	8.1	4.4	10.6
30-Aug	5.8	3.1	2.8	5.4	8.2	10.1	11.6	8.6	7.4	8.4	8.2	6.6	5.9	5.5	3.5	2.8	5.7	5.8	4.3	2.4	2.7	3.8	4.3	4.2	5.7	11.6
31-Aug	4.9	5.4	4.9	4.5	4.1	3.9	3.8	4.1	3.6	2.7	1.6	1.9	3.2	3.4	5.3	5.8	6.8	2.8	3.7	4.0	3.8	2.4	2.6	3.6	3.9	6.8
	5.3	5.8	5.8	5.9	5.7	6.1	5.1	4.4	4.3	4.5	4.7	4.3	4.1	4.1	3.9	4.0	4.8	4.8	5.7	6.1	5.6	5.5	5.6	5.4	Diurnal Average	
	16.6	18.2	17.3	16.2	17.0	30.3	11.6	16.6	13.0	13.8	17.4	13.8	10.0	10.5	10.1	9.9	11.1	13.9	29.2	33.1	25.1	15.9	16.8	17.0	Diurnal Maximum	

C - Calibration

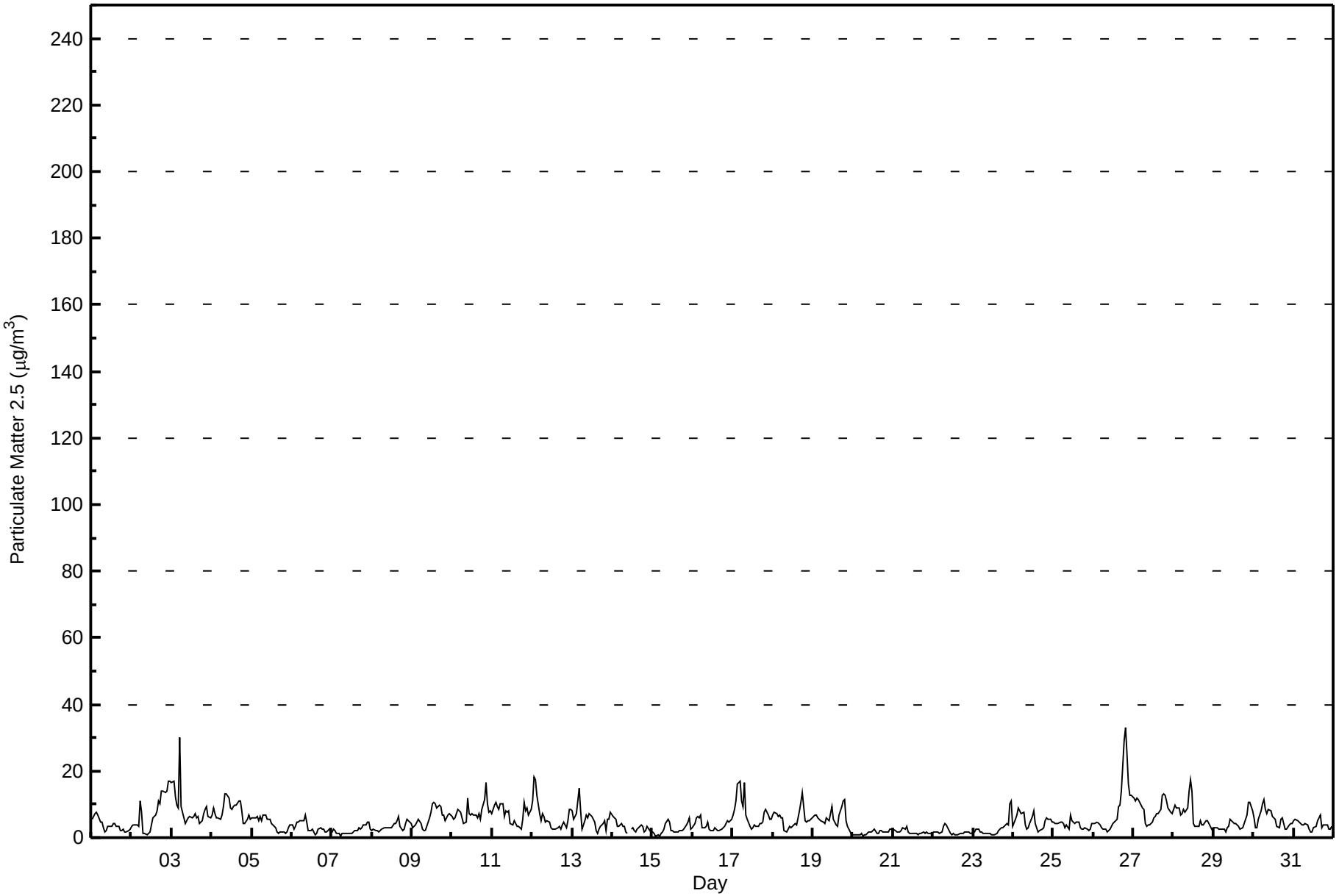
Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 $\mu g/m^3$

Wood Buffalo Environmental Association

Hourly Averages

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

Wapasu - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

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

Wapasu - August 2015

Concentration Ranges ($\mu g/m^3$)	Number of Hours	%	Cumulative %
1 - 5	459	61.78	61.78
6 - 15	245	32.97	94.75
16 - 25	13	1.75	96.50
26 - 80	3	0.40	96.90
> 81.0	0	0.00	96.90

Total Number of Valid Hours: 743

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

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

Wapasu - August 2015

Concentration Ranges ($\mu g/m^3$)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
1 - 5	16	10	7	9	25	37	73	35	23	26	44	46	37	17	24	30	459
6 - 15	4	1	3	7	15	36	31	43	15	24	29	13	9	4	4	7	245
16 - 25	0	0	0	0	1	2	1	7	1	0	1	0	0	0	0	0	13
26 - 80	0	0	0	0	0	1	0	1	0	0	1	0	0	0	0	0	3
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	20	11	10	16	41	76	105	86	39	50	75	59	46	21	28	37	720

Total Number of Valid Hours: 743

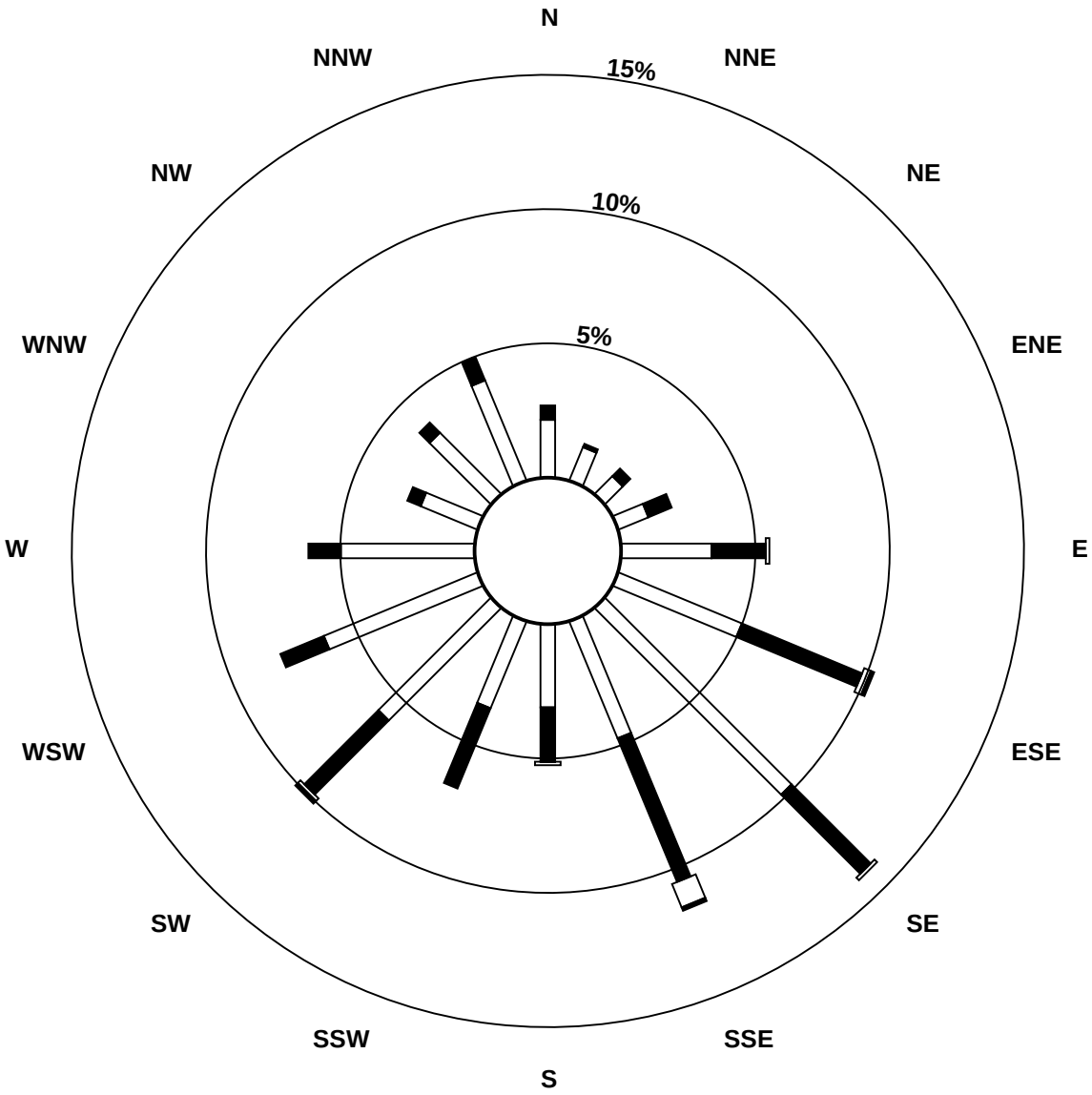
Total Number of Hours: 744

Wood Buffalo Environmental Association

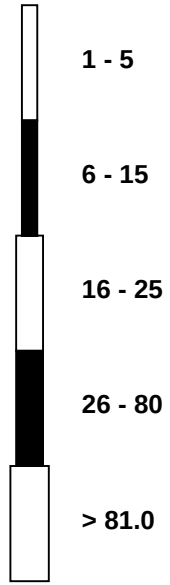
Wind Rose Aug 2015

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

Wapasu (AMS 17)



Classes ($\mu g/m^3$)



1 - 5

6 - 15

16 - 25

26 - 80

> 81.0

Total Number of Valid Hours: 743

Maximum Value: 27.6 C on Aug 10 16:00

Maximum Daily Average: 21.6 C on Aug 10

Minimum Value: 3.4 C on Aug 22 23:00

Minimum Daily Average: 8.2 C on Aug 22

Maximum Diurnal Average: 20.6 C at hour 16

Minimum Diurnal Average: 11.0 C at hour 5

Monthly Average: 15.69 C

Percentiles: P_1 = 4.8 P_{10} = 9.2 Q_1 = 11.8 Median = 15.6 Q_3 = 19.5 P_{90} = 22.4 P_{99} = 25.8

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

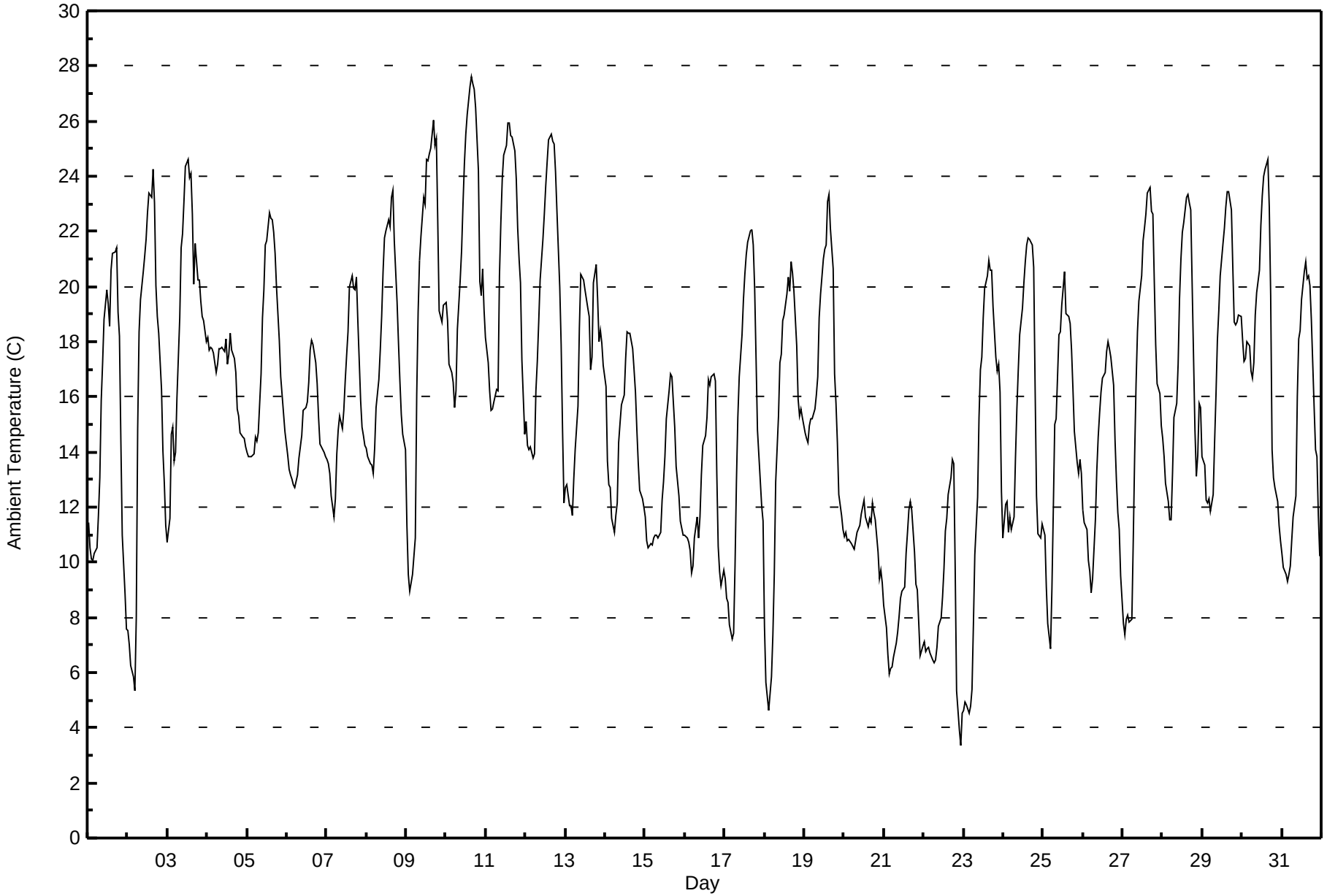
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	11.4	10.5	10.1	10.0	10.3	10.5	11.7	13.1	15.9	17.2	18.8	19.9	19.4	18.5	20.6	21.2	21.3	21.4	19.1	18.2	14.5	11.0	8.8	7.6	15.0	21.4
2-Aug	7.5	7.0	6.2	5.8	5.3	8.0	14.8	18.3	19.5	20.5	21.1	21.7	22.7	23.4	23.3	24.2	23.0	20.0	18.9	18.3	16.3	14.0	12.9	11.4	16.0	24.2
3-Aug	10.7	11.6	14.7	14.9	13.7	14.0	16.0	18.9	21.4	21.9	23.1	24.4	24.6	24.0	24.1	22.7	20.1	21.6	20.2	20.3	19.5	18.9	18.8	18.0	19.1	24.6
4-Aug	18.1	17.7	17.8	17.8	17.6	16.9	17.2	17.8	17.7	17.8	17.6	18.1	17.2	17.6	18.3	17.7	17.4	16.9	15.6	15.3	14.7	14.5	14.5	14.2	16.9	18.3
5-Aug	14.0	13.8	13.8	13.9	13.9	14.5	14.4	14.7	16.8	18.9	19.9	21.5	21.6	22.7	22.5	22.4	22.0	21.2	20.0	18.0	16.8	16.0	15.4	14.8	17.6	22.7
6-Aug	13.9	13.4	13.2	13.0	12.8	12.7	13.2	13.8	14.2	14.6	15.5	15.6	15.8	16.5	17.7	18.1	17.9	17.3	16.5	15.2	14.3	14.2	14.0	13.8	14.9	18.1
7-Aug	13.8	13.6	13.2	12.4	11.6	12.3	13.9	14.8	15.3	14.8	15.5	16.6	17.5	18.4	20.0	20.4	19.9	19.9	20.4	18.8	15.9	14.9	14.6	14.2	15.9	20.4
8-Aug	14.1	13.8	13.6	13.5	13.2	14.1	15.6	16.6	17.7	18.9	20.5	21.7	22.0	22.4	22.2	23.2	23.5	21.6	19.4	18.0	16.6	15.4	14.7	14.1	17.8	23.5
9-Aug	11.4	9.5	9.0	9.2	9.6	10.9	16.1	19.1	20.9	21.8	23.2	23.0	24.6	24.5	24.8	25.0	26.0	25.1	25.4	22.4	19.1	18.7	19.3	19.4	19.1	26.0
10-Aug	19.4	18.8	17.2	16.9	16.5	15.6	16.2	18.5	20.2	21.3	23.0	24.4	25.5	26.3	27.2	27.6	27.4	27.1	26.5	24.2	20.2	19.7	20.6	19.1	21.6	27.6
11-Aug	18.2	17.2	16.2	15.5	15.6	15.8	16.3	16.2	20.4	22.3	23.9	24.8	25.1	25.9	25.9	25.5	25.4	24.9	23.9	22.1	21.0	20.1	17.3	14.7	20.6	25.9
12-Aug	15.1	14.3	14.1	14.2	13.8	13.9	16.2	17.3	18.7	20.3	21.7	22.6	23.7	24.5	25.3	25.5	25.2	25.2	24.1	22.7	20.0	17.9	14.8	12.2	19.3	25.5
13-Aug	12.7	12.8	12.1	12.1	11.7	13.0	14.1	15.6	18.5	20.4	20.3	20.2	19.9	19.2	18.9	17.0	17.4	20.2	20.8	19.6	18.0	18.4	18.0	17.2	17.0	20.8
14-Aug	16.4	13.7	12.8	12.7	11.6	11.1	11.7	12.2	14.4	15.1	15.7	16.1	17.4	18.3	18.3	18.3	17.7	17.0	16.1	14.8	13.6	12.6	12.3	12.0	14.7	18.3
15-Aug	11.6	10.8	10.5	10.7	10.6	10.9	11.0	11.0	10.9	11.1	12.3	12.9	13.8	15.2	16.2	16.8	16.7	15.8	14.9	13.5	12.4	11.5	11.2	11.0	12.6	16.8
16-Aug	11.0	10.9	10.7	10.4	9.6	9.9	10.9	11.7	10.9	11.6	13.2	14.2	14.6	15.2	16.6	16.4	16.7	16.9	16.6	13.2	10.6	9.7	9.1	9.7	12.5	16.9
17-Aug	9.4	8.7	8.6	7.7	7.2	7.4	9.9	12.9	15.3	16.7	18.2	19.5	20.4	21.1	21.6	22.0	22.1	21.5	19.9	17.4	14.8	12.9	12.1	11.5	15.0	22.1
18-Aug	7.7	5.6	4.6	5.2	5.8	7.4	9.6	12.9	15.3	17.2	17.5	18.8	19.0	19.7	20.3	19.9	20.9	20.5	19.8	17.9	15.9	15.3	15.6	15.3	14.5	20.9
19-Aug	14.7	14.5	14.4	14.9	15.2	15.2	15.6	16.1	16.7	18.9	19.7	21.0	21.4	21.5	23.1	23.3	22.1	20.6	16.8	15.8	14.4	12.5	11.7	11.2	17.1	23.3
20-Aug	10.9	11.1	10.8	10.8	10.7	10.6	10.5	10.8	11.1	11.3	11.8	12.0	12.3	11.6	11.3	11.6	11.4	12.2	11.8	11.5	10.4	9.4	9.7	9.3	11.0	12.3
21-Aug	8.5	7.6	6.7	6.0	6.2	6.2	6.6	7.1	7.5	8.1	8.7	9.0	9.1	10.3	11.1	11.9	12.2	11.9	10.4	9.2	9.0	7.8	6.6	7.0	8.5	12.2
22-Aug	7.1	6.8	6.9	6.9	6.7	6.4	6.3	6.4	6.9	7.7	8.0	8.7	9.8	11.1	11.6	12.5	13.1	13.7	13.6	9.8	5.3	3.9	3.4	4.5	8.2	13.7
23-Aug	4.6	4.9	4.8	4.5	4.8	5.4	7.7	10.3	12.4	15.2	17.0	17.4	18.9	19.9	20.4	21.0	20.6	20.6	19.3	17.5	16.9	17.2	16.1	12.6	13.7	21.0
24-Aug	10.9	12.1	12.2	11.1	11.6	11.2	11.6	13.8	15.6	17.0	18.3	19.2	20.1	20.9	21.5	21.8	21.7	21.5	20.7	16.4	12.4	11.0	10.9	11.4	15.6	21.8
25-Aug	11.2	11.0	9.1	7.8	6.9	9.1	12.0	15.0	15.2	18.3	18.4	19.3	19.9	20.5	19.0	18.9	18.7	17.7	16.3	14.8	13.6	13.2	13.8	13.2	14.7	20.5
26-Aug	11.9	11.4	11.2	10.1	9.7	8.9	9.4	11.6	13.3	14.5	15.4	16.1	16.7	16.9	17.6	18.0	17.8	17.4	16.4	14.4	13.0	11.8	11.2	9.5	13.5	18.0
27-Aug	7.8	7.4	7.9	8.1	7.8	7.9	10.8	13.9	16.5	18.3	19.5	20.4	21.6	22.1	22.6	23.4	23.6	22.7	22.6	20.2	17.9	16.5	16.1	14.9	16.3	23.6
28-Aug	14.5	13.8	12.9	12.2	11.5	11.5	13.2	15.3	15.8	17.2	19.6	21.0	22.0	22.3	23.3	23.3	23.0	22.8	20.1	14.8	13.1	13.9	15.7	15.6	17.0	23.3
29-Aug	13.8	13.5	12.3	12.2	12.3	11.9	12.4	14.4	16.1	18.1	19.1	20.4	21.6	22.1	22.9	23.4	23.5	22.8	20.7	18.7	18.6	18.7	19.0	18.9	17.8	23.5
30-Aug	18.1	17.3	17.4	18.0	17.8	17.0	16.7	17.2	19.0	19.8	20.6	22.2	23.3	24.0	24.2	24.6	22.9	19.7	14.1	13.1	12.7	12.2	11.4	10.8	18.1	24.6
31-Aug	10.3	9.8	9.5	9.3	9.6	9.9	10.8	11.7	12.4	16.0	18.1	18.4	19.5	20.6	20.9	20.3	20.4	20.0	18.8	15.6	14.1	13.8	11.7	10.2	14.7	20.9
	12.3	11.8	11.4	11.2	11.0	11.3	12.7	14.2	15.6	16.9	17.9	18.8	19.4	19.9	20.4	20.6	20.4	19.9	18.7	16.8	15.0	14.1	13.6	12.9	Diurnal Average	
	19.4	18.8	17.8	18.0	17.8	17.0	17.2	19.1	21.4	22.3	23.9	24.8	25.5	26.3	27.2	27.6	27.4	27.1	26.5	24.2	21.0	20.1	20.6	19.4	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature (AT) - C

Wapasu - August 2015



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	96	12.90	12.90
10 - 20	484	65.05	77.96
> 20	164	22.04	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Wapasu - August 2015

Maximum Value: 99 % on Aug 1 05:00

Maximum Daily Average: 87.4 % on Aug 21

Minimum Value: 29 % on Aug 31 18:00

Minimum Daily Average: 52.0 % on Aug 12

Maximum Diurnal Average: 85.6 % at hour 5

Minimum Diurnal Average: 46.8 % at hour 16

Monthly Average: 68.4 %

Percentiles: P_1 = 31 P_{10} = 41 Q_1 = 53 Median = 67 Q_3 = 86 P_{90} = 94 P_{99} = 99

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

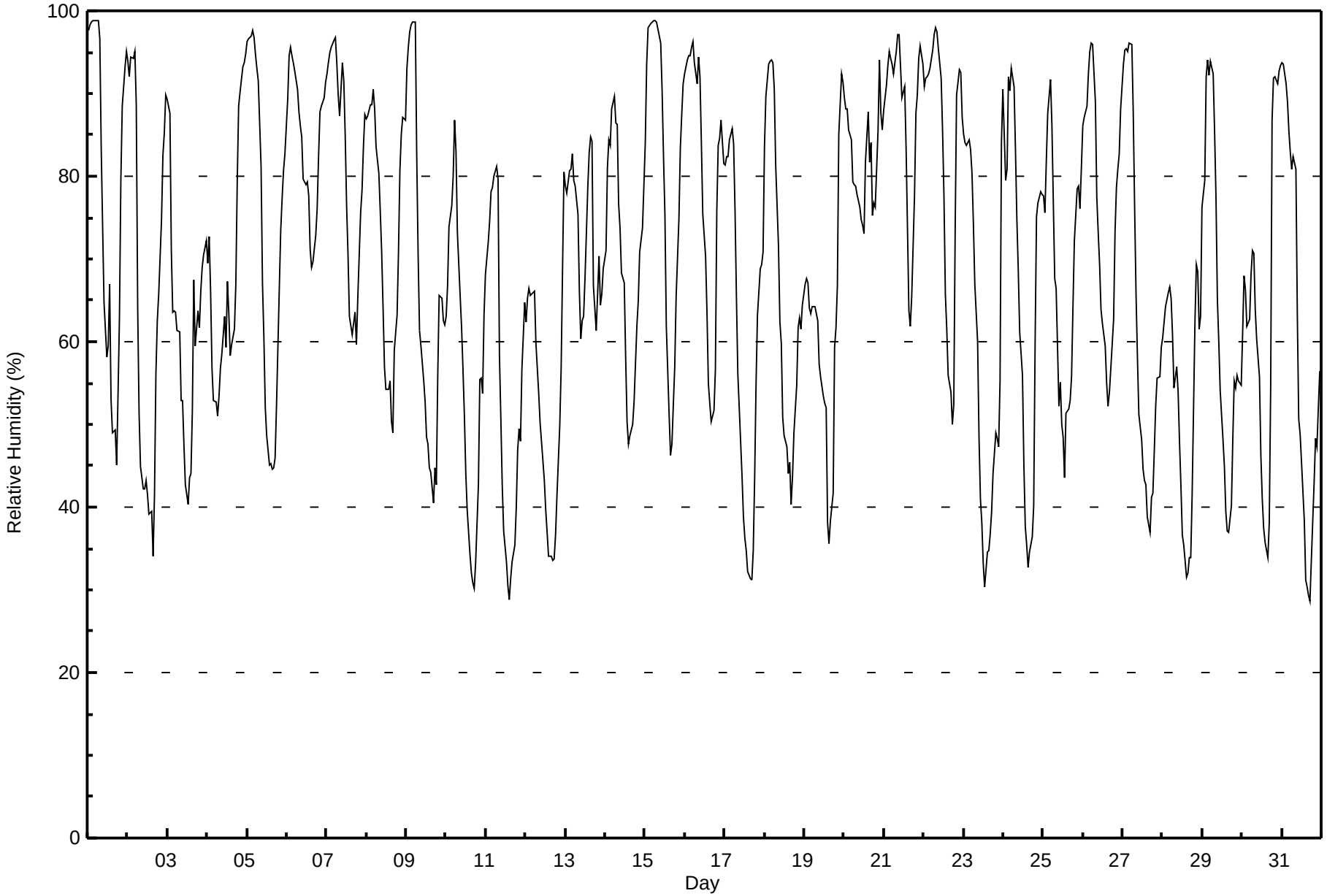
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	98	98	99	99	99	99	99	97	83	74	65	58	60	67	53	49	49	45	54	63	79	89	93	95	77.6	99
2-Aug	94	92	94	94	95	89	64	51	45	42	42	43	42	39	39	34	42	56	62	66	75	82	85	90	65.0	95
3-Aug	89	88	71	64	64	64	61	61	53	53	47	43	40	44	44	52	67	60	64	62	66	69	70	72	61.1	89
4-Aug	69	73	66	57	53	53	51	53	57	58	63	59	67	63	58	60	61	67	79	89	90	93	94	95	67.9	95
5-Aug	96	97	97	98	97	95	93	92	81	67	60	52	49	45	45	45	45	46	52	66	73	77	81	83	72.1	98
6-Aug	89	95	96	95	94	93	90	88	86	85	80	79	79	78	71	69	70	73	76	82	88	88	89	91	84.3	96
7-Aug	92	94	95	96	97	97	94	90	87	94	91	85	76	70	63	61	62	64	60	65	76	78	84	88	81.6	97
8-Aug	87	87	89	89	90	88	84	80	76	71	64	57	54	54	55	50	49	59	63	71	81	85	87	87	73.2	90
9-Aug	93	96	98	98	99	99	83	71	61	60	55	53	48	48	45	44	41	45	43	56	66	65	63	62	66.2	99
10-Aug	63	67	74	76	80	87	83	73	65	62	57	51	44	40	34	32	31	30	33	43	55	56	54	63	56.4	87
11-Aug	68	72	75	78	79	80	81	80	58	51	43	37	33	30	29	31	33	35	40	47	49	48	57	65	54.1	81
12-Aug	62	65	66	66	66	66	60	57	54	50	46	43	40	37	34	34	34	34	37	41	50	57	69	80	52.0	80
13-Aug	79	78	81	81	83	80	79	75	66	60	62	63	68	79	83	85	84	67	61	66	70	64	66	69	72.8	85
14-Aug	71	81	84	84	88	90	87	86	77	74	68	67	58	50	48	49	50	53	57	62	65	71	74	79	69.6	90
15-Aug	84	94	98	98	99	99	99	99	98	96	90	82	75	62	51	46	48	52	57	65	75	83	88	91	80.4	99
16-Aug	92	94	94	95	96	96	94	91	94	92	84	75	70	64	55	53	50	52	57	76	84	85	87	81	79.6	96
17-Aug	81	82	82	84	86	84	76	65	56	52	44	39	36	35	32	31	31	35	44	55	63	69	69	71	58.5	86
18-Aug	83	90	94	94	94	94	91	81	71	62	60	51	49	47	44	45	40	44	49	55	62	63	62	64	66.2	94
19-Aug	67	68	67	64	63	64	64	63	63	57	56	53	53	52	38	36	38	42	59	62	67	85	92	91	61.0	92
20-Aug	90	88	88	86	84	79	79	79	78	76	75	74	73	82	88	82	84	75	77	76	86	94	88	86	81.9	94
21-Aug	88	91	93	95	94	94	92	95	97	97	93	89	91	83	73	64	62	66	78	88	90	94	96	94	87.4	97
22-Aug	91	92	92	92	93	95	97	98	98	95	92	86	78	66	61	56	54	50	52	74	90	93	92	87	82.2	98
23-Aug	85	84	84	84	83	80	74	67	60	48	41	38	33	30	35	35	37	39	44	49	48	47	55	84	56.9	85
24-Aug	91	79	81	92	90	93	91	83	75	69	61	56	45	38	35	33	35	36	40	60	75	77	78	78	66.3	93
25-Aug	78	76	82	88	92	86	77	68	67	52	55	50	49	44	51	52	53	56	64	72	79	79	76	81	67.6	92
26-Aug	86	87	88	92	95	96	96	89	77	73	69	64	62	59	55	52	54	57	63	73	79	81	83	88	75.8	96
27-Aug	94	95	95	95	96	96	88	76	66	58	51	48	45	43	43	39	37	41	42	47	52	56	56	59	63.2	96
28-Aug	61	62	64	66	67	65	61	54	57	54	48	43	37	35	31	32	34	34	42	62	69	68	62	63	53.0	69
29-Aug	76	80	92	94	92	94	92	86	77	65	60	54	48	45	39	37	37	40	48	55	54	56	55	55	63.9	94
30-Aug	61	68	66	62	63	68	71	71	64	60	56	46	41	37	36	34	38	54	87	92	92	91	93	93	64.4	93
31-Aug	94	94	91	89	85	83	81	82	81	63	51	49	45	38	31	30	29	29	34	43	48	47	52	57	59.4	94
	82.3	84.0	85.1	85.3	85.6	85.3	81.6	77.5	71.9	66.8	62.2	57.7	54.5	51.8	48.5	46.8	47.7	49.5	55.4	63.9	70.8	73.9	75.7	78.8	Diurnal Average	
	98	98	99	99	99	99	99	99	98	97	93	89	91	83	88	85	84	75	87	92	92	94	96	95	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity (RH) - %

Wapasu - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Relative Humidity (RH) - %

Wapasu - August 2015

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	66	8.87	8.87
40 - 60	196	26.34	35.22
60 - 80	224	30.11	65.32
80 - 100	258	34.68	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

Wapasu - August 2015

Maximum Speed: 20 km/h on Aug 11 14:00

Maximum Daily Speed Average: 11.0 km/h on Aug 4

Minimum Speed Value: 0 km/h on Aug 7 04:00

Minimum Daily Speed Average: 0.8 km/h on Aug 26

Maximum Diurnal Speed Average: 5.4 km/h at hour 16

Minimum Diurnal Speed Average: 2.4 km/h at hour 19

Monthly Average Velocity: 3.0 km/h 185.8 deg

Percentiles: P_1 = 1 P_{10} = 4 Q_1 = 5 Median = 7 Q_3 = 11 P_{90} = 13 P_{99} = 18

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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	E4	E4	E4	E3	SE1	NE3	N2	N2	NNW8	NNW9	NNW9	NNW9	N8	NNW5	NW9	WNW7	NW8	N7	N5	NW3	E2	ENE3	SE4	SE5	N2.9	NNW9
2-Aug	SE7	SE6	SE6	SE5	SE5	SE6	SE5	SSE5	SSW7	SSW6	SSW4	WSW6	SW4	W6	NW6	WNW7	NW9	NNW7	SSW7	E4	ENE4	E2	SE3	ESE4	S1.8	NW9
3-Aug	E3	ESE4	ESE7	ESE9	ESE8	ESE6	SE7	SE5	S2	NW7	NNW7	ESE6	NE6	ENE5	ESE7	SSE7	SE11	SE10	ESE10	ESE6	ESE5	ESE7	ESE8	ESE7	ESE5.2	SE11
4-Aug	ESE6	E10	ESE11	ESE13	ESE14	ESE14	ESE13	ESE15	ESE13	ESE9	ENE8	E11	E13	ESE14	ESE18	ESE16	ESE13	ESE13	ESE10	SE10	SE9	SE9	SE5	ENE2	ESE11.0	ESE18
5-Aug	NE5	E7	ENE5	ENE6	E6	E7	ESE8	ESE8	ESE11	E13	E12	E13	ENE13	E13	E13	E13	E12	ESE14	ESE15	SE11	SE10	SE9	SE12	SE12	ESE9.6	ESE15
6-Aug	SE8	E6	E4	E6	ESE8	ESE12	ESE14	ESE14	ESE13	ESE11	SE13	ESE11	ESE12	ESE12	ESE13	ESE12	ESE15	ESE13	ESE12	ESE11	ESE8	ESE6	ESE8	SE7	ESE10.3	ESE15
7-Aug	SE7	SE4	E1	NNW0	E1	ESE4	SE7	SE7	SSE6	SE6	SE7	SE9	SE7	SSE5	SE7	SSE7	SE5	SE6	SE6	SE5	SE7	SE8	SE10	SE11	SE5.9	SE11
8-Aug	SE10	SE10	SE10	SE9	SE8	SE8	SSE7	SSE7	S6	SSE7	SSE8	SW7	WSW6	SSE3	ESE7	SE2	N4	ENE10	E10	ESE9	ESE9	SE7	SE6	SE4	SE5.8	SE10
9-Aug	NE3	NE3	ENE5	E4	ESE4	ESE4	E3	W3	SE1	WNW5	NW6	NNW1	W6	NNW5	SW3	WNW5	W2	ESE5	E5	E5	E6	ESE7	SE10	SE11	E1.7	SE11
10-Aug	SE11	SSE9	SE7	SE8	SSE9	SW6	SSW5	SW8	SW11	SW12	SW12	SW11	SW13	WSW14	SW16	WSW14	SW13	SW11	SW7	SSW4	SSE5	SSE6	S8	SSE7	SSW7.5	SW16
11-Aug	S6	SSE7	SSE7	SSE8	SSE7	SSE6	SSE7	SSE7	SSW10	SW11	SW16	WSW18	WSW20	WSW20	WSW20	WSW20	WSW15	W11	W8	SW4	SSW5	SW6	SSW3	SSE4	SW8.2	WSW20
12-Aug	S6	SSE6	SSE6	SSE6	SSE7	S6	SSW8	SW11	SW11	SW13	SW15	SW13	WSW11	SW12	SW11	SW12	SW13	WSW11	WSW8	SW8	SSW5	S5	SSE4	SSE5	SW7.8	SW15
13-Aug	SE6	SE7	SSE6	SE7	SSE7	SE7	S6	SSE6	SSW7	SSW8	SSW7	SW7	SW7	SSW5	SW8	SW9	S8	SSW10	SW10	S7	S6	SSW7	S6	SSW7	S6.3	SW10
14-Aug	SW6	S5	SSW7	SW10	SW7	SW8	WSW8	SW8	SW11	WSW11	W12	W11	W13	W16	W15	W15	W17	W14	W12	WNW11	W8	W8	WSW8	W8	WSW9.3	W17
15-Aug	WNW7	WNW7	WNW8	NW11	NW12	NNW10	NNW9	NNW12	NNW13	NNW11	NNW8	N8	N11	NNW12	NNW12	N12	NNW11	NNW10	NNW7	NNW6	NW7	NW5	NNW6	NNW5	NNW8.6	NNW13
16-Aug	NNW5	N5	NW5	NNW3	W1	WSW2	W4	WNW6	W4	WSW3	NW6	NW6	WSW5	SW3	NNW6	NW5	W5	N1	WSW1	SSE3	SSE4	SSE4	SE4	SSE5	WNW1.9	NNW6
17-Aug	SSE5	SSE5	SSE5	SSE6	SSE7	SSE7	SSE7	S7	SSW8	SW10	SW13	SW11	SW10	WSW10	WSW9	WSW7	W7	NNW5	W0	SSW2	S3	SE5	SSE6	SSE5	SSW4.8	SW13
18-Aug	E1	ESE1	N2	N4	NNE3	N5	NE4	N6	NNW6	NNW7	NW6	NNW4	NW5	NW5	W5	WNW5	ENE1	S4	SSE5	ESE9	ESE11	SE13	SE13	SE12	ENE1.2	SE13
19-Aug	SE12	SE12	SE13	SSE14	SSE16	SSE17	SSE18	SSE18	SSE16	S16	SSW14	SW14	WSW14	WSW12	W16	WSW16	WSW17	W16	W13	W10	W12	WSW9	SW8	SW7	SSW9.2	SSE18
20-Aug	SSW6	SW8	SW11	SW12	SW10	WSW13	WSW12	WSW12	WSW12	WSW12	WSW13	WSW13	W13	W13	WSW11	W11	W8	W11	W7	W6	W3	S2	WSW4	WSW6	WSW9.1	WSW13
21-Aug	SW6	SW6	SSW5	SSW6	SW7	SW7	SW7	WSW8	W8	W9	NW9	NW6	WNW6	W7	WNW11	NW14	NW14	NW12	NW6	WSW4	WNW4	NW4	NW3	WNW4	W5.7	NW14
22-Aug	WNW5	W4	W4	W5	WSW4	WSW6	WSW6	WSW8	WSW7	W7	NW9	NW9	WNW8	NW11	NW10	NW9	NW7	NW8	NNW5	ESE2	SE5	SE5	SE5	SE6	WNW3.9	NW11
23-Aug	SE6	SE6	SE6	SE7	SE7	SE7	SSE7	SSE7	SSE8	S10	S11	S10	SSE10	SSE10	S10	S10	S9	SSE9	SE10	SE12	SE13	SE15	SSW7	E5	SSE8.2	SE15
24-Aug	ENE5	SSE6	WSW4	SE8	SSE7	S5	SSE7	S9	SSW11	SSW11	SSW11	SW11	WSW12	SW13	WSW12	WSW10	WSW10	WSW8	WSW6	S3	SE3	ENE4	NE5	ENE5	SSW5.1	SW13
25-Aug	E6	E6	E6	E6	E6	E6	ESE5	ESE3	NW6	N6	NNW9	NNW8	N8	N8	NNW8	N7	NNE7	NNE5	NNE3	NE2	E3	NE5	NNW5	N5	NNE3.6	NNW9
26-Aug	NE6	NNE7	NNE4	NNE3	NNE3	ENE3	E3	ENE3	NNE4	NNW5	NW5	WNW7	WNW8	WNW6	WSW5	W6	WSW7	SW5	SW3	SSE3	SSE4	SSE5	SSE5	SE5	NW0.8	WNW8
27-Aug	SE6	SE6	SE7	SE7	SE7	SSE7	SSE6	S7	SSW8	SSW9	SSW10	SSW11	SSW11	SSW11	S12	SSW12	SSW12	SSW9	SW10	SSW6	S6	SSE8	S8	SSE7	S7.6	SSW12
28-Aug	S6	S7	S7	SSE7	SSE7	SSE8	SSW8	SW11	SSW11	SW12	SW13	SW15	WSW16	WSW14	W15	WSW13	SW13	SW11	SW5	ESE3	ESE4	SE4	WNW4	NNE4	SW7.1	WSW16
29-Aug	NNE3	S2	ESE4	SE4	SE6	S3	SSW3	SSW6	SW8	SW9	WSW9	SSW8	SSW7	SSW6	S7	SW8	SSE7	SE9	SE7	ESE9	ESE12	ESE14	ESE16	ESE17	SSE5.2	ESE17
30-Aug	ESE18	ESE18	ESE19	SE19	SE18	SE15	SSE10	SSE9	SSW9	WSW11	W10	WNW9	W9	WSW8	WSW9	SW8	SW7	SSW3	SSE9	SE9	SE9	SSE7	SSE8	SSE8	SSE6.3	ESE19
31-Aug	SSE7	SE8	SSE8	SE7	SSE7	SSE9	SSE9	S8	SSE8	S8	SSW10	SW14	SSW15	SW16	SW19	SW16	SW16	SW14	SW8	S6	S6	SSW7	SSE6	SSE6	SSW8.4	SW19
	SE3.7	SE4.2	SE3.9	SE4.4	SE4.7	SSE4.5	SSE4.5	S4.2	SSW4.4	SW4.5	WSW4.6	SW4.7	WSW4.6	WSW4.7	WSW4.9	WSW5.4	WSW4.1	SW2.4	S2.4	SSE3.0	SE4.0	SSE4.2	SSE4.3	SE4.3	Diurnal Average	
	ESE18	ESE18	ESE19	SE19	SE18	SSE17	SSE18	SSE18	SSE16	S16	SW16	WSW18	WSW20	WSW20	WSW20	WSW20	WSW17	W16	ESE15	SE12	SE13	SE15	ESE16	ESE17	Diurnal Maximum	

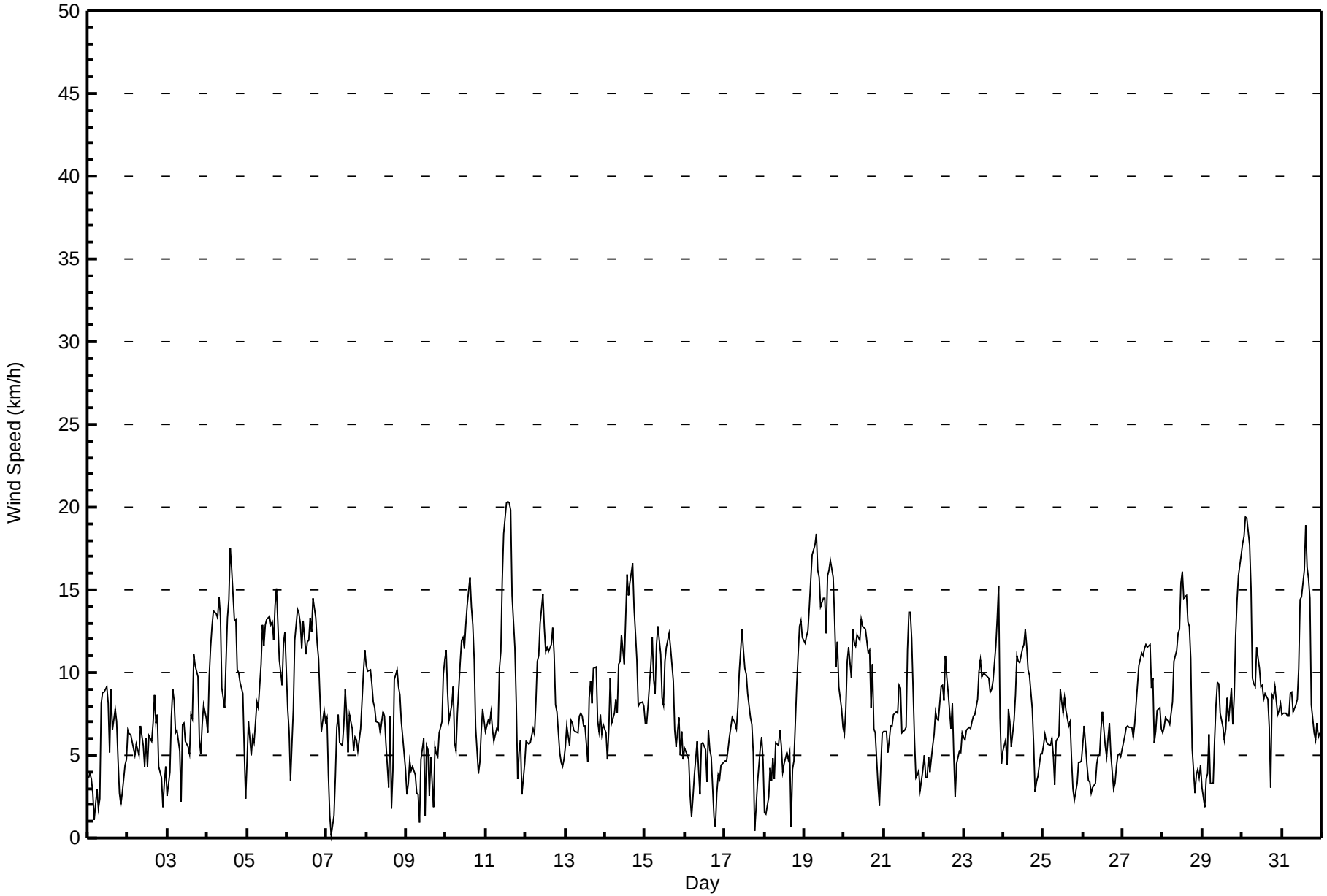
All monthly, daily, and diurnal averages have been calculated using vector methods

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed (WS) - km/h

Wapasu - August 2015



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	193	25.94	25.94
6 - 11	410	55.11	81.05
12 - 19	137	18.41	99.46
20 - 28	4	0.54	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Wind Speed (WS) - km/h

Wapasu - August 2015

Wind Speed	Wind Direction																
Ranges (km/h)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 5	10	9	8	12	19	14	24	20	10	11	7	9	12	7	9	12	193
6 - 11	9	2	2	3	14	33	66	62	28	37	47	29	21	14	22	21	410
12 - 19	1	0	0	1	8	31	15	6	2	4	26	20	14	1	4	4	137
20 - 28	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	4
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	20	11	10	16	41	78	105	88	40	52	80	62	47	22	35	37	744

Total Number of Valid Hours: 744

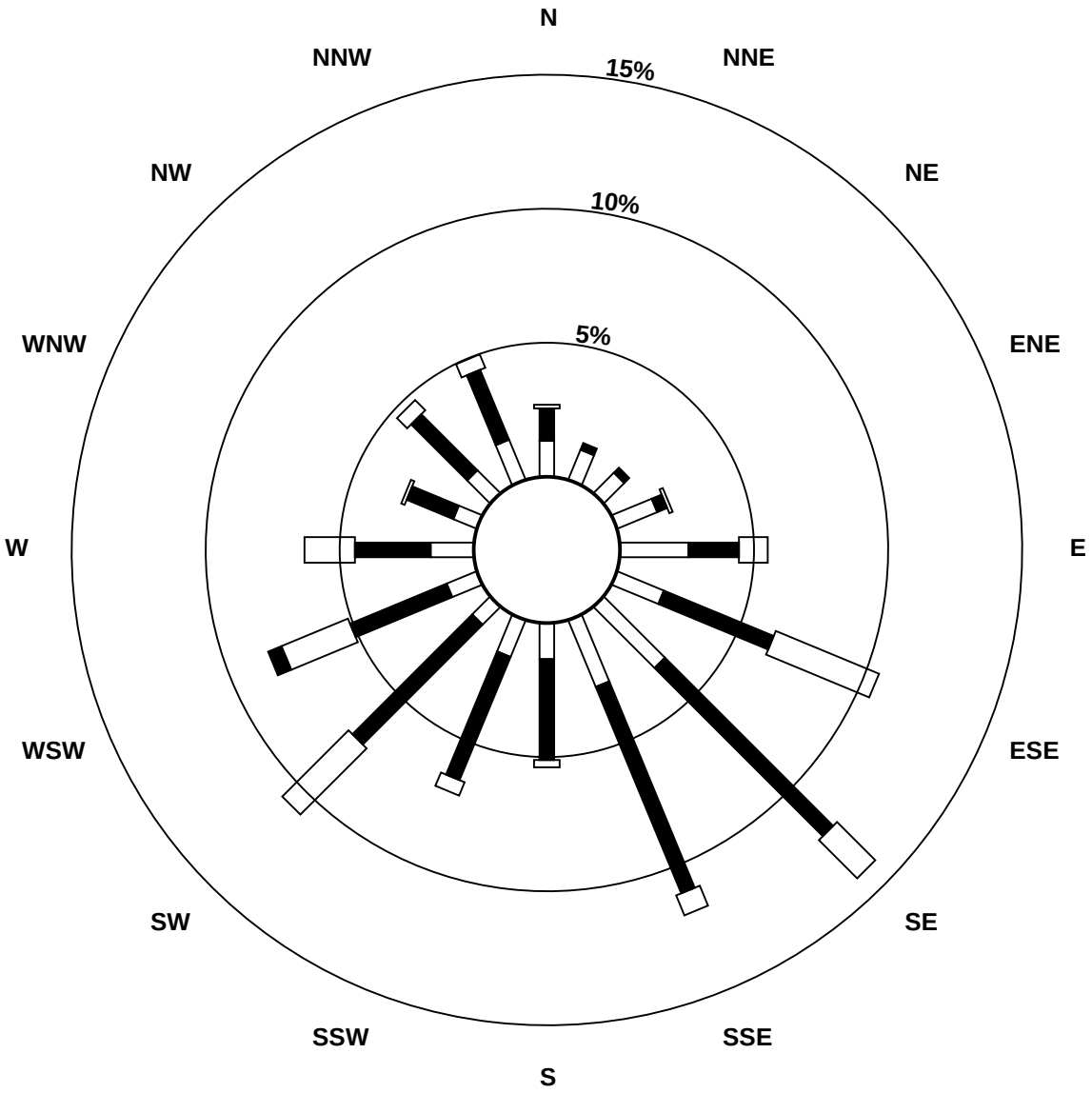
Total Number of Hours: 744

Wood Buffalo Environmental Association

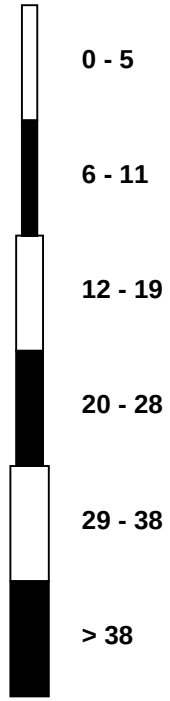
Wind Rose Aug 2015

Wind Speed (WS) - km/h

Wapasu (AMS 17)



Classes (km/h)



Total Number of Valid Hours: 744

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Speed (WS) - km/h

Wapasu - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 7 km/h on Aug 11 14:00

Minimum Value: 0 km/h on Aug 28 20:00

Percentiles: $P_1 = 1$ $P_{10} = 1$ $Q_1 = 2$ Median = 2 $Q_3 = 4$ $P_{90} = 4$ $P_{99} = 6$

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
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Aug	1	1	1	1	1	1	1	1	3	3	3	3	3	2	3	4	3	4	2	1	1	1	1	1	4
2-Aug	1	0	1	1	1	1	1	1	3	2	3	3	3	3	2	3	4	4	4	1	1	1	1	1	4
3-Aug	2	1	2	2	2	1	1	2	2	2	3	3	2	2	2	2	3	3	2	2	1	2	2	1	3
4-Aug	1	2	3	3	4	4	4	4	3	4	4	4	4	5	5	4	4	3	3	3	3	2	2	1	5
5-Aug	1	2	1	2	1	2	2	2	3	4	4	5	4	4	4	5	4	5	4	3	3	3	3	4	5
6-Aug	2	2	1	2	2	4	4	4	4	4	4	4	4	4	4	4	4	4	3	3	3	2	2	2	4
7-Aug	2	1	1	1	1	2	2	2	2	2	2	3	3	2	3	3	2	2	2	1	1	1	2	3	3
8-Aug	3	3	3	2	2	2	2	2	2	2	3	3	3	2	3	2	3	3	3	2	2	2	1	1	3
9-Aug	2	1	1	1	1	1	1	2	2	2	2	2	3	2	2	1	2	2	1	1	1	1	2	2	3
10-Aug	3	2	1	2	4	2	2	3	4	4	4	3	5	5	5	5	4	4	2	1	1	2	2	2	5
11-Aug	2	2	1	2	1	1	4	2	4	4	6	6	7	7	6	6	5	4	3	1	2	2	1	1	7
12-Aug	1	1	1	2	2	2	3	4	4	4	5	4	4	4	5	4	4	4	3	2	1	1	1	1	5
13-Aug	1	1	1	1	1	1	2	2	3	3	3	2	3	2	3	5	3	4	4	2	2	2	2	2	5
14-Aug	2	1	2	3	2	3	4	2	3	4	4	4	5	6	5	5	5	5	5	3	3	3	2	3	6
15-Aug	3	3	2	4	4	3	3	4	4	3	3	3	4	5	5	5	4	3	3	2	2	1	2	1	5
16-Aug	2	2	1	1	1	1	2	2	1	2	2	2	3	2	3	3	2	1	1	1	1	0	1	1	3
17-Aug	1	1	1	1	1	1	2	2	3	3	4	4	4	4	3	3	3	2	2	1	2	1	1	1	4
18-Aug	1	1	2	1	1	1	1	2	2	2	3	3	2	3	3	1	2	2	2	2	3	3	4	3	4
19-Aug	3	3	3	4	5	5	5	6	6	6	5	5	4	4	5	6	6	6	6	3	4	3	2	2	6
20-Aug	2	3	3	3	3	4	4	3	4	4	4	4	4	4	3	4	3	3	2	2	3	1	1	2	4
21-Aug	2	2	2	2	2	2	2	2	2	3	3	2	3	2	4	4	4	4	3	1	3	3	2	1	4
22-Aug	2	1	2	2	1	2	2	2	2	2	3	3	3	4	3	3	3	3	3	1	1	1	1	1	4
23-Aug	1	1	1	1	1	1	2	2	3	4	4	3	4	4	3	4	4	3	2	3	3	4	5	4	5
24-Aug	1	2	2	3	3	2	2	3	4	4	4	4	4	4	4	3	3	3	2	1	0	2	1	1	4
25-Aug	1	1	1	1	1	1	1	1	1	3	3	3	3	3	3	3	2	2	1	1	1	1	2	2	3
26-Aug	2	2	2	2	1	1	1	1	2	2	3	3	3	3	2	2	2	2	1	1	1	1	1	1	3
27-Aug	1	1	1	1	1	1	1	2	3	3	4	4	4	4	4	5	4	4	4	2	2	2	2	1	5
28-Aug	2	2	2	2	2	2	3	4	4	4	4	5	5	5	5	4	4	4	3	0	1	1	2	1	5
29-Aug	1	1	1	2	2	1	2	2	3	3	3	3	3	3	3	3	3	3	2	2	4	4	4	5	5
30-Aug	5	5	5	5	5	5	4	3	3	3	4	3	4	3	3	4	3	4	3	2	2	2	2	2	5
31-Aug	1	2	1	1	1	2	3	2	2	3	4	5	6	6	6	6	5	5	3	2	2	3	1	1	6
	5	5	5	5	5	5	5	6	6	6	6	6	7	7	6	6	6	6	6	3	4	4	5	5	
	Diurnal Maximum																								

Direction of Maximum Speed: 240 deg on Aug 11 14:00
Direction of Maximum Daily Speed Average: 108.1 deg on Aug 4

Direction of Minimum Speed: 344 deg on Aug 7 04:00

Direction of Minimum Daily Speed Average: 0.8 deg on Aug 26

Monthly Average Direction: 224.5 deg

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
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average
1-Aug	97	95	101	99	127	56	356	0	343	341	334	327	8	337	317	290	304	354	0	308	93	71	127	132	353.7
2-Aug	141	136	134	136	132	140	136	157	207	212	199	250	233	259	305	300	313	348	207	89	67	90	134	105	178.2
3-Aug	82	106	119	123	122	120	129	132	173	313	343	103	56	63	109	163	136	130	121	102	108	110	119	122	115.1
4-Aug	119	94	103	106	110	103	103	107	113	114	76	96	96	106	111	110	102	109	111	126	140	130	125	73	108.1
5-Aug	49	79	74	74	86	100	109	113	112	97	98	100	75	85	94	97	96	110	123	139	140	136	128	130	104.5
6-Aug	126	100	80	100	102	107	114	120	118	116	125	122	113	114	116	118	112	112	113	116	120	109	114	124	114.5
7-Aug	125	136	88	344	85	115	135	138	147	126	140	129	130	154	129	150	146	129	134	141	125	128	140	141	134.4
8-Aug	144	145	144	143	142	146	160	156	169	159	159	215	258	168	121	125	349	58	94	119	123	133	130	135	140.0
9-Aug	48	55	70	96	114	102	96	271	142	294	316	333	280	347	234	282	270	119	89	95	101	112	126	133	98.1
10-Aug	135	150	135	134	165	223	206	227	232	232	223	228	232	238	230	240	235	226	228	203	158	162	173	158	207.8
11-Aug	175	161	149	150	148	161	162	157	206	216	227	242	242	240	244	241	257	264	264	230	201	235	207	159	221.9
12-Aug	169	161	168	162	168	174	199	215	220	219	231	235	247	231	232	230	236	238	237	228	207	191	165	148	215.1
13-Aug	141	140	147	141	148	146	173	161	198	202	204	218	222	212	224	226	187	204	215	191	183	207	189	198	189.7
14-Aug	218	170	199	223	231	214	237	215	234	258	272	268	281	261	261	275	280	275	276	289	270	264	258	271	257.9
15-Aug	286	290	300	316	326	335	332	339	328	331	342	358	355	348	345	350	341	342	348	331	321	323	329	331	333.0
16-Aug	339	356	323	342	270	239	270	285	276	251	304	308	238	220	338	305	278	351	237	147	149	159	143	157	284.6
17-Aug	159	164	166	155	150	149	156	180	208	219	224	229	227	244	253	252	276	327	276	210	176	141	148	150	202.7
18-Aug	80	118	353	3	16	9	35	351	344	345	324	347	320	313	269	296	74	175	147	113	123	132	139	141	76.6
19-Aug	144	143	144	152	152	149	148	153	168	184	203	223	238	243	262	248	255	261	274	261	259	246	223	216	203.8
20-Aug	212	219	230	233	229	238	240	245	255	254	255	258	267	269	258	265	261	275	267	266	277	183	244	246	250.3
21-Aug	233	222	212	207	218	219	227	246	264	279	308	318	291	276	295	308	314	320	311	248	294	315	311	291	278.0
22-Aug	296	276	261	262	238	244	249	257	252	259	311	313	297	305	310	315	320	306	327	104	126	136	133	139	283.8
23-Aug	136	142	137	136	136	145	154	157	155	169	178	185	168	161	177	177	176	160	136	133	138	141	206	85	155.6
24-Aug	70	161	238	143	161	182	165	188	200	205	210	224	237	230	237	249	253	251	237	186	140	67	54	60	207.7
25-Aug	81	93	95	97	100	100	107	104	321	350	335	341	357	349	333	358	27	22	30	48	97	49	347	8	27.3
26-Aug	37	17	14	21	29	61	94	71	26	330	319	291	295	293	252	259	239	232	216	165	157	156	155	141	305.1
27-Aug	139	134	143	138	141	147	162	172	193	204	198	204	197	202	190	207	196	197	227	196	172	168	172	167	183.1
28-Aug	174	176	173	166	167	168	196	214	207	220	229	219	244	253	262	246	234	235	226	112	122	129	303	26	217.8
29-Aug	13	180	114	133	130	169	209	198	227	227	237	213	209	202	187	224	157	138	137	121	115	120	118	120	159.0
30-Aug	119	111	116	127	132	131	154	154	210	246	269	290	274	255	258	232	219	209	156	134	132	154	150	149	158.9
31-Aug	148	143	147	146	152	154	165	170	167	172	211	218	211	217	223	228	235	233	221	181	182	213	158	157	195.8
	136.2	135.7	140.1	141.3	144.4	148.2	161.2	174.8	203.2	221.7	237.0	235.5	244.4	241.9	240.5	244.2	242.3	227.5	190.5	153.6	146.0	147.0	148.9	141.4	
	Diurnal Average																								

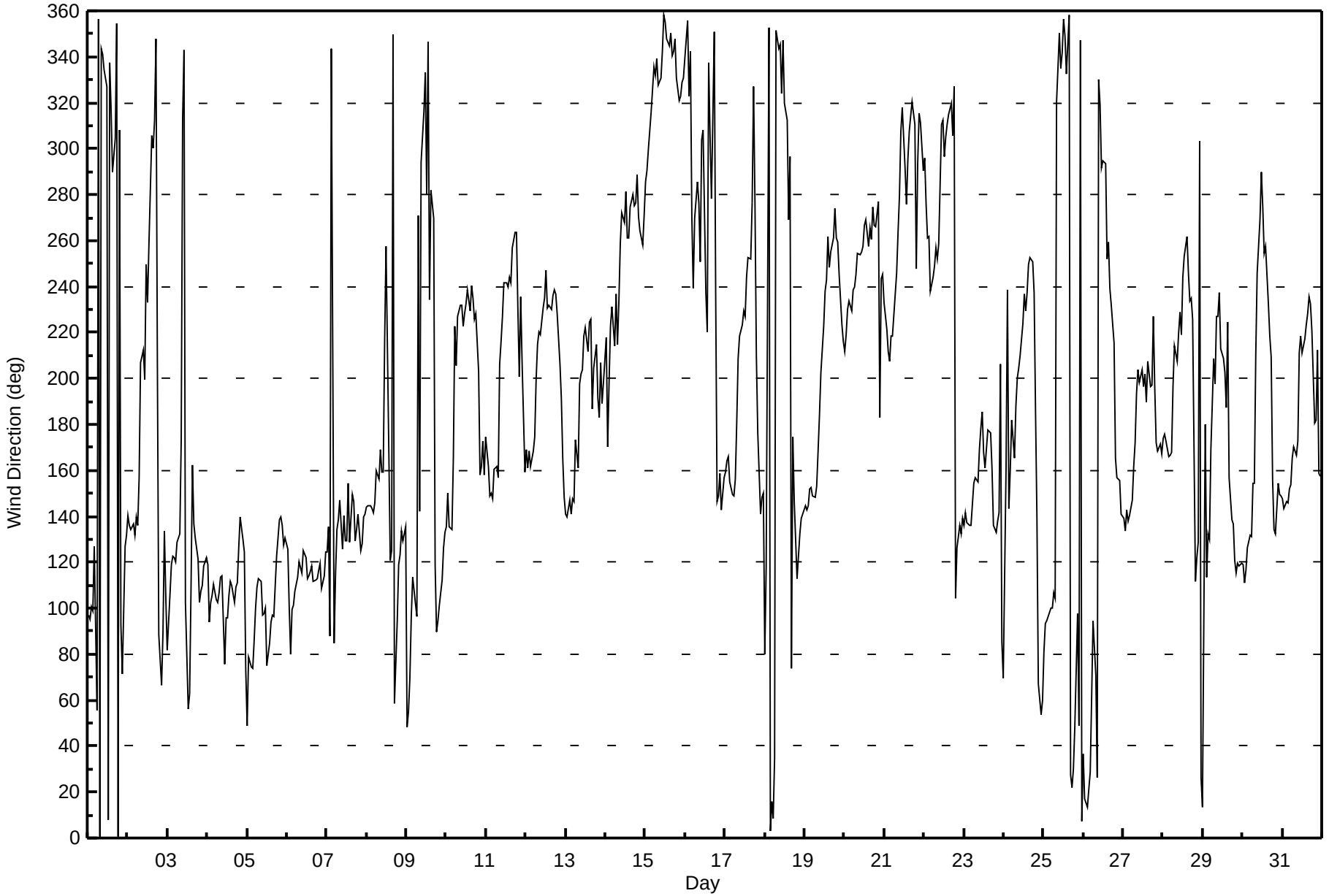
All monthly, daily, and diurnal averages have been calculated using vector methods

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction (WD) - deg

Wapasu - August 2015



Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg

Wapasu - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 104 deg on Aug 17 19:00

Minimum Value: 4 deg on Aug 2 02:00

Percentiles: P_1 = 7 P_{10} = 16 Q_1 = 21 Median = 28 Q_3 = 36 P_{90} = 49 P_{99} = 86

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
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Aug	24	22	28	32	76	27	68	59	36	34	45	38	47	44	29	49	39	49	31	33	46	40	22	16	76
2-Aug	7	4	5	4	7	6	9	33	39	56	67	58	69	63	64	58	44	44	41	25	17	51	38	24	69
3-Aug	70	29	17	16	14	18	16	31	70	41	46	60	49	38	26	39	19	22	19	14	17	20	16	17	70
4-Aug	20	19	19	20	20	20	21	20	19	32	34	22	24	22	20	19	22	20	19	21	21	18	23	47	47
5-Aug	28	20	18	18	18	22	20	22	24	27	30	32	26	29	30	29	25	22	20	19	21	24	19	19	32
6-Aug	20	23	19	19	21	22	21	24	23	24	25	24	24	25	26	25	24	22	22	22	20	20	21	18	26
7-Aug	19	26	73	65	37	13	18	27	23	29	27	32	36	46	45	45	42	24	30	19	10	14	17	19	73
8-Aug	21	19	20	21	20	22	27	27	34	29	41	44	68	71	31	94	75	25	28	22	18	16	13	62	94
9-Aug	46	18	12	25	20	25	33	58	101	64	50	100	61	45	68	30	87	29	24	14	10	12	17	15	101
10-Aug	17	23	17	17	41	36	33	34	27	29	33	35	33	27	28	30	27	29	26	33	11	19	27	20	41
11-Aug	29	31	17	20	14	24	55	25	34	31	28	27	25	26	26	23	28	26	27	34	26	44	53	13	55
12-Aug	20	18	24	25	25	30	34	33	32	28	28	30	35	34	38	36	26	29	26	25	25	23	24	13	38
13-Aug	7	8	12	8	11	16	28	30	37	40	41	32	36	44	33	42	35	42	30	33	27	34	29	33	44
14-Aug	34	27	26	28	26	30	28	27	28	33	26	28	28	28	28	28	27	30	29	26	27	27	27	28	34
15-Aug	28	29	22	25	26	32	32	34	27	27	36	38	34	37	39	41	40	36	36	30	18	21	27	29	41
16-Aug	32	41	32	30	61	27	29	31	26	47	41	43	60	73	54	42	38	84	57	7	15	13	10	12	84
17-Aug	11	11	15	10	10	13	23	32	33	29	28	35	40	41	40	47	45	35	104	69	52	11	14	15	104
18-Aug	58	89	30	28	24	22	35	40	42	43	50	81	64	61	69	30	102	58	24	17	17	17	19	19	102
19-Aug	22	21	21	26	26	24	24	26	31	36	35	32	29	27	29	28	27	29	27	26	26	27	26	28	36
20-Aug	27	30	23	21	26	21	22	25	26	25	28	27	27	28	27	28	28	26	27	26	57	57	24	24	57
21-Aug	21	26	30	26	27	28	26	24	29	27	28	26	30	31	29	26	25	25	40	27	58	37	35	33	58
22-Aug	25	32	36	30	23	22	25	25	26	29	30	23	31	26	27	32	46	35	38	25	10	10	14	11	46
23-Aug	12	12	10	9	11	15	22	26	26	35	38	38	40	40	36	43	37	29	19	17	18	20	61	83	83
24-Aug	30	42	40	19	48	41	30	36	36	38	36	31	32	30	34	34	31	31	21	30	10	27	12	15	48
25-Aug	14	12	12	10	13	13	12	61	25	49	34	42	49	45	36	44	35	36	22	42	38	20	28	40	61
26-Aug	26	35	40	53	34	49	43	36	49	52	53	50	37	50	63	44	33	29	24	17	8	9	11	11	63
27-Aug	6	8	8	7	7	11	22	27	37	39	36	38	39	38	37	37	37	41	35	32	23	22	26	22	41
28-Aug	29	25	26	24	23	23	36	33	37	30	31	29	29	31	31	29	26	25	29	27	19	28	75	25	75
29-Aug	46	75	41	65	29	54	48	34	30	33	38	45	52	58	55	42	52	22	16	16	18	19	19	21	75
30-Aug	20	21	20	18	20	21	33	32	39	30	33	37	42	47	32	38	33	64	37	19	17	25	18	20	64
31-Aug	18	18	16	16	15	20	28	31	29	36	38	35	36	36	29	28	24	25	30	29	28	39	19	19	39
	70	89	73	65	76	54	68	61	101	64	67	100	69	73	69	94	102	84	104	69	58	57	75	83	
	Diurnal Maximum																								

Wood Buffalo Environmental Association
SO2 Calibration Report

W B E A

Station Information

Calibration Date	August 13, 2015	Last Calibration	July 23, 2015
Station Name	Wapasu	Station Number	AMS 17
Reason:	Routine		
Start Time (MST)	8:50	End Time (MST)	13:30
Gas Cert Reference	SA130010A	Station temp.	23 Deg C
Cal Gas Concentration	47.8 ppm	Cal Gas Exp Date	12-Dec-16
Calibrator Make/Model	API T700	Serial Number	493
ZAG Make/Model	API 701	Serial Number	4427
DACS make/model	Campbell Scientific CR3000	DACS serial No.	6894

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 1000 ppb		PMT voltage	-702	-702
Analyzer IP address	192.168.1.43		Lamp voltage	861	860
Calculated slope	0.998345	0.998427	Chamber temp	44.9	45.3
Calculated intercept	0.552734	0.734287	Pressure	686.2	690.1
Analyzer Background	8.5	8.4	Flow	0.450	0.453
Analyzer Coefficient	0.808	0.808	Intensity	83	82

Analyzer make	Thermo 43i	Analyzer serial #	1218153459

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.3	----
as found span	5000	60.4	577.4	571.9	1.010
calibrator zero	5000	0.0	0.0	-0.3	----
high point	5000	60.4	577.4	577.6	1.000
second point	5000	30.2	288.7	288.9	1.000
third point	5000	15.2	145.3	143.9	1.010
as left zero	5000	0.0	0.0	-0.1	----
as left span	5000	60.4	577.4	575.8	1.003
				Average Correction Factor	1.003

Corrected As found	572.2	Previous response	577.8	% change	1.0%

Notes:

Filter changed after as founds. No adjustments made.

Calibration Performed By: Devin Russell

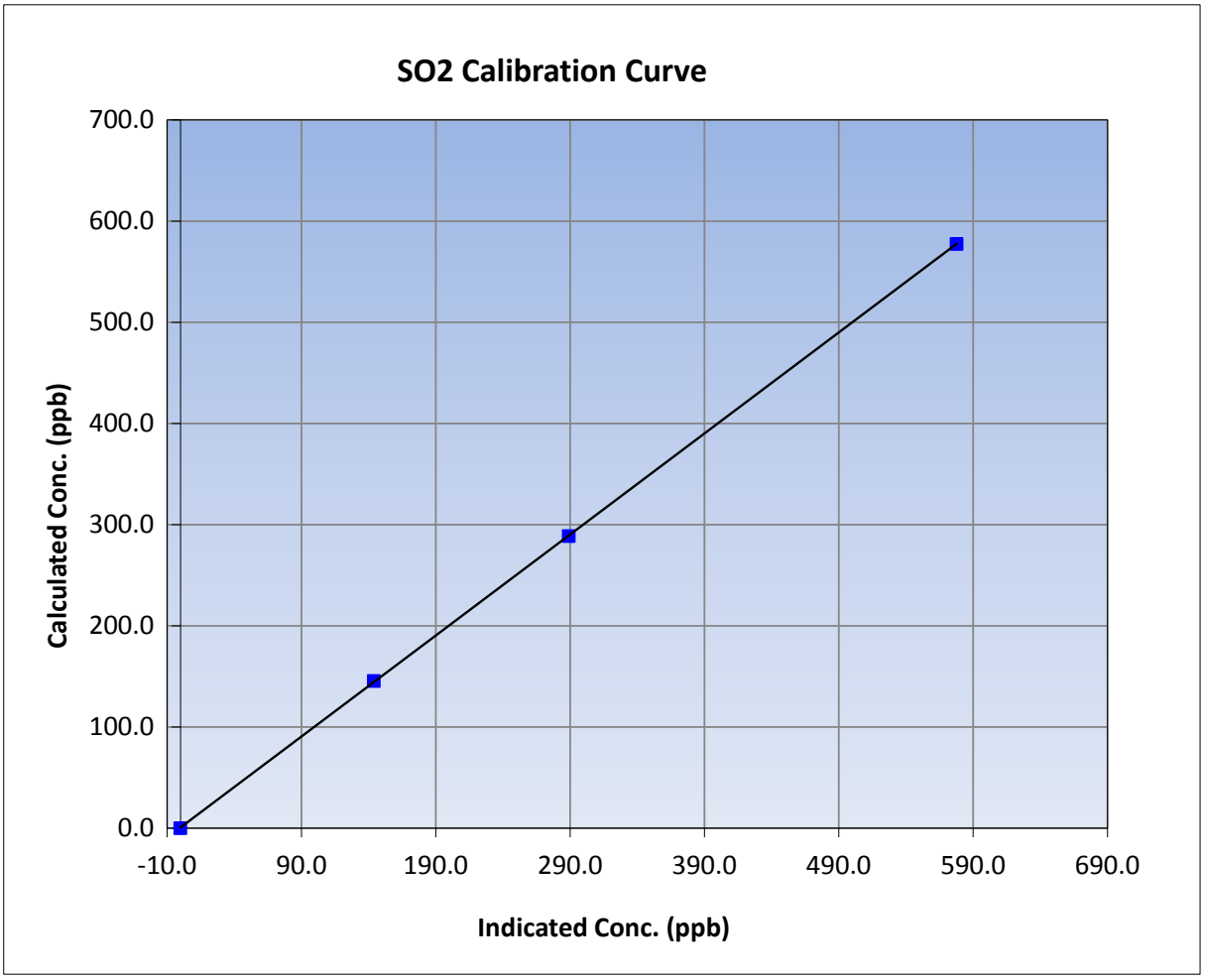
Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

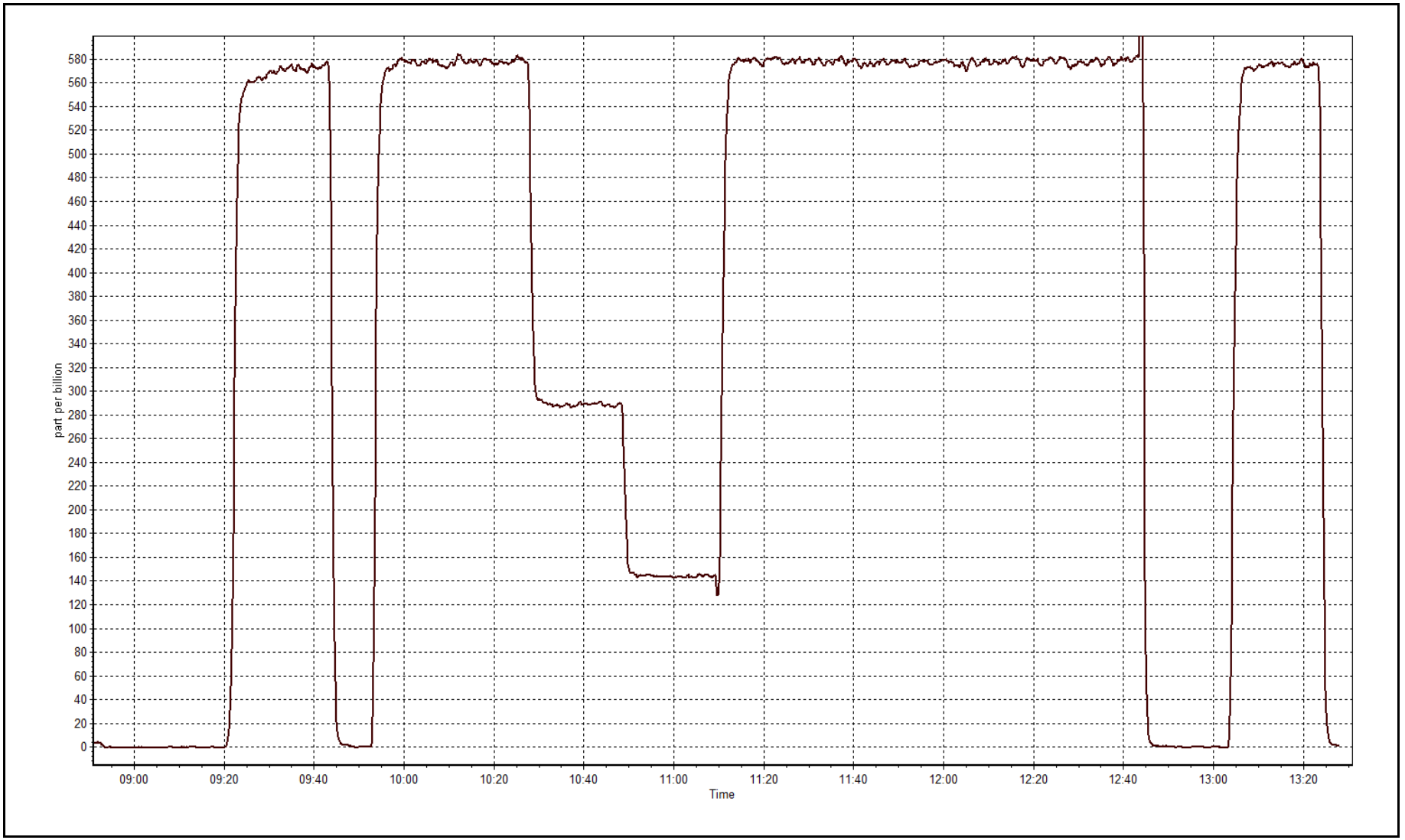
Calibration Date	August 13, 2015	Previous Calibration	July 23, 2015
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	8:50	End Time (MST)	13:30
Analyzer make	Thermo 43i	Analyzer serial #	1218153459

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.3	----	Correlation Coefficient	0.999994
577.4	577.6	0.9997		
288.7	288.9	0.9995	Slope	0.998427
145.3	143.9	1.0097		
			Intercept	0.734287



SO2 Calibration Plot Date: August 13, 2015



Wood Buffalo Environmental Association
H2S Calibration Report

W B E A

Station Information

Calibration Date	August 14, 2015	Last Calibration	July 22, 2015
Station Name	Wapasu	Station Number	AMS 17
Reason:	Routine		
Start Time (MST)	8:50	End Time (MST)	14:50
Gas Cert Reference	CC107167	Station temp.	23 Deg C
Cal Gas Concentration	5.1 ppm	Cal Gas Exp Date	09-Sep-17
Calibrator Make/Model	API T700	Serial Number	997
ZAG air Make/Model	API 701	Serial Number	4227
DACS make/model	Campbell Scientific CR3000	Serial Number	6894
SO2 gas concentration	47.8 ppm	SO2 gas cert/exp	SA130010A December-12-16

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-651	-651
Analyzer IP address	192.168.1.42		Lamp voltage	808	790
Calculated slope	1.001819	0.995883	Chamber temp	45	45
Calculated intercept	-0.279169	-0.039872	Pressure	546.5	563.6
Analyzer Background	11.7	13.9	Flow	0.996	0.934
Analyzer Coefficient	0.842	1.15	Intensity	91	112
			Converter temp.	341	338

Analyzer make/model	Thermo 450i	Analyzer serial #	1218153583
Converter make/model	n/a	Converter serial #	n/a

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.0	----
as found span	5000	78.5	80.1	80.1	1.000
SO2 scrubber check	5000	20.9	199.8	0.8	----
calibrator zero	5000	0.0	0.0	-0.1	----
high point	5000	78.5	80.1	80.4	0.996
second point	5000	39.3	40.1	40.3	0.995
third point	5000	19.7	20.1	20.4	0.983
as left zero	5000	0.0	0.0	0.0	----
as left span	5000	78.5	80.1	80.7	0.993
				Average Correction Factor	0.991

Corrected As found	80.1	Previous response	80.2	% change	0.2%

Notes:

Filter changed after as founds. Changed UV lamp and socket after as founds. Adjusted Flash Lamp voltage, and set initial flash reference voltage. Srubber check completed after maintenance. Zero and span adjusted.

Calibration Performed By: Devin Russell

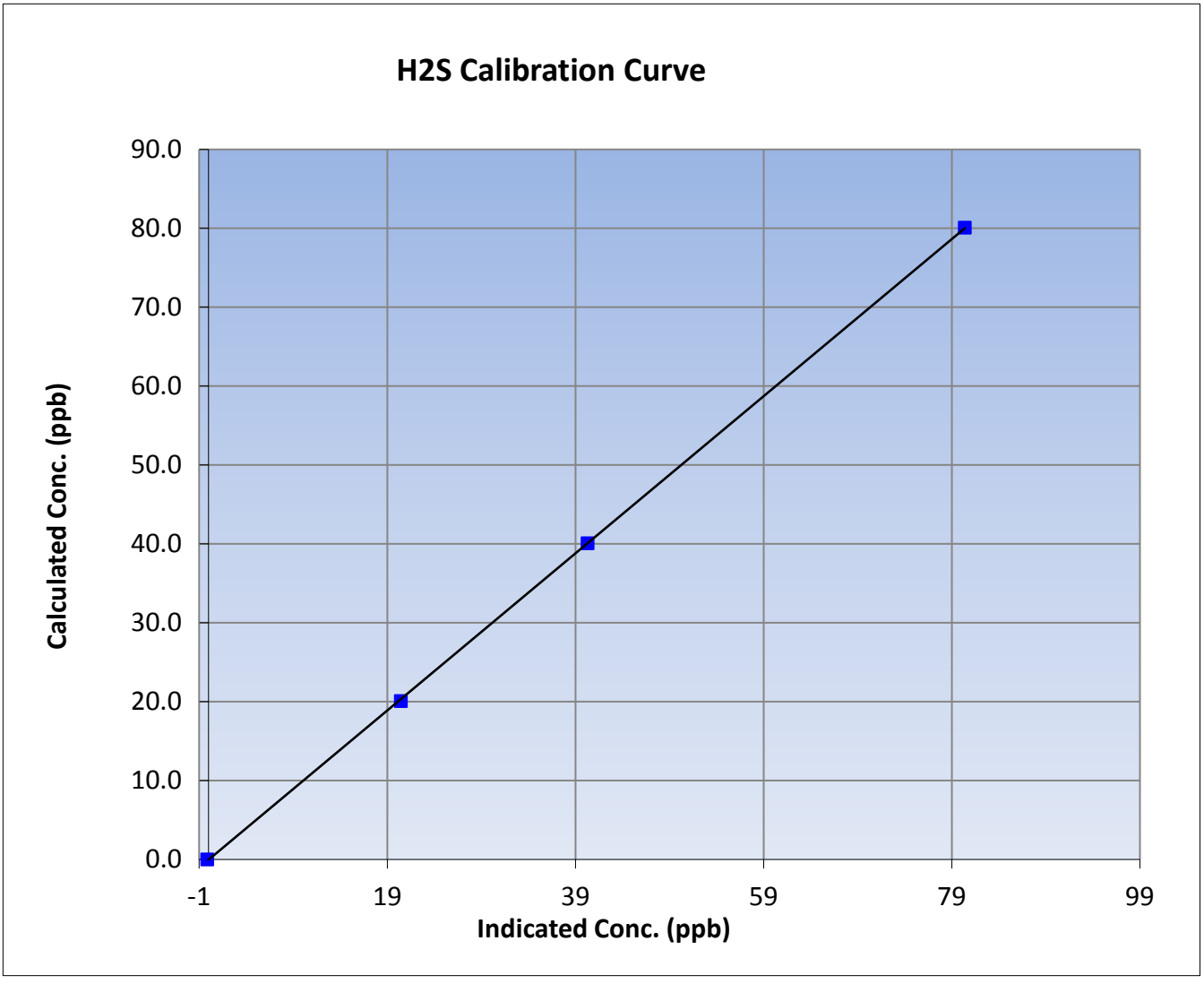
Wood Buffalo Environmental Association
H2S Calibration Report

Station Information

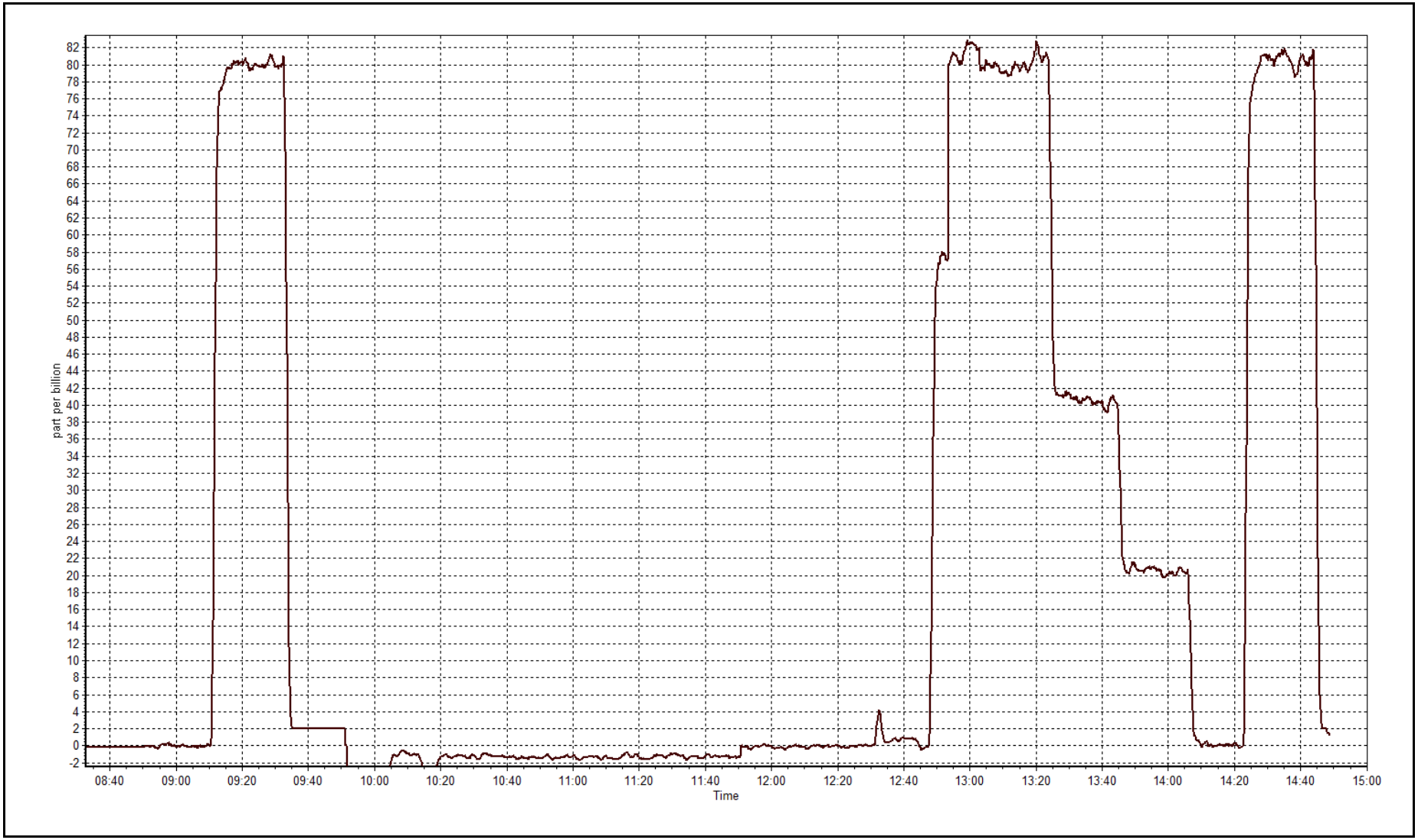
Calibration Date	August 14, 2015	Previous Calibration	July 22, 2015
Station Name	AMS 17	Station Number	AMS 17
Start Time (MST)	8:50	End Time (MST)	14:50
Analyzer make	Thermo 450i	Analyzer serial #	1218153583

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999977
80.1	80.4	0.9961		
40.1	40.3	0.9947	Slope	0.995883
20.1	20.4	0.9831		
			Intercept	-0.039872



H2S Calibration Plot Date: August 14, 2015



Wood Buffalo Environmental Association
THC Calibration Report

W B E A

Station Information

Calibration Date	August-13-15	Last Calibration	July-23-15
Station Name	Wapasu	Station Number	AMS 17
Reason:	Routine		
Start Time (MST)	8:50	End Time (MST)	13:30
Gas Cert Reference	SA130010A	Cal Gas Expiry Date	12/12/2015
CH4 Cal Gas Conc.	512 ppm	CH4 Equiv Conc.	1092.3 ppm
C3H8 Cal Gas Conc.	211 ppm	Station temp.	23 Deg C
Calibrator Make/Model	API T700	Serial Number	493
ZAG make/model	Teledyne API 701	Serial Number	4427
DACS make/model	Campbell Scientific CR3000	Serial Number	6894

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 50 ppm		Sample Pressure	8.5	8.5
Analyzer IP address	192.168.1.51		Air or Bypass Press	41.1	41.1
Calculated slope	1.000524	0.999595	Fuel Pressure	24.8	24.8
Calculated intercept	-0.055054	-0.057133	Analyzer Coeff	4.2	4.2
			Analyzer BKG	2.560	2.550

Analyzer make	Thermo 51i-LT	Analyzer serial #	1218153352

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	0.04	----
as found span	5000	60.4	13.19	13.26	0.995
calibrator zero	5000	0.0	0.00	0.04	----
high point	5000	60.4	13.19	13.24	0.997
second point	5000	30.2	6.60	6.69	0.986
third point	5000	15.2	3.32	3.38	0.982
as left zero	5000	0.0	0.00	0.04	----
as left span	5000	60.4	13.19	13.27	0.994
				Average Correction Factor	0.988

Corrected As found	13.22	Previous response	13.24	% change	0.2%

Notes:

Filter changed after as founds. Span adjusted.

Calibration Performed By: Devin Russell

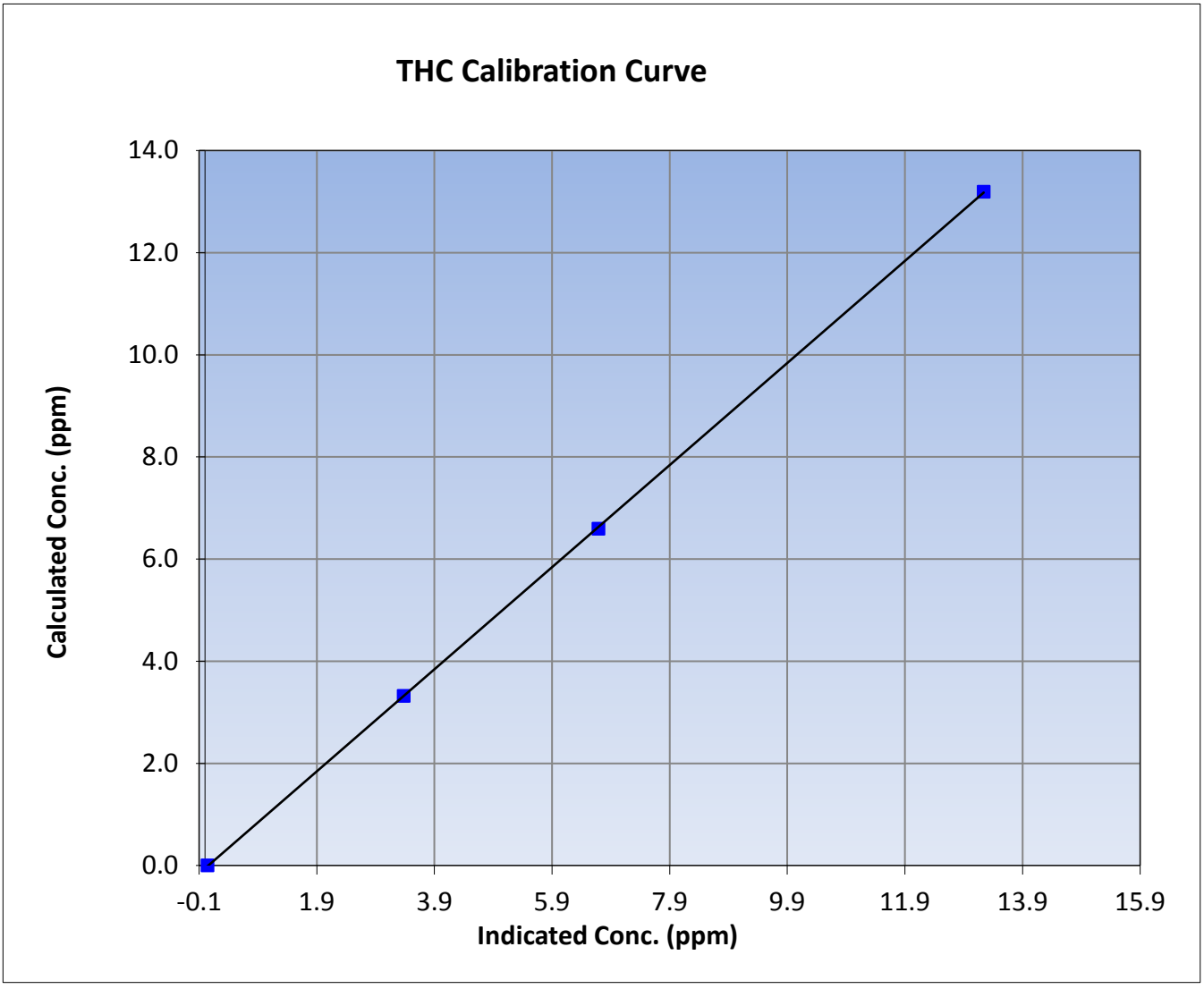
Wood Buffalo Environmental Association
THC Calibration Report

Station Information

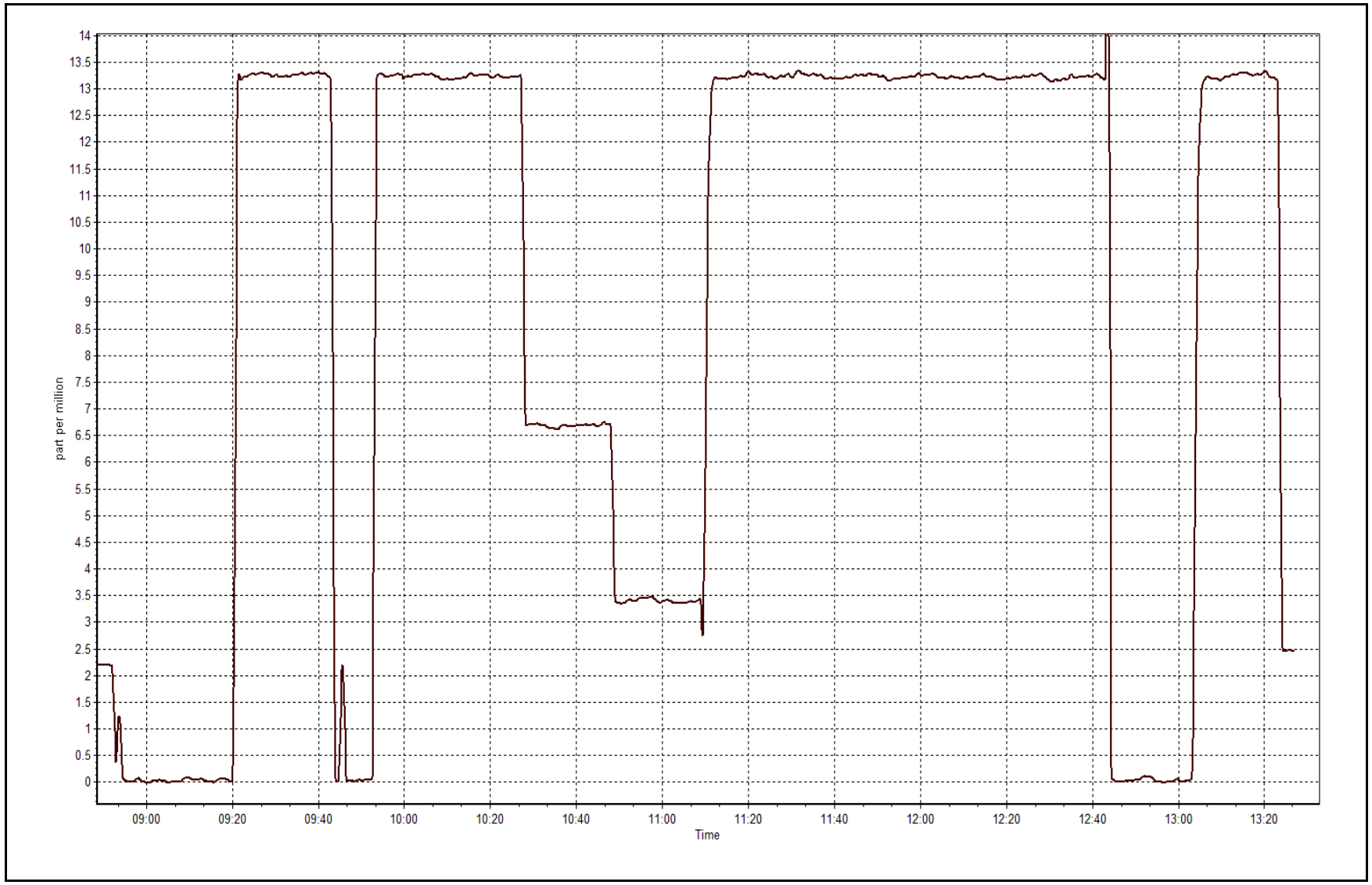
Calibration Date	August 13, 2015	Previous Calibration	July 23, 2015
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	8:50	End Time (MST)	13:30
Analyzer make	Thermo 51i-LT	Analyzer serial #	1218153352

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.04	----	Correlation Coefficient	0.999982
13.19	13.24	0.9966		
6.60	6.69	0.9861	Slope	0.999595
3.32	3.38	0.9824		
			Intercept	-0.057133



THC Calibration Plot Date: August 13, 2015



Wood Buffalo Environmental Association
O_3 Calibration Report

Station Information

Calibration Date	August 14, 2015	Previous Calibration	July 28, 2015
Station Name	Wapasu	Station Number	AMS 17
Reason:	Routine		
Start Time (MST)	9:30	End Time (MST)	12:35
NO2 GPT Ref date	August-13-15	Transfer Standard	23
		Station temp.	23 Deg C
Calibrator Make/Model	Teledyne API T700	Serial Number	997
ZAG make/model	Teledyne API 701	Serial Number	4427
DACS make/model	Campbell Scientific CR3000	Serial Number	6894

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 500 ppb		Bench temp.	26.8	27.3
Analyzer IP address	192.168.1.48		Lamp temp.	58.0	58.0
Calculated slope	0.997517	0.997278	Pressure	26.0	26.0
Calculated intercept	-0.655873	-1.067615	Flow cell A	709.000	722.000
Analyzer Background	4.5	5.2	Flow cell B	721.000	708.000
Analyzer Coefficient	0.971	0.958	Cell A Intensity		
			Cell B Intensity		

Analyzer make	Teledyne API T400	Analyzer serial #	824

Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator Lamp Intensity (mA)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	193.1/800	0.0	0.9	----
as found span	5000	713.6/1082.0	350.4	355.0	0.987
calibrator zero	5000	193.1/800	0.0	0.4	----
high point	5000	713.6/1082.0	350.4	351.9	0.996
second point	5000	496.5/973.6	235.8	237.9	0.991
third point	5000	260.3/849.3	120.2	122.5	0.982
as left zero	5000	193.1/800	0.0	-0.1	----
as left span	5000	713.9/1083.6	350.4	353.1	0.992
				Average Correction Factor	0.990

Corrected As found	354.1	Previous response	351.9	% change	-0.6%

Notes:

Changed filter after as founds. Adjusted zero and span.

Calibration Performed By: Devin Russell

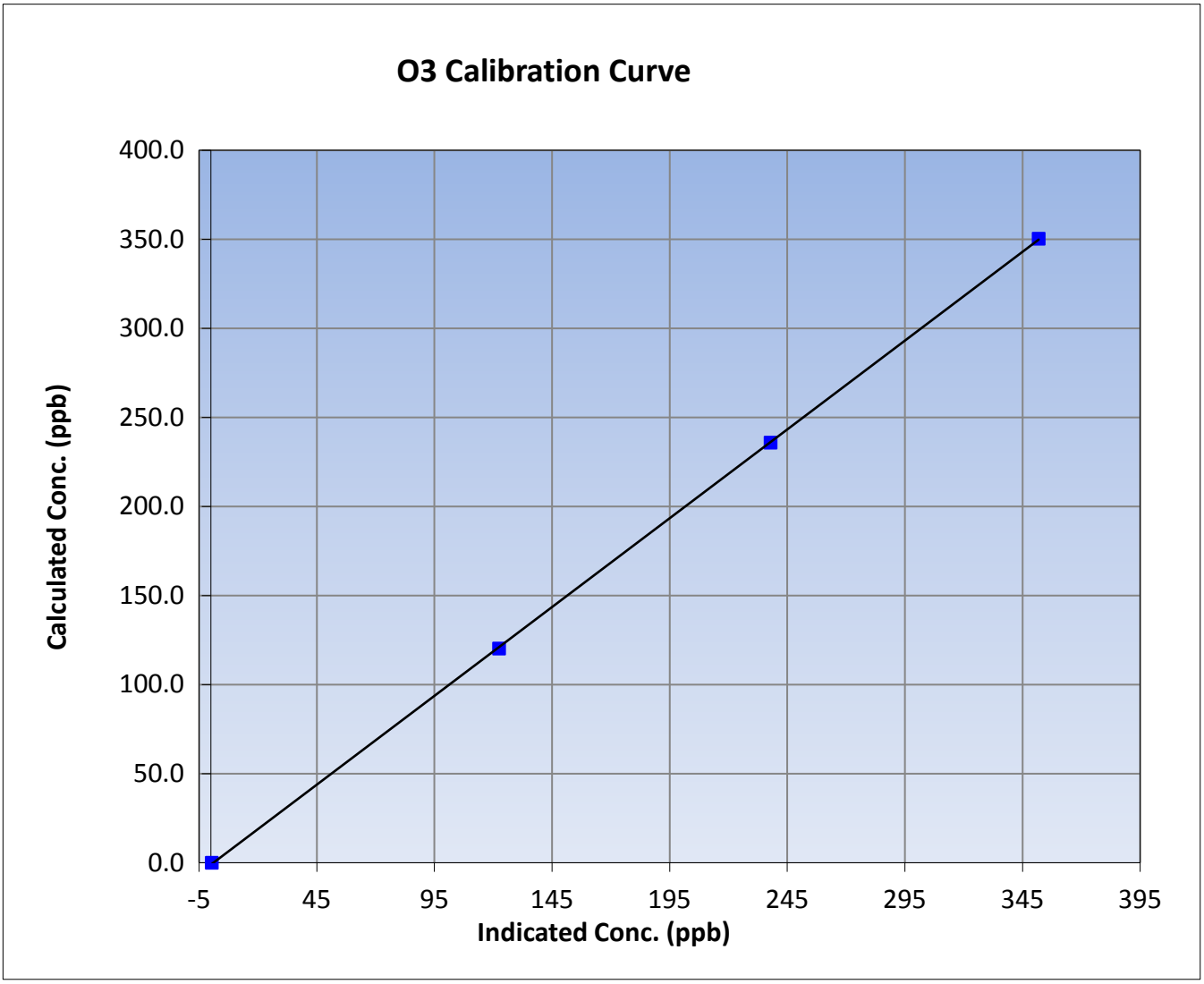
Wood Buffalo Environmental Association
O3 Calibration Report

Station Information

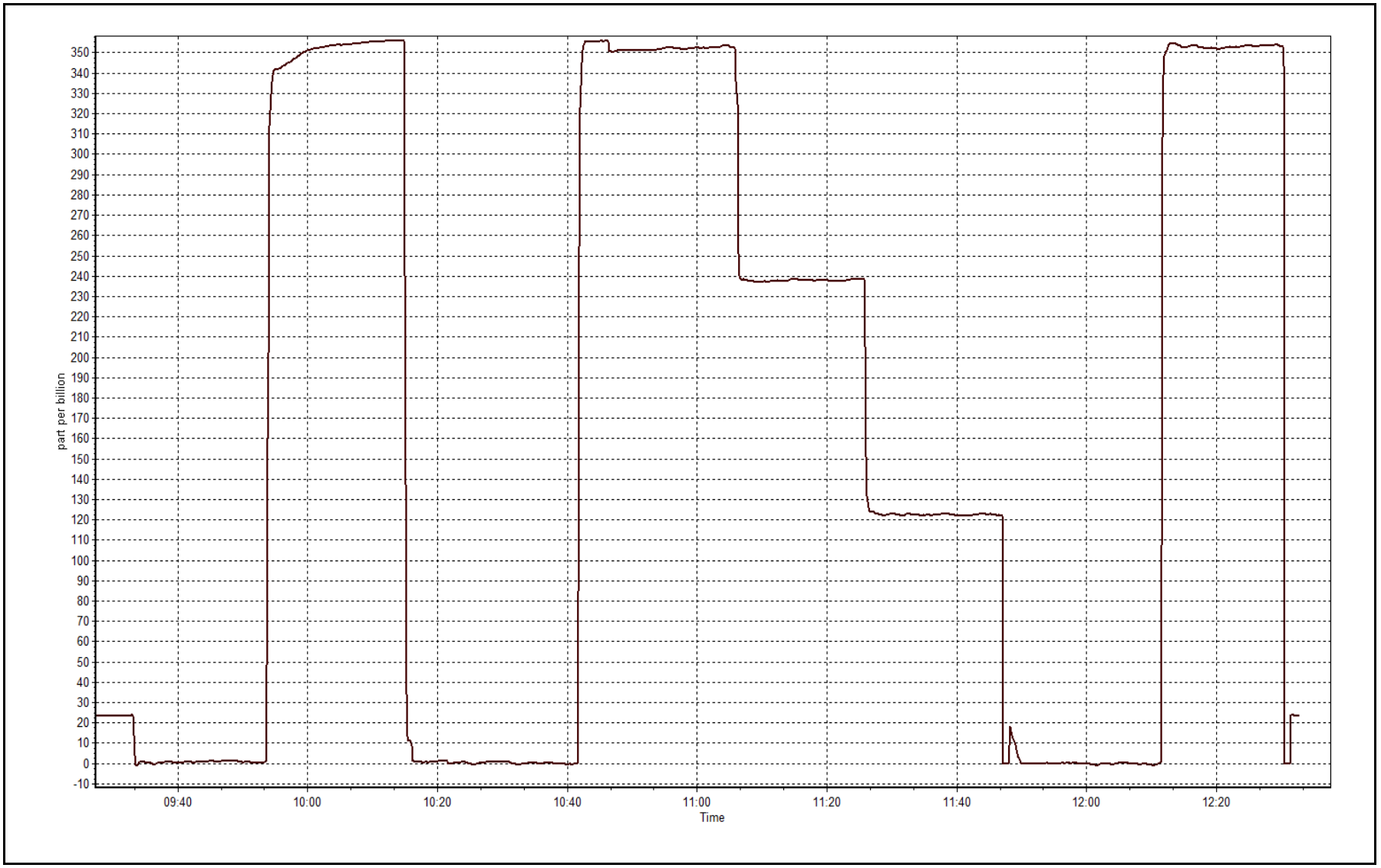
Calibration Date	August-14-15	Previous Calibration	July 28, 2015
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	9:30	End Time (MST)	12:35
Analyzer make	Teledyne API T400	Analyzer serial #	824

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.4	----	Correlation Coefficient	0.999975
350.4	351.9	0.9959		
235.8	237.9	0.9910	Slope	0.997278
120.2	122.5	0.9816		
			Intercept	-1.067615



O3 Calibration Plot Date: August 14, 2015



Wood Buffalo Environmental Association
NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	August 13, 2015	Previous Calibration	July 23, 2015
Station Name	Wapasu	Station Number	AMS 17
Reason:	Routine		
Start Time (MST)	8:50	End Time (MST)	13:25
NO Cal Gas Conc	49.7 ppm	Gas Cert Reference	SA130010A
NOx Cal Gas Conc	49.7 ppm	Cal Gas Expiry Date	December 12, 2016
Calibrator	API T700	Serial Number	997
Zero air Generator	Teledyne API T701	Serial Number	4427

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	6894

Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.998977	1.000462	1.000070
	Data Offset	2.204958	1.099697	1.562714
Current Calibration	Data Slope	0.998440	1.001139	0.995717
	Data Offset	1.800858	1.052682	0.076879

Analyzer Information

Analyzer make/model	API T200	Analyzer serial #	833

Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
NO coefficient	0.901		0.906	
NOX coefficient	0.901		0.909	
NO2 coefficient	1.000		1.000	
NO bkgrnd	0.0		0.0	
NOX bkgrnd	2.9		2.9	
Chamber Temp	50	Deg C	50	Deg C
Moly Temp	316.5	Deg C	316.2	Deg C
PMT voltage	781	V	781	mV
PMT Temp	7	Deg C	7	Deg C
O3 flow	71	ccm	71	ccm
R Cell press NO	4.4	mmHg	4.5	mmHg
R Cell Press Nox	4.4	mmHg	4.5	mmHg
NO sample flow	0.44	lpm	0.439	lpm
Nox sample Flow	0.440	lpm	0.439	lpm

Notes:

Filter changed after as founds. Span adjusted.

Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: August 13, 2015 Station Number: AMS 17

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	-1.4	-0.4	-1.0	----	----
as found span	5000	60.4	600.4	600.4	0.0	594.8	594.9	-0.1	1.0094	1.0093
calibrator zero	5000	0.0	0.0	0.0	0.0	-1.4	-0.4	-1.0	----	----
high point	5000	60.4	600.4	600.4	0.0	599.4	598.6	0.8	1.0017	1.0030
second point	5000	30.2	300.2	300.2	0.0	299.7	299.6	0.1	1.0016	1.0019
third point	5000	15.2	151.1	151.1	0.0	148.4	148.4	-0.2	1.0183	1.0179
as left zero	5000	0.0	0.0	0.0	0.0	-0.9	0.3	-1.1	----	----
as left span	5000	60.4	600.4	246.2	354.2	598.6	247.6	351.1	1.0029	0.9946
								Average Correction Factor	1.0072	1.0076

Corrcted As found NO_X= 596.2 NO= 595.3 Percent Change NO_X= 0.4% NO= 0.6%

Previous Response NO_X= 598.8 NO= 599.0

GPT Calibration Data

Dilution Flow 5000 ccm Source Gas Flow 60.40 ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
Cal zero			0.0			-1.0			N/A	
1st NO2 (300)	----	246.2	350.4	597.1	246.2	350.9	0.9935	1.0000	0.9987	100.1%
2nd NO2 (200)	----	360.8	235.8	598.5	360.8	237.7	0.9912	1.0000	0.9921	100.8%
3rd NO2 (100)	----	476.4	120.2	598.0	476.4	121.6	0.9919	1.0000	0.9886	101.1%
4th NO2 (0)	596.6	----	2.1	598.8	596.6	2.2	0.9907	1.0000	N/A	----
					Average Correction Factor		0.9918	1.0000	0.9931	100.7%

Calibration Performed By: Devin Russell

Wood Buffalo Environmental Association

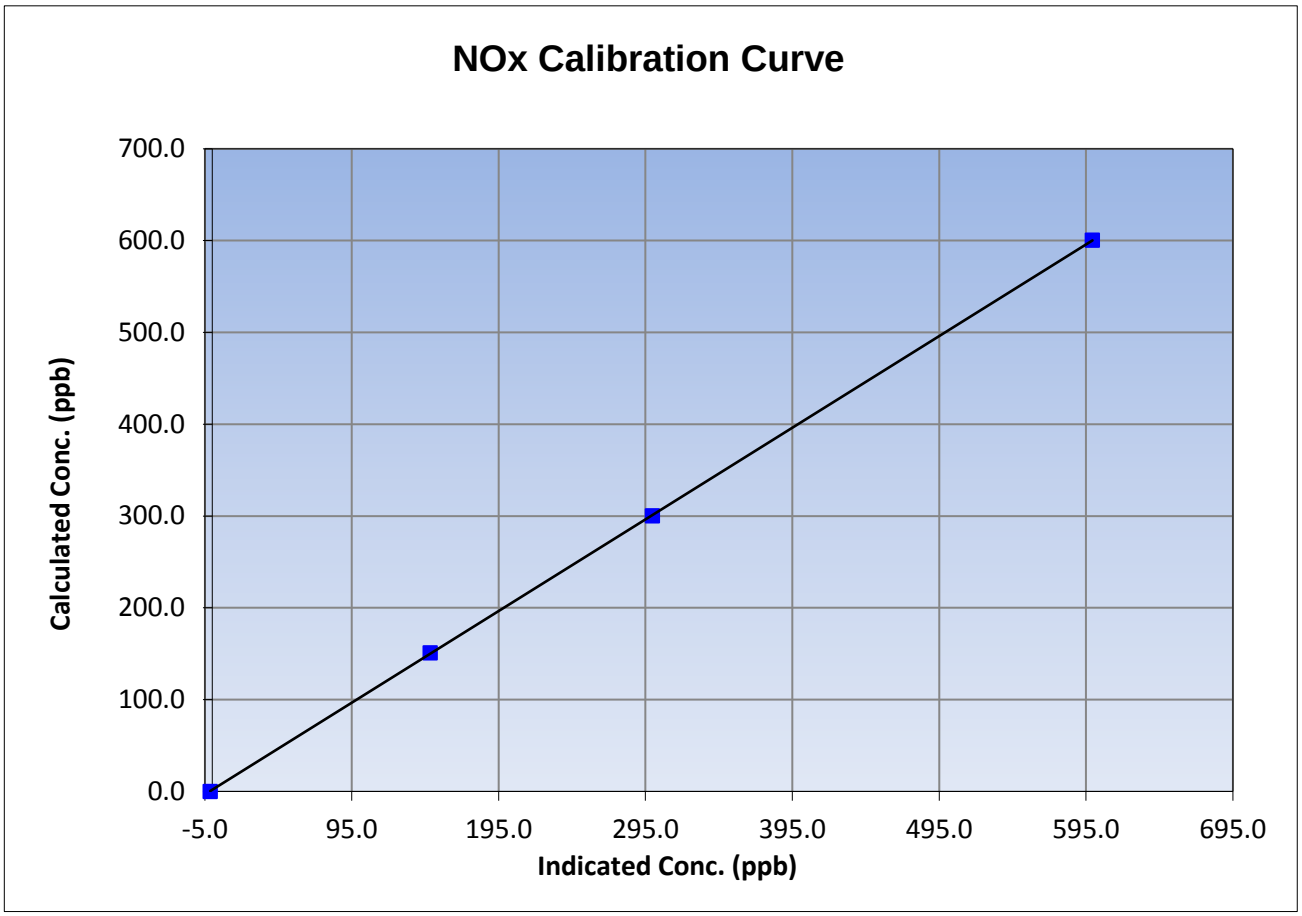
NO_X Calibration Summary

Station Information

Calibration Date	August 13, 2015	Previous Calibration	July 23, 2015
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	8:50	End Time (MST)	13:25
Analyzer make	API T200	Analyzer serial #	833

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-1.4	----	Correlation Coefficient	0.999989
600.4	599.4	1.0017		
300.2	299.7	1.0016	Slope	0.998440
151.1	148.4	1.0183		
			Intercept	1.800858



Wood Buffalo Environmental Association

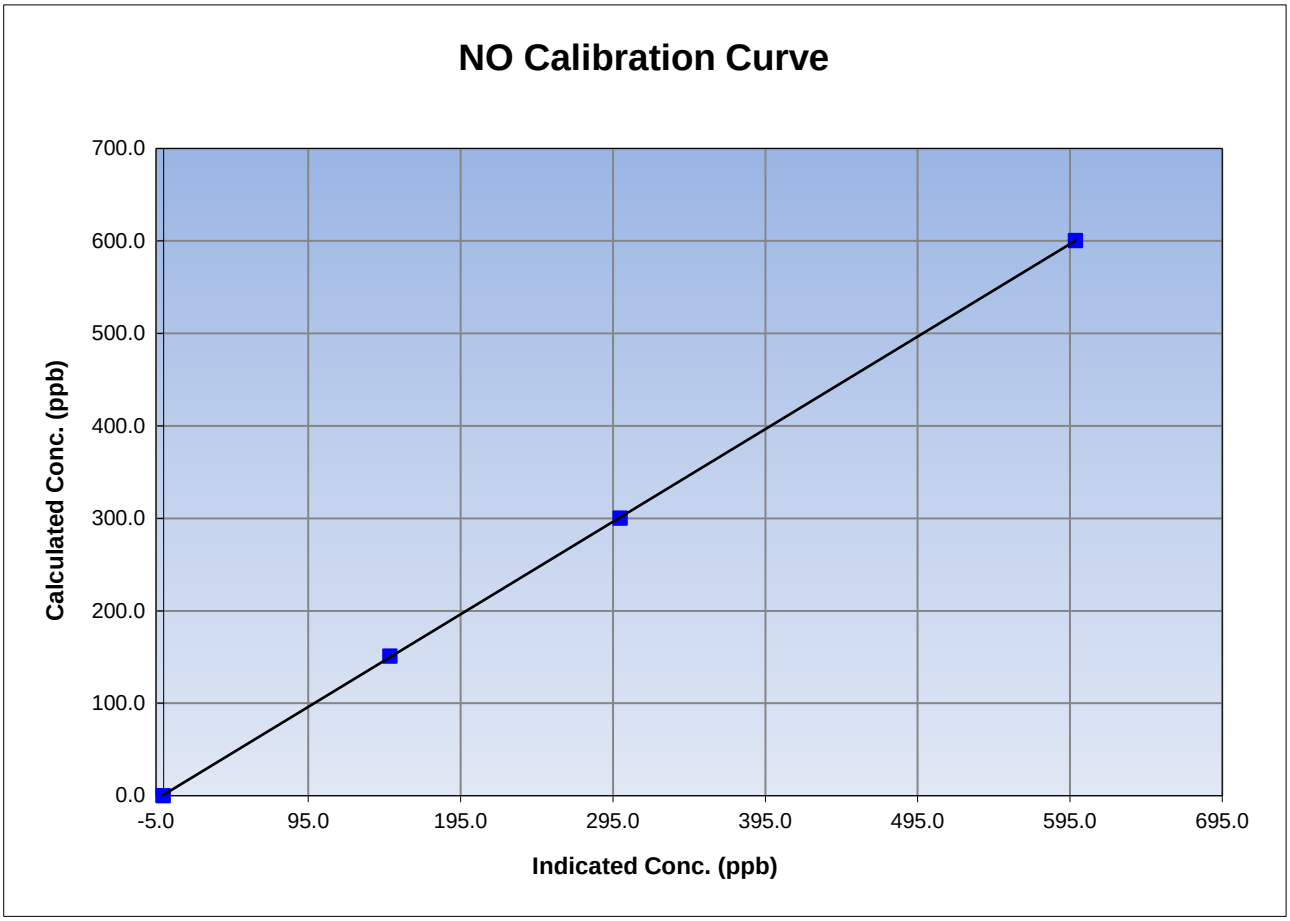
NO Calibration Summary

Station Information

Calibration Date	August 13, 2015	Previous Calibration	July 23, 2015
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	8:50	End Time (MST)	13:25
Analyzer make	API T200	Analyzer serial #	833

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.4	N/A	Correlation Coefficient	0.999984
600.4	598.6	1.0030		
300.2	299.6	1.0019	Slope	1.001139
151.1	148.4	1.0179		
			Intercept	1.052682



Wood Buffalo Environmental Association

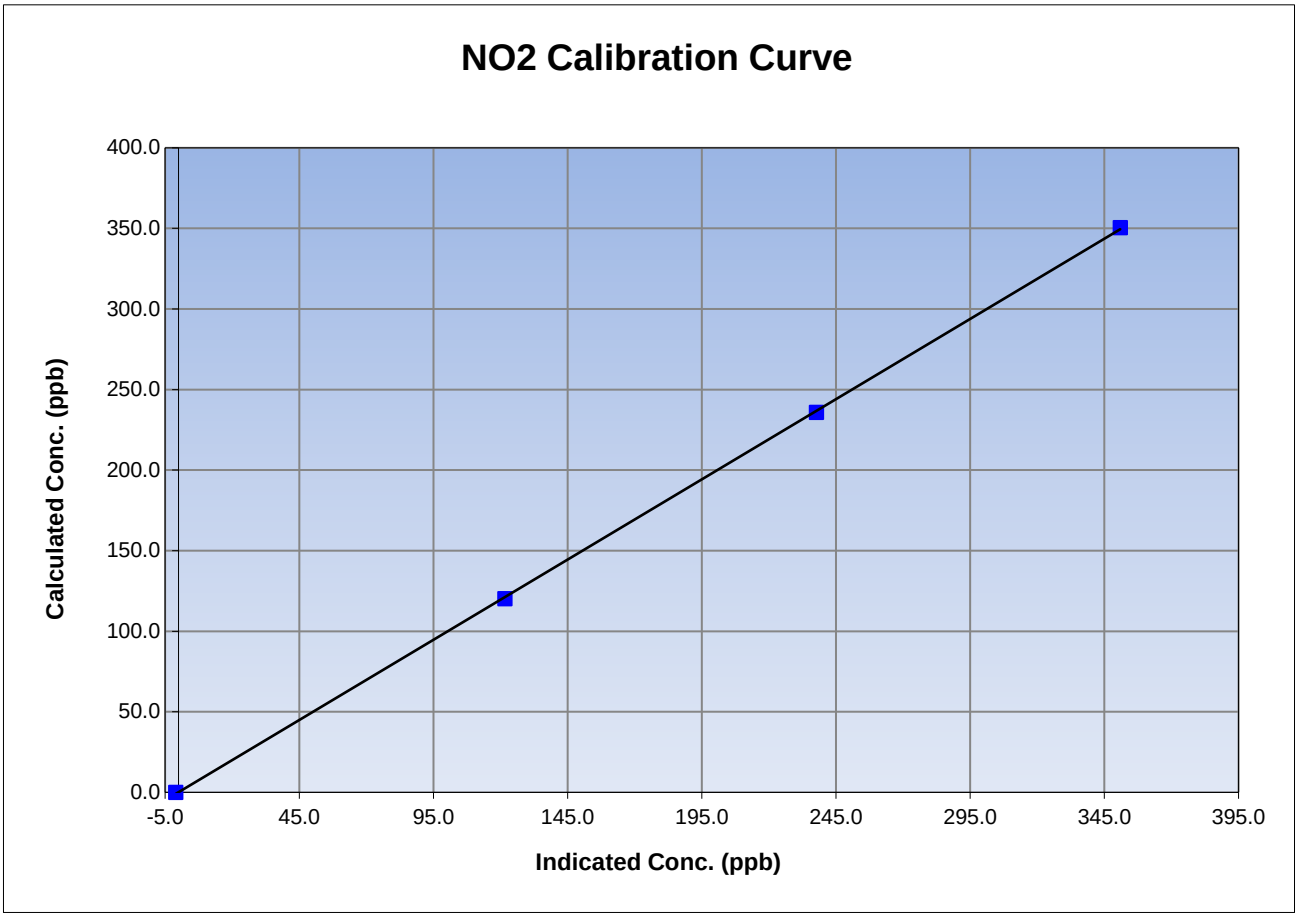
NO_2 Calibration Summary

Station Information

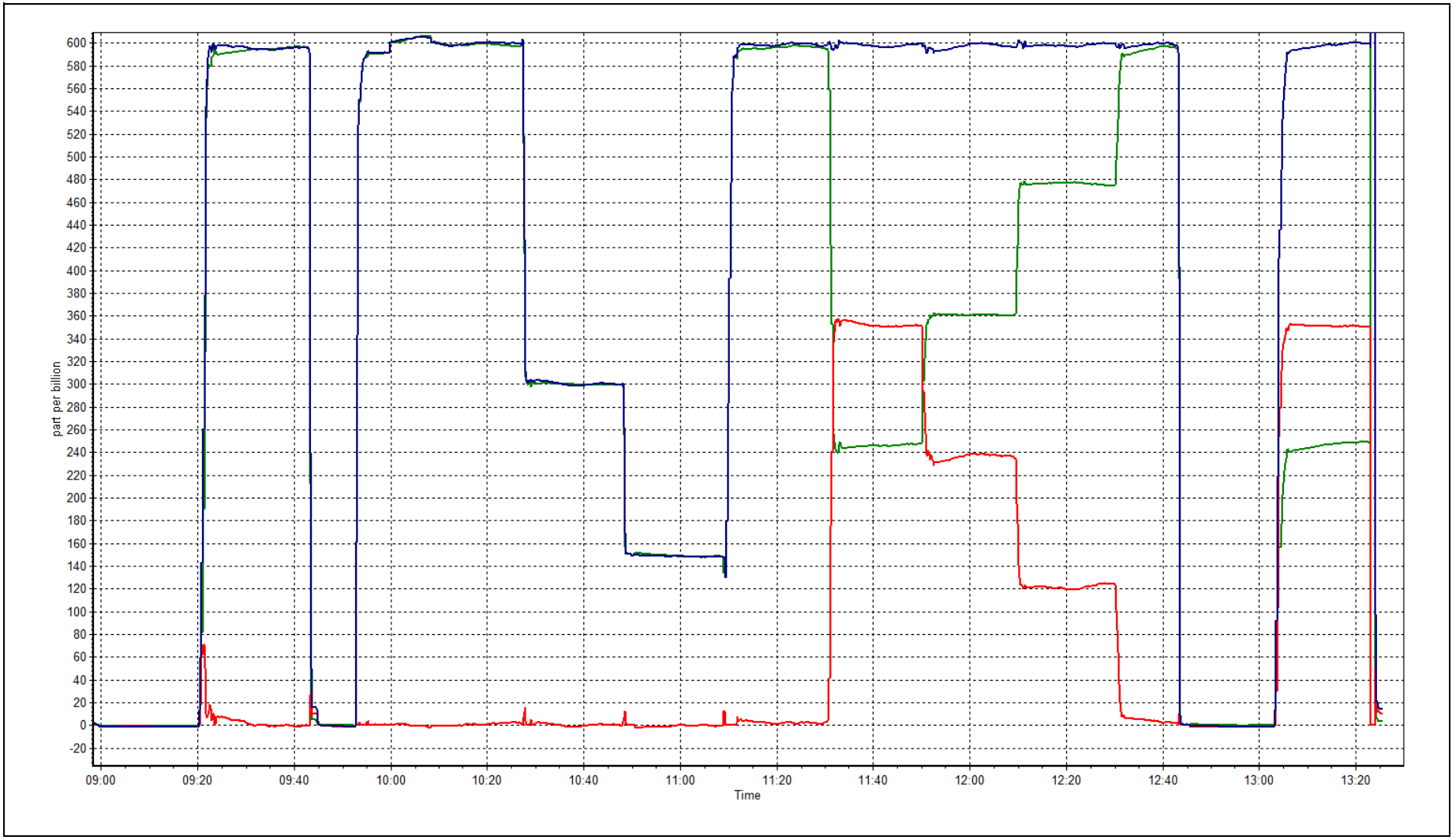
Calibration Date	August 13, 2015	Previous Calibration	July 23, 2015
Station Number	Wapasu	Station Number	AMS 17
Start Time (MST)	8:50	End Time (MST)	13:25
Analyzer make	API T200	Analyzer serial #	833

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-1.0	N/A	Correlation Coefficient	0.999949
350.4	350.9	0.9987		
235.8	237.7	0.9921	Slope	0.995717
120.2	121.6	0.9886		
			Intercept	0.076879



NOx, NO & NO_2 Calibration Plot Date: August 13, 2015



Wood Buffalo Environmental Association

SHARP CONFORMANCE TEST

STATION INFORMATION

Calibration Date:	August 14, 2015	Previous Calibration:	July 28, 2015
Station Name:	Wapasu	Station Number:	AMS 17
Start Time (MST):	10:20	End Time (MST):	11:05
Calibrator Make/Model:	Delta Cal	Calibrator Serial Number:	954

SHARP INFORMATION

Particulate Fraction:	PM2.5
Make/Model:	Thermo / SHARP 5030
Serial Number	E-1107
Source SN:	2518
HEPA PN:	1337
Time Correct (MST):	Yes
Paremeters Checked:	T1, T2, T2,T4, P3, Main Flow, Beta, Neph

AUDIT DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	14.0	15.4	1.4	14.0
T2	25.0	na	na	25.0
T3	24.0	na	na	24.0
T4	30.0	na	na	30.0
RH (%)	34.0	na	na	34.0

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	952	953.9	1.9	952

Main Flow (Lph)

Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
1000	994	-6	994	1000

Nephalometer Calibration

Parameter	As Founds	adjusted(Limit +or- 2.0ug/m3)	As Left
Analog	195	no	195
Neph	0		0
C14	7.7		7.7
Indicated Concentration (ug/m3)	0		0
Offset 1	197.2		197.2
Offset 2	32		32

Leak Check (Quarterly)

Leak Check Date:	June 10, 2015	Previous Leak Check Date:	
	Measured	Difference LPM (Limit +/- 0.42 LPM)	
Flow without adaptor (LPM):	16.59	0.09	
Flow with adaptor [turn off pump first](LPM):	16.50		

Mass Foil Calibration (Annualy)

Foil Calibration Date:		Previous Foil Calibration:	
Zeroed?:	NO		
Foil Mass:	1337	Mass foil set S/N:	
Previous Correction Factor:	6775		
New Correction Factor:	6924		

INSPECTION DATA

Item	Condition	Date of install or rebuild
Cyclone	Good / Replaced	
Pump	Good	
Filter Tape	Good	
Mass Foil Cal Set	na	
HEPA filter	Good	

NOTES:

Cyclone Head changed with a clean head.

Audit Performed By: Devin Russell

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 18
CONKLIN LOOKOUT
AUGUST 2015

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

September 28, 2015

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONKLIN LOOKOUT (AMS 18)
AUGUST 2015

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	705	36	39	99.60	4	0	1	0
TRS(ppb) Average	706	37	38	99.87	0	0	0	0
O3 (ppb) Average	706	35	38	99.60	54	0	37	-
NO2 (ppb) Average	704	36	40	99.46	5	0	1	-
NO (ppb) Average	704	36	40	99.46	7	-	0	-
NOX (ppb) Average	704	36	40	99.46	10	-	1	-
PM2.5 (ug/m3) Average	742	1	2	99.87	26	-	10.7	0
Wind Speed 10 m (km/h) Average	744	0	0	100.00	17	-	11	-
Wind Direction 10 m (deg) Average	744	0	0	100.00	-	-	-	-
Temperature 2 m (C) Average	744	0	0	100.00	28.7	-	21.3	-
Relative Humidity (%) Average	744	0	0	100.00	99	-	98.0	-
Global Solar Radiation (W/m2) Average	744	0	0	100.00	872	-	298.0	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONKLIN LOOKOUT (AMS 18)
AUGUST 2015

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

					Percentile						
Parameter	Number	Mean	StnDev	Total	Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	705	0.3	0	-	0	0	0	0	0	1	4
TRS (ppb) Average	706	0.3	0	-	0	0	0	0	0	0	0
O3 (ppb) Average	706	27.2	8	-	8	17	21	27	33	38	54
NO2 (ppb) Average	704	0.6	0	-	0	0	0	0	1	1	5
NO (ppb) Average	704	0	0	-	0	0	0	0	0	0	7
NOX (ppb) Average	704	0.6	1	-	0	0	0	0	1	1	10
PM2.5 (ug/m3) Average	742	3.44	2.8	-	0	0.9	1.6	2.7	4.5	6.6	26
Wind Speed 10 m (km/h) Average	744	6.6	3	-	0	3	4	6	9	11	17
Wind Direction 10 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-
Temperature 2 m (C) Average	744	15.5	4.8	-	3.6	9.8	12.1	14.8	19.1	22.3	28.7
Relative Humidity (%) Average	744	71.2	19	-	29	42	56	73	88	96	99
Global Solar Radiation (W/m2) Average	744	203.6	265	-	0	0	0	52	376	667	872

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONKLIN LOOKOUT (AMS 18)
AUGUST 2015

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2	13 Aug 2015 17:00	13 Aug 2015 18:00	2	Maintenance - internal WBEA audit
SO2	18 Aug 2015 12:00	18 Aug 2015 12:00	1	Maintenance - replace sample manifold
TRS	18 Aug 2015 12:00	18 Aug 2015 12:00	1	Maintenance - internal WBEA audit
O3	13 Aug 2015 15:00	13 Aug 2015 16:00	2	Maintenance - internal WBEA audit
O3	18 Aug 2015 12:00	18 Aug 2015 12:00	1	Maintenance - replace sample manifold
NO2	13 Aug 2015 13:00	13 Aug 2015 15:00	3	Maintenance - internal WBEA audit
NO2	18 Aug 2015 12:00	18 Aug 2015 12:00	1	Maintenance - replace sample manifold
PM2.5	14 Aug 2015 11:00	14 Aug 2015 11:00	1	Maintenance - internal WBEA audit

Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO_2) - ppb

Conklin Lookout - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 4 ppb on Aug 23 11:00 Maximum Daily Average: 0.9 ppb on Aug 27

Minimum Value: 0 ppb on Aug 6 07:00 Minimum Daily Average: 0.0 ppb on Aug 12
Maximum Diurnal Average: 0.5 ppb at hour 11 Minimum Diurnal Average: 0.2 ppb at hour 3
Monthly Average: 0.3 ppb Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 1$ $P_{99} = 2$

Hours in Service:	744
Hours of Data:	705
Hours of Missing Data:	39
Hours of Calibration:	36
Percent Operational Time:	99.6

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0.3	1
2-Aug	1	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
3-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0.4	1
4-Aug	Z	1	1	1	1	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
5-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
6-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
7-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
8-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
9-Aug	0	0	0	0	0	Z	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0.5	1
10-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
11-Aug	0	Z	0	0	0	0	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
12-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
13-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	M	M	0	0	0	0	0	0	0.3	0
14-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
15-Aug	0	0	0	0	0	Z	0	0	0	1	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0.4	1
16-Aug	Z	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
17-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
18-Aug	0	0	Z	0	0	0	0	1	1	3	2	M	2	1	0	0	0	0	0	0	0	0	0	0	0.6	3
19-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
20-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
21-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
22-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.1	1
23-Aug	0	Z	0	0	0	0	0	0	0	0	4	2	1	1	1	1	0	1	0	0	1	1	1	1	0.7	4
24-Aug	1	1	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
25-Aug	0	0	0	Z	0	0	0	2	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2
26-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
27-Aug	0	0	0	0	0	Z	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.9	2
28-Aug	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0.5	1
29-Aug	1	Z	0	0	0	0	0	0	0	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	0.6	1
30-Aug	1	2	Z	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2
31-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
	0.3	0.3	0.2	0.2	0.3	0.2	0.3	0.4	0.4	0.4	0.5	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	Diurnal Average	
	1	2	1	1	1	1	1	2	2	3	4	2	2	1	1	1	1	1	1	1	1	1	1	1	Diurnal Maximum	

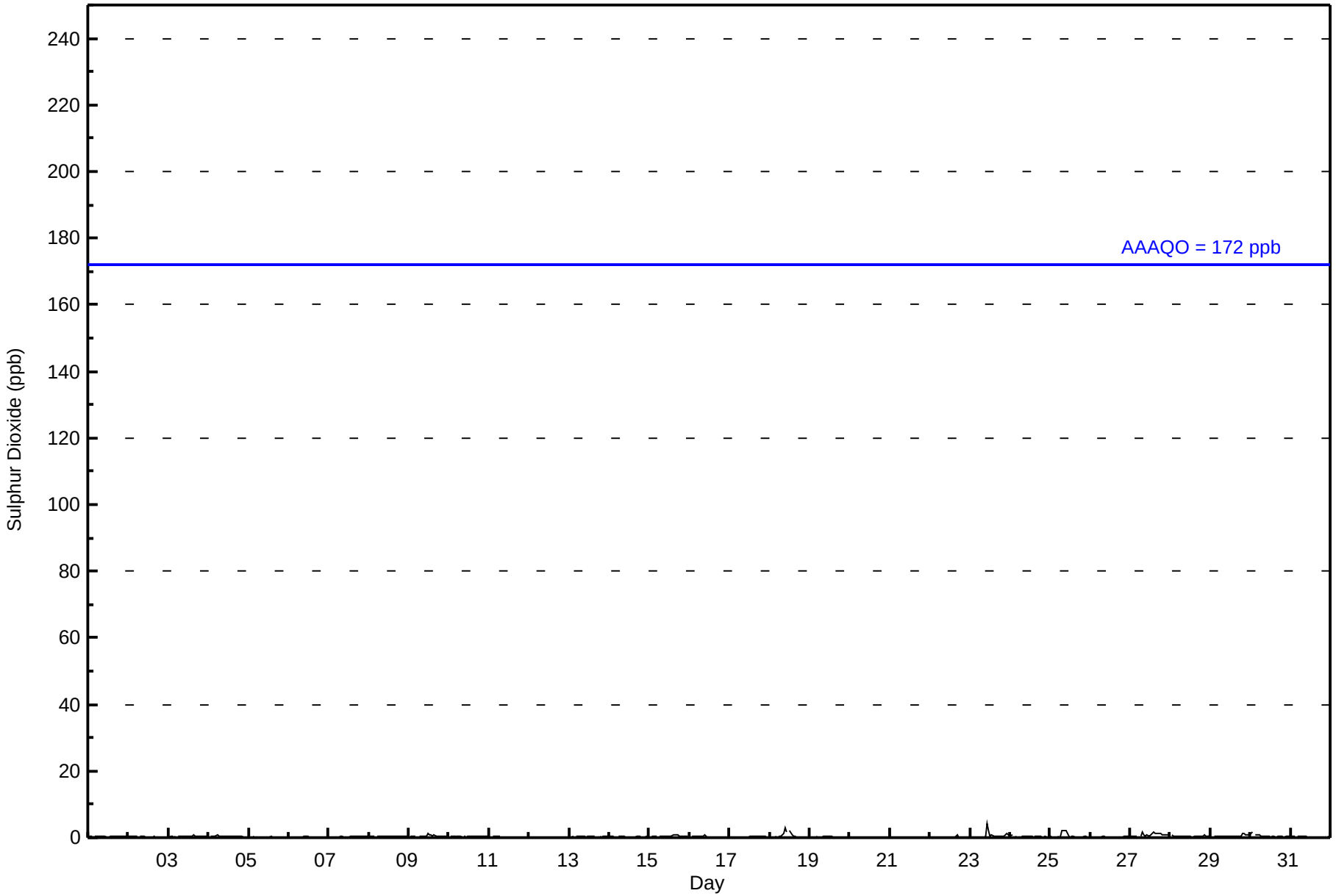
Z - zerospan C - Calibration M - Maintenance
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb

Wood Buffalo Environmental Association

Hourly Averages

Sulphur Dioxide (SO_2) - ppb

Conklin Lookout - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

Conklin Lookout - August 2015

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 (SO_2) - ppb

Conklin Lookout - August 2015

Concentration	**Wind Direction**																
Ranges (ppb)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 10	14	23	19	31	38	32	31	25	19	77	92	69	83	97	33	22	705
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	14	23	19	31	38	32	31	25	19	77	92	69	83	97	33	22	705

Total Number of Valid Hours: 705

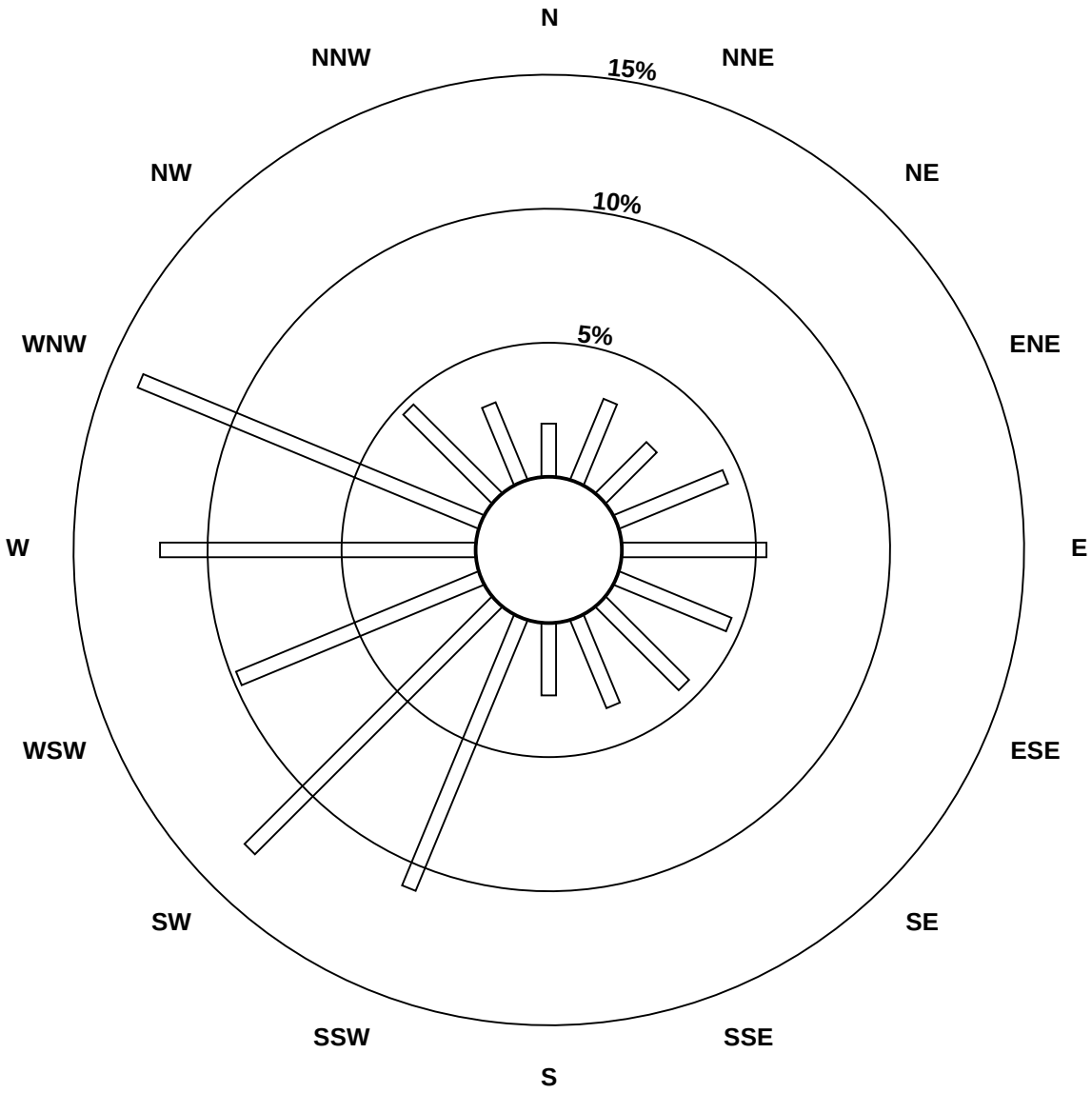
Total Number of Hours: 744

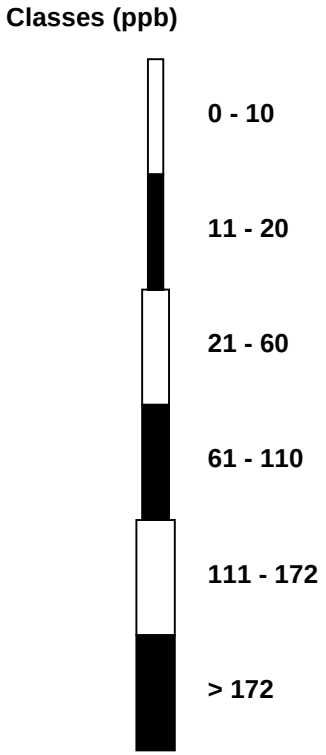
Wood Buffalo Environmental Association

Wind Rose Aug 2015

Sulphur Dioxide (SO_2) - ppb

Conklin Lookout (AMS 18)





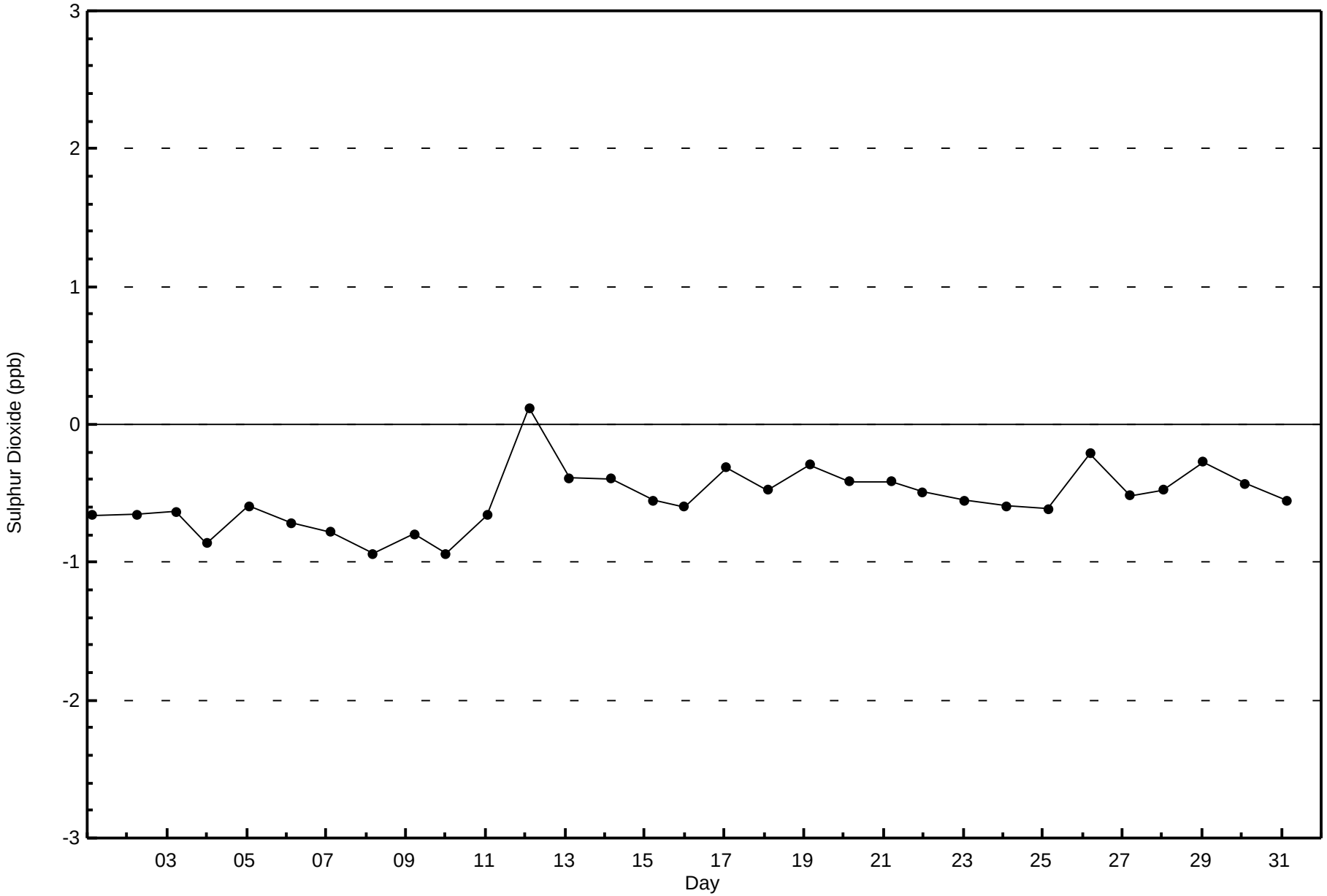
Total Number of Valid Hours: 705

Wood Buffalo Environmental Association

Zero Responses

Sulphur Dioxide (SO_2) - ppb

Conklin Lookout - August 2015

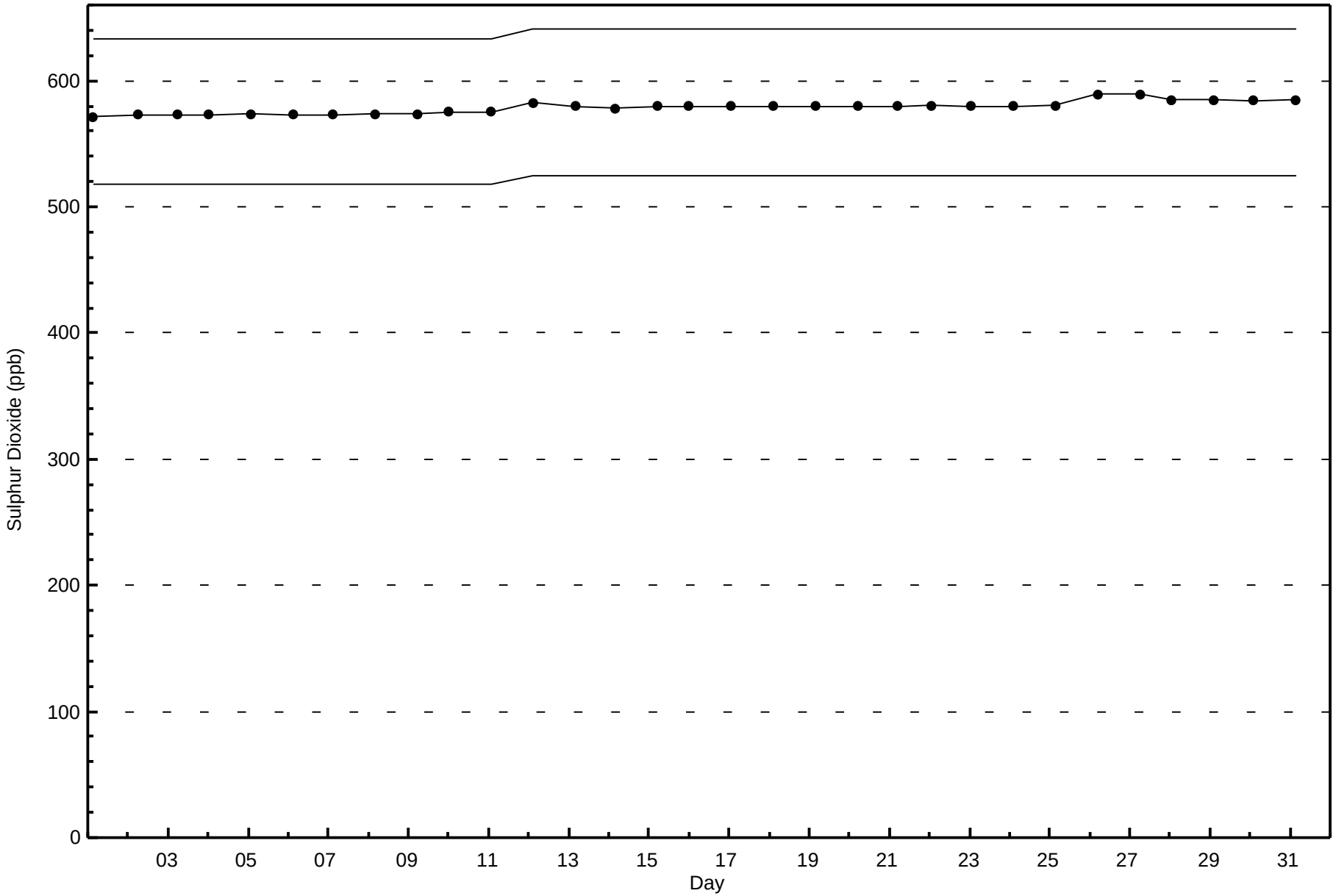


Wood Buffalo Environmental Association

Span Responses

Sulphur Dioxide (SO_2) - ppb

Conklin Lookout - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

Conklin Lookout - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 0 ppb on Aug 3 11:00 Maximum Daily Average: 0.3 ppb on Aug 3

Minimum Value: 0 ppb on Aug 17 08:00 Minimum Daily Average: 0.2 ppb on Aug 17
Maximum Diurnal Average: 0.3 ppb at hour 10 Minimum Diurnal Average: 0.3 ppb at hour 4
Monthly Average: 0.3 ppb Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 0$ $P_{99} = 0$

Hours in Service:	744
Hours of Data:	706
Hours of Missing Data:	38
Hours of Calibration:	37
Percent Operational Time:	99.9

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

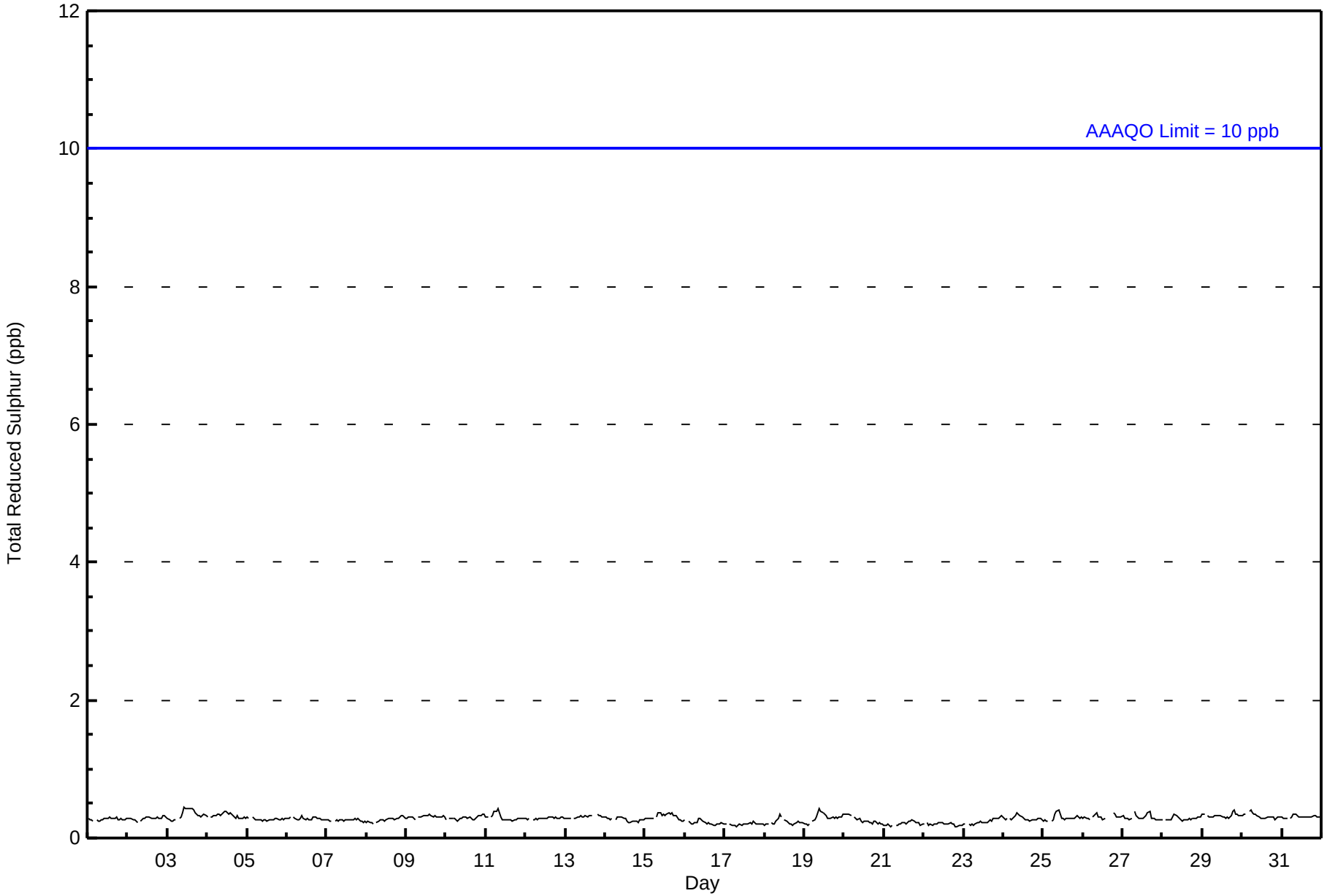
Z - zerospan C - Calibration M - Maintenance
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb

Wood Buffalo Environmental Association

Hourly Averages

Total Reduced Sulphur (TRS) - ppb

Conklin Lookout - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb

Conklin Lookout - August 2015

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

Total Number of Valid Hours: 706

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Total Reduced Sulphur (TRS) - ppb

Conklin Lookout - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 2	17	23	19	32	38	31	30	27	20	76	91	66	88	95	33	20	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	17	23	19	32	38	31	30	27	20	76	91	66	88	95	33	20	706

Total Number of Valid Hours: 706

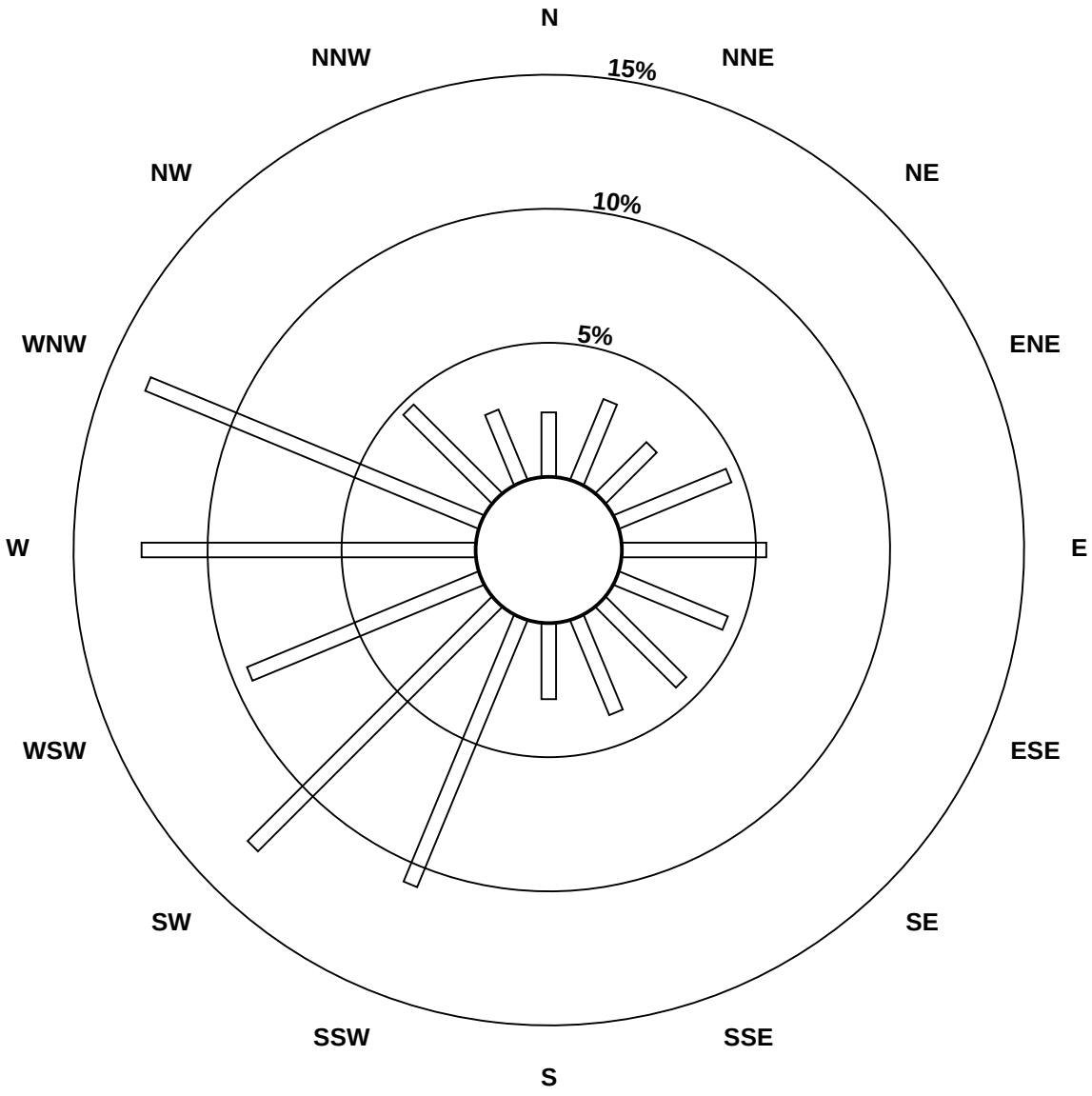
Total Number of Hours: 744

Wood Buffalo Environmental Association

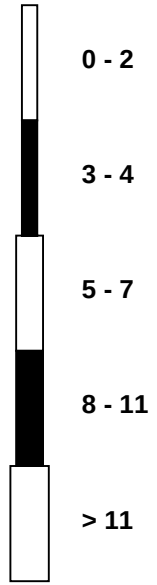
Wind Rose Aug 2015

Total Reduced Sulphur (TRS) - ppb

Conklin Lookout (AMS 18)



Classes (ppb)



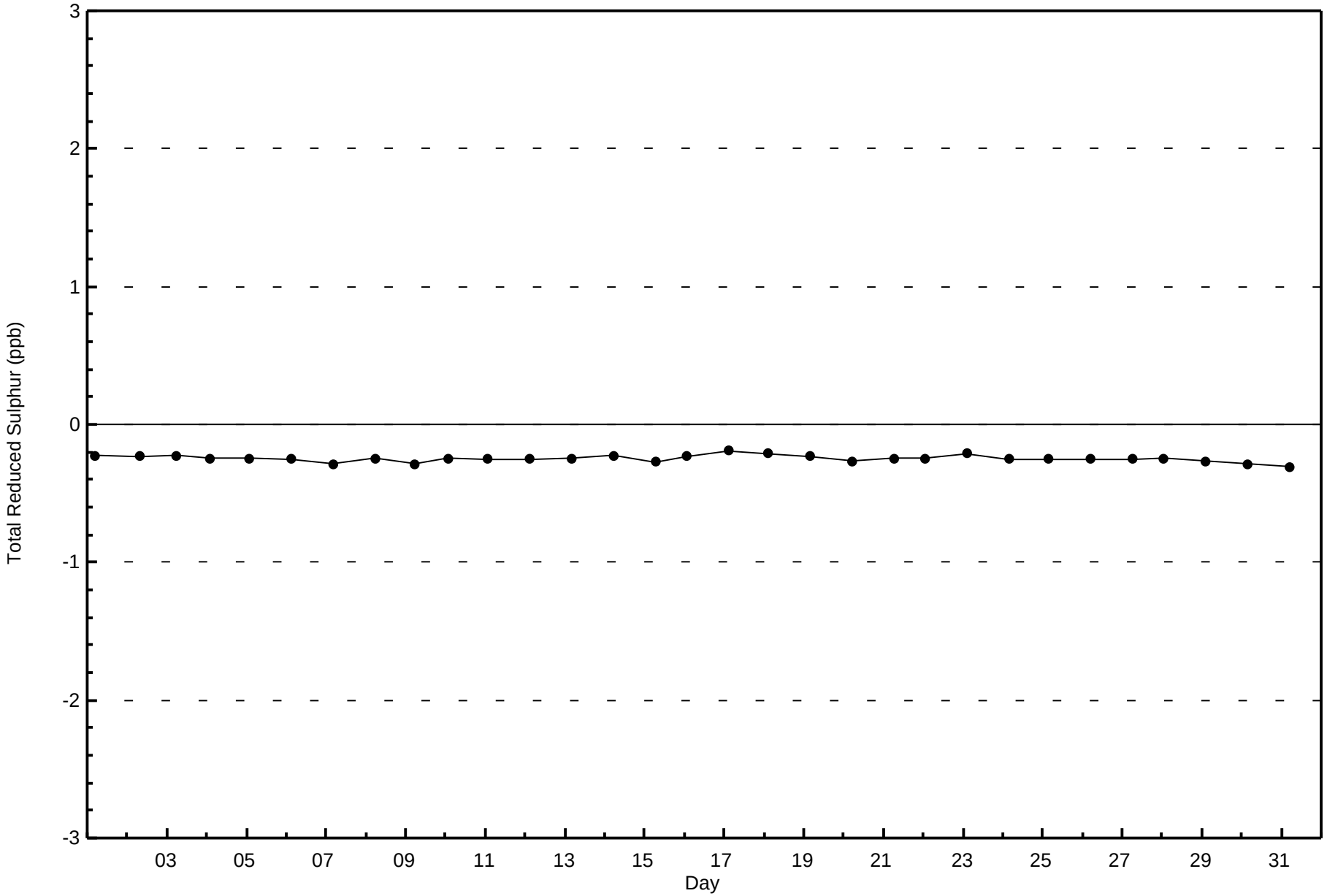
Total Number of Valid Hours: 706

Wood Buffalo Environmental Association

Zero Responses

Total Reduced Sulphur (TRS) - ppb

Conklin Lookout - August 2015

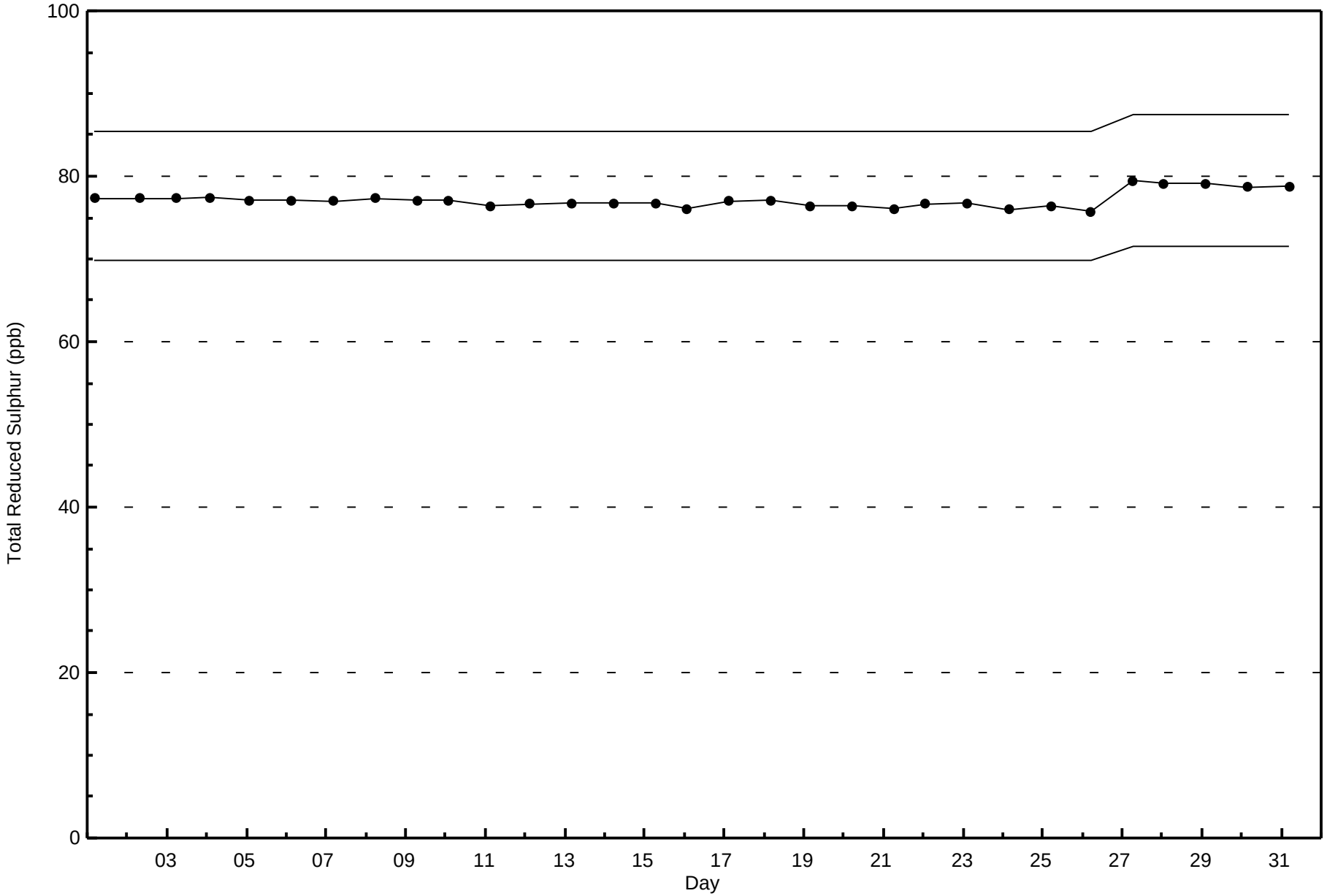


Wood Buffalo Environmental Association

Span Responses

Total Reduced Sulphur (TRS) - ppb

Conklin Lookout - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

Conklin Lookout - August 2015

Maximum Value: 7 ppb on Aug 20 10:00

Maximum Daily Average: 0.4 ppb on Aug 20

Minimum Value: 0 ppb on Aug 1 01:00

Minimum Daily Average: 0.0 ppb on Aug 10

Maximum Diurnal Average: 0.4 ppb at hour 10

Minimum Diurnal Average: 0.0 ppb at hour 1

Monthly Average: 0.0 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 0$ $P_{99} = 1$

Hours in Service:	744
Hours of Data:	704
Hours of Missing Data:	40
Hours of Calibration:	36
Percent Operational Time:	99.5

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2-Aug	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
4-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
5-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
6-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
7-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
8-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
9-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
10-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
11-Aug	0	Z	0	0	0	0	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
12-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
13-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	M	M	M	0	0	0	0	0	0	0	0	0	0.0	0
14-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
15-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
16-Aug	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
17-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
18-Aug	0	0	Z	0	0	0	0	0	0	1	0	M	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
19-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
20-Aug	0	0	0	0	Z	0	0	0	0	7	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	7
21-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
22-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
23-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
24-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
25-Aug	0	0	0	Z	0	0	0	1	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2
26-Aug	0	0	0	0	Z	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
27-Aug	0	0	0	0	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	1
28-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
29-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
30-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
31-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Diurnal Average	
	0	0	0	0	0	0	0	1	2	7	2	0	0	0	0	0	0	0	0	0	0	0	0	0	Diurnal Maximum	

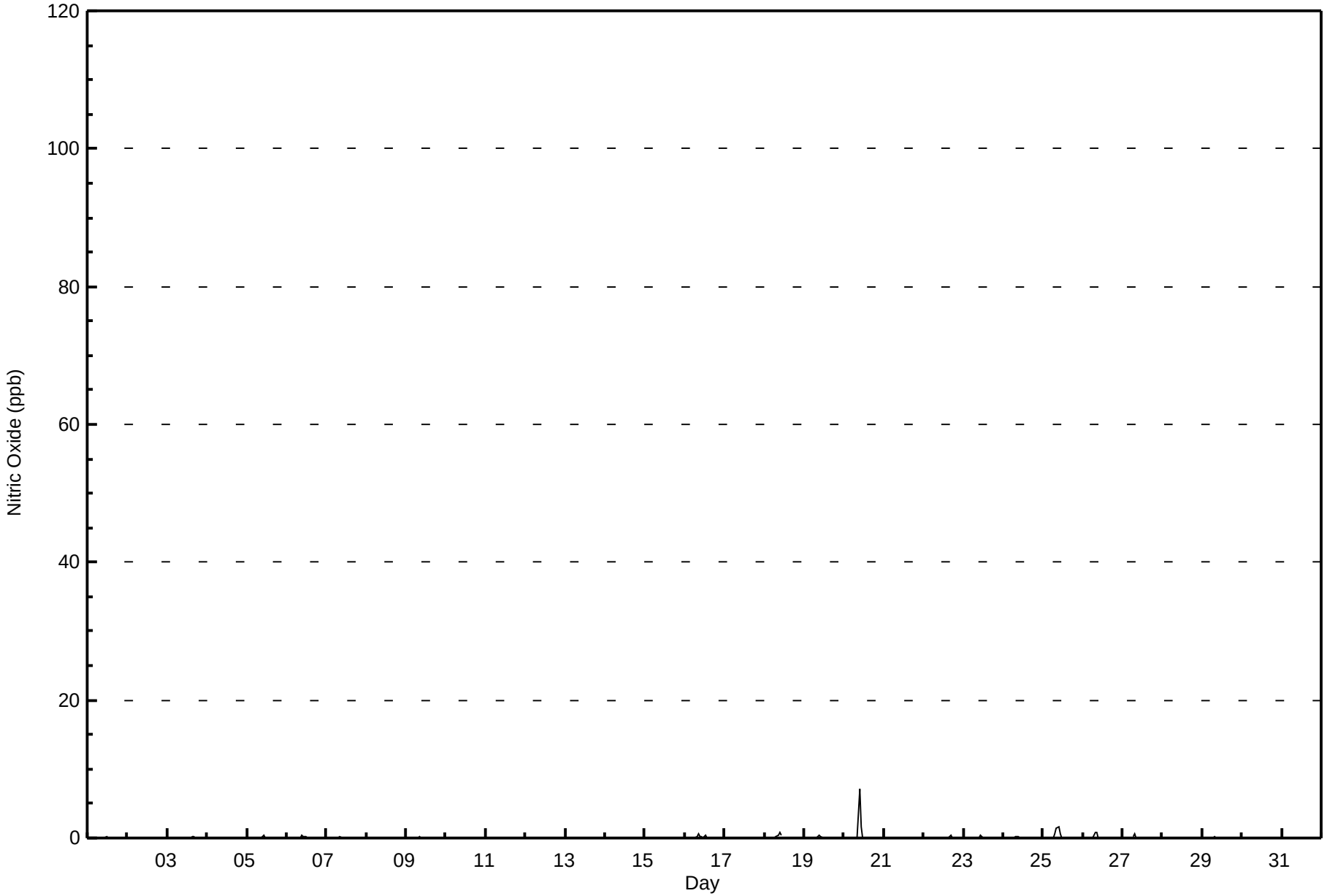
Z - zerospan C - Calibration M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Nitric Oxide (NO) - ppb

Conklin Lookout - August 2015



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	704	100.00	100.00
21 - 40	0	0.00	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: 704

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Nitric Oxide (NO) - ppb

Conklin Lookout - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	14	23	19	31	37	32	30	25	19	77	92	69	83	97	34	22	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	14	23	19	31	37	32	30	25	19	77	92	69	83	97	34	22	704

Total Number of Valid Hours: 704

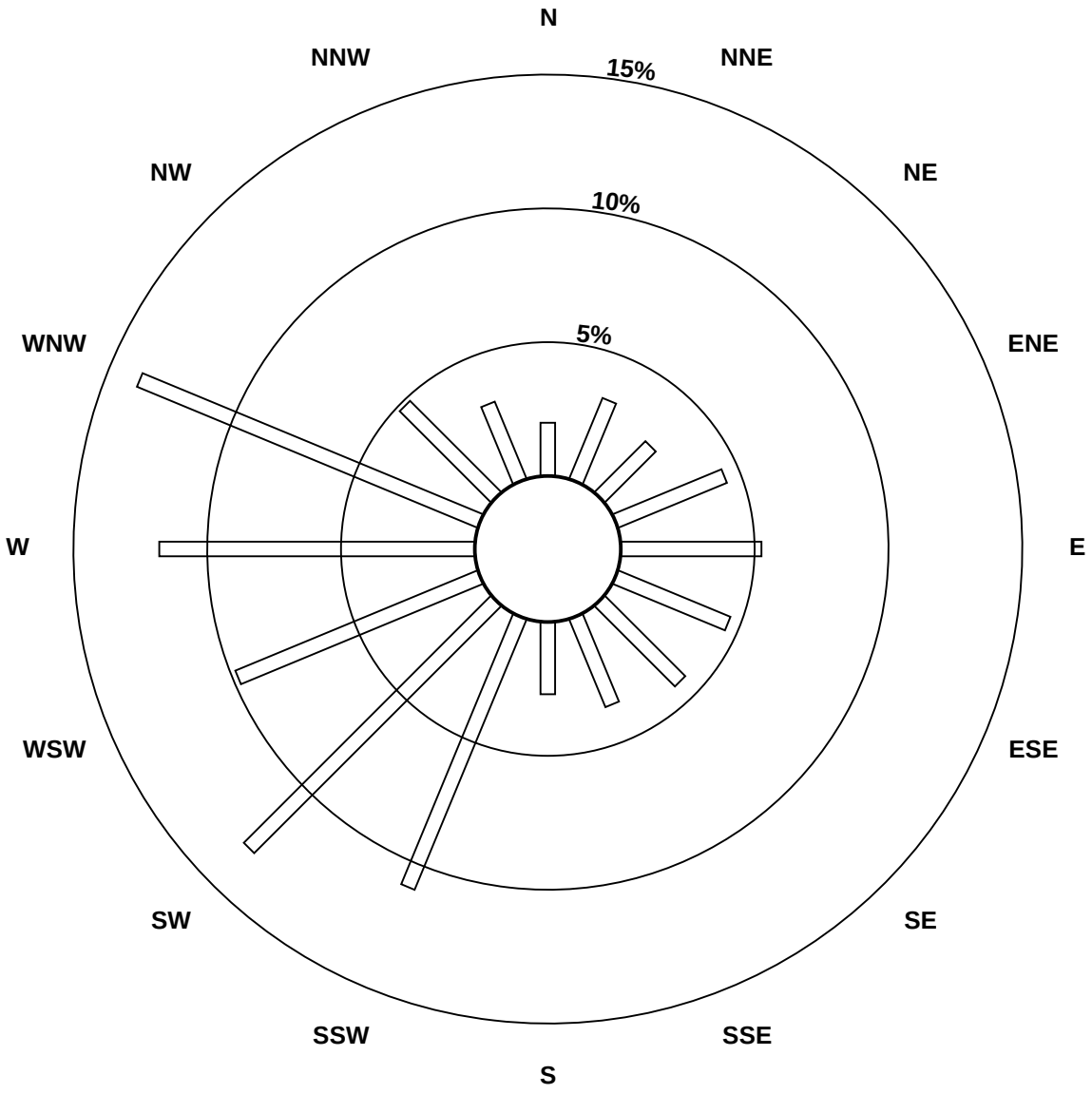
Total Number of Hours: 744

Wood Buffalo Environmental Association

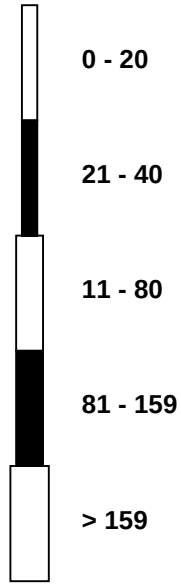
Wind Rose Aug 2015

Nitric Oxide (NO) - ppb

Conklin Lookout (AMS 18)



Classes (ppb)



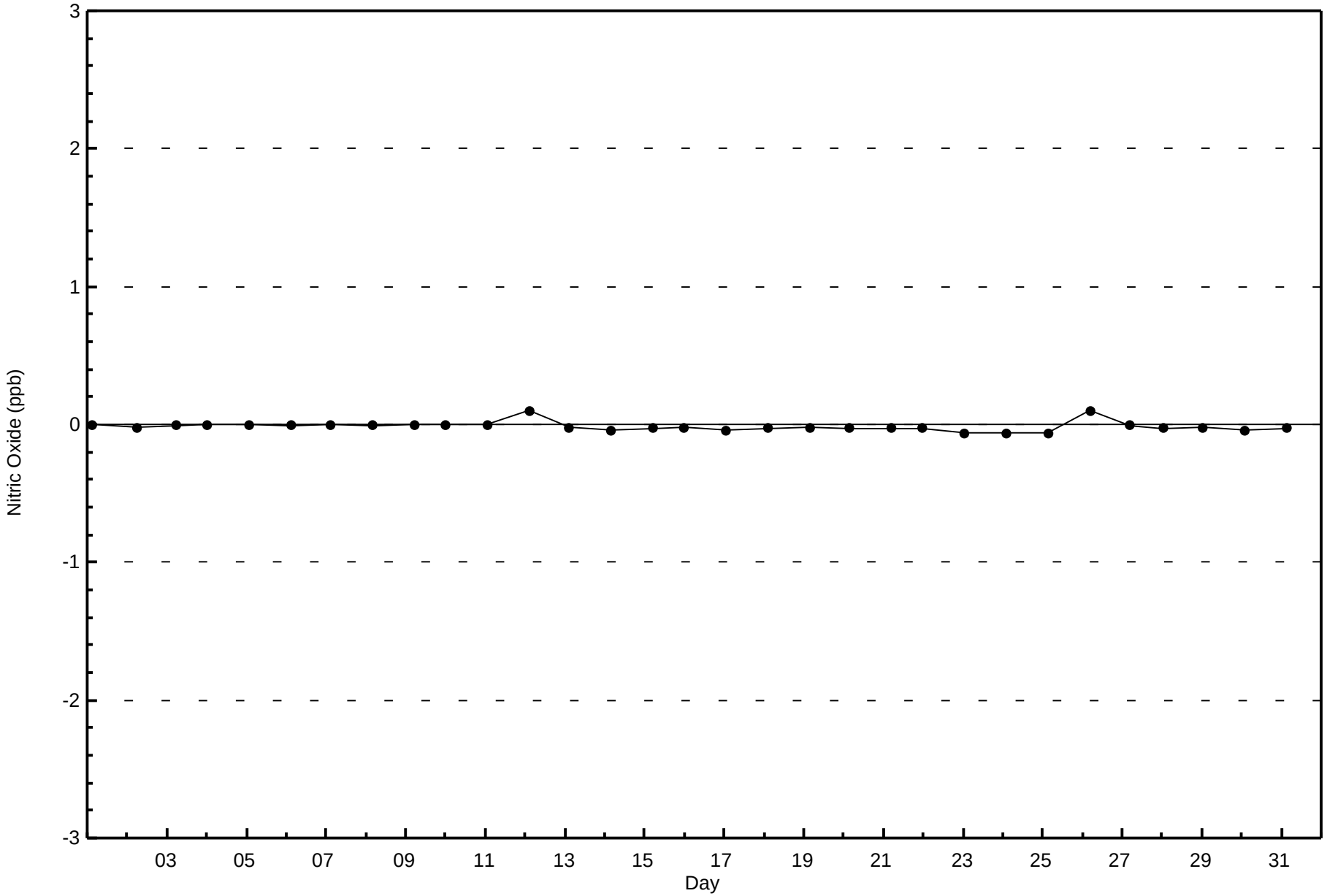
Total Number of Valid Hours: 704

Wood Buffalo Environmental Association

Zero Responses

Nitric Oxide (NO) - ppb

Conklin Lookout - August 2015

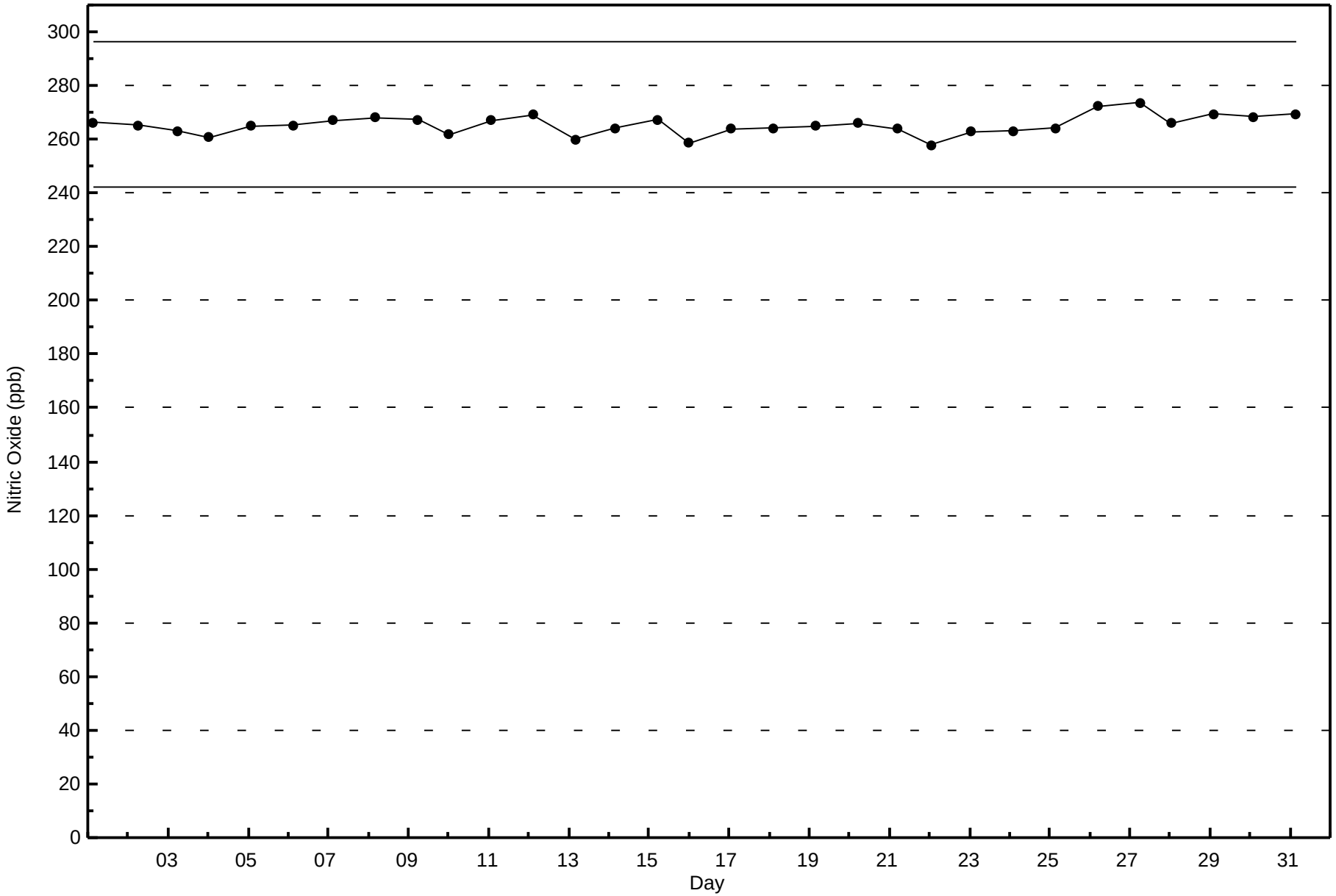


Wood Buffalo Environmental Association

Span Responses

Nitric Oxide (NO) - ppb

Conklin Lookout - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO_2) - ppb

Conklin Lookout - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 5 ppb on Aug 25 09:00 Maximum Daily Average: 1.3 ppb on Aug 25

Minimum Value: 0 ppb on Aug 20 11:00 Minimum Daily Average: 0.1 ppb on Aug 21
Maximum Diurnal Average: 0.8 ppb at hour 8 Minimum Diurnal Average: 0.4 ppb at hour 18
Monthly Average: 0.6 ppb Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 1$ $P_{90} = 1$ $P_{99} = 2$

Hours in Service:	744
Hours of Data:	704
Hours of Missing Data:	40
Hours of Calibration:	36
Percent Operational Time:	99.5

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

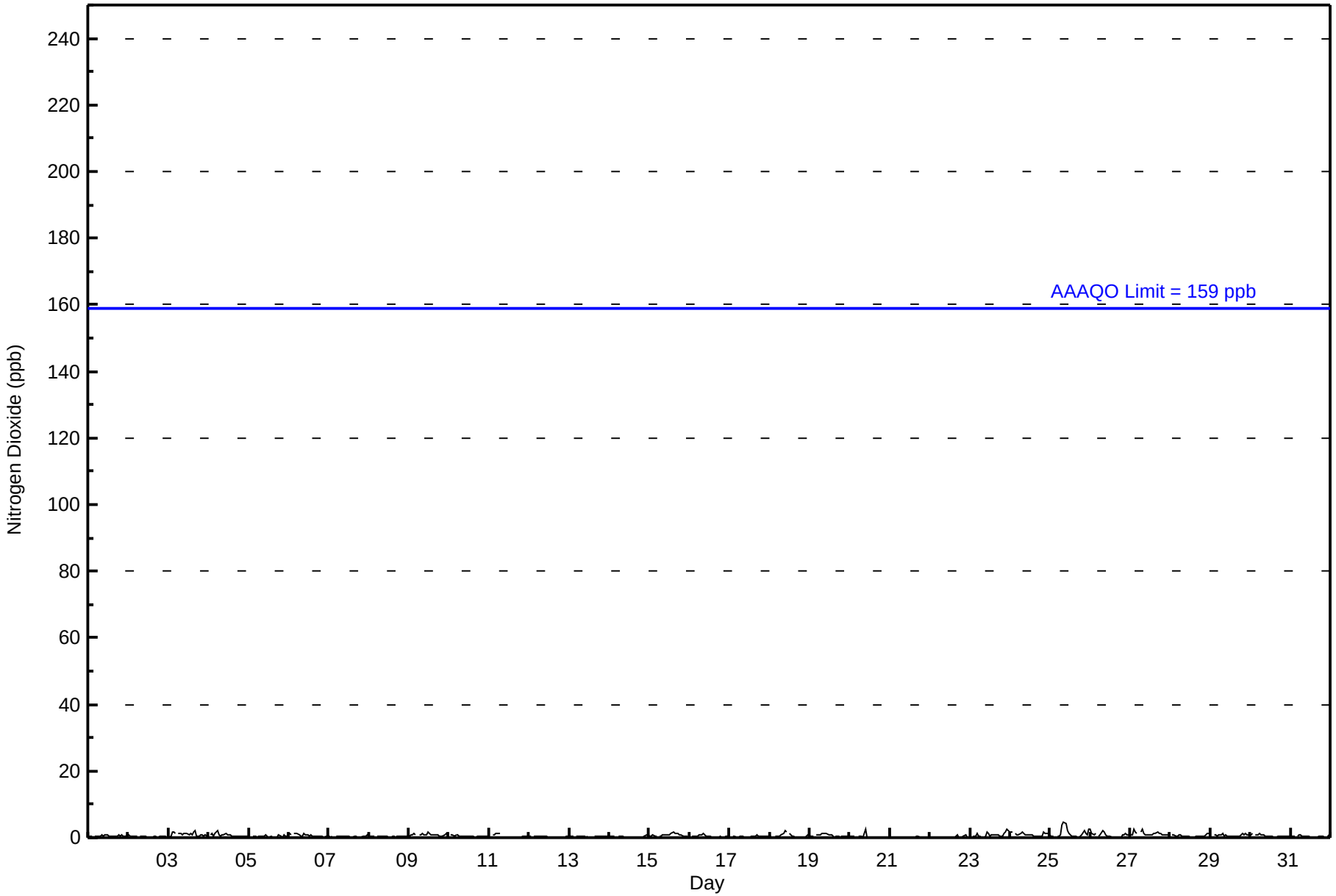
Z - zerospan C - Calibration M - Maintenance
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Dioxide (NO_2) - ppb

Conklin Lookout - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Nitrogen Dioxide (NO_2) - ppb

Conklin Lookout - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	704	100.00	100.00
21 - 40	0	0.00	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: 704

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Dioxide (NO_2) - ppb

Conklin Lookout - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	14	23	19	31	37	32	30	25	19	77	92	69	83	97	34	22	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	14	23	19	31	37	32	30	25	19	77	92	69	83	97	34	22	704

Total Number of Valid Hours: 704

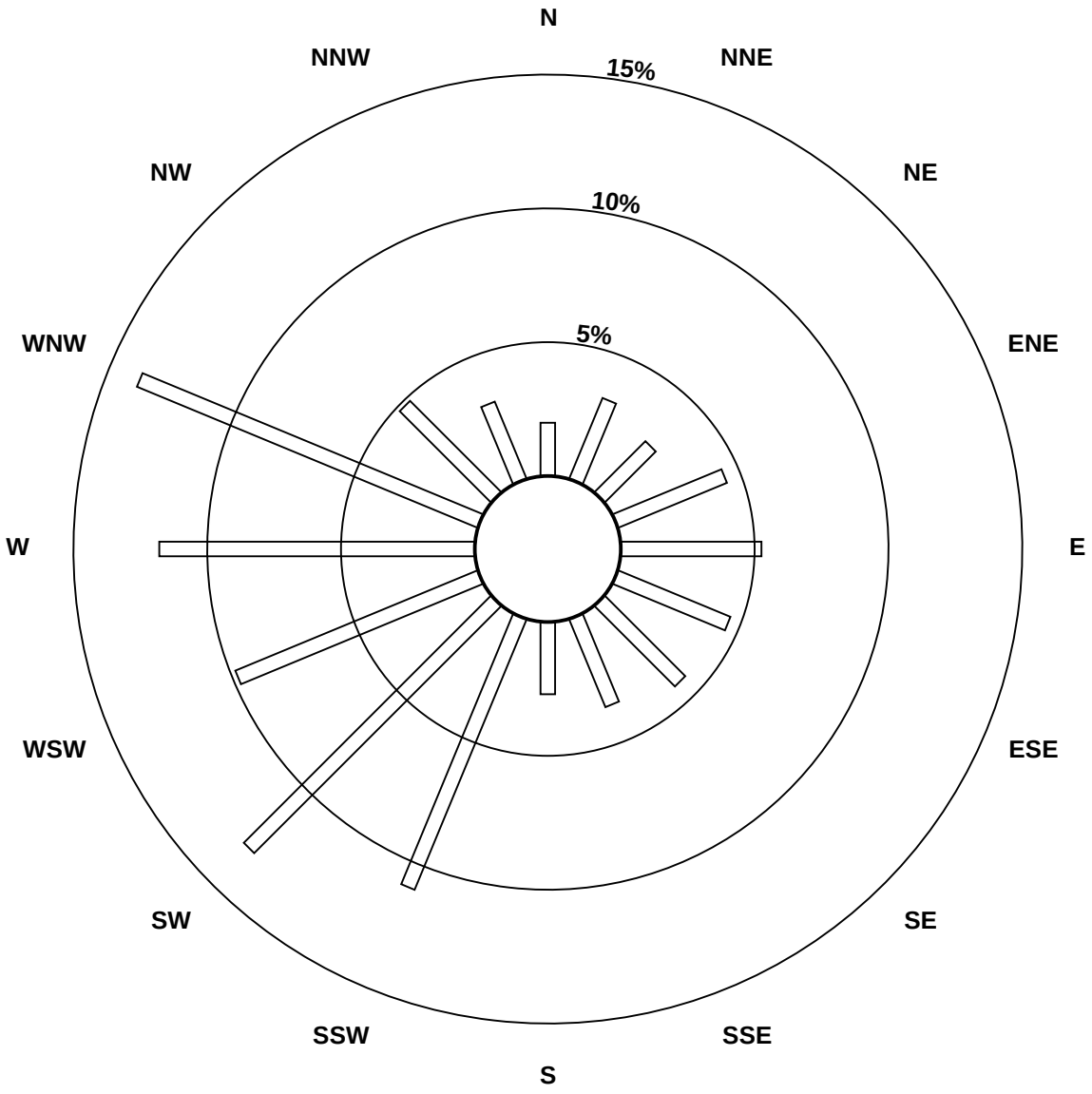
Total Number of Hours: 744

Wood Buffalo Environmental Association

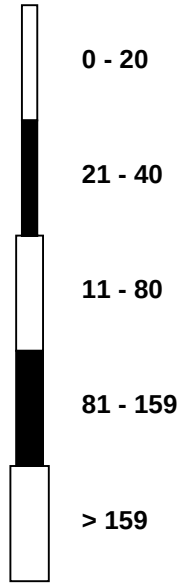
Wind Rose Aug 2015

Nitrogen Dioxide (NO_2) - ppb

Conklin Lookout (AMS 18)



Classes (ppb)



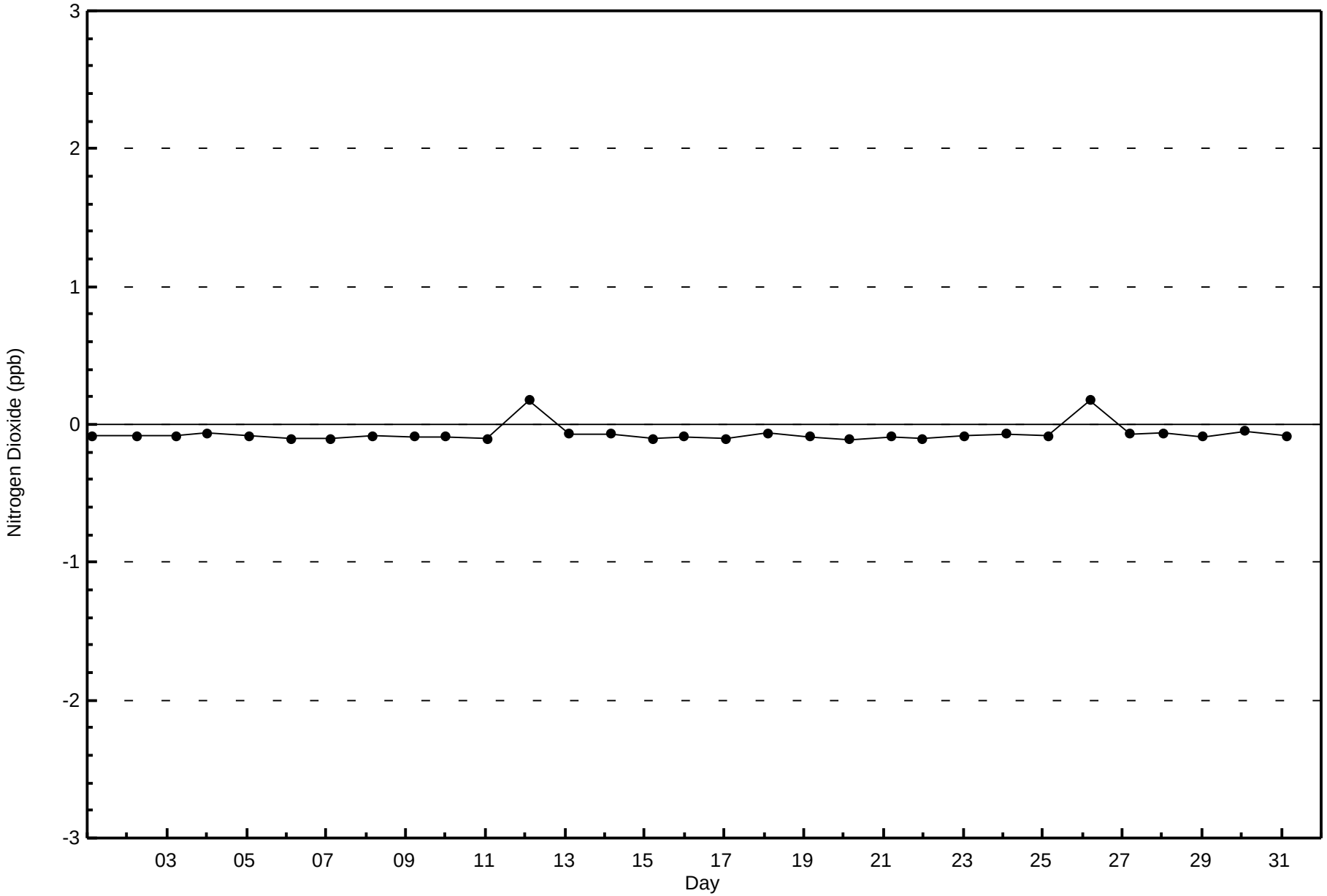
Total Number of Valid Hours: 704

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Dioxide (NO_2) - ppb

Conklin Lookout - August 2015

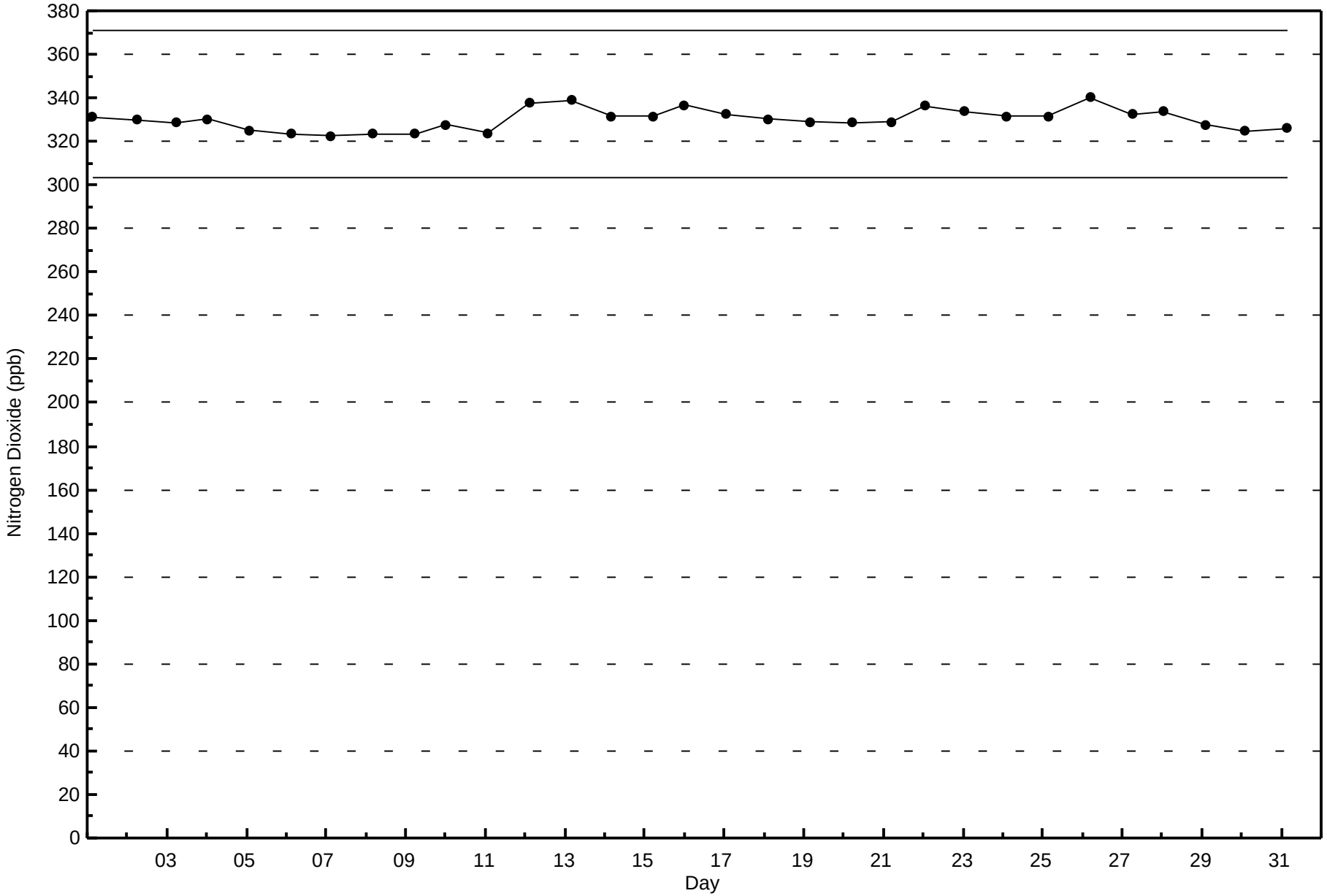


Wood Buffalo Environmental Association

Span Responses

Nitrogen Dioxide (NO_2) - ppb

Conklin Lookout - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_X) - ppb

Conklin Lookout - August 2015

Maximum Value: 10 ppb on Aug 20 10:00

Maximum Daily Average: 1.5 ppb on Aug 25

Minimum Value: 0 ppb on Aug 21 22:00

Minimum Daily Average: 0.1 ppb on Aug 21

Maximum Diurnal Average: 1.2 ppb at hour 10

Minimum Diurnal Average: 0.4 ppb at hour 18

Monthly Average: 0.6 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 1$ $P_{90} = 1$ $P_{99} = 3$

Hours in Service:	744
Hours of Data:	704
Hours of Missing Data:	40
Hours of Calibration:	36
Percent Operational Time:	99.5

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0	0	1	Z	1	0	0	1	1	1	1	1	0	0	0	0	1	1	1	1	1	1	1	1	0.6	1
2-Aug	1	1	1	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
3-Aug	0	1	1	2	1	Z	1	1	1	1	1	1	1	1	1	2	2	1	0	1	1	1	1	1	1.1	2
4-Aug	Z	1	1	1	1	2	1	1	1	1	1	1	1	1	1	0	0	1	0	1	0	1	1	0	0.8	2
5-Aug	0	Z	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	1	0	0	1	0	1	0.4	1
6-Aug	1	1	Z	1	1	1	1	1	1	2	1	1	0	1	0	0	1	1	1	0	1	0	0	0	0.7	2
7-Aug	0	0	0	Z	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.4	1
8-Aug	1	0	0	0	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.4	1
9-Aug	0	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	0.9	1
10-Aug	Z	1	1	1	1	1	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1
11-Aug	1	Z	1	1	1	1	1	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1
12-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
13-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	M	M	M	0	0	0	0	0	1	1	0	0	0.4	1
14-Aug	0	0	0	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.3	1
15-Aug	0	0	1	0	0	Z	1	1	1	1	1	1	1	1	2	1	1	1	1	1	0	1	0	0	0.8	2
16-Aug	Z	1	1	0	0	0	1	1	2	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0.5	2
17-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.3	1
18-Aug	0	0	Z	0	0	0	0	1	2	3	2	M	1	1	0	0	0	0	0	0	0	0	1	1	0.7	3
19-Aug	1	0	0	Z	1	1	1	2	2	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.7	2
20-Aug	0	0	0	0	Z	0	0	0	0	10	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	10
21-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
22-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0.2	1
23-Aug	0	Z	0	1	1	1	0	0	0	1	2	1	1	1	1	1	1	1	1	1	1	2	2	2	0.9	2
24-Aug	2	2	Z	1	1	1	1	2	1	1	1	1	1	1	1	1	0	1	0	1	2	1	1	1	1.0	2
25-Aug	0	0	0	Z	1	0	1	4	6	6	3	1	1	1	1	0	0	0	0	1	2	1	1	2	1.5	6
26-Aug	2	1	1	1	Z	1	1	3	3	1	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0.9	3
27-Aug	1	1	2	1	1	Z	2	3	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1.2	3
28-Aug	Z	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	0	1	1	1	1	0.6	1
29-Aug	1	Z	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1	1	1	1	0.8	1
30-Aug	1	1	Z	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	1
31-Aug	0	0	0	Z	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.4	1
	0.6	0.6	0.6	0.7	0.7	0.7	0.7	1.0	1.0	1.2	0.8	0.6	0.5	0.4	0.4	0.4	0.5	0.4	0.4	0.5	0.5	0.6	0.6	0.6	Diurnal Average	
	2	2	2	2	1	2	2	4	6	10	3	1	1	1	2	2	2	1	1	1	2	2	2	2	Diurnal Maximum	

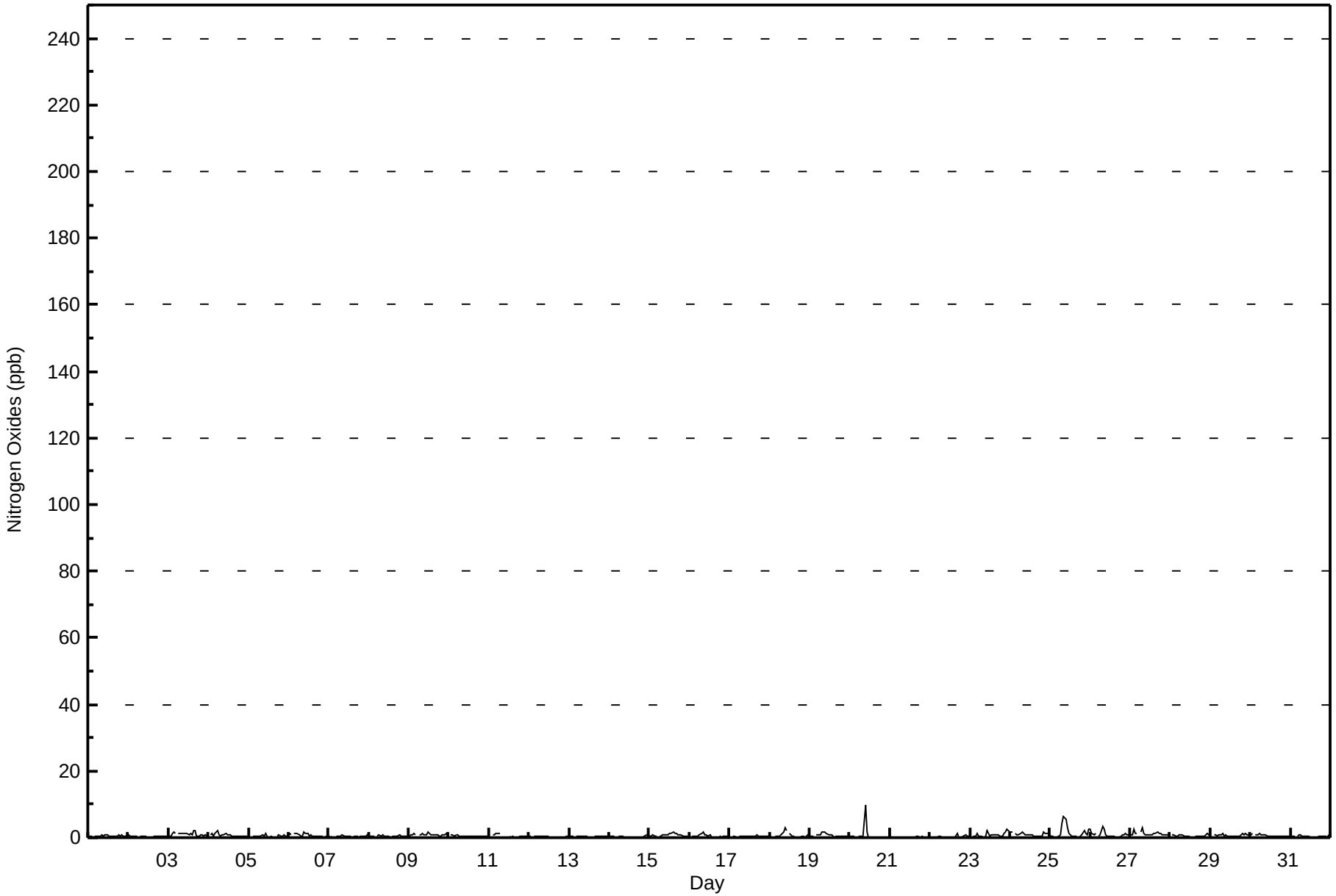
Z - zerospan C - Calibration M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Oxides (NO_X) - ppb

Conklin Lookout - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Nitrogen Oxides (NO_X) - ppb

Conklin Lookout - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	704	100.00	100.00
21 - 40	0	0.00	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: 704

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Oxides (NO_X) - ppb

Conklin Lookout - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	14	23	19	31	37	32	30	25	19	77	92	69	83	97	34	22	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	14	23	19	31	37	32	30	25	19	77	92	69	83	97	34	22	704

Total Number of Valid Hours: 704

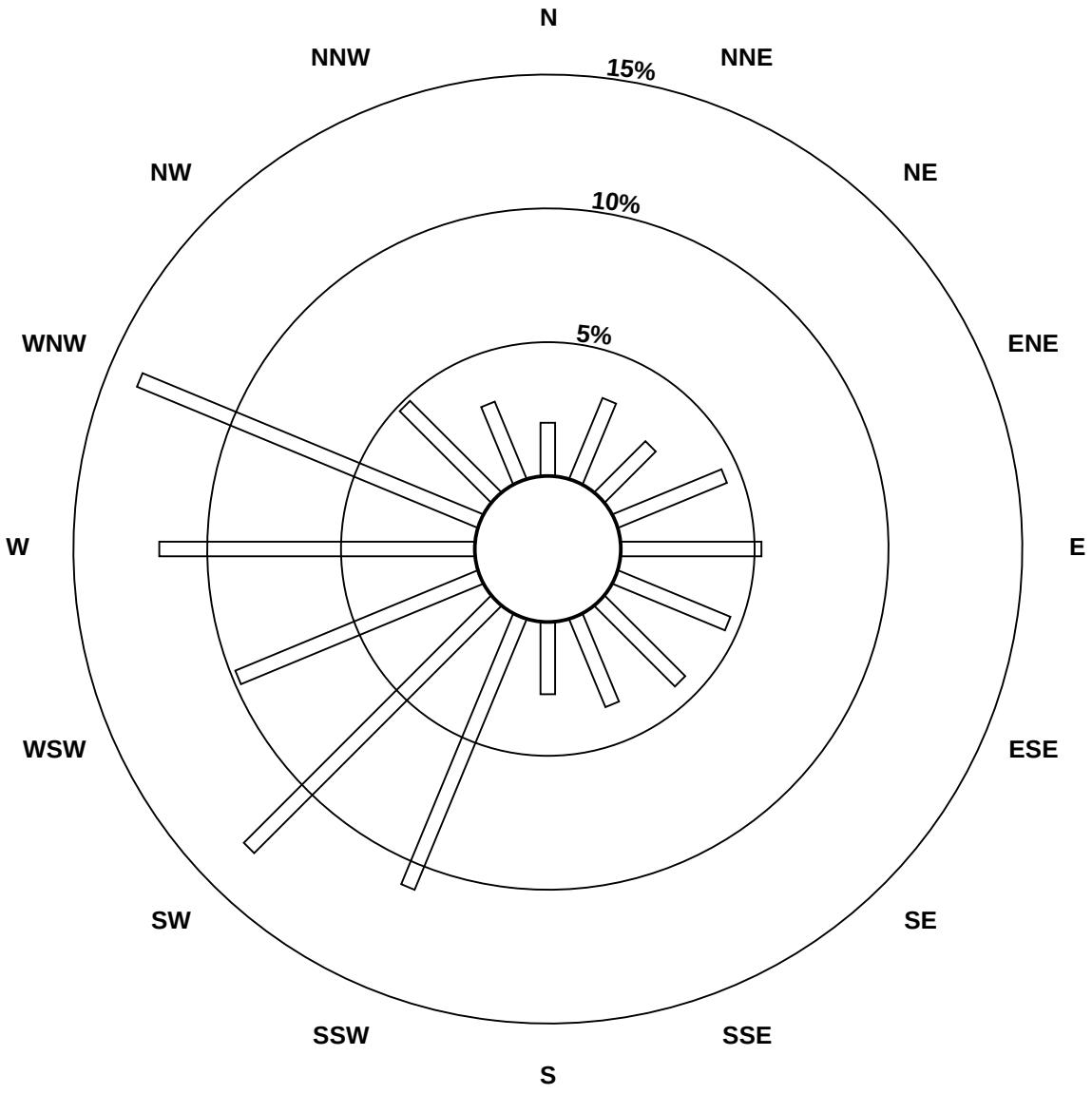
Total Number of Hours: 744

Wood Buffalo Environmental Association

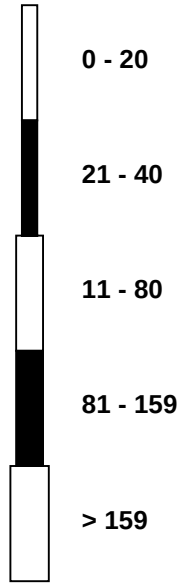
Wind Rose Aug 2015

Nitrogen Oxides (NO_X) - ppb

Conklin Lookout (AMS 18)



Classes (ppb)



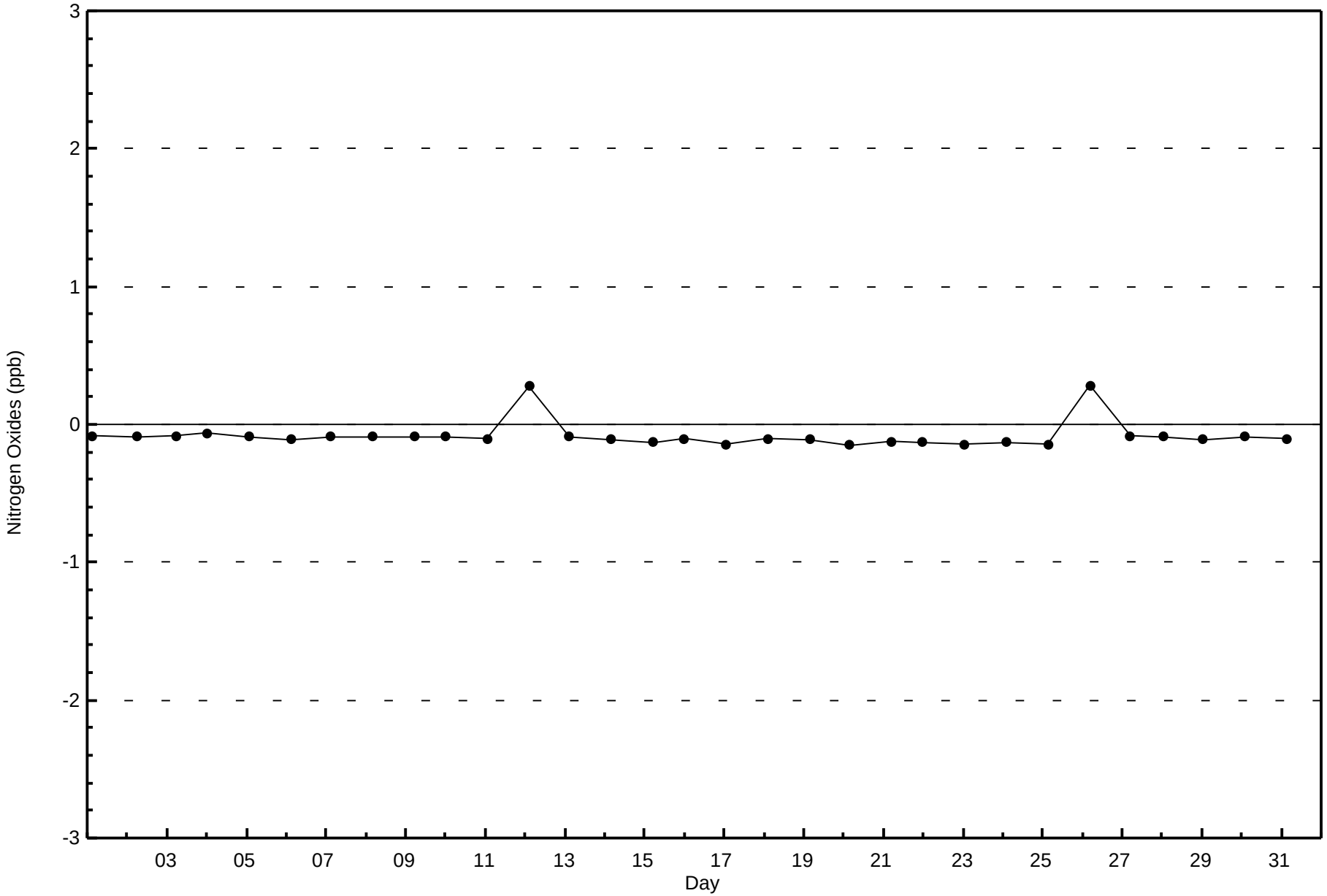
Total Number of Valid Hours: 704

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Oxides (NO_X) - ppb

Conklin Lookout - August 2015

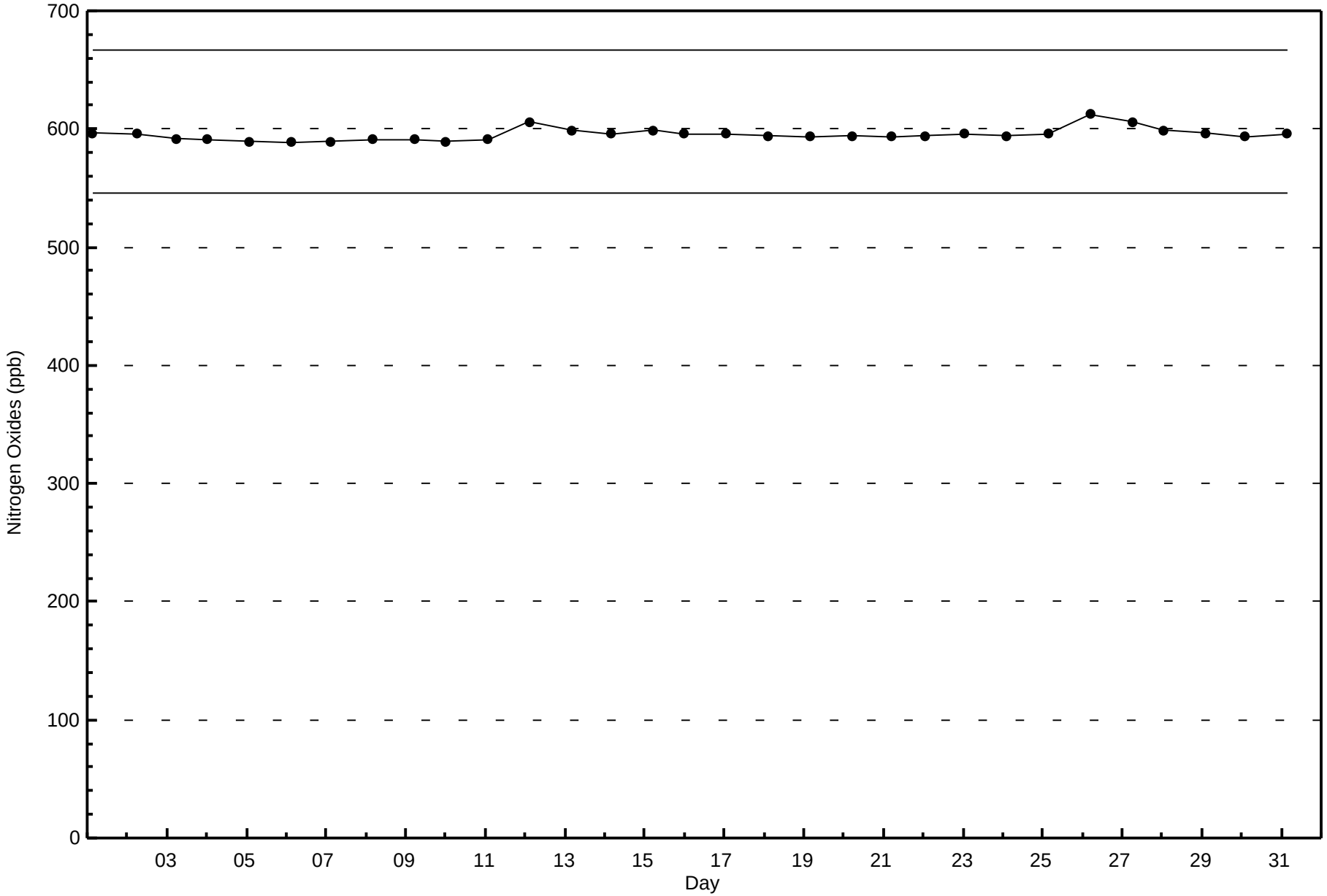


Wood Buffalo Environmental Association

Span Responses

Nitrogen Oxides (NO_X) - ppb

Conklin Lookout - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O_3) - ppb

Conklin Lookout - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 54 ppb on Aug 27 17:00

Maximum Daily Average: 36.6 ppb on Aug 10

Minimum Value: 8 ppb on Aug 7 04:00

Minimum Daily Average: 13.7 ppb on Aug 7

Maximum Diurnal Average: 32.9 ppb at hour 16

Minimum Diurnal Average: 21.4 ppb at hour 7

Monthly Average: 27.2 ppb

Percentiles: $P_1 = 9$ $P_{10} = 17$ $Q_1 = 21$ Median = 27 $Q_3 = 33$ $P_{90} = 38$ $P_{99} = 44$

Hours in Service:	744
Hours of Data:	706
Hours of Missing Data:	38
Hours of Calibration:	35
Percent Operational Time:	99.6

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	23	26	24	21	23	Z	14	19	20	26	27	27	28	30	33	33	29	32	28	20	26	25	32	33	26.1	33
2-Aug	32	32	33	31	30	22	14	23	Z	25	26	29	30	30	30	32	32	33	27	18	16	22	23	27	26.9	33
3-Aug	25	25	19	13	17	23	23	Z	20	24	29	25	24	28	25	28	21	27	34	32	27	26	22	19	24.3	34
4-Aug	17	17	Z	20	19	17	19	22	22	20	20	21	21	19	21	27	30	27	25	23	22	19	17	17	20.9	30
5-Aug	17	16	17	Z	18	19	19	21	26	26	23	22	22	18	19	19	21	20	20	21	21	20	19	17	20.0	26
6-Aug	14	12	12	11	Z	11	14	14	18	21	23	25	24	30	33	22	22	20	15	13	12	11	9	8	17.2	33
7-Aug	8	8	8	8	8	Z	9	9	10	11	13	16	19	20	24	25	21	21	16	14	13	10	12	11	13.7	25
8-Aug	10	12	12	13	13	14	Z	15	20	24	28	29	26	26	30	27	28	21	22	14	16	17	22	17	19.8	30
9-Aug	15	21	26	20	26	17	17	Z	27	35	37	45	47	39	36	39	38	37	31	27	33	31	26	29	30.4	47
10-Aug	30	34	Z	35	30	29	27	36	37	38	43	40	40	41	41	42	41	41	41	39	36	35	33	34	36.6	43
11-Aug	34	33	34	Z	34	34	33	33	33	33	33	33	34	34	35	36	35	42	38	36	33	29	31	34	34.2	42
12-Aug	31	29	28	32	Z	32	33	33	C	C	C	C	39	35	33	31	30	27	26	24	25	26	25	23	29.6	39
13-Aug	23	24	27	27	26	Z	21	22	19	24	26	28	31	32	M	M	31	28	27	25	20	24	26	30	25.8	32
14-Aug	38	36	33	30	28	27	Z	29	31	35	35	31	31	31	31	33	33	31	30	28	19	17	17	17	29.2	38
15-Aug	17	18	17	18	18	18	17	Z	17	16	17	18	20	26	28	28	30	27	26	24	22	21	21	20	21.0	30
16-Aug	21	18	Z	16	14	14	14	14	15	18	21	24	26	28	28	29	28	27	22	21	21	20	21	22	21.0	29
17-Aug	23	23	23	Z	23	21	16	15	19	25	30	33	33	34	32	35	34	34	33	31	31	28	27	31	27.5	35
18-Aug	29	26	24	23	Z	22	21	21	22	25	31	M	38	36	34	34	34	30	29	23	25	28	27	27	27.6	38
19-Aug	26	26	25	25	29	Z	27	26	27	28	32	33	33	32	30	35	35	36	37	37	35	33	33	31	31.0	37
20-Aug	29	27	26	24	24	23	Z	22	24	23	26	25	25	24	24	24	23	23	22	23	22	21	20	19	23.5	29
21-Aug	18	18	18	18	18	17	18	Z	20	20	21	21	21	21	20	19	20	22	23	22	22	21	20	19	19.9	23
22-Aug	18	18	Z	18	19	19	18	19	22	27	28	28	28	29	31	31	33	33	28	17	17	24	24	27	24.2	33
23-Aug	29	29	25	Z	26	25	26	27	24	28	37	40	40	41	42	42	41	43	38	34	37	40	38	36	34.3	43
24-Aug	36	35	33	28	Z	22	24	27	31	32	32	33	37	39	39	41	40	34	25	21	23	27	27	28	31.0	41
25-Aug	30	29	27	26	26	Z	26	25	24	25	31	35	37	37	36	35	35	34	29	29	33	30	27	23	30.0	37
26-Aug	21	22	24	23	20	20	Z	16	16	21	26	28	30	31	32	29	31	31	23	22	25	24	28	27	24.8	32
27-Aug	26	21	20	21	19	21	19	Z	26	31	37	38	43	44	47	49	54	54	50	45	42	42	40	39	35.9	54
28-Aug	37	37	Z	37	33	31	30	29	33	34	35	39	38	39	39	41	42	38	30	35	39	35	31	42	35.9	42
29-Aug	36	35	31	Z	21	19	18	22	27	31	38	39	40	41	42	43	40	35	32	34	35	35	34	33	33.2	43
30-Aug	34	34	31	29	Z	35	34	34	35	40	41	43	43	43	41	39	40	35	34	28	23	27	30	29	34.9	43
31-Aug	34	32	32	32	33	Z	26	29	33	29	33	36	37	38	38	40	36	34	27	30	27	25	25	27	32.0	40
	25.2	25.0	24.1	23.0	22.9	22.1	21.4	23.1	24.0	26.6	29.3	30.5	31.7	32.2	32.5	32.9	32.6	31.6	28.6	26.1	25.8	25.6	25.4	25.6	Diurnal Average	
	38	37	34	37	34	35	34	36	37	40	43	45	47	44	47	49	54	54	50	45	42	42	40	42	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance

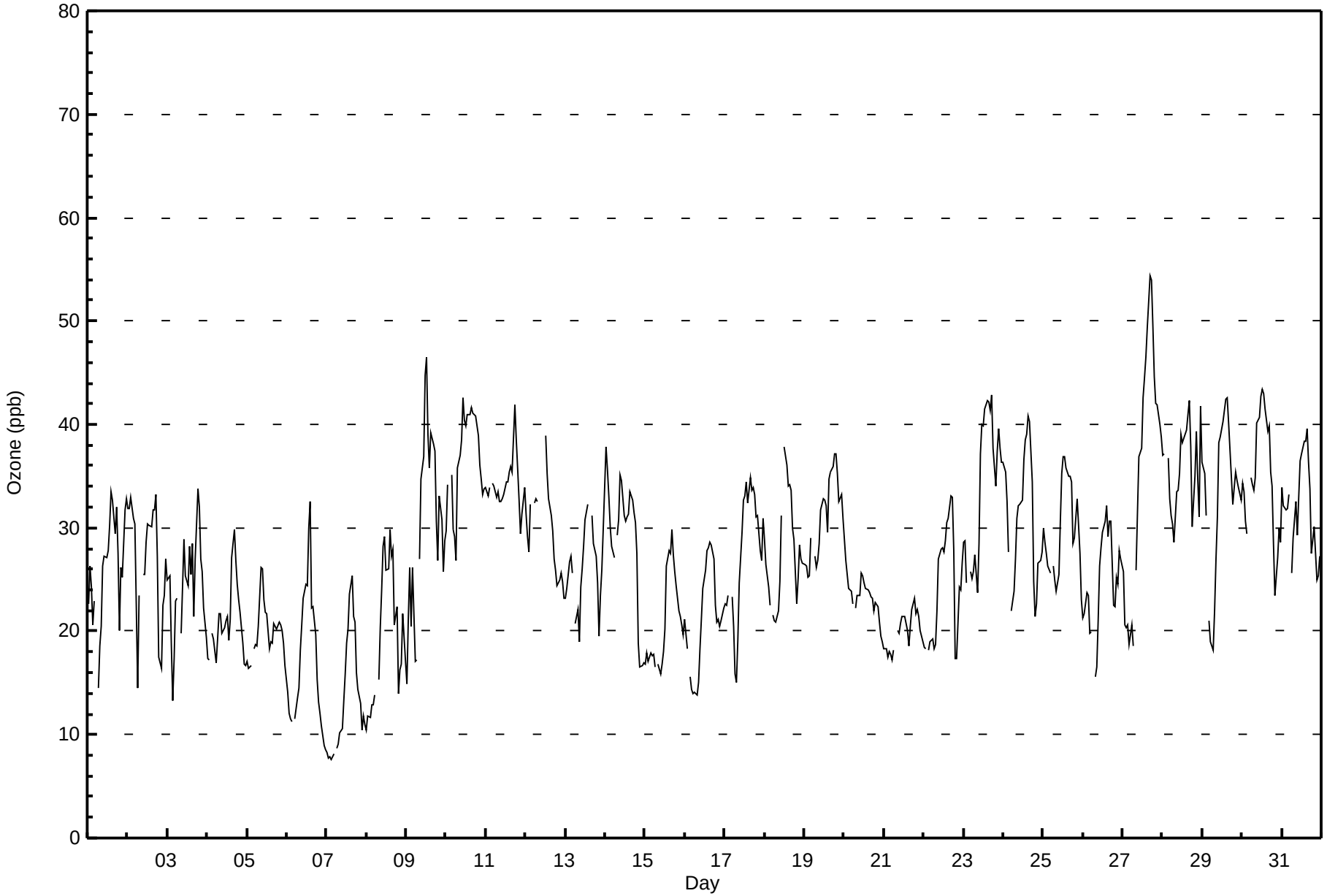
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb

Wood Buffalo Environmental Association

Hourly Averages

Ozone (O_3) - ppb

Conklin Lookout - August 2015



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	153	21.67	21.67
21 - 50	551	78.05	99.72
51 - 82	2	0.28	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 706

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Ozone (O_3) - ppb

Conklin Lookout - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	2	3	6	19	13	9	19	1	4	14	5	3	9	28	13	5	153
21 - 50	13	20	10	12	26	22	12	26	15	62	84	66	78	67	22	16	551
51 - 82	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	15	23	16	31	39	31	31	27	19	76	91	69	87	95	35	21	706

Total Number of Valid Hours: 706

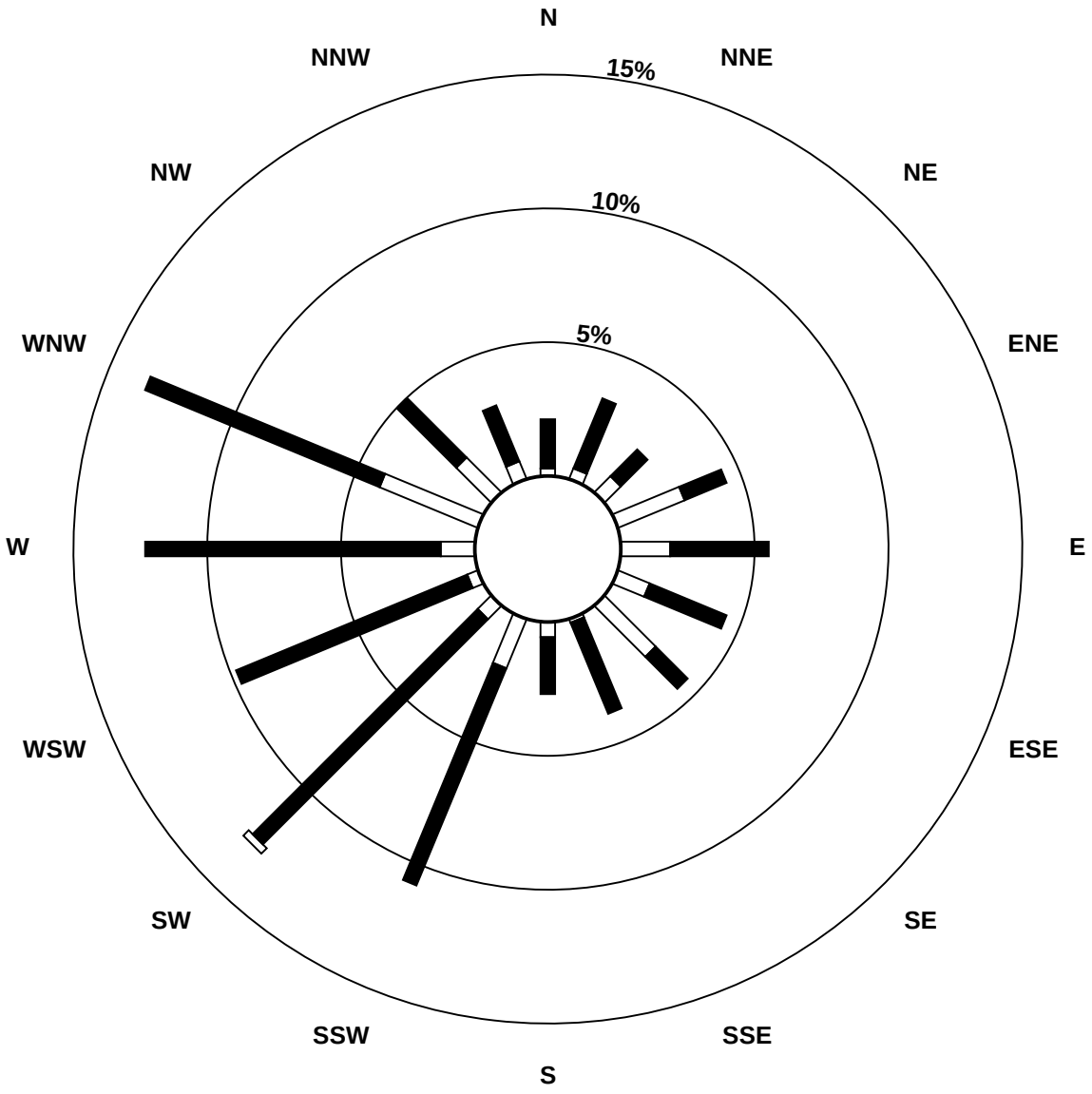
Total Number of Hours: 744

Wood Buffalo Environmental Association

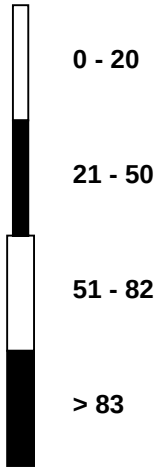
Wind Rose Aug 2015

Ozone (O_3) - ppb

Conklin Lookout (AMS 18)



Classes (ppb)



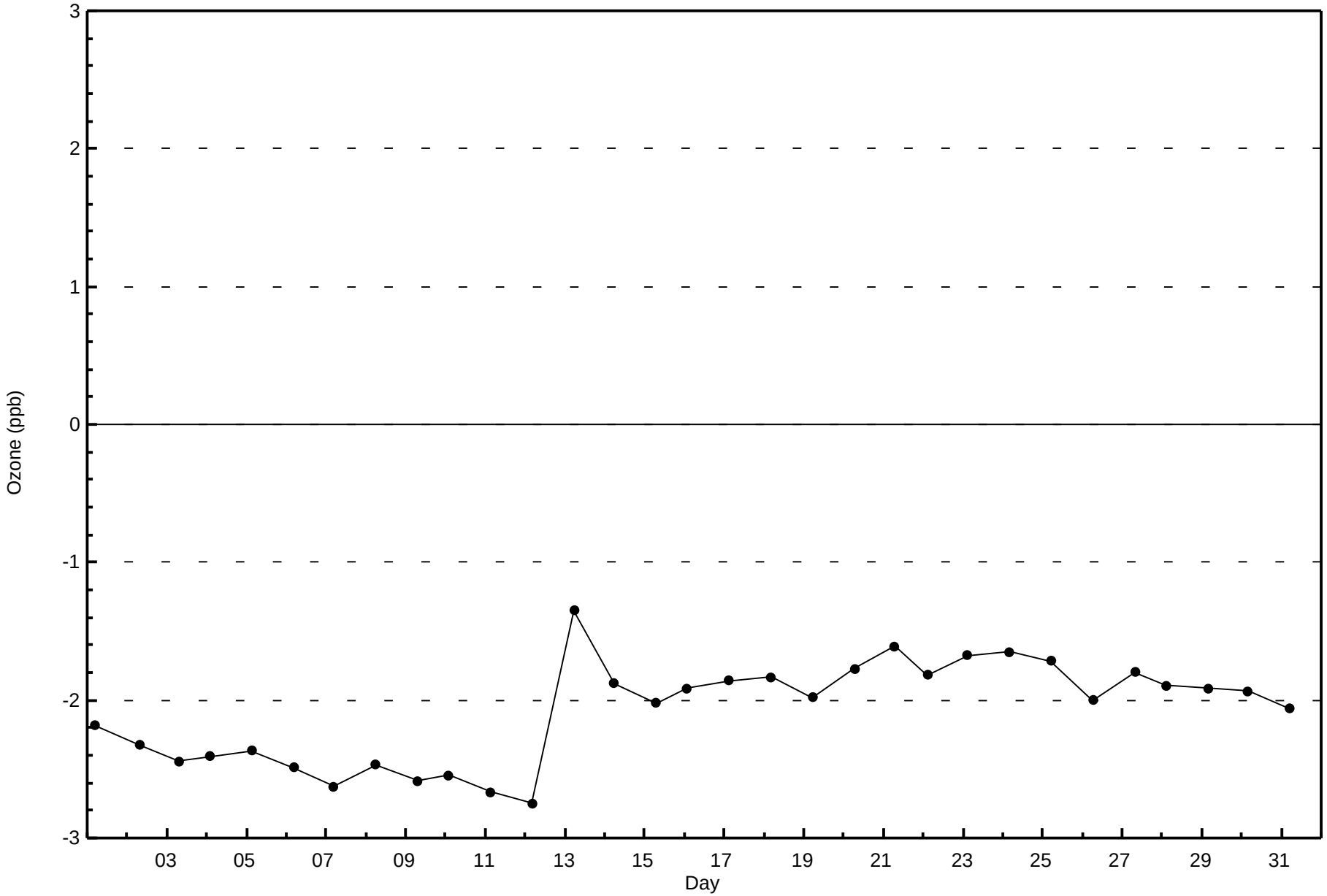
Total Number of Valid Hours: 706

Wood Buffalo Environmental Association

Zero Responses

Ozone (O_3) - ppb

Conklin Lookout - August 2015

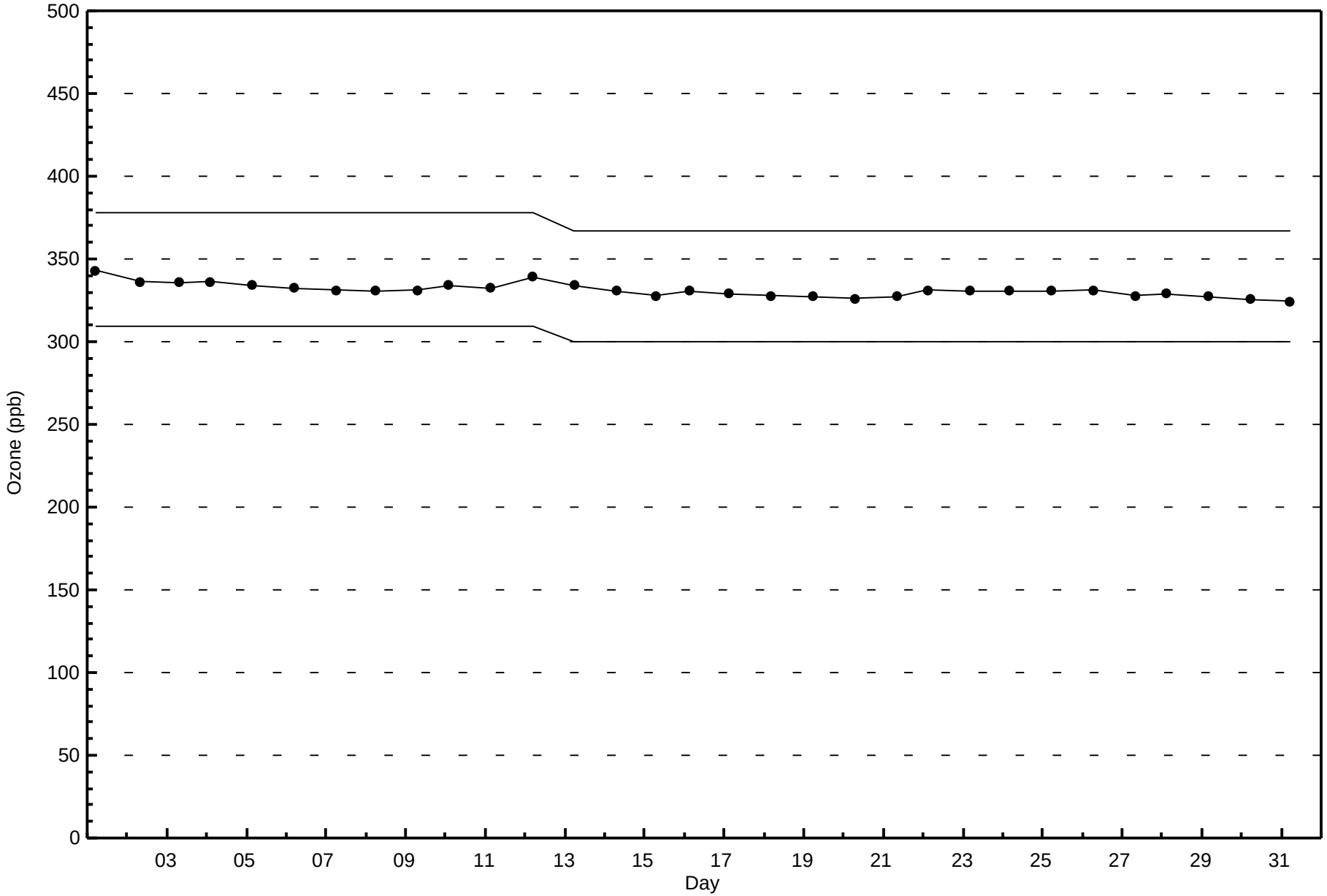


Wood Buffalo Environmental Association

Span Responses

Ozone (O_3) - ppb

Conklin Lookout - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

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

Conklin Lookout - August 2015

Number of Exceedences (AAAQO): 24-hr: 0

Maximum Value: 26.0 $\mu g/m^3$ on Aug 27 14:00

Maximum Daily Average: 10.7 $\mu g/m^3$ on Aug 27

Minimum Value: 0.0 $\mu g/m^3$ on Aug 14 12:00

Minimum Daily Average: 0.9 $\mu g/m^3$ on Aug 14

Maximum Diurnal Average: 3.8 $\mu g/m^3$ at hour 22

Minimum Diurnal Average: 2.6 $\mu g/m^3$ at hour 9

Monthly Average: 3.44 $\mu g/m^3$

Percentiles: P_1 = 0.2 P_{10} = 0.9 Q_1 = 1.6 Median = 2.7 Q_3 = 4.5 P_{90} = 6.6 P_{99} = 14.1

Hours in Service:	744
Hours of Data:	742
Hours of Missing Data:	2
Hours of Calibration:	1
Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	5.7	6.1	7.6	7.9	5.7	5.4	6.4	5.8	3.3	3.8	2.1	3.3	6.1	5.6	6.6	7.0	8.9	5.9	5.7	5.2	3.5	6.6	7.5	6.9	5.8	8.9
2-Aug	5.0	3.8	1.9	2.0	2.7	2.9	1.9	1.7	1.6	2.3	4.0	4.9	4.9	5.4	6.2	5.9	5.4	3.5	3.1	1.9	2.4	4.8	5.9	5.3	3.7	6.2
3-Aug	5.8	5.9	5.2	2.4	3.3	6.0	7.6	7.1	2.3	2.3	6.0	8.5	8.2	5.4	4.5	5.0	7.7	7.4	7.9	7.9	6.4	4.1	4.9	3.7	5.7	8.5
4-Aug	2.1	3.7	5.4	3.1	3.4	3.0	2.2	3.9	3.7	3.1	4.6	3.7	5.2	4.7	3.1	4.6	6.1	7.6	6.0	2.9	4.7	4.6	2.3	3.1	4.0	7.6
5-Aug	3.4	3.4	3.0	3.2	3.7	3.4	4.9	3.1	3.4	4.2	3.6	1.9	2.4	1.8	1.8	3.1	2.6	1.5	1.3	1.3	1.7	2.3	1.4	1.3	2.7	4.9
6-Aug	1.3	1.4	1.4	1.4	1.3	1.4	1.6	1.7	2.1	2.2	2.0	2.3	2.5	1.7	2.4	2.8	2.2	2.1	2.8	3.5	2.0	2.3	2.5	1.8	2.0	3.5
7-Aug	2.1	2.3	2.0	2.1	2.2	1.9	2.0	2.4	2.4	2.3	2.0	1.9	1.8	1.4	1.5	1.7	1.8	1.9	2.1	4.2	4.5	4.5	4.0	2.5	2.4	4.5
8-Aug	2.6	2.8	2.6	2.4	2.5	2.3	2.3	2.1	2.2	2.2	2.4	3.6	4.2	1.9	1.3	2.3	3.1	3.0	1.9	2.1	4.4	6.0	6.0	4.6	3.0	6.0
9-Aug	3.8	5.6	3.7	3.8	6.3	7.7	6.0	2.0	2.7	5.0	7.2	7.7	5.6	4.4	3.6	3.5	6.2	7.3	7.3	4.7	5.4	6.2	4.1	3.6	5.1	7.7
10-Aug	5.9	6.6	6.0	2.8	2.0	3.6	3.6	1.7	1.9	1.7	2.0	4.0	4.9	5.3	4.7	3.6	3.4	3.0	2.4	2.5	2.8	2.7	4.3	5.8	3.6	6.6
11-Aug	4.6	2.5	2.4	3.5	5.1	5.1	8.3	8.8	4.2	3.6	3.4	3.3	2.4	3.0	4.3	3.0	3.0	2.7	3.2	2.7	2.5	2.7	2.9	2.8	3.7	8.8
12-Aug	4.1	4.8	4.5	3.9	4.2	3.8	3.5	C	1.7	0.7	0.5	0.4	0.3	0.3	0.4	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.6	1.6	4.8
13-Aug	0.7	1.2	1.5	1.1	0.9	1.4	1.5	1.3	2.1	1.2	0.7	0.9	1.6	2.0	3.2	3.2	2.9	2.1	4.5	4.7	2.1	1.5	2.5	3.1	2.0	4.7
14-Aug	3.2	2.5	1.8	1.7	1.8	2.2	1.8	1.2	0.5	0.1	M	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.3	0.5	1.1	0.8	0.6	0.6	0.9	3.2
15-Aug	0.5	0.5	0.5	0.6	0.8	1.0	1.2	1.4	1.8	2.3	3.0	3.1	1.6	3.3	6.4	6.9	4.7	4.2	4.4	3.9	2.4	2.3	2.3	1.9	2.5	6.9
16-Aug	1.9	2.6	3.9	4.3	3.4	2.8	3.9	4.3	5.4	6.6	4.2	1.5	0.8	0.3	0.4	0.4	0.2	0.2	1.3	1.3	2.0	1.9	1.8	1.4	2.4	6.6
17-Aug	1.5	1.6	1.8	1.9	1.6	1.9	2.2	1.8	1.4	0.8	0.7	0.8	1.0	1.3	1.3	1.6	1.9	2.2	1.8	2.1	2.3	2.4	2.9	2.6	1.7	2.9
18-Aug	2.7	3.1	4.1	4.3	3.9	3.8	3.9	4.5	3.8	2.6	3.8	7.7	8.7	5.7	4.5	3.2	2.7	2.9	2.8	3.1	4.3	4.0	3.5	2.8	4.0	8.7
19-Aug	2.3	2.5	2.0	2.3	3.5	2.9	4.0	4.1	3.4	2.1	1.8	2.6	5.0	4.6	4.1	1.7	1.8	1.8	1.5	1.8	2.0	2.3	2.0	1.6	2.6	5.0
20-Aug	2.0	2.4	2.3	2.1	1.9	1.9	1.8	1.6	1.4	1.6	0.9	0.9	0.9	1.1	1.0	1.0	1.1	1.1	1.3	1.2	1.2	1.3	1.3	1.2	1.4	2.4
21-Aug	1.2	1.2	1.2	1.2	1.2	1.3	1.4	1.3	1.0	0.9	0.9	0.8	0.9	0.8	0.9	1.3	1.1	0.9	1.0	1.1	0.9	0.8	0.9	0.9	1.1	1.4
22-Aug	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.1	1.0	0.8	0.8	0.7	0.6	0.6	0.6	0.8	4.0	1.1	1.2	1.7	1.5	1.3	1.3	1.3	1.1	4.0
23-Aug	1.4	1.4	1.7	1.6	1.6	1.8	1.8	1.8	1.9	1.9	2.0	1.6	1.2	1.2	1.3	1.5	1.5	1.6	1.9	2.3	3.9	3.6	3.2	3.1	2.0	3.9
24-Aug	3.8	5.3	5.4	6.0	6.0	5.7	5.1	4.0	2.6	2.2	2.0	2.1	2.5	2.2	1.6	2.0	2.5	2.8	4.8	4.8	4.8	5.5	5.3	4.6	3.9	6.0
25-Aug	4.0	3.7	3.1	2.1	2.0	1.8	1.8	2.4	2.8	3.3	2.8	2.4	2.5	3.7	4.8	4.9	4.3	4.3	4.0	5.9	8.6	6.6	5.0	4.8	3.8	8.6
26-Aug	4.4	3.6	3.2	4.1	4.5	3.8	4.1	3.0	1.9	2.7	4.0	5.0	5.3	6.0	6.7	7.0	5.8	4.4	3.2	3.6	6.4	7.8	8.2	4.2	4.7	8.2
27-Aug	3.0	3.7	4.5	2.7	3.9	5.6	5.6	2.4	3.6	5.7	9.6	12.3	25.9	26.0	16.1	12.9	14.9	16.9	16.5	14.5	13.6	12.3	12.1	13.4	10.7	26.0
28-Aug	14.1	11.5	7.9	5.9	6.7	7.3	7.2	6.8	3.7	3.0	2.4	1.1	1.0	1.4	2.0	2.6	3.3	3.4	3.3	2.9	3.4	4.4	5.0	7.8	4.9	14.1
29-Aug	7.1	5.9	8.8	8.8	7.0	6.1	4.2	1.8	4.3	10.8	8.6	9.4	8.0	6.4	4.9	5.2	6.2	7.4	7.3	8.1	8.2	8.3	6.4	5.0	6.8	10.8
30-Aug	8.8	11.2	12.9	10.5	12.7	11.7	9.0	7.9	4.3	1.9	1.8	1.3	1.1	1.2	1.5	1.8	2.4	2.7	1.2	1.7	2.7	3.3	2.4	1.3	4.9	12.9
31-Aug	1.8	3.6	4.2	4.7	3.8	4.0	3.0	1.6	0.8	1.3	1.2	0.6	0.3	0.2	0.4	0.2	0.4	0.6	0.9	1.4	2.1	1.3	0.9	0.9	1.7	4.7
	3.6	3.8	3.8	3.4	3.6	3.7	3.7	3.2	2.6	2.8	3.0	3.2	3.8	3.5	3.3	3.3	3.6	3.5	3.5	3.4	3.7	3.8	3.7	3.4	Diurnal Average	
	14.1	11.5	12.9	10.5	12.7	11.7	9.0	8.8	5.4	10.8	9.6	12.3	25.9	26.0	16.1	12.9	14.9	16.9	16.5	14.5	13.6	12.3	12.1	13.4	Diurnal Maximum	

C - Calibration M - Maintenance

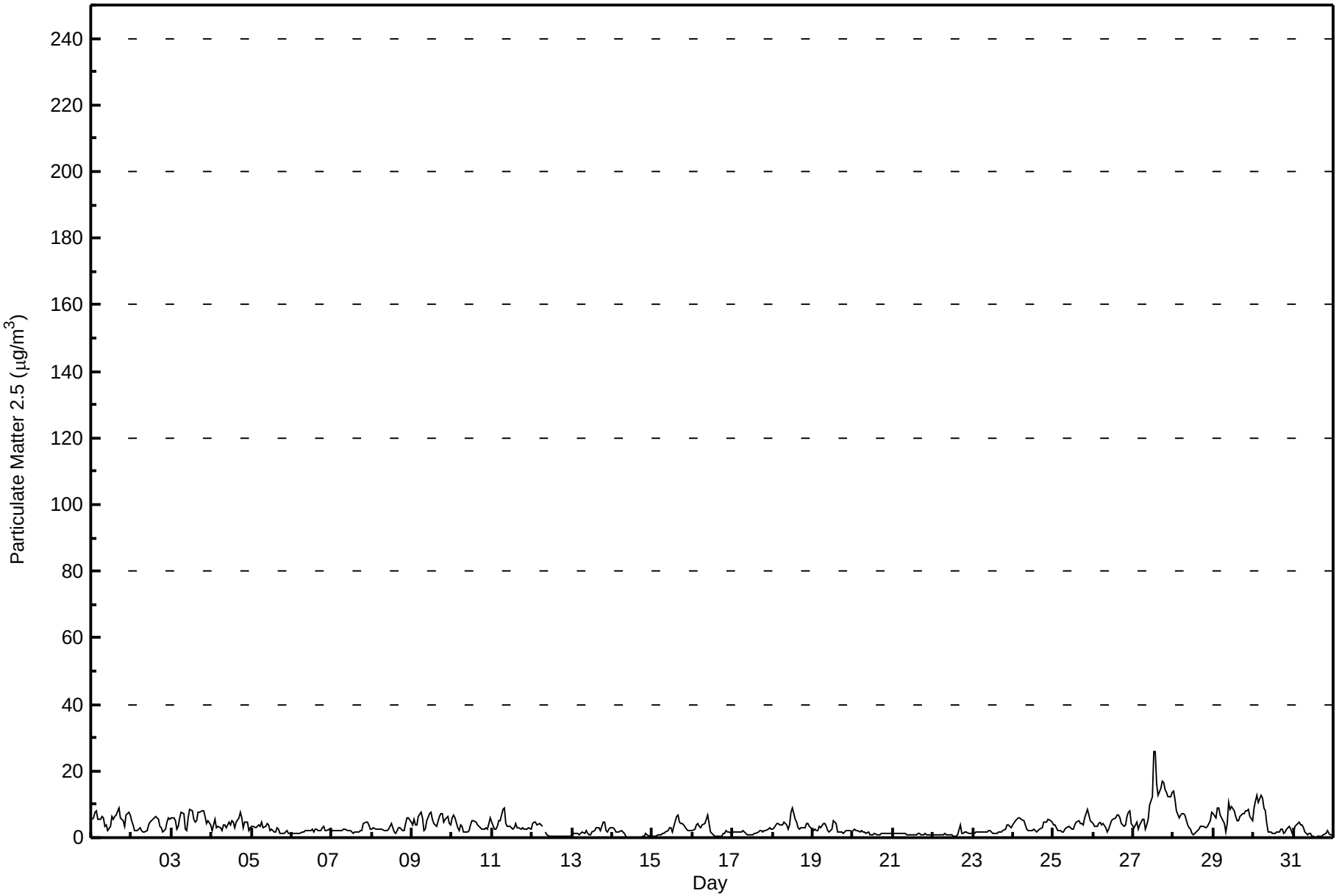
Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 $\mu g/m^3$

Wood Buffalo Environmental Association

Hourly Averages

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

Conklin Lookout - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

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

Conklin Lookout - August 2015

Concentration Ranges ($\mu g/m^3$)	Number of Hours	%	Cumulative %
1 - 5	528	71.16	71.16
6 - 15	122	16.44	87.60
16 - 25	3	0.40	88.01
26 - 80	2	0.27	88.27
> 81.0	0	0.00	88.27

Total Number of Valid Hours: 742

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

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

Conklin Lookout - August 2015

Concentration Ranges ($\mu g/m^3$)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
1 - 5	14	14	17	31	33	25	24	14	12	64	64	53	60	57	27	19	528
6 - 15	3	10	2	2	6	7	8	11	7	15	25	9	6	4	5	2	122
16 - 25	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	3
26 - 80	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	2
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	17	24	19	33	39	32	32	25	19	80	93	62	66	61	32	21	655

Total Number of Valid Hours: 742

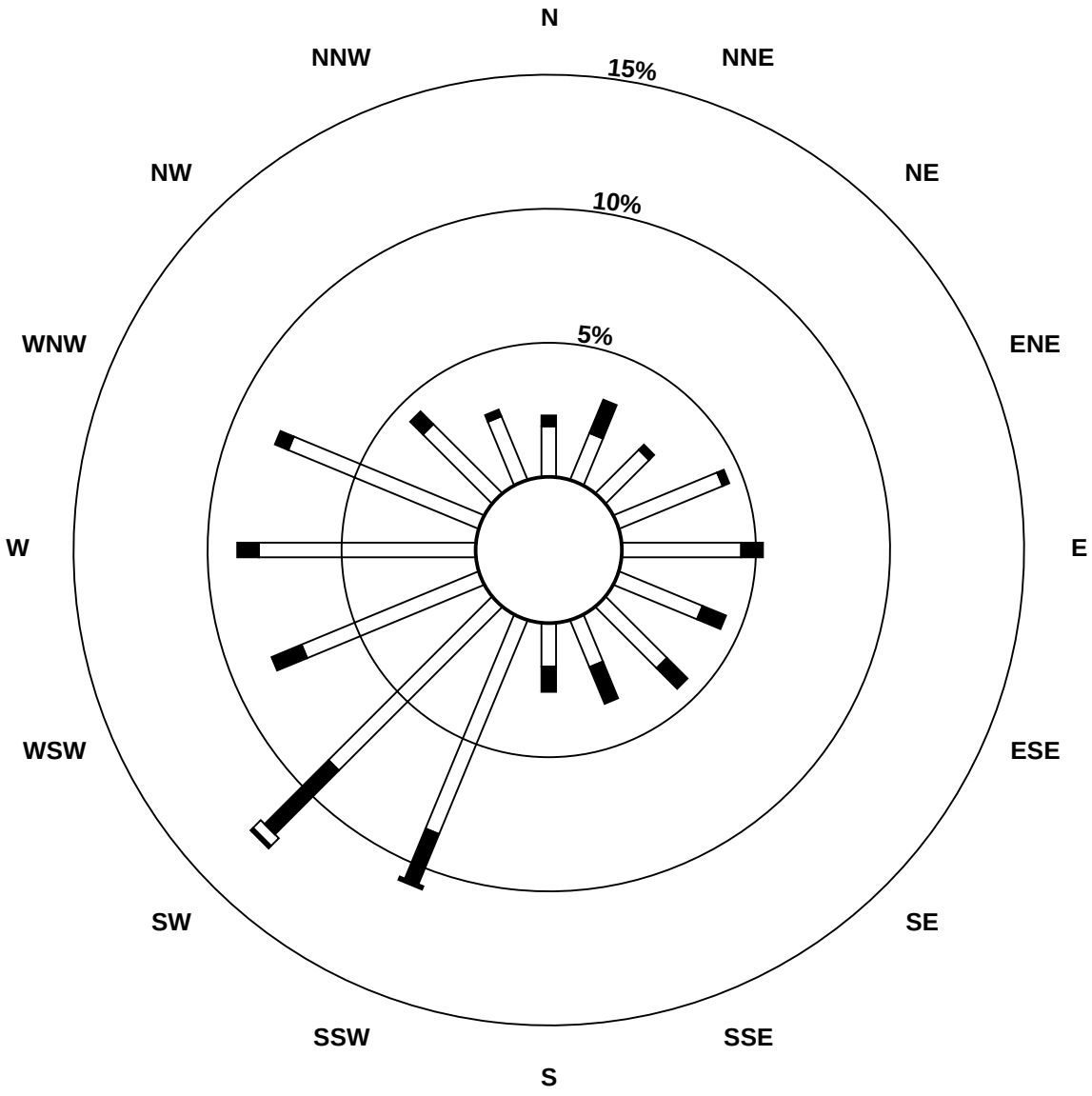
Total Number of Hours: 744

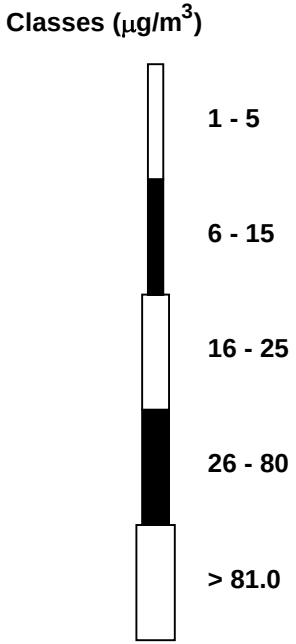
Wood Buffalo Environmental Association

Wind Rose Aug 2015

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

Conklin Lookout (AMS 18)





Total Number of Valid Hours: 742

Maximum Value: 28.7 C on Aug 13 15:00

Maximum Daily Average: 21.3 C on Aug 13

Minimum Value: 3.6 C on Aug 22 06:00

Minimum Daily Average: 8.3 C on Aug 22

Maximum Diurnal Average: 20.5 C at hour 15

Minimum Diurnal Average: 11.4 C at hour 6

Monthly Average: 15.50 C

Percentiles: P_1 = 5.7 P_{10} = 9.8 Q_1 = 12.1 Median = 14.8 Q_3 = 19.1 P_{90} = 22.3 P_{99} = 26.4

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

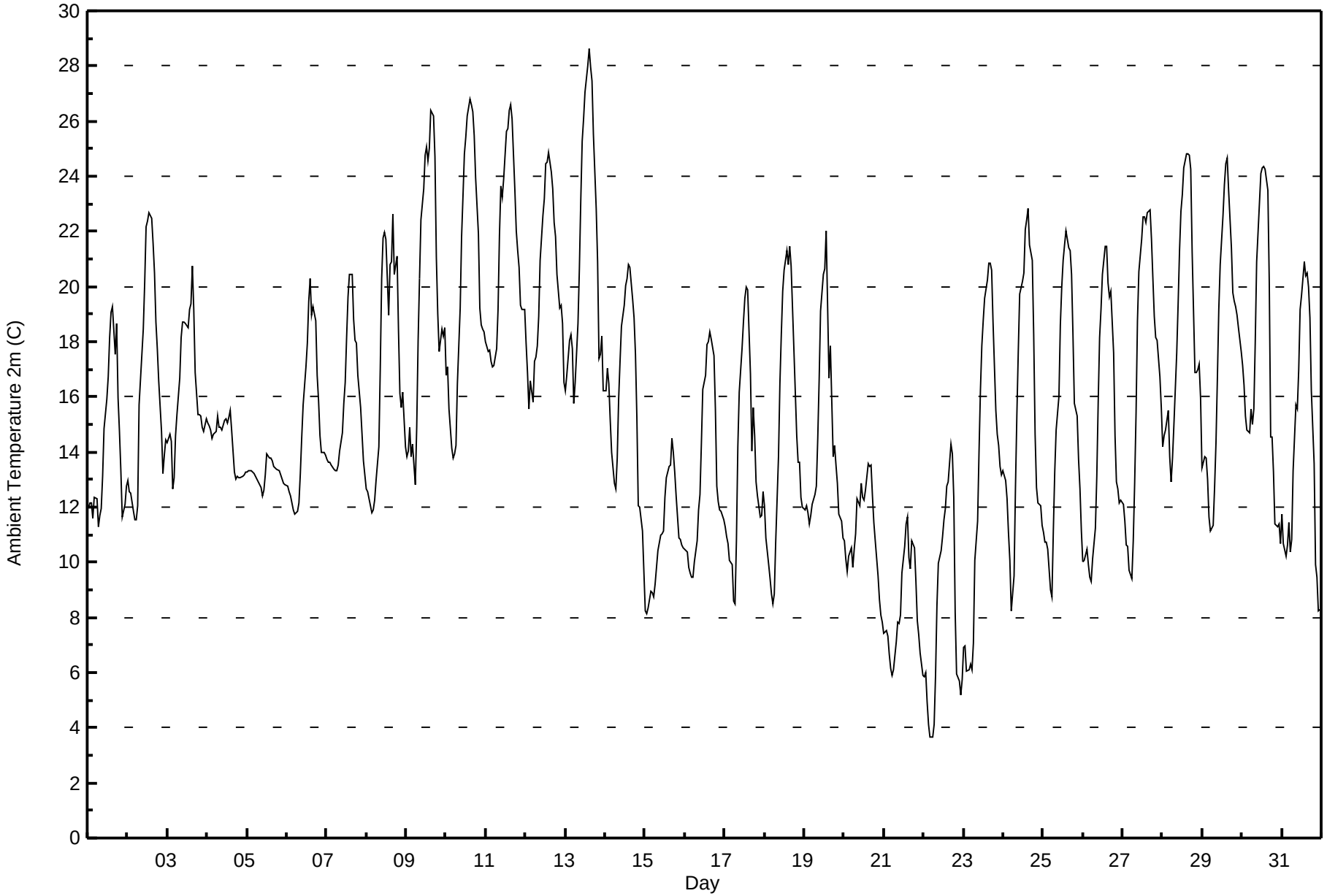
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	12.0	12.2	12.1	11.6	12.3	12.3	11.3	11.7	11.9	13.1	14.8	15.9	16.7	18.2	19.1	19.3	17.6	18.7	16.0	14.8	13.3	11.6	12.1	12.8	14.2	19.3
2-Aug	13.0	12.6	12.5	11.8	11.5	11.6	12.0	15.7	16.6	18.4	20.1	22.2	22.4	22.7	22.5	21.6	20.5	18.7	17.8	16.6	14.8	13.2	13.9	14.4	16.5	22.7
3-Aug	14.4	14.6	14.4	12.7	13.1	14.6	15.3	16.7	18.1	18.7	18.7	18.6	18.5	19.2	19.4	20.7	19.2	16.9	15.4	15.4	15.3	14.9	14.8	15.2	16.4	20.7
4-Aug	15.0	15.0	14.8	14.5	14.6	14.7	15.3	14.9	14.9	14.8	15.2	15.2	15.1	15.3	15.5	14.8	13.3	13.0	13.1	13.0	13.1	13.1	13.2	13.3	14.4	15.5
5-Aug	13.3	13.3	13.3	13.3	13.2	13.1	13.0	12.9	12.7	12.4	12.6	13.2	13.9	13.8	13.8	13.7	13.5	13.4	13.4	13.3	13.2	13.0	12.9	12.8	13.2	13.9
6-Aug	12.7	12.6	12.4	12.2	11.9	11.8	11.8	12.2	13.2	14.6	15.7	17.1	17.9	19.5	20.3	19.0	19.3	18.8	16.8	15.9	14.6	14.0	14.0	13.9	15.1	20.3
7-Aug	13.8	13.6	13.6	13.6	13.4	13.3	13.3	13.5	14.0	14.7	15.8	16.5	18.1	19.6	20.4	20.4	18.8	18.1	18.0	16.8	15.6	14.6	13.7	13.1	15.7	20.4
8-Aug	12.7	12.5	12.1	11.8	11.9	12.3	13.0	14.2	17.0	20.3	21.8	21.9	21.7	19.0	20.8	20.9	22.6	20.5	21.1	18.4	16.1	15.6	16.2	14.2	17.0	22.6
9-Aug	13.9	14.0	14.9	13.9	14.3	12.8	14.9	18.0	20.3	22.4	23.5	24.8	25.1	24.6	25.0	26.4	26.2	24.7	21.1	19.0	17.7	18.5	18.2	18.5	19.7	26.4
10-Aug	16.8	17.1	15.6	14.1	13.8	14.0	14.2	16.5	19.2	21.8	23.3	24.8	25.4	26.2	26.8	26.6	26.3	25.5	24.0	21.9	19.2	18.6	18.5	18.4	20.4	26.8
11-Aug	18.0	17.7	17.7	17.3	17.1	17.2	17.7	19.2	21.9	23.6	23.3	23.9	25.6	25.7	26.4	26.6	26.1	23.5	22.0	21.3	20.7	19.3	19.2	19.2	21.3	26.6
12-Aug	17.9	16.9	15.6	16.6	15.8	17.3	17.5	17.8	18.9	21.0	22.6	23.2	24.5	24.5	24.9	24.2	23.5	22.3	21.8	20.4	19.2	19.3	18.7	16.5	20.0	24.9
13-Aug	16.2	16.8	18.1	18.2	17.7	15.8	16.5	18.7	20.6	23.1	25.3	26.1	27.0	28.0	28.7	28.0	27.4	25.5	22.8	20.9	17.4	17.6	18.2	16.2	21.3	28.7
14-Aug	16.2	17.0	16.5	15.1	14.0	12.9	12.6	13.8	15.9	17.3	18.5	19.3	20.1	20.3	20.8	20.7	19.5	18.8	17.6	15.3	12.1	12.0	11.1	9.7	16.1	20.8
15-Aug	8.2	8.1	8.4	9.0	8.9	8.7	9.2	9.8	10.4	11.0	11.0	11.1	12.3	13.0	13.5	13.5	14.5	14.0	13.3	12.4	10.9	10.8	10.6	10.5	11.0	14.5
16-Aug	10.5	10.4	9.8	9.6	9.5	9.5	10.0	10.8	11.9	12.5	14.3	16.3	16.8	17.9	18.0	18.4	18.1	17.5	15.6	12.8	12.2	11.9	11.9	11.5	13.2	18.4
17-Aug	11.3	10.9	10.7	10.1	9.9	8.6	8.5	10.8	14.2	16.2	17.8	18.7	19.6	20.0	19.9	16.8	14.0	15.6	14.6	12.9	12.4	11.6	11.7	12.6	13.7	20.0
18-Aug	12.0	10.9	9.9	9.4	8.9	8.5	8.9	10.7	13.8	16.5	18.3	19.8	20.6	21.3	20.8	21.5	20.7	19.2	17.7	14.6	13.6	13.6	12.4	12.0	14.8	21.5
19-Aug	11.9	12.0	11.8	11.4	11.7	12.1	12.4	12.8	14.5	16.6	19.1	20.4	20.7	22.0	19.4	16.7	17.8	13.8	14.2	13.5	12.9	11.8	11.5	10.9	14.7	22.0
20-Aug	10.8	10.1	9.7	10.2	10.5	9.8	10.5	11.0	12.3	12.1	12.9	12.4	12.3	12.6	13.6	13.5	13.5	12.4	11.5	10.8	9.5	8.6	8.1	7.8	11.1	13.6
21-Aug	7.4	7.5	7.3	6.7	6.1	5.9	6.1	7.1	7.9	7.8	8.1	9.6	10.6	11.4	11.6	10.1	9.8	10.8	10.5	9.3	7.9	7.4	6.7	5.9	8.3	11.6
22-Aug	5.9	6.0	4.9	4.1	3.7	3.6	4.1	5.9	8.4	10.0	10.4	10.9	11.5	11.9	12.8	12.9	14.3	13.9	12.3	8.2	5.9	5.7	5.2	5.8	8.3	14.3
23-Aug	6.9	7.0	6.1	6.1	6.3	6.1	7.1	10.1	11.5	14.0	16.2	17.8	18.8	19.6	20.2	20.8	20.9	20.6	18.7	15.5	14.6	14.2	13.5	13.2	13.6	20.9
24-Aug	13.3	12.9	12.3	11.1	10.1	8.2	9.5	12.7	15.3	17.7	19.7	20.2	20.5	22.1	22.4	22.8	21.5	20.9	18.2	14.6	12.7	12.1	12.1	11.3	15.6	22.8
25-Aug	11.1	10.7	10.7	10.5	9.0	8.8	11.2	13.3	14.8	16.0	18.6	20.0	21.0	21.5	22.0	21.4	21.3	20.5	18.3	15.8	15.3	13.7	12.7	11.2	15.4	22.0
26-Aug	10.0	10.1	10.5	9.9	9.5	9.3	10.1	11.3	13.1	15.8	18.1	19.2	20.4	21.5	21.5	20.2	19.7	19.8	17.6	14.6	12.9	12.7	12.1	12.3	14.7	21.5
27-Aug	12.1	11.5	10.7	10.6	9.7	9.4	10.8	12.8	15.4	18.7	20.6	21.7	22.5	22.5	22.3	22.7	22.8	21.7	20.3	18.9	18.1	18.0	16.7	15.6	16.9	22.8
28-Aug	14.2	14.6	14.8	15.5	13.8	12.9	13.8	15.0	17.6	19.4	21.3	22.7	23.4	24.3	24.8	24.8	24.7	24.2	21.3	16.9	16.9	17.0	17.2	16.0	18.6	24.8
29-Aug	13.4	13.8	13.8	13.0	11.7	11.1	11.3	12.7	14.3	16.7	19.2	20.8	22.6	23.7	24.5	24.7	23.5	21.4	19.8	19.5	19.3	18.9	18.5	17.6	17.7	24.7
30-Aug	17.1	16.4	15.3	14.8	14.7	15.6	15.0	15.6	18.0	20.9	23.0	24.1	24.3	24.3	24.2	23.5	20.1	14.5	14.5	13.3	11.4	11.3	11.4	10.7	17.3	24.3
31-Aug	11.7	10.7	10.2	10.6	11.5	10.4	10.9	13.3	15.7	15.6	17.0	19.2	19.7	20.9	20.4	20.5	20.0	18.9	16.2	13.6	9.9	9.5	8.2	8.3	14.3	20.9
	12.7	12.6	12.3	11.9	11.6	11.4	11.9	13.3	15.0	16.6	18.0	19.0	19.7	20.2	20.5	20.2	19.7	18.7	17.3	15.5	14.2	13.7	13.4	12.9	Diurnal Average	
	18.0	17.7	18.1	18.2	17.7	17.3	17.7	19.2	21.9	23.6	25.3	26.1	27.0	28.0	28.7	28.0	27.4	25.5	24.0	21.9	20.7	19.3	19.2	19.2	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature 2m (AT 2m) - C

Conklin Lookout - August 2015



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	80	10.75	10.75
10 - 20	517	69.49	80.24
> 20	147	19.76	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

Maximum Value: 99 % on Aug 6 06:00

Maximum Daily Average: 98.1 % on Aug 5

Minimum Value: 29 % on Aug 28 15:00

Minimum Daily Average: 51.2 % on Aug 28

Maximum Diurnal Average: 86.4 % at hour 6

Minimum Diurnal Average: 51.0 % at hour 15

Monthly Average: 71.2 %

Percentiles: P_1 = 31 P_{10} = 42 Q_1 = 56 Median = 73 Q_3 = 88 P_{90} = 96 P_{99} = 99

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

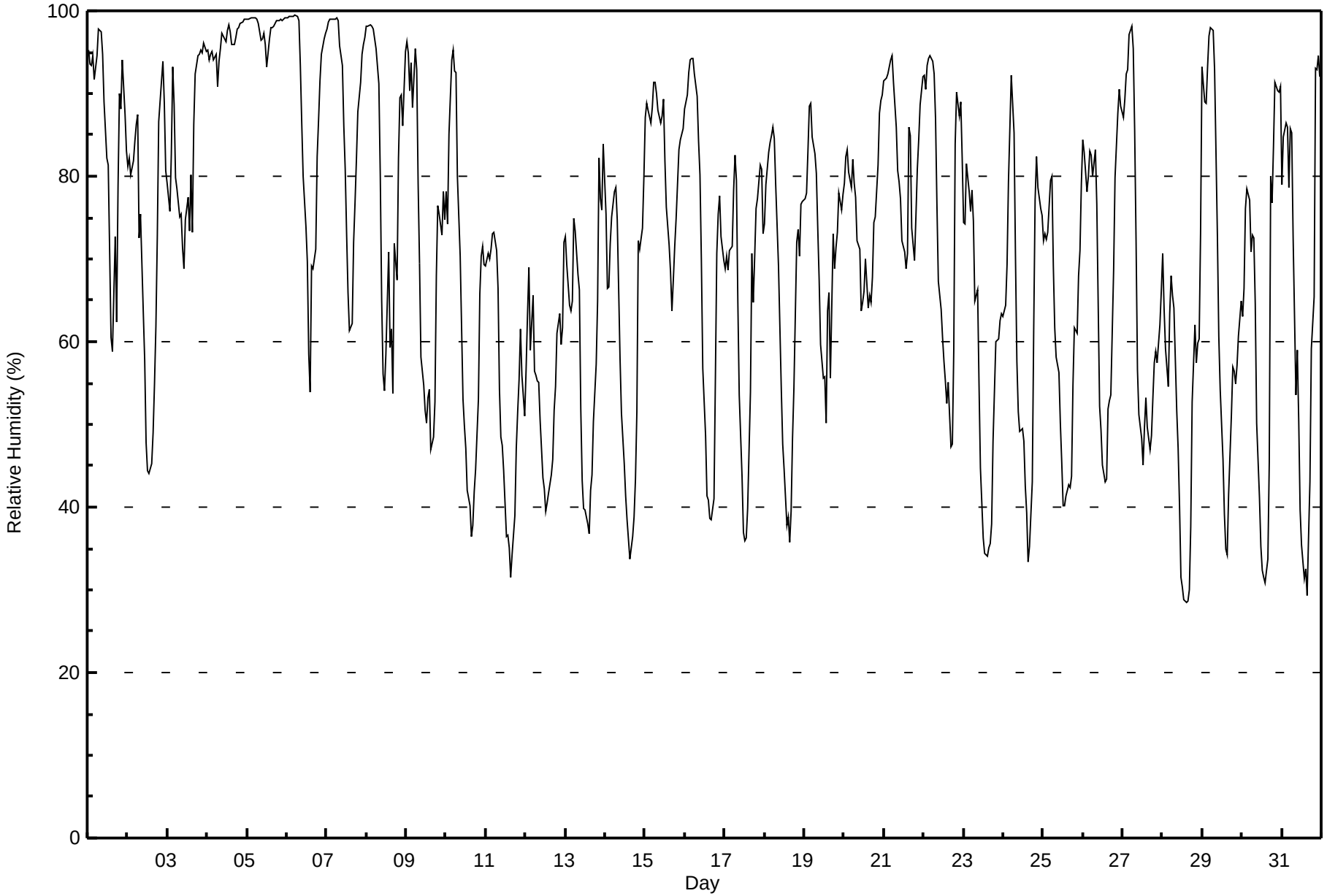
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	95	94	93	95	92	94	98	98	98	95	89	82	81	71	61	59	73	62	79	90	88	94	87	83	85.4	98
2-Aug	81	82	80	82	84	86	87	72	75	64	58	48	44	44	45	49	55	62	73	87	91	94	89	81	71.4	94
3-Aug	79	76	83	93	89	80	79	75	75	71	69	75	77	73	80	73	86	92	95	95	95	95	96	95	83.2	96
4-Aug	95	94	95	95	94	95	91	94	95	97	97	96	98	98	98	96	96	97	98	98	98	99	99	99	96.3	99
5-Aug	99	99	99	99	99	99	99	98	96	97	97	96	93	97	98	98	98	99	99	99	99	99	99	99	98.1	99
6-Aug	99	99	99	99	99	99	99	99	93	87	80	74	70	58	54	69	69	71	82	87	92	95	97	97	86.2	99
7-Aug	98	99	99	99	99	99	99	99	96	93	86	81	73	66	61	62	72	77	82	88	91	95	96	97	87.8	99
8-Aug	98	98	98	98	98	97	95	91	80	65	56	54	59	71	59	62	54	72	67	82	89	90	86	95	79.8	98
9-Aug	96	95	90	94	88	95	93	79	69	58	55	52	50	53	54	47	48	53	68	76	75	73	78	75	71.5	96
10-Aug	78	74	85	94	95	93	93	80	70	62	53	50	47	42	40	36	38	42	45	53	66	70	71	69	64.4	95
11-Aug	69	71	70	71	73	73	71	67	54	48	47	44	36	37	35	31	34	39	47	52	55	61	56	51	53.9	73
12-Aug	57	63	69	59	66	56	56	55	55	50	44	42	40	41	42	44	46	52	55	61	63	60	62	72	54.5	72
13-Aug	73	69	64	64	65	75	73	68	66	52	43	40	40	38	37	42	44	50	57	65	82	77	76	84	60.2	84
14-Aug	75	66	67	72	75	78	79	75	66	58	51	45	41	39	36	34	36	39	43	52	72	71	74	80	59.4	80
15-Aug	87	89	88	86	88	91	91	90	88	86	87	89	82	76	72	68	64	67	72	75	83	84	85	86	82.4	91
16-Aug	88	90	93	94	94	94	92	90	84	80	70	57	49	41	41	39	39	41	56	71	75	78	73	70	70.7	94
17-Aug	69	70	69	71	72	78	83	79	65	54	44	37	36	36	40	54	71	65	70	76	77	81	81	73	64.6	83
18-Aug	74	79	83	84	85	86	85	79	69	62	54	48	45	38	39	36	40	48	54	72	74	70	77	77	64.8	86
19-Aug	77	78	83	89	89	85	83	80	74	67	60	56	56	50	64	66	56	73	69	71	73	78	76	78	72.0	89
20-Aug	79	82	83	81	79	82	79	77	72	71	64	65	66	70	64	66	65	68	74	75	81	88	89	90	75.4	90
21-Aug	91	92	92	93	94	95	91	86	81	79	77	72	71	69	71	86	85	74	70	75	81	84	89	92	82.9	95
22-Aug	92	91	93	94	95	94	92	87	76	67	64	61	58	55	52	55	47	48	59	84	90	87	89	82	75.6	95
23-Aug	74	74	82	78	76	78	75	65	66	55	45	41	36	34	34	35	36	38	48	60	60	60	63	63	57.3	82
24-Aug	63	64	69	79	86	92	85	70	58	52	49	49	48	43	39	33	35	43	61	77	82	79	76	75	62.9	92
25-Aug	72	73	72	73	80	80	69	62	58	56	50	45	40	40	41	43	42	44	55	62	61	68	71	79	59.9	80
26-Aug	84	83	78	80	83	82	80	83	77	64	52	49	45	43	43	52	53	54	69	80	84	88	90	88	70.2	90
27-Aug	87	89	92	93	97	98	96	86	72	57	51	48	45	50	53	50	47	49	53	57	59	58	62	66	67.3	98
28-Aug	71	64	59	55	63	68	66	64	52	47	40	31	30	29	29	29	30	38	53	62	58	60	60	73	51.2	73
29-Aug	93	89	89	93	97	98	98	93	83	73	61	54	46	39	35	34	41	51	57	56	55	57	61	65	67.4	98
30-Aug	63	66	76	78	77	71	73	73	65	50	41	35	32	31	31	34	45	80	77	84	91	90	90	91	64.4	91
31-Aug	79	85	86	86	79	86	85	73	53	59	51	40	35	31	33	29	36	43	59	65	93	93	95	92	65.3	95
	81.9	81.9	83.2	84.6	85.4	86.4	85.0	80.2	73.7	67.0	60.8	56.6	53.8	51.7	51.0	51.9	54.2	59.0	66.0	73.8	78.6	79.9	80.4	81.2	Diurnal Average	
	99	99	99	99	99	99	99	99	98	97	97	96	98	98	98	98	98	99	99	99	99	99	99	99	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity (RH) - %

Conklin Lookout - August 2015



Maximum Value: 872 W/m2 on Aug 11 13:00

Maximum Daily Average: 298.2 W/m2 on Aug 10

Minimum Value: 0 W/m2 on Aug 1 01:00

Minimum Daily Average: 26.8 W/m2 on Aug 4

Maximum Diurnal Average: 609.5 W/m2 at hour 13

Minimum Diurnal Average: 0.0 W/m2 at hour 23

Monthly Average: 203.6 W/m2

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 52 $Q_3 = 376$ $P_{90} = 667$ $P_{99} = 853$

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

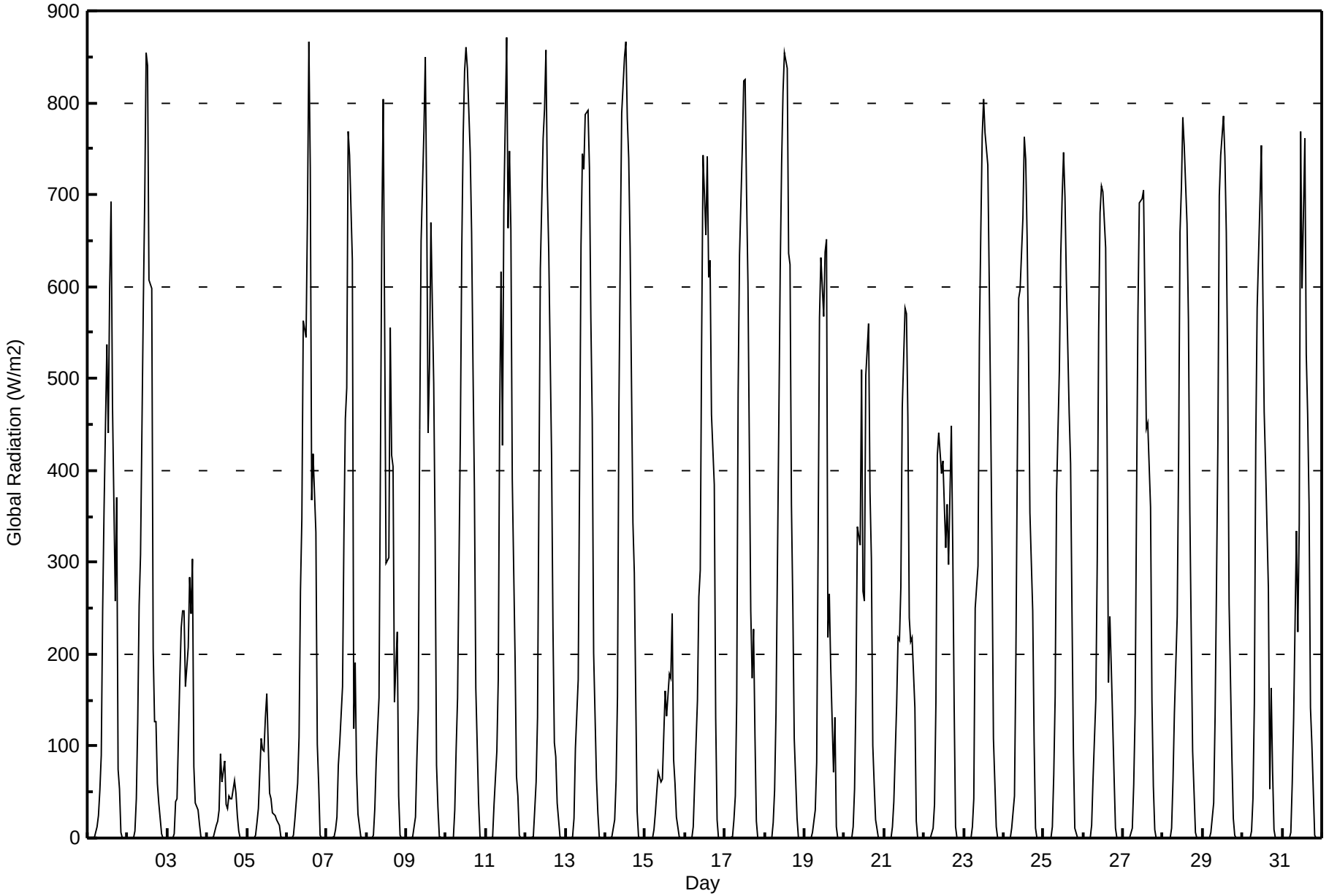
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0	0	0	0	1	12	25	52	90	249	358	538	440	598	692	472	257	370	75	53	6	0	0	0	178.7	692
2-Aug	0	0	0	0	8	43	127	253	308	583	698	854	840	607	598	207	126	127	59	38	4	0	0	0	228.4	854
3-Aug	0	0	0	0	5	40	43	173	228	247	248	165	207	284	244	304	78	38	30	14	2	0	0	0	97.8	304
4-Aug	0	0	0	0	1	14	19	30	91	61	83	36	32	45	43	42	63	49	25	8	1	0	0	0	26.8	91
5-Aug	0	0	0	0	0	3	16	32	108	96	95	132	157	48	43	27	26	24	20	14	1	0	0	0	35.0	157
6-Aug	0	0	0	0	2	20	60	109	268	348	563	544	678	866	729	368	418	333	103	58	4	0	0	0	228.0	866
7-Aug	0	0	0	0	2	10	22	79	103	165	332	457	490	768	744	628	119	190	72	26	2	0	0	0	175.3	768
8-Aug	0	0	0	0	2	31	83	153	406	660	805	561	299	305	555	416	404	149	224	45	3	0	0	0	212.6	805
9-Aug	0	0	0	0	2	23	87	140	444	651	769	849	688	441	516	670	494	329	80	33	1	0	0	0	259.1	849
10-Aug	0	0	0	0	1	31	97	153	441	642	764	834	860	837	746	658	510	380	163	37	2	0	0	0	298.2	860
11-Aug	0	0	0	0	2	36	95	172	457	616	427	688	872	664	748	662	390	195	67	46	3	0	0	0	255.8	872
12-Aug	0	0	0	0	1	31	61	131	382	619	762	793	857	710	638	417	229	104	89	38	2	0	0	0	244.4	857
13-Aug	0	0	0	0	2	21	98	173	400	645	745	727	788	792	729	566	456	201	66	27	1	0	0	0	268.2	792
14-Aug	0	0	0	0	1	19	63	154	465	642	789	850	866	782	739	642	343	289	155	29	2	0	0	0	284.6	866
15-Aug	0	0	0	0	1	9	27	51	72	61	64	112	160	132	178	174	245	86	59	23	1	0	0	0	60.6	245
16-Aug	0	0	0	0	0	13	60	150	262	291	545	742	657	741	611	628	461	384	131	20	1	0	0	0	237.3	742
17-Aug	0	0	0	0	1	19	46	150	484	635	752	824	825	702	604	247	174	227	112	19	0	0	0	0	242.5	825
18-Aug	0	0	0	0	1	17	53	136	451	618	733	812	854	838	637	624	364	252	108	22	0	0	0	0	271.6	854
19-Aug	0	0	0	0	0	7	31	82	313	566	631	568	638	652	219	266	186	72	130	12	0	0	0	0	182.2	652
20-Aug	0	0	0	0	0	12	53	158	338	318	509	268	258	504	560	378	304	100	58	19	0	0	0	0	159.9	560
21-Aug	0	0	0	0	0	12	40	145	219	216	273	468	577	571	458	239	213	217	142	18	0	0	0	0	158.8	577
22-Aug	0	0	0	0	0	11	36	149	417	441	397	411	361	316	362	297	449	316	143	13	0	0	0	0	171.6	449
23-Aug	0	0	0	0	0	13	43	251	297	544	660	764	804	767	732	605	465	307	109	12	0	0	0	0	265.5	804
24-Aug	0	0	0	0	0	10	46	196	406	588	597	674	763	739	654	534	354	247	105	11	0	0	0	0	246.8	763
25-Aug	0	0	0	0	0	12	69	154	376	509	635	698	747	698	606	462	408	245	96	10	0	0	0	0	238.5	747
26-Aug	0	0	0	0	0	13	64	151	302	551	680	709	704	642	441	170	242	185	68	10	0	0	0	0	205.5	709
27-Aug	0	0	0	0	0	10	58	136	365	568	691	695	704	579	445	452	360	149	56	9	0	0	0	0	219.9	704
28-Aug	0	0	0	0	0	10	62	136	242	412	659	708	784	754	668	564	357	222	94	5	0	0	0	0	236.6	784
29-Aug	0	0	0	0	0	7	38	131	272	430	698	743	786	742	660	503	254	87	22	3	0	0	0	0	224.0	786
30-Aug	0	0	0	0	0	8	42	147	429	577	693	754	602	463	405	271	53	163	71	9	0	0	0	0	195.3	754
31-Aug	0	0	0	0	0	6	60	129	334	224	342	769	597	760	527	460	364	141	102	2	0	0	0	0	200.8	769
	0.0	0.0	0.0	0.0	1.1	16.9	55.6	137.2	315.1	444.3	548.3	604.7	609.5	591.9	533.3	417.8	295.6	199.3	91.4	22.2	1.2	0.0	0.0	0.0	Diurnal Average	
	0	0	0	0	8	43	127	253	484	660	805	854	872	866	748	670	510	384	224	58	6	0	0	0	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Global Radiation (GR) - W/m2

Conklin Lookout - August 2015



Concentration Ranges (W/m2)	Number of Hours	%	Cumulative %
0 - 20	323	43.41	43.41
21 - 100	100	13.44	56.85
101 - 300	105	14.11	70.97
301 - 600	108	14.52	85.48
601 - 900	108	14.52	100.00
> 900	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Conklin Lookout - August 2015

Maximum Speed: 17 km/h on Aug 19 10:00

Maximum Daily Speed Average: 9.7 km/h on Aug 20

Minimum Speed Value: 0 km/h on Aug 8 00:00

Minimum Daily Speed Average: 1.4 km/h on Aug 26

Maximum Diurnal Speed Average: 4.1 km/h at hour 5

Minimum Diurnal Speed Average: 1.6 km/h at hour 20

Monthly Average Velocity: 3.0 km/h 245.1 deg

Percentiles: $P_1 = 1$ $P_{10} = 3$ $Q_1 = 4$ Median = 6 $Q_3 = 9$ $P_{90} = 11$ $P_{99} = 14$

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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	SSW6	SSW7	SW6	SW3	W5	SSW2	ESE1	NW3	NNW2	NNE3	N4	WNW5	NNW4	NW4	NE6	NNE7	NNE2	ENE4	ENE3	SW4	SW5	WSW3	W4	W5	WNW1.4	SSW7
2-Aug	W6	W5	WNW5	WNW5	W4	NW2	S2	WSW2	ESE4	ESE4	ENE3	W1	ESE2	SW2	SW5	SSW7	WSW5	SW5	SSW4	SW0	SSE1	SE4	SSW6	SSW6	SW2.1	SSW7
3-Aug	SSW6	SSW6	NW1	SE2	S4	SSW5	SSW6	S3	SE3	SSW5	SW6	SW2	SSE2	SE4	ESE3	ESE4	S2	SSE4	E6	E5	E5	E5	E5	E5	SSE2.6	SSW6
4-Aug	ENE6	ESE5	ENE7	E7	ESE9	ESE8	SE7	ESE6	ESE9	SE9	SE7	SSE8	SE7	SE7	SSE7	SSE9	SSE8	SE8	ESE8	E6	E5	NE4	E5	E5	ESE6.1	ESE9
5-Aug	E4	E4	ENE5	ENE6	ENE6	ENE6	E7	E8	E10	E9	E9	E9	E10	E8	E9	E10	E10	ESE9	ESE8	ESE9	ESE9	SE10	ESE8	SE6	E7.5	SE10
6-Aug	SE7	SE6	SE6	SE5	SE5	SE6	SE6	SE6	SE5	SE5	ESE4	E6	ESE6	ESE5	E4	ENE7	ENE7	E8	ENE6	ENE6	ENE4	ENE4	NE5	NE4	ESE4.8	E8
7-Aug	NE4	NNE4	NE3	ENE3	E2	NE4	NE4	ENE4	ENE4	ENE4	ENE4	ENE4	ENE5	ENE6	ENE6	E6	E2	SW4	NW2	NW2	N1	ENE1	ESE2	SE0	ENE2.8	ENE6
8-Aug	SSW5	SSW6	SSW6	SSW6	SSW6	SSW7	SSW6	SSW6	SSW6	SSE4	SSE6	WSW4	W4	WSW9	WSW5	WSW3	WSW4	NNE2	ENE4	E1	SE3	SSW5	SW5	SSW3	SSW3.8	WSW9
9-Aug	SSW5	SW5	SW7	SW4	WSW4	S1	SE1	NE3	E4	E4	ESE3	E5	E4	ENE4	E4	ESE6	E5	SE7	SSE4	S3	SSE3	SSE5	S5	WSW7	SSE2.2	SW7
10-Aug	NW4	WSW7	WSW6	SSE4	SSW7	W2	W4	WNW7	W5	W5	WSW5	W6	SW6	SW7	WSW7	WSW8	SW8	SSW9	SW7	SSW8	SSW6	SSW7	SSW8	SSW8	SW5.5	SSW9
11-Aug	SSW9	SSW10	SSW10	SSW11	SW12	SW11	SW10	WSW7	W6	W8	W7	WSW8	WSW10	SW11	WSW12	WSW15	WSW13	WSW12	WSW9	WSW8	W7	WSW6	W6	WSW6	WSW8.8	WSW15
12-Aug	SW6	SW8	SW7	SW8	SW9	WSW10	WSW10	WSW10	WSW9	WSW10	W13	WNW13	W12	WNW12	W11	W11	W9	W6	W7	W5	WSW6	W7	WSW6	SW6	WSW8.4	W13
13-Aug	SW6	SW9	WSW9	WSW8	WSW8	SW6	SW7	WSW7	SSW6	SSW7	SSW4	S4	SE3	E3	N1	N5	N4	NW4	NW4	NNE4	S1	SW6	SW10	SSW12	SW3.8	SSW12
14-Aug	WSW12	W13	W13	W13	W12	WNW10	WNW9	WNW9	WNW9	WNW11	WNW11	WNW11	WNW12	WNW12	WNW12	W12	WNW10	WNW10	W7	W6	WSW2	WNW4	WNW4	W3	W9.2	W13
15-Aug	W3	WNW4	WNW5	WNW6	WNW5	NW5	NW3	NW4	NW5	NW5	NW5	NNW5	NNW6	NNW6	N6	NW6	NW6	NW5	WNW4	WNW5	WNW5	WNW6	WNW5	WNW6	NW4.8	NW6
16-Aug	WNW6	WNW5	WNW5	WNW5	WNW6	WNW5	NW4	WNW5	WNW6	WNW7	NW5	WNW6	WNW8	WNW8	WNW7	WNW6	NNW5	W5	WNW1	WSW6	WSW9	WSW8	W8	W8	WNW5.6	WSW9
17-Aug	W8	W7	WSW7	W7	W6	WSW6	SW7	SSW8	SW7	SW8	SW8	SW8	SW8	SW9	SW8	SSW12	SSW7	SSW9	SSW10	SW9	SW9	SW8	SW7	W9	SW7.5	SSW12
18-Aug	W9	WNW7	WNW8	WNW9	WNW10	WNW10	WNW9	NW8	WNW8	WNW7	WNW8	WNW7	WNW6	W6	W8	W7	WSW5	WSW6	WSW5	SW5	SW6	SW7	SW7	SSW8	W6.3	WNW10
19-Aug	SSW8	SSW9	SSW8	SSW9	S8	S9	S11	SSW13	SSW16	SSW17	SW14	SW14	SW16	SW15	WSW10	SW13	W16	WNW11	WSW7	W10	W11	W8	W11	W10	SW9.7	SSW17
20-Aug	W8	WSW7	WSW9	W10	W11	WSW10	W10	W12	WNW12	WNW12	W13	WNW12	W12	W12	W14	W12	W11	WNW9	W7	WNW6	WNW8	WNW7	W8	WNW8	W9.7	W14
21-Aug	WNW8	WNW9	W8	W9	WNW8	WNW8	WNW7	WNW9	NW8	NW8	WNW10	WNW10	WNW11	WNW10	NW9	NW6	NW6	NW7	NW5	WNW6	WNW8	WNW9	WNW8	WNW8	WNW7.9	WNW11
22-Aug	WNW8	WNW8	WNW7	W8	W8	W9	W9	WNW10	WNW10	NW10	NW8	WNW9	WNW8	WNW8	WNW8	WNW6	NW7	WNW7	WNW4	WSW2	W2	W3	W3	SW5	WNW6.6	WNW10
23-Aug	SW7	SW7	SW8	SW8	SW9	SSW8	SSW9	SSW9	S6	SSW8	SSW10	SSW11	SSW12	SSW12	SSW11	SSW10	SSW9	S7	S4	SSE4	SSE6	S8	SSW9	SSW10	SSW8.2	SSW12
24-Aug	SSW11	SSW11	W5	SW4	SSW3	SSE4	SSE4	SSW5	SSW8	SW6	W2	NNW6	N5	NW4	NNW4	NNW4	NNE5	N2	SW1	NNW1	NNW1	N3	N3	NW2	WSW1.5	SSW11
25-Aug	NNW2	NNW3	N3	N4	NNW3	NNW3	NNE5	NE7	NNE7	NNE6	NE7	NE9	NE9	NE8	NE7	ENE8	NE8	NE6	NNE5	NNE6	NNE7	NNE6	NNE4	N4	NNE5.3	NE9
26-Aug	NNW3	NNE5	ENE5	ENE4	N3	NNE4	NNE6	NE7	ESE5	ESE5	E4	ENE3	NE1	NW2	WNW3	W3	SW5	WSW3	NW3	N2	NE3	ESE3	SSE2	SSW4	NE1.4	NE7
27-Aug	SSW5	NW2	NNW3	N3	E2	SSE2	SSW5	SSW6	SSW5	SSW4	WSW7	SSW8	SSW10	SW11	SW14	SW13	SW13	SW11	SW10	SW9	SW10	SW9	SW9	SW8	SW6.7	SW14
28-Aug	SW9	SW9	SW10	WSW9	SW10	SW11	SW11	SW9	SW10	WSW9	WSW11	W12	W11	WSW11	WSW11	SW10	WSW6	W3	NW1	N1	ESE3	ESE4	N3	N6	WSW6.6	W12
29-Aug	NNE3	NNE6	NNW4	NE6	NNE2	NNE3	NNW3	NNW4	W2	S2	S3	S3	S3	SSE3	SSE4	SSE5	SE4	SSE4	ESE5	SE8	SE9	ESE10	ESE11	ESE9	ESE2.7	ESE11
30-Aug	SE7	SE5	SSE4	SSW5	SW9	WSW14	W13	WSW10	W9	W8	NW5	NNW4	SW1	SSW4	SW9	SW6	W13	WNW8	WNW7	WNW5	SW4	SW7	SW7	WSW5	WSW5.2	WSW14
31-Aug	WSW5	SW7	SW7	SW8	SW9	SW10	SW11	WSW10	W9	W5	WSW4	WSW7	W10	WSW12	WSW12	WSW12	WNW4	W3	SSE0	W3	NW2	SSE1	S4	S4	WSW5.9	WSW12
	SW3.6	WSW3.8	WSW3.6	WSW3.2	WSW4.1	WSW3.6	WSW3.4	WSW3.2	WSW2.9	WSW2.8	W2.9	W3.2	WSW3.1	WSW3.7	WSW3.7	WSW3.5	WSW3.1	WSW2.6	WSW1.6	WSW1.6	SW1.9	SW2.2	SW2.7	SW3.3	Diurnal Average	
	WSW12	W13	W13	W13	SW12	WSW14	W13	SSW13	SSW16	SSW17	SW14	SW14	SW16	SW15	SW14	WSW15	W16	WSW12	SSW10	W10	W11	ESE10	W11	SSW12	Diurnal Maximum	

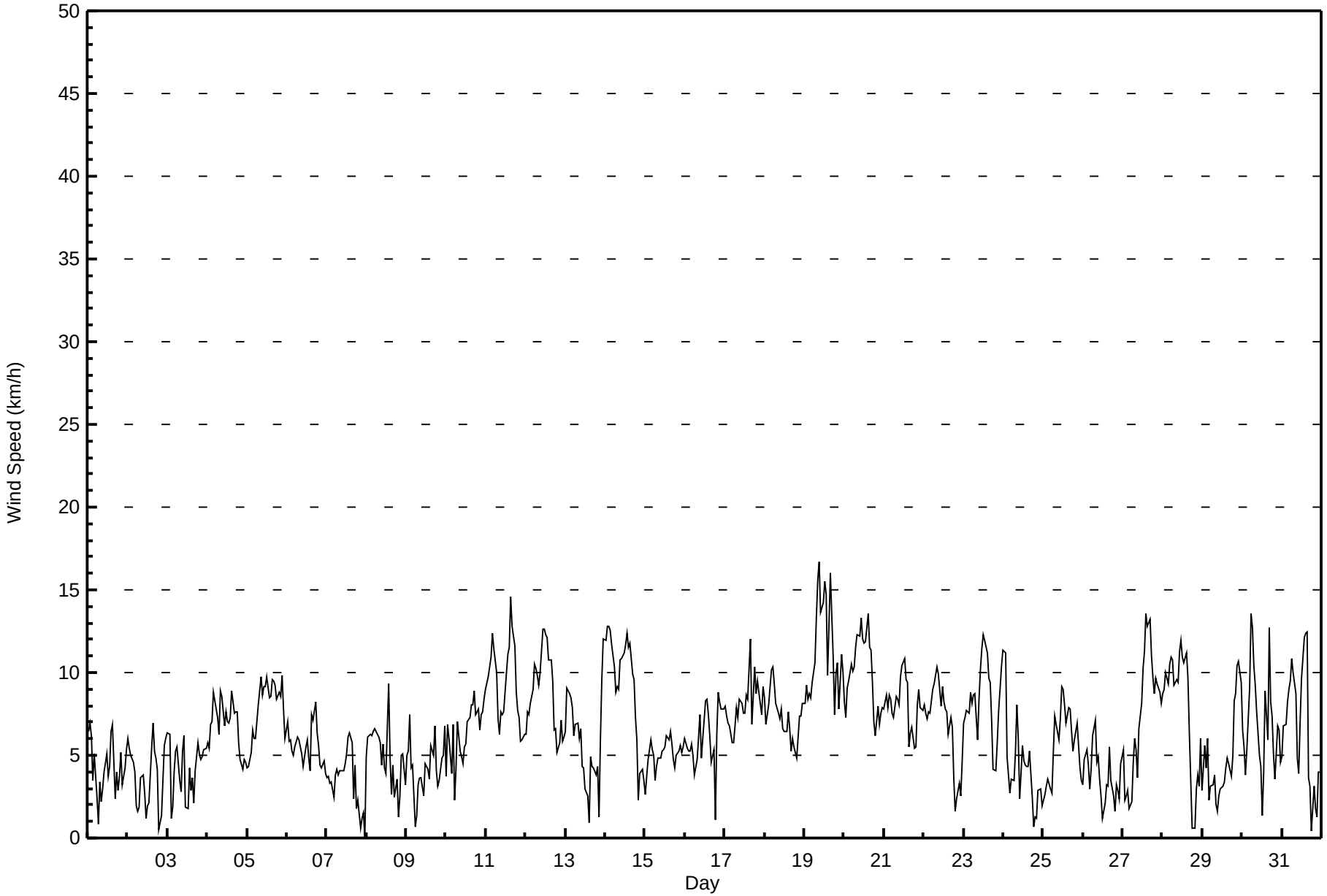
All monthly, daily, and diurnal averages have been calculated using vector methods

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed (WS) - km/h

Conklin Lookout - August 2015



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	297	39.92	39.92
6 - 11	397	53.36	93.28
12 - 19	50	6.72	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: 744

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Wind Speed (WS) - km/h

Conklin Lookout - August 2015

Wind Speed Ranges (km/h)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 5	15	16	8	20	23	17	14	21	15	18	19	17	25	23	27	19	297
6 - 11	2	8	11	13	16	15	18	6	6	56	69	46	48	71	9	3	397
12 - 19	0	0	0	0	0	0	0	0	0	7	9	9	17	8	0	0	50
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	17	24	19	33	39	32	32	27	21	81	97	72	90	102	36	22	744

Total Number of Valid Hours: 744

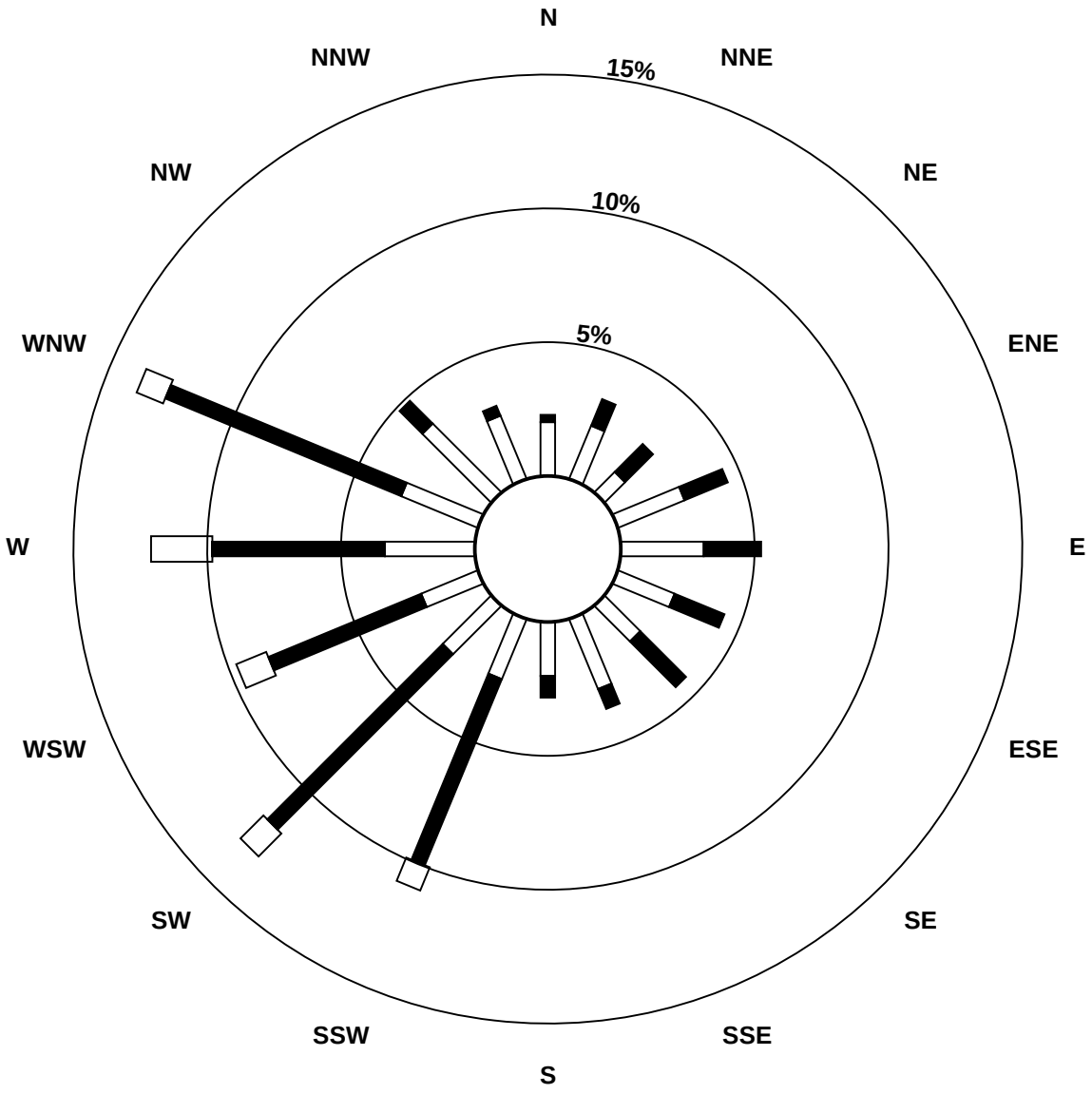
Total Number of Hours: 744

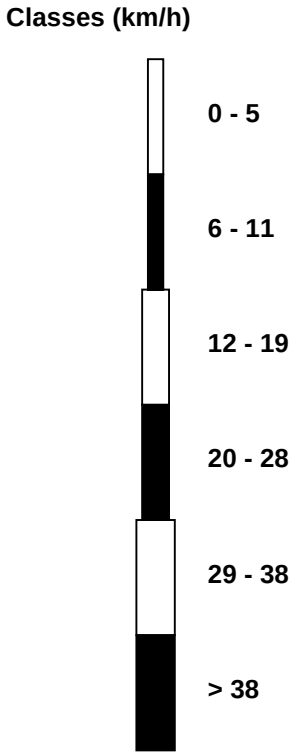
Wood Buffalo Environmental Association

Wind Rose Aug 2015

Wind Speed (WS) - km/h

Conklin Lookout (AMS 18)





Total Number of Valid Hours: 744

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Speed (WS) - km/h

Conklin Lookout - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 9 km/h on Aug 19 17:00

Minimum Value: 0 km/h on Aug 22 23:00

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
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Aug	1	1	2	2	2	2	1	1	1	1	2	2	2	2	3	3	2	3	2	1	1	1	1	1	3
2-Aug	1	1	1	1	1	2	1	1	1	1	1	2	2	2	2	2	3	2	1	1	1	1	1	1	3
3-Aug	1	1	1	1	1	1	1	1	1	3	2	1	1	1	1	1	2	1	2	1	1	1	2	2	3
4-Aug	2	2	2	3	3	3	3	3	3	3	3	3	2	2	3	4	3	3	3	2	2	1	2	1	4
5-Aug	1	2	2	2	2	2	3	3	4	4	3	4	4	3	4	4	4	4	3	3	3	3	3	2	4
6-Aug	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	2	2	1	2	1	1	3
7-Aug	1	1	1	1	1	1	1	1	2	1	2	1	3	3	2	3	2	1	1	1	2	1	1	1	3
8-Aug	2	1	1	1	1	1	1	2	2	2	3	3	2	4	4	2	2	1	2	1	1	1	1	1	4
9-Aug	2	2	1	2	1	1	1	1	1	1	2	2	2	2	1	2	2	4	1	1	1	2	2	2	4
10-Aug	1	6	3	2	2	1	2	2	2	2	2	2	3	3	3	3	3	3	2	2	1	1	1	2	6
11-Aug	2	2	2	3	3	3	3	2	2	3	3	4	4	4	4	5	5	5	3	2	2	2	2	2	5
12-Aug	2	2	2	2	2	3	3	3	3	4	4	5	5	5	4	4	3	2	2	2	1	2	2	1	5
13-Aug	2	2	2	3	2	2	2	2	2	2	2	2	2	2	2	3	2	2	2	2	1	1	4	4	4
14-Aug	4	4	4	4	4	4	3	3	4	4	4	4	4	5	5	5	4	4	3	2	1	1	1	1	5
15-Aug	1	1	1	2	2	2	1	2	2	2	2	2	3	3	3	3	3	2	2	2	2	2	2	2	3
16-Aug	2	1	1	1	2	1	1	2	2	2	2	3	3	3	3	3	3	2	1	2	2	3	2	2	3
17-Aug	2	2	2	2	1	1	1	2	2	3	3	3	3	3	3	5	3	2	3	2	3	2	2	3	5
18-Aug	3	2	2	3	3	3	3	3	3	3	3	3	3	2	3	3	2	3	2	1	1	1	2	2	3
19-Aug	2	2	2	3	3	3	3	4	5	5	4	5	5	5	5	6	9	5	3	3	4	3	4	3	9
20-Aug	3	2	3	3	4	3	4	4	4	5	5	4	4	5	5	4	4	4	3	3	3	2	2	3	5
21-Aug	2	3	2	3	3	2	2	3	3	3	3	4	5	3	4	3	3	3	2	2	2	3	3	2	5
22-Aug	3	2	2	2	3	3	3	3	4	4	3	4	4	3	3	3	4	3	2	1	1	1	0	2	4
23-Aug	1	1	1	2	2	2	2	3	2	3	4	4	4	4	4	3	4	3	2	1	2	2	3	3	4
24-Aug	3	3	3	1	2	1	1	2	3	3	2	2	2	2	2	2	2	1	1	1	1	1	1	1	3
25-Aug	1	1	1	2	1	1	2	2	2	2	2	3	3	3	3	3	3	2	2	3	2	2	2	1	3
26-Aug	1	2	1	1	1	1	2	2	2	2	2	2	2	2	2	1	2	1	1	1	1	1	0	1	2
27-Aug	1	1	1	1	1	0	1	1	1	1	3	3	4	4	5	4	4	4	3	2	3	2	2	2	5
28-Aug	1	2	2	3	2	2	2	2	3	3	4	5	4	4	4	3	3	1	1	1	1	1	2	4	5
29-Aug	2	2	4	2	1	1	1	1	1	1	2	2	2	2	2	2	2	1	2	3	3	3	4	3	4
30-Aug	2	2	1	2	3	5	4	4	3	3	2	2	3	2	3	3	8	4	2	3	1	2	1	1	8
31-Aug	1	1	2	2	2	2	3	3	3	2	1	3	4	5	5	5	2	2	1	6	1	2	1	1	6
	4	6	4	4	4	5	4	4	5	5	5	5	5	5	5	6	9	5	3	6	4	3	4	4	
	Diurnal Maximum																								

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Conklin Lookout - August 2015

Direction of Maximum Speed: 206 deg on Aug 19 10:00
Direction of Maximum Daily Speed Average: 274.5 deg on Aug 20

Direction of Minimum Speed: 143 deg on Aug 8 00:00

Direction of Minimum Daily Speed Average: 1.4 deg on Aug 26

Monthly Average Direction: 258.9 deg

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
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average
1-Aug	208	213	223	228	264	212	102	313	345	12	11	303	335	316	36	33	27	76	65	215	234	258	267	271	283.0
2-Aug	277	281	289	295	274	313	175	247	118	112	69	265	116	220	217	206	237	236	210	219	148	144	200	202	226.9
3-Aug	204	200	323	134	191	194	195	189	128	197	214	218	154	132	107	111	181	165	84	84	92	85	98	88	151.2
4-Aug	71	106	70	92	117	114	131	106	118	128	129	150	132	144	153	157	151	137	120	96	87	56	88	98	119.0
5-Aug	92	90	69	72	71	76	79	79	81	85	79	83	85	85	96	101	100	112	118	110	117	125	123	134	95.1
6-Aug	134	133	129	125	139	139	144	138	138	133	123	99	108	117	87	62	72	88	76	65	76	77	47	50	105.2
7-Aug	38	33	46	61	85	53	56	77	62	71	59	62	66	70	60	79	92	224	325	321	11	66	121	143	61.5
8-Aug	206	206	203	205	212	210	206	198	197	167	154	253	269	242	243	257	244	29	60	82	143	203	222	209	210.7
9-Aug	204	222	219	227	246	179	130	49	86	99	107	94	98	76	86	102	85	130	148	179	165	159	181	255	150.3
10-Aug	311	251	254	150	207	273	271	284	268	268	246	272	229	232	255	237	225	211	216	209	207	209	207	206	233.4
11-Aug	208	207	210	212	218	222	228	246	261	274	272	242	248	229	246	246	248	252	251	246	270	237	265	243	238.9
12-Aug	233	221	227	232	232	249	250	253	251	255	278	286	275	282	269	263	272	266	272	267	255	276	255	229	258.5
13-Aug	230	234	244	251	254	229	230	237	210	196	196	172	142	90	359	2	355	310	314	32	172	214	218	210	231.3
14-Aug	242	261	266	271	274	285	290	294	284	284	288	289	290	289	288	279	286	293	281	274	253	291	298	280	280.1
15-Aug	278	291	294	298	302	309	321	307	306	317	323	327	345	336	351	309	322	309	303	302	297	298	298	296	311.0
16-Aug	296	297	293	292	292	298	311	301	290	295	309	295	291	297	294	290	341	273	285	237	242	251	267	263	284.9
17-Aug	271	266	258	263	265	237	216	212	221	232	236	227	235	228	219	210	196	211	209	217	233	231	233	261	231.5
18-Aug	268	283	284	287	292	296	300	305	297	296	296	300	283	264	263	263	255	243	237	215	217	216	214	212	270.4
19-Aug	208	207	204	195	188	184	189	196	200	206	214	227	218	224	243	234	269	295	254	261	280	259	274	272	228.1
20-Aug	265	244	240	262	262	252	266	279	291	292	280	287	274	275	267	275	280	282	280	291	284	287	278	287	274.5
21-Aug	289	283	281	281	284	286	284	287	304	308	292	296	295	302	304	304	310	312	321	301	292	293	296	299	295.2
22-Aug	295	294	290	279	274	275	281	291	297	305	309	300	300	299	300	302	304	291	285	250	264	274	262	228	290.3
23-Aug	224	219	215	218	217	212	212	204	180	192	205	199	196	210	211	202	197	184	179	158	168	188	192	195	201.2
24-Aug	196	198	260	218	203	158	161	200	211	234	278	331	352	326	339	338	18	360	224	347	330	4	1	326	251.3
25-Aug	336	335	356	2	345	332	21	41	31	28	36	44	46	42	53	59	55	40	31	26	26	20	14	354	30.7
26-Aug	346	12	62	77	355	12	29	53	110	103	83	59	46	321	290	279	214	247	306	349	34	102	160	196	42.8
27-Aug	207	315	337	0	91	165	197	199	203	203	240	212	212	218	215	223	229	226	226	220	227	236	223	223	221.1
28-Aug	218	230	232	242	219	217	222	222	235	256	254	266	260	246	237	229	256	273	317	351	112	104	352	357	240.0
29-Aug	26	32	343	50	14	16	342	338	267	177	179	191	190	154	147	148	132	148	122	126	127	122	117	116	114.6
30-Aug	128	127	152	201	231	257	266	258	268	277	315	335	230	210	231	232	261	302	292	282	230	222	221	250	251.0
31-Aug	257	225	219	218	221	215	214	247	272	264	248	249	259	245	239	239	298	273	152	265	312	157	169	175	237.8
	235.8	237.0	246.4	243.6	241.5	241.1	238.7	250.4	246.3	249.8	261.7	267.7	256.5	251.9	252.0	243.0	257.5	251.5	241.8	237.7	231.0	222.3	228.9	234.6	
	Diurnal Average																								

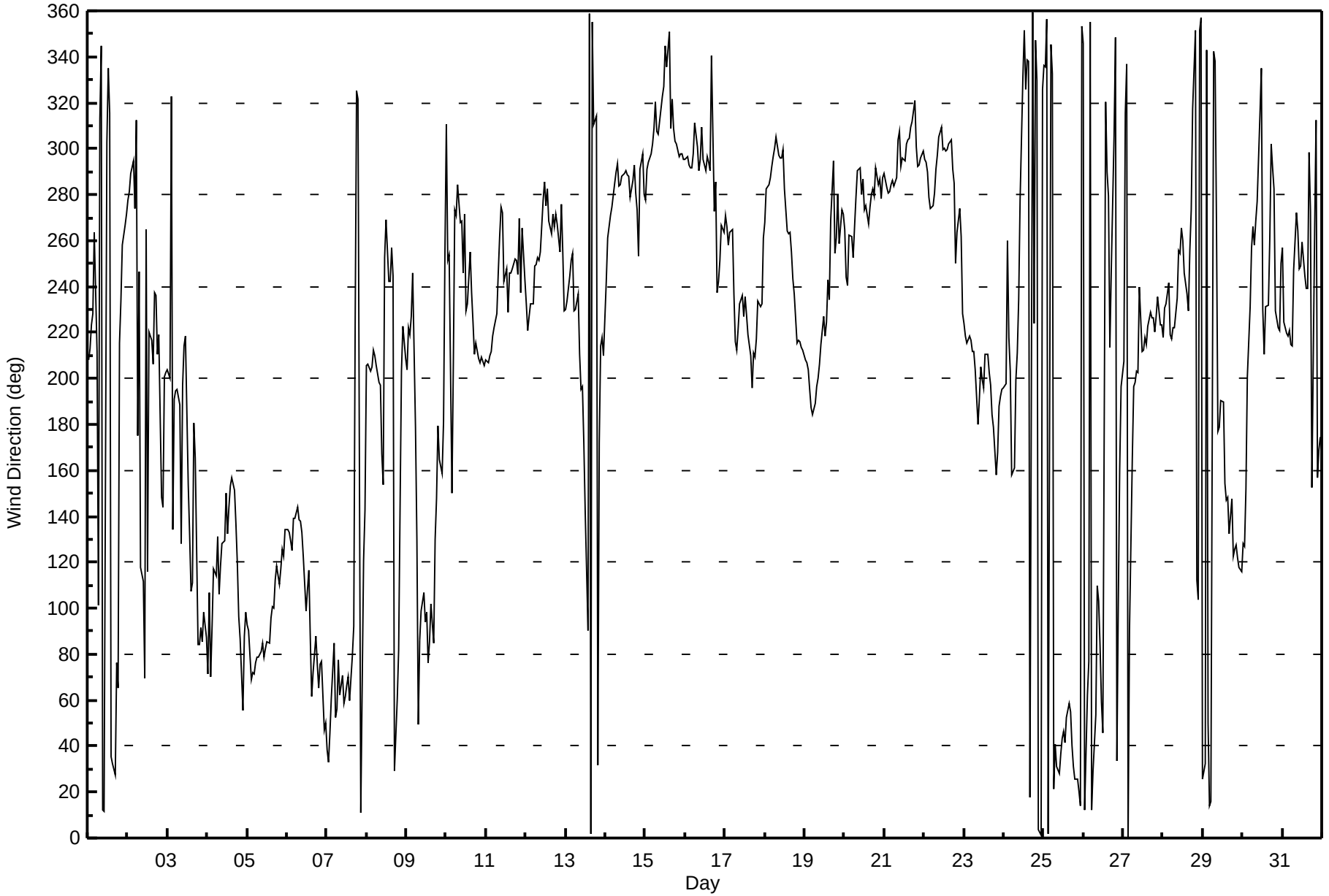
All monthly, daily, and diurnal averages have been calculated using vector methods

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction (WD) - deg

Conklin Lookout - August 2015



Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg

Conklin Lookout - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 106 deg on Aug 2 12:00

Minimum Value: 10 deg on Aug 27 00:00

Percentiles: P_1 = 12 P_{10} = 19 Q_1 = 25 Median = 31 Q_3 = 41 P_{90} = 63 P_{99} = 96

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Aug	12	14	30	55	41	60	75	34	82	70	54	50	59	61	45	35	70	71	68	19	16	23	19	21	82
2-Aug	21	20	17	16	22	38	49	78	32	40	81	106	97	87	44	27	36	38	20	91	68	23	12	10	106
3-Aug	12	13	61	70	16	18	18	30	39	36	27	91	75	31	41	48	82	40	24	23	25	24	23	25	91
4-Aug	25	33	29	26	22	24	46	45	24	23	29	34	31	30	36	36	30	27	23	30	26	24	25	26	46
5-Aug	29	31	26	27	24	29	32	31	32	33	30	30	32	30	30	35	30	30	29	27	28	27	26	27	35
6-Aug	30	27	26	26	29	28	30	33	36	38	50	49	41	58	67	32	32	34	30	25	28	25	29	24	67
7-Aug	22	24	26	30	32	18	24	29	34	35	53	39	53	46	42	49	75	26	42	27	89	74	48	90	90
8-Aug	23	15	14	14	15	15	17	19	37	54	63	71	54	28	65	62	46	74	31	53	54	12	12	38	74
9-Aug	20	30	15	45	49	92	59	25	39	46	81	56	65	39	41	37	32	45	25	23	26	32	33	40	92
10-Aug	25	42	54	52	22	71	44	30	38	40	54	56	50	42	40	35	34	24	20	17	12	14	15	15	71
11-Aug	16	18	18	18	21	19	20	32	32	33	32	31	39	30	34	32	32	34	28	26	28	32	30	29	39
12-Aug	22	17	18	23	24	30	30	32	32	36	31	33	36	33	36	32	32	30	29	29	23	28	34	17	36
13-Aug	25	21	25	28	31	28	23	24	24	31	58	72	90	78	98	57	65	65	64	38	66	18	25	22	98
14-Aug	29	32	32	29	32	29	27	34	32	34	41	40	37	35	38	39	36	35	32	28	42	48	32	59	59
15-Aug	67	52	31	28	29	36	40	47	43	59	63	64	65	62	62	54	67	60	61	41	33	35	31	32	67
16-Aug	27	28	27	24	25	25	34	38	32	37	61	49	40	40	45	53	67	38	93	21	25	29	30	28	93
17-Aug	26	29	27	26	22	21	14	17	28	36	38	46	44	39	33	27	27	20	21	21	24	22	25	29	46
18-Aug	32	26	24	23	23	24	24	28	32	41	42	59	58	47	36	41	38	27	21	12	14	15	15	18	59
19-Aug	18	18	19	20	29	31	25	23	25	23	25	27	27	28	33	32	36	33	32	31	32	32	33	28	36
20-Aug	30	25	26	31	34	31	35	34	33	35	33	34	34	33	34	32	33	34	40	39	30	32	30	33	40
21-Aug	27	27	28	29	29	30	32	35	40	48	36	35	42	41	46	73	57	55	64	43	29	28	29	28	73
22-Aug	28	30	28	27	34	29	30	29	35	46	47	49	50	46	44	57	58	40	51	27	20	10	17	17	58
23-Aug	12	13	14	14	16	17	19	22	30	31	32	34	32	31	32	32	36	40	37	38	39	31	23	22	40
24-Aug	20	21	47	37	54	24	34	39	31	49	87	55	64	66	60	60	45	77	90	49	48	20	29	36	90
25-Aug	23	30	37	28	15	20	25	20	26	29	27	32	33	39	35	28	30	22	17	22	18	21	26	23	39
26-Aug	22	23	17	24	46	24	24	24	41	40	65	96	105	94	67	49	23	29	47	27	28	28	19	10	105
27-Aug	12	45	22	24	46	22	12	15	21	64	46	37	35	34	29	27	27	24	24	20	20	23	19	16	64
28-Aug	16	19	20	25	19	18	18	19	27	34	33	35	37	35	34	35	33	20	69	89	19	13	59	50	89
29-Aug	59	37	51	38	61	39	29	35	64	83	80	80	79	72	68	57	38	32	21	26	25	26	24	23	83
30-Aug	28	19	31	21	25	31	30	34	32	40	61	65	103	80	29	29	42	29	23	31	35	24	14	22	103
31-Aug	19	16	12	16	19	20	21	34	30	33	51	49	40	37	31	34	63	48	85	98	72	102	25	25	102
	67	52	61	70	61	92	75	78	82	83	87	106	105	94	98	73	82	77	93	98	89	102	59	90	
	Diurnal Maximum																								

Wood Buffalo Environmental Association
SO2 Calibration Report

W B E A

Station Information

Calibration Date	July 2, 2015	Last Calibration	NA
Station Name	Conklin Lookout	Station Number	AMS 18
Reason:	Install		
Start Time (MST)	7:38	End Time (MST)	11:35
Gas Cert Reference	EY0000368	Station temp.	22 Deg C
Cal Gas Concentration	49 ppm	Cal Gas Exp Date	10/06/2016
Calibrator Make/Model	API T700	Serial Number	1222
ZAG Make/Model	API 701	Serial Number	5610
DACS make/model	Campbell Scientific CR3000	DACS serial No.	9035

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 1000 ppb		PMT voltage	NA	-602
Analyzer IP address	192.168.1.43		Lamp voltage	NA	880
Calculated slope	NA	0.996604	Chamber temp	NA	45.0
Calculated intercept	NA	-0.661207	Pressure	NA	661.6
Analyzer Background	NA	27.0	Flow	NA	0.461
Analyzer Coefficient	NA	0.991	Intensity	NA	86

Analyzer make	Thermo 43i	Analyzer serial #	JC1501301453

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero					
as found span					
calibrator zero	5000	0.0	0.0	0.1	----
high point	5000	58.7	575.3	578.1	0.995
second point	5000	29.3	287.1	287.5	0.999
third point	5000	14.6	143.1	145.9	0.981
as left zero	5000	0.0	0.0	-0.6	----
as left span	5000	58.7	575.3	572.5	1.005
				Average Correction Factor	0.992

Corrected As found	NA	Previous response	NA	% change	NA

Notes:

Installation calibration.

Calibration Performed By: Melissa Lemay

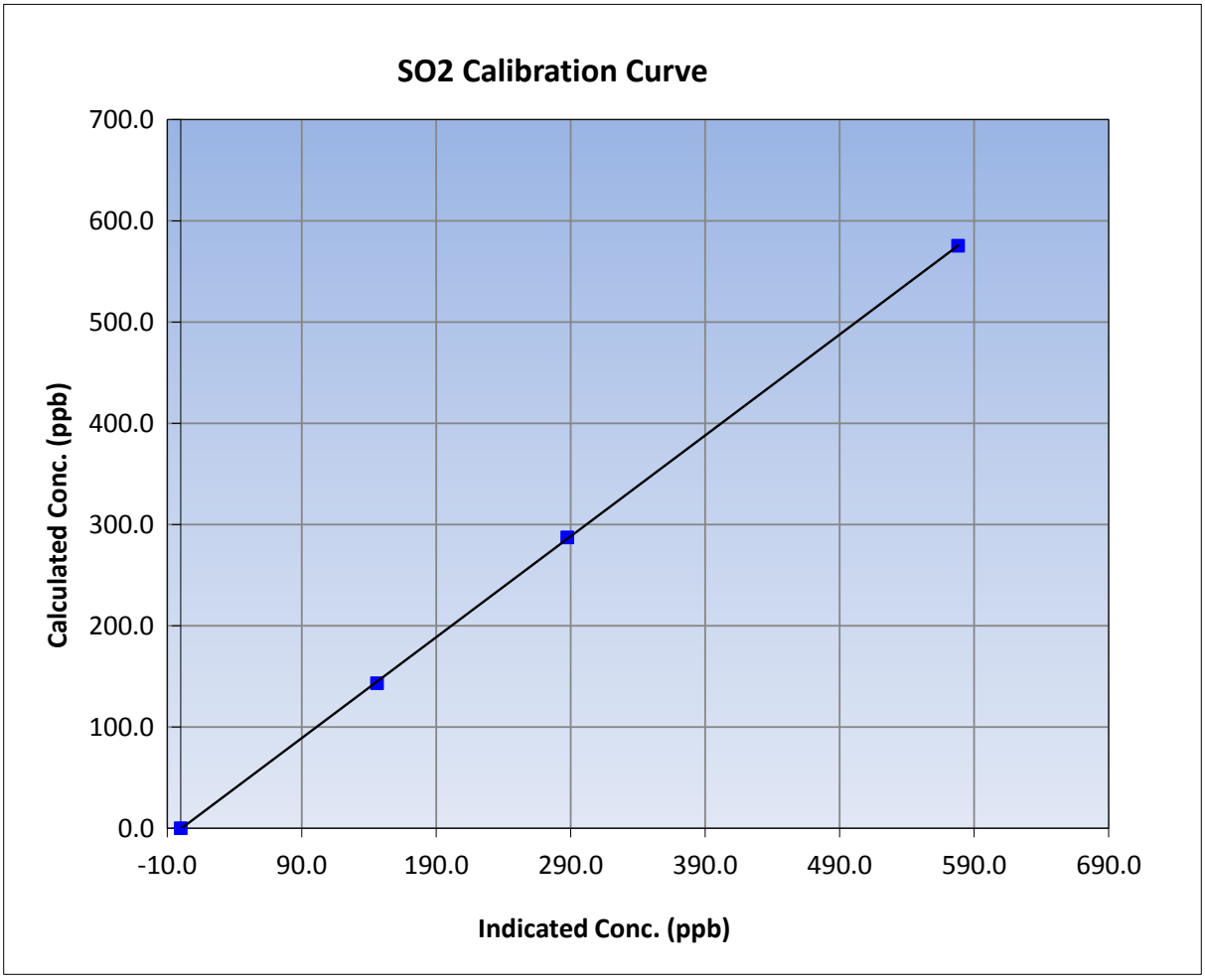
Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

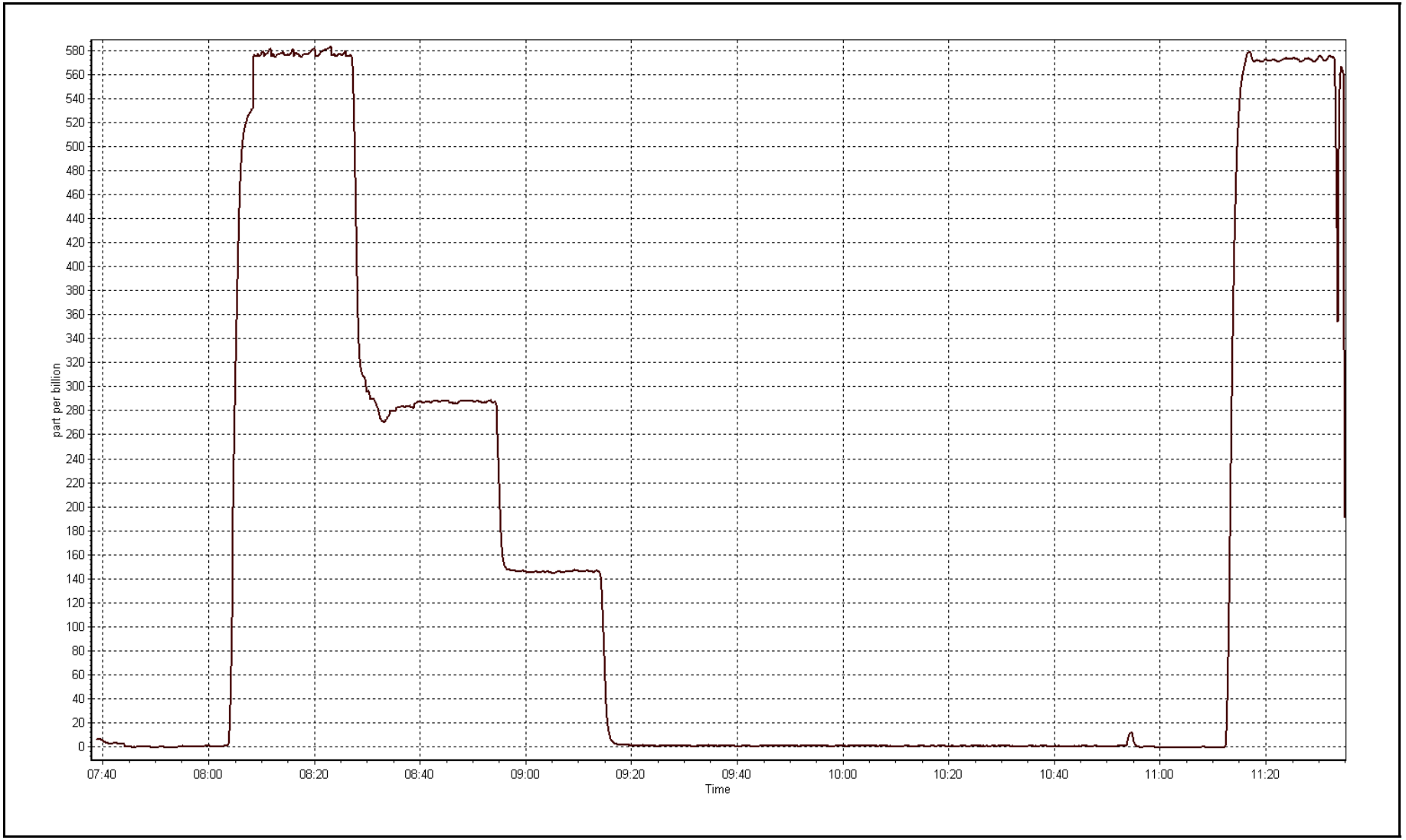
Calibration Date	July 2, 2015	Previous Calibration	NA
Station Name	Conklin Lookout	Station Number	AMS 18
Start Time (MST)	7:38	End Time (MST)	11:35
Analyzer make	Thermo 43i	Analyzer serial #	JC1501301453

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	0.999973
575.3	578.1	0.9951		
287.1	287.5	0.9987	Slope	0.996604
143.1	145.9	0.9807		
			Intercept	-0.661207



SO2 Calibration Plot Date: July 2, 2015



Wood Buffalo Environmental Association
SO2 Calibration Report

W B E A

Station Information

Calibration Date	July 29, 2015	Last Calibration	July 2, 2015
Station Name	Conklin Lookout	Station Number	AMS 18
Reason:	Routine		
Start Time (MST)	8:44	End Time (MST)	12:12
Gas Cert Reference	EY0000368	Station temp.	22 Deg C
Cal Gas Concentration	49 ppm	Cal Gas Exp Date	10/06/2016
Calibrator Make/Model	API T700	Serial Number	1222
ZAG Make/Model	API 701	Serial Number	5610
DACS make/model	Campbell Scientific CR3000	DACS serial No.	9035

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 1000 ppb		PMT voltage	-602	-602
Analyzer IP address	192.168.1.43		Lamp voltage	880	882
Calculated slope	0.996604	0.995667	Chamber temp	45.0	45.1
Calculated intercept	-0.661207	-1.280513	Pressure	661.6	658.4
Analyzer Background	27.0	24.9	Flow	0.461	0.438
Analyzer Coefficient	0.991	0.965	Intensity	86	86

Analyzer make	Thermo 43i	Analyzer serial #	JC1501301453

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-2.2	----
as found span	5000	58.6	574.3	589.4	0.974
calibrator zero	5000	0.0	0.0	-0.4	----
high point	5000	58.7	575.3	578.2	0.995
second point	5000	29.3	287.1	290.5	0.988
third point	5000	14.6	143.1	146.7	0.975
as left zero	5000	0.0	0.0	-0.2	----
as left span	5000	58.7	575.3	576.3	0.998
				Average Correction Factor	0.986

Corrected As found	591.6	Previous response	576.9	% change	-2.5%

Notes:

Zero drifted down, zero and span adjusted

Calibration Performed By: Melissa Lemay

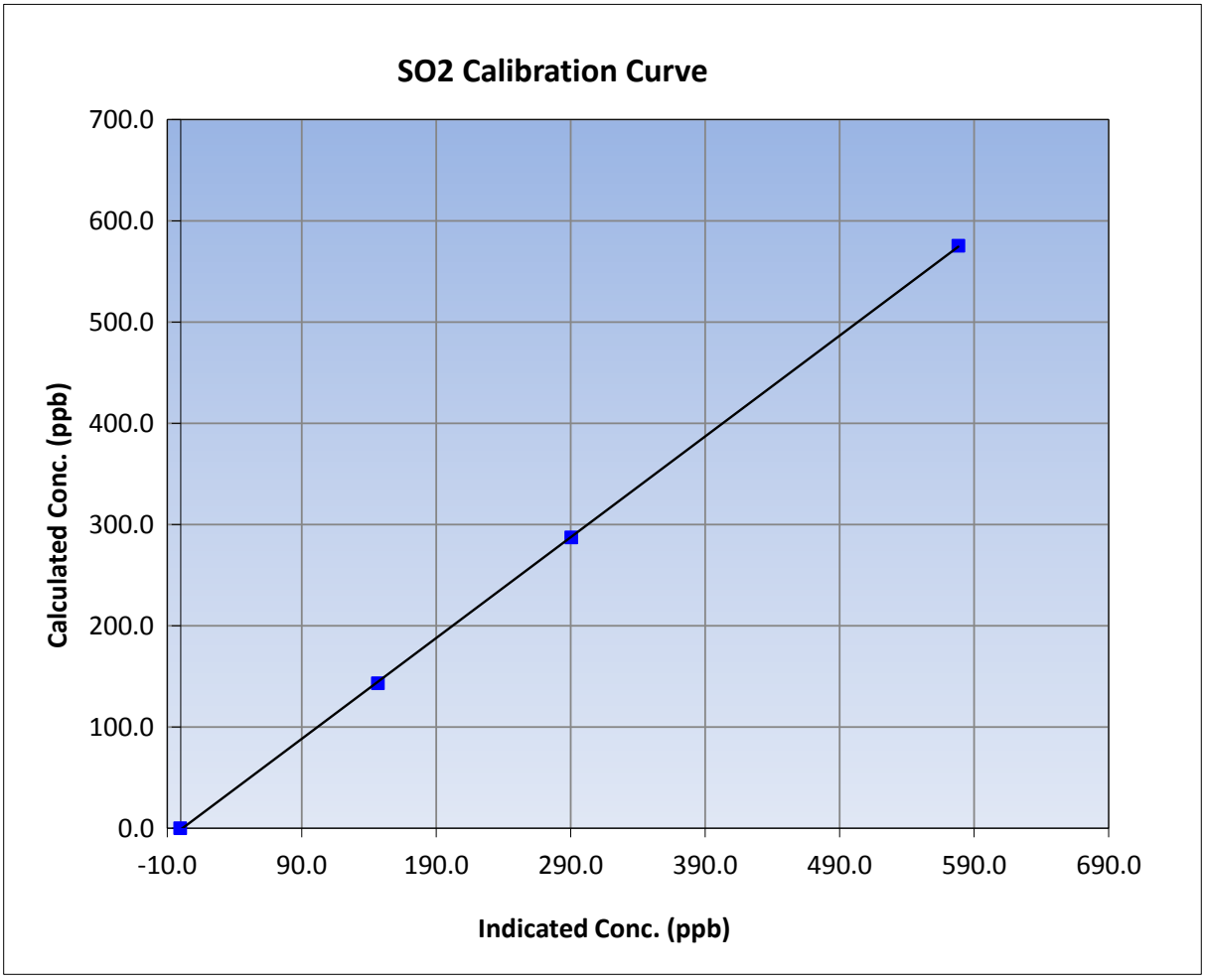
Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

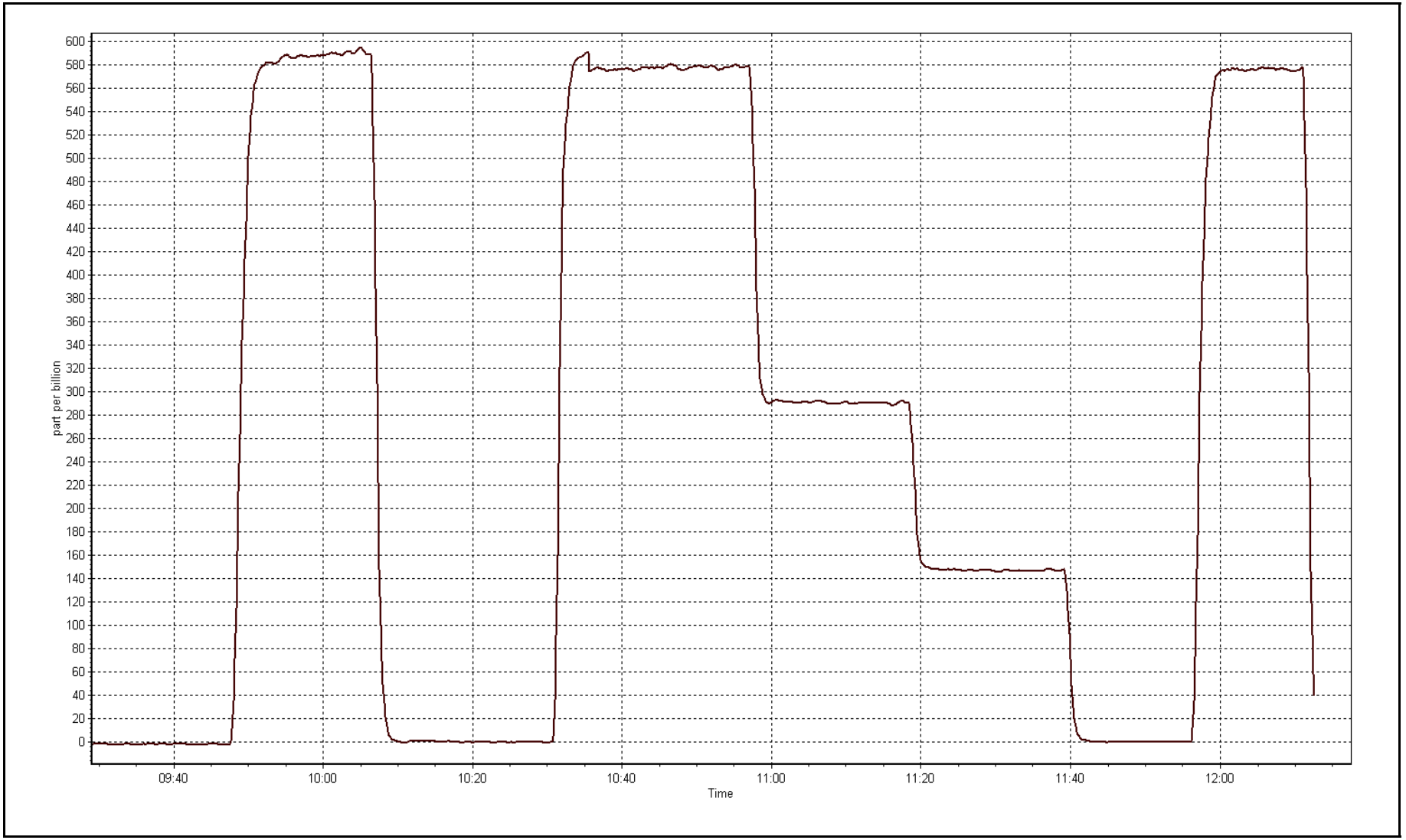
Calibration Date	July 29, 2015	Previous Calibration	July 2, 2015
Station Name	Conklin Lookout	Station Number	AMS 18
Start Time (MST)	8:44	End Time (MST)	12:12
Analyzer make	Thermo 43i	Analyzer serial #	JC1501301453

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.4	----	Correlation Coefficient	0.999961
575.3	578.2	0.9949		
287.1	290.5	0.9884	Slope	0.995667
143.1	146.7	0.9753		
			Intercept	-1.280513



SO2 Calibration Plot Date: July 29, 2015



Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

Calibration Date	August 11, 2015	Last Calibration	July 29, 2015
Station Name	Conklin Lookout	Station Number	AMS 18
Reason:	Routine		
Start Time (MST)	7:20	End Time (MST)	11:54
Gas Cert Reference	EY0000368	Station temp.	22 Deg C
Cal Gas Concentration	49 ppm	Cal Gas Exp Date	10/06/2016
Calibrator Make/Model	API T700	Serial Number	1222
ZAG Make/Model	API 701	Serial Number	5610
DACS make/model	Campbell Scientific CR3000	DACS serial No.	9035

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 1000 ppb		PMT voltage	-602	-601
Analyzer IP address	192.168.1.43		Lamp voltage	882	878
Calculated slope	0.995667	0.985015	Chamber temp	45.1	45.2
Calculated intercept	-1.280513	-1.901961	Pressure	658.4	658.7
Analyzer Background	24.9	24.5	Flow	0.438	0.436
Analyzer Coefficient	0.965	0.965	Intensity	86	86

Analyzer make	Thermo 43i	Analyzer serial #	JC1501301453

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.8	----
as found span	5000	58.6	574.3	582.0	0.987
calibrator zero	5000	0.0	0.0	0.4	----
high point	5000	58.7	575.3	585.4	0.983
second point	5000	29.3	287.1	293.5	0.978
third point	5000	14.6	143.1	149.2	0.959
as left zero	5000	0.0	0.0	-0.2	----
as left span	5000	58.7	575.3	586.7	0.981
				Average Correction Factor	0.973

Corrected As found	582.8	Previous response	578.1	% change	-0.8%

Notes:

zero adjusted, filter changed out, no maintenance done

Calibration Performed By: Melissa Lemay

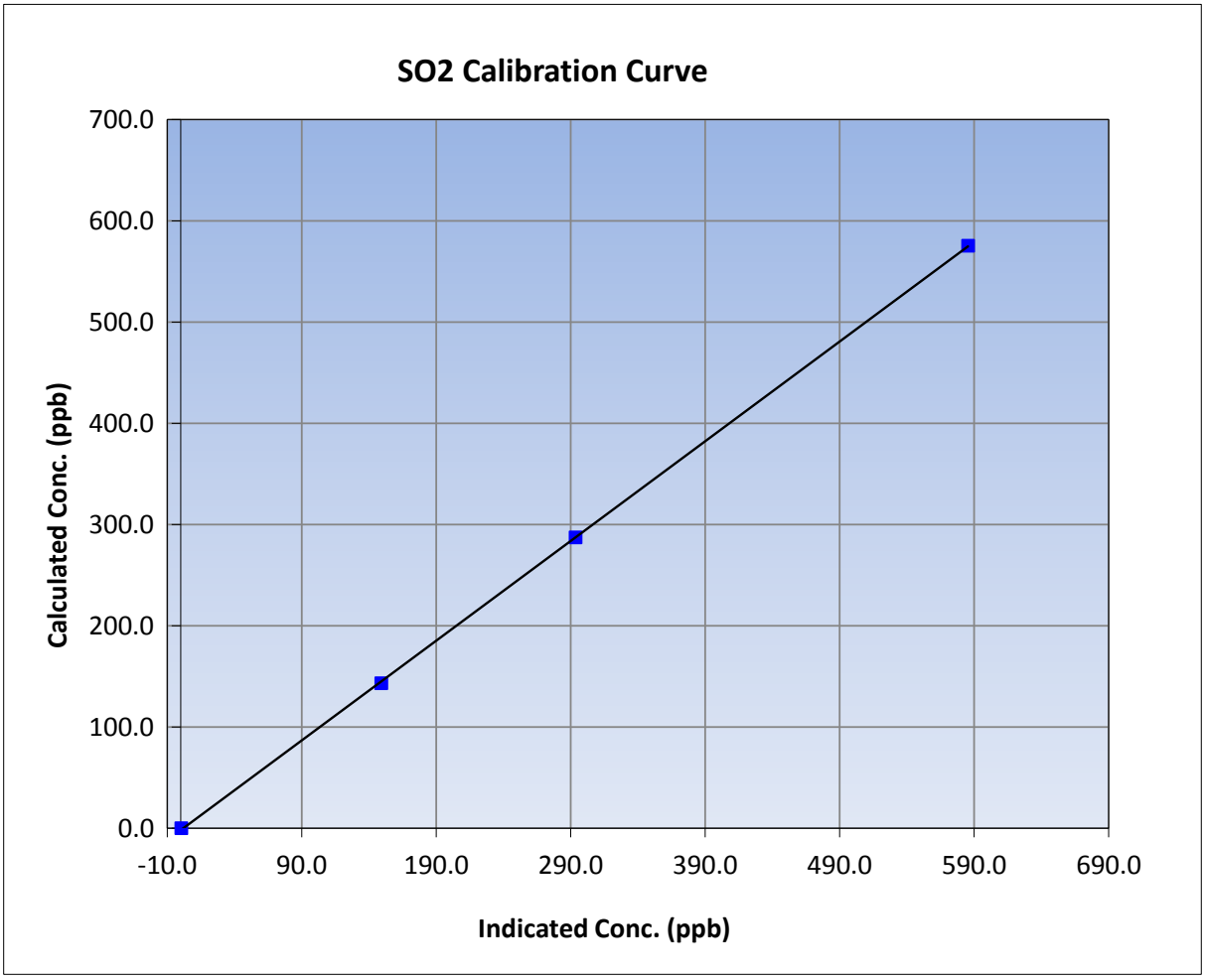
Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

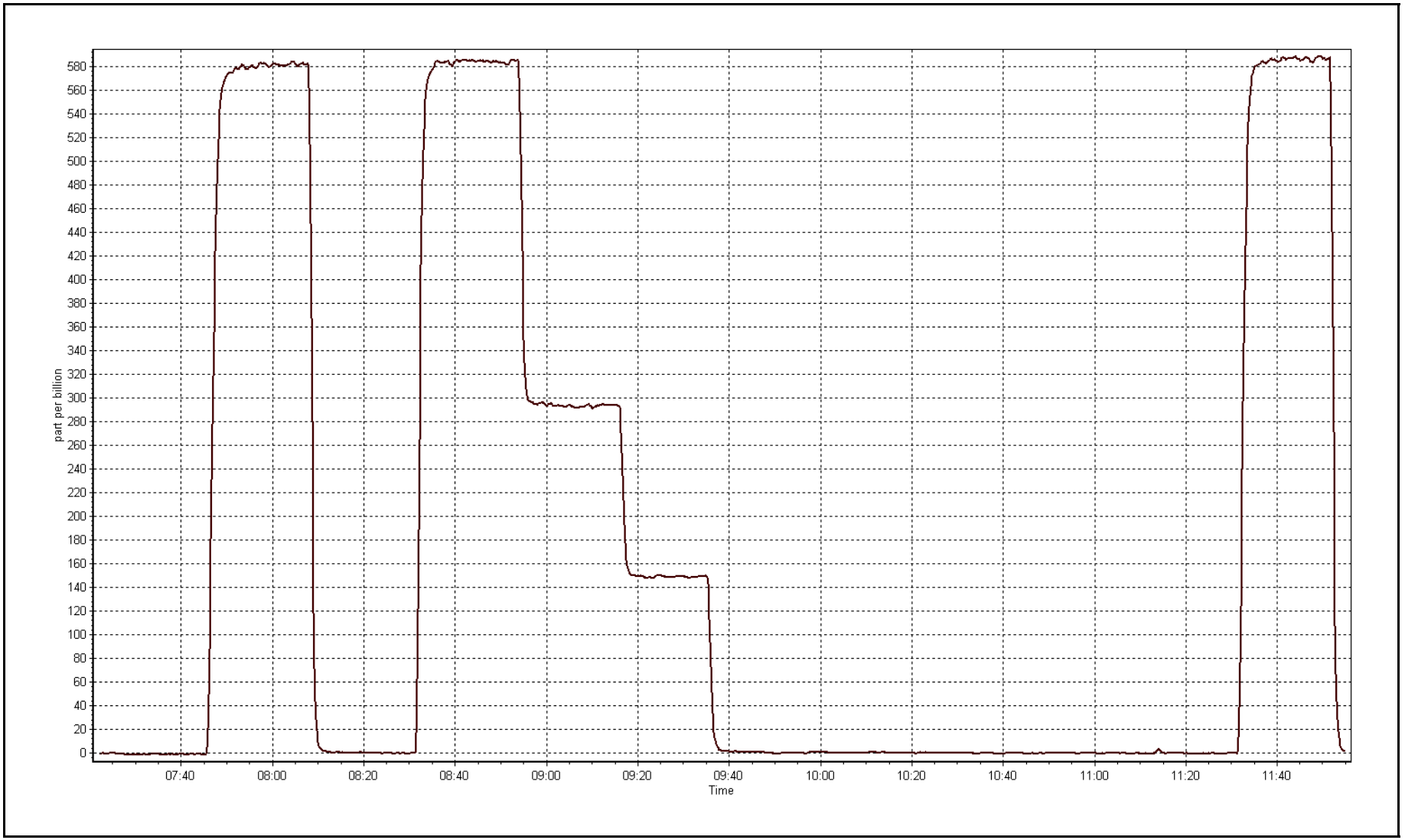
Calibration Date	August 11, 2015	Previous Calibration	July 29, 2015
Station Name	Conklin Lookout	Station Number	AMS 18
Start Time (MST)	7:20	End Time (MST)	11:54
Analyzer make	Thermo 43i	Analyzer serial #	JC1501301453

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.4	----	Correlation Coefficient	0.999964
575.3	585.4	0.9827		
287.1	293.5	0.9783	Slope	0.985015
143.1	149.2	0.9590		
			Intercept	-1.901961



SO2 Calibration Plot Date: August 11, 2015



Wood Buffalo Environmental Association
TRS Calibration Report

Station Information

Calibration Date	July 3, 2015	Last Calibration	NA
Station Name	Conklin Lookout	Station Number	AMS 18
Reason:	Install		
Start Time (MST)	7:20	End Time (MST)	10:12
Gas Cert Reference	CC233389	Station temp.	22 Deg C
Cal Gas Concentration	4.88 ppm	Cal Gas Exp Date	06/10/2014
Calibrator Make/Model	API 700	Serial Number	1222
Dil air Make/Model	API 701	Serial Number	5610
DACS make/model	Campbell Scientific CR3000	DACS serial No.	9035
SO2 gas concentration	49 ppm	SO2 gas cert/exp	EY0000368 June-10-16

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	NA	-700
Analyzer IP address	192.168.1.42		Lamp voltage	NA	999
Calculated slope	NA	0.994080	Chamber temp	NA	45
Calculated intercept	NA	-0.062128	Pressure	NA	633.0
Analyzer Background	NA	2.8	Flow	NA	0.409
Analyzer Coefficient	NA	1.064	Intensity	NA	89
			Converter temp.	NA	800

Analyzer make/model	Thermo 43i-TLE	Analyzer serial #	1336160090
Converter make/model	CDN-101	Converter serial #	522

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero					
as found span					
SO2 scrubber check	5000	29.3	287.1	0.8	----
calibrator zero	5000	0.0	0.0	-0.2	----
high point	5000	82.0	80.0	80.5	0.994
second point	5000	41.0	40.0	40.3	0.993
third point	5000	20.5	20.0	20.5	0.976
as left zero	5000	0.0	0.0	-0.1	----
as left span	5000	82.0	80.0	80.6	0.993
				Average Correction Factor	0.988

Corrected As found	NA	Previous response	NA	% change	NA

Notes:

Installation calibration; SOX scrubber checked before the zero.

Calibration Performed By: Melissa Lemay

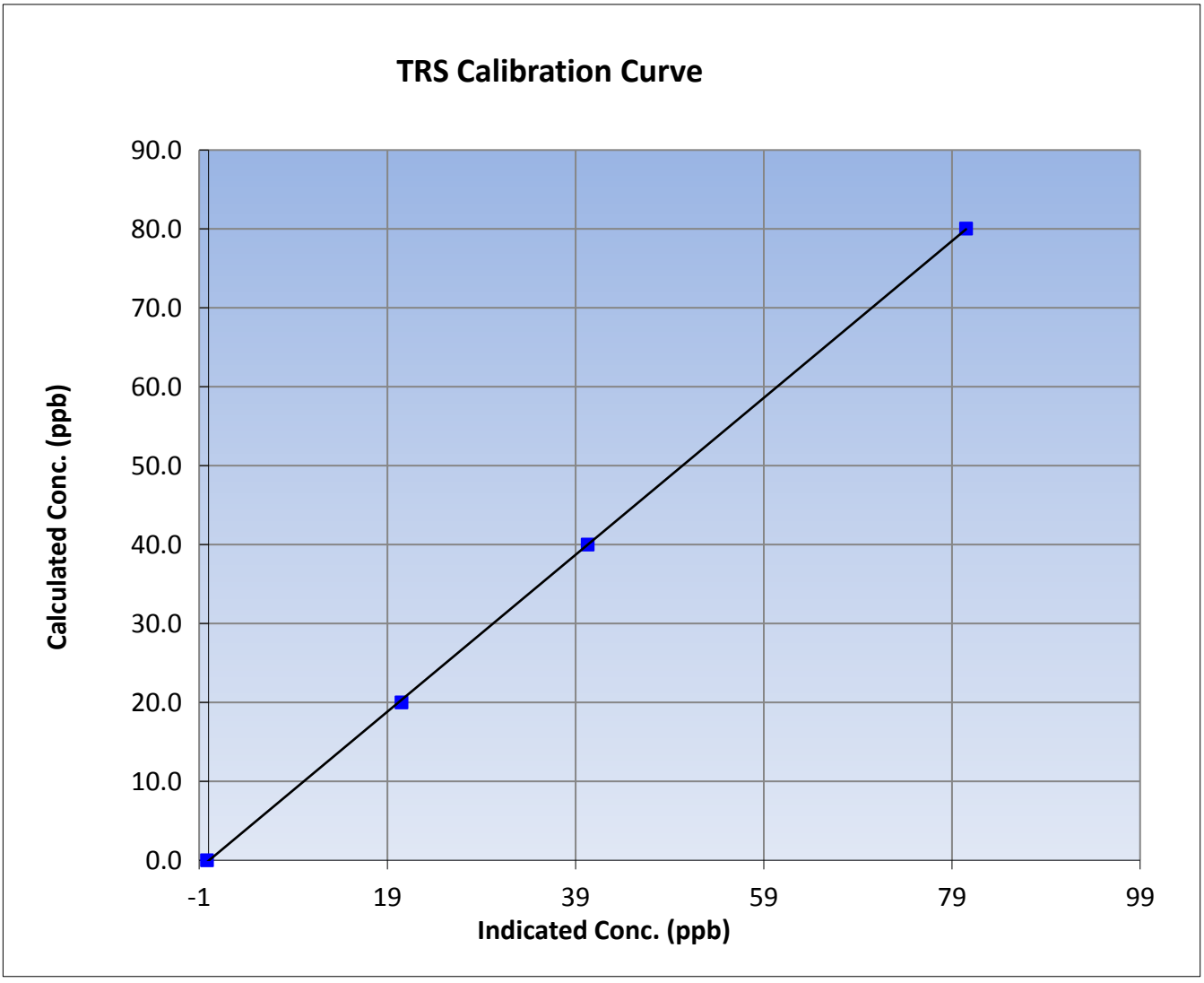
Wood Buffalo Environmental Association
TRS Calibration Report

Station Information

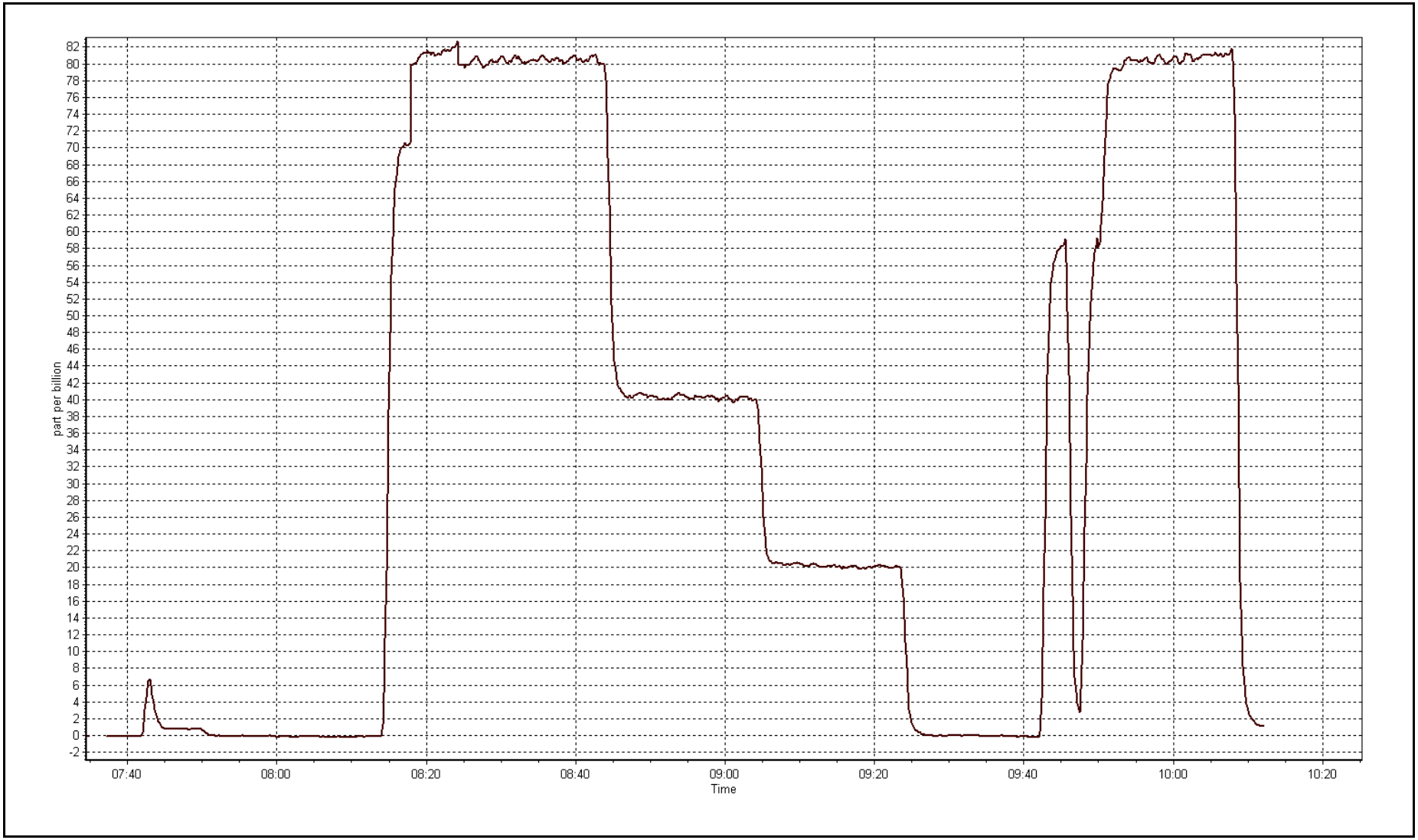
Calibration Date	July 3, 2015	Previous Calibration	NA
Station Name	Conklin Lookout	Station Number	AMS 18
Start Time (MST)	7:20	End Time (MST)	10:12
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1336160090

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	----	Correlation Coefficient	0.999957
80.0	80.5	0.9942		
40.0	40.3	0.9930	Slope	0.994080
20.0	20.5	0.9760		
			Intercept	-0.062128



TRS Calibration Plot Date: July 3, 2015



Wood Buffalo Environmental Association
TRS Calibration Report

W B E A

Station Information

Calibration Date	August 26, 2015	Last Calibration	July 3, 2015
Station Name	Conklin Lookout	Station Number	AMS 18
Reason:	Routine		
Start Time (MST)	14:00	End Time (MST)	17:17
Gas Cert Reference	CC233389	Station temp.	22 Deg C
Cal Gas Concentration	4.88 ppm	Cal Gas Exp Date	06/10/2014
Calibrator Make/Model	API 700	Serial Number	1222
Dil air Make/Model	API 701	Serial Number	5610
DACS make/model	Campbell Scientific CR3000	DACS serial No.	9035
SO2 gas concentration	49 ppm	SO2 gas cert/exp	EY0000368 June 10 2015

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-700	-700
Analyzer IP address	192.168.1.42		Lamp voltage	999	999
Calculated slope	0.994080	0.992749	Chamber temp	45	45
Calculated intercept	-0.062128	-0.092080	Pressure	633.0	633.0
Analyzer Background	2.86	2.86	Flow	0.409	0.409
Analyzer Coefficient	1.064	1.092	Intensity	89	89
			Converter temp.	800	800

Analyzer make/model	Thermo 43i-TLE	Analyzer serial #	1336160090
Converter make/model	CDN-101	Converter serial #	522

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.2	----
as found span	5000	82.0	80.0	77.0	1.039
SO2 scrubber check	5000	10.0	98.0	0.0	----
calibrator zero	5000	0.0	0.0	-0.1	----
high point	5000	82.0	80.0	80.6	0.993
second point	5000	41.0	40.0	40.5	0.988
third point	5000	20.5	20.0	20.5	0.977
as left zero	5000	0.0	0.0	-0.1	----
as left span	5000	82.0	80.0	80.8	0.990
				Average Correction Factor	0.986

Corrected As found	77.2	Previous response	80.6	% change	4.4%

Notes:

Span adjusted after inlet filter changed. No issues detected, calibration passed.

Calibration Performed By: Zack Eastman

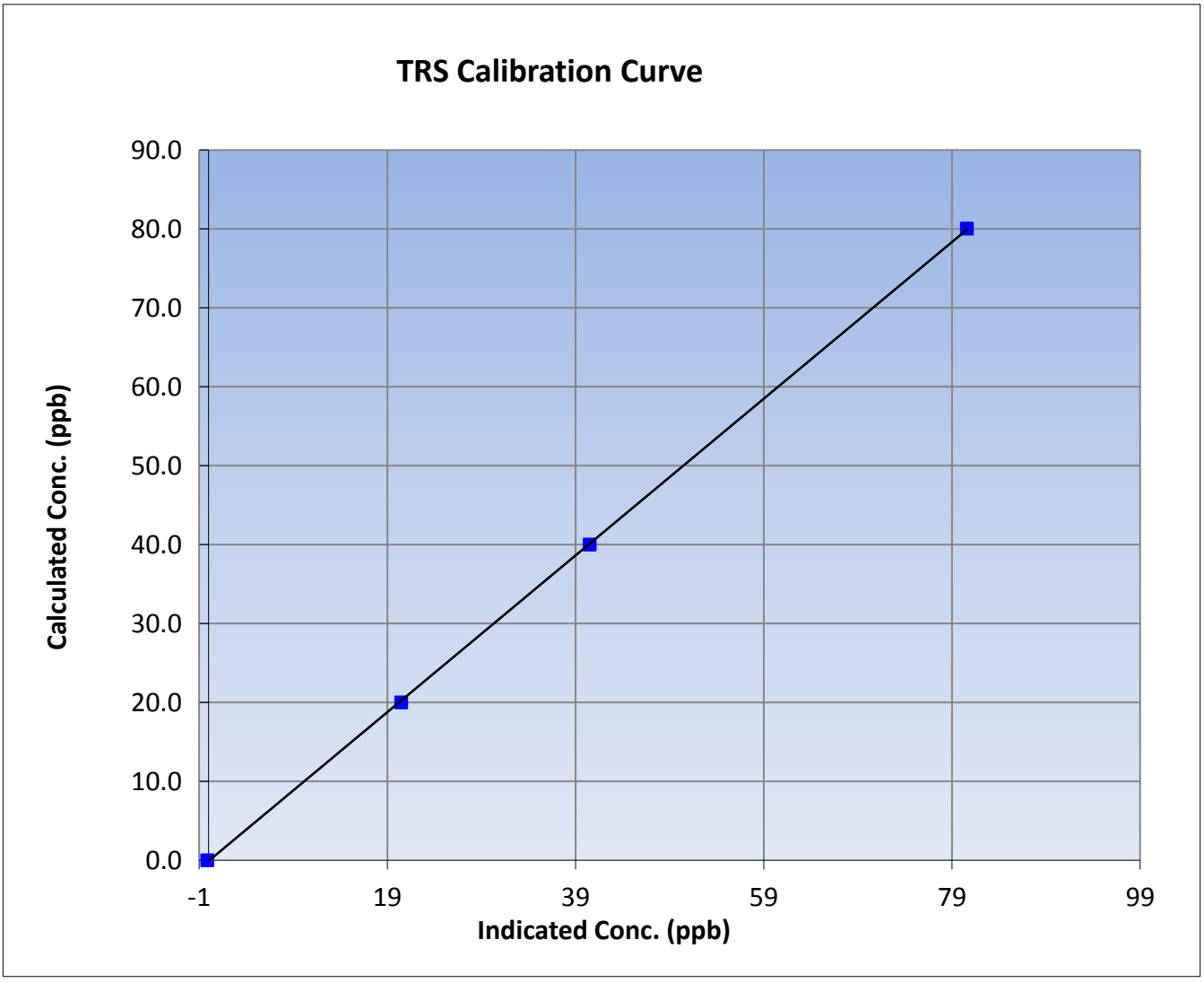
Wood Buffalo Environmental Association
TRS Calibration Report

Station Information

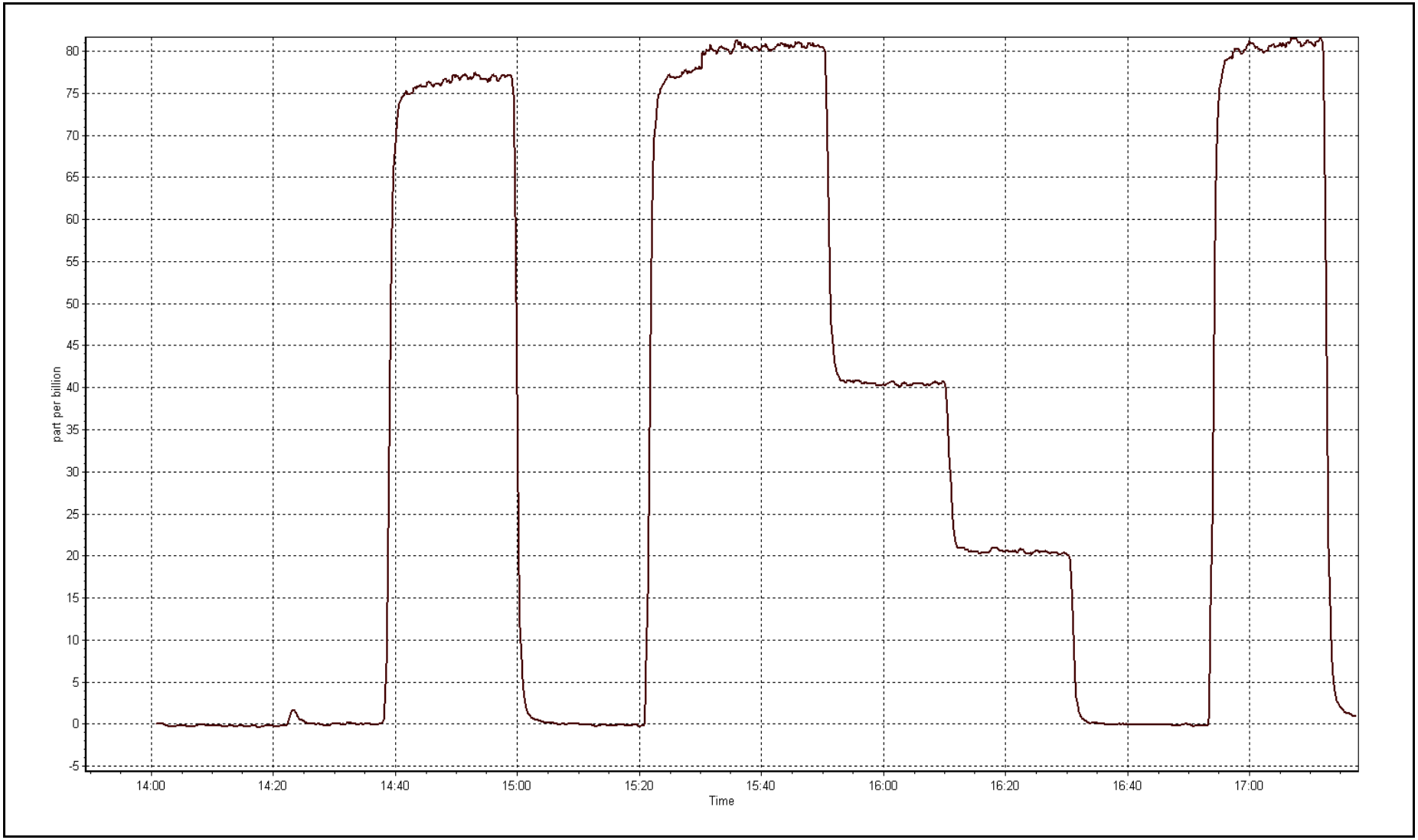
Calibration Date	August 26, 2015	Previous Calibration	July 3, 2015
Station Name	AMS 18	Station Number	AMS 18
Start Time (MST)	14:00	End Time (MST)	17:17
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1336160090

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999965
80.0	80.6	0.9930		
40.0	40.5	0.9880	Slope	0.992749
20.0	20.5	0.9770		
			Intercept	-0.092080



TRS Calibration Plot Date: August 26, 2015



Wood Buffalo Environmental Association
O_3 Calibration Report

Station Information

Calibration Date	July 3, 2015	Previous Calibration	NA
Station Name	Conklin Lookout	Station Number	AMS 18
Reason:	Install		
Start Time (MST)	10:15	End Time (MST)	12:05
NO2 GPT Ref date	June 10, 2016	Transfer Standard	
		Station temp.	22 Deg C
Calibrator Make/Model	Teledyne API 700	Serial Number	1222
ZAG make/model	Teledyne API 701	Serial Number	5610
DACS make/model	Campbell Scientific CR3000	Serial Number	9305

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 500 ppb		Bench temp.	NA	28.4
Analyzer IP address	192.168.1.48		Lamp temp.	NA	53.4
Calculated slope	NA	0.995234	Pressure	NA	609.8
Calculated intercept	NA	-0.792239	Flow cell A	NA	0.688
Analyzer Background	NA	-0.4	Flow cell B	NA	0.688
Analyzer Coefficient	NA	1.031	Cell A Intensity	NA	100747
			Cell B Intensity	NA	95046

Analyzer make	Thermo 49i	Analyzer serial #	1501663733

Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator Lamp Intensity (mA)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero					
as found span					
calibrator zero	5000	0	0.0	0.2	----
high point	5000	757	332.8	334.4	0.995
second point	5000	520	224.7	227.5	0.988
third point	5000	270	114.1	115.9	0.984
as left zero	5000	0	0.0	0.1	----
as left span	5000	757	332.8	335.1	0.993
				Average Correction Factor	0.989

Corrected As found	NA	Previous response	NA	% change	NA

Notes:

Installation calibration conducted.

Calibration Performed By: Melissa Lemay

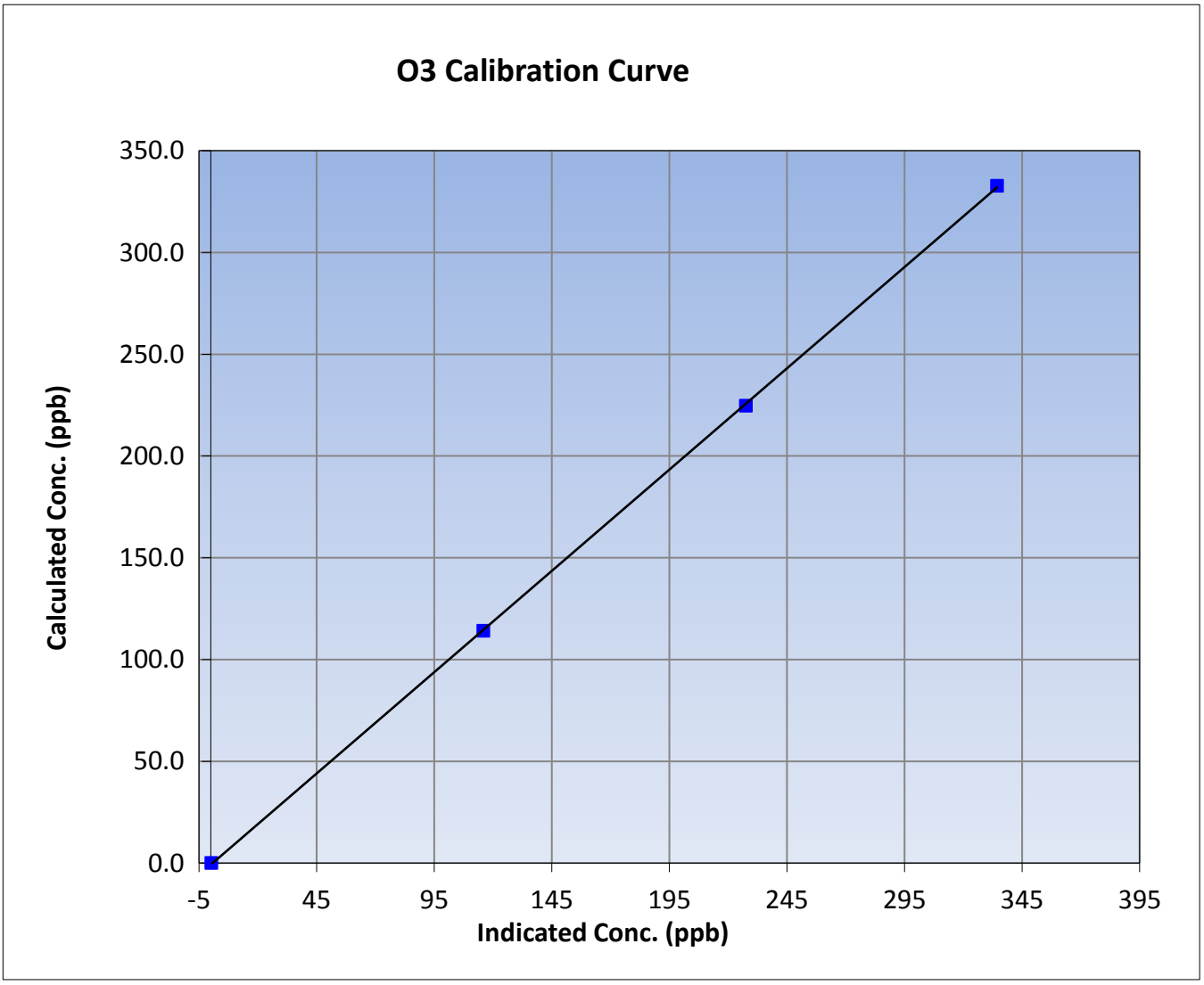
Wood Buffalo Environmental Association
O3 Calibration Report

Station Information

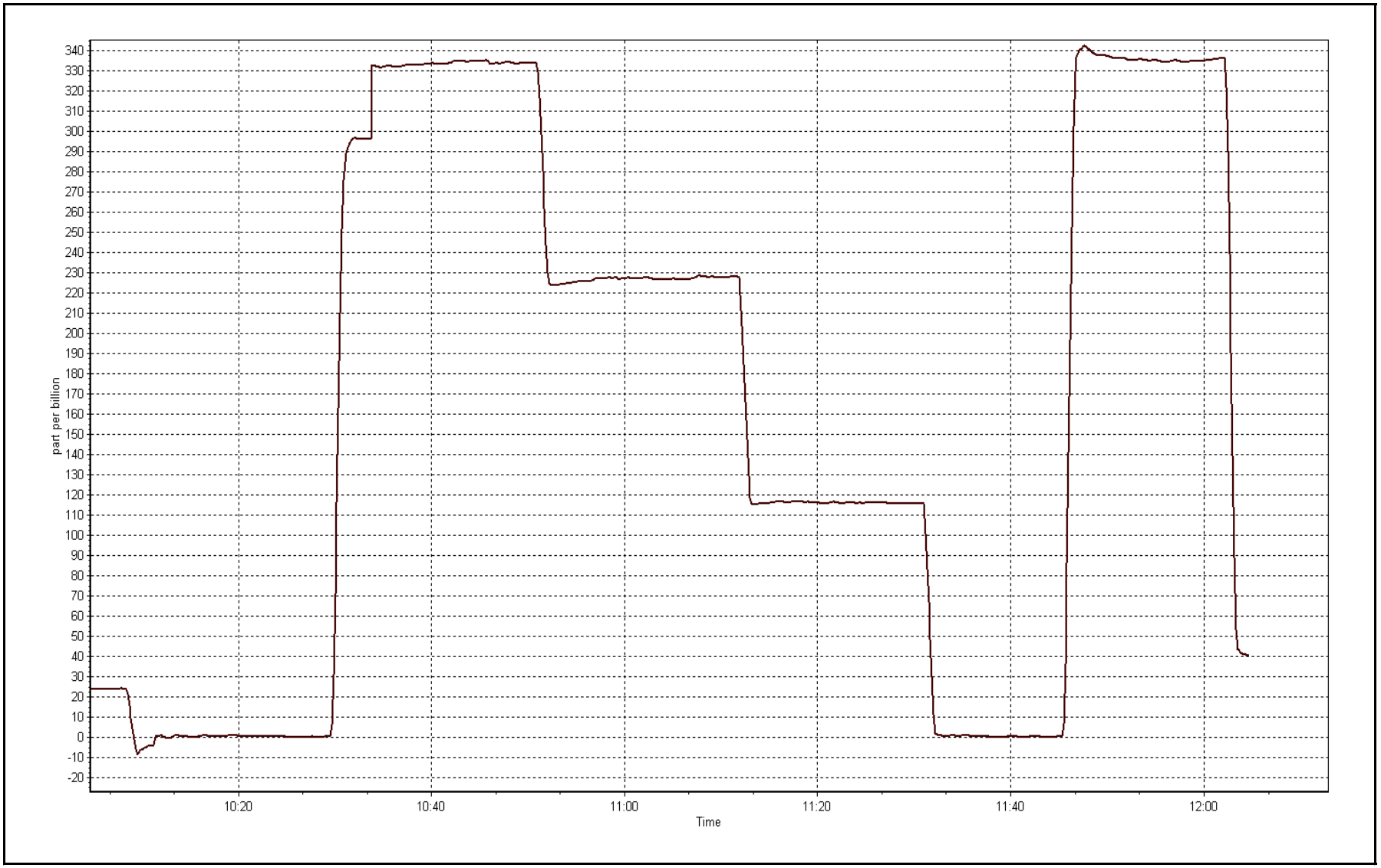
Calibration Date	July-03-15	Previous Calibration	NA
Station Name	Conklin Lookout	Station Number	AMS 18
Start Time (MST)	10:15	End Time (MST)	12:05
Analyzer make	Thermo 49i	Analyzer serial #	1501663733

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	----	Correlation Coefficient	0.999967
332.8	334.4	0.9952		
224.7	227.5	0.9877	Slope	0.995234
114.1	115.9	0.9845		
			Intercept	-0.792239



O3 Calibration Plot Date: July 3, 2015



Wood Buffalo Environmental Association
O_3 Calibration Report

W B E A

Station Information

Calibration Date	August 12, 2015	Previous Calibration	July 3, 2015
Station Name	Conklin Lookout	Station Number	AMS 18
Reason:	Routine		
Start Time (MST)	7:54	End Time (MST)	11:20
NO2 GPT Ref date	August 11, 2015	Transfer Standard	
		Station temp.	22 Deg C
Calibrator Make/Model	Teledyne API 700	Serial Number	1222
ZAG make/model	Teledyne API 701	Serial Number	5610
DACS make/model	Campbell Scientific CR3000	Serial Number	9305

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 500 ppb		Bench temp.	28.4	27.9
Analyzer IP address	192.168.1.48		Lamp temp.	53.4	53.2
Calculated slope	0.995234	1.000866	Pressure	609.8	612.8
Calculated intercept	-0.792239	-1.836335	Flow cell A	0.688	0.691
Analyzer Background	-0.4	-0.9	Flow cell B	0.688	0.691
Analyzer Coefficient	1.031	1.001	Cell A Intensity	100747	93323
			Cell B Intensity	95046	89865

Analyzer make	Thermo 49i	Analyzer serial #	1501663733

Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator Lamp Intensity (mA)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0	0.0	-0.6	----
as found span	5000	757	332.3	341.0	0.974
calibrator zero	5000	0	0.0	-0.1	----
high point	5000	757	332.3	332.1	1.001
second point	5000	520	223.9	227.0	0.986
third point	5000	270	113.3	117.3	0.966
as left zero	5000	0	0.0	0.1	----
as left span	5000	757	332.3	337.0	0.986
				Average Correction Factor	0.984

Corrected As found	341.6	Previous response	334.7	% change	-2.0%

Notes:

changed solenoid, no leaks, cells are clean, filter changed out, zero and span adjusted

Calibration Performed By: Melissa Lemay

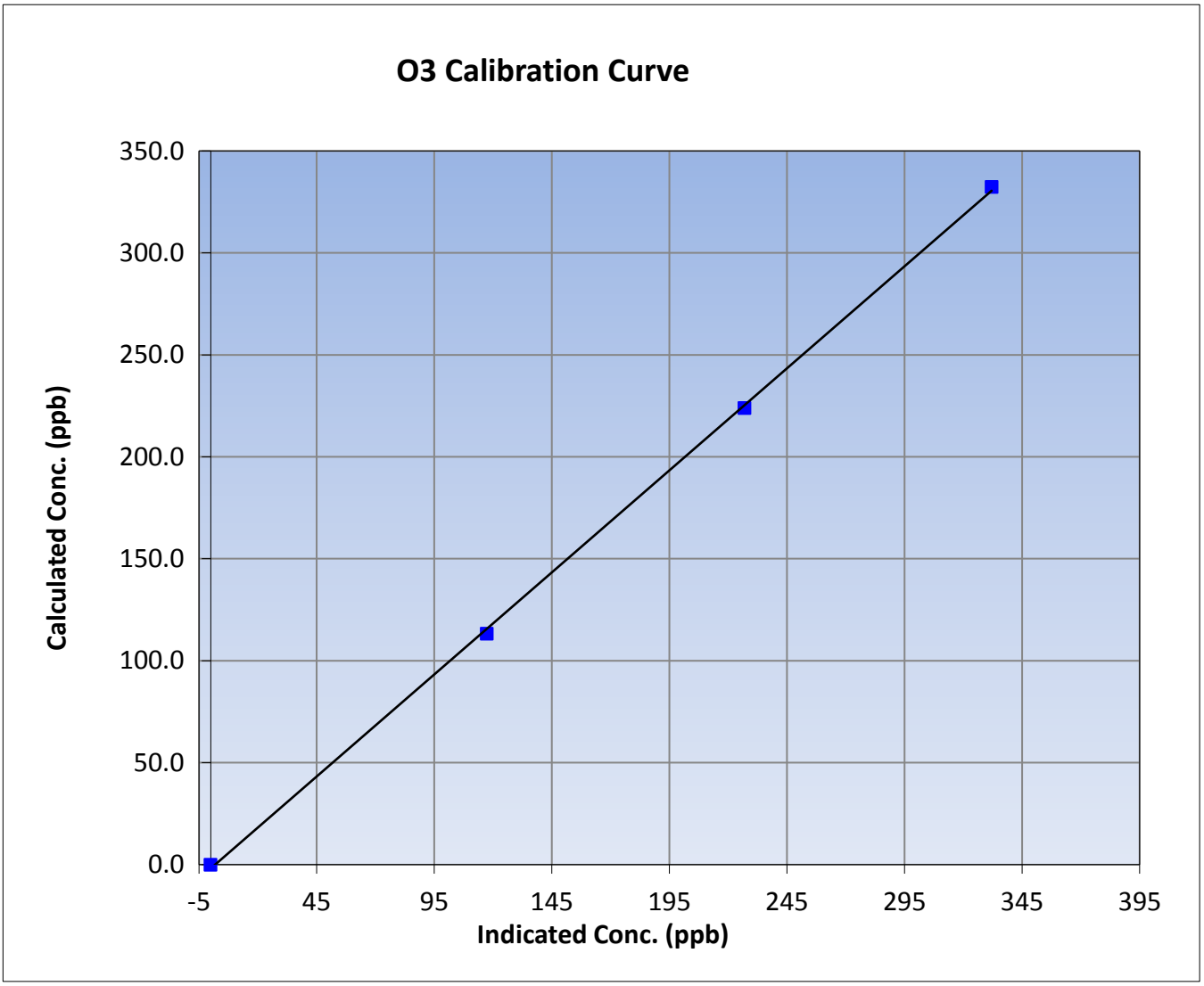
Wood Buffalo Environmental Association
O3 Calibration Report

Station Information

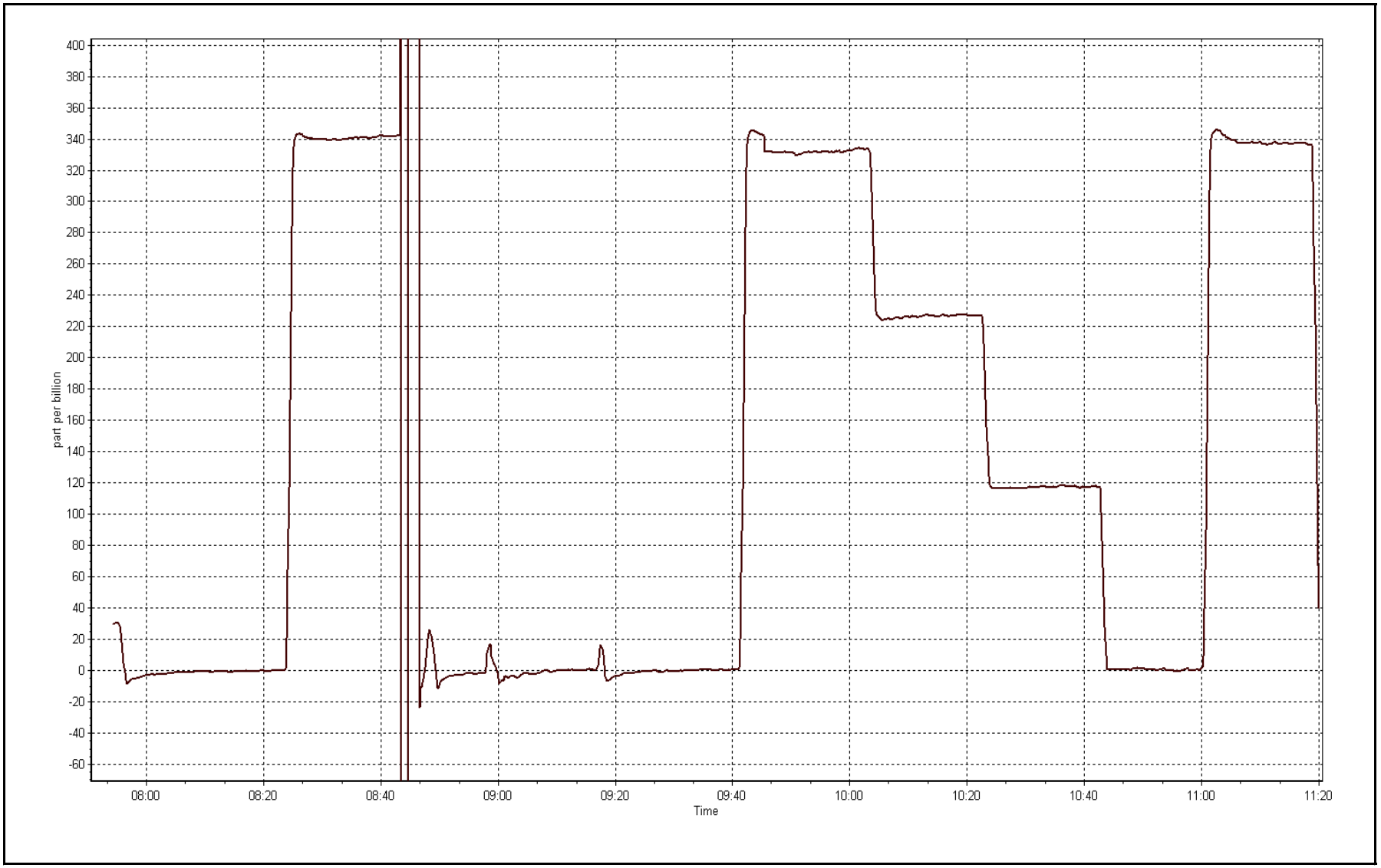
Calibration Date	August-12-15	Previous Calibration	July 3, 2015
Station Name	Conklin Lookout	Station Number	AMS 18
Start Time (MST)	7:54	End Time (MST)	11:20
Analyzer make	Thermo 49i	Analyzer serial #	1501663733

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999768
332.3	332.1	1.0008		
223.9	227.0	0.9863	Slope	1.000866
113.3	117.3	0.9659		
			Intercept	-1.836335



O3 Calibration Plot Date: August 12, 2015



Wood Buffalo Environmental Association
NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	July 2, 2015	Previous Calibration	NA
Station Name	Conklin Lookout	Station Number	AMS18
Reason:	Install		
Start Time (MST)	7:38	End Time (MST)	11:35
NO Cal Gas Conc	51.2 ppm	Gas Cert Reference	EY0000368
NOx Cal Gas Conc	51.2 ppm	Cal Gas Expiry Date	10/06/2016
Calibrator	API T700	Serial Number	1222
Zero air Generator	Teledyne API T701	Serial Number	5610

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	9035

Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	NA	NA	NA
	Data Offset	NA	NA	NA
Current Calibration	Data Slope	1.004830	1.003320	0.996617
	Data Offset	-2.792426	-2.263071	-0.757455

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1336160088

Test Point	before		after	
Concentration range	NA	ppb	0-1000	ppb
NO coefficient	NA		0.764	
NOX coefficient	NA		0.995	
NO2 coefficient	NA		0.999	
NO bkgrnd	NA		1.6	
NOX bkgrnd	NA		1.7	
Chamber Temp	NA	Deg C	50.4	Deg C
Moly Temp	NA	Deg C	323.4	Deg C
PMT voltage	NA	V	-842.5	V
PMT Temp	NA	Deg C	-2.9	Deg C
O3 flow	NA	ccm	ok	ccm
R Cell press NO	NA	mmHg	150.3	mmHg
R Cell Press Nox	NA	mmHg	150.3	mmHg
NO sample flow	NA	lpm	0.999	lpm
Nox sample Flow	NA	lpm	0.998	lpm

Notes:

Install calibration conducted.

Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: July 2, 2015 Station Number: AMS18

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero										
as found span										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
high point	5000	58.7	601.1	601.1	0.0	599.5	600.1	-0.6	1.0026	1.0016
second point	5000	29.3	300.0	300.0	0.0	302.9	302.7	0.2	0.9905	0.9912
third point	5000	14.6	149.5	149.5	0.0	154.3	153.4	0.9	0.9689	0.9746
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.1	0.0	----	----
as left span	5000	55.2	564.7	270.3	294.4	608.0	268.2	339.8	0.9288	1.0078
								Average Correction Factor	0.9874	0.9891

Corrcted As found NO_X= NA NO= NA Percent Change NO_X= N/A NO= N/A

Previous Response NO_X= NA NO= NA

GPT Calibration Data

Dilution Flow 5000 ccm Source Gas Flow 58.70 ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
Cal zero			0.0			0.0			N/A	
1st NO2 (300)	----	270.3	332.8	604.2	270.3	333.9	0.9833	1.0000	0.9967	100.3%
2nd NO2 (200)	----	378.4	224.7	605.3	378.4	227.0	0.9815	1.0000	0.9899	101.0%
3rd NO2 (100)	----	489.0	114.1	605.6	489.0	116.0	0.9810	1.0000	0.9836	101.7%
4th NO2 (0)	603.1	----	-1.5	601.6	603.1	-1.6	0.9876	1.0000	N/A	----
					Average Correction Factor		0.9834	1.0000	0.9901	101.0%

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

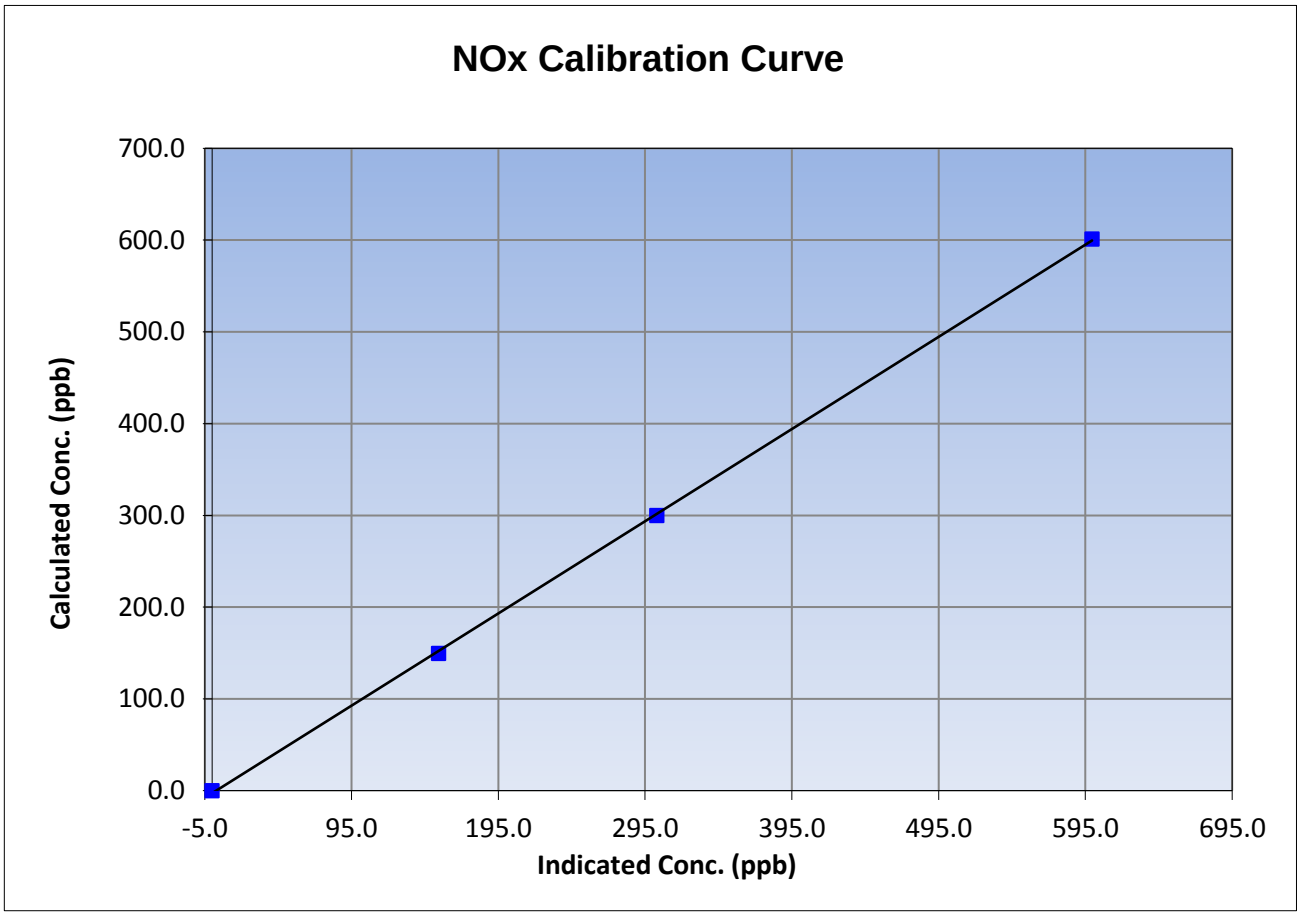
NO_X Calibration Summary

Station Information

Calibration Date	July 2, 2015	Previous Calibration	NA
Station Name	Conklin Lookout	Station Number	AMS18
Start Time (MST)	7:38	End Time (MST)	11:35
Analyzer make	Thermo 42i	Analyzer serial #	1336160088

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999899
601.1	599.5	1.0026		
300.0	302.9	0.9905	Slope	1.004830
149.5	154.3	0.9689		
			Intercept	-2.792426



Wood Buffalo Environmental Association

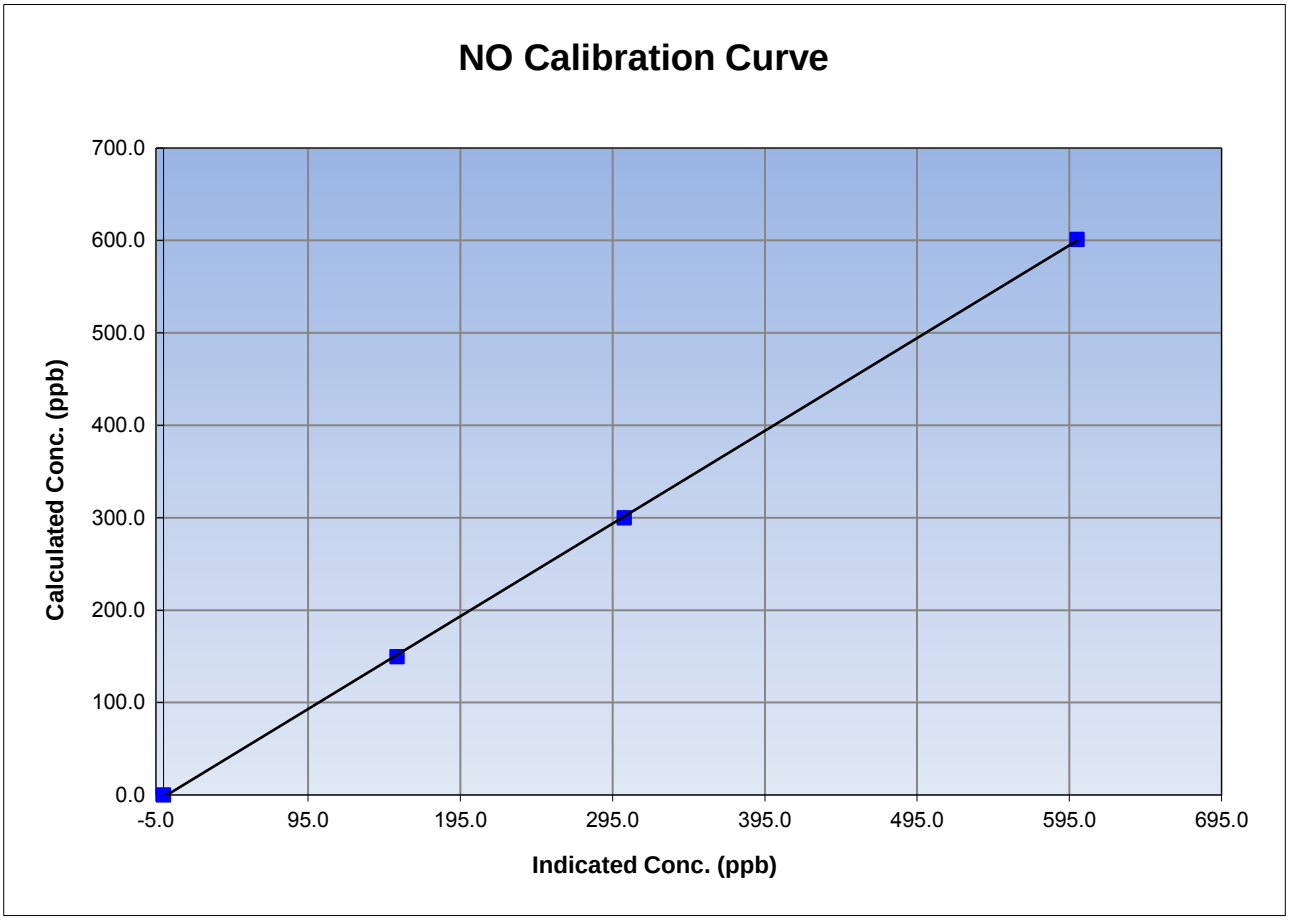
NO Calibration Summary

Station Information

Calibration Date	July 2, 2015	Previous Calibration	NA
Station Name	Conklin Lookout	Station Number	AMS18
Start Time (MST)	7:38	End Time (MST)	11:35
Analyzer make	Thermo 42i	Analyzer serial #	1336160088

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999932
601.1	600.1	1.0016		
300.0	302.7	0.9912	Slope	1.003320
149.5	153.4	0.9746		
			Intercept	-2.263071



Wood Buffalo Environmental Association

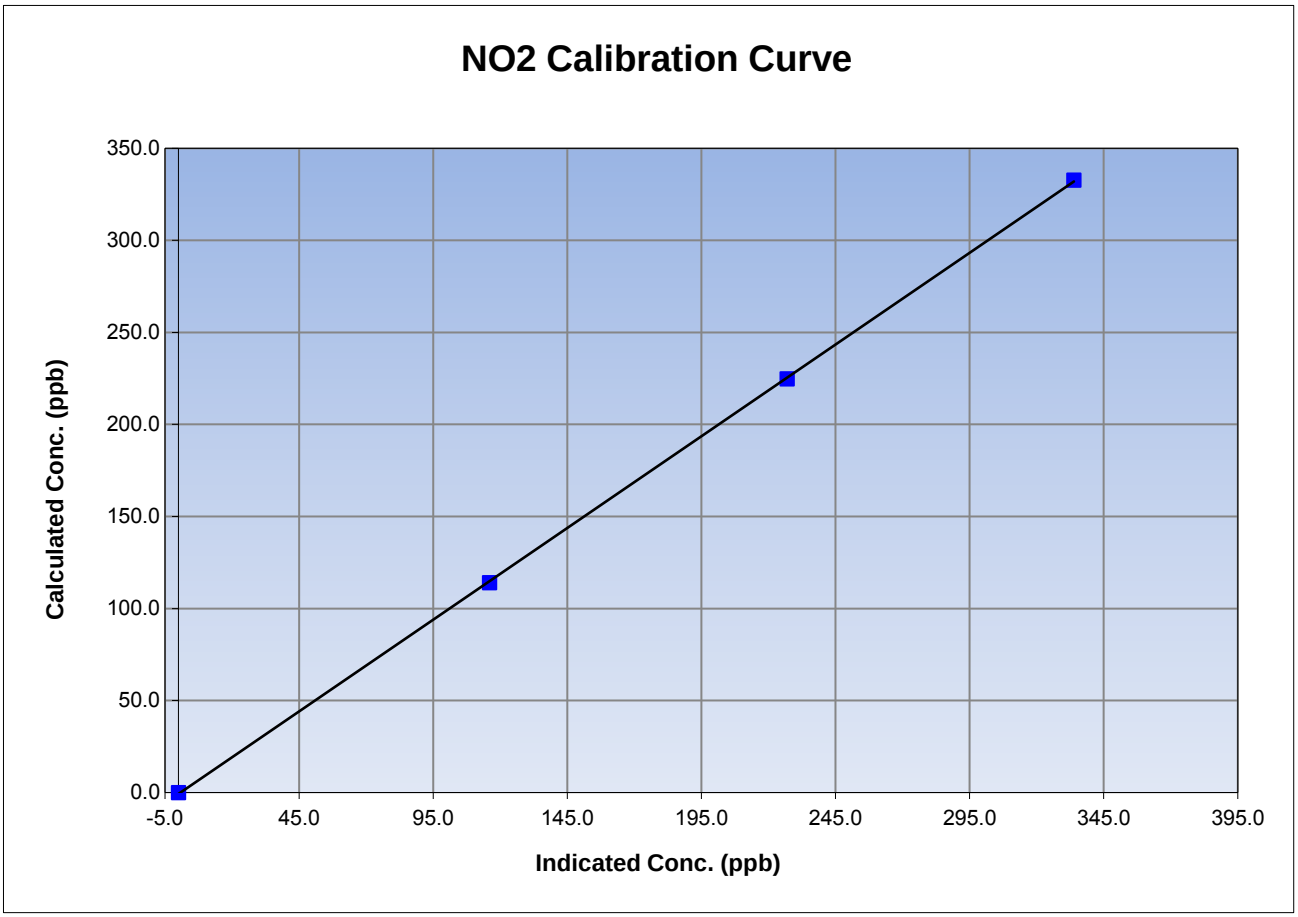
NO_2 Calibration Summary

Station Information

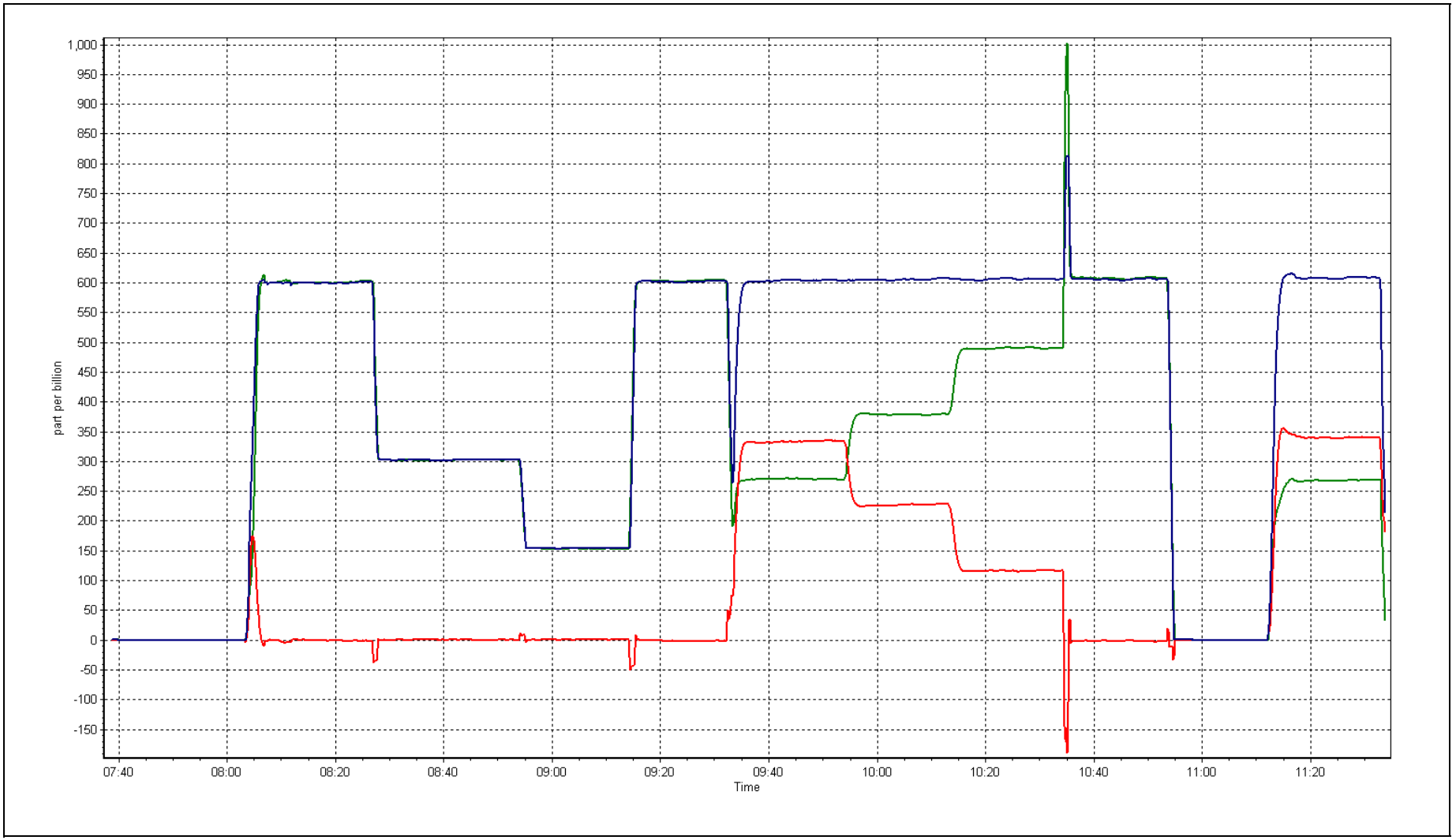
Calibration Date	July 2, 2015	Previous Calibration	NA
Station Name	Conklin Lookout	Station Number	AMS18
Start Time (MST)	7:38	End Time (MST)	11:35
Analyzer make	Thermo 42i	Analyzer serial #	1336160088

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999962
332.8	333.9	0.9967		
224.7	227.0	0.9899	Slope	0.996617
114.1	116.0	0.9836		
			Intercept	-0.757455



NOx, NO & NO_2 Calibration Plot Date: July 2, 2015



Wood Buffalo Environmental Association
NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	August 11, 2015	Previous Calibration	July 2, 2015
Station Name	Conklin Lookout	Station Number	AMS18
Reason:	Routine		
Start Time (MST)	7:20	End Time (MST)	11:53
NO Cal Gas Conc	51.2 ppm	Gas Cert Reference	EY0000368
NOx Cal Gas Conc	51.2 ppm	Cal Gas Expiry Date	10/06/2016
Calibrator	API T700	Serial Number	1222
Zero air Generator	Teledyne API T701	Serial Number	5610

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	9035

Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	1.004830	1.003320	0.996617
	Data Offset	-2.792426	-2.263071	-0.757455
Current Calibration	Data Slope	1.014580	1.012207	0.993377
	Data Offset	-2.859492	-2.458819	-1.499080

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1336160088

Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
NO coefficient	0.764		0.764	
NOX coefficient	0.995		0.995	
NO2 coefficient	0.999		0.999	
NO bkgrnd	1.6		1.6	
NOX bkgrnd	1.7		1.7	
Chamber Temp	50.5	Deg C	50.4	Deg C
Moly Temp	325	Deg C	323.4	Deg C
PMT voltage	-842.5	V	-842.5	V
PMT Temp	-2.7	Deg C	-2.9	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	151.2	mmHg	150.3	mmHg
R Cell Press Nox	151.2	mmHg	150.3	mmHg
NO sample flow	0.973	lpm	0.999	lpm
Nox sample Flow	0.970	lpm	0.998	lpm

Notes:

no adjustments or maintenance done, filter changed out

Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: August 11, 2015 Station Number: AMS18

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1	----	----
as found span	5000	58.7	601.1	601.1	0.0	590.0	591.0	-0.6	1.0188	1.0171
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1	----	----
high point	5000	58.7	601.1	601.1	0.0	593.7	594.9	-1.2	1.0124	1.0104
second point	5000	29.3	300.0	300.0	0.0	300.2	300.4	-0.2	0.9994	0.9988
third point	5000	14.6	149.5	149.5	0.0	153.0	152.4	0.6	0.9772	0.9810
as left zero	5000	0.0	0.0	0.0	0.0	0.0	0.1	-0.1	----	----
as left span	5000	58.7	601.1	270.0	331.1	609.5	264.4	345.1	0.9862	1.0212
								Average Correction Factor	0.9963	0.9967

Corrcted As found NO_X= 590.1 NO= 591.0 Percent Change NO_X= 1.8% NO= 1.8%

Previous Response NO_X= 601.0 NO= 601.4

GPT Calibration Data

Dilution Flow 5000 ccm Source Gas Flow 58.70 ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
Cal zero			0.0			-0.1			N/A	
1st NO2 (300)	----	270.0	332.3	604.6	270.0	335.1	0.9827	1.0000	0.9916	100.8%
2nd NO2 (200)	----	378.4	223.9	605.3	378.4	227.0	0.9815	1.0000	0.9863	101.4%
3rd NO2 (100)	----	489.0	113.3	607.0	489.0	118.0	0.9788	1.0000	0.9602	104.1%
4th NO2 (0)	602.3	----	-1.7	600.6	602.3	-1.7	0.9892	1.0000	N/A	----
					Average Correction Factor		0.9830	1.0000	0.9794	102.1%

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

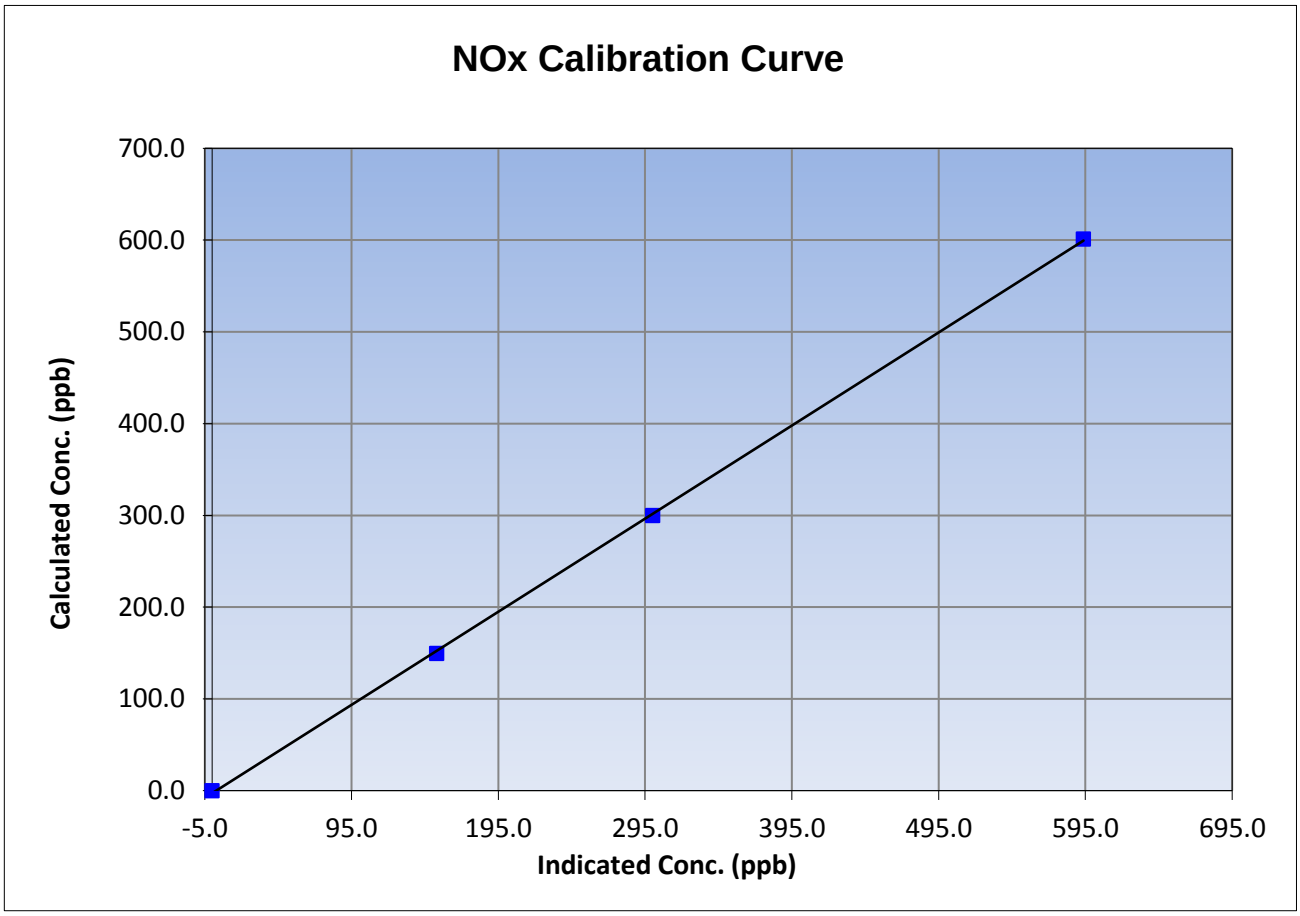
NO_X Calibration Summary

Station Information

Calibration Date	August 11, 2015	Previous Calibration	July 2, 2015
Station Name	Conklin Lookout	Station Number	AMS18
Start Time (MST)	7:20	End Time (MST)	11:53
Analyzer make	Thermo 42i	Analyzer serial #	1336160088

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999887
601.1	593.7	1.0124		
300.0	300.2	0.9994	Slope	1.014580
149.5	153.0	0.9772		
			Intercept	-2.859492



Wood Buffalo Environmental Association

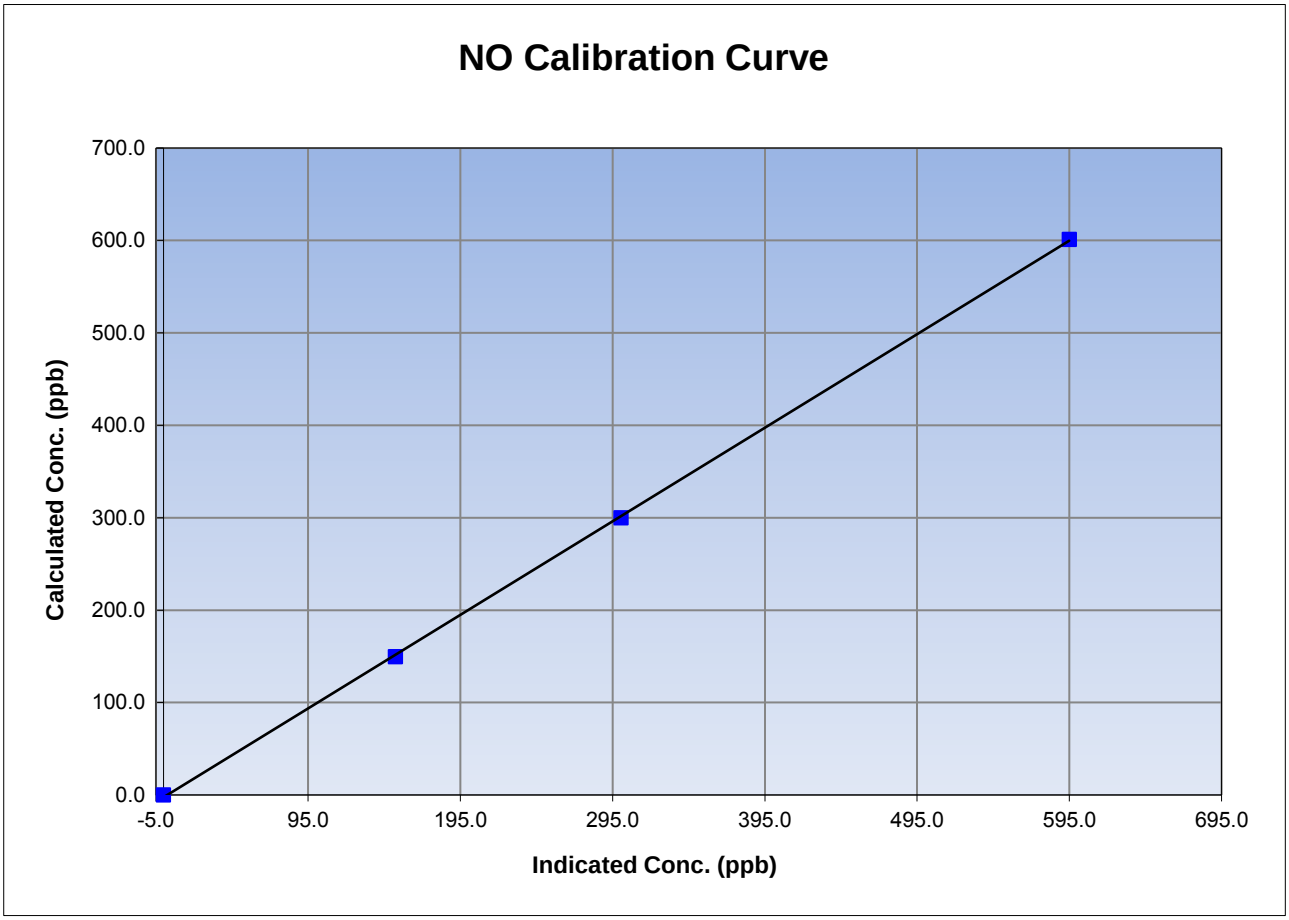
NO Calibration Summary

Station Information

Calibration Date	August 11, 2015	Previous Calibration	July 2, 2015
Station Name	Conklin Lookout	Station Number	AMS18
Start Time (MST)	7:20	End Time (MST)	11:53
Analyzer make	Thermo 42i	Analyzer serial #	1336160088

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999920
601.1	594.9	1.0104		
300.0	300.4	0.9988	Slope	1.012207
149.5	152.4	0.9810		
			Intercept	-2.458819



Wood Buffalo Environmental Association

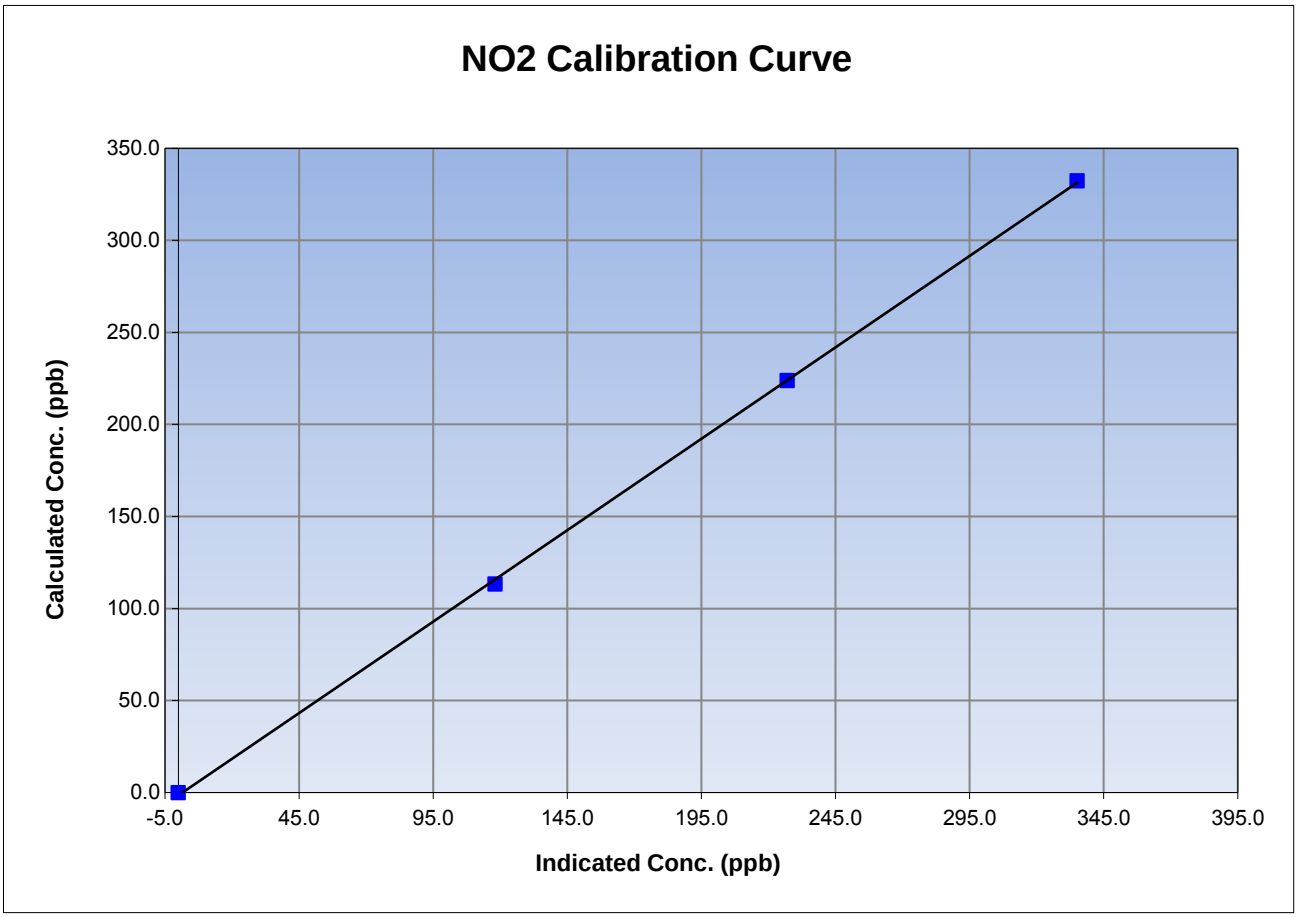
NO_2 Calibration Summary

Station Information

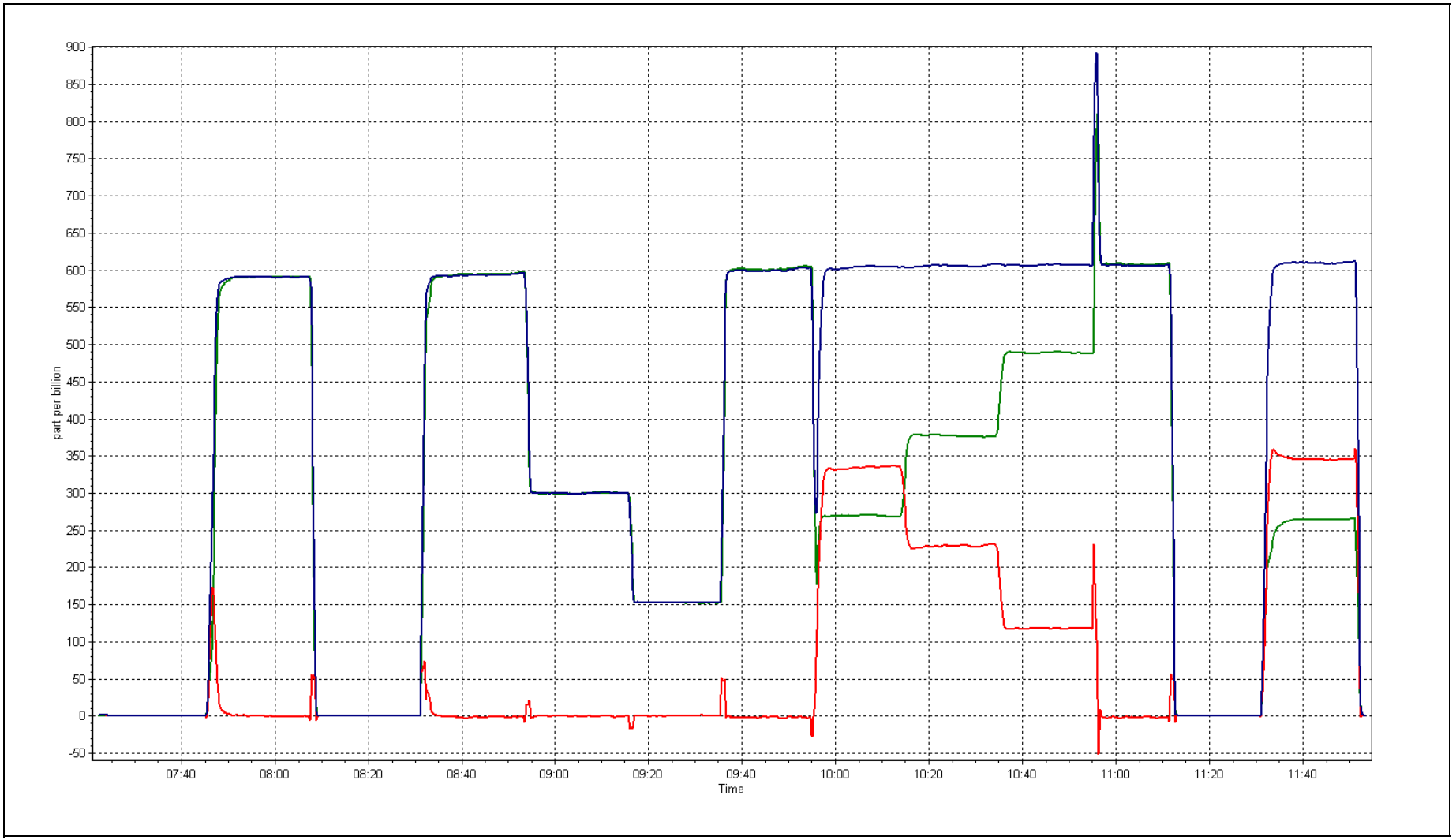
Calibration Date	August 11, 2015	Previous Calibration	July 2, 2015
Station Name	Conklin Lookout	Station Number	AMS18
Start Time (MST)	7:20	End Time (MST)	11:53
Analyzer make	Thermo 42i	Analyzer serial #	1336160088

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999849
332.3	335.1	0.9916		
223.9	227.0	0.9863	Slope	0.993377
113.3	118.0	0.9602		
			Intercept	-1.499080



NOx, NO & NO_2 Calibration Plot Date: August 11, 2015



Wood Buffalo Environmental Association

SHARP CONFORMANCE TEST

STATION INFORMATION

Calibration Date:	June 30, 2015	Previous Calibration:	
Station Name:	Conklin Lookout	Station Number:	AMS 18
Start Time (MST):	8:00	End Time (MST):	9:20
Calibrator Make/Model:	Delta Cal	Calibrator Serial Number:	1019

SHARP INFORMATION

Particulate Fraction:	PM2.5
Make/Model:	Thermo / SHARP 5030
Serial Number	E-781
Source SN:	N/A
HEPA PN:	12144
Time Correct (MST):	Yes
Paremeters Checked:	T1, P3, Main Flow, Beta, Neph

AUDIT DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	28.0	27.7	-0.3	28.0
T2	29.0	na	na	29.0
T3	33.0	na	na	33.0
T4	30.0	na	na	30.0
RH (%)	28.0	na	na	28.0

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	942	937.0	-5.0	942

Main Flow (Lph)

Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
1000	1000	0	1000	1000

Nephalometer Calibration

Parameter	As Founds	adjusted(Limit +or- 2.0ug/m3)	As Left
Analog	286		284
Neph	4.3		-0.8
C14	7.5	Yes	6.5
Indicated Concentration (ug/m3)	1.6		-0.4
Offset 1	287		286.7
Offset 2	41.1		41.8

Leak Check (Quarterly)

Leak Check Date:	June 30, 2015	Previous Leak Check Date:	
	Measured	Difference LPM (Limit +/- 0.42 LPM)	
Flow without adaptor (LPM):	16.81	0.02	
Flow with adaptor [turn off pump first](LPM):	16.79		

Mass Foil Calibration (Annualy)

Foil Calibration Date:	June 30, 2015	Previous Foil Calibration:	
Zeroed?:	Yes		
Foil Mass:	1337	Mass foil set S/N:	12111
Previous Correction Factor:	6983		
New Correction Factor:	7050		

INSPECTION DATA

Item	Condition	Date of install or rebuild
Cyclone	Good / cleaned	
Pump	Good	
Filter Tape	Good	
Mass Foil Cal Set	na	
HEPA filter	Good	

NOTES:

Sampling Head Cleaned, Install of station; Flow, temperature and Pressure were checked on June 29,2015, Mass Foil, Nepholometer, and Leak were done on June 30,2015

Audit Performed By: Melissa Lemay

Wood Buffalo Environmental Association

SHARP CONFORMANCE TEST

STATION INFORMATION

Calibration Date:	August 12, 2015	Previous Calibration:	June 30, 2015
Station Name:	Conklin Lookout	Station Number:	AMS 18
Start Time (MST):	7:38	End Time (MST):	7:53
Calibrator Make/Model:	Delta Cal	Calibrator Serial Number:	1019

SHARP INFORMATION

Particulate Fraction:	PM2.5
Make/Model:	Thermo / SHARP 5030
Serial Number	E-781
Source SN:	N/A
HEPA PN:	12144
Time Correct (MST):	Yes
Paremeters Checked:	T1, P3, Main Flow, Neph

AUDIT DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	16.0	18.0	2.0	18.0
T2	24.0	na	na	24.0
T3	31.0	na	na	31.0
T4	24.0	na	na	24.0
RH (%)	38.0	na	na	38.0

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	937	931.0	-6.0	937

Main Flow (Lph)

Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
1000	1020	20	1000	1000

Nephalometer Calibration

Parameter	As Founds	adjusted(Limit +or- 2.0ug/m3)	As Left
Analog	290		288
Neph	3.4		-0.6
C14	10.5	Yes	10.6
Indicated Concentration (ug/m3)	1.8		-0.4
Offset 1	292		290.7
Offset 2	41.8		41.8

Leak Check (Quarterly)

Leak Check Date:	June 30, 2015	Previous Leak Check Date:	
	Measured	Difference LPM (Limit +/- 0.42 LPM)	
Flow without adaptor (LPM):	16.81	0.02	
Flow with adaptor [turn off pump first](LPM):	16.79		

Mass Foil Calibration (Annualy)

Foil Calibration Date:	June 30, 2015	Previous Foil Calibration:	
Zeroed?:	Yes		
Foil Mass:	1337	Mass foil set S/N:	12111
Previous Correction Factor:	6983		
New Correction Factor:	7050		

INSPECTION DATA

Item	Condition	Date of install or rebuild
Cyclone	Good / cleaned	
Pump	Good	
Filter Tape	Good	
Mass Foil Cal Set	na	
HEPA filter	Good	

NOTES:

Sampling Head Cleaned, flow, T1 and nepholometer adjusted

Audit Performed By: Melissa Lemay

Wood Buffalo Environmental Association

WS/WD Calibration Report

Station Information

Calibration Date	June-30-15	Previous Calibration	
Station Number	AMS 18	Station Location	Conklin Lookout
Reason:	Routine / Installation	Removal	Other:
Start Time (MST)	9:30	End Time (MST)	10:43
Barometric Pressure	703	Station Temperature	22 Deg C
WS Calibrator	MetOne 053	Serial Number	P15103

WIND SPEED

Sensor make/model	Met One 010C-1	Sensor serial #	N/A
DACS make	Campbel Scientific CR3000	DACS serial No.	N/A
DACS voltage range	5000	DACS channel #	N/A
	Before		After
DACS slope	N/A	DACS slope	N/A
DACS intercept	N/A	DACS intercept	N/A
Calculated slope		Calculated slope	0.999751
Calculated intercept		Calculated intercept	0.024792

Wind Speed Calibration Data

Shaft RPM	Actual Speed (K/hr)	Indicated Speed (K/hr)	Correction factor
0	0	0.0	n/a
200	20.2	20.1	1.0050
400	39.4	39.4	1.0000
600	58.69	58.7	1.0000
800	77.84	77.8	1.0000
Average Correction Factor			1.0012

WIND DIRECTION

Sensor make/model	Met One 020C-1	Sensor serial #	N/A
DACS make	Campbel Scientific CR3000	DACS serial No.	N/A
DACS voltage range	5000	DACS channel #	N/A
	Before		After
DACS slope	N/A	DACS slope	N/A
DACS intercept	N/A	DACS intercept	N/A
Calculated slope		Calculated slope	1.001541
Calculated intercept		Calculated intercept	-0.998438

Wind Direction Calibration Data

Physical Direction (Degrees)	Indicated Direction (Degrees)	Correction factor
0	0.7	n/a
90	90.8	0.9912
180	181.0	0.9945
270	271.4	0.9948
360	359.7	1.0008
Average Correction Factor		0.9953

Notes:

Barrings are good in both WS and WD

Calibration Performed By: Melissa Lemay

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 19
SUNCOR FIREBAG
AUGUST 2015

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

September 28, 2015

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FIREBAG (AMS 19)
AUGUST 2015
MONTHLY SUMMARY for
AMD SECTION III.B.1(c)

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	708	36	36	100.00	25	0	4	0
H2S (ppb) Average	709	35	35	100.00	3	0	1	0
THC (ppm) Average	708	36	36	100.00	3.1	-	2.4	-
NO2 (ppb) Average	708	36	36	100.00	18	0	5	-
NO (ppb) Average	708	36	36	100.00	15	-	3	-
NOX (ppb) Average	708	36	36	100.00	29	-	6	-
Temperature 2 m (C) Average	744	0	0	100.00	26.4	-	21.3	-
Relative Humidity (%) Average	744	0	0	100.00	99	-	89	-
Wind Speed 10 m (km/h) Average	741	1	3	99.73	34	-	23	-
Wind Direction 10 m (deg) Average	741	1	3	99.73	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FIREBAG (AMS 19)
AUGUST 2015

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

					Percentile						
Parameter	Number	Mean	StnDev	Total	Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	708	1.2	3	-	0	0	0	0	1	3	25
H2S (ppb) Average	709	0.2	0	-	0	0	0	0	0	0	3
THC (ppm) Average	708	2.13	0.1	-	1.9	2	2.1	2.1	2.2	2.3	3.1
NO2 (ppb) Average	708	2.4	3	-	0	0	1	1	3	6	18
NO (ppb) Average	708	0.8	2	-	0	0	0	0	1	2	15
NOX (ppb) Average	708	3.2	4	-	0	0	1	2	4	8	29
Temperature 2 m (C) Average	744	15.49	4.4	-	5.4	10.2	12.2	15.5	18.8	21.3	26.4
Relative Humidity (%) Average	744	67.7	19	-	30	42	53	67	83	94	99
Wind Speed 10 m (km/h) Average	741	12.9	6	-	1	6	9	12	17	20	34
Wind Direction 10 m (deg) Average	741	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FIREBAG (AMS 19)
AUGUST 2015

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
Wind Speed, Wind Direction	02 Aug 2015 22:00	02 Aug 2015 23:00	2	Flat line in sensor output signal

Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO_2) - ppb

Firebag - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 25 ppb on Aug 31 11:00 Maximum Daily Average: 4.0 ppb on Aug 13

Minimum Value: 0 ppb on Aug 15 04:00 Minimum Daily Average: 0.1 ppb on Aug 15

Maximum Diurnal Average: 3.2 ppb at hour 10 Minimum Diurnal Average: 0.4 ppb at hour 24

Monthly Average: 1.2 ppb Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 1$ $P_{90} = 3$ $P_{99} = 12$

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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
2-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	1	1	1	1	2	1	1	2	2	1	1	1	0.7	2
3-Aug	2	2	1	0	0	Z	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.5	2
4-Aug	Z	8	11	8	6	8	9	3	0	0	3	2	4	3	0	0	2	3	0	0	0	0	0	0	3.2	11
5-Aug	0	Z	1	0	2	4	1	1	1	1	0	1	0	0	1	0	1	1	0	0	0	0	0	0	0.7	4
6-Aug	0	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0.2	1
7-Aug	0	0	0	Z	0	0	0	0	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0.1	0
8-Aug	0	0	0	0	Z	0	1	0	0	0	0	0	0	1	2	0	1	0	1	1	0	0	0	0	0.4	2
9-Aug	0	0	0	0	0	Z	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	4
10-Aug	Z	0	0	0	0	0	0	0	1	6	4	4	4	3	1	1	2	1	1	1	0	0	0	0	1.4	6
11-Aug	0	Z	0	0	1	2	3	4	3	8	5	3	1	1	1	1	0	0	0	0	0	2	1	1	1.7	8
12-Aug	2	3	Z	6	3	3	4	4	3	1	1	1	0	0	0	1	3	2	0	0	0	1	1	1	1.8	6
13-Aug	1	1	5	Z	15	7	3	7	4	4	8	10	7	4	3	1	1	1	2	3	2	2	2	2	4.0	15
14-Aug	2	1	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2
15-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
16-Aug	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
17-Aug	0	Z	1	4	6	7	9	10	5	7	2	1	0	2	2	2	1	1	0	2	1	0	0	1	2.8	10
18-Aug	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.2	1
19-Aug	0	0	0	Z	0	0	1	0	0	1	1	3	4	1	0	0	0	0	0	0	0	0	0	0	0.6	4
20-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
21-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
22-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
23-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	1	1	1	1	1	0	0	0.5	1
24-Aug	0	0	Z	1	1	1	1	1	1	0	0	2	3	4	3	0	0	0	0	0	1	1	0	0	0.9	4
25-Aug	0	0	0	Z	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
26-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	2	6	5	9	5	2	2	1.5	9
27-Aug	1	1	1	2	10	Z	2	1	1	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	1.1	10
28-Aug	Z	3	3	3	3	3	5	6	9	11	10	9	3	1	0	1	3	2	1	0	1	0	0	0	3.4	11
29-Aug	0	Z	0	0	0	0	0	0	12	24	16	1	0	0	0	0	0	0	0	0	0	0	0	0	2.5	24
30-Aug	0	0	Z	0	0	0	0	0	2	13	4	4	2	2	1	11	19	3	0	0	0	0	1	0	2.7	19
31-Aug	0	0	0	Z	0	0	0	0	3	17	25	12	2	1	1	1	4	8	1	0	0	2	2	1	3.5	25
	0.4	0.8	1.0	1.1	1.9	1.5	1.4	1.4	1.5	3.2	2.8	1.9	1.2	0.9	0.7	0.8	1.4	1.0	0.6	0.7	0.7	0.5	0.4	0.4	Diurnal Average	
	2	8	11	8	15	8	9	10	12	24	25	12	7	4	3	11	19	8	6	5	9	5	2	2	Diurnal Maximum	

Z - zerospan C - Calibration

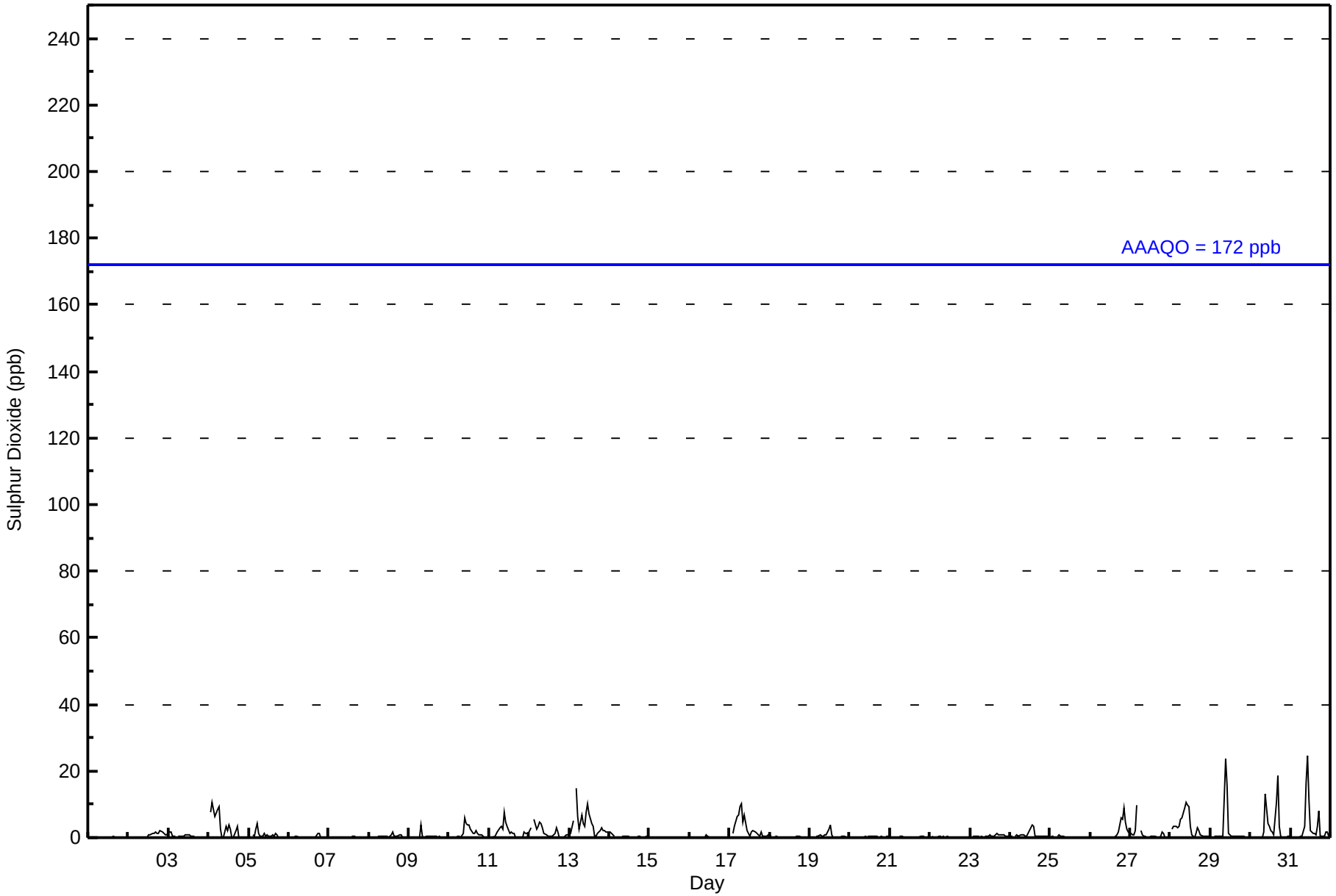
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb

Wood Buffalo Environmental Association

Hourly Averages

Sulphur Dioxide (SO_2) - ppb

Firebag - August 2015



Sulphur Dioxide (SO_2) - ppb
Firebag - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	696	98.31	98.31
11 - 20	10	1.41	99.72
21 - 60	2	0.28	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

Firebag - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 10	30	25	16	4	16	40	74	47	51	53	91	85	60	43	35	23	693
11 - 20	0	0	0	0	0	1	0	0	0	2	1	5	1	0	0	0	10
21 - 60	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	2
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	30	25	16	4	16	41	74	47	51	55	93	91	61	43	35	23	705

Total Number of Valid Hours: 705

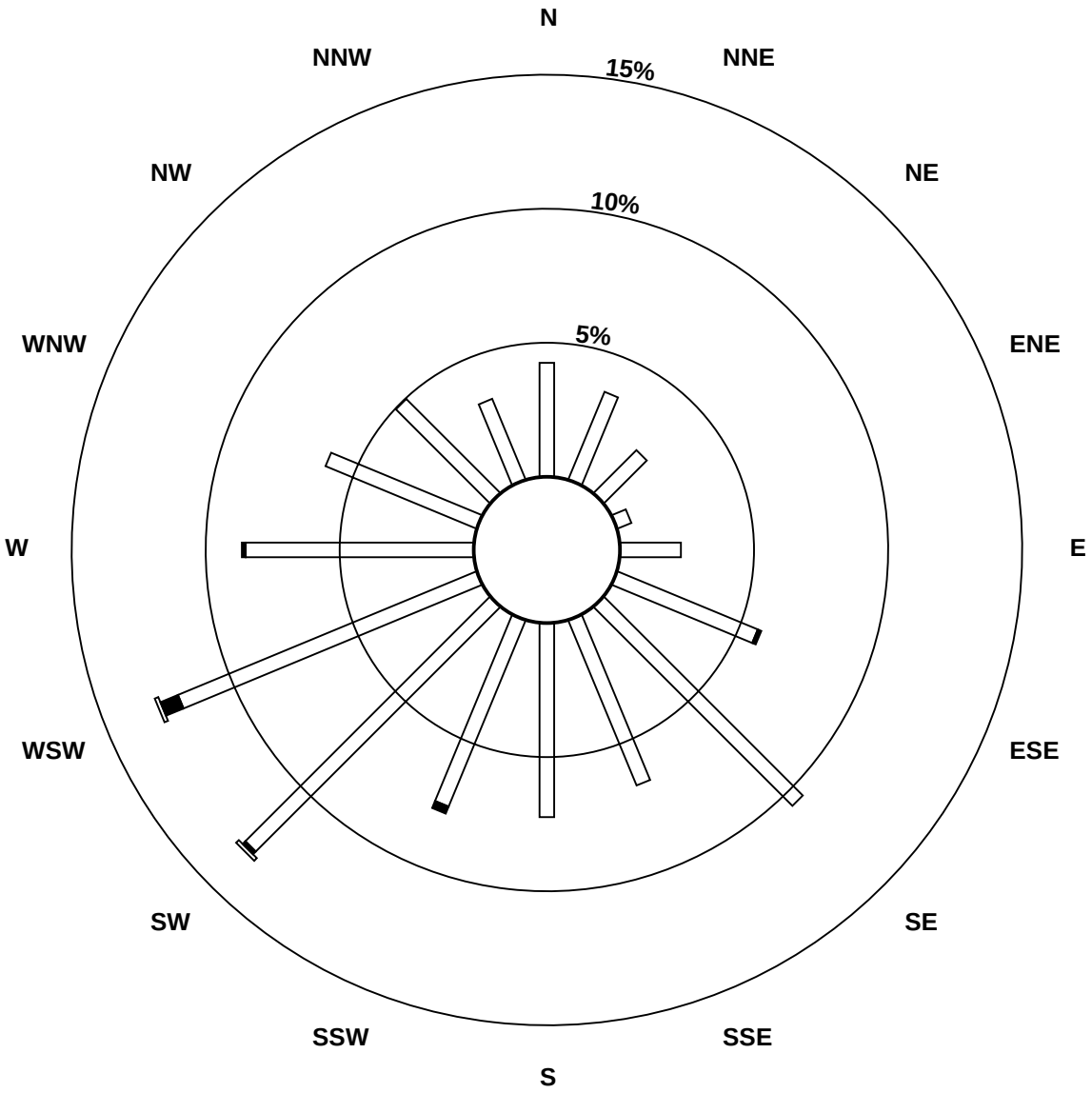
Total Number of Hours: 744

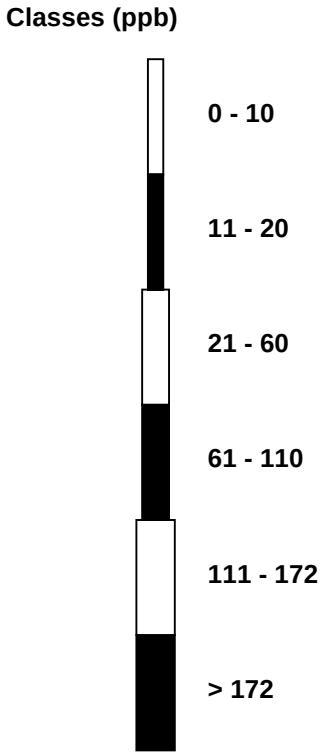
Wood Buffalo Environmental Association

Wind Rose Aug 2015

Sulphur Dioxide (SO_2) - ppb

Firebag (AMS 19)





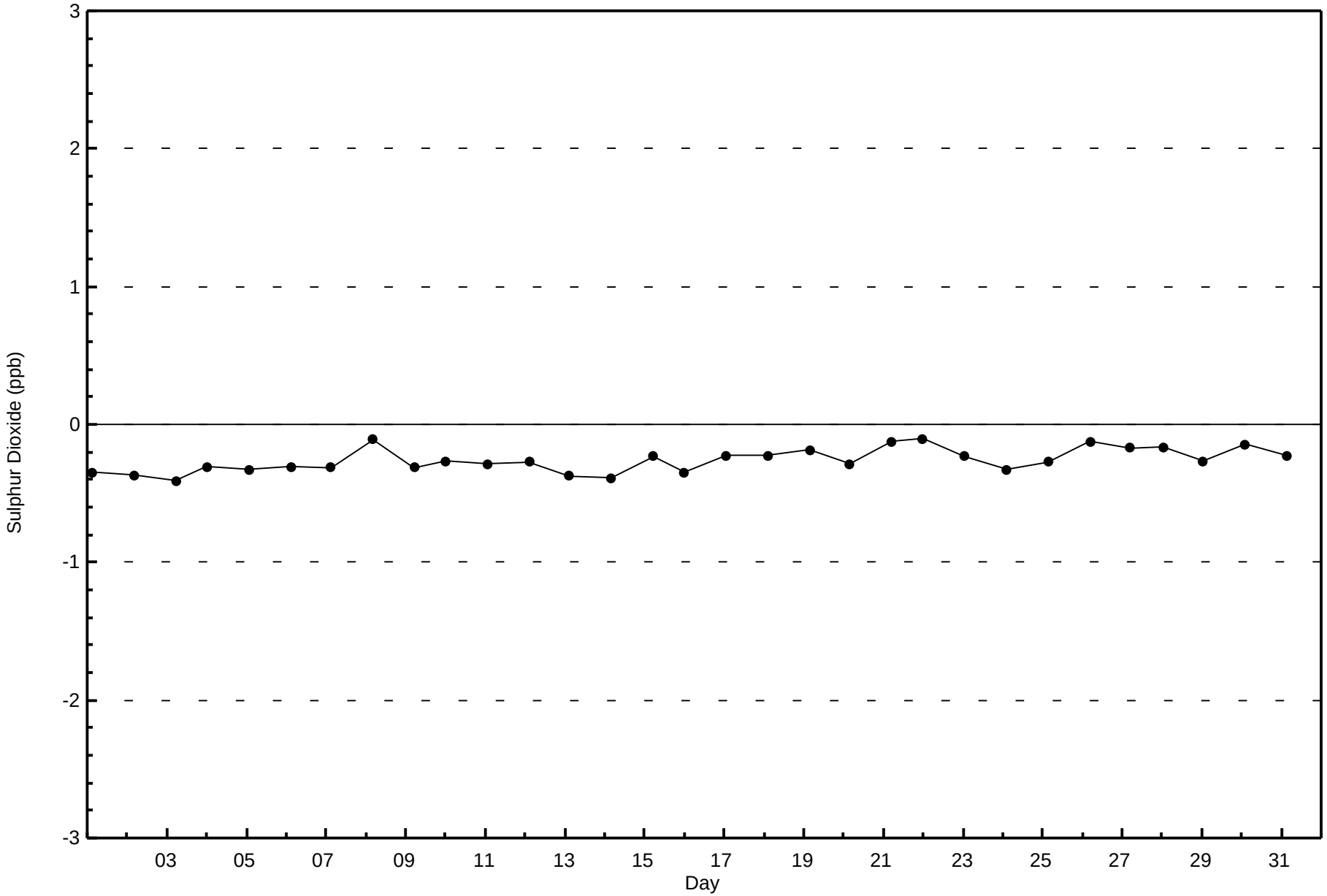
Total Number of Valid Hours: 705

Wood Buffalo Environmental Association

Zero Responses

Sulphur Dioxide (SO_2) - ppb

Firebag - August 2015

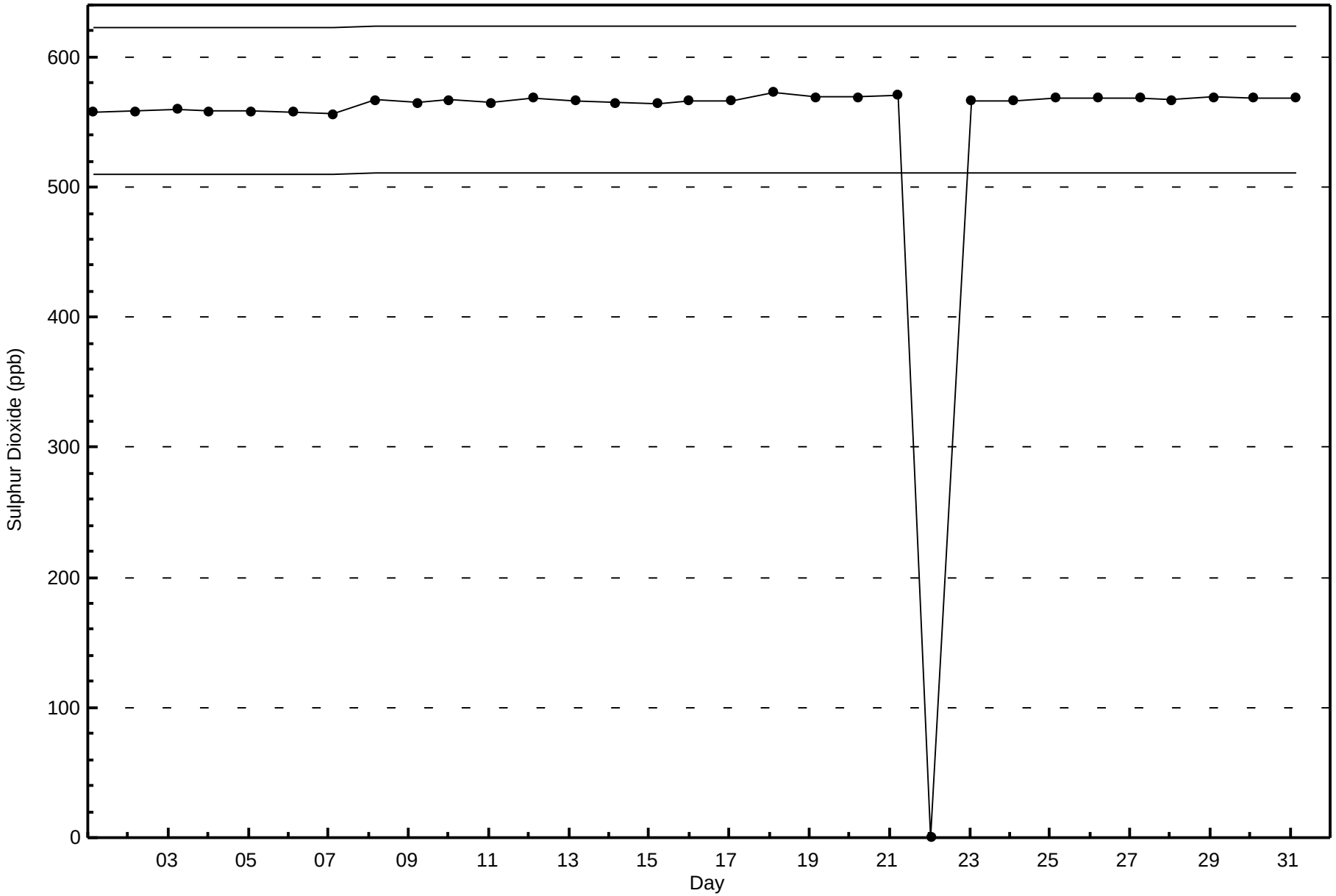


Wood Buffalo Environmental Association

Span Responses

Sulphur Dioxide (SO_2) - ppb

Firebag - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Hydrogen Sulphide (H_2S) - ppb

Firebag - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 3 ppb on Aug 25 04:00

Maximum Daily Average: 0.6 ppb on Aug 25

Minimum Value: 0 ppb on Sep 1 00:00

Minimum Daily Average: 0.1 ppb on Aug 31

Maximum Diurnal Average: 0.4 ppb at hour 4

Minimum Diurnal Average: 0.2 ppb at hour 16

Monthly Average: 0.2 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 0$ $P_{99} = 1$

Hours in Service:	744
Hours of Data:	709
Hours of Missing Data:	35
Hours of Calibration:	35
Percent Operational Time:	100.0

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

Z - zerospan C - Calibration

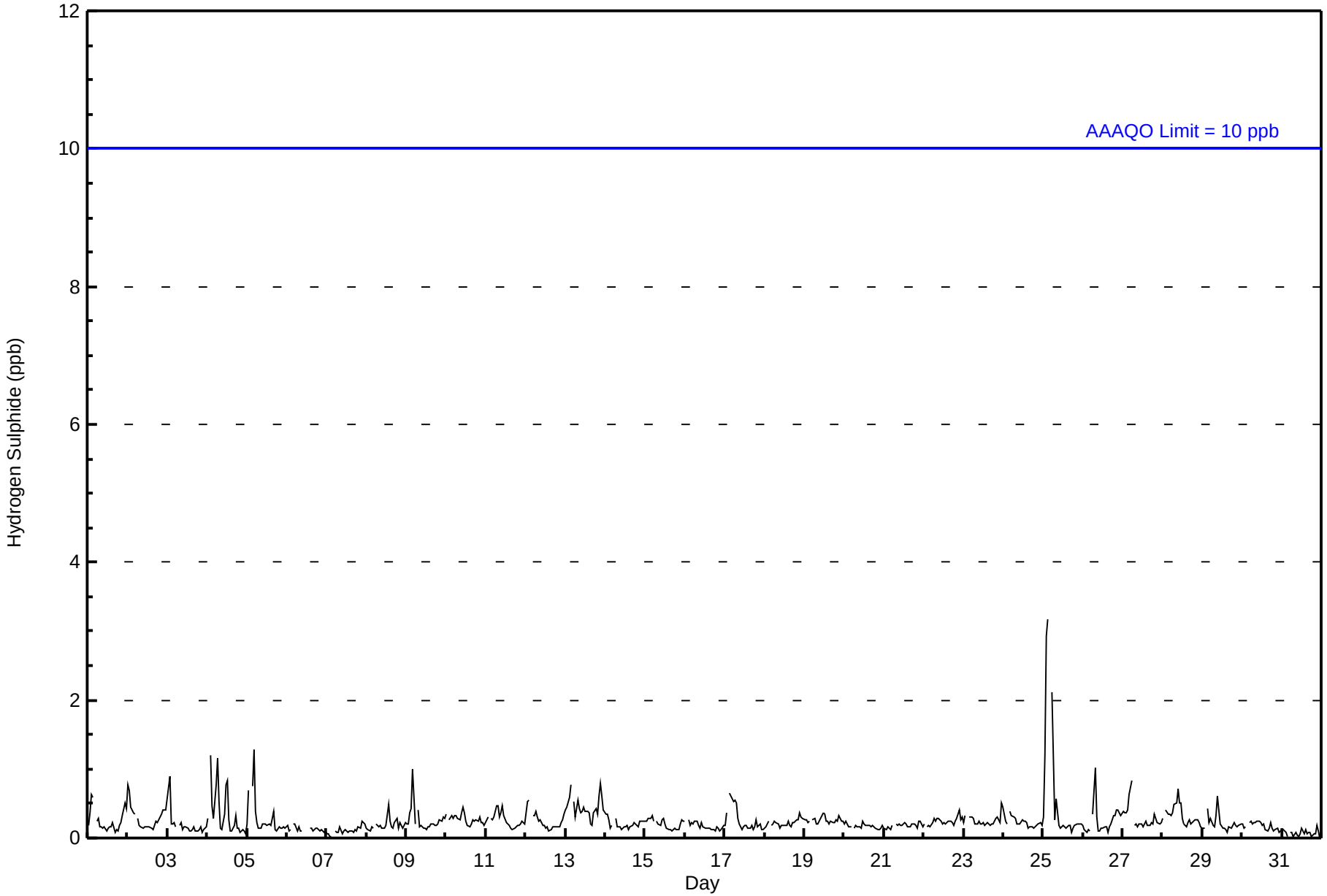
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb

Wood Buffalo Environmental Association

Hourly Averages

Hydrogen Sulphide (H_2S) - ppb

Firebag - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Hydrogen Sulphide (H_2S) - ppb

Firebag - August 2015

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 (H_2S) - ppb

Firebag - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 2	29	25	16	5	16	37	72	51	51	53	95	91	61	41	38	23	704
3 - 4	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	29	25	16	5	16	39	72	51	51	53	95	91	61	41	38	23	706

Total Number of Valid Hours: 706

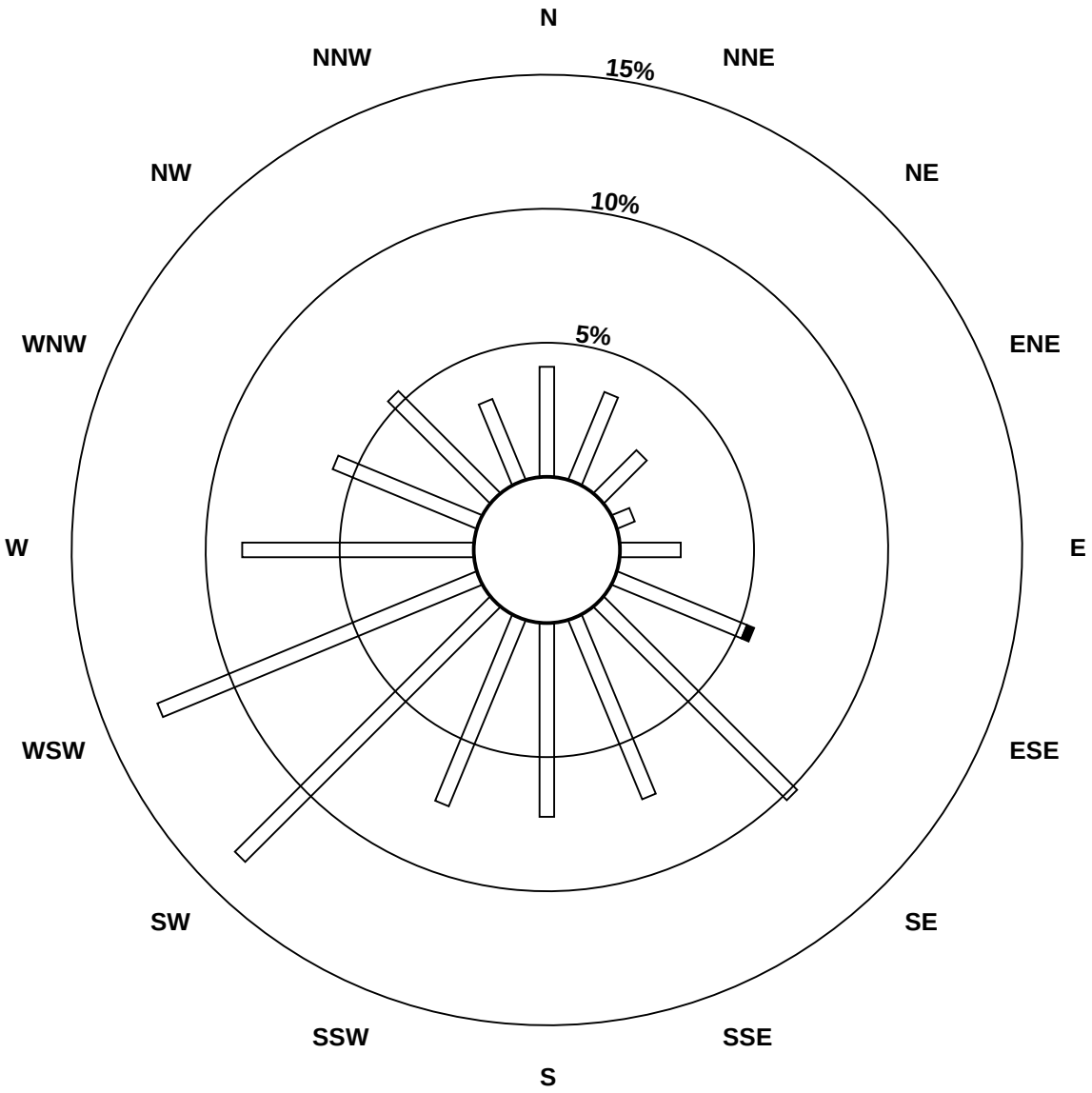
Total Number of Hours: 744

Wood Buffalo Environmental Association

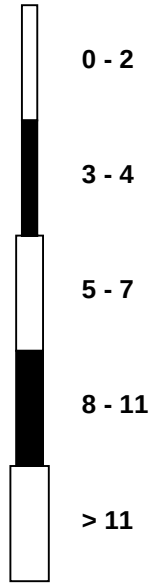
Wind Rose Aug 2015

Hydrogen Sulphide (H_2S) - ppb

Firebag (AMS 19)



Classes (ppb)



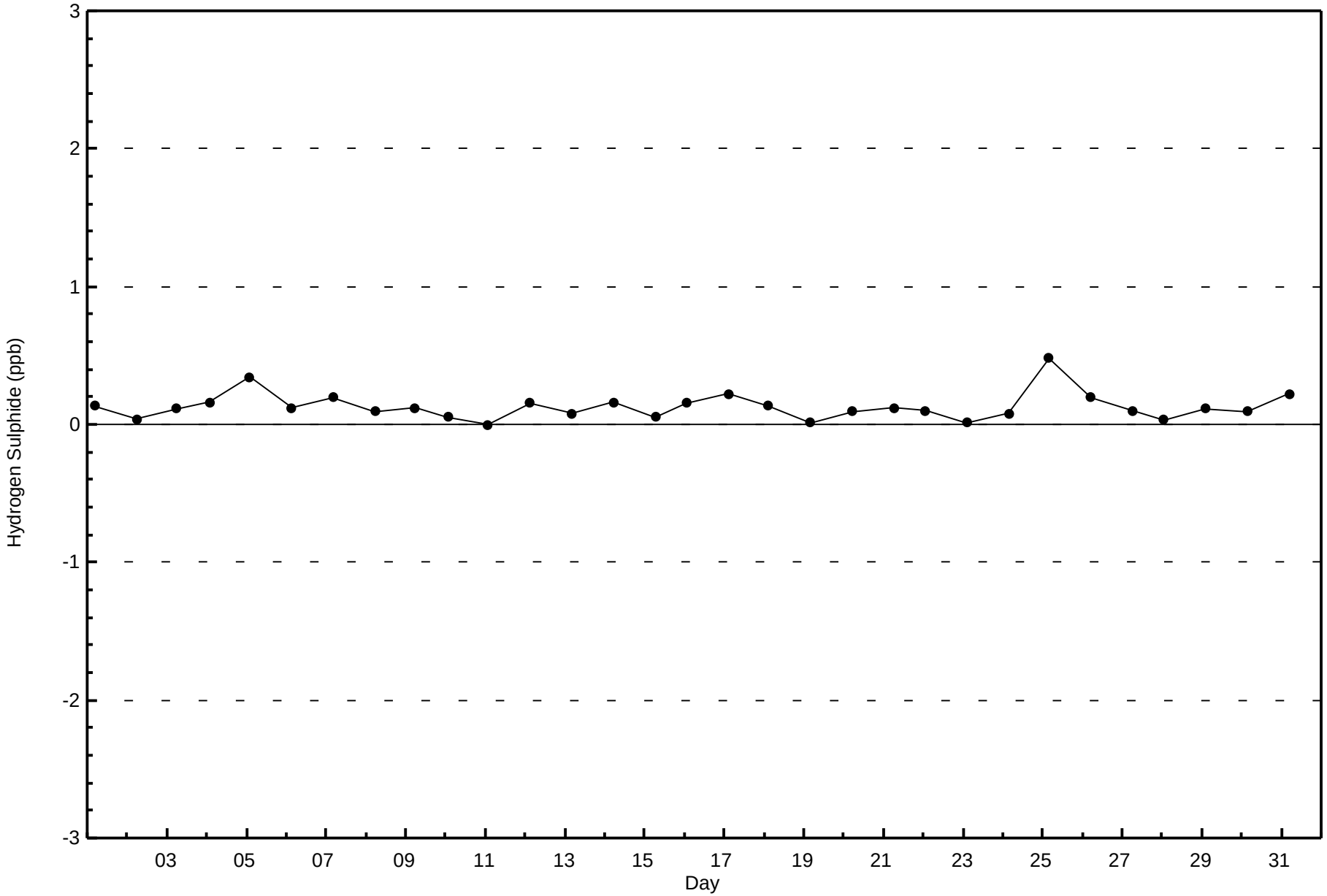
Total Number of Valid Hours: 706

Wood Buffalo Environmental Association

Zero Responses

Hydrogen Sulphide (H_2S) - ppb

Firebag - August 2015

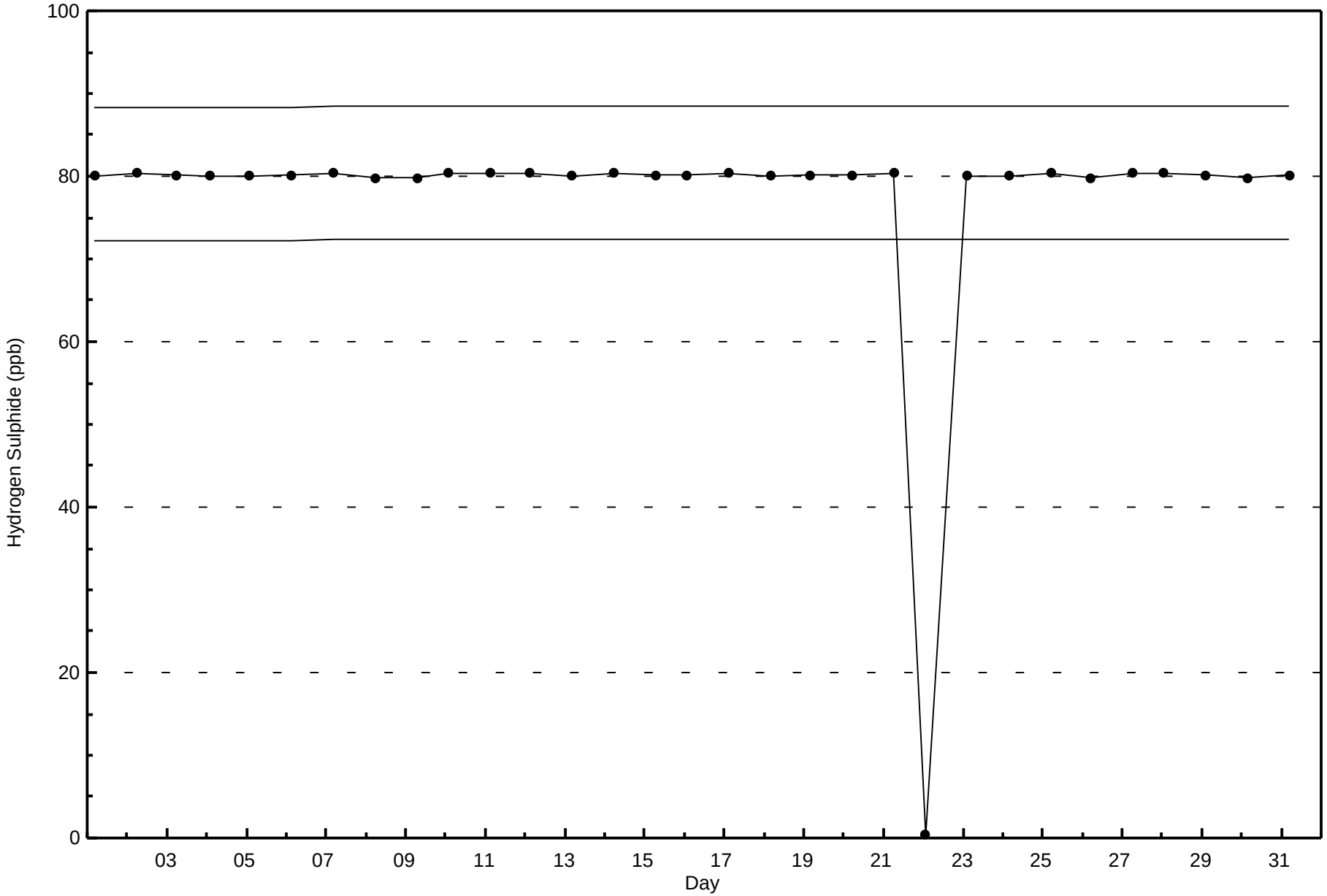


Wood Buffalo Environmental Association

Span Responses

Hydrogen Sulphide (H_2S) - ppb

Firebag - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Firebag - August 2015

Maximum Value: 3.1 ppm on Aug 2 01:00

Maximum Daily Average: 2.4 ppm on Aug 2

Minimum Value: 1.9 ppm on Aug 27 15:00

Minimum Daily Average: 2.1 ppm on Aug 30

Maximum Diurnal Average: 2.3 ppm at hour 3

Minimum Diurnal Average: 2.0 ppm at hour 17

Monthly Average: 2.13 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} = 2.6

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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	2.2	2.2	2.4	Z	2.6	2.3	2.4	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.4	2.9	2.2	2.9
2-Aug	3.1	2.7	3.0	2.8	Z	2.4	2.5	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	2.3	2.4	2.9	2.6	2.4	3.1
3-Aug	2.3	2.2	2.3	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	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.3
4-Aug	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.2
5-Aug	2.1	Z	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.2
6-Aug	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
7-Aug	2.1	2.1	2.1	Z	2.2	2.1	2.1	2.1	2.1	C	C	C	C	C	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.1	2.2
8-Aug	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.2	2.1	2.2	2.1	2.2
9-Aug	2.2	2.3	2.3	2.4	2.5	Z	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.0	2.1	2.0	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.5
10-Aug	Z	2.2	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	2.1	2.2
11-Aug	2.0	Z	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.2	2.3	2.1	2.3
12-Aug	2.4	2.4	Z	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.3	2.3	2.2	2.4
13-Aug	2.4	2.4	2.5	Z	2.3	2.2	2.1	2.2	2.1	2.1	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.3	2.1	2.5
14-Aug	2.3	2.3	2.2	2.1	Z	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.3
15-Aug	2.2	2.1	2.1	2.2	2.2	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.2
16-Aug	Z	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.3	2.2	2.3	2.1	2.3
17-Aug	2.3	Z	2.6	2.5	2.5	2.4	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.6
18-Aug	2.3	2.3	Z	2.3	2.3	2.2	2.3	2.2	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3
19-Aug	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	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
20-Aug	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	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.4	2.1	2.4
21-Aug	2.2	2.2	2.2	2.1	2.1	Z	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.1	2.1	2.3
22-Aug	Z	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.3	2.3	2.2	2.3
23-Aug	2.2	Z	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2
24-Aug	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.4	2.3	2.2	2.2	2.4
25-Aug	2.2	2.3	2.4	Z	2.3	2.3	2.2	2.2	2.2	2.1	2.1	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.2	2.2	2.3	2.2	2.2	2.2	2.4
26-Aug	2.1	2.2	2.1	2.1	Z	2.1	2.1	2.2	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.2	2.3	2.3	2.3	2.4	2.1	2.4
27-Aug	2.4	2.3	2.2	2.2	2.2	Z	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.4
28-Aug	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.3	2.4	2.4	2.1	2.1	2.4
29-Aug	2.2	Z	2.3	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.3
30-Aug	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	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.1	2.1	2.1
31-Aug	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1
	2.2	2.2	2.3	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	2.0	2.1	2.1	2.1	2.2	2.2	2.2	2.2	Diurnal Average	
	3.1	2.7	3.0	2.8	2.6	2.4	2.5	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.2	2.2	2.3	2.4	2.9	2.9	Diurnal Maximum	

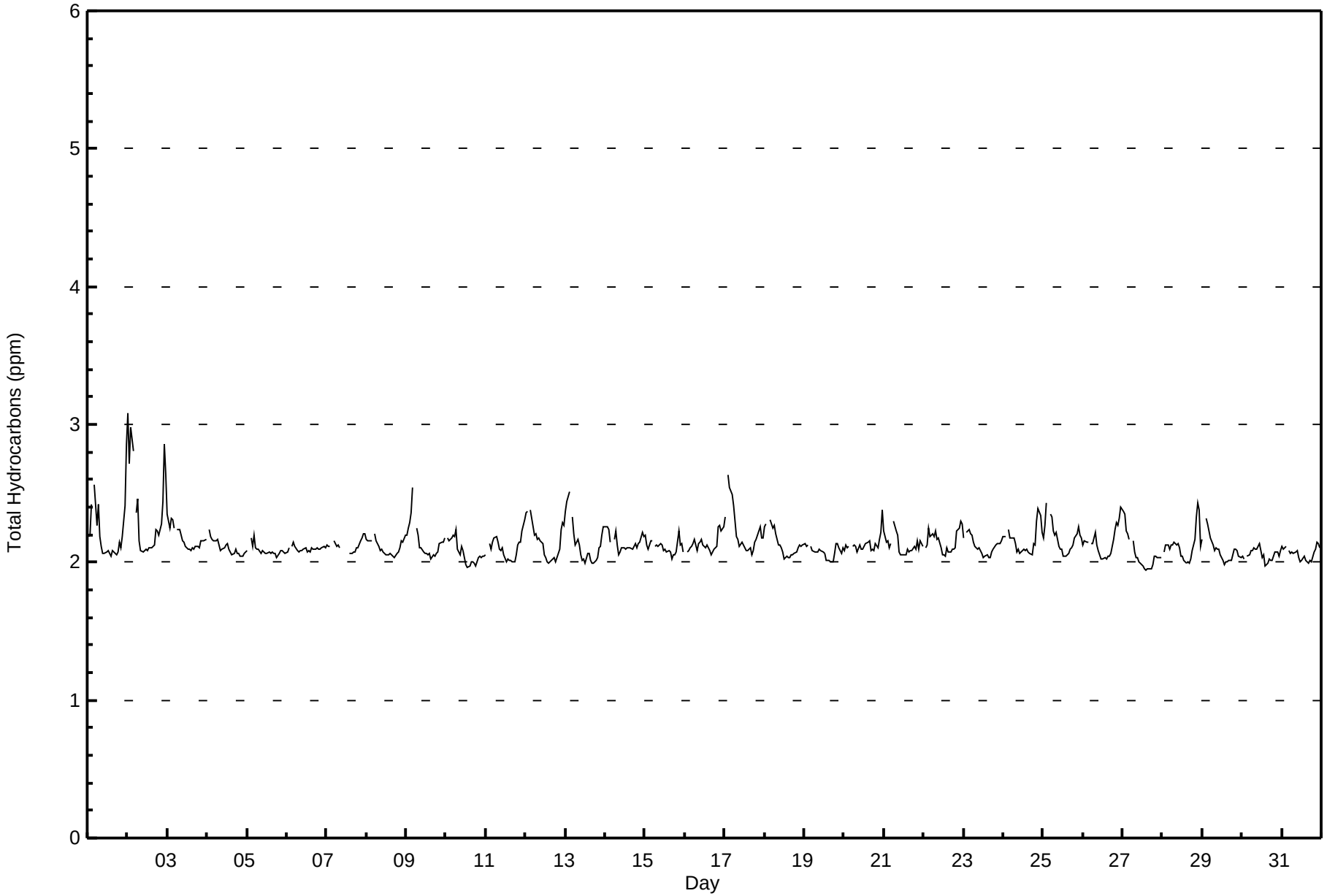
Z - zerospan C - Calibration

Wood Buffalo Environmental Association

Hourly Averages

Total Hydrocarbons (THC) - ppm

Firebag - August 2015



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm

Firebag - August 2015

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	120	16.95	16.95
2.1 - 3.0	587	82.91	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

Firebag - August 2015

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	3	1	2	0	1	1	7	3	2	16	24	36	14	2	6	2	120
2.1 - 3.0	27	24	14	4	15	40	66	44	49	39	69	55	47	41	29	21	584
3.1 - 10.0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	30	25	16	4	16	41	74	47	51	55	93	91	61	43	35	23	705

Total Number of Valid Hours: 705

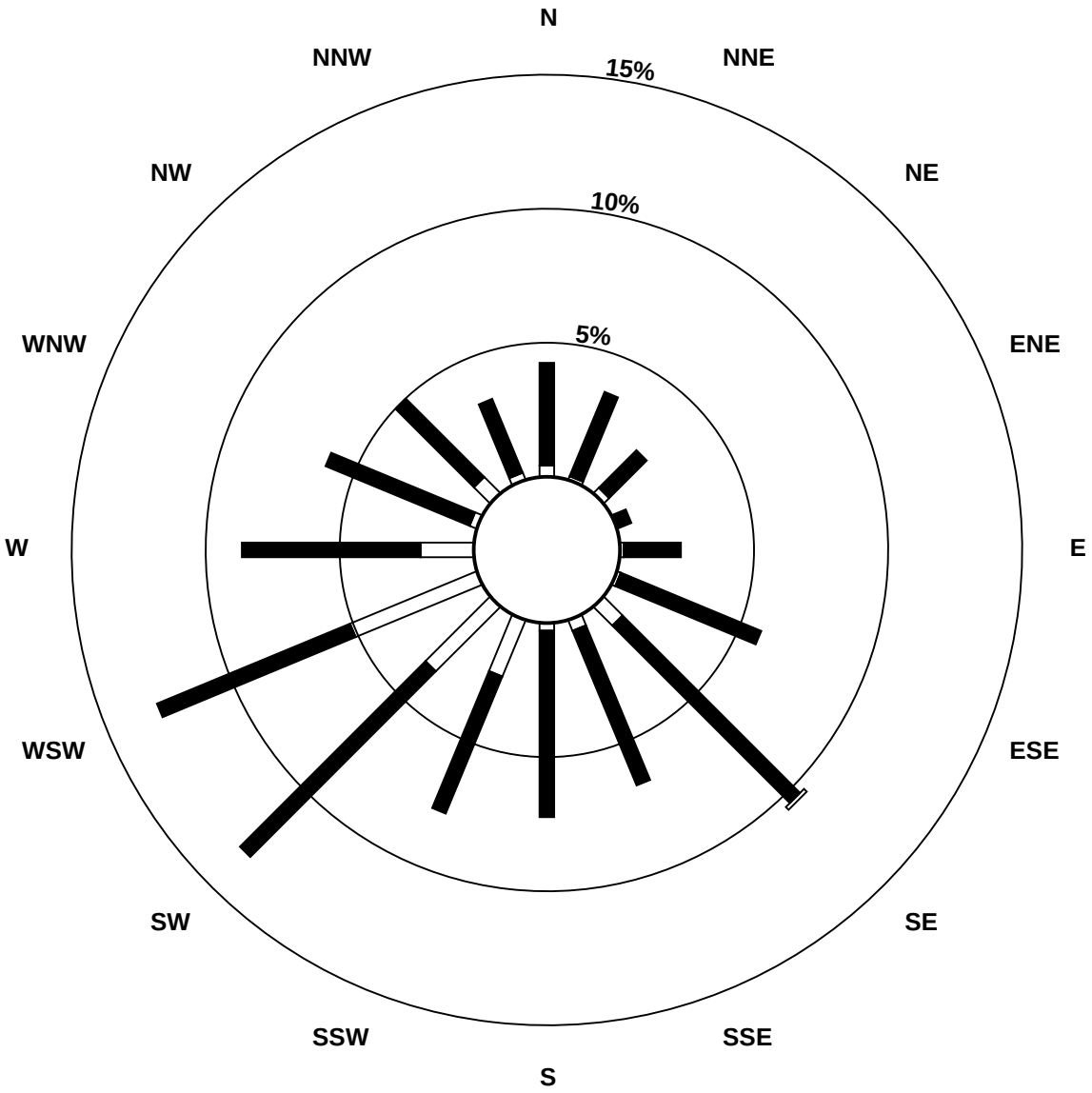
Total Number of Hours: 744

Wood Buffalo Environmental Association

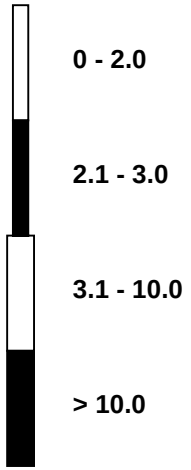
Wind Rose Aug 2015

Total Hydrocarbons (THC) - ppm

Firebag (AMS 19)



Classes (ppm)



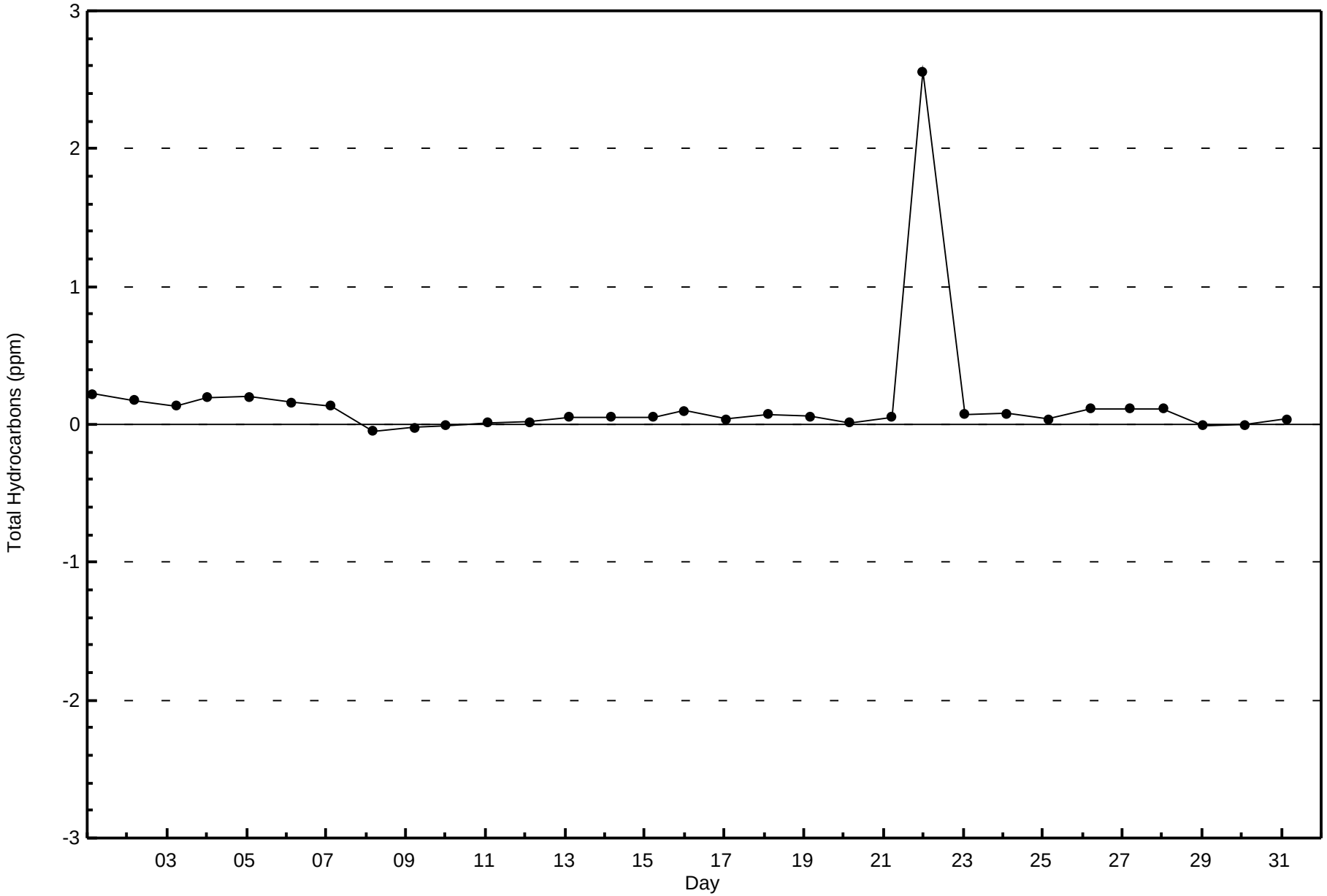
Total Number of Valid Hours: 705

Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Firebag - August 2015

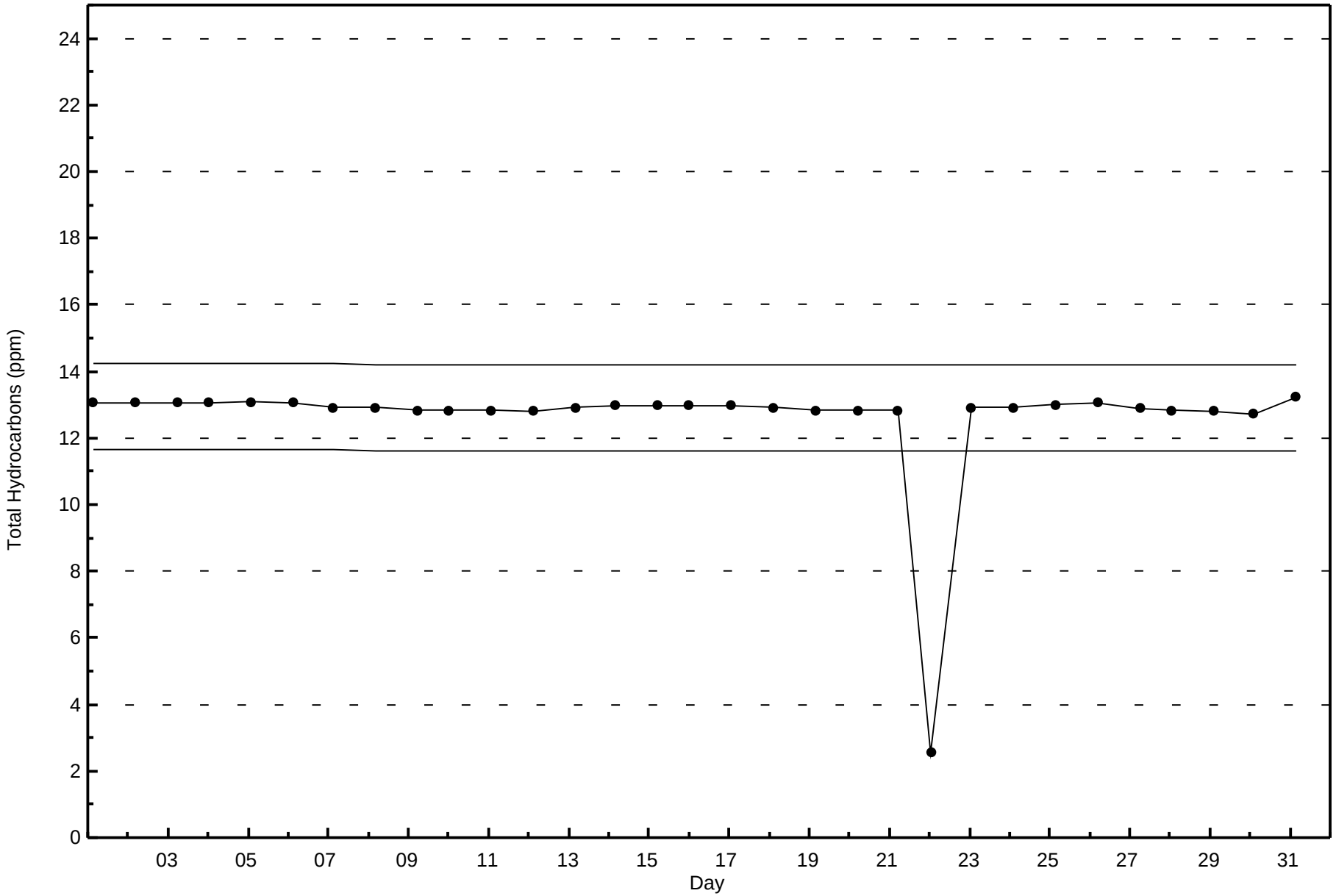


Wood Buffalo Environmental Association

Span Responses

Total Hydrocarbons (THC) - ppm

Firebag - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxide (NO) - ppb

Firebag - August 2015

Maximum Value: 15 ppb on Aug 10 00:00

Maximum Daily Average: 3.1 ppb on Aug 7

Minimum Value: 0 ppb on Aug 8 02:00

Minimum Daily Average: 0.1 ppb on Aug 15

Maximum Diurnal Average: 1.7 ppb at hour 22

Minimum Diurnal Average: 0.3 ppb at hour 17

Monthly Average: 0.8 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 1$ $P_{90} = 2$ $P_{99} = 8$

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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0	2	2	Z	0	0	1	1	1	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0.5	3
2-Aug	0	0	0	2	Z	7	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.7	7
3-Aug	1	0	0	0	1	Z	5	1	1	0	0	1	0	1	1	0	1	1	3	1	0	0	0	5	1.1	5
4-Aug	Z	0	0	0	0	0	0	0	0	3	0	0	1	0	0	0	0	0	1	3	2	4	1	0	0.8	4
5-Aug	1	Z	0	1	1	1	0	0	0	1	1	1	1	1	1	1	0	0	2	4	0	6	8	4	1.5	8
6-Aug	8	0	Z	0	0	1	0	0	1	0	1	1	0	0	0	1	0	0	0	0	1	0	0	0	0.8	8
7-Aug	0	0	0	Z	1	2	6	5	3	C	C	C	C	C	1	1	2	4	1	3	2	13	11	1	3.1	13
8-Aug	0	0	0	3	Z	1	0	0	0	0	0	0	0	2	2	1	0	1	0	1	8	6	3	5	1.4	8
9-Aug	2	3	2	1	5	Z	3	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	8	15	1.9	15
10-Aug	Z	3	3	7	6	0	1	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1.2	7
11-Aug	0	Z	0	0	0	0	0	1	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2
12-Aug	0	0	Z	0	0	0	1	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2
13-Aug	0	0	0	Z	0	0	0	4	3	1	2	2	2	2	1	0	0	1	1	0	0	0	0	0	0.9	4
14-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1
15-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
16-Aug	Z	0	0	0	0	0	1	0	1	1	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0.3	2
17-Aug	0	Z	0	0	1	4	4	3	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.8	4
18-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	8	6	4	0.9	8
19-Aug	2	0	0	Z	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0.3	2
20-Aug	0	0	0	0	Z	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0.3	1
21-Aug	0	0	0	0	0	Z	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2
22-Aug	Z	0	0	0	0	0	0	1	2	2	1	0	0	0	0	0	0	0	0	0	1	8	5	1	1.0	8
23-Aug	0	Z	0	0	1	6	1	0	0	0	0	0	0	0	0	0	0	0	1	5	5	2	0	0	1.1	6
24-Aug	0	1	Z	0	2	2	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0.4	2
25-Aug	2	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2
26-Aug	0	0	0	0	Z	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
27-Aug	0	0	0	0	0	Z	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2
28-Aug	Z	0	0	0	0	0	1	1	2	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0.5	2
29-Aug	0	Z	0	3	3	10	1	0	1	2	1	0	0	0	0	0	0	1	5	2	0	0	0	0	1.3	10
30-Aug	0	0	Z	0	6	6	5	1	0	1	1	1	0	0	0	0	0	0	1	2	3	4	0	0	1.4	6
31-Aug	0	0	0	Z	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
	0.7	0.4	0.4	0.8	1.1	1.6	1.3	0.9	0.7	0.7	0.6	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.6	0.8	0.8	1.7	1.4	1.2	Diurnal Average	
	8	3	3	7	6	10	6	5	3	3	2	2	2	2	2	3	2	4	5	5	8	13	11	15	Diurnal Maximum	

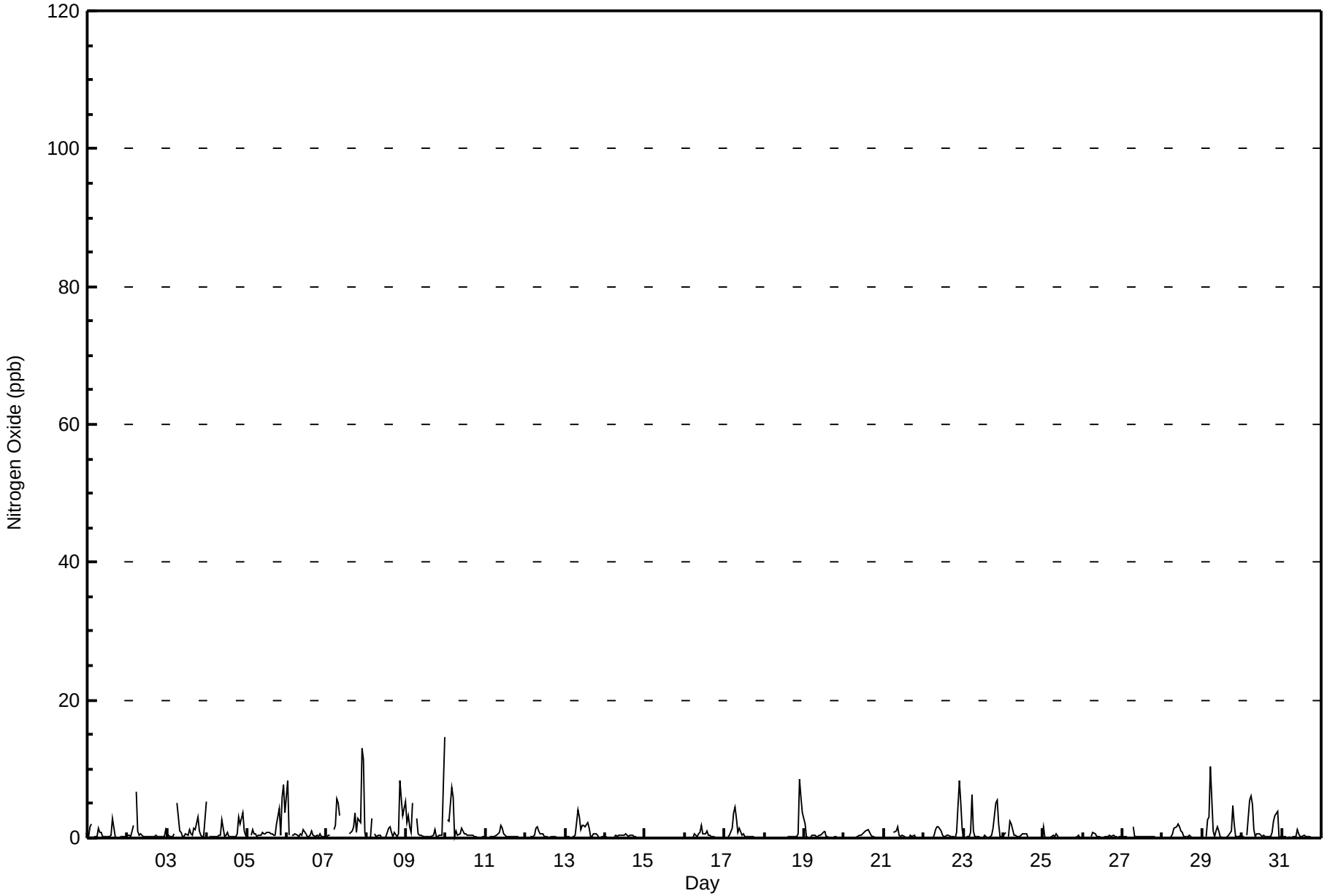
Z - zerospan C - Calibration

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Oxide (NO) - ppb

Firebag - August 2015



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	708	100.00	100.00
21 - 40	0	0.00	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: 708

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Oxide (NO) - ppb

Firebag - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	30	25	16	4	16	41	74	47	51	55	93	91	61	43	35	23	705
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	30	25	16	4	16	41	74	47	51	55	93	91	61	43	35	23	705

Total Number of Valid Hours: 705

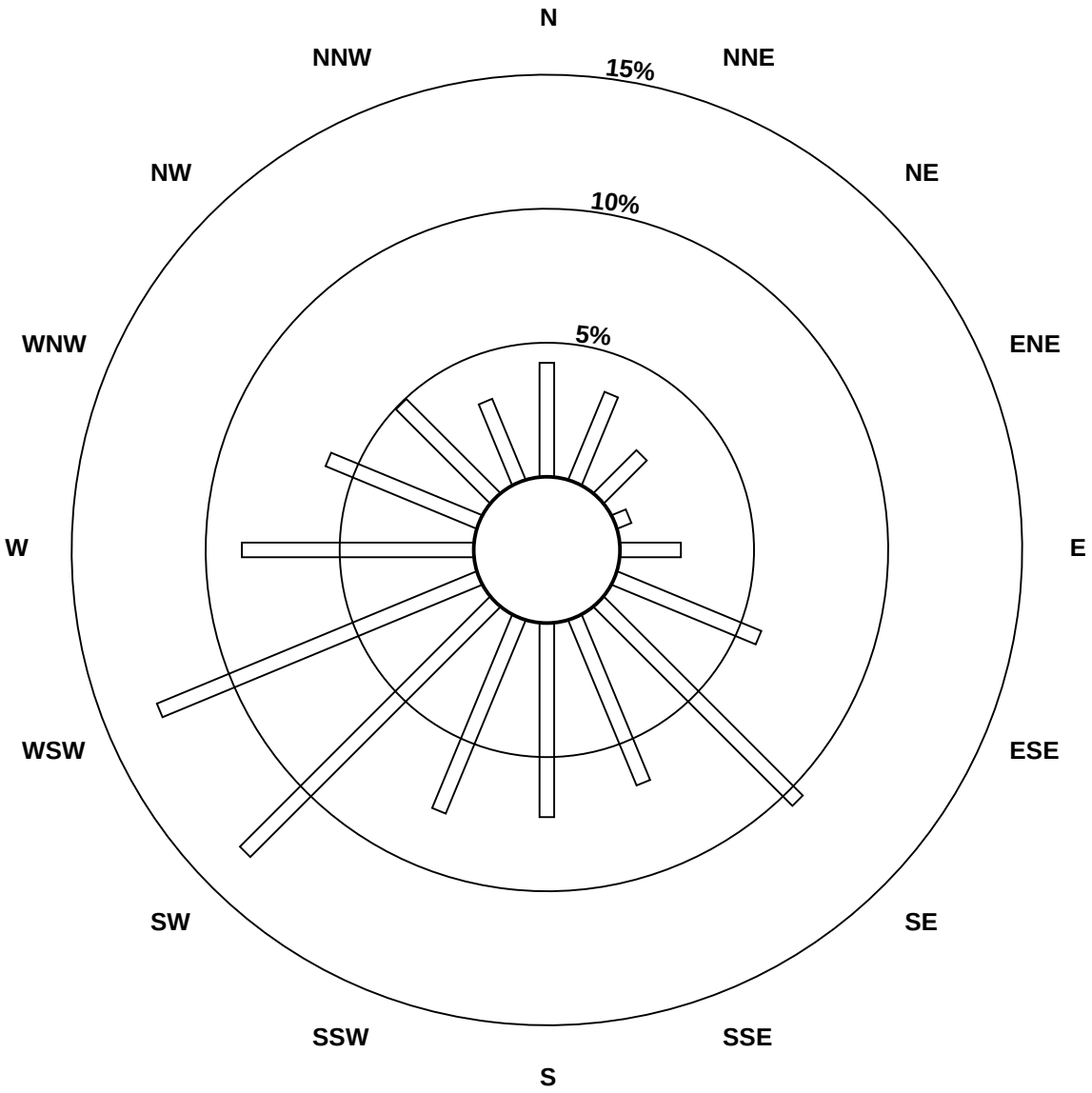
Total Number of Hours: 744

Wood Buffalo Environmental Association

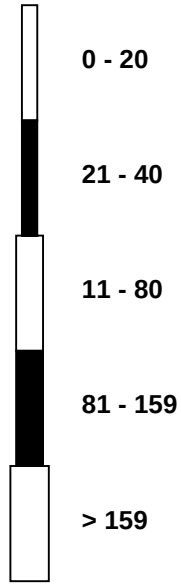
Wind Rose Aug 2015

Nitrogen Oxide (NO) - ppb

Firebag (AMS 19)



Classes (ppb)



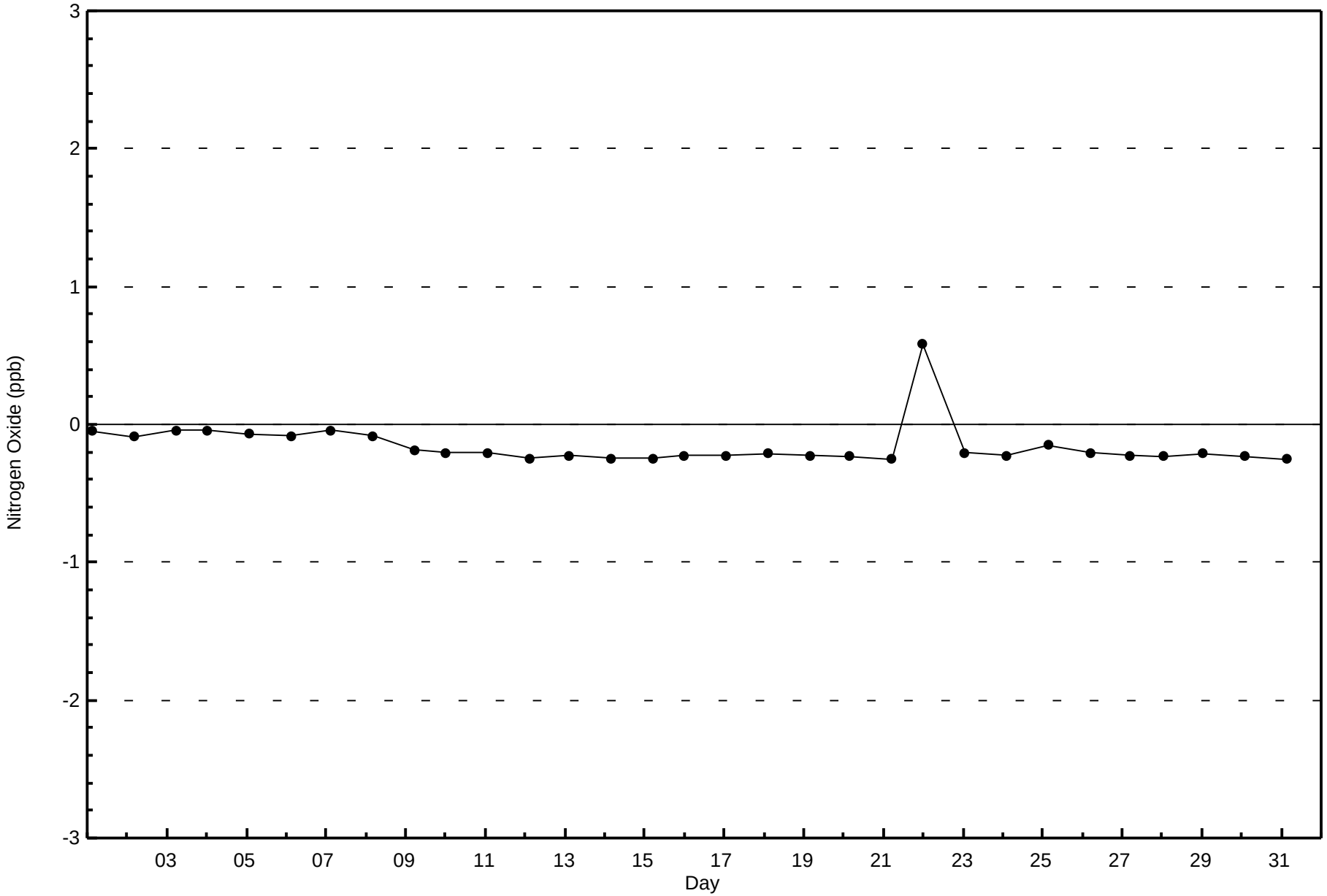
Total Number of Valid Hours: 705

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Oxide (NO) - ppb

Firebag - August 2015

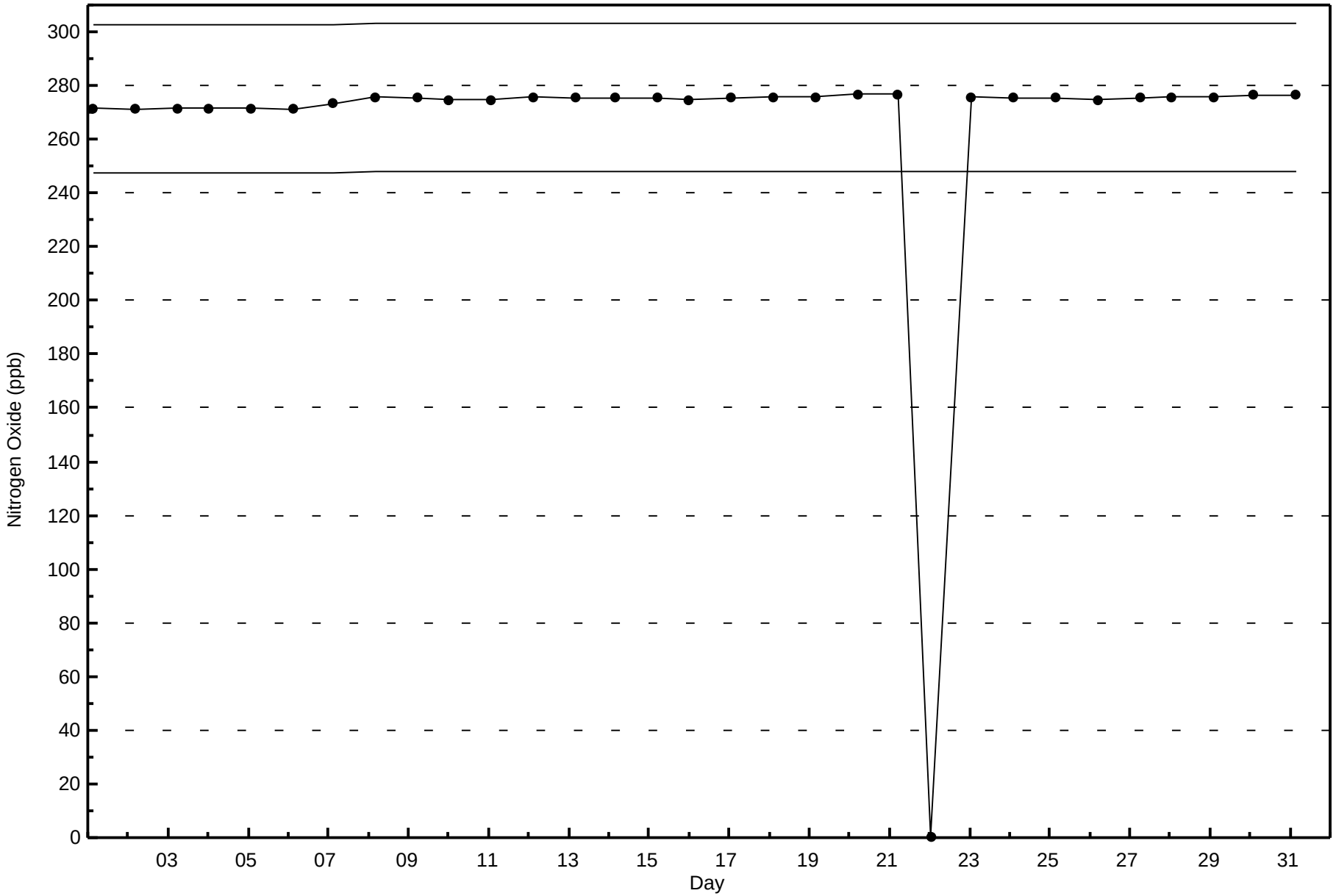


Wood Buffalo Environmental Association

Span Responses

Nitrogen Oxide (NO) - ppb

Firebag - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO_2) - ppb

Firebag - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 18 ppb on Aug 17 05:00

Maximum Daily Average: 5.4 ppb on Aug 13

Minimum Value: 0 ppb on Aug 15 13:00

Minimum Daily Average: 0.4 ppb on Aug 15

Maximum Diurnal Average: 4.6 ppb at hour 5

Minimum Diurnal Average: 1.1 ppb at hour 15

Monthly Average: 2.4 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 1$ Median = 1 $Q_3 = 3$ $P_{90} = 6$ $P_{99} = 14$

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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	2	6	6	Z	4	1	8	2	2	1	0	0	0	0	1	4	0	0	0	0	0	1	1	1	1.7	8
2-Aug	3	5	4	5	Z	14	2	1	1	0	0	0	1	1	1	1	1	4	3	2	3	4	3	7	2.8	14
3-Aug	6	2	1	1	4	Z	7	2	2	1	1	1	1	2	2	2	3	3	6	6	4	1	1	6	2.8	7
4-Aug	Z	2	2	1	1	2	2	2	2	4	1	2	3	1	0	1	1	1	1	4	3	7	2	1	1.9	7
5-Aug	1	Z	3	2	3	1	1	1	1	1	1	1	1	1	1	1	1	1	2	4	1	5	7	4	2.0	7
6-Aug	7	1	Z	0	1	1	1	0	1	1	1	1	0	0	0	1	0	0	0	0	1	0	0	0	0.7	7
7-Aug	0	0	0	Z	1	2	3	4	2	C	C	C	C	C	1	2	2	4	2	5	4	11	8	2	2.9	11
8-Aug	1	1	1	2	Z	1	1	1	1	1	1	1	1	3	3	2	1	2	2	2	11	6	5	5	2.3	11
9-Aug	4	8	5	3	9	Z	4	2	1	1	1	1	1	1	1	1	2	2	1	1	3	2	8	14	3.4	14
10-Aug	Z	3	2	6	6	3	5	2	2	5	3	3	2	2	1	2	2	1	1	1	1	1	1	1	2.4	6
11-Aug	1	Z	2	1	1	2	5	6	2	4	4	2	1	1	1	1	1	1	1	2	1	2	3	3	2.1	6
12-Aug	4	7	Z	10	9	6	5	4	3	2	2	1	1	1	1	1	2	2	1	0	1	2	3	3	3.0	10
13-Aug	5	7	11	Z	14	5	3	7	5	3	5	6	6	6	5	1	1	2	3	4	4	4	7	10	5.4	14
14-Aug	8	5	3	1	Z	2	3	2	1	1	2	2	1	1	1	1	1	1	1	0	0	1	5	2	1.9	8
15-Aug	3	0	0	3	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	3
16-Aug	Z	0	0	0	0	0	4	0	2	2	3	1	1	2	1	1	1	1	1	1	2	1	0	0	1.0	4
17-Aug	2	Z	11	15	18	14	8	5	2	2	1	2	1	2	2	2	1	1	1	3	2	3	2	1	4.4	18
18-Aug	1	1	Z	4	2	0	0	0	0	0	0	0	0	0	1	1	1	1	2	1	2	12	8	5	1.9	12
19-Aug	3	0	1	Z	1	1	2	1	1	1	2	3	3	1	1	0	0	0	2	4	3	1	0	0	1.3	4
20-Aug	0	1	0	0	Z	0	0	0	1	3	1	2	2	2	2	3	2	1	1	1	1	1	2	6	1.3	6
21-Aug	1	0	0	0	1	Z	3	3	3	1	1	1	1	0	0	0	1	1	2	0	0	1	6	0	1.2	6
22-Aug	Z	0	0	5	3	2	4	6	4	4	2	1	0	0	1	1	1	1	1	2	5	10	10	4	2.9	10
23-Aug	2	Z	3	2	3	8	3	1	1	0	0	0	0	1	1	1	2	2	5	16	15	6	2	4	3.3	16
24-Aug	4	4	Z	5	8	8	3	2	1	1	1	2	2	2	2	1	0	1	1	2	2	2	1	1	2.3	8
25-Aug	4	3	1	Z	3	4	3	1	2	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1.1	4
26-Aug	0	0	0	0	Z	1	3	3	1	1	0	0	0	1	1	1	2	3	5	8	8	6	9	11	2.8	11
27-Aug	13	11	8	7	6	Z	5	1	1	1	1	1	1	1	1	1	1	1	2	3	2	3	2	1	3.1	13
28-Aug	Z	3	4	6	5	5	5	6	6	6	5	3	2	1	1	1	2	2	2	2	5	6	2	2	3.5	6
29-Aug	3	Z	5	6	7	13	4	1	3	4	3	1	1	0	1	1	2	3	13	7	1	1	1	1	3.5	13
30-Aug	1	0	Z	1	8	8	7	2	1	2	2	2	2	2	1	1	2	2	3	7	6	6	1	1	3.0	8
31-Aug	1	1	1	Z	1	1	1	1	1	2	1	1	1	1	1	1	1	1	0	1	3	4	6	5	1.5	6
	3.1	2.8	3.0	3.5	4.6	4.1	3.3	2.2	1.7	1.8	1.5	1.3	1.2	1.3	1.1	1.1	1.1	1.4	2.0	2.9	3.0	3.5	3.3	3.3	Diurnal Average	
	13	11	11	15	18	14	8	7	6	6	5	6	6	6	5	4	3	4	13	16	15	12	10	14	Diurnal Maximum	

Z - zerospan C - Calibration

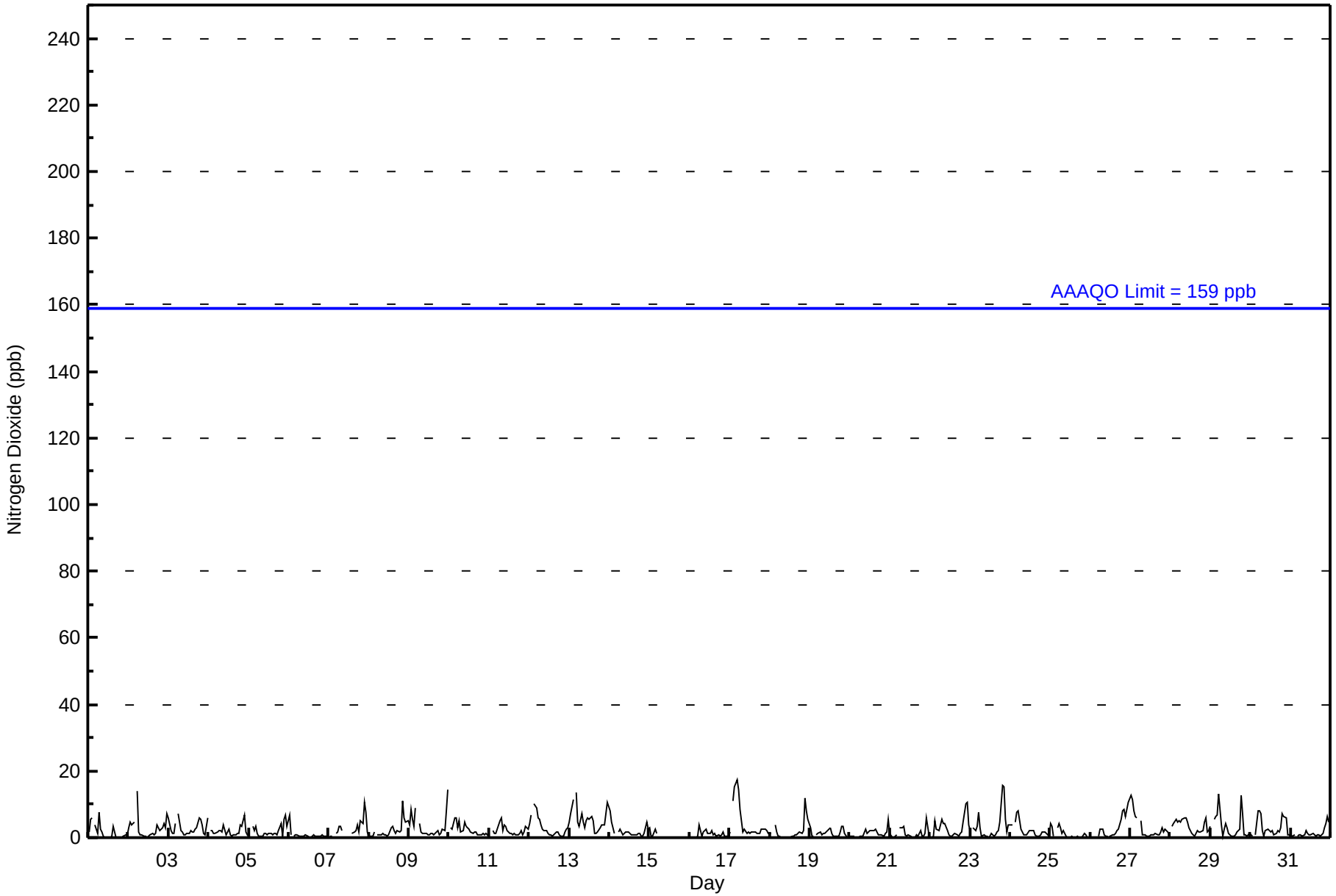
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Dioxide (NO_2) - ppb

Firebag - August 2015



Nitrogen Dioxide (NO_2) - ppb
Firebag - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	708	100.00	100.00
21 - 40	0	0.00	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: 708

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Dioxide (NO_2) - ppb

Firebag - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	30	25	16	4	16	41	74	47	51	55	93	91	61	43	35	23	705
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	30	25	16	4	16	41	74	47	51	55	93	91	61	43	35	23	705

Total Number of Valid Hours: 705

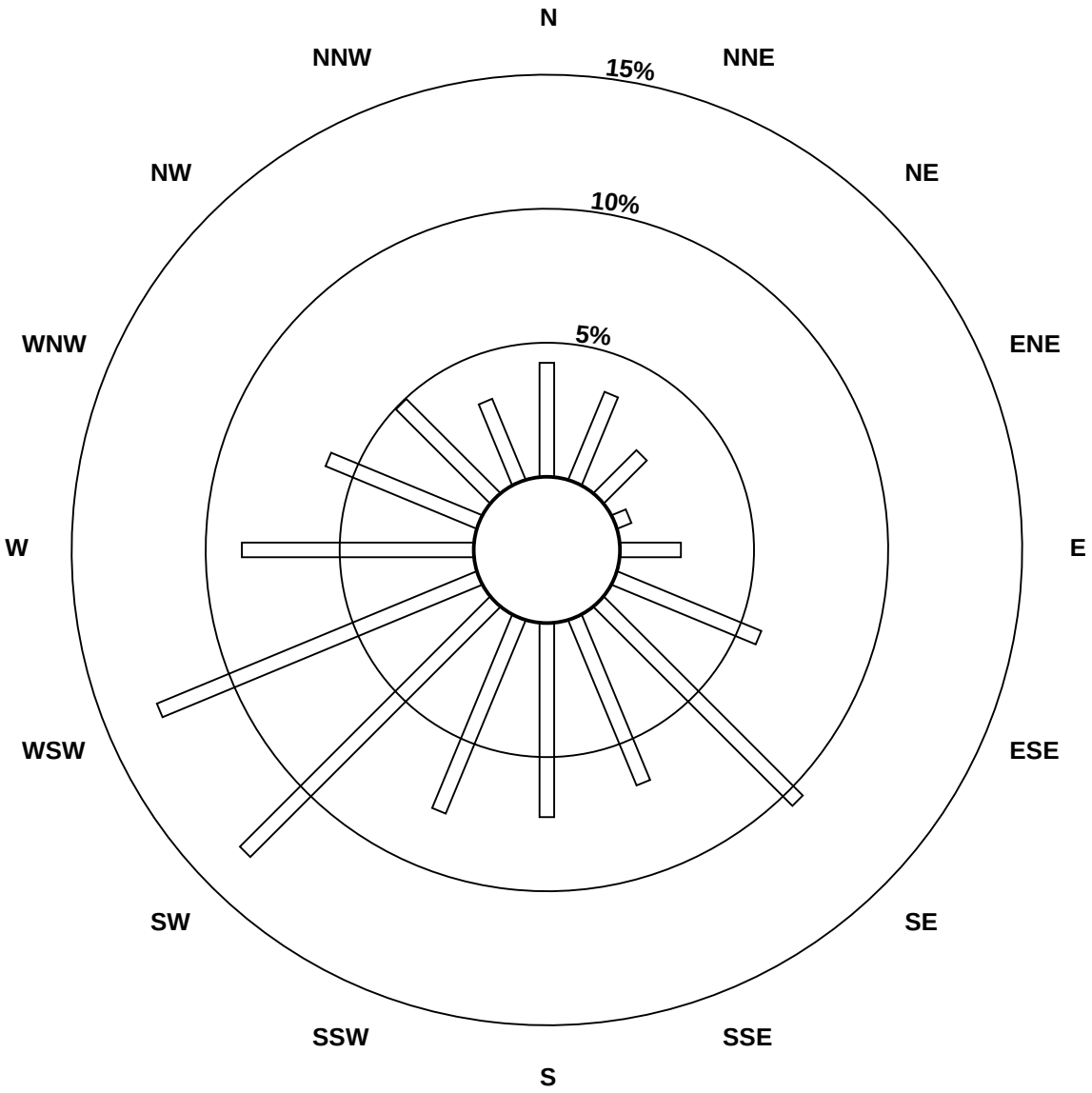
Total Number of Hours: 744

Wood Buffalo Environmental Association

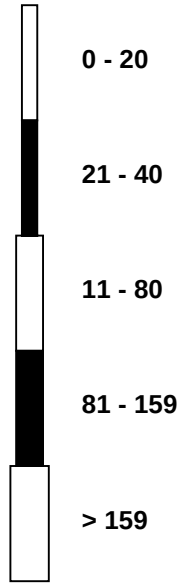
Wind Rose Aug 2015

Nitrogen Dioxide (NO_2) - ppb

Firebag (AMS 19)



Classes (ppb)



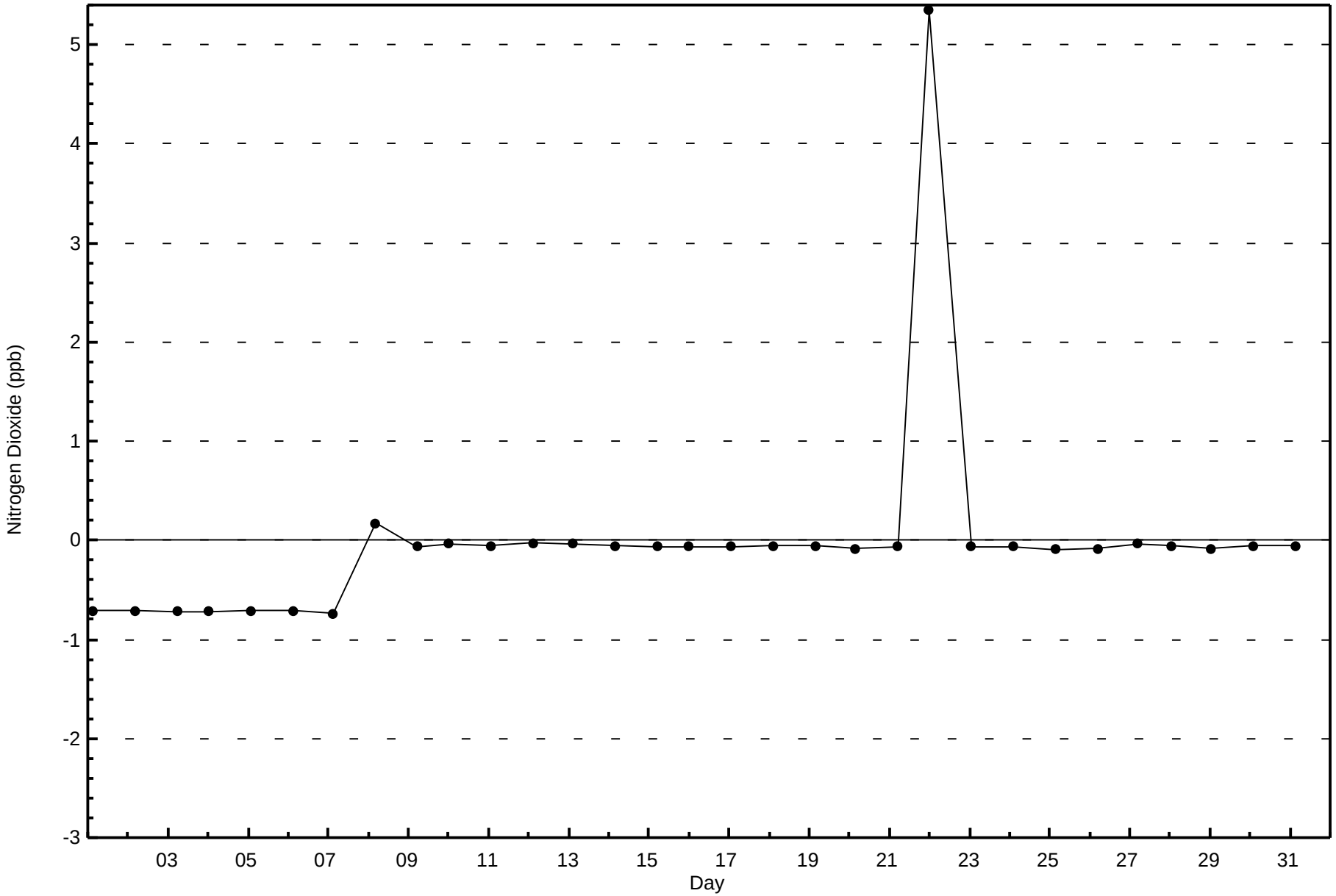
Total Number of Valid Hours: 705

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Dioxide (NO_2) - ppb

Firebag - August 2015

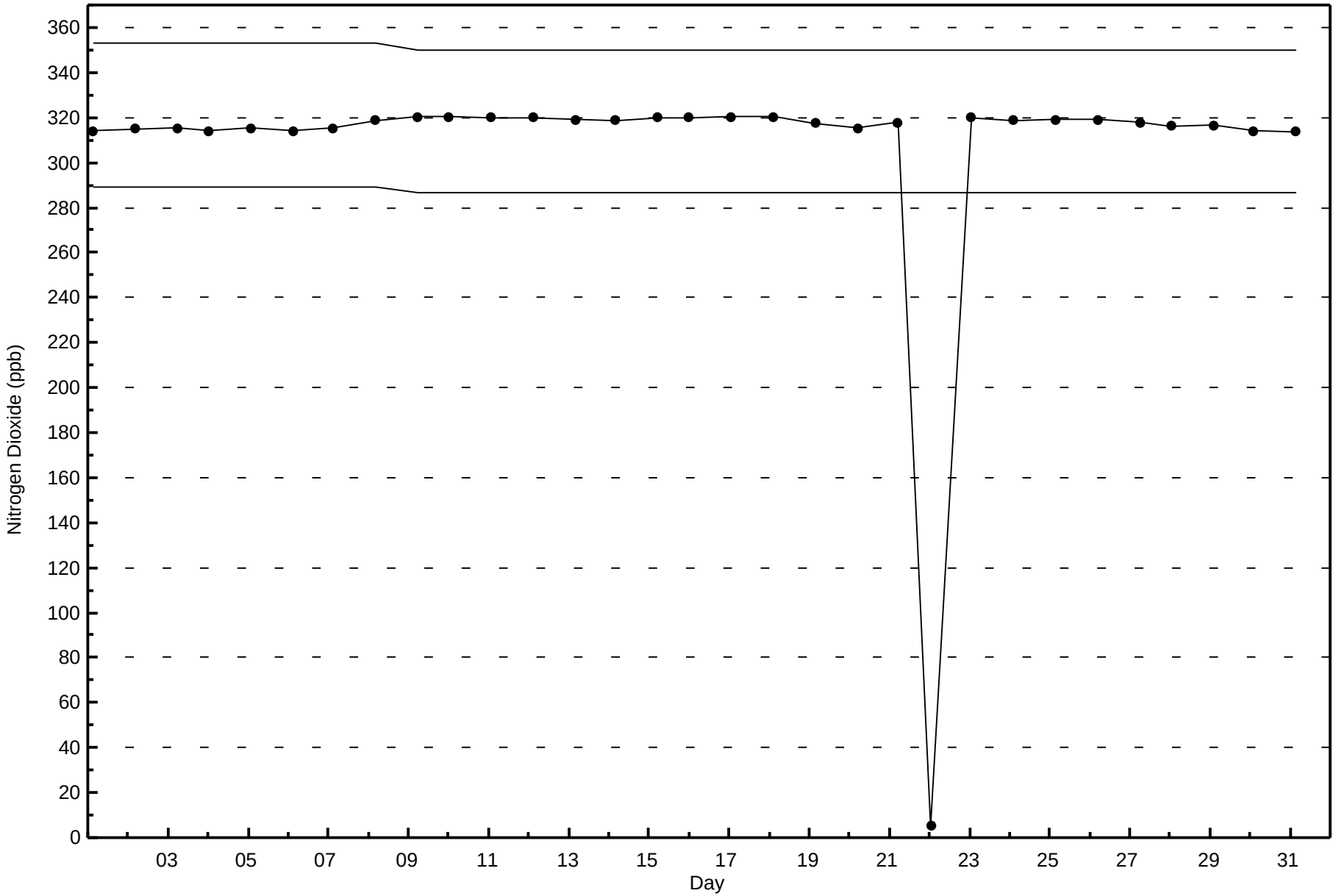


Wood Buffalo Environmental Association

Span Responses

Nitrogen Dioxide (NO_2) - ppb

Firebag - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_X) - ppb

Firebag - August 2015

Maximum Value: 29 ppb on Aug 10 00:00

Maximum Daily Average: 6.3 ppb on Aug 13

Minimum Value: 0 ppb on Aug 15 18:00

Minimum Daily Average: 0.5 ppb on Aug 15

Maximum Diurnal Average: 5.7 ppb at hour 5

Minimum Diurnal Average: 1.4 ppb at hour 15

Monthly Average: 3.2 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 1$ Median = 2 $Q_3 = 4$ $P_{90} = 8$ $P_{99} = 20$

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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	2	7	8	Z	4	1	9	3	2	1	0	0	0	0	1	7	0	0	0	0	0	1	1	1	2.2	9
2-Aug	3	5	4	6	Z	21	3	1	1	0	1	0	1	1	1	1	1	4	3	2	3	5	3	8	3.5	21
3-Aug	6	2	1	2	5	Z	12	3	3	1	1	2	2	3	2	2	4	4	9	6	4	1	1	11	3.9	12
4-Aug	Z	2	2	1	2	2	2	2	2	7	1	2	3	1	1	1	1	1	2	7	5	10	3	1	2.7	10
5-Aug	2	Z	4	4	4	2	1	1	1	2	2	2	2	2	1	2	2	1	4	9	1	11	15	7	3.4	15
6-Aug	15	1	Z	1	1	1	1	1	1	1	2	1	1	1	1	2	1	0	1	1	1	1	1	0	1.5	15
7-Aug	0	1	1	Z	3	4	9	9	5	C	C	C	C	C	2	3	4	7	3	8	7	24	19	2	6.1	24
8-Aug	1	1	1	5	Z	2	1	1	1	1	1	1	1	5	5	3	1	3	2	3	19	12	8	10	3.7	19
9-Aug	6	12	7	4	14	Z	7	2	2	2	1	1	1	1	1	1	2	3	1	2	3	3	16	29	5.3	29
10-Aug	Z	6	5	13	12	3	6	2	3	6	4	4	3	2	2	2	2	1	1	1	1	1	1	1	3.6	13
11-Aug	1	Z	2	1	2	3	5	7	3	6	5	3	2	1	1	1	1	1	1	2	1	2	3	3	2.5	7
12-Aug	4	7	Z	10	9	6	7	5	4	2	3	1	1	1	1	1	2	2	1	1	1	2	3	3	3.4	10
13-Aug	5	7	11	Z	14	5	4	11	8	4	7	8	7	9	7	2	1	2	4	4	4	4	7	10	6.3	14
14-Aug	8	5	3	1	Z	2	3	2	1	2	2	2	2	1	1	1	1	1	2	0	0	1	5	2	2.2	8
15-Aug	3	0	0	3	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	3
16-Aug	Z	0	0	0	0	1	4	0	2	3	5	2	2	3	1	1	1	1	1	1	2	1	1	1	1.4	5
17-Aug	2	Z	11	16	19	18	13	8	3	4	2	2	1	2	2	2	1	1	1	3	2	3	2	1	5.1	19
18-Aug	1	1	Z	4	2	1	0	0	0	0	0	0	0	0	1	1	1	1	2	1	3	20	14	9	2.8	20
19-Aug	5	1	1	Z	1	2	2	1	2	2	2	3	4	2	1	0	0	1	2	4	3	1	0	0	1.7	5
20-Aug	0	1	0	0	Z	0	0	0	1	3	2	2	3	3	3	3	2	1	1	1	1	1	2	6	1.7	6
21-Aug	2	0	0	0	1	Z	4	4	5	1	1	1	1	0	0	0	1	1	2	0	0	2	6	0	1.5	6
22-Aug	Z	0	1	5	3	2	4	7	6	6	3	1	1	0	1	1	1	1	1	2	6	18	15	5	4.0	18
23-Aug	2	Z	3	2	4	14	4	1	1	1	0	0	1	2	1	1	2	3	6	21	20	8	2	4	4.4	21
24-Aug	4	5	Z	5	10	10	3	2	1	1	1	3	3	3	3	1	0	0	1	2	2	2	1	1	2.7	10
25-Aug	6	3	1	Z	3	4	3	1	3	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1.3	6
26-Aug	0	0	0	0	Z	1	4	3	1	1	1	0	0	1	1	1	2	3	6	8	8	6	9	11	3.0	11
27-Aug	13	11	8	7	6	Z	6	1	1	1	1	1	1	1	1	1	1	1	2	3	2	3	2	1	3.2	13
28-Aug	Z	4	5	6	5	5	5	7	8	8	6	4	3	1	1	1	2	2	2	2	5	6	2	2	4.0	8
29-Aug	4	Z	6	9	10	23	5	1	4	6	4	2	1	1	1	1	2	3	17	9	1	1	1	1	4.8	23
30-Aug	1	0	Z	1	14	14	12	3	1	3	3	3	2	2	1	1	2	2	4	9	9	10	1	1	4.4	14
31-Aug	1	1	1	Z	1	1	1	1	1	3	2	1	1	2	1	1	1	1	0	1	3	4	6	5	1.7	6
	3.7	3.2	3.3	4.3	5.7	5.7	4.6	3.0	2.4	2.6	2.1	1.8	1.6	1.7	1.4	1.5	1.5	1.8	2.6	3.7	3.9	5.2	4.8	4.5	Diurnal Average	
	15	12	11	16	19	23	13	11	8	8	7	8	7	9	7	7	4	7	17	21	20	24	19	29	Diurnal Maximum	

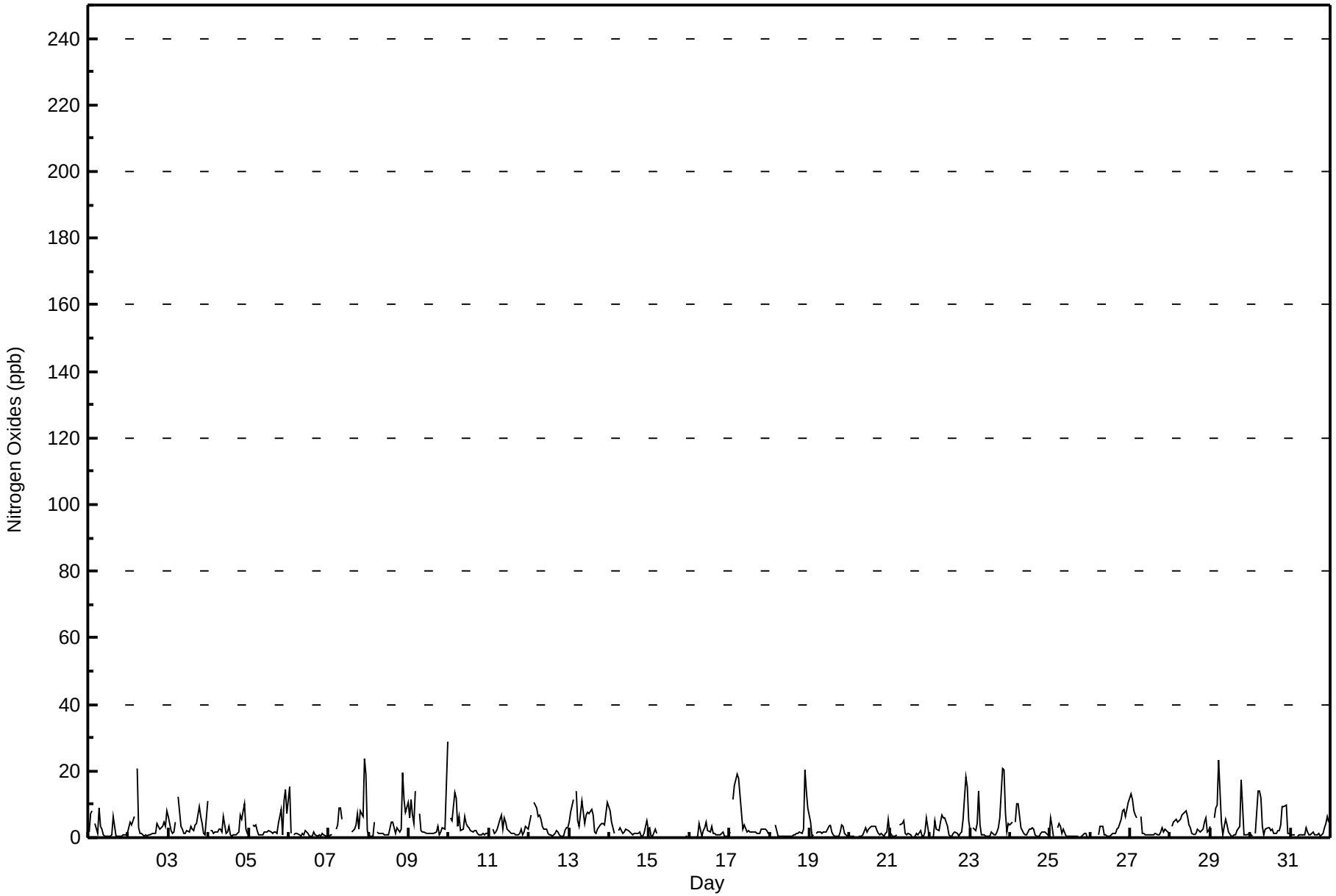
Z - zerospan C - Calibration

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Oxides (NO_X) - ppb

Firebag - August 2015



Nitrogen Oxides (NO_X) - ppb
Firebag - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	703	99.29	99.29
21 - 40	5	0.71	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: 708

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Oxides (NO_X) - ppb

Firebag - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	30	25	16	4	16	41	74	42	51	55	93	91	61	43	35	23	700
21 - 40	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	5
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	30	25	16	4	16	41	74	47	51	55	93	91	61	43	35	23	705

Total Number of Valid Hours: 705

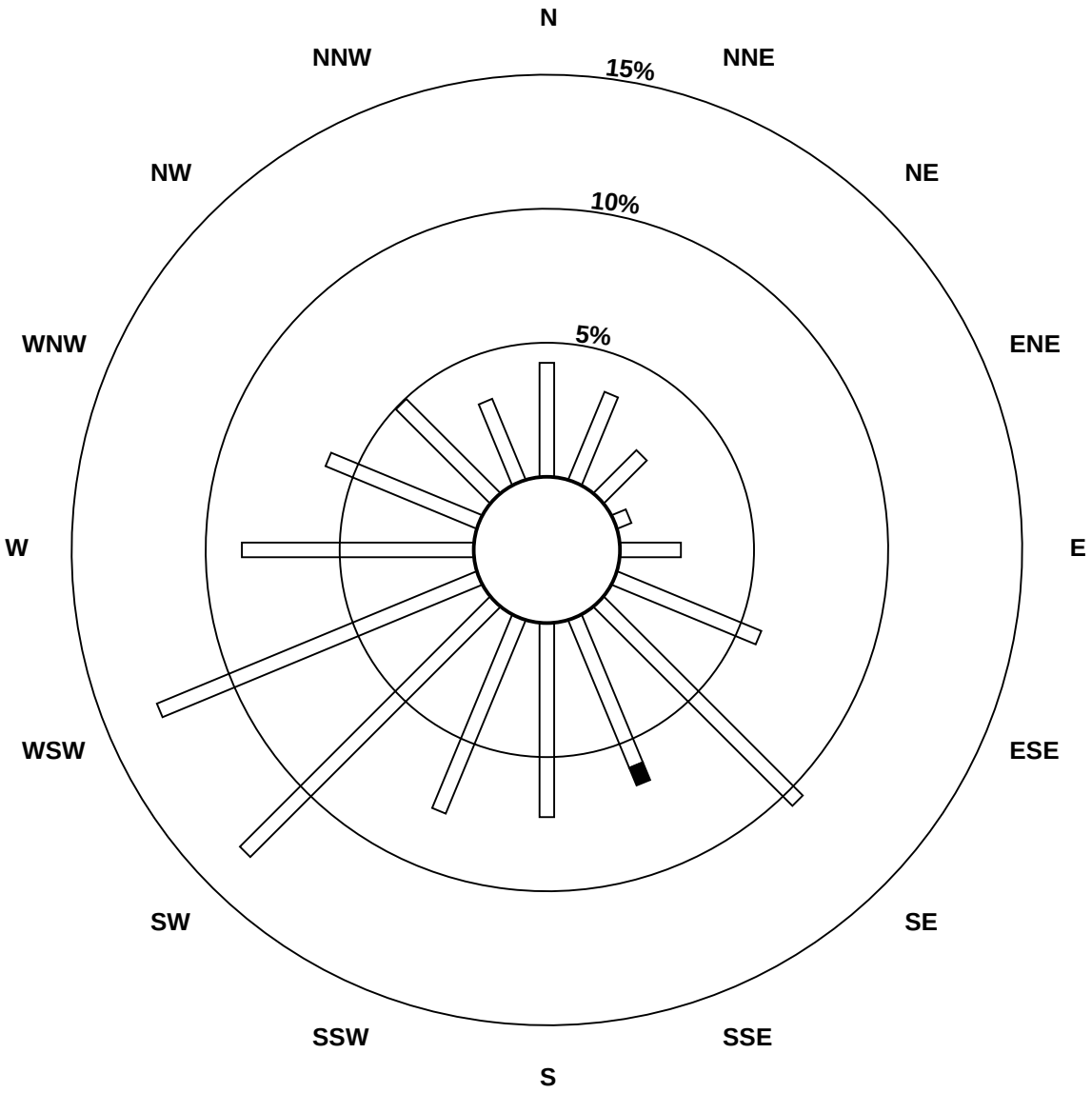
Total Number of Hours: 744

Wood Buffalo Environmental Association

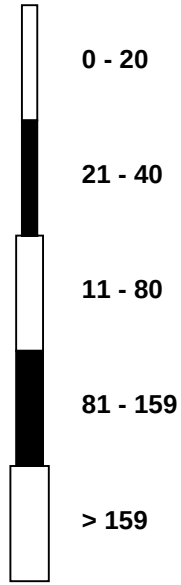
Wind Rose Aug 2015

Nitrogen Oxides (NO_X) - ppb

Firebag (AMS 19)



Classes (ppb)



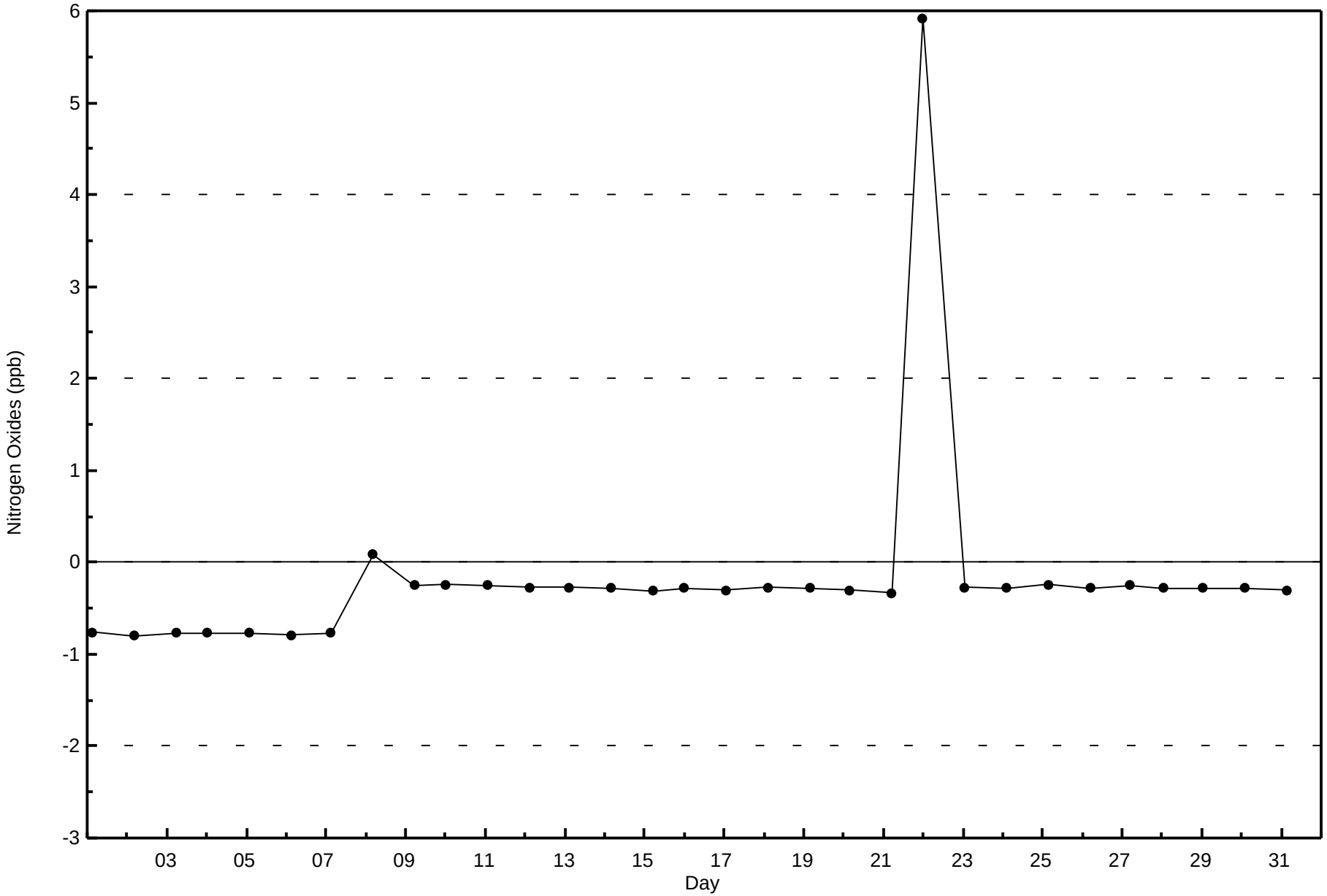
Total Number of Valid Hours: 705

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Oxides (NO_X) - ppb

Firebag - August 2015

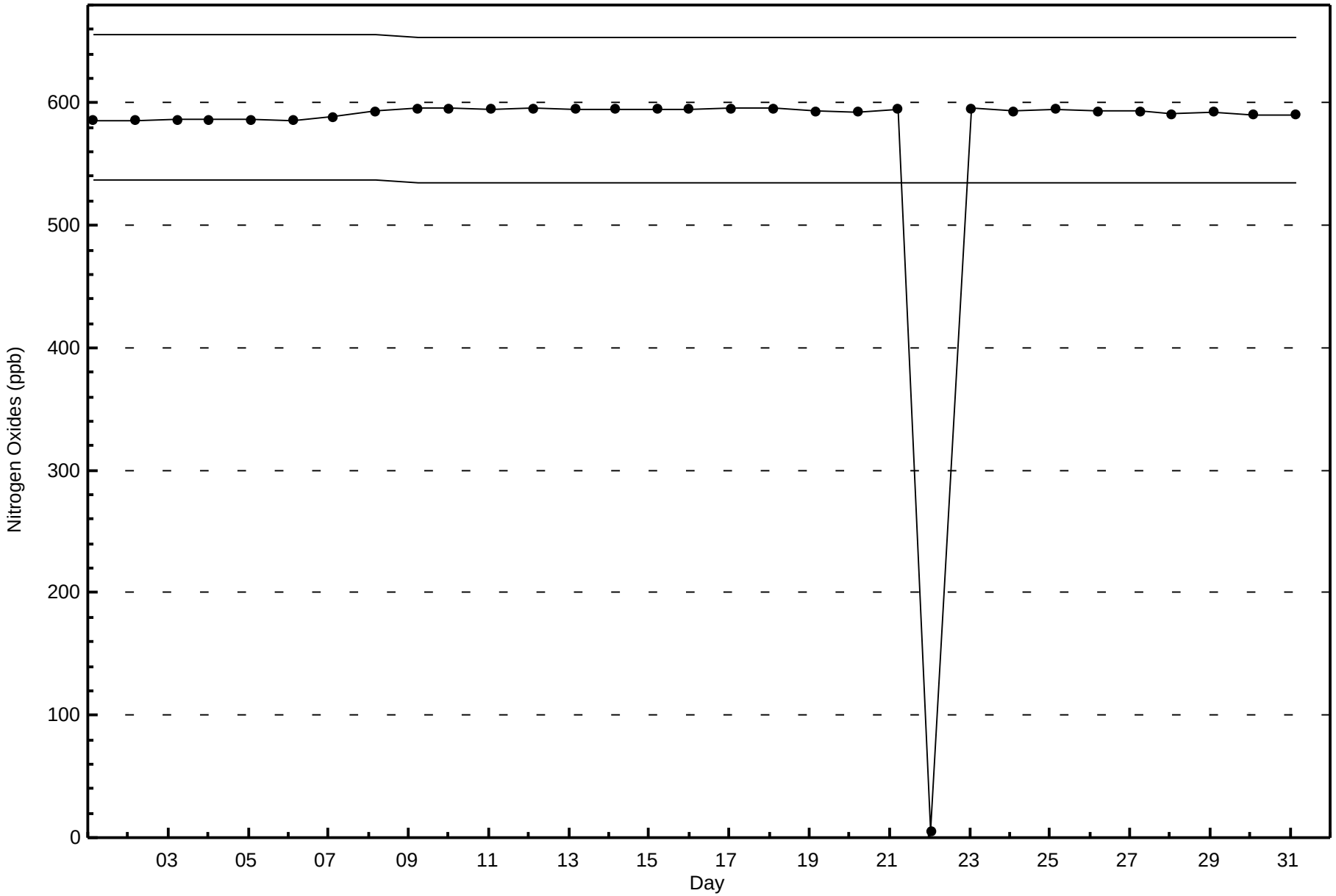


Wood Buffalo Environmental Association

Span Responses

Nitrogen Oxides (NO_X) - ppb

Firebag - August 2015



Maximum Value: 26.4 C on Aug 10 18:00

Maximum Daily Average: 21.3 C on Aug 10

Minimum Value: 5.4 C on Aug 23 05:00

Minimum Daily Average: 7.8 C on Aug 21

Maximum Diurnal Average: 19.4 C at hour 16

Minimum Diurnal Average: 11.8 C at hour 5

Monthly Average: 15.49 C

Percentiles: P_1 = 6.0 P_{10} = 10.2 Q_1 = 12.2 Median = 15.5 Q_3 = 18.8 P_{90} = 21.3 P_{99} = 24.3

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

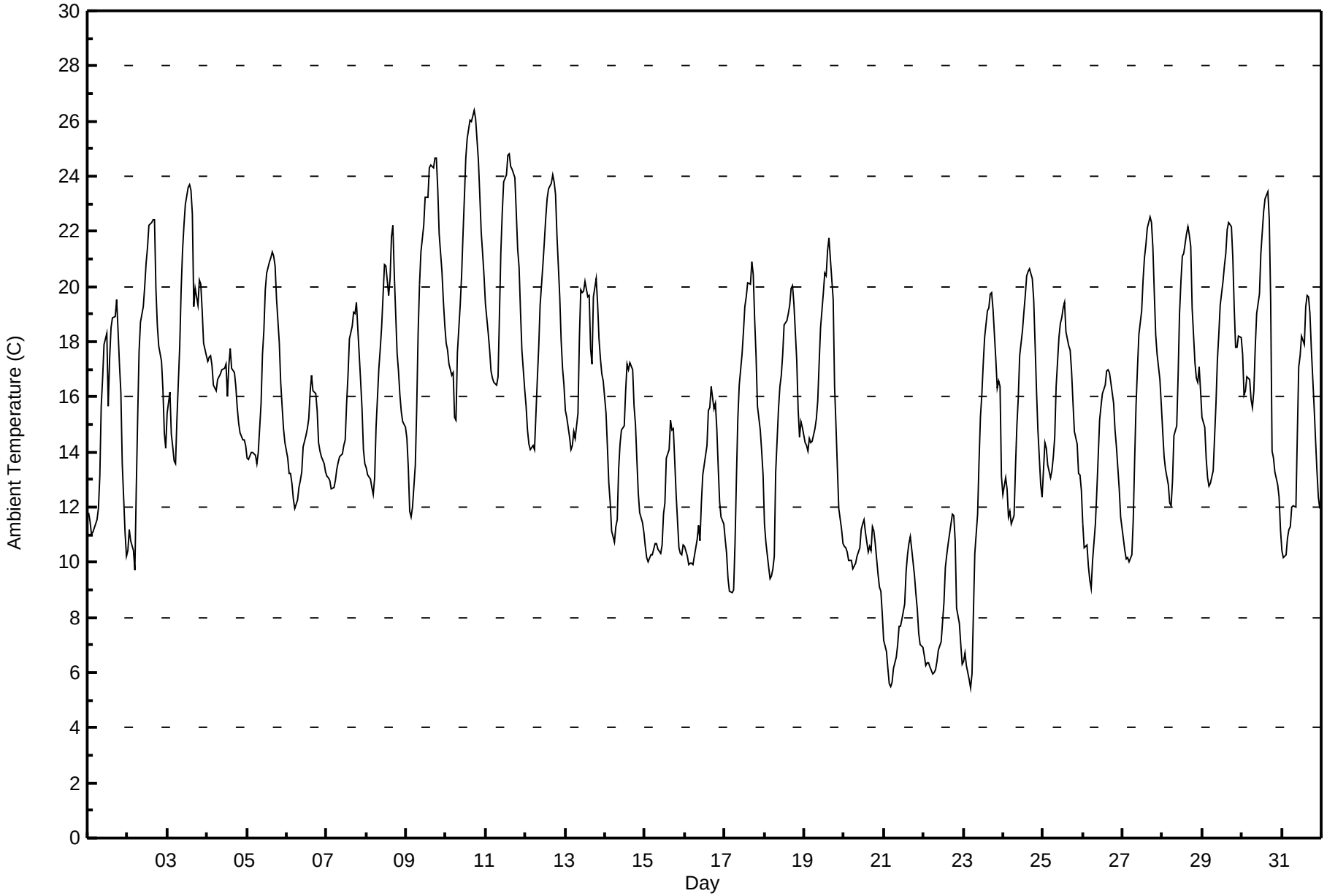
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	11.8	11.5	11.1	11.1	11.2	11.6	12.0	13.1	15.7	16.7	17.9	18.3	15.7	17.4	18.5	18.9	18.9	19.5	18.4	17.2	16.2	13.6	11.1	10.2	14.9	19.5
2-Aug	10.4	11.2	10.8	10.4	9.7	12.6	15.3	17.6	18.7	19.2	20.0	20.8	21.4	22.2	22.3	22.4	22.4	19.9	18.6	17.9	17.3	16.3	14.7	14.1	16.9	22.4
3-Aug	15.4	16.2	14.6	14.2	13.7	13.6	15.2	17.8	19.9	21.3	22.2	23.0	23.6	23.7	23.5	22.6	19.3	19.9	19.3	20.2	20.1	19.1	18.0	17.5	18.9	23.7
4-Aug	17.3	17.4	17.5	17.1	16.4	16.2	16.6	16.7	16.8	17.0	17.1	17.2	16.0	17.1	17.7	17.0	16.9	16.4	15.6	15.0	14.7	14.4	14.4	14.2	16.4	17.7
5-Aug	13.8	13.7	14.0	14.0	14.0	13.9	13.6	14.0	15.8	17.5	18.4	19.9	20.5	20.9	21.1	21.2	21.1	20.7	19.6	18.0	16.5	15.7	14.8	14.4	17.0	21.2
6-Aug	13.8	13.2	13.2	12.9	12.3	11.9	12.3	12.7	13.0	13.3	14.2	14.6	14.9	15.2	16.2	16.8	16.2	16.1	15.5	14.3	14.0	13.8	13.6	13.3	14.0	16.8
7-Aug	13.1	13.1	12.9	12.7	12.7	12.9	13.4	13.6	13.8	13.9	14.2	14.5	15.8	16.8	18.1	18.6	19.1	19.0	19.4	18.5	16.6	15.6	14.1	13.6	15.2	19.4
8-Aug	13.4	13.1	13.0	12.7	12.5	13.0	14.9	17.0	17.7	18.6	19.7	20.8	20.7	19.7	20.3	21.8	22.2	20.4	17.6	16.9	16.1	15.4	15.1	14.9	17.0	22.2
9-Aug	14.5	13.4	11.9	11.6	12.0	13.5	15.6	18.3	20.1	21.2	22.2	23.2	23.2	23.3	24.3	24.4	24.3	24.7	24.7	23.6	21.9	20.5	19.5	18.6	19.6	24.7
10-Aug	17.9	17.7	17.2	16.8	16.9	15.2	15.2	17.6	19.3	20.4	21.9	23.2	24.7	25.4	26.0	26.0	26.2	26.4	26.1	24.6	23.3	22.0	21.2	20.4	21.3	26.4
11-Aug	19.4	18.3	17.7	17.0	16.7	16.5	16.4	16.7	19.0	21.3	22.7	23.8	24.0	24.7	24.8	24.3	24.2	23.9	22.7	21.4	20.7	19.1	17.7	16.3	20.4	24.8
12-Aug	15.6	14.8	14.3	14.1	14.2	14.1	15.4	16.6	17.8	19.3	20.8	21.6	22.5	23.2	23.6	23.7	24.1	23.8	23.3	21.8	19.6	18.0	17.0	16.4	19.0	24.1
13-Aug	15.5	15.2	14.5	14.1	14.2	14.7	14.5	15.4	18.1	19.9	19.8	19.9	20.2	19.6	19.7	17.8	17.2	19.6	20.3	19.4	18.1	17.4	16.8	16.6	17.4	20.3
14-Aug	15.4	14.2	12.9	12.2	11.2	10.7	11.3	11.6	13.4	14.3	14.8	14.9	16.2	17.2	17.0	17.2	17.0	15.7	15.0	13.7	12.5	11.8	11.4	11.1	13.9	17.2
15-Aug	10.6	10.2	10.0	10.3	10.3	10.5	10.7	10.7	10.5	10.3	10.6	11.8	12.2	13.8	14.1	15.2	14.8	14.9	13.7	12.4	10.5	10.3	10.3	10.6	11.6	15.2
16-Aug	10.6	10.2	9.9	10.0	10.0	9.9	10.2	10.9	11.3	10.8	12.2	13.2	13.9	14.2	15.5	15.6	16.4	15.5	15.8	14.9	13.5	12.2	11.7	11.4	12.5	16.4
17-Aug	10.9	10.3	9.4	8.9	8.9	9.0	10.7	13.1	15.2	16.4	17.5	18.3	19.3	19.7	20.1	20.1	20.9	20.4	18.8	17.5	15.7	14.8	14.0	13.2	15.1	20.9
18-Aug	11.4	10.7	9.8	9.4	9.5	9.8	10.2	13.3	15.5	16.3	16.8	17.6	18.6	18.7	19.0	19.3	20.0	20.0	19.4	17.4	15.6	14.5	15.1	14.9	15.1	20.0
19-Aug	14.4	14.3	14.0	14.5	14.3	14.4	14.8	15.2	15.9	17.2	18.5	19.8	20.5	20.4	21.3	21.7	21.0	19.5	16.4	14.9	13.4	11.9	11.2	10.7	16.3	21.7
20-Aug	10.6	10.5	10.4	10.0	10.0	9.8	9.8	10.0	10.2	10.5	11.2	11.4	11.5	11.1	10.4	10.6	10.4	11.3	11.2	10.7	9.6	9.1	8.9	8.1	10.3	11.5
21-Aug	7.2	6.7	6.1	5.6	5.5	5.7	6.2	6.5	7.0	7.7	7.7	7.9	8.5	9.6	10.3	10.7	10.9	10.5	9.5	8.8	8.3	7.4	7.0	6.9	7.8	10.9
22-Aug	6.6	6.3	6.4	6.3	6.2	5.9	6.0	6.1	6.4	6.8	7.1	7.8	8.6	9.8	10.3	10.7	11.4	11.7	11.7	10.8	8.3	7.8	7.0	6.3	8.0	11.7
23-Aug	6.4	6.7	6.3	5.7	5.4	6.0	8.2	10.3	11.7	13.6	15.3	16.1	17.2	18.2	19.1	19.2	19.7	19.8	19.2	17.4	16.3	16.6	16.4	13.1	13.5	19.8
24-Aug	12.5	13.1	12.7	11.7	11.9	11.4	11.7	13.4	15.0	15.9	17.5	18.4	19.1	19.7	20.4	20.5	20.6	20.3	19.5	17.9	16.2	14.8	12.8	12.4	15.8	20.6
25-Aug	13.4	14.3	14.2	13.5	13.0	13.3	13.9	14.6	16.4	18.1	18.6	18.9	19.2	19.4	18.4	17.8	17.7	16.9	15.8	14.7	14.3	13.2	13.2	12.6	15.6	19.4
26-Aug	11.4	10.5	10.6	9.9	9.3	9.1	10.1	11.4	12.6	13.9	15.1	15.6	16.1	16.4	16.9	17.0	16.9	16.5	15.8	14.8	14.2	13.4	12.6	11.6	13.4	17.0
27-Aug	10.8	10.4	10.1	10.2	10.0	10.3	11.6	13.7	15.7	17.1	18.3	19.1	20.2	21.0	21.5	22.1	22.5	22.3	21.4	19.8	18.2	17.5	16.6	15.7	16.5	22.5
28-Aug	14.7	13.8	13.4	12.8	12.1	12.1	13.0	14.6	15.0	16.8	19.0	20.2	21.1	21.2	21.9	22.2	21.9	21.4	19.2	17.2	16.7	16.5	17.1	16.2	17.1	22.2
29-Aug	15.3	14.9	13.8	13.1	12.8	12.9	13.3	14.5	15.8	17.4	18.2	19.3	20.2	20.7	21.2	22.1	22.3	22.2	21.0	19.2	17.8	17.8	18.2	18.1	17.6	22.3
30-Aug	17.6	16.0	16.2	16.7	16.6	15.9	15.6	16.2	17.8	19.0	19.7	21.2	22.0	22.7	23.2	23.4	22.4	19.4	14.0	13.8	13.3	12.8	12.4	11.2	17.5	23.4
31-Aug	10.4	10.2	10.3	10.9	11.2	11.3	12.0	12.0	12.0	14.6	17.1	17.5	18.2	17.9	19.3	19.7	19.6	19.0	17.8	15.6	14.4	13.3	12.4	11.9	14.5	19.7
	13.0	12.7	12.2	11.9	11.8	11.9	12.6	13.7	14.9	16.0	17.0	17.7	18.2	18.7	19.2	19.4	19.3	19.0	17.9	16.8	15.6	14.7	14.1	13.4	Diurnal Average	
	19.4	18.3	17.7	17.1	16.9	16.5	16.6	18.3	20.1	21.3	22.7	23.8	24.7	25.4	26.0	26.0	26.2	26.4	26.1	24.6	23.3	22.0	21.2	20.4	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature (AT) - C

Firebag - August 2015



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	69	9.27	9.27
10 - 20	554	74.46	83.74
> 20	121	16.26	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Firebag - August 2015

Maximum Value: 99 % on Aug 7 05:00

Maximum Daily Average: 88.9 % on Aug 21

Minimum Value: 30 % on Aug 31 17:00

Minimum Daily Average: 50.6 % on Aug 28

Maximum Diurnal Average: 82.7 % at hour 5

Minimum Diurnal Average: 49.5 % at hour 16

Monthly Average: 67.7 %

Percentiles: P_1 = 33 P_{10} = 42 Q_1 = 53 Median = 67 Q_3 = 83 P_{90} = 94 P_{99} = 98

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

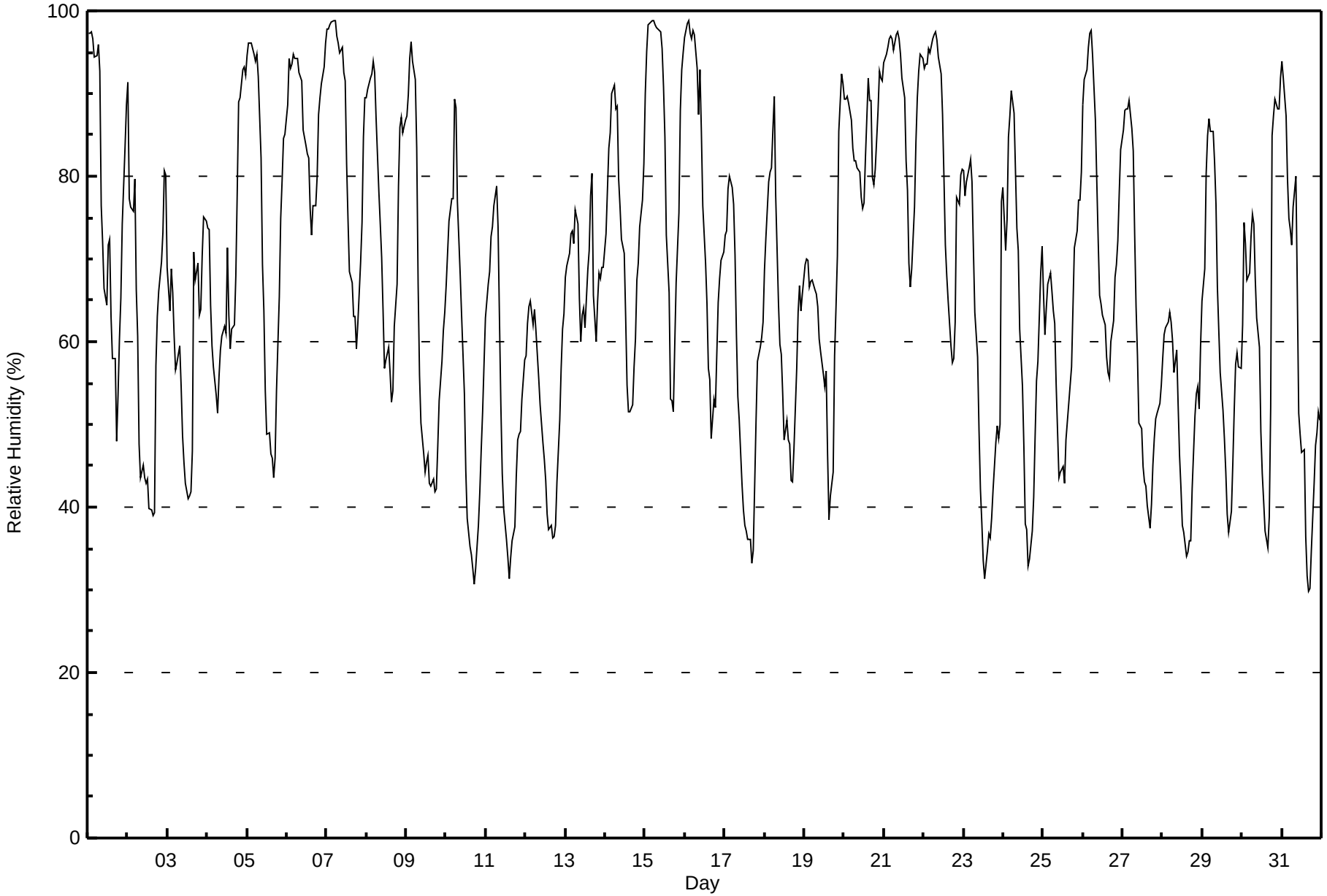
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	97	97	97	97	94	95	96	93	76	72	66	64	72	72	63	58	58	48	54	60	65	74	84	89	76.8	97
2-Aug	91	77	76	76	80	66	61	48	43	45	44	43	43	40	40	39	39	57	63	66	70	73	81	80	60.0	91
3-Aug	69	64	69	66	61	57	57	59	55	49	45	43	41	41	42	47	71	68	69	63	64	70	75	75	59.1	75
4-Aug	74	73	64	59	57	54	51	56	59	61	62	61	71	63	59	61	62	68	78	89	89	93	93	92	68.8	93
5-Aug	95	96	96	95	95	94	95	92	82	69	64	54	49	49	46	46	44	46	54	65	75	80	85	85	72.9	96
6-Aug	89	94	93	93	95	94	94	93	92	92	86	84	83	82	76	73	76	76	80	88	89	91	93	96	87.6	96
7-Aug	98	98	98	99	99	99	97	96	95	96	93	91	82	75	68	67	63	63	59	62	70	74	85	90	84.0	99
8-Aug	89	91	92	92	94	92	87	78	74	70	64	57	58	59	56	53	54	62	67	79	86	87	85	87	75.6	94
9-Aug	87	90	94	96	94	92	83	67	56	50	47	44	45	46	43	43	43	42	42	47	53	58	61	63	62.0	96
10-Aug	67	71	74	77	77	89	88	77	68	63	58	54	44	39	35	34	33	31	33	38	42	47	51	57	56.2	89
11-Aug	63	67	68	73	74	76	79	74	63	52	44	40	36	34	31	34	36	38	44	48	49	49	53	58	53.5	79
12-Aug	58	62	64	65	62	64	61	58	56	52	48	46	43	39	37	38	36	36	38	43	50	57	62	63	51.7	65
13-Aug	68	69	71	73	73	72	76	74	65	60	63	64	62	69	71	78	80	66	60	65	68	68	69	69	68.9	80
14-Aug	73	78	83	85	90	91	88	89	80	76	72	71	63	55	52	51	52	57	60	68	70	74	77	81	72.3	91
15-Aug	90	95	98	99	99	99	98	98	98	97	95	91	85	73	66	53	53	52	60	67	76	88	93	95	84.0	99
16-Aug	97	98	99	97	97	98	97	93	87	93	85	76	69	65	57	55	48	53	52	58	65	68	70	71	77.0	99
17-Aug	73	73	78	80	79	77	71	61	53	51	43	40	38	37	36	36	33	35	43	51	58	59	61	62	55.2	80
18-Aug	69	73	79	81	81	86	90	78	65	60	58	54	48	50	48	48	43	43	47	57	64	67	64	66	63.1	90
19-Aug	69	70	70	67	67	68	66	66	64	60	59	56	55	56	46	39	41	44	58	64	70	85	92	91	63.6	92
20-Aug	89	89	90	89	87	83	82	82	81	80	77	76	77	82	92	89	89	80	79	81	88	93	92	92	85.0	93
21-Aug	94	95	96	97	97	97	95	97	97	97	95	92	90	82	78	70	67	69	76	84	90	93	95	94	88.9	97
22-Aug	93	94	94	95	95	97	97	97	96	94	92	87	80	72	68	65	59	57	58	62	77	77	80	81	82.0	97
23-Aug	81	78	79	81	82	79	71	64	58	49	42	38	33	31	35	37	36	39	42	48	50	48	50	77	55.4	82
24-Aug	79	71	75	85	87	90	88	81	74	71	61	55	47	38	37	33	34	37	41	49	55	58	68	71	61.9	90
25-Aug	66	61	64	67	68	66	64	62	55	44	44	44	45	43	48	53	55	57	64	71	73	77	77	81	60.4	81
26-Aug	89	92	93	96	97	98	95	87	79	72	66	65	63	62	58	56	56	60	63	68	69	72	78	83	75.6	98
27-Aug	86	88	88	88	89	86	83	73	64	58	50	49	45	43	42	40	37	40	45	48	51	51	52	55	60.6	89
28-Aug	58	61	62	62	64	62	60	56	59	52	46	42	38	37	34	35	36	36	42	51	54	55	52	59	50.6	64
29-Aug	65	69	80	85	87	85	85	82	77	67	61	56	52	48	44	39	37	39	45	52	57	59	57	57	61.9	87
30-Aug	62	74	72	68	68	73	75	74	68	63	59	49	44	41	37	35	39	52	85	87	89	88	88	92	66.0	92
31-Aug	94	92	87	80	75	74	72	76	80	66	51	49	47	47	36	32	30	30	35	43	47	49	52	50	58.1	94
	79.7	80.6	82.1	82.7	82.7	82.3	80.8	76.8	71.6	67.2	62.7	59.2	56.4	53.9	51.1	49.5	49.7	51.0	56.0	62.0	66.9	70.4	73.4	76.2	Diurnal Average	
	98	98	99	99	99	99	98	98	98	97	95	92	90	82	92	89	89	80	85	89	90	93	95	96	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity (RH) - %

Firebag - August 2015



Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	62	8.33	8.33
40 - 60	205	27.55	35.89
60 - 80	260	34.95	70.83
80 - 100	217	29.17	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Firebag - August 2015

Maximum Speed: 34 km/h on Aug 19 08:00

Maximum Daily Speed Average: 16.9 km/h on Aug 19

Minimum Speed Value: 1 km/h on Aug 2 21:00

Minimum Daily Speed Average: 1.9 km/h on Aug 18

Maximum Diurnal Speed Average: 7.8 km/h at hour 10

Minimum Diurnal Speed Average: 4.0 km/h at hour 20

Monthly Average Velocity: 5.3 km/h 222.5 deg

Percentiles: $P_1 = 2$ $P_{10} = 6$ $Q_1 = 9$ Median = 12 $Q_3 = 17$ $P_{90} = 20$ $P_{99} = 29$

Hours in Service:	744
Hours of Data:	741
Hours of Missing Data:	3
Percent Operational Time:	99.7

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Aug	NE6	E6	S2	ENE4	WNW4	N6	N6	NNW7	N15	N15	N14	N11	N14	N9	NE8	SSE3	NW8	N13	N11	NNW7	NNW7	NNE5	NE4	ENE2	N6.4	N15
2-Aug	SE3	S4	S5	SSE5	SSE5	SSE4	S4	SSW8	SSW6	SW8	SW5	SW6	W4	WNW7	NNW3	WNW9	NW5	NNW12	W10	SW2	NE1	AF	AF	E4	SW2.6	NNW12
3-Aug	E6	ESE11	SE12	SE12	SE12	SE11	SE8	SSE7	SE7	ESE5	ESE8	SE9	E7	SE12	SE12	SSE11	S14	S11	S10	SE5	SE7	SE10	SE9	SSE10	SE8.6	S14
4-Aug	SE10	ESE14	ESE15	ESE17	ESE17	ESE18	ESE19	ESE16	SE16	SE17	ESE16	ESE17	ESE17	ESE22	ESE21	SE21	ESE20	ESE17	SE15	SSE16	SSE16	SSE12	SE10	SE8	SE15.7	ESE22
5-Aug	E8	E11	E11	E11	ESE12	ESE14	ESE14	SE12	SE16	ESE17	E17	ESE18	E17	ESE18	ESE17	ESE22	ESE19	SE19	SE20	SSE14	S14	SSE15	SSE15	SSE14	ESE14.0	ESE22
6-Aug	SSE13	SE11	SE12	SE12	ESE13	ESE16	SE17	SE20	SE20	SE18	SE19	SE17	ESE19	SE18	ESE17	SE18	ESE17	ESE22	ESE19	SE16	SE13	SE12	ESE12	SE11	SE15.8	ESE22
7-Aug	SE11	SE11	SE9	SE7	SE8	SE8	SSE11	SSE10	SSE10	SE10	SSE12	SSE12	SSE11	S8	SE9	SSE12	SSE11	SSE11	SSE11	SE9	SE9	SSE11	SSE12	S15	SSE10.2	S15
8-Aug	S15	S13	S13	S13	S10	S13	S12	S10	SSW11	SSW12	SSW15	SSW13	NW3	E13	SSE7	E1	NE4	E15	ESE16	SE12	SSE11	SSE10	SSE9	S8	SSE8.3	ESE16
9-Aug	S8	SSE5	SE2	ENE5	SE4	SE4	SE4	SE7	SE9	SE7	NNE2	SE2	SW4	SE2	NE1	SSW4	S6	ESE4	ESE8	SE8	SE10	SE10	SSE11	SSE12	SE5.0	SSE12
10-Aug	SSE12	S13	S12	SSE12	S15	WSW11	WSW11	WSW12	W16	WSW19	WSW19	WSW17	WSW21	WSW25	WSW23	WSW22	WSW19	WSW18	SW12	SW8	SSW10	SSW15	SW14	SSW14	SW13.2	WSW25
11-Aug	SSW15	SSW14	SSW13	SSW13	SSW10	SW11	SW12	SSW12	SW17	WSW19	WSW24	WSW26	WSW29	WSW30	WSW34	WSW27	W23	WNW20	W12	W7	SW8	WSW11	W8	SW9	WSW15.6	WSW34
12-Aug	SW13	SW12	SW12	SW11	SW14	SW14	SW16	WSW20	WSW20	WSW18	WSW21	WSW18	W17	WSW15	WSW15	WSW16	WSW18	WSW16	W15	WSW11	SW9	SW10	SW10	SW7	WSW14.1	WSW21
13-Aug	SW9	SW9	SW12	SW10	SSW9	SW11	SW12	SW12	WSW14	WSW14	SW14	WSW11	WSW13	WSW9	WSW17	W16	SW18	SW20	SW20	SW14	SW12	SW11	SW11	SW14	SW12.6	SW20
14-Aug	WSW13	WSW10	WSW13	WSW17	W15	WSW13	W17	WSW16	W20	W20	W21	WNW19	WNW21	W24	WNW23	WNW23	WNW26	WNW21	WNW22	WNW14	WNW13	W12	W14	W13	W16.7	WNW26
15-Aug	WNW13	WNW11	NW12	NNW16	NNW16	N17	N14	N20	N21	N19	N18	N16	N19	NNE16	N15	N18	N20	N18	N12	N9	NNW9	NNW11	NNW9	NNW12	N14.2	N21
16-Aug	N11	N11	N10	N9	NNW6	NW5	WNW7	WNW9	WNW11	WNW9	NW9	NW10	WNW9	WSW7	NNW10	NNW10	W10	WNW8	NW5	SW5	SW7	SW9	WSW7	SW8	WNW6.3	N11
17-Aug	SW9	SW10	SW11	SW11	SW11	SW12	SW12	SW12	WSW13	SW15	C	WSW18	WSW14	WSW13	W11	NW10	WNW8	NW8	NW6	SW9	SW10	SSW9	SSW10	SSW10	WSW9.5	WSW18
18-Aug	W8	WNW8	NW9	N8	NNE9	NNE11	NNE9	NNE10	NE13	NNE11	NNE9	NNE7	NNW7	NNW9	WNW7	NW5	W3	NNW2	SE14	SE13	SE13	SSE16	SSE20	SSE18	NE1.9	SSE20
19-Aug	SSE19	S19	S19	S23	S25	S27	S30	S34	S32	SSW32	SW26	WSW25	WSW24	W18	W21	W25	W27	W25	WNW23	W17	W19	W18	W17	WSW15	SW16.9	S34
20-Aug	WSW14	WSW16	WSW17	WSW17	W18	W20	W21	W21	W21	W20	W23	W23	W23	WNW23	W20	W17	W15	WNW17	WNW15	WNW14	WNW11	WSW9	W8	W10	W16.7	W23
21-Aug	W12	WSW12	W12	WSW11	WSW11	WSW11	W13	W14	W14	NW16	NW18	NW13	NW15	NW14	NW17	NW19	NNW20	NNW21	NW12	WNW9	WNW8	NW12	NW9	NW10	WNW11.7	NNW21
22-Aug	NW11	WNW9	WNW8	WNW7	WNW7	W8	WNW12	WNW15	WNW15	WNW15	NW14	NW17	NW16	NW14	NNW15	NNW11	NW12	NNW11	N6	NE3	SE5	SSE8	S5	S8	NW7.7	NW17
23-Aug	S9	SSW10	S8	S9	S9	S10	SSW10	SSW12	SSW14	SSW17	SSW18	SSW17	SSW17	S17	SSW17	SSW19	SSW19	S18	S16	SSE14	SSE15	SSE21	SSW15	ENE3	S13.3	SSE21
24-Aug	SE12	S11	SW12	SSW11	S18	S12	SSW15	SSW18	SW21	SW20	SW17	WSW16	WSW18	W19	W18	W16	W15	W12	WSW9	WSW5	SW6	NW5	NNE9	NE9	SW9.3	SW21
25-Aug	E10	ESE11	ESE11	ESE9	ESE9	ESE9	SE8	SE7	ENE5	NE9	NNE10	NNE11	NNE10	N9	N12	NNE13	NNE13	NNE9	NNE8	NE6	NE3	NE8	NNE8	NNE9	NE6.7	NNE13
26-Aug	NNE11	NNE12	NNE12	NNE8	NE9	NE5	E6	E6	NE6	E2	NNW3	NW6	NW8	NW8	W8	W8	WSW9	W7	W6	WSW7	SW8	SW9	SW8	SW9	NW2.3	NNE12
27-Aug	SW7	SSW8	SSW8	SSW9	SSW9	S7	SSW10	SW11	SW16	SSW17	SW17	SW18	SW19	SW18	SW21	SW19	SW22	SW20	WSW14	SW10	SSW13	SSW15	SW15	SW15	SW13.9	SW22
28-Aug	SW14	SW14	SW15	SW15	SW14	SW14	SW18	SW18	SW20	WSW21	WSW24	WSW24	W24	W24	W23	WSW20	WSW20	WSW17	WSW10	WSW3	S4	S3	NW8	N11	WSW14.2	WSW24
29-Aug	NE7	NW2	SE3	SSE4	SE8	SSE9	SSW7	SW12	WSW14	WSW14	WSW13	WSW11	SW9	WSW10	WSW7	SSW10	SSW12	S15	SSE11	SE11	SE14	SE15	SE18	SE22	S7.0	SE22
30-Aug	SE22	SE21	SE20	SE20	SSE20	SSE19	SSE13	S14	SW16	W16	WNW16	NW14	NW14	WNW12	W10	WSW13	SW10	SSW15	SW13	SSE13	SE12	S12	SW13	S12	S8.3	SE22
31-Aug	S11	S12	S11	SSW12	SSW12	SSW15	SSW18	SW17	SW15	SSW13	SW17	WSW23	SW25	WSW19	WSW27	WSW26	WSW27	WSW22	WSW15	SW11	SSW12	SW11	SSW11	SSW12	SW15.5	WSW27
	S4.6	S5.0	SSW5.0	S5.2	S5.8	S5.7	SSW6.4	SSW7.1	SW7.4	SW7.8	WSW7.3	WSW7.4	W7.6	WSW6.9	W7.3	WSW7.1	WSW7.3	WSW5.0	SW4.3	SSW4.0	SSW5.3	SSW5.8	SSW5.6	SSW5.1	Diurnal Average	
	SE22	SE21	SE20	S23	S25	S27	S30	S34	S32	SSW32	SW26	WSW26	WSW29	WSW30	WSW34	WSW27	WSW27	W25	WNW23	W17	W19	SSE21	SSE20	SE22	Diurnal Maximum	

C - Calibration AF - Analyzer Failure

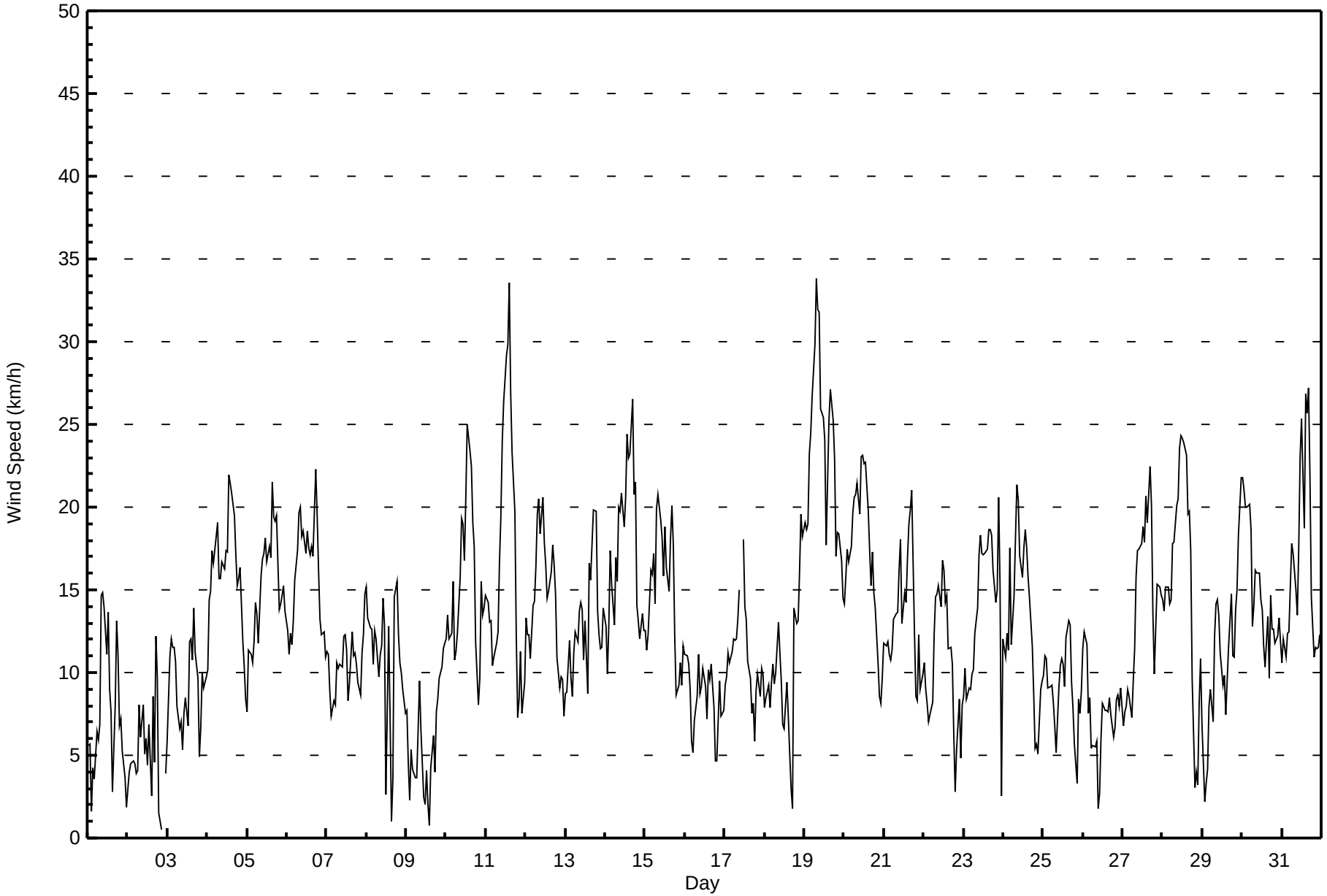
All monthly, daily, and diurnal averages have been calculated using vector methods

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed (WS) - km/h

Firebag - August 2015



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	62	8.37	8.37
6 - 11	266	35.90	44.26
12 - 19	319	43.05	87.31
20 - 28	87	11.74	99.06
29 - 38	7	0.94	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

Firebag - August 2015

Wind Speed Ranges (km/h)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 5	0	2	7	5	3	2	9	7	7	1	4	2	2	1	7	3	62
6 - 11	14	17	9	0	10	8	32	19	18	20	39	21	13	19	14	13	266
12 - 19	15	6	1	0	4	27	31	23	24	36	45	43	29	13	17	5	319
20 - 28	3	0	0	0	0	5	9	3	3	0	10	23	19	10	0	2	87
29 - 38	0	0	0	0	0	0	0	0	3	1	0	3	0	0	0	0	7
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	32	25	17	5	17	42	81	52	55	58	98	92	63	43	38	23	741

Total Number of Valid Hours: 741

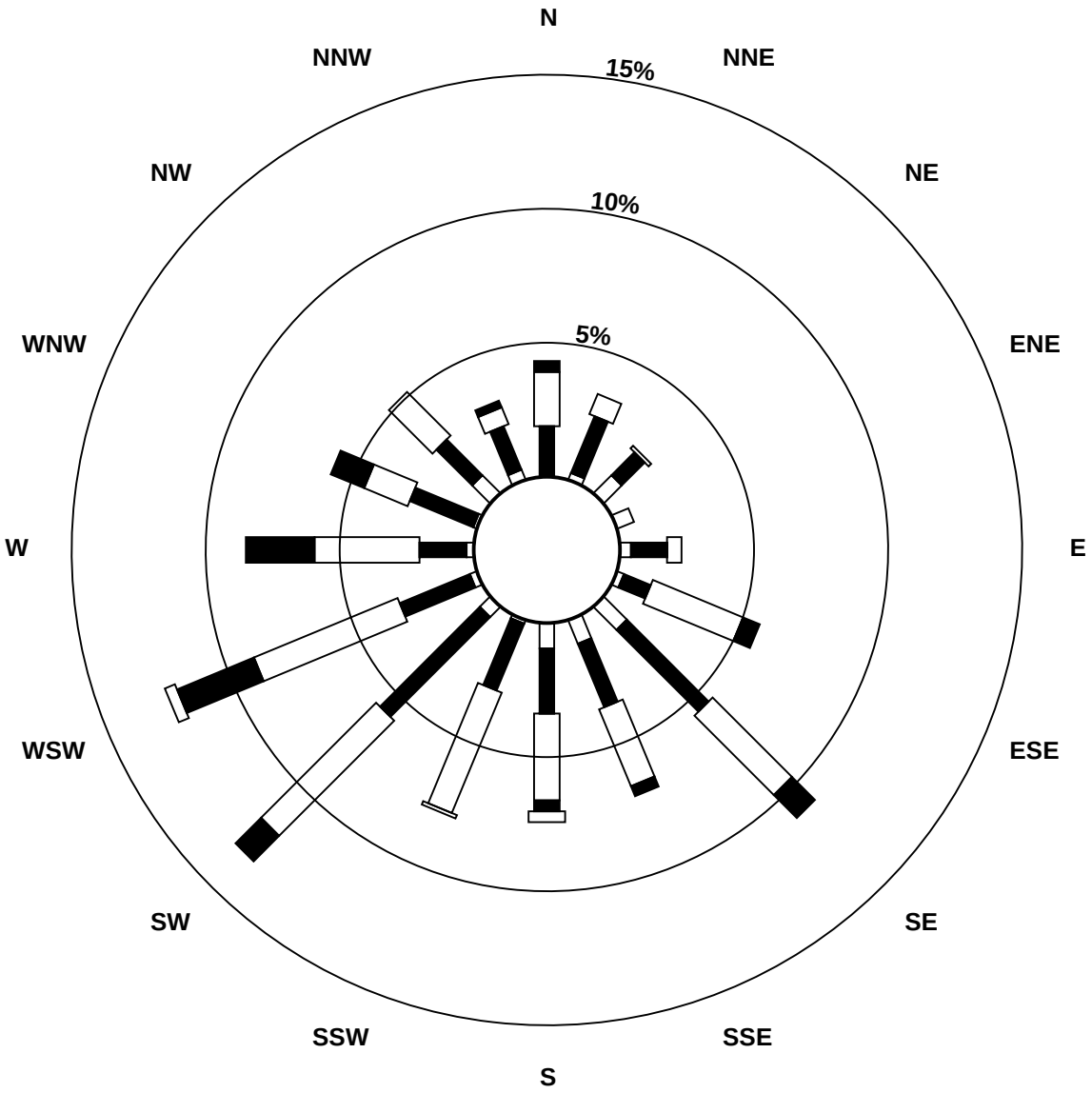
Total Number of Hours: 744

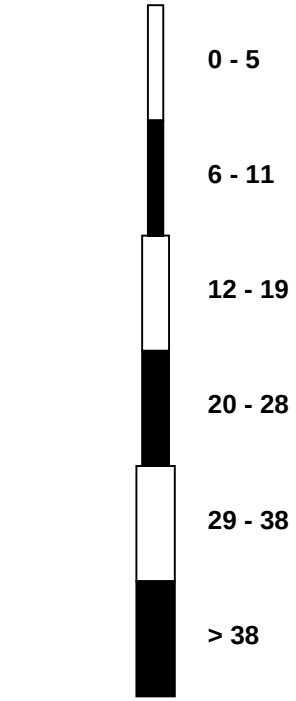
Wood Buffalo Environmental Association

Wind Rose Aug 2015

Wind Speed (WS) - km/h

Firebag (AMS 19)





Total Number of Valid Hours: 741

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Speed (WS) - km/h

Firebag - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 11 km/h on Aug 1 13:00

Minimum Value: 1 km/h on Aug 2 03:00

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:	741
Hours of Missing Data:	3
Hours of Calibration:	1
Percent Operational Time:	99.7

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

C - Calibration AF - Analyzer Failure

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Firebag - August 2015

Direction of Maximum Speed: 181 deg on Aug 19 08:00
Direction of Maximum Daily Speed Average: 225.8 deg on Aug 19

Direction of Minimum Speed: 38 deg on Aug 2 21:00

Direction of Minimum Daily Speed Average: 1.9 deg on Aug 18

Monthly Average Direction: 242.6 deg

Hours in Service:	744
Hours of Data:	741
Hours of Missing Data:	3
Percent Operational Time:	99.7

Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average
1-Aug	49	87	177	69	287	356	349	341	5	359	2	358	4	358	37	156	315	11	9	329	338	24	41	76	4.8
2-Aug	142	176	171	167	155	153	185	196	200	225	231	218	267	283	337	296	314	337	260	235	38	AF	AF	95	232.7
3-Aug	98	122	124	137	135	130	145	160	142	114	120	137	86	142	143	158	186	178	169	130	134	128	133	150	140.3
4-Aug	131	111	114	118	121	117	113	118	133	145	116	107	108	120	122	124	116	119	136	152	167	149	142	131	124.9
5-Aug	87	94	100	89	108	119	118	126	125	115	101	116	100	109	110	102	104	127	140	156	172	158	152	147	120.2
6-Aug	152	129	124	127	118	122	126	132	134	134	136	127	122	125	122	131	122	115	122	125	134	126	122	130	127.1
7-Aug	135	140	136	130	132	136	150	155	149	146	156	155	168	182	142	161	165	151	157	144	146	157	161	170	152.1
8-Aug	174	177	180	178	178	175	191	190	193	193	205	208	320	87	149	80	48	81	114	128	155	166	165	177	165.7
9-Aug	170	158	146	77	135	136	127	128	139	145	33	137	234	140	42	206	169	120	117	127	132	136	149	155	141.3
10-Aug	151	172	176	168	184	249	255	257	259	255	249	252	250	253	250	250	253	250	236	233	204	202	220	203	232.6
11-Aug	212	208	207	199	211	222	216	204	228	239	246	247	257	253	257	258	271	283	274	264	223	243	259	230	242.9
12-Aug	220	223	228	222	219	228	236	244	245	243	255	258	263	250	258	244	248	254	260	246	229	230	235	225	242.1
13-Aug	222	216	219	217	211	214	222	225	242	238	230	243	250	246	255	261	220	226	234	229	227	225	219	225	230.9
14-Aug	243	255	239	248	265	248	266	258	263	268	281	291	286	281	287	294	294	297	285	301	291	281	272	279	276.5
15-Aug	292	298	309	328	341	356	355	360	357	349	349	357	4	15	8	0	358	359	355	357	341	343	344	347	349.4
16-Aug	356	10	356	352	342	309	300	303	299	289	307	304	292	254	332	331	280	289	310	235	220	231	239	230	302.3
17-Aug	231	234	230	231	221	219	220	229	238	230	C	246	253	246	275	314	285	326	310	228	218	211	203	213	239.1
18-Aug	263	285	326	0	13	20	15	24	34	30	16	26	328	336	294	320	280	332	138	133	143	152	162	165	45.5
19-Aug	167	177	173	181	181	178	174	181	188	205	219	242	252	269	274	273	267	276	292	278	277	273	262	253	225.8
20-Aug	246	250	256	258	259	261	262	264	270	273	275	279	278	289	278	281	273	290	286	288	291	255	264	268	271.2
21-Aug	265	258	259	253	249	255	263	275	281	306	322	325	317	307	319	322	337	336	323	285	290	322	321	307	300.4
22-Aug	306	301	294	294	288	272	283	287	287	283	314	324	312	310	344	341	321	340	359	50	141	148	169	177	305.0
23-Aug	187	194	188	181	179	188	198	203	204	202	208	197	194	188	211	203	195	187	174	158	161	167	205	63	190.4
24-Aug	125	189	232	199	176	182	193	203	216	224	232	252	255	273	263	264	267	271	257	238	229	326	30	56	230.3
25-Aug	80	103	102	108	116	117	128	128	73	36	20	15	12	6	4	22	21	21	17	36	36	51	26	18	49.0
26-Aug	33	28	14	29	43	46	89	100	38	88	333	312	319	316	275	270	252	261	259	238	227	227	222	227	315.1
27-Aug	225	210	199	206	201	191	207	219	215	208	216	222	217	216	215	227	221	224	237	225	209	211	214	216	216.1
28-Aug	220	221	222	219	218	217	226	235	223	237	247	244	259	259	262	250	247	257	255	253	177	181	309	359	241.8
29-Aug	39	309	127	165	142	165	196	226	247	250	247	242	229	245	237	202	192	172	163	144	129	134	136	140	184.8
30-Aug	134	124	129	139	150	149	166	175	215	263	285	305	316	290	269	245	231	197	214	153	145	188	202	186	186.9
31-Aug	183	188	186	195	201	198	208	216	216	211	230	244	234	239	238	245	250	245	239	216	210	229	207	210	223.7
	184.1	184.8	191.6	186.1	184.7	188.0	203.1	212.2	223.7	233.2	249.1	253.2	264.0	258.4	259.5	257.0	253.1	256.3	231.5	200.0	194.2	193.3	198.0	193.1	
	Diurnal Average																								

C - Calibration AF - Analyzer Failure

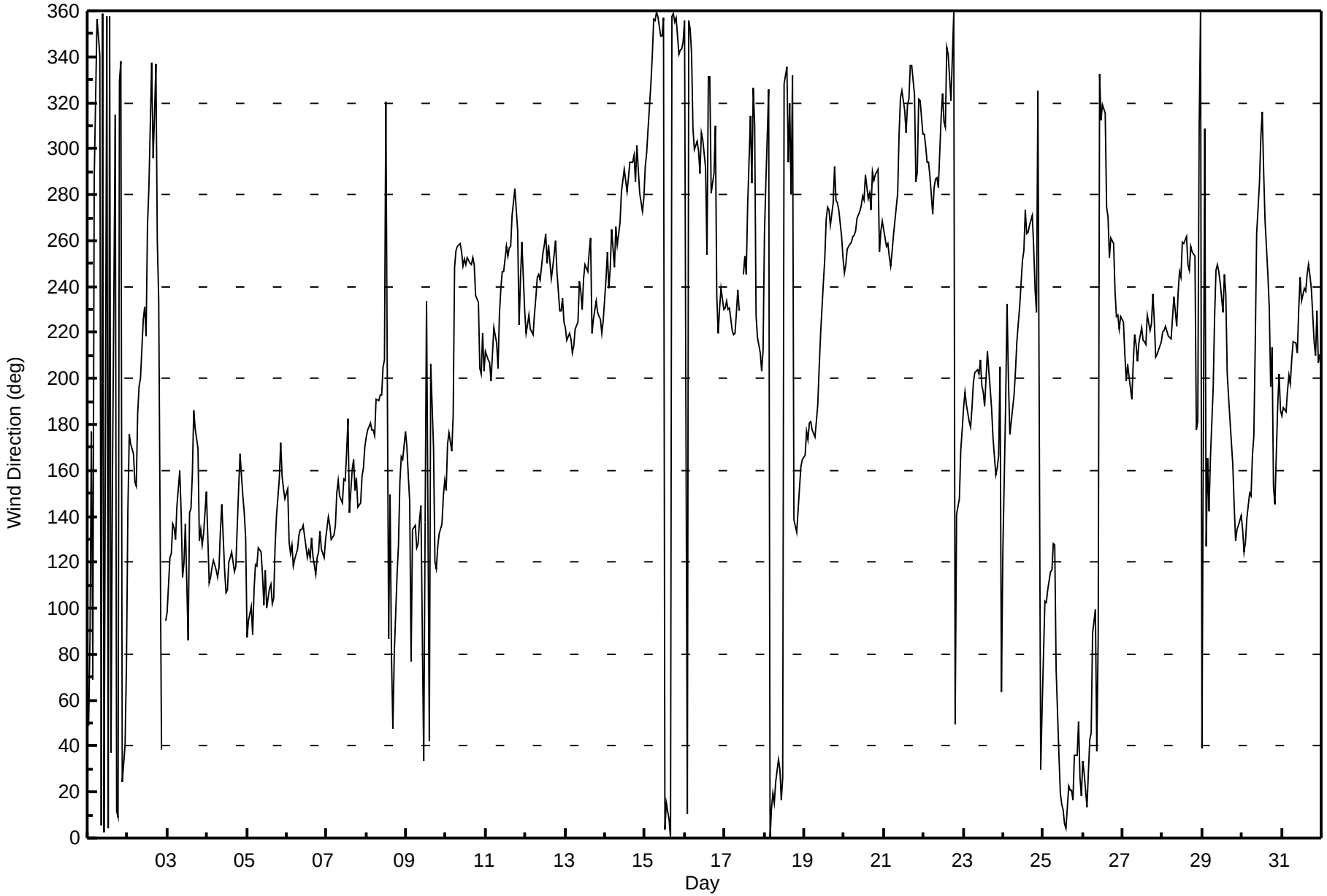
All monthly, daily, and diurnal averages have been calculated using vector methods

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction (WD) - deg

Firebag - August 2015



Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg

Firebag - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 91 deg on Aug 26 11:00

Minimum Value: 4 deg on Aug 27 05:00

Percentiles: $P_1 = 6$ $P_{10} = 8$ $Q_1 = 10$ Median = 13 $Q_3 = 17$ $P_{90} = 31$ $P_{99} = 80$

Hours in Service:	744
Hours of Data:	741
Hours of Missing Data:	3
Hours of Calibration:	1
Percent Operational Time:	99.7

Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Aug	28	10	82	20	57	14	13	20	14	17	21	33	28	18	39	70	24	16	14	10	15	13	25	31	82
2-Aug	22	13	8	8	10	13	50	13	32	33	57	45	59	48	80	24	38	10	47	84	69	AF	AF	28	84
3-Aug	14	10	10	11	11	11	21	26	16	32	47	34	45	21	14	24	12	12	13	14	10	10	14	12	47
4-Aug	28	11	11	9	10	10	10	14	14	14	12	15	12	11	12	12	10	12	11	16	9	12	11	14	28
5-Aug	25	16	11	12	13	11	10	12	14	16	14	19	21	21	19	15	15	13	15	14	8	12	10	11	25
6-Aug	11	14	11	12	10	11	11	13	13	14	15	14	13	15	16	16	15	11	12	13	13	12	11	12	16
7-Aug	13	13	13	13	13	12	13	12	12	14	15	15	20	31	27	29	20	18	20	15	9	10	11	8	31
8-Aug	8	8	8	8	8	10	7	14	10	15	16	21	75	18	19	89	87	19	14	17	10	13	12	10	89
9-Aug	11	9	21	22	15	18	16	17	14	33	75	68	66	71	88	62	25	43	17	11	9	9	13	10	88
10-Aug	11	11	12	10	31	14	11	13	14	13	18	19	20	15	15	14	15	13	11	23	11	9	18	9	31
11-Aug	10	9	9	6	8	11	24	10	11	12	14	14	14	16	14	13	15	14	15	18	8	26	25	8	26
12-Aug	8	7	9	9	8	8	9	11	11	13	15	18	22	22	25	17	19	18	14	9	10	7	10	10	25
13-Aug	9	9	8	9	8	9	9	9	12	13	12	14	16	16	13	26	11	10	10	9	8	9	8	9	26
14-Aug	17	14	9	12	11	10	13	14	13	13	14	13	15	16	13	14	16	13	13	13	12	12	12	12	17
15-Aug	13	13	17	12	12	15	14	15	13	13	14	15	14	13	16	16	15	15	13	11	8	8	9	11	17
16-Aug	14	15	16	13	18	15	13	17	15	12	24	23	36	39	37	36	27	12	23	12	8	9	7	7	39
17-Aug	6	9	6	6	8	8	8	8	12	13	C	17	33	31	30	33	31	26	45	15	8	9	7	10	45
18-Aug	13	18	12	11	15	9	11	13	17	26	28	72	55	34	40	68	73	88	21	11	10	10	9	9	88
19-Aug	8	8	8	9	9	9	9	9	9	11	15	15	14	19	18	14	12	15	14	11	11	11	11	8	19
20-Aug	9	9	9	10	9	10	10	11	11	13	12	13	13	13	12	13	11	12	11	10	16	17	13	11	17
21-Aug	9	8	8	9	9	11	10	12	13	16	13	13	15	15	16	15	14	12	13	12	26	12	13	11	26
22-Aug	11	11	12	16	14	11	14	12	12	12	17	15	14	17	15	17	18	17	14	31	14	12	13	8	31
23-Aug	7	5	6	6	7	7	12	7	9	13	14	14	16	17	22	14	16	14	13	9	10	10	53	77	77
24-Aug	11	32	11	13	14	13	8	9	12	13	17	21	19	21	20	23	21	17	12	19	7	54	11	10	54
25-Aug	11	9	8	9	8	9	12	10	31	36	26	26	32	38	17	15	15	13	8	11	73	14	18	12	73
26-Aug	10	14	12	31	17	23	25	23	24	82	91	56	24	29	35	39	18	16	9	9	9	9	9	7	91
27-Aug	13	6	6	7	4	5	12	9	11	13	17	15	16	19	17	14	14	10	19	15	9	9	8	8	19
28-Aug	8	8	8	8	8	8	11	10	10	12	11	14	14	15	16	19	14	13	11	19	12	20	46	15	46
29-Aug	15	65	77	64	22	13	40	15	15	16	20	28	30	22	33	36	25	13	10	12	12	12	12	11	77
30-Aug	13	11	11	11	11	11	18	12	22	18	20	21	32	26	35	27	11	26	39	17	10	20	8	9	39
31-Aug	9	9	8	4	7	7	9	9	9	11	17	13	15	15	14	15	13	11	10	10	9	23	9	9	23
	28	65	82	64	57	23	50	26	32	82	91	72	75	71	88	89	87	88	47	84	73	54	53	77	
	Diurnal Maximum																								

C - Calibration AF - Analyzer Failure

Wood Buffalo Environmental Association
SO2 Calibration Report

W B E A

Station Information

Calibration Date	August 7, 2015	Last Calibration	July 9, 2015
Station Name	Firebag	Station Number	AMS 19
Reason:	Routine		
Start Time (MST)	9:00	End Time (MST)	13:45
Gas Cert Reference	SA130123A	Station temp.	Deg C
Cal Gas Concentration	49.3 ppm	Cal Gas Exp Date	December 12, 2016
Calibrator Make/Model	API T700	Serial Number	996
ZAG Make/Model	API 701	Serial Number	4891
DACS make/model	Campbell Scientific CR3000	DACS serial No.	9037

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 1000 ppb		PMT voltage	-606	-605
Analyzer IP address	192.168.1.43		Lamp voltage	788	787
Calculated slope	0.997818	0.999356	Chamber temp	45.0	45.5
Calculated intercept	-0.574874	-0.954139	Pressure	683.7	680.7
Analyzer Background	8.0	8.0	Flow	0.448	0.446
Analyzer Coefficient	0.952	0.964	Intensity	90	90

Analyzer make	Thermo 43i	Analyzer serial #	1410661308

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.3	----
as found span	5000	58.3	574.8	565.7	1.016
calibrator zero	5000	0.0	0.0	-0.2	----
high point	5000	58.3	574.8	575.2	0.999
second point	5000	29.2	287.9	290.8	0.990
third point	5000	14.7	144.9	146.3	0.991
as left zero	5000	0.0	0.0	0.0	----
as left span	5000	58.3	574.8	572.8	1.004
				Average Correction Factor	0.993

Corrected As found	566.0	Previous response	576.7	% change	1.9%

Notes:

Filter changed after as founds. Span adjusted.

Calibration Performed By: Devin Russell

Wood Buffalo Environmental Association
SO2 Calibration Report

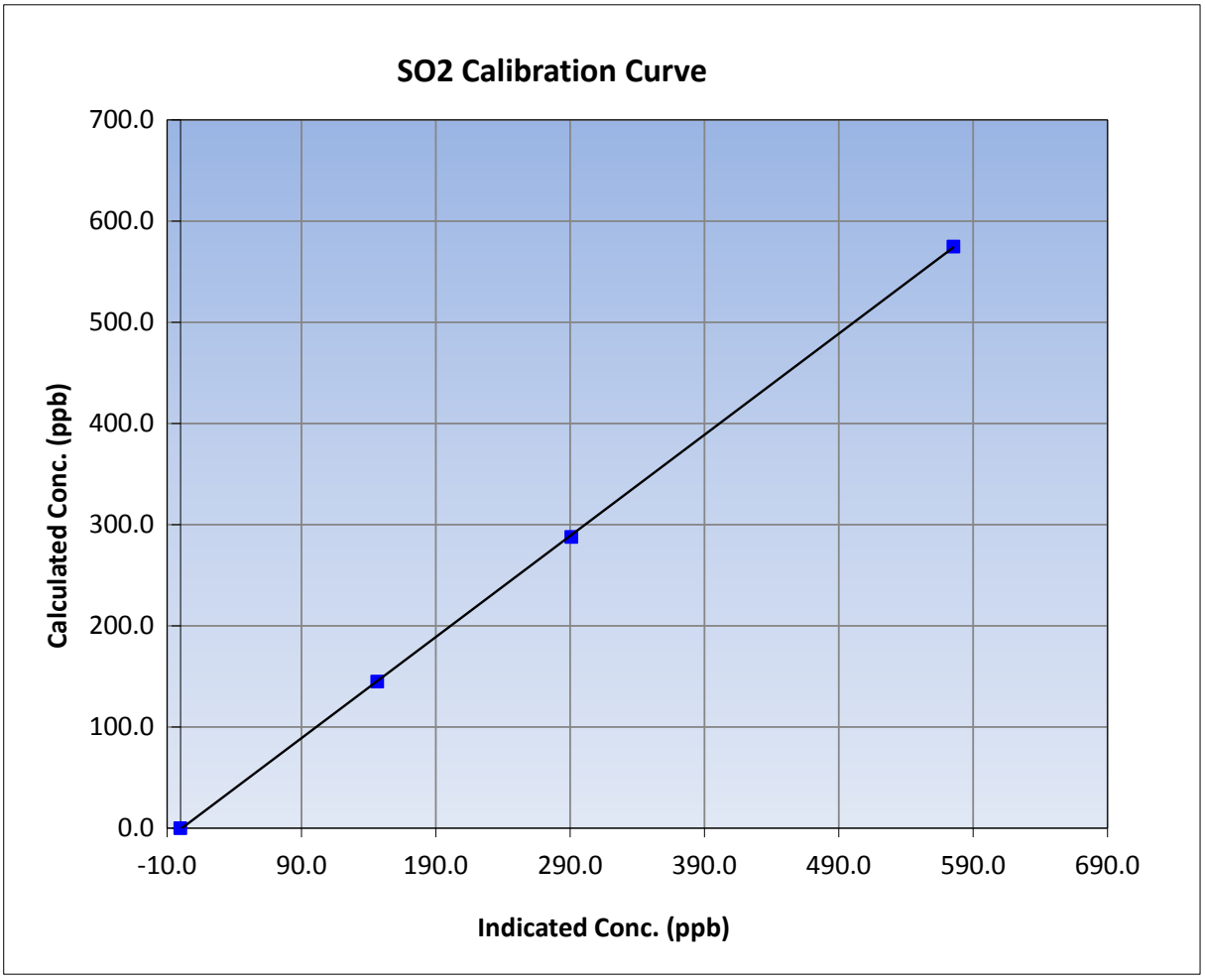
W B E A

Station Information

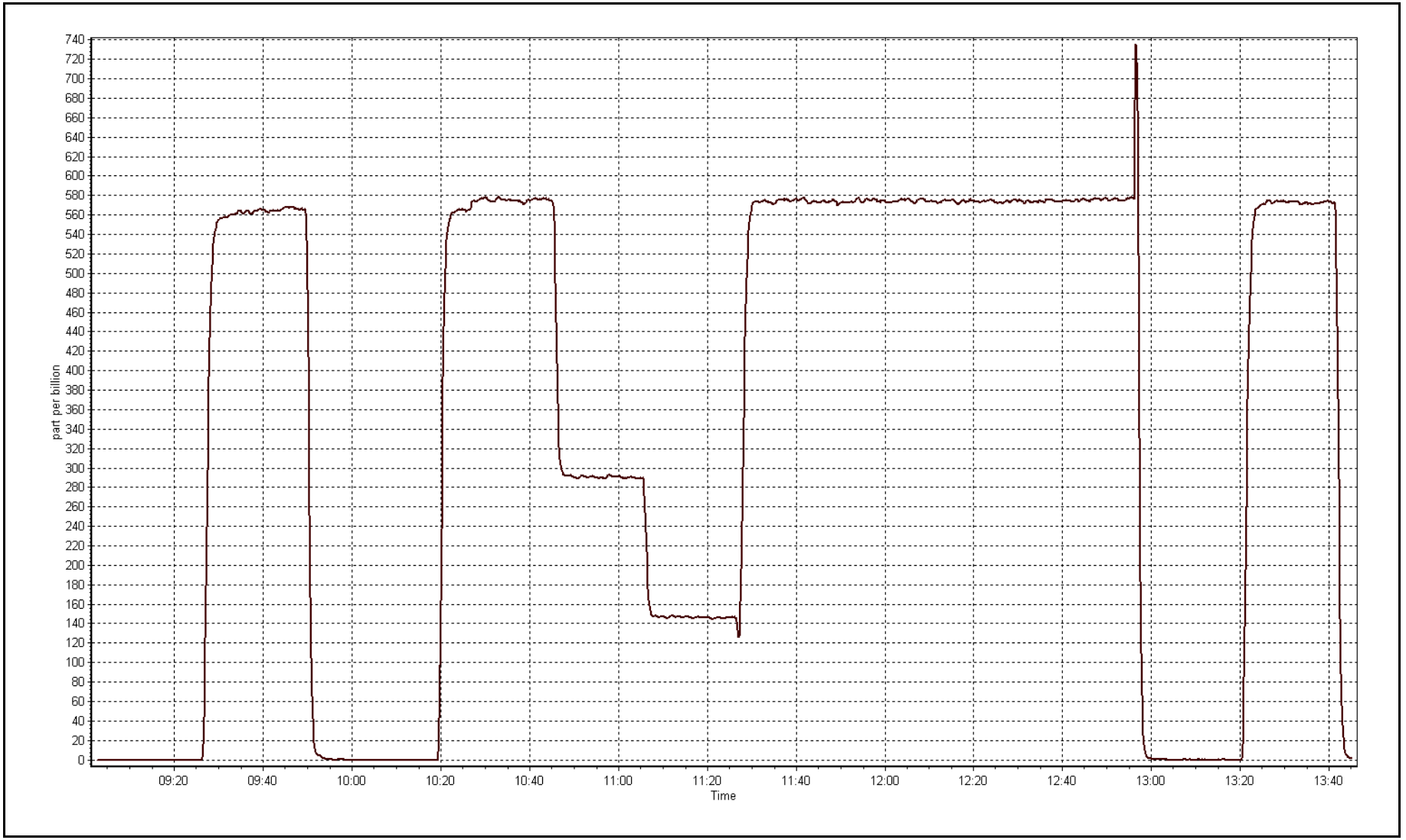
Calibration Date	August 7, 2015	Previous Calibration	July 9, 2015
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	9:00	End Time (MST)	13:45
Analyzer make	Thermo 43i	Analyzer serial #	1410661308

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	----	Correlation Coefficient	0.999970
574.8	575.2	0.9994		
287.9	290.8	0.9900	Slope	0.999356
144.9	146.3	0.9906		
			Intercept	-0.954139



SO2 Calibration Plot Date: August 7, 2015



Wood Buffalo Environmental Association
H2S Calibration Report

Station Information

Calibration Date	August 6, 2015	Last Calibration	July 10, 2015
Station Name	Firebag	Station Number	AMS 19
Reason:	Routine		
Start Time (MST)	9:50	End Time (MST)	13:05
Gas Cert Reference	ALM066720	Station temp.	22 Deg C
Cal Gas Concentration	4.85 ppm	Cal Gas Exp Date	10/06/2014
Calibrator Make/Model	API T700	Serial Number	996
ZAG air Make/Model	API 701	Serial Number	4891
DACS make/model	Campbell Scientific CR3000	Serial Number	9037
SO2 gas concentration	49.3 ppm	SO2 gas cert/exp	SA130123A December-12-16

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-574	-574
Analyzer IP address	192.168.1.42		Lamp voltage	923	923
Calculated slope	0.990716	0.996633	Chamber temp	45	45
Calculated intercept	-0.035374	-0.324302	Pressure	534.6	543.1
Analyzer Background	12.1	12	Flow	0.949	0.959
Analyzer Coefficient	1.073	1.073	Intensity	86	86
			Converter temp.	333	334

Analyzer make/model	Thermo 450i	Analyzer serial #	815129098
Converter make/model		Converter serial #	

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.1	----
as found span	5000	83.3	80.8	80.9	0.999
SO2 scrubber check	5000	15.2	149.9	1.1	----
calibrator zero	5000	0.0	0.0	0.2	----
high point	5000	83.3	80.8	81.3	0.994
second point	5000	41.7	40.4	41.1	0.985
third point	5000	21.0	20.4	20.8	0.978
as left zero	5000	0.0	0.0	0.2	----
as left span	5000	83.3	80.8	81.4	0.992
				Average Correction Factor	0.986

Corrected As found	80.8	Previous response	81.6	% change	0.9%

Notes:

Filter changed after as founds. Scrubber check completed after as founds.

Calibration Performed By: Devin Russell

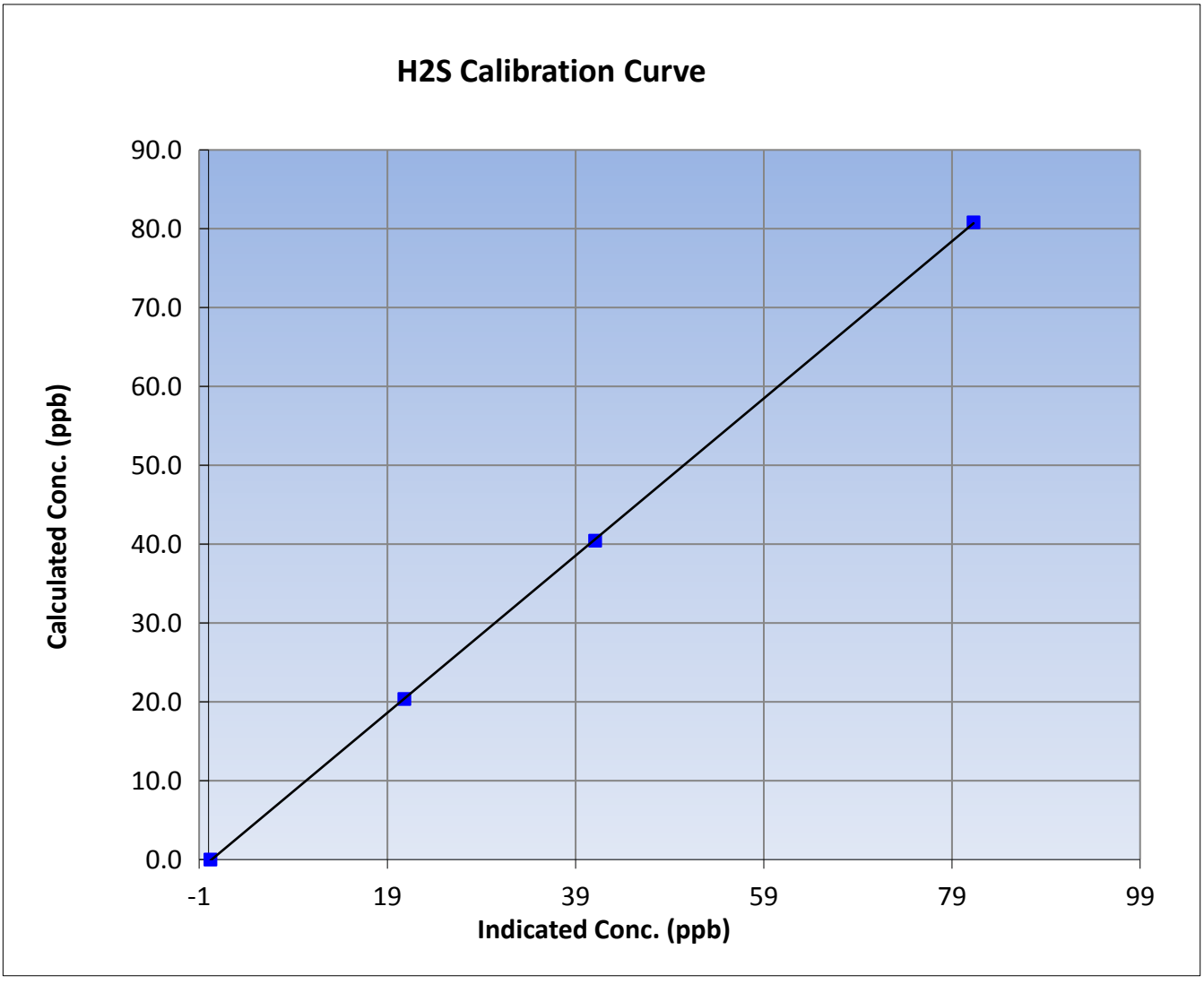
Wood Buffalo Environmental Association
H2S Calibration Report

Station Information

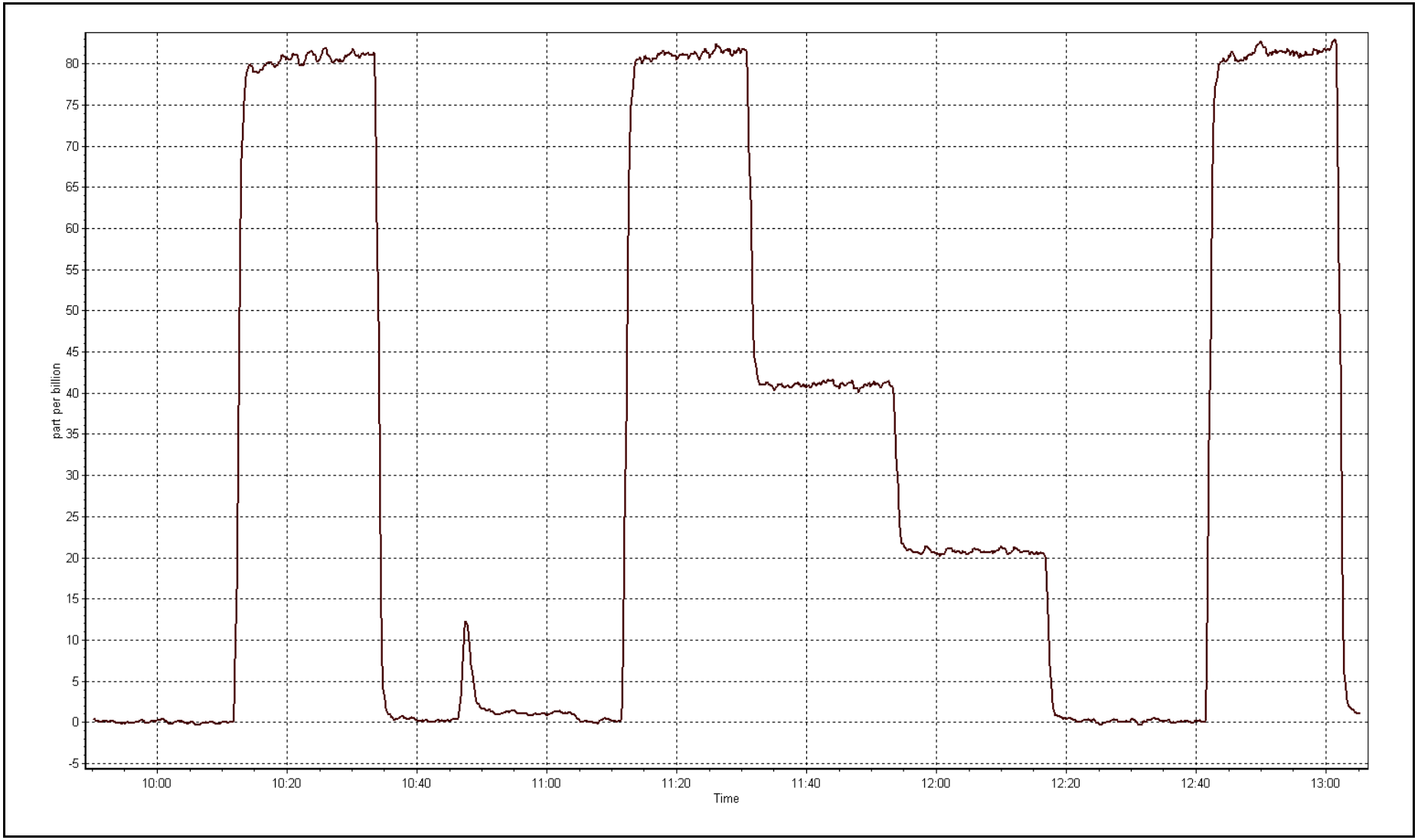
Calibration Date	August 6, 2015	Previous Calibration	July 10, 2015
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	9:50	End Time (MST)	13:05
Analyzer make	Thermo 450i	Analyzer serial #	815129098

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	----	Correlation Coefficient	0.999984
80.8	81.3	0.9939		
40.4	41.1	0.9846	Slope	0.996633
20.4	20.8	0.9784		
			Intercept	-0.324302



H2S Calibration Plot Date: August 6, 2015



Wood Buffalo Environmental Association
THC Calibration Report

W B E A

Station Information

Calibration Date	August-07-15	Last Calibration	July-09-15
Station Name	Firebag	Station Number	AMS 19
Reason:	Routine		
Start Time (MST)	9:00	End Time (MST)	13:45
Gas Cert Reference	SA130123A	Cal Gas Expiry Date	12/12/2016
CH4 Cal Gas Conc.	512 ppm	CH4 Equiv Conc.	1092.3 ppm
C3H8 Cal Gas Conc.	211 ppm	Station temp.	22 Deg C
Calibrator Make/Model	API T700	Serial Number	996
ZAG make/model	Teledyne API 701	Serial Number	4891
DACS make/model	Campbell Scientific CR3000	Serial Number	9037

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 50 ppm		Sample Pressure	8.6	8.6
Analyzer IP address	192.168.1.51		Air or Bypass Press	34.9	34.9
Calculated slope	0.997359	0.989715	Fuel Pressure	23.0	23.0
Calculated intercept	0.021123	0.009301	Analyzer Coeff	3.6	3.6
			Analyzer BKG	4.730	4.850

Analyzer make	Thermo 51i-LT	Analyzer serial #	1336160089

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	0.09	----
as found span	5000	58.3	12.74	12.95	0.983
calibrator zero	5000	0.0	0.00	-0.03	----
high point	5000	58.3	12.74	12.84	0.992
second point	5000	29.2	6.38	6.47	0.986
third point	5000	14.7	3.21	3.24	0.991
as left zero	5000	0.0	0.00	0.03	----
as left span	5000	58.3	12.74	12.76	0.998
				Average Correction Factor	0.990

Corrected As found	12.86	Previous response	12.75	% change	-0.9%

Notes:

Filter changed after as founds. Zero and span adjusted.

Calibration Performed By: Devin Russell

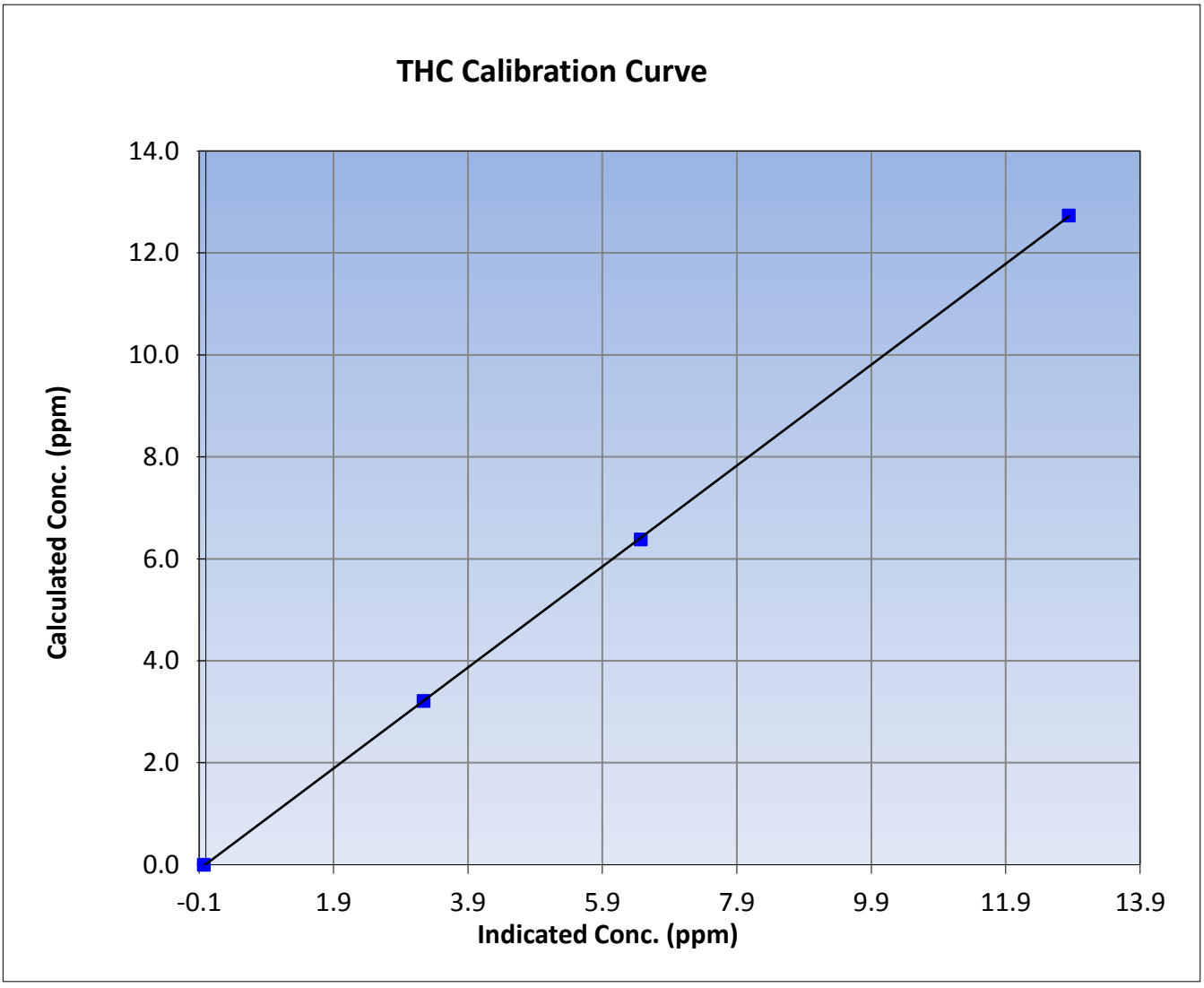
Wood Buffalo Environmental Association
THC Calibration Report

Station Information

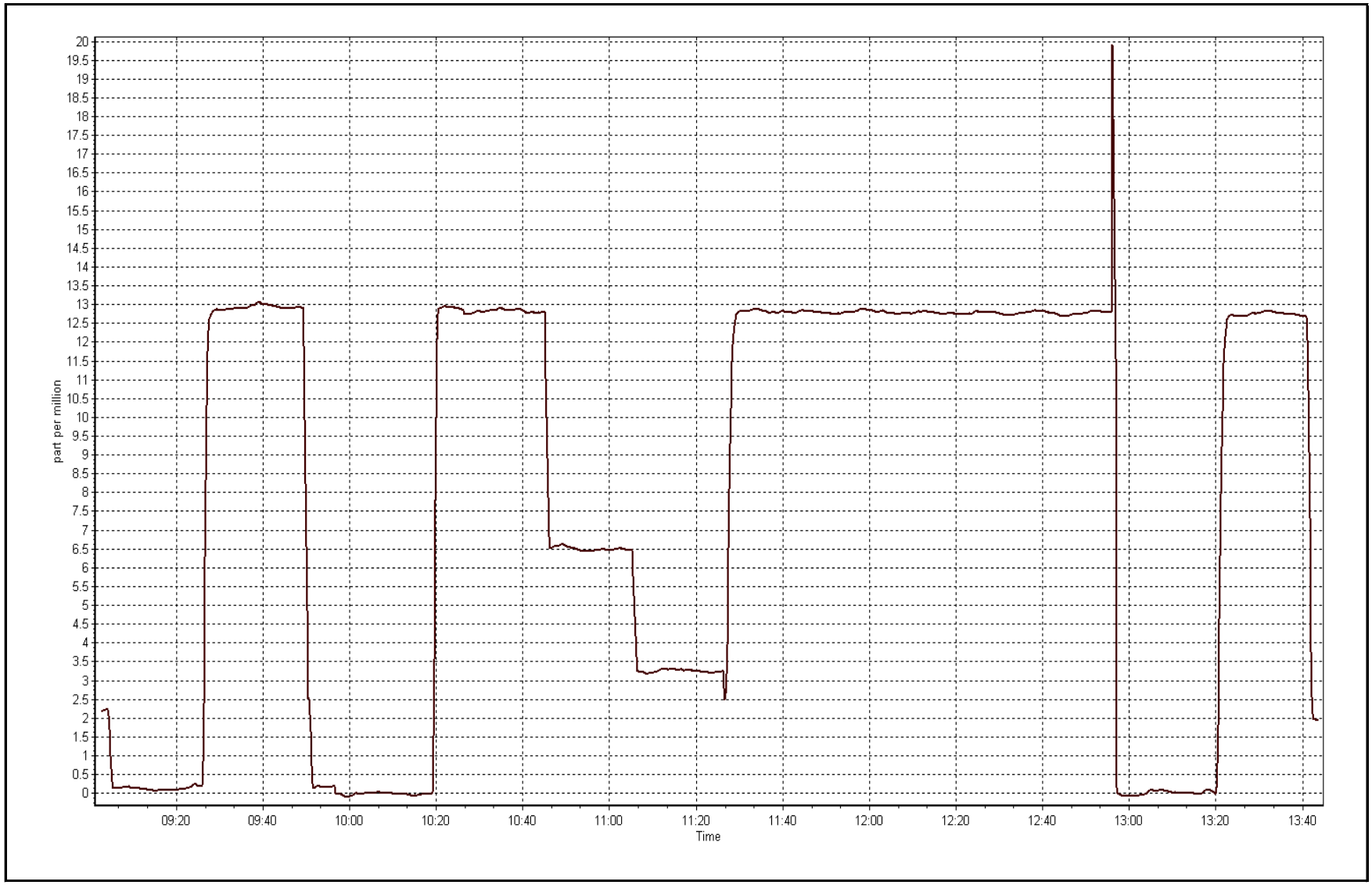
Calibration Date	August 7, 2015	Previous Calibration	July 9, 2015
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	9:00	End Time (MST)	13:45
Analyzer make	Thermo 51i-LT	Analyzer serial #	1336160089

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	-0.03	----	Correlation Coefficient	0.999978
12.74	12.84	0.9919		
6.38	6.47	0.9859	Slope	0.989715
3.21	3.24	0.9911		
			Intercept	0.009301



THC Calibration Plot Date: August 7, 2015



Wood Buffalo Environmental Association
NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	August 7, 2015	Previous Calibration	July 9, 2015
Station Name	Firebag	Station Number	AMS 19
Reason:	Routine		
Start Time (MST)	9:00	End Time (MST)	13:45
NO Cal Gas Conc	51.5 ppm	Gas Cert Reference	SA130123A
NOx Cal Gas Conc	51.5 ppm	Cal Gas Expiry Date	12/12/2016
Calibrator	API T700	Serial Number	996
Zero air Generator	Teledyne API T701	Serial Number	4891

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	9037

Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.996846	0.998743	0.993402
	Data Offset	-0.794965	-0.922701	-0.374095
Current Calibration	Data Slope	1.000273	1.000403	0.995635
	Data Offset	-1.012062	-0.743927	-0.390351

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1410661309

Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
NO coefficient	0.850		0.859	
NOX coefficient	1.002		1.000	
NO2 coefficient	1.000		1.000	
NO bkgrnd	3.7		3.9	
NOX bkgrnd	4.5		4.0	
Chamber Temp	50.6	Deg C	50.4	Deg C
Moly Temp	327.6	Deg C	325.5	Deg C
PMT voltage	-780	V	-780	V
PMT Temp	-2.8	Deg C	-2.7	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	156.8	mmHg	158.6	mmHg
R Cell Press Nox	156.8	mmHg	158.6	mmHg
NO sample flow	0.639	lpm	0.644	lpm
Nox sample Flow	0.641	lpm	0.644	lpm

Notes:

Filter changed after as founds. Zero and Span adjusted.

Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: August 7, 2015 Station Number: AMS 19

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	-0.8	-0.1	-0.7	----	----
as found span	5000	58.3	600.5	600.5	0.0	593.3	591.8	1.5	1.0122	1.0147
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
high point	5000	58.3	600.5	600.5	0.0	600.4	600.2	0.3	1.0001	1.0005
second point	5000	29.2	300.8	300.8	0.0	303.3	303.0	0.3	0.9918	0.9927
third point	5000	14.7	151.4	151.4	0.0	152.9	152.2	0.6	0.9904	0.9946
as left zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.1	0.0	----	----
as left span	5000	58.3	600.5	283.3	317.2	599.6	281.8	317.9	1.0014	1.0056
								Average Correction Factor	0.9941	0.9960

Corrcted As found NO_X= 594.1 NO= 591.9 Percent Change NO_X= 1.5% NO= 1.7%

Previous Response NO_X= 603.2 NO= 602.2

GPT Calibration Data

Dilution Flow 5000 ccm Source Gas Flow 58.30 ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
Cal zero			0.0			0.0			N/A	
1st NO2 (300)	----	283.3	315.8	600.5	283.3	317.2	0.9884	1.0000	0.9956	100.4%
2nd NO2 (200)	----	386.6	212.5	600.7	386.6	214.1	0.9882	1.0000	0.9923	100.8%
3rd NO2 (100)	----	490.6	108.5	600.4	490.6	109.8	0.9887	1.0000	0.9883	101.2%
4th NO2 (0)	599.1	----	1.5	600.6	599.1	1.5	0.9883	1.0000	N/A	----
					Average Correction Factor		0.9884	1.0000	0.9920	100.8%

Calibration Performed By: Devin Russell

Wood Buffalo Environmental Association

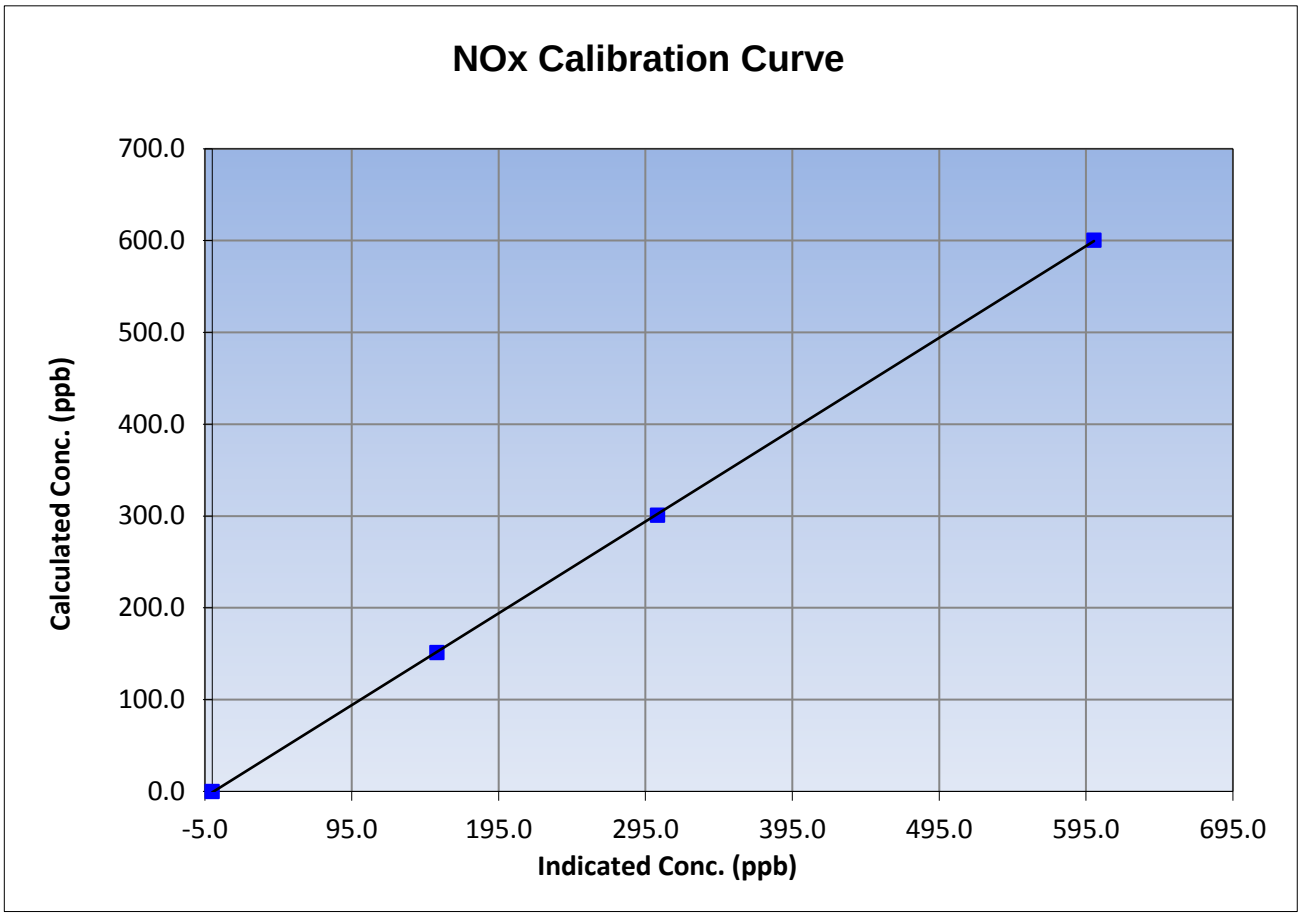
NO_X Calibration Summary

Station Information

Calibration Date	August 7, 2015	Previous Calibration	July 9, 2015
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	9:00	End Time (MST)	13:45
Analyzer make	Thermo 42i	Analyzer serial #	1410661309

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999975
600.5	600.4	1.0001		
300.8	303.3	0.9918	Slope	1.000273
151.4	152.9	0.9904		
			Intercept	-1.012062



Wood Buffalo Environmental Association

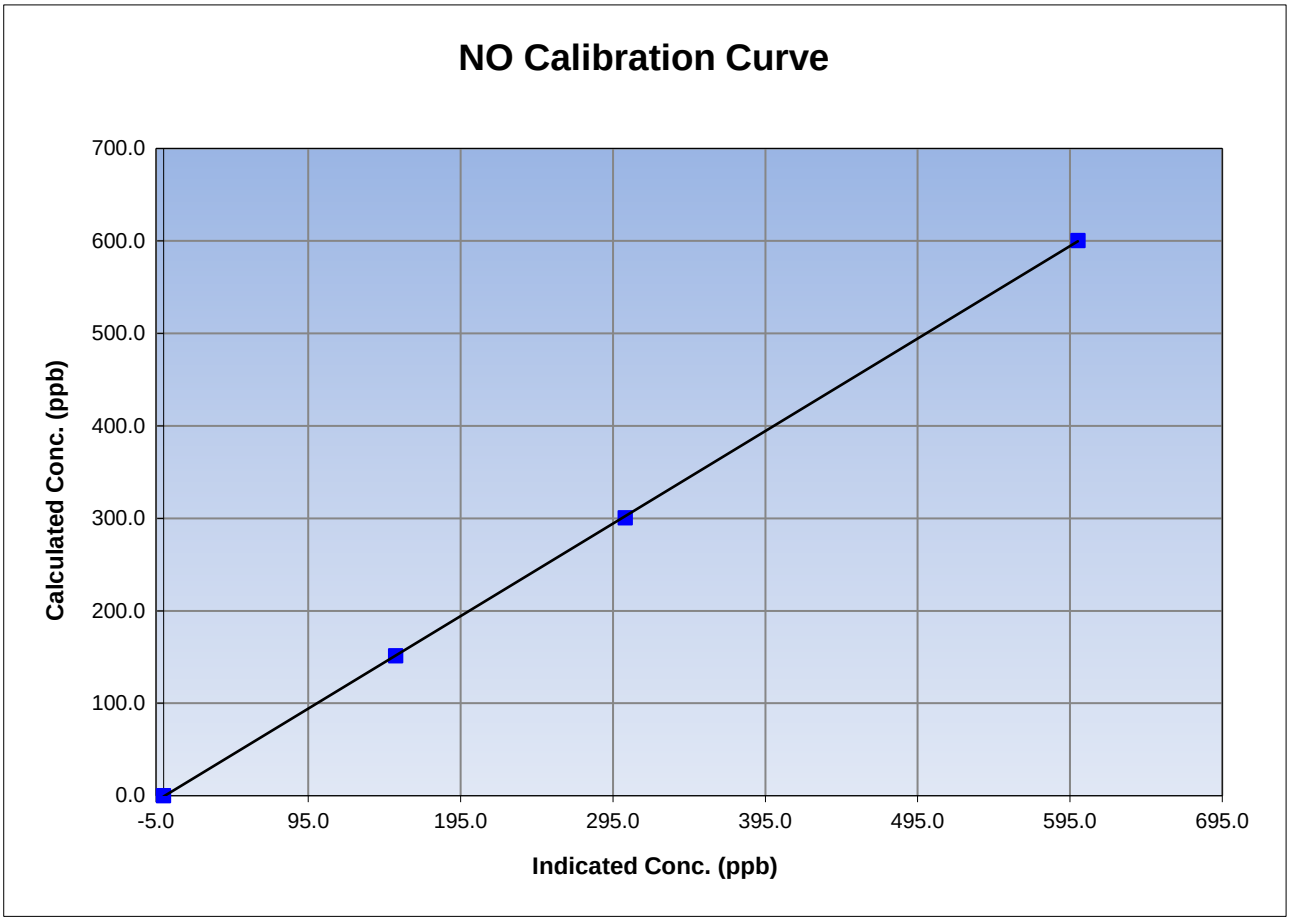
NO Calibration Summary

Station Information

Calibration Date	August 7, 2015	Previous Calibration	July 9, 2015
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	9:00	End Time (MST)	13:45
Analyzer make	Thermo 42i	Analyzer serial #	1410661309

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999980
600.5	600.2	1.0005		
300.8	303.0	0.9927	Slope	1.000403
151.4	152.2	0.9946		
			Intercept	-0.743927



Wood Buffalo Environmental Association

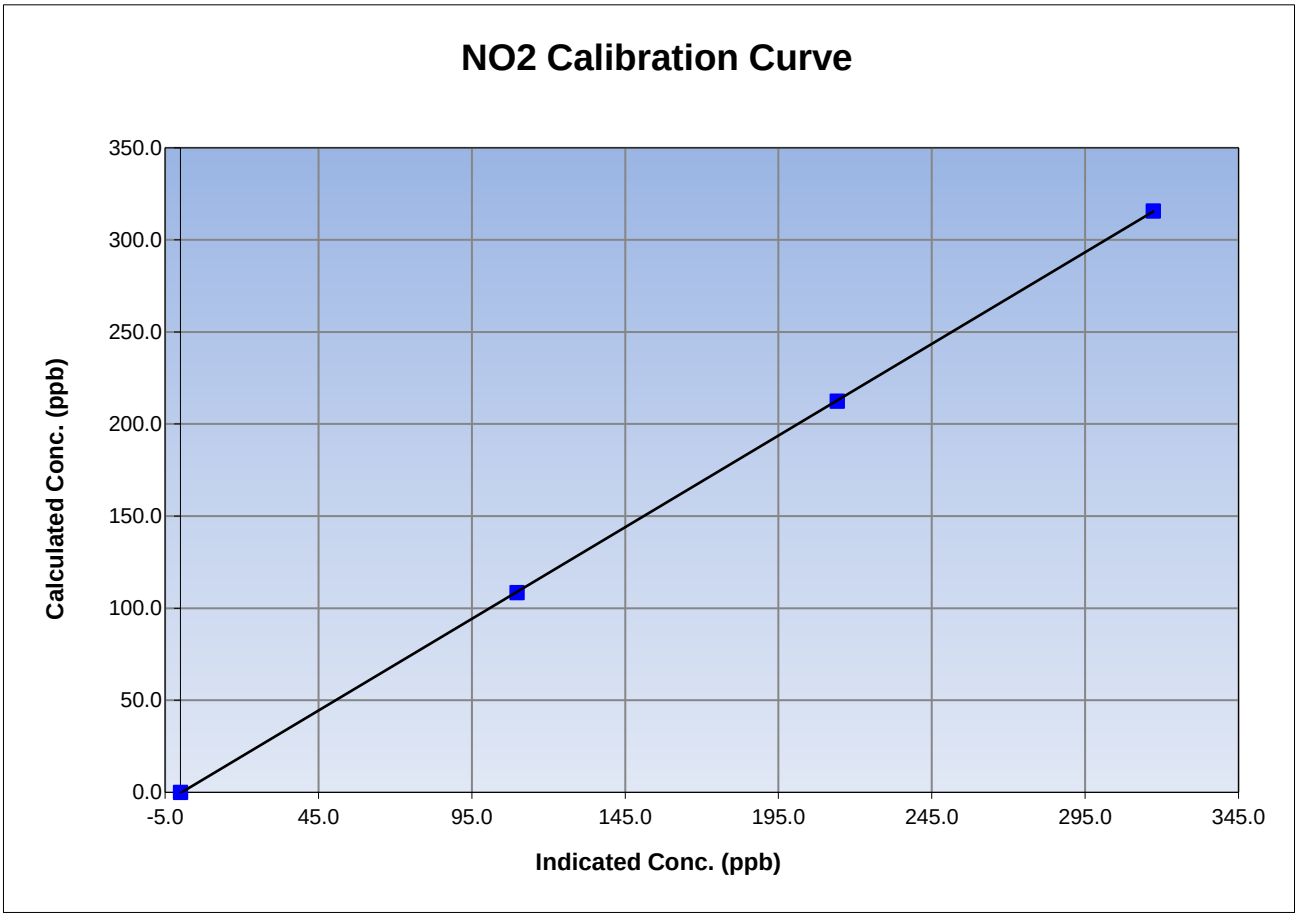
NO_2 Calibration Summary

Station Information

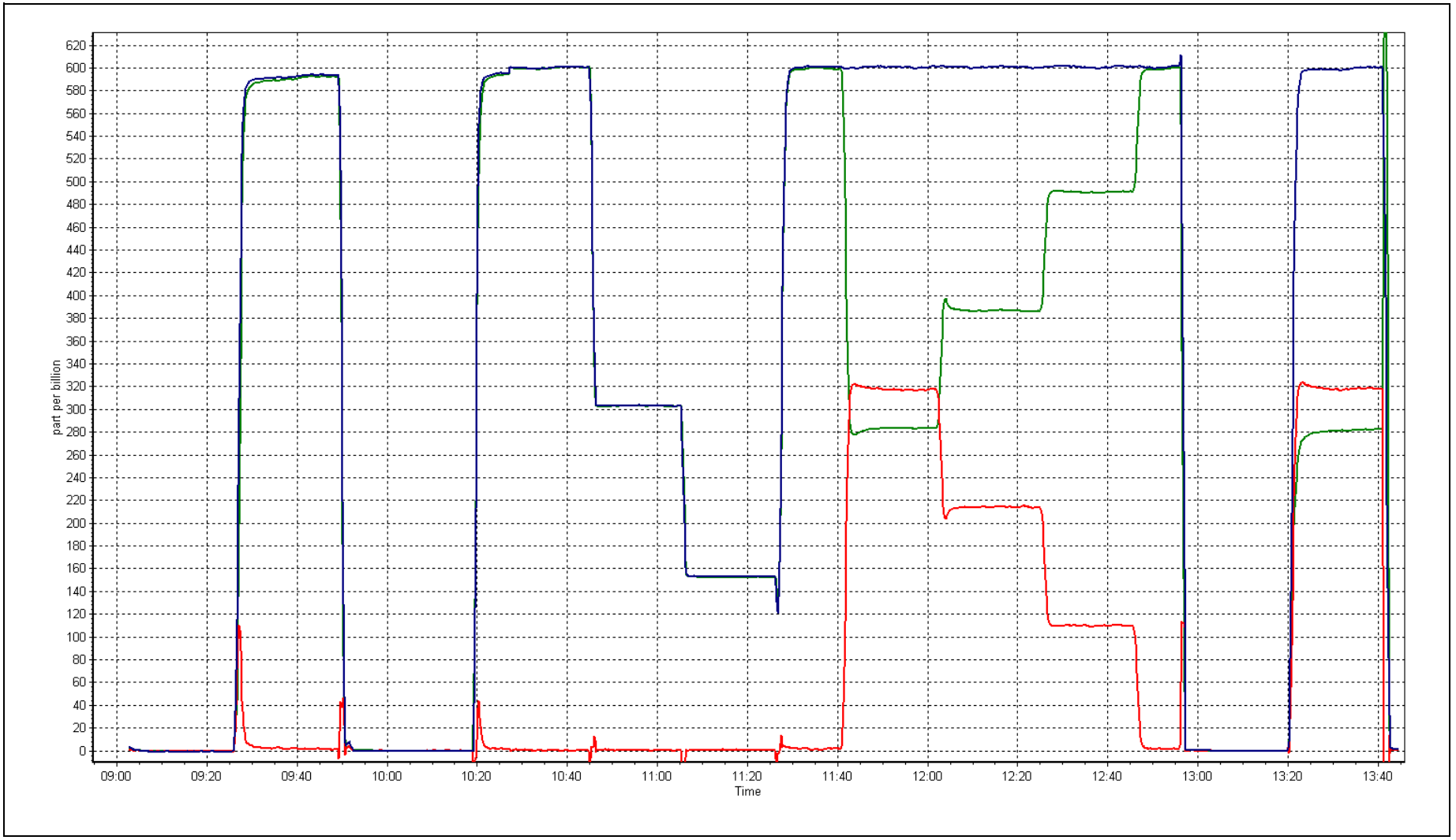
Calibration Date	August 7, 2015	Previous Calibration	July 9, 2015
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	9:00	End Time (MST)	13:45
Analyzer make	Thermo 42i	Analyzer serial #	1410661309

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999990
315.8	317.2	0.9956		
212.5	214.1	0.9923	Slope	0.995635
108.5	109.8	0.9883		
			Intercept	-0.390351



NOx, NO & NO_2 Calibration Plot Date: August 7, 2015



Wood Buffalo Environmental Association

WS/WD Calibration Report

Station Information

Calibration Date	August-17-15	Previous Calibration	July-09-14
Station Name	Firebag	Station Number	AMS 19
Reason:	Routine	Installation	Removal
Start Time (MST)	9:40	End Time (MST)	10:55
Barometric Press	n/a	Station Temp	22 Deg C
WS Calibrator	MetOne 053	Serial Number	K13090

WIND SPEED

Sensor make/model	Met One 010C-1	Sensor serial #	P22394
DACS make	Campbel Scientific CR3000	DACS serial No.	9037
DACS voltage range	5000	DACS channel #	P2
	Before		After
Calculated slope	0.996832	Calculated slope	0.998872
Calculated intercept	0.041578	Calculated intercept	0.028977

Wind Speed Calibration Data

Shaft RPM	Actual Speed (K/hr)	Indicated Speed (K/hr)	Correction factor
0	0.0	0.0	n/a
200	20.2	20.1	1.0025
400	39.4	39.4	0.9989
600	58.6	58.5	1.0001
800	77.8	77.8	0.9989
1000	96.9	97.0	0.9996
Average Correction Factor			1.0000

WIND DIRECTION

Sensor make/model	Met One 020C-1	Sensor serial #	P22885
DACS make	Campbel Scientific CR3000	DACS serial No.	9037
DACS voltage range	5000	DACS channel #	SE 24
	Before		After
Calculated slope	0.997484	Calculated slope	0.990896
Calculated intercept	0.612527	Calculated intercept	0.235275

As Found Declination (west of North) 16° As Left Declination (west of North) 16°

Wind Direction Calibration Data

Physical Direction (Degrees)	Indicated Direction (Degrees)	Correction factor
0	0.5	n/a
90	90.9	0.9900
180	180.6	0.9964
270	270.1	0.9996
357	361.9	0.9864
Average Correction Factor		0.9931

Notes: WS bearings replaced. WS count wheel was rubbing on the sensor; sensor screw loosened and sensor moved back slightly to prevent rubbing.

Declination checked. WD heading off by 1-2 degrees west of north. Did not adjust.

Calibration Performed By: Devin Russell

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 502
CONOCOPHILLIPS
SURMONT
AUGUST 2015

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

September 28, 2015

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONOCOPHILLIPS SURMONT (AMS 502)
AUGUST 2015

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	706	38	38	100.00	7	0	2	0
H2S (ppb) Average	706	34	38	99.46	5	0	3	0
NO2 (ppb) Average	699	37	45	98.92	15	0	4	-
NO (ppb) Average	699	37	45	98.92	34	-	18	-
NOX (ppb) Average	699	37	45	98.92	35	-	18	-
Temperature 2 m (C) Average	744	0	0	100.00	27.3	-	22.1	-
Relative Humidity (%) Average	744	0	0	100.00	100	-	94	-
Wind Speed 10 m (km/h) Average	744	0	0	100.00	33	-	21	-
Wind Direction 10 m (deg) Average	744	0	0	100.00	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONOCOPHILLIPS SURMONT (AMS 502)
AUGUST 2015

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

					Percentile						
Parameter	Number	Mean	StnDev	Total	Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	706	0.7	1	-	0	0	0	0	1	1	7
H2S (ppb) Average	706	0.5	1	-	0	0	0	0	0	1	5
NO2 (ppb) Average	699	0.9	1	-	0	0	0	0	1	3	15
NO (ppb) Average	699	3.2	5	-	0	0	0	2	3	8	34
NOX (ppb) Average	699	4.1	5	-	0	0	1	2	5	10	35
Temperature 2 m (C) Average	744	16.06	4.3	-	5.3	11.1	13.1	15.6	19.1	21.8	27.3
Relative Humidity (%) Average	744	67.3	18	-	26	43	54	68	82	91	100
Wind Speed 10 m (km/h) Average	744	12.3	6	-	1	6	8	11	16	21	33
Wind Direction 10 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONOCOPHILLIPS SURMONT (AMS 502)
AUGUST 2015

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
H2S	02 Aug 2015 17:00	02 Aug 2015 17:00	1	Unstable operation - excessive baseline drift
H2S	08 Aug 2015 04:00	08 Aug 2015 04:00	1	Unstable operation - excessive baseline drift
H2S	19 Aug 2015 02:00	19 Aug 2015 02:00	1	Unstable operation - excessive baseline drift
H2S	23 Aug 2015 07:00	23 Aug 2015 07:00	1	Unstable operation - excessive baseline drift
NO2, NO, NOX	21 Aug 2015 08:00	21 Aug 2015 15:00	8	Maintenance - PMT adjustment and re-calibration

Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO_2) - ppb

ConocoPhillips - Surmont - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 7 ppb on Aug 20 17:00

Maximum Daily Average: 1.9 ppb on Aug 15

Minimum Value: 0 ppb on Aug 19 03:00

Minimum Daily Average: 0.2 ppb on Aug 6

Maximum Diurnal Average: 1.0 ppb at hour 15

Minimum Diurnal Average: 0.4 ppb at hour 3

Monthly Average: 0.7 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 1$ $P_{90} = 1$ $P_{99} = 6$

Hours in Service:	744
Hours of Data:	706
Hours of Missing Data:	38
Hours of Calibration:	38
Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0	1	Z	1	1	1	1	0	1	1	1	1	3	1	2	1	0	2	1	1	1	1	1	1	1.0	3
2-Aug	1	1	0	Z	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.6	1
3-Aug	0	0	0	0	Z	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0.5	1
4-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
5-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
6-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
7-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
8-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.3	1
9-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
10-Aug	0	0	0	0	0	Z	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.4	1
11-Aug	Z	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
12-Aug	0	Z	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0.4	1
13-Aug	1	1	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
14-Aug	0	0	0	Z	0	0	0	0	0	0	0	1	2	1	1	1	0	5	5	2	0	0	2	0	1.0	5
15-Aug	2	3	3	4	Z	3	2	4	2	2	2	1	1	2	1	0	0	0	1	3	3	2	2	1	1.9	4
16-Aug	2	0	0	0	0	Z	0	1	1	2	3	2	0	2	4	3	1	1	0	0	0	0	0	0	1.0	4
17-Aug	0	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.4	1
18-Aug	0	0	Z	0	0	3	1	2	6	C	C	C	C	C	C	C	1	1	1	1	0	0	0	0	--	6
19-Aug	0	0	0	Z	1	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0.4	1
20-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	2	4	7	4	1	1	0	0	0	0	0.9	7
21-Aug	0	0	0	0	0	Z	1	1	1	1	2	1	4	3	3	3	4	4	2	1	1	0	0	1	1.5	4
22-Aug	Z	1	0	0	0	0	0	0	0	4	6	5	5	5	6	3	1	0	0	0	0	0	0	0	1.8	6
23-Aug	0	Z	0	0	0	0	0	0	0	0	1	1	1	2	1	1	1	1	1	1	2	1	1	1	0.8	2
24-Aug	1	1	Z	0	0	0	1	0	0	0	0	1	1	3	3	2	1	1	1	1	0	0	0	0	0.9	3
25-Aug	0	0	0	Z	6	6	3	3	2	1	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1.3	6
26-Aug	1	1	1	1	Z	1	1	0	0	0	0	1	0	1	1	0	1	1	1	1	0	0	0	0	0.6	1
27-Aug	0	0	0	0	0	Z	0	0	1	0	1	1	0	0	0	0	1	1	1	1	1	0	0	0	0.5	1
28-Aug	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.3	1
29-Aug	0	Z	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	1	0	0	0	0	0	0	0.5	1
30-Aug	0	0	Z	0	0	0	0	0	0	0	5	6	3	1	0	0	1	0	1	0	0	0	0	1	1.0	6
31-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
	0.5	0.5	0.4	0.5	0.6	0.7	0.6	0.7	0.7	0.6	0.9	0.9	1.0	0.9	1.0	0.9	0.8	0.8	0.7	0.6	0.5	0.4	0.5	0.4	Diurnal Average	
	2	3	3	4	6	6	3	4	6	4	6	6	5	5	6	4	7	5	5	3	3	2	2	1	Diurnal Maximum	

Z - zerospan C - Calibration

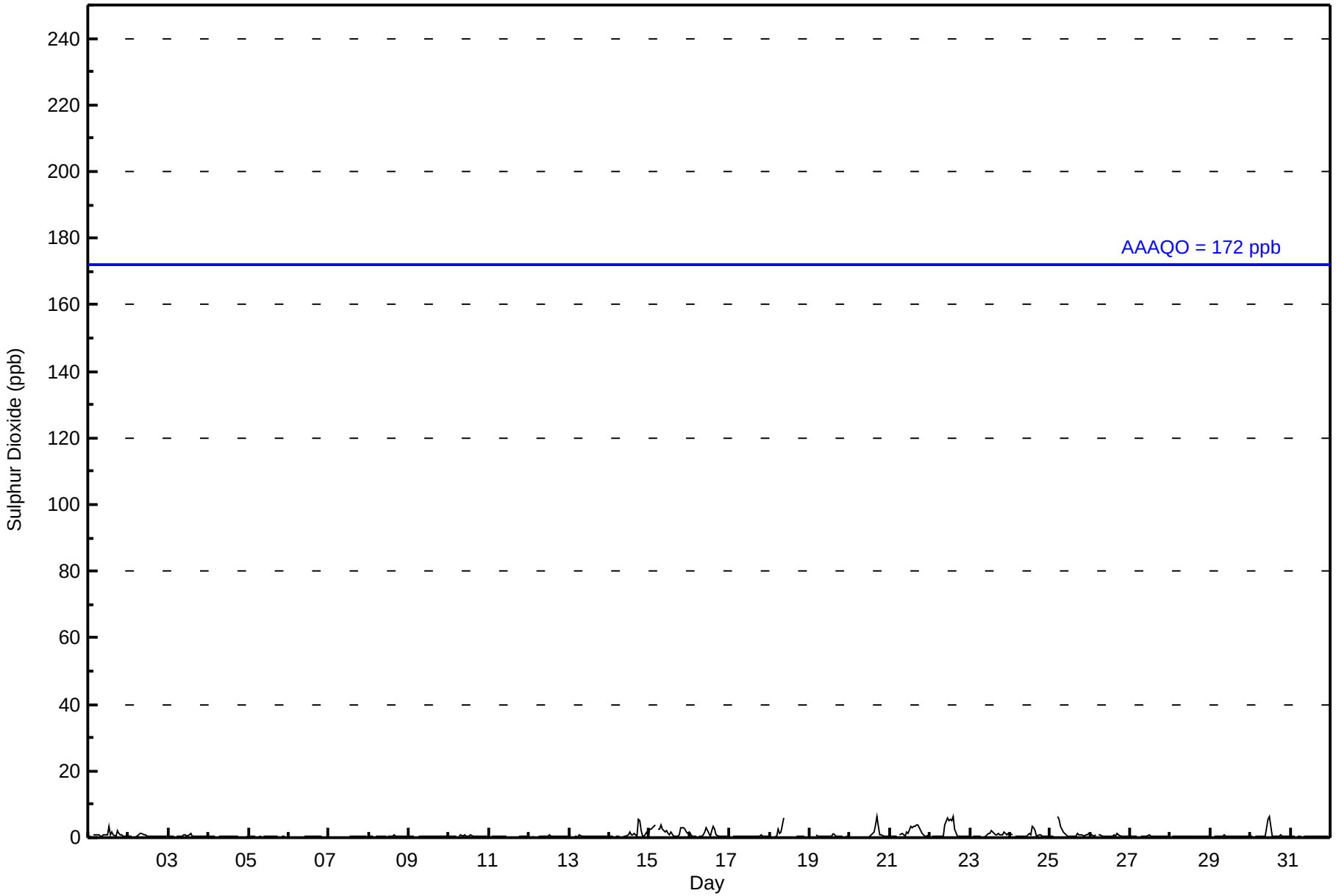
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb

Wood Buffalo Environmental Association

Hourly Averages

Sulphur Dioxide (SO_2) - ppb

ConocoPhillips - Surmont - August 2015



Sulphur Dioxide (SO_2) - ppb

ConocoPhillips - Surmont - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	706	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: 706

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

ConocoPhillips - Surmont - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 10	10	8	4	17	47	78	34	30	42	54	92	83	117	31	37	22	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	10	8	4	17	47	78	34	30	42	54	92	83	117	31	37	22	706

Total Number of Valid Hours: 706

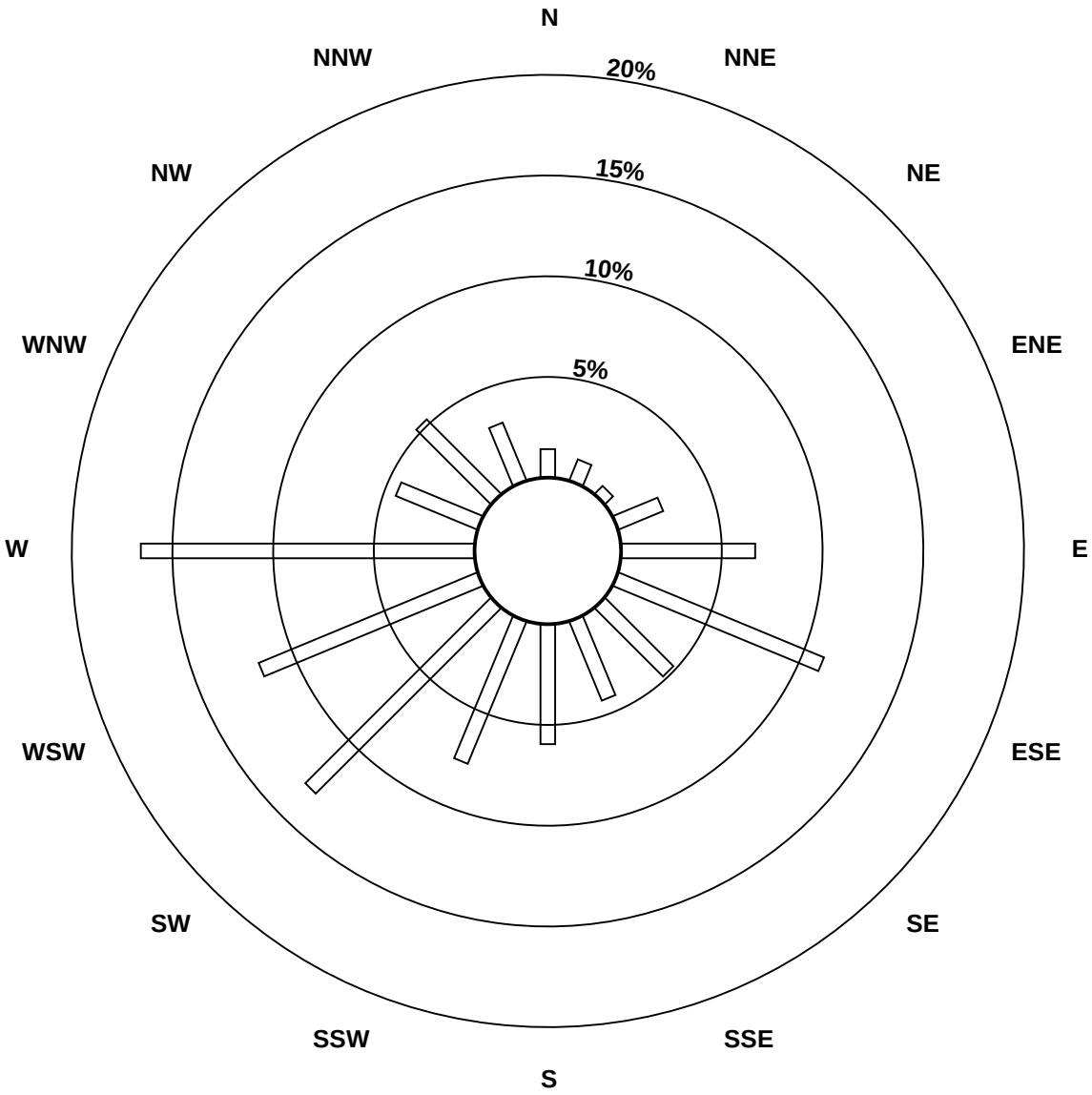
Total Number of Hours: 744

Wood Buffalo Environmental Association

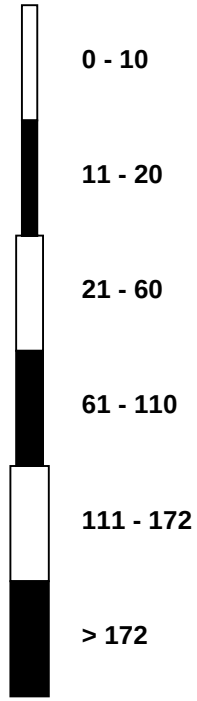
Wind Rose Aug 2015

Sulphur Dioxide (SO_2) - ppb

ConocoPhillips - Surmont (AMS502)



Classes (ppb)



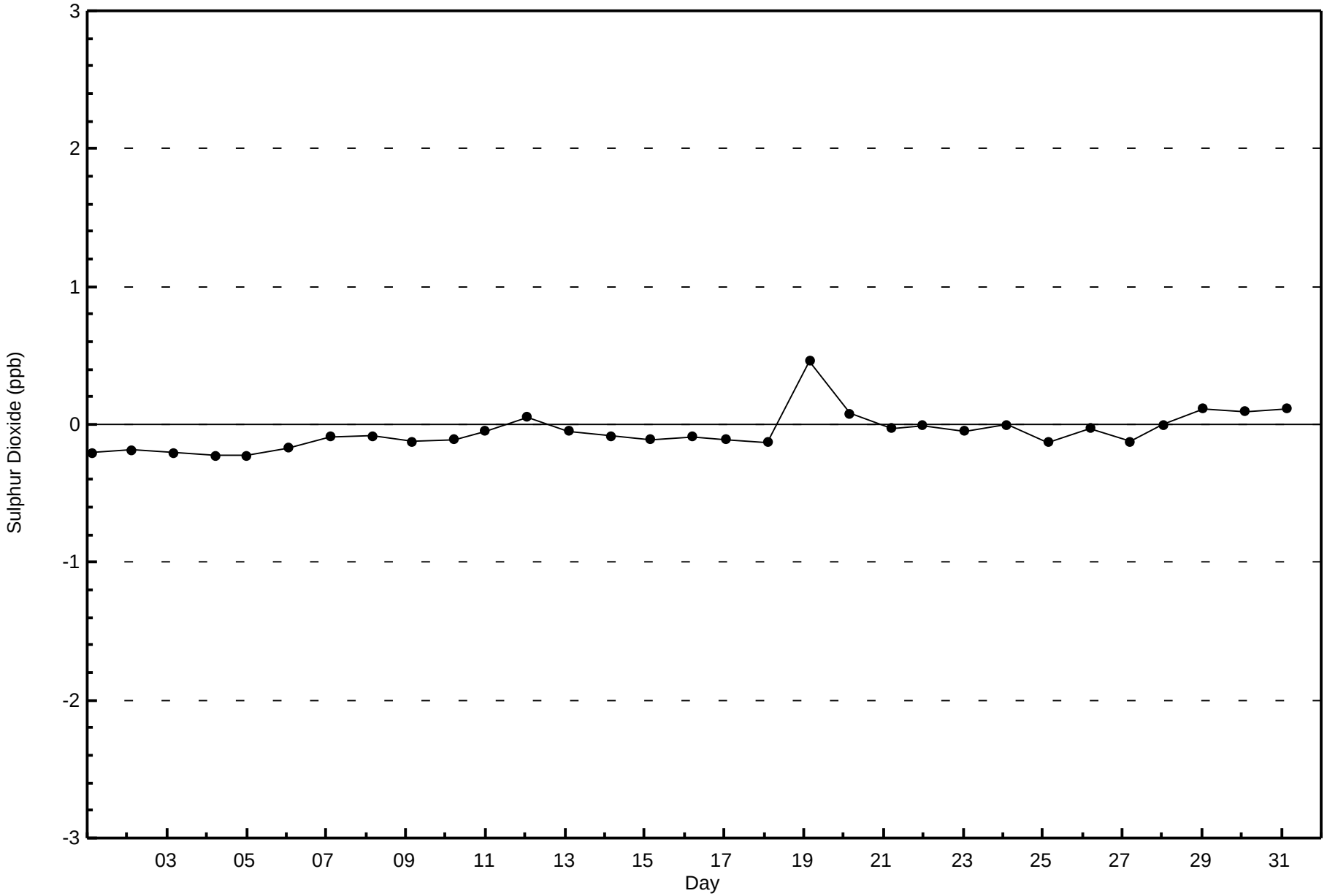
Total Number of Valid Hours: 706

Wood Buffalo Environmental Association

Zero Responses

Sulphur Dioxide (SO_2) - ppb

ConocoPhillips - Surmont - August 2015

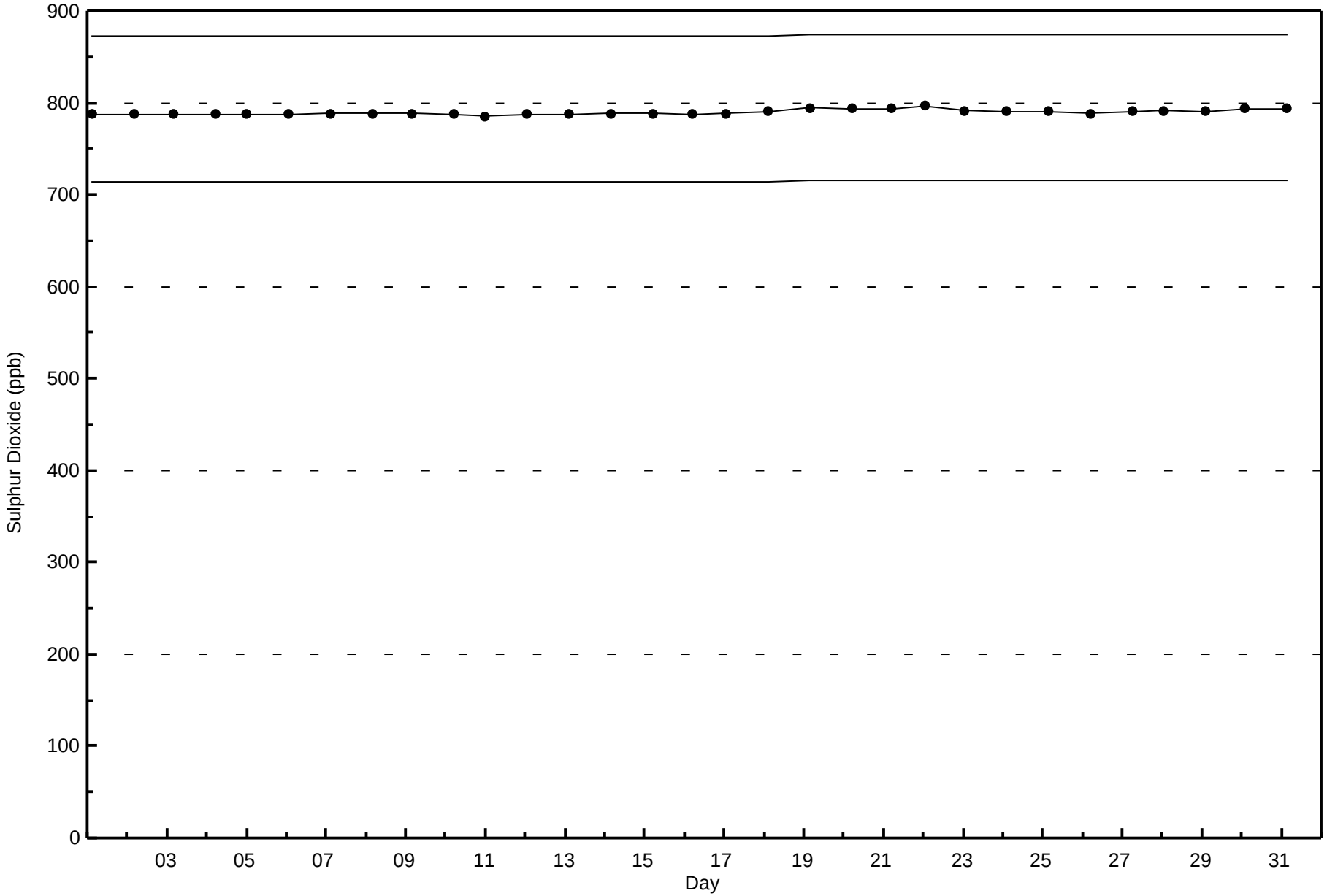


Wood Buffalo Environmental Association

Span Responses

Sulphur Dioxide (SO_2) - ppb

ConocoPhillips - Surmont - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Hydrogen Sulphide (H_2S) - ppb

ConocoPhillips - Surmont - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 5 ppb on Aug 15 08:00

Maximum Daily Average: 3.4 ppb on Aug 15

Minimum Value: 0 ppb on Aug 23 06:00

Minimum Daily Average: 0.1 ppb on Aug 5

Maximum Diurnal Average: 0.8 ppb at hour 5

Minimum Diurnal Average: 0.4 ppb at hour 21

Monthly Average: 0.5 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 1$ $P_{99} = 4$

Hours in Service:	744
Hours of Data:	706
Hours of Missing Data:	38
Hours of Calibration:	34
Percent Operational Time:	99.5

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0	0	2	Z	2	0	0	0	1	1	1	1	1	1	1	0	0	1	1	1	0	0	0	0	0.6	2
2-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	UO	0	0	0	0	0	0	0	0.2	0
3-Aug	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
4-Aug	0	0	0	0	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
5-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
6-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
7-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
8-Aug	0	0	0	UO	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
9-Aug	0	0	0	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
10-Aug	1	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
11-Aug	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
12-Aug	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
13-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0.3	1
14-Aug	0	0	1	3	Z	4	4	4	3	3	3	2	2	2	2	2	2	2	2	2	2	3	4	4	2.3	4
15-Aug	4	4	4	4	4	Z	4	5	4	4	4	4	4	4	3	3	2	1	2	3	3	3	3	3	3.4	5
16-Aug	3	2	2	2	3	3	Z	2	1	1	1	0	1	1	1	1	1	1	0	0	0	0	0	0	1.1	3
17-Aug	0	1	Z	1	1	1	1	1	1	1	C	C	C	0	0	0	0	0	0	0	0	0	1	2	0.6	2
18-Aug	1	1	1	Z	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1
19-Aug	0	UO	0	0	Z	0	0	0	0	0	0	0	0	1	1	1	1	1	0	1	1	2	2	2	0.6	2
20-Aug	1	1	1	1	2	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1	1.1	2
21-Aug	1	1	0	0	0	0	Z	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0.5	1
22-Aug	0	Z	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0	1	0	0	0	0	0	0.3	1
23-Aug	0	0	Z	0	0	0	UO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
24-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0.3	1
25-Aug	0	0	0	0	Z	2	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0.6	2
26-Aug	1	0	0	1	1	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0.5	1
27-Aug	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
28-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.3	1
29-Aug	0	0	Z	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	3
30-Aug	0	0	0	Z	0	0	0	1	1	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0.3	1
31-Aug	0	0	0	0	Z	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.2	1
	0.6	0.5	0.6	0.7	0.8	0.6	0.7	0.7	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.4	0.4	0.4	0.5	0.5	Diurnal Average	
	4	4	4	4	4	4	4	5	4	4	4	4	4	4	3	3	2	2	2	3	3	3	4	4	Diurnal Maximum	

Z - zerospan C - Calibration UO - Unstable Operation

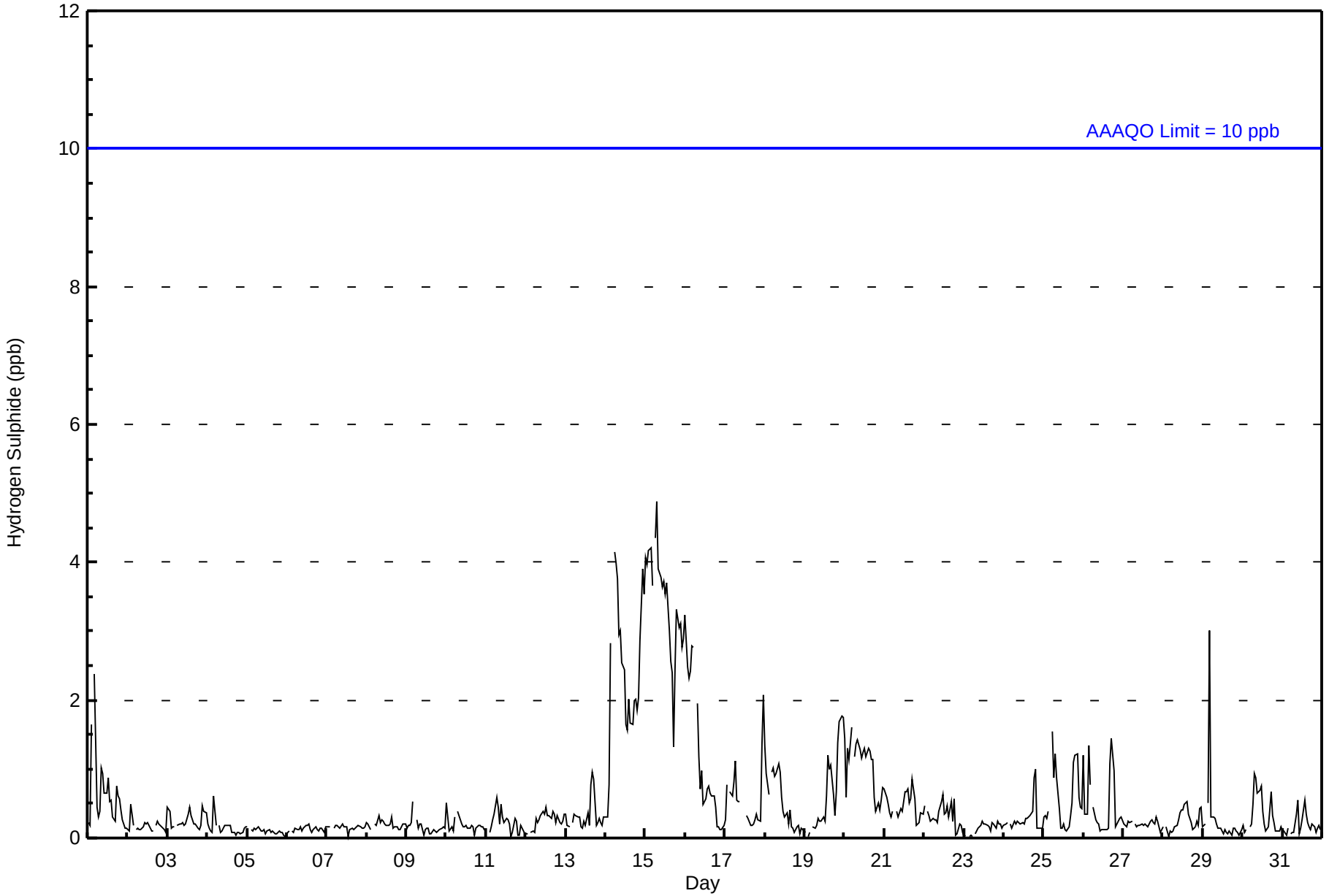
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb

Wood Buffalo Environmental Association

Hourly Averages

Hydrogen Sulphide (H_2S) - ppb

ConocoPhillips - Surmont - August 2015



Hydrogen Sulphide (H_2S) - ppb

ConocoPhillips - Surmont - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	672	95.18	95.18
3 - 4	33	4.67	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: 706

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Hydrogen Sulphide (H_2S) - ppb

ConocoPhillips - Surmont - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 2	11	8	4	17	47	78	31	28	41	53	92	83	100	24	30	25	672
3 - 4	0	0	0	0	0	0	0	0	0	0	0	2	14	8	7	2	33
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	1	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	11	8	4	17	47	78	31	28	41	53	92	85	114	33	37	27	706

Total Number of Valid Hours: 706

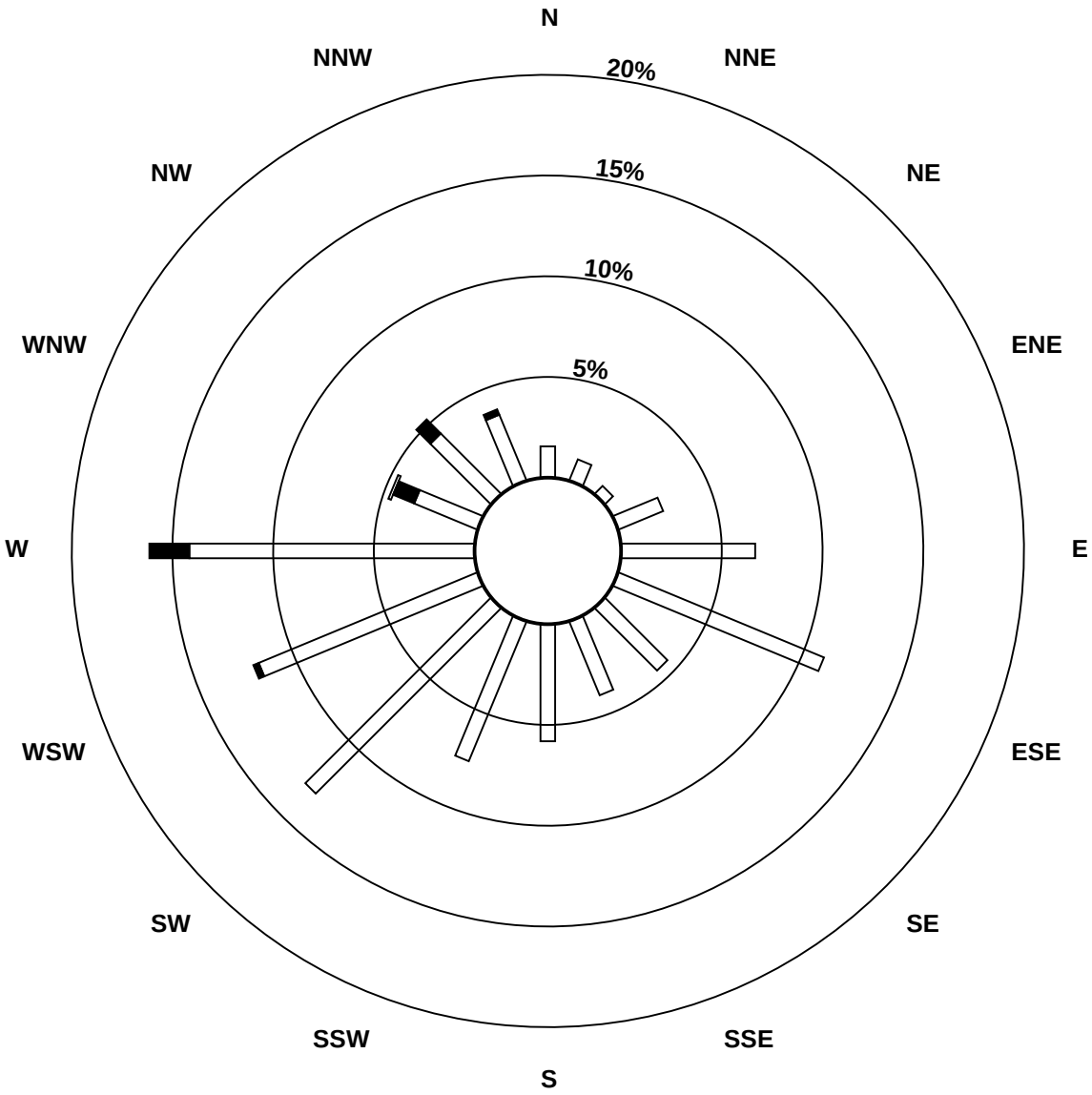
Total Number of Hours: 744

Wood Buffalo Environmental Association

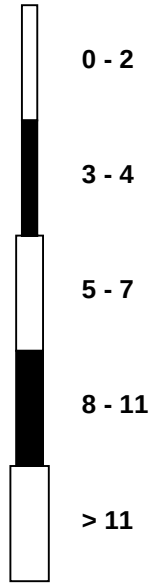
Wind Rose Aug 2015

Hydrogen Sulphide (H_2S) - ppb

ConocoPhillips - Surmont (AMS502)



Classes (ppb)



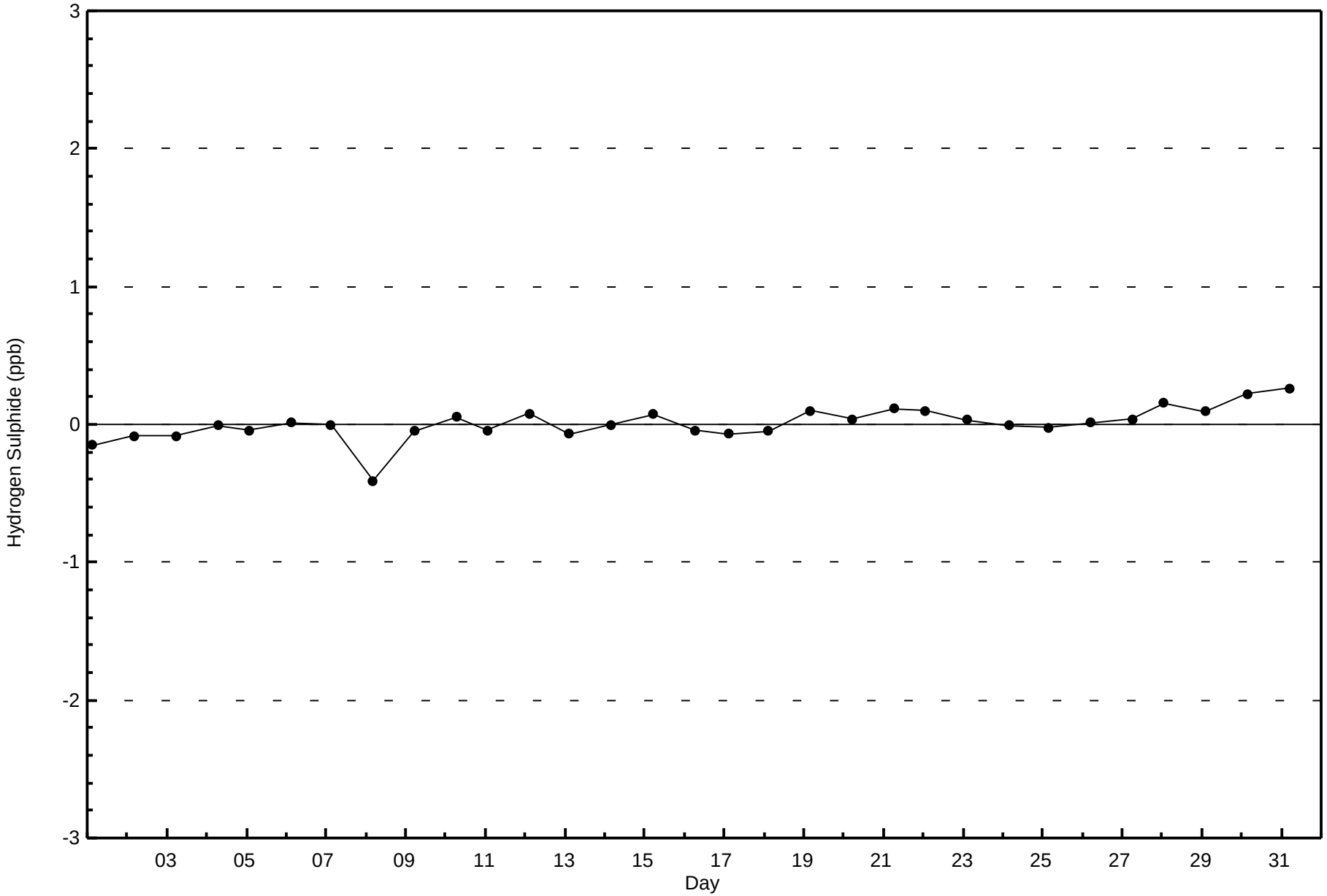
Total Number of Valid Hours: 706

Wood Buffalo Environmental Association

Zero Responses

Hydrogen Sulphide (H_2S) - ppb

ConocoPhillips - Surmont - August 2015

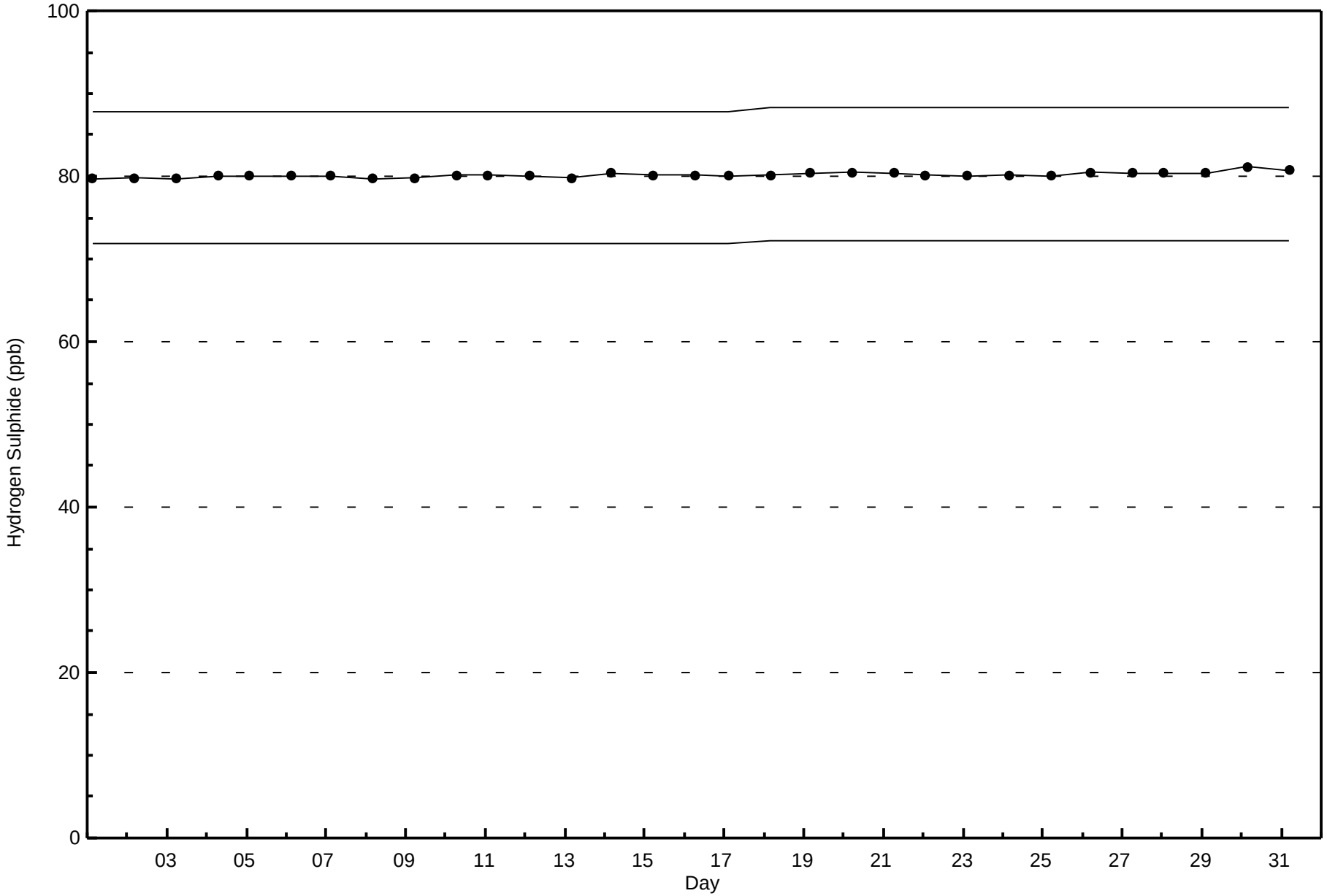


Wood Buffalo Environmental Association

Span Responses

Hydrogen Sulphide (H_2S) - ppb

ConocoPhillips - Surmont - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxide (NO) - ppb

ConocoPhillips - Surmont - August 2015

Maximum Value: 34 ppb on Aug 21 07:00

Maximum Daily Average: 17.7 ppb on Aug 20

Minimum Value: 0 ppb on Aug 6 21:00

Minimum Daily Average: 0.0 ppb on Aug 31

Maximum Diurnal Average: 4.0 ppb at hour 11

Minimum Diurnal Average: 2.3 ppb at hour 22

Monthly Average: 3.2 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 2 $Q_3 = 3$ $P_{90} = 8$ $P_{99} = 24$

Hours in Service:	744
Hours of Data:	699
Hours of Missing Data:	45
Hours of Calibration:	37
Percent Operational Time:	98.9

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	2	1	Z	2	1	2	2	2	2	3	3	2	4	2	2	2	2	2	2	1	1	1	1	1	1.9	4
2-Aug	1	1	1	Z	0	1	1	1	1	3	2	2	4	4	2	4	2	1	1	1	1	1	0	1	1.5	4
3-Aug	2	1	0	1	Z	3	3	3	4	2	3	2	1	2	4	8	3	2	2	2	2	2	3	2	2.5	8
4-Aug	1	1	2	1	8	Z	2	5	4	4	3	3	3	2	4	2	2	3	1	1	1	2	1	2	2.6	8
5-Aug	Z	2	1	1	1	1	2	4	2	2	3	2	3	3	2	2	3	3	1	1	1	2	2	1	1.9	4
6-Aug	1	Z	1	2	1	3	2	3	3	3	3	4	2	2	2	1	1	1	0	0	0	0	0	1	1.6	4
7-Aug	1	1	Z	1	2	2	2	3	3	2	3	3	2	2	1	2	1	1	2	1	1	2	2	1	1.7	3
8-Aug	2	6	3	Z	3	1	2	7	2	2	2	2	2	2	1	1	0	0	1	1	1	1	1	2	1.9	7
9-Aug	1	1	1	1	Z	0	1	1	1	3	2	2	2	2	1	3	2	0	1	0	0	1	1	0	1.1	3
10-Aug	1	0	0	1	2	Z	2	2	2	3	2	0	1	2	0	0	0	1	0	1	1	1	1	0	1.0	3
11-Aug	Z	1	1	1	0	1	1	2	1	0	0	0	1	0	0	0	0	0	0	0	0	1	3	3	0.7	3
12-Aug	2	Z	2	3	3	5	3	3	2	2	3	4	3	3	1	1	1	0	1	0	0	0	3	3	2.1	5
13-Aug	1	0	Z	0	1	0	1	2	2	4	9	6	2	5	1	2	4	2	2	2	4	2	4	5	2.6	9
14-Aug	2	1	3	Z	2	2	1	1	2	2	2	4	4	2	2	3	2	14	12	4	0	0	5	1	3.1	14
15-Aug	7	8	7	10	Z	5	4	8	5	5	6	4	3	4	2	2	1	1	3	6	7	7	6	7	5.0	10
16-Aug	7	2	3	4	5	Z	6	4	3	3	4	4	5	5	9	6	5	3	2	4	5	7	4	3	4.5	9
17-Aug	4	Z	10	6	6	8	8	10	13	14	14	11	12	14	12	17	20	16	15	20	17	13	6	3	11.7	20
18-Aug	6	3	Z	5	5	6	3	4	11	C	C	C	C	C	C	2	4	6	5	1	1	2	5	8	--	11
19-Aug	8	6	5	Z	3	10	2	7	8	9	7	10	8	9	8	4	7	9	9	8	14	14	24	18	9.0	24
20-Aug	24	23	24	22	Z	21	22	12	9	17	14	4	9	16	15	15	26	23	20	26	23	6	17	20	17.7	26
21-Aug	23	25	19	24	25	Z	34	M	M	M	M	M	M	M	M	14	10	9	5	3	3	3	2	5	--	34
22-Aug	Z	2	1	2	2	2	2	2	3	11	15	13	13	11	13	6	2	1	2	2	2	1	0	0	4.6	15
23-Aug	0	Z	0	1	1	1	0	1	1	3	5	4	2	3	3	2	1	3	1	1	4	2	0	0	1.7	5
24-Aug	0	0	Z	0	0	1	0	1	0	0	0	1	0	4	3	3	0	0	1	0	0	0	0	0	0.6	4
25-Aug	0	0	0	Z	0	0	1	2	1	1	0	0	1	0	0	0	2	1	0	0	0	0	0	0	0.4	2
26-Aug	0	0	0	0	Z	0	1	1	1	1	2	1	3	2	3	0	1	0	0	0	0	0	0	0	0.8	3
27-Aug	0	0	1	0	0	Z	0	0	1	1	2	1	0	0	0	0	1	0	0	1	2	1	0	0	0.5	2
28-Aug	Z	0	0	0	0	0	0	0	0	0	1	0	1	0	0	1	1	1	1	1	1	1	1	0	0.4	1
29-Aug	0	Z	0	0	0	0	0	0	1	2	2	1	1	1	2	1	2	1	0	0	0	0	0	0	0.6	2
30-Aug	0	0	Z	0	0	0	0	0	0	0	6	8	2	1	0	1	0	0	1	0	0	0	0	0	0.9	8
31-Aug	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
	3.5	3.3	3.3	3.5	2.7	2.9	3.5	3.0	3.0	3.5	4.0	3.4	3.3	3.5	3.3	3.4	3.4	3.4	2.9	2.8	2.9	2.3	2.9	2.8	Diurnal Average	
	24	25	24	24	25	21	34	12	13	17	15	13	13	16	15	17	26	23	20	26	23	14	24	20	Diurnal Maximum	

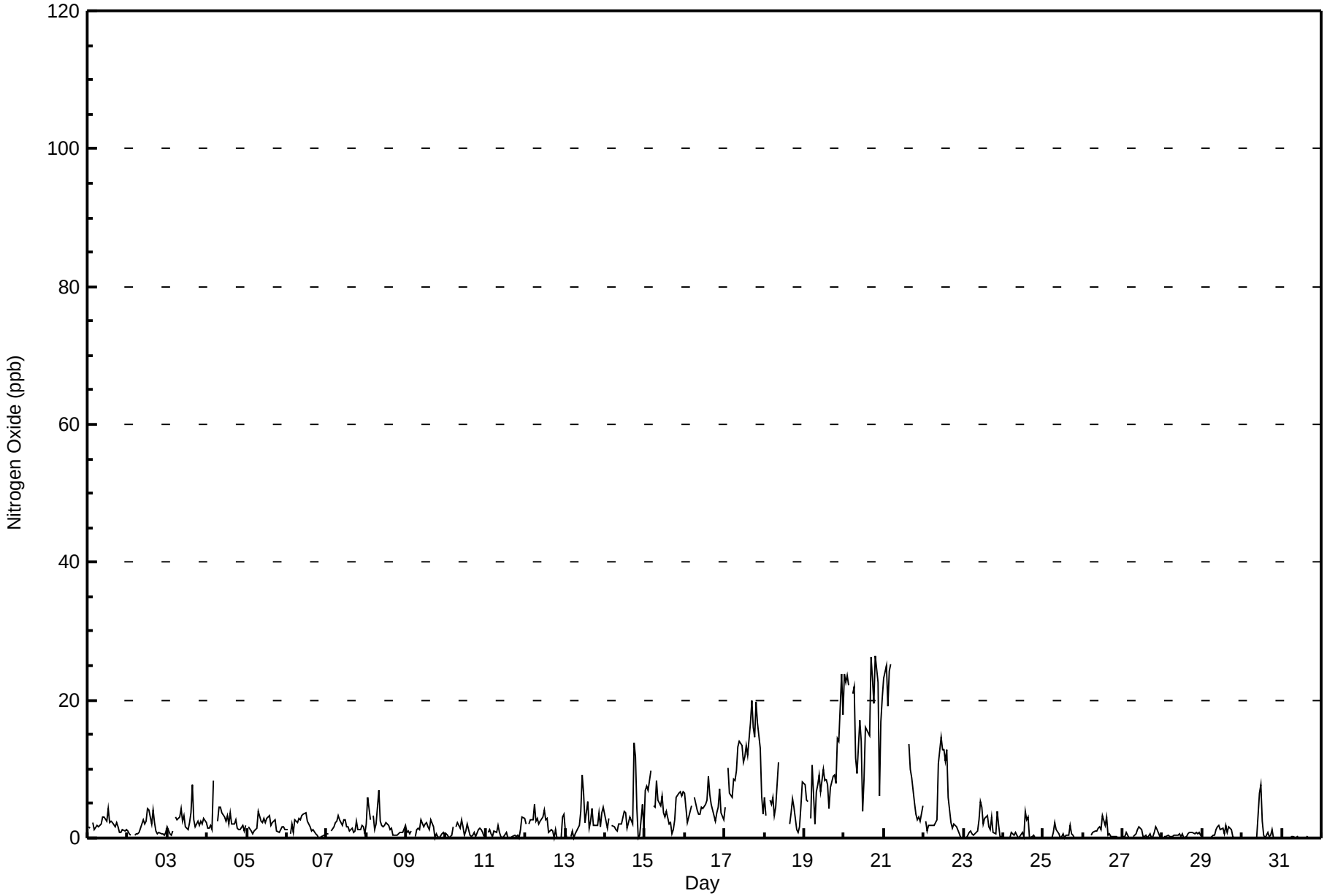
Z - zerospan C - Calibration M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Oxide (NO) - ppb

ConocoPhillips - Surmont - August 2015



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	683	97.71	97.71
21 - 40	16	2.29	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: 699

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Oxide (NO) - ppb

ConocoPhillips - Surmont - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	10	8	4	17	47	78	34	30	42	54	92	78	102	30	34	23	683
21 - 40	0	0	0	0	0	0	0	0	0	0	0	5	10	1	0	0	16
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	10	8	4	17	47	78	34	30	42	54	92	83	112	31	34	23	699

Total Number of Valid Hours: 699

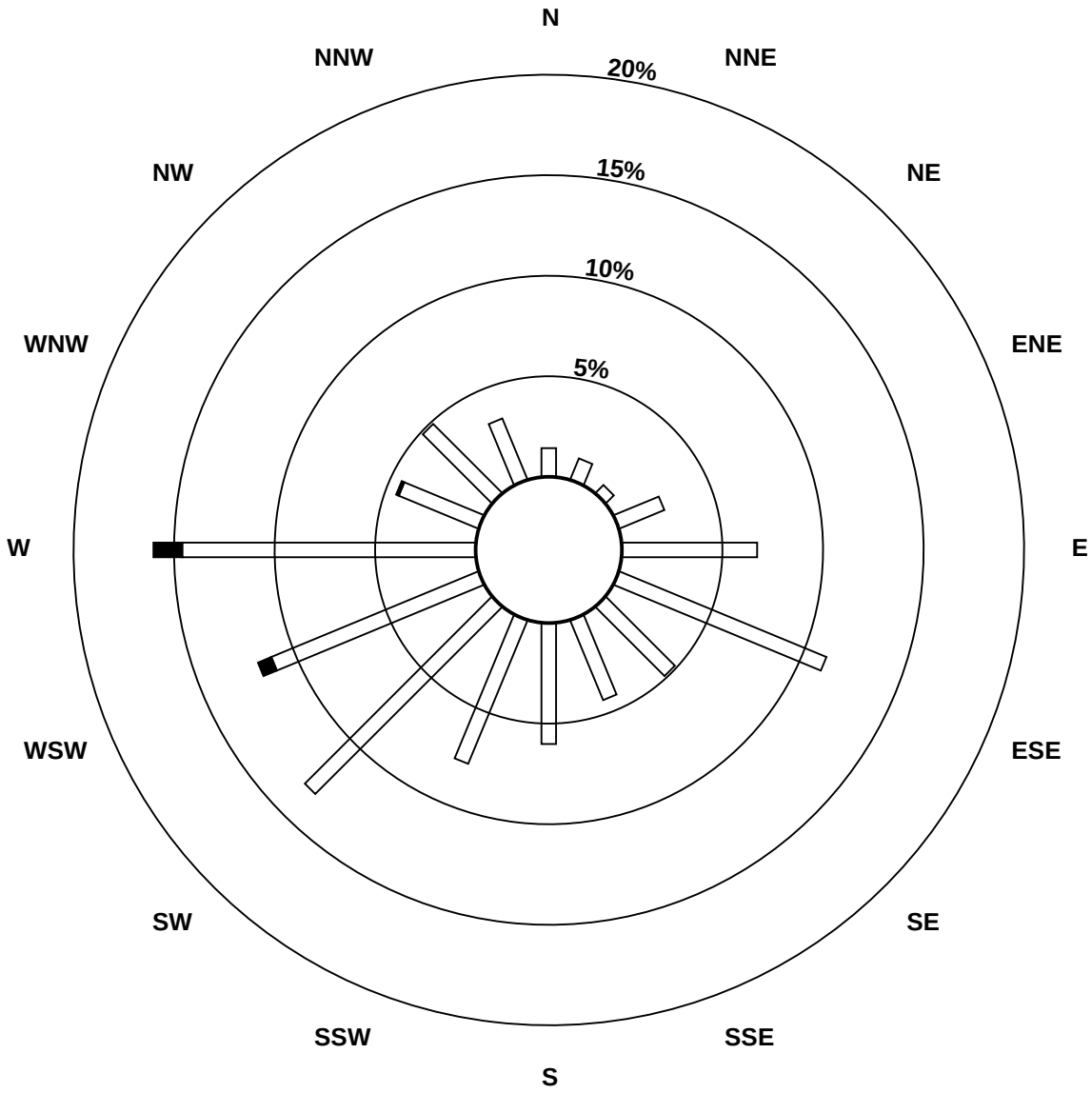
Total Number of Hours: 744

Wood Buffalo Environmental Association

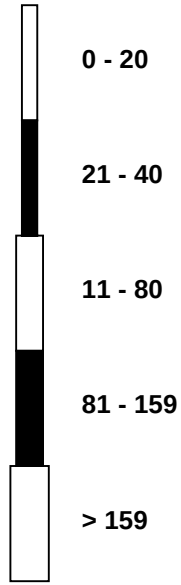
Wind Rose Aug 2015

Nitrogen Oxide (NO) - ppb

ConocoPhillips - Surmont (AMS502)



Classes (ppb)



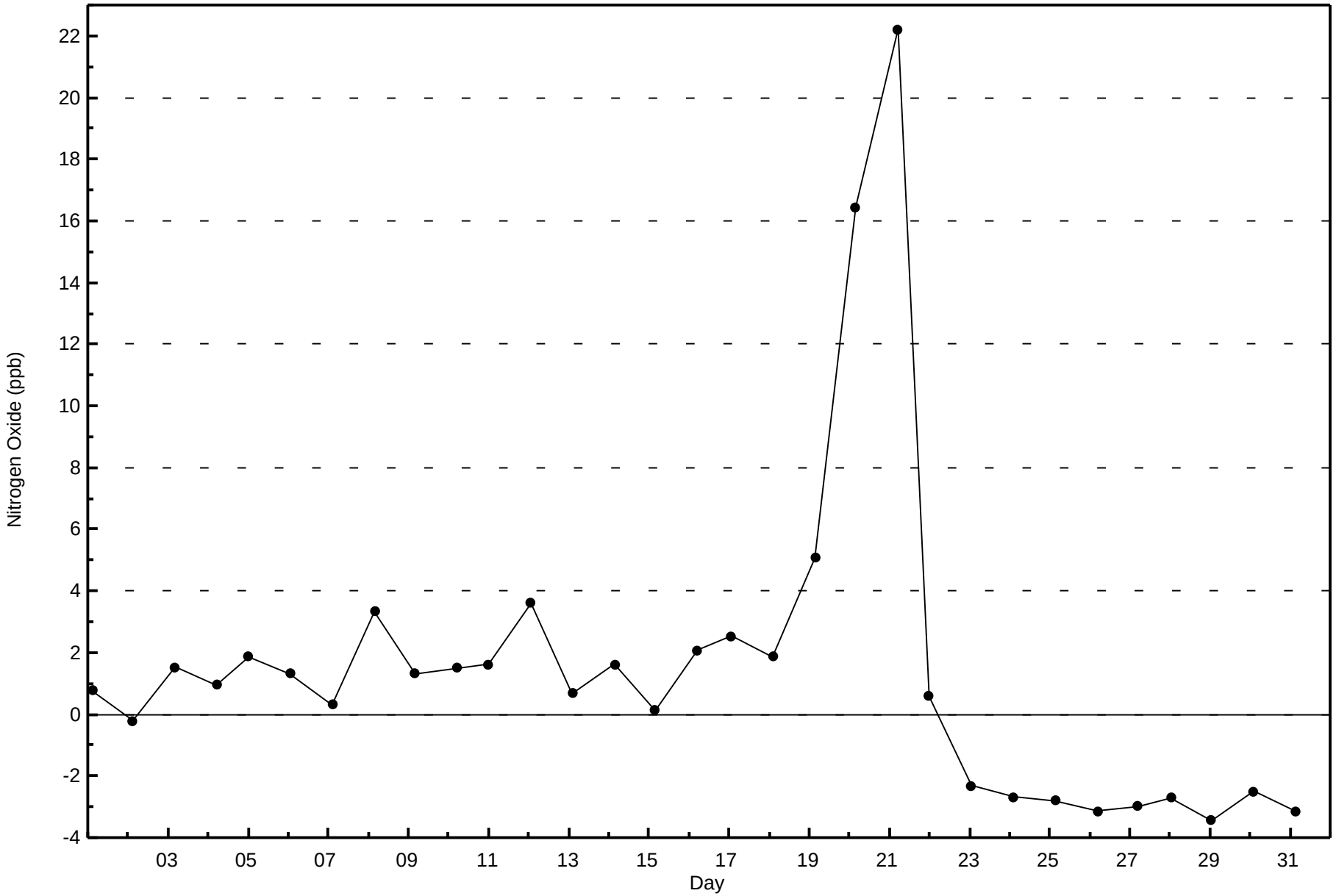
Total Number of Valid Hours: 699

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Oxide (NO) - ppb

ConocoPhillips - Surmont - August 2015

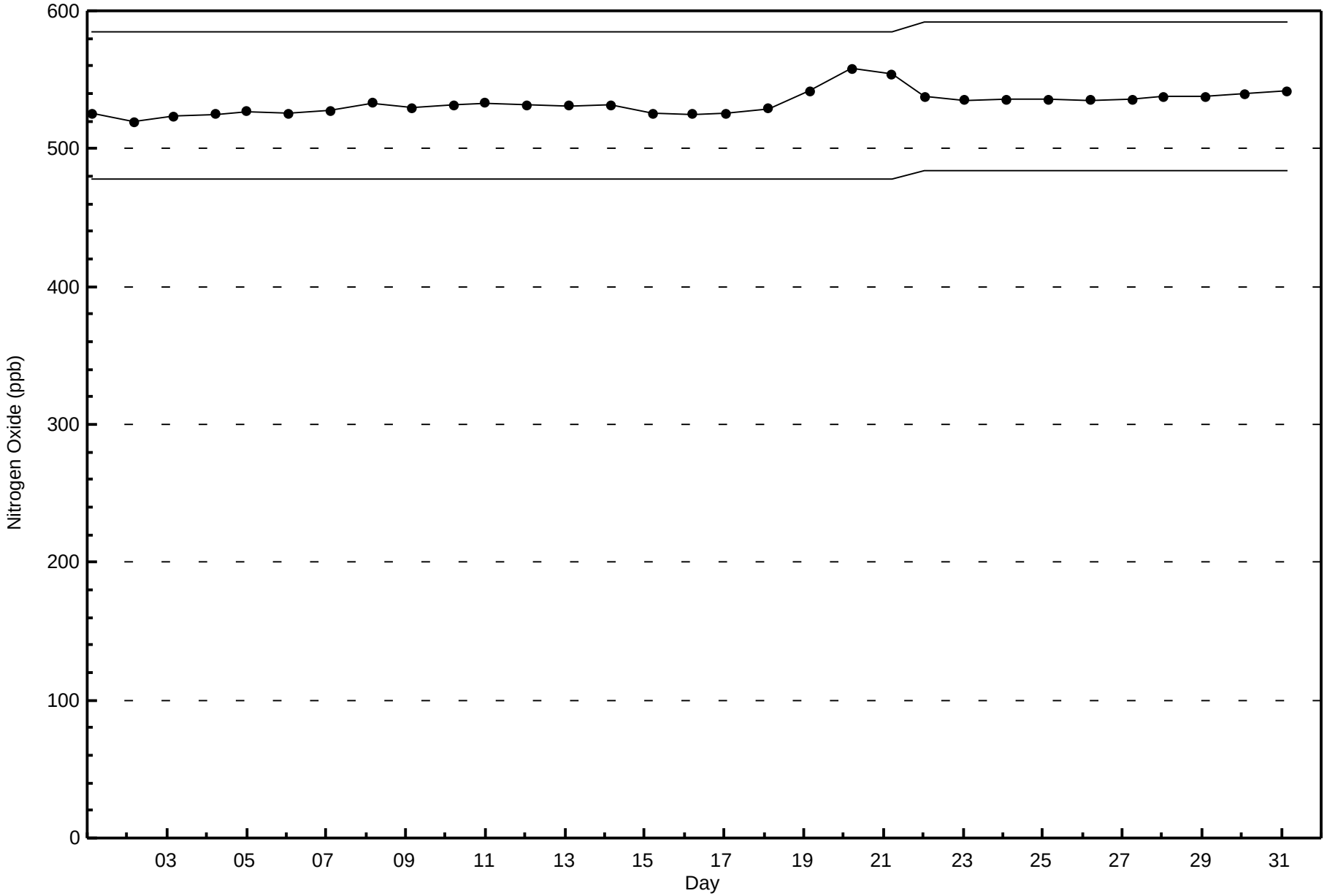


Wood Buffalo Environmental Association

Span Responses

Nitrogen Oxide (NO) - ppb

ConocoPhillips - Surmont - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO_2) - ppb

ConocoPhillips - Surmont - August 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 15 ppb on Aug 23 21:00

Maximum Daily Average: 3.6 ppb on Aug 23

Minimum Value: 0 ppb on Aug 1 01:00

Minimum Daily Average: 0.0 ppb on Aug 11

Maximum Diurnal Average: 1.5 ppb at hour 6

Minimum Diurnal Average: 0.4 ppb at hour 4

Monthly Average: 0.9 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 1$ $P_{90} = 3$ $P_{99} = 6$

Hours in Service:	744
Hours of Data:	699
Hours of Missing Data:	45
Hours of Calibration:	37
Percent Operational Time:	98.9

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	0	0	Z	0	1	1	1	0	0	2	2	2	4	2	1	1	1	2	1	1	0	0	0	1	0.9	4
2-Aug	0	0	2	Z	0	0	1	1	1	2	1	1	0	1	1	3	2	0	0	0	0	0	0	0	0.7	3
3-Aug	2	1	0	0	Z	4	4	3	2	1	3	1	1	2	0	2	2	0	0	0	0	1	1	2	1.4	4
4-Aug	0	0	0	0	2	Z	1	1	0	1	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0.4	4
5-Aug	Z	0	0	0	0	0	0	2	1	1	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0.3	2
6-Aug	0	Z	0	0	0	1	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1
7-Aug	0	0	Z	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	1	1	0	0.2	1
8-Aug	2	3	1	Z	0	0	0	4	1	0	2	3	1	1	0	1	0	0	0	0	1	2	1	1	1.1	4
9-Aug	0	1	0	0	Z	0	0	2	1	0	0	0	1	0	0	1	1	0	0	0	0	0	1	0	0.3	2
10-Aug	0	0	0	0	1	Z	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
11-Aug	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	1
12-Aug	0	Z	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	3	2	0.4	3
13-Aug	1	1	Z	1	1	0	1	0	1	1	1	3	1	1	1	1	2	1	1	1	1	1	1	1	0.9	3
14-Aug	0	1	1	Z	1	1	1	1	1	1	1	1	2	1	0	1	1	5	3	1	0	0	1	0	1.0	5
15-Aug	3	3	3	3	Z	2	2	3	3	2	2	1	0	0	0	0	0	0	1	3	2	1	0	0	1.5	3
16-Aug	1	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	1
17-Aug	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	6	0	0	0	0	0.3	6
18-Aug	0	0	Z	0	0	1	0	0	4	C	C	C	C	C	C	0	0	4	2	0	0	0	0	0	--	4
19-Aug	0	0	0	Z	2	7	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	7
20-Aug	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	2	4	3	0	0	0	0	0	1	0.4	4
21-Aug	1	0	0	0	0	Z	1	M	M	M	M	M	M	M	M	3	2	2	1	1	0	0	0	0	--	3
22-Aug	Z	0	0	0	0	0	0	0	0	4	4	5	4	2	4	2	1	0	0	0	1	1	0	0	1.2	5
23-Aug	0	Z	0	1	1	1	0	1	1	3	5	6	4	5	6	3	3	7	3	5	15	8	3	4	3.6	15
24-Aug	2	2	Z	1	1	6	3	2	2	1	1	2	1	4	4	2	0	1	1	0	0	0	0	0	1.5	6
25-Aug	0	0	1	Z	8	6	6	5	3	2	1	1	1	1	1	1	2	3	2	1	2	4	4	3	2.5	8
26-Aug	2	1	1	2	Z	6	3	2	2	2	2	1	2	3	3	1	2	2	2	2	3	1	1	1	2.1	6
27-Aug	1	1	1	1	1	Z	1	1	1	2	1	2	1	0	1	1	1	1	1	1	2	1	0	0	1.0	2
28-Aug	Z	1	1	1	0	1	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0	1	1	1	0.5	1
29-Aug	1	Z	2	1	2	3	3	2	2	2	2	1	2	1	2	2	2	2	1	0	0	0	0	0	1.4	3
30-Aug	0	1	Z	0	1	0	1	1	1	1	5	5	2	2	1	2	1	1	2	1	1	1	1	1	1.3	5
31-Aug	0	0	0	Z	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
	0.7	0.6	0.5	0.4	0.8	1.5	0.9	1.2	1.0	1.0	1.2	1.2	1.1	0.9	0.9	1.0	0.8	1.1	0.7	0.8	1.0	0.8	0.7	0.5	Diurnal Average	
	3	3	3	3	8	7	6	5	4	4	5	6	4	5	6	3	4	7	3	6	15	8	4	4	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance

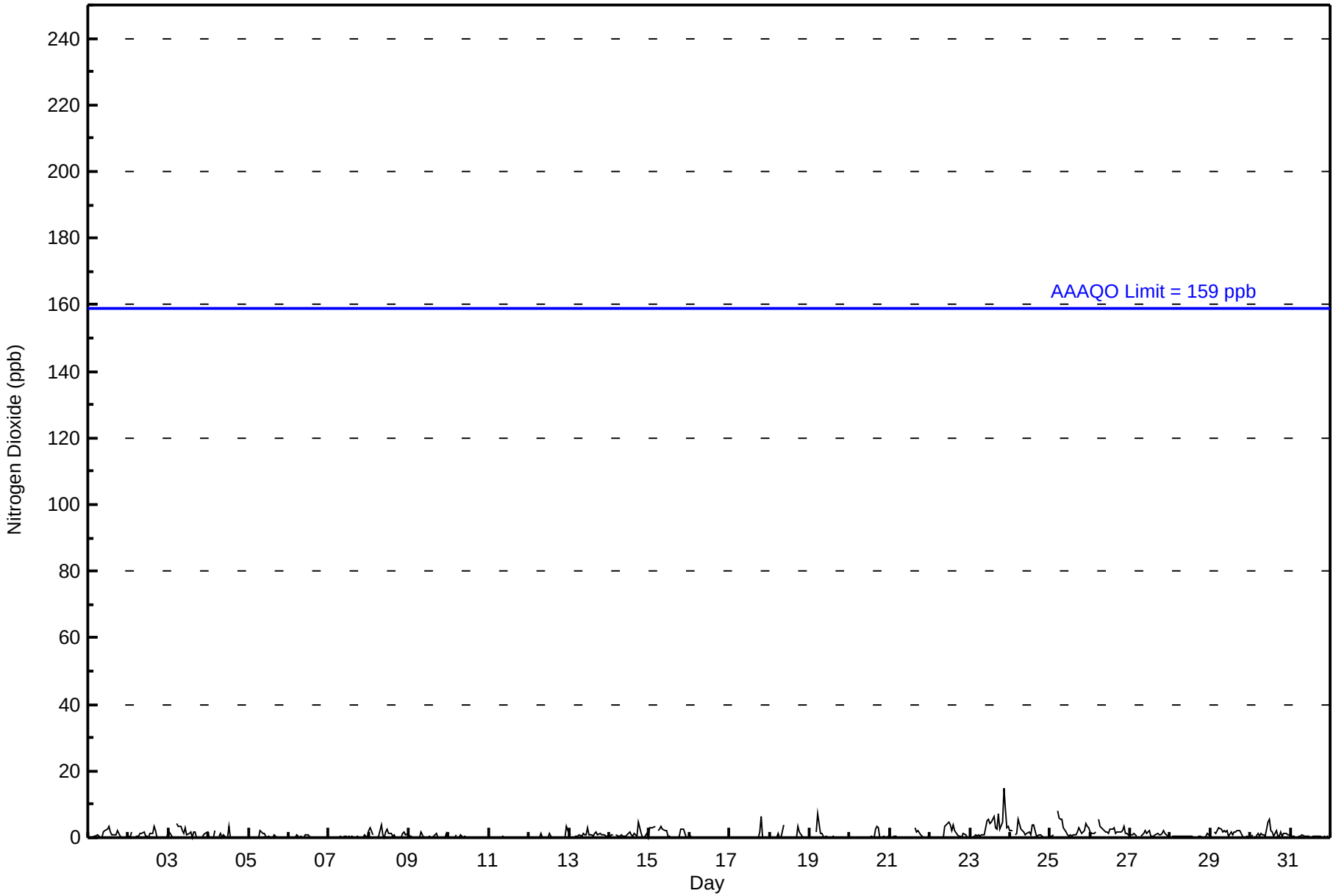
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Dioxide (NO_2) - ppb

ConocoPhillips - Surmont - August 2015



Nitrogen Dioxide (NO_2) - ppb

ConocoPhillips - Surmont - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	699	100.00	100.00
21 - 40	0	0.00	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: 699

Total Number of Hours: 744

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Dioxide (NO_2) - ppb

ConocoPhillips - Surmont - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	10	8	4	17	47	78	34	30	42	54	92	83	112	31	34	23	699
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	10	8	4	17	47	78	34	30	42	54	92	83	112	31	34	23	699

Total Number of Valid Hours: 699

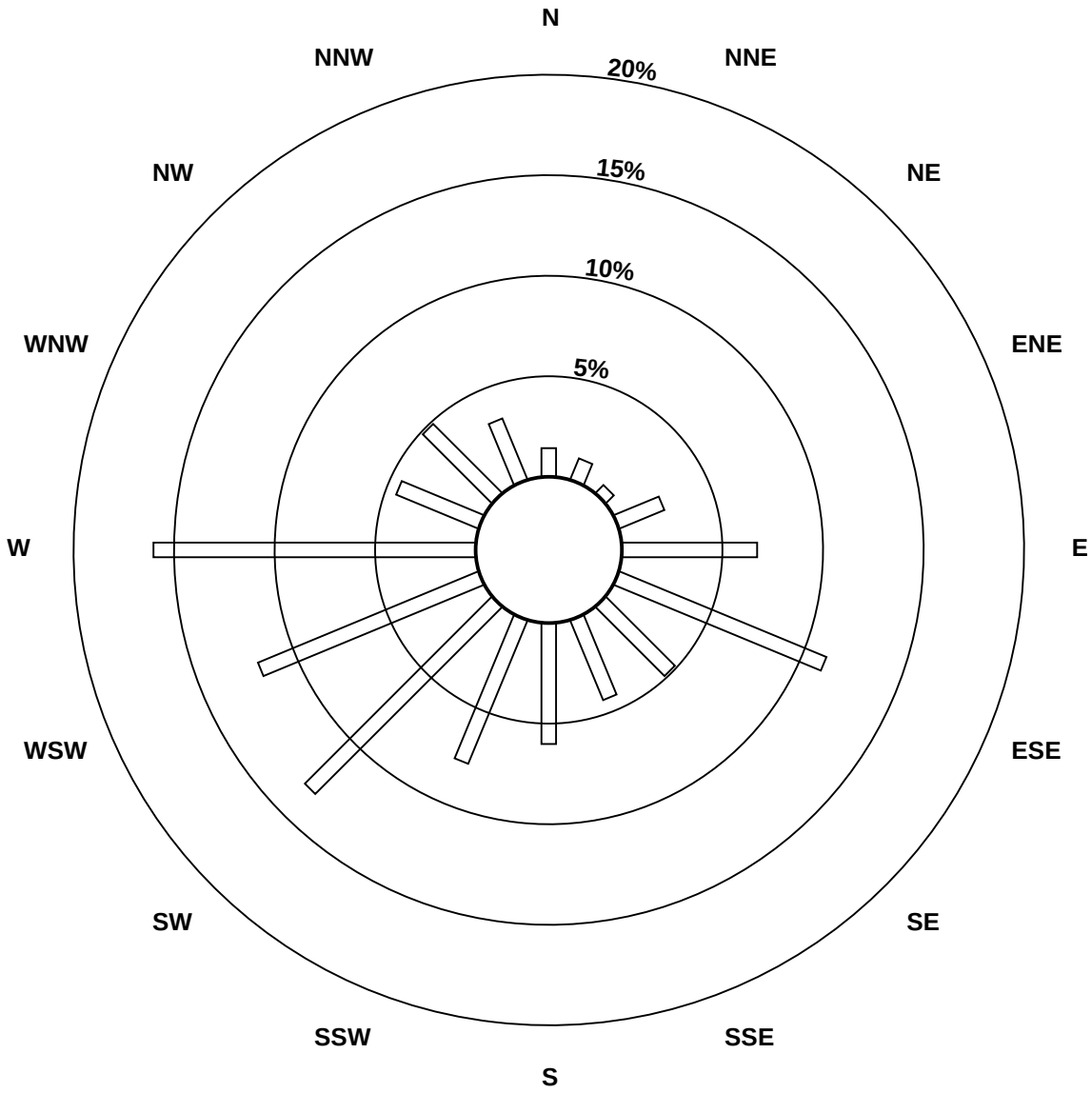
Total Number of Hours: 744

Wood Buffalo Environmental Association

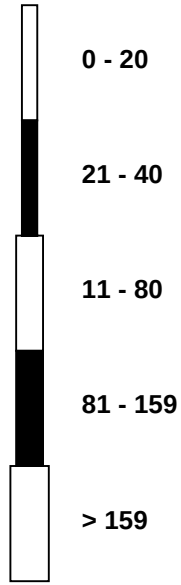
Wind Rose Aug 2015

Nitrogen Dioxide (NO_2) - ppb

ConocoPhillips - Surmont (AMS502)



Classes (ppb)



0 - 20

21 - 40

11 - 80

81 - 159

> 159

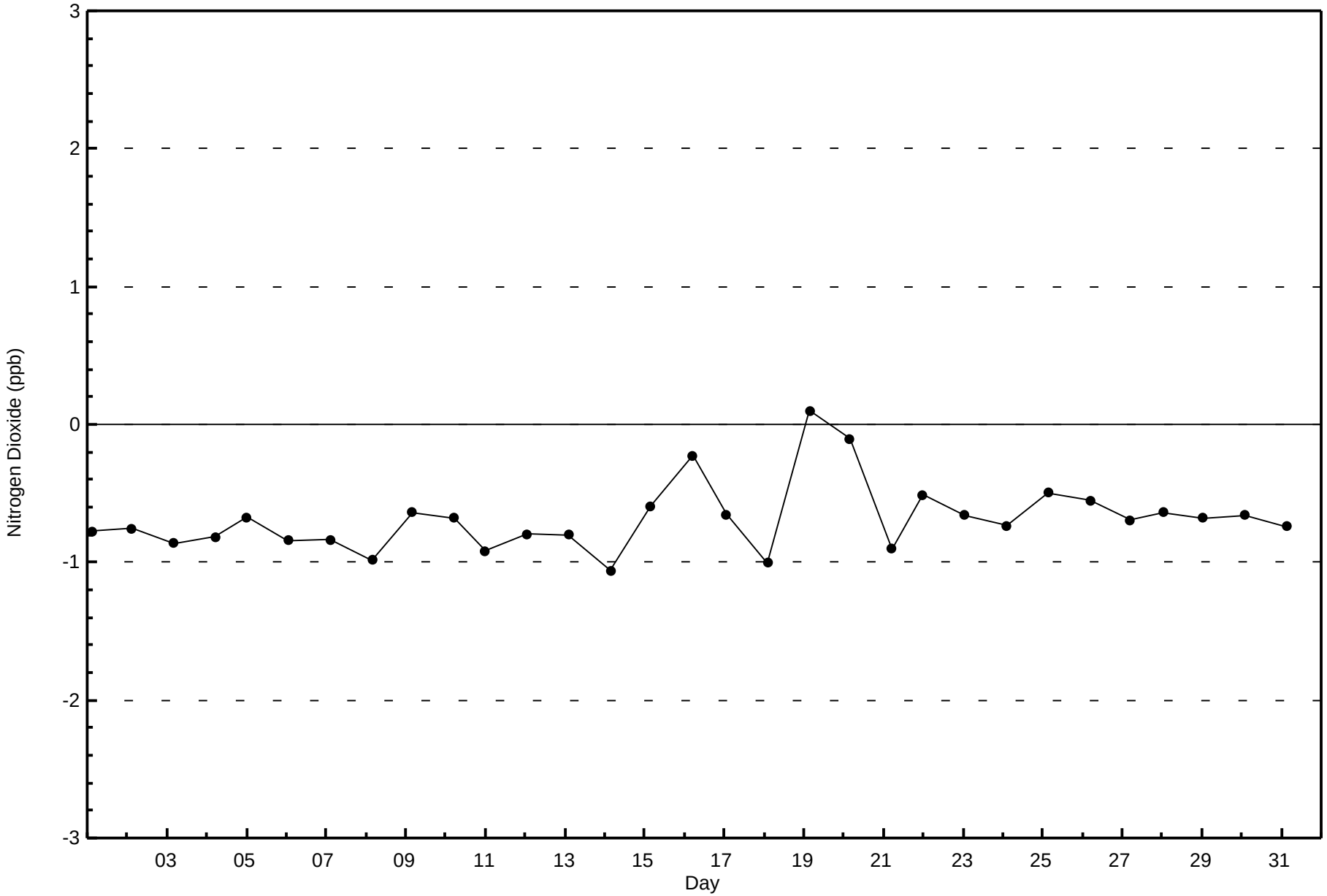
Total Number of Valid Hours: 699

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Dioxide (NO_2) - ppb

ConocoPhillips - Surmont - August 2015

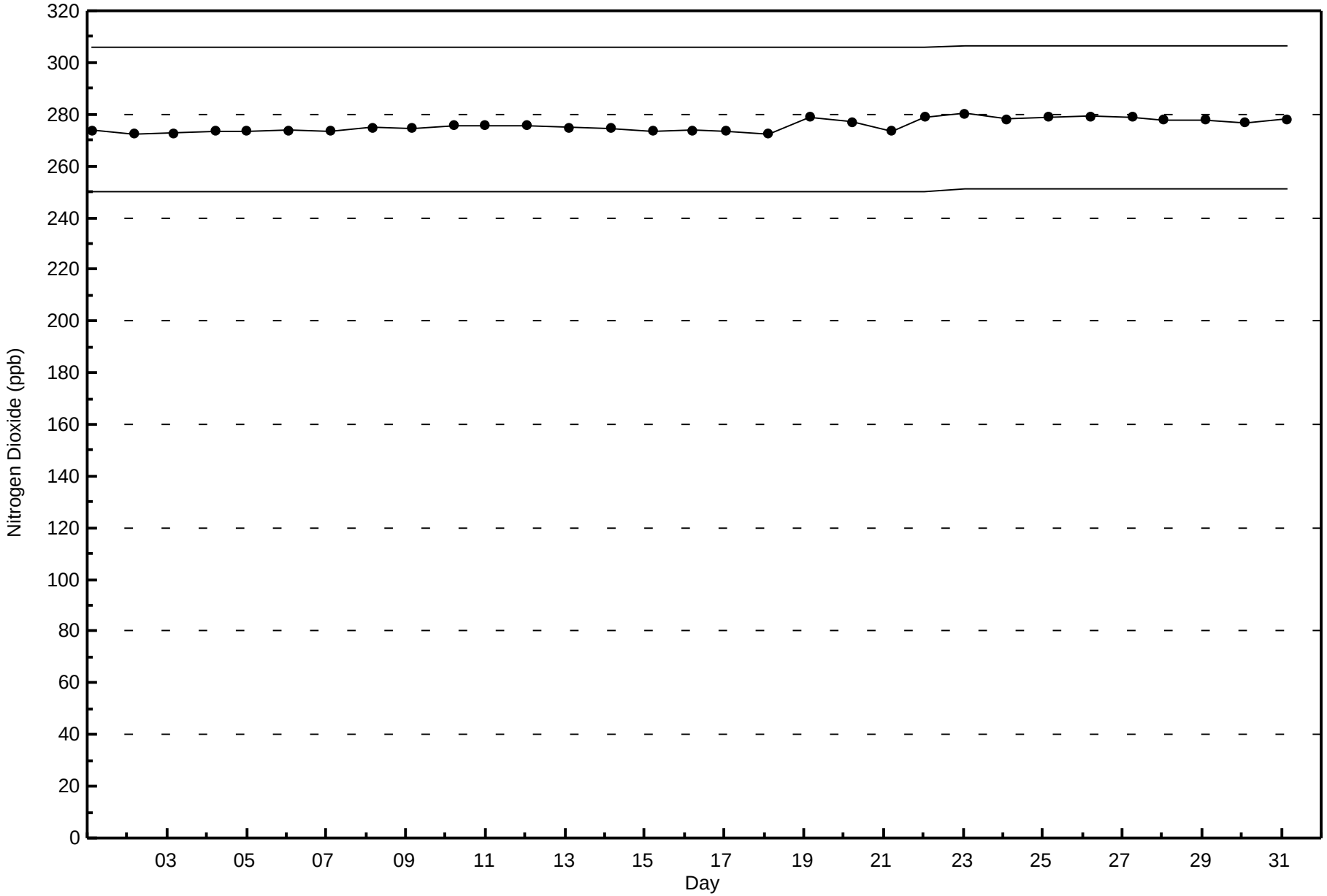


Wood Buffalo Environmental Association

Span Responses

Nitrogen Dioxide (NO_2) - ppb

ConocoPhillips - Surmont - August 2015



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_X) - ppb

ConocoPhillips - Surmont - August 2015

Maximum Value: 35 ppb on Aug 21 07:00

Maximum Daily Average: 18.1 ppb on Aug 20

Minimum Value: 0 ppb on Aug 6 21:00

Minimum Daily Average: 0.4 ppb on Aug 31

Maximum Diurnal Average: 5.2 ppb at hour 11

Minimum Diurnal Average: 3.1 ppb at hour 22

Monthly Average: 4.1 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 1$ Median = 2 $Q_3 = 5$ $P_{90} = 10$ $P_{99} = 25$

Hours in Service:	744
Hours of Data:	699
Hours of Missing Data:	45
Hours of Calibration:	37
Percent Operational Time:	98.9

Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	2	1	Z	2	2	2	2	2	2	5	5	5	8	4	3	3	3	4	3	1	1	1	1	2	2.8	8
2-Aug	1	1	2	Z	1	1	1	2	3	4	3	3	4	5	3	7	4	1	1	1	1	1	0	1	2.2	7
3-Aug	4	1	0	1	Z	7	6	6	7	4	6	2	3	4	4	9	4	2	2	2	2	3	4	4	3.8	9
4-Aug	2	1	2	1	10	Z	3	6	4	4	3	3	7	2	4	2	2	3	1	1	1	2	1	2	2.9	10
5-Aug	Z	2	1	1	1	1	2	6	4	3	3	2	3	3	2	3	3	3	1	1	1	2	2	1	2.2	6
6-Aug	1	Z	1	2	1	4	2	3	3	3	4	4	3	2	2	1	1	1	0	0	0	0	0	1	1.7	4
7-Aug	1	1	Z	1	2	2	3	4	3	2	3	3	2	2	2	2	1	1	3	1	1	3	2	1	1.9	4
8-Aug	4	9	3	Z	3	1	2	11	3	2	4	5	3	3	2	2	0	0	1	1	2	2	1	3	3.0	11
9-Aug	1	1	1	1	Z	0	1	3	2	3	2	2	3	2	1	3	3	0	1	0	0	1	2	0	1.4	3
10-Aug	1	0	0	1	2	Z	2	3	2	3	2	0	1	2	0	0	0	1	0	1	1	1	1	0	1.1	3
11-Aug	Z	1	1	1	0	1	1	2	1	0	0	0	1	0	0	0	0	0	0	0	0	1	3	3	0.7	3
12-Aug	2	Z	2	3	3	5	3	4	2	2	3	4	4	3	1	1	1	0	1	0	0	0	6	5	2.4	6
13-Aug	2	1	Z	1	2	0	1	2	3	5	10	10	3	6	2	4	6	3	3	3	5	3	4	5	3.6	10
14-Aug	3	2	4	Z	2	2	2	2	3	3	3	5	5	2	3	4	2	19	15	6	0	1	6	1	4.1	19
15-Aug	10	11	10	13	Z	7	7	12	8	7	8	4	3	4	2	2	1	1	3	8	9	8	6	7	6.5	13
16-Aug	7	2	3	4	5	Z	6	4	3	3	4	4	5	5	9	6	5	3	2	4	5	7	4	3	4.5	9
17-Aug	4	Z	10	6	6	8	8	10	13	14	14	11	12	14	12	17	20	16	16	26	17	13	6	3	12.0	26
18-Aug	6	3	Z	5	5	7	3	4	15	C	C	C	C	C	C	2	4	9	6	2	1	2	5	8	--	15
19-Aug	8	6	5	Z	5	18	3	8	8	9	7	10	8	9	8	4	7	9	9	8	14	14	24	18	9.6	24
20-Aug	24	23	24	22	Z	21	22	12	9	17	14	4	9	16	15	17	30	26	20	26	23	6	17	21	18.1	30
21-Aug	24	25	19	25	26	Z	35	M	M	M	M	M	M	M	M	17	12	11	6	4	3	3	2	5	--	35
22-Aug	Z	2	1	2	2	2	2	2	3	14	19	18	17	13	17	8	3	2	2	2	3	1	0	0	5.9	19
23-Aug	0	Z	0	2	2	2	1	1	2	6	10	10	6	8	10	5	4	10	3	5	19	10	3	4	5.3	19
24-Aug	2	2	Z	1	1	6	3	3	2	1	1	2	1	8	6	5	0	1	1	0	0	0	0	0	2.1	8
25-Aug	0	0	1	Z	8	6	6	8	4	2	1	1	1	1	1	1	4	4	2	1	2	4	4	3	2.9	8
26-Aug	2	1	1	2	Z	6	4	4	3	3	3	3	6	4	6	1	3	2	2	3	3	1	1	1	2.8	6
27-Aug	1	1	2	1	1	Z	1	1	2	3	3	3	1	1	1	1	2	1	1	2	4	2	1	0	1.5	4
28-Aug	Z	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	2	1	0.9	2
29-Aug	1	Z	2	1	2	3	3	2	3	3	4	2	3	2	3	2	4	3	1	0	0	0	0	0	2.1	4
30-Aug	0	1	Z	0	1	0	1	1	1	1	11	13	5	2	1	3	1	1	3	0	1	1	1	1	2.2	13
31-Aug	0	0	0	Z	0	0	1	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.4	1
	4.2	3.8	3.9	4.0	3.5	4.4	4.5	4.3	4.0	4.5	5.2	4.6	4.4	4.4	4.1	4.4	4.2	4.4	3.6	3.6	3.9	3.1	3.6	3.4	Diurnal Average	
	24	25	24	25	26	21	35	12	15	17	19	18	17	16	17	17	30	26	20	26	23	14	24	21	Diurnal Maximum	

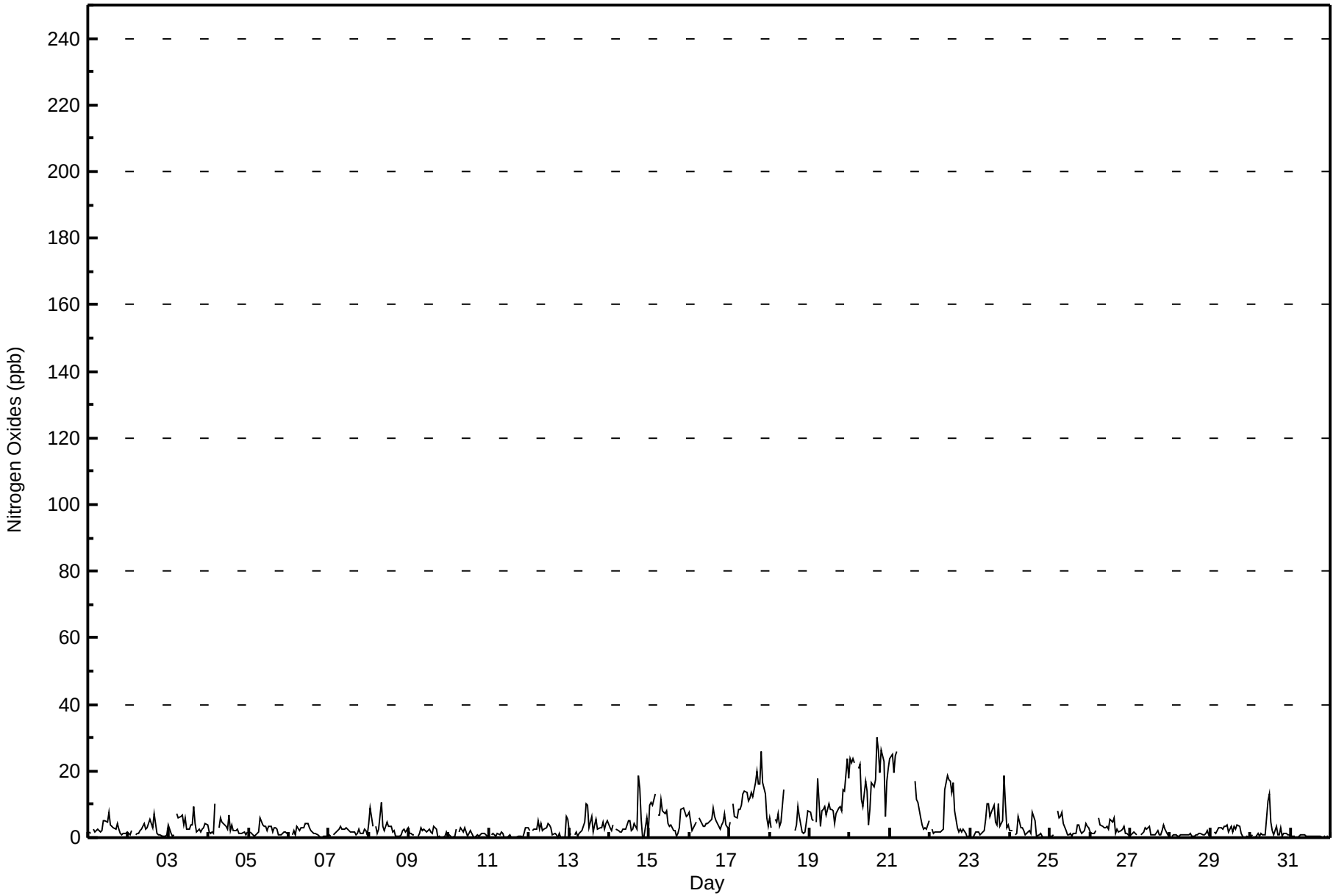
Z - zerospan C - Calibration M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Oxides (NO_X) - ppb

ConocoPhillips - Surmont - August 2015



Nitrogen Oxides (NO_X) - ppb

ConocoPhillips - Surmont - August 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	681	97.42	97.42
21 - 40	18	2.58	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: 699

Total Number of Hours: 744

Nitrogen Oxides (NO_X) - ppb

ConocoPhillips - Surmont - August 2015

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	10	8	4	17	47	78	34	29	42	54	92	78	101	30	34	23	681
21 - 40	0	0	0	0	0	0	0	1	0	0	0	5	11	1	0	0	18
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	10	8	4	17	47	78	34	30	42	54	92	83	112	31	34	23	699

Total Number of Valid Hours: 699

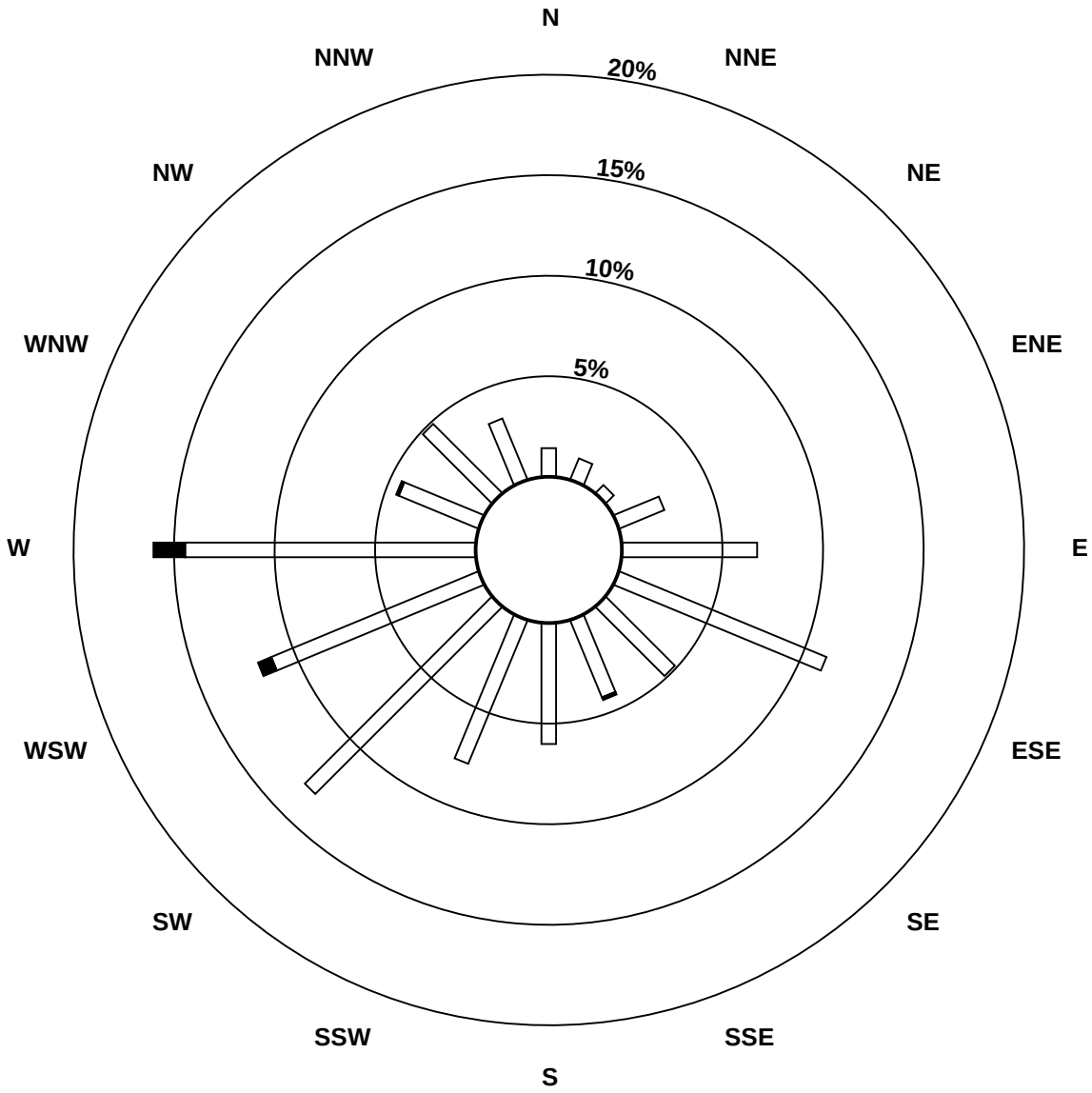
Total Number of Hours: 744

Wood Buffalo Environmental Association

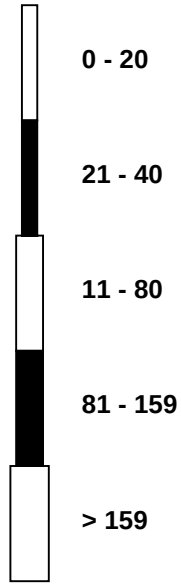
Wind Rose Aug 2015

Nitrogen Oxides (NO_X) - ppb

ConocoPhillips - Surmont (AMS502)



Classes (ppb)



0 - 20

21 - 40

11 - 80

81 - 159

> 159

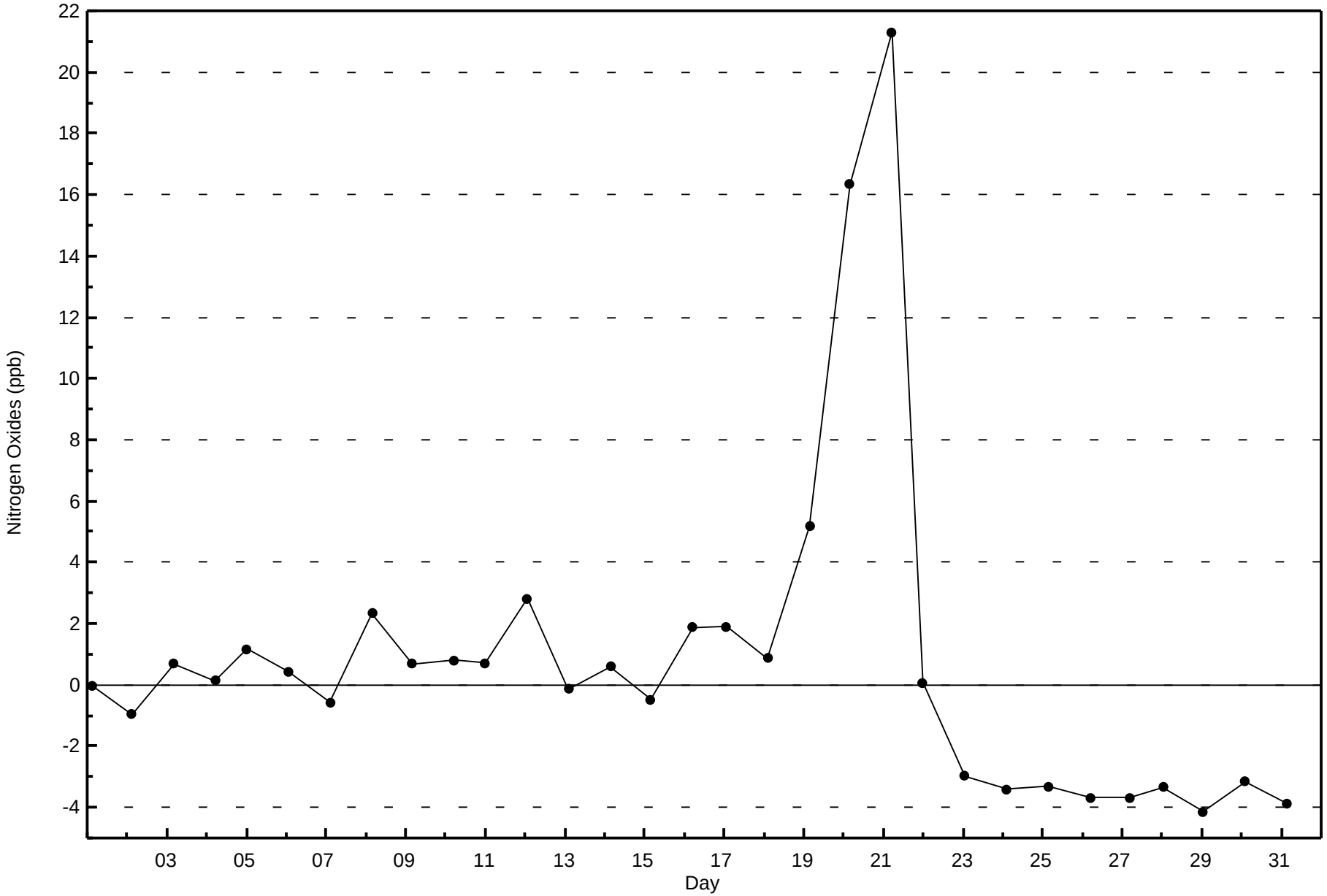
Total Number of Valid Hours: 699

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Oxides (NO_X) - ppb

ConocoPhillips - Surmont - August 2015

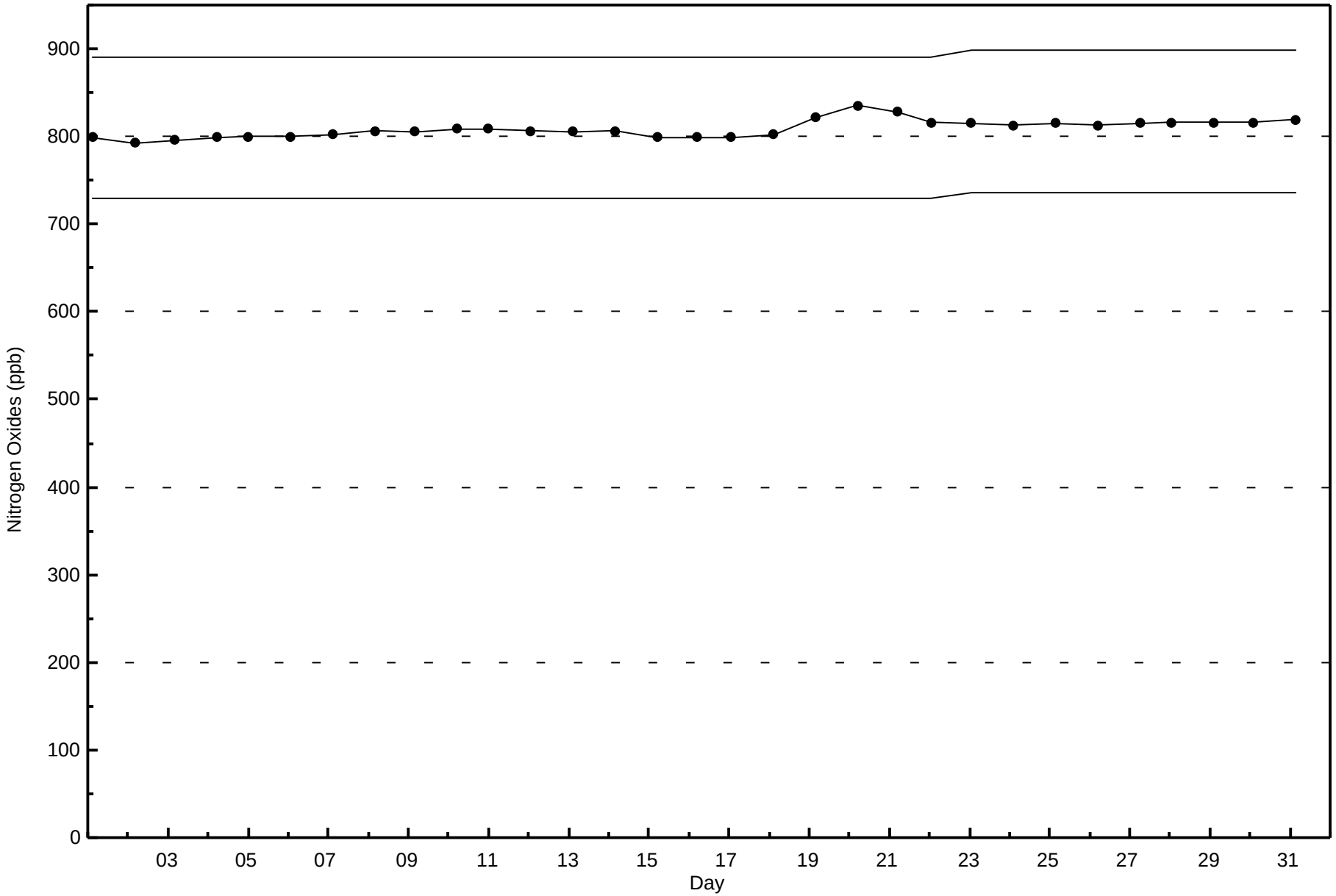


Wood Buffalo Environmental Association

Span Responses

Nitrogen Oxides (NO_X) - ppb

ConocoPhillips - Surmont - August 2015



Maximum Value: 27.3 C on Aug 10 16:00

Maximum Daily Average: 22.1 C on Aug 11

Minimum Value: 5.3 C on Aug 22 06:00

Minimum Daily Average: 8.8 C on Aug 21

Maximum Diurnal Average: 19.9 C at hour 15

Minimum Diurnal Average: 12.6 C at hour 6

Monthly Average: 16.06 C

Percentiles: P_1 = 6.7 P_{10} = 11.1 Q_1 = 13.1 Median = 15.6 Q_3 = 19.1 P_{90} = 21.8 P_{99} = 26.2

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

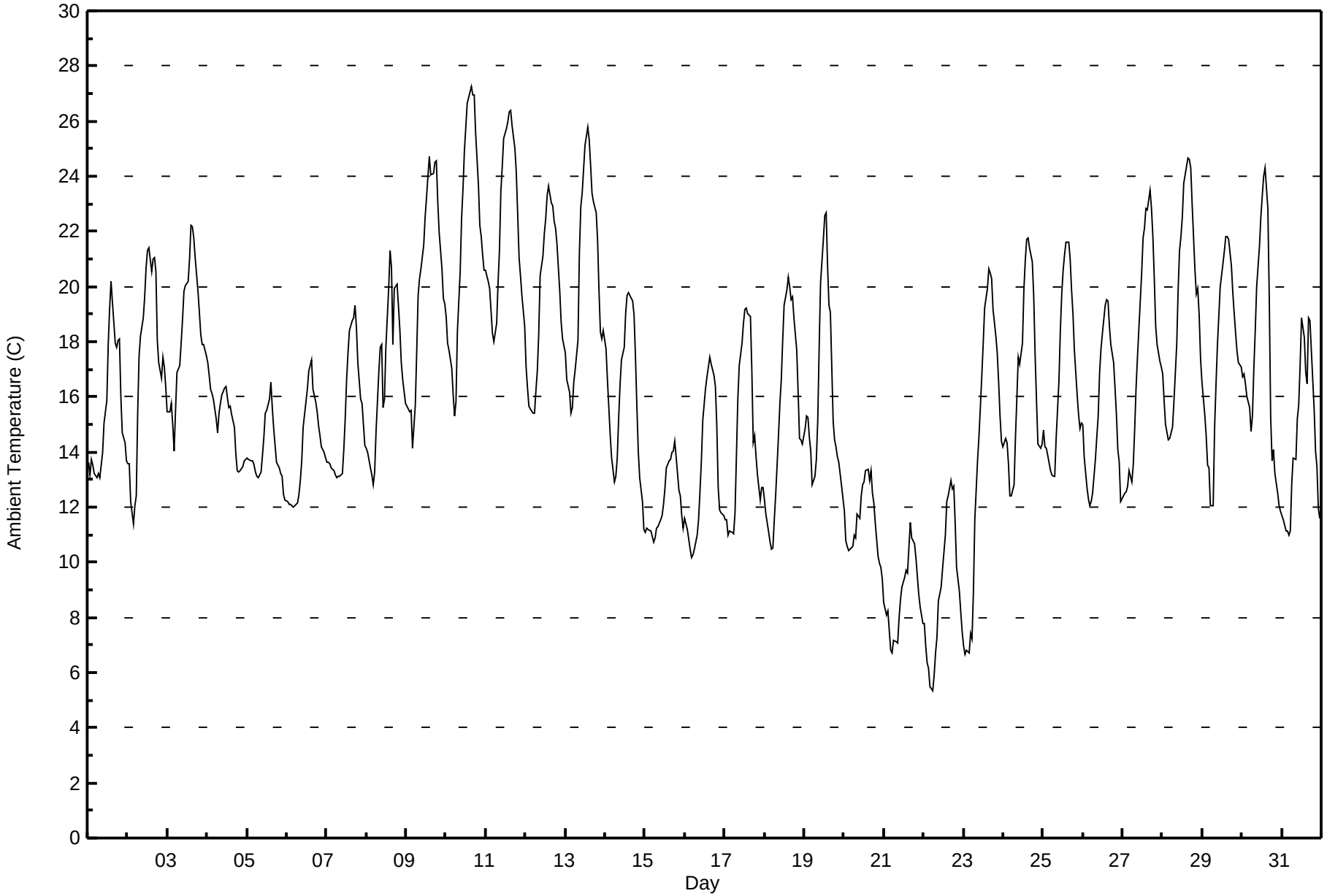
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	13.6	13.2	13.7	13.5	13.2	13.1	13.2	13.1	13.5	14.0	15.1	15.9	17.9	19.2	20.2	19.4	18.0	17.8	18.1	18.1	16.0	14.7	14.3	13.7	15.5	20.2
2-Aug	13.6	13.6	12.2	11.4	12.1	12.4	15.4	17.5	18.2	18.9	19.6	20.7	21.3	21.4	20.5	21.0	21.0	20.6	18.1	17.3	16.7	17.4	17.1	16.4	17.3	21.4
3-Aug	15.5	15.4	15.8	15.0	14.0	15.5	16.9	17.1	18.0	18.8	19.9	20.0	20.2	21.0	22.2	22.2	21.8	21.1	19.8	19.1	18.3	17.9	17.9	17.5	18.4	22.2
4-Aug	17.3	16.8	16.3	16.1	15.9	15.2	14.7	15.4	15.8	16.1	16.3	16.4	15.9	15.6	15.7	15.3	14.9	13.9	13.3	13.3	13.3	13.5	13.7	13.7	15.2	17.3
5-Aug	13.8	13.7	13.7	13.7	13.6	13.2	13.1	13.1	13.2	13.9	14.6	15.4	15.5	15.9	16.5	15.6	14.9	14.2	13.7	13.4	13.2	13.1	12.5	12.2	14.0	16.5
6-Aug	12.2	12.1	12.1	12.0	12.0	12.0	12.2	12.4	13.0	13.7	14.9	15.8	16.3	16.9	17.2	17.3	16.3	15.8	15.5	14.9	14.6	14.2	14.0	13.8	14.2	17.3
7-Aug	13.6	13.6	13.6	13.4	13.3	13.2	13.1	13.1	13.1	13.2	14.1	15.2	16.6	17.6	18.4	18.8	18.9	19.3	18.5	17.2	15.9	15.8	15.0	14.2	15.4	19.3
8-Aug	14.1	14.0	13.4	13.1	12.8	13.3	14.7	16.9	17.8	17.9	15.6	15.9	17.8	19.9	21.3	20.7	17.9	20.0	20.1	19.3	18.4	17.3	16.6	15.8	16.9	21.3
9-Aug	15.7	15.6	15.5	15.5	14.1	15.7	17.6	19.7	20.3	20.7	21.5	22.5	23.2	24.0	24.7	24.0	24.1	24.5	24.5	23.1	22.0	20.6	19.6	19.4	20.3	24.7
10-Aug	18.9	18.0	17.7	17.0	16.1	15.3	15.8	18.4	20.6	22.5	23.5	24.9	25.8	26.6	27.0	27.3	27.0	27.0	25.6	23.7	22.2	21.8	21.2	20.6	21.9	27.3
11-Aug	20.6	20.2	20.0	19.1	18.3	18.0	18.7	20.2	21.3	23.4	24.4	25.4	25.7	26.0	26.3	26.4	25.8	25.0	24.2	22.6	21.0	20.4	19.7	18.6	22.1	26.4
12-Aug	17.1	16.3	15.6	15.6	15.4	15.4	16.2	16.9	18.2	20.4	21.1	21.9	22.5	23.3	23.7	23.1	22.9	22.4	22.1	21.5	19.8	18.7	18.1	17.9	19.4	23.7
13-Aug	17.6	16.6	16.2	15.4	15.6	16.5	17.0	18.1	21.2	22.9	23.4	24.2	25.1	25.8	25.3	24.4	23.4	23.1	22.7	21.7	19.8	18.4	18.1	18.4	20.5	25.8
14-Aug	17.8	16.6	15.6	14.6	13.8	12.9	13.1	13.8	15.2	16.4	17.3	17.8	19.0	19.7	19.8	19.7	19.5	19.0	17.5	15.6	14.0	13.1	12.2	11.2	16.0	19.8
15-Aug	11.1	11.2	11.2	11.1	10.9	10.7	10.9	11.2	11.3	11.6	11.7	12.1	12.7	13.4	13.7	13.7	14.0	14.0	14.4	13.8	12.6	12.4	11.7	11.2	12.2	14.4
16-Aug	11.6	11.2	10.8	10.4	10.2	10.3	10.5	11.0	11.5	12.6	13.7	15.2	16.3	16.7	17.1	17.4	17.2	16.8	16.4	14.9	12.7	11.9	11.8	11.7	13.3	17.4
17-Aug	11.5	11.5	11.0	11.1	11.1	11.1	11.8	13.9	15.9	17.2	17.9	18.7	19.2	19.2	19.0	18.9	16.9	14.3	14.6	13.8	13.2	12.3	12.7	12.7	14.6	19.2
18-Aug	12.2	11.8	11.1	10.7	10.5	10.5	11.6	12.5	14.6	15.8	16.6	18.0	19.3	19.9	20.3	20.0	19.5	19.6	18.9	17.7	16.2	14.5	14.5	14.3	15.4	20.3
19-Aug	14.8	15.3	15.2	14.6	14.0	12.8	13.1	13.7	15.2	17.8	20.1	21.7	22.6	22.7	20.7	19.3	19.1	15.1	14.5	14.2	13.8	13.7	12.8	12.3	16.2	22.7
20-Aug	11.8	10.8	10.6	10.4	10.5	10.6	11.0	10.9	11.8	11.6	12.4	12.8	12.9	13.3	13.4	13.0	13.3	12.5	12.2	11.4	10.2	10.0	9.8	9.4	11.5	13.4
21-Aug	8.5	8.1	8.2	7.5	6.8	6.7	7.2	7.1	7.0	8.0	8.7	9.1	9.4	9.7	9.6	10.5	11.5	10.9	10.7	10.1	9.5	8.9	8.4	7.8	8.8	11.5
22-Aug	7.8	7.0	6.4	6.1	5.5	5.3	5.9	6.7	7.3	8.6	9.1	9.8	10.4	11.0	12.2	12.4	12.9	12.6	12.8	11.5	9.8	9.0	8.2	7.5	9.0	12.9
23-Aug	6.9	6.7	6.8	6.7	7.4	7.2	8.9	11.5	13.8	14.6	15.7	16.8	17.9	19.2	19.9	20.6	20.5	20.3	19.2	18.2	17.6	16.5	15.3	14.4	14.3	20.6
24-Aug	14.2	14.5	14.3	13.6	12.4	12.4	12.8	14.5	16.0	17.5	17.2	18.0	19.9	21.0	21.7	21.8	21.4	20.9	19.7	17.5	15.9	14.3	14.2	14.3	16.7	21.8
25-Aug	14.8	14.2	14.1	13.9	13.3	13.2	13.1	13.1	14.5	16.6	18.4	19.7	20.6	21.1	21.6	21.6	21.0	19.9	19.0	17.7	16.1	15.4	14.8	15.0	16.8	21.6
26-Aug	15.0	13.9	12.7	12.3	12.0	12.2	12.5	13.7	14.5	15.3	16.9	17.8	18.3	19.3	19.5	19.5	18.6	17.9	17.2	16.3	15.4	14.1	13.6	12.2	15.4	19.5
27-Aug	12.4	12.5	12.6	12.8	13.3	12.9	13.6	14.8	16.3	17.5	18.5	20.5	21.7	22.1	22.8	22.8	23.5	22.8	21.8	20.3	18.5	17.9	17.3	17.1	17.8	23.5
28-Aug	16.8	15.9	15.0	14.4	14.5	14.7	14.9	15.8	17.9	19.9	21.3	21.8	22.5	23.7	24.3	24.6	24.6	24.3	23.0	20.6	19.7	19.9	19.0	17.4	19.4	24.6
29-Aug	16.5	15.3	14.6	13.5	13.4	12.1	12.1	14.9	16.4	17.8	18.9	20.0	20.8	21.3	21.8	21.8	21.7	20.8	19.8	19.0	18.3	17.6	17.2	17.1	17.6	21.8
30-Aug	16.7	16.8	16.5	16.0	15.6	14.7	15.3	17.0	18.4	20.0	21.4	22.6	23.3	24.0	24.3	22.8	19.6	15.3	13.7	14.1	13.2	12.5	12.0	11.9	17.4	24.3
31-Aug	11.7	11.5	11.1	11.1	11.0	11.1	12.8	13.8	13.7	15.2	15.7	17.2	18.9	18.1	16.9	16.5	18.8	18.8	17.7	15.5	14.0	13.5	12.0	11.6	14.5	18.9
	14.1	13.7	13.3	13.0	12.7	12.6	13.2	14.3	15.3	16.5	17.3	18.2	19.0	19.6	19.9	19.8	19.4	18.7	18.0	17.0	15.9	15.2	14.7	14.2	Diurnal Average	
	20.6	20.2	20.0	19.1	18.3	18.0	18.7	20.2	21.3	23.4	24.4	25.4	25.8	26.6	27.0	27.3	27.0	27.0	25.6	23.7	22.2	21.8	21.2	20.6	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature (AT) - C

ConocoPhillips - Surmont - August 2015



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	45	6.05	6.05
10 - 20	561	75.40	81.45
> 20	138	18.55	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

Maximum Value: 100 % on Aug 7 06:00

Maximum Daily Average: 94.4 % on Aug 5

Minimum Value: 26 % on Aug 28 16:00

Minimum Daily Average: 43.8 % on Aug 28

Maximum Diurnal Average: 81.1 % at hour 6

Minimum Diurnal Average: 50.7 % at hour 15

Monthly Average: 67.3 %

Percentiles: P_1 = 30 P_{10} = 43 Q_1 = 54 Median = 68 Q_3 = 82 P_{90} = 91 P_{99} = 100

Hours in Service:	744
Hours of Data:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

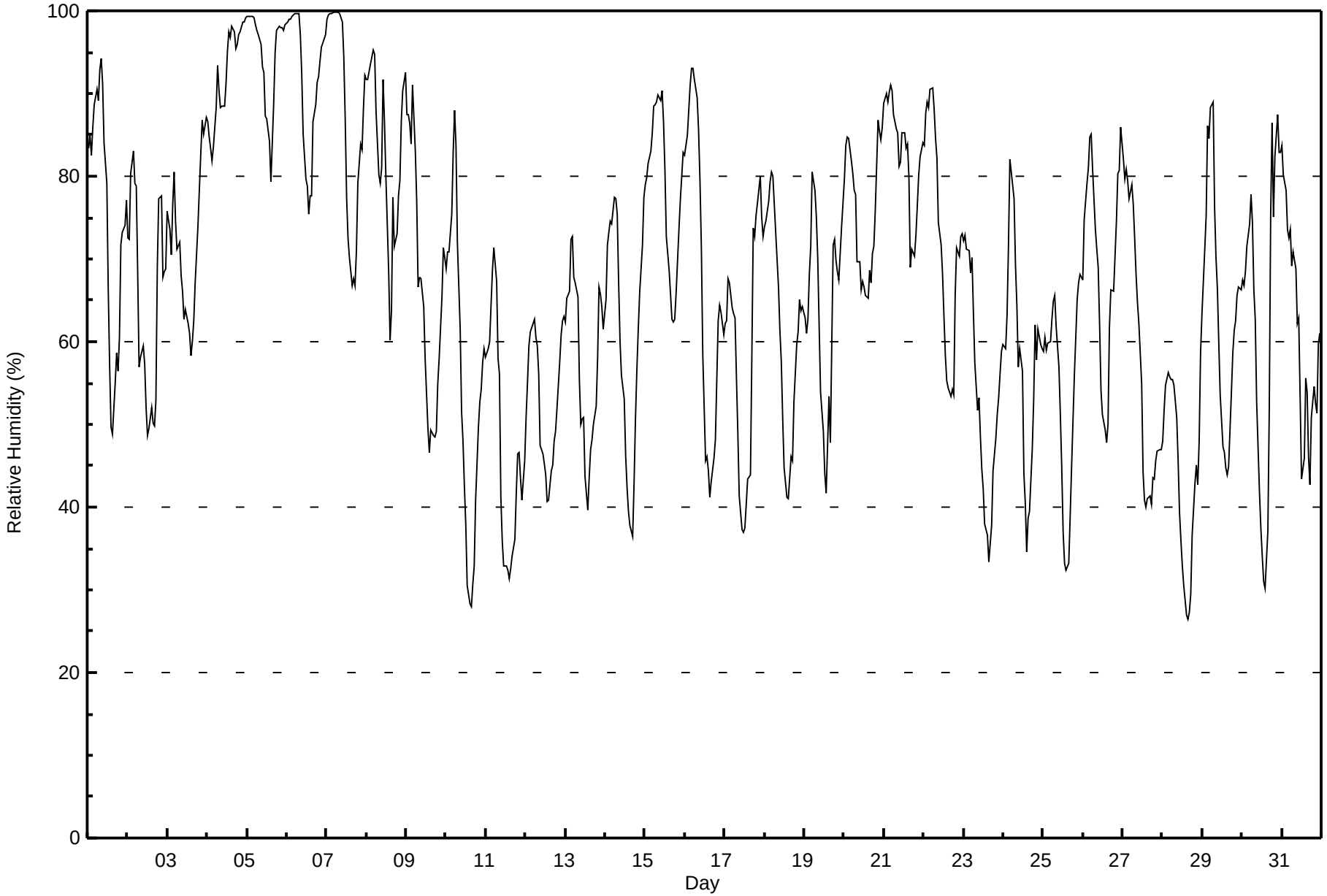
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	83	85	83	86	89	91	89	93	94	91	84	79	66	57	50	49	55	59	56	60	72	73	74	77	74.8	94
2-Aug	72	72	80	83	79	79	69	57	58	60	57	52	49	49	52	50	50	53	69	77	78	68	69	69	64.6	83
3-Aug	76	73	70	77	80	75	71	72	68	66	63	64	62	61	58	60	62	67	74	78	83	87	85	87	71.7	87
4-Aug	87	85	83	82	83	88	93	90	88	88	89	91	95	97	97	98	97	95	96	97	97	99	99	99	92.3	99
5-Aug	99	99	99	99	99	98	98	97	96	93	92	87	87	84	79	84	89	95	98	98	98	98	98	98	94.4	99
6-Aug	99	99	99	99	99	100	100	100	97	92	85	80	79	75	78	78	87	89	91	92	94	96	97	97	91.7	100
7-Aug	99	99	100	100	100	100	100	100	100	99	94	87	78	72	70	67	68	67	71	79	84	83	88	92	87.3	100
8-Aug	92	92	94	94	95	95	88	80	79	81	92	87	80	68	60	64	77	72	73	78	79	87	90	93	82.9	95
9-Aug	87	87	86	84	91	83	77	67	68	68	64	58	54	50	47	49	49	48	49	55	58	65	71	70	66.1	91
10-Aug	69	71	71	75	83	88	84	72	62	52	48	43	38	31	28	28	31	33	41	50	53	54	57	59	54.9	88
11-Aug	58	59	60	64	69	71	67	58	56	41	36	33	33	32	31	33	34	36	42	46	47	43	41	46	47.4	71
12-Aug	51	55	60	61	62	63	61	60	56	47	46	45	44	41	41	44	45	48	49	52	58	61	63	63	53.1	63
13-Aug	62	65	66	72	73	68	67	65	55	50	51	51	44	40	44	47	48	50	52	58	67	66	64	61	57.8	73
14-Aug	65	72	73	75	74	78	77	75	67	60	56	53	46	42	40	38	37	43	51	57	62	66	72	77	60.6	78
15-Aug	79	80	81	83	85	88	89	89	90	89	90	87	81	73	69	66	63	62	63	66	74	77	80	83	78.6	90
16-Aug	83	85	88	91	93	93	92	90	86	80	71	59	46	46	44	41	43	46	48	55	63	64	63	61	67.9	93
17-Aug	62	63	68	67	64	63	63	56	49	41	37	37	37	40	43	44	58	74	73	75	77	80	75	73	59.2	80
18-Aug	74	75	77	79	80	80	77	73	67	61	58	51	45	41	41	44	46	46	53	60	61	65	64	64	61.7	80
19-Aug	63	61	63	68	72	80	78	75	70	62	54	49	44	42	47	53	48	72	72	70	69	67	74	77	63.8	80
20-Aug	80	84	85	85	82	80	78	78	70	70	66	67	67	66	65	69	67	71	72	76	87	86	84	86	75.7	87
21-Aug	89	90	89	90	91	90	87	86	85	81	82	85	85	83	84	80	69	71	70	73	77	80	82	84	82.7	91
22-Aug	84	88	89	88	90	91	88	85	82	74	72	68	63	58	55	54	53	54	54	66	71	70	73	73	72.7	91
23-Aug	72	73	71	71	68	70	63	57	52	53	48	45	42	38	37	33	36	38	44	48	51	53	56	59	53.3	73
24-Aug	60	59	63	72	82	80	77	69	64	57	59	56	44	41	35	39	40	47	53	62	58	62	60	59	58.2	82
25-Aug	59	60	59	60	60	63	65	66	62	57	51	45	37	33	32	33	39	45	50	56	65	67	68	68	54.2	68
26-Aug	67	75	79	81	85	85	81	74	71	69	62	54	51	49	48	50	62	66	66	70	75	80	81	86	69.5	86
27-Aug	82	80	81	80	77	79	77	72	68	65	62	55	44	41	40	41	41	40	44	43	46	47	47	47	58.3	82
28-Aug	48	52	55	56	56	55	55	55	51	46	39	36	33	30	27	26	27	30	37	43	45	43	48	59	43.8	59
29-Aug	63	71	75	86	85	88	89	76	70	66	60	54	47	47	45	44	45	54	59	61	63	66	67	66	64.4	89
30-Aug	68	67	69	71	74	78	74	66	63	53	42	37	34	31	30	37	52	75	86	75	82	87	83	83	63.3	87
31-Aug	84	80	78	74	73	74	69	71	69	62	63	53	43	46	56	54	46	43	51	55	53	51	60	61	61.1	84
	74.7	76.0	77.2	79.2	80.5	81.1	78.8	74.9	71.4	66.9	63.7	59.6	54.8	51.8	50.7	51.5	53.6	57.7	61.5	65.6	69.1	70.7	72.0	73.5	Diurnal Average	
	99	99	100	100	100	100	100	100	100	99	94	91	95	97	97	98	97	95	98	98	98	99	99	99	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity (RH) - %

ConocoPhillips - Surmont - August 2015



Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	49	6.59	6.59
40 - 60	211	28.36	34.95
60 - 80	277	37.23	72.18
80 - 100	207	27.82	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

ConocoPhillips - Surmont - August 2015

Maximum Speed: 33 km/h on Aug 30 18:00

Maximum Daily Speed Average: 20.7 km/h on Aug 20

Minimum Speed Value: 1 km/h on Aug 26 02:00

Minimum Daily Speed Average: 2.5 km/h on Aug 26

Maximum Diurnal Speed Average: 7.6 km/h at hour 7

Minimum Diurnal Speed Average: 2.3 km/h at hour 19

Monthly Average Velocity: 5.5 km/h 239.0 deg

Percentiles: $P_1 = 2$ $P_{10} = 6$ $Q_1 = 8$ Median = 11 $Q_3 = 16$ $P_{90} = 21$ $P_{99} = 27$

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	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Aug	SW12	SW12	WSW8	W9	NW11	WSW6	SW8	WSW7	WNW8	NNW12	NNW15	NNW14	NW11	NNW13	NNW15	N18	N12	NW11	NW8	W8	WSW9	WSW11	WSW11	SW11	WNW7.6	N18
2-Aug	SW9	SW10	WNW4	WSW5	WSW7	SW9	SSW4	S4	S5	SE6	ESE11	ESE10	NE7	ESE10	S10	SSE9	SSE8	SSW12	SW11	SSW5	SW7	SSW8	SW9	SSW9	SSW5.2	SSW12
3-Aug	WNW4	SSW5	S4	S4	S3	SE5	SE5	ESE8	ESE8	ESE10	SE12	SE9	SSW4	N5	NNE3	ESE10	ESE10	E7	E7	ESE7	ESE7	SSE2	E2	NNE3	ESE4.3	SE12
4-Aug	NE5	ENE6	E7	ESE9	NNE4	E7	E6	ENE6	E13	ESE12	ESE14	ESE11	ESE13	ESE15	ESE16	ESE16	ESE19	SE20	SE21	SE18	ESE12	ESE10	ESE11	E11	ESE11.1	SE21
5-Aug	E12	E10	E8	ENE8	ENE10	E11	E11	E11	E10	ENE11	E12	E15	ENE13	ENE16	E17	ESE16	E13	E14	E16	ENE18	E20	E20	E20	E18	E13.6	E20
6-Aug	E17	ESE15	ESE14	ESE12	ESE12	ESE12	ESE12	ESE12	ESE9	ESE9	ESE8	ESE9	E10	ESE9	E8	ENE11	ENE13	ENE12	ENE10	E10	ENE9	E8	E9	E7	E10.2	E17
7-Aug	E7	ENE6	E6	E6	E7	ESE7	E8	E9	ESE7	E7	ESE7	E6	E5	ESE5	E10	ESE9	ESE8	ESE7	SSE6	S3	ESE9	SE13	ESE12	ESE9	ESE6.9	SE13
8-Aug	SE9	SSE8	S8	S7	S7	S7	S7	SE7	SSE7	ESE12	NE8	SE8	SSE8	SE8	SE8	E2	S10	SSW9	SSW6	SE5	SE7	ESE6	S6	S4	SSE6.0	ESE12
9-Aug	SSW9	SSW9	SW9	SW7	W5	W4	SW2	NNE5	ENE5	E9	ESE9	ESE10	ESE9	ESE8	E9	ESE6	ESE6	E7	E8	ESE6	ESE9	ESE9	SE4	S8	SE4.2	ESE10
10-Aug	WSW11	W8	SSW8	SSW7	S11	WSW8	W13	W14	W11	W8	W13	WSW11	WSW13	WSW15	WSW14	WSW14	WSW10	SSW11	S9	S7	SSW10	SSW11	SW10	SW10	SW9.3	WSW15
11-Aug	SW10	SW12	SW14	SW14	SW17	SW21	WSW20	WSW15	SW11	WSW19	WSW17	WSW20	WSW25	WSW26	WSW23	SW22	SW20	WSW19	WSW11	SW10	SW10	WSW16	SW14	SW15	WSW16.6	WSW26
12-Aug	SW15	SW14	SW15	SW18	SW18	SW18	WSW19	SW15	WSW17	WSW25	W25	W22	W23	WSW23	W24	WSW16	W18	WSW14	WSW11	WSW12	WSW12	WSW12	WSW14	WSW15	WSW16.7	WSW25
13-Aug	WSW14	SW14	SW13	SW16	SW17	WSW17	SW15	WSW14	WSW10	SSW9	S8	S8	SSW10	WSW13	SW7	NNW15	NNW18	NNW15	NNE5	S6	SSW7	SW8	SW9	SW13	WSW8.6	NNW18
14-Aug	SW15	SW16	SW18	WSW21	WSW20	WSW21	W24	W22	W23	W27	W24	W25	W22	WSW23	W25	W24	W20	WNW19	WNW18	W13	W13	W15	W19	W15	W19.5	W27
15-Aug	W19	W17	W18	WNW15	WNW14	WNW13	WNW14	WNW16	NW21	NW22	NW21	NW22	NW23	NW23	NW21	NNW20	NNW17	NNW11	NW12	WNW13	WNW13	WNW13	W12	W12	NW15.8	NW23
16-Aug	WNW11	W10	W11	W11	W11	WNW10	W11	W8	W9	W9	W9	W8	W15	W14	WNW15	NW12	NNW13	NW9	NNW9	WSW9	WSW11	SW10	SW10	SW13	W9.3	WNW15
17-Aug	SW13	WSW13	WSW11	WSW9	WSW15	WSW15	WSW10	SW13	SW14	SW14	S6	SE10	SE12	ESE14	ESE12	ESE9	S8	SSE10	SE8	SSE11	S10	SW12	WSW19	WSW18	SSW7.8	WSW19
18-Aug	W12	W12	WSW11	W10	W10	W10	W12	W17	WNW14	NNW13	NNW11	NNW9	NW8	NNW9	W5	NNW6	SSE5	SE8	SE10	S8	S7	SSW8	SSW7	SSW7	W5.5	W17
19-Aug	SSW9	S9	SSW12	S15	SSE15	SSE17	SSE20	SSE18	S17	S16	SSW17	SW19	SW20	WSW23	W30	W20	W22	SW29	SW19	WSW23	WSW24	W25	W24	W22	SW15.4	W30
20-Aug	WSW18	WSW17	WSW21	WSW21	W21	WSW18	W18	W23	W27	W26	W28	W28	W26	W25	W23	W22	WNW21	W21	W15	W14	W17	W15	W18	W20	W20.7	W28
21-Aug	W20	W19	W18	W16	W12	W17	W19	W23	W22	W23	W20	W18	NW18	NW17	NW16	NW15	NW19	NW15	WNW13	W13	W14	W15	W17	W19	W16.9	W23
22-Aug	W19	W18	W19	W19	W19	W18	W17	W20	W20	WNW21	WNW19	WNW17	WNW20	WNW21	WNW16	WNW17	NW13	NNW10	NNW7	SW4	SSE4	S5	S8	SSW9	W13.1	WNW21
23-Aug	SSW10	SSW10	SSW10	SSW10	SSW9	SSW10	SSW9	SSW8	SSE11	SE13	SE16	SE15	SE13	SE15	SE16	S12	SSE13	SE13	SE11	SE11	SSE14	SSE13	SSE15	SSE17	SSE10.9	SSE17
24-Aug	SSE16	SSW14	WSW13	WSW8	SSW2	SSE9	SSE11	S11	SSE9	SW8	W9	WSW8	W11	WNW10	W11	W10	W6	W9	NW8	W6	W4	W5	WSW4	W7	WSW5.9	SSE16
25-Aug	WNW9	WNW9	WNW10	WNW8	W7	NW9	NW11	NW12	NW9	N10	N12	NNE11	N10	N12	NNE10	N10	NNW15	NNW16	NW13	NW14	NW15	NW14	NW10	NW9	NNW9.4	NNW16
26-Aug	NW9	SSW1	WSW4	NW11	NW11	NW10	NNW3	NNE3	NE3	ENE6	E5	E6	E8	ESE5	SSE6	N2	NW12	NW10	NNW7	N5	NNW2	SSW2	SSW4	W4	NNW2.5	NW12
27-Aug	SW5	SSW7	S4	S5	S8	S8	S9	S9	SSE9	ESE12	ESE14	SE7	SSW12	SSW11	SSW12	SW11	SW14	SW18	SW16	SW18	SW16	SW20	SW22	SW21	SSW10.2	SW22
28-Aug	SW22	SW20	SW20	SW23	SW22	SW22	SW23	SW22	SW18	SW18	WSW22	WSW22	WSW23	WSW23	WSW22	WSW19	WSW16	WSW12	SW6	SW7	SW7	S2	W3	W4	SW16.3	SW23
29-Aug	ESE4	N8	NW5	NNW3	NNW7	SW5	SW7	S6	SSE7	SE8	SSE8	ESE10	SE10	ESE11	ESE12	ESE13	ESE13	ESE7	E8	E15	ESE15	ESE14	ESE13	ESE12	ESE6.6	ESE15
30-Aug	ESE12	ESE13	ESE12	ESE12	SE9	SSW4	WSW14	WSW20	W21	WSW19	WNW18	WNW16	W13	WSW8	SSW6	S5	W13	WSW33	W7	WSW11	SE6	SSE5	SW11	SSW10	WSW6.9	WSW33
31-Aug	SW10	SW11	SW10	SSW10	SSW11	SSW11	SSW10	SW16	WSW20	WSW14	SW9	SW12	SW15	WSW20	SW18	S13	SW8	SSW8	SW6	SW9	SSW9	S8	SSW8	SW10	SW11.1	WSW20
	SW6.7	SW7.1	SW7.2	SW7.0	WSW6.7	SW7.2	SW7.6	WSW7.1	WSW6.5	WSW5.2	WSW4.3	WSW4.1	WSW5.8	WSW5.7	WSW5.2	W3.7	W4.3	WSW4.8	WSW2.3	SW4.0	SSW4.1	SW5.1	SW6.4	SW6.7	Diurnal Average	
	SW22	SW20	WSW21	SW23	SW22	SW22	W24	W23	W27	W27	W28	W28	W26	WSW26	W30	W24	W22	WSW33	SE21	WSW23	WSW24	W25	W24	W22	Diurnal Maximum	

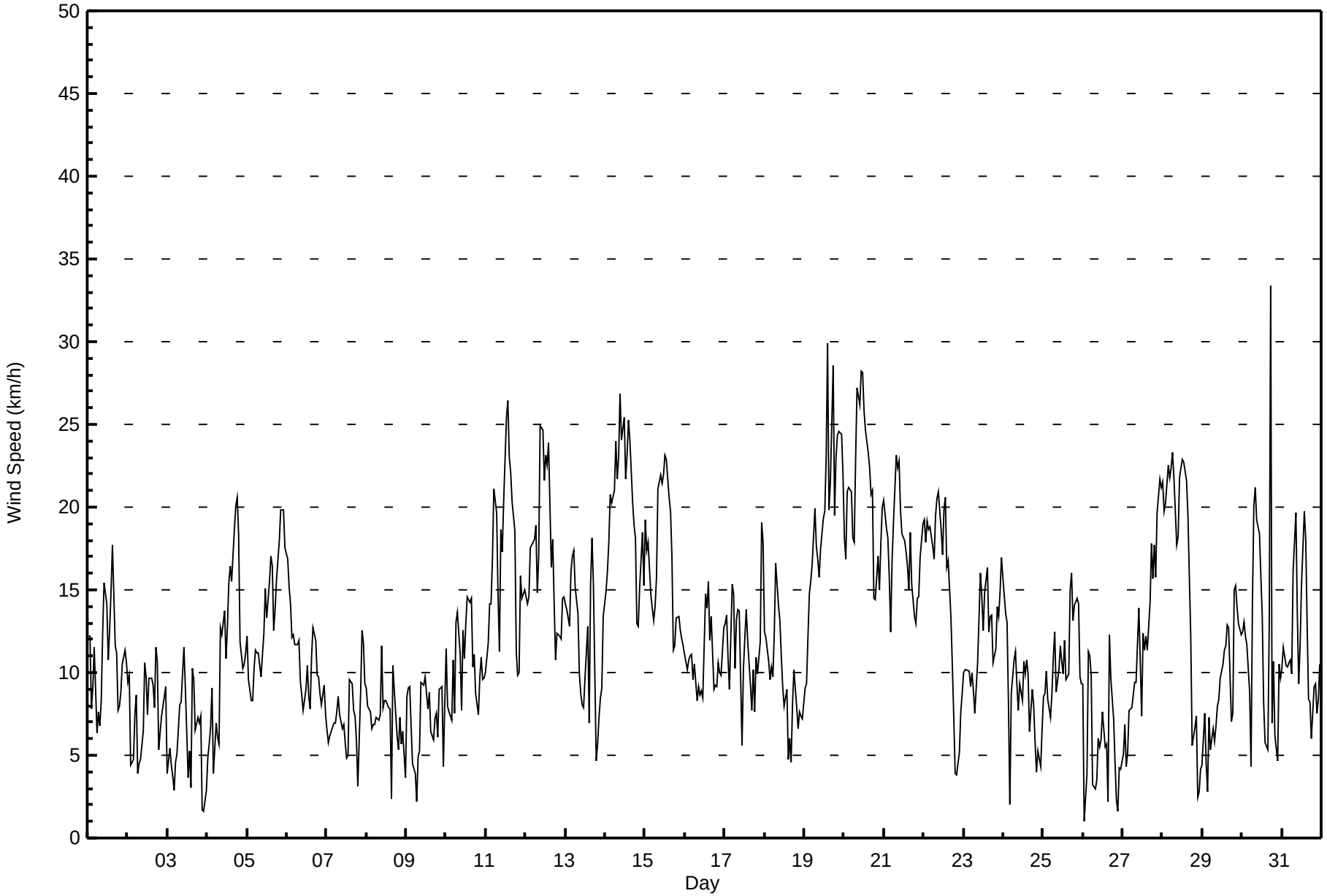
All monthly, daily, and diurnal averages have been calculated using vector methods

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed (WS) - km/h

ConocoPhillips - Surmont - August 2015



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	69	9.27	9.27
6 - 11	318	42.74	52.02
12 - 19	258	34.68	86.69
20 - 28	96	12.90	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

ConocoPhillips - Surmont - August 2015

Wind Speed Ranges (km/h)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 5	3	6	2	1	4	3	4	4	12	9	4	3	8	2	1	3	69
6 - 11	4	2	2	10	33	44	17	16	29	41	33	24	28	9	16	10	318
12 - 19	4	0	0	6	10	33	11	9	5	6	43	37	47	19	15	13	258
20 - 28	0	0	0	0	3	0	2	1	0	0	15	25	38	4	7	1	96
29 - 38	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	3
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	11	8	4	17	50	80	34	30	46	56	96	90	122	34	39	27	744

Total Number of Valid Hours: 744

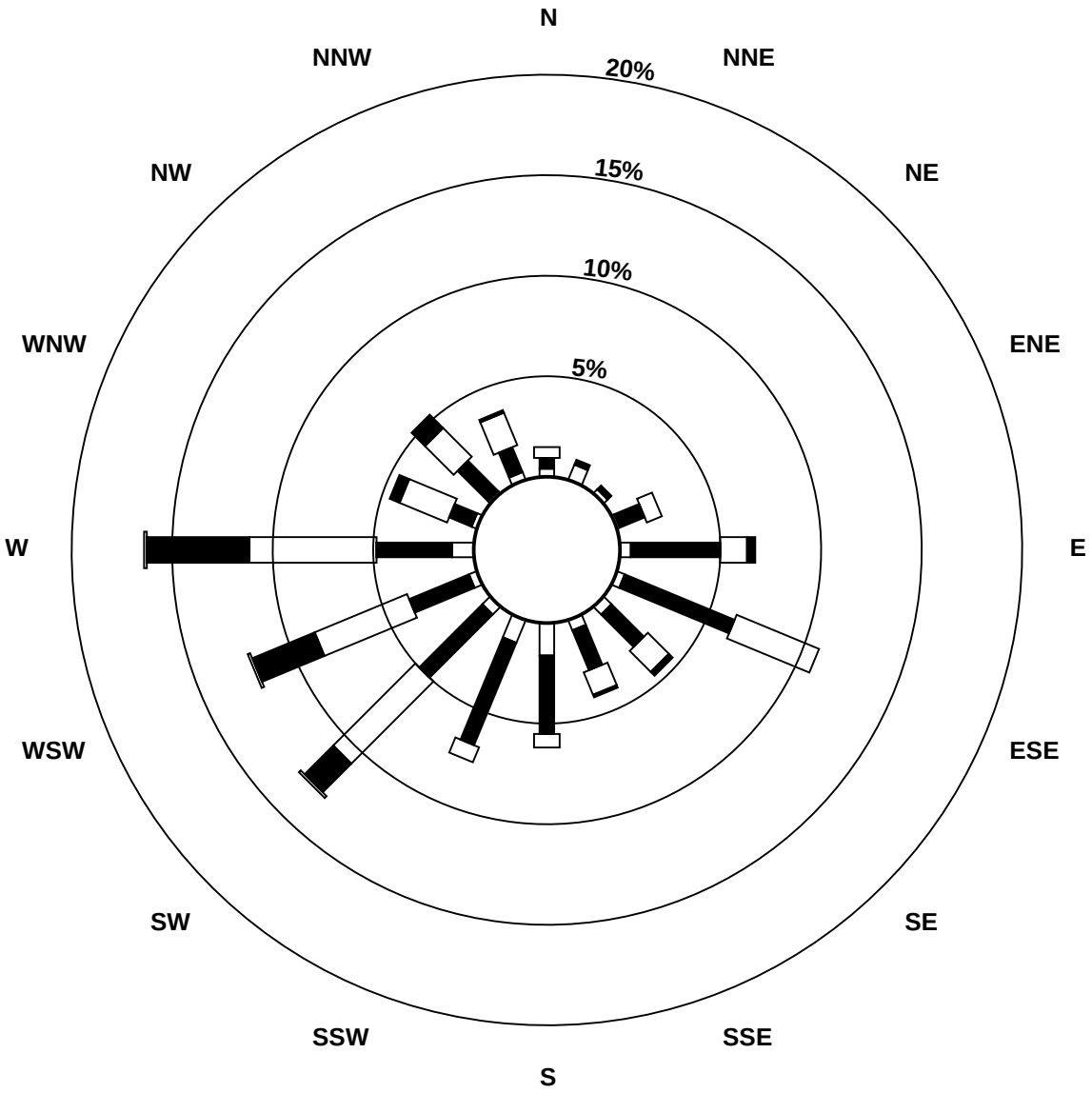
Total Number of Hours: 744

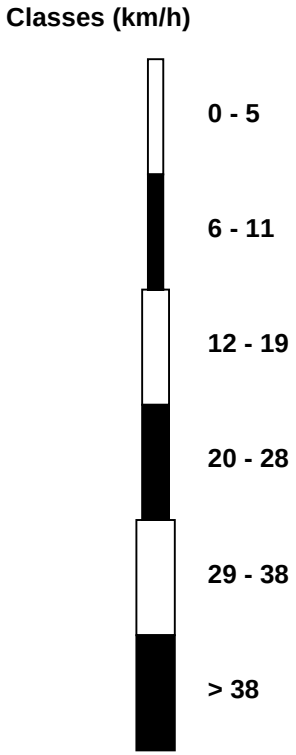
Wood Buffalo Environmental Association

Wind Rose Aug 2015

Wind Speed (WS) - km/h

ConocoPhillips - Surmont (AMS502)





Total Number of Valid Hours: 744

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 15 km/h on Aug 30 18:00

Minimum Value: 0 km/h on Aug 16 21:00

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:	744
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

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

Direction of Maximum Speed: 244 deg on Aug 30 18:00
Direction of Maximum Daily Speed Average: 264.4 deg on Aug 20

Direction of Minimum Speed: 195 deg on Aug 26 02:00

Direction of Minimum Daily Speed Average: 2.5 deg on Aug 26

Monthly Average Direction: 247.6 deg

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
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average
1-Aug	225	227	250	281	312	249	226	245	290	334	334	333	315	337	330	359	2	325	324	270	258	253	248	235	296.4
2-Aug	231	235	283	246	241	216	198	191	174	136	105	104	43	121	178	152	168	205	227	205	215	207	215	206	191.7
3-Aug	294	201	188	169	173	141	142	117	118	115	125	125	197	351	17	104	116	88	100	107	109	163	91	30	120.2
4-Aug	43	72	96	111	32	94	81	77	99	102	110	103	109	112	112	106	118	133	128	128	123	110	107	94	109.0
5-Aug	89	86	79	71	74	83	87	83	81	78	80	90	78	72	79	105	101	90	80	78	83	86	90	95	84.7
6-Aug	101	108	104	110	112	114	115	115	108	104	102	109	95	102	79	65	62	71	77	84	75	85	89	86	95.7
7-Aug	87	72	84	90	97	102	94	100	106	92	103	98	87	119	82	121	115	112	155	185	107	127	123	117	106.5
8-Aug	133	148	173	171	170	188	173	146	155	116	36	134	168	144	142	82	183	192	206	135	125	113	191	182	153.8
9-Aug	208	208	216	229	274	269	227	25	68	97	111	119	112	107	98	115	110	84	87	103	114	119	132	185	128.0
10-Aug	247	261	195	204	172	247	262	273	271	278	265	237	241	247	256	251	241	213	190	187	200	205	214	217	235.8
11-Aug	216	224	224	226	225	234	242	244	234	252	237	241	243	244	241	235	235	243	249	233	227	237	234	228	236.6
12-Aug	227	229	223	226	226	228	238	233	242	250	262	262	268	258	259	255	264	256	246	252	248	241	240	243	246.4
13-Aug	240	229	224	226	233	239	235	238	245	212	182	170	200	243	235	327	327	331	12	186	192	214	214	226	238.1
14-Aug	228	230	236	246	253	251	260	267	264	265	263	269	264	256	267	262	259	284	288	276	268	271	278	272	261.8
15-Aug	280	281	281	292	283	285	299	302	317	318	317	320	321	319	324	329	328	339	324	289	282	282	278	280	305.2
16-Aug	289	268	267	268	275	287	271	274	262	260	273	261	260	276	292	312	338	319	334	249	246	216	221	226	273.0
17-Aug	234	244	244	249	242	242	248	234	235	232	175	133	129	117	119	114	178	161	137	161	170	219	247	256	208.6
18-Aug	271	261	258	259	270	264	267	277	300	329	343	341	323	331	273	327	161	141	127	183	188	211	201	201	270.2
19-Aug	203	184	195	191	161	152	157	167	173	187	208	216	217	246	260	266	263	234	234	241	254	259	260	266	224.8
20-Aug	257	237	249	250	260	255	261	266	265	264	261	263	269	272	272	279	282	278	268	266	268	265	263	265	264.4
21-Aug	269	262	270	267	263	269	275	277	271	272	272	279	305	305	305	304	308	306	289	270	273	274	272	276	280.2
22-Aug	279	273	272	275	274	269	266	272	273	283	297	295	287	284	299	287	319	341	331	219	150	178	191	204	279.3
23-Aug	207	209	207	207	204	209	210	200	165	134	139	141	144	145	137	173	148	145	125	135	147	158	163	161	162.0
24-Aug	164	192	244	239	198	154	168	173	165	224	263	258	265	289	274	274	276	279	310	281	269	260	255	270	236.8
25-Aug	285	285	285	284	280	308	308	324	326	353	9	26	5	10	30	8	332	332	326	321	319	315	304	305	327.7
26-Aug	306	195	248	318	310	317	328	27	50	71	81	93	99	112	149	1	319	321	340	356	341	194	197	267	337.4
27-Aug	229	195	178	185	189	184	190	185	165	122	121	143	211	210	206	214	220	227	226	232	236	232	227	226	207.3
28-Aug	229	233	228	225	226	226	226	228	227	233	240	243	247	249	253	242	242	242	228	226	233	182	277	270	235.3
29-Aug	102	4	305	339	332	220	225	171	167	143	147	107	124	113	106	118	115	105	101	93	105	114	116	106	115.1
30-Aug	103	116	110	117	124	198	247	255	259	257	285	297	273	241	195	170	270	244	272	248	131	162	218	208	236.4
31-Aug	218	218	214	207	210	205	206	224	244	251	215	224	229	242	232	190	216	210	215	218	211	187	201	215	219.9
	234.3	228.8	232.9	234.9	238.2	232.9	236.2	241.9	243.1	248.3	251.8	244.9	251.4	255.7	255.1	261.6	266.0	251.6	247.2	220.5	212.4	217.3	224.6	229.5	
	Diurnal Average																								

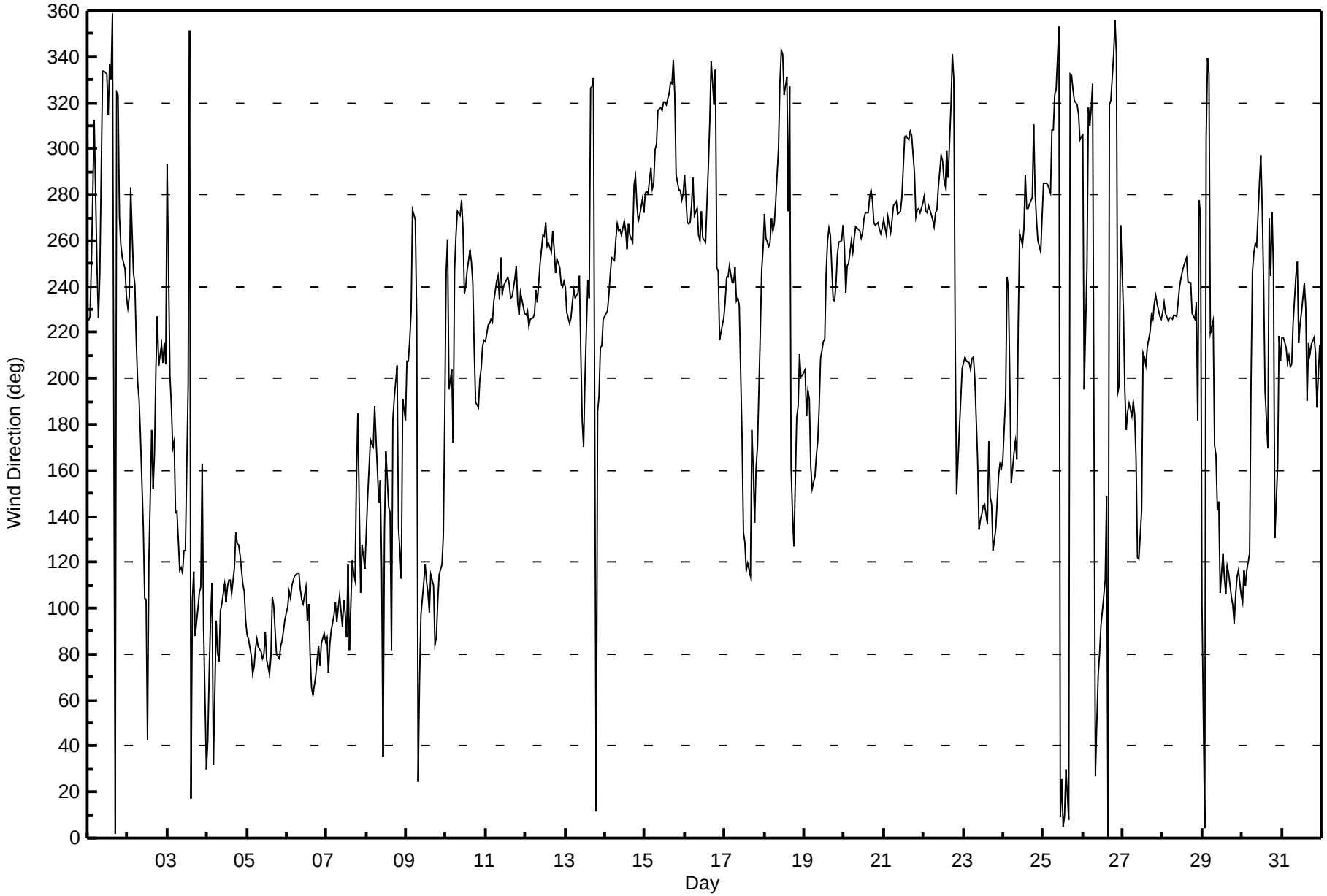
All monthly, daily, and diurnal averages have been calculated using vector methods

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction (WD) - deg

ConocoPhillips - Surmont - August 2015



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0

Maximum Value: 89 deg on Aug 24 05:00

Minimum Value: 6 deg on Aug 16 21:00

Percentiles: P_1 = 7 P_{10} = 9 Q_1 = 12 Median = 15 Q_3 = 23 P_{90} = 36 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
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Aug	10	8	36	37	27	33	17	18	28	15	16	14	32	30	19	26	21	41	34	28	13	12	6	7	41
2-Aug	7	7	57	40	12	8	15	29	52	44	20	30	38	23	23	22	20	30	15	21	12	10	12	13	57
3-Aug	52	18	34	30	36	30	33	13	13	17	18	28	51	81	82	23	19	18	12	12	11	71	72	85	85
4-Aug	32	42	20	12	47	27	24	34	12	12	13	14	14	17	15	13	13	12	11	11	13	12	14	13	47
5-Aug	12	13	12	13	14	15	14	13	15	15	15	16	14	15	14	17	13	12	14	13	13	14	13	12	17
6-Aug	14	14	13	12	13	14	14	14	16	16	20	23	20	35	27	21	19	17	14	12	14	16	13	14	35
7-Aug	14	14	18	13	13	13	13	13	15	17	20	31	49	43	30	20	20	32	37	48	11	10	11	12	49
8-Aug	13	21	17	17	16	18	23	19	21	16	36	31	26	30	37	83	19	21	22	40	17	21	22	73	83
9-Aug	14	11	11	11	13	19	50	26	34	18	22	24	45	34	26	43	30	14	15	13	11	10	50	15	50
10-Aug	23	11	41	21	43	15	13	12	13	36	21	29	25	25	18	24	18	18	22	18	17	17	16	15	43
11-Aug	15	12	11	9	12	10	10	16	12	11	16	17	15	16	16	15	13	13	13	10	9	9	8	9	17
12-Aug	8	8	11	10	9	9	9	12	14	13	14	18	19	16	15	16	12	10	11	9	7	7	7	8	19
13-Aug	8	7	11	11	7	7	8	8	13	21	33	43	44	24	26	20	15	14	55	28	12	13	13	15	55
14-Aug	10	9	8	9	8	9	11	13	12	13	14	16	18	19	16	17	14	16	15	12	9	8	10	10	19
15-Aug	11	11	9	16	16	13	15	14	12	12	13	13	12	12	12	14	13	13	16	15	11	11	9	13	16
16-Aug	16	8	8	8	13	22	9	18	12	17	25	53	23	27	22	34	27	36	31	7	6	10	11	7	53
17-Aug	8	8	9	11	8	8	11	11	14	16	66	41	28	16	14	18	52	24	69	18	15	24	10	9	69
18-Aug	9	13	10	6	8	8	9	9	18	18	23	30	43	37	62	55	40	33	21	19	16	11	13	15	62
19-Aug	18	19	19	21	17	14	13	17	18	21	23	20	21	15	18	14	12	15	9	10	10	9	10	10	23
20-Aug	12	8	10	9	10	11	12	12	12	12	12	12	12	14	14	14	17	15	12	13	11	9	9	10	17
21-Aug	9	9	10	11	10	11	11	10	11	13	14	12	19	20	22	28	20	23	25	12	8	9	9	10	28
22-Aug	10	10	9	9	9	9	10	11	11	14	19	19	15	18	21	26	27	19	34	29	40	25	13	9	40
23-Aug	9	11	9	11	12	12	15	20	20	20	17	18	25	20	21	31	25	17	14	13	12	16	12	13	31
24-Aug	14	33	15	29	89	24	15	18	20	27	23	18	22	33	21	23	40	25	27	25	39	13	13	13	89
25-Aug	11	9	9	9	10	20	18	13	18	26	21	33	35	28	37	28	20	15	10	8	10	9	18	21	37
26-Aug	35	81	24	19	19	14	57	57	43	27	42	34	29	60	42	81	14	16	16	19	68	61	28	10	81
27-Aug	20	14	23	22	16	16	18	18	18	19	19	69	24	30	26	30	22	14	13	10	9	8	9	8	69
28-Aug	8	8	9	9	9	9	9	9	11	13	13	15	17	15	14	18	15	14	11	9	18	44	49	59	59
29-Aug	30	18	62	68	22	30	18	25	32	29	31	21	22	20	22	15	14	12	14	12	12	13	13	11	68
30-Aug	11	14	11	11	25	23	44	10	10	11	20	24	26	41	43	64	9	20	52	18	47	46	15	10	64
31-Aug	13	12	12	10	12	14	17	15	15	17	18	26	19	26	18	26	25	22	22	14	16	17	18	19	26
	52	81	62	68	89	33	57	57	52	44	66	69	51	81	82	83	52	41	69	48	68	71	72	85	
	Diurnal Maximum																								

Wood Buffalo Environmental Association
SO2 Calibration Report

W B E A

Station Information

Calibration Date	August 18, 2015	Last Calibration	July 22, 2015
Station Name	ConocoPhillips - Surmont	Station Number	AMS 502
Reason:	Routine		
Start Time (MST)	9:20	End Time (MST)	14:50
Gas Cert Reference	LL104215	Station temp.	21 Deg C
Cal Gas Concentration	48.3 ppm	Cal Gas Exp Date	12-Feb-18
Calibrator Make/Model	API T700	Serial Number	522
ZAG Make/Model	API 701	Serial Number	4865
DACS make/model	Campbell Scientific CR3000	DACS serial No.	7882

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 1000 ppb		PMT voltage	731	726
Analyzer IP address	192.168.1.73		Lamp voltage	2414	2358
Calculated slope	0.999243	1.001567	Chamber temp	50.0	50.0
Calculated intercept	-0.041966	-0.351569	Pressure	21.9	22.1
Analyzer Background	19.3	19.3	Flow	0.548	0.554
Analyzer Coefficient	1.015	1.015	Intensity	60	58

Analyzer make	API T100	Analyzer serial #	598

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.1	----
as found span	5000	83.2	803.7	802.4	1.002
calibrator zero	5000	0.0	0.0	-0.1	----
high point	5000	83.2	803.7	802.4	1.002
second point	5000	41.6	401.9	402.4	0.999
third point	5000	20.8	200.9	201.0	1.000
as left zero	5000	0.0	0.0	0.4	----
as left span	6000	99.8	803.4	799.7	1.005
				Average Correction Factor	1.000

Corrected As found	802.5	Previous response	804.4	% change	0.2%

Notes:

Inlet filter replaced after as founds. No adjustments.

Calibration Performed By: Asad Hidayat

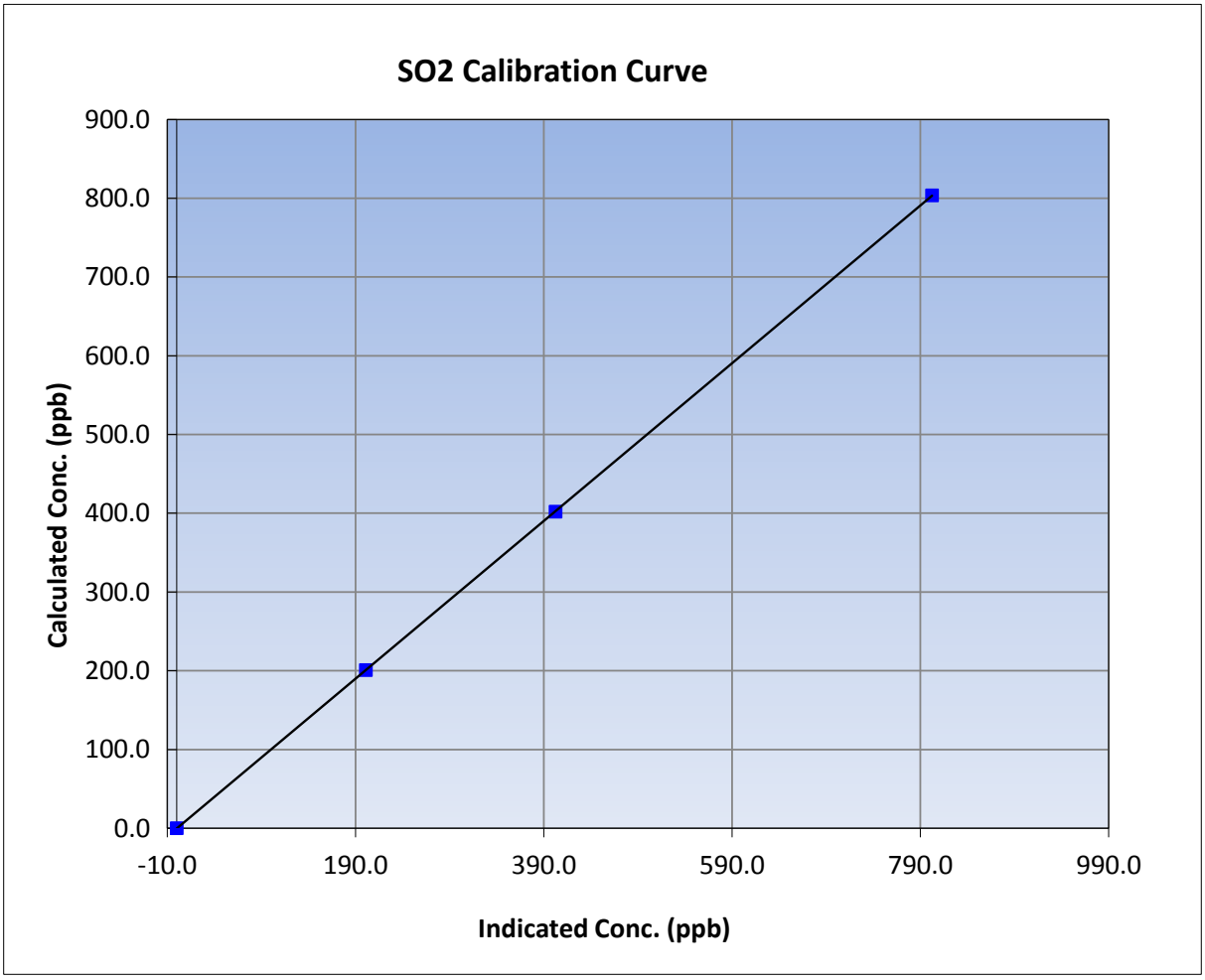
Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

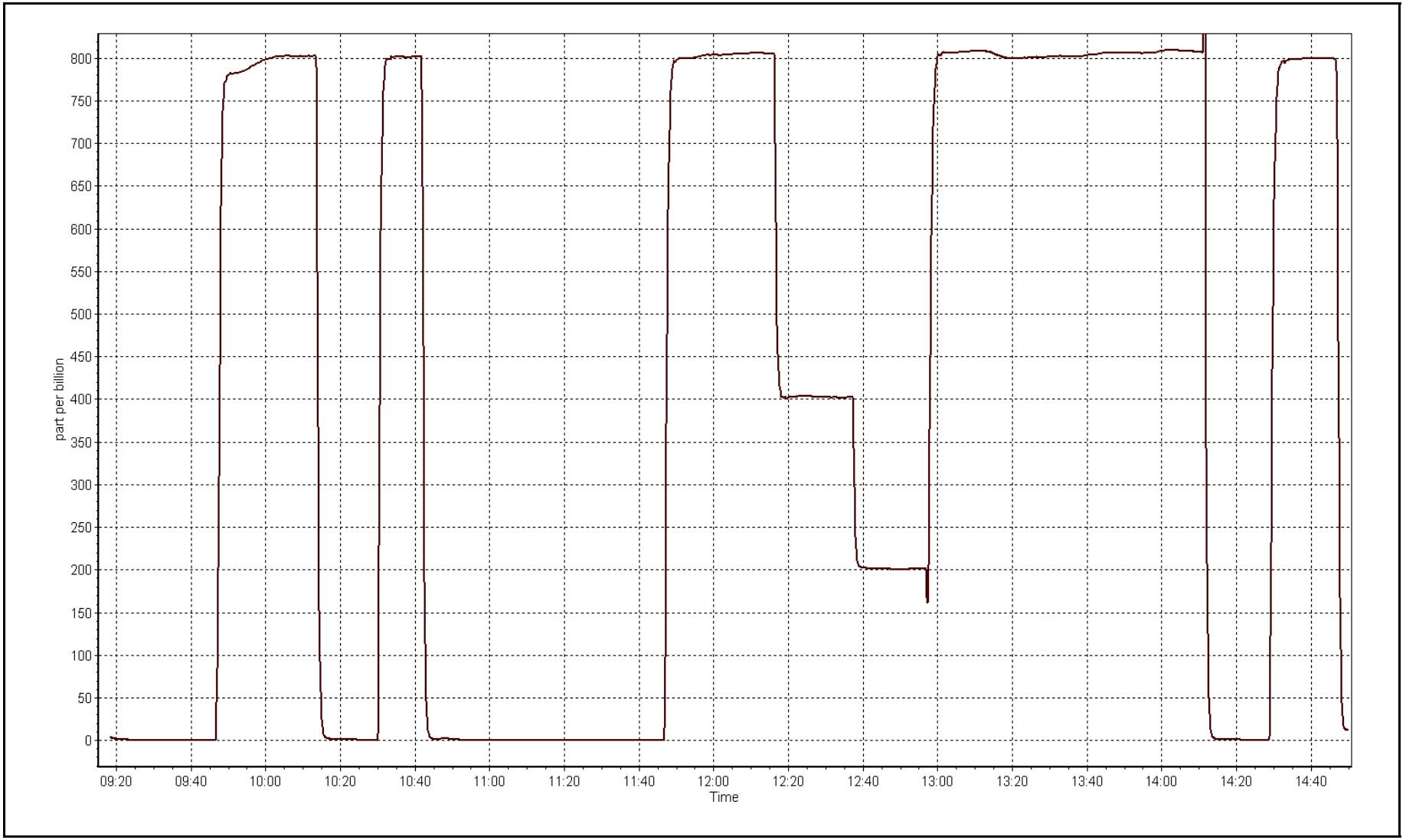
Calibration Date	August 18, 2015	Previous Calibration	July 22, 2015
Station Name	ConocoPhillips - Surmont	Station Number	AMS 502
Start Time (MST)	9:20	End Time (MST)	14:50
Analyzer make	API T100	Analyzer serial #	598

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999997
803.7	802.4	1.0016		
401.9	402.4	0.9987	Slope	1.001567
200.9	201.0	0.9998		
			Intercept	-0.351569



SO2 Calibration Plot Date: August 18, 2015



Wood Buffalo Environmental Association
H2S Calibration Report

Station Information

Calibration Date	August 17, 2015	Last Calibration	July 21, 2015
Station Name	ConocoPhillips-Surmont	Station Number	AMS 502
Reason:	Routine		
Start Time (MST)	10:00	End Time (MST)	12:50
Gas Cert Reference	LL34303	Station temp.	21 Deg C
Cal Gas Concentration	10.4 ppm	Cal Gas Exp Date	30 May, 2016
Calibrator Make/Model	API T700	Serial Number	622
ZAG air Make/Model	API 701	Serial Number	4865
DACS make/model	Campbell Scientific CR3000	Serial Number	7882
SO2 gas concentration	51.1 ppm	SO2 gas cert/exp	LL110503 April-1-2016

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	81	81
Analyzer IP address	192.168.1.75		Lamp voltage	2337	2267
Calculated slope	0.999826	0.996380	Chamber temp	50	50
Calculated intercept	0.021809	0.102492	Pressure	22.6	22.9
Analyzer Background	20.6	20.6	Flow	0.560	0.579
Analyzer Coefficient	0.930	0.93	Intensity	52	50
			Converter temp.	317	315

Analyzer make/model	API T101	Analyzer serial #	197
Converter make/model	N/A	Converter serial #	N/A

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.1	----
as found span	5000	38.5	80.1	80.3	0.997
SO2 scrubber check	5000	20.7	211.6	3.7	----
calibrator zero	5000	0.0	0.0	-0.1	----
high point	5000	38.5	80.1	80.3	0.997
second point	5000	19.3	40.1	40.0	1.003
third point	5000	12.0	25.0	25.0	0.998
as left zero	5000	0.0	0.0	-0.2	----
as left span	5000	38.5	80.1	79.5	1.008
				Average Correction Factor	1.000

Corrected As found	80.4	Previous response	80.1	% change	-0.4%

Notes:

Inlet filter replaced after as founds. No adjustments.

Calibration Performed By: Asad Hidayat

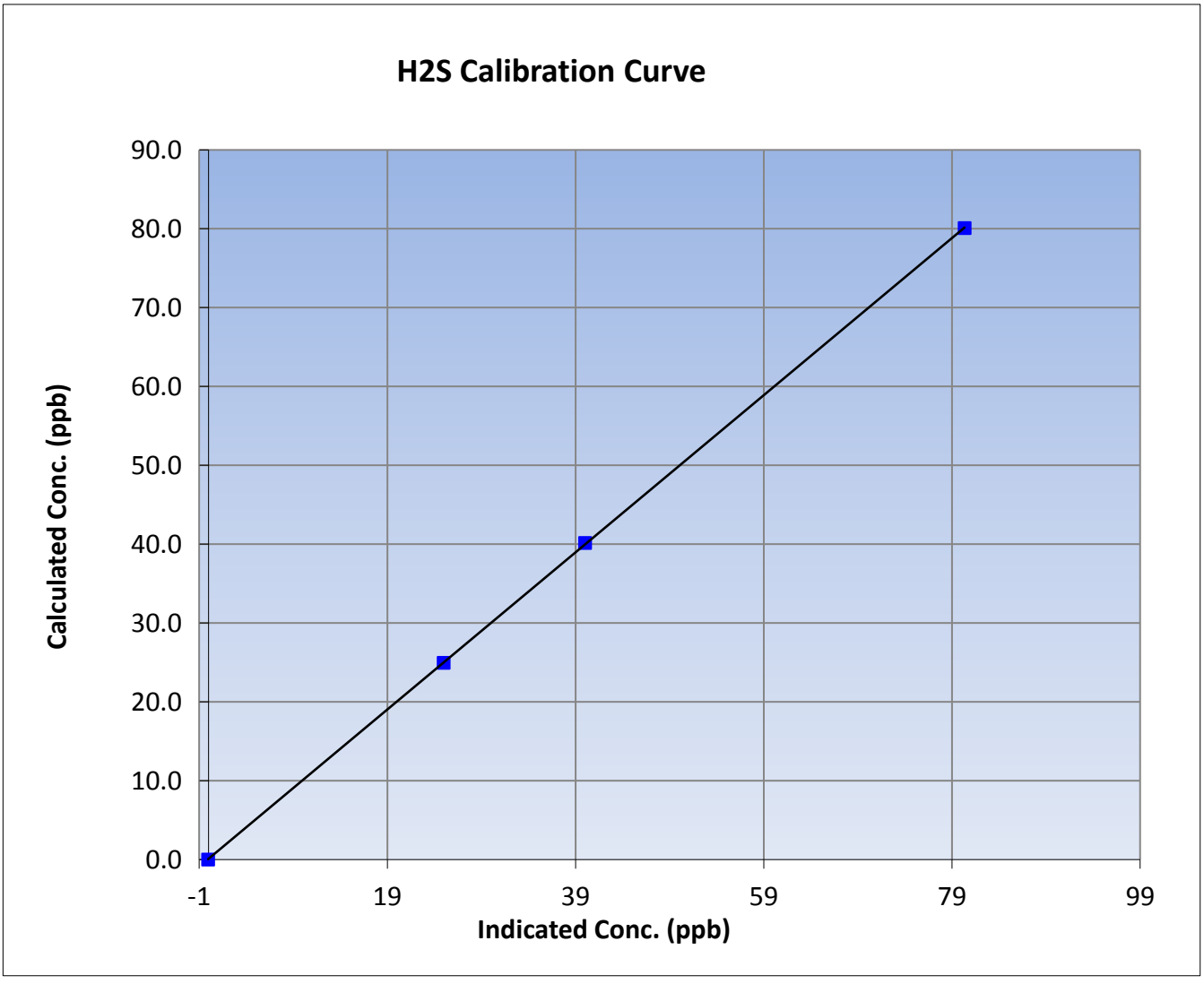
Wood Buffalo Environmental Association
H2S Calibration Report

Station Information

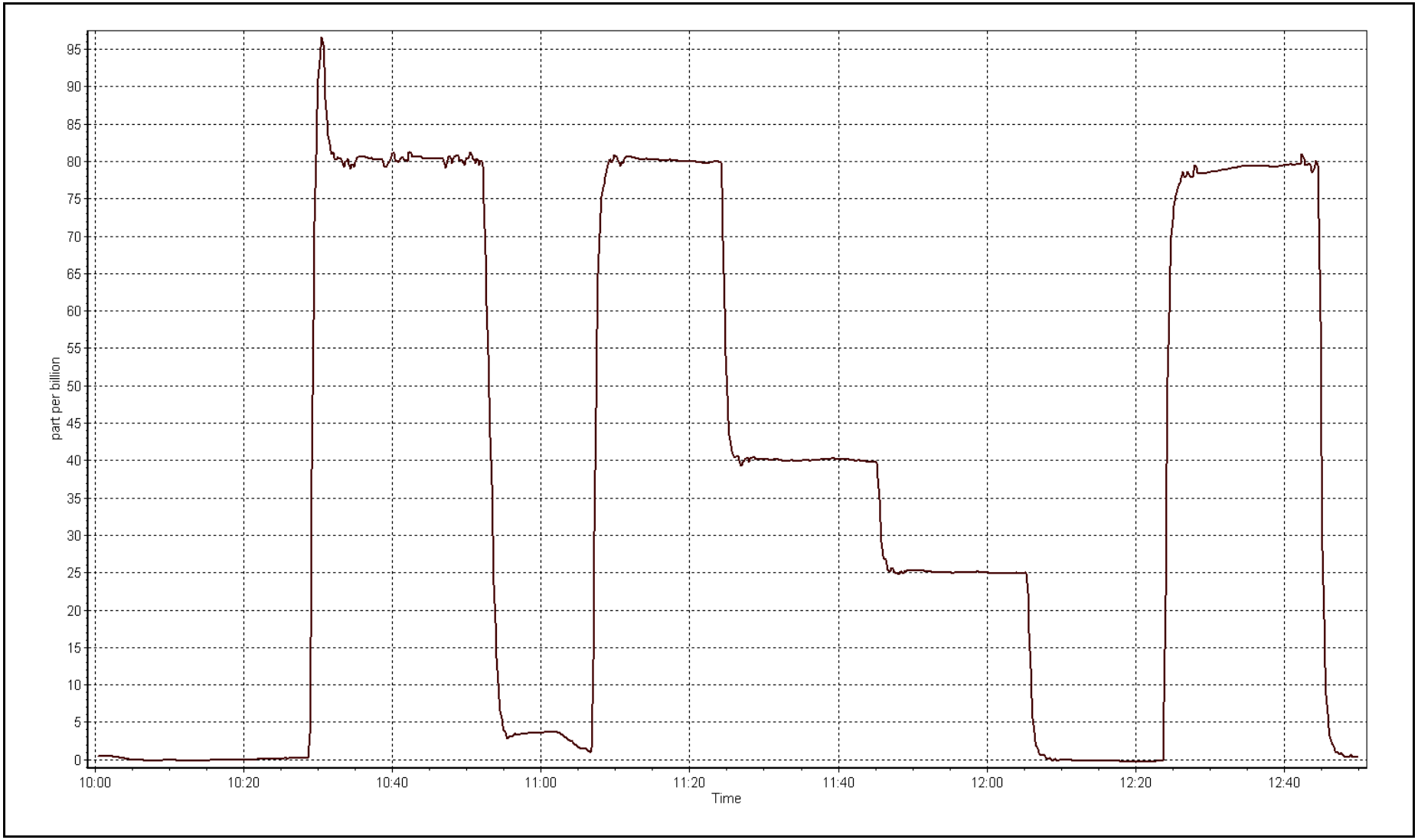
Calibration Date	August 17, 2015	Previous Calibration	July 21, 2015
Station Name	ConocoPhillips-Surmont	Station Number	AMS 502
Start Time (MST)	10:00	End Time (MST)	12:50
Analyzer make	API T101	Analyzer serial #	197

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999988
80.1	80.3	0.9968		
40.1	40.0	1.0033	Slope	0.996380
25.0	25.0	0.9984		
			Intercept	0.102492



H2S Calibration Plot Date: August 17, 2015



Wood Buffalo Environmental Association
NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	August 18, 2015	Previous Calibration	July 22, 2015
Station Name	ConocoPhillips - Surmont	Station Number	AMS 502
Reason:	Routine		
Start Time (MST)	9:20	End Time (MST)	14:55
NO Cal Gas Conc	48.1 ppm	Gas Cert Reference	LL104215
NOx Cal Gas Conc	48.1 ppm	Cal Gas Expiry Date	12-Feb-18
Calibrator	API T700	Serial Number	622
Zero air Generator	Teledyne API T701	Serial Number	4865

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	7882

Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.996816	0.997023	1.001108
	Data Offset	0.572223	0.394891	0.071697
Current Calibration	Data Slope	0.994376	0.993003	1.001673
	Data Offset	0.535566	1.075246	-0.031475

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1218153356

Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
NO coefficient	0.769		1.016	
NOX coefficient	1.001		1.000	
NO2 coefficient	1.000		1.000	
NO bkgrnd	5.1		7.0	
NOX bkgrnd	6.1		6.9	
Chamber Temp	50.6	Deg C	50.3	Deg C
Moly Temp	325	Deg C	323.2	Deg C
PMT voltage	-941.9	V	-909.1	V
PMT Temp	-2.8	Deg C	-3.1	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	210	mmHg	217.8	mmHg
R Cell Press Nox	210	mmHg	218.1	mmHg
NO sample flow	0.472	lpm	0.466	lpm
Nox sample Flow	0.472	lpm	0.467	lpm

Notes:

Inlet filter replaced after as founds. Adjusted PMT voltage from 940V to 909V due to NO coeff being low from previous cal. Performed pre-cal procedure. Adjusted zero and span.

Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: August 18, 2015 Station Number: AMS 502

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	1.9	2.2	-0.3	----	----
as found span	5000	83.2	800.4	800.4	0.0	789.9	789.4	0.5	1.0133	1.0139
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.9	0.6	----	----
high point	5000	83.2	800.4	800.4	0.0	804.3	804.8	-0.5	0.9951	0.9945
second point	5000	41.6	400.2	400.2	0.0	402.3	402.5	-0.2	0.9947	0.9942
third point	5000	20.8	200.1	200.1	0.0	200.1	199.8	0.3	1.0000	1.0016
as left zero	5000	0.0	0.0	0.0	0.0	0.7	0.5	0.2	----	----
as left span	6000	99.8	800.1	515.2	284.9	819.1	540.2	279.0	0.9767	0.9537
								Average Correction Factor	0.9966	0.9968

Corrcted As found NO_X= 787.9 NO= 787.2 Percent Change NO_X= 1.8% NO= 1.9%

Previous Response NO_X= 802.4 NO= 802.4

GPT Calibration Data

Dilution Flow 5000 ccm Source Gas Flow 83.20 ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
Cal zero			0.0			0.6			N/A	
1st NO2 (300)	N/A	515.2	277.1	806.0	528.3	277.8	0.9767	0.9753	0.9976	100.2%
2nd NO2 (200)	N/A	599.5	192.8	806.5	615.6	191.0	0.9762	0.9739	1.0097	99.0%
3rd NO2 (100)	N/A	690.0	102.3	807.3	705.3	102.1	0.9752	0.9783	1.0024	99.8%
4th NO2 (0)	792.3	N/A	13.6	805.9	804.7	1.6	0.9769	0.9845	N/A	----
					Average Correction Factor		0.9762	0.9780	1.0032	99.7%

Calibration Performed By: Asad Hidayat

Wood Buffalo Environmental Association

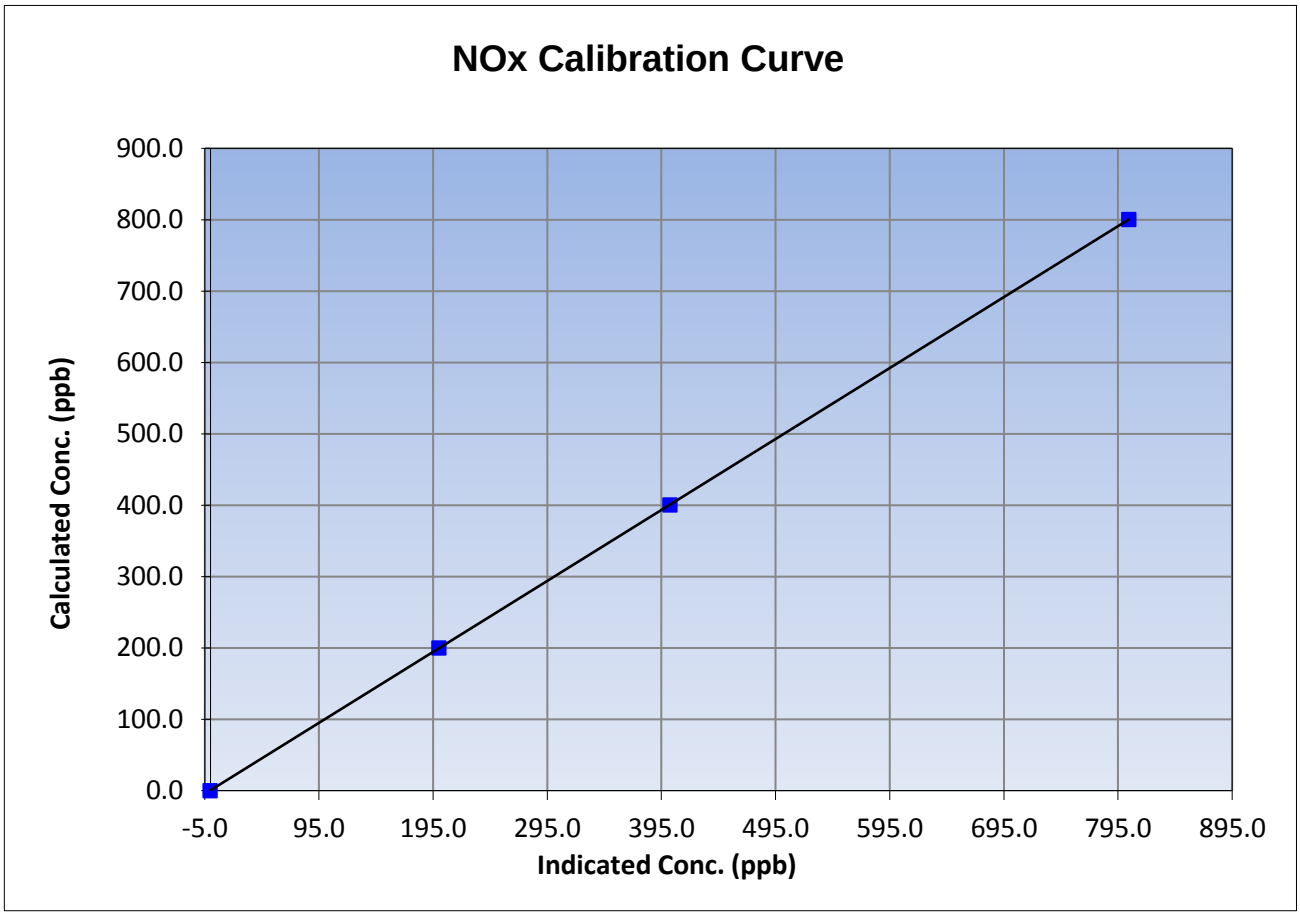
NO_X Calibration Summary

Station Information

Calibration Date	August 18, 2015	Previous Calibration	July 22, 2015
Station Name	ConocoPhillips - Surmont	Station Number	AMS 502
Start Time (MST)	9:20	End Time (MST)	14:55
Analyzer make	Thermo 42i	Analyzer serial #	1218153356

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.3	----	Correlation Coefficient	0.999998
800.4	804.3	0.9951		
400.2	402.3	0.9947	Slope	0.994376
200.1	200.1	1.0000		
			Intercept	0.535566



Wood Buffalo Environmental Association

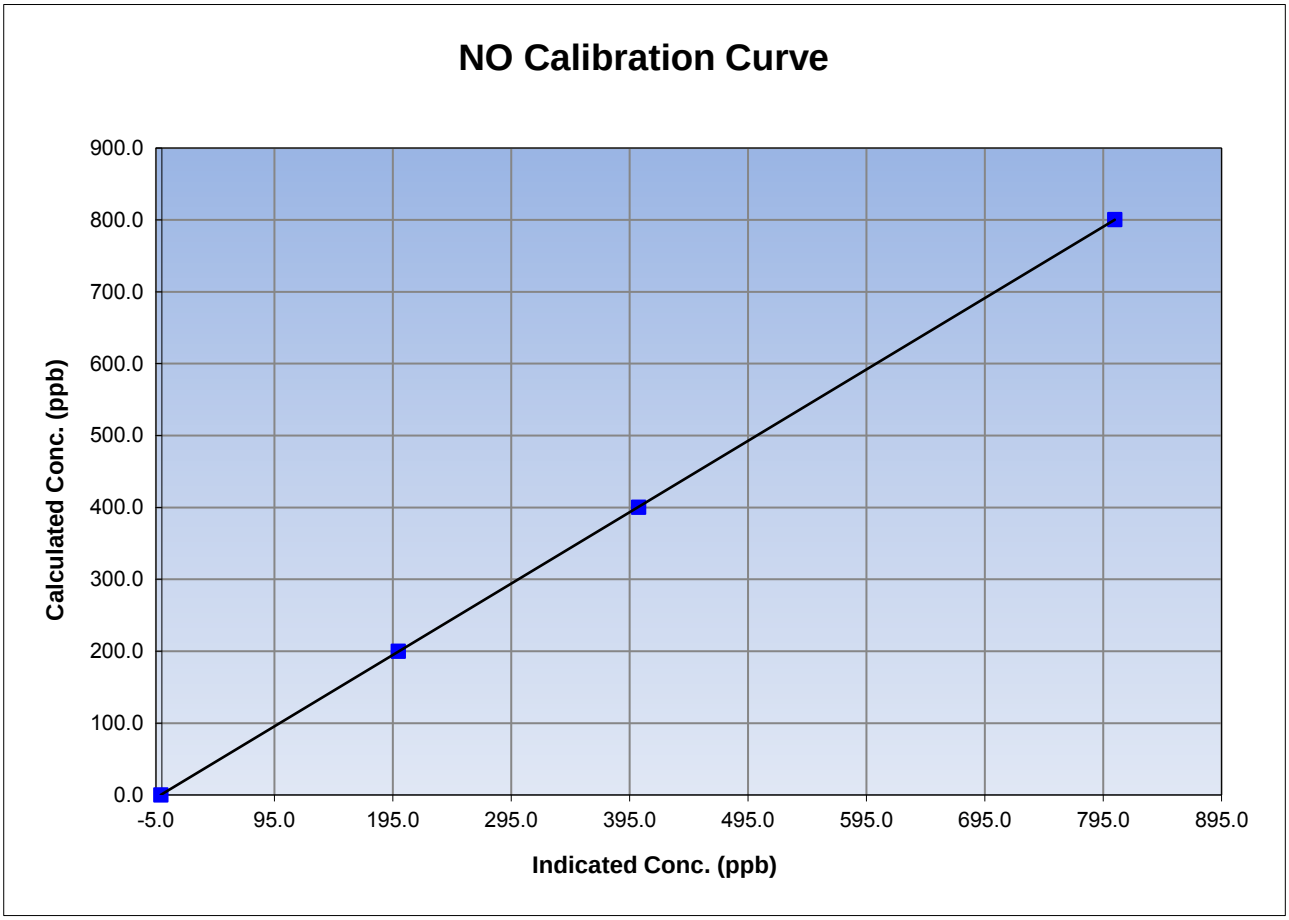
NO Calibration Summary

Station Information

Calibration Date	August 18, 2015	Previous Calibration	July 22, 2015
Station Name	ConocoPhillips - Surmont	Station Number	AMS 502
Start Time (MST)	9:20	End Time (MST)	14:55
Analyzer make	Thermo 42i	Analyzer serial #	1218153356

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.9	N/A	Correlation Coefficient	0.999998
800.4	804.8	0.9945		
400.2	402.5	0.9942	Slope	0.993003
200.1	199.8	1.0016		
			Intercept	1.075246



Wood Buffalo Environmental Association

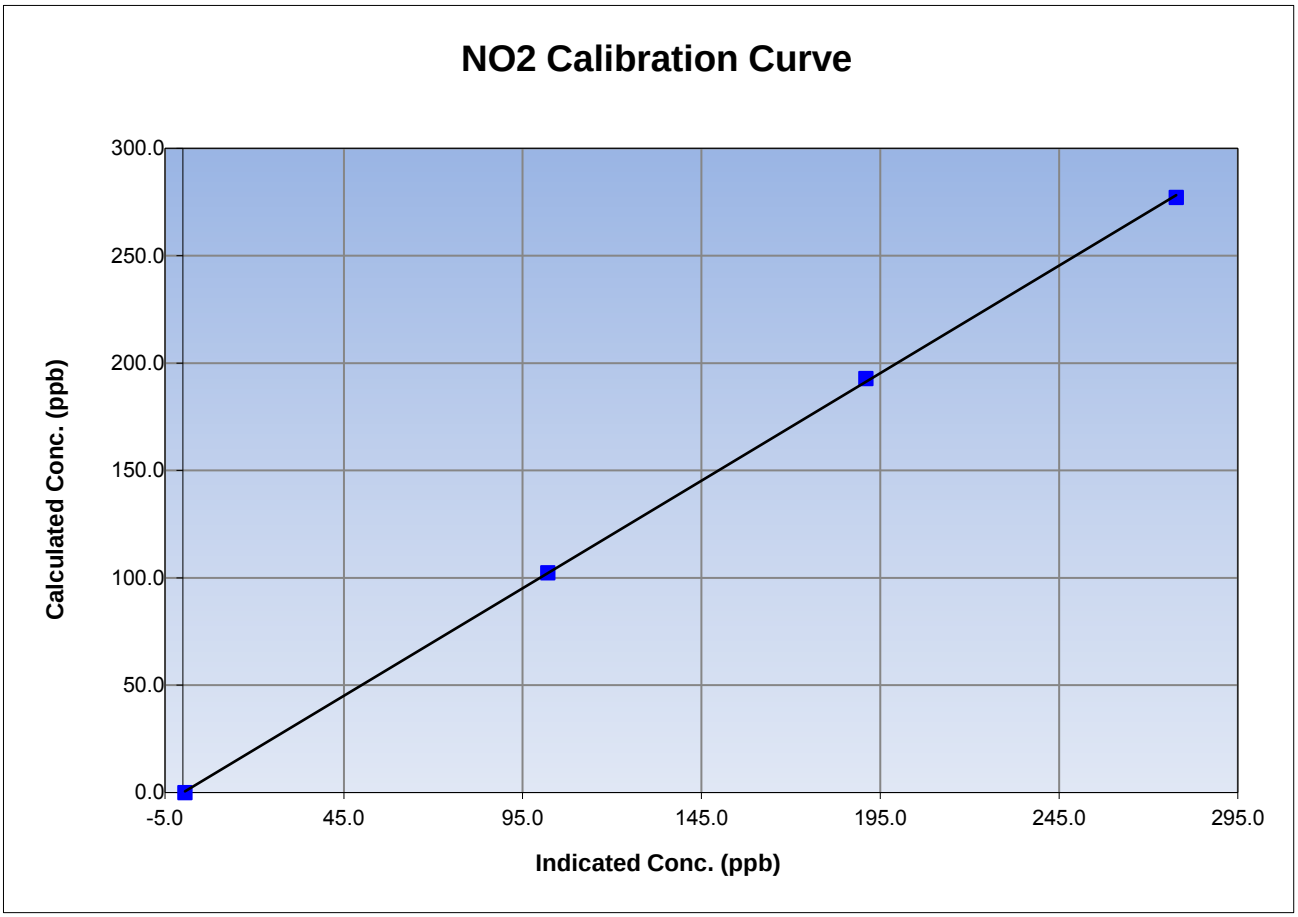
NO_2 Calibration Summary

Station Information

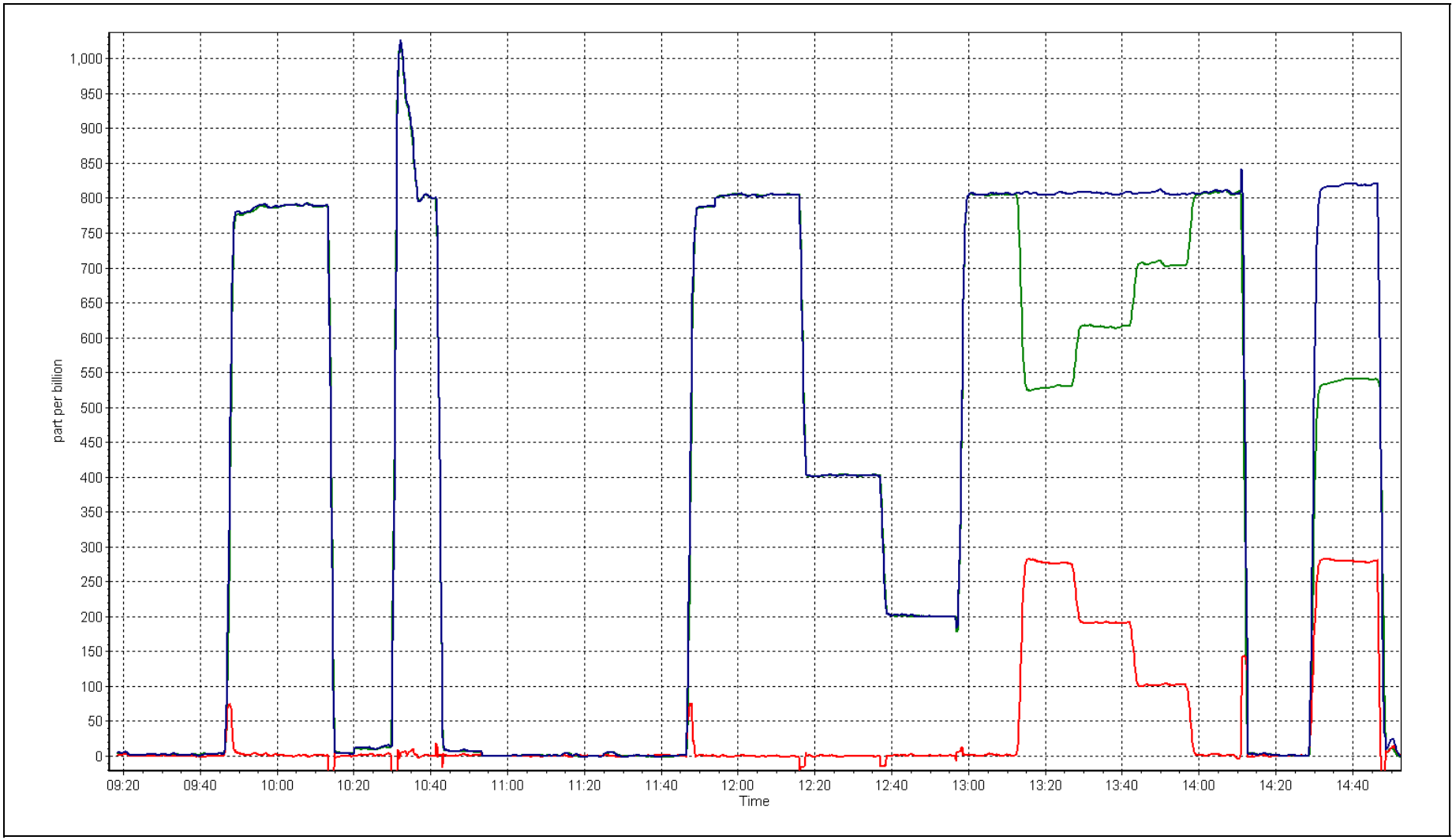
Calibration Date	August 18, 2015	Previous Calibration	July 22, 2015
Station Name	ConocoPhillips - Surmont	Station Number	AMS 502
Start Time (MST)	9:20	End Time (MST)	14:55
Analyzer make	Thermo 42i	Analyzer serial #	1218153356

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.6	N/A	Correlation Coefficient	0.999906
277.1	277.8	0.9976		
192.8	191.0	1.0097	Slope	1.001673
102.3	102.1	1.0024		
			Intercept	-0.031475



NOx, NO & NO_2 Calibration Plot Date: August 18, 2015



Wood Buffalo Environmental Association
NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	August 21, 2015		Previous Calibration	August 18, 2015
Station Name	ConocoPhillips - Surmont		Station Number	AMS 502
Reason:	Routine			
Start Time (MST)	10:07		End Time (MST)	15:15
NO Cal Gas Conc	48.1	ppm	Gas Cert Reference	LL104215
NOx Cal Gas Conc	48.1	ppm	Cal Gas Expiry Date	12-Feb-18
Calibrator	API T700		Serial Number	622
Zero air Generator	Teledyne API T701		Serial Number	4865

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	7882

Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.994376	0.993003	1.001673
	Data Offset	0.535566	1.075246	-0.031475
Current Calibration	Data Slope	0.998923	0.999138	1.007647
	Data Offset	0.243572	-0.034023	0.346987

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1218153356

Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
NO coefficient	1.016		1.024	
NOX coefficient	1.000		1.001	
NO2 coefficient	1.000		1.000	
NO bkgrnd	7.0		7.3	
NOX bkgrnd	6.9		8.1	
Chamber Temp	50.3	Deg C	50.3	Deg C
Moly Temp	323.2	Deg C	322.4	Deg C
PMT voltage	-909.1	V	-866.3	V
PMT Temp	-3.1	Deg C	-2.7	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	217.8	mmHg	161.8	mmHg
R Cell Press Nox	218.1	mmHg	162.4	mmHg
NO sample flow	0.466	lpm	0.662	lpm
Nox sample Flow	0.467	lpm	0.661	lpm

Notes:

Recalibrating due to high baseline from past few days. Changed charcoal and pump after as founds. Performed PMT to get better background factor. Adjusted both zero and span.

Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: August 21, 2015 Station Number: AMS 502

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	15.6	14.6	0.9	----	----
as found span	5000	83.2	800.4	800.4	0.0	819.8	816.7	3.2	0.9763	0.9801
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	0.4	-0.3	----	----
high point	5000	83.3	801.3	801.3	0.0	802.1	802.2	-0.1	0.9991	0.9990
second point	5000	41.6	400.2	400.2	0.0	400.3	400.6	-0.3	0.9997	0.9990
third point	5000	20.8	200.1	200.1	0.0	199.7	199.8	-0.1	1.0022	1.0015
as left zero	5000	0.0	0.0	0.0	0.0	-0.6	0.0	-0.6	----	----
as left span	6000	99.8	800.1	515.2	284.9	816.7	540.2	276.5	0.9796	0.9537
								Average Correction Factor	1.0003	0.9998

Corrcted As found NO_X= 804.3 NO= 802.1 Percent Change NO_X= 0.0% NO= 0.4%

Previous Response NO_X= 804.4 NO= 804.9

GPT Calibration Data

Dilution Flow 5000 ccm Source Gas Flow 83.20 ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
Cal zero			0.0			-0.3			N/A	
1st NO2 (300)	N/A	515.2	277.1	806.7	531.6	275.2	0.9760	0.9692	1.0069	99.3%
2nd NO2 (200)	N/A	599.5	192.8	806.4	615.5	190.0	0.9763	0.9740	1.0147	98.5%
3rd NO2 (100)	N/A	690.0	102.3	808.0	706.4	101.6	0.9744	0.9768	1.0071	99.3%
4th NO2 (0)	792.3	N/A	14.5	806.8	804.9	2.0	0.9758	0.9843	N/A	----
					Average Correction Factor		0.9756	0.9761	1.0096	99.1%

Calibration Performed By: Asad Hidayat

Wood Buffalo Environmental Association

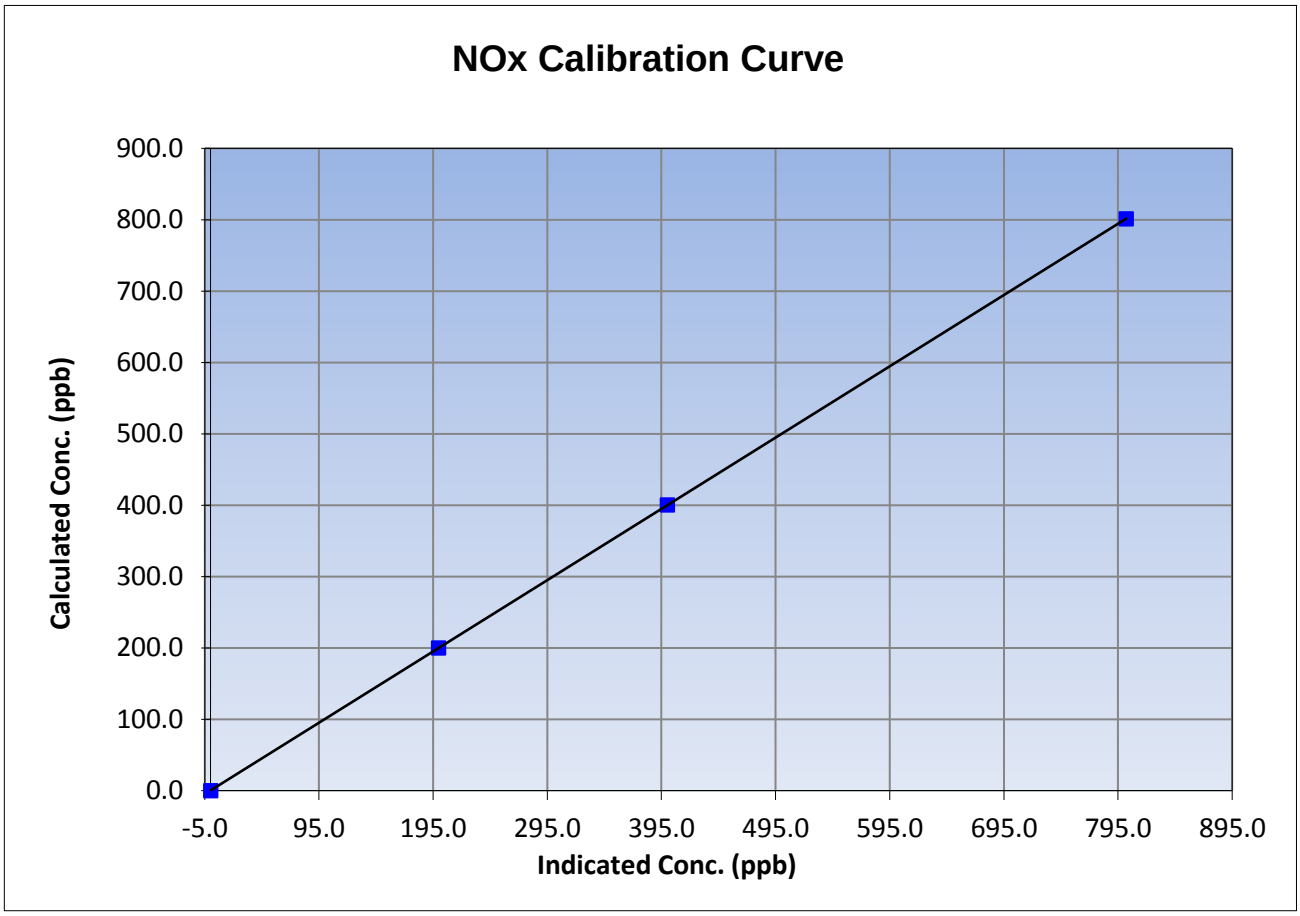
NO_X Calibration Summary

Station Information

Calibration Date	August 21, 2015	Previous Calibration	August 18, 2015
Station Name	ConocoPhillips - Surmont	Station Number	AMS 502
Start Time (MST)	10:07	End Time (MST)	15:15
Analyzer make	Thermo 42i	Analyzer serial #	1218153356

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	0.999999
801.3	802.1	0.9991		
400.2	400.3	0.9997	Slope	0.998923
200.1	199.7	1.0022		
			Intercept	0.243572



Wood Buffalo Environmental Association

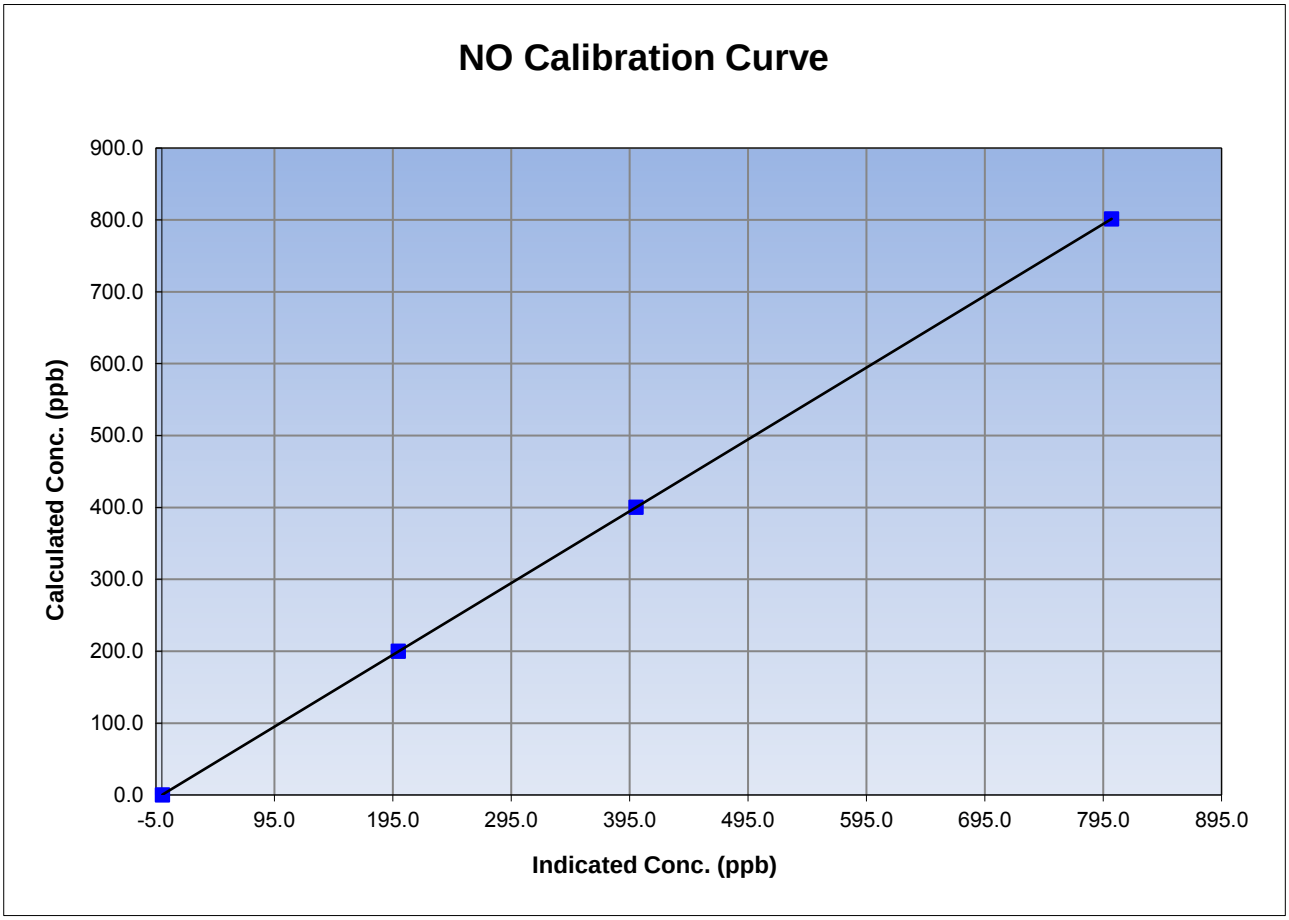
NO Calibration Summary

Station Information

Calibration Date	August 21, 2015	Previous Calibration	August 18, 2015
Station Name	ConocoPhillips - Surmont	Station Number	AMS 502
Start Time (MST)	10:07	End Time (MST)	15:15
Analyzer make	Thermo 42i	Analyzer serial #	1218153356

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.4	N/A	Correlation Coefficient	0.999999
801.3	802.2	0.9990		
400.2	400.6	0.9990	Slope	0.999138
200.1	199.8	1.0015		
			Intercept	-0.034023



Wood Buffalo Environmental Association

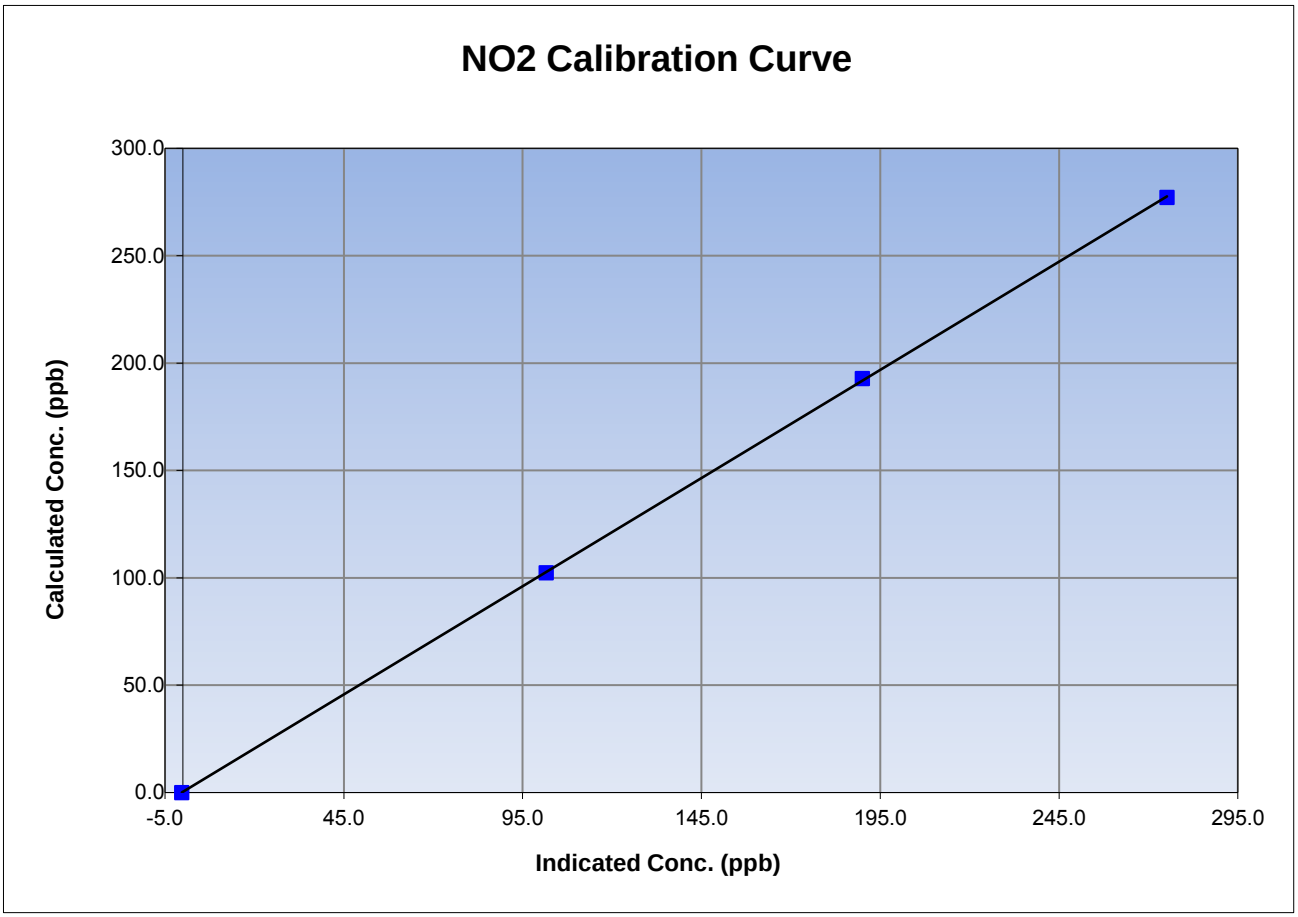
NO_2 Calibration Summary

Station Information

Calibration Date	August 21, 2015	Previous Calibration	August 18, 2015
Station Name	ConocoPhillips - Surmont	Station Number	AMS 502
Start Time (MST)	10:07	End Time (MST)	15:15
Analyzer make	Thermo 42i	Analyzer serial #	1218153356

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.3	N/A	Correlation Coefficient	0.999966
277.1	275.2	1.0069		
192.8	190.0	1.0147	Slope	1.007647
102.3	101.6	1.0071		
			Intercept	0.346987



NOx, NO & NO_2 Calibration Plot Date: August 21, 2015