Wood Buffalo Environmental Association

APRIL 2016
MONTHLY REPORT

CONTINUOUS MONITORING
INTEGRATED MONITORING
May 27, 2016

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

W B E A

#100 – 330 Thickwood Blvd.
Fort McMurray, AB, T9K 1Y1

Tel: (780) 799-4420
Fax: (780) 715-2016
Email: info@wbea.org

www.wbea.org

May 27, 2016

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 April 2016
Wood Buffalo Environmental Association

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

The continuous ambient air quality monitoring network stations are:

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

WBEA commissioned a permanent air monitoring station in the community of Conklin on April 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, and relative humidity 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
Member	**EPEA Approval No.**
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.	241311-00-02
Suncor Energy Inc.	094-02-00
Sunshine Oilsands Ltd.	305529-00-00
Syncrude Canada Ltd.	026-02-00
Teck Resources Ltd.	EIA Application
Total E&P Canada Ltd.	228044-00-00
Williams Energy (Canada) Inc.	73203-01-00

Aboriginal Communities

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

Government and Non-Industrial Organizations

Alberta Energy Regulator
Alberta Environment & Parks
Alberta Health Services
Alberta Health & Wellness
Environment Canada

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

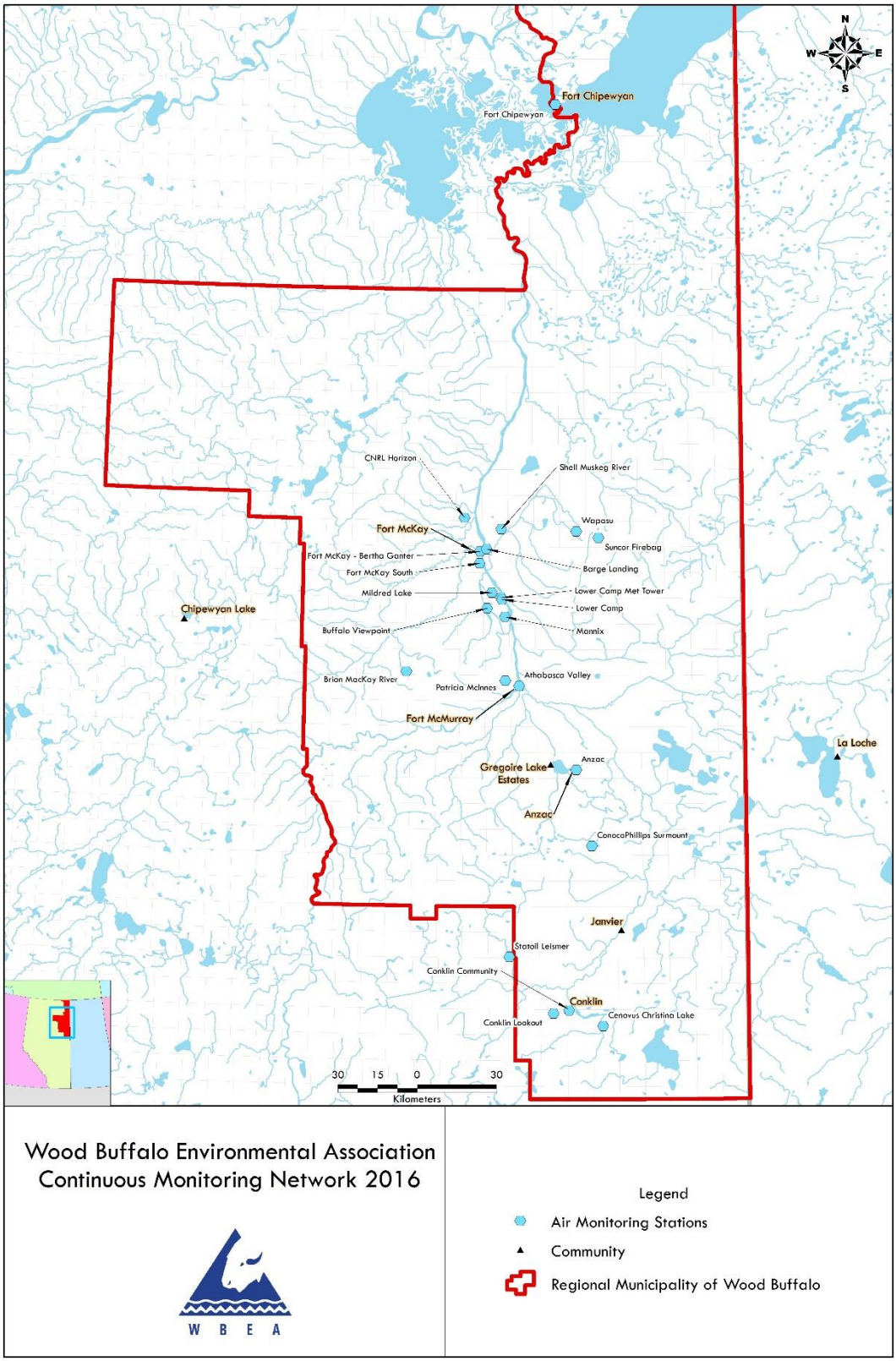


Figure 1: Map of WBEA Air Monitoring Network.

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

1.0 Concentrations in Excess of Alberta Ambient Air Quality Objectives

There were no ambient concentrations in excess of the air quality objectives as indicated in the Air Monitoring Directive Section III.A.3 (a & b) for SO_2, H_2S, CO, NO_2, NH_3, O_3, and $PM_{2.5}$.

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 AEMERA Airdata Warehouse

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

2.0 Operational Status

Continuous Monitoring

In April 2016, there were no incidents resulting in compliance monitoring instruments operating less than 90% of the time.

In April 2016, there were no incidents of a monitoring instrument not required for air quality compliance operating less than 90% of the time.

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

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.

The WBEA monitoring region experienced meteorological conditions which resulted in freezing temperatures and ice buildup on wind sensors. Periods affecting individual sensors at the stations are provided below.

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 2 hours following the daily spans have been reported as invalid for a total of 53 hours this month.

Maintenance and cleaning of the sample manifold on April 11 interrupted the normal operations of the SO_2, TRS, THC, O_3, and NO_2 analyzers for 2 hours.

Two instances of intermittent baseline drifts affected the normal operations of the O_3 analyzer for 2 hours this reporting period.

Three instances of intermittent baseline drifts affected the normal operations of the $PM_{2.5}$ analyzer for 5 hours this reporting period.

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

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

Station 2, Mildred Lake

A station power outage on April 1 interrupted the normal operations of all air quality analyzers for 4 hours.

Maintenance and cleaning of the sample manifold on April 15 interrupted the normal operations of the SO_2 and THC analyzers for 1 hour.

Flat-lines in the output signal of the wind sensor resulted in 24 hours of invalid data this reporting period.

Station 3, Lower Camp B - Meteorology

Flat lines in output signals of the meteorological sensors at the 20 m elevation resulted in 2 hours of downtime.

Flat lines in output signals of the sonic wind sensors at 20, 45, 100, and 167 m elevations resulted in 9, 9, 4, and 4 hours of downtime for each respective sensor.

Station 4, Buffalo Viewpoint

Flat-lines in the output signal of the wind sensor resulted in 15 hours of invalid data this reporting period.

Station 5, Mannix

Maintenance and cleaning of the sample manifold on April 13 interrupted the normal operations of the H_2S analyzer for 1 hour.

Flat lines in output signals of the sonic wind sensors at 45, 75, and 90 m elevations resulted in 2 hours of downtime for each respective sensor.

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 2 hours following each daily span has been reported as invalid for a total of 40 hours this month.

Maintenance and cleaning of the sample manifold on April 26 interrupted the normal operations of the TRS, O_3, NO_2, and NH_3 analyzers for 1 hour.

Replacement and upgrade of the calibration system followed by operational confirmations on April 19 interrupted the normal operations of the O_3 and NO_2 analyzers for 2 hours.

Flat-lines in the output signal of the wind sensor resulted in 7 hours of invalid data this reporting period.

Station 7, Athabasca Valley

A station power outage on April 6 interrupted the normal operations of all air quality analyzers for 3 hours; the THC analyzer required an additional 1 hour to stabilize following the power outage.

A station power outage on April 14 interrupted the normal operations of all air quality analyzer for 1 to 2 hours.

Maintenance and cleaning of the sample manifold on April 19 interrupted the normal operations of the TRS, O_3, and CO analyzers for 1 hour.

Verification of the daily zero and span response on April 19 interrupted the routine operations of the TRS, O_3, and CO analyzers for 1 to 2 hours.

Maintenance to confirm calibration points for the ozone calibration on April 20 interrupted the routine operations of the NO_2 analyzer for 2 hours.

Multiple instances of unstable operation due to baseline drift affected the normal operations of the $PM_{2.5}$ analyzer for 10 hours this reporting period.

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

Station 8, Fort Chipewyan

Maintenance performed on the daily zero and span system to resolve the analyzer responses to the April 18 daily span check resulted in 1-6 hours of downtime for the SO_2, O_3, and NO_2 analyzers.

Unstable operation due to debris on the sample filter tape on April 5 interrupted the routine operations of the $PM_{2.5}$ analyzer for 15 hours. Maintenance on April 6 to clean and verify the operation of the analyzer resulted in 4 hours of invalid data. An instance of unstable operation due to baseline drift on April 8 affected the normal operations of the $PM_{2.5}$ analyzer for 6 hours.

Station 9, Barge Landing

A station power outage on April 6 interrupted the normal operations of all air quality analyzers for 7 hours.

Maintenance and cleaning of the sample manifold on April 8 interrupted the normal operations of the TRS analyzer for 1 hour.

Flat-lines in the output signal of the wind sensor resulted in 46 hours of invalid data this reporting period.

Station 11, Lower Camp

Maintenance and cleaning of the sample manifold on April 5 interrupted the normal operations of the SO_2 and THC analyzers for 1 hour.

Excessive baseline drift on April 14 due to unstable shelter temperature interrupted the routine operations of the THC analyzer for 6 hours.

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

Station 13, Fort McKay South

Maintenance and cleaning of the sample manifold on April 5 interrupted the normal operations of the TRS and O_3 analyzers for 1 to 2 hours.

Maintenance to rebuild the sample pump on April 5 interrupted the routine operations of the THC analyzer for 2 hours.

A power spike at the station on April 6 interrupted the routine operations of the NO_2 analyzer for 1 hour.

A station power outage on April 13 interrupted the normal operations of all air quality analyzers for 1 to 2 hours.

Multiple instances of unstable operation due to baseline drift affected the normal operations of the $PM_{2.5}$ analyzer for 13 hours this reporting period.

Flat-lines in the output signal of the wind sensor resulted in 9 hours of invalid data this reporting period.

Station 14, Anzac

The automated daily zero and span check system required a reset on April 2 and 10. Verification of the daily zero and span responses interrupted the routine operations of all air quality analyzers for 1 hour on each occurrence.

There were four issues associated with the operation of the THC analyzer, resulting in 28 hours of invalid data. Maintenance on April 11 to upgrade the carrier gas system, confirm operations, and stabilization interrupted the routine operations of the THC analyzer for 24 hours. Maintenance to verify analyzer response and collect diagnostic information on April 20 and 25 affected the operations of the analyzer for 1 hour on each occurrence. A span adjustment on April 25 interrupted the routine operations of the analyzer for 2 hours.

Routine maintenance to verify the response of the leaf wetness sensor on April 4 resulted in 1 hour of invalid data.

Flat-lines in the output signal of the wind sensor resulted in 29 hours of invalid data this reporting period.

Station 15, CNRL Horizon

A power spike at the station on April 16 affected the normal operations of the THC analyzer for 1 hour.

Maintenance to clean and organize the station wiring and rack spacing on April 27 interrupted the routine operations of the TRS analyzer for 7 hours. After relocation of the analyzer, the TRS converter failed to operate, resulting in an additional 16 hours of invalid data.

Multiple instances of communication issues on April 30 with the data logger affected the TRS, THC, and NO_2 analyzers resulting in 1 to 4 hours of invalid data. This was resolved on May 2 when the LAN network switch was replaced.

Flat-lines in the output signal of the wind sensor resulted in 36 hours of invalid data this reporting period.

Station 16, Shell Muskeg River

No operational issues to report this month.

Station 17, Wapasu

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

Station 18, Conklin Lookout

There were five issues associated with the operation of the THC analyzer resulting in 11 hours of invalid data. A power spike at the station on April 1 affected the normal operations of the THC analyzer for 1 hour. Maintenance to verify analyzer response and capture diagnostic information on April 2 interrupted the routine operations of the THC analyzer for 2 hours. Maintenance to replace the sample pump on April 3 interrupted the routine operations of the analyzer for 5 hours. Maintenance to collect diagnostic information and troubleshoot baseline performance on April 4 affected the routine operations of the THC analyzer for 3 hours.

Unstable operation due to baseline drift on April 21 affected the normal operations of the $PM_{2.5}$ analyzer for 1 hour.

Station 19, Firebag

Flat-lines in the output signal of the wind sensor resulted in 35 hours of invalid data this reporting period.

Station 20, Brion MacKay River

Station operator activities during a routine calibration on April 4 interrupted the normal operations of the NO_2 analyzer for 1 hour.

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

Station 21, Conklin Community

The SO_2 analyzer experienced two instances of unstable operations due to excessive baseline drift on April 1 and 2 resulting in 5 hours of invalid data.

Maintenance to confirm calibration points for the ozone calibration on April 13 interrupted the routine operations of the NO_2 analyzer for 2 hours.

Flat-lines in the output signal of the wind sensor resulted in 40 hours of invalid data this reporting period.

Station 500, Cenovus Christina Lake

There were three issues with the operation of the NO_2 analyzer resulting in 51 hours of invalid data. A power spike at the station on April 20 interrupted the routine operations of the analyzer for 1 hour. A failed sample pump on April 24 affected the routine operations of the analyzer for 30 hours. Maintenance to replace the sample pump on April 25 resulted in an additional 20 hours of invalid data.

Station 502, ConocoPhillips Surmont

Maintenance and cleaning of the sample manifold on April 19 interrupted the normal operations of the SO_2 and H_2S analyzers for 2 hours.

The H_2S analyzer experienced two instances of unstable operations due to excessive baseline drift on April 17 and 18 resulting in 3 hours of invalid data.

There were two issues with the operation of the NO_2 analyzer resulting in 21 hours of invalid data. Station operator activities on site on April 18 affected the routine operations of the NO_2 analyzer for 4 hours. Unstable operation due to excessive baseline drift on April 18 affected the normal operations of the NO_2 analyzer for 17 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

Mike Martineau
Data Technician

Sanjay Prasad
Air Quality Scientist

R00_1604_L01

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

APRIL 2016

Prepared May 26 2016 12:16

APPROVAL NUMBERS	REPORT DATE MONTH	REPORT DATE YEAR
289664-00-00 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	4	2016

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	99.72	0.051	0	0.008	0
SO2(ppm)	2	99.31	0.044	0	0.013	0
SO2(ppm)	4	100.00	0.025	0	0.003	0
SO2(ppm)	5	100.00	0.035	0	0.010	0
SO2(ppm)	6	100.00	0.039	0	0.005	0
SO2(ppm)	7	99.44	0.019	0	0.003	0
SO2(ppm)	8	99.44	0.004	0	0.001	0
SO2(ppm)	11	99.86	0.098	0	0.014	0
SO2(ppm)	13	100.00	0.043	0	0.006	0
SO2(ppm)	14	99.72	0.004	0	0.001	0
SO2(ppm)	15	100.00	0.021	0	0.005	0
SO2(ppm)	16	100.00	0.021	0	0.006	0
SO2(ppm)	17	100.00	0.007	0	0.001	0
SO2(ppm)	18	100.00	0.002	0	0.001	0
SO2(ppm)	19	100.00	0.020	0	0.002	0
SO2(ppm)	20	100.00	0.011	0	0.003	0
SO2(ppm)	21	99.31	0.006	0	0.001	0
SO2(ppm)	500	100.00	0.009	0	0.002	0
SO2(ppm)	502	99.72	0.034	0	0.008	0
H2S(ppm)	2	99.44	0.006	0	0.002	0
H2S(ppm)	4	100.00	0.004	0	0.001	0
H2S(ppm)	5	99.86	0.006	0	0.002	0
H2S(ppm)	11	100.00	0.008	0	0.002	0
H2S(ppm)	17	100.00	0.001	0	0.000	0
H2S(ppm)	19	100.00	0.001	0	0.000	0
H2S(ppm)	20	100.00	0.001	0	0.000	0
H2S(ppm)	500	100.00	0.001	0	0.000	0
H2S(ppm)	502	99.31	0.001	0	0.001	0
TRS(ppm)	1	99.72	0.003	0	0.001	0
TRS(ppm)	6	99.86	0.001	0	0.000	0
TRS(ppm)	7	99.17	0.001	0	0.000	0
TRS(ppm)	9	98.89	0.003	0	0.001	0
TRS(ppm)	13	99.72	0.006	0	0.001	0
TRS(ppm)	14	99.72	0.001	0	0.000	0
TRS(ppm)	15	96.67	0.002	0	0.000	0
TRS(ppm)	18	100.00	0.001	0	0.000	0
TRS(ppm)	21	100.00	0.000	0	0.000	0
THC(ppm)	1	99.72	2.9	-	2.2	-
THC(ppm)	2	99.31	5.0	-	2.7	-
THC(ppm)	4	100.00	9.1	-	2.8	-
THC(ppm)	5	100.00	8.8	-	2.9	-
THC(ppm)	6	100.00	2.3	-	2.1	-
THC(ppm)	7	99.17	2.3	-	2.0	-
THC(ppm)	9	99.03	4.7	-	2.5	-
THC(ppm)	11	99.03	4.1	-	2.6	-
THC(ppm)	13	99.58	5.2	-	2.9	-
THC(ppm)	14	95.83	2.2	-	2.0	-
THC(ppm)	15	99.31	5.0	-	2.6	-
THC(ppm)	16	100.00	4.5	-	2.8	-
THC(ppm)	17	100.00	2.4	-	2.2	-
THC(ppm)	18	98.47	2.2	-	2.1	-
THC(ppm)	19	100.00	2.4	-	2.2	-
THC(ppm)	20	100.00	2.6	-	2.3	-
THC(ppm)	21	100.00	2.200	-	2.000	-
O3(ppm)	1	99.44	0.062	0	0.049	-
O3(ppm)	6	99.58	0.075	0	0.059	-
O3(ppm)	7	99.17	0.066	0	0.048	-

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

Prepared: May 26 2016 12:16

APPROVAL NUMBERS	REPORT DATE MONTH	REPORT DATE YEAR
289664-00-00 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 241311-00-02 094-02-00 305529-00-00 026-02-00 228044-00-00 73203-01-00	4	2016

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
O3(ppm)	8	99.86	0.057	0	0.050	-
O3(ppm)	13	99.44	0.062	0	0.047	-
O3(ppm)	14	99.86	0.064	0	0.054	-
O3(ppm)	17	100.00	0.060	0	0.049	-
O3(ppm)	18	100.00	0.063	0	0.056	-
O3(ppm)	21	100.00	0.062	0	0.051	-
NO2(ppm)	1	99.72	0.039	0	0.012	-
NO2(ppm)	6	99.72	0.027	0	0.008	-
NO2(ppm)	7	99.03	0.026	0	0.008	-
NO2(ppm)	8	99.17	0.008	0	0.003	-
NO2(ppm)	13	99.31	0.030	0	0.012	-
NO2(ppm)	14	99.72	0.013	0	0.003	-
NO2(ppm)	15	99.58	0.037	0	0.009	-
NO2(ppm)	16	100.00	0.040	0	0.017	-
NO2(ppm)	17	100.00	0.016	0	0.003	-
NO2(ppm)	18	100.00	0.003	0	0.001	-
NO2(ppm)	19	100.00	0.034	0	0.006	-
NO2(ppm)	20	99.86	0.026	0	0.006	-
NO2(ppm)	21	99.72	0.019	0	0.002	-
NO2(ppm)	500	92.92	0.018	0	0.005	-
NO2(ppm)	502	96.81	0.0	0	0.0	-
CO(ppm)	7	99.03	0.2	0	0.1	-
NH3(ppm)	1	92.64	0.000	0	0.000	-
NH3(ppm)	6	94.31	0.000	0	0.000	-
PM2.5(ug/m3)	1	99.31	47.1	-	11.3	0
PM2.5(ug/m3)	6	100.00	30.5	-	7.5	0
PM2.5(ug/m3)	7	98.06	25.1	-	6.8	0
PM2.5(ug/m3)	8	96.53	24.9	-	5.9	0
PM2.5(ug/m3)	13	98.06	18.6	-	8.8	0
PM2.5(ug/m3)	14	100.00	14.7	-	5.3	0
PM2.5(ug/m3)	15	100.00	20.0	-	8.0	0
PM2.5(ug/m3)	16	100.00	44.1	-	16.3	0
PM2.5(ug/m3)	17	100.00	19.7	-	6.9	0
PM2.5(ug/m3)	18	99.86	46.1	-	7.6	0
PM2.5(ug/m3)	21	100.00	57.1	-	7.7	0
WIND	1	99.44	-	-	-	-
WIND	2	96.67	-	-	-	-
WIND	4	97.92	-	-	-	-
WIND	5	100.00	-	-	-	-
WIND	6	99.03	-	-	-	-
WIND	7	99.44	-	-	-	-
WIND	8	100.00	-	-	-	-
WIND	9	93.61	-	-	-	-
WIND	11	99.31	-	-	-	-
WIND	13	98.75	-	-	-	-
WIND	14	95.97	-	-	-	-
WIND	15	95.00	-	-	-	-
WIND	16	100.00	-	-	-	-
WIND	17	99.86	-	-	-	-
WIND	18	100.00	-	-	-	-
WIND	19	95.14	-	-	-	-
WIND	20	96.81	-	-	-	-
WIND	21	94.44	-	-	-	-
WIND	500	100.00	-	-	-	-
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
APRIL 2016

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

May 27, 2016

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

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	684	34	36	99.72	51	0	8	0
TRS(ppb) Average	684	34	36	99.72	3	0	1	0
THC(ppm) Average	684	34	36	99.72	2.9	-	2.2	-
NMHC(ppm) Average	684	34	36	99.72	0.461	-	0.1	-
CH4(ppm) Average	684	34	36	99.72	2.5	-	2.1	-
O3 (ppb) Average	671	45	49	99.44	62	0	49	-
NO2 (ppb) Average	682	36	38	99.72	39	0	12	-
NO (ppb) Average	682	36	38	99.72	14	-	3	-
NOX (ppb) Average	682	36	38	99.72	53	-	15	-
NH3 (ppb) Average	625	42	95	92.64	0	0	0	-
PM2.5 (ug/m3) Average	711	4	9	99.31	47.1	-	11.3	0
Wind Speed 10 m (km/h) Average	716	0	4	99.44	22	-	12	-
Wind Direction 10 m (deg) Average	716	0	4	99.44	-	-	-	-
Temperature 2 m (C) Average	720	0	0	100.00	28.4	-	16.3	-
Temperature 10 m (C) Average	720	0	0	100.00	28	-	16.8	-
Relative Humidity (%) Average	720	0	0	100.00	99	-	91	-
Precipitation (mm) Total	720	0	0	100.00	1.4	-	4.3	-
Leaf Wetness (% of range) Average	720	0	0	100.00	61	-	13	-
Global Solar Radiation (W/m2) Average	720	0	0	100.00	777	-	267	-

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

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

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

					Percentile						
Parameter	Number	Mean	StnDev	Total	Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	684	1.3	4	-	0	0	0	0	1	3	51
TRS (ppb) Average	684	0.6	0	-	0	0	0	0	1	1	3
THC (ppm) Average	684	2.01	0.1	-	1.9	1.9	1.9	2	2	2.2	2.9
NMHC(ppm) Average	684	0.024	0.063	-	0	0	0	0	0	0.1	0.461
CH4(ppm) Average	684	1.98	0.1	-	1.9	1.9	1.9	2	2	2.1	2.5
O3 (ppb) Average	671	31.1	12	-	0	14	24	31	40	46	62
NO2 (ppb) Average	682	6.5	6	-	0	1	2	5	9	14	39
NO (ppb) Average	682	1.2	2	-	0	0	0	0	1	4	14
NOX (ppb) Average	682	7.7	7	-	0	1	2	6	11	16	53
NH3 (ppb) Average	625	0	0	-	0	0	0	0	0	0	0
PM2.5 (ug/m3) Average	711	5.54	4.5	-	0.1	1.7	2.7	4.2	7.2	11	47.1
Wind Speed 10 m (km/h) Average	716	7.6	4	-	1	3	5	7	10	13	22
Wind Direction 10 m (deg) Average	716	-	-	-	-	-	-	-	-	-	-
Temperature 2 m (C) Average	720	3.69	8.2	-	-15.8	-6.6	-1.8	2.9	8.4	15.9	28.4
Temperature 10 m (C) Average	720	3.95	8	-	-13.6	-5.8	-1.7	3.1	8.4	16	28
Relative Humidity (%) Average	720	57	22	-	12	26	40	58	74	86	99
Precipitation (mm) Total	720	-	-	14.99	-	-	-	-	-	-	-
Leaf Wetness (% of range) Average	720	1	6	-	-2	-1	-1	0	0	1	61
Global Solar Radiation (W/m2) Average	720	173.6	232	-	0	0	0	43	286	582	777

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

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2, TRS, THC, O3, NO2	11 Apr 2016 10:00	11 Apr 2016 11:00	2	Maintenance - manifold cleaning
O3	09 Apr 2016 05:00	09 Apr 2016 05:00	1	Unstable operation - excessive baseline drift
O3	25 Apr 2016 23:00	25 Apr 2016 23:00	1	Unstable operation - excessive baseline drift
NH3	01 Apr 2016 05:00	30 Apr 2016 05:00	53	Stabilization after daily span
PM2.5	16 Apr 2016 17:00	16 Apr 2016 18:00	2	Unstable operation - excessive baseline drift
PM2.5	17 Apr 2016 16:00	17 Apr 2016 17:00	2	Unstable operation - excessive baseline drift
PM2.5	19 Apr 2016 09:00	19 Apr 2016 09:00	1	Unstable operation - excessive baseline drift
Wind Speed, Wind Direction	06 Apr 2016 09:00	06 Apr 2016 12:00	4	Flat line in sensor output signal - Sensor frozen

Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO_2) - ppb

Fort McKay - Bertha Ganter - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 51 ppb on Apr 18 10:00 Maximum Daily Average: 7.6 ppb on Apr 18

Minimum Value: 0 ppb on Apr 12 09:00 Minimum Daily Average: 0.0 ppb on Apr 20
Maximum Diurnal Average: 3.6 ppb at hour 10 Minimum Diurnal Average: 0.4 ppb at hour 21
Monthly Average: 1.3 ppb Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 1$ $P_{90} = 3$ $P_{99} = 18$

Hours in Service:	720
Hours of Data:	684
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-Apr	1	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
2-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
3-Apr	0	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
4-Apr	0	0	0	0	Z	0	0	0	1	6	19	20	23	20	16	13	9	3	2	1	1	1	1	1	5.9	23
5-Apr	1	1	1	1	0	Z	0	0	0	0	0	2	13	2	4	3	1	0	0	0	0	0	1	1	1.5	13
6-Apr	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
7-Apr	0	Z	0	0	0	0	0	0	0	1	7	6	5	4	1	0	0	0	0	0	0	0	0	0	1.2	7
8-Apr	0	0	Z	0	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
9-Apr	0	0	0	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.3	1
10-Apr	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
11-Apr	0	0	0	1	3	Z	4	1	4	M	M	6	9	12	14	9	6	8	6	5	3	2	1	1	4.6	14
12-Apr	Z	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
13-Apr	0	Z	0	0	0	0	0	0	0	1	0	2	4	2	3	3	1	0	0	1	0	1	1	1	0.9	4
14-Apr	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
15-Apr	0	0	0	Z	0	0	0	0	0	0	1	6	5	6	5	5	6	4	1	0	0	0	0	1	1.8	6
16-Apr	2	2	2	0	Z	1	2	2	3	3	2	4	2	0	0	0	0	0	0	0	0	0	0	0	1.1	4
17-Apr	0	1	2	1	1	Z	2	2	2	5	1	0	0	0	0	0	0	0	0	0	1	0	1	1	1.0	5
18-Apr	Z	1	1	1	1	2	3	3	15	51	39	31	6	2	0	0	2	1	2	3	1	4	1	4	7.6	51
19-Apr	2	Z	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
20-Apr	0	0	Z	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-Apr	0	0	0	Z	0	0	0	0	5	8	5	0	0	1	1	0	0	0	0	0	0	0	0	0	0.9	8
22-Apr	0	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
23-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.2	1
24-Apr	Z	5	8	9	0	0	0	6	11	14	11	7	1	4	0	1	1	0	0	0	0	3	1	0	3.6	14
25-Apr	0	Z	0	0	0	1	0	1	2	1	0	0	2	3	0	0	0	0	0	0	0	0	0	0	0.6	3
26-Apr	0	0	Z	0	1	1	1	1	2	1	4	1	2	1	0	1	1	2	1	1	1	0	0	0	1.0	4
27-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
28-Apr	0	0	0	0	Z	0	0	1	1	2	5	3	1	2	2	2	1	1	0	0	0	1	1	1	1.1	5
29-Apr	1	1	2	2	1	Z	1	5	4	3	3	3	3	2	2	2	0	1	0	0	1	1	1	1	1.7	5
30-Apr	Z	3	2	3	4	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.9	4
	0.4	0.7	0.8	0.8	0.6	0.4	0.6	0.9	1.9	3.6	3.6	3.2	2.7	2.1	1.8	1.4	1.1	0.8	0.6	0.5	0.4	0.6	0.4	0.5	Diurnal Average	
	2	5	8	9	4	2	4	6	15	51	39	31	23	20	16	13	9	8	6	5	3	4	1	4	Diurnal Maximum	

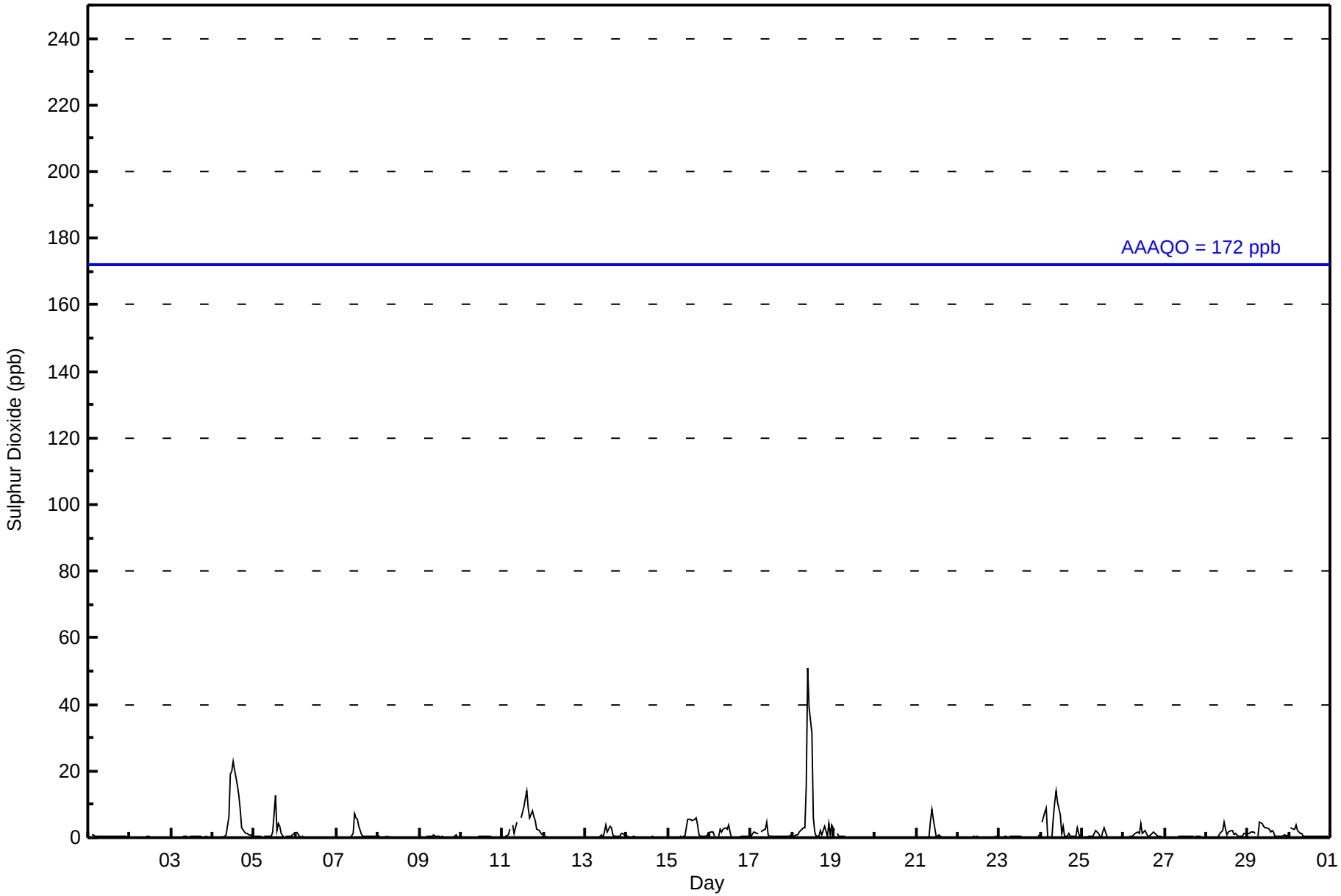
Z - zerospan C - Calibration M - Maintenance
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb

Wood Buffalo Environmental Association

Hourly Averages

Sulphur Dioxide (SO_2) - ppb

Fort McKay - Bertha Ganter - April 2016



Sulphur Dioxide (SO_2) - ppb

Fort McKay - Bertha Ganter - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	668	97.66	97.66
11 - 20	12	1.75	99.42
21 - 60	4	0.58	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

Fort McKay - Bertha Ganter - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 10	123	63	41	34	20	12	27	71	123	37	8	8	22	19	19	37	664
11 - 20	0	0	0	1	0	0	3	5	3	0	0	0	0	0	0	0	12
21 - 60	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	4
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	123	63	41	35	20	12	30	78	128	37	8	8	22	19	19	37	680

Total Number of Valid Hours: 680

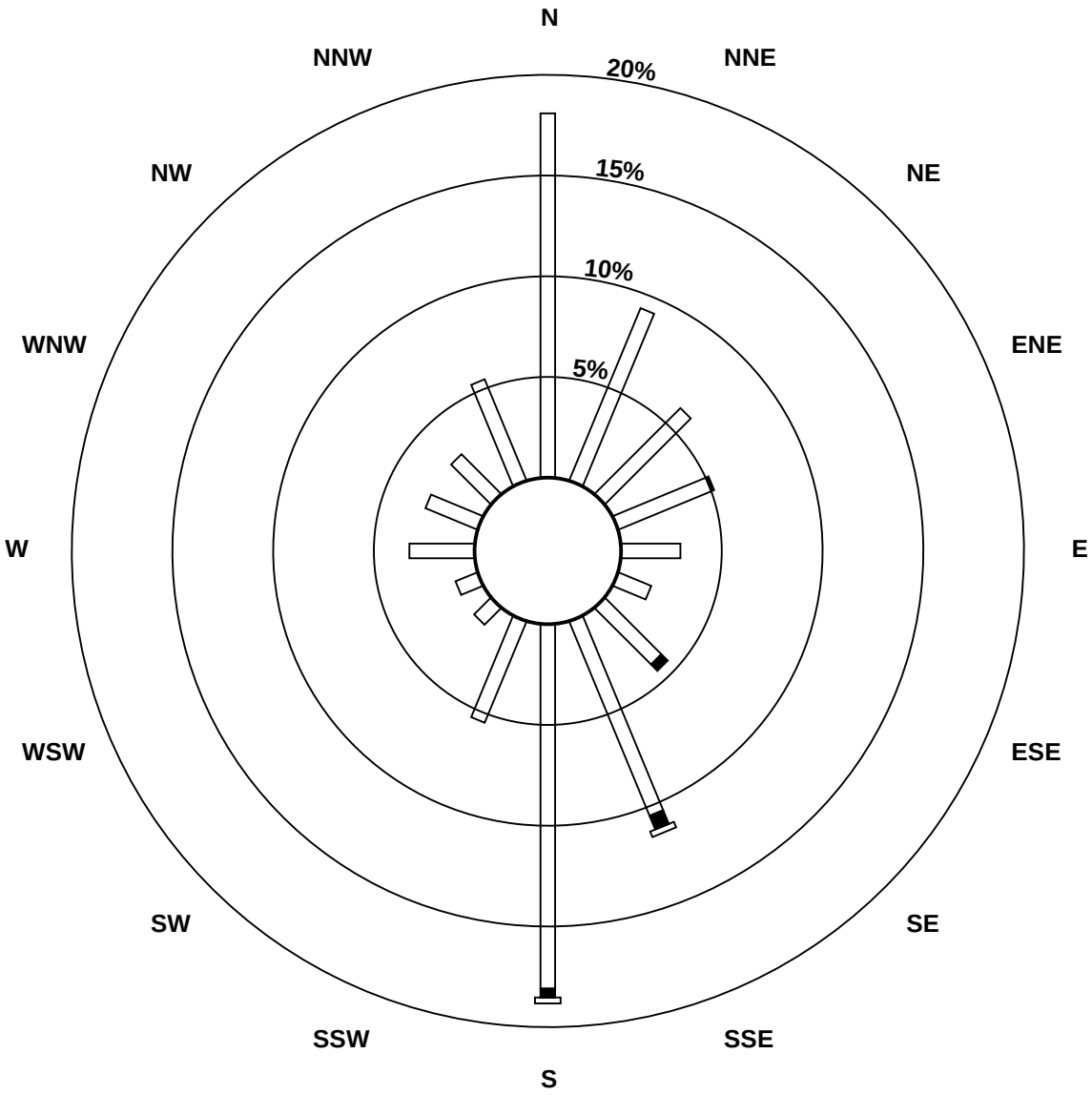
Total Number of Hours: 720

Wood Buffalo Environmental Association

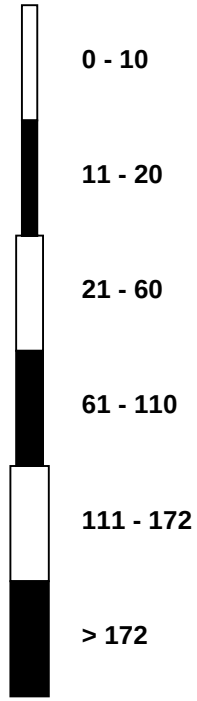
Wind Rose Apr 2016

Sulphur Dioxide (SO_2) - ppb

Fort McKay - Bertha Ganter (AMS 1)



Classes (ppb)



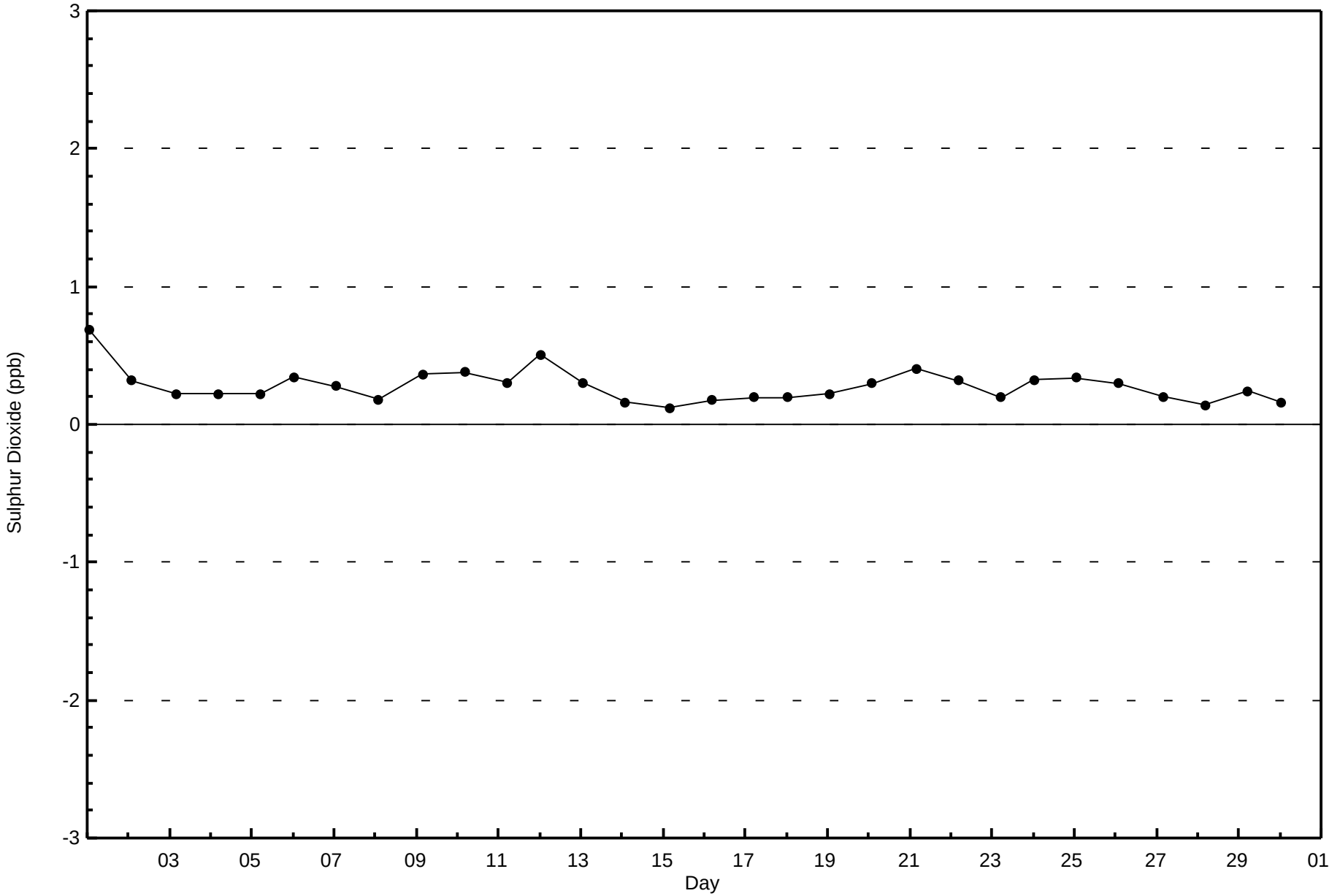
Total Number of Valid Hours: 680

Wood Buffalo Environmental Association

Zero Responses

Sulphur Dioxide (SO_2) - ppb

Fort McKay - Bertha Ganter - April 2016

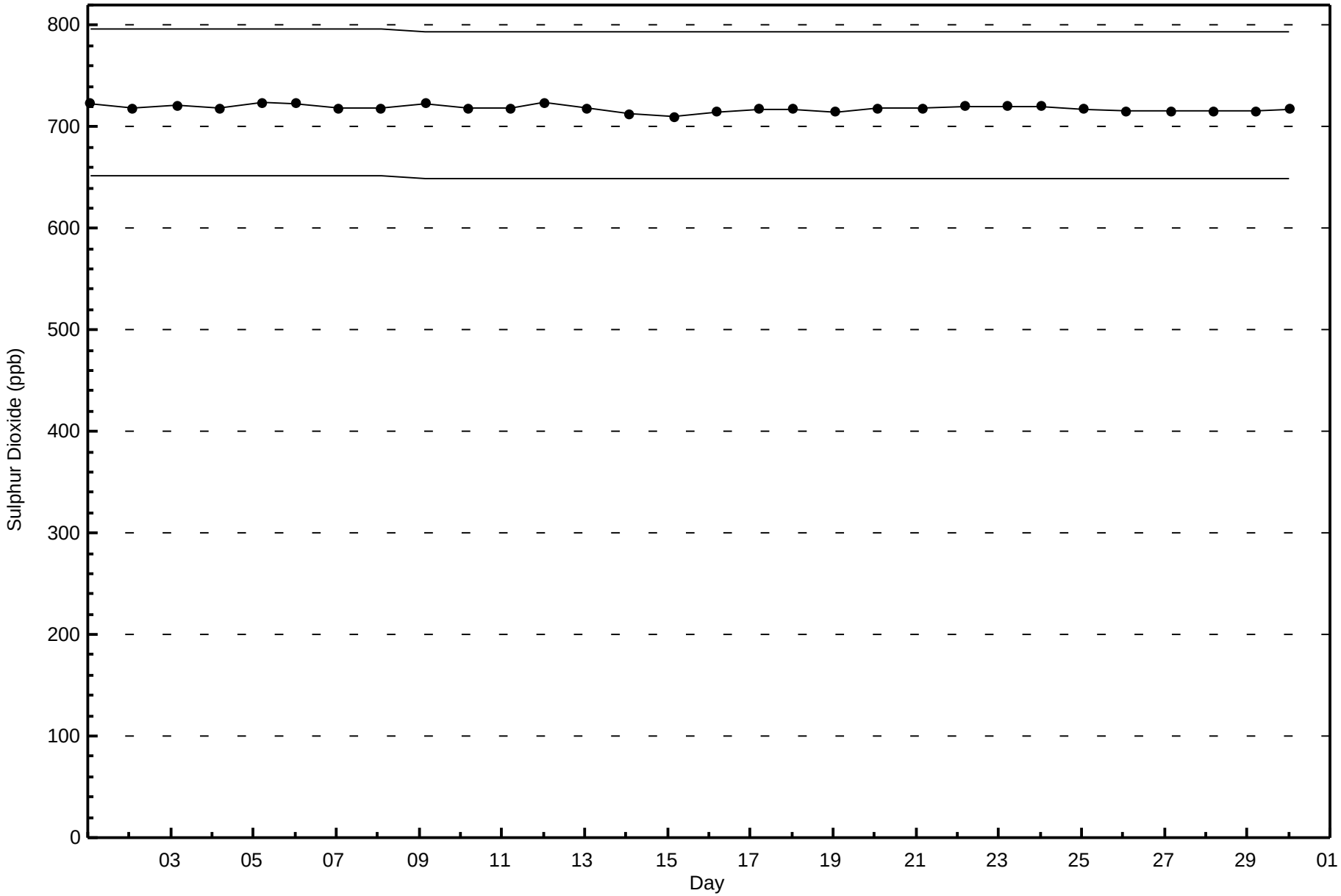


Wood Buffalo Environmental Association

Span Responses

Sulphur Dioxide (SO_2) - ppb

Fort McKay - Bertha Ganter - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

Fort McKay - Bertha Ganter - April 2016

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

Maximum Value: 3 ppb on Apr 18 20:00

Maximum Daily Average: 1.2 ppb on Apr 18

Minimum Value: 0 ppb on Apr 17 17:00

Minimum Daily Average: 0.4 ppb on Apr 23

Maximum Diurnal Average: 0.7 ppb at hour 9

Minimum Diurnal Average: 0.5 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:	720
Hours of Data:	684
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-Apr	1	1	Z	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.6	1
2-Apr	1	1	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
3-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0.4	1
4-Apr	0	0	0	0	0	Z	0	0	1	2	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0.7	2
5-Apr	0	0	0	0	0	0	Z	0	1	1	1	1	1	1	1	1	0	0	0	0	0	1	1	1	0.5	1
6-Apr	1	Z	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	0	0	1	1	1	0.6	1
7-Apr	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1	0.6	1
8-Apr	0	0	0	Z	0	0	0	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0.4	0
9-Apr	0	0	0	0	Z	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1
10-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0.4	1
11-Apr	0	0	0	1	1	1	Z	1	1	M	M	1	1	1	1	1	1	1	1	1	1	1	0	0	0.7	1
12-Apr	0	Z	0	0	0	0	0	0	0	1	1	1	1	0	0	1	1	1	0	0	0	0	0	0	0.5	1
13-Apr	0	0	Z	0	0	1	1	1	1	1	0	1	0	0	0	1	1	0	0	1	0	1	1	1	0.5	1
14-Apr	1	1	0	Z	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.5	1
15-Apr	0	0	0	0	Z	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0.5	1
16-Apr	1	1	1	1	1	Z	2	2	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.7	2
17-Apr	1	1	1	1	2	1	Z	1	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0.8	2
18-Apr	1	Z	1	1	2	2	2	2	2	2	1	1	1	0	0	0	1	1	1	3	1	1	1	1	1.2	3
19-Apr	1	2	Z	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2
20-Apr	0	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
21-Apr	0	0	0	0	Z	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1
22-Apr	0	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
23-Apr	0	0	0	0	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.4	1
24-Apr	1	Z	0	1	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1	1	0	0.5	1
25-Apr	0	0	Z	1	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.5	1
26-Apr	1	0	0	Z	0	0	0	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	0.6	1
27-Apr	0	0	0	0	Z	0	1	1	1	1	1	1	1	1	0	0	0	0	0	1	1	1	1	1	0.5	1
28-Apr	0	0	0	0	0	Z	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1	1	1	0.6	1
29-Apr	1	1	1	1	1	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0.6	1
30-Apr	1	Z	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0.6	1
	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	Diurnal Average	
	1	2	1	1	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	3	1	1	1	1	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance

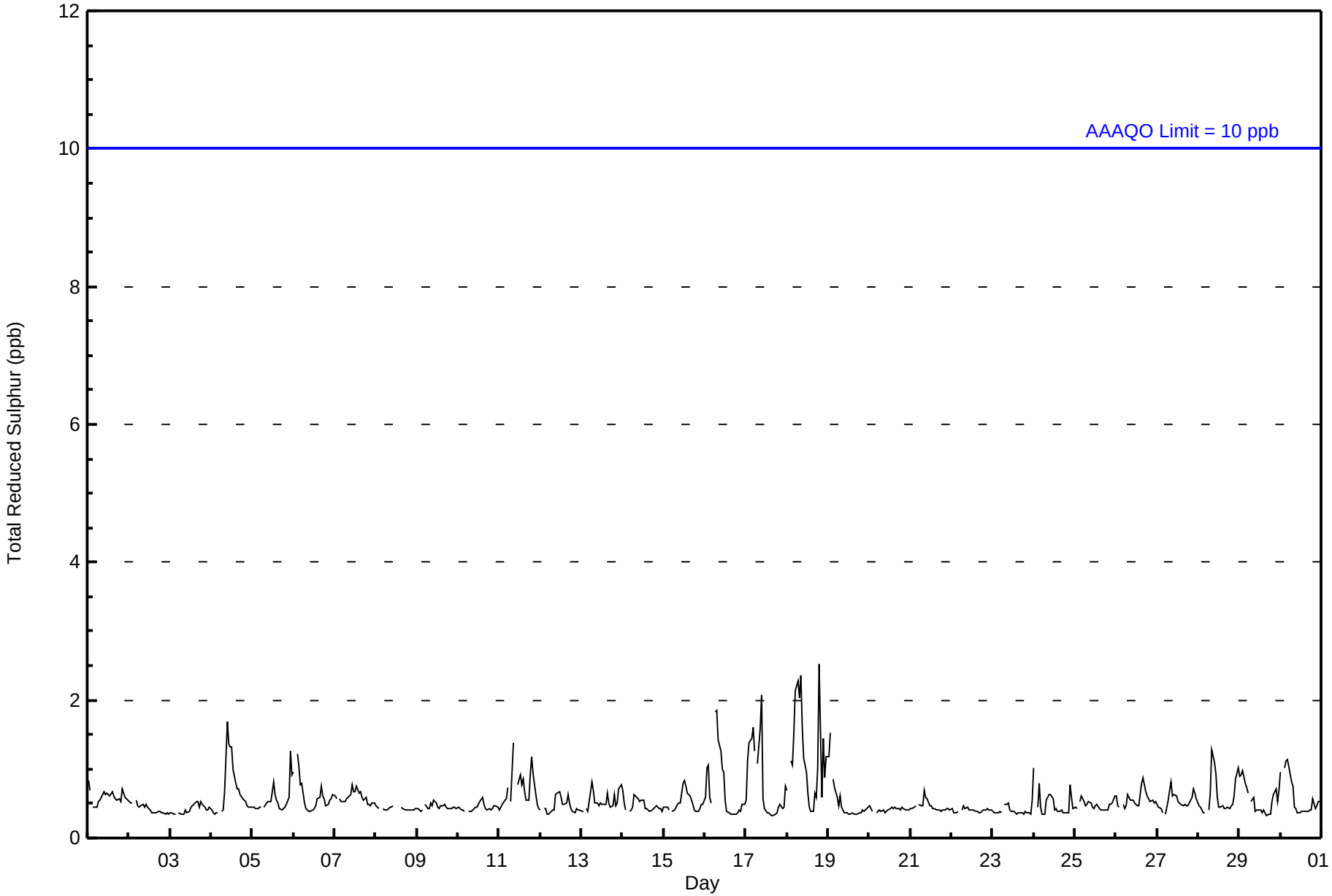
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb

Wood Buffalo Environmental Association

Hourly Averages

Total Reduced Sulphur (TRS) - ppb

Fort McKay - Bertha Ganter - April 2016



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	683	99.85	99.85
3 - 4	1	0.15	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Total Reduced Sulphur (TRS) - ppb

Fort McKay - Bertha Ganter - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 2	122	64	40	34	20	12	30	79	123	38	11	8	20	20	19	39	679
3 - 4	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	122	64	40	34	20	12	30	79	124	38	11	8	20	20	19	39	680

Total Number of Valid Hours: 680

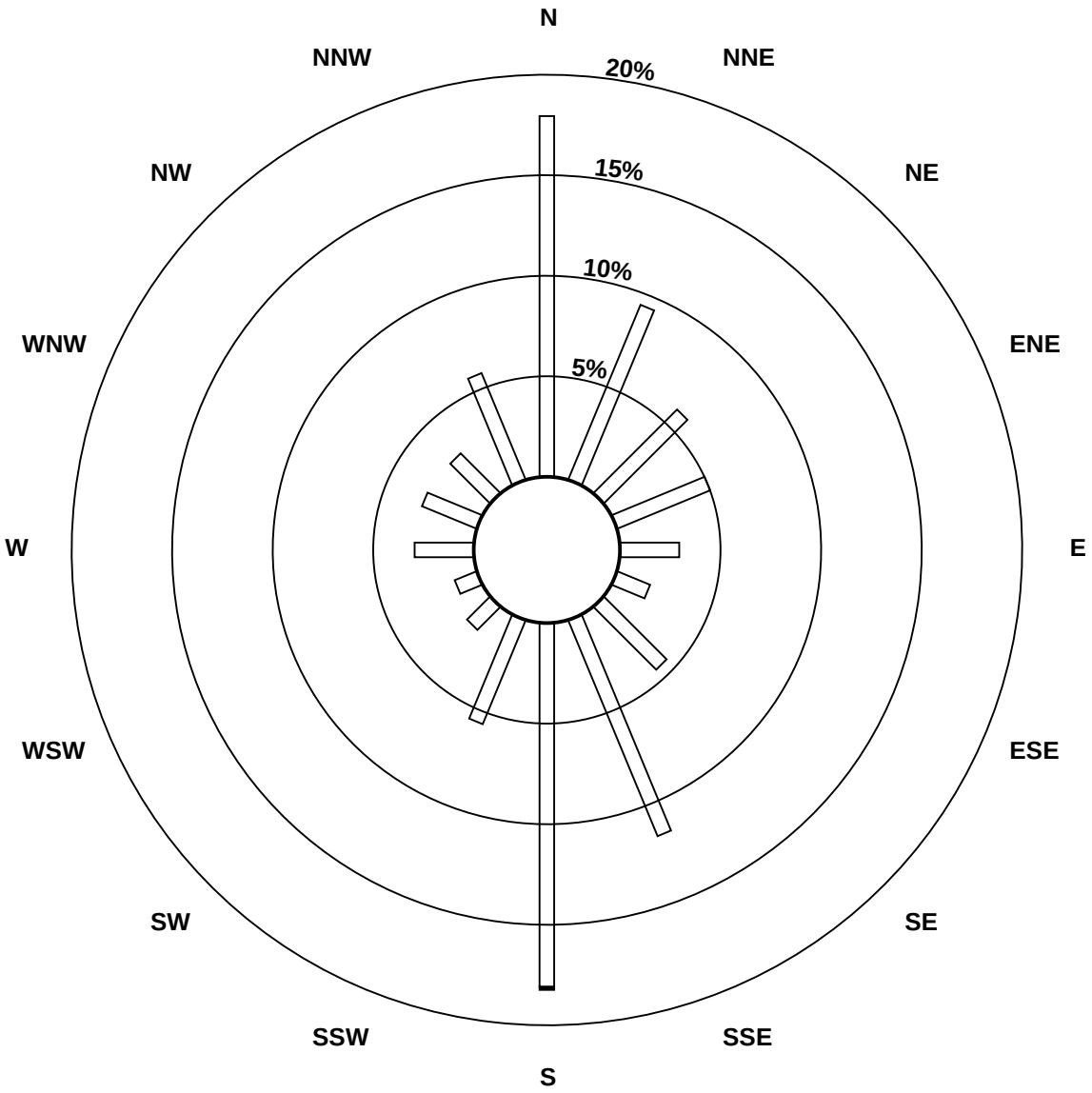
Total Number of Hours: 720

Wood Buffalo Environmental Association

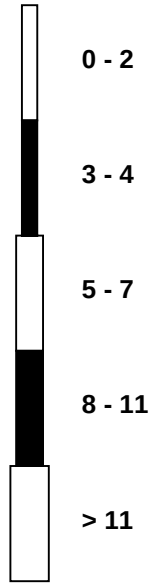
Wind Rose Apr 2016

Total Reduced Sulphur (TRS) - ppb

Fort McKay - Bertha Ganter (AMS 1)



Classes (ppb)



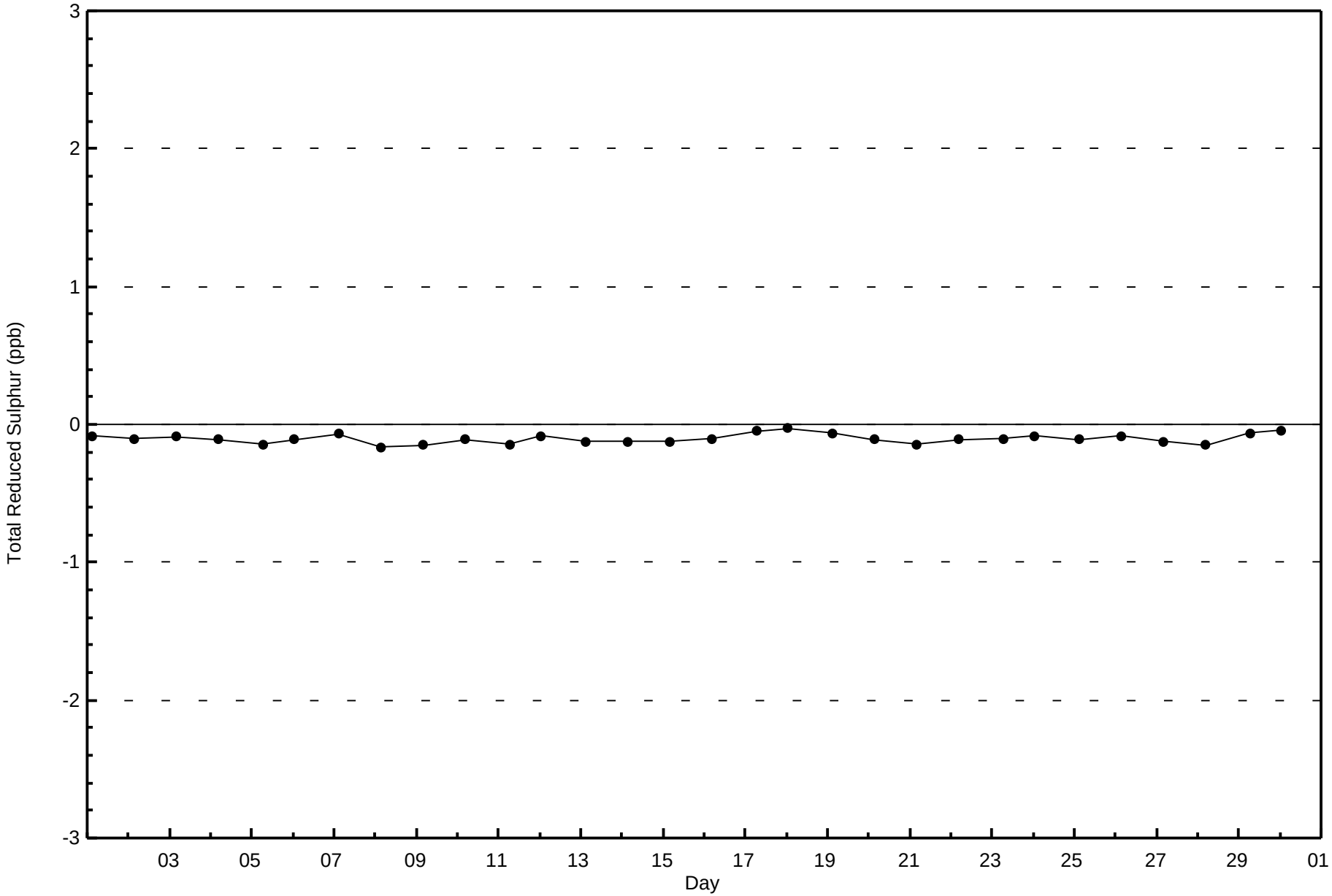
Total Number of Valid Hours: 680

Wood Buffalo Environmental Association

Zero Responses

Total Reduced Sulphur (TRS) - ppb

Fort McKay - Bertha Ganter - April 2016

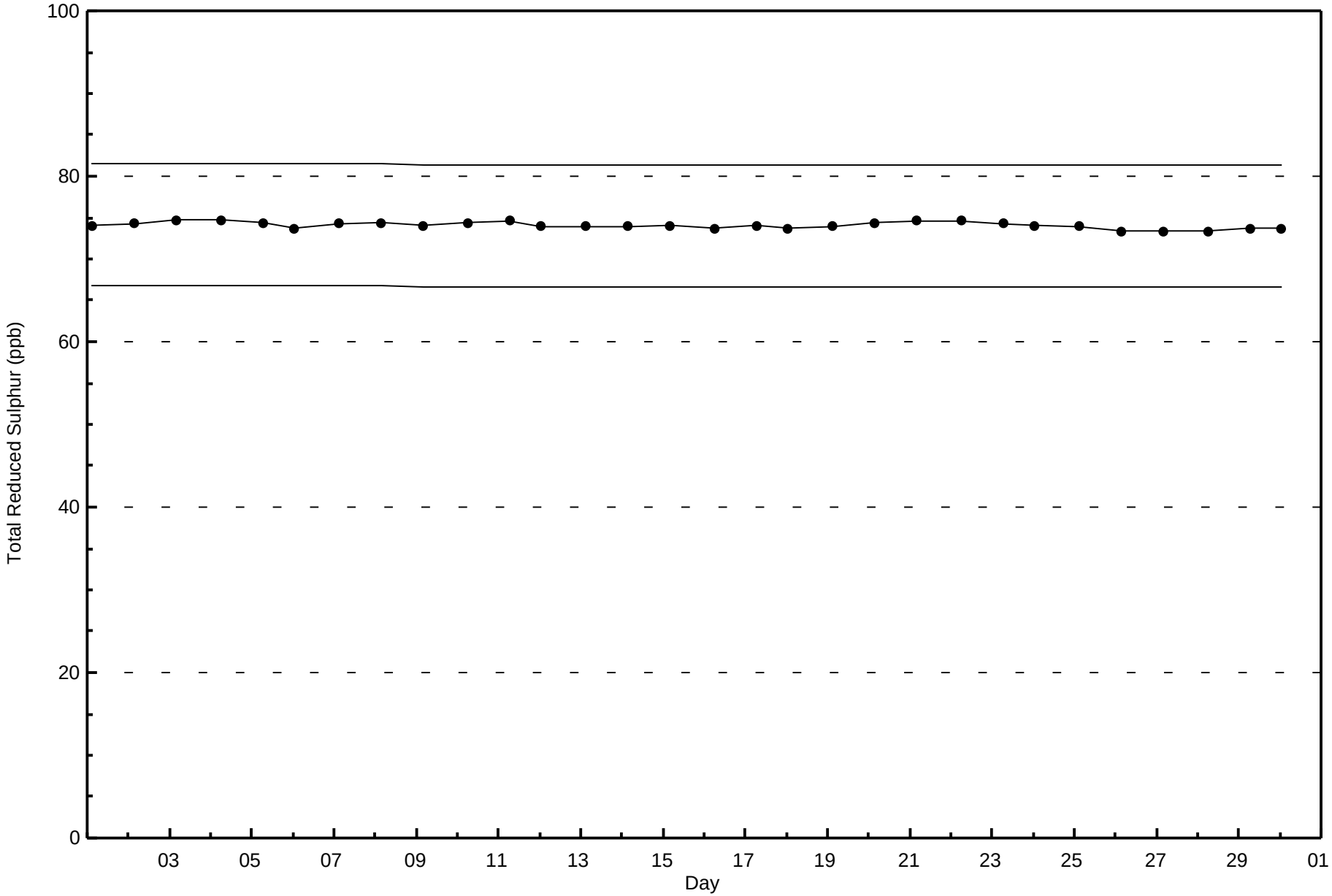


Wood Buffalo Environmental Association

Span Responses

Total Reduced Sulphur (TRS) - ppb

Fort McKay - Bertha Ganter - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Fort McKay - Bertha Ganter - April 2016

Maximum Value: 2.9 ppm on Apr 18 03:00

Maximum Daily Average: 2.2 ppm on Apr 18

Minimum Value: 1.9 ppm on Apr 19 11:00

Minimum Daily Average: 1.9 ppm on Apr 8

Maximum Diurnal Average: 2.1 ppm at hour 9

Minimum Diurnal Average: 1.9 ppm at hour 18

Monthly Average: 2.01 ppm

Percentiles: P_1 = 1.9 P_{10} = 1.9 Q_1 = 1.9 Median = 2.0 Q_3 = 2.0 P_{90} = 2.2 P_{99} = 2.7

Hours in Service:	720
Hours of Data:	684
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-Apr	2.6	Z	2.0	2.0	1.9	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.6
2-Apr	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1
3-Apr	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.1	2.0	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.1
4-Apr	2.0	1.9	1.9	1.9	Z	2.0	2.0	2.0	2.3	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.1	2.1	2.0	1.9	1.9	2.0	2.3
5-Apr	1.9	1.9	1.9	1.9	2.0	Z	1.9	1.9	2.1	2.1	2.1	2.0	2.1	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	1.9	2.0	2.1
6-Apr	Z	2.0	2.0	2.1	2.7	2.3	2.0	1.9	1.9	1.9	1.9	2.0	2.0	2.2	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.7
7-Apr	2.0	Z	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.1	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
8-Apr	2.0	1.9	Z	1.9	1.9	1.9	1.9	1.9	C	C	C	C	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
9-Apr	1.9	1.9	1.9	Z	2.3	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	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.3
10-Apr	1.9	1.9	1.9	1.9	Z	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.1
11-Apr	2.0	2.0	2.0	2.0	2.0	Z	2.1	2.0	2.0	M	M	2.1	2.0	2.0	2.0	2.0	1.9	1.9	2.4	2.7	2.8	2.1	2.0	2.0	2.1	2.8
12-Apr	Z	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.1	2.2	2.1	2.0	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	2.0	2.1	2.0	2.0	2.2
13-Apr	1.9	Z	2.0	2.0	1.9	2.2	2.3	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	2.0	2.3
14-Apr	1.9	2.0	Z	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	2.1	2.1	2.0	2.0	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1
15-Apr	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.1	2.2	2.0	2.2	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.2
16-Apr	2.0	2.1	2.0	2.0	Z	2.1	2.1	2.5	2.4	2.2	2.2	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1	2.2	2.0	2.5
17-Apr	2.1	2.2	2.2	2.2	2.3	Z	2.2	2.3	2.4	2.8	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	2.1	2.1	2.8
18-Apr	Z	2.4	2.9	2.7	2.5	2.5	2.6	2.4	2.3	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.2	1.9	1.9	2.1	2.1	2.0	2.2	2.9
19-Apr	2.3	Z	2.3	2.5	2.3	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.5
20-Apr	2.0	2.0	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1	2.1	2.1	2.0	2.1
21-Apr	2.1	2.1	2.2	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	2.0	2.0	2.0	2.0	2.0	2.0	2.2
22-Apr	2.0	2.0	1.9	2.0	Z	1.9	2.0	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.1
23-Apr	2.0	2.0	2.0	2.0	2.0	Z	2.0	2.3	2.3	2.2	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	2.3
24-Apr	Z	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	2.0
25-Apr	1.9	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.1	2.1	2.3	2.0	2.3
26-Apr	2.1	2.1	Z	2.1	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1
27-Apr	2.1	2.1	2.1	Z	2.1	2.0	2.1	2.2	2.3	2.2	2.3	2.3	2.2	2.1	2.2	2.1	2.1	2.0	2.1	2.3	2.4	2.3	2.3	2.1	2.2	2.4
28-Apr	2.0	2.0	2.0	2.0	Z	2.0	2.1	2.4	2.7	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	2.1	2.2	2.1	2.7
29-Apr	2.1	2.2	2.2	2.1	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	2.2	2.2	2.2	2.4	2.0	2.4
30-Apr	Z	2.2	2.2	2.1	2.0	2.1	2.1	2.2	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.2	2.3	2.3	2.0	2.3
	2.0	2.0	2.1	2.0	2.1	2.0	2.0	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	Diurnal Average	
	2.6	2.4	2.9	2.7	2.7	2.5	2.6	2.5	2.7	2.8	2.3	2.3	2.2	2.2	2.2	2.1	2.1	2.1	2.4	2.7	2.8	2.3	2.3	2.4	Diurnal Maximum	

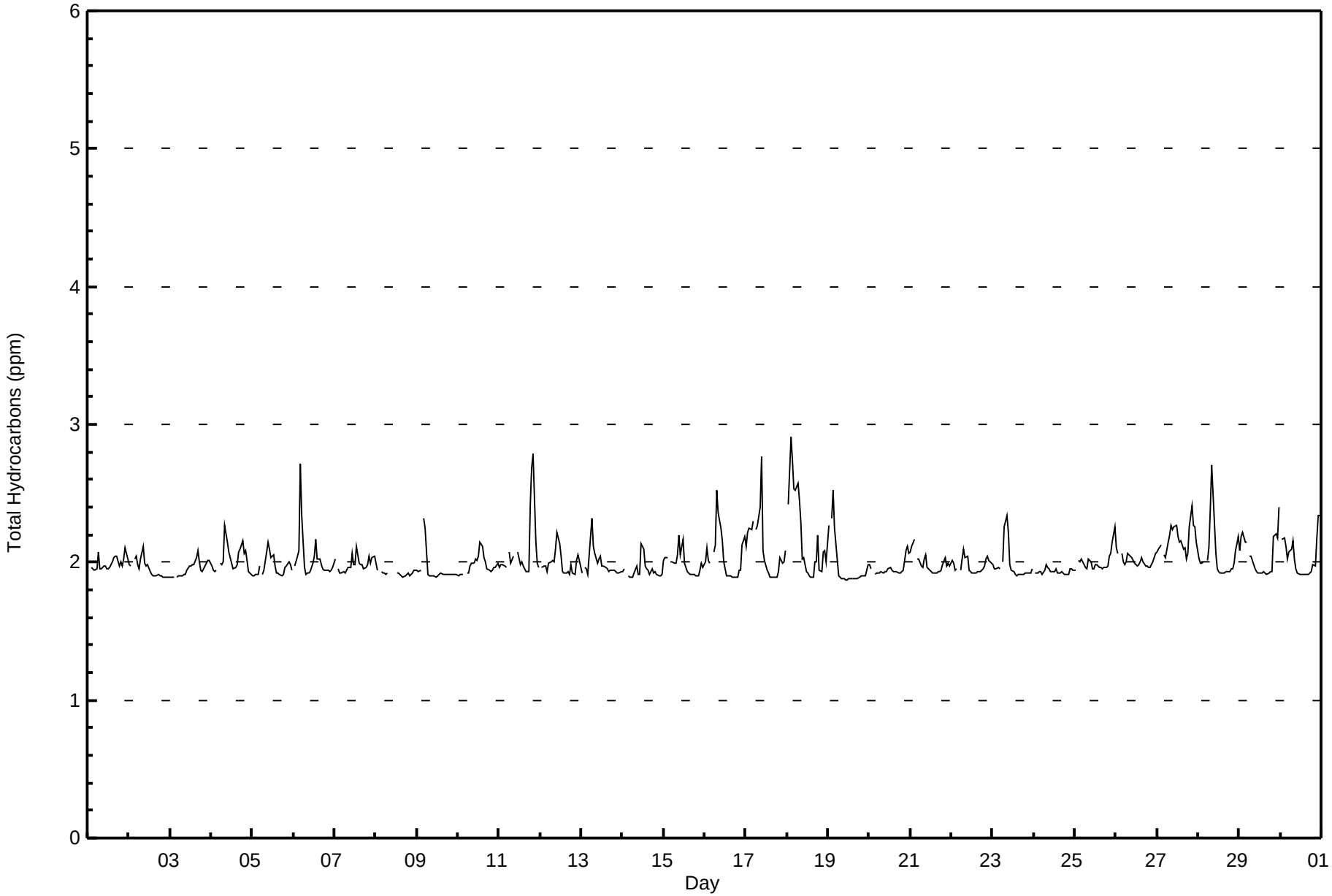
Z - zerospan C - Calibration M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Total Hydrocarbons (THC) - ppm

Fort McKay - Bertha Ganter - April 2016



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

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	539	78.80	78.80
2.1 - 3.0	145	21.20	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Total Hydrocarbons (THC) - ppm

Fort McKay - Bertha Ganter - April 2016

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	108	52	36	25	13	12	27	60	86	21	6	7	21	19	15	27	535
2.1 - 3.0	15	11	5	10	7	0	3	18	42	16	2	1	1	0	4	10	145
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	123	63	41	35	20	12	30	78	128	37	8	8	22	19	19	37	680

Total Number of Valid Hours: 680

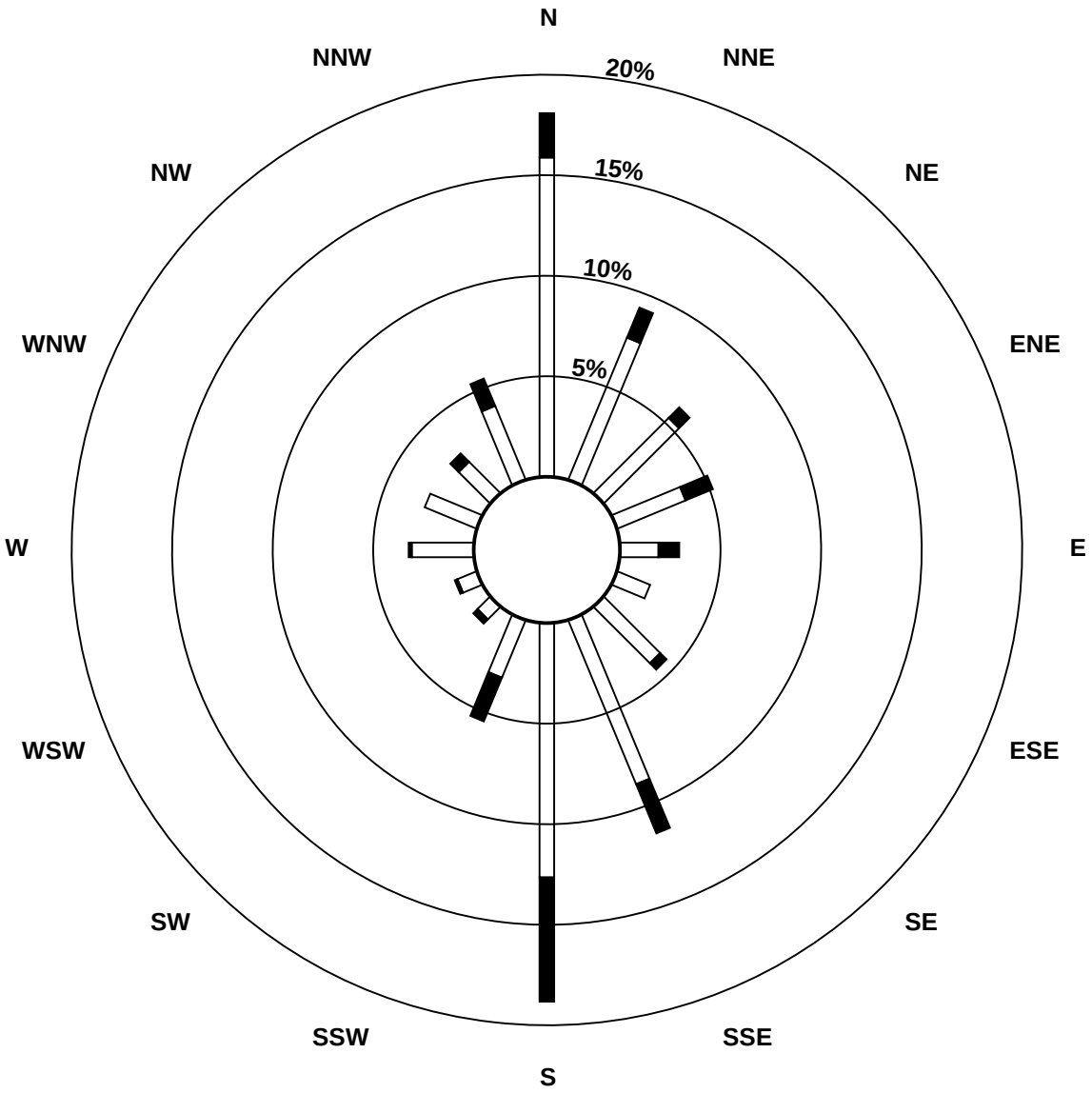
Total Number of Hours: 720

Wood Buffalo Environmental Association

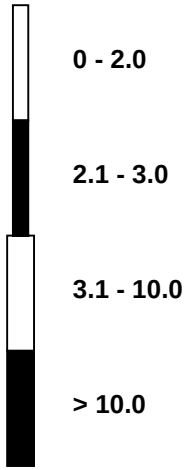
Wind Rose Apr 2016

Total Hydrocarbons (THC) - ppm

Fort McKay - Bertha Ganter (AMS 1)



Classes (ppm)



0 - 2.0

2.1 - 3.0

3.1 - 10.0

> 10.0

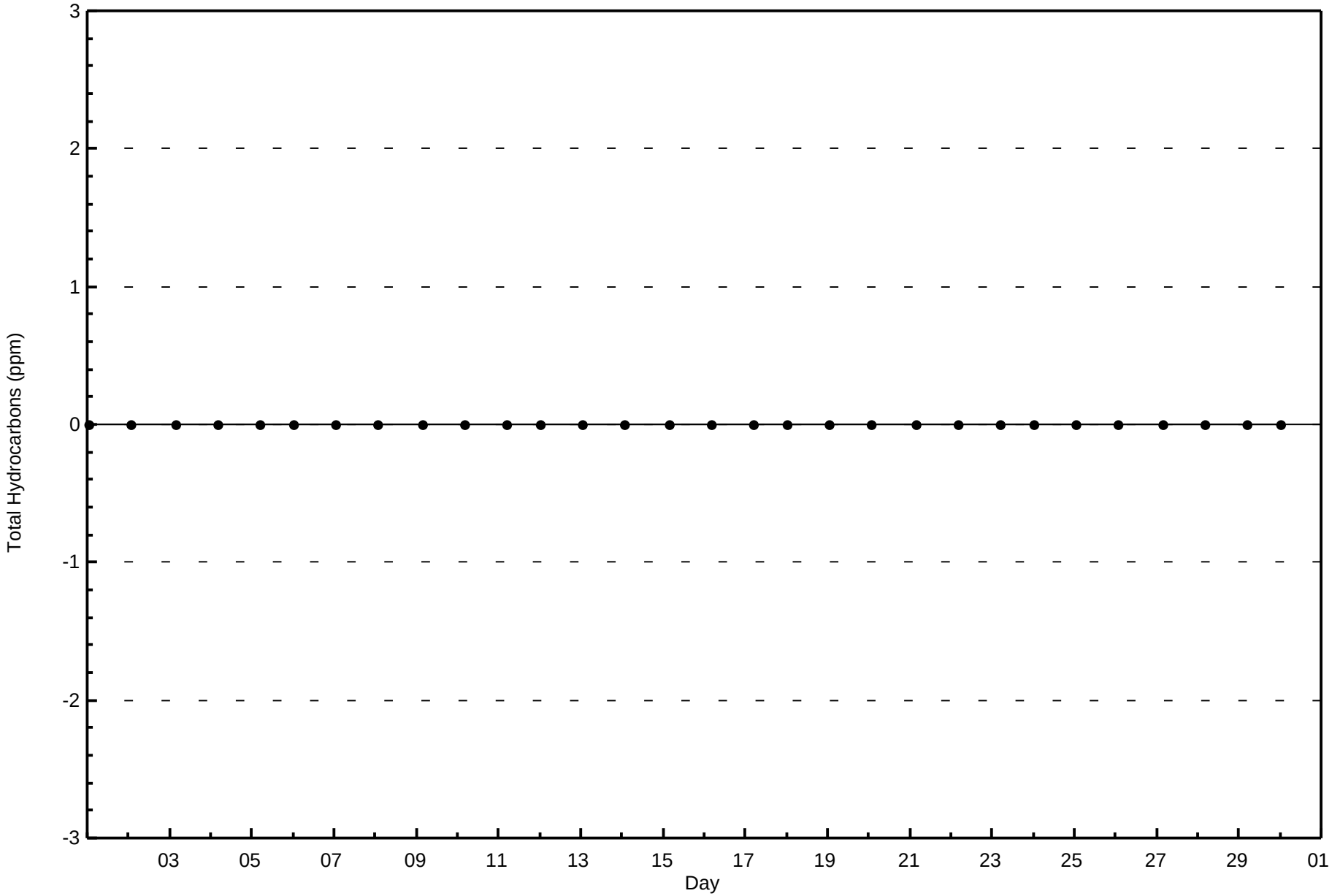
Total Number of Valid Hours: 680

Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Fort McKay - Bertha Ganter - April 2016

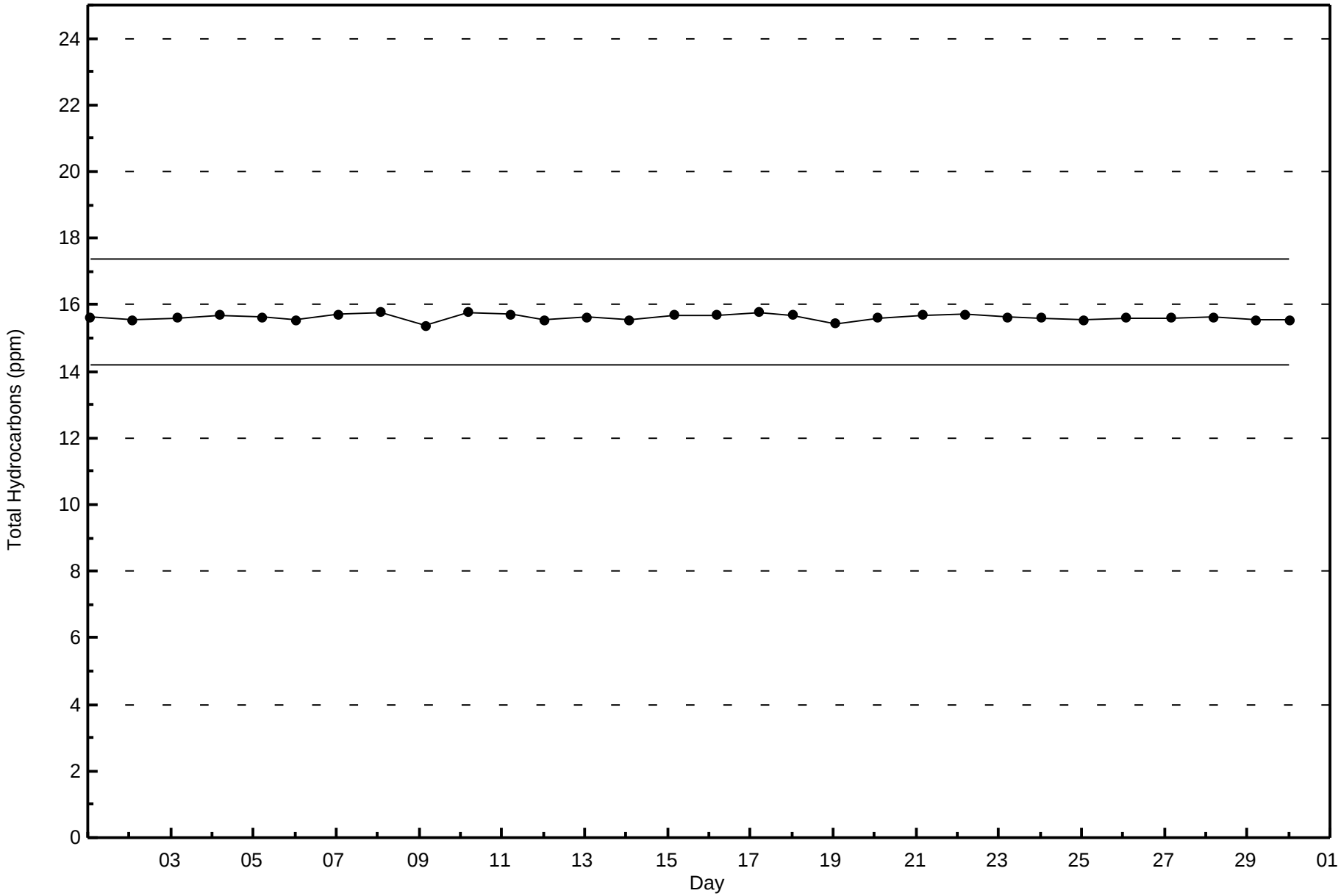


Wood Buffalo Environmental Association

Span Responses

Total Hydrocarbons (THC) - ppm

Fort McKay - Bertha Ganter - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Non Methane Hydrocarbons (NMHC) - ppm

Fort McKay - Bertha Ganter - April 2016

Maximum Value: 0.461 ppm on Apr 11 21:00

Maximum Daily Average: 0.100 ppm on Apr 18

Minimum Value: 0.000 ppm on Apr 1 04:00

Minimum Daily Average: 0.000 ppm on Apr 8

Maximum Diurnal Average: 0.057 ppm at hour 9

Minimum Diurnal Average: 0.006 ppm at hour 18

Monthly Average: 0.024 ppm

Percentiles: P_1 = 0.0 P_{10} = 0.0 Q_1 = 0.0 Median = 0.0 Q_3 = 0.0 P_{90} = 0.1 P_{99} = 0.3

Hours in Service:	720
Hours of Data:	684
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-Apr	0.273	Z	0.002	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.015	0.037	0.054	0.061	0.006	0.013	0.000	0.005	0.059	0.014	0.024	0.273
2-Apr	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.024	0.048	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.048
3-Apr	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.001	0.036	0.083	0.029	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.083
4-Apr	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.001	0.119	0.077	0.035	0.014	0.002	0.000	0.000	0.000	0.068	0.051	0.035	0.000	0.001	0.000	0.000	0.000	0.018	0.119
5-Apr	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.005	0.041	0.000	0.000	0.024	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.005	0.040	0.001	0.000	0.005	0.041
6-Apr	Z	0.000	0.002	0.007	0.225	0.148	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.104	0.016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.022	0.225
7-Apr	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.088	0.014	0.000	0.074	0.002	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.088
8-Apr	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	C	C	C	C	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9-Apr	0.000	0.000	0.000	Z	0.082	0.082	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.082
10-Apr	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.016	0.013	0.040	0.112	0.091	0.039	0.027	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.015	0.112
11-Apr	0.000	0.000	0.000	0.000	0.000	Z	0.071	0.053	0.041	M	M	0.065	0.000	0.023	0.001	0.000	0.000	0.000	0.215	0.396	0.461	0.063	0.000	0.000	0.066	0.461
12-Apr	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.047	0.152	0.105	0.075	0.002	0.000	0.003	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.017	0.152
13-Apr	0.000	Z	0.000	0.000	0.000	0.076	0.107	0.035	0.003	0.000	0.006	0.019	0.000	0.000	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.107
14-Apr	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.043	0.015	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.043
15-Apr	0.000	0.001	0.000	Z	0.000	0.000	0.000	0.015	0.046	0.031	0.024	0.159	0.040	0.022	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.015	0.159
16-Apr	0.020	0.085	0.013	0.000	Z	0.001	0.056	0.362	0.326	0.219	0.127	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.000	0.039	0.048	0.057	0.362
17-Apr	0.030	0.112	0.160	0.158	0.185	Z	0.164	0.196	0.250	0.363	0.014	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.014	0.072	0.046	0.034	0.053	0.081	0.363
18-Apr	Z	0.210	0.399	0.342	0.303	0.265	0.280	0.229	0.121	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.034	0.010	0.050	0.000	0.004	0.013	0.040	0.000	0.100	0.399
19-Apr	0.063	Z	0.067	0.096	0.042	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	0.012	0.096
20-Apr	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	0.070	0.074	0.040	0.008	0.074
21-Apr	0.054	0.075	0.102	Z	0.002	0.000	0.000	0.000	0.000	0.029	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.016	0.032	0.000	0.000	0.000	0.014	0.102
22-Apr	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
23-Apr	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.097	0.155	0.066	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.014	0.155
24-Apr	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Apr	0.000	Z	0.005	0.000	0.005	0.000	0.000	0.000	0.014	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	0.025	0.013	0.003	0.025
26-Apr	0.000	0.000	Z	0.010	0.000	0.000	0.000	0.007	0.007	0.001	0.000	0.000	0.000	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.001	0.010
27-Apr	0.002	0.007	0.022	Z	0.000	0.000	0.004	0.011	0.073	0.154	0.143	0.182	0.158	0.154	0.158	0.082	0.119	0.043	0.061	0.211	0.243	0.128	0.074	0.024	0.089	0.243
28-Apr	0.000	0.000	0.000	0.000	Z	0.000	0.033	0.172	0.431	0.157	0.019	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.030	0.079	0.040	0.431
29-Apr	0.048	0.091	0.089	0.069	0.066	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.111	0.118	0.051	0.168	0.035	0.168
30-Apr	Z	0.058	0.065	0.051	0.006	0.023	0.056	0.083	0.008	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.135	0.325	0.303	0.049	0.325
	0.020	0.026	0.037	0.029	0.037	0.024	0.026	0.043	0.057	0.043	0.022	0.021	0.012	0.017	0.010	0.007	0.013	0.006	0.012	0.022	0.031	0.021	0.025	0.025	Diurnal Average	
	0.273	0.210	0.399	0.342	0.303	0.265	0.280	0.362	0.431	0.363	0.152	0.182	0.158	0.154	0.158	0.082	0.119	0.061	0.215	0.396	0.461	0.135	0.325	0.303	Diurnal Maximum	

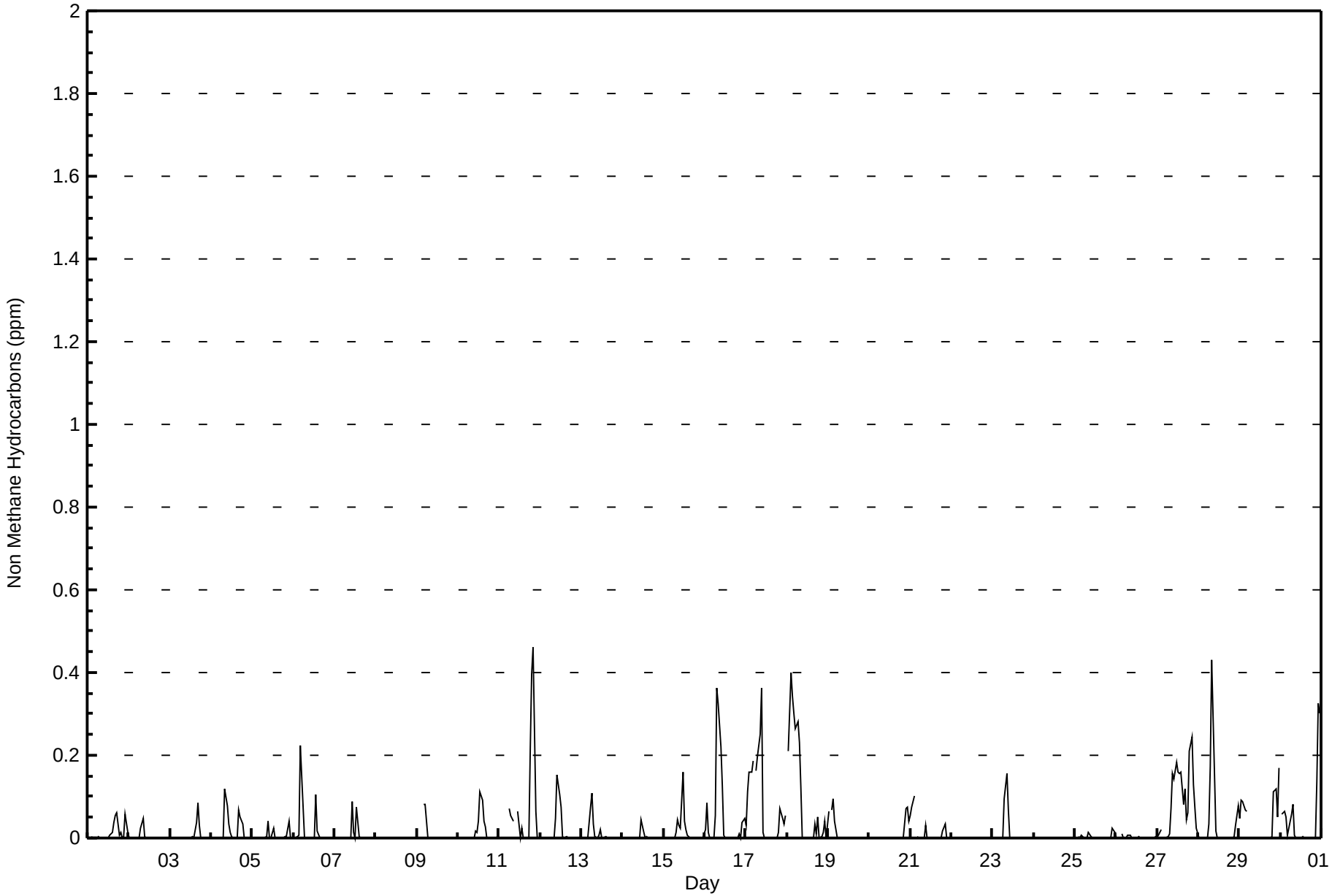
Z - zerospan C - Calibration M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Non Methane Hydrocarbons (NMHC) - ppm

Fort McKay - Bertha Ganter - April 2016



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm

Fort McKay - Bertha Ganter - April 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	507	74.12	74.12
0.006 - 0.05	84	12.28	86.40
0.06 - 0.1	55	8.04	94.44
> 0.1	38	5.56	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm

Fort McKay - Bertha Ganter - April 2016

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	113	50	31	16	8	11	26	56	76	21	6	8	20	19	15	27	503
0.006 - 0.05	4	9	4	9	6	1	3	8	29	5	2	0	1	0	2	1	84
0.06 - 0.1	5	2	4	7	3	0	1	6	16	3	0	0	0	0	2	6	55
> 0.1	1	2	2	3	3	0	0	8	7	8	0	0	1	0	0	3	38
Totals	123	63	41	35	20	12	30	78	128	37	8	8	22	19	19	37	680

Total Number of Valid Hours: 680

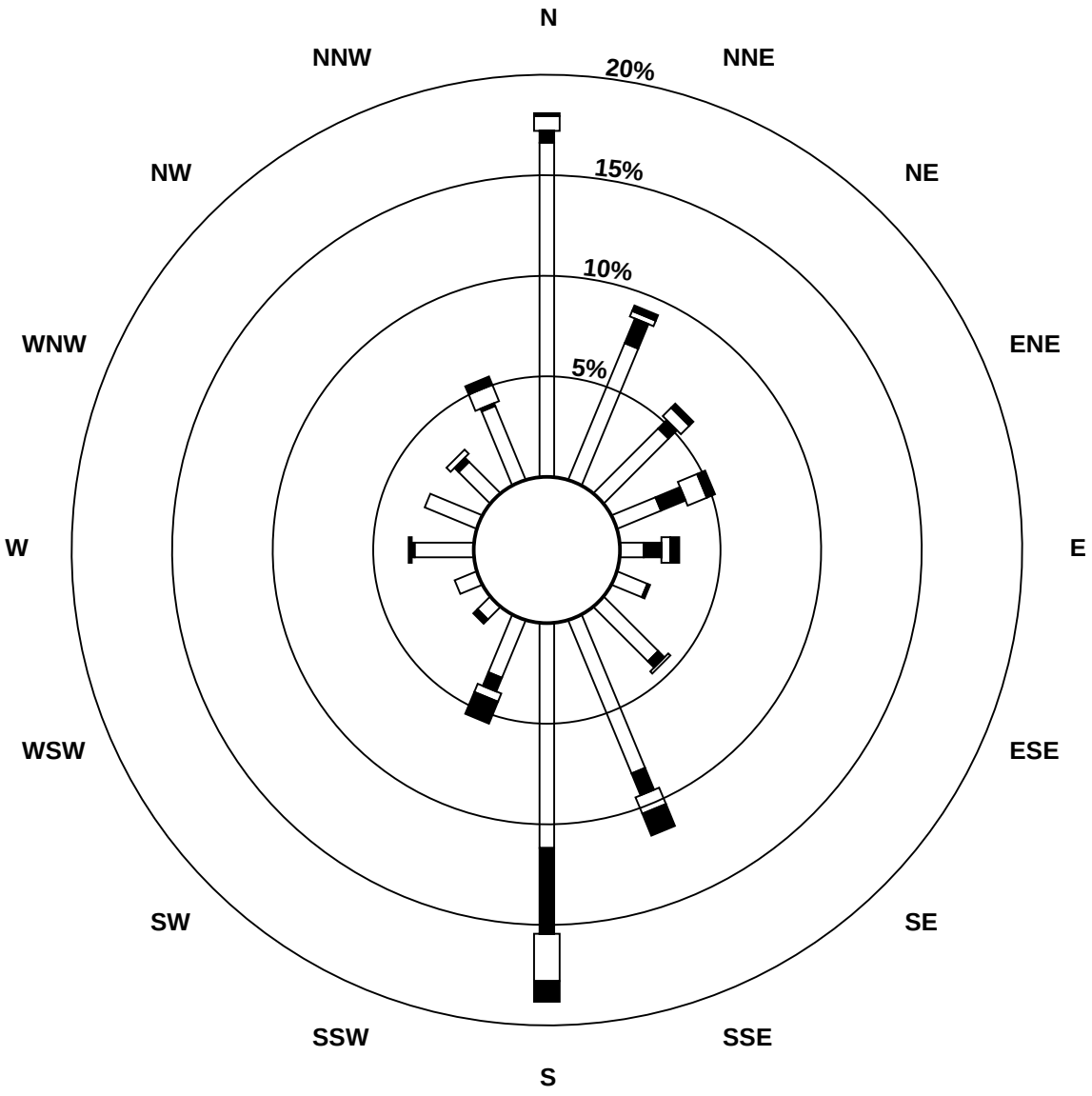
Total Number of Hours: 720

Wood Buffalo Environmental Association

Wind Rose Apr 2016

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

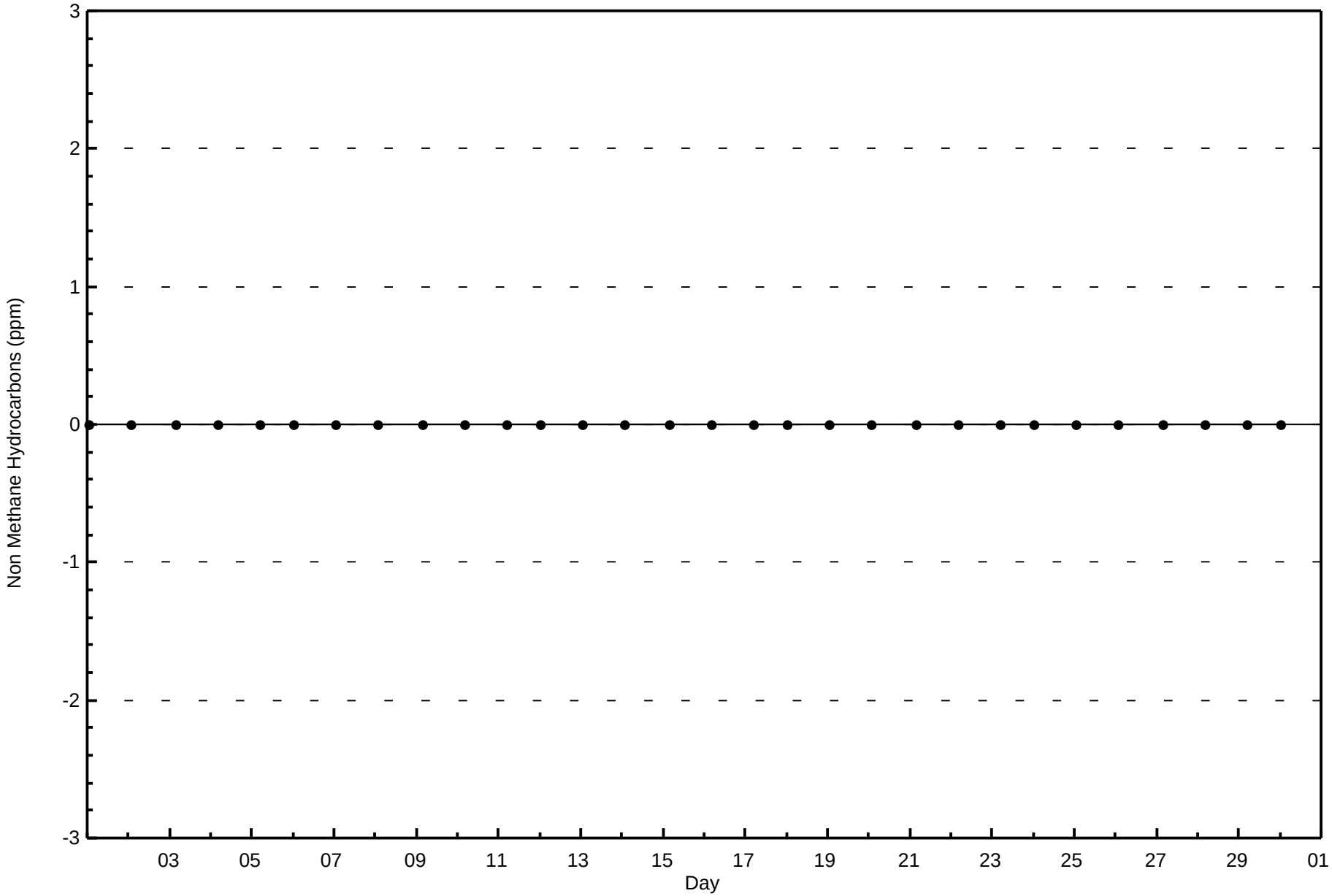
Total Number of Valid Hours: 680

Wood Buffalo Environmental Association

Zero Responses

Non Methane Hydrocarbons (NMHC) - ppm

Fort McKay - Bertha Ganter - April 2016

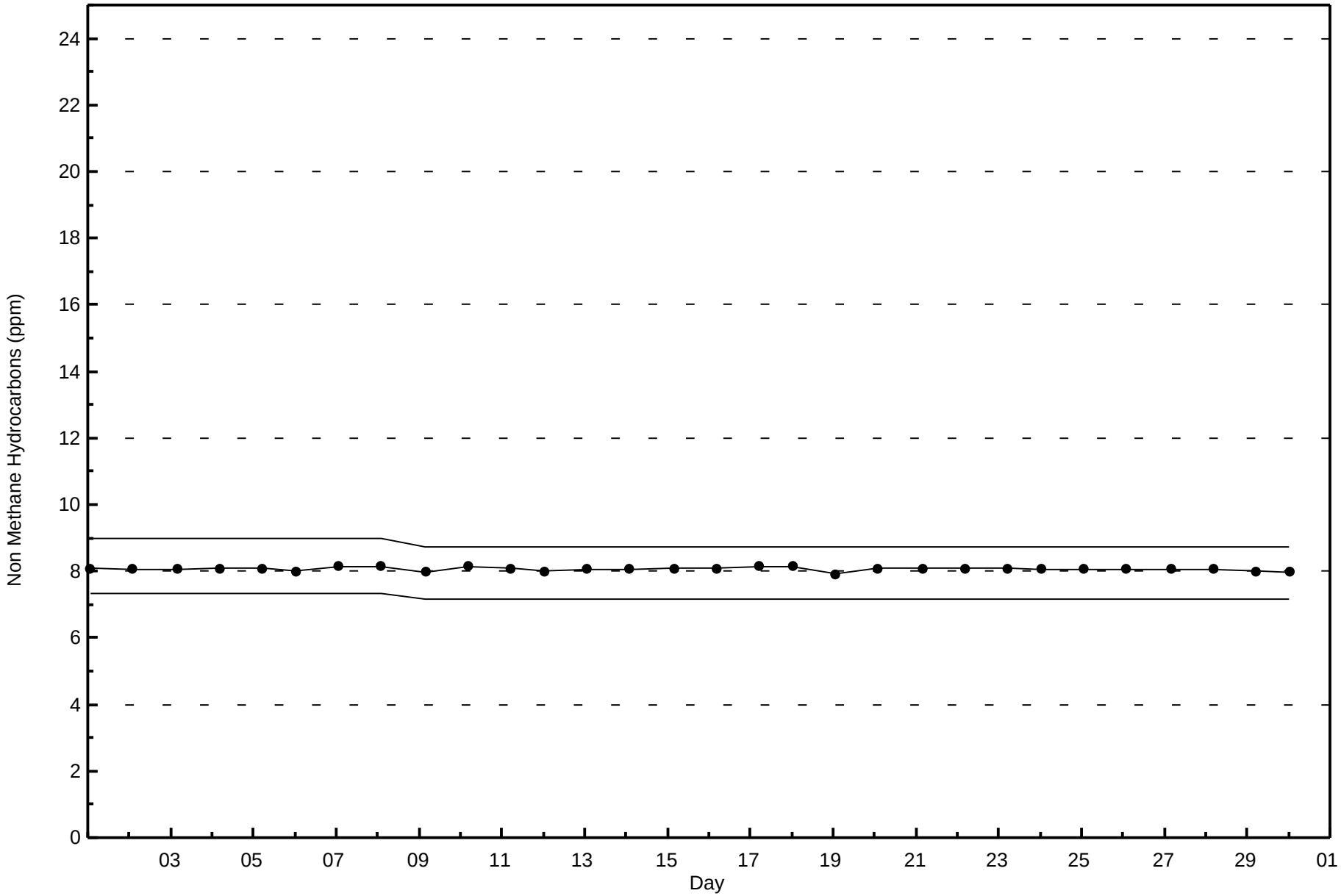


Wood Buffalo Environmental Association

Span Responses

Non Methane Hydrocarbons (NMHC) - ppm

Fort McKay - Bertha Ganter - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Methane (CH_4) - ppm

Fort McKay - Bertha Ganter - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 2.5 ppm on Apr 18 03:00 Maximum Daily Average: 2.1 ppm on Apr 18

Minimum Value: 1.9 ppm on Apr 19 11:00 Minimum Daily Average: 1.9 ppm on Apr 8
Maximum Diurnal Average: 2.0 ppm at hour 9 Minimum Diurnal Average: 1.9 ppm at hour 18
Monthly Average: 1.98 ppm Percentiles: P_1 = 1.9 P_{10} = 1.9 Q_1 = 1.9 Median = 2.0 Q_3 = 2.0 P_{90} = 2.1 P_{99} = 2.3

Hours in Service:	720
Hours of Data:	684
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-Apr	2.3	Z	2.0	2.0	1.9	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	2.3
2-Apr	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1
3-Apr	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	2.0	2.0	2.0	2.0	1.9	2.0
4-Apr	2.0	1.9	1.9	1.9	Z	2.0	2.0	2.0	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.0	1.9	1.9	2.0	2.2
5-Apr	1.9	1.9	1.9	1.9	2.0	Z	1.9	1.9	2.1	2.1	2.1	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	1.9	2.0	2.1
6-Apr	Z	2.0	2.0	2.1	2.5	2.2	2.0	1.9	1.9	1.9	1.9	2.0	2.0	2.1	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.5
7-Apr	2.0	Z	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
8-Apr	2.0	1.9	Z	1.9	1.9	1.9	1.9	1.9	C	C	C	C	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
9-Apr	1.9	1.9	1.9	Z	2.2	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	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.2
10-Apr	1.9	1.9	1.9	1.9	Z	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0
11-Apr	2.0	2.0	2.0	2.0	2.0	Z	2.0	1.9	2.0	M	M	2.0	2.0	2.0	2.0	2.0	1.9	1.9	2.2	2.3	2.3	2.1	2.0	2.0	2.0	2.3
12-Apr	Z	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	2.0	2.1	2.0	2.0	2.1
13-Apr	1.9	Z	2.0	2.0	1.9	2.1	2.2	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	2.0	2.2
14-Apr	1.9	2.0	Z	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	2.1	2.1	2.0	2.0	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1
15-Apr	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.2	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.2
16-Apr	2.0	2.0	2.0	2.0	Z	2.1	2.1	2.2	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	2.1	2.1	2.0	2.2
17-Apr	2.1	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.2	2.4	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.0	2.0	2.0	2.4
18-Apr	Z	2.2	2.5	2.4	2.2	2.3	2.3	2.2	2.2	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.2	1.9	1.9	2.1	2.0	2.0	2.1	2.5
19-Apr	2.2	Z	2.3	2.4	2.2	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.4
20-Apr	2.0	2.0	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.9	2.0
21-Apr	2.0	2.0	2.1	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	2.0	2.0	2.0	2.0	2.0	2.0	2.1
22-Apr	2.0	2.0	1.9	2.0	Z	1.9	2.0	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.1
23-Apr	2.0	2.0	2.0	2.0	2.0	Z	2.0	2.2	2.2	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.2
24-Apr	Z	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	2.0
25-Apr	1.9	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.0	2.2
26-Apr	2.1	2.1	Z	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1
27-Apr	2.1	2.1	2.1	Z	2.1	2.0	2.1	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	2.2	2.1	2.2	2.1	2.1	2.2
28-Apr	2.0	2.0	2.0	2.0	Z	2.0	2.1	2.2	2.3	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.1	2.1	2.0	2.3
29-Apr	2.0	2.1	2.1	2.1	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	2.1	2.1	2.1	2.2	2.0	2.2
30-Apr	Z	2.1	2.1	2.1	2.0	2.1	2.0	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.1
	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	Diurnal Average	
	2.3	2.2	2.5	2.4	2.5	2.3	2.3	2.2	2.3	2.4	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.2	2.3	2.3	2.1	2.2	2.2	Diurnal Maximum	

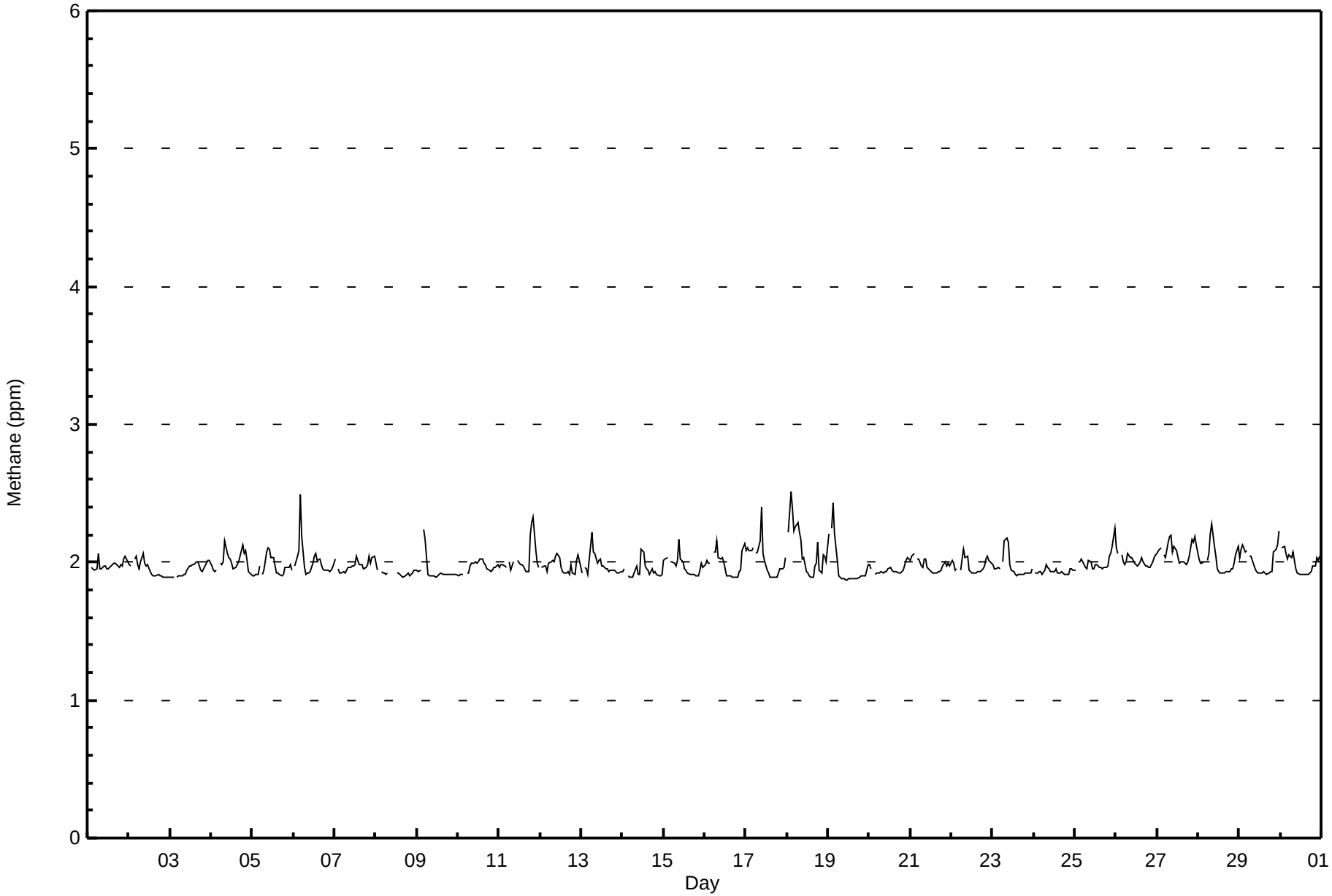
Z - zerospan C - Calibration M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Methane (CH_4) - ppm

Fort McKay - Bertha Ganter - April 2016



Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	580	84.80	84.80
2.1 - 3.0	104	15.20	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720

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

Frequency Distribution | **Fort McKay - Bertha Ganter - April 2016**

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	112	56	39	30	19	12	30	67	92	21	6	7	22	19	15	29	576
2.1 - 3.0	11	7	2	5	1	0	0	11	36	16	2	1	0	0	4	8	104
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	123	63	41	35	20	12	30	78	128	37	8	8	22	19	19	37	680

Total Number of Valid Hours: 680

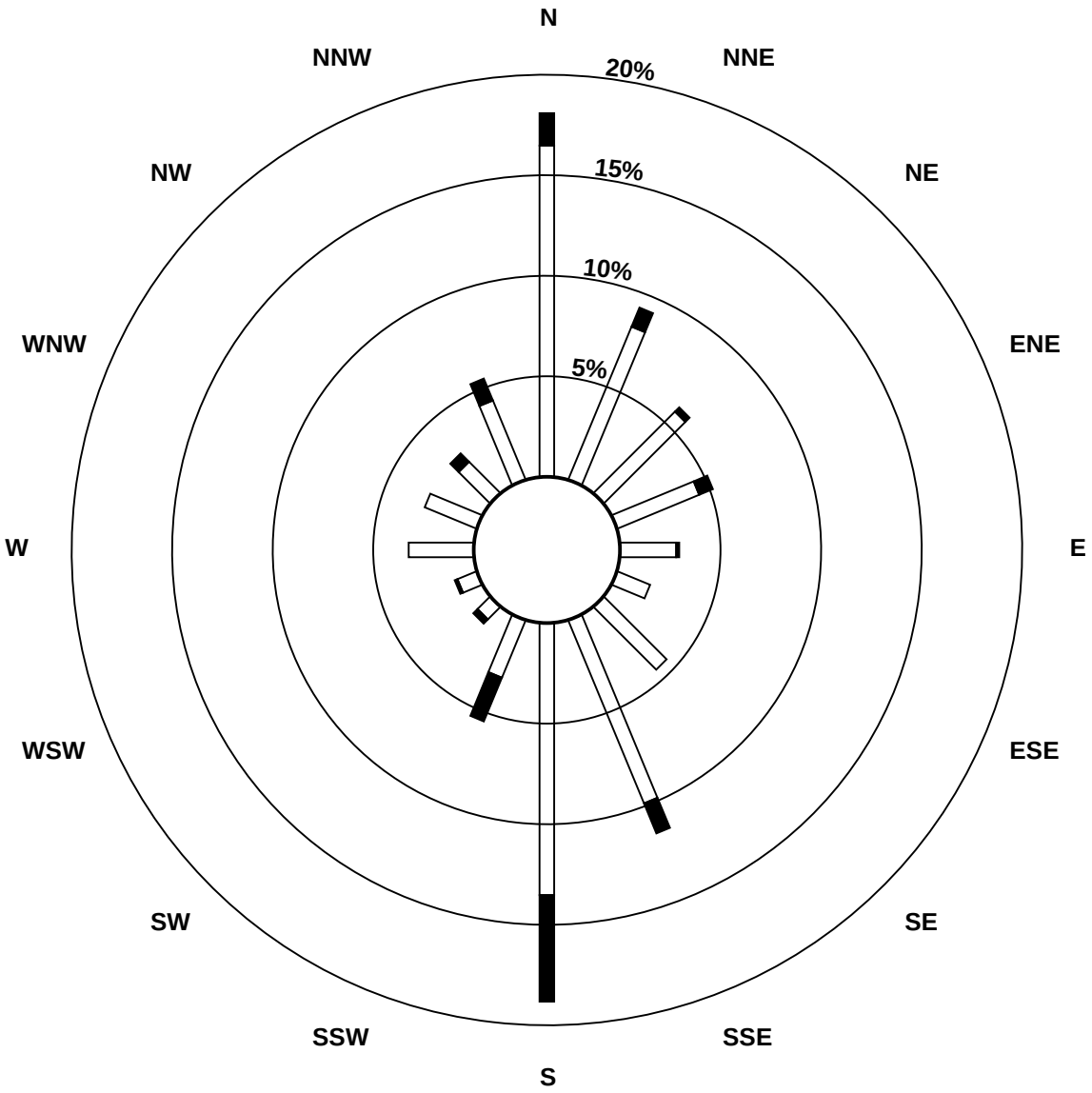
Total Number of Hours: 720

Wood Buffalo Environmental Association

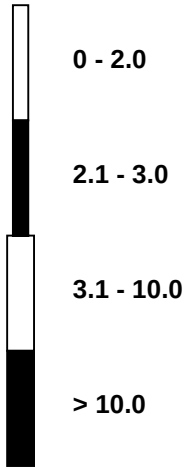
Wind Rose Apr 2016

Methane (CH_4) - ppm

Fort McKay - Bertha Ganter (AMS 1)



Classes (ppm)



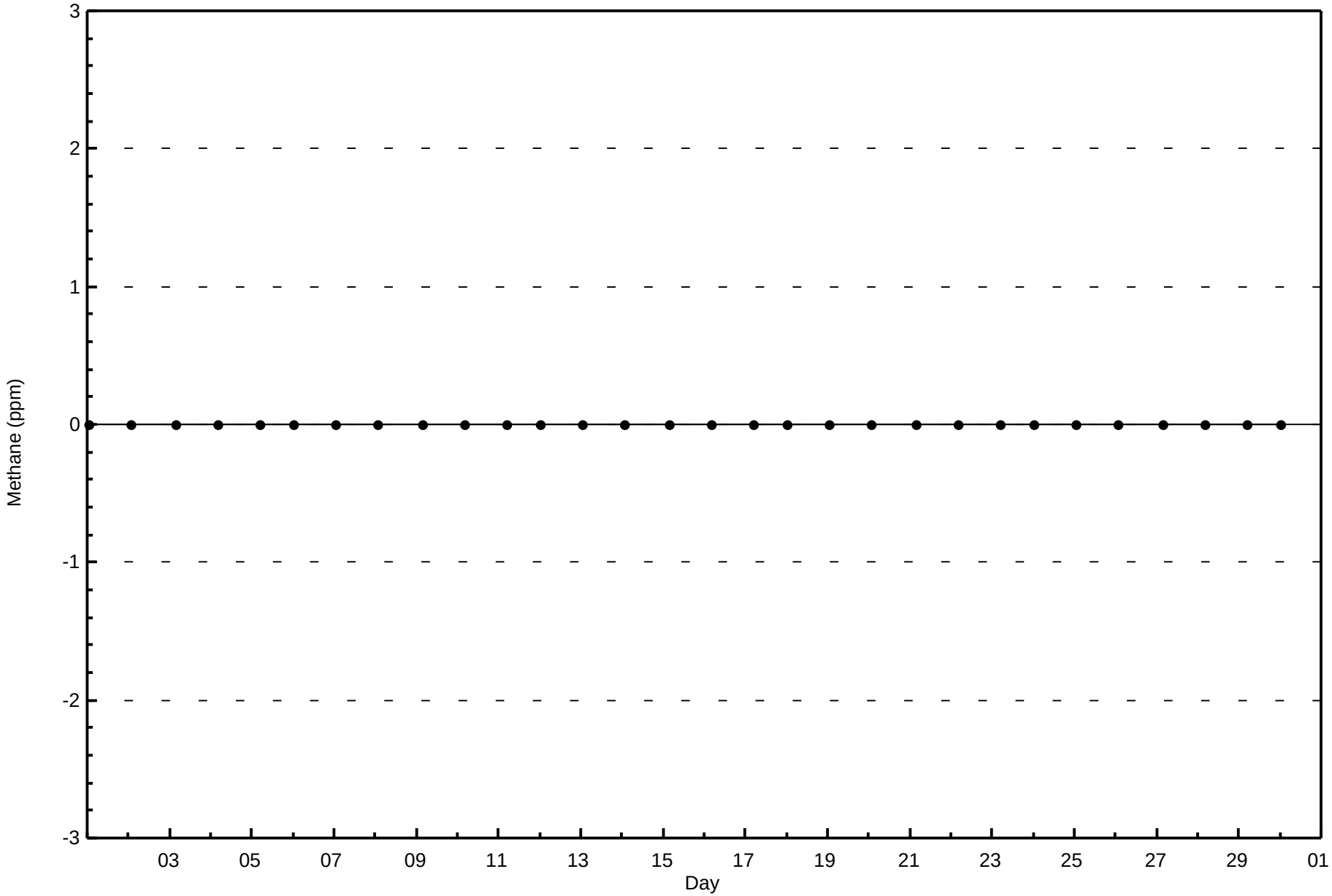
Total Number of Valid Hours: 680

Wood Buffalo Environmental Association

Zero Responses

Methane (CH_4) - ppm

Fort McKay - Bertha Ganter - April 2016

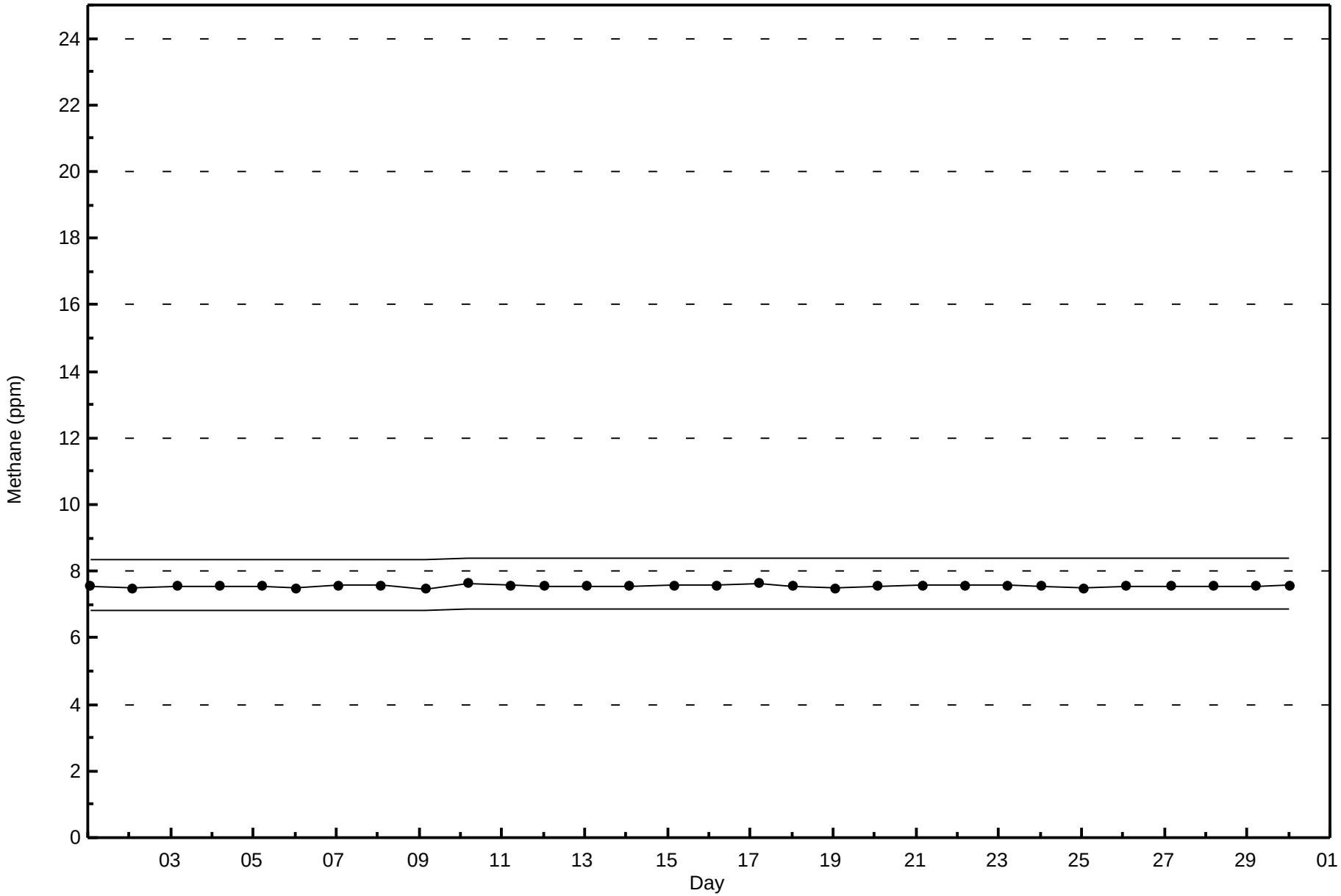


Wood Buffalo Environmental Association

Span Responses

Methane (CH_4) - ppm

Fort McKay - Bertha Ganter - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

Fort McKay - Bertha Ganter - April 2016

Maximum Value: 14 ppb on Apr 11 19:00

Maximum Daily Average: 3.0 ppb on Apr 18

Minimum Value: 0 ppb on Apr 1 03:00

Minimum Daily Average: 0.0 ppb on Apr 19

Maximum Diurnal Average: 3.6 ppb at hour 10

Minimum Diurnal Average: 0.0 ppb at hour 21

Monthly Average: 1.2 ppb

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

Hours in Service:	720
Hours of Data:	682
Hours of Missing Data:	38
Hours of Calibration:	36
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-Apr	11	Z	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	1.0	11
2-Apr	0	0	Z	0	0	0	1	3	3	2	3	3	1	0	0	0	0	0	0	0	0	0	0	0	0.7	3
3-Apr	0	0	0	Z	0	0	0	0	0	0	0	1	3	3	3	4	2	1	1	0	0	0	0	0	0.8	4
4-Apr	0	0	0	0	Z	0	1	4	7	C	C	C	C	C	C	3	4	5	4	0	0	0	0	0	--	7
5-Apr	0	0	0	0	0	Z	0	1	7	10	8	8	8	2	1	1	0	0	0	0	0	0	0	0	2.0	10
6-Apr	Z	0	0	0	6	1	0	0	0	1	1	3	6	2	5	4	2	1	0	0	0	0	0	0	1.4	6
7-Apr	0	Z	0	0	0	0	0	1	1	3	3	5	4	9	4	4	2	1	0	0	0	0	0	0	1.6	9
8-Apr	0	0	Z	0	0	0	0	1	1	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0.4	2
9-Apr	0	0	0	Z	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	3
10-Apr	0	0	0	0	Z	0	0	1	2	2	3	2	2	3	3	2	1	1	0	0	0	0	0	0	0.9	3
11-Apr	0	0	0	0	0	Z	0	0	1	M	M	3	4	5	4	2	1	1	14	14	0	0	0	0	2.5	14
12-Apr	Z	0	0	0	0	0	1	1	2	5	5	5	3	2	2	2	2	1	0	0	0	0	0	0	1.4	5
13-Apr	0	Z	0	0	0	7	10	6	8	4	2	2	2	1	2	1	1	1	0	0	0	0	0	0	2.2	10
14-Apr	0	0	Z	0	0	0	0	0	1	0	0	3	3	1	0	0	0	0	0	0	0	0	0	0	0.4	3
15-Apr	0	0	0	Z	0	1	3	4	4	9	2	6	4	3	2	1	2	1	0	0	0	0	0	0	1.8	9
16-Apr	0	0	0	0	Z	2	4	1	2	2	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0.7	4
17-Apr	0	0	0	0	0	Z	1	3	6	8	5	3	1	0	0	0	0	0	0	0	0	0	0	0	1.2	8
18-Apr	Z	0	8	9	4	3	8	6	5	10	8	5	1	0	0	0	0	0	0	0	0	0	0	0	3.0	10
19-Apr	0	Z	0	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-Apr	0	0	Z	0	0	0	0	0	0	1	1	1	2	2	2	1	1	0	0	0	0	0	0	0	0.5	2
21-Apr	0	0	0	Z	0	1	1	5	9	8	4	3	2	1	1	1	1	0	0	0	0	0	0	0	1.6	9
22-Apr	0	0	0	0	Z	0	2	8	5	5	2	1	1	1	1	1	1	0	0	0	0	0	0	0	1.2	8
23-Apr	0	0	0	0	0	Z	4	10	9	11	3	2	1	0	0	0	0	0	0	0	0	0	0	0	1.8	11
24-Apr	Z	0	0	0	0	0	1	2	3	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0.6	3
25-Apr	0	Z	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	1	7	1	0.6	7
26-Apr	0	0	Z	0	0	0	0	1	1	1	1	2	1	0	0	0	0	1	1	0	0	0	0	0	0.5	2
27-Apr	1	1	1	Z	1	3	5	6	11	5	8	6	3	2	1	1	1	1	0	0	0	1	1	0	2.7	11
28-Apr	0	0	0	1	Z	2	4	9	5	4	4	1	0	0	0	0	0	0	0	0	0	0	0	0	1.3	9
29-Apr	0	0	0	0	0	Z	2	4	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	4
30-Apr	Z	0	0	0	0	0	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2
	0.5	0.1	0.4	0.4	0.6	0.8	1.7	2.7	3.3	3.6	2.7	2.5	1.9	1.4	1.2	1.1	0.7	0.5	0.8	0.5	0.0	0.1	0.3	0.1	Diurnal Average	
	11	1	8	9	6	7	10	10	11	11	8	8	8	9	5	4	4	5	14	14	0	1	7	1	Diurnal Maximum	

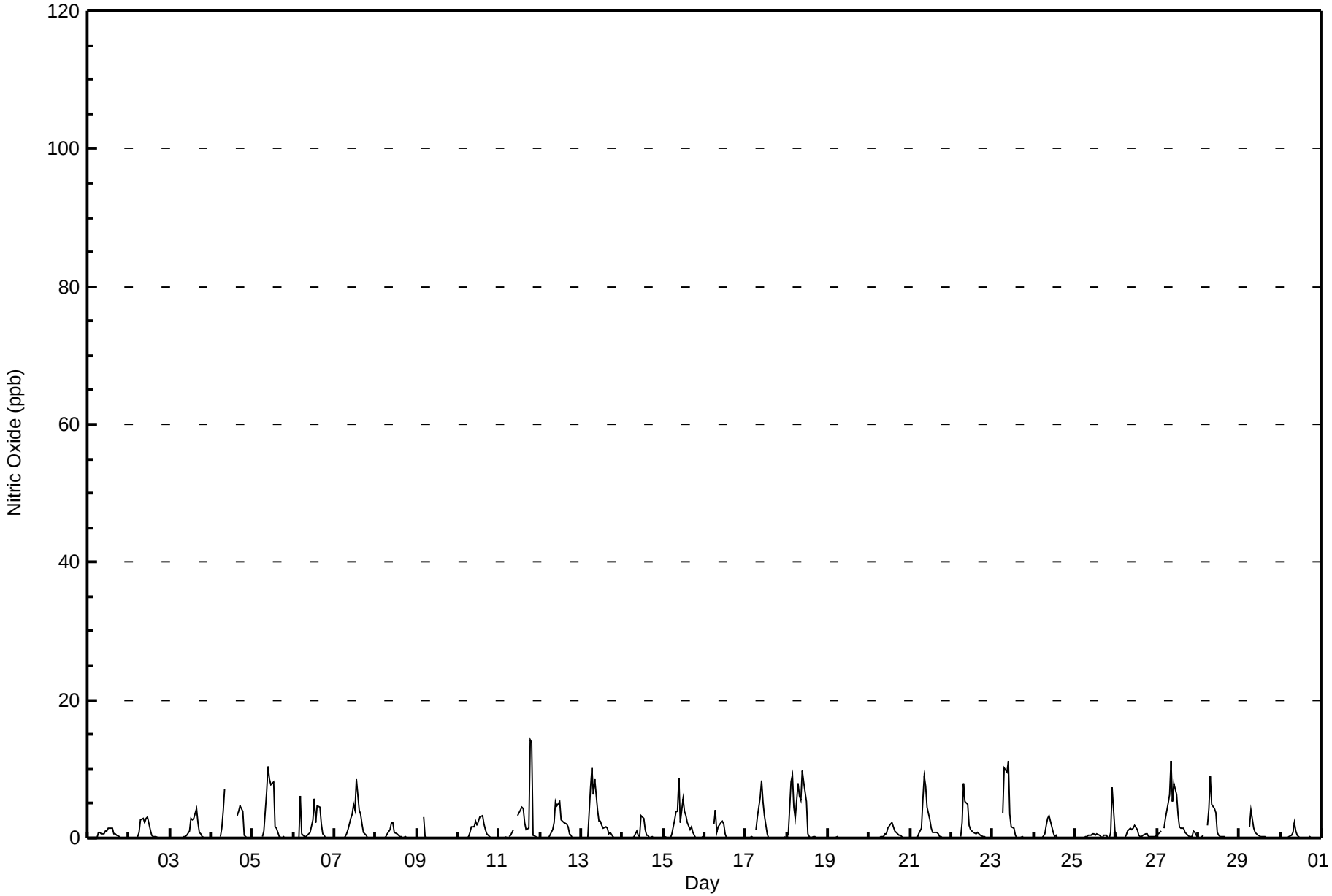
Z - zerospan C - Calibration M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Nitric Oxide (NO) - ppb

Fort McKay - Bertha Ganter - April 2016



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	682	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: 682

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitric Oxide (NO) - ppb

Fort McKay - Bertha Ganter - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	123	63	41	35	20	12	28	80	126	37	8	8	22	19	19	37	678
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	123	63	41	35	20	12	28	80	126	37	8	8	22	19	19	37	678

Total Number of Valid Hours: 678

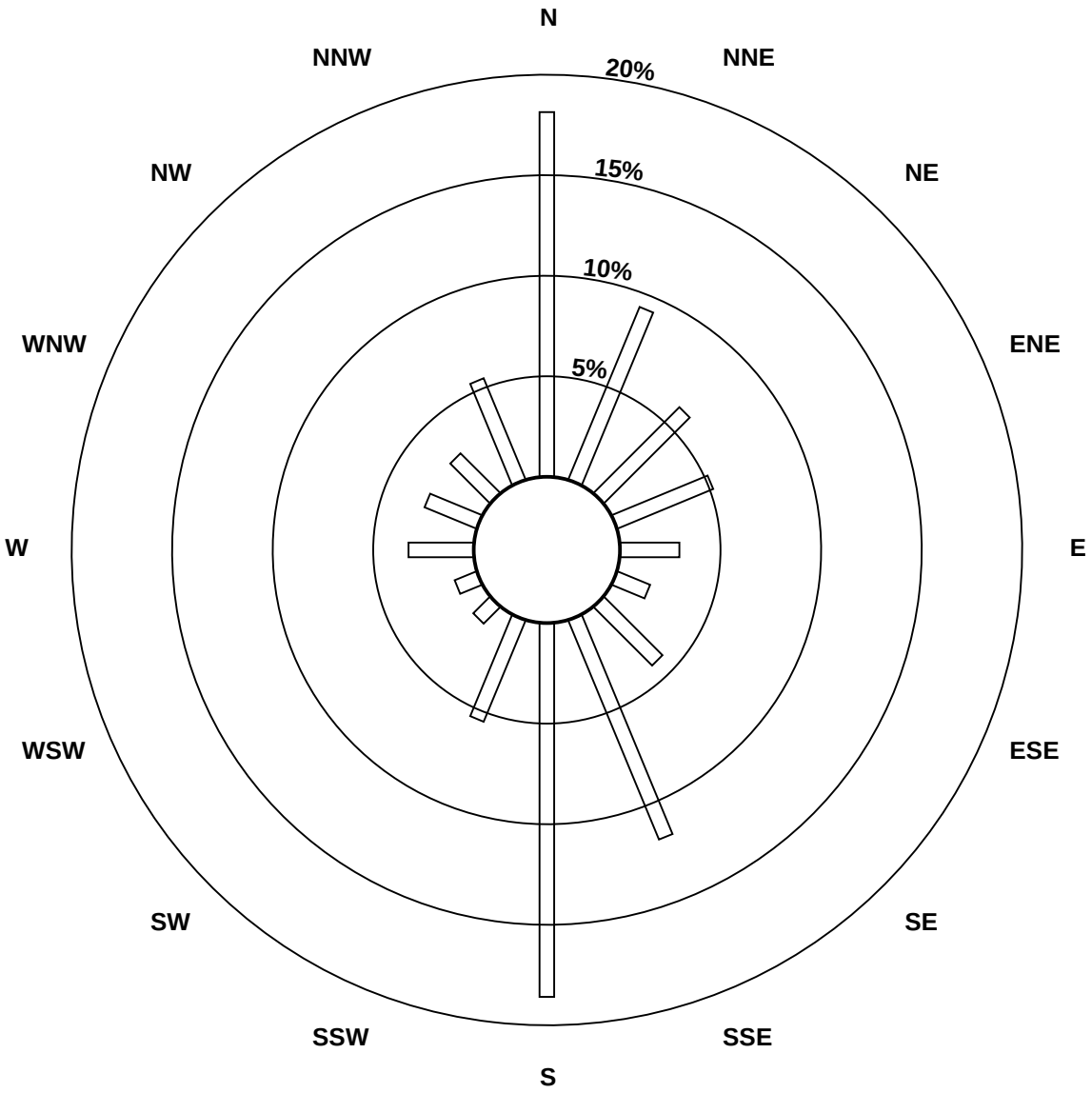
Total Number of Hours: 720

Wood Buffalo Environmental Association

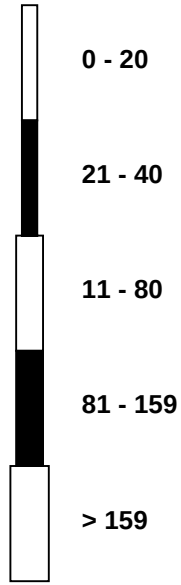
Wind Rose Apr 2016

Nitric Oxide (NO) - ppb

Fort McKay - Bertha Ganter (AMS 1)



Classes (ppb)



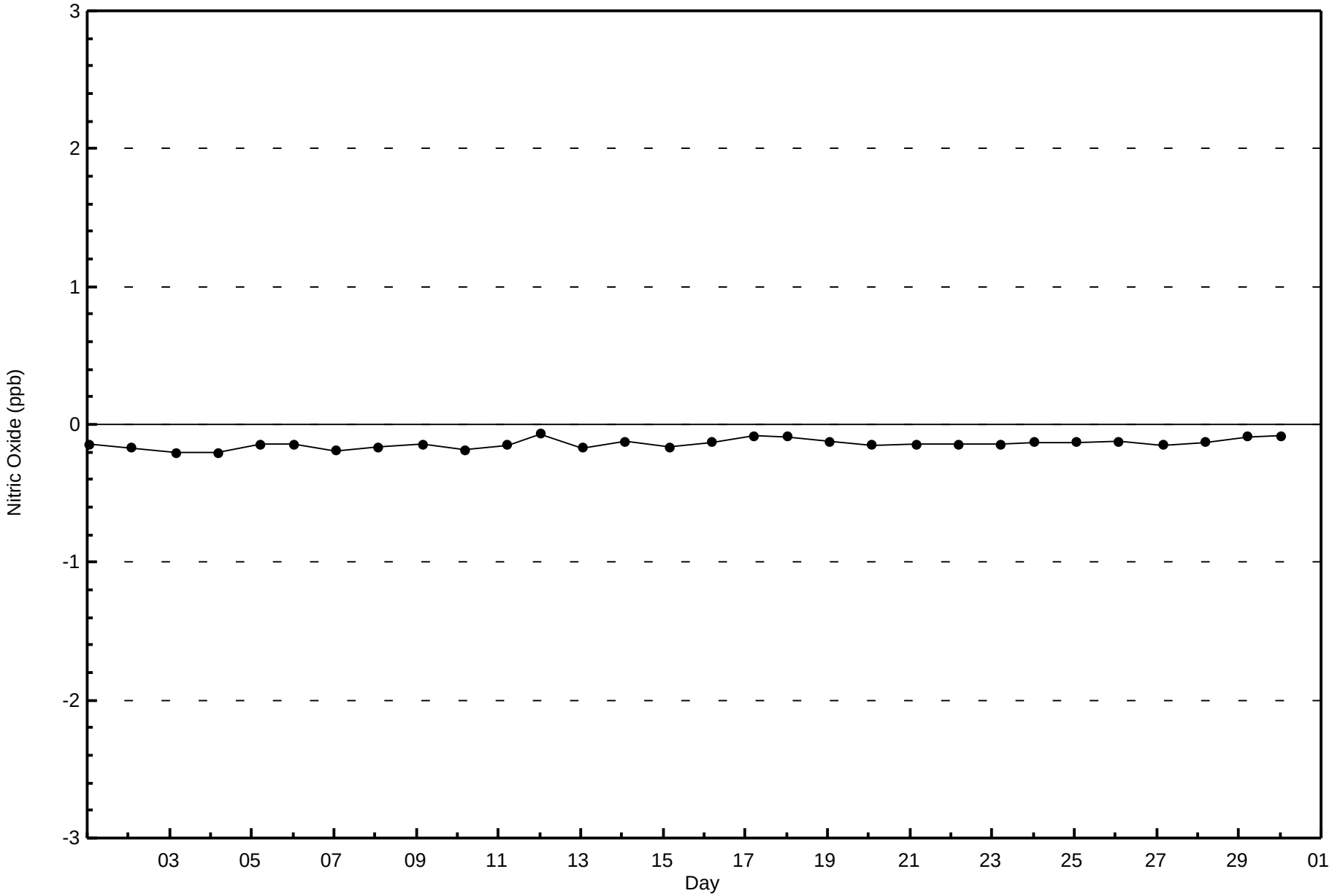
Total Number of Valid Hours: 678

Wood Buffalo Environmental Association

Zero Responses

Nitric Oxide (NO) - ppb

Fort McKay - Bertha Ganter - April 2016

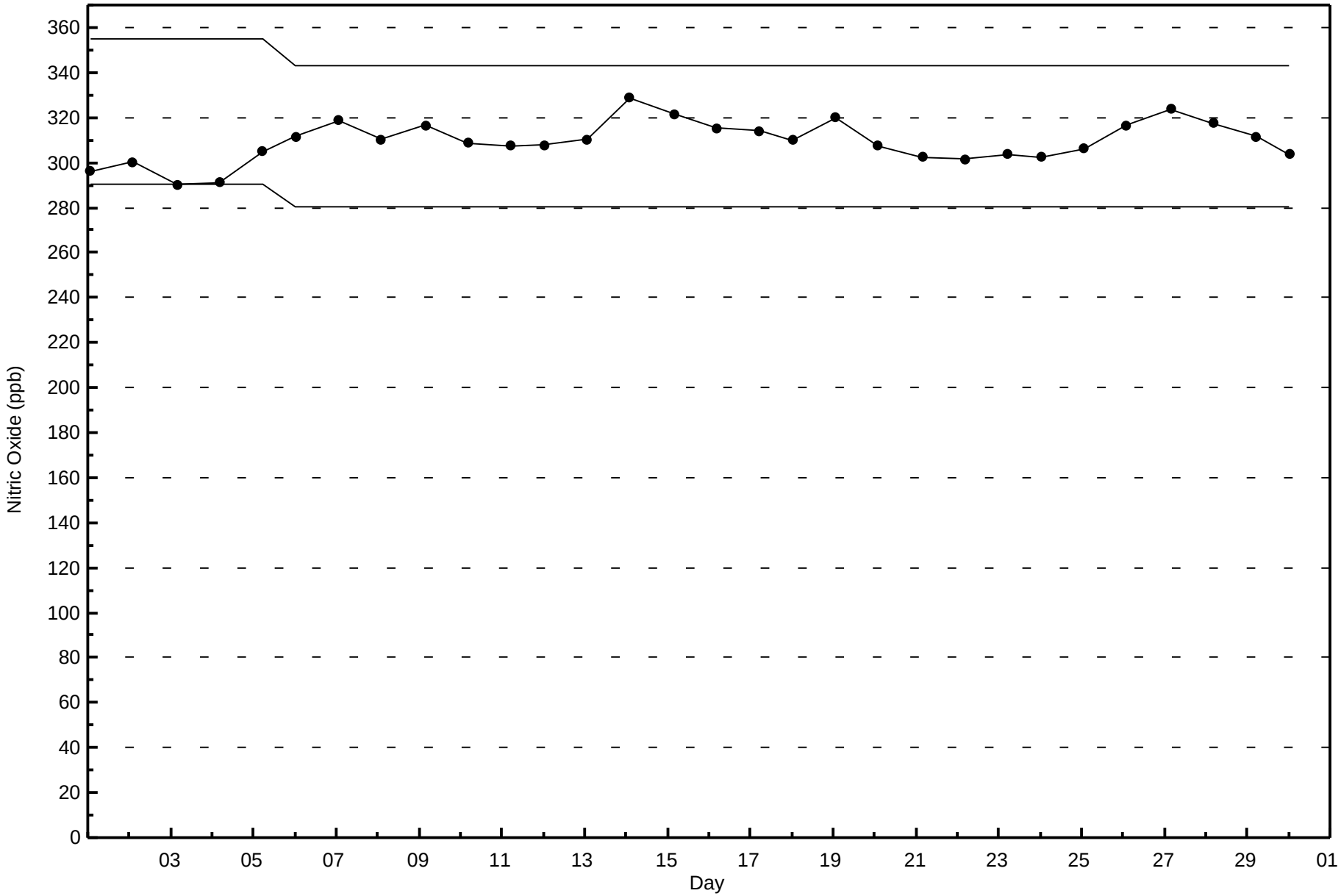


Wood Buffalo Environmental Association

Span Responses

Nitric Oxide (NO) - ppb

Fort McKay - Bertha Ganter - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO_2) - ppb

Fort McKay - Bertha Ganter - April 2016

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

Maximum Value: 39 ppb on Apr 11 20:00 Maximum Daily Average: 12.1 ppb on Apr 11

Minimum Value: 0 ppb on Apr 19 10:00 Minimum Daily Average: 1.7 ppb on Apr 19

Maximum Diurnal Average: 8.9 ppb at hour 23 Minimum Diurnal Average: 3.4 ppb at hour 17

Monthly Average: 6.5 ppb Percentiles: $P_1 = 0$ $P_{10} = 1$ $Q_1 = 2$ Median = 5 $Q_3 = 9$ $P_{90} = 14$ $P_{99} = 26$

Hours in Service:	720
Hours of Data:	682
Hours of Missing Data:	38
Hours of Calibration:	36
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-Apr	29	Z	5	4	4	4	16	9	5	3	3	3	4	5	5	4	4	4	3	4	13	16	18	14	7.7	29
2-Apr	14	15	Z	15	17	15	11	10	8	6	6	7	4	2	1	1	1	1	1	2	1	1	1	1	6.1	17
3-Apr	1	1	1	Z	1	1	1	1	2	1	1	2	5	5	5	8	6	4	8	11	10	11	12	10	4.8	12
4-Apr	8	6	5	6	Z	11	8	8	11	C	C	C	C	C	C	11	16	22	27	24	24	13	7	5	--	27
5-Apr	4	4	6	7	10	Z	7	12	23	24	18	14	14	4	4	3	2	2	7	6	3	2	5	4	7.9	24
6-Apr	Z	5	4	4	13	10	4	2	4	4	4	8	13	9	12	13	10	6	9	6	6	6	6	10	7.2	13
7-Apr	13	Z	10	4	7	6	6	6	9	9	8	10	9	15	9	9	8	7	10	9	14	13	16	14	9.5	16
8-Apr	10	5	Z	3	2	2	3	4	4	6	6	3	2	2	1	1	1	1	2	2	1	3	7	7	3.4	10
9-Apr	8	7	6	Z	17	11	1	1	2	1	1	1	1	1	1	1	1	1	1	0	1	2	1	0	2.7	17
10-Apr	1	1	1	0	Z	1	1	4	5	4	6	4	5	7	7	6	4	3	3	4	7	15	13	8	4.7	15
11-Apr	5	5	7	8	12	Z	8	5	7	M	M	9	9	11	11	8	7	11	26	39	33	20	8	6	12.1	39
12-Apr	Z	5	5	4	3	7	9	10	13	12	10	11	7	7	6	7	7	6	9	2	2	8	12	10	7.4	13
13-Apr	4	Z	9	9	4	21	28	19	18	10	9	11	10	10	11	10	7	12	11	5	5	5	4	4	10.1	28
14-Apr	3	5	Z	1	1	2	2	2	6	2	1	9	10	4	2	2	1	3	2	2	2	0	1	2	2.7	10
15-Apr	11	16	14	Z	8	8	6	8	7	12	4	10	7	7	5	4	5	4	4	2	2	6	10	9	7.3	16
16-Apr	13	13	13	14	Z	20	17	6	8	7	6	6	3	1	1	0	0	0	0	2	5	7	18	20	7.7	20
17-Apr	13	16	17	16	15	Z	14	16	14	16	12	8	3	1	0	0	0	0	0	2	5	6	7	13	8.6	17
18-Apr	Z	14	24	25	23	18	16	12	12	18	17	14	4	2	1	1	2	1	2	4	1	3	3	6	9.5	25
19-Apr	4	Z	5	7	7	8	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1.7	8
20-Apr	4	3	Z	1	1	1	1	1	1	1	1	2	3	4	3	3	3	2	4	6	4	3	6	6	2.8	6
21-Apr	6	7	9	Z	10	9	6	10	13	12	8	6	4	3	3	3	2	1	2	4	8	15	14	14	7.3	15
22-Apr	14	9	4	4	Z	5	11	16	11	10	5	4	3	3	3	3	3	3	5	8	14	17	14	10	7.7	17
23-Apr	10	7	8	9	8	Z	14	19	18	19	8	5	5	2	0	1	1	1	1	1	1	1	2	4	6.2	19
24-Apr	Z	5	8	12	8	3	7	14	12	11	9	6	2	3	1	1	2	1	1	1	1	5	2	7	5.3	14
25-Apr	4	Z	2	1	2	3	3	4	3	3	3	3	2	3	3	2	1	2	3	4	15	26	30	24	6.3	30
26-Apr	16	9	Z	3	4	3	4	4	4	4	5	6	4	2	1	2	3	5	6	6	7	6	4	5	4.9	16
27-Apr	6	5	5	Z	3	2	3	4	5	7	10	11	6	3	4	4	3	3	4	6	14	25	22	13	7.3	25
28-Apr	5	4	3	2	Z	2	3	6	9	9	9	4	2	2	2	2	2	2	3	6	6	10	11	11	5.0	11
29-Apr	12	13	10	10	12	Z	12	16	6	4	3	2	2	2	2	2	1	1	2	3	5	5	7	6	6.0	16
30-Apr	Z	6	5	8	12	9	6	6	7	4	2	1	1	1	0	0	0	2	3	2	3	8	9	6	4.3	12
	8.7	7.4	7.3	7.1	8.0	7.2	7.5	7.8	8.2	7.7	6.3	6.1	4.9	4.0	3.6	3.7	3.4	3.7	5.3	5.7	7.1	8.6	8.9	8.5	Diurnal Average	
	29	16	24	25	23	21	28	19	23	24	18	14	14	15	12	13	16	22	27	39	33	26	30	24	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance

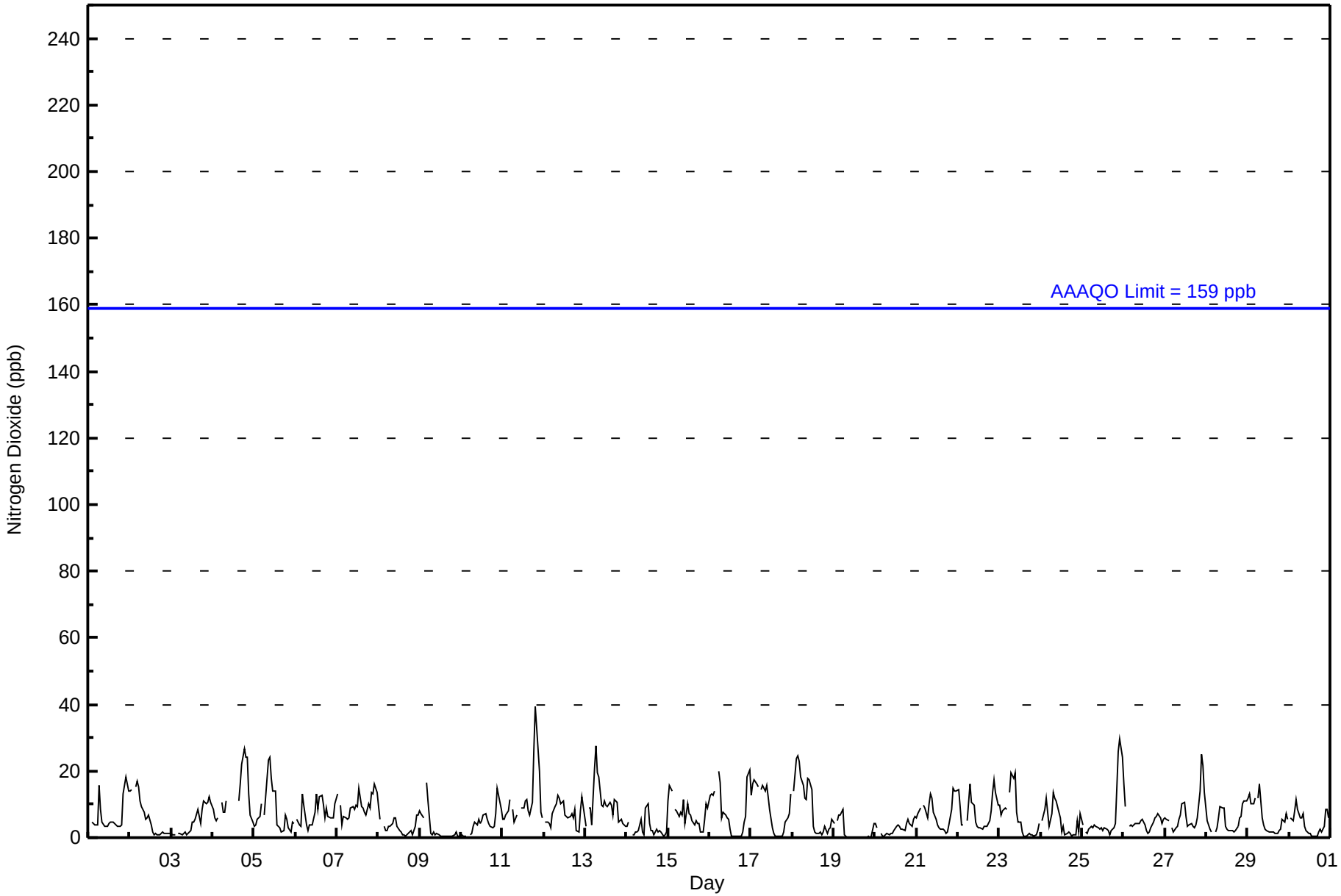
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Dioxide (NO_2) - ppb

Fort McKay - Bertha Ganter - April 2016



Nitrogen Dioxide (NO_2) - ppb

Fort McKay - Bertha Ganter - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	662	97.07	97.07
21 - 40	20	2.93	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: 682

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Dioxide (NO_2) - ppb

Fort McKay - Bertha Ganter - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	115	61	41	35	20	12	28	80	125	31	8	8	22	19	19	34	658
21 - 40	8	2	0	0	0	0	0	0	1	6	0	0	0	0	0	3	20
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	123	63	41	35	20	12	28	80	126	37	8	8	22	19	19	37	678

Total Number of Valid Hours: 678

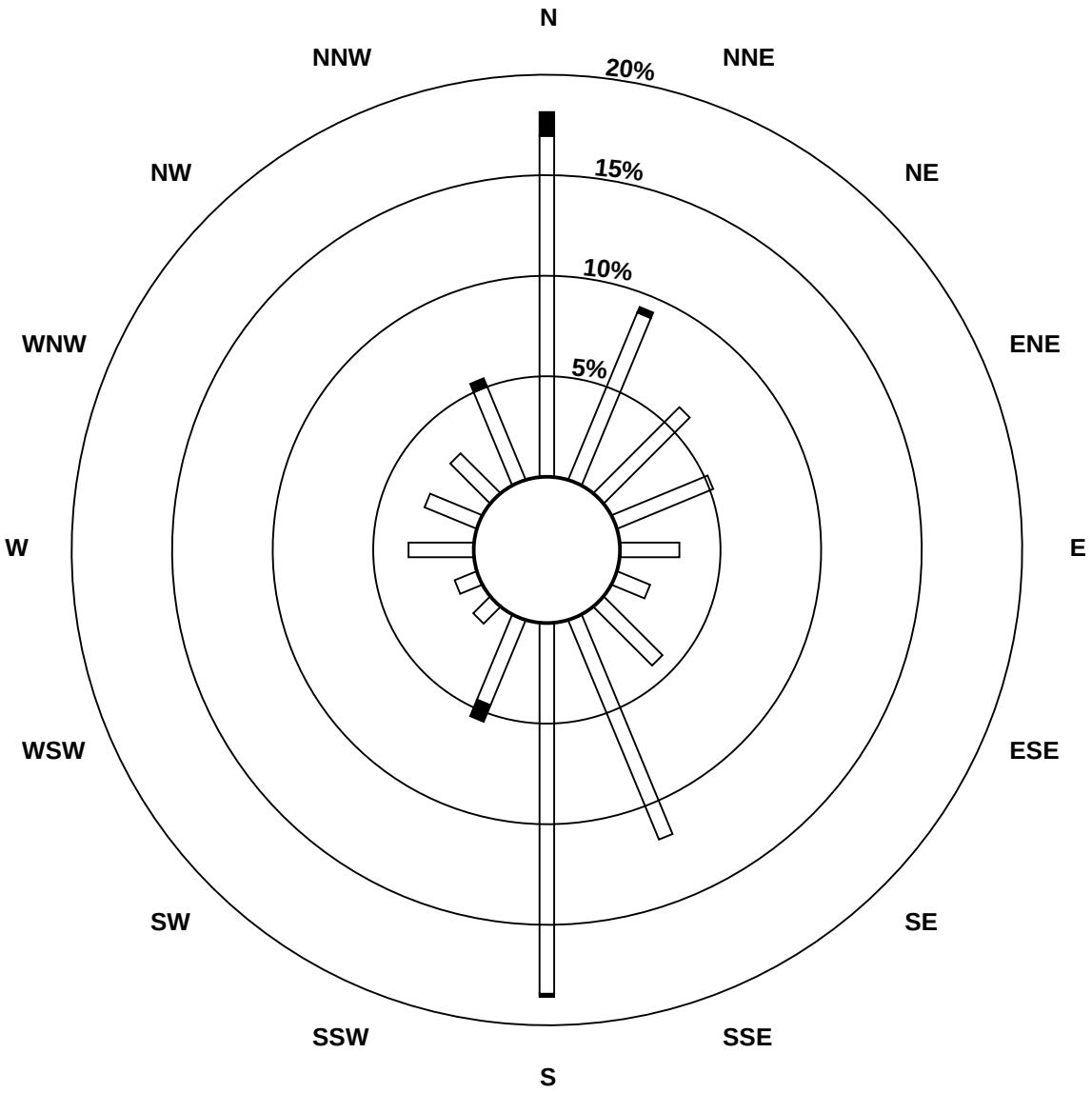
Total Number of Hours: 720

Wood Buffalo Environmental Association

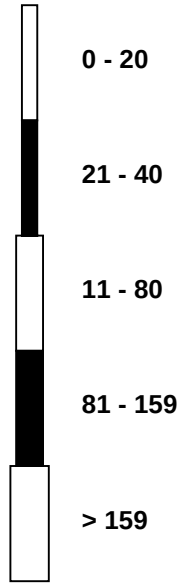
Wind Rose Apr 2016

Nitrogen Dioxide (NO_2) - ppb

Fort McKay - Bertha Ganter (AMS 1)



Classes (ppb)



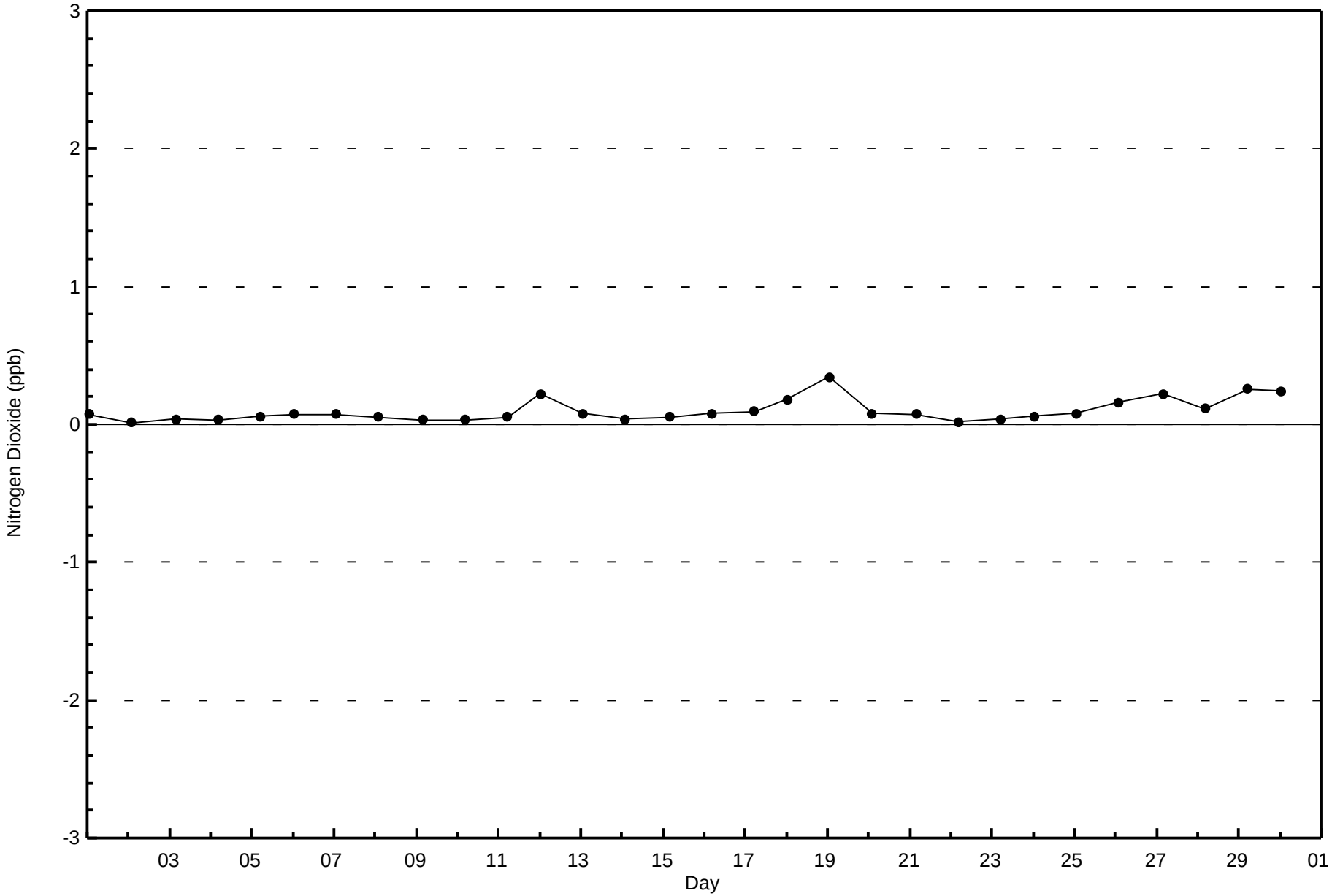
Total Number of Valid Hours: 678

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Dioxide (NO_2) - ppb

Fort McKay - Bertha Ganter - April 2016

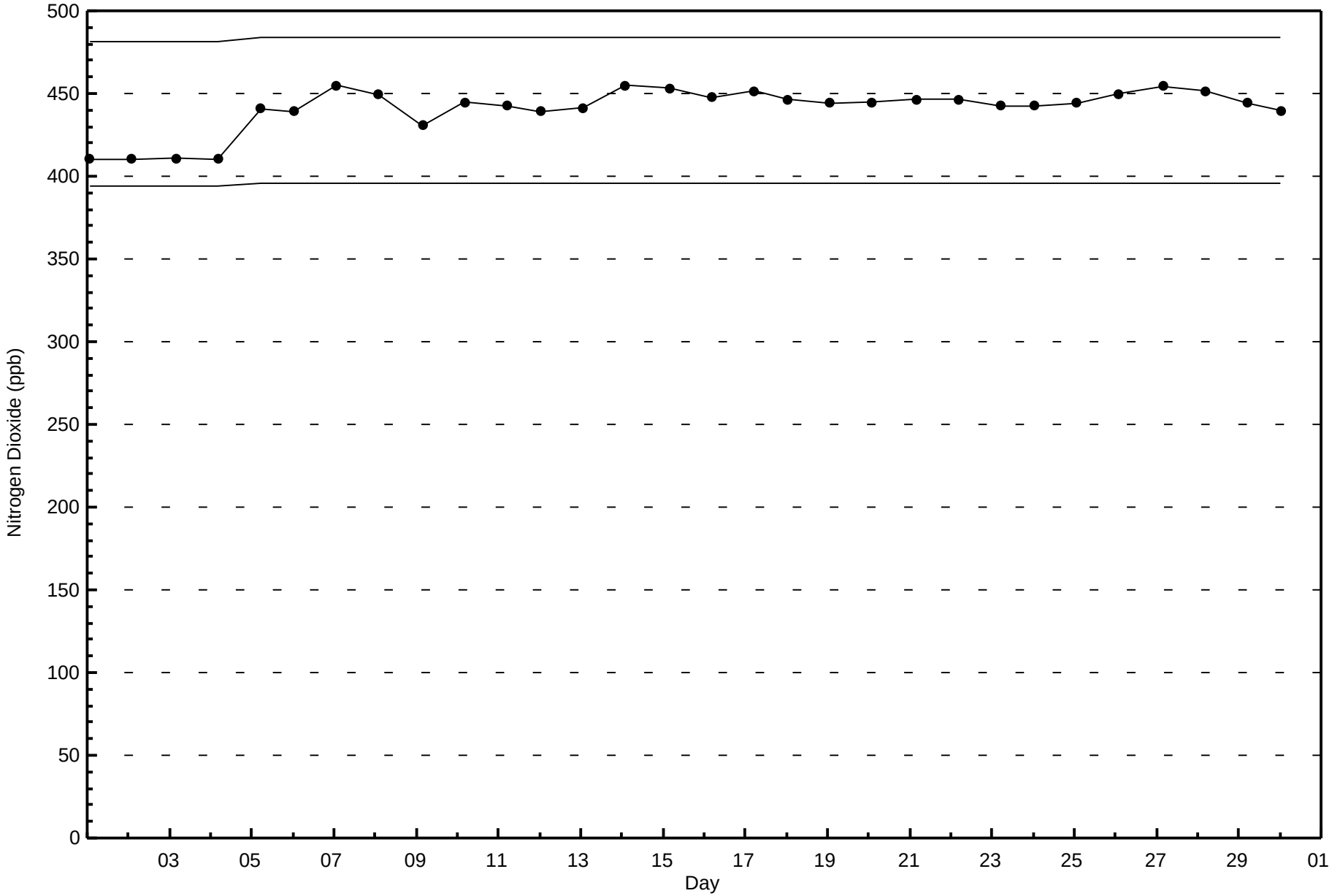


Wood Buffalo Environmental Association

Span Responses

Nitrogen Dioxide (NO_2) - ppb

Fort McKay - Bertha Ganter - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_X) - ppb

Fort McKay - Bertha Ganter - April 2016

Maximum Value: 53 ppb on Apr 11 20:00

Maximum Daily Average: 14.6 ppb on Apr 11

Minimum Value: 0 ppb on Apr 19 12:00

Minimum Daily Average: 1.7 ppb on Apr 19

Maximum Diurnal Average: 11.5 ppb at hour 9

Minimum Diurnal Average: 4.1 ppb at hour 17

Monthly Average: 7.7 ppb

Percentiles: $P_1 = 0$ $P_{10} = 1$ $Q_1 = 2$ Median = 6 $Q_3 = 11$ $P_{90} = 16$ $P_{99} = 34$

Hours in Service:	720
Hours of Data:	682
Hours of Missing Data:	38
Hours of Calibration:	36
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-Apr	40	Z	5	4	4	4	17	9	5	4	4	4	6	6	6	5	4	4	3	4	13	16	18	14	8.7	40
2-Apr	14	14	Z	15	17	15	12	12	10	8	9	10	5	2	1	1	1	1	1	2	1	1	1	1	6.8	17
3-Apr	1	1	1	Z	1	1	1	1	2	1	2	3	8	7	8	12	8	5	9	11	10	11	12	10	5.6	12
4-Apr	8	6	5	6	Z	11	9	12	18	C	C	C	C	C	C	14	20	27	31	24	24	13	7	5	--	31
5-Apr	4	4	6	7	10	Z	7	13	30	34	26	22	22	5	5	4	2	2	7	6	3	2	5	4	10.0	34
6-Apr	Z	5	4	4	19	11	4	2	4	4	5	10	19	11	17	17	12	6	9	6	6	6	6	10	8.6	19
7-Apr	13	Z	10	4	6	6	6	6	10	12	12	15	13	23	13	12	10	8	11	9	14	13	16	14	11.1	23
8-Apr	9	5	Z	3	2	2	4	4	6	8	8	4	3	2	1	1	1	2	2	2	1	3	7	7	3.8	9
9-Apr	8	7	6	Z	20	11	1	1	2	1	1	1	0	1	0	1	1	0	1	0	1	2	1	0	2.9	20
10-Apr	1	1	1	0	Z	1	1	4	6	5	8	6	7	10	10	8	5	4	3	4	7	15	13	8	5.6	15
11-Apr	5	5	7	8	12	Z	9	5	8	M	M	12	13	16	16	10	8	12	41	53	33	20	8	6	14.6	53
12-Apr	Z	4	5	4	3	7	10	11	15	17	15	16	9	9	8	9	9	7	9	2	2	8	12	9	8.8	17
13-Apr	4	Z	9	9	4	28	38	26	27	14	12	13	12	11	12	11	7	12	11	5	5	5	4	4	12.2	38
14-Apr	3	4	Z	1	1	2	2	2	6	2	1	12	13	6	3	3	1	3	1	2	1	0	1	2	3.2	13
15-Apr	11	16	14	Z	8	9	9	12	11	20	7	16	11	10	7	5	7	5	5	2	2	6	10	9	9.1	20
16-Apr	13	13	13	14	Z	22	21	7	10	9	8	7	3	1	0	0	0	0	0	2	4	7	18	20	8.4	22
17-Apr	13	16	17	16	15	Z	15	19	20	24	18	12	3	1	0	0	0	0	0	2	5	6	7	13	9.8	24
18-Apr	Z	14	32	34	27	21	23	18	17	27	26	19	4	2	1	2	2	1	2	4	1	3	3	6	12.5	34
19-Apr	4	Z	5	7	7	9	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1.7	9
20-Apr	4	3	Z	1	1	1	1	1	1	2	2	3	5	6	5	4	3	3	5	6	4	3	6	6	3.3	6
21-Apr	6	7	9	Z	10	10	7	16	22	19	12	8	6	4	3	3	3	1	2	4	8	15	14	14	8.9	22
22-Apr	14	9	4	4	Z	5	13	24	16	15	6	5	4	4	3	4	4	4	5	8	14	17	14	10	8.9	24
23-Apr	10	7	8	9	8	Z	17	30	27	31	11	6	6	2	0	1	1	1	1	1	1	1	2	4	8.0	31
24-Apr	Z	5	8	12	7	3	8	15	15	14	12	7	2	4	1	1	2	1	1	1	1	5	2	7	5.8	15
25-Apr	4	Z	2	1	2	3	3	4	4	3	3	3	3	3	3	2	1	3	3	4	15	27	37	25	6.9	37
26-Apr	16	9	Z	3	4	4	4	5	6	5	7	7	5	3	1	2	3	5	6	7	7	6	5	5	5.5	16
27-Apr	7	6	6	Z	4	4	8	10	16	12	18	17	10	5	5	6	4	4	4	6	14	26	22	14	9.9	26
28-Apr	5	4	3	2	Z	3	7	15	14	13	13	4	3	2	2	2	2	2	4	6	6	10	11	11	6.3	15
29-Apr	12	13	10	10	12	Z	13	20	7	5	3	2	2	2	2	2	1	1	2	3	5	5	7	5	6.4	20
30-Apr	Z	6	5	8	12	9	6	7	9	5	3	1	1	1	0	0	0	2	3	2	3	8	8	6	4.6	12
	9.1	7.5	7.7	7.5	8.7	8.0	9.2	10.4	11.5	11.3	9.0	8.6	6.8	5.4	4.8	4.8	4.1	4.2	6.1	6.2	7.1	8.6	9.2	8.5	Diurnal Average	
	40	16	32	34	27	28	38	30	30	34	26	22	22	23	17	17	20	27	41	53	33	27	37	25	Diurnal Maximum	

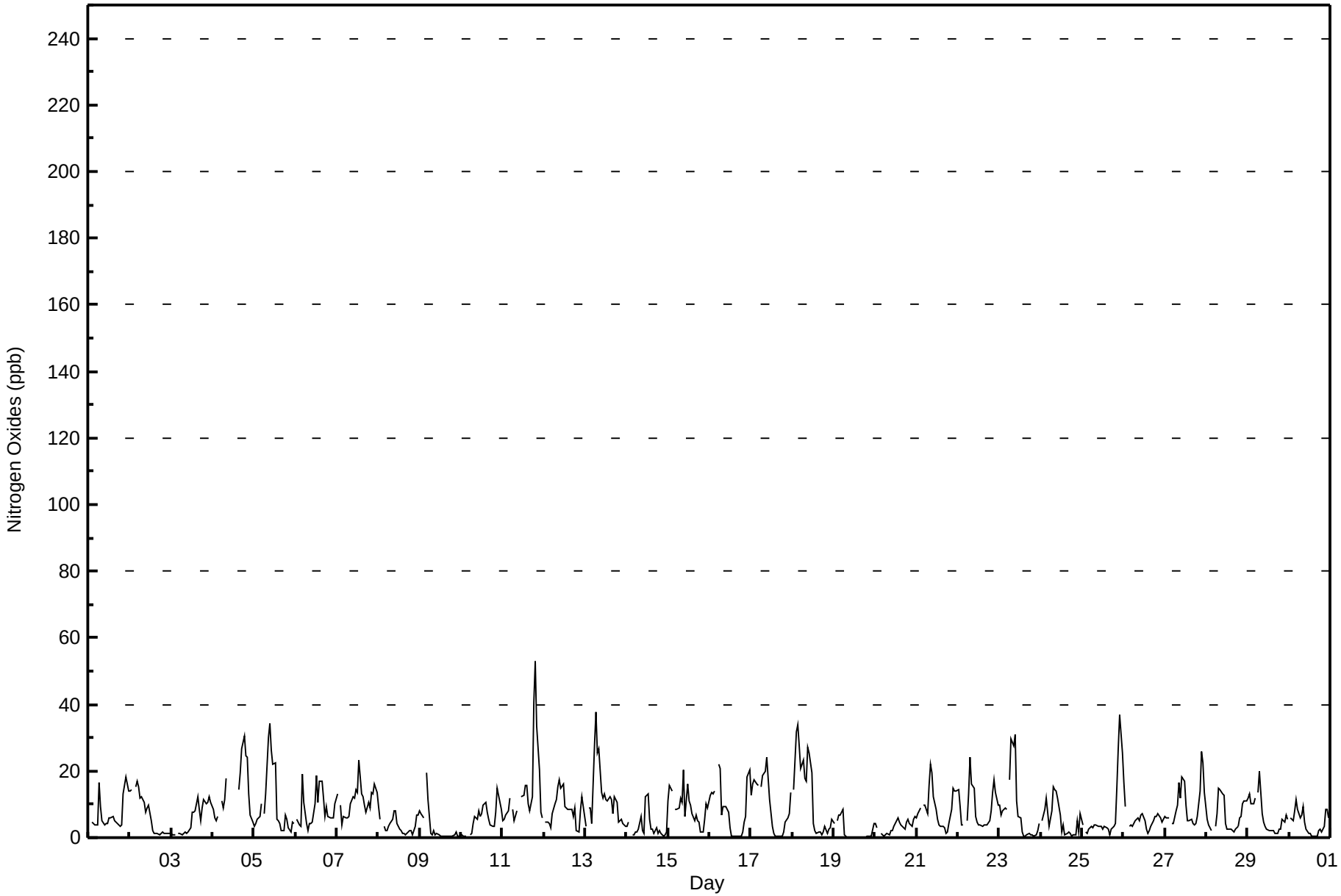
Z - zerospan C - Calibration M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Oxides (NO_X) - ppb

Fort McKay - Bertha Ganter - April 2016



Nitrogen Oxides (NO_X) - ppb

Fort McKay - Bertha Ganter - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	644	94.43	94.43
21 - 40	36	5.28	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: 682

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Oxides (NO_X) - ppb

Fort McKay - Bertha Ganter - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	113	59	38	35	19	11	27	78	121	30	8	8	22	19	19	33	640
21 - 40	10	2	3	0	1	1	1	2	5	7	0	0	0	0	0	4	36
11 - 80	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	123	63	41	35	20	12	28	80	126	37	8	8	22	19	19	37	678

Total Number of Valid Hours: 678

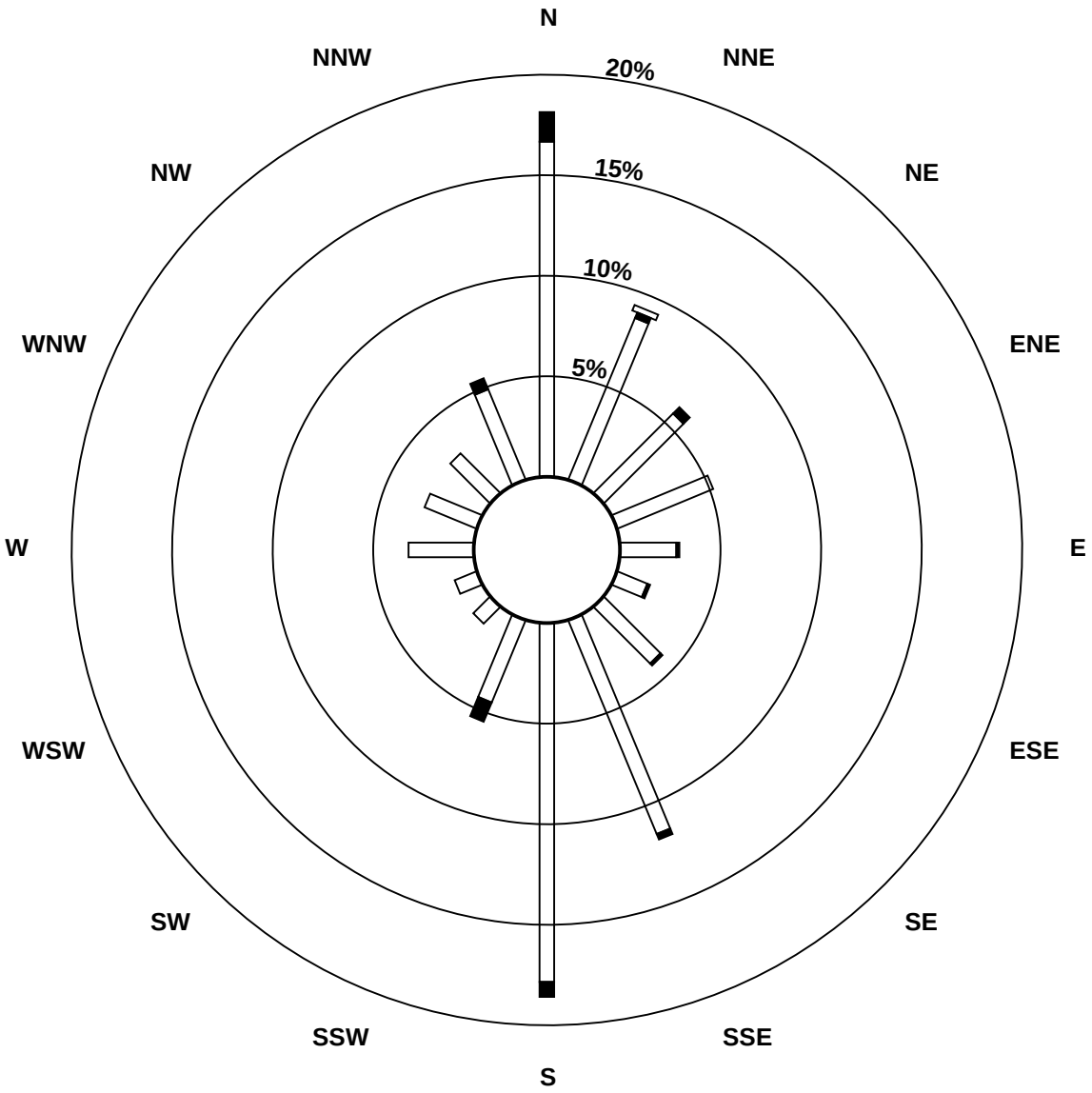
Total Number of Hours: 720

Wood Buffalo Environmental Association

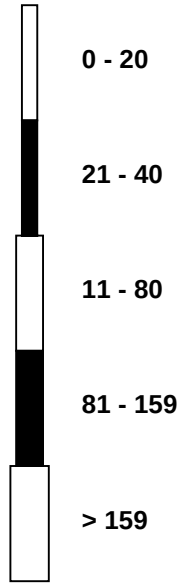
Wind Rose Apr 2016

Nitrogen Oxides (NO_X) - ppb

Fort McKay - Bertha Ganter (AMS 1)



Classes (ppb)



0 - 20

21 - 40

11 - 80

81 - 159

> 159

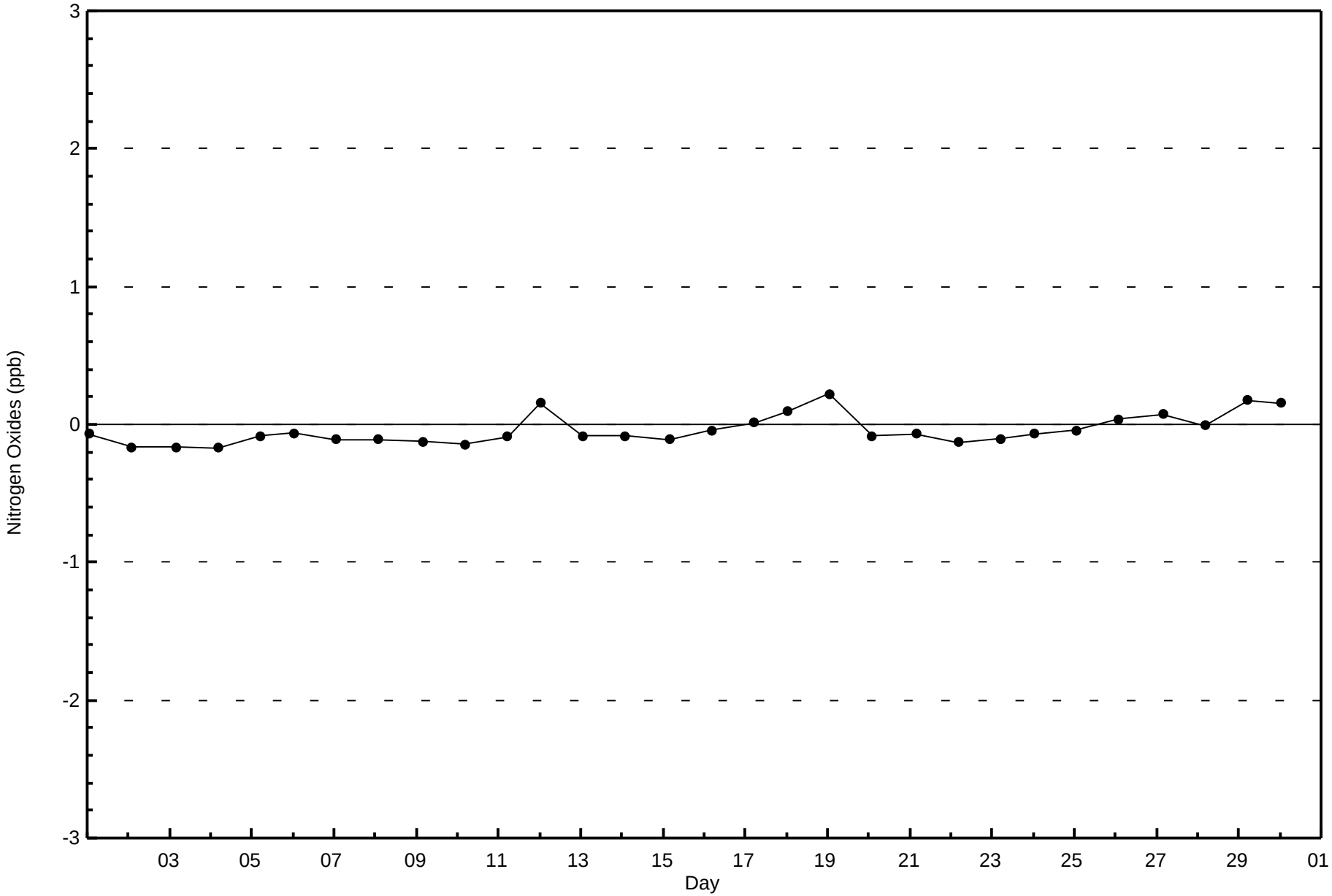
Total Number of Valid Hours: 678

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Oxides (NO_X) - ppb

Fort McKay - Bertha Ganter - April 2016

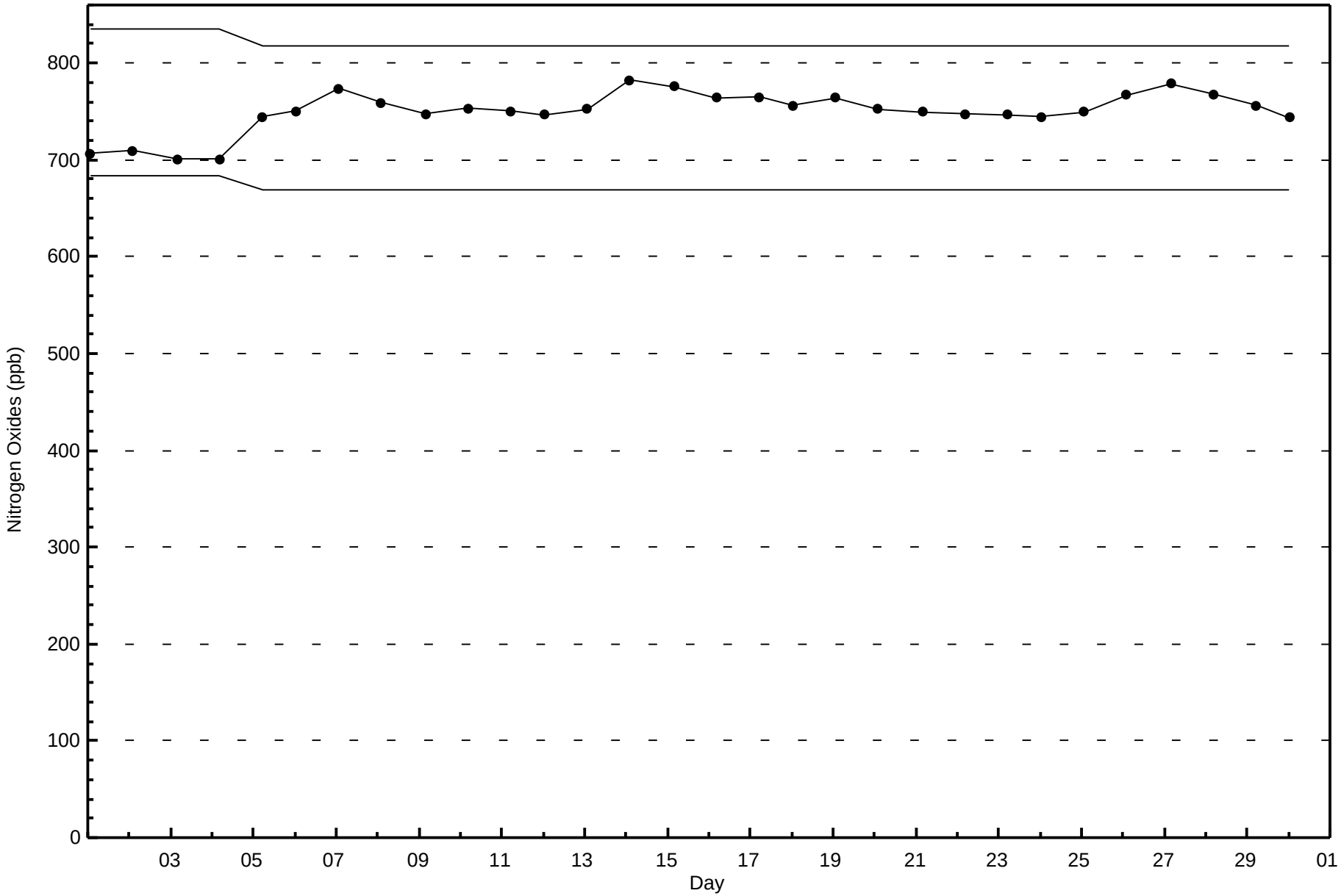


Wood Buffalo Environmental Association

Span Responses

Nitrogen Oxides (NO_X) - ppb

Fort McKay - Bertha Ganter - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O_3) - ppb

Fort McKay - Bertha Ganter - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 62 ppb on Apr 19 12:00 Maximum Daily Average: 49.2 ppb on Apr 19

Minimum Value: 0 ppb on Apr 27 05:00 Minimum Daily Average: 13.6 ppb on Apr 27
Maximum Diurnal Average: 40.9 ppb at hour 17 Minimum Diurnal Average: 20.6 ppb at hour 5
Monthly Average: 31.1 ppb Percentiles: $P_1 = 1$ $P_{10} = 14$ $Q_1 = 24$ Median = 31 $Q_3 = 40$ $P_{90} = 46$ $P_{99} = 57$

Hours in Service:	720
Hours of Data:	671
Hours of Missing Data:	49
Hours of Calibration:	45
Percent Operational Time:	99.4

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-Apr	5	12	31	28	Z	27	20	30	34	35	35	36	35	36	36	38	39	40	39	36	24	21	18	23	29.4	40
2-Apr	22	21	19	19	15	Z	26	28	34	38	39	38	42	42	43	43	42	43	43	42	42	42	41	41	35.0	43
3-Apr	41	42	43	43	43	43	Z	44	43	44	44	43	40	40	39	36	38	40	35	30	30	27	23	23	38.0	44
4-Apr	23	23	24	20	18	14	17	Z	25	C	C	C	C	C	C	C	C	C	16	16	16	28	36	38	--	38
5-Apr	39	38	36	35	31	31	36	31	Z	19	25	28	29	39	41	40	42	42	33	30	31	29	25	24	32.7	42
6-Apr	21	18	11	Z	5	12	22	31	32	31	30	27	22	29	25	24	25	29	29	33	34	35	34	29	25.5	35
7-Apr	26	29	29	36	Z	33	34	34	31	C	C	C	C	C	C	29	30	32	28	27	20	20	17	17	--	36
8-Apr	18	21	23	20	25	Z	26	31	30	29	28	29	30	31	35	35	35	34	32	31	33	30	25	23	28.4	35
9-Apr	20	20	16	11	UO	21	Z	37	36	39	40	41	43	42	42	42	41	42	43	43	42	41	41	40	35.6	43
10-Apr	41	42	42	42	42	41	40	Z	37	38	37	39	39	38	38	40	41	42	41	37	31	22	20	23	37.1	42
11-Apr	21	18	14	16	18	15	28	34	Z	M	M	32	32	31	32	37	40	35	20	4	6	17	28	30	24.2	40
12-Apr	28	24	19	Z	33	30	32	32	30	32	34	34	39	40	40	39	38	38	34	40	40	32	25	28	33.1	40
13-Apr	34	31	26	25	Z	16	5	12	15	26	26	25	27	27	25	25	27	22	22	25	24	23	20	13	22.6	34
14-Apr	13	14	30	37	36	Z	31	31	29	35	37	30	28	34	37	37	38	34	36	36	30	33	29	25	31.2	38
15-Apr	17	10	8	7	10	8	Z	23	30	26	36	33	34	35	36	39	37	37	34	34	33	28	24	26	26.2	39
16-Apr	19	17	16	15	13	6	11	Z	26	28	31	37	46	52	52	52	53	52	49	46	38	30	17	12	31.3	53
17-Apr	16	13	12	7	6	7	10	12	Z	24	32	39	49	51	48	45	44	44	42	37	28	24	20	13	27.2	51
18-Apr	7	6	1	Z	1	3	7	16	25	25	29	39	55	51	54	54	56	55	56	52	55	53	52	49	34.8	56
19-Apr	47	42	40	33	Z	32	47	48	49	53	57	62	60	59	58	58	61	58	55	50	45	44	43	32	49.2	62
20-Apr	29	30	33	31	32	Z	30	28	29	28	28	28	28	30	33	36	37	38	35	31	29	31	27	25	30.7	38
21-Apr	23	18	14	8	7	11	Z	20	22	24	31	36	40	43	44	44	44	45	44	40	34	28	28	27	29.5	45
22-Apr	25	28	35	34	31	31	25	Z	26	29	38	41	43	45	46	45	45	45	42	38	30	26	28	30	35.1	46
23-Apr	28	30	28	24	23	22	22	19	Z	22	34	40	43	47	47	45	44	42	41	39	39	38	36	35	34.2	47
24-Apr	33	34	30	Z	30	35	30	24	26	27	29	34	40	39	45	48	48	47	45	44	44	39	43	35	36.9	48
25-Apr	38	36	37	37	Z	32	33	32	31	31	31	31	32	32	33	32	34	33	31	28	16	4	UO	3	29.4	38
26-Apr	11	18	19	22	22	Z	22	22	22	23	21	20	24	25	24	23	23	21	17	13	9	9	3	4	18.2	25
27-Apr	2	2	0	1	0	0	Z	3	4	15	14	15	22	30	31	32	32	31	31	26	15	2	1	3	13.6	32
28-Apr	6	7	3	1	1	1	3	Z	21	26	34	50	54	55	55	55	55	55	52	45	41	32	28	24	30.6	55
29-Apr	25	24	26	29	25	22	23	24	Z	44	50	52	53	53	53	52	52	52	50	43	38	37	34	35	38.9	53
30-Apr	35	35	34	Z	28	31	34	34	35	41	46	53	51	48	47	47	46	46	44	38	39	30	25	18	38.6	53
	23.9	23.4	23.3	23.2	20.6	20.9	24.6	27.2	28.9	30.8	33.9	36.0	38.5	40.1	40.7	40.4	40.9	40.4	37.3	34.6	31.2	28.5	27.3	25.0	Diurnal Average	
	47	42	43	43	43	43	47	48	49	53	57	62	60	59	58	58	61	58	56	52	55	53	52	49	Diurnal Maximum	

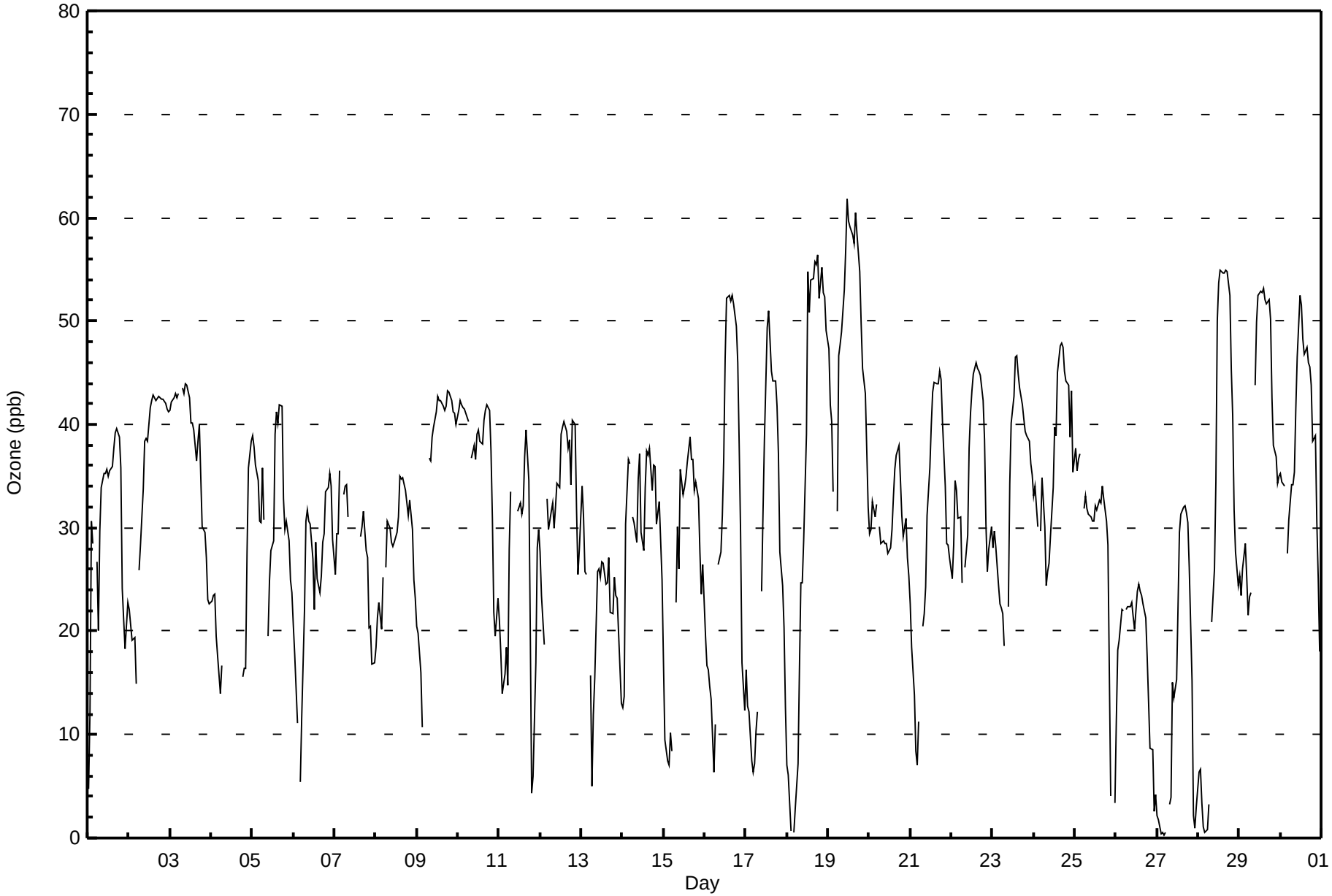
Z - zerospan C - Calibration M - Maintenance UO - Unstable Operation
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb

Wood Buffalo Environmental Association

Hourly Averages

Ozone (O_3) - ppb

Fort McKay - Bertha Ganter - April 2016



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	123	18.33	18.33
21 - 50	505	75.26	93.59
51 - 82	43	6.41	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 671

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Ozone (O_3) - ppb

Fort McKay - Bertha Ganter - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	18	5	2	3	0	1	4	8	19	19	7	5	6	4	8	14	123
21 - 50	108	56	33	29	20	8	23	65	87	14	3	1	12	9	10	23	501
51 - 82	0	0	0	0	0	0	1	4	16	5	2	3	4	8	0	0	43
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	126	61	35	32	20	9	28	77	122	38	12	9	22	21	18	37	667

Total Number of Valid Hours: 667

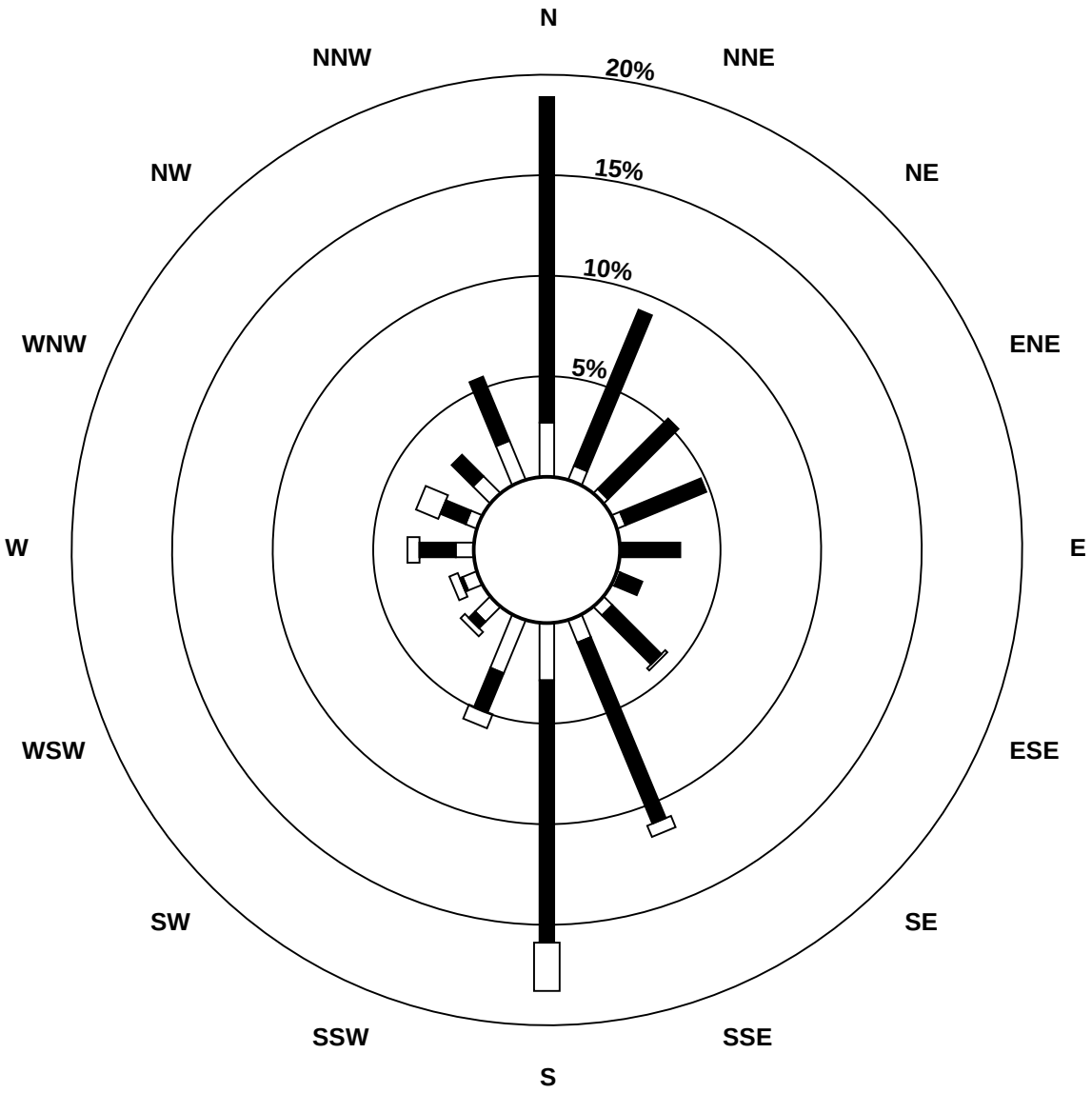
Total Number of Hours: 720

Wood Buffalo Environmental Association

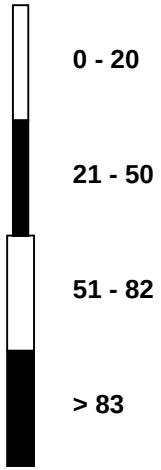
Wind Rose Apr 2016

Ozone (O_3) - ppb

Fort McKay - Bertha Ganter (AMS 1)



Classes (ppb)



0 - 20

21 - 50

51 - 82

> 83

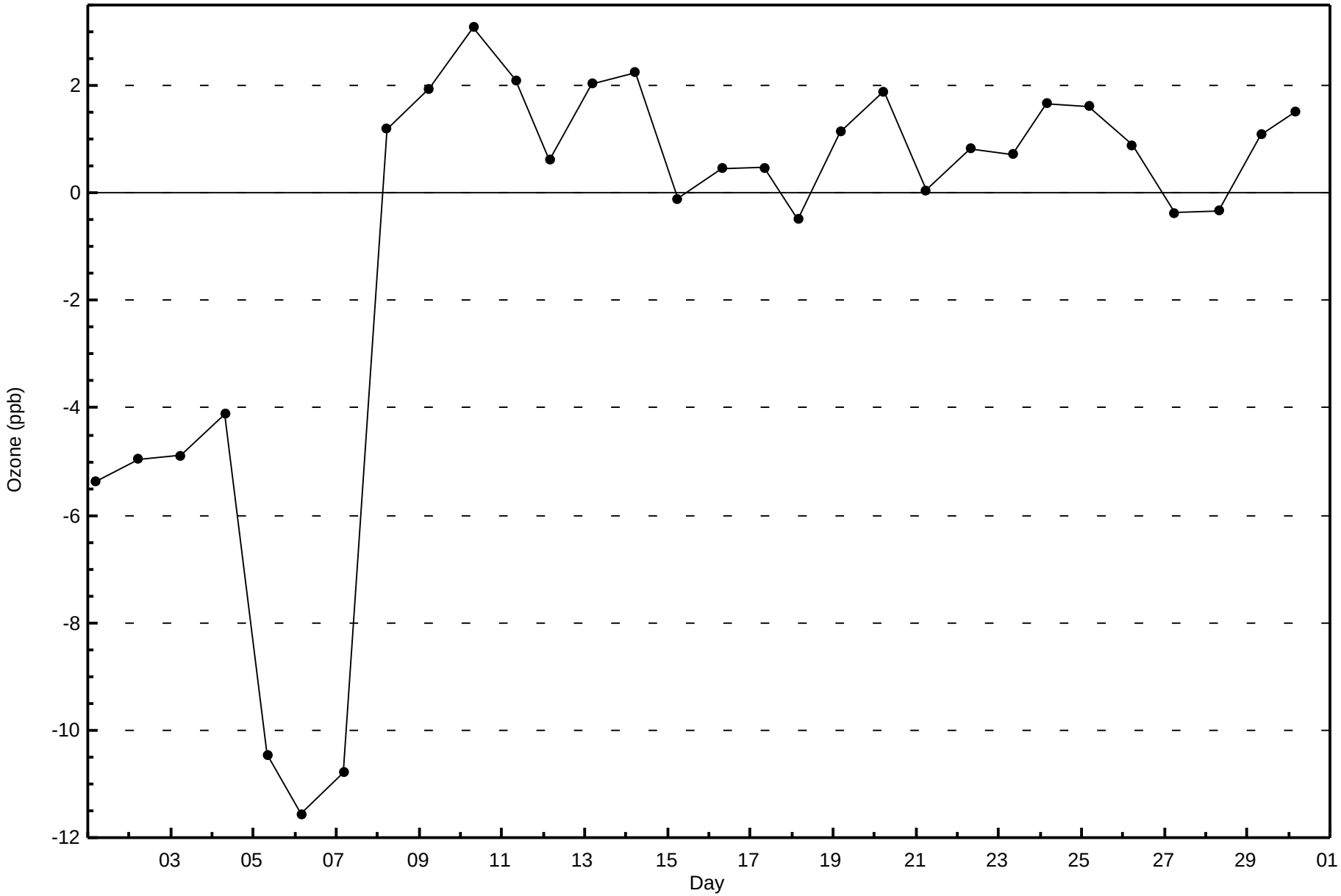
Total Number of Valid Hours: 667

Wood Buffalo Environmental Association

Zero Responses

Ozone (O_3) - ppb

Fort McKay - Bertha Ganter - April 2016

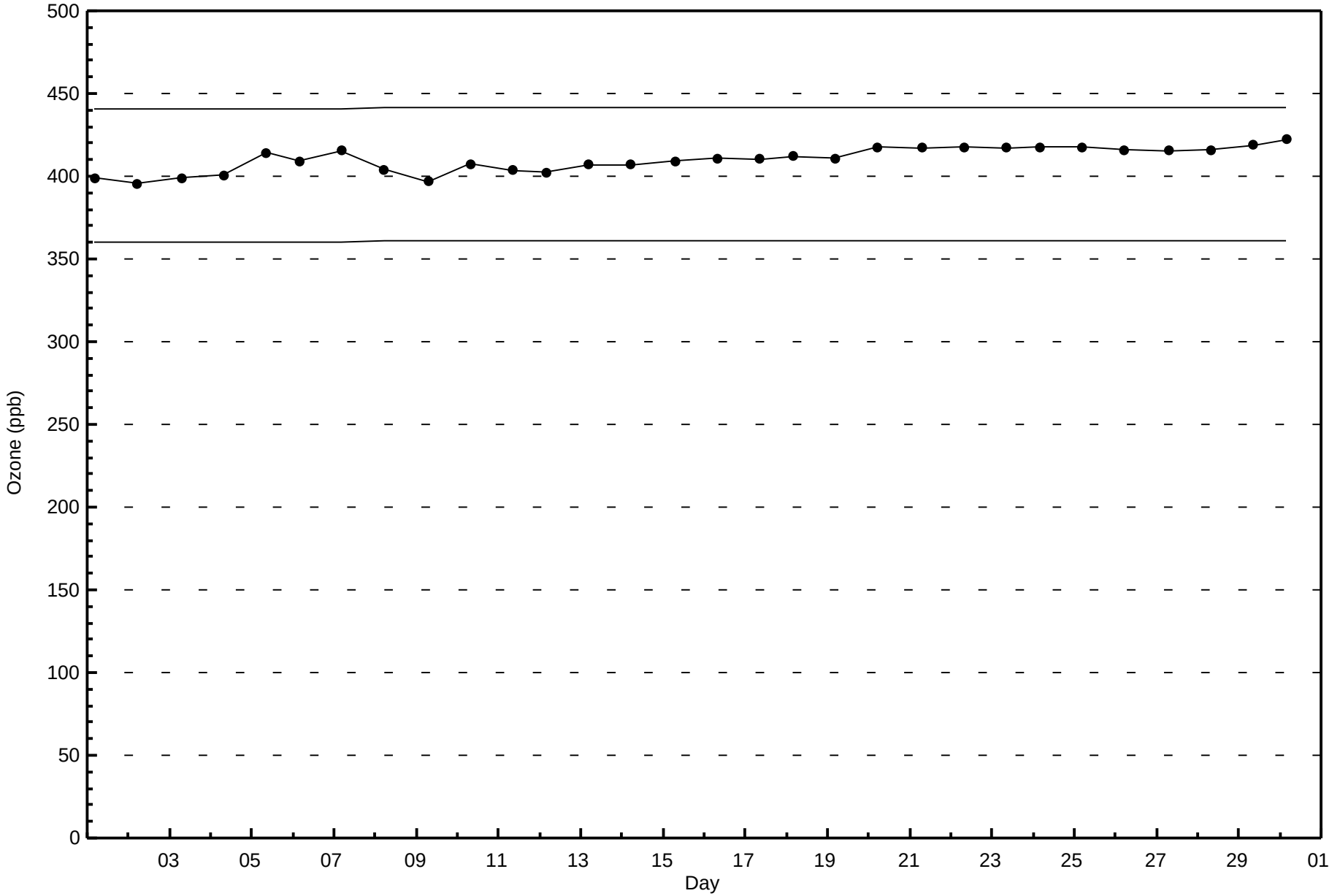


Wood Buffalo Environmental Association

Span Responses

Ozone (O_3) - ppb

Fort McKay - Bertha Ganter - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

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

Fort McKay - Bertha Ganter - April 2016

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

Maximum Value: 47.1 $\mu g/m^3$ on Apr 17 21:00

Maximum Daily Average: 11.3 $\mu g/m^3$ on Apr 29

Minimum Value: 0.1 $\mu g/m^3$ on Apr 16 16:00

Minimum Daily Average: 2.2 $\mu g/m^3$ on Apr 8

Maximum Diurnal Average: 7.4 $\mu g/m^3$ at hour 21

Minimum Diurnal Average: 3.5 $\mu g/m^3$ at hour 15

Monthly Average: 5.54 $\mu g/m^3$

Percentiles: $P_1 = 0.8$ $P_{10} = 1.7$ $Q_1 = 2.7$ Median = 4.2 $Q_3 = 7.2$ $P_{90} = 11.0$ $P_{99} = 21.1$

Hours in Service:	720
Hours of Data:	711
Hours of Missing Data:	9
Hours of Calibration:	4
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-Apr	14.4	6.8	2.7	3.2	2.5	2.3	2.4	1.9	1.7	1.3	1.2	1.4	1.6	1.8	2.4	2.3	2.1	1.9	2.0	2.7	5.1	4.3	4.3	3.7	3.2	14.4
2-Apr	3.7	4.1	4.1	4.0	4.1	4.0	4.3	3.8	3.7	2.4	2.6	3.4	2.9	1.4	1.4	2.2	1.9	1.6	1.8	2.4	2.6	2.7	2.7	2.6	2.9	4.3
3-Apr	1.9	1.8	1.8	1.9	1.9	1.9	1.9	2.0	2.0	2.2	1.9	1.8	2.0	2.2	2.3	3.1	2.7	2.2	3.7	4.5	4.5	6.0	4.1	5.2	2.7	6.0
4-Apr	3.6	3.7	3.4	4.7	3.3	3.7	3.8	3.9	5.9	13.2	16.3	18.8	15.6	7.2	7.0	6.9	8.0	7.7	7.8	5.9	5.3	4.8	4.0	3.5	7.0	18.8
5-Apr	3.1	3.5	5.1	5.7	5.8	7.3	5.5	8.1	10.4	7.3	6.7	6.8	8.1	4.0	5.3	5.3	3.9	2.6	4.2	4.5	3.7	4.5	7.3	6.5	5.6	10.4
6-Apr	6.8	7.6	9.7	13.5	13.7	9.6	3.9	2.3	2.5	2.8	2.9	3.0	3.5	3.6	3.5	2.9	2.9	2.5	2.6	2.7	2.8	2.5	2.5	2.6	4.7	13.7
7-Apr	2.9	3.9	4.2	3.8	4.1	4.2	3.7	3.6	4.1	4.6	6.7	7.4	8.8	9.7	4.3	3.1	3.1	3.0	3.3	3.1	3.1	3.2	3.4	3.5	4.4	9.7
8-Apr	3.1	2.8	2.7	2.7	2.7	2.7	2.7	2.6	2.9	3.4	3.0	2.0	1.7	1.3	0.9	1.1	1.0	1.0	1.4	1.7	1.7	2.2	2.5	2.5	2.2	3.4
9-Apr	2.4	2.6	2.6	2.9	4.0	2.5	1.7	1.6	1.7	1.8	1.4	1.0	1.0	1.5	1.5	2.5	2.7	2.9	3.5	3.6	4.0	3.9	3.9	3.6	2.5	4.0
10-Apr	3.1	2.7	2.9	3.0	3.1	3.4	3.3	2.7	2.5	2.6	9.7	9.2	2.8	2.9	3.2	2.6	2.4	2.7	2.9	3.3	5.7	8.3	5.5	7.9	4.1	9.7
11-Apr	6.6	5.9	7.7	7.7	7.1	10.5	7.6	7.2	6.6	11.1	16.2	16.8	13.4	14.0	13.6	7.9	6.6	8.9	12.2	15.2	10.1	10.4	9.3	7.6	10.0	16.8
12-Apr	6.0	6.1	6.8	6.9	4.7	4.6	4.9	4.8	5.1	5.8	5.9	5.3	4.2	4.4	4.6	4.7	3.9	3.6	3.6	3.1	2.9	4.0	4.2	3.6	4.7	6.9
13-Apr	3.0	2.8	3.0	3.2	2.8	4.2	5.2	4.9	4.2	3.4	3.6	4.9	5.3	5.0	5.5	6.4	7.2	6.4	6.5	6.4	5.6	4.6	4.4	5.0	4.7	7.2
14-Apr	5.5	4.9	3.2	3.6	4.5	5.9	5.2	3.2	2.2	1.3	0.9	1.8	1.6	1.0	0.8	0.8	0.8	1.2	0.9	1.1	1.0	0.9	1.6	1.6	2.3	5.9
15-Apr	2.7	3.4	3.5	3.3	3.1	3.3	3.6	7.7	3.1	2.9	2.0	5.0	5.3	5.9	4.0	2.1	2.3	1.3	1.5	1.8	2.4	4.0	4.7	21.4	4.2	21.4
16-Apr	4.4	5.1	6.1	7.6	4.8	4.6	5.0	5.3	5.7	4.4	3.2	4.3	1.8	0.6	0.4	0.1	UO	UO	0.6	9.7	24.7	19.7	15.4	10.9	6.6	24.7
17-Apr	10.1	11.9	12.3	12.0	11.4	10.2	9.4	8.9	13.3	10.5	4.8	4.2	3.4	1.8	0.5	UO	UO	0.4	2.4	8.4	47.1	29.8	13.7	9.7	10.7	47.1
18-Apr	9.3	10.3	11.1	11.9	9.6	9.8	10.1	8.3	7.7	8.1	11.6	7.5	6.5	5.0	5.1	4.9	7.4	10.6	12.0	17.5	11.2	10.2	11.5	22.8	10.0	22.8
19-Apr	21.7	25.1	20.2	20.1	28.0	14.8	10.2	1.8	UO	0.8	1.4	1.4	1.9	1.6	1.1	1.4	1.4	1.0	1.0	1.2	0.8	1.1	1.3	4.1	7.1	28.0
20-Apr	0.9	1.1	1.2	2.6	2.1	2.8	3.8	4.8	4.1	3.0	2.6	2.8	3.6	4.3	3.6	2.9	2.6	2.5	2.8	3.4	6.7	6.6	4.3	4.2	3.3	6.7
21-Apr	5.0	5.5	6.1	6.2	6.4	7.3	5.6	4.9	19.3	16.8	2.8	2.4	2.6	2.2	1.5	1.3	1.3	0.7	1.2	2.1	3.9	5.4	3.6	2.8	4.9	19.3
22-Apr	2.4	2.2	2.4	3.0	2.7	3.5	3.8	3.1	C	C	C	C	3.7	3.1	2.8	3.0	2.8	3.2	3.1	4.9	8.1	6.6	4.9	4.4	3.7	8.1
23-Apr	4.0	3.6	4.0	3.9	3.8	3.7	4.2	5.6	6.6	6.4	4.5	3.9	3.9	2.8	1.9	2.2	3.1	3.7	6.1	5.9	3.1	2.7	3.2	4.9	4.1	6.6
24-Apr	7.2	5.2	5.7	8.2	5.7	4.8	5.5	7.1	7.7	7.7	7.6	6.8	6.8	7.2	4.8	5.2	6.1	5.0	4.4	4.4	4.8	9.9	8.6	8.7	6.5	9.9
25-Apr	9.8	8.6	9.5	9.9	9.1	9.1	8.0	10.3	10.4	7.7	5.1	4.4	4.2	5.0	3.0	2.5	1.9	2.1	2.6	2.3	4.6	5.2	5.7	5.3	6.1	10.4
26-Apr	5.2	4.6	5.8	6.3	7.3	8.6	8.1	10.7	8.5	7.8	10.1	6.6	6.3	6.3	6.0	6.9	8.0	7.7	8.9	12.4	9.4	9.8	9.3	8.7	7.9	12.4
27-Apr	8.0	6.3	8.5	5.4	3.2	2.8	2.7	3.7	6.1	3.7	2.8	3.0	2.5	1.6	1.5	2.1	1.9	1.7	1.5	2.1	3.4	3.8	4.1	9.1	3.8	9.1
28-Apr	4.0	4.3	4.1	3.9	4.2	4.4	5.6	5.7	9.3	7.0	9.2	5.7	3.3	3.8	4.6	6.4	7.2	9.6	10.7	14.5	13.5	18.8	19.6	20.4	8.3	20.4
29-Apr	15.1	13.3	12.9	11.3	12.5	12.2	11.7	12.3	12.9	13.0	9.8	8.8	8.0	7.6	7.0	8.2	8.1	7.9	8.1	11.2	17.8	13.8	15.1	13.0	11.3	17.8
30-Apr	13.8	14.0	12.2	11.1	10.8	12.2	11.7	11.5	8.4	7.2	5.2	4.8	4.0	2.2	1.8	1.5	1.5	2.9	4.4	4.5	2.6	7.0	6.3	5.8	7.0	14.0
	6.3	6.1	6.2	6.4	6.3	6.0	5.5	5.5	6.4	5.9	5.6	5.3	4.7	4.0	3.5	3.5	3.7	3.8	4.3	5.5	7.4	7.2	6.4	7.2	Diurnal Average	
	21.7	25.1	20.2	20.1	28.0	14.8	11.7	12.3	19.3	16.8	16.3	18.8	15.6	14.0	13.6	8.2	8.1	10.6	12.2	17.5	47.1	29.8	19.6	22.8	Diurnal Maximum	

C - Calibration UO - Unstable Operation

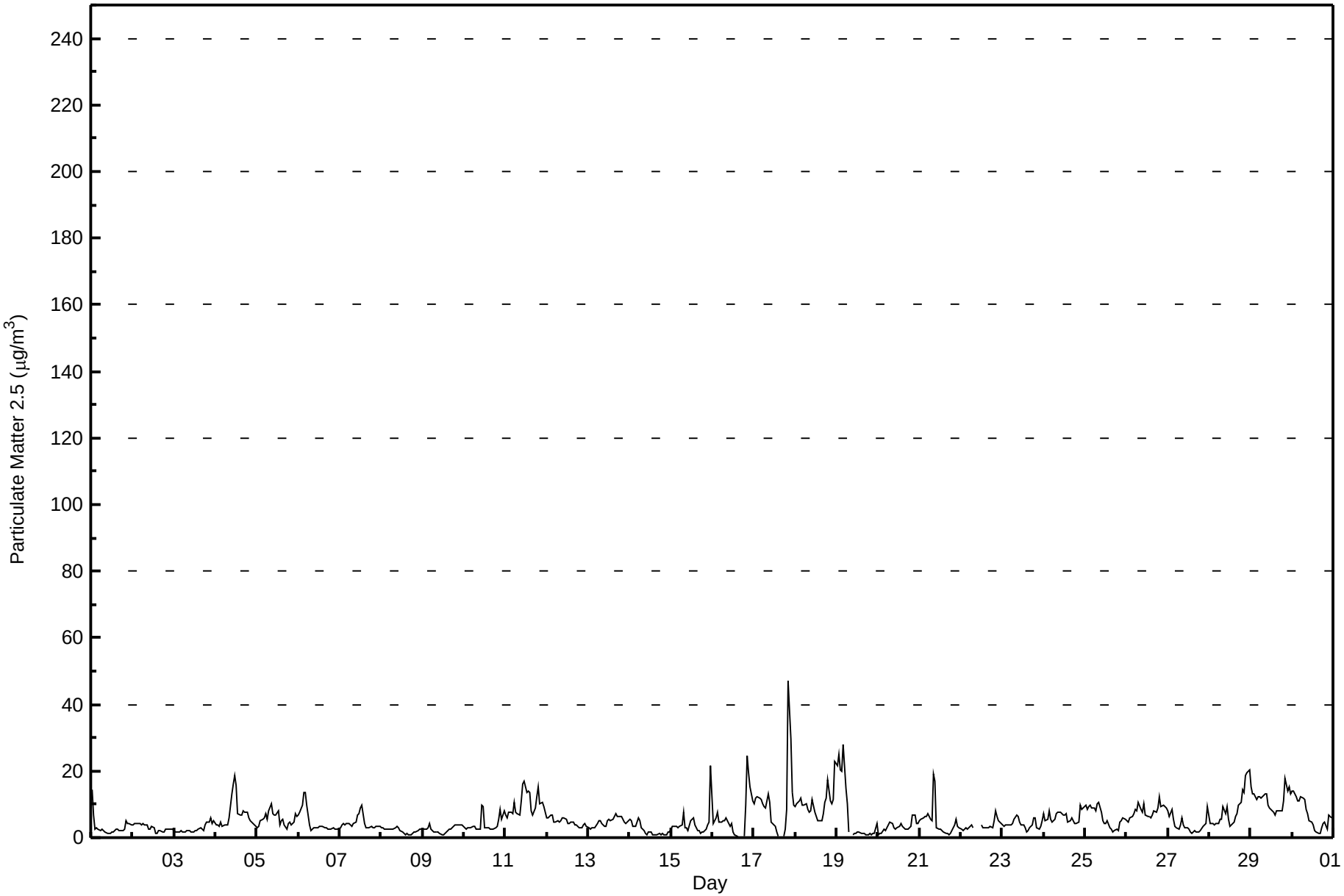
Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 $\mu g/m^3$

Wood Buffalo Environmental Association

Hourly Averages

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

Fort McKay - Bertha Ganter - April 2016



Concentration Ranges ($\mu g/m^3$)	Number of Hours	%	Cumulative %
1 - 5	435	61.18	61.18
6 - 15	233	32.77	93.95
16 - 25	20	2.81	96.77
26 - 80	3	0.42	97.19
> 81.0	0	0.00	97.19

Total Number of Valid Hours: 711

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

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

Fort McKay - Bertha Ganter - April 2016

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	113	55	31	30	15	8	20	35	35	15	8	3	14	13	12	24	431
6 - 15	17	6	6	4	5	3	9	45	87	21	3	3	2	4	5	13	233
16 - 25	0	0	0	1	0	1	0	4	12	1	1	0	0	0	0	0	20
26 - 80	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	3
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	130	61	37	35	20	12	29	84	135	39	12	6	16	17	17	37	687

Total Number of Valid Hours: 707

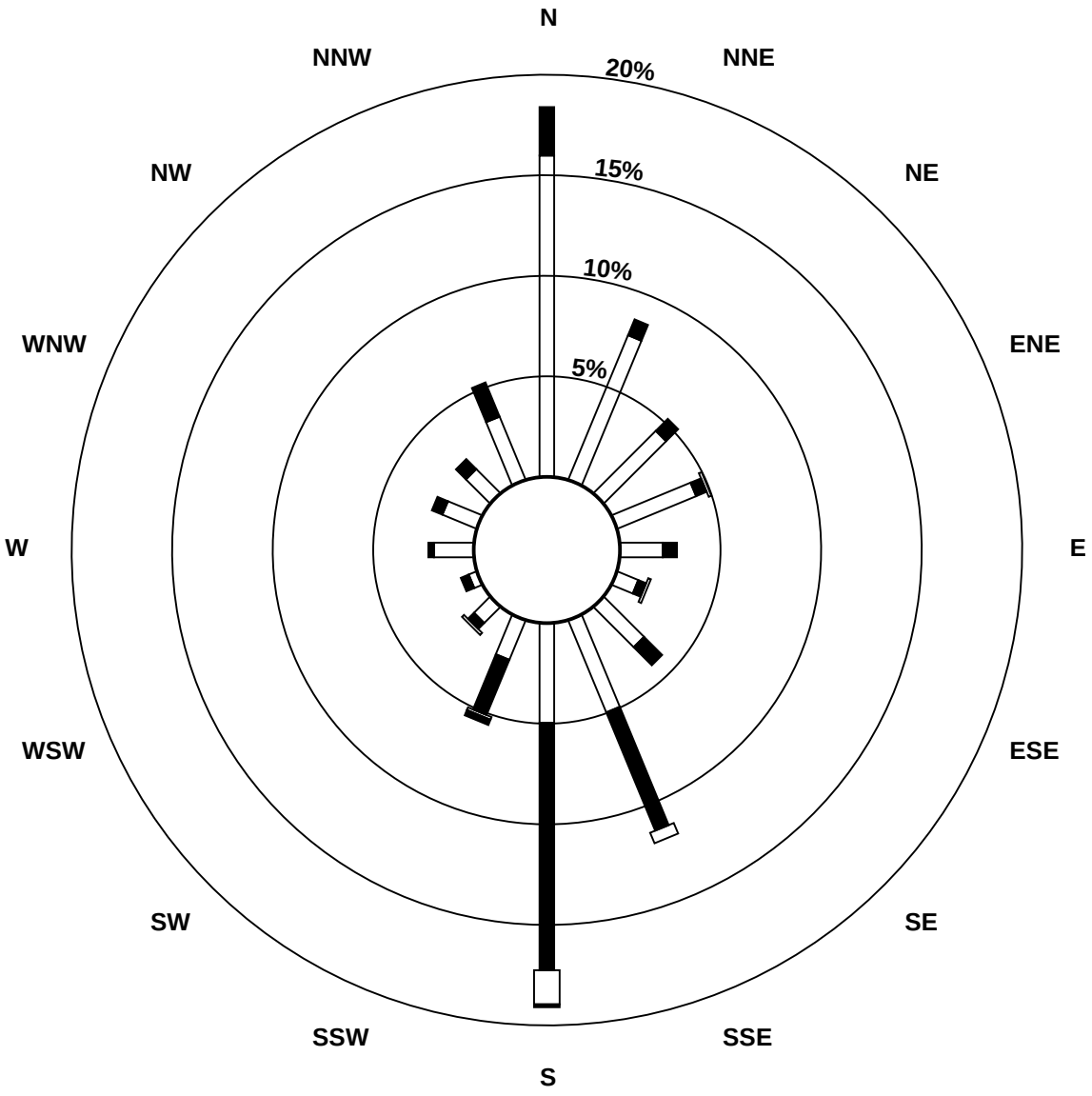
Total Number of Hours: 720

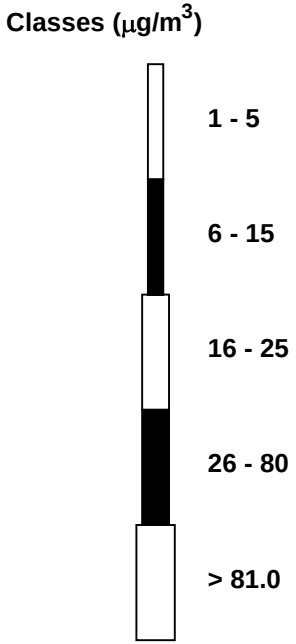
Wood Buffalo Environmental Association

Wind Rose Apr 2016

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

Fort McKay - Bertha Ganter (AMS 1)





Total Number of Valid Hours: 707

Wood Buffalo Environmental Association

Summary of Hour Averages

Ammonia (NH_3) - ppb

Fort McKay - Bertha Ganter - April 2016

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

Maximum Value: 0 ppb on Apr 1 01:00 Maximum Daily Average: 0.0 ppb on Apr 1

Minimum Value: 0 ppb on Apr 1 01:00 Minimum Daily Average: 0.0 ppb on Apr 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:	720
Hours of Data:	625
Hours of Missing Data:	95
Hours of Calibration:	42
Percent Operational Time:	92.6

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-Apr	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
2-Apr	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
3-Apr	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
4-Apr	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
5-Apr	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
6-Apr	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
7-Apr	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
8-Apr	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
9-Apr	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
10-Apr	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
11-Apr	0	0	0	0	0	0	0	Z	RE	RE	C	C	C	C	0	0	0	0	0	0	0	0	0	0	--	0
12-Apr	0	0	Z	RE	RE	0	0	0	0	0	C	C	C	C	C	C	C	C	0	0	0	0	0	0	--	0
13-Apr	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
14-Apr	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
15-Apr	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
16-Apr	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
17-Apr	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
18-Apr	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
19-Apr	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
20-Apr	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
21-Apr	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
22-Apr	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
23-Apr	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
24-Apr	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
25-Apr	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
26-Apr	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
27-Apr	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
28-Apr	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
29-Apr	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
30-Apr	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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 RE - Recovery

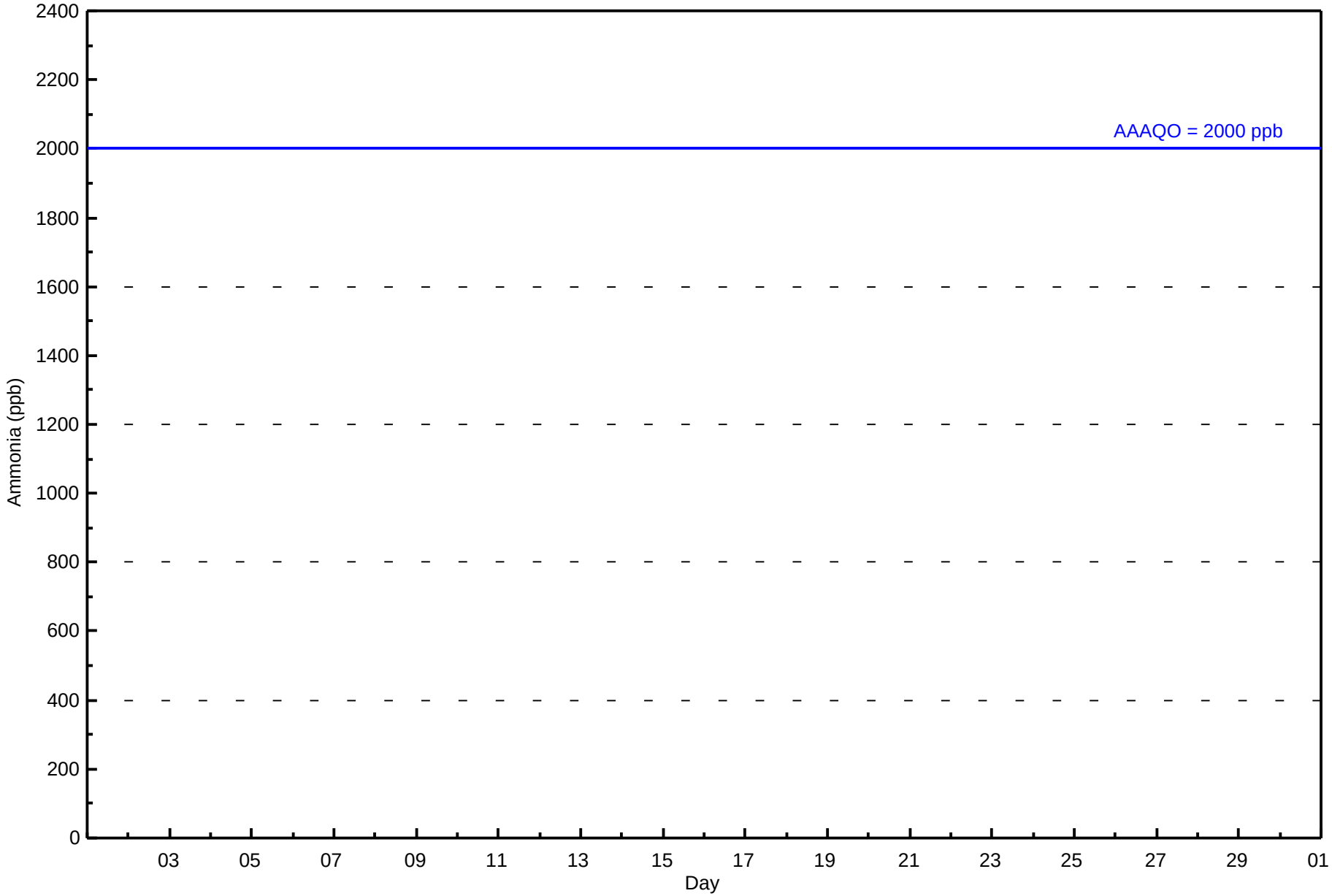
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 2000 ppb

Wood Buffalo Environmental Association

Hourly Averages

Ammonia (NH_3) - ppb

Fort McKay - Bertha Ganter - April 2016



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 5	625	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: 625

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Ammonia (NH_3) - ppb

Fort McKay - Bertha Ganter - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 5	113	59	36	30	17	9	29	72	111	35	12	7	21	21	16	33	621
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	113	59	36	30	17	9	29	72	111	35	12	7	21	21	16	33	621

Total Number of Valid Hours: 621

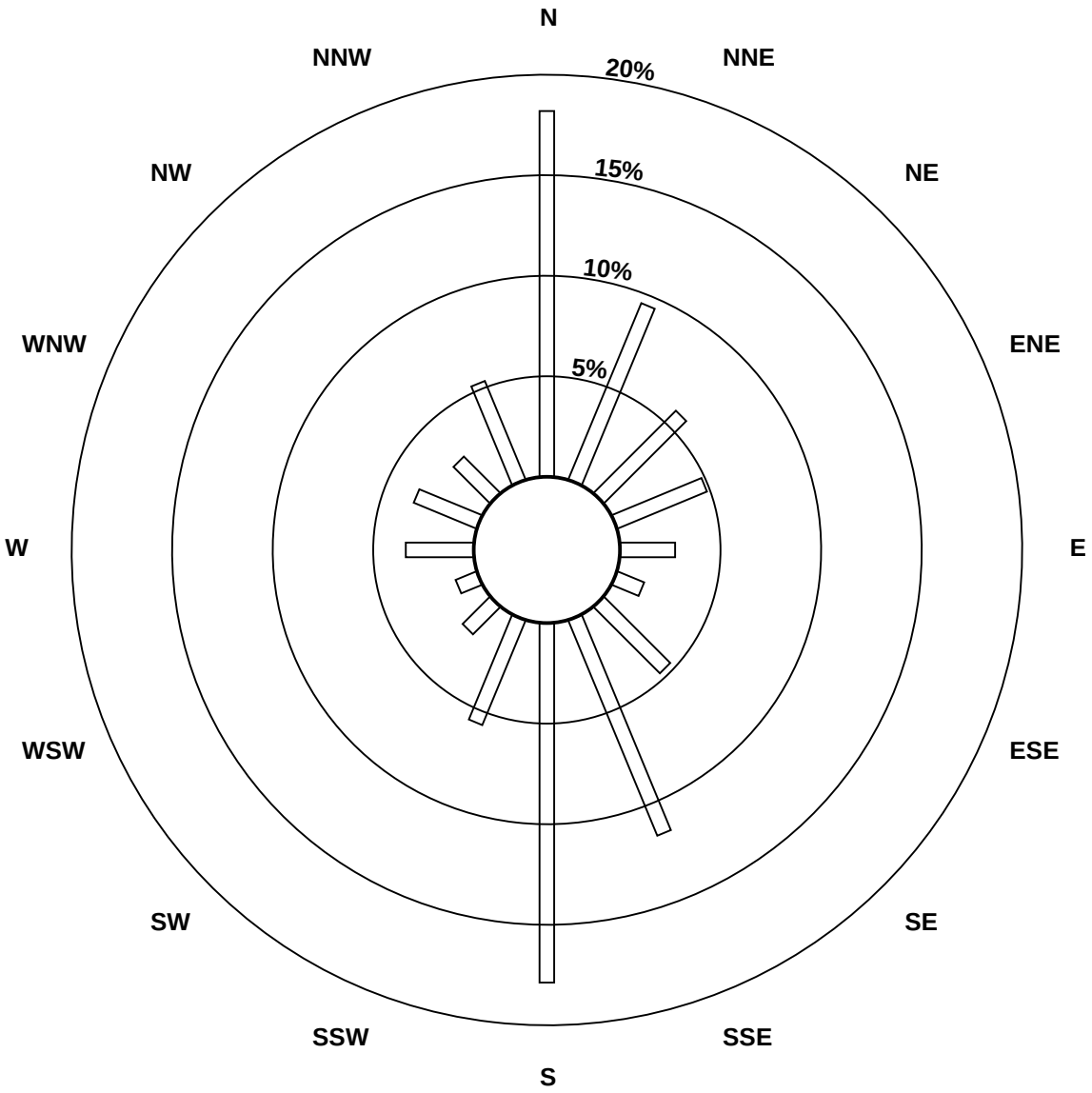
Total Number of Hours: 720

Wood Buffalo Environmental Association

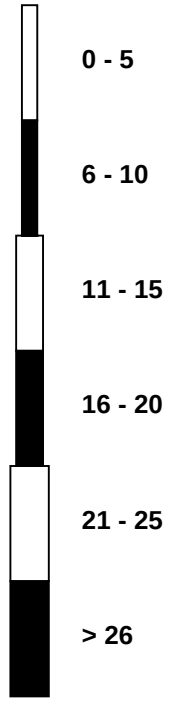
Wind Rose Apr 2016

Ammonia (NH_3) - ppb

Fort McKay - Bertha Ganter (AMS 1)



Classes (ppb)



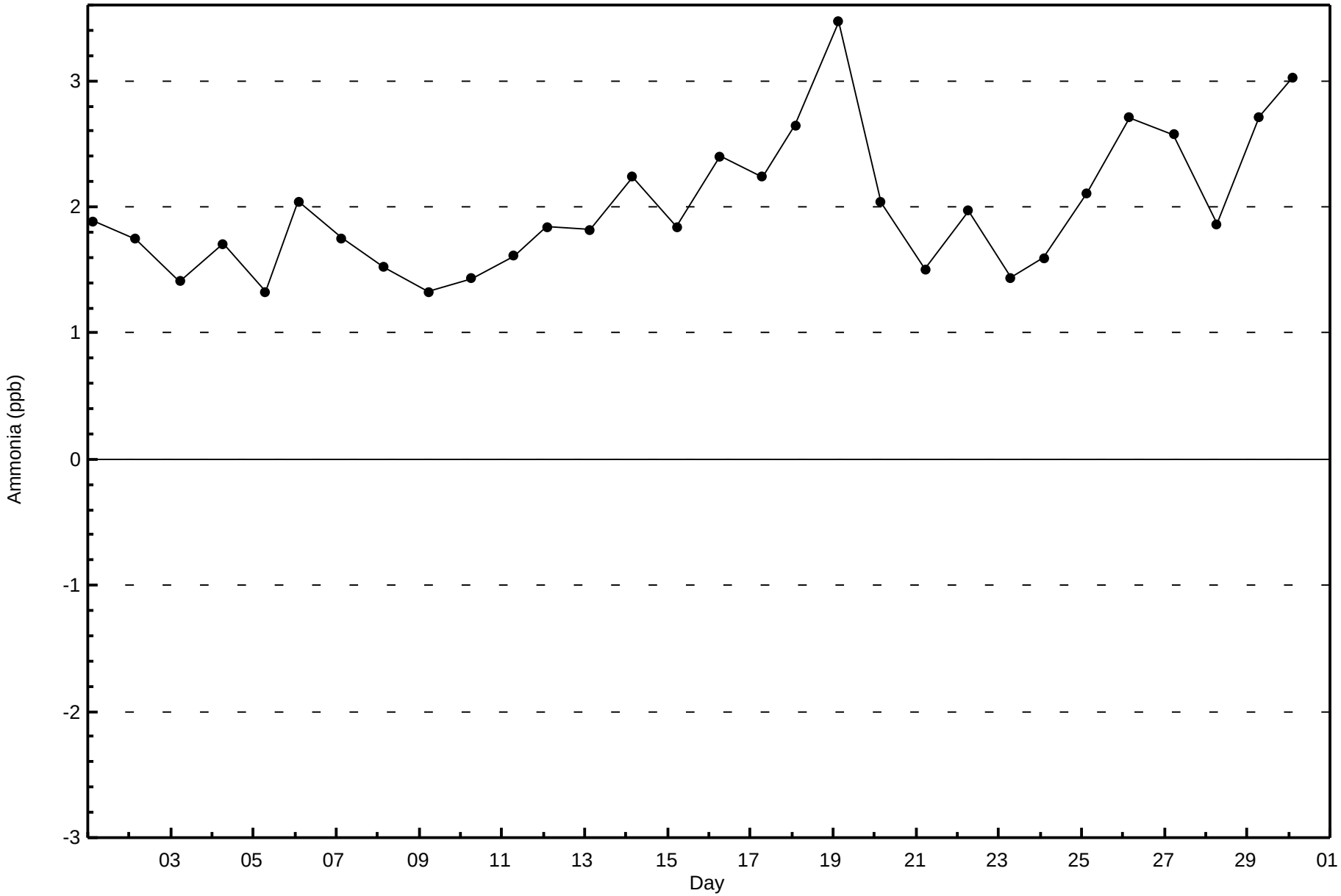
Total Number of Valid Hours: 621

Wood Buffalo Environmental Association

Zero Responses

Ammonia (NH_3) - ppb

Fort McKay - Bertha Ganter - April 2016

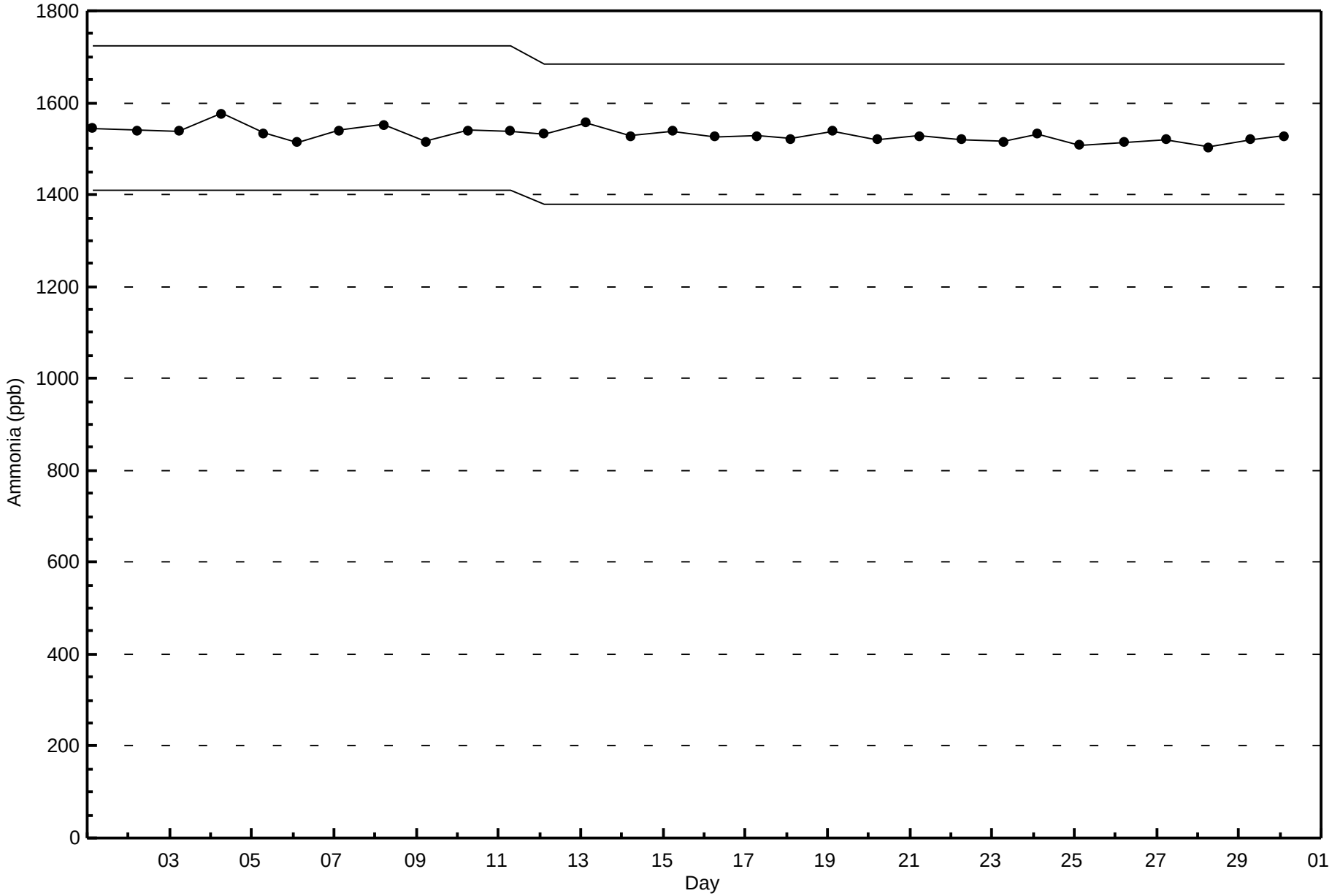


Wood Buffalo Environmental Association

Span Responses

Ammonia (NH_3) - ppb

Fort McKay - Bertha Ganter - April 2016



Maximum Value: 28.0 C on Apr 18 16:00

Maximum Daily Average: 16.8 C on Apr 18

Minimum Value: -13.6 C on Apr 4 06:00

Minimum Daily Average: -7.3 C on Apr 3

Maximum Diurnal Average: 8.5 C at hour 16

Minimum Diurnal Average: -0.9 C at hour 6

Monthly Average: 3.95 C

Percentiles: P_1 = -10.5 P_{10} = -5.8 Q_1 = -1.7 Median = 3.1 Q_3 = 8.4 P_{90} = 16.0 P_{99} = 24.9

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

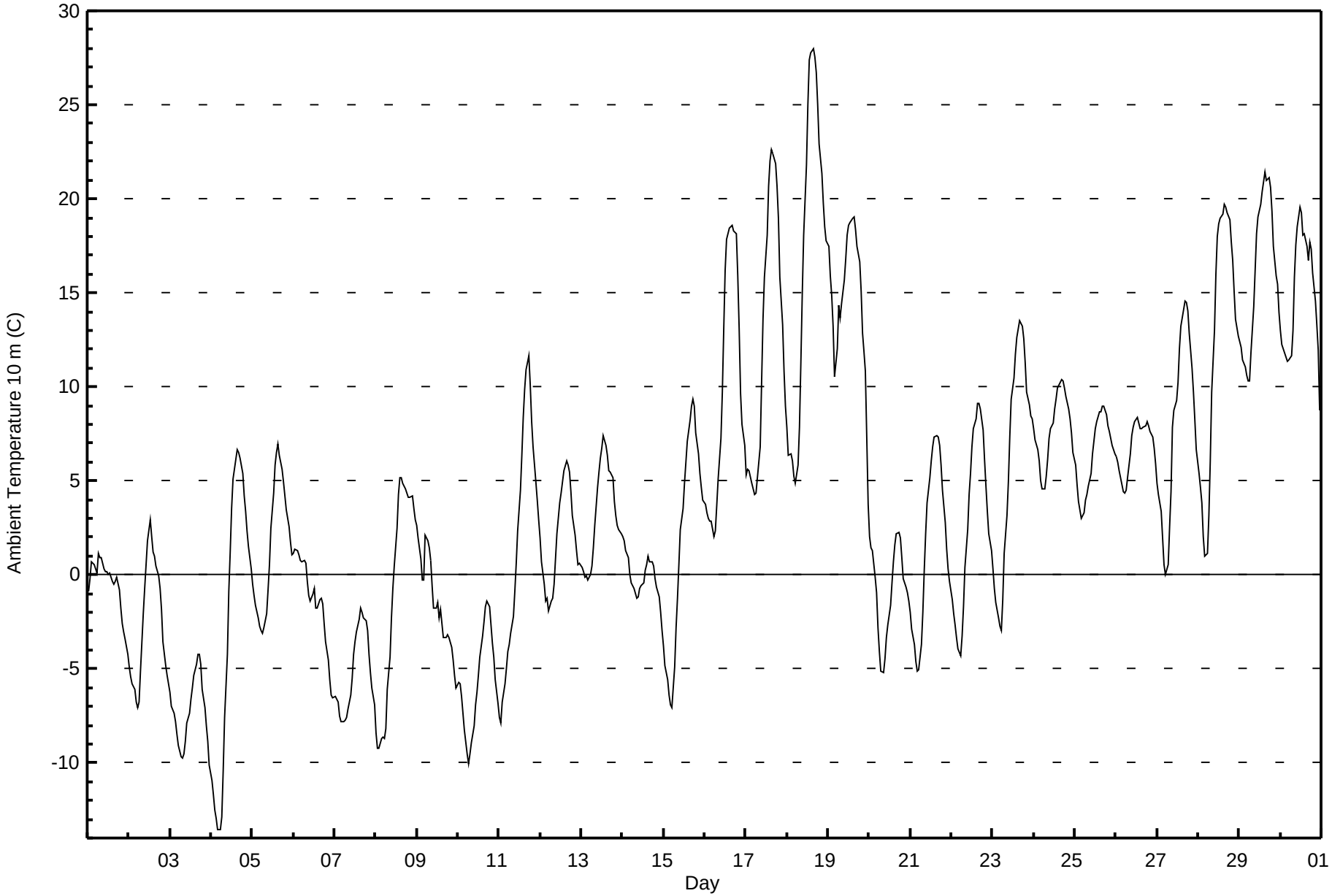
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	-0.9	-0.2	0.7	0.6	0.5	0.1	1.1	0.9	0.9	0.3	0.1	0.2	0.0	0.1	-0.4	-0.5	-0.3	-0.1	-0.8	-1.8	-2.6	-3.0	-3.4	-4.2	-0.5	1.1
2-Apr	-4.9	-5.4	-5.8	-6.1	-6.8	-7.0	-6.8	-5.1	-2.1	-0.7	0.5	1.8	2.9	2.1	1.2	1.0	0.5	-0.1	-0.7	-1.8	-3.5	-4.8	-5.4	-5.8	-2.6	2.9
3-Apr	-6.2	-7.0	-7.4	-7.8	-8.5	-9.1	-9.7	-9.8	-9.5	-8.9	-7.9	-7.3	-6.6	-6.0	-5.4	-4.8	-4.2	-4.2	-4.7	-6.1	-7.1	-8.0	-8.8	-10.1	-7.3	-4.2
4-Apr	-11.0	-11.7	-12.5	-12.9	-13.6	-13.6	-12.9	-10.4	-7.6	-4.2	-0.9	1.2	3.5	5.1	6.1	6.6	6.5	6.2	5.4	4.2	3.4	2.4	1.5	0.3	-2.5	6.6
5-Apr	-0.5	-1.1	-1.6	-2.3	-2.7	-3.0	-3.1	-2.8	-2.0	-0.8	0.6	2.5	4.3	5.8	6.5	7.0	6.4	5.6	4.9	4.2	3.5	2.5	1.7	1.1	1.5	7.0
6-Apr	1.1	1.3	1.3	1.1	0.8	0.7	0.8	0.6	-0.3	-1.1	-1.4	-1.0	-0.7	-1.8	-1.8	-1.3	-1.2	-1.6	-2.6	-3.5	-4.5	-5.6	-6.4	-6.5	-1.4	1.3
7-Apr	-6.5	-6.6	-6.8	-7.5	-7.8	-7.8	-7.7	-7.5	-7.2	-6.4	-5.5	-4.3	-3.5	-3.1	-2.4	-1.8	-2.0	-2.3	-2.4	-3.0	-4.2	-5.2	-6.0	-6.9	-5.2	-1.8
8-Apr	-8.4	-9.2	-9.2	-8.7	-8.6	-8.7	-8.2	-6.1	-4.4	-2.3	-0.7	0.5	2.5	4.3	5.2	5.2	4.9	4.6	4.4	4.1	4.1	4.2	3.5	2.9	-1.0	5.2
9-Apr	2.6	2.0	0.9	-0.3	-0.2	2.1	1.8	1.4	0.8	-0.6	-1.8	-1.7	-1.5	-2.3	-1.9	-3.4	-3.3	-3.3	-3.2	-3.4	-3.9	-4.5	-5.4	-6.0	-1.5	2.6
10-Apr	-5.8	-5.8	-6.5	-7.4	-8.3	-9.5	-10.0	-9.5	-8.9	-8.1	-6.9	-6.2	-5.3	-4.4	-3.3	-2.5	-1.7	-1.4	-1.7	-2.7	-3.6	-4.4	-5.6	-6.8	-5.7	-1.4
11-Apr	-7.6	-7.9	-6.8	-5.8	-4.9	-4.1	-3.7	-3.1	-2.2	-0.9	0.6	2.3	4.5	6.4	8.4	9.9	10.9	11.6	10.1	8.2	6.8	5.0	4.0	2.9	1.9	11.6
12-Apr	2.0	0.7	-0.5	-1.4	-1.3	-1.9	-1.4	-1.3	-0.5	0.8	2.2	3.8	4.4	5.0	5.5	6.1	5.8	5.5	4.4	3.1	2.1	1.3	0.5	0.6	1.9	6.1
13-Apr	0.4	0.2	-0.1	-0.1	-0.3	0.0	0.5	1.4	2.6	4.7	5.4	6.2	6.7	7.4	6.9	6.3	5.6	5.5	5.2	3.9	3.1	2.6	2.4	2.2	3.3	7.4
14-Apr	2.0	1.8	1.3	0.9	0.0	-0.4	-0.5	-0.8	-1.2	-1.2	-0.7	-0.6	-0.4	0.2	0.6	1.0	0.7	0.7	0.5	-0.2	-0.6	-1.2	-2.0	-3.0	-0.1	2.0
15-Apr	-3.8	-4.8	-5.6	-6.4	-6.9	-7.1	-4.9	-2.8	-1.2	0.5	2.4	3.5	4.9	6.0	7.1	8.2	9.0	9.4	9.0	7.6	6.5	5.4	4.7	4.0	1.9	9.4
16-Apr	3.7	3.3	3.0	2.8	2.8	2.0	2.4	3.7	5.1	7.2	9.7	13.1	16.2	17.9	18.4	18.5	18.6	18.3	18.1	15.9	13.1	9.6	8.0	6.9	9.9	18.6
17-Apr	5.3	5.6	5.6	4.9	4.5	4.3	4.4	5.1	6.8	10.2	13.6	15.9	18.1	20.7	22.0	22.6	22.4	21.9	20.7	18.9	15.8	13.3	10.8	9.0	12.6	22.6
18-Apr	7.9	6.3	6.4	6.0	5.2	4.8	5.8	7.9	11.3	14.9	18.1	21.8	25.0	27.4	27.8	28.0	27.6	26.7	25.0	22.9	21.3	19.8	18.5	17.8	16.8	28.0
19-Apr	17.4	15.9	14.9	13.2	10.5	12.0	14.3	13.7	14.4	15.7	16.8	18.0	18.6	18.8	19.0	19.0	18.4	17.5	16.7	15.1	12.9	11.9	10.9	3.7	15.0	19.0
20-Apr	2.0	1.4	1.3	-0.2	-0.9	-2.8	-4.1	-5.1	-5.2	-4.5	-3.3	-2.6	-1.6	-0.5	0.7	1.6	2.2	2.2	2.0	0.9	-0.2	-0.7	-1.0	-1.4	-0.8	2.2
21-Apr	-2.0	-2.9	-3.7	-4.6	-5.1	-5.1	-3.7	-2.0	0.3	2.2	3.8	5.1	6.0	6.8	7.3	7.4	7.4	6.9	5.8	4.5	2.8	1.3	0.3	-0.3	1.6	7.4
22-Apr	-1.3	-2.1	-2.7	-3.3	-3.9	-4.3	-3.3	-1.7	0.4	2.4	4.3	5.4	6.8	7.7	8.3	9.1	9.1	8.8	7.7	6.1	4.7	3.4	2.2	1.3	2.7	9.1
23-Apr	0.3	-0.7	-1.5	-2.3	-2.7	-3.0	-1.3	1.1	3.2	5.0	7.3	9.4	10.5	11.8	12.6	13.1	13.5	13.2	12.6	11.3	9.7	9.0	8.4	8.3	6.2	13.5
24-Apr	7.8	7.2	6.7	6.0	5.0	4.5	4.6	5.2	6.1	7.2	7.8	8.1	8.8	9.3	10.0	10.2	10.4	10.3	9.9	9.5	8.8	8.3	7.6	6.5	7.8	10.4
25-Apr	5.8	4.8	3.9	3.4	3.0	3.3	4.0	4.2	4.7	5.4	6.4	7.1	7.8	8.1	8.7	8.6	8.9	9.0	8.5	7.9	7.6	7.2	6.9	6.5	6.3	9.0
26-Apr	6.3	6.0	5.6	4.8	4.4	4.3	4.5	5.2	6.5	7.4	7.8	8.1	8.4	8.1	7.8	7.8	7.9	7.9	8.1	7.9	7.6	7.4	6.7	5.9	6.8	8.4
27-Apr	4.9	4.3	3.4	2.0	0.5	0.0	0.6	2.5	4.4	7.8	8.8	9.3	10.2	12.0	13.2	14.1	14.5	14.5	14.1	12.8	10.9	9.7	8.2	6.6	7.9	14.5
28-Apr	5.4	4.6	3.8	2.0	1.0	1.2	3.1	6.1	9.7	13.0	16.0	18.0	18.7	19.0	19.2	19.7	19.6	19.3	18.9	17.7	16.7	15.1	13.6	12.7	12.2	19.7
29-Apr	12.4	12.1	11.4	11.1	10.6	10.3	10.3	11.8	14.3	16.2	18.1	19.1	19.7	20.3	20.9	21.4	21.0	21.1	20.6	19.3	17.5	15.9	15.4	14.0	16.0	21.4
30-Apr	13.0	12.2	11.8	11.6	11.4	11.4	11.7	13.0	15.9	17.5	18.5	19.5	19.3	18.1	18.1	17.5	16.8	17.7	17.3	16.0	14.6	13.3	11.9	8.7	14.9	19.5
	1.4	0.8	0.4	-0.2	-0.7	-0.9	-0.4	0.5	1.8	3.3	4.7	5.9	6.9	7.7	8.2	8.5	8.5	8.4	7.8	6.7	5.4	4.4	3.5	2.4	Diurnal Average	
	17.4	15.9	14.9	13.2	11.4	12.0	14.3	13.7	15.9	17.5	18.5	21.8	25.0	27.4	27.8	28.0	27.6	26.7	25.0	22.9	21.3	19.8	18.5	17.8	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature 10 m (AT 10m) - C

Fort McKay - Bertha Ganter - April 2016



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

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	248	34.44	34.44
0 - 10	324	45.00	79.44
10 - 20	126	17.50	96.94
> 20	22	3.06	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Maximum Value: 28.4 C on Apr 18 16:00

Maximum Daily Average: 16.3 C on Apr 18

Minimum Value: -15.8 C on Apr 4 06:00

Minimum Daily Average: -7.4 C on Apr 3

Maximum Diurnal Average: 9.2 C at hour 16

Minimum Diurnal Average: -1.7 C at hour 6

Monthly Average: 3.69 C

Percentiles: P_1 = -12.8 P_{10} = -6.6 Q_1 = -1.8 Median = 2.9 Q_3 = 8.4 P_{90} = 15.9 P_{99} = 23.6

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

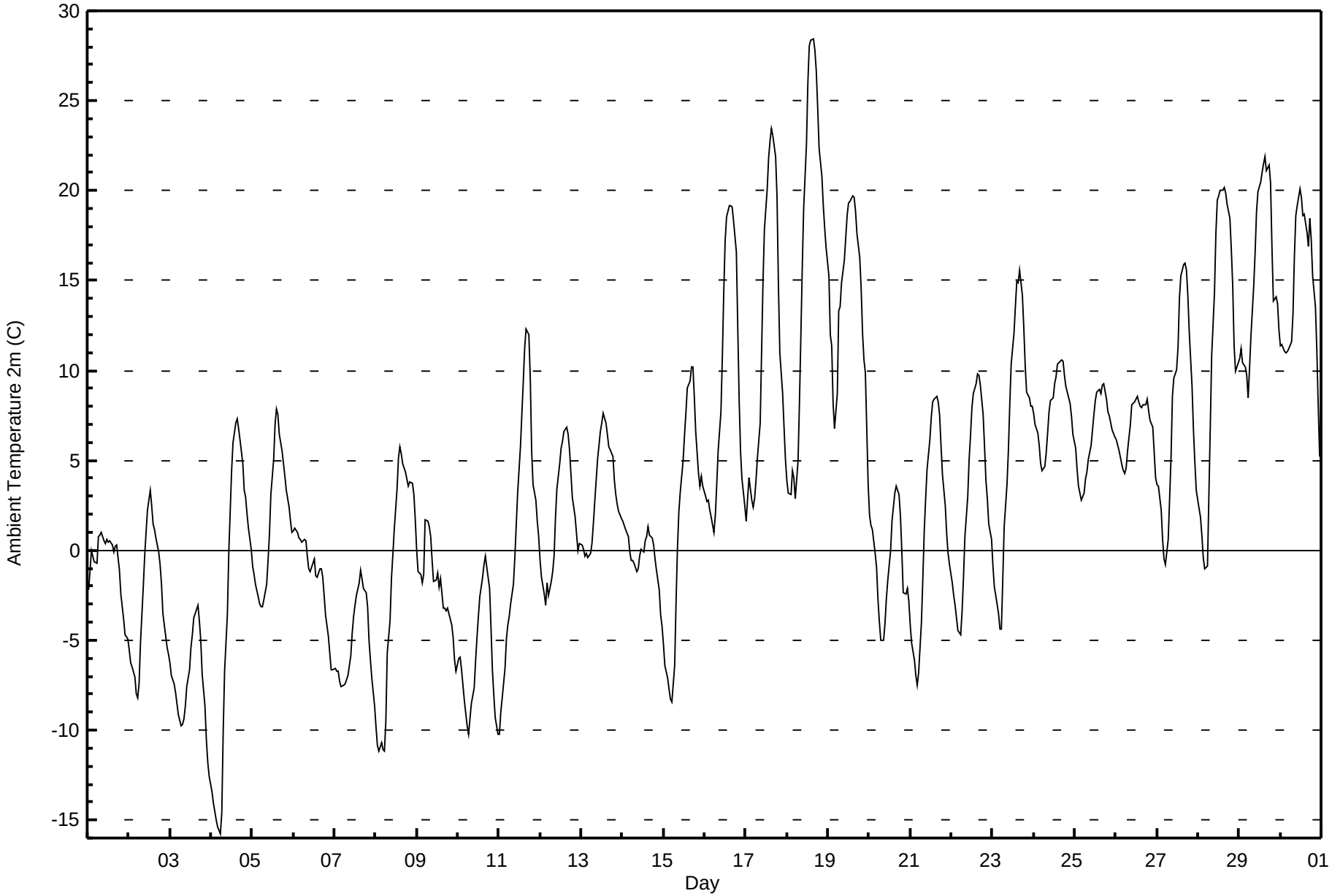
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	-2.2	-1.2	0.0	-0.3	-0.7	-0.7	0.7	0.9	1.0	0.5	0.4	0.6	0.4	0.5	0.3	-0.1	0.2	0.3	-1.1	-2.4	-3.2	-3.8	-4.7	-4.9	-0.8	1.0
2-Apr	-5.5	-6.2	-6.5	-7.0	-8.0	-8.2	-7.4	-5.2	-2.1	-0.3	1.0	2.3	3.4	2.5	1.4	1.2	0.7	-0.1	-0.8	-1.9	-3.5	-4.8	-5.4	-5.8	-2.8	3.4
3-Apr	-6.2	-7.0	-7.4	-7.9	-8.5	-9.1	-9.8	-9.7	-9.3	-8.7	-7.5	-6.6	-5.4	-4.7	-3.8	-3.3	-3.1	-3.9	-5.0	-6.9	-8.7	-10.5	-11.8	-12.6	-7.4	-3.1
4-Apr	-13.5	-14.1	-14.5	-15.0	-15.4	-15.8	-14.6	-10.0	-6.7	-3.5	-0.1	2.2	4.4	6.0	7.1	7.3	6.8	6.2	4.8	3.3	2.9	2.0	1.2	0.0	-2.9	7.3
5-Apr	-0.8	-1.4	-1.9	-2.6	-3.0	-3.1	-3.2	-2.7	-1.9	-0.6	0.9	3.1	5.1	7.0	7.8	7.5	6.5	5.5	4.8	4.1	3.3	2.4	1.6	1.0	1.6	7.8
6-Apr	1.0	1.2	1.0	0.7	0.6	0.5	0.6	0.6	-0.3	-1.0	-1.2	-0.7	-0.5	-1.4	-1.5	-1.1	-1.1	-1.5	-2.5	-3.6	-4.8	-5.7	-6.6	-6.6	-1.4	1.2
7-Apr	-6.5	-6.7	-6.7	-7.3	-7.5	-7.5	-7.4	-7.2	-7.0	-5.9	-4.6	-3.7	-3.1	-2.5	-1.8	-1.1	-1.5	-2.1	-2.4	-3.1	-5.0	-6.1	-7.1	-8.6	-5.1	-1.1
8-Apr	-9.8	-10.9	-11.2	-10.7	-11.1	-11.2	-9.5	-5.7	-3.9	-1.6	-0.2	1.2	3.4	5.1	5.7	5.4	4.8	4.4	4.0	3.6	3.8	3.7	3.1	1.7	-1.5	5.7
9-Apr	0.0	-1.2	-1.4	-1.8	-1.4	1.7	1.6	1.3	0.7	-0.6	-1.7	-1.6	-1.3	-2.1	-1.6	-3.2	-3.2	-3.3	-3.2	-3.5	-4.2	-4.9	-6.1	-6.7	-2.0	1.7
10-Apr	-6.1	-5.9	-6.6	-7.5	-8.3	-9.8	-10.3	-9.4	-8.5	-7.7	-6.2	-4.8	-3.7	-2.6	-1.5	-0.8	-0.4	-0.9	-2.1	-4.3	-6.7	-8.0	-9.3	-10.2	-5.9	-0.4
11-Apr	-10.2	-9.0	-8.2	-6.6	-4.9	-4.1	-3.7	-3.0	-1.9	-0.4	1.4	3.2	5.7	7.5	9.4	11.2	12.3	12.0	9.7	5.5	3.7	2.8	1.6	0.8	1.4	12.3
12-Apr	-0.6	-1.5	-2.5	-3.0	-1.8	-2.5	-1.7	-1.2	-0.3	1.9	3.4	4.8	5.7	6.1	6.6	6.8	6.4	5.6	4.3	3.0	1.9	0.9	0.0	0.3	1.8	6.8
13-Apr	0.3	0.0	-0.3	-0.2	-0.4	-0.2	0.4	1.4	2.8	5.1	5.8	6.6	7.1	7.6	7.0	6.5	5.8	5.6	5.2	3.9	3.1	2.5	2.1	1.7	3.3	7.6
14-Apr	1.6	1.4	1.1	0.7	-0.1	-0.5	-0.6	-0.7	-1.2	-1.0	-0.4	0.0	-0.1	0.5	0.7	1.3	0.8	0.7	0.3	-0.5	-1.1	-2.2	-3.6	-4.2	-0.3	1.6
15-Apr	-5.2	-6.4	-7.1	-7.8	-8.3	-8.4	-6.4	-2.8	0.1	2.1	3.2	4.9	6.4	7.6	9.0	9.4	10.2	10.2	8.6	6.6	4.3	3.5	4.1	3.5	1.7	10.2
16-Apr	3.0	2.7	2.8	2.2	1.8	1.0	2.0	3.6	5.5	7.7	10.7	14.3	17.2	18.6	19.1	19.2	19.1	18.3	16.6	12.4	8.4	5.5	4.0	2.5	9.1	19.2
17-Apr	1.6	2.9	4.1	2.8	2.4	2.9	3.9	5.1	7.1	11.1	15.0	17.9	20.1	21.8	22.7	23.4	23.0	21.9	19.6	14.8	11.0	8.7	6.9	5.1	11.5	23.4
18-Apr	3.9	3.2	3.1	4.4	4.0	2.9	5.0	8.3	11.9	15.7	19.0	22.6	26.0	28.0	28.3	28.4	27.8	26.7	24.6	22.3	20.8	19.2	17.9	16.8	16.3	28.4
19-Apr	15.3	12.0	11.3	8.1	6.7	8.7	13.3	13.6	14.8	16.2	17.4	18.6	19.3	19.4	19.7	19.6	18.9	17.6	16.3	14.6	12.1	10.6	9.9	3.7	14.1	19.7
20-Apr	1.9	1.4	1.2	-0.2	-1.0	-2.8	-4.0	-5.0	-5.0	-4.0	-2.6	-1.6	0.0	1.6	2.4	3.2	3.5	3.1	1.9	0.0	-2.4	-2.4	-2.1	-2.8	-0.7	3.5
21-Apr	-4.2	-5.2	-6.1	-6.9	-7.5	-6.8	-4.0	-1.6	1.1	2.8	4.5	6.1	7.4	8.2	8.4	8.5	8.3	7.5	5.7	4.2	2.5	0.9	-0.1	-0.8	1.4	8.5
22-Apr	-1.8	-2.5	-3.1	-3.8	-4.5	-4.7	-3.4	-1.5	0.8	2.9	5.1	6.4	7.9	8.7	9.2	9.8	9.8	9.2	7.6	5.7	3.9	2.9	1.4	0.6	2.8	9.8
23-Apr	-0.9	-2.1	-2.5	-3.5	-4.4	-4.4	-1.7	1.3	3.7	5.5	8.1	10.4	12.0	13.6	14.9	14.9	15.6	14.2	12.4	10.3	8.8	8.5	8.0	8.1	6.3	15.6
24-Apr	7.6	7.0	6.5	5.8	4.8	4.5	4.7	5.4	6.5	7.7	8.3	8.5	9.2	9.6	10.4	10.5	10.6	10.5	9.8	9.1	8.5	8.1	7.4	6.4	7.8	10.6
25-Apr	5.6	4.5	3.6	3.2	2.8	3.2	4.0	4.4	5.0	5.9	6.7	7.5	8.3	8.8	9.0	8.8	9.2	9.3	8.4	7.7	7.4	7.1	6.7	6.3	6.4	9.3
26-Apr	6.2	5.9	5.5	4.8	4.4	4.3	4.6	5.5	7.0	8.1	8.1	8.3	8.6	8.3	8.0	8.0	8.1	8.1	8.4	7.8	7.2	6.9	5.5	4.0	6.7	8.6
27-Apr	3.7	3.6	2.2	0.6	-0.5	-0.8	0.6	2.9	5.1	8.5	9.5	10.0	11.3	14.0	15.3	15.9	16.0	15.6	14.2	12.2	9.1	6.7	4.9	3.4	7.7	16.0
28-Apr	2.3	1.8	0.8	-0.4	-1.1	-0.9	3.0	6.9	10.9	14.3	17.6	19.4	19.7	20.0	20.0	20.2	19.9	19.3	18.5	16.7	14.7	11.4	10.0	10.4	11.5	20.2
29-Apr	10.7	11.2	10.5	10.2	9.7	8.5	10.1	11.9	14.7	16.6	18.9	20.0	20.5	21.1	21.5	21.9	21.1	21.5	20.4	16.8	13.9	14.1	13.7	12.2	15.5	21.9
30-Apr	11.4	11.4	11.1	11.0	11.1	11.2	11.6	13.1	16.4	18.6	19.1	20.1	19.7	18.6	18.7	17.7	16.9	18.5	17.3	15.3	13.5	11.1	8.0	5.2	14.4	20.1
	0.1	-0.4	-0.7	-1.3	-1.7	-1.7	-0.7	0.7	2.2	3.9	5.3	6.7	7.8	8.6	9.1	9.2	9.1	8.7	7.5	5.8	4.2	3.0	2.0	1.0	Diurnal Average	
	15.3	12.0	11.3	11.0	11.1	11.2	13.3	13.6	16.4	18.6	19.1	22.6	26.0	28.0	28.3	28.4	27.8	26.7	24.6	22.3	20.8	19.2	17.9	16.8	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature 2m (AT 2m) - C

Fort McKay - Bertha Ganter - April 2016



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	259	35.97	35.97
0 - 10	318	44.17	80.14
10 - 20	117	16.25	96.39
> 20	26	3.61	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Maximum Value: 99 % on Apr 27 08:00

Maximum Daily Average: 90.7 % on Apr 6

Minimum Value: 12 % on Apr 19 16:00

Minimum Daily Average: 26.0 % on Apr 19

Maximum Diurnal Average: 73.4 % at hour 6

Minimum Diurnal Average: 41.1 % at hour 16

Monthly Average: 57.0 %

Percentiles: $P_1 = 15$ $P_{10} = 26$ $Q_1 = 40$ Median = 58 $Q_3 = 74$ $P_{90} = 86$ $P_{99} = 98$

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

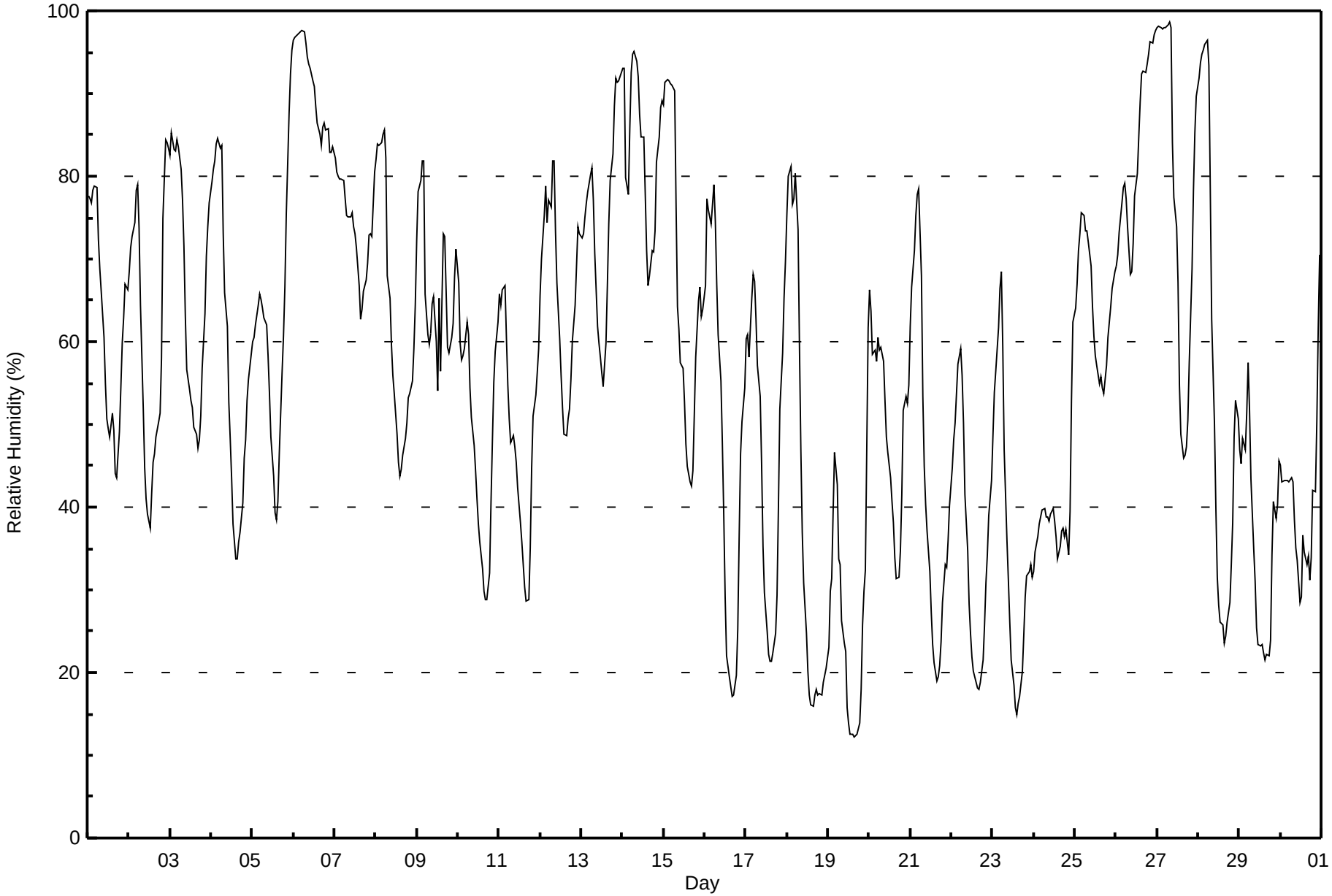
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	78	77	77	78	79	79	72	69	66	61	55	51	49	49	51	49	44	44	49	54	60	63	67	66	61.9	79
2-Apr	69	71	73	74	78	79	74	64	52	45	41	39	37	42	45	46	49	50	51	58	75	84	84	83	61.0	84
3-Apr	82	85	83	83	84	84	81	77	72	63	57	54	53	52	50	49	47	48	51	57	63	70	74	77	66.5	85
4-Apr	79	81	82	84	85	83	84	73	66	62	53	48	44	38	34	34	36	37	41	46	48	53	55	58	58.4	85
5-Apr	60	60	62	64	66	65	64	63	62	58	54	48	44	39	38	41	46	56	61	67	75	88	92	95	61.3	95
6-Apr	96	97	97	97	97	98	97	96	94	94	93	92	91	89	87	85	84	86	86	86	86	83	83	84	90.7	98
7-Apr	82	81	80	80	80	79	77	75	75	75	76	74	73	71	67	63	64	66	67	70	73	73	73	81	73.9	82
8-Apr	82	84	84	84	85	86	82	68	65	60	56	54	49	45	44	45	46	48	50	53	54	55	59	64	62.6	86
9-Apr	72	78	80	82	82	66	61	60	61	65	65	60	54	65	57	73	73	66	59	59	61	62	68	71	66.6	82
10-Apr	67	60	58	58	59	62	61	54	51	47	44	41	38	36	33	30	29	29	32	41	48	55	59	62	48.1	67
11-Apr	66	64	66	67	61	55	51	48	49	47	45	42	38	36	33	30	29	29	35	45	51	54	56	59	48.1	67
12-Apr	66	70	75	79	74	77	76	82	82	73	67	60	56	52	49	49	51	52	55	60	64	69	74	73	66.1	82
13-Apr	72	73	75	77	78	80	81	77	71	62	60	58	56	55	60	67	74	80	83	88	92	91	92	93	74.7	93
14-Apr	93	93	80	78	86	92	95	95	94	92	87	85	85	78	71	67	68	71	71	73	82	85	88	89	83.2	95
15-Apr	89	91	92	92	91	91	90	76	64	61	57	57	53	48	45	43	43	44	51	58	65	67	63	64	66.5	92
16-Apr	67	77	76	75	74	79	75	67	61	55	48	39	29	22	20	18	17	17	20	25	36	47	50	54	47.9	79
17-Apr	60	61	58	65	68	67	63	57	53	45	35	30	25	22	21	21	22	25	29	40	52	59	65	70	46.5	70
18-Apr	75	80	81	77	77	80	74	59	47	37	31	25	20	17	16	16	17	18	17	17	17	19	20	21	40.0	81
19-Apr	23	30	31	39	47	43	34	33	26	23	22	16	14	12	13	12	12	12	14	18	26	30	32	62	26.0	62
20-Apr	66	64	58	59	58	60	59	59	58	53	48	47	44	41	38	34	31	32	35	42	52	53	53	55	49.9	66
21-Apr	62	67	71	75	78	79	68	53	45	40	37	32	27	23	21	19	20	21	24	28	33	33	36	40	43.0	79
22-Apr	45	48	50	54	57	59	56	50	41	35	28	25	22	20	19	18	18	19	22	26	31	34	39	43	35.8	59
23-Apr	49	54	56	62	67	68	59	47	36	31	26	21	18	16	15	16	17	20	25	29	32	32	33	31	35.9	68
24-Apr	32	35	37	38	39	40	40	39	39	38	39	40	38	36	34	35	37	37	36	37	34	39	53	62	39.0	62
25-Apr	64	67	71	73	76	75	73	73	72	69	64	61	58	57	55	56	54	54	57	60	62	64	66	68	64.7	76
26-Apr	69	70	73	77	79	79	77	74	68	69	72	78	80	85	89	92	93	93	93	95	96	96	97	98	83.0	98
27-Apr	98	98	98	98	98	98	98	99	98	84	77	74	67	55	49	46	46	47	51	57	69	78	85	90	77.4	99
28-Apr	92	94	95	95	96	96	93	78	63	50	40	31	28	26	26	24	24	26	29	33	38	48	53	51	55.4	96
29-Apr	47	45	48	47	51	58	52	43	35	31	25	23	23	23	22	22	22	22	24	34	41	39	40	46	36.0	58
30-Apr	45	43	43	43	43	43	44	43	38	35	34	28	29	37	35	33	34	31	34	42	42	50	62	71	40.9	71
	68.3	70.0	70.4	71.8	73.1	73.4	70.4	65.1	60.1	55.4	51.3	47.8	44.8	42.9	41.1	41.1	41.6	42.7	45.1	50.0	55.2	59.1	62.4	66.0	Diurnal Average	
	98	98	98	98	98	98	98	99	98	94	93	92	91	89	89	92	93	93	93	95	96	96	97	98	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity (RH) - %

Fort McKay - Bertha Ganter - April 2016



Maximum Value: 1.4 mm on Apr 14 08:00

Maximum Daily Total: 4.3 mm on Apr 14

Minimum Value: 0.0 mm on Apr 1 01:00

Minimum Daily Total: 0.0 mm on Apr 1

Maximum Diurnal Total: 1.4 mm at hour 8

Minimum Diurnal Total: 0.0 mm at hour 3

Monthly Total: 14.99 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} = 0.7

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

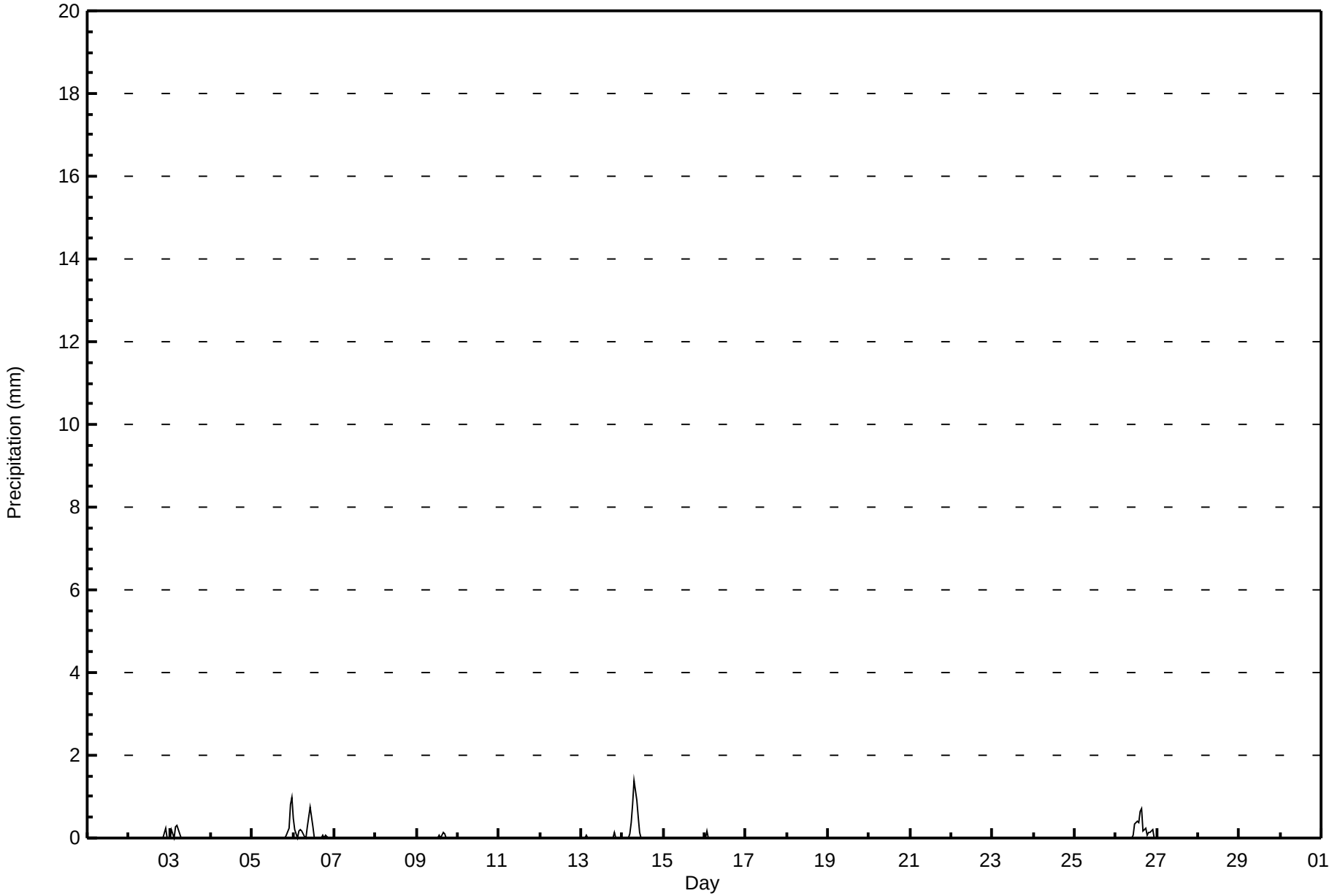
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.2	0.2
3-Apr	0.0	0.2	0.0	0.3	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.3
4-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.8	1.0	2.1	1.0
6-Apr	0.5	0.2	0.0	0.2	0.2	0.2	0.1	0.0	0.3	0.5	0.8	0.3	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	3.3	0.8
7-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.1
10-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.2	0.2
14-Apr	0.0	0.0	0.0	0.0	0.1	0.4	0.8	1.4	0.9	0.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.3	1.4
15-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
17-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.4	0.4	0.7	0.7	0.2	0.2	0.1	0.1	0.1	0.2	0.0	0.0	3.5	0.7
27-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.5	0.6	0.0	0.5	0.6	0.7	0.9	1.4	1.2	1.0	1.0	0.6	0.4	0.5	0.7	0.8	0.3	0.3	0.1	0.4	0.2	0.7	0.8	1.0	Diurnal Average	
	0.5	0.2	0.0	0.3	0.3	0.4	0.8	1.4	0.9	0.5	0.8	0.3	0.4	0.4	0.7	0.7	0.2	0.2	0.1	0.2	0.1	0.3	0.8	1.0	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Precipitation (PC) - mm

Fort McKay - Bertha Ganter - April 2016



Concentration Ranges (mm)	Number of Hours	%	Cumulative %
0 - 0.3	706	98.06	98.06
0.4 - 0.5	6	0.83	98.89
0.6 - 0.7	2	0.28	99.17
0.8 - 1.4	6	0.83	100.00
1.5 - 10	0	0.00	100.00
> 10	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Maximum Value: 61 % on Apr 6 12:00

Maximum Daily Average: 13.3 % on Apr 26

Minimum Value: -2 % on Apr 19 16:00

Minimum Daily Average: -1.4 % on Apr 19

Maximum Diurnal Average: 2.2 % at hour 24

Minimum Diurnal Average: 0.0 % at hour 9

Monthly Average: 1.0 %

Percentiles: $P_1 = -2$ $P_{10} = -1$ $Q_1 = -1$ Median = 0 $Q_3 = 0$ $P_{90} = 1$ $P_{99} = 33$

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

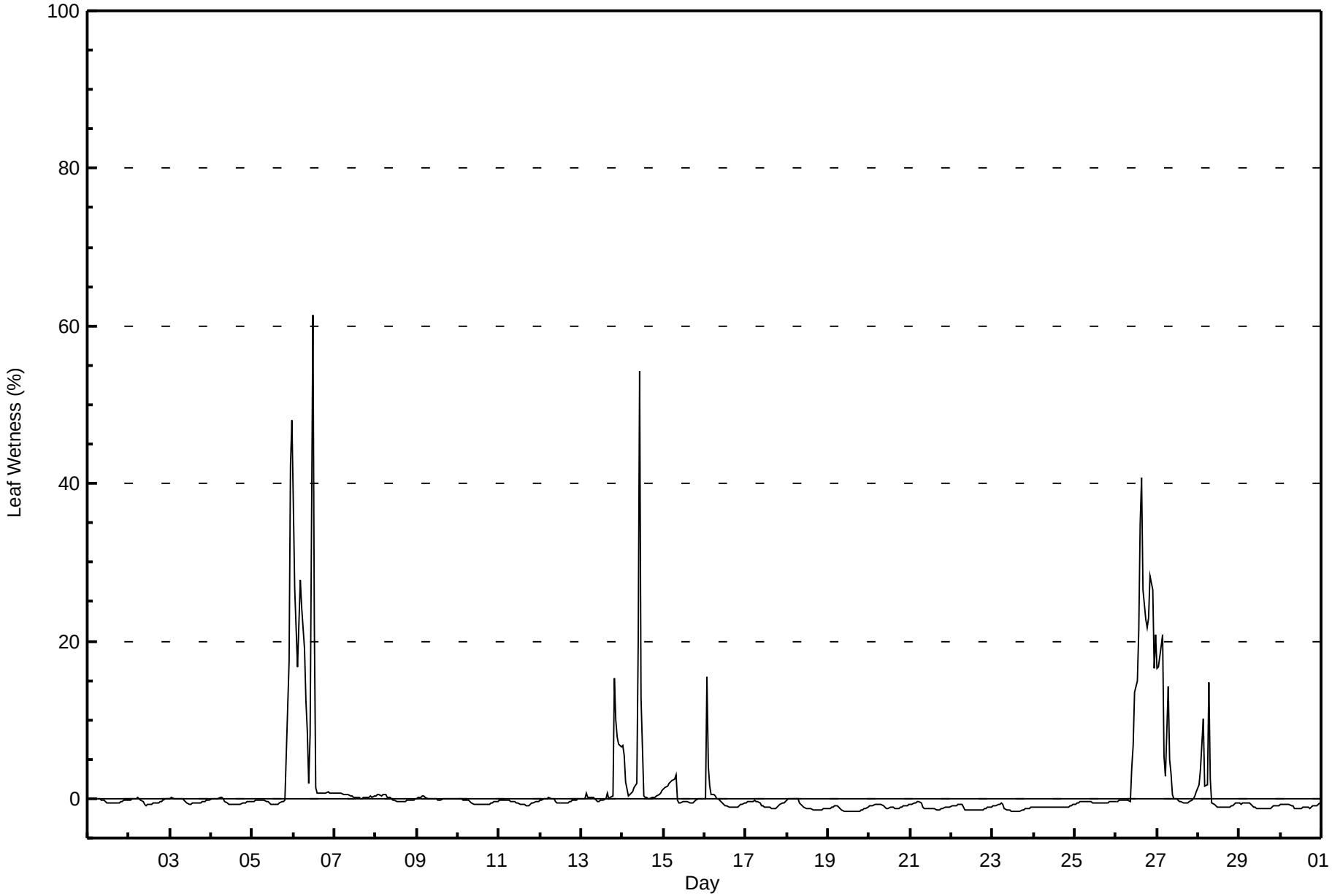
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	-1	0	-1	-1	0	0	0	0	0	0	-0.3	0
2-Apr	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	0	-0.3	0
3-Apr	0	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	-0.3	0
4-Apr	0	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	-0.4	0
5-Apr	0	0	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	0	0	0	6	17	42	48	4.4	48
6-Apr	38	27	17	22	28	24	19	12	9	2	8	61	22	1	1	1	1	1	1	1	1	1	1	1	12.4	61
7-Apr	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
8-Apr	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	1
9-Apr	0	0	0	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-Apr	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	-0.5	0
11-Apr	0	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	-0.5	0
12-Apr	0	0	0	0	0	0	0	0	0	0	-1	-1	-1	0	0	-1	0	0	0	0	0	0	0	0	-0.2	0
13-Apr	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	15	10	8	7	7	2.0	15
14-Apr	7	6	2	0	0	1	1	1	2	20	54	13	0	0	0	0	0	0	0	0	0	0	1	1	4.6	54
15-Apr	1	1	2	2	2	2	2	3	0	0	0	0	0	0	0	0	-1	0	0	0	0	0	0	0	0.5	3
16-Apr	0	15	4	2	1	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.4	15
17-Apr	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	-0.7	0
18-Apr	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-0.9	0
19-Apr	-1	-1	-1	-1	-1	-1	-1	-1	-1	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-1	-1	-1	-1	-1	-1.4	-1
20-Apr	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1.0	-1
21-Apr	-1	-1	-1	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1.1	0
22-Apr	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1.2	-1
23-Apr	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-2	-2	-2	-2	-2	-2	-2	-1	-1	-1	-1	-1	-1	-1.2	-1
24-Apr	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1.1	-1
25-Apr	-1	-1	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	-0.5	0
26-Apr	0	0	0	0	0	0	0	0	0	4	7	14	15	21	35	41	27	23	22	23	28	26	17	21	13.3	41
27-Apr	16	17	19	21	5	3	14	5	3	1	0	0	0	0	0	-1	-1	-1	-1	0	0	0	0	1	4.2	21
28-Apr	2	4	7	10	2	2	15	3	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	1.2	15
29-Apr	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1.0	-1
30-Apr	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	-1.0	0
	1.8	2.0	1.4	1.7	1.1	0.9	1.5	0.5	0.0	0.3	1.6	2.2	0.5	0.0	0.4	0.6	0.2	0.1	0.1	0.7	1.0	1.3	1.8	2.2	Diurnal Average	
	38	27	19	22	28	24	19	12	9	20	54	61	22	21	35	41	27	23	22	23	28	26	42	48	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Leaf Wetness (LW) - %

Fort McKay - Bertha Ganter - April 2016



Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 0.3	76	39.58	39.58
0.4 - 0.5	17	8.85	48.44
0.6 - 0.7	18	9.38	57.81
0.8 - 1.4	10	5.21	63.02
1.5 - 10	32	16.67	79.69
> 10	38	19.79	99.48

Total Number of Valid Hours: 192

Total Number of Hours: 720

Wood Buffalo Environmental Association

Summary of Hour Averages

Global Radiation (GR) - W/m2

Fort McKay - Bertha Ganter - April 2016

Maximum Value: 777 W/m2 on Apr 27 14:00

Maximum Daily Average: 266.5 W/m2 on Apr 15

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

Minimum Daily Average: 36.7 W/m2 on Apr 6

Maximum Diurnal Average: 510.0 W/m2 at hour 13

Minimum Diurnal Average: 0.0 W/m2 at hour 1

Monthly Average: 173.6 W/m2

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 43 $Q_3 = 286$ $P_{90} = 582$ $P_{99} = 743$

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

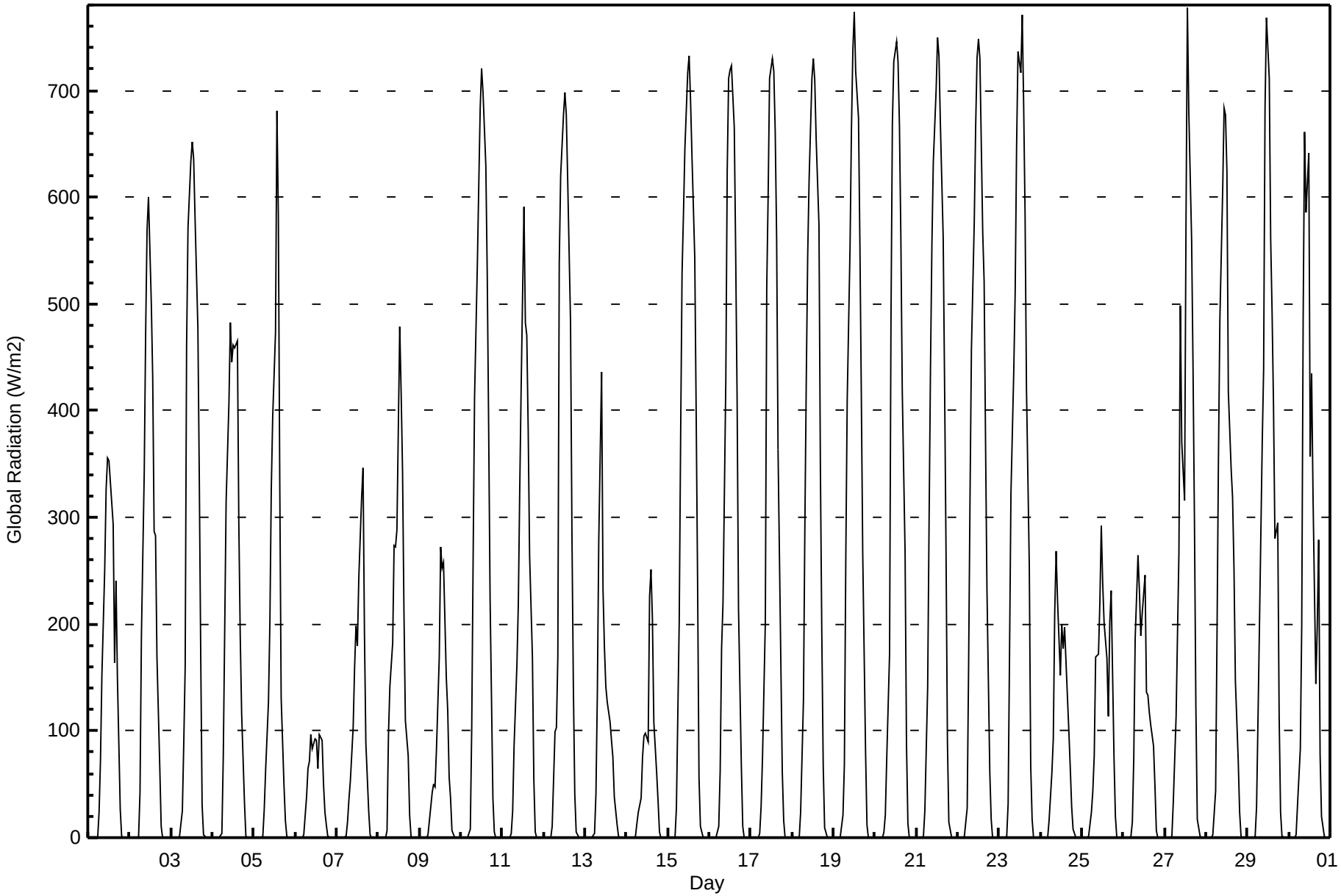
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	0	0	0	0	0	1	24	73	152	251	326	356	352	334	293	164	241	149	27	2	0	0	0	0	114.4	356
2-Apr	0	0	0	0	0	2	43	190	343	473	570	600	502	431	287	283	169	67	10	1	0	0	0	0	165.4	600
3-Apr	0	0	0	0	0	1	25	89	160	460	571	634	652	635	580	477	337	173	31	2	0	0	0	0	201.2	652
4-Apr	0	0	0	0	0	4	77	195	315	407	482	446	462	458	466	295	189	116	33	1	0	0	0	0	164.4	482
5-Apr	0	0	0	0	0	1	27	63	127	201	327	394	473	681	583	335	131	48	17	1	0	0	0	0	142.1	681
6-Apr	0	0	0	0	0	3	38	65	72	97	84	92	91	65	96	91	50	24	12	2	0	0	0	0	36.7	97
7-Apr	0	0	0	0	0	2	15	35	53	104	159	198	180	243	319	346	191	89	25	2	0	0	0	0	81.7	346
8-Apr	0	0	0	0	0	6	95	142	182	274	273	288	479	416	342	211	110	77	21	2	0	0	0	0	121.5	479
9-Apr	0	0	0	0	0	3	29	42	50	47	83	169	272	253	258	149	119	56	37	7	0	0	0	0	65.7	272
10-Apr	0	0	0	0	0	8	103	263	413	538	612	683	721	698	629	526	384	224	37	6	0	0	0	0	243.6	721
11-Apr	0	0	0	0	0	4	25	86	161	218	325	420	590	482	471	382	264	170	54	5	0	0	0	0	152.4	590
12-Apr	0	0	0	0	0	11	99	103	170	538	620	676	698	677	615	483	285	142	41	6	0	0	0	0	215.1	698
13-Apr	0	0	0	0	0	4	41	137	279	437	232	178	142	128	108	91	75	39	12	1	0	0	0	0	79.3	437
14-Apr	0	0	0	0	0	2	13	24	38	75	96	98	90	226	252	205	109	60	34	5	0	0	0	0	55.2	252
15-Apr	0	0	0	0	0	27	204	377	528	585	645	716	733	692	640	544	398	240	56	10	0	0	0	0	266.5	733
16-Apr	0	0	0	0	0	10	63	177	220	428	625	711	719	723	666	546	411	214	67	10	0	0	0	0	232.9	723
17-Apr	0	0	0	0	0	4	29	75	202	515	603	712	730	718	661	562	363	163	63	16	0	0	0	0	225.6	730
18-Apr	0	0	0	0	0	23	128	290	429	544	616	711	730	711	654	574	346	192	68	9	0	0	0	0	251.1	730
19-Apr	0	0	0	0	0	21	69	262	409	552	664	738	774	718	674	555	415	265	81	12	0	0	0	0	258.7	774
20-Apr	0	0	0	0	0	6	20	74	172	482	669	728	745	727	668	564	419	267	87	14	0	0	0	0	235.1	745
21-Apr	0	0	0	0	1	26	142	296	440	555	633	701	750	733	669	562	421	270	90	15	0	0	0	0	262.7	750
22-Apr	0	0	0	0	1	27	160	318	457	577	667	730	749	730	568	521	371	233	62	17	0	0	0	0	257.9	749
23-Apr	0	0	0	0	1	31	173	323	438	511	647	737	716	771	686	584	420	253	67	17	0	0	0	0	265.6	771
24-Apr	0	0	0	0	1	16	61	93	210	268	223	152	200	177	196	132	100	66	29	7	0	0	0	0	80.4	268
25-Apr	0	0	0	0	1	24	43	77	169	172	221	292	238	201	168	113	201	231	75	19	0	0	0	0	93.6	292
26-Apr	0	0	0	0	1	14	74	186	264	232	189	210	246	136	133	117	105	86	49	7	0	0	0	0	85.4	264
27-Apr	0	0	0	0	2	33	114	192	267	499	371	315	574	777	680	559	438	296	123	17	1	0	0	0	219.0	777
28-Apr	0	0	0	0	3	43	193	355	486	607	683	677	624	418	344	319	253	146	73	24	1	0	0	0	218.8	683
29-Apr	0	0	0	0	1	29	110	195	369	439	684	769	712	560	492	405	280	295	113	23	1	0	0	0	228.2	769
30-Apr	0	0	0	0	3	31	84	200	485	661	585	642	357	434	320	144	198	278	77	20	1	0	0	0	188.4	661
	0.0	0.0	0.0	0.0	0.5	13.9	77.3	166.5	268.7	391.5	449.4	492.5	510.0	498.4	450.7	361.3	259.8	164.4	52.4	9.4	0.2	0.0	0.0	0.0	Diurnal Average	
	0	0	0	0	3	43	204	377	528	661	684	769	774	777	686	584	438	296	123	24	1	0	0	0	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Global Radiation (GR) - W/m2

Fort McKay - Bertha Ganter - April 2016



Concentration Ranges (W/m2)	Number of Hours	%	Cumulative %
0 - 20	324	45.00	45.00
21 - 100	98	13.61	58.61
101 - 300	126	17.50	76.11
301 - 600	103	14.31	90.42
601 - 900	69	9.58	100.00
> 900	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Fort McKay - Bertha Ganter - April 2016

Maximum Speed: 22 km/h on Apr 18 16:00

Maximum Daily Speed Average: 11.6 km/h on Apr 18

Minimum Speed Value: 1 km/h on Apr 14 00:00

Minimum Daily Speed Average: 0.9 km/h on Apr 4

Maximum Diurnal Speed Average: 3.8 km/h at hour 12

Minimum Diurnal Speed Average: 0.2 km/h at hour 22

Monthly Average Velocity: 1.0 km/h 125.1 deg

Percentiles: $P_1 = 1$ $P_{10} = 3$ $Q_1 = 5$ Median = 7 $Q_3 = 10$ $P_{90} = 13$ $P_{99} = 20$

Hours in Service: 720

Hours of Data: 716

Hours of Missing Data: 4

Percent Operational Time: 99.4

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-Apr	SSW3	WSW2	W2	S1	NE1	N5	NNE7	NNE8	NNE10	NNE13	NNE12	NE9	NE9	NE9	E10	ENE8	ENE8	NE6	NE5	N4	N5	N5	N4	NNE6	NNE5.2	NNE13
2-Apr	N6	N7	N7	N6	N4	N5	N5	NNE6	NNE5	NE5	NNE8	N10	N12	N14	N14	N13	N13	N12	N12	N13	N11	N10	N10	N9	N8.9	N14
3-Apr	N9	N12	N10	N10	N10	N11	N12	N11	N10	N13	NNE11	NE9	ENE10	ENE11	E11	E11	ENE8	NE7	NNE5	N5	N4	NNW2	NNW4	NNW2	NNE7.2	N13
4-Apr	W2	WNW3	WNW2	WSW3	SW2	WSW2	WSW2	SSE3	SSE5	S8	SSE4	S4	SSE3	SE4	SE2	ENE5	NE5	N5	N6	N6	N7	N7	N8	N7	NNE0.9	S8
5-Apr	N6	N7	N7	N6	N6	NNW5	N6	N6	N5	N5	NNE4	E4	SE2	S10	SSE12	S12	S12	SSW10	SSW8	S9	S9	S9	S11	S9	S2.1	SSE12
6-Apr	S7	S4	NW3	NW3	NNW6	NNW6	N7	N9	AF	AF	AF	AF	NNE4	ENE6	NNE6	NNE5	NNE4	NNE5	NNE7	NNE6	NNE6	NNE7	N4	N4	N3.9	N9
7-Apr	NNE3	NNE3	ENE3	E5	ESE5	ESE4	E3	E5	E3	ESE2	SSE4	ENE3	NE5	NE7	NE7	NE8	NE8	NNE7	NNE5	N6	N5	N5	N5	NW5	NE3.6	NE8
8-Apr	NNW4	N4	N3	NE3	E4	ENE4	NNE4	SSE3	SSE10	SSE14	SSE13	SSE13	SSE15	SSE14	SE19	SE19	SE19	SE13	SE11	SE12	SSE15	S8	SSE8	SE6	SE8.3	SE19
9-Apr	SE5	SE2	NNW5	NW3	NW8	NW10	NNW10	NNW12	NNW12	NNW14	NNW14	NNW14	NNW16	N14	N12	N13	N9	N12	N12	N10	NNW9	NNW8	NW6	NNW6	NNW8.9	NNW16
10-Apr	N9	N11	N11	N10	N10	N8	N9	NNE8	NNE8	N9	ENE7	E9	E8	E9	E9	E7	ENE6	NE5	ENE4	NE3	ENE4	NNW1	NW1	SSE2	NE5.4	N11
11-Apr	W2	NNW2	SSW2	SSE5	SSE7	S8	S9	S9	S10	S9	SSE10	SSE11	SSE12	SSE10	SSE8	SSE6	SE4	NNE1	NNE4	NNE4	NNW5	NNW6	NNW5	NW4	S3.7	SSE12
12-Apr	WNW3	WNW3	NW4	NNW3	N8	N4	NNE6	NNE7	NE6	E8	E9	ENE8	ENE10	ENE10	ENE11	NE9	NE9	NNE7	N8	N10	N9	N7	N6	N7	NNE5.7	ENE11
13-Apr	N6	N6	N4	NNW5	NNE4	NNW4	N4	NNW5	NNE6	E1	ESE2	SE3	SSE4	SSW2	S9	SSE8	SSE7	S6	S7	SSE7	S7	SSE4	SSE2	ESE1	SE1.1	S9
14-Apr	NNE2	N4	N7	N9	N8	N6	N5	NNE5	NNE6	N8	N7	ENE4	NNE4	NNW8	NW8	NNE4	NE4	NNW3	NNW8	NNW7	NW5	WNW5	W3	N4	N5.0	N9
15-Apr	NW2	W3	WNW3	WNW2	W2	W2	SE1	ESE1	SE6	SSE9	S12	SSE12	SSE12	SSE12	SSE11	S12	S10	SSE11	SE10	SE8	SSE5	S6	S10	S10	SSE6.0	SSE12
16-Apr	W4	SE8	S7	SSW6	S6	S5	S6	S9	SSE11	S10	SSE13	S10	SW1	WSW9	WSW10	WSW12	W12	WNW9	W4	SW3	SW4	S4	S3	SW2	SSW5.0	SSE13
17-Apr	SSW3	SSW5	SSW3	S3	SSW3	SW2	S4	SSW4	S3	SSE11	SSE9	SSE8	SE10	SW5	W9	W8	W8	W6	WNW2	E1	SSW3	SSW3	SSW3	N1	SSW3.2	SSE11
18-Apr	SSW3	SSW5	SSW5	S6	SSW5	SSW5	S5	SSE8	SSE10	SSE11	S10	S13	SSE15	S17	SSW20	SSW22	S20	S20	S20	S15	S13	S14	S13	S9	S11.6	SSW22
19-Apr	S6	S7	S7	SSW3	S5	WSW4	WNW10	NW12	NW9	WNW11	WNW13	W15	W16	W18	WNW19	WNW19	WNW20	WNW19	WNW18	NW14	NW9	WNW10	NW9	NNE12	WNW9.4	WNW20
20-Apr	NNE9	N10	N10	N9	N11	NNE13	N13	NNE12	NNE13	NNE12	NNE11	NE11	ENE11	E11	ENE10	ENE10	ENE8	ENE8	NNE6	NNE4	NE3	N4	NNE4	NNE3	NNE8.1	NNE13
21-Apr	NNE3	NNW1	NNW2	NNW2	N2	N3	ESE3	SSE3	ESE4	ENE7	NE6	NE9	NE9	NE9	NE10	ENE11	NE10	NE10	NE10	NE8	NNE8	N8	N7	N7	NE5.5	ENE11
22-Apr	N6	N7	N6	N6	N6	N7	N6	N8	N8	NNE9	NE9	NE9	NE9	NNE10	NNE10	NNE10	NNE9	NNE9	NNE7	N7	N7	N7	N7	NNE6	NNE7.4	NNE10
23-Apr	N7	N6	NNW5	N5	NNW4	N4	N5	NE4	NE5	N6	NE5	NE1	SSE3	ESE6	SE9	SSE9	SSE9	SSE10	SE8	ESE8	SE10	SE12	SSE11	SSE12	ESE3.1	SSE12
24-Apr	SSE14	S14	SSE13	SSE10	SE9	SE8	SSE8	SSE9	S10	S11	SSE13	SSE11	S11	S9	S12	S11	S9	SSE8	ESE9	SE8	SE13	S11	S12	SSW11	SSE10.2	SSE14
25-Apr	S12	SSW10	S9	S7	S6	S6	S8	S10	S12	S11	SSW11	S12	S11	SSE12	S12	SSW10	SSW9	SSW13	S11	S10	SSW8	SSW6	SSW6	SSW6	S9.3	SSW13
26-Apr	SSW7	SW8	S8	S9	S8	S8	S10	S11	S11	SSE11	SSE10	S8	S10	SSE10	SSE9	SSE9	SSE7	SSE6	SE3	SSE4	SSE5	S4	WNW3	WSW2	S7.0	S11
27-Apr	SSW3	S2	S2	SW2	S3	S2	S4	S2	SSE3	ENE6	ENE6	ENE5	ENE4	E8	E8	E7	ENE8	ENE8	ENE6	NE5	N5	N5	NNW3	NW2	ENE2.5	ENE8
28-Apr	NNW3	NW3	WNW2	W2	SW2	SW2	S3	SSE6	SSE9	SSE9	SSE10	SSE12	S11	SSE12	SSE13	S14	S13	SSE12	SE10	SSE5	S5	S4	S5	S5	SSE6.2	S14
29-Apr	S5	S5	S6	S6	S5	SE4	SSE6	SSE9	S16	S16	S20	S21	S21	S19	S19	SSW16	SSW16	S17	SSW9	S3	S5	S7	S8	SSE7	S10.9	S21
30-Apr	S7	S9	S7	S10	S10	S8	S7	S7	S12	S16	SSW16	SSW19	SW13	W11	W11	WNW10	W6	S11	S11	ESE1	N5	NNE2	NNW1	W3	SSW6.6	SSW19
	WNW0.4	WNW0.6	NW0.8	NW0.4	N0.5	NNW1.0	N1.1	ENE0.9	ESE1.8	ESE2.6	SE3.0	SE3.8	SE3.3	SE2.8	SE2.9	SE2.5	SE2.0	SE1.7	E1.1	NE1.4	ENE0.7	WSW0.2	WSW0.6	NW0.3	Diurnal Average	
	SSE14	S14	SSE13	N10	N11	NNE13	N13	NNE12	S16	S16	S20	S21	S21	S19	SSW20	SSW22	WNW20	S20	S20	S15	SSE15	S14	S13	SSE12	Diurnal Maximum	

AF - Analyzer Failure

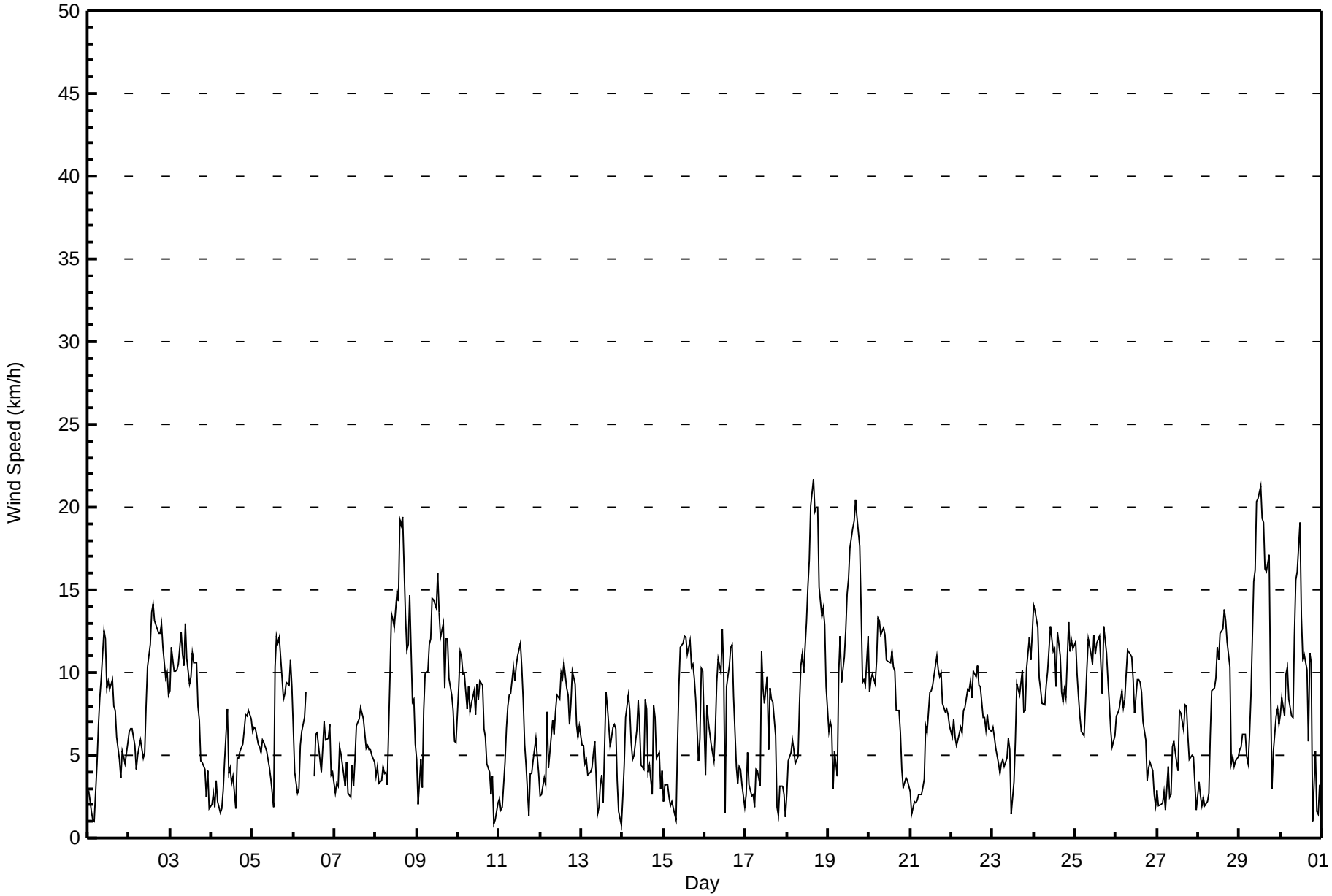
All monthly, daily, and diurnal averages have been calculated using vector methods

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed (WS) - km/h

Fort McKay - Bertha Ganter - April 2016



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	246	34.36	34.36
6 - 11	358	50.00	84.36
12 - 19	103	14.39	98.74
20 - 28	9	1.26	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 716

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Wind Speed (WS) - km/h

Fort McKay - Bertha Ganter - April 2016

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	35	25	15	9	8	9	10	18	28	18	10	6	11	10	11	23	246
6 - 11	80	32	26	26	12	3	14	44	75	14	1	2	7	5	7	10	358
12 - 19	17	7	0	0	0	0	7	22	26	5	1	1	4	5	2	6	103
20 - 28	0	0	0	0	0	0	0	0	6	2	0	0	0	1	0	0	9
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	132	64	41	35	20	12	31	84	135	39	12	9	22	21	20	39	716

Total Number of Valid Hours: 716

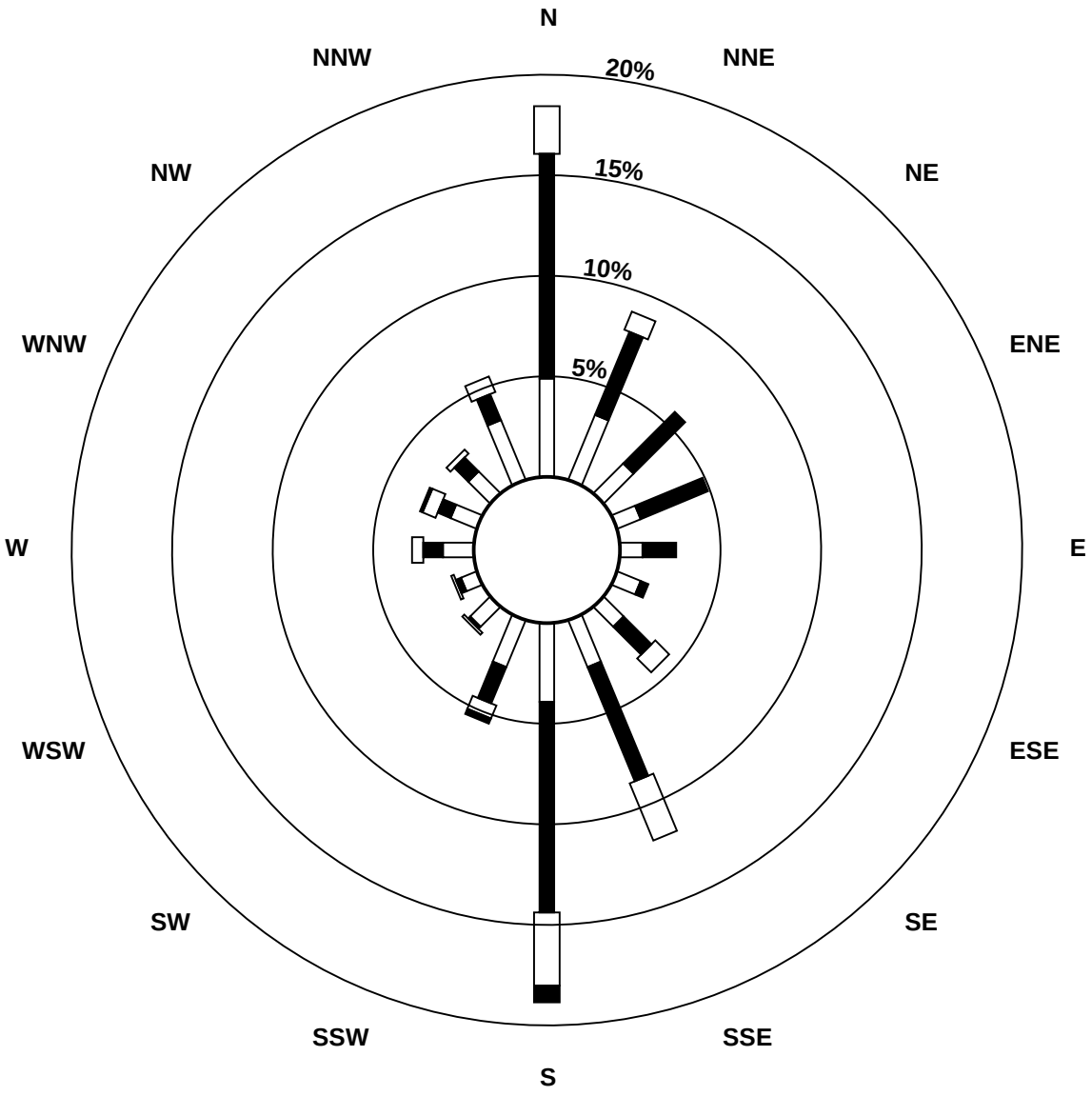
Total Number of Hours: 720

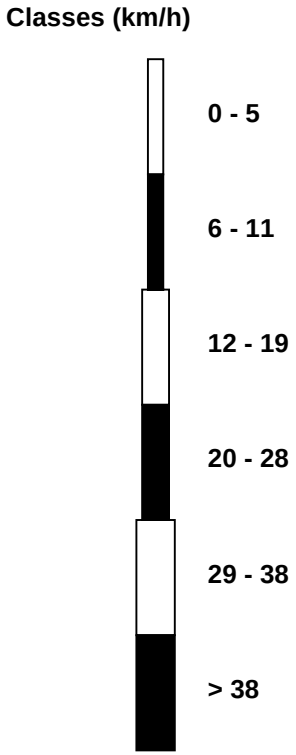
Wood Buffalo Environmental Association

Wind Rose Apr 2016

Wind Speed (WS) - km/h

Fort McKay - Bertha Ganter (AMS 1)





Total Number of Valid Hours: 716

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Speed (WS) - km/h

Fort McKay - Bertha Ganter - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 8 km/h on Apr 19 15:00

Minimum Value: 0 km/h on Apr 21 04:00

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

Hours in Service:	720
Hours of Data:	716
Hours of Missing Data:	4
Hours of Calibration:	0
Percent Operational Time:	99.4

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-Apr	2	1	1	1	1	1	3	4	4	5	5	4	4	3	3	3	3	2	2	1	1	1	1	1	5
2-Apr	1	1	2	1	1	1	2	2	2	3	3	4	4	5	5	5	5	5	4	5	4	3	3	3	5
3-Apr	3	4	4	3	3	4	4	4	4	5	4	3	3	3	4	3	3	2	2	1	1	1	1	1	5
4-Apr	1	1	1	1	1	1	1	1	2	2	1	1	1	2	2	2	2	2	1	2	2	2	2	2	2
5-Apr	2	2	2	1	1	1	2	2	2	2	1	2	3	3	3	3	3	3	3	2	2	2	2	2	3
6-Apr	2	2	1	1	1	2	2	3	AF	AF	AF	AF	3	2	2	2	1	2	3	2	2	3	2	1	3
7-Apr	1	2	1	2	1	1	1	1	1	1	1	1	2	2	2	3	3	3	2	2	1	1	1	1	3
8-Apr	1	1	1	1	1	1	1	1	4	3	3	3	4	3	5	5	6	3	4	3	4	4	2	2	6
9-Apr	1	1	2	1	4	4	3	5	4	5	5	5	5	5	5	5	4	4	5	4	3	3	2	2	5
10-Apr	4	4	4	4	3	3	4	3	3	3	4	3	3	3	3	2	2	2	2	1	1	1	1	2	4
11-Apr	1	1	1	2	1	2	2	2	2	2	2	2	2	2	2	1	1	2	1	1	1	1	1	1	2
12-Apr	1	2	2	1	3	1	3	3	2	2	3	3	4	4	4	4	3	3	3	3	3	2	2	2	4
13-Apr	2	2	2	2	1	1	2	2	2	2	1	1	2	1	2	2	2	1	2	2	1	1	1	1	2
14-Apr	1	2	3	4	3	2	1	2	3	3	4	2	3	4	3	2	2	2	2	2	1	1	1	1	4
15-Apr	1	1	1	1	1	1	1	1	1	2	3	3	3	3	3	3	2	3	2	4	1	2	2	2	4
16-Apr	3	2	2	1	1	1	2	2	2	3	2	2	4	4	5	5	5	4	2	1	1	1	1	1	5
17-Apr	2	1	2	2	2	2	2	1	2	3	2	3	2	4	4	4	3	3	2	1	1	1	1	1	4
18-Apr	1	1	2	1	1	1	1	2	2	2	2	3	3	5	5	6	5	5	5	3	3	3	3	2	6
19-Apr	3	2	2	1	1	3	3	4	3	5	5	6	6	7	8	7	7	7	6	5	4	3	4	5	8
20-Apr	4	4	5	3	4	5	5	5	4	5	5	4	4	4	4	4	3	3	3	2	1	1	1	1	5
21-Apr	1	1	1	0	1	1	1	1	2	2	3	3	3	4	4	4	4	4	4	3	3	2	2	2	4
22-Apr	1	2	2	1	1	2	2	2	3	3	4	4	3	4	4	4	4	4	3	2	2	2	2	2	4
23-Apr	1	1	2	1	1	1	2	2	2	3	2	2	3	4	4	4	3	3	2	2	2	3	3	3	4
24-Apr	3	3	3	2	2	2	2	2	3	2	3	3	3	4	3	3	2	3	2	3	3	3	3	3	4
25-Apr	3	3	2	2	1	1	2	2	3	3	3	3	3	3	3	3	3	3	3	2	2	2	1	2	3
26-Apr	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	3	3	1	1	3
27-Apr	1	1	1	1	1	1	1	2	2	2	2	2	2	2	3	3	3	3	2	2	1	1	2	1	3
28-Apr	1	1	1	1	1	1	1	2	2	2	2	4	4	4	3	4	3	3	3	2	1	1	1	1	4
29-Apr	1	1	1	1	1	1	1	2	4	4	5	5	6	5	5	6	5	5	5	1	1	1	2	1	6
30-Apr	2	2	1	2	2	2	2	2	3	4	5	6	6	5	5	3	3	4	3	3	2	1	1	1	6
	4	4	5	4	4	5	5	5	4	5	5	6	6	7	8	7	7	7	6	5	4	4	4	5	
	Diurnal Maximum																								

AF - Analyzer Failure

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Fort McKay - Bertha Ganter - April 2016

Direction of Maximum Speed: 195 deg on Apr 18 16:00
Direction of Maximum Daily Speed Average: 182.7 deg on Apr 18

Direction of Minimum Speed: 109 deg on Apr 14 00:00

Direction of Minimum Daily Speed Average: 0.9 deg on Apr 4

Monthly Average Direction: 259.1 deg

Hours in Service:	720
Hours of Data:	716
Hours of Missing Data:	4
Percent Operational Time:	99.4

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-Apr	195	241	276	179	52	354	12	24	13	14	22	36	39	46	79	67	67	55	46	11	1	357	4	13	30.4
2-Apr	7	6	7	9	358	359	360	12	21	44	27	1	3	358	355	5	356	0	3	3	360	360	358	353	3.2
3-Apr	355	355	355	354	354	358	360	356	1	6	27	45	73	77	81	81	70	49	20	4	356	337	339	339	20.4
4-Apr	269	288	295	238	230	242	240	156	159	172	147	174	155	124	133	69	49	5	1	5	4	358	359	357	20.0
5-Apr	354	354	354	358	349	348	350	350	9	8	15	82	137	181	164	179	174	201	197	186	175	176	171	172	176.4
6-Apr	178	188	311	321	333	339	353	1	AF	AF	AF	AF	25	61	27	27	30	16	20	20	24	20	359	355	10.8
7-Apr	24	12	64	92	105	115	100	83	80	119	152	75	49	51	52	55	46	31	18	8	354	0	351	323	48.1
8-Apr	330	1	4	52	85	74	13	150	154	153	168	151	152	153	141	141	141	137	144	143	157	173	163	145	144.4
9-Apr	135	132	336	321	305	321	338	341	341	348	340	346	345	354	354	6	7	10	1	352	339	331	319	343	346.4
10-Apr	353	354	359	2	4	2	6	22	25	11	58	82	90	88	85	88	70	53	62	42	75	340	326	152	35.1
11-Apr	273	347	205	168	161	176	184	187	171	170	160	165	161	161	166	149	143	23	30	14	332	336	328	325	169.2
12-Apr	291	302	313	345	359	357	18	14	38	82	92	70	70	62	60	49	51	30	6	1	4	0	357	354	29.7
13-Apr	357	5	349	333	20	335	8	346	15	99	106	129	154	199	173	168	151	171	179	156	170	160	166	109	137.0
14-Apr	16	1	11	7	4	351	351	17	12	358	357	60	19	341	321	14	34	327	329	327	311	293	274	356	352.3
15-Apr	326	268	298	303	274	276	144	121	142	147	178	161	163	162	160	177	173	153	139	135	149	171	172	178	165.5
16-Apr	268	141	175	193	188	177	180	182	163	171	166	170	217	242	257	251	278	290	273	235	221	187	174	223	205.6
17-Apr	202	202	201	169	203	214	188	201	173	162	155	149	144	224	264	269	276	278	299	84	202	197	196	358	201.9
18-Apr	211	200	197	191	202	205	191	168	167	165	171	176	167	191	193	195	184	184	182	174	178	178	182	183	182.7
19-Apr	180	177	184	201	180	238	301	320	321	285	283	271	272	275	283	295	299	298	300	314	320	303	307	12	290.6
20-Apr	14	9	354	5	3	13	8	13	15	25	21	42	68	79	72	72	63	59	27	28	36	7	19	14	29.1
21-Apr	18	346	340	331	350	2	121	160	105	71	40	55	55	54	34	57	49	47	39	39	14	7	5	7	39.5
22-Apr	2	360	356	355	358	3	2	6	358	14	42	55	40	24	25	21	32	24	16	5	2	7	357	12	15.2
23-Apr	354	359	338	355	337	352	8	38	42	4	48	35	152	106	134	167	152	154	130	115	128	145	148	163	113.2
24-Apr	163	172	168	158	136	143	149	161	171	173	166	161	174	188	169	175	170	148	123	134	144	172	188	204	164.4
25-Apr	190	194	188	190	188	184	184	176	176	174	198	186	176	158	189	200	208	194	188	191	194	199	211	208	188.0
26-Apr	200	215	176	174	171	173	174	169	169	158	168	185	182	165	162	160	164	164	145	152	161	181	296	258	173.1
27-Apr	196	172	185	230	182	184	173	172	147	59	64	72	57	89	96	86	73	70	57	41	2	351	331	319	77.4
28-Apr	341	320	282	269	227	232	170	150	152	159	149	163	177	162	158	173	170	156	145	158	172	172	187	174	166.0
29-Apr	181	189	171	185	173	145	152	155	169	170	174	178	181	179	182	193	202	189	209	183	171	177	178	162	179.3
30-Apr	173	187	186	180	178	184	185	179	183	170	194	196	225	275	274	283	271	176	182	104	354	31	330	273	201.5
	281.5	300.2	314.9	321.3	1.7	347.6	6.9	57.5	119.0	123.8	135.7	139.1	138.2	135.0	144.6	145.6	133.9	128.6	87.2	55.4	70.2	248.7	244.8	310.2	
	Diurnal Average																								

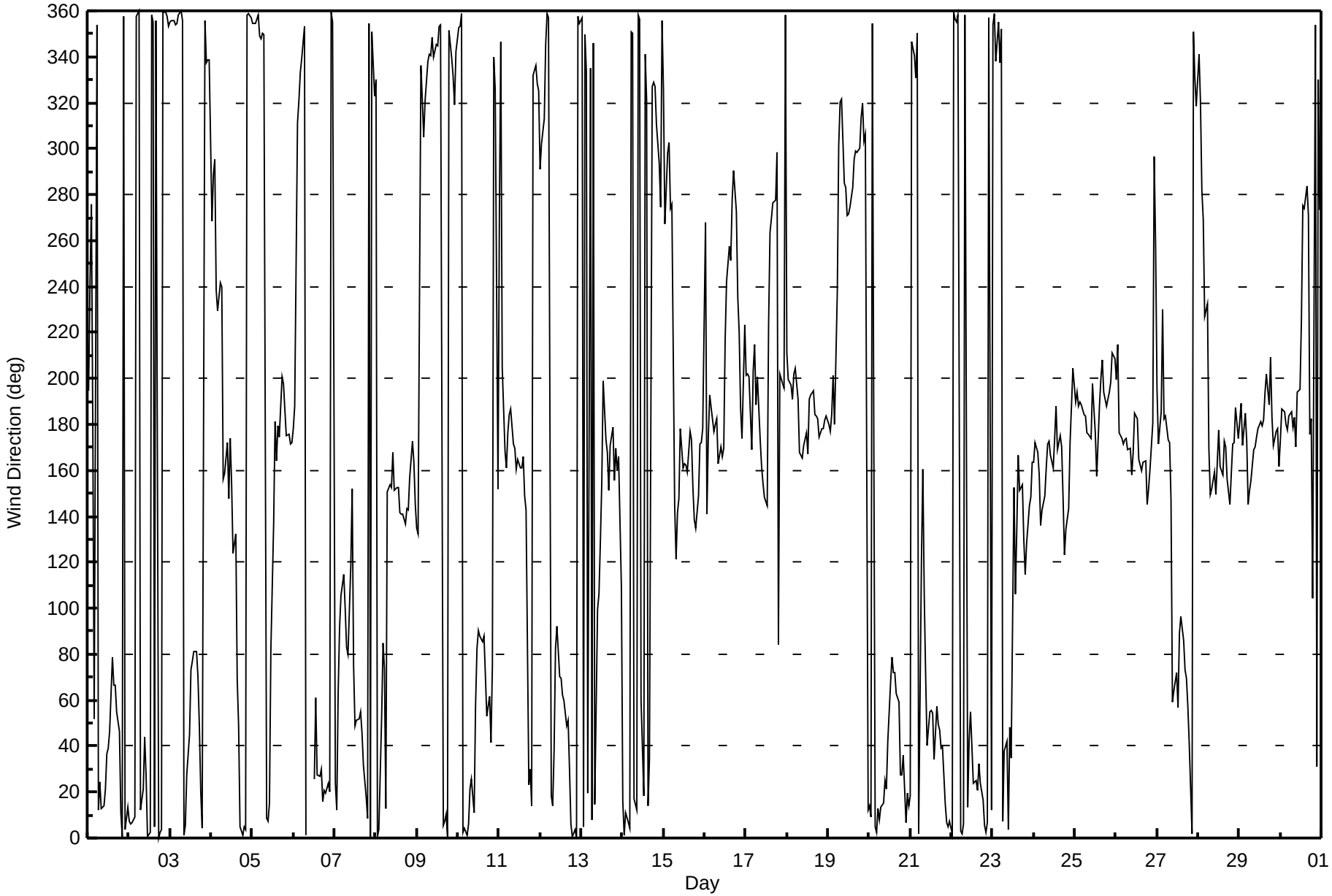
AF - Analyzer Failure
All monthly, daily, and diurnal averages have been calculated using vector methods

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction (WD) - deg

Fort McKay - Bertha Ganter - April 2016



Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg

Fort McKay - Bertha Ganter - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 103 deg on Apr 5 13:00

Minimum Value: 8 deg on Apr 17 22:00

Percentiles: P_1 = 11 P_{10} = 14 Q_1 = 18 Median = 27 Q_3 = 40 P_{90} = 52 P_{99} = 91

Hours in Service:	720
Hours of Data:	716
Hours of Missing Data:	4
Hours of Calibration:	0
Percent Operational Time:	99.4

Day	Hourly Period Ending At (MST)																								Daily
	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-Apr	58	77	69	63	78	21	32	41	37	36	41	48	46	46	27	41	38	48	49	35	21	16	20	17	78
2-Apr	16	16	17	15	14	19	21	23	54	64	52	35	37	30	30	36	32	32	30	30	29	30	27	29	64
3-Apr	27	26	29	29	27	29	27	29	32	35	43	45	36	26	29	27	33	36	40	23	20	35	23	62	62
4-Apr	33	38	53	16	31	50	28	46	25	19	42	41	54	55	91	43	39	30	22	22	25	27	25	29	91
5-Apr	24	22	22	23	22	22	23	28	34	41	51	76	103	27	18	20	17	22	18	18	13	13	13	16	103
6-Apr	16	33	34	27	23	24	30	29	AF	AF	AF	AF	44	37	39	46	40	44	38	40	40	36	43	31	46
7-Apr	59	50	52	21	19	31	42	28	54	59	37	71	54	44	39	43	45	40	41	30	19	21	22	27	71
8-Apr	36	17	26	19	16	20	33	44	24	18	17	20	18	19	16	15	15	15	15	14	18	27	16	19	44
9-Apr	23	57	41	54	19	20	22	26	28	28	26	27	26	30	32	32	36	32	33	25	25	22	17	17	57
10-Apr	27	28	29	29	32	29	30	46	44	39	55	30	38	32	32	39	43	47	38	35	29	68	59	55	68
11-Apr	28	68	47	18	16	18	16	18	14	14	16	16	17	16	21	21	23	91	36	25	25	17	20	36	91
12-Apr	29	44	27	38	31	28	44	39	43	37	31	40	40	42	41	47	42	43	31	28	31	26	27	24	47
13-Apr	29	24	42	40	47	26	34	37	33	96	81	49	35	72	16	15	13	19	13	14	16	24	67	56	96
14-Apr	44	24	33	36	34	25	28	37	36	31	45	49	58	37	24	53	41	46	19	19	17	15	9	36	58
15-Apr	48	16	18	24	29	23	75	80	17	18	27	21	18	19	21	20	20	20	13	18	21	16	12	13	80
16-Apr	55	18	28	16	14	13	15	15	14	16	14	22	95	49	45	42	37	34	33	25	21	9	17	41	95
17-Apr	60	16	72	74	63	86	51	40	49	14	27	19	16	68	49	48	37	40	79	70	19	8	15	84	86
18-Apr	35	23	16	13	15	18	22	16	13	15	18	16	18	25	19	18	18	16	16	13	14	13	14	12	35
19-Apr	31	13	13	38	14	65	32	24	40	38	36	43	39	41	35	26	25	23	22	23	19	21	30	35	65
20-Apr	37	39	32	31	35	33	35	37	35	42	44	47	43	31	35	36	49	40	44	39	36	22	32	25	49
21-Apr	33	55	48	32	31	53	57	39	66	40	56	46	49	48	47	40	43	44	44	50	37	30	27	29	66
22-Apr	21	24	25	23	19	21	28	29	36	40	46	41	54	44	44	43	44	43	40	28	24	28	21	20	54
23-Apr	15	19	28	21	21	19	25	53	55	52	60	103	98	66	38	40	38	27	21	13	15	14	14	16	103
24-Apr	15	14	14	14	12	13	19	16	15	17	18	17	20	25	17	17	19	20	15	16	14	14	17	21	25
25-Apr	16	16	13	12	13	14	14	16	18	19	27	22	25	17	21	21	32	21	14	14	15	16	19	19	32
26-Apr	16	23	17	14	12	13	14	14	16	15	14	24	18	15	14	17	19	19	26	23	21	60	40	43	60
27-Apr	26	39	43	47	23	66	19	68	88	50	43	66	67	36	42	50	37	37	38	46	20	17	36	63	88
28-Apr	24	35	39	38	35	37	28	14	19	21	19	28	36	25	23	19	17	16	12	22	17	17	13	10	39
29-Apr	12	14	11	11	12	13	13	15	15	15	17	19	19	21	25	26	22	20	25	38	13	11	18	10	38
30-Apr	14	13	12	14	15	17	15	18	20	19	25	25	48	41	37	32	54	27	18	81	34	77	59	27	81
	60	77	72	74	78	86	75	80	88	96	81	103	103	72	91	53	54	91	79	81	40	77	67	84	
	Diurnal Maximum																								

AF - Analyzer Failure

Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

Calibration Date	April 8, 2016	Last Calibration	March 16, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	Routine		
Start Time (MST)	8:25	End Time (MST)	11:15
Gas Cert Reference	LL107945	Station temp.	21 Deg C
Cal Gas Concentration	49.7 ppm	Cal Gas Exp Date	08/09/2018
Calibrator Make/Model	Sabio 4010	Serial Number	1730512
ZAG Make/Model	API 701	Serial Number	587
DACS make/model	Campbell Scientific CR3000	DACS serial No.	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	820	819
Calculated slope	0.998936	1.001336	Chamber temp	45.3	45.0
Calculated intercept	-0.391058	-0.010335	Pressure	689.2	684.5
Analyzer Background	12.5	12.5	Flow	0.503	0.499
Analyzer Coefficient	0.950	0.950	Intensity	90	90

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	81.3	734.7	733.1	1.002
calibrator zero	5500	0.0	0.0	0.7	----
high point	5500	81.3	734.7	734.2	1.001
second point	5500	45.6	412.1	410.8	1.003
third point	5500	22.8	206.0	205.2	1.004
as left zero	5500	0.0	0.0	0.7	----
as left span	5500	81.3	734.7	731.5	1.004
				Average Correction Factor	1.003

Corrected As found	732.8	Previous response	735.8	% change	0.4%

Notes:

Inlet filter changed after as founds. No adjustments made.

Calibration Performed By: Devin Russell

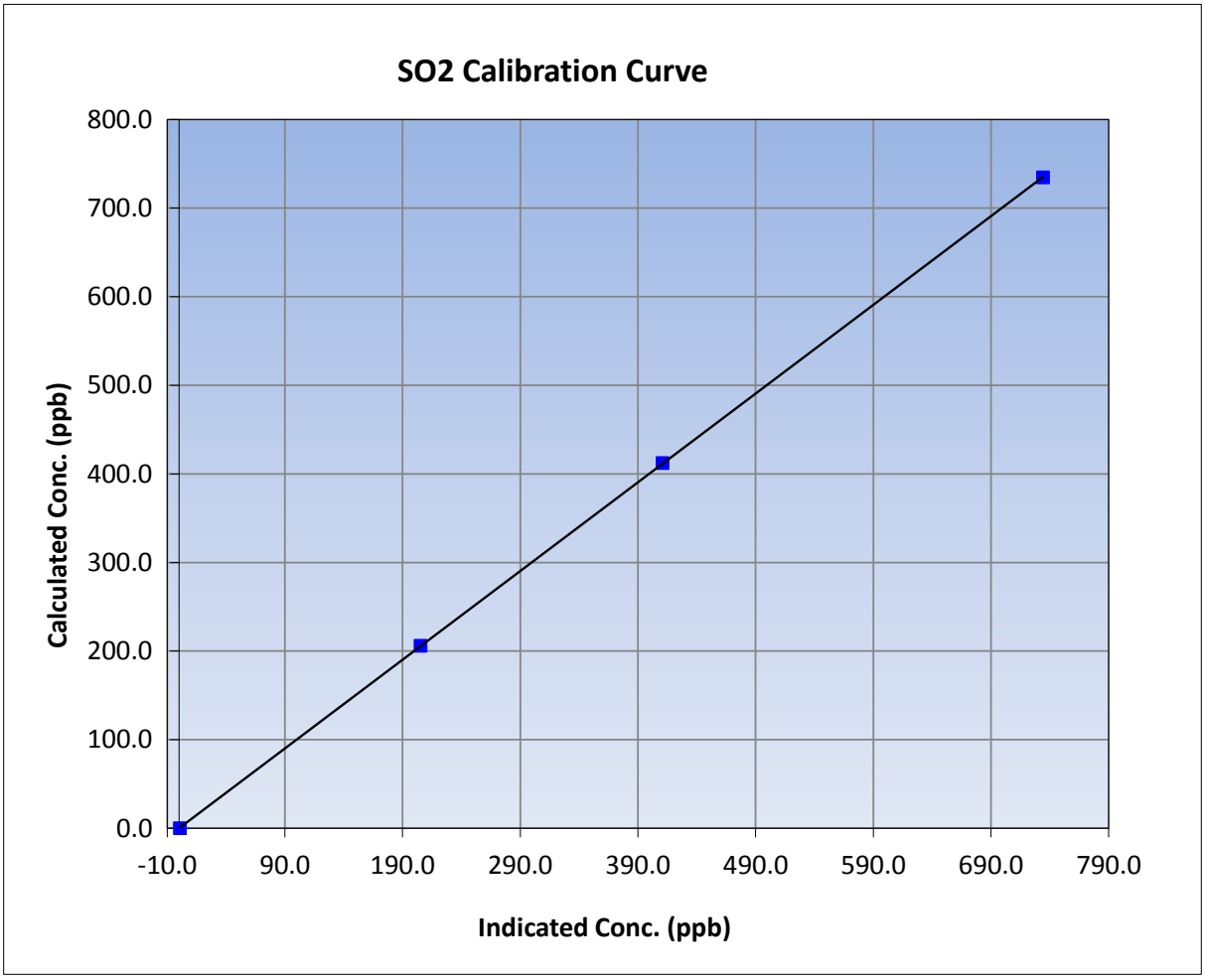
Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

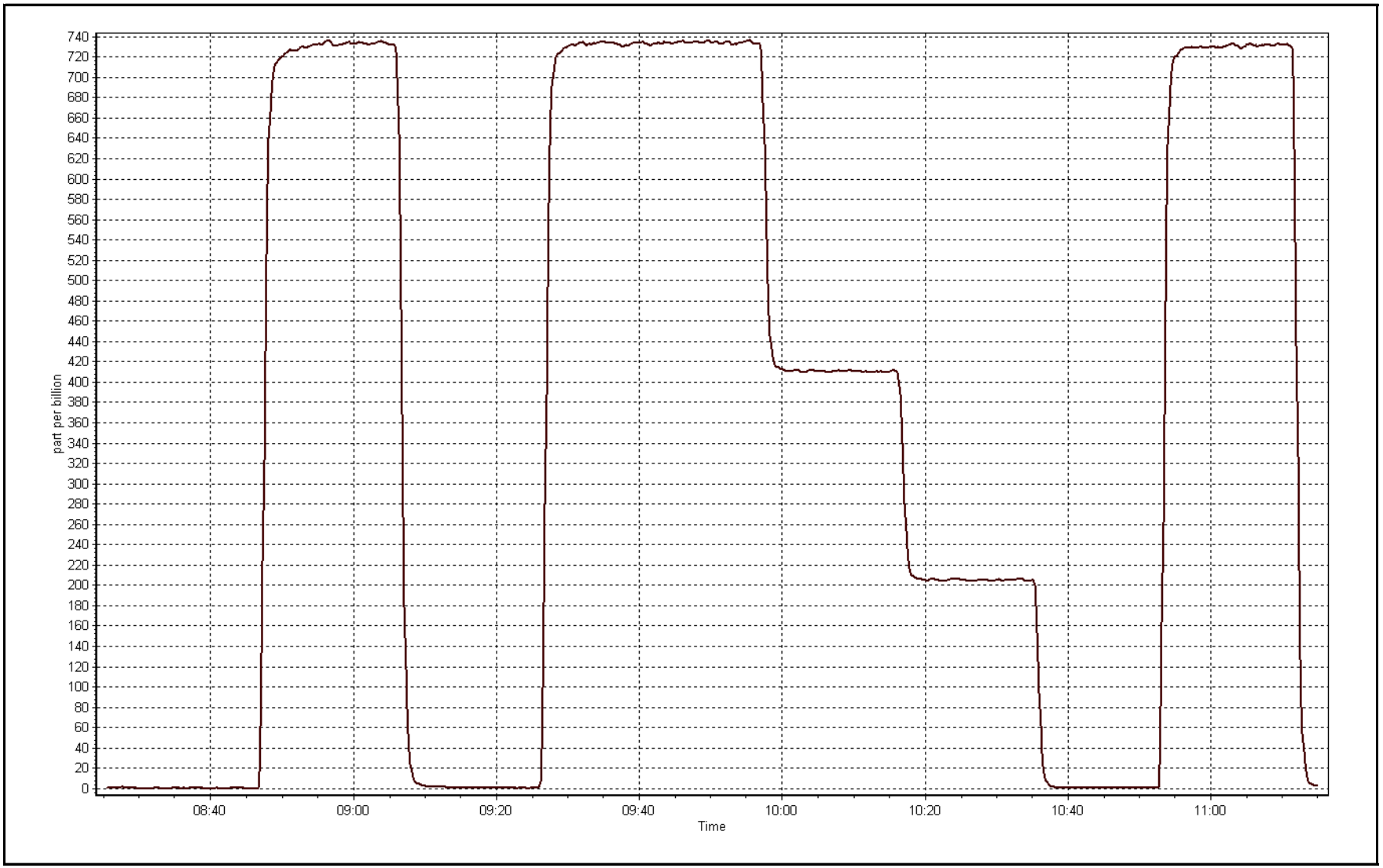
Calibration Date	April 8, 2016	Previous Calibration	March 16, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	8:25	End Time (MST)	11:15
Analyzer make	Thermo 43i	Analyzer serial #	JC1501301448

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.7	----	Correlation Coefficient	0.999994
734.7	734.2	1.0006		
412.1	410.8	1.0030	Slope	1.001336
206.0	205.2	1.0041		
			Intercept	-0.010335



SO2 Calibration Plot Date: April 8, 2016



Wood Buffalo Environmental Association
TRS Calibration Report

Station Information

Calibration Date	April 8, 2016	Last Calibration	March 17, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	Routine		
Start Time (MST)	11:10	End Time (MST)	14:20
Gas Cert Reference	LL27480	Station temp.	21 Deg C
Cal Gas Concentration	10.6 ppm	Cal Gas Exp Date	21/12/2012
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	49.7 ppm	SO2 gas cert/exp	SA140071A 26/Sep/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	1168	1160
Calculated slope	0.994107	1.003049	Chamber temp	45	45
Calculated intercept	0.147164	-0.037670	Pressure	676.3	669.0
Analyzer Background	1.9	1.9	Flow	0.439	0.433
Analyzer Coefficient	1.029	1.029	Intensity	80	79
			Converter temp.	800	800

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

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6000	0.0	0.0	-0.1	----
as found span	6500	46.0	75.0	74.5	1.007
SO2 scrubber check	5500	22.8	206.0	0.4	----
calibrator zero	6500	0.0	0.0	0.0	----
high point	6500	46.0	75.0	74.8	1.003
second point	6500	24.6	40.1	40.1	1.000
third point	6500	12.3	20.1	20.0	1.003
as left zero	6000	0.0	0.0	0.0	----
as left span	6500	46.0	75.0	75.0	1.000
				Average Correction Factor	1.002

Corrected As found	74.6	Previous response	75.3	% change	0.9%

Notes:

Inlet filter changed after as founds. Scrubber check completed after as founds. No adjustments made.

Calibration Performed By: Devin Russell

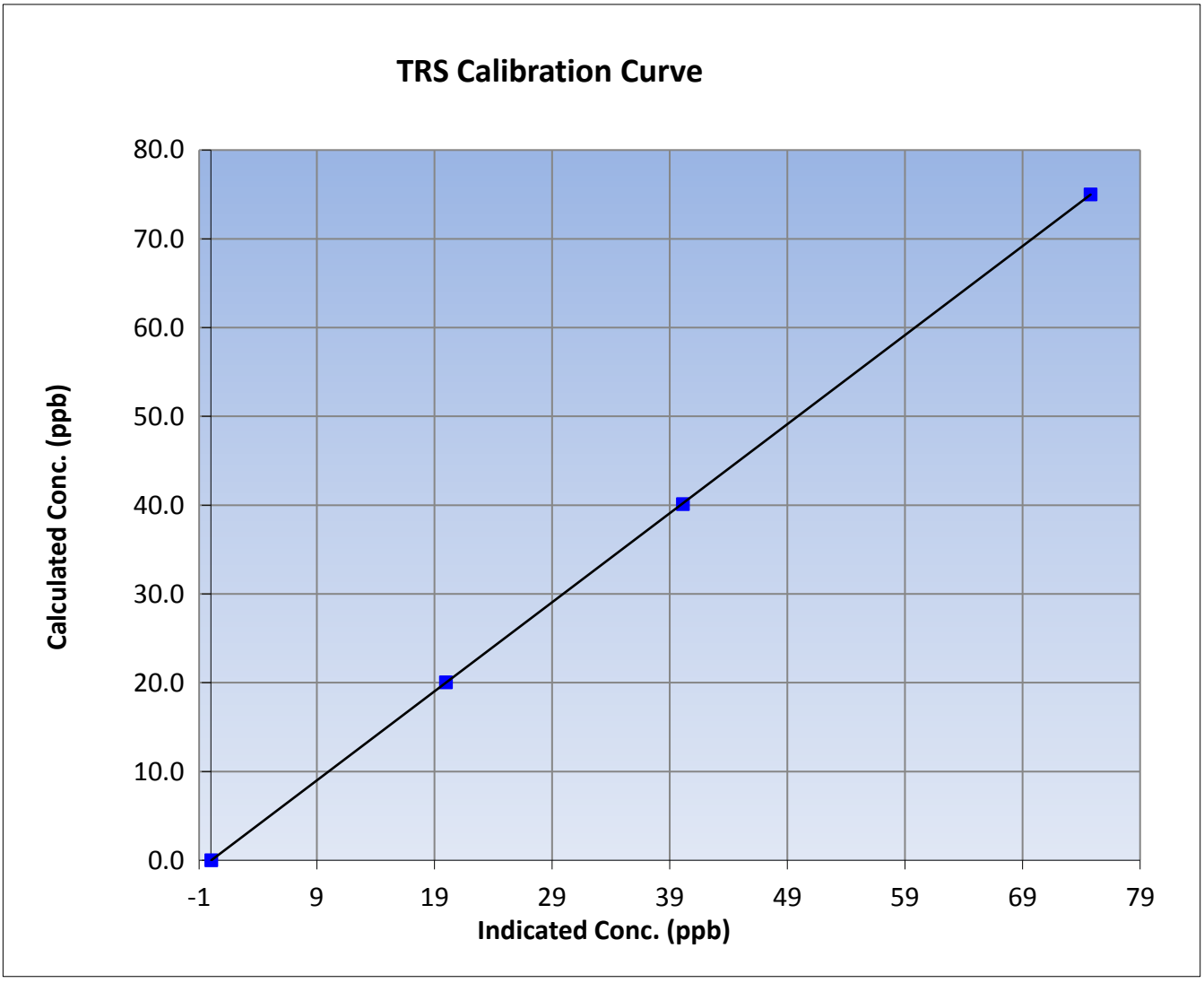
Wood Buffalo Environmental Association
TRS Calibration Report

Station Information

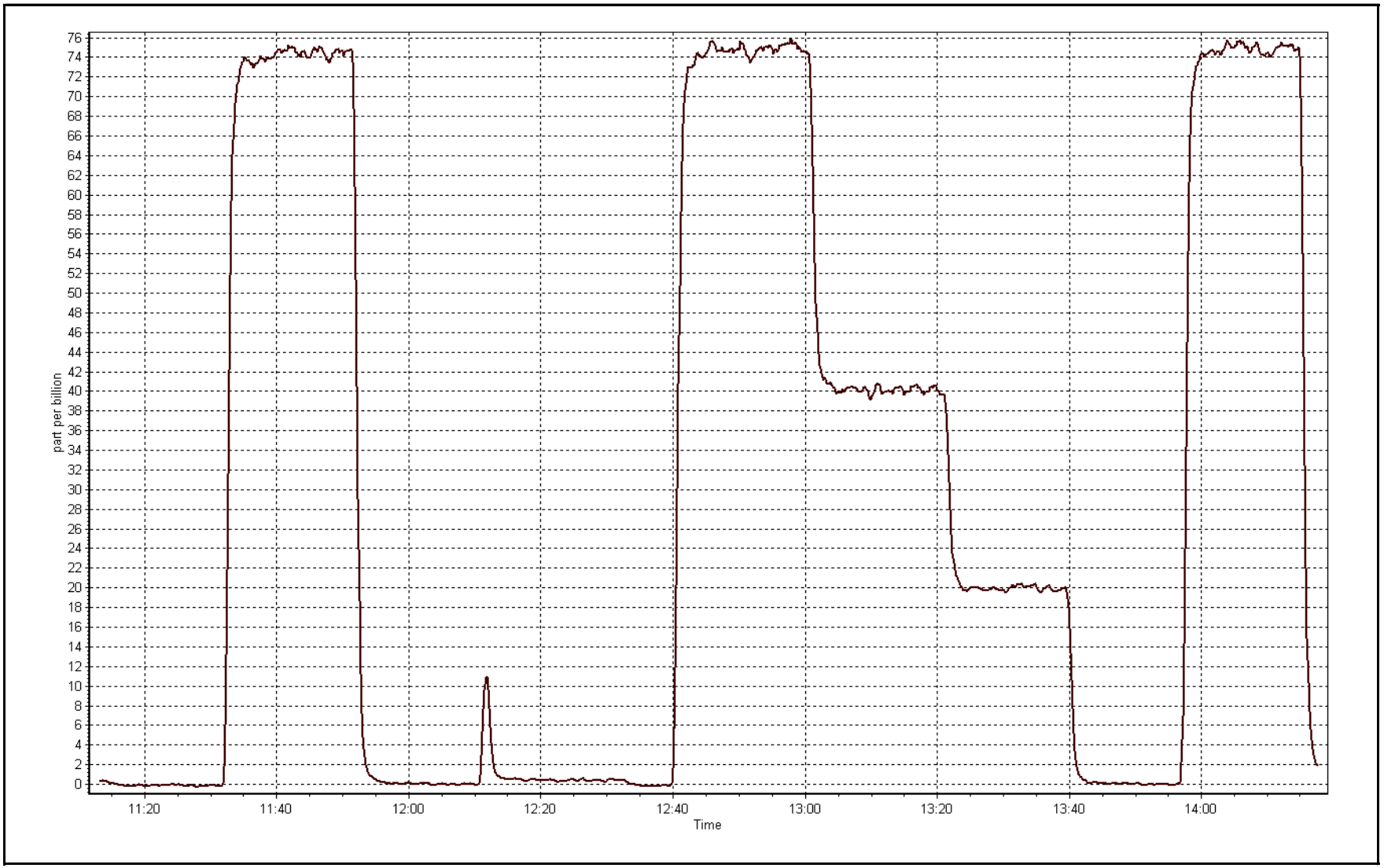
Calibration Date	April 8, 2016	Previous Calibration	March 17, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	11:10	End Time (MST)	14:20
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1218153461

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999996
75.0	74.8	1.0030		
40.1	40.1	0.9999	Slope	1.003049
20.1	20.0	1.0034		
			Intercept	-0.037670



TRS Calibration Plot Date: April 8, 2016



Wood Buffalo Environmental Association
THC / NMHC Calibration Report

Station Information

Calibration Date	April 8, 2016	Last Calibration	March 16, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1

Reason: Routine

Start Time (MST)	8:25	End Time (MST)	11:15
Gas Cert Reference	SA140071A	Cal Gas Expiry Date	September-26-17
CH4 Cal Gas Conc.	515.0 ppm	CH4 Equiv Conc.	1065.0 ppm
C3H8 Cal Gas Conc.	200.0 ppm	Station temp.	21 Deg C
Calibrator Model	Sabio 4010	Serial Number	1730512
ZAG make/model	Teledyne API 701	Serial Number	587
DACS make/model	Campbell Scientific CR3000	Serial Number	2582

Analyzer Information

	Before	*After*		*Before*	*After*
THC Range (ppm)	0 - 50 ppm		Column Temp	75.3	74.9
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	175.1	175.0
Analyzer IP address	192.168.1.55		Flame Temp	405.0	405.0
THC Calc slope	0.998019	0.998651	Carrier Pressure	37.3	37.3
THC Calc intercept	0.041141	0.039078	Fuel Pressure	44.3	44.3
NMHC Calc slope	0.998372	0.999187	Air Pressure	39.0	38.9
NMHC Calc intercept	-0.003891	-0.001955			

Analyzer make	Thermo 55i	Analyzer serial #	1152430012

THC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5500	0.0	0.00	0.00	----
as found span	5500	81.3	15.74	15.78	0.998
calibrator zero	5500	0.0	0.00	0.00	----
high point	5500	81.3	15.74	15.76	0.999
second point	5500	45.6	8.83	8.75	1.009
third point	5500	22.8	4.41	4.36	1.013
as left zero	5500	0.0	0.00	0.00	----
as left span	5500	81.3	15.74	15.71	1.002
				Average Correction Factor	1.007

Corrected As found	15.78	Previous response	15.73	% change	-0.3%

Notes:

Inlet filter changed after as founds. Span adjusted.

Calibration Performed By: Devin Russell

Wood Buffalo Environmental Association

THC / NMHC Calibration Report

NMHC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5500	0	0.00	0.00	----
as found span	5500	81.3	8.13	8.16	0.996
calibrator zero	5500	0.0	0.00	0.00	----
high point	5500	81.3	8.13	8.14	0.999
second point	5500	45.6	4.56	4.56	1.000
third point	5500	22.8	2.28	2.29	0.996
as left zero	5500	0.0	0.00	0.00	----
as left span	5500	81.3	8.13	8.11	1.002
				Average Correction Factor	0.998

Corrected As found	8.16	Previous response	8.15	% change	-0.2%

CH4 Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5500	0	0.00	0.00	----
as found span	5500	81.3	7.61	7.62	0.999
calibrator zero	5500	0.0	0.00	0.00	----
high point	5500	81.3	7.61	7.62	0.999
second point	5500	45.6	4.27	4.19	1.019
third point	5500	22.8	2.13	2.07	1.031
as left zero	5500	0.0	0.00	0.00	----
as left span	5500	81.3	7.61	7.60	1.002
				Average Correction Factor	1.016

Corrected As found	7.62	Previous response	7.59	% change	-0.5%

Wood Buffalo Environmental Association

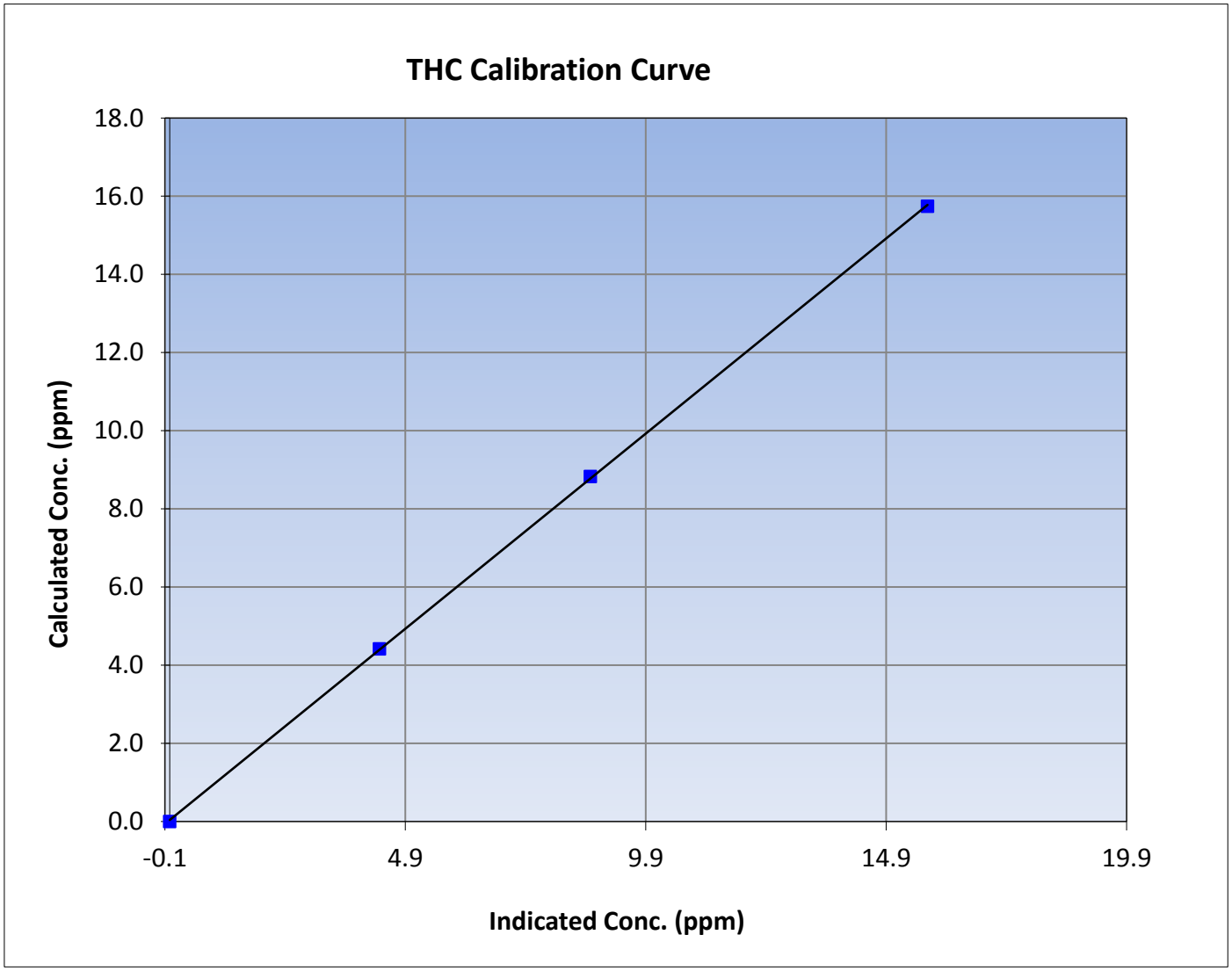
THC Calibration Summary

Station Information

Calibration Date	April 8, 2016	Previous Calibration	March 16, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	8:25	End Time (MST)	11:15
Analyzer make	Thermo 55i	Analyzer serial #	1152430012

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999956
15.74	15.76	0.9989		
8.83	8.75	1.0091	Slope	0.998651
4.41	4.36	1.0126		
			Intercept	0.039078



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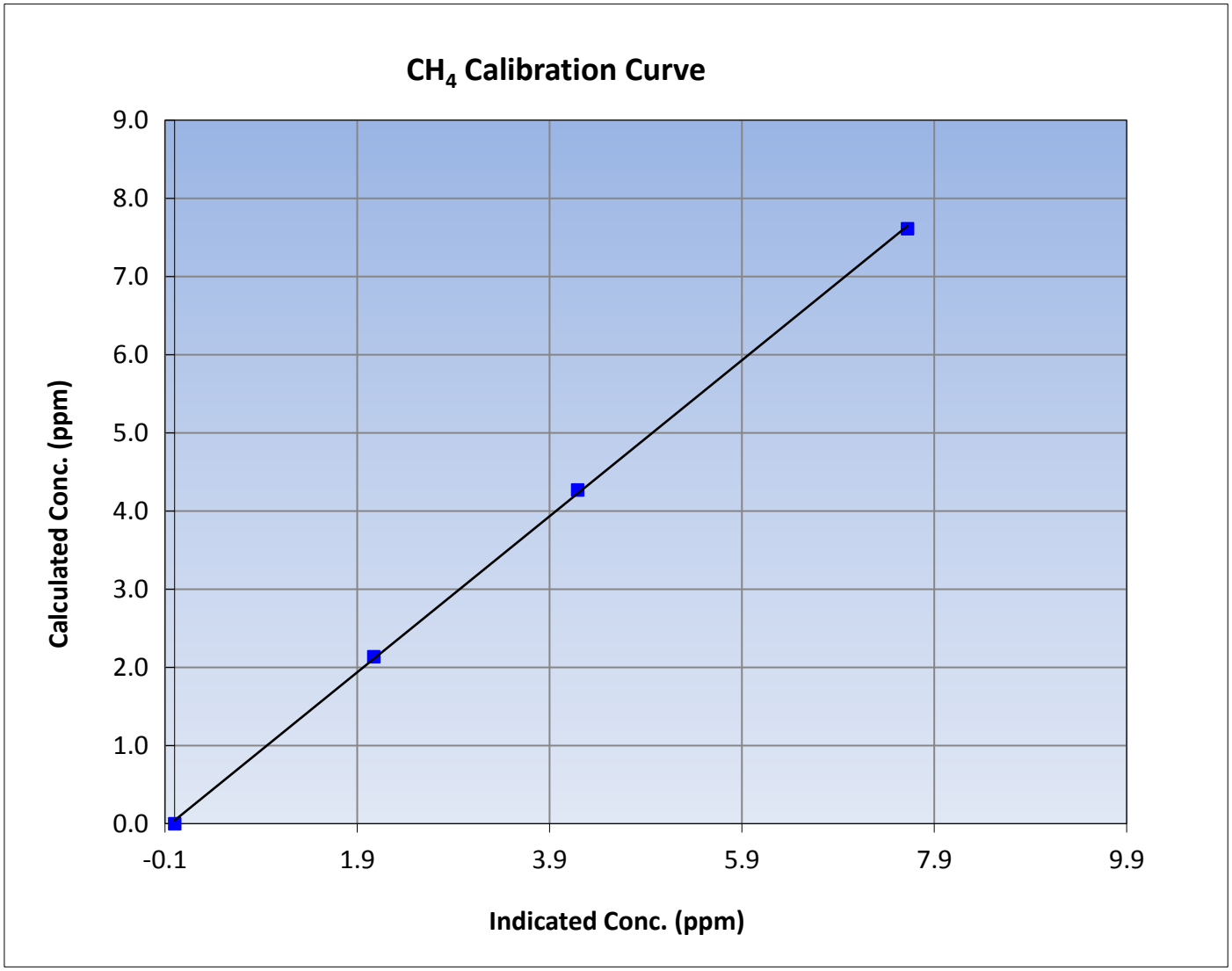
CH_4 Calibration Summary

Station Information

Calibration Date	April 8, 2016	Previous Calibration	March 16, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	8:25	End Time (MST)	11:15
Analyzer make	Thermo 55i	Analyzer serial #	1152430012

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999817
7.61	7.62	0.9990		
4.27	4.19	1.0190	Slope	0.997985
2.13	2.07	1.0314		
			Intercept	0.041333



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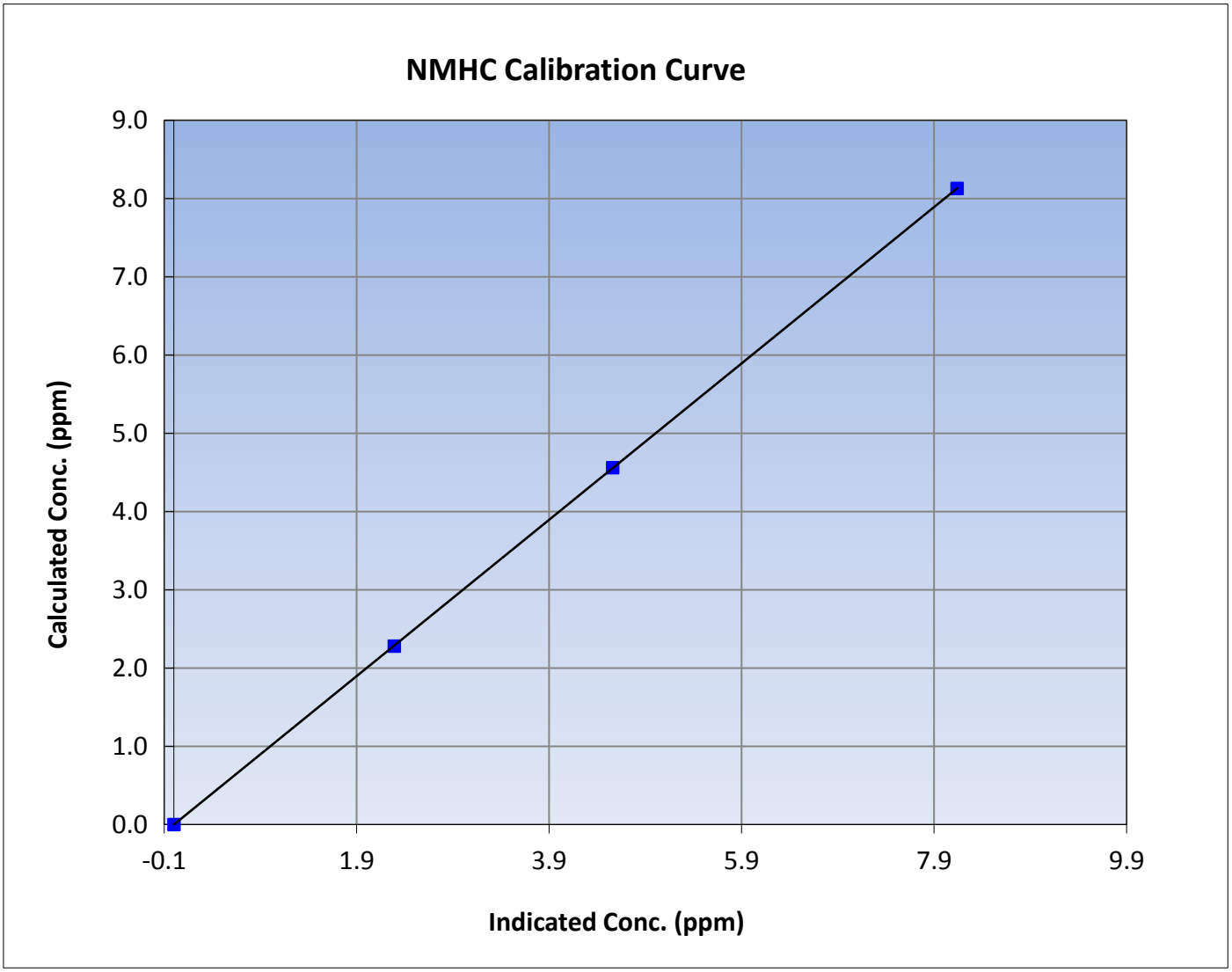
NMHC Calibration Summary

Station Information

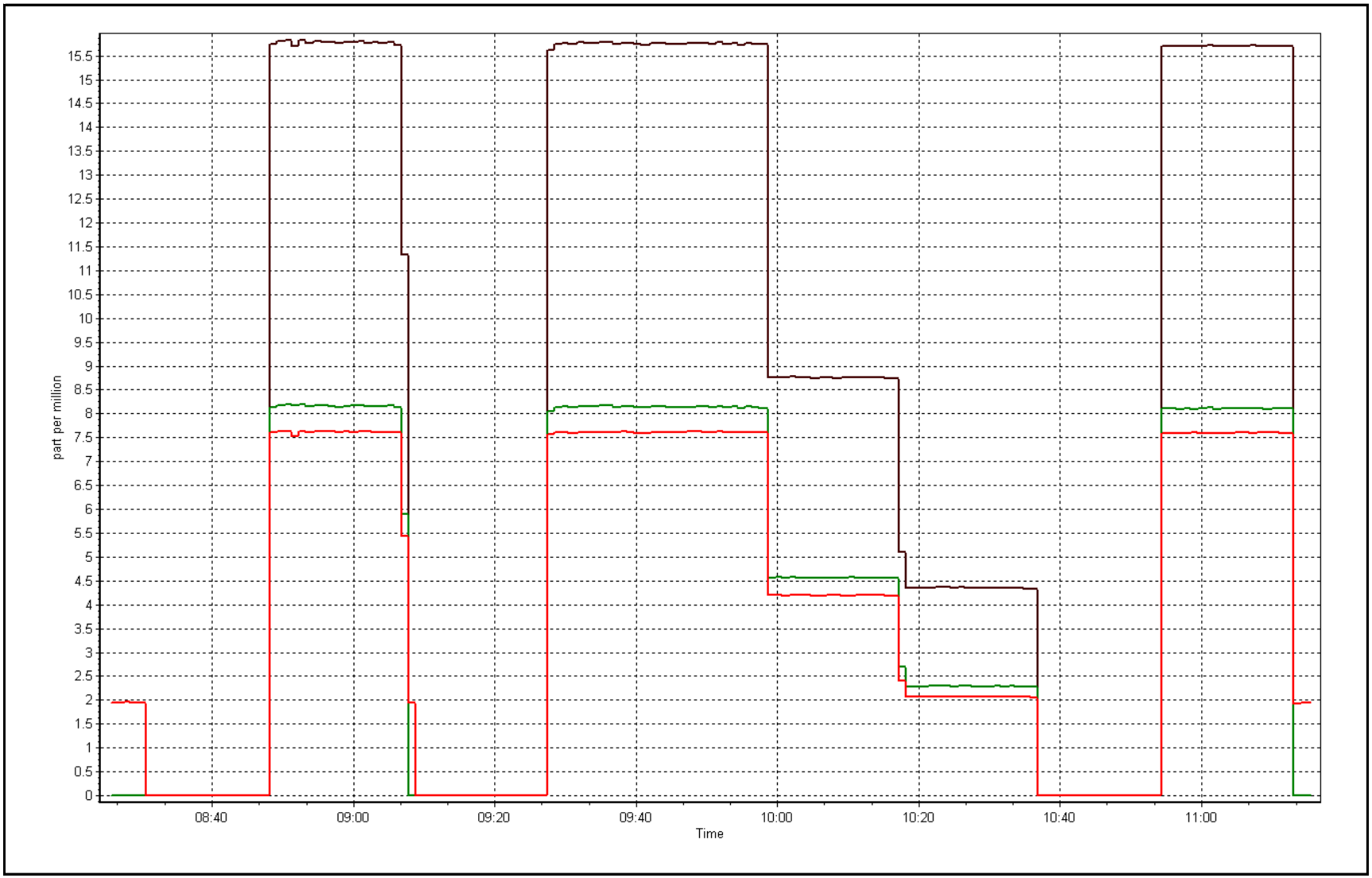
Calibration Date	April 8, 2016	Previous Calibration	March 16, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	8:25	End Time (MST)	11:15
Analyzer make	Thermo 55i	Analyzer serial #	1152430012

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999998
8.13	8.14	0.9988		
4.56	4.56	1.0000	Slope	0.999187
2.28	2.29	0.9956		
			Intercept	-0.001955



THC Calibration Plot Date: April 8, 2016



Wood Buffalo Environmental Association
O_3 Calibration Report

Station Information

Calibration Date	April 4, 2016	Previous Calibration	March 22, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	Routine		
Start Time (MST)	9:10	End Time (MST)	17:40 MST
NO2 GPT Ref date	March-22-16	Transfer Standard	N/A
		Station temp.	23 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.	26.9	28.4
Analyzer IP address	192.168.1.48		Lamp temp.	53.6	53.5
Calculated slope	1.003317	1.001233	Pressure	721.7	718.1
Calculated intercept	-4.323129	-1.200985	Flow cell A	0.764	0.761
Analyzer Background	-4.6	-2.0	Flow cell B	0.766	0.763
Analyzer Coefficient	0.998	1.046	Cell A Intensity	100513	99591
			Cell B Intensity	100251	100112

Analyzer make	Thermo 49i	Analyzer serial #	1300156233

Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator Lamp Intensity	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.00	0.0	2.0	----
as found span	5000	0.98	405.2	396.2	1.023
calibrator zero	5000	0.00	0.0	0.1	----
high point	5000	0.98	405.2	405.3	1.000
second point	5000	0.56	241.0	242.1	0.995
third point	5000	0.34	123.5	126.0	0.980
as left zero	5500	0.00	0.0	-0.4	----
as left span	5000	0.98	405.0	414.5	0.977
				Average Correction Factor	0.992

Corrected As found	394.2	Previous response	408.2	% change	3.5%

Notes:

As founds completed. O3 scrubber replaced to determine if the O3 scrubber installed last calibration is the cause of the negative dipping during zeroes. Scrubber replacement did not solve issue. Thermo tech support suggested conditioning analyzer with high concentration of O3. A point of around 715 ppb was generated for around 40 minutes. Zero did not dip negative after conditioning. Zero adjusted. Span adjusted.

Calibration Performed By: Devin Russell

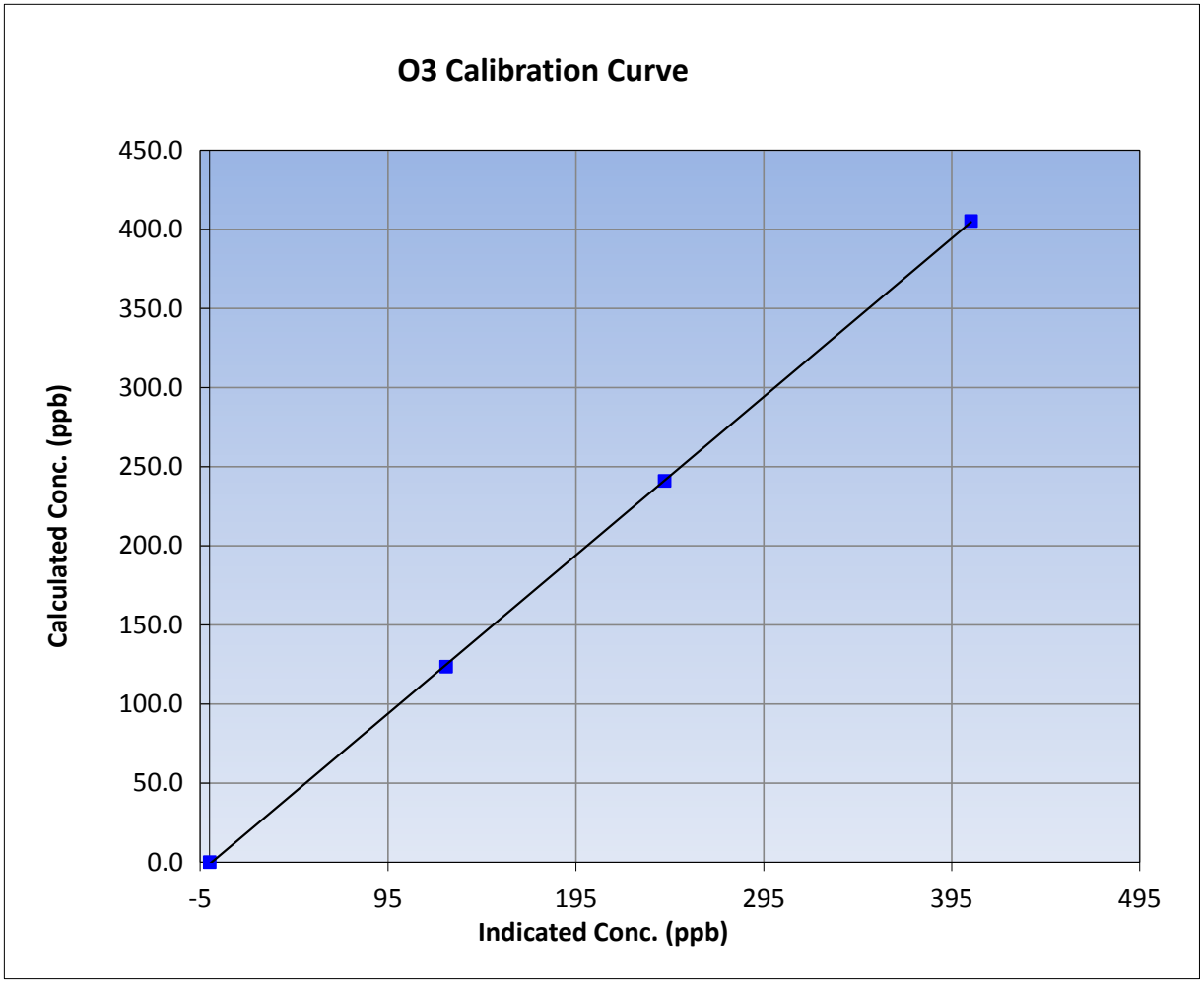
Wood Buffalo Environmental Association
O3 Calibration Report

Station Information

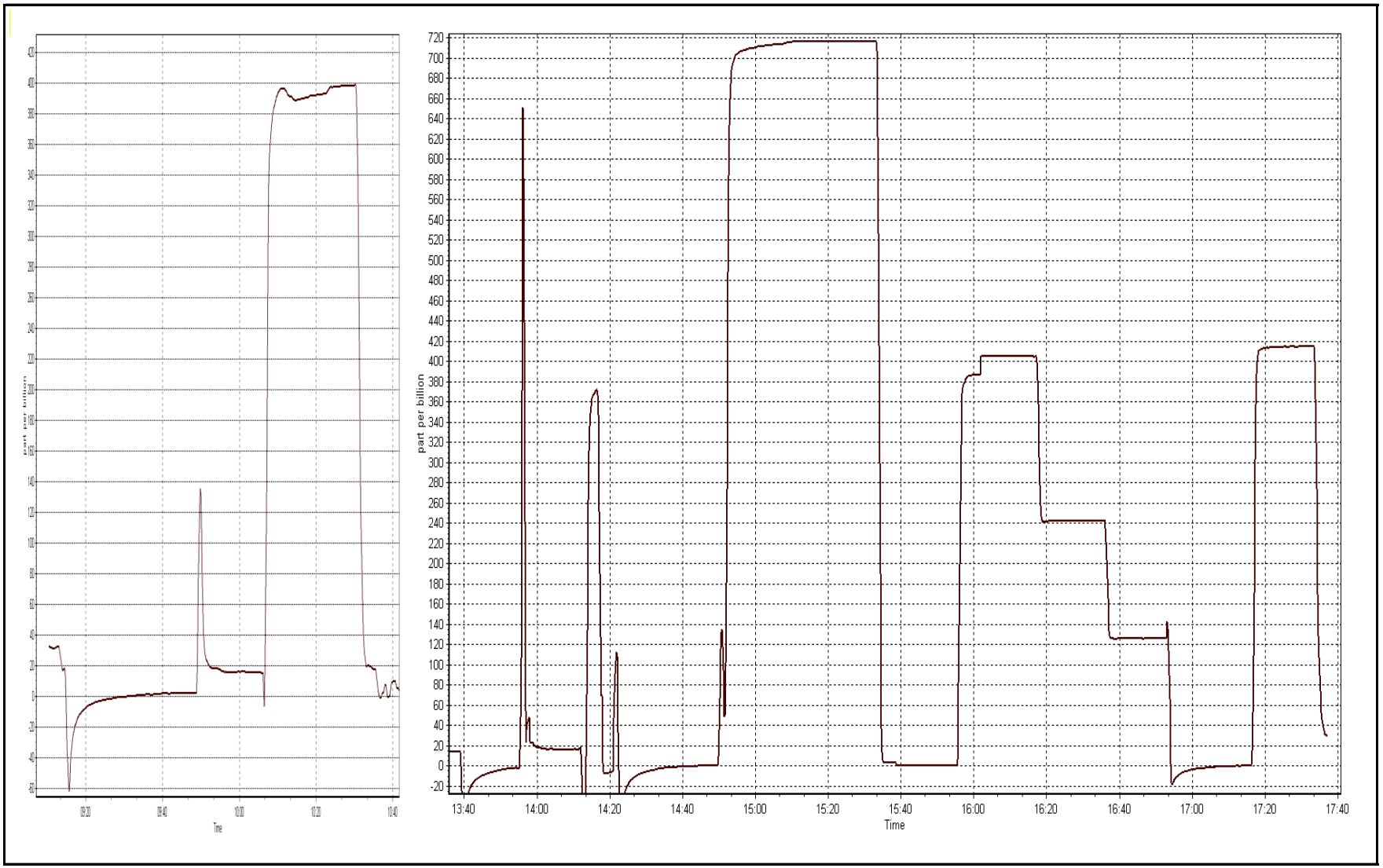
Calibration Date	April-04-16	Previous Calibration	March 22, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:10	End Time (MST)	
Analyzer make	Thermo 49i	Analyzer serial #	1300156233

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	0.999960
405.2	405.3	0.9997		
241.0	242.1	0.9953	Slope	1.001233
123.5	126.0	0.9805		
			Intercept	-1.200985



O3 Calibration Plot Date: April 4, 2016



Wood Buffalo Environmental Association
O_3 Calibration Report

W B E A

Station Information

Calibration Date	April 7, 2016	Previous Calibration	April 4, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	Removal		
Start Time (MST)	8:45	End Time (MST)	10:26
NO2 GPT Ref date	April-04-16	Transfer Standard	N/A
		Station temp.	23 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.	28.4	NA
Analyzer IP address	192.168.1.48		Lamp temp.	53.5	NA
Calculated slope	1.001233	0.991967	Pressure	718.1	NA
Calculated intercept	-1.200985	-0.167842	Flow cell A	0.761	NA
Analyzer Background	-2.0	NA	Flow cell B	0.763	NA
Analyzer Coefficient	1.046	NA	Cell A Intensity	99591	NA
			Cell B Intensity	100112	NA

Analyzer make	Thermo 49i	Analyzer serial #	1300156233

Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator Lamp Intensity	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.00	0.0	-2.2	----
as found span	5000	0.98	405.2	406.9	0.996
calibrator zero	5000	0.00	0.0	-2.2	----
high point	5000	0.98	405.2	406.9	0.996
second point	5000	0.56	241.0	244.6	0.985
third point	5000	0.34	123.5	127.2	0.971
as left zero	5500	0.00	0.0		----
as left span	5000	0.98	405.0		
				Average Correction Factor	0.984

Corrected As found	409.1	Previous response	405.9	% change	-0.8%

Notes:

Removal Calibration due to negative dip during zero.

Calibration Performed By: Devin Russell

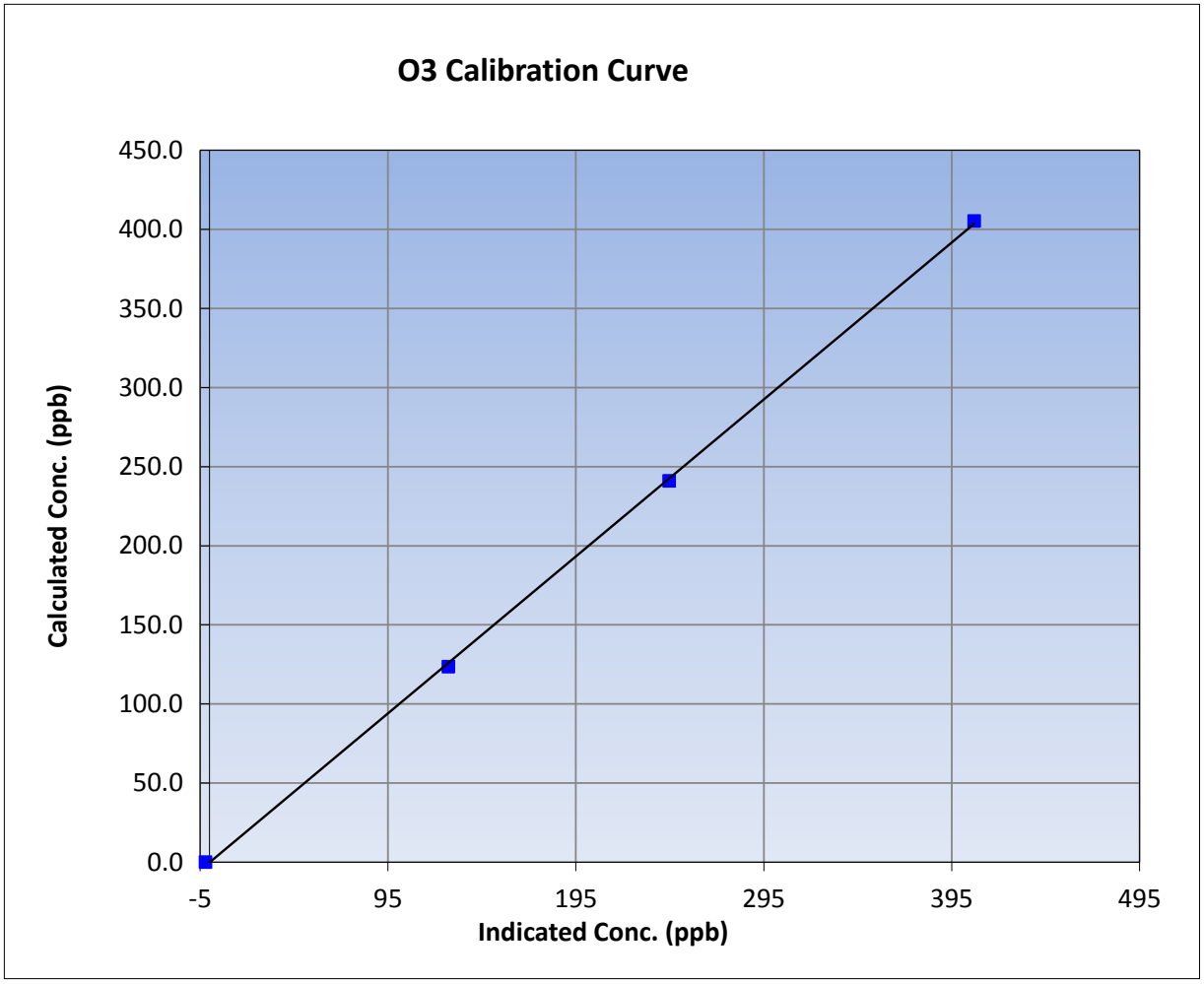
Wood Buffalo Environmental Association
O3 Calibration Report

Station Information

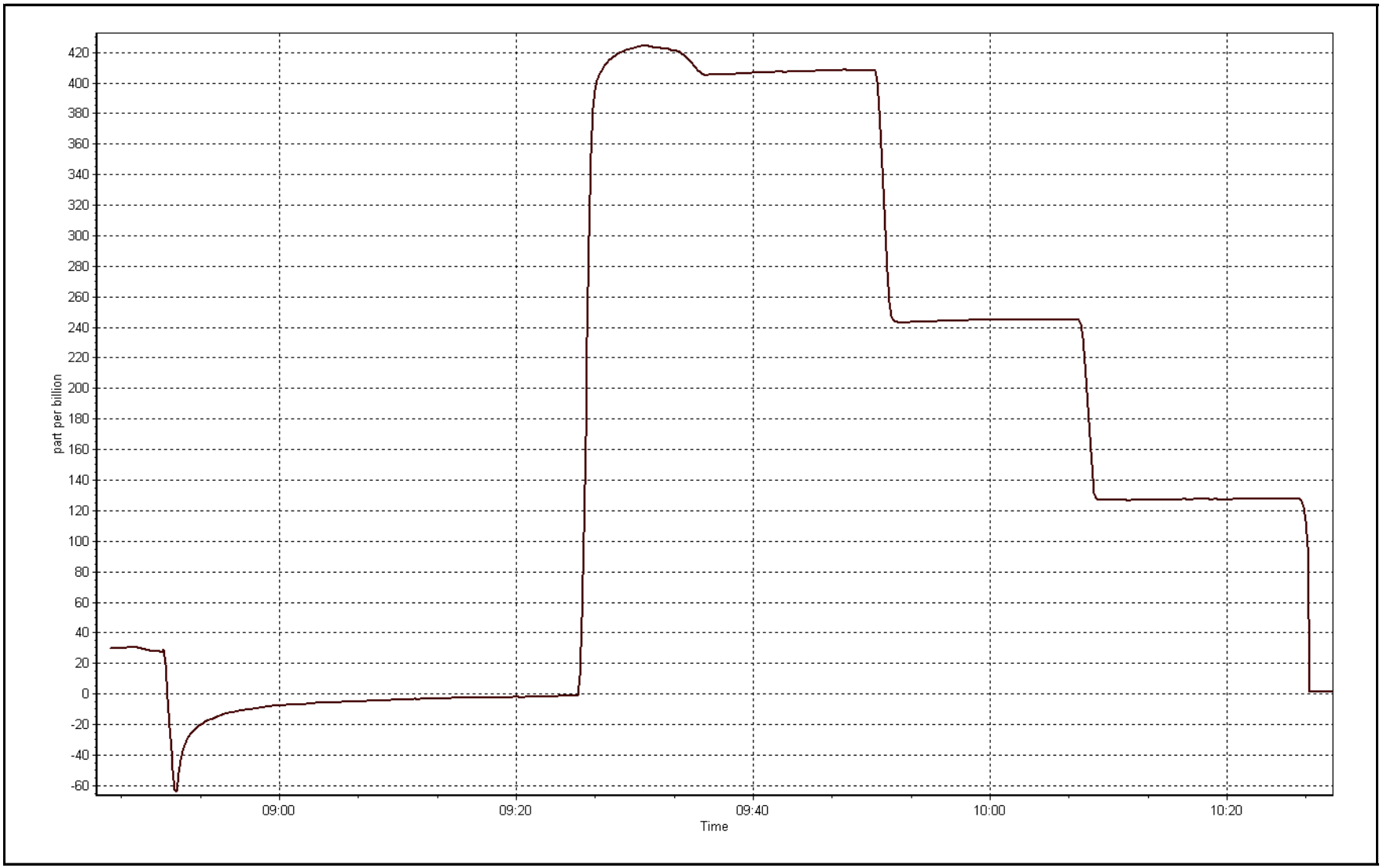
Calibration Date	April-07-16	Previous Calibration	April 4, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	8:45	End Time (MST)	10:26
Analyzer make	Thermo 49i	Analyzer serial #	1300156233

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-2.2	----	Correlation Coefficient	0.999813
405.2	406.9	0.9957		
241.0	244.6	0.9852	Slope	0.991967
123.5	127.2	0.9709		
			Intercept	-0.167842



O3 Calibration Plot Date: April 7, 2016



Wood Buffalo Environmental Association
O_3 Calibration Report

Station Information

Calibration Date	April 7, 2016	Previous Calibration	NA
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	Install		
Start Time (MST)	10:35	End Time (MST)	14:15
NO2 GPT Ref date	April-04-16	Transfer Standard	N/A
		Station temp.	23 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.	NA	25.4
Analyzer IP address	192.168.1.79		Lamp temp.	NA	58.0
Calculated slope	NA	1.002378	Pressure	NA	27.3
Calculated intercept	NA	-1.550128	Flow cell A	NA	785.0
Analyzer Background	NA	0.7	Flow cell B	NA	785.0
Analyzer Coefficient	NA	1.129	Cell A Intensity	NA	NA
			Cell B Intensity	NA	NA

Analyzer make	API T400	Analyzer serial #	1107

Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator Lamp Intensity	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero					
as found span					
calibrator zero	5000	0.00	0.0	0.7	----
high point	5000	0.98	405.2	405.3	1.000
second point	5000	0.56	241.0	242.4	0.994
third point	5000	0.34	123.5	125.8	0.982
as left zero	5500	0.00	0.0	0.3	----
as left span	5000	0.98	405.0	399.9	1.013
				Average Correction Factor	0.992

Corrected As found	NA	Previous response	NA	% change	NA

Notes:

Installation Calibration. Communication errors during span. Fixed by changing the lantronix port settings. During as left zero, internal zero/span valve kept switching on along with the external zero/span valve. Internal valve eventually unplugged and left in sample mode.

Calibration Performed By: Devin Russell

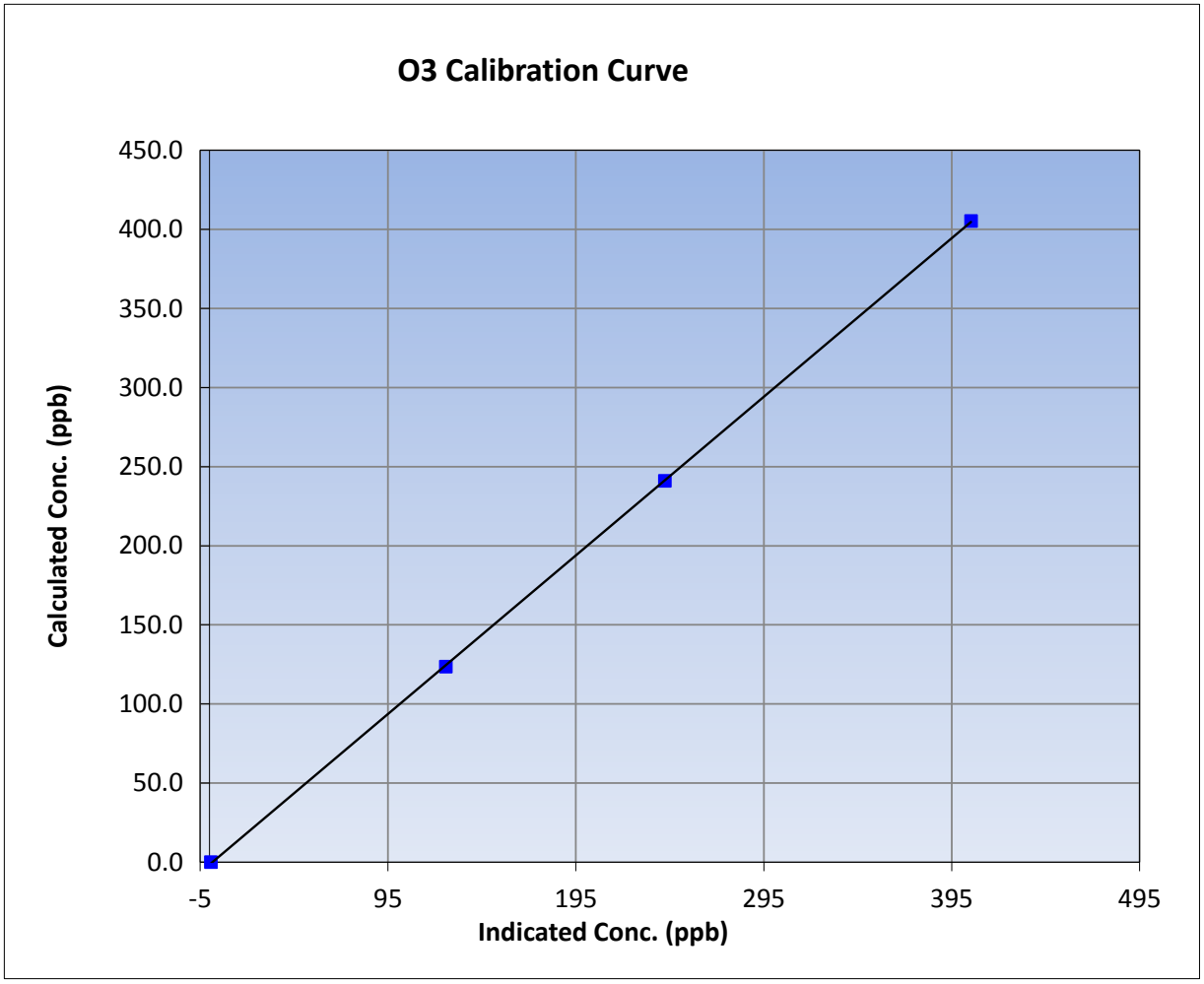
Wood Buffalo Environmental Association
O3 Calibration Report

Station Information

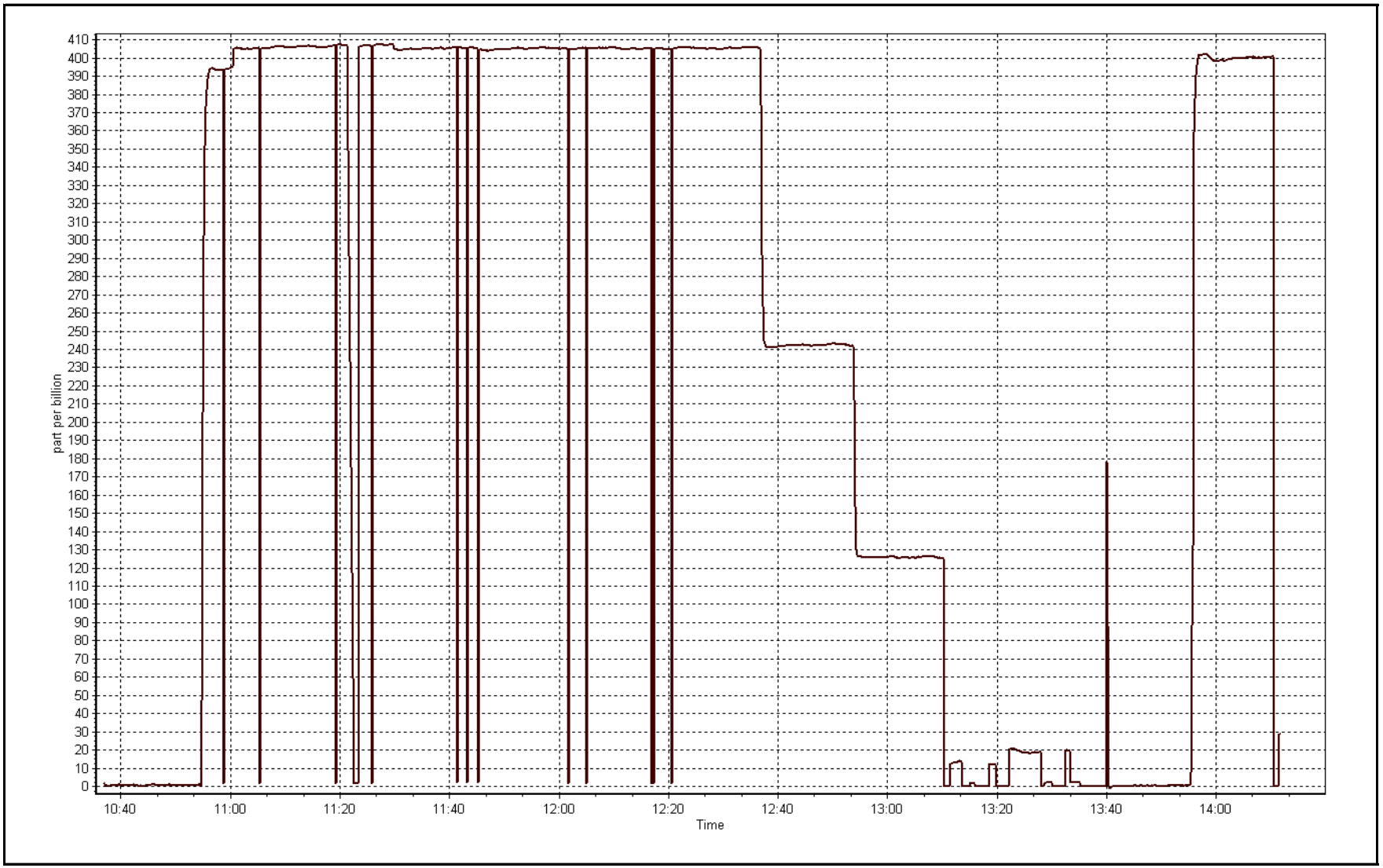
Calibration Date	April-07-16	Previous Calibration	NA
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	10:35	End Time (MST)	14:15
Analyzer make	API T400	Analyzer serial #	1107

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.7	----	Correlation Coefficient	0.999976
405.2	405.3	0.9999		
241.0	242.4	0.9944	Slope	1.002378
123.5	125.8	0.9820		
			Intercept	-1.550128



O3 Calibration Plot Date: April 7, 2016



Wood Buffalo Environmental Association
NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	April 4, 2016	Previous Calibration	March 14, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	Routine		
Start Time (MST)	9:10	End Time (MST)	14:20
NO Cal Gas Conc	50.7 ppm	Gas Cert Reference	LL107945
NOx Cal Gas Conc	50.9 ppm	Cal Gas Expiry Date	09/08/2018
Calibrator	Sabio 4010	Serial Number	1730512
Zero air Generator	Teledyne API T701	Serial Number	587

DACS Information

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

Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.999985	0.999766	1.004769
	Data Offset	0.003052	0.104022	0.588582
Current Calibration	Data Slope	1.000067	0.999941	1.006332
	Data Offset	1.049470	1.231210	0.045757

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1218153357

Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
Analyzer IP	192.168.1.43		192.168.1.43	
NO coefficient	1.109		0.838	
NOX coefficient	1.002		1.003	
NO2 coefficient	1.000		1.000	
NO bkgrnd	6.5		5.3	
NOX bkgrnd	6.5		5.3	
Chamber Temp	50.3	Deg C	50.4	Deg C
Moly Temp	323.4	Deg C	322.6	Deg C
PMT voltage	-817	V	-816.2	V
PMT Temp	-2.7	Deg C	-2.9	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	189.8	mmHg	158.1	mmHg
R Cell Press Nox	189.8	mmHg	158.1	mmHg
NO sample flow	0.512	lpm	0.67	lpm
Nox sample Flow	0.512	lpm	0.670	lpm

Notes:

As found NO and Nox around 11% low. Spans have been drifting down since last calibration. Pump changed after as founds. Span concentration jumped from 675 ppb to 1010 ppb after pump change. Inlet filter changed after as founds. Span adjusted. At the end of the high point the pressure jumped from 156 to 158 mmhg. Span was readjusted.

Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: April 4, 2016 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	-0.2	0.1	----	----
as found span	5500	81.4	753.3	750.4	3.0	678.6	676.1	2.6	1.1100	1.1099
calibrator zero	5500	0.0	0.0	0.0	0.0	0.1	-0.1	0.2	----	----
high point	5500	81.4	753.3	750.4	3.0	752.8	749.7	3.1	1.0008	1.0009
second point	5500	45.6	422.0	420.3	1.7	420.7	419.0	1.7	1.0032	1.0033
third point	5500	22.8	211.0	210.2	0.8	208.6	207.6	1.0	1.0117	1.0126
as left zero	5500	0.0	0.0	0.0	0.0	0.2	0.1	0.2	----	----
as left span	5500	81.4	753.3	338.6	414.7	744.9	326.4	418.4	1.0113	1.0374
								Average Correction Factor	1.0052	1.0056

Corrcted As found NO_X= 678.7 NO= 676.3 Percent Change NO_X= 11.0% NO= 11.0%

Previous Response NO_X= 753.3 NO= 750.4

GPT Calibration Data

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

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
1st NO ref point		3.0	746.6	743.8	0.2	1.0090	1.0089	----	----
1st NO2 (300)	338.6	408.1	744.3	338.6	405.8	1.0121	----	1.0056	99.4%
2nd NO2 (200)	502.8	243.9	744.6	502.8	241.8	1.0117	----	1.0088	99.1%
3rd NO2 (100)	620.3	126.4	745.9	620.3	125.6	1.0100	----	1.0068	99.3%
2nd NO ref point	----	3.0	745.5	742.6	3.0	1.0104	1.0105	----	----
				Average Correction Factor		1.0111		1.0071	99.3%

Calibration Performed By: Devin Russell

Wood Buffalo Environmental Association

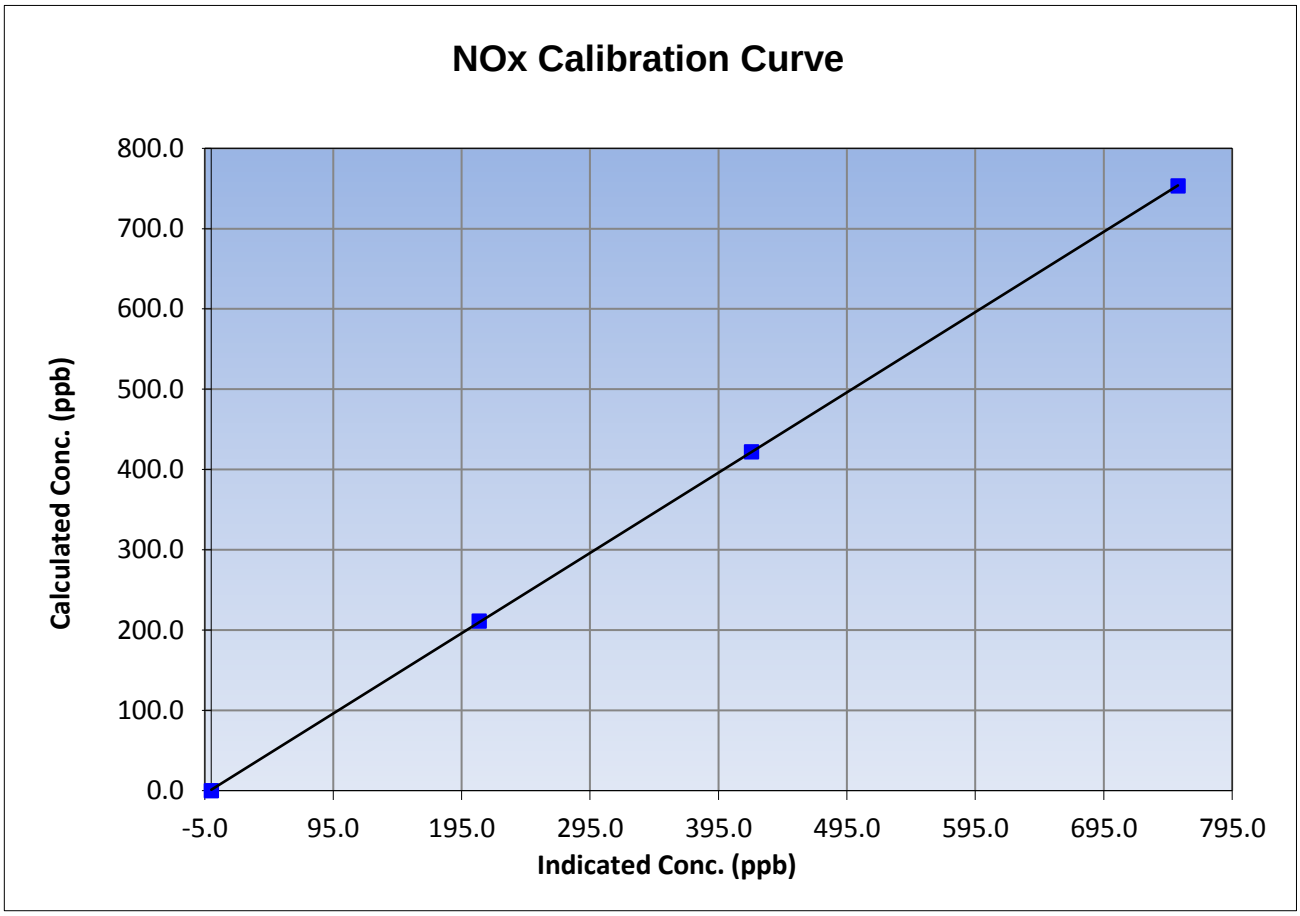
NO_X Calibration Summary

Station Information

Calibration Date	April 4, 2016	Previous Calibration	March 14, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:10	End Time (MST)	14:20
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	0.1	----	Correlation Coefficient	0.999989
753.3	752.8	1.0008		
422.0	420.7	1.0032	Slope	1.000067
211.0	208.6	1.0117		
			Intercept	1.049470



Wood Buffalo Environmental Association

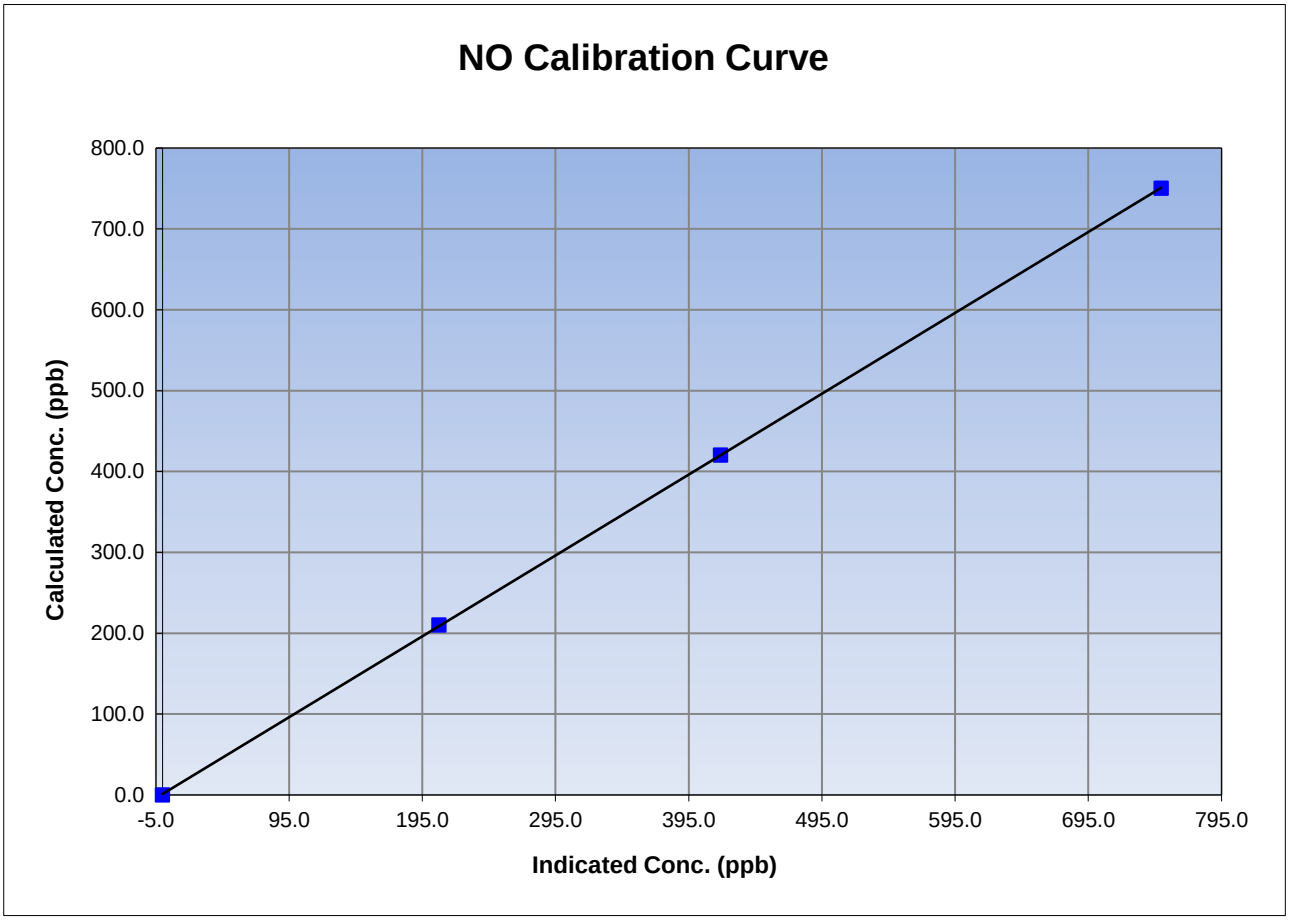
NO Calibration Summary

Station Information

Calibration Date	April 4, 2016	Previous Calibration	March 14, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:10	End Time (MST)	14:20
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	-0.1	N/A	Correlation Coefficient	0.999989
750.4	749.7	1.0009		
420.3	419.0	1.0033	Slope	0.999941
210.2	207.6	1.0126		
			Intercept	1.231210



Wood Buffalo Environmental Association

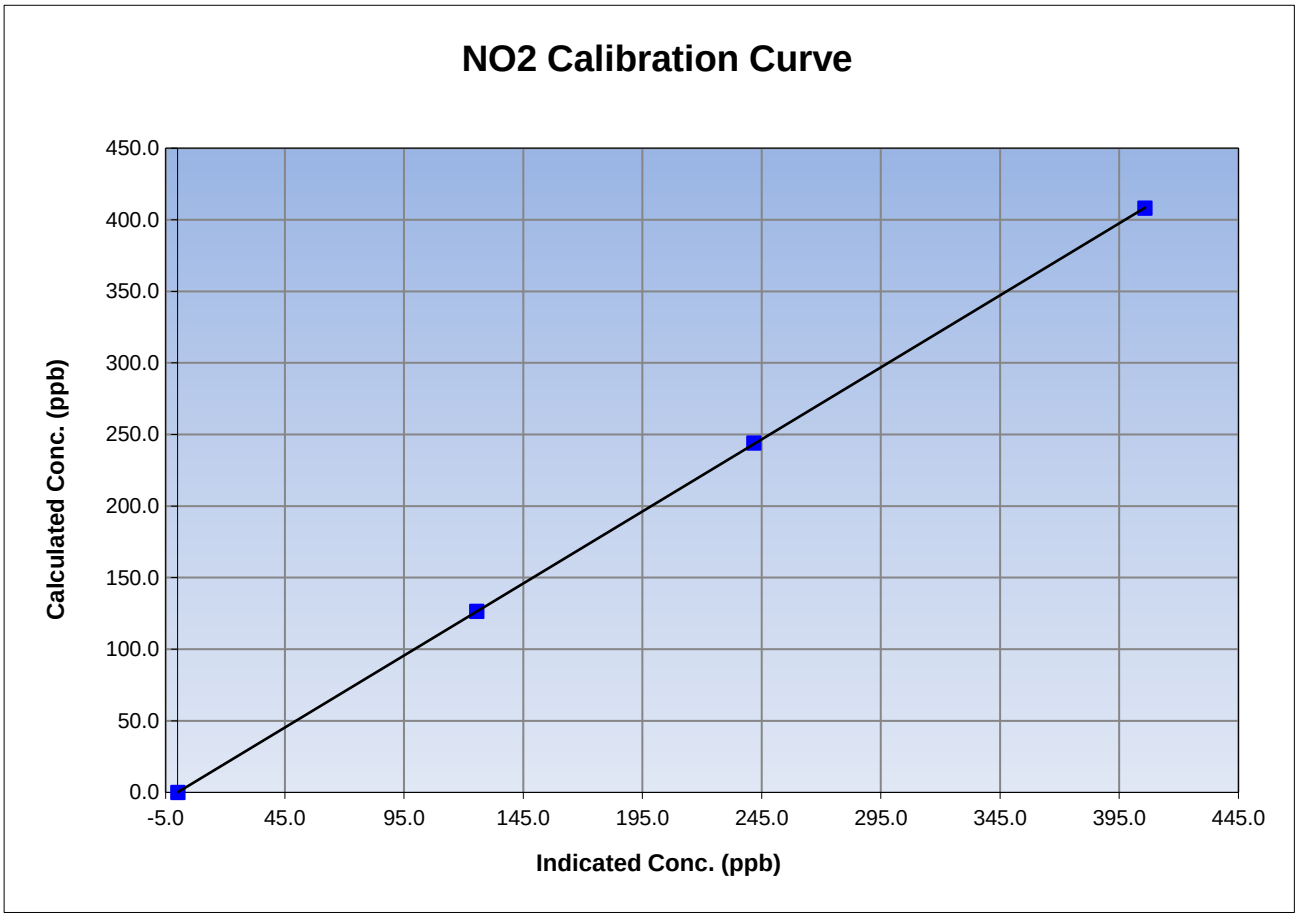
NO_2 Calibration Summary

Station Information

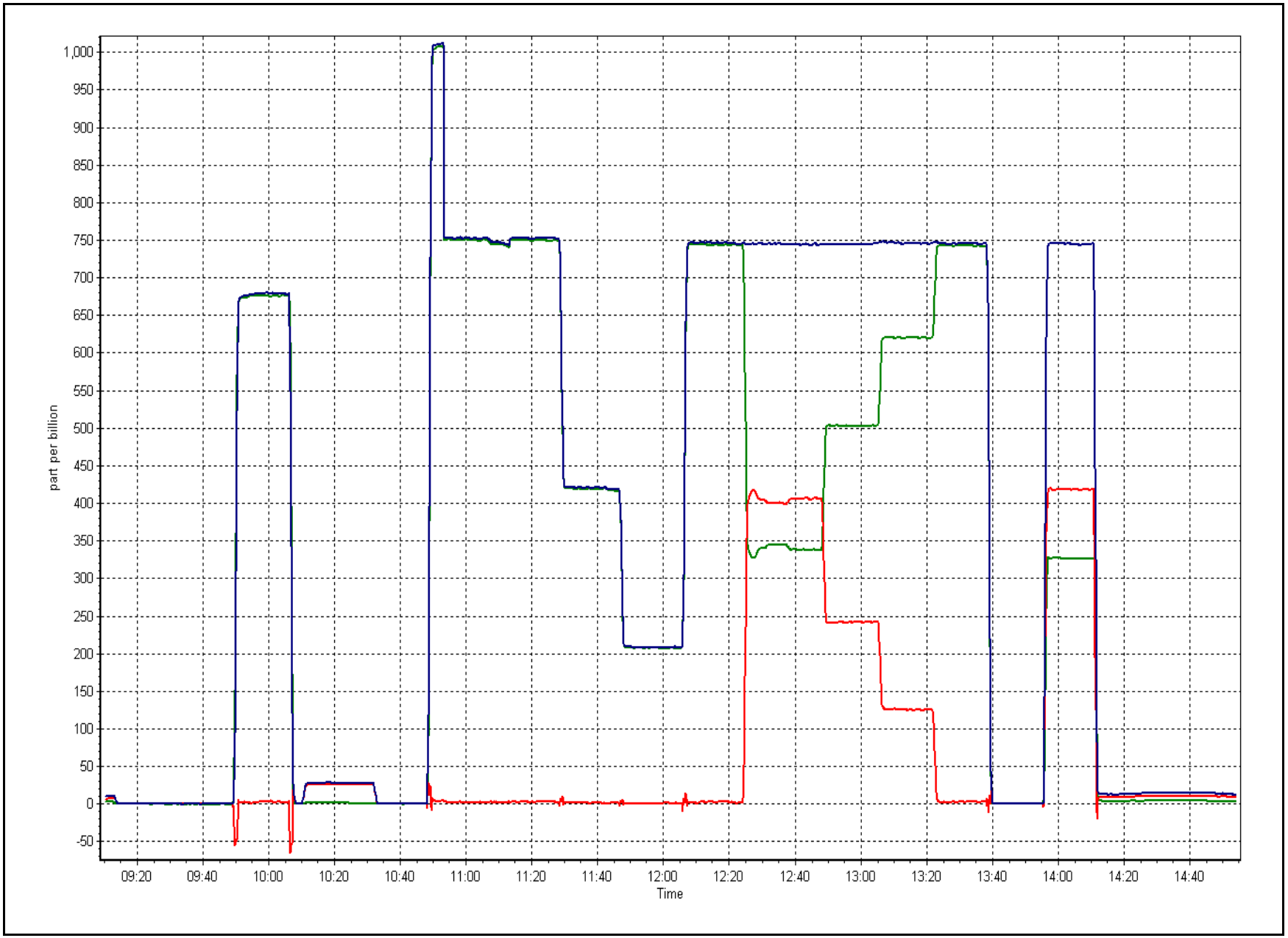
Calibration Date	April 4, 2016	Previous Calibration	March 14, 2016
Station Number	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:10	End Time (MST)	14:20
Analyzer make	Thermo 42i	Analyzer serial #	1218153357

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	N/A	Correlation Coefficient	0.999995
408.1	405.8	1.0056		
243.9	241.8	1.0088	Slope	1.006332
126.4	125.6	1.0068		
			Intercept	0.045757



NOX Calibration Plot Date: April 4, 2016



Wood Buffalo Environmental Association
N_t-NO_X-NH_3 Calibration Report

W B E A

Station Information

Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
NOX Calibration Date	April 11, 2016	NOX Previous Cal Date	March 14, 2016
NH3 Calibration Date	April 12, 2016	NH3 Previous Cal Date	March 14, 2016

Reason: Routine

Start Time (MST)	9:15		End Time (MST)	13:20	
			Station Temperature	21.0	Deg C
Calibrator	Sabio 4010		Serial Number	14300410	
NH3 Cal Gas Conc	30.6	ppm	NH3 Expiry Date / SN	21/Dec/2012	LL76495
NOx Cal Gas Conc	50.9	ppm	NO Expiry Date / SN	14/Jan/2016	3222140
NO Cal Gas Conc	50.7	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	1.000703	0.990975	0.997805	1.000650	0.998440
	Data Offset	-8.148077	-9.176072	-1.057435	-0.431213	-0.653179
Cal Stats After	Data Slope	1.003336	0.994100	1.003314	1.001384	1.005824
	Data Offset	-8.233135	-9.463860	-1.567151	-0.124040	-0.110476
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	-0.2	ppb	-0.2	ppb
NOx BKG	-0.1	ppb	-0.1	ppb
Nt BKG	-0.2		-0.2	
NO coefficient	1.200		1.200	
NO2 coefficient	1.000	ppb	1.000	ppb
NOx coefficient	1.328		1.328	
NH3 coefficient	0.926		0.932	
Nt coefficient	1.330		1.330	
NH3 conv temp	825	DegC	825	Deg C
Chamber Temp	50.0	Deg C	50.0	Deg C
Moly Temp	314.4	Deg C	315.2	Deg C
PMT Temp	7.0	Deg C	7.0	Deg C
O3 flow	84.0	ccm	85.0	ccm
R Cell Press	4.8	mmHg	4.8	mmHg
PMT Voltage	645.0	v	645.0	v
Sample Flow 1 NO	518.0	ccm	516.0	ccm
Sample Flow 2 Nox	528.0	ccm	518.0	ccm
Sample Flow 3 Nt	546.0	ccm	552.0	ccm

Notes:

No maintenance completed. NH3 span adjusted.

Wood Buffalo Environmental Association

NH_3 Calibration Report

Station Information

Calibration Date: April 12, 2016 Station Number: AMS 1

NH3 Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated Nt conc (ppb)	Calculated NOx conc (ppb)	Calculated 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	2.5	0.6	1.9	----	----
as found NO	5500	81.3	752.4	752.4	----	743.7	742.2	1.5	1.012	----
calibrator zero	5500	0.0	0.0	0.0	0.0	3.1	0.9	2.2	----	----
high NO point	5500	81.3	752.4	752.4	----	753.8	751.8	1.9	0.998	----
NO/O3 point	5500	81.3	752.4	752.4	----	750.8	753.8	-3.0	1.002	----
as found NH3	1500	88.2	1799.3	NA	1799.3	1807.1	17.4	1789.4	0.996	1.006
first NH3	1500	88.2	1799.3	NA	1799.3	1818.2	17.7	1800.5	0.990	0.999
second NH3	1500	49.0	999.6	NA	999.6	1011.7	11.0	1000.7	0.988	0.999
third NH3	1500	24.6	501.8	NA	501.8	525.5	6.3	519.2	0.955	0.967
								Average Correction Factor	1.0001	0.9883

Nt Corrected As Found Nt = 741.2 ppb Previous Response Nt = 768.4 ppb Nt percent change 3.7%

NOx Corrected As Found NOx = 741.7 ppb Previous Response NOx = 755.1 ppb NOx percent change 1.8%

NH3 Previous Converter Efficiency = 92.6 % NH3 Current Converter Efficiency = 93.2 % NH3 percent change 0.6%

Wood Buffalo Environmental Association

$NO_X(NH_3)$ Calibration Report

Station Information

Calibration Date: April 11, 2016 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	0.9	1.0	3.1	----	----
as found span	5500	81.4	753.3	750.4	753.3	751.8	750.2	753.8	1.0020	1.0002
calibrator zero	5500	0.0	0.0	0.0	0.0	0.9	1.0	3.1	----	----
high point	5500	81.4	753.3	750.4	753.3	751.8	750.2	753.8	1.0020	1.0002
second point	5500	45.6	422.0	420.3	422.0	423.0	418.9	419.7	0.9977	1.0036
third point	5500	22.8	211.0	210.2	211.0	212.3	209.5	210.5	0.9940	1.0034
								Average Correction Factor	0.9979	1.0024

	Nt	NOX	NO	NO2
Corrected As found	750.7	750.9	749.2	----
Previous Response	769.4	756.0	750.3	----
Percent Change	2.5%	0.7%	0.1%	0.5%

GPT Calibration Data

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

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
1st NO ref point	----	3.0	753.8	747.9	5.9	0.9993	1.0032	----	----
1st NO2 (300)	340.1	410.8	748.6	340.1	408.5	1.0063	----	1.0056	99.4%
2nd NO2 (200)	505.2	245.7	749.4	505.2	244.2	1.0052	----	1.0060	99.4%
3rd NO2 (100)	623.3	127.6	750.6	623.3	127.3	1.0036	----	1.0023	99.8%
2nd NO ref point	----	3.0	749.8	744.4	5.3	1.0047	1.0080	----	----
				Average Correction Factor		1.0049	1.0056	1.0046	99.5%

Calibration Performed By: Devin Russell

Wood Buffalo Environmental Association

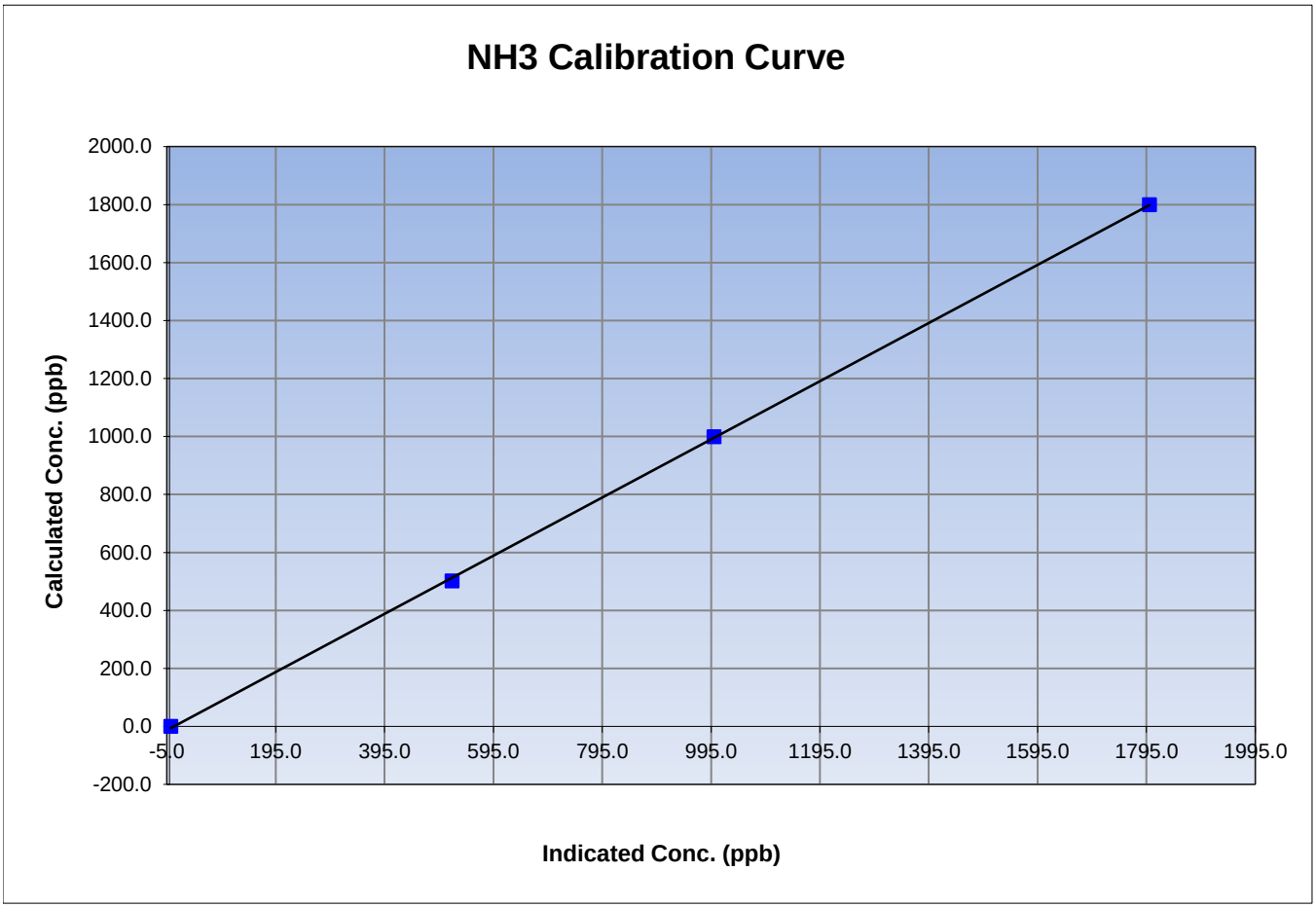
NH3 Calibration Summary

Station Information

Calibration Date	April 12, 2016	Previous Calibration	March 14, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:15	End Time (MST)	13:20
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	2.2	----	Correlation Coefficient	0.999904
1799.3	1800.5	0.9993		
999.6	1000.7	0.9989	Slope	1.003336
501.8	519.2	0.9665		
			Intercept	-8.233135



Wood Buffalo Environmental Association

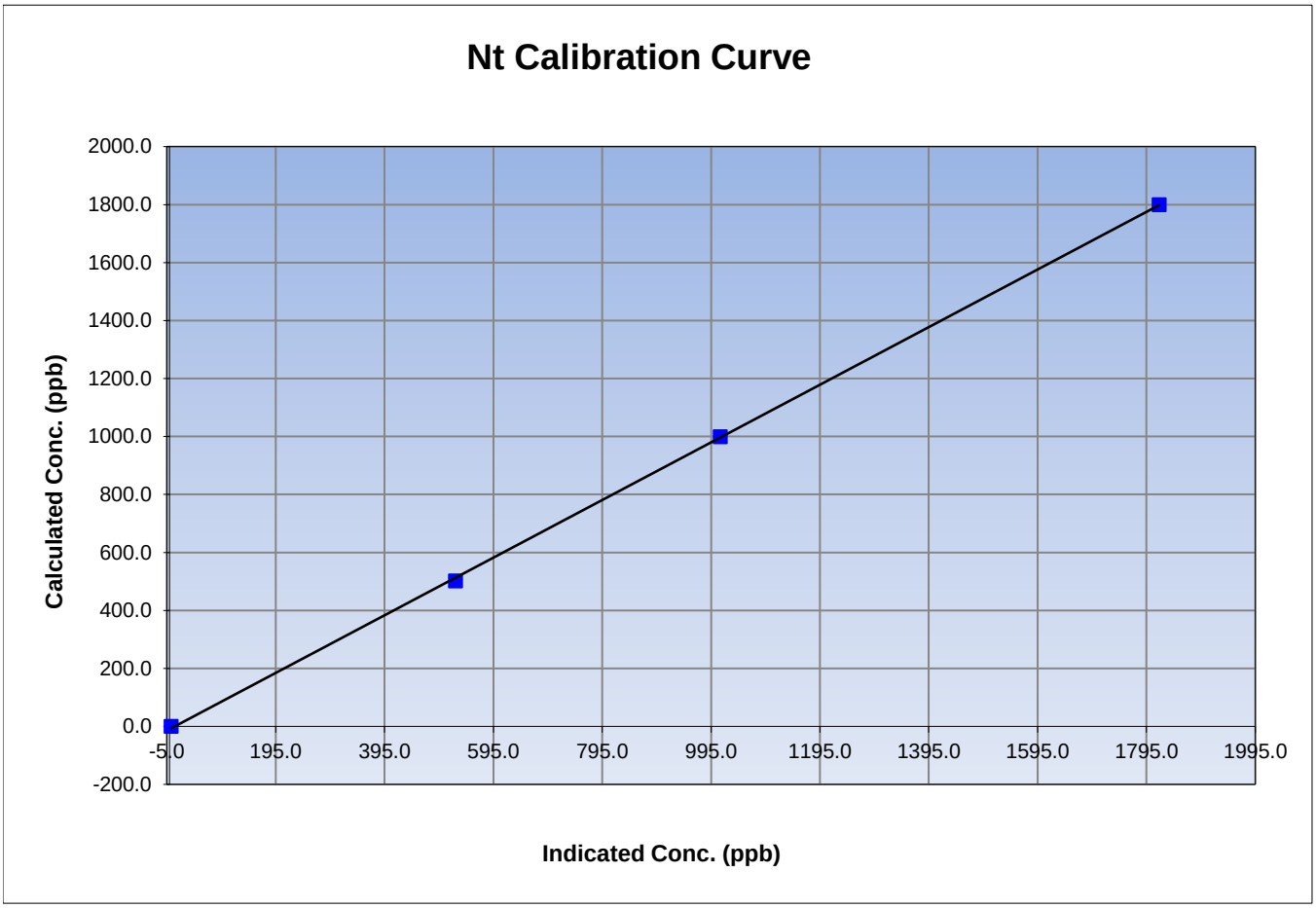
Nt Calibration Summary

Station Information

Calibration Date	April 12, 2016	Previous Calibration	March 14, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:15	End Time (MST)	13:20
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	3.1	----	Correlation Coefficient	0.999900
1799.3	1818.2	0.9896		
999.6	1011.7	0.9881	Slope	0.994100
501.8	525.5	0.9550		
			Intercept	-9.463860



Wood Buffalo Environmental Association

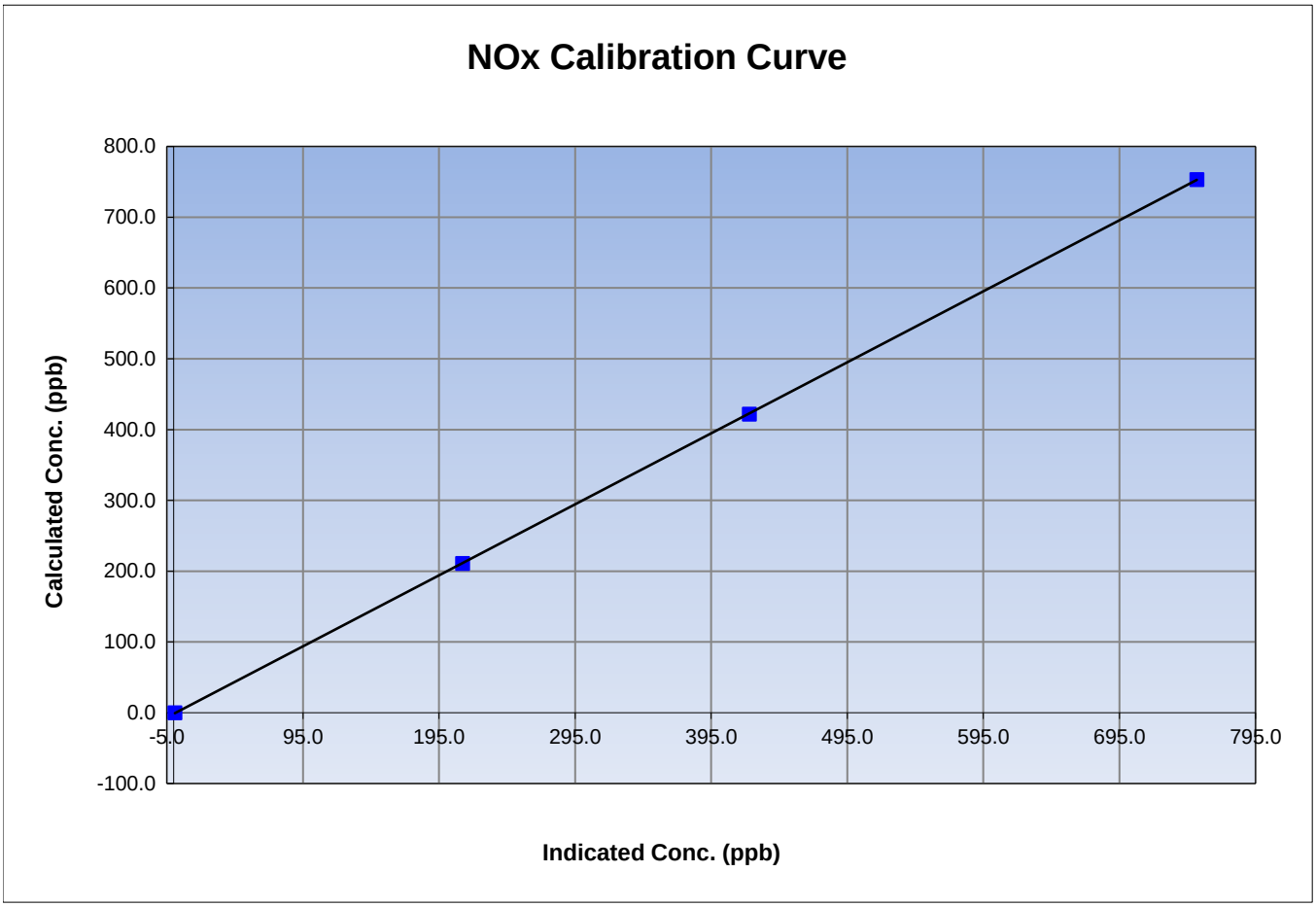
NOx Calibration Summary

Station Information

Calibration Date	April 11, 2016	Previous Calibration	March 14, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:15	End Time (MST)	13:20
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	0.9	----	Correlation Coefficient	0.999995
753.3	751.8	1.0020		
422.0	423.0	0.9977	Slope	1.003314
211.0	212.3	0.9940		
			Intercept	-1.567151



Wood Buffalo Environmental Association

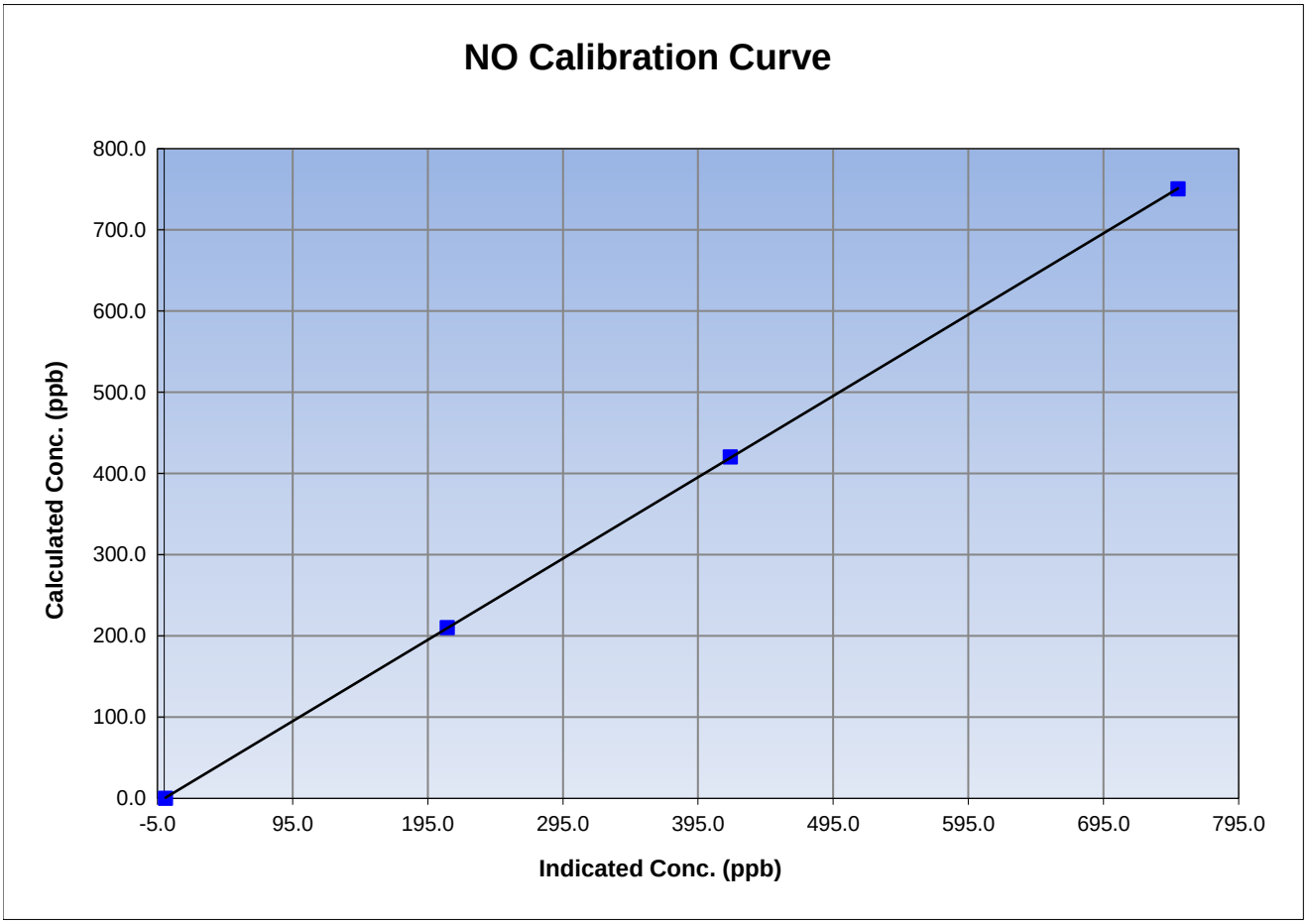
NO Calibration Summary

Station Information

Calibration Date	April 11, 2016	Previous Calibration	March 14, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:15	End Time (MST)	13:20
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	1.0	----	Correlation Coefficient	0.999991
750.4	750.2	1.0002		
420.3	418.9	1.0036	Slope	1.001384
210.2	209.5	1.0034		
			Intercept	-0.124040



Wood Buffalo Environmental Association

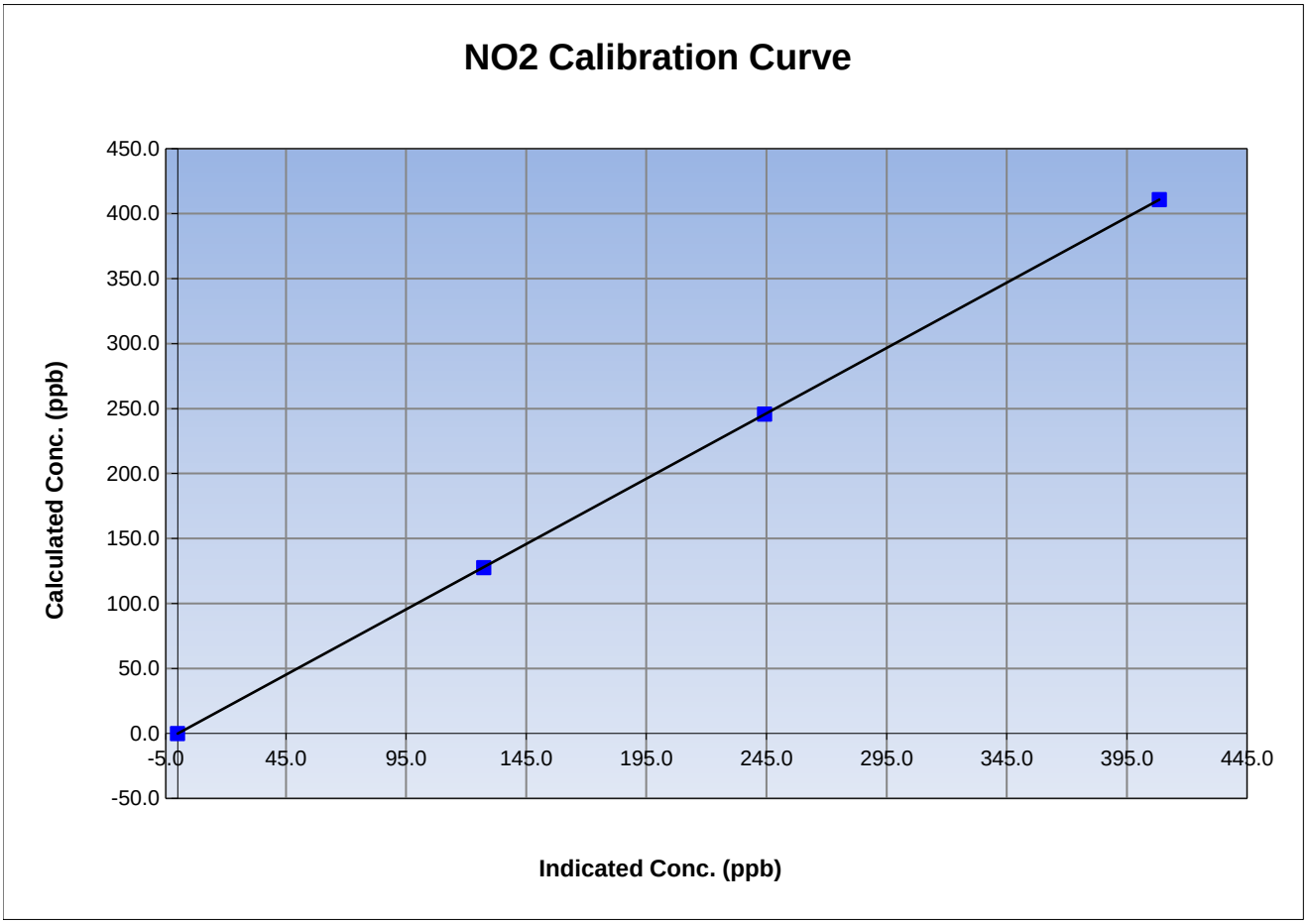
NO_2 Calibration Summary

Station Information

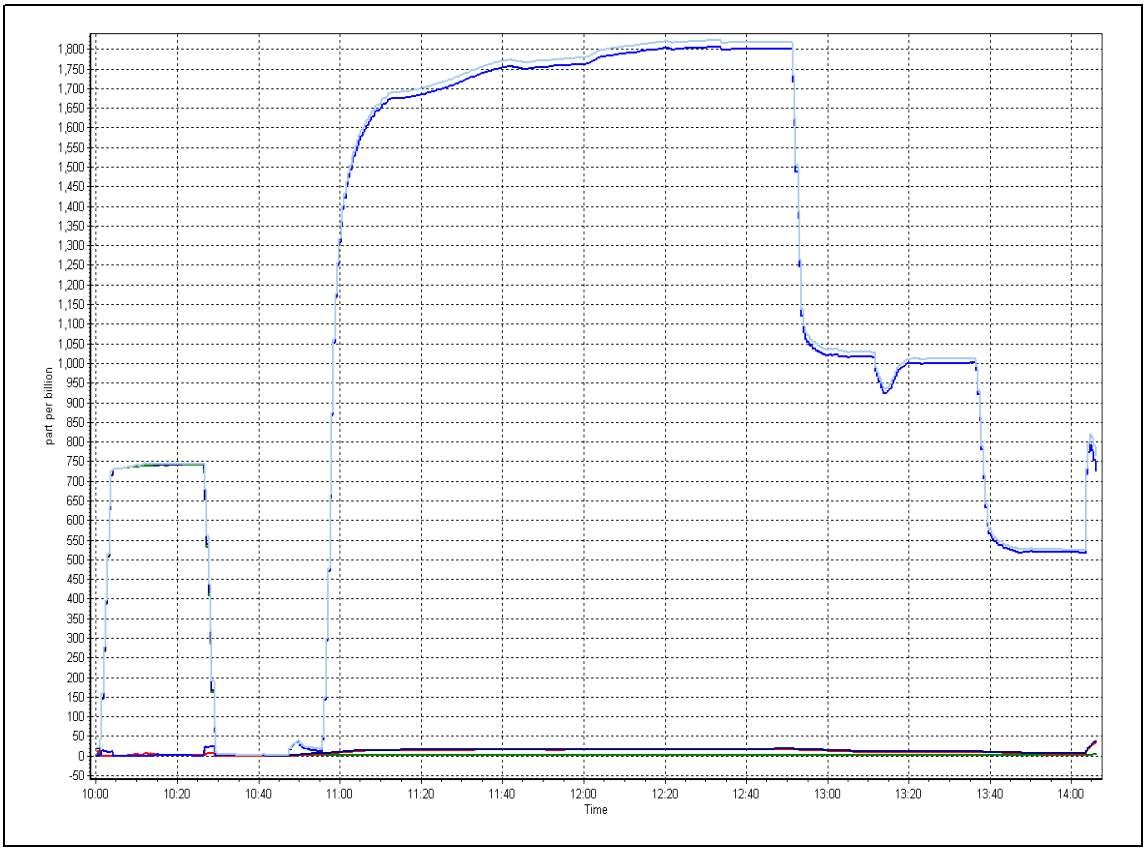
Calibration Date	April 11, 2016	Previous Calibration	March 14, 2016
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:15	End Time (MST)	13:20
Analyzer make	API T201	Analyzer serial #	152

Calibration Information

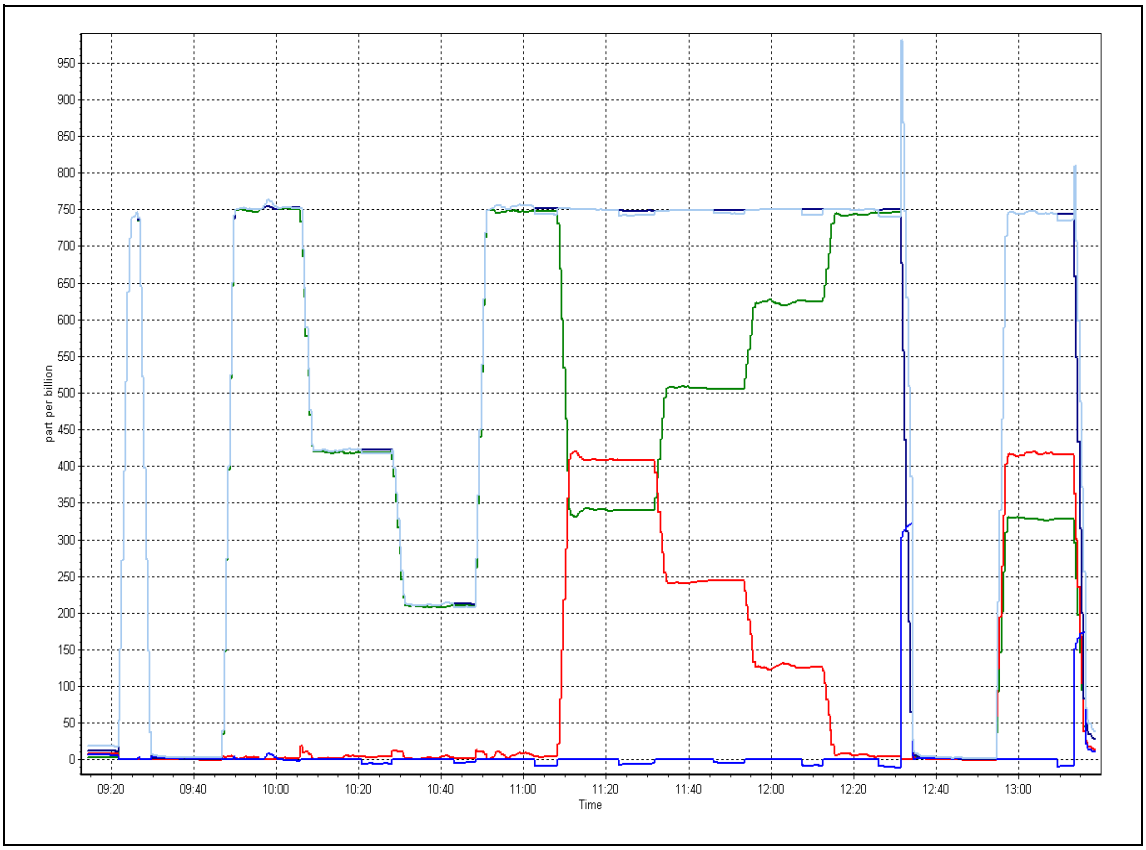
Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999998
410.8	408.5	1.0056		
245.7	244.2	1.0060	Slope	1.005824
127.6	127.3	1.0023		
			Intercept	-0.110476



NH_3 Calibration Plot Date: April 12, 2016



NOX Calibration Plot Date: April 11, 2016



Wood Buffalo Environmental Association

SHARP CALIBRATION

STATION INFORMATION

Calibration Date:	April 22, 2016	Previous Calibration:	March 17, 2016
Station Name:	Bertha Ganter - Fort McKay	Station Number:	AMS 1
Start Time (MST):	8:20	End Time (MST):	9:00
Calibrator Make/Model:	Delta Cal	Calibrator Serial Number:	141228

SHARP INFORMATION

Particulate Fraction:	PM2.5							
Make/Model:	Thermo / SHARP 5030							
Serial Number	E-803							
C_{14} Source SN:	4173							
Confirmation of Time settings:	Yes ☑	No ☐						
Paremeters Checked:	T1 ☑	T2 ☐	T3 ☐	T4 ☐	P3 ☑	Main Flow ☑	Beta ☐	Neph ☑

CALIBRATION DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	1.0	0.1	-0.9	1.0
T2	22.0	na	na	
T3	23.0	na	na	
T4	19.0	na	na	
RH (%)	11.0	na	na	

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	991	990.6	-0.4	991

Main Flow (Lph)

Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
1000	1001	1	1001	1000

Nephalometer Calibration

Parameter	As Founds	Zeroed (Limit +or- 2.0ug/m3)	As Left
Analog	218		NA
Neph	-0.4		NA
C14	8.8		NA
Indicated Concentration (ug/m3)	**-0.2**	**no**	**NA**
Offset 1	219.7		NA
Offset 2	34.2		NA

Leak Check (Quarterly)

Leak Check Date:	February 5, 2016	Previous Leak Check Date:	April 20, 2015

	Measured	Difference LPM (Limit +/- 0.42 LPM)
Flow without adaptor (LPM):	16.63	0.14
*Flow with adaptor (LPM):	16.49	

**Note - do not attach adaptor without shutting off the pump first*

Mass Foil Calibration (Annualy)

Foil Calibration Date:		Previous Foil Calibration:	
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/clean	05/02/2016
Pump	Good	
Filter Tape	Good	
Mass Foil Cal Set	na	
HEPA filter	Good	

NOTES:

Checks completed before removing SHARP. Removing due to recurring status code 4000 "Analog out range 2", and recurring error 02 "HVPS". SHARP will be brought back to FOC for testing.

Calibration Performed By: **Devin Russell**

Wood Buffalo Environmental Association

SHARP CALIBRATION

STATION INFORMATION

Calibration Date:	April 22, 2016	Previous Calibration:	NA
Station Name:	Bertha Ganter - Fort McKay	Station Number:	AMS 1
Start Time (MST):	9:20	End Time (MST):	11:55
Calibrator Make/Model:	Delta Cal	Calibrator Serial Number:	141228

SHARP INFORMATION

Particulate Fraction:	PM2.5
Make/Model:	Thermo / SHARP 5030
Serial Number	E-1486
C_{14} Source SN:	5691
Confirmation of Time settings:	Yes ☑ No ☐

Paremeters Checked: T1 ☑ T2 ☐ T3 ☐ T4 ☐ P3 ☑ Main Flow ☑ Beta ☐ Neph ☑

CALIBRATION DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	4.0	3.2	-0.8	4.0
T2	21.0	na	na	
T3	19.0	na	na	
T4	21.0	na	na	
RH (%)	37.0	na	na	

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	991	989.9	-1.1	991

Main Flow (Lph)

Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
1000	982	-18	1001	1000

Nephalometer Calibration

Parameter	As Founds	Zeroed (Limit +or- 2.0ug/m3)	As Left
Analog	207		208
Neph	1.3		0
C14	264		239.2
Indicated Concentration (ug/m3)	**1.5**	**yes**	**0**
Offset 1	207		206.9
Offset 2	33.9		33.8

Leak Check (Quarterly)

Leak Check Date: April 22, 2016 Previous Leak Check Date: n/a

	Measured	Difference LPM (Limit +/- 0.42 LPM)
Flow without adaptor (LPM):	16.68	0.01
*Flow with adaptor (LPM):	16.67	

**Note - do not attach adaptor without shutting off the pump first*

Mass Foil Calibration (Annualy)

Foil Calibration Date: Previous Foil Calibration:

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/clean	22/04/2016
Pump	Good	
Filter Tape	Good	
Mass Foil Cal Set	na	
HEPA filter	Good	22/04/2016

NOTES:

Installation calibration. T1 and P3 checked. Flow adjusted from 982 Lph to 1000 Lph. Leak check completed. Nephalometer zeroed.

Calibration Performed By: **Devin Russell**

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 2
MILDRED LAKE
APRIL 2016

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

May 27, 2016

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

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	682	33	38	99.31	44	0	13	0
H2S (ppb) Average	682	34	38	99.44	6	0	2	0
THC (ppm) Average	682	33	38	99.31	5	-	2.7	-
Temperature (C) Average	720	0	0	100.00	27	-	16.5	-
Relative Humidity (%) Average	720	0	0	100.00	100	-	93	-
Wind Speed 10 m (km/h) Average	696	0	24	96.67	26	-	17	-
Wind Direction 10 m (deg) Average	696	0	24	96.67	-	-	-	-

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

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

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

					Percentile						
Parameter	Number	Mean	StnDev	Total	Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	682	2.4	5	-	0	0	0	0	2	8	44
H2S (ppb) Average	682	0.5	1	-	0	0	0	0	0	1	6
THC (ppm) Average	682	2.31	0.3	-	2	2.1	2.2	2.2	2.3	2.6	5
Temperature 2 m (C) Average	720	3.92	7.8	-	-12.3	-5.8	-1.7	3.1	8.3	15.9	27
Relative Humidity (%) Average	720	57.6	22	-	13	26	40	58	75	89	100
Wind Speed 10 m (km/h) Average	696	10.6	5	-	0	4	7	10	13	17	26
Wind Direction 10 m (deg) Average	696	-	-	-	-	-	-	-	-	-	-

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

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
AIR QUALITY ANALYZERS	01 Apr 2016 13:00	01 Apr 2016 16:00	4	Station power failure
SO2, THC	15 Apr 2016 13:00	15 Apr 2016 13:00	1	Maintenance - sample manifold cleaning
Wind Speed, Wind Direction	06 Apr 2016 09:00	06 Apr 2016 12:00	4	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	06 Apr 2016 17:00	07 Apr 2016 12:00	20	Flat line in sensor output signal - Sensor frozen

Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO_2) - ppb

Mildred Lake - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 44 ppb on Apr 8 18:00 Maximum Daily Average: 13.2 ppb on Apr 8

Minimum Value: 0 ppb on Apr 1 11:00
Maximum Diurnal Average: 3.7 ppb at hour 13
Monthly Average: 2.4 ppb

Minimum Daily Average: 0.0 ppb on Apr 2
Minimum Diurnal Average: 1.4 ppb at hour 19
Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 2$ $P_{90} = 8$ $P_{99} = 24$

Hours in Service:	720
Hours of Data:	682
Hours of Missing Data:	38
Hours of Calibration:	33
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-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	PF	PF	PF	PF	0	0	0	0	0	0	0	0	0.1	0
2-Apr	0	0	0	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-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
4-Apr	0	0	0	0	0	Z	0	0	7	7	5	10	7	1	3	6	7	2	1	1	1	1	0	0	2.5	10
5-Apr	Z	0	0	0	0	0	0	0	0	0	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0.3	2
6-Apr	4	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	4
7-Apr	0	0	Z	0	0	0	0	2	2	4	8	33	38	8	3	1	0	0	0	0	0	0	0	0	4.4	38
8-Apr	0	0	0	Z	0	2	15	18	10	8	6	9	9	2	5	8	19	44	17	31	33	21	24	21	13.2	44
9-Apr	21	12	10	2	2	1	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.3	21
10-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	0	0	14	0.9	14
11-Apr	Z	7	7	5	14	13	0	0	1	0	0	1	2	4	7	5	2	4	3	3	3	2	2	2	3.7	14
12-Apr	1	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
13-Apr	0	0	Z	0	0	0	0	2	17	7	4	0	4	4	1	0	0	1	1	3	3	1	0	0	2.2	17
14-Apr	0	0	0	Z	0	0	0	0	0	0	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.0	0
15-Apr	0	0	0	0	Z	0	0	0	2	3	3	2	M	1	3	4	5	2	0	0	16	12	11	10	3.4	16
16-Apr	8	2	8	9	13	Z	1	1	1	3	12	2	0	1	2	5	2	5	6	1	0	0	0	0	3.6	13
17-Apr	Z	22	17	19	11	4	5	26	18	0	0	0	7	5	5	5	3	0	0	1	1	5	9	2	7.2	26
18-Apr	14	Z	16	8	2	8	4	7	18	25	19	5	2	0	0	0	0	0	0	0	0	0	0	0	5.5	25
19-Apr	0	1	Z	1	1	3	5	0	0	1	3	10	23	22	11	10	4	1	0	0	0	0	0	0	4.1	23
20-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
21-Apr	0	0	0	0	Z	0	1	9	12	21	12	2	0	0	1	0	0	0	0	0	0	0	0	0	2.6	21
22-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
23-Apr	Z	0	0	0	0	0	0	2	1	2	0	0	3	1	4	4	4	0	1	0	0	10	13	5	2.2	13
24-Apr	15	Z	23	23	14	17	10	8	9	2	4	1	0	0	0	0	0	0	2	2	9	0	0	0	6.1	23
25-Apr	0	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
26-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	4	2	1	1	0	1	4	0	0.6	4
27-Apr	0	0	0	0	Z	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
28-Apr	0	0	0	0	0	Z	1	5	2	8	9	2	0	0	0	0	0	4	8	3	0	0	0	0	1.9	9
29-Apr	Z	0	0	0	1	17	15	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.8	17
30-Apr	0	Z	0	2	2	0	0	0	0	0	0	0	0	2	6	1	2	0	1	6	1	1	0	0	1.2	6
	2.6	1.8	3.3	2.8	2.4	2.6	2.0	2.9	3.4	3.1	3.1	2.9	3.7	1.9	1.8	1.8	1.8	2.3	1.4	1.8	2.3	1.9	2.2	1.9	Diurnal Average	
	21	22	23	23	14	17	15	26	18	25	19	33	38	22	11	10	19	44	17	31	33	21	24	21	Diurnal Maximum	

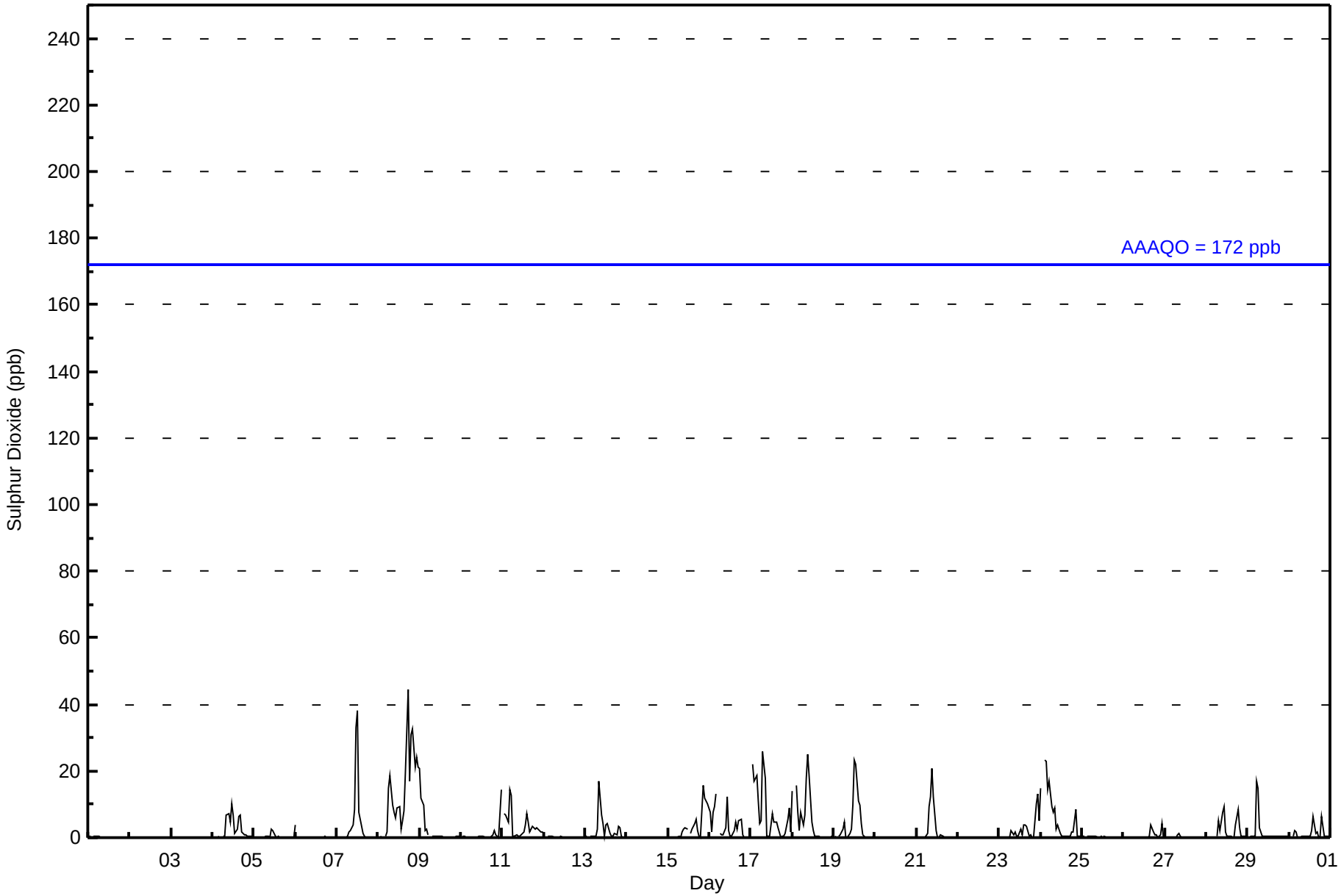
Z - zerospan C - Calibration M - Maintenance PF - Power Failure
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb

Wood Buffalo Environmental Association

Hourly Averages

Sulphur Dioxide (SO_2) - ppb

Mildred Lake - April 2016



Sulphur Dioxide (SO_2) - ppb
Mildred Lake - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	634	92.96	92.96
11 - 20	31	4.55	97.51
21 - 60	17	2.49	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

Mildred Lake - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 10	91	124	44	17	5	11	32	80	73	54	24	12	13	8	11	13	612
11 - 20	0	0	0	0	1	0	11	14	3	0	0	1	0	1	0	0	31
21 - 60	1	0	0	0	1	0	1	11	0	0	0	0	2	0	0	0	16
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	92	124	44	17	7	11	44	105	76	54	24	13	15	9	11	13	659

Total Number of Valid Hours: 659

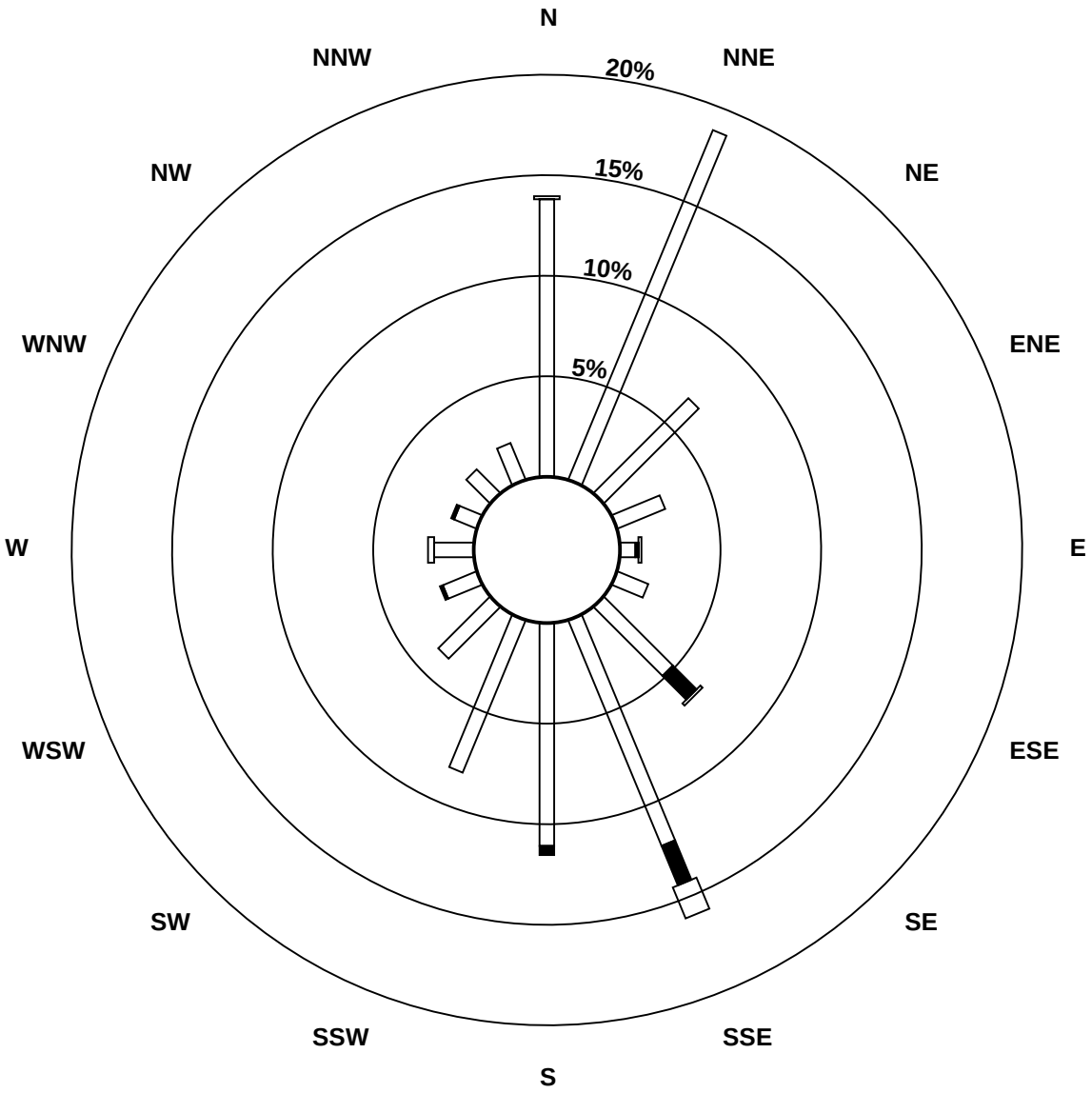
Total Number of Hours: 720

Wood Buffalo Environmental Association

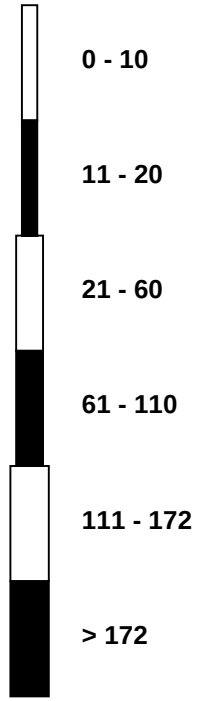
Wind Rose Apr 2016

Sulphur Dioxide (SO_2) - ppb

Mildred Lake (AMS 2)



Classes (ppb)



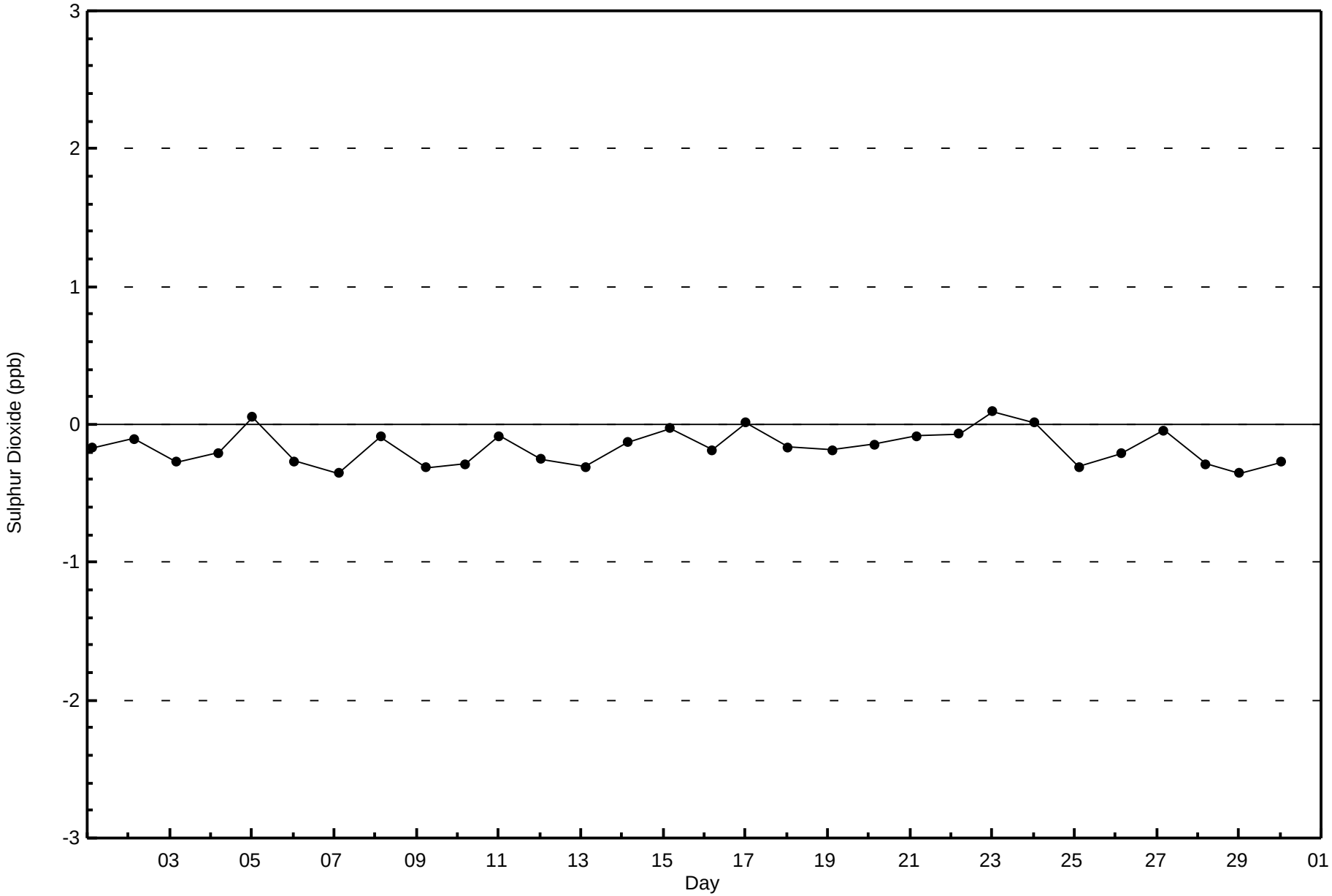
Total Number of Valid Hours: 659

Wood Buffalo Environmental Association

Zero Responses

Sulphur Dioxide (SO_2) - ppb

Mildred Lake - April 2016

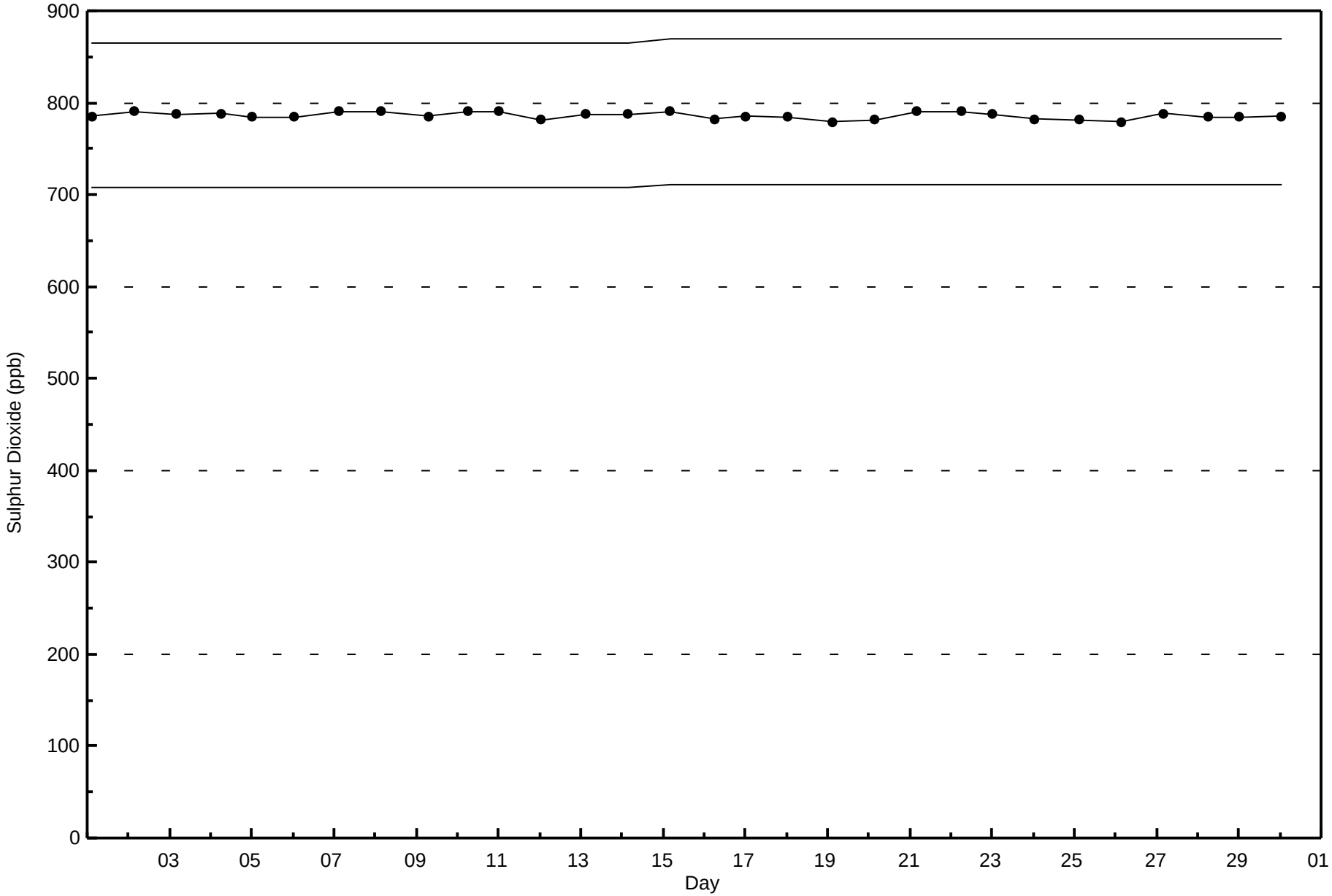


Wood Buffalo Environmental Association

Span Responses

Sulphur Dioxide (SO_2) - ppb

Mildred Lake - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Hydrogen Sulphide (H_2S) - ppb

Mildred Lake - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 6 ppb on Apr 19 07:00 Maximum Daily Average: 1.6 ppb on Apr 19

Minimum Value: 0 ppb on Apr 5 17:00
Maximum Diurnal Average: 0.9 ppb at hour 6
Monthly Average: 0.5 ppb

Minimum Daily Average: 0.1 ppb on Apr 3
Minimum Diurnal Average: 0.2 ppb at hour 17
Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 1$ $P_{99} = 4$

Hours in Service:	720
Hours of Data:	682
Hours of Missing Data:	38
Hours of Calibration:	34
Percent Operational Time:	99.4

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-Apr	0	0	0	Z	1	0	0	0	0	0	0	0	PF	PF	PF	PF	0	0	0	0	0	0	0	0	0.3	1
2-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
3-Apr	0	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-Apr	0	0	0	0	0	0	Z	0	2	2	1	2	1	0	0	1	0	1	0	0	0	0	0	0	0.6	2
5-Apr	0	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0.2	1
6-Apr	3	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	3
7-Apr	0	0	0	Z	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1
8-Apr	0	0	0	0	Z	0	0	1	2	1	1	0	0	0	0	0	1	3	3	3	1	3	4	5	1.2	5
9-Apr	6	2	1	0	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	6
10-Apr	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0.2	3
11-Apr	1	Z	1	1	3	3	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0	0.7	3
12-Apr	0	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-Apr	0	0	0	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	2	1	1	0	0	0.4	2
14-Apr	0	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-Apr	0	0	0	0	0	Z	0	0	2	C	C	C	C	0	0	0	0	0	0	0	3	2	2	1	0.7	3
16-Apr	1	1	1	2	4	3	Z	2	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0.9	4
17-Apr	2	Z	4	4	3	2	2	5	4	0	0	0	0	0	0	0	0	0	0	0	0	1	3	1	1.4	5
18-Apr	3	6	Z	4	1	3	1	2	4	4	3	1	0	0	0	0	0	0	0	0	0	0	0	0	1.5	6
19-Apr	0	0	2	Z	0	3	6	0	0	3	5	2	2	2	4	4	0	0	0	0	0	0	0	1	1.6	6
20-Apr	0	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-Apr	0	0	0	0	0	Z	1	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	3
22-Apr	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
23-Apr	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0.4	2
24-Apr	3	3	Z	5	2	2	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	1.0	5
25-Apr	0	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-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0.3	1
27-Apr	0	0	1	0	0	Z	0	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2
28-Apr	0	0	0	0	1	1	Z	2	1	1	1	0	0	0	0	0	0	1	1	1	1	0	1	1	0.6	2
29-Apr	1	Z	1	1	0	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	3
30-Apr	0	0	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.3	1
	0.8	0.7	0.5	0.8	0.8	0.9	0.7	0.8	0.8	0.6	0.6	0.4	0.3	0.2	0.3	0.3	0.2	0.3	0.3	0.3	0.4	0.4	0.6	0.6	Diurnal Average	
	6	6	4	5	4	3	6	5	4	4	5	2	2	2	4	4	1	3	3	3	3	3	4	5	Diurnal Maximum	

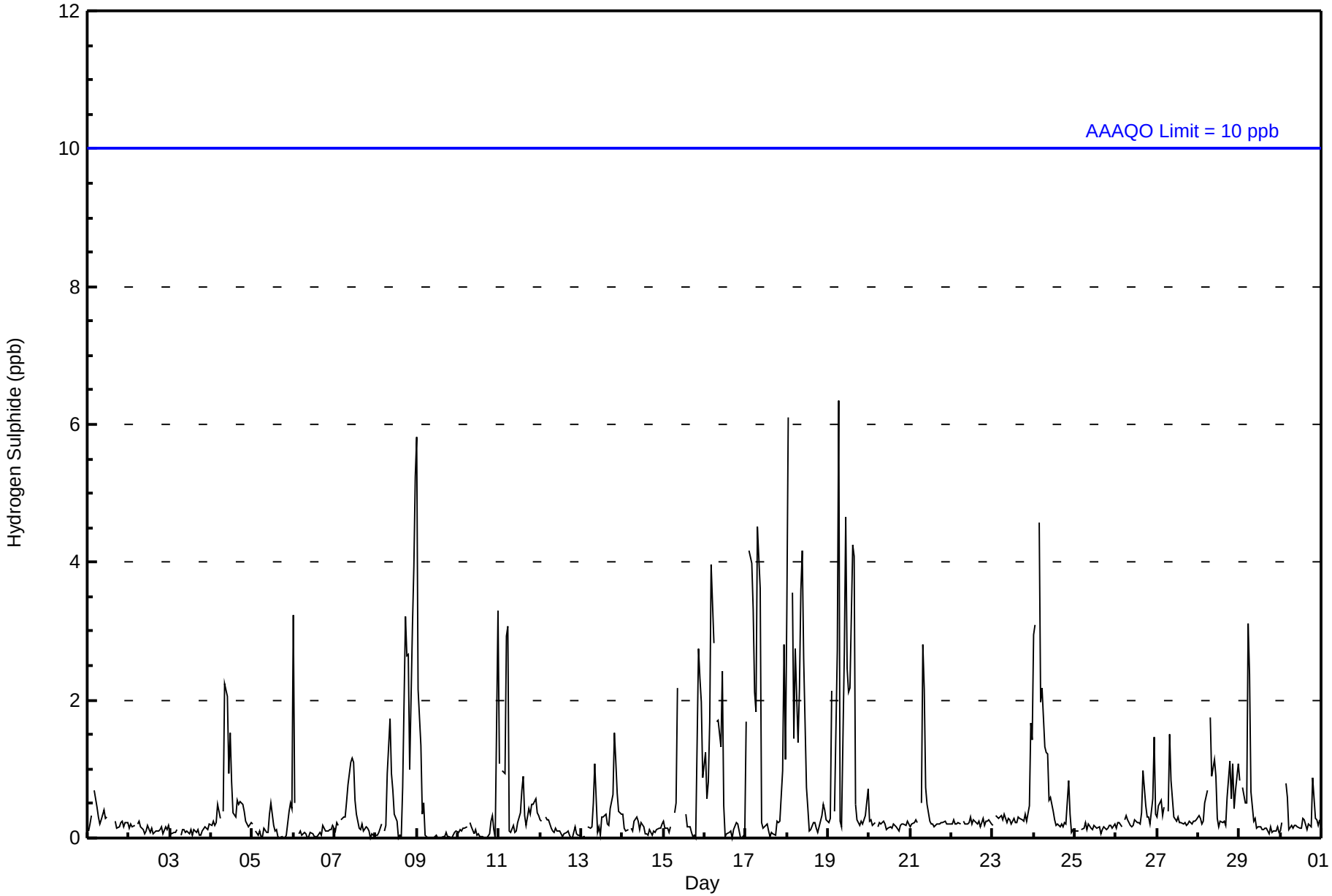
Z - zerospan C - Calibration PF - Power Failure
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb

Wood Buffalo Environmental Association

Hourly Averages

Hydrogen Sulphide (H_2S) - ppb

Mildred Lake - April 2016



Hydrogen Sulphide (H_2S) - ppb
Mildred Lake - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	644	94.43	94.43
3 - 4	31	4.55	98.97
5 - 7	7	1.03	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Hydrogen Sulphide (H_2S) - ppb

Mildred Lake - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 2	93	125	45	15	8	10	40	81	71	55	22	11	14	6	10	15	621
3 - 4	0	0	0	0	0	0	6	16	4	1	0	1	0	2	1	0	31
5 - 7	0	0	0	0	0	1	0	4	0	0	0	0	1	1	0	0	7
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	93	125	45	15	8	11	46	101	75	56	22	12	15	9	11	15	659

Total Number of Valid Hours: 659

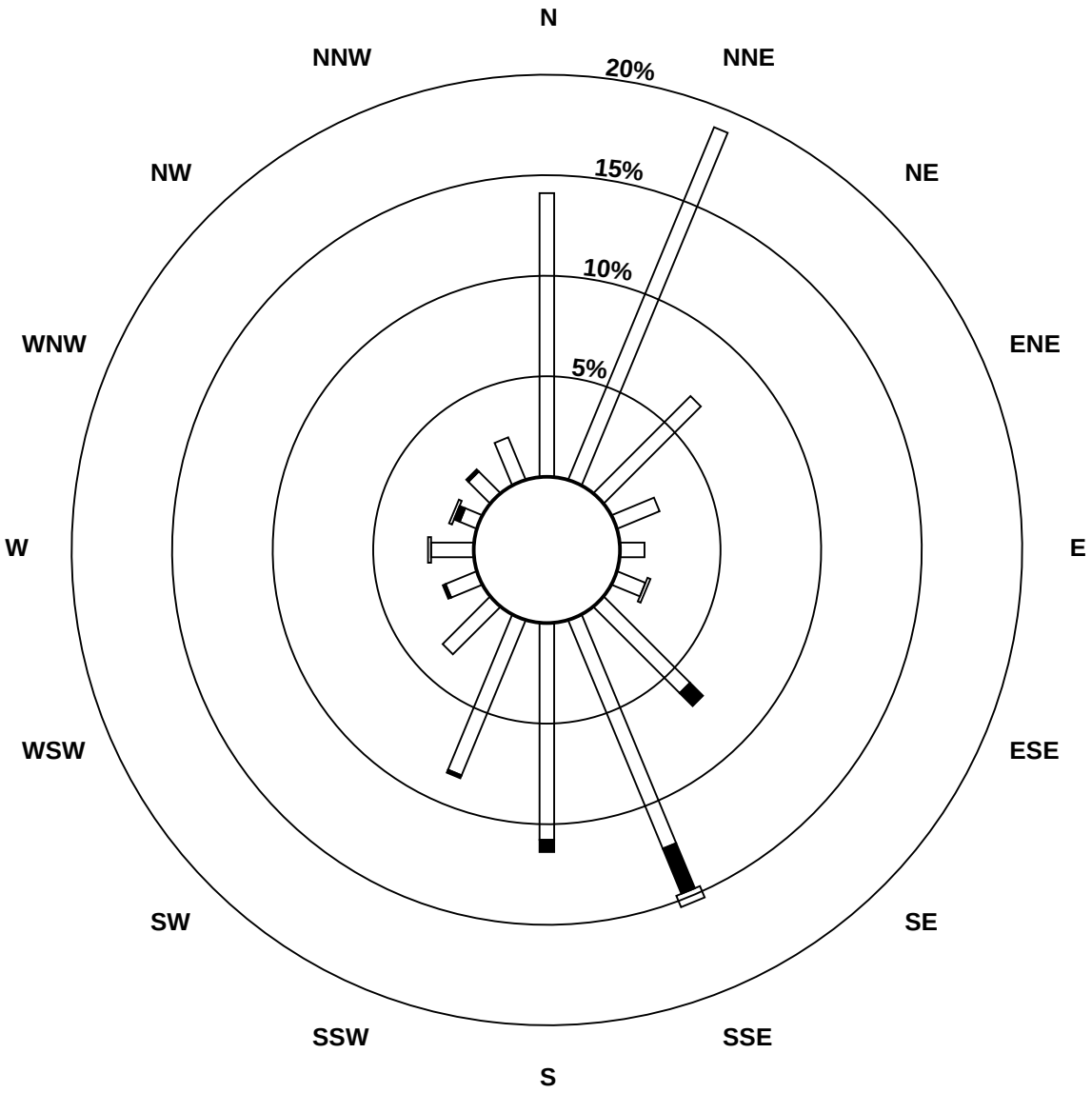
Total Number of Hours: 720

Wood Buffalo Environmental Association

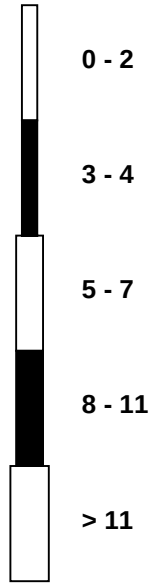
Wind Rose Apr 2016

Hydrogen Sulphide (H_2S) - ppb

Mildred Lake (AMS 2)



Classes (ppb)



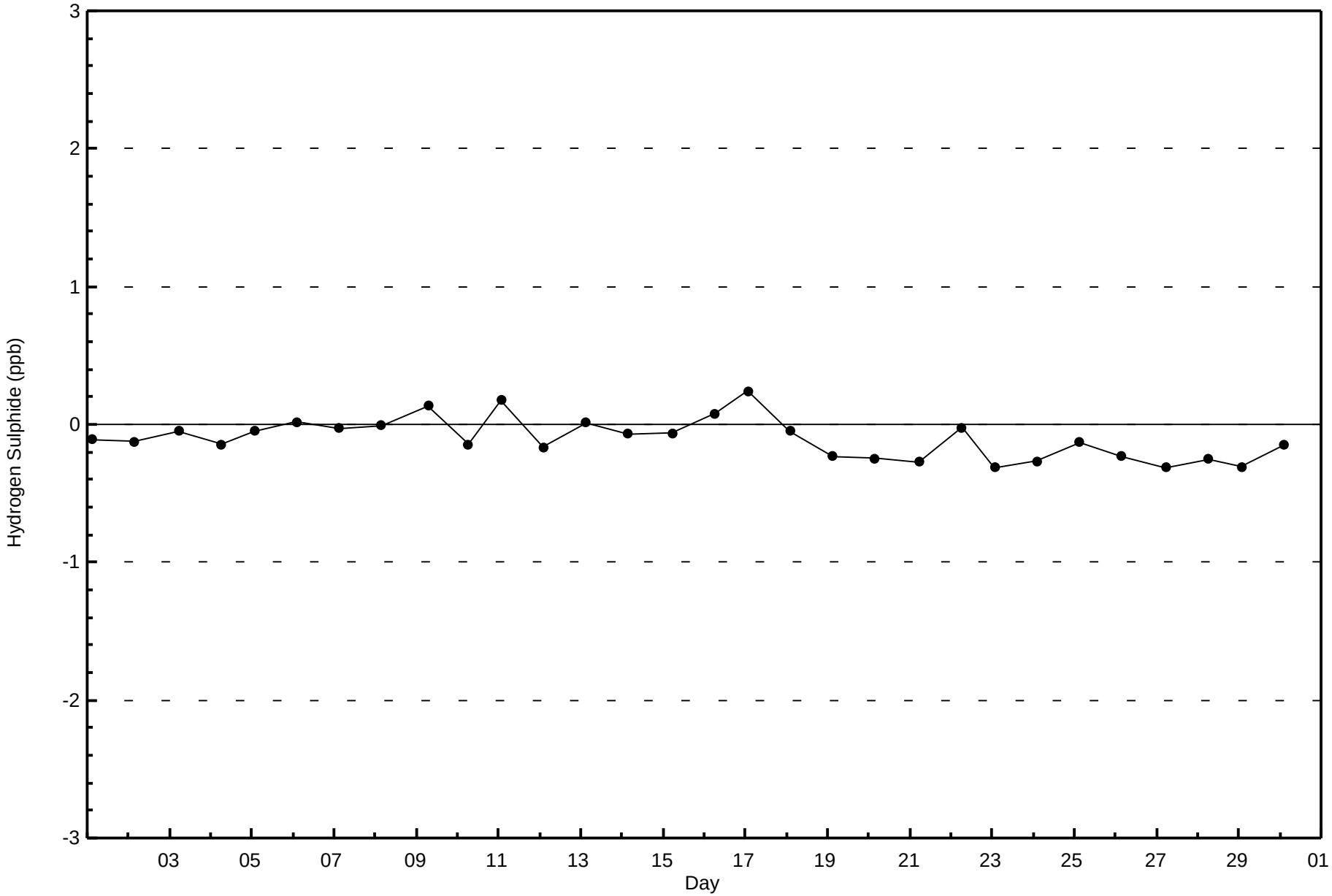
Total Number of Valid Hours: 659

Wood Buffalo Environmental Association

Zero Responses

Hydrogen Sulphide (H_2S) - ppb

Mildred Lake - April 2016

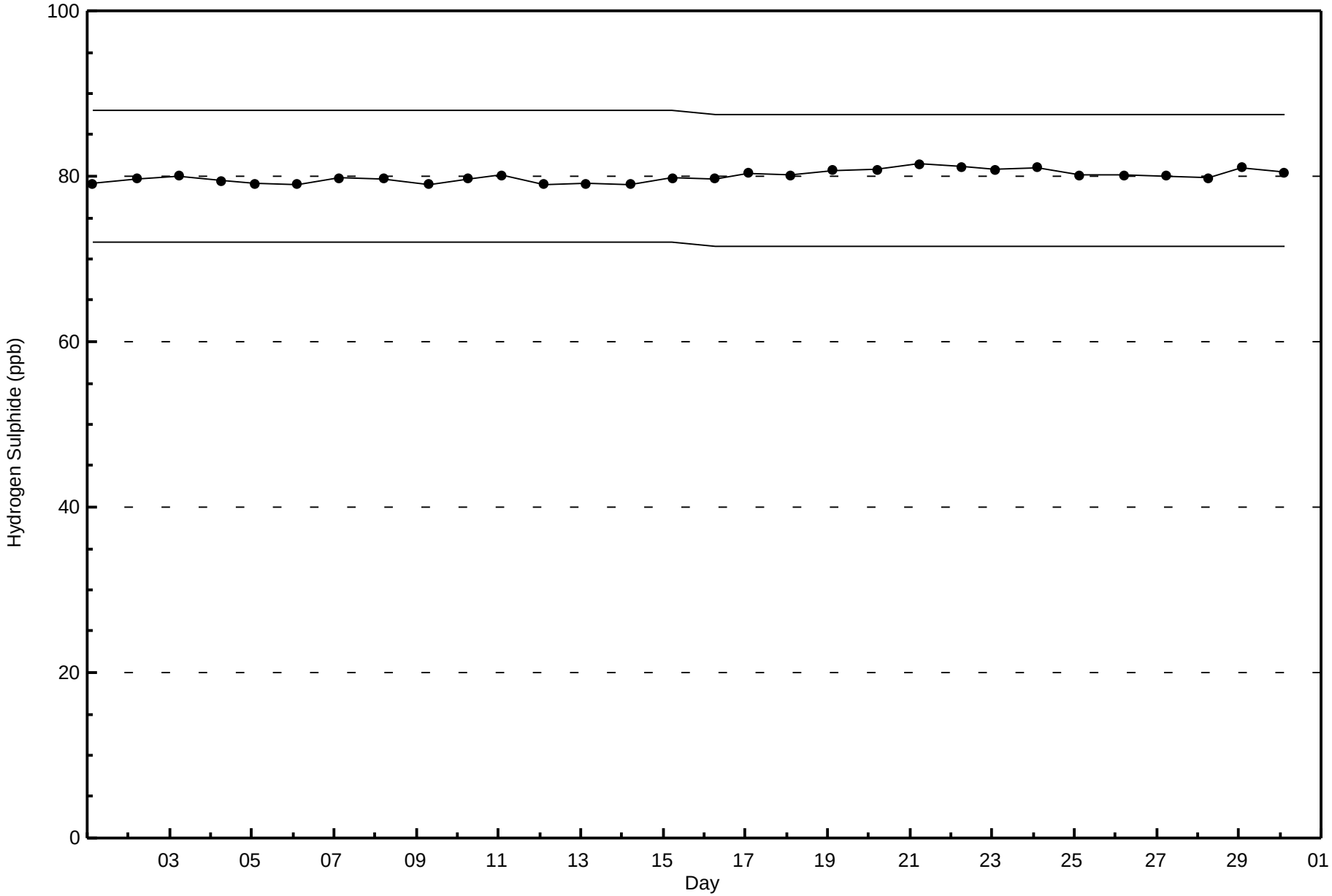


Wood Buffalo Environmental Association

Span Responses

Hydrogen Sulphide (H_2S) - ppb

Mildred Lake - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Mildred Lake - April 2016

Maximum Value: 5.0 ppm on Apr 15 09:00

Maximum Daily Average: 2.7 ppm on Apr 28

Minimum Value: 2.0 ppm on Apr 5 06:00

Minimum Daily Average: 2.2 ppm on Apr 25

Maximum Diurnal Average: 2.5 ppm at hour 5

Minimum Diurnal Average: 2.2 ppm at hour 16

Monthly Average: 2.31 ppm

Percentiles: P_1 = 2.1 P_{10} = 2.1 Q_1 = 2.2 Median = 2.2 Q_3 = 2.3 P_{90} = 2.6 P_{99} = 3.7

Hours in Service:	720
Hours of Data:	682
Hours of Missing Data:	38
Hours of Calibration:	33
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-Apr	2.1	2.3	Z	3.3	3.6	3.0	2.3	2.1	2.2	2.2	2.1	2.1	PF	PF	PF	PF	2.2	2.2	2.2	2.2	2.2	2.1	2.0	2.0	2.3	3.6
2-Apr	2.1	2.1	2.2	Z	2.1	2.1	2.2	2.1	2.1	2.2	2.3	2.5	2.5	2.5	2.4	2.4	2.3	2.2	2.1	2.2	2.1	2.2	2.3	2.4	2.2	2.5
3-Apr	2.2	2.2	2.3	2.4	Z	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.2	2.4
4-Apr	2.2	2.2	2.3	2.3	2.3	Z	2.5	2.4	2.6	2.7	2.4	2.2	2.2	2.3	2.3	2.2	2.2	2.4	2.4	2.7	2.1	2.2	2.2	2.3	2.3	2.7
5-Apr	Z	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.2	2.5	2.4	2.1	2.2	2.1	2.2	2.1	2.1	2.1	2.1	3.0	2.8	3.0	2.2	3.0
6-Apr	2.9	Z	2.4	3.0	2.5	2.5	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.3	3.0
7-Apr	2.1	2.1	Z	2.1	2.1	2.1	2.2	2.3	2.6	2.6	2.4	2.3	2.3	2.2	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.6
8-Apr	2.1	2.1	2.1	Z	2.3	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.3
9-Apr	2.3	2.3	2.3	2.3	3.1	2.4	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	3.1
10-Apr	2.2	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.3	2.3	2.3	2.2	2.4	2.2	2.4
11-Apr	Z	2.4	2.4	2.7	2.3	2.4	2.3	2.6	2.4	2.4	2.5	2.4	2.3	2.3	2.3	2.2	2.2	2.3	2.2	2.3	2.5	2.5	2.5	2.3	2.4	2.7
12-Apr	2.3	Z	2.5	2.5	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.3	2.2	2.2	2.2	2.2	2.5
13-Apr	2.2	2.2	Z	2.2	2.3	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.2	2.4	2.4	2.9	2.2	2.2	2.7	2.4	2.3	2.3	2.9
14-Apr	2.3	2.2	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	C	C	C	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.2	2.2	2.6	2.9	2.2	2.9
15-Apr	2.7	2.3	2.2	2.2	Z	2.2	2.4	2.7	5.0	3.7	2.7	2.3	M	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.5	5.0
16-Apr	2.3	2.4	2.5	2.5	2.5	Z	2.7	3.6	3.7	2.8	2.3	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.3	2.6	2.5	2.6	2.3	2.5	3.7
17-Apr	Z	3.1	3.0	2.7	2.9	3.0	2.8	2.7	2.6	2.2	2.2	2.2	2.3	2.2	2.1	2.1	2.2	2.5	3.1	2.5	2.4	3.0	4.6	3.3	2.7	4.6
18-Apr	2.7	Z	2.8	3.0	2.9	2.8	2.7	2.8	2.4	2.4	2.4	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.6	2.7	2.5	2.2	2.4	3.0
19-Apr	2.1	2.2	Z	2.4	2.3	2.8	2.9	2.2	2.1	2.2	2.3	2.3	2.3	2.4	2.3	2.2	2.3	2.4	2.5	2.7	2.2	2.8	3.0	4.1	2.5	4.1
20-Apr	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
21-Apr	2.2	2.2	2.2	2.2	Z	2.4	2.4	2.5	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.5
22-Apr	2.2	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
23-Apr	Z	2.3	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.3
24-Apr	2.3	Z	2.3	2.3	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.3	2.3	2.4	2.1	2.1	2.2	2.4
25-Apr	2.1	2.1	Z	2.1	2.2	2.2	2.2	2.1	2.2	2.1	2.1	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2
26-Apr	2.4	2.2	2.2	Z	2.2	2.2	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.3	2.2	2.5	2.3	2.3	2.5	2.6	2.3	2.6
27-Apr	2.6	2.8	2.9	2.9	Z	2.4	2.3	2.7	2.7	2.5	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.9
28-Apr	2.4	2.3	2.3	2.3	3.7	Z	3.2	3.1	2.8	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.7	5.0	2.6	3.5	4.3	2.7	5.0
29-Apr	Z	3.2	3.4	2.7	2.9	2.5	2.4	2.6	2.2	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.1	2.1	2.1	2.3	3.4
30-Apr	2.2	Z	2.8	3.0	2.5	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.3	2.2	2.2	2.2	2.2	2.2	3.0
	2.3	2.3	2.4	2.5	2.5	2.4	2.4	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.4	2.4	Diurnal Average	
	2.9	3.2	3.4	3.3	3.7	3.0	3.2	3.6	5.0	3.7	2.7	2.5	2.5	2.5	2.4	2.4	2.4	2.5	3.1	2.7	5.0	3.0	4.6	4.3	Diurnal Maximum	

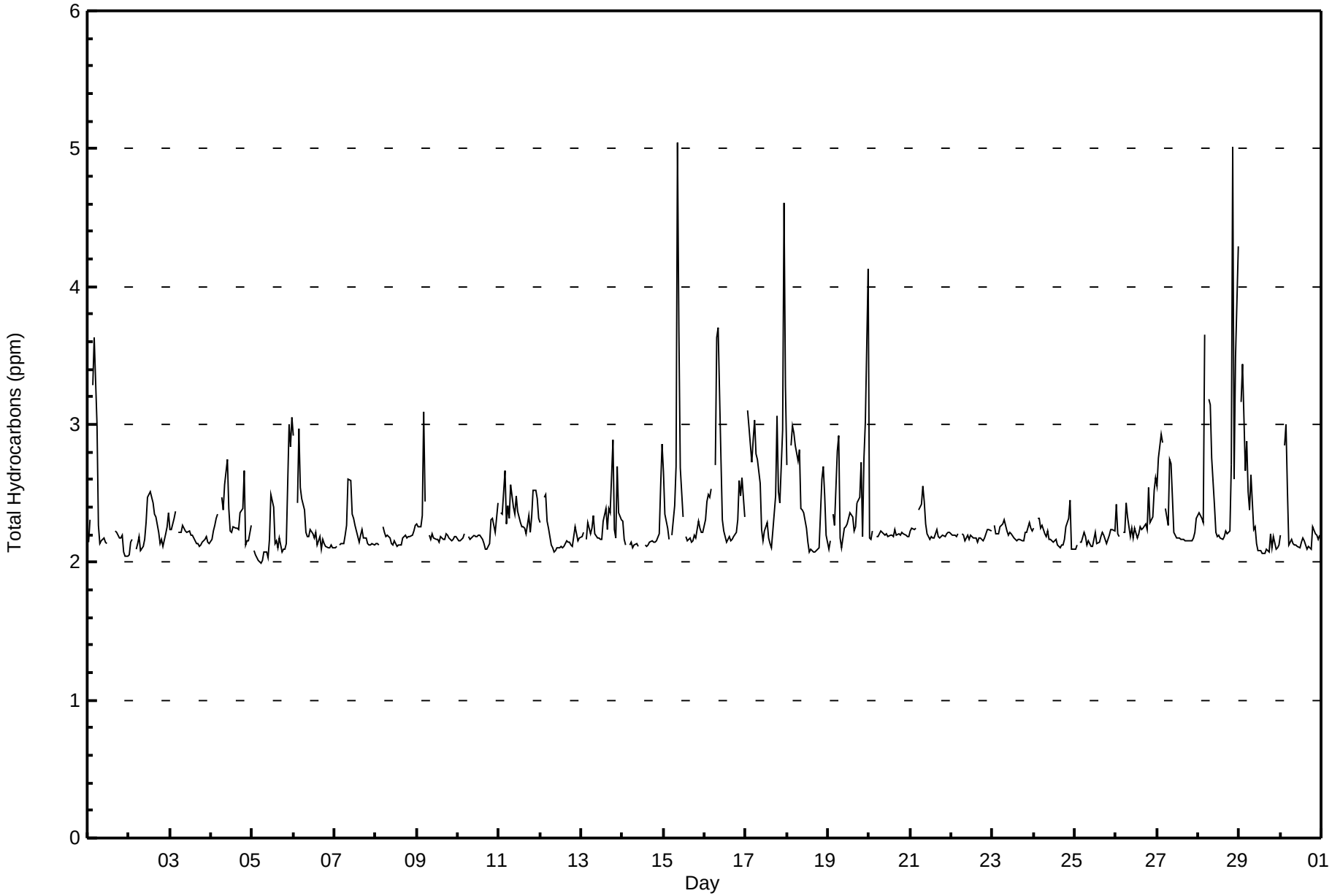
Z - zerospan C - Calibration M - Maintenance PF - Power Failure

Wood Buffalo Environmental Association

Hourly Averages

Total Hydrocarbons (THC) - ppm

Mildred Lake - April 2016



Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	7	1.03	1.03
2.1 - 3.0	655	96.04	97.07
3.1 - 10.0	20	2.93	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Total Hydrocarbons (THC) - ppm

Mildred Lake - April 2016

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	4	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	7
2.1 - 3.0	87	122	43	17	7	11	44	101	68	51	23	13	15	8	10	12	632
3.1 - 10.0	1	0	0	0	0	0	0	4	8	3	1	0	0	1	1	1	20
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	92	124	44	17	7	11	44	105	76	54	24	13	15	9	11	13	659

Total Number of Valid Hours: 659

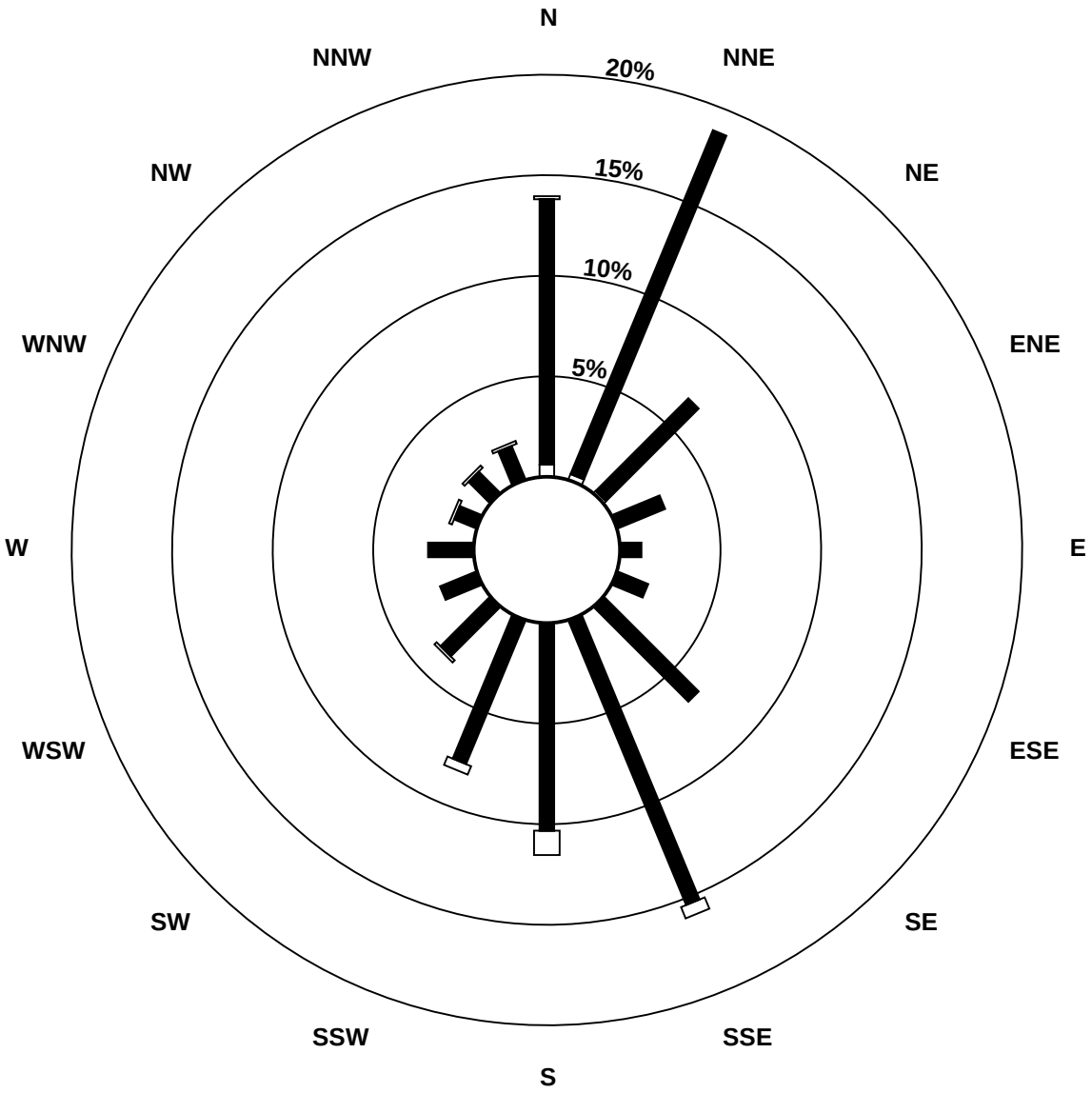
Total Number of Hours: 720

Wood Buffalo Environmental Association

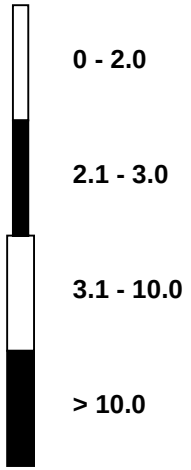
Wind Rose Apr 2016

Total Hydrocarbons (THC) - ppm

Mildred Lake (AMS 2)



Classes (ppm)



0 - 2.0

2.1 - 3.0

3.1 - 10.0

> 10.0

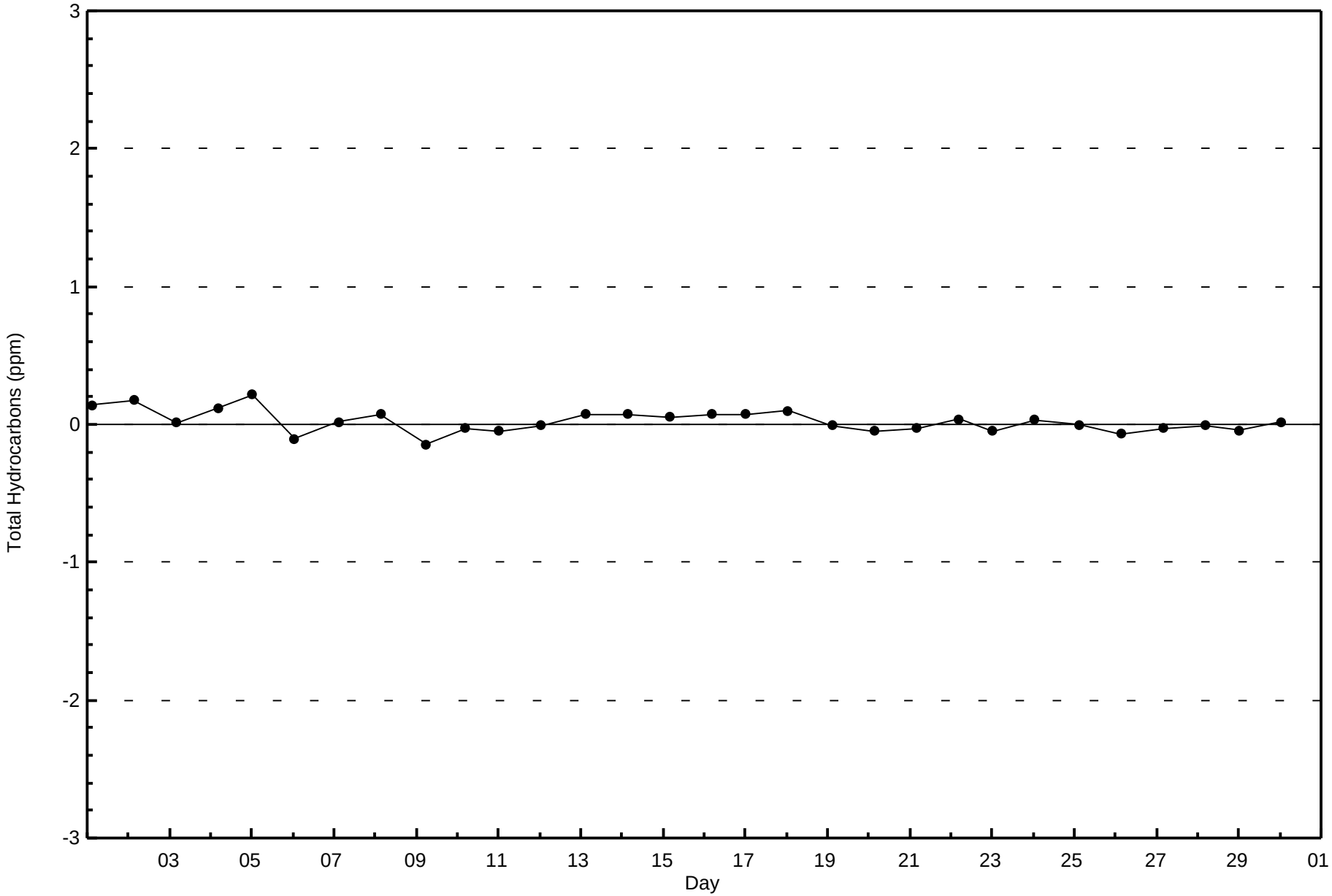
Total Number of Valid Hours: 659

Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Mildred Lake - April 2016

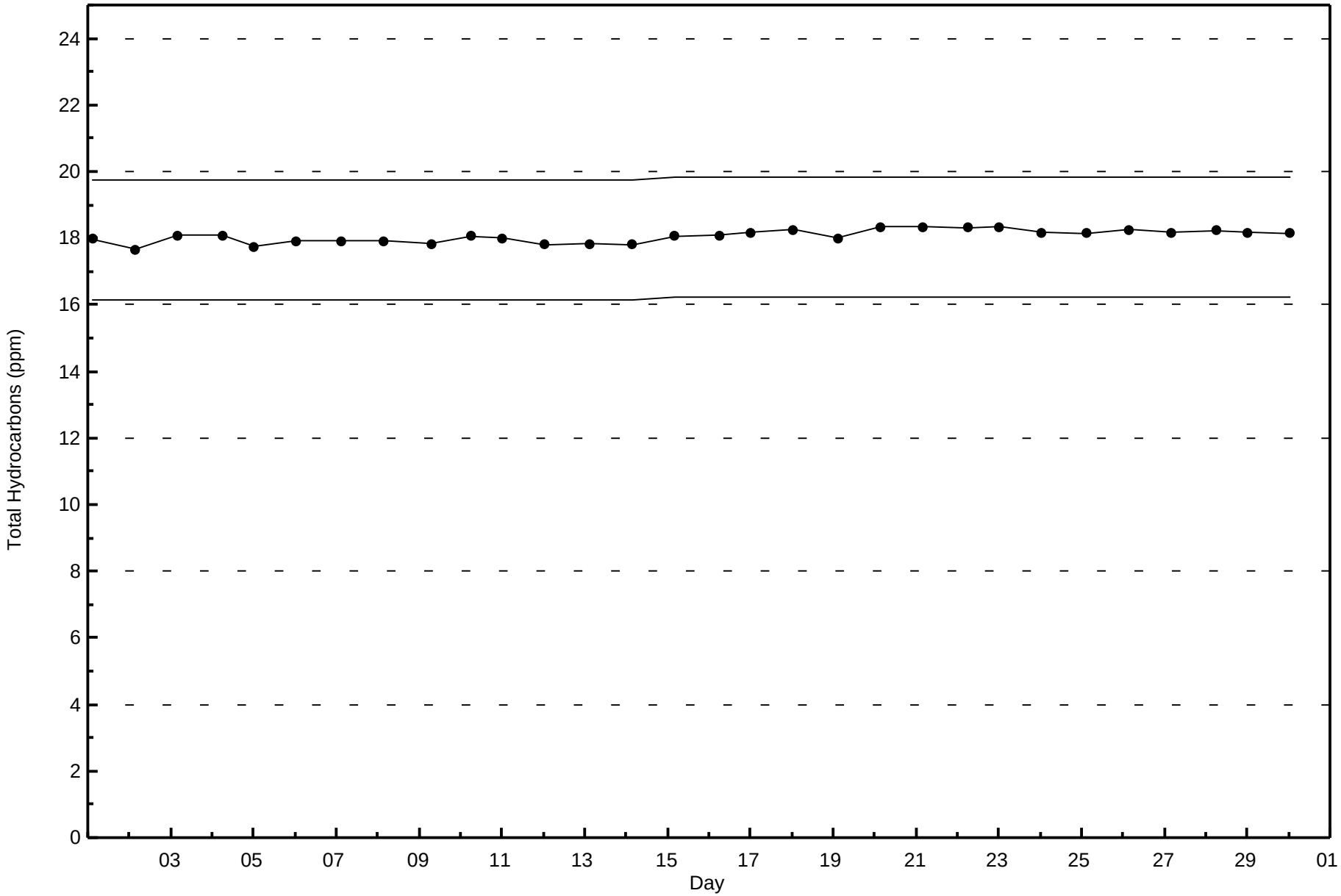


Wood Buffalo Environmental Association

Span Responses

Total Hydrocarbons (THC) - ppm

Mildred Lake - April 2016



Maximum Value: 27.0 C on Apr 18 15:00

Maximum Daily Average: 16.5 C on Apr 18

Minimum Value: -12.3 C on Apr 4 04:00

Minimum Daily Average: -7.1 C on Apr 3

Maximum Diurnal Average: 8.4 C at hour 16

Minimum Diurnal Average: -0.7 C at hour 6

Monthly Average: 3.92 C

Percentiles: P_1 = -9.7 P_{10} = -5.8 Q_1 = -1.7 Median = 3.1 Q_3 = 8.3 P_{90} = 15.9 P_{99} = 22.2

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

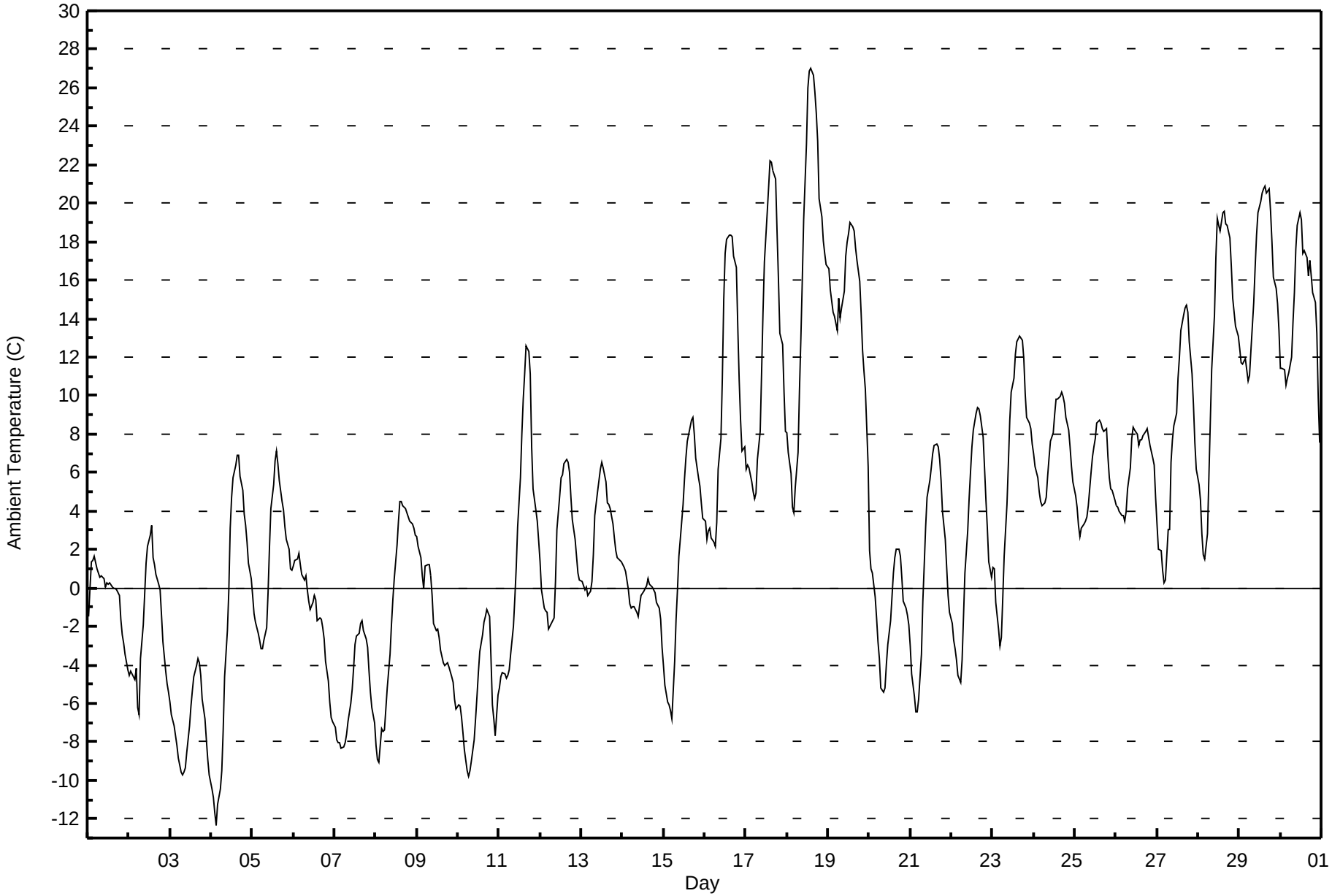
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	-1.5	-0.1	1.4	1.4	1.7	1.0	0.8	0.5	0.7	0.5	0.1	0.3	0.2	0.3	0.1	0.0	0.0	-0.1	-0.4	-1.6	-2.4	-2.8	-3.4	-4.3	-0.3	1.7
2-Apr	-4.6	-4.4	-4.5	-4.8	-4.2	-6.2	-6.6	-3.7	-1.9	-0.3	1.3	2.1	2.7	3.3	1.6	1.2	0.7	0.2	-0.1	-1.4	-2.8	-4.3	-5.0	-5.4	-2.0	3.3
3-Apr	-5.9	-6.6	-7.2	-7.7	-8.2	-8.9	-9.6	-9.7	-9.6	-9.4	-8.5	-7.2	-6.1	-5.3	-4.6	-4.1	-3.7	-3.9	-4.5	-5.8	-6.8	-7.9	-8.9	-9.7	-7.1	-3.7
4-Apr	-10.5	-10.9	-11.7	-12.3	-11.3	-10.4	-9.5	-7.4	-4.7	-2.2	-0.2	3.1	4.7	5.7	6.4	6.9	6.9	5.8	5.1	3.8	3.3	2.4	1.3	0.5	-1.5	6.9
5-Apr	-0.4	-1.3	-1.8	-2.3	-2.8	-3.2	-3.2	-2.7	-2.1	-0.3	2.1	4.1	5.4	6.6	7.1	6.5	5.6	4.5	4.0	3.1	2.5	2.0	1.0	0.9	1.5	7.1
6-Apr	1.1	1.4	1.5	1.8	1.2	0.7	0.4	0.6	-0.1	-0.7	-1.1	-0.7	-0.4	-0.6	-1.7	-1.6	-1.6	-2.1	-2.6	-3.8	-4.9	-5.9	-6.7	-7.0	-1.4	1.8
7-Apr	-7.2	-7.9	-8.0	-8.1	-8.3	-8.3	-8.0	-7.6	-6.9	-6.0	-5.3	-4.2	-2.9	-2.5	-2.4	-1.8	-1.7	-2.2	-2.7	-3.1	-4.4	-5.4	-6.2	-7.0	-5.3	-1.7
8-Apr	-8.2	-8.9	-9.1	-7.3	-7.4	-7.4	-6.3	-5.2	-3.4	-1.9	-0.6	0.5	2.2	3.5	4.5	4.5	4.3	4.1	3.9	3.7	3.5	3.3	3.1	2.7	-0.9	4.5
9-Apr	2.6	2.2	1.6	0.6	0.0	1.2	1.2	1.2	0.6	-0.4	-1.9	-2.2	-2.1	-2.6	-3.2	-3.9	-4.1	-4.0	-3.9	-4.1	-4.6	-4.9	-5.8	-6.3	-1.8	2.6
10-Apr	-6.1	-6.2	-6.7	-7.5	-8.4	-9.5	-9.8	-9.5	-9.0	-7.9	-6.8	-5.6	-4.4	-3.3	-2.4	-1.8	-1.5	-1.1	-1.5	-3.6	-6.1	-6.8	-7.7	-5.5	-5.8	-1.1
11-Apr	-5.2	-4.6	-4.4	-4.4	-4.7	-4.5	-4.3	-3.5	-2.0	-0.5	1.0	3.2	5.7	8.0	9.8	11.1	12.6	12.3	11.1	7.3	5.1	4.1	3.5	2.4	2.5	12.6
12-Apr	1.4	-0.1	-1.0	-1.2	-1.3	-2.2	-1.8	-1.7	-1.6	0.3	3.0	4.8	5.7	5.9	6.4	6.7	6.5	6.0	4.7	3.6	2.6	1.7	0.8	0.4	2.1	6.7
13-Apr	0.4	0.1	-0.1	0.0	-0.4	-0.2	0.3	1.7	3.8	5.0	5.6	6.1	6.6	6.2	5.5	4.4	4.3	4.2	3.3	2.6	2.0	1.6	1.5	1.3	2.7	6.6
14-Apr	1.2	1.1	0.8	-0.1	-0.8	-1.0	-1.0	-1.0	-1.2	-1.5	-0.9	-0.4	-0.2	0.0	0.1	0.5	0.2	0.0	-0.1	-0.3	-0.8	-1.0	-1.6	-3.1	-0.5	1.2
15-Apr	-4.1	-5.1	-6.0	-6.1	-6.4	-6.8	-3.8	-1.6	-0.1	1.6	2.5	4.3	5.6	6.7	7.7	8.3	8.7	8.9	8.0	6.7	5.8	5.3	4.5	3.6	2.0	8.9
16-Apr	3.5	2.6	2.9	3.1	2.6	2.4	2.2	3.4	6.1	7.8	10.9	15.0	17.4	18.1	18.3	18.3	18.2	17.3	16.7	13.6	10.8	8.7	7.1	7.3	9.8	18.3
17-Apr	6.1	6.4	6.3	5.5	5.0	4.6	4.9	6.7	8.2	11.2	14.3	17.0	19.5	20.9	22.2	22.1	21.7	21.3	18.5	16.1	13.3	12.6	10.1	8.1	12.6	22.2
18-Apr	8.1	7.0	5.9	4.2	3.9	5.2	7.0	10.3	13.0	15.9	19.2	23.1	26.0	26.9	27.0	26.6	25.8	24.7	23.2	20.3	19.3	18.1	17.4	16.8	16.5	27.0
19-Apr	16.6	15.5	14.9	14.3	14.1	13.4	15.1	14.0	14.5	15.4	17.2	18.0	18.4	19.0	18.8	18.5	17.7	17.0	15.9	14.3	12.4	11.3	10.3	6.3	15.1	19.0
20-Apr	1.9	1.0	0.8	-0.4	-1.6	-2.8	-3.7	-5.2	-5.4	-5.2	-4.0	-3.0	-1.7	-0.4	0.8	1.6	2.0	2.0	1.7	0.6	-0.7	-1.1	-1.4	-2.0	-1.1	2.0
21-Apr	-3.0	-4.5	-5.6	-6.4	-6.5	-5.8	-3.5	-0.7	1.2	3.2	4.7	5.6	6.2	7.0	7.4	7.5	7.3	6.7	5.6	4.0	2.6	1.0	-0.4	-1.2	1.3	7.5
22-Apr	-1.9	-2.7	-3.2	-3.7	-4.5	-4.9	-3.7	-1.5	0.8	2.9	4.7	6.0	7.3	8.2	9.1	9.4	9.3	8.9	7.8	6.2	4.6	3.1	1.4	0.6	2.7	9.4
23-Apr	1.1	1.0	-0.8	-2.2	-3.0	-2.5	-0.6	1.7	4.3	6.4	8.7	10.2	10.9	12.1	12.8	12.9	13.1	12.9	11.9	10.1	8.9	8.6	8.3	7.5	6.4	13.1
24-Apr	7.0	6.3	5.7	5.0	4.5	4.3	4.4	4.7	5.8	6.8	7.6	8.1	9.0	9.8	9.8	9.9	10.2	10.0	9.6	8.9	8.2	7.3	6.3	5.5	7.3	10.2
25-Apr	4.8	4.2	3.3	2.7	3.1	3.3	3.5	3.7	4.3	6.0	6.8	7.4	7.7	8.6	8.7	8.6	8.3	8.1	8.3	6.9	5.7	5.1	5.1	4.6	5.8	8.7
26-Apr	4.2	4.2	4.0	3.8	3.8	3.5	3.9	5.1	6.2	7.8	8.4	8.2	8.0	7.4	7.7	7.7	7.9	8.2	8.3	7.9	7.4	6.7	6.4	4.7	6.3	8.4
27-Apr	3.3	2.0	1.9	0.9	0.2	0.4	3.0	3.0	6.5	7.7	8.4	9.1	10.9	12.0	13.4	14.2	14.5	14.7	14.3	12.8	11.1	9.5	7.6	6.2	7.8	14.7
28-Apr	5.4	4.6	2.8	1.7	1.5	2.8	5.8	8.6	11.3	14.2	17.2	19.2	18.9	18.6	19.5	19.6	18.9	18.9	18.2	16.7	15.1	14.3	13.6	13.1	12.5	19.6
29-Apr	12.5	11.7	11.6	11.9	11.3	10.8	11.1	12.4	14.9	16.7	18.4	19.5	20.1	20.6	20.7	20.9	20.5	20.7	19.6	18.0	16.1	15.6	14.7	13.4	16.0	20.9
30-Apr	11.4	11.4	11.4	10.5	10.9	11.2	12.0	13.8	15.4	17.6	18.8	19.5	19.1	17.4	17.6	17.2	16.2	17.0	16.2	15.4	14.8	13.3	9.9	7.5	14.4	19.5
	1.1	0.6	0.2	-0.2	-0.5	-0.7	0.0	1.0	2.3	3.7	5.1	6.4	7.4	7.9	8.3	8.4	8.3	8.0	7.3	6.0	4.7	3.8	2.9	2.1	Diurnal Average	
	16.6	15.5	14.9	14.3	14.1	13.4	15.1	14.0	15.4	17.6	19.2	23.1	26.0	26.9	27.0	26.6	25.8	24.7	23.2	20.3	19.3	18.1	17.4	16.8	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature (AT) - C

Mildred Lake - April 2016



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	248	34.44	34.44
0 - 10	322	44.72	79.17
10 - 20	130	18.06	97.22
> 20	20	2.78	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Mildred Lake - April 2016

Maximum Value: 100 % on Apr 27 06:00

Maximum Daily Average: 93.3 % on Apr 6

Minimum Value: 13 % on Apr 19 16:00

Minimum Daily Average: 24.3 % on Apr 19

Maximum Diurnal Average: 72.3 % at hour 6

Minimum Diurnal Average: 44.7 % at hour 15

Monthly Average: 57.6 %

Percentiles: P_1 = 17 P_{10} = 26 Q_1 = 40 Median = 58 Q_3 = 75 P_{90} = 89 P_{99} = 98

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

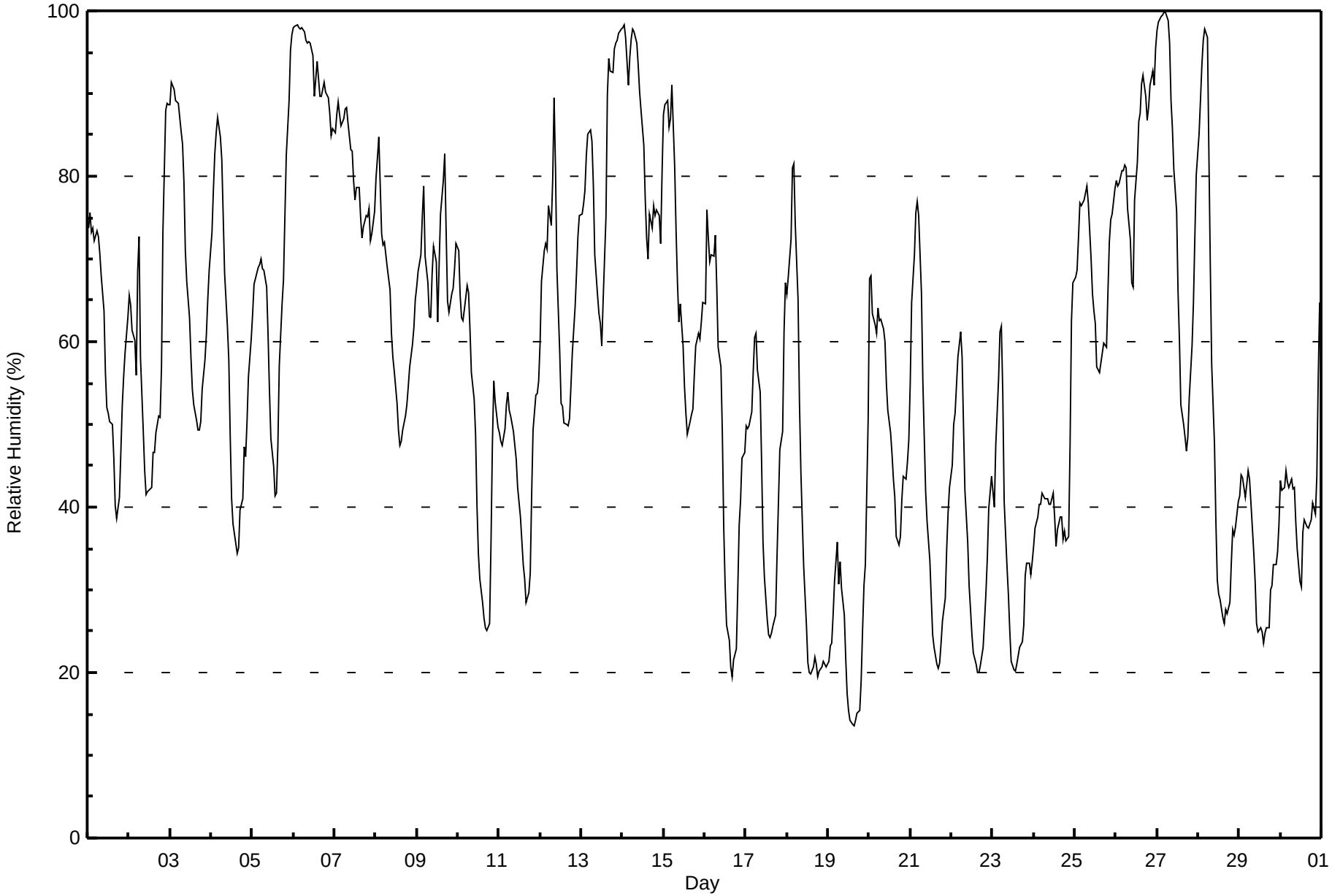
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	74	76	73	74	72	73	73	71	68	64	56	52	51	50	50	46	40	39	41	47	52	56	59	63	59.1	76
2-Apr	66	64	61	60	56	69	73	58	49	44	42	42	42	42	47	47	49	51	51	57	73	88	89	89	58.7	89
3-Apr	89	91	90	89	89	89	85	84	79	71	67	63	58	54	52	51	49	49	50	54	58	61	65	69	69.1	91
4-Apr	73	78	83	85	87	85	82	75	68	62	58	49	41	38	36	34	35	40	41	47	46	50	56	60	58.8	87
5-Apr	63	67	68	69	69	70	69	69	67	61	54	48	45	41	42	47	57	65	67	75	83	89	95	97	65.7	97
6-Apr	98	98	98	98	98	98	97	96	96	96	96	95	90	92	94	90	90	90	91	90	90	88	85	86	93.3	98
7-Apr	85	87	89	87	86	87	88	88	86	83	83	80	77	79	79	75	72	74	75	75	76	72	73	76	80.6	89
8-Apr	80	82	85	73	72	72	70	69	66	61	58	56	53	49	47	48	49	51	52	55	57	60	62	65	62.2	85
9-Apr	67	68	71	75	79	70	67	63	63	68	71	70	62	69	75	80	83	73	65	64	66	66	69	72	69.8	83
10-Apr	71	66	63	63	64	67	66	62	56	53	49	40	34	31	28	27	25	25	26	36	48	55	53	50	48.2	71
11-Apr	49	48	47	49	52	54	52	51	49	48	46	42	39	36	33	31	28	30	32	42	49	54	54	55	44.6	55
12-Apr	60	67	71	72	71	76	74	80	89	81	69	59	53	52	50	50	50	51	55	59	64	68	73	75	65.4	89
13-Apr	75	77	78	82	85	86	84	79	71	66	63	62	60	65	75	90	94	93	93	95	96	97	97	98	81.7	98
14-Apr	98	98	97	91	94	97	98	97	96	93	90	88	84	77	73	70	75	74	76	75	76	75	72	80	85.2	98
15-Apr	87	89	89	86	87	91	81	73	67	62	65	60	54	51	49	50	51	52	56	60	61	60	62	65	67.1	91
16-Apr	64	76	72	70	70	70	73	67	59	57	49	37	30	26	24	21	19	22	23	30	38	41	46	47	47.2	76
17-Apr	50	50	50	52	56	60	61	57	54	45	36	32	26	25	24	25	26	27	34	40	47	49	61	67	43.9	67
18-Apr	66	68	72	81	82	74	65	53	44	38	33	26	21	20	20	21	22	21	20	20	21	21	21	21	39.6	82
19-Apr	21	23	24	27	31	36	31	33	30	27	22	17	15	14	14	13	14	15	16	19	25	31	33	51	24.3	51
20-Apr	68	68	63	62	61	64	63	63	62	60	55	52	49	46	43	41	36	35	37	41	44	43	45	48	52.1	68
21-Apr	55	65	71	76	77	75	66	55	48	42	38	33	29	25	23	21	20	21	24	26	29	35	39	42	43.2	77
22-Apr	45	50	51	55	58	61	58	50	42	36	30	28	25	22	21	20	20	21	23	26	30	34	40	44	37.1	61
23-Apr	42	40	47	55	61	62	54	41	33	30	25	21	20	20	21	22	23	24	26	32	33	33	32	33	34.6	62
24-Apr	35	37	39	40	40	42	41	41	41	40	40	42	39	35	37	39	39	36	37	36	36	47	63	67	41.3	67
25-Apr	68	69	73	77	76	77	78	79	77	70	66	64	62	57	56	57	59	60	59	66	72	75	75	79	68.7	79
26-Apr	79	79	79	81	81	81	81	76	72	67	67	77	82	87	88	91	92	90	87	88	91	93	91	95	83.1	95
27-Apr	98	99	99	100	100	100	99	96	89	86	81	76	66	60	52	50	49	47	48	53	60	65	73	80	76.0	100
28-Apr	85	89	93	96	98	97	83	70	57	48	38	31	29	29	27	26	28	27	29	33	37	37	38	41	52.7	98
29-Apr	41	44	44	41	43	44	43	41	35	31	26	25	25	25	24	25	25	25	30	31	33	33	35	38	33.6	44
30-Apr	43	42	42	44	43	42	43	42	42	38	35	31	30	37	38	38	37	38	38	41	39	44	56	65	41.3	65
	66.5	68.5	69.5	70.3	71.3	72.3	69.9	65.9	61.9	57.6	53.6	49.9	46.5	45.2	44.7	44.8	45.3	45.5	46.7	50.4	54.3	57.3	60.3	63.9	Diurnal Average	
	98	99	99	100	100	100	99	97	96	96	96	95	90	92	94	91	94	93	93	95	96	97	97	98	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity (RH) - %

Mildred Lake - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Mildred Lake - April 2016

Maximum Speed: 26 km/h on Apr 19 15:00

Maximum Daily Speed Average: 16.0 km/h on Apr 8

Minimum Speed Value: 0 km/h on Apr 15 06:00

Minimum Daily Speed Average: 0.4 km/h on Apr 4

Maximum Diurnal Speed Average: 2.7 km/h at hour 21

Minimum Diurnal Speed Average: 1.0 km/h at hour 15

Monthly Average Velocity: 1.5 km/h 91.2 deg

Percentiles: $P_1 = 2$ $P_{10} = 4$ $Q_1 = 7$ Median = 10 $Q_3 = 13$ $P_{90} = 17$ $P_{99} = 24$

Hours in Service:	720
Hours of Data:	696
Hours of Missing Data:	24
Percent Operational Time:	96.7

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-Apr	SSW5	W5	WNW9	WNW6	NW6	NNE5	N8	NNE13	NNE13	NNE17	NNE16	NNE15	NNE15	NE12	ENE11	NE11	NE10	NE11	ENE8	NNE6	NNE7	ENE5	NE5	NNE6	NNE7.5	NNE17
2-Apr	ENE5	ENE5	ENE6	E6	ESE7	N8	N8	ENE8	E10	ENE8	NNE8	N16	NNW18	N19	N23	N23	N25	NNE21	NNE18	NNE19	NNE16	NNE16	N17	N13	NNE11.8	N25
3-Apr	N11	N12	N14	N16	N17	N15	NNE19	NNE17	N20	N21	N15	N13	NE11	NNE11	NNE10	NE10	ENE9	ENE9	NE9	NNE7	NNE8	NNE7	NNE8	NNE7	NNE11.9	N21
4-Apr	N7	N3	N3	NNE2	SSW6	SSW6	SW3	SW5	SSE6	S8	S8	SSE6	SSE9	S8	S7	SSW6	SW4	N9	N9	N10	N11	NNE10	N11	N11	NE0.4	N11
5-Apr	N11	N11	N11	N10	N10	N11	NNE9	NNE8	NNE9	N6	W3	SW4	SSW6	S9	S12	S13	S13	SSW11	SSW12	S10	S10	SSE12	SSE13	SSE12	SSE1.8	S13
6-Apr	SSE10	S6	WSW2	NNW9	N12	NNW14	N14	N14	AF	AF	AF	AF	N8	N4	NNE7	NNE7	AF	AF	AF	AF	AF	AF	AF	AF	----	N14
7-Apr	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	E3	NNE8	NE10	NNE10	NNE11	NNE11	NNE9	NNE9	NNE8	NNE9	NE8	NNE5	----	NNE11
8-Apr	NNE7	NE5	ESE4	SE10	SE12	SE13	SE13	SSE16	SSE17	SSE20	SSE18	SE18	SE22	SE24	SE25	SE24	SE20	SSE20	SSE25	SSE23	SE21	SSE17	SSE17	SSE16	SE16.0	SE25
9-Apr	SSE16	SE11	SSE10	N6	NNW10	NW19	NNW14	N15	N19	N16	N21	NNW22	N21	N22	NNE18	N20	N16	NNE18	NNE21	N17	N11	N11	NNW10	N9	N12.2	N22
10-Apr	N14	N18	N17	N16	N14	N12	NNE10	NE12	NNE13	NNE10	NNE9	NE9	N8	NNE6	NE7	ENE5	NNE5	WSW3	SSW5	ESE2	E4	ENE3	E5	SSE11	NNE7.0	N18
11-Apr	SE11	SSE13	SSE13	SSE14	SSE13	SSE11	S11	SSE12	SSE14	SSE13	SSE13	SSE12	SSE12	SSE11	SSE7	ESE3	WSW3	SSW4	ESE4	NNE5	N3	N6	N7	N4	SSE6.8	SSE14
12-Apr	N3	NW2	NW2	N7	N12	NNE10	NNE11	NNE16	NNE10	N9	NNE7	N12	NE12	NE14	NE15	NNE15	NNE14	NNE14	NNE15	NNE15	NNE15	NNE12	NNE10	N12	NNE10.6	NNE16
13-Apr	N9	NNE9	NNE9	N7	NE7	N8	NNE5	N3	SE8	SE11	SSE11	S8	SE7	SSE10	S6	SE6	SE5	S5	SSE8	SE9	SSE6	SSE3	SE2	NE3	ESE3.2	SE11
14-Apr	NE4	NNE4	NNE9	NNE12	NNE14	N11	N10	NNE10	NNE10	NNE12	N12	N9	NNW13	NNW15	NNW14	N8	NE7	NNE7	N6	N8	N7	NNW9	NW8	WNW3	N8.4	NNW15
15-Apr	N3	NNE4	N5	NNE7	NE5	ENE0	SW3	S4	S6	S7	SSE10	SSE12	SSE12	SSE13	SSE13	SE13	SE15	SE14	SE12	SE13	SE10	SSE13	SE14	SSE11	SE7.2	SE15
16-Apr	SSE9	ESE6	SE12	SSE12	SE9	SSE12	S10	SSE12	SSE12	SSE11	SSE14	SSE11	SW12	WSW13	WSW12	W14	WNW12	W10	W10	WSW4	WSW3	WSW4	SW4	SW4	SSW6.1	SSE14
17-Apr	SSE7	SSE7	SSE6	SE5	S4	SW1	SSE4	SSE5	S7	S9	SSW8	SSW7	SSW6	S7	W10	W10	WNW11	NW11	SW3	SE2	SE5	SE6	SSW4	SSW4	SSW3.6	WNW11
18-Apr	SSE5	ESE3	S3	S5	S6	S7	S6	SSE8	SE10	SSE11	SSE13	SSE15	S17	SSW22	SSW21	SSW23	SSW22	SSW22	S20	S14	S15	SSE17	SSE14	SSE13	S12.3	SSW23
19-Apr	S15	SSE2	S10	SW8	WSW8	WSW11	WNW13	NNW16	NNW15	NW12	W16	W20	W23	W24	WNW26	WNW26	WNW25	NW23	NW22	NW16	NNW17	NW14	NW15	N19	WNW13.3	WNW26
20-Apr	NNE15	NNE16	NNE16	NNE13	NNE14	NNE19	NNE17	NNE20	NNE18	NNE18	NNE16	NNE18	NNE13	NE13	NE13	NE12	NE11	NE10	NE9	NE7	NE7	NE8	NE7	NE6	NNE12.8	NNE20
21-Apr	NE4	NE3	N4	NNE3	NNE3	ENE3	E3	SSE2	E2	N3	WSW2	NNE9	NNE11	NNE13	NNE14	NNE15	NE17	NE17	NE16	NE14	NE11	NNE9	NNE9	NNE9	NNE7.8	NE17
22-Apr	NNE9	N12	NNE11	NNE9	NNE9	NNE9	NNE9	NNE10	NNE11	NNE13	NE11	NNE12	NNE11	NNE13	NE13	NNE13	NNE16	NNE14	NNE13	N12	NNE12	NNE10	N10	N8	NNE11.1	NNE16
23-Apr	ESE6	ESE9	NE5	N7	NNE5	N8	N5	E7	S2	WSW4	SSE6	SSE14	SE14	SSE12	SSE13	SE13	SE13	SE11	SE9	ESE8	ESE9	SE14	SSE21	SSE17	SE7.3	SSE21
24-Apr	SE14	SE13	SSE12	SSE12	SE12	SSE13	SSE13	SSE14	SSE13	SSE14	SSE14	S14	S12	S14	S12	S12	S9	ESE12	SE12	SE15	SSE17	S15	SSW16	SSW14	SSE12.5	SSE17
25-Apr	SSW15	SSW15	SSW13	S10	S8	S9	S11	S12	S14	SSW13	SSW14	S13	S13	SSW13	SW9	SW8	SW7	SSW10	SW10	SW8	SSW7	SSW6	SSW6	SSW6	SSW10.1	SSW15
26-Apr	SSW7	SSW9	SSW11	S12	SSW11	S8	SSE8	S12	S11	SSE11	S9	SW7	S9	SSE11	S9	SSE9	SE7	SSE7	ESE6	S5	S6	SSE6	S7	SSW4	S8.0	S12
27-Apr	W1	SSW3	SW4	SW4	SSW2	SSW4	S4	SE4	SSE4	ENE8	ENE9	NNE4	NNE7	NNE7	NNE9	NE8	ENE10	NE8	NE9	NNE8	NNE8	NE6	NNE8	N8	NE3.8	ENE10
28-Apr	N7	N6	N3	SW2	SSW5	SSW4	S6	S8	SSE8	SSE9	SSE9	SSW10	SSW10	SSE12	SSW15	S14	S12	SSE13	SSE12	SSE9	SSE8	S9	S8	S9	S6.9	SSW15
29-Apr	S9	S8	S12	SSE13	SSE12	SSE8	SSE9	SSE14	S18	SSE19	S23	SSW22	S21	SSW23	SSW24	SSW22	SSW18	SW16	SSW7	SSW11	S10	SSW12	S12	SSW12	S14.1	SSW24
30-Apr	S7	S8	SSE9	SSE11	SSE12	S12	S7	S10	SSW11	SSW10	SW15	SW15	SW15	W14	W14	WSW12	W11	SSW10	SSW7	SSE5	NW3	NNE8	ENE4	NE1	SSW6.6	SW15
	ESE1.9	E1.8	E1.4	ENE1.6	ENE1.7	NNE1.6	NE1.7	ENE2.5	ESE2.7	ESE2.7	SE2.4	SSE1.4	SSE1.3	SSE1.5	SE1.0	ESE1.0	NE1.3	ENE1.9	E2.3	ENE2.5	ENE2.7	E2.2	ESE1.2	E1.2	Diurnal Average	
	SSE16	N18	N17	N16	N17	NW19	NNE19	NNE20	N20	N21	S23	SSW22	W23	W24	WNW26	WNW26	WNW25	NW23	SSE25	SSE23	SE21	SSE17	SSE21	N19	Diurnal Maximum	

AF - Analyzer Failure

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

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Speed (WS) - km/h

Mildred Lake - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 8 km/h on Apr 19 15:00

Minimum Value: 0 km/h on Apr 21 06:00

Percentiles: $P_1 = 1$ $P_{10} = 1$ $Q_1 = 2$ Median = 3 $Q_3 = 4$ $P_{90} = 4$ $P_{99} = 7$

Hours in Service:	720
Hours of Data:	696
Hours of Missing Data:	24
Hours of Calibration:	0
Percent Operational Time:	96.7

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-Apr	2	4	4	2	2	2	2	3	4	4	5	4	4	3	3	3	3	3	3	1	1	1	1	1	5
2-Apr	1	1	2	2	3	2	1	3	2	3	4	3	4	5	5	5	5	5	4	4	4	3	3	3	5
3-Apr	2	3	3	3	4	3	4	4	4	5	4	3	4	4	3	3	3	2	2	2	1	1	1	1	5
4-Apr	2	1	2	1	2	1	2	1	2	2	2	2	3	2	2	2	2	2	1	1	2	2	2	2	3
5-Apr	1	1	1	1	2	2	2	2	2	1	2	1	2	3	3	3	3	2	2	2	2	2	2	2	3
6-Apr	3	2	1	2	2	3	4	3	AF	AF	AF	AF	4	4	3	4	AF	AF	AF	AF	AF	AF	AF	AF	4
7-Apr	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	2	2	2	3	3	3	2	2	2	2	2	2	3
8-Apr	2	2	2	2	3	3	3	5	4	4	4	5	6	5	6	6	6	6	6	6	6	5	4	3	6
9-Apr	4	3	3	2	3	4	4	4	4	4	4	5	5	5	5	5	5	5	6	5	2	3	1	2	6
10-Apr	3	4	4	4	3	2	2	3	3	3	4	4	4	3	3	3	2	2	1	1	1	1	2	2	4
11-Apr	2	3	3	3	3	3	2	3	2	2	2	2	2	2	2	2	1	1	1	1	2	2	2	1	3
12-Apr	1	2	1	3	3	3	4	4	3	3	3	4	4	4	4	3	3	3	3	3	3	2	2	2	4
13-Apr	2	2	2	3	2	1	1	1	2	3	2	2	2	2	2	2	2	3	2	2	2	2	1	2	3
14-Apr	1	1	3	3	3	2	2	3	3	3	3	2	4	3	3	3	2	2	1	2	2	2	2	1	4
15-Apr	3	1	2	2	1	1	1	1	1	2	2	3	3	3	3	3	3	3	3	3	2	4	3	3	4
16-Apr	3	3	3	3	2	3	2	2	2	2	3	3	4	4	4	5	4	3	4	2	1	1	1	2	5
17-Apr	2	1	2	2	2	2	2	3	2	2	2	2	2	3	4	4	4	3	2	1	1	1	1	1	4
18-Apr	2	1	1	2	1	1	2	2	2	2	3	3	5	5	5	6	5	5	5	4	3	4	4	2	6
19-Apr	4	4	3	3	3	5	5	4	4	3	6	7	8	7	8	7	8	7	6	4	4	3	3	5	8
20-Apr	4	4	4	4	4	5	4	5	4	4	5	5	4	4	4	4	3	3	3	2	1	2	2	1	5
21-Apr	2	1	1	0	1	0	1	1	2	2	3	4	4	4	4	4	4	4	4	4	3	2	2	2	4
22-Apr	2	2	2	1	1	2	2	2	2	4	4	4	4	4	4	4	4	3	3	2	3	3	2	3	4
23-Apr	4	2	2	1	2	1	1	2	2	2	4	4	3	4	4	4	3	3	2	2	2	4	4	5	5
24-Apr	3	3	3	3	3	3	4	3	3	3	3	3	4	3	3	3	3	3	3	4	5	3	3	3	5
25-Apr	3	3	2	2	2	2	3	3	3	3	3	3	4	3	3	2	2	3	2	2	1	1	2	2	4
26-Apr	1	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	2	2	1	3
27-Apr	1	1	1	1	1	1	1	1	2	2	3	2	4	3	4	4	3	2	2	2	2	2	2	1	4
28-Apr	2	1	2	2	1	1	1	2	2	2	3	4	4	3	4	4	3	3	3	3	2	2	2	2	4
29-Apr	2	2	2	2	2	2	2	6	4	4	6	5	5	6	6	5	6	5	3	3	2	2	2	3	6
30-Apr	1	2	2	2	3	2	2	2	2	3	4	4	5	5	5	4	5	3	4	2	3	2	2	1	5
	4	4	4	4	4	5	5	6	4	5	6	7	8	7	8	7	8	7	6	6	6	5	4	5	
	Diurnal Maximum																								

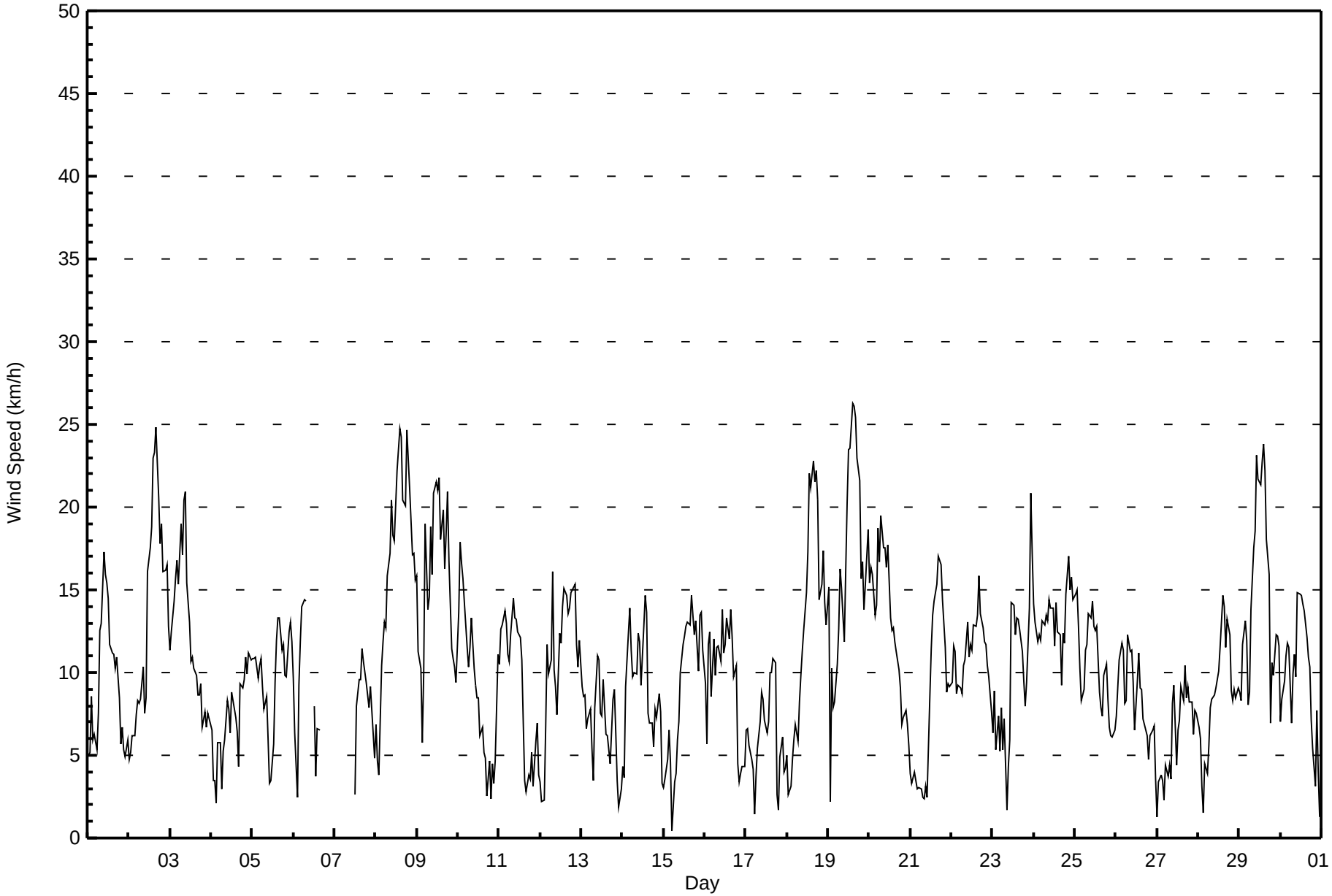
AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed (WS) - km/h

Mildred Lake - April 2016



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	112	16.09	16.09
6 - 11	303	43.53	59.63
12 - 19	237	34.05	93.68
20 - 28	44	6.32	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 696

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Wind Speed (WS) - km/h

Mildred Lake - April 2016

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	13	12	9	8	5	5	6	8	8	11	12	8	3	1	3	0	112
6 - 11	45	64	26	10	3	7	15	39	45	25	7	2	5	3	3	4	303
12 - 19	30	51	12	0	0	1	20	56	25	13	5	3	4	2	5	10	237
20 - 28	9	3	0	0	0	0	6	5	3	9	0	0	3	4	1	1	44
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	97	130	47	18	8	13	47	108	81	58	24	13	15	10	12	15	696

Total Number of Valid Hours: 696

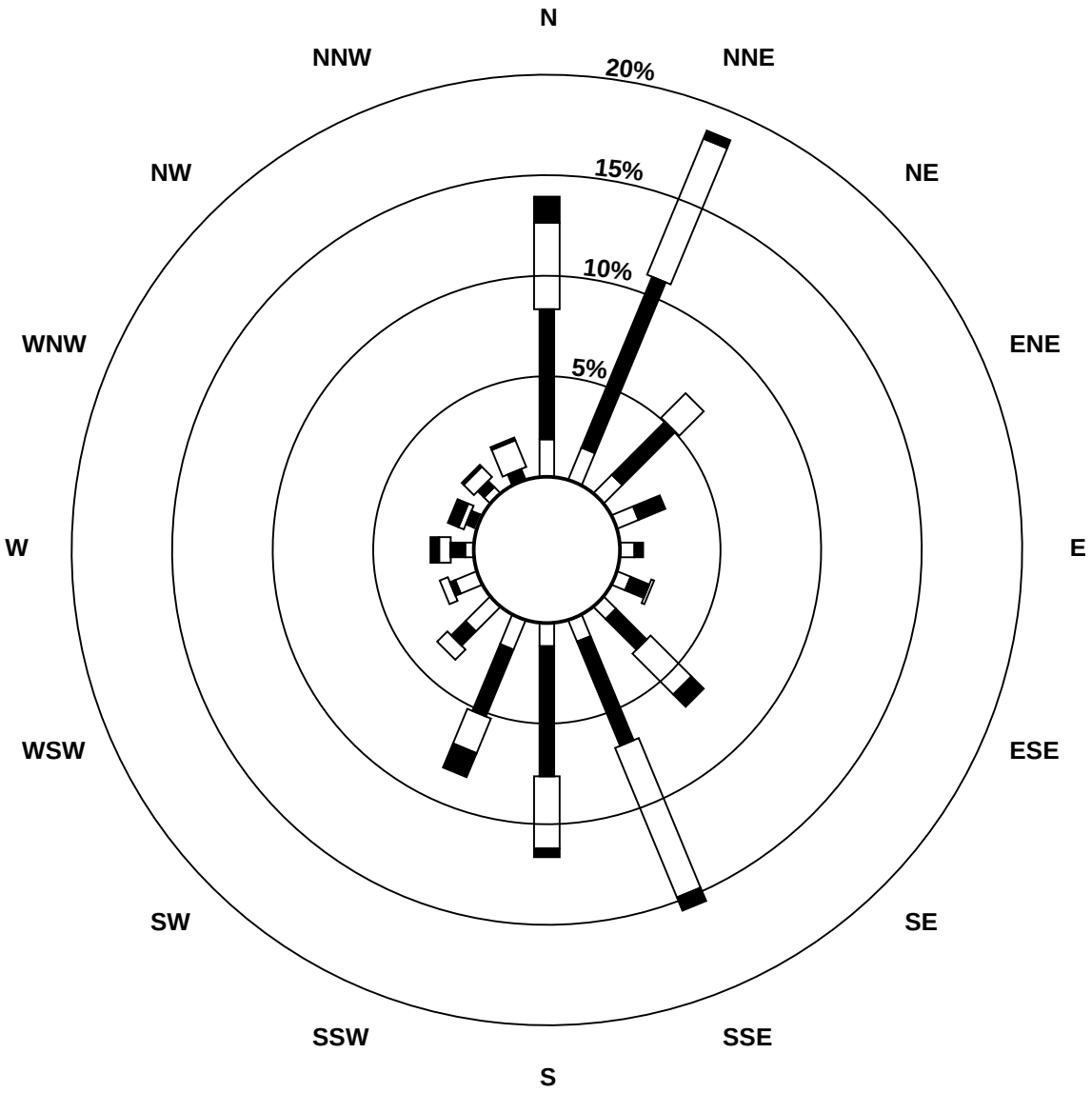
Total Number of Hours: 720

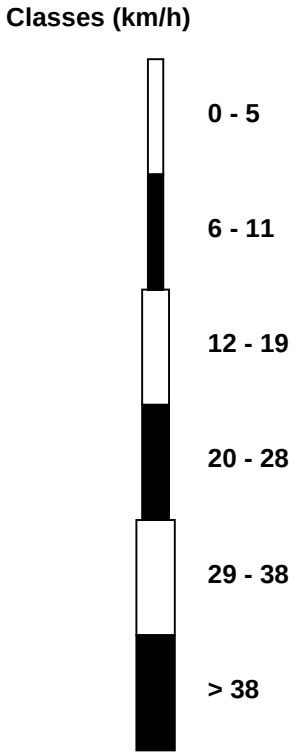
Wood Buffalo Environmental Association

Wind Rose Apr 2016

Wind Speed (WS) - km/h

Mildred Lake (AMS 2)





Total Number of Valid Hours: 696

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Mildred Lake - April 2016

Direction of Maximum Speed: 285 deg on Apr 19 15:00
Direction of Maximum Daily Speed Average: 142.6 deg on Apr 8

Direction of Minimum Speed: 70 deg on Apr 15 06:00

Direction of Minimum Daily Speed Average: 0.4 deg on Apr 4

Monthly Average Direction: 191.7 deg

Hours in Service:	720
Hours of Data:	696
Hours of Missing Data:	24
Percent Operational Time:	96.7

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-Apr	195	269	290	303	317	16	8	26	25	24	27	24	28	49	62	52	53	48	58	27	28	61	48	23	28.1
2-Apr	67	70	61	89	113	6	8	70	89	78	13	351	344	353	5	10	9	13	16	13	17	12	10	10	17.2
3-Apr	353	356	3	4	8	8	14	14	5	8	11	5	35	25	29	37	58	57	45	33	32	19	19	13	15.9
4-Apr	2	356	7	30	212	203	217	220	162	183	182	165	151	173	173	196	214	6	11	4	11	15	7	3	37.4
5-Apr	7	7	7	9	11	11	16	20	19	357	259	222	200	176	172	182	178	197	193	183	177	166	158	160	156.2
6-Apr	157	173	246	332	349	347	356	354	AF	AF	AF	AF	353	11	32	18	AF	AF	AF	AF	AF	AF	AF	AF	--
7-Apr	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	83	29	41	32	29	31	33	31	18	14	35	27	--
8-Apr	19	36	109	128	129	134	135	149	155	157	155	142	137	133	133	135	140	148	154	151	142	157	156	151	142.6
9-Apr	154	142	165	0	331	326	335	355	358	3	354	347	356	356	12	9	7	12	12	6	0	356	344	358	359.8
10-Apr	360	2	3	6	7	4	20	39	16	28	17	36	357	31	37	66	13	252	199	114	85	67	98	149	21.4
11-Apr	143	158	162	157	158	162	185	168	165	167	166	159	160	156	149	110	249	202	102	12	2	2	354	4	158.1
12-Apr	351	317	326	5	10	16	17	17	15	10	20	11	36	50	53	28	23	17	13	12	12	25	13	7	19.1
13-Apr	11	18	15	3	43	8	12	6	125	126	157	169	146	147	177	129	144	172	162	138	155	149	139	48	113.3
14-Apr	51	16	17	14	12	7	359	18	27	16	4	351	343	327	329	354	38	23	8	357	2	337	313	284	0.2
15-Apr	0	24	7	12	35	70	231	188	173	171	148	160	161	149	151	142	133	130	131	127	145	152	141	150	142.2
16-Apr	167	108	134	154	146	165	172	166	166	157	152	168	225	239	248	267	288	279	272	251	247	242	232	219	197.4
17-Apr	162	149	156	138	176	228	162	160	186	186	195	196	205	191	270	272	295	317	226	136	131	131	213	207	200.0
18-Apr	156	107	179	181	183	185	176	165	143	151	154	153	173	202	200	201	198	195	190	178	172	167	165	164	178.9
19-Apr	186	156	176	235	244	254	290	330	334	312	279	277	279	278	285	290	296	305	304	306	332	316	307	0	293.4
20-Apr	27	26	13	16	27	22	17	24	25	26	13	18	13	34	40	53	47	55	48	46	44	55	53	42	29.1
21-Apr	46	35	11	32	30	65	98	168	82	0	245	32	26	29	29	32	34	34	41	38	35	24	19	20	32.8
22-Apr	17	8	13	13	14	16	17	17	13	13	37	28	29	27	38	24	15	21	20	8	18	15	2	5	18.4
23-Apr	114	119	37	6	22	7	5	95	181	241	148	149	143	149	153	138	136	131	130	116	114	133	157	158	132.1
24-Apr	146	145	147	150	143	157	156	153	156	158	156	175	183	174	181	185	179	123	128	134	153	174	198	203	160.8
25-Apr	194	192	194	189	190	178	178	177	184	198	200	191	171	199	226	228	222	211	214	214	204	207	206	213	196.9
26-Apr	212	193	192	190	192	181	149	179	172	168	175	217	177	167	170	166	139	148	123	191	181	154	175	211	175.9
27-Apr	259	197	227	219	198	202	183	129	159	77	64	30	22	21	30	39	60	52	43	31	33	38	12	2	45.7
28-Apr	2	354	7	228	196	210	189	184	156	153	161	203	201	164	195	183	171	150	153	165	165	173	173	171	173.8
29-Apr	174	177	169	166	165	148	154	163	176	168	184	194	189	193	197	197	209	218	211	194	180	192	191	194	185.7
30-Apr	186	177	158	149	157	187	173	187	200	203	220	217	223	274	267	245	274	197	197	161	309	29	71	45	206.7
	113.2	83.5	81.8	60.8	61.8	24.9	36.1	77.6	104.2	109.2	144.5	157.0	152.3	148.3	135.3	106.0	55.2	68.7	82.1	71.9	72.6	88.6	106.4	100.4	
	Diurnal Average																								

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

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg

Mildred Lake - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 93 deg on Apr 21 11:00

Minimum Value: 8 deg on Apr 6 04:00

Percentiles: P_1 = 10 P_{10} = 13 Q_1 = 15 Median = 18 Q_3 = 25 P_{90} = 36 P_{99} = 76

Hours in Service:	720
Hours of Data:	696
Hours of Missing Data:	24
Hours of Calibration:	0
Percent Operational Time:	96.7

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-Apr	37	53	28	20	20	22	17	18	19	18	21	20	20	26	25	26	24	20	18	15	16	19	13	14	53
2-Apr	30	18	24	31	23	21	13	21	20	38	40	17	14	20	18	17	16	16	15	16	16	15	14	15	40
3-Apr	15	13	16	13	15	13	15	15	14	16	20	26	36	33	27	28	27	25	16	17	15	13	11	11	36
4-Apr	11	12	29	31	17	14	65	19	27	20	22	44	31	23	32	29	43	14	12	12	13	15	11	12	65
5-Apr	12	11	12	12	11	11	12	15	15	19	55	46	32	25	22	17	17	15	13	16	15	11	13	13	55
6-Apr	16	16	60	8	9	13	13	13	AF	AF	AF	AF	13	15	16	14	AF	AF	AF	AF	AF	AF	AF	AF	60
7-Apr	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	78	27	22	24	21	18	18	15	14	13	19	33	78
8-Apr	17	26	37	13	15	16	17	20	16	15	17	18	17	16	16	17	18	17	15	16	19	15	14	15	37
9-Apr	14	18	36	59	21	13	10	17	16	18	14	14	16	15	21	16	17	17	17	14	14	12	9	13	59
10-Apr	14	15	14	16	14	12	20	21	22	31	34	50	42	57	49	70	63	70	22	38	20	26	37	13	70
11-Apr	14	12	12	13	14	20	17	12	11	14	12	17	18	19	31	81	55	31	39	21	52	22	10	24	81
12-Apr	44	62	61	16	13	13	16	16	20	33	33	29	33	22	22	21	19	15	13	13	13	14	17	11	62
13-Apr	15	18	27	30	17	14	17	43	27	18	22	24	22	18	15	27	29	45	16	16	19	27	62	43	62
14-Apr	18	25	17	15	14	14	13	18	17	17	19	17	19	15	15	24	19	16	17	14	13	16	18	27	27
15-Apr	76	21	15	15	19	65	30	25	20	29	25	21	19	22	23	24	18	16	15	12	17	17	18	14	76
16-Apr	52	52	16	15	15	15	13	12	13	15	16	27	23	26	31	26	23	23	22	23	26	21	27	38	52
17-Apr	13	15	19	32	43	70	34	47	28	20	19	24	38	62	33	32	26	19	68	65	21	9	27	21	70
18-Apr	24	39	33	17	15	10	20	20	20	18	19	18	23	16	15	14	14	13	14	15	14	13	12	11	39
19-Apr	16	85	25	26	25	34	28	16	16	20	24	21	20	18	19	18	17	17	15	17	11	13	14	34	85
20-Apr	17	17	15	16	20	20	18	18	18	22	25	25	34	30	30	29	29	24	18	16	14	14	14	13	34
21-Apr	19	16	10	14	13	19	17	63	86	74	93	44	31	30	25	26	22	19	17	16	14	16	14	14	93
22-Apr	13	10	11	12	11	14	15	16	19	19	33	32	34	29	34	27	23	19	17	14	14	14	11	26	34
23-Apr	54	17	28	16	21	11	14	26	85	62	66	24	24	25	25	26	25	25	16	13	11	18	15	15	85
24-Apr	17	16	16	15	17	15	16	15	17	16	17	19	22	18	18	16	22	16	16	16	19	15	12	13	22
25-Apr	12	12	11	13	14	17	17	18	17	18	16	22	22	17	27	25	20	17	16	16	11	13	20	15	27
26-Apr	15	14	11	12	13	22	18	17	15	15	18	27	19	13	15	15	23	31	19	22	24	33	23	28	33
27-Apr	62	38	28	26	23	20	17	38	55	30	26	55	73	52	37	40	26	26	15	14	16	13	9	9	73
28-Apr	11	12	45	71	16	23	18	20	20	21	29	35	30	21	21	21	19	17	15	17	12	12	13	13	71
29-Apr	13	14	11	10	10	15	15	12	18	14	17	18	18	20	17	16	17	19	24	14	13	11	12	17	24
30-Apr	21	15	16	14	15	15	23	18	15	24	20	24	23	33	24	26	30	16	69	34	77	22	30	76	77
	76	85	61	71	43	70	65	63	86	74	93	55	78	62	49	81	63	70	69	65	77	33	62	76	
	Diurnal Maximum																								

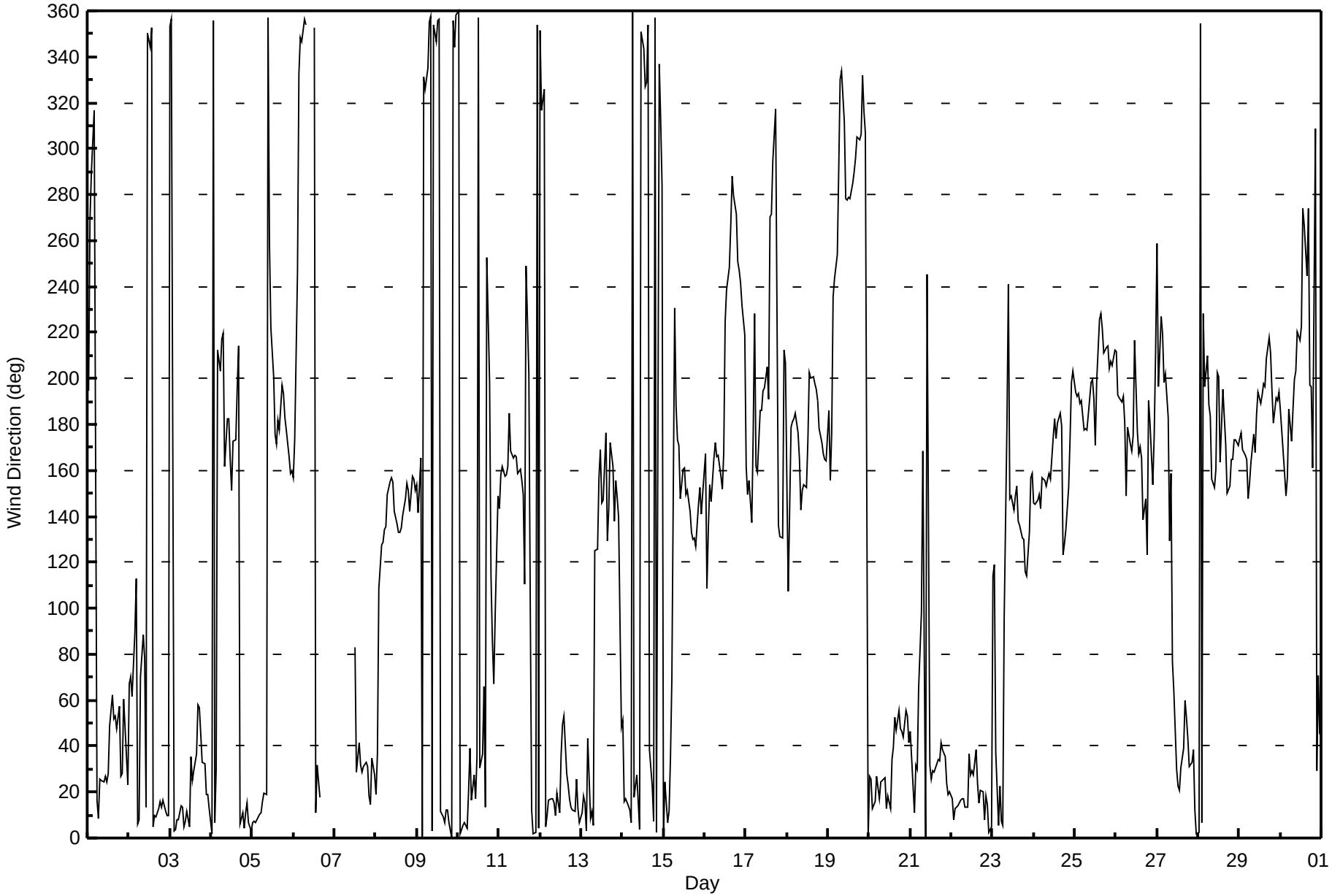
AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction (WD) - deg

Mildred Lake - April 2016



Wood Buffalo Environmental Association
SO2 Calibration Report

W B E A

Station Information

Calibration Date	April 14, 2016	Last Calibration	March 8, 2016
Station Name	Mildred Lake	Station Number	AMS 2
Reason:	Routine		
Start Time (MST)	9:50	End Time (MST)	12:25
Gas Cert Reference	SA1301009	Station temp.	22 Deg C
Cal Gas Concentration	47.2 ppm	Cal Gas Exp Date	12/12/2016
Calibrator Make/Model	API T700	Serial Number	1185
ZAG Make/Model	API 701	Serial Number	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	-654
Analyzer IP address	192.168.1.43		Lamp voltage	799	800
Calculated slope	0.991737	0.994165	Chamber temp	45.2	44.9
Calculated intercept	1.067322	1.367975	Pressure	687.6	695.9
Analyzer Background	21.1	20.5	Flow	0.489	0.493
Analyzer Coefficient	0.941	0.935	Intensity	90	90

Analyzer make	TEI 43i	Analyzer serial #	JC1404901075

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.4	----
as found span	5000	82.7	780.7	788.2	0.990
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	82.7	780.7	784.6	0.995
second point	5000	41.5	391.8	392.0	0.999
third point	5000	20.8	196.4	194.7	1.008
as left zero	5000	0.0	0.0	0.0	----
as left span	5000	82.7	780.7	782.1	0.998
				Average Correction Factor	1.001

Corrected As found	788.6	Previous response	786.1	% change	-0.3%

Notes:

Changed inlet filter after as found. Adjusted zero and span.

Calibration Performed By: Evan Magill

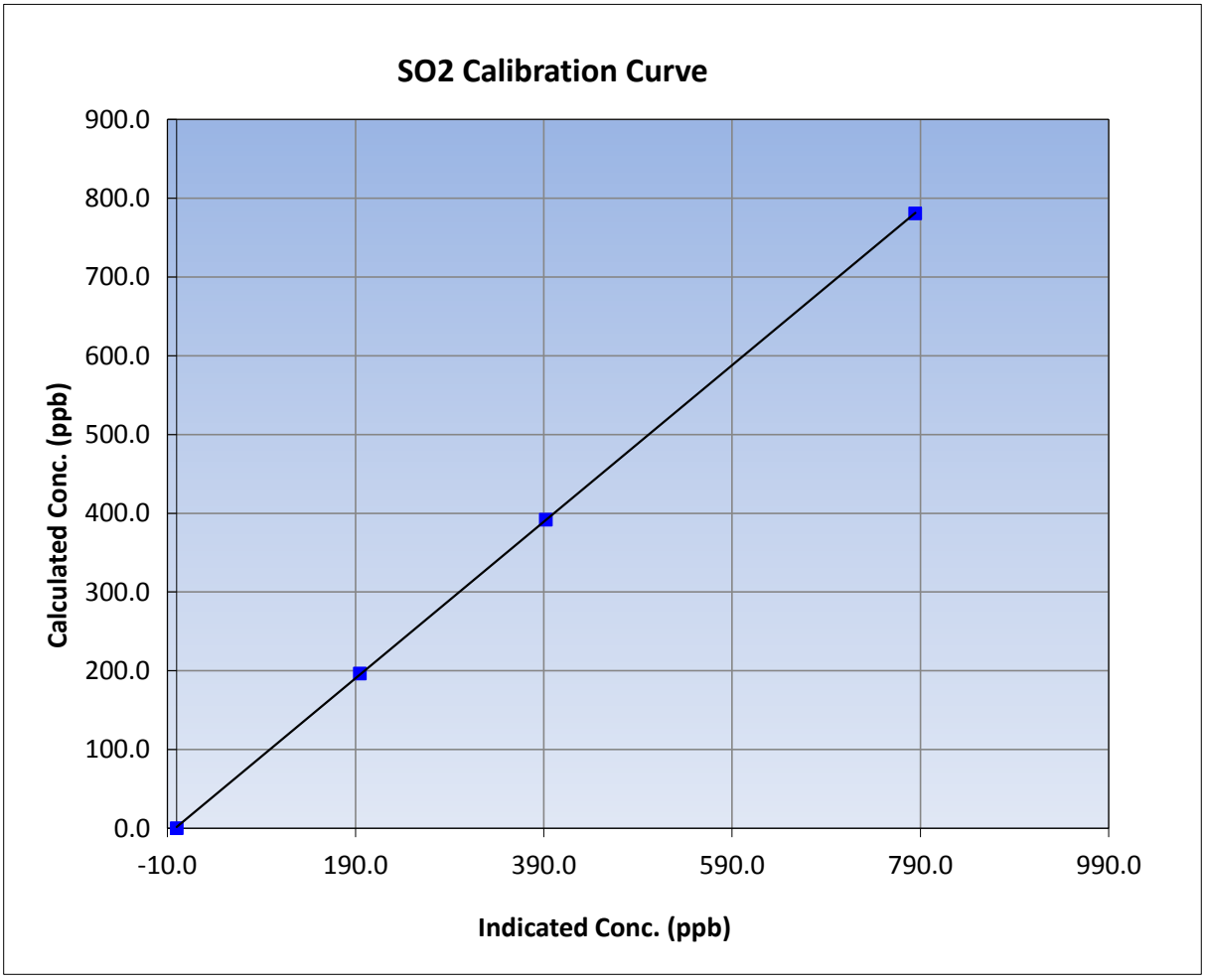
Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

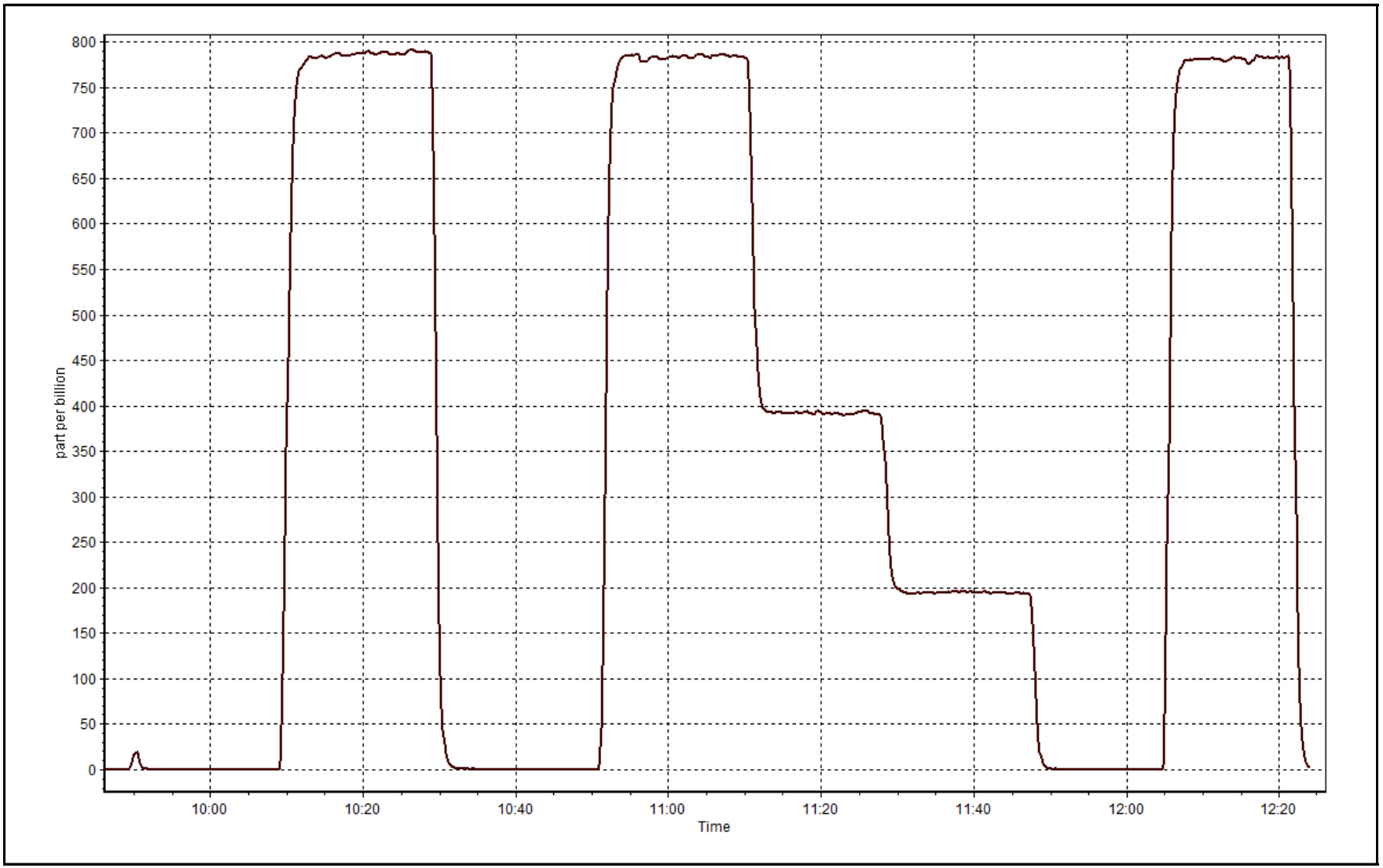
Calibration Date	April 14, 2016	Previous Calibration	March 8, 2016
Station Name	Mildred Lake	Station Number	AMS 2
Start Time (MST)	9:50	End Time (MST)	12:25
Analyzer make	TEI 43i	Analyzer serial #	JC1404901075

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999985
780.7	784.6	0.9950		
391.8	392.0	0.9994	Slope	0.994165
196.4	194.7	1.0085		
			Intercept	1.367975



SO2 Calibration Plot Date: April 14, 2016



Wood Buffalo Environmental Association
H2S Calibration Report

Station Information

Calibration Date	April 15, 2016	Last Calibration	March 8, 2016
Station Name	Mildred Lake	Station Number	AMS 2
Reason:	Routine		
Start Time (MST)	9:40	End Time (MST)	12:50
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	API T700	Serial Number	1185
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	788	787
Calculated slope	0.998537	0.989422	Chamber temp	45	45
Calculated intercept	0.383260	0.677957	Pressure	541.7	553.0
Analyzer Background	15.8	16	Flow	1.035	1.050
Analyzer Coefficient	0.954	0.969	Intensity	87	88
			Converter temp.	324	324

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

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.3	----
as found span	4000	64.1	80.8	79.6	1.014
SO2 scrubber check	5000	21.2	200.1	1.3	----
calibrator zero	4000	0.0	0.0	-0.2	----
high point	4000	64.1	80.8	81.1	0.995
second point	4000	32.1	40.4	40.0	1.010
third point	4000	16.1	20.3	19.3	1.049
as left zero	5000	0.0	0.0	-0.2	----
as left span	4000	64.1	80.8	81.5	0.991
				Average Correction Factor	1.018

Corrected As found	79.4	Previous response	80.5	% change	1.4%

Notes:

Changed inlet filter and scrubber check done after as founds. Small adjustment on zero and span.

Calibration Performed By: Evan Magill

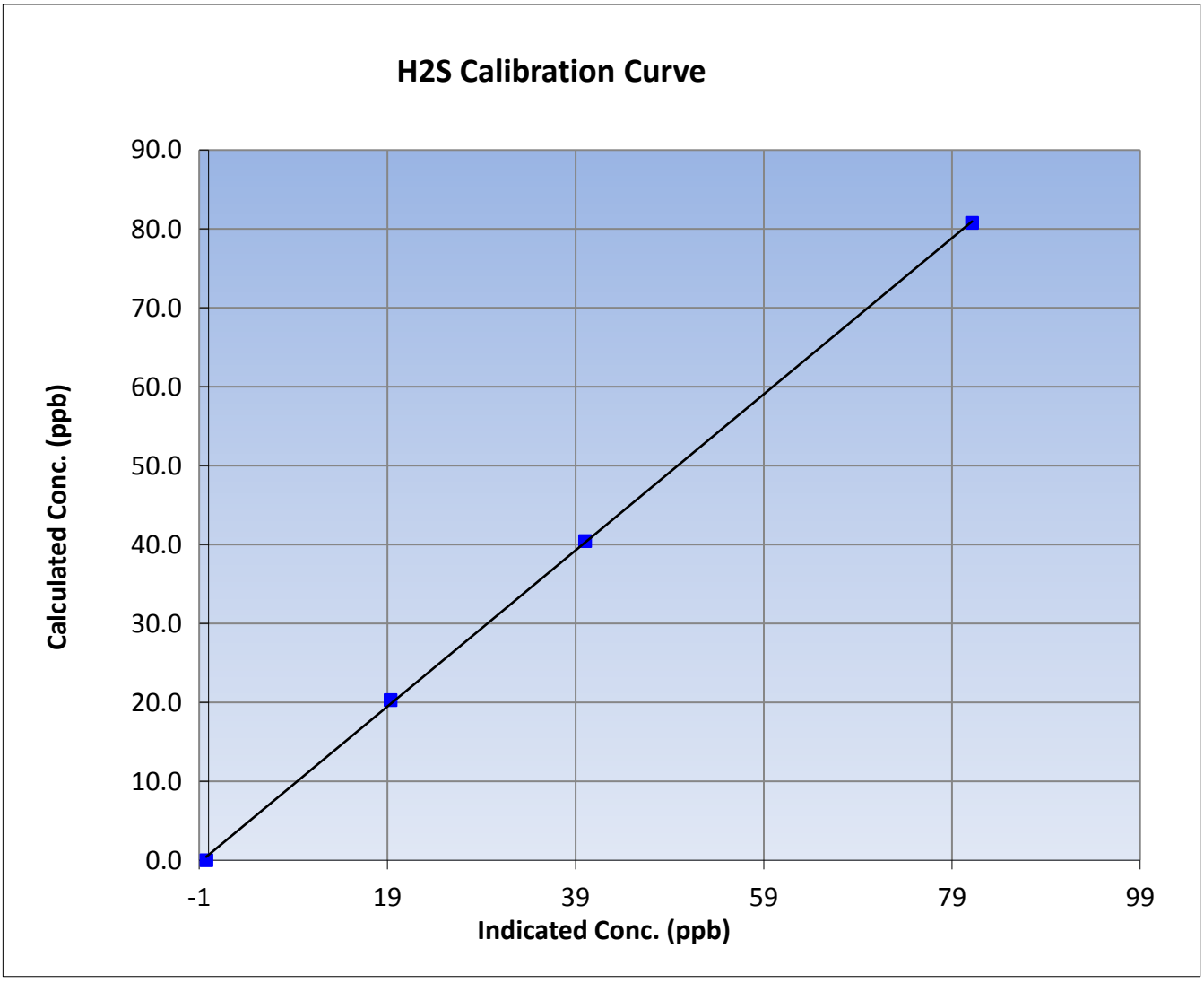
Wood Buffalo Environmental Association
H2S Calibration Report

Station Information

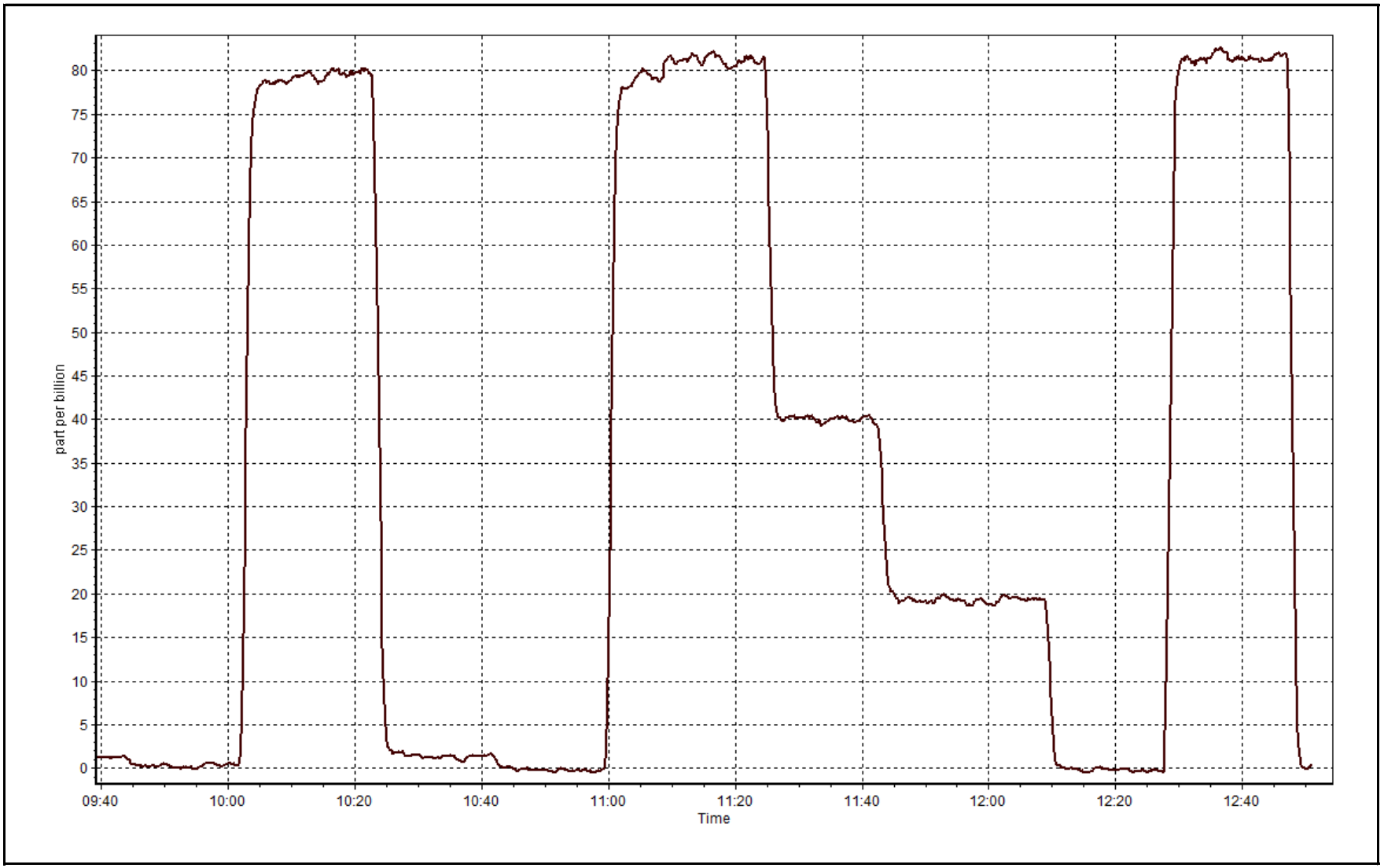
Calibration Date	April 15, 2016	Previous Calibration	March 8, 2016
Station Name	Mildred Lake	Station Number	AMS 2
Start Time (MST)	9:40	End Time (MST)	12:50
Analyzer make	TEI 450i	Analyzer serial #	815129107

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	----	Correlation Coefficient	0.999865
80.8	81.1	0.9954		
40.4	40.0	1.0104	Slope	0.989422
20.3	19.3	1.0489		
			Intercept	0.677957



H2S Calibration Plot Date: April 15, 2016



Wood Buffalo Environmental Association
THC Calibration Report

W B E A

Station Information

Calibration Date	April-14-16	Last Calibration	March-08-16
Station Name	Mildred Lake	Station Number	AMS 2
Reason:	Routine		
Start Time (MST)	9:50	End Time (MST)	12:25
Gas Cert Reference	SA1301009	Cal Gas Expiry Date	12/12/2016
CH4 Cal Gas Conc.	510 ppm	CH4 Equiv Conc.	1087.5 ppm
C3H8 Cal Gas Conc.	210 ppm	Station temp.	22 Deg C
Calibrator Make/Model	API T700	Serial Number	1185
ZAG make/model	Teledyne API 701	Serial Number	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	8.0
Analyzer IP address	192.168.1.51		Air or Bypass Press	39.8	39.8
Calculated slope	1.000928	0.998405	Fuel Pressure	25.6	25.6
Calculated intercept	0.029591	0.009455	Analyzer Coeff	4.540	4.604
			Analyzer BKG	2.23	2.33

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	0.06	----
as found span	5000	82.7	17.99	17.86	1.007
calibrator zero	5000	0.0	0.00	0.02	----
high point	5000	82.7	17.99	18.02	0.998
second point	5000	41.5	9.03	9.02	1.001
third point	5000	20.8	4.52	4.49	1.008
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	82.7	17.99	17.87	1.007
				Average Correction Factor	1.002

Corrected As found	17.80	Previous response	17.94	% change	0.8%

Notes:

Changed inlet filter after as found. Adjusted zero and span.

Calibration Performed By: Evan Magill

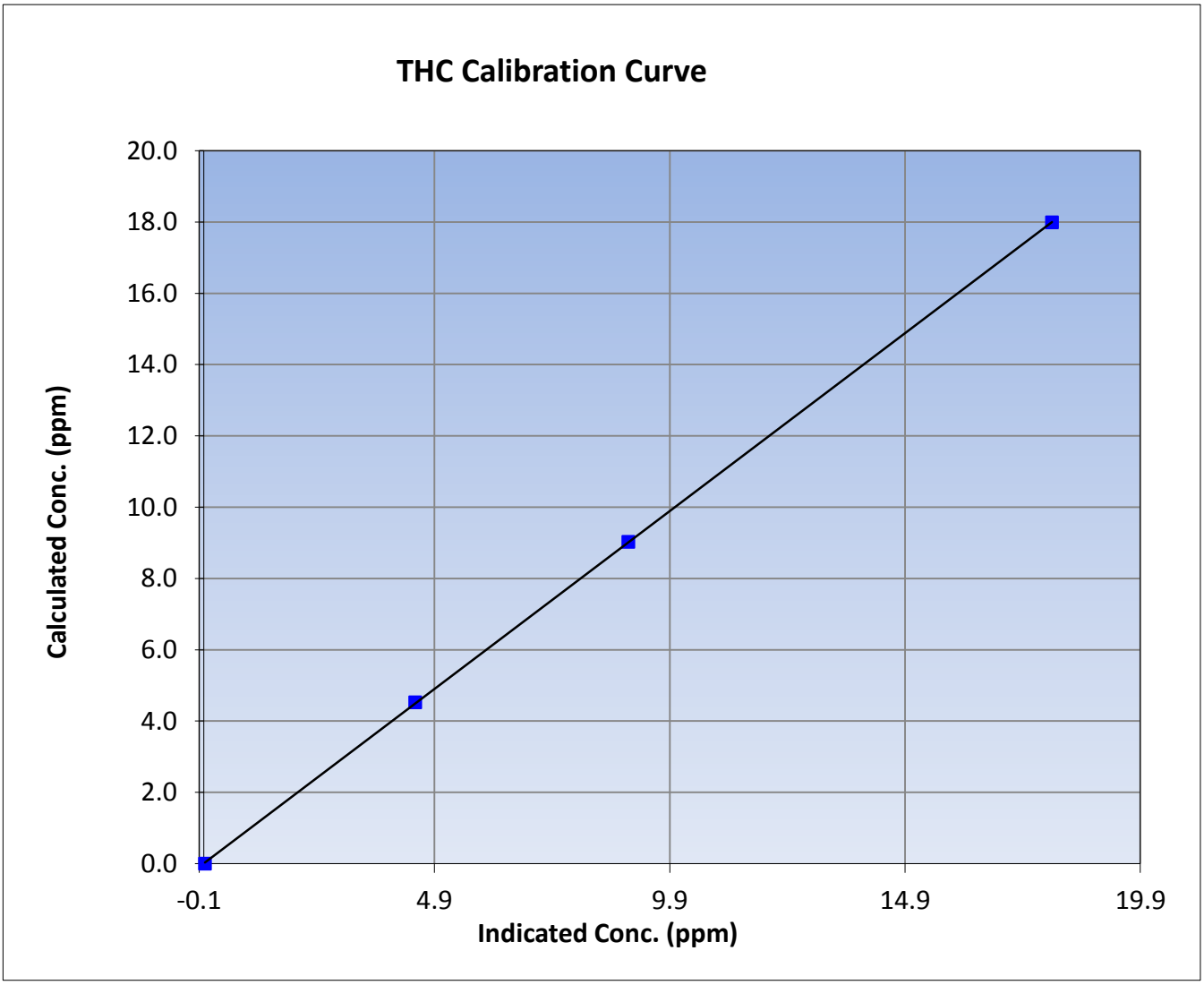
Wood Buffalo Environmental Association
THC Calibration Report

Station Information

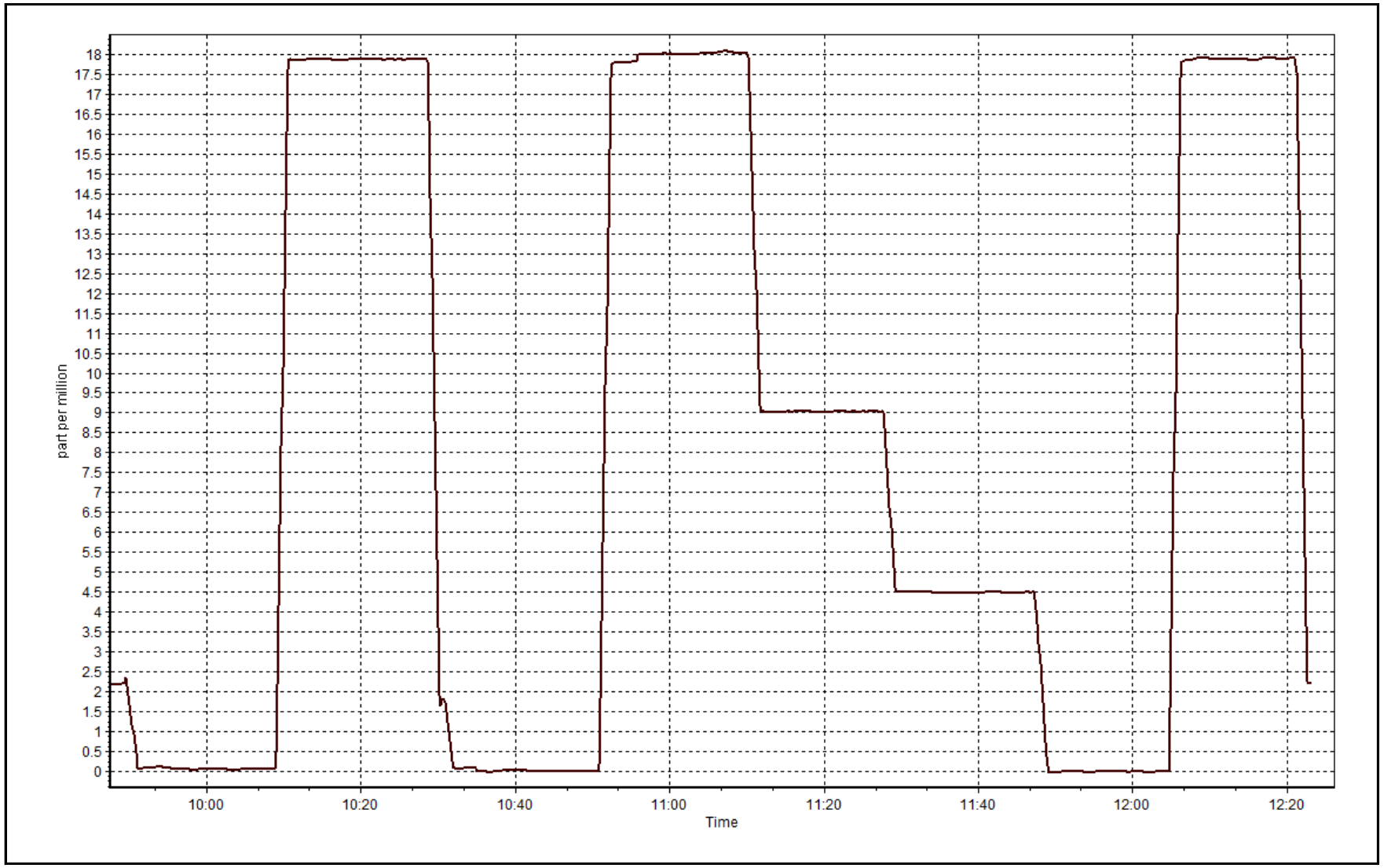
Calibration Date	April 14, 2016	Previous Calibration	March 8, 2016
Station Name	Mildred Lake	Station Number	AMS 2
Start Time (MST)	9:50	End Time (MST)	12:25
Analyzer make	Thermo 51i-LT	Analyzer serial #	1300156231

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.02	----	Correlation Coefficient	0.999988
17.99	18.02	0.9982		
9.03	9.02	1.0007	Slope	0.998405
4.52	4.49	1.0076		
			Intercept	0.009455



THC Calibration Plot Date: April 14, 2016



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 3
LOWER CAMP METEOROLOGY
APRIL 2016

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

May 27, 2016

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

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
Temperature 20 m (C) Average	720	0	0	100.00	27.2	-	16.8	-
Temperature 45 m (C) Average	718	0	2	99.72	27.3	-	17.1	-
Temperature 100 m (C) Average	720	0	0	100.00	26.8	-	18.0	-
Temperature 167 m (C) Average	720	0	0	100.00	26.1	-	18.5	-
Relative Humidity 20 m (%) Average	720	0	0	100.00	99	-	91.0	-
Relative Humidity 45 m (%) Average	718	0	2	99.72	98	-	89.0	-
Relative Humidity 100 m (%) Average	720	0	0	100.00	98	-	91.0	-
Relative Humidity 167 m (%) Average	720	0	0	100.00	97	-	92.0	-
Wind Speed 20 m (km/h) Average	711	0	9	98.75	25	-	16.0	-
Wind Speed 45 m (km/h) Average	711	0	9	98.75	33	-	21.0	-
Wind Speed 100 m (km/h) Average	716	0	4	99.44	45	-	31.0	-
Wind Speed 167 m (km/h) Average	716	0	4	99.44	51	-	36.0	-
Wind Direction 20 m (deg) Average	711	0	9	98.75	-	-	-	-
Wind Direction 45 m (deg) Average	711	0	9	98.75	-	-	-	-
Wind Direction 100 m (deg) Average	716	0	4	99.44	-	-	-	-
Wind Direction 167 m (deg) Average	716	0	4	99.44	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	711	0	9	98.75	0.6	-	0.1	-
Vertical Wind Speed 45 m (km/h) Average	711	0	9	98.75	1.5	-	0.9	-
Vertical Wind Speed 100 m (km/h) Average	716	0	4	99.44	3.3	-	1.7	-
Vertical Wind Speed 167 m (km/h) Average	716	0	4	99.44	5.2	-	2.1	-

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

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

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	720	4.33	7.8	-	-12.1	-4.9	-1.3	3.5	8.6	16.5	27.2
Temperature 45 m (C) Average	718	4.32	7.8	-	-11.6	-5.1	-1.5	3.7	8.6	16.6	27.3
Temperature 100 m (C) Average	720	4.14	7.9	-	-10.6	-5.5	-1.8	3.5	8.6	16.5	26.8
Temperature 167 m (C) Average	720	3.98	7.9	-	-10.6	-5.6	-2.1	3.2	8.7	16.2	26.1
Relative Humidity 20 m (%) Average	720	56.2	22	-	13	25	39	57	73	86	99
Relative Humidity 45 m (%) Average	718	55	22	-	12	25	38	56	72	84	98
Relative Humidity 100 m (%) Average	720	54.1	22	-	12	24	36	54	70	84	98
Relative Humidity 167 m (%) Average	720	53.7	22	-	12	24	35	53	70	86	97
Wind Speed 20 m (km/h) Average	711	8.8	5	-	0	2	4	8	12	16	25
Wind Speed 45 m (km/h) Average	711	11.4	7	-	0	3	6	11	15	21	33
Wind Speed 100 m (km/h) Average	716	15.7	9	-	0	5	9	15	21	27	45
Wind Speed 167 m (km/h) Average	716	18.2	10	-	1	7	11	17	24	31	51
Wind Direction 20 m (deg) Average	711	-	-	-	-	-	-	-	-	-	-
Wind Direction 45 m (deg) Average	711	-	-	-	-	-	-	-	-	-	-
Wind Direction 100 m (deg) Average	716	-	-	-	-	-	-	-	-	-	-
Wind Direction 167 m (deg) Average	716	-	-	-	-	-	-	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	711	-0.06	0.2	-	-0.9	-0.3	-0.2	0	0.1	0.2	0.6
Vertical Wind Speed 45 m (km/h) Average	711	0.12	0.5	-	-1.8	-0.4	-0.2	0.1	0.5	0.8	1.5
Vertical Wind Speed 100 m (km/h) Average	716	0.36	0.7	-	-1.6	-0.3	0	0.2	0.7	1.3	3.3
Vertical Wind Speed 167 m (km/h) Average	716	0.62	0.8	-	-1.5	-0.2	0.1	0.4	1	1.6	5.2

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

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
Temperature, Relative Humidity 45 m	20 Apr 2016 07:00	20 Apr 2016 08:00	2	Flat line in sensor output signal - Sensor frozen
Wind Speed. Wind Direction, Vertical Wind Speed 20 m	06 Apr 2016 15:00	06 Apr 2016 16:00	2	Flat line in sensor output signal - Sensor frozen
Wind Speed. Wind Direction, Vertical Wind Speed 20 m	06 Apr 2016 19:00	07 Apr 2016 01:00	7	Flat line in sensor output signal - Sensor frozen
Wind Speed. Wind Direction, Vertical Wind Speed 45 m	06 Apr 2016 07:00	06 Apr 2016 07:00	1	Flat line in sensor output signal - Sensor frozen
Wind Speed. Wind Direction, Vertical Wind Speed 45 m	06 Apr 2016 09:00	06 Apr 2016 14:00	6	Flat line in sensor output signal - Sensor frozen
Wind Speed. Wind Direction, Vertical Wind Speed 45 m	20 Apr 2016 07:00	20 Apr 2016 08:00	2	Flat line in sensor output signal - Sensor frozen
Wind Speed. Wind Direction, Vertical Wind Speed 100 m	06 Apr 2016 07:00	06 Apr 2016 07:00	1	Flat line in sensor output signal - Sensor frozen
Wind Speed. Wind Direction, Vertical Wind Speed 100 m	06 Apr 2016 10:00	06 Apr 2016 12:00	3	Flat line in sensor output signal - Sensor frozen
Wind Speed. Wind Direction, Vertical Wind Speed 167 m	06 Apr 2016 08:00	06 Apr 2016 11:00	4	Flat line in sensor output signal - Sensor frozen

Maximum Value: 27.2 C on Apr 18 16:00

Maximum Daily Average: 16.8 C on Apr 18

Minimum Value: -12.1 C on Apr 4 06:00

Minimum Daily Average: -6.3 C on Apr 3

Maximum Diurnal Average: 8.8 C at hour 17

Minimum Diurnal Average: -0.4 C at hour 6

Monthly Average: 4.33 C

Percentiles: P_1 = -9.4 P_{10} = -4.9 Q_1 = -1.3 Median = 3.5 Q_3 = 8.6 P_{90} = 16.5 P_{99} = 24.8

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

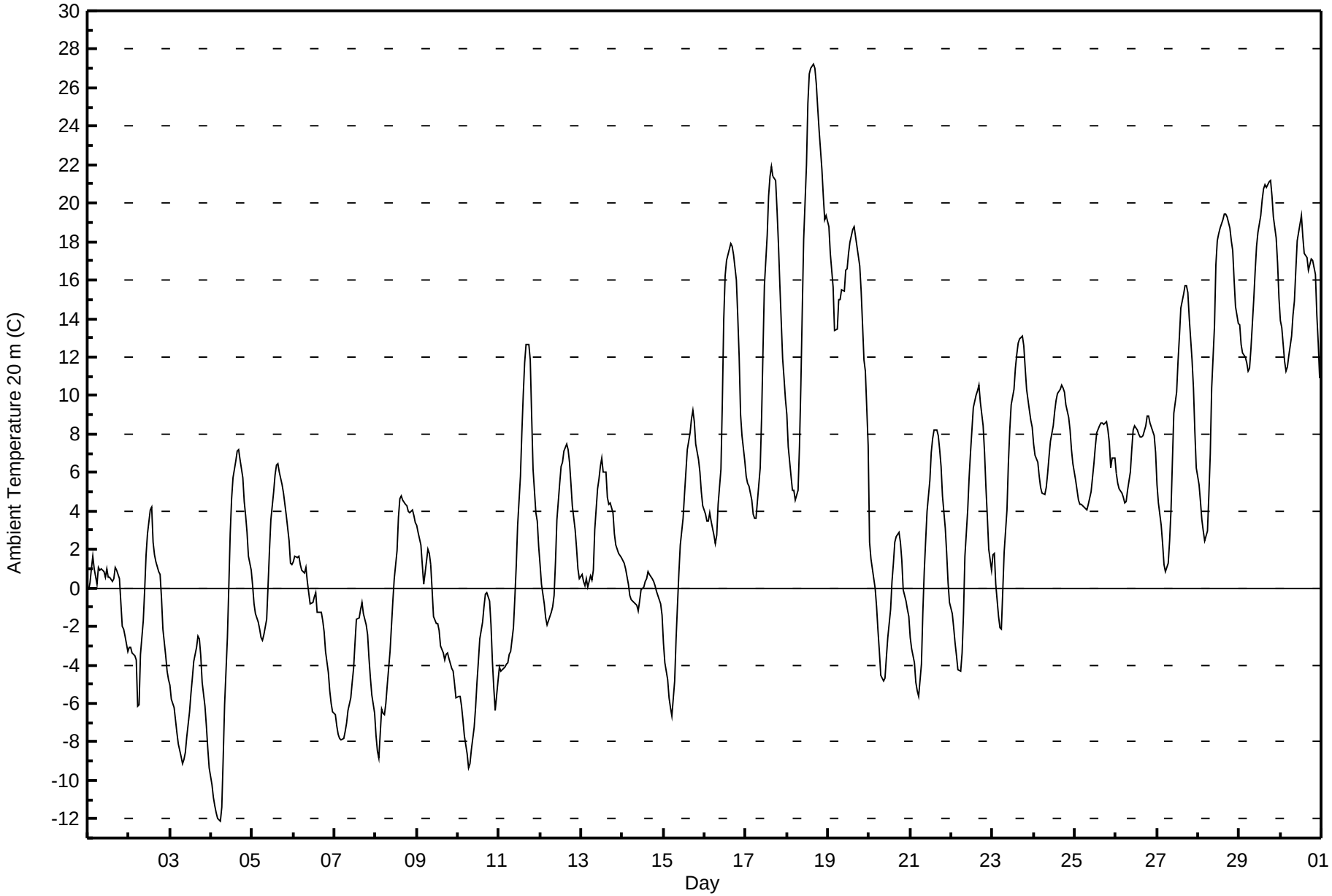
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	-0.1	0.3	1.0	1.7	1.0	0.2	1.0	0.9	1.0	0.9	0.6	1.0	0.6	0.6	0.3	0.5	1.0	0.9	0.5	-0.7	-2.0	-2.1	-2.5	-3.3	0.1	1.7
2-Apr	-3.1	-3.1	-3.4	-3.5	-3.7	-6.2	-6.1	-3.4	-1.7	-0.1	1.7	2.8	4.1	4.2	2.4	1.8	1.4	0.9	0.7	-0.6	-2.1	-3.5	-4.3	-4.8	-1.2	4.2
3-Apr	-5.1	-5.8	-6.2	-6.9	-7.5	-8.1	-8.8	-9.1	-8.9	-8.5	-7.8	-6.5	-5.5	-4.7	-3.8	-3.1	-2.5	-2.7	-3.5	-4.9	-6.1	-7.2	-8.4	-9.3	-6.3	-2.5
4-Apr	-10.3	-10.9	-11.3	-11.7	-11.9	-12.1	-11.4	-8.8	-6.1	-2.6	0.0	2.8	4.6	5.7	6.6	7.1	7.2	6.6	5.7	4.5	3.8	2.9	1.7	0.9	-1.5	7.2
5-Apr	0.1	-0.8	-1.4	-1.8	-2.1	-2.6	-2.7	-2.5	-1.6	0.1	1.9	3.5	5.0	5.9	6.4	6.5	6.0	5.3	4.9	4.3	3.8	2.4	1.2	1.2	1.8	6.5
6-Apr	1.4	1.7	1.6	1.6	1.2	0.9	0.7	1.0	0.4	-0.3	-0.8	-0.8	-0.5	-0.2	-1.3	-1.3	-1.3	-1.7	-2.3	-3.3	-4.4	-5.3	-6.0	-6.4	-1.1	1.7
7-Apr	-6.6	-7.2	-7.6	-7.8	-7.9	-7.8	-7.5	-7.0	-6.3	-5.7	-4.9	-4.2	-2.9	-1.7	-1.6	-1.1	-0.8	-1.3	-2.0	-2.4	-3.6	-4.7	-5.6	-6.5	-4.8	-0.8
8-Apr	-7.7	-8.5	-8.9	-6.3	-6.5	-6.6	-6.0	-5.0	-3.3	-2.0	-0.7	0.5	1.9	3.7	4.6	4.8	4.6	4.4	4.3	4.0	3.9	4.1	3.7	3.4	-0.6	4.8
9-Apr	3.3	2.9	2.2	1.2	0.2	0.7	2.0	1.8	1.2	-0.1	-1.5	-1.9	-1.9	-2.2	-3.0	-3.4	-3.7	-3.5	-3.4	-3.6	-4.2	-4.3	-5.0	-5.7	-1.3	3.3
10-Apr	-5.6	-5.6	-6.1	-6.9	-7.7	-8.6	-9.3	-9.1	-8.4	-7.2	-6.2	-4.9	-3.8	-2.7	-1.7	-0.9	-0.3	-0.2	-0.7	-1.9	-3.8	-5.2	-6.3	-4.9	-4.9	-0.2
11-Apr	-4.1	-4.4	-4.2	-4.1	-4.0	-3.9	-3.4	-3.3	-2.1	-0.6	1.2	3.2	5.8	8.0	10.0	11.7	12.7	12.7	11.9	9.0	6.1	3.9	3.4	2.1	2.8	12.7
12-Apr	1.2	0.2	-0.8	-1.6	-1.9	-1.7	-1.3	-1.0	-0.4	1.4	3.5	5.4	6.3	6.5	7.1	7.5	7.2	6.5	5.5	4.3	3.0	2.1	1.0	0.5	2.5	7.5
13-Apr	0.7	0.3	0.1	0.5	0.1	0.7	0.4	0.9	3.0	5.2	5.7	6.3	6.8	6.0	6.0	4.7	4.4	4.4	3.9	2.8	2.2	2.0	1.8	1.5	2.9	6.8
14-Apr	1.4	1.3	1.0	0.2	-0.4	-0.6	-0.7	-0.7	-0.9	-1.2	-0.7	-0.1	0.1	0.4	0.5	0.8	0.7	0.5	0.3	0.1	-0.2	-0.6	-0.8	-1.4	0.0	1.4
15-Apr	-2.8	-3.9	-4.8	-5.7	-6.2	-6.6	-4.8	-2.6	-0.9	0.8	2.2	3.6	4.8	6.1	7.2	8.1	8.8	9.2	8.7	7.5	6.7	6.0	5.0	4.3	2.1	9.2
16-Apr	3.8	3.5	3.4	3.9	3.5	2.7	2.3	2.7	4.3	6.2	9.6	14.0	16.2	17.0	17.6	17.9	17.8	17.3	16.0	14.1	12.0	9.0	7.9	6.6	9.6	17.9
17-Apr	5.8	5.5	5.3	4.5	3.9	3.6	3.6	4.5	6.2	8.8	12.4	15.7	18.3	20.4	21.4	21.9	21.4	21.2	19.7	17.9	15.8	11.9	10.9	9.8	12.1	21.9
18-Apr	9.0	7.4	5.8	5.1	5.1	4.6	5.1	7.3	10.5	14.4	18.2	22.0	25.2	26.8	27.0	27.2	27.0	26.2	25.0	23.8	21.8	20.4	19.1	19.3	16.8	27.2
19-Apr	18.8	17.4	16.5	15.7	13.4	13.5	15.0	15.0	15.5	15.5	16.5	16.6	17.4	18.0	18.7	18.8	18.3	17.7	16.7	15.5	13.7	11.8	11.3	7.4	15.6	18.8
20-Apr	2.4	1.5	1.0	0.0	-0.9	-2.2	-3.3	-4.5	-4.8	-4.7	-3.6	-2.6	-1.1	0.3	1.3	2.4	2.6	2.9	2.4	1.4	-0.1	-0.7	-1.1	-1.5	-0.5	2.9
21-Apr	-2.6	-3.2	-3.9	-4.9	-5.3	-5.6	-4.0	-1.3	0.9	2.4	3.9	5.6	7.0	7.8	8.2	8.2	7.9	7.2	6.3	4.8	3.1	1.8	0.3	-0.7	1.8	8.2
22-Apr	-1.4	-2.1	-2.9	-3.5	-4.3	-4.3	-3.4	-1.3	1.6	4.0	5.7	7.1	8.2	9.4	10.0	10.2	10.5	9.6	8.4	7.0	5.2	3.7	2.0	0.9	3.4	10.5
23-Apr	1.7	1.8	0.2	-1.4	-2.1	-2.1	-0.2	1.8	4.1	6.5	8.2	9.5	10.3	11.4	12.2	12.7	12.9	13.1	12.6	11.4	10.3	9.3	8.7	8.4	6.7	13.1
24-Apr	7.5	6.9	6.5	5.8	5.2	4.9	4.9	5.2	6.0	6.8	7.6	8.4	9.2	9.7	10.1	10.3	10.6	10.4	10.2	9.5	8.8	8.2	7.2	6.5	7.8	10.6
25-Apr	5.6	5.1	4.6	4.4	4.3	4.2	4.1	4.1	4.3	5.0	5.8	6.4	7.4	8.1	8.4	8.5	8.5	8.5	8.6	8.2	7.5	6.2	6.7	6.7	6.3	8.6
26-Apr	6.0	5.4	5.2	5.0	4.7	4.4	4.5	5.1	6.0	7.2	8.2	8.4	8.2	8.0	7.8	7.9	7.9	8.4	9.0	9.0	8.6	8.1	7.9	7.0	7.0	9.0
27-Apr	5.3	4.4	3.2	2.3	1.2	0.9	1.3	2.4	4.1	6.6	9.1	10.2	11.8	13.1	14.6	15.3	15.7	15.7	15.3	14.0	11.9	10.4	8.1	6.3	8.5	15.7
28-Apr	5.4	4.5	3.6	2.9	2.4	3.0	4.9	7.0	10.4	13.6	16.8	18.1	18.4	18.7	19.1	19.5	19.4	19.3	18.7	18.1	17.5	16.0	14.6	13.7	12.7	19.5
29-Apr	13.7	12.6	12.2	12.0	11.7	11.3	11.4	12.4	15.0	16.5	17.8	18.5	19.4	20.1	20.8	21.0	20.8	21.1	21.2	20.4	19.3	18.2	16.8	15.0	16.6	21.2
30-Apr	13.9	13.5	11.8	11.3	11.5	12.1	13.1	14.2	14.9	16.5	18.1	18.9	19.4	18.3	17.4	17.2	16.5	16.8	17.1	17.0	16.3	14.2	12.7	10.9	15.1	19.4
	1.9	1.4	0.8	0.4	-0.1	-0.4	0.1	0.9	2.1	3.5	4.9	6.3	7.4	8.1	8.5	8.7	8.8	8.6	8.1	7.0	5.8	4.6	3.7	2.9	Diurnal Average	
	18.8	17.4	16.5	15.7	13.4	13.5	15.0	15.0	15.5	16.5	18.2	22.0	25.2	26.8	27.0	27.2	27.0	26.2	25.0	23.8	21.8	20.4	19.1	19.3	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature 20 m (AT20m) - C

Lower Camp Met Tower - April 2016



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	224	31.11	31.11
0 - 10	337	46.81	77.92
10 - 20	136	18.89	96.81
> 20	23	3.19	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature 45 m (AT45m) - C

Lower Camp Met Tower - April 2016

Maximum Value: 27.3 C on Apr 18 16:00

Maximum Daily Average: 17.1 C on Apr 18

Minimum Value: -11.6 C on Apr 4 04:00

Minimum Daily Average: -6.6 C on Apr 3

Maximum Diurnal Average: 8.5 C at hour 17

Minimum Diurnal Average: -0.2 C at hour 6

Monthly Average: 4.32 C

Percentiles: P_1 = -9.7 P_{10} = -5.1 Q_1 = -1.5 Median = 3.7 Q_3 = 8.6 P_{90} = 16.6 P_{99} = 25.0

Hours in Service:	720
Hours of Data:	718
Hours of Missing Data:	2
Hours of Calibration:	0
Percent Operational Time:	99.7

Day	Hourly Period Ending At (MST)																								Daily	Daily
	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-Apr	0.2	0.6	1.1	1.8	1.6	0.8	1.1	0.8	0.7	0.5	0.1	0.4	0.1	0.1	-0.1	0.1	0.5	0.7	0.4	-0.6	-1.8	-2.0	-2.0	-2.3	0.1	1.8
2-Apr	-2.5	-2.7	-3.0	-3.2	-3.4	-6.1	-6.3	-3.9	-2.0	-0.4	1.4	2.5	3.4	3.7	2.0	1.4	1.1	0.7	0.6	-0.7	-2.3	-3.7	-4.5	-4.9	-1.4	3.7
3-Apr	-5.2	-5.9	-6.4	-7.0	-7.6	-8.2	-8.9	-9.4	-9.3	-9.1	-8.6	-7.5	-6.5	-5.5	-4.6	-3.8	-3.1	-3.1	-3.7	-4.9	-6.0	-7.0	-8.2	-9.2	-6.6	-3.1
4-Apr	-10.0	-10.7	-11.1	-11.6	-11.5	-11.5	-11.5	-9.4	-6.2	-2.8	-0.2	2.5	4.3	5.5	6.3	6.9	7.0	6.6	5.8	4.8	4.0	3.2	1.9	1.1	-1.5	7.0
5-Apr	0.3	-0.6	-1.2	-1.7	-2.1	-2.5	-2.8	-2.7	-1.9	-0.3	1.7	3.3	4.8	5.6	6.2	6.4	5.9	5.3	4.9	4.3	3.7	2.5	1.3	1.3	1.7	6.4
6-Apr	1.4	1.7	1.7	1.9	1.2	0.9	0.7	0.9	0.2	-0.5	-1.1	-1.1	-0.7	-0.4	-1.5	-1.5	-1.5	-1.9	-2.4	-3.4	-4.4	-5.4	-6.1	-6.5	-1.2	1.9
7-Apr	-6.7	-7.2	-7.7	-7.9	-8.0	-7.9	-7.6	-7.1	-6.5	-5.8	-5.1	-4.4	-3.1	-2.1	-1.9	-1.5	-1.2	-1.7	-2.1	-2.5	-3.7	-4.6	-5.5	-6.4	-4.9	-1.2
8-Apr	-7.4	-8.1	-8.2	-6.2	-6.5	-6.6	-6.1	-5.2	-3.5	-2.2	-0.9	0.2	1.7	3.5	4.5	4.7	4.5	4.3	4.3	4.0	3.9	4.1	3.8	3.5	-0.6	4.7
9-Apr	3.4	2.9	2.3	1.5	0.5	1.0	2.0	1.7	1.1	-0.3	-1.7	-2.1	-2.1	-2.6	-3.3	-3.7	-4.0	-3.6	-3.5	-3.7	-4.1	-4.2	-4.9	-5.5	-1.4	3.4
10-Apr	-5.6	-5.7	-6.2	-6.9	-7.7	-8.7	-9.6	-9.7	-9.1	-8.1	-7.1	-5.8	-4.8	-3.4	-2.5	-1.5	-0.8	-0.6	-0.8	-1.7	-3.0	-4.5	-5.7	-4.5	-5.2	-0.6
11-Apr	-4.1	-4.4	-4.2	-4.1	-4.0	-3.9	-3.5	-3.4	-2.2	-0.7	1.0	3.0	5.5	7.7	9.8	11.5	12.4	12.5	12.1	9.8	7.6	5.3	4.3	3.6	3.0	12.5
12-Apr	2.8	1.6	0.5	-1.1	-1.5	-1.6	-1.6	-1.5	-0.8	0.5	2.6	4.5	5.5	5.7	6.5	6.8	6.8	6.2	5.5	4.3	3.2	2.3	1.3	0.6	2.5	6.8
13-Apr	0.7	0.4	0.2	0.5	0.1	0.9	0.3	0.7	2.7	4.9	5.6	6.2	6.7	6.0	6.1	4.9	4.6	4.5	3.9	2.8	2.2	2.0	1.8	1.6	2.9	6.7
14-Apr	1.4	1.3	1.1	0.2	-0.4	-0.7	-0.7	-0.9	-1.1	-1.5	-1.1	-0.6	-0.3	0.1	0.2	0.5	0.5	0.4	0.3	0.1	-0.2	-0.5	-0.7	-1.1	-0.1	1.4
15-Apr	-2.5	-3.6	-4.4	-5.4	-6.0	-6.4	-5.1	-2.4	-1.2	0.5	1.9	3.3	4.4	5.7	6.8	7.8	8.5	9.1	8.7	7.6	6.9	6.3	5.3	4.4	2.1	9.1
16-Apr	3.9	3.6	3.7	4.1	3.7	2.9	2.4	2.7	4.2	6.2	9.6	13.7	15.9	16.6	17.2	17.5	17.6	17.3	16.6	15.0	13.4	12.1	9.2	7.5	9.9	17.6
17-Apr	6.7	6.0	5.7	4.9	4.2	3.8	3.9	4.8	6.4	8.8	12.1	15.4	18.1	20.1	21.0	21.4	21.1	21.2	20.3	18.7	16.8	14.2	12.1	10.9	12.4	21.4
18-Apr	9.8	8.2	6.5	5.8	5.5	4.8	5.4	7.6	10.9	14.2	17.8	21.9	25.1	26.8	27.1	27.3	27.1	26.4	25.1	24.0	22.2	20.8	19.8	19.6	17.1	27.3
19-Apr	19.0	17.8	17.2	16.4	14.5	14.5	15.1	14.6	14.7	15.1	16.1	16.2	17.0	17.6	18.3	18.5	18.0	17.5	16.6	15.5	13.8	12.2	11.5	7.3	15.6	19.0
20-Apr	2.3	1.4	0.9	-0.1	-1.1	-2.3	AF	AF	-5.1	-5.2	-4.4	-3.4	-1.9	-0.4	0.6	1.7	2.1	2.4	2.2	1.4	0.0	-0.6	-1.1	-1.4	-0.5	2.4
21-Apr	-2.5	-2.8	-3.5	-4.5	-4.8	-5.2	-4.2	-1.6	0.5	2.3	3.6	5.0	6.2	6.9	7.5	7.5	7.4	6.9	6.1	4.7	3.2	2.0	0.5	-0.5	1.7	7.5
22-Apr	-1.1	-1.9	-2.7	-3.4	-4.0	-4.3	-3.9	-2.1	0.7	3.1	4.9	6.3	7.5	8.6	9.2	9.8	10.0	9.3	8.3	7.0	5.4	3.9	2.3	1.3	3.1	10.0
23-Apr	2.2	2.0	0.6	-1.0	-1.7	-2.2	-1.0	1.5	3.9	6.2	8.0	9.2	10.0	11.0	11.8	12.4	12.6	12.9	12.6	11.5	10.3	9.3	8.7	8.3	6.6	12.9
24-Apr	7.4	6.9	6.5	5.8	5.2	4.9	4.8	5.0	5.8	6.5	7.4	8.3	9.1	9.6	10.0	10.3	10.5	10.3	10.1	9.5	8.8	8.1	7.1	6.4	7.7	10.5
25-Apr	5.5	5.0	4.5	4.3	4.3	4.1	4.0	4.0	4.2	4.8	5.6	6.2	7.1	7.9	8.3	8.4	8.4	8.4	8.5	8.2	7.6	6.9	7.0	6.7	6.2	8.5
26-Apr	5.9	5.4	5.1	4.9	4.6	4.4	4.3	4.9	5.8	6.8	8.0	8.3	8.1	7.9	7.7	7.8	7.9	8.4	8.9	9.0	8.6	8.2	8.0	7.2	6.9	9.0
27-Apr	5.8	4.8	4.0	3.2	1.7	0.9	1.2	2.3	4.0	6.6	8.6	9.7	11.0	12.2	13.7	14.6	15.0	15.3	15.1	14.0	12.1	10.8	8.9	6.7	8.4	15.3
28-Apr	5.7	5.2	4.2	3.8	3.5	3.5	4.3	6.8	10.0	13.2	16.3	17.9	18.3	18.6	19.0	19.3	19.4	19.2	18.8	18.2	17.9	16.6	15.1	14.2	12.9	19.4
29-Apr	14.3	13.2	12.5	12.3	11.8	11.4	11.4	12.3	14.8	16.3	17.6	18.4	19.2	20.0	20.6	20.9	20.7	21.0	21.1	20.5	19.5	18.4	17.0	15.3	16.7	21.1
30-Apr	14.1	13.7	11.8	11.3	11.6	12.1	13.0	14.0	14.7	16.3	17.9	18.8	19.3	18.1	17.2	17.0	16.4	16.7	17.1	17.1	16.5	14.5	12.9	11.1	15.1	19.3
	2.2	1.6	1.0	0.6	0.1	-0.2	0.0	0.9	1.9	3.2	4.6	5.9	7.0	7.7	8.1	8.4	8.5	8.4	8.0	7.2	6.1	5.0	4.0	3.2	Diurnal Average	
	19.0	17.8	17.2	16.4	14.5	14.5	15.1	14.6	14.8	16.3	17.9	21.9	25.1	26.8	27.1	27.3	27.1	26.4	25.1	24.0	22.2	20.8	19.8	19.6	Diurnal Maximum	

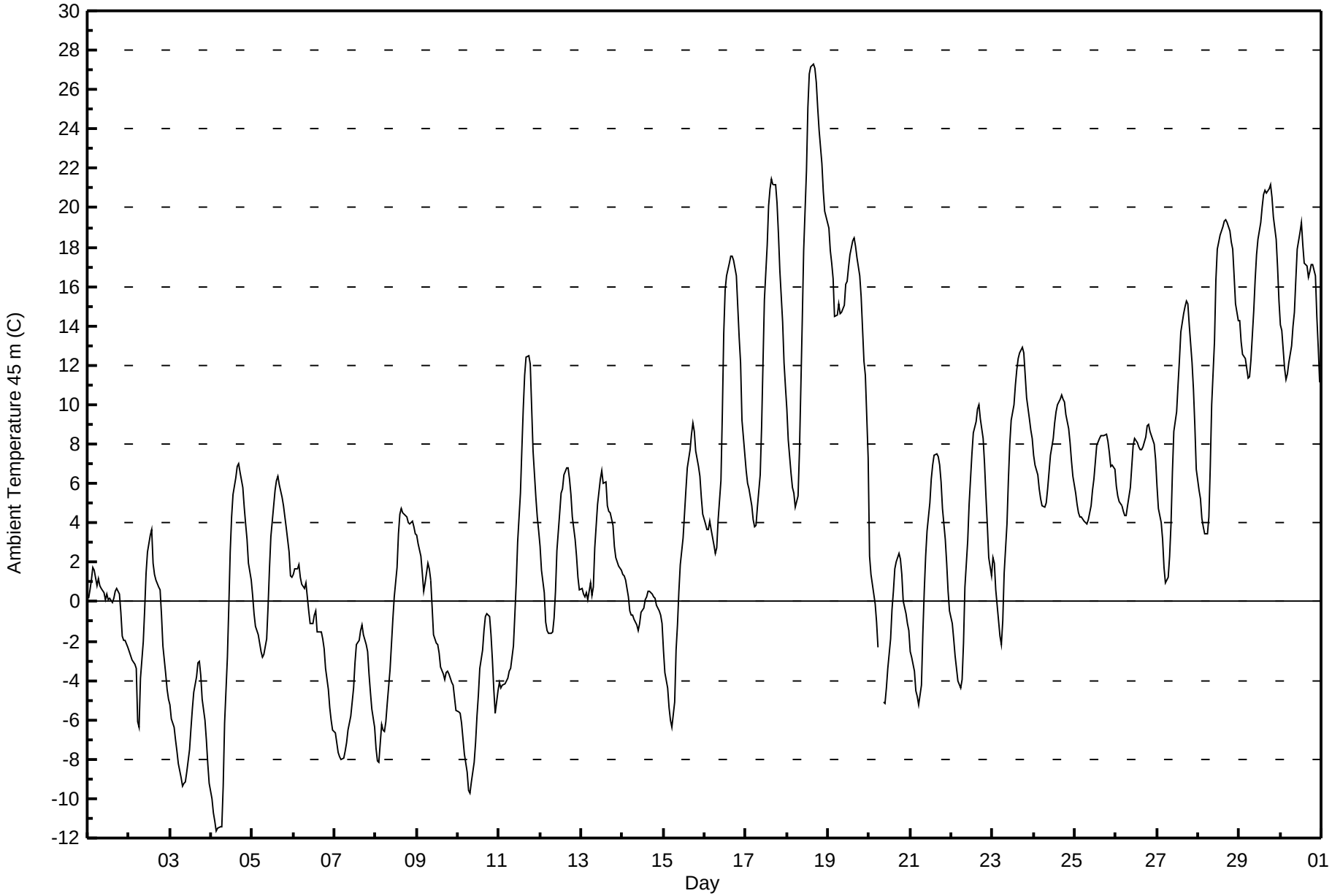
AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature 45 m (AT45m) - C

Lower Camp Met Tower - April 2016



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	225	31.34	31.34
0 - 10	340	47.35	78.69
10 - 20	129	17.97	96.66
> 20	24	3.34	100.00

Total Number of Valid Hours: 718

Total Number of Hours: 720

Maximum Value: 26.8 C on Apr 18 16:00

Maximum Daily Average: 18.0 C on Apr 18

Minimum Value: -10.6 C on Apr 10 08:00

Minimum Daily Average: -7.3 C on Apr 3

Maximum Diurnal Average: 7.9 C at hour 17

Minimum Diurnal Average: 0.0 C at hour 7

Monthly Average: 4.14 C

Percentiles: P_1 = -9.9 P_{10} = -5.5 Q_1 = -1.8 Median = 3.5 Q_3 = 8.6 P_{90} = 16.5 P_{99} = 24.4

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

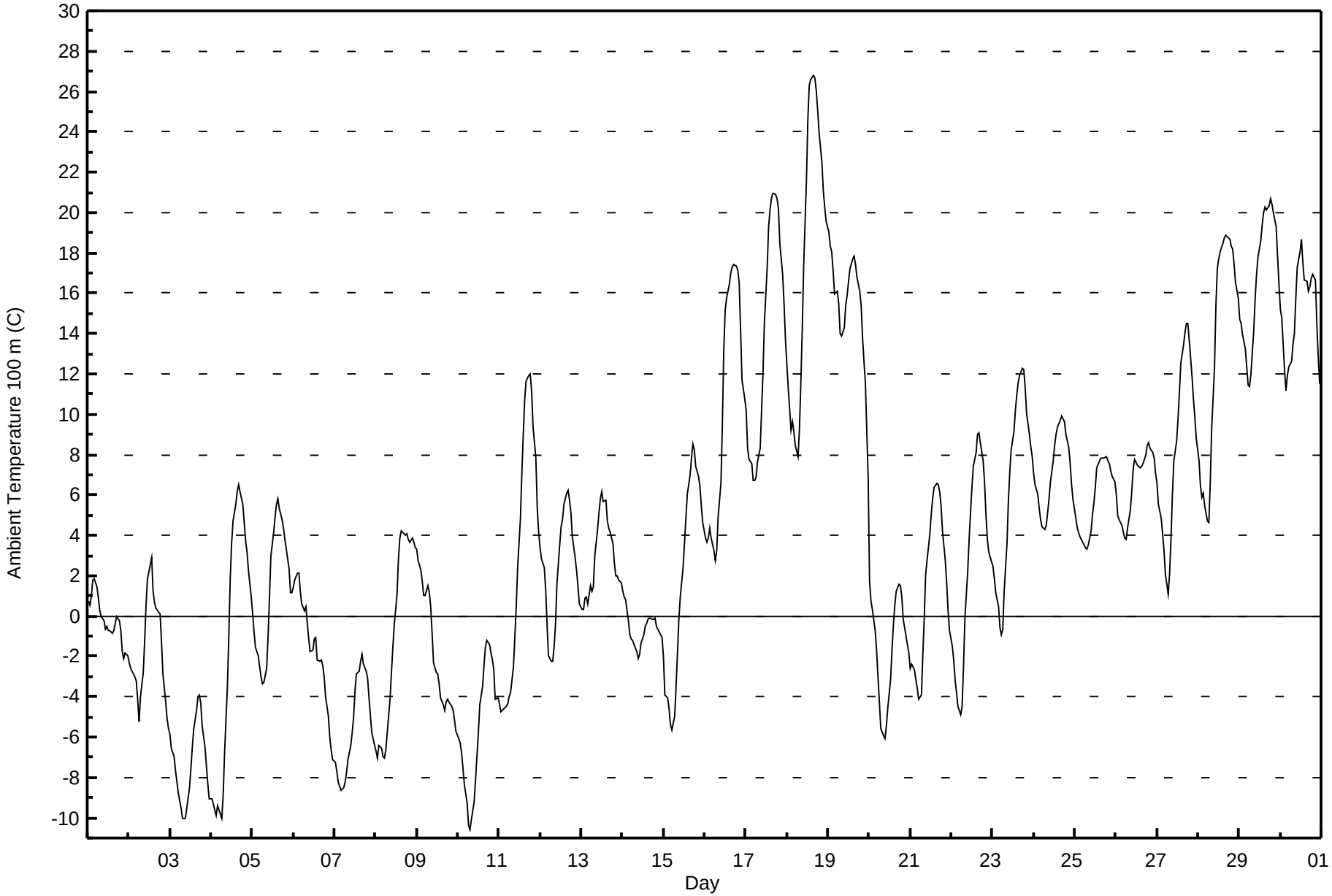
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	0.7	0.5	1.0	1.8	1.8	1.4	0.9	0.3	0.0	-0.3	-0.7	-0.5	-0.7	-0.7	-0.8	-0.7	-0.3	0.0	-0.2	-0.7	-1.8	-2.1	-1.8	-2.0	-0.2	1.8
2-Apr	-2.3	-2.6	-2.7	-3.0	-3.2	-4.1	-5.2	-3.9	-2.8	-1.2	0.6	1.9	2.6	2.9	1.2	0.7	0.4	0.2	0.1	-1.2	-2.9	-4.2	-5.1	-5.6	-1.7	2.9
3-Apr	-5.8	-6.5	-7.0	-7.7	-8.2	-8.8	-9.6	-10.0	-10.0	-10.0	-9.6	-8.5	-7.5	-6.5	-5.6	-4.7	-4.0	-3.9	-4.3	-5.4	-6.5	-7.4	-8.3	-9.0	-7.3	-3.9
4-Apr	-9.1	-9.3	-9.6	-9.9	-9.4	-9.8	-10.1	-8.9	-6.7	-3.5	-1.0	1.8	3.6	4.7	5.5	6.2	6.5	6.1	5.5	4.7	3.7	3.2	2.3	1.0	-1.4	6.5
5-Apr	0.1	-0.8	-1.5	-2.0	-2.5	-3.0	-3.4	-3.3	-2.6	-1.0	0.9	3.0	4.2	4.9	5.5	5.8	5.4	4.7	4.3	3.8	3.3	2.3	1.2	1.1	1.3	5.8
6-Apr	1.4	1.8	2.1	2.2	1.2	0.6	0.3	0.5	-0.4	-1.1	-1.7	-1.7	-1.1	-1.0	-2.2	-2.2	-2.2	-2.5	-3.0	-4.0	-5.0	-6.0	-6.7	-7.1	-1.6	2.2
7-Apr	-7.2	-7.7	-8.2	-8.5	-8.6	-8.5	-8.2	-7.8	-7.1	-6.4	-5.8	-5.0	-3.7	-2.9	-2.7	-2.2	-1.9	-2.4	-2.8	-3.1	-4.0	-5.0	-5.8	-6.4	-5.5	-1.9
8-Apr	-6.7	-7.0	-6.4	-6.6	-7.0	-7.0	-6.6	-5.8	-4.1	-2.8	-1.5	-0.4	1.1	2.8	3.8	4.2	4.1	4.0	4.1	3.8	3.6	3.9	3.7	3.4	-0.8	4.2
9-Apr	3.3	2.8	2.3	1.7	1.0	1.0	1.5	1.2	0.5	-0.9	-2.3	-2.8	-2.9	-3.3	-4.1	-4.4	-4.7	-4.3	-4.1	-4.2	-4.5	-4.7	-5.1	-5.7	-1.8	3.3
10-Apr	-6.1	-6.2	-6.8	-7.5	-8.3	-9.3	-10.4	-10.6	-10.1	-9.2	-8.1	-6.9	-5.8	-4.4	-3.5	-2.5	-1.5	-1.2	-1.4	-1.8	-2.2	-2.6	-4.1	-4.1	-5.6	-1.2
11-Apr	-4.3	-4.8	-4.7	-4.6	-4.5	-4.3	-4.0	-3.7	-2.5	-1.1	0.4	2.4	4.9	7.1	9.0	10.7	11.6	11.9	12.0	11.1	9.3	7.8	5.3	4.1	2.9	12.0
12-Apr	3.4	2.8	2.4	1.3	-0.4	-2.0	-2.2	-2.3	-1.6	-0.5	1.6	3.5	4.4	4.8	5.5	6.1	6.2	5.7	5.1	3.9	2.9	2.3	1.5	0.6	2.3	6.2
13-Apr	0.3	0.4	0.9	1.0	0.6	1.5	1.2	1.4	3.0	4.3	5.1	5.8	6.1	5.7	5.7	4.7	4.4	4.1	3.6	2.6	2.0	2.0	1.8	1.6	2.9	6.1
14-Apr	1.2	1.0	0.8	-0.2	-0.9	-1.1	-1.2	-1.4	-1.7	-2.1	-1.9	-1.3	-0.9	-0.5	-0.4	-0.2	-0.1	-0.2	-0.2	-0.1	-0.5	-0.8	-0.9	-1.1	-0.6	1.2
15-Apr	-2.1	-3.9	-4.1	-4.6	-5.4	-5.6	-5.0	-3.5	-1.8	-0.2	1.0	2.4	3.6	4.8	6.0	7.0	7.9	8.5	8.3	7.4	6.9	6.5	5.5	4.6	1.8	8.5
16-Apr	3.9	3.6	3.9	4.4	3.9	3.3	2.8	3.2	4.9	6.6	9.4	13.1	15.1	15.8	16.5	17.0	17.3	17.4	17.4	17.1	16.5	14.2	11.7	10.8	10.4	17.4
17-Apr	10.2	8.3	7.8	7.5	6.8	6.8	6.9	7.6	8.4	10.2	12.1	14.6	17.3	19.3	20.1	20.7	21.0	20.9	20.7	20.2	18.4	16.9	15.5	13.7	13.8	21.0
18-Apr	12.5	11.3	9.2	9.7	9.1	8.5	7.9	9.3	11.6	14.2	17.4	21.7	24.7	26.3	26.6	26.8	26.7	26.0	25.0	24.0	22.5	21.1	20.3	19.6	18.0	26.8
19-Apr	19.0	18.3	18.0	17.2	15.9	16.1	15.5	14.0	13.9	14.3	15.4	15.9	16.6	17.2	17.7	17.9	17.4	16.8	16.1	15.4	13.8	12.6	11.6	6.8	15.6	19.0
20-Apr	1.8	0.7	0.3	-0.7	-1.7	-3.0	-4.3	-5.6	-6.0	-6.1	-5.4	-4.5	-3.1	-1.7	-0.4	0.5	1.2	1.6	1.5	1.0	-0.1	-1.0	-1.4	-1.8	-1.6	1.8
21-Apr	-2.6	-2.4	-2.7	-3.1	-3.6	-4.1	-3.9	-1.9	-0.1	2.1	2.8	4.1	5.0	5.8	6.4	6.6	6.5	6.2	5.5	4.2	2.8	1.6	0.3	-0.7	1.4	6.6
22-Apr	-1.5	-2.2	-3.1	-3.8	-4.5	-4.9	-4.4	-2.5	-0.1	2.2	3.8	5.1	6.4	7.4	8.1	9.0	9.1	8.6	7.7	6.6	5.1	3.8	3.2	2.7	2.6	9.1
23-Apr	2.5	1.8	1.2	0.5	-0.5	-0.9	-0.7	1.2	3.6	5.7	7.1	8.3	9.2	10.2	11.0	11.6	12.0	12.3	12.2	11.3	10.0	9.0	8.4	7.9	6.5	12.3
24-Apr	7.1	6.5	6.0	5.4	4.8	4.4	4.3	4.5	5.1	5.8	6.7	7.7	8.5	9.0	9.4	9.7	9.9	9.8	9.6	9.0	8.4	7.6	6.6	5.8	7.2	9.9
25-Apr	4.9	4.4	4.1	4.0	3.8	3.6	3.4	3.3	3.5	4.2	5.0	5.6	6.4	7.3	7.7	7.8	7.8	7.8	7.9	7.7	7.5	7.2	6.9	6.6	5.8	7.9
26-Apr	6.0	5.0	4.8	4.5	4.2	3.8	3.8	4.3	5.2	6.2	7.3	7.7	7.5	7.4	7.3	7.4	7.5	8.0	8.4	8.6	8.3	8.1	7.9	7.1	6.5	8.6
27-Apr	6.6	5.5	4.8	4.1	3.2	2.1	1.1	2.1	3.8	6.1	7.7	8.7	9.8	11.1	12.5	13.4	14.1	14.5	14.5	13.7	11.9	10.8	9.8	8.8	8.4	14.5
28-Apr	7.7	6.4	5.9	6.1	5.5	4.7	4.7	6.7	9.3	12.3	15.4	17.2	17.7	18.1	18.5	18.7	18.9	18.8	18.7	18.3	18.2	17.4	16.5	15.7	13.2	18.9
29-Apr	14.7	14.5	14.0	13.2	12.3	11.5	11.4	12.0	14.2	15.7	17.0	17.8	18.6	19.4	20.0	20.2	20.1	20.4	20.7	20.4	20.0	19.3	17.8	16.4	16.7	20.7
30-Apr	15.2	14.8	12.1	11.2	11.9	12.3	12.6	13.4	14.0	15.8	17.3	18.1	18.6	17.5	16.7	16.6	16.1	16.3	16.7	17.0	16.7	14.5	12.9	11.5	15.0	18.6
	2.5	1.9	1.5	1.1	0.6	0.2	0.0	0.5	1.4	2.6	3.9	5.1	6.2	6.9	7.4	7.7	7.9	7.9	7.7	7.0	6.2	5.3	4.4	3.6	Diurnal Average	
	19.0	18.3	18.0	17.2	15.9	16.1	15.5	14.0	14.2	15.8	17.4	21.7	24.7	26.3	26.6	26.8	26.7	26.0	25.0	24.0	22.5	21.1	20.3	19.6	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature 100 m (AT100m) - C

Lower Camp Met Tower - April 2016



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	250	34.72	34.72
0 - 10	315	43.75	78.47
10 - 20	132	18.33	96.81
> 20	23	3.19	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Maximum Value: 26.1 C on Apr 18 16:00

Maximum Daily Average: 18.5 C on Apr 18

Minimum Value: -10.6 C on Apr 3 08:00

Minimum Daily Average: -7.4 C on Apr 3

Maximum Diurnal Average: 7.5 C at hour 17

Minimum Diurnal Average: 0.2 C at hour 7

Monthly Average: 3.98 C

Percentiles: P_1 = -9.8 P_{10} = -5.6 Q_1 = -2.1 Median = 3.2 Q_3 = 8.7 P_{90} = 16.2 P_{99} = 23.7

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

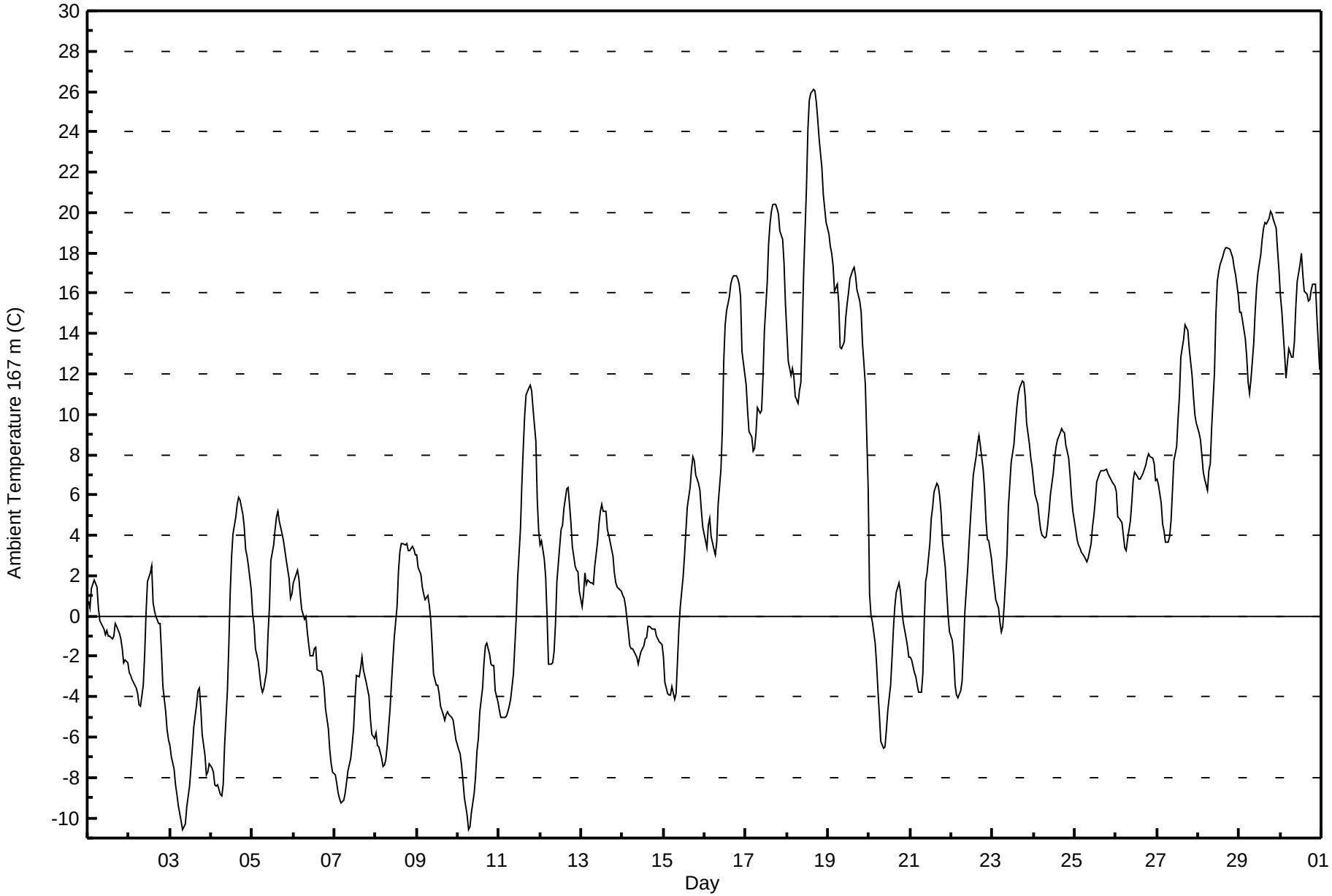
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	0.7	0.4	1.4	1.5	1.8	1.4	0.4	-0.2	-0.4	-0.6	-0.9	-0.7	-1.0	-1.0	-1.2	-1.0	-0.4	-0.5	-0.8	-1.2	-1.6	-2.3	-2.1	-2.3	-0.4	1.8
2-Apr	-2.8	-3.0	-3.2	-3.5	-3.6	-3.9	-4.4	-4.5	-3.4	-1.9	0.2	1.7	2.1	2.5	0.7	0.3	0.0	-0.4	-0.4	-1.8	-3.5	-4.7	-5.6	-6.2	-2.0	2.5
3-Apr	-6.4	-7.0	-7.6	-8.3	-8.8	-9.4	-10.2	-10.6	-10.5	-10.3	-9.5	-8.5	-7.5	-6.6	-5.5	-4.4	-3.7	-3.6	-4.5	-5.9	-6.9	-7.8	-7.7	-7.3	-7.4	-3.6
4-Apr	-7.5	-7.7	-8.3	-8.4	-8.4	-8.9	-8.9	-8.4	-6.4	-3.7	-1.5	1.2	3.0	4.1	4.9	5.5	5.9	5.7	5.1	4.4	3.3	3.0	2.5	1.3	-1.2	5.9
5-Apr	0.1	-0.4	-1.6	-2.2	-2.9	-3.5	-3.7	-3.6	-2.7	-0.9	0.4	2.7	3.5	4.3	4.9	5.2	4.7	4.1	3.7	3.3	2.8	1.9	0.9	1.1	0.9	5.2
6-Apr	1.7	1.8	2.3	1.9	1.0	0.4	-0.2	0.0	-0.8	-1.4	-2.0	-1.9	-1.6	-1.6	-2.7	-2.7	-2.7	-3.0	-3.6	-4.6	-5.6	-6.7	-7.3	-7.8	-2.0	2.3
7-Apr	-7.9	-8.3	-8.8	-9.1	-9.2	-9.1	-8.7	-8.2	-7.7	-7.1	-6.4	-5.6	-4.1	-2.9	-3.0	-2.6	-2.1	-2.7	-3.3	-3.7	-4.0	-5.1	-5.9	-6.1	-5.9	-2.1
8-Apr	-5.8	-6.4	-6.5	-7.0	-7.5	-7.4	-7.1	-6.4	-4.6	-3.4	-2.2	-1.1	0.5	2.2	3.2	3.6	3.6	3.5	3.6	3.3	3.2	3.4	3.3	3.1	-1.2	3.6
9-Apr	3.0	2.4	2.1	1.5	1.1	0.8	1.0	0.6	-0.1	-1.4	-2.9	-3.4	-3.4	-3.8	-4.4	-4.9	-5.1	-4.9	-4.7	-4.9	-5.0	-5.2	-5.7	-6.2	-2.2	3.0
10-Apr	-6.6	-6.9	-7.4	-8.1	-9.0	-9.9	-10.6	-10.5	-9.7	-8.8	-7.9	-6.7	-6.1	-4.7	-3.5	-2.3	-1.5	-1.4	-1.9	-2.4	-2.4	-2.5	-3.7	-4.3	-5.8	-1.4
11-Apr	-4.7	-5.0	-5.1	-5.1	-5.0	-4.7	-4.5	-4.2	-2.9	-1.5	-0.1	1.9	4.3	6.5	8.3	9.9	10.9	11.3	11.4	11.2	10.2	8.7	5.8	4.3	2.6	11.4
12-Apr	3.5	3.7	2.8	1.9	0.0	-2.3	-2.4	-2.3	-1.7	-0.4	1.7	3.5	4.3	4.5	5.3	6.3	6.3	5.6	4.6	3.4	2.5	2.2	2.2	1.2	2.3	6.3
13-Apr	0.5	1.1	2.1	1.5	1.8	1.6	1.6	1.6	2.5	3.7	4.6	5.2	5.5	5.2	5.2	4.3	4.0	3.6	3.0	2.2	1.6	1.5	1.4	1.2	2.8	5.5
14-Apr	1.0	0.9	0.4	-0.8	-1.4	-1.6	-1.6	-1.7	-2.1	-2.4	-2.1	-1.7	-1.5	-1.2	-1.0	-0.5	-0.5	-0.6	-0.6	-0.6	-1.0	-1.3	-1.3	-1.4	-1.0	1.0
15-Apr	-2.0	-3.3	-3.8	-3.9	-3.9	-3.5	-4.1	-3.8	-2.3	-0.6	0.4	1.9	3.0	4.2	5.4	6.4	7.2	7.9	7.7	7.0	6.6	6.2	5.2	4.5	1.8	7.9
16-Apr	3.8	3.4	4.5	4.9	3.9	3.3	3.0	3.7	5.5	7.3	9.2	12.6	14.4	15.2	15.9	16.4	16.7	16.9	16.9	16.7	16.4	15.8	13.1	12.0	10.5	16.9
17-Apr	11.4	10.2	9.2	8.9	8.2	8.3	9.1	10.3	10.1	10.2	11.9	14.2	16.5	18.5	19.4	20.0	20.4	20.4	20.2	19.9	19.1	18.7	17.5	15.5	14.5	20.4
18-Apr	14.1	12.6	11.9	12.3	11.8	10.9	10.5	11.1	11.6	14.1	17.0	21.2	24.1	25.6	25.9	26.1	26.0	25.5	24.7	23.7	22.2	20.9	20.2	19.5	18.5	26.1
19-Apr	18.9	18.3	18.0	17.3	16.1	16.4	15.6	13.4	13.3	13.6	14.8	15.5	16.0	16.7	17.2	17.3	16.8	16.2	15.6	15.0	13.4	12.5	11.5	6.4	15.2	18.9
20-Apr	1.1	0.1	-0.3	-1.4	-2.3	-3.7	-4.9	-6.2	-6.5	-6.5	-5.6	-4.7	-3.4	-2.1	-0.6	0.4	1.2	1.6	1.3	0.4	-0.3	-1.1	-1.5	-2.1	-2.0	1.6
21-Apr	-2.0	-2.1	-2.8	-3.0	-3.4	-3.7	-3.8	-2.8	-0.3	1.7	2.2	3.6	4.8	5.4	6.2	6.6	6.4	6.0	5.1	3.7	2.4	1.3	0.0	-0.8	1.3	6.6
22-Apr	-1.2	-1.9	-3.4	-3.9	-4.0	-3.7	-3.2	-1.6	0.3	2.3	3.7	4.8	6.0	7.0	7.9	8.5	9.0	8.5	7.3	6.3	4.7	3.8	3.8	2.8	2.7	9.0
23-Apr	2.1	1.4	0.8	0.4	-0.3	-0.8	-0.5	0.5	3.1	5.4	6.5	7.6	8.6	9.5	10.3	10.9	11.3	11.6	11.6	10.9	9.6	8.5	7.8	7.4	6.0	11.6
24-Apr	6.7	6.0	5.5	4.9	4.3	4.0	3.8	3.9	4.5	5.2	6.0	7.1	7.8	8.4	8.8	9.1	9.3	9.2	9.1	8.5	7.9	7.0	6.0	5.2	6.6	9.3
25-Apr	4.3	3.8	3.5	3.4	3.2	3.0	2.8	2.7	2.9	3.6	4.4	5.0	5.8	6.7	7.1	7.2	7.2	7.2	7.2	7.1	7.0	6.8	6.7	6.4	5.2	7.2
26-Apr	6.2	4.9	4.8	4.6	4.0	3.4	3.2	3.8	4.7	5.6	6.7	7.1	6.9	6.8	6.8	6.9	7.1	7.5	7.8	8.0	7.9	7.9	7.6	6.7	6.1	8.0
27-Apr	6.8	6.5	5.6	4.6	4.2	3.7	3.7	3.9	4.7	6.2	7.7	8.4	9.7	10.9	12.8	13.8	14.4	14.3	14.1	13.2	11.9	10.9	10.0	9.6	8.8	14.4
28-Apr	9.1	8.8	7.9	7.1	6.8	6.2	7.2	7.5	9.4	12.0	14.9	16.6	17.1	17.5	17.8	18.1	18.2	18.3	18.2	18.0	17.8	17.3	16.9	15.9	13.5	18.3
29-Apr	15.1	15.0	14.6	13.7	12.8	11.6	11.0	11.7	13.5	15.1	16.3	17.0	17.9	18.7	19.3	19.5	19.4	19.7	20.1	19.9	19.6	19.2	18.1	17.1	16.5	20.1
30-Apr	15.9	15.2	13.0	11.8	12.5	13.3	12.8	12.9	13.6	15.3	16.6	17.4	18.0	16.9	16.1	16.0	15.6	15.7	16.2	16.5	16.4	14.9	13.6	12.2	14.9	18.0
	2.6	2.2	1.7	1.2	0.8	0.4	0.2	0.4	1.2	2.3	3.5	4.7	5.7	6.4	6.9	7.3	7.5	7.4	7.2	6.6	5.9	5.2	4.4	3.6	Diurnal Average	
	18.9	18.3	18.0	17.3	16.1	16.4	15.6	13.4	13.6	15.3	17.0	21.2	24.1	25.6	25.9	26.1	26.0	25.5	24.7	23.7	22.2	20.9	20.2	19.5	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature 167 m (AT167m) - C

Lower Camp Met Tower - April 2016



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	259	35.97	35.97
0 - 10	298	41.39	77.36
10 - 20	146	20.28	97.64
> 20	17	2.36	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Maximum Value: 99 % on Apr 27 08:00

Maximum Daily Average: 90.5 % on Apr 6

Minimum Value: 13 % on Apr 19 16:00

Minimum Daily Average: 22.6 % on Apr 19

Maximum Diurnal Average: 72.2 % at hour 6

Minimum Diurnal Average: 42.8 % at hour 17

Monthly Average: 56.2 %

Percentiles: P_1 = 16 P_{10} = 25 Q_1 = 39 Median = 57 Q_3 = 73 P_{90} = 86 P_{99} = 98

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

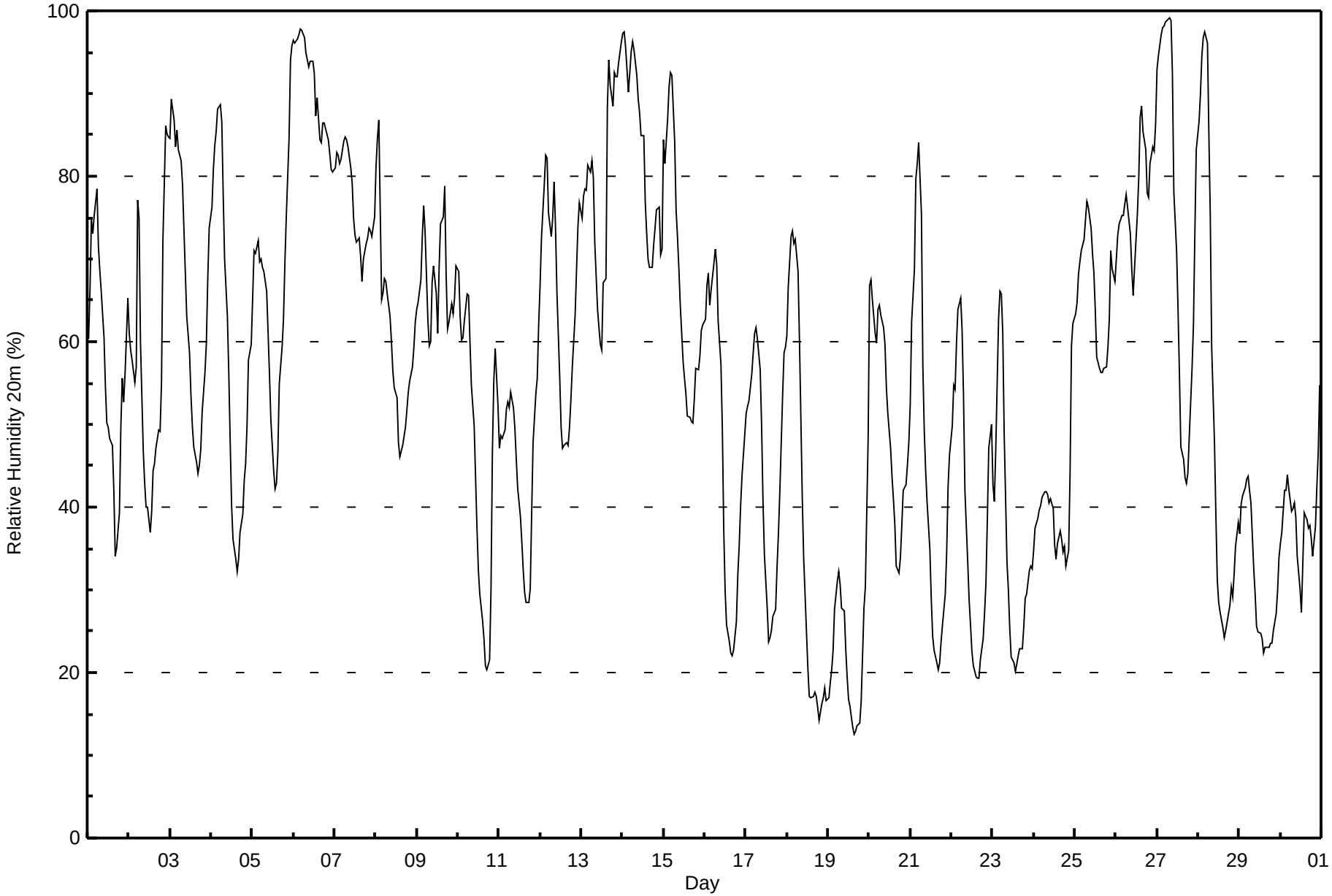
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	60	66	75	73	75	78	72	69	66	61	55	50	50	48	47	42	34	35	39	50	56	53	56	65	57.3	78
2-Apr	61	59	58	55	57	77	75	60	47	43	40	40	37	39	44	45	47	49	49	55	72	86	85	85	56.9	86
3-Apr	85	89	87	84	86	83	82	79	73	68	63	59	53	50	47	45	44	45	47	52	56	60	68	74	65.8	89
4-Apr	76	81	84	86	88	89	87	78	70	63	56	48	40	36	34	32	34	37	39	43	45	50	58	60	58.9	89
5-Apr	65	71	71	72	70	70	69	68	66	61	56	50	44	42	43	47	55	59	63	69	75	85	94	96	65.1	96
6-Apr	97	96	97	97	98	98	97	95	94	93	94	94	92	87	89	84	84	87	86	86	84	83	81	81	90.5	98
7-Apr	81	83	83	82	82	84	85	84	84	81	79	75	73	72	73	70	67	70	72	73	74	73	73	75	76.9	85
8-Apr	81	84	87	65	66	68	67	66	63	60	56	54	53	48	46	47	48	50	52	54	55	57	59	62	60.3	87
9-Apr	64	65	67	73	76	73	63	60	60	67	69	66	61	69	74	75	79	68	62	62	65	63	65	69	67.3	79
10-Apr	68	63	60	61	63	66	66	60	55	50	44	37	32	29	26	24	21	20	22	30	47	55	59	52	46.3	68
11-Apr	47	49	48	49	52	53	52	54	52	50	46	42	39	36	32	30	28	28	30	39	48	54	56	62	44.8	62
12-Apr	67	73	79	83	82	76	73	75	79	74	66	56	50	47	48	48	47	50	53	57	63	69	74	77	65.1	83
13-Apr	75	78	78	78	81	81	82	80	72	64	62	60	59	67	68	88	94	91	89	93	92	92	94	96	79.7	96
14-Apr	97	97	96	90	93	95	96	95	92	89	88	85	85	77	73	70	69	69	72	74	76	76	71	71	83.2	97
15-Apr	84	81	87	91	93	92	84	76	73	69	64	58	56	54	51	51	50	50	53	57	57	58	61	62	67.2	93
16-Apr	63	67	68	64	66	70	71	69	63	57	50	37	30	26	24	22	22	23	26	32	35	40	44	49	46.5	71
17-Apr	51	52	53	56	59	61	62	60	57	50	41	34	28	24	24	25	27	28	33	37	42	54	59	59	44.7	62
18-Apr	61	67	73	73	72	72	69	60	51	41	34	25	21	17	17	17	18	17	16	14	16	17	18	17	37.6	73
19-Apr	17	19	20	23	28	31	32	31	28	27	23	20	17	16	13	13	13	14	14	16	22	28	30	49	22.6	49
20-Apr	67	67	65	61	60	64	64	63	62	60	54	51	47	44	41	38	33	32	34	38	42	43	45	48	51.0	67
21-Apr	52	62	69	80	82	84	75	57	49	44	41	35	29	24	23	21	20	21	24	26	29	34	43	46	44.7	84
22-Apr	50	55	54	60	64	65	61	54	42	33	29	26	23	21	20	19	19	22	24	27	31	39	47	50	38.9	65
23-Apr	43	41	47	63	66	66	61	49	33	30	25	22	21	20	21	22	23	23	26	29	29	32	33	32	35.7	66
24-Apr	35	37	39	40	40	41	42	42	42	41	41	40	35	34	36	37	36	35	35	33	35	44	60	62	40.0	62
25-Apr	63	65	68	70	71	72	75	77	76	74	71	68	64	58	57	56	56	57	57	59	63	71	69	67	66.0	77
26-Apr	70	73	74	75	75	77	78	76	73	69	66	69	75	80	87	89	85	83	78	77	82	84	83	86	77.7	89
27-Apr	93	95	97	98	98	99	99	99	99	92	78	71	64	56	47	46	43	43	44	48	57	62	73	83	74.4	99
28-Apr	87	90	95	97	97	96	85	75	59	48	39	31	28	27	26	24	25	26	28	30	29	32	35	38	52.0	97
29-Apr	37	40	41	42	43	44	42	40	33	30	26	25	25	24	22	23	23	23	24	23	25	27	30	34	31.1	44
30-Apr	36	37	42	42	44	42	40	40	41	39	34	30	27	33	39	38	37	38	36	34	38	42	47	55	38.8	55
	64.4	66.7	68.7	69.4	70.9	72.2	70.1	66.4	61.8	57.6	52.9	48.6	45.3	43.5	43.1	43.0	42.8	43.1	44.2	47.2	51.3	55.4	58.9	62.1	Diurnal Average	
	97	97	97	98	98	99	99	99	99	93	94	94	92	87	89	89	94	91	89	93	92	92	94	96	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity 20m (RH20m) - %

Lower Camp Met Tower - April 2016



Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	25	3.47	3.47
20 - 40	166	23.06	26.53
40 - 60	200	27.78	54.31
60 - 80	211	29.31	83.61
80 - 100	118	16.39	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity 45m (RH45m) - %

Lower Camp Met Tower - April 2016

Maximum Value: 98 % on Apr 27 08:00

Maximum Daily Average: 89.3 % on Apr 6

Minimum Value: 12 % on Apr 19 16:00

Minimum Daily Average: 21.8 % on Apr 19

Maximum Diurnal Average: 70.4 % at hour 6

Minimum Diurnal Average: 42.3 % at hour 17

Monthly Average: 55.0 %

Percentiles: $P_1 = 15$ $P_{10} = 25$ $Q_1 = 38$ Median = 56 $Q_3 = 72$ $P_{90} = 84$ $P_{99} = 97$

Hours in Service:	720
Hours of Data:	718
Hours of Missing Data:	2
Hours of Calibration:	0
Percent Operational Time:	99.7

Day	Hourly Period Ending At (MST)																								Daily	Daily
	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-Apr	57	67	74	72	72	75	70	68	66	61	55	51	50	48	47	42	34	34	39	47	53	51	53	55	55.8	75
2-Apr	55	55	53	51	53	74	74	60	47	43	40	40	38	40	44	45	47	49	48	54	71	85	85	84	55.7	85
3-Apr	84	89	86	83	85	82	81	79	74	70	65	61	56	51	49	47	45	45	46	50	55	58	66	72	65.8	89
4-Apr	73	78	82	84	82	83	85	79	70	63	56	47	40	36	33	32	33	36	38	41	43	47	54	57	57.2	85
5-Apr	61	67	68	69	68	69	68	68	66	62	56	50	44	42	42	46	54	59	62	69	74	83	92	94	63.9	94
6-Apr	95	95	96	95	97	97	95	93	93	92	93	93	91	86	88	83	83	85	85	84	83	81	79	79	89.3	97
7-Apr	80	82	81	80	81	84	84	84	83	81	79	74	73	73	73	70	68	70	71	71	72	71	71	72	76.1	84
8-Apr	78	80	79	63	65	66	66	65	62	59	56	54	52	47	45	46	46	49	50	53	54	56	58	61	58.7	80
9-Apr	62	64	66	70	73	71	62	59	60	67	69	66	61	69	74	75	79	67	60	61	63	62	63	67	66.2	79
10-Apr	67	62	59	59	61	65	65	61	56	51	45	38	33	30	27	24	21	20	21	24	34	45	51	49	44.5	67
11-Apr	45	47	47	48	50	51	51	53	51	49	45	42	38	35	32	29	28	28	29	36	42	49	52	53	42.9	53
12-Apr	57	63	68	77	77	74	73	77	81	77	69	58	51	48	49	49	48	50	52	56	61	66	71	75	63.7	81
13-Apr	74	76	77	77	80	78	81	80	72	64	61	59	58	66	66	86	91	88	87	91	91	90	92	95	78.3	95
14-Apr	96	96	93	88	91	94	95	95	92	88	87	84	84	76	72	68	67	67	69	71	74	73	68	67	81.5	96
15-Apr	79	77	82	88	91	92	85	74	73	68	64	57	55	54	51	51	50	50	52	55	55	56	59	60	65.9	92
16-Apr	61	64	65	62	64	67	69	68	62	56	49	37	29	25	23	22	21	21	23	28	29	30	39	44	44.2	69
17-Apr	47	48	49	53	56	59	60	58	55	49	40	34	28	24	24	25	26	27	30	33	38	47	54	54	42.4	60
18-Apr	57	62	69	70	69	70	67	58	49	40	34	24	20	17	16	17	17	17	15	14	15	16	16	16	36.0	70
19-Apr	16	18	19	21	25	29	31	31	28	27	23	19	16	15	13	12	12	13	13	16	21	26	29	48	21.8	48
20-Apr	66	67	64	60	59	63	AF	AF	61	60	56	53	49	45	42	39	33	32	33	37	40	41	44	47	49.6	67
21-Apr	51	60	67	78	78	81	76	57	49	44	41	35	29	25	23	21	20	20	23	25	28	33	41	44	43.8	81
22-Apr	48	54	52	58	62	64	63	55	44	35	29	26	23	21	20	19	19	21	23	26	29	37	45	46	38.3	64
23-Apr	39	38	43	57	62	65	63	49	33	30	25	21	21	20	21	22	22	22	24	28	28	31	32	31	34.4	65
24-Apr	34	36	37	38	39	40	41	41	41	40	41	39	35	33	35	36	35	34	34	32	34	43	59	62	39.0	62
25-Apr	63	64	67	69	70	72	74	77	76	74	70	68	64	58	56	56	56	56	56	59	61	66	66	66	65.1	77
26-Apr	69	72	74	75	75	76	77	76	73	69	66	68	75	79	86	87	83	82	77	76	80	82	82	84	76.7	87
27-Apr	89	93	95	96	97	98	98	98	98	89	79	72	66	58	49	47	45	43	44	47	55	60	68	80	73.5	98
28-Apr	84	85	91	94	94	91	87	75	60	48	39	31	28	27	25	24	24	25	27	29	27	29	32	34	50.4	94
29-Apr	32	36	38	40	41	42	40	39	32	29	25	24	24	23	22	23	22	22	23	22	24	26	28	32	29.6	42
30-Apr	33	34	41	41	42	40	39	39	40	38	34	30	27	33	39	38	37	37	35	33	36	41	46	53	37.7	53
	61.8	64.3	66.2	67.2	68.7	70.4	69.7	66.1	61.5	57.4	52.9	48.6	45.3	43.4	42.9	42.6	42.3	42.3	43.0	45.6	49.1	52.7	56.5	59.4	Diurnal Average	
	96	96	96	96	97	98	98	98	98	92	93	93	91	86	88	87	91	88	87	91	91	90	92	95	Diurnal Maximum	

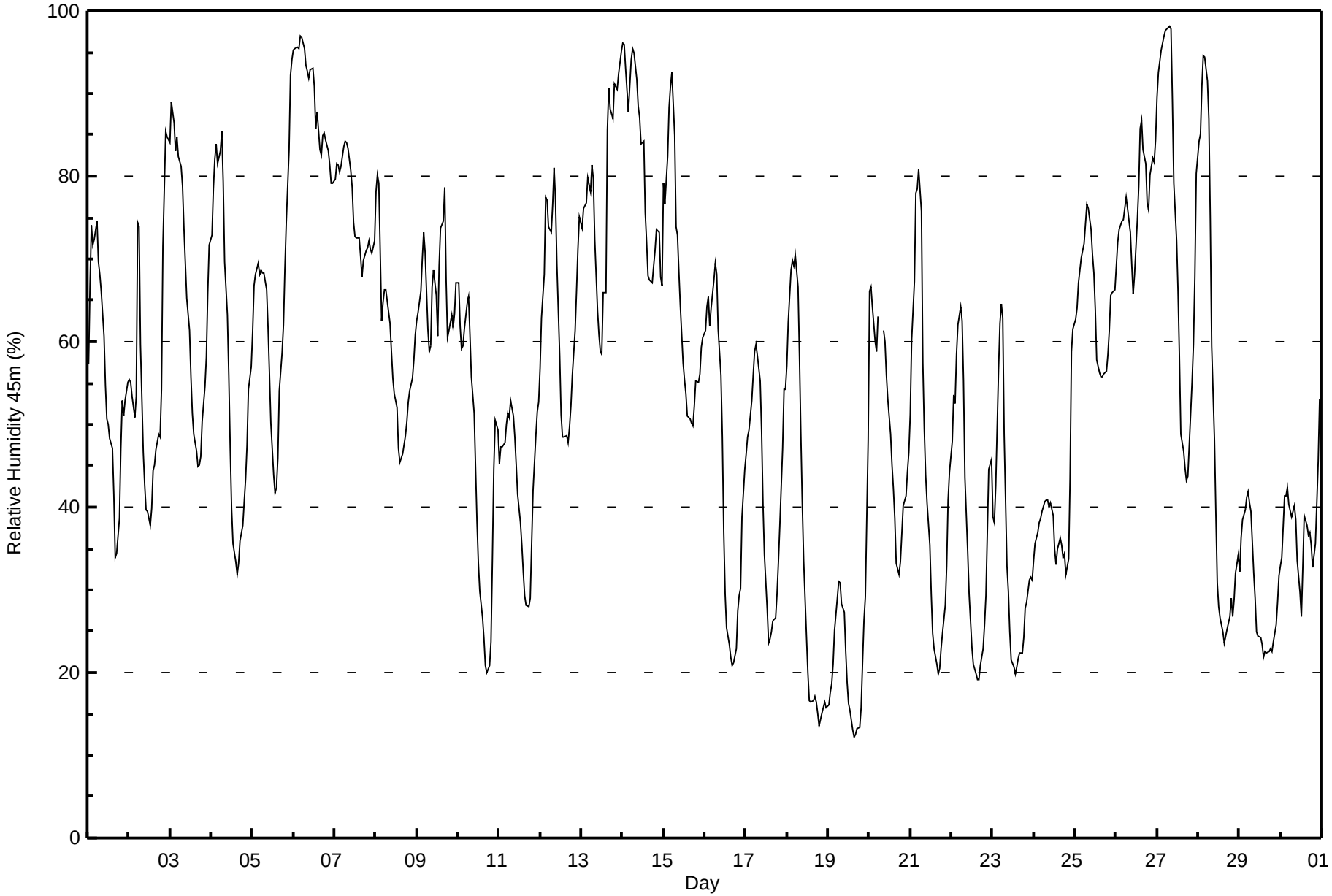
AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity 45m (RH45m) - %

Lower Camp Met Tower - April 2016



Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	28	3.90	3.90
20 - 40	178	24.79	28.69
40 - 60	201	27.99	56.69
60 - 80	205	28.55	85.24
80 - 100	106	14.76	100.00

Total Number of Valid Hours: 718

Total Number of Hours: 720

Maximum Value: 98 % on Apr 27 08:00

Maximum Daily Average: 90.5 % on Apr 6

Minimum Value: 12 % on Apr 19 16:00

Minimum Daily Average: 21.1 % on Apr 19

Maximum Diurnal Average: 67.5 % at hour 7

Minimum Diurnal Average: 42.9 % at hour 18

Monthly Average: 54.1 %

Percentiles: $P_1 = 14$ $P_{10} = 24$ $Q_1 = 36$ Median = 54 $Q_3 = 70$ $P_{90} = 84$ $P_{99} = 96$

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

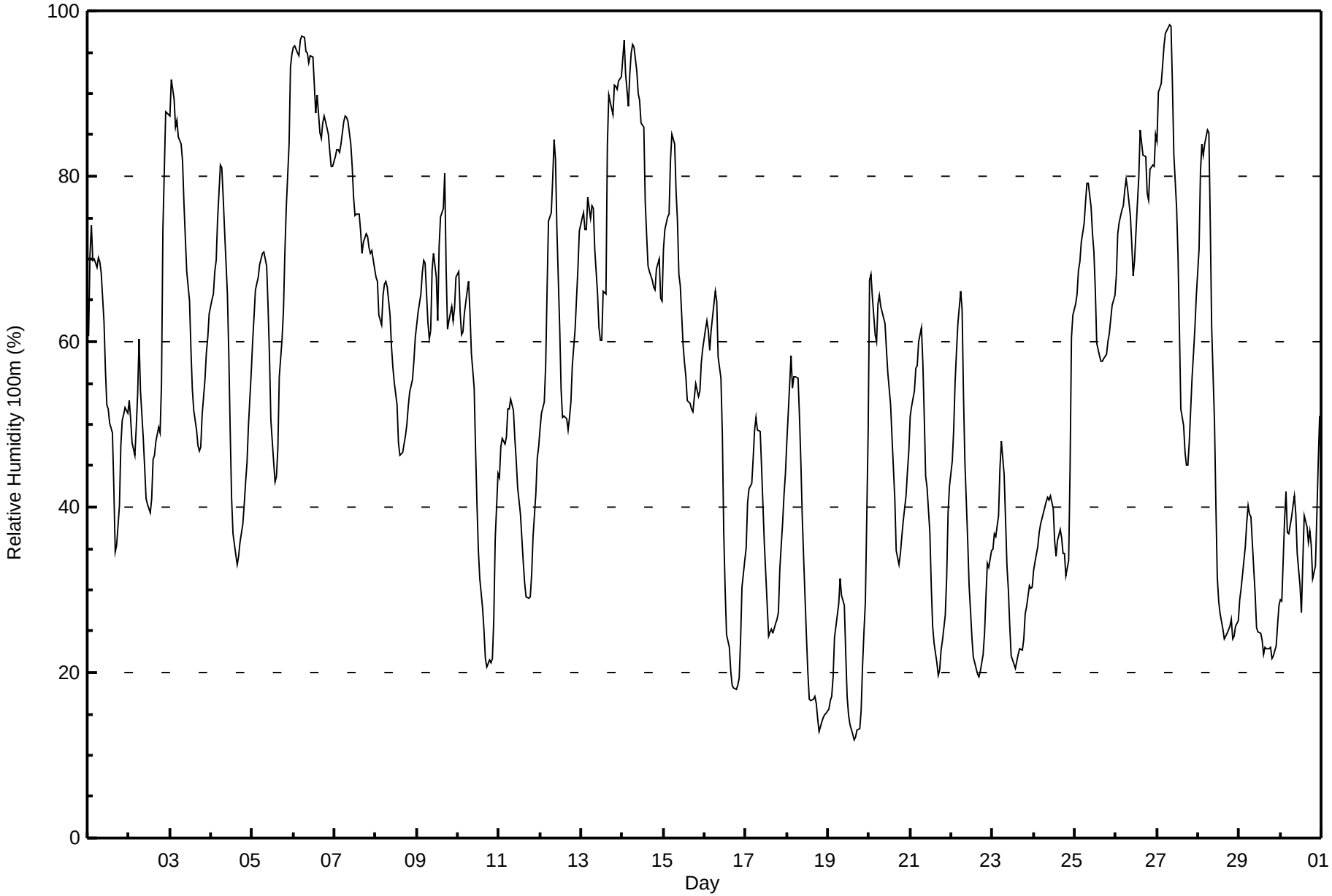
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	61	71	74	70	70	69	70	70	68	62	57	52	52	50	49	42	35	35	40	47	50	51	52	51	56.2	74
2-Apr	53	51	48	46	50	54	60	54	48	45	41	40	39	41	46	46	48	50	49	55	74	88	88	88	54.2	88
3-Apr	87	92	89	86	87	85	84	82	77	73	69	65	59	54	52	49	47	47	47	51	56	59	61	63	67.5	92
4-Apr	65	66	68	70	75	81	81	78	73	66	59	49	41	37	34	33	34	36	38	40	43	45	50	56	54.9	81
5-Apr	60	63	66	68	69	70	71	71	69	64	58	51	46	43	44	47	56	60	64	71	76	84	93	95	65.0	95
6-Apr	96	96	95	95	96	97	97	95	95	94	95	94	91	88	90	85	85	86	87	87	85	83	81	81	90.5	97
7-Apr	82	83	83	83	84	87	87	87	87	84	81	77	75	75	76	73	71	72	73	73	71	71	71	69	78.2	87
8-Apr	68	67	63	62	66	67	67	67	63	59	57	55	52	48	46	46	47	49	50	52	54	55	58	61	57.5	68
9-Apr	62	64	66	68	70	69	62	60	61	69	71	68	63	71	75	76	80	69	62	63	64	62	64	68	67.0	80
10-Apr	68	64	61	61	63	66	67	64	59	54	47	40	35	31	28	25	22	21	21	21	22	26	36	44	43.6	68
11-Apr	44	47	48	48	48	52	52	53	52	48	46	42	39	36	33	31	29	29	29	32	36	42	46	47	42.1	53
12-Apr	49	51	53	57	66	75	76	80	84	82	74	62	54	51	51	51	49	51	53	57	61	65	69	73	62.3	84
13-Apr	75	76	74	74	77	75	76	76	71	66	62	60	60	66	66	84	90	89	88	91	91	90	92	92	77.5	92
14-Apr	94	96	92	89	92	95	96	96	93	90	89	86	86	77	73	69	69	67	67	66	69	70	65	65	81.3	96
15-Apr	71	74	75	75	82	85	84	78	75	68	67	60	58	56	53	53	52	52	53	55	53	54	58	59	64.5	85
16-Apr	62	63	61	59	61	65	66	65	58	56	49	37	30	25	23	20	19	18	18	18	19	24	30	33	40.8	66
17-Apr	35	41	42	43	46	49	51	49	49	45	40	35	28	24	25	25	25	26	27	27	33	38	41	44	37.0	51
18-Apr	48	51	58	54	56	56	56	51	45	39	34	24	20	17	17	17	17	16	14	13	14	15	15	15	31.7	58
19-Apr	16	17	17	19	24	27	28	31	29	28	22	17	15	14	13	12	12	13	13	15	21	25	28	49	21.1	49
20-Apr	68	68	65	61	60	65	66	64	63	62	59	56	52	48	45	41	35	33	34	36	38	41	44	47	52.2	68
21-Apr	51	52	54	57	57	60	62	58	51	44	42	37	31	26	23	21	20	20	23	24	27	32	39	43	39.7	62
22-Apr	46	49	55	59	62	66	64	53	45	36	31	28	24	22	21	20	20	20	22	25	29	33	33	35	37.4	66
23-Apr	35	37	36	39	45	48	46	44	33	30	26	22	21	21	21	22	23	23	24	27	28	30	30	30	30.9	48
24-Apr	32	33	35	37	38	39	40	41	41	41	41	40	36	34	36	37	36	34	34	32	34	45	61	63	39.2	63
25-Apr	65	66	69	70	72	74	77	79	79	76	73	71	66	60	58	58	58	58	58	60	61	63	64	66	66.7	79
26-Apr	68	73	74	76	76	78	80	78	75	72	68	70	77	80	86	84	83	82	78	77	81	81	81	85	77.7	86
27-Apr	84	90	91	93	96	97	98	98	98	91	83	76	70	61	52	50	47	45	45	48	56	58	62	65	73.1	98
28-Apr	71	80	84	83	84	86	85	74	62	50	40	32	29	27	25	24	24	25	26	27	24	24	26	26	47.4	86
29-Apr	29	30	32	35	38	40	39	39	33	29	25	25	25	24	22	23	23	23	23	22	22	23	26	28	28.3	40
30-Apr	29	29	39	42	37	37	39	40	41	39	34	30	27	33	39	38	36	37	35	31	33	39	45	51	36.7	51
	59.1	61.3	62.3	62.6	65.0	67.1	67.5	65.8	62.6	58.8	54.6	50.1	46.7	44.7	44.0	43.4	42.9	42.9	43.2	44.8	47.5	50.6	53.6	56.4	Diurnal Average	
	96	96	95	95	96	97	98	98	98	94	95	94	91	88	90	85	90	89	88	91	91	90	93	95	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity 100m (RH100m) - %

Lower Camp Met Tower - April 2016



Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	32	4.44	4.44
20 - 40	183	25.42	29.86
40 - 60	199	27.64	57.50
60 - 80	202	28.06	85.56
80 - 100	104	14.44	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity 167m (RH167m) - %

Lower Camp Met Tower - April 2016

Maximum Value: 97 % on Apr 6 07:00

Maximum Daily Average: 91.7 % on Apr 6

Minimum Value: 12 % on Apr 19 16:00

Minimum Daily Average: 20.9 % on Apr 19

Maximum Diurnal Average: 65.6 % at hour 7

Minimum Diurnal Average: 43.4 % at hour 17

Monthly Average: 53.7 %

Percentiles: P_1 = 14 P_{10} = 24 Q_1 = 35 Median = 53 Q_3 = 70 P_{90} = 86 P_{99} = 96

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

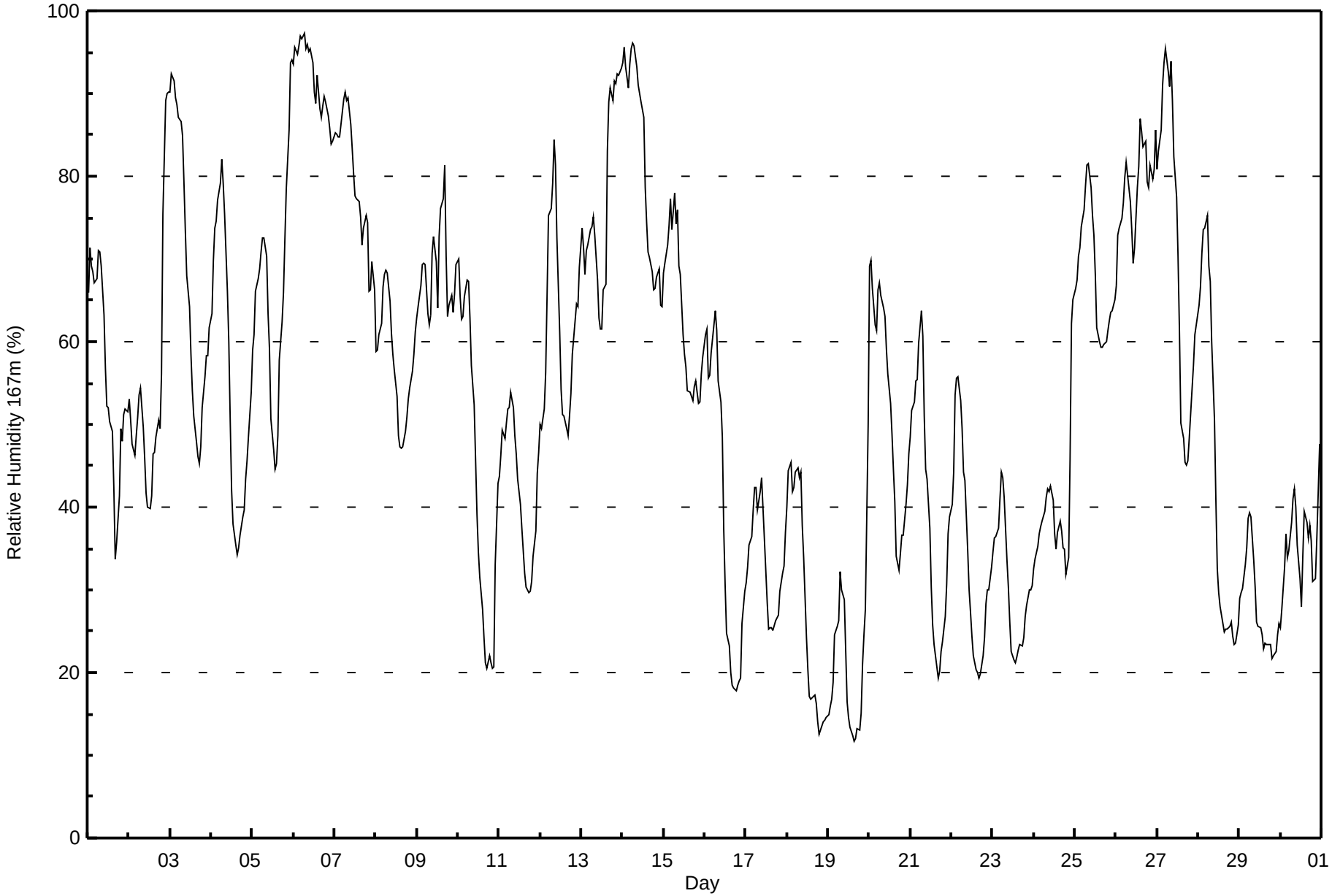
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	66	71	69	68	67	68	71	71	69	63	57	52	52	50	49	42	34	36	41	49	48	51	52	51	56.2	71
2-Apr	53	51	48	46	49	51	54	54	50	46	42	40	40	41	46	47	48	51	49	56	75	89	90	90	54.4	90
3-Apr	90	92	91	89	89	87	87	85	79	73	68	64	58	54	51	48	46	45	47	52	56	58	58	62	68.0	92
4-Apr	63	70	74	75	77	79	82	79	76	66	60	51	42	38	35	34	35	37	39	40	43	46	48	54	55.9	82
5-Apr	59	61	66	68	69	71	73	73	70	63	59	51	47	45	45	49	58	62	66	72	79	86	94	94	65.7	94
6-Apr	94	96	95	96	97	97	97	95	96	95	95	94	90	89	92	88	87	89	90	89	87	86	84	84	91.7	97
7-Apr	85	85	85	85	86	89	90	89	89	86	83	80	78	77	77	75	72	74	75	74	66	66	70	66	79.4	90
8-Apr	59	59	61	62	67	68	69	68	65	61	58	57	53	49	47	47	47	49	51	53	54	56	58	61	57.5	69
9-Apr	63	64	67	69	70	69	63	62	63	71	73	70	64	73	76	77	81	70	63	64	66	64	66	69	68.2	81
10-Apr	70	65	63	63	65	68	67	63	57	52	46	39	35	31	28	24	21	21	22	21	21	21	33	43	43.3	70
11-Apr	44	46	49	48	50	52	52	54	52	49	47	43	40	37	35	32	30	30	30	31	34	37	44	47	42.2	54
12-Apr	50	49	52	56	66	75	76	79	84	81	73	61	54	51	51	50	49	51	54	58	63	64	64	69	61.7	84
13-Apr	74	71	68	71	72	73	74	75	73	67	63	61	62	66	67	83	89	91	89	92	91	92	92	93	77.1	93
14-Apr	94	96	93	91	94	95	96	96	93	91	90	89	87	79	74	71	70	68	66	66	68	69	64	64	81.9	96
15-Apr	68	69	72	74	77	74	78	74	76	69	68	61	58	57	54	54	53	53	55	55	53	53	56	58	63.3	78
16-Apr	61	62	56	56	59	62	64	61	55	53	49	37	30	25	23	20	18	18	18	19	19	19	26	30	39.1	64
17-Apr	31	33	35	37	40	42	42	40	42	43	40	36	28	25	25	26	25	26	27	27	30	32	33	37	33.4	43
18-Apr	40	44	45	42	42	44	45	44	44	38	34	24	20	17	17	17	17	16	14	13	14	14	14	15	28.1	45
19-Apr	15	16	17	19	25	26	26	32	30	29	23	17	15	13	12	12	12	13	13	15	21	25	28	50	20.9	50
20-Apr	69	70	67	62	61	66	67	66	64	63	59	56	53	49	45	41	34	32	34	37	37	40	43	46	52.5	70
21-Apr	48	52	53	55	55	60	64	61	51	45	43	38	30	26	23	21	19	20	23	24	27	31	37	39	39.3	64
22-Apr	40	44	54	56	56	53	50	44	43	35	30	27	24	22	20	20	19	20	22	24	28	30	30	33	34.4	56
23-Apr	34	36	37	38	41	44	44	41	33	30	26	22	21	21	22	23	23	23	24	27	28	30	30	31	30.5	44
24-Apr	33	34	35	37	38	38	39	41	42	42	42	41	37	35	37	38	37	35	35	32	34	46	62	65	39.8	65
25-Apr	66	68	70	71	74	76	79	81	82	79	75	73	68	62	60	59	59	60	60	61	62	63	64	65	68.3	82
26-Apr	67	73	74	75	77	80	82	80	77	74	70	71	79	81	87	85	84	84	79	79	81	80	81	86	78.5	87
27-Apr	81	83	86	91	94	95	93	91	94	89	82	77	70	61	50	48	45	45	46	48	54	57	61	62	71.0	95
28-Apr	64	67	71	74	74	75	69	67	60	51	41	33	30	28	26	25	25	25	26	26	24	23	23	26	43.8	75
29-Apr	29	30	30	33	35	39	39	39	34	30	26	26	25	25	23	24	23	23	23	22	22	22	25	26	28.0	39
30-Apr	25	28	33	37	34	35	38	41	42	40	35	31	28	34	39	38	36	38	36	31	31	36	42	48	35.7	48
	57.9	59.5	60.4	61.4	63.2	65.0	65.6	64.9	62.9	59.2	55.2	50.8	47.4	45.4	44.6	43.9	43.4	43.5	43.9	45.3	47.2	49.6	52.4	55.4	Diurnal Average	
	94	96	95	96	97	97	97	96	96	95	95	94	90	89	92	88	89	91	90	92	91	92	94	94	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity 167m (RH167m) - %

Lower Camp Met Tower - April 2016



Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	34	4.72	4.72
20 - 40	194	26.94	31.67
40 - 60	188	26.11	57.78
60 - 80	205	28.47	86.25
80 - 100	99	13.75	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed 20 m (WS20m) - km/h

Lower Camp Met Tower - April 2016

Maximum Speed: 25 km/h on Apr 19 16:00

Maximum Daily Speed Average: 15.1 km/h on Apr 29

Minimum Speed Value: 0 km/h on Apr 4 05:00

Minimum Daily Speed Average: 0.7 km/h on Apr 4

Maximum Diurnal Speed Average: 3.0 km/h at hour 12

Minimum Diurnal Speed Average: 0.3 km/h at hour 18

Monthly Average Velocity: 1.6 km/h 149.7 deg

Percentiles: $P_1 = 0$ $P_{10} = 2$ $Q_1 = 4$ Median = 8 $Q_3 = 12$ $P_{90} = 16$ $P_{99} = 23$

Hours in Service: 720

Hours of Data: 711

Hours of Missing Data: 9

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-Apr	SSE4	SE2	WNW2	W5	WNW0	NW3	NW5	N8	N9	N13	N13	N10	NNE9	NNE8	NE8	NNE8	NNE8	NE7	NE7	NNE4	NNW3	NE3	ENE3	N5	NNE5.0	N13
2-Apr	E3	ENE3	NE4	E3	ENE3	N8	N4	ENE4	ESE9	SE6	SSE2	WSW6	NNW9	NW10	N15	N18	N19	N16	N14	N16	N12	N12	N13	N9	N6.9	N19
3-Apr	N8	NNW7	NNW8	N11	N12	N14	N14	N14	N15	N14	N12	N10	N9	N8	N8	N8	N5	NNE6	NNE6	NNE5	N4	N2	N3	N3	N8.6	N15
4-Apr	NNW3	NNW2	N2	W1	E0	NNW2	N4	N1	SE2	SE5	SSE6	SSE5	SSE8	SSE8	SE6	SSE5	S4	N5	N6	N5	NNW5	N5	N8	NNW3	ENE0.7	SSE8
5-Apr	N4	N4	N3	N3	N4	NNW3	N5	N4	NNW3	NNW3	N1	SW2	S8	S10	SSE14	S13	S16	S12	S11	S12	SSE14	SSE17	SSE16	SSE13	S4.8	SSE17
6-Apr	SE6	SSE6	SE5	NW3	N7	NNW8	NNW9	NNW8	N9	N9	N9	N6	N7	N8	AF	AF	NNE7	NNE7	AF	AF	AF	AF	AF	AF	----	N9
7-Apr	AF	ENE4	ENE3	NE3	NE4	NE2	N2	NNE2	N2	ESE2	SSE5	SSE7	SSE4	N5	NNE6	NNE7	NNE8	NNE8	N8	NNE6	N6	NNW3	N3	NNE4	NNE2.9	NNE8
8-Apr	NNW4	NNW3	N3	SE12	SE11	SE13	SE14	SE17	SE16	SSE19	SE17	SE18	SSE23	SSE20	SE23	SE22	SE20	SE18	SSE18	SSE18	SSE24	SSE20	SE14	SE16	SE15.1	SSE24
9-Apr	SE15	SE12	SSE2	NNW4	NW5	NNW6	NNW9	NNW12	NNW14	N12	N15	N15	N15	N14	N16	N15	N14	N17	N18	N15	NNW8	NNW7	NNW6	NNW6	N9.1	N18
10-Apr	N10	NNW12	N12	NNW11	N10	N9	NNE8	N9	N8	N7	N8	N7	N8	NNW5	NNW6	NNE5	N2	W4	WSW3	NNE1	NE0	SE0	SW0	SSE6	N5.4	N12
11-Apr	SSE13	SE9	SE9	SSE12	SSE10	SSE9	S7	SSE7	SSE10	SSE12	SSE11	SSE11	SSE11	SSE10	SE6	SE4	SSE4	SSE4	NNW2	NW1	WNW0	NNW2	NW2	W0	SSE6.2	SSE13
12-Apr	NNW2	NNW1	N2	NNW3	NNW5	N7	N6	N12	N7	N6	N7	N9	NNE8	N10	NNE9	N11	N12	N11	N11	N7	N7	N6	N4	N5	N6.9	N12
13-Apr	NNW3	N4	NNW5	N5	N4	NNW5	NNW4	N5	NNE3	SE10	SSE11	SSE9	SE8	SSE12	SSE6	SE8	SE3	SSW2	SSE8	SE9	SSE6	SE5	N1	NNW2	SE2.5	SSE12
14-Apr	N2	NW2	NNW6	NNW8	N8	NNW6	NNW7	N8	N8	N9	N8	N6	NNW7	NNW9	NW9	N4	NNE6	NNE5	N4	NNW4	N5	NNW3	WNW5	NW2	NNW5.6	NNW9
15-Apr	NNW3	N2	N2	NNW1	NNW1	ENE1	E1	SE1	SE4	SSE7	SSE9	SSE11	SSE10	SSE11	SE11	SE12	SE14	SE12	SE12	SE13	SE15	SSE17	SE17	SE13	SE7.5	SSE17
16-Apr	SSE3	E3	SSE12	SSE12	SSE8	SSE8	SSE4	SSE7	SSE10	SE11	SSE14	SSE10	WSW12	W14	W12	W14	W11	W10	W11	WSW5	NE0	SE3	SSE3	SSE9	SSW4.9	SSE14
17-Apr	SSE13	SSE10	SSE10	SSE7	SSE8	SSE6	SSE8	SSE8	SSE7	SSE11	SSE11	SSE7	S3	SSW3	WSW10	WSW9	W13	W8	W4	SSE2	SSE2	SSE4	SSE4	SSE7	S5.0	W13
18-Apr	SSE8	E1	SSE2	SSE8	SE8	SE4	SE7	SSE7	SSE11	SSE10	SSE10	SSE15	SSE16	SSW21	SSW21	SSW21	SSW22	S23	S20	S19	SSE22	SSE25	SSE22	SSE16	S13.4	SSE25
19-Apr	S13	SE8	SSE16	SSE9	SSE7	SW5	W12	NNW13	NNW9	W8	W14	W22	W24	W21	WNW24	WNW25	WNW25	NW21	NW20	NW15	NNW13	NW11	NW13	N15	WNW10.2	WNW25
20-Apr	NNE9	NNE12	N10	N12	N12	NNE14	NNE12	N15	NNE13	NNE13	N12	N12	N8	NNE8	NNE9	NNE9	NNE8	NNE8	NE7	NE6	NNW3	N3	NE2	NE3	NNE9.0	N15
21-Apr	N1	N2	NNW3	N1	NNW2	N1	NNW1	E1	S1	SSW3	WSW7	WNW4	N10	NNE9	NNE11	NNE12	NNE13	NNE15	NNE12	NNE9	NNE8	N5	NNW4	NNW4	N4.7	NNE15
22-Apr	N4	NNW4	NNW5	N4	N4	N5	N6	N8	NNW7	N9	N8	NNE9	NNE6	N8	N9	NNW6	N8	N13	NNE11	NNE9	N6	N6	N5	NNW3	N6.5	N13
23-Apr	S0	ESE6	NNW5	N5	NNW4	NNW4	N3	NNE2	SSW3	W1	SSE7	SSE10	SSE13	SSE11	SSE12	SSE11	SSE12	SSE11	SSE11	ESE7	SE10	SE13	SSE16	SSE20	SSE6.0	SSE20
24-Apr	SE16	SSE17	SSE18	SE13	SE15	SSE13	SE12	SE11	SSE12	SSE13	SSE13	S13	S14	S16	S12	S12	SSE9	SE10	SE12	SE16	SSE18	S19	SSW13	SSW13	SSE13.1	S19
25-Apr	S15	SSW12	SSW11	S10	S11	SSE15	S13	S13	S14	S12	S11	S12	SSE13	S10	SSW10	SSW9	SW8	SW9	SW11	SW7	SSW5	S4	S6	SSW8	S10.0	S15
26-Apr	SSW10	S6	S9	S13	S14	SSE7	SE9	SSE12	SSE11	SSE11	SSE10	S9	S10	SSE9	SE9	SE8	SSE9	SE6	SSE5	SSE4	SSE7	SSE7	SSE10	S3	SSE8.2	S14
27-Apr	W2	SW2	SSE2	SSE2	SE2	SE5	SE4	SE4	SSE5	SSE3	NNE5	N4	N7	N7	N6	NNE7	N7	NNE6	NE6	NNE6	NNW4	N4	N5	NNW3	NNE2.3	N7
28-Apr	NW2	NNW3	WNW1	NW1	SE2	SSE1	SE1	SSE6	SSE9	SE8	SE9	SSW11	S12	S12	S14	S15	S12	SE13	SSE10	SSE11	S9	SSE11	SSE12	SSE15	SSE7.5	S15
29-Apr	SSE14	SSE16	SSE16	SSE15	SE12	SE13	SE12	SSE12	SSE22	S20	S23	S20	S20	S18	S23	SSW20	SSW18	SW16	SSW11	S12	S13	S14	S13	S13	S15.1	S23
30-Apr	SSE15	SSE13	E4	E4	SSE6	S12	SSE10	SSE7	SE8	SSE12	SW20	SW18	SSW20	WSW16	W16	W15	W12	SSW6	S9	S13	S7	N4	ESE0	WNW2	SSW7.3	SSW20
	SSE3.0	SE2.2	SE1.6	ESE1.5	ESE1.6	E1.2	E0.8	ENE1.7	ESE2.3	SE2.9	SSE2.8	S3.0	S2.8	SSW2.3	SSW1.7	SW1.6	WSW1.0	NNE0.3	ESE0.6	SE1.5	SSE2.4	SSE2.9	SSE2.5	SSE2.7	Diurnal Average	
	SE16	SSE17	SSE18	SSE15	SE15	SSE15	N14	SE17	SSE22	S20	S23	W22	W24	SSW21	WNW24	WNW25	WNW25	S23	NW20	S19	SSE24	SSE25	SSE22	SSE20	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 20 m (WS20m) - km/h

Lower Camp Met Tower - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 10 km/h on Apr 19 15:00

Minimum Value: 0 km/h on Apr 15 05:00

Percentiles: $P_1 = 1$ $P_{10} = 1$ $Q_1 = 2$ Median = 3 $Q_3 = 4$ $P_{90} = 5$ $P_{99} = 8$

Hours in Service:	720
Hours of Data:	711
Hours of Missing Data:	9
Hours of Calibration:	0
Percent Operational Time:	98.8

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-Apr	2	2	2	2	1	1	2	5	4	5	5	4	4	4	4	3	3	3	3	1	2	1	2	2	5
2-Apr	1	2	2	2	2	4	2	4	3	2	2	3	4	5	6	6	6	5	4	5	4	4	4	4	6
3-Apr	4	3	3	4	4	5	5	4	5	5	5	4	4	4	3	4	2	2	2	2	2	1	1	1	5
4-Apr	1	1	1	1	1	1	1	1	1	2	2	3	3	3	3	3	1	3	2	1	1	2	2	1	3
5-Apr	2	1	1	1	2	1	2	1	1	1	2	2	4	4	5	4	4	3	3	3	3	4	4	4	5
6-Apr	5	3	4	1	3	3	3	3	3	3	3	4	3	3	AF	AF	3	3	AF	AF	AF	AF	AF	AF	5
7-Apr	AF	2	1	2	2	1	1	1	1	1	2	2	3	2	3	3	4	3	3	2	2	1	1	1	4
8-Apr	2	2	1	4	4	4	5	5	6	6	6	7	8	7	8	7	7	6	6	5	8	8	4	5	8
9-Apr	5	4	4	3	2	3	4	5	5	5	6	6	5	6	6	6	5	6	7	6	3	3	2	2	7
10-Apr	4	4	5	4	4	3	3	4	3	3	4	3	3	3	3	3	2	2	1	1	1	1	1	4	5
11-Apr	5	4	4	4	4	4	2	2	4	3	3	3	3	3	3	2	2	2	1	1	1	1	1	1	5
12-Apr	1	2	2	2	2	3	3	4	3	2	2	4	3	4	4	4	4	4	3	3	2	2	2	2	4
13-Apr	2	1	2	2	1	1	2	3	3	4	3	3	3	5	2	4	3	3	2	3	3	2	1	1	5
14-Apr	1	1	3	3	4	2	3	3	3	4	3	3	3	4	3	2	2	2	1	2	2	2	3	2	4
15-Apr	2	1	1	1	0	1	1	1	2	2	3	3	4	3	4	4	5	4	4	4	4	4	4	5	5
16-Apr	4	2	5	5	3	3	3	3	4	4	5	4	5	5	5	5	4	3	2	3	1	2	2	5	5
17-Apr	2	2	3	2	2	3	4	4	4	4	3	3	2	3	4	3	5	3	3	3	2	2	3	2	5
18-Apr	2	1	2	2	2	2	3	1	4	4	4	4	6	6	6	6	5	6	5	5	5	5	4	4	6
19-Apr	5	3	3	4	4	4	4	5	4	3	9	7	9	7	10	9	9	8	8	5	4	3	4	6	10
20-Apr	4	5	5	5	5	6	5	6	5	5	5	5	4	4	4	4	3	3	3	2	2	2	2	2	6
21-Apr	2	1	1	1	1	1	1	1	1	1	3	3	4	4	5	5	5	6	6	4	3	2	2	2	6
22-Apr	2	1	1	2	1	2	2	2	2	3	4	4	4	4	4	4	4	5	4	4	3	2	2	2	5
23-Apr	2	3	1	2	1	2	1	2	1	2	4	4	4	4	4	5	5	4	4	3	3	5	5	6	6
24-Apr	5	6	5	4	4	4	4	4	4	5	4	4	4	4	4	4	4	4	5	5	6	5	4	4	6
25-Apr	4	4	3	2	3	3	3	3	4	4	4	4	5	4	4	3	3	3	3	3	1	1	2	3	5
26-Apr	3	2	2	3	3	4	4	3	4	3	3	3	3	3	3	3	3	3	2	2	2	2	3	3	4
27-Apr	1	2	1	1	2	2	1	2	2	1	3	3	3	3	3	3	3	2	2	2	1	1	2	1	3
28-Apr	1	1	1	1	1	1	1	3	3	3	3	4	5	5	4	4	4	4	3	2	2	2	2	2	5
29-Apr	2	2	2	2	2	3	3	4	6	6	6	6	7	6	7	7	6	5	3	3	3	3	3	2	7
30-Apr	3	5	2	2	5	4	5	3	3	4	7	5	6	6	5	5	5	4	3	6	5	2	1	2	7
	5	6	5	5	5	6	5	6	6	6	9	7	9	7	10	9	9	8	8	6	8	8	5	6	
	Diurnal Maximum																								

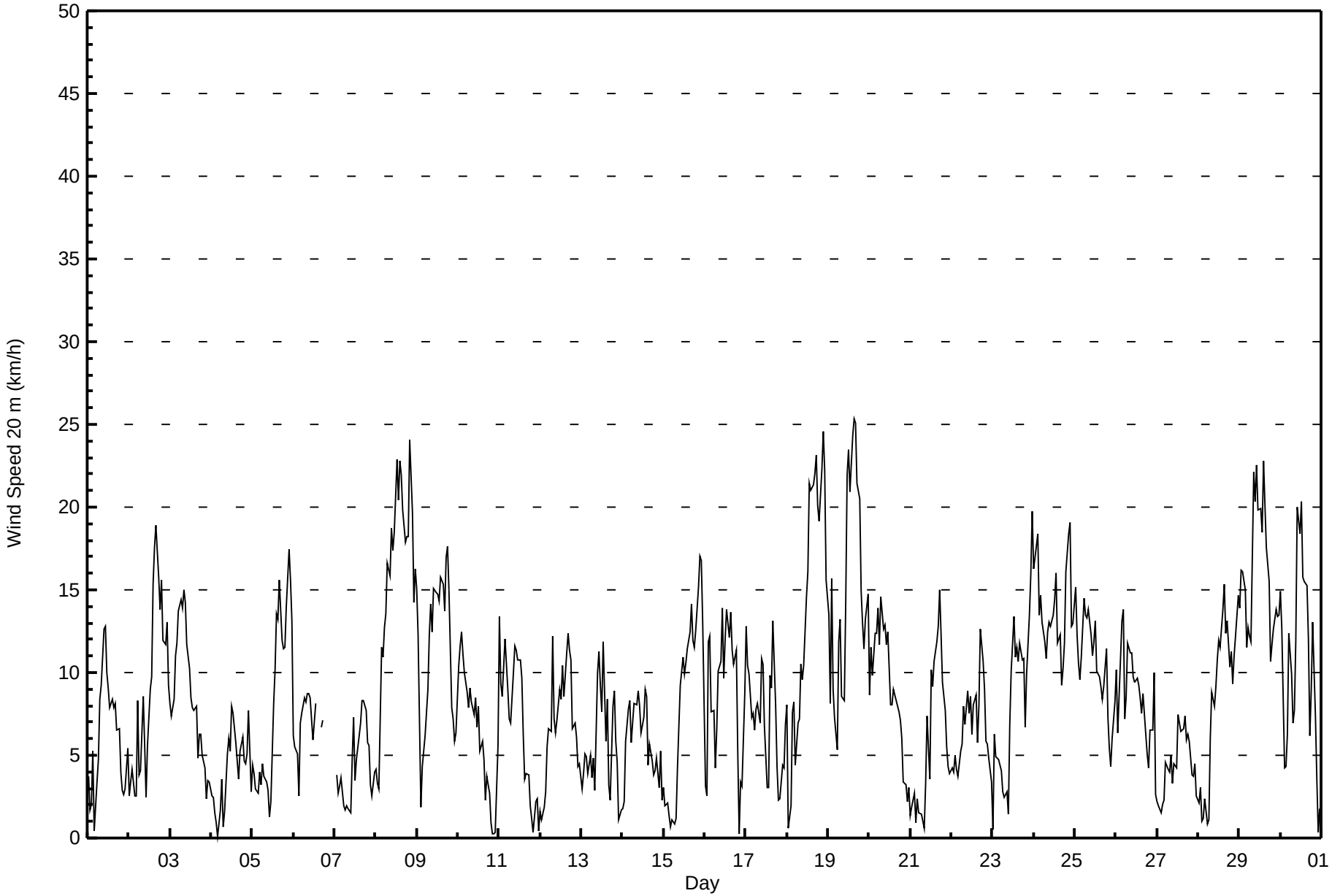
AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed 20 m (WS20m) - km/h

Lower Camp Met Tower - April 2016



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	223	31.36	31.36
6 - 11	273	38.40	69.76
12 - 19	181	25.46	95.22
20 - 28	34	4.78	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 711

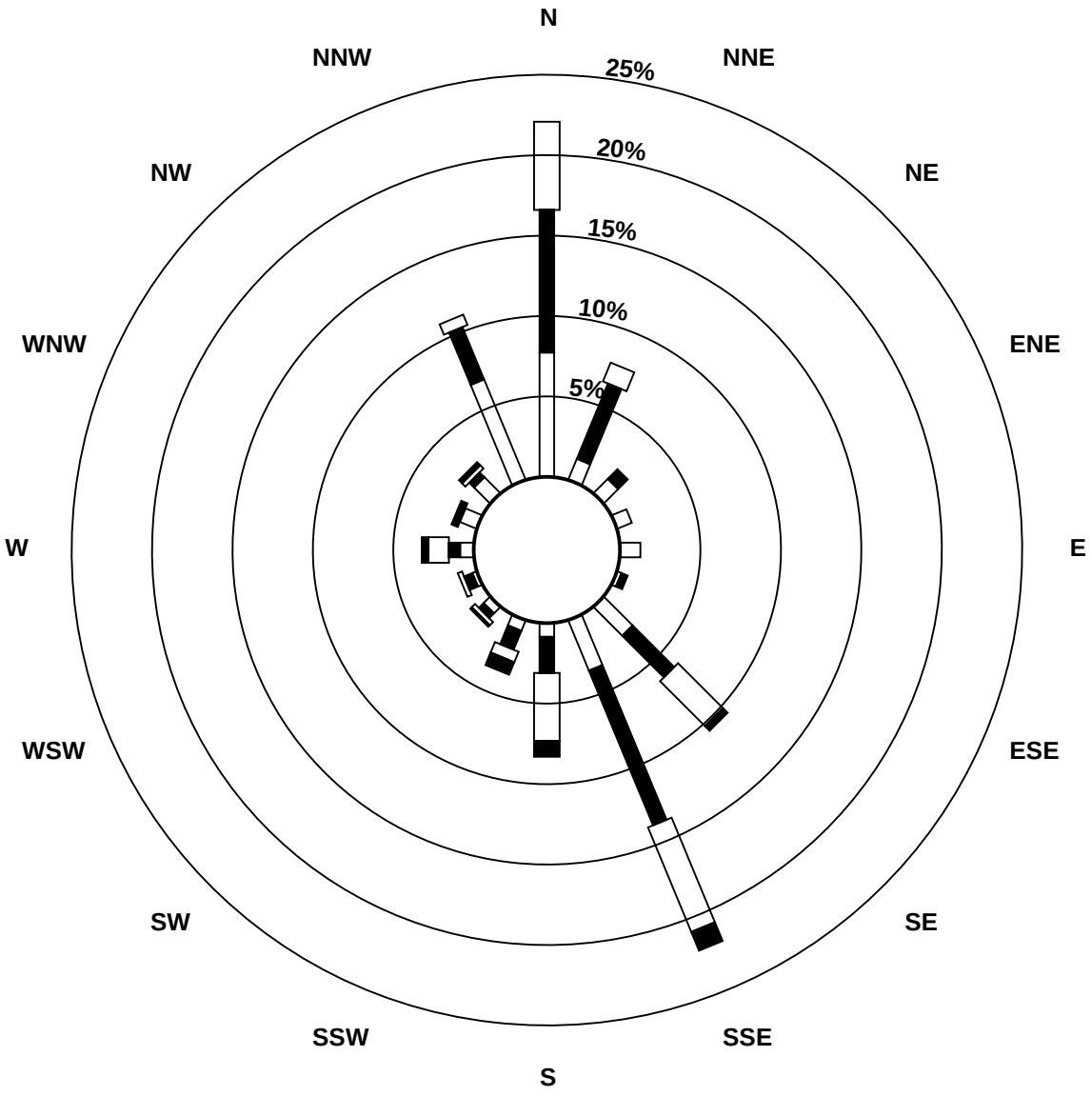
Total Number of Hours: 720

Wood Buffalo Environmental Association

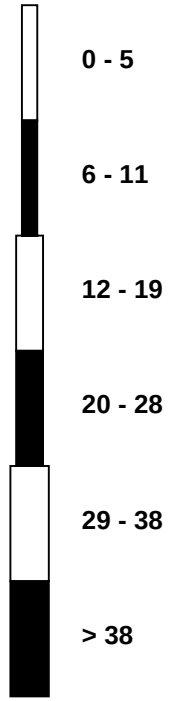
Wind Rose Apr 2016

Wind Speed 20 m (WS20m) - km/h

Lower Camp Met Tower (AMS 3)



Classes (km/h)



Total Number of Valid Hours: 711

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed 45 m (WS45m) - km/h

Lower Camp Met Tower - April 2016

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

Maximum Daily Speed Average: 20.3 km/h on Apr 8

Minimum Speed Value: 0 km/h on Apr 4 04:00

Minimum Daily Speed Average: 1.5 km/h on Apr 4

Maximum Diurnal Speed Average: 4.2 km/h at hour 10

Minimum Diurnal Speed Average: 0.6 km/h at hour 17

Monthly Average Velocity: 1.9 km/h 120.0 deg

Percentiles: $P_1 = 1$ $P_{10} = 3$ $Q_1 = 6$ Median = 11 $Q_3 = 15$ $P_{90} = 21$ $P_{99} = 30$

Hours in Service:	720
Hours of Data:	711
Hours of Missing Data:	9
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-Apr	SE6	SSW1	W4	W7	W3	NW5	NW6	N13	N14	N18	N19	N14	NNE13	NNE11	NNE12	NNE11	N11	NE9	NE10	NNE8	N5	NE4	E6	NE4	NNE7.0	N19
2-Apr	ESE5	E6	ENE6	E5	E5	N11	NNW6	ENE6	ESE11	SE6	SE2	WSW6	NNW11	NW13	NNW21	N24	N25	N22	N19	N21	N17	NNW16	NNW17	NNW12	N9.0	N25
3-Apr	N12	NNW10	NNW12	NNW15	NNW16	N19	N20	N19	N21	N19	N15	N13	N11	N10	N10	N10	N6	N8	NNE9	N8	N6	N4	N6	N5	N11.7	N21
4-Apr	NNW4	NNW4	N3	W0	SW1	NNW1	NNW4	N1	ESE2	SE5	SE6	SE6	SE9	SE9	SE7	SE5	SSE4	N8	N10	NNW8	NNW7	N8	N10	NNW5	NE1.5	N10
5-Apr	NNW7	N6	NNW5	NNW4	N6	NNW5	NNW6	NNW5	NNW4	NNW3	NNW2	SW2	SSE9	SSE12	SSE16	S15	S17	S13	S13	S13	SSE15	SSE20	SE20	SE18	SSE5.2	SSE20
6-Apr	SE10	SE7	SE7	NW4	NNW10	NNW11	AF	NNW11	AF	AF	AF	AF	AF	AF	NNE11	N12	NNE12	N12	NNE12	NNE11	NNE12	NNE10	N8	N7	----	NNE12
7-Apr	N6	ENE6	ENE4	NE4	NNE5	NE3	N2	NNE2	NNW2	ESE2	SE5	SSE8	SE3	N6	NNE8	NNE9	N11	N13	N11	N9	N9	NNW5	N4	NNE6	NNE4.5	N13
8-Apr	NNW6	NNW4	NNE3	SE16	SE14	SE17	SE19	SE22	SE21	SE25	SE23	SE24	SE31	SE27	SE30	SE28	SE26	SE24	SE24	SE24	SE31	SE26	SE20	SE22	SE20.3	SE31
9-Apr	SE22	SE17	SE5	NNW6	NW8	NNW9	NNW12	NNW17	NNW20	N18	N21	NNW21	N21	NNW20	N23	N22	N19	N23	N26	N21	NNW11	NNW11	NNW9	NNW9	N12.7	N26
10-Apr	NNW15	NNW16	NNW17	NNW15	NNW14	N12	N11	N13	N11	N9	N11	N8	NNW10	NNW7	NNW7	NNE6	N3	W4	SW3	NE1	ESE1	N0	ESE1	SE10	N7.2	NNW17
11-Apr	SE19	SE13	SE11	SE17	SE16	SE13	SSE9	SE8	SE13	SE14	SSE13	SSE12	SSE12	SE12	SE7	ESE4	SE4	SE5	NNW2	NNW1	WSW1	NNW4	NW3	NNW2	SE7.8	SE19
12-Apr	WNW2	NW2	NNW2	NNW5	NNW8	NNW10	NNW9	N17	N9	NNW8	NNW8	N12	N11	N14	NNE12	N15	N17	N16	N15	NNW10	N11	N10	N8	N7	N9.7	N17
13-Apr	NNW5	N6	N7	NNW8	N6	N7	NNW5	N7	N3	SE13	SE16	SE13	SE9	SE15	SSE6	SE12	SE5	SSW3	SSE9	SE13	SSE8	SE6	NE1	N2	ESE3.6	SE16
14-Apr	N3	NNW3	NNW9	NNW11	NNW12	NNW9	NNW10	N11	N12	N13	N11	NNW9	NNW9	NNW12	NW11	N6	N8	N7	N6	NNW6	N7	NNW5	WNW8	WNW4	NNW8.1	N13
15-Apr	NNW4	N3	N4	N3	NNW1	NW1	NE1	SE1	SE4	SE7	SE11	SE12	SE12	SE12	SE14	SE15	SE18	SE16	SE15	SE17	SE21	SE24	SE24	SE19	SE9.5	SE24
16-Apr	SE6	E4	SE18	SE18	SE12	SE12	SE7	SE11	SE15	SE17	SE19	SSE12	WSW15	W17	WSW16	WSW17	WSW16	W15	WSW17	WSW10	S2	SE7	SSE5	SSE12	S7.1	SE19
17-Apr	SE15	SE12	SE11	SE9	SE9	SE8	SE9	SE13	SE11	SE14	SE12	SE7	S3	SSW3	WSW12	WSW11	WSW17	W11	W6	SSE3	SE4	SE9	SE8	SE8	SSE6.1	WSW17
18-Apr	SE11	SE4	SE4	SE10	SE11	SE6	SE9	SE9	SE14	SE14	SE14	SE19	SSE18	S23	S23	S23	S24	S25	S22	S21	SSE25	SSE28	SSE25	SSE18	SSE15.6	SSE28
19-Apr	SSE15	SE10	SE19	SSE11	SE9	SW8	WSW17	NW17	NNW11	W10	WSW19	WSW30	W31	W28	W31	W33	WNW32	WNW27	WNW26	WNW19	NW17	NW15	WNW18	NNW20	W13.5	W33
20-Apr	NNE13	NNE18	N15	N18	N18	NNE22	AF	AF	N18	N18	N17	N16	N10	NNE11	N12	NNE11	NNE11	NNE10	NNE10	NNE10	N5	N4	NE3	NE5	NNE12.4	NNE22
21-Apr	N2	N3	NNW4	N2	N4	N3	N2	ENE1	ESE0	SSW3	SW8	WNW5	N13	N12	N14	NNE16	NNE19	NNE22	NNE19	NNE14	N11	N8	NNW7	N6	N7.1	NNE22
22-Apr	N7	NNW6	NNW7	N6	NNW5	N7	N7	N9	NNW9	N11	N10	NNE11	N8	N11	N12	NW7	N11	N18	NNE17	NNE14	N9	N8	N8	NNW6	N9.2	N18
23-Apr	SE3	ESE9	N5	N7	NNW6	NNW6	NNW3	NNE3	SSW3	W1	SSE8	SSE12	SSE15	SSE12	SSE13	SSE12	SE14	SE14	SE15	ESE10	ESE13	SE18	SE22	SSE25	SE7.8	SSE25
24-Apr	SE22	SE26	SE24	SE19	SE20	SE19	SE17	SE15	SE16	SE17	SE16	SSE15	S15	S17	S13	S13	SSE11	ESE14	SE16	SE21	SSE22	SSE20	S15	S15	SSE16.6	SE26
25-Apr	S17	S14	S12	S11	S12	SSE15	SSE14	SSE14	SSE15	S14	S12	SSE13	SSE15	S11	S11	SSW11	SW10	SSW11	SW14	SSW10	SSW8	S7	S8	SSW11	S11.5	S17
26-Apr	SSW13	S8	S9	S14	SSE15	SSE8	SE12	SSE13	SE14	SE14	SE12	SSE11	SSE11	SSE10	SE11	SE10	SE13	SE9	SE7	SSE5	SSE8	SE9	SSE12	S4	SSE9.9	SSE15
27-Apr	WSW4	WSW4	S1	SSE2	SE4	SE7	SE5	SE5	SE5	SSE3	N6	N5	N9	N8	N8	N8	N9	NNE8	NNE9	NNE9	N6	N5	N8	NNW4	NNE3.2	NNE9
28-Apr	NNW3	NNW5	NW2	W2	SE4	SE4	SE3	SE7	SE11	SE9	SE11	S13	S13	SSE13	S15	SSE17	SSE14	SE18	SE15	SSE13	SSE11	SSE12	SSE13	SE17	SSE8.9	SE18
29-Apr	SSE15	SSE19	SE19	SE18	SE16	SE17	SE17	SE15	SSE24	SSE22	SSE24	S23	S23	S21	S25	S24	SSW21	SSW18	SSW12	S13	S16	S17	S15	SSE15	SSE17.7	S25
30-Apr	SSE17	SSE15	E6	E6	SSE10	SSE14	SSE11	SE8	SE10	SSE14	SSW23	SSW21	SSW24	WSW20	WSW20	WSW21	W16	S7	S10	S15	SSE7	N5	ESE2	SW1	SSW8.8	SSW24
	SE3.5	ESE3.0	ESE2.3	E2.2	E2.4	ENE1.9	E1.5	ENE2.5	E3.6	ESE4.2	SE3.6	SSE3.4	S3.2	S2.4	SSW0.8	SW0.8	W0.6	NNE1.4	NE1.8	E2.0	ESE2.6	SE3.1	SE2.8	SE3.1	Diurnal Average	
	SE22	SE26	SE24	SE19	SE20	NNE22	N20	SE22	SSE24	SE25	SSE24	WSW30	W31	W28	W31	W33	WNW32	WNW27	WNW26	SE24	SE31	SSE28	SSE25	SSE25	Diurnal Maximum	

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Hours of Calibration:	0
Percent Operational Time:	98.8

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-Apr	2	2	3	2	1	2	2	6	5	6	6	5	5	4	4	3	4	3	3	1	3	2	2	2	6
2-Apr	2	2	2	2	3	4	2	4	3	3	2	3	4	6	6	6	6	6	4	5	4	4	4	4	6
3-Apr	4	3	4	4	5	5	5	5	5	5	4	4	4	4	4	4	3	3	3	3	2	2	1	1	5
4-Apr	2	1	2	0	1	1	2	1	1	3	3	4	3	3	3	3	1	4	2	2	2	2	1	2	4
5-Apr	2	1	1	1	2	1	2	2	2	1	2	2	4	4	5	4	4	3	3	3	3	4	4	4	5
6-Apr	6	3	4	2	3	3	AF	3	AF	AF	AF	AF	AF	AF	3	3	4	3	3	3	3	4	3	2	6
7-Apr	2	2	2	2	2	1	1	1	1	1	2	2	3	3	3	3	4	4	3	3	2	2	2	1	4
8-Apr	2	2	1	4	4	5	5	6	7	7	6	7	8	8	8	8	7	6	6	6	7	9	4	4	9
9-Apr	4	4	7	3	3	3	4	6	6	5	6	6	6	6	7	6	6	7	8	6	3	3	3	3	8
10-Apr	4	5	5	4	4	4	4	4	4	3	4	4	3	3	3	3	2	2	1	1	1	1	2	5	5
11-Apr	5	4	4	4	5	4	3	2	4	3	3	3	3	4	3	2	2	1	1	1	1	1	1	1	5
12-Apr	1	2	2	2	2	3	4	5	4	2	2	4	4	4	4	4	4	3	4	3	3	2	3	2	5
13-Apr	2	2	2	2	2	2	2	3	4	4	3	3	4	5	2	4	4	3	2	3	3	2	1	1	5
14-Apr	1	1	4	4	4	2	3	3	4	4	3	3	2	4	3	2	2	2	2	2	2	2	3	3	4
15-Apr	3	1	1	1	1	0	1	1	2	2	3	3	4	4	4	5	5	4	4	4	4	4	4	5	5
16-Apr	6	3	4	5	4	4	4	4	4	5	4	5	5	5	4	5	4	3	2	3	1	2	2	6	6
17-Apr	2	2	3	2	2	3	4	4	4	4	3	3	2	3	4	3	5	3	2	3	3	1	3	3	5
18-Apr	3	3	1	2	2	2	2	1	4	3	5	4	5	5	5	6	5	6	4	5	5	5	5	5	6
19-Apr	5	4	3	3	4	6	4	5	4	3	12	6	8	7	10	9	9	8	8	5	5	3	4	7	12
20-Apr	5	5	5	6	6	7	AF	AF	6	6	5	5	5	5	5	5	4	3	3	2	3	2	2	2	7
21-Apr	2	1	2	1	1	1	1	1	1	1	3	4	5	4	5	5	6	6	6	4	3	2	2	2	6
22-Apr	2	2	2	2	1	2	2	2	2	3	4	5	4	4	5	5	6	5	4	4	4	3	2	2	6
23-Apr	3	3	2	3	1	2	1	2	1	2	5	4	4	4	5	5	5	4	4	3	4	5	6	6	6
24-Apr	5	6	4	4	4	4	4	4	5	5	5	4	4	4	4	4	4	4	5	5	5	6	4	4	6
25-Apr	4	4	3	2	2	3	4	3	4	3	3	4	5	4	4	3	3	3	3	3	2	1	1	3	5
26-Apr	4	2	2	3	3	4	4	3	3	3	3	3	3	3	2	3	3	3	2	1	2	3	3	4	4
27-Apr	1	3	1	1	3	2	2	2	2	1	3	3	3	3	3	4	3	2	3	2	2	1	2	2	4
28-Apr	1	1	1	1	2	2	1	3	3	3	3	4	4	5	4	5	4	5	4	2	2	2	3	1	5
29-Apr	2	2	2	1	2	3	3	4	6	6	6	6	7	6	6	6	6	5	3	2	3	3	2	3	7
30-Apr	4	5	2	2	6	3	5	3	4	4	8	5	7	6	4	5	6	3	3	7	5	3	2	1	8
	6	6	7	6	6	7	5	6	7	7	12	7	8	8	10	9	9	8	8	7	7	9	6	7	
	Diurnal Maximum																								

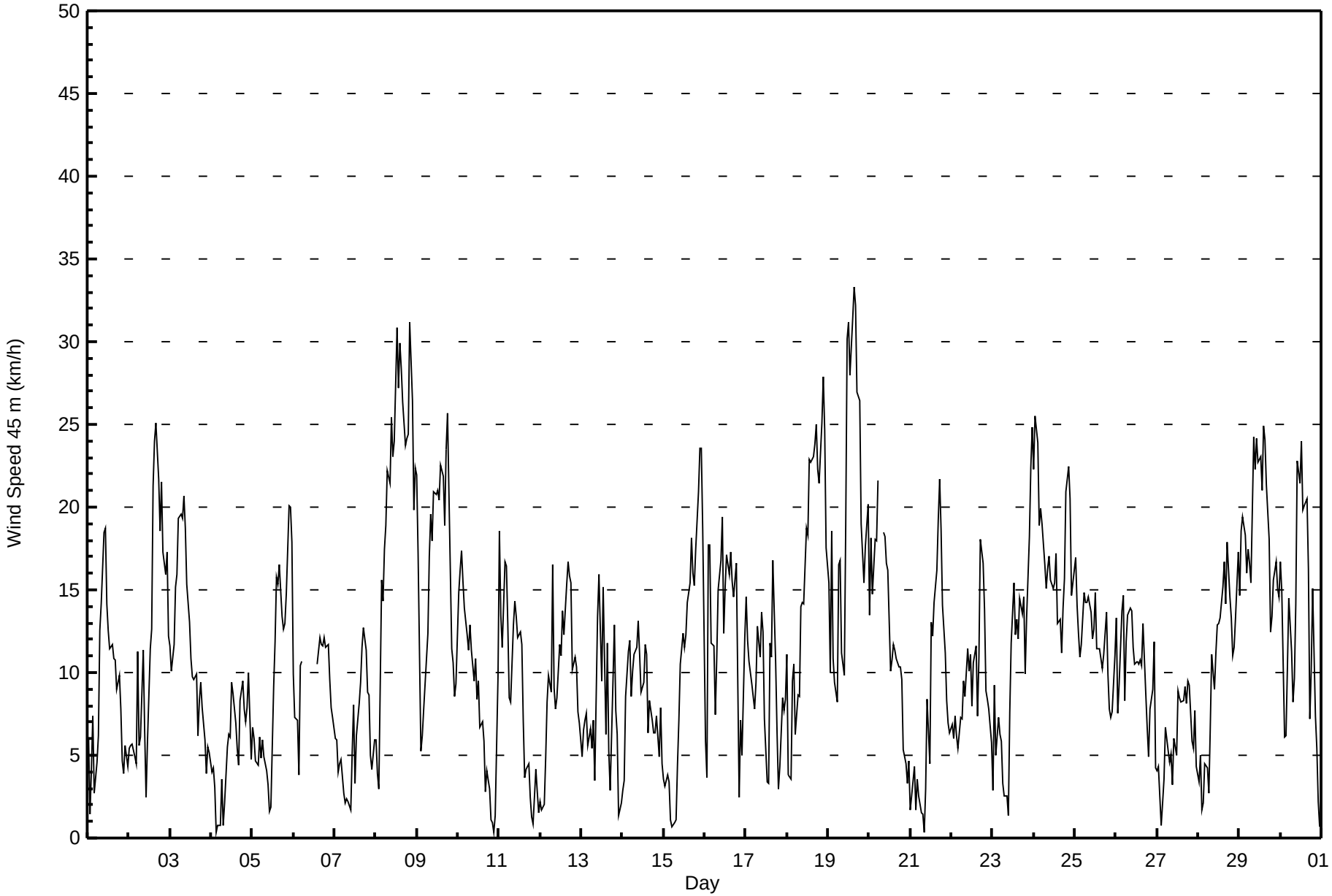
AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed 45 m (WS45m) - km/h

Lower Camp Met Tower - April 2016



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

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	145	20.39	20.39
6 - 11	248	34.88	55.27
12 - 19	233	32.77	88.05
20 - 28	77	10.83	98.87
29 - 38	8	1.13	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 711

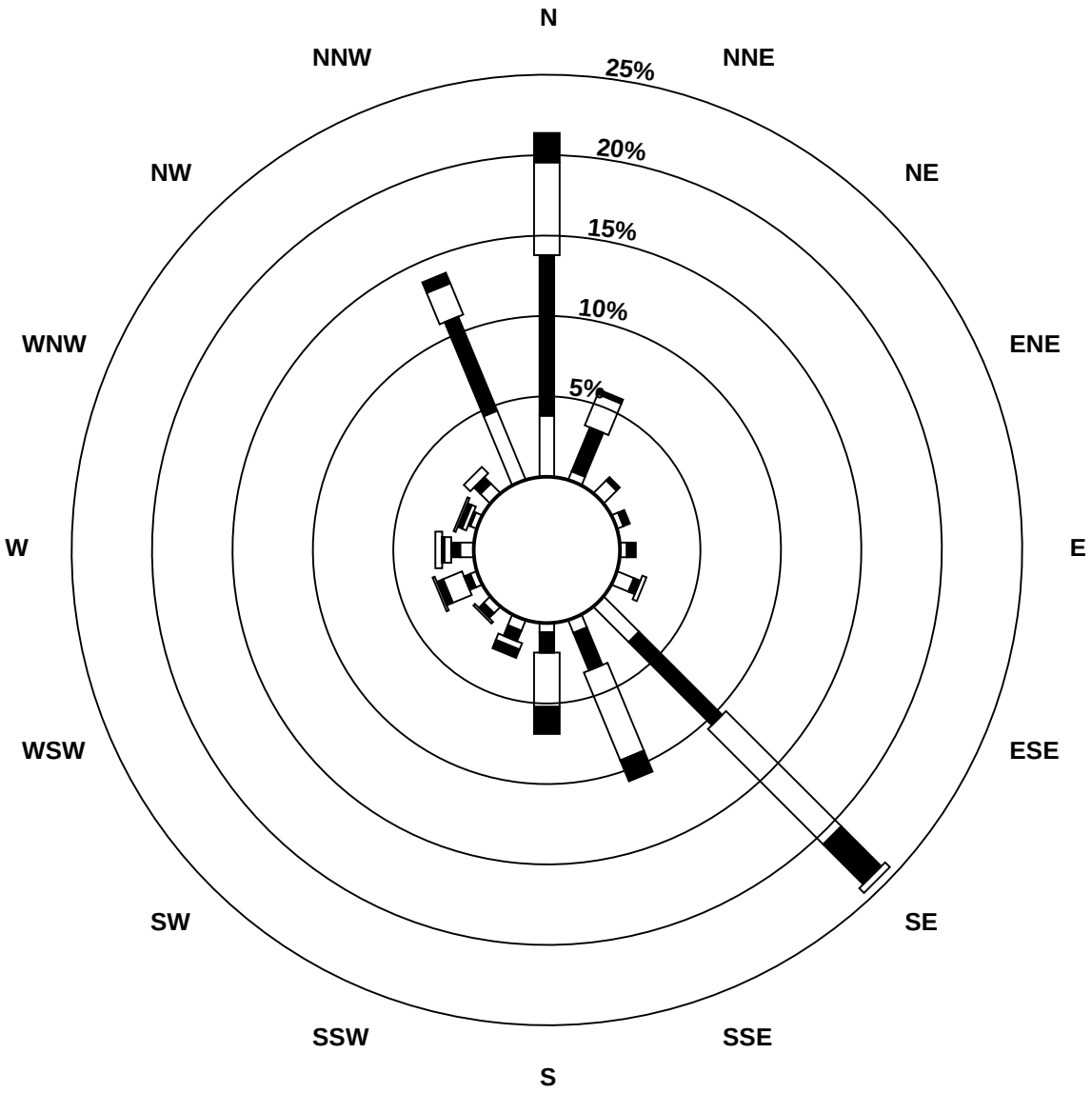
Total Number of Hours: 720

Wood Buffalo Environmental Association

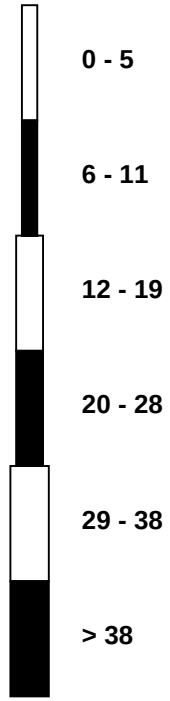
Wind Rose Apr 2016

Wind Speed 45 m (WS45m) - km/h

Lower Camp Met Tower (AMS 3)



Classes (km/h)



Total Number of Valid Hours: 711

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed 100 m (WS100m) - km/h

Lower Camp Met Tower - April 2016

Maximum Speed: 45 km/h on Apr 19 16:00

Maximum Daily Speed Average: 31.2 km/h on Apr 8

Minimum Speed Value: 0 km/h on Apr 5 12:00

Minimum Daily Speed Average: 2.9 km/h on Apr 4

Maximum Diurnal Speed Average: 5.7 km/h at hour 1

Minimum Diurnal Speed Average: 0.2 km/h at hour 17

Monthly Average Velocity: 2.9 km/h 120.7 deg

Percentiles: $P_1 = 2$ $P_{10} = 5$ $Q_1 = 9$ Median = 15 $Q_3 = 21$ $P_{90} = 27$ $P_{99} = 42$

Hours in Service: 720

Hours of Data: 716

Hours of Missing Data: 4

Percent Operational Time: 99.4

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-Apr	SSW7	WSW9	W12	W11	WNW6	N8	N11	N19	N20	N26	N24	N20	NNE17	NNE15	NNE14	NNE14	NNE13	NE12	NE12	NE12	NE10	E7	SE13	ESE10	NNE8.8	N26
2-Apr	SE15	SE16	ESE16	SE16	SE16	ENE7	NE7	E12	ESE14	ESE8	ESE3	W3	NW13	NW15	NNW29	N32	N34	N30	N25	N29	N22	N22	N23	N18	NNE10.2	N34
3-Apr	N16	NNW14	N17	N21	N22	N26	N27	N25	N26	N24	N19	N16	N13	N13	N12	N11	N8	NNE11	NNE12	NNE13	NNE10	N7	NNE8	NNE5	N15.4	N27
4-Apr	NNW4	NW4	NNW3	NE2	S3	SSE4	SE3	SE2	ESE6	SE7	SE7	SE9	SE11	SE11	SE10	SE8	SE6	NNE10	N14	NNE13	N11	NNE9	N13	N11	ENE2.9	N14
5-Apr	N12	N11	N10	N9	N10	N9	N8	NNW5	N6	NNW3	WNW2	SSW0	S10	SSE13	SSE18	SSE17	S18	S15	S15	S17	SSE17	SSE25	SSE26	SSE25	SSE5.5	SSE26
6-Apr	SE19	SSE10	SSW3	NW11	NNW18	NNW20	AF	NNW20	N17	AF	AF	AF	NNW14	N13	NNE15	N16	NNE16	N16	NNE15	NNE15	NNE16	NNE14	N11	N10	N10.5	NNW20
7-Apr	N8	ENE9	ENE6	NE6	NE6	ENE4	N2	NE3	N2	ESE3	SE7	SE9	ESE4	N8	NNE11	NNE12	NNE14	NNE17	N15	NNE13	NNE16	N10	NNE7	ENE8	NE6.7	NNE17
8-Apr	ENE4	ESE7	SE15	SE24	SE22	SE27	SE29	SE30	SE32	SE35	SE32	SE34	SE42	SE39	SE42	SE41	SE39	SE38	SE37	SE37	SE44	SE38	SE31	SE34	SE31.2	SE44
9-Apr	SE33	SE28	SE19	NNW9	NNW13	NW19	NNW21	NNW24	NNW28	N24	N28	NNW28	N29	N27	N30	N31	N26	N32	N36	N29	NNW18	NNW19	NNW16	NNW18	N17.9	N36
10-Apr	NNW24	NNW25	NNW25	NNW23	N20	N18	N18	N16	N15	N12	N13	N11	NNW11	NNW8	NNW8	NNE7	NNE3	W3	SW3	SE3	ESE4	SE8	SE15	SE22	N8.8	NNW25
11-Apr	SE31	SE21	SE20	SE25	SE25	SE20	SSE10	SE14	SE17	SSE17	SSE15	SSE14	SSE15	SE14	SE9	ESE5	SE5	SE6	ENE3	ESE4	E2	NE2	NNW9	NNW6	SE11.2	SE31
12-Apr	NW5	NW2	NW3	NNW8	N18	N17	N13	N21	N12	N9	NNW10	N14	NNE14	N17	NNE17	N19	N20	N20	N21	N16	N17	NNE15	NNE13	N13	N13.6	N21
13-Apr	N8	NNE8	NE8	NNW9	ENE9	NE5	NE3	NNW1	ESE5	SE19	SE21	SE18	SE12	SE16	SSE7	SE18	SE12	SSE4	SSE12	SE21	SE14	SSE7	S3	E3	SE7.4	SE21
14-Apr	ENE6	NNE6	N16	N18	N19	NNW15	NNW17	N16	N17	N19	N15	NNW12	NNW12	NNW16	NW15	N9	N11	NNE11	N10	NNW13	N13	NNW10	WNW14	W9	NNW12.1	N19
15-Apr	NNW5	NE5	NNW6	N10	N5	NW2	WSW5	SSW1	SE5	SE7	SE12	SE15	SE14	SE15	SE18	SE20	SE22	SE21	SE22	SE26	SE31	SE34	SE34	SE30	SE12.5	SE34
16-Apr	SE15	SE5	SE26	SE26	SE22	SE22	SE20	SSE18	SSE19	SSE18	SE21	SSE14	WSW17	WSW23	WSW19	WSW22	WSW19	W20	W23	WSW16	SW15	SW10	SSW5	SSE8	S10.8	SE26
17-Apr	SSE14	SSE16	SSE14	SSE15	SSE9	SSE14	SE17	SE24	SSE19	SSE9	SSE11	SSE7	SSW4	SW5	WSW13	WSW13	WSW22	W13	WNW9	SSW2	ESE7	SE14	SSE13	SSE15	S8.8	SE24
18-Apr	SSE17	SSE14	SSE11	SSE16	SSE16	SSE18	SSE17	SSE16	SE20	SE21	SE18	SSE20	SSE21	S24	SSW24	SSW25	S27	S30	S31	S29	SSE33	SSE36	SSE30	S24	SSE21.3	SSE36
19-Apr	S22	SSE11	SSE16	SSW12	SSW8	WSW23	WSW25	NW22	NW15	W11	WSW25	WSW38	W42	W39	W43	W45	WNW43	WNW38	WNW39	WNW29	NW30	NW27	WNW30	NNW27	W21.4	W45
20-Apr	NNE19	NNE25	N22	N27	N25	NNE30	NNE25	N30	N26	N25	N22	N21	N13	NNE15	NNE15	NNE15	NNE14	NNE14	NE13	NE14	NNE13	NE8	ENE8	ENE6	NNE18.1	N30
21-Apr	E4	SE4	SE3	SE3	ESE5	ESE5	ESE4	E2	ENE1	WSW2	SW8	WNW4	N17	NNE16	NNE19	NNE22	NNE25	NNE28	NNE26	NNE22	NNE19	NNE13	N12	NNE13	NNE9.2	NNE28
22-Apr	NNE12	N12	N10	N9	N8	N10	N8	N10	NNW10	N13	NNE13	NNE15	NNE11	NNE14	N15	NNW9	N14	N24	NNE24	NNE21	N14	N11	NNE7	NE2	N12.1	NNE24
23-Apr	SE10	SE17	ESE5	E8	E2	NE3	NNW3	E2	SE3	NNW1	SE9	SE16	SE18	SE15	SSE17	SE15	SE18	SE17	SE19	SE18	SE23	SE29	SE34	SSE33	SE13.3	SE34
24-Apr	SE34	SE37	SE30	SE27	SE27	SE26	SE23	SE21	SE22	SE22	SE21	SSE18	S17	SSE19	S14	S14	SSE14	ESE20	SE23	SE29	SSE30	SSE25	SSW17	S18	SSE21.9	SE37
25-Apr	S20	S18	S17	S16	SSE14	SSE15	SSE15	SSE16	SSE15	S14	S12	SSE13	SSE17	S12	S13	SSW12	SW12	SW13	SW16	SSW14	SSW16	SSW11	SSW11	SSW21	S13.9	SSW21
26-Apr	SW26	SSW12	S13	S20	S18	SSE10	SE15	SSE13	SSE15	SE15	SSE13	SSE11	SSE11	SSE12	SE13	SE13	SE18	SE13	SE9	S6	S11	SSE14	SSE17	S6	SSE12.4	SW26
27-Apr	WSW9	W6	SSW3	SW3	SSE4	S5	SSE6	SE7	SE3	ESE3	NNE8	NNE5	N9	N9	N10	N11	N10	NE10	NE12	NNE12	NNE10	ENE7	NE7	N5	NNE3.8	NNE12
28-Apr	NNW7	NW3	NE1	SSE2	SSE6	SSE4	SSE7	SE10	SE13	SE11	SE15	S14	S14	SSE15	SSE17	SSE19	SSE17	SE26	SE24	SSE17	S15	S21	S19	SSE21	SSE11.7	SE26
29-Apr	S20	SSE22	SSE26	SSE23	SSE20	SE26	SE24	SSE21	SSE27	SSE25	S27	S24	S24	S23	S27	S24	SSW23	SSW21	SSW15	S16	S25	S26	S23	S18	S22.0	S27
30-Apr	S22	S18	SE13	SE15	SSE21	S20	S16	SSE10	SE13	SSE16	SSW24	SSW24	SSW28	WSW27	WSW26	WSW25	W22	SSW9	S12	SSW18	S7	NNE11	ESE8	SE3	SSW12.4	SSW28
	SSE5.7	SE4.9	SE4.5	ESE3.3	ESE3.6	ESE2.6	ESE2.8	ENE3.6	E4.5	ESE4.7	SE4.0	SSE3.6	S2.7	S1.8	SSW0.5	SW0.3	N0.2	NE2.4	ENE3.0	E3.6	ESE4.3	SE5.2	SE4.7	SE5.0	Diurnal Average	
	SE34	SE37	SE30	SE27	SE27	NNE30	SE29	SE30	SE32	SE35	SE32	WSW38	SE42	SE39	W43	W45	WNW43	WNW38	WNW39	SE37	SE44	SE38	SE34	SE34	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 100 m (WS100m) - km/h

Lower Camp Met Tower - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 15 km/h on Apr 19 11:00

Minimum Value: 1 km/h on Apr 15 06:00

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

Hours in Service:	720
Hours of Data:	716
Hours of Missing Data:	4
Hours of Calibration:	0
Percent Operational Time:	99.4

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

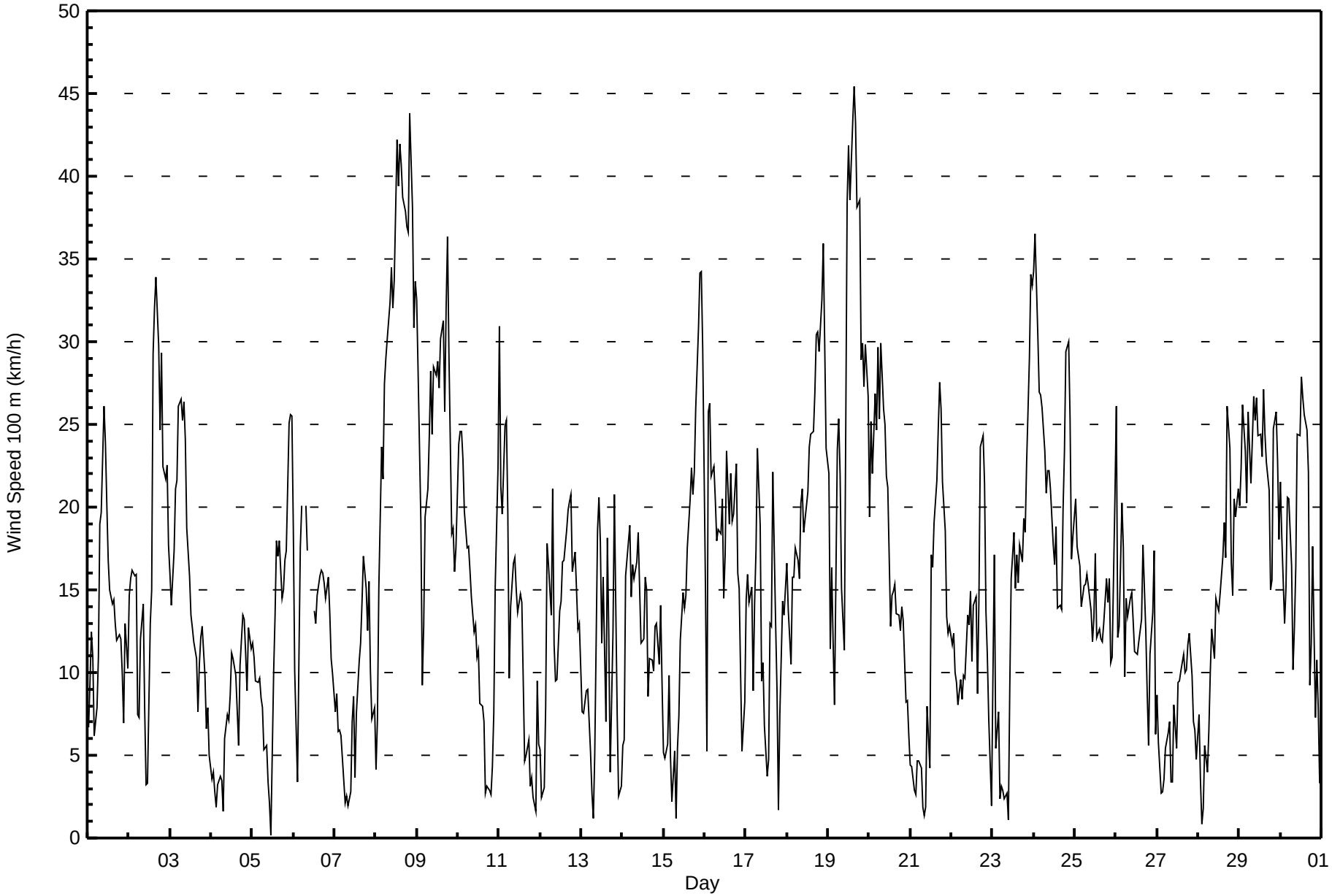
AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed 100 m (WS100m) - km/h

Lower Camp Met Tower - April 2016



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	88	12.29	12.29
6 - 11	152	21.23	33.52
12 - 19	264	36.87	70.39
20 - 28	150	20.95	91.34
29 - 38	50	6.98	98.32
> 38	12	1.68	100.00

Total Number of Valid Hours: 716

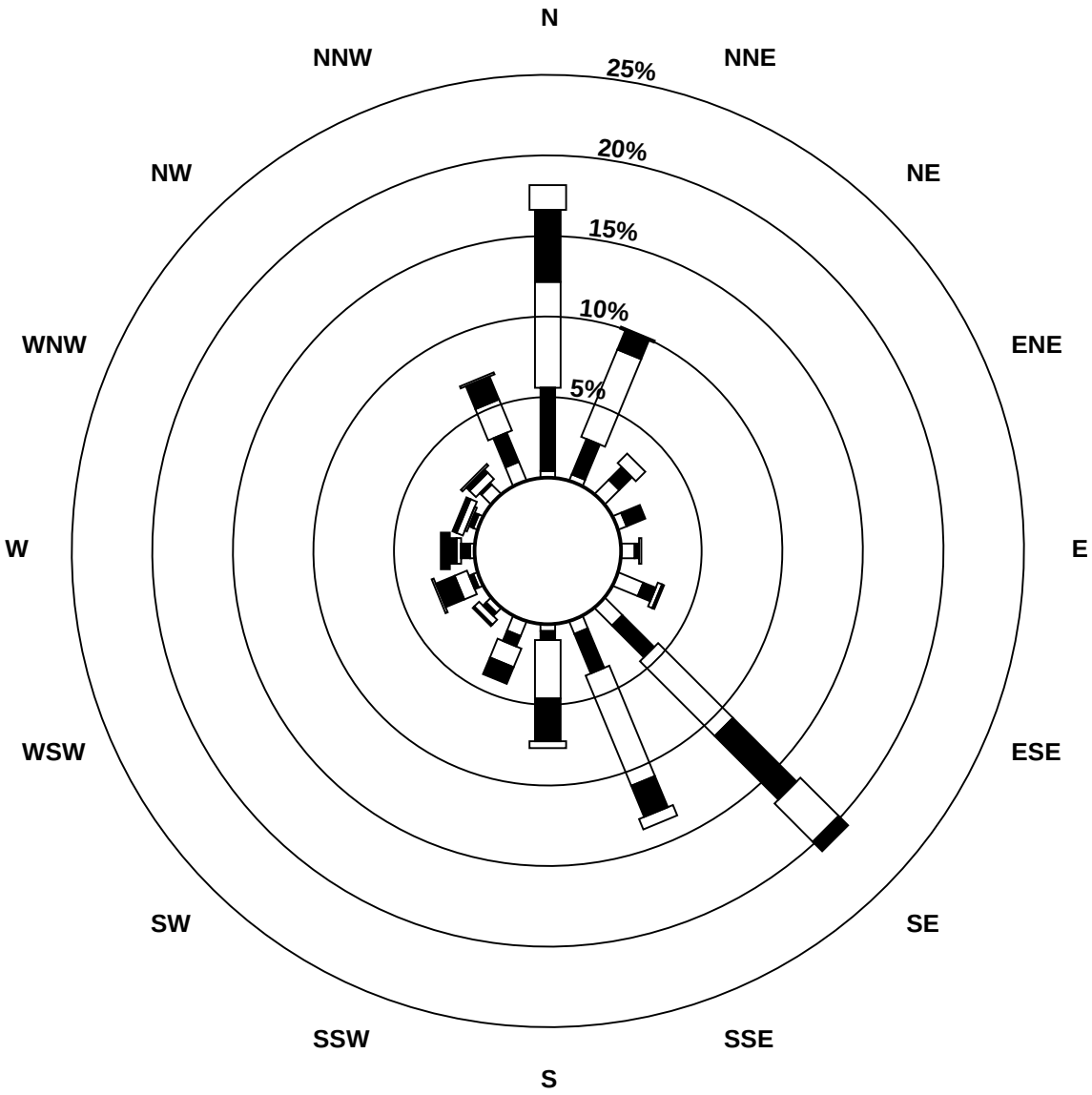
Total Number of Hours: 720

Wood Buffalo Environmental Association

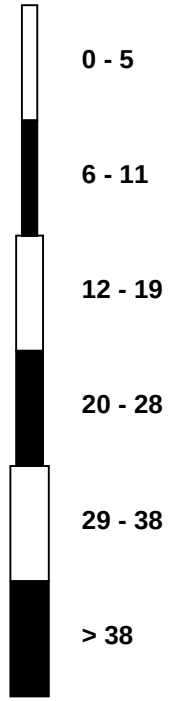
Wind Rose Apr 2016

Wind Speed 100 m (WS100m) - km/h

Lower Camp Met Tower (AMS 3)



Classes (km/h)



Total Number of Valid Hours: 716

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed 167 m (WS167m) - km/h

Lower Camp Met Tower - April 2016

Maximum Speed: 51 km/h on Apr 19 16:00

Maximum Daily Speed Average: 36.1 km/h on Apr 8

Minimum Speed Value: 1 km/h on Apr 27 05:00

Minimum Daily Speed Average: 4.2 km/h on Apr 27

Maximum Diurnal Speed Average: 8.1 km/h at hour 1

Minimum Diurnal Speed Average: 0.5 km/h at hour 17

Monthly Average Velocity: 3.7 km/h 137.8 deg

Percentiles: P_1 = 2 P_{10} = 7 Q_1 = 11 Median = 17 Q_3 = 24 P_{90} = 31 P_{99} = 47

Hours in Service:	720
Hours of Data:	716
Hours of Missing Data:	4
Percent Operational Time:	99.4

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Apr	SW13	W17	W22	WNW14	WNW12	N12	N16	NNE21	N21	N26	NNE24	NNE20	NNE17	NNE15	NNE14	NNE14	NNE12	NE12	ENE13	ENE13	E17	ESE12	SE19	SE17	NNE8.9	N26
2-Apr	SE20	SE21	SE21	SE21	SE22	ESE14	ESE14	ESE14	ESE15	ESE8	E3	NW3	NNW13	NNW17	N32	N33	N37	N31	N25	N31	N24	N22	N23	N18	NNE10.5	N37
3-Apr	N16	N16	N20	N23	N24	N27	N29	N25	N28	N25	N19	N16	N14	N13	N13	N11	N8	NNE10	NNE12	NE17	NNE16	NNE11	ENE10	SE9	N15.9	N29
4-Apr	SE9	S6	S6	SSE9	S12	S11	SSE6	S7	SSE9	S9	SSE6	SE8	SE10	SE11	SE10	ESE8	SE6	NNE10	NNE17	NE22	NNE16	ENE13	NE8	NNE12	ESE5.2	NE22
5-Apr	NNE13	NE11	NNE12	NNE12	NNE11	NNE10	NNE8	N6	NNE8	NE4	WNW3	SSE2	S11	SSE13	SSE18	S18	S21	S17	S17	S20	S23	SSE23	SSE26	SSE27	SSE6.7	SSE27
6-Apr	SSE23	S13	WSW11	NW17	NW22	NNW27	N25	AF	AF	AF	AF	NNW13	NNW18	NNW14	N15	N17	NNE18	NNE18	NNE17	NNE16	NNE19	NNE17	NNE12	N11	N11.7	NNW27
7-Apr	N8	ENE10	ENE9	NE8	NE7	ENE4	NNE2	ENE2	N1	ESE3	SE7	SE8	E4	NNE8	NNE10	NE12	NNE14	NNE16	NNE15	NNE15	NE23	NNE18	ENE13	ESE10	NE8.0	NE23
8-Apr	SE15	SE19	SE22	SE27	SE25	SE33	SE34	SE34	SE35	SE35	SE33	SE37	SE45	SE45	SE47	SE47	SE45	SE45	SE42	SE41	SE50	SSE43	SE36	SSE37	SE36.1	SE50
9-Apr	SSE35	SE32	SSE22	NNW6	NNW16	NW28	NNW27	NNW29	NNW32	N26	N32	NNW31	N31	N29	N31	N33	N28	N35	N39	N32	N24	NNW24	NNW20	N22	N20.2	N39
10-Apr	N29	N29	N29	N26	N21	N20	N21	N16	N14	N13	N13	N11	NNW12	NNW8	NNW8	NNE7	NNE2	WNW2	SW3	SE3	ESE7	SE12	SE21	SSE27	N9.4	N29
11-Apr	SSE31	SSE21	SSE21	SSE27	SSE25	SSE22	SSE11	SSE12	SSE14	SSE16	SSE15	SSE14	SSE14	SSE13	SE10	ESE5	SE5	SE6	E4	SE5	S7	SSW5	NW7	N8	SSE11.8	SSE31
12-Apr	NNW4	SW3	WSW3	NNW10	N22	NNE22	N17	N21	N13	N10	N10	N14	NNE14	NNE17	NNE17	NNE18	N19	N20	NNE23	NNE18	NNE21	NE20	ENE18	NE14	NNE14.3	NNE23
13-Apr	NE7	E13	ESE14	NW2	ESE17	ESE10	SE11	SSE9	SE10	SE20	SE21	SE20	SE11	SE15	S7	SE19	SE18	SSE4	SSE12	SE21	SSE16	S7	SSW5	E2	SE10.9	SE21
14-Apr	NE3	NNE10	N20	N22	N24	N20	N21	N17	NNE18	N19	N17	NNW12	NW13	NNW18	NW17	N8	N11	NNE12	N12	NNW17	N16	NW14	WNW17	W12	N14.1	N24
15-Apr	NW7	NE7	ENE5	NE6	ENE5	SSE4	SW7	SW6	SSE5	SSE8	SE12	SSE14	SE14	SE14	SE18	SE21	SE22	SE22	SE24	SE30	SE36	SE40	SSE40	SSE34	SE14.7	SSE40
16-Apr	SSE20	SE9	SE31	SE26	SE26	SE27	SSE22	SSE21	S16	S14	SSE19	S15	WSW20	WSW26	WSW23	WSW26	WSW22	W22	W26	W18	WSW14	SW17	SW21	WSW14	SSW13.4	SE31
17-Apr	SSW12	S14	S16	SSE16	SSE17	SSE22	SSE20	SSE23	SSE20	S12	S8	S6	SW6	SW7	WSW15	WSW16	W24	WNW14	W11	WSW2	SE8	SSE13	S21	S19	S10.6	WSW24
18-Apr	S17	SSE14	SSE16	S13	S13	S20	S21	SSE19	SE20	SE20	SE19	SSE20	S23	SSW29	SSW30	SSW30	S33	S36	S36	S42	S41	S44	S41	S34	S25.4	S44
19-Apr	S31	SSW19	SSW19	SW21	WSW18	WSW35	W34	NW25	NW16	W13	W28	WSW45	W46	W42	W48	W51	WNW49	WNW44	WNW47	WNW36	NW37	NW36	WNW42	N29	W27.6	W51
20-Apr	NNE22	NNE27	N25	N30	NNE26	NNE32	NNE27	N32	NNE27	NNE25	N23	N21	NNE13	NNE15	NNE16	NNE16	NNE14	NNE14	NE13	NE15	NE20	ENE18	ENE16	E9	NNE19.6	NNE32
21-Apr	SE11	SE10	SE9	SSE8	SE8	SE8	SE6	SSE3	ENE1	NW2	WSW7	NW4	NNE17	NNE16	NNE20	NNE22	NNE26	NNE29	NNE28	NNE26	NE28	NE20	NNE19	NE21	NE10.4	NNE29
22-Apr	NE19	NNE17	NNE13	NNE14	NE14	NE15	NE11	NNE8	N10	N13	NNE13	NNE15	NNE11	NNE15	N15	N8	N14	NNE24	NNE29	NE29	NNE16	ENE10	ESE9	SE8	NNE13.3	NNE29
23-Apr	SE14	SE22	SE11	ESE10	ESE10	SE8	SE3	ESE7	E4	NNW2	SE10	SE17	SE18	SE16	SSE17	SE16	SE18	SE17	SE20	SE23	SE28	SE34	SE38	SSE35	SE16.3	SE38
24-Apr	SSE36	SE38	SSE32	SSE29	SE30	SSE29	SE28	SE24	SE24	SE23	SE22	SSE19	S19	S21	S16	S16	SSE15	SE21	SE27	SE34	SSE33	SSE27	SSW22	S22	SSE24.1	SSE38
25-Apr	S22	S21	S19	S18	S18	S18	S17	SSE18	S17	S15	S14	S13	SSE17	S14	S14	SSW13	SW13	SSW14	SW16	SSW17	SSW18	SSW17	SSW18	SSW23	S16.1	SSW23
26-Apr	SW27	SW24	SSW25	SSW23	S22	S12	SSE14	S13	S13	SSE13	SSE12	S12	S12	S13	SSE11	SSE11	SSE15	SSE12	SE9	SSW7	S13	S16	SSE19	SSW10	S13.6	SW27
27-Apr	W10	W10	W6	SSW1	NW1	SSW2	SSW3	SSE3	E3	ENE5	NNE9	NNE5	N9	N9	N10	N11	N10	NE10	NE12	NE15	ENE19	E14	ESE9	SE5	NNE4.2	ENE19
28-Apr	SSE2	S4	SSE9	SSE12	SSE12	SSE11	SSE15	S12	SSE10	SSE10	SE14	SSW16	S15	S16	S19	S22	SSE19	SE29	SE27	SSE18	S18	S23	S27	S28	SSE15.6	SE29
29-Apr	S28	S30	S34	SSE30	SSE25	SSE27	SSE24	SSE22	SSE28	SSE27	S30	S29	S28	S27	S32	SSW30	SSW27	SSW24	SSW18	SSW20	S26	SSW30	SSW30	SSW34	S26.3	SSW34
30-Apr	SSW36	SSW33	S17	SSE19	S25	SSW31	SSW24	S12	SSE12	SSE16	SSW27	SSW27	SSW32	WSW30	WSW29	WSW29	W24	SSW13	S13	SSW20	SSW8	NE17	E17	SE10	SSW16.6	SSW36
	SSE8.1	SSE6.9	SSE6.4	SE4.4	SE4.7	SE3.6	ESE3.0	ESE3.6	ESE4.0	ESE3.9	SE3.6	S3.3	S3.0	SSW2.3	SW1.2	SSW1.2	SSW0.5	ENE2.4	ENE3.3	E4.6	ESE6.2	SE6.8	SSE8.0	SSE7.8	Diurnal Average	
	SSE36	SSE38	S34	N30	SE30	WSW35	W34	SE34	SE35	SE35	SE33	WSW45	W46	SE45	W48	W51	WNW49	SE45	WNW47	S42	SE50	S44	WNW42	SSE37	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 167 m (WS167m) - km/h

Lower Camp Met Tower - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 15 km/h on Apr 19 11:00

Minimum Value: 0 km/h on Apr 15 04:00

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

Hours in Service:	720
Hours of Data:	716
Hours of Missing Data:	4
Hours of Calibration:	0
Percent Operational Time:	99.4

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

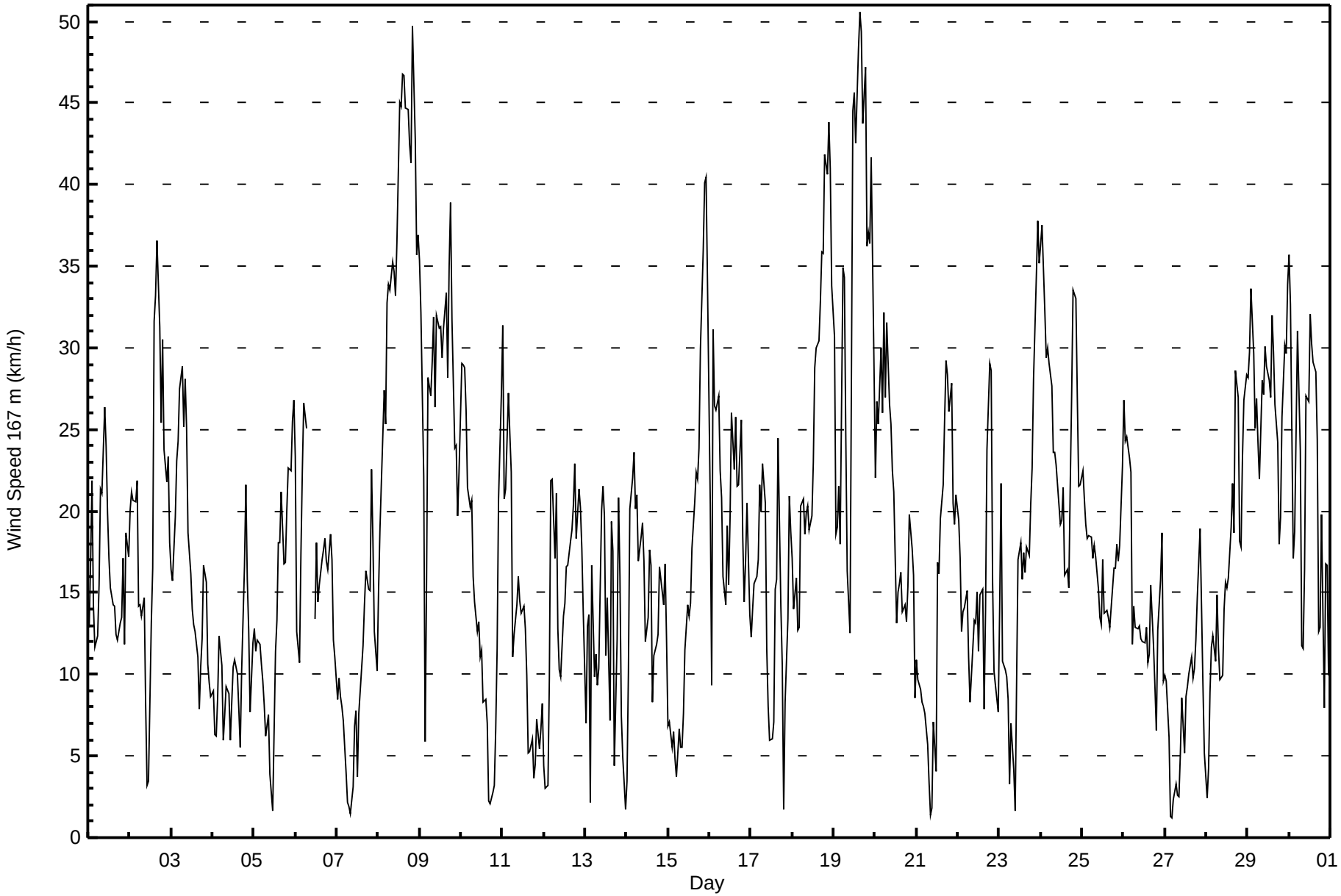
AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed 167 m (WS167m) - km/h

Lower Camp Met Tower - April 2016



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

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	51	7.12	7.12
6 - 11	128	17.88	25.00
12 - 19	255	35.61	60.61
20 - 28	172	24.02	84.64
29 - 38	84	11.73	96.37
> 38	26	3.63	100.00

Total Number of Valid Hours: 716

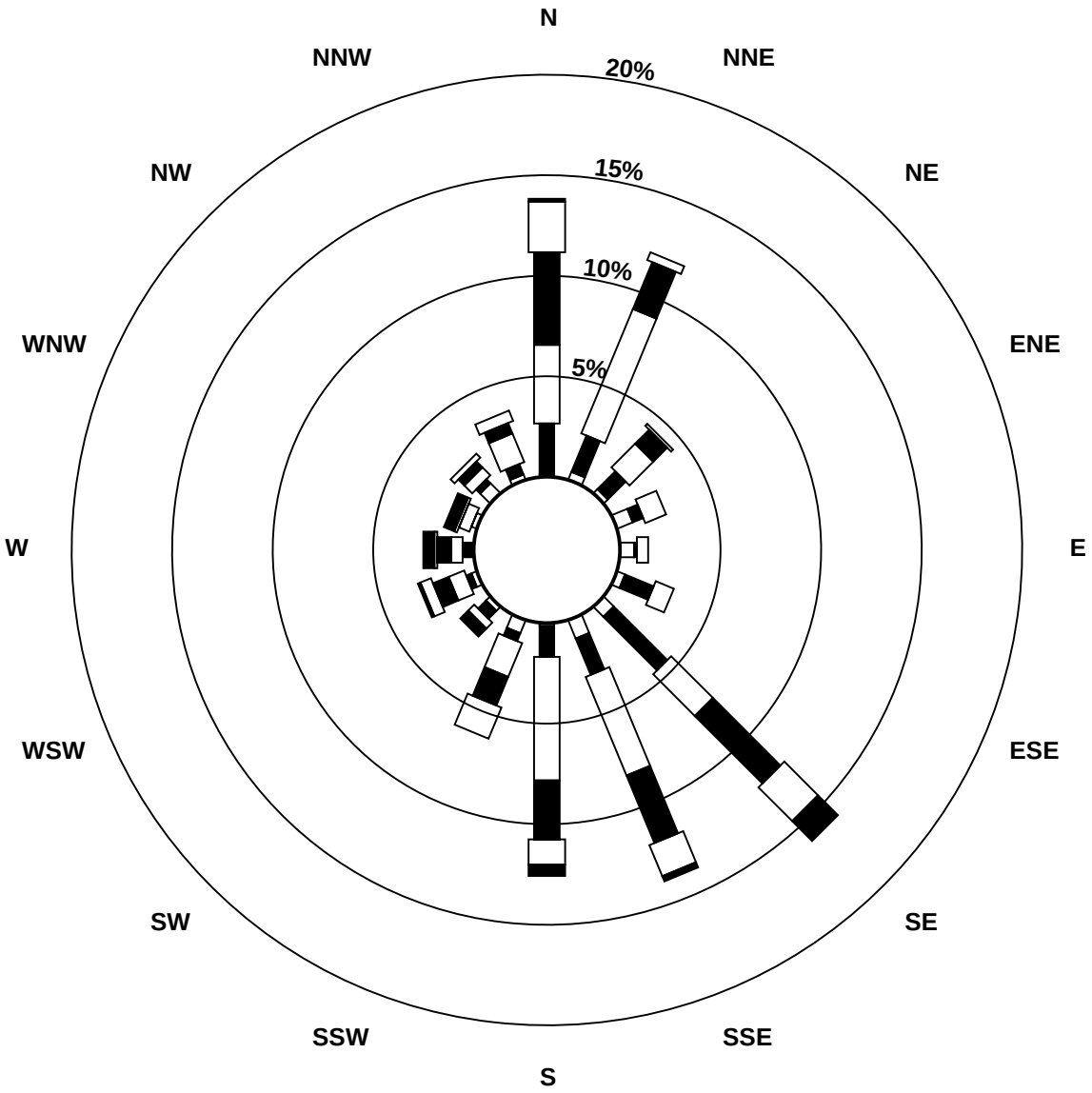
Total Number of Hours: 720

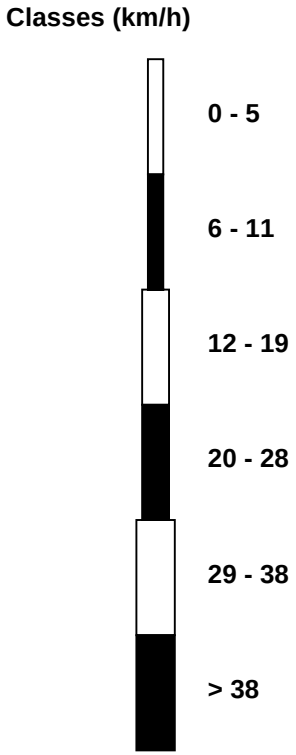
Wood Buffalo Environmental Association

Wind Rose Apr 2016

Wind Speed 167 m (WS167m) - km/h

Lower Camp Met Tower (AMS 3)





Total Number of Valid Hours: 716

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction 20 m (WD20m) - deg

Lower Camp Met Tower - April 2016

Direction of Maximum Speed: 285 deg on Apr 19 16:00
Direction of Maximum Daily Speed Average: 176.0 deg on Apr 29

Direction of Minimum Speed: 100 deg on Apr 4 05:00

Direction of Minimum Daily Speed Average: 0.7 deg on Apr 4

Monthly Average Direction: 326.0 deg

Hours in Service:	720
Hours of Data:	711
Hours of Missing Data:	9
Percent Operational Time:	98.8

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-Apr	148	124	289	279	289	320	319	11	11	10	11	9	28	29	42	18	14	44	55	25	342	47	77	5	16.7
2-Apr	79	62	42	79	71	4	349	77	111	136	162	252	337	315	351	356	355	355	356	1	4	355	355	350	1.3
3-Apr	353	338	346	352	355	357	358	357	358	358	0	356	1	9	2	356	9	13	20	13	349	351	10	358	358.3
4-Apr	333	347	355	270	100	348	350	6	131	138	148	161	154	158	139	151	169	2	354	349	337	2	4	342	67.2
5-Apr	1	359	353	354	357	342	354	349	340	341	357	234	178	169	163	181	181	191	187	185	168	162	156	149	172.2
6-Apr	146	159	144	323	350	337	339	337	357	356	360	355	352	351	AF	AF	13	15	AF	AF	AF	AF	AF	AF	--
7-Apr	AF	71	66	54	40	44	3	24	351	123	157	161	158	1	27	29	15	12	9	12	11	344	351	13	29.0
8-Apr	344	346	2	135	139	143	146	146	146	152	146	143	150	147	143	144	145	146	149	151	154	152	146	146	146.0
9-Apr	144	135	155	346	324	346	335	343	348	3	354	352	355	354	3	1	355	359	3	357	347	347	332	338	356.8
10-Apr	349	348	349	348	353	359	14	8	11	354	4	1	350	340	348	30	0	269	240	31	53	137	231	157	355.1
11-Apr	149	141	138	152	150	150	175	162	155	156	162	165	164	152	139	126	149	156	330	312	290	327	310	281	154.3
12-Apr	328	346	354	336	339	352	349	359	354	354	353	1	16	10	20	3	357	356	0	349	359	2	352	1	358.6
13-Apr	337	354	346	354	357	345	346	5	12	137	152	149	141	152	160	136	138	202	161	145	162	136	6	339	133.6
14-Apr	352	321	341	346	349	335	338	357	8	5	0	352	338	338	326	8	13	14	355	342	0	334	302	319	348.0
15-Apr	337	1	4	338	340	73	84	130	142	152	149	153	152	155	143	144	143	137	135	141	145	149	140	136	142.5
16-Apr	149	89	147	151	148	154	163	157	147	144	150	159	247	269	259	263	262	268	263	251	39	145	162	158	195.9
17-Apr	151	151	153	148	151	148	147	147	147	147	149	152	185	196	258	258	267	271	269	160	166	151	155	155	171.9
18-Apr	154	98	166	151	142	140	144	153	153	149	151	152	168	197	198	200	197	188	186	178	165	164	162	167	172.8
19-Apr	173	138	155	154	149	217	261	327	337	269	263	260	272	270	284	285	297	305	308	309	328	311	312	350	284.3
20-Apr	26	18	10	4	9	17	15	11	12	14	10	7	11	31	16	21	26	21	37	35	346	0	51	43	16.0
21-Apr	11	358	348	354	347	349	329	91	172	213	241	286	10	19	13	17	24	27	25	23	13	357	348	348	9.4
22-Apr	356	339	341	358	349	359	1	359	348	359	11	16	12	9	359	327	354	3	20	19	352	1	360	343	0.7
23-Apr	172	110	347	354	345	342	351	27	209	267	165	166	162	162	162	159	157	149	147	121	131	142	150	158	150.3
24-Apr	146	149	155	146	143	149	145	144	147	148	152	175	181	181	189	188	167	129	135	143	157	172	202	199	160.0
25-Apr	189	193	193	187	179	168	169	172	173	183	189	176	164	191	198	210	224	222	224	214	208	185	190	207	189.3
26-Apr	213	184	175	175	169	163	139	156	156	149	154	171	174	168	137	139	147	139	149	165	167	150	167	185	162.1
27-Apr	273	233	154	150	143	134	136	144	152	167	19	11	9	5	2	16	355	33	35	17	347	5	3	338	25.5
28-Apr	323	339	283	323	141	148	127	150	149	146	144	192	187	176	180	176	172	145	148	158	169	163	152	150	163.3
29-Apr	160	153	152	151	146	141	142	155	167	171	177	191	186	191	185	195	202	215	202	191	184	185	176	170	176.0
30-Apr	168	164	87	82	157	169	162	157	141	161	219	220	213	247	266	264	271	198	181	186	174	354	113	285	200.9
	154.4	129.1	126.5	122.8	111.5	94.4	80.8	66.9	111.7	131.7	155.1	180.4	184.4	200.6	205.6	215.7	247.9	20.8	113.8	134.2	150.6	151.6	156.2	153.9	
	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 20 m (WD20m) - deg

Lower Camp Met Tower - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 105 deg on Apr 30 23:00

Minimum Value: 4 deg on Apr 29 00:00

Percentiles: P_1 = 7 P_{10} = 13 Q_1 = 17 Median = 21 Q_3 = 32 P_{90} = 57 P_{99} = 91

Hours in Service:	720
Hours of Data:	711
Hours of Missing Data:	9
Hours of Calibration:	0
Percent Operational Time:	98.8

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-Apr	22	77	78	17	94	38	27	27	26	23	25	27	30	30	30	28	26	29	22	21	35	43	54	22	94
2-Apr	50	38	39	57	69	33	19	52	26	42	80	54	25	40	17	16	15	15	14	16	19	16	16	17	80
3-Apr	22	18	21	18	16	17	16	17	17	18	22	24	29	37	32	36	43	26	22	24	27	42	23	16	43
4-Apr	29	25	83	48	96	60	21	83	60	34	25	36	22	24	31	35	24	65	13	14	15	20	10	40	96
5-Apr	13	15	19	21	19	18	19	26	25	37	85	86	36	23	20	20	14	14	12	14	10	8	11	14	86
6-Apr	63	54	67	24	20	16	18	17	22	19	17	33	23	22	AF	AF	24	22	AF	AF	AF	AF	AF	AF	67
7-Apr	AF	28	37	38	37	53	40	42	59	69	35	14	71	33	27	25	27	23	20	21	22	26	42	27	71
8-Apr	26	40	38	18	16	17	18	17	18	16	17	18	15	17	16	16	16	15	14	13	15	15	14	13	40
9-Apr	15	19	99	70	22	24	18	18	18	20	19	19	19	21	19	21	18	18	19	18	17	19	17	17	99
10-Apr	17	17	17	16	18	17	22	24	26	30	35	38	32	53	42	54	85	38	22	89	91	88	98	31	98
11-Apr	17	23	25	16	19	22	20	13	13	12	14	18	16	18	26	43	34	17	53	58	86	57	27	92	92
12-Apr	53	88	82	47	19	18	20	19	25	29	25	26	29	26	29	23	16	16	16	21	17	17	39	23	88
13-Apr	41	25	29	39	27	24	23	28	66	20	14	17	20	12	21	12	61	76	16	17	25	48	60	23	76
14-Apr	24	27	22	19	21	20	18	19	23	24	23	25	22	20	18	27	22	24	23	18	17	24	25	63	63
15-Apr	27	33	28	50	68	41	64	55	26	16	19	16	19	18	19	18	17	17	15	14	12	11	12	16	68
16-Apr	75	67	17	17	23	21	63	38	23	19	14	46	23	18	20	17	16	17	10	33	85	41	44	16	85
17-Apr	7	6	8	16	14	37	30	24	43	14	13	22	54	54	22	19	17	17	24	70	72	11	60	7	72
18-Apr	10	83	64	9	8	16	11	10	11	20	18	14	21	14	13	14	11	11	11	10	8	8	7	11	83
19-Apr	14	32	11	41	46	61	18	19	24	28	23	15	18	17	19	18	20	19	17	17	14	11	14	32	61
20-Apr	24	24	24	21	22	23	26	23	23	25	29	24	37	38	36	36	31	29	24	18	43	37	66	28	66
21-Apr	89	59	27	56	24	19	37	79	98	23	20	69	28	32	29	28	24	21	23	22	20	20	20	22	98
22-Apr	21	26	17	23	22	17	19	16	22	25	37	37	55	40	37	65	42	22	21	22	39	21	37	31	65
23-Apr	92	27	30	46	22	43	27	71	47	81	35	18	13	19	17	23	17	19	15	20	18	15	16	13	92
24-Apr	15	15	12	15	13	14	16	17	17	16	18	18	14	15	18	16	32	21	19	15	16	12	11	12	32
25-Apr	11	12	11	11	11	7	9	13	13	16	19	19	18	23	20	20	17	14	10	10	12	18	13	13	23
26-Apr	15	18	14	11	10	33	25	19	17	17	20	20	17	20	14	19	19	21	17	21	21	30	12	71	71
27-Apr	62	63	66	49	57	16	21	26	18	37	49	51	32	33	37	41	31	26	22	24	23	22	29	58	66
28-Apr	40	30	64	67	39	75	57	26	17	19	20	29	26	20	19	14	20	17	14	13	24	11	7	4	75
29-Apr	7	5	5	6	10	11	12	15	11	12	15	16	18	15	15	14	16	15	16	9	9	10	10	8	18
30-Apr	8	18	32	30	61	14	39	32	26	28	21	18	15	36	17	17	17	32	21	27	79	38	105	66	105
	92	88	99	70	96	75	64	83	98	81	85	86	71	54	42	65	85	76	53	89	91	88	105	92	
	Diurnal Maximum																								

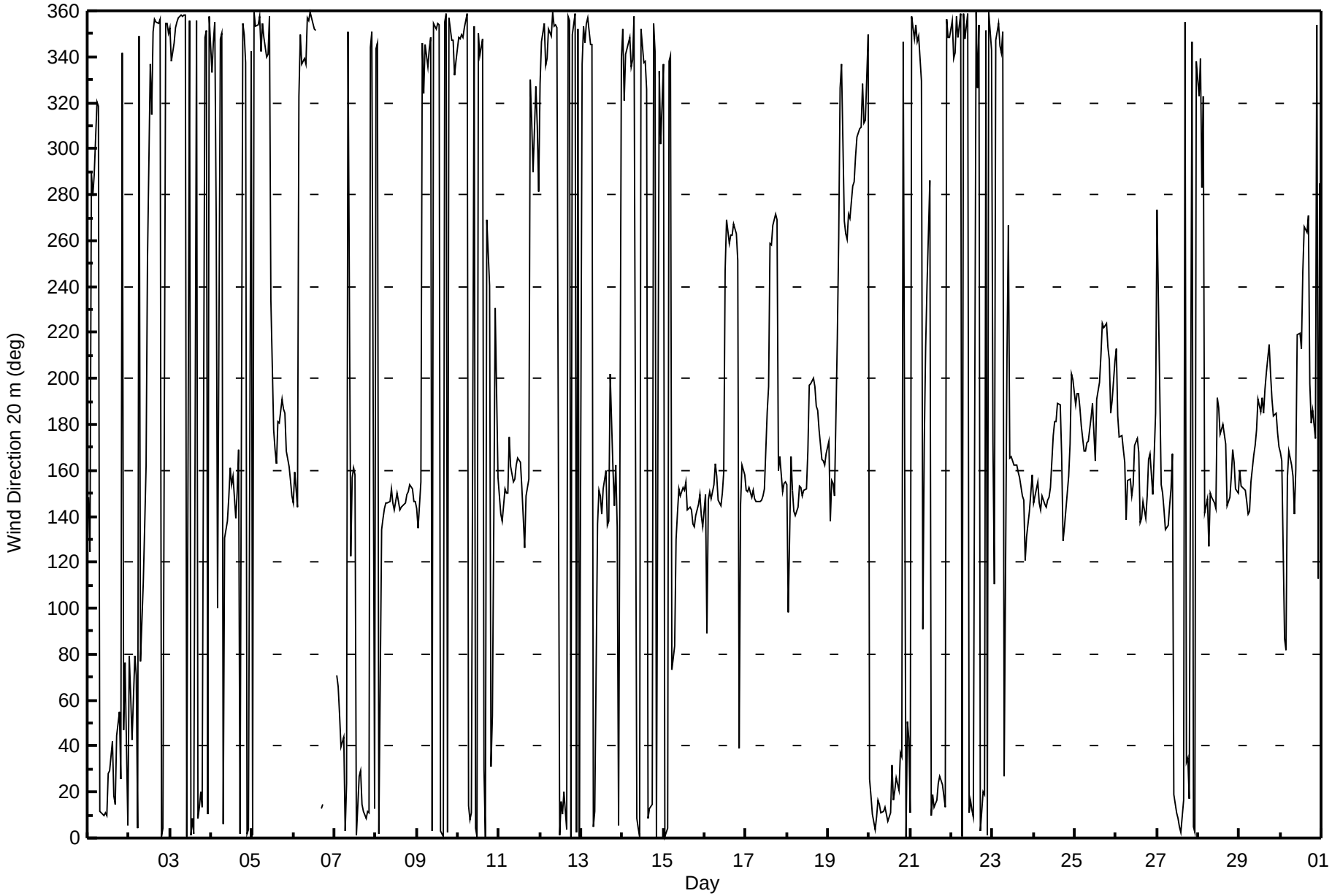
AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction 20 m (WD20m) - deg

Lower Camp Met Tower - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction 45 m (WD45m) - deg

Lower Camp Met Tower - April 2016

Direction of Maximum Speed: 275 deg on Apr 19 16:00
Direction of Maximum Daily Speed Average: 136.3 deg on Apr 8

Direction of Minimum Speed: 264 deg on Apr 4 04:00

Direction of Minimum Daily Speed Average: 1.5 deg on Apr 4

Monthly Average Direction: 343.9 deg

Hours in Service:	720
Hours of Data:	711
Hours of Missing Data:	9
Percent Operational Time:	98.8

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-Apr	146	208	279	272	268	311	323	7	8	7	8	4	21	22	33	13	11	35	48	26	357	56	97	36	12.9
2-Apr	107	90	68	99	96	356	342	71	103	127	146	247	328	311	346	350	350	349	350	357	0	348	348	345	358.2
3-Apr	351	334	342	347	348	352	354	353	352	354	356	350	358	3	355	351	4	6	13	11	351	349	0	355	353.6
4-Apr	341	344	351	264	226	342	346	2	109	127	135	145	142	146	126	135	154	2	349	344	334	356	351	337	35.6
5-Apr	348	349	345	348	351	342	347	343	339	335	336	232	167	157	153	169	171	180	176	175	161	153	146	140	159.7
6-Apr	136	145	137	315	344	332	AF	332	AF	AF	AF	AF	AF	AF	14	7	12	10	17	17	20	12	353	349	--
7-Apr	1	67	59	47	31	44	1	13	346	116	144	150	142	356	20	21	9	6	5	7	10	345	357	13	21.2
8-Apr	341	344	12	129	132	136	136	135	137	141	137	134	139	136	135	134	136	136	140	141	142	142	137	137	136.3
9-Apr	136	129	139	333	320	332	329	336	341	359	349	346	349	348	358	356	351	355	358	352	342	341	330	336	351.9
10-Apr	342	342	344	343	348	355	8	4	5	352	360	356	344	337	339	17	351	265	232	49	116	11	114	139	351.9
11-Apr	138	134	133	141	140	139	162	146	143	144	150	155	153	142	131	112	136	142	344	336	254	333	324	342	141.7
12-Apr	293	324	333	341	336	348	347	355	349	348	347	358	10	7	12	360	354	351	357	346	352	358	349	350	353.6
13-Apr	337	350	349	348	3	353	339	356	10	128	140	139	132	141	155	127	126	195	151	135	148	131	46	359	116.9
14-Apr	359	329	338	344	343	334	334	353	6	1	356	348	331	331	318	4	7	9	352	338	354	332	293	301	343.6
15-Apr	337	5	353	353	337	323	53	127	129	142	140	141	141	144	133	135	133	127	125	132	138	142	135	130	132.8
16-Apr	136	89	138	138	135	140	139	144	137	137	139	152	240	261	249	254	254	260	254	241	177	136	150	148	180.8
17-Apr	137	138	137	136	136	135	133	136	136	137	139	143	171	198	249	251	258	265	271	149	138	135	140	138	158.5
18-Apr	141	129	146	135	131	129	130	137	139	139	141	143	159	187	188	190	186	178	176	169	159	157	157	162	161.6
19-Apr	166	131	146	150	142	221	249	321	331	263	257	252	262	261	274	275	287	295	298	299	321	305	302	346	275.6
20-Apr	18	13	6	3	6	12	AF	AF	8	9	4	3	6	21	10	14	20	16	31	28	358	2	44	41	11.7
21-Apr	10	2	346	358	355	349	353	62	116	212	236	282	4	11	8	13	19	21	19	16	11	355	347	349	6.4
22-Apr	358	348	339	351	347	352	356	356	345	356	3	12	4	6	356	322	353	359	16	16	350	355	352	337	357.1
23-Apr	138	113	358	357	345	340	344	22	196	271	153	152	151	151	151	148	146	138	136	116	122	134	140	147	136.9
24-Apr	136	139	144	137	134	139	135	134	138	138	140	162	171	171	178	178	153	119	126	133	147	163	190	186	148.0
25-Apr	177	180	180	175	169	161	161	162	164	173	180	167	154	182	188	201	216	212	216	205	198	182	183	197	180.7
26-Apr	207	177	170	169	162	155	133	147	145	140	144	162	164	158	131	130	139	133	137	160	158	142	157	171	153.2
27-Apr	247	241	182	148	142	135	131	135	139	153	11	4	1	1	353	7	351	27	29	12	349	7	1	341	16.1
28-Apr	328	348	316	268	126	145	126	139	136	136	135	184	179	164	169	166	161	135	137	149	167	165	147	143	153.5
29-Apr	159	148	144	142	137	133	136	142	158	161	168	180	176	181	175	186	193	206	193	180	175	176	171	167	166.7
30-Apr	162	159	100	93	149	161	157	146	129	150	211	211	205	240	257	254	262	191	171	180	167	2	120	234	192.4
	136.6	113.7	106.2	98.5	92.8	75.0	100.5	66.0	96.2	115.5	136.9	164.7	170.0	184.7	200.9	220.8	278.5	27.4	50.9	88.0	118.9	128.9	136.1	133.2	
	Diurnal Average																								

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

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction 45 m (WD45m) - deg

Lower Camp Met Tower - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 101 deg on Apr 21 09:00

Minimum Value: 4 deg on Apr 29 03:00

Percentiles: P_1 = 5 P_{10} = 9 Q_1 = 12 Median = 16 Q_3 = 24 P_{90} = 45 P_{99} = 85

Hours in Service:	720
Hours of Data:	711
Hours of Missing Data:	9
Hours of Calibration:	0
Percent Operational Time:	98.8

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-Apr	13	77	53	12	46	25	22	20	18	17	17	21	25	24	22	21	19	27	17	9	36	39	26	33	77
2-Apr	30	28	35	40	57	15	12	45	17	35	86	59	20	38	14	12	12	11	10	13	13	12	11	14	86
3-Apr	19	14	16	14	12	12	12	13	14	14	17	18	24	32	26	23	35	21	16	18	23	28	16	11	35
4-Apr	17	14	23	83	54	93	52	72	47	31	23	33	17	19	30	32	19	58	9	11	11	14	6	21	93
5-Apr	9	9	13	13	12	15	12	16	21	28	77	93	37	21	18	17	11	12	9	12	9	8	8	9	93
6-Apr	63	50	46	40	14	12	AF	15	AF	AF	AF	AF	AF	AF	17	16	16	14	18	15	16	16	19	20	63
7-Apr	27	17	23	27	27	32	39	37	43	69	34	11	72	28	22	19	21	16	15	16	15	20	27	22	72
8-Apr	19	34	47	11	12	12	12	12	12	11	12	13	11	12	12	12	11	12	10	9	11	10	9	9	47
9-Apr	9	12	96	67	16	20	14	14	14	16	15	14	15	16	15	17	15	13	16	13	13	14	14	13	96
10-Apr	13	14	13	13	14	14	16	18	20	24	27	37	26	42	36	46	78	40	23	69	70	96	70	16	96
11-Apr	12	15	18	11	11	16	17	12	10	9	12	15	14	16	23	42	32	15	46	55	73	22	24	45	73
12-Apr	27	74	80	19	12	13	15	13	21	20	21	19	24	20	21	17	12	12	12	15	11	11	27	12	80
13-Apr	30	18	27	32	22	18	16	14	69	14	9	12	16	9	24	7	44	69	14	11	21	50	76	22	76
14-Apr	23	19	16	16	15	15	13	15	17	16	17	20	18	17	15	22	15	16	16	13	12	17	18	47	47
15-Apr	37	20	21	14	47	58	54	57	25	13	14	13	15	15	16	14	12	13	11	9	7	7	8	9	58
16-Apr	67	70	9	9	11	13	37	18	12	10	8	45	19	12	15	12	11	11	6	15	37	10	24	11	70
17-Apr	5	5	7	9	10	25	22	14	23	8	9	17	49	55	16	13	10	12	10	68	48	7	17	9	68
18-Apr	6	39	19	4	4	10	7	7	5	12	12	10	19	14	13	14	11	8	8	8	8	8	7	10	39
19-Apr	11	32	13	22	22	57	13	15	22	24	18	9	12	11	14	13	17	16	14	15	13	8	11	32	57
20-Apr	17	16	18	16	17	16	AF	AF	18	20	24	19	30	31	29	29	27	25	20	12	35	29	47	27	47
21-Apr	79	38	17	21	14	13	38	70	101	25	18	65	22	27	22	23	19	15	17	16	16	16	14	14	101
22-Apr	15	21	13	14	13	12	14	10	17	19	29	36	53	32	34	63	39	17	15	14	21	11	30	14	63
23-Apr	89	18	27	25	16	21	24	63	57	87	39	15	11	16	14	20	14	15	11	14	13	11	10	10	89
24-Apr	10	9	8	9	8	9	10	11	12	12	13	19	11	11	17	15	30	15	13	10	14	10	13	11	30
25-Apr	8	10	8	7	8	7	8	11	10	13	16	17	16	23	20	20	16	15	9	10	12	10	10	14	23
26-Apr	15	14	11	9	8	22	18	17	12	12	17	17	14	17	10	12	12	15	13	21	20	27	10	47	47
27-Apr	30	51	69	38	21	10	17	23	16	40	45	46	26	26	25	32	28	20	17	19	17	19	20	23	69
28-Apr	31	18	45	31	20	16	26	20	12	14	14	29	24	17	17	13	18	11	9	11	18	9	13	4	45
29-Apr	7	5	4	4	5	6	8	12	10	11	13	14	15	13	13	13	15	15	16	6	5	5	6	7	16
30-Apr	7	12	25	19	32	13	35	30	20	25	21	17	15	34	12	11	13	32	17	27	86	32	81	86	86
	89	77	96	83	57	93	54	72	101	87	86	93	72	55	36	63	78	69	46	69	86	96	81	86	
	Diurnal Maximum																								

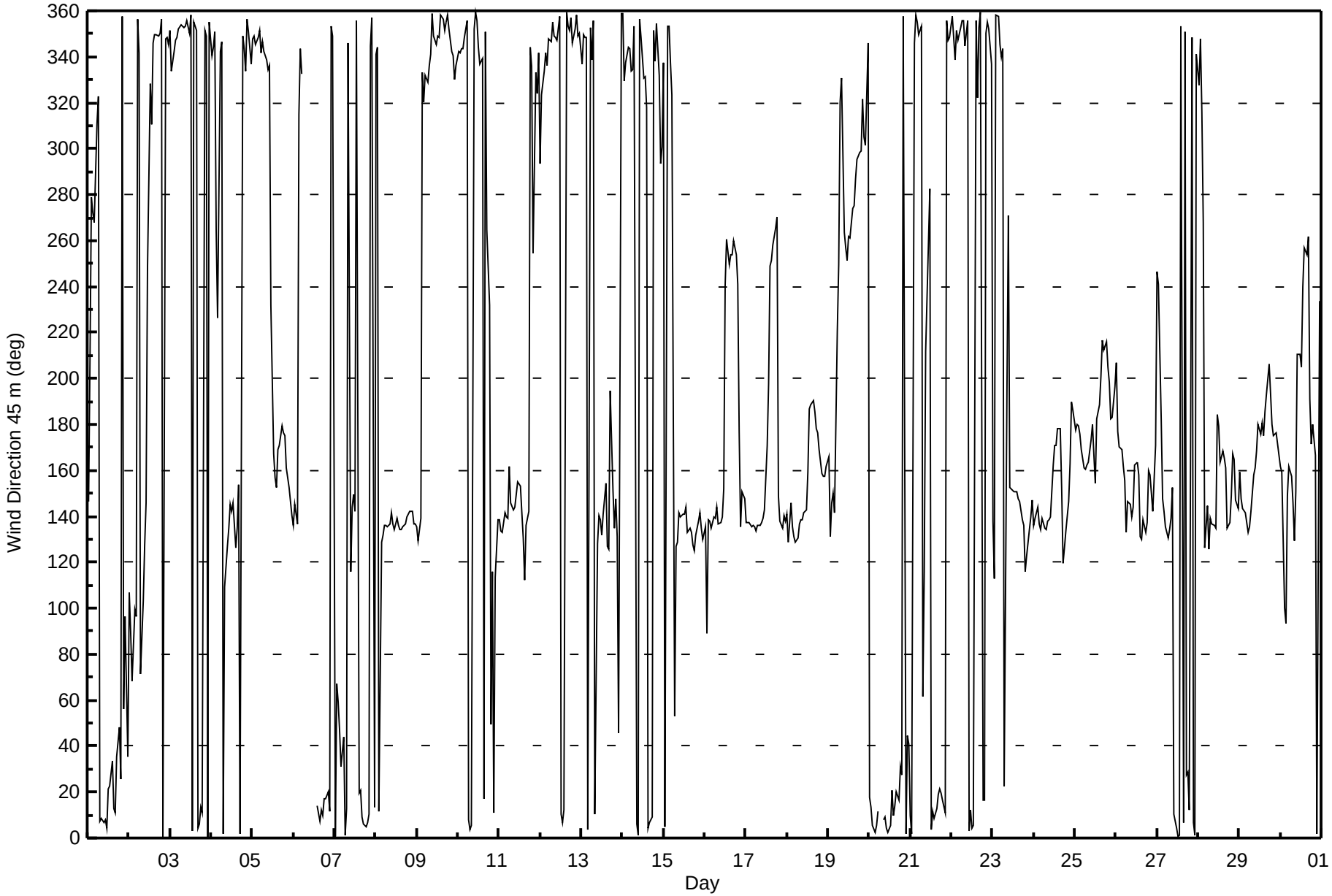
AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction 45 m (WD45m) - deg

Lower Camp Met Tower - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction 100 m (WD100m) - deg

Lower Camp Met Tower - April 2016

Direction of Maximum Speed: 275 deg on Apr 19 16:00
Direction of Maximum Daily Speed Average: 138.5 deg on Apr 8

Direction of Minimum Speed: 203 deg on Apr 5 12:00

Direction of Minimum Daily Speed Average: 2.9 deg on Apr 4

Monthly Average Direction: 261.0 deg

Hours in Service:	720
Hours of Data:	716
Hours of Missing Data:	4
Percent Operational Time:	99.4

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-Apr	194	243	264	280	290	356	355	11	10	7	10	8	23	25	33	15	20	40	52	54	52	96	131	120	18.4
2-Apr	130	126	122	128	134	62	47	96	104	116	115	264	326	321	347	353	353	355	359	1	4	354	353	351	15.6
3-Apr	354	340	349	351	353	356	357	357	353	354	355	351	359	4	360	358	10	17	22	23	14	6	19	15	358.6
4-Apr	337	310	339	42	179	149	125	136	123	145	138	138	142	141	125	124	143	13	5	17	2	33	359	354	67.7
5-Apr	356	351	350	360	360	353	351	346	351	327	285	203	172	156	153	168	172	182	178	178	164	155	152	150	158.2
6-Apr	146	157	208	306	331	330	AF	336	354	AF	AF	AF	336	351	13	9	13	11	18	22	23	16	2	354	0.1
7-Apr	4	62	65	51	43	59	7	37	349	105	133	135	119	8	25	31	15	13	11	18	28	11	29	76	34.2
8-Apr	70	118	134	136	136	136	137	138	139	142	139	136	139	137	136	136	138	139	143	142	140	144	142	143	138.5
9-Apr	142	136	140	346	329	316	328	337	341	359	349	344	350	349	359	357	354	357	359	355	347	345	338	346	353.0
10-Apr	347	345	347	347	352	360	7	4	5	359	1	4	348	345	344	16	23	267	217	146	121	140	130	142	1.9
11-Apr	144	141	140	144	142	144	154	146	146	150	153	156	153	144	131	117	132	134	77	104	86	45	330	333	142.3
12-Apr	324	304	318	330	351	3	358	357	357	350	346	358	15	10	21	6	0	359	7	360	358	18	12	353	0.4
13-Apr	349	27	50	337	76	55	47	334	114	130	138	139	132	140	159	134	131	158	149	136	144	155	174	87	125.7
14-Apr	59	18	353	354	354	347	344	359	11	3	356	348	329	330	319	0	9	12	356	343	355	328	292	281	348.1
15-Apr	341	37	347	349	0	317	240	194	131	142	137	144	138	141	133	134	132	130	127	132	143	145	144	142	135.7
16-Apr	141	129	138	139	138	144	143	147	151	147	145	166	238	256	247	251	252	261	261	258	233	215	199	162	188.1
17-Apr	154	150	151	152	161	151	145	140	148	166	148	151	197	222	248	251	256	275	284	203	122	144	156	154	169.3
18-Apr	147	148	152	154	152	154	154	155	136	136	140	149	162	190	192	195	188	180	179	171	161	160	164	170	164.7
19-Apr	176	164	166	192	196	248	255	322	326	271	258	251	259	260	273	275	285	295	297	297	322	310	300	348	276.8
20-Apr	16	13	6	6	9	13	13	8	9	11	7	4	8	24	14	17	27	19	34	35	33	40	62	57	15.4
21-Apr	90	125	133	125	115	120	115	100	73	238	236	295	8	17	15	16	21	23	22	24	27	18	9	14	23.8
22-Apr	14	4	354	3	8	10	10	0	346	359	12	16	14	13	2	333	1	8	21	25	6	9	22	52	8.6
23-Apr	140	131	108	90	85	45	336	89	124	338	142	146	146	145	147	143	144	137	137	126	125	137	141	147	136.4
24-Apr	141	142	145	142	138	142	138	137	137	139	138	161	172	168	178	179	149	122	130	134	147	163	194	187	147.9
25-Apr	180	182	181	178	168	164	162	161	164	176	183	168	155	185	186	203	218	214	217	209	209	202	200	209	185.6
26-Apr	219	196	189	178	170	168	143	155	155	146	149	164	167	163	144	139	141	143	134	177	169	155	154	189	163.6
27-Apr	252	270	213	217	158	169	147	140	138	115	16	16	360	1	356	6	360	35	37	29	27	63	47	9	24.8
28-Apr	341	318	52	160	152	167	151	140	137	134	136	186	182	165	168	166	161	139	141	158	178	176	173	163	159.0
29-Apr	171	163	159	158	151	143	144	149	160	161	169	180	177	181	177	189	196	208	194	188	181	183	185	190	172.4
30-Apr	184	188	145	136	159	178	175	158	136	156	212	211	208	243	256	250	260	198	178	193	182	31	105	134	195.5
	146.7	134.3	130.7	119.0	108.5	103.9	107.2	71.6	90.7	109.4	130.4	157.5	169.6	188.3	195.6	214.1	350.5	43.8	61.5	86.9	109.2	130.4	142.3	142.6	
	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 100 m (WD100m) - deg

Lower Camp Met Tower - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 110 deg on Apr 23 10:00

Minimum Value: 3 deg on Apr 11 05:00

Percentiles: P_1 = 3 P_{10} = 5 Q_1 = 8 Median = 11 Q_3 = 17 P_{90} = 32 P_{99} = 84

Hours in Service:	720
Hours of Data:	716
Hours of Missing Data:	4
Hours of Calibration:	0
Percent Operational Time:	99.4

Day	Hourly Period Ending At (MST)																								Daily
	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-Apr	18	15	18	9	21	13	13	12	11	10	12	12	18	17	15	13	14	19	11	6	20	25	9	12	25
2-Apr	8	7	8	11	12	40	32	9	11	30	77	74	16	38	9	6	6	7	7	5	7	6	6	7	77
3-Apr	11	10	10	8	8	6	7	6	8	8	10	11	14	18	22	18	27	13	8	9	15	15	10	14	27
4-Apr	41	15	54	39	15	25	15	38	22	13	16	15	10	15	17	19	18	49	4	11	12	19	8	6	54
5-Apr	5	5	7	7	5	7	9	10	12	24	56	104	32	19	18	15	12	13	10	9	7	4	5	5	104
6-Apr	10	18	42	13	6	8	AF	9	12	AF	AF	AF	11	15	7	8	8	7	13	10	11	12	13	14	42
7-Apr	24	11	17	16	21	21	42	24	50	56	25	11	59	21	13	13	13	10	9	12	8	13	28	16	59
8-Apr	33	28	8	5	6	5	5	5	5	4	6	6	5	5	6	6	5	5	4	4	6	5	4	4	33
9-Apr	3	4	13	71	20	10	9	9	8	11	10	9	9	11	8	9	9	7	9	7	7	7	7	7	71
10-Apr	8	9	8	8	9	7	7	11	11	13	19	22	17	36	30	32	67	58	29	19	10	8	8	5	67
11-Apr	3	5	6	3	3	9	13	5	5	7	10	10	10	12	13	21	21	8	23	24	49	71	9	11	71
12-Apr	21	55	67	16	10	8	11	7	16	15	17	13	17	16	15	12	8	8	7	8	8	9	14	6	67
13-Apr	15	18	41	22	30	44	73	99	67	6	4	6	14	18	28	4	10	93	10	4	11	10	42	19	99
14-Apr	12	15	9	10	9	10	8	10	9	9	9	11	13	11	14	16	10	8	8	6	8	14	10	10	16
15-Apr	38	19	16	4	9	34	8	72	13	14	8	10	10	11	10	6	6	7	6	6	3	3	3	3	72
16-Apr	33	84	4	3	4	3	4	5	10	6	6	39	17	6	12	10	9	9	6	8	5	13	22	27	84
17-Apr	9	6	9	6	13	7	7	4	9	10	13	18	43	46	14	11	8	17	11	61	17	6	8	8	61
18-Apr	3	7	9	5	5	4	7	8	4	3	5	10	19	15	14	14	11	8	7	7	7	6	7	9	19
19-Apr	11	38	18	25	39	18	17	11	16	19	14	6	7	8	10	9	14	13	9	12	8	7	7	32	39
20-Apr	10	8	9	9	9	10	12	8	10	13	16	12	22	22	21	23	20	18	15	6	15	23	20	20	23
21-Apr	39	14	29	22	16	8	13	51	83	85	19	66	15	19	17	15	12	9	9	9	10	13	10	9	85
22-Apr	8	8	6	8	11	9	12	10	12	16	22	23	42	29	28	81	30	12	8	8	13	16	23	74	81
23-Apr	17	7	28	14	68	52	41	84	51	110	53	9	8	13	9	12	9	10	7	9	7	5	4	6	110
24-Apr	4	3	4	4	4	3	4	5	4	5	7	18	11	11	15	14	27	8	8	5	11	10	12	11	27
25-Apr	8	9	6	5	7	7	8	9	10	14	16	15	13	21	21	18	11	10	7	6	4	9	9	13	21
26-Apr	8	13	12	6	8	16	13	17	10	11	16	14	13	14	8	8	6	12	8	22	19	23	10	28	28
27-Apr	13	17	46	38	51	22	15	9	34	44	28	38	18	20	18	19	23	15	14	11	19	22	28	36	51
28-Apr	14	32	89	64	15	20	14	11	6	7	7	26	20	19	17	11	17	5	4	7	9	4	7	5	89
29-Apr	7	4	4	5	6	3	3	8	8	10	12	14	16	14	13	13	14	13	16	9	4	5	7	10	16
30-Apr	8	12	14	9	10	9	14	23	11	22	18	16	13	29	8	8	11	20	15	26	78	38	26	49	78
	41	84	89	71	68	52	73	99	83	110	77	104	59	46	30	81	67	93	29	61	78	71	42	74	
	Diurnal Maximum																								

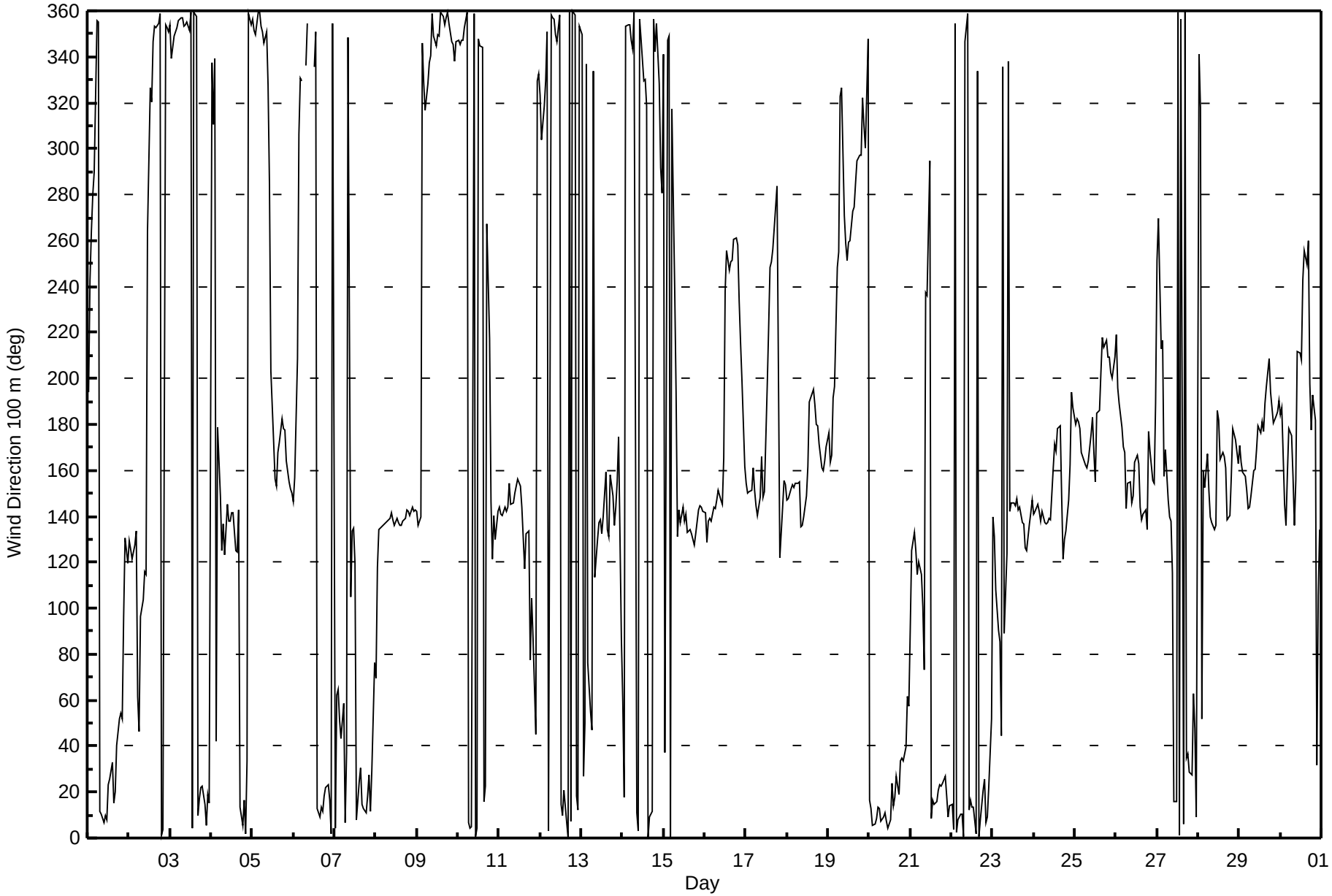
AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction 100 m (WD100m) - deg

Lower Camp Met Tower - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

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

Lower Camp Met Tower - April 2016

Maximum Value: 0.6 km/h on Apr 29 23:00

Maximum Daily Average: 0.1 km/h on Apr 25

Minimum Value: -0.9 km/h on Apr 19 16:00

Minimum Daily Average: -0.3 km/h on Apr 19

Maximum Diurnal Average: 0.0 km/h at hour 1

Minimum Diurnal Average: -0.1 km/h at hour 16

Monthly Average: -0.06 km/h

Percentiles: P_1 = -0.7 P_{10} = -0.3 Q_1 = -0.2 Median = 0.0 Q_3 = 0.1 P_{90} = 0.2 P_{99} = 0.4

Hours in Service:	720
Hours of Data:	711
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-Apr	0.1	0.1	-0.1	-0.1	0.1	-0.1	0.0	-0.1	0.0	-0.1	-0.3	0.1	-0.2	0.1	-0.2	-0.1	-0.3	0.0	-0.3	0.0	0.0	-0.2	-0.2	-0.3	-0.1	0.1
2-Apr	0.0	0.0	0.0	0.0	-0.1	-0.5	0.0	-0.2	-0.2	0.1	0.0	-0.2	-0.2	-0.1	-0.4	-0.6	-0.8	-0.4	-0.4	-0.4	-0.4	-0.3	-0.6	-0.2	-0.2	0.1
3-Apr	-0.1	0.1	0.1	-0.2	-0.4	-0.4	-0.5	-0.4	-0.5	-0.5	-0.5	-0.2	-0.3	0.0	-0.1	-0.3	0.1	0.2	0.1	-0.1	-0.2	0.0	-0.1	-0.1	-0.2	0.2
4-Apr	-0.1	0.0	0.0	0.0	0.1	0.0	-0.2	0.0	0.0	0.2	0.3	0.3	-0.1	0.0	0.2	0.0	0.0	-0.1	0.0	-0.1	-0.2	-0.1	-0.3	0.0	0.0	0.3
5-Apr	-0.1	-0.1	0.0	0.0	0.0	0.0	-0.2	0.0	0.2	0.0	0.2	-0.1	0.3	0.0	-0.1	0.1	0.4	0.0	0.0	0.1	0.2	-0.1	-0.2	-0.1	0.0	0.4
6-Apr	0.0	0.0	0.2	0.0	-0.1	0.0	0.0	0.1	-0.2	-0.3	-0.2	-0.6	-0.3	-0.1	AF	AF	0.3	0.0	AF	AF	AF	AF	AF	AF	--	0.3
7-Apr	AF	-0.1	0.0	0.0	-0.2	0.0	-0.2	0.1	0.1	0.2	0.3	-0.1	0.0	0.1	0.0	-0.2	-0.1	0.1	-0.1	0.1	-0.1	0.0	-0.1	-0.2	0.0	0.3
8-Apr	0.0	0.0	0.0	-0.1	-0.1	0.0	0.0	-0.2	-0.3	-0.3	-0.1	0.0	0.0	0.1	0.0	-0.3	-0.2	0.0	-0.3	-0.2	-0.3	-0.3	0.0	-0.2	-0.1	0.1
9-Apr	-0.3	-0.4	0.1	0.0	0.0	0.0	0.1	-0.1	-0.1	-0.3	-0.4	-0.2	-0.4	-0.2	-0.6	-0.3	-0.4	-0.7	-0.4	-0.4	0.0	0.1	0.0	-0.1	-0.2	0.1
10-Apr	0.0	0.1	-0.1	-0.2	-0.2	-0.2	0.0	-0.3	-0.1	0.1	-0.3	0.1	-0.3	0.2	-0.2	0.2	0.1	0.0	-0.1	0.1	0.0	0.1	0.1	0.1	0.0	0.2
11-Apr	-0.1	-0.1	-0.2	-0.2	0.1	-0.1	0.1	-0.1	0.1	-0.2	-0.3	0.1	0.1	0.0	-0.1	-0.2	0.5	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.5
12-Apr	0.0	0.0	0.0	-0.1	-0.1	0.0	-0.1	-0.5	-0.3	-0.2	-0.5	-0.2	-0.1	-0.3	0.1	-0.2	-0.7	-0.5	-0.2	0.1	-0.1	-0.1	-0.1	-0.1	-0.2	0.1
13-Apr	0.0	-0.1	-0.1	-0.1	-0.1	-0.3	0.0	-0.2	-0.1	-0.1	-0.2	0.0	-0.1	-0.1	0.1	-0.1	0.0	0.0	0.1	0.0	0.1	-0.1	0.0	0.0	-0.1	0.1
14-Apr	0.0	0.0	0.0	0.0	0.0	0.1	0.1	-0.3	-0.1	-0.2	-0.3	0.0	-0.1	-0.1	-0.1	0.0	-0.2	0.1	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1	0.1
15-Apr	-0.1	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.0	0.4	0.1	-0.1	0.2	0.2	-0.1	0.0	-0.2	0.0	-0.2	-0.3	-0.3	-0.2	-0.3	-0.5	-0.1	0.4
16-Apr	0.0	-0.1	-0.3	-0.2	-0.1	-0.1	-0.2	-0.6	-0.2	-0.2	-0.2	0.0	-0.4	-0.6	-0.5	-0.7	-0.3	-0.3	-0.4	-0.1	0.1	0.1	0.1	0.0	-0.2	0.1
17-Apr	0.0	0.1	0.0	0.0	0.2	-0.1	0.0	-0.5	-0.5	0.0	0.1	0.1	0.0	-0.1	-0.4	-0.5	-0.8	-0.1	-0.1	0.1	0.1	0.1	0.1	0.2	-0.1	0.2
18-Apr	0.2	0.1	0.0	0.1	0.2	0.2	0.1	-0.1	-0.4	0.0	0.3	-0.2	0.3	0.0	0.1	-0.1	0.0	0.1	0.2	0.3	0.3	0.2	0.3	0.3	0.1	0.3
19-Apr	0.4	0.0	0.2	0.3	0.1	0.0	-0.4	-0.2	0.0	-0.2	-0.3	-0.5	-0.8	-0.8	-0.7	-0.9	-0.6	-0.4	-0.4	-0.5	-0.1	-0.4	-0.3	-0.5	-0.3	0.4
20-Apr	0.0	0.2	-0.1	-0.1	-0.3	0.1	0.0	0.0	-0.1	0.0	-0.1	-0.5	-0.1	0.2	-0.2	0.2	-0.1	-0.1	-0.2	0.0	-0.1	-0.1	-0.1	-0.1	-0.1	0.2
21-Apr	0.0	0.1	0.0	0.0	0.0	0.0	-0.1	0.3	0.2	-0.1	-0.2	0.0	-0.2	0.1	0.0	-0.3	-0.1	-0.4	0.0	-0.2	-0.2	-0.2	0.0	-0.1	-0.1	0.3
22-Apr	-0.1	-0.2	0.0	0.0	-0.2	-0.1	-0.3	-0.6	-0.1	-0.3	0.2	-0.2	-0.3	0.0	0.0	0.0	0.0	-0.3	-0.1	-0.1	0.0	-0.2	-0.1	-0.1	-0.1	0.2
23-Apr	-0.1	-0.2	-0.2	-0.1	-0.3	-0.2	-0.2	-0.1	0.0	0.2	0.0	0.1	-0.1	-0.1	-0.2	0.1	0.0	-0.2	-0.3	-0.1	-0.2	-0.1	0.0	-0.1	-0.1	0.2
24-Apr	0.0	0.1	-0.2	0.0	-0.3	-0.1	-0.2	0.0	0.1	0.0	-0.1	0.0	0.2	0.1	0.1	0.2	0.1	0.0	-0.1	-0.4	-0.1	0.3	0.2	-0.1	0.0	0.3
25-Apr	0.1	0.2	0.0	0.2	0.3	0.2	0.3	0.2	0.2	0.3	0.3	0.3	-0.1	0.1	0.0	0.1	0.0	0.0	-0.1	0.1	0.1	0.3	0.3	0.1	0.1	0.3
26-Apr	0.2	0.4	0.4	0.5	0.3	0.2	-0.2	-0.2	0.1	-0.1	0.1	0.1	0.0	0.2	-0.2	-0.1	-0.1	-0.1	0.0	0.1	0.2	0.0	0.3	0.1	0.1	0.5
27-Apr	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.2	0.1	0.2	-0.1	-0.3	0.1	0.2	-0.3	-0.2	-0.1	-0.2	-0.2	-0.2	-0.3	-0.1	0.0	0.2
28-Apr	0.0	-0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.0	0.2	0.1	0.2	0.2	0.2	-0.1	0.0	0.1	0.3	0.3	0.2	0.0	0.1	0.3
29-Apr	0.4	0.1	-0.1	0.0	-0.1	-0.2	-0.1	-0.1	0.2	0.1	0.2	0.1	0.1	0.2	0.2	-0.1	0.1	-0.2	0.0	0.1	0.3	0.3	0.6	0.5	0.1	0.6
30-Apr	0.4	0.5	-0.4	-0.3	0.0	0.3	0.4	-0.1	-0.1	0.1	-0.3	-0.3	-0.2	-0.4	-0.7	-0.5	-0.4	0.0	0.2	0.1	0.4	-0.2	0.1	0.1	-0.1	0.5
	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1	0.0	-0.1	-0.1	-0.1	0.0	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	0.0	0.0	0.0	-0.1	Diurnal Average	
	0.4	0.5	0.4	0.5	0.3	0.3	0.4	0.3	0.2	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.5	0.2	0.2	0.3	0.4	0.3	0.6	0.5	Diurnal Maximum	

AF - Analyzer Failure

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

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

Lower Camp Met Tower - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 4.7 km/h on Apr 19 16:00

Minimum Value: 0.1 km/h on Apr 21 04:00

Percentiles: P_1 = 0.1 P_{10} = 0.5 Q_1 = 0.9 Median = 1.7 Q_3 = 2.3 P_{90} = 2.8 P_{99} = 4.1

Hours in Service:	720
Hours of Data:	711
Hours of Missing Data:	9
Hours of Calibration:	0
Percent Operational Time:	98.8

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-Apr	0.6	0.7	1.0	0.7	0.3	0.4	0.9	2.4	2.5	3.2	3.1	2.7	2.5	2.2	2.3	2.2	2.2	1.8	1.5	0.7	0.7	0.6	0.6	0.8	3.2
2-Apr	0.8	1.0	1.3	1.0	1.4	1.5	0.7	1.4	2.0	1.7	1.6	1.7	2.2	2.4	3.2	3.4	3.5	3.0	2.4	3.0	2.6	2.2	2.5	1.9	3.5
3-Apr	1.9	1.6	1.9	2.3	2.4	2.8	2.7	2.8	3.2	3.0	2.6	2.5	2.4	2.4	2.3	2.0	1.8	1.8	1.6	1.3	1.0	0.6	0.6	0.5	3.2
4-Apr	0.4	0.4	0.3	0.1	0.1	0.2	0.5	0.8	1.0	1.6	1.8	1.7	1.8	1.7	1.6	1.1	0.8	1.3	1.0	0.7	0.8	0.9	1.1	0.5	1.8
5-Apr	0.6	0.6	0.6	0.5	0.8	0.6	0.9	1.0	1.1	1.1	1.3	1.3	1.7	2.0	2.1	1.8	1.8	1.4	1.3	1.3	1.4	1.8	2.2	2.3	2.3
6-Apr	1.7	1.1	0.8	0.3	1.4	1.5	1.8	1.8	2.2	1.8	1.8	2.0	1.6	1.5	AF	AF	2.1	1.8	AF	AF	AF	AF	AF	AF	2.2
7-Apr	AF	0.9	0.7	0.9	1.1	0.6	0.7	0.9	0.9	1.0	1.3	1.4	1.4	1.7	1.7	1.8	2.2	2.2	1.9	1.4	1.3	0.7	0.8	0.6	2.2
8-Apr	0.6	0.7	0.5	2.2	2.0	2.6	2.9	3.3	3.4	3.8	3.5	3.7	4.5	4.2	4.5	4.2	3.9	3.6	3.3	3.3	3.8	3.5	2.5	2.7	4.5
9-Apr	2.8	2.5	1.6	0.8	0.7	1.4	1.9	2.6	3.0	2.8	3.2	3.1	3.2	3.3	3.5	3.4	2.8	3.5	3.9	3.1	1.5	1.6	1.1	1.2	3.9
10-Apr	2.2	2.3	2.6	2.3	2.1	1.8	2.0	2.3	2.3	2.2	2.3	2.3	2.3	2.2	2.0	2.0	1.5	1.1	0.6	0.2	0.1	0.2	0.5	1.6	2.6
11-Apr	2.7	2.1	1.9	2.4	2.5	2.1	1.2	1.2	1.7	1.8	1.9	1.8	1.9	2.0	1.7	1.5	1.4	0.9	0.2	0.1	0.2	0.2	0.2	0.2	2.7
12-Apr	0.2	0.2	0.3	0.4	0.8	1.3	1.5	2.5	1.8	1.8	1.9	2.3	2.5	2.6	2.5	2.6	2.4	2.2	2.1	1.4	1.3	1.0	0.8	0.9	2.6
13-Apr	0.6	0.7	0.8	1.0	0.7	0.8	0.8	1.2	1.3	2.3	2.1	1.8	1.4	1.6	0.6	1.4	1.0	0.7	0.9	1.7	0.9	0.6	0.3	0.2	2.3
14-Apr	0.2	0.2	1.3	1.8	1.9	1.2	1.5	1.7	2.0	2.1	1.9	1.6	1.4	1.9	1.8	1.3	1.3	1.2	0.8	0.8	0.9	0.6	0.9	0.4	2.1
15-Apr	0.5	0.3	0.2	0.3	0.1	0.1	0.4	0.8	1.4	1.8	2.1	2.2	2.2	2.2	2.5	2.7	2.7	2.4	2.0	2.0	2.2	2.4	2.5	2.3	2.7
16-Apr	1.6	0.7	1.8	1.8	1.4	1.5	1.3	2.0	2.2	2.3	2.4	2.5	2.1	2.6	2.2	2.3	1.9	1.6	1.3	0.7	0.4	0.5	0.5	0.9	2.6
17-Apr	0.9	0.6	0.6	0.9	0.9	1.2	1.1	1.6	1.6	2.0	2.0	1.9	1.8	1.7	1.9	1.6	2.1	1.4	0.5	0.3	0.3	0.3	0.5	0.5	2.1
18-Apr	0.7	0.3	0.4	0.7	0.6	0.6	0.8	0.9	1.5	2.3	2.4	2.4	2.4	2.1	2.0	2.1	2.1	2.1	2.0	2.2	2.5	2.7	2.1	2.0	2.7
19-Apr	2.0	1.3	1.1	0.9	0.9	1.5	1.9	2.5	2.2	1.9	2.9	3.7	4.1	3.8	4.5	4.7	4.6	4.1	3.8	2.7	2.4	1.6	2.2	3.4	4.7
20-Apr	2.2	3.1	2.5	3.1	3.0	3.5	3.0	3.8	3.3	3.3	3.1	3.1	2.6	2.8	2.7	2.7	2.3	2.2	1.7	1.3	0.9	0.9	0.8	0.8	3.8
21-Apr	0.5	0.3	0.4	0.1	0.2	0.2	0.4	0.9	1.3	1.1	1.8	2.0	2.8	2.7	2.9	3.0	3.2	3.6	3.1	2.3	1.8	1.1	0.8	0.8	3.6
22-Apr	0.9	0.9	0.9	0.8	0.7	1.0	1.2	1.5	1.7	2.2	2.3	2.6	2.4	2.7	2.7	2.1	2.4	2.9	2.8	2.2	1.2	0.9	0.8	0.5	2.9
23-Apr	1.0	1.3	0.6	0.7	0.7	0.7	0.7	1.1	1.2	1.5	1.8	2.0	2.2	2.0	2.1	2.0	2.1	1.9	1.7	1.4	1.9	2.6	3.3	3.1	3.3
24-Apr	3.3	3.4	2.6	2.5	2.4	2.4	2.3	2.3	2.5	2.6	2.6	1.9	1.7	1.9	1.6	1.5	1.7	2.2	2.5	3.0	2.7	2.2	1.5	1.7	3.4
25-Apr	1.7	1.6	1.2	1.1	1.2	1.5	1.6	1.7	1.9	1.8	1.5	1.8	2.3	1.5	1.5	1.3	1.2	1.2	1.3	1.1	0.9	0.6	0.7	1.3	2.3
26-Apr	1.5	1.1	1.2	1.5	1.7	1.3	2.0	1.7	2.1	2.3	1.9	1.4	1.4	1.4	1.5	1.5	1.8	1.3	0.9	0.4	0.9	1.0	1.0	0.6	2.3
27-Apr	0.3	0.5	0.2	0.3	0.3	0.7	1.0	1.1	1.4	1.4	1.8	1.8	2.4	2.3	2.2	2.3	1.9	1.6	1.6	1.2	0.7	0.6	0.6	0.4	2.4
28-Apr	0.3	0.3	0.1	0.2	0.3	0.2	0.5	1.4	2.1	2.1	2.3	1.9	1.7	1.8	1.9	1.9	1.8	2.6	1.8	1.0	0.9	0.8	0.6	0.9	2.6
29-Apr	1.0	1.1	1.1	1.1	1.4	1.9	1.9	2.2	2.8	2.5	2.7	2.4	2.5	2.2	2.7	2.3	2.2	1.8	1.3	1.0	1.2	1.3	1.4	1.3	2.8
30-Apr	1.5	1.6	1.0	1.2	1.7	2.0	1.9	1.7	1.7	2.2	2.2	2.1	2.2	2.8	2.6	2.5	2.1	1.1	1.1	1.5	1.4	0.8	0.6	0.4	2.8
	3.3	3.4	2.6	3.1	3.0	3.5	3.0	3.8	3.4	3.8	3.5	3.7	4.5	4.2	4.5	4.7	4.6	4.1	3.9	3.3	3.8	3.5	3.3	3.4	
	Diurnal Maximum																								

AF - Analyzer Failure

Wood Buffalo Environmental Association

Summary of Hour Averages

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

Lower Camp Met Tower - April 2016

Maximum Value: 1.5 km/h on Apr 8 15:00

Maximum Daily Average: 0.9 km/h on Apr 8

Minimum Value: -1.8 km/h on Apr 19 17:00

Minimum Daily Average: -0.6 km/h on Apr 19

Maximum Diurnal Average: 0.3 km/h at hour 10

Minimum Diurnal Average: -0.1 km/h at hour 17

Monthly Average: 0.12 km/h

Percentiles: P_1 = -1.2 P_{10} = -0.4 Q_1 = -0.2 Median = 0.1 Q_3 = 0.5 P_{90} = 0.8 P_{99} = 1.2

Hours in Service:	720
Hours of Data:	711
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-Apr	0.5	0.0	-0.1	-0.3	0.0	-0.2	-0.3	-0.1	0.0	-0.1	-0.4	0.2	0.1	0.3	0.0	0.1	-0.1	0.2	0.1	0.1	0.0	-0.1	0.0	-0.2	0.0	0.5
2-Apr	0.3	0.3	0.1	0.2	0.2	-0.8	-0.2	0.1	0.4	0.4	0.3	-0.3	-0.5	-0.4	-0.6	-0.8	-0.9	-0.7	-0.7	-0.5	-0.6	-0.5	-0.7	-0.4	-0.3	0.4
3-Apr	-0.2	-0.2	0.0	-0.4	-0.7	-0.6	-0.6	-0.6	-0.8	-0.6	-0.5	-0.5	-0.3	0.0	-0.2	-0.3	0.3	0.2	0.1	0.0	-0.2	-0.1	-0.2	-0.2	-0.3	0.3
4-Apr	-0.1	-0.1	-0.1	0.0	0.0	0.0	-0.2	0.1	0.1	0.4	0.6	0.6	0.5	0.4	0.5	0.2	0.2	-0.1	-0.2	-0.2	-0.3	-0.4	-0.3	-0.1	0.1	0.6
5-Apr	-0.1	-0.1	0.0	-0.1	-0.1	0.0	-0.2	-0.1	0.3	0.1	0.5	0.2	0.4	0.4	0.5	0.3	0.4	-0.1	-0.2	0.0	0.5	0.8	0.8	1.1	0.2	1.1
6-Apr	0.6	0.2	0.7	-0.1	-0.4	-0.3	AF	-0.3	AF	AF	AF	AF	AF	AF	0.3	-0.1	0.1	-0.1	-0.1	0.1	-0.1	0.0	0.0	0.0	--	0.7
7-Apr	-0.1	0.1	0.2	0.1	-0.1	0.2	-0.1	0.2	0.2	0.4	0.6	0.4	0.2	0.0	0.1	-0.1	0.0	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.2	0.1	0.6
8-Apr	-0.2	0.0	0.0	0.8	0.8	0.8	0.9	0.9	1.1	1.1	1.1	0.9	1.4	1.3	1.5	1.3	1.2	1.2	1.0	1.0	1.2	0.9	0.9	0.9	0.9	1.5
9-Apr	0.9	0.6	0.5	-0.2	-0.3	-0.2	-0.2	-0.6	-0.5	-0.4	-0.5	-0.7	-0.7	-0.4	-0.6	-0.5	-0.5	-0.8	-0.5	-0.5	-0.3	-0.1	-0.3	-0.3	-0.3	0.9
10-Apr	-0.3	-0.3	-0.4	-0.3	-0.4	-0.2	0.0	-0.3	-0.1	-0.2	-0.2	0.1	-0.3	0.3	-0.2	0.5	0.4	0.0	-0.1	0.1	0.1	0.1	0.1	0.6	0.0	0.6
11-Apr	1.0	0.6	0.6	0.5	0.9	0.4	0.5	0.3	0.6	0.5	0.3	0.6	0.6	0.5	0.4	0.1	0.7	0.3	0.0	0.1	0.1	-0.1	-0.1	0.0	0.4	1.0
12-Apr	0.0	0.0	0.0	-0.2	-0.3	-0.1	-0.1	-0.6	-0.4	-0.1	-0.5	-0.2	0.0	-0.2	0.3	-0.4	-0.7	-0.4	-0.3	-0.1	-0.2	-0.3	-0.2	-0.2	-0.2	0.3
13-Apr	-0.1	-0.2	-0.3	-0.2	-0.2	-0.5	-0.3	-0.2	0.0	0.6	0.7	0.6	0.5	0.8	0.4	0.5	0.3	0.1	0.5	0.7	0.5	0.2	0.0	0.0	0.2	0.8
14-Apr	0.0	-0.1	-0.1	-0.2	-0.3	-0.1	-0.2	-0.3	-0.1	-0.2	-0.3	-0.1	-0.4	-0.5	-0.5	0.0	-0.2	0.0	0.0	-0.1	-0.1	-0.2	-0.3	-0.2	-0.2	0.0
15-Apr	-0.2	-0.1	-0.1	0.0	0.1	0.1	0.1	0.2	0.2	0.6	0.6	0.5	0.6	0.8	0.6	0.7	0.6	0.7	0.6	0.8	0.9	1.2	1.2	0.8	0.5	1.2
16-Apr	0.4	0.1	0.7	0.8	0.5	0.5	0.1	-0.3	0.4	0.5	0.8	0.7	-0.4	-0.9	-0.6	-0.9	-0.6	-0.6	-0.6	-0.2	0.1	0.7	0.2	0.7	0.1	0.8
17-Apr	0.8	0.7	0.6	0.7	0.7	0.3	0.5	0.1	-0.2	0.7	0.7	0.5	0.0	0.0	-0.4	-0.5	-0.8	-0.4	-0.2	0.3	0.3	0.6	0.5	0.7	0.3	0.8
18-Apr	1.0	0.3	0.2	0.7	0.7	0.6	0.8	0.2	0.5	0.6	0.9	1.0	0.7	-0.3	-0.1	-0.4	-0.4	-0.7	-0.4	0.1	0.7	1.0	1.0	0.7	0.4	1.0
19-Apr	0.6	0.5	1.1	0.7	0.8	0.0	-0.4	-0.8	0.1	-0.3	-0.6	-0.8	-1.4	-1.3	-1.5	-1.6	-1.8	-1.0	-1.3	-1.2	-0.7	-0.9	-1.2	-0.9	-0.6	1.1
20-Apr	0.1	0.1	-0.1	0.0	-0.4	0.0	AF	AF	0.0	-0.1	-0.2	-0.4	0.1	0.5	-0.3	0.3	-0.1	0.0	-0.1	0.1	-0.2	-0.1	0.1	0.2	0.0	0.5
21-Apr	0.0	0.0	-0.1	0.0	0.1	0.1	0.0	0.4	0.3	-0.1	-0.3	0.0	-0.3	0.2	0.0	-0.2	0.0	-0.1	0.3	0.1	0.0	-0.2	-0.2	-0.1	0.0	0.4
22-Apr	-0.1	-0.2	-0.2	-0.2	-0.2	-0.2	-0.3	-0.7	-0.3	-0.4	0.1	0.2	-0.2	0.1	-0.1	0.0	0.0	-0.3	0.2	0.1	-0.1	-0.3	-0.3	-0.3	-0.2	0.2
23-Apr	0.0	0.3	-0.3	-0.3	-0.5	-0.4	-0.3	0.1	-0.1	0.4	0.3	0.5	0.7	0.2	0.5	0.6	0.7	0.6	0.7	0.4	0.6	0.7	1.1	1.2	0.3	1.2
24-Apr	1.1	1.2	1.2	1.0	0.9	0.9	0.9	0.8	0.8	1.1	0.9	0.5	0.1	0.1	0.2	0.2	0.4	0.8	0.7	0.6	0.9	0.6	0.0	-0.1	0.7	1.2
25-Apr	-0.4	0.1	-0.3	-0.1	0.2	0.6	0.8	0.6	0.4	0.4	0.3	0.6	0.4	0.2	-0.1	0.3	-0.1	0.0	-0.1	-0.1	0.1	0.1	0.2	0.0	0.2	0.8
26-Apr	0.0	0.5	0.6	0.6	0.8	0.4	0.5	0.4	0.6	0.6	0.7	0.5	0.3	0.6	0.3	0.4	0.5	0.4	0.4	0.3	0.6	0.4	0.6	0.2	0.5	0.8
27-Apr	0.0	0.0	0.1	0.2	0.3	0.3	0.2	0.3	0.2	0.5	0.3	0.3	0.0	-0.2	-0.2	0.3	-0.5	0.0	0.1	-0.1	-0.3	-0.2	-0.4	-0.2	0.0	0.5
28-Apr	-0.1	-0.1	0.0	0.0	0.3	0.2	0.2	0.5	0.6	0.7	0.8	0.2	0.2	0.3	0.3	0.3	0.5	0.8	0.8	0.7	0.5	0.6	0.9	1.2	0.4	1.2
29-Apr	1.0	1.2	1.1	1.1	0.8	0.7	0.7	0.8	1.1	0.7	0.3	-0.1	0.2	0.0	0.3	-0.5	-0.3	-0.3	-0.3	-0.4	-0.4	-0.4	0.3	0.6	0.3	1.2
30-Apr	0.8	1.1	-0.2	-0.2	0.5	0.9	0.8	0.3	0.6	0.6	-0.4	-0.3	-0.6	-0.6	-1.0	-0.8	-0.8	-0.1	0.4	0.5	0.5	-0.2	0.2	0.1	0.1	1.1
	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.2	0.3	0.2	0.2	0.1	0.1	0.0	0.0	-0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.2	Diurnal Average	
	1.1	1.2	1.2	1.1	0.9	0.9	0.9	0.9	1.1	1.1	1.1	1.0	1.4	1.3	1.5	1.3	1.2	1.2	1.0	1.0	1.2	1.2	1.2	1.2	Diurnal Maximum	

AF - Analyzer Failure

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

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

Lower Camp Met Tower - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 5.3 km/h on Apr 19 16:00

Minimum Value: 0.1 km/h on Apr 4 05:00

Percentiles: P_1 = 0.2 P_{10} = 0.6 Q_1 = 1.0 Median = 1.7 Q_3 = 2.3 P_{90} = 3.0 P_{99} = 4.2

Hours in Service:	720
Hours of Data:	711
Hours of Missing Data:	9
Hours of Calibration:	0
Percent Operational Time:	98.8

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-Apr	0.8	0.8	1.3	0.7	0.3	0.4	1.1	2.6	2.6	3.4	3.1	2.9	2.5	2.4	2.1	2.3	2.1	1.8	1.5	0.8	0.8	0.6	0.7	0.8	3.4
2-Apr	1.1	1.4	1.7	1.4	1.7	1.5	0.8	1.4	2.0	1.8	1.7	1.8	2.5	2.7	3.4	3.5	3.5	3.1	2.4	3.1	2.5	2.3	2.4	2.1	3.5
3-Apr	1.9	1.9	2.2	2.4	2.3	2.8	2.8	2.7	3.0	3.1	2.6	2.6	2.4	2.6	2.4	2.2	1.9	2.0	1.7	1.3	1.1	0.6	0.6	0.6	3.1
4-Apr	0.5	0.4	0.4	0.1	0.1	0.2	0.5	0.8	1.0	1.6	1.8	1.7	1.8	1.7	1.5	1.2	0.8	1.3	0.9	0.9	1.0	0.9	0.7	0.7	1.8
5-Apr	0.7	0.6	0.7	0.6	0.9	0.8	1.0	1.1	1.1	1.2	1.3	1.3	2.0	2.1	2.2	2.3	2.2	1.8	1.6	1.6	1.5	1.7	1.8	2.1	2.3
6-Apr	1.6	1.1	0.7	0.5	1.4	1.9	AF	2.2	AF	AF	AF	AF	AF	AF	2.1	2.0	2.1	1.8	2.0	1.9	1.7	1.6	1.5	1.3	2.2
7-Apr	1.0	0.9	0.8	1.1	1.1	0.7	0.8	0.9	1.0	1.1	1.4	1.3	1.6	1.7	1.8	1.8	2.1	2.3	1.9	1.5	1.4	1.0	0.8	0.6	2.3
8-Apr	0.6	0.8	0.9	2.1	1.9	2.5	2.8	3.0	3.2	3.2	3.4	3.6	4.2	4.0	4.2	4.0	3.7	3.4	3.1	2.9	3.5	3.1	2.3	2.4	4.2
9-Apr	2.4	2.3	1.9	0.9	0.9	1.7	2.3	2.9	3.3	2.8	3.5	3.3	3.4	3.4	3.6	3.6	2.8	3.5	4.2	3.2	1.8	2.0	1.3	1.4	4.2
10-Apr	2.5	2.9	2.9	2.6	2.3	1.9	2.2	2.2	2.3	2.3	2.4	2.5	2.6	2.6	2.3	2.2	1.7	1.3	0.7	0.3	0.2	0.2	0.6	1.7	2.9
11-Apr	2.8	2.2	1.9	2.2	2.3	2.1	1.2	1.3	1.5	1.7	1.7	1.8	1.8	1.9	1.6	1.6	1.4	0.8	0.2	0.2	0.3	0.2	0.4	0.2	2.8
12-Apr	0.2	0.2	0.3	0.4	0.9	1.6	1.7	2.5	1.9	2.0	2.2	2.4	2.4	2.5	2.6	2.6	2.2	2.2	2.1	1.7	1.4	1.1	0.9	0.8	2.6
13-Apr	0.7	0.7	0.9	1.0	0.8	0.8	0.8	1.0	1.3	2.0	1.6	1.6	1.2	1.2	0.7	1.1	1.1	0.9	0.8	1.7	1.0	0.5	0.3	0.2	2.0
14-Apr	0.2	0.3	1.6	2.1	2.2	1.5	1.8	1.8	2.0	2.3	2.1	1.8	1.6	2.2	2.0	1.3	1.3	1.2	0.8	1.0	0.9	0.8	1.1	0.4	2.3
15-Apr	0.4	0.5	0.2	0.4	0.2	0.2	0.4	0.8	1.3	1.7	2.0	2.2	2.1	2.2	2.4	2.4	2.4	2.2	1.9	1.6	1.9	2.0	2.0	2.0	2.4
16-Apr	1.7	0.8	1.5	1.6	1.4	1.5	1.5	2.0	1.9	1.9	1.9	2.2	2.3	2.9	2.3	2.3	1.8	1.7	1.0	0.6	0.6	0.8	0.8	0.9	2.9
17-Apr	0.7	0.7	0.6	0.8	0.8	1.2	1.0	1.3	1.5	1.5	1.6	1.8	2.0	1.9	2.0	1.7	1.9	1.3	0.5	0.5	0.5	0.4	0.7	0.7	2.0
18-Apr	0.7	0.4	0.5	0.6	0.6	0.8	0.6	0.8	1.1	2.0	2.0	2.0	2.5	3.0	3.0	2.9	3.1	3.0	2.6	2.7	2.6	2.7	2.4	2.4	3.1
19-Apr	2.5	1.6	1.2	1.2	1.1	1.8	1.9	2.8	2.6	2.1	3.2	3.5	4.1	4.0	5.1	5.3	5.2	4.7	4.4	3.1	2.7	1.6	2.5	3.6	5.3
20-Apr	2.3	3.2	2.6	3.2	3.1	3.6	AF	AF	3.3	3.2	3.1	3.2	2.8	2.8	2.8	2.8	2.3	2.1	1.7	1.3	1.1	1.1	1.1	0.8	3.6
21-Apr	0.5	0.3	0.5	0.1	0.2	0.2	0.4	1.0	1.4	1.0	1.9	2.2	2.7	2.8	3.0	3.0	3.0	3.4	3.3	2.7	2.0	1.3	0.9	0.9	3.4
22-Apr	1.0	1.1	1.0	1.0	0.7	1.0	1.2	1.3	1.7	2.2	2.6	2.8	2.7	2.8	2.9	2.5	2.7	3.0	2.8	2.3	1.4	0.8	0.9	0.7	3.0
23-Apr	1.2	1.4	0.8	0.8	0.7	0.8	0.7	1.2	1.2	1.6	1.8	2.0	2.0	2.0	2.2	2.0	1.8	1.7	1.4	1.5	1.9	2.3	2.9	2.8	2.9
24-Apr	2.9	3.0	2.4	2.2	2.0	2.0	2.0	2.1	2.3	2.4	2.5	2.2	2.2	2.3	2.0	1.9	1.9	2.2	2.3	2.7	2.7	2.3	2.2	2.2	3.0
25-Apr	2.2	2.2	1.6	1.2	1.3	1.4	1.7	2.0	2.2	2.1	2.0	2.1	2.5	2.0	1.8	1.6	1.4	1.4	1.5	1.2	1.1	0.8	1.0	1.6	2.5
26-Apr	1.8	1.4	1.5	1.8	1.8	1.5	2.0	1.6	1.9	2.0	1.8	1.5	1.6	1.6	1.2	1.4	1.5	1.2	0.8	0.5	1.0	1.0	1.0	0.7	2.0
27-Apr	0.5	0.6	0.3	0.3	0.4	0.6	0.9	1.2	1.3	1.6	1.9	2.2	2.4	2.5	2.3	2.5	1.9	1.6	1.6	1.1	0.9	0.7	0.6	0.5	2.5
28-Apr	0.4	0.3	0.1	0.1	0.3	0.3	0.6	1.3	1.8	1.9	2.1	2.4	2.1	2.1	2.2	2.4	2.0	2.3	1.6	1.0	1.2	0.9	0.8	0.8	2.4
29-Apr	1.2	1.0	1.0	1.0	1.1	1.5	1.6	2.1	3.0	2.9	3.4	3.3	3.2	3.0	3.6	3.0	2.7	2.3	1.7	1.3	1.2	1.4	1.5	1.3	3.6
30-Apr	1.6	1.7	1.2	1.2	2.0	2.1	2.1	1.8	1.7	2.1	2.7	2.6	2.8	3.3	2.7	2.2	2.2	1.4	1.3	1.7	1.4	1.0	0.8	0.5	3.3
	2.9	3.2	2.9	3.2	3.1	3.6	2.8	3.0	3.3	3.4	3.5	3.6	4.2	4.0	5.1	5.3	5.2	4.7	4.4	3.2	3.5	3.1	2.9	3.6	
	Diurnal Maximum																								

AF - Analyzer Failure

Wood Buffalo Environmental Association

Summary of Hour Averages

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

Lower Camp Met Tower - April 2016

Maximum Value: 3.3 km/h on Apr 30 05:00

Maximum Daily Average: 1.7 km/h on Apr 8

Minimum Value: -1.6 km/h on Apr 19 19:00

Minimum Daily Average: -0.4 km/h on Apr 19

Maximum Diurnal Average: 0.6 km/h at hour 10

Minimum Diurnal Average: 0.2 km/h at hour 15

Monthly Average: 0.36 km/h

Percentiles: P_1 = -1.0 P_{10} = -0.3 Q_1 = 0.0 Median = 0.2 Q_3 = 0.7 P_{90} = 1.3 P_{99} = 2.3

Hours in Service:	720
Hours of Data:	716
Hours of Missing Data:	4
Hours of Calibration:	0
Percent Operational Time:	99.4

Day	Hourly Period Ending At (MST)																								Daily	Daily
	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-Apr	0.0	0.3	0.8	-0.4	-0.2	-0.1	0.0	0.1	0.3	0.9	-0.2	0.9	0.8	1.0	0.0	0.7	-0.3	0.3	-0.2	0.3	0.5	-0.1	0.3	0.1	0.2	1.0
2-Apr	0.6	0.7	0.5	1.0	0.9	-0.2	-0.1	0.5	0.3	0.0	0.5	0.1	-0.1	-0.6	-0.3	-0.3	-0.1	-0.2	0.2	0.1	0.2	0.0	0.0	-0.2	0.2	1.0
3-Apr	0.7	-0.2	0.4	0.1	-0.2	0.0	0.6	0.4	-0.5	0.1	-0.6	-0.7	-0.1	-0.3	-0.5	-0.1	0.5	-0.1	0.2	0.3	0.3	0.1	-0.1	-0.1	0.0	0.7
4-Apr	-0.1	-0.1	0.0	0.1	-0.1	0.2	0.2	0.1	0.0	0.8	0.5	0.6	0.5	0.6	0.9	0.4	0.2	0.2	0.2	0.5	0.1	-0.2	-0.4	0.0	0.2	0.9
5-Apr	-0.2	0.0	0.0	0.1	0.0	0.2	-0.1	0.0	0.3	0.0	0.4	-0.1	0.5	1.1	1.0	0.8	0.3	0.1	-0.3	-0.4	0.1	1.0	1.5	1.7	0.3	1.7
6-Apr	1.4	-0.4	0.0	-0.3	-0.6	-0.3	AF	-0.5	0.1	AF	AF	AF	-0.3	0.1	0.5	0.4	0.5	0.1	0.1	0.4	-0.2	0.2	0.4	0.1	0.1	1.4
7-Apr	0.3	-0.2	-0.1	-0.1	0.0	0.1	-0.1	0.0	0.2	0.5	0.7	0.4	0.0	-0.4	0.4	-0.2	0.0	0.0	0.2	0.3	0.5	-0.1	0.0	-0.1	0.1	0.7
8-Apr	0.1	0.5	1.1	1.1	1.3	1.9	1.6	1.5	2.1	1.9	1.8	1.6	2.7	2.0	2.5	2.3	2.0	2.2	2.0	1.8	2.2	1.9	1.4	1.7	1.7	2.7
9-Apr	2.0	1.7	2.3	-0.1	-0.1	0.0	-0.3	-0.7	-0.6	0.1	0.2	-0.4	0.1	0.3	-0.6	0.2	-0.1	0.1	0.4	0.3	0.0	-0.1	-0.1	-0.1	0.2	2.3
10-Apr	-0.1	-0.2	0.0	-0.1	0.3	0.7	-0.2	-0.1	-0.5	-0.5	-0.5	-0.4	-0.9	0.5	-0.3	0.1	0.5	-0.1	-0.2	0.1	0.2	0.4	0.9	2.3	0.1	2.3
11-Apr	2.7	2.3	1.6	1.4	2.1	1.7	1.1	1.0	0.9	1.0	1.3	1.3	1.1	0.9	0.7	0.4	0.3	0.3	0.1	0.2	0.1	0.0	-0.1	-0.1	0.9	2.7
12-Apr	-0.1	0.0	-0.1	-0.2	-0.2	0.3	0.4	-0.3	-0.1	-0.2	-0.6	0.0	0.2	0.0	0.8	0.0	-0.1	0.2	0.2	0.5	0.1	0.1	0.1	-0.2	0.0	0.8
13-Apr	-0.1	0.0	0.0	0.0	0.1	-0.1	0.0	0.0	0.3	1.1	0.7	1.1	0.4	0.6	0.2	0.8	0.7	0.3	0.7	1.6	1.4	0.2	0.1	0.1	0.4	1.6
14-Apr	0.0	-0.1	0.0	-0.1	0.0	-0.2	-0.3	0.1	0.3	0.4	-0.2	0.6	-0.3	-0.5	-0.2	-0.1	-0.1	0.0	0.2	-0.1	0.0	0.1	-0.3	-0.3	0.0	0.6
15-Apr	-0.1	-0.1	-0.1	0.1	0.1	0.0	0.0	0.2	0.1	0.1	0.5	0.5	0.6	0.8	0.6	0.8	0.7	1.0	0.9	1.2	1.0	1.4	1.8	2.0	0.6	2.0
16-Apr	1.6	0.3	1.1	1.6	1.5	1.9	2.2	1.0	1.0	1.0	0.8	0.9	0.1	-0.4	-0.2	0.0	-0.1	-0.1	-0.1	0.3	0.6	0.2	0.2	0.1	0.6	2.2
17-Apr	0.5	0.7	0.4	1.1	0.1	0.3	0.7	1.2	0.7	0.1	0.5	0.3	-0.3	-0.1	-0.1	-0.3	0.0	-0.4	-0.2	0.1	0.4	1.2	0.5	0.8	0.4	1.2
18-Apr	1.4	0.8	0.6	0.8	0.7	1.3	0.9	-0.4	0.2	1.5	1.3	1.4	1.2	0.3	0.0	0.0	-0.2	-0.7	-1.1	-0.3	0.6	0.5	0.4	0.3	0.5	1.5
19-Apr	0.1	0.3	0.1	0.3	0.3	-0.1	0.2	-0.6	0.6	-0.1	-0.1	0.1	-0.7	-0.4	-1.0	-0.9	-0.9	-1.3	-1.6	-1.2	-0.8	-1.0	-1.4	-0.4	-0.4	0.6
20-Apr	0.6	1.1	0.4	0.8	0.6	0.4	1.2	0.5	1.0	0.7	0.0	-0.2	0.4	0.8	-0.2	0.6	-0.1	0.5	-0.1	0.3	0.4	-0.3	0.0	0.0	0.4	1.2
21-Apr	0.0	0.2	0.1	0.1	0.1	0.2	0.0	0.4	0.6	-0.4	0.0	0.2	0.2	0.4	0.1	0.5	0.2	-0.2	0.6	0.2	0.3	0.2	0.0	0.2	0.2	0.6
22-Apr	0.3	0.5	0.0	0.2	-0.1	0.0	-0.3	-0.6	0.1	-0.4	0.3	0.3	0.7	0.6	-0.2	0.7	0.6	0.5	0.3	0.7	0.4	0.0	0.2	0.1	0.2	0.7
23-Apr	0.1	0.7	0.4	0.2	0.2	0.2	-0.1	0.5	0.1	1.3	0.3	0.5	0.7	0.1	0.1	0.7	0.9	0.4	0.9	1.1	1.0	1.6	2.0	2.5	0.7	2.5
24-Apr	2.7	2.4	2.3	1.9	1.3	1.6	1.4	1.2	1.2	1.2	1.7	1.1	-0.3	0.0	0.1	0.1	0.7	0.8	1.1	1.2	1.8	0.5	0.0	0.0	1.1	2.7
25-Apr	-0.6	-0.3	-0.5	-0.5	0.2	0.2	0.8	0.8	0.4	0.7	0.6	0.6	1.2	0.4	0.3	0.7	0.4	0.3	0.6	-0.2	-0.3	0.5	0.5	0.6	0.3	1.2
26-Apr	1.6	0.8	0.7	0.1	0.5	0.6	1.3	0.4	1.2	0.9	0.7	0.3	0.6	0.8	0.4	0.6	1.2	0.8	0.5	0.1	0.9	0.7	0.6	0.0	0.7	1.6
27-Apr	0.1	-0.1	0.1	0.1	0.3	0.1	0.4	0.5	-0.1	0.9	0.4	0.2	0.0	-0.6	-0.8	0.0	-0.6	0.0	0.1	0.2	-0.2	0.0	-0.1	0.0	0.0	0.9
28-Apr	0.0	-0.1	0.1	0.1	0.2	0.1	0.5	0.6	0.7	0.3	0.9	0.5	0.0	0.8	0.3	-0.2	0.5	1.4	1.4	0.6	0.2	0.3	0.3	0.3	0.4	1.4
29-Apr	0.3	0.3	0.4	0.7	1.0	1.3	1.1	1.7	1.0	1.2	0.1	-0.2	0.3	0.1	0.1	-0.7	0.0	-0.3	-0.2	0.2	-1.0	-0.5	0.1	0.6	0.3	1.7
30-Apr	0.1	0.8	1.3	1.4	3.3	1.0	1.1	0.9	0.8	0.8	0.2	0.2	-0.3	0.0	-0.2	0.0	-0.2	-0.1	0.3	0.3	0.2	0.5	0.2	0.3	0.5	3.3
	0.5	0.4	0.5	0.4	0.5	0.4	0.5	0.3	0.4	0.6	0.4	0.4	0.3	0.3	0.2	0.3	0.2	0.2	0.2	0.4	0.4	0.3	0.3	0.4	Diurnal Average	
	2.7	2.4	2.3	1.9	3.3	1.9	2.2	1.7	2.1	1.9	1.8	1.6	2.7	2.0	2.5	2.3	2.0	2.2	2.0	1.8	2.2	1.9	2.0	2.5	Diurnal Maximum	

AF - Analyzer Failure

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

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

Lower Camp Met Tower - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 4.7 km/h on Apr 19 16:00

Minimum Value: 0.2 km/h on Apr 15 06:00

Percentiles: P_1 = 0.3 P_{10} = 0.7 Q_1 = 1.1 Median = 1.7 Q_3 = 2.4 P_{90} = 3.0 P_{99} = 3.8

Hours in Service:	720
Hours of Data:	716
Hours of Missing Data:	4
Hours of Calibration:	0
Percent Operational Time:	99.4

Day	Hourly Period Ending At (MST)																								Daily
	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-Apr	0.8	1.3	2.2	0.9	0.5	0.9	1.6	2.6	2.6	3.2	3.1	2.9	3.2	2.9	2.6	2.2	2.1	2.4	1.8	0.6	1.2	1.0	1.2	1.4	3.2
2-Apr	1.7	1.5	1.7	1.9	2.2	1.9	1.2	1.3	2.3	1.9	2.1	2.4	3.1	3.0	3.2	2.6	2.9	2.4	1.7	2.1	2.1	1.6	1.8	1.5	3.2
3-Apr	1.8	1.7	2.1	2.3	2.1	2.0	2.4	2.2	2.7	2.8	2.6	2.8	2.6	2.6	2.4	2.4	2.1	1.9	1.6	1.3	1.7	1.0	0.7	0.6	2.8
4-Apr	0.4	0.3	0.5	0.2	0.4	0.4	0.3	0.3	0.6	1.2	1.6	1.8	1.9	1.9	1.6	1.6	0.9	0.9	0.7	1.3	1.5	1.3	0.6	0.7	1.9
5-Apr	0.6	0.5	0.7	0.6	0.6	0.8	0.9	1.0	1.1	1.1	1.2	1.4	2.3	2.5	2.7	2.7	2.1	1.7	1.5	1.5	1.6	1.7	2.0	2.0	2.7
6-Apr	1.7	1.7	0.6	0.9	1.1	1.6	AF	2.2	1.9	AF	AF	AF	1.8	1.6	1.5	1.8	1.9	1.6	1.9	2.0	2.0	2.1	1.7	1.5	2.2
7-Apr	1.4	0.8	1.1	1.5	1.4	0.9	0.8	0.7	1.1	1.3	1.4	1.1	1.8	1.5	1.9	2.0	2.1	1.9	1.6	1.6	1.4	1.4	1.4	0.9	2.1
8-Apr	0.7	1.2	1.3	1.9	2.1	2.1	2.1	2.4	2.3	2.4	2.5	3.2	3.2	3.5	3.7	3.9	3.3	3.2	2.7	2.5	3.2	2.8	1.8	1.9	3.9
9-Apr	1.6	1.7	1.8	1.2	1.0	2.4	2.6	2.8	3.1	2.3	3.3	3.3	3.1	3.3	2.5	3.0	2.6	3.0	3.5	2.6	1.5	1.8	1.0	1.4	3.5
10-Apr	2.5	2.9	2.6	2.4	2.1	1.7	1.6	2.0	2.2	2.4	2.7	2.7	2.8	3.1	2.6	2.3	2.1	1.6	0.8	0.3	0.3	0.4	1.2	1.6	3.1
11-Apr	1.9	1.4	1.7	1.5	1.2	1.5	1.4	1.2	1.3	1.6	1.9	2.0	2.1	2.0	1.8	1.8	1.3	0.8	0.3	0.3	0.7	0.8	0.7	0.5	2.1
12-Apr	0.3	0.2	0.3	0.3	0.9	1.4	1.7	1.8	2.1	2.3	2.3	2.2	2.4	2.4	2.7	2.4	1.8	1.5	1.8	1.5	1.4	1.1	1.1	0.8	2.7
13-Apr	0.7	0.5	0.6	0.9	0.9	0.8	1.0	1.0	1.5	1.8	1.2	1.5	1.3	1.2	0.9	0.9	1.3	1.2	1.1	1.0	1.4	0.9	0.5	0.2	1.8
14-Apr	0.3	0.5	1.7	2.3	2.0	1.7	1.8	1.2	1.8	1.9	1.6	2.0	1.9	2.0	2.0	1.2	0.9	1.1	0.4	0.8	0.8	0.8	1.0	0.6	2.3
15-Apr	0.7	0.6	0.3	0.3	0.3	0.2	0.3	0.8	0.8	0.9	1.8	2.2	2.3	2.4	2.6	2.3	2.9	2.2	1.7	1.5	1.7	2.1	1.9	1.6	2.9
16-Apr	1.8	0.9	1.0	0.9	0.9	1.2	1.3	1.2	1.4	1.2	1.5	2.3	2.9	1.6	2.3	2.1	1.6	1.1	0.8	0.5	0.7	1.3	1.2	1.2	2.9
17-Apr	1.0	0.8	0.9	0.9	0.9	1.1	1.1	0.9	1.2	1.2	1.2	1.4	2.2	2.2	2.5	1.7	1.4	1.5	0.7	0.5	0.7	0.4	0.9	0.8	2.5
18-Apr	0.9	0.7	0.7	0.8	0.6	0.9	1.0	1.2	1.1	1.0	1.2	2.0	3.1	3.2	3.3	3.3	3.0	2.7	2.4	2.8	3.0	3.1	3.0	3.0	3.3
19-Apr	2.7	2.0	1.9	1.5	1.7	1.6	1.9	3.4	3.4	2.7	2.6	2.8	3.1	2.9	4.2	4.7	4.6	4.6	4.3	2.8	2.5	1.8	2.7	3.8	4.7
20-Apr	2.4	3.0	2.6	3.1	3.1	3.4	3.5	3.4	3.1	3.3	3.6	3.2	3.0	3.2	3.4	3.1	2.8	2.6	1.9	1.1	1.6	1.9	1.8	0.9	3.6
21-Apr	0.8	0.4	0.7	0.3	0.4	0.3	0.5	1.2	1.9	1.3	2.3	2.9	2.7	3.4	3.5	3.5	3.5	3.5	3.4	2.6	2.4	1.8	1.4	1.3	3.5
22-Apr	1.2	0.8	0.7	1.1	0.9	1.2	1.2	0.9	2.1	2.6	2.7	3.1	3.4	3.4	3.2	3.2	3.3	2.7	2.7	2.4	1.7	0.9	1.9	1.2	3.4
23-Apr	1.6	1.6	1.3	0.9	0.9	1.2	0.8	1.3	1.5	1.9	2.0	2.1	2.2	2.3	2.6	2.5	2.2	1.7	1.3	1.2	1.9	2.1	2.2	2.8	2.8
24-Apr	1.9	1.9	1.9	1.6	1.4	1.3	1.5	1.6	1.9	2.0	2.3	2.6	2.3	2.7	2.1	2.2	2.0	2.1	2.2	2.4	2.6	2.5	2.1	2.0	2.7
25-Apr	2.1	2.0	1.5	1.2	1.2	1.5	1.9	2.4	2.7	2.7	2.4	2.5	3.1	2.5	2.2	2.0	2.0	1.8	1.9	1.2	0.8	0.9	1.1	1.3	3.1
26-Apr	1.4	1.4	1.3	1.5	1.7	1.5	2.0	1.8	2.2	2.0	2.0	1.7	1.8	1.7	1.4	1.0	1.2	1.2	0.8	0.7	1.4	1.2	1.2	0.9	2.2
27-Apr	0.6	0.6	0.5	0.4	0.6	0.6	0.7	0.7	0.7	1.7	1.8	2.4	2.4	2.6	2.3	2.5	2.3	2.0	1.5	1.1	1.5	1.4	0.9	0.5	2.6
28-Apr	0.4	0.4	0.4	0.4	0.5	0.5	0.6	0.9	1.0	1.1	1.9	2.9	2.4	3.0	2.8	2.6	2.4	1.9	1.2	1.4	1.1	1.0	1.1	1.3	3.0
29-Apr	1.3	1.2	1.5	1.8	1.3	1.1	1.2	2.2	3.7	3.7	3.9	3.8	3.6	3.4	3.7	3.1	3.0	2.7	1.9	1.5	1.4	1.7	1.7	1.5	3.9
30-Apr	1.5	1.6	1.3	1.7	2.2	2.0	2.2	2.2	1.8	2.1	3.1	3.0	2.8	3.6	2.0	1.9	1.6	1.6	1.5	2.5	1.4	1.6	1.6	1.0	3.6
	2.7	3.0	2.6	3.1	3.1	3.4	3.5	3.4	3.7	3.7	3.9	3.8	3.6	3.6	4.2	4.7	4.6	4.6	4.3	2.8	3.2	3.1	3.0	3.8	
	Diurnal Maximum																								

AF - Analyzer Failure

Wood Buffalo Environmental Association

Summary of Hour Averages

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

Lower Camp Met Tower - April 2016

Maximum Value: 5.2 km/h on Apr 26 02:00

Maximum Daily Average: 2.1 km/h on Apr 8

Minimum Value: -1.5 km/h on Apr 10 13:00

Minimum Daily Average: 0.0 km/h on Apr 27

Maximum Diurnal Average: 1.0 km/h at hour 2

Minimum Diurnal Average: 0.3 km/h at hour 15

Monthly Average: 0.62 km/h

Percentiles: P_1 = -1.1 P_{10} = -0.2 Q_1 = 0.1 Median = 0.4 Q_3 = 1.0 P_{90} = 1.6 P_{99} = 3.1

Hours in Service:	720
Hours of Data:	716
Hours of Missing Data:	4
Hours of Calibration:	0
Percent Operational Time:	99.4

Day	Hourly Period Ending At (MST)																								Daily	Daily
	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-Apr	0.9	0.9	1.8	-0.2	0.1	0.0	0.3	0.1	0.3	1.4	-0.4	1.2	0.9	0.9	-0.4	0.9	-0.4	0.2	0.0	0.7	1.5	0.3	0.5	0.4	0.5	1.8
2-Apr	1.1	1.4	1.4	1.5	1.4	0.4	0.9	1.0	0.3	-0.2	0.8	0.1	-0.1	-0.5	-0.2	-0.2	-0.1	0.1	0.3	0.1	0.3	0.0	0.1	0.0	0.4	1.5
3-Apr	0.7	0.2	0.6	0.3	0.1	0.1	0.5	0.3	-0.4	0.4	-0.9	-0.8	-0.3	-0.7	-0.5	-0.3	0.5	-0.5	0.0	0.7	0.5	0.1	0.2	0.7	0.1	0.7
4-Apr	0.5	0.2	0.3	0.4	0.4	0.4	0.2	0.0	0.3	0.6	0.4	0.2	0.3	0.6	0.9	0.5	0.2	0.4	0.5	1.4	0.5	0.3	0.0	0.2	0.4	1.4
5-Apr	-0.2	0.3	0.4	0.4	-0.1	0.1	0.2	0.1	0.1	0.3	0.1	-0.3	0.7	1.8	0.9	1.1	0.2	0.7	0.2	0.2	0.2	0.7	1.4	1.3	0.5	1.8
6-Apr	1.5	-0.1	0.5	-0.1	-0.6	0.0	0.2	AF	AF	AF	AF	-0.4	0.3	0.1	0.4	0.2	0.4	-0.1	0.2	0.4	-0.2	0.2	0.2	0.0	0.2	1.5
7-Apr	0.3	0.0	0.2	0.0	0.3	0.1	0.2	0.1	0.4	0.4	0.6	0.2	-0.1	-0.7	0.2	-0.3	0.0	0.2	0.1	0.3	1.2	0.2	0.6	0.6	0.2	1.2
8-Apr	1.2	1.7	1.7	1.4	1.9	2.2	2.1	1.8	2.6	1.9	2.0	2.0	2.8	2.5	3.0	3.2	2.7	2.7	2.1	2.3	2.4	2.0	1.7	1.6	2.1	3.2
9-Apr	2.2	2.5	3.1	-0.1	-0.2	0.1	0.2	-0.4	-0.7	0.3	0.1	-0.4	0.3	0.5	-0.7	0.4	-0.2	0.1	0.6	0.6	0.1	0.1	0.2	0.2	0.4	3.1
10-Apr	0.2	0.1	0.1	0.0	0.6	0.7	0.1	-0.3	-0.8	-1.0	-0.6	-0.3	-1.5	0.4	-0.1	-0.2	0.2	-0.1	0.2	0.2	0.6	0.8	1.6	2.5	0.1	2.5
11-Apr	2.8	2.6	2.0	1.6	2.2	2.0	1.0	0.6	0.5	0.6	0.8	1.0	0.9	0.8	0.4	0.3	0.1	0.2	0.2	0.4	0.3	0.4	0.0	0.2	0.9	2.8
12-Apr	0.1	0.2	0.2	0.0	0.1	0.3	0.4	-0.2	0.0	-0.2	-0.7	0.2	0.5	0.0	1.0	0.2	0.0	0.2	0.3	0.7	0.4	0.3	0.4	-0.2	0.2	1.0
13-Apr	0.1	0.4	0.9	0.3	1.0	0.5	0.6	0.9	1.2	1.4	0.5	1.4	0.3	0.6	0.4	1.1	1.4	0.5	0.8	1.9	1.6	0.0	0.3	0.1	0.8	1.9
14-Apr	0.1	0.1	0.3	0.0	-0.1	-0.1	-0.2	0.1	0.3	0.4	0.0	0.7	-0.3	-0.2	-0.1	0.0	-0.2	0.1	0.3	0.1	0.1	0.2	0.2	0.3	0.1	0.7
15-Apr	0.1	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.3	-0.1	0.2	0.3	0.2	0.5	0.4	0.5	0.6	1.1	1.3	1.6	0.8	1.0	1.8	2.3	0.6	2.3
16-Apr	2.2	0.9	1.4	1.4	1.9	2.4	2.5	1.5	0.7	0.5	0.3	1.0	1.0	0.2	0.3	0.5	0.4	0.4	0.3	0.5	0.7	1.2	1.3	0.3	1.0	2.5
17-Apr	0.5	0.2	0.1	1.0	0.7	0.8	0.7	1.4	0.7	0.2	0.4	0.3	-0.4	-0.4	0.2	-0.1	0.5	-0.1	0.3	0.1	0.8	0.9	0.5	0.4	0.4	1.4
18-Apr	0.8	0.5	0.9	0.3	0.3	0.8	0.5	0.0	0.2	2.0	1.4	0.8	0.9	1.4	1.4	1.7	1.3	0.2	-0.1	-1.1	0.5	0.5	-0.2	0.0	0.6	2.0
19-Apr	1.2	1.6	0.7	2.0	0.7	0.7	0.6	-0.7	0.6	0.2	0.2	1.1	0.2	0.8	0.0	-0.2	0.2	-0.9	-1.4	-0.8	-0.8	-1.0	-1.4	-0.2	0.1	2.0
20-Apr	0.6	1.2	0.5	1.3	0.7	0.7	1.1	0.4	1.1	0.5	-0.2	-0.4	0.4	1.1	-0.3	0.6	-0.2	0.6	-0.2	0.4	0.8	-0.4	0.7	0.5	0.5	1.3
21-Apr	0.7	0.7	0.7	0.6	0.5	0.5	0.2	0.4	0.6	-0.3	0.1	0.4	0.3	0.1	-0.3	0.3	0.2	-0.4	0.7	0.5	0.6	0.7	0.3	0.4	0.4	0.7
22-Apr	0.8	1.4	0.0	0.1	-0.4	0.0	-0.2	-0.2	0.3	-0.3	0.3	0.3	0.8	0.6	0.0	0.7	0.6	0.8	0.5	1.1	0.9	0.4	0.5	0.3	0.4	1.4
23-Apr	0.4	1.1	1.0	0.7	1.3	0.6	0.2	0.9	-0.1	1.3	0.4	-0.1	0.1	-0.2	-0.5	0.3	0.3	0.0	1.2	2.1	2.0	2.2	2.3	2.6	0.8	2.6
24-Apr	3.1	2.7	2.5	2.1	1.5	1.5	1.6	1.4	1.4	1.2	1.9	1.3	-0.1	0.1	0.6	0.4	0.9	1.1	1.6	1.8	2.0	0.5	1.4	1.0	1.4	3.1
25-Apr	0.3	0.5	0.4	-0.1	0.2	0.3	0.6	0.7	0.4	1.0	1.1	0.8	1.2	1.0	1.0	1.5	0.9	1.2	1.4	1.2	1.4	1.9	2.0	2.2	1.0	2.2
26-Apr	2.9	5.2	4.7	2.7	1.1	1.1	1.2	0.2	0.6	0.6	0.6	0.3	0.4	0.8	0.1	0.5	1.2	0.9	0.6	0.7	1.1	1.1	1.0	0.6	1.3	5.2
27-Apr	0.2	0.0	0.3	0.1	0.1	0.2	0.4	0.2	0.0	0.7	0.2	-0.5	-0.4	-1.1	-1.2	-0.1	-0.6	0.2	0.3	0.5	0.0	0.5	0.5	0.4	0.0	0.7
28-Apr	0.1	0.2	0.3	0.3	0.5	0.5	0.6	0.4	0.5	0.3	0.8	1.3	0.5	1.1	0.9	-0.2	0.7	1.6	1.6	0.6	0.3	0.5	0.2	-0.2	0.6	1.6
29-Apr	0.5	-0.4	0.5	0.9	1.2	1.0	0.8	1.3	0.5	0.8	0.1	0.3	0.8	1.0	0.5	0.7	1.7	1.2	1.0	1.4	1.1	2.2	2.7	3.4	1.0	3.4
30-Apr	3.9	4.3	1.5	1.8	2.8	4.0	3.2	1.3	0.6	0.9	1.4	1.1	1.5	1.6	0.3	0.7	0.4	0.8	0.7	1.3	0.7	1.3	0.6	0.9	1.6	4.3
	1.0	1.0	1.0	0.7	0.7	0.7	0.7	0.5	0.4	0.5	0.4	0.4	0.4	0.5	0.3	0.5	0.5	0.4	0.5	0.7	0.7	0.6	0.7	0.8	Diurnal Average	
	3.9	5.2	4.7	2.7	2.8	4.0	3.2	1.8	2.6	2.0	2.0	2.0	2.8	2.5	3.0	3.2	2.7	2.7	2.1	2.3	2.4	2.2	2.7	3.4	Diurnal Maximum	

AF - Analyzer Failure

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

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

Lower Camp Met Tower - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 4.8 km/h on Apr 19 16:00

Minimum Value: 0.2 km/h on Apr 15 05:00

Percentiles: P_1 = 0.2 P_{10} = 0.6 Q_1 = 1.0 Median = 1.7 Q_3 = 2.3 P_{90} = 3.0 P_{99} = 3.8

Hours in Service:	720
Hours of Data:	716
Hours of Missing Data:	4
Hours of Calibration:	0
Percent Operational Time:	99.4

Day	Hourly Period Ending At (MST)																								Daily
	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-Apr	1.0	1.2	2.4	1.1	0.9	1.3	2.1	2.8	2.9	3.5	3.6	3.5	3.4	3.4	2.8	2.5	2.1	2.6	1.7	0.7	0.9	1.1	1.3	1.7	3.6
2-Apr	2.1	1.8	1.6	1.9	1.9	2.0	1.1	1.4	2.3	2.2	2.2	2.7	2.8	2.7	2.6	2.4	2.3	2.4	2.0	2.3	2.2	1.2	1.5	1.1	2.8
3-Apr	1.8	1.4	1.9	2.1	1.8	1.9	2.5	2.1	2.5	2.8	2.8	3.0	3.0	2.8	2.8	2.6	2.3	2.0	1.5	0.9	1.7	1.3	0.8	0.5	3.0
4-Apr	0.5	0.4	0.5	0.5	0.6	0.5	0.3	0.4	0.5	0.8	1.1	1.6	2.1	2.1	1.7	1.7	1.1	0.9	0.7	1.2	2.0	1.6	0.7	0.6	2.1
5-Apr	0.7	0.5	0.7	0.6	0.6	0.5	0.5	0.6	0.7	0.5	1.3	1.7	2.3	2.7	3.0	2.5	1.6	1.4	1.1	1.0	1.1	1.3	1.4	1.5	3.0
6-Apr	1.4	2.0	0.9	1.1	1.1	1.2	1.5	AF	AF	AF	AF	1.0	1.9	1.4	1.4	1.8	1.9	1.6	2.0	2.0	1.9	2.0	2.1	1.5	2.1
7-Apr	1.5	0.7	1.0	1.5	1.3	0.8	0.7	0.5	1.1	1.1	1.3	1.1	1.7	1.4	2.1	2.1	2.4	2.1	1.7	1.5	0.7	1.4	1.7	1.0	2.4
8-Apr	1.0	1.1	1.3	1.6	2.0	1.7	1.7	2.1	2.3	2.3	2.3	2.5	2.8	2.8	3.3	3.2	2.8	2.7	2.8	2.3	3.2	2.9	1.9	2.0	3.3
9-Apr	2.1	1.6	2.0	1.5	1.0	2.5	2.3	2.3	2.7	2.4	3.1	2.9	3.2	3.4	2.5	3.0	2.5	3.2	3.7	2.8	1.5	1.5	0.9	1.6	3.7
10-Apr	2.1	2.6	2.3	1.9	2.0	1.8	1.3	2.1	2.4	2.5	2.9	3.1	3.0	3.5	3.0	2.5	2.2	1.9	0.9	0.4	0.3	0.4	1.1	1.6	3.5
11-Apr	2.0	1.7	1.7	1.5	1.5	1.6	1.4	1.3	1.4	1.4	1.7	1.9	2.0	2.1	1.8	1.5	1.4	0.9	0.3	0.4	0.7	0.8	0.7	0.4	2.1
12-Apr	0.2	0.4	0.4	0.4	1.0	1.6	1.8	1.8	2.1	2.2	2.4	2.5	2.9	2.8	3.2	2.6	2.1	1.6	1.8	1.8	1.6	1.1	1.3	0.7	3.2
13-Apr	0.6	0.6	0.7	1.1	1.2	1.1	1.1	1.8	1.7	1.7	1.3	1.4	1.4	1.2	0.8	0.9	1.3	1.3	1.1	0.9	1.6	0.6	0.5	0.2	1.8
14-Apr	0.2	0.6	1.6	2.5	2.1	1.7	1.3	1.3	1.9	1.9	1.6	2.1	1.9	2.0	2.2	1.5	1.1	1.1	0.5	0.7	0.8	0.7	0.9	0.6	2.5
15-Apr	0.8	0.6	0.5	0.2	0.2	0.2	0.4	0.5	0.6	1.0	2.0	2.3	2.4	2.6	3.0	2.7	2.9	2.3	1.6	1.5	1.9	1.9	1.6	1.7	3.0
16-Apr	2.1	1.2	1.3	1.3	0.9	1.3	1.4	1.4	1.1	1.0	1.5	2.8	2.9	1.5	2.4	2.0	1.8	1.4	1.0	0.6	0.5	1.2	1.4	0.8	2.9
17-Apr	0.9	0.8	0.7	0.9	1.0	1.1	1.2	1.1	1.2	1.1	1.2	1.0	1.8	2.1	2.4	1.6	1.5	2.0	1.0	0.4	0.6	0.6	1.0	0.7	2.4
18-Apr	0.9	0.7	0.7	0.6	0.6	0.7	0.7	1.0	1.2	0.8	1.2	1.9	2.6	2.6	2.5	2.5	1.9	2.0	1.8	1.8	2.2	2.0	2.1	2.0	2.6
19-Apr	1.9	2.3	1.7	1.6	1.7	1.8	1.6	3.6	3.6	2.9	2.7	2.3	2.9	2.8	4.1	4.8	4.6	4.6	3.7	2.5	2.1	1.5	2.2	4.2	4.8
20-Apr	2.3	3.2	2.7	3.1	3.3	3.4	3.6	3.4	3.6	3.7	3.8	3.6	3.4	3.7	3.9	3.8	3.1	3.1	1.8	0.9	1.1	1.8	1.8	1.2	3.9
21-Apr	0.7	0.6	0.9	0.5	0.4	0.3	0.4	1.0	1.9	1.7	2.5	3.1	3.3	3.8	4.1	3.8	3.9	3.5	3.4	2.4	2.2	2.0	1.5	1.2	4.1
22-Apr	1.0	0.7	0.9	0.7	1.1	0.8	1.1	0.7	1.8	2.7	3.4	3.4	3.7	3.7	3.7	3.3	3.8	3.0	2.3	2.0	1.9	1.2	2.0	1.7	3.8
23-Apr	2.1	1.9	1.8	1.2	1.3	1.7	1.2	1.5	1.5	2.3	2.4	2.6	2.5	2.8	3.1	3.1	2.6	2.1	1.4	1.3	1.8	1.9	2.1	3.1	3.1
24-Apr	2.0	2.1	2.0	1.7	1.4	1.5	1.6	1.6	1.7	2.1	2.6	2.5	2.0	2.4	1.7	1.7	1.8	2.2	2.1	2.0	2.2	1.9	1.6	1.4	2.6
25-Apr	1.4	1.2	1.1	0.9	0.7	0.9	1.2	1.8	2.0	2.1	1.9	2.3	3.1	2.3	2.1	1.8	2.2	1.8	2.0	1.1	0.5	0.5	0.5	0.6	3.1
26-Apr	1.1	1.3	0.6	0.9	1.0	1.2	1.9	1.4	1.6	1.8	1.8	1.4	1.4	1.3	1.1	1.0	1.5	1.1	0.7	0.9	1.0	1.1	1.0	1.0	1.9
27-Apr	0.5	0.4	0.6	0.2	0.2	0.3	0.3	0.4	0.7	1.6	1.8	2.2	2.8	2.6	2.5	2.8	2.6	2.5	1.7	0.9	1.5	1.4	0.8	0.7	2.8
28-Apr	0.4	0.4	0.5	0.6	0.6	0.5	0.7	0.8	1.0	1.0	2.1	2.9	2.3	2.7	2.6	1.9	2.1	2.0	1.0	1.4	0.9	0.9	0.8	0.8	2.9
29-Apr	1.0	0.7	1.0	1.5	1.6	1.5	1.4	2.4	2.7	3.3	3.3	2.9	3.0	3.2	3.2	2.4	2.7	2.5	1.6	1.0	1.2	1.0	0.9	0.8	3.3
30-Apr	0.9	1.4	1.0	1.3	1.3	1.4	1.6	1.8	2.1	1.9	3.1	2.7	2.8	3.4	1.6	1.7	1.4	1.4	1.1	2.6	1.8	1.4	2.0	1.4	3.4
	2.3	3.2	2.7	3.1	3.3	3.4	3.6	3.6	3.6	3.7	3.8	3.6	3.7	3.8	4.1	4.8	4.6	4.6	3.7	2.8	3.2	2.9	2.2	4.2	
	Diurnal Maximum																								

AF - Analyzer Failure

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 4
BUFFALO VIEWPOINT
APRIL 2016

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

May 27, 2016

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

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	687	33	33	100.00	25	0	3	0
H2S (ppb) Average	687	33	33	100.00	4	0	1	0
THC (ppm) Average	687	33	33	100.00	9.1	-	2.8	-
Temperature (C) Average	720	0	0	100.00	27.7	-	17.1	-
Relative Humidity (%) Average	720	0	0	100.00	99	-	94	-
Wind Speed 10 m (km/h) Average	705	0	15	97.92	32	-	21	-
Wind Direction 10 m (deg) Average	705	0	15	97.92	-	-	-	-

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

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

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

					Percentile						
Parameter	Number	Mean	StnDev	Total	Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	687	0.6	2	-	0	0	0	0	0	1	25
H2S (ppb) Average	687	0.3	0	-	0	0	0	0	0	0	4
THC (ppm) Average	687	2.27	0.3	-	2.1	2.1	2.2	2.2	2.3	2.4	9.1
Temperature 2 m (C) Average	720	4	7.9	-	-14.2	-5.5	-1.5	2.9	8.4	16.1	27.7
Relative Humidity (%) Average	720	58	23	-	14	26	40	58	76	89	99
Wind Speed 10 m (km/h) Average	705	11.7	6	-	1	5	8	10	15	21	32
Wind Direction 10 m (deg) Average	705	-	-	-	-	-	-	-	-	-	-

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

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
Wind Speed, Wind Direction	06 Apr 2016 18:00	06 Apr 2016 18:00	1	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	07 Apr 2016 02:00	07 Apr 2016 10:00	9	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	14 Apr 2016 07:00	14 Apr 2016 11:00	5	Flat line in sensor output signal - Sensor frozen

Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO_2) - ppb

Buffalo Viewpoint - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 25 ppb on Apr 7 14:00 Maximum Daily Average: 3.3 ppb on Apr 21

Minimum Value: 0 ppb on Apr 13 23:00
Maximum Diurnal Average: 1.7 ppb at hour 11
Monthly Average: 0.6 ppb

Minimum Daily Average: 0.1 ppb on Apr 25
Minimum Diurnal Average: 0.3 ppb at hour 1
Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 1$ $P_{99} = 9$

Hours in Service:	720
Hours of Data:	687
Hours of Missing Data:	33
Hours of Calibration:	33
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-Apr	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	1	0	0.5	7
2-Apr	0	0	Z	0	0	0	0	2	0	4	10	4	2	2	0	0	0	0	0	0	0	0	0	0	1.2	10
3-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
4-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	3	4	1	1	0	0	0	0	0.6	4
5-Apr	0	0	0	0	0	Z	0	0	0	1	2	4	1	0	0	0	0	0	0	0	0	0	0	0	0.6	4
6-Apr	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
7-Apr	0	Z	1	5	0	4	6	4	2	1	4	5	6	25	7	2	1	0	0	0	0	0	0	1	3.3	25
8-Apr	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
9-Apr	0	0	0	Z	1	0	0	0	1	1	1	1	1	3	1	0	0	0	0	0	1	1	1	1	0.7	3
10-Apr	1	0	0	0	Z	0	0	0	0	0	0	0	1	1	1	0	1	5	8	6	2	1	1	0	1.4	8
11-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	1	0	1	2	3	2	4	4	2	2	2	2	1.2	4
12-Apr	Z	1	1	1	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
13-Apr	0	Z	0	1	7	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	7
14-Apr	0	0	Z	0	0	0	0	0	0	0	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.1	0
15-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
16-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
17-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
18-Apr	Z	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
19-Apr	0	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
20-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.1	1
21-Apr	1	13	9	Z	1	1	1	0	6	18	12	9	2	0	0	1	0	0	0	0	0	0	0	0	3.3	18
22-Apr	0	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
23-Apr	0	0	0	0	1	Z	0	0	1	7	11	0	0	0	0	0	0	0	0	0	0	0	0	0	1.0	11
24-Apr	Z	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
25-Apr	0	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
26-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
27-Apr	0	0	0	Z	0	0	0	1	2	4	2	1	2	1	1	1	1	0	0	0	0	0	2	0	0.8	4
28-Apr	0	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
29-Apr	0	0	0	0	0	Z	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0.4	1
30-Apr	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	1	0.4	1
	0.3	0.8	0.6	0.4	0.6	0.5	0.4	0.4	0.5	1.4	1.7	1.0	0.7	1.2	0.5	0.3	0.5	0.5	0.6	0.5	0.3	0.5	0.4	0.3	Diurnal Average	
	1	13	9	5	7	4	6	4	6	18	12	9	6	25	7	2	3	5	8	6	2	7	2	2	Diurnal Maximum	

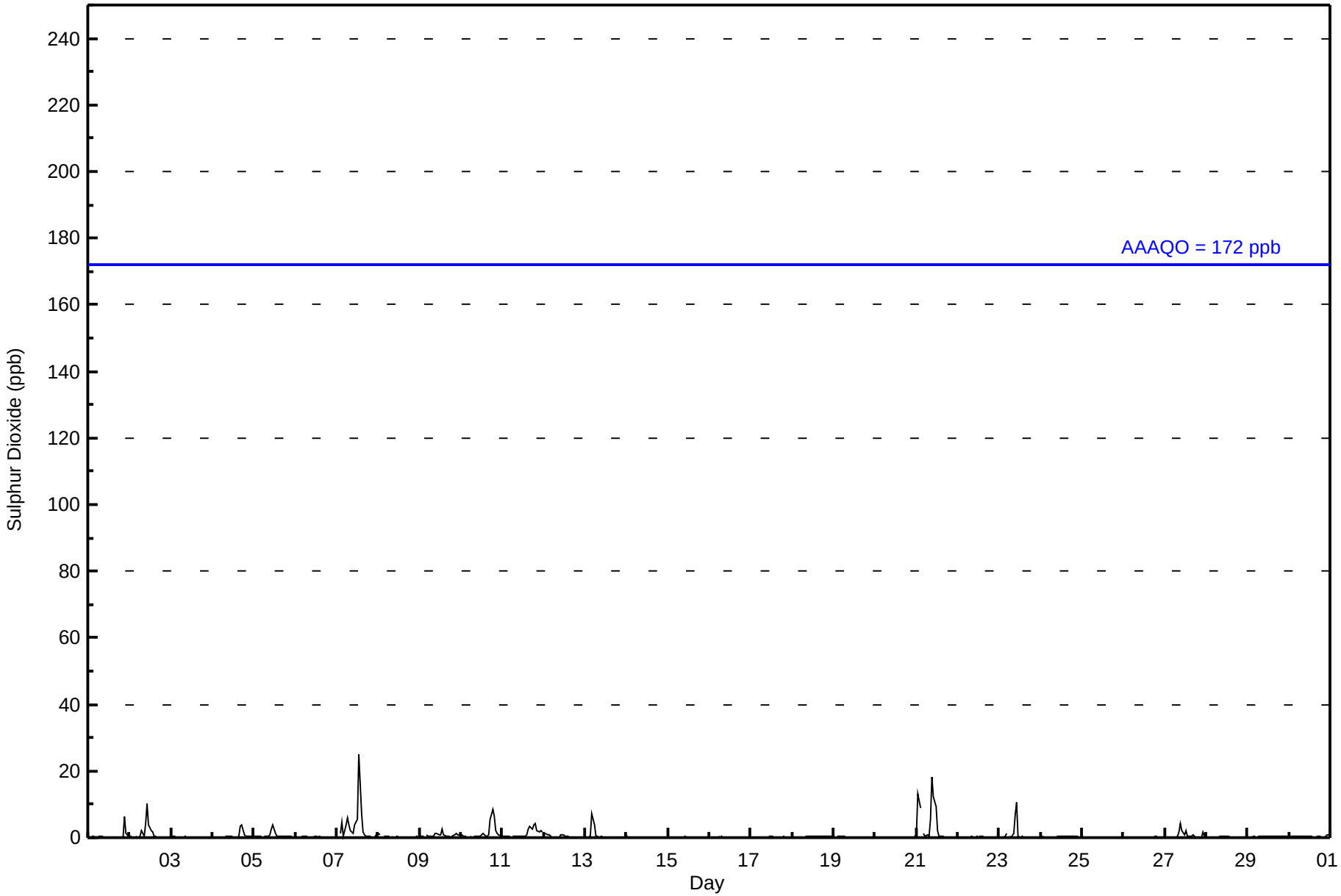
Z - zerospan C - Calibration
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb

Wood Buffalo Environmental Association

Hourly Averages

Sulphur Dioxide (SO_2) - ppb

Buffalo Viewpoint - April 2016



Sulphur Dioxide (SO_2) - ppb
Buffalo Viewpoint - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	682	99.27	99.27
11 - 20	4	0.58	99.85
21 - 60	1	0.15	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

Buffalo Viewpoint - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 10	127	89	15	8	7	56	85	115	53	20	3	17	15	10	20	29	669
11 - 20	2	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	4
21 - 60	0	1	0	0	0	0	0	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	129	90	15	8	8	57	85	115	53	20	3	17	15	10	20	29	674

Total Number of Valid Hours: 674

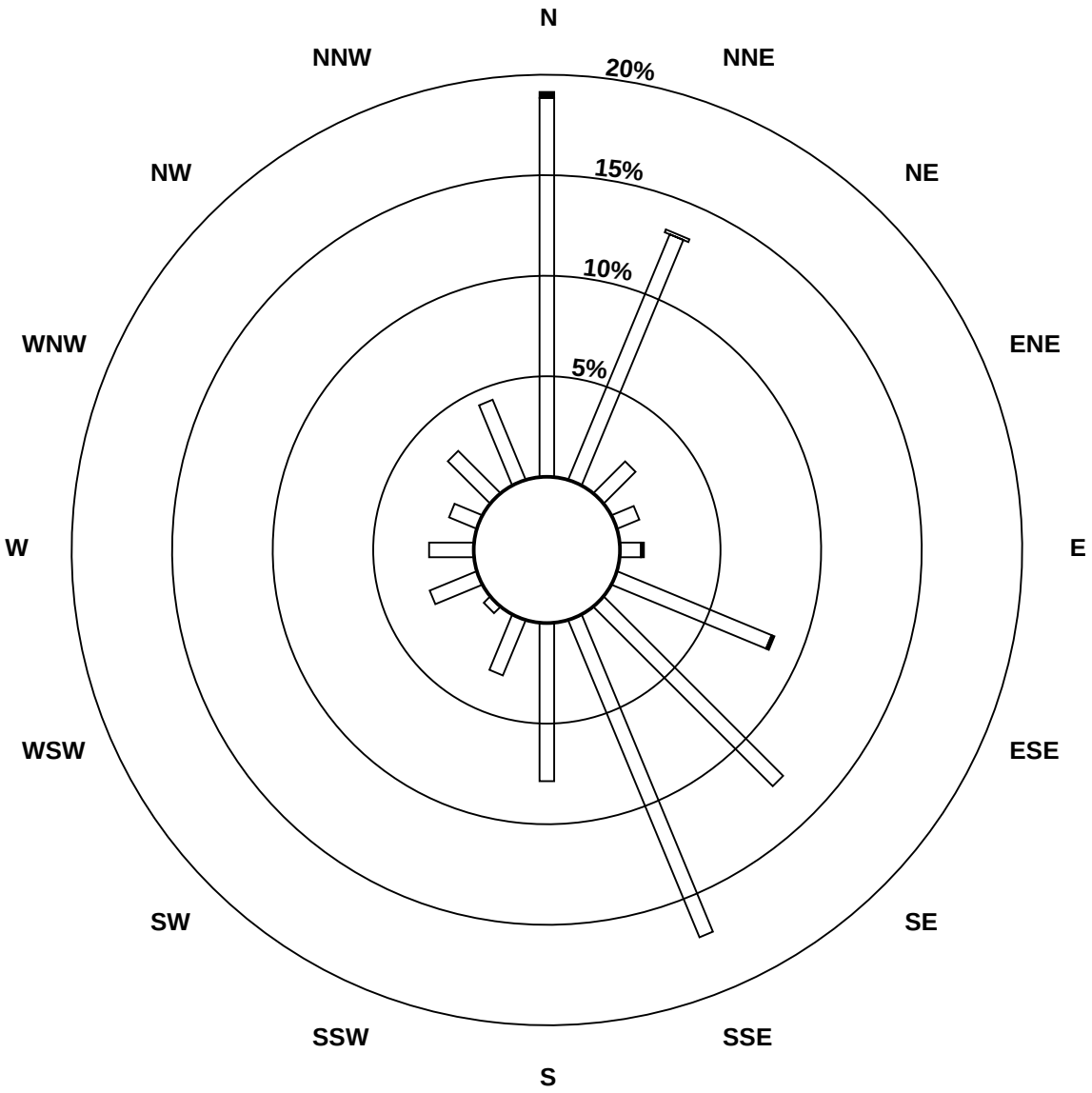
Total Number of Hours: 720

Wood Buffalo Environmental Association

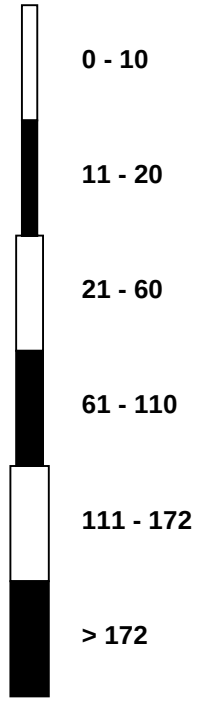
Wind Rose Apr 2016

Sulphur Dioxide (SO_2) - ppb

Buffalo Viewpoint (AMS 4)



Classes (ppb)



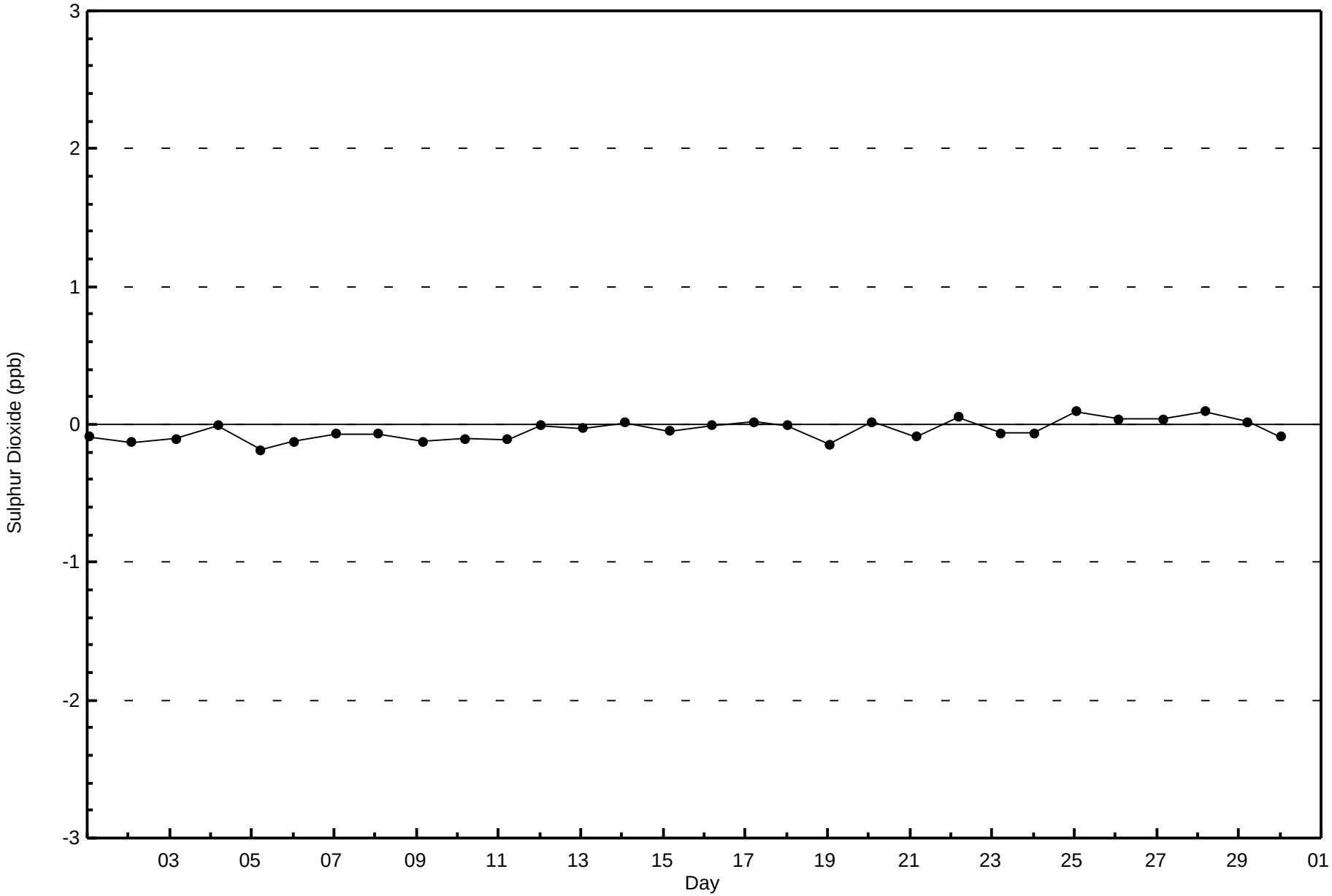
Total Number of Valid Hours: 674

Wood Buffalo Environmental Association

Zero Responses

Sulphur Dioxide (SO_2) - ppb

Buffalo Viewpoint - April 2016

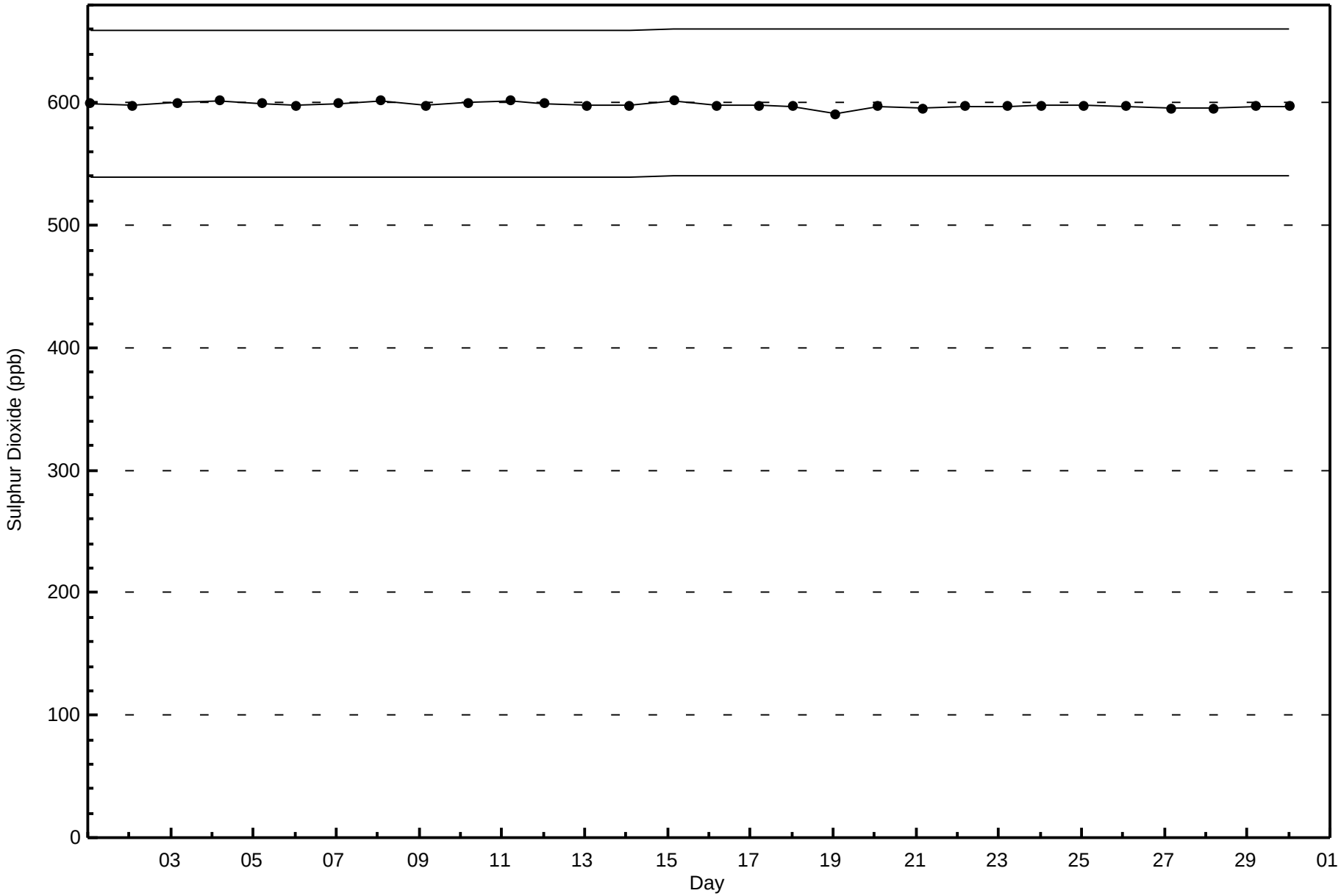


Wood Buffalo Environmental Association

Span Responses

Sulphur Dioxide (SO_2) - ppb

Buffalo Viewpoint - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Hydrogen Sulphide (H_2S) - ppb

Buffalo Viewpoint - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 4 ppb on Apr 21 10:00 Maximum Daily Average: 0.8 ppb on Apr 21

Minimum Value: 0 ppb on Apr 20 06:00 Minimum Daily Average: 0.1 ppb on Apr 20
Maximum Diurnal Average: 0.4 ppb at hour 10 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 $Q_3 = 0$ $P_{90} = 0$ $P_{99} = 2$

Hours in Service:	720
Hours of Data:	687
Hours of Missing Data:	33
Hours of Calibration:	33
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-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.3	1
2-Apr	1	0	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
3-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
4-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0.3	1
5-Apr	0	0	0	0	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
6-Apr	0	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-Apr	0	1	Z	2	1	2	2	2	1	0	1	1	1	1	1	0	0	0	0	0	0	0	0	1	0.7	2
8-Apr	1	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
9-Apr	0	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
10-Apr	0	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
11-Apr	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	0	1	1	3	2	2	2	0.6	3
12-Apr	1	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
13-Apr	0	0	Z	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	3
14-Apr	0	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
15-Apr	0	0	0	0	Z	0	0	1	0	0	0	C	C	C	0	0	0	0	0	0	0	0	0	0	0.2	1
16-Apr	0	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
17-Apr	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
18-Apr	0	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
19-Apr	0	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
20-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
21-Apr	0	3	3	2	Z	2	1	0	2	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	4
22-Apr	0	0	0	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
23-Apr	0	0	0	0	0	0	Z	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
24-Apr	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
25-Apr	0	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
26-Apr	0	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
27-Apr	0	0	0	0	Z	0	0	1	2	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0.4	2
28-Apr	0	0	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
29-Apr	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
30-Apr	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
	0.3	0.4	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.2	Diurnal Average	
	1	3	3	2	3	2	2	2	2	4	1	1	1	1	1	0	1	1	1	1	3	2	2	2	Diurnal Maximum	

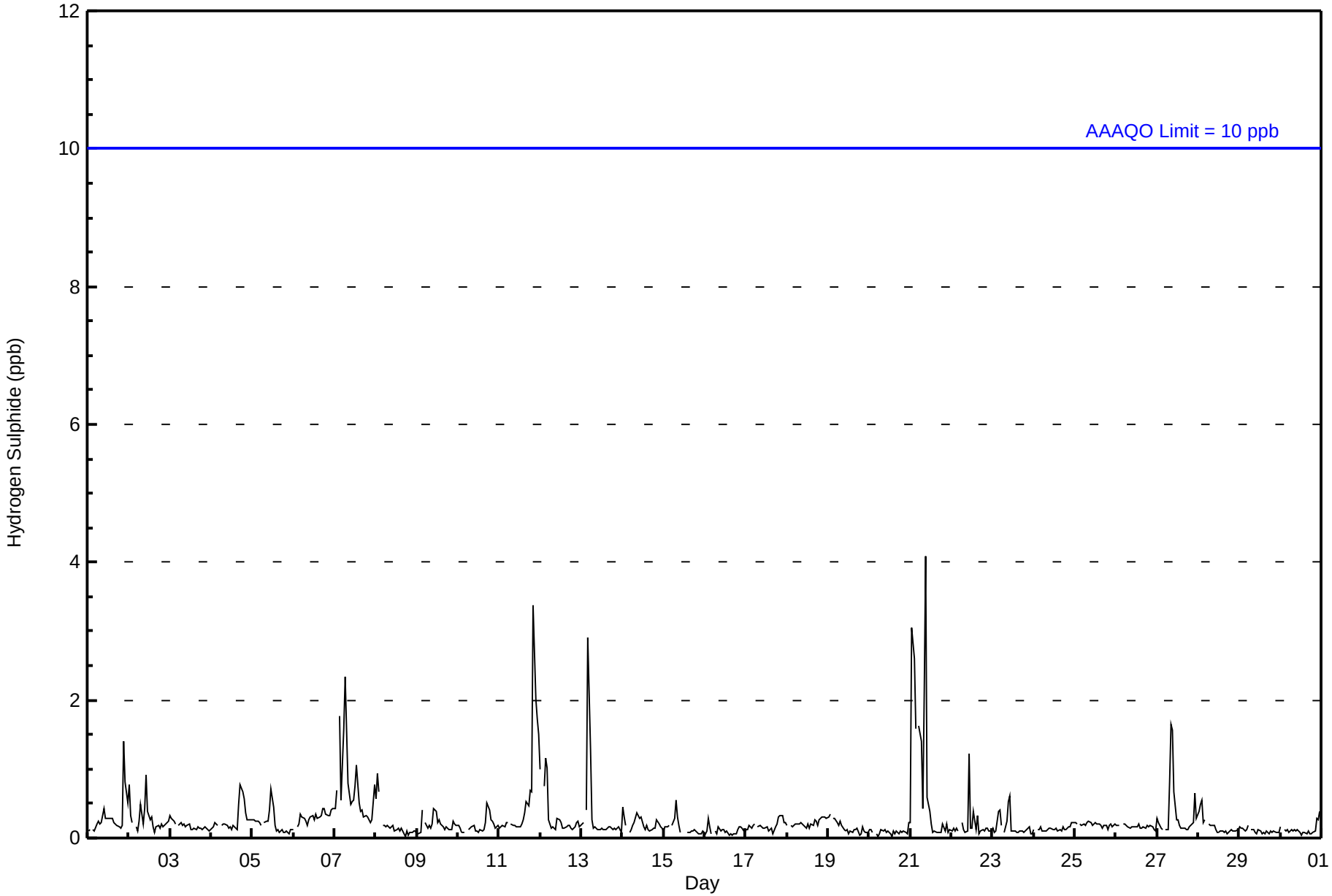
Z - zerospan C - Calibration
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb

Wood Buffalo Environmental Association

Hourly Averages

Hydrogen Sulphide (H_2S) - ppb

Buffalo Viewpoint - April 2016



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Hydrogen Sulphide (H_2S) - ppb

Buffalo Viewpoint - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	682	99.27	99.27
3 - 4	5	0.73	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Hydrogen Sulphide (H_2S) - ppb

Buffalo Viewpoint - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 2	130	88	16	6	10	54	85	112	51	21	3	18	14	9	22	29	668
3 - 4	1	0	0	1	0	1	1	1	0	0	0	0	0	0	0	0	5
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	131	88	16	7	10	55	86	113	51	21	3	18	14	9	22	29	673

Total Number of Valid Hours: 673

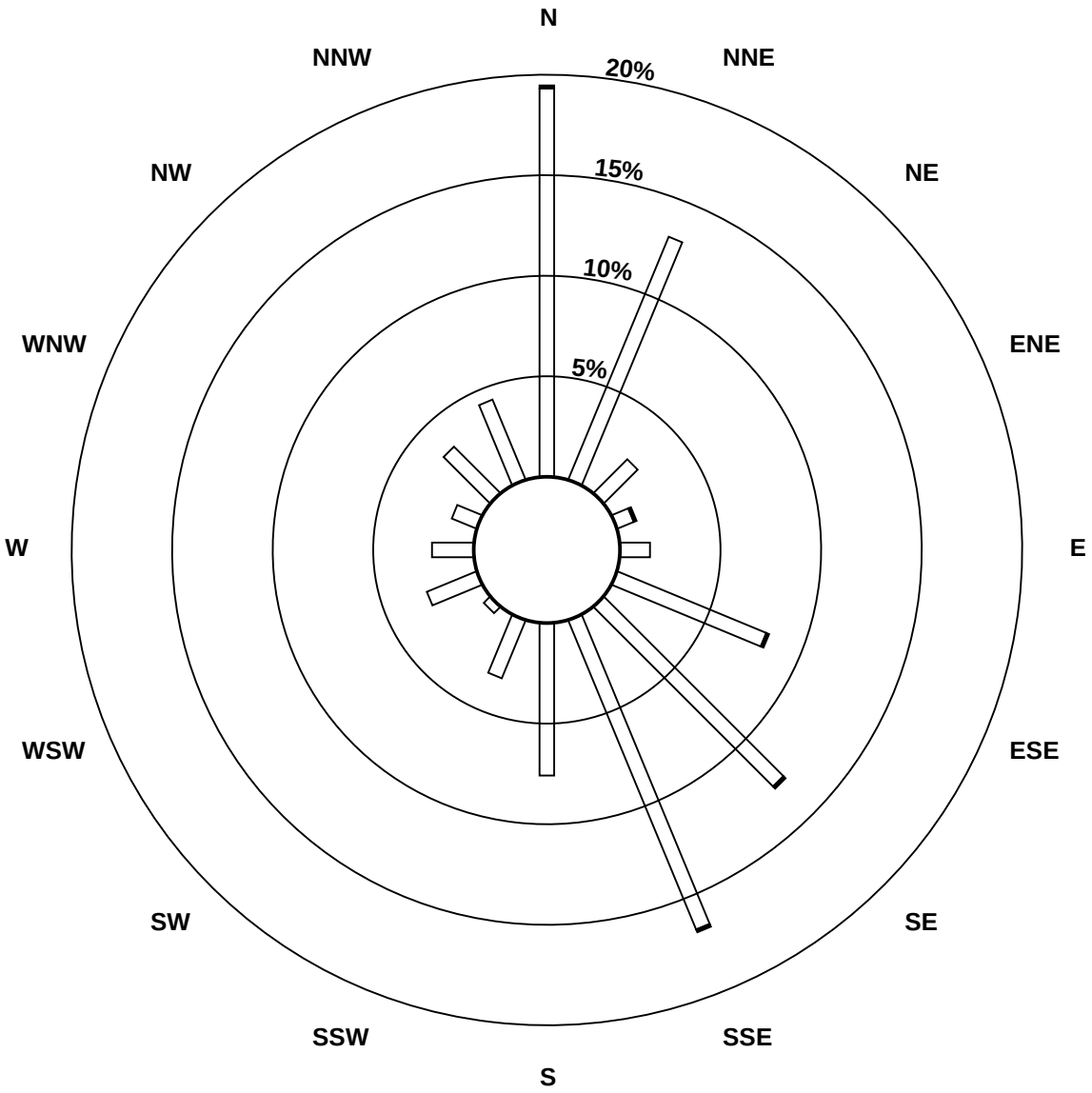
Total Number of Hours: 720

Wood Buffalo Environmental Association

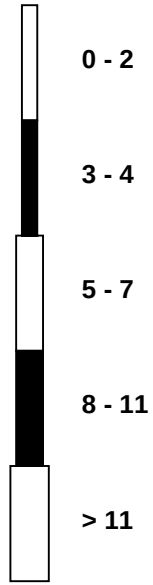
Wind Rose Apr 2016

Hydrogen Sulphide (H_2S) - ppb

Buffalo Viewpoint (AMS 4)



Classes (ppb)



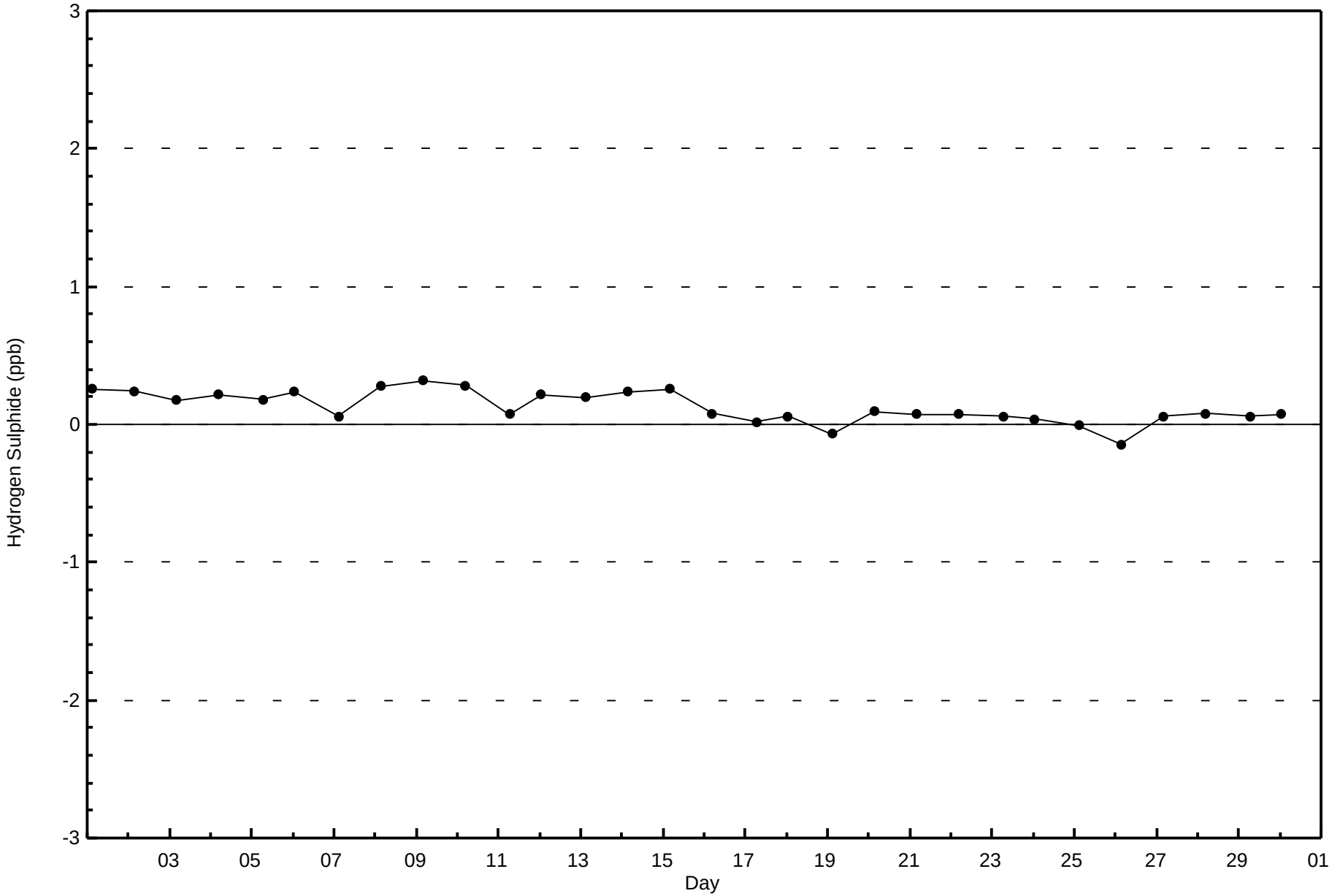
Total Number of Valid Hours: 673

Wood Buffalo Environmental Association

Zero Responses

Hydrogen Sulphide (H_2S) - ppb

Buffalo Viewpoint - April 2016

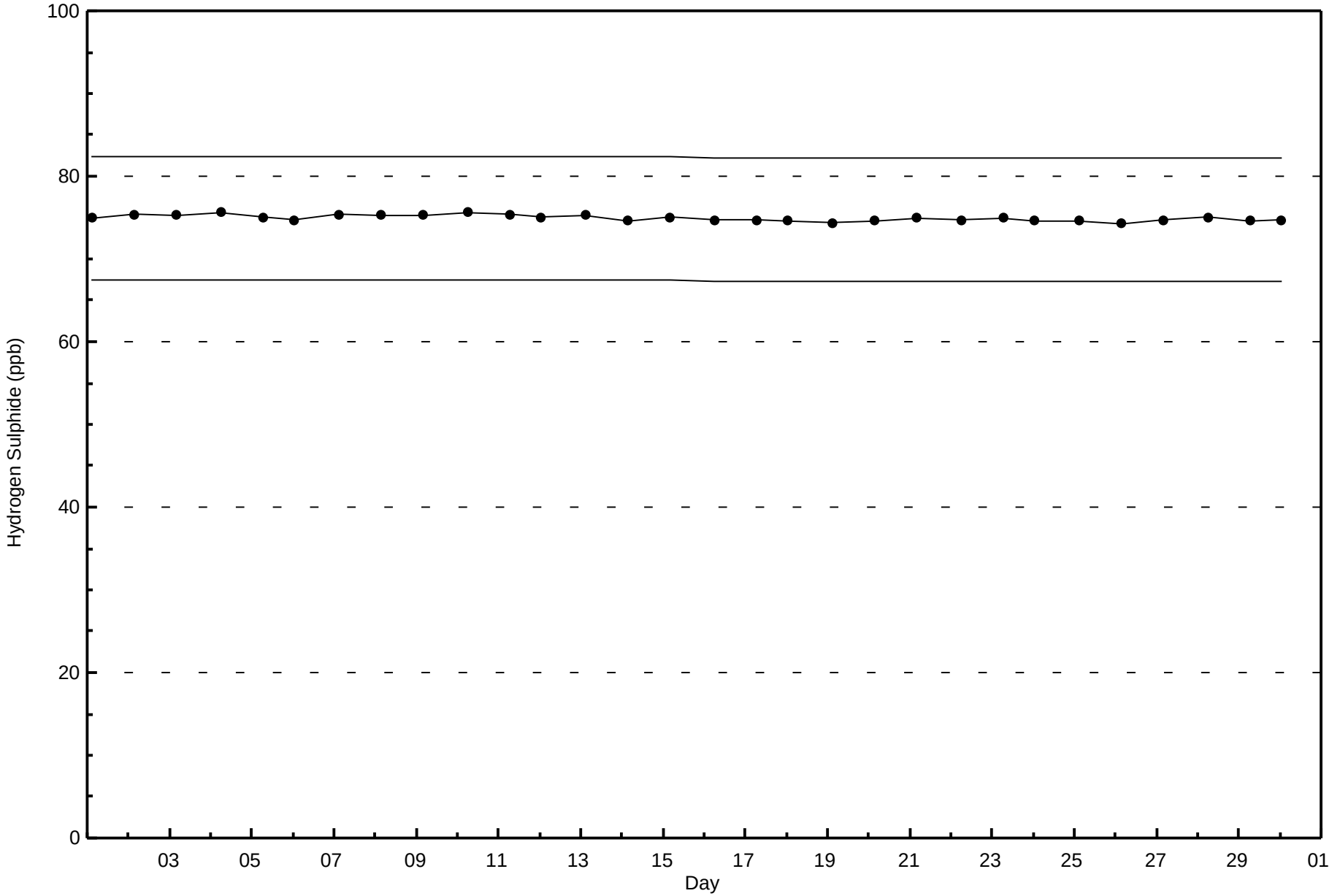


Wood Buffalo Environmental Association

Span Responses

Hydrogen Sulphide (H_2S) - ppb

Buffalo Viewpoint - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Buffalo Viewpoint - April 2016

Maximum Value: 9.1 ppm on Apr 11 21:00

Maximum Daily Average: 2.8 ppm on Apr 11

Minimum Value: 2.1 ppm on Apr 18 19:00

Minimum Daily Average: 2.1 ppm on Apr 18

Maximum Diurnal Average: 2.5 ppm at hour 21

Minimum Diurnal Average: 2.2 ppm at hour 16

Monthly Average: 2.27 ppm

Percentiles: P_1 = 2.1 P_{10} = 2.1 Q_1 = 2.2 Median = 2.2 Q_3 = 2.3 P_{90} = 2.4 P_{99} = 3.2

Hours in Service:	720
Hours of Data:	687
Hours of Missing Data:	33
Hours of Calibration:	33
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-Apr	2.2	Z	2.2	2.2	2.2	2.4	2.5	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.7	2.4	2.2	2.7
2-Apr	2.6	2.2	Z	2.8	2.2	2.1	2.2	2.3	2.4	2.4	2.3	2.4	2.5	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.4	2.3	2.8
3-Apr	2.4	2.4	2.2	Z	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4
4-Apr	2.2	2.2	2.3	2.3	Z	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.5	2.7	2.5	2.3	2.3	2.3	2.3	2.7
5-Apr	2.3	2.3	2.3	2.3	2.2	Z	2.2	2.2	2.3	2.3	2.4	2.5	2.4	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.5
6-Apr	Z	2.2	2.2	2.6	3.1	2.6	2.4	2.2	2.2	2.2	2.3	2.4	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	3.1
7-Apr	2.2	Z	2.2	2.2	2.2	2.2	2.4	2.4	2.4	2.2	2.2	2.2	2.4	2.3	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.4
8-Apr	2.2	2.3	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3
9-Apr	2.1	2.1	2.2	Z	3.1	2.5	2.4	2.4	2.3	2.4	2.5	2.4	2.3	2.5	2.3	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.4	2.3	2.4	3.1
10-Apr	2.3	2.2	2.2	2.2	Z	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.3	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.4
11-Apr	2.2	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.4	2.2	2.3	2.5	2.4	2.5	9.1	4.7	4.0	3.9	2.8	9.1
12-Apr	Z	3.2	3.1	3.7	3.3	2.4	2.2	2.1	2.1	2.1	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.3	2.3	2.2	2.2	2.4	3.7
13-Apr	2.2	Z	2.3	2.7	2.7	2.4	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.7
14-Apr	2.4	2.4	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	C	C	C	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.2	2.4
15-Apr	2.2	2.3	2.3	Z	2.4	2.5	2.6	2.7	2.4	2.2	2.2	2.2	2.3	2.5	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.7
16-Apr	2.2	2.2	2.4	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.5	2.3	2.3	2.3	2.3	2.2	2.3	2.5
17-Apr	2.2	2.2	2.2	2.2	2.2	Z	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.3	2.5	2.4	2.3	2.4	2.2	2.2	2.2	2.5
18-Apr	Z	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.3
19-Apr	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.4	2.5	2.2	2.2	2.2	2.5
20-Apr	2.1	2.1	Z	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.3
21-Apr	2.2	2.4	2.4	Z	2.4	2.4	2.4	2.3	2.5	2.5	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.3	2.5
22-Apr	2.2	2.2	2.2	2.2	Z	2.3	2.3	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
23-Apr	2.2	2.2	2.2	2.5	2.3	Z	2.3	2.2	2.3	2.5	2.3	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.5
24-Apr	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.3	2.2	2.1	2.1	2.1	2.2	2.3
25-Apr	2.1	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
26-Apr	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
27-Apr	2.3	2.4	2.3	Z	2.3	2.2	2.2	2.3	3.2	2.6	2.4	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.4	3.2
28-Apr	2.4	2.9	3.0	2.5	Z	2.4	2.4	2.2	2.2	2.3	2.2	2.1	2.1	2.2	2.1	2.1	2.2	2.2	2.3	2.2	2.3	2.3	2.3	2.3	2.3	3.0
29-Apr	2.3	2.3	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.3
30-Apr	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	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.7	2.4	2.9	2.2	2.9
	2.2	2.3	2.3	2.4	2.4	2.3	2.3	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.5	2.3	2.3	2.3	Diurnal Average	
	2.6	3.2	3.1	3.7	3.3	2.6	2.6	2.7	3.2	2.6	2.5	2.5	2.5	2.5	2.4	2.3	2.3	2.5	2.5	2.7	9.1	4.7	4.0	3.9	Diurnal Maximum	

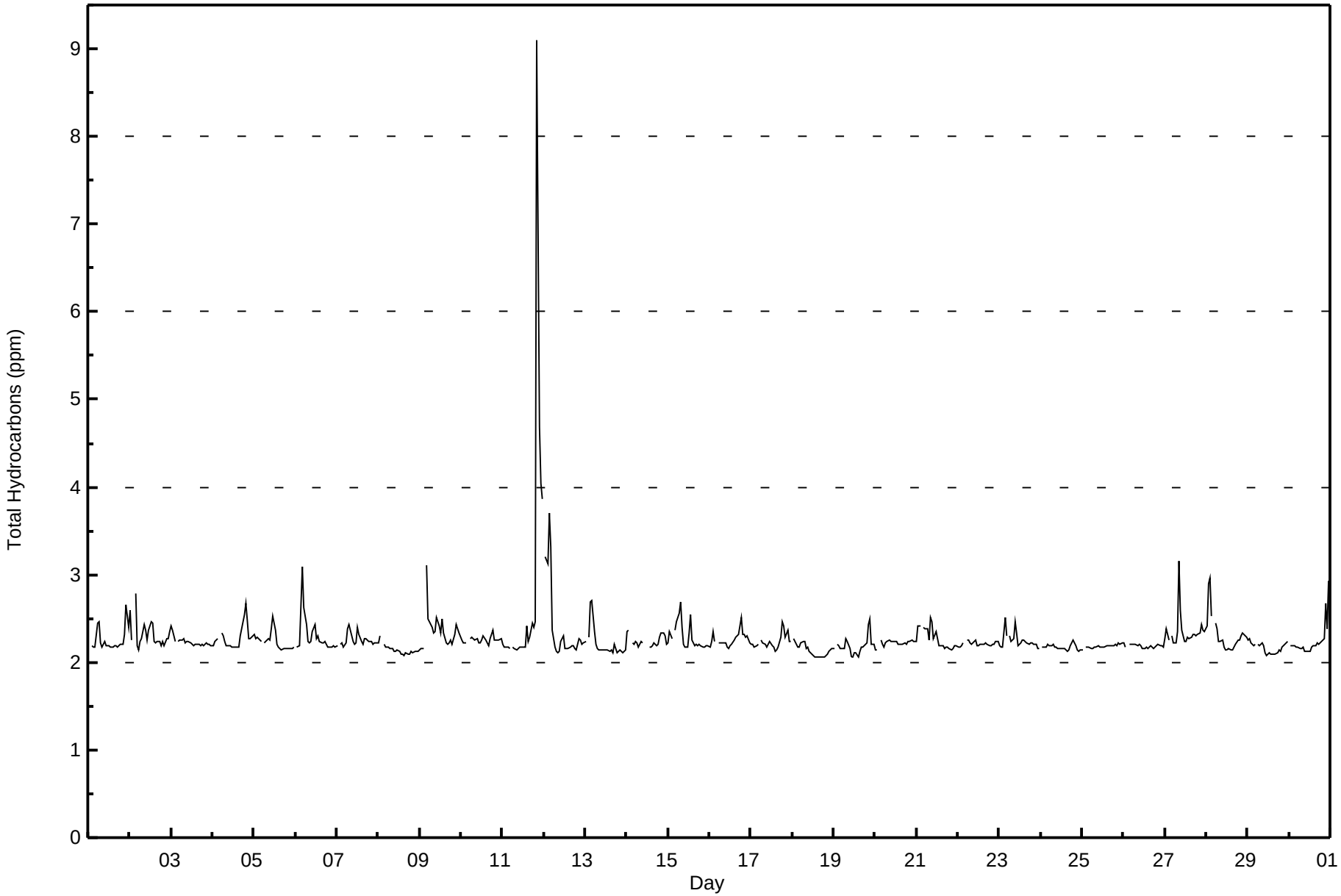
Z - zerospan C - Calibration

Wood Buffalo Environmental Association

Hourly Averages

Total Hydrocarbons (THC) - ppm

Buffalo Viewpoint - April 2016



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm

Buffalo Viewpoint - April 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	0	0.00	0.00
2.1 - 3.0	676	98.40	98.40
3.1 - 10.0	11	1.60	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Total Hydrocarbons (THC) - ppm

Buffalo Viewpoint - April 2016

Concentration Ranges (ppm)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 2.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.1 - 3.0	128	90	15	7	8	57	85	114	53	19	2	17	15	9	16	28	663
3.1 - 10.0	1	0	0	1	0	0	0	1	0	1	1	0	0	1	4	1	11
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	129	90	15	8	8	57	85	115	53	20	3	17	15	10	20	29	674

Total Number of Valid Hours: 674

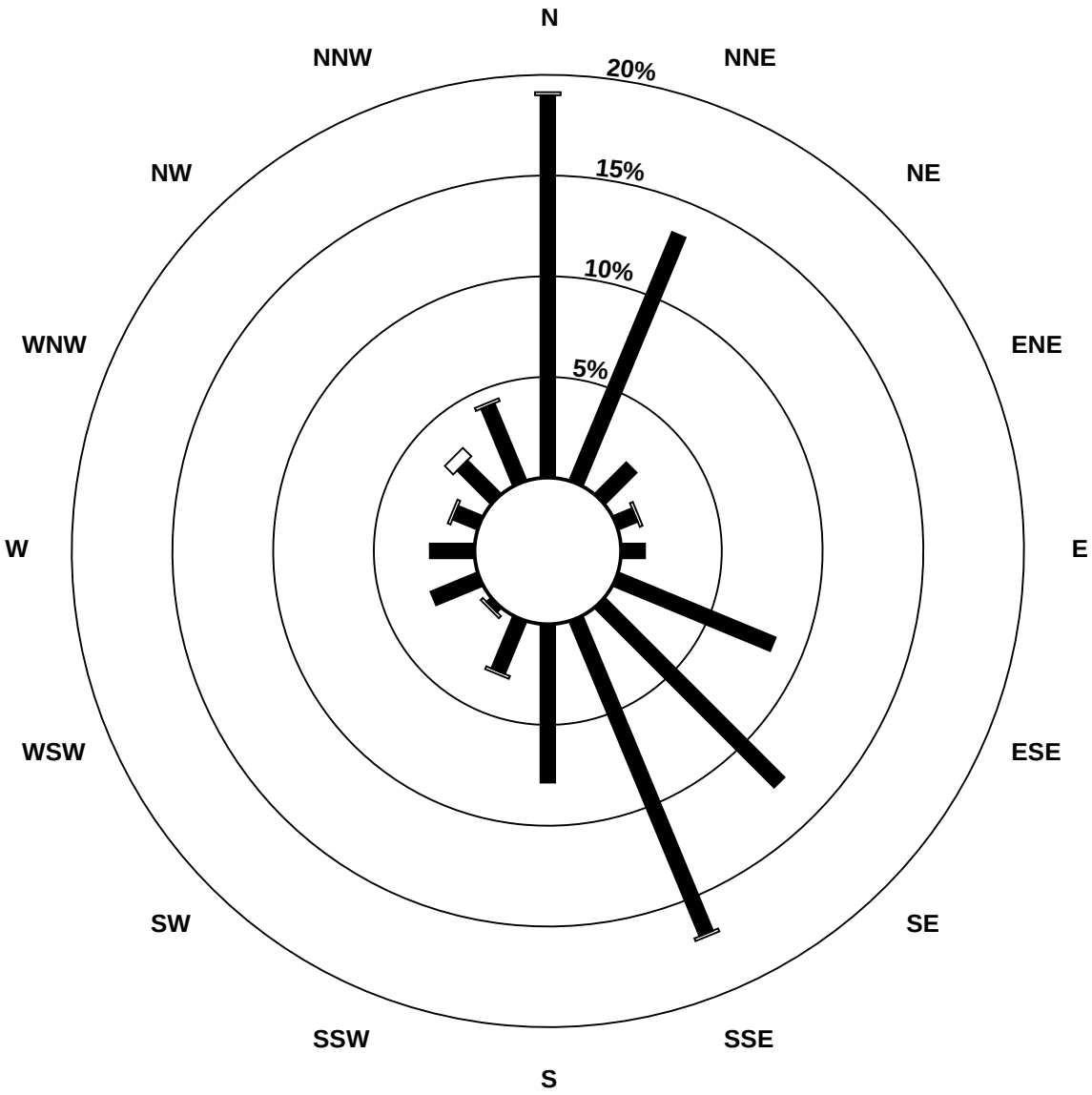
Total Number of Hours: 720

Wood Buffalo Environmental Association

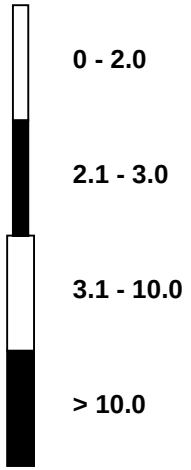
Wind Rose Apr 2016

Total Hydrocarbons (THC) - ppm

Buffalo Viewpoint (AMS 4)



Classes (ppm)



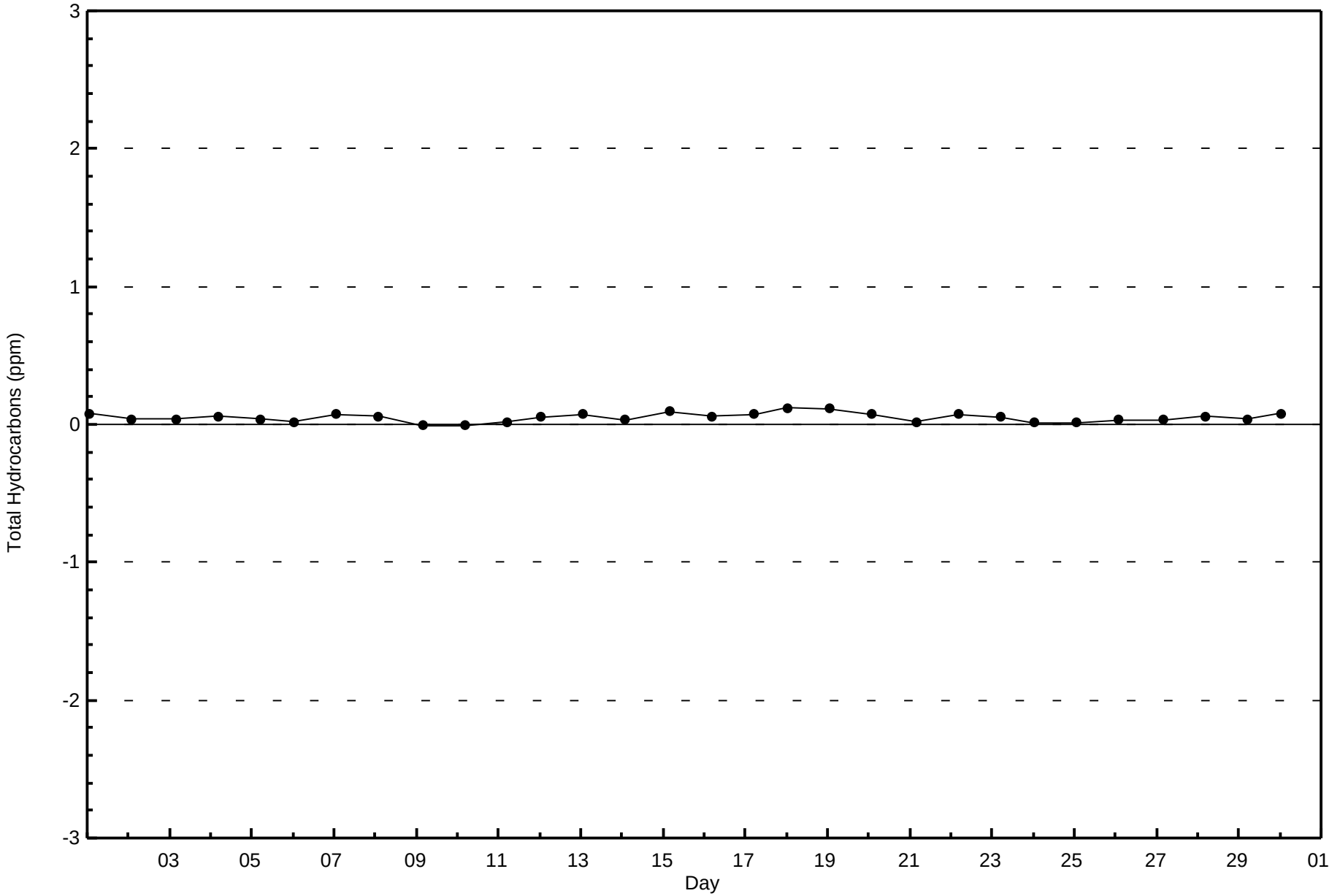
Total Number of Valid Hours: 674

Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Buffalo Viewpoint - April 2016

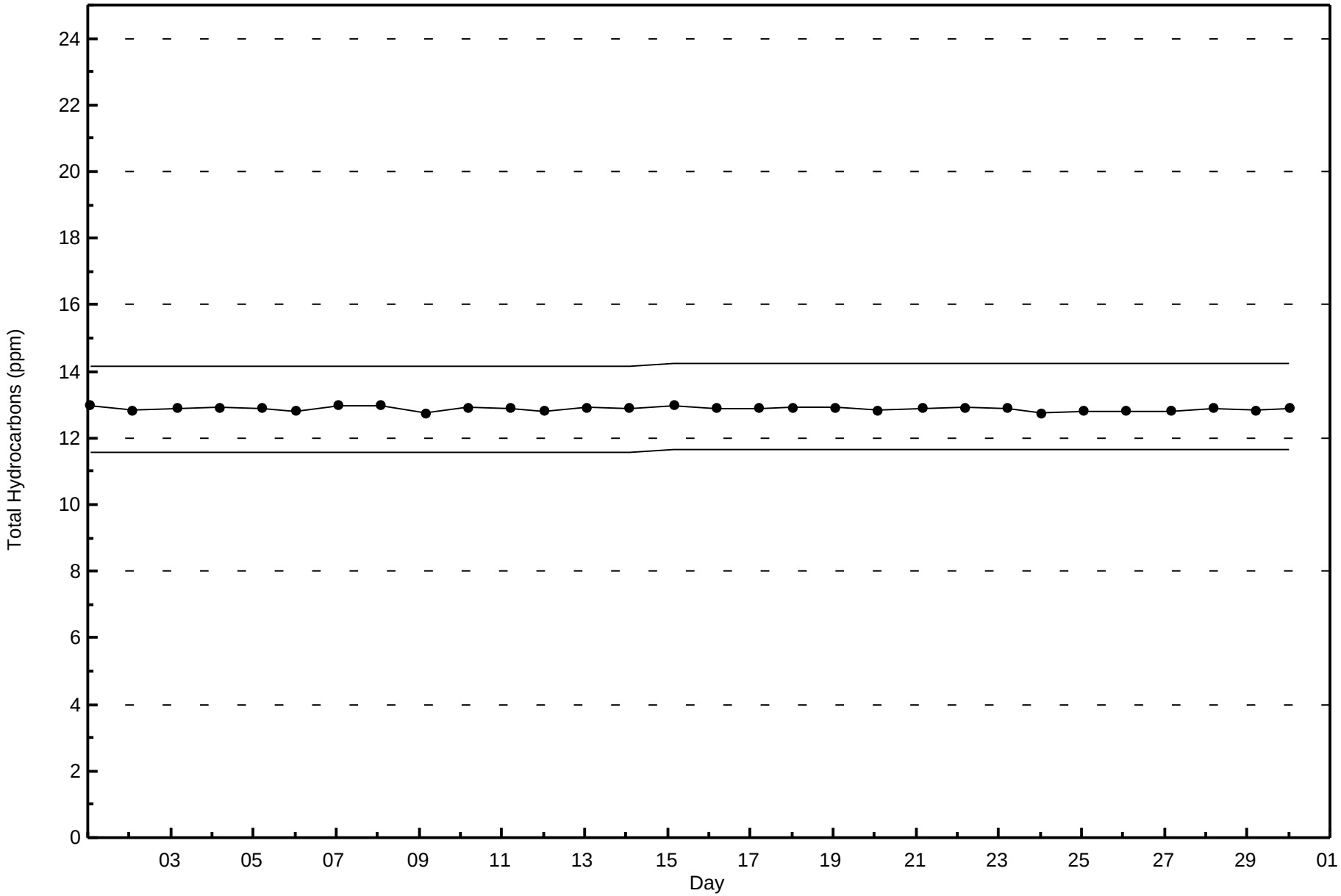


Wood Buffalo Environmental Association

Span Responses

Total Hydrocarbons (THC) - ppm

Buffalo Viewpoint - April 2016



Maximum Value: 27.7 C on Apr 18 15:00

Maximum Daily Average: 17.1 C on Apr 18

Minimum Value: -14.2 C on Apr 4 06:00

Minimum Daily Average: -6.5 C on Apr 3

Maximum Diurnal Average: 8.9 C at hour 16

Minimum Diurnal Average: -1.1 C at hour 6

Monthly Average: 4.00 C

Percentiles: P_1 = -10.1 P_{10} = -5.5 Q_1 = -1.5 Median = 2.9 Q_3 = 8.4 P_{90} = 16.1 P_{99} = 23.4

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

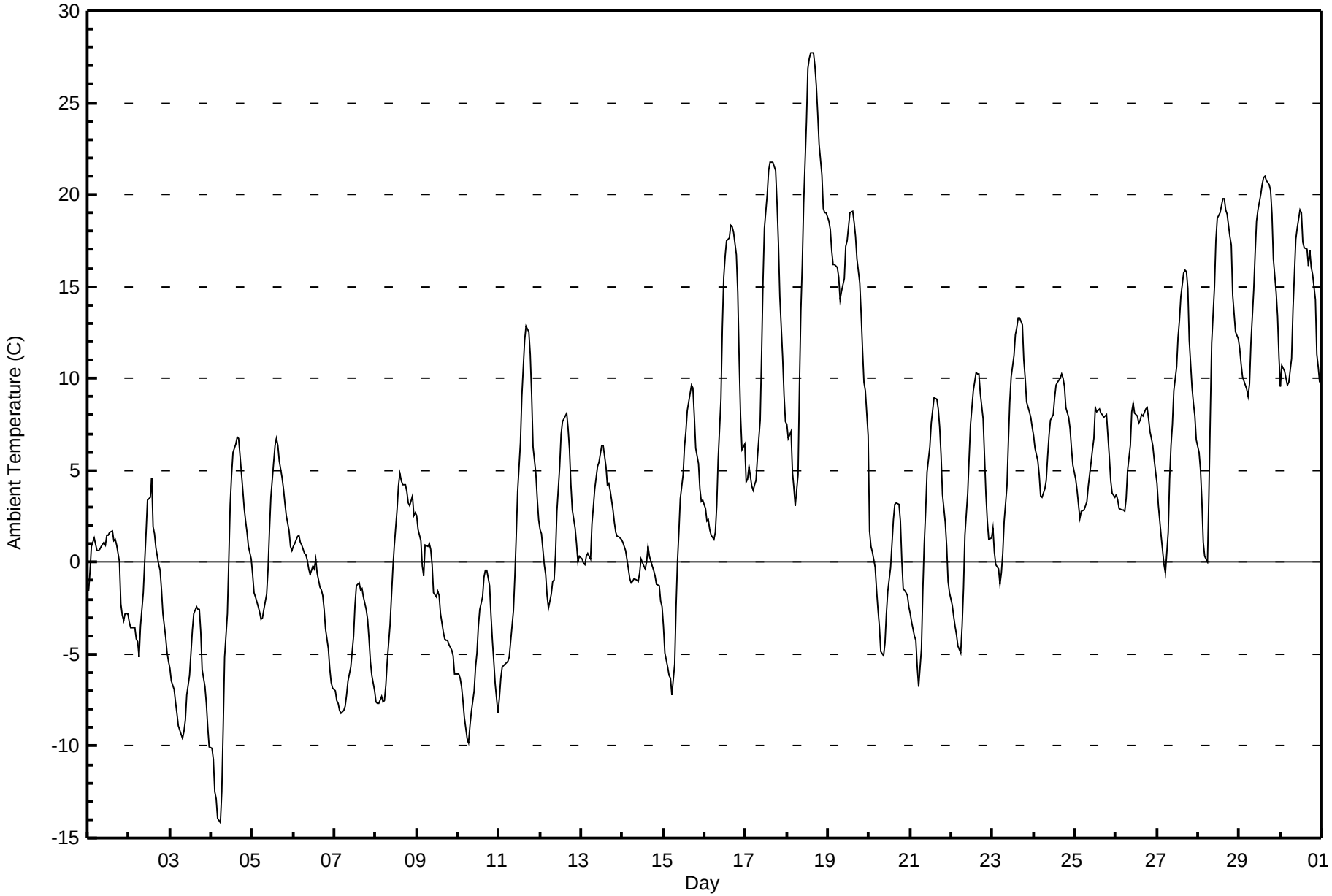
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	-1.6	-0.5	0.9	1.1	1.3	0.6	0.6	0.7	0.9	1.1	0.9	1.5	1.5	1.6	1.7	1.2	1.2	0.9	0.0	-2.3	-2.9	-3.2	-2.8	-2.8	0.1	1.7
2-Apr	-3.2	-3.6	-3.6	-3.6	-4.2	-4.3	-5.2	-3.5	-1.6	0.1	1.7	3.4	3.5	4.6	1.9	1.5	0.8	-0.1	-0.4	-1.5	-2.8	-4.1	-4.9	-5.4	-1.4	4.6
3-Apr	-5.8	-6.4	-6.9	-7.6	-8.2	-8.9	-9.4	-9.6	-9.2	-8.6	-7.2	-6.1	-5.0	-3.7	-2.8	-2.4	-2.6	-2.5	-3.8	-5.9	-6.8	-7.6	-9.0	-10.1	-6.5	-2.4
4-Apr	-10.2	-10.7	-12.5	-12.9	-13.9	-14.2	-12.5	-9.0	-5.1	-2.8	0.1	3.1	4.8	5.9	6.4	6.8	6.8	5.8	3.9	2.9	2.2	1.6	0.8	0.1	-2.2	6.8
5-Apr	-0.7	-1.6	-1.9	-2.4	-2.7	-3.1	-3.0	-2.6	-1.7	-0.3	1.7	3.5	5.4	6.3	6.8	6.4	5.5	4.6	4.0	3.2	2.5	1.7	0.9	0.6	1.4	6.8
6-Apr	0.8	1.0	1.4	1.5	1.1	0.9	0.4	0.4	0.1	-0.3	-0.7	-0.2	-0.3	0.2	-0.6	-1.3	-1.5	-1.8	-2.6	-3.6	-4.7	-5.7	-6.5	-6.8	-1.2	1.5
7-Apr	-7.0	-7.5	-7.6	-8.1	-8.2	-8.1	-7.8	-7.2	-6.5	-5.7	-4.8	-4.0	-2.3	-1.3	-1.1	-1.5	-1.4	-1.9	-2.6	-3.1	-4.1	-5.4	-6.2	-7.0	-5.0	-1.1
8-Apr	-7.6	-7.7	-7.7	-7.3	-7.6	-7.6	-6.7	-5.4	-3.4	-1.9	-0.4	0.9	2.8	4.2	4.8	4.5	4.2	4.2	3.9	3.2	3.1	3.6	2.5	2.7	-0.8	4.8
9-Apr	2.5	1.8	1.2	-0.2	-0.7	0.9	0.9	1.0	0.7	-0.1	-1.7	-1.9	-1.5	-1.8	-2.8	-3.8	-4.1	-4.3	-4.3	-4.4	-4.8	-5.1	-6.1	-6.1	-1.9	2.5
10-Apr	-6.1	-6.3	-6.8	-7.5	-8.4	-9.6	-9.8	-8.9	-8.1	-7.0	-5.7	-5.0	-3.4	-2.6	-1.9	-0.8	-0.4	-0.5	-1.3	-2.9	-4.2	-5.4	-6.6	-8.2	-5.3	-0.4
11-Apr	-7.3	-6.3	-5.7	-5.5	-5.5	-5.4	-5.2	-4.3	-2.7	-0.8	1.4	3.8	6.5	9.0	10.5	12.1	12.9	12.6	11.3	9.1	6.3	4.8	3.5	2.4	2.4	12.9
12-Apr	1.8	1.6	-0.1	-0.6	-1.8	-2.5	-1.7	-1.0	-0.9	0.4	2.8	5.2	7.0	7.6	7.8	8.1	7.3	6.1	4.2	2.9	1.9	1.0	0.0	0.3	2.4	8.1
13-Apr	0.2	0.0	-0.2	0.3	0.5	0.2	2.1	3.0	4.0	5.2	5.4	5.9	6.4	6.3	5.2	4.2	4.3	3.9	2.8	2.2	1.6	1.4	1.4	1.3	2.8	6.4
14-Apr	1.1	0.9	0.6	-0.3	-0.9	-1.1	-1.1	-0.9	-1.0	-1.1	-0.6	0.1	-0.2	-0.4	0.0	0.8	0.3	-0.2	-0.5	-0.7	-1.2	-1.3	-2.1	-2.4	-0.5	1.1
15-Apr	-3.5	-4.9	-5.7	-6.2	-6.3	-7.3	-5.6	-2.4	0.0	1.7	3.4	4.8	6.3	7.2	8.2	9.2	9.7	9.5	8.0	6.2	5.4	4.0	3.3	3.4	2.0	9.7
16-Apr	2.9	2.2	2.3	1.8	1.5	1.3	1.6	3.1	5.6	8.9	12.8	15.5	16.7	17.5	17.7	18.3	18.3	17.9	16.8	14.7	11.0	7.9	6.1	6.4	9.5	18.3
17-Apr	4.3	4.5	5.2	4.1	3.9	4.2	4.5	5.7	7.7	11.3	15.3	18.2	20.0	21.3	21.8	21.7	21.8	21.3	19.6	17.3	14.4	11.1	9.1	7.7	12.3	21.8
18-Apr	7.5	6.7	7.1	4.9	4.0	3.1	4.7	9.6	13.7	16.2	19.6	24.0	26.9	27.4	27.7	27.7	27.0	25.9	24.4	22.8	21.1	19.2	19.0	19.0	17.1	27.7
19-Apr	18.5	18.1	17.0	16.2	16.2	16.1	15.5	14.3	14.7	15.4	17.2	17.5	18.3	19.0	19.1	18.5	17.7	16.5	15.2	13.5	11.5	9.8	9.3	6.9	15.5	19.1
20-Apr	1.7	0.9	0.6	-0.3	-1.5	-2.6	-3.5	-4.9	-5.1	-4.4	-2.8	-1.6	-0.2	1.0	2.3	3.2	3.2	3.2	2.2	0.1	-1.4	-1.7	-1.8	-2.4	-0.7	3.2
21-Apr	-2.8	-3.3	-4.1	-4.2	-5.7	-6.8	-4.7	-1.5	1.0	2.7	4.9	6.3	7.6	8.3	8.9	8.8	8.3	7.3	5.8	3.7	2.2	0.9	-1.1	-1.6	1.7	8.9
22-Apr	-2.4	-2.9	-3.5	-3.9	-4.6	-4.9	-3.5	-1.5	1.4	3.7	5.7	7.5	8.4	9.4	10.3	10.2	10.3	9.2	7.8	5.8	3.7	2.2	1.2	1.3	3.0	10.3
23-Apr	1.8	0.6	-0.1	-0.4	-1.2	-0.6	0.5	2.2	4.2	6.5	8.7	10.1	11.2	12.4	12.8	13.3	13.3	12.9	11.0	10.0	8.7	8.1	7.9	7.4	6.7	13.3
24-Apr	6.9	6.2	5.5	4.8	3.6	3.5	4.0	4.4	5.7	6.9	7.7	8.0	8.9	9.6	9.8	10.0	10.2	10.0	9.5	8.4	7.9	7.3	6.2	5.3	7.1	10.2
25-Apr	4.5	3.9	3.2	2.4	2.7	2.9	3.1	3.3	4.2	5.4	6.1	6.7	8.4	8.2	8.4	8.1	8.0	7.9	8.0	6.9	5.7	4.4	3.7	3.5	5.4	8.4
26-Apr	3.7	3.4	2.9	2.8	2.9	2.7	3.4	5.0	6.4	8.2	8.7	8.1	8.0	7.6	7.7	8.0	8.0	8.4	8.4	7.8	7.1	6.3	5.6	4.9	6.1	8.7
27-Apr	4.3	3.1	1.4	0.6	-0.2	-0.6	1.6	4.5	6.4	7.5	9.3	10.6	12.3	13.2	14.5	15.7	15.9	15.8	14.9	12.1	9.5	8.6	8.0	6.7	8.2	15.9
28-Apr	6.0	5.1	3.4	1.1	0.3	0.1	3.6	7.9	11.9	15.0	17.5	18.7	18.8	19.0	19.8	19.7	19.2	18.9	17.7	17.2	14.6	13.5	12.5	12.1	12.2	19.8
29-Apr	11.6	10.8	10.1	9.6	9.4	9.0	9.7	12.0	14.9	16.8	18.5	19.2	20.0	20.5	21.0	21.0	20.8	20.5	20.3	18.9	16.5	14.7	13.4	11.2	15.4	21.0
30-Apr	9.6	10.7	10.4	10.0	9.6	9.8	11.1	13.8	15.7	17.6	18.2	19.1	19.0	17.4	17.1	17.0	16.1	17.0	16.1	15.7	14.3	11.3	10.6	9.8	14.0	19.1
	1.1	0.7	0.2	-0.3	-0.8	-1.1	-0.4	0.9	2.5	3.9	5.5	6.8	7.9	8.5	8.8	8.9	8.7	8.3	7.3	6.0	4.6	3.5	2.6	2.0	Diurnal Average	
	18.5	18.1	17.0	16.2	16.2	16.1	15.5	14.3	15.7	17.6	19.6	24.0	26.9	27.4	27.7	27.7	27.0	25.9	24.4	22.8	21.1	19.2	19.0	19.0	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature (AT) - C

Buffalo Viewpoint - April 2016



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	240	33.33	33.33
0 - 10	337	46.81	80.14
10 - 20	120	16.67	96.81
> 20	23	3.19	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Buffalo Viewpoint - April 2016

Maximum Value: 99 % on Apr 27 06:00

Maximum Daily Average: 94.5 % on Apr 6

Minimum Value: 14 % on Apr 19 16:00

Minimum Daily Average: 23.4 % on Apr 19

Maximum Diurnal Average: 72.8 % at hour 6

Minimum Diurnal Average: 44.0 % at hour 14

Monthly Average: 58.0 %

Percentiles: $P_1 = 16$ $P_{10} = 26$ $Q_1 = 40$ Median = 58 $Q_3 = 76$ $P_{90} = 89$ $P_{99} = 98$

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

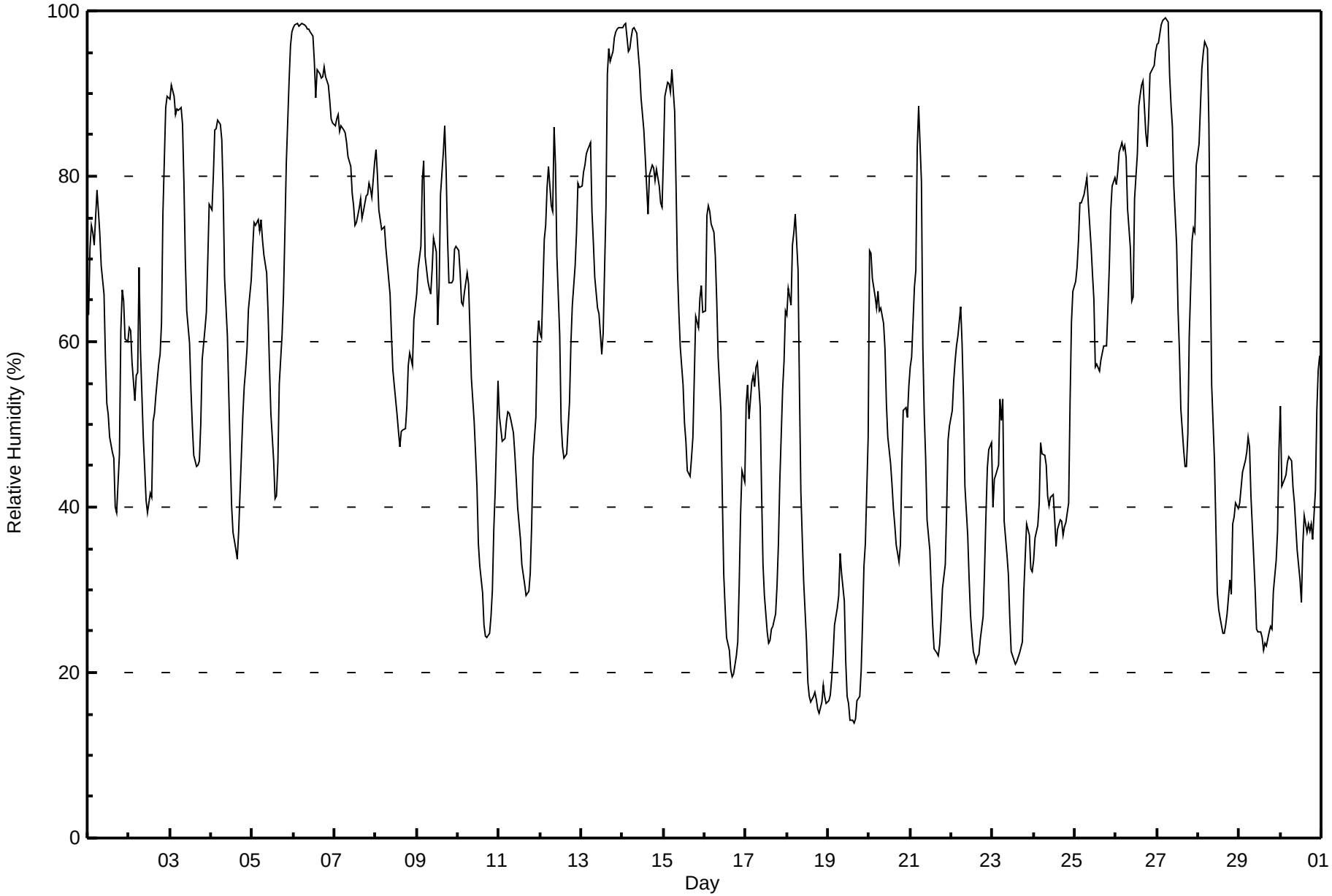
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	63	71	74	73	72	78	76	73	69	66	58	53	51	48	47	46	40	39	46	61	66	65	60	60	60.7	78
2-Apr	62	61	57	53	56	56	69	59	49	45	41	39	42	41	50	51	54	57	59	62	75	88	90	89	58.6	90
3-Apr	89	91	90	87	88	88	88	86	79	70	64	60	54	50	46	45	45	46	50	58	61	64	70	77	68.6	91
4-Apr	76	80	86	86	87	86	84	78	68	61	54	47	40	37	35	34	37	42	51	55	57	59	64	67	61.2	87
5-Apr	71	74	74	75	73	75	72	70	68	64	57	51	46	41	41	45	55	61	66	73	82	91	96	97	67.5	97
6-Apr	98	98	98	98	98	98	98	98	98	98	97	97	94	89	93	92	92	92	93	92	91	89	87	86	94.5	98
7-Apr	86	87	87	85	86	86	85	84	82	81	78	76	74	74	76	77	75	76	78	78	79	78	77	82	80.4	87
8-Apr	83	80	76	74	74	74	71	69	66	61	57	55	51	49	47	49	49	49	52	57	59	57	63	64	62.0	83
9-Apr	66	69	72	79	82	70	67	67	66	69	73	71	62	67	78	83	86	81	73	67	67	67	71	71	71.8	86
10-Apr	71	68	65	64	66	68	67	61	56	50	46	42	36	33	30	26	24	24	25	27	30	37	42	55	46.4	71
11-Apr	51	50	48	48	50	51	51	51	49	46	43	40	36	33	32	31	29	30	32	38	46	51	60	63	44.1	63
12-Apr	61	61	72	74	79	81	76	76	86	81	70	61	50	47	46	46	50	53	60	64	69	73	79	79	66.5	86
13-Apr	79	80	81	83	83	84	76	72	68	64	63	61	59	61	76	92	95	94	95	97	97	98	98	98	81.5	98
14-Apr	98	98	98	95	95	97	98	98	97	95	93	90	86	82	79	75	80	81	81	79	81	79	77	76	87.9	98
15-Apr	82	90	91	91	90	93	88	79	69	64	59	55	50	48	44	44	46	48	56	63	62	65	67	64	67.0	93
16-Apr	64	75	76	76	74	73	70	65	58	52	41	32	28	24	23	20	20	20	22	24	30	39	44	43	45.6	76
17-Apr	52	55	51	55	56	55	57	57	52	42	33	29	25	24	24	25	26	27	30	36	43	54	58	64	42.9	64
18-Apr	63	66	64	72	73	75	69	54	42	36	31	24	19	17	17	17	18	17	16	15	16	18	17	16	36.4	75
19-Apr	17	17	19	22	26	28	29	34	32	29	21	17	16	14	14	14	14	17	17	20	26	33	36	49	23.4	49
20-Apr	71	71	68	65	64	66	64	64	62	59	53	48	45	43	40	38	35	33	35	45	52	52	51	55	53.3	71
21-Apr	57	58	67	69	83	88	79	59	51	46	39	35	30	26	23	22	22	23	26	30	33	40	48	50	46.0	88
22-Apr	52	55	58	59	61	64	60	53	43	37	31	27	25	23	21	22	22	24	27	32	39	45	47	48	40.6	64
23-Apr	40	43	44	45	53	51	53	38	34	32	27	22	22	21	21	22	22	24	30	34	38	37	32	32	34.1	53
24-Apr	34	36	38	41	48	46	46	45	41	40	41	41	39	35	37	38	38	37	38	38	40	53	62	66	42.5	66
25-Apr	67	69	72	77	77	78	79	80	77	72	68	65	57	57	56	58	59	60	59	64	69	76	79	80	68.9	80
26-Apr	79	81	83	84	83	84	82	76	71	65	65	77	83	88	90	91	92	85	84	87	92	93	93	95	83.5	95
27-Apr	96	96	98	99	99	99	99	92	89	86	79	72	64	59	52	47	45	45	49	61	72	74	73	81	76.0	99
28-Apr	84	88	93	95	96	95	86	70	55	46	38	30	28	27	25	25	26	27	31	29	38	39	40	40	52.1	96
29-Apr	40	42	44	46	47	48	47	41	34	30	25	25	25	24	23	24	23	25	26	25	30	34	37	47	33.8	48
30-Apr	52	43	43	44	45	46	46	42	40	38	35	31	28	35	39	37	38	37	38	36	42	52	57	58	41.8	58
	66.8	68.5	69.6	70.5	72.2	72.8	71.2	66.5	61.7	57.4	52.7	49.1	45.4	44.0	44.2	44.6	45.3	45.8	48.1	51.6	56.1	60.0	62.5	65.1	Diurnal Average	
	98	98	98	99	99	99	99	98	98	98	97	97	94	89	93	92	95	94	95	97	97	98	98	98	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity (RH) - %

Buffalo Viewpoint - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Buffalo Viewpoint - April 2016

Maximum Speed: 32 km/h on Apr 19 16:00

Maximum Daily Speed Average: 18.2 km/h on Apr 9

Minimum Speed Value: 1 km/h on Apr 28 03:00

Minimum Daily Speed Average: 2.2 km/h on Apr 5

Maximum Diurnal Speed Average: 4.1 km/h at hour 19

Minimum Diurnal Speed Average: 0.4 km/h at hour 12

Monthly Average Velocity: 2.0 km/h 48.1 deg

Percentiles: $P_1 = 2$ $P_{10} = 5$ $Q_1 = 8$ Median = 10 $Q_3 = 15$ $P_{90} = 21$ $P_{99} = 29$

Hours in Service: 720

Hours of Data: 705

Hours of Missing Data: 15

Percent Operational Time: 97.9

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-Apr	SSE7	WSW7	W11	W9	W10	NNW9	N11	N17	N17	N22	N23	N21	N17	NE13	NNE11	NNE13	NNE11	NNE12	NNE8	NNE8	NNE10	NE7	ESE5	E6	N8.4	N23
2-Apr	ESE7	ESE7	ESE8	ESE10	SE6	E6	NNE8	NE9	E10	NE7	NNE7	N9	NNW15	NNW16	NNW26	N26	NNW26	N25	N22	N27	N22	N19	N18	NNW16	N11.4	N27
3-Apr	N17	N18	NNW19	N23	NNW21	NNW22	N19	N22	N25	N27	N19	N15	N11	N10	N10	NNE7	NE8	NNE9	NNE11	NNE11	NNE12	NNE11	N8	N6	N14.7	N27
4-Apr	NNE6	WSW1	SSE4	SSE5	SSE6	SE6	SSE4	SSE6	SE6	SE6	ESE6	ESE7	ESE10	ESE9	ESE8	ESE7	NNE6	NNE8	N12	N11	NNE12	NNE11	NNE8	NNE10	ENE3.7	N12
5-Apr	NNE11	N9	N10	N11	N12	N10	N10	N9	N8	N5	NNW5	N9	N7	SE9	SSE11	SSE11	SSE12	S10	S9	SSE10	SSE11	SE11	SE13	SSE11	E2.2	SE13
6-Apr	SSE8	SSE7	SSW3	WNW8	NW11	NW16	N21	N20	N18	N15	N12	NNW10	NNW15	NW16	N15	NNE15	NNE15	AF	NNE16	NNE13	NNE9	NNE11	N9	N7	N10.1	N21
7-Apr	NNE8	AF	AF	AF	AF	AF	AF	AF	AF	AF	ESE6	ESE7	NE6	NNE9	NNE10	NNE12	N14	N17	N16	NNE14	NNE13	NNE11	NNE11	NE7	----	N17
8-Apr	NE7	ENE5	SE6	SE8	SE9	SE11	SE13	SE12	SE18	SE18	SE16	SE17	ESE20	ESE19	ESE23	ESE21	SE22	SE19	SE15	SE15	SE20	SE15	SE9	SE13	SE14.1	ESE23
9-Apr	SE12	SE7	S5	NW9	NW16	NW25	NW18	NW15	NNW24	NNW25	NNW28	NNW26	NNW25	NNW29	N23	N29	N24	N26	N30	N27	N23	NNW20	NNW16	NNW19	NNW18.2	N30
10-Apr	N24	N25	N27	N27	N24	N21	N19	N13	N14	N11	N7	N6	N8	N6	NNE5	N6	NNE7	W1	SE3	SE5	ESE7	SSE5	SE7	SSE8	N9.1	N27
11-Apr	SSE11	SSE14	SSE13	SSE11	SSE9	SSE10	SSE11	SSE11	SSE11	SSE11	SSE10	SE10	SE10	ESE9	NE7	NNE9	N10	N6	NE5	ESE4	SSE6	SW2	NW7	NNW5	SE5.3	SSE14
12-Apr	NNW6	WNW4	SSW3	NW6	N13	N12	N14	N23	N15	NNW8	NW7	NW8	NNE11	NNE14	NNE16	N17	N17	N19	N18	N17	N14	NNE12	N10	NNE10	N11.5	N23
13-Apr	NNE9	NE10	NNE7	NW5	ENE8	NNE6	ESE8	ESE8	ESE10	ESE8	ESE8	ESE7	SE6	SE8	SSE5	SE6	SSE2	ESE2	SE8	SE9	SE5	SSE5	SE3	ENE1	ESE4.4	NE10
14-Apr	NNE3	N5	N14	N22	N20	N14	AF	AF	AF	AF	AF	NW11	NW18	NW18	NW15	NW7	N8	NNE10	N6	NW11	NNW10	NW11	WNW10	WSW5	NNW9.8	N22
15-Apr	S5	N5	N6	N5	NNE3	SSW3	SSW3	S3	SSE4	SSE6	SSE9	S10	SSE9	SSE11	ESE13	ESE12	ESE13	ESE13	ESE12	SE12	SE12	SE13	SE13	SE14	SE6.8	SE14
16-Apr	SSE9	E4	SE9	SSE7	SE9	SSE10	SSE12	SSE15	SSE13	SE9	SE11	SSW13	SW15	WSW15	WSW16	WSW14	W12	WSW12	WSW11	SSW6	SSE8	SSE9	SSE9	SSE8	S7.3	WSW16
17-Apr	SE13	SE12	SE9	SE7	S4	SSE7	SE9	SSE7	SSE7	SSE8	SSW3	N5	N5	WNW7	W12	W11	WSW14	W9	WSW5	SE6	SSE7	SE9	SSE10	SE12	S4.1	WSW14
18-Apr	SE11	ESE5	SSE5	SE9	SE9	SSE6	SSE6	SE5	ESE7	ESE11	ESE12	SE13	SSE17	S20	S20	S21	S22	S22	S21	SSE20	SSE20	SSE20	SSE20	SSE20	SSE13.5	S22
19-Apr	S22	SSW19	S14	SSW13	SW13	WSW21	WSW16	NW16	NW15	WNW11	W21	WSW27	W24	W25	W26	W32	W29	WNW25	WNW26	WNW19	NW19	NW16	WNW17	NNW27	W16.1	W32
20-Apr	NNE18	N22	N22	N22	N23	N28	N29	N29	N25	N23	N20	N20	N15	NNE11	NNE13	NNE12	NNE12	NNE11	NNE11	NNE10	NNE10	NE9	NE9	NNE7	N16.8	N29
21-Apr	NE7	ESE4	SE3	E3	ESE3	SSE4	SSE2	ESE5	NE5	N7	N7	N8	N11	N15	N17	N20	NNE21	NNE23	NNE24	NNE21	NNE19	NNE14	N12	NNE12	NNE9.6	NNE24
22-Apr	NNE13	NNE13	NNE13	NNE12	NNE13	NNE12	N12	N12	N11	N13	NNW11	N10	N9	NNW7	NNW8	N15	N18	N21	N21	NNE18	NNE14	NNE11	NNE8	ENE6	N12.1	N21
23-Apr	ESE9	ESE8	E6	E6	E4	E4	ENE3	ESE9	ESE5	N7	E6	ESE13	ESE11	E11	ESE11	ESE13	ESE13	ESE11	ESE10	SE10	ESE10	SE15	SE15	SE14	ESE8.5	SE15
24-Apr	SE14	SE11	SE10	SE8	SE9	SE8	SE8	ESE9	SE11	SE11	SE11	SSE13	S10	SSE14	SSE14	SSE11	SSE8	ESE11	ESE12	ESE15	SSE14	SSE14	S14	S13	SSE10.7	ESE15
25-Apr	S13	SSE11	SSE9	SSE8	SSE8	SSE10	SSE12	SSE13	SSE12	S12	S12	S10	SSE14	S11	SSW11	SSW9	SSW8	S9	SSW10	S8	S6	S6	S6	S6	S9.4	SSE14
26-Apr	S6	SE8	SSE7	SSE9	SSE11	SSE8	SE11	SSE10	SSE10	SSE9	S8	SSW7	SSE9	SSE10	SSE9	SE8	SE10	SE9	SE6	S5	S8	SE8	SSE7	SSW7	SSE7.9	SE11
27-Apr	WSW6	SW3	S6	SSE5	SE5	S6	SSE4	ENE3	ENE3	NE7	NE8	NNE9	N10	N10	NNE9	NNE10	NNE9	NNE9	NNE11	NNE11	NNE11	NE9	NNE6	NNE6	NNE4.6	NNE11
28-Apr	NNE6	N4	SSW1	S5	SSE5	SSE7	SSE7	SSE7	SE7	SE8	ESE8	S12	S11	SSE11	S15	SSE13	SE13	SE12	SE10	SSE8	SE8	SSE9	SSE9	SSE9	SSE7.2	S15
29-Apr	SSE10	SSE11	SSE9	SSE9	SSE10	SSE8	SSE8	SSE15	SSE17	SSE18	S22	S22	S22	SSE21	S21	S20	S17	SSW15	S10	S11	SSE11	SSE9	SSE10	SSE10	SSE13.6	S22
30-Apr	SE11	SSE11	SE11	SE12	SSE10	SSE9	SE10	S9	S10	SSW13	SSW17	S14	SSW19	WSW19	WSW18	WSW17	WSW10	S9	S6	S8	SSE4	N9	NNE5	W6	S7.6	SSW19
	E3.1	E2.3	E1.7	NE1.7	NE2.0	N1.6	NE1.9	NE3.1	NE3.4	NE2.8	ENE1.2	NNE0.4	NNW0.5	NNW0.6	N1.1	N2.2	NNE2.8	NNE3.4	NNE4.1	NE3.7	ENE4.0	ENE3.3	E2.1	E2.0	Diurnal Average	
	N24	N25	N27	N27	N24	N28	N29	N29	N25	N27	NNW28	WSW27	NNW25	NNW29	W26	W32	W29	N26	N30	N27	NNW23	NNW20	SSE20	NNW27	Diurnal Maximum	

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: 9 km/h on Apr 19 11:00

Minimum Value: 0 km/h on Apr 21 06:00

Percentiles: P_1 = 1 P_{10} = 1 Q_1 = 2 Median = 3 Q_3 = 4 P_{90} = 5 P_{99} = 7

Hours in Service:	720
Hours of Data:	705
Hours of Missing Data:	15
Hours of Calibration:	0
Percent Operational Time:	97.9

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

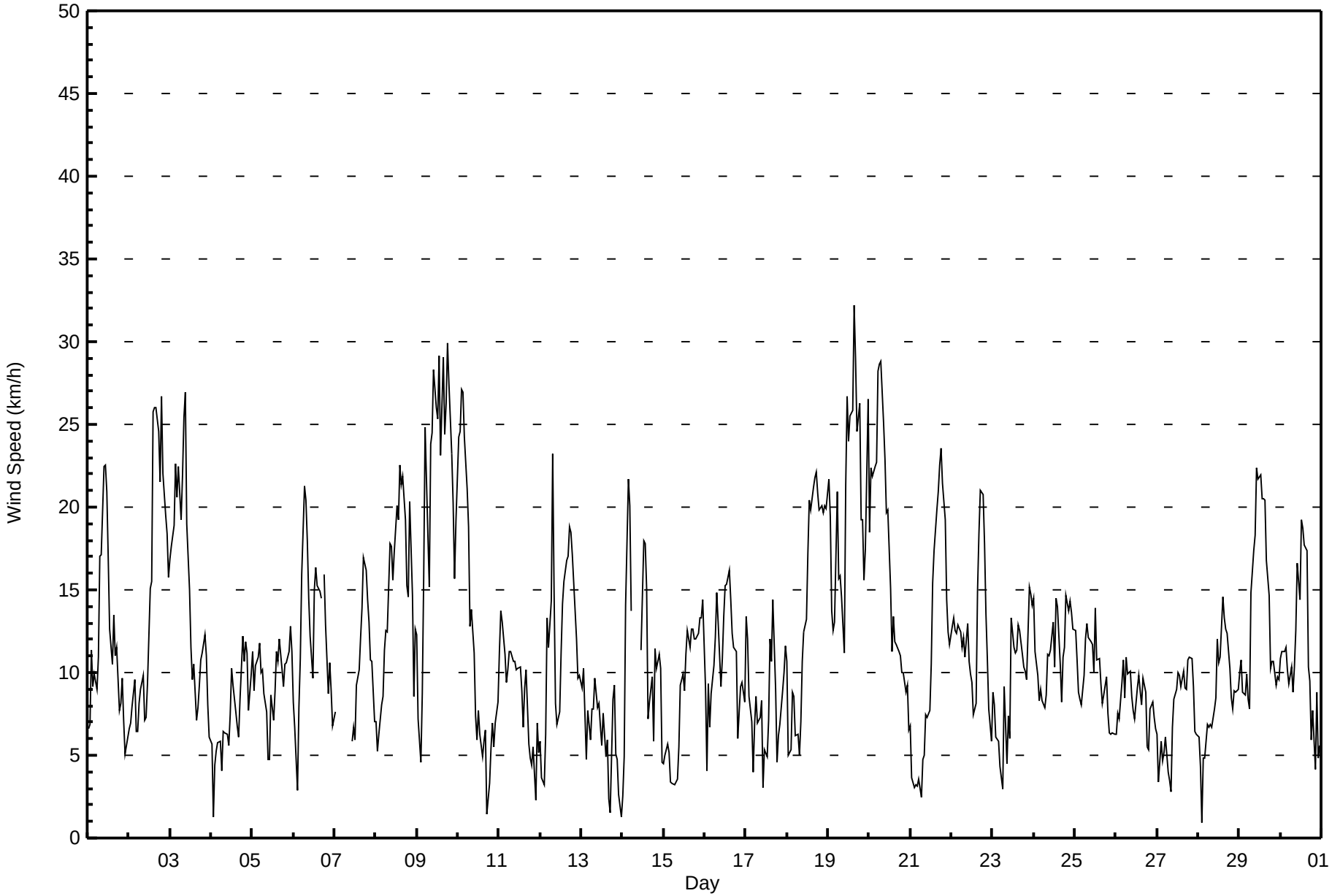
AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed (WS) - km/h

Buffalo Viewpoint - April 2016



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	74	10.50	10.50
6 - 11	352	49.93	60.43
12 - 19	185	26.24	86.67
20 - 28	87	12.34	99.01
29 - 38	7	0.99	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 705

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Wind Speed (WS) - km/h

Buffalo Viewpoint - April 2016

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	4	2	5	4	8	7	15	6	7	1	3	1	1	1	2	74
6 - 11	42	53	14	3	6	34	54	82	25	7	0	4	6	4	10	8	352
12 - 19	43	30	0	0	0	13	27	21	10	7	2	9	2	3	11	7	185
20 - 28	39	4	0	0	0	3	2	6	12	0	0	2	4	2	1	12	87
29 - 38	4	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1	7
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	135	91	16	8	10	58	90	124	53	21	3	18	15	10	23	30	705

Total Number of Valid Hours: 705

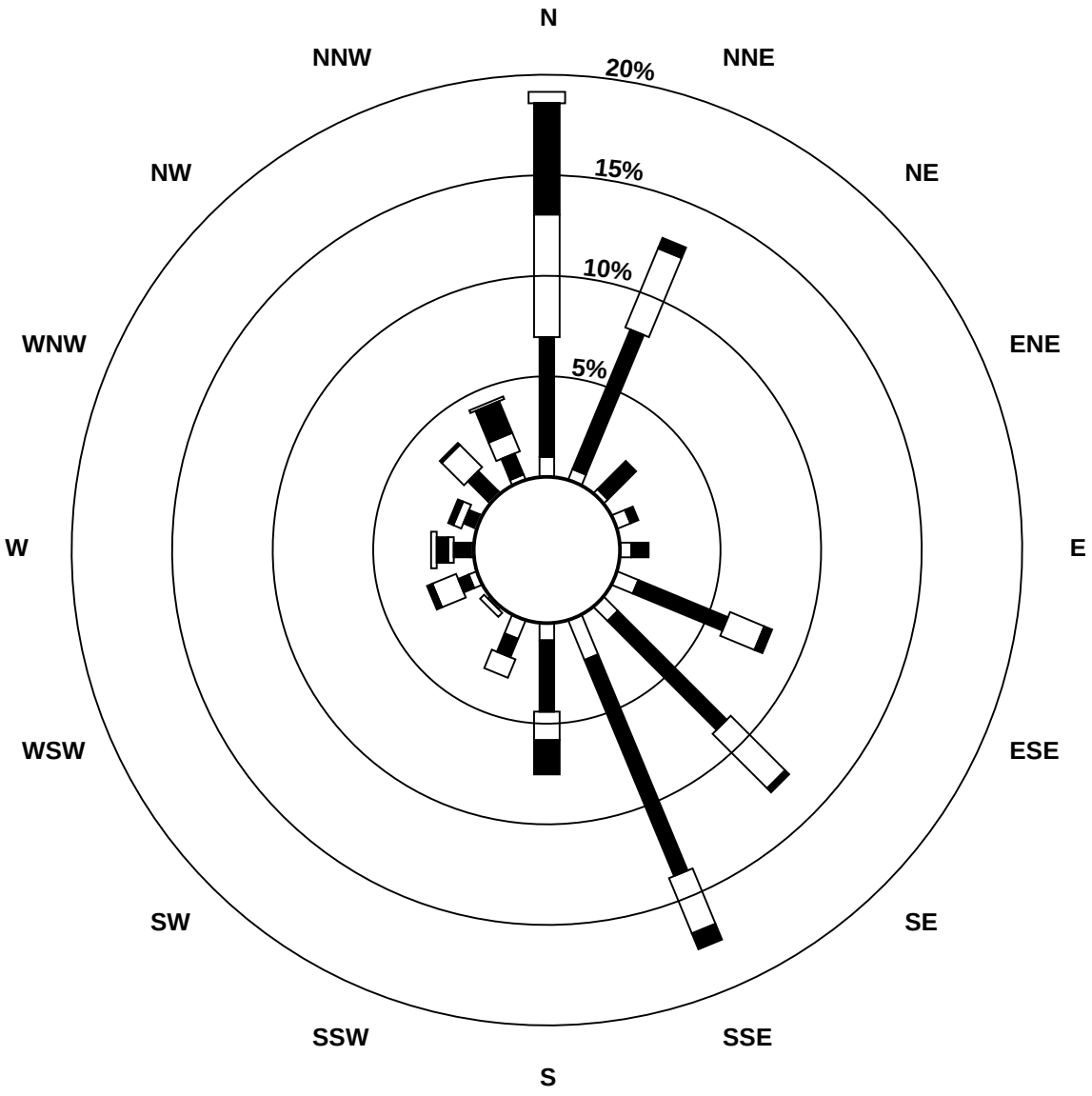
Total Number of Hours: 720

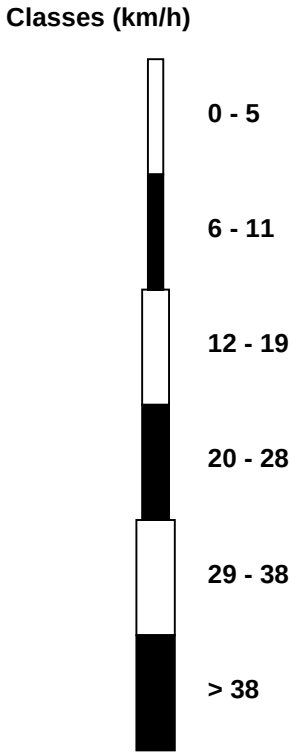
Wood Buffalo Environmental Association

Wind Rose Apr 2016

Wind Speed (WS) - km/h

Buffalo Viewpoint (AMS 4)





Total Number of Valid Hours: 705

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Buffalo Viewpoint - April 2016

Direction of Maximum Speed: 273 deg on Apr 19 16:00
Direction of Maximum Daily Speed Average: 339.3 deg on Apr 9

Direction of Minimum Speed: 212 deg on Apr 28 03:00

Direction of Minimum Daily Speed Average: 2.2 deg on Apr 5

Monthly Average Direction: 100.6 deg

Hours in Service:	720
Hours of Data:	705
Hours of Missing Data:	15
Percent Operational Time:	97.9

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-Apr	158	244	265	264	268	328	355	5	3	4	5	359	9	34	33	23	20	24	28	23	26	54	111	96	6.2
2-Apr	108	113	106	103	130	101	26	56	81	49	27	350	340	344	348	354	347	351	356	356	5	357	353	344	6.7
3-Apr	352	353	348	349	344	348	352	351	349	352	353	354	3	3	7	21	36	27	17	21	22	25	10	5	358.4
4-Apr	22	253	148	151	167	142	157	156	135	139	114	112	116	113	113	119	28	12	8	10	15	22	22	14	75.4
5-Apr	22	5	4	6	5	349	357	354	6	5	336	356	359	135	147	160	168	178	177	158	153	146	144	148	81.0
6-Apr	162	167	210	300	314	324	349	350	353	1	351	333	327	319	6	12	15	AF	13	20	19	26	11	7	352.8
7-Apr	15	AF	AF	AF	AF	AF	AF	AF	AF	AF	110	117	55	19	15	22	7	7	9	16	21	14	26	34	--
8-Apr	42	68	138	133	131	136	136	131	140	141	145	124	120	119	122	121	128	130	131	126	131	142	137	141	128.8
9-Apr	140	140	190	318	305	308	308	307	348	340	336	332	333	334	352	356	357	358	353	354	349	334	329	347	339.3
10-Apr	350	351	353	355	358	358	357	7	8	351	359	0	351	360	30	10	26	266	145	128	122	155	144	156	2.7
11-Apr	153	153	155	154	152	155	157	147	147	149	147	142	143	104	45	19	354	355	47	119	147	224	324	347	136.0
12-Apr	341	303	212	312	350	352	357	353	349	339	325	325	14	17	22	2	357	2	8	7	358	22	9	12	358.4
13-Apr	22	35	32	314	59	28	114	122	115	115	119	111	137	135	165	128	153	122	125	127	137	155	127	62	103.9
14-Apr	28	8	7	4	4	359	AF	AF	AF	AF	AF	317	305	304	310	314	9	22	2	318	334	307	299	238	335.7
15-Apr	174	2	8	1	27	205	204	178	168	161	167	169	165	147	119	121	116	118	119	125	133	131	138	141	134.7
16-Apr	158	84	141	154	145	157	154	149	147	135	145	199	225	242	246	258	260	252	251	211	157	149	153	158	187.2
17-Apr	134	134	141	134	182	165	146	148	155	153	198	350	356	292	272	268	256	274	246	136	147	141	149	142	172.5
18-Apr	140	103	158	140	139	166	162	140	122	117	122	131	168	182	178	177	177	175	169	159	154	153	158	168	158.9
19-Apr	181	197	189	210	232	241	242	324	312	285	262	255	263	259	265	273	272	292	296	287	313	310	298	338	270.1
20-Apr	12	8	358	349	9	6	360	8	8	2	358	4	357	15	14	19	29	22	13	20	21	35	39	31	8.6
21-Apr	51	117	145	89	116	150	150	121	38	4	350	358	6	359	2	5	15	13	14	16	21	24	11	17	17.4
22-Apr	16	14	16	25	19	14	9	359	4	353	338	5	7	341	338	352	356	360	7	17	25	29	24	69	7.8
23-Apr	122	111	95	84	83	92	66	115	102	350	85	111	103	93	110	109	109	115	121	129	122	124	136	141	111.2
24-Apr	140	142	145	140	129	137	127	123	129	138	141	167	183	147	155	162	162	106	122	121	147	166	177	182	146.3
25-Apr	169	166	166	156	157	150	154	156	160	175	183	169	165	187	199	197	194	190	194	191	176	171	171	170	172.8
26-Apr	179	146	148	148	153	155	145	159	161	165	172	193	165	148	150	137	138	136	135	188	171	129	163	192	155.9
27-Apr	258	214	184	156	141	173	154	77	75	44	36	13	354	357	18	14	32	25	22	13	24	34	30	13	27.0
28-Apr	17	352	212	180	151	164	156	165	127	124	119	190	175	165	179	166	146	131	126	151	141	152	154	151	152.5
29-Apr	153	151	153	157	153	159	161	148	156	154	171	174	170	168	171	175	191	199	181	172	154	159	153	148	165.9
30-Apr	143	148	140	142	147	150	146	173	185	192	193	188	194	239	252	247	248	183	174	182	164	358	30	278	189.6
	99.4	87.9	88.3	40.1	34.8	6.5	39.6	47.6	54.2	44.1	62.2	28.9	338.5	336.3	7.8	8.5	12.4	23.5	27.2	44.3	60.8	70.8	86.0	91.8	
	Diurnal Average																								

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

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg

Buffalo Viewpoint - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 99 deg on Apr 13 18:00

Minimum Value: 4 deg on Apr 18 01:00

Percentiles: P_1 = 7 P_{10} = 12 Q_1 = 15 Median = 18 Q_3 = 24 P_{90} = 35 P_{99} = 67

Hours in Service:	720
Hours of Data:	705
Hours of Missing Data:	15
Hours of Calibration:	0
Percent Operational Time:	97.9

Day	Hourly Period Ending At (MST)																								Daily
	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-Apr	16	30	15	14	12	27	15	17	15	16	17	18	18	19	20	16	19	16	15	10	12	16	13	15	30
2-Apr	16	16	18	20	19	19	20	24	25	41	34	37	20	21	17	20	18	18	18	19	16	16	16	14	41
3-Apr	15	16	14	15	13	14	15	15	16	16	16	18	23	26	24	36	26	17	14	13	12	11	13	16	36
4-Apr	16	63	19	20	16	11	25	20	25	36	36	29	21	26	30	23	27	21	13	15	12	13	14	10	63
5-Apr	9	18	13	11	14	12	13	13	22	25	40	17	25	31	29	26	26	22	18	18	15	15	15	17	40
6-Apr	20	27	52	12	11	13	14	14	17	16	14	26	13	14	22	15	14	AF	16	16	15	14	17	15	52
7-Apr	19	AF	AF	AF	AF	AF	AF	AF	AF	AF	24	26	54	24	20	17	16	15	15	15	15	12	13	11	54
8-Apr	7	38	13	18	17	19	19	20	18	20	21	19	17	17	17	17	18	17	18	17	20	19	16	18	38
9-Apr	16	42	57	49	12	12	12	12	16	15	15	14	16	14	21	18	18	19	18	17	17	14	11	18	57
10-Apr	16	16	17	18	18	17	17	18	18	19	37	66	39	43	67	44	32	83	51	10	6	10	12	11	83
11-Apr	13	14	16	17	17	20	18	16	18	20	22	22	25	29	47	17	16	17	15	34	15	67	15	15	67
12-Apr	12	48	58	24	13	15	15	16	15	28	36	37	23	22	16	18	17	16	14	16	16	12	15	12	58
13-Apr	15	14	45	45	20	25	19	20	18	23	19	31	22	24	18	37	74	99	13	15	18	26	30	53	99
14-Apr	34	23	15	16	17	16	AF	AF	AF	AF	AF	26	13	13	15	23	29	17	28	12	12	13	13	38	38
15-Apr	13	34	19	17	41	26	32	25	53	57	34	27	38	30	23	24	20	17	15	17	16	14	14	15	57
16-Apr	34	66	32	34	15	18	16	15	16	20	29	27	29	26	22	23	22	20	12	31	18	6	14	35	66
17-Apr	5	8	12	52	49	25	12	20	19	25	83	56	69	57	26	25	17	17	14	20	6	10	7	7	83
18-Apr	4	50	21	8	13	17	12	25	20	16	17	25	26	23	23	21	20	20	19	18	17	16	18	18	50
19-Apr	20	17	18	15	19	18	16	16	17	23	21	17	18	18	19	17	19	21	14	15	10	9	13	33	33
20-Apr	16	16	17	19	16	18	19	18	17	18	19	19	21	33	24	24	20	19	16	12	11	14	12	12	33
21-Apr	13	15	15	19	16	17	19	31	47	26	29	39	31	20	20	20	17	17	15	14	14	14	11	11	47
22-Apr	9	10	11	11	9	8	13	15	19	17	27	35	34	44	42	18	17	18	17	17	14	11	8	45	45
23-Apr	17	19	17	31	38	40	52	22	64	26	56	28	35	34	32	26	28	21	14	16	15	17	17	18	64
24-Apr	17	17	16	16	15	14	17	16	20	21	24	23	24	25	23	25	24	20	19	17	28	20	19	19	28
25-Apr	19	19	16	12	14	16	18	19	21	24	22	27	26	21	21	19	19	19	18	18	11	12	9	11	27
26-Apr	17	13	12	15	17	27	17	23	22	29	31	23	23	19	19	20	23	22	23	23	21	23	17	11	31
27-Apr	23	52	25	22	17	16	44	50	66	38	34	24	23	24	31	24	22	18	16	12	9	7	20	14	66
28-Apr	10	19	76	27	20	12	16	28	26	21	42	25	35	32	24	26	23	19	14	19	13	13	13	14	76
29-Apr	15	14	14	15	16	15	18	18	20	24	24	22	23	25	25	22	22	18	20	18	12	12	14	11	25
30-Apr	12	12	10	11	15	15	14	25	21	21	19	24	20	30	18	16	34	24	27	35	76	35	47	24	76
	34	66	76	52	49	40	52	50	66	57	83	66	69	57	67	44	74	99	51	35	76	67	47	53	
	Diurnal Maximum																								

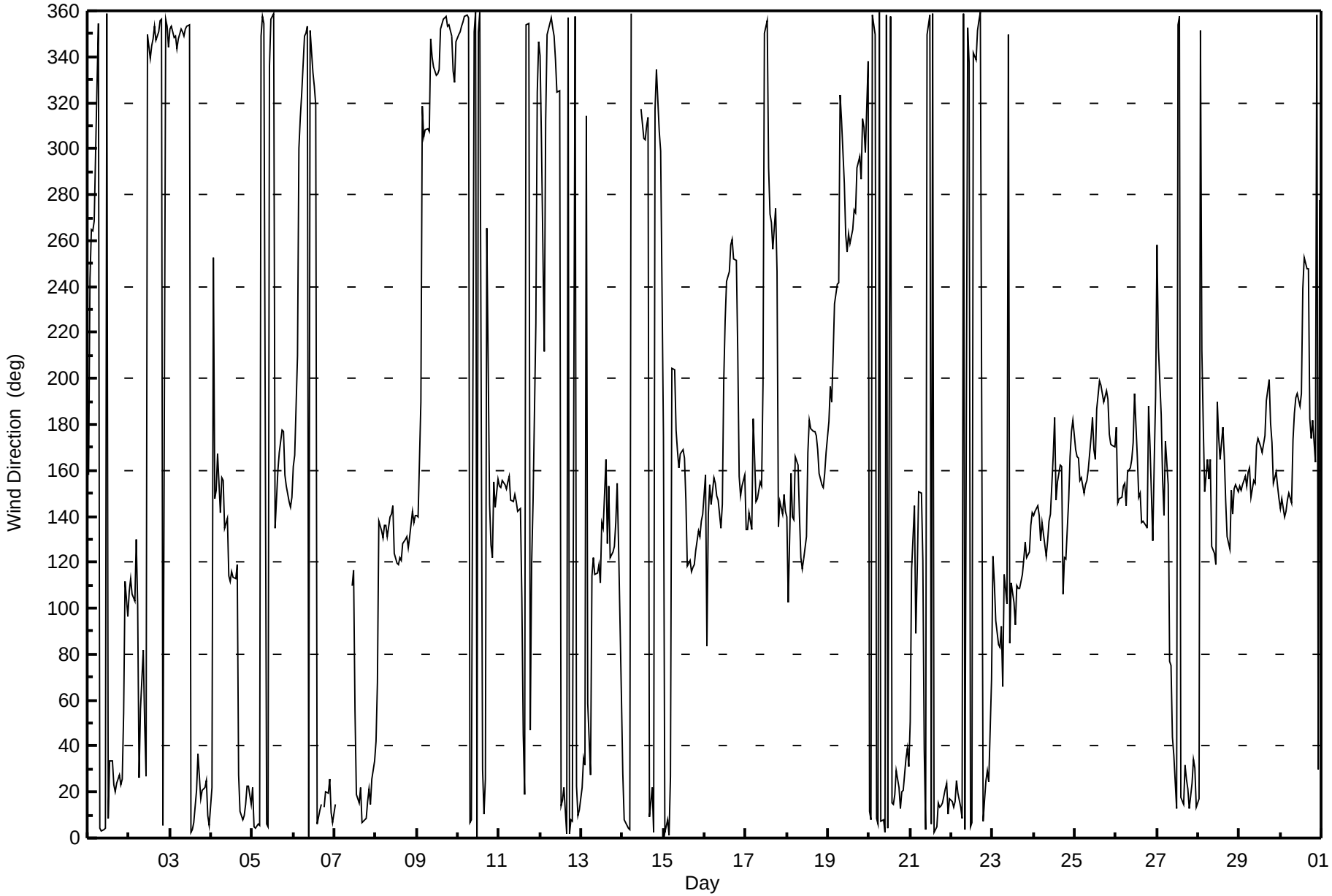
AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction (WD) - deg

Buffalo Viewpoint - April 2016



Wood Buffalo Environmental Association
SO2 Calibration Report

W B E A

Station Information

Calibration Date	April 14, 2016	Last Calibration	March 2, 2016
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Reason:	Routine		
Start Time (MST)	9:52	End Time (MST)	12:19
Gas Cert Reference	LL107929	Station temp.	21 Deg C
Cal Gas Concentration	49.7 ppm	Cal Gas Exp Date	08-Spet-2018
Calibrator Make/Model	Sabio 4010	Serial Number	11551008
ZAG Make/Model	API 701	Serial Number	4297
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2635

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 1000 ppb		PMT voltage	-593	-593
Analyzer IP address	192.168.1.43		Lamp voltage	838	841
Calculated slope	0.995391	1.000280	Chamber temp	45.0	45.0
Calculated intercept	0.301890	-0.376609	Pressure	709.4	695.2
Analyzer Background	10.7	10.8	Flow	0.505	0.495
Analyzer Coefficient	0.819	0.819	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	0.0	----
as found span	5000	60.4	600.4	599.6	1.001
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	60.4	600.4	599.6	1.001
second point	5000	30.2	300.2	303.0	0.991
third point	5000	15.1	150.1	149.3	1.005
as left zero	5000	0.0	0.0	0.1	----
as left span	5000	60.4	600.4	604.0	0.994
				Average Correction Factor	0.999

Corrected As found	599.6	Previous response	602.9	% change	0.5%

Notes:

Sample inlet filter replaced after as founds. No adjustments.

Calibration Performed By: Asad Hidayat

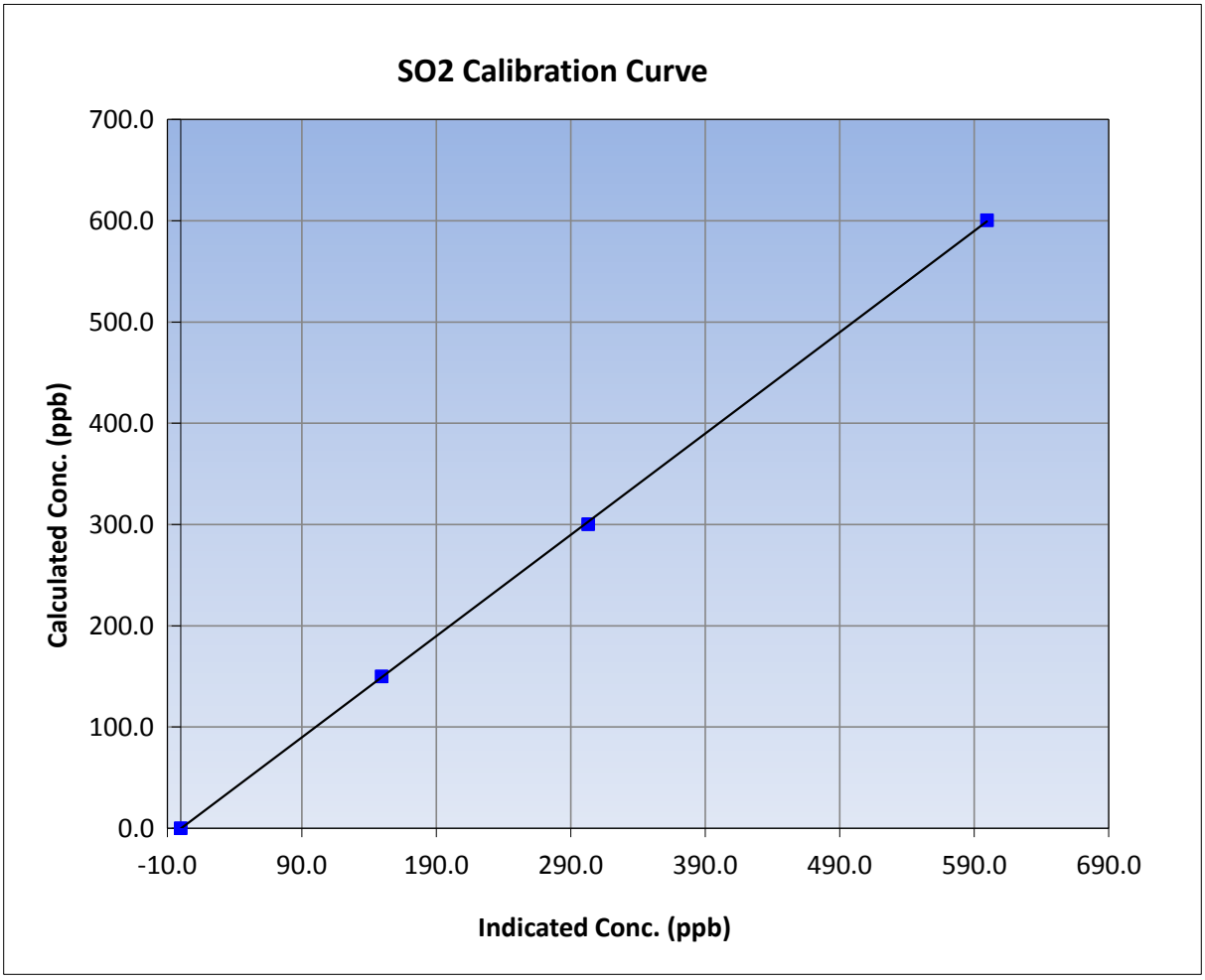
Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

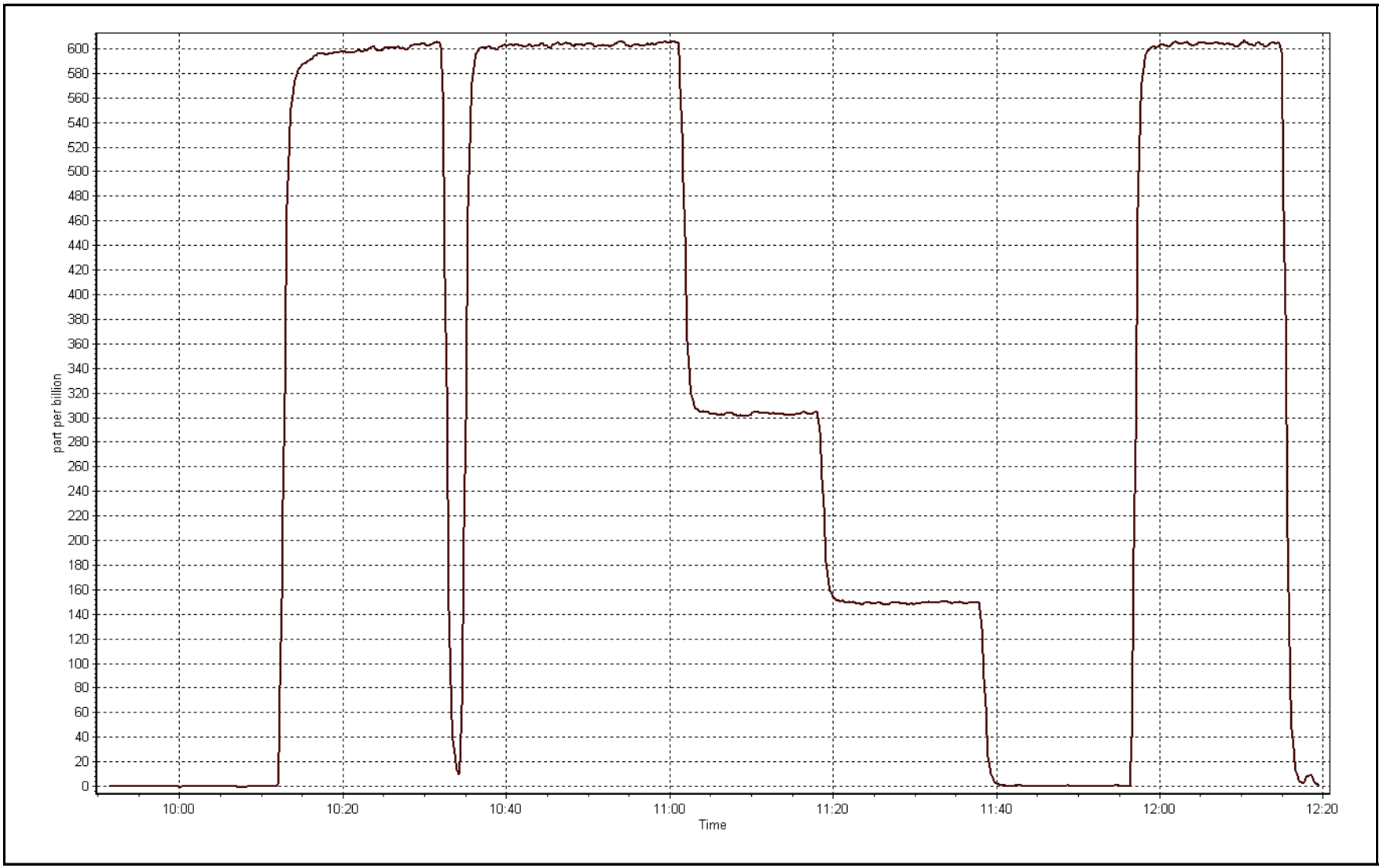
Calibration Date	April 14, 2016	Previous Calibration	March 2, 2016
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Start Time (MST)	9:52	End Time (MST)	12:19
Analyzer make	TEI 43i	Analyzer serial #	JC1327300932

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999956
600.4	599.6	1.0013		
300.2	303.0	0.9908	Slope	1.000280
150.1	149.3	1.0053		
			Intercept	-0.376609



SO2 Calibration Plot Date: April 14, 2016



Wood Buffalo Environmental Association
H2S Calibration Report

Station Information

Calibration Date	April 15, 2016	Last Calibration	March 2, 2016
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Reason:	Routine		
Start Time (MST)	11:09	End Time (MST)	13:53
Gas Cert Reference	LL101590	Station temp.	22 Deg C
Cal Gas Concentration	9.75 ppm	Cal Gas Exp Date	2/22/2016
Calibrator Make/Model	Sabio 4010	Serial Number	11551008
ZAG air Make/Model	API 701	Serial Number	4297
DACS make/model	Campbell Scientific CR3000	Serial Number	2635
SO2 gas concentration	49.7 ppm	SO2 gas cert/exp	LL107929 08-Spet-2018

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-617	-617
Analyzer IP address	192.168.1.42		Lamp voltage	879	879
Calculated slope	0.991852	0.997243	Chamber temp	45	45
Calculated intercept	0.032663	-0.005586	Pressure	550.5	552.6
Analyzer Background	13.9	14.1	Flow	1.045	1.051
Analyzer Coefficient	0.862	0.862	Intensity	94	94
			Converter temp.	330	329

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

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6000	0.0	0.0	0.3	----
as found span	6000	46.2	75.1	75.0	1.001
SO2 scrubber check	5000	15.1	150.1	1.7	----
calibrator zero	6000	0.0	0.0	0.1	----
high point	6000	46.2	75.1	75.3	0.997
second point	6000	25.8	41.9	42.2	0.994
third point	6000	15.4	25.0	24.9	1.007
as left zero	5000	0.0	0.0	0.1	----
as left span	6000	46.1	74.9	75.2	0.996
				Average Correction Factor	0.999

Corrected As found	74.7	Previous response	75.7	% change	1.2%

Notes:

Scrubber check done and sample inlet filter replaced after as founds. Slightly adjusted zero.

Calibration Performed By: Asad Hidayat

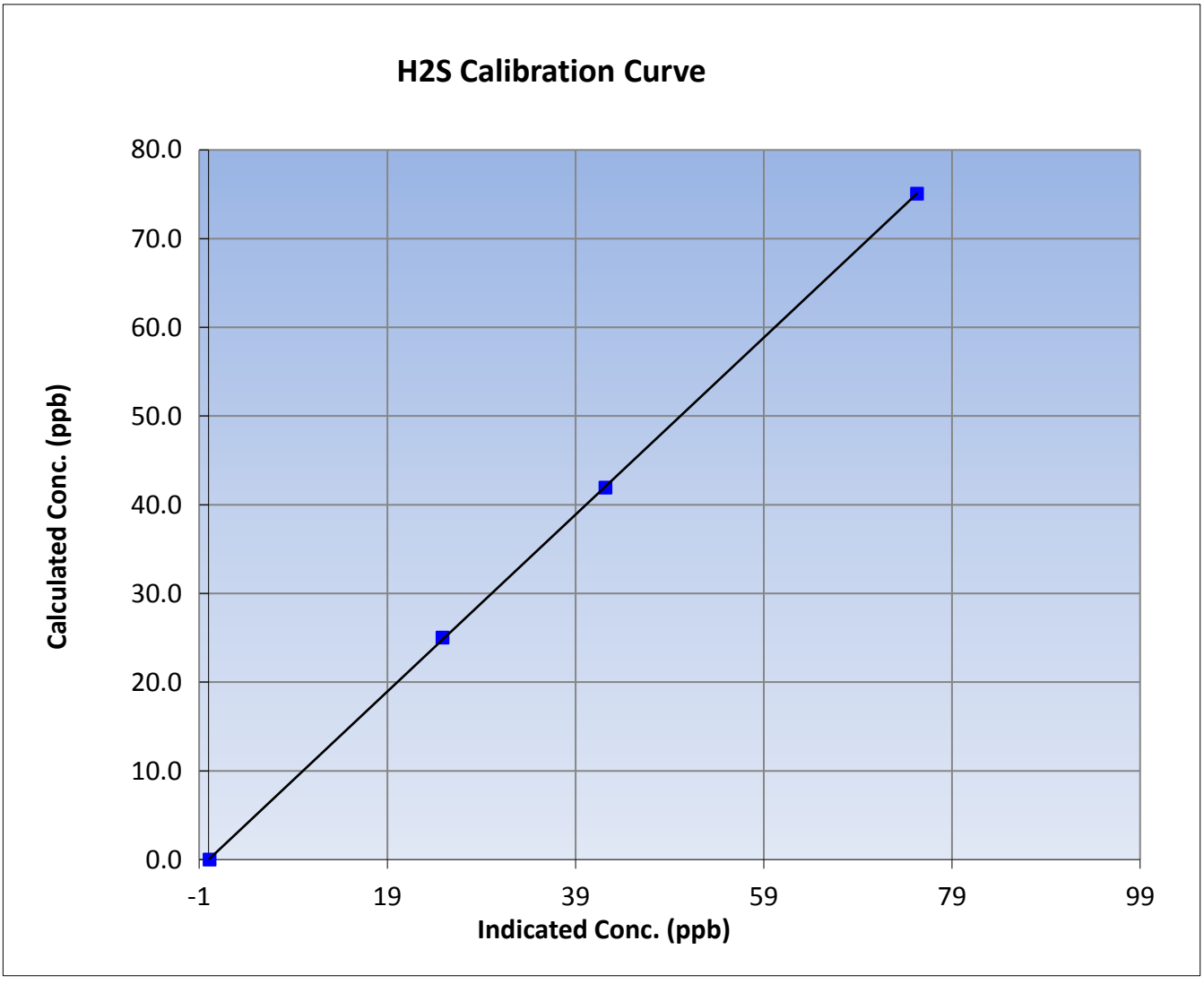
Wood Buffalo Environmental Association
H2S Calibration Report

Station Information

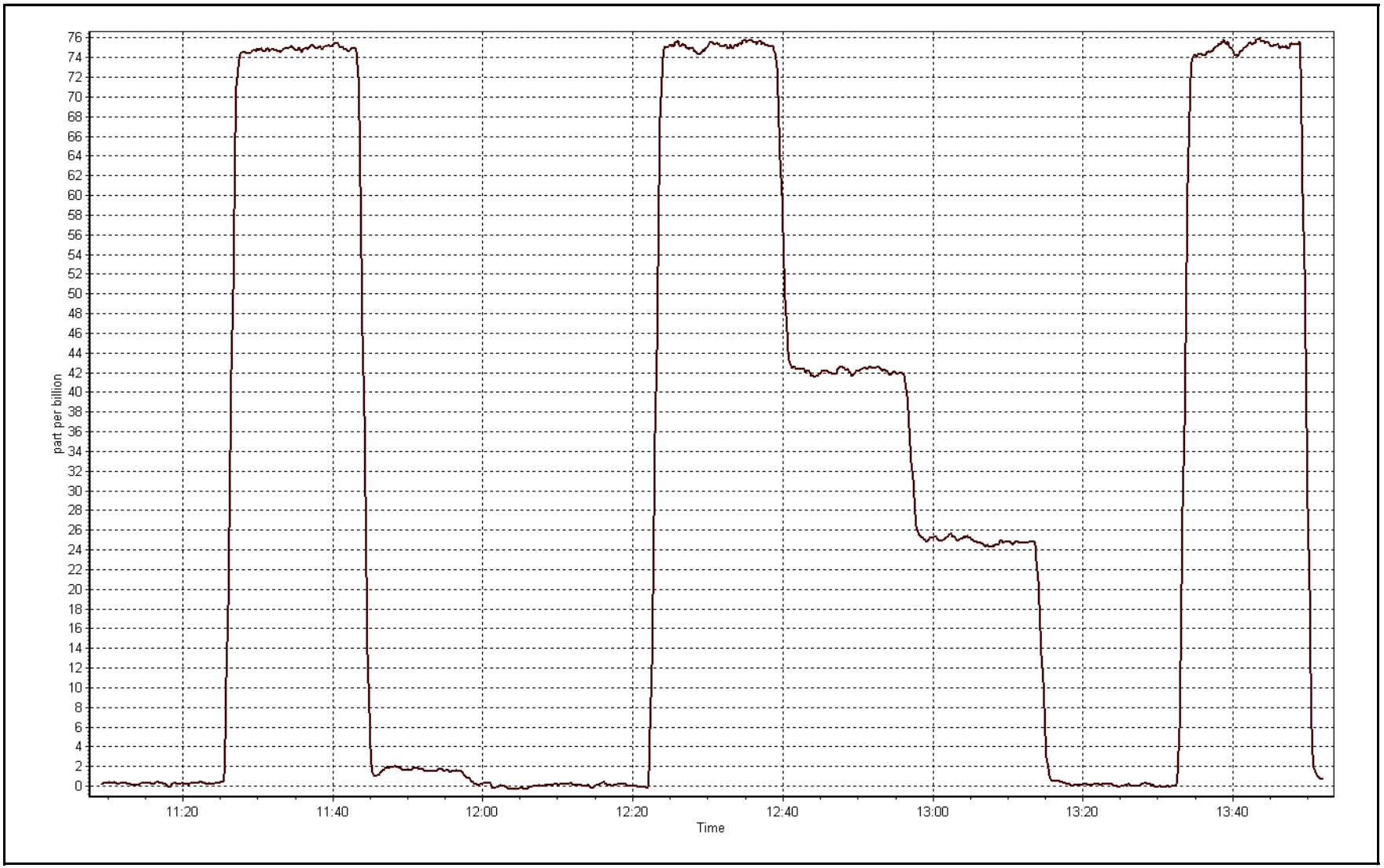
Calibration Date	April 15, 2016	Previous Calibration	March 2, 2016
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Start Time (MST)	11:09	End Time (MST)	13:53
Analyzer make	TEI 450i	Analyzer serial #	1336160094

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	0.999969
75.1	75.3	0.9971		
41.9	42.2	0.9937	Slope	0.997243
25.0	24.9	1.0070		
			Intercept	-0.005586



H2S Calibration Plot Date: April 15, 2016



Wood Buffalo Environmental Association
THC Calibration Report

W B E A

Station Information

Calibration Date	April-14-16	Last Calibration	March-02-16
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Reason:	Routine		
Start Time (MST)	9:52	End Time (MST)	12:17
Gas Cert Reference	LL107929	Cal Gas Expiry Date	08-Sep-18
CH4 Cal Gas Conc.	514 ppm	CH4 Equiv Conc.	1061.3 ppm
C3H8 Cal Gas Conc.	199 ppm	Station temp.	21 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11551008
ZAG make/model	Teledyne API 701	Serial Number	4297
DACS make/model	Campbell Scientific CR3000	Serial Number	2635

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 50 ppm		Sample Pressure	8.5	8.5
Analyzer IP address	192.168.1.51		Air or Bypass Press	30.4	30.4
Calculated slope	1.001888	1.003784	Fuel Pressure	19.9	19.9
Calculated intercept	-0.071999	-0.060162	Analyzer Coeff	4.2	4.1
			Analyzer BKG	0.880	0.870

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	0.04	----
as found span	5000	60.4	12.82	12.88	0.995
calibrator zero	5000	0.0	0.00	0.04	----
high point	5000	60.4	12.82	12.82	1.000
second point	5000	30.2	6.41	6.46	0.992
third point	5000	15.1	3.20	3.27	0.980
as left zero	5000	0.0	0.00	0.06	----
as left span	5000	60.4	12.82	12.85	0.998
				Average Correction Factor	0.991

Corrected As found	12.84	Previous response	12.87	% change	0.2%

Notes:

Sample inlet filter replaced after as founds. Slightly adjusted span.

Calibration Performed By: Asad Hidayat

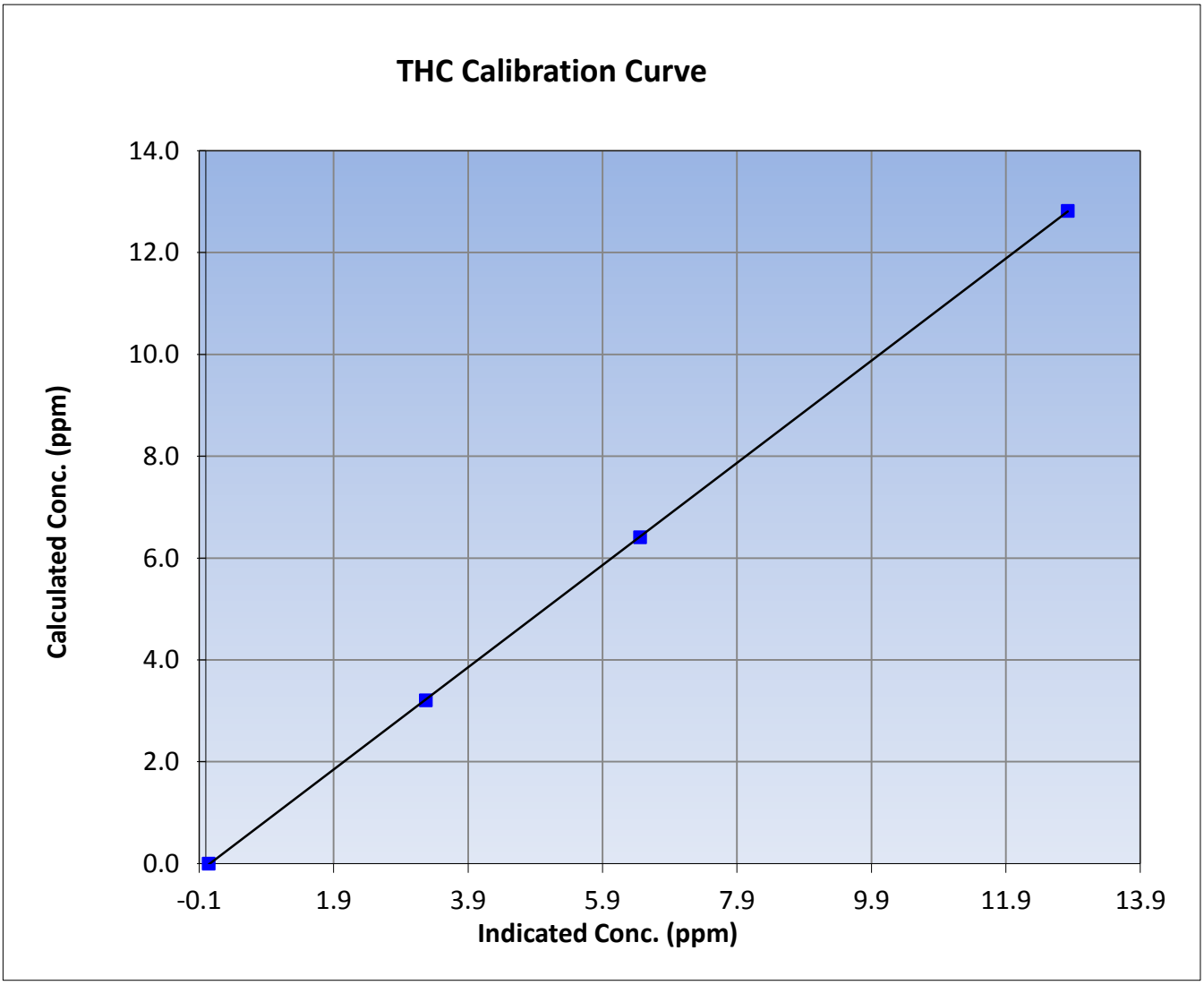
Wood Buffalo Environmental Association
THC Calibration Report

Station Information

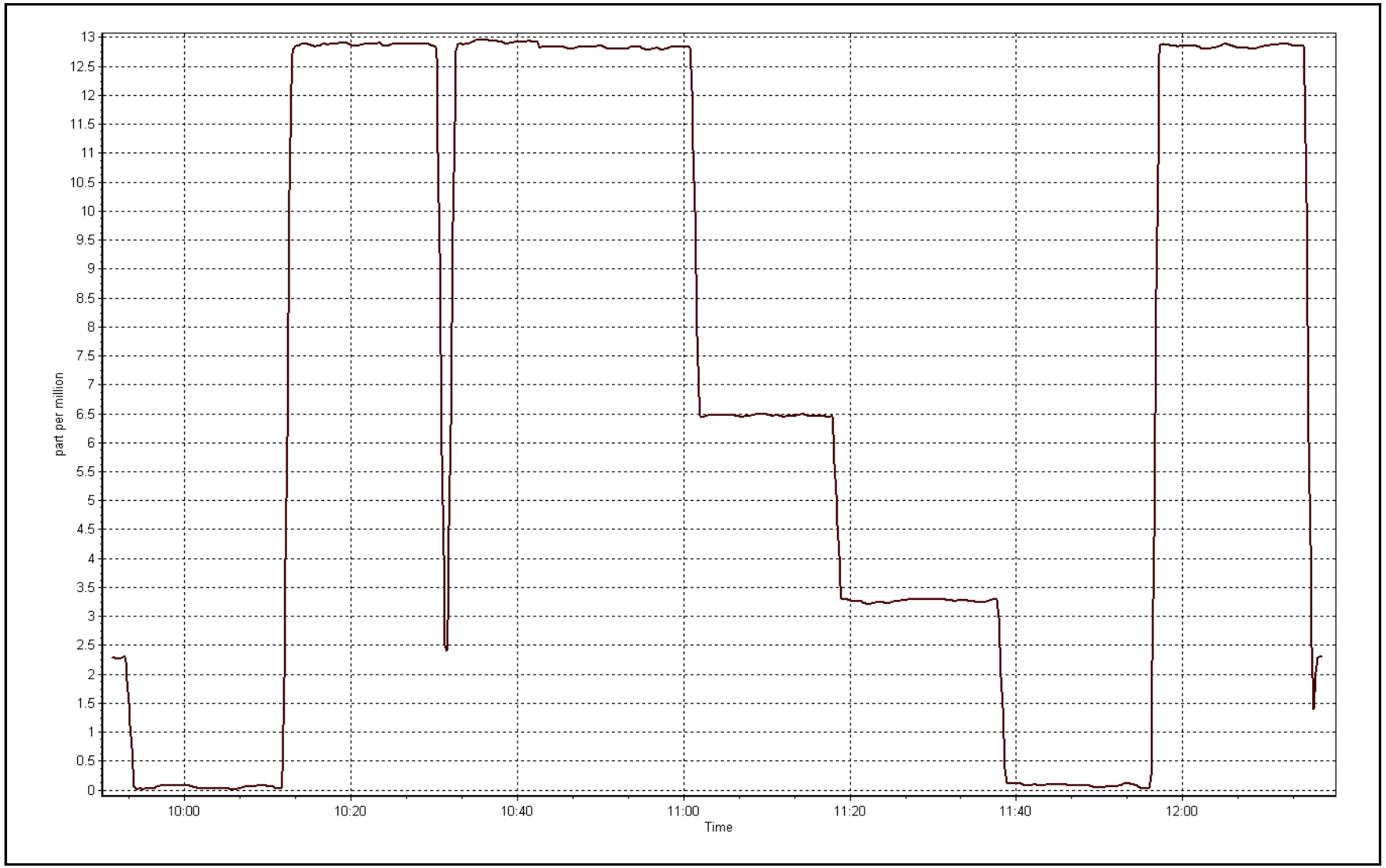
Calibration Date	April 14, 2016	Previous Calibration	March 2, 2016
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Start Time (MST)	9:52	End Time (MST)	12:17
Analyzer make	TEI 51i-LT	Analyzer serial #	1201650671

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.04	----	Correlation Coefficient	0.999988
12.82	12.82	1.0000		
6.41	6.46	0.9923	Slope	1.003784
3.20	3.27	0.9801		
			Intercept	-0.060162



THC Calibration Plot Date: April 14, 2016



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 5
MANNIX
APRIL 2016

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

May 27, 2016

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

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	687	33	33	100.00	35	0	10	0
H2S (ppb) Average	686	33	34	99.86	6	0	2	0
THC (ppm) Average	687	33	33	100.00	8.8	-	2.9	-
Temperature 2 m (C) Average	720	0	0	100.00	28.5	-	17.6	-
Temperature 20 m (C) Average	720	0	0	100.00	26.8	-	17.6	-
Temperature 45 m (C) Average	720	0	0	100.00	26.3	-	17.8	-
Temperature 75 m (C) Average	720	0	0	100.00	26	-	18.2	-
Temperature 90 m (C) Average	720	0	0	100.00	25.8	-	18.4	-
Relative Humidity 2 m (%) Average	720	0	0	100.00	98	-	92	-
Relative Humidity 20 m (%) Average	720	0	0	100.00	98	-	91	-
Relative Humidity 45 m (%) Average	720	0	0	100.00	98	-	91	-
Relative Humidity 75 m (%) Average	720	0	0	100.00	98	-	91	-
Relative Humidity 90 m (%) Average	720	0	0	100.00	98	-	91	-
Wind Speed 20 m (km/h) Average	720	0	0	100.00	42	-	22	-
Wind Speed 45 m (km/h) Average	718	0	2	99.72	47	-	28	-
Wind Speed 75 m (km/h) Average	718	0	2	99.72	49	-	31	-
Wind Speed 90 m (km/h) Average	718	0	2	99.72	49	-	32	-
Wind Direction 20 m (deg) Average	720	0	0	100.00	-	-	-	-
Wind Direction 45 m (deg) Average	718	0	2	99.72	-	-	-	-
Wind Direction 75 m (deg) Average	718	0	2	99.72	-	-	-	-
Wind Direction 90 m (deg) Average	718	0	2	99.72	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	720	0	0	100.00	1	-	0.5	-
Vertical Wind Speed 45 m (km/h) Average	718	0	2	99.72	2.4	-	1.5	-
Vertical Wind Speed 75 m (km/h) Average	718	0	2	99.72	1.8	-	0.8	-
Vertical Wind Speed 90 m (km/h) Average	718	0	2	99.72	4	-	2.2	-

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

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

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

					Percentile						
Parameter	Number	Mean	StnDev	Total	Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	687	1.9	4	-	0	0	0	0	1	6	35
H2S (ppb) Average	686	0.5	1	-	0	0	0	0	1	1	6
THC (ppm) Average	687	2.29	0.3	-	2.1	2.1	2.2	2.2	2.3	2.5	8.8
Temperature 2 m (C) Average	720	4.34	7.7	-	-10.7	-5	-1.2	3.3	8.8	16	28.5
Temperature 20 m (C) Average	720	4.21	7.7	-	-10.1	-5.1	-1.5	3.3	8.6	16.2	26.8
Temperature 45 m (C) Average	720	4.08	7.8	-	-10.5	-5.3	-1.7	3.2	8.6	16.2	26.3
Temperature 75 m (C) Average	720	3.95	7.8	-	-10.8	-5.4	-1.9	3	8.9	16	26
Temperature 90 m (C) Average	720	3.91	7.9	-	-11	-5.5	-2	3	8.9	16	25.8
Relative Humidity 2 m (%) Average	720	54.8	22	-	12	24	37	54	72	87	98
Relative Humidity 20 m (%) Average	720	53.8	22	-	12	24	36	53	70	85	98
Relative Humidity 45 m (%) Average	720	53.7	22	-	12	24	35	53	70	84	98
Relative Humidity 75 m (%) Average	720	53.6	22	-	12	24	35	53	70	85	98
Relative Humidity 90 m (%) Average	720	53.7	22	-	12	24	35	52	70	86	98
Wind Speed 20 m (km/h) Average	720	11.6	6	-	0	5	8	11	14	20	42
Wind Speed 45 m (km/h) Average	718	15.5	7	-	0	7	10	15	19	26	47
Wind Speed 75 m (km/h) Average	718	16.9	9	-	1	7	10	16	22	29	49
Wind Speed 90 m (km/h) Average	718	18.5	9	-	0	8	12	18	24	31	49
Wind Direction 20 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-
Wind Direction 45 m (deg) Average	718	-	-	-	-	-	-	-	-	-	-
Wind Direction 75 m (deg) Average	718	-	-	-	-	-	-	-	-	-	-
Wind Direction 90 m (deg) Average	718	-	-	-	-	-	-	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	720	0.18	0.3	-	-0.9	-0.3	0	0.2	0.4	0.6	1
Vertical Wind Speed 45 m (km/h) Average	718	0.27	0.8	-	-1.8	-0.8	-0.3	0.3	0.9	1.2	2.4
Vertical Wind Speed 75 m (km/h) Average	718	0.18	0.5	-	-1.2	-0.4	-0.1	0.1	0.5	0.8	1.8
Vertical Wind Speed 90 m (km/h) Average	718	0.62	0.9	-	-1.9	-0.3	0.1	0.5	1.1	1.7	4

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

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
H2S	13 Apr 2016 11:00	13 Apr 2016 11:00	1	Maintenance - sample manifold cleaned
Wind Speed, Wind Direction, Vertical Wind Speed 45 m	05 Apr 2016 23:00	05 Apr 2016 23:00	1	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction, Vertical Wind Speed 45 m	06 Apr 2016 07:00	06 Apr 2016 07:00	1	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction, Vertical Wind Speed 75 m	05 Apr 2016 23:00	06 Apr 2016 00:00	2	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction, Vertical Wind Speed 90 m	05 Apr 2016 23:00	06 Apr 2016 00:00	2	Flat line in sensor output signal - Sensor frozen

Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO_2) - ppb

Mannix - April 2016

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

Maximum Value: 35 ppb on Apr 12 06:00 Maximum Daily Average: 9.5 ppb on Apr 12

Minimum Value: 0 ppb on Apr 6 04:00 Minimum Daily Average: 0.0 ppb on Apr 26

Maximum Diurnal Average: 2.9 ppb at hour 6 Minimum Diurnal Average: 0.6 ppb at hour 23

Monthly Average: 1.9 ppb Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 1$ $P_{90} = 6$ $P_{99} = 18$

Hours in Service:	720
Hours of Data:	687
Hours of Missing Data:	33
Hours of Calibration:	33
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-Apr	1	1	Z	1	0	4	9	2	2	11	13	10	10	7	1	1	0	0	0	0	0	0	0	0	3.3	13
2-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	1	1	3	2	2	6	16	20	16	4	5	4	3.5	20
3-Apr	9	5	5	5	Z	2	1	1	2	3	4	3	3	8	5	6	3	3	0	0	0	0	0	0	3.0	9
4-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	6	6	2	0	0	8	1.1	8
5-Apr	Z	12	14	11	13	10	11	11	15	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	4.5	15
6-Apr	0	Z	0	0	0	0	1	2	2	5	1	3	1	2	10	9	5	2	6	0	0	0	2	14	2.9	14
7-Apr	8	0	Z	0	0	0	0	0	0	1	4	3	2	6	5	3	2	0	2	1	0	0	1	0	1.6	8
8-Apr	0	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
9-Apr	0	0	0	0	Z	1	1	1	5	4	3	1	2	2	2	1	1	1	3	1	7	11	5	6	2.5	11
10-Apr	8	6	5	4	3	Z	2	5	4	13	9	11	4	9	9	12	1	1	1	0	0	0	0	0	4.7	13
11-Apr	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	5	0.6	5
12-Apr	16	Z	1	2	8	35	18	3	14	12	6	9	19	14	2	2	4	4	16	11	10	1	0	9	9.5	35
13-Apr	14	1	Z	3	1	0	0	0	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0	1.0	14
14-Apr	0	0	4	Z	2	3	3	3	4	3	0	2	1	1	1	1	2	1	1	4	3	1	0	0	1.7	4
15-Apr	0	3	3	13	Z	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.0	13
16-Apr	0	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
17-Apr	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
18-Apr	0	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
19-Apr	0	0	Z	0	0	0	0	1	3	0	0	0	0	0	0	0	0	0	0	0	29	1	0	9	1.9	29
20-Apr	1	6	9	Z	7	15	4	17	13	11	12	7	5	9	5	0	2	0	0	0	0	0	0	0	5.4	17
21-Apr	0	0	0	0	Z	0	0	0	0	1	19	23	7	1	1	6	3	0	0	0	0	0	0	0	2.7	23
22-Apr	0	0	1	12	4	Z	1	1	2	1	0	0	0	0	0	0	0	0	4	1	2	1	0	0	1.4	12
23-Apr	Z	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
24-Apr	0	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
25-Apr	0	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
26-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
27-Apr	0	0	0	0	Z	0	0	0	0	0	0	4	12	7	11	11	6	1	2	0	0	0	0	0	2.4	12
28-Apr	0	0	0	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
29-Apr	Z	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
30-Apr	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	2	1	0.6	7
	2.3	1.5	1.8	2.1	1.7	2.9	1.8	1.7	2.4	2.5	2.6	2.7	2.4	2.3	1.9	1.9	1.2	0.8	2.0	1.6	2.4	1.0	0.6	2.0	Diurnal Average	
	16	12	14	13	13	35	18	17	15	13	19	23	19	14	11	12	6	6	16	20	29	11	5	14	Diurnal Maximum	

Z - zerospan C - Calibration

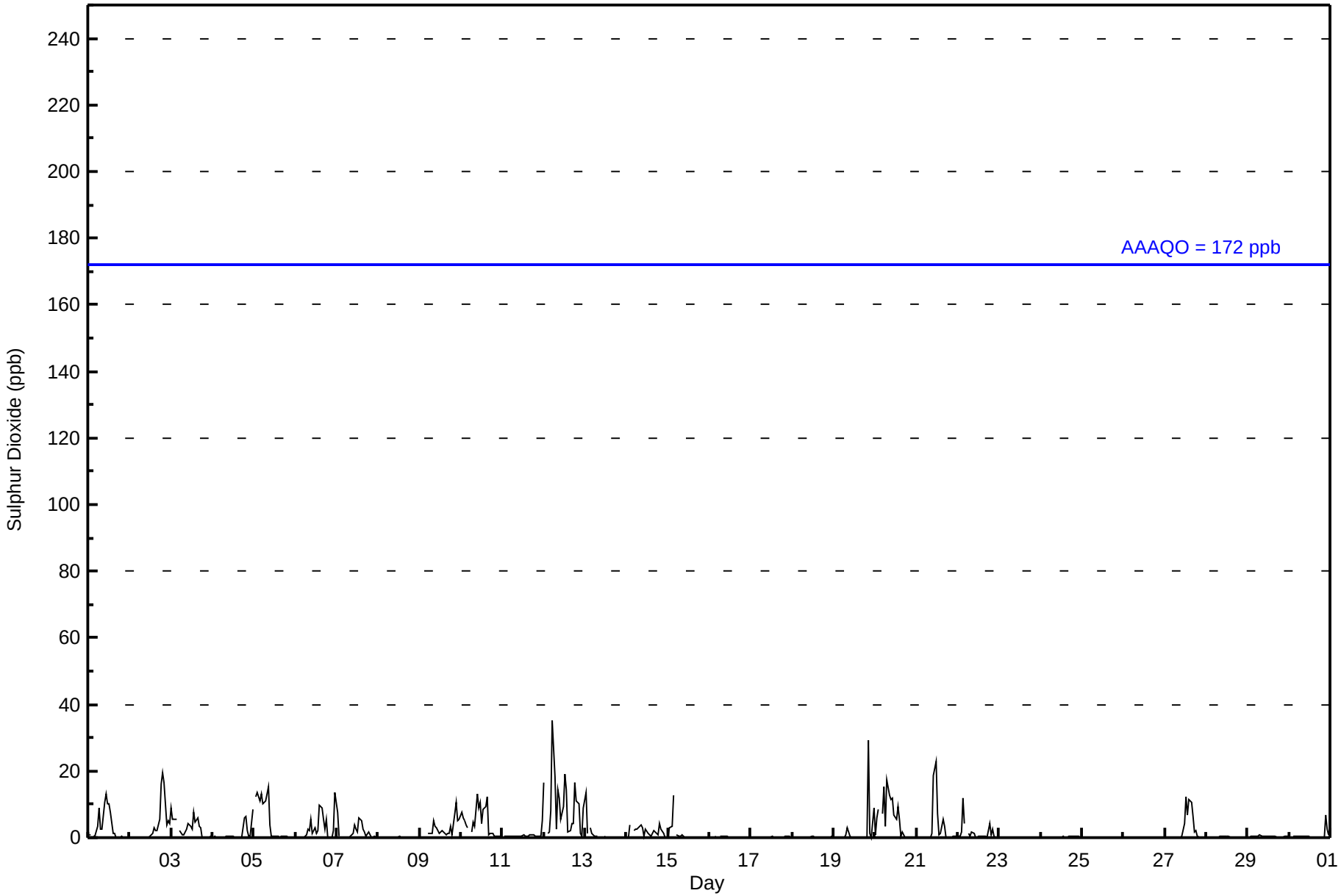
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb

Wood Buffalo Environmental Association

Hourly Averages

Sulphur Dioxide (SO_2) - ppb

Mannix - April 2016



Sulphur Dioxide (SO_2) - ppb

Mannix - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	647	94.18	94.18
11 - 20	37	5.39	99.56
21 - 60	3	0.44	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

Mannix - April 2016

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	66	19	19	22	36	148	99	47	16	10	15	18	14	16	57	647
11 - 20	24	6	1	0	0	0	0	0	0	1	0	0	0	0	1	4	37
21 - 60	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	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	70	72	20	19	22	36	148	99	47	17	10	15	18	14	19	61	687

Total Number of Valid Hours: 687

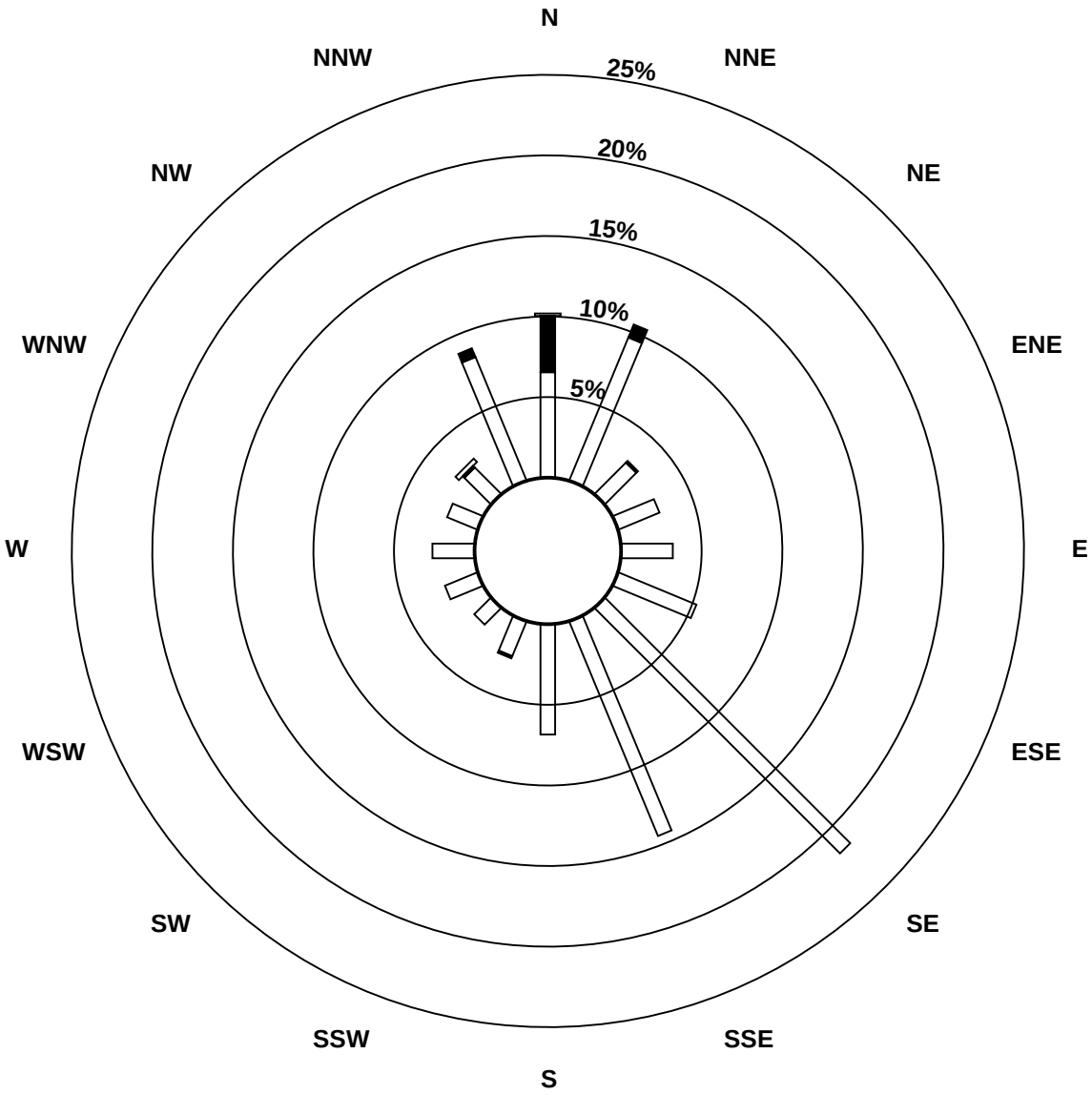
Total Number of Hours: 720

Wood Buffalo Environmental Association

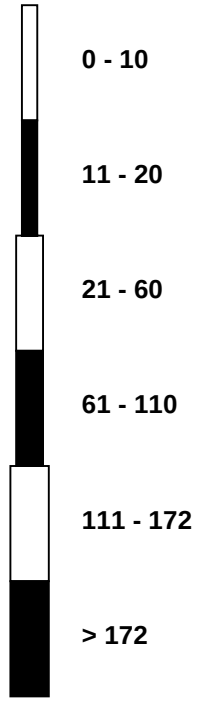
Wind Rose Apr 2016

Sulphur Dioxide (SO_2) - ppb

Mannix (AMS 5)



Classes (ppb)



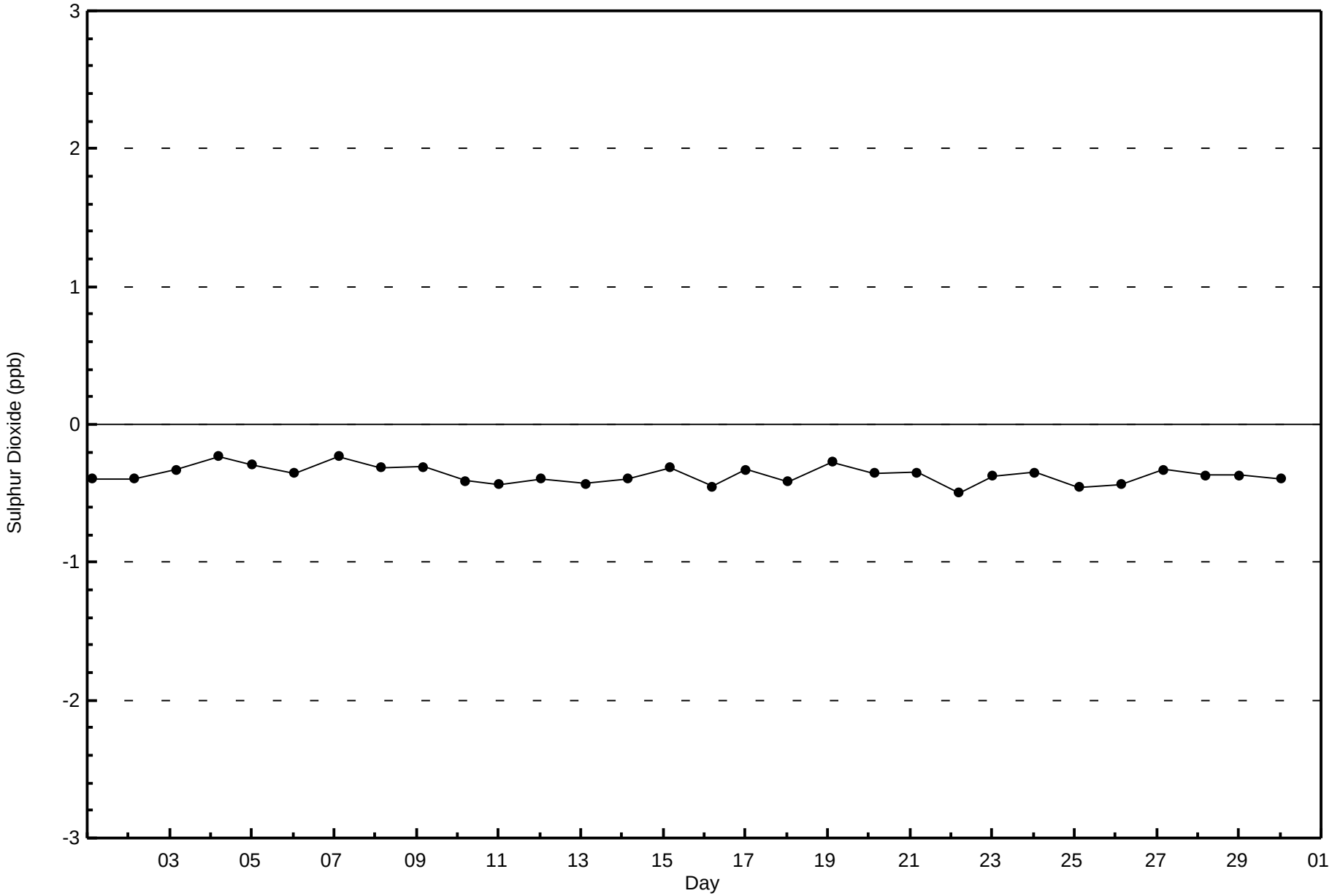
Total Number of Valid Hours: 687

Wood Buffalo Environmental Association

Zero Responses

Sulphur Dioxide (SO_2) - ppb

Mannix - April 2016

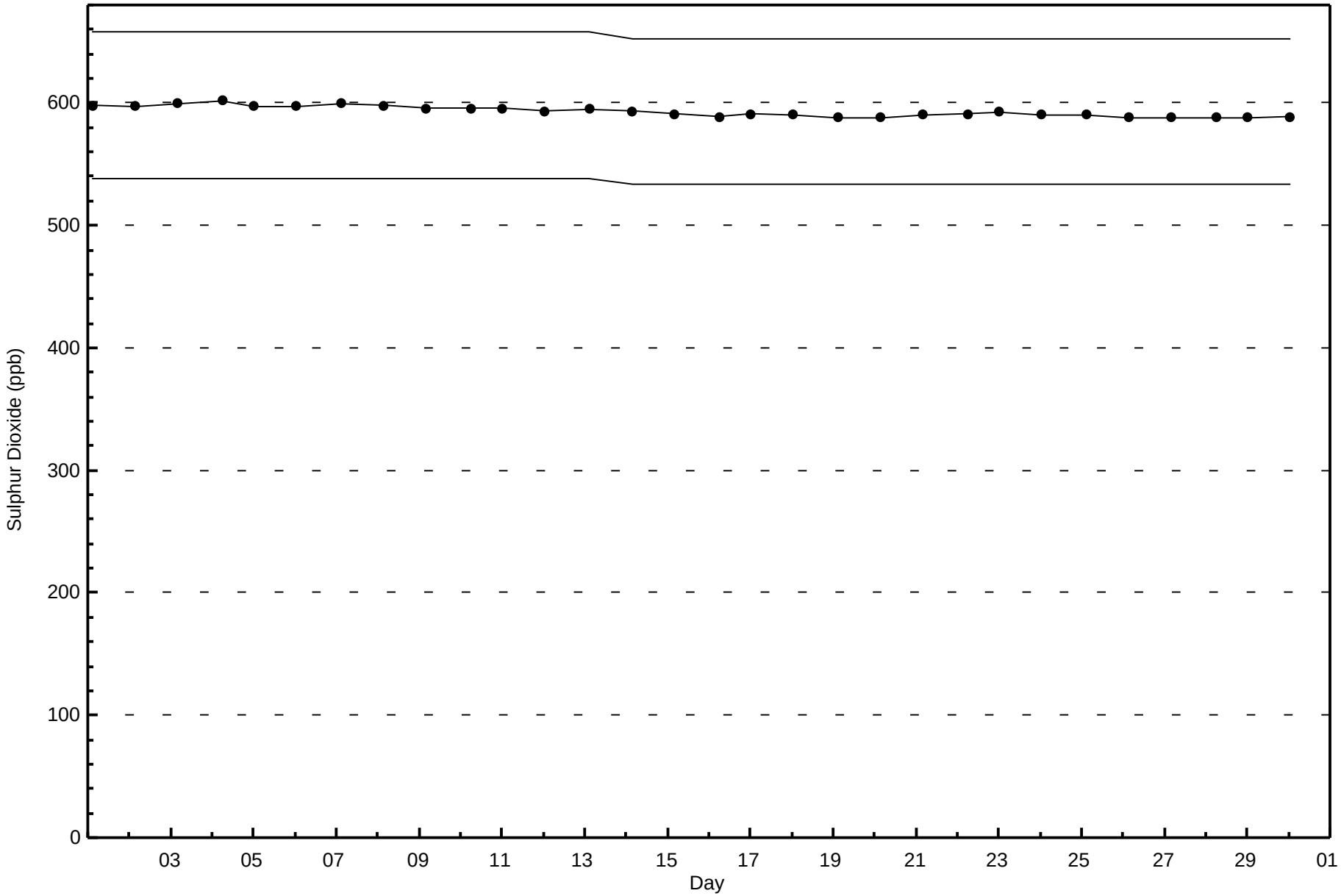


Wood Buffalo Environmental Association

Span Responses

Sulphur Dioxide (SO_2) - ppb

Mannix - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Hydrogen Sulphide (H_2S) - ppb

Mannix - April 2016

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

Maximum Value: 6 ppb on Apr 15 04:00

Maximum Daily Average: 1.5 ppb on Apr 5

Minimum Value: 0 ppb on Apr 11 13:00

Minimum Daily Average: 0.1 ppb on Apr 16

Maximum Diurnal Average: 1.0 ppb at hour 5

Minimum Diurnal Average: 0.2 ppb at hour 17

Monthly Average: 0.5 ppb

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

Hours in Service:	720
Hours of Data:	686
Hours of Missing Data:	34
Hours of Calibration:	33
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-Apr	0	0	0	Z	0	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.8	3
2-Apr	1	1	1	1	Z	0	1	1	1	1	0	0	1	1	1	0	0	0	1	1	0	0	1	1	0.6	1
3-Apr	1	1	1	1	0	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	3	0.6	3
4-Apr	1	1	0	0	0	1	Z	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1	1	2	0.5	2
5-Apr	4	Z	2	3	3	4	3	4	5	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.5	5
6-Apr	0	0	Z	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	0.8	1
7-Apr	1	1	1	Z	0	1	1	0	1	1	1	0	0	0	0	1	0	0	0	0	0	0	1	1	0.5	1
8-Apr	0	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-Apr	0	0	0	0	4	Z	2	1	1	1	1	1	1	1	1	0	0	0	0	0	1	2	1	1	0.8	4
10-Apr	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
11-Apr	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.2	2
12-Apr	5	4	2	Z	5	2	1	0	1	1	1	1	C	C	C	0	0	1	1	1	1	1	1	3	1.4	5
13-Apr	3	1	0	Z	1	0	0	0	0	0	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	3
14-Apr	1	1	1	1	Z	0	1	1	1	1	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0.6	1
15-Apr	0	1	3	6	3	1	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	6
16-Apr	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
17-Apr	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0.3	1
18-Apr	0	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
19-Apr	0	0	0	Z	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0.3	2
20-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.3	1
21-Apr	0	0	0	0	0	Z	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	1	1	0.4	1
22-Apr	0	0	2	3	2	4	Z	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0.8	4
23-Apr	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
24-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
25-Apr	0	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
26-Apr	0	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-Apr	0	0	0	0	0	Z	1	0	1	1	0	1	1	1	1	0	0	0	0	0	1	1	1	0	0.6	1
28-Apr	0	0	0	0	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
29-Apr	0	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
30-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.4	1
	0.8	0.6	0.7	0.8	1.0	0.8	0.6	0.6	0.6	0.5	0.3	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.3	0.4	0.4	0.5	0.5	0.7	Diurnal Average	
	5	4	3	6	5	4	3	4	5	3	1	1	1	1	1	1	1	1	1	1	1	2	1	3	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance

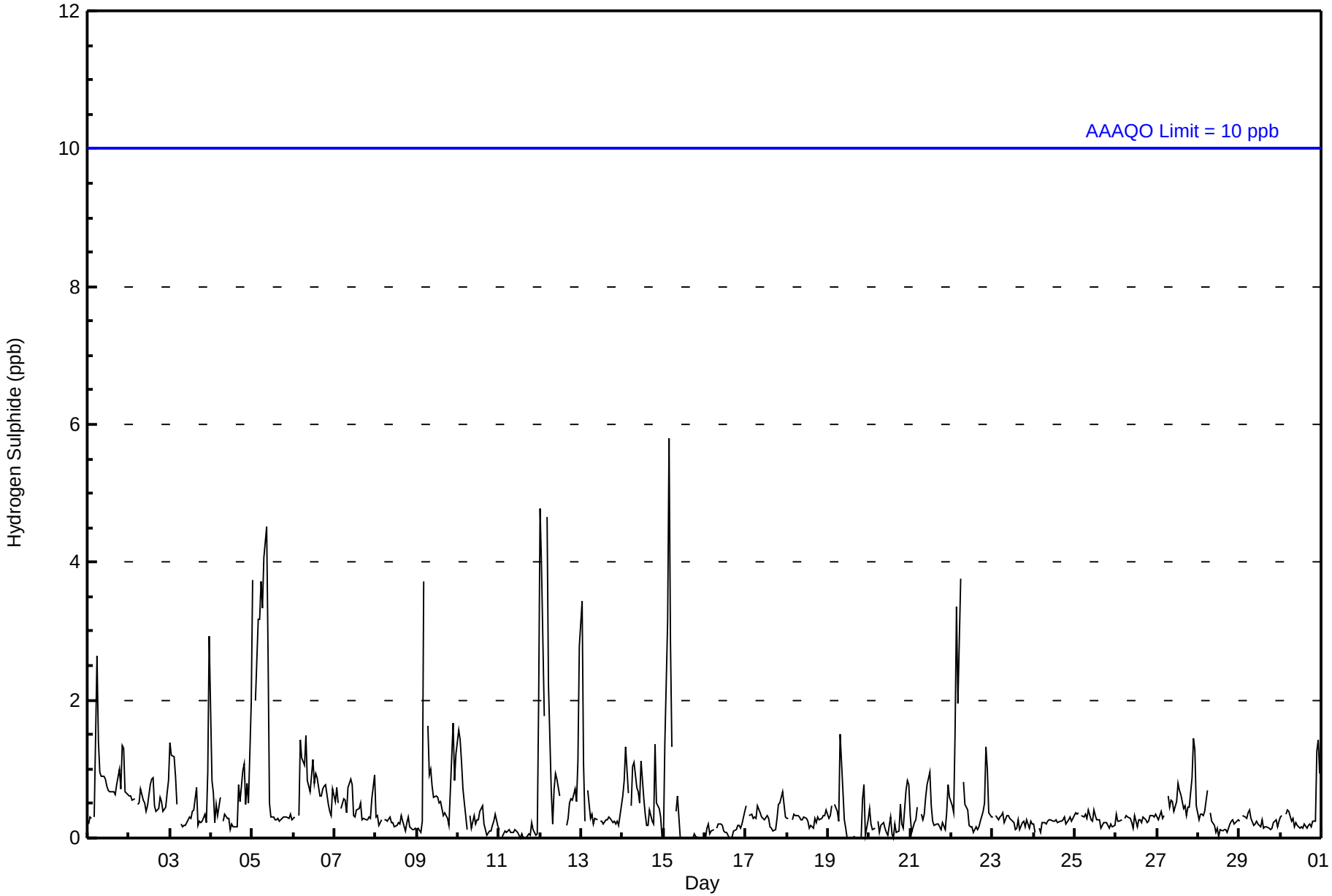
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb

Wood Buffalo Environmental Association

Hourly Averages

Hydrogen Sulphide (H_2S) - ppb

Mannix - April 2016



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Hydrogen Sulphide (H_2S) - ppb

Mannix - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	665	96.94	96.94
3 - 4	17	2.48	99.42
5 - 7	4	0.58	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Hydrogen Sulphide (H_2S) - ppb

Mannix - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 2	57	67	20	17	23	39	148	97	48	17	8	15	18	12	19	60	665
3 - 4	7	3	0	2	0	0	0	0	0	0	1	0	1	0	1	2	17
5 - 7	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	66	72	20	19	23	39	148	97	48	17	9	15	19	12	20	62	686

Total Number of Valid Hours: 686

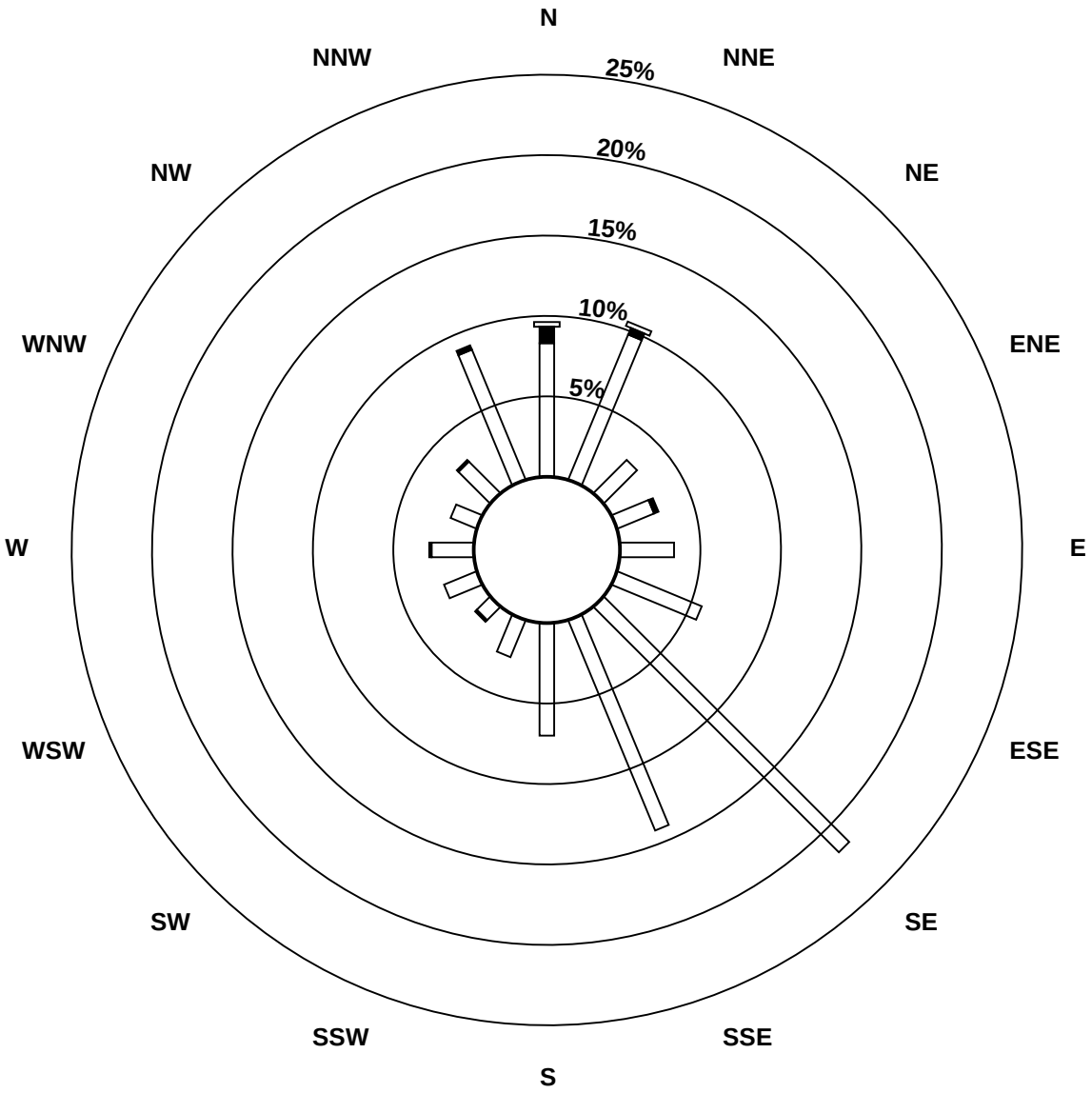
Total Number of Hours: 720

Wood Buffalo Environmental Association

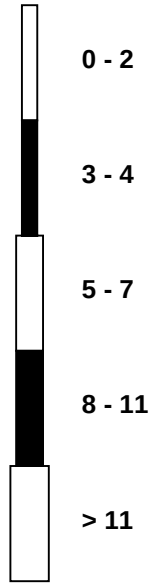
Wind Rose Apr 2016

Hydrogen Sulphide (H_2S) - ppb

Mannix (AMS 5)



Classes (ppb)



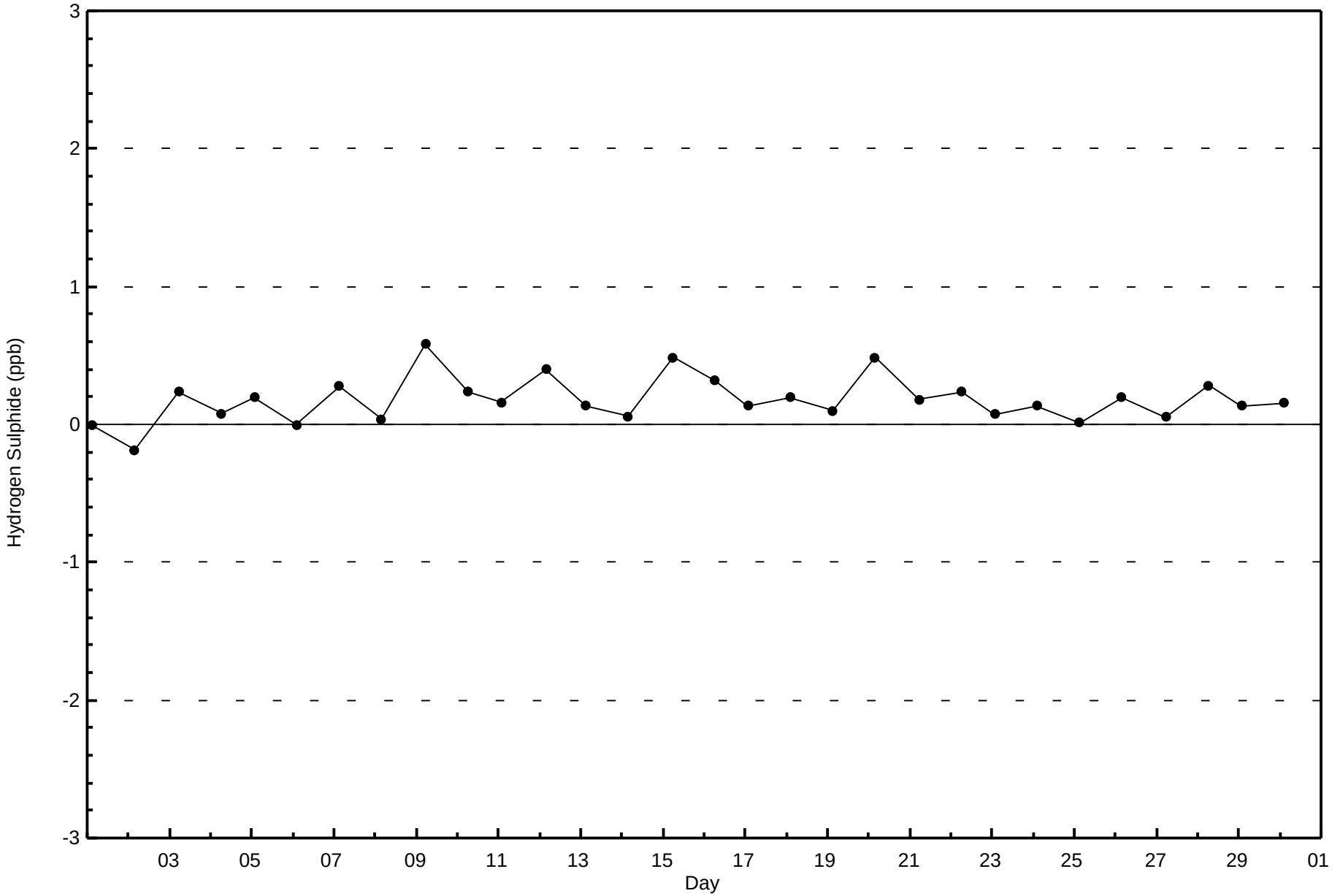
Total Number of Valid Hours: 686

Wood Buffalo Environmental Association

Zero Responses

Hydrogen Sulphide (H_2S) - ppb

Mannix - April 2016

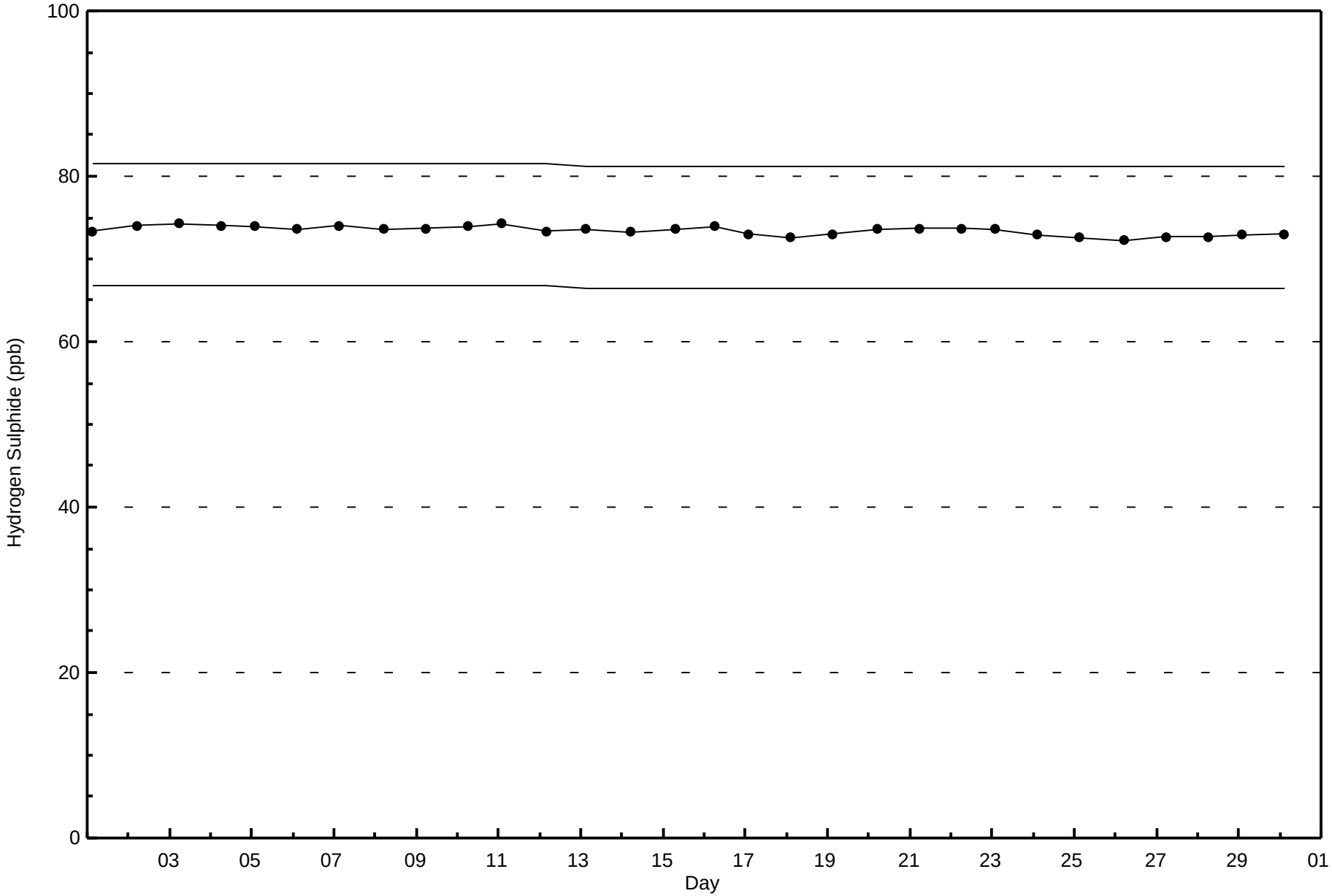


Wood Buffalo Environmental Association

Span Responses

Hydrogen Sulphide (H_2S) - ppb

Mannix - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Mannix - April 2016

Maximum Value: 8.8 ppm on Apr 12 04:00

Maximum Daily Average: 2.9 ppm on Apr 12

Minimum Value: 2.1 ppm on Apr 19 12:00

Minimum Daily Average: 2.2 ppm on Apr 8

Maximum Diurnal Average: 2.6 ppm at hour 4

Minimum Diurnal Average: 2.2 ppm at hour 17

Monthly Average: 2.29 ppm

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

Hours in Service:	720
Hours of Data:	687
Hours of Missing Data:	33
Hours of Calibration:	33
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-Apr	2.2	2.2	Z	2.2	2.2	3.9	3.0	2.8	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.3	2.3	2.3	2.2	2.4	2.5	2.6	2.2	2.2	2.4	3.9
2-Apr	2.2	2.2	2.2	Z	2.1	2.1	2.2	2.2	2.2	2.1	2.2	2.2	2.8	2.6	2.4	2.2	2.1	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.8
3-Apr	2.3	2.4	2.3	2.3	Z	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.3	2.2	2.3	2.5	2.3	2.4	2.4	2.6	3.0	2.3	3.0
4-Apr	2.4	2.3	2.3	2.3	2.4	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.4	2.3	2.5	2.4	2.7	2.3	2.7
5-Apr	Z	2.6	2.5	2.7	2.7	2.7	2.6	2.8	2.8	2.8	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.4	2.8
6-Apr	2.2	Z	2.2	2.3	4.0	3.2	2.6	2.3	2.3	2.2	2.2	2.3	2.5	2.3	2.3	2.3	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.4	4.0
7-Apr	2.2	2.3	Z	2.4	2.2	2.3	2.3	2.2	2.3	2.2	2.2	2.2	2.2	2.3	2.2	2.3	2.2	2.2	2.2	2.3	2.2	2.3	2.3	2.8	2.3	2.8
8-Apr	2.2	2.2	2.2	Z	2.1	2.1	2.2	2.2	2.1	2.1	2.2	2.1	2.2	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2
9-Apr	2.1	2.2	2.2	2.4	Z	2.9	3.8	2.8	2.2	2.3	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.4	3.8
10-Apr	2.3	2.3	2.3	2.2	2.2	Z	2.2	2.2	2.2	2.3	2.4	2.4	2.3	2.3	2.3	2.2	2.3	2.2	2.3	2.2	2.2	2.3	2.3	2.2	2.3	2.4
11-Apr	Z	2.1	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.3	3.2	2.2	3.2
12-Apr	3.7	Z	4.3	8.8	4.9	2.4	2.3	2.2	2.2	2.4	2.6	2.4	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.5	2.5	2.5	2.9	8.8
13-Apr	2.6	2.7	Z	2.5	2.5	2.3	2.4	2.2	C	C	C	2.2	2.3	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.7
14-Apr	2.4	2.6	2.4	Z	2.2	2.2	2.2	2.3	2.2	2.2	2.1	2.2	2.3	2.4	2.3	2.3	2.2	2.2	2.2	2.5	2.2	2.5	2.6	2.2	2.3	2.6
15-Apr	2.2	2.4	2.6	2.8	Z	3.5	2.5	2.8	2.8	2.5	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.4	3.5
16-Apr	2.2	2.4	2.3	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4
17-Apr	Z	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.7	2.2	2.2	2.2	2.7
18-Apr	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2
19-Apr	2.1	2.2	Z	2.1	2.2	2.1	2.1	2.7	2.5	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.1	2.9	2.9	2.2	2.3	2.3	2.9
20-Apr	2.3	2.3	2.2	Z	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.4	2.5	2.5	2.4	2.3	2.5
21-Apr	2.4	2.3	2.3	2.3	Z	2.3	2.2	2.2	2.3	2.4	2.3	2.4	2.3	2.3	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.3	2.3	2.4
22-Apr	2.3	2.3	2.4	2.5	2.6	Z	2.6	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.4	2.5	2.3	2.2	2.3	2.6
23-Apr	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.3
24-Apr	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.2
25-Apr	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
26-Apr	2.2	2.2	2.2	Z	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.3
27-Apr	2.1	2.2	2.2	2.1	Z	2.2	2.2	2.3	2.5	2.5	2.4	2.4	2.4	2.3	2.2	2.2	2.2	2.3	2.5	2.4	2.5	2.7	2.6	2.4	2.3	2.7
28-Apr	2.3	2.3	2.3	2.3	2.3	Z	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
29-Apr	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
30-Apr	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.5	2.6	2.6	2.2	2.6
	2.3	2.3	2.3	2.6	2.4	2.4	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	Diurnal Average	
	3.7	2.7	4.3	8.8	4.9	3.9	3.8	2.8	2.8	2.8	2.6	2.4	2.8	2.6	2.4	2.3	2.3	2.3	2.5	2.5	2.9	2.9	2.6	3.2	Diurnal Maximum	

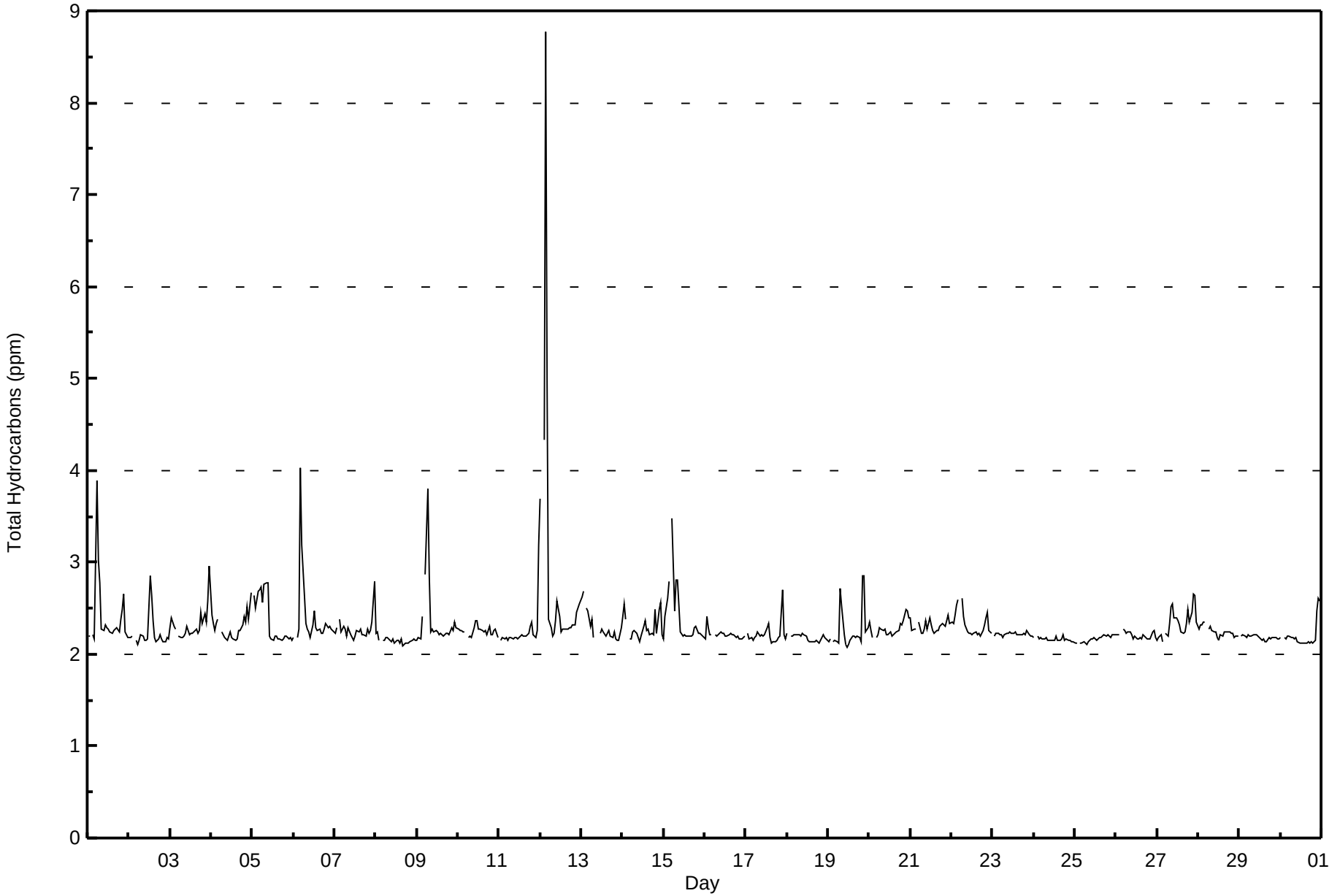
Z - zerospan C - Calibration

Wood Buffalo Environmental Association

Hourly Averages

Total Hydrocarbons (THC) - ppm

Mannix - April 2016



Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	0	0.00	0.00
2.1 - 3.0	677	98.54	98.54
3.1 - 10.0	10	1.46	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Total Hydrocarbons (THC) - ppm

Mannix - April 2016

Concentration Ranges (ppm)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 2.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.1 - 3.0	69	71	19	19	22	36	148	99	46	17	9	15	18	13	16	60	677
3.1 - 10.0	1	1	1	0	0	0	0	0	1	0	1	0	0	1	3	1	10
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	70	72	20	19	22	36	148	99	47	17	10	15	18	14	19	61	687

Total Number of Valid Hours: 687

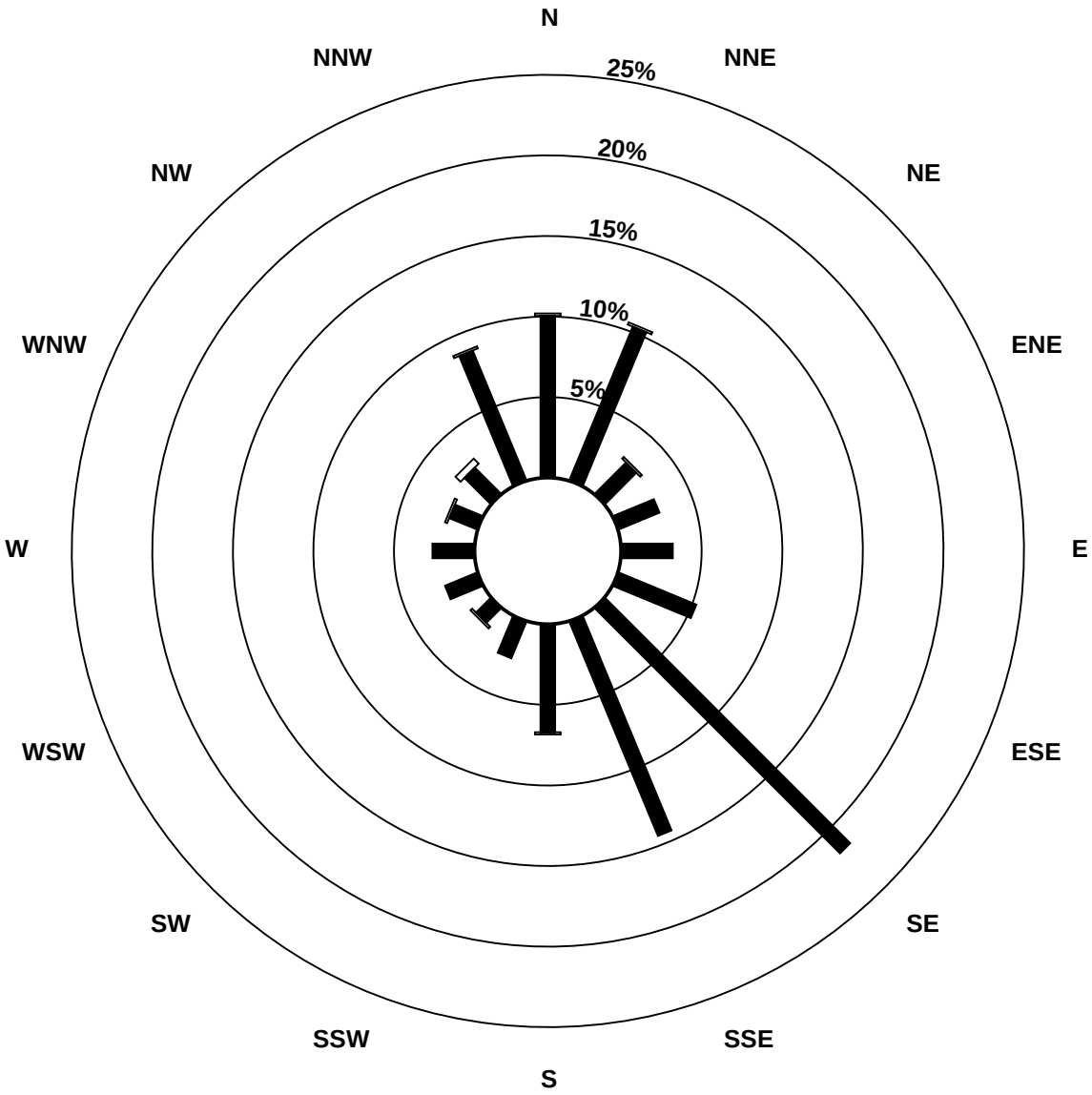
Total Number of Hours: 720

Wood Buffalo Environmental Association

Wind Rose Apr 2016

Total Hydrocarbons (THC) - ppm

Mannix (AMS 5)



Classes (ppm)

0 - 2.0

2.1 - 3.0

3.1 - 10.0

> 10.0

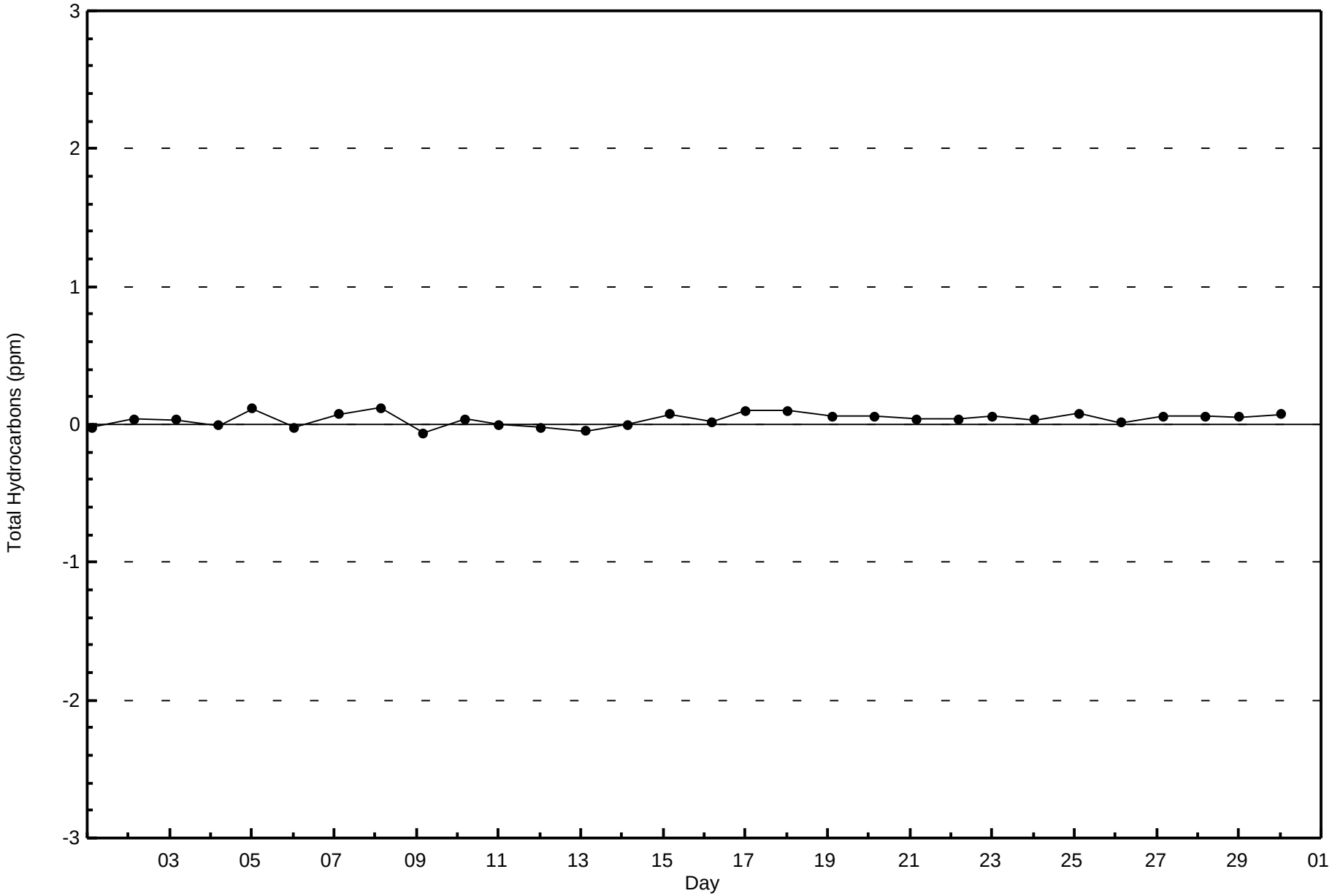
Total Number of Valid Hours: 687

Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Mannix - April 2016

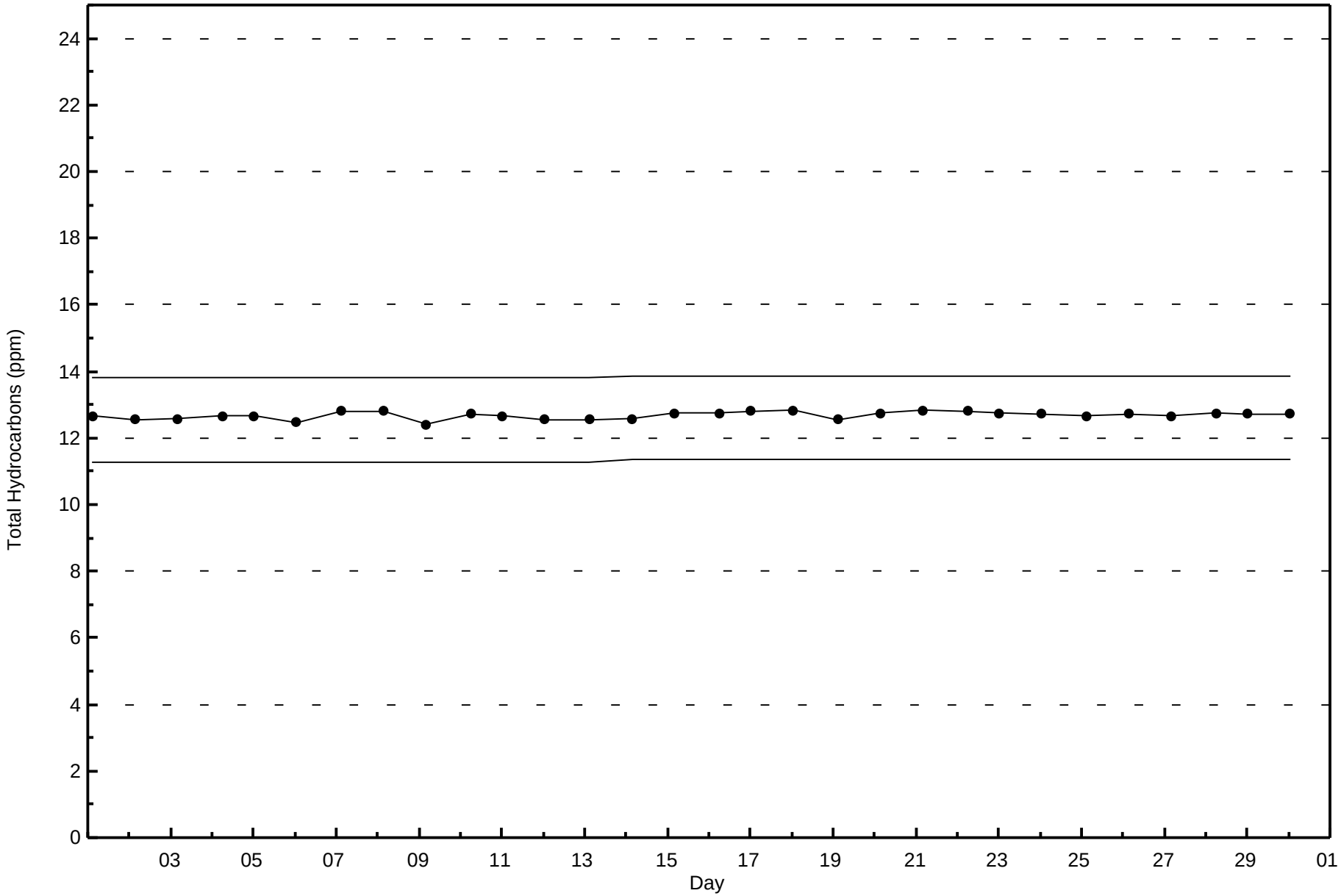


Wood Buffalo Environmental Association

Span Responses

Total Hydrocarbons (THC) - ppm

Mannix - April 2016



Maximum Value: 28.5 C on Apr 18 14:00

Maximum Daily Average: 17.6 C on Apr 18

Minimum Value: -10.7 C on Apr 4 06:00

Minimum Daily Average: -6.2 C on Apr 3

Maximum Diurnal Average: 8.9 C at hour 16

Minimum Diurnal Average: -0.1 C at hour 6

Monthly Average: 4.34 C

Percentiles: P_1 = -9.0 P_{10} = -5.0 Q_1 = -1.2 Median = 3.3 Q_3 = 8.8 P_{90} = 16.0 P_{99} = 22.8

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

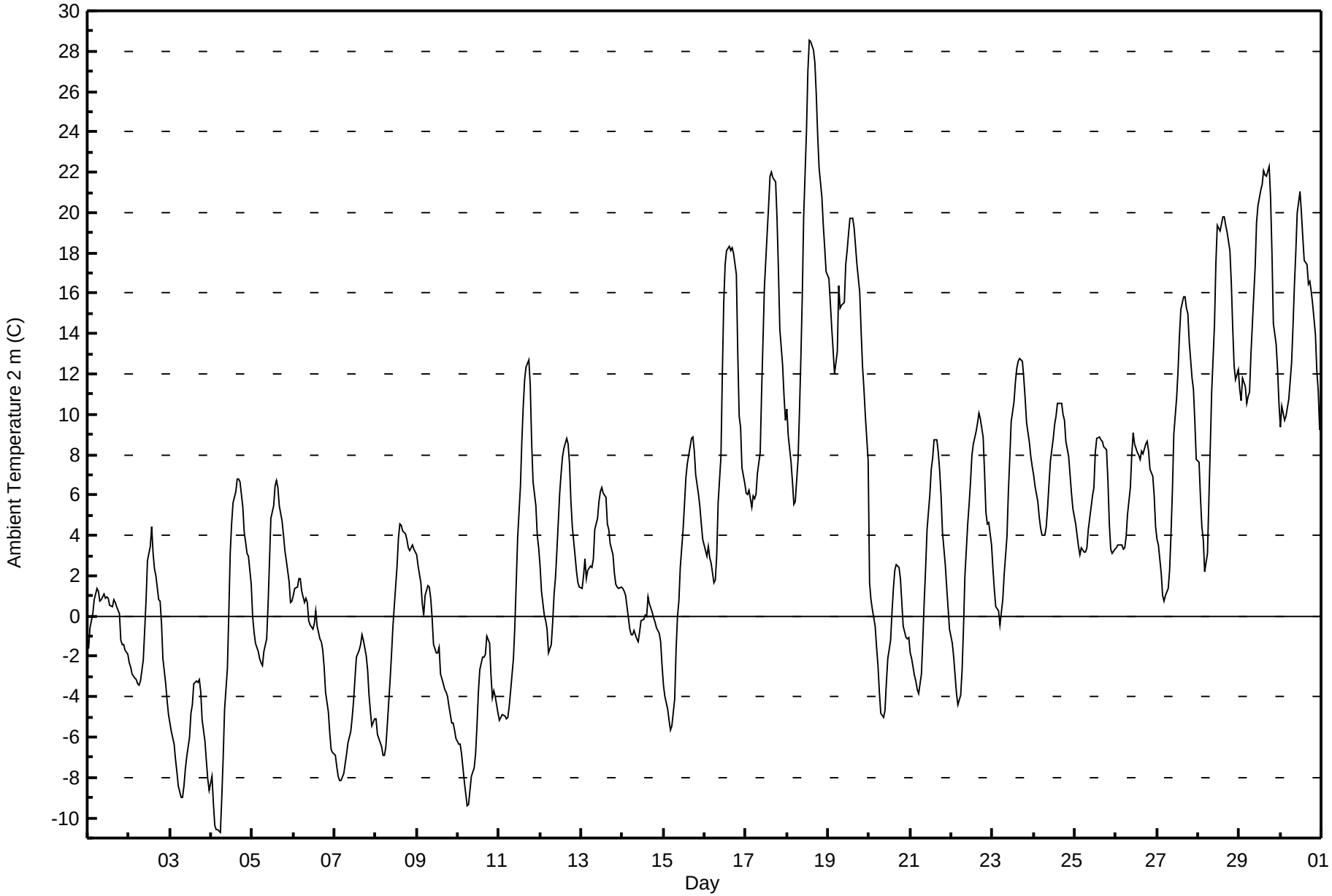
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	-1.6	-0.6	-0.2	0.1	0.8	1.4	1.2	0.8	0.8	1.1	0.9	1.0	0.9	0.5	0.5	0.8	0.7	0.4	0.1	-1.2	-1.4	-1.4	-1.7	-1.9	0.1	1.4
2-Apr	-2.3	-2.5	-2.8	-3.0	-3.2	-3.3	-3.4	-3.2	-2.2	-0.7	0.8	2.8	3.5	4.4	3.1	2.3	2.0	0.8	0.8	-0.4	-2.1	-3.4	-4.2	-4.9	-0.9	4.4
3-Apr	-5.3	-5.7	-6.4	-7.1	-7.7	-8.4	-9.0	-9.0	-8.4	-7.6	-7.0	-6.0	-4.8	-4.4	-3.4	-3.2	-3.3	-3.2	-3.8	-5.2	-6.2	-7.2	-8.1	-8.6	-6.2	-3.2
4-Apr	-7.9	-9.3	-10.4	-10.6	-10.6	-10.7	-9.0	-6.9	-4.6	-2.6	0.1	3.1	4.5	5.6	6.2	6.8	6.8	6.6	5.4	4.2	3.7	3.1	3.0	1.6	-0.9	6.8
5-Apr	0.0	-0.8	-1.3	-1.7	-2.1	-2.3	-2.4	-1.7	-1.1	0.6	2.7	4.8	5.5	6.4	6.7	6.4	5.4	4.7	4.0	3.3	2.8	1.7	0.7	0.8	1.8	6.7
6-Apr	1.0	1.4	1.5	1.9	1.9	1.2	0.7	0.9	0.7	-0.2	-0.5	-0.6	-0.4	0.2	-0.5	-1.1	-1.3	-1.7	-2.5	-3.7	-4.7	-5.8	-6.6	-6.8	-1.0	1.9
7-Apr	-6.9	-7.4	-8.0	-8.1	-8.2	-7.8	-7.3	-6.8	-6.3	-5.7	-5.0	-4.2	-3.1	-2.1	-1.7	-1.4	-0.9	-1.2	-2.0	-2.7	-3.9	-4.8	-5.5	-5.1	-4.8	-0.9
8-Apr	-5.1	-5.8	-6.1	-6.5	-6.9	-6.9	-6.5	-5.4	-3.2	-2.0	-0.6	0.5	2.5	3.9	4.6	4.5	4.2	4.1	3.8	3.4	3.2	3.5	3.3	3.2	-0.4	4.6
9-Apr	3.0	2.5	1.7	0.6	0.1	1.0	1.5	1.5	0.9	-0.1	-1.4	-1.8	-1.8	-1.6	-2.9	-3.4	-3.6	-3.8	-4.0	-4.5	-5.3	-5.3	-5.6	-6.1	-1.6	3.0
10-Apr	-6.4	-6.4	-6.8	-7.5	-8.2	-9.4	-9.3	-8.6	-7.9	-7.5	-6.8	-5.4	-3.7	-2.7	-2.0	-2.0	-1.9	-1.0	-1.4	-2.9	-4.0	-3.7	-4.0	-4.8	-5.2	-1.0
11-Apr	-5.2	-5.0	-4.9	-5.0	-5.1	-5.0	-4.5	-3.7	-2.1	-0.5	1.6	3.9	6.5	8.7	10.4	11.7	12.3	12.7	11.5	8.6	6.6	5.5	4.0	3.4	2.8	12.7
12-Apr	2.5	1.2	0.0	-0.3	-0.7	-1.8	-1.4	-0.3	1.1	1.9	3.2	6.1	7.1	7.9	8.3	8.8	8.6	7.5	5.7	4.5	3.0	2.2	1.6	1.4	3.3	8.8
13-Apr	1.4	2.0	2.8	1.9	2.3	2.5	2.4	2.8	4.3	4.8	5.6	6.2	6.4	6.1	5.9	4.6	4.3	3.6	3.0	2.2	1.6	1.5	1.4	1.4	3.4	6.4
14-Apr	1.4	1.2	1.0	-0.1	-0.7	-1.0	-0.9	-0.7	-1.1	-1.3	-0.8	-0.2	-0.2	0.0	0.0	1.0	0.6	0.2	-0.1	-0.3	-0.6	-0.9	-1.2	-2.4	-0.3	1.4
15-Apr	-3.4	-4.0	-4.6	-5.2	-5.6	-5.5	-4.1	-1.7	0.0	0.7	2.4	4.3	5.6	6.9	7.6	8.4	8.8	8.9	8.1	7.0	6.0	5.4	4.6	3.8	2.3	8.9
16-Apr	3.2	3.0	3.4	2.9	2.6	1.7	1.8	3.0	5.6	7.9	12.0	15.6	17.5	18.1	18.4	18.1	18.2	18.0	16.9	13.1	9.9	9.3	7.4	6.6	9.8	18.4
17-Apr	6.1	6.0	6.2	5.4	5.9	5.8	6.0	7.0	8.1	11.1	13.7	16.3	19.0	20.3	21.8	22.0	21.8	21.5	19.7	17.1	14.3	12.4	10.9	9.7	12.8	22.0
18-Apr	10.2	8.9	7.6	6.6	5.5	5.7	7.8	10.1	12.8	15.8	19.8	24.0	27.0	28.5	28.5	28.0	27.5	25.8	23.8	22.2	20.8	19.4	18.3	17.1	17.6	28.5
19-Apr	16.7	15.6	14.3	13.2	12.0	13.1	16.4	15.3	15.4	15.5	17.4	18.1	19.0	19.7	19.7	19.2	18.3	17.4	16.0	14.1	12.3	11.2	9.9	7.7	15.3	19.7
20-Apr	1.6	0.8	0.3	-0.5	-1.6	-2.4	-3.8	-4.8	-5.0	-4.7	-3.3	-2.1	-1.2	0.2	1.4	2.3	2.6	2.4	1.9	0.7	-0.5	-1.0	-1.1	-1.1	-0.8	2.6
21-Apr	-1.8	-2.1	-2.9	-3.2	-3.6	-3.8	-2.9	-1.1	0.8	2.4	4.3	6.1	7.3	7.9	8.7	8.8	8.1	7.2	6.0	4.2	2.6	1.4	0.4	-0.6	2.2	8.8
22-Apr	-1.3	-2.0	-2.9	-3.8	-4.4	-3.9	-2.6	-0.6	2.0	4.5	5.6	6.7	8.0	8.5	9.2	9.5	10.0	9.8	8.9	7.1	5.1	4.6	4.7	3.5	3.6	10.0
23-Apr	2.3	1.3	0.5	0.3	-0.4	0.2	0.8	2.1	4.0	6.1	7.9	9.6	10.6	11.6	12.3	12.7	12.7	12.6	11.8	10.8	9.6	8.6	7.9	7.4	6.8	12.7
24-Apr	7.0	6.4	5.7	4.9	4.3	4.0	4.0	4.4	5.4	6.6	7.7	8.8	9.5	9.9	10.5	10.6	10.5	10.0	9.7	8.7	7.9	7.0	6.1	5.3	7.3	10.6
25-Apr	4.5	4.0	3.4	3.1	3.4	3.2	3.2	3.4	4.3	5.4	5.9	6.4	8.1	8.8	8.9	8.8	8.7	8.4	8.3	6.7	4.6	3.3	3.1	3.3	5.5	8.9
26-Apr	3.4	3.5	3.5	3.5	3.3	3.4	3.9	5.1	6.4	8.0	9.1	8.6	8.1	8.0	7.8	8.2	8.0	8.5	8.7	8.2	7.3	6.9	6.0	4.5	6.3	9.1
27-Apr	3.8	3.5	2.1	1.0	0.8	1.0	1.4	2.2	4.1	6.2	9.0	10.8	12.1	13.9	15.2	15.8	15.8	15.3	15.0	13.6	11.8	11.3	9.6	7.8	8.5	15.8
28-Apr	7.6	5.9	4.4	3.8	2.2	3.1	5.8	8.4	11.1	14.4	17.5	19.4	19.2	19.1	19.8	19.8	19.3	19.0	18.1	16.5	14.3	12.4	11.7	12.2	12.7	19.8
29-Apr	11.3	10.7	11.8	11.4	10.6	10.9	11.1	13.0	15.9	17.3	19.5	20.3	21.1	21.4	22.1	21.9	21.8	22.3	20.7	18.0	14.5	13.5	12.2	10.5	16.0	22.3
30-Apr	9.3	10.4	9.7	9.9	10.3	10.8	12.5	14.4	16.4	18.1	20.0	21.1	20.0	18.7	17.6	17.4	16.5	16.6	16.1	15.5	14.0	12.2	11.2	9.3	14.5	21.1
	1.6	1.2	0.8	0.3	-0.1	-0.1	0.4	1.3	2.6	3.9	5.4	6.8	7.8	8.5	8.8	8.9	8.8	8.5	7.7	6.3	4.9	4.1	3.3	2.6	Diurnal Average	
	16.7	15.6	14.3	13.2	12.0	13.1	16.4	15.3	16.4	18.1	20.0	24.0	27.0	28.5	28.5	28.0	27.5	25.8	23.8	22.2	20.8	19.4	18.3	17.1	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature 2 m (AT2m) - C

Mannix - April 2016



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	225	31.25	31.25
0 - 10	342	47.50	78.75
10 - 20	128	17.78	96.53
> 20	25	3.47	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Maximum Value: 26.8 C on Apr 18 16:00

Maximum Daily Average: 17.6 C on Apr 18

Minimum Value: -10.1 C on Apr 10 08:00

Minimum Daily Average: -6.8 C on Apr 3

Maximum Diurnal Average: 8.1 C at hour 17

Minimum Diurnal Average: 0.1 C at hour 6

Monthly Average: 4.21 C

Percentiles: P_1 = -9.7 P_{10} = -5.1 Q_1 = -1.5 Median = 3.3 Q_3 = 8.6 P_{90} = 16.2 P_{99} = 23.7

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

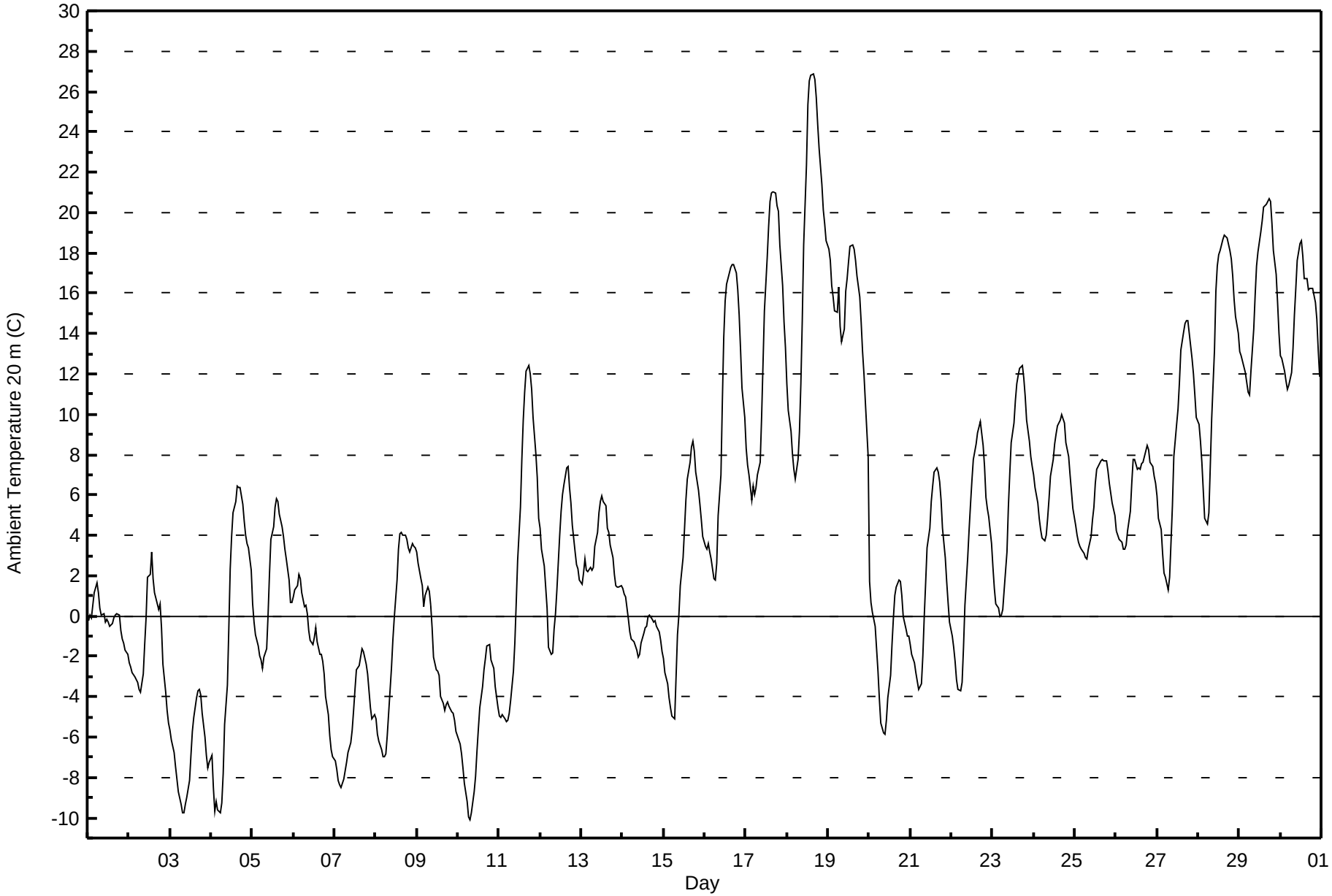
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	-0.3	0.0	-0.1	0.5	1.1	1.6	1.2	0.4	0.1	0.1	-0.3	-0.2	-0.3	-0.5	-0.4	-0.1	0.0	0.1	0.1	-0.7	-1.2	-1.3	-1.7	-1.9	-0.1	1.6
2-Apr	-2.3	-2.5	-2.8	-3.0	-3.1	-3.3	-3.6	-3.8	-2.8	-1.4	-0.1	1.9	2.1	3.2	1.8	1.1	0.9	0.3	0.6	-0.6	-2.4	-3.8	-4.7	-5.3	-1.4	3.2
3-Apr	-5.7	-6.1	-6.7	-7.5	-8.1	-8.7	-9.3	-9.7	-9.8	-9.3	-9.0	-8.2	-6.9	-5.7	-5.0	-4.1	-3.7	-3.6	-3.9	-4.8	-6.0	-6.9	-7.6	-7.2	-6.8	-3.6
4-Apr	-6.9	-8.5	-9.7	-9.2	-9.6	-9.8	-9.2	-7.8	-5.4	-3.4	-0.6	2.4	3.9	5.1	5.7	6.4	6.4	6.4	5.6	4.7	4.0	3.6	3.4	2.3	-0.8	6.4
5-Apr	0.6	-0.3	-0.9	-1.5	-2.0	-2.2	-2.6	-2.1	-1.6	0.0	2.0	3.8	4.4	5.4	5.8	5.7	5.0	4.4	3.9	3.3	2.8	1.8	0.7	0.7	1.6	5.8
6-Apr	1.0	1.3	1.5	2.0	1.8	1.1	0.5	0.5	0.1	-0.7	-1.2	-1.4	-1.1	-0.6	-1.3	-1.9	-1.9	-2.3	-2.8	-4.0	-4.9	-5.9	-6.6	-6.9	-1.4	2.0
7-Apr	-7.2	-7.6	-8.1	-8.4	-8.5	-8.1	-7.7	-7.3	-6.8	-6.3	-5.6	-4.7	-3.7	-2.7	-2.4	-2.1	-1.6	-1.8	-2.4	-2.8	-3.7	-4.5	-5.1	-4.9	-5.2	-1.6
8-Apr	-5.1	-5.8	-6.2	-6.6	-6.9	-7.0	-6.8	-5.9	-3.7	-2.6	-1.2	-0.1	1.8	3.3	4.1	4.2	4.0	4.0	3.8	3.4	3.2	3.6	3.4	3.4	-0.7	4.2
9-Apr	3.2	2.6	1.9	1.5	0.5	1.0	1.4	1.2	0.5	-0.6	-2.0	-2.7	-2.8	-2.9	-4.0	-4.3	-4.7	-4.4	-4.3	-4.5	-4.8	-4.8	-5.2	-5.7	-1.8	3.2
10-Apr	-6.2	-6.4	-6.8	-7.5	-8.3	-9.2	-10.0	-10.1	-9.8	-8.7	-7.9	-6.7	-5.6	-4.5	-3.5	-2.6	-2.1	-1.5	-1.4	-2.2	-2.4	-2.6	-3.5	-4.6	-5.6	-1.4
11-Apr	-4.9	-5.0	-4.9	-5.1	-5.2	-5.2	-4.8	-4.2	-2.8	-1.3	0.7	2.8	5.4	7.8	9.7	11.1	12.2	12.4	12.0	11.2	9.8	8.1	6.8	4.8	3.0	12.4
12-Apr	4.4	3.3	2.5	1.4	0.4	-1.5	-1.9	-1.9	-0.7	0.1	1.3	4.0	5.2	6.0	6.5	7.4	7.4	6.4	5.6	4.5	3.2	2.6	2.3	1.8	2.9	7.4
13-Apr	1.6	2.1	2.9	2.2	2.2	2.4	2.3	2.4	3.4	4.2	5.1	5.7	6.0	5.7	5.5	4.4	4.2	3.5	2.9	2.0	1.5	1.4	1.4	1.5	3.2	6.0
14-Apr	1.4	1.1	0.9	-0.2	-0.8	-1.1	-1.2	-1.3	-1.7	-2.0	-1.9	-1.3	-0.9	-0.5	-0.5	0.0	0.0	-0.2	-0.3	-0.2	-0.5	-0.8	-1.2	-1.7	-0.6	1.4
15-Apr	-2.1	-2.8	-3.4	-4.0	-4.6	-4.9	-5.1	-3.0	-0.9	0.1	1.5	2.9	4.3	5.7	6.8	7.7	8.4	8.7	8.2	7.1	6.2	5.5	4.8	3.9	2.1	8.7
16-Apr	3.4	3.3	3.6	3.2	2.8	1.9	1.8	2.6	5.0	7.0	10.6	13.8	15.6	16.4	17.0	17.3	17.4	17.4	17.0	16.1	14.9	13.2	11.3	9.8	10.1	17.4
17-Apr	8.3	7.5	7.0	5.8	6.4	6.0	6.4	7.0	7.6	9.8	12.5	15.1	17.8	19.3	20.6	20.9	21.1	21.0	20.3	20.1	18.4	16.3	14.6	13.3	13.5	21.1
18-Apr	11.5	10.2	9.1	8.0	7.2	6.8	7.7	9.1	11.5	14.6	18.4	22.4	25.3	26.5	26.8	26.8	26.6	25.7	24.4	23.2	21.4	20.1	19.4	18.6	17.6	26.8
19-Apr	18.2	17.6	16.4	15.8	15.1	15.1	16.3	14.4	13.6	14.3	16.1	16.7	17.5	18.3	18.4	18.2	17.6	16.8	15.8	14.6	13.1	12.0	10.6	7.9	15.4	18.4
20-Apr	1.7	0.7	0.2	-0.5	-1.6	-2.7	-4.1	-5.3	-5.8	-5.8	-5.2	-4.0	-2.9	-1.4	-0.1	1.0	1.5	1.8	1.7	1.0	0.0	-0.7	-1.0	-1.0	-1.4	1.8
21-Apr	-1.4	-1.9	-2.3	-2.8	-3.2	-3.6	-3.3	-1.9	0.0	1.6	3.4	4.3	5.7	6.5	7.1	7.4	7.1	6.7	5.8	4.4	2.9	1.7	0.7	-0.3	1.9	7.4
22-Apr	-1.0	-1.6	-2.2	-3.2	-3.7	-3.7	-3.3	-1.6	0.6	2.9	4.3	5.5	6.7	7.8	8.5	9.1	9.4	9.6	8.4	7.4	5.9	5.3	4.9	3.6	3.3	9.6
23-Apr	2.4	1.4	0.6	0.4	0.0	0.0	0.3	1.3	3.2	5.4	7.1	8.6	9.5	10.7	11.5	11.9	12.3	12.4	11.8	10.9	9.7	8.7	7.9	7.4	6.5	12.4
24-Apr	7.0	6.4	5.6	4.8	4.3	3.9	3.7	4.0	4.9	5.8	6.9	7.8	8.6	9.0	9.4	9.7	10.0	9.8	9.6	8.6	7.9	7.0	6.1	5.3	6.9	10.0
25-Apr	4.5	4.0	3.7	3.5	3.3	3.1	2.9	2.8	3.3	3.9	4.8	5.4	6.6	7.3	7.6	7.7	7.7	7.7	7.7	7.2	6.6	6.1	5.6	5.0	5.3	7.7
26-Apr	4.2	4.0	3.8	3.6	3.3	3.3	3.5	4.2	5.2	6.6	7.7	7.7	7.3	7.3	7.3	7.5	7.6	8.2	8.5	8.3	7.7	7.4	6.9	6.6	6.2	8.5
27-Apr	6.0	4.9	4.3	3.1	2.1	1.9	1.3	1.9	3.7	5.5	7.9	9.5	10.3	11.6	13.2	14.1	14.5	14.6	14.7	14.0	12.8	12.0	11.0	9.8	8.5	14.7
28-Apr	9.5	8.7	7.6	6.3	4.9	4.5	5.1	7.4	9.8	13.2	16.1	17.4	17.9	18.2	18.7	18.9	18.8	18.7	18.1	17.7	16.9	15.7	14.8	14.0	13.3	18.9
29-Apr	13.1	12.9	12.6	12.1	11.6	11.1	10.9	12.2	14.2	15.9	17.3	18.1	19.0	19.6	20.3	20.3	20.4	20.7	20.5	19.4	18.1	16.9	15.5	14.0	16.1	20.7
30-Apr	12.9	12.8	12.2	11.7	11.2	11.5	12.1	13.3	14.9	16.2	17.6	18.5	18.6	17.8	16.7	16.7	16.2	16.2	16.2	16.3	15.6	14.7	13.2	11.8	14.8	18.6
	2.4	1.9	1.4	0.9	0.4	0.1	0.1	0.6	1.7	2.8	4.2	5.5	6.5	7.3	7.7	8.0	8.1	8.0	7.6	6.9	5.9	5.1	4.3	3.5	Diurnal Average	
	18.2	17.6	16.4	15.8	15.1	15.1	16.3	14.4	14.9	16.2	18.4	22.4	25.3	26.5	26.8	26.8	26.6	25.7	24.4	23.2	21.4	20.1	19.4	18.6	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature 20 m (AT20m) - C

Mannix - April 2016



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	239	33.19	33.19
0 - 10	327	45.42	78.61
10 - 20	132	18.33	96.94
> 20	22	3.06	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Maximum Value: 26.3 C on Apr 18 16:00 | Maximum Daily Average: 17.8 C on Apr 18

Minimum Value: -10.5 C on Apr 10 08:00 | Minimum Daily Average: -7.1 C on Apr 3

Maximum Diurnal Average: 7.7 C at hour 17 | Minimum Diurnal Average: 0.1 C at hour 7

Monthly Average: 4.08 C | Percentiles: P_1 = -9.4 P_{10} = -5.3 Q_1 = -1.7 Median = 3.2 Q_3 = 8.6 P_{90} = 16.2 P_{99} = 24.0

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

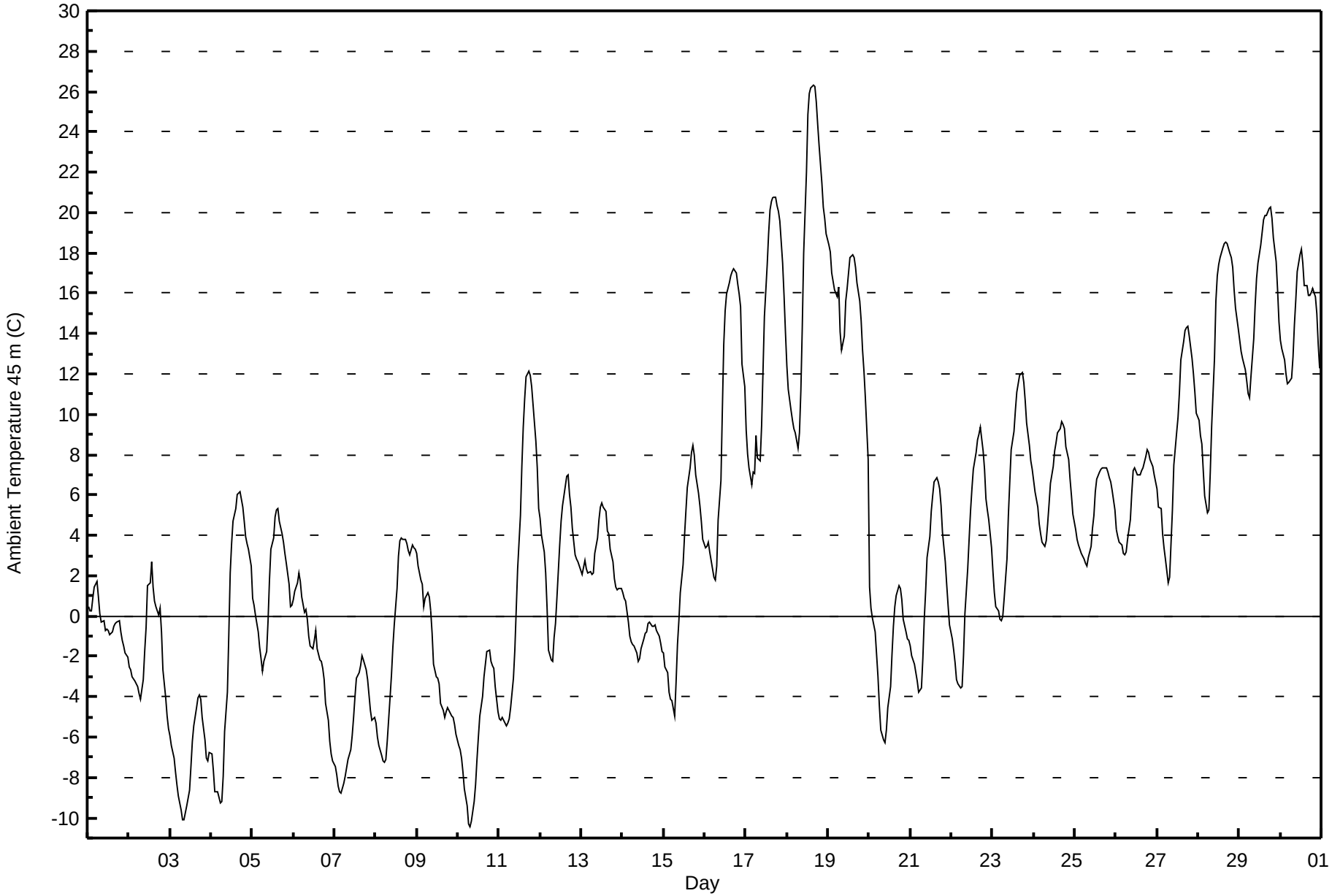
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	0.5	0.3	0.3	0.9	1.4	1.7	1.0	0.1	-0.3	-0.2	-0.7	-0.6	-0.7	-0.9	-0.8	-0.5	-0.4	-0.3	-0.2	-0.8	-1.2	-1.5	-1.8	-2.1	-0.3	1.7
2-Apr	-2.5	-2.7	-3.0	-3.2	-3.3	-3.5	-3.9	-4.1	-3.2	-1.8	-0.6	1.5	1.6	2.7	1.4	0.8	0.5	0.1	0.4	-0.8	-2.6	-4.0	-4.9	-5.5	-1.7	2.7
3-Apr	-5.9	-6.4	-7.0	-7.8	-8.4	-8.9	-9.6	-10.1	-10.1	-9.8	-9.4	-8.6	-7.4	-6.2	-5.5	-4.5	-4.1	-3.9	-4.1	-5.0	-6.2	-7.0	-7.2	-6.8	-7.1	-3.9
4-Apr	-6.8	-7.7	-8.7	-8.7	-8.7	-9.3	-9.2	-8.0	-5.7	-3.8	-0.9	2.1	3.6	4.7	5.3	6.0	6.1	6.1	5.4	4.7	3.9	3.6	3.3	2.5	-0.8	6.1
5-Apr	0.9	0.5	0.0	-0.8	-1.5	-2.1	-2.7	-2.2	-1.8	-0.3	1.8	3.3	3.9	4.9	5.3	5.3	4.7	4.1	3.7	3.1	2.6	1.5	0.5	0.5	1.5	5.3
6-Apr	0.8	1.2	1.7	2.1	1.7	0.9	0.2	0.3	-0.2	-1.0	-1.5	-1.6	-1.2	-0.7	-1.6	-2.2	-2.2	-2.6	-3.1	-4.3	-5.2	-6.2	-6.8	-7.2	-1.6	2.1
7-Apr	-7.4	-7.9	-8.4	-8.7	-8.8	-8.3	-8.0	-7.6	-7.1	-6.6	-5.9	-5.0	-4.0	-3.0	-2.8	-2.4	-2.0	-2.2	-2.7	-3.1	-3.9	-4.7	-5.2	-5.0	-5.4	-2.0
8-Apr	-5.3	-6.0	-6.4	-6.9	-7.2	-7.2	-7.1	-6.2	-4.0	-2.9	-1.6	-0.4	1.4	3.0	3.8	3.9	3.8	3.8	3.6	3.2	3.0	3.5	3.4	3.3	-0.9	3.9
9-Apr	3.1	2.5	1.8	1.6	0.5	0.9	1.2	1.0	0.2	-0.9	-2.4	-3.0	-3.1	-3.3	-4.3	-4.7	-5.0	-4.7	-4.5	-4.7	-4.9	-5.0	-5.4	-5.9	-2.0	3.1
10-Apr	-6.4	-6.6	-7.1	-7.8	-8.5	-9.4	-10.3	-10.5	-10.2	-9.2	-8.4	-7.1	-6.0	-5.0	-4.0	-3.0	-2.4	-1.8	-1.7	-2.2	-2.4	-2.6	-3.5	-4.7	-5.9	-1.7
11-Apr	-5.1	-5.1	-5.0	-5.3	-5.5	-5.3	-5.1	-4.5	-3.1	-1.7	0.3	2.4	5.0	7.4	9.4	10.7	11.8	12.1	11.9	11.4	10.5	8.6	7.3	5.4	2.9	12.1
12-Apr	4.8	4.0	3.2	2.1	0.4	-1.7	-2.2	-2.2	-1.1	-0.4	0.9	3.5	4.7	5.5	6.0	6.9	7.0	6.0	5.4	4.3	3.1	2.8	2.7	2.5	2.9	7.0
13-Apr	2.1	2.4	2.8	2.3	2.2	2.2	2.0	2.2	3.1	3.9	4.8	5.4	5.6	5.4	5.2	4.2	4.0	3.3	2.7	1.8	1.4	1.3	1.4	1.4	3.0	5.6
14-Apr	1.2	0.9	0.8	-0.3	-1.0	-1.3	-1.4	-1.5	-1.9	-2.2	-2.1	-1.6	-1.2	-0.9	-0.8	-0.4	-0.3	-0.5	-0.5	-0.5	-0.7	-1.0	-1.4	-1.8	-0.8	1.2
15-Apr	-1.8	-2.5	-2.8	-3.8	-4.1	-4.2	-4.9	-3.3	-1.4	-0.2	1.2	2.6	3.9	5.2	6.4	7.3	8.1	8.5	8.0	7.0	6.1	5.4	4.7	3.8	2.0	8.5
16-Apr	3.4	3.4	3.6	3.2	2.8	1.9	1.8	2.5	4.8	6.7	10.2	13.4	15.2	16.0	16.5	16.9	17.1	17.2	17.0	16.5	15.9	15.4	12.5	11.4	10.2	17.2
17-Apr	9.2	8.0	7.4	6.5	7.1	7.1	8.9	7.8	7.7	9.4	12.1	14.9	17.4	19.0	20.1	20.5	20.7	20.7	20.3	20.1	19.6	17.5	15.9	14.1	13.8	20.7
18-Apr	12.4	11.2	10.2	9.7	9.3	9.1	8.3	9.1	11.2	14.3	18.0	22.0	24.9	25.9	26.2	26.3	26.2	25.5	24.4	23.3	21.5	20.3	19.7	18.9	17.8	26.3
19-Apr	18.4	18.0	17.0	16.6	16.2	15.8	16.3	14.1	13.2	13.9	15.6	16.3	17.0	17.8	17.9	17.8	17.3	16.5	15.6	14.6	13.2	12.1	10.8	7.7	15.4	18.4
20-Apr	1.4	0.4	-0.1	-0.8	-1.9	-3.0	-4.5	-5.6	-6.1	-6.3	-5.7	-4.5	-3.5	-1.9	-0.5	0.5	1.1	1.5	1.4	0.8	-0.2	-0.8	-1.1	-1.2	-1.7	1.5
21-Apr	-1.5	-2.0	-2.4	-2.8	-3.2	-3.8	-3.6	-2.1	-0.2	1.2	2.9	3.9	5.2	5.9	6.6	6.8	6.6	6.3	5.5	4.2	2.7	1.6	0.5	-0.4	1.6	6.8
22-Apr	-1.1	-1.7	-2.3	-3.1	-3.3	-3.6	-3.5	-2.0	0.1	2.3	3.8	5.2	6.3	7.3	8.1	8.7	9.0	9.3	8.2	7.3	5.8	5.3	4.8	3.4	3.1	9.3
23-Apr	2.2	1.2	0.5	0.3	-0.2	-0.2	0.0	0.9	2.9	5.0	6.6	8.2	9.2	10.2	11.1	11.5	11.9	12.1	11.6	10.7	9.6	8.4	7.7	7.2	6.2	12.1
24-Apr	6.8	6.2	5.4	4.6	4.1	3.7	3.5	3.7	4.6	5.5	6.6	7.4	8.2	8.6	9.1	9.3	9.6	9.5	9.3	8.4	7.7	6.8	5.9	5.1	6.6	9.6
25-Apr	4.3	3.8	3.5	3.3	3.1	2.8	2.6	2.5	2.9	3.4	4.3	5.0	6.1	6.8	7.1	7.3	7.4	7.4	7.4	7.1	6.9	6.6	6.2	5.3	5.1	7.4
26-Apr	4.3	4.0	3.7	3.5	3.1	3.0	3.2	3.8	4.8	6.1	7.2	7.3	7.0	7.0	7.0	7.2	7.4	7.9	8.2	8.1	7.8	7.4	7.0	6.7	5.9	8.2
27-Apr	6.3	5.4	5.3	4.1	3.4	2.8	1.6	1.9	3.6	5.3	7.5	9.1	9.8	11.1	12.7	13.6	14.1	14.3	14.4	13.9	12.8	12.0	11.1	10.1	8.6	14.4
28-Apr	9.7	8.9	8.5	7.2	5.9	5.2	5.2	7.2	9.4	12.8	15.6	16.9	17.4	17.8	18.3	18.5	18.5	18.5	18.0	17.8	17.3	16.2	15.3	14.2	13.3	18.5
29-Apr	13.7	13.1	12.7	12.2	11.7	11.0	10.8	11.9	13.8	15.4	16.7	17.5	18.4	19.0	19.7	19.8	19.9	20.2	20.3	19.7	18.7	17.6	16.2	14.6	16.0	20.3
30-Apr	13.7	13.2	12.7	12.0	11.5	11.6	11.8	12.9	14.4	15.7	17.1	17.9	18.2	17.5	16.4	16.4	15.9	15.9	16.1	16.2	15.8	15.0	13.4	12.3	14.7	18.2
	2.5	2.0	1.6	1.1	0.6	0.3	0.1	0.4	1.3	2.5	3.8	5.1	6.1	6.9	7.3	7.6	7.7	7.7	7.4	6.8	6.0	5.2	4.4	3.7	Diurnal Average	
	18.4	18.0	17.0	16.6	16.2	15.8	16.3	14.1	14.4	15.7	18.0	22.0	24.9	25.9	26.2	26.3	26.2	25.5	24.4	23.3	21.5	20.3	19.7	18.9	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature 45 m (AT45m) - C

Mannix - April 2016



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	249	34.58	34.58
0 - 10	314	43.61	78.19
10 - 20	138	19.17	97.36
> 20	19	2.64	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Maximum Value: 26.0 C on Apr 18 16:00

Maximum Daily Average: 18.2 C on Apr 18

Minimum Value: -10.8 C on Apr 10 08:00

Minimum Daily Average: -7.3 C on Apr 3

Maximum Diurnal Average: 7.4 C at hour 17

Minimum Diurnal Average: 0.2 C at hour 7

Monthly Average: 3.95 C

Percentiles: P_1 = -9.8 P_{10} = -5.4 Q_1 = -1.9 Median = 3.0 Q_3 = 8.9 P_{90} = 16.0 P_{99} = 24.1

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

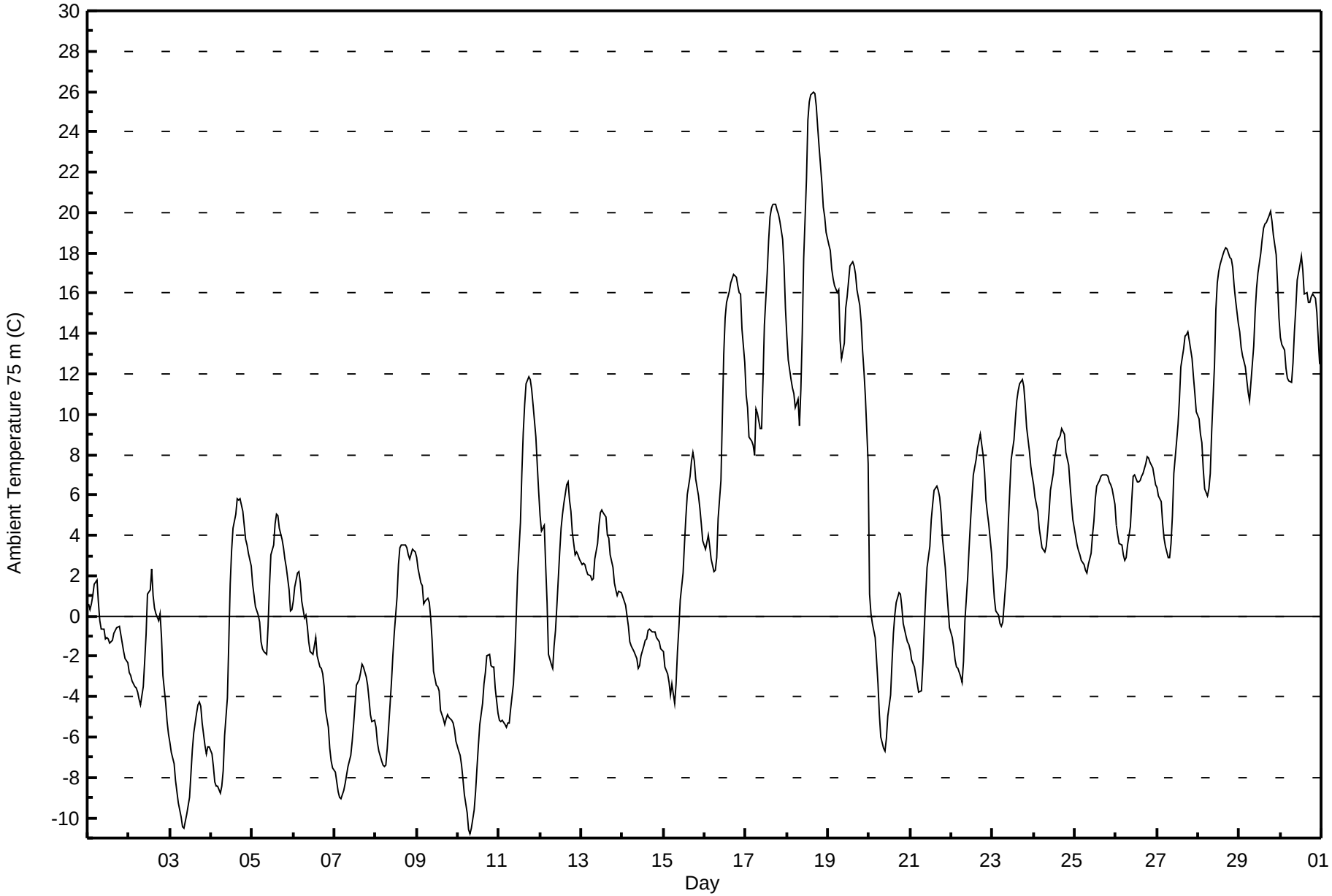
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	0.6	0.3	0.6	1.0	1.6	1.8	0.7	-0.2	-0.6	-0.6	-1.1	-1.0	-1.1	-1.3	-1.2	-0.9	-0.7	-0.6	-0.5	-0.9	-1.3	-1.7	-2.1	-2.3	-0.5	1.8
2-Apr	-2.8	-2.9	-3.2	-3.5	-3.6	-3.8	-4.2	-4.4	-3.5	-2.2	-0.9	1.1	1.3	2.3	1.0	0.4	0.1	-0.2	0.1	-1.1	-2.9	-4.3	-5.2	-5.9	-2.0	2.3
3-Apr	-6.3	-6.7	-7.3	-8.1	-8.7	-9.3	-10.0	-10.4	-10.5	-10.2	-9.8	-9.0	-7.8	-6.6	-5.8	-4.8	-4.4	-4.2	-4.4	-5.3	-6.4	-6.8	-6.5	-6.5	-7.3	-4.2
4-Apr	-6.9	-7.5	-8.2	-8.4	-8.4	-8.7	-8.5	-7.7	-6.0	-4.1	-1.3	1.6	3.3	4.4	5.1	5.8	5.7	5.8	5.2	4.5	3.8	3.5	3.1	2.5	-0.9	5.8
5-Apr	1.6	1.0	0.5	0.0	-0.3	-1.3	-1.6	-1.8	-1.9	-0.5	1.4	3.0	3.5	4.6	5.0	5.0	4.3	3.8	3.4	2.9	2.4	1.3	0.3	0.3	1.5	5.0
6-Apr	0.8	1.5	2.2	2.2	1.6	0.7	-0.1	0.0	-0.5	-1.3	-1.7	-1.9	-1.5	-1.1	-2.0	-2.5	-2.6	-2.9	-3.5	-4.7	-5.5	-6.5	-7.2	-7.5	-1.8	2.2
7-Apr	-7.8	-8.2	-8.7	-9.0	-9.1	-8.6	-8.3	-7.9	-7.5	-6.9	-6.2	-5.4	-4.4	-3.5	-3.2	-2.8	-2.4	-2.5	-3.0	-3.5	-4.1	-4.9	-5.2	-5.1	-5.8	-2.4
8-Apr	-5.5	-6.3	-6.7	-7.2	-7.4	-7.4	-7.4	-6.5	-4.4	-3.3	-1.9	-0.8	1.0	2.6	3.4	3.5	3.6	3.5	3.4	3.0	2.8	3.3	3.3	3.2	-1.2	3.6
9-Apr	2.9	2.3	1.7	1.5	0.6	0.7	0.9	0.6	-0.1	-1.2	-2.7	-3.4	-3.5	-3.7	-4.7	-5.1	-5.4	-5.1	-4.9	-5.0	-5.2	-5.3	-5.7	-6.2	-2.3	2.9
10-Apr	-6.7	-6.9	-7.4	-8.1	-8.9	-9.7	-10.6	-10.8	-10.5	-9.6	-8.7	-7.5	-6.4	-5.4	-4.3	-3.4	-2.8	-2.0	-1.9	-2.5	-2.5	-2.5	-3.6	-4.8	-6.1	-1.9
11-Apr	-5.2	-5.2	-5.1	-5.4	-5.5	-5.3	-5.3	-4.6	-3.3	-2.0	0.0	2.0	4.7	7.0	9.0	10.5	11.5	11.9	11.7	11.3	10.5	8.9	7.5	6.1	2.7	11.9
12-Apr	5.0	4.2	4.5	2.5	0.7	-1.9	-2.4	-2.6	-1.5	-0.7	0.5	3.1	4.3	5.1	5.6	6.5	6.6	5.7	5.2	4.2	3.1	3.2	3.1	2.8	2.8	6.6
13-Apr	2.6	2.6	2.6	2.3	2.1	2.0	1.8	1.9	2.8	3.6	4.5	5.1	5.3	5.1	4.9	4.0	3.9	3.0	2.4	1.7	1.3	1.1	1.2	1.2	2.9	5.3
14-Apr	0.9	0.7	0.6	-0.5	-1.3	-1.5	-1.6	-1.8	-2.1	-2.6	-2.5	-2.0	-1.5	-1.2	-1.1	-0.7	-0.6	-0.8	-0.8	-0.8	-1.0	-1.3	-1.6	-1.7	-1.1	0.9
15-Apr	-1.7	-2.5	-2.9	-3.3	-3.9	-3.3	-4.3	-3.3	-1.7	-0.6	0.8	2.1	3.6	4.9	6.0	6.9	7.7	8.1	7.7	6.8	6.0	5.3	4.6	3.7	1.9	8.1
16-Apr	3.3	3.7	4.0	3.5	2.9	2.2	2.3	2.9	4.8	6.7	9.9	13.0	14.8	15.6	16.1	16.5	16.7	16.9	16.8	16.4	16.0	16.0	14.2	12.5	10.3	16.9
17-Apr	11.0	10.3	8.9	8.7	8.5	8.0	10.3	10.0	9.3	9.3	11.7	14.4	17.0	18.6	19.8	20.2	20.4	20.4	20.1	19.9	19.6	18.7	17.3	15.3	14.5	20.4
18-Apr	13.9	12.7	11.7	11.3	11.0	10.4	10.7	9.4	11.2	14.0	17.7	21.7	24.6	25.5	25.8	26.0	25.9	25.3	24.3	23.3	21.5	20.3	19.8	19.0	18.2	26.0
19-Apr	18.4	18.1	17.2	16.7	16.3	16.0	16.2	13.7	12.8	13.5	15.2	15.8	16.6	17.4	17.6	17.4	16.9	16.2	15.4	14.5	13.2	12.1	10.9	7.5	15.2	18.4
20-Apr	1.1	0.1	-0.4	-1.1	-2.2	-3.4	-4.9	-6.0	-6.5	-6.7	-6.1	-5.0	-3.9	-2.3	-0.9	0.1	0.7	1.2	1.1	0.5	-0.4	-1.0	-1.3	-1.4	-2.0	1.2
21-Apr	-1.7	-2.2	-2.5	-2.9	-3.3	-3.8	-3.7	-2.4	-0.6	0.9	2.4	3.5	4.8	5.6	6.2	6.4	6.2	5.9	5.1	3.9	2.4	1.4	0.4	-0.6	1.3	6.4
22-Apr	-1.1	-1.5	-2.2	-2.5	-2.6	-3.0	-3.3	-2.2	-0.2	1.9	3.4	4.7	5.9	7.0	7.7	8.4	8.7	9.0	8.0	7.1	5.7	5.1	4.6	3.1	3.0	9.0
23-Apr	1.9	0.9	0.3	0.1	-0.4	-0.5	-0.3	0.6	2.4	4.6	6.2	7.7	8.7	9.8	10.7	11.2	11.5	11.7	11.3	10.5	9.4	8.2	7.4	7.0	5.9	11.7
24-Apr	6.5	5.9	5.2	4.4	3.9	3.4	3.2	3.4	4.2	5.1	6.2	7.0	7.9	8.3	8.7	9.0	9.3	9.2	9.0	8.1	7.5	6.5	5.6	4.8	6.3	9.3
25-Apr	4.0	3.5	3.2	3.1	2.8	2.5	2.3	2.1	2.5	3.1	4.0	4.7	5.8	6.5	6.7	6.9	7.0	7.0	7.0	6.9	6.7	6.5	6.3	5.5	4.9	7.0
26-Apr	4.5	4.0	3.6	3.5	3.0	2.8	2.9	3.5	4.4	5.8	6.9	7.0	6.6	6.7	6.7	6.9	7.0	7.6	7.9	7.8	7.7	7.4	6.9	6.5	5.7	7.9
27-Apr	6.3	6.0	5.7	4.6	3.9	3.4	2.9	2.9	3.6	5.0	7.1	8.6	9.5	10.7	12.3	13.3	13.8	13.9	14.1	13.7	12.8	11.9	11.0	10.1	8.6	14.1
28-Apr	9.8	9.0	8.6	7.3	6.3	6.0	6.3	7.1	9.2	12.4	15.2	16.5	17.1	17.4	17.9	18.1	18.2	18.2	17.8	17.7	17.3	16.4	15.7	14.5	13.3	18.2
29-Apr	14.1	13.3	12.9	12.3	11.7	11.1	10.7	11.6	13.4	15.1	16.3	17.0	18.0	18.7	19.3	19.5	19.5	19.8	20.0	19.6	18.9	17.9	16.5	14.8	15.9	20.0
30-Apr	13.8	13.5	13.2	12.3	11.8	11.6	11.6	12.6	14.1	15.3	16.7	17.5	17.9	17.2	16.0	16.0	15.6	15.6	15.8	16.0	15.8	15.0	13.8	12.5	14.6	17.9
	2.6	2.1	1.7	1.2	0.8	0.4	0.2	0.3	1.1	2.1	3.4	4.7	5.7	6.5	6.9	7.3	7.4	7.4	7.1	6.5	5.8	5.2	4.5	3.7	Diurnal Average	
	18.4	18.1	17.2	16.7	16.3	16.0	16.2	13.7	14.1	15.3	17.7	21.7	24.6	25.5	25.8	26.0	25.9	25.3	24.3	23.3	21.5	20.3	19.8	19.0	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature 75 m (AT75m) - C

Mannix - April 2016



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	254	35.28	35.28
0 - 10	303	42.08	77.36
10 - 20	147	20.42	97.78
> 20	16	2.22	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Maximum Value: 25.8 C on Apr 18 16:00

Maximum Daily Average: 18.4 C on Apr 18

Minimum Value: -11.0 C on Apr 10 08:00

Minimum Daily Average: -7.4 C on Apr 3

Maximum Diurnal Average: 7.3 C at hour 17

Minimum Diurnal Average: 0.2 C at hour 7

Monthly Average: 3.91 C

Percentiles: P_1 = -10.0 P_{10} = -5.5 Q_1 = -2.0 Median = 3.0 Q_3 = 8.9 P_{90} = 16.0 P_{99} = 24.0

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

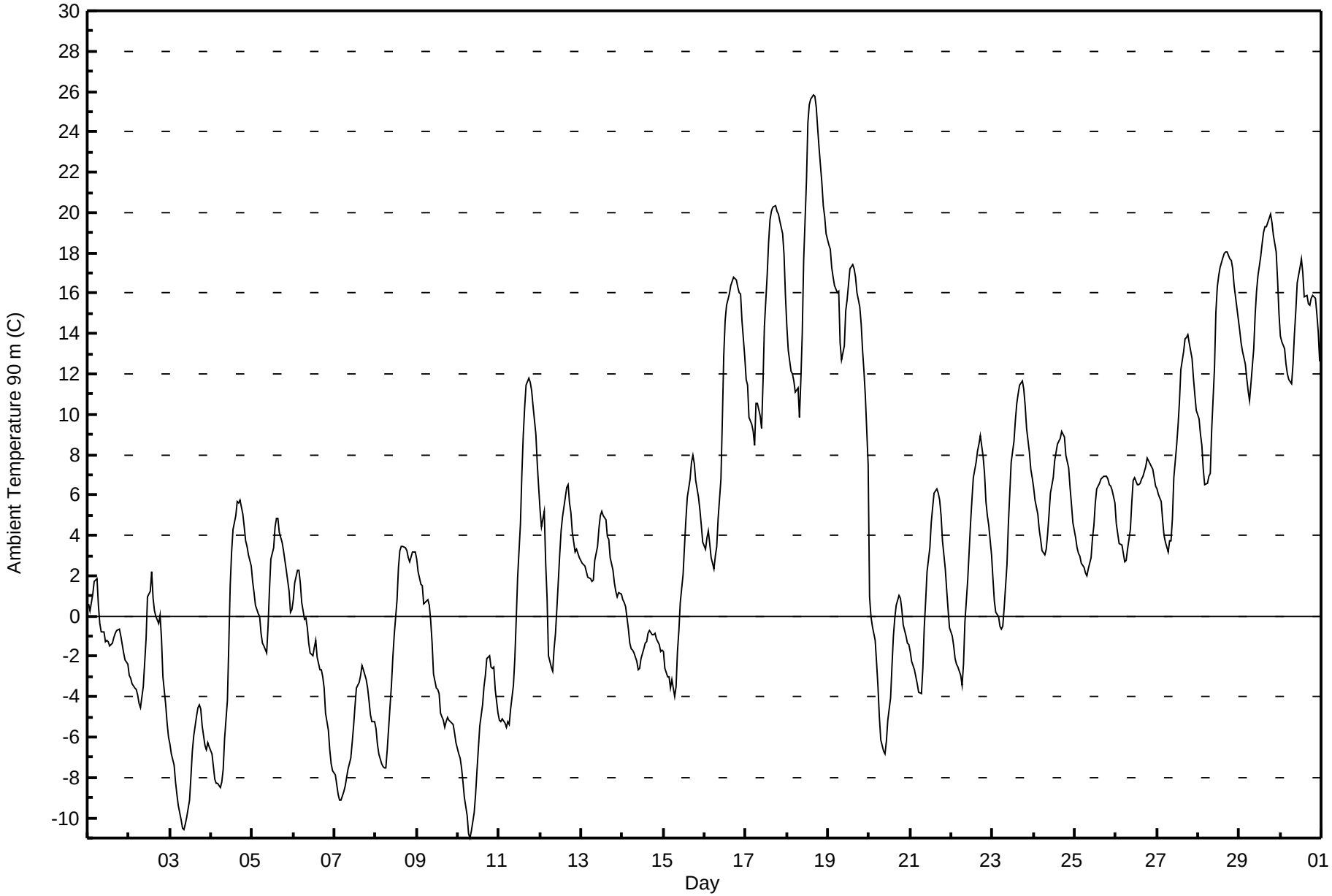
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	0.6	0.3	0.7	1.1	1.7	1.8	0.6	-0.3	-0.8	-0.8	-1.3	-1.2	-1.3	-1.5	-1.3	-1.0	-0.9	-0.7	-0.7	-1.0	-1.4	-1.8	-2.2	-2.4	-0.6	1.8
2-Apr	-2.9	-3.0	-3.3	-3.6	-3.7	-3.9	-4.3	-4.5	-3.5	-2.3	-1.1	0.9	1.2	2.2	0.9	0.2	0.0	-0.3	0.1	-1.2	-3.0	-4.4	-5.3	-6.0	-2.1	2.2
3-Apr	-6.4	-6.8	-7.4	-8.2	-8.9	-9.4	-10.1	-10.5	-10.6	-10.3	-10.0	-9.1	-7.9	-6.7	-5.9	-5.0	-4.5	-4.4	-4.6	-5.4	-6.4	-6.6	-6.3	-6.5	-7.4	-4.4
4-Apr	-6.9	-7.5	-8.1	-8.3	-8.3	-8.5	-8.2	-7.6	-6.1	-4.2	-1.4	1.5	3.1	4.3	5.0	5.7	5.6	5.7	5.1	4.5	3.7	3.5	3.0	2.5	-0.9	5.7
5-Apr	1.7	1.2	0.5	0.1	0.0	-0.8	-1.4	-1.5	-1.8	-0.5	1.3	2.8	3.4	4.4	4.8	4.8	4.2	3.6	3.3	2.8	2.3	1.2	0.2	0.3	1.5	4.8
6-Apr	0.8	1.6	2.3	2.3	1.7	0.7	-0.2	-0.1	-0.6	-1.4	-1.8	-2.0	-1.6	-1.2	-2.1	-2.6	-2.7	-3.0	-3.6	-4.8	-5.6	-6.7	-7.3	-7.6	-1.9	2.3
7-Apr	-7.9	-8.3	-8.9	-9.2	-9.2	-8.7	-8.4	-8.0	-7.6	-7.0	-6.3	-5.5	-4.5	-3.6	-3.3	-2.9	-2.5	-2.7	-3.1	-3.6	-4.2	-4.9	-5.2	-5.2	-5.9	-2.5
8-Apr	-5.6	-6.4	-6.8	-7.3	-7.5	-7.5	-7.5	-6.6	-4.5	-3.4	-2.0	-0.9	0.8	2.4	3.2	3.4	3.4	3.4	3.3	2.9	2.7	3.2	3.2	3.2	-1.3	3.4
9-Apr	2.8	2.2	1.6	1.5	0.6	0.7	0.8	0.5	-0.2	-1.3	-2.8	-3.6	-3.6	-3.9	-4.8	-5.2	-5.5	-5.2	-5.0	-5.1	-5.3	-5.4	-5.8	-6.3	-2.4	2.8
10-Apr	-6.8	-7.0	-7.5	-8.2	-9.0	-9.9	-10.8	-11.0	-10.6	-9.7	-8.9	-7.7	-6.5	-5.5	-4.4	-3.5	-2.9	-2.1	-2.0	-2.6	-2.6	-2.5	-3.6	-4.8	-6.3	-2.0
11-Apr	-5.1	-5.2	-5.1	-5.3	-5.5	-5.2	-5.4	-4.6	-3.4	-2.1	-0.2	1.9	4.5	7.0	8.9	10.4	11.4	11.8	11.6	11.2	10.4	9.0	7.6	6.3	2.7	11.8
12-Apr	5.3	4.4	5.2	2.6	0.9	-2.0	-2.5	-2.7	-1.6	-0.8	0.4	3.0	4.2	4.9	5.4	6.4	6.5	5.6	5.1	4.1	3.2	3.3	3.1	2.9	2.8	6.5
13-Apr	2.6	2.6	2.5	2.2	2.0	1.9	1.7	1.8	2.7	3.4	4.4	5.0	5.2	5.0	4.8	3.9	3.8	2.9	2.3	1.6	1.3	1.0	1.1	1.1	2.8	5.2
14-Apr	0.8	0.7	0.5	-0.6	-1.4	-1.6	-1.7	-1.8	-2.2	-2.7	-2.6	-2.1	-1.6	-1.3	-1.3	-0.8	-0.7	-0.9	-0.9	-0.9	-1.1	-1.4	-1.7	-1.7	-1.2	0.8
15-Apr	-1.8	-2.6	-3.0	-3.0	-3.5	-3.2	-4.0	-3.5	-1.7	-0.7	0.7	2.1	3.5	4.8	5.9	6.8	7.6	8.0	7.5	6.7	5.9	5.3	4.5	3.7	1.9	8.0
16-Apr	3.3	3.9	4.2	3.6	2.9	2.3	2.9	3.4	4.8	6.8	9.7	12.9	14.6	15.4	15.9	16.4	16.6	16.8	16.7	16.3	16.0	16.0	14.6	12.8	10.4	16.8
17-Apr	11.7	11.5	9.9	9.5	9.2	8.5	10.6	10.6	9.9	9.3	11.6	14.3	16.9	18.5	19.6	20.0	20.3	20.3	20.0	19.9	19.6	19.0	17.9	15.9	14.8	20.3
18-Apr	14.3	13.2	12.1	12.0	11.6	11.1	11.3	9.8	11.7	14.0	17.6	21.6	24.4	25.3	25.6	25.8	25.8	25.2	24.2	23.2	21.4	20.3	19.8	19.0	18.4	25.8
19-Apr	18.4	18.2	17.2	16.8	16.4	16.0	16.1	13.5	12.7	13.4	15.1	15.7	16.5	17.2	17.4	17.2	16.8	16.1	15.3	14.5	13.2	12.1	10.9	7.5	15.2	18.4
20-Apr	1.0	0.0	-0.5	-1.2	-2.3	-3.5	-5.0	-6.1	-6.7	-6.8	-6.2	-5.1	-4.1	-2.5	-1.0	-0.1	0.5	1.0	0.9	0.4	-0.4	-1.0	-1.3	-1.4	-2.1	1.0
21-Apr	-1.7	-2.2	-2.6	-3.0	-3.4	-3.8	-3.8	-2.6	-0.6	0.7	2.2	3.4	4.6	5.4	6.1	6.3	6.1	5.8	5.0	3.7	2.3	1.3	0.3	-0.6	1.2	6.3
22-Apr	-1.0	-1.5	-2.1	-2.4	-2.5	-3.0	-3.4	-2.4	-0.3	1.8	3.2	4.5	5.7	6.8	7.6	8.2	8.5	8.9	7.9	7.1	5.7	5.0	4.5	3.0	2.9	8.9
23-Apr	1.8	0.8	0.2	0.0	-0.5	-0.6	-0.5	0.4	2.5	4.6	6.1	7.6	8.7	9.7	10.5	11.0	11.4	11.6	11.2	10.4	9.3	8.1	7.3	6.9	5.8	11.6
24-Apr	6.4	5.8	5.1	4.3	3.8	3.3	3.0	3.3	4.1	5.0	6.1	6.9	7.7	8.1	8.5	8.8	9.1	9.0	8.9	8.0	7.4	6.4	5.5	4.6	6.2	9.1
25-Apr	3.8	3.4	3.1	3.0	2.7	2.4	2.1	2.0	2.4	2.9	3.8	4.5	5.6	6.3	6.6	6.8	6.9	6.9	6.9	6.8	6.5	6.4	6.3	5.6	4.7	6.9
26-Apr	4.5	4.1	3.6	3.5	3.1	2.7	2.8	3.3	4.3	5.6	6.7	6.9	6.5	6.5	6.6	6.8	6.9	7.4	7.8	7.7	7.6	7.3	6.9	6.4	5.6	7.8
27-Apr	6.3	6.0	5.7	4.8	4.0	3.7	3.2	3.7	3.7	4.9	6.9	8.5	9.4	10.6	12.2	13.1	13.7	13.8	13.9	13.5	12.8	11.8	11.0	10.2	8.6	13.9
28-Apr	9.8	9.0	8.5	7.3	6.5	6.6	6.9	7.1	9.2	12.3	15.0	16.3	16.9	17.3	17.8	18.0	18.1	18.1	17.7	17.6	17.2	16.4	15.9	14.7	13.3	18.1
29-Apr	14.2	13.5	13.1	12.5	11.8	11.2	10.7	11.5	13.3	14.9	16.1	16.9	17.8	18.5	19.1	19.3	19.3	19.7	19.9	19.5	18.9	18.1	16.7	15.0	15.9	19.9
30-Apr	13.8	13.6	13.3	12.5	12.0	11.7	11.5	12.5	13.9	15.1	16.5	17.3	17.7	17.0	15.9	15.9	15.4	15.4	15.7	15.9	15.7	15.0	14.1	12.6	14.6	17.7
	2.6	2.2	1.8	1.3	0.8	0.4	0.2	0.3	1.1	2.0	3.3	4.6	5.6	6.4	6.8	7.1	7.3	7.3	7.0	6.5	5.8	5.2	4.5	3.7	Diurnal Average	
	18.4	18.2	17.2	16.8	16.4	16.0	16.1	13.5	13.9	15.1	17.6	21.6	24.4	25.3	25.6	25.8	25.8	25.2	24.2	23.2	21.4	20.3	19.8	19.0	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature 90 m (AT90m) - C

Mannix - April 2016



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	259	35.97	35.97
0 - 10	298	41.39	77.36
10 - 20	148	20.56	97.92
> 20	15	2.08	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Mannix - April 2016

Maximum Value: 98 % on Apr 27 08:00

Maximum Daily Average: 91.6 % on Apr 6

Minimum Value: 12 % on Apr 19 14:00

Minimum Daily Average: 22.1 % on Apr 19

Maximum Diurnal Average: 68.3 % at hour 6

Minimum Diurnal Average: 42.4 % at hour 14

Monthly Average: 54.8 %

Percentiles: $P_1 = 15$ $P_{10} = 24$ $Q_1 = 37$ Median = 54 $Q_3 = 72$ $P_{90} = 87$ $P_{99} = 97$

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

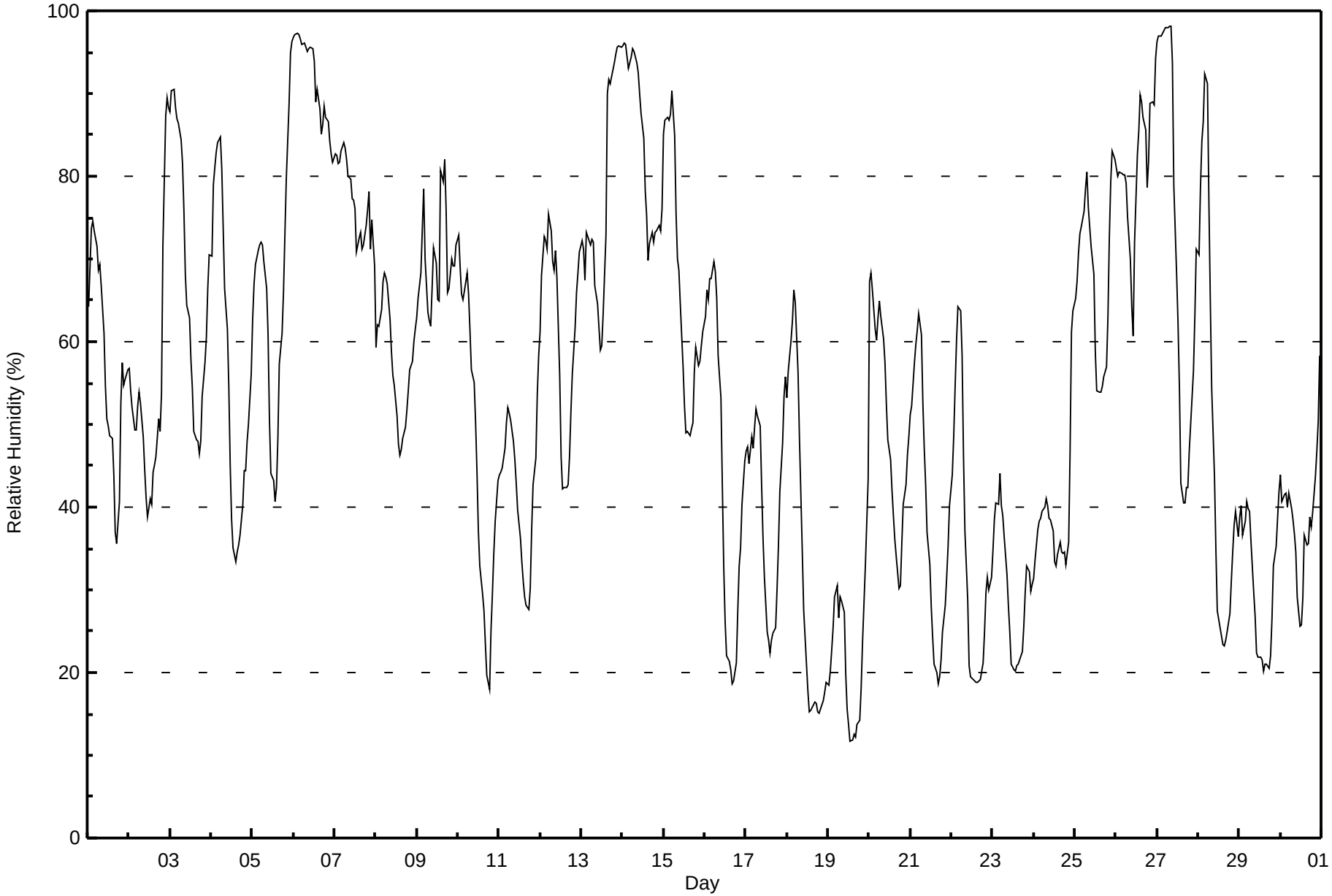
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	64	69	74	75	73	71	69	69	67	61	55	51	50	49	48	44	37	36	41	52	58	55	55	57	57.4	75
2-Apr	57	54	52	49	49	52	54	52	48	45	41	39	41	40	44	45	46	51	49	54	72	87	89	88	54.2	89
3-Apr	88	90	91	88	87	86	84	82	76	68	64	63	58	54	49	48	48	46	48	53	58	60	67	71	67.8	91
4-Apr	70	79	81	83	84	85	81	74	66	62	55	45	39	35	33	35	35	37	40	44	44	48	50	56	56.7	85
5-Apr	63	67	69	71	72	72	72	70	66	61	50	44	43	41	42	48	57	61	66	73	80	89	95	96	65.3	96
6-Apr	97	97	97	97	97	96	96	96	95	95	96	95	94	89	90	88	85	86	88	87	87	84	83	82	91.6	97
7-Apr	83	83	82	82	83	84	83	82	80	80	77	77	76	71	73	73	71	72	74	76	78	71	75	69	77.3	84
8-Apr	59	62	62	64	67	68	68	67	63	59	56	55	51	48	46	47	48	50	52	54	57	58	60	62	57.6	68
9-Apr	63	65	68	73	78	70	64	63	62	66	71	70	65	65	81	79	82	76	66	66	70	69	69	72	69.8	82
10-Apr	73	69	66	65	66	68	66	61	57	55	50	44	37	33	30	28	23	20	18	25	30	34	38	43	45.8	73
11-Apr	44	44	45	47	50	52	51	51	48	46	43	40	36	33	31	29	28	28	30	37	43	46	54	58	42.3	58
12-Apr	61	68	73	72	71	75	73	70	69	71	68	56	46	42	42	42	43	46	52	56	62	66	68	71	61.0	75
13-Apr	72	71	67	73	73	72	72	72	67	65	62	59	59	63	73	90	92	91	93	94	95	96	96	96	77.6	96
14-Apr	96	96	96	93	94	94	95	95	94	93	90	88	84	78	75	70	72	73	72	73	73	74	73	76	84.1	96
15-Apr	85	87	87	87	87	90	85	75	70	69	65	57	52	49	49	49	49	50	56	59	57	58	60	61	66.4	90
16-Apr	63	66	65	68	68	70	69	65	58	53	43	33	26	22	21	20	19	19	21	27	33	35	40	46	43.8	70
17-Apr	47	47	45	48	47	50	52	51	50	43	36	32	25	24	22	24	25	25	30	35	42	48	53	56	39.9	56
18-Apr	53	57	60	62	66	65	56	48	41	35	28	21	18	15	15	16	17	16	15	15	16	17	18	19	32.9	66
19-Apr	18	20	23	25	29	30	27	29	29	27	20	16	14	12	12	13	12	14	14	18	24	28	33	43	22.1	43
20-Apr	67	68	66	62	60	63	65	63	60	58	52	48	46	42	39	36	34	30	30	36	40	43	46	48	50.2	68
21-Apr	51	52	57	60	61	63	61	53	47	43	37	33	28	24	21	20	19	20	21	25	28	32	35	40	38.8	63
22-Apr	44	48	54	60	64	64	58	46	37	29	21	20	19	19	19	19	19	19	21	25	30	32	30	31	34.5	64
23-Apr	35	38	40	40	44	40	39	36	32	28	25	21	20	20	21	21	22	23	26	30	33	32	30	31	30.3	44
24-Apr	31	34	37	38	39	39	40	41	40	39	39	37	33	33	34	36	35	34	35	33	36	47	61	64	38.9	64
25-Apr	65	67	71	73	74	76	78	80	76	71	70	68	59	54	54	54	55	56	57	63	72	79	83	82	68.3	83
26-Apr	81	80	80	80	80	80	79	75	70	64	61	72	82	85	90	89	87	86	79	82	89	89	89	94	81.0	94
27-Apr	96	97	97	97	98	98	98	98	98	94	79	68	62	54	43	41	40	42	42	47	53	56	63	71	72.2	98
28-Apr	71	79	84	87	92	91	77	65	54	44	35	28	26	25	23	23	24	25	27	31	35	38	39	36	48.3	92
29-Apr	39	40	37	38	41	40	39	36	30	27	22	22	22	22	20	21	21	20	22	26	33	35	39	42	30.6	42
30-Apr	44	41	42	42	40	42	40	38	37	35	29	26	26	29	37	35	36	39	38	39	44	47	50	58	38.8	58
	62.7	64.5	65.6	66.7	67.9	68.3	66.4	63.5	59.6	56.1	51.3	47.5	44.7	42.4	42.6	42.8	42.7	43.0	44.1	47.9	52.3	55.1	58.0	60.7	Diurnal Average	
	97	97	97	97	98	98	98	98	98	95	96	95	94	89	90	90	92	91	93	94	95	96	96	96	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity (RH) - %

Mannix - April 2016



Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	37	5.14	5.14
20 - 40	174	24.17	29.31
40 - 60	197	27.36	56.67
60 - 80	195	27.08	83.75
80 - 100	117	16.25	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity 20m (RH20m) - %

Mannix - April 2016

Maximum Value: 98 % on Apr 27 09:00

Maximum Daily Average: 90.5 % on Apr 6

Minimum Value: 12 % on Apr 19 14:00

Minimum Daily Average: 21.0 % on Apr 19

Maximum Diurnal Average: 66.2 % at hour 6

Minimum Diurnal Average: 42.9 % at hour 18

Monthly Average: 53.8 %

Percentiles: $P_1 = 14$ $P_{10} = 24$ $Q_1 = 36$ Median = 53 $Q_3 = 70$ $P_{90} = 85$ $P_{99} = 96$

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

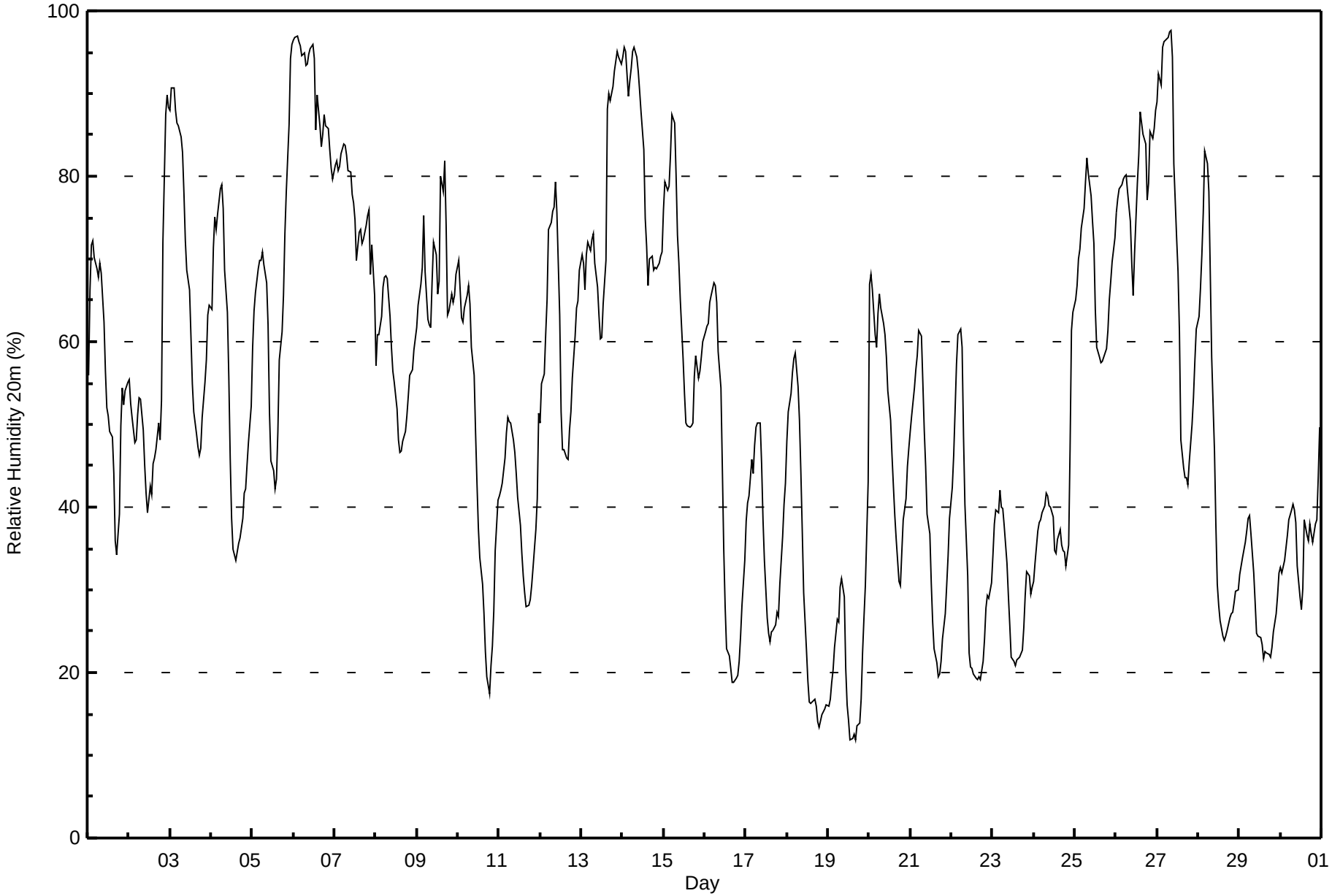
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	56	66	72	72	70	69	68	70	68	62	57	52	51	49	49	44	36	34	39	50	54	52	54	55	56.2	72
2-Apr	55	53	51	48	48	51	53	53	49	45	42	39	42	42	45	46	47	50	48	53	72	87	90	88	54.1	90
3-Apr	88	91	91	88	86	86	85	83	78	72	69	66	61	55	52	49	47	46	47	51	55	58	63	64	67.9	91
4-Apr	64	71	75	74	75	78	79	76	69	63	56	46	39	35	34	35	36	36	39	42	42	45	48	52	54.5	79
5-Apr	59	64	66	69	70	70	71	69	67	62	51	46	44	42	43	49	58	61	66	73	78	86	94	96	64.8	96
6-Apr	96	97	97	96	96	95	95	93	94	95	95	96	94	86	90	86	84	85	87	86	86	83	81	80	90.5	97
7-Apr	81	82	81	81	83	84	84	83	81	81	78	77	75	70	73	74	72	72	74	75	76	68	72	66	76.7	84
8-Apr	57	61	61	63	67	68	68	68	63	59	56	55	52	48	47	47	48	49	51	53	56	57	59	60	57.2	68
9-Apr	62	64	67	69	75	69	63	62	62	67	72	70	66	67	80	78	82	74	63	64	66	65	66	68	68.4	82
10-Apr	70	66	63	62	64	66	67	65	59	56	49	43	38	34	31	27	22	20	17	21	23	27	35	41	44.4	70
11-Apr	41	42	43	46	49	51	50	50	48	47	44	41	38	34	32	30	28	28	29	31	33	37	41	51	40.2	51
12-Apr	50	55	56	61	65	73	74	76	76	79	76	63	52	47	47	46	46	49	52	56	61	64	65	69	60.7	79
13-Apr	70	70	66	70	72	71	72	73	69	67	63	60	61	65	70	88	90	89	91	93	94	95	94	94	77.0	95
14-Apr	94	96	95	90	92	93	95	96	94	93	90	88	83	75	72	67	70	70	69	69	69	70	70	71	82.1	96
15-Apr	76	79	78	79	83	88	87	80	73	69	65	58	54	50	50	50	50	50	56	58	56	56	58	60	65.1	88
16-Apr	61	62	62	65	66	67	67	65	59	54	45	35	28	23	22	21	19	19	19	20	21	24	28	34	41.0	67
17-Apr	38	41	41	46	44	48	50	50	50	45	38	34	27	25	24	25	25	26	27	27	31	36	40	43	36.7	50
18-Apr	48	51	54	56	58	59	55	50	44	37	30	23	19	16	16	17	17	16	14	13	15	15	16	16	31.5	59
19-Apr	16	17	19	20	23	26	26	30	31	29	21	16	14	12	12	13	12	14	14	17	22	27	31	43	21.0	43
20-Apr	67	68	66	61	59	63	66	64	62	61	58	54	51	46	43	39	36	31	31	35	38	41	45	47	51.3	68
21-Apr	49	51	54	57	58	61	61	55	49	45	39	37	31	26	23	21	19	20	21	24	27	31	34	39	38.9	61
22-Apr	42	46	52	57	61	61	59	49	40	32	22	21	21	20	19	19	19	19	21	24	28	29	29	31	34.3	61
23-Apr	34	38	40	39	42	40	40	38	33	29	26	22	21	21	22	22	22	23	25	29	32	32	29	30	30.4	42
24-Apr	31	33	37	38	38	39	40	42	41	40	40	39	35	34	36	37	35	35	35	33	35	47	61	64	39.4	64
25-Apr	65	67	70	71	74	76	79	82	80	78	75	72	64	59	58	57	58	58	59	61	65	67	70	73	68.3	82
26-Apr	76	77	79	79	80	80	80	78	75	69	66	71	79	83	88	86	85	84	77	79	86	85	86	88	79.7	88
27-Apr	89	92	91	96	96	96	97	97	98	94	82	72	69	61	48	45	44	44	43	45	50	53	58	62	71.7	98
28-Apr	63	66	71	76	83	81	78	68	58	47	38	31	28	26	24	24	24	25	27	27	27	28	30	30	45.1	83
29-Apr	32	33	34	36	37	39	39	37	32	28	25	24	24	23	22	23	22	22	22	23	25	27	29	32	28.8	39
30-Apr	33	32	34	35	37	38	40	40	40	38	33	29	28	30	38	37	36	38	37	36	38	39	44	50	36.6	50
	58.9	61.0	62.1	63.3	65.0	66.2	66.2	64.7	61.5	58.2	53.3	49.3	46.2	43.5	43.6	43.3	43.0	42.9	43.3	45.6	48.7	51.1	54.0	56.5	Diurnal Average	
	96	97	97	96	96	96	97	97	98	95	95	96	94	86	90	88	90	89	91	93	94	95	94	96	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity 20m (RH20m) - %

Mannix - April 2016



Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	37	5.14	5.14
20 - 40	192	26.67	31.81
40 - 60	188	26.11	57.92
60 - 80	202	28.06	85.97
80 - 100	101	14.03	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity 45m (RH45m) - %

Mannix - April 2016

Maximum Value: 98 % on Apr 6 03:00

Maximum Daily Average: 91.1 % on Apr 6

Minimum Value: 12 % on Apr 19 17:00

Minimum Daily Average: 20.5 % on Apr 19

Maximum Diurnal Average: 66.1 % at hour 7

Minimum Diurnal Average: 43.3 % at hour 18

Monthly Average: 53.7 %

Percentiles: P_1 = 13 P_{10} = 24 Q_1 = 35 Median = 53 Q_3 = 70 P_{90} = 84 P_{99} = 97

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

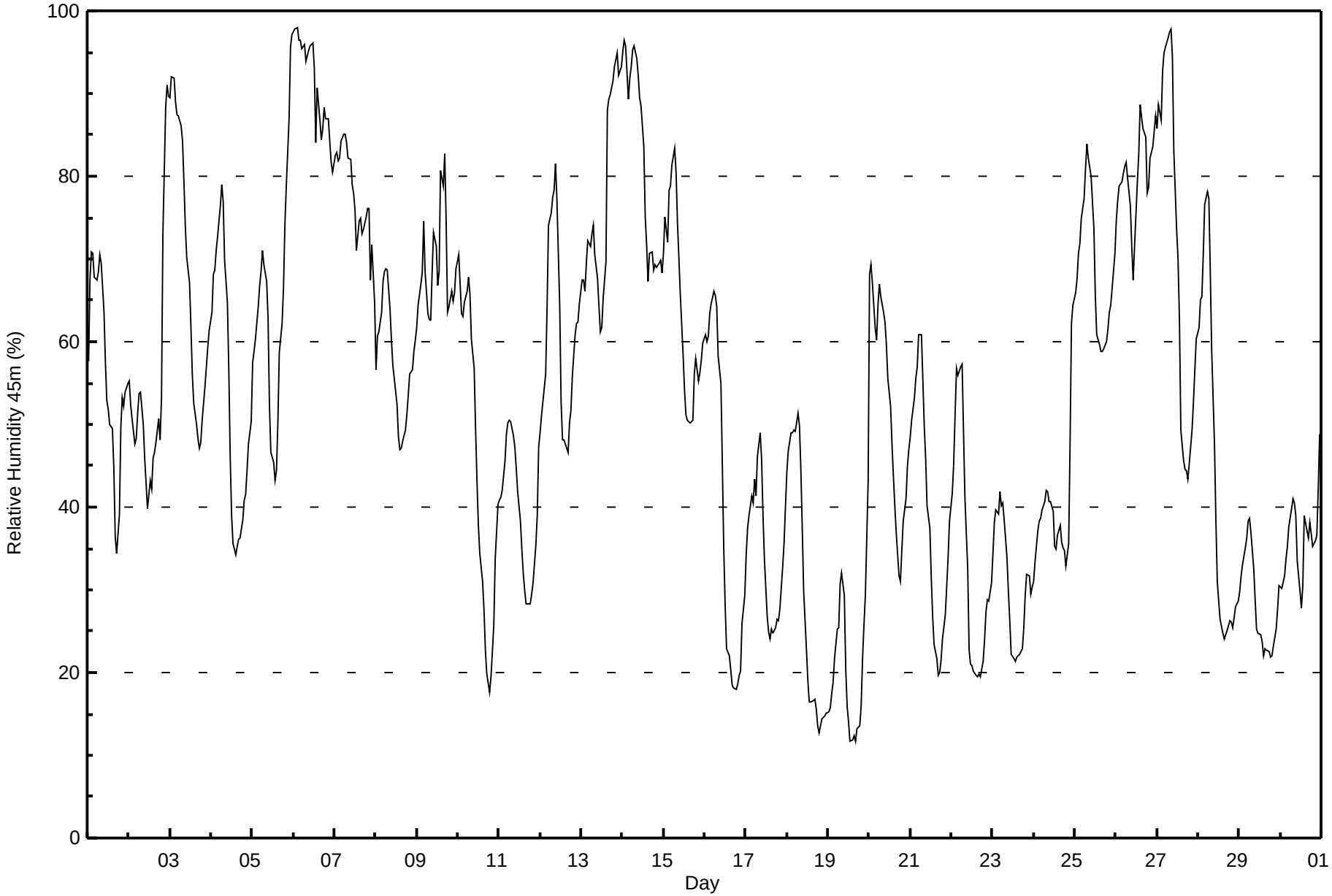
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	58	68	71	71	68	68	68	70	69	64	58	53	52	50	49	45	36	34	39	50	53	52	54	55	56.4	71
2-Apr	55	52	51	48	48	51	54	54	50	46	43	40	43	42	46	47	48	51	48	53	73	88	91	90	54.7	91
3-Apr	89	92	92	89	87	87	86	84	79	74	70	67	62	56	53	50	48	47	48	51	55	57	59	61	68.5	92
4-Apr	64	68	69	71	73	76	79	77	70	65	57	46	39	36	34	35	36	36	39	41	41	44	48	50	53.9	79
5-Apr	57	59	60	64	67	68	71	69	67	63	52	47	45	43	44	50	59	62	66	74	79	87	96	97	64.5	97
6-Apr	97	98	98	96	96	95	96	94	95	95	96	96	93	84	91	87	84	86	88	87	87	84	82	80	91.1	98
7-Apr	83	83	82	82	84	85	85	84	82	82	79	78	76	71	74	75	73	74	75	76	76	67	72	65	77.6	85
8-Apr	57	61	61	64	67	68	69	69	64	60	57	56	52	48	47	47	48	49	51	54	56	57	59	60	57.5	69
9-Apr	62	64	67	69	75	68	63	63	63	68	73	72	67	68	81	79	83	75	64	64	66	65	66	69	68.9	83
10-Apr	71	67	63	63	65	66	68	66	60	57	50	43	38	34	31	28	23	20	18	19	23	26	34	40	44.6	71
11-Apr	41	41	42	46	49	50	51	50	49	47	45	42	38	35	32	30	28	28	28	29	31	35	39	47	39.8	51
12-Apr	49	51	54	56	64	74	76	77	78	81	77	64	53	48	48	47	47	50	52	56	61	62	62	65	60.6	81
13-Apr	67	68	66	69	72	72	73	74	71	68	64	61	62	65	70	88	89	90	92	93	94	95	92	93	77.0	95
14-Apr	95	97	96	89	92	93	95	96	94	92	90	88	84	75	72	67	71	71	69	69	69	70	70	68	82.1	97
15-Apr	71	75	72	78	79	81	83	81	74	70	66	59	54	51	50	50	50	51	56	58	55	56	58	60	64.1	83
16-Apr	61	60	61	63	65	66	66	64	58	55	45	35	28	23	22	20	18	18	18	19	20	20	26	29	40.0	66
17-Apr	34	37	39	41	40	43	41	46	49	46	39	34	27	25	24	25	25	25	26	26	28	33	36	40	34.6	49
18-Apr	44	47	49	49	49	49	51	50	44	38	30	23	19	17	16	17	17	16	14	13	14	15	15	15	29.6	51
19-Apr	15	16	17	19	22	25	25	31	32	29	21	16	14	12	12	12	12	13	14	16	22	26	29	43	20.5	43
20-Apr	68	69	67	62	60	64	67	65	64	62	60	56	52	48	44	40	37	32	31	35	38	41	45	47	52.2	69
21-Apr	49	50	53	56	57	61	61	55	50	46	40	38	32	27	23	22	20	20	21	24	27	30	34	38	38.9	61
22-Apr	42	45	51	57	56	57	57	49	41	32	23	21	21	20	20	19	20	19	21	24	27	29	29	31	33.8	57
23-Apr	34	38	40	39	42	40	41	39	34	30	26	22	22	21	22	22	22	23	25	29	32	32	30	30	30.6	42
24-Apr	31	33	37	38	39	40	41	42	42	41	41	39	35	35	37	38	36	35	35	33	36	48	62	64	39.9	64
25-Apr	66	68	71	72	75	77	81	84	82	80	77	74	66	61	60	59	59	59	60	61	63	64	66	71	69.0	84
26-Apr	75	77	79	79	80	81	82	80	76	71	67	72	79	83	89	87	86	85	78	79	82	84	85	87	80.1	89
27-Apr	86	89	87	93	95	96	97	97	98	94	83	74	70	63	49	46	45	44	43	45	49	53	57	60	71.3	98
28-Apr	62	65	65	71	77	78	77	69	59	48	38	31	29	27	25	24	25	25	26	26	25	27	28	29	43.9	78
29-Apr	30	32	33	35	36	38	39	37	33	29	25	25	25	24	22	23	23	23	22	22	23	25	28	30	28.3	39
30-Apr	30	30	32	34	35	38	40	41	40	39	34	30	28	31	39	37	36	38	37	35	36	37	42	49	36.1	49
	58.1	60.0	60.8	62.1	63.8	65.3	66.1	65.2	62.2	59.1	54.1	50.0	46.8	44.1	44.2	43.9	43.4	43.3	43.5	45.4	48.1	50.3	53.0	55.5	Diurnal Average	
	97	98	98	96	96	96	97	97	98	95	96	96	93	84	91	88	89	90	92	93	94	95	96	97	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity 45m (RH45m) - %

Mannix - April 2016



Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	39	5.42	5.42
20 - 40	190	26.39	31.81
40 - 60	189	26.25	58.06
60 - 80	199	27.64	85.69
80 - 100	103	14.31	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Maximum Value: 98 % on Apr 6 01:00

Maximum Daily Average: 91.4 % on Apr 6

Minimum Value: 12 % on Apr 19 17:00

Minimum Daily Average: 20.5 % on Apr 19

Maximum Diurnal Average: 65.2 % at hour 7

Minimum Diurnal Average: 43.8 % at hour 18

Monthly Average: 53.6 %

Percentiles: P_1 = 13 P_{10} = 24 Q_1 = 35 Median = 53 Q_3 = 70 P_{90} = 85 P_{99} = 96

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

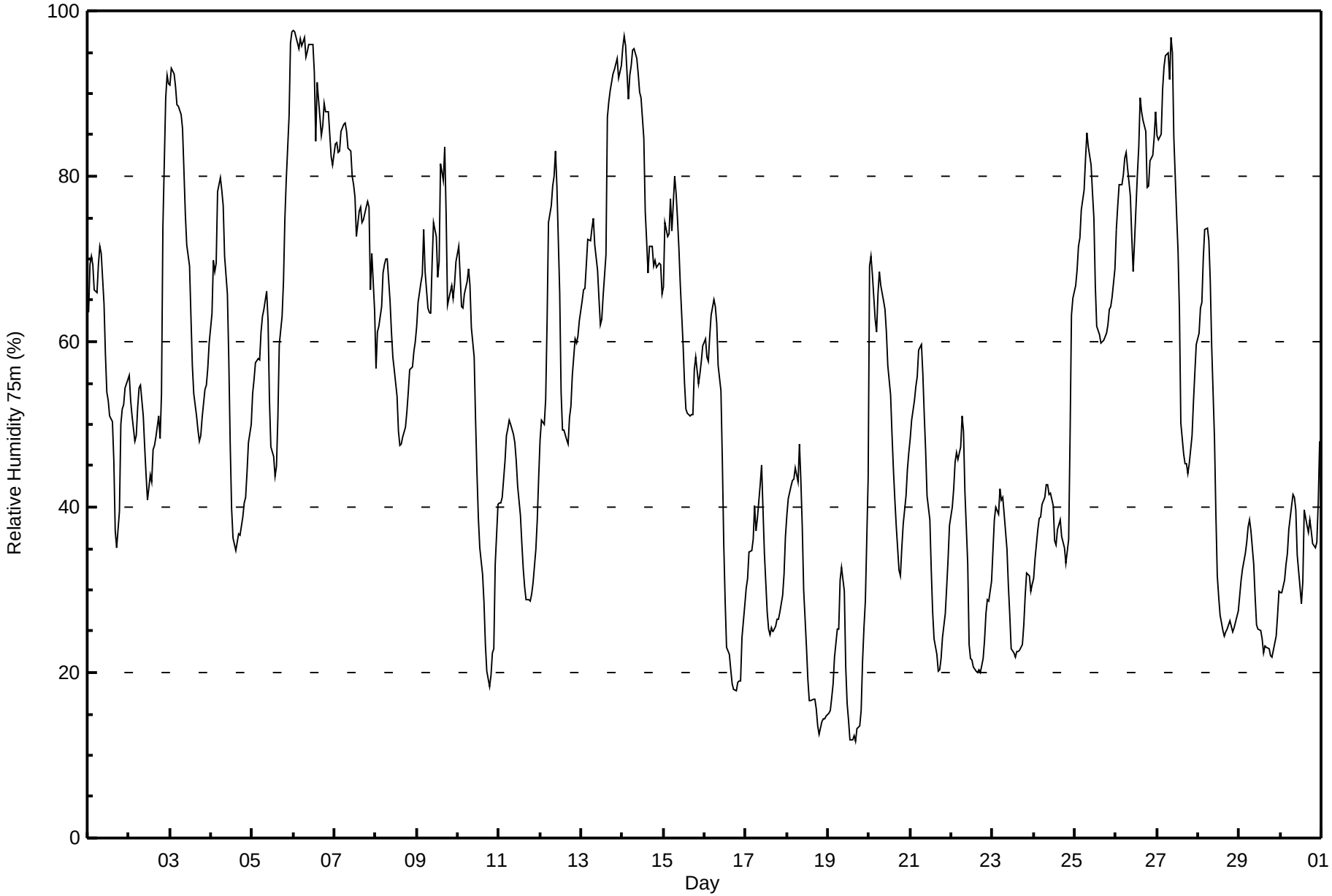
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	64	69	70	69	66	66	69	71	71	65	59	54	53	51	50	46	37	35	40	50	52	52	54	55	57.0	71
2-Apr	56	53	51	48	49	52	54	55	51	47	44	41	44	43	47	47	49	51	48	54	74	90	92	91	55.4	92
3-Apr	91	93	92	91	89	89	87	86	81	75	72	69	63	57	54	51	49	48	49	51	54	55	57	60	69.3	93
4-Apr	63	70	69	70	78	80	78	77	70	66	58	48	40	36	35	36	37	37	39	40	41	44	48	50	54.5	80
5-Apr	54	55	57	58	58	61	63	64	66	63	53	47	46	44	45	51	60	63	67	75	80	87	96	97	62.9	97
6-Apr	98	98	96	95	97	96	97	94	95	96	96	96	93	84	91	87	85	86	89	88	88	85	82	81	91.4	98
7-Apr	84	84	83	83	86	86	87	85	83	83	80	79	78	73	76	76	74	75	76	77	76	66	71	64	78.5	87
8-Apr	57	61	62	64	68	69	70	70	65	61	58	57	53	49	48	48	48	50	52	54	57	57	59	60	58.2	70
9-Apr	62	65	67	68	74	68	64	64	63	69	74	73	68	70	81	80	84	75	64	65	67	65	67	70	69.5	84
10-Apr	71	68	64	64	66	67	69	67	62	58	51	44	39	35	32	28	23	20	18	20	22	23	33	40	45.2	71
11-Apr	41	40	41	46	49	50	51	50	49	48	46	43	39	36	33	30	29	29	29	29	31	35	38	43	39.7	51
12-Apr	48	51	50	53	62	74	76	79	80	83	79	66	54	49	49	48	48	51	52	56	60	60	61	63	60.5	83
13-Apr	65	66	66	69	72	72	74	75	72	69	65	62	63	66	71	87	89	90	92	93	93	94	92	93	77.1	94
14-Apr	96	97	96	89	92	93	95	95	94	92	90	89	85	76	72	68	72	72	69	70	69	69	69	66	82.4	97
15-Apr	67	74	73	73	77	73	80	78	75	71	67	60	55	52	51	51	51	51	57	58	55	56	58	59	63.5	80
16-Apr	60	58	58	61	63	65	64	62	57	54	46	36	29	23	22	20	19	18	18	19	19	19	24	28	39.2	65
17-Apr	30	31	35	35	36	40	37	39	43	45	40	34	27	25	25	26	25	26	26	26	27	29	32	36	32.3	45
18-Apr	39	41	43	43	43	45	43	48	43	38	30	23	19	17	17	17	17	16	13	13	14	14	14	15	27.7	48
19-Apr	15	15	17	19	22	25	25	31	33	30	21	16	14	12	12	12	12	13	13	15	21	25	29	44	20.5	44
20-Apr	69	70	68	63	61	66	68	67	65	64	61	57	54	49	45	41	38	32	32	35	38	41	45	47	53.1	70
21-Apr	48	50	53	55	56	59	60	56	51	47	41	38	32	27	24	22	20	20	22	24	27	30	34	38	39.0	60
22-Apr	40	42	45	47	46	47	51	49	42	33	23	22	22	21	20	20	20	20	22	24	27	29	29	31	32.2	51
23-Apr	35	38	40	39	42	41	41	39	35	31	27	23	22	22	23	22	23	23	26	29	32	32	30	31	31.1	42
24-Apr	31	34	37	39	39	40	41	43	43	42	42	40	36	35	37	38	36	36	35	33	36	48	63	65	40.4	65
25-Apr	67	69	72	73	76	78	82	85	84	81	78	75	67	62	61	60	60	60	61	62	64	64	65	69	69.8	85
26-Apr	74	77	79	79	80	82	83	81	78	73	68	72	80	84	89	88	87	86	79	79	82	82	85	88	80.5	89
27-Apr	85	84	85	90	93	95	95	92	97	95	85	75	71	64	50	47	45	45	44	45	49	53	56	60	70.8	97
28-Apr	61	64	65	70	74	74	72	67	60	48	39	32	29	27	25	24	25	25	26	26	25	25	26	27	43.2	74
29-Apr	29	31	32	34	36	38	38	37	33	29	26	25	25	24	22	23	23	23	22	22	23	24	27	30	28.3	38
30-Apr	30	30	31	33	34	37	40	42	41	40	34	30	28	31	40	38	37	38	37	36	35	36	40	48	36.1	48
	57.6	59.3	59.9	60.6	62.8	64.3	65.2	64.9	62.7	59.9	55.0	50.9	47.5	44.7	44.9	44.4	44.0	43.8	43.9	45.6	48.0	49.8	52.5	55.0	Diurnal Average	
	98	98	96	95	97	96	97	95	97	96	96	96	93	84	91	88	89	90	92	93	93	94	96	97	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity 75m (RH75m) - %

Mannix - April 2016



Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	35	4.86	4.86
20 - 40	195	27.08	31.94
40 - 60	194	26.94	58.89
60 - 80	193	26.81	85.69
80 - 100	103	14.31	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Maximum Value: 98 % on Apr 6 01:00

Maximum Daily Average: 91.5 % on Apr 6

Minimum Value: 12 % on Apr 19 17:00

Minimum Daily Average: 20.5 % on Apr 19

Maximum Diurnal Average: 65.1 % at hour 7

Minimum Diurnal Average: 44.1 % at hour 18

Monthly Average: 53.7 %

Percentiles: P_1 = 13 P_{10} = 24 Q_1 = 35 Median = 52 Q_3 = 70 P_{90} = 86 P_{99} = 97

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

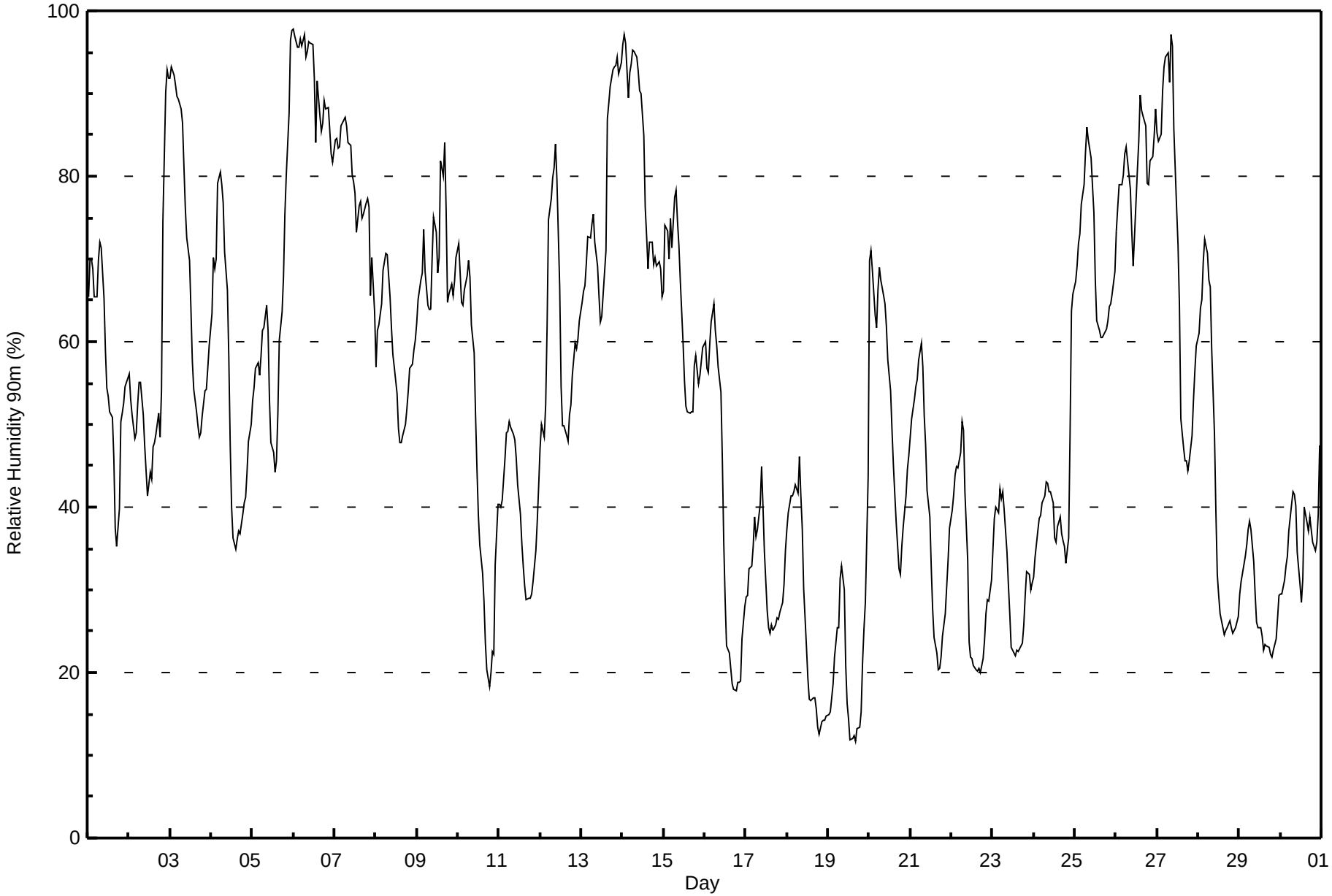
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	65	70	70	69	65	65	70	72	71	65	59	54	53	52	51	46	37	35	40	50	51	52	55	56	57.3	72
2-Apr	56	53	51	48	49	52	55	55	51	48	44	41	44	43	47	48	49	51	49	54	75	90	93	92	55.8	93
3-Apr	92	93	92	91	90	89	88	86	81	76	72	70	64	58	54	52	50	48	49	51	54	54	57	60	69.7	93
4-Apr	63	70	69	70	79	81	79	77	71	66	58	48	40	36	35	36	37	37	39	40	41	44	48	50	54.8	81
5-Apr	53	54	57	58	56	58	61	62	64	61	53	48	47	44	46	51	60	64	68	75	80	88	96	98	62.6	98
6-Apr	98	97	96	96	97	96	97	94	95	96	96	96	92	84	92	87	85	86	89	88	88	86	83	82	91.5	98
7-Apr	84	85	83	84	86	87	87	86	84	84	80	79	78	73	77	77	75	75	77	77	76	66	70	64	78.9	87
8-Apr	57	61	62	65	69	70	71	71	65	62	58	57	54	49	48	48	49	50	52	54	57	57	59	60	58.5	71
9-Apr	62	65	67	68	74	68	64	64	64	70	75	73	68	70	82	80	84	76	65	66	67	66	67	70	69.8	84
10-Apr	72	68	65	64	66	68	70	68	62	59	51	45	39	35	32	29	24	20	18	20	23	22	33	40	45.5	72
11-Apr	40	40	41	46	49	49	50	50	49	48	46	43	39	36	33	31	29	29	29	29	31	35	38	43	39.7	50
12-Apr	47	50	48	52	62	75	77	80	81	84	80	67	55	50	50	49	48	51	52	56	60	59	60	63	60.6	84
13-Apr	65	66	67	70	73	73	74	75	72	69	66	62	63	66	71	87	89	91	93	93	93	94	92	94	77.4	94
14-Apr	96	97	96	89	92	94	95	95	94	93	90	90	85	76	73	69	72	72	69	70	69	70	69	65	82.6	97
15-Apr	66	74	73	70	75	71	77	78	75	72	68	60	55	52	52	51	52	52	57	58	55	56	58	59	63.2	78
16-Apr	60	57	56	60	62	65	61	59	57	54	46	36	29	23	22	20	19	18	18	19	19	19	24	28	38.8	65
17-Apr	29	29	33	33	35	39	37	37	40	45	40	35	27	25	25	26	25	26	27	27	27	29	31	35	31.7	45
18-Apr	37	39	41	41	42	43	42	46	41	37	30	23	19	17	17	17	17	16	13	13	14	14	14	15	27.1	46
19-Apr	15	15	17	19	22	25	25	31	33	30	21	16	14	12	12	12	12	13	13	15	21	25	28	44	20.5	44
20-Apr	70	71	69	63	62	66	69	67	66	65	62	58	54	49	45	42	38	33	32	35	38	41	44	46	53.5	71
21-Apr	48	51	53	55	55	58	60	57	51	47	42	39	33	28	24	22	20	21	22	24	27	30	34	37	39.1	60
22-Apr	40	42	44	45	45	47	50	49	42	34	24	22	22	21	20	20	20	20	22	24	27	29	29	31	32.0	50
23-Apr	35	39	40	39	42	41	42	40	35	31	27	23	22	22	23	23	23	24	26	29	32	32	30	31	31.2	42
24-Apr	32	34	37	39	39	41	41	43	43	42	42	41	36	36	38	39	37	36	35	33	36	49	64	66	40.7	66
25-Apr	67	69	72	73	77	79	83	86	84	82	79	76	67	63	61	60	60	61	62	63	64	65	66	69	70.3	86
26-Apr	73	76	79	79	80	83	84	82	78	73	69	73	81	84	90	88	87	86	79	79	82	82	85	88	80.9	90
27-Apr	85	84	85	90	93	94	95	91	97	96	86	76	72	64	51	47	46	46	44	46	49	53	56	60	71.1	97
28-Apr	61	64	65	70	72	71	67	67	59	49	40	32	29	27	25	25	25	25	26	25	25	25	25	27	42.8	72
29-Apr	29	31	32	34	35	37	38	37	33	30	26	25	25	24	23	23	23	23	22	22	23	24	27	29	28.3	38
30-Apr	29	30	31	33	34	37	40	42	42	40	35	31	29	31	40	38	37	39	37	36	35	36	39	48	36.1	48
	57.6	59.2	59.7	60.4	62.6	64.0	65.1	64.9	62.7	60.2	55.5	51.2	47.9	45.1	45.2	44.7	44.3	44.1	44.2	45.8	48.0	49.7	52.5	54.9	Diurnal Average	
	98	97	96	96	97	96	97	95	97	96	96	96	92	84	92	88	89	91	93	93	93	94	96	98	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity 90m (RH90m) - %

Mannix - April 2016



Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	32	4.44	4.44
20 - 40	197	27.36	31.81
40 - 60	196	27.22	59.03
60 - 80	188	26.11	85.14
80 - 100	107	14.86	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed 20 m (WS20m) - km/h

Mannix - April 2016

Maximum Speed: 42 km/h on Apr 19 17:00

Maximum Daily Speed Average: 18.0 km/h on Apr 8

Minimum Speed Value: 0 km/h on Apr 21 11:00

Minimum Daily Speed Average: 2.3 km/h on Apr 27

Maximum Diurnal Speed Average: 4.6 km/h at hour 1

Minimum Diurnal Speed Average: 0.5 km/h at hour 17

Monthly Average Velocity: 2.2 km/h 111.3 deg

Percentiles: $P_1 = 2$ $P_{10} = 5$ $Q_1 = 8$ Median = 11 $Q_3 = 14$ $P_{90} = 20$ $P_{99} = 29$

Hours in Service:	720
Hours of Data:	720
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-Apr	S6	SW6	WSW8	WSW6	W10	NNW9	NNE18	NNE18	N16	N20	N19	NNE14	NNE15	NNE14	NNE10	NNE12	NE11	NE12	NE10	NNE8	NE9	E9	ESE9	E10	NNE7.8	N20
2-Apr	ESE12	ESE12	ESE10	ESE13	SE14	SE9	E11	E13	E12	E8	ENE8	NE10	NW15	WNW14	NNW20	NNW20	NNW21	NNW20	N19	N19	N19	N14	NNW13	NNW11	NNE7.3	NNW21
3-Apr	NW12	NNW11	NNW13	NNW14	NNW13	NNW13	N14	NNW14	NNW18	N15	NNW14	NW13	NNW11	N7	NNW9	N6	NE7	NNE8	NNE8	NNE9	NNE12	NNE10	N8	ENE2	N10.2	NNW18
4-Apr	SE5	SSW5	SW4	SE4	S6	SSE8	SSE9	SSE8	SE5	SE8	SE6	ESE7	ESE7	SE8	SE6	SSE7	NNE6	NNE5	N10	N11	NNE11	NE5	E2	N4	ESE3.0	NNE11
5-Apr	N5	N6	N7	N8	N8	NNW4	N7	N3	NNE4	ENE2	SE5	SSE10	SSE12	SSE13	SSE16	SSE16	S15	S14	SSE11	S11	SSE13	SE11	SE12	SSE14	SSE5.2	SSE16
6-Apr	SE10	SSE9	SE1	WNW9	NW13	NW17	NNW16	NNW15	N16	N12	NNW10	NNW8	NNW11	NNW12	N13	N13	N14	N14	NNE15	NNE16	NNE14	NNE17	N13	N10	N9.7	NW17
7-Apr	N8	NE10	NE8	NE8	NNE6	WSW1	SW3	S3	SSE4	SSE5	SE7	ESE6	ENE6	ENE8	NNE9	NE10	N11	N14	NNE14	NNE13	NNE11	NNE11	NNE8	E6	NE5.7	N14
8-Apr	ESE12	ESE9	SE14	SE15	SE13	SE19	SE18	SE16	SE19	SE20	SE20	SE21	SE19	SE20	SE23	SE21	SE22	SE21	SE21	SE21	SE21	SE19	SE14	SE18	SE18.0	SE23
9-Apr	SE17	SE14	SE9	NW3	NW10	WNW21	NW18	NW17	NNW18	NNW19	NNW20	NNW22	NNW20	NNW21	NNW20	NNW21	NNW20	NNW19	N24	NNW21	NNW13	NNW13	NNW12	NNW12	NNW13.2	NNW24
10-Apr	NNW17	NNW18	NNW16	NNW17	NNW15	NNW15	N13	N10	NNW11	NNE8	NE10	NNE8	NW10	WNW10	WNW8	NE5	ENE5	ENE1	E2	SE4	SE4	SE5	SE10	SE13	N5.9	NNW18
11-Apr	SE13	SSE13	SSE14	SE12	SE12	SE13	SSE9	SSE9	SSE10	SE13	SE12	SE12	SE12	SE11	SE9	SE9	ESE7	NNE2	N1	SSE4	S9	SSE9	SSW3	NE5	SE8.6	SSE14
12-Apr	NNE3	SW2	S4	WNW7	N10	N15	NNE13	NNW14	N10	NW8	WNW10	NW11	N13	N13	N15	N13	N12	NNW15	N19	N16	N13	NNE14	NNE8	NNE7	N9.8	N19
13-Apr	NNE4	ENE11	E13	SW2	E13	ESE11	ESE8	SE11	ESE11	ESE10	SE8	SE9	E5	SE5	SSE5	SE10	SE12	SE10	SE4	SE9	SE6	S4	S3	NNE1	ESE6.8	E13
14-Apr	NE3	N5	N11	N18	N17	NNW17	NNW14	NNW12	N13	N13	NNW13	NNW11	NW13	WNW17	WNW16	NNW10	N7	N8	NNW5	NW6	NNW9	NW7	WNW9	W6	NNW9.8	N18
15-Apr	WSW6	NNW4	N3	N4	W2	SW3	SW5	SSW2	SE4	ESE7	SE9	SE11	SE11	SE11	SE11	SE13	SE13	SE13	ESE10	ESE12	SE15	SE15	SE17	SE14	SE7.2	SE17
16-Apr	SE13	ESE6	SE12	SE10	SE10	SE12	SE12	SSE9	SSE10	SE9	SSE14	S10	SW16	WSW20	WSW19	W16	WSW15	WSW13	W13	SW7	SSW10	SW10	SSW9	SSE9	SSW7.4	WSW20
17-Apr	SE9	SSE9	SSE9	SE10	SE11	SE10	SE10	SE10	SE9	SE9	SE8	SE7	ENE2	ENE4	W5	W12	W16	W11	W6	SSE3	SE8	SE6	SSE11	SSE10	SSE5.0	W16
18-Apr	SE9	SE10	SE9	SE10	SE8	SE11	SSE13	SE11	SE10	SE9	SE13	SE14	SSE19	S23	S23	S24	S23	S25	S23	SSE28	SSE24	SSE26	SSE26	SSE22	SSE16.6	SSE28
19-Apr	S20	S15	SSE13	S10	S9	SSW10	WSW15	NW20	NW14	WNW11	W26	W32	WSW30	WSW32	W34	W37	W42	W31	WNW26	W22	NW18	WNW18	WNW18	NNW20	W16.9	W42
20-Apr	NNE20	NNE24	N18	N21	N20	N21	NNE19	N23	N21	N19	N15	N15	NNE13	NNE13	NNE11	NNE12	NNE12	NNE11	NNE10	NNE10	NNE11	NNE8	NE7	ENE7	N14.7	NNE24
21-Apr	ESE5	ESE5	ESE4	ESE4	ESE4	ESE4	SE5	SE4	E3	ENE3	SSW0	NW4	N7	NNE10	NNE14	N18	N21	NNE23	NNE23	NNE19	NNE18	NNE15	NNE13	NNE14	NNE8.1	NNE23
22-Apr	NNE12	NNE11	NNE10	N10	NNE9	NNE10	NNE9	NNE7	N7	N7	NE7	ENE7	NE7	E6	E6	ENE3	NE7	ENE4	NNW13	NNE9	NNE9	NE6	ESE9	ESE12	NNE6.6	NNW13
23-Apr	ESE11	ESE11	ESE10	ESE8	SE7	ESE9	ESE8	ESE11	ESE6	E5	E9	E12	E12	E12	ESE12	ESE12	ESE12	ESE11	SE11	SE14	SE9	SE14	SE19	SE17	ESE10.4	SE19
24-Apr	SE14	SE13	SE10	SE13	SE13	SE13	SE13	SE11	SE14	SE12	SE12	SSE15	SSE19	SSE18	SSE16	SSE13	SE10	ESE12	SE14	SE16	SE16	SSE14	S14	S15	SE12.9	SSE19
25-Apr	S16	S14	S8	SSE9	SSE11	SSE13	SSE16	SSE16	SSE15	SSE13	SSE12	SSE11	SSE12	S13	S11	S11	SSW10	SW10	SSW10	SSW8	S7	S7	S7	S8	S10.6	SSE16
26-Apr	SSE8	S9	SSE10	SSE13	SSE16	SSE14	SSE13	SSE13	SSE12	SSE9	SSE10	SSE10	SSE10	SSE9	SE9	SE8	SE9	SSE8	SE7	SSW5	S9	SE6	SE7	SSW6	SSE9.2	SSE16
27-Apr	WSW7	W7	WSW4	WSW4	S4	SSE3	SSE4	E3	ESE3	E6	ENE8	NNE3	NNW6	NW10	NNW8	NNW8	N8	ENE8	ENE8	NNE8	NNE9	ENE10	E4	SSE4	NNE2.3	NW10
28-Apr	SE7	SE5	SE6	SSE7	SE6	SSE10	SSE8	SE7	SE9	SE7	SE10	S12	S12	SSE14	SSE15	SSE15	SE14	SE14	SE10	SE8	SSE10	SSE12	SSE11	SSE11	SSE9.8	SSE15
29-Apr	SSE15	SSE12	SE14	SSE13	SSE12	SE13	SE12	SSE15	SSE24	SSE22	SSE20	SSE23	SSE22	SSE25	S24	S22	S20	SSW16	S14	S10	S13	S12	SSE13	SSE13	SSE16.3	SSE25
30-Apr	SSE14	SSE14	SSE13	SSE15	SSE15	SSE12	SSE13	S12	S12	S15	SSW19	S19	SSW21	SSW20	WSW20	WSW18	W19	SSW5	SSE10	SSE7	SSE8	N5	NE6	SE3	S10.2	SSW21
	SE4.6	ESE3.7	ESE3.7	ESE2.3	ESE2.5	ESE2.2	ESE2.5	E2.5	E2.9	E3.3	ESE2.9	SE2.8	S1.9	S2.2	SW1.1	S0.5	N0.5	NE1.5	NE2.6	ENE2.7	E3.2	E3.4	SE3.6	SE3.9	Diurnal Average	
	NNE20	NNE24	N18	N21	N20	N21	NNE19	N23	SSE24	SSE22	W26	W32	WSW30	WSW32	W34	W37	W42	W31	WNW26	SSE28	SSE24	SSE26	SSE26	SSE22	Diurnal Maximum	

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

Summary of Hour Standard Deviations

Mannix - April 2016

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

Maximum Value: 11 km/h on Apr 19 11:00

Minimum Value: 1 km/h on Apr 15 01:00

Percentiles: $P_1 = 1$ $P_{10} = 2$ $Q_1 = 2$ Median = 4 $Q_3 = 5$ $P_{90} = 6$ $P_{99} = 9$

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

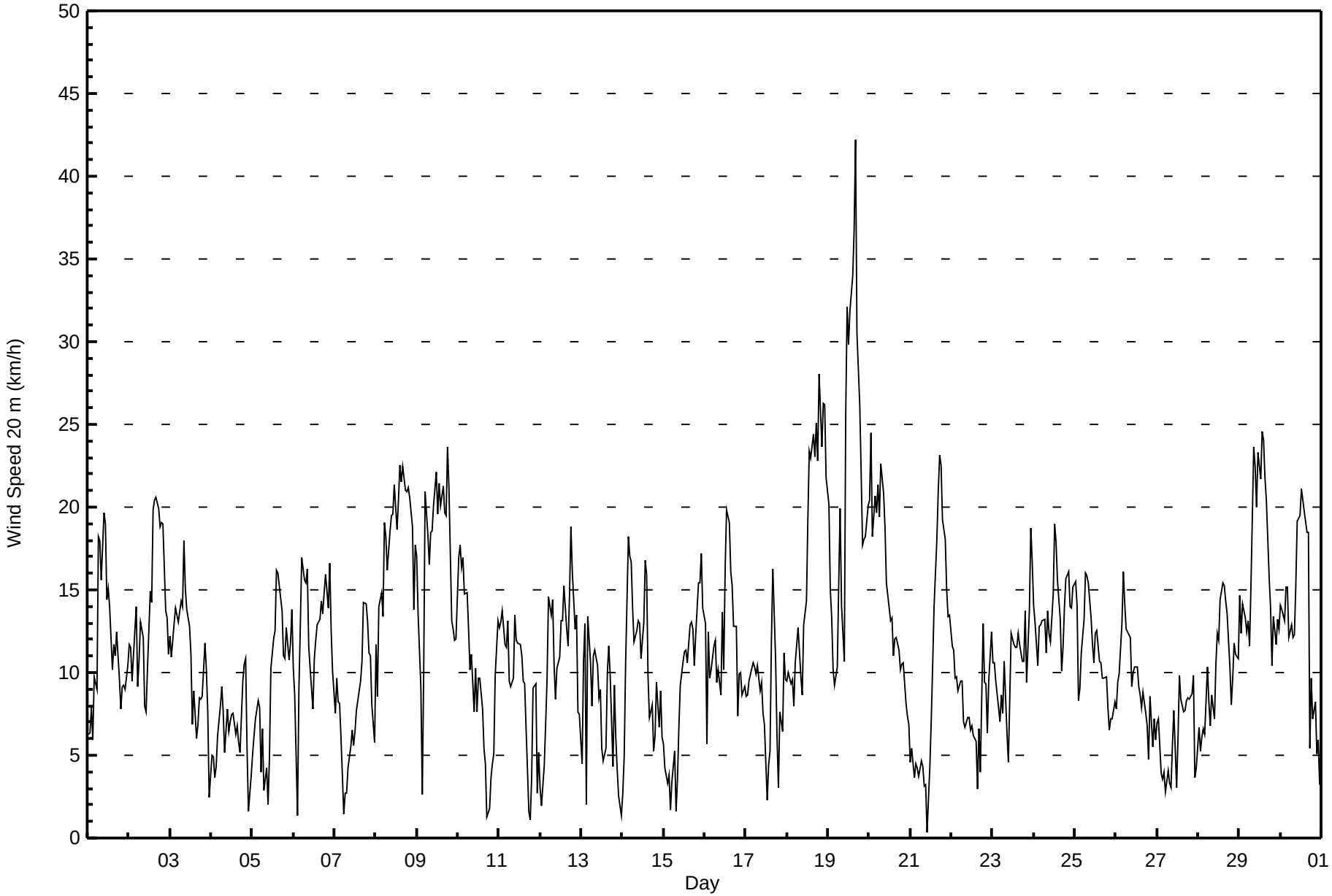
Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Apr	1	2	2	1	2	4	5	5	5	6	5	5	4	4	4	3	3	3	2	1	2	2	3	3	6
2-Apr	4	4	4	4	5	4	4	4	4	3	3	3	4	4	6	6	6	6	5	6	5	4	4	4	6
3-Apr	3	3	4	4	5	5	4	4	5	5	5	4	4	4	3	3	3	2	2	2	2	2	2	2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

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed 20 m (WS20m) - km/h

Mannix - April 2016



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	92	12.78	12.78
6 - 11	291	40.42	53.19
12 - 19	264	36.67	89.86
20 - 28	66	9.17	99.03
29 - 38	6	0.83	99.86
> 38	1	0.14	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Wind Speed 20 m (WS20m) - km/h

Mannix - April 2016

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	8	4	9	7	7	15	8	5	6	6	3	2	0	2	3	92
6 - 11	24	34	16	10	9	24	70	38	17	7	4	4	5	7	7	15	291
12 - 19	35	27	1	0	7	10	59	49	17	2	1	5	5	5	10	31	264
20 - 28	7	4	0	0	0	0	11	11	10	2	0	2	2	2	1	14	66
29 - 38	0	0	0	0	0	0	0	0	0	0	0	2	4	0	0	0	6
> 38	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Totals	73	73	21	19	23	41	155	106	49	17	11	16	19	14	20	63	720

Total Number of Valid Hours: 720

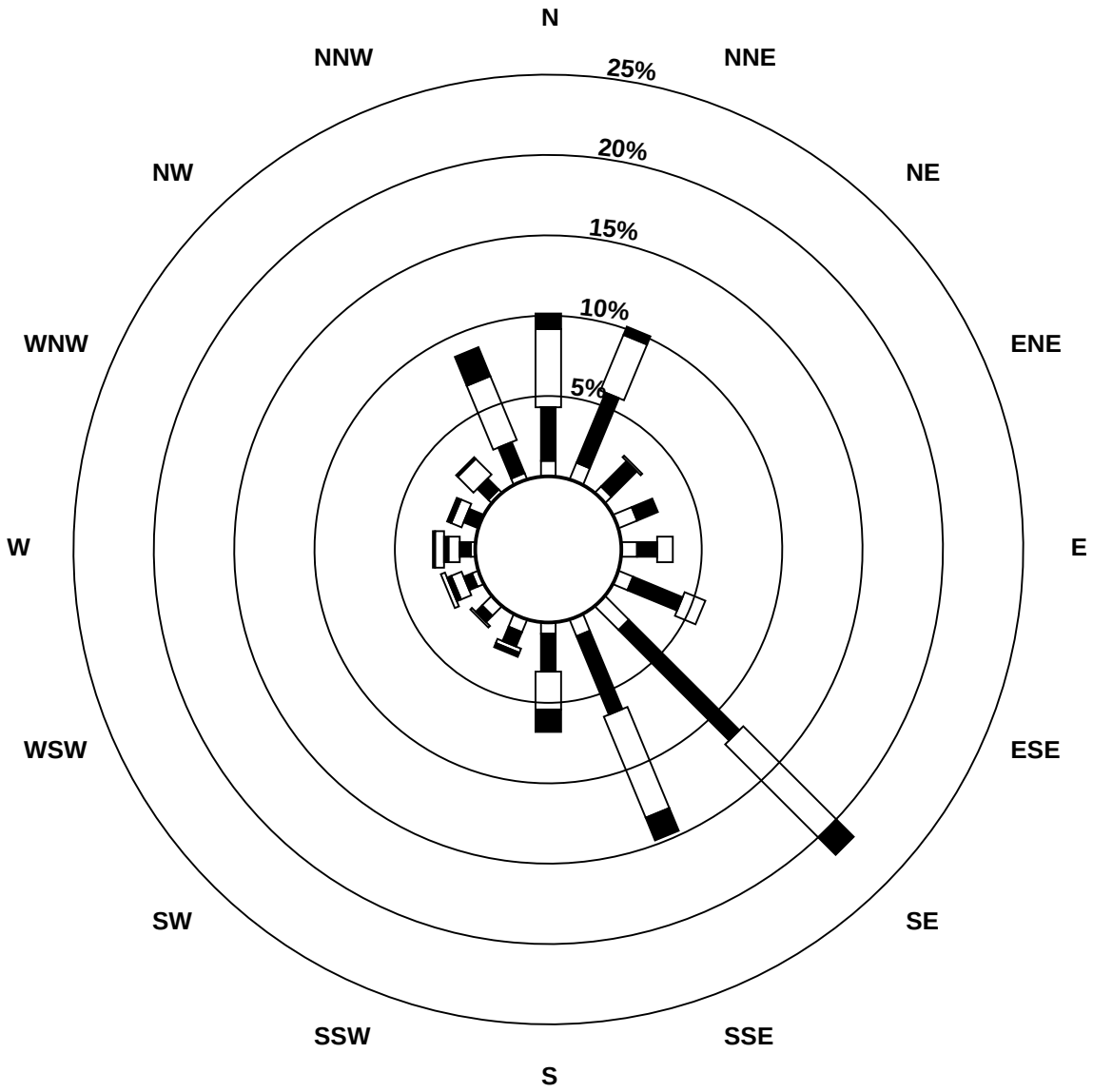
Total Number of Hours: 720

Wood Buffalo Environmental Association

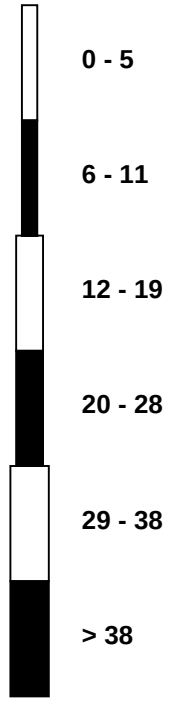
Wind Rose Apr 2016

Wind Speed 20 m (WS20m) - km/h

Mannix (AMS 5)



Classes (km/h)



Total Number of Valid Hours: 720

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed 45 m (WS45m) - km/h

Mannix - April 2016

Maximum Speed: 47 km/h on Apr 19 17:00

Maximum Daily Speed Average: 24.7 km/h on Apr 18

Minimum Speed Value: 0 km/h on Apr 11 19:00

Minimum Daily Speed Average: 3.2 km/h on Apr 27

Maximum Diurnal Speed Average: 7.2 km/h at hour 1

Minimum Diurnal Speed Average: 0.2 km/h at hour 17

Monthly Average Velocity: 3.1 km/h 113.2 deg

Percentiles: P_1 = 2 P_{10} = 7 Q_1 = 10 Median = 15 Q_3 = 19 P_{90} = 26 P_{99} = 36

Hours in Service:	720
Hours of Data:	718
Hours of Missing Data:	2
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-Apr	S11	WSW11	WSW14	W11	W14	NNW14	N24	N23	N20	N26	N24	N17	N18	NNE17	NNE12	N14	NNE12	NE14	NNE12	NNE10	NE13	E11	E12	E13	N9.7	N26
2-Apr	E16	ESE15	ESE13	ESE16	ESE18	ESE12	E13	E16	E14	E9	NE9	NE11	WNW17	WNW15	NNW25	NNW27	NNW28	NNW27	N26	N26	N26	NNW18	NNW18	NNW14	NNE9.8	NNW28
3-Apr	NW15	NW14	NW16	NNW18	NNW18	NNW18	NNW19	NNW18	NNW23	NNW19	NNW16	NW15	NNW14	N9	NNW11	N8	NNE7	NNE10	NNE10	NNE11	N15	NNE13	NNE8	ESE6	NNW12.6	NNW23
4-Apr	ESE8	SSE10	SSE8	SE8	SSE12	SE13	SE14	SE9	SE6	SE9	SE7	ESE8	ESE8	ESE8	SE7	SE8	NNE6	NNE6	N14	N16	N15	ENE7	E4	N5	ESE4.9	N16
5-Apr	N11	N9	NNE10	N13	N12	N7	N8	NNW4	N5	ENE2	SE6	SSE13	SSE16	SE15	SSE20	SSE20	SSE21	S20	SSE16	SSE17	SSE17	SE15	AF	SE18	SE6.4	SSE21
6-Apr	SE15	SSE13	SSW4	WNW14	NW18	NW22	AF	NNW21	NNW22	N16	NNW13	NNW11	NW14	NW15	N17	N17	N19	N18	N19	NNE20	NNE17	NNE20	N16	N13	NNW12.4	NW22
7-Apr	N10	NNE12	NNE10	NNE10	NNE7	SW1	SW4	S3	SSE5	SE6	ESE7	ESE6	ENE7	NE8	NNE11	NNE11	N13	N18	N17	N16	N15	N16	NNE10	E8	NNE7.0	N18
8-Apr	ESE15	ESE12	ESE18	ESE18	ESE16	ESE24	ESE22	ESE20	SE23	SE24	SE24	ESE26	ESE23	ESE25	ESE27	ESE27	ESE28	ESE27	ESE27	ESE27	ESE28	SE26	ESE20	SE25	ESE22.9	ESE28
9-Apr	SE24	ESE18	ESE13	NNW1	NW15	WNW29	NW24	NW21	NNW25	NNW24	NNW27	NW29	NNW25	NNW28	NNW26	NNW29	NNW26	NNW26	NNW32	NNW28	NNW18	NNW18	NW16	NNW17	NNW17.5	NNW32
10-Apr	NNW23	NNW23	NNW22	NNW22	NNW19	NNW20	N17	NNW13	NNW13	N9	NNE12	NNE9	WNW12	WNW11	WNW9	NE6	ENE5	NE2	E2	SE6	ESE5	ESE8	SE15	SE18	N7.6	NNW23
11-Apr	SE18	SE19	SE20	SE16	SE16	SE19	SSE12	SE12	SE12	SE16	SE14	SE14	SE14	SE13	SE11	SE11	E7	NNE2	WNW0	SSE4	S15	SSE17	S8	ENE5	SE11.7	SE20
12-Apr	ESE2	SE5	SSE7	WNW9	NNW15	N19	N18	NNW18	N13	NW10	WNW12	NW13	N15	N16	N18	N15	NNW14	NNW19	N26	N22	N19	NNE18	NNE11	NE9	N12.3	N26
13-Apr	NE7	ENE15	E16	S3	E17	ESE14	ESE12	SE14	ESE13	ESE12	ESE10	SE11	E6	SE5	SSE7	SE13	ESE15	SE12	SE5	ESE13	SE9	S8	S5	NNW1	ESE9.0	E17
14-Apr	NE3	N6	N14	NNW25	NNW24	NNW23	NNW19	NNW16	N16	N17	NNW16	NW13	NW16	WNW21	WNW20	NW12	NNW9	N11	NNW7	NW9	NNW13	NW9	WNW12	W9	NNW12.9	NNW25
15-Apr	WSW8	NW6	N5	NNW3	NNW2	SSE2	SW6	SSW2	SE4	ESE7	SE10	SE12	SE13	SE13	ESE12	ESE15	ESE15	ESE15	ESE14	ESE16	SE22	ESE21	SE24	SE20	SE8.8	SE24
16-Apr	SE18	ESE9	ESE17	SE14	SE16	SE17	SE18	SSE14	SSE15	SE12	SE16	S12	SW19	WSW23	WSW23	WSW19	WSW18	WSW16	WSW16	SW11	SW14	SW19	SW18	S13	S10.3	WSW23
17-Apr	SSE17	SSE17	SSE18	SE19	SE19	SE19	SE18	ESE15	SE13	SE12	SE8	SE7	NE2	NE4	W7	W15	W19	W13	W8	S4	SE11	SE14	SSE19	SSE19	SSE8.8	SE19
18-Apr	SE18	SE16	SE16	SE17	SE18	SE21	SSE22	SE16	SE13	SE11	SE16	SE17	SSE25	S35	S35	S36	S36	SSE39	SSE33	SSE37	SSE32	SSE36	SSE37	SSE31	SSE24.7	SSE39
19-Apr	SSE31	S24	SSE21	S16	SSW13	SW16	WSW21	WNW25	NW17	W12	WSW29	WSW36	WSW35	WSW37	W39	W42	W47	W36	WNW34	W29	WNW25	WNW26	WNW26	NW28	W21.3	W47
20-Apr	N27	N31	N25	NNW28	NNW27	N28	N25	N29	N26	N24	NNW19	N17	NNE15	N15	N13	N14	N14	NNE13	NNE12	NNE13	NNE14	NNE11	NE10	ENE8	N18.6	N31
21-Apr	E7	ESE8	ESE6	ESE6	E5	ESE5	SE6	SE5	E3	NE3	WSW0	NW5	NNW8	NNE13	N17	N23	N27	N29	N29	NNE25	N24	NNE20	NNE19	N18	NNE10.4	N29
22-Apr	NNE16	N16	N13	N14	NNE12	NNE13	N11	NNE8	N8	N9	NNE8	ENE8	NE8	E6	ENE7	NE4	NNE7	ENE5	NNW17	NNE12	N12	ENE8	ESE12	ESE16	NNE8.5	NNW17
23-Apr	ESE13	ESE13	ESE12	ESE11	ESE10	ESE12	ESE9	E13	E7	E4	E9	E14	E14	E13	ESE13	ESE14	ESE14	ESE13	ESE14	SE18	ESE12	SE18	SE25	SE21	ESE12.8	SE25
24-Apr	SE19	SE18	SE14	ESE16	ESE17	ESE17	SE17	ESE13	ESE16	ESE15	ESE14	SSE20	SSE23	SSE22	SSE20	SSE17	SE13	E14	ESE18	ESE19	SE22	SSE20	S23	S25	SE16.8	S25
25-Apr	S25	SSE22	SSE14	SSE13	SE15	SSE17	SSE20	SSE20	SSE19	SSE17	SSE16	SSE13	SSE15	S17	S15	S15	S14	SSW13	SSW14	S13	S13	S16	S18	S17	SSE15.6	S25
26-Apr	S14	SSE17	SSE16	SSE20	SSE23	SSE19	SSE17	SSE16	SSE15	SSE11	SSE13	SSE13	SSE13	SSE12	SE10	SE9	ESE10	SE9	SE8	SSW7	S16	SE9	SE11	SSW9	SSE12.7	SSE23
27-Apr	WSW10	WNW12	WSW7	WNW5	WSW1	S4	SSE4	E3	E3	E7	ENE8	N4	NNW7	NW12	NNW10	NNW10	N9	ENE9	NE9	NNE11	NNE13	ENE13	E6	SE8	NNE3.2	NNE13
28-Apr	SE10	SE9	SE13	SE13	SE12	SE14	SE11	SE9	SE9	ESE8	ESE12	S17	SSE16	SSE18	SSE21	SSE20	SE18	SE18	SE14	SE12	SSE16	SSE18	SSE19	SSE17	SE13.8	SSE21
29-Apr	SSE23	SE19	SE22	SE20	SE19	SE19	SE17	SE19	SSE29	SSE29	SSE29	SSE31	SSE29	SSE33	SSE34	S32	S31	S24	S22	SSE18	SSE24	SSE23	SSE22	SSE20	SSE23.8	SSE34
30-Apr	SSE23	SSE21	SSE21	SSE22	SSE23	SSE20	SSE18	S18	SSE17	SSE21	S28	S30	S31	SSW29	WSW23	WSW23	WSW21	SSW7	SSE13	SSE10	SSE11	N8	NE10	ESE7	S14.9	S31
	SE7.2	ESE5.9	ESE5.7	ESE3.6	ESE3.8	ESE3.4	ESE4.2	ENE3.1	E3.2	E3.7	ESE3.3	SE3.5	S2.6	S3.0	SSW1.6	SSE0.9	NNE0.2	NE1.7	NE3.3	ENE3.4	E4.1	ESE4.8	SE5.6	SE6.3	Diurnal Average	
	SSE31	N31	N25	NNW28	NNW27	WNW29	N25	N29	SSE29	SSE29	WSW29	WSW36	WSW35	WSW37	W39	W42	W47	SSE39	WNW34	SSE37	SSE32	SSE36	SSE37	SSE31	Diurnal Maximum	

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: 12 km/h on Apr 19 11:00

Minimum Value: 1 km/h on Apr 15 01:00

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

Hours in Service:	720
Hours of Data:	718
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-Apr	2	2	2	1	2	5	5	5	5	5	5	5	4	4	4	3	3	3	3	1	2	3	3	3	5
2-Apr	3	4	4	4	5	5	4	4	3	3	3	3	3	4	5	5	5	6	5	6	4	4	3	4	6
3-Apr	3	3	3	4	4	4	3	3	4	4	5	3	4	4	3	3	3	2	2	2	2	2	1	2	5
4-Apr	3	1	2	4	1	1	3	2	3	2	3	3	3	3	2	3	2	1	2	2	2	2	4	3	4
5-Apr	1	1	1	1	1	2	2	2	1	2	2	6	4	5	4	4	4	3	3	3	2	3	AF	3	6
6-Apr	3	3	3	2	3	4	AF	4	4	4	4	3	4	3	3	4	4	4	5	4	4	4	4	3	5
7-Apr	2	3	2	2	2	2	1	2	1	2	2	2	3	2	3	3	3	3	3	2	3	2	2	3	3
8-Apr	4	5	5	5	4	5	6	5	5	6	7	7	7	7	7	7	7	7	7	7	7	7	4	5	7
9-Apr	5	6	4	5	3	4	4	5	5	4	6	6	6	6	6	6	5	6	7	6	4	4	3	4	7
10-Apr	4	4	5	4	4	4	4	4	4	3	3	3	4	3	4	3	3	2	1	2	2	2	4	3	5
11-Apr	3	3	3	3	3	3	2	2	3	3	3	3	3	4	3	4	3	2	1	3	3	1	3	2	4
12-Apr	1	2	3	3	5	3	7	4	3	2	3	3	3	4	3	3	3	3	4	5	4	3	4	2	7
13-Apr	3	3	4	3	4	5	4	4	4	4	4	4	4	3	2	3	5	7	2	3	2	1	1	1	7
14-Apr	1	2	4	5	5	4	4	3	4	4	3	3	5	3	4	3	2	3	3	2	3	2	2	2	5
15-Apr	1	1	1	1	1	1	1	1	2	2	4	4	4	5	4	4	4	4	4	5	5	6	5	4	6
16-Apr	5	3	6	4	2	2	2	3	3	3	4	6	6	5	6	5	5	4	3	1	2	1	2	5	6
17-Apr	2	3	4	2	2	2	4	3	2	3	3	3	3	3	4	5	5	3	4	2	2	2	2	3	5
18-Apr	2	2	1	1	2	2	2	3	3	3	5	4	6	8	7	7	7	7	5	6	5	5	4	4	8
19-Apr	5	5	3	3	2	5	5	5	4	4	12	7	9	9	7	8	8	6	5	5	4	3	4	7	12
20-Apr	6	6	5	6	6	6	6	6	5	6	5	5	4	4	5	4	4	3	2	2	2	2	2	2	6
21-Apr	3	3	2	3	1	2	2	2	2	2	2	3	5	6	5	5	5	5	5	4	3	3	3	3	6
22-Apr	2	2	2	1	2	1	2	2	3	3	4	4	4	4	4	3	3	2	7	5	2	2	5	5	7
23-Apr	4	4	4	4	4	4	4	4	4	2	3	5	5	5	6	4	4	4	4	4	4	6	6	4	6
24-Apr	5	4	3	3	4	4	4	4	4	4	4	4	7	5	4	5	4	4	5	5	4	3	5	5	7
25-Apr	4	4	3	2	2	3	4	4	4	3	3	3	4	3	4	4	3	2	2	2	1	1	1	2	4
26-Apr	2	2	2	3	3	2	3	3	2	4	4	3	3	3	2	2	3	3	2	1	4	2	2	2	4
27-Apr	2	1	2	2	2	1	1	1	2	2	3	4	3	4	4	3	3	3	2	3	2	3	4	4	4
28-Apr	4	4	2	1	1	1	2	3	2	3	4	4	6	6	6	5	5	4	3	2	2	2	2	2	6
29-Apr	2	2	3	3	4	4	3	5	6	6	7	8	8	8	7	6	7	7	4	2	2	2	2	1	8
30-Apr	2	1	2	3	2	4	3	3	4	5	6	6	6	8	5	5	7	3	3	4	2	5	2	2	8
	6	6	6	6	6	6	7	6	6	6	12	8	9	9	7	8	8	7	7	7	7	7	6	7	
	Diurnal Maximum																								

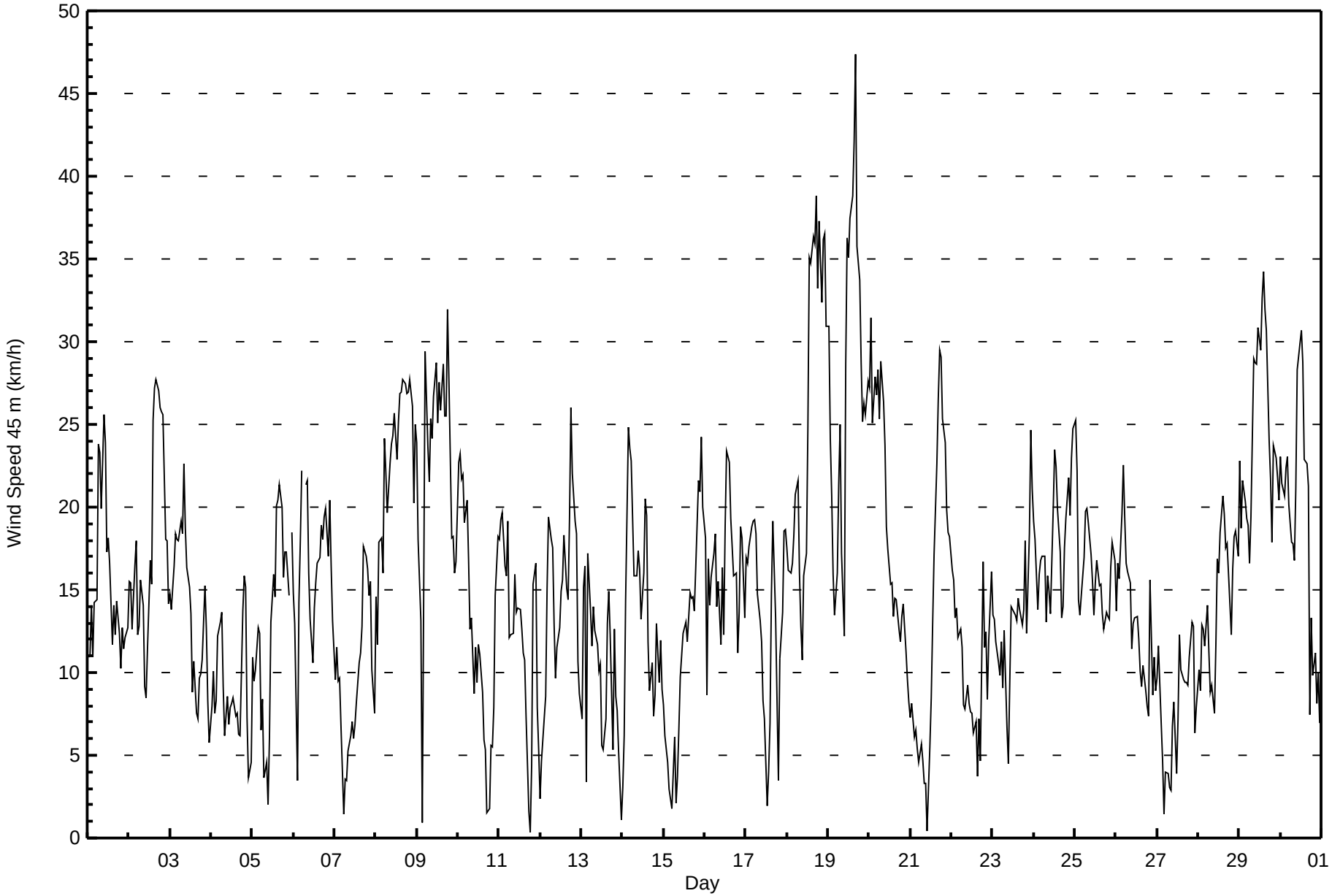
AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed 45 m (WS45m) - km/h

Mannix - April 2016



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	53	7.38	7.38
6 - 11	156	21.73	29.11
12 - 19	333	46.38	75.49
20 - 28	134	18.66	94.15
29 - 38	38	5.29	99.44
> 38	4	0.56	100.00

Total Number of Valid Hours: 718

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Wind Speed 45 m (WS45m) - km/h

Mannix - April 2016

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	4	1	6	4	7	3	5	4	5	2	2	2	0	2	1	5	53
6 - 11	15	22	10	8	11	20	32	7	3	3	1	5	4	3	4	8	156
12 - 19	44	23	2	2	12	52	67	45	17	4	4	5	5	7	15	29	333
20 - 28	19	4	0	0	0	15	16	30	8	0	0	6	0	6	4	26	134
29 - 38	4	0	0	0	0	0	0	14	8	1	0	4	2	2	1	2	38
> 38	0	0	0	0	0	0	0	1	0	0	0	0	3	0	0	0	4
Totals	86	50	18	14	30	90	120	101	41	10	7	22	14	20	25	70	718

Total Number of Valid Hours: 718

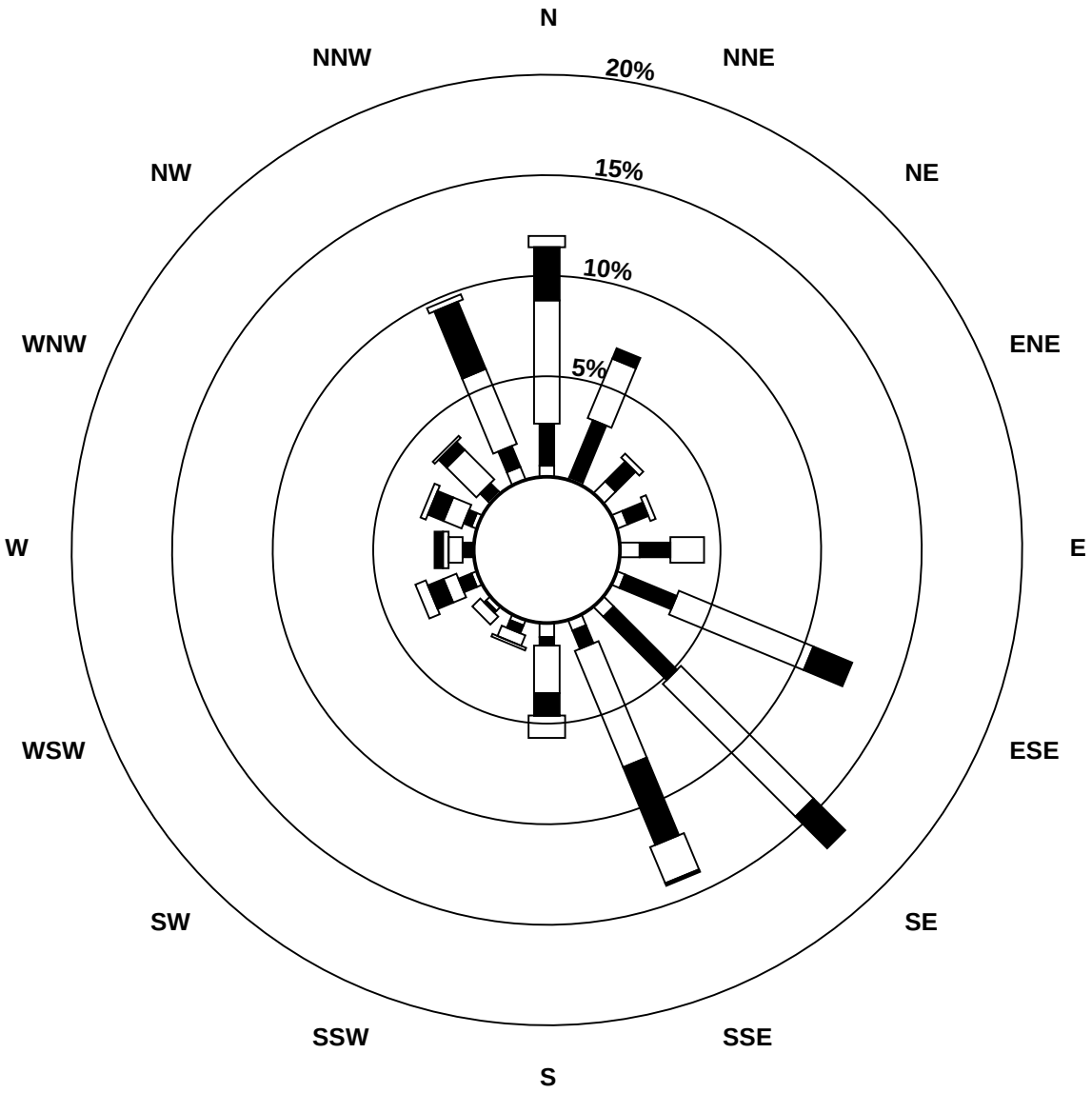
Total Number of Hours: 720

Wood Buffalo Environmental Association

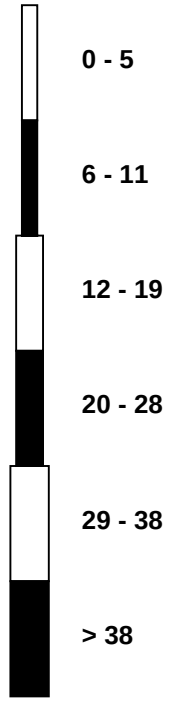
Wind Rose Apr 2016

Wind Speed 45 m (WS45m) - km/h

Mannix (AMS 5)



Classes (km/h)



Total Number of Valid Hours: 718

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed 75 m (WS75m) - km/h

Mannix - April 2016

Maximum Speed: 49 km/h on Apr 19 17:00

Maximum Daily Speed Average: 29.1 km/h on Apr 18

Minimum Speed Value: 1 km/h on Apr 14 00:00

Minimum Daily Speed Average: 4.1 km/h on Apr 27

Maximum Diurnal Speed Average: 8.1 km/h at hour 1

Minimum Diurnal Speed Average: 0.6 km/h at hour 16

Monthly Average Velocity: 3.3 km/h 116.1 deg

Percentiles: P_1 = 2 P_{10} = 7 Q_1 = 10 Median = 16 Q_3 = 22 P_{90} = 29 P_{99} = 40

Hours in Service: 720

Hours of Data: 718

Hours of Missing Data: 2

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-Apr	SSW9	WSW15	W20	W15	W18	NNW18	N27	N26	N22	N28	N26	N19	N20	NNE18	NNE13	NNE15	NNE13	NE16	NE15	NE13	ENE15	E10	ESE10	E10	N11.1	N28
2-Apr	ESE11	ESE11	ESE11	ESE12	ESE15	ESE11	E11	E15	E12	E9	NE9	NE12	NW16	WNW15	NNW27	NNW31	NNW32	NNW32	N29	N29	N27	N20	NNW21	NNW15	NNE11.2	NNW32
3-Apr	NNW15	NNW15	NNW18	NNW21	NNW22	NNW22	N22	NNW21	NNW24	NNW20	NNW17	NW15	NNW14	N9	NNW11	N8	NNE8	NNE10	NNE11	NNE12	NNE18	NNE14	ENE8	ESE9	N13.5	NNW24
4-Apr	SE9	SE13	SE12	SE12	SE13	SE11	SE14	SE9	SE7	SE8	SE7	ESE7	ESE7	SE8	SE8	SE7	NNE7	NE7	N15	N19	NNE18	ENE9	E5	NE3	ESE6.2	N19
5-Apr	NNE9	NE7	NE8	NE11	NE11	NNE8	NNE8	NNE5	NNE5	ESE3	SE6	SSE14	SSE17	SE15	SSE21	SSE22	SSE23	S22	SSE18	SSE20	SSE21	SE19	AF	AF	SE8.7	SSE23
6-Apr	SE20	SSE18	WSW8	WNW19	NW22	NW27	NNW23	NNW23	NNW24	N18	NNW14	NNW12	NW16	NW17	N18	N19	N22	N21	N22	NNE23	NNE19	NNE24	N19	N15	NNW14.3	NW27
7-Apr	N10	NNE13	NNE11	NNE11	NNE7	SSW1	SW3	SSE3	SSE5	SE6	ESE6	ESE5	ENE8	NE8	NNE11	NE12	N14	N19	N19	NNE19	NNE17	NNE19	NE13	E8	NNE8.1	NNE19
8-Apr	ESE10	ESE10	ESE15	ESE14	ESE12	ESE19	ESE18	ESE16	SE23	SE22	SE23	ESE21	ESE18	ESE20	ESE21	ESE21	ESE24	SE25	SE26	ESE24	SE25	SE28	SE22	SE29	ESE20.1	SE29
9-Apr	SE26	SE17	SE14	E1	NW17	WNW34	NW27	NW24	NNW29	NNW27	NNW30	NNW32	NNW28	NNW30	NNW28	NNW32	NNW28	NNW29	NNW36	NNW31	NNW22	NNW22	NNW18	NNW20	NNW19.8	NNW36
10-Apr	NNW26	NNW26	NNW25	NNW25	NNW22	NNW22	N19	NNW13	NNW14	N10	NNE12	NNE10	NW12	NW11	NW8	NE6	ENE6	NE2	E2	SE5	ESE4	ESE6	SE13	SE23	N8.8	NNW26
11-Apr	SE24	SE26	SE26	SE21	SE21	SE25	SE15	SE16	SE15	SE17	SE14	SE14	SE14	SE12	SE11	SE11	E7	NNE2	SSW1	S5	S17	S22	S9	SE7	SE13.9	SE26
12-Apr	SE7	SSE6	S12	WNW8	N20	N22	N22	NNW19	N14	NW10	NW11	NW13	N16	N16	N20	N16	N16	N22	N29	N26	N23	NNE20	ENE12	ENE10	N12.8	N29
13-Apr	E9	E15	E13	SSE6	E14	ESE11	ESE9	SE13	ESE10	ESE9	ESE9	SE9	E5	SE5	SSE8	SE11	ESE11	SE11	SE5	ESE11	SE10	SSE9	S7	NNW1	ESE8.3	E15
14-Apr	NE3	N7	N18	N29	N28	N27	NNW24	NNW19	N17	N19	NNW18	NNW14	NW17	WNW22	WNW21	NW12	N10	N12	NNW9	NW10	NNW15	NNW11	WNW14	W12	NNW14.7	N29
15-Apr	W9	WNW7	NNW4	N3	NE1	SSE4	SSW6	S3	SE4	ESE6	SE9	SE12	SE12	SE13	ESE11	ESE12	ESE11	ESE11	ESE11	ESE12	SE21	ESE19	SE26	SE22	SE8.2	SE26
16-Apr	SE21	SE8	ESE16	SE16	SE18	SE20	SE23	SE20	SSE20	SSE15	SSE18	S14	SW20	WSW25	WSW25	WSW21	WSW19	WSW18	WSW18	WSW14	SW15	SW19	SW26	SSW14	SSW11.7	SW26
17-Apr	SSE20	SSE23	SSE23	SSE24	SE24	SE26	SE21	SE19	SE20	SSE13	SE8	SE6	NE2	NNE3	W8	W16	W20	W14	W9	SSW3	SE10	SE18	SSE25	SSE25	SSE11.5	SE26
18-Apr	SSE21	SE22	SE21	SSE18	SE19	SSE27	SSE25	SSE21	SE16	SE12	SE17	SE18	SSE27	S38	S38	S40	S41	SSE44	SSE39	SSE44	SSE40	SSE44	SSE43	SSE38	SSE29.1	SSE44
19-Apr	S37	S29	S25	S19	SSW16	SW21	WSW25	NW28	NW18	W13	WSW30	WSW39	WSW38	WSW42	W41	W44	W49	W38	WNW38	W33	NW31	WNW31	WNW31	NW31	W24.1	W49
20-Apr	N32	N35	N28	N31	N30	N32	N28	N32	N29	N26	N20	N19	NNE16	N17	N14	NNE16	N16	NNE13	NNE13	NNE15	NNE18	NNE15	ENE12	ENE9	N20.6	N35
21-Apr	ESE7	ESE7	SE7	ESE7	ESE4	SE6	SE6	ESE4	E4	NE4	NW1	NW6	N9	NNE14	N19	N25	N29	N32	N33	NNE29	NNE28	NNE25	NNE23	NNE22	NNE11.9	NNE33
22-Apr	NNE19	NNE17	NNE14	NNE14	NE11	NE13	NNE12	NNE8	NNE8	N10	NE9	ENE8	NE8	ENE6	ENE8	ENE4	NE8	ENE5	N17	NNE12	NNE13	ENE9	ESE11	ESE12	NE9.3	NNE19
23-Apr	ESE11	ESE10	ESE9	ESE9	ESE9	ESE9	ESE7	E10	E6	E4	E8	E13	E14	E13	ESE12	ESE12	ESE11	ESE11	ESE10	SE18	ESE10	SE17	SE25	SE23	ESE11.3	SE25
24-Apr	SE21	SE19	SE14	SE14	ESE14	SE16	SE16	ESE11	ESE12	ESE12	ESE11	SSE21	SSE25	SSE24	SSE22	SSE19	SE13	ESE11	ESE16	ESE16	SE23	SSE22	S26	S28	SE16.8	S28
25-Apr	S29	S25	SSE18	SSE16	SE17	SSE19	SSE22	SSE22	SSE21	SSE18	SSE16	SSE14	SSE16	S18	S17	S16	S14	SSW13	SSW15	S15	S15	S18	S21	SSW23	S17.4	S29
26-Apr	S17	S22	SSE20	SSE24	SSE27	SSE23	SSE19	SSE17	SSE16	SSE12	SSE14	SSE14	SSE14	SSE13	SE11	SE8	SE9	SE9	SE8	S8	S17	SSE10	SE13	SSW10	SSE14.3	SSE27
27-Apr	WSW9	W14	WSW7	NW4	NE2	SSE5	SSW4	ENE3	ENE4	ENE8	ENE9	N5	NNW7	NW12	NNW11	NNW10	N10	NE10	NE10	NNE14	NE17	ENE15	E7	ESE7	NNE4.1	NE17
28-Apr	ESE8	SE11	SE14	SE15	SE15	SE14	SE14	SSE12	SE9	ESE7	SE11	S18	SSE17	SSE20	SSE22	SSE21	SE18	SE18	SE16	SSE15	SSE21	SSE24	SSE26	SSE24	SSE15.7	SSE26
29-Apr	SSE28	SSE25	SE28	SE27	SE25	SE24	SE21	SE23	SSE31	SSE31	SSE31	SSE33	SSE32	SSE36	SSE37	S35	S34	S26	S25	S21	SSE29	S30	S28	S27	SSE28.0	SSE37
30-Apr	SSE27	S27	S26	SSE27	SSE29	SSE26	SSE22	S20	S18	SSE23	S31	S32	S34	SSW32	WSW24	WSW25	WSW22	SSW9	SSE15	SSE11	SSE12	N9	NE15	ESE7	S17.4	S34
	SE8.1	SE6.9	SE6.4	ESE4.2	ESE4.2	ESE3.8	E3.9	E3.4	E3.4	E3.8	ESE3.2	SE3.3	SSE2.5	S2.9	SSW1.5	S0.6	NNW0.6	NE2.0	NNE3.8	ENE3.8	E5.0	ESE5.7	SE6.7	SE7.3	Diurnal Average	
	S37	N35	SE28	N31	N30	WNW34	N28	N32	SSE31	SSE31	SSE31	WSW39	WSW38	WSW42	W41	W44	W49	SSE44	SSE39	SSE44	SSE40	SSE44	SSE43	SSE38	Diurnal Maximum	

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: 12 km/h on Apr 19 11:00

Minimum Value: 0 km/h on Apr 15 01:00

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

Hours in Service:	720
Hours of Data:	718
Hours of Missing Data:	2
Hours of Calibration:	0
Percent Operational Time:	99.7

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

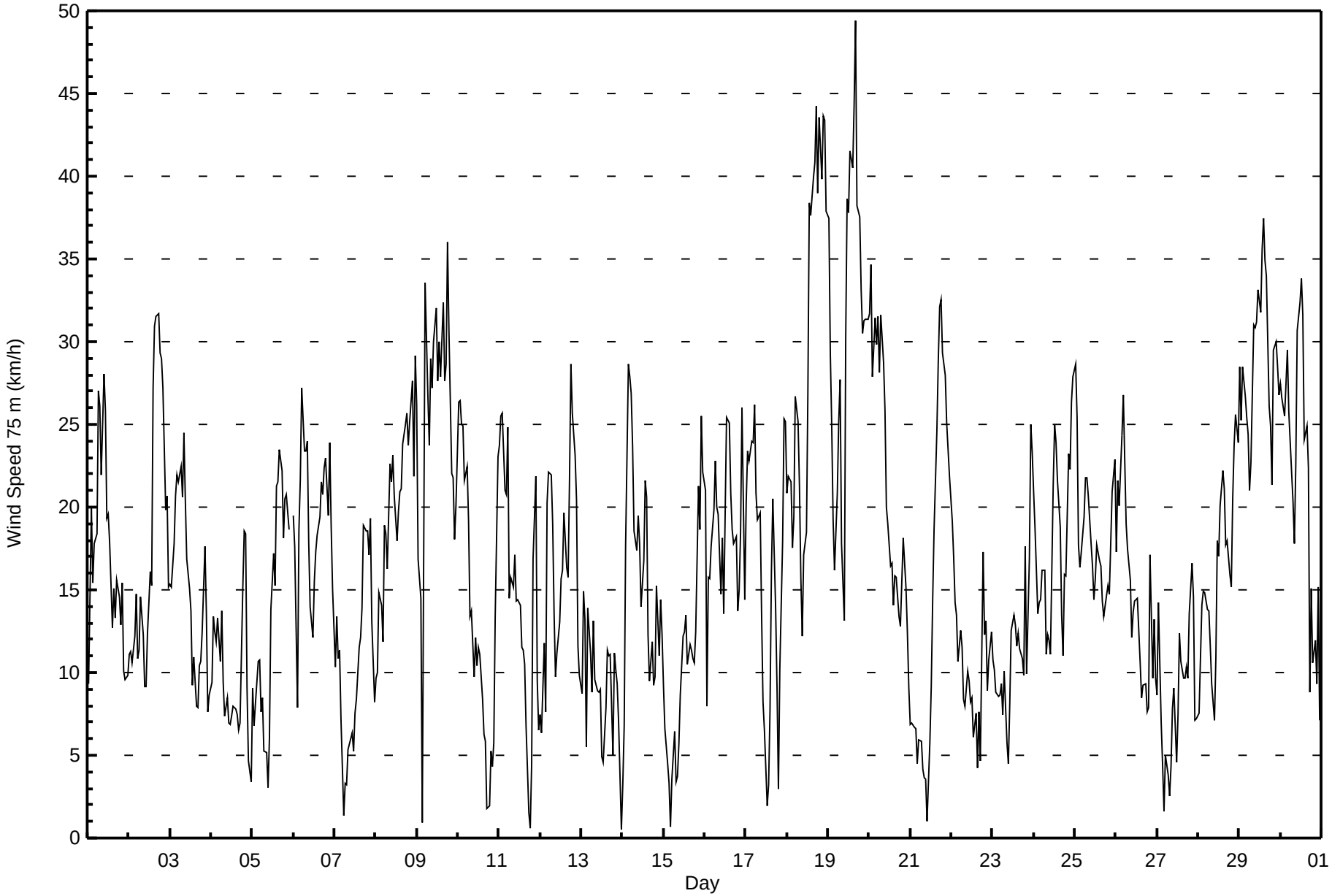
AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed 75 m (WS75m) - km/h

Mannix - April 2016



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	47	6.55	6.55
6 - 11	175	24.37	30.92
12 - 19	241	33.57	64.48
20 - 28	183	25.49	89.97
29 - 38	59	8.22	98.19
> 38	13	1.81	100.00

Total Number of Valid Hours: 718

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Wind Speed 75 m (WS75m) - km/h

Mannix - April 2016

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	2	4	7	4	6	5	4	4	2	4	1	0	0	0	2	2	47
6 - 11	10	14	14	12	11	46	35	6	3	4	0	3	3	2	6	6	175
12 - 19	26	31	9	4	8	22	48	29	15	4	2	5	7	3	11	17	241
20 - 28	26	7	0	0	0	6	40	45	14	1	3	7	2	2	5	25	183
29 - 38	12	3	0	0	0	0	1	10	11	1	0	2	2	4	2	11	59
> 38	0	0	0	0	0	0	0	6	2	0	0	2	3	0	0	0	13
Totals	76	59	30	20	25	79	128	100	47	14	6	19	17	11	26	61	718

Total Number of Valid Hours: 718

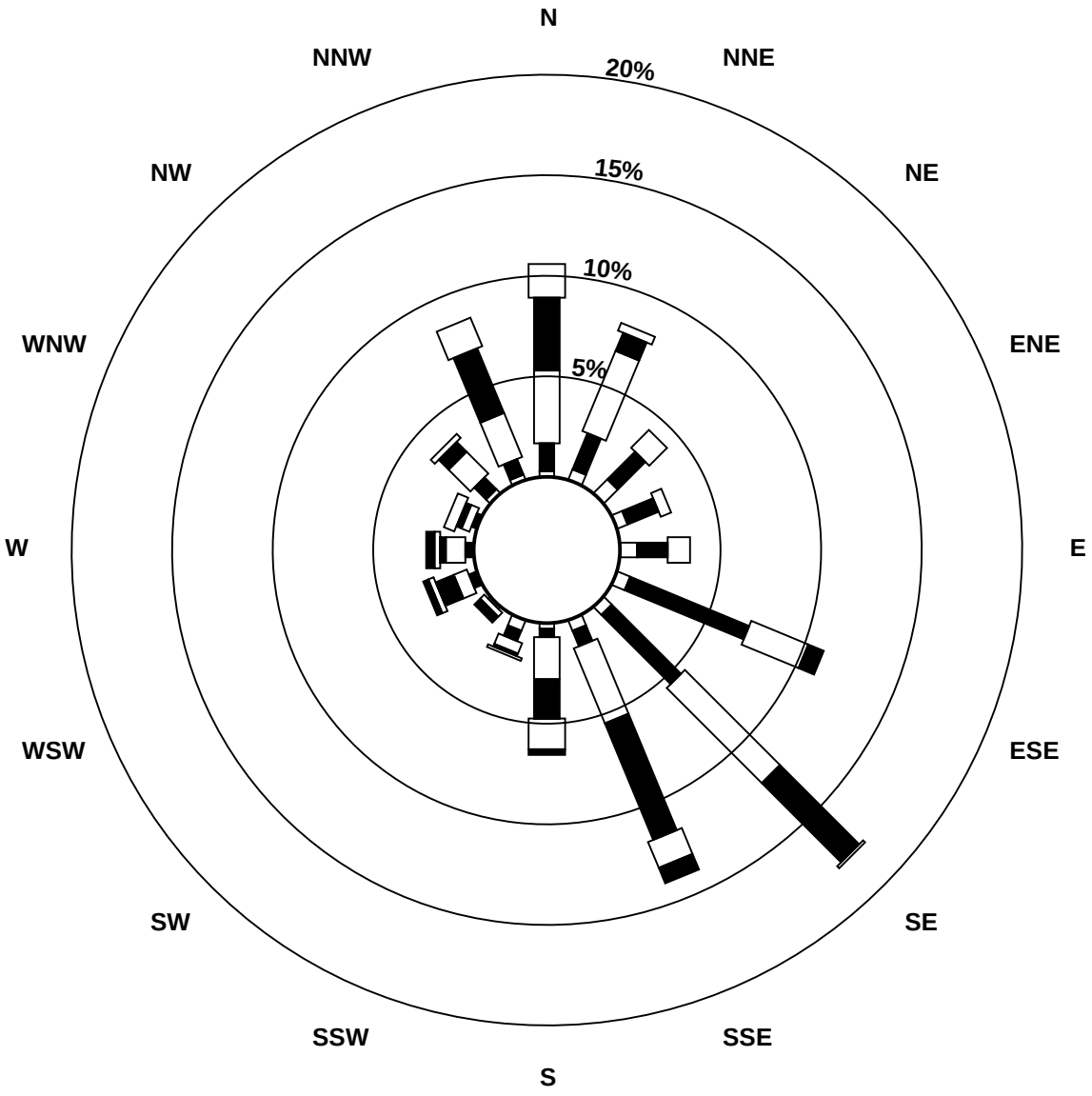
Total Number of Hours: 720

Wood Buffalo Environmental Association

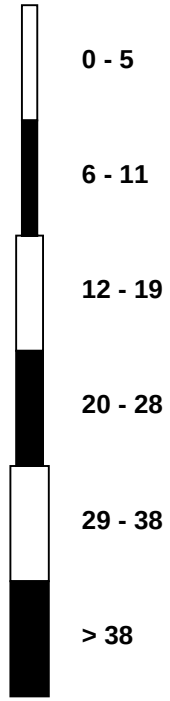
Wind Rose Apr 2016

Wind Speed 75 m (WS75m) - km/h

Mannix (AMS 5)



Classes (km/h)



Total Number of Valid Hours: 718

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed 90 m (WS90m) - km/h

Mannix - April 2016

Maximum Speed: 49 km/h on Apr 19 17:00

Maximum Daily Speed Average: 30.3 km/h on Apr 18

Minimum Speed Value: 0 km/h on Apr 14 00:00

Minimum Daily Speed Average: 4.4 km/h on Apr 27

Maximum Diurnal Speed Average: 10.0 km/h at hour 1

Minimum Diurnal Speed Average: 0.8 km/h at hour 17

Monthly Average Velocity: 4.4 km/h 122.3 deg

Percentiles: P_1 = 2 P_{10} = 8 Q_1 = 12 Median = 18 Q_3 = 24 P_{90} = 31 P_{99} = 44

Hours in Service:	720
Hours of Data:	718
Hours of Missing Data:	2
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-Apr	SW9	W16	W22	W17	WNW19	NNW20	N28	N27	N23	N29	N27	N20	N20	NNE18	NNE13	NNE15	NNE14	NE16	NE15	NE13	ENE16	E15	ESE16	ESE15	N11.4	N29
2-Apr	ESE20	ESE20	ESE16	ESE22	ESE21	ESE15	E14	E18	E15	E11	NE10	NE13	NW15	WNW15	NNW28	NNW32	NNW33	N34	N30	N30	N28	N20	N21	NNW16	NNE11.6	N34
3-Apr	NNW15	NNW15	NNW19	NNW22	NNW22	NNW22	N23	N22	NNW25	NNW21	NNW17	NNW15	NNW14	N9	NNW11	N8	NNE8	NNE11	NNE11	NNE13	NNE18	NE14	E8	SE12	N13.5	NNW25
4-Apr	SE13	SE15	SSE14	SE14	SE15	SE13	SE17	SE12	SE9	SE10	SE8	ESE9	SE9	SE9	SE9	SE8	NE6	NE7	N15	NNE20	NNE20	ENE12	E7	ENE3	ESE7.6	NNE20
5-Apr	NE8	E7	ENE8	ENE10	NE10	NE7	NE8	NE5	NE5	ESE5	SE7	SSE15	SSE18	SSE16	SSE22	SSE22	SSE24	S23	SSE19	S22	SSE23	SE21	AF	AF	SE10.4	SSE24
6-Apr	SSE23	S20	WSW10	WNW20	NW23	NW28	NNW25	NNW24	N26	N19	NNW14	NNW13	NW16	NW18	N19	N20	N22	N22	N23	NNE24	NNE20	NNE25	N20	N16	NNW14.9	NW28
7-Apr	N10	NNE14	NNE11	NE12	NE7	S2	SW3	SSE3	SSE6	SSE7	SE7	ESE6	ENE8	NE8	NNE11	NE12	N14	N19	NNE19	NNE19	NNE18	NNE21	NE14	E11	NE8.3	NNE21
8-Apr	ESE18	ESE14	ESE20	ESE20	ESE17	ESE25	ESE24	ESE21	SE26	SE26	SE27	ESE27	ESE27	ESE28	ESE31	ESE33	ESE31	SE31	SE32	ESE31	SE33	SE33	SE27	SE34	ESE26.4	SE34
9-Apr	SE31	SE22	SE18	SE2	NW17	WNW35	NW28	NW25	NNW30	NNW28	NNW32	NNW33	NNW29	NNW31	NNW29	NNW34	NNW28	NNW30	N38	NNW32	NNW24	NNW23	NNW19	NNW21	NNW20.3	N38
10-Apr	NNW28	NNW28	NNW26	NNW26	NNW22	NNW23	N20	N13	NNW14	N10	NNE12	NNE10	NW11	NW11	NW8	NE6	ENE6	ENE2	E2	ESE7	ESE8	ESE11	SE17	SE27	N8.6	NNW28
11-Apr	SE28	SE29	SE29	SE24	SE24	SE28	SSE17	SE19	SE17	SE18	SE16	SE15	SE16	SE14	SE13	SE12	ESE8	ENE1	SSW1	S5	S18	S24	SSW10	SE10	SE15.7	SE29
12-Apr	SSE11	SSE8	S14	WNW6	N21	N24	N24	NNW20	N14	NNW9	NW11	NNW13	N16	N16	N20	N16	N16	N22	N30	N27	N24	NE20	ENE13	E12	N12.7	N30
13-Apr	E12	E20	E20	SSE8	E21	ESE17	ESE13	SE16	ESE13	ESE12	SE11	SE11	E6	SE6	SSE9	SE14	ESE18	SE14	SE7	ESE14	SE12	SSE10	S8	W0	ESE11.3	E21
14-Apr	NE3	N7	N19	N31	N30	N29	NNW25	N20	N18	N20	N19	NNW14	NW17	WNW21	WNW21	NW12	N10	N12	N10	NW10	NNW16	NNW11	WNW15	W13	NNW15.4	N31
15-Apr	W9	WNW7	NNW4	N4	E2	SE4	S7	S5	SE4	SE7	SE10	SE14	SE14	SE15	SE13	ESE15	ESE15	ESE15	ESE18	ESE20	SE26	ESE25	SE30	SE27	SE10.8	SE30
16-Apr	SE26	SE14	SE22	SE19	SE21	SE24	SE27	SSE24	S21	SSE16	SSE20	S15	SW20	WSW26	WSW25	WSW21	WSW19	WSW18	WSW19	WSW15	WSW16	SW18	SW28	SW15	SSW12.7	SW28
17-Apr	S19	S24	S21	SSE21	SSE22	SSE26	SSE20	SE22	SSE23	SSE15	SE10	SE7	NE2	NNE3	W8	W17	W21	W14	W9	SSW3	SE11	SE20	SSE27	S26	S12.0	SSE27
18-Apr	S21	SSE23	SSE22	SSE15	SSE16	SSE24	SSE22	SSE24	SE17	SE15	SE19	SE20	SSE28	S40	S39	S41	S42	S46	SSE41	SSE47	SSE44	SSE48	SSE47	SSE41	SSE30.3	SSE48
19-Apr	S40	S31	S27	SSW21	SW18	WSW23	WSW27	NW28	NW18	W13	W30	WSW39	WSW38	WSW42	W40	W44	W49	W39	WNW39	W34	NW32	WNW33	WNW33	NW33	W25.0	W49
20-Apr	NNE33	N36	N29	N33	N31	N32	N29	N32	N30	N27	N20	N19	NNE17	N17	NNE14	NNE16	NNE16	NNE14	NNE13	NNE16	NNE20	NE16	ENE14	E11	N21.2	N36
21-Apr	ESE10	ESE10	SE9	ESE9	ESE7	SE9	SE8	SE5	ESE4	NE3	W1	NW6	N9	NNE15	NNE19	N25	N29	NNE33	NNE34	NNE31	NNE30	NNE27	NNE25	NNE23	NNE12.2	NNE34
22-Apr	NNE19	NNE16	NNE13	NE12	ENE11	NE12	NE11	NNE8	NNE8	NNE10	NE10	ENE9	NE9	E7	ENE8	ENE5	NE8	E5	N17	NE12	NNE13	E11	ESE15	ESE20	NE9.5	ESE20
23-Apr	ESE17	ESE16	ESE15	ESE14	ESE13	ESE16	ESE10	ESE14	E8	E5	E10	ESE16	E16	E15	ESE15	ESE15	ESE16	ESE14	ESE15	SE21	ESE13	SE22	SE29	SE26	ESE15.1	SE29
24-Apr	SE25	SE22	SE16	SE18	ESE19	SE20	SE20	SE14	ESE16	ESE16	ESE15	SSE22	SSE26	SSE25	SSE23	SSE20	SE16	ESE17	ESE21	ESE22	SE27	SSE24	S27	S29	SE19.5	S29
25-Apr	S30	S27	S20	SSE18	SSE19	SSE21	SSE23	SSE23	SSE22	SSE19	SSE17	SSE15	SSE17	S18	S17	S17	SSW15	SW14	SSW15	SSW16	S15	SSW18	S21	SSW25	S18.4	S30
26-Apr	SSW19	S23	S22	SSE26	SSE29	SSE25	SSE20	SSE18	SSE16	SSE13	SSE14	SSE15	SSE15	SSE13	SSE11	SE9	SE11	SE10	SE9	SSW8	S18	SSE13	SE15	S10	SSE15.4	SSE29
27-Apr	WSW8	W13	WSW6	NNW4	ENE2	SSE6	SSW5	NE2	NE7	ENE9	ENE9	N4	NNW7	NW12	N10	NNW9	N9	ENE11	NE10	NNE14	NE18	E18	ESE10	ESE9	NNE4.4	E18
28-Apr	ESE10	SE13	SE16	SE17	SSE17	SE17	SE19	SSE14	SE10	SE9	SE13	S18	SSE18	SSE21	SSE23	SSE22	SE19	SE21	SE18	SSE17	SSE23	SSE26	SSE29	SSE28	SSE17.8	SSE29
29-Apr	SSE31	SSE29	SSE33	SE31	SE29	SE28	SE24	SSE25	SSE32	SSE32	SSE32	SSE35	SSE33	SSE37	SSE39	S36	S35	S27	S26	S23	S32	S34	S32	S30	SSE30.2	SSE39
30-Apr	S29	S29	S27	SSE29	SSE33	S29	S24	S22	S18	S23	S31	S33	SSW35	SSW33	WSW24	WSW25	WSW22	SSW9	SSE16	SSE11	SSE13	N9	NE17	ESE11	S18.5	SSW35
	SE10.0	SE8.7	SE7.9	SE5.3	ESE5.4	ESE5.1	ESE4.8	E4.1	E4.0	E4.4	ESE3.9	SE4.0	SSE3.1	S3.4	S1.8	SE1.2	ENE0.8	ENE2.5	NE4.1	ENE4.5	E5.9	ESE7.3	ESE8.2	SE9.1	Diurnal Average	
	S40	N36	SSE33	N33	SSE33	WNW35	N29	N32	SSE32	SSE32	SSE32	WSW39	WSW38	WSW42	W40	W44	W49	S46	SSE41	SSE47	SSE44	SSE48	SSE47	SSE41	Diurnal Maximum	

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: 12 km/h on Apr 19 11:00

Minimum Value: 0 km/h on Apr 15 07:00

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

Hours in Service:	720
Hours of Data:	718
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-Apr	2	3	2	1	1	5	5	5	5	5	5	5	4	3	4	3	3	3	2	2	1	3	4	4	5
2-Apr	3	5	4	4	5	5	4	4	4	3	3	3	3	4	5	4	5	5	3	5	2	3	3	4	5
3-Apr	3	3	3	4	4	4	3	3	4	4	5	3	3	4	4	3	3	2	2	2	1	2	2	4	5
4-Apr	4	1	2	2	2	3	3	2	3	3	3	3	3	3	2	2	2	1	3	2	2	3	4	2	4
5-Apr	2	2	1	1	1	1	1	1	1	3	3	6	4	5	4	4	3	3	3	3	2	2	AF	AF	6
6-Apr	3	3	4	2	4	3	4	5	4	4	4	3	5	3	3	4	3	4	5	3	4	3	5	4	5
7-Apr	2	2	2	2	2	1	1	1	1	2	2	2	3	2	3	2	2	3	2	2	2	2	2	4	4
8-Apr	4	5	5	4	4	4	6	4	5	6	7	6	6	6	6	6	6	8	7	7	7	7	5	6	8
9-Apr	5	7	4	5	5	3	5	6	4	4	6	5	6	6	6	6	6	5	7	6	3	4	4	5	7
10-Apr	4	4	5	4	4	4	5	3	4	3	3	4	4	4	4	3	3	2	2	2	2	2	6	3	6
11-Apr	3	3	2	2	2	2	4	2	2	3	3	3	3	4	4	3	3	2	1	3	5	2	6	3	6
12-Apr	2	2	3	4	7	3	8	4	3	3	2	3	3	4	3	3	3	3	3	3	2	3	5	5	8
13-Apr	4	2	5	3	6	7	4	4	4	4	4	4	4	2	1	4	5	6	3	3	2	1	2	1	7
14-Apr	1	3	5	4	5	4	3	3	4	4	3	3	5	4	3	3	2	2	2	3	3	3	2	3	5
15-Apr	0	2	1	1	1	2	0	3	2	2	4	4	4	5	4	4	4	3	5	5	6	5	6	4	6
16-Apr	6	4	6	6	3	3	3	4	3	3	4	5	6	5	6	4	6	4	3	1	1	3	2	7	7
17-Apr	3	2	4	5	2	2	4	2	2	3	3	4	3	3	5	4	5	3	3	1	3	3	3	1	5
18-Apr	2	3	3	2	4	2	2	3	2	3	4	3	6	7	7	6	6	6	5	5	5	4	4	5	7
19-Apr	5	5	4	4	3	7	5	5	4	4	12	7	9	8	6	8	8	6	5	5	4	3	4	6	12
20-Apr	6	6	5	5	5	6	6	6	5	5	5	5	4	4	5	4	4	3	2	2	1	2	2	3	6
21-Apr	3	3	3	4	2	3	4	2	2	2	2	3	6	7	5	4	5	4	4	4	3	3	2	2	7
22-Apr	2	1	2	2	2	1	2	2	3	4	4	4	4	4	4	2	3	2	7	4	3	3	5	5	7
23-Apr	5	4	4	5	5	5	4	5	5	3	4	6	5	5	5	4	5	4	4	4	4	7	6	4	7
24-Apr	5	4	3	4	4	4	4	4	3	3	4	4	7	4	4	5	4	5	5	4	5	3	5	5	7
25-Apr	4	3	3	2	2	2	4	3	4	3	3	3	4	3	3	3	2	2	2	2	2	1	3	1	4
26-Apr	2	1	2	2	3	2	3	3	2	3	3	2	3	3	2	2	3	3	2	1	5	3	2	1	5
27-Apr	2	2	3	3	1	1	1	2	2	2	3	3	4	4	3	3	4	3	2	3	1	3	5	3	5
28-Apr	2	6	2	1	2	3	2	4	2	3	4	5	6	5	7	5	5	5	3	3	4	2	2	2	7
29-Apr	1	2	2	3	3	4	3	5	6	6	7	7	8	7	7	7	6	7	5	2	2	2	3	2	8
30-Apr	2	2	2	2	2	3	3	3	3	4	5	6	6	9	4	5	7	3	3	4	3	6	3	3	9
	6	7	6	6	7	7	8	6	6	6	12	7	9	9	7	8	8	8	7	7	7	7	6	7	
	Diurnal Maximum																								

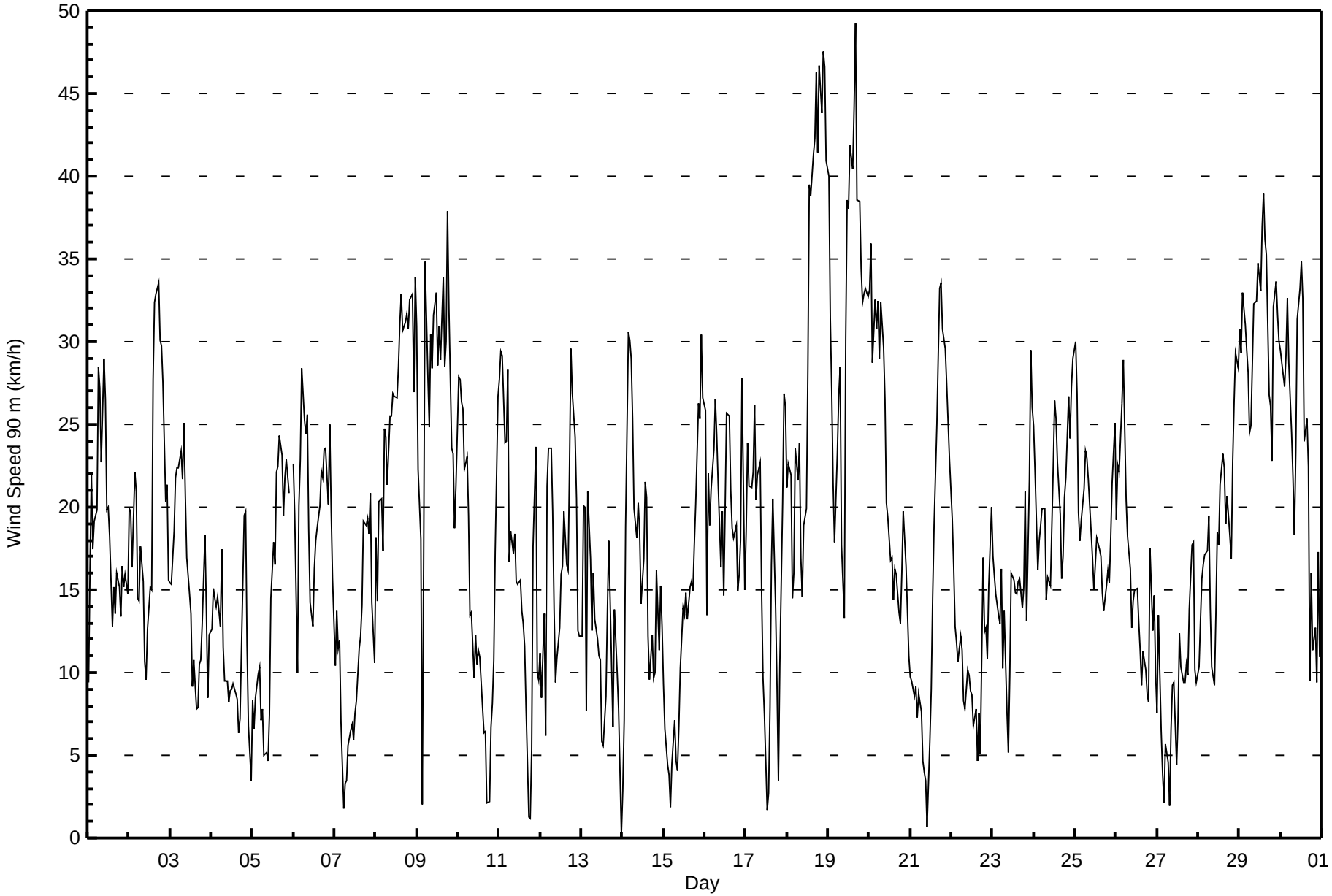
AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed 90 m (WS90m) - km/h

Mannix - April 2016



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	36	5.01	5.01
6 - 11	136	18.94	23.96
12 - 19	240	33.43	57.38
20 - 28	199	27.72	85.10
29 - 38	87	12.12	97.21
> 38	20	2.79	100.00

Total Number of Valid Hours: 718

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Wind Speed 90 m (WS90m) - km/h

Mannix - April 2016

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	2	1	6	5	3	3	4	1	3	3	1	0	2	0	0	2	36
6 - 11	11	9	16	10	11	16	27	10	3	3	1	3	3	2	6	5	136
12 - 19	19	25	14	4	9	37	45	30	11	5	4	5	7	3	8	14	240
20 - 28	28	10	1	0	3	17	32	39	23	2	2	8	2	3	5	24	199
29 - 38	18	5	0	0	0	4	11	14	14	2	0	1	2	3	2	11	87
> 38	0	0	0	0	0	0	0	7	6	0	0	2	4	1	0	0	20
Totals	78	50	37	19	26	77	119	101	60	15	8	19	20	12	21	56	718

Total Number of Valid Hours: 718

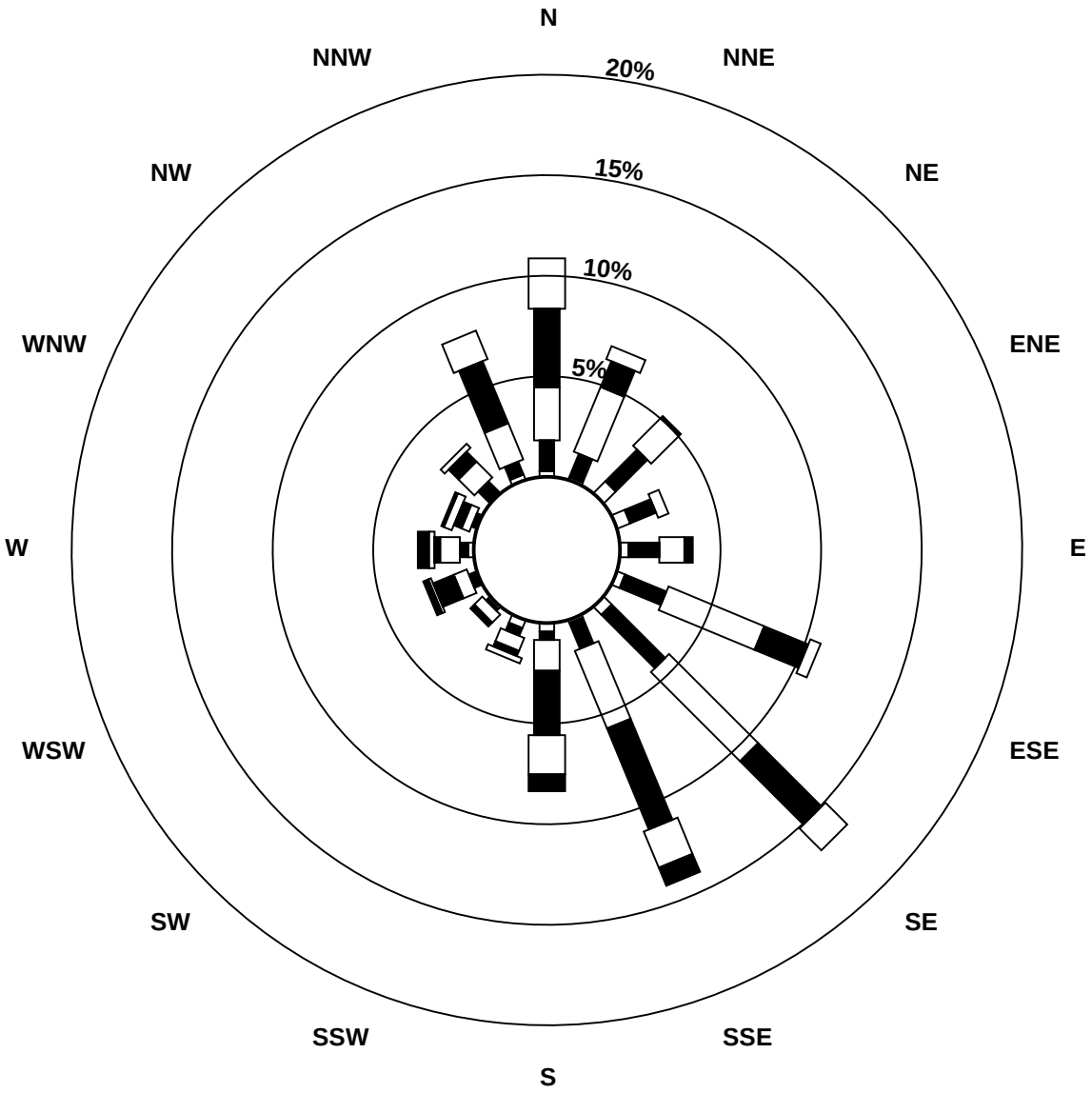
Total Number of Hours: 720

Wood Buffalo Environmental Association

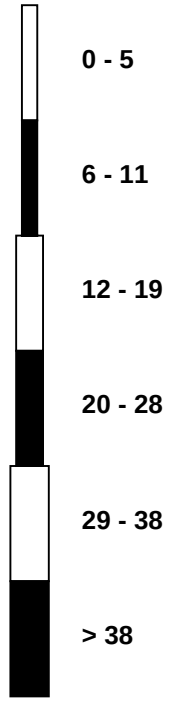
Wind Rose Apr 2016

Wind Speed 90 m (WS90m) - km/h

Mannix (AMS 5)



Classes (km/h)



Total Number of Valid Hours: 718

Direction of Maximum Speed: 273 deg on Apr 19 17:00
Direction of Maximum Daily Speed Average: 127.7 deg on Apr 8

Direction of Minimum Speed: 210 deg on Apr 21 11:00

Direction of Minimum Daily Speed Average: 2.3 deg on Apr 27

Monthly Average Direction: 162.3 deg

Hours in Service:	720
Hours of Data:	720
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-Apr	171	232	244	246	266	336	12	14	357	357	6	14	17	24	31	18	36	46	40	27	48	89	107	95	19.0
2-Apr	103	108	111	105	127	126	90	90	96	89	61	54	304	286	335	345	341	346	4	358	5	351	344	335	20.6
3-Apr	326	329	329	338	337	342	353	347	337	349	347	323	332	1	342	8	45	26	22	16	16	16	10	70	350.0
4-Apr	125	197	220	141	176	159	154	149	137	137	133	122	120	128	146	150	32	28	353	2	15	49	92	350	115.9
5-Apr	359	3	9	7	6	341	9	356	17	69	141	166	168	151	156	159	169	175	167	172	154	142	146	149	148.0
6-Apr	145	150	142	283	310	315	332	338	350	1	343	332	327	331	359	356	356	354	13	23	21	19	11	4	351.6
7-Apr	355	35	41	40	20	249	227	178	168	148	133	120	73	65	31	41	9	10	12	15	14	14	22	81	34.1
8-Apr	105	117	126	127	127	129	130	127	136	132	133	129	125	126	126	125	128	127	128	128	130	131	127	132	127.7
9-Apr	132	127	128	309	304	296	308	324	337	348	345	329	336	341	344	348	345	345	349	346	342	340	331	337	338.9
10-Apr	336	335	340	342	346	345	358	349	342	17	38	29	306	301	303	52	77	64	100	135	124	125	131	140	355.6
11-Apr	144	148	148	143	142	145	159	150	148	144	146	138	141	134	139	135	102	18	11	150	169	166	194	39	143.3
12-Apr	18	215	180	297	352	2	13	336	355	321	298	326	8	4	5	359	351	348	4	8	1	20	23	17	355.5
13-Apr	22	65	93	219	88	115	123	133	123	120	131	134	97	128	161	129	125	138	133	126	143	178	173	17	119.5
14-Apr	47	359	4	351	350	348	340	345	5	357	348	331	309	303	297	329	354	1	343	322	343	323	286	264	336.5
15-Apr	240	335	352	353	276	215	226	210	127	122	131	142	144	145	125	129	129	128	112	119	131	127	132	132	133.1
16-Apr	134	113	125	143	133	141	144	151	153	139	148	179	234	243	250	263	256	256	259	229	210	217	209	168	195.9
17-Apr	145	148	148	139	139	138	137	135	144	144	126	130	60	66	267	266	268	280	278	152	145	130	157	152	157.1
18-Apr	137	136	139	139	140	145	150	141	135	129	137	140	155	178	180	177	180	174	169	164	155	156	161	163	159.0
19-Apr	170	170	158	169	172	207	238	306	313	285	263	259	253	251	272	275	273	276	290	280	306	298	283	327	266.3
20-Apr	18	12	352	352	353	358	12	10	9	5	352	9	26	14	14	17	14	30	28	18	20	30	49	64	10.9
21-Apr	108	117	123	109	105	112	139	131	92	66	210	321	359	25	14	9	10	12	14	18	16	23	25	17	25.7
22-Apr	19	16	14	11	13	15	12	16	10	360	34	77	43	94	79	62	37	75	343	22	14	55	122	107	32.4
23-Apr	122	121	118	112	125	110	115	104	102	89	95	99	96	92	114	108	113	121	127	135	131	131	134	140	116.8
24-Apr	132	132	130	127	126	129	130	128	129	128	126	164	161	157	166	166	143	105	130	130	140	156	186	179	143.0
25-Apr	175	174	174	162	152	153	154	154	160	168	164	156	164	174	179	180	193	220	208	195	184	182	177	188	172.0
26-Apr	166	169	167	161	160	160	159	160	166	162	161	164	166	167	143	140	129	148	138	203	180	133	140	213	160.1
27-Apr	254	278	244	242	183	156	147	97	104	100	75	25	338	324	348	341	5	66	58	25	29	73	83	148	31.6
28-Apr	137	145	131	159	142	154	149	136	137	128	130	190	169	156	163	158	144	135	146	146	158	161	155	151	151.1
29-Apr	159	153	146	148	149	141	145	150	157	157	164	163	164	166	170	181	184	193	176	171	170	173	165	161	163.6
30-Apr	162	159	157	157	157	165	166	173	172	172	194	189	197	212	251	242	259	198	153	152	153	3	44	125	185.4
	128.7	120.5	119.9	111.9	109.2	115.2	103.7	84.0	90.2	96.4	114.3	145.9	171.0	180.3	214.6	169.4	0.3	46.7	39.0	67.5	84.6	97.7	129.5	128.2	
	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: 107 deg on Apr 21 11:00

Minimum Value: 4 deg on Apr 17 21:00

Percentiles: P_1 = 6 P_{10} = 9 Q_1 = 11 Median = 15 Q_3 = 21 P_{90} = 34 P_{99} = 89

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

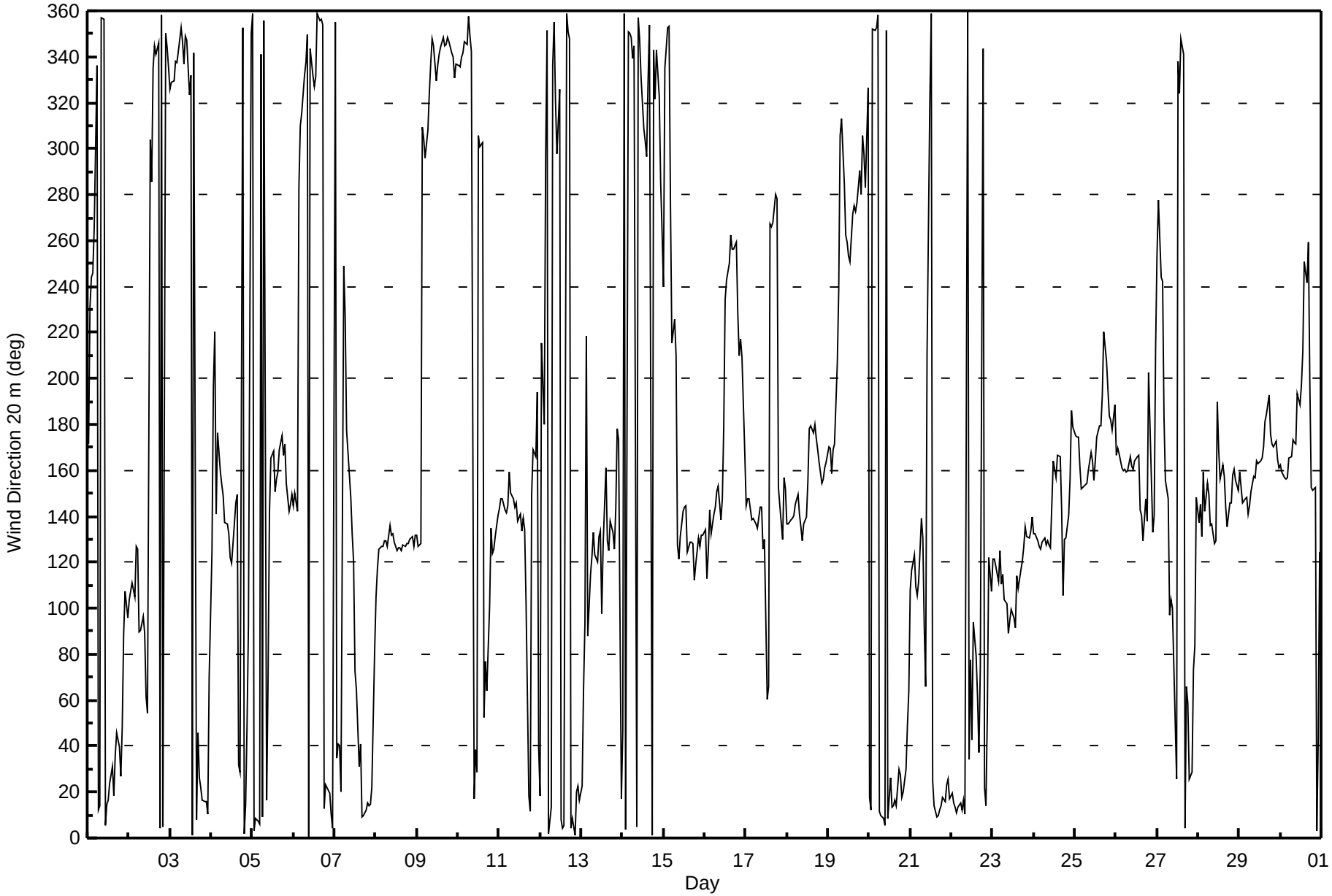
Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Apr	10	24	14	9	8	36	11	11	19	16	15	20	19	16	20	16	17	11	11	7	13	19	15	14	36
2-Apr	13	14	17	13	14	18	15	12	14	27	28	26	11	20	15	13	14	14	11	13	10	15	12	17	28
3-Apr	13	13	14	15	15	15	14	13	14	17	24	21	24	50	25	40	40	20	17	11	9	7	8	42	50
4-Apr	29	22	46	29	11	7	8	12	19	14	19	19	20	22	23	23	22	11	13	10	10	35	101	36	101
5-Apr	13	9	10	8	10	21	12	30	12	55	27	30	21	23	15	18	16	15	15	16	9	9	10	9	55
6-Apr	10	11	89	11	11	12	13	13	16	16	17	19	17	14	15	14	13	15	15	11	11	10	14	18	89
7-Apr	18	14	16	11	20	68	46	36	22	22	23	28	31	23	20	20	16	10	10	10	9	10	14	30	68
8-Apr	13	15	12	13	11	10	11	11	12	12	12	11	14	14	13	13	11	12	11	12	14	11	12	11	15
9-Apr	11	15	18	92	20	10	11	16	14	14	14	12	15	15	14	14	12	14	13	13	13	13	13	13	92
10-Apr	12	12	13	13	15	12	16	20	21	34	22	48	45	29	45	50	48	92	55	26	15	11	13	10	92
11-Apr	11	10	10	10	9	9	12	12	11	10	13	12	14	15	21	17	27	89	52	43	11	6	66	22	89
12-Apr	20	55	48	13	15	10	19	13	20	35	18	30	18	17	15	18	18	13	11	11	14	11	17	13	55
13-Apr	35	20	17	78	10	23	18	11	16	18	16	12	32	32	32	10	15	32	30	14	23	14	34	59	78
14-Apr	17	18	14	13	13	13	13	15	14	15	13	17	16	16	17	17	22	22	25	20	14	22	10	20	25
15-Apr	9	49	27	21	55	22	8	53	36	21	16	22	21	18	20	14	12	12	16	17	12	12	11	11	55
16-Apr	17	65	14	19	10	10	9	15	12	14	18	45	22	20	17	18	13	18	11	16	6	8	12	37	65
17-Apr	10	12	15	8	9	9	9	11	14	14	19	21	91	84	75	27	15	11	14	35	4	9	8	10	91
18-Apr	8	7	7	7	10	7	9	11	11	13	13	11	21	18	18	16	16	14	11	9	9	8	9	8	21
19-Apr	12	12	13	13	18	32	13	20	16	26	17	14	15	15	13	11	9	12	10	9	15	11	9	40	40
20-Apr	12	11	14	12	14	15	15	15	14	17	22	24	22	23	29	23	21	18	15	9	8	11	13	23	29
21-Apr	48	21	18	19	10	14	17	24	46	42	107	68	59	42	22	16	13	11	10	10	9	11	11	9	107
22-Apr	9	8	8	8	7	8	9	21	24	32	34	41	44	46	52	73	36	46	31	27	13	32	19	17	73
23-Apr	18	15	15	18	21	17	21	19	36	42	21	22	27	22	24	27	22	23	15	10	14	11	11	11	42
24-Apr	11	12	10	11	12	12	12	11	10	12	15	15	15	14	16	18	30	18	12	11	13	20	15	15	30
25-Apr	14	14	14	12	9	9	9	10	12	18	18	17	20	19	21	21	20	20	15	12	10	8	10	11	21
26-Apr	16	11	11	8	8	9	12	16	15	24	24	17	14	17	11	13	19	23	21	18	17	38	17	21	38
27-Apr	20	10	37	32	41	25	13	23	28	16	25	73	48	35	33	36	39	25	12	12	9	16	76	39	76
28-Apr	20	34	12	29	15	8	10	19	12	16	20	24	24	16	22	17	16	13	16	10	12	6	8	8	34
29-Apr	5	7	9	9	10	10	10	11	11	14	22	20	21	18	17	20	19	18	15	10	9	10	5	5	22
30-Apr	7	6	7	7	8	12	10	14	18	16	20	19	19	28	16	13	12	34	16	32	16	56	28	58	58
	48	65	89	92	55	68	46	53	46	55	107	73	91	84	75	73	48	92	55	43	23	56	101	59	
	Diurnal Maximum																								

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction 20 m (WD20m) - deg

Mannix - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction 45 m (WD45m) - deg

Mannix - April 2016

Direction of Maximum Speed: 267 deg on Apr 19 17:00
Direction of Maximum Daily Speed Average: 154.1 deg on Apr 18

Direction of Minimum Speed: 283 deg on Apr 11 19:00

Direction of Minimum Daily Speed Average: 3.2 deg on Apr 27

Monthly Average Direction: 11.7 deg

Hours in Service:	720
Hours of Data:	718
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-Apr	177	243	258	265	271	329	6	7	351	350	1	7	8	17	22	11	28	38	32	25	49	89	101	93	7.4
2-Apr	98	103	103	102	120	117	85	82	89	82	51	44	301	284	329	341	338	343	358	354	359	347	341	332	15.0
3-Apr	324	324	326	332	333	336	348	341	332	341	341	320	328	350	337	357	31	20	17	13	9	13	19	105	344.9
4-Apr	122	152	163	131	149	143	136	136	135	132	127	116	116	122	136	142	26	27	350	0	10	57	89	3	107.8
5-Apr	356	11	13	11	5	350	359	339	357	76	136	161	163	144	150	154	164	171	163	167	149	138	AF	144	140.4
6-Apr	141	147	202	282	307	311	AF	332	344	354	338	327	321	325	352	351	352	350	7	16	14	12	4	358	345.9
7-Apr	351	26	32	30	17	228	228	171	166	145	122	114	66	52	22	33	3	5	6	10	11	9	26	82	26.5
8-Apr	102	113	119	118	120	121	121	120	129	125	126	121	117	118	117	116	120	121	122	121	123	126	123	127	120.8
9-Apr	126	120	123	327	304	293	305	319	332	343	339	324	332	334	340	343	339	341	345	341	335	333	326	332	334.3
10-Apr	331	331	334	337	341	342	352	343	337	8	27	15	303	300	299	44	67	54	96	129	115	119	125	135	350.6
11-Apr	137	141	140	136	135	137	151	141	141	139	140	133	135	126	133	130	98	13	283	155	169	164	171	67	139.5
12-Apr	114	141	149	293	347	358	4	332	350	318	296	322	1	359	1	354	348	345	359	3	355	17	29	36	353.8
13-Apr	44	70	90	174	85	108	115	126	114	113	123	125	91	127	158	124	115	130	126	120	138	172	176	338	114.6
14-Apr	40	355	356	348	347	345	336	341	356	351	343	325	304	298	292	324	347	355	337	317	338	321	282	272	332.1
15-Apr	246	314	353	328	327	162	218	201	127	119	125	134	137	140	118	120	119	119	104	112	125	119	125	125	125.3
16-Apr	128	118	117	131	126	133	138	147	154	140	145	179	228	238	243	256	250	249	254	236	220	217	214	179	189.9
17-Apr	149	149	147	140	135	135	129	123	137	145	126	125	42	51	263	259	262	275	273	170	137	136	153	150	152.2
18-Apr	144	129	132	130	133	143	147	143	134	126	133	136	151	172	173	171	174	168	164	158	148	151	156	159	154.1
19-Apr	167	171	161	177	192	220	237	303	308	278	256	253	248	246	265	269	267	271	284	273	300	294	282	321	259.5
20-Apr	10	5	349	348	348	354	6	3	2	360	346	1	16	6	6	11	8	22	21	13	16	25	49	65	4.6
21-Apr	98	108	120	111	100	115	129	125	87	55	249	318	347	16	8	4	4	7	8	12	11	17	17	11	19.9
22-Apr	13	10	7	6	12	13	9	13	5	356	31	64	38	83	65	53	31	67	341	20	6	59	115	103	26.4
23-Apr	113	115	112	105	117	102	106	97	94	90	88	96	87	84	105	102	106	112	117	127	123	125	127	133	110.4
24-Apr	126	126	124	120	118	123	124	121	122	120	118	159	154	151	161	160	137	99	122	122	134	153	178	173	137.9
25-Apr	170	168	168	158	146	147	147	148	154	163	160	151	161	171	175	175	189	213	202	189	182	183	176	187	168.7
26-Apr	172	166	163	157	155	155	154	156	161	158	157	159	160	162	139	136	122	142	129	193	174	136	134	204	156.7
27-Apr	256	282	253	282	247	180	152	92	89	86	65	4	331	318	342	337	358	57	49	20	25	70	86	130	13.9
28-Apr	125	131	127	139	136	141	137	143	131	120	123	183	166	150	156	153	139	129	136	144	154	154	150	147	144.7
29-Apr	153	146	141	142	143	133	137	145	151	151	159	158	158	160	164	175	178	186	171	167	166	168	163	161	158.6
30-Apr	160	160	157	151	155	163	162	170	168	167	187	182	191	204	246	237	253	195	147	147	149	350	48	112	177.8
	129.8	122.5	121.0	111.3	103.5	109.1	105.6	78.2	83.2	89.6	111.4	144.8	169.6	177.5	199.1	165.6	27.4	50.8	34.7	66.9	87.1	107.0	131.0	131.1	
	Diurnal Average																								

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

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction 45 m (WD45m) - deg

Mannix - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 109 deg on Apr 21 11:00

Minimum Value: 2 deg on Apr 25 22:00

Percentiles: P_1 = 3 P_{10} = 6 Q_1 = 8 Median = 11 Q_3 = 18 P_{90} = 29 P_{99} = 82

Hours in Service:	720
Hours of Data:	718
Hours of Missing Data:	2
Hours of Calibration:	0
Percent Operational Time:	99.7

Day	Hourly Period Ending At (MST)																								Daily
	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-Apr	16	15	10	5	5	32	8	8	15	12	12	18	16	12	16	12	14	9	8	7	12	16	12	11	32
2-Apr	8	10	14	9	11	15	14	10	12	23	21	21	9	19	11	10	10	11	7	9	4	11	8	14	23
3-Apr	10	11	10	11	11	11	10	10	10	14	20	17	20	37	22	32	36	17	12	9	6	5	9	28	37
4-Apr	21	12	18	14	7	9	7	9	20	12	17	15	18	19	18	21	19	9	8	6	7	33	76	43	76
5-Apr	6	8	8	5	5	16	7	22	15	64	22	24	15	19	12	14	12	10	10	12	7	7	AF	6	64
6-Apr	7	6	50	8	8	9	AF	10	14	10	13	15	13	11	12	10	9	10	12	8	8	8	11	13	50
7-Apr	13	10	12	8	15	81	29	31	18	18	21	26	26	21	15	17	12	7	7	7	8	7	14	27	81
8-Apr	9	12	9	9	8	7	9	9	9	8	9	8	11	10	10	10	8	8	8	8	11	7	7	7	12
9-Apr	6	12	8	100	18	7	8	13	10	12	11	10	14	12	11	10	9	10	10	9	10	9	10	10	100
10-Apr	9	9	9	9	11	8	12	15	19	30	19	37	39	22	41	48	44	94	61	14	10	9	8	7	94
11-Apr	7	7	6	7	6	6	9	8	8	8	11	10	12	14	19	15	24	91	97	37	11	5	27	28	97
12-Apr	30	14	30	26	10	7	16	10	15	31	15	26	12	12	10	13	14	10	6	7	9	8	13	18	31
13-Apr	20	13	14	69	7	19	14	8	14	16	14	12	32	33	26	7	11	26	28	10	22	9	22	75	75
14-Apr	13	18	10	10	10	10	9	12	10	11	10	14	15	13	16	13	20	17	20	17	10	20	9	10	20
15-Apr	11	42	14	19	25	50	9	51	35	19	15	20	19	18	17	11	10	10	12	11	8	9	6	6	51
16-Apr	13	58	11	11	5	6	5	11	8	14	15	44	21	16	13	16	10	16	10	11	5	3	8	39	58
17-Apr	5	6	6	5	4	5	7	8	12	13	16	20	89	85	73	25	13	9	9	29	3	5	4	4	89
18-Apr	4	6	4	3	2	4	4	7	8	10	10	9	18	12	12	10	9	8	7	6	7	6	6	6	18
19-Apr	7	7	9	11	11	20	11	19	12	25	15	12	13	13	11	9	8	11	8	7	13	8	7	38	38
20-Apr	9	8	11	8	10	11	11	11	11	14	17	21	16	20	23	18	16	15	12	7	7	8	14	13	23
21-Apr	29	18	14	20	12	12	14	22	38	39	109	60	55	31	17	13	9	8	7	7	6	8	8	6	109
22-Apr	6	5	4	4	5	7	6	16	19	27	30	36	43	50	41	72	31	43	29	29	10	32	16	13	72
23-Apr	14	12	12	14	16	12	18	17	38	59	19	20	23	21	22	24	19	20	12	7	9	8	8	9	59
24-Apr	8	7	6	6	8	8	8	8	7	9	12	12	11	12	11	12	28	14	11	8	10	17	7	7	28
25-Apr	7	7	7	10	7	7	7	7	8	12	14	14	17	14	14	15	17	17	10	8	5	2	4	6	17
26-Apr	15	4	7	4	4	5	8	12	10	19	20	14	11	13	9	11	17	21	21	16	11	35	16	22	35
27-Apr	24	7	14	43	85	26	31	29	35	16	20	63	43	28	26	27	35	21	10	10	8	14	62	29	85
28-Apr	11	27	4	11	5	4	9	17	10	16	19	19	19	15	19	15	14	10	13	8	8	5	5	4	27
29-Apr	3	5	5	6	6	7	7	8	9	11	18	16	17	14	14	15	13	11	9	6	4	4	3	4	18
30-Apr	3	3	5	4	7	7	6	8	11	11	15	13	15	26	14	11	10	29	15	27	18	44	21	33	44
	30	58	50	100	85	81	31	51	38	64	109	63	89	85	73	72	44	94	97	37	22	44	76	75	
	Diurnal Maximum																								

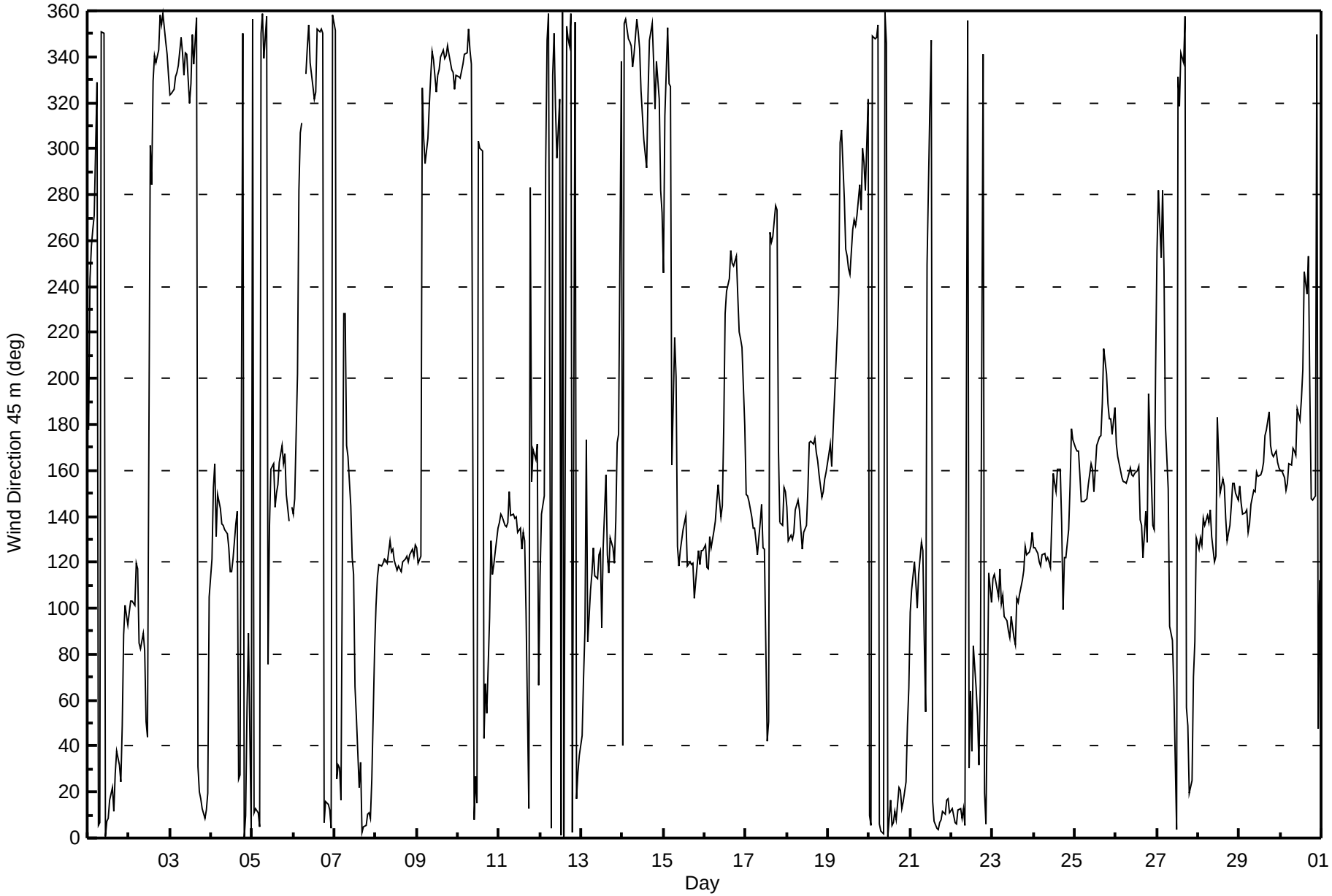
AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction 45 m (WD45m) - deg

Mannix - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction 75 m (WD75m) - deg

Mannix - April 2016

Direction of Maximum Speed: 268 deg on Apr 19 17:00
Direction of Maximum Daily Speed Average: 157.5 deg on Apr 18

Direction of Minimum Speed: 332 deg on Apr 14 00:00
Direction of Minimum Daily Speed Average: 4.1 deg on Apr 27

Monthly Average Direction: 110.6 deg

Hours in Service:	720
Hours of Data:	718
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-Apr	203	255	266	276	279	335	7	9	353	353	3	8	10	19	24	15	30	39	36	40	62	93	105	99	4.8
2-Apr	102	108	106	104	121	118	88	83	89	81	52	45	305	291	333	344	342	348	1	358	2	352	348	339	11.3
3-Apr	328	328	329	336	341	344	353	347	336	345	344	326	334	352	340	358	30	24	22	19	16	29	61	123	350.8
4-Apr	125	138	145	133	133	128	127	133	138	134	127	118	120	124	135	138	30	35	357	8	17	65	94	42	103.2
5-Apr	32	54	53	44	40	26	29	16	12	104	129	159	162	144	149	153	164	170	164	167	151	140	AF	AF	137.0
6-Apr	146	161	241	287	307	313	334	333	344	358	338	328	323	325	354	354	356	354	9	18	17	15	7	3	345.5
7-Apr	356	29	32	33	30	196	227	162	163	144	121	112	69	51	24	37	8	9	10	15	19	14	41	91	31.0
8-Apr	105	117	122	119	119	122	123	123	131	126	127	122	118	120	119	118	123	124	125	123	125	128	127	131	123.4
9-Apr	129	124	126	93	308	297	309	322	334	345	341	327	335	336	343	346	342	343	348	344	338	336	329	336	336.9
10-Apr	335	334	337	340	344	345	354	347	340	10	27	15	310	309	305	43	67	54	89	125	106	115	125	134	353.8
11-Apr	136	139	138	132	132	134	146	136	139	140	141	136	136	126	136	133	101	32	192	170	174	173	184	129	141.0
12-Apr	146	148	170	295	352	2	5	337	353	325	305	326	4	3	5	358	352	351	3	8	3	32	58	75	1.0
13-Apr	82	85	94	162	91	107	114	126	115	112	122	124	90	136	157	125	114	131	125	122	142	166	178	332	119.2
14-Apr	41	357	358	352	351	350	341	345	359	353	346	329	306	300	294	322	351	359	345	323	342	327	286	279	336.0
15-Apr	261	299	338	354	36	156	192	184	135	123	125	133	137	142	123	120	120	119	106	113	126	122	127	127	128.8
16-Apr	131	131	123	128	127	130	133	145	163	150	147	182	228	239	243	256	251	250	254	243	232	225	226	204	193.4
17-Apr	166	164	158	151	145	143	146	129	141	153	133	130	43	32	266	260	262	277	277	192	139	134	156	160	160.7
18-Apr	160	144	145	147	143	151	157	150	138	130	134	138	152	172	173	172	174	168	165	159	149	153	159	162	157.5
19-Apr	171	178	171	191	209	234	241	306	310	279	256	254	248	247	265	271	268	272	286	275	304	297	286	324	260.9
20-Apr	11	8	352	350	352	357	9	5	4	2	350	3	16	9	9	14	11	25	25	17	22	33	61	78	8.2
21-Apr	103	116	124	119	107	125	124	122	92	51	306	321	352	19	11	8	7	10	11	15	16	21	23	19	22.7
22-Apr	25	25	23	27	47	41	29	24	16	6	34	61	42	78	68	61	36	71	349	31	19	71	113	106	37.6
23-Apr	111	114	112	104	116	103	108	99	89	89	91	98	87	85	102	103	107	112	114	126	120	124	128	135	110.8
24-Apr	129	128	127	124	122	126	125	123	122	121	119	157	152	151	160	160	140	103	123	121	136	152	178	173	140.9
25-Apr	170	169	168	159	146	147	147	148	154	162	161	149	159	171	174	176	190	212	203	189	185	187	178	193	169.5
26-Apr	187	173	168	162	158	157	156	159	164	157	158	157	159	161	142	137	124	143	129	189	171	154	139	193	159.9
27-Apr	256	281	256	321	44	167	196	67	61	73	61	5	339	323	347	345	3	55	48	27	36	77	94	122	21.1
28-Apr	122	135	131	139	145	130	135	154	134	123	129	184	164	149	156	153	139	130	133	150	155	157	154	150	146.6
29-Apr	156	148	142	142	143	133	136	146	150	150	159	158	158	160	164	175	178	186	171	169	168	170	170	170	159.1
30-Apr	167	169	169	157	160	166	165	174	170	168	187	182	191	204	247	238	254	195	150	153	156	350	53	107	179.8
	138.2	136.6	134.2	120.4	108.8	107.5	97.3	81.3	83.4	85.4	108.4	145.3	168.0	183.2	202.3	178.0	346.0	39.8	32.5	61.7	84.4	109.8	136.6	139.3	
	Diurnal Average																								

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: 99 deg on Apr 21 11:00

Minimum Value: 2 deg on Apr 25 22:00

Percentiles: P_1 = 3 P_{10} = 5 Q_1 = 8 Median = 11 Q_3 = 16 P_{90} = 26 P_{99} = 85

Hours in Service:	720
Hours of Data:	718
Hours of Missing Data:	2
Hours of Calibration:	0
Percent Operational Time:	99.7

Day	Hourly Period Ending At (MST)																								Daily
	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-Apr	17	11	9	4	4	28	7	7	15	11	11	16	14	11	13	11	13	8	6	6	9	16	15	15	28
2-Apr	13	14	16	14	13	15	14	10	13	20	19	18	9	18	10	8	8	9	5	7	3	9	7	13	20
3-Apr	9	9	9	12	9	10	8	9	9	13	18	17	18	31	23	31	28	14	9	6	5	9	17	16	31
4-Apr	15	5	11	6	4	9	7	12	19	13	16	15	20	21	15	17	18	8	8	6	6	29	49	58	58
5-Apr	11	15	12	7	7	23	5	15	14	54	18	31	13	17	11	13	12	9	9	11	6	5	AF	AF	54
6-Apr	6	7	37	7	7	6	8	8	11	9	11	13	13	10	12	8	7	8	11	6	7	6	10	10	37
7-Apr	12	7	8	7	13	72	28	27	18	19	20	22	25	18	12	14	10	5	6	6	8	6	18	24	72
8-Apr	14	15	11	11	12	9	10	11	9	9	9	10	13	11	11	11	10	9	8	9	10	7	8	7	15
9-Apr	7	11	8	91	16	6	7	11	9	10	10	8	12	11	10	9	7	8	9	8	8	8	10	9	91
10-Apr	8	7	8	7	9	7	9	13	18	24	17	32	38	20	41	43	32	88	51	14	16	14	11	5	88
11-Apr	6	5	4	5	4	5	7	7	7	8	10	9	11	13	17	15	22	91	91	33	12	4	16	20	91
12-Apr	8	16	10	28	7	6	14	9	14	29	15	23	11	11	8	10	13	8	4	5	9	9	18	17	29
13-Apr	14	10	16	52	11	18	14	10	15	16	14	12	30	36	22	11	13	23	24	13	19	8	15	86	86
14-Apr	12	19	8	7	7	8	7	10	10	9	9	13	15	13	15	12	19	15	18	15	9	20	7	6	20
15-Apr	9	33	12	22	63	16	19	39	31	20	16	18	20	18	16	14	12	12	15	14	9	10	7	7	63
16-Apr	11	53	13	9	6	5	4	10	7	13	13	43	21	15	12	16	10	15	10	7	4	4	6	37	53
17-Apr	8	7	4	5	4	6	6	7	10	12	16	25	90	80	71	22	14	10	10	34	6	4	6	3	90
18-Apr	4	6	4	4	3	4	3	5	8	9	8	9	18	12	11	9	8	7	6	5	6	4	5	6	18
19-Apr	7	7	8	11	11	15	10	18	11	25	14	12	12	13	10	9	7	11	8	6	11	7	6	37	37
20-Apr	7	6	9	7	9	10	10	10	10	12	17	18	15	17	20	15	13	13	13	5	5	6	9	13	20
21-Apr	20	16	14	18	17	15	17	26	31	37	99	55	55	28	15	11	8	7	6	6	5	6	6	5	99
22-Apr	5	5	5	8	8	7	9	14	19	24	23	30	38	44	36	46	27	41	26	31	13	28	17	15	46
23-Apr	15	14	14	17	15	15	18	18	34	34	19	20	20	20	23	23	19	19	15	9	13	10	9	8	34
24-Apr	8	9	7	9	10	9	9	10	10	12	13	10	10	11	9	11	28	16	13	11	11	16	6	7	28
25-Apr	6	6	5	9	6	6	6	6	8	10	12	13	17	13	13	13	16	16	8	7	5	2	6	6	17
26-Apr	11	3	6	3	3	4	7	11	9	16	17	11	10	12	8	13	19	20	20	16	9	32	15	18	32
27-Apr	25	3	22	39	63	13	27	42	21	18	17	53	39	26	21	23	30	18	10	8	8	13	43	21	63
28-Apr	13	26	6	10	3	6	9	13	12	14	18	20	17	13	18	14	13	11	13	8	6	4	5	3	26
29-Apr	3	4	4	4	4	5	6	7	8	10	17	15	16	13	13	15	12	10	9	6	3	3	3	4	17
30-Apr	3	3	5	6	6	5	5	8	10	10	14	12	14	26	12	10	9	27	15	26	23	44	15	20	44
	25	53	37	91	63	72	28	42	34	54	99	55	90	80	71	46	32	91	91	34	23	44	49	86	
	Diurnal Maximum																								

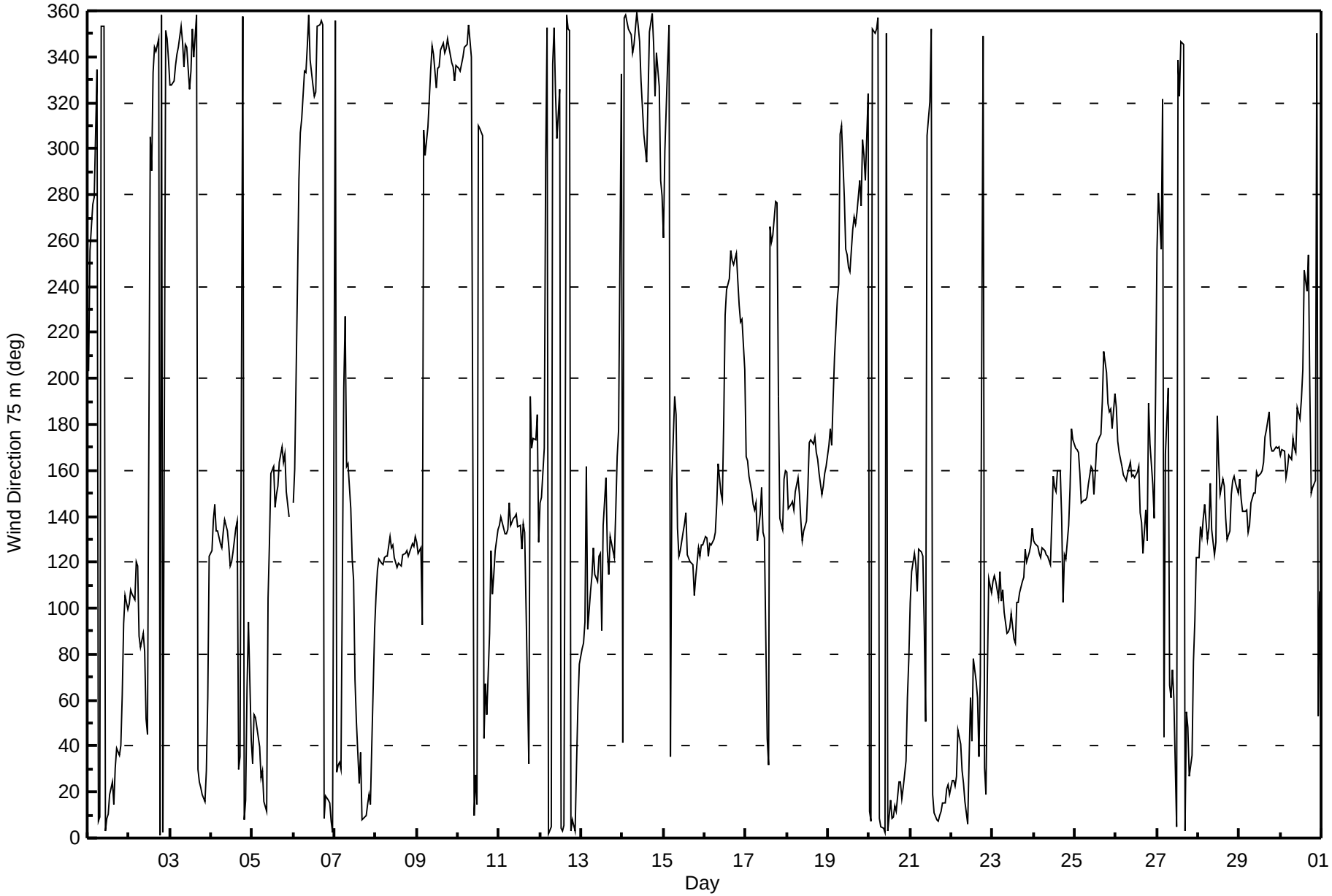
AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction 75 m (WD75m) - deg

Mannix - April 2016



Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction 90 m (WD90m) - deg

Mannix - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 107 deg on Apr 21 11:00

Minimum Value: 2 deg on Apr 25 22:00

Percentiles: P_1 = 3 P_{10} = 5 Q_1 = 7 Median = 10 Q_3 = 15 P_{90} = 26 P_{99} = 74

Hours in Service:	720
Hours of Data:	718
Hours of Missing Data:	2
Hours of Calibration:	0
Percent Operational Time:	99.7

Day	Hourly Period Ending At (MST)																								Daily
	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-Apr	15	10	8	4	4	25	6	7	13	10	10	15	13	10	13	11	13	8	6	5	9	10	10	11	25
2-Apr	7	9	12	7	8	13	13	8	11	19	18	18	10	17	9	8	7	8	4	6	3	8	6	13	19
3-Apr	9	9	9	8	8	9	7	8	8	12	17	16	17	38	22	35	31	14	9	5	5	12	17	9	38
4-Apr	10	4	9	4	3	6	4	12	16	13	16	15	21	22	14	17	19	9	8	6	6	28	34	48	48
5-Apr	11	17	12	9	9	21	7	15	16	40	20	25	13	17	11	13	12	8	9	10	5	5	AF	AF	40
6-Apr	6	8	29	6	8	7	7	8	12	8	11	12	12	10	13	7	6	7	11	6	6	6	9	9	29
7-Apr	11	7	7	7	14	59	26	24	16	19	21	26	29	19	12	14	9	5	5	6	8	6	19	20	59
8-Apr	7	10	7	7	7	4	7	8	9	7	8	6	9	6	6	6	6	7	6	5	8	6	6	6	10
9-Apr	5	7	5	87	14	5	7	11	8	10	10	8	12	11	9	8	7	8	8	7	7	7	9	9	87
10-Apr	7	7	7	7	9	6	8	13	18	25	17	31	38	21	62	45	35	79	54	12	9	7	9	4	79
11-Apr	5	4	3	3	3	4	7	6	6	8	10	9	11	12	17	14	22	98	43	27	13	4	16	10	98
12-Apr	4	12	9	43	8	5	12	8	12	29	16	23	10	10	8	9	11	8	3	5	10	10	20	15	43
13-Apr	9	7	12	44	6	14	12	8	14	16	15	12	35	34	20	8	8	22	20	10	19	8	12	88	88
14-Apr	15	16	8	6	6	7	6	8	9	8	8	13	15	13	14	11	18	14	16	15	8	20	6	7	20
15-Apr	6	30	15	21	39	13	20	26	32	17	17	17	21	18	15	12	9	9	10	8	7	6	4	4	39
16-Apr	10	54	10	7	4	4	4	9	6	12	12	41	21	15	11	16	10	14	10	6	4	3	6	36	54
17-Apr	10	7	7	7	5	5	6	8	10	11	15	26	93	89	72	21	14	10	9	33	7	4	9	4	93
18-Apr	5	7	4	5	5	6	4	4	10	7	7	9	18	12	11	9	8	6	5	5	5	4	5	6	18
19-Apr	7	8	8	11	10	13	10	17	11	24	14	11	11	12	10	8	7	11	7	6	11	6	6	36	36
20-Apr	6	5	8	6	8	9	9	9	9	11	16	16	14	16	19	15	14	14	13	4	4	7	8	11	19
21-Apr	16	12	11	11	10	9	14	25	34	39	107	53	58	28	14	10	7	6	5	6	5	6	5	6	107
22-Apr	5	5	7	9	10	6	10	14	20	22	23	31	40	45	36	42	27	41	26	34	17	27	15	11	45
23-Apr	12	10	10	12	12	11	18	17	32	35	20	19	21	21	21	20	17	18	12	5	10	7	7	8	35
24-Apr	6	7	5	5	6	7	6	7	7	8	9	9	10	11	9	10	26	12	10	7	11	16	6	7	26
25-Apr	6	6	4	8	5	5	5	5	7	10	11	12	16	13	11	12	15	15	7	7	5	2	6	7	16
26-Apr	9	2	6	2	2	4	7	11	8	15	16	11	9	12	8	13	18	20	19	15	8	29	14	16	29
27-Apr	30	5	29	40	55	7	23	79	14	17	19	53	38	25	22	23	32	19	10	8	9	12	32	17	79
28-Apr	10	23	6	12	6	6	6	11	12	13	16	20	17	13	18	14	14	10	13	8	5	3	5	2	23
29-Apr	4	3	3	3	4	4	5	7	7	9	17	15	17	13	12	15	12	10	8	6	3	3	3	4	17
30-Apr	4	4	6	7	5	4	5	7	10	9	13	12	14	26	12	9	9	26	14	25	26	44	14	15	44
	30	54	29	87	55	59	26	79	34	40	107	53	93	89	72	45	35	98	54	34	26	44	34	88	
	Diurnal Maximum																								

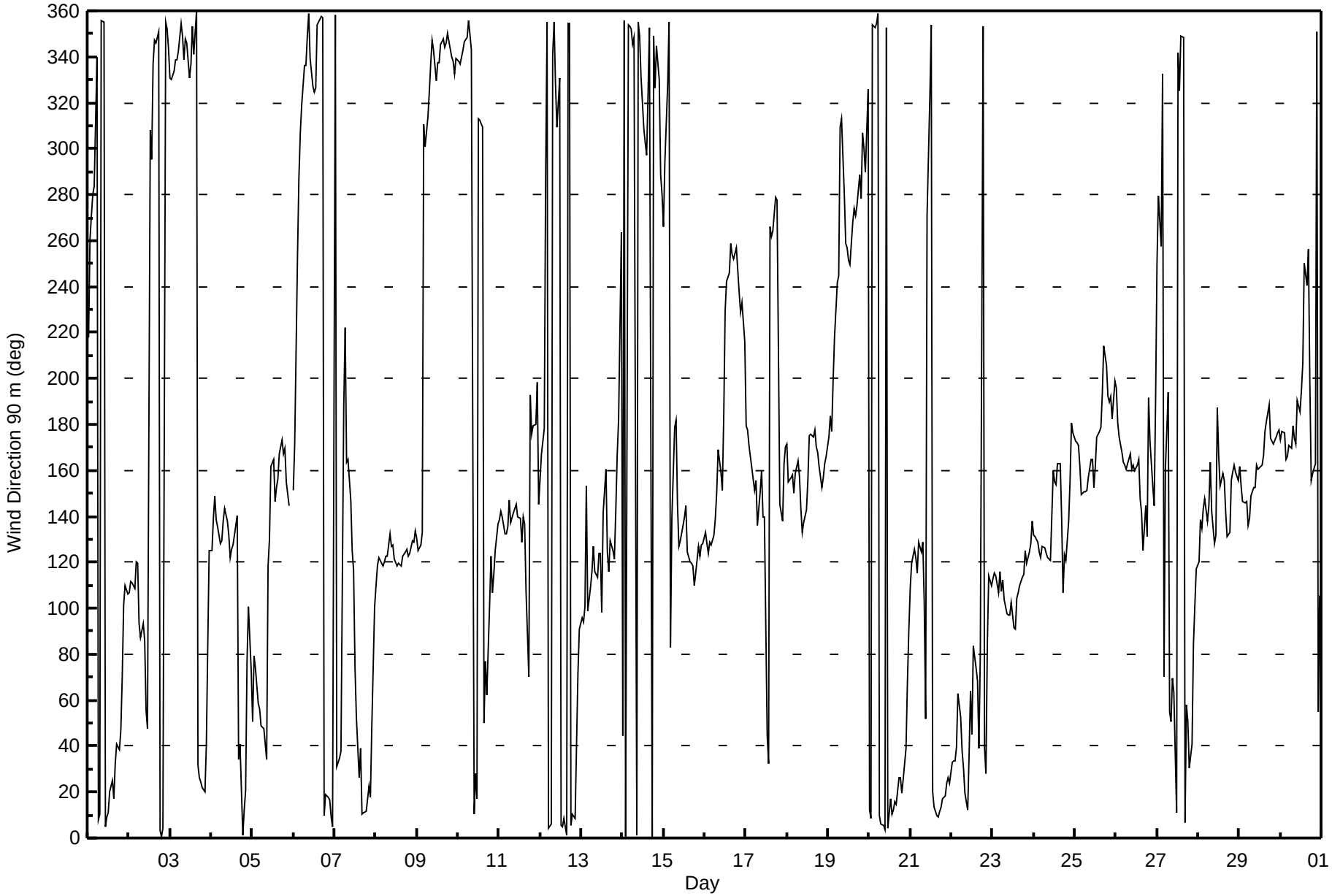
AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction 90 m (WD90m) - deg

Mannix - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

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

Mannix - April 2016

Maximum Value: 1.0 km/h on Apr 18 22:00

Maximum Daily Average: 0.5 km/h on Apr 23

Minimum Value: -0.9 km/h on Apr 19 12:00

Minimum Daily Average: -0.4 km/h on Apr 19

Maximum Diurnal Average: 0.3 km/h at hour 1

Minimum Diurnal Average: 0.1 km/h at hour 17

Monthly Average: 0.18 km/h

Percentiles: P_1 = -0.6 P_{10} = -0.3 Q_1 = 0.0 Median = 0.2 Q_3 = 0.4 P_{90} = 0.6 P_{99} = 0.8

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

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

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

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

Mannix - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 4.2 km/h on Apr 8 15:00

Minimum Value: 0.1 km/h on Apr 17 20:00

Percentiles: P_1 = 0.2 P_{10} = 0.7 Q_1 = 1.1 Median = 1.7 Q_3 = 2.2 P_{90} = 2.8 P_{99} = 3.7

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

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

Wood Buffalo Environmental Association

Summary of Hour Averages

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

Mannix - April 2016

Maximum Value: 2.4 km/h on Apr 18 23:00

Maximum Daily Average: 1.5 km/h on Apr 18

Minimum Value: -1.8 km/h on Apr 9 20:00

Minimum Daily Average: -0.9 km/h on Apr 9

Maximum Diurnal Average: 0.5 km/h at hour 1

Minimum Diurnal Average: 0.0 km/h at hour 18

Monthly Average: 0.27 km/h

Percentiles: P_1 = -1.4 P_{10} = -0.8 Q_1 = -0.3 Median = 0.3 Q_3 = 0.9 P_{90} = 1.2 P_{99} = 1.9

Hours in Service:	720
Hours of Data:	718
Hours of Missing Data:	2
Hours of Calibration:	0
Percent Operational Time:	99.7

Day	Hourly Period Ending At (MST)																								Daily	Daily
	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-Apr	0.2	-0.2	-0.4	-0.4	-0.5	-0.7	-0.8	-0.7	-1.1	-1.3	-1.1	-0.1	-0.2	0.0	0.3	-0.2	0.4	-0.2	0.1	0.0	0.2	0.4	0.7	0.8	-0.2	0.8
2-Apr	0.5	0.8	1.4	0.5	0.8	1.0	0.4	0.5	0.0	-0.1	-0.1	0.0	-0.6	0.1	-1.2	-1.4	-1.2	-1.3	-1.1	-1.1	-1.3	-0.9	-0.8	-0.7	-0.2	1.4
3-Apr	-0.7	-0.5	-0.8	-0.9	-1.0	-0.7	-0.9	-0.8	-1.2	-0.6	-0.3	-0.6	0.0	1.4	-0.2	0.8	0.3	0.1	0.2	-0.2	-0.5	-0.3	-0.1	0.5	-0.3	1.4
4-Apr	0.4	0.5	0.3	0.5	0.6	0.6	0.7	0.1	0.1	0.1	0.2	0.3	0.9	0.7	0.0	0.3	0.1	0.0	-0.6	-0.6	-0.4	0.2	0.5	0.0	0.2	0.9
5-Apr	-0.2	-0.2	-0.2	-0.3	-0.4	-0.3	-0.3	0.0	-0.3	0.1	0.3	0.7	1.1	1.3	0.9	1.2	1.4	0.6	1.0	0.7	1.2	1.1	AF	1.1	0.5	1.4
6-Apr	1.1	0.9	0.2	-0.4	-0.7	-0.9	AF	-1.3	-1.2	-0.7	-0.4	-0.3	-0.4	-0.7	-0.8	-0.6	-0.7	-0.7	-0.2	-0.5	-0.4	-0.6	-0.6	-0.4	-0.4	1.1
7-Apr	-0.4	-0.1	-0.1	0.2	-0.1	0.0	0.3	0.3	0.3	0.5	0.4	1.0	0.5	0.0	-0.2	0.4	-0.3	-0.7	-0.7	-0.5	-0.4	-0.4	0.0	0.6	0.0	1.0
8-Apr	0.5	0.5	0.3	0.7	0.7	0.7	0.7	0.4	0.9	0.8	1.2	0.5	1.2	0.9	0.7	0.9	0.5	0.7	0.9	0.9	0.7	1.4	0.9	1.2	0.8	1.4
9-Apr	1.2	1.2	0.6	0.1	-0.6	-1.1	-0.7	-0.9	-1.3	-1.3	-1.3	-1.5	-1.1	-1.1	-1.4	-1.5	-1.5	-1.3	-1.7	-1.8	-1.0	-1.0	-0.9	-0.9	-0.9	1.2
10-Apr	-1.3	-1.4	-1.1	-1.3	-1.2	-1.0	-0.2	0.1	-0.6	0.1	-0.2	0.1	-0.1	0.0	-0.2	0.1	-0.4	-0.1	0.2	0.6	0.2	0.2	1.1	1.1	-0.2	1.1
11-Apr	1.2	1.2	1.2	1.0	1.1	1.1	0.8	0.7	0.7	0.7	1.2	0.6	1.0	0.6	0.8	0.8	0.5	0.2	0.1	0.1	0.7	0.9	0.5	0.2	0.7	1.2
12-Apr	0.1	0.4	0.4	-0.3	-0.5	-0.7	-0.4	-1.2	-0.3	0.1	-0.6	0.4	-0.8	-0.6	-0.9	-0.7	-0.7	-1.0	-1.1	-0.8	-0.6	-0.4	0.0	0.1	-0.4	0.4
13-Apr	0.2	0.6	0.6	0.3	0.6	0.6	1.2	0.3	0.4	1.1	1.1	0.4	0.6	0.5	0.3	0.7	1.0	0.6	0.5	0.9	0.6	0.3	0.1	0.1	0.6	1.2
14-Apr	0.4	-0.2	-0.5	-1.4	-1.4	-1.3	-1.2	-0.8	-0.4	-0.6	-0.9	-0.5	-0.7	-0.9	-0.6	-0.5	-0.4	-0.4	-0.2	-0.4	-0.7	-0.5	-0.3	-0.3	-0.6	0.4
15-Apr	0.0	0.0	-0.1	-0.1	0.0	0.1	-0.1	0.6	0.6	0.3	0.3	1.3	0.8	1.0	0.8	0.3	0.5	0.6	0.9	0.8	1.1	1.0	1.3	0.9	0.5	1.3
16-Apr	0.7	0.3	0.7	0.6	0.9	1.0	1.1	1.0	1.1	1.0	1.1	0.4	-0.1	-0.5	-0.4	0.0	-0.5	-0.1	-0.2	-0.1	-0.1	0.0	-0.2	0.8	0.4	1.1
17-Apr	1.0	1.1	1.2	1.1	1.4	1.4	1.4	0.8	0.8	0.7	0.3	0.5	0.8	1.1	0.2	0.1	-0.2	-0.4	-0.2	0.2	0.9	1.1	1.4	1.4	0.7	1.4
18-Apr	1.4	1.2	1.2	1.7	1.7	1.4	1.3	0.7	0.4	0.4	0.8	1.1	1.8	1.4	1.7	1.3	1.3	1.7	1.8	2.3	2.0	2.3	2.4	2.0	1.5	2.4
19-Apr	1.6	1.2	1.5	0.6	0.1	-0.3	-0.4	-1.2	-0.8	-0.1	-0.5	-0.7	-0.7	0.2	-0.6	-0.9	-0.9	-0.6	-0.9	-0.7	-0.9	-0.8	-0.9	-1.1	-0.3	1.6
20-Apr	-0.7	-1.4	-1.7	-1.5	-1.4	-0.8	-0.3	-0.9	-0.4	-0.1	-0.7	0.3	0.0	-0.7	-0.8	-0.4	-0.5	-0.1	-0.1	-0.4	-0.2	0.0	0.1	0.5	-0.5	0.5
21-Apr	0.9	0.7	0.7	0.5	-0.1	0.3	0.7	0.4	0.5	-0.4	0.1	-0.4	0.9	-0.4	-0.3	-0.5	-0.9	-1.1	-0.8	-0.7	-0.9	-0.2	-0.3	-0.5	-0.1	0.9
22-Apr	-0.4	-0.4	-0.4	-0.4	-0.1	-0.2	-0.6	-0.2	0.1	0.2	-0.2	0.0	0.3	0.3	0.4	0.1	-0.5	-0.2	-0.7	-0.1	-0.4	0.1	1.0	1.1	0.0	1.1
23-Apr	1.3	0.6	0.8	0.5	1.0	0.8	1.3	0.8	0.0	0.3	-0.1	0.4	0.6	0.3	0.7	0.6	0.6	0.9	1.0	0.8	0.9	0.6	1.2	1.0	0.7	1.3
24-Apr	1.0	0.8	0.6	0.2	0.3	0.4	0.6	0.0	-0.1	0.3	0.7	1.3	1.3	1.0	1.2	1.2	1.1	0.9	0.8	0.3	1.3	1.5	0.8	1.0	0.8	1.5
25-Apr	1.2	1.0	0.6	0.8	1.0	1.0	1.2	1.5	1.7	1.1	0.8	1.0	0.7	0.5	0.6	0.5	0.7	0.1	0.2	0.3	0.4	0.5	0.6	0.3	0.8	1.7
26-Apr	0.7	0.8	0.9	1.4	1.5	1.3	1.1	1.2	0.8	1.0	0.9	1.0	1.1	0.7	0.6	0.6	0.6	0.8	0.3	0.1	0.6	0.5	0.7	0.1	0.8	1.5
27-Apr	-0.1	-0.3	-0.1	-0.1	0.1	0.1	0.2	0.2	0.3	-0.1	-0.1	0.3	0.6	0.3	0.7	0.0	0.4	0.4	-0.1	0.0	-0.2	0.6	0.5	0.7	0.2	0.7
28-Apr	1.0	0.4	0.9	0.8	0.8	0.9	0.5	0.6	0.3	0.6	1.4	0.6	1.1	1.2	1.2	1.7	0.7	0.8	0.7	0.9	1.0	1.2	1.3	1.2	0.9	1.7
29-Apr	1.5	1.3	1.4	1.4	1.3	1.2	1.0	1.4	2.0	2.3	2.3	1.9	2.2	1.6	2.0	1.5	1.2	0.5	1.0	0.9	1.0	0.9	1.2	1.3	1.4	2.3
30-Apr	1.5	1.3	1.4	1.5	1.6	1.3	1.2	0.8	0.9	1.0	0.8	1.3	0.5	0.5	-0.2	-0.2	-0.4	0.5	0.9	0.4	0.9	-0.2	0.1	0.4	0.7	1.6
	0.5	0.4	0.4	0.2	0.2	0.2	0.3	0.2	0.1	0.3	0.2	0.4	0.4	0.4	0.2	0.2	0.1	0.0	0.1	0.1	0.2	0.3	0.4	0.5	Diurnal Average	
	1.6	1.3	1.5	1.7	1.7	1.4	1.4	1.5	2.0	2.3	2.3	1.9	2.2	1.6	2.0	1.7	1.4	1.7	1.8	2.3	2.0	2.3	2.4	2.0	Diurnal Maximum	

AF - Analyzer Failure

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

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

Mannix - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 4.4 km/h on Apr 19 14:00

Minimum Value: 0.1 km/h on Apr 15 01:00

Percentiles: P_1 = 0.2 P_{10} = 0.7 Q_1 = 1.1 Median = 1.9 Q_3 = 2.5 P_{90} = 3.0 P_{99} = 3.8

Hours in Service:	720
Hours of Data:	718
Hours of Missing Data:	2
Hours of Calibration:	0
Percent Operational Time:	99.7

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

AF - Analyzer Failure

Wood Buffalo Environmental Association

Summary of Hour Averages

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

Mannix - April 2016

Maximum Value: 1.8 km/h on Apr 3 14:00

Maximum Daily Average: 0.8 km/h on Apr 18

Minimum Value: -1.2 km/h on Apr 6 09:00

Minimum Daily Average: -0.4 km/h on Apr 8

Maximum Diurnal Average: 0.5 km/h at hour 13

Minimum Diurnal Average: 0.0 km/h at hour 18

Monthly Average: 0.18 km/h

Percentiles: P_1 = -0.9 P_{10} = -0.4 Q_1 = -0.1 Median = 0.1 Q_3 = 0.5 P_{90} = 0.8 P_{99} = 1.4

Hours in Service:	720
Hours of Data:	718
Hours of Missing Data:	2
Hours of Calibration:	0
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-Apr	0.0	0.2	0.0	-0.1	0.0	-0.1	-0.2	-0.2	-0.5	-0.4	-0.4	0.3	0.3	0.3	0.5	0.2	0.4	-0.3	0.1	0.1	0.3	0.1	0.5	0.4	0.1	0.5
2-Apr	0.3	0.6	1.3	0.2	0.0	0.6	0.1	-0.2	-0.6	-0.5	-0.2	0.0	0.0	0.8	-0.3	-0.4	-0.4	-0.3	-0.3	-0.1	-0.7	-0.4	-0.2	-0.3	0.0	1.3
3-Apr	-0.2	0.0	0.3	0.2	-0.1	1.1	0.8	0.0	-0.4	0.1	0.5	0.2	0.6	1.8	0.3	1.5	0.6	0.3	0.5	0.1	-0.1	0.0	0.1	0.3	0.3	1.8
4-Apr	0.0	0.1	0.2	0.0	0.0	-0.1	-0.1	-0.2	-0.1	-0.5	-0.2	-0.3	0.6	0.4	-0.6	0.0	0.1	0.0	-0.2	-0.1	-0.1	0.3	0.5	0.2	0.0	0.6
5-Apr	0.3	0.1	0.1	0.0	0.1	0.0	0.1	0.1	-0.1	0.4	-0.1	0.5	0.8	1.2	0.1	0.8	1.1	0.3	0.8	0.4	0.8	0.3	AF	AF	0.4	1.2
6-Apr	0.8	0.7	0.1	0.2	0.1	0.0	-0.3	-0.6	-1.2	-0.4	0.1	-0.1	0.2	0.0	-0.2	-0.1	-0.3	-0.2	0.2	-0.3	-0.1	-0.4	-0.5	0.0	-0.1	0.8
7-Apr	-0.2	-0.1	-0.2	0.0	-0.1	0.1	0.3	0.5	0.2	0.4	0.2	1.1	0.4	0.0	-0.2	0.6	-0.2	-0.4	-0.4	-0.2	0.0	0.0	0.0	0.4	0.1	1.1
8-Apr	0.5	0.3	-0.6	-0.4	-0.3	-0.8	-0.6	-0.7	-0.2	-0.2	-0.1	-0.7	0.2	-0.4	-0.5	-0.3	-0.7	-1.0	-0.6	-0.8	-0.9	-0.3	-0.4	-0.3	-0.4	0.5
9-Apr	-0.1	0.2	-0.3	0.1	0.3	0.4	0.2	0.1	-0.5	-0.6	-0.5	-0.7	0.0	0.0	-0.6	-0.7	-0.7	-0.5	-0.5	-0.9	-0.4	-0.6	-0.4	-0.5	-0.3	0.4
10-Apr	-0.5	-0.5	-0.5	-0.6	-0.6	-0.4	0.7	0.7	0.1	0.5	-0.1	0.2	0.5	0.7	0.1	0.2	-0.6	-0.4	0.3	0.4	0.4	0.0	0.1	0.1	0.0	0.7
11-Apr	0.1	0.0	-0.2	-0.1	0.0	-0.1	0.4	-0.1	0.0	0.0	0.7	-0.1	0.4	0.0	0.6	0.2	0.4	0.2	0.1	0.0	0.4	0.5	0.2	0.1	0.2	0.7
12-Apr	0.2	0.2	0.3	0.2	0.0	-0.3	-0.2	-0.8	0.0	0.7	-0.3	1.0	-0.7	-0.5	-0.4	-0.4	-0.3	-0.3	-0.5	-0.3	0.1	-0.1	0.3	0.1	-0.1	1.0
13-Apr	0.1	0.0	0.2	0.2	0.2	0.2	1.2	-0.4	0.0	0.8	0.6	-0.1	0.6	0.3	0.1	-0.1	0.6	0.0	0.3	0.2	0.1	0.2	0.1	0.2	0.2	1.2
14-Apr	0.3	-0.1	-0.1	-1.0	-0.9	-0.8	-0.7	-0.4	0.2	-0.1	-0.4	-0.1	0.0	0.1	0.2	0.1	-0.1	0.0	0.1	0.0	-0.3	0.0	0.1	0.1	-0.2	0.3
15-Apr	0.2	0.3	0.1	0.0	0.1	0.2	0.0	0.6	0.3	0.1	-0.1	0.8	0.6	0.7	0.7	-0.4	-0.2	-0.1	1.0	0.4	-0.4	-0.1	-0.1	-0.4	0.2	1.0
16-Apr	-0.3	0.1	-0.3	-0.2	-0.1	0.0	0.0	0.5	0.7	0.6	0.7	0.2	0.3	-0.3	0.1	1.0	-0.2	0.6	0.2	0.1	0.0	0.2	0.1	0.4	0.2	1.0
17-Apr	0.4	0.6	0.9	0.8	0.7	0.6	0.7	0.0	0.3	0.4	-0.1	0.2	1.2	1.2	0.9	0.5	0.4	0.1	0.1	0.1	0.3	0.2	1.1	1.2	0.5	1.2
18-Apr	0.8	0.4	0.6	1.0	1.0	1.1	0.8	0.3	-0.1	-0.2	0.1	0.4	0.9	0.7	1.0	0.8	0.4	1.1	1.1	1.5	1.1	1.4	1.4	1.3	0.8	1.5
19-Apr	0.9	0.9	0.9	0.2	0.0	0.1	0.0	-0.2	-0.1	0.2	0.4	0.2	0.2	1.0	0.8	0.5	0.7	0.7	0.4	0.4	0.2	0.6	0.1	0.3	0.4	1.0
20-Apr	-0.3	-0.7	-0.9	-1.0	-0.4	0.3	0.5	0.1	0.3	0.9	0.2	0.9	0.0	-0.4	-0.8	-0.3	-0.3	0.1	-0.1	-0.1	0.1	0.0	0.1	0.5	-0.1	0.9
21-Apr	1.0	0.6	0.3	0.2	-0.2	0.2	0.3	0.3	0.5	-0.3	0.0	-0.4	1.1	-0.4	0.0	-0.3	-0.1	-0.6	-0.3	-0.4	-0.4	0.0	0.0	-0.2	0.0	1.1
22-Apr	-0.1	0.1	0.2	0.0	0.3	0.2	-0.2	-0.1	0.1	0.3	-0.5	-0.3	0.2	0.4	0.2	-0.2	-0.6	-0.6	-0.1	0.3	-0.1	0.1	0.4	0.8	0.0	0.8
23-Apr	1.0	0.2	0.4	0.2	0.7	0.8	1.2	0.4	-0.2	0.2	-0.2	0.1	0.3	0.0	0.1	0.1	0.1	0.5	0.4	-0.3	0.1	-0.5	-0.4	-0.1	0.2	1.2
24-Apr	-0.2	-0.2	-0.2	-0.7	-0.6	-0.4	-0.4	-0.7	-0.9	-0.5	0.1	0.9	0.6	0.0	1.0	1.0	0.6	0.5	-0.1	-0.7	0.1	0.8	0.6	0.5	0.1	1.0
25-Apr	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.8	1.1	0.9	0.4	0.7	0.3	0.2	0.2	0.1	0.5	0.0	0.0	0.2	0.2	0.1	0.3	0.0	0.4	1.1
26-Apr	0.2	0.4	0.5	0.8	1.0	0.9	0.7	0.6	0.4	1.0	0.4	0.8	0.9	0.3	0.3	0.2	0.1	0.7	0.0	0.1	0.4	0.3	0.2	0.1	0.5	1.0
27-Apr	0.2	0.1	0.2	0.0	0.1	0.2	0.2	0.3	0.1	-0.2	-0.3	0.5	1.1	1.0	1.2	0.2	1.1	0.6	0.0	0.1	0.0	0.2	0.3	0.3	0.3	1.2
28-Apr	0.2	0.0	0.0	0.2	0.4	0.2	0.0	0.4	0.0	0.1	0.7	0.4	1.1	0.5	0.8	1.3	0.0	-0.3	-0.3	0.5	0.8	0.9	0.9	0.9	0.4	1.3
29-Apr	1.1	0.7	0.4	0.4	0.5	0.0	0.2	0.5	1.2	1.4	1.6	1.0	1.6	0.8	1.3	0.9	0.6	0.0	0.7	0.6	0.5	0.4	0.5	0.7	0.7	1.6
30-Apr	0.6	0.4	0.6	1.0	1.0	0.7	0.6	0.6	0.6	0.6	0.7	0.7	0.1	0.6	0.3	0.0	0.0	0.4	0.5	-0.1	0.5	0.2	0.1	0.1	0.5	1.0
	0.3	0.2	0.2	0.1	0.1	0.2	0.2	0.1	0.0	0.2	0.1	0.3	0.5	0.4	0.2	0.2	0.1	0.0	0.1	0.0	0.1	0.1	0.2	0.3	Diurnal Average	
	1.1	0.9	1.3	1.0	1.0	1.1	1.2	0.8	1.2	1.4	1.6	1.1	1.6	1.8	1.3	1.5	1.1	1.1	1.1	1.5	1.1	1.4	1.4	1.3	Diurnal Maximum	

AF - Analyzer Failure

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

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

Mannix - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 4.5 km/h on Apr 19 14:00

Minimum Value: 0.1 km/h on Apr 15 01:00

Percentiles: P_1 = 0.2 P_{10} = 0.6 Q_1 = 1.2 Median = 2.0 Q_3 = 2.6 P_{90} = 3.1 P_{99} = 3.9

Hours in Service:	720
Hours of Data:	718
Hours of Missing Data:	2
Hours of Calibration:	0
Percent Operational Time:	99.7

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

AF - Analyzer Failure

Wood Buffalo Environmental Association

Summary of Hour Averages

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

Mannix - April 2016

Maximum Value: 4.0 km/h on Apr 19 17:00

Maximum Daily Average: 2.2 km/h on Apr 19

Minimum Value: -1.9 km/h on Apr 8 20:00

Minimum Daily Average: -1.1 km/h on Apr 8

Maximum Diurnal Average: 0.9 km/h at hour 13

Minimum Diurnal Average: 0.4 km/h at hour 1

Monthly Average: 0.62 km/h

Percentiles: P_1 = -1.7 P_{10} = -0.3 Q_1 = 0.1 Median = 0.5 Q_3 = 1.1 P_{90} = 1.7 P_{99} = 3.5

Hours in Service:	720
Hours of Data:	718
Hours of Missing Data:	2
Hours of Calibration:	0
Percent Operational Time:	99.7

Day	Hourly Period Ending At (MST)																								Daily	Daily
	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-Apr	0.0	1.1	1.7	1.4	1.8	1.6	1.6	1.6	1.4	1.9	1.5	1.7	1.5	1.1	1.0	1.0	0.8	0.0	0.5	0.4	0.4	-0.2	0.1	-0.1	1.0	1.9
2-Apr	-0.4	0.0	0.5	-0.4	-0.7	0.2	0.0	-0.2	-0.7	-0.7	-0.2	0.3	1.4	2.1	2.1	2.3	2.5	2.5	1.7	2.0	1.0	1.1	1.6	1.0	0.8	2.5
3-Apr	1.0	1.3	1.7	1.6	1.2	2.0	1.9	1.6	1.9	1.9	1.9	1.5	1.7	2.6	1.2	2.1	0.9	0.7	1.0	0.6	0.7	0.3	0.0	0.0	1.3	2.6
4-Apr	-0.2	0.3	0.4	0.2	0.2	-0.3	-0.2	-0.1	-0.1	-0.6	-0.3	-0.7	0.2	0.2	-0.7	-0.2	0.2	0.1	0.8	1.1	1.0	0.3	0.4	0.3	0.1	1.1
5-Apr	0.5	0.2	0.2	0.2	0.3	0.2	0.2	0.3	0.2	0.4	-0.4	0.6	0.8	1.1	0.1	0.8	1.1	0.3	0.8	0.5	0.8	0.6	AF	AF	0.4	1.1
6-Apr	0.9	0.5	0.8	2.4	2.4	2.4	2.3	2.7	1.5	1.1	1.3	1.0	1.7	1.7	1.3	1.3	1.3	1.3	1.7	0.9	0.9	1.0	0.7	1.1	1.4	2.7
7-Apr	0.5	0.4	0.1	0.3	0.1	0.2	0.3	0.4	0.1	0.3	-0.1	0.7	0.3	0.2	0.3	1.0	0.7	0.8	0.7	0.8	0.8	1.1	0.4	0.2	0.4	1.1
8-Apr	-0.1	0.0	-1.1	-0.8	-0.7	-1.8	-1.2	-1.4	-0.3	-0.5	-0.6	-1.7	-0.9	-1.5	-1.6	-1.6	-1.7	-1.7	-1.2	-1.9	-1.8	-0.6	-0.6	-0.1	-1.1	0.0
9-Apr	-0.3	-0.2	-0.4	0.4	2.0	3.7	2.8	2.4	2.1	1.7	2.2	2.1	2.4	2.6	1.8	1.9	1.6	1.9	2.5	1.8	1.8	1.5	1.3	1.2	1.7	3.7
10-Apr	1.9	1.8	1.7	1.6	1.2	1.4	2.3	1.9	1.3	1.2	0.3	0.8	1.3	1.6	0.8	0.3	-0.7	-0.5	0.3	0.4	0.1	-0.1	-0.1	0.3	0.9	2.3
11-Apr	0.3	0.2	0.2	0.0	0.2	0.1	0.5	0.0	0.2	0.1	0.7	-0.1	0.5	-0.3	0.5	0.1	0.1	0.1	0.0	0.0	0.4	0.6	0.2	0.4	0.2	0.7
12-Apr	0.4	0.2	0.4	0.8	1.8	1.2	1.3	0.9	1.0	1.6	0.6	2.3	0.4	0.4	0.9	0.8	0.8	1.4	1.4	1.3	1.7	0.5	0.3	0.0	0.9	2.3
13-Apr	0.1	0.1	-0.1	0.1	-0.1	-0.2	0.5	-0.7	-0.6	0.1	0.2	-0.5	0.5	0.2	0.1	-0.3	0.1	-0.1	0.2	-0.3	0.0	0.2	0.1	0.3	0.0	0.5
14-Apr	0.3	0.4	1.3	1.0	1.4	1.5	1.6	1.2	1.8	1.5	1.2	1.1	1.5	2.2	2.1	1.3	0.7	0.9	0.9	0.9	1.0	1.0	1.4	1.2	1.2	2.2
15-Apr	0.7	0.9	0.5	0.3	0.1	0.1	0.1	0.5	0.1	-0.1	-0.2	0.6	0.4	0.7	0.2	-0.9	-0.8	-0.7	0.3	-0.3	-0.7	-0.9	-0.5	-0.7	0.0	0.9
16-Apr	-0.4	0.1	-0.8	-0.4	-0.4	0.0	0.5	0.8	0.5	0.6	0.9	0.3	0.7	0.4	0.9	2.0	0.7	1.4	1.1	0.5	0.3	0.3	0.4	0.7	0.5	2.0
17-Apr	0.2	0.4	0.6	0.6	0.8	0.9	0.8	0.3	0.6	0.4	-0.2	0.1	1.3	1.2	1.5	1.4	1.7	1.2	0.9	0.2	0.4	0.6	1.0	0.8	0.7	1.7
18-Apr	0.5	0.7	0.8	0.8	0.9	0.8	0.5	0.2	0.0	-0.2	0.1	0.6	0.9	0.7	1.1	0.9	0.4	1.1	1.0	1.4	1.3	1.4	1.1	1.1	0.8	1.4
19-Apr	1.0	0.9	0.8	0.1	0.0	0.7	0.8	2.5	1.6	1.2	1.9	2.3	1.6	2.6	3.2	3.4	4.0	3.5	3.8	3.2	3.5	3.8	3.1	3.6	2.2	4.0
20-Apr	1.5	1.5	1.3	1.5	2.0	3.0	2.4	2.5	2.5	2.8	2.1	2.3	0.8	0.5	-0.1	0.5	0.5	0.6	0.4	0.7	0.8	0.4	0.2	0.3	1.3	3.0
21-Apr	0.6	0.4	0.2	0.0	-0.3	0.2	0.2	0.2	0.2	-0.3	0.2	0.2	1.6	0.1	1.0	1.2	1.9	1.4	1.7	1.3	1.1	1.1	1.0	0.8	0.7	1.9
22-Apr	0.4	0.6	0.5	0.2	0.5	0.5	0.1	0.2	0.3	0.8	-0.3	-0.3	0.3	0.1	0.1	-0.2	-0.3	-0.6	1.2	0.9	0.5	0.0	0.1	-0.1	0.2	1.2
23-Apr	0.3	-0.5	-0.1	-0.1	0.2	0.2	0.7	0.1	-0.3	0.1	-0.5	-0.3	-0.2	-0.1	-0.4	-0.5	-0.3	0.1	-0.1	-0.9	-0.2	-1.2	-0.9	-0.1	-0.2	0.7
24-Apr	-0.2	-0.2	-0.3	-1.2	-1.1	-0.8	-0.9	-1.1	-1.4	-1.1	-0.5	0.9	0.5	-0.2	1.0	1.2	0.6	0.0	-0.8	-1.3	0.0	0.9	0.7	0.5	-0.2	1.2
25-Apr	0.5	0.4	0.4	0.6	0.6	0.6	0.5	0.8	1.1	1.0	0.3	0.8	0.4	0.0	0.2	0.0	0.4	-0.1	-0.2	0.1	0.1	0.2	0.3	-0.1	0.4	1.1
26-Apr	0.0	0.5	0.5	0.6	0.9	0.8	0.7	0.5	0.3	1.0	0.4	0.9	1.0	0.3	0.4	0.1	0.0	0.5	-0.1	0.0	0.3	0.2	0.3	0.1	0.4	1.0
27-Apr	0.5	1.4	0.6	0.4	0.2	0.2	0.2	0.3	0.3	-0.1	-0.2	0.8	1.7	2.0	2.1	1.0	1.8	0.7	0.3	0.6	0.4	0.2	0.2	0.0	0.6	2.1
28-Apr	0.0	0.1	0.1	0.2	0.5	0.4	0.4	0.3	0.0	-0.1	0.2	0.4	1.0	0.6	0.9	1.4	-0.1	-0.6	-0.4	0.6	0.7	0.8	0.8	0.9	0.4	1.4
29-Apr	0.9	0.7	0.7	0.7	0.7	0.3	0.4	0.6	1.2	1.5	1.9	1.0	1.7	0.7	1.4	1.0	0.6	-0.1	0.6	0.6	0.5	0.7	0.8	0.9	0.8	1.9
30-Apr	0.6	0.6	0.6	0.8	0.8	0.7	0.5	0.5	0.4	0.5	0.6	0.7	0.0	0.7	1.2	0.4	1.0	0.4	0.6	-0.1	0.5	1.0	0.4	0.0	0.6	1.2
	0.4	0.5	0.5	0.5	0.6	0.7	0.7	0.7	0.6	0.6	0.5	0.7	0.9	0.8	0.8	0.8	0.7	0.6	0.7	0.5	0.6	0.6	0.5	0.5	Diurnal Average	
	1.9	1.8	1.7	2.4	2.4	3.7	2.8	2.7	2.5	2.8	2.2	2.3	2.4	2.6	3.2	3.4	4.0	3.5	3.8	3.2	3.5	3.8	3.1	3.6	Diurnal Maximum	

AF - Analyzer Failure

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

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

Mannix - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 4.7 km/h on Apr 19 14:00

Minimum Value: 0.2 km/h on Apr 15 05:00

Percentiles: P_1 = 0.2 P_{10} = 0.6 Q_1 = 1.1 Median = 1.9 Q_3 = 2.6 P_{90} = 3.1 P_{99} = 4.0

Hours in Service:	720
Hours of Data:	718
Hours of Missing Data:	2
Hours of Calibration:	0
Percent Operational Time:	99.7

Day	Hourly Period Ending At (MST)																								Daily
	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-Apr	0.8	1.1	0.7	0.7	0.5	1.3	2.4	2.0	2.6	3.2	2.9	3.0	3.1	2.8	2.5	2.4	2.5	1.4	1.0	0.4	0.7	1.6	2.1	2.1	3.2
2-Apr	1.9	2.4	2.4	2.2	2.6	2.0	1.3	1.7	2.1	2.0	1.7	2.5	2.2	2.4	2.7	3.0	2.9	2.5	1.8	2.0	1.3	1.4	1.6	1.5	3.0
3-Apr	1.9	1.7	2.0	2.2	2.4	2.5	2.5	2.3	2.7	3.0	3.4	3.4	3.5	3.0	3.3	3.1	2.7	2.1	1.6	0.8	0.7	0.5	0.5	1.2	3.5
4-Apr	1.2	0.4	0.3	0.4	0.4	0.8	0.8	0.9	1.4	1.2	1.5	1.8	2.0	2.4	1.7	2.0	1.4	0.7	1.1	1.1	1.1	1.4	1.2	1.1	2.4
5-Apr	0.6	0.6	0.7	0.6	0.5	0.4	0.4	0.4	0.6	1.3	1.8	2.8	2.7	3.2	2.9	2.8	2.3	1.4	1.4	1.0	1.1	1.1	AF	AF	3.2
6-Apr	1.0	0.8	1.3	0.7	1.2	1.9	2.3	2.3	2.3	1.6	1.7	1.5	2.3	2.2	1.7	2.2	2.0	1.9	2.2	1.6	1.7	2.0	2.0	1.9	2.3
7-Apr	1.3	1.0	1.3	1.1	1.0	0.7	1.0	1.1	1.6	1.6	1.7	1.7	2.1	2.1	2.2	2.2	1.8	1.5	1.4	1.1	0.9	0.9	0.9	1.2	2.2
8-Apr	1.9	1.8	2.4	2.3	2.1	2.2	2.7	2.3	2.8	2.7	2.9	3.0	3.5	3.3	3.6	3.9	3.1	3.2	3.0	3.0	3.6	2.8	1.7	1.9	3.9
9-Apr	2.1	2.2	1.4	1.3	1.3	2.2	2.3	2.5	2.6	2.4	3.0	3.0	3.2	3.6	2.9	3.3	2.7	3.1	3.7	3.1	2.0	1.8	2.2	2.2	3.7
10-Apr	2.5	2.6	2.4	2.4	2.2	1.9	2.4	2.7	2.7	3.1	2.8	3.2	3.1	3.4	2.6	2.3	2.0	1.6	0.9	0.9	0.9	1.4	1.7	1.3	3.4
11-Apr	1.5	1.4	1.2	0.8	0.7	0.9	1.2	1.1	1.2	1.6	2.0	2.1	2.2	2.3	2.0	1.8	1.6	1.3	0.5	0.4	0.7	0.5	0.7	0.5	2.3
12-Apr	0.4	0.3	0.6	0.7	1.3	1.9	2.2	2.4	2.5	2.6	2.6	3.2	2.7	2.9	2.6	2.5	2.0	1.9	1.4	1.5	1.6	1.4	0.9	1.5	3.2
13-Apr	0.9	0.8	1.3	1.4	1.3	2.0	1.9	1.7	2.2	2.1	2.0	1.7	1.2	1.1	0.8	1.4	2.4	2.1	1.0	1.5	0.9	0.6	0.3	0.3	2.4
14-Apr	0.5	0.6	2.0	2.9	2.9	2.8	2.0	1.8	1.8	2.1	2.2	2.2	2.1	1.9	2.0	1.8	1.4	1.3	1.2	1.3	1.4	0.9	1.0	0.5	2.9
15-Apr	0.2	0.8	0.3	0.2	0.2	0.3	0.2	0.9	1.2	1.8	2.3	2.9	2.8	3.1	2.8	2.5	2.3	2.1	2.2	2.6	2.6	2.4	1.9	1.5	3.1
16-Apr	1.4	1.5	1.8	1.4	1.0	1.0	1.0	1.3	1.2	1.0	2.4	2.8	3.4	3.1	3.0	3.1	2.1	2.1	1.7	0.4	0.3	0.2	0.3	1.2	3.4
17-Apr	0.6	0.6	0.6	0.5	0.6	0.5	0.6	1.1	1.3	1.3	1.5	1.6	2.7	2.7	2.7	2.6	2.4	1.4	0.7	0.2	0.2	0.4	0.4	0.4	2.7
18-Apr	0.6	0.6	0.6	0.8	0.9	0.6	0.8	1.0	1.0	1.4	1.8	2.2	3.4	3.7	3.7	3.5	3.0	3.4	2.6	2.9	2.7	2.4	2.6	2.6	3.7
19-Apr	3.0	2.6	1.9	2.1	1.5	2.9	2.6	2.6	2.2	2.1	3.6	3.9	4.2	4.7	3.9	3.9	4.2	3.4	2.7	2.1	2.1	2.0	1.8	2.9	4.7
20-Apr	2.6	2.9	2.9	2.8	2.9	3.5	3.2	3.5	3.2	3.6	3.7	3.8	3.5	3.8	3.5	3.5	2.9	2.6	1.7	0.9	0.8	0.8	0.9	0.8	3.8
21-Apr	1.4	1.3	1.0	1.0	0.9	0.7	0.9	1.3	1.5	1.9	2.5	3.1	3.6	3.4	3.7	3.1	3.2	2.7	2.6	2.3	1.9	2.0	1.4	1.1	3.7
22-Apr	0.9	0.7	0.9	0.7	0.7	0.5	0.7	1.5	2.2	2.9	2.5	2.5	3.0	2.6	2.7	2.0	2.4	1.7	2.8	2.3	2.1	1.6	2.8	2.8	3.0
23-Apr	2.5	2.5	2.1	1.7	1.8	1.7	1.8	2.0	1.9	1.8	2.1	2.8	3.2	2.7	2.9	2.6	2.8	2.3	2.2	1.8	1.9	2.6	3.0	2.6	3.2
24-Apr	2.1	2.1	1.3	1.4	1.8	1.9	2.0	1.7	1.8	2.1	2.4	2.8	2.6	2.5	2.6	2.4	2.2	2.3	2.5	2.6	2.4	2.0	2.1	2.2	2.8
25-Apr	2.0	1.6	1.1	0.9	1.3	1.4	1.8	1.9	2.3	2.7	2.2	2.4	2.6	2.7	2.5	2.1	1.8	1.4	1.1	0.8	0.3	0.2	0.3	0.4	2.7
26-Apr	0.6	0.5	0.8	0.7	0.8	1.0	1.4	1.7	2.0	2.6	2.7	2.1	2.0	1.5	1.2	1.3	1.6	1.6	1.1	0.3	0.3	1.2	0.8	0.3	2.7
27-Apr	0.6	0.3	0.5	0.4	0.3	0.3	0.3	0.4	0.6	1.1	1.9	2.7	3.0	3.2	3.4	3.1	3.0	1.9	1.5	0.6	0.7	1.4	1.1	1.4	3.4
28-Apr	1.3	0.8	0.6	0.4	0.3	0.7	0.5	1.3	1.2	1.5	2.5	2.9	3.0	2.5	3.0	2.9	2.5	2.1	1.5	1.0	0.8	0.6	0.7	0.8	3.0
29-Apr	0.4	0.9	1.1	1.2	1.4	1.2	1.5	2.6	3.6	3.7	4.1	4.0	4.4	4.1	3.9	3.6	3.4	2.6	2.0	1.1	0.8	0.6	0.6	0.9	4.4
30-Apr	0.8	0.8	0.7	0.9	1.1	1.1	1.3	1.8	2.1	2.5	3.4	3.6	3.0	3.3	2.5	2.5	1.8	1.8	1.7	1.7	1.4	1.2	0.7	0.8	3.6
	3.0	2.9	2.9	2.9	2.9	3.5	3.2	3.5	3.6	3.7	4.1	4.0	4.4	4.7	3.9	3.9	4.2	3.4	3.7	3.1	3.6	2.8	3.0	2.9	
	Diurnal Maximum																								

AF - Analyzer Failure

Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

Calibration Date	April 13, 2016	Last Calibration	March 14, 2016
Station Name	Mannix	Station Number	AMS 5
Reason:	Routine		
Start Time (MST)	8:40	End Time (MST)	11:05
Gas Cert Reference	S9610161A	Station temp.	22 Deg C
Cal Gas Concentration	50 ppm	Cal Gas Exp Date	26/09/2017
Calibrator Make/Model	Sabio 4010	Serial Number	11061107
ZAG Make/Model	API 701	Serial Number	1083
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2633

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 1000 ppb		PMT voltage	-635	-635
Analyzer IP address	192.168.1.43		Lamp voltage	826	824
Calculated slope	0.996173	1.001693	Chamber temp	45.1	45.3
Calculated intercept	1.233694	0.735087	Pressure	695.2	698.6
Analyzer Background	7.7	7.6	Flow	0.457	0.476
Analyzer Coefficient	0.974	0.974	Intensity	90	90

Analyzer make	TEI 43i	Analyzer serial #	1008841399

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.4	----
as found span	5000	60.0	600.0	598.0	1.003
calibrator zero	5000	0.0	0.0	-0.4	----
high point	5000	60.0	600.0	598.0	1.003
second point	5000	30.0	300.0	299.9	1.000
third point	5000	15.0	150.0	147.8	1.015
as left zero	5000	0.0	0.0	-0.2	----
as left span	5000	60.0	600.0	600.7	0.999
				Average Correction Factor	1.006

Corrected As found	598.4	Previous response	601.1	% change	0.5%

Notes:

Changed inlet filter after as founds. No adjustments.

Calibration Performed By: Evan Magill

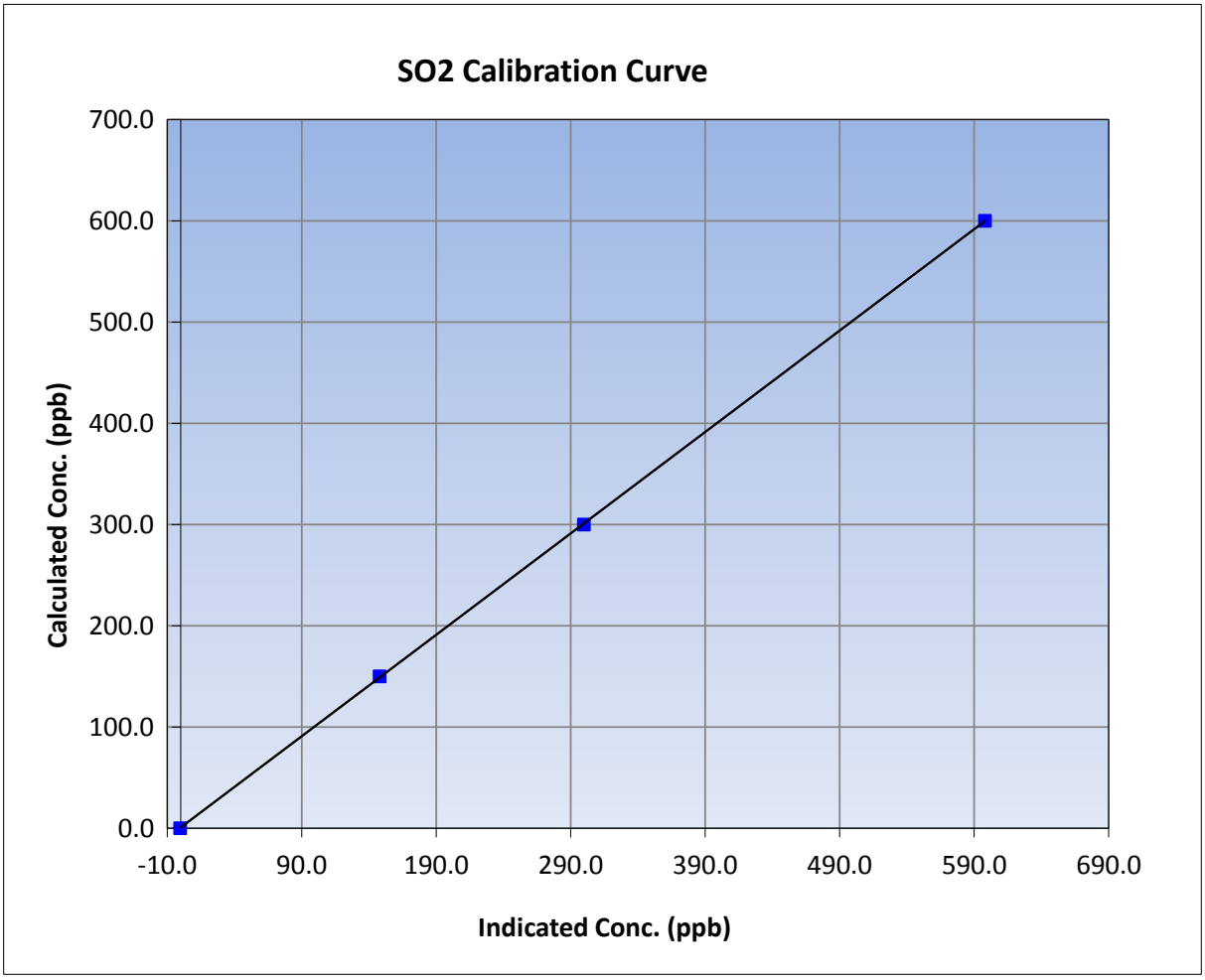
Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

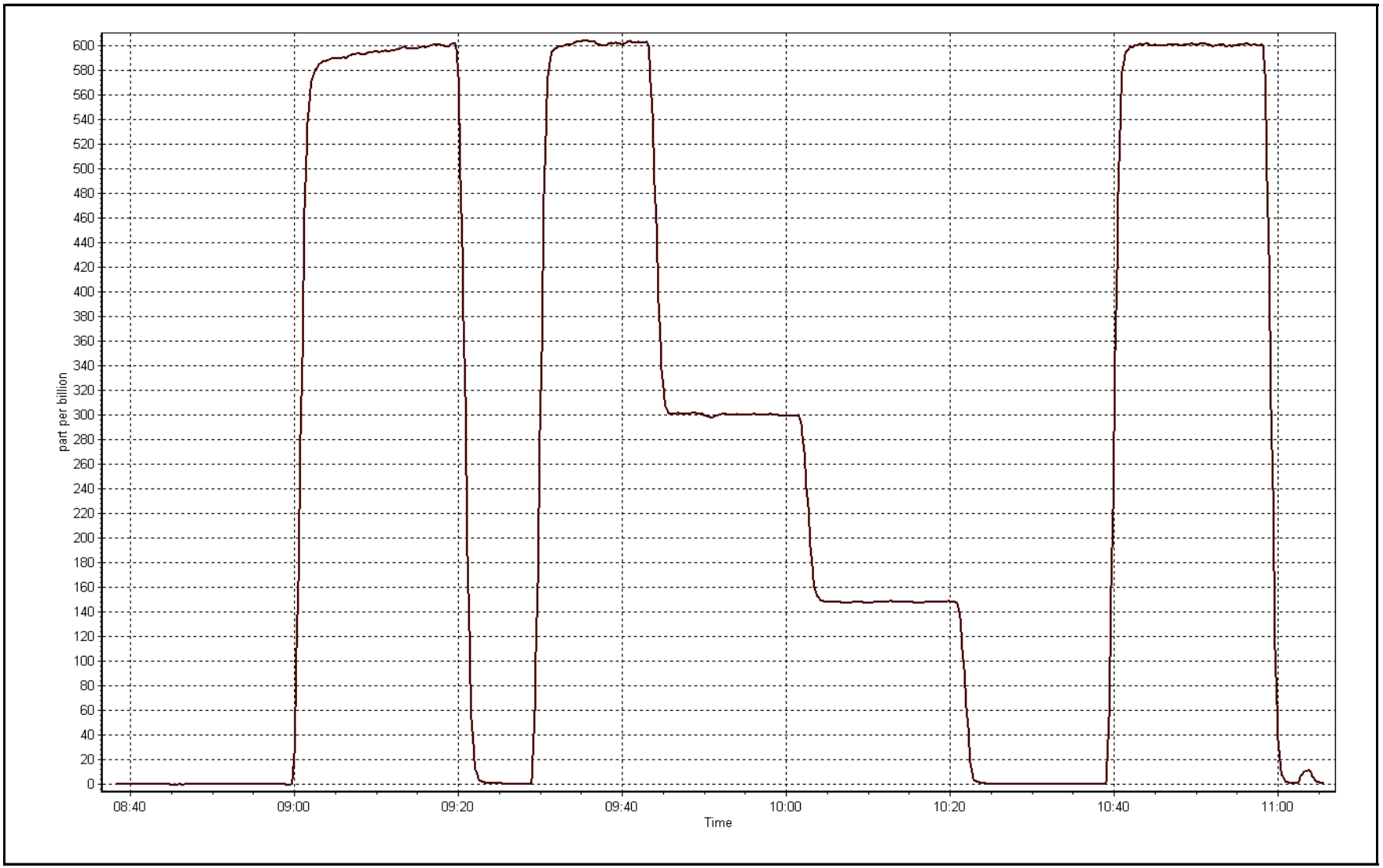
Calibration Date	April 13, 2016	Previous Calibration	March 14, 2016
Station Name	Mannix	Station Number	AMS 5
Start Time (MST)	8:40	End Time (MST)	11:05
Analyzer make	TEI 43i	Analyzer serial #	1008841399

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.4	----	Correlation Coefficient	0.999985
600.0	598.0	1.0033		
300.0	299.9	1.0005	Slope	1.001693
150.0	147.8	1.0149		
			Intercept	0.735087



SO2 Calibration Plot Date: April 13, 2016



Wood Buffalo Environmental Association
H2S Calibration Report

Station Information

Calibration Date	April 12, 2016	Last Calibration	March 15, 2016
Station Name	Mannix	Station Number	AMS 5
Reason:	Routine		
Start Time (MST)	12:00	End Time (MST)	14:35
Gas Cert Reference	CC62844	Station temp.	21 Deg C
Cal Gas Concentration	5.04 ppm	Cal Gas Exp Date	09/09/2017
Calibrator Make/Model	Sabio 4010	Serial Number	11061107
ZAG air Make/Model	API 701	Serial Number	138
DACS make/model	Campbell Scientific CR3000	Serial Number	2633
SO2 gas concentration	50 ppm	SO2 gas cert/exp	S960161A 09-Sep-17

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-657	-657
Analyzer IP address	192.168.1.42		Lamp voltage	817	814
Calculated slope	0.996830	1.010555	Chamber temp	45	45
Calculated intercept	-0.302095	-0.294635	Pressure	507.4	512.6
Analyzer Background	19.4	19.2	Flow	1.009	1.020
Analyzer Coefficient	0.968	0.968	Intensity	104	104
			Converter temp.	324	325

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

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.1	----
as found span	5000	74.4	75.0	74.3	1.010
SO2 scrubber check	5000	15.0	150.0	1.5	----
calibrator zero	5000	0.0	0.0	0.1	----
high point	5000	74.4	75.0	74.3	1.010
second point	5000	41.7	42.0	42.3	0.994
third point	5000	24.8	25.0	25.0	0.998
as left zero	5000	0.0	0.0	0.2	----
as left span	5000	74.4	75.0	74.8	1.002
				Average Correction Factor	1.001

Corrected As found	74.2	Previous response	75.5	% change	1.9%

Notes:

Changed inlet filter and scrubber check done after as founds. No adjustments.

Calibration Performed By: Evan Magill

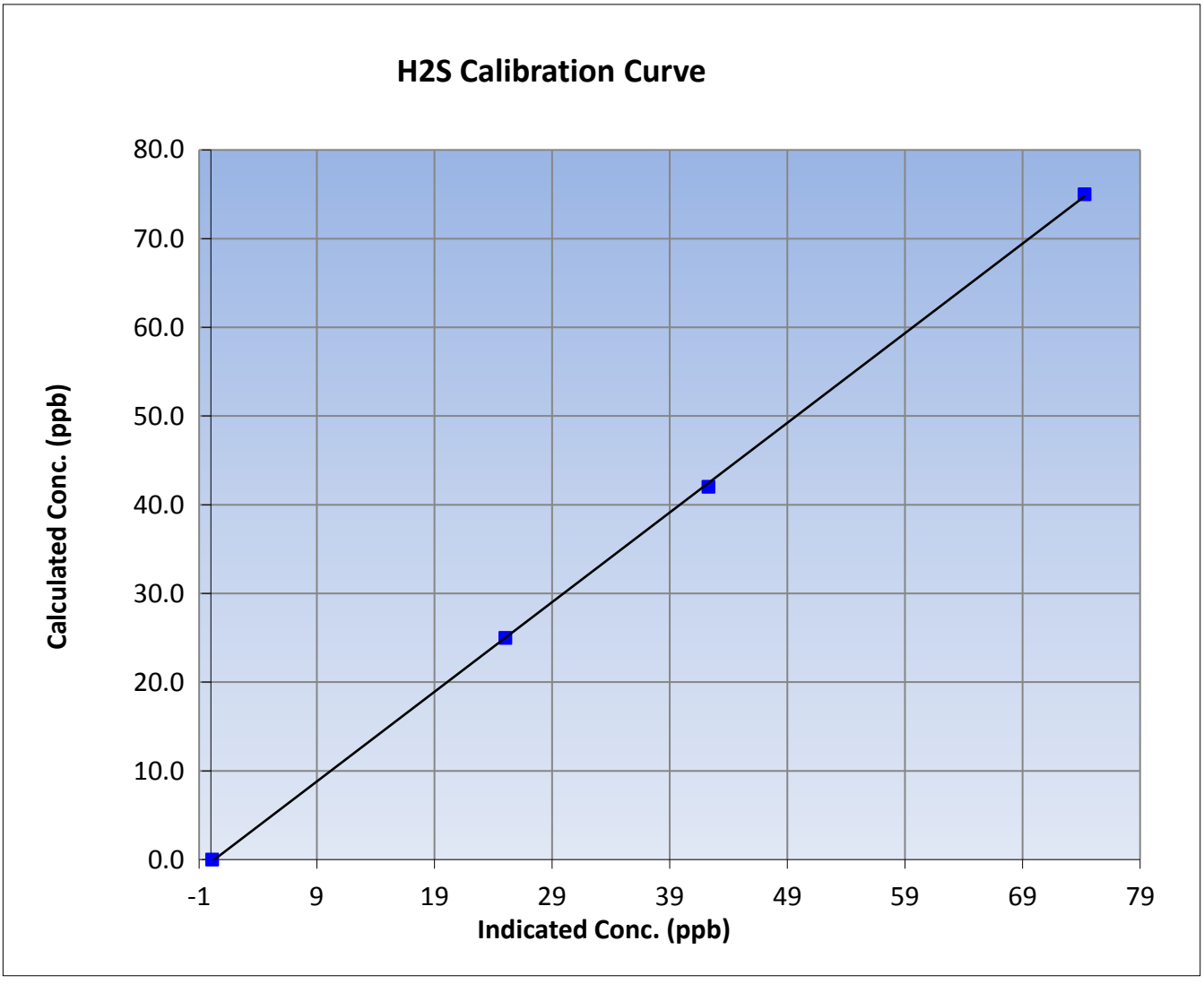
Wood Buffalo Environmental Association
H2S Calibration Report

Station Information

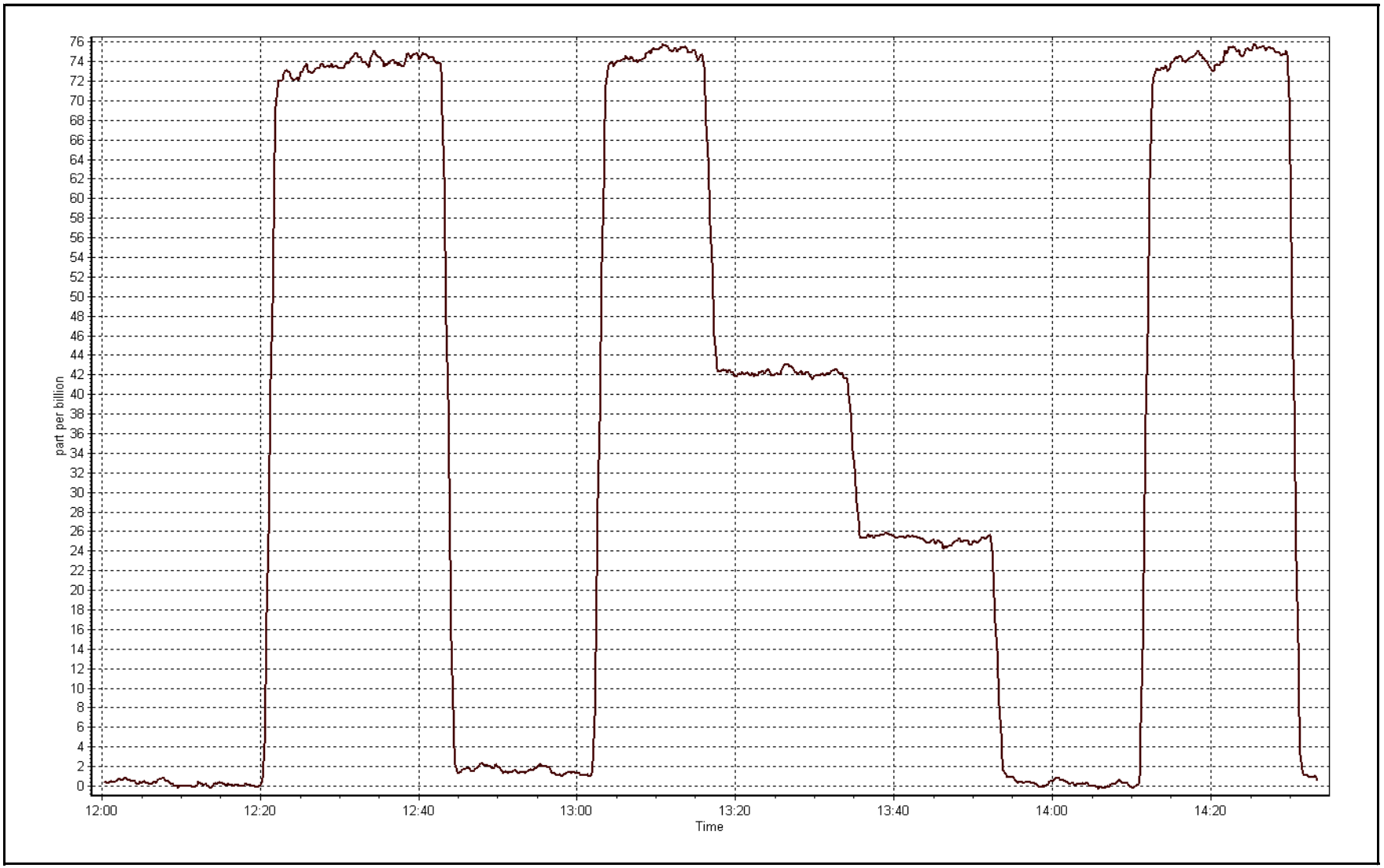
Calibration Date	April 12, 2016	Previous Calibration	March 15, 2016
Station Name	Mannix	Station Number	AMS 5
Start Time (MST)	12:00	End Time (MST)	14:35
Analyzer make	Thermo 450i	Analyzer serial #	815129108

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	0.999914
75.0	74.3	1.0098		
42.0	42.3	0.9939	Slope	1.010555
25.0	25.0	0.9983		
			Intercept	-0.294635



H2S Calibration Plot Date: April 12, 2016



Wood Buffalo Environmental Association
THC Calibration Report

W B E A

Station Information

Calibration Date	April-13-16	Last Calibration	March-14-16
Station Name	Mannix	Station Number	AMS 5
Reason:	Routine		
Start Time (MST)	8:40	End Time (MST)	11:05
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	0.996795	0.995134	Fuel Pressure	20.2	20.2
Calculated intercept	0.002017	0.006115	Analyzer Coeff	3.397	3.397
			Analyzer BKG	2.82	2.82

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	12.53	0.994
calibrator zero	5000	0.0	0.00	0.02	----
high point	5000	60.0	12.46	12.53	0.994
second point	5000	30.0	6.23	6.22	1.001
third point	5000	15.0	3.11	3.11	1.001
as left zero	5000	0.0	0.00	0.06	----
as left span	5000	60.0	12.46	12.55	0.993
				Average Correction Factor	0.999

Corrected As found	12.51	Previous response	12.49	% change	-0.1%

Notes:

Changed inlet filter after as founds. No adjustments.

Calibration Performed By: Evan Magill

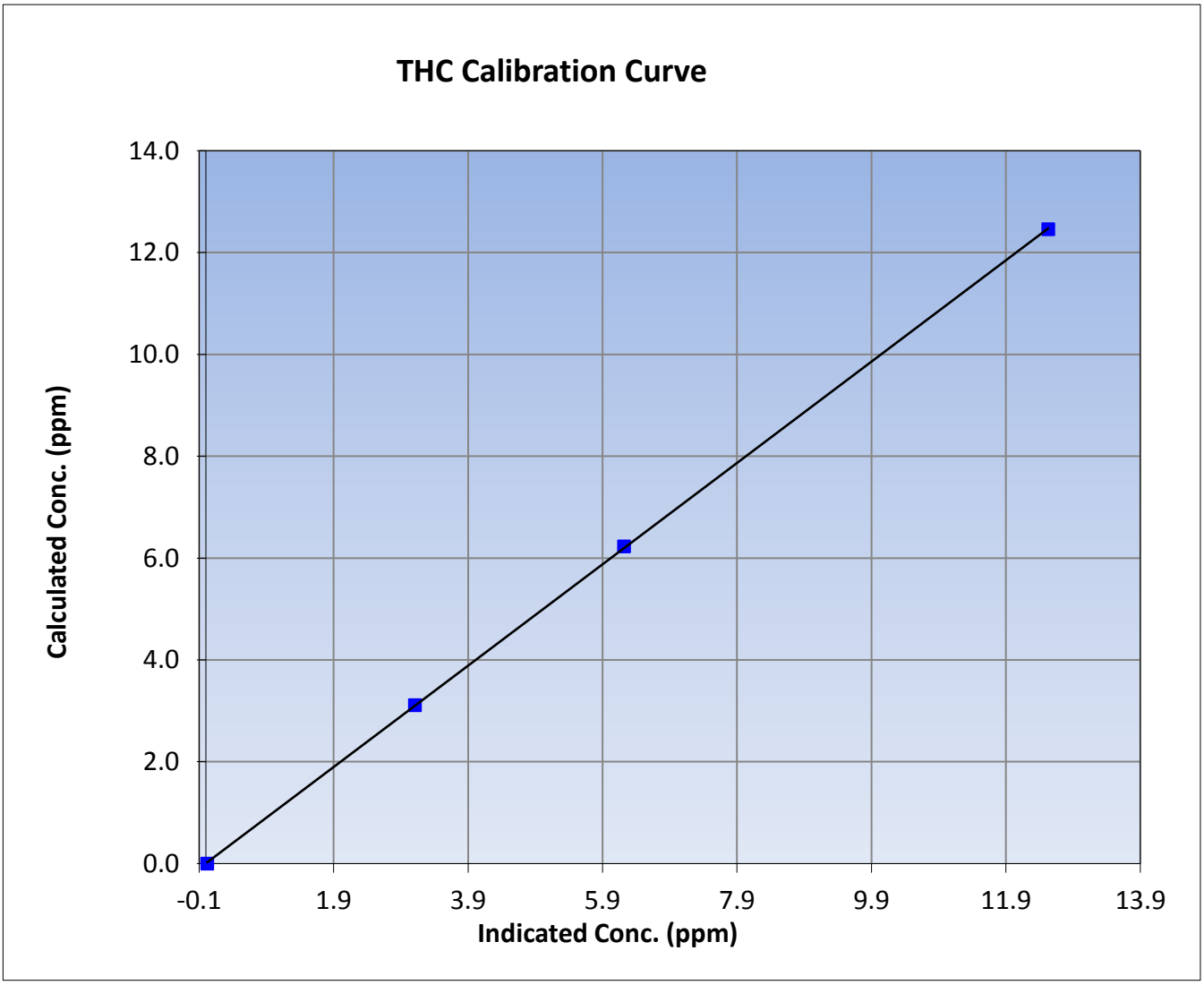
Wood Buffalo Environmental Association
THC Calibration Report

Station Information

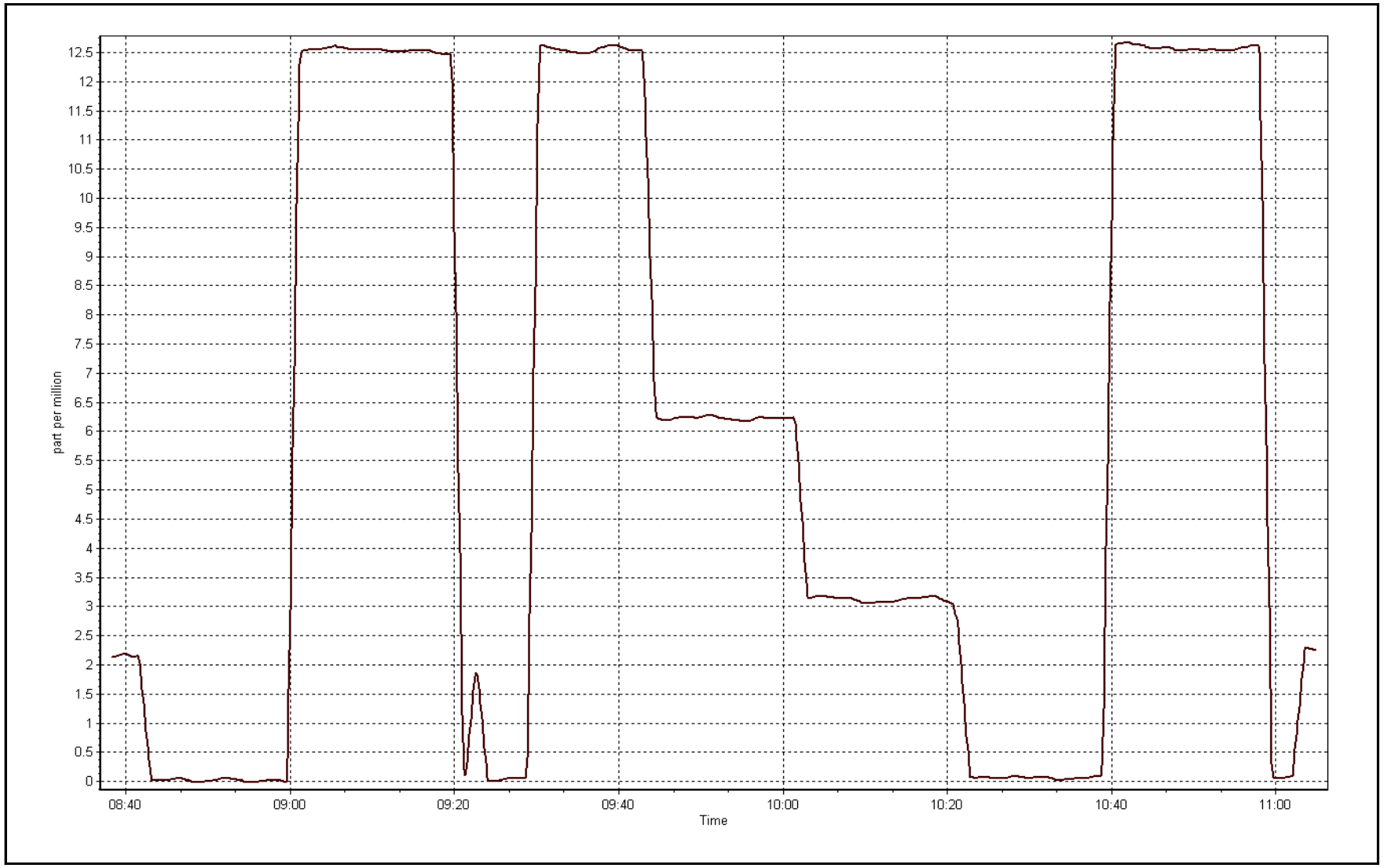
Calibration Date	April 13, 2016	Previous Calibration	March 14, 2016
Station Name	Mannix	Station Number	AMS 5
Start Time (MST)	8:40	End Time (MST)	11:05
Analyzer make	Thermo 51i-LT	Analyzer serial #	1317958295

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.02	----	Correlation Coefficient	0.999974
12.46	12.53	0.9941		
6.23	6.22	1.0013	Slope	0.995134
3.11	3.11	1.0013		
			Intercept	0.006115



THC Calibration Plot Date: April 13, 2016



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 6
PATRICIA MCINNES
APRIL 2016

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

May 27, 2016

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

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	687	33	33	100.00	39	0	5	0
TRS (ppb) Average	686	33	34	99.86	1	0	0	0
THC (ppm) Average	687	33	33	100.00	2.3	-	2.1	-
NMHC(ppm) Average	687	33	33	100.00	0.317	-	0.014	-
CH4(ppm) Average	687	33	33	100.00	2.3	-	2.1	-
O3 (ppb) Average	682	35	38	99.58	75	0	59	-
NO2 (ppb) Average	683	35	37	99.72	27	0	8	-
NO (ppb) Average	683	35	37	99.72	33	-	3	-
NOX (ppb) Average	683	35	37	99.72	57	-	10	-
NH3 (ppb) Average	637	42	83	94.31	0	0	0	-
PM2.5 (ug/m3) Average	718	2	2	100.00	30.5	-	7.5	0
Temperature 2 m (C) Average	720	0	0	100.00	26.9	-	16.7	-
Relative Humidity (%) Average	720	0	0	100.00	98	-	88	-
Wind Speed 10 m (km/h) Average	713	0	7	99.03	37	-	21	-
Wind Direction 10 m (deg) Average	713	0	7	99.03	-	-	-	-

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

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

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

					Percentile						
Parameter	Number	Mean	StnDev	Total	Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	687	0.7	2	-	0	0	0	0	0	2	39
TRS (ppb) Average	686	0.1	0	-	0	0	0	0	0	0	1
THC (ppm) Average	687	2.02	0	-	1.9	2	2	2	2	2.1	2.3
NMHC(ppm) Average	687	0.001	0.016	-	0	0	0	0	0	0	0.317
CH4(ppm) Average	687	2.02	0	-	1.9	2	2	2	2	2.1	2.3
O3 (ppb) Average	682	37.7	11	-	6	24	32	38	44	50	75
NO2 (ppb) Average	683	4	4	-	0	1	2	3	5	9	27
NO (ppb) Average	683	1	2	-	0	0	0	0	1	2	33
NOX (ppb) Average	683	5.1	5	-	0	1	2	4	6	11	57
NH3 (ppb) Average	637	0	0	-	0	0	0	0	0	0	0
PM2.5 (ug/m3) Average	718	4.17	2.8	-	0.3	1.6	2.4	3.5	5.2	7.6	30.5
Temperature 2 m (C) Average	720	4.31	7.7	-	-12.3	-5.3	-1	3.1	8.8	16.6	26.9
Relative Humidity (%) Average	720	55.5	23	-	10	25	37	56	73	86	98
Wind Speed 10 m (km/h) Average	713	11.2	6	-	1	4	7	10	15	19	37
Wind Direction 10 m (deg) Average	713	-	-	-	-	-	-	-	-	-	-

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

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
TRS, O3, NO2, NH3	26 Apr 2016 09:00	26 Apr 2016 09:00	1	Maintenance - sample manifold cleaned
O3, NO2	19 Apr 2016 15:00	19 Apr 2016 16:00	2	Maintenance - confirm new calibrator operation
NH3	01 Apr 2016 06:00	30 Apr 2016 05:00	40	Stabilization after daily span
Wind Speed, Wind Direction	14 Apr 2016 05:00	14 Apr 2016 11:00	7	Flat line in sensor output signal - Sensor frozen

Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO_2) - ppb

Patricia McInnes - April 2016

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

Maximum Value: 39 ppb on Apr 1 15:00

Maximum Daily Average: 4.9 ppb on Apr 1

Minimum Value: 0 ppb on Apr 2 06:00

Minimum Daily Average: 0.0 ppb on Apr 23

Maximum Diurnal Average: 1.9 ppb at hour 15

Minimum Diurnal Average: 0.2 ppb at hour 3

Monthly Average: 0.7 ppb

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

Hours in Service:	720
Hours of Data:	687
Hours of Missing Data:	33
Hours of Calibration:	33
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-Apr	0	0	Z	0	0	0	0	1	3	4	6	13	17	12	39	13	3	0	0	0	0	0	0	0	4.9	39
2-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	2	6	2	2	2	3	5	3	1	1.2	6
3-Apr	1	2	2	2	Z	1	2	3	4	4	5	5	5	2	4	5	6	5	5	4	2	0	0	0	3.0	6
4-Apr	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
5-Apr	Z	0	0	0	1	1	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2
6-Apr	0	Z	0	0	0	0	4	1	2	1	1	0	0	0	0	1	5	4	2	2	0	0	0	0	1.0	5
7-Apr	8	1	Z	0	0	0	0	0	0	0	1	1	1	1	2	3	4	1	0	0	0	0	0	0	1.1	8
8-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
9-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1	1	1	0.3	1
10-Apr	0	0	0	0	1	Z	2	6	3	6	1	1	1	4	4	4	3	1	1	1	1	0	0	0	1.8	6
11-Apr	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0.3	1
12-Apr	0	Z	0	0	0	2	9	8	2	6	5	4	6	5	0	0	0	1	6	5	5	3	2	1	3.1	9
13-Apr	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
14-Apr	0	0	0	Z	2	1	0	0	0	1	1	1	0	0	0	0	0	0	2	1	1	0	0	0	0.5	2
15-Apr	0	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-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
17-Apr	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
18-Apr	0	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
19-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
20-Apr	0	0	0	3	3	Z	1	2	2	6	5	4	3	0	0	0	0	0	0	0	0	0	0	0	1.3	6
21-Apr	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-Apr	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
23-Apr	0	0	Z	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-Apr	0	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-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
26-Apr	0	0	0	0	0	Z	0	0	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
27-Apr	0	0	0	0	0	0	Z	0	0	0	0	4	0	0	5	9	5	4	3	2	2	1	0	0	1.5	9
28-Apr	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
29-Apr	0	0	Z	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
30-Apr	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
	0.5	0.2	0.2	0.3	0.3	0.3	0.8	0.9	0.7	1.1	1.0	1.2	1.2	0.9	1.9	1.3	1.2	0.7	0.8	0.7	0.5	0.4	0.3	0.2	Diurnal Average	
	8	2	2	3	3	2	9	8	4	6	6	13	17	12	39	13	6	5	6	5	5	5	3	1	Diurnal Maximum	

Z - zerospan C - Calibration

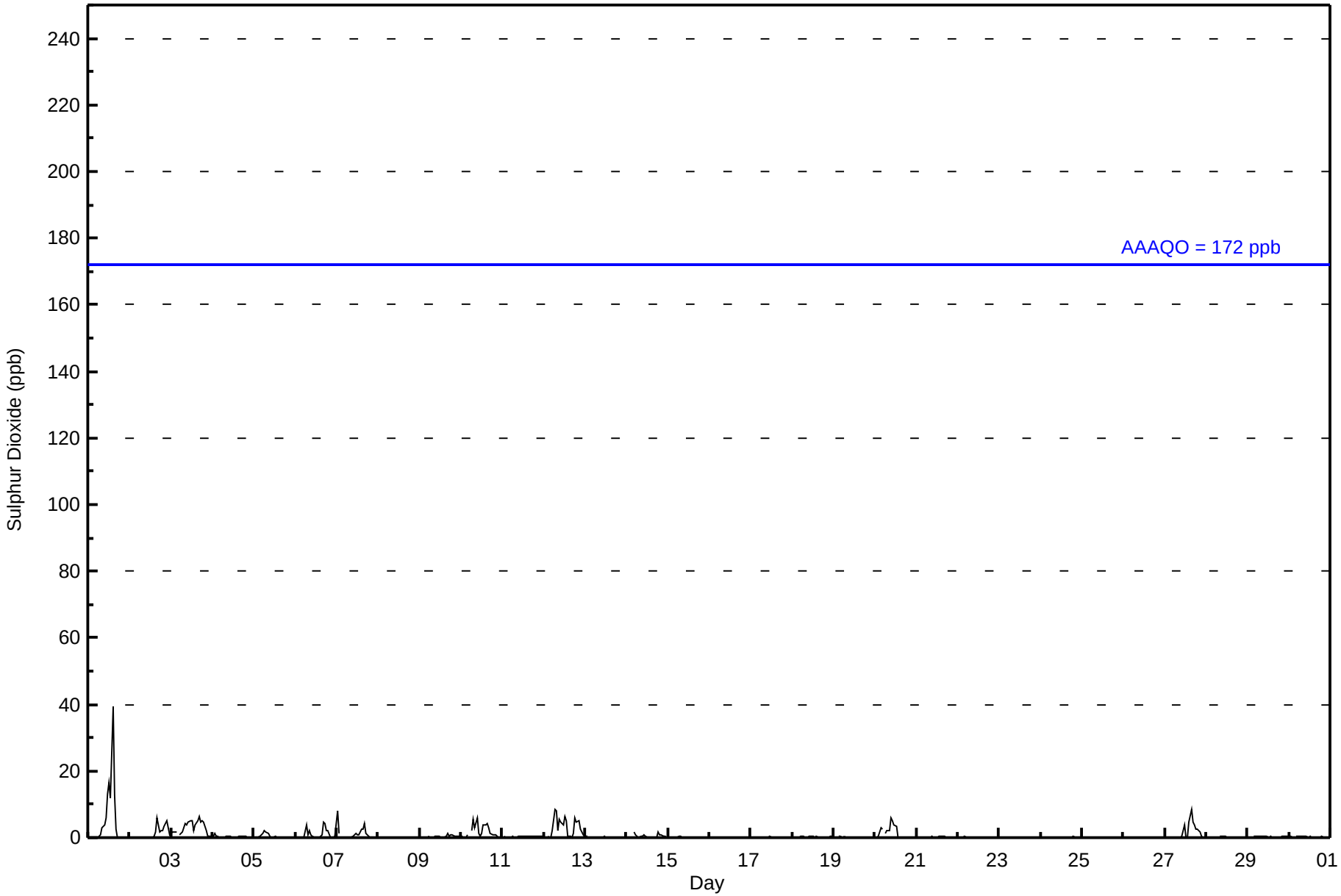
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb

Wood Buffalo Environmental Association

Hourly Averages

Sulphur Dioxide (SO_2) - ppb

Patricia McInnes - April 2016



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	682	99.27	99.27
11 - 20	4	0.58	99.85
21 - 60	1	0.15	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

Patricia McInnes - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 10	79	47	23	20	37	89	68	42	70	34	18	24	20	22	21	61	675
11 - 20	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
21 - 60	0	1	0	0	0	0	0	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	80	51	23	20	37	89	68	42	70	34	18	24	20	22	21	61	680

Total Number of Valid Hours: 680

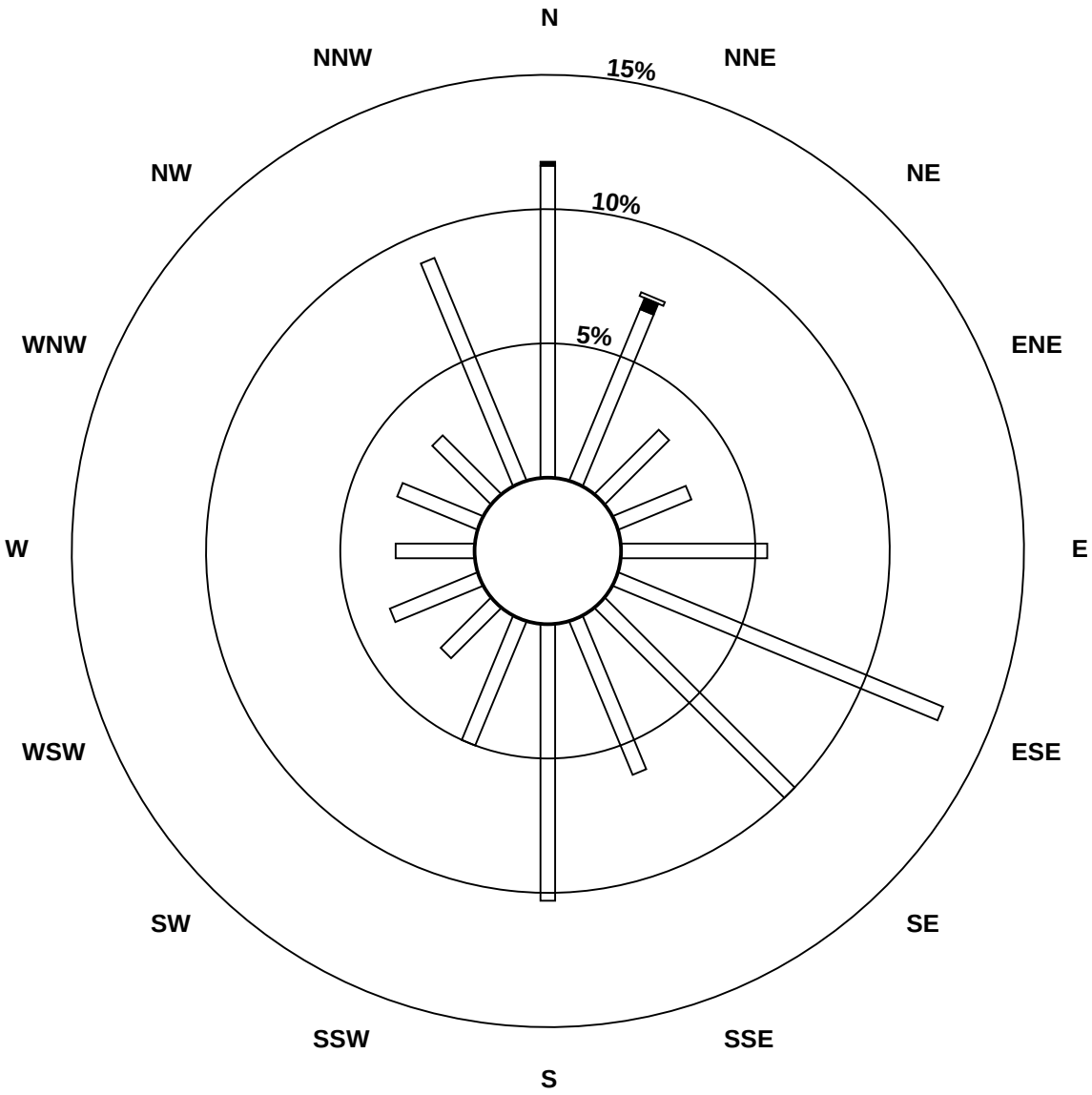
Total Number of Hours: 720

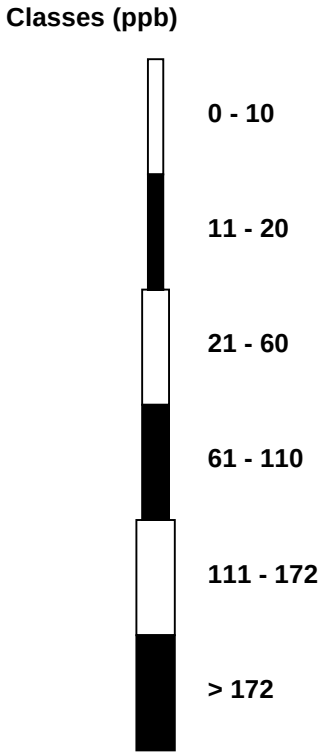
Wood Buffalo Environmental Association

Wind Rose Apr 2016

Sulphur Dioxide (SO_2) - ppb

Patricia McInnes (AMS 6)





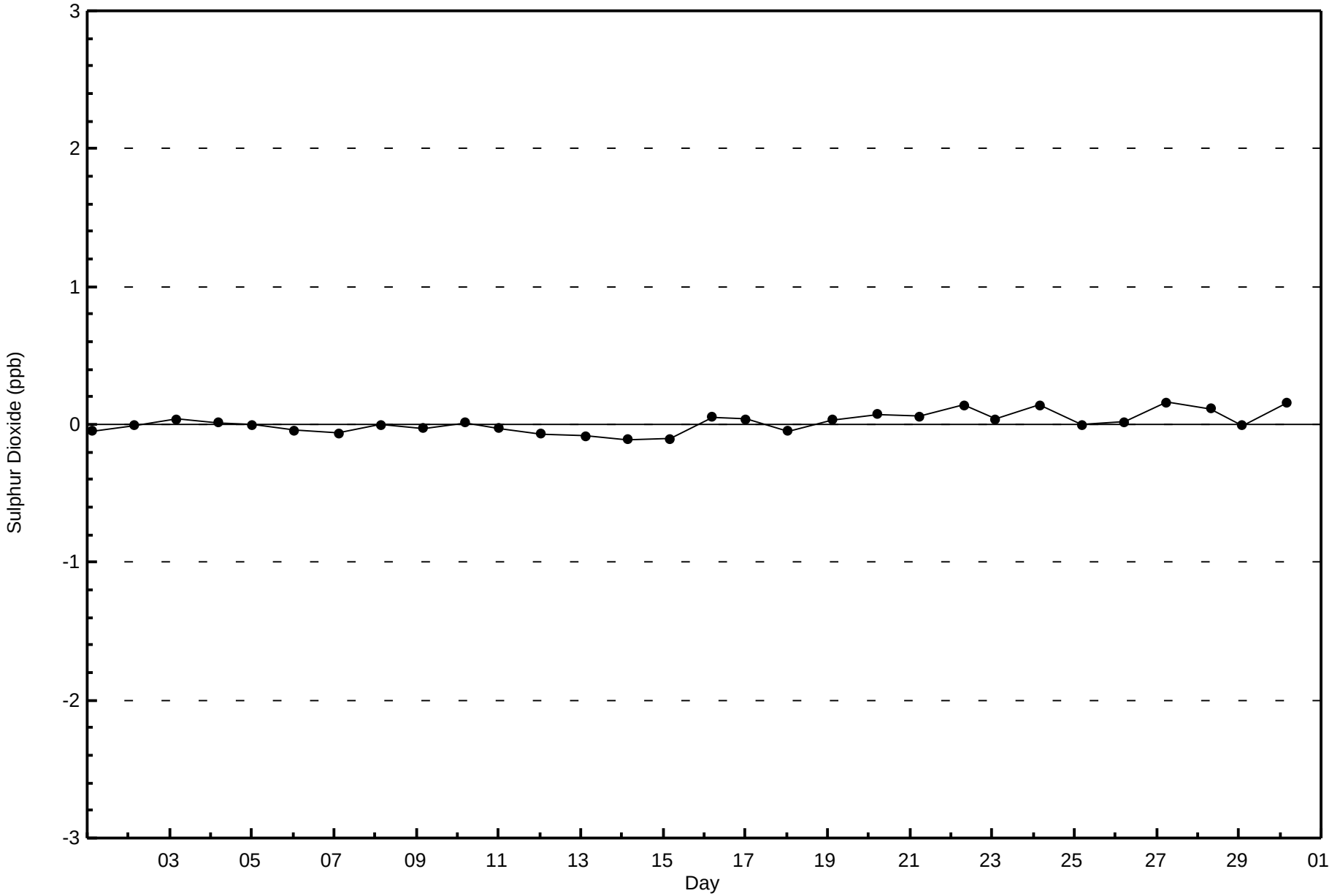
Total Number of Valid Hours: 680

Wood Buffalo Environmental Association

Zero Responses

Sulphur Dioxide (SO_2) - ppb

Patricia McInnes - April 2016

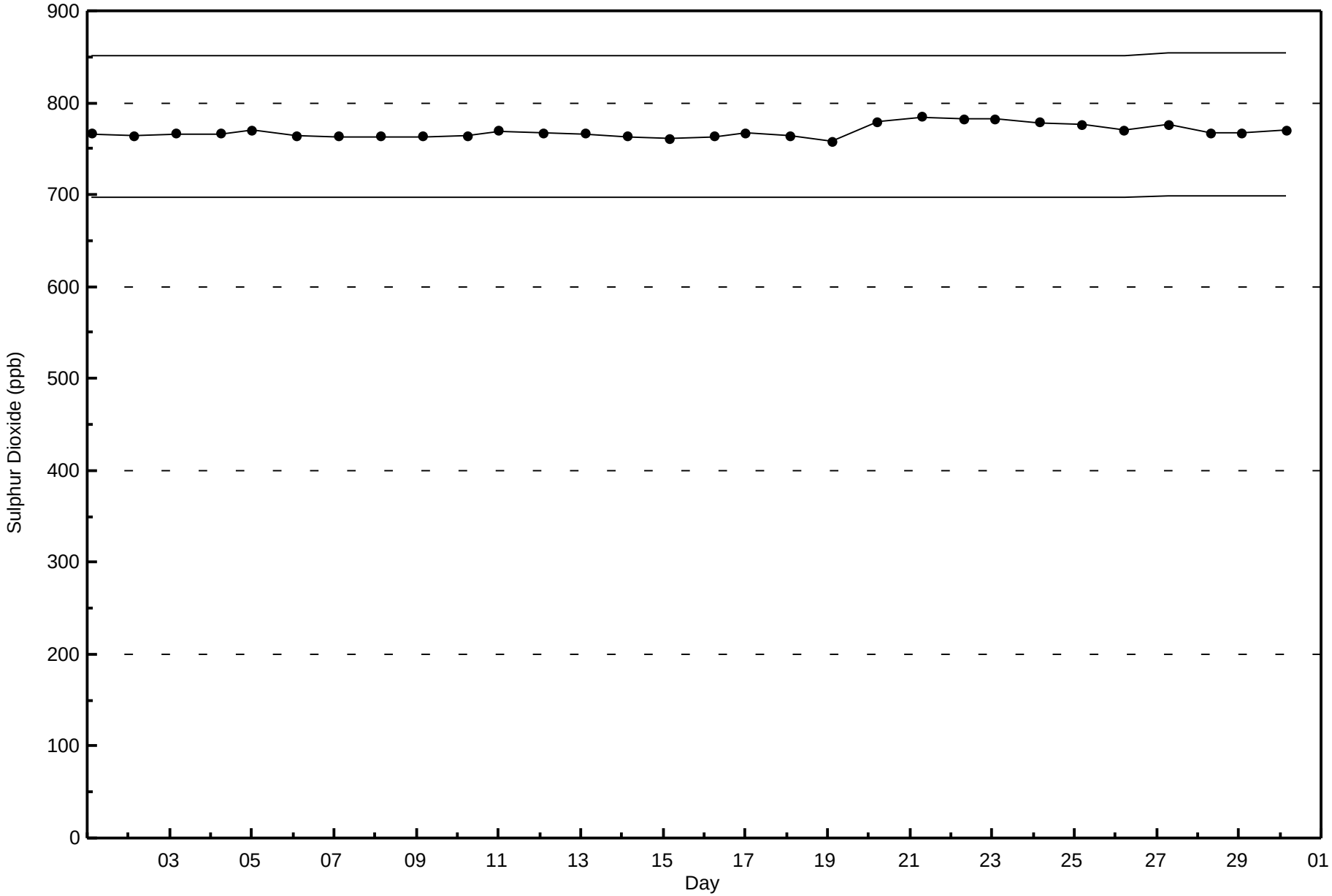


Wood Buffalo Environmental Association

Span Responses

Sulphur Dioxide (SO_2) - ppb

Patricia McInnes - April 2016



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

Maximum Value: 1 ppb on Apr 5 07:00 Maximum Daily Average: 0.2 ppb on Apr 12

Minimum Value: 0 ppb on Apr 29 14:00 Minimum Daily Average: 0.1 ppb on Apr 29

Maximum Diurnal Average: 0.2 ppb at hour 7 Minimum Diurnal Average: 0.1 ppb at hour 14

Monthly Average: 0.1 ppb Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 0$ $P_{99} = 0$

Hours in Service:	720
Hours of Data:	686
Hours of Missing Data:	34
Hours of Calibration:	33
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-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
2-Apr	0	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-Apr	0	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-Apr	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-Apr	0	Z	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
6-Apr	0	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-Apr	0	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-Apr	0	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-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
10-Apr	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-Apr	0	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-Apr	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
13-Apr	0	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-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.1	1
15-Apr	0	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-Apr	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
17-Apr	0	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-Apr	0	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-Apr	0	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-Apr	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
21-Apr	0	0	0	0	0	0	0	Z	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
22-Apr	0	0	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
23-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
24-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
25-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
26-Apr	0	0	0	0	0	0	Z	0	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
27-Apr	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
28-Apr	0	0	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
29-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
30-Apr	0	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
	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Diurnal Average	
	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance

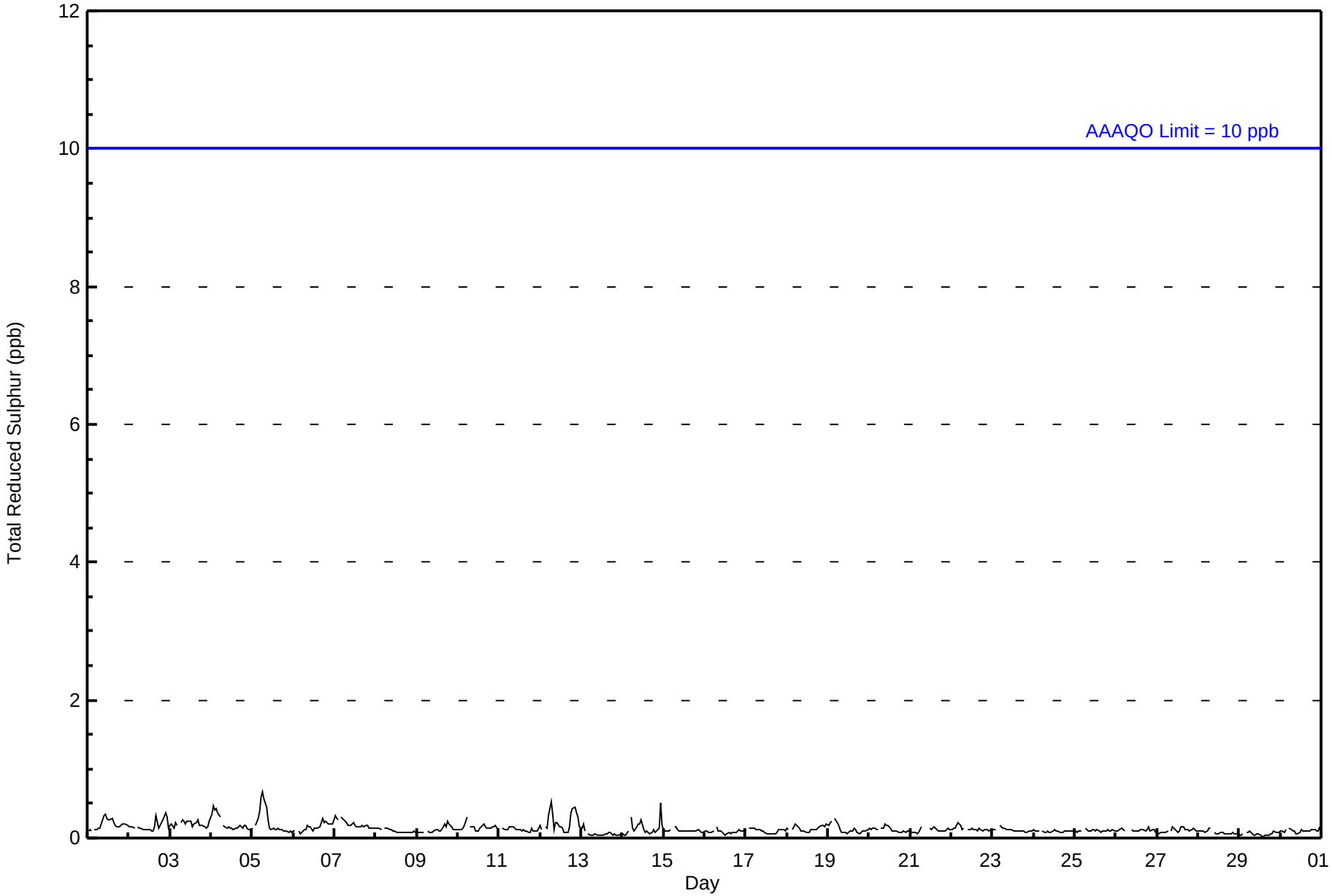
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb

Wood Buffalo Environmental Association

Hourly Averages

Total Reduced Sulphur (TRS) - ppb

Patricia McInnes - April 2016



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	686	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Total Reduced Sulphur (TRS) - ppb

Patricia McInnes - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 2	80	50	22	19	37	88	66	46	71	37	17	23	20	20	22	62	680
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	80	50	22	19	37	88	66	46	71	37	17	23	20	20	22	62	680

Total Number of Valid Hours: 680

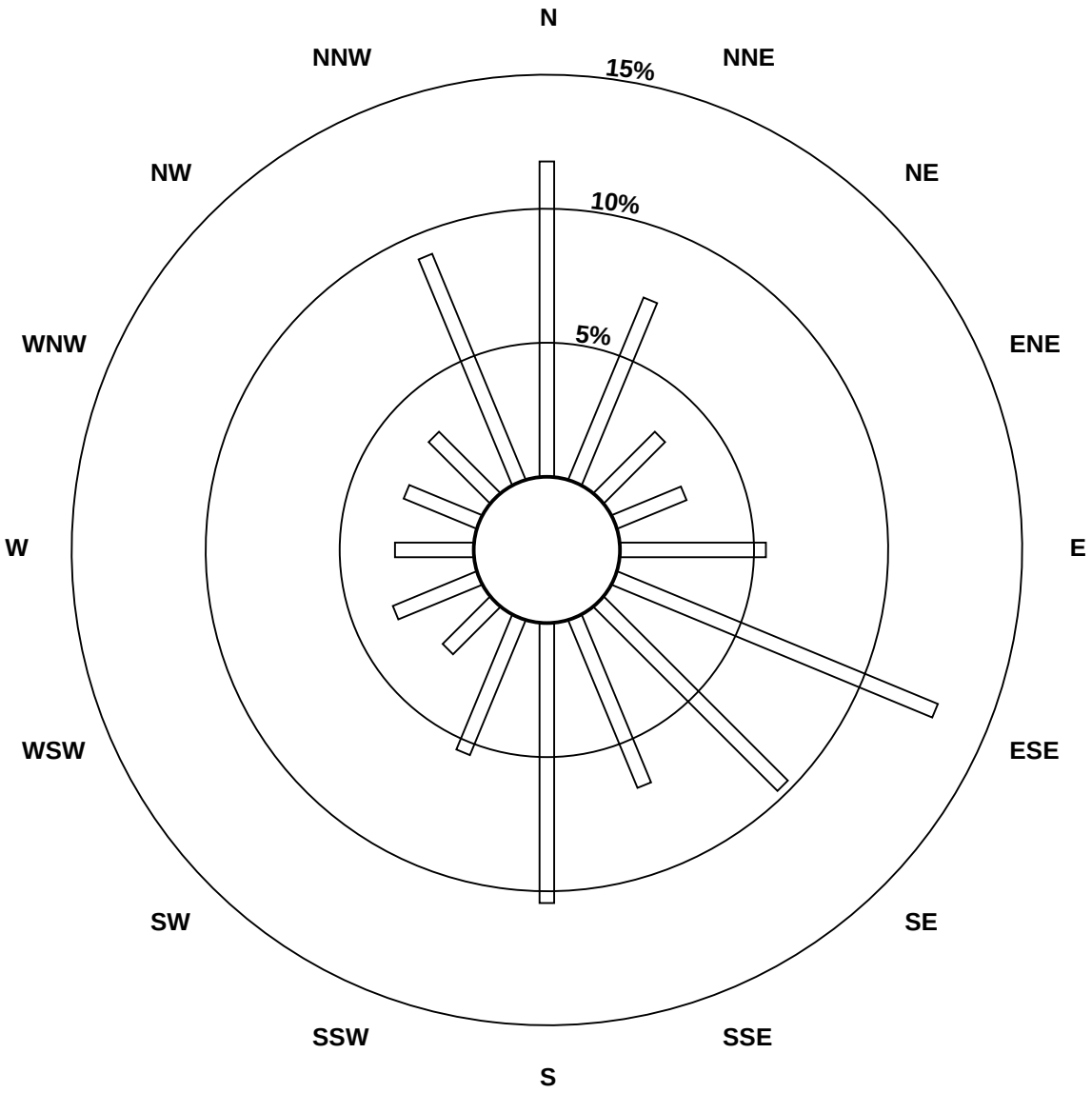
Total Number of Hours: 720

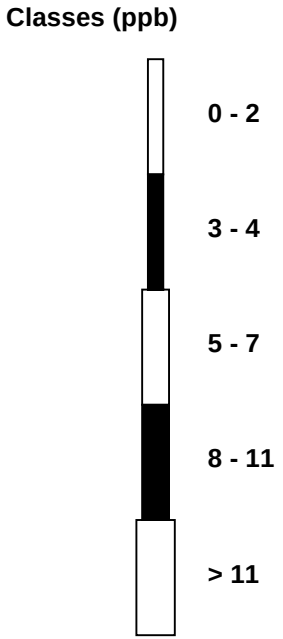
Wood Buffalo Environmental Association

Wind Rose Apr 2016

Total Reduced Sulphur (TRS) - ppb

Patricia McInnes (AMS 6)





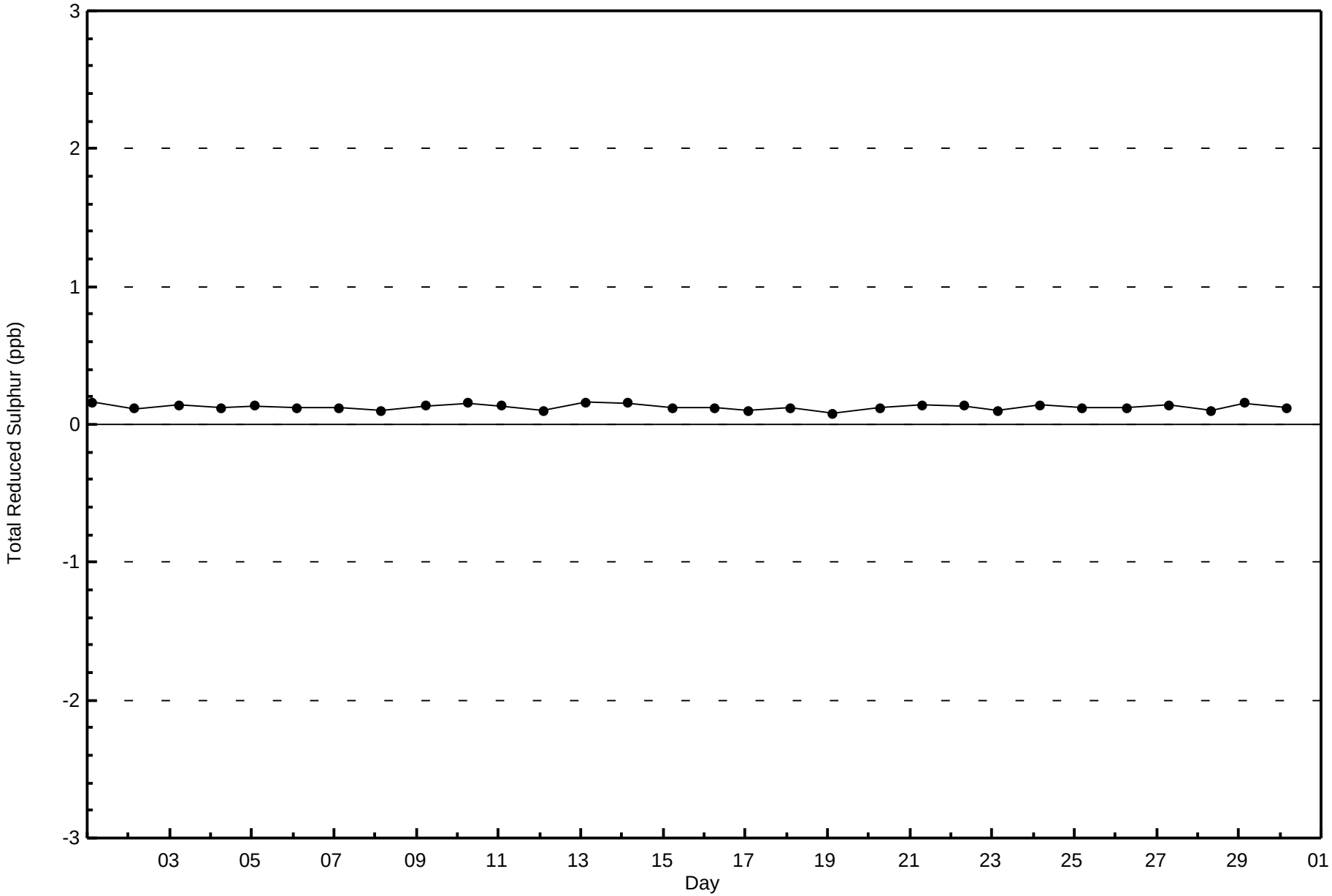
Total Number of Valid Hours: 680

Wood Buffalo Environmental Association

Zero Responses

Total Reduced Sulphur (TRS) - ppb

Patricia McInnes - April 2016

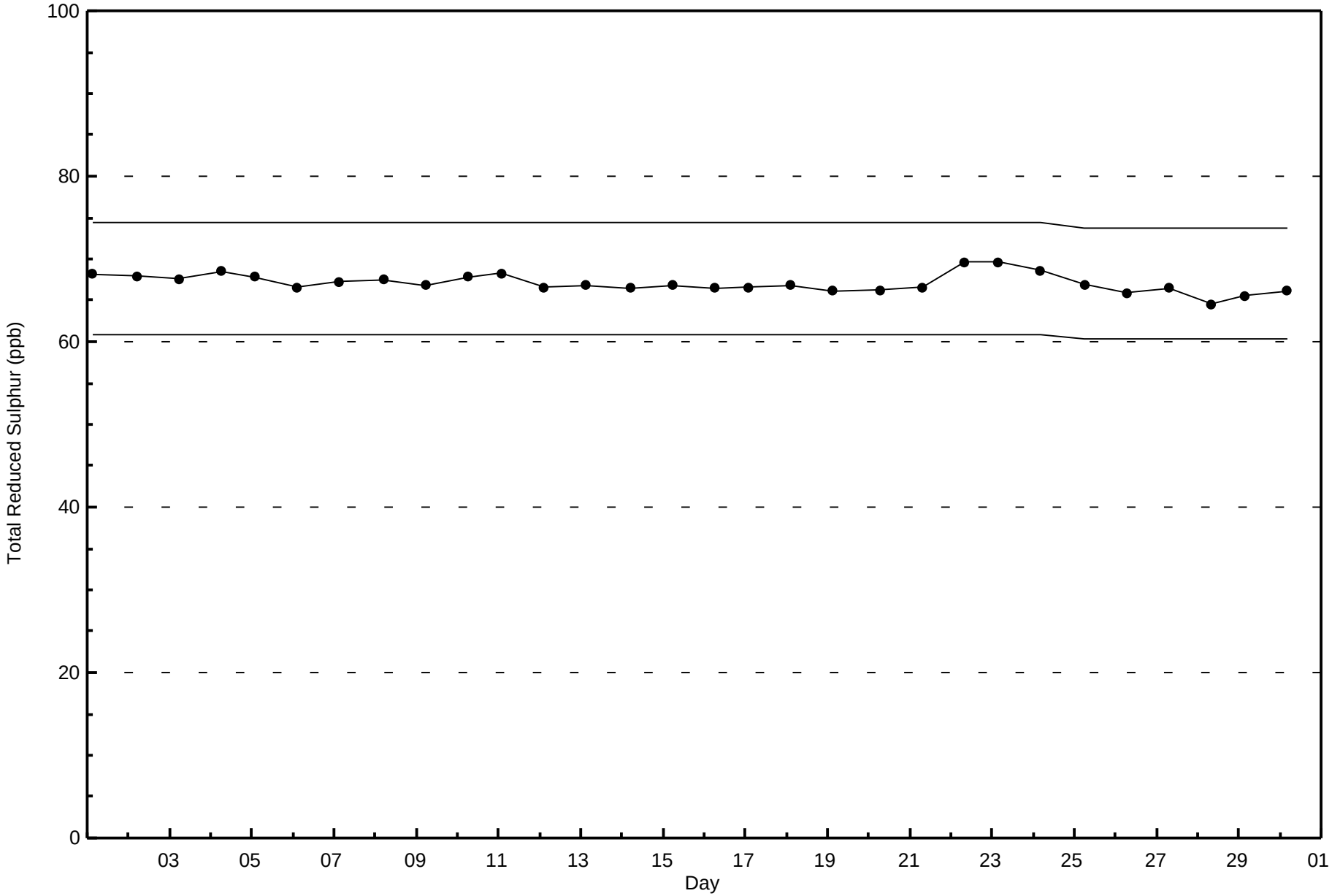


Wood Buffalo Environmental Association

Span Responses

Total Reduced Sulphur (TRS) - ppb

Patricia McInnes - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Patricia McInnes - April 2016

Maximum Value: 2.3 ppm on Apr 4 21:00

Maximum Daily Average: 2.1 ppm on Apr 12

Minimum Value: 1.9 ppm on Apr 19 12:00

Minimum Daily Average: 2.0 ppm on Apr 19

Maximum Diurnal Average: 2.1 ppm at hour 6

Minimum Diurnal Average: 2.0 ppm at hour 14

Monthly Average: 2.02 ppm

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

Hours in Service:	720
Hours of Data:	687
Hours of Missing Data:	33
Hours of Calibration:	33
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-Apr	2.1	2.2	Z	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.2
2-Apr	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.1
3-Apr	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.1	2.1	2.1
4-Apr	2.1	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.3	2.0	2.0	2.0	2.1	2.3
5-Apr	Z	2.0	2.0	2.1	2.1	2.2	2.2	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.2
6-Apr	2.1	Z	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
7-Apr	2.0	2.0	Z	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1
8-Apr	2.1	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
9-Apr	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
10-Apr	2.0	2.0	2.0	2.0	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.0	2.1
11-Apr	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1
12-Apr	2.1	Z	2.1	2.1	2.1	2.3	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3
13-Apr	2.0	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
14-Apr	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.3	2.0	2.0	2.3
15-Apr	2.0	2.0	2.0	2.1	Z	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
16-Apr	2.0	2.0	2.0	2.0	2.0	Z	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.1
17-Apr	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.2	2.2	2.1	2.0	2.2
18-Apr	2.1	Z	2.1	2.1	2.1	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2
19-Apr	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
20-Apr	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	2.1	2.1	2.0	2.1
21-Apr	2.1	2.1	2.1	2.1	2.1	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.1
22-Apr	2.0	2.0	2.1	2.1	2.1	2.1	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
23-Apr	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
24-Apr	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
25-Apr	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.1
26-Apr	2.1	2.1	2.1	2.1	2.1	Z	2.1	2.1	C	C	C	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
27-Apr	2.0	2.0	2.0	2.1	2.0	2.0	Z	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.1
28-Apr	2.1	2.1	2.1	2.1	2.1	2.1	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
29-Apr	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
30-Apr	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
	2.0	2.0	2.0	2.1	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	Diurnal Average	
	2.1	2.2	2.1	2.1	2.1	2.3	2.2	2.2	2.1	2.1	2.0	2.0	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.3	2.2	2.3	2.1	Diurnal Maximum	

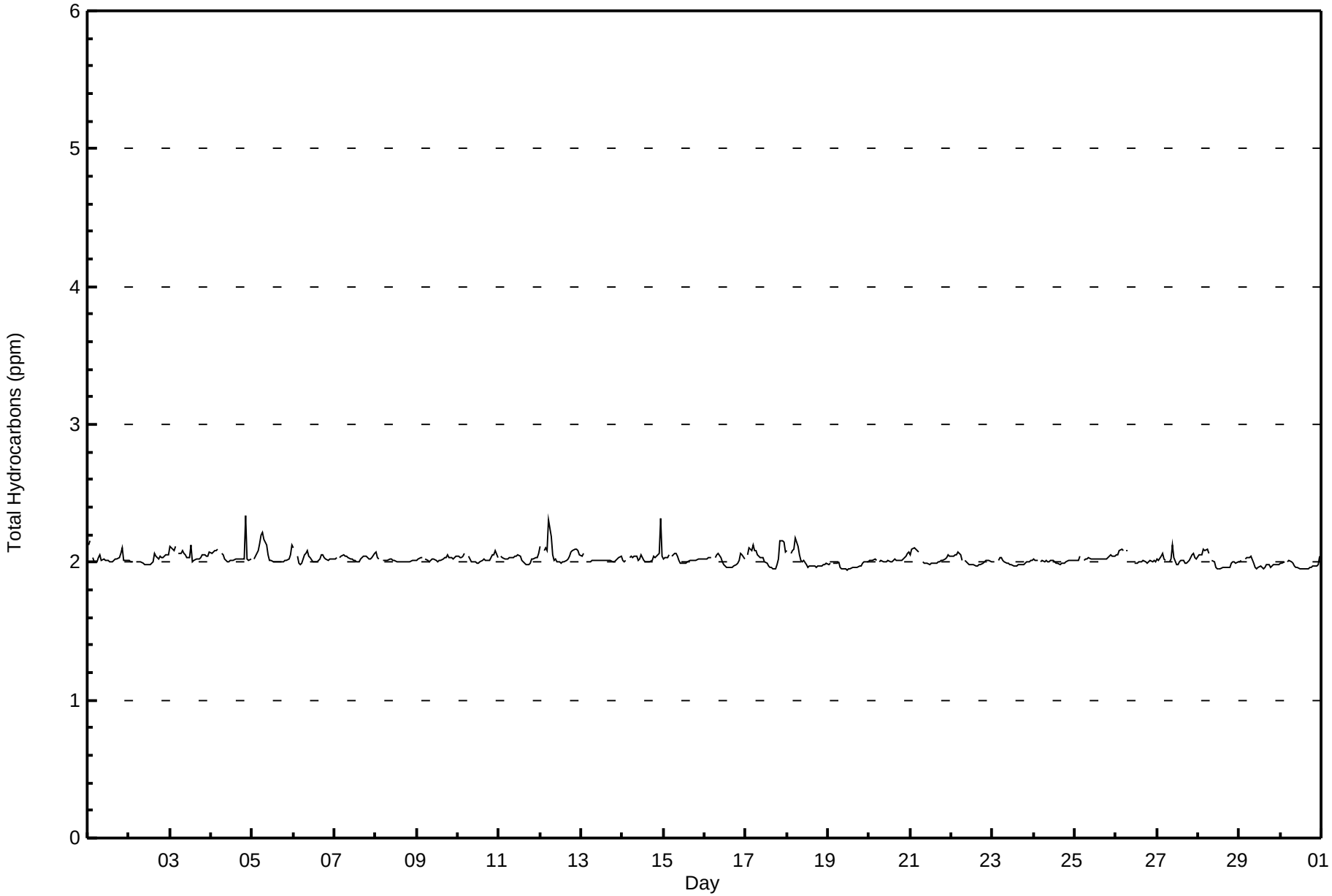
Z - zerospan C - Calibration

Wood Buffalo Environmental Association

Hourly Averages

Total Hydrocarbons (THC) - ppm

Patricia McInnes - April 2016



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm

Patricia McInnes - April 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	563	81.95	81.95
2.1 - 3.0	124	18.05	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Total Hydrocarbons (THC) - ppm

Patricia McInnes - April 2016

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	61	44	21	18	31	84	62	32	54	27	14	20	19	16	18	35	556
2.1 - 3.0	19	7	2	2	6	5	6	10	16	7	4	4	1	6	3	26	124
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	80	51	23	20	37	89	68	42	70	34	18	24	20	22	21	61	680

Total Number of Valid Hours: 680

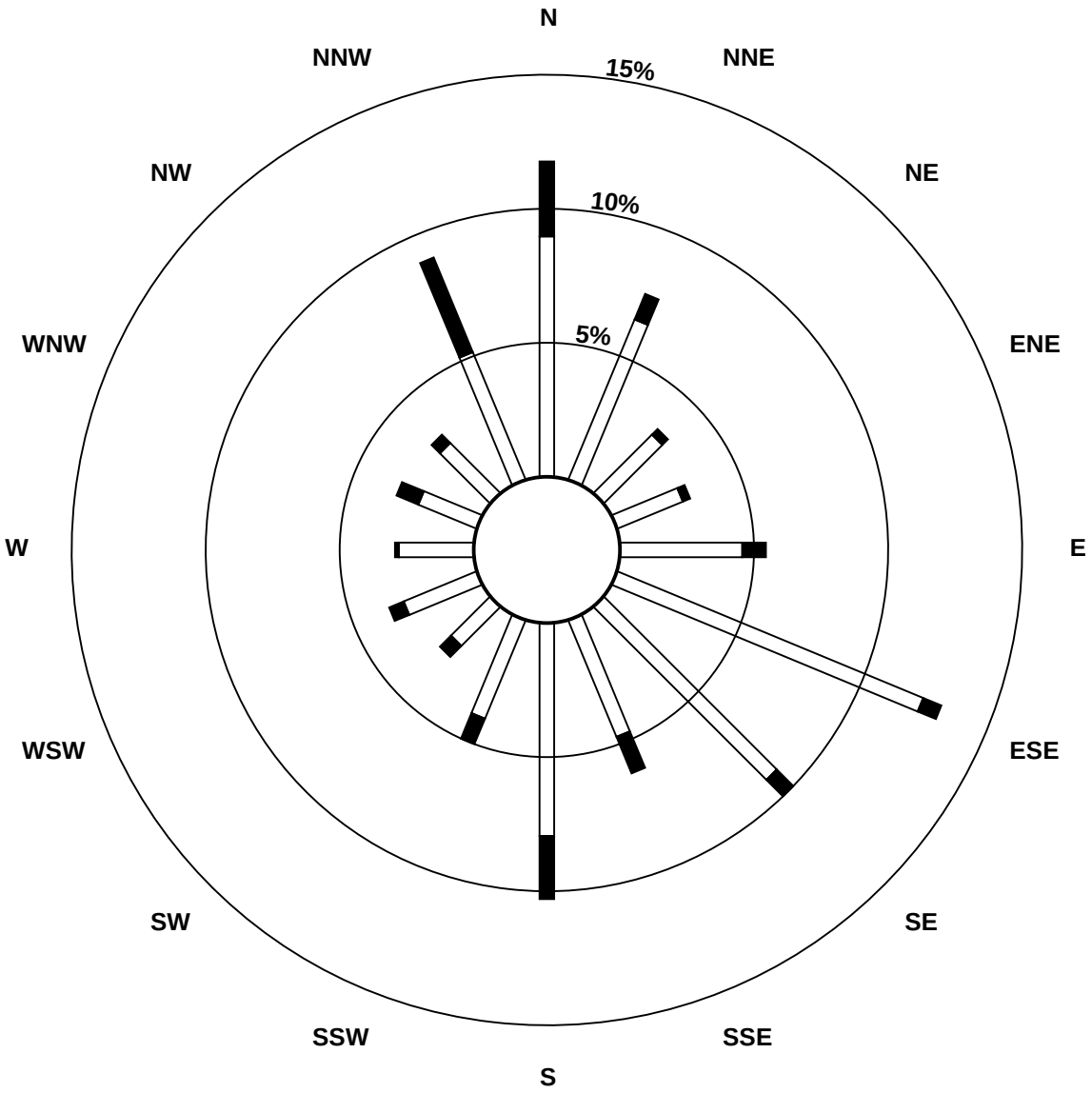
Total Number of Hours: 720

Wood Buffalo Environmental Association

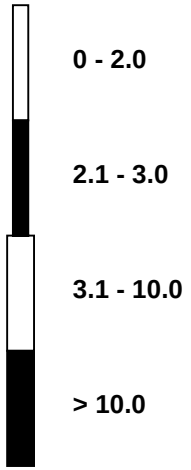
Wind Rose Apr 2016

Total Hydrocarbons (THC) - ppm

Patricia McInnes (AMS 6)



Classes (ppm)



0 - 2.0

2.1 - 3.0

3.1 - 10.0

> 10.0

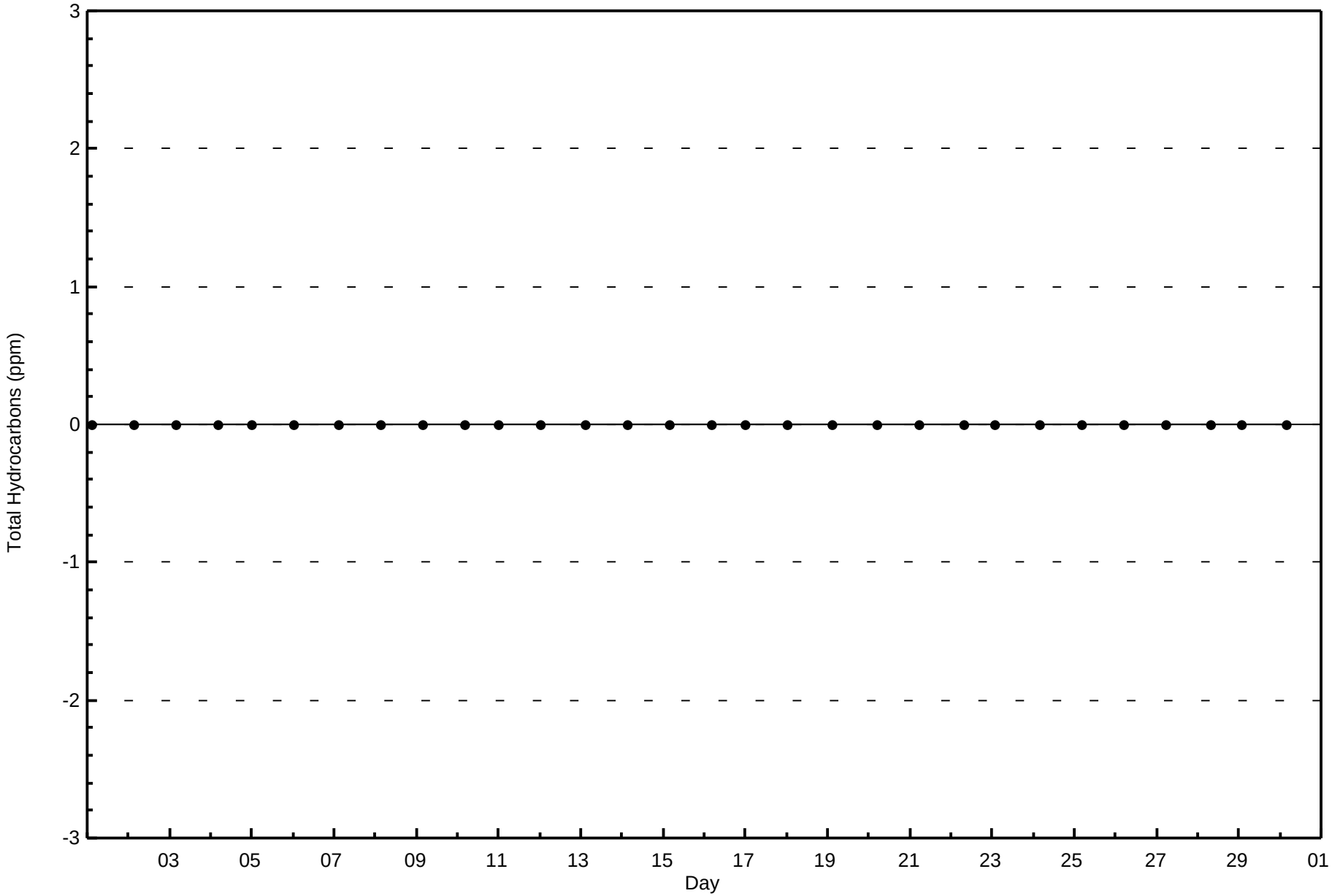
Total Number of Valid Hours: 680

Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Patricia McInnes - April 2016

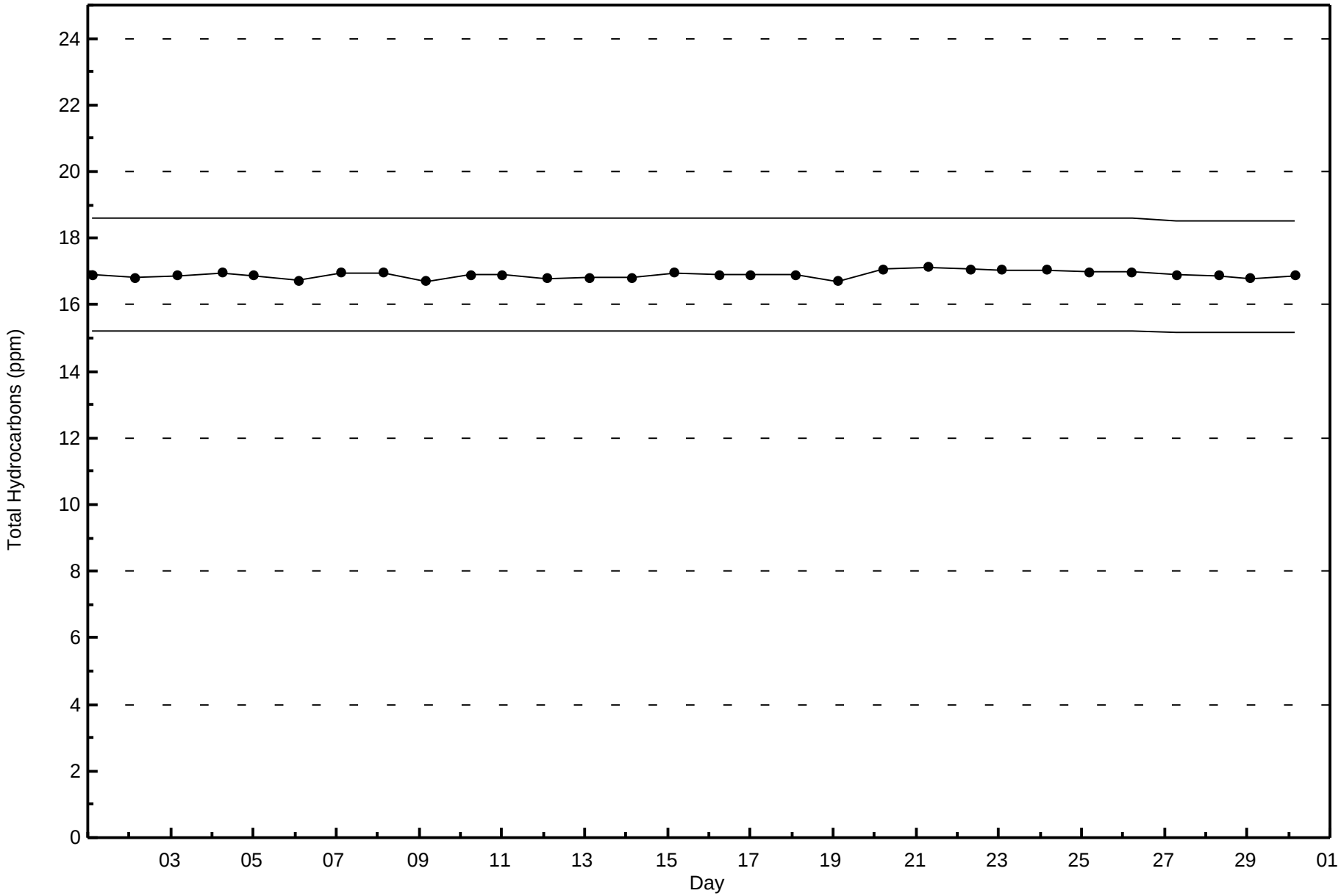


Wood Buffalo Environmental Association

Span Responses

Total Hydrocarbons (THC) - ppm

Patricia McInnes - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Non Methane Hydrocarbons (NMHC) - ppm

Patricia McInnes - April 2016

Maximum Value: 0.317 ppm on Apr 4 21:00

Maximum Daily Average: 0.014 ppm on Apr 4

Minimum Value: 0.000 ppm on Apr 1 01:00

Minimum Daily Average: 0.000 ppm on Apr 1

Maximum Diurnal Average: 0.011 ppm at hour 21

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:	720
Hours of Data:	687
Hours of Missing Data:	33
Hours of Calibration:	33
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-Apr	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
2-Apr	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
3-Apr	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
4-Apr	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	0.317	0.000	0.000	0.000	0.014	0.317
5-Apr	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6-Apr	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Apr	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
8-Apr	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
9-Apr	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
10-Apr	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	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
11-Apr	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Apr	0.000	Z	0.000	0.000	0.000	0.021	0.031	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.002	0.031
13-Apr	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
14-Apr	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	0.013	0.245	0.000	0.011	0.245
15-Apr	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
16-Apr	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
17-Apr	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
18-Apr	0.000	Z	0.000	0.000	0.000	0.008	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.008
19-Apr	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	0.015	0.000	0.000	0.000	0.001	0.015
20-Apr	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
21-Apr	0.000	0.000	0.000	0.000	0.000	0.002	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002
22-Apr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001
23-Apr	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
24-Apr	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
25-Apr	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	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
26-Apr	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.009	C	C	C	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009
27-Apr	0.000	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.082	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.082
28-Apr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
29-Apr	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30-Apr	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	0.000	0.001	0.001	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.008	0.000	Diurnal Average	
	0.000	0.000	0.000	0.000	0.000	0.021	0.031	0.009	0.000	0.082	0.000	0.005	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.317	0.013	0.245	0.000	Diurnal Maximum	

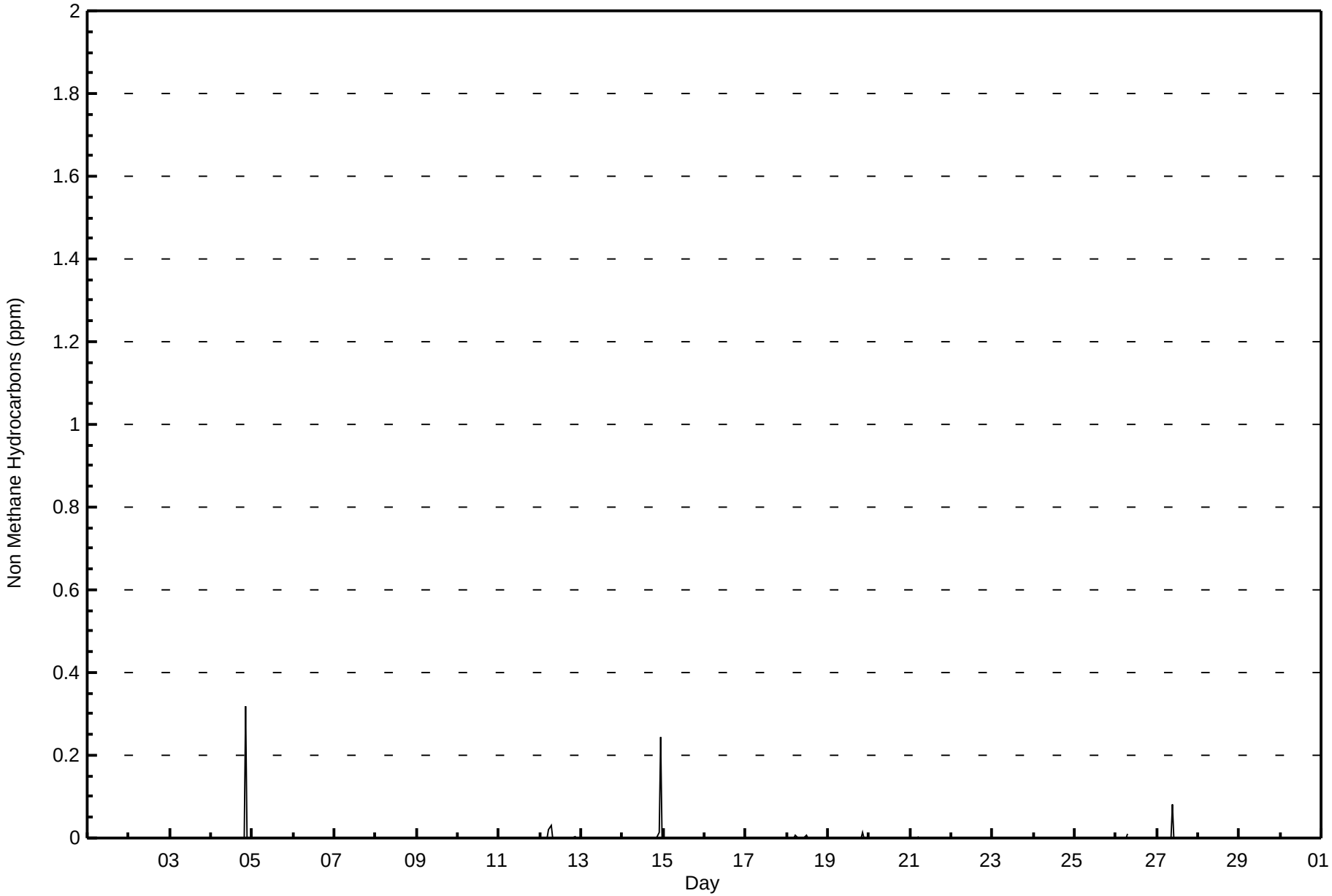
Z - zerospan C - Calibration

Wood Buffalo Environmental Association

Hourly Averages

Non Methane Hydrocarbons (NMHC) - ppm

Patricia McInnes - April 2016



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm

Patricia McInnes - April 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	678	98.69	98.69
0.006 - 0.05	6	0.87	99.56
0.06 - 0.1	1	0.15	99.71
> 0.1	2	0.29	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm

Patricia McInnes - April 2016

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	80	51	22	19	37	89	68	40	70	34	18	24	20	21	20	58	671
0.006 - 0.05	0	0	0	0	0	0	0	2	0	0	0	0	0	1	1	2	6
0.06 - 0.1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
> 0.1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	2
Totals	80	51	23	20	37	89	68	42	70	34	18	24	20	22	21	61	680

Total Number of Valid Hours: 680

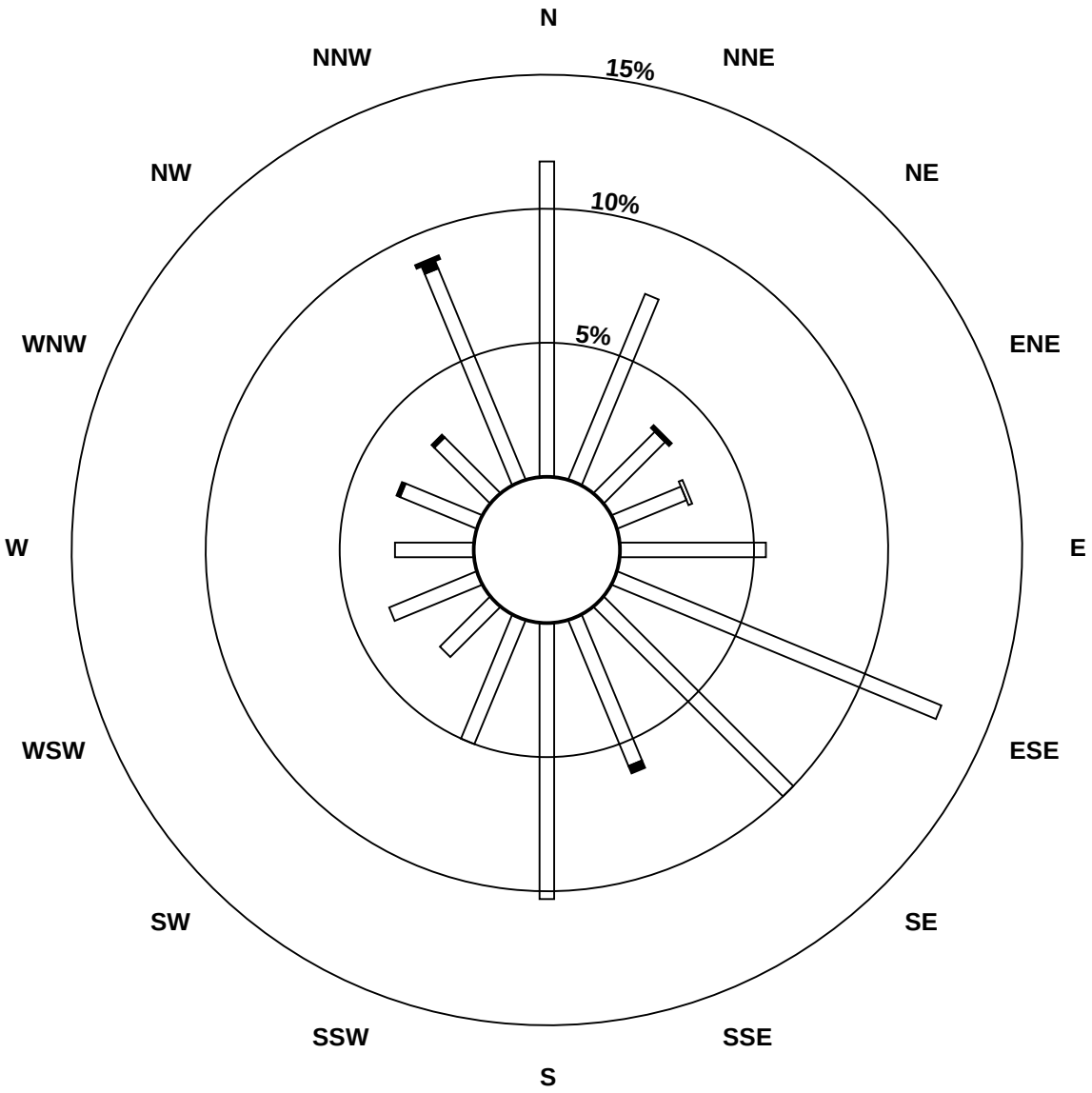
Total Number of Hours: 720

Wood Buffalo Environmental Association

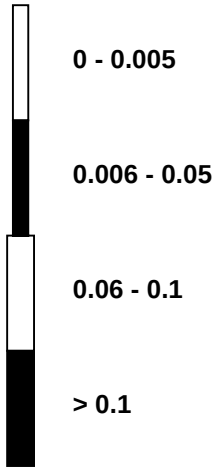
Wind Rose Apr 2016

Non Methane Hydrocarbons (NMHC) - ppm

Patricia McInnes (AMS 6)



Classes (ppm)



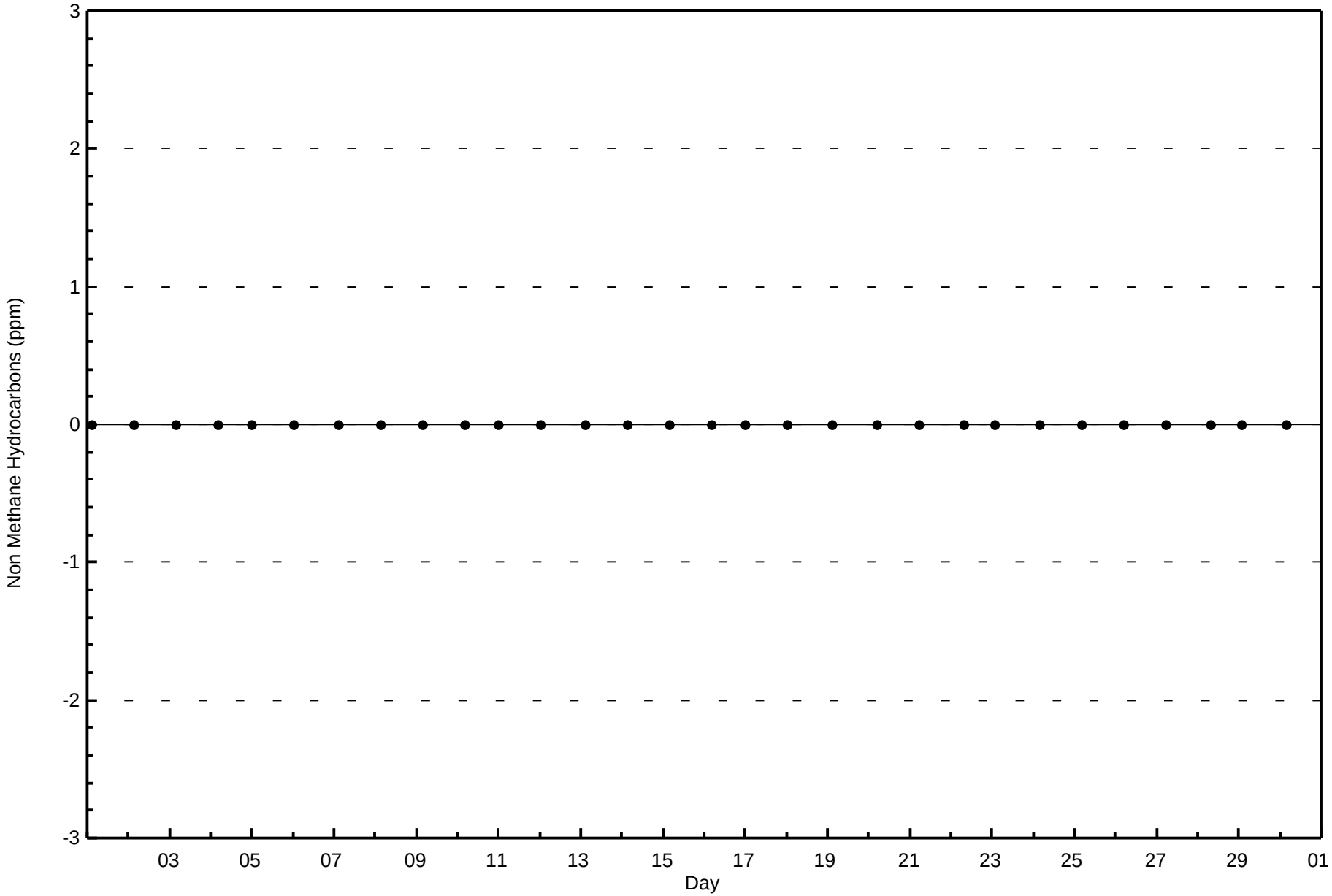
Total Number of Valid Hours: 680

Wood Buffalo Environmental Association

Zero Responses

Non Methane Hydrocarbons (NMHC) - ppm

Patricia McInnes - April 2016

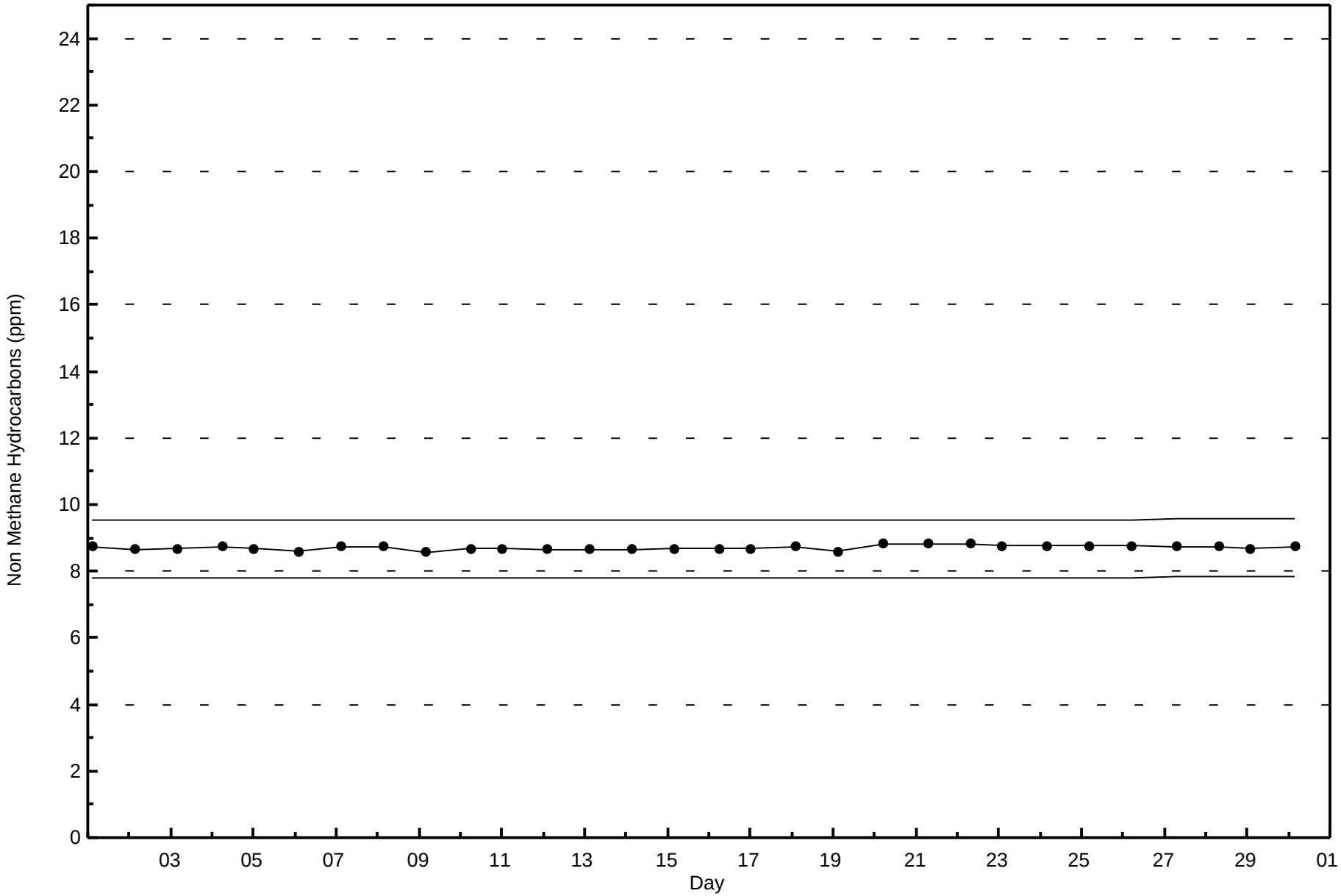


Wood Buffalo Environmental Association

Span Responses

Non Methane Hydrocarbons (NMHC) - ppm

Patricia McInnes - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Methane (CH_4) - ppm

Patricia McInnes - April 2016

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

Maximum Value: 2.3 ppm on Apr 12 06:00

Maximum Daily Average: 2.1 ppm on Apr 12

Minimum Value: 1.9 ppm on Apr 19 12:00

Minimum Daily Average: 2.0 ppm on Apr 19

Maximum Diurnal Average: 2.1 ppm at hour 6

Minimum Diurnal Average: 2.0 ppm at hour 14

Monthly Average: 2.02 ppm

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

Hours in Service:	720
Hours of Data:	687
Hours of Missing Data:	33
Hours of Calibration:	33
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-Apr	2.1	2.2	Z	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.2
2-Apr	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.1
3-Apr	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.1	2.1	2.1
4-Apr	2.1	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
5-Apr	Z	2.0	2.0	2.1	2.1	2.2	2.2	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.2
6-Apr	2.1	Z	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
7-Apr	2.0	2.0	Z	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1
8-Apr	2.1	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
9-Apr	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
10-Apr	2.0	2.0	2.0	2.0	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.0	2.1
11-Apr	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1
12-Apr	2.1	Z	2.1	2.1	2.1	2.3	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3
13-Apr	2.0	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
14-Apr	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.1
15-Apr	2.0	2.0	2.0	2.1	Z	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
16-Apr	2.0	2.0	2.0	2.0	2.0	Z	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.1
17-Apr	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.2	2.2	2.1	2.0	2.2
18-Apr	2.1	Z	2.1	2.1	2.1	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2
19-Apr	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
20-Apr	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	2.1	2.1	2.0	2.1
21-Apr	2.1	2.1	2.1	2.1	2.1	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.1
22-Apr	2.0	2.0	2.1	2.1	2.1	2.1	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
23-Apr	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
24-Apr	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
25-Apr	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.1
26-Apr	2.1	2.1	2.1	2.1	2.1	Z	2.1	2.1	C	C	C	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
27-Apr	2.0	2.0	2.0	2.1	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.1
28-Apr	2.1	2.1	2.1	2.1	2.1	2.1	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
29-Apr	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
30-Apr	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
	2.0	2.0	2.0	2.1	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	Diurnal Average	
	2.1	2.2	2.1	2.1	2.1	2.3	2.2	2.2	2.1	2.1	2.0	2.0	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.1	Diurnal Maximum	

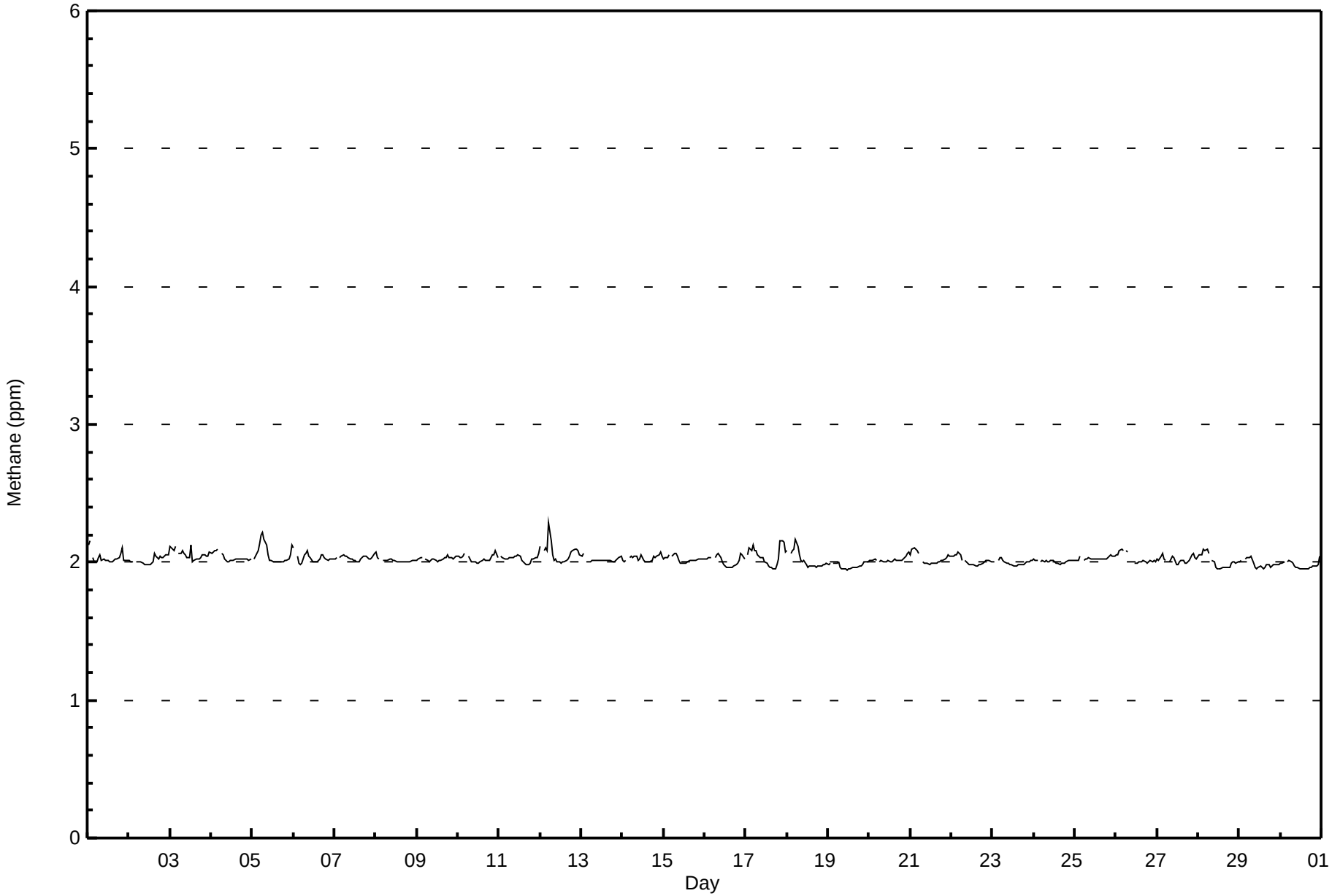
Z - zerospan C - Calibration

Wood Buffalo Environmental Association

Hourly Averages

Methane (CH_4) - ppm

Patricia McInnes - April 2016



Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	565	82.24	82.24
2.1 - 3.0	122	17.76	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720

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

Frequency Distribution | **Patricia McInnes - April 2016**

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	61	44	22	19	31	84	62	32	54	27	14	20	19	16	18	35	558
2.1 - 3.0	19	7	1	1	6	5	6	10	16	7	4	4	1	6	3	26	122
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	80	51	23	20	37	89	68	42	70	34	18	24	20	22	21	61	680

Total Number of Valid Hours: 680

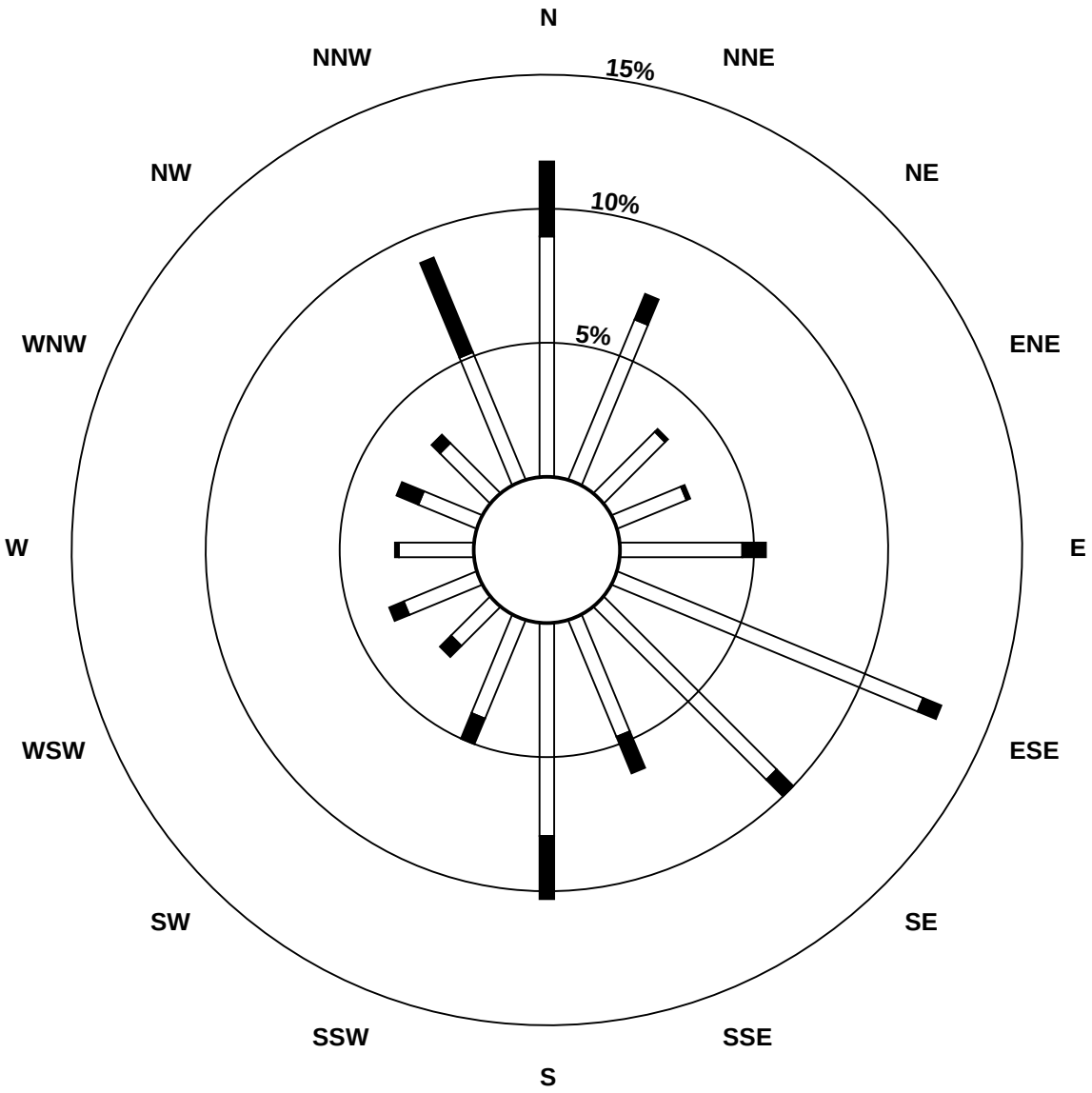
Total Number of Hours: 720

Wood Buffalo Environmental Association

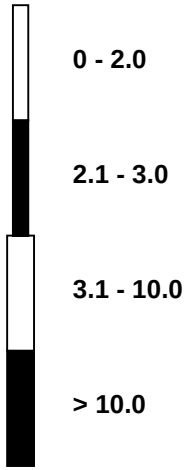
Wind Rose Apr 2016

Methane (CH_4) - ppm

Patricia McInnes (AMS 6)



Classes (ppm)



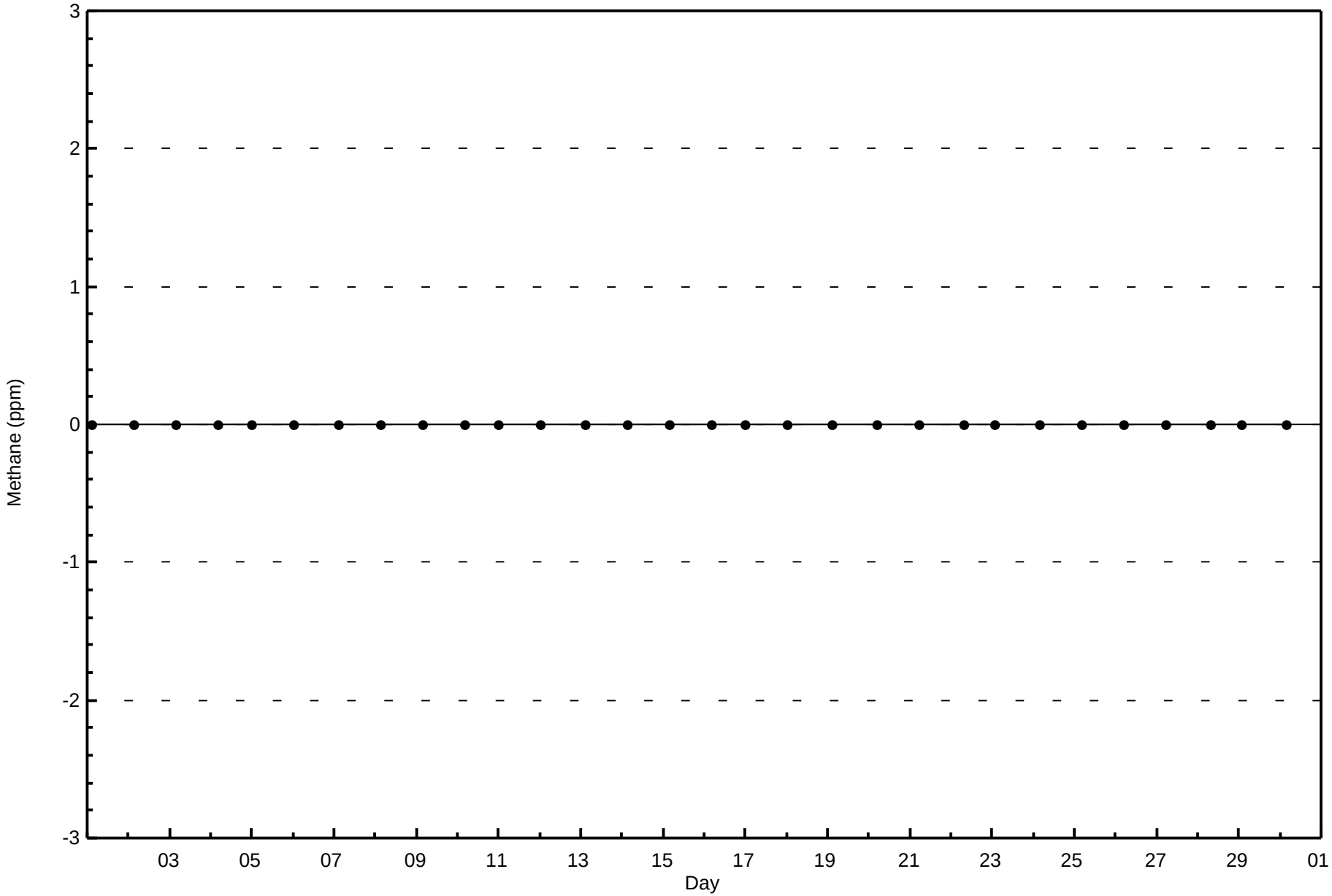
Total Number of Valid Hours: 680

Wood Buffalo Environmental Association

Zero Responses

Methane (CH_4) - ppm

Patricia McInnes - April 2016

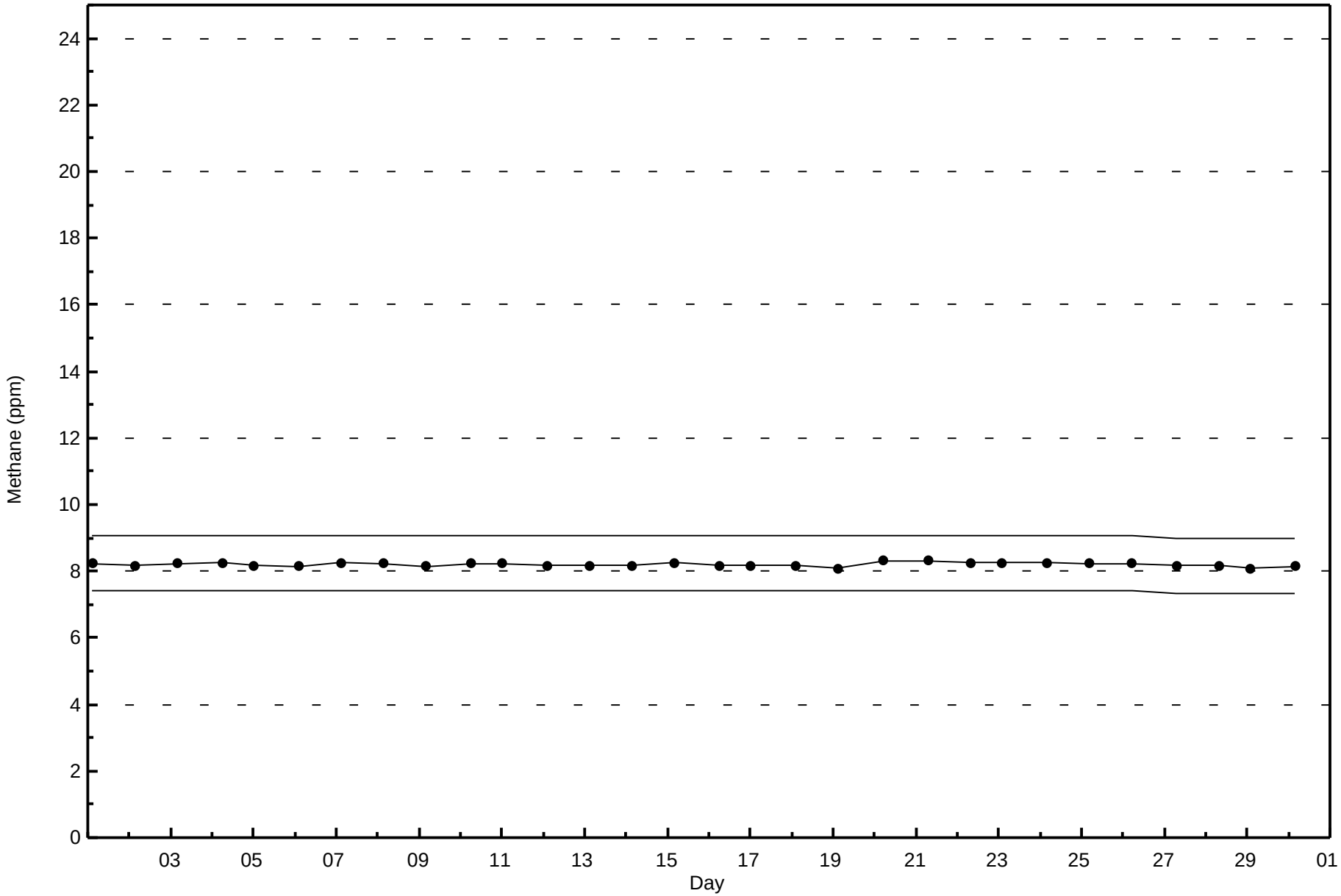


Wood Buffalo Environmental Association

Span Responses

Methane (CH_4) - ppm

Patricia McInnes - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O_3) - ppb

Patricia McInnes - April 2016

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

Maximum Value: 75 ppb on Apr 19 12:00

Maximum Daily Average: 59.0 ppb on Apr 19

Minimum Value: 6 ppb on Apr 18 06:00

Minimum Daily Average: 24.8 ppb on Apr 27

Maximum Diurnal Average: 45.2 ppb at hour 14

Minimum Diurnal Average: 28.2 ppb at hour 6

Monthly Average: 37.7 ppb

Percentiles: $P_1 = 11$ $P_{10} = 24$ $Q_1 = 32$ Median = 38 $Q_3 = 44$ $P_{90} = 50$ $P_{99} = 62$

Hours in Service:	720
Hours of Data:	682
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-Apr	25	14	26	34	41	Z	34	35	38	40	40	39	40	40	40	39	39	43	39	29	20	40	39	42	35.4	43
2-Apr	42	44	44	44	43	43	Z	43	44	44	45	45	46	46	45	40	40	40	39	41	41	38	37	35	42.2	46
3-Apr	31	29	29	30	33	36	36	Z	38	41	44	45	46	46	46	45	40	39	39	31	28	31	33	28	36.7	46
4-Apr	27	28	22	17	13	17	24	31	Z	35	36	39	40	41	42	42	37	35	35	30	30	31	36	34	31.4	42
5-Apr	26	33	28	Z	24	20	21	24	27	32	37	39	39	42	45	43	37	35	34	31	30	29	26	23	31.6	45
6-Apr	20	17	21	28	Z	28	22	29	28	35	33	36	36	36	37	33	26	28	28	32	38	38	39	42	30.8	42
7-Apr	37	38	34	34	32	Z	27	30	33	37	37	37	40	41	38	35	33	33	32	33	34	36	32	21	34.1	41
8-Apr	19	30	36	38	38	37	Z	36	36	35	36	37	38	38	38	38	38	38	37	36	36	36	34	34	35.6	38
9-Apr	34	33	32	30	29	36	40	Z	41	40	41	43	46	45	46	44	43	45	43	46	46	43	42	41	40.4	46
10-Apr	42	45	45	43	40	38	41	42	Z	43	45	47	47	47	48	50	50	50	49	41	26	23	19	38	41.8	50
11-Apr	39	40	40	Z	38	36	32	33	38	38	39	41	43	47	50	50	50	49	47	39	44	44	43	39	41.7	50
12-Apr	27	23	24	18	Z	13	29	39	44	45	46	48	50	49	49	48	47	45	42	39	37	35	34	34	37.7	50
13-Apr	35	31	39	42	40	Z	37	40	38	38	39	38	37	36	36	33	27	32	37	38	35	32	29	28	35.5	42
14-Apr	26	26	26	30	36	37	Z	35	35	36	37	38	41	43	43	41	41	39	34	33	31	30	31	30	34.7	43
15-Apr	29	20	17	12	16	15	12	Z	27	36	38	39	41	41	42	40	39	38	37	39	41	39	39	39	32.0	42
16-Apr	38	35	32	32	33	32	30	26	Z	42	47	51	54	57	56	54	54	54	53	40	36	31	28	34	41.2	57
17-Apr	36	32	24	Z	12	18	27	29	34	37	43	49	52	51	50	49	48	48	43	32	25	19	17	23	34.7	52
18-Apr	21	19	18	18	Z	6	13	27	35	38	45	54	57	59	60	59	60	60	61	61	59	61	61	59	43.9	61
19-Apr	58	56	54	52	50	Z	44	54	60	66	73	75	75	72	M	M	61	63	63	59	56	53	49	47	59.0	75
20-Apr	40	37	36	33	Z	34	34	C	C	C	C	C	32	34	35	37	38	39	40	38	37	30	24	25	34.6	40
21-Apr	26	21	17	16	14	Z	17	28	32	35	39	40	42	42	44	46	46	45	44	43	39	33	30	30	33.5	46
22-Apr	30	29	26	26	25	23	Z	35	38	42	45	47	48	48	47	47	44	45	45	41	39	39	40	43	38.7	48
23-Apr	44	Z	42	38	32	28	37	41	42	41	43	43	44	43	42	42	42	40	40	40	41	41	42	40	40.3	44
24-Apr	40	39	Z	40	40	40	39	38	39	38	39	43	46	50	50	50	49	47	48	47	47	47	46	44	43.7	50
25-Apr	43	42	41	Z	36	34	30	29	29	31	35	36	38	38	38	38	38	38	37	34	33	32	35	34	35.6	43
26-Apr	31	30	28	24	Z	22	23	26	M	29	30	30	30	29	28	29	29	32	32	27	26	30	27	19	27.8	32
27-Apr	11	12	8	10	11	Z	21	22	19	18	26	35	33	31	33	34	38	37	37	33	25	22	26	28	24.8	38
28-Apr	18	13	12	9	10	8	Z	27	33	38	51	54	55	55	55	55	55	53	54	51	51	49	50	51	39.5	55
29-Apr	49	Z	47	45	41	40	39	41	47	51	52	54	54	54	54	54	54	53	52	50	49	50	49	49	49.0	54
30-Apr	48	46	Z	44	42	37	40	42	42	44	49	51	52	51	47	48	47	46	44	39	40	43	41	29	44.1	52
	33.1	30.9	30.2	30.3	30.7	28.2	30.0	34.0	36.6	38.8	41.7	44.0	44.7	45.2	44.2	43.5	43.1	43.0	42.1	39.2	37.3	36.8	35.9	35.5	Diurnal Average	
	58	56	54	52	50	43	44	54	60	66	73	75	75	72	60	59	61	63	63	61	59	61	61	59	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance

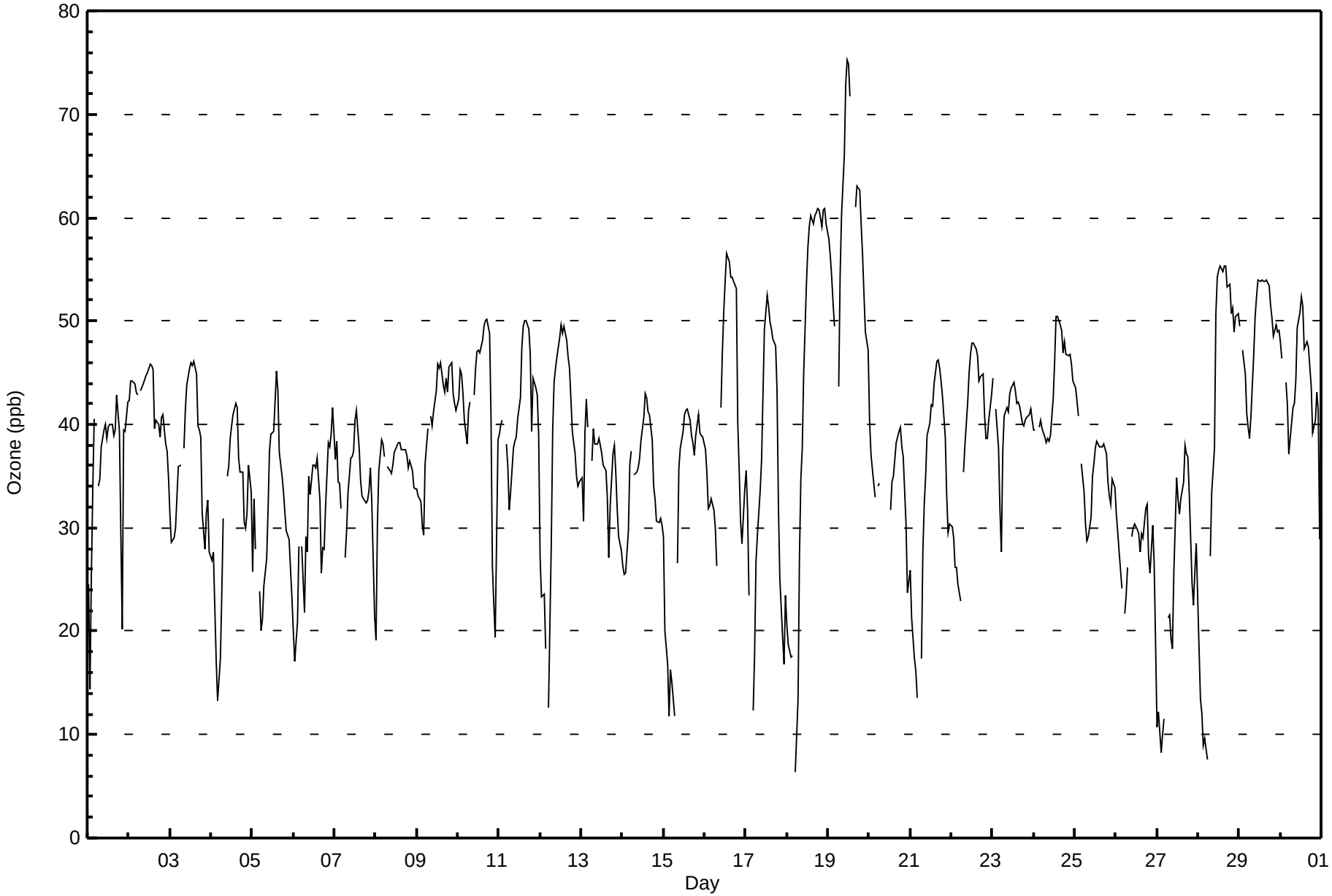
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb

Wood Buffalo Environmental Association

Hourly Averages

Ozone (O_3) - ppb

Patricia McInnes - April 2016



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	45	6.60	6.60
21 - 50	572	83.87	90.47
51 - 82	65	9.53	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Ozone (O_3) - ppb

Patricia McInnes - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	1	1	1	2	2	2	2	4	7	4	4	4	1	4	3	3	45
21 - 50	76	50	21	19	38	83	64	36	39	24	9	15	8	8	18	58	566
51 - 82	0	0	0	0	0	0	3	6	22	9	3	6	9	6	1	0	65
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	77	51	22	21	40	85	69	46	68	37	16	25	18	18	22	61	676

Total Number of Valid Hours: 676

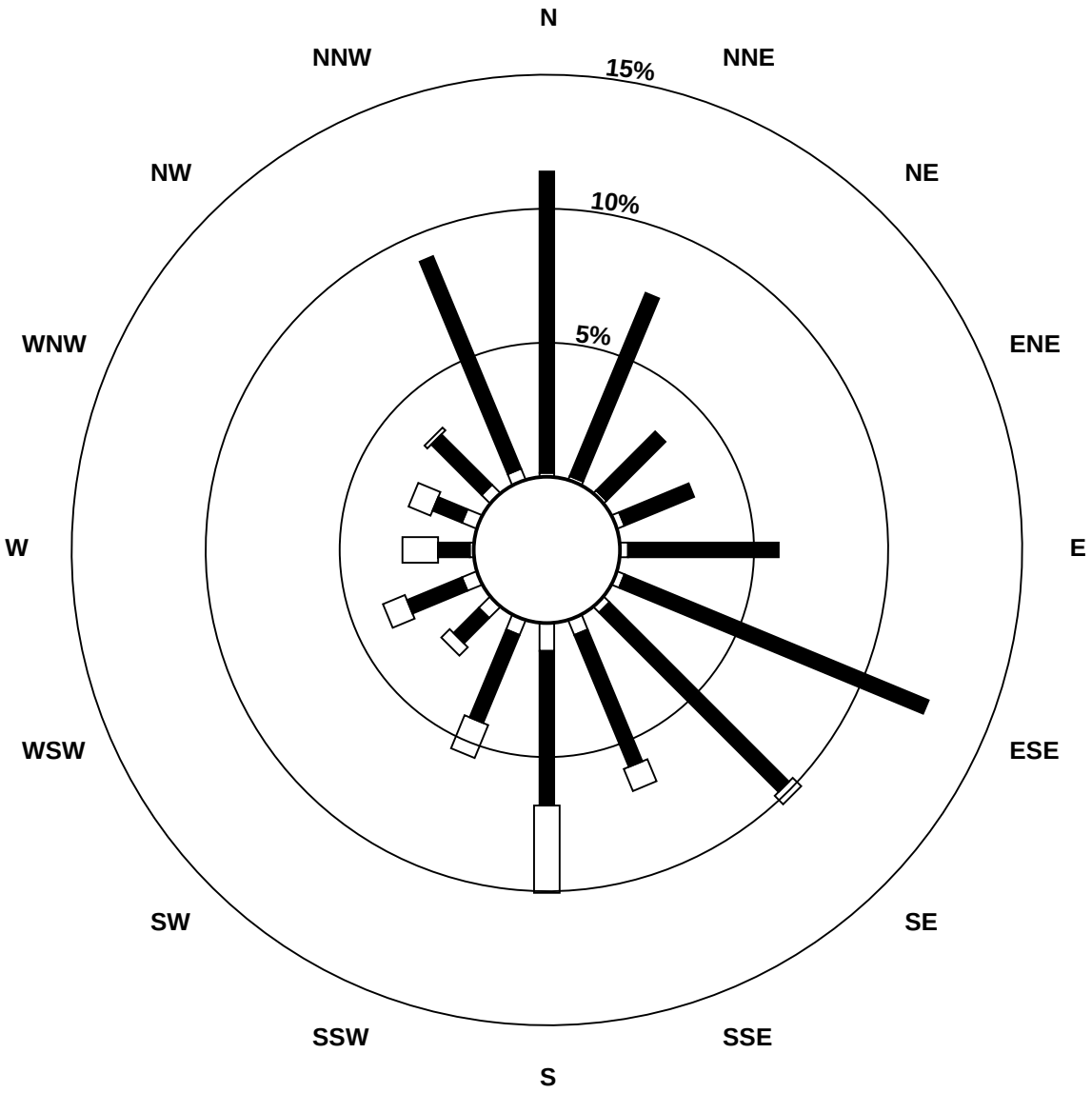
Total Number of Hours: 720

Wood Buffalo Environmental Association

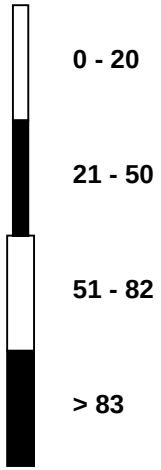
Wind Rose Apr 2016

Ozone (O_3) - ppb

Patricia McInnes (AMS 6)



Classes (ppb)



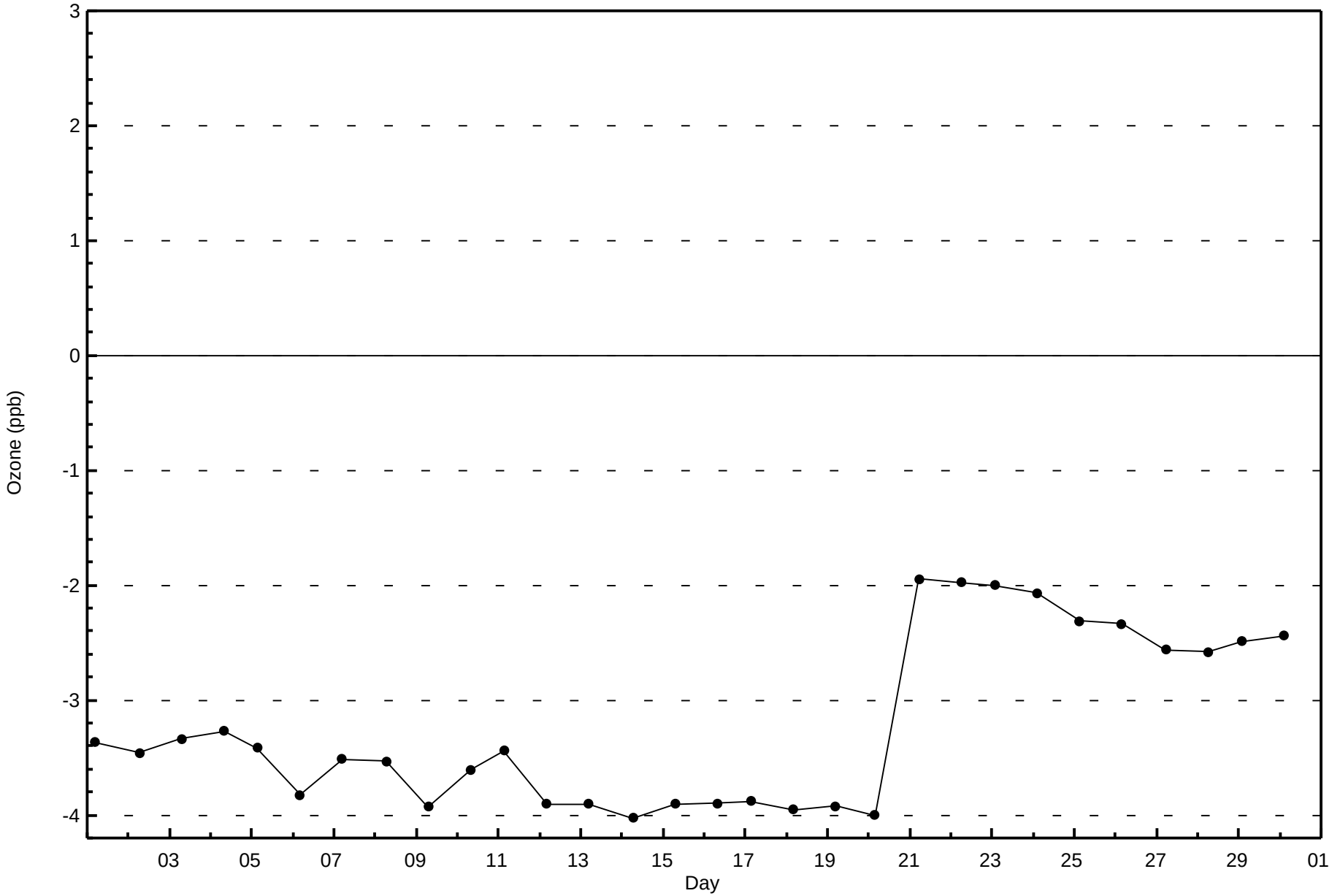
Total Number of Valid Hours: 676

Wood Buffalo Environmental Association

Zero Responses

Ozone (O_3) - ppb

Patricia McInnes - April 2016

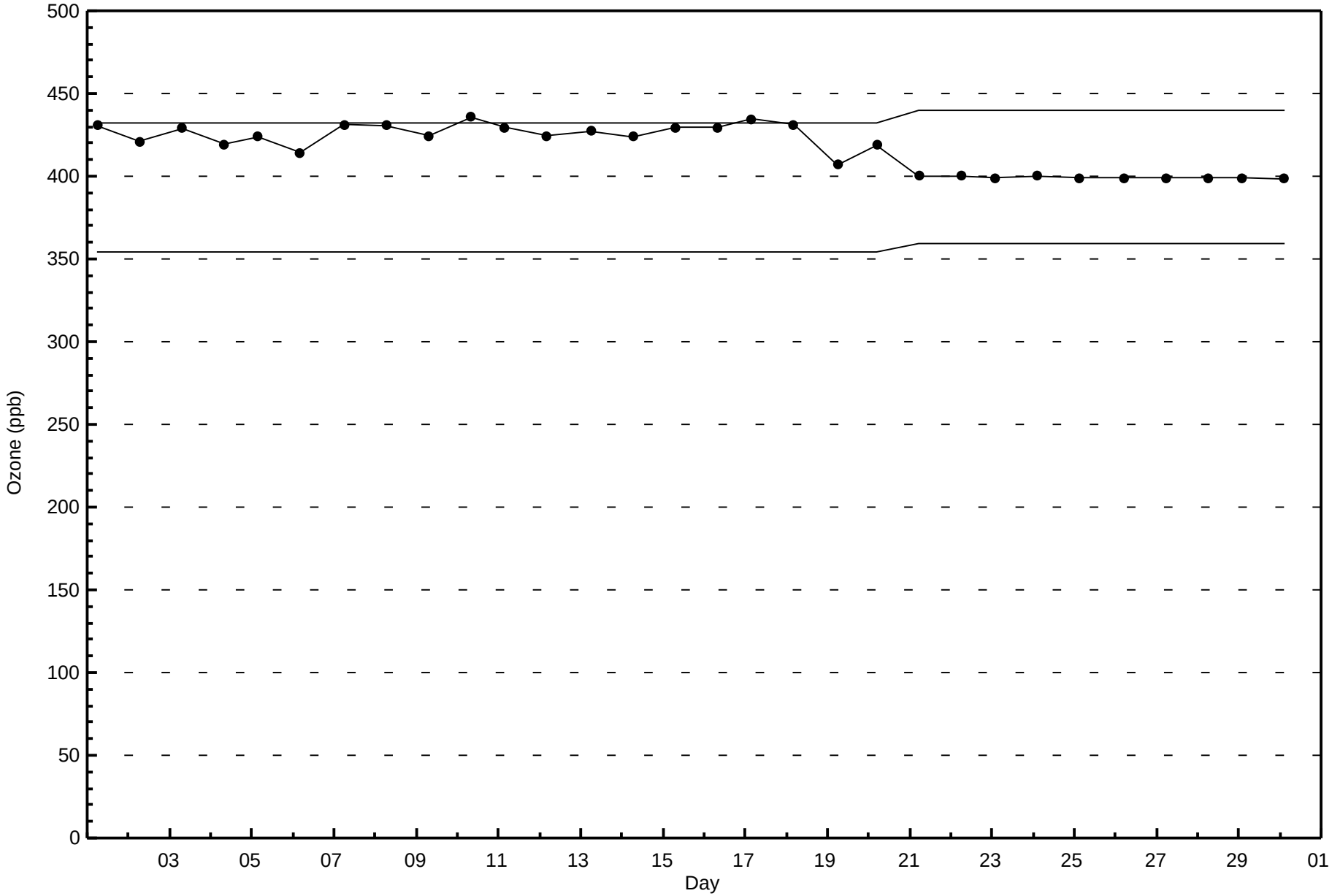


Wood Buffalo Environmental Association

Span Responses

Ozone (O_3) - ppb

Patricia McInnes - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

Patricia McInnes - April 2016

Maximum Value: 33 ppb on Apr 18 06:00

Maximum Daily Average: 3.0 ppb on Apr 18

Minimum Value: 0 ppb on Apr 1 04:00

Minimum Daily Average: 0.1 ppb on Apr 19

Maximum Diurnal Average: 3.1 ppb at hour 17

Minimum Diurnal Average: 0.2 ppb at hour 24

Monthly Average: 1.0 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:	720
Hours of Data:	683
Hours of Missing Data:	37
Hours of Calibration:	35
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-Apr	0	2	Z	0	0	0	0	1	1	1	1	2	2	1	2	3	3	2	1	1	2	1	1	0	1.1	3
2-Apr	1	0	0	Z	1	1	1	1	1	1	1	2	0	0	0	2	2	1	0	0	0	0	0	0	0.7	2
3-Apr	0	0	0	0	Z	0	1	1	2	3	2	2	2	2	2	2	15	8	1	0	0	0	0	0	1.9	15
4-Apr	0	0	0	0	0	Z	3	3	2	2	1	1	1	1	1	2	16	10	3	4	1	1	0	0	2.3	16
5-Apr	Z	0	0	0	0	1	1	2	2	2	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0.8	2
6-Apr	1	Z	0	0	0	0	1	1	1	1	0	0	0	0	0	1	2	2	1	0	0	0	0	0	0.5	2
7-Apr	0	0	Z	0	0	1	1	3	2	2	2	2	1	1	2	4	4	2	1	1	0	0	0	0	1.2	4
8-Apr	0	0	0	Z	1	1	1	2	1	2	1	1	1	1	1	1	2	1	1	1	1	1	0	0	1.0	2
9-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0.2	1
10-Apr	0	0	0	0	0	Z	1	1	2	2	1	1	1	2	1	1	2	2	1	2	2	1	1	1	1.1	2
11-Apr	Z	1	0	1	2	2	3	3	2	1	1	1	1	1	1	1	0	0	0	1	0	0	0	0	1.0	3
12-Apr	0	Z	9	4	2	2	2	2	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	1.5	9
13-Apr	0	0	Z	1	2	1	2	1	1	2	1	1	2	1	1	2	11	1	1	1	1	0	0	0	1.4	11
14-Apr	0	0	0	Z	0	0	1	1	1	2	2	2	0	0	0	0	0	1	1	0	0	0	0	0	0.5	2
15-Apr	0	0	0	2	Z	1	11	9	4	1	0	0	0	1	1	2	2	2	2	1	0	1	1	0	1.7	11
16-Apr	0	0	0	0	1	Z	1	3	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0.4	3
17-Apr	Z	0	1	1	3	2	1	1	1	2	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0.7	3
18-Apr	0	Z	0	3	6	33	15	4	1	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	3.0	33
19-Apr	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	M	0	0	0	0	0	0	0	0	0.1	1
20-Apr	0	0	0	0	0	Z	1	1	1	2	C	C	C	C	C	2	2	1	0	0	0	0	0	0	0.5	2
21-Apr	0	0	0	0	2	3	Z	4	2	2	1	0	0	1	1	1	1	1	0	0	0	0	0	0	0.9	4
22-Apr	0	0	0	0	0	3	2	Z	1	1	0	0	0	0	1	2	13	3	1	2	1	1	1	0	1.5	13
23-Apr	1	0	Z	1	1	1	1	1	1	1	0	0	0	0	1	1	2	3	1	1	0	0	0	0	0.8	3
24-Apr	0	0	0	Z	0	0	1	1	1	1	1	0	0	0	0	1	1	1	0	0	0	0	0	0	0.4	1
25-Apr	0	0	0	0	Z	1	1	1	1	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0.5	1
26-Apr	0	0	0	1	1	Z	2	1	M	1	1	0	0	0	1	2	7	7	2	2	0	0	0	0	1.3	7
27-Apr	0	0	3	3	3	2	Z	3	5	7	4	2	1	3	3	2	4	3	1	1	0	0	0	0	2.2	7
28-Apr	0	0	0	0	0	6	7	Z	1	1	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0.9	7
29-Apr	0	0	Z	0	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
30-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0.2	1
	0.2	0.2	0.6	0.7	1.0	2.4	2.3	1.8	1.4	1.4	1.0	0.8	0.7	0.7	0.7	1.3	3.1	1.8	0.7	0.7	0.4	0.3	0.2	0.2	Diurnal Average	
	1	2	9	4	6	33	15	9	5	7	4	2	2	3	3	4	16	10	3	4	2	1	1	1	Diurnal Maximum	

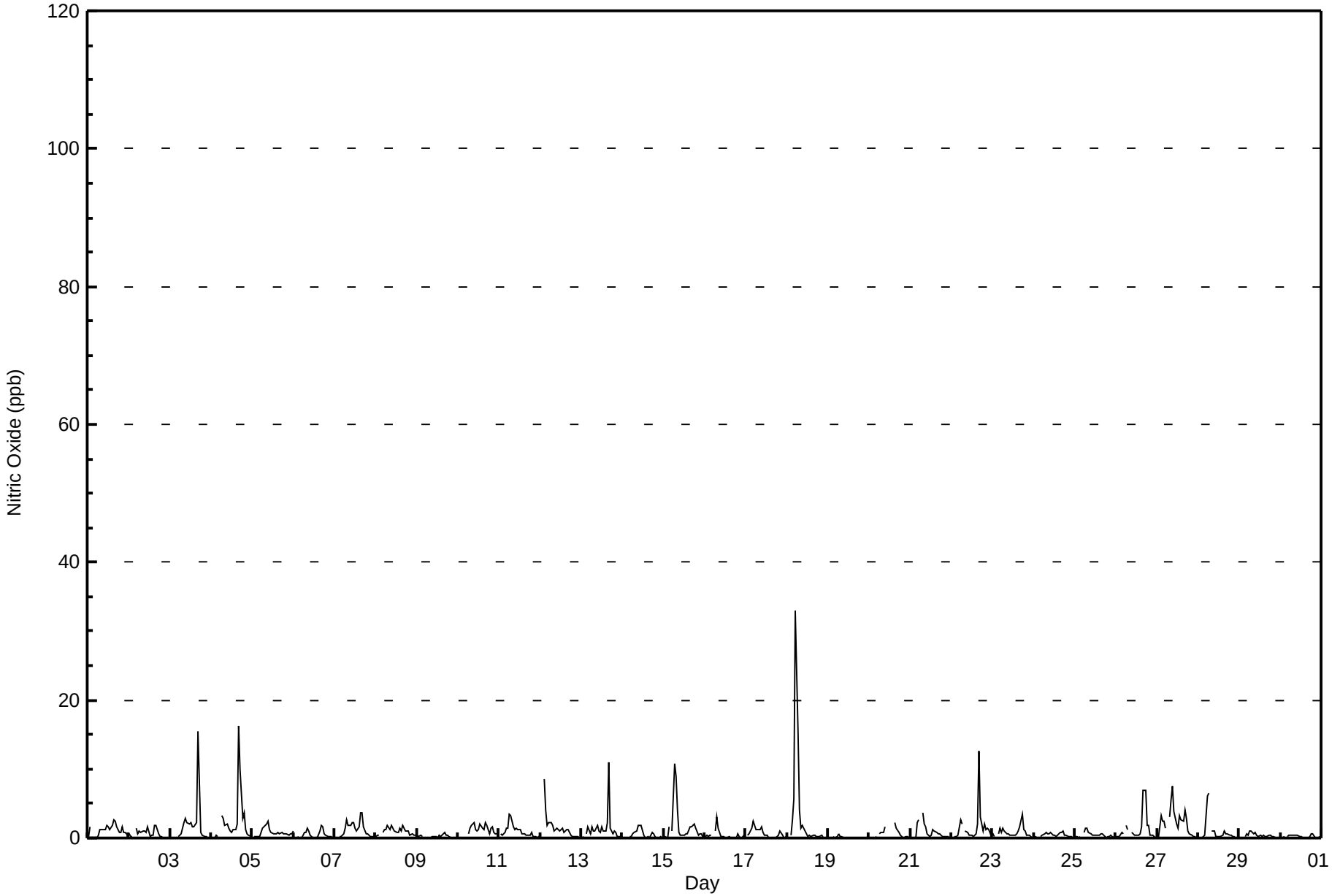
Z - zerospan C - Calibration M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Nitric Oxide (NO) - ppb

Patricia McInnes - April 2016



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	682	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: 683

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitric Oxide (NO) - ppb

Patricia McInnes - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	78	48	23	20	37	89	68	42	71	34	18	24	19	22	21	61	675
21 - 40	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	78	48	23	20	37	89	68	43	71	34	18	24	19	22	21	61	676

Total Number of Valid Hours: 676

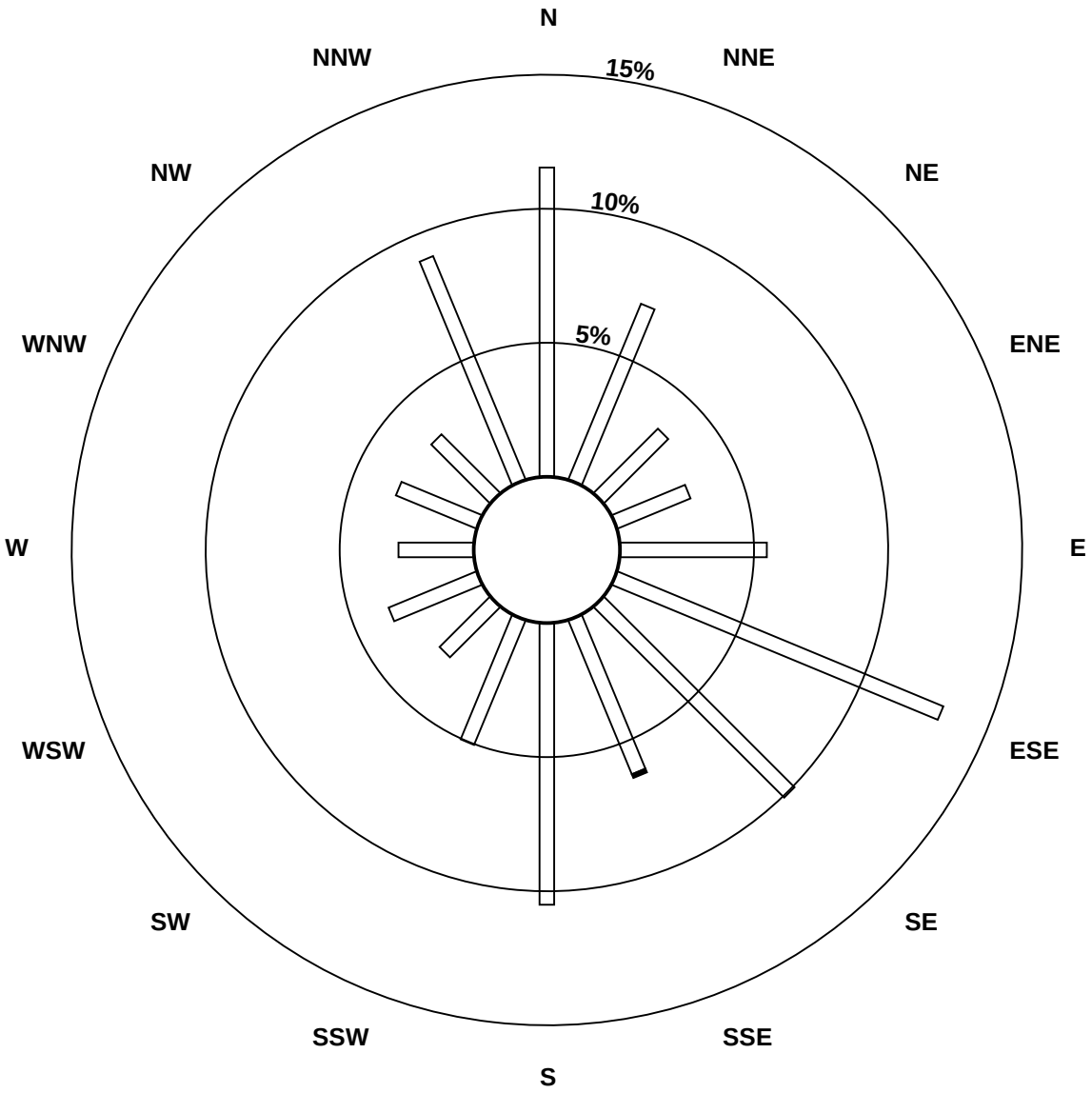
Total Number of Hours: 720

Wood Buffalo Environmental Association

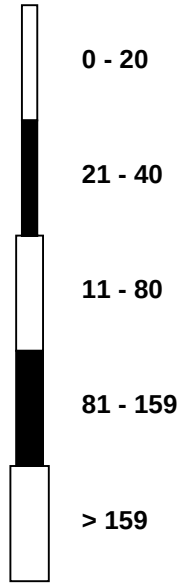
Wind Rose Apr 2016

Nitric Oxide (NO) - ppb

Patricia McInnes (AMS 6)



Classes (ppb)



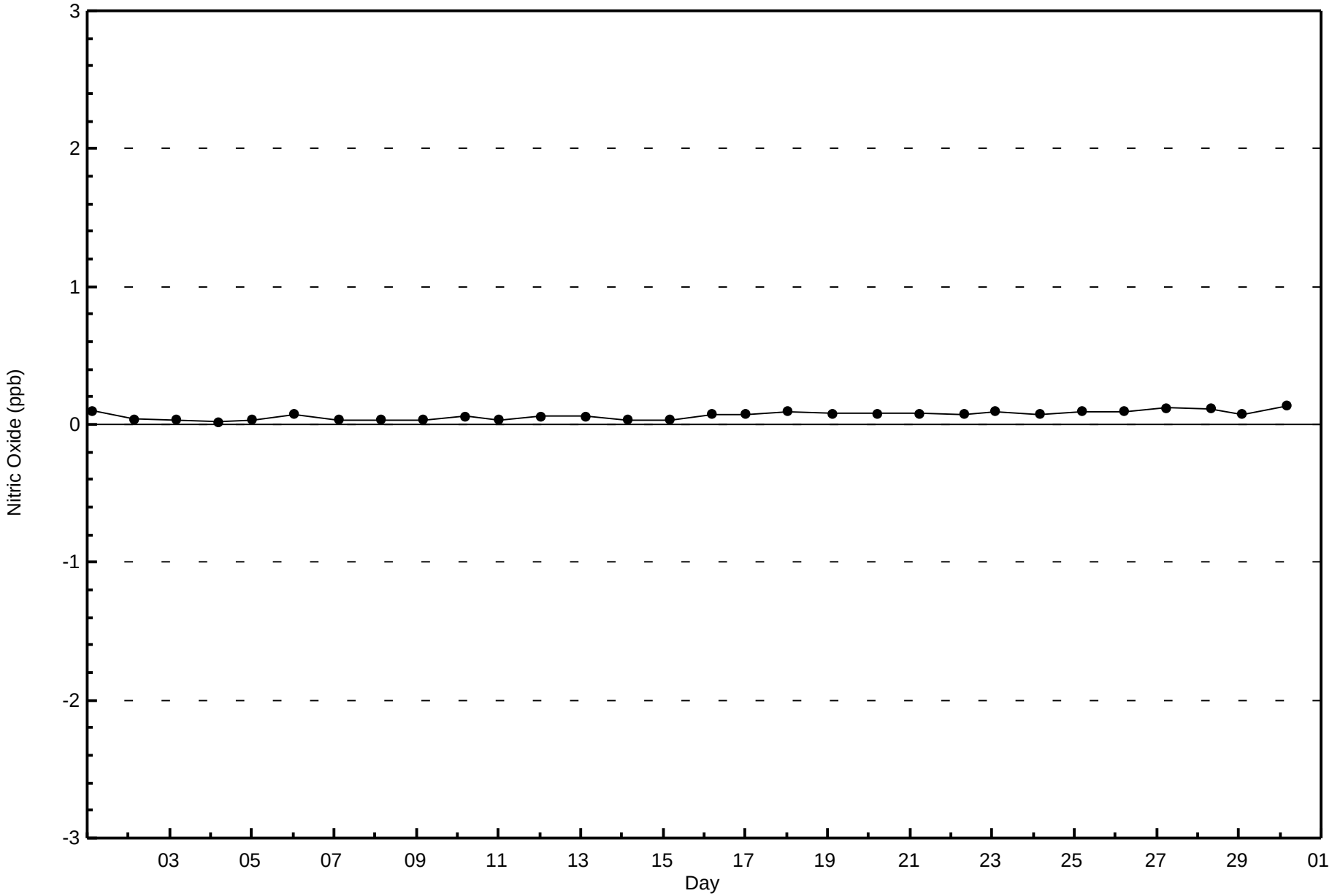
Total Number of Valid Hours: 676

Wood Buffalo Environmental Association

Zero Responses

Nitric Oxide (NO) - ppb

Patricia McInnes - April 2016

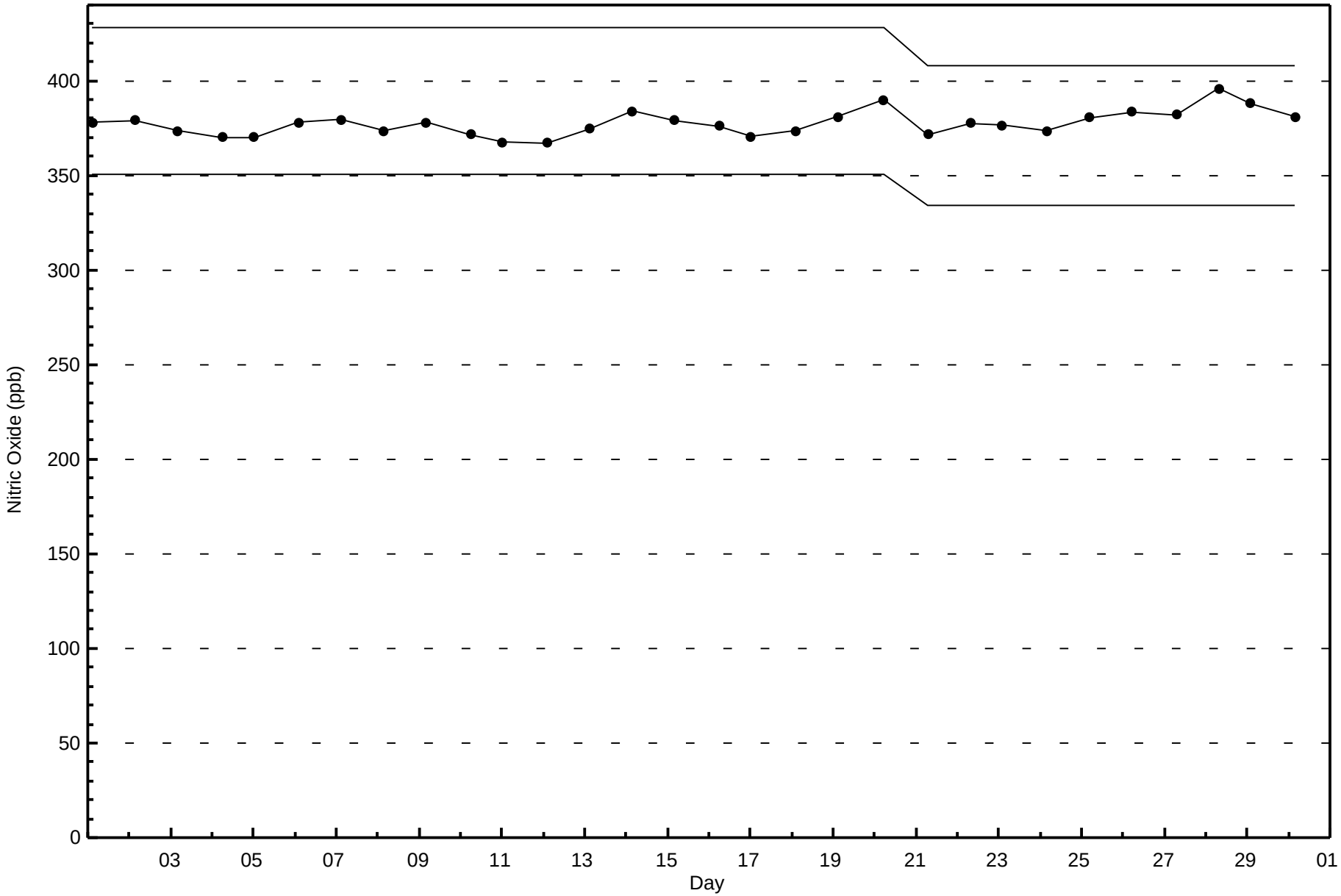


Wood Buffalo Environmental Association

Span Responses

Nitric Oxide (NO) - ppb

Patricia McInnes - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO_2) - ppb

Patricia McInnes - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 27 ppb on Apr 12 06:00 Maximum Daily Average: 8.1 ppb on Apr 3

Minimum Value: 0 ppb on Apr 9 13:00
Maximum Diurnal Average: 7.5 ppb at hour 6
Monthly Average: 4.0 ppb

Minimum Daily Average: 0.6 ppb on Apr 19
Minimum Diurnal Average: 1.4 ppb at hour 13
Percentiles: $P_1 = 0$ $P_{10} = 1$ $Q_1 = 2$ Median = 3 $Q_3 = 5$ $P_{90} = 9$ $P_{99} = 19$

Hours in Service:	720
Hours of Data:	683
Hours of Missing Data:	37
Hours of Calibration:	35
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-Apr	5	19	Z	1	0	0	5	5	3	3	2	4	3	3	4	5	6	7	9	18	26	6	5	3	6.1	26
2-Apr	3	1	1	Z	3	3	3	2	2	2	1	1	1	1	2	7	6	5	6	4	4	6	5	7	3.3	7
3-Apr	10	12	12	12	Z	8	9	9	9	6	4	3	4	3	3	4	12	12	9	14	11	9	4	8	8.1	14
4-Apr	4	5	3	6	8	Z	13	7	4	3	3	2	2	2	2	3	11	11	10	15	13	7	4	5	6.2	15
5-Apr	Z	6	8	8	8	14	13	10	9	6	2	1	1	1	2	2	2	2	3	4	4	3	3	3	5.0	14
6-Apr	5	Z	2	0	0	0	8	5	7	3	2	0	0	0	0	4	10	9	9	6	3	4	3	2	3.6	10
7-Apr	6	4	Z	6	9	13	13	12	8	5	5	5	3	2	4	7	7	8	7	8	7	4	7	13	7.0	13
8-Apr	8	6	3	Z	2	3	3	3	2	3	2	1	1	1	1	2	2	2	2	4	2	2	4	3	2.6	8
9-Apr	3	3	3	3	Z	1	1	0	1	2	2	1	0	2	1	3	4	2	4	3	2	3	4	5	2.2	5
10-Apr	4	2	3	4	6	Z	5	4	4	4	2	2	2	3	3	3	4	3	5	13	20	12	14	6	5.5	20
11-Apr	Z	4	3	4	5	7	10	8	4	4	3	3	2	2	1	2	1	2	3	10	4	4	2	5	4.0	10
12-Apr	12	Z	6	9	7	27	13	6	3	3	3	3	4	4	2	4	5	5	7	7	7	7	7	6	6.7	27
13-Apr	5	7	Z	2	4	4	6	2	2	3	3	4	3	3	4	7	10	4	3	3	5	6	8	7	4.6	10
14-Apr	1	1	1	Z	3	3	5	4	4	5	4	3	1	0	0	1	0	3	8	7	5	3	4	2	3.0	8
15-Apr	1	2	1	6	Z	2	12	10	5	1	1	1	1	1	1	2	3	3	4	3	3	2	1	1	2.8	12
16-Apr	2	3	5	4	4	Z	6	8	3	1	1	1	0	0	0	0	0	0	0	10	6	2	3	5	2.7	10
17-Apr	Z	8	13	13	20	18	12	9	6	5	2	1	1	0	0	0	0	0	3	6	5	4	2	2	5.5	20
18-Apr	6	Z	5	11	16	24	21	9	3	3	3	2	1	1	1	1	1	1	1	2	2	1	1	1	5.0	24
19-Apr	0	0	Z	1	2	2	5	1	0	0	0	0	0	0	0	M	0	0	0	0	0	0	0	0	0.6	5
20-Apr	2	1	2	4	4	Z	4	4	3	4	C	C	C	C	C	3	3	3	3	6	5	9	12	6	4.3	12
21-Apr	6	4	3	4	4	6	Z	7	4	3	1	1	1	3	3	3	3	3	3	4	6	10	13	11	4.5	13
22-Apr	10	10	12	10	12	15	7	Z	3	2	1	1	1	1	1	3	5	7	2	6	7	8	5	3	5.6	15
23-Apr	2	2	Z	7	11	7	5	2	1	1	1	1	1	1	1	1	2	2	3	2	2	1	1	1	2.4	11
24-Apr	1	1	1	Z	2	2	2	2	2	1	2	1	1	1	1	2	2	2	2	2	2	1	1	1	1.6	2
25-Apr	1	2	2	3	Z	5	6	5	3	2	1	1	1	1	1	1	2	1	1	2	3	4	2	2	2.3	6
26-Apr	3	3	3	7	5	Z	7	3	M	1	1	1	1	1	2	2	4	4	4	8	4	3	5	1	3.3	8
27-Apr	1	0	3	4	3	5	Z	6	7	8	5	4	2	5	5	5	6	6	7	10	11	8	6	2	5.1	11
28-Apr	2	2	1	2	1	5	7	Z	2	2	1	1	1	1	1	1	3	3	3	5	4	5	2	2	2.4	7
29-Apr	2	2	Z	4	5	5	6	4	2	1	1	1	1	1	1	1	1	2	2	3	4	3	2	1	2.3	6
30-Apr	2	3	4	Z	5	8	4	2	1	2	1	1	1	1	0	1	0	2	3	8	4	1	1	7	2.6	8
	3.9	4.1	4.1	5.3	5.7	7.5	7.4	5.4	3.7	2.9	2.1	1.7	1.4	1.4	1.6	2.7	3.8	3.7	4.1	6.3	5.9	4.6	4.3	3.9	Diurnal Average	
	12	19	13	13	20	27	21	12	9	8	5	5	4	5	5	7	12	12	10	18	26	12	14	13	Diurnal Maximum	

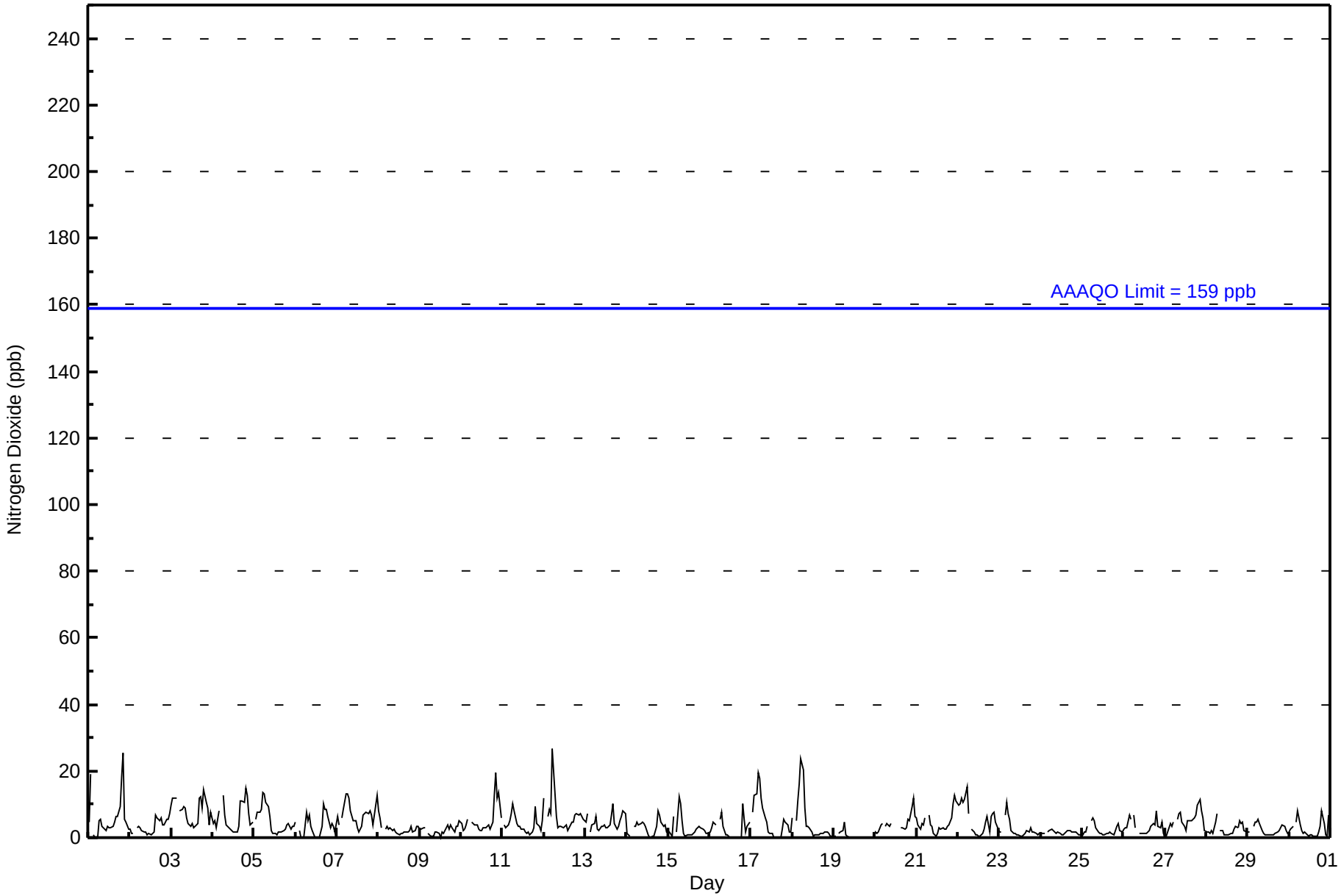
Z - zerospan C - Calibration M - Maintenance
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Dioxide (NO_2) - ppb

Patricia McInnes - April 2016



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	679	99.41	99.41
21 - 40	4	0.59	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: 683

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Dioxide (NO_2) - ppb

Patricia McInnes - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	78	48	22	20	37	89	68	41	71	34	18	24	19	22	21	60	672
21 - 40	0	0	1	0	0	0	0	2	0	0	0	0	0	0	0	1	4
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	78	48	23	20	37	89	68	43	71	34	18	24	19	22	21	61	676

Total Number of Valid Hours: 676

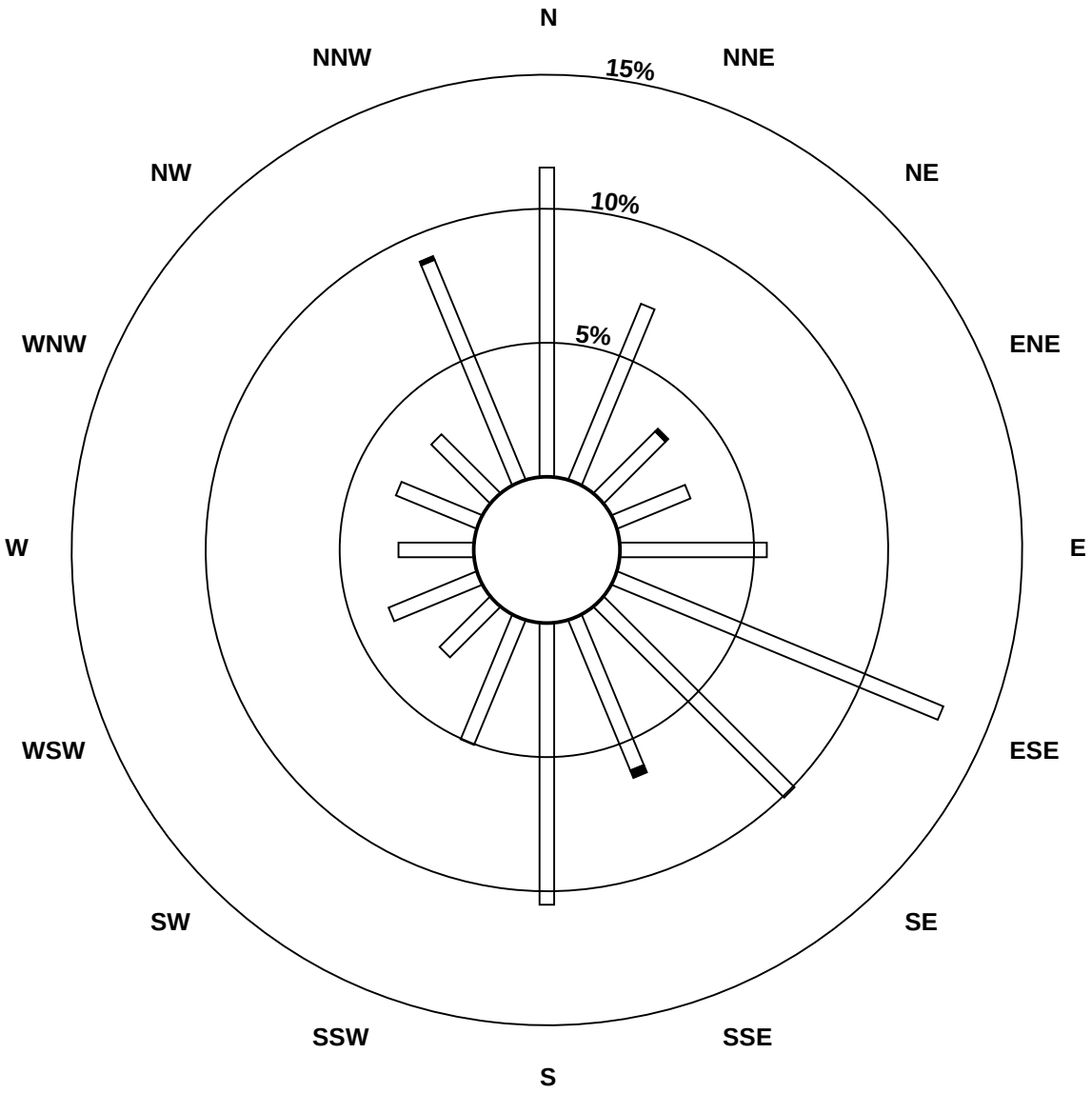
Total Number of Hours: 720

Wood Buffalo Environmental Association

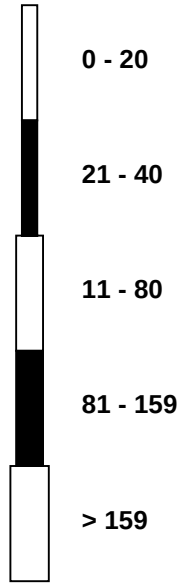
Wind Rose Apr 2016

Nitrogen Dioxide (NO_2) - ppb

Patricia McInnes (AMS 6)



Classes (ppb)



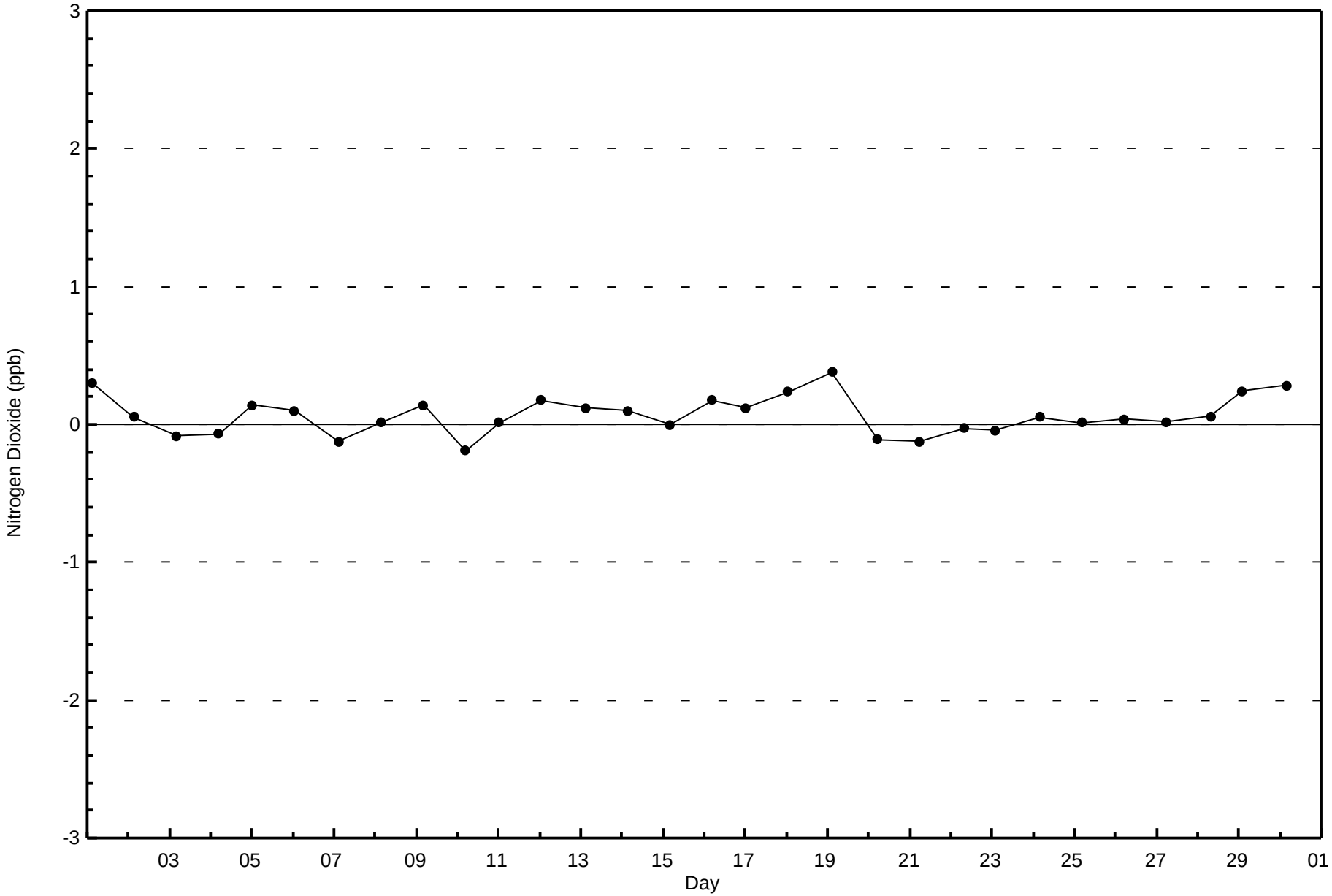
Total Number of Valid Hours: 676

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Dioxide (NO_2) - ppb

Patricia McInnes - April 2016

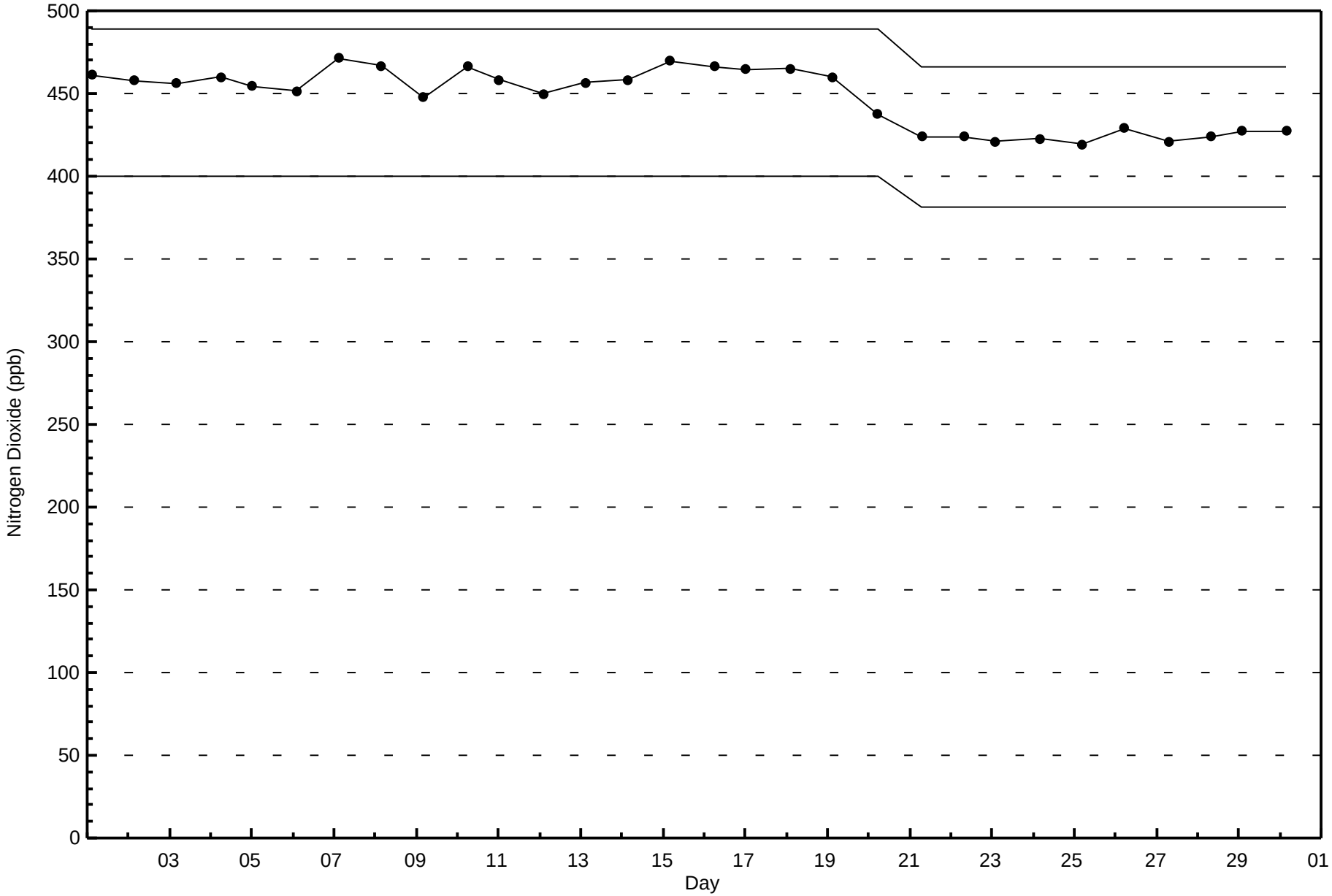


Wood Buffalo Environmental Association

Span Responses

Nitrogen Dioxide (NO_2) - ppb

Patricia McInnes - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_X) - ppb

Patricia McInnes - April 2016

Maximum Value: 57 ppb on Apr 18 06:00

Maximum Daily Average: 10.0 ppb on Apr 3

Minimum Value: 0 ppb on Apr 16 17:00

Minimum Daily Average: 0.6 ppb on Apr 19

Maximum Diurnal Average: 9.9 ppb at hour 6

Minimum Diurnal Average: 2.0 ppb at hour 13

Monthly Average: 5.1 ppb

Percentiles: $P_1 = 0$ $P_{10} = 1$ $Q_1 = 2$ Median = 4 $Q_3 = 6$ $P_{90} = 11$ $P_{99} = 22$

Hours in Service:	720
Hours of Data:	683
Hours of Missing Data:	37
Hours of Calibration:	35
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-Apr	5	21	Z	1	0	0	6	7	4	4	3	5	5	4	6	7	9	8	10	19	27	7	6	3	7.2	27
2-Apr	3	2	1	Z	5	4	4	3	3	2	2	3	1	2	2	9	8	6	6	4	4	6	6	7	3.9	9
3-Apr	10	12	12	12	Z	8	9	11	11	9	6	5	6	5	5	7	27	20	10	15	11	9	4	8	10.0	27
4-Apr	4	5	3	6	8	Z	16	10	6	5	4	3	2	3	3	5	27	21	13	18	14	8	4	5	8.5	27
5-Apr	Z	6	8	8	8	14	15	12	11	9	3	2	2	1	2	3	2	3	3	4	5	3	4	4	5.8	15
6-Apr	6	Z	2	0	0	0	8	6	8	4	3	0	0	0	0	5	12	10	9	7	3	4	4	2	4.1	12
7-Apr	6	4	Z	6	9	14	15	14	10	7	7	7	4	3	5	10	11	9	8	8	7	4	7	13	8.3	15
8-Apr	8	6	3	Z	3	4	4	5	4	4	3	2	2	2	3	3	3	3	3	4	2	3	4	4	3.6	8
9-Apr	3	3	3	3	Z	1	1	1	1	2	2	1	0	2	1	4	5	3	4	3	2	3	4	5	2.4	5
10-Apr	4	2	2	4	6	Z	5	6	6	6	4	3	4	5	4	4	6	4	5	14	21	13	14	7	6.5	21
11-Apr	Z	5	3	5	6	9	14	11	6	5	5	4	4	2	2	2	1	2	3	10	5	4	2	5	5.0	14
12-Apr	12	Z	15	13	9	29	16	8	4	4	5	4	5	5	3	5	6	6	7	7	7	7	7	6	8.2	29
13-Apr	5	7	Z	2	5	5	8	3	3	5	4	5	4	4	5	9	21	6	3	4	6	7	8	7	5.9	21
14-Apr	2	1	1	Z	3	3	5	5	5	7	6	5	1	0	0	1	0	4	9	7	5	3	4	2	3.5	9
15-Apr	1	2	1	8	Z	3	23	19	9	2	1	1	1	1	1	3	4	5	5	4	3	3	2	2	4.6	23
16-Apr	2	3	5	4	5	Z	6	11	5	1	1	1	0	0	0	0	0	0	0	11	6	2	3	5	3.1	11
17-Apr	Z	8	13	15	22	20	13	10	7	6	3	2	2	0	0	0	0	0	3	6	5	4	2	2	6.1	22
18-Apr	6	Z	5	14	22	57	36	13	5	5	4	2	1	1	1	1	2	2	1	2	2	1	1	0	8.0	57
19-Apr	0	0	Z	1	2	2	5	1	1	0	0	0	0	0	0	M	0	0	0	0	0	0	0	0	0.6	5
20-Apr	1	1	2	4	4	Z	4	5	4	6	C	C	C	C	C	5	4	3	3	6	5	9	12	7	4.9	12
21-Apr	6	4	3	4	6	9	Z	10	6	5	2	1	2	4	4	4	3	3	4	4	6	10	13	11	5.4	13
22-Apr	10	10	12	11	12	18	9	Z	3	3	1	1	1	1	2	5	18	9	3	8	9	9	6	3	7.1	18
23-Apr	2	2	Z	7	12	8	7	3	2	2	1	1	1	1	1	2	4	5	4	3	2	1	1	1	3.2	12
24-Apr	1	2	1	Z	2	2	3	3	2	2	2	2	1	1	2	3	3	3	2	2	2	1	1	1	2.0	3
25-Apr	1	2	2	4	Z	6	7	6	4	2	2	2	1	1	1	2	2	2	1	2	4	5	3	2	2.7	7
26-Apr	3	3	3	7	6	Z	9	4	M	2	2	2	2	2	2	4	10	11	5	10	4	3	5	1	4.5	11
27-Apr	1	0	6	7	6	6	Z	9	13	15	9	6	4	8	8	8	10	9	8	10	12	8	6	2	7.3	15
28-Apr	2	2	1	2	2	11	14	Z	3	3	1	1	1	1	2	2	3	4	3	5	4	5	2	2	3.3	14
29-Apr	2	2	Z	4	5	5	6	5	3	2	1	1	1	1	1	1	1	2	2	3	4	3	2	1	2.7	6
30-Apr	2	3	4	Z	5	8	4	2	2	2	2	1	1	1	0	0	0	2	4	9	4	1	1	7	2.8	9
	4.0	4.3	4.7	6.0	6.7	9.9	9.7	7.2	5.1	4.4	3.1	2.5	2.0	2.1	2.3	3.9	6.8	5.5	4.8	7.1	6.4	4.9	4.6	4.1	Diurnal Average	
	12	21	15	15	22	57	36	19	13	15	9	7	6	8	8	10	27	21	13	19	27	13	14	13	Diurnal Maximum	

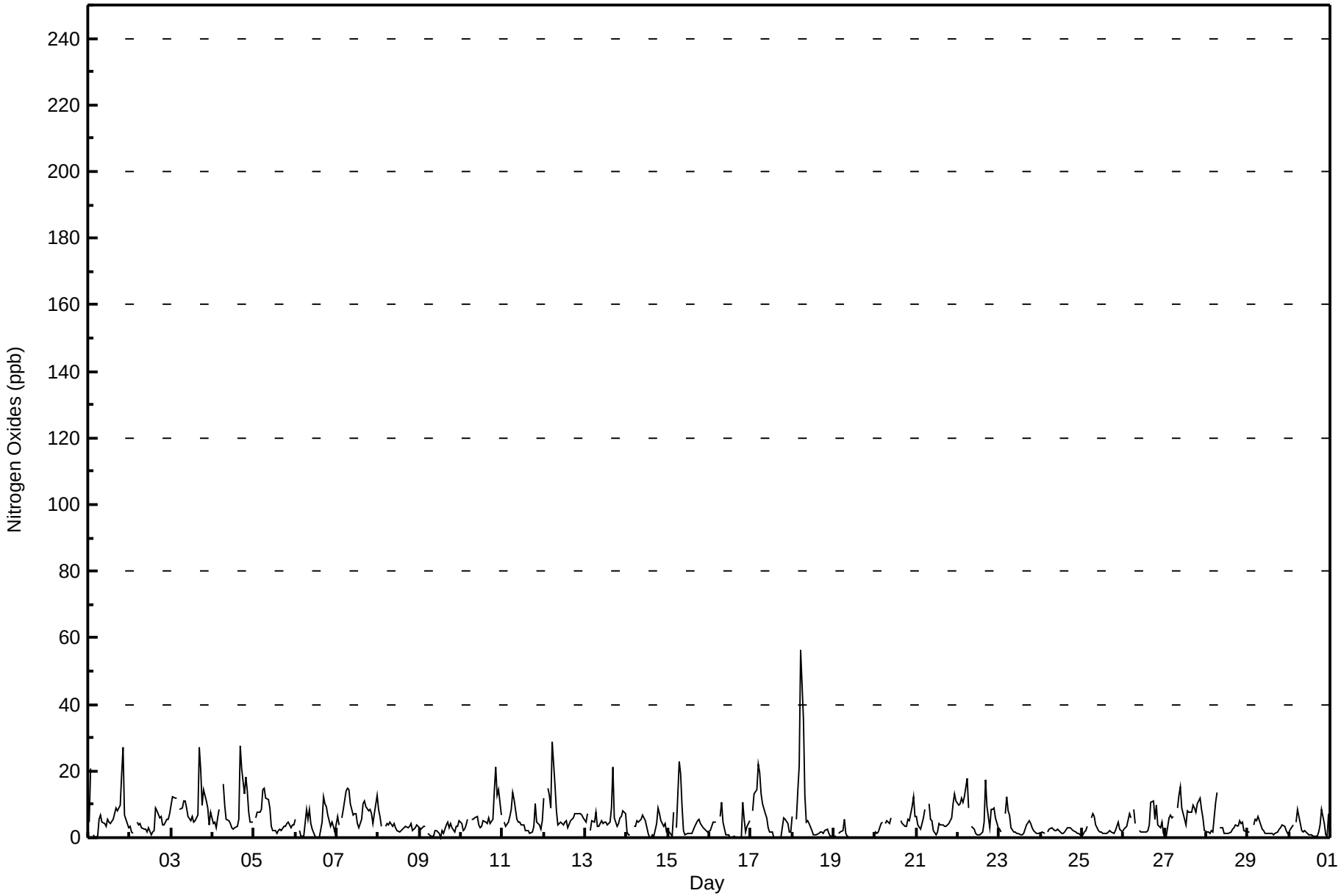
Z - zerospan C - Calibration M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Oxides (NO_X) - ppb

Patricia McInnes - April 2016



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	670	98.10	98.10
21 - 40	12	1.76	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: 683

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Oxides (NO_X) - ppb

Patricia McInnes - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	78	48	21	17	36	89	68	40	68	34	18	24	19	22	21	60	663
21 - 40	0	0	2	3	1	0	0	2	3	0	0	0	0	0	0	1	12
11 - 80	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	78	48	23	20	37	89	68	43	71	34	18	24	19	22	21	61	676

Total Number of Valid Hours: 676

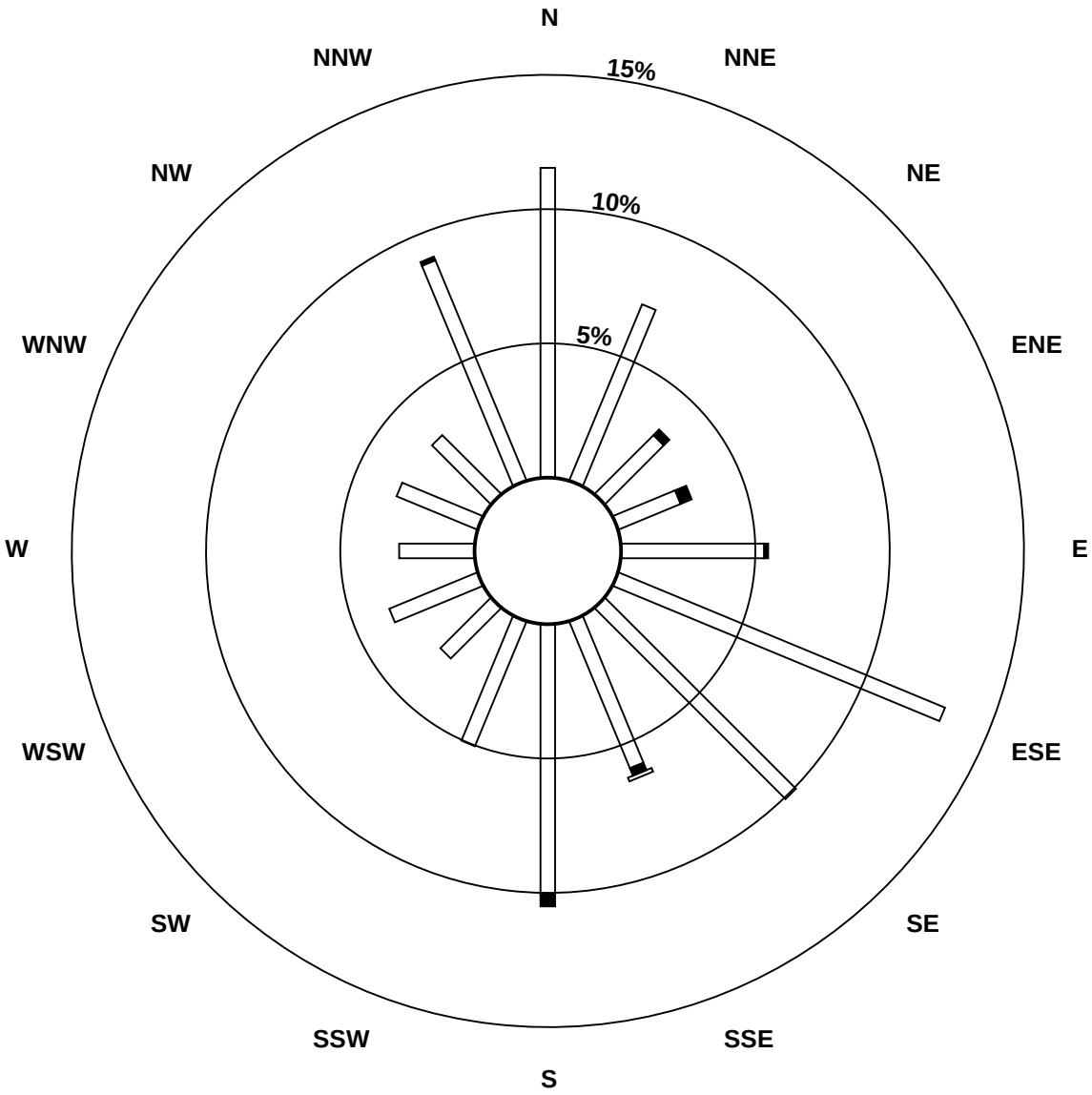
Total Number of Hours: 720

Wood Buffalo Environmental Association

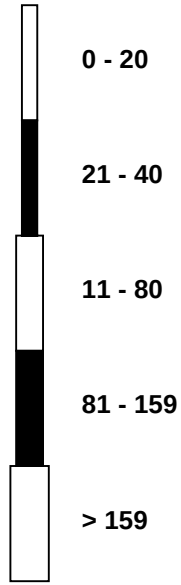
Wind Rose Apr 2016

Nitrogen Oxides (NO_X) - ppb

Patricia McInnes (AMS 6)



Classes (ppb)



0 - 20

21 - 40

11 - 80

81 - 159

> 159

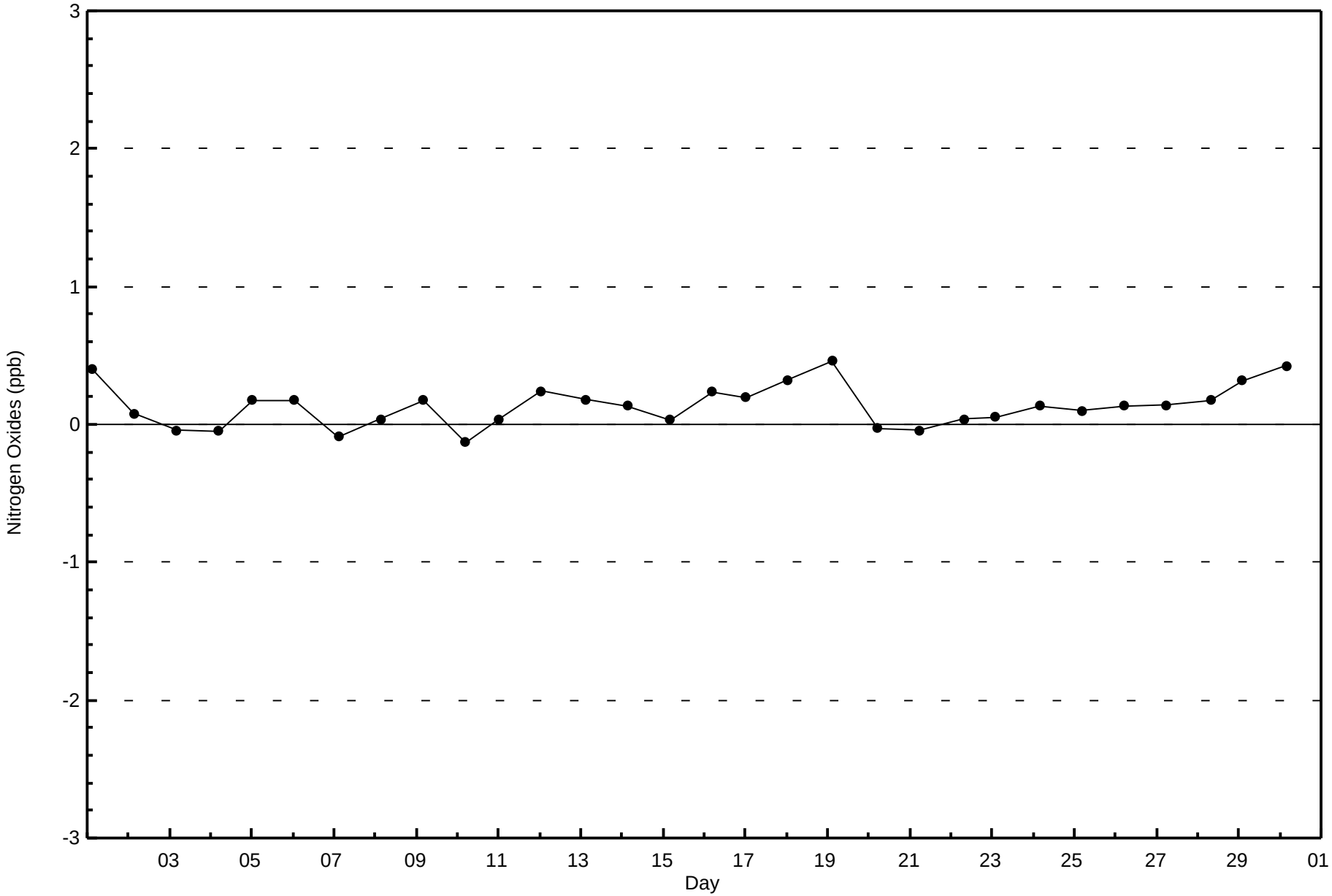
Total Number of Valid Hours: 676

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Oxides (NO_X) - ppb

Patricia McInnes - April 2016

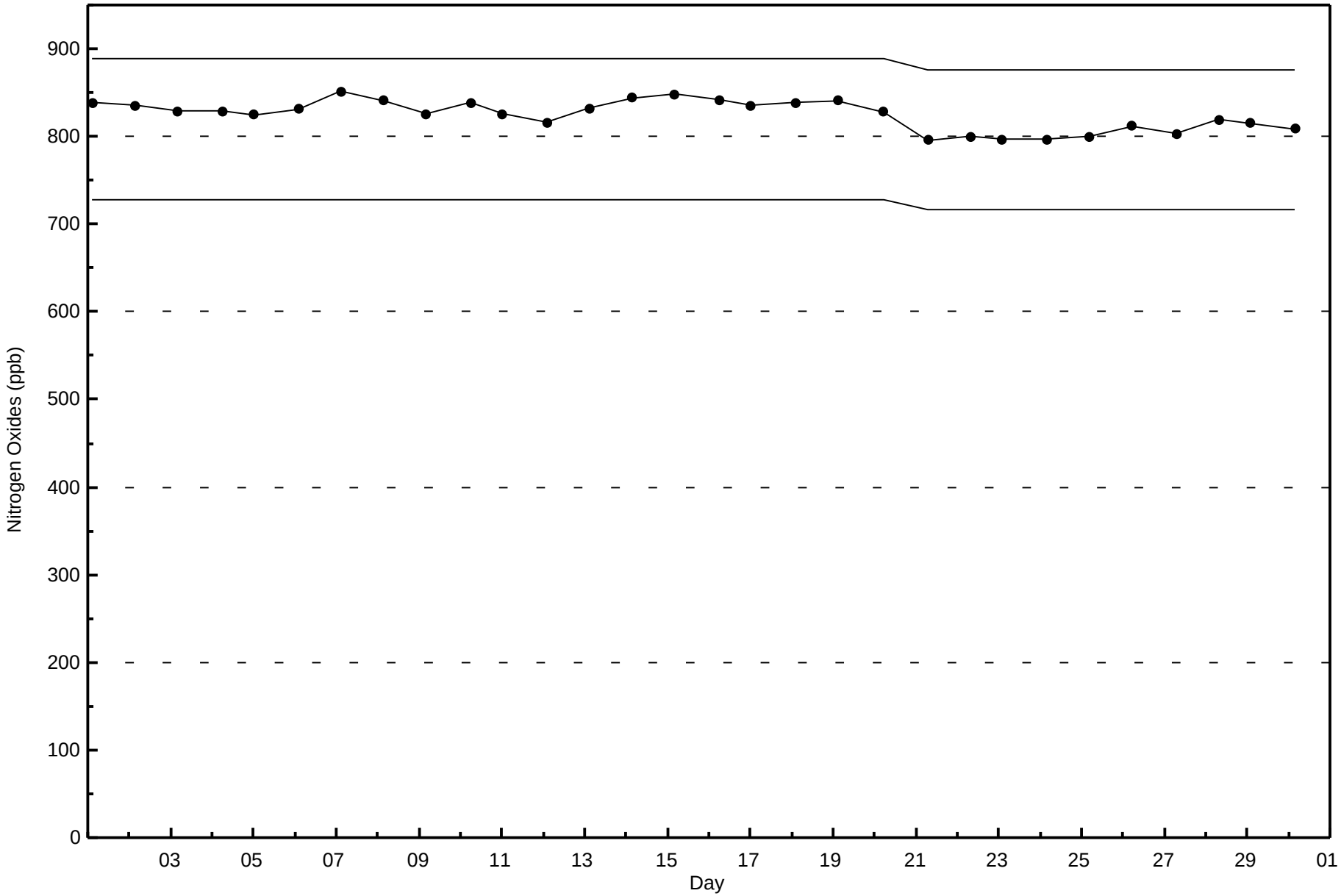


Wood Buffalo Environmental Association

Span Responses

Nitrogen Oxides (NO_X) - ppb

Patricia McInnes - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Ammonia (NH_3) - ppb

Patricia McInnes - April 2016

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

Maximum Value: 0 ppb on Apr 1 01:00 Maximum Daily Average: 0.0 ppb on Apr 1

Minimum Value: 0 ppb on Apr 1 01:00 Minimum Daily Average: 0.0 ppb on Apr 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:	720
Hours of Data:	637
Hours of Missing Data:	83
Hours of Calibration:	42
Percent Operational Time:	94.3

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-Apr	0	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2-Apr	0	0	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3-Apr	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
4-Apr	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
5-Apr	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
6-Apr	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
7-Apr	0	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
8-Apr	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
9-Apr	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
10-Apr	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
11-Apr	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
12-Apr	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
13-Apr	0	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
14-Apr	0	0	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
15-Apr	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
16-Apr	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
17-Apr	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
18-Apr	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
19-Apr	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
20-Apr	0	0	0	Z	RE	0	0	0	0	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0	--	0
21-Apr	0	0	0	0	Z	RE	0	0	0	0	C	C	C	C	C	C	C	0	0	0	0	0	0	0	--	0
22-Apr	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
23-Apr	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
24-Apr	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
25-Apr	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
26-Apr	0	0	0	Z	RE	RE	0	0	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
27-Apr	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
28-Apr	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
29-Apr	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
30-Apr	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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

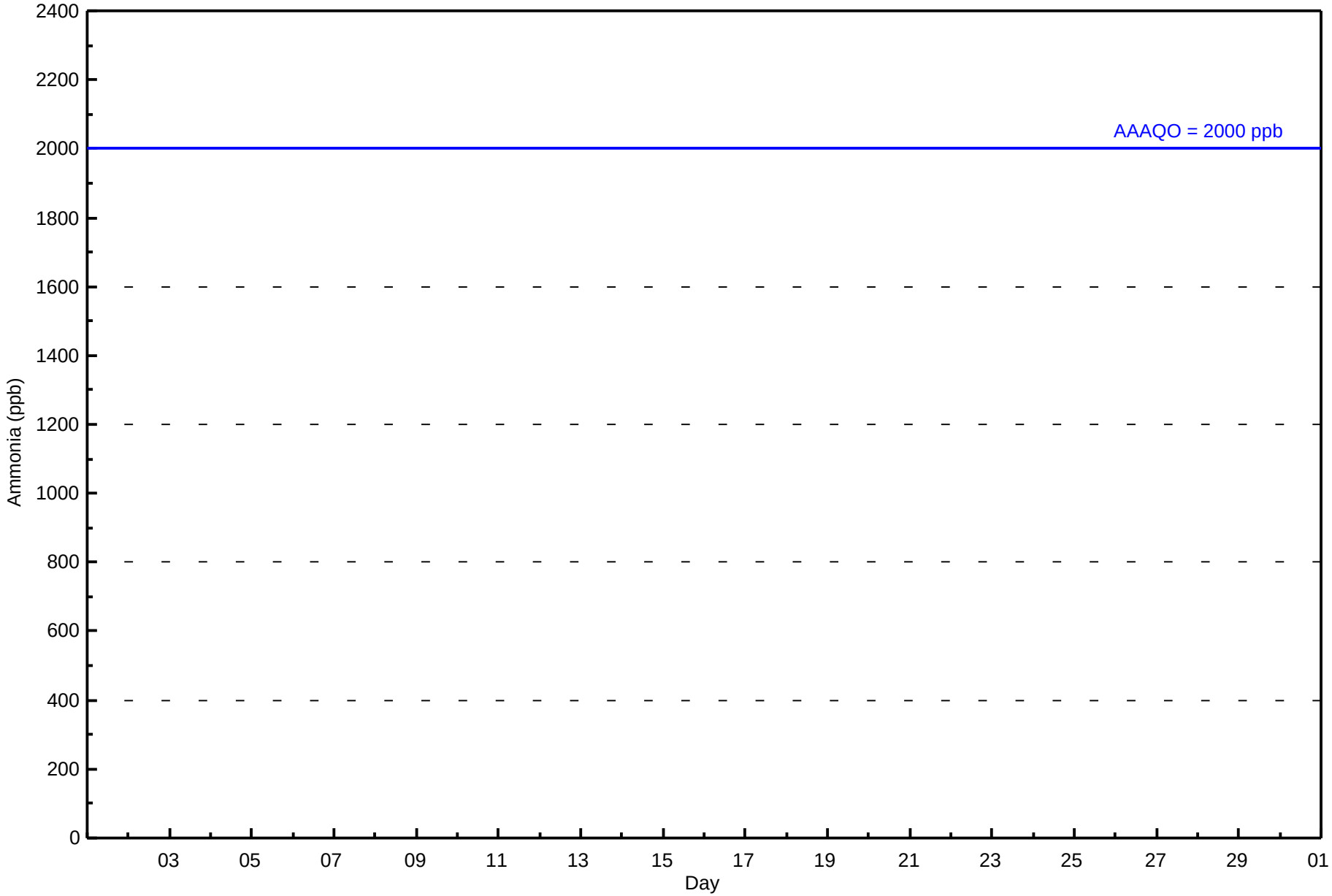
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 2000 ppb

Wood Buffalo Environmental Association

Hourly Averages

Ammonia (NH_3) - ppb

Patricia McInnes - April 2016



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 5	637	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: 637

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Ammonia (NH_3) - ppb

Patricia McInnes - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 5	74	42	22	21	39	82	63	38	63	33	14	25	19	17	20	60	632
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	74	42	22	21	39	82	63	38	63	33	14	25	19	17	20	60	632

Total Number of Valid Hours: 632

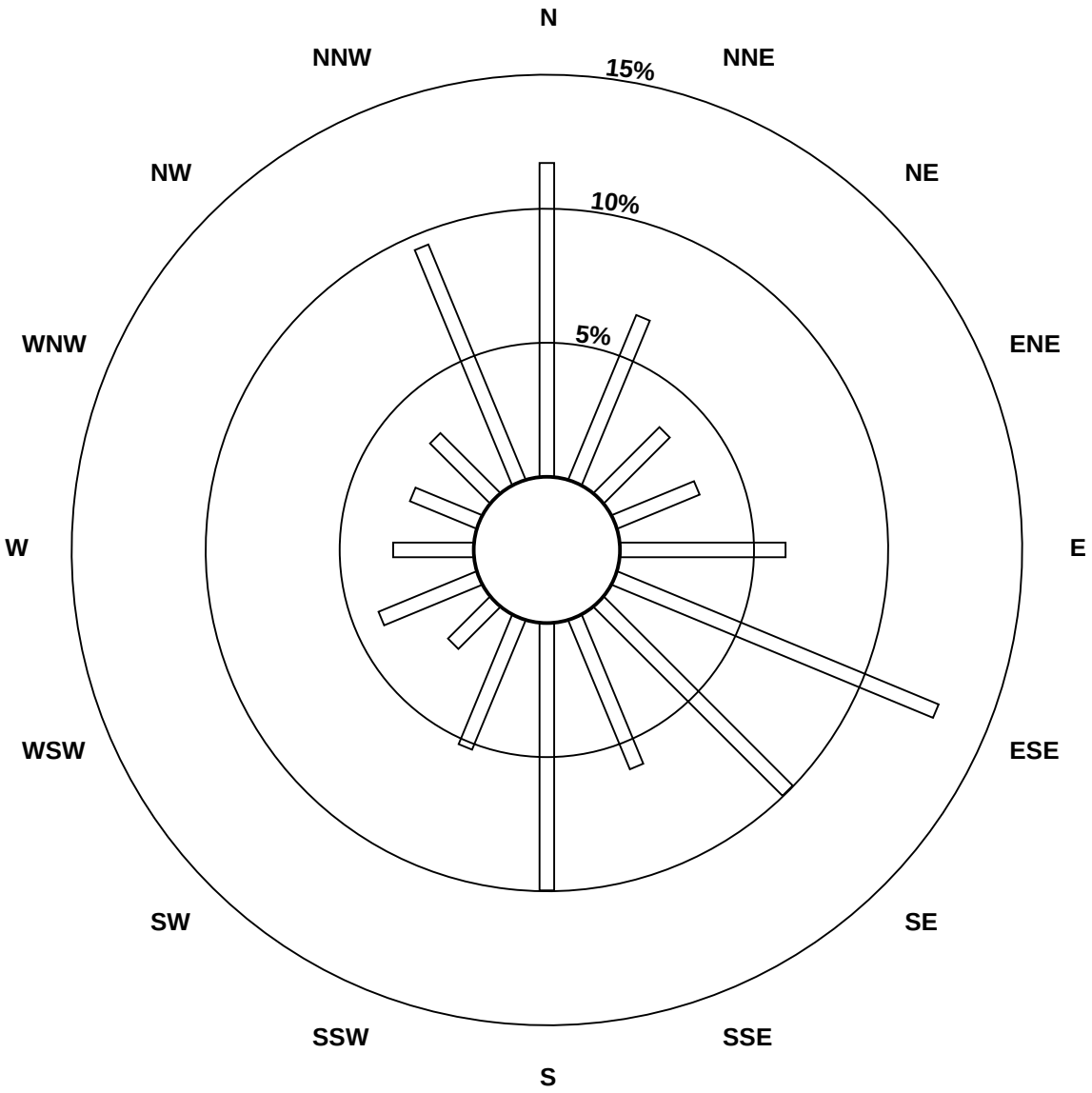
Total Number of Hours: 720

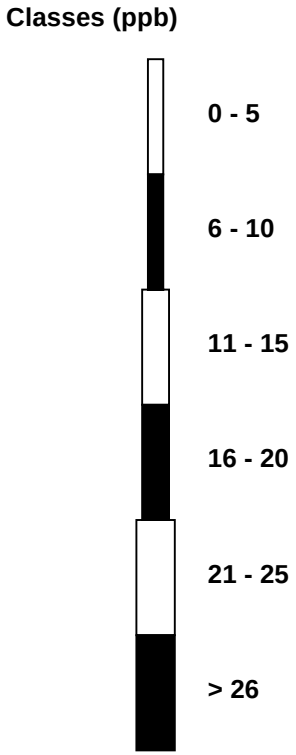
Wood Buffalo Environmental Association

Wind Rose Apr 2016

Ammonia (NH_3) - ppb

Patricia McInnes (AMS 6)





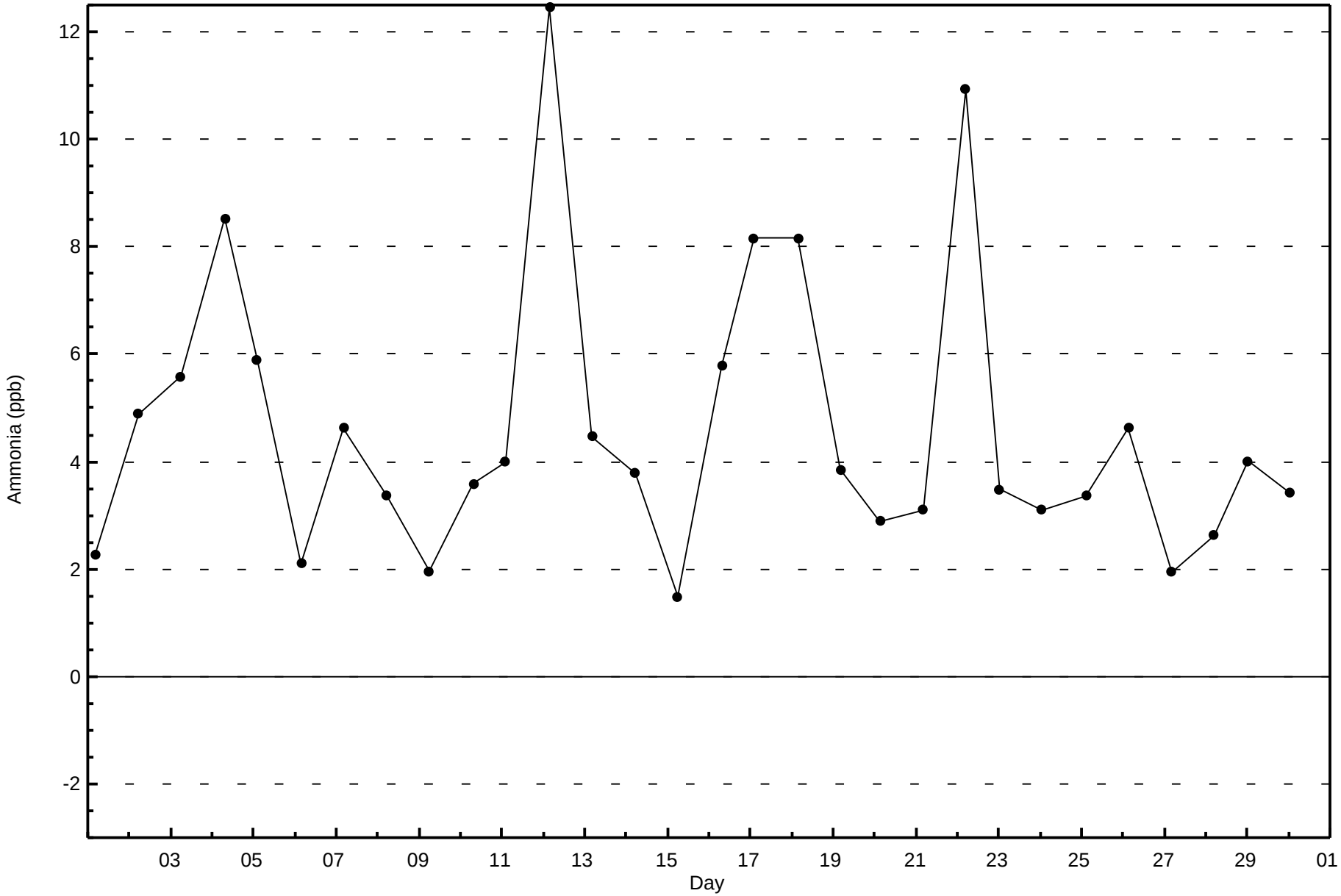
Total Number of Valid Hours: 632

Wood Buffalo Environmental Association

Zero Responses

Ammonia (NH_3) - ppb

Patricia McInnes - April 2016

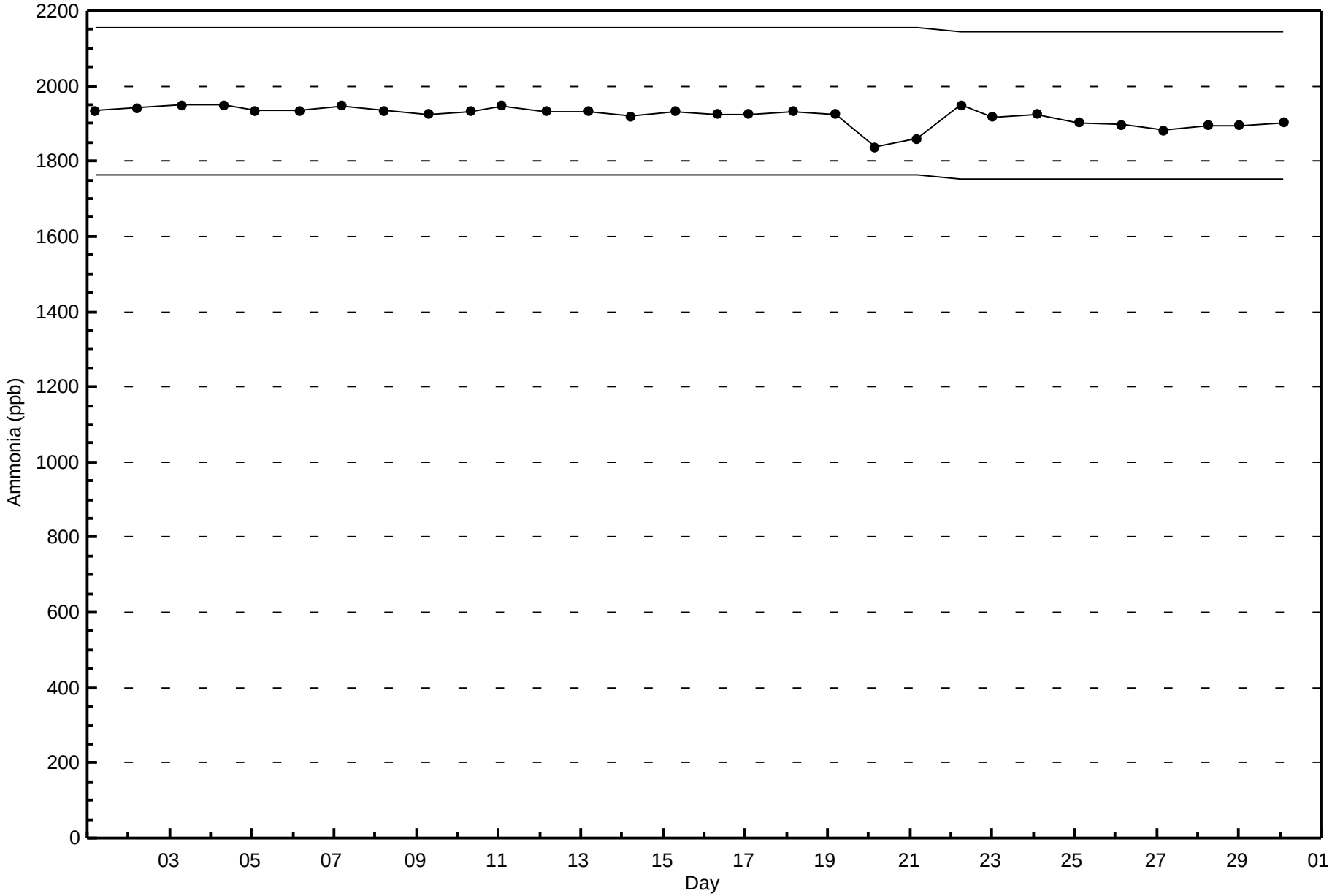


Wood Buffalo Environmental Association

Span Responses

Ammonia (NH_3) - ppb

Patricia McInnes - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

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

Patricia McInnes - April 2016

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

Maximum Value: 30.5 $\mu g/m^3$ on Apr 15 21:00

Maximum Daily Average: 7.5 $\mu g/m^3$ on Apr 3

Minimum Value: 0.3 $\mu g/m^3$ on Apr 27 07:00

Minimum Daily Average: 2.1 $\mu g/m^3$ on Apr 30

Maximum Diurnal Average: 6.7 $\mu g/m^3$ at hour 21

Minimum Diurnal Average: 2.4 $\mu g/m^3$ at hour 14

Monthly Average: 4.17 $\mu g/m^3$

Percentiles: $P_1 = 0.7$ $P_{10} = 1.6$ $Q_1 = 2.4$ Median = 3.5 $Q_3 = 5.2$ $P_{90} = 7.6$ $P_{99} = 14.6$

Hours in Service:	720
Hours of Data:	718
Hours of Missing Data:	2
Hours of Calibration:	2
Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily	Daily
	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-Apr	2.6	6.7	2.2	1.4	1.1	1.1	1.8	2.1	1.6	1.6	1.6	1.9	2.3	2.5	3.5	3.6	5.0	4.5	5.4	9.6	15.2	6.0	4.0	3.1	3.8	15.2
2-Apr	3.1	3.4	3.3	3.2	3.5	3.6	3.5	3.0	2.2	1.9	1.6	1.8	1.4	1.7	2.0	5.9	5.8	5.0	5.4	4.5	4.6	6.1	6.6	5.8	3.7	6.6
3-Apr	11.6	16.4	12.7	11.5	7.5	3.0	3.6	3.8	3.7	3.6	4.9	7.7	9.4	8.9	8.9	8.6	8.4	7.8	8.0	8.9	8.1	4.3	3.5	4.8	7.5	16.4
4-Apr	5.0	6.3	5.7	6.2	5.9	6.4	5.1	4.4	3.5	3.1	2.7	2.3	2.1	2.2	2.9	3.9	6.3	8.2	7.3	8.4	7.4	5.7	4.7	5.0	5.0	8.4
5-Apr	5.5	4.1	8.7	9.2	5.1	7.6	7.9	7.9	6.1	5.4	3.4	2.3	2.5	2.3	2.0	2.0	2.5	3.2	3.8	5.8	4.3	3.2	5.0	3.9	4.7	9.2
6-Apr	4.9	5.8	3.0	1.5	1.2	1.1	8.2	7.2	11.8	5.5	2.9	1.8	1.9	2.0	1.8	3.7	8.1	8.4	4.4	3.9	4.0	3.4	2.7	2.2	4.2	11.8
7-Apr	3.2	3.2	4.5	3.6	4.4	5.9	5.9	5.3	3.9	2.7	3.1	3.1	2.3	1.8	2.8	4.4	4.1	4.5	4.2	5.1	4.9	3.2	4.0	7.9	4.1	7.9
8-Apr	4.2	1.9	1.6	1.7	1.9	2.1	2.2	2.1	1.9	1.8	1.7	1.8	1.8	2.0	2.2	2.4	2.4	2.3	2.2	2.5	2.5	3.0	3.4	3.1	2.3	4.2
9-Apr	2.7	2.7	2.9	3.0	3.3	2.9	2.4	2.4	2.3	2.9	2.9	3.0	1.8	2.0	2.5	3.7	4.1	2.8	3.6	4.3	4.1	6.6	5.4	5.3	3.3	6.6
10-Apr	3.5	3.0	3.2	3.4	3.9	4.7	3.6	3.5	3.5	2.9	3.0	2.7	2.7	2.5	2.7	3.3	2.8	3.2	4.8	10.4	11.9	11.4	10.2	4.9	4.7	11.9
11-Apr	4.1	4.4	3.8	4.1	4.8	4.6	8.5	7.6	3.8	5.0	4.4	3.7	2.6	1.9	1.8	2.1	2.1	2.5	3.9	8.8	6.0	7.3	3.9	5.2	4.4	8.8
12-Apr	6.9	6.5	5.4	8.4	5.9	12.4	9.1	6.7	4.4	4.2	4.2	4.6	5.0	6.0	5.4	5.7	6.2	7.3	8.2	8.9	8.5	8.8	8.0	6.3	6.8	12.4
13-Apr	5.6	6.6	5.5	4.9	4.9	5.1	5.5	4.9	4.9	4.5	4.1	4.1	3.7	4.1	4.8	6.4	5.9	4.8	3.5	2.4	2.3	2.4	2.4	3.3	4.4	6.6
14-Apr	2.8	2.6	3.2	6.2	5.9	6.9	5.6	4.7	4.2	2.6	2.2	2.5	0.9	0.5	0.6	0.6	0.6	1.0	2.4	1.8	1.5	1.9	2.6	1.7	2.7	6.9
15-Apr	1.4	0.8	0.7	0.8	0.9	0.8	1.8	2.5	2.1	1.1	1.1	1.4	1.6	1.4	1.6	2.1	2.6	2.9	3.8	4.7	30.5	8.8	4.0	4.4	3.5	30.5
16-Apr	4.3	3.7	3.3	3.3	3.0	3.2	3.3	3.7	2.1	1.3	1.4	1.5	1.3	1.3	1.2	0.9	0.8	0.8	0.8	6.2	7.0	3.8	9.0	4.4	3.0	9.0
17-Apr	8.2	11.3	21.1	10.8	6.1	5.7	4.8	5.3	4.3	3.9	2.4	2.2	2.0	1.1	1.1	0.9	0.9	1.3	2.6	11.9	7.6	22.9	10.9	3.9	6.4	22.9
18-Apr	6.2	4.4	4.2	5.6	7.1	17.6	10.1	5.5	2.8	2.8	2.9	2.0	1.6	1.7	1.9	2.3	2.7	3.4	3.5	4.9	4.3	6.5	7.4	5.2	4.9	17.6
19-Apr	5.5	6.7	7.6	8.7	9.7	10.6	11.2	10.1	8.6	6.1	4.2	2.3	1.9	2.0	4.5	3.3	4.7	6.0	5.5	3.1	2.3	2.0	2.1	2.4	5.5	11.2
20-Apr	3.7	3.1	3.3	4.4	3.8	4.6	6.5	6.5	5.2	3.9	5.0	4.3	2.7	2.6	2.9	2.8	3.1	3.3	3.9	5.4	9.7	6.4	7.4	4.8	4.5	9.7
21-Apr	3.7	2.8	3.3	3.7	3.4	3.7	5.0	3.3	2.1	1.6	1.2	1.4	1.4	1.9	2.2	2.3	2.6	3.2	3.9	5.1	7.2	7.9	7.1	5.3	3.6	7.9
22-Apr	8.8	4.4	4.6	4.6	4.9	5.7	3.3	2.3	1.7	1.3	1.2	1.2	1.1	1.1	1.3	1.6	2.1	4.0	3.1	8.1	16.2	10.9	8.9	5.3	4.5	16.2
23-Apr	4.8	5.1	6.4	7.1	11.8	9.6	6.7	4.3	3.9	3.0	3.0	2.5	2.5	2.2	2.3	3.0	4.3	5.0	5.6	5.2	4.0	4.0	3.9	3.7	4.7	11.8
24-Apr	4.2	4.6	4.9	5.2	4.9	5.1	4.6	4.9	4.2	4.0	3.5	2.7	2.5	2.4	2.6	3.4	3.4	4.1	3.6	5.1	5.0	4.6	5.7	5.5	4.2	5.7
25-Apr	6.9	7.5	7.0	7.0	7.0	6.3	6.5	6.6	5.8	5.0	3.4	2.5	2.4	2.6	2.5	2.7	3.1	3.0	3.0	3.2	5.3	5.9	5.3	4.7	4.8	7.5
26-Apr	5.2	5.6	5.9	6.3	5.7	5.4	4.7	2.9	2.8	C	C	3.3	3.5	3.7	4.0	3.8	3.6	2.9	2.6	2.6	2.2	2.9	3.2	0.9	3.8	6.3
27-Apr	1.4	0.6	1.1	0.7	0.7	0.8	0.3	1.1	1.8	4.1	7.4	5.6	2.4	2.1	2.6	2.6	2.7	2.7	3.0	3.9	4.8	5.2	3.5	1.4	2.6	7.4
28-Apr	1.5	1.6	1.4	1.7	1.6	2.1	2.5	2.5	2.7	2.6	2.1	1.9	2.1	2.4	2.5	2.8	3.3	3.6	3.3	3.6	4.8	3.4	2.8	2.7	2.6	4.8
29-Apr	2.8	2.6	2.6	3.1	3.4	3.4	3.5	3.4	2.8	2.9	2.6	2.6	2.5	2.2	2.2	2.2	2.2	2.4	2.5	2.7	2.8	5.6	4.0	2.5	2.9	5.6
30-Apr	2.8	3.2	4.2	1.9	2.2	3.2	2.6	2.1	2.1	2.1	1.6	1.1	1.1	1.1	1.3	1.5	1.1	1.3	2.2	3.9	2.1	1.0	1.0	4.2	2.1	4.2
	4.6	4.7	4.9	4.8	4.5	5.2	5.0	4.4	3.8	3.2	3.0	2.7	2.4	2.4	2.7	3.1	3.6	3.8	4.0	5.5	6.7	5.8	5.1	4.1	Diurnal Average	
	11.6	16.4	21.1	11.5	11.8	17.6	11.2	10.1	11.8	6.1	7.4	7.7	9.4	8.9	8.9	8.6	8.4	8.4	8.2	11.9	30.5	22.9	10.9	7.9	Diurnal Maximum	

C - Calibration

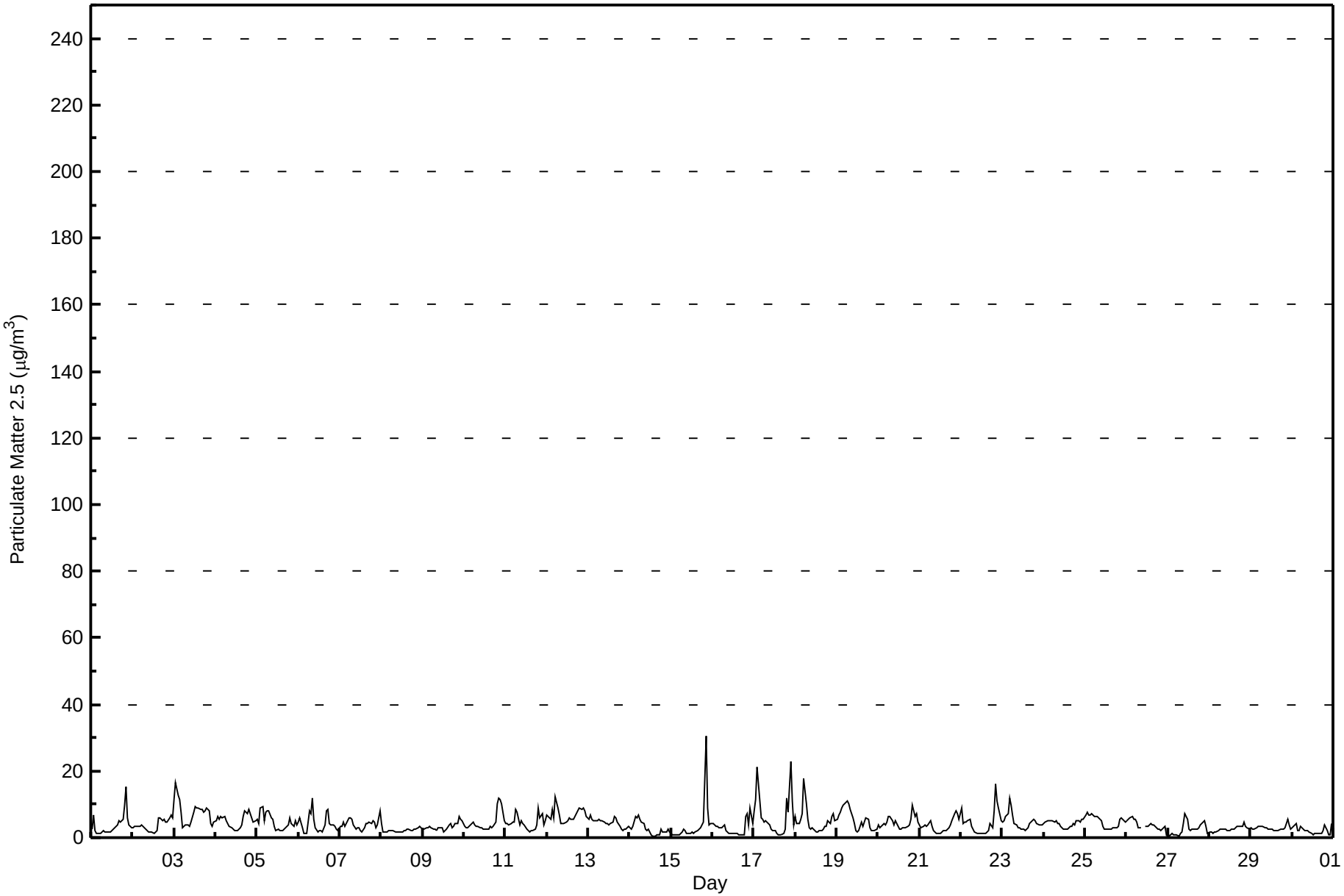
Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 $\mu g/m^3$

Wood Buffalo Environmental Association

Hourly Averages

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

Patricia McInnes - April 2016



Concentration Ranges ($\mu g/m^3$)	Number of Hours	%	Cumulative %
1 - 5	534	74.37	74.37
6 - 15	154	21.45	95.82
16 - 25	5	0.70	96.52
26 - 80	1	0.14	96.66
> 81.0	0	0.00	96.66

Total Number of Valid Hours: 718

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

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

Patricia McInnes - April 2016

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	56	42	16	14	34	78	64	37	54	25	8	16	14	16	17	39	530
6 - 15	27	9	7	7	6	13	7	9	18	11	6	4	1	4	1	21	151
16 - 25	0	0	0	0	0	1	0	1	1	0	1	0	0	0	1	0	5
26 - 80	0	0	0	0	0	0	1	0	0	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	83	51	23	21	40	92	72	47	73	36	15	20	15	20	19	60	687

Total Number of Valid Hours: 711

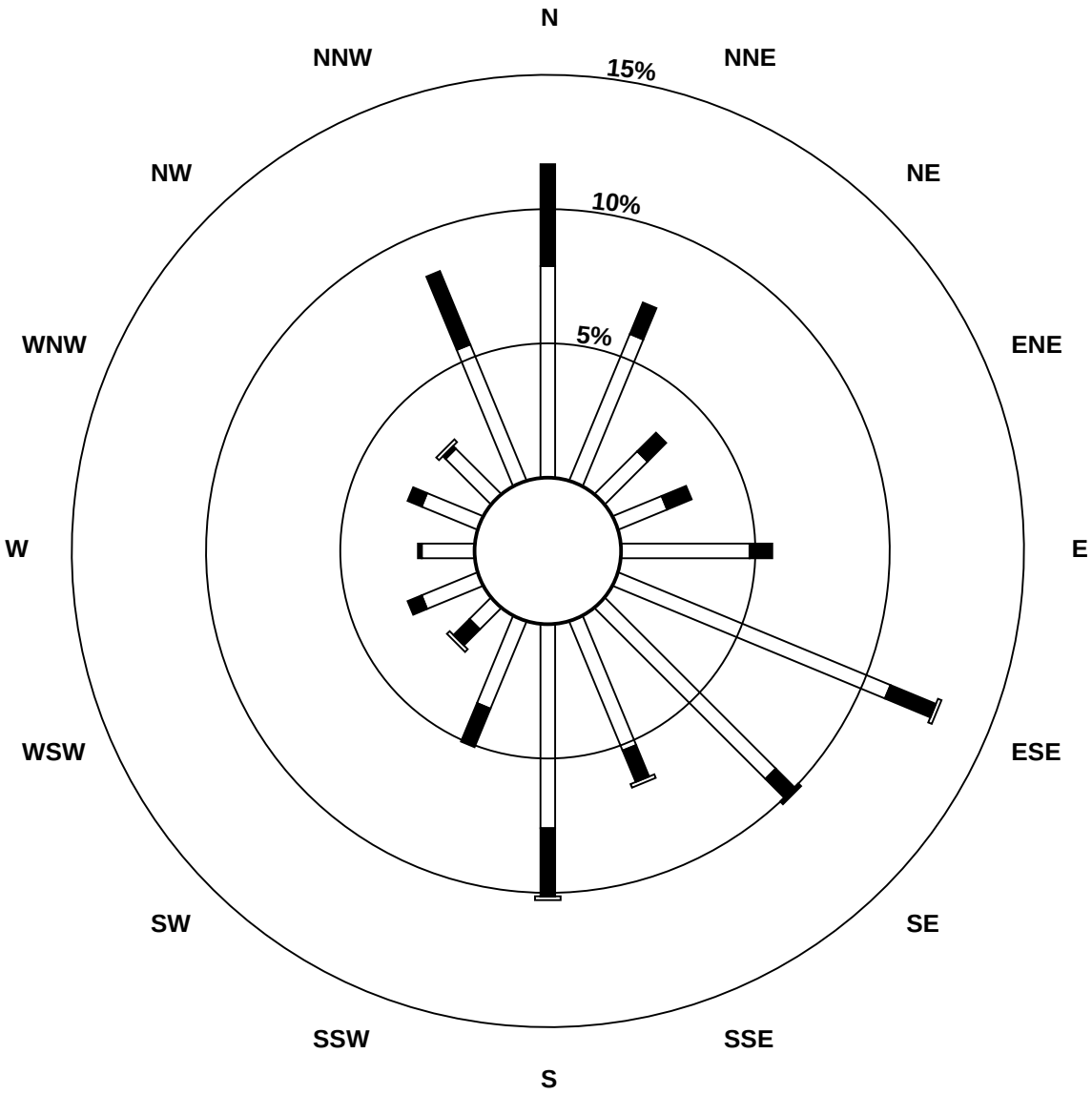
Total Number of Hours: 720

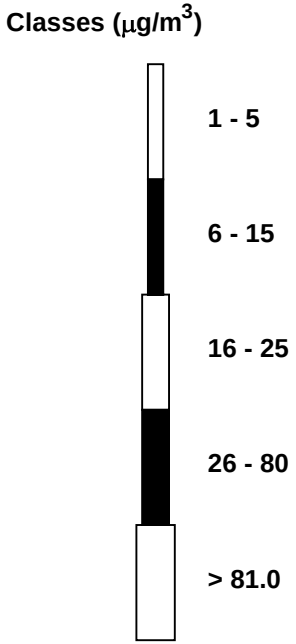
Wood Buffalo Environmental Association

Wind Rose Apr 2016

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

Patricia McInnes (AMS 6)





Total Number of Valid Hours: 711

Maximum Value: 26.9 C on Apr 18 16:00

Maximum Daily Average: 16.7 C on Apr 18

Minimum Value: -12.3 C on Apr 4 05:00

Minimum Daily Average: -6.0 C on Apr 3

Maximum Diurnal Average: 9.0 C at hour 16

Minimum Diurnal Average: -0.5 C at hour 6

Monthly Average: 4.31 C

Percentiles: P_1 = -9.0 P_{10} = -5.3 Q_1 = -1.0 Median = 3.1 Q_3 = 8.8 P_{90} = 16.6 P_{99} = 24.1

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

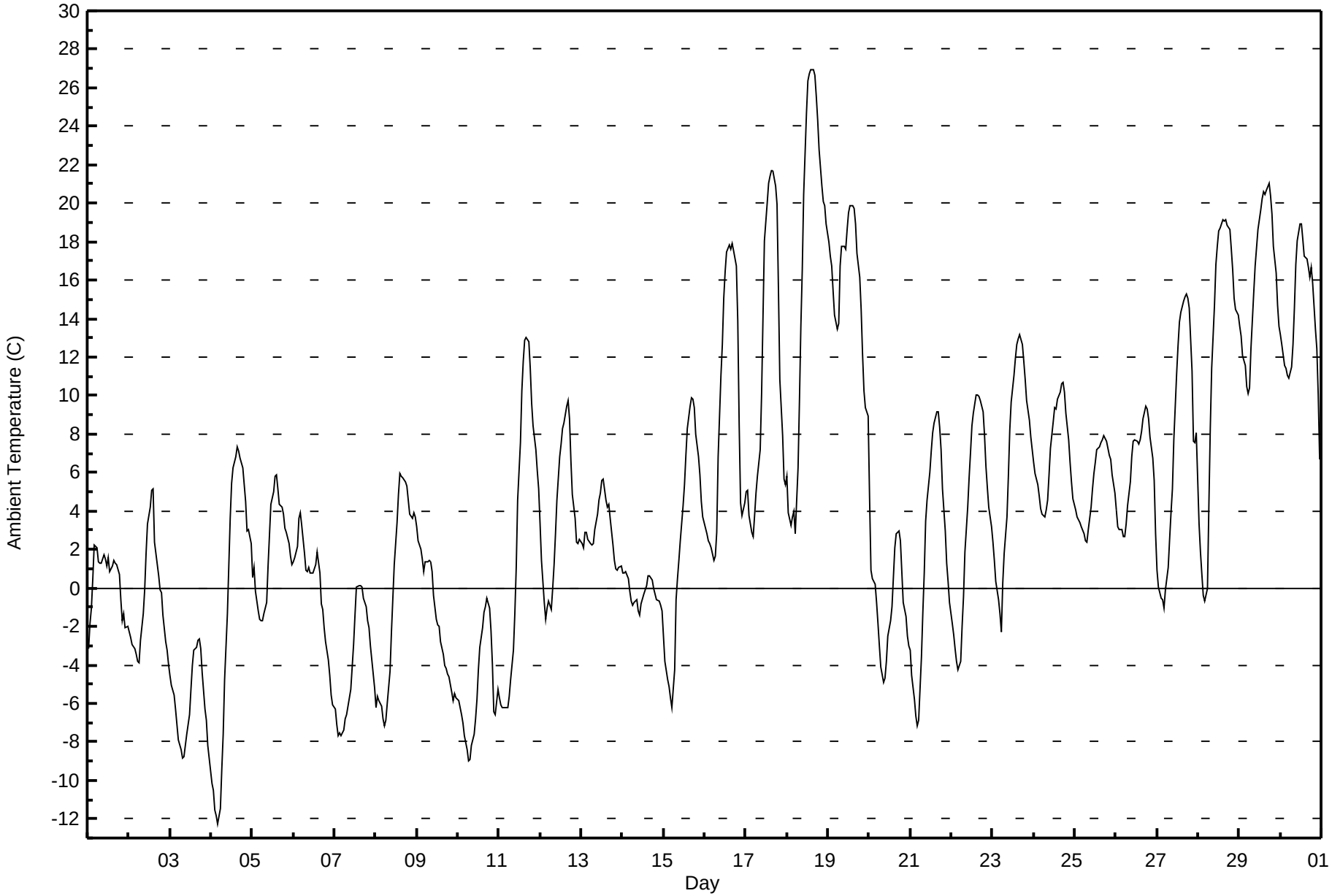
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	-3.2	-1.9	-1.0	0.5	2.2	2.1	1.4	1.3	1.3	1.7	1.5	1.2	1.6	0.9	1.2	1.4	1.3	1.2	0.7	-0.6	-1.7	-1.3	-2.1	-2.0	0.3	2.2
2-Apr	-2.3	-2.5	-2.9	-3.1	-3.4	-3.8	-3.9	-2.8	-1.3	-0.1	1.8	3.3	4.2	5.1	5.1	2.4	1.8	0.6	-0.1	-0.3	-1.4	-2.8	-3.3	-3.9	-0.6	5.1
3-Apr	-4.5	-5.0	-5.6	-6.3	-7.1	-7.9	-8.4	-8.8	-8.8	-8.2	-7.6	-6.6	-5.3	-4.1	-3.2	-3.1	-2.7	-2.7	-3.1	-4.4	-6.3	-6.9	-8.2	-8.8	-6.0	-2.7
4-Apr	-10.1	-10.5	-11.5	-11.8	-12.3	-11.5	-9.4	-7.6	-4.8	-1.3	1.2	3.6	5.5	6.3	6.8	7.3	7.1	6.8	6.2	5.4	4.5	3.0	3.1	2.3	-0.9	7.3
5-Apr	0.6	1.1	-0.1	-1.2	-1.6	-1.7	-1.7	-1.3	-0.7	1.2	2.7	4.3	5.0	5.8	5.8	5.1	4.3	4.2	3.9	3.1	2.9	2.3	1.6	1.2	1.9	5.8
6-Apr	1.4	1.5	2.2	3.6	3.9	3.3	1.8	0.9	0.8	1.1	0.8	0.8	1.0	1.2	1.9	0.8	-0.8	-1.1	-2.1	-2.8	-3.7	-4.5	-5.5	-6.1	0.0	3.9
7-Apr	-6.3	-7.1	-7.6	-7.6	-7.7	-7.4	-6.8	-6.6	-6.1	-5.2	-4.1	-3.0	-1.4	0.0	0.1	0.1	0.0	-0.5	-1.0	-1.7	-2.1	-3.0	-3.8	-5.2	-3.9	0.1
8-Apr	-6.2	-5.7	-5.8	-6.2	-6.8	-7.1	-6.9	-6.0	-4.3	-2.3	-0.5	1.2	3.4	4.9	5.9	5.8	5.7	5.5	5.3	4.5	3.8	3.6	3.9	3.7	0.0	5.9
9-Apr	3.2	2.4	2.0	1.5	0.9	1.4	1.3	1.4	1.4	0.8	-0.4	-1.6	-1.9	-2.0	-2.8	-3.5	-4.1	-4.2	-4.5	-4.6	-5.4	-5.9	-5.5	-5.7	-1.5	3.2
10-Apr	-5.8	-6.2	-6.6	-7.1	-7.7	-8.4	-9.0	-9.0	-8.2	-7.6	-6.8	-5.8	-4.2	-3.1	-2.1	-1.3	-1.0	-0.5	-1.1	-2.2	-4.0	-6.4	-6.6	-5.3	-5.2	-0.5
11-Apr	-5.7	-6.0	-6.3	-6.2	-6.2	-6.2	-5.6	-4.7	-3.2	-1.3	1.1	4.6	7.6	10.3	11.8	12.9	13.0	12.8	11.4	9.6	8.4	7.2	6.1	5.2	2.9	13.0
12-Apr	3.3	1.4	-0.8	-1.7	-1.0	-0.7	-1.1	0.0	1.2	2.8	4.6	6.8	7.5	8.3	8.6	9.4	9.7	8.8	6.6	4.9	3.6	2.4	2.3	2.5	3.7	9.7
13-Apr	2.3	2.1	2.9	2.9	2.5	2.3	2.3	2.3	3.1	3.8	4.6	4.9	5.5	5.7	4.6	4.2	4.4	3.6	2.2	1.4	1.0	0.9	1.1	1.1	3.0	5.7
14-Apr	0.8	0.8	0.9	0.5	-0.2	-0.6	-0.9	-0.8	-0.6	-1.2	-1.4	-0.8	-0.3	-0.1	0.2	0.6	0.6	0.4	0.0	-0.4	-0.6	-0.7	-0.9	-1.2	-0.3	0.9
15-Apr	-2.5	-3.8	-4.8	-5.1	-5.7	-6.2	-4.2	-0.6	0.5	1.4	2.5	4.3	5.4	6.9	8.3	9.5	9.9	9.8	9.4	8.0	6.8	5.9	4.5	3.7	2.7	9.9
16-Apr	3.1	2.8	2.5	2.3	2.1	1.5	1.7	2.9	6.9	11.0	12.7	15.1	16.5	17.5	17.9	17.6	17.9	17.6	16.7	13.9	8.5	4.4	3.7	4.5	9.2	17.9
17-Apr	5.0	5.1	3.8	2.9	2.7	3.7	5.0	5.8	7.2	10.1	14.1	18.1	20.0	21.1	21.4	21.7	21.7	20.9	20.0	15.6	10.9	7.9	5.6	5.4	11.5	21.7
18-Apr	5.8	3.9	3.3	3.7	4.0	2.8	6.3	9.8	13.6	16.5	20.5	24.7	26.4	26.7	26.9	26.9	26.6	25.5	24.3	22.8	20.9	20.1	19.8	18.9	16.7	26.9
19-Apr	18.0	17.2	16.7	15.4	14.2	13.5	13.7	16.7	17.7	17.7	17.6	18.6	19.5	19.9	19.9	19.7	18.9	17.4	16.2	14.5	12.2	10.2	9.4	8.9	16.0	19.9
20-Apr	4.7	0.9	0.5	0.2	-0.7	-1.8	-3.0	-4.1	-4.9	-4.7	-3.8	-2.5	-1.7	-1.0	0.5	2.1	2.8	3.0	2.5	0.9	-0.8	-1.5	-2.5	-3.0	-0.7	4.7
21-Apr	-3.3	-4.5	-5.8	-6.6	-7.2	-6.8	-3.6	-1.3	0.8	3.5	4.5	6.0	7.1	8.1	8.6	9.1	9.2	8.3	7.2	5.2	2.9	1.3	0.3	-0.8	1.8	9.2
22-Apr	-1.9	-2.5	-3.2	-3.8	-4.3	-3.8	-2.0	-0.5	1.8	4.2	5.8	7.0	8.4	9.1	10.0	10.0	9.9	9.7	9.2	7.9	6.3	5.2	4.2	3.2	3.8	10.0
23-Apr	2.4	1.4	0.4	-0.6	-1.4	-2.3	0.2	1.8	3.7	5.8	8.2	9.6	11.0	11.9	12.7	13.0	13.1	12.6	11.8	10.8	9.8	8.7	7.8	7.2	6.7	13.1
24-Apr	6.5	5.9	5.4	4.8	4.2	3.8	3.7	4.0	4.6	5.9	7.3	8.6	9.3	9.3	9.8	10.1	10.6	10.7	10.2	9.1	7.7	6.5	5.5	4.7	7.0	10.7
25-Apr	4.0	3.7	3.6	3.4	3.2	2.8	2.5	2.4	3.0	4.2	5.2	5.9	6.6	7.2	7.3	7.5	7.7	7.9	7.6	7.2	6.9	6.7	5.9	4.9	5.3	7.9
26-Apr	4.0	3.2	3.0	3.0	2.7	2.7	3.3	4.2	5.5	6.8	7.6	7.7	7.6	7.5	7.7	8.1	8.8	9.5	9.3	8.8	7.8	6.8	5.6	2.8	6.0	9.5
27-Apr	1.0	0.0	-0.5	-0.6	-1.0	-0.1	1.1	2.5	3.9	5.2	7.7	11.1	12.6	13.8	14.4	14.9	15.2	15.3	15.0	14.5	11.3	7.6	7.6	8.1	7.5	15.3
28-Apr	3.3	1.9	0.7	-0.4	-0.7	0.0	4.3	8.3	11.4	14.7	16.8	17.8	18.6	18.7	19.1	19.1	19.1	18.9	18.6	17.6	16.5	15.1	14.5	14.2	12.0	19.1
29-Apr	13.6	13.1	12.1	11.6	10.5	10.1	10.4	12.5	15.4	16.8	17.6	18.6	19.6	20.2	20.6	20.4	20.6	21.0	20.4	19.4	17.8	16.3	14.7	13.6	16.1	21.0
30-Apr	13.1	12.7	11.5	11.4	11.1	10.9	11.5	12.6	14.5	16.8	18.1	18.9	18.9	18.1	17.2	17.1	16.7	16.1	16.6	15.8	13.5	12.4	10.0	6.7	14.3	18.9
	1.5	0.8	0.3	0.0	-0.4	-0.5	0.1	1.2	2.5	4.0	5.3	6.8	7.8	8.5	8.9	9.0	8.9	8.6	8.0	6.8	5.3	4.0	3.3	2.7	Diurnal Average	
	18.0	17.2	16.7	15.4	14.2	13.5	13.7	16.7	17.7	17.7	20.5	24.7	26.4	26.7	26.9	26.9	26.6	25.5	24.3	22.8	20.9	20.1	19.8	18.9	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature (AT) - C

Patricia McInnes - April 2016



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	223	30.97	30.97
0 - 10	343	47.64	78.61
10 - 20	130	18.06	96.67
> 20	24	3.33	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Patricia McInnes - April 2016

Maximum Value: 98 % on Apr 27 07:00

Maximum Daily Average: 88.0 % on Apr 6

Minimum Value: 10 % on Apr 19 15:00

Minimum Daily Average: 19.5 % on Apr 19

Maximum Diurnal Average: 69.3 % at hour 6

Minimum Diurnal Average: 42.7 % at hour 14

Monthly Average: 55.5 %

Percentiles: $P_1 = 14$ $P_{10} = 25$ $Q_1 = 37$ Median = 56 $Q_3 = 73$ $P_{90} = 86$ $P_{99} = 97$

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

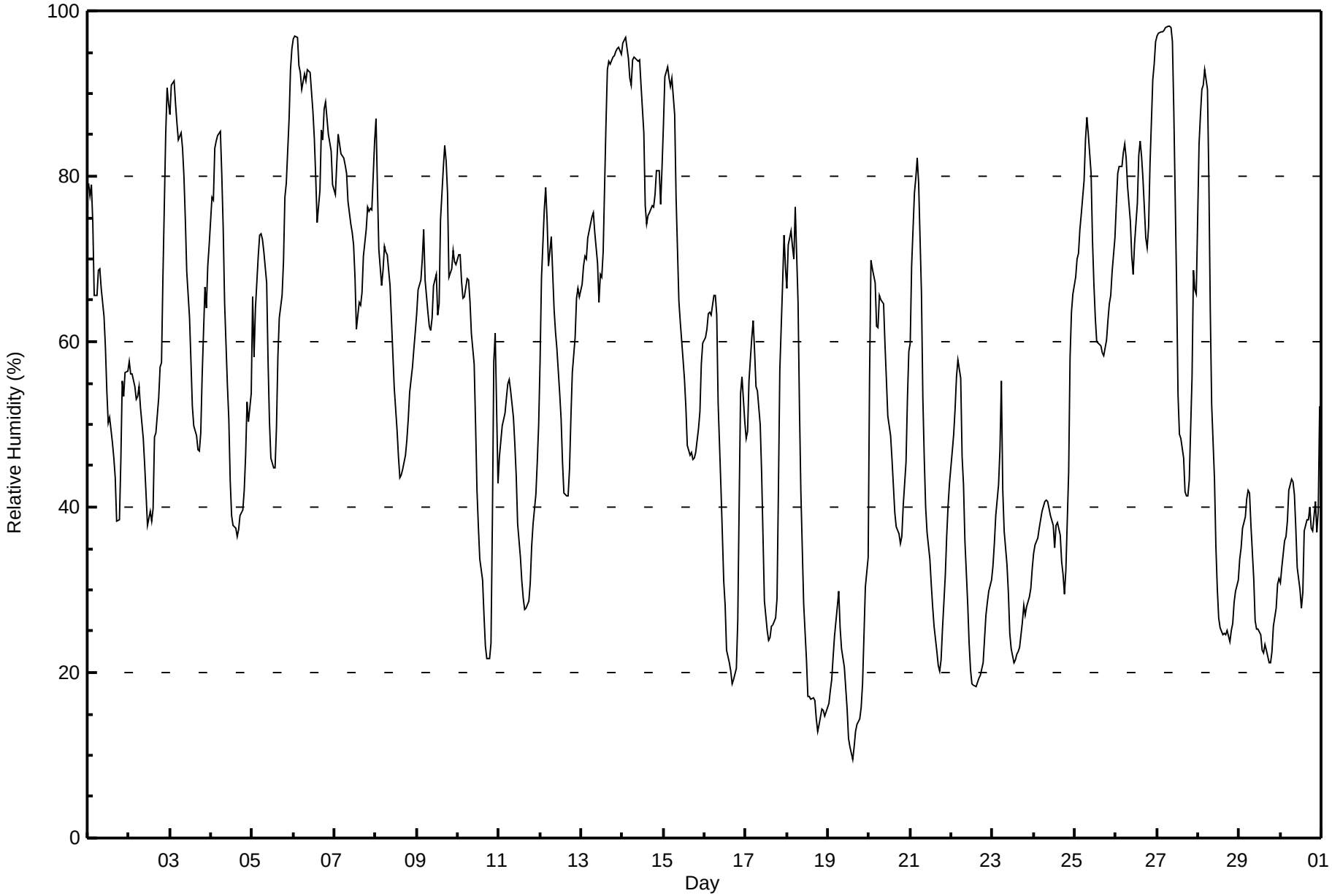
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	79	78	79	74	66	66	69	69	66	63	59	54	50	51	48	46	43	38	38	46	55	53	56	57	58.5	79
2-Apr	58	56	56	55	53	53	55	52	48	45	42	38	40	38	40	48	49	53	57	58	68	85	91	89	55.2	91
3-Apr	87	91	92	89	86	84	85	83	80	75	68	63	58	52	50	49	47	47	49	56	67	64	69	72	69.3	92
4-Apr	78	77	83	84	85	85	80	74	65	55	51	43	39	38	37	36	37	39	40	42	46	53	50	54	57.2	85
5-Apr	65	58	64	70	73	73	72	71	67	58	50	46	45	45	50	58	63	66	70	77	79	87	93	96	66.5	96
6-Apr	97	97	97	93	93	91	92	92	93	93	93	88	85	80	74	78	86	84	88	89	85	84	83	79	88.0	97
7-Apr	78	82	85	84	83	82	81	80	77	74	73	72	68	62	65	64	66	70	74	76	76	76	76	84	75.3	85
8-Apr	87	79	71	67	69	71	71	71	67	63	58	54	49	46	43	44	45	46	48	51	54	57	59	61	59.6	87
9-Apr	63	66	67	70	74	67	64	62	61	63	67	68	63	65	75	81	84	82	78	68	69	71	70	69	69.4	84
10-Apr	70	71	67	65	65	68	67	65	61	57	50	42	38	34	31	27	23	22	22	24	39	58	61	43	48.7	71
11-Apr	46	48	50	51	53	55	55	54	51	48	44	38	34	31	29	28	28	29	31	35	38	42	45	50	42.2	55
12-Apr	58	68	76	79	75	69	73	68	64	61	59	54	51	45	42	41	41	45	51	56	60	65	66	65	59.7	79
13-Apr	67	69	70	70	73	74	75	76	73	69	65	68	68	71	86	93	94	94	94	95	95	95	96	95	80.2	96
14-Apr	96	96	97	94	92	91	94	94	94	94	94	91	85	76	74	75	76	76	76	78	81	81	77	81	86.0	97
15-Apr	86	92	93	92	91	92	88	77	71	65	62	58	55	52	48	46	47	46	46	47	49	52	57	60	65.5	93
16-Apr	61	62	63	63	63	66	66	63	53	42	37	31	28	23	21	20	19	19	21	26	41	54	56	50	43.6	66
17-Apr	48	49	55	60	63	59	55	54	50	44	37	29	25	24	24	26	26	27	29	42	57	67	73	69	45.5	73
18-Apr	66	72	73	72	70	76	65	52	42	35	28	22	17	17	17	17	17	14	13	14	16	15	15	15	35.8	76
19-Apr	16	18	19	22	24	28	30	25	23	21	18	16	12	11	10	11	13	14	14	16	19	24	30	34	19.5	34
20-Apr	56	70	69	67	62	62	66	65	65	60	55	51	49	46	43	39	38	37	36	36	40	45	53	59	52.8	70
21-Apr	60	69	78	80	82	79	66	53	46	40	37	34	31	28	26	23	21	20	22	25	32	36	40	43	44.6	82
22-Apr	47	49	52	56	58	56	46	43	36	28	24	20	19	19	18	19	19	20	21	24	27	28	30	31	32.9	58
23-Apr	33	36	39	43	47	55	42	37	33	30	25	23	21	22	22	23	23	26	28	27	28	29	30	32	31.4	55
24-Apr	34	35	36	37	38	40	41	41	41	40	39	38	35	38	38	37	33	32	30	32	44	58	64	66	40.3	66
25-Apr	68	70	71	74	75	79	84	87	85	80	72	67	63	60	60	60	59	58	60	63	65	66	69	73	69.4	87
26-Apr	77	80	81	81	83	84	82	79	75	70	68	72	77	83	84	82	80	72	71	74	81	92	94	96	79.9	96
27-Apr	97	97	97	98	98	98	98	98	98	96	88	67	53	49	48	46	42	41	41	43	56	69	66	66	72.9	98
28-Apr	84	88	90	91	93	91	79	64	52	43	35	30	27	25	25	25	25	25	24	25	26	29	30	31	48.2	93
29-Apr	34	35	37	39	41	42	42	38	31	26	25	25	25	23	22	23	23	21	21	23	26	28	31	31	29.7	42
30-Apr	31	33	36	36	38	42	43	43	42	38	33	30	28	30	37	38	39	40	37	37	41	37	39	52	37.5	52
	64.2	66.3	68.2	68.6	68.8	69.3	67.5	64.4	60.3	55.9	51.9	47.7	44.5	42.7	42.9	43.4	43.4	43.4	44.3	46.8	51.9	56.7	58.9	60.1	Diurnal Average	
	97	97	97	98	98	98	98	98	98	96	94	91	85	83	86	93	94	94	94	95	95	95	96	96	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity (RH) - %

Patricia McInnes - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Patricia McInnes - April 2016

Maximum Speed: 37 km/h on Apr 19 15:00

Maximum Daily Speed Average: 18.4 km/h on Apr 19

Minimum Speed Value: 1 km/h on Apr 4 05:00

Minimum Daily Speed Average: 4.0 km/h on Apr 27

Maximum Diurnal Speed Average: 2.9 km/h at hour 8

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

Monthly Average Velocity: 1.2 km/h 88.5 deg

Percentiles: $P_1 = 1$ $P_{10} = 4$ $Q_1 = 7$ Median = 10 $Q_3 = 15$ $P_{90} = 19$ $P_{99} = 24$

Hours in Service:	720
Hours of Data:	713
Hours of Missing Data:	7
Percent Operational Time:	99.0

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-Apr	W1	S3	WSW5	WNW6	WNW9	WNW8	N11	NNE14	NNE16	N18	NNW20	N16	NNE17	NNE16	NNE13	NNE13	NNE15	NNE12	N10	N6	NE5	E9	E8	ESE13	NNE8.1	NNW20
2-Apr	ESE12	ESE15	ESE14	E13	E11	ESE12	ESE12	E12	E11	ENE9	NE8	NE10	N12	N11	N12	NNW22	NNW23	NNW21	NNW17	NNW18	NNW17	NNW14	NNW13	NNW13	NNE7.7	NNW23
3-Apr	NNW13	NW10	NNW13	NNW16	NNW17	NNW17	NNW19	NNW20	NNW20	NNW19	NNW17	N14	N14	N13	NNE11	NE13	NE11	NNE10	NNE9	N5	N5	N6	NW4	N5	N11.7	NNW20
4-Apr	NNW4	WSW3	WSW1	ESE2	SE1	SSE5	SE7	SE8	SE6	E5	ESE7	ESE8	ESE7	ESE7	ESE8	ENE7	ENE9	ENE10	ENE9	ENE7	NE5	ENE5	E7	E5	E4.8	ENE10
5-Apr	ENE3	ENE6	N6	NNW6	NNW5	NNW6	N7	N7	NNE6	E6	SE8	SE10	SE9	SE10	SE14	SSE14	S16	S13	S12	S10	SSE9	SSE11	SSE8	SE8	SE4.5	S16
6-Apr	SE5	S5	WSW8	W13	WNW13	NW17	NNW19	NNW20	NNW14	NNW16	NNW15	NW19	NW18	NW16	WNW21	NNW16	N15	N14	NNE14	N15	N14	N13	N13	NNW12	NNW11.7	WNW21
7-Apr	N12	N11	N7	N8	NNE5	ESE1	ENE2	E4	SE4	E4	E5	E7	E8	NE6	NNE12	NNE15	NNE14	N14	N14	N13	NNE11	NNE10	NNE7	N5	NNE7.1	NNE15
8-Apr	N3	E7	ESE11	ESE14	ESE15	ESE17	ESE18	ESE17	ESE15	ESE17	ESE19	ESE23	ESE24	ESE21	ESE24	ESE24	ESE21	ESE20	SE18	ESE15	ESE18	SE15	ESE10	SE14	ESE16.3	ESE24
9-Apr	SE14	ESE10	ESE7	NNW2	NW15	NW23	NW20	NW18	NW18	NNW19	NNW25	NNW25	NNW27	NNW23	NNW24	N21	N21	N17	N19	NNW20	NNW12	NNW7	NW8	NNW10	NNW13.9	NNW27
10-Apr	NNW15	NNW17	NNW18	NNW17	N16	NNW13	N14	N14	NNE10	NNE13	NE14	NE13	NE11	NE10	NE11	NE8	NNE6	NNW4	NNE5	NE5	E4	SE3	ESE5	ESE9	NNE8.6	NNW18
11-Apr	SE8	SE9	SE9	SE9	SE9	SE11	SE8	ESE7	SE9	SE8	SE7	SE7	SE7	SSE9	SSE8	S10	SSW11	SSW12	SSW9	S8	SSW8	SSW8	SW9	S7	SSE7.4	SSW12
12-Apr	SSE5	SSE1	WNW4	SSW4	W4	NNW12	NNW15	NNW15	NNW13	NNW10	NNE9	N11	NNE15	NNE15	NNE19	N17	N15	N15	N14	NNW13	NNW12	N10	N7	N6	N9.7	NNE19
13-Apr	N7	NNE5	ESE9	SE9	E13	ESE9	ESE5	ESE15	E10	E12	ESE10	SE3	ESE8	ESE6	ESE8	E6	ENE6	ESE15	SE11	SE5	SE5	S2	NNE4	NNE4	ESE6.6	ESE15
14-Apr	NW4	WNW3	NNW7	N16	AF	AF	AF	AF	AF	AF	AF	N12	NW13	NW17	NW13	NNW9	NNW6	NNE8	NNE9	N6	NW4	NW6	NNW7	NW4	----	NW17
15-Apr	WSW3	WSW5	WSW3	NNW3	NW2	WSW3	S2	ESE3	SE5	S7	S10	SE11	SSE12	SSE9	SE11	ESE14	E16	ESE16	ESE14	ESE16	SE15	ESE15	ESE12	SE12	SE7.2	ESE16
16-Apr	SE10	ESE7	E5	SE10	SE9	SE9	SE8	SSE5	S8	SSW14	SSW16	SSW16	WSW18	WSW17	WSW17	WSW17	W16	WSW17	W9	WSW7	SW7	WSW7	SW8	SW7	SSW7.7	WSW18
17-Apr	SSW7	S6	S6	S5	SSE6	S5	SSE5	ESE2	SSE5	SSE5	SSE8	SE5	W6	W16	W14	W16	W14	W10	WSW3	SSW2	WNW2	SW2	SW4	SSW6	SW4.2	W16
18-Apr	S6	S7	S7	S9	S7	SSE6	SSE7	SSE6	SE7	ESE9	ESE8	SE9	S22	S23	S26	S24	S26	S26	S26	SSE20	SSE17	S17	S22	SSW20	S14.0	S26
19-Apr	SSW19	SSW20	SSW19	SW16	SW14	SW10	SSW8	WSW15	NW15	W24	W27	W26	W32	W31	W37	W32	WNW31	WNW32	WNW23	WNW16	WNW13	WNW13	WNW14	WNW16	W18.4	W37
20-Apr	N20	N19	N14	N13	N17	NNE19	N19	N19	N21	N21	N19	N18	NNE18	NNE14	NNE13	N14	N15	N14	N13	N10	NNW9	N7	NNE4	ENE4	N14.4	N21
21-Apr	E4	E2	E1	N2	NW3	WNW3	E2	E6	ENE4	NE4	NNE8	N9	N12	NNE13	NNE16	N16	N21	N22	N21	N17	N12	N10	N8	N8	N8.4	N22
22-Apr	N10	N8	N7	N7	N6	NNE6	NE7	N7	NNE8	NE5	NE6	ENE9	ENE8	NNE9	E7	ENE8	ENE7	ENE11	E13	ESE11	ESE9	ESE9	ESE10	ESE11	ENE6.2	E13
23-Apr	ESE14	ESE12	E8	E5	ESE5	ESE1	E7	E11	ESE8	E5	ESE13	ESE15	ESE14	ESE14	ESE15	E14	E15	E14	ESE16	ESE18	ESE19	ESE18	SE15	SE14	ESE11.8	ESE19
24-Apr	SE12	SE11	SE10	ESE11	ESE13	SE11	ESE10	ESE11	ESE14	ESE13	SE11	SE13	SE17	SSE17	SSE12	SE10	ESE13	ESE15	SE17	SE17	SSE15	S17	SSW16	S15	SE12.1	S17
25-Apr	S15	S10	SSE7	SE6	SE8	ESE9	SE9	SE10	SE9	SSE10	S11	S13	S15	S14	S13	S10	SSW10	SW10	WSW9	SW7	SSW5	S8	S9	SSW8	S8.5	S15
26-Apr	SSW7	SSW6	S6	S5	SSE6	SSE5	SE6	SSE8	S10	S9	SSE10	S8	S9	S8	S8	SE5	ESE7	E10	E8	ENE7	W6	SSE8	SSE3	WNW4	SSE5.1	S10
27-Apr	NW5	WNW6	W1	SW4	SW4	SW5	SSW5	ESE3	ENE3	ENE5	NE4	NE4	NE8	NE12	NNE13	NNE12	NE12	NNE12	NNE11	NNE9	N5	E4	ESE6	E5	NNE4.0	NNE13
28-Apr	WNW3	WNW4	SSW1	SSW4	WSW2	SSW2	S5	SSE6	SSE6	SSE7	SSW9	S10	S16	S18	S17	SSE13	SE14	SE12	S13	S10	SSE10	SSE8	SSE11	SSE10	S7.8	S18
29-Apr	SSE8	SSE10	SE10	SE10	ESE10	SE11	SE11	SE13	SE17	SSE23	S23	S25	S24	S25	S24	SSW24	SSW18	S19	S15	S14	S11	S11	SSW10	SSW12	S14.5	S25
30-Apr	SSW10	S9	S9	SSE9	SSE8	S6	S9	SSW10	SSW14	SSW15	SW24	SW23	SSW22	SW23	WSW21	WSW18	WSW14	WSW6	SSE8	S7	SW6	WSW11	W8	WSW3	SSW10.7	SW24
	SE1.3	SE1.6	ESE1.5	E1.0	ENE1.1	ENE0.8	ENE2.3	ENE2.9	ENE2.7	E2.2	ESE1.3	ESE1.5	SE0.9	S0.9	S0.3	NNE1.2	NNE2.3	NE2.5	ENE2.2	ENE2.1	E1.2	SE1.9	SSE1.7	SSE1.9	Diurnal Average	
	N20	SSW20	SSW19	NNW17	NNW17	NW23	NW20	NNW20	N21	W24	W27	W26	W32	W31	W37	W32	WNW31	WNW32	S26	NNW20	ESE19	ESE18	S22	SSW20	Diurnal Maximum	

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: 9 km/h on Apr 19 15:00

Minimum Value: 0 km/h on Apr 15 06:00

Percentiles: $P_1 = 1$ $P_{10} = 1$ $Q_1 = 2$ Median = 3 $Q_3 = 4$ $P_{90} = 5$ $P_{99} = 7$

Hours in Service:	720
Hours of Data:	713
Hours of Missing Data:	7
Hours of Calibration:	0
Percent Operational Time:	99.0

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-Apr	1	2	2	2	1	1	3	2	4	4	4	5	4	3	3	3	3	2	2	1	2	2	2	3	5
2-Apr	3	3	4	3	2	3	3	3	3	2	3	3	3	3	5	4	4	4	3	3	3	2	2	3	5
3-Apr	2	2	3	3	3	3	4	3	4	3	4	4	4	4	4	3	3	2	3	2	1	1	1	1	4
4-Apr	1	1	1	1	1	3	2	2	1	2	2	2	3	3	2	2	2	2	2	2	2	2	2	1	3
5-Apr	2	1	1	1	1	1	1	1	1	3	2	4	2	3	4	3	3	3	3	2	2	2	2	2	4
6-Apr	1	1	4	2	3	3	4	5	3	3	5	4	4	3	5	6	3	3	2	3	3	2	3	2	6
7-Apr	2	2	1	2	2	1	1	1	1	1	2	2	2	3	3	3	3	3	3	2	2	3	2	1	3
8-Apr	1	2	3	3	3	4	4	4	3	4	4	6	6	5	6	6	4	5	4	3	4	5	2	3	6
9-Apr	3	3	2	3	3	5	4	3	5	4	5	6	5	5	6	5	4	4	4	5	4	2	2	2	6
10-Apr	3	3	4	4	4	3	4	3	2	3	3	4	4	4	3	4	3	2	2	1	2	2	2	2	4
11-Apr	1	2	2	2	2	2	2	1	2	2	2	2	2	3	3	4	3	3	3	2	1	1	1	1	4
12-Apr	1	2	2	1	4	2	3	3	3	3	2	3	3	3	3	3	3	3	3	2	2	2	2	2	4
13-Apr	2	1	3	3	3	3	2	5	2	4	3	3	2	2	2	1	2	3	5	2	1	1	1	1	5
14-Apr	2	2	2	3	AF	AF	AF	AF	AF	AF	AF	3	3	3	2	2	2	3	2	2	1	2	1	1	3
15-Apr	1	1	1	1	1	0	1	1	2	3	3	3	4	4	4	4	3	3	3	4	3	4	3	3	4
16-Apr	2	2	2	4	3	2	1	1	2	3	3	5	5	4	5	5	4	5	3	1	1	1	2	1	5
17-Apr	1	1	1	1	1	2	3	3	2	1	2	2	5	4	7	5	5	4	2	1	1	1	1	1	7
18-Apr	1	1	1	1	1	1	1	1	2	1	2	5	6	5	6	6	6	6	7	5	3	5	6	5	7
19-Apr	4	4	4	3	2	3	2	6	6	7	8	8	8	8	9	7	8	7	6	3	2	2	2	3	9
20-Apr	5	4	4	4	4	5	4	4	4	4	4	5	4	5	4	4	3	3	3	2	1	1	1	1	5
21-Apr	1	2	1	1	1	1	2	1	1	2	3	3	4	5	4	4	4	4	4	4	2	2	2	1	5
22-Apr	2	1	1	1	1	2	1	2	3	3	3	3	4	4	4	4	3	3	3	3	2	2	2	2	4
23-Apr	3	3	2	1	2	1	2	2	2	2	4	4	4	5	5	4	3	3	4	4	4	5	4	4	5
24-Apr	3	3	2	2	4	2	3	3	3	3	3	4	5	4	3	3	3	4	4	5	4	3	4	4	5
25-Apr	4	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	2	2	2	1	1	2	2	1	4
26-Apr	1	1	1	1	1	1	1	2	3	2	3	2	2	2	1	1	2	3	2	1	3	3	2	1	3
27-Apr	2	1	2	1	1	2	1	1	2	2	2	2	3	4	3	3	3	3	2	2	1	1	3	3	4
28-Apr	1	1	1	2	1	1	2	2	2	2	3	4	4	5	5	4	4	4	3	3	2	1	2	2	5
29-Apr	2	2	2	2	2	2	2	3	4	6	7	6	6	6	7	6	5	5	5	3	2	2	2	2	7
30-Apr	2	2	1	1	1	1	3	2	3	4	5	6	6	5	5	4	4	4	2	1	2	1	1	2	6
	5	4	4	4	4	5	4	6	6	7	8	8	8	8	9	7	8	7	7	5	4	5	6	5	
	Diurnal Maximum																								

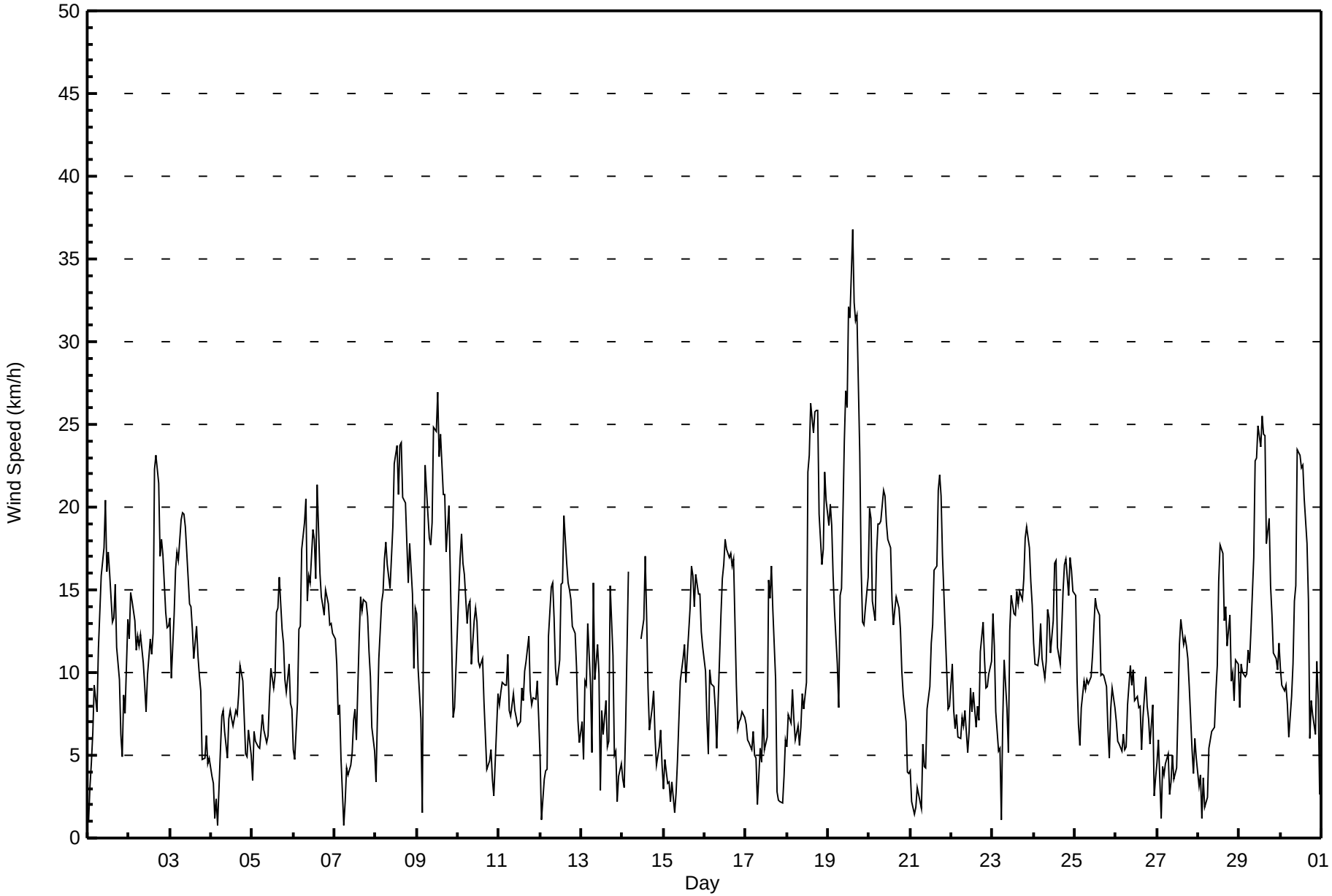
AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed (WS) - km/h

Patricia McInnes - April 2016



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	122	17.11	17.11
6 - 11	284	39.83	56.94
12 - 19	243	34.08	91.02
20 - 28	58	8.13	99.16
29 - 38	6	0.84	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 713

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Wind Speed (WS) - km/h

Patricia McInnes - April 2016

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	7	7	7	15	9	9	10	8	7	5	10	2	8	7	5	122
6 - 11	27	19	11	14	17	35	45	29	35	15	8	6	5	4	3	11	284
12 - 19	42	26	5	0	8	41	18	7	18	11	2	8	6	6	11	34	243
20 - 28	8	0	0	0	0	7	0	2	13	4	3	1	3	2	2	13	58
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	4	2	0	0	6
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	83	52	23	21	40	92	72	48	74	37	18	25	20	22	23	63	713

Total Number of Valid Hours: 713

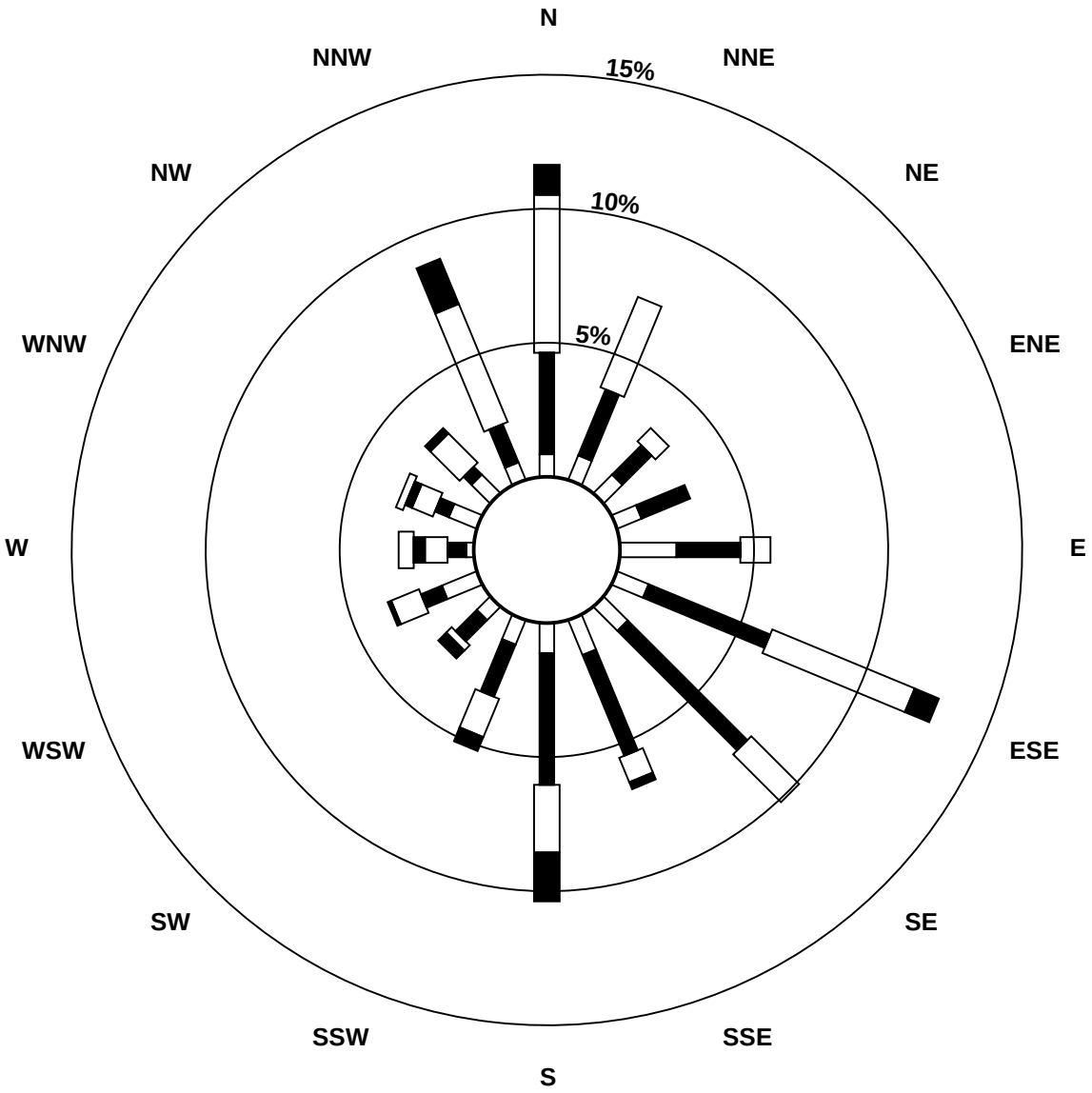
Total Number of Hours: 720

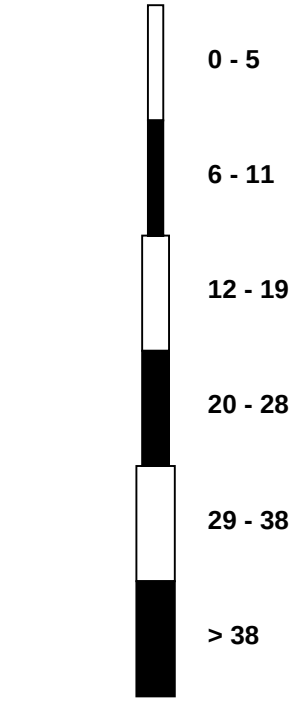
Wood Buffalo Environmental Association

Wind Rose Apr 2016

Wind Speed (WS) - km/h

Patricia McInnes (AMS 6)





Total Number of Valid Hours: 713

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Patricia McInnes - April 2016

Direction of Maximum Speed: 259 deg on Apr 19 15:00
Direction of Maximum Daily Speed Average: 265.3 deg on Apr 19

Direction of Minimum Speed: 143 deg on Apr 4 05:00

Direction of Minimum Daily Speed Average: 4.0 deg on Apr 27

Monthly Average Direction: 273.4 deg

Hours in Service:	720
Hours of Data:	713
Hours of Missing Data:	7
Percent Operational Time:	99.0

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-Apr	278	179	240	300	290	292	359	12	12	359	345	10	29	31	18	32	29	20	10	11	47	94	94	110	15.3
2-Apr	106	113	108	96	94	123	106	86	91	75	40	48	357	349	349	345	342	338	337	336	338	342	342	335	21.6
3-Apr	334	323	334	335	340	341	341	339	342	341	348	352	1	1	22	36	41	30	18	8	352	355	316	352	350.9
4-Apr	337	252	244	114	143	149	145	139	127	98	119	115	114	116	113	77	71	73	76	72	51	59	92	86	99.2
5-Apr	64	61	4	345	333	348	355	351	21	93	125	145	135	142	129	158	188	181	174	169	159	165	147	134	140.7
6-Apr	137	176	237	264	293	314	333	338	330	337	327	318	312	317	301	332	6	0	20	8	5	7	359	346	332.1
7-Apr	3	7	356	359	17	105	68	95	127	91	99	81	89	53	14	23	15	8	2	4	29	32	27	353	24.6
8-Apr	11	96	108	116	117	121	119	116	114	116	117	117	118	115	115	112	116	121	129	120	122	126	119	128	117.3
9-Apr	131	122	121	335	323	307	317	314	318	330	333	330	328	341	333	349	352	354	350	348	340	342	322	331	335.5
10-Apr	342	338	344	344	352	348	3	11	14	33	39	36	42	49	46	50	22	335	29	54	80	146	115	123	16.1
11-Apr	135	129	130	131	126	137	129	119	132	135	137	130	133	160	166	176	201	206	203	186	197	205	214	187	159.6
12-Apr	162	163	291	212	281	340	341	344	348	348	20	355	14	28	18	8	4	3	349	346	346	2	359	3	357.4
13-Apr	1	27	111	126	96	113	110	116	82	95	123	145	103	115	122	101	66	108	129	128	146	179	31	19	104.6
14-Apr	305	283	328	1	AF	AF	AF	AF	AF	AF	AF	354	323	314	323	328	335	12	14	352	316	325	346	314	--
15-Apr	252	243	246	333	315	249	182	119	143	183	177	136	148	154	128	111	101	105	104	118	131	123	121	128	130.5
16-Apr	131	123	99	133	141	144	141	160	172	199	201	199	242	251	242	251	261	252	264	248	229	237	224	220	213.6
17-Apr	201	183	177	187	159	170	147	120	162	150	149	135	277	273	270	261	276	273	254	194	294	225	227	211	226.0
18-Apr	177	183	188	182	173	155	156	147	143	115	106	135	179	187	184	184	185	184	180	163	154	169	187	197	174.7
19-Apr	204	212	210	217	228	224	207	257	304	274	274	264	266	262	259	276	286	294	284	288	290	301	292	294	265.3
20-Apr	349	357	7	358	6	12	10	10	11	5	357	5	18	30	18	4	1	359	358	351	346	358	22	71	5.7
21-Apr	87	82	88	352	306	292	96	95	77	48	23	6	359	16	12	6	354	358	354	355	357	1	11	5	7.1
22-Apr	358	356	1	1	4	21	38	358	19	52	52	64	57	25	79	75	75	73	98	118	104	108	108	113	59.1
23-Apr	115	110	90	100	107	104	100	101	114	91	104	113	109	103	103	90	97	100	108	116	117	122	126	135	109.1
24-Apr	126	130	124	120	119	125	120	114	118	121	124	145	145	168	157	134	123	116	128	142	167	183	192	182	140.4
25-Apr	180	170	159	137	129	122	128	134	141	160	184	180	191	178	183	187	195	219	237	223	202	174	191	207	176.3
26-Apr	198	196	179	175	167	150	142	152	176	175	168	171	190	185	182	127	106	89	81	60	278	164	166	284	161.3
27-Apr	310	302	268	227	232	215	193	118	65	57	39	34	37	44	23	22	36	24	29	21	8	85	112	84	32.8
28-Apr	299	283	208	201	244	197	172	156	154	151	192	186	181	186	173	153	133	125	181	170	165	153	153	166	168.8
29-Apr	164	150	141	129	119	124	132	140	145	159	171	181	173	179	172	202	200	178	178	178	177	188	204	211	170.4
30-Apr	193	186	171	161	165	171	183	194	202	199	216	215	207	219	248	238	256	245	157	171	225	244	273	240	211.3
	129.6	135.6	123.3	100.7	71.7	71.3	63.1	62.3	69.3	79.5	106.1	111.1	141.0	187.0	188.3	24.0	18.9	39.3	62.2	68.6	96.6	134.3	152.7	158.4	
	Diurnal Average																								

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

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg

Patricia McInnes - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 101 deg on Apr 7 06:00

Minimum Value: 4 deg on Apr 18 04:00

Percentiles: P_1 = 8 P_{10} = 11 Q_1 = 13 Median = 16 Q_3 = 24 P_{90} = 36 P_{99} = 79

Hours in Service:	720
Hours of Data:	713
Hours of Missing Data:	7
Hours of Calibration:	0
Percent Operational Time:	99.0

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-Apr	89	53	28	22	9	8	28	13	14	19	17	21	15	15	19	15	17	17	12	10	25	12	14	13	89
2-Apr	13	12	13	13	12	16	16	14	22	28	44	28	24	21	17	13	12	12	10	9	8	11	11	10	44
3-Apr	10	13	12	10	10	11	11	11	13	12	15	19	19	20	32	20	22	20	18	33	8	12	15	11	33
4-Apr	19	26	55	38	61	25	13	18	19	34	30	23	38	36	32	24	22	14	11	11	40	43	15	14	61
5-Apr	26	15	15	11	11	10	12	12	22	34	24	25	29	32	26	31	15	14	11	13	14	15	14	12	34
6-Apr	12	23	24	12	10	14	11	11	12	12	13	16	12	12	15	34	16	17	12	14	15	14	15	13	34
7-Apr	15	14	16	14	25	101	61	19	38	31	45	25	30	45	21	20	15	14	14	11	16	11	16	23	101
8-Apr	38	14	11	12	13	13	13	14	13	14	15	15	15	14	14	13	13	13	13	13	14	15	14	12	38
9-Apr	12	14	16	96	12	10	11	11	12	13	14	16	12	17	11	16	16	15	15	14	18	12	14	13	96
10-Apr	14	11	12	13	14	13	16	16	21	19	19	19	34	27	30	35	57	57	37	14	42	34	14	14	57
11-Apr	12	12	13	12	12	12	16	16	16	17	22	30	32	32	37	34	26	24	13	9	13	9	8	25	37
12-Apr	11	85	40	27	50	10	12	13	15	25	25	24	19	18	14	14	14	15	13	11	12	14	22	29	85
13-Apr	16	28	24	35	11	21	37	19	15	18	21	86	21	23	14	16	26	13	25	24	17	48	23	32	86
14-Apr	47	29	23	16	AF	AF	AF	AF	AF	AF	AF	15	21	13	15	19	21	24	16	28	15	25	11	20	47
15-Apr	21	14	17	44	44	13	53	36	35	32	32	28	30	35	31	23	12	14	14	14	12	13	14	13	53
16-Apr	15	28	29	12	12	11	12	19	20	16	15	24	20	27	22	19	17	18	15	14	9	8	10	9	29
17-Apr	10	16	10	11	11	29	56	72	20	35	28	57	77	24	31	22	20	20	42	33	45	43	18	7	77
18-Apr	16	9	13	4	13	17	17	14	16	15	22	42	19	19	15	17	15	14	12	14	12	14	14	14	42
19-Apr	12	12	13	12	11	20	14	24	31	20	16	20	15	17	18	16	17	13	15	12	11	8	9	10	31
20-Apr	26	16	14	17	15	14	15	16	15	16	17	24	23	20	25	25	22	17	15	12	8	13	29	20	29
21-Apr	16	30	64	50	22	23	81	26	30	55	45	32	32	31	20	19	17	17	16	15	14	13	12	14	81
22-Apr	13	12	11	12	13	17	20	24	26	63	53	41	48	49	57	49	47	19	22	14	10	10	12	12	63
23-Apr	13	13	16	15	15	80	17	15	29	44	27	25	28	31	24	24	19	16	14	13	12	14	14	16	80
24-Apr	13	14	13	13	15	13	13	13	13	17	21	22	21	24	29	24	17	16	17	24	14	13	13	14	29
25-Apr	13	13	14	16	14	13	15	16	16	19	16	15	19	20	19	21	18	19	13	13	19	11	13	10	21
26-Apr	11	13	10	11	10	14	17	16	20	23	19	21	17	23	16	41	22	18	17	23	43	34	87	15	87
27-Apr	11	6	77	24	36	15	18	41	46	28	59	61	38	23	26	23	20	20	19	11	24	37	22	28	77
28-Apr	37	23	80	29	31	16	16	19	25	34	39	28	22	19	23	23	19	17	17	14	11	10	9	14	80
29-Apr	12	11	10	15	13	12	12	14	18	17	17	18	19	20	18	18	21	19	14	13	10	13	14	10	21
30-Apr	13	15	11	9	9	15	13	15	16	19	17	18	21	16	17	18	16	36	20	16	20	12	16	70	70
	89	85	80	96	61	101	81	72	46	63	59	86	77	49	57	49	57	57	42	33	45	48	87	70	
	Diurnal Maximum																								

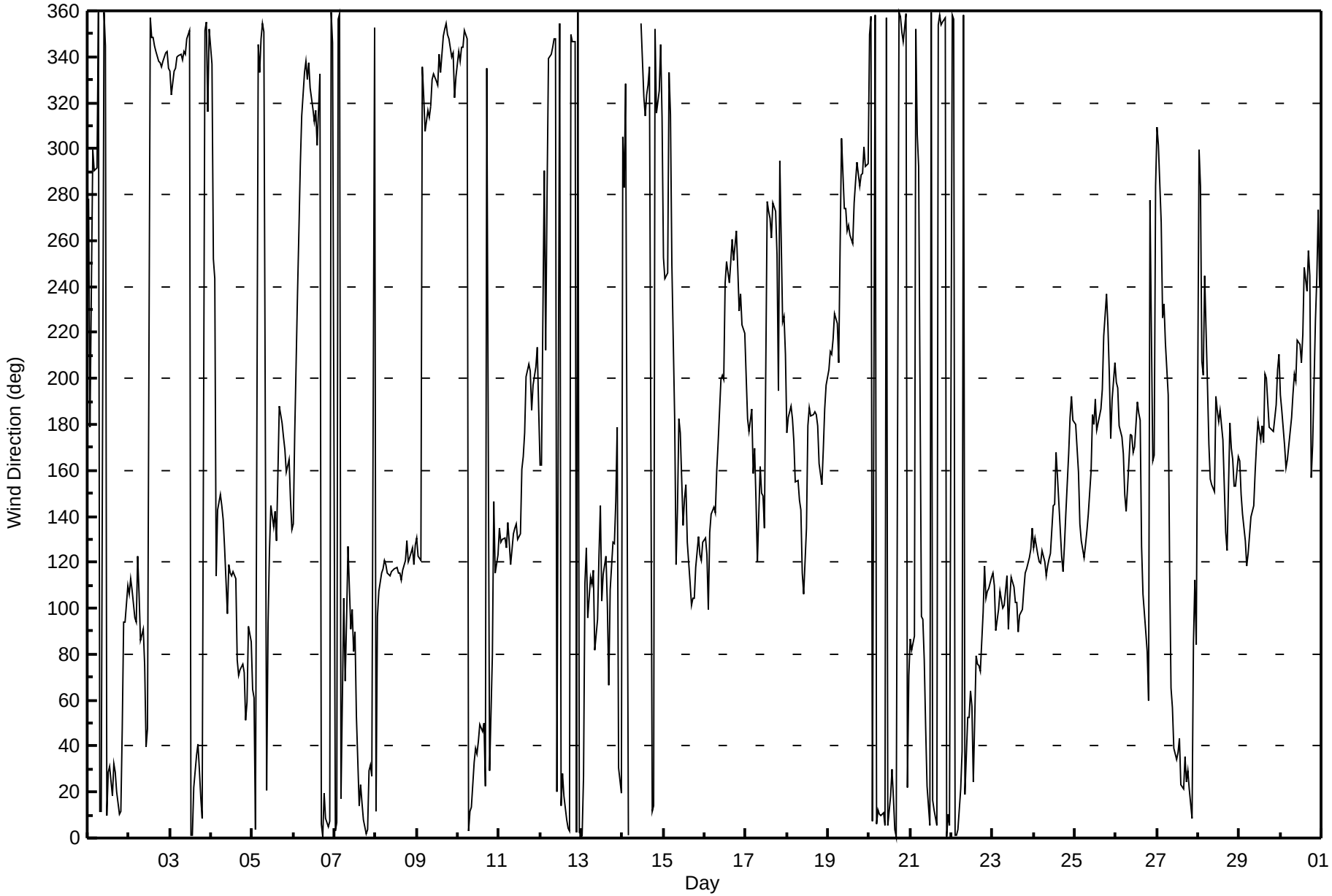
AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction (WD) - deg

Patricia McInnes - April 2016



Wood Buffalo Environmental Association
SO2 Calibration Report

W B E A

Station Information

Calibration Date	April 26, 2016	Last Calibration	March 1, 2016
Station Name	Patricia McInnes	Station Number	AMS 6
Reason:	Routine		
Start Time (MST)	8:05	End Time (MST)	11:05
Gas Cert Reference	EY0000355	Station temp.	21 Deg C
Cal Gas Concentration	49.8 ppm	Cal Gas Exp Date	18/09/2018
Calibrator Make/Model	Teledyne API T700	Serial Number	2449
ZAG Make/Model	Teledyne API 701	Serial Number	60
DACS make/model	Campbell Scientific CR3000	DACS serial No.	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	766	764
Calculated slope	1.001241	1.001888	Chamber temp	45.1	44.9
Calculated intercept	1.101378	0.897634	Pressure	693.4	695.8
Analyzer Background	5.9	5.9	Flow	0.441	0.441
Analyzer Coefficient	1.122	1.122	Intensity	90	90

Analyzer make	Thermo 43i	Analyzer serial #	1008841397

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5500	0.0	0.0	0.0	----
as found span	5500	86.8	785.9	779.7	1.008
calibrator zero	5500	0.0	0.0	0.3	----
high point	5500	86.8	785.9	784.2	1.002
second point	5500	43.4	393.0	390.5	1.006
third point	5500	21.7	196.5	194.1	1.012
as left zero	5500	0.0	0.0	0.3	----
as left span	5500	86.8	785.9	783.2	1.003
				Average Correction Factor	1.007

Corrected As found	779.8	Previous response	783.9	% change	0.5%

Notes:

Sample inlet filter replaced after as founds. No adjustments made.

Calibration Performed By: Devin Russell

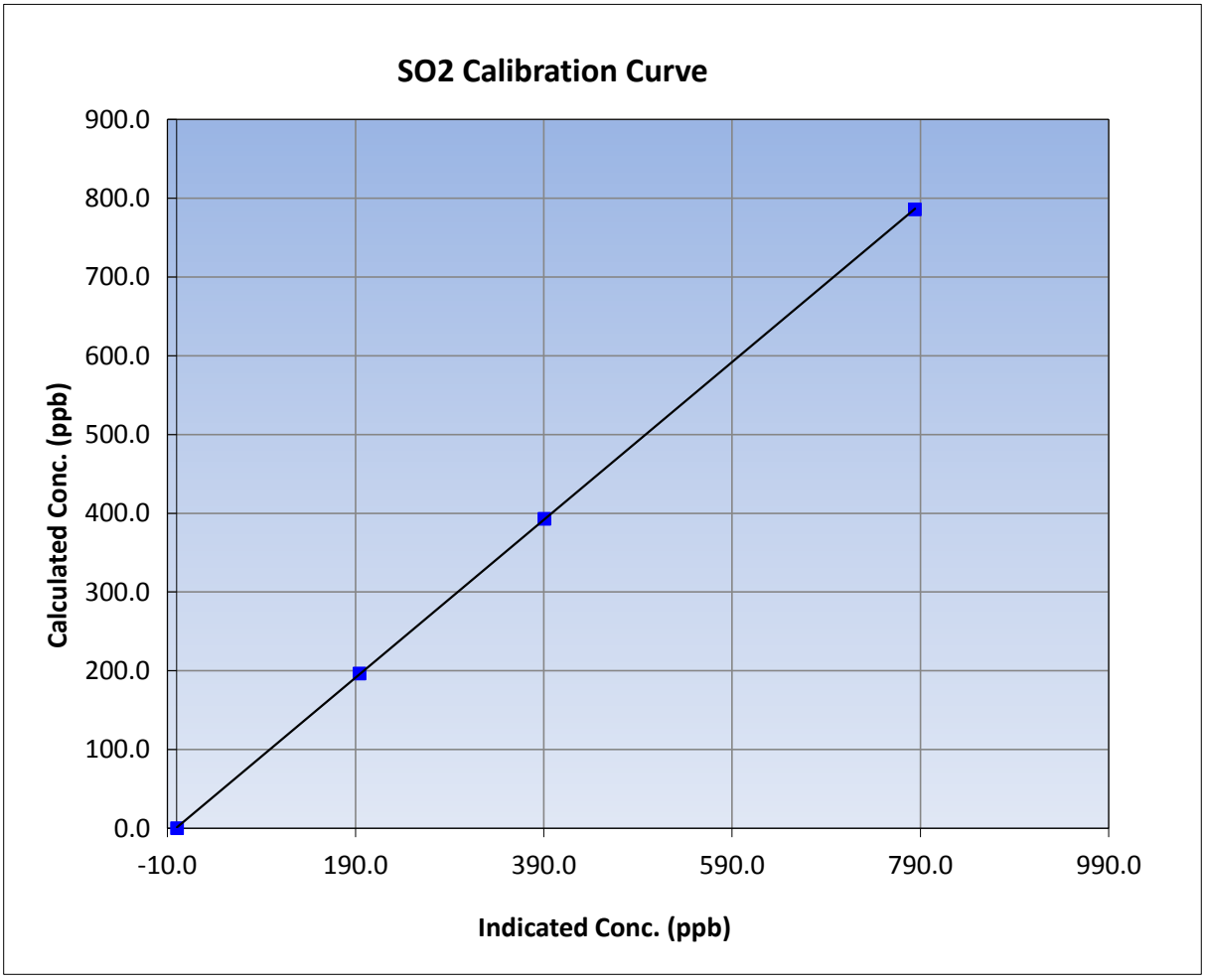
Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

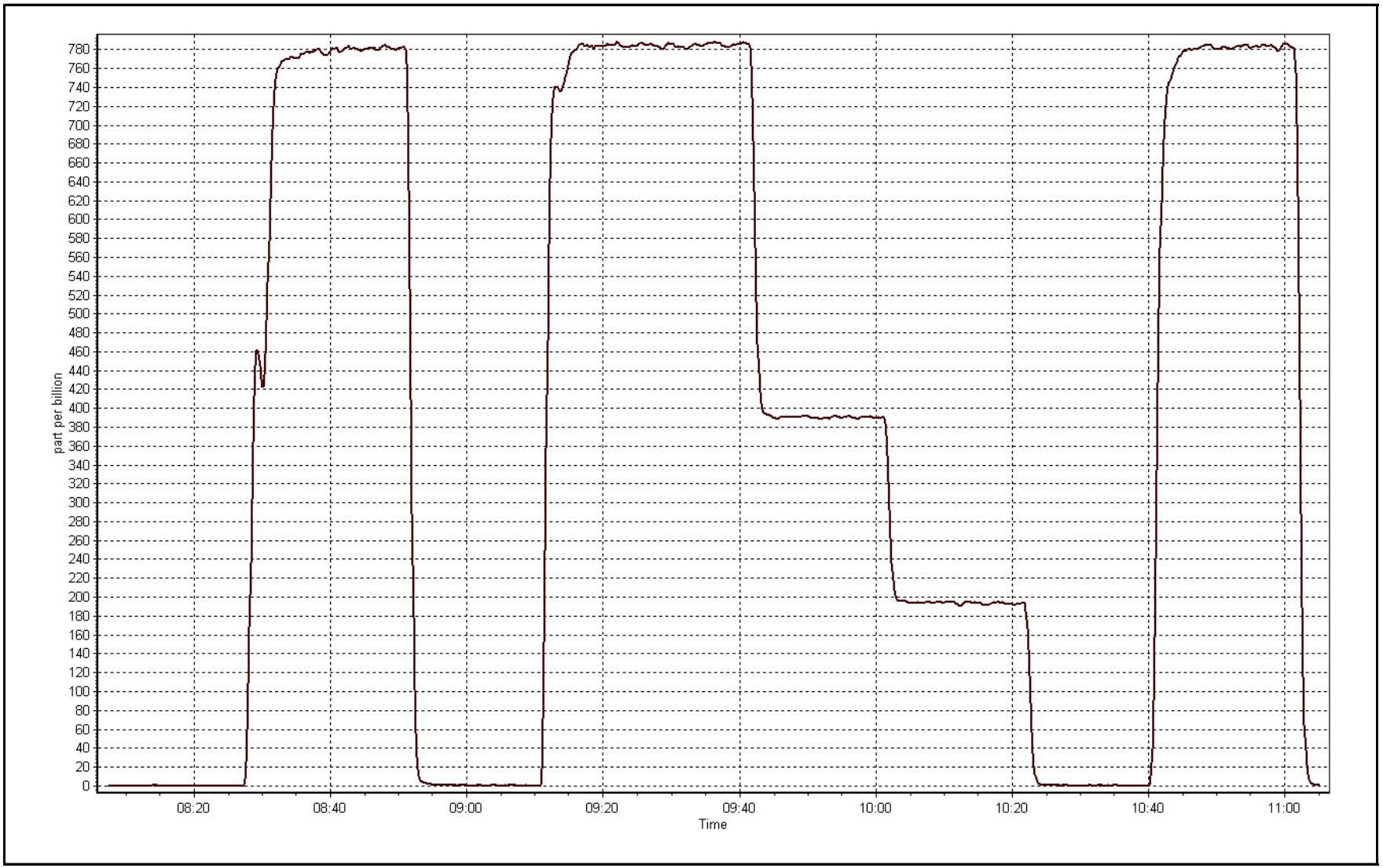
Calibration Date	April 26, 2016	Previous Calibration	March 1, 2016
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	8:05	End Time (MST)	11:05
Analyzer make	Thermo 43i	Analyzer serial #	1008841397

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.3	----	Correlation Coefficient	0.999989
785.9	784.2	1.0022		
393.0	390.5	1.0063	Slope	1.001888
196.5	194.1	1.0121		
			Intercept	0.897634



SO2 Calibration Plot Date: April 26, 2016



Wood Buffalo Environmental Association
TRS Calibration Report

Station Information

Calibration Date	April 21, 2016	Last Calibration	March 9, 2016
Station Name	Patricia McInnis	Station Number	AMS 6
Reason:	Routine		
Start Time (MST)	7:35	End Time (MST)	10:45
Gas Cert Reference	SA5551	Station temp.	22 Deg C
Cal Gas Concentration	5.28 ppm	Cal Gas Exp Date	13/02/2018
Calibrator Make/Model	Teledyne API T700	Serial Number	2449
Dil air Make/Model	Teledyne API 701	Serial Number	60
DACS make/model	Campbell Scientific CR3000	DACS serial No.	9036
SO2 gas concentration	49.8 ppm	SO2 gas cert/exp	SA130110A 12/Dec/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	1011	1004
Calculated slope	0.992653	0.989956	Chamber temp	45	45
Calculated intercept	-0.234619	-0.282193	Pressure	684.2	695.2
Analyzer Background	2.05	2.09	Flow	0.431	0.439
Analyzer Coefficient	1.134	1.158	Intensity	91	91
			Converter temp.	800	800

Analyzer make/model	Thermo 43i-TLE	Analyzer serial #	1218153358
Converter make/model	CDN-101	Converter serial #	520

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5500	0.0	0.0	0.2	----
as found span	5500	72.9	70.0	69.0	1.015
SO2 scrubber check	5500	21.7	196.5	0.3	----
calibrator zero	5500	0.0	0.0	0.3	----
high point	5500	72.9	70.0	70.9	0.987
second point	5500	41.8	40.1	41.0	0.979
third point	5500	20.8	20.0	20.4	0.978
as left zero	5500	0.0	0.0	0.2	----
as left span	5500	72.9	70.0	72.3	0.968
				Average Correction Factor	0.982

Corrected As found	68.8	Previous response	70.7	% change	2.8%

Notes:

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

Calibration Performed By: Devin Russell

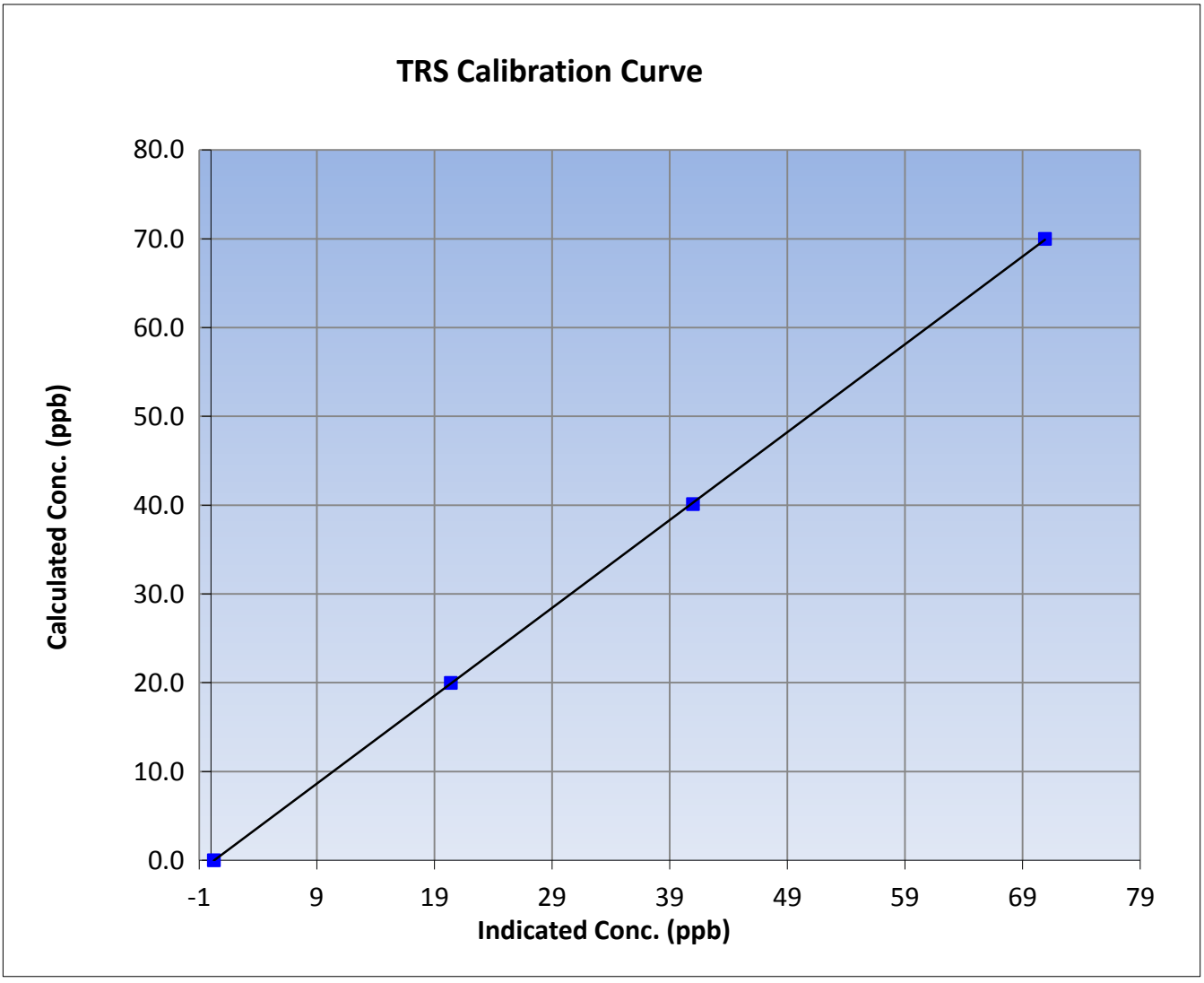
Wood Buffalo Environmental Association
TRS Calibration Report

Station Information

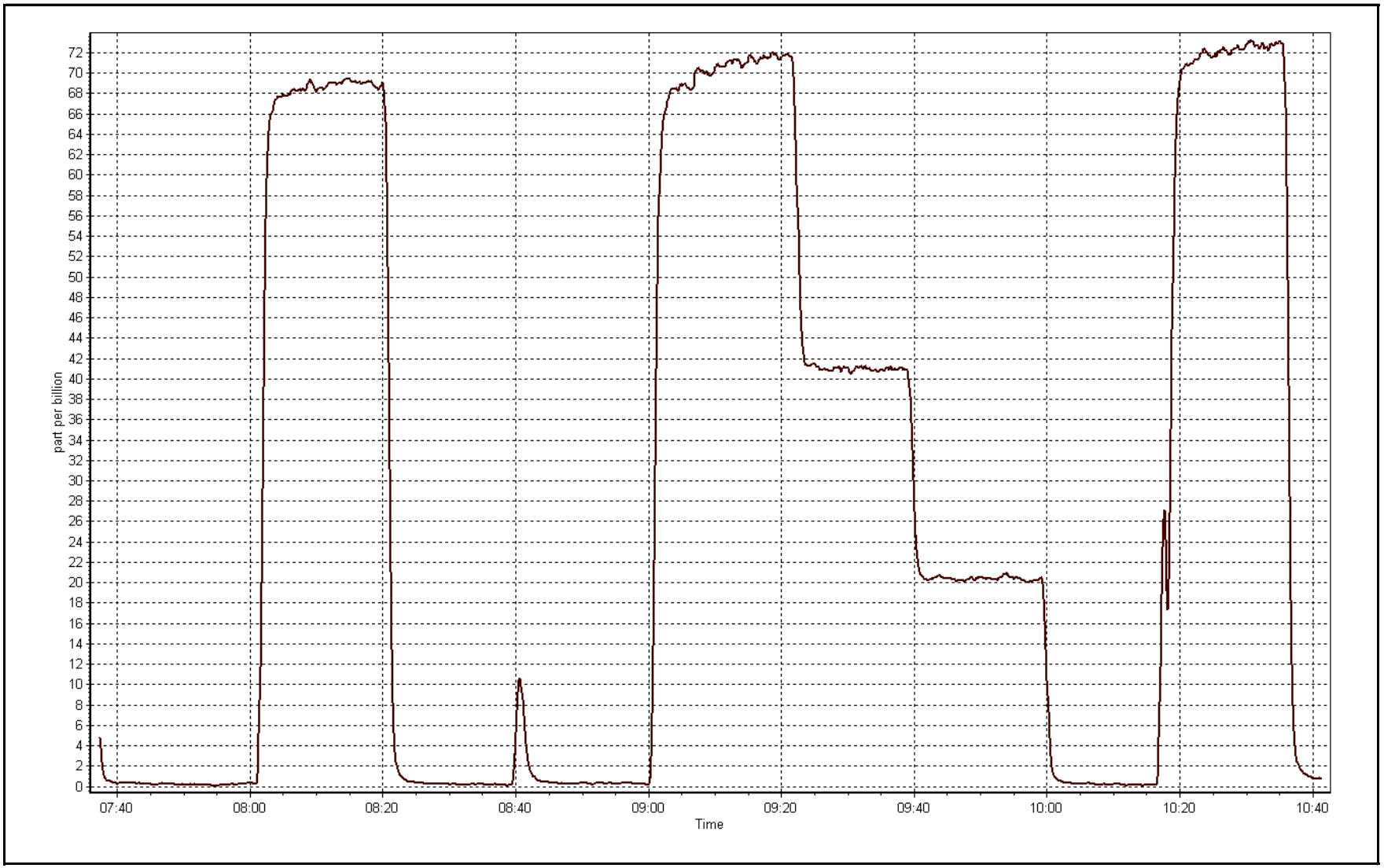
Calibration Date	April 21, 2016	Previous Calibration	March 9, 2016
Station Name	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	7:35	End Time (MST)	10:45
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1218153358

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.3	----	Correlation Coefficient	0.999987
70.0	70.9	0.9871		
40.1	41.0	0.9792	Slope	0.989956
20.0	20.4	0.9783		
			Intercept	-0.282193



TRS Calibration Plot Date: April 21, 2016



Wood Buffalo Environmental Association
THC / NMHC Calibration Report

Station Information

Calibration Date	April-26-16	Last Calibration	March-01-16
Station Name	Patricia McInnes	Station Number	AMS 6

Reason: Routine

Start Time (MST)	8:05	End Time (MST)	11:05
Gas Cert Reference	EY0000355	Cal Gas Expiry Date	September-18-18
CH4 Cal Gas Conc.	518.0 ppm	CH4 Equiv Conc.	1068.0 ppm
C3H8 Cal Gas Conc.	200.0 ppm	Station temp.	21 Deg C
Calibrator Model	Teledyne API T700	Serial Number	2449
ZAG make/model	Teledyne API 701	Serial Number	60
DACS make/model	Campbell Scientific CR3000	Serial Number	9036

Analyzer Information

	Before	*After*		*Before*	*After*
THC Range (ppm)	0 - 50 ppm		Column Temp	75.2	75.3
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	0.999428	0.999112	Carrier Pressure	34.5	34.6
THC Calc intercept	0.048246	0.028080	Fuel Pressure	42.3	42.3
NMHC Calc slope	0.999570	0.998549	Air Pressure	32.4	32.4
NMHC Calc intercept	0.024125	0.008006			

Analyzer make	Thermo 55i	Analyzer serial #	1331259521

THC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5500	0.0	0.00	0.00	----
as found span	5500	86.8	16.85	17.00	0.991
calibrator zero	5500	0.0	0.00	0.00	----
high point	5500	86.8	16.85	16.86	1.000
second point	5500	43.4	8.43	8.38	1.006
third point	5500	21.7	4.21	4.17	1.010
as left zero	5500	0.0	0.00	0.00	----
as left span	5500	86.8	16.85	16.77	1.005
				Average Correction Factor	1.005

Corrected As found	17.00	Previous response	16.82	% change	-1.1%

Notes:

Sample inlet filter replaced 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	86.8	8.68	8.76	0.991
calibrator zero	5500	0.0	0.00	0.00	----
high point	5500	86.8	8.68	8.69	0.999
second point	5500	43.4	4.34	4.33	1.002
third point	5500	21.7	2.17	2.16	1.005
as left zero	5500	0.0	0.00	0.00	----
as left span	5500	86.8	8.68	8.67	1.001
				Average Correction Factor	1.002

Corrected As found	8.76	Previous response	8.66	% change	-1.1%

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	86.8	8.17	8.24	0.992
calibrator zero	5500	0.0	0.00	0.00	----
high point	5500	86.8	8.17	8.17	1.001
second point	5500	43.4	4.09	4.05	1.009
third point	5500	21.7	2.04	2.01	1.017
as left zero	5500	0.0	0.00	0.00	----
as left span	5500	86.8	8.17	8.10	1.009
				Average Correction Factor	1.009

Corrected As found	8.24	Previous response	8.16	% change	-1.0%

Wood Buffalo Environmental Association

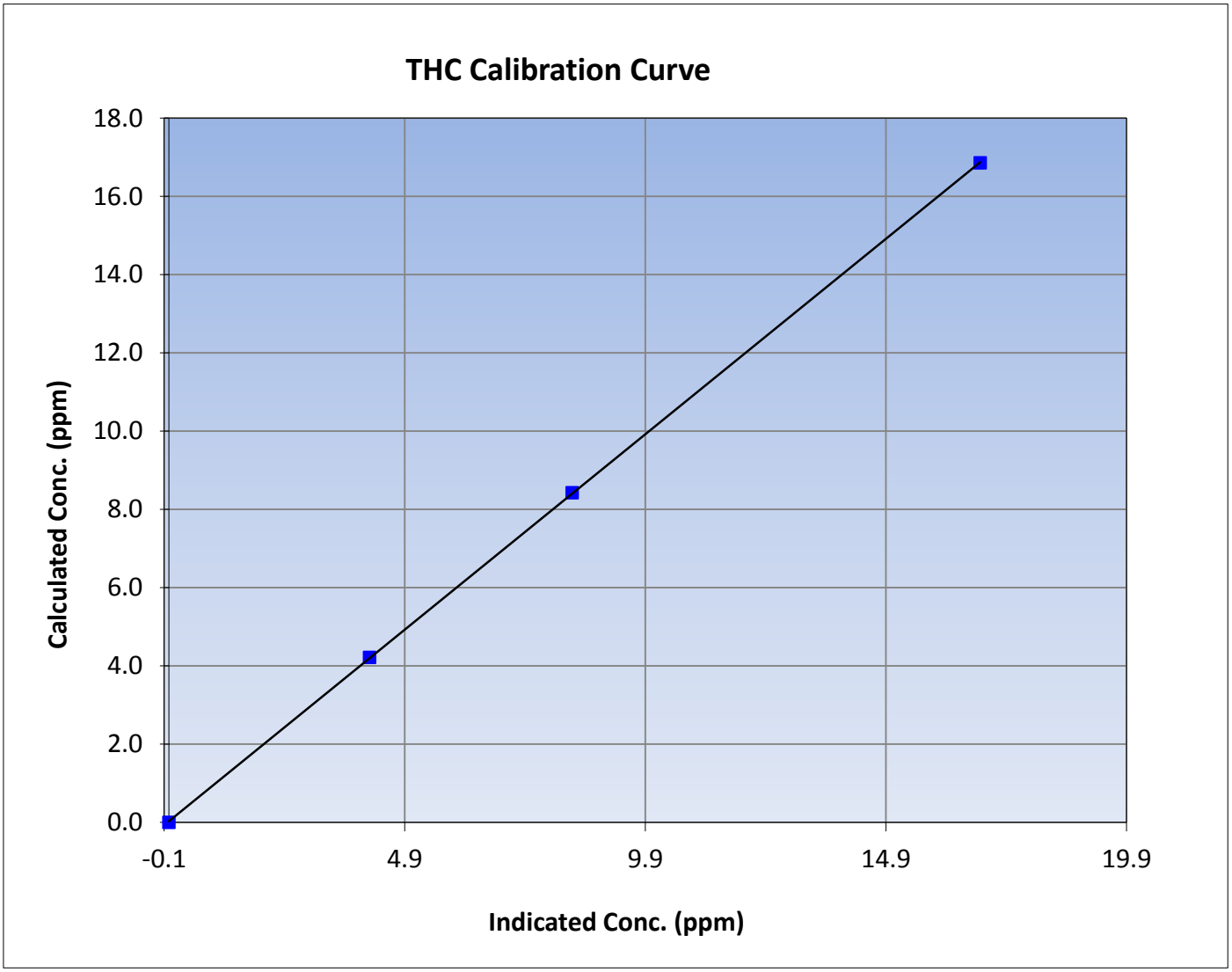
THC Calibration Summary

Station Information

Calibration Date	April 26, 2016	Previous Calibration	March 1, 2016
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	8:05	End Time (MST)	11:05
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	0.999986
16.85	16.86	0.9997		
8.43	8.38	1.0057	Slope	0.999112
4.21	4.17	1.0105		
			Intercept	0.028080



Wood Buffalo Environmental Association

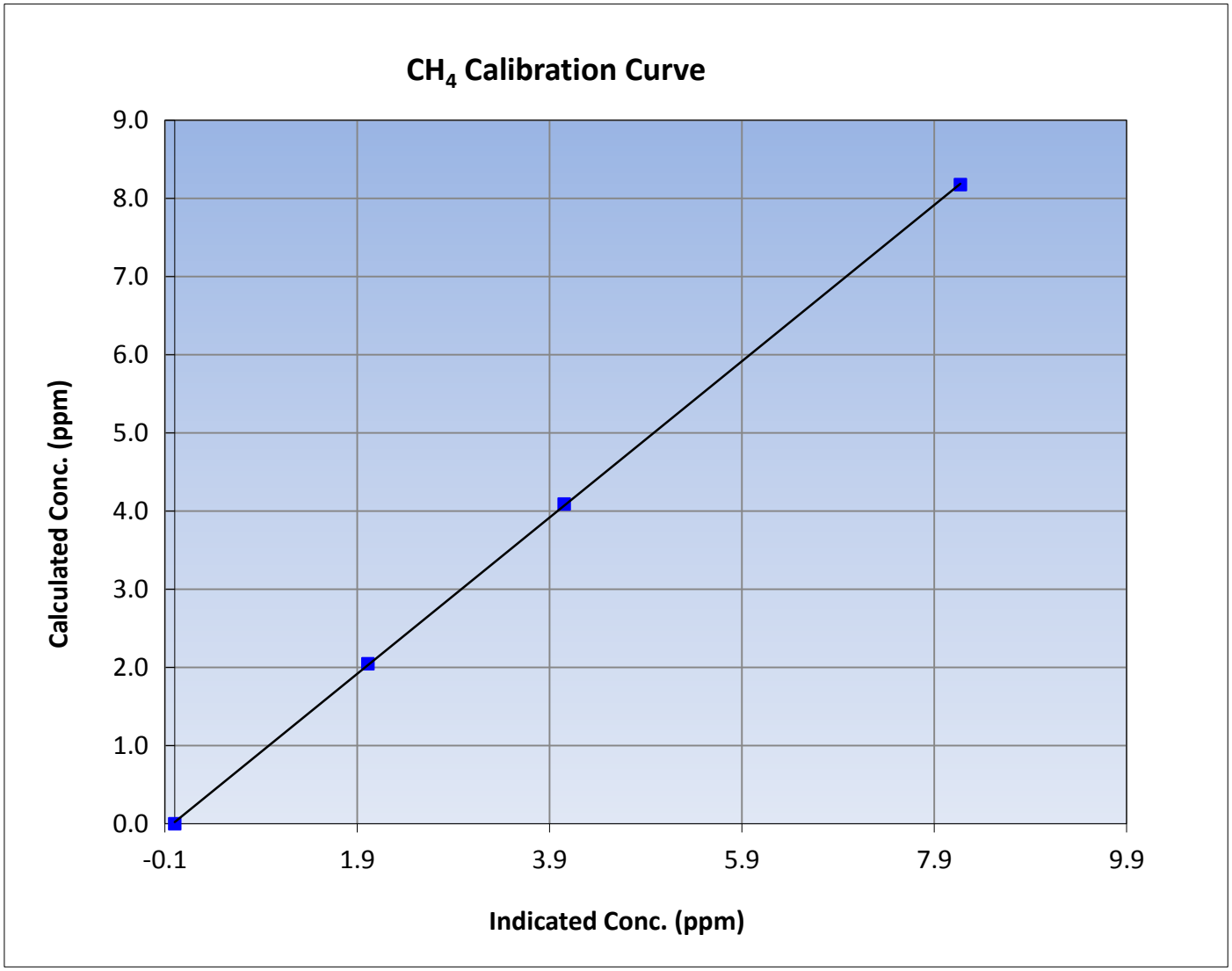
CH_4 Calibration Summary

Station Information

Calibration Date	April 26, 2016	Previous Calibration	March 1, 2016
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	8:05	End Time (MST)	11:05
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	0.999970
8.17	8.17	1.0006		
4.09	4.05	1.0093	Slope	0.999705
2.04	2.01	1.0168		
			Intercept	0.020103



Wood Buffalo Environmental Association

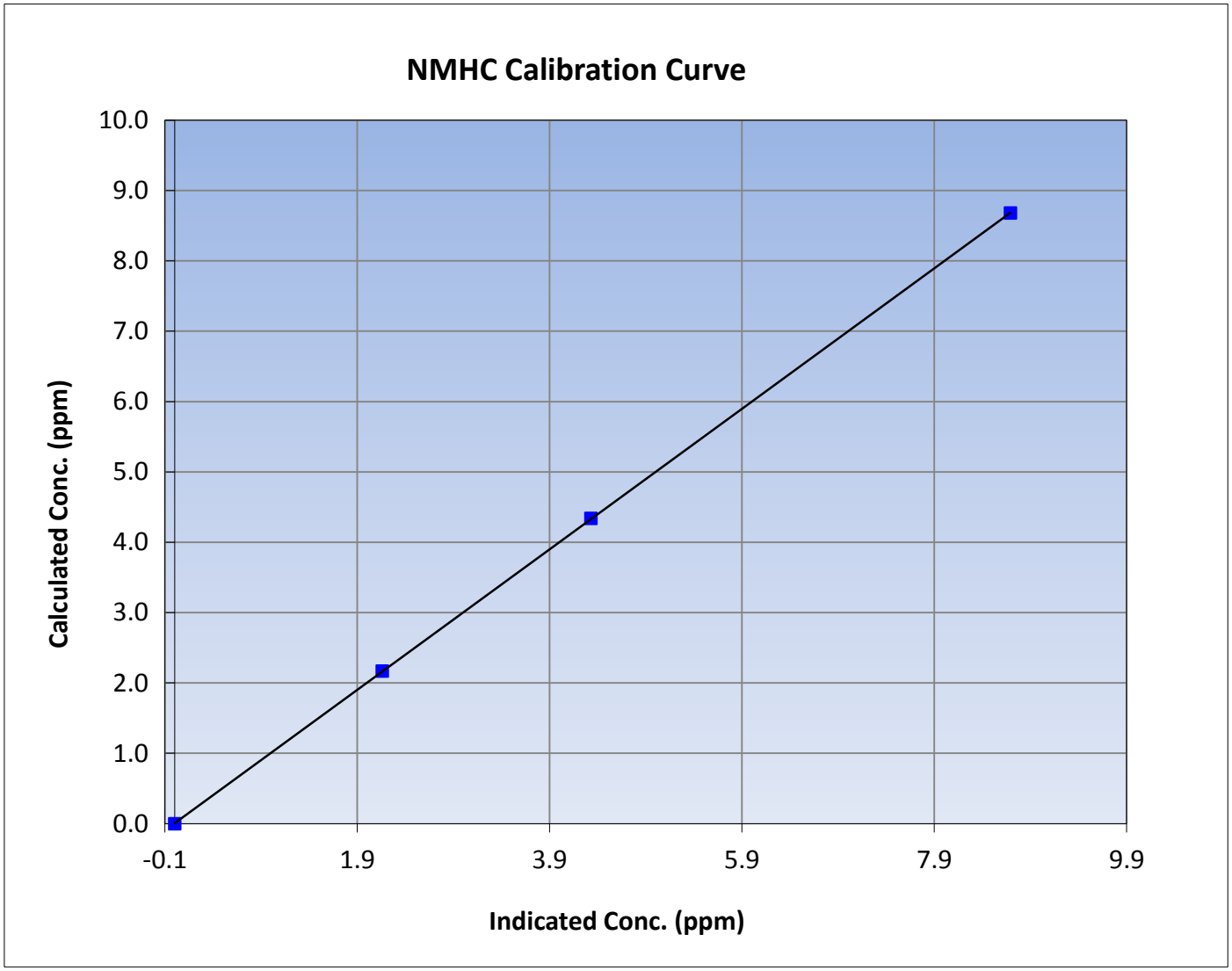
NMHC Calibration Summary

Station Information

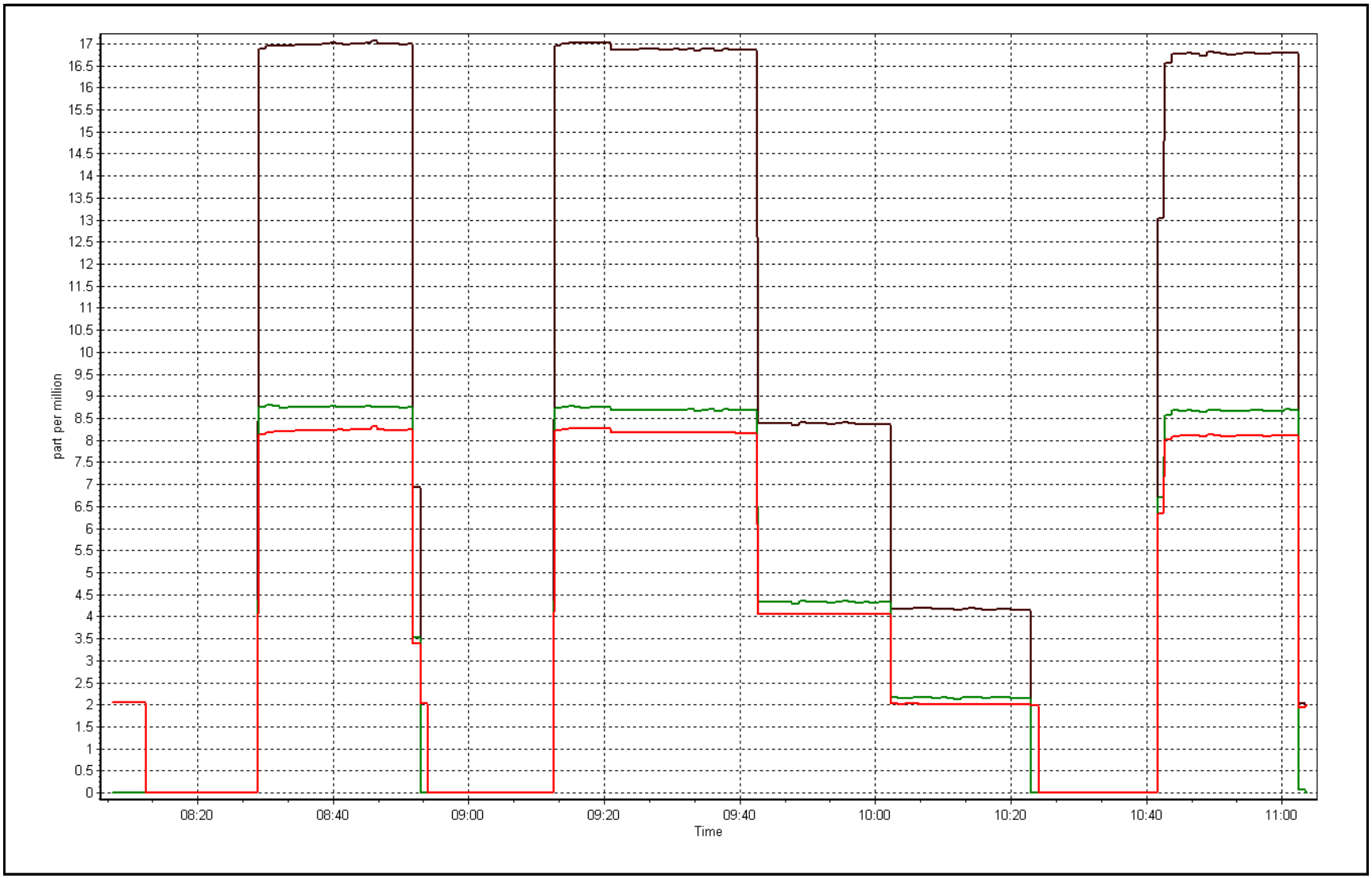
Calibration Date	April 26, 2016	Previous Calibration	March 1, 2016
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	8:05	End Time (MST)	11:05
Analyzer make	Thermo 55i	Analyzer serial #	1331259521

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999995
8.68	8.69	0.9988		
4.34	4.33	1.0023	Slope	0.998549
2.17	2.16	1.0046		
			Intercept	0.008006



THC Calibration Plot Date: April 26, 2016



Wood Buffalo Environmental Association
O_3 Calibration Report

W B E A

Station Information

Calibration Date	April 20, 2016	Previous Calibration	March 9, 2016
Station Name	Patricia McInnis	Station Number	AMS 6
Reason:	Routine		
Start Time (MST)	7:25	End Time (MST)	10:45
NO2 GPT Ref date	NA	Transfer Standard	23
		Station temp.	23 Deg C
Calibrator Make/Model	Teledyne API T700	Serial Number	2449
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.	27.4	27.5
Analyzer IP address	192.168.1.48		Lamp temp.	53.5	53.5
Calculated slope	0.998433	1.003333	Pressure	661.7	675.1
Calculated intercept	-1.054509	-1.744629	Flow cell A	0.701	0.705
Analyzer Background	0.0	-1.7	Flow cell B	0.724	0.728
Analyzer Coefficient	1.041	0.991	Cell A Intensity	98406	91640
			Cell B Intensity	98682	93042

Analyzer make	Thermo 49i	Analyzer serial #	1300156234

Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator O3 Generator Drive Voltage (mV)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5500	800.0	0.0	-1.6	----
as found span	5500	1095.3	400.0	418.4	0.956
calibrator zero	5500	800.0	0.0	0.8	----
high point	5500	1095.3	400.0	399.8	1.000
second point	5500	919.5	200.0	201.8	0.991
third point	5500	813.2	100.0	102.2	0.978
as left zero	5500	800.0	0.0	-0.1	----
as left span	5500	1095.3	400.0	400.1	1.000
				Average Correction Factor	0.990

Corrected As found	420.0	Previous response	401.7	% change	-4.4%

Notes:

Inlet filter changed after as founds. API T700 calibrator with optional photometer was installed yesterday, and used for this calibration; therefore no GPT was referenced for O3 calibration.

Calibration Performed By: Devin Russell

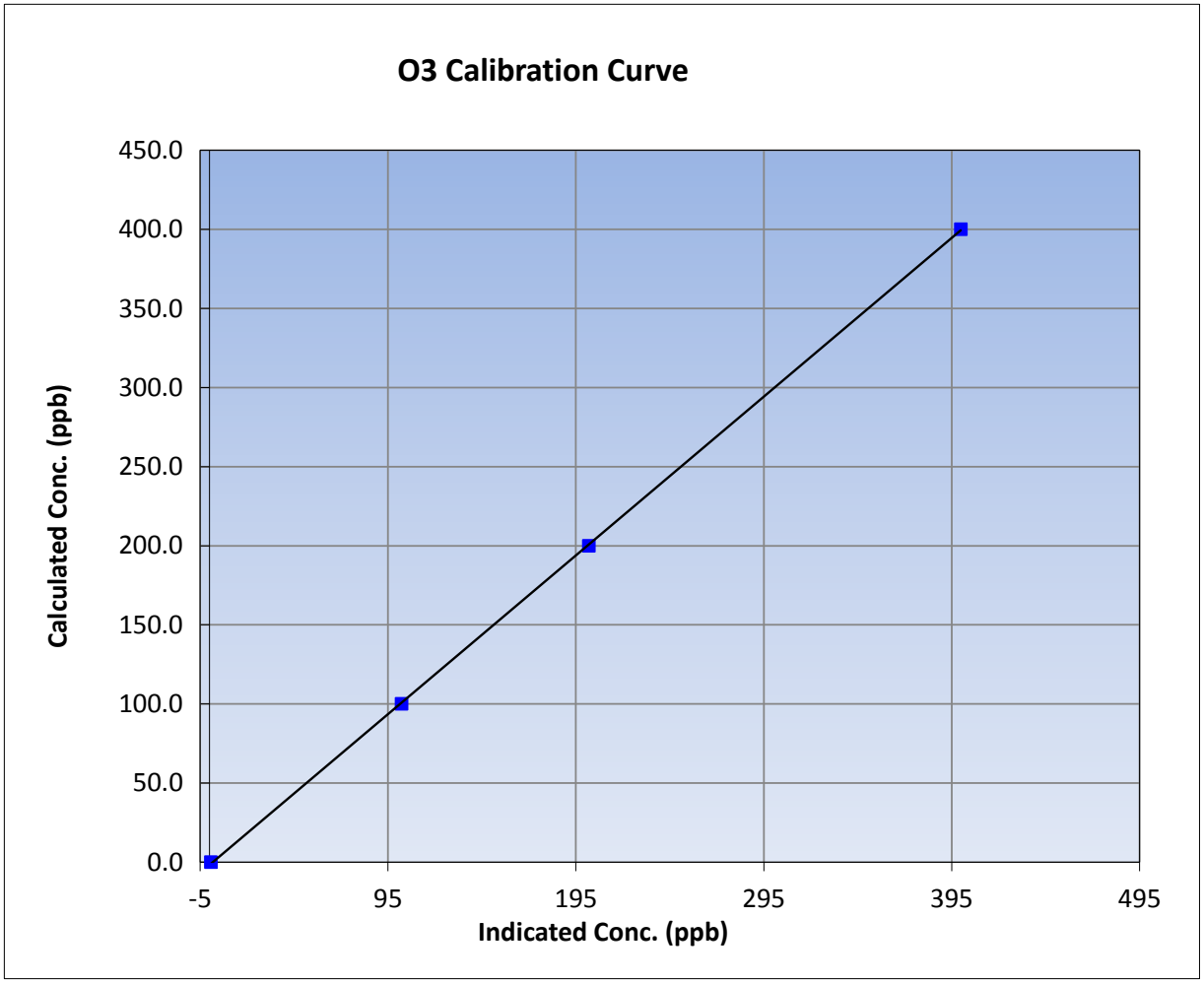
Wood Buffalo Environmental Association
O3 Calibration Report

Station Information

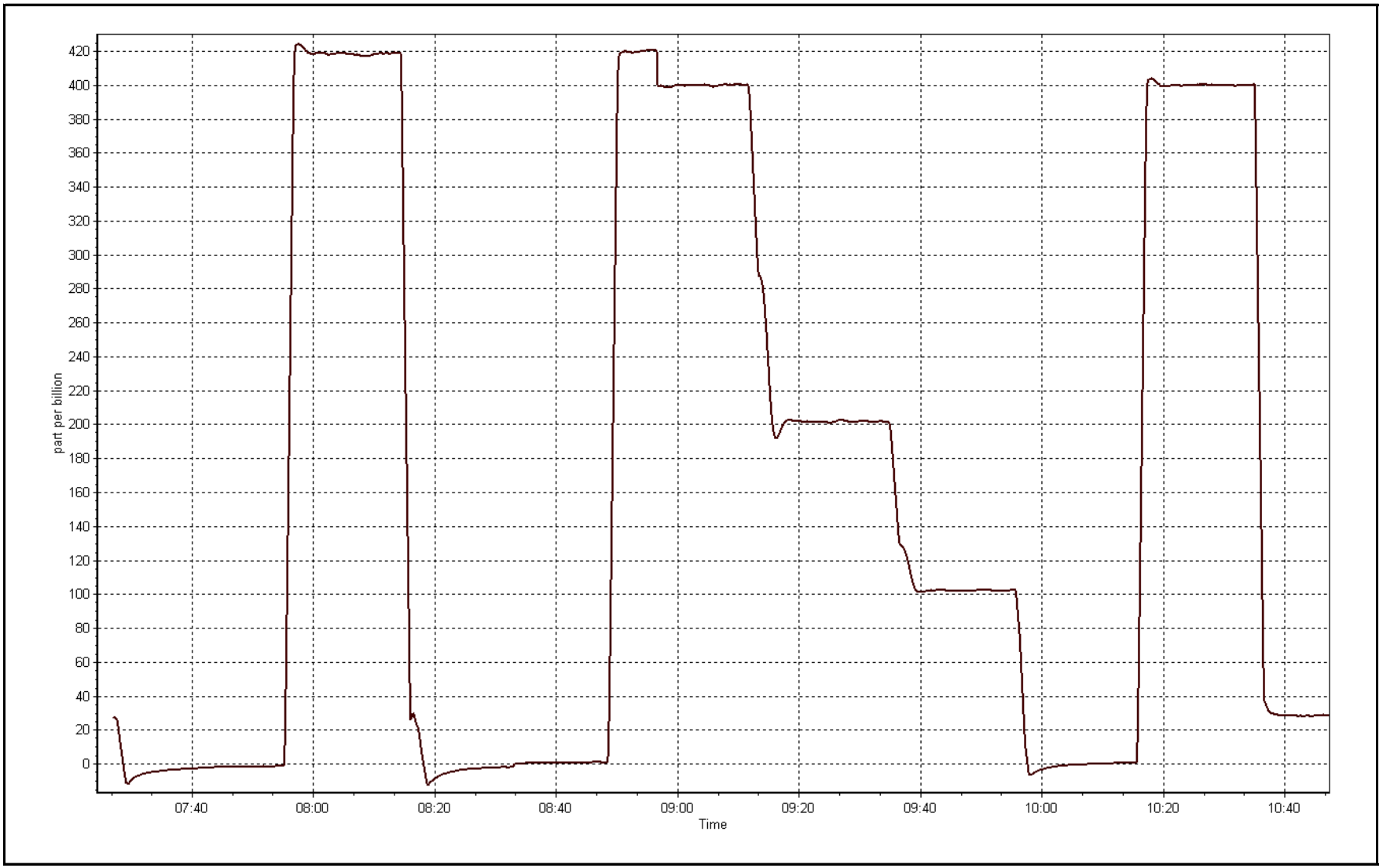
Calibration Date	April-20-16	Previous Calibration	March 9, 2016
Station Name	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	7:25	End Time (MST)	10:45
Analyzer make	Thermo 49i	Analyzer serial #	1300156234

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.8	----	Correlation Coefficient	0.999970
400.0	399.8	1.0005		
200.0	201.8	0.9909	Slope	1.003333
100.0	102.2	0.9782		
			Intercept	-1.744629



O3 Calibration Plot Date: April 20, 2016



Wood Buffalo Environmental Association
NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	April 20, 2016	Previous Calibration	March 8, 2016
Station Name	Patricia McInnes	Station Number	AMS 6
Reason:	Routine		
Start Time (MST)	9:55	End Time (MST)	14:50
NO Cal Gas Conc	50.7 ppm	Gas Cert Reference	EY0000355
NOx Cal Gas Conc	50.9 ppm	Cal Gas Expiry Date	18/09/2018
Calibrator	Teledyne API T700	Serial Number	2449
Zero air Generator	Teledyne API 701	Serial Number	60

DACS Information

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

Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.999882	1.001481	0.993387
	Data Offset	0.775251	1.034173	-1.669127
Current Calibration	Data Slope	0.998241	0.997044	0.997795
	Data Offset	0.968793	0.930536	1.021930

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1218153460

Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
Analyzer IP	192.168.1.43		192.168.1.43	
NO coefficient	1.214		1.185	
NOX coefficient	1.007		1.002	
NO2 coefficient	1.000		1.000	
NO bkgrnd	3.000		3.0	
NOX bkgrnd	3.400		3.3	
Chamber Temp	50.700	Deg C	50.7	Deg C
Moly Temp	326.000	Deg C	322.1	Deg C
PMT voltage	-761.100	V	-761.1	V
PMT Temp	-2.800	Deg C	-3	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	183.300	mmHg	188.6	mmHg
R Cell Press Nox	183.300	mmHg	188.6	mmHg
NO sample flow	0.755	lpm	0.777	lpm
Nox sample Flow	0.755	lpm	0.777	lpm

Notes:

Calibration completed with a new API T700 calibrator. Span adjusted. No maintenance completed.

Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: April 20, 2016 Station Number: AMS 6

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5500	0.0	0.0	0.0	0.0	-0.1	0.1	-0.2	----	----
as found span	5500	86.8	803.3	800.1	3.2	828.5	821.7	6.8	0.9696	0.9738
calibrator zero	5500	0.0	0.0	0.0	0.0	-0.1	0.1	-0.2	----	----
high point	5500	86.8	803.3	800.1	3.2	804.0	801.9	2.1	0.9991	0.9978
second point	5500	43.4	401.6	400.1	1.6	401.5	400.3	1.2	1.0004	0.9994
third point	5500	21.7	200.8	200.0	0.8	198.9	198.3	0.7	1.0095	1.0089
as left zero	5500	0.0	0.0	0.0	0.0	0.1	0.1	-0.1	----	----
as left span	5500	86.8	803.3	385.0	418.3	800.3	383.5	416.9	1.0037	1.0039
								Average Correction Factor	1.0030	1.0020

Corrcted As found NO_X= 828.5 NO= 821.5 Percent Change NO_X= -3.1% NO= -2.9%

Previous Response NO_X= 802.6 NO= 797.9

GPT Calibration Data

Dilution Flow (total) 5500 ccm Source Gas Flow 86.80 ccm NOX ref calc conc = 803.3 ppb NO ref calc conc = 800.1 ppb

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
1st NO ref point		3.2	801.3	797.6	-0.2	1.0025	1.0032	----	----
1st NO2 (300)	385.0	415.8	801.0	385.0	416.0	1.0028	----	0.9994	100.1%
2nd NO2 (200)	589.9	210.9	800.1	589.9	210.2	1.0041	----	1.0035	99.7%
3rd NO2 (100)	690.9	109.9	799.0	690.9	108.1	1.0054	----	1.0166	98.4%
2nd NO ref point	----	3.2	798.5	795.2	3.3	1.0060	1.0062	----	----
				Average Correction Factor		1.0046		1.0065	99.4%

Calibration Performed By: Devin Russell

Wood Buffalo Environmental Association

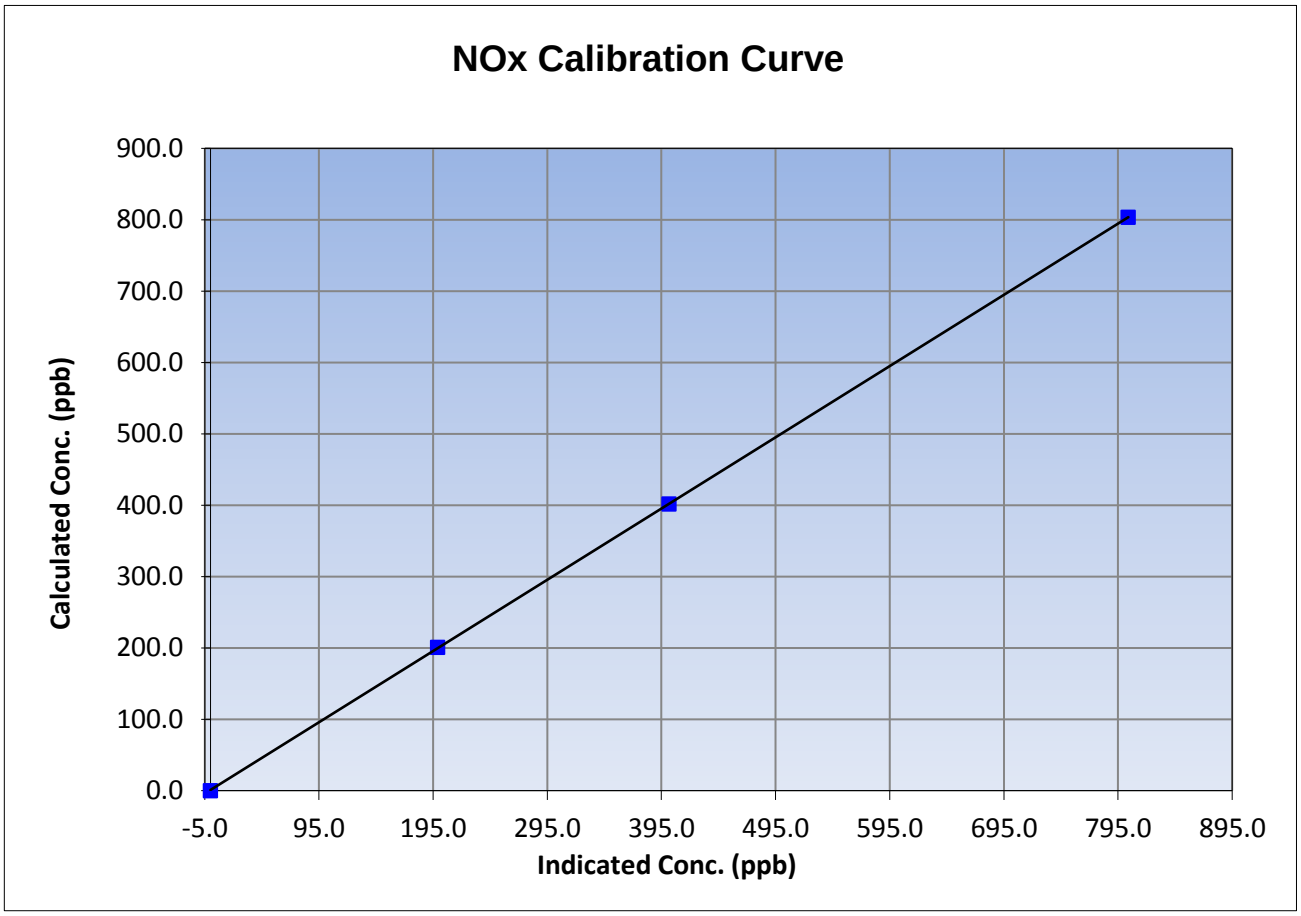
NO_X Calibration Summary

Station Information

Calibration Date	April 20, 2016	Previous Calibration	March 8, 2016
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	9:55	End Time (MST)	14:50
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	0.999993
803.3	804.0	0.9991		
401.6	401.5	1.0004	Slope	0.998241
200.8	198.9	1.0095		
			Intercept	0.968793



Wood Buffalo Environmental Association

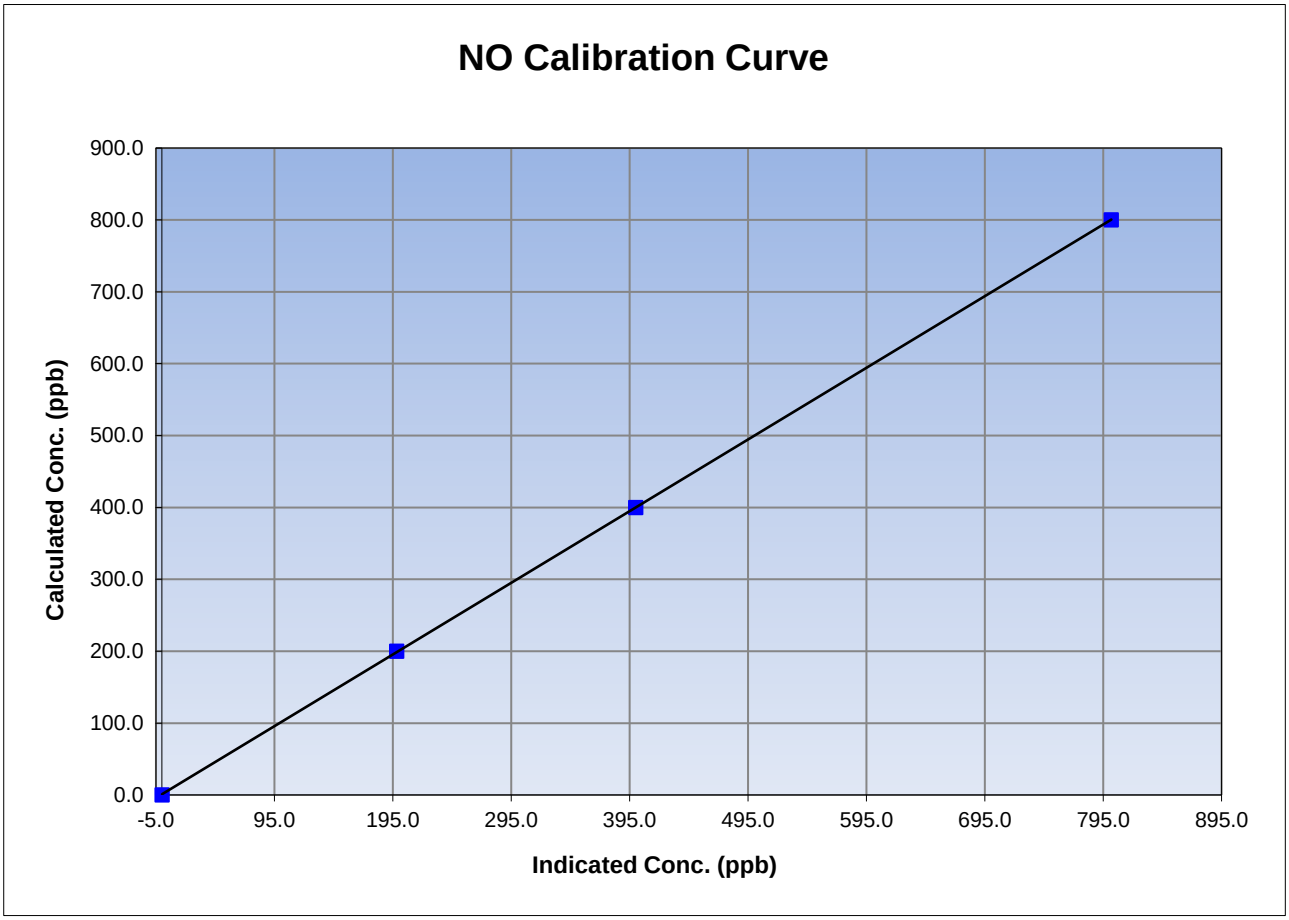
NO Calibration Summary

Station Information

Calibration Date	April 20, 2016	Previous Calibration	March 8, 2016
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	9:55	End Time (MST)	14:50
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	0.999991
800.1	801.9	0.9978		
400.1	400.3	0.9994	Slope	0.997044
200.0	198.3	1.0089		
			Intercept	0.930536



Wood Buffalo Environmental Association

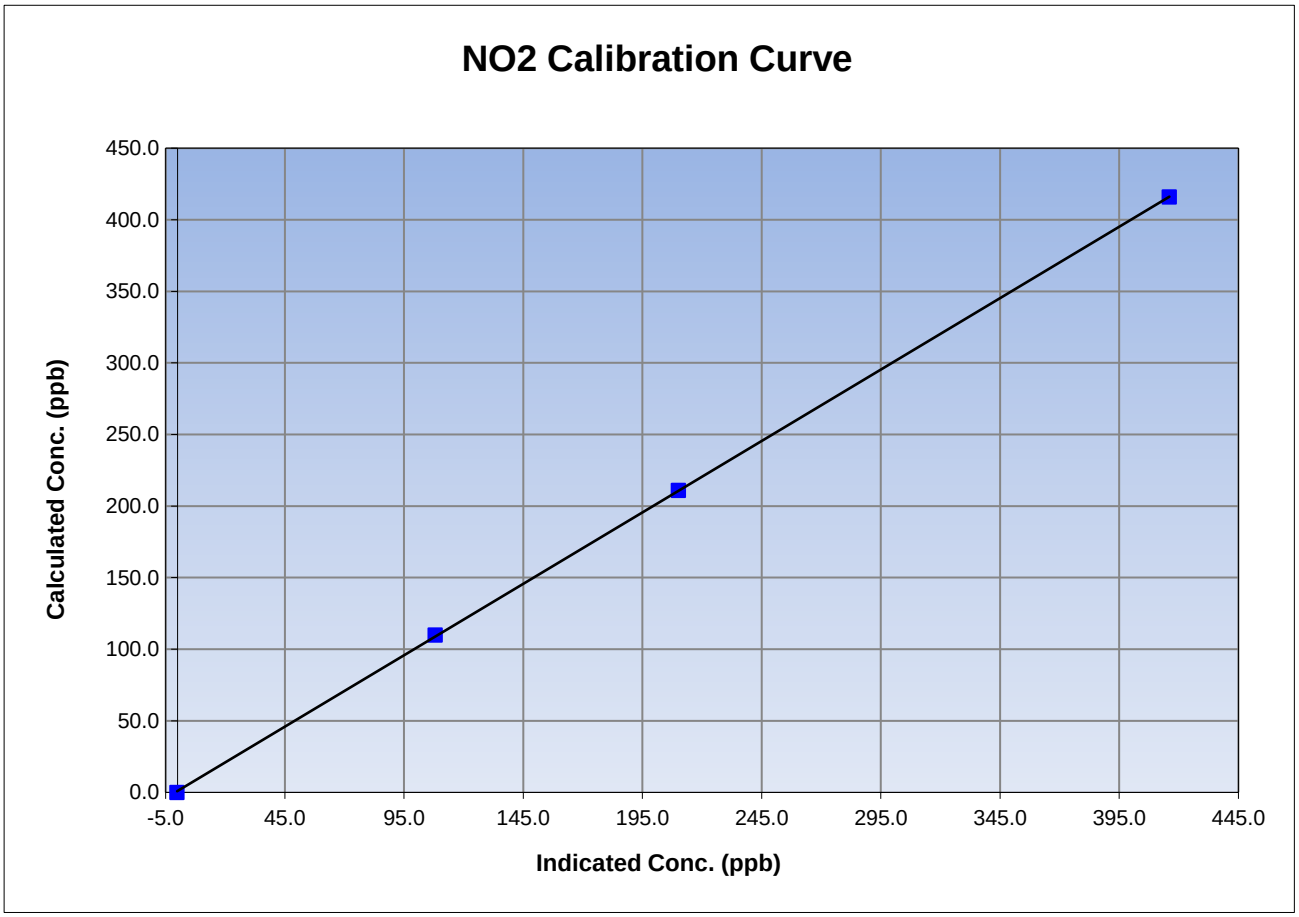
NO_2 Calibration Summary

Station Information

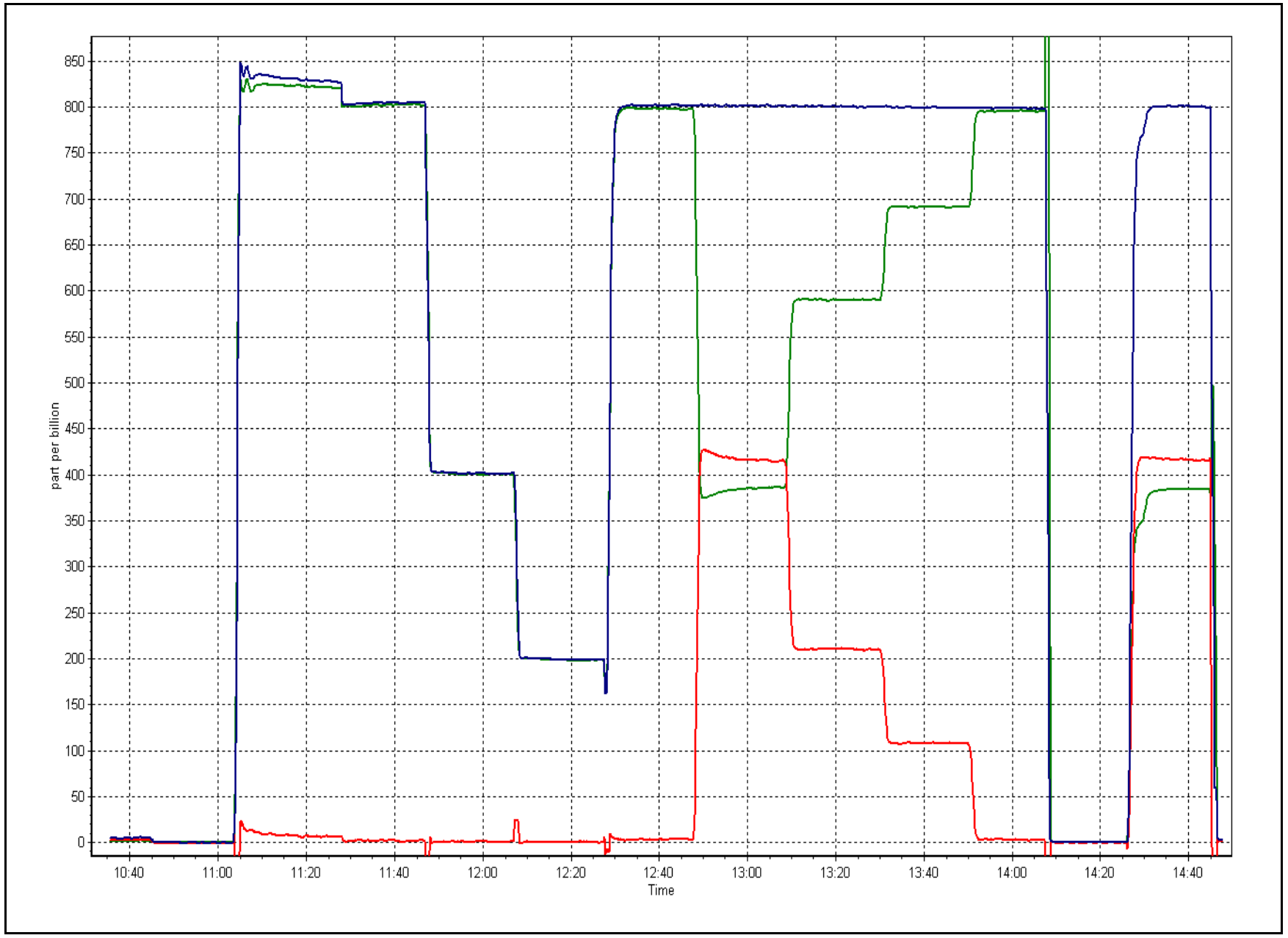
Calibration Date	April 20, 2016	Previous Calibration	March 8, 2016
Station Number	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	9:55	End Time (MST)	14:50
Analyzer make	Thermo 42i	Analyzer serial #	1218153460

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	N/A	Correlation Coefficient	0.999980
415.8	416.0	0.9994		
210.9	210.2	1.0035	Slope	0.997795
109.9	108.1	1.0166		
			Intercept	1.021930



NOX Calibration Plot Date: April 20, 2016



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	April 20, 2016	NOX Previous Cal Date	March 8, 2016
NH3 Calibration Date	April 21, 2016	NH3 Previous Cal Date	March 8, 2016

Reason: Routine

Start Time (MST)	9:55		End Time (MST)	14:50	
			Station Temperature	21.0	Deg C
Calibrator	Teledyne API T700		Serial Number	2449	
NH3 Cal Gas Conc	75.1	ppm	NH3 Expiry Date / SN	4/Aug/2012	SGAL-3617
NOx Cal Gas Conc	50.9	ppm	NO Expiry Date / SN	18/Sep/2018	EY0000355
NO Cal Gas Conc	50.7	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	0.998516	0.982024	1.001191	0.999268	1.004934
	Data Offset	-6.609983	-8.297754	1.945705	2.232742	-0.763294
Cal Stats After	Data Slope	0.999478	0.980308	1.005176	1.000433	1.004424
	Data Offset	-3.491074	-4.641996	1.454033	1.912168	1.056367
IP address		192.168.1.17				

Analyzer Information

Analyzer make/model: Teledyne T201 — Analyzer serial #: 215

Converter — Converter serial #

Test Point	before		after	
NH3 Conc range	2500	ppb	2500	ppb
NOX Conc range	1000	ppb	1000	ppb
NO BKG	-0.2	ppb	-0.2	ppb
NOx BKG	-0.2	ppb	-0.2	ppb
Nt BKG	-0.4		-0.4	
NO coefficient	1.023		1.013	
NO2 coefficient	1.000	ppb	1.000	ppb
NOx coefficient	1.046		1.035	
NH3 coefficient	0.968		0.955	
Nt coefficient	1.041		1.038	
NH3 conv temp	825	DegC	825	Deg C
Chamber Temp	50.0	Deg C	50.0	Deg C
Moly Temp	316.3	Deg C	315.0	Deg C
PMT Temp	7.0	Deg C	7.0	Deg C
O3 flow	85.0	ccm	85.0	ccm
R Cell Press	6.1	mmHg	6.1	mmHg
PMT Voltage	693.0	v	693.0	v
Sample Flow 1 NO	545.0	ccm	560.0	ccm
Sample Flow 2 Nox	545.0	ccm	560.0	ccm
Sample Flow 3 Nt	558.0	ccm	560.0	ccm

Notes:

Calibration completed with a new API T700 calibrator. Span adjusted. No maintenance completed. NH3 span adjusted.

Wood Buffalo Environmental Association

NH_3 Calibration Report

Station Information

Calibration Date: April 21, 2016 Station Number: AMS 6

NH3 Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated Nt conc (ppb)	Calculated NOx conc (ppb)	Calculated 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	-2.0	-2.9	1.0	----	----
as found NO	5500	86.8	803.3	803.3	----	792.6	790.8	1.7	1.014	----
calibrator zero	5500	0.0	0.0	0.0	0.0	0.4	-0.2	0.6	----	----
high NO point	5500	86.8	803.3	803.3	----	801.7	798.8	2.9	1.002	----
NO/O3 point	5500	86.8	803.3	803.3	----	806.0	799.1	6.8	0.997	----
as found NH3	3500	93.2	1999.8	NA	1999.8	2001.0	38.1	1962.9	0.999	1.019
first NH3	3500	93.2	1999.8	NA	1999.8	2042.4	39.2	2003.1	0.979	0.998
second NH3	3500	46.6	999.9	NA	999.9	1027.3	24.4	1004.6	0.973	0.995
third NH3	3500	23.3	500.0	NA	500.0	518.9	11.7	507.2	0.964	0.986
								Average Correction Factor	0.9994	0.9931

Nt Corrected As Found	Nt =	794.5	ppb	Previous Response	Nt =	826.3	ppb	Nt percent change	4.0%
NOx Corrected As Found	NOx =	793.7	ppb	Previous Response	NOx =	800.4	ppb	NOx percent change	0.8%
NH3 Previous Converter Efficiency =		96.8	%	NH3 Current Converter Efficiency =		95.5	%	NH3 percent change	-1.3%

Wood Buffalo Environmental Association

$NO_X(NH_3)$ Calibration Report

Station Information

Calibration Date: April 20, 2016 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	5500	0.0	0.0	0.0	0.0	-0.2	-0.2	0.4	----	----
as found span	5500	86.8	803.3	800.1	803.3	816.3	809.1	809.7	0.9840	0.9889
calibrator zero	5500	0.0	0.0	0.0	0.0	-0.2	-0.2	0.4	----	----
high point	5500	86.8	803.3	800.1	803.3	798.8	799.1	801.7	1.0057	1.0013
second point	5500	43.4	401.6	400.1	401.6	396.3	396.0	400.1	1.0136	1.0102
third point	5500	21.7	200.8	200.0	200.8	197.9	197.1	199.8	1.0149	1.0151
								Average Correction Factor	1.0114	1.0089

	Nt	NOX	NO	NO2
Corrected As found	809.3	816.5	809.3	----
Previous Response	826.3	800.4	798.5	----
Percent Change	2.1%	-2.0%	-1.3%	-0.6%

GPT Calibration Data

Dilution Flow (total) 5500 ccm Source Gas Flow 86.8 ccm NOX ref calc conc = 803.3 ppb NO ref calc conc = 800.1 ppb

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
1st NO ref point	----	3.2	799.1	798.2	1.0	1.0052	1.0025	----	----
1st NO2 (300)	385.4	415.9	799.2	385.4	413.7	1.0052	----	1.0053	99.5%
2nd NO2 (200)	590.0	211.3	798.4	590.0	208.4	1.0061	----	1.0141	98.6%
3rd NO2 (100)	690.2	111.1	799.0	690.2	108.8	1.0054	----	1.0216	97.9%
2nd NO ref point	----	3.2	798.4	795.3	3.3	1.0061	1.0061	----	----
				Average Correction Factor		1.0057	1.0043	1.0137	98.7%

Calibration Performed By: Devin Russell

Wood Buffalo Environmental Association

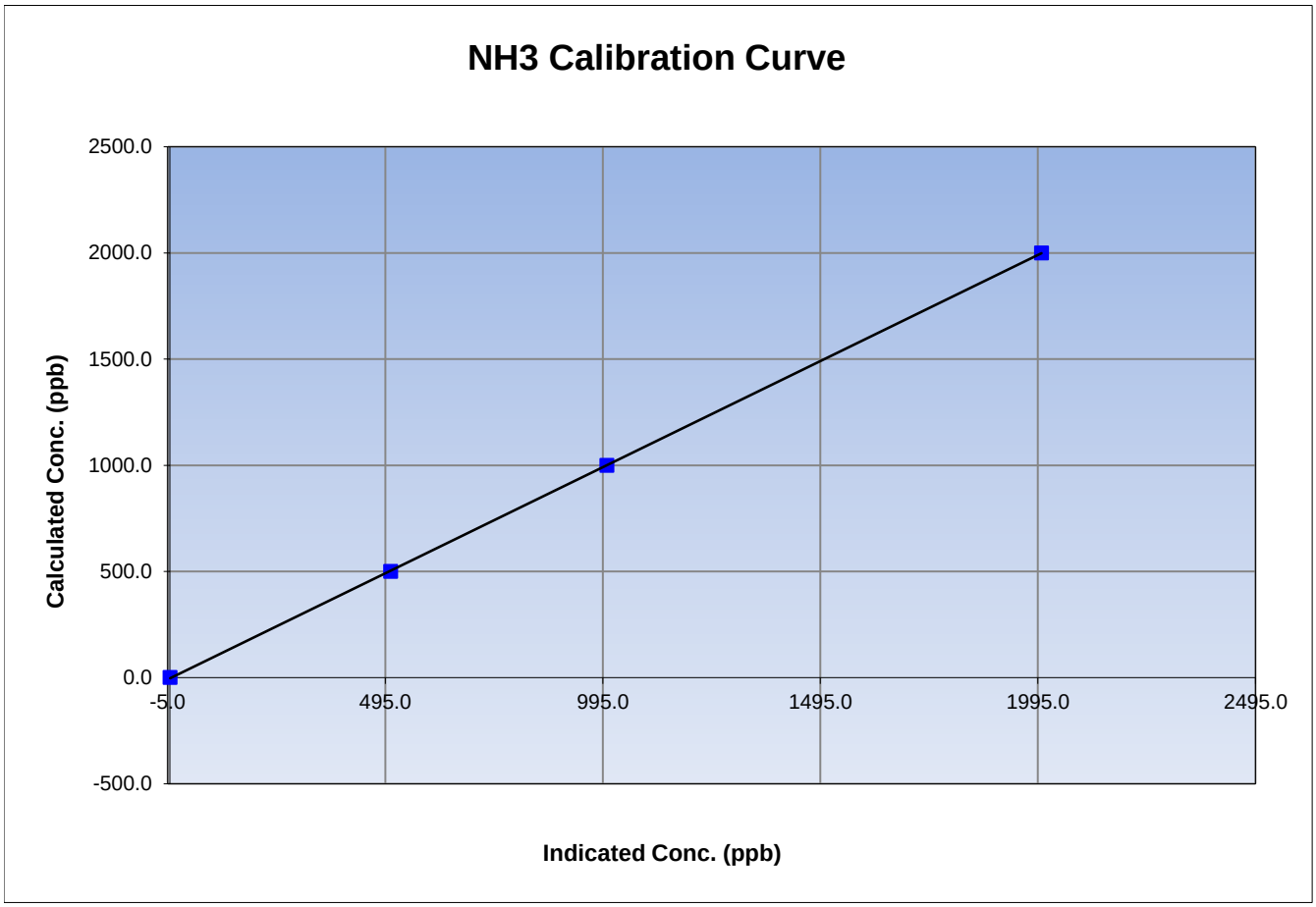
NH3 Calibration Summary

Station Information

Calibration Date	April 21, 2016	Previous Calibration	March 8, 2016
Station Name	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	9:55	End Time (MST)	14:50
Analyzer make	Teledyne T201	Analyzer serial #	215

NH3 Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.6	----	Correlation Coefficient	0.999990
1999.8	2003.1	0.9983		
999.9	1004.6	0.9953	Slope	0.999478
500.0	507.2	0.9857		
			Intercept	-3.491074



Wood Buffalo Environmental Association

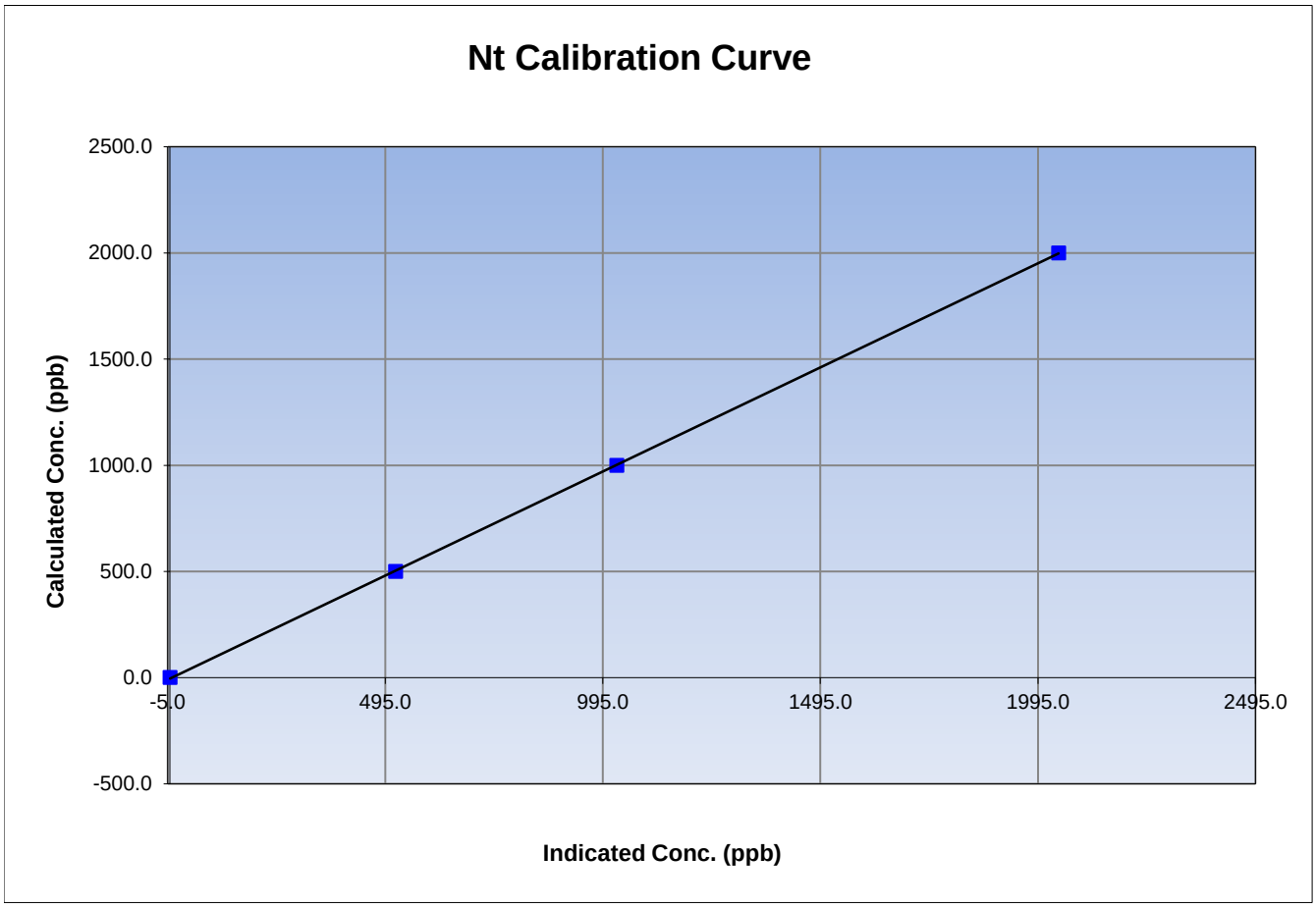
Nt Calibration Summary

Station Information

Calibration Date	April 21, 2016	Previous Calibration	March 8, 2016
Station Name	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	9:55	End Time (MST)	14:50
Analyzer make	Teledyne 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	0.4	----	Correlation Coefficient	0.999979
1999.8	2042.4	0.9792		
999.9	1027.3	0.9733	Slope	0.980308
500.0	518.9	0.9636		
			Intercept	-4.641996



Wood Buffalo Environmental Association

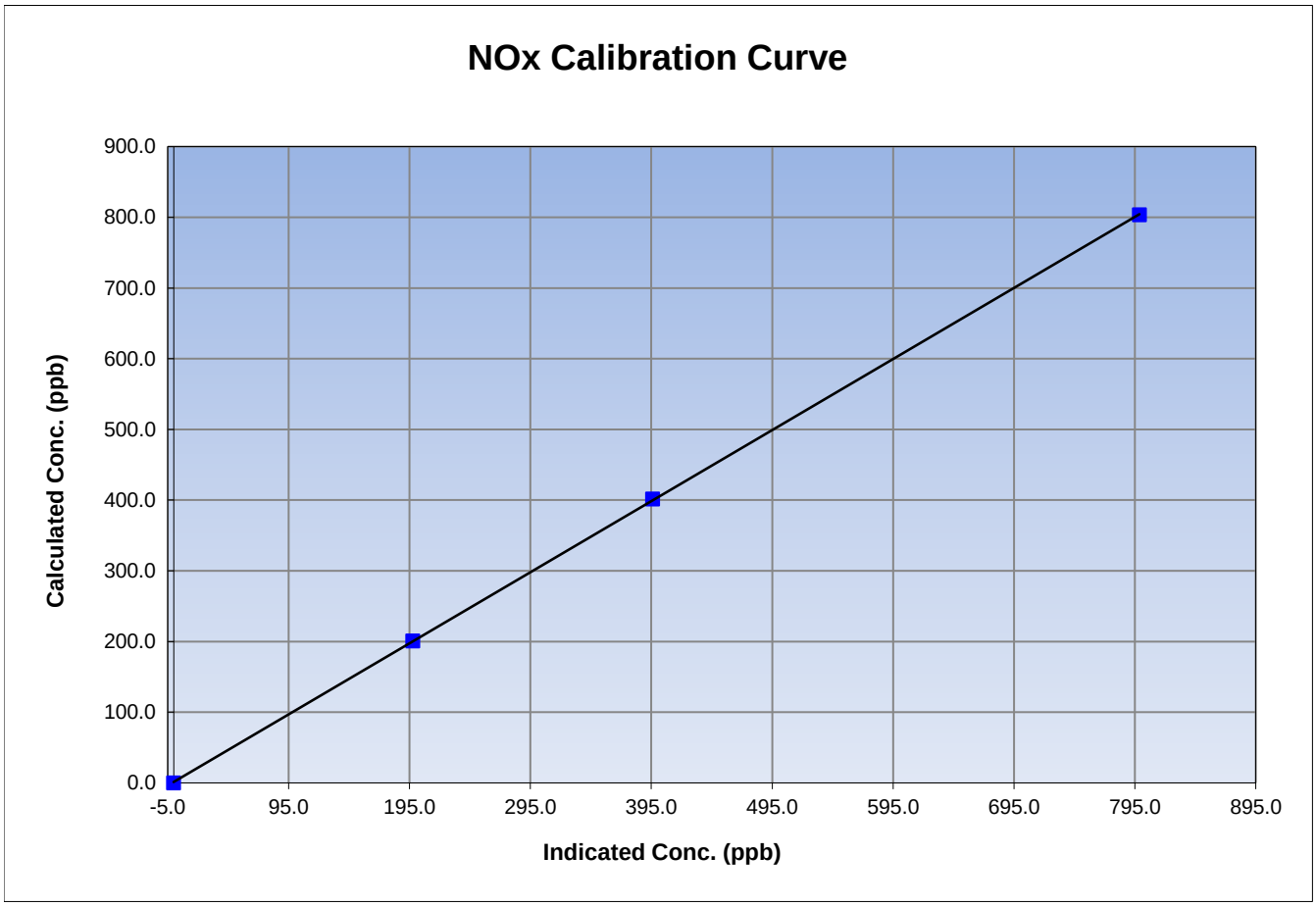
NOx Calibration Summary

Station Information

Calibration Date	April 20, 2016	Previous Calibration	March 8, 2016
Station Name	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	9:55	End Time (MST)	14:50
Analyzer make	Teledyne T201	Analyzer serial #	215

NO_X Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	----	Correlation Coefficient	0.999981
803.3	798.8	1.0057		
401.6	396.3	1.0136	Slope	1.005176
200.8	197.9	1.0149		
			Intercept	1.454033



Wood Buffalo Environmental Association

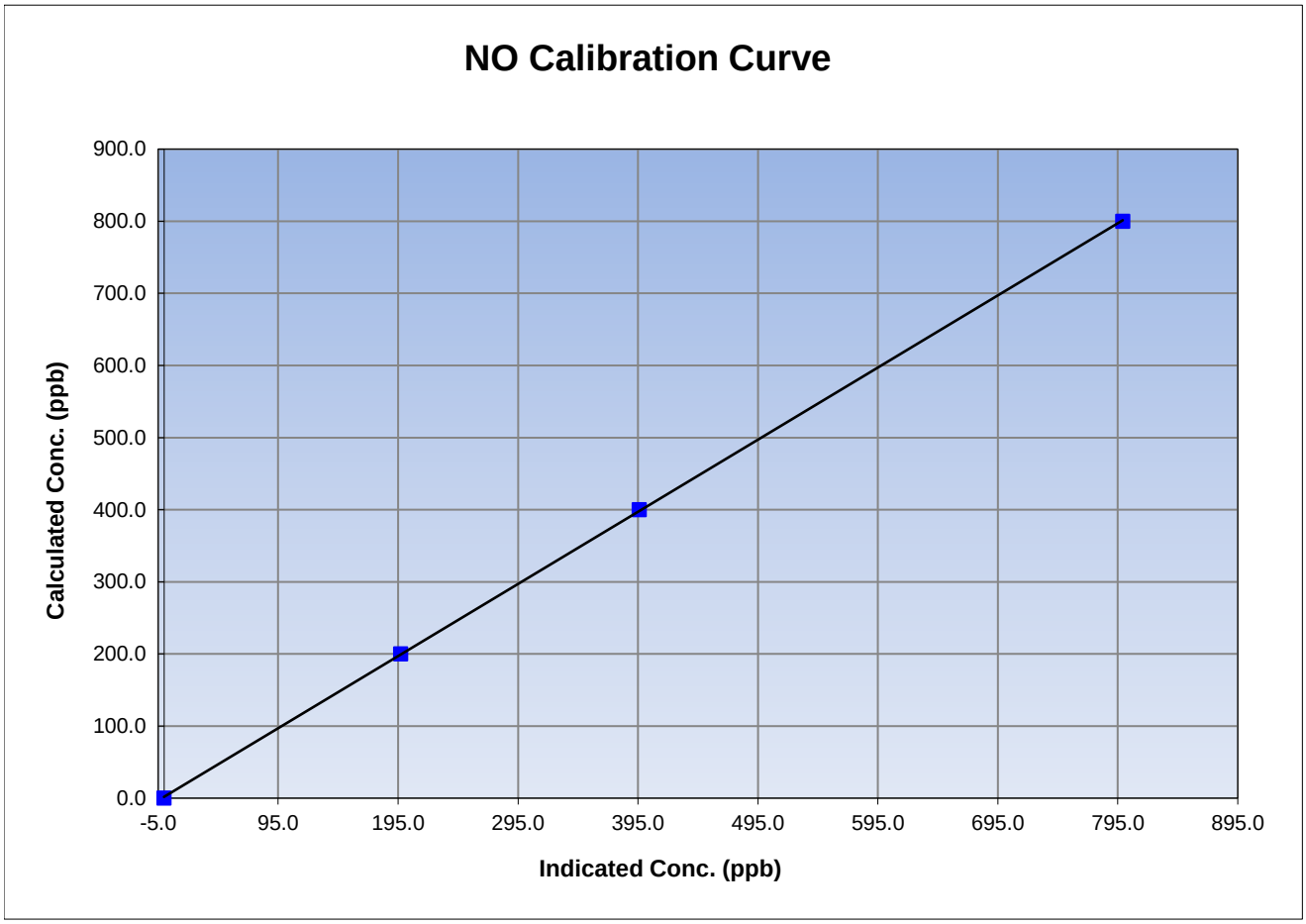
NO Calibration Summary

Station Information

Calibration Date	April 20, 2016	Previous Calibration	March 8, 2016
Station Name	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	9:55	End Time (MST)	14:50
Analyzer make	Teledyne T201	Analyzer serial #	215

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	----	Correlation Coefficient	0.999973
800.1	799.1	1.0013		
400.1	396.0	1.0102	Slope	1.000433
200.0	197.1	1.0151		
			Intercept	1.912168



Wood Buffalo Environmental Association

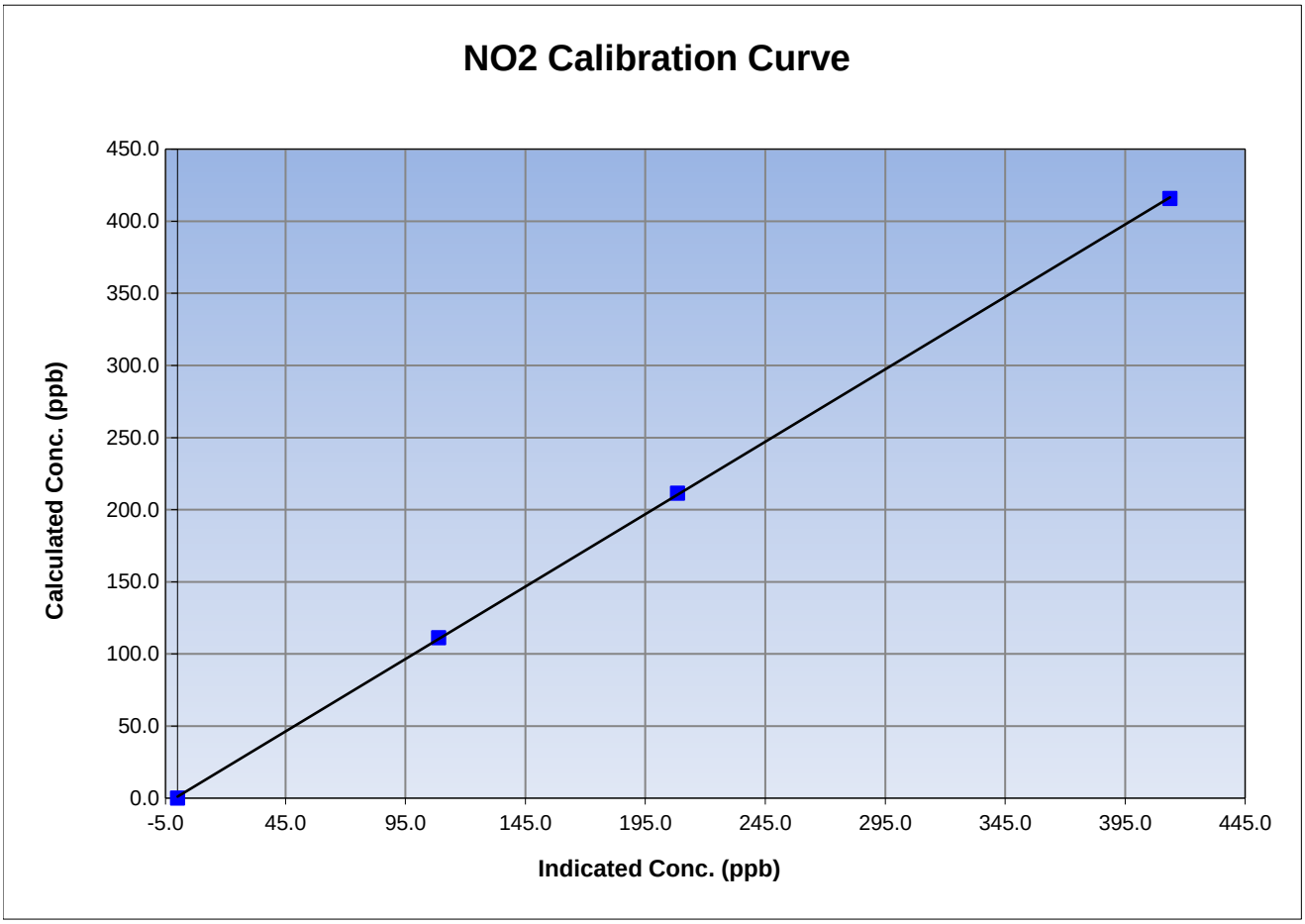
NO_2 Calibration Summary

Station Information

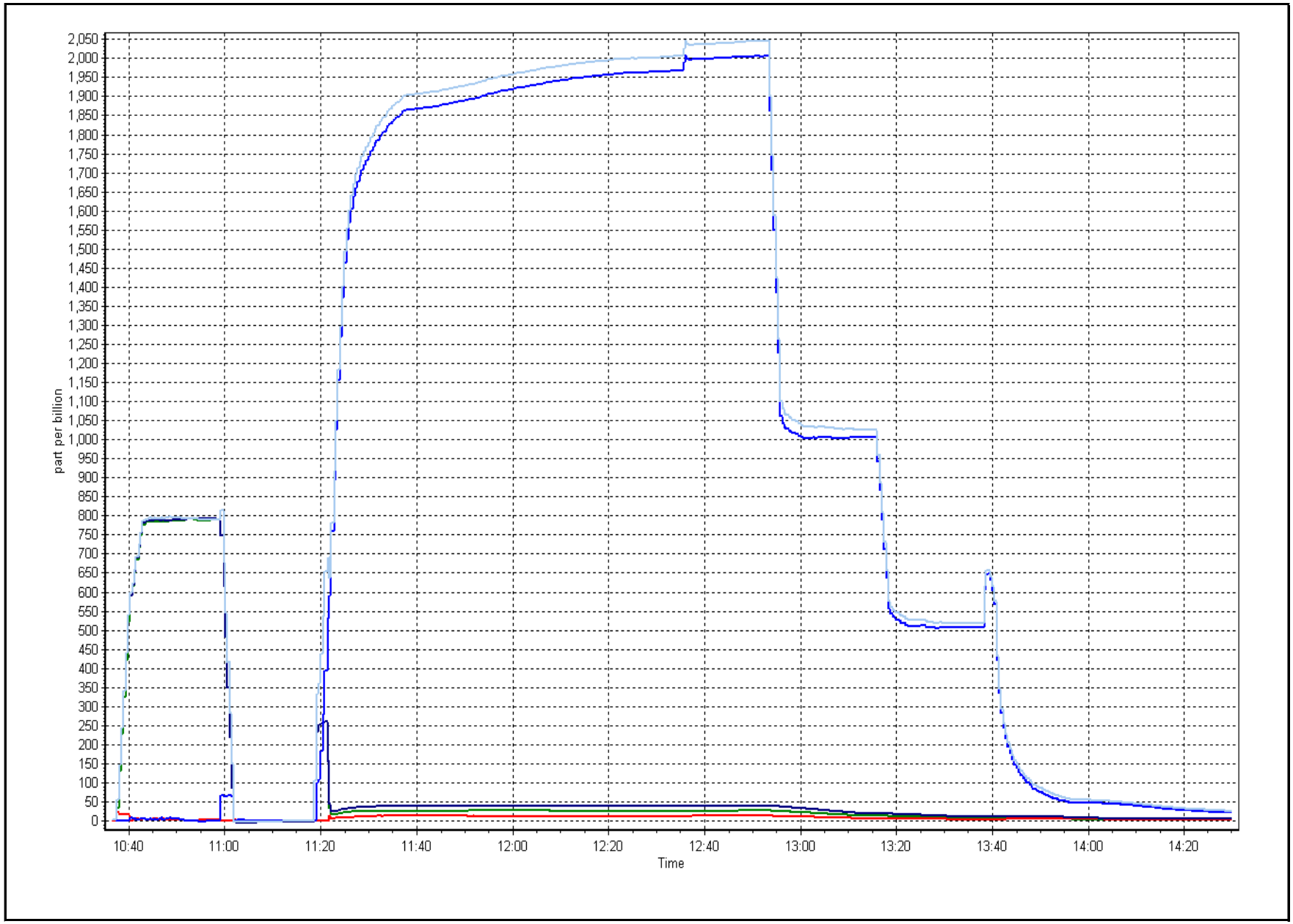
Calibration Date	April 20, 2016	Previous Calibration	March 8, 2016
Station Name	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	9:55	End Time (MST)	14:50
Analyzer make	Teledyne T201	Analyzer serial #	215

Calibration Information

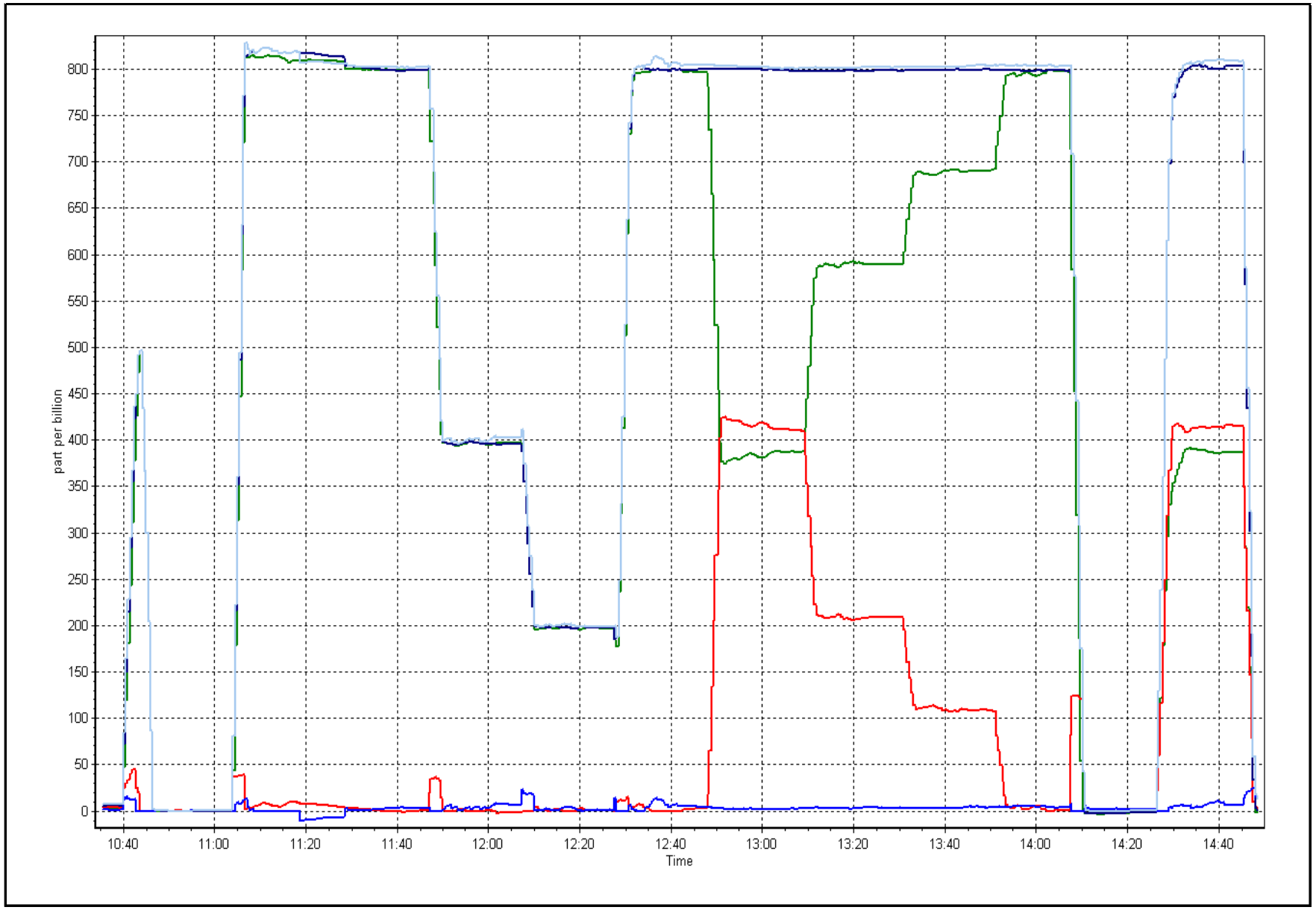
Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999965
415.9	413.7	1.0053		
211.3	208.4	1.0141	Slope	1.004424
111.1	108.8	1.0216		
			Intercept	1.056367



NH_3 Calibration Plot Date: April 21, 2016



NOX Calibration Plot Date: April 20, 2016



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SHARP CALIBRATION

STATION INFORMATION

Calibration Date:	April 26, 2016	Previous Calibration:	March 9, 2016
Station Name:	Patricia McInnis	Station Number:	AMS 6
Start Time (MST):	9:05	End Time (MST):	10:42
Calibrator Make/Model:	Delta Cal	Calibrator Serial Number:	141228

SHARP INFORMATION

Particulate Fraction:	PM2.5										
Make/Model:	Thermo / SHARP 5030										
Serial Number											
C_{14} Source SN:											
Confirmation of Time settings:	Yes ☑	No ☐									
Paremeters Checked:	T1 ☑	T2 ☐	T3 ☐	T4 ☐	P3 ☑	Main Flow ☑	Beta ☐	Neph ☑			

CALIBRATION DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	5.0	5.6	0.6	5.0
T2	19.0	na	na	19.0
T3	21.0	na	na	21.0
T4	13.0	na	na	13.0
RH (%)	31.0	na	na	31.0

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	972	967.9	-4.1	972

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	206		207
Neph	1.4		0.1
C14	-1.2		-5.2
Indicated Concentration (ug/m3)	**0.4**	**yes**	**0**
Offset 1	205.3		206.4
Offset 2	32.7		32.8

Leak Check (Quarterly)

Leak Check Date:		Previous Leak Check Date:	February 12, 2016
	Measured	**Difference LPM (Limit +/- 0.42 LPM)**	
Flow without adaptor (LPM):		0.00	
*Flow with adaptor (LPM):			

**Note - do not attach adaptor without shutting off the pump first*

Mass Foil Calibration (Annualy)

Foil Calibration Date:		Previous Foil Calibration:	May 20, 2015
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	26/04/2016
Pump	Good	
Filter Tape	Good	
Mass Foil Cal Set	na	
HEPA filter	Good	26/04/2016

NOTES:

Cyclone head cleaned. Nephalometer zeroed.

Calibration Performed By: **Devin Russell**

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 7
ATHABASCA VALLEY
APRIL 2016

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

May 27, 2016

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ATHABASCA VALLEY (AMS 7)
APRIL 2016

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	681	35	39	99.44	19	0	3	0
TRS (ppb) Average	682	32	38	99.17	1	0	0	0
THC (ppm) Average	679	35	41	99.17	2.3	-	2	-
NMHC (ppm) Average	679	35	41	99.17	0.215	-	0.042	-
CH4(ppm) Average	679	35	41	99.17	2.3	-	1.9	-
O3 (ppb) Average	680	34	40	99.17	66	0	48	-
NO2 (ppb) Average	678	35	42	99.03	26	0	8	-
NO (ppb) Average	678	35	42	99.03	14	-	2	-
NOX (ppb) Average	678	35	42	99.03	31	-	9	-
PM2.5 (ug/m3) Average	703	3	17	98.06	25.1	-	6.8	0
CO(ppm) Average	682	31	38	99.03	0.2	0	0.1	-
Temperature 2 m (C) Average	720	0	0	100.00	27.8	-	16.7	-
Barometric Pressure (inHg) Average	720	0	0	100.00	29.4	-	29.3	-
Relative Humidity (%) Average	720	0	0	100.00	99	-	89	-
Wind Speed 10 m (km/h) Average	716	0	4	99.44	39	-	21	-
Wind Direction 10 m (deg) Average	716	0	4	99.44	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ATHABASCA VALLEY (AMS 7)
APRIL 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

					Percentile						
Parameter	Number	Mean	StnDev	Total	Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	681	0.7	2	-	0	0	0	0	0	2	19
TRS (ppb) Average	682	0.2	0	-	0	0	0	0	0	0	1
THC (ppm) Average	679	1.89	0.1	-	1.8	1.9	1.9	1.9	1.9	1.9	2.3
NMHC (ppm) Average	679	0.005	0.026	-	0	0	0	0	0	0	0.215
CH4(ppm) Average	679	1.89	0	-	1.8	1.9	1.9	1.9	1.9	1.9	2.3
O3 (ppb) Average	680	30.1	10	-	3	16	24	31	36	42	66
NO2 (ppb) Average	678	4.6	3	-	0	2	2	4	6	9	26
NO (ppb) Average	678	0.8	1	-	0	0	0	0	1	2	14
NOX (ppb) Average	678	5.4	4	-	0	2	3	5	7	10	31
PM2.5 (ug/m3) Average	703	4.36	2.2	-	0.6	2.4	3	3.9	5.1	6.8	25.1
CO(ppm) Average	682	0.07	0	-	0	0	0.1	0.1	0.1	0.1	0.2
Temperature 2 m (C) Average	720	4.74	7.5	-	-10	-4.3	-0.6	3.3	9	16.6	27.8
Barometric Pressure (inHg) Average	720	29.05	0.2	-	28.4	28.8	28.9	29.1	29.2	29.3	29.4
Relative Humidity (%) Average	720	56	22	-	11	25	38	57	72	86	99
Wind Speed 10 m (km/h) Average	716	10.1	6	-	0	3	5	9	14	18	39
Wind Direction 10 m (deg) Average	716	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ATHABASCA VALLEY (AMS 7)
APRIL 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
AIR QUALITY ANALYZERS	06 Apr 2016 05:00	06 Apr 2016 07:00	3	Station power failure
NMHC, CH4, THC	06 Apr 2016 08:00	06 Apr 2016 08:00	1	Stabilization following power failure
THC, NO2	14 Apr 2016 13:00	14 Apr 2016 14:00	2	Station power failure
SO2, TRS, O3, CO, PM2.5	14 Apr 2016 13:00	14 Apr 2016 13:00	1	Station power failure
TRS, O3, CO	19 Apr 2016 09:00	19 Apr 2016 09:00	1	Maintenance - cleaned glass manifold
TRS, O3	19 Apr 2016 13:00	19 Apr 2016 13:00	1	Maintenance - tested daily zero and span system
CO	19 Apr 2016 13:00	19 Apr 2016 14:00	2	Maintenance - tested daily zero and span system
NO2, NO, NOX	20 Apr 2016 09:00	20 Apr 2016 10:00	2	Maintenance - confirmed calibration points for Ozone
PM2.5	16 Apr 2016 16:00	16 Apr 2016 19:00	4	Unstable operation - excessive baseline drift
PM2.5	17 Apr 2016 15:00	17 Apr 2016 18:00	4	Unstable operation - excessive baseline drift
PM2.5	18 Apr 2016 16:00	18 Apr 2016 16:00	1	Unstable operation - excessive baseline drift
PM2.5	18 Apr 2016 18:00	18 Apr 2016 18:00	1	Unstable operation - excessive baseline drift
Wind Speed, Wind Direction	14 Apr 2016 07:00	14 Apr 2016 09:00	3	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	14 Apr 2016 11:00	14 Apr 2016 11:00	1	Flat line in sensor output signal - Sensor frozen

Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO_2) - ppb

Athabasca Valley - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 19 ppb on Apr 1 15:00 Maximum Daily Average: 3.3 ppb on Apr 1

Minimum Value: 0 ppb on Apr 22 21:00 Minimum Daily Average: 0.1 ppb on Apr 22
Maximum Diurnal Average: 1.3 ppb at hour 13 Minimum Diurnal Average: 0.2 ppb at hour 24
Monthly Average: 0.7 ppb Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 2$ $P_{99} = 8$

Hours in Service:	720
Hours of Data:	681
Hours of Missing Data:	39
Hours of Calibration:	35
Percent Operational Time:	99.4

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-Apr	0	Z	0	0	0	0	0	0	0	4	8	10	17	12	19	1	0	0	0	0	0	0	0	0	3.3	19
2-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	6	2	7	5	4	2	1	0	1	1.4	7
3-Apr	1	1	1	Z	1	2	2	0	1	2	1	1	5	9	5	5	7	4	8	3	2	1	0	0	2.6	9
4-Apr	0	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
5-Apr	0	0	0	0	1	Z	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
6-Apr	Z	0	0	0	PF	PF	PF	1	0	2	1	1	0	0	1	2	8	6	2	0	0	0	0	0	1.3	8
7-Apr	0	Z	0	0	0	0	0	0	0	0	1	2	1	1	2	3	3	1	0	0	0	0	0	0	0.7	3
8-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
9-Apr	0	0	0	Z	0	0	0	1	1	1	2	2	0	1	1	3	3	4	2	2	3	2	3	1	1.4	4
10-Apr	6	3	3	2	Z	0	0	3	9	2	0	0	0	1	2	2	2	1	1	1	0	0	0	0	1.8	9
11-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0.3	1
12-Apr	Z	0	0	0	0	0	0	1	8	4	2	1	4	2	0	0	0	0	1	0	0	0	1	0	1.2	8
13-Apr	0	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
14-Apr	0	0	Z	0	0	0	2	2	2	0	0	2	PF	0	0	0	0	0	1	0	0	0	0	0	0.6	2
15-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
16-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
17-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
18-Apr	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	1
19-Apr	0	0	0	0	0	0	0	Z	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.2	0
20-Apr	0	0	0	Z	0	0	0	0	0	1	2	3	1	0	0	0	0	0	0	0	0	0	0	0	0.4	3
21-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0.2	1
22-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
23-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
24-Apr	Z	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
25-Apr	0	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
26-Apr	0	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
27-Apr	0	0	0	Z	0	0	0	0	0	0	0	1	0	0	2	5	5	4	2	2	1	1	0	0	1.2	5
28-Apr	0	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
29-Apr	0	0	1	1	0	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
30-Apr	Z	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
	0.4	0.3	0.3	0.3	0.3	0.2	0.3	0.4	0.9	0.8	0.8	0.9	1.3	1.0	1.2	1.1	1.2	1.0	0.9	0.6	0.4	0.3	0.3	0.2	Diurnal Average	
	6	3	3	2	1	2	2	3	9	4	8	10	17	12	19	6	8	7	8	4	3	2	3	1	Diurnal Maximum	

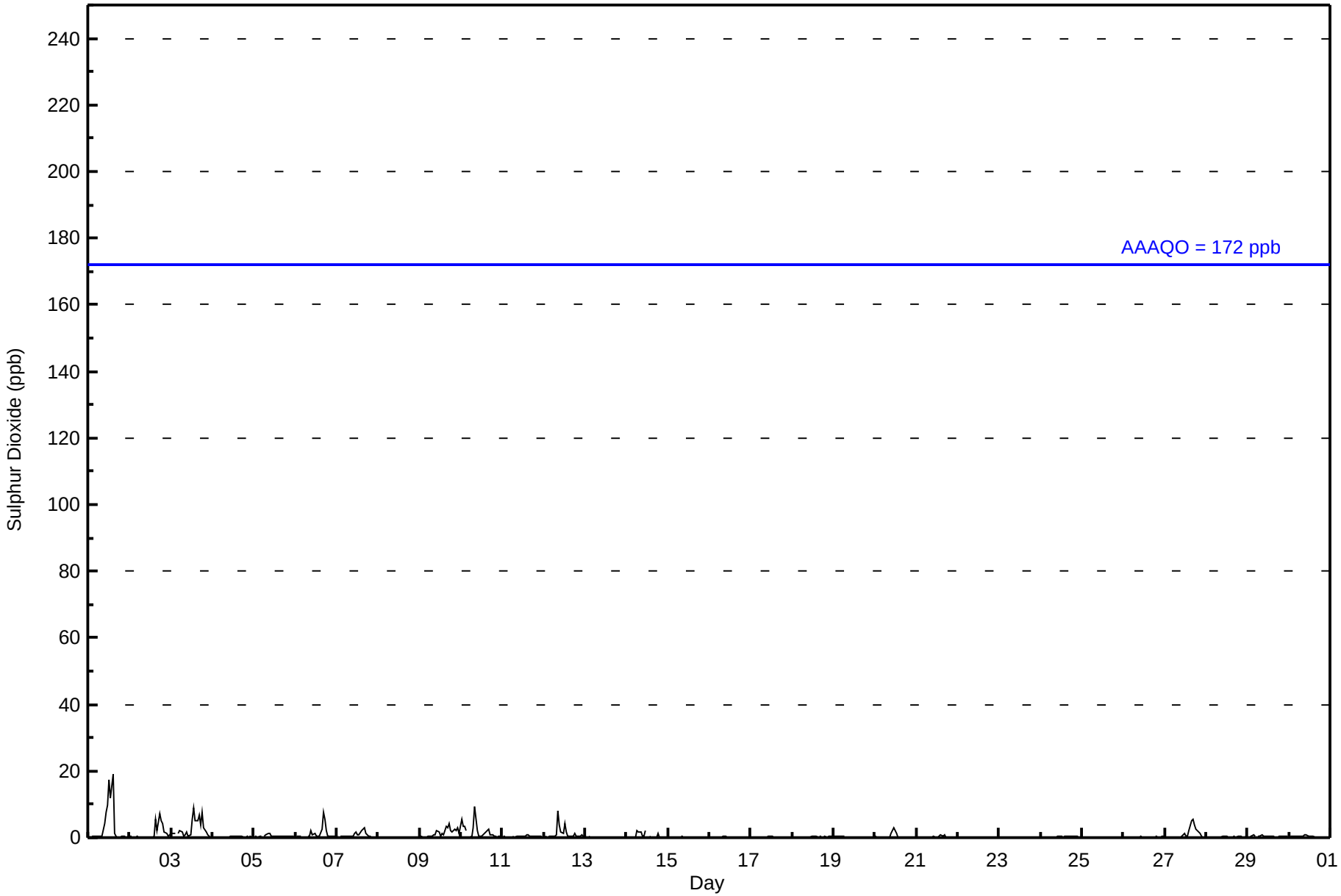
Z - zerospan C - Calibration PF - Power Failure
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb

Wood Buffalo Environmental Association

Hourly Averages

Sulphur Dioxide (SO_2) - ppb

Athabasca Valley - April 2016



Sulphur Dioxide (SO_2) - ppb
Athabasca Valley - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	678	99.56	99.56
11 - 20	3	0.44	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 681

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

Athabasca Valley - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 10	84	17	12	13	34	41	149	56	34	30	25	14	13	19	24	109	674
11 - 20	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	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	85	18	12	13	34	41	149	56	34	30	25	14	13	19	24	110	677

Total Number of Valid Hours: 677

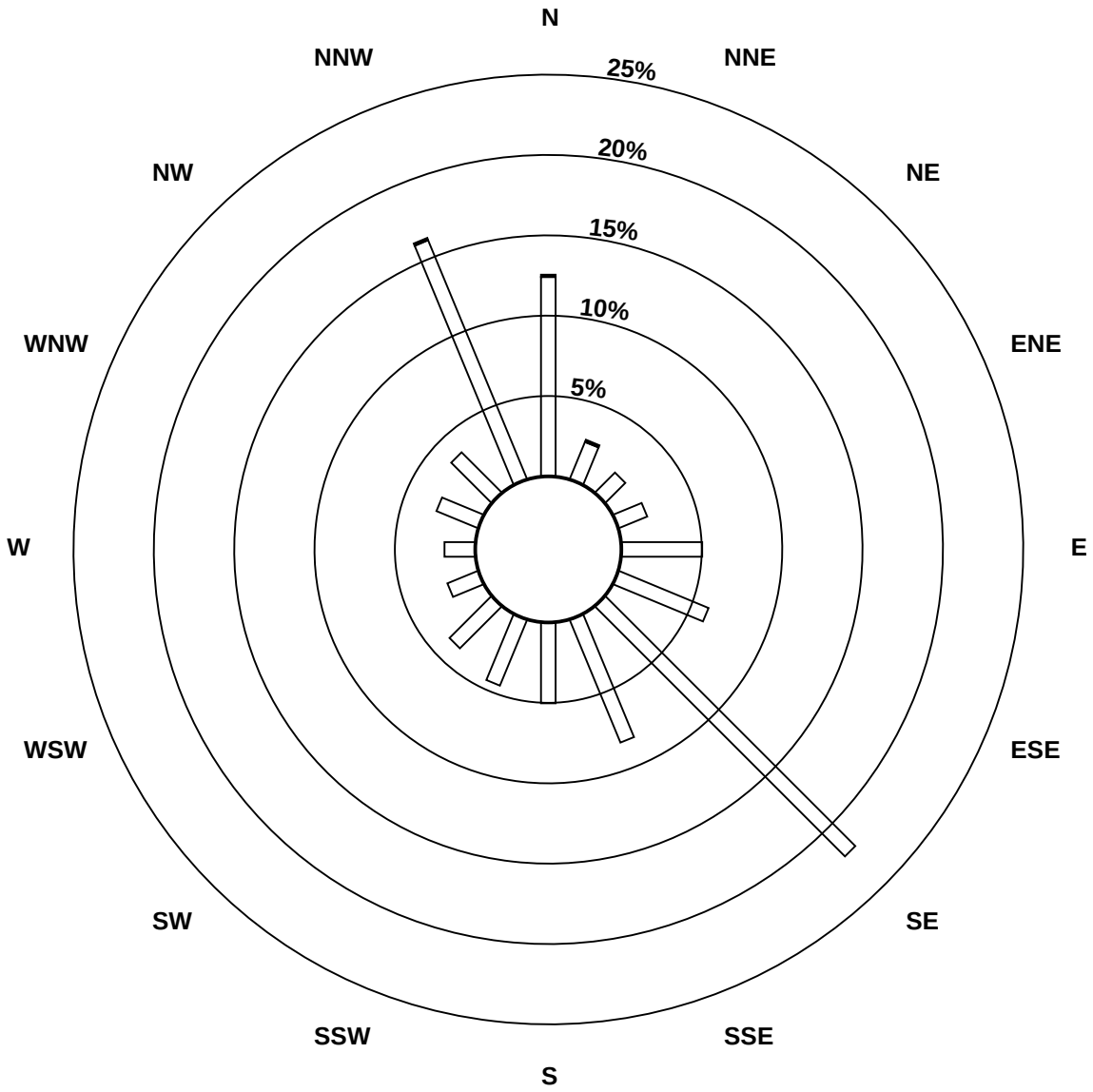
Total Number of Hours: 720

Wood Buffalo Environmental Association

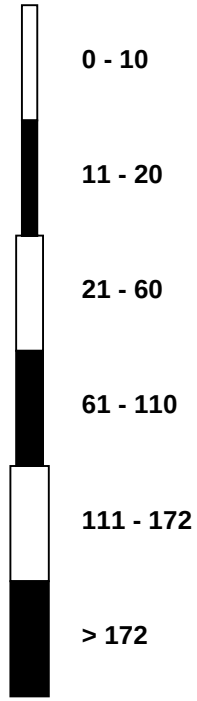
Wind Rose Apr 2016

Sulphur Dioxide (SO_2) - ppb

Athabasca Valley (AMS 7)



Classes (ppb)



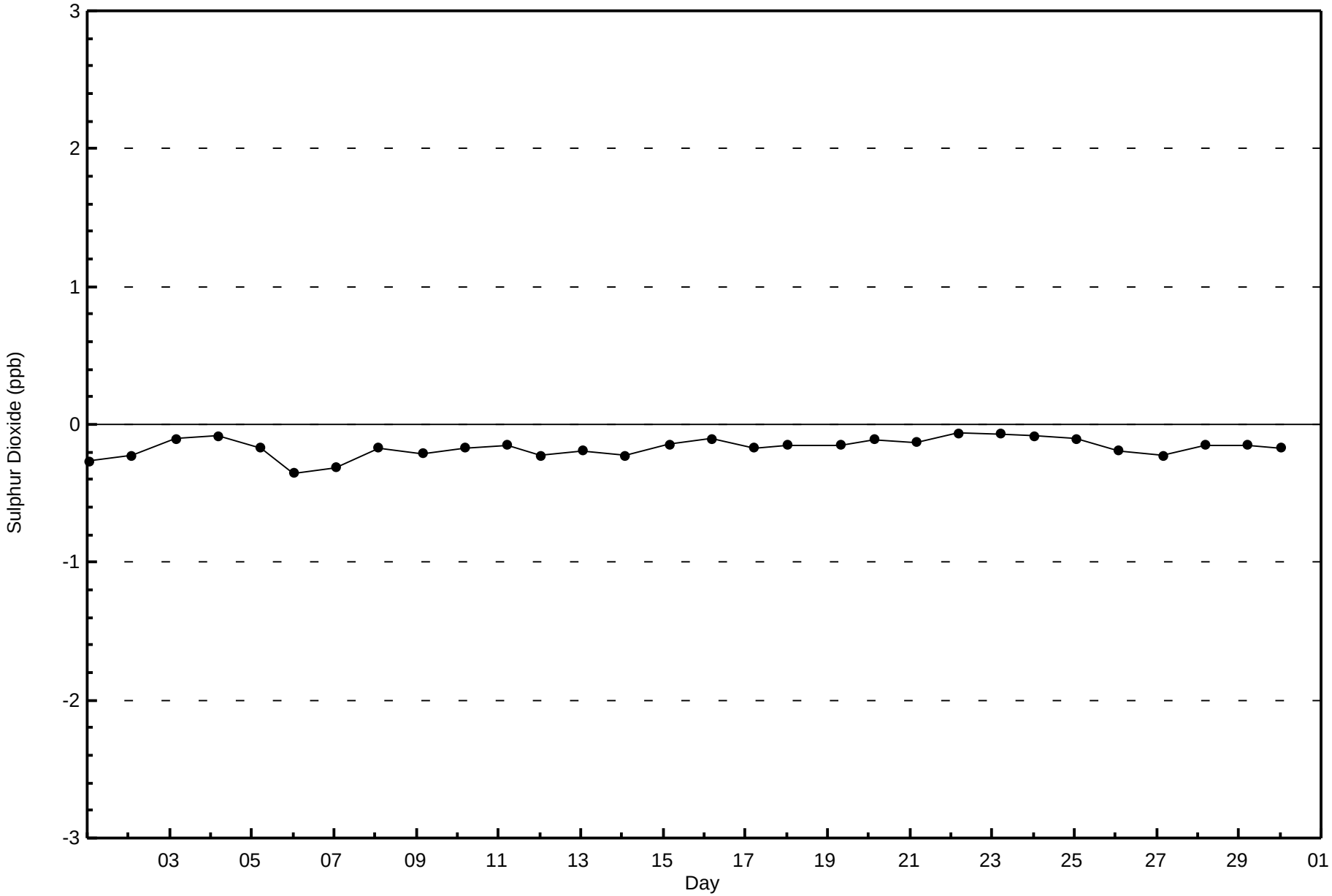
Total Number of Valid Hours: 677

Wood Buffalo Environmental Association

Zero Responses

Sulphur Dioxide (SO_2) - ppb

Athabasca Valley - April 2016

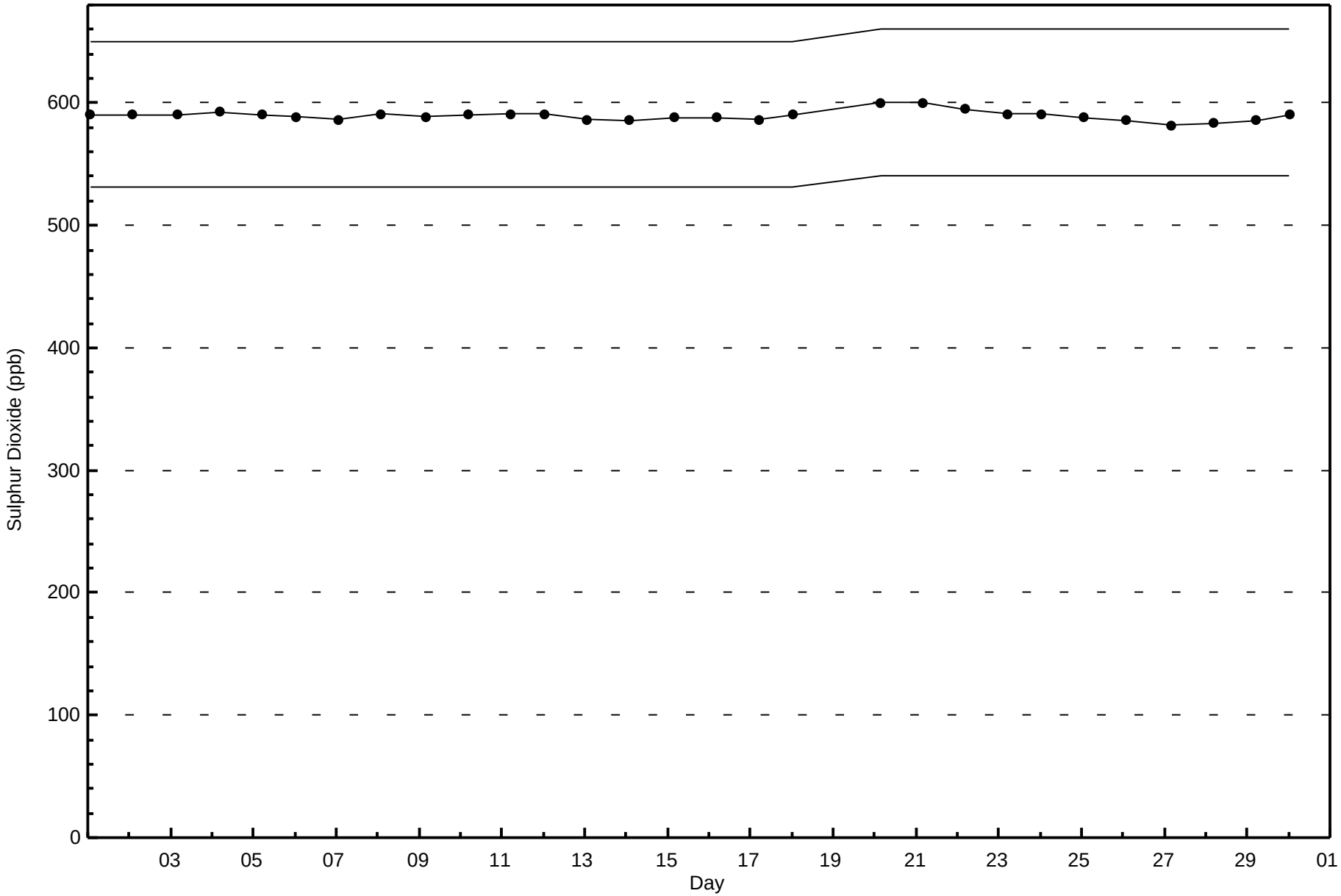


Wood Buffalo Environmental Association

Span Responses

Sulphur Dioxide (SO_2) - ppb

Athabasca Valley - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

Athabasca Valley - April 2016

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

Maximum Value: 1 ppb on Apr 5 09:00

Maximum Daily Average: 0.3 ppb on Apr 1

Minimum Value: 0 ppb on Apr 21 12:00

Minimum Daily Average: 0.1 ppb on Apr 8

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:	720
Hours of Data:	682
Hours of Missing Data:	38
Hours of Calibration:	32
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-Apr	0	0	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
2-Apr	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
3-Apr	0	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
4-Apr	0	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-Apr	0	0	0	0	1	1	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
6-Apr	0	Z	0	0	PF	PF	PF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
7-Apr	0	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-Apr	0	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
9-Apr	0	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-Apr	0	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
11-Apr	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
12-Apr	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.3	1
13-Apr	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.3	1
14-Apr	0	0	0	Z	0	0	0	0	1	0	0	0	PF	0	0	0	0	0	0	0	0	0	0	0	0.3	1
15-Apr	0	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
16-Apr	0	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
17-Apr	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
18-Apr	0	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
19-Apr	0	0	0	0	0	0	0	0	M	0	0	0	M	0	0	0	0	0	0	0	0	0	0	0	0.3	0
20-Apr	0	0	0	0	Z	0	0	0	0	0	0	C	C	C	0	0	0	0	0	0	0	0	0	0	0.2	0
21-Apr	0	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
22-Apr	0	1	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
23-Apr	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
24-Apr	0	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
25-Apr	0	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
26-Apr	0	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
27-Apr	0	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
28-Apr	0	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
29-Apr	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
30-Apr	0	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
	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	0.2	0.2	0.2	0.2	0.2	0.3	0.3	Diurnal Average	
	1	1	0	0	1	1	0	1	1	1	0	0	0	0	0	0	1	0	1	1	0	0	1	1	Diurnal Maximum	

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

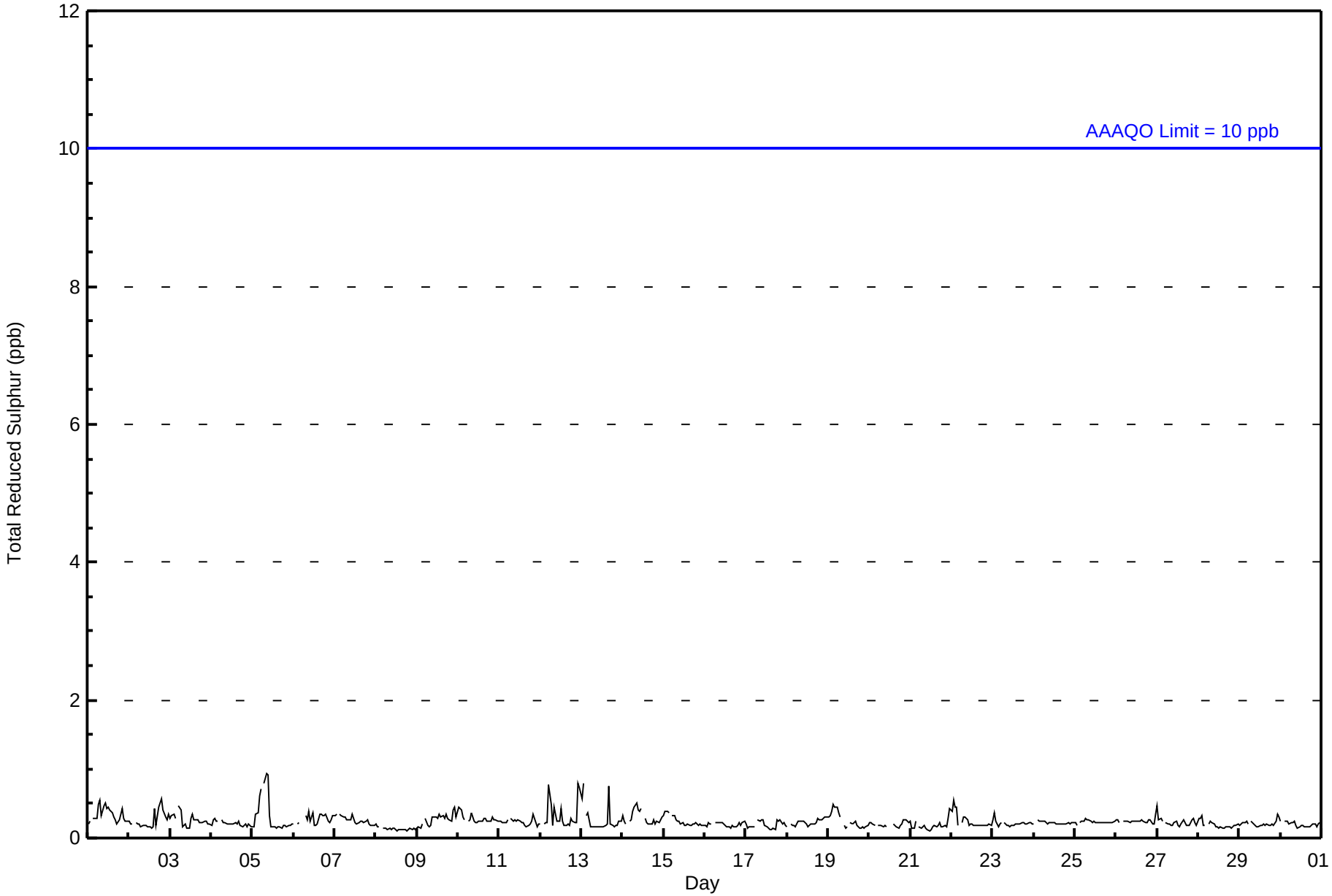
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb

Wood Buffalo Environmental Association

Hourly Averages

Total Reduced Sulphur (TRS) - ppb

Athabasca Valley - April 2016



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	682	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Total Reduced Sulphur (TRS) - ppb

Athabasca Valley - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 2	85	17	13	13	35	39	150	55	34	28	27	15	15	22	24	106	678
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	85	17	13	13	35	39	150	55	34	28	27	15	15	22	24	106	678

Total Number of Valid Hours: 678

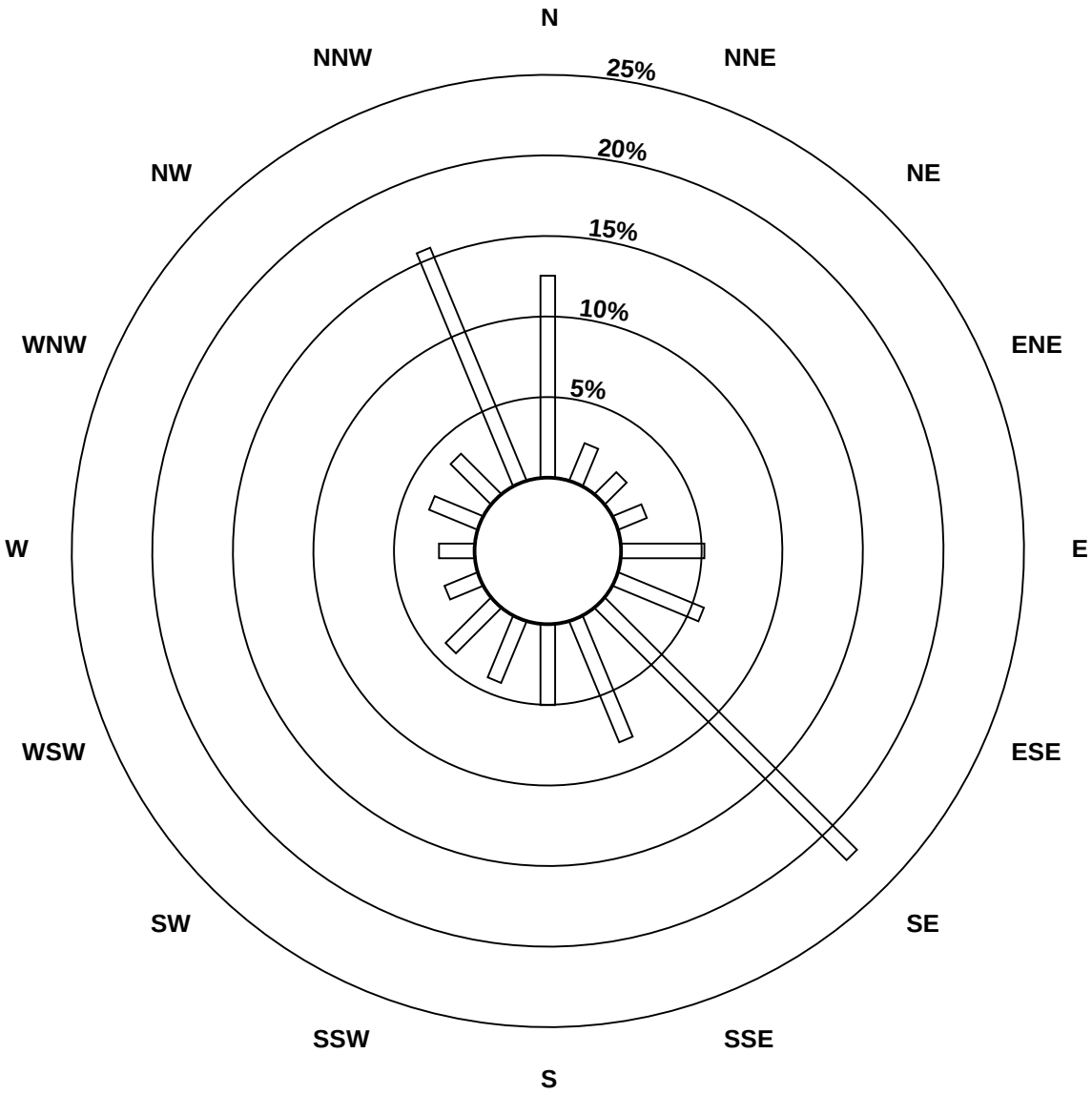
Total Number of Hours: 720

Wood Buffalo Environmental Association

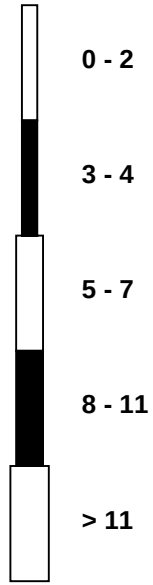
Wind Rose Apr 2016

Total Reduced Sulphur (TRS) - ppb

Athabasca Valley (AMS 7)



Classes (ppb)



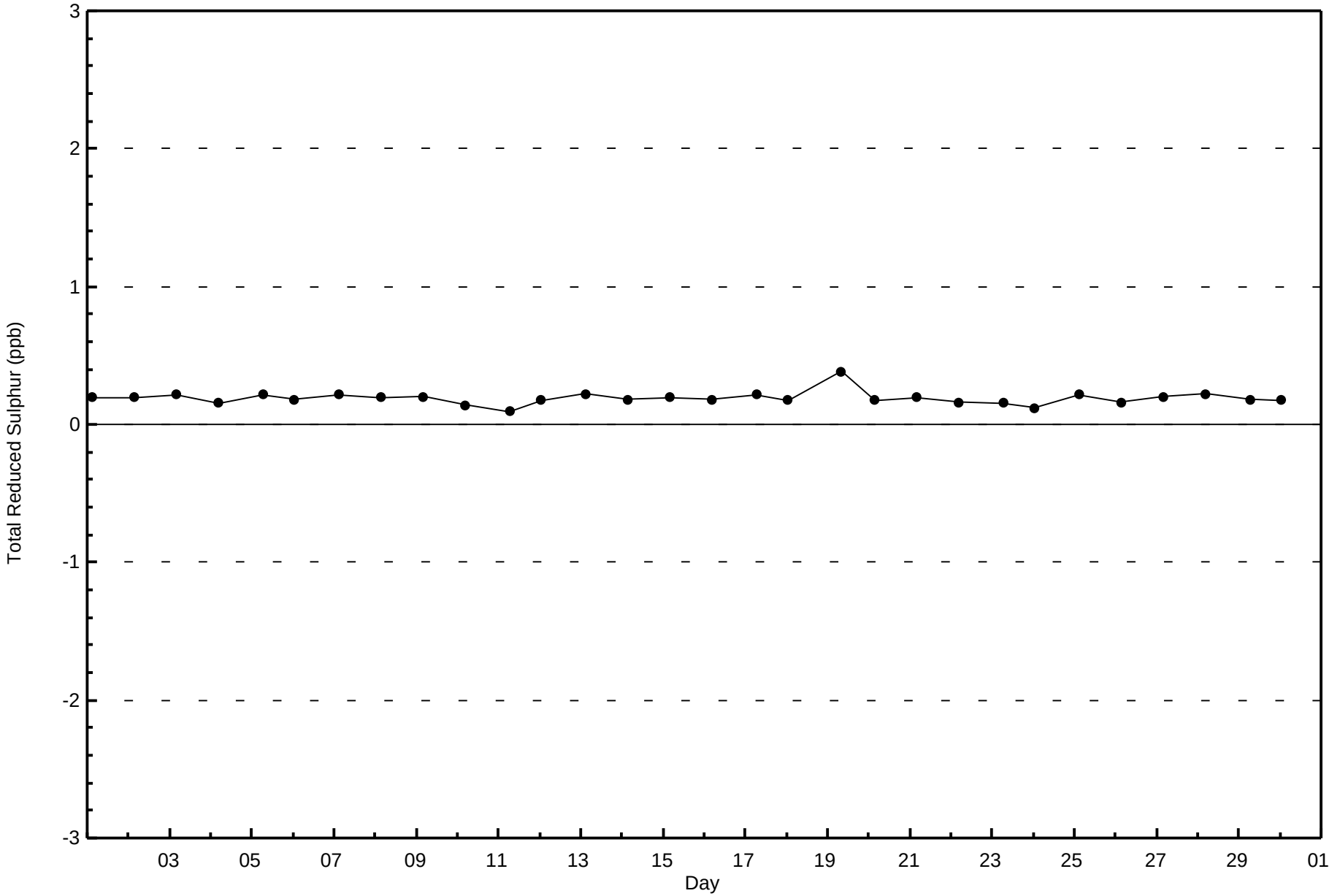
Total Number of Valid Hours: 678

Wood Buffalo Environmental Association

Zero Responses

Total Reduced Sulphur (TRS) - ppb

Athabasca Valley - April 2016

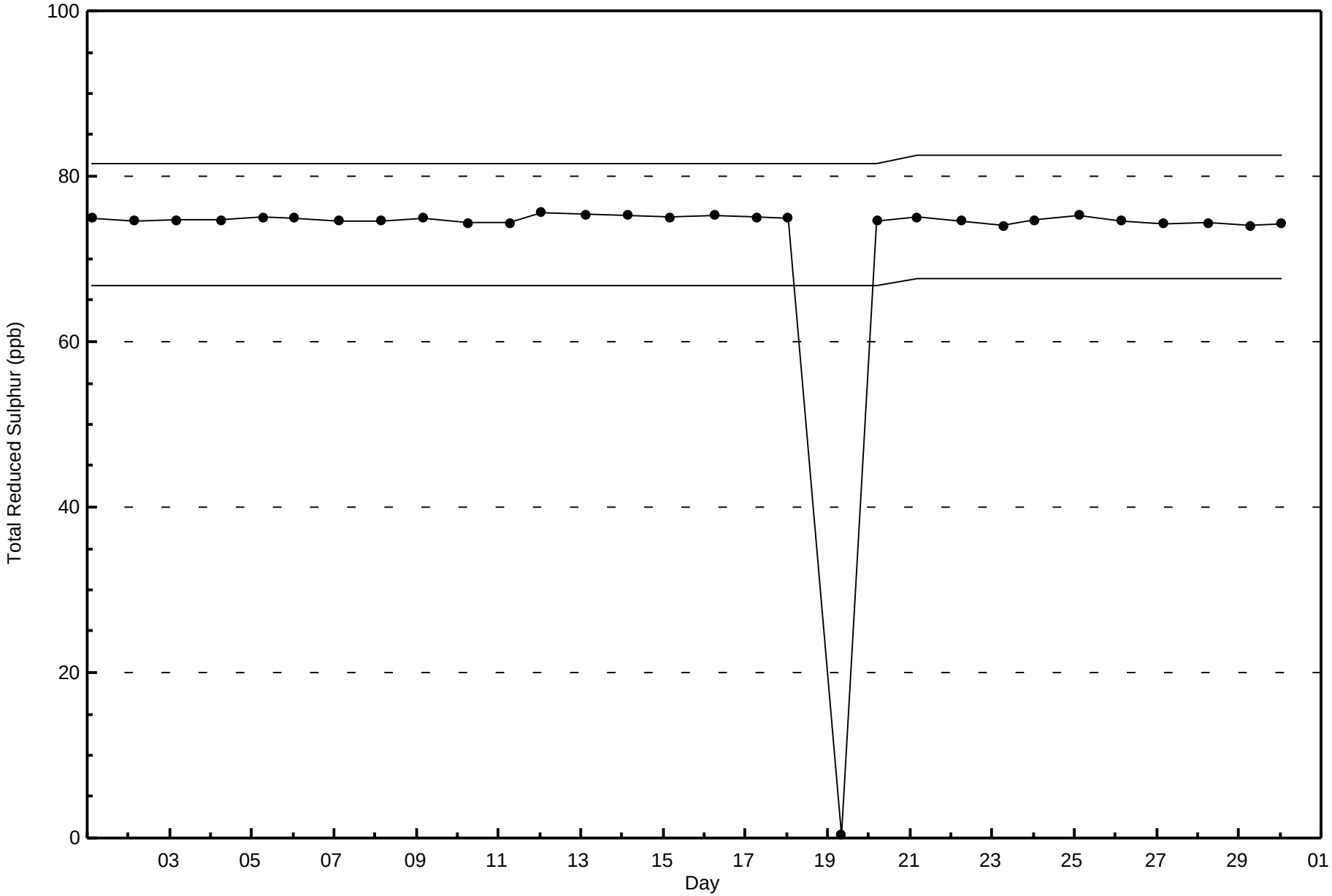


Wood Buffalo Environmental Association

Span Responses

Total Reduced Sulphur (TRS) - ppb

Athabasca Valley - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Athabasca Valley - April 2016

Maximum Value: 2.3 ppm on Apr 28 06:00

Maximum Daily Average: 2.0 ppm on Apr 5

Minimum Value: 1.8 ppm on Apr 19 14:00

Minimum Daily Average: 1.8 ppm on Apr 19

Maximum Diurnal Average: 1.9 ppm at hour 6

Minimum Diurnal Average: 1.9 ppm at hour 15

Monthly Average: 1.89 ppm

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

Hours in Service:	720
Hours of Data:	679
Hours of Missing Data:	41
Hours of Calibration:	35
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-Apr	2.0	Z	1.9	2.1	2.0	2.2	2.1	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.2
2-Apr	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
3-Apr	1.9	2.0	2.1	Z	1.9	2.0	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	1.9	2.0	1.9	1.9	1.9	2.1
4-Apr	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
5-Apr	1.9	1.9	1.9	1.9	2.1	Z	2.2	2.2	2.2	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	1.9	1.9	2.0	2.2
6-Apr	Z	1.9	1.9	1.9	PF	PF	PF	UO	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
7-Apr	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
8-Apr	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
9-Apr	1.9	1.9	1.9	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	2.0
10-Apr	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
11-Apr	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	1.9	1.9	2.0
12-Apr	Z	2.0	1.9	2.0	2.2	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	1.9	1.9	2.0	2.0	1.9	2.2
13-Apr	2.0	Z	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
14-Apr	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	PF	PF	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-Apr	2.0	2.1	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	2.1
16-Apr	1.9	1.9	1.9	1.9	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	2.0	1.9	2.0
17-Apr	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	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	2.0
18-Apr	Z	1.9	1.9	1.9	2.0	2.0	1.9	1.9	1.9	2.1	2.1	1.9	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	2.1
19-Apr	1.9	1.9	1.9	1.9	1.9	1.9	1.9	Z	C	C	C	C	C	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
20-Apr	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
21-Apr	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
22-Apr	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
23-Apr	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	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	1.9	1.9	1.9	1.9
24-Apr	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	2.0
25-Apr	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
26-Apr	1.9	2.0	Z	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
27-Apr	1.9	1.9	1.9	Z	1.9	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
28-Apr	1.9	2.0	2.0	2.0	Z	2.3	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	2.3
29-Apr	1.9	1.9	1.9	1.9	1.9	Z	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	1.9	1.9
30-Apr	Z	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	1.8	1.8	1.9	1.9	2.0	1.9	1.9	1.9	1.9	2.0
	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	Diurnal Average	
	2.0	2.1	2.1	2.1	2.2	2.3	2.2	2.2	2.2	2.2	2.1	1.9	2.0	1.9	1.9	2.0	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	Diurnal Maximum	

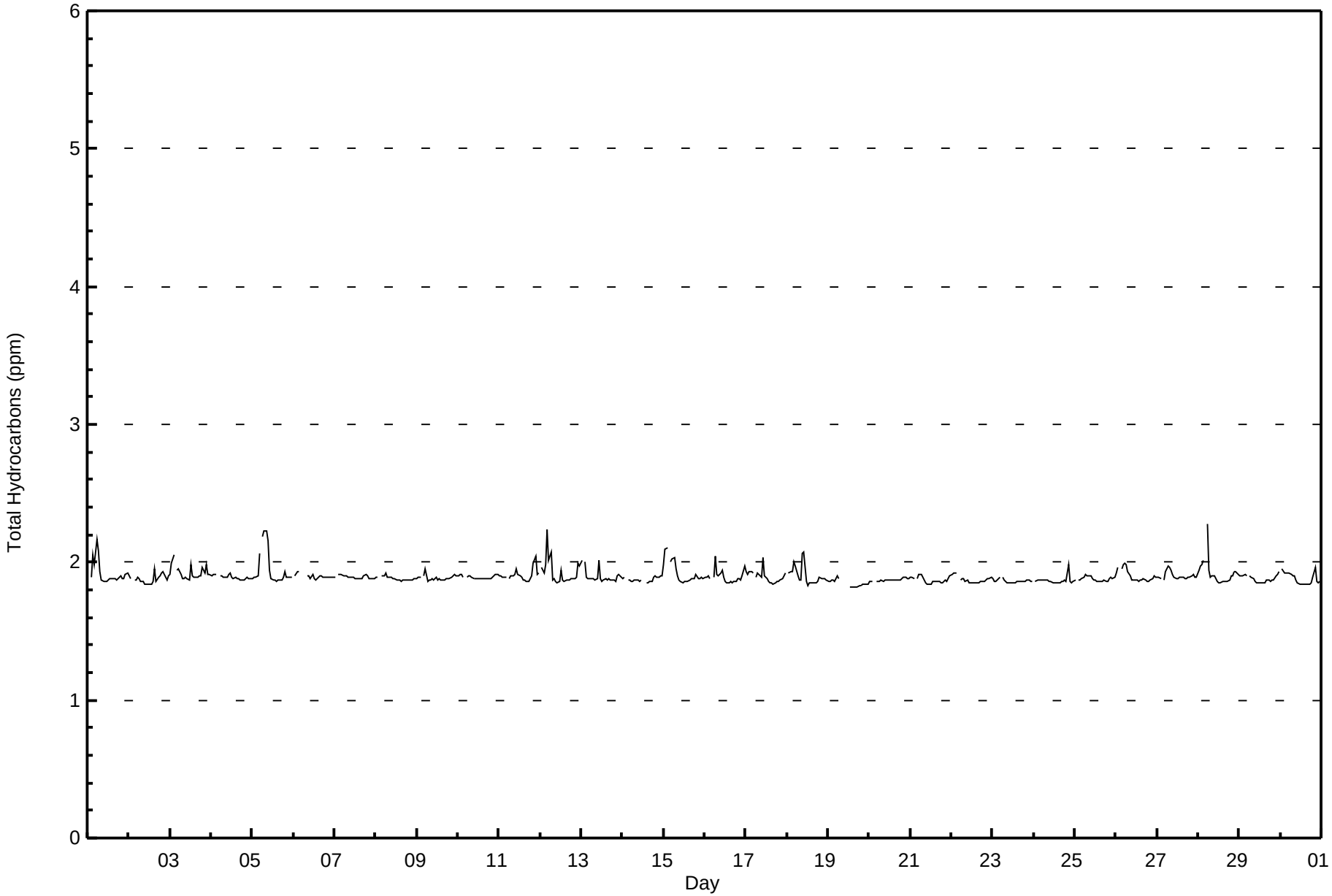
Z - zerospan C - Calibration UO - Unstable Operation PF - Power Failure

Wood Buffalo Environmental Association

Hourly Averages

Total Hydrocarbons (THC) - ppm

Athabasca Valley - April 2016



Total Hydrocarbons (THC) - ppm
Athabasca Valley - April 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	663	97.64	97.64
2.1 - 3.0	16	2.36	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 679

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Total Hydrocarbons (THC) - ppm

Athabasca Valley - April 2016

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	79	18	12	12	33	39	149	55	34	30	25	12	12	19	23	107	659
2.1 - 3.0	6	0	0	1	1	2	0	1	0	0	0	2	1	0	0	2	16
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	85	18	12	13	34	41	149	56	34	30	25	14	13	19	23	109	675

Total Number of Valid Hours: 675

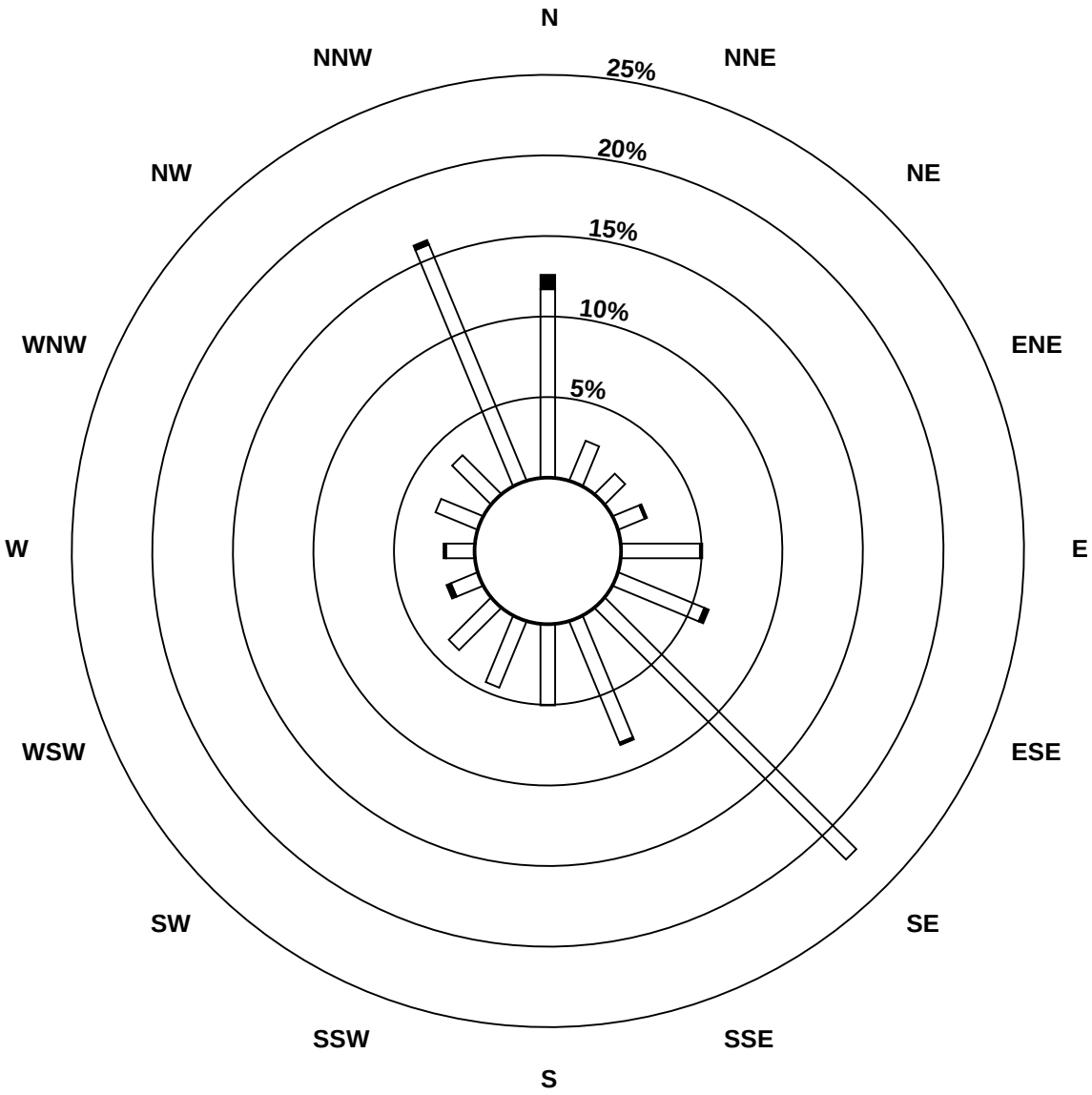
Total Number of Hours: 720

Wood Buffalo Environmental Association

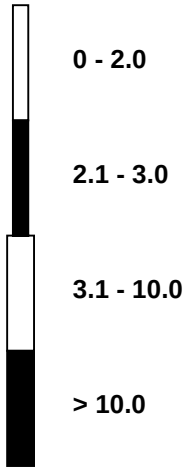
Wind Rose Apr 2016

Total Hydrocarbons (THC) - ppm

Athabasca Valley (AMS 7)



Classes (ppm)



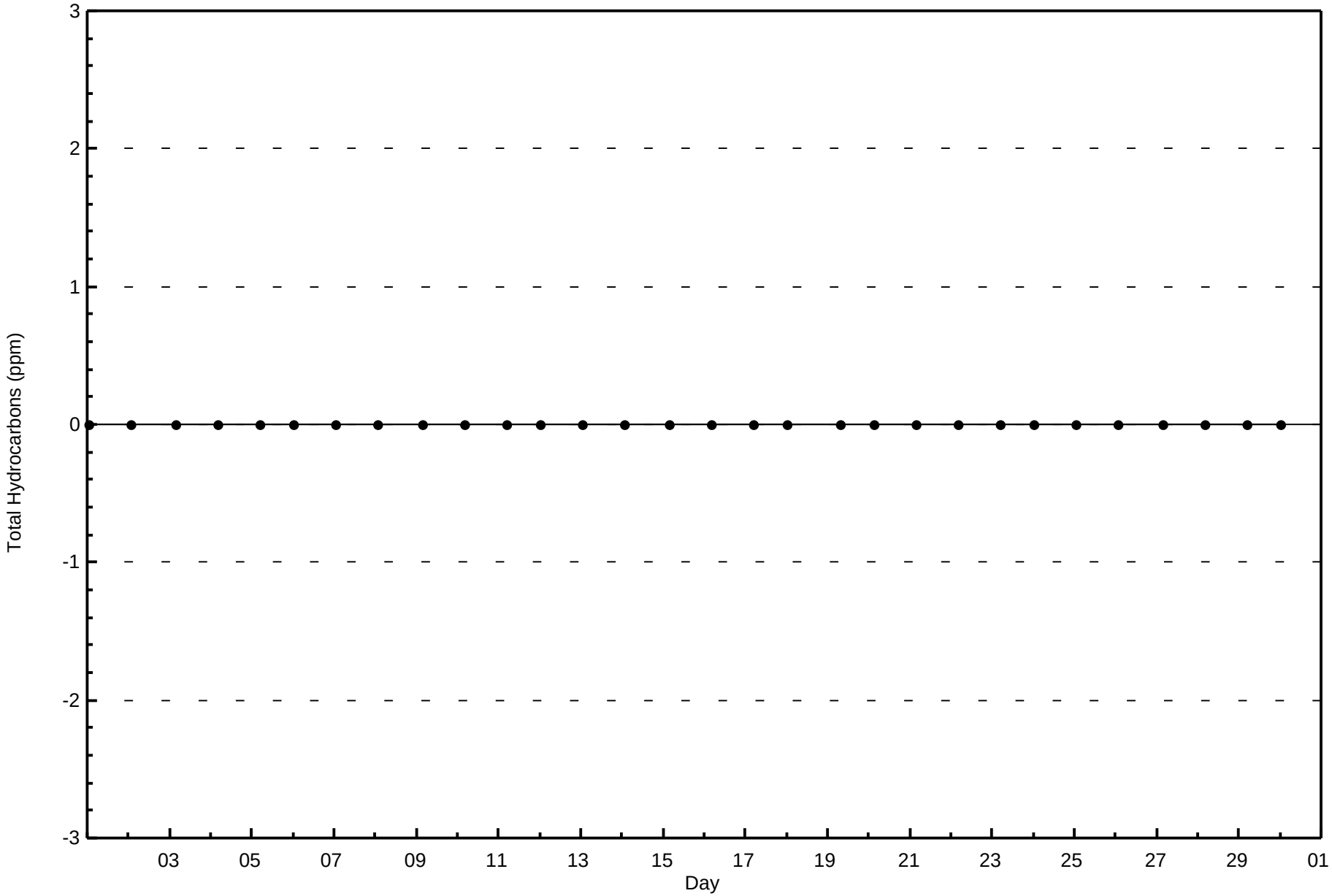
Total Number of Valid Hours: 675

Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Athabasca Valley - April 2016

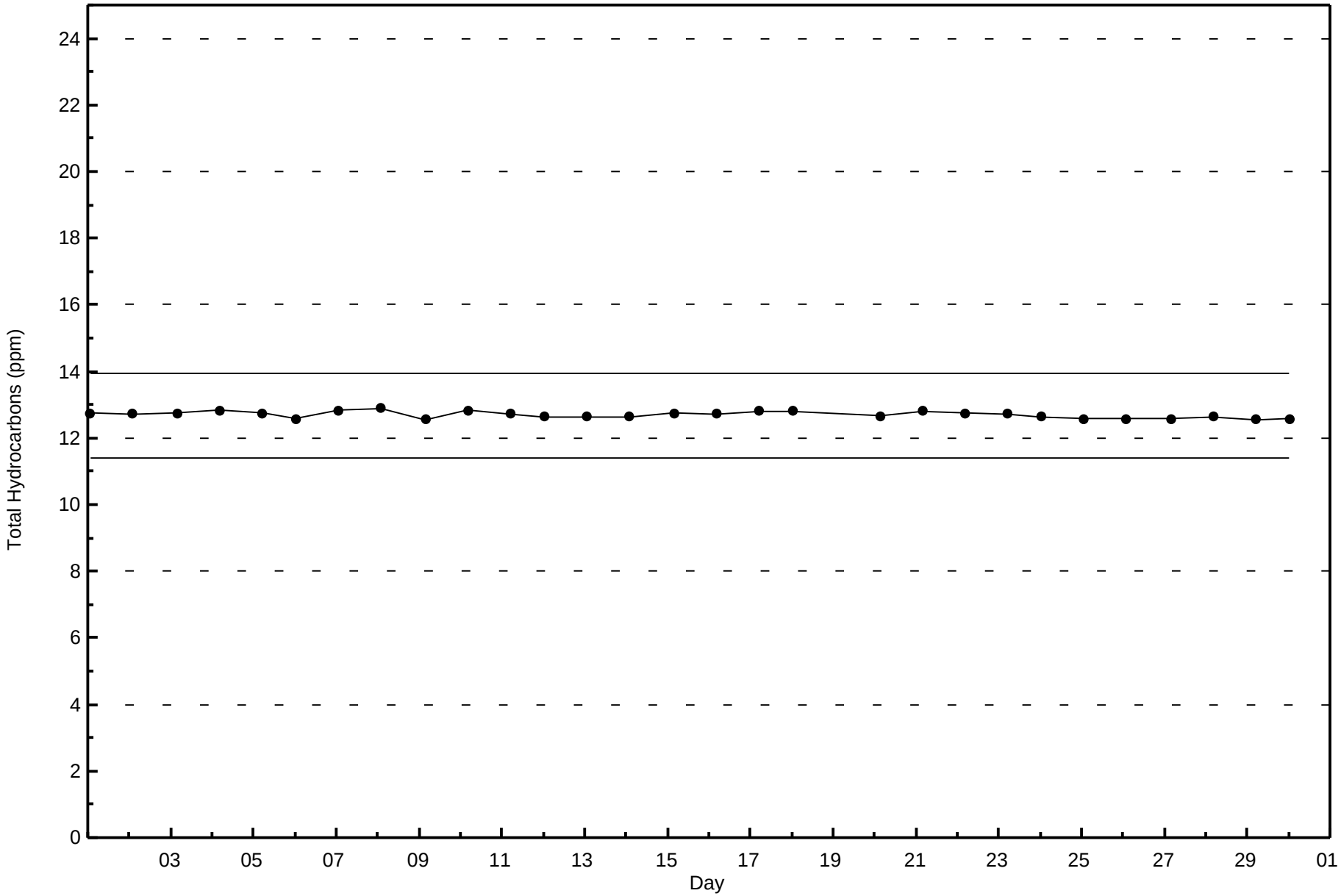


Wood Buffalo Environmental Association

Span Responses

Total Hydrocarbons (THC) - ppm

Athabasca Valley - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Non Methane Hydrocarbons (NMHC) - ppm

Athabasca Valley - April 2016

Maximum Value: 0.215 ppm on Apr 5 09:00

Maximum Daily Average: 0.042 ppm on Apr 5

Minimum Value: 0.000 ppm on Apr 1 01:00

Minimum Daily Average: 0.000 ppm on Apr 6

Maximum Diurnal Average: 0.020 ppm at hour 7

Minimum Diurnal Average: 0.000 ppm at hour 19

Monthly Average: 0.005 ppm

Percentiles: P_1 = 0.0 P_{10} = 0.0 Q_1 = 0.0 Median = 0.0 Q_3 = 0.0 P_{90} = 0.0 P_{99} = 0.2

Hours in Service:	720
Hours of Data:	679
Hours of Missing Data:	41
Hours of Calibration:	35
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-Apr	0.000	Z	0.000	0.006	0.000	0.000	0.006	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.010
2-Apr	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	0.015	0.000	0.000	0.000	0.001	0.021	0.000	0.000	0.000	0.002	0.021
3-Apr	0.000	0.021	0.080	Z	0.000	0.000	0.000	0.000	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	0.001	0.000	0.000	0.005	0.080
4-Apr	0.000	0.000	0.000	0.000	Z	0.000	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.010
5-Apr	0.000	0.000	0.000	0.001	0.090	Z	0.196	0.214	0.215	0.176	0.036	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.037	0.000	0.000	0.000	0.000	0.042	0.215
6-Apr	Z	0.000	0.000	0.000	PF	PF	PF	UO	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7-Apr	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003
8-Apr	0.000	0.000	Z	0.000	0.000	0.007	0.022	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.022
9-Apr	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
10-Apr	0.000	0.000	0.001	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004
11-Apr	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.005	0.046	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	0.002	0.046
12-Apr	Z	0.000	0.000	0.000	0.000	0.010	0.097	0.000	0.000	0.000	0.000	0.000	0.067	0.012	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.078	0.057	0.014	0.097
13-Apr	0.088	Z	0.078	0.003	0.000	0.000	0.000	0.000	0.000	0.004	0.136	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	0.014	0.136
14-Apr	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	PF	PF	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-Apr	0.074	0.170	0.190	Z	0.086	0.108	0.111	0.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.033	0.190
16-Apr	0.000	0.000	0.000	0.000	Z	0.000	0.154	0.015	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.154
17-Apr	0.000	0.000	0.000	0.000	0.000	Z	0.002	0.000	0.000	0.000	0.141	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.013	0.009	0.000	0.007	0.141
18-Apr	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.184	0.190	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.016	0.190
19-Apr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Z	C	C	C	C	C	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
20-Apr	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
21-Apr	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
22-Apr	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
23-Apr	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004
24-Apr	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.117	0.000	0.000	0.000	0.005	0.117
25-Apr	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Apr	0.000	0.001	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005
27-Apr	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.002
28-Apr	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.003	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.004
29-Apr	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
30-Apr	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.007	0.007	0.013	0.000	0.007	0.005	0.020	0.010	0.008	0.013	0.019	0.000	0.002	0.001	0.000	0.001	0.000	0.000	0.000	0.001	0.005	0.000	0.003	0.002	Diurnal Average	
	0.088	0.170	0.190	0.006	0.090	0.108	0.196	0.214	0.215	0.184	0.190	0.006	0.067	0.012	0.010	0.015	0.005	0.002	0.000	0.037	0.117	0.013	0.078	0.057	Diurnal Maximum	

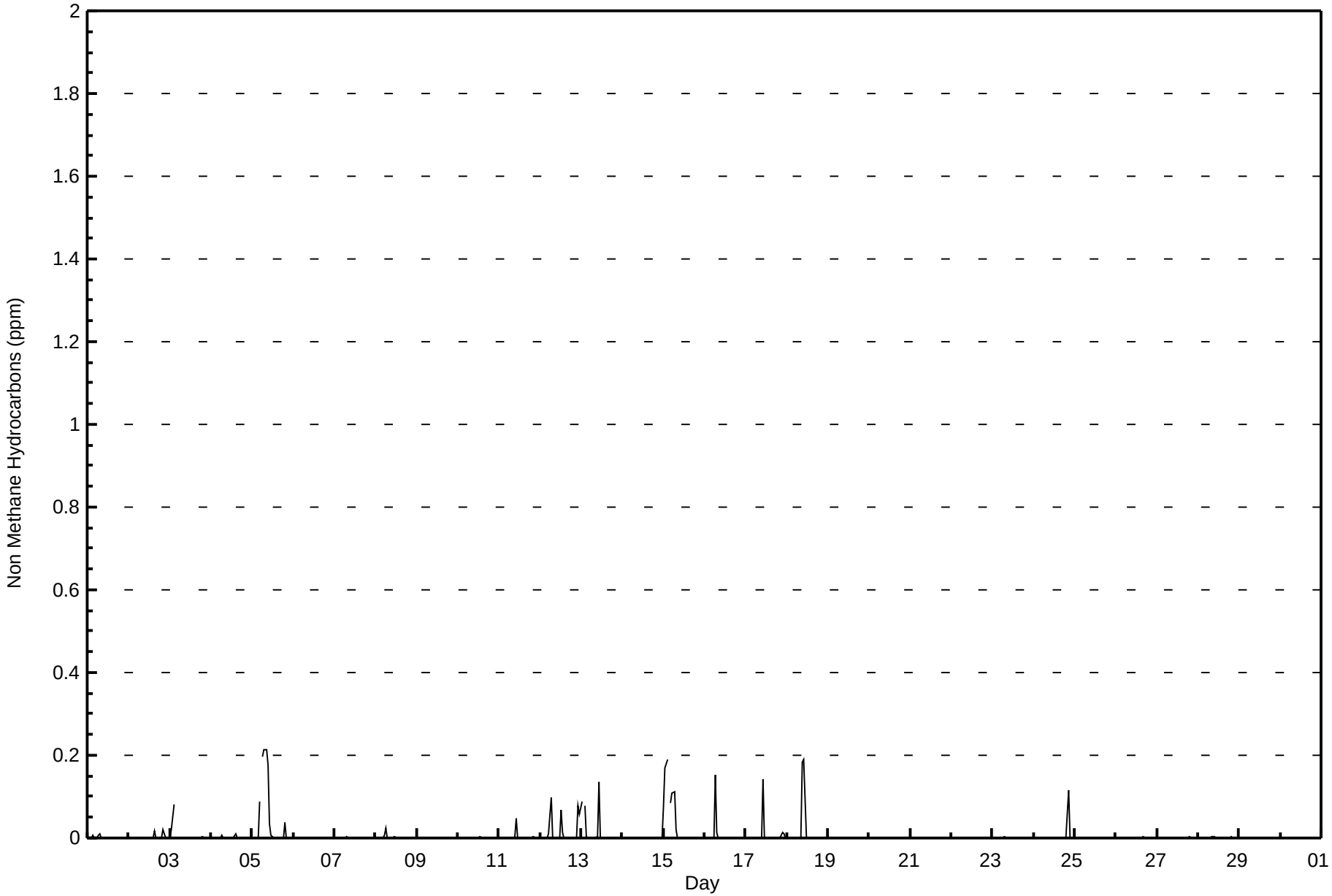
Z - zerospan C - Calibration UO - Unstable Operation PF - Power Failure

Wood Buffalo Environmental Association

Hourly Averages

Non Methane Hydrocarbons (NMHC) - ppm

Athabasca Valley - April 2016



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm

Athabasca Valley - April 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	635	93.52	93.52
0.006 - 0.05	20	2.95	96.47
0.06 - 0.1	15	2.21	98.67
> 0.1	9	1.33	100.00

Total Number of Valid Hours: 679

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm

Athabasca Valley - April 2016

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	74	17	11	12	32	39	141	52	34	28	25	13	10	19	22	102	631
0.006 - 0.05	3	0	1	0	1	1	4	4	0	2	0	0	0	0	0	4	20
0.06 - 0.1	4	1	0	0	1	0	3	0	0	0	0	0	2	0	1	3	15
> 0.1	4	0	0	1	0	1	1	0	0	0	0	1	1	0	0	0	9
Totals	85	18	12	13	34	41	149	56	34	30	25	14	13	19	23	109	675

Total Number of Valid Hours: 675

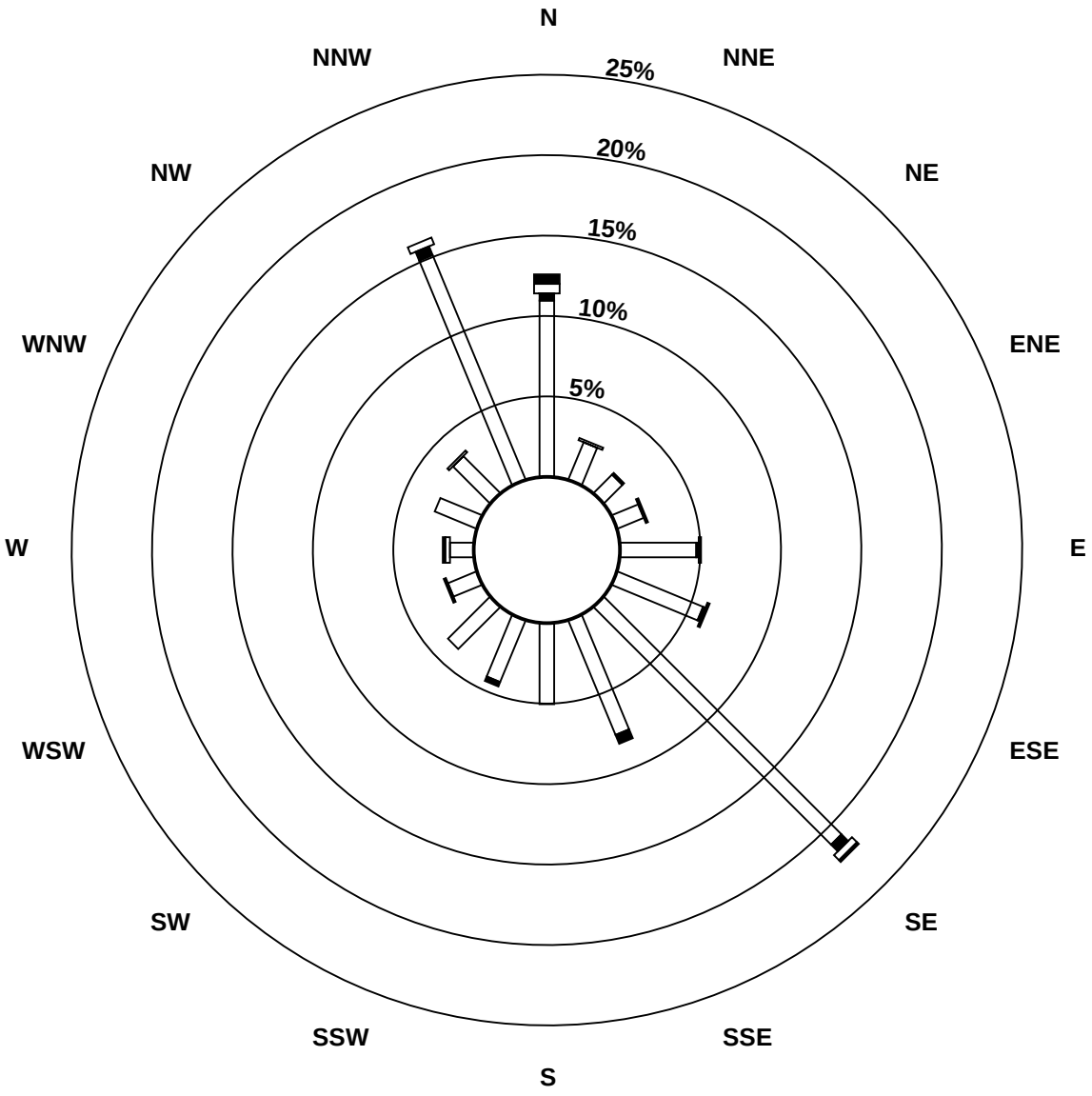
Total Number of Hours: 720

Wood Buffalo Environmental Association

Wind Rose Apr 2016

Non Methane Hydrocarbons (NMHC) - ppm

Athabasca Valley (AMS 7)



Classes (ppm)

0 - 0.005

0.006 - 0.05

0.06 - 0.1

> 0.1

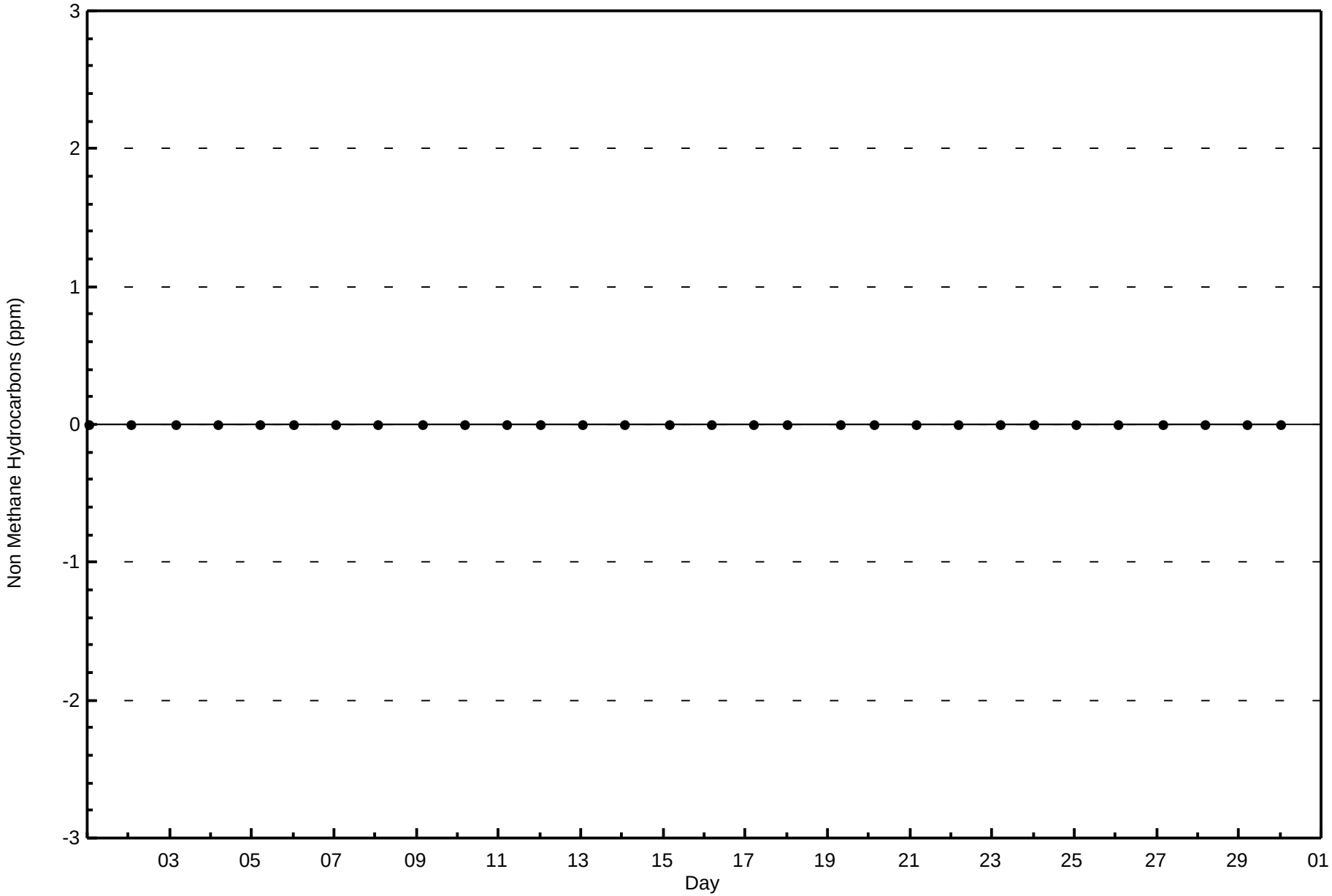
Total Number of Valid Hours: 675

Wood Buffalo Environmental Association

Zero Responses

Non Methane Hydrocarbons (NMHC) - ppm

Athabasca Valley - April 2016

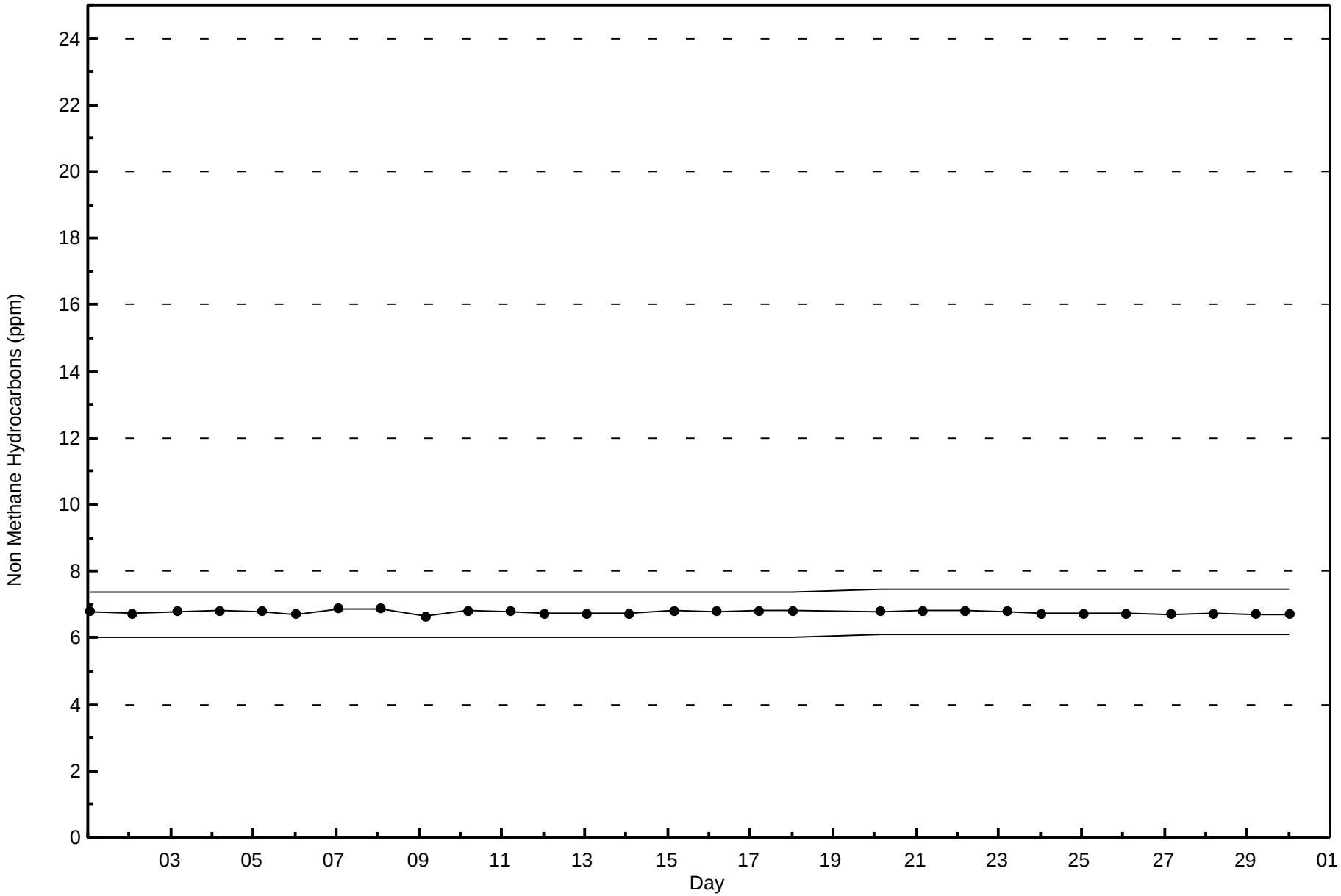


Wood Buffalo Environmental Association

Span Responses

Non Methane Hydrocarbons (NMHC) - ppm

Athabasca Valley - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Methane (CH_4) - ppm

Athabasca Valley - April 2016

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

Maximum Value: 2.3 ppm on Apr 28 06:00

Maximum Daily Average: 1.9 ppm on Apr 1

Minimum Value: 1.8 ppm on Apr 19 14:00

Minimum Daily Average: 1.8 ppm on Apr 19

Maximum Diurnal Average: 1.9 ppm at hour 6

Minimum Diurnal Average: 1.9 ppm at hour 15

Monthly Average: 1.89 ppm

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

Hours in Service:	720
Hours of Data:	679
Hours of Missing Data:	41
Hours of Calibration:	35
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-Apr	2.0	Z	1.9	2.0	2.0	2.2	2.1	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.2
2-Apr	1.9	1.9	Z	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	1.9	1.9	1.9
3-Apr	1.9	2.0	2.0	Z	1.9	2.0	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	1.9	2.0	1.9	1.9	1.9	2.0
4-Apr	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
5-Apr	1.9	1.9	1.9	1.9	2.0	Z	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
6-Apr	Z	1.9	1.9	1.9	PF	PF	PF	UO	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
7-Apr	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
8-Apr	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
9-Apr	1.9	1.9	1.9	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	2.0
10-Apr	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
11-Apr	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	2.0	2.0	1.9	1.9	1.9	2.0
12-Apr	Z	2.0	1.9	2.0	2.2	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	2.2
13-Apr	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
14-Apr	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	PF	PF	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-Apr	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
16-Apr	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.0
17-Apr	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
18-Apr	Z	1.9	1.9	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	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	2.0
19-Apr	1.9	1.9	1.9	1.9	1.9	1.9	1.9	Z	C	C	C	C	C	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
20-Apr	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
21-Apr	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
22-Apr	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
23-Apr	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	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	1.9	1.9	1.9	1.9
24-Apr	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
25-Apr	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
26-Apr	1.9	2.0	Z	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
27-Apr	1.9	1.9	1.9	Z	1.9	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
28-Apr	1.9	2.0	2.0	2.0	Z	2.3	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	2.3
29-Apr	1.9	1.9	1.9	1.9	1.9	Z	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	1.9	1.9
30-Apr	Z	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	1.8	1.8	1.9	1.9	2.0	1.9	1.9	1.9	1.9	2.0
	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	Diurnal Average	
	2.0	2.0	2.0	2.0	2.2	2.3	2.1	2.0	2.0	2.0	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.9	2.0	Diurnal Maximum	

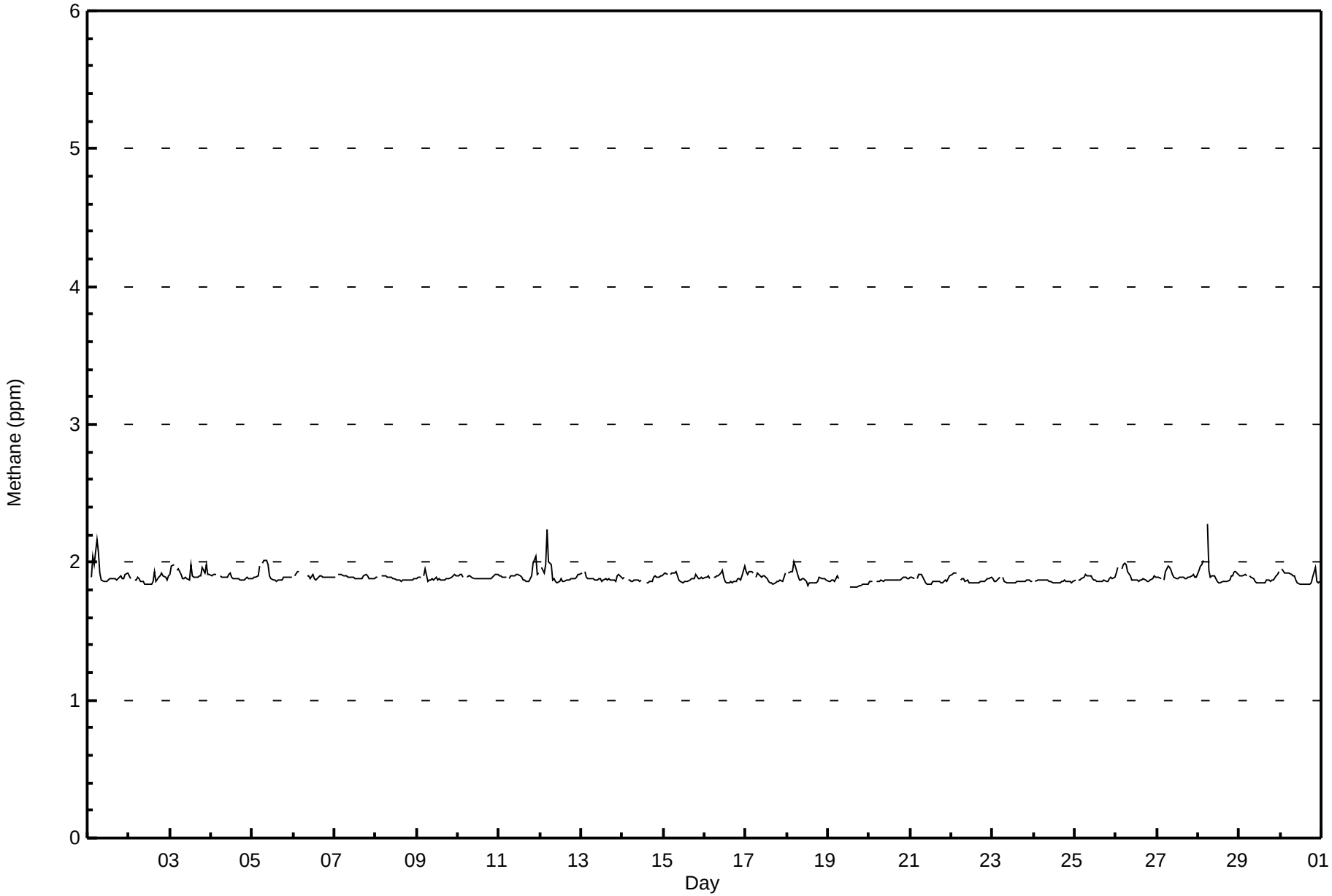
Z - zerospan C - Calibration UO - Unstable Operation PF - Power Failure

Wood Buffalo Environmental Association

Hourly Averages

Methane (CH_4) - ppm

Athabasca Valley - April 2016



Methane (CH_4) - ppm
Athabasca Valley - April 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	675	99.41	99.41
2.1 - 3.0	4	0.59	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 679

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Methane (CH_4) - ppm

Athabasca Valley - April 2016

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	84	18	12	13	34	40	149	55	34	30	25	13	13	19	23	109	671
2.1 - 3.0	1	0	0	0	0	1	0	1	0	0	0	1	0	0	0	0	4
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	85	18	12	13	34	41	149	56	34	30	25	14	13	19	23	109	675

Total Number of Valid Hours: 675

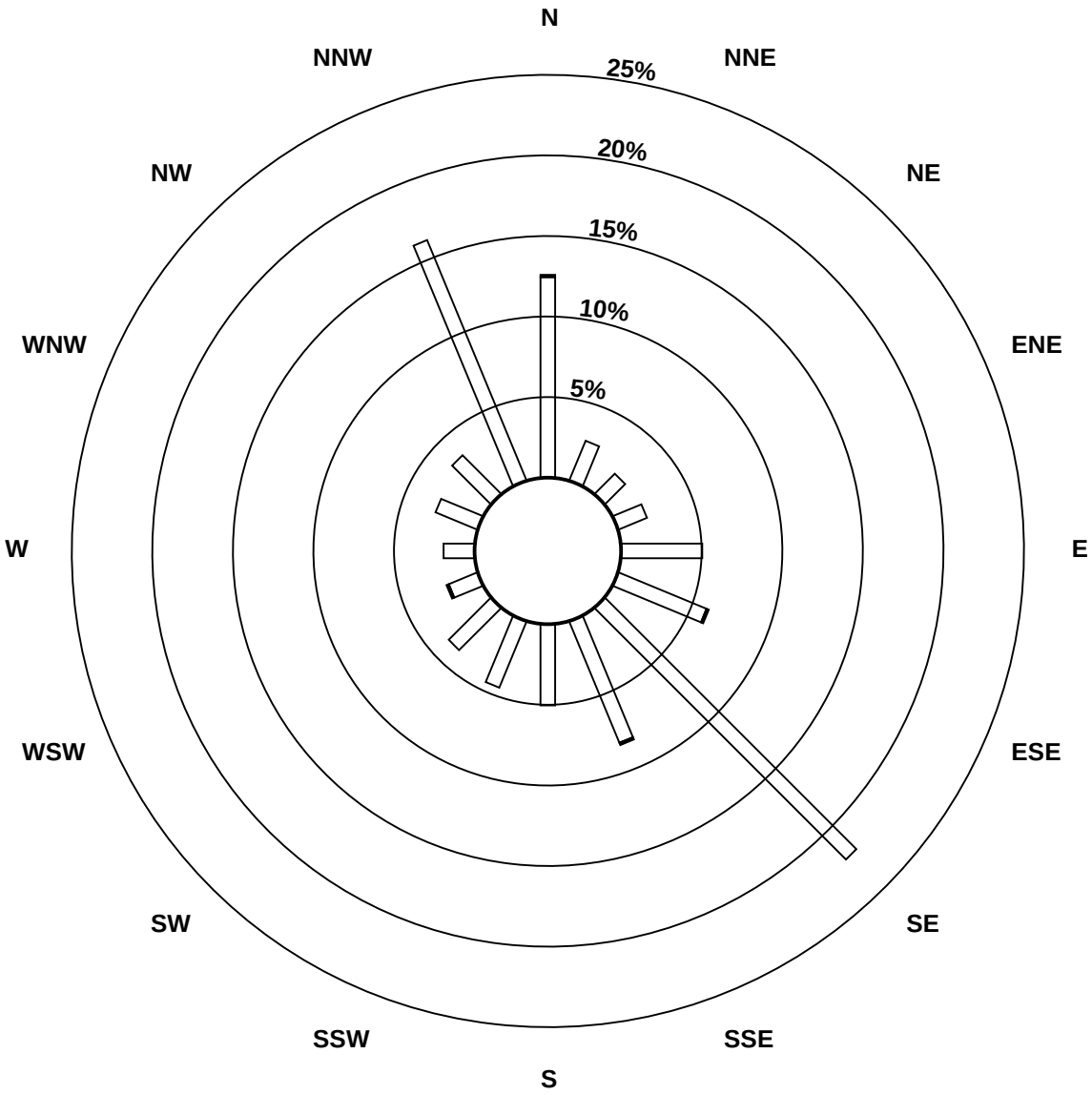
Total Number of Hours: 720

Wood Buffalo Environmental Association

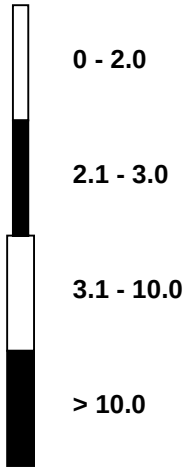
Wind Rose Apr 2016

Methane (CH_4) - ppm

Athabasca Valley (AMS 7)



Classes (ppm)



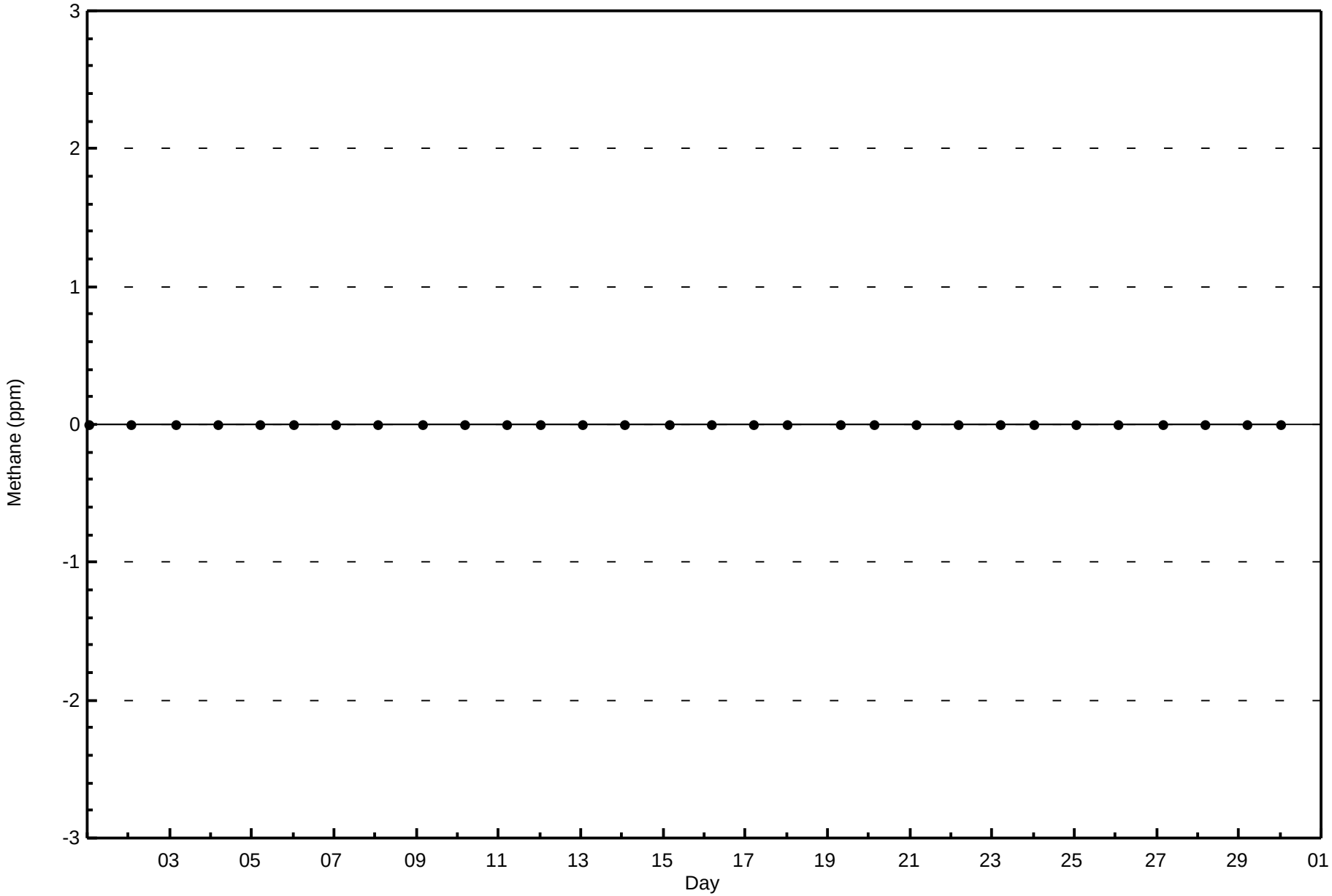
Total Number of Valid Hours: 675

Wood Buffalo Environmental Association

Zero Responses

Methane (CH_4) - ppm

Athabasca Valley - April 2016

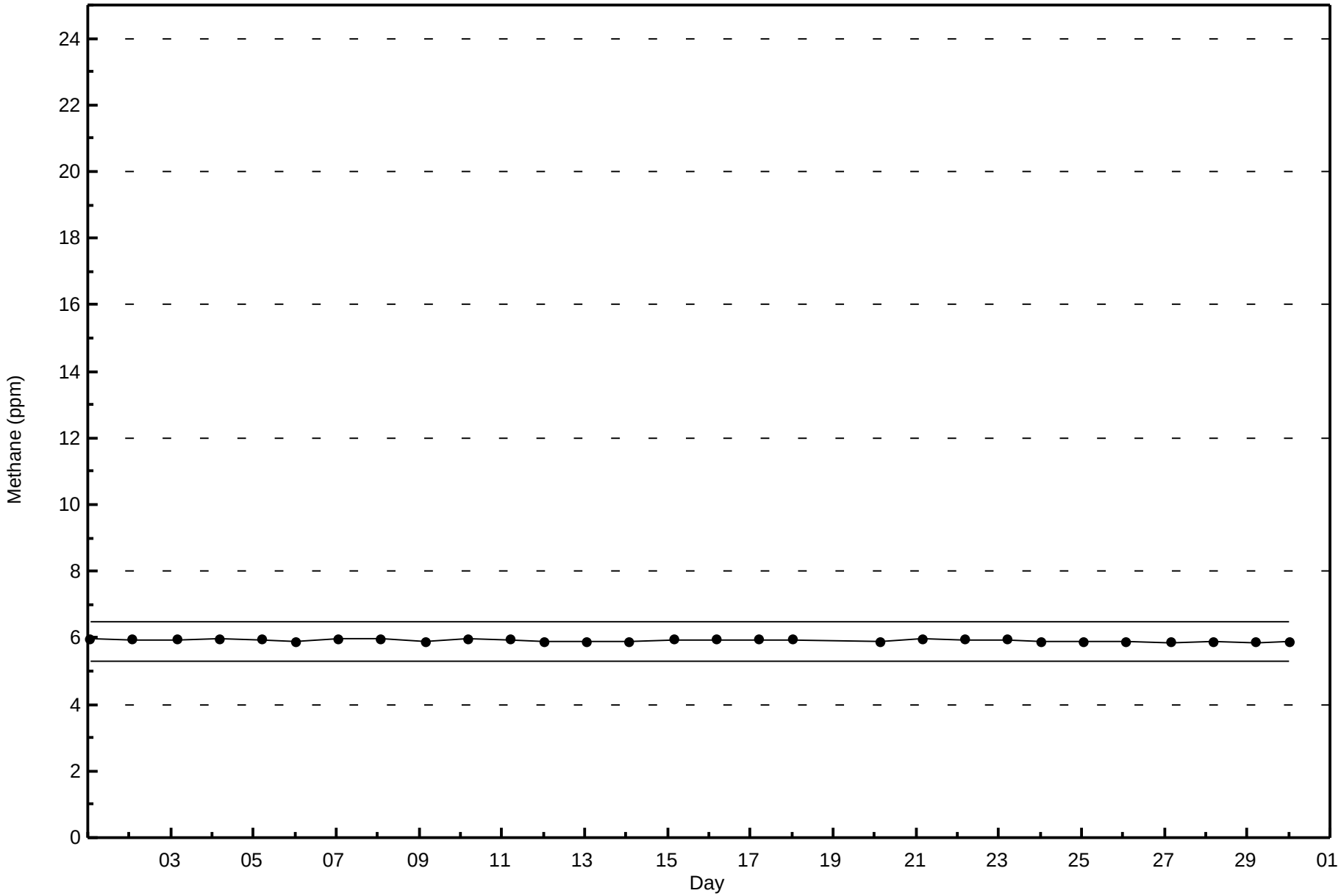


Wood Buffalo Environmental Association

Span Responses

Methane (CH_4) - ppm

Athabasca Valley - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O_3) - ppb

Athabasca Valley - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 66 ppb on Apr 19 12:00 Maximum Daily Average: 47.8 ppb on Apr 19

Minimum Value: 3 ppb on Apr 1 06:00
Maximum Diurnal Average: 37.9 ppb at hour 14
Monthly Average: 30.1 ppb

Minimum Daily Average: 19.1 ppb on Apr 27
Minimum Diurnal Average: 22.5 ppb at hour 4
Percentiles: P_1 = 6 P_{10} = 16 Q_1 = 24 Median = 31 Q_3 = 36 P_{90} = 42 P_{99} = 53

Hours in Service:	720
Hours of Data:	680
Hours of Missing Data:	40
Hours of Calibration:	34
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-Apr	22	23	26	Z	18	3	6	16	31	31	32	33	33	33	32	33	36	39	33	31	24	33	31	32	27.5	39
2-Apr	34	34	35	37	Z	31	34	36	35	37	36	37	38	39	38	31	36	32	30	30	34	35	33	30	34.5	39
3-Apr	29	24	23	23	26	Z	32	36	36	37	38	39	39	38	39	38	37	34	32	28	22	19	21	19	30.9	39
4-Apr	23	17	15	13	12	17	Z	24	25	26	26	27	32	33	35	35	35	35	35	29	25	30	27	24	26.1	35
5-Apr	22	21	20	17	15	11	12	Z	16	20	28	31	31	33	39	35	29	27	25	22	21	20	19	18	23.2	39
6-Apr	17	15	Z	10	PF	PF	PF	16	22	23	26	25	27	28	28	24	20	24	23	26	31	32	31	33	24.1	33
7-Apr	34	32	27	Z	27	26	27	27	29	31	30	31	34	35	32	30	29	28	25	26	31	30	30	29	29.6	35
8-Apr	28	28	31	30	Z	27	28	27	28	29	29	29	30	31	31	30	29	28	28	27	26	27	25	26	28.4	31
9-Apr	27	25	23	22	18	Z	32	32	32	34	32	33	36	37	37	35	36	34	37	37	35	31	32	34	31.7	37
10-Apr	33	34	34	36	36	36	Z	32	34	36	37	38	39	40	42	42	42	41	41	36	23	21	19	26	34.8	42
11-Apr	32	32	32	32	31	30	30	Z	27	28	30	31	35	37	41	41	41	40	27	21	12	10	15	15	29.2	41
12-Apr	14	16	Z	12	11	6	20	34	33	36	37	39	41	41	41	39	38	38	36	33	30	30	25	23	29.2	41
13-Apr	20	19	17	Z	30	29	25	30	31	31	30	30	27	27	25	22	22	25	28	27	26	22	20	18	25.2	31
14-Apr	16	15	16	25	Z	30	28	28	29	29	31	32	PF	35	35	34	33	31	26	23	23	19	19	22	26.3	35
15-Apr	18	13	10	7	4	Z	4	8	15	24	29	32	33	34	34	32	31	31	31	29	28	27	27	28	23.0	34
16-Apr	28	26	25	25	25	22	Z	23	24	24	24	38	44	46	46	44	44	43	41	27	19	16	14	14	29.7	46
17-Apr	16	17	17	17	17	15	19	Z	21	26	29	36	43	43	41	40	39	38	29	14	14	12	12	10	24.5	43
18-Apr	11	11	Z	12	11	8	16	18	22	25	29	38	47	49	50	49	49	49	48	46	45	45	49	48	33.8	50
19-Apr	48	47	44	41	40	29	32	38	M	52	61	66	M	63	57	54	52	53	53	50	47	43	41	40	47.8	66
20-Apr	33	29	29	29	29	Z	29	C	C	C	C	C	27	28	30	32	33	34	34	33	27	23	25	27	29.5	34
21-Apr	22	19	21	19	20	Z	17	20	23	28	33	35	37	36	38	41	41	39	41	39	37	39	31	25	30.5	41
22-Apr	22	22	19	17	29	29	Z	27	30	33	39	42	42	43	42	42	42	41	38	38	37	35	30	30	33.4	43
23-Apr	34	36	37	33	29	29	30	Z	35	35	37	38	38	37	37	37	37	36	36	35	35	35	36	35	35.2	38
24-Apr	34	33	Z	34	33	32	33	32	33	33	33	39	41	44	45	45	43	41	41	40	38	38	41	39	37.6	45
25-Apr	38	36	35	Z	32	29	26	25	23	24	30	31	32	33	32	34	33	32	31	29	27	29	30	28	30.4	38
26-Apr	23	18	20	15	Z	13	15	19	21	24	25	25	24	24	22	23	25	28	30	27	21	22	16	13	21.5	30
27-Apr	9	11	4	7	10	Z	6	8	11	13	16	22	26	28	30	30	33	33	33	30	23	15	24	15	19.1	33
28-Apr	12	10	8	7	4	4	Z	15	22	26	35	45	47	49	48	49	49	47	45	39	41	38	33	34	30.8	49
29-Apr	36	38	38	35	34	32	34	Z	39	43	45	47	48	48	48	47	48	47	46	43	39	28	29	31	40.1	48
30-Apr	26	20	Z	33	33	32	31	31	29	36	44	45	47	46	44	42	41	39	35	30	21	31	32	24	34.4	47
	25.3	24.1	24.3	22.5	23.0	22.7	23.6	25.1	27.0	30.2	32.9	35.7	36.4	37.9	37.9	37.1	36.8	36.4	34.6	31.5	28.8	27.9	27.2	26.4	Diurnal Average	
	48	47	44	41	40	36	34	38	39	52	61	66	48	63	57	54	52	53	53	50	47	45	49	48	Diurnal Maximum	

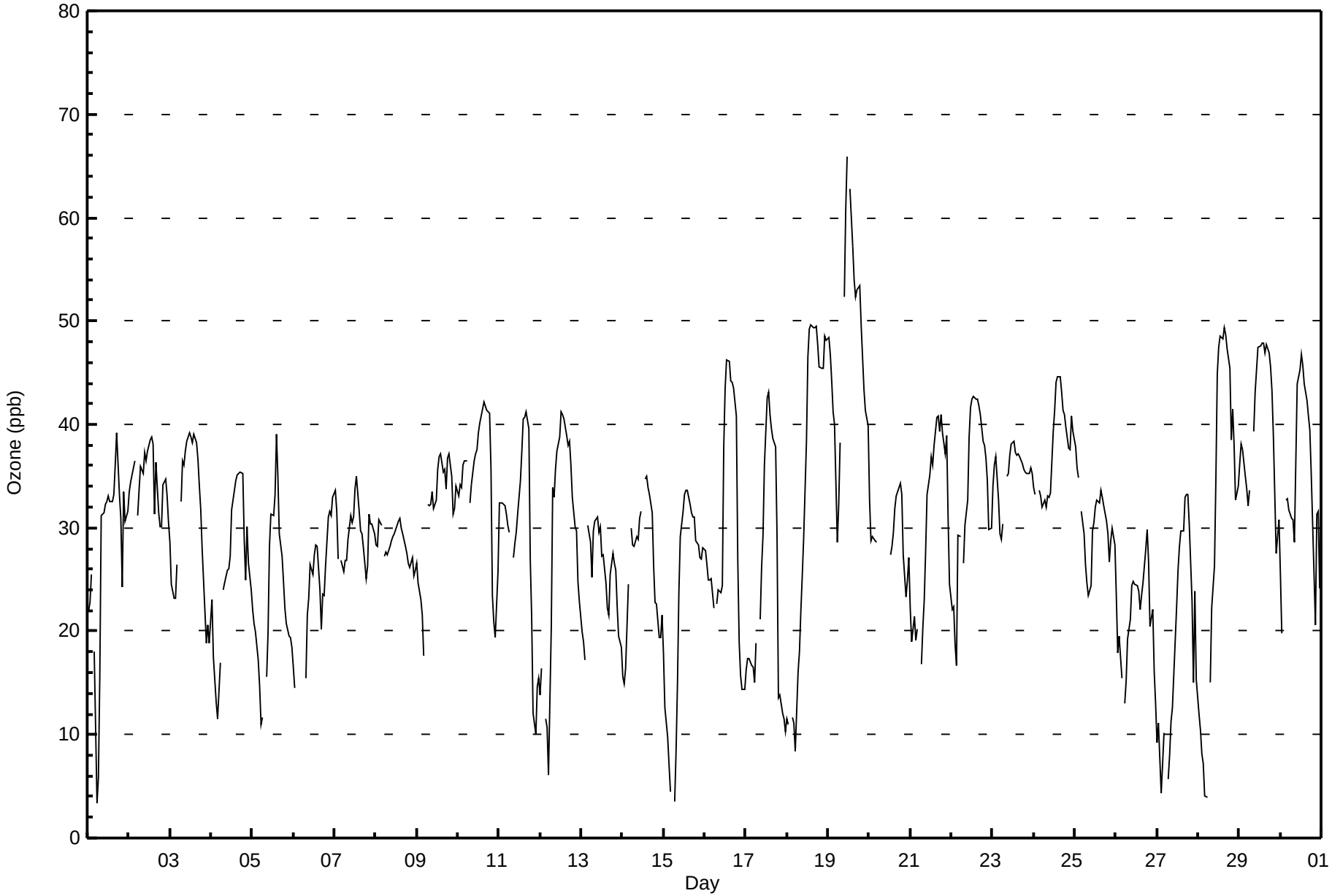
Z - zerospan C - Calibration M - Maintenance PF - Power Failure
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb

Wood Buffalo Environmental Association

Hourly Averages

Ozone (O_3) - ppb

Athabasca Valley - April 2016



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	114	16.76	16.76
21 - 50	557	81.91	98.68
51 - 82	9	1.32	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 680

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Ozone (O_3) - ppb

Athabasca Valley - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	11	4	3	3	7	3	21	14	4	8	7	5	4	5	6	9	114
21 - 50	73	12	10	10	27	36	125	44	30	21	21	9	6	13	18	98	553
51 - 82	0	0	0	0	0	0	0	0	0	0	0	0	4	4	1	0	9
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	84	16	13	13	34	39	146	58	34	29	28	14	14	22	25	107	676

Total Number of Valid Hours: 676

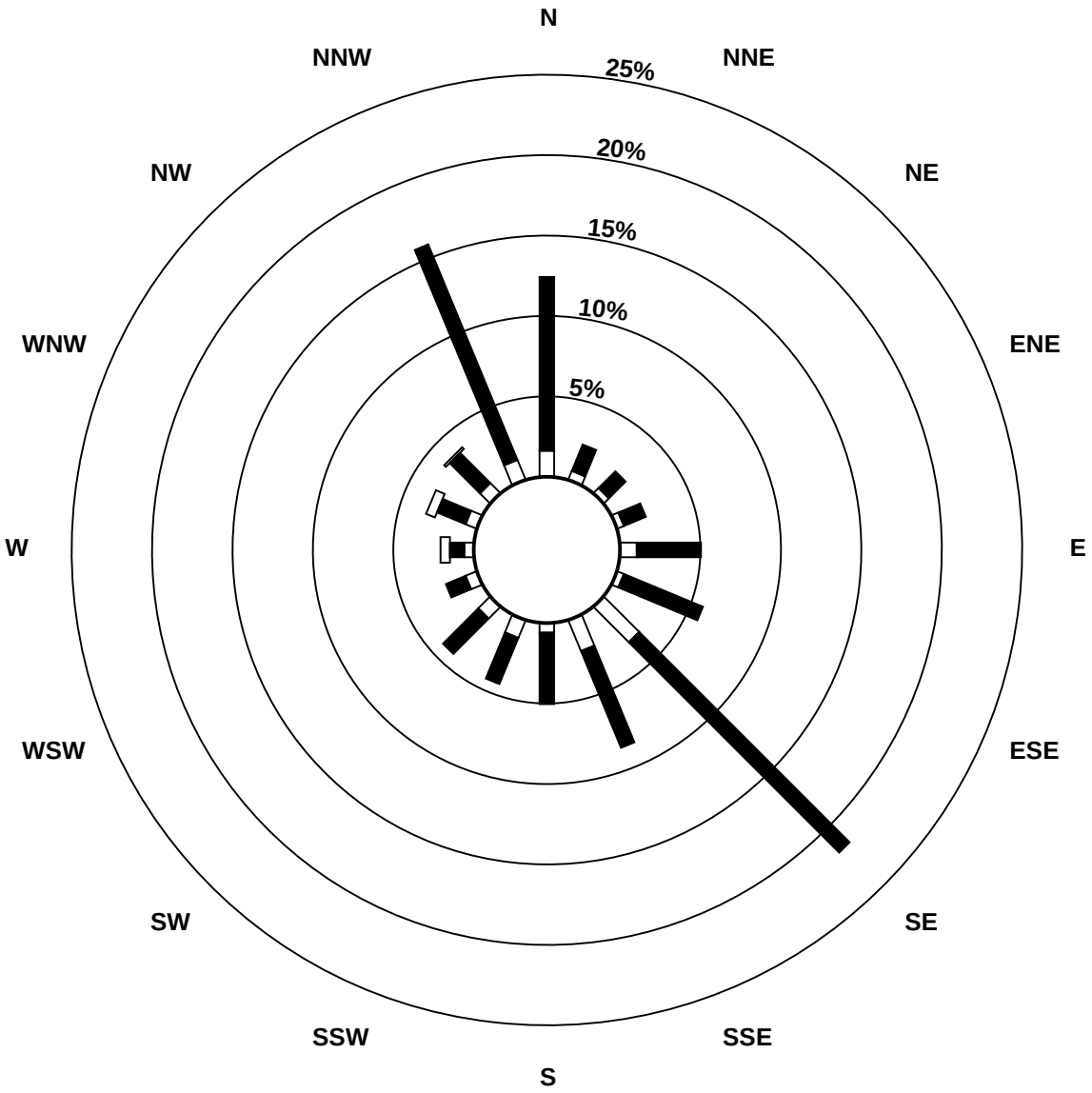
Total Number of Hours: 720

Wood Buffalo Environmental Association

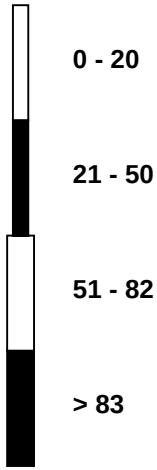
Wind Rose Apr 2016

Ozone (O_3) - ppb

Athabasca Valley (AMS 7)



Classes (ppb)



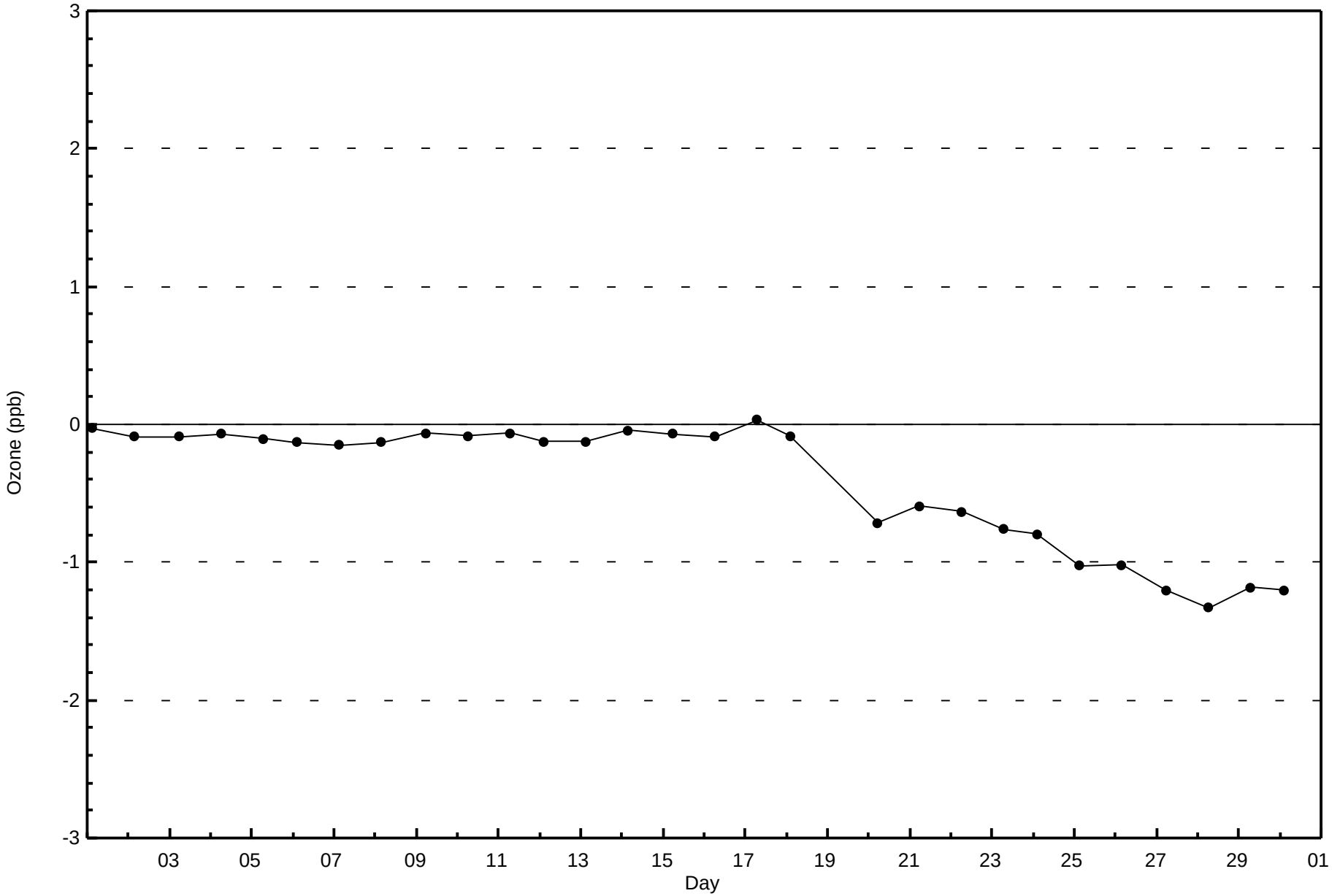
Total Number of Valid Hours: 676

Wood Buffalo Environmental Association

Zero Responses

Ozone (O_3) - ppb

Athabasca Valley - April 2016

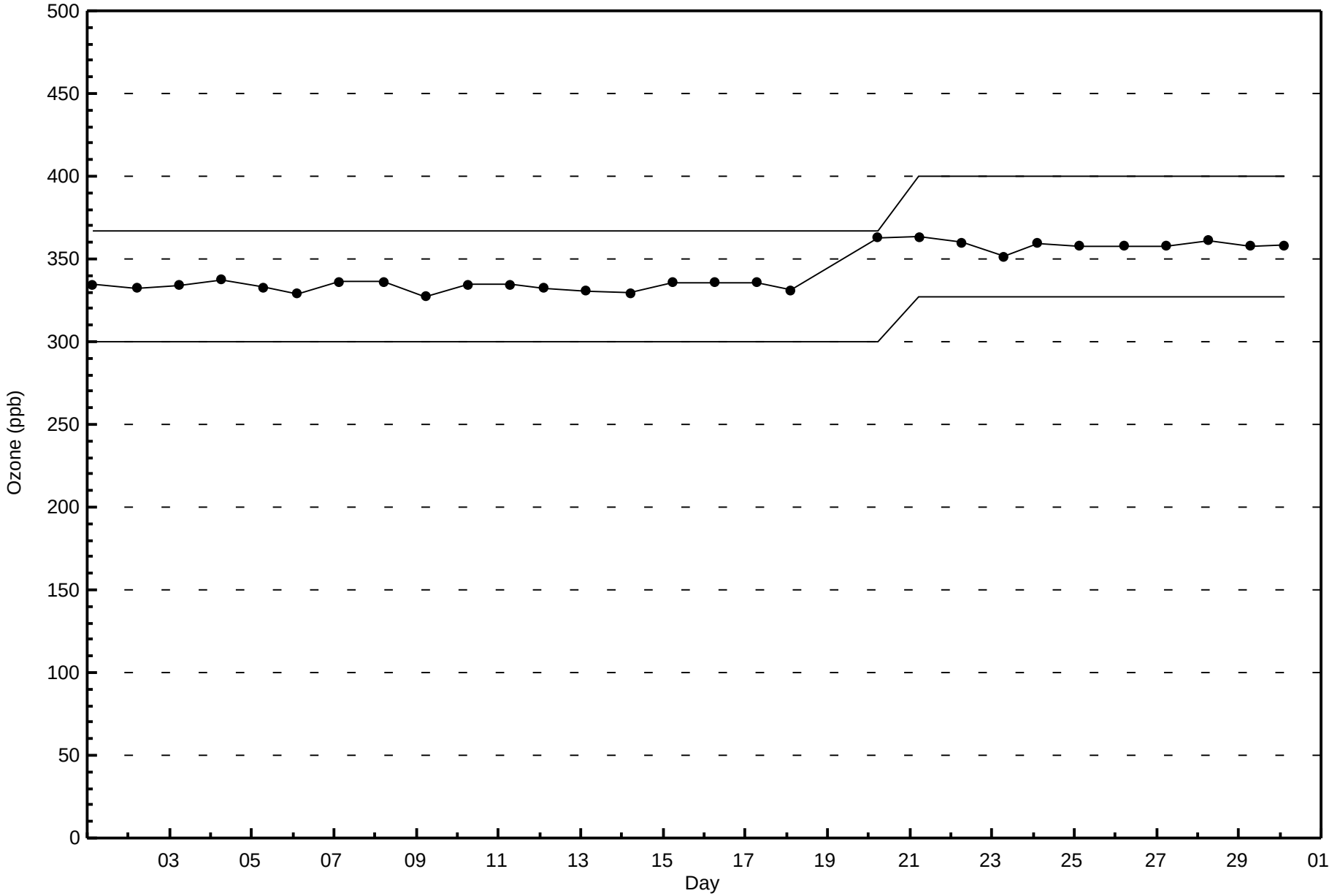


Wood Buffalo Environmental Association

Span Responses

Ozone (O_3) - ppb

Athabasca Valley - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

Athabasca Valley - April 2016

Maximum Value: 14 ppb on Apr 28 06:00

Maximum Daily Average: 1.6 ppb on Apr 11

Minimum Value: 0 ppb on Apr 1 03:00

Minimum Daily Average: 0.2 ppb on Apr 9

Maximum Diurnal Average: 2.0 ppb at hour 6

Minimum Diurnal Average: 0.1 ppb at hour 1

Monthly Average: 0.8 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 1$ $P_{90} = 2$ $P_{99} = 5$

Hours in Service:	720
Hours of Data:	678
Hours of Missing Data:	42
Hours of Calibration:	35
Percent Operational Time:	99.0

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-Apr	0	Z	0	0	0	3	8	7	1	1	1	1	1	1	1	1	1	0	1	1	0	1	0	0	1.3	8
2-Apr	0	0	Z	0	0	0	1	1	1	0	1	0	0	0	0	2	0	1	0	0	0	0	0	0	0.4	2
3-Apr	0	0	0	Z	0	0	0	0	0	1	0	0	1	2	1	1	1	1	0	0	0	0	0	0	0.4	2
4-Apr	0	0	0	0	Z	1	2	2	3	3	2	2	1	1	1	1	1	0	0	0	1	0	0	0	1.0	3
5-Apr	0	0	0	0	0	Z	1	2	4	4	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1.1	4
6-Apr	Z	1	1	0	PF	PF	PF	2	1	2	1	1	1	0	1	1	2	1	0	0	0	0	0	0	0.7	2
7-Apr	0	Z	0	0	0	0	0	2	1	2	2	2	1	0	1	2	1	1	0	0	0	0	0	0	0.6	2
8-Apr	0	0	Z	0	1	1	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0.9	2
9-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0.2	1
10-Apr	0	0	0	0	Z	0	0	2	2	1	2	1	2	2	1	0	1	0	0	0	0	0	0	1	0.7	2
11-Apr	0	0	0	0	1	Z	1	2	3	3	3	2	1	1	0	1	0	1	3	2	5	5	2	0	1.6	5
12-Apr	Z	0	0	2	1	11	5	1	2	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1.4	11
13-Apr	0	Z	0	0	0	1	2	1	1	1	1	1	2	1	2	1	1	1	1	0	0	0	0	0	0.7	2
14-Apr	0	0	Z	0	0	0	0	0	1	1	1	1	PF	PF	0	0	1	1	1	1	0	0	0	0	0.3	1
15-Apr	0	0	0	Z	1	2	6	5	3	3	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1.3	6
16-Apr	0	0	0	0	Z	1	1	2	2	3	3	1	0	0	0	0	0	0	0	1	1	1	1	0	0.9	3
17-Apr	0	0	0	0	1	Z	1	1	2	1	2	1	0	0	0	0	0	0	1	4	1	1	0	0	0.7	4
18-Apr	Z	0	0	1	1	3	2	3	3	2	2	1	0	0	1	0	1	1	1	0	0	0	0	0	1.0	3
19-Apr	0	0	0	0	0	3	1	Z	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.2	3
20-Apr	0	0	0	Z	0	0	0	0	M	M	1	1	1	1	1	1	1	1	0	0	0	1	0	0	0.4	1
21-Apr	0	0	0	Z	1	1	4	4	3	1	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0.8	4
22-Apr	0	0	0	0	Z	0	1	2	2	3	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0.5	3
23-Apr	0	0	0	0	0	Z	1	1	1	1	1	1	1	0	0	1	1	0	0	0	0	1	0	0	0.5	1
24-Apr	Z	1	1	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	0	0	0.6	1
25-Apr	0	Z	0	0	0	0	1	1	2	2	1	1	1	0	1	1	0	1	0	0	0	0	0	0	0.5	2
26-Apr	0	0	Z	1	1	2	3	2	2	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0.9	3
27-Apr	0	0	0	Z	1	4	5	5	3	2	2	2	2	2	2	2	1	1	1	0	0	1	0	0	1.5	5
28-Apr	0	0	0	0	Z	14	6	3	3	2	0	0	0	1	1	0	0	0	1	1	0	0	0	0	1.5	14
29-Apr	0	0	0	0	0	Z	1	1	1	1	1	1	1	1	0	1	0	0	0	0	1	1	0	0	0.5	1
30-Apr	Z	0	0	0	0	0	1	1	3	2	0	0	0	0	0	0	0	0	1	1	3	0	0	0	0.6	3
	0.1	0.1	0.1	0.3	0.4	2.0	1.9	1.9	1.8	1.6	1.2	1.0	0.8	0.7	0.7	0.7	0.7	0.6	0.5	0.7	0.6	0.6	0.2	0.1	Diurnal Average	
	0	1	1	2	1	14	8	7	4	4	3	2	2	2	2	2	2	1	3	4	5	5	2	1	Diurnal Maximum	

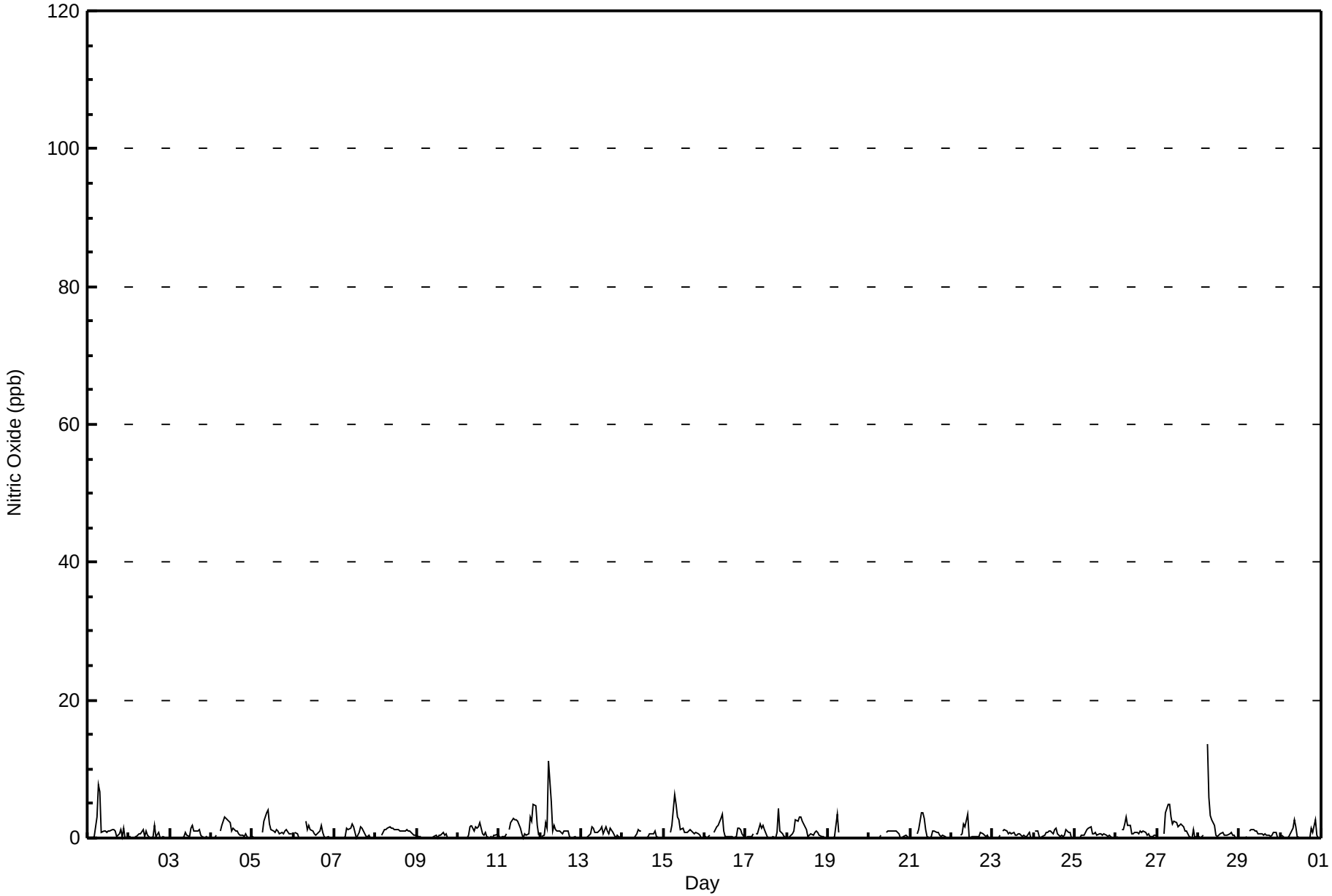
Z - zerospan C - Calibration M - Maintenance PF - Power Failure

Wood Buffalo Environmental Association

Hourly Averages

Nitric Oxide (NO) - ppb

Athabasca Valley - April 2016



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	678	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: 678

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitric Oxide (NO) - ppb

Athabasca Valley - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	84	18	12	13	34	41	149	56	34	30	25	14	13	19	23	109	674
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	84	18	12	13	34	41	149	56	34	30	25	14	13	19	23	109	674

Total Number of Valid Hours: 674

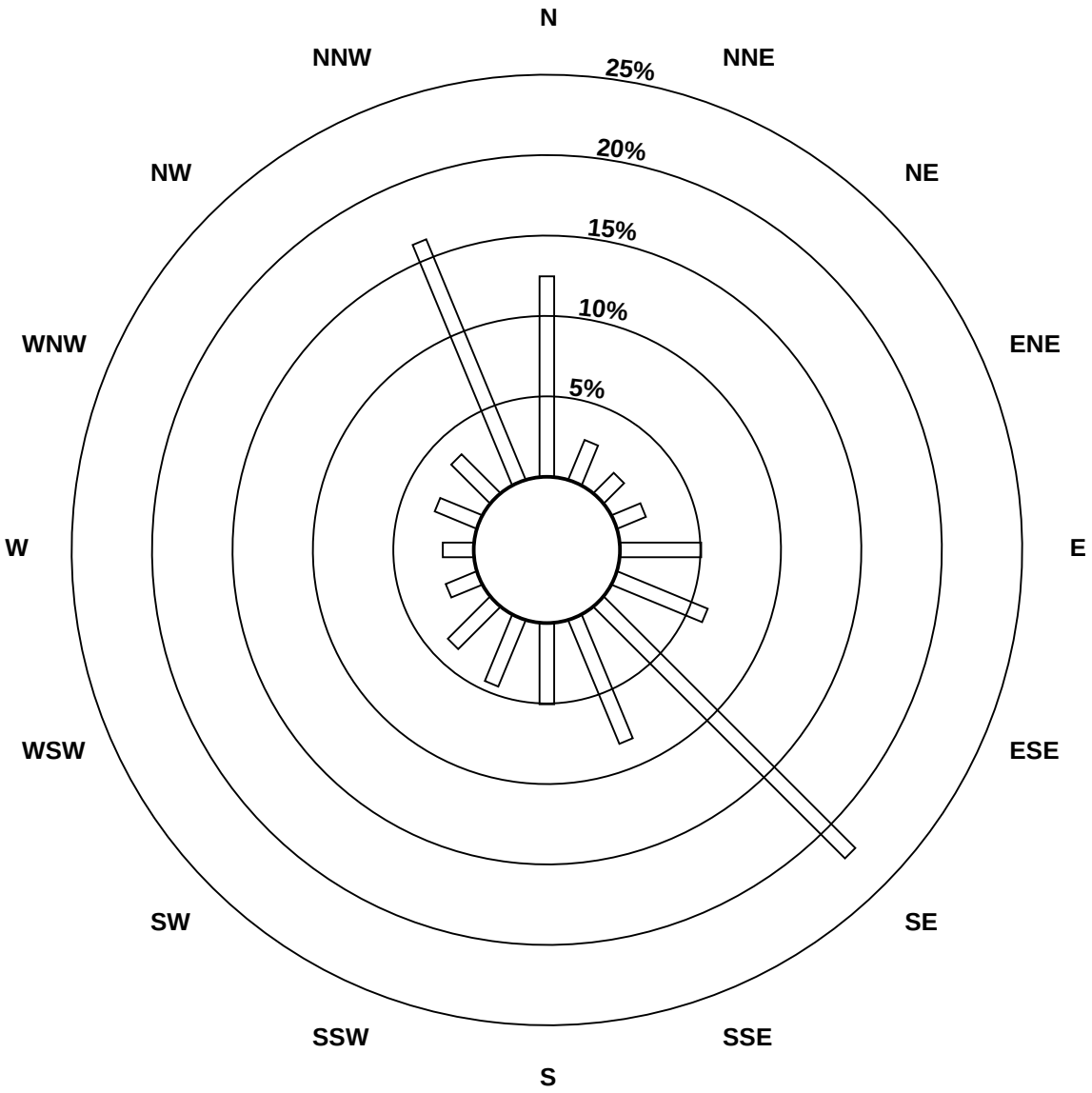
Total Number of Hours: 720

Wood Buffalo Environmental Association

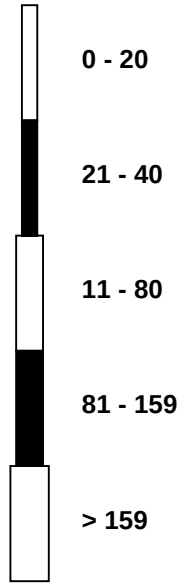
Wind Rose Apr 2016

Nitric Oxide (NO) - ppb

Athabasca Valley (AMS 7)



Classes (ppb)



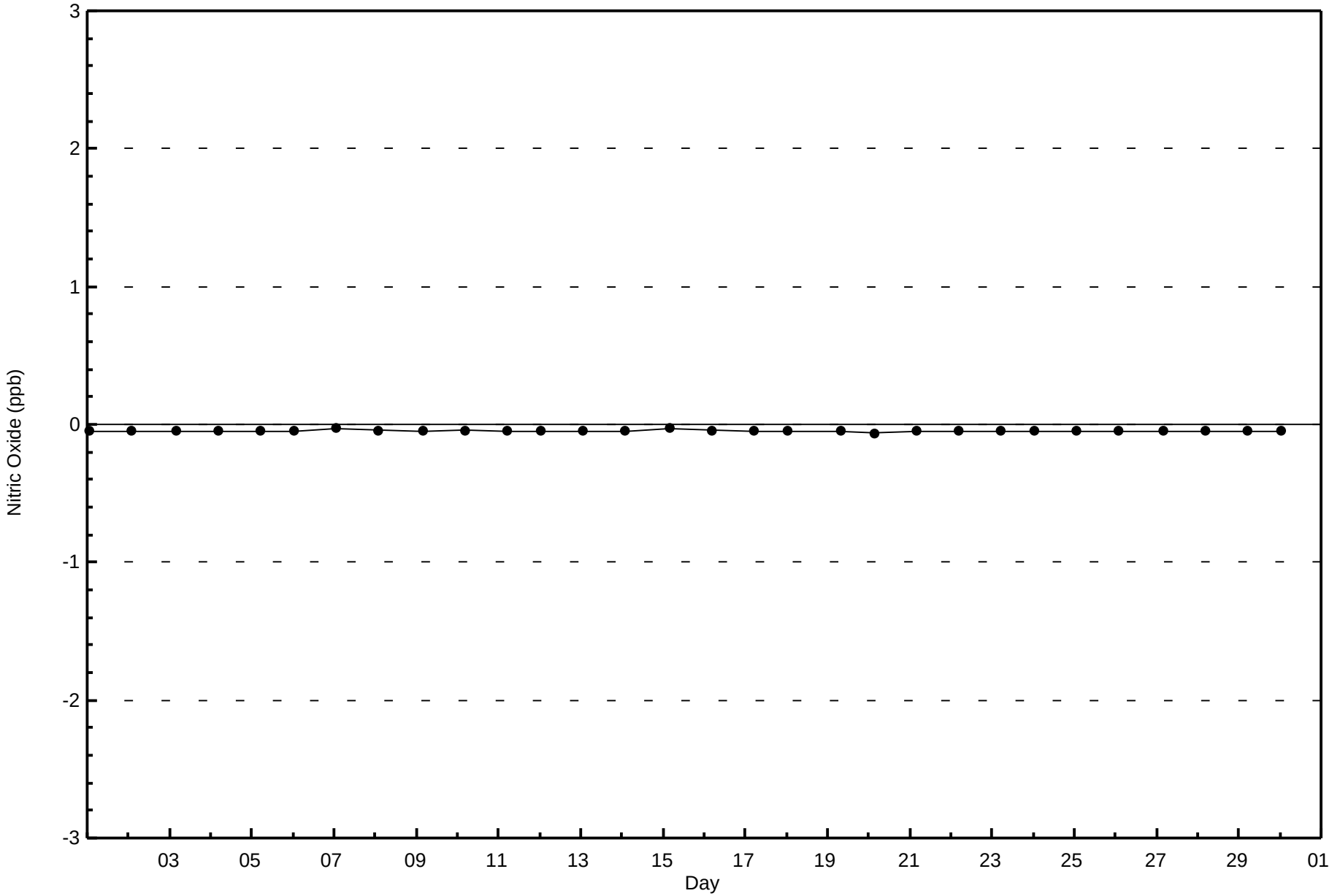
Total Number of Valid Hours: 674

Wood Buffalo Environmental Association

Zero Responses

Nitric Oxide (NO) - ppb

Athabasca Valley - April 2016

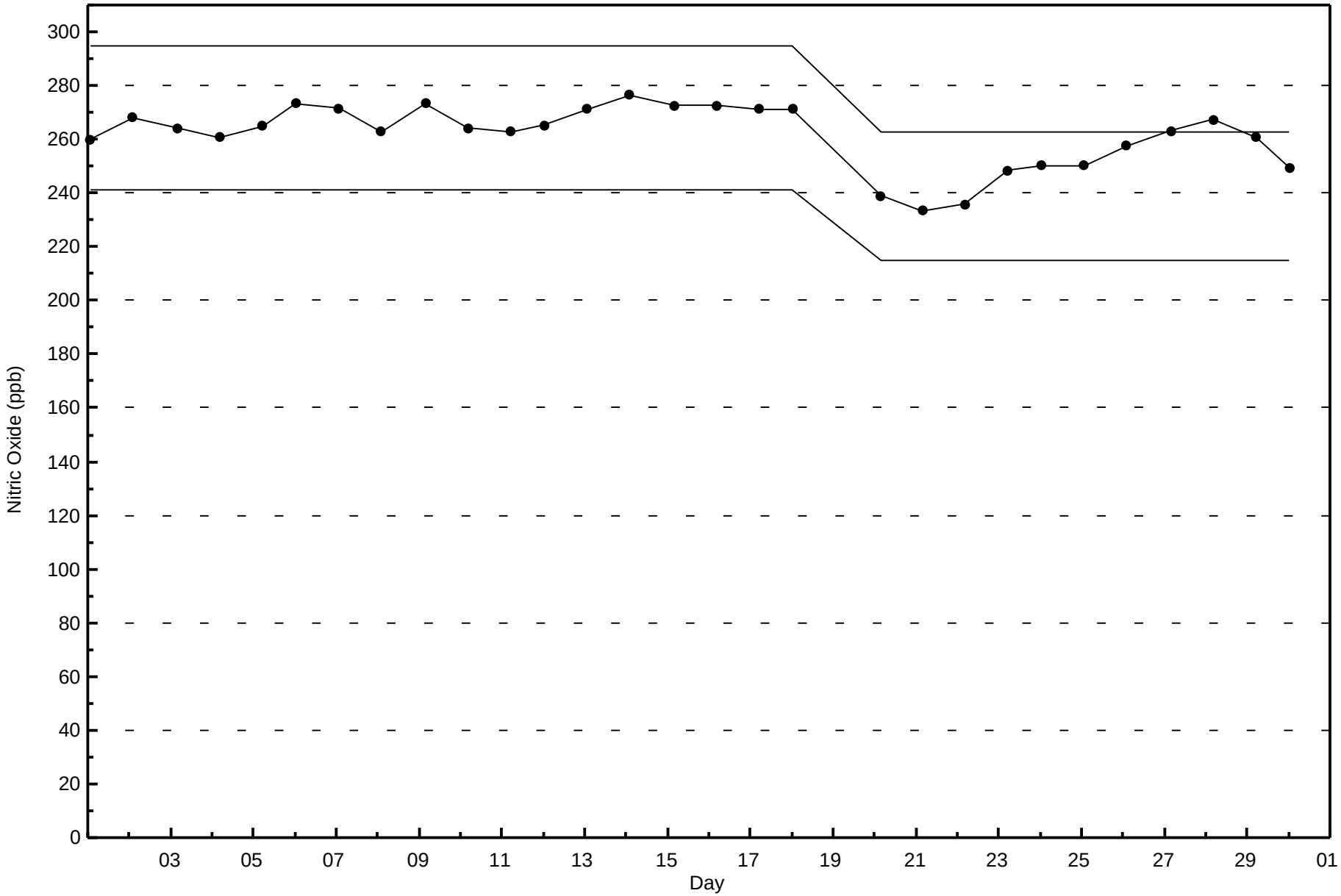


Wood Buffalo Environmental Association

Span Responses

Nitric Oxide (NO) - ppb

Athabasca Valley - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO_2) - ppb

Athabasca Valley - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 26 ppb on Apr 11 21:00 Maximum Daily Average: 7.7 ppb on Apr 11

Minimum Value: 0 ppb on Apr 2 13:00
Maximum Diurnal Average: 7.7 ppb at hour 21
Monthly Average: 4.6 ppb

Minimum Daily Average: 2.4 ppb on Apr 19
Minimum Diurnal Average: 2.1 ppb at hour 14
Percentiles: $P_1 = 0$ $P_{10} = 2$ $Q_1 = 2$ Median = 4 $Q_3 = 6$ $P_{90} = 9$ $P_{99} = 18$

Hours in Service:	720
Hours of Data:	678
Hours of Missing Data:	42
Hours of Calibration:	35
Percent Operational Time:	99.0

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-Apr	3	Z	2	4	6	22	22	15	2	3	3	2	2	3	3	3	3	2	8	9	14	4	5	5	6.4	22
2-Apr	5	5	Z	2	4	8	5	2	3	1	2	1	0	0	1	8	2	7	8	6	3	2	2	4	3.5	8
3-Apr	6	9	10	Z	9	12	5	2	3	2	2	2	3	4	3	3	5	6	8	10	12	11	7	6	6.1	12
4-Apr	3	5	6	8	Z	11	9	6	5	4	4	4	2	3	3	2	2	2	1	7	10	3	3	3	4.7	11
5-Apr	3	3	3	7	10	Z	14	13	13	10	5	3	3	2	3	4	3	4	5	7	8	7	6	4	6.1	14
6-Apr	Z	5	7	5	PF	PF	PF	10	5	7	4	4	2	2	2	5	9	6	6	4	3	4	4	3	4.9	10
7-Apr	2	Z	6	5	4	6	5	5	5	4	4	4	2	1	2	4	3	5	8	6	2	1	1	0	3.7	8
8-Apr	0	1	Z	4	5	6	5	5	4	3	3	2	2	2	2	3	4	5	5	6	6	4	6	5	3.7	6
9-Apr	3	5	6	Z	8	5	2	2	2	2	4	5	2	2	3	4	4	6	3	3	4	6	6	4	4.0	8
10-Apr	6	5	5	3	Z	2	3	6	5	2	2	3	3	2	2	2	2	3	3	7	13	9	11	9	4.6	13
11-Apr	5	5	5	5	5	Z	6	9	8	7	6	5	4	2	2	3	2	3	15	18	26	20	12	7	7.7	26
12-Apr	Z	5	3	9	10	16	12	3	5	4	2	2	3	2	2	4	4	3	4	6	7	6	8	8	5.7	16
13-Apr	9	Z	9	5	3	7	10	5	3	3	6	4	5	4	8	6	6	5	5	5	4	6	8	8	5.8	10
14-Apr	7	6	Z	4	3	5	5	5	4	4	3	3	PF	PF	1	1	1	2	7	9	8	7	6	4	4.6	9
15-Apr	5	5	3	Z	7	4	4	3	3	4	2	2	2	2	2	2	2	2	3	6	5	5	5	5	3.6	7
16-Apr	4	4	4	5	Z	7	6	5	4	5	7	3	2	2	2	2	2	2	4	11	10	9	7	7	4.9	11
17-Apr	5	5	5	5	6	Z	5	4	6	4	4	3	2	1	1	1	1	2	8	18	10	7	5	5	4.8	18
18-Apr	Z	2	3	3	4	5	7	5	5	5	5	4	2	2	2	2	3	3	5	7	5	6	4	3	3.9	7
19-Apr	2	1	2	4	4	12	6	Z	C	C	C	C	C	1	1	1	1	1	1	1	2	2	1	0	2.4	12
20-Apr	2	3	2	Z	2	3	2	3	M	M	2	2	2	1	2	2	2	3	3	4	9	7	4	2	2.9	9
21-Apr	3	2	1	Z	3	6	8	6	6	2	1	1	1	3	3	2	3	3	2	2	3	1	6	10	3.4	10
22-Apr	12	10	12	13	Z	2	3	6	4	5	1	1	1	1	1	0	1	1	3	3	4	6	7	4	4.3	13
23-Apr	2	1	1	4	8	Z	5	4	3	2	2	1	2	1	1	1	1	2	2	3	3	3	3	3	2.4	8
24-Apr	Z	5	5	4	4	5	4	4	3	3	3	2	2	2	2	2	3	2	4	5	6	5	2	1	3.4	6
25-Apr	2	Z	4	4	5	5	5	5	5	4	3	3	3	2	2	3	3	4	4	5	8	5	3	3	3.8	8
26-Apr	6	9	Z	9	10	11	10	5	4	2	2	2	3	3	3	3	3	2	1	2	3	4	8	4	4.8	11
27-Apr	4	3	1	Z	3	6	7	5	4	2	3	3	3	4	3	4	4	5	5	6	10	12	3	4	4.5	12
28-Apr	4	3	4	4	Z	11	7	4	4	3	2	1	3	3	3	3	4	4	7	12	8	8	11	10	5.4	12
29-Apr	7	5	5	6	7	Z	7	5	4	3	3	2	2	2	2	3	2	3	4	6	9	17	10	9	5.3	17
30-Apr	Z	9	5	6	5	6	6	5	8	4	2	2	2	2	1	2	2	2	7	12	20	6	2	2	5.1	20
	4.4	4.7	4.5	5.3	5.6	7.6	6.7	5.4	4.6	3.7	3.1	2.6	2.2	2.1	2.3	2.9	2.9	3.4	4.9	6.9	7.7	6.4	5.5	4.8	Diurnal Average	
	12	10	12	13	10	22	22	15	13	10	7	5	5	4	8	8	9	7	15	18	26	20	12	10	Diurnal Maximum	

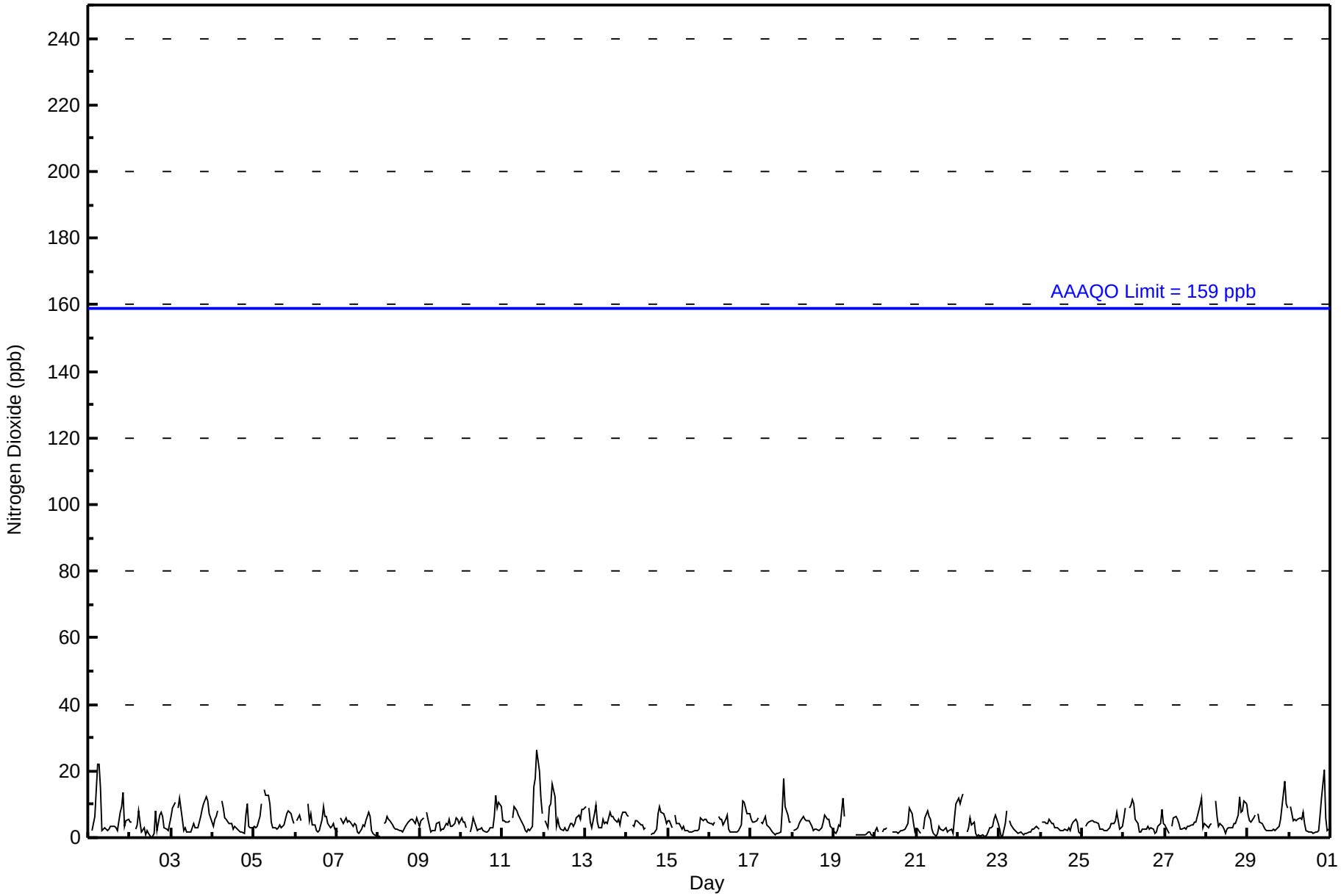
Z - zerospan C - Calibration M - Maintenance PF - Power Failure
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Dioxide (NO_2) - ppb

Athabasca Valley - April 2016



Nitrogen Dioxide (NO_2) - ppb
Athabasca Valley - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	675	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: 678

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Dioxide (NO_2) - ppb

Athabasca Valley - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	83	18	12	13	34	40	148	56	34	30	25	14	13	19	23	109	671
21 - 40	1	0	0	0	0	1	1	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	84	18	12	13	34	41	149	56	34	30	25	14	13	19	23	109	674

Total Number of Valid Hours: 674

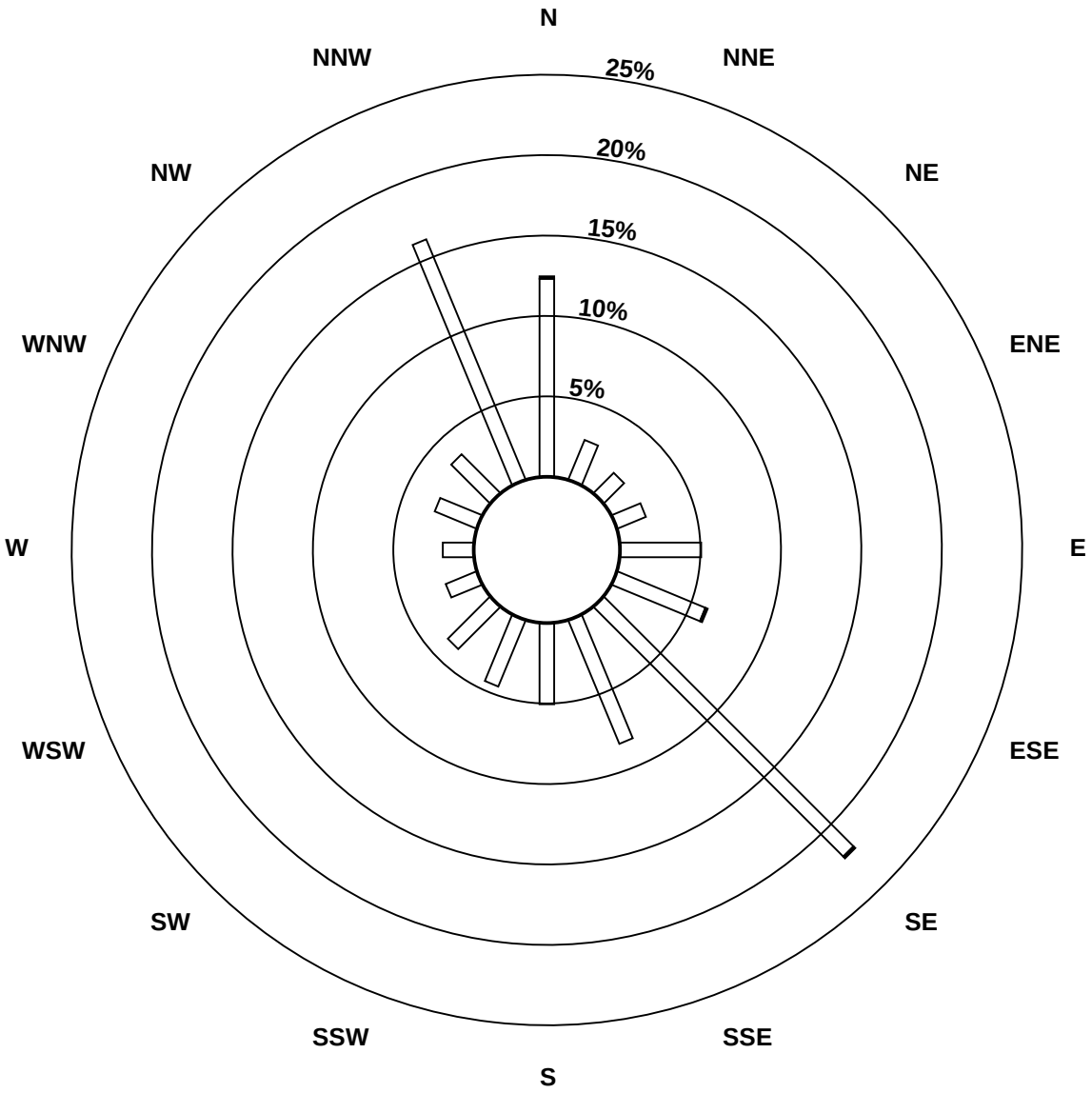
Total Number of Hours: 720

Wood Buffalo Environmental Association

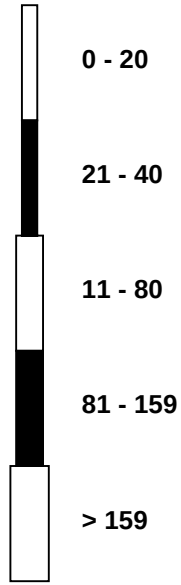
Wind Rose Apr 2016

Nitrogen Dioxide (NO_2) - ppb

Athabasca Valley (AMS 7)



Classes (ppb)



0 - 20

21 - 40

11 - 80

81 - 159

> 159

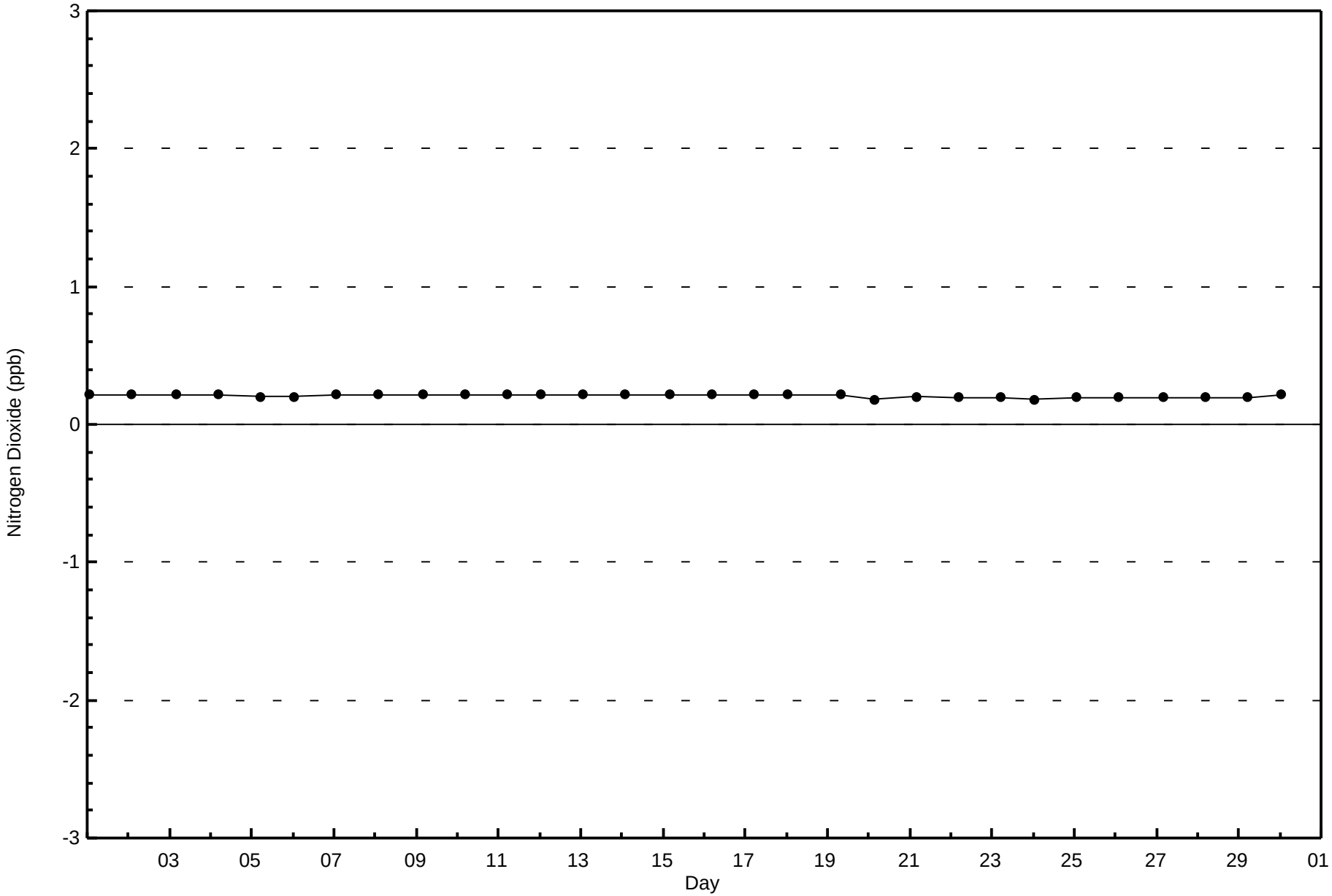
Total Number of Valid Hours: 674

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Dioxide (NO_2) - ppb

Athabasca Valley - April 2016

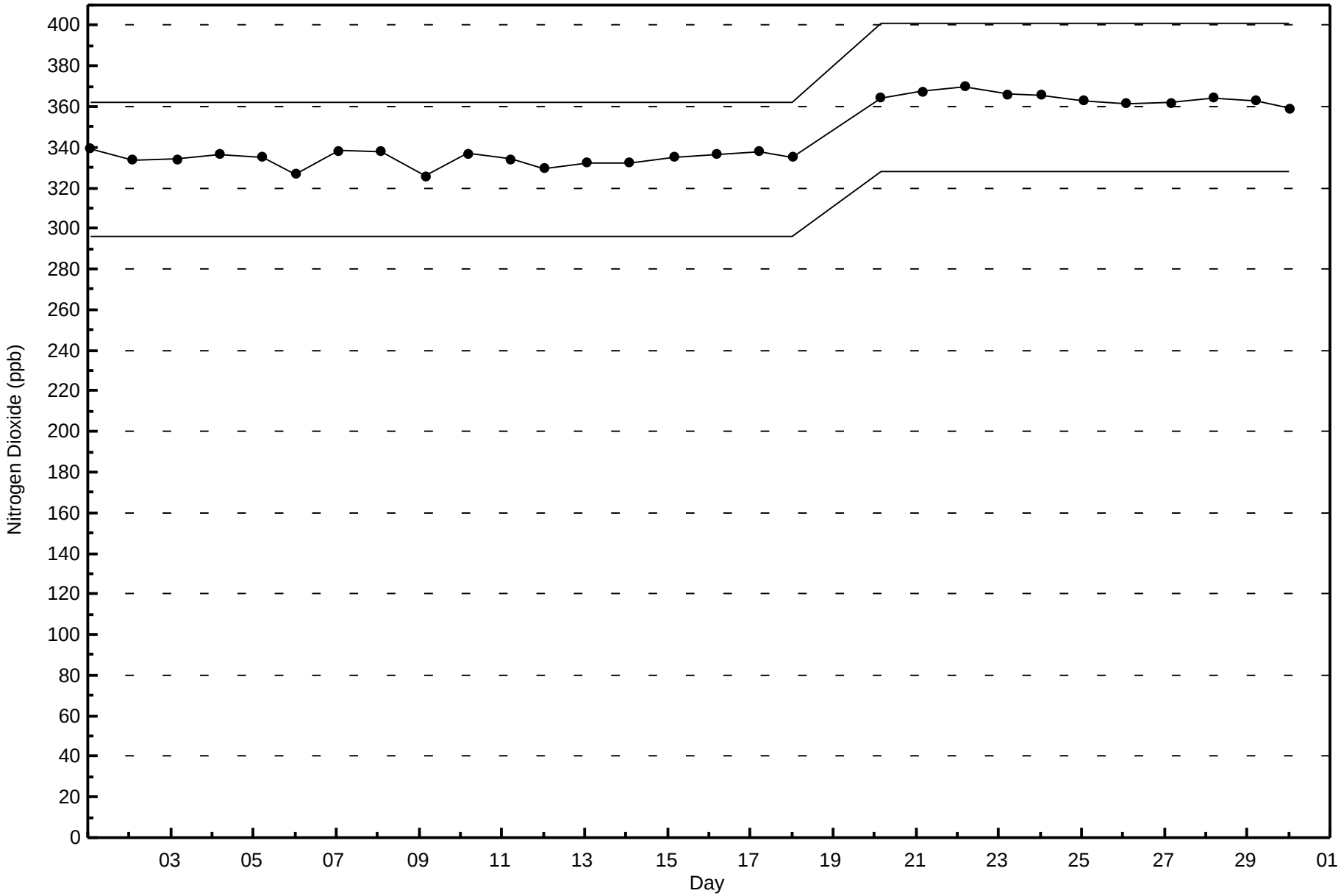


Wood Buffalo Environmental Association

Span Responses

Nitrogen Dioxide (NO_2) - ppb

Athabasca Valley - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_X) - ppb

Athabasca Valley - April 2016

Maximum Value: 31 ppb on Apr 11 21:00

Maximum Daily Average: 9.3 ppb on Apr 11

Minimum Value: 0 ppb on Apr 2 13:00

Minimum Daily Average: 2.6 ppb on Apr 19

Maximum Diurnal Average: 9.6 ppb at hour 6

Minimum Diurnal Average: 2.9 ppb at hour 14

Monthly Average: 5.4 ppb

Percentiles: $P_1 = 1$ $P_{10} = 2$ $Q_1 = 3$ Median = 5 $Q_3 = 7$ $P_{90} = 10$ $P_{99} = 22$

Hours in Service:	720
Hours of Data:	678
Hours of Missing Data:	42
Hours of Calibration:	35
Percent Operational Time:	99.0

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-Apr	3	Z	2	4	6	25	30	21	3	4	4	3	3	4	5	5	4	3	8	10	14	5	5	6	7.7	30
2-Apr	5	5	Z	3	4	8	5	2	4	1	3	2	0	0	2	10	2	8	8	6	3	2	2	4	3.9	10
3-Apr	6	9	10	Z	9	12	5	2	3	2	2	2	4	6	4	4	6	7	9	10	12	11	7	6	6.5	12
4-Apr	3	5	6	8	Z	12	11	8	8	7	7	7	4	5	4	3	2	2	2	7	11	4	3	3	5.7	12
5-Apr	3	3	3	7	10	Z	15	15	17	14	7	4	4	3	4	5	4	5	6	8	9	8	6	5	7.2	17
6-Apr	Z	6	7	5	PF	PF	PF	13	6	9	5	5	3	2	3	6	11	7	6	4	3	4	4	3	5.6	13
7-Apr	2	Z	6	5	4	6	5	7	6	5	6	5	2	1	3	6	5	6	8	6	3	2	1	0	4.4	8
8-Apr	0	0	Z	4	5	7	7	7	5	4	4	4	3	3	3	3	5	6	6	7	6	5	6	5	4.7	7
9-Apr	4	5	6	Z	8	5	2	2	2	2	4	5	2	3	3	5	4	6	3	3	4	6	6	4	4.1	8
10-Apr	6	5	5	3	Z	2	4	7	6	3	4	4	4	4	2	2	3	3	3	7	13	9	11	10	5.2	13
11-Apr	5	5	5	5	5	Z	7	11	11	10	9	7	5	2	2	3	3	4	18	20	31	25	13	7	9.3	31
12-Apr	Z	5	3	12	12	27	18	4	7	5	3	3	4	3	3	5	5	3	4	6	7	6	8	8	7.0	27
13-Apr	9	Z	9	5	3	8	12	6	4	4	7	5	6	5	9	7	7	7	5	6	4	7	8	8	6.5	12
14-Apr	7	6	Z	4	3	5	5	5	5	5	4	4	PF	PF	1	2	2	3	8	10	8	7	6	4	4.9	10
15-Apr	5	5	3	Z	7	6	11	8	6	6	3	4	3	3	2	3	3	3	3	7	6	6	5	5	4.9	11
16-Apr	4	4	4	5	Z	7	7	7	6	8	10	4	2	2	2	2	2	2	4	13	12	10	8	7	5.8	13
17-Apr	5	5	5	5	7	Z	5	5	8	5	5	4	2	1	1	2	2	2	9	22	11	7	5	5	5.6	22
18-Apr	Z	2	3	4	5	8	9	8	8	7	7	5	2	3	3	3	3	4	5	7	6	6	4	3	5.0	9
19-Apr	1	1	2	4	4	15	7	Z	C	C	C	C	C	1	1	1	1	1	1	1	2	2	1	0	2.6	15
20-Apr	2	3	2	Z	2	3	2	3	M	M	3	3	3	2	3	3	3	3	3	4	9	8	4	2	3.4	9
21-Apr	3	2	1	Z	3	7	12	10	8	4	1	1	1	4	4	3	3	4	2	2	3	1	6	10	4.2	12
22-Apr	12	10	12	13	Z	2	4	8	6	8	2	1	1	1	1	1	1	2	3	3	4	6	7	4	4.8	13
23-Apr	2	1	1	4	8	Z	6	5	4	3	3	2	2	2	1	2	2	2	2	3	3	4	3	3	2.9	8
24-Apr	Z	6	5	4	4	5	5	5	4	4	4	3	3	3	3	2	3	3	4	6	6	5	2	1	4.0	6
25-Apr	2	Z	3	4	5	5	6	6	6	6	3	3	3	3	3	3	3	5	5	5	8	5	3	3	4.3	8
26-Apr	6	9	Z	10	11	14	13	7	6	3	2	3	3	3	4	4	4	3	2	2	4	4	9	5	5.7	14
27-Apr	4	3	1	Z	4	10	11	10	7	4	5	5	4	6	5	6	5	6	5	7	10	13	3	5	6.0	13
28-Apr	4	3	4	5	Z	25	12	7	7	5	3	1	3	3	4	3	5	5	7	13	8	9	11	10	6.8	25
29-Apr	7	5	5	6	7	Z	8	6	5	4	3	3	3	3	3	3	3	3	4	6	10	18	10	9	5.8	18
30-Apr	Z	10	5	6	5	6	7	7	10	6	2	2	2	2	1	2	2	2	8	13	23	6	2	2	5.7	23
	4.4	4.8	4.6	5.6	6.0	9.6	8.6	7.4	6.4	5.3	4.3	3.6	3.0	2.9	2.9	3.6	3.6	3.9	5.4	7.5	8.3	7.0	5.7	4.9	Diurnal Average	
	12	10	12	13	12	27	30	21	17	14	10	7	6	6	9	10	11	8	18	22	31	25	13	10	Diurnal Maximum	

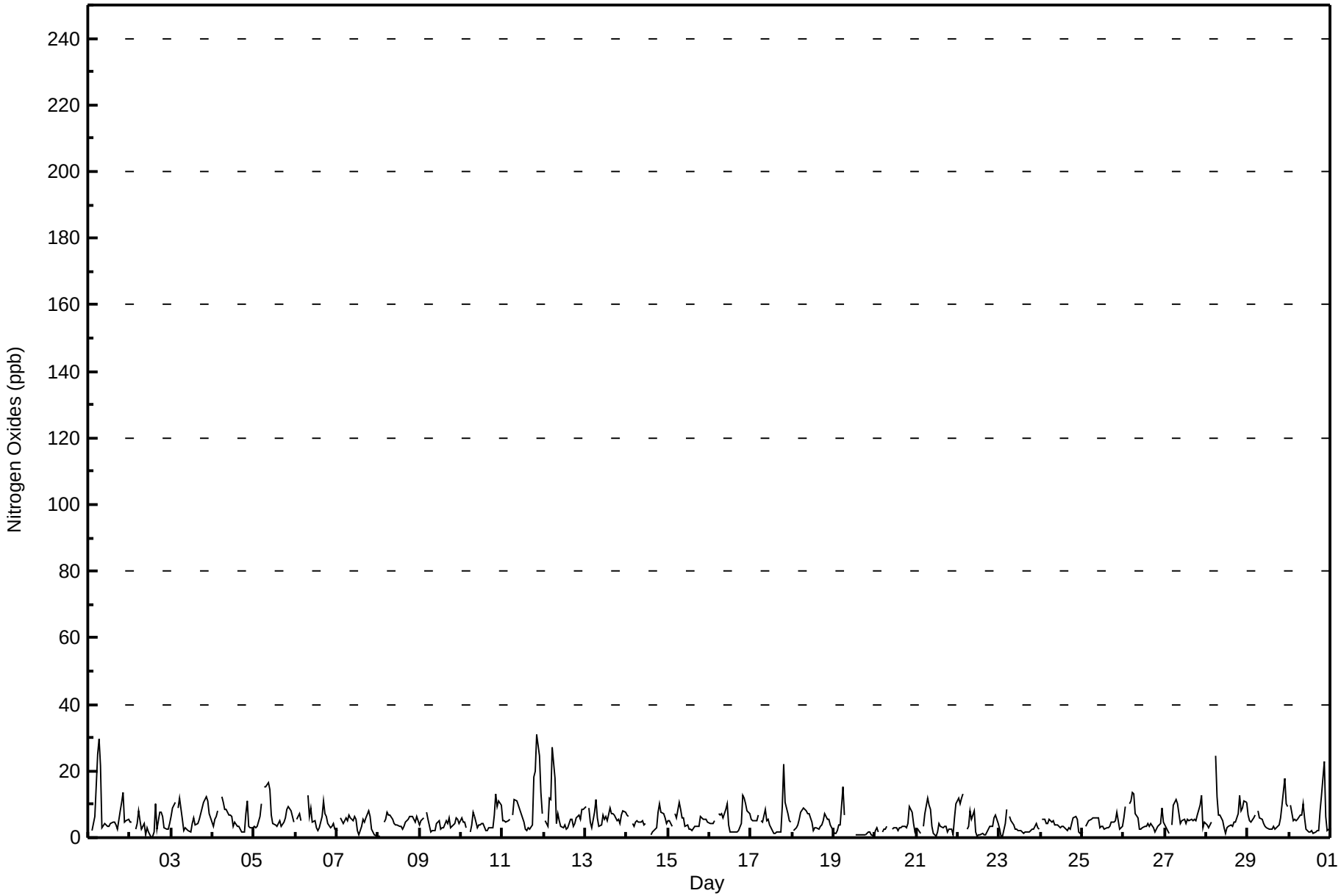
Z - zerospan C - Calibration M - Maintenance PF - Power Failure

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Oxides (NO_X) - ppb

Athabasca Valley - April 2016



Nitrogen Oxides (NO_X) - ppb
Athabasca Valley - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	669	98.67	98.67
21 - 40	9	1.33	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: 678

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Oxides (NO_X) - ppb

Athabasca Valley - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	83	18	12	13	34	40	148	53	34	29	25	14	13	19	23	107	665
21 - 40	1	0	0	0	0	1	1	3	0	1	0	0	0	0	0	2	9
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	84	18	12	13	34	41	149	56	34	30	25	14	13	19	23	109	674

Total Number of Valid Hours: 674

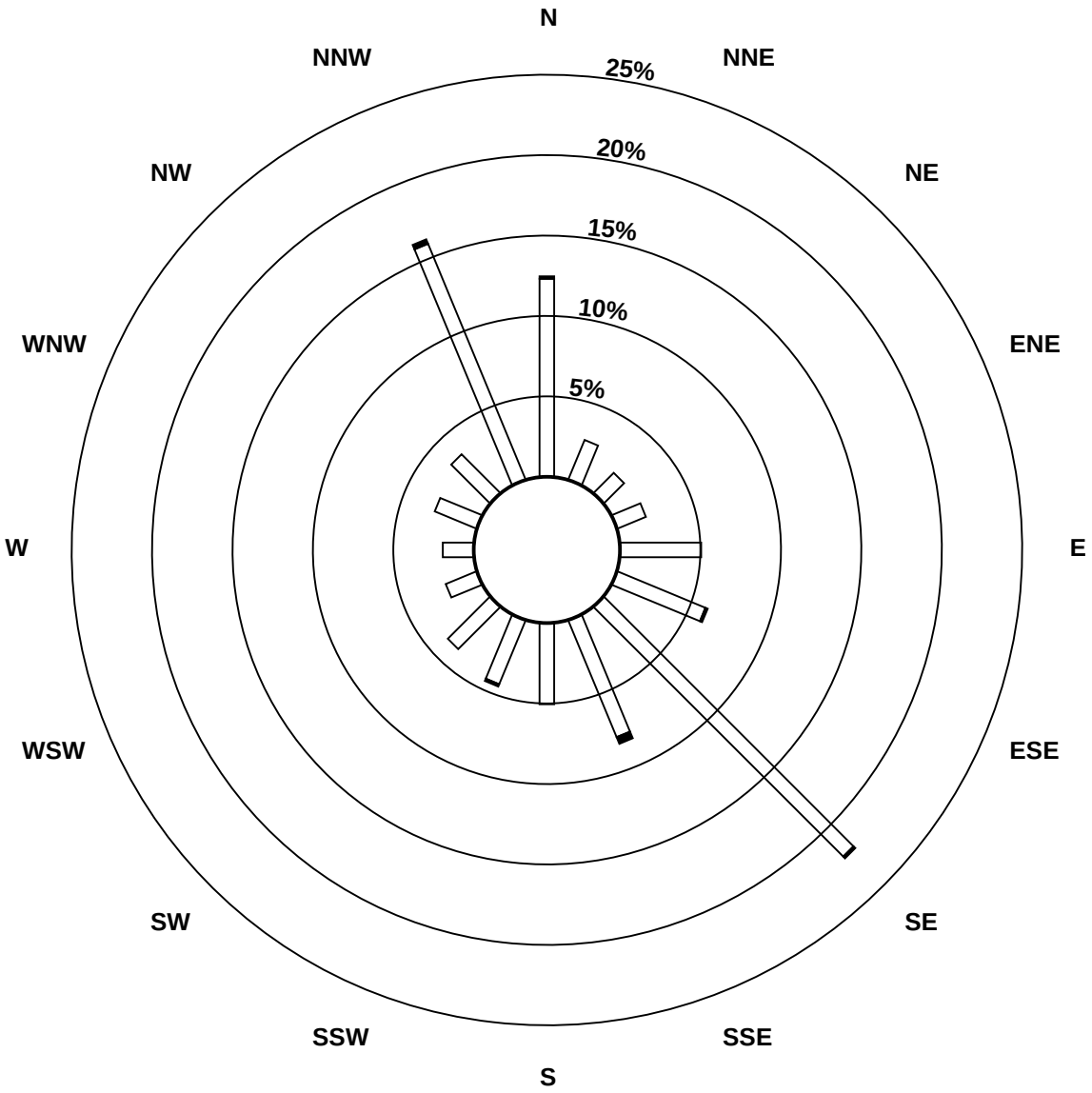
Total Number of Hours: 720

Wood Buffalo Environmental Association

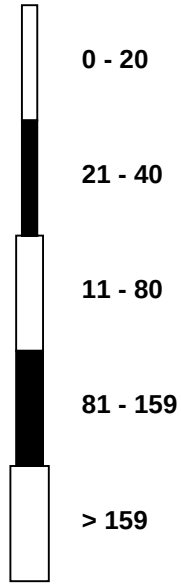
Wind Rose Apr 2016

Nitrogen Oxides (NO_X) - ppb

Athabasca Valley (AMS 7)



Classes (ppb)



0 - 20

21 - 40

11 - 80

81 - 159

> 159

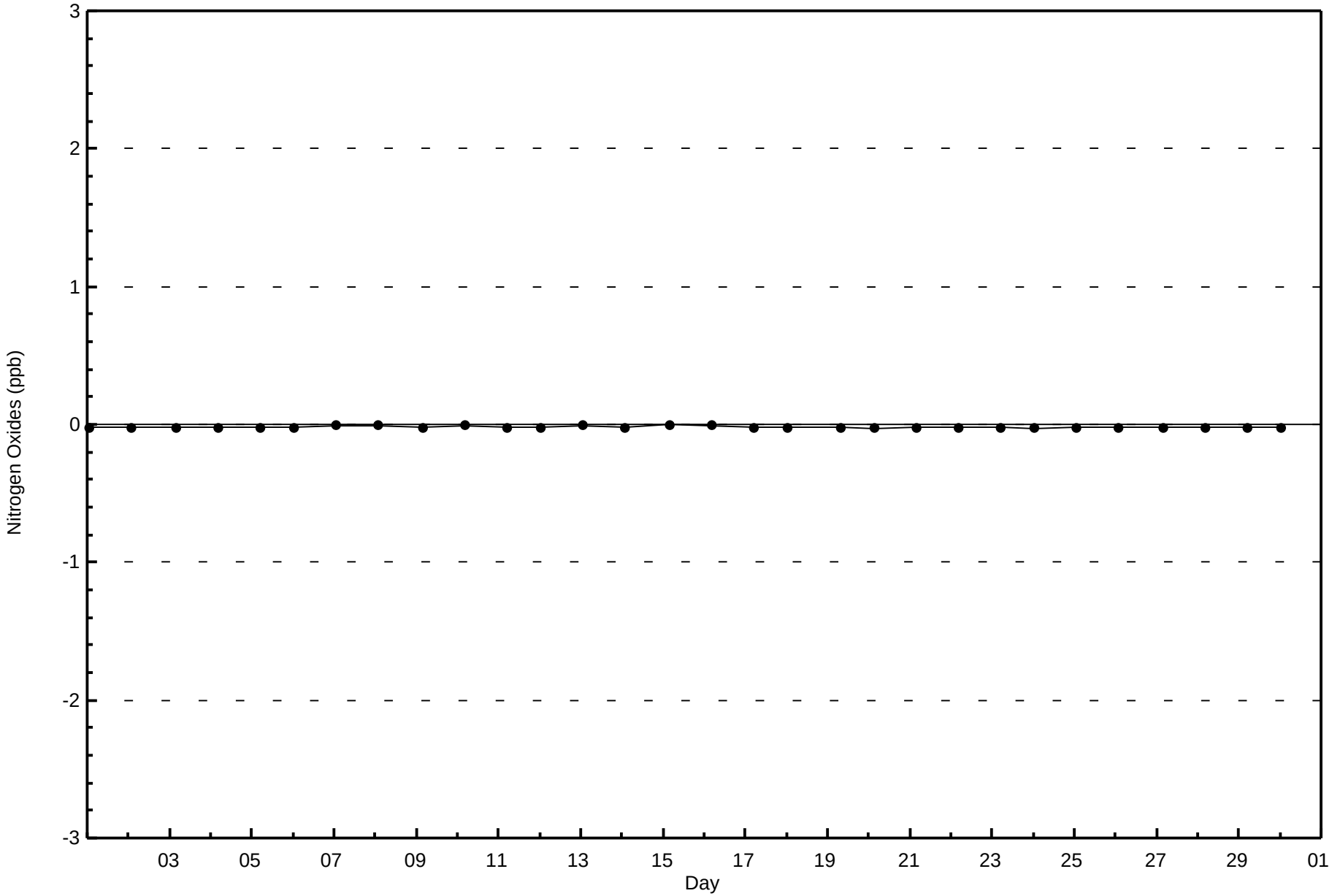
Total Number of Valid Hours: 674

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Oxides (NO_X) - ppb

Athabasca Valley - April 2016

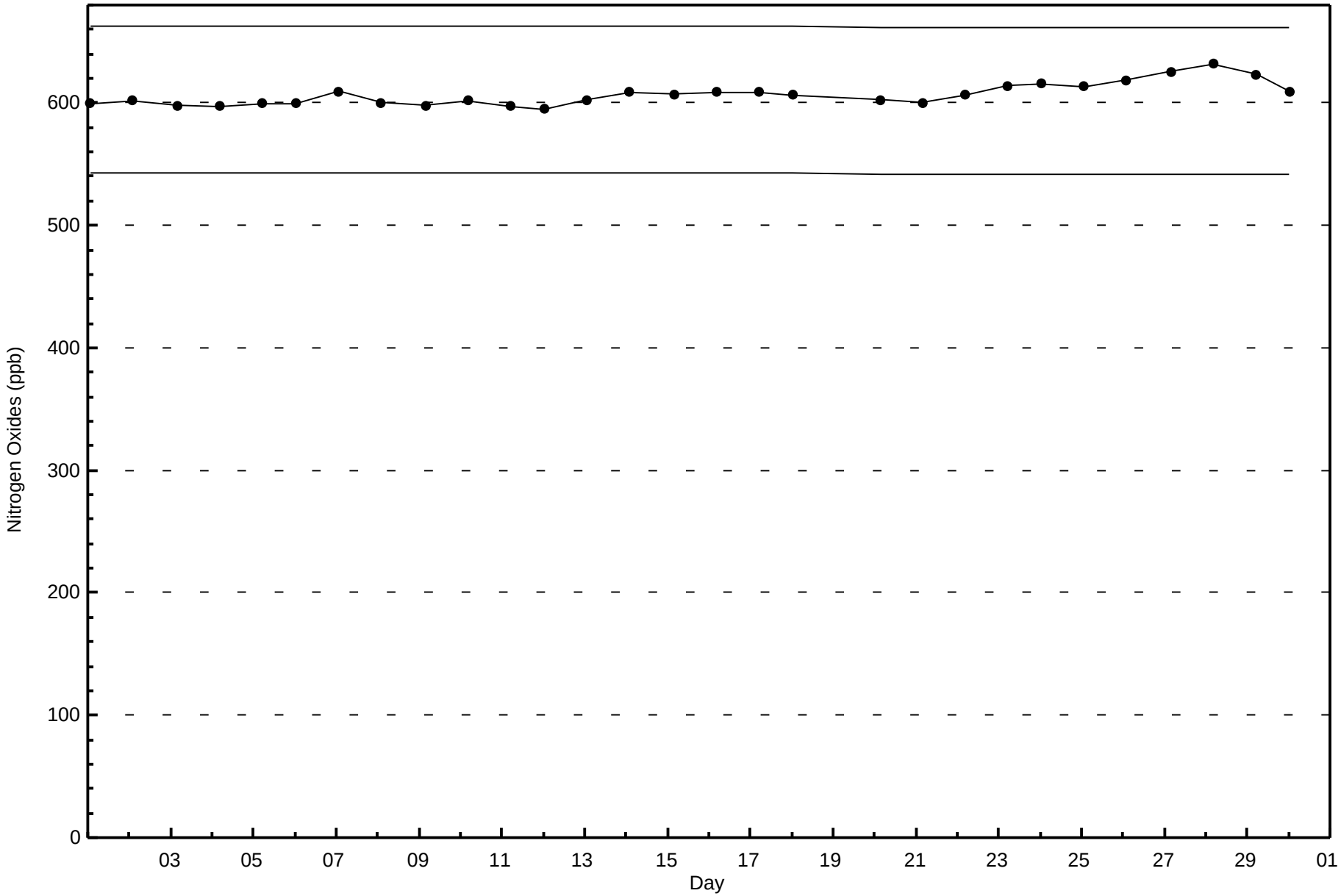


Wood Buffalo Environmental Association

Span Responses

Nitrogen Oxides (NO_X) - ppb

Athabasca Valley - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

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

Athabasca Valley - April 2016

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

Maximum Value: 25.1 $\mu g/m^3$ on Apr 17 23:00

Maximum Daily Average: 6.8 $\mu g/m^3$ on Apr 24

Minimum Value: 0.6 $\mu g/m^3$ on Apr 16 15:00

Minimum Daily Average: 3.1 $\mu g/m^3$ on Apr 15

Maximum Diurnal Average: 6.4 $\mu g/m^3$ at hour 21

Minimum Diurnal Average: 3.0 $\mu g/m^3$ at hour 14

Monthly Average: 4.36 $\mu g/m^3$

Percentiles: P_1 = 1.6 P_{10} = 2.4 Q_1 = 3.0 Median = 3.9 Q_3 = 5.1 P_{90} = 6.8 P_{99} = 13.3

Hours in Service:	720
Hours of Data:	703
Hours of Missing Data:	17
Hours of Calibration:	3
Percent Operational Time:	98.1

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-Apr	2.8	2.4	2.2	2.3	2.8	4.6	4.5	4.0	2.0	2.1	2.0	1.7	2.0	2.6	2.8	3.1	2.9	3.0	4.8	6.3	5.9	3.4	3.5	3.1	3.2	6.3
2-Apr	3.2	3.6	3.5	3.1	3.0	3.8	3.2	3.6	3.5	2.9	2.3	1.9	1.6	1.8	2.8	7.2	4.0	5.0	5.6	5.7	4.2	4.1	4.5	5.1	3.7	7.2
3-Apr	4.3	5.9	7.3	4.1	3.9	4.2	3.7	3.0	3.0	3.0	2.5	2.7	2.7	2.7	2.9	3.3	4.0	4.5	5.3	6.6	7.0	6.4	5.3	5.1	4.3	7.3
4-Apr	3.0	2.9	3.1	3.4	3.4	3.3	3.1	3.2	3.5	3.4	3.6	3.4	3.2	3.4	3.6	4.0	4.0	4.1	4.2	6.1	7.1	3.8	3.9	3.6	3.8	7.1
5-Apr	3.2	3.1	3.3	3.7	4.9	5.7	6.1	6.3	7.4	7.9	5.9	4.3	3.8	3.7	3.1	3.7	3.5	4.5	4.5	4.7	5.1	4.1	4.2	3.4	4.6	7.9
6-Apr	3.2	3.0	2.9	3.1	PF	PF	PF	5.3	4.9	4.9	4.2	5.3	4.3	4.1	3.9	5.6	5.8	4.7	3.8	3.4	3.5	3.5	3.4	3.0	4.1	5.8
7-Apr	3.2	4.1	4.7	4.2	3.8	4.3	3.7	3.2	2.6	2.6	3.3	3.7	3.1	2.6	3.3	4.8	4.6	4.3	4.2	4.4	3.5	3.0	2.8	2.3	3.6	4.8
8-Apr	2.5	2.8	3.1	2.6	3.0	3.5	3.3	3.1	2.7	2.5	2.4	2.4	2.7	2.6	3.1	3.0	3.2	4.0	4.4	4.3	4.2	3.6	3.8	3.3	3.2	4.4
9-Apr	2.9	2.9	3.0	3.1	3.4	3.8	2.6	2.7	2.8	2.9	2.7	4.8	2.3	2.9	3.1	2.7	2.8	2.8	3.0	3.2	3.5	4.4	4.4	4.5	3.2	4.8
10-Apr	4.4	4.8	5.0	4.5	4.9	5.0	5.1	5.7	4.6	4.2	3.6	3.4	2.9	2.6	2.9	3.2	3.5	4.0	4.5	8.1	8.9	7.3	6.8	5.9	4.8	8.9
11-Apr	3.1	3.5	2.8	2.7	2.9	3.6	3.8	4.2	4.5	4.3	4.7	4.7	4.2	3.4	2.6	3.1	1.7	2.5	14.3	13.6	22.3	16.0	9.6	7.0	6.0	22.3
12-Apr	7.2	4.9	3.8	4.7	4.6	5.2	5.5	3.9	4.4	3.7	3.4	3.3	3.9	4.4	4.7	5.9	6.2	5.8	7.1	8.1	7.8	6.7	6.7	6.7	5.4	8.1
13-Apr	7.3	7.7	7.9	5.3	4.7	4.9	5.8	5.0	4.7	4.4	4.6	4.2	4.2	4.4	5.8	5.7	4.9	4.5	3.2	2.5	1.9	2.3	3.5	4.9	4.8	7.9
14-Apr	7.5	9.4	6.0	4.2	3.9	4.0	4.3	4.5	3.7	2.7	2.1	2.3	PF	1.2	1.3	1.5	1.9	1.8	3.1	3.2	2.7	2.2	1.8	1.9	3.4	9.4
15-Apr	2.1	2.2	2.0	1.9	1.9	2.0	2.3	2.5	2.8	2.8	2.3	2.6	2.4	1.8	1.8	2.4	2.6	2.7	2.2	6.0	6.2	7.0	5.9	5.0	3.1	7.0
16-Apr	4.1	3.7	3.3	3.0	2.9	3.2	3.3	3.3	2.9	3.2	3.8	1.9	1.4	1.0	0.6	UO	UO	UO	UO	4.8	6.8	6.3	7.2	6.1	3.6	7.2
17-Apr	4.5	4.3	4.2	3.5	3.1	2.4	2.7	2.8	3.5	3.7	3.5	3.4	2.8	0.6	UO	UO	UO	UO	4.3	13.3	10.0	6.8	25.1	9.6	5.7	25.1
18-Apr	4.7	4.0	6.0	3.2	3.3	3.4	3.8	3.7	3.8	3.5	3.9	5.0	4.9	3.4	2.1	UO	2.8	UO	2.2	5.5	6.4	7.3	7.7	3.7	4.3	7.7
19-Apr	3.2	3.4	3.7	4.6	5.3	9.1	7.5	7.4	6.1	4.7	3.4	2.9	2.4	2.7	4.0	2.9	2.7	3.0	3.1	2.4	2.1	2.0	1.8	2.0	3.8	9.1
20-Apr	4.3	2.7	2.2	2.1	2.6	3.0	3.0	3.2	3.2	2.7	2.5	2.1	2.0	2.4	2.6	3.2	3.8	4.2	4.4	5.1	5.8	5.4	4.4	3.3	3.3	5.8
21-Apr	3.7	4.4	3.8	3.9	3.6	3.8	3.8	3.9	3.4	2.3	1.8	1.6	1.7	2.2	3.0	3.5	4.2	5.3	4.1	3.7	5.1	4.3	4.6	4.9	3.6	5.3
22-Apr	4.4	4.2	4.3	4.0	2.7	2.7	2.4	2.8	C	C	C	2.5	2.4	2.2	2.2	2.2	2.6	2.9	4.3	4.3	5.2	5.2	5.1	3.5	3.4	5.2
23-Apr	4.0	3.9	3.4	3.6	3.8	3.5	3.3	3.1	2.9	2.4	2.2	2.3	2.4	2.7	3.4	4.0	4.2	5.6	6.8	6.0	5.6	7.6	6.2	4.1	4.0	7.6
24-Apr	5.1	18.3	13.4	9.5	5.0	5.1	7.5	6.5	5.6	5.2	5.0	5.8	5.4	7.4	5.4	3.9	6.3	5.5	6.1	6.7	7.3	6.1	5.8	5.3	6.8	18.3
25-Apr	5.4	5.5	5.6	5.2	5.1	5.4	4.8	4.5	4.4	4.2	3.2	3.0	3.2	3.1	3.6	4.0	3.9	4.3	3.9	3.9	4.9	4.5	4.3	4.4	4.3	5.6
26-Apr	6.3	6.3	5.7	5.6	5.6	6.3	4.7	3.5	4.0	4.8	4.5	4.8	4.7	4.6	5.0	4.9	4.5	3.4	2.9	3.4	3.5	4.2	4.9	4.1	4.7	6.3
27-Apr	2.7	3.3	3.1	3.4	2.3	3.4	2.9	2.8	3.1	3.2	4.8	4.1	3.1	2.1	3.1	4.0	4.7	5.0	5.4	7.1	9.1	9.6	4.5	6.9	4.3	9.6
28-Apr	7.6	6.2	5.2	4.6	4.6	5.9	4.4	4.0	4.4	4.4	4.0	3.7	3.8	5.3	5.4	6.0	7.9	8.2	9.8	11.3	8.4	8.6	9.9	8.5	6.3	11.3
29-Apr	7.9	7.6	7.2	7.4	7.8	8.1	7.9	6.5	5.9	5.9	5.7	5.6	4.6	4.2	4.0	3.7	3.9	4.1	4.2	5.7	7.7	13.2	11.2	8.2	6.6	13.2
30-Apr	7.7	8.9	5.4	5.1	5.1	4.7	4.6	4.9	5.2	4.3	2.5	2.2	2.2	2.4	3.0	3.5	3.2	3.0	5.6	7.5	10.9	5.3	3.4	4.1	4.8	10.9
	4.5	5.0	4.6	4.1	3.9	4.4	4.3	4.1	4.0	3.7	3.5	3.4	3.1	3.0	3.3	3.9	3.9	4.2	4.9	5.9	6.4	5.8	5.9	4.8	Diurnal Average	
	7.9	18.3	13.4	9.5	7.8	9.1	7.9	7.4	7.4	7.9	5.9	5.8	5.4	7.4	5.8	7.2	7.9	8.2	14.3	13.6	22.3	16.0	25.1	9.6	Diurnal Maximum	

C - Calibration UO - Unstable Operation PF - Power Failure

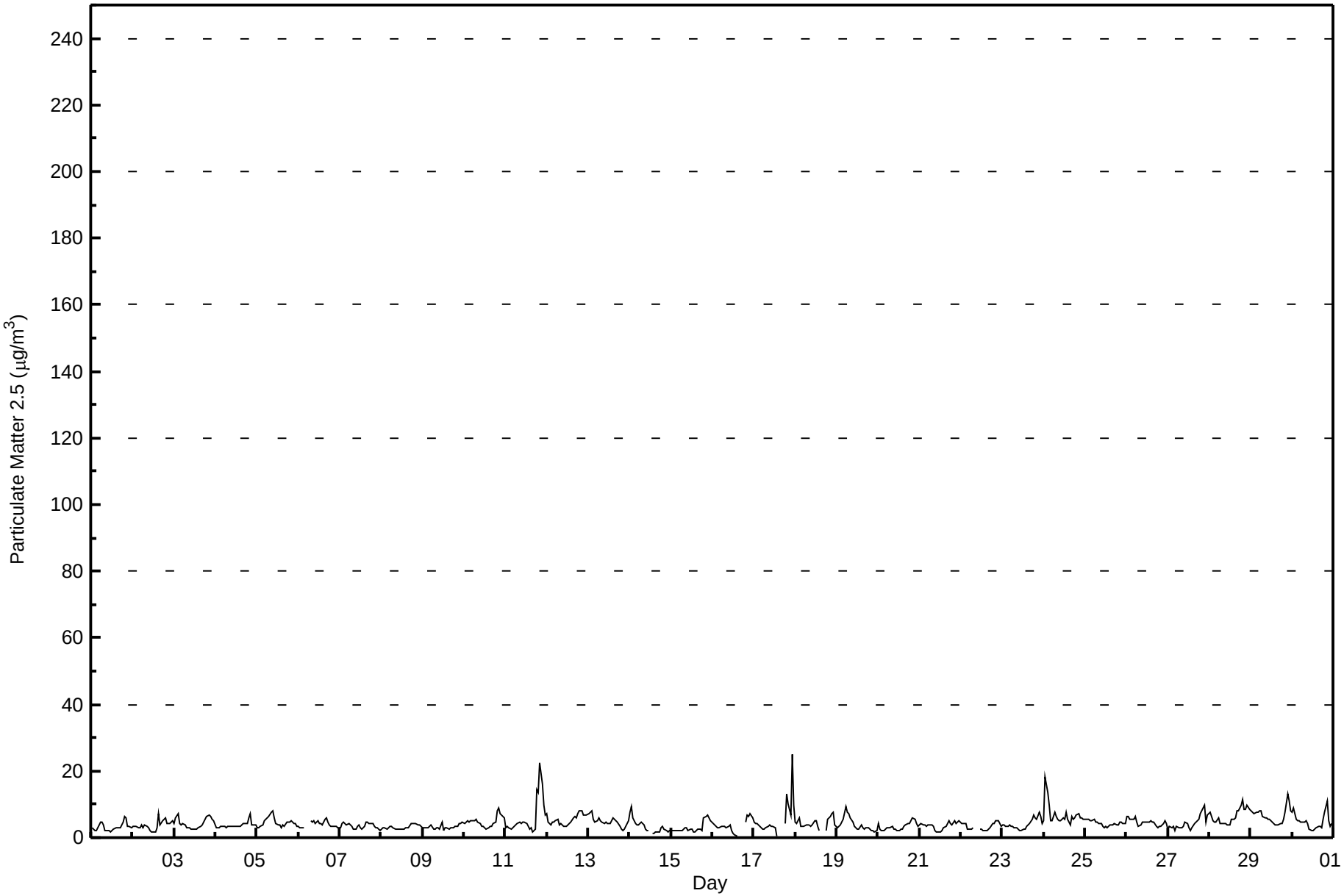
Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 $\mu g/m^3$

Wood Buffalo Environmental Association

Hourly Averages

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

Athabasca Valley - April 2016



Concentration Ranges ($\mu g/m^3$)	Number of Hours	%	Cumulative %
1 - 5	561	79.80	79.80
6 - 15	135	19.20	99.00
16 - 25	4	0.57	99.57
26 - 80	0	0.00	99.57
> 81.0	0	0.00	99.57

Total Number of Valid Hours: 703

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

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

Athabasca Valley - April 2016

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	69	14	10	13	35	35	111	34	31	25	22	9	12	13	22	102	557
6 - 15	20	5	3	0	1	6	44	25	3	3	5	3	0	4	4	9	135
16 - 25	0	0	0	0	0	0	2	1	0	1	0	0	0	0	0	0	4
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	89	19	13	13	36	41	157	60	34	29	27	12	12	17	26	111	696

Total Number of Valid Hours: 699

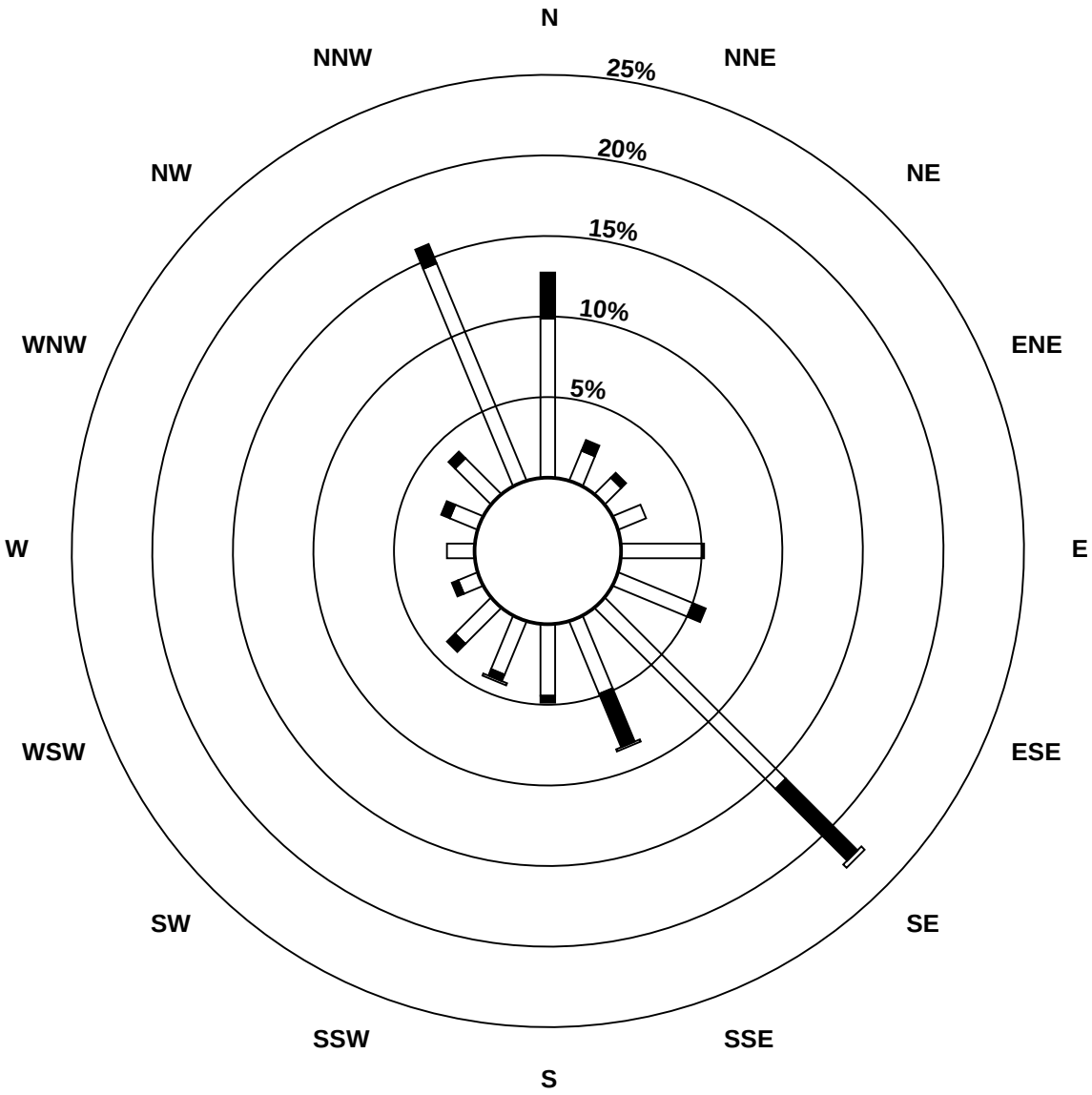
Total Number of Hours: 720

Wood Buffalo Environmental Association

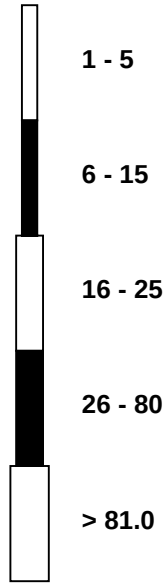
Wind Rose Apr 2016

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

Athabasca Valley (AMS 7)



Classes ($\mu g/m^3$)



Total Number of Valid Hours: 699

Wood Buffalo Environmental Association

Summary of Hour Averages

Carbon Monoxide (CO) - ppm

Athabasca Valley - April 2016

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

Maximum Value: 0.2 ppm on Apr 11 21:00

Maximum Daily Average: 0.1 ppm on Apr 11

Minimum Value: 0.0 ppm on Apr 18 16:00

Minimum Daily Average: 0.0 ppm on Apr 22

Maximum Diurnal Average: 0.1 ppm at hour 21

Minimum Diurnal Average: 0.1 ppm at hour 15

Monthly Average: 0.07 ppm

Percentiles: P_1 = 0.0 P_{10} = 0.0 Q_1 = 0.1 Median = 0.1 Q_3 = 0.1 P_{90} = 0.1 P_{99} = 0.2

Hours in Service:	720
Hours of Data:	682
Hours of Missing Data:	38
Hours of Calibration:	31
Percent Operational Time:	99.0

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-Apr	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2-Apr	0.1	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
3-Apr	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1
4-Apr	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
5-Apr	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
6-Apr	0.1	0.1	0.1	0.1	PF	PF	PF	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
7-Apr	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
8-Apr	0.1	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
9-Apr	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
10-Apr	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1
11-Apr	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.2	0.2	0.2	0.2	0.1	0.1	0.2
12-Apr	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
13-Apr	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
14-Apr	0.1	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	PF	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
15-Apr	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
16-Apr	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.2	0.2	0.2	0.2	0.1	0.1	0.2
17-Apr	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.2
18-Apr	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.1
19-Apr	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	M	0.1	0.0	0.0	M	M	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.1
20-Apr	0.1	0.1	0.1	0.1	0.1	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.1
21-Apr	0.0	0.0	0.0	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
22-Apr	0.1	0.1	0.1	0.1	0.0	0.0	C	C	C	C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.1
23-Apr	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.1	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1
24-Apr	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1
25-Apr	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
26-Apr	0.1	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
27-Apr	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1
28-Apr	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	Z	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
29-Apr	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.2
30-Apr	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.2
	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Diurnal Average	
	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.1	Diurnal Maximum	

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

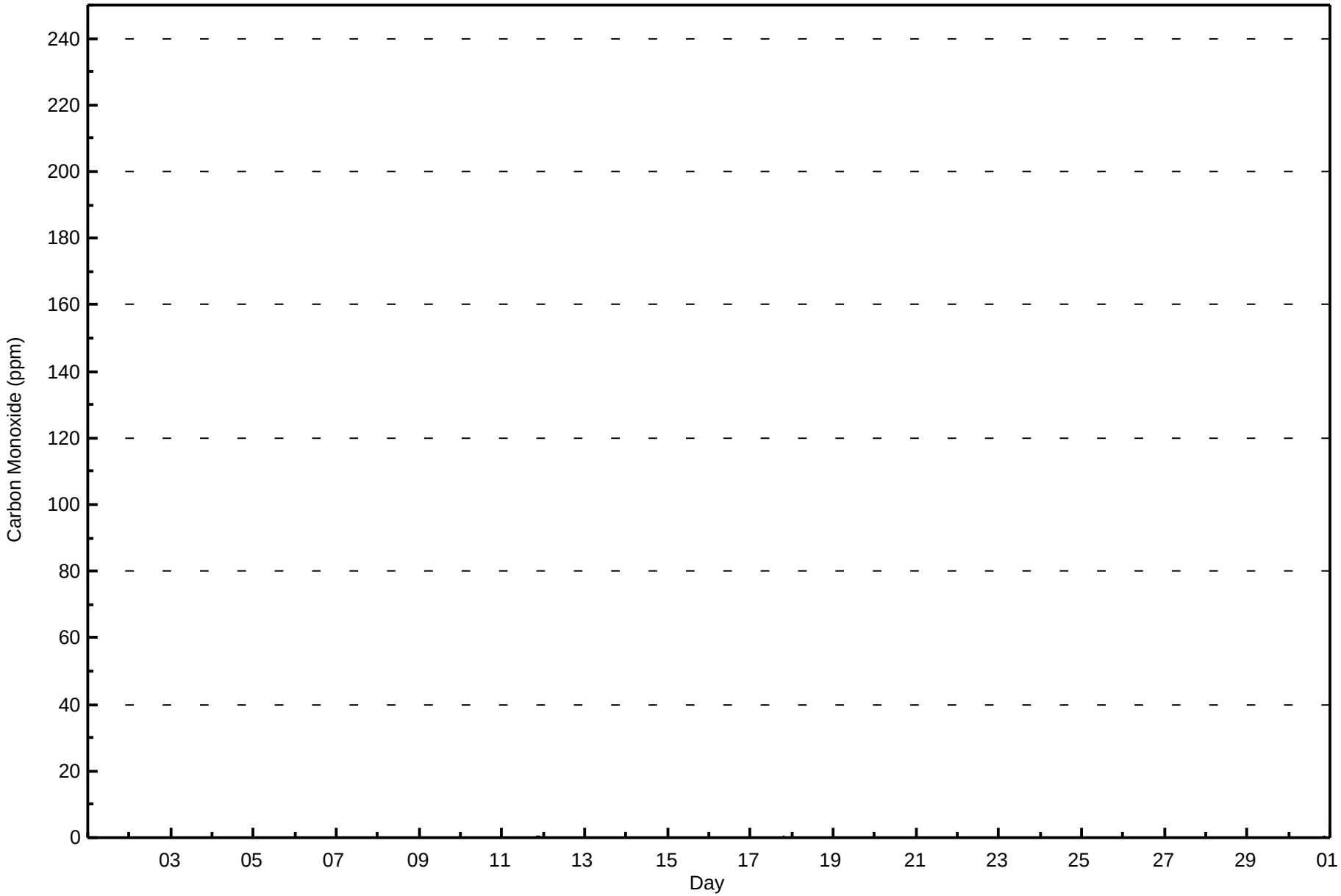
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 13 ppm

Wood Buffalo Environmental Association

Hourly Averages

Carbon Monoxide (CO) - ppm

Athabasca Valley - April 2016



Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.3	682	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: 682

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Carbon Monoxide (CO) - ppm

Athabasca Valley - April 2016

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	87	17	12	12	36	39	147	57	34	29	28	14	14	21	24	108	679
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	87	17	12	12	36	39	147	57	34	29	28	14	14	21	24	108	679

Total Number of Valid Hours: 679

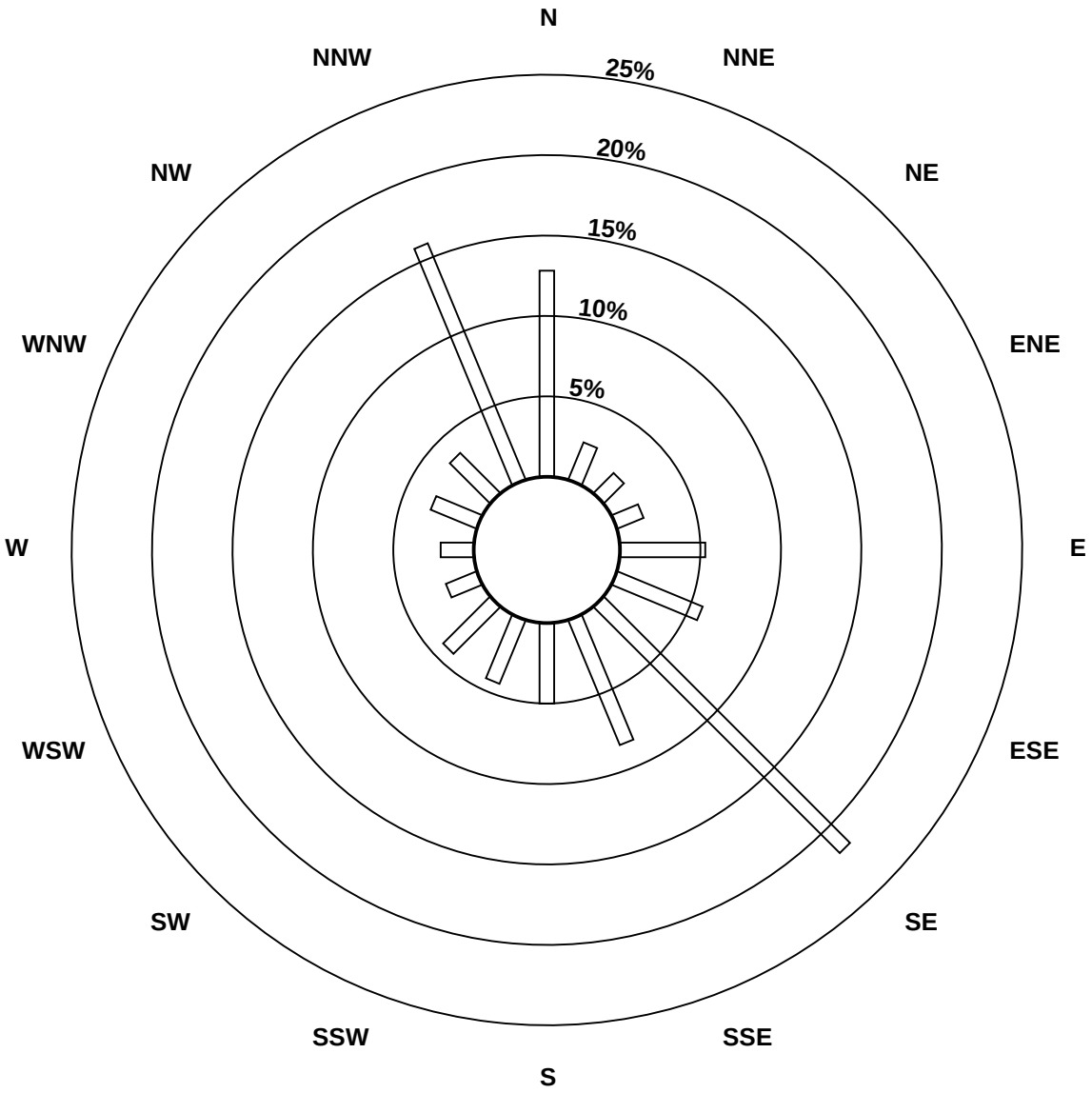
Total Number of Hours: 720

Wood Buffalo Environmental Association

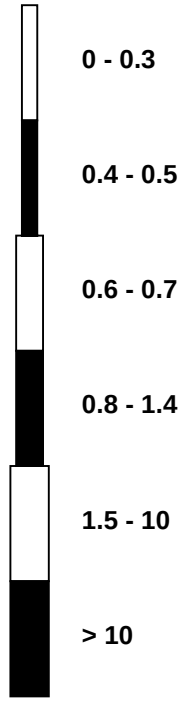
Wind Rose Apr 2016

Carbon Monoxide (CO) - ppm

Athabasca Valley (AMS 7)



Classes (ppm)



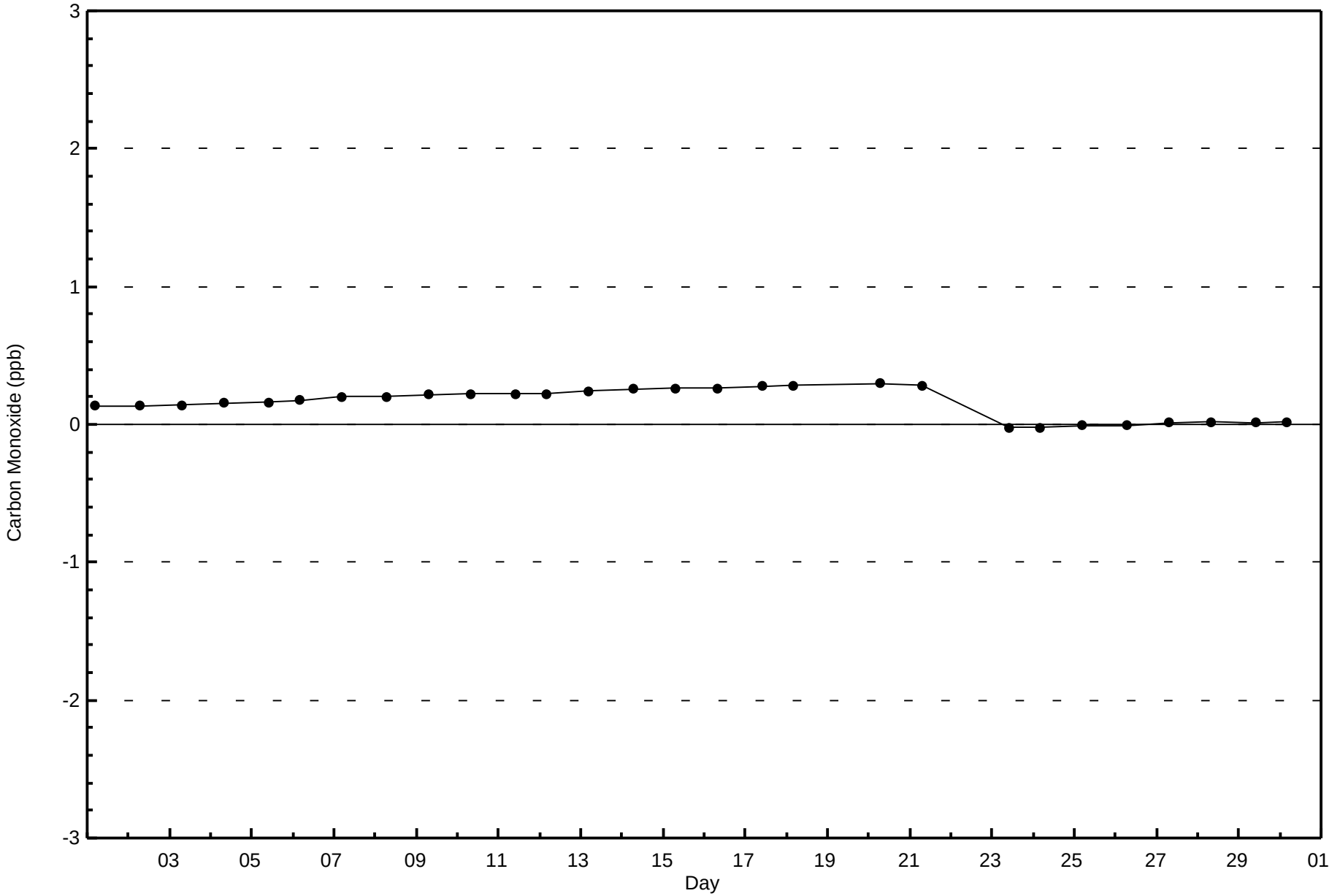
Total Number of Valid Hours: 679

Wood Buffalo Environmental Association

Zero Responses

Carbon Monoxide (CO) - ppb

Athabasca Valley - April 2016

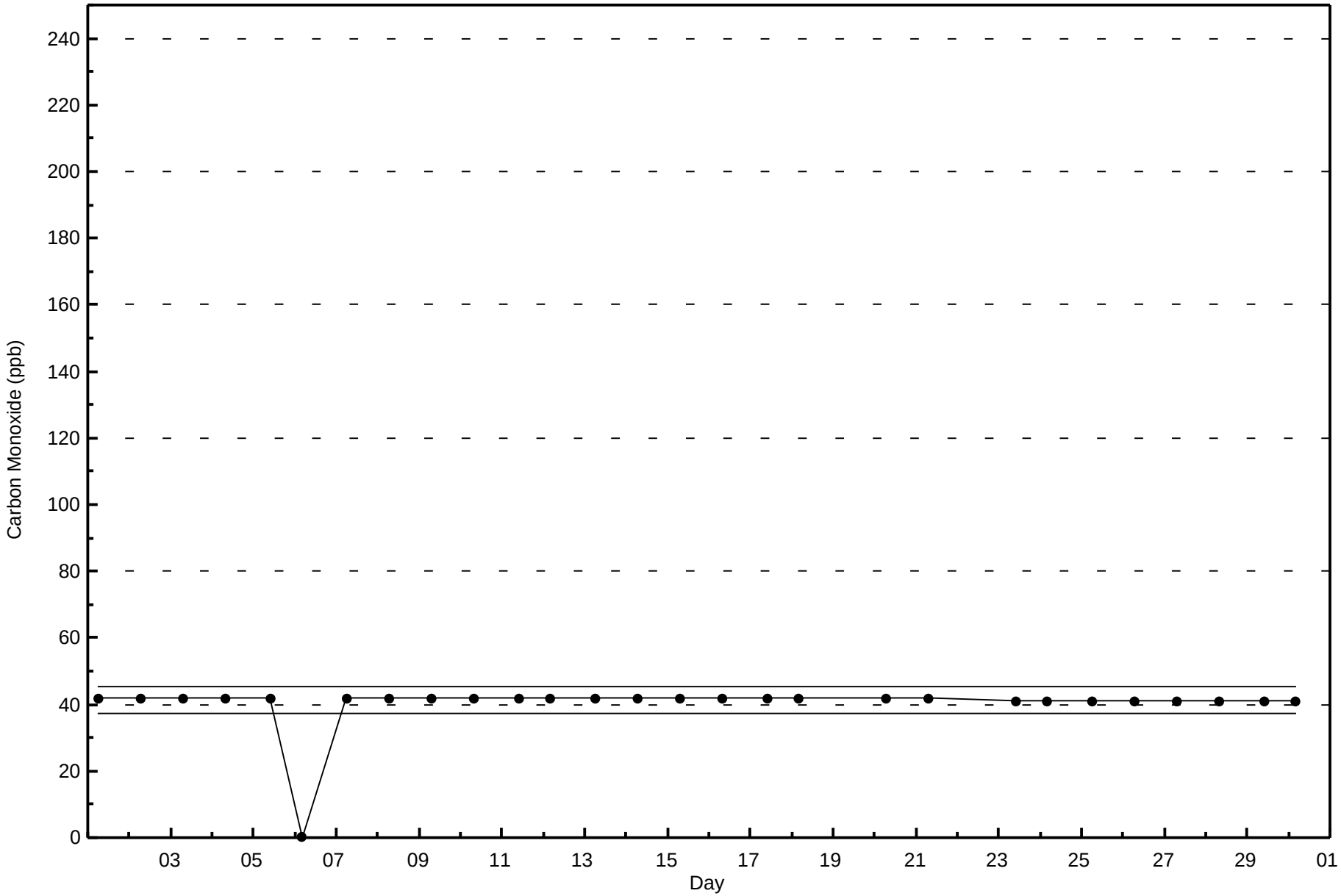


Wood Buffalo Environmental Association

Span Responses

Carbon Monoxide (CO) - ppb

Athabasca Valley - April 2016



Maximum Value: 27.8 C on Apr 18 17:00

Maximum Daily Average: 16.7 C on Apr 29

Minimum Value: -10.0 C on Apr 4 05:00

Minimum Daily Average: -5.1 C on Apr 3

Maximum Diurnal Average: 9.4 C at hour 17

Minimum Diurnal Average: 0.0 C at hour 6

Monthly Average: 4.74 C

Percentiles: P_1 = -8.2 P_{10} = -4.3 Q_1 = -0.6 Median = 3.3 Q_3 = 9.0 P_{90} = 16.6 P_{99} = 25.1

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

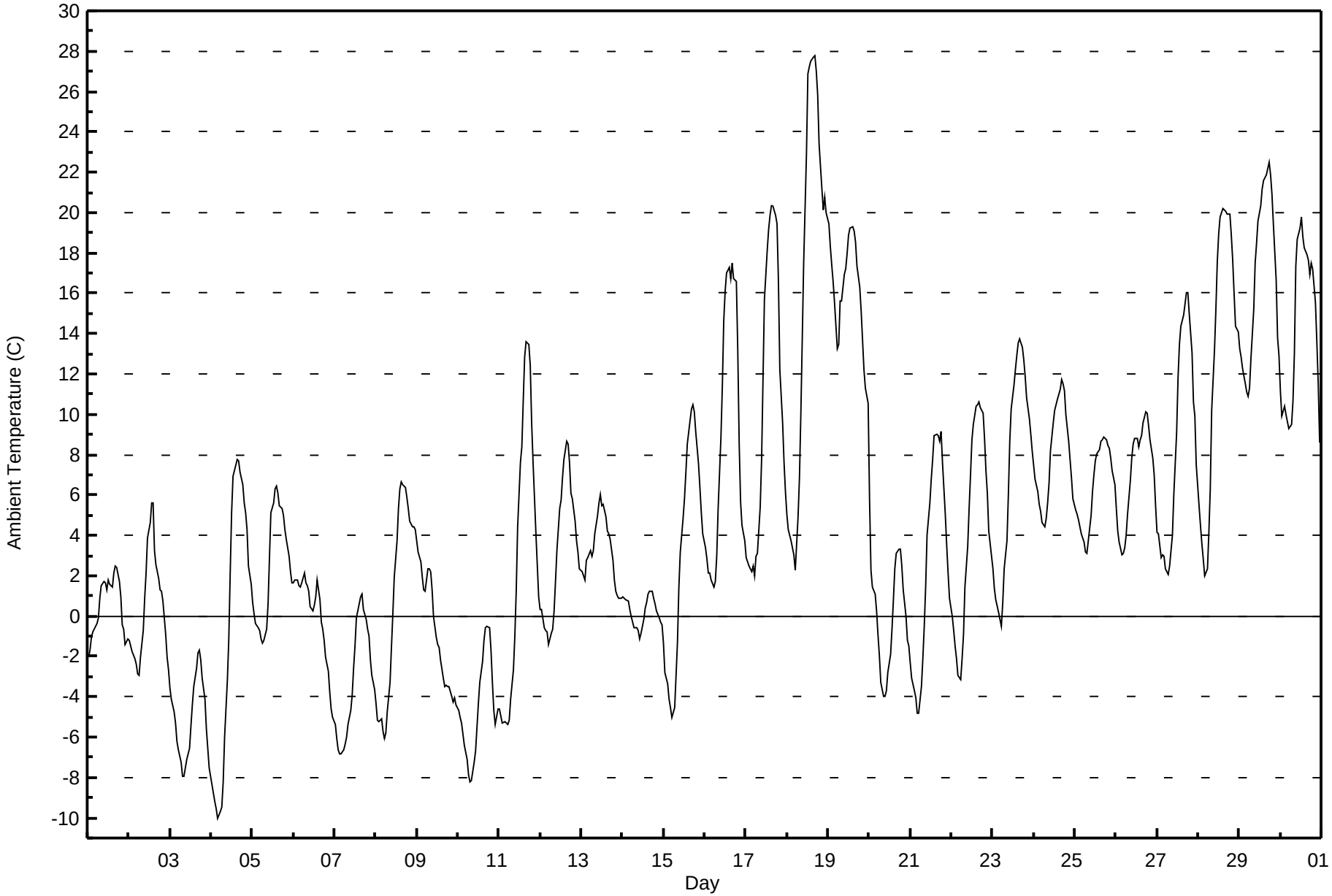
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	-2.0	-1.7	-1.0	-0.8	-0.6	-0.4	-0.1	0.9	1.5	1.7	1.6	1.3	1.8	1.6	1.4	2.2	2.5	2.4	1.7	0.9	-0.4	-0.7	-1.4	-1.1	0.5	2.5
2-Apr	-1.2	-1.5	-1.8	-2.1	-2.4	-2.9	-2.9	-2.0	-0.7	0.9	2.2	3.9	4.6	5.6	5.6	3.3	2.5	1.8	1.3	1.2	0.7	-0.9	-2.1	-2.7	0.4	5.6
3-Apr	-3.5	-4.1	-4.7	-5.3	-6.2	-6.7	-7.2	-7.9	-7.9	-7.5	-7.1	-6.6	-5.5	-4.4	-3.5	-2.6	-1.8	-1.7	-2.2	-3.1	-4.1	-5.6	-6.6	-7.5	-5.1	-1.7
4-Apr	-8.3	-8.8	-9.2	-9.6	-10.0	-9.7	-9.5	-8.2	-6.0	-3.1	-1.1	2.1	5.1	6.9	7.5	7.8	7.7	7.2	6.5	5.6	5.1	4.3	2.5	1.6	-0.6	7.8
5-Apr	0.7	0.1	-0.4	-0.6	-0.7	-1.1	-1.4	-1.2	-0.6	0.6	2.9	5.1	5.6	6.3	6.5	6.1	5.5	5.3	5.0	4.3	3.8	3.0	2.2	1.7	2.4	6.5
6-Apr	1.6	1.8	1.8	1.5	1.5	1.6	2.1	1.6	1.5	1.3	0.5	0.3	0.5	1.0	1.8	0.8	-0.3	-0.7	-1.2	-2.1	-2.7	-3.7	-4.6	-5.0	0.0	2.1
7-Apr	-5.4	-6.1	-6.6	-6.8	-6.8	-6.6	-6.3	-6.0	-5.4	-4.7	-3.9	-2.6	-1.5	-0.1	0.6	1.0	1.1	0.3	-0.2	-0.7	-1.0	-2.2	-2.9	-3.6	-3.2	1.1
8-Apr	-4.3	-5.2	-5.2	-5.1	-5.7	-6.1	-5.8	-4.8	-3.3	-1.5	0.2	1.9	3.7	5.3	6.3	6.6	6.5	6.4	5.9	5.3	4.7	4.4	4.4	4.3	0.8	6.6
9-Apr	3.7	3.2	2.7	2.0	1.3	1.3	2.4	2.3	2.2	1.3	-0.1	-1.1	-1.4	-1.5	-2.2	-3.1	-3.5	-3.5	-3.5	-3.5	-4.0	-4.3	-4.1	-4.4	-0.7	3.7
10-Apr	-4.7	-5.0	-5.3	-5.8	-6.4	-7.1	-7.8	-8.2	-8.2	-7.3	-6.7	-5.5	-4.3	-3.3	-2.2	-1.2	-0.6	-0.5	-0.6	-1.7	-3.3	-4.7	-5.3	-4.6	-4.6	-0.5
11-Apr	-4.6	-5.0	-5.3	-5.3	-5.3	-5.4	-5.1	-4.1	-2.7	-1.0	1.3	4.4	7.6	8.4	10.7	12.8	13.6	13.5	12.4	9.5	7.6	4.1	2.5	0.9	2.7	13.6
12-Apr	0.3	0.3	-0.6	-0.7	-0.8	-1.4	-0.9	-0.6	0.3	1.7	3.3	5.3	5.8	6.9	7.7	8.6	8.6	7.6	6.1	5.8	4.7	3.7	3.2	2.4	3.2	8.6
13-Apr	2.2	2.0	1.8	2.8	2.9	3.3	3.0	3.2	4.0	5.0	5.6	6.1	5.4	5.5	4.9	4.2	4.0	3.8	2.8	1.8	1.2	1.0	0.9	0.9	3.3	6.1
14-Apr	1.0	0.9	0.8	0.8	0.3	0.0	-0.3	-0.6	-0.6	-0.7	-1.1	-0.9	-0.2	0.4	0.7	1.1	1.3	1.2	0.9	0.6	0.2	-0.1	-0.3	-0.4	0.2	1.3
15-Apr	-1.4	-2.8	-3.4	-4.1	-4.5	-5.0	-4.5	-2.9	-1.3	1.5	3.2	4.9	5.8	7.1	8.5	9.7	10.3	10.5	10.2	9.2	7.5	6.4	5.1	4.1	3.1	10.5
16-Apr	3.4	2.8	2.1	2.2	1.8	1.5	1.7	3.0	5.3	8.9	11.4	14.7	16.1	17.0	17.3	16.8	17.5	16.7	16.6	13.2	8.6	5.7	4.5	3.7	8.8	17.5
17-Apr	2.9	2.7	2.5	2.2	2.5	2.0	2.9	3.1	5.4	7.8	11.7	15.7	18.1	19.2	19.9	20.4	20.4	19.9	19.5	16.6	12.2	9.6	7.6	6.2	10.5	20.4
18-Apr	5.1	4.3	3.7	3.4	3.1	2.3	4.9	6.9	10.1	13.7	17.5	22.9	26.9	27.2	27.5	27.7	27.8	27.0	25.9	23.4	21.2	20.1	20.7	20.0	16.4	27.8
19-Apr	19.4	18.3	17.5	16.6	15.6	13.3	13.4	15.6	15.6	16.9	17.2	17.9	18.8	19.2	19.3	19.1	18.5	17.3	16.3	15.1	13.7	12.2	11.3	10.5	16.2	19.4
20-Apr	5.7	2.3	1.4	1.1	0.2	-1.0	-2.0	-3.3	-4.0	-4.0	-3.7	-2.8	-1.9	-0.7	0.8	2.3	3.1	3.3	3.3	2.5	1.3	0.0	-1.2	-1.5	0.1	5.7
21-Apr	-2.3	-3.1	-3.7	-4.0	-4.8	-4.8	-3.5	-2.1	-0.5	1.5	4.0	5.6	6.8	7.8	8.9	9.0	9.0	8.7	9.1	7.6	5.0	3.5	2.1	0.9	2.5	9.1
22-Apr	0.0	-0.7	-1.5	-2.1	-2.9	-3.1	-2.1	-1.0	1.5	3.5	5.4	7.0	8.7	9.5	10.4	10.5	10.6	10.4	10.0	8.8	7.2	6.1	4.2	2.9	4.3	10.6
23-Apr	2.4	1.4	0.8	0.2	-0.2	-0.5	0.7	2.3	3.8	6.0	8.7	10.3	11.5	12.2	12.9	13.5	13.8	13.3	12.7	11.9	10.8	9.8	9.0	8.2	7.3	13.8
24-Apr	7.5	6.8	6.1	5.5	5.2	4.6	4.4	4.8	5.6	6.6	8.2	9.6	10.2	10.5	10.7	11.2	11.7	11.5	11.2	10.0	8.7	7.8	6.8	5.8	8.0	11.7
25-Apr	5.2	5.1	4.7	4.4	4.1	3.7	3.2	3.1	3.7	5.0	6.2	7.0	7.7	8.1	8.2	8.6	8.8	8.9	8.7	8.4	8.3	7.9	7.2	6.5	6.4	8.9
26-Apr	5.3	4.2	3.7	3.1	3.1	3.4	4.0	5.1	6.7	7.8	8.5	8.8	8.8	8.4	8.7	8.9	9.5	10.2	10.1	9.4	8.8	7.8	7.0	5.5	7.0	10.2
27-Apr	4.1	4.1	2.9	3.0	2.9	2.4	2.1	2.5	3.2	4.0	6.0	9.1	11.8	13.5	14.4	14.9	15.5	16.1	16.0	15.0	13.0	10.6	9.9	7.5	8.5	16.1
28-Apr	5.5	4.5	3.6	2.8	2.0	2.4	4.2	6.3	10.2	13.2	15.2	17.6	18.9	19.8	20.2	20.1	20.0	19.9	19.9	18.8	17.6	15.9	14.4	14.1	12.8	20.2
29-Apr	13.2	12.8	12.3	11.5	11.1	10.9	11.3	12.8	15.2	17.5	18.5	19.6	20.4	21.2	21.6	21.8	21.9	22.5	21.9	20.9	19.5	16.6	13.8	12.9	16.7	22.5
30-Apr	11.1	9.9	10.4	10.0	9.6	9.3	9.5	10.7	13.1	17.4	18.7	19.2	19.8	18.8	18.3	17.9	17.6	16.9	17.5	17.2	15.6	13.6	11.5	8.6	14.3	19.8
	2.1	1.5	1.0	0.7	0.3	0.0	0.3	1.0	2.3	3.8	5.1	6.7	7.9	8.6	9.1	9.3	9.4	9.2	8.8	7.7	6.4	5.1	4.1	3.3	Diurnal Average	
	19.4	18.3	17.5	16.6	15.6	13.3	13.4	15.6	15.6	17.5	18.7	22.9	26.9	27.2	27.5	27.7	27.8	27.0	25.9	23.4	21.2	20.1	20.7	20.0	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature (AT) - C

Athabasca Valley - April 2016



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	206	28.61	28.61
0 - 10	353	49.03	77.64
10 - 20	135	18.75	96.39
> 20	26	3.61	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Wood Buffalo Environmental Association

Summary of Hour Averages

Barometric Pressure (BP) - %

Athabasca Valley - April 2016

Maximum Value: 29.4 % on Apr 20 13:00

Maximum Daily Average: 29.3 % on Apr 20

Minimum Value: 28.4 % on Apr 9 02:00

Minimum Daily Average: 28.7 % on Apr 2

Maximum Diurnal Average: 29.1 % at hour 9

Minimum Diurnal Average: 29.0 % at hour 19

Monthly Average: 29.05 %

Percentiles: P_1 = 28.5 P_{10} = 28.8 Q_1 = 28.9 Median = 29.1 Q_3 = 29.2 P_{90} = 29.3 P_{99} = 29.4

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

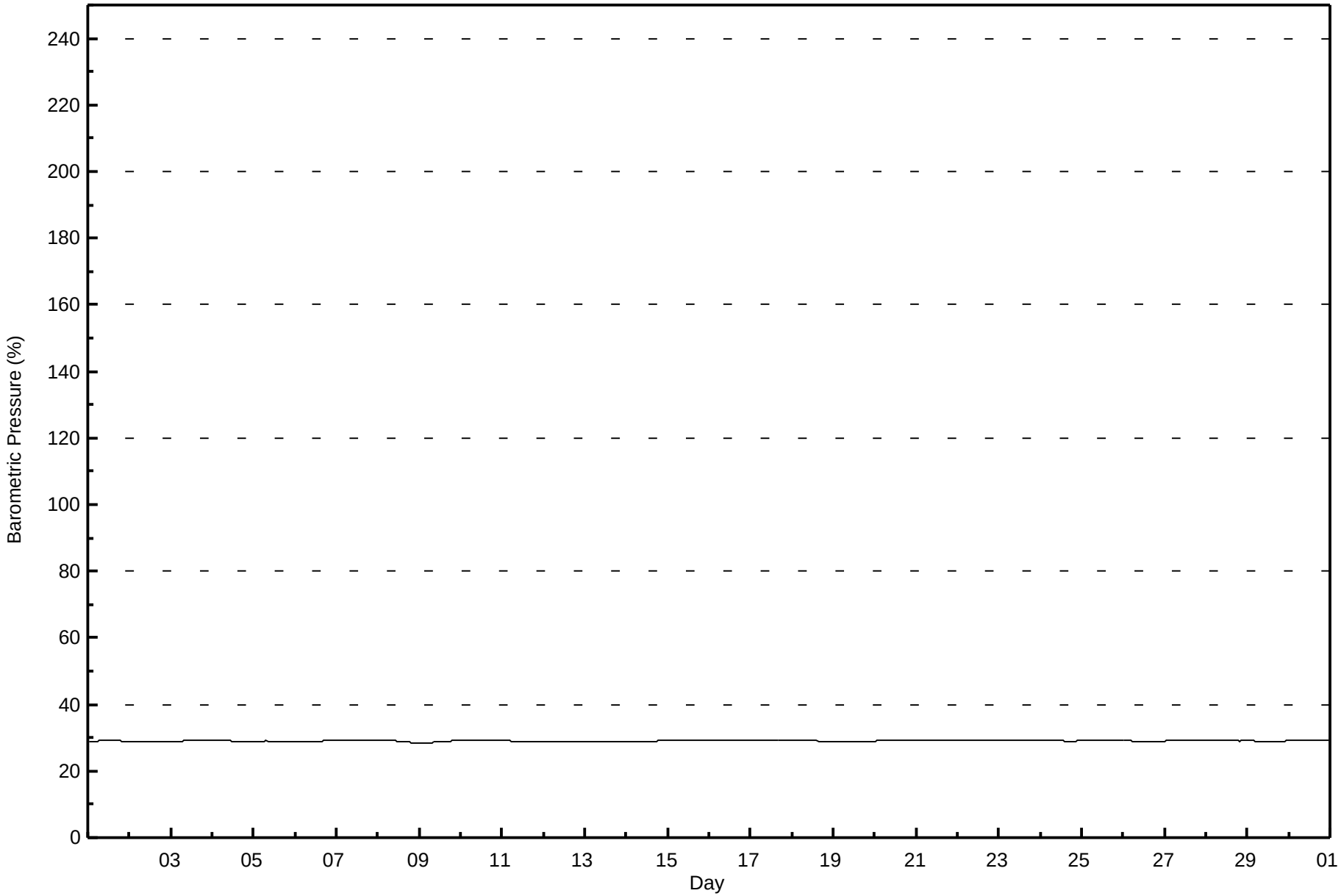
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.0	29.0	29.0	29.0	28.9	28.9	29.0	29.1
2-Apr	28.9	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.7	28.6	28.7	28.6	28.6	28.7	28.7	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.7	28.9
3-Apr	28.9	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.1	29.1	29.1	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.1	29.2
4-Apr	29.2	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.1	29.1	29.0	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.2
5-Apr	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	28.8	28.8	28.8	28.7	28.7	28.9	29.0
6-Apr	28.7	28.6	28.6	28.6	28.7	28.7	28.7	28.8	28.8	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.1	29.1	29.1	29.2	29.2	29.2	29.2	28.9	29.2
7-Apr	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3
8-Apr	29.3	29.3	29.3	29.3	29.3	29.2	29.2	29.2	29.1	29.1	29.0	29.0	28.9	28.9	28.8	28.7	28.7	28.6	28.6	28.6	28.5	28.5	28.5	28.5	28.9	29.3
9-Apr	28.5	28.4	28.4	28.4	28.5	28.5	28.6	28.6	28.6	28.7	28.7	28.7	28.8	28.8	28.9	28.9	28.9	29.0	29.0	29.0	29.1	29.1	29.1	29.1	28.8	29.1
10-Apr	29.1	29.2	29.2	29.2	29.2	29.2	29.2	29.3	29.3	29.3	29.3	29.3	29.3	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.2	29.3
11-Apr	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	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	29.1
12-Apr	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.9
13-Apr	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	28.9
14-Apr	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	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.1	28.9	29.1
15-Apr	29.1	29.1	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.1	29.1	29.1	29.2	29.2	29.2	29.2	29.2
16-Apr	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.1	29.1	29.2	29.1	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2
17-Apr	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.3	29.3	29.3	29.3	29.3
18-Apr	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.2	29.2	29.2	29.1	29.1	29.1	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.8	28.8	28.8	29.1	29.3
19-Apr	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	28.8	28.9
20-Apr	29.0	29.0	29.1	29.1	29.2	29.2	29.3	29.3	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.3	29.4
21-Apr	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.3	29.3	29.3	29.3	29.3	29.3
22-Apr	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.3	29.3
23-Apr	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.2
24-Apr	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.1	29.0	29.1
25-Apr	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.1
26-Apr	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0
27-Apr	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1
28-Apr	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.1	29.1	29.1	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.1	29.2
29-Apr	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.1	29.0	29.1
30-Apr	29.1	29.1	29.1	29.1	29.1	29.1	29.1	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	29.2
	29.0	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	Diurnal Average	
	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Barometric Pressure (BP) - %

Athabasca Valley - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - inHg

Athabasca Valley - April 2016

Maximum Value: 99 inHg on Apr 27 08:00

Maximum Daily Average: 88.7 inHg on Apr 6

Minimum Value: 11 inHg on Apr 19 15:00

Minimum Daily Average: 20.3 inHg on Apr 19

Maximum Diurnal Average: 69.4 inHg at hour 6

Minimum Diurnal Average: 43.2 inHg at hour 18

Monthly Average: 56.0 inHg

Percentiles: P_1 = 14 P_{10} = 25 Q_1 = 38 Median = 57 Q_3 = 72 P_{90} = 86 P_{99} = 99

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

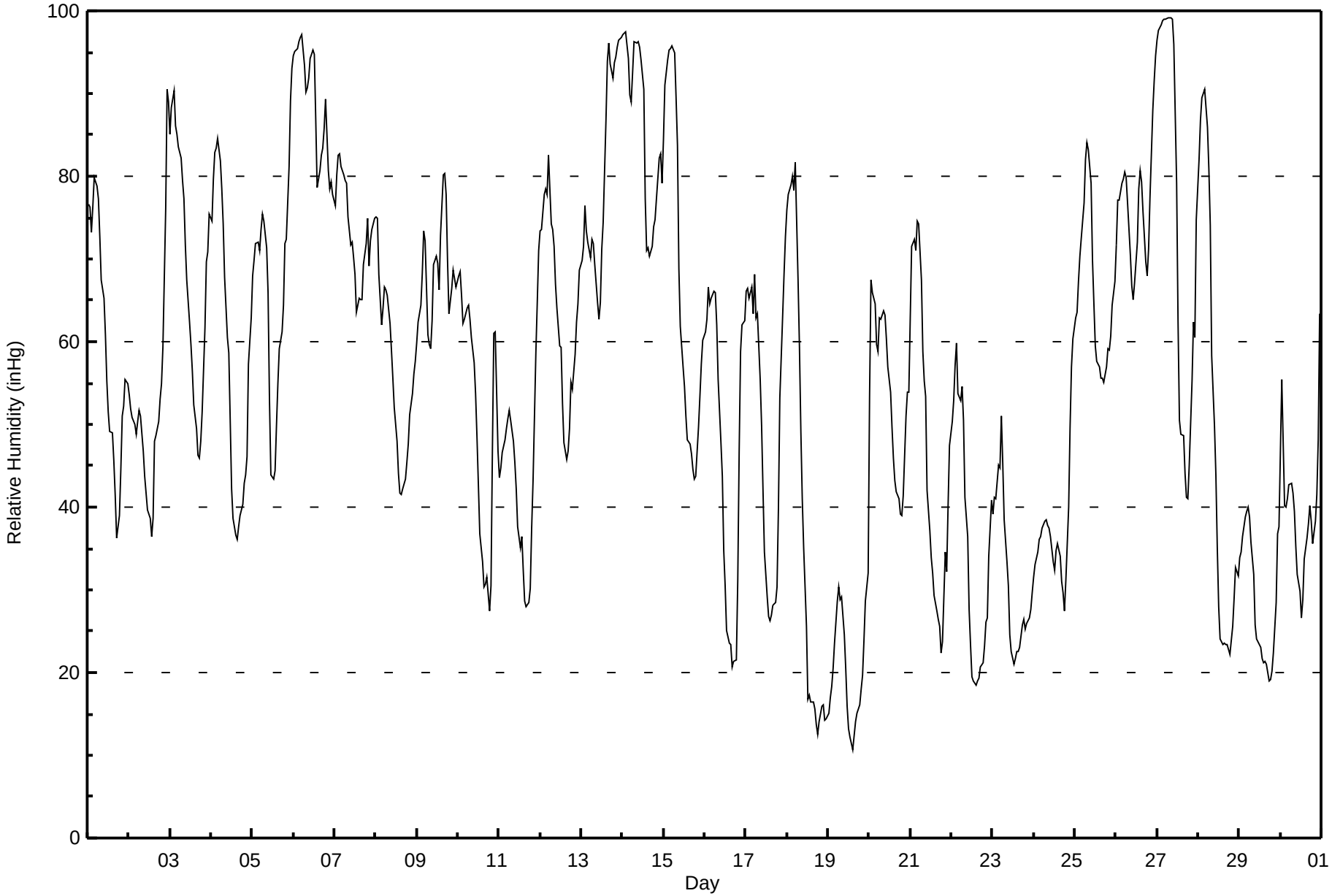
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	77	76	73	76	80	79	77	73	67	65	61	55	52	49	49	46	41	36	39	45	51	52	56	55	59.6	80
2-Apr	54	52	51	50	49	50	52	51	47	44	42	40	39	36	39	48	49	50	53	55	59	76	91	89	52.7	91
3-Apr	85	88	90	86	85	84	82	80	77	72	68	62	60	56	52	49	46	46	48	52	62	70	71	76	68.6	90
4-Apr	75	80	83	83	85	82	78	74	68	60	59	50	42	39	37	36	38	39	40	43	44	46	57	63	58.4	85
5-Apr	68	70	72	72	71	74	75	75	71	66	53	44	43	44	50	55	59	61	64	72	72	81	89	93	66.5	93
6-Apr	95	95	95	96	97	97	93	90	91	92	94	95	95	87	79	81	83	83	86	89	81	78	79	78	88.7	97
7-Apr	76	80	83	83	81	80	79	79	75	72	72	70	68	64	65	65	65	69	72	75	69	72	74	75	73.5	83
8-Apr	75	75	68	62	64	67	66	66	62	59	56	52	48	44	42	42	42	43	45	48	51	54	56	58	56.0	75
9-Apr	60	62	64	68	73	72	61	60	59	63	69	70	70	66	73	80	80	78	70	63	66	69	68	67	68.0	80
10-Apr	68	68	66	62	63	64	64	63	60	57	54	48	43	37	33	30	31	31	28	31	47	61	61	47	50.7	68
11-Apr	44	45	47	48	49	51	52	51	48	45	42	38	35	36	32	29	28	29	30	37	43	59	65	71	43.9	71
12-Apr	73	73	78	78	78	83	74	74	72	67	64	59	59	52	48	46	47	49	55	54	58	62	65	69	64.1	83
13-Apr	70	72	76	73	72	70	72	72	69	65	63	65	71	74	87	94	96	94	92	94	94	96	96	97	80.2	97
14-Apr	97	97	97	94	90	89	93	96	96	96	96	94	90	77	71	71	70	72	74	75	77	82	83	79	85.7	97
15-Apr	84	91	94	95	95	96	95	90	84	69	62	57	55	51	48	48	46	45	43	44	50	53	57	60	67.1	96
16-Apr	61	63	67	64	65	66	66	62	55	48	44	35	31	25	23	23	21	21	21	31	47	59	62	63	46.8	67
17-Apr	66	66	65	67	63	68	63	63	55	50	42	35	29	27	26	27	28	29	30	40	53	63	68	73	49.9	73
18-Apr	76	78	79	80	78	82	68	59	49	41	35	26	17	17	16	16	16	14	13	14	16	16	14	14	38.9	82
19-Apr	15	17	18	20	23	29	30	29	29	25	21	16	13	12	11	12	14	15	16	18	20	24	29	32	20.3	32
20-Apr	53	67	66	64	60	59	63	63	64	63	60	57	54	50	46	43	42	41	39	39	41	51	54	54	53.9	67
21-Apr	63	72	72	71	75	74	68	59	55	53	42	37	34	32	29	27	26	26	22	24	35	32	40	48	46.5	75
22-Apr	50	53	57	60	54	53	55	51	41	36	28	23	19	19	18	19	19	21	21	23	26	27	34	41	35.4	60
23-Apr	39	41	41	45	45	51	45	38	33	31	25	23	21	22	22	23	23	26	26	25	26	27	28	30	31.5	51
24-Apr	31	33	35	36	36	37	38	38	38	37	36	33	32	35	36	34	31	30	28	31	40	50	57	60	37.2	60
25-Apr	63	64	67	70	73	77	82	84	83	79	70	65	60	58	57	56	56	55	57	59	59	61	64	67	66.0	84
26-Apr	72	77	77	79	80	81	80	77	70	67	65	67	72	79	81	79	76	70	68	71	77	88	92	95	76.6	95
27-Apr	96	98	98	99	99	99	99	99	99	99	96	79	63	50	49	49	44	41	41	45	55	62	60	75	74.8	99
28-Apr	82	87	90	90	90	86	81	74	58	50	44	35	28	24	23	24	23	23	22	24	26	29	33	32	49.1	90
29-Apr	34	35	37	39	40	40	39	36	32	26	24	24	23	22	21	21	21	19	19	20	22	28	37	38	29.0	40
30-Apr	47	55	40	40	41	43	43	42	40	35	32	30	27	29	34	36	38	40	38	36	38	42	48	63	39.8	63
	65.0	67.7	68.2	68.5	68.5	69.4	67.8	65.5	61.7	57.7	53.9	49.5	46.4	43.8	43.3	43.6	43.3	43.2	43.4	45.8	50.2	55.6	59.6	62.0	Diurnal Average	
	97	98	98	99	99	99	99	99	99	99	96	95	95	87	87	94	96	94	92	94	94	96	96	97	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity (RH) - inHg

Athabasca Valley - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Athabasca Valley - April 2016

Maximum Speed: 39 km/h on Apr 19 14:00

Maximum Daily Speed Average: 18.1 km/h on Apr 19

Minimum Speed Value: 0 km/h on Apr 16 22:00

Minimum Daily Speed Average: 1.5 km/h on Apr 17

Maximum Diurnal Speed Average: 3.6 km/h at hour 17

Minimum Diurnal Speed Average: 1.0 km/h at hour 12

Monthly Average Velocity: 0.8 km/h 65.4 deg

Percentiles: $P_1 = 0$ $P_{10} = 3$ $Q_1 = 5$ Median = 9 $Q_3 = 14$ $P_{90} = 18$ $P_{99} = 34$

Hours in Service: 720

Hours of Data: 716

Hours of Missing Data: 4

Percent Operational Time: 99.4

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Apr	WNW2	SW3	SSW3	E0	SE2	ESE2	N6	NNW9	N15	N15	NNW20	NNW18	N15	NNE13	NNW12	N12	N11	N8	N6	NE4	NW2	E6	ESE3	ESE7	N6.2	NNW20
2-Apr	ESE6	SE10	SE12	ESE10	ESE8	SE9	ESE8	E8	SE8	E6	SW2	E4	NNW6	NNW6	NNW10	N17	N18	NNW20	NNW14	N10	N10	N8	NNW7	NNW12	NNE4.4	NNW20
3-Apr	NNW16	NNW11	NNW16	NNW18	NNW19	NNW16	NNW18	NNW23	NNW20	N20	NNW20	NNW16	N14	N12	NNW13	NNW12	N8	N9	NNW8	N5	NW3	N4	NNW4	NNW3	NNW12.6	NNW23
4-Apr	N2	NW1	WSW2	NW1	WNW2	SE6	SE9	SE10	SE8	E4	NNW4	NNW3	NE1	S8	ESE7	E7	ENE9	E10	E9	ESE1	NNE1	E6	ESE1	NNW3	ESE2.9	SE10
5-Apr	N3	NE2	NNE3	N6	N10	N9	N11	N8	N7	N4	SE6	SSE13	SE12	ESE13	SSE16	SSE13	SSW11	S10	S10	SSE8	SE12	SE9	SE10	SE12	SE4.0	SSE16
6-Apr	SE12	SE9	SSE4	E1	NNW5	NNW11	NNW18	NNW17	NW14	NNW15	NNW14	NNW15	N12	N12	NNW17	NNW16	NNW13	NNW13	N11	N12	N11	N11	NNW15	NNW12	NNW9.9	NNW18
7-Apr	NNW11	NNW9	N8	N6	NNE3	NNE3	ENE3	ENE4	SE4	ESE5	ESE6	E5	ENE7	NW4	NNW13	NNW15	NNW14	N13	NNW14	N9	ENE11	N4	N6	NE5	N5.7	NNW15
8-Apr	ENE4	E6	E9	SE11	SE12	SE13	SE14	SE13	SE17	SE18	SE20	SE21	SE26	SE23	SE26	SE19	SE15	SE18	SE16	SE14	SE13	SE14	SE11	SE15	SE15.0	SE26
9-Apr	SE17	SE12	SE7	NE2	NNW12	NNW14	NW21	NW22	NW21	NNW22	N20	NNW25	NNW23	N18	NNW25	N21	N22	N18	N22	N20	N12	NNW3	NW9	NNW11	NNW13.4	NNW25
10-Apr	N14	NNW16	NNW17	N16	N15	N13	NNE12	N12	NNW15	NNW14	NNW13	NNW11	NW11	NW9	NNW10	NW7	NW7	NW9	N6	NNE3	WNW2	SSE1	SSE3	SE8	NNW8.8	NNW17
11-Apr	SSE11	SSE10	SSE12	SSE13	SE14	SE18	SSE14	SSE11	SSE11	SSE10	SSE9	SSE9	SE5	NNW6	NNW6	ENE2	WSW3	SSW10	S7	SW3	SE3	SSE6	SSE2	ESE0	SSE6.7	SE18
12-Apr	SW2	S3	WSW3	SSW3	WSW1	NNW5	NNW12	NNW14	N11	N11	NNW11	N12	NNW15	NNW17	NNW17	NNW16	N17	N15	NNW16	N15	N12	N11	N8	N8	NNW9.7	NNW17
13-Apr	N8	NNE5	NNE1	S2	E8	SSE8	SSE7	SE12	SE11	SE12	SE10	SE12	SW5	S1	SE6	N2	N4	SE11	SE14	SSW4	SW4	ESE2	ENE2	NNW1	SE4.2	SE14
14-Apr	WNW2	WSW2	WNW2	NNW14	NNW16	NNW16	AF	AF	AF	N9	AF	NNW12	NNW10	NW18	NW17	N10	NNE8	N6	NNE7	NNE4	NNW2	NW1	NNW4	NNW4	NNW7.7	NW18
15-Apr	W2	W3	WSW3	NW3	NW0	W1	E1	NE3	ENE5	NE4	ESE2	SE8	SSE10	ESE7	ESE13	SE13	ESE14	ESE13	ESE14	SE13	SE17	SE13	SE7	SE9	SE5.9	SE17
16-Apr	SE9	SE9	SE7	SSE14	SE17	SE12	SE10	SSE9	SE11	SE8	ESE6	SSW7	SW14	SW16	WSW13	WSW13	WSW13	W15	W9	SW3	E1	NNE0	SSE1	SW1	S5.4	SE17
17-Apr	SW1	S4	SSE5	SSE5	SSE6	S5	SE7	E5	SE9	SE9	SE8	E6	NE5	WNW9	W11	W10	WNW12	WNW12	WSW1	SSW2	W0	SSW1	SSW0	SW1	SSW1.5	WNW12
18-Apr	SW3	SSW2	SSW4	SSW5	SSW5	SSW5	SE7	SE6	SE7	ESE7	ENE2	SSE7	S19	SSW17	SSW20	SSW20	S19	S18	S15	SE14	SE15	SE13	SSE14	SSE9	S9.3	SSW20
19-Apr	S10	SSW8	S7	SSW9	SW13	ESE3	WSW2	WSW9	NW15	WNW20	W29	W34	W38	W39	W39	WNW36	WNW36	NW35	WNW29	WNW18	W16	WNW15	WNW19	WNW21	W18.1	W39
20-Apr	NNW19	NNW18	N15	N14	N17	NNE15	N18	NNE17	N17	NNW23	N20	NNW19	NNW17	NNW13	NNW13	NNW15	NNW17	NNW17	NNW15	NNW11	N7	N5	NE5	ENE3	N14.1	NNW23
21-Apr	E4	E3	E3	E2	E3	ESE4	E5	ENE4	NNW3	NW5	NNW7	NW8	NNW11	NNW14	N15	NNW18	NNW24	NNW24	NNE13	NE12	N11	NNE10	N7	N8	N7.3	NNW24
22-Apr	N10	N7	N6	N4	N5	NNE6	N7	NNW9	NNW5	WNW5	WNW6	NW3	E7	ESE10	E8	E9	E9	E10	ESE12	ESE10	SE8	SE7	SE5	ESE7	ENE3.7	ESE12
23-Apr	E5	E5	E3	ESE3	SE3	SE4	ESE4	SE6	SSE13	S6	SE12	ESE13	SE13	SE12	ESE13	ESE10	ESE12	ESE13	ESE14	SE16	SE20	SE19	SE18	SE14	SE10.0	SE20
24-Apr	SE14	SE12	SE11	SE10	SE11	SE10	SE13	SE12	SE14	SE15	SE12	SE19	SE18	SSE17	SE14	SSE10	SE11	SE17	SE17	SE18	SE12	SSE11	S12	S14	SE13.2	SE19
25-Apr	S10	SSE9	SE9	SE9	SE11	SE12	SE11	SE12	SE10	SE9	S9	SSW9	S10	SSW10	S10	S10	SSW6	SSE9	SSW6	SW6	S5	S6	SW5	S5	SSE7.6	SE12
26-Apr	SSE5	SSE5	SE8	SE7	SE6	SE6	SE7	SE10	SSE6	SSW7	SW6	SSW6	SSW5	SW4	SW3	E5	SE5	ESE8	E8	E6	WNW2	S8	SSE4	W1	SSE4.2	SE10
27-Apr	W3	WSW4	NE3	SSE3	SW4	SE6	SE8	SE5	SE1	NW4	WNW5	NNW7	NNW10	NNW12	NNW14	NNW13	NNW12	N9	N8	N6	NW3	SSE3	ESE6	SW3	NNW2.9	NNW14
28-Apr	ESE1	NE0	S0	SE2	SSE2	SSE4	SE3	SE4	SE8	ENE5	NNW4	NNE3	SSW7	S14	SSE14	SE15	SE14	SE13	SSE12	SSE8	S10	SSE7	SE7	SE11	SSE5.9	SE15
29-Apr	SE9	SE13	SE15	SE14	SE13	SE11	SE12	SE18	SE17	SSE19	SSE19	SSE18	S18	S19	S20	SSW18	SW17	SSW14	S12	SSE12	SSE10	SE8	NE3	SE7	SSE12.6	S20
30-Apr	SSE5	SSE5	SE14	SE14	SE11	SE12	SE12	SE12	SE9	SSW7	SW19	WSW19	SW20	SW22	WSW22	SW17	W15	WNW8	SE5	SE9	SSE6	SW8	SW4	S3	SSW7.4	WSW22
	ESE1.3	SE1.6	ESE2.2	ESE2.1	E1.8	E2.4	E2.7	E2.5	E2.4	NNE2.1	NNW1.3	NW1.0	W1.3	W2.3	WNW2.7	NNW2.9	NNW3.6	N2.3	NE1.7	E2.0	ESE2.2	SE2.5	ESE1.2	SE1.3	Diurnal Average	
	NNW19	NNW18	NNW17	NNW18	NNW19	SE18	NW21	NNW23	NW21	NNW23	W29	W34	W38	W39	W39	WNW36	WNW36	NW35	WNW29	N20	SE20	SE19	WNW19	WNW21	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

Athabasca Valley - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 10 km/h on Apr 19 10:00

Minimum Value: 1 km/h on Apr 14 21:00

Percentiles: P_1 = 1 P_{10} = 1 Q_1 = 2 Median = 3 Q_3 = 4 P_{90} = 5 P_{99} = 8

Hours in Service:	720
Hours of Data:	716
Hours of Missing Data:	4
Hours of Calibration:	0
Percent Operational Time:	99.4

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

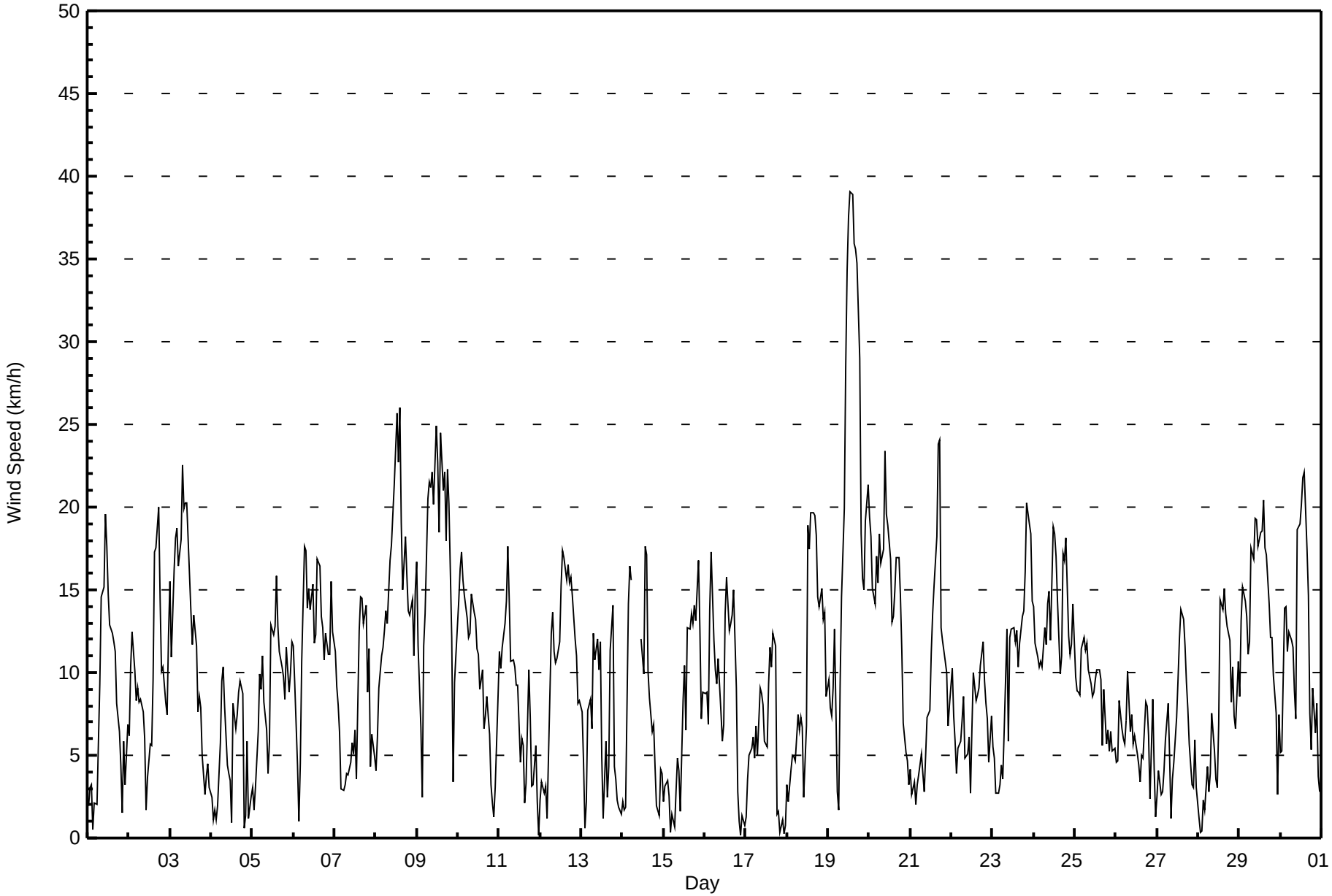
AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed (WS) - km/h

Athabasca Valley - April 2016



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	192	26.82	26.82
6 - 11	244	34.08	60.89
12 - 19	235	32.82	93.72
20 - 28	36	5.03	98.74
29 - 38	7	0.98	99.72
> 38	2	0.28	100.00

Total Number of Valid Hours: 716

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Wind Speed (WS) - km/h

Athabasca Valley - April 2016

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	10	10	12	10	18	13	14	16	9	12	17	9	5	9	12	16	192
6 - 11	43	4	0	3	18	16	67	25	15	13	3	1	3	3	7	23	244
12 - 19	30	5	1	0	0	12	70	19	10	3	6	4	3	5	3	64	235
20 - 28	6	0	0	0	0	0	6	0	1	2	2	1	0	2	3	13	36
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	3	3	1	0	7
> 38	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2
Totals	89	19	13	13	36	41	157	60	35	30	28	15	16	22	26	116	716

Total Number of Valid Hours: 716

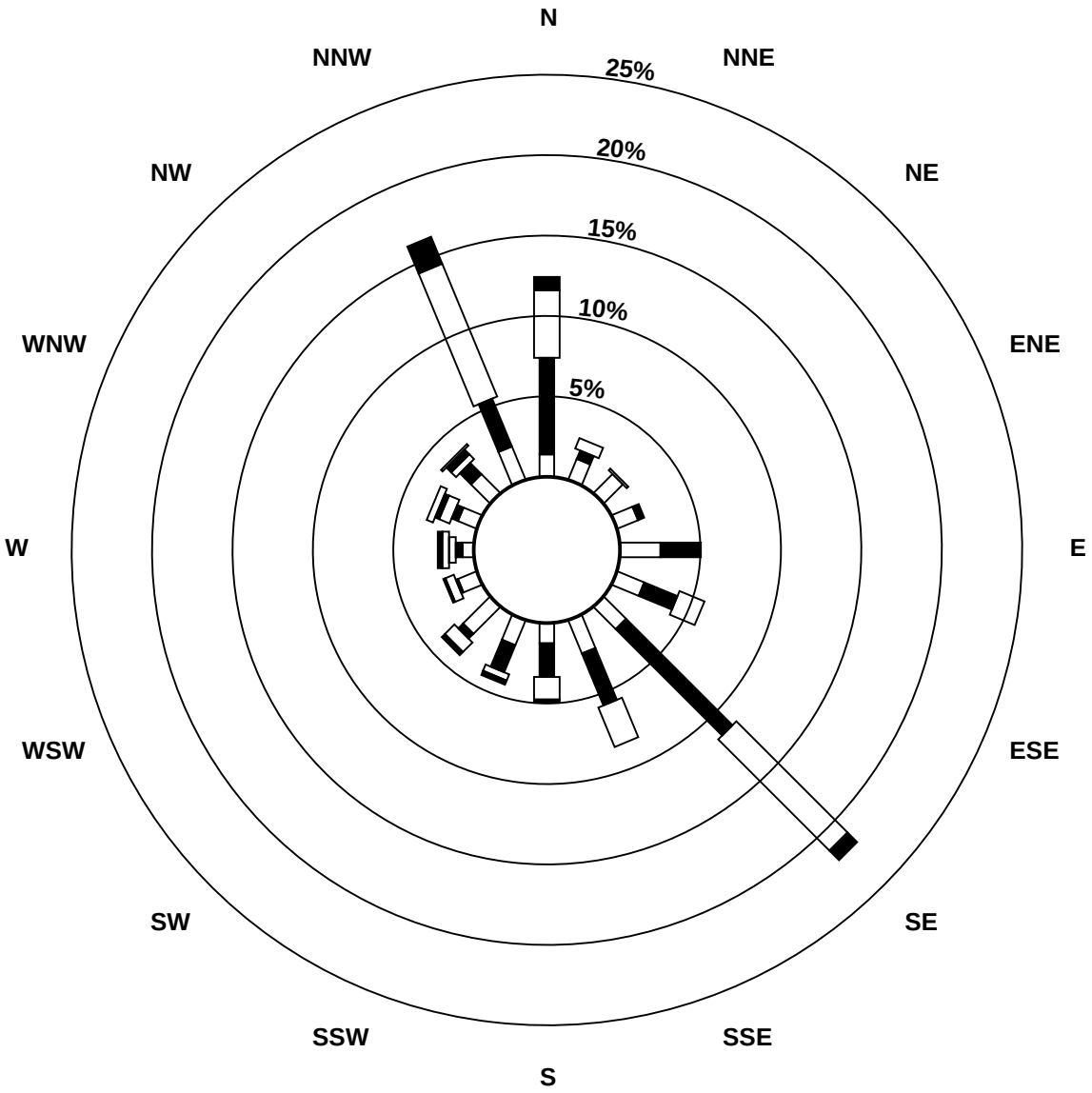
Total Number of Hours: 720

Wood Buffalo Environmental Association

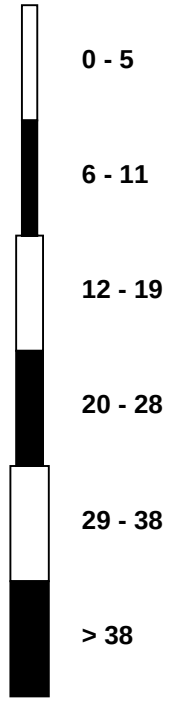
Wind Rose Apr 2016

Wind Speed (WS) - km/h

Athabasca Valley (AMS 7)



Classes (km/h)



Total Number of Valid Hours: 716

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Athabasca Valley - April 2016

Direction of Maximum Speed: 278 deg on Apr 19 14:00
Direction of Maximum Daily Speed Average: 281.1 deg on Apr 19

Direction of Minimum Speed: 16 deg on Apr 16 22:00
Direction of Minimum Daily Speed Average: 1.5 deg on Apr 17

Monthly Average Direction: 330.9 deg

Hours in Service:	720
Hours of Data:	716
Hours of Missing Data:	4
Percent Operational Time:	99.4

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-Apr	288	218	212	89	141	103	352	341	352	352	348	345	353	17	346	358	1	356	351	53	324	100	107	122	358.5
2-Apr	119	138	128	109	111	146	116	97	130	79	235	96	336	341	344	353	353	342	344	356	9	0	345	341	27.5
3-Apr	340	345	337	339	333	334	348	344	348	349	341	348	352	354	342	346	7	351	346	2	305	351	341	344	344.3
4-Apr	349	314	237	326	295	136	140	139	132	100	338	329	38	171	108	86	77	85	88	114	13	94	105	340	104.5
5-Apr	354	35	32	8	355	352	352	355	1	349	135	149	128	118	149	157	192	175	170	153	140	145	142	145	131.7
6-Apr	146	144	160	101	345	342	332	332	326	340	346	338	352	353	332	342	348	347	350	349	8	355	342	335	344.4
7-Apr	343	347	352	2	13	22	61	77	138	119	118	91	74	323	347	348	346	349	344	1	58	7	3	39	8.8
8-Apr	67	92	100	130	134	137	137	140	135	131	128	129	129	127	128	124	126	135	137	133	140	145	146	142	131.1
9-Apr	141	144	132	34	336	340	324	312	321	347	350	343	345	355	346	349	351	352	350	353	353	341	324	335	344.5
10-Apr	349	333	341	352	357	358	14	8	347	344	340	335	324	323	330	318	309	324	352	13	285	149	168	146	343.8
11-Apr	151	154	153	147	146	146	148	151	148	152	159	153	132	347	345	68	250	206	177	219	131	166	148	119	154.2
12-Apr	224	186	241	205	254	340	343	348	349	353	348	350	348	346	348	346	349	351	346	353	357	7	10	351	348.2
13-Apr	3	18	12	189	99	147	157	141	128	124	141	146	221	169	139	9	353	126	137	195	232	118	68	331	133.1
14-Apr	288	244	289	346	339	338	AF	AF	AF	359	AF	346	346	316	326	359	13	10	16	13	342	316	344	348	342.8
15-Apr	270	281	250	309	314	262	87	53	60	49	111	128	148	112	112	125	117	121	122	131	145	138	129	138	126.5
16-Apr	146	135	128	147	146	146	142	147	143	133	117	208	231	228	242	258	250	266	274	231	83	16	158	218	188.2
17-Apr	234	169	157	161	155	178	142	90	146	134	126	80	35	295	280	280	287	286	245	209	281	209	205	214	204.1
18-Apr	223	213	210	202	192	207	142	131	130	119	64	153	185	197	211	201	178	183	172	144	142	146	155	168	173.4
19-Apr	176	199	180	199	226	115	246	239	323	297	281	273	273	278	277	294	298	306	298	293	279	292	283	291	281.1
20-Apr	340	346	1	358	5	12	7	12	10	343	349	346	345	345	334	332	336	340	345	347	354	8	47	73	352.3
21-Apr	90	101	91	95	101	103	84	76	344	318	334	325	328	339	352	343	338	342	26	36	10	15	7	356	359.7
22-Apr	356	359	6	354	11	32	9	344	340	294	297	312	98	111	91	81	87	87	121	117	125	125	127	119	66.1
23-Apr	100	86	88	120	143	133	108	129	168	179	136	123	141	138	123	116	113	115	120	126	130	130	133	141	129.2
24-Apr	134	136	142	134	133	140	143	139	132	132	137	144	142	153	146	150	138	126	133	140	143	163	175	172	142.3
25-Apr	172	164	143	141	132	133	133	138	135	137	174	199	187	207	181	175	198	167	212	223	180	174	222	178	165.8
26-Apr	153	158	145	138	135	140	132	135	166	207	217	209	209	234	216	93	142	117	89	80	285	180	148	270	153.7
27-Apr	260	253	47	167	226	130	130	129	138	307	288	338	339	343	347	348	348	3	2	1	317	166	121	234	347.8
28-Apr	119	48	172	129	158	149	143	126	126	61	346	29	201	183	166	139	136	130	165	159	169	161	137	138	148.6
29-Apr	139	143	138	138	139	141	146	141	135	147	151	166	182	179	171	205	220	198	185	167	152	141	56	139	160.6
30-Apr	150	162	144	140	132	132	139	140	137	202	236	237	221	232	257	236	266	299	129	143	161	229	234	189	199.6
	104.4	130.7	120.2	109.7	96.4	98.3	84.1	81.4	80.0	30.2	336.8	318.5	267.2	276.1	302.5	328.6	330.7	354.4	48.6	80.7	113.3	130.5	121.2	137.2	
	Diurnal Average																								

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

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg

Athabasca Valley - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 101 deg on Apr 28 02:00

Minimum Value: 9 deg on Apr 12 14:00

Percentiles: P_1 = 9 P_{10} = 13 Q_1 = 15 Median = 20 Q_3 = 33 P_{90} = 59 P_{99} = 94

Hours in Service:	720
Hours of Data:	716
Hours of Missing Data:	4
Hours of Calibration:	0
Percent Operational Time:	99.4

Day	Hourly Period Ending At (MST)																								Daily
	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-Apr	53	64	74	99	57	69	30	23	17	18	16	15	17	20	15	22	21	26	31	20	73	21	49	25	99
2-Apr	24	16	17	19	22	18	25	20	39	36	86	93	48	45	26	19	18	12	13	18	24	23	16	14	93
3-Apr	9	15	9	10	10	10	17	13	16	14	13	15	17	20	12	27	29	21	12	19	35	31	39	32	39
4-Apr	27	71	78	72	61	28	15	14	17	66	38	41	94	28	32	19	16	10	9	90	68	28	87	48	94
5-Apr	40	56	31	19	14	16	10	14	20	33	75	21	20	22	22	29	30	20	18	22	14	20	14	15	75
6-Apr	13	15	27	86	43	20	11	10	9	13	14	11	17	15	22	16	16	13	16	17	19	18	10	10	86
7-Apr	17	14	16	16	51	46	35	37	48	38	36	39	24	57	17	13	12	13	11	19	16	56	28	33	57
8-Apr	23	14	17	17	16	14	15	17	16	17	17	15	14	16	15	18	16	15	15	14	19	15	15	12	23
9-Apr	12	14	21	74	20	16	10	9	12	15	15	12	15	19	16	16	17	18	17	18	18	32	21	13	74
10-Apr	19	13	13	19	18	19	18	21	14	19	13	19	24	21	17	24	23	18	16	24	62	80	59	17	80
11-Apr	17	15	13	12	12	10	13	15	14	15	16	20	76	26	34	99	88	27	21	51	55	13	74	89	99
12-Apr	41	39	48	41	96	24	13	14	12	16	13	13	12	9	12	10	12	14	12	13	15	25	41	45	96
13-Apr	26	38	92	74	18	27	25	21	26	23	24	25	44	77	66	48	37	22	16	48	12	73	59	20	92
14-Apr	38	31	45	18	12	10	AF	AF	AF	18	AF	12	14	11	12	21	17	18	18	25	36	46	15	18	46
15-Apr	48	26	25	51	82	52	85	54	54	51	93	51	32	80	26	24	22	21	18	15	13	16	26	16	93
16-Apr	20	25	36	12	10	13	15	17	13	21	25	67	18	15	24	27	23	15	19	44	78	85	67	75	85
17-Apr	79	47	29	27	27	52	52	47	22	20	25	19	59	44	34	27	27	16	86	33	95	67	89	90	95
18-Apr	27	27	20	26	37	24	29	34	20	32	68	88	28	30	27	30	24	25	17	15	12	13	18	41	88
19-Apr	32	37	30	23	30	71	94	34	35	35	17	16	16	16	16	16	15	12	15	12	14	16	10	12	94
20-Apr	28	15	21	19	20	18	21	19	21	14	19	13	18	21	20	15	12	13	12	14	18	20	34	30	34
21-Apr	22	25	18	48	41	21	13	23	45	12	17	29	22	19	25	14	13	15	23	21	15	13	14	15	48
22-Apr	14	34	28	36	22	25	25	13	26	27	38	76	59	40	48	33	25	16	23	18	16	17	29	21	76
23-Apr	23	17	39	66	43	27	36	37	15	52	30	28	33	30	32	35	32	20	18	16	14	14	15	18	66
24-Apr	14	15	14	16	15	15	12	13	14	15	17	17	18	20	23	24	26	17	17	17	16	18	18	17	26
25-Apr	15	17	14	15	15	15	16	15	15	17	30	32	27	34	32	26	39	18	30	18	24	22	23	33	39
26-Apr	15	12	9	13	15	27	16	11	39	35	52	31	40	24	59	59	48	23	14	15	75	41	27	67	75
27-Apr	46	43	36	54	32	41	9	31	84	49	37	15	13	13	12	14	15	25	20	15	42	75	30	33	84
28-Apr	74	101	81	66	60	25	82	73	27	44	48	65	67	26	28	24	16	17	15	17	22	20	15	11	101
29-Apr	15	11	12	13	12	16	14	14	14	19	22	27	33	30	25	29	23	29	23	13	15	15	48	21	48
30-Apr	48	19	9	9	12	10	10	11	12	66	16	20	22	15	21	18	14	33	45	13	21	16	80	72	80
	79	101	92	99	96	71	94	73	84	66	93	93	94	80	66	99	88	33	86	90	95	85	89	90	
	Diurnal Maximum																								

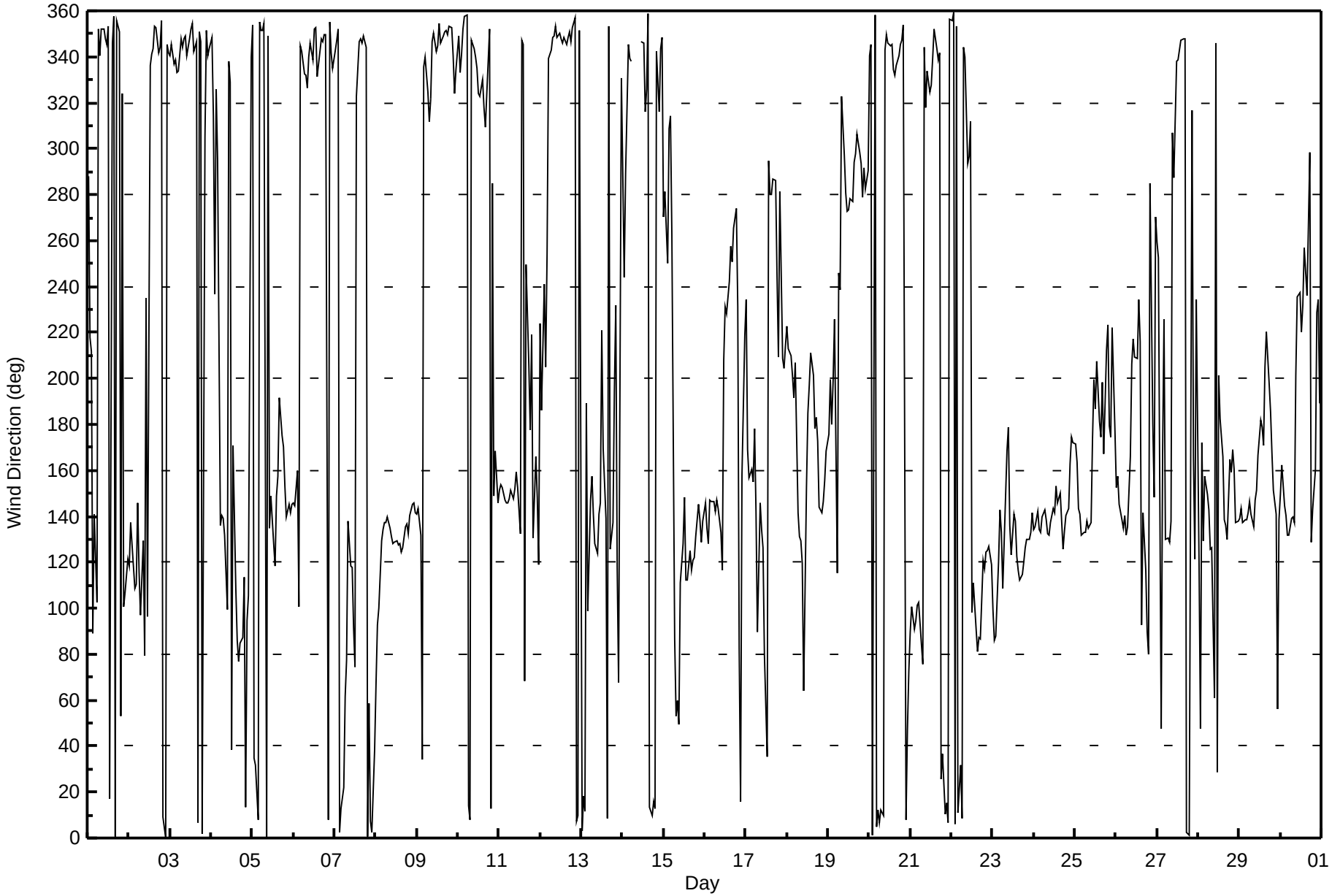
AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction (WD) - deg

Athabasca Valley - April 2016



Wood Buffalo Environmental Association
SO2 Calibration Report

W B E A

Station Information

Calibration Date	April 19, 2015	Last Calibration	March 7, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Routine		
Start Time (MST)	8:20	End Time (MST)	12:16
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	-619	-619
Analyzer IP address	192.168.1.103		Lamp voltage	803	802
Calculated slope	0.998695	0.994250	Chamber temp	44.0	44.0
Calculated intercept	1.769867	2.000456	Pressure	689.6	685.2
Analyzer Background	18.4	18.8	Flow	0.475	0.475
Analyzer Coefficient	1.084	1.084	Intensity	43561	43456

Analyzer make	Thermo 45C	Analyzer serial #	630718530

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.2	----
as found span	5000	60.7	607.0	606.4	1.001
calibrator zero	5000	0.0	0.0	-0.1	----
high point	5000	60.7	607.0	609.6	0.996
second point	5000	30.4	304.0	302.3	1.006
third point	5000	15.2	152.0	149.3	1.018
as left zero	5000	0.0	0.0	0.1	----
as left span	5000	60.7	607.0	608.1	0.998
				Average Correction Factor	1.006

Corrected As found	606.6	Previous response	606.0	% change	-0.1%

Notes:

filter changed out, no adjustments done, zero air for calibrator changed out

Calibration Performed By: Melissa Lemay

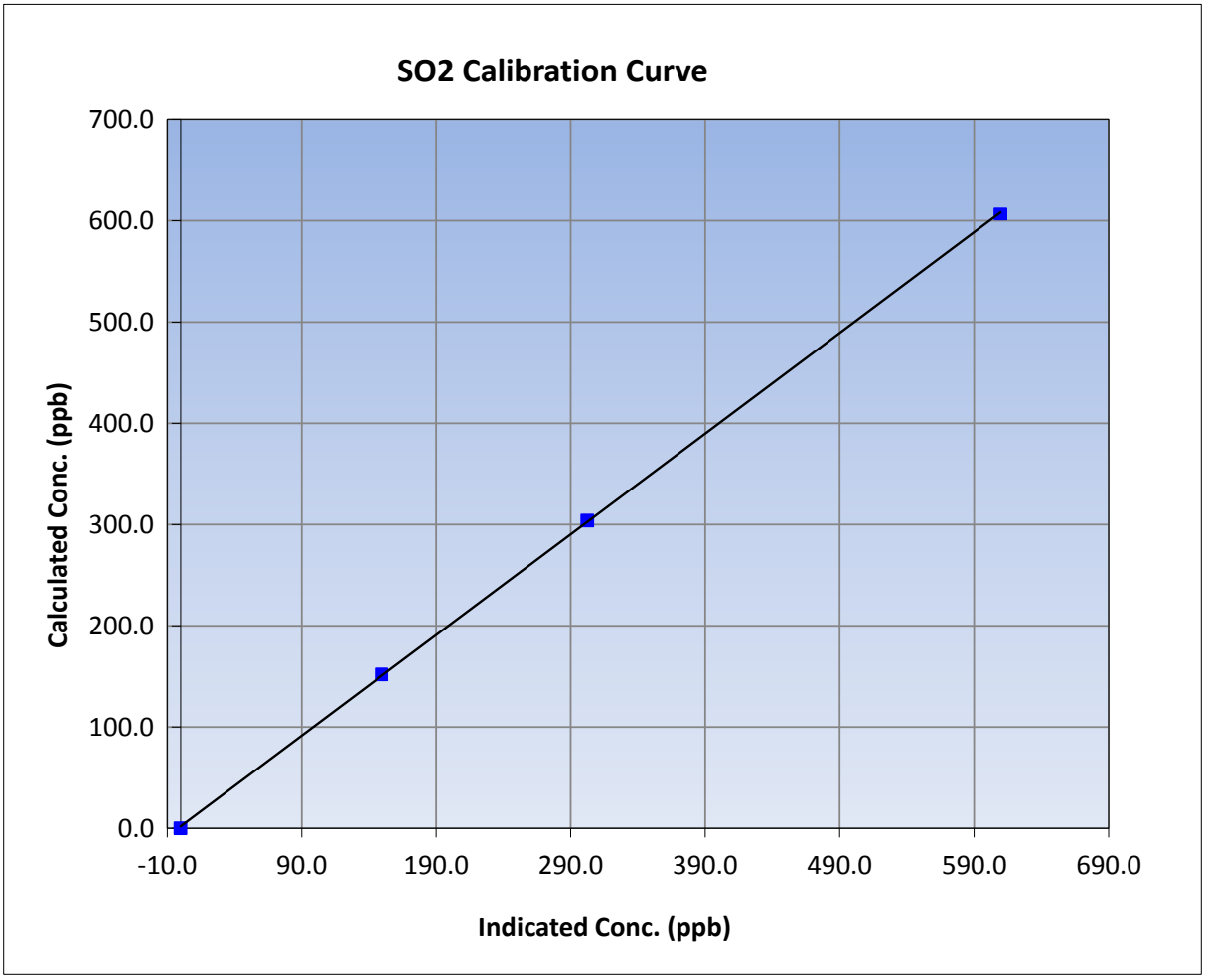
Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

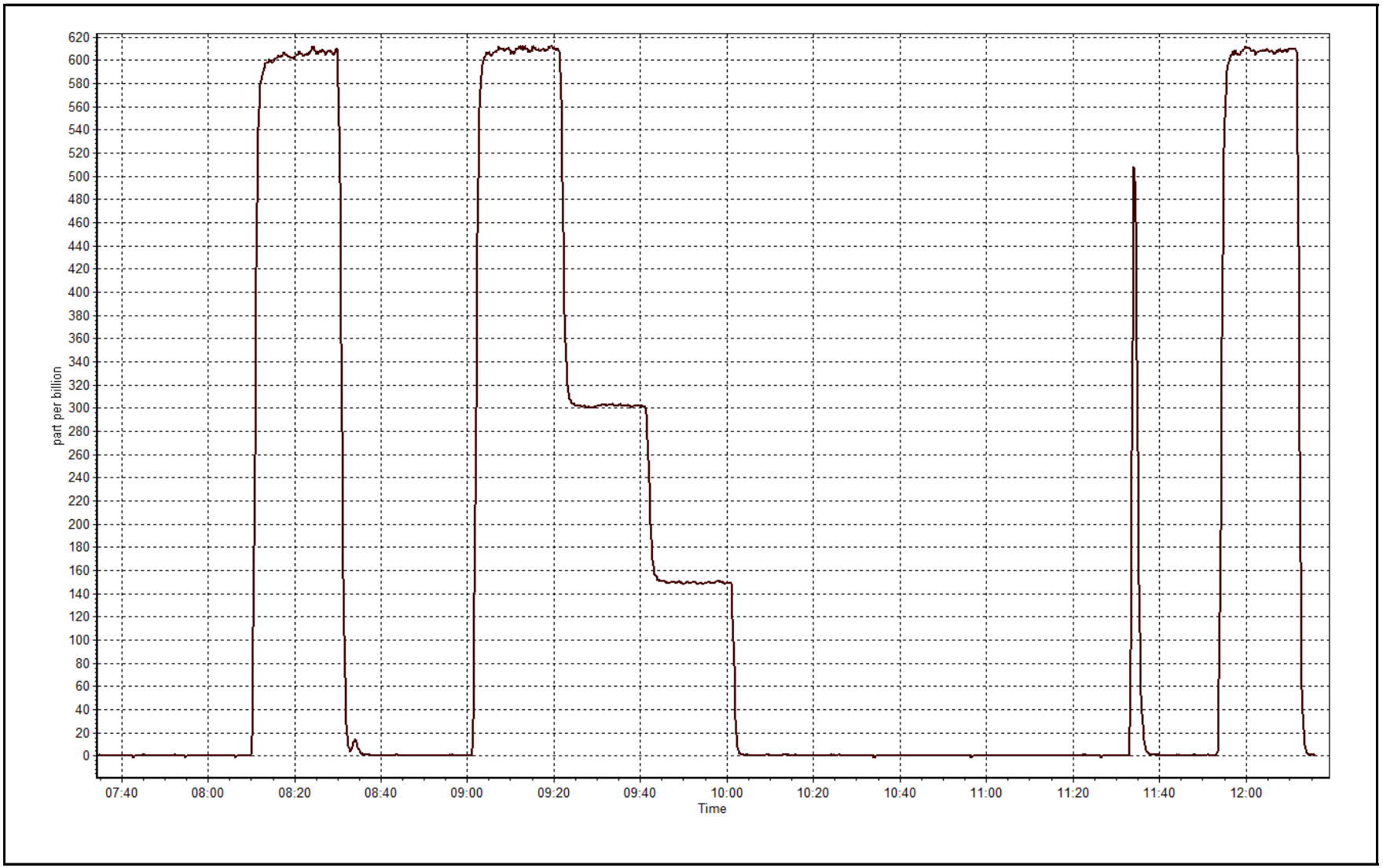
Calibration Date	April 19, 2015	Previous Calibration	March 7, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	8:20	End Time (MST)	12:16
Analyzer make	Thermo 45C	Analyzer serial #	630718530

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999954
607.0	609.6	0.9957		
304.0	302.3	1.0056	Slope	0.994250
152.0	149.3	1.0181		
			Intercept	2.000456



SO2 Calibration Plot Date: April 19, 2015



Wood Buffalo Environmental Association
TRS Calibration Report

Station Information

Calibration Date	April 20, 2016	Last Calibration	March 14, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Routine		
Start Time (MST)	11:12	End Time (MST)	13:30
Gas Cert Reference	ALM052589	Station temp.	22 Deg C
Cal Gas Concentration	5.02 ppm	Cal Gas Exp Date	09/09/2017
Calibrator Make/Model	Sabio 4010	Serial Number	8400311
Dil air Make/Model	API 701	Serial Number	1864
DACS make/model	Campbell Scientific CR3000	DACS serial No.	5564
SO2 gas concentration	50 ppm	SO2 gas cert/exp	S970259A 26/Sep/17

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	699	699
Analyzer IP address	192.168.1.44		Lamp voltage	1110	1115
Calculated slope	0.996396	1.005674	Chamber temp	45	45
Calculated intercept	-0.175389	-0.331567	Pressure	693.1	715.9
Analyzer Background	2.39	2.39	Flow	0.430	0.442
Analyzer Coefficient	1.067	1.067	Intensity	71	71
			Converter temp.	800	800

Analyzer make/model	Thermo 43i-LTE	Analyzer serial #	1507864683
Converter make/model	CDN-101	Converter serial #	503

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6000	0.0	0.0	0.2	----
as found span	6000	89.6	75.0	74.7	1.004
SO2 scrubber check	5000	15.2	152.0	0.5	----
calibrator zero	6000	0.0	0.0	0.2	----
high point	6000	89.6	75.0	74.7	1.004
second point	6000	50.2	42.0	42.4	0.991
third point	6000	29.9	25.0	25.2	0.993
as left zero	6000	0.0	0.0	0.3	----
as left span	6000	89.6	75.0	74.2	1.010
				Average Correction Factor	0.996

Corrected As found	74.5	Previous response	75.4	% change	1.2%

Notes:

no maintenance or adjustments done, filter changed out,

Calibration Performed By: Melissa Lemay

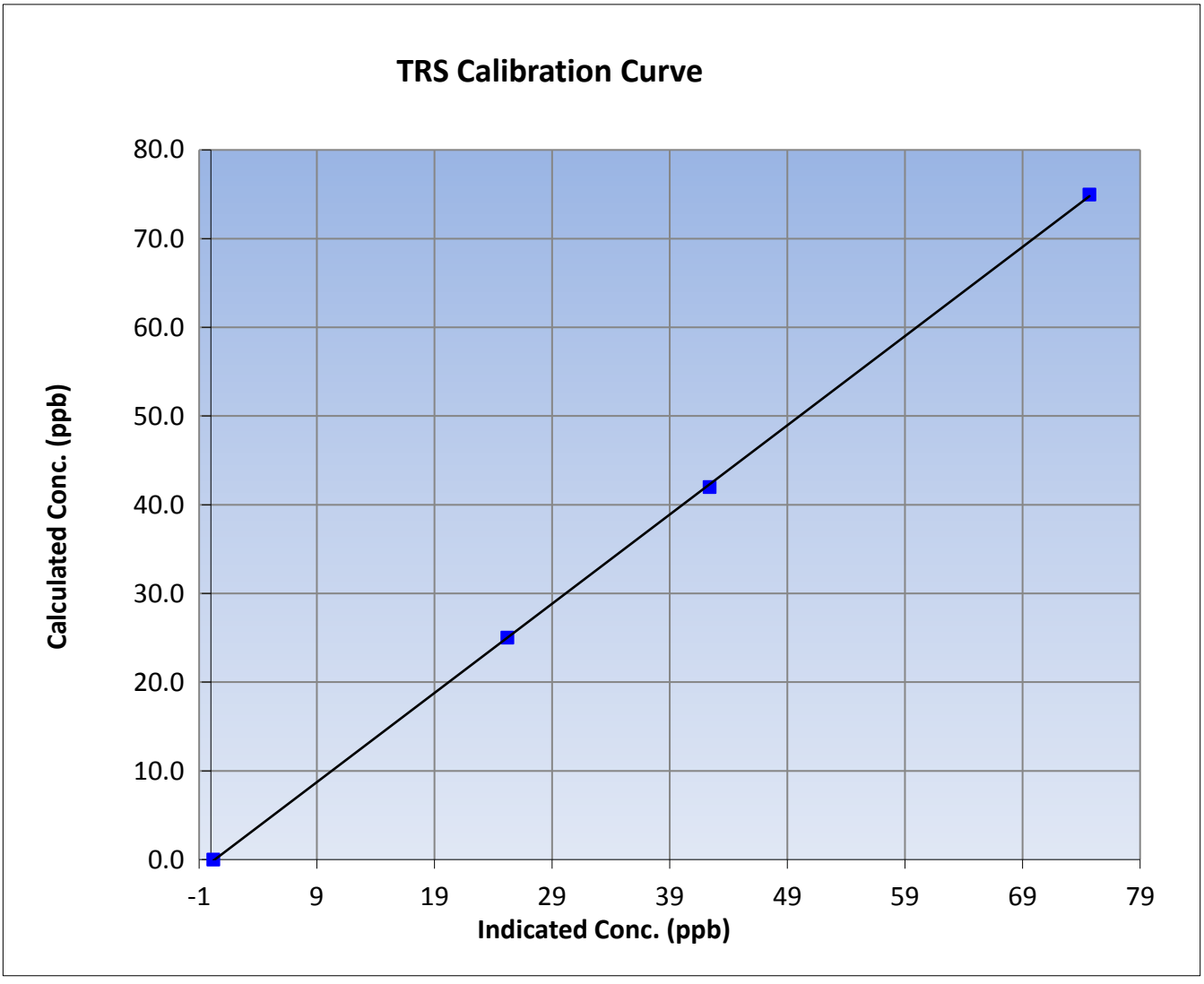
Wood Buffalo Environmental Association
TRS Calibration Report

Station Information

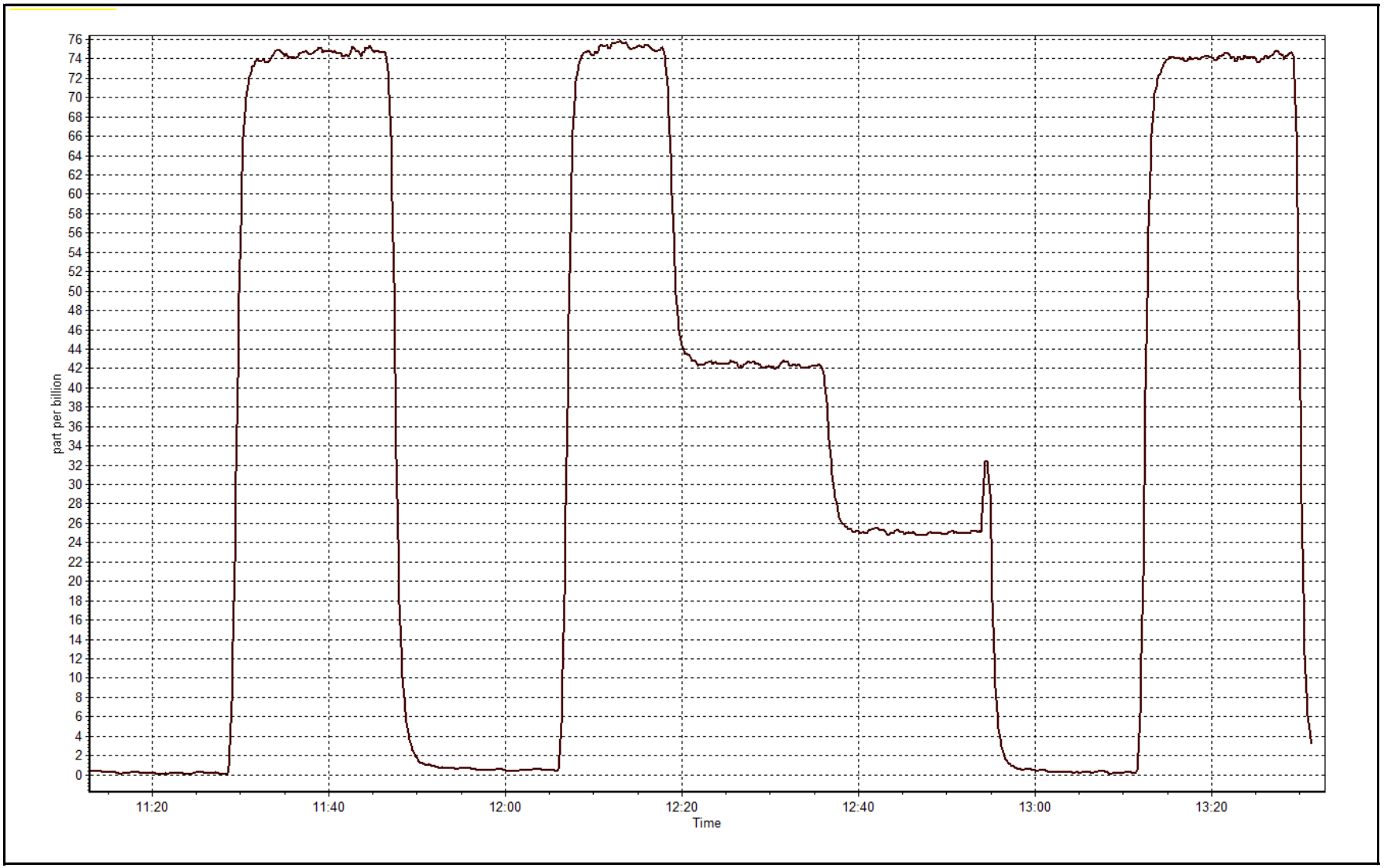
Calibration Date	April 20, 2016	Previous Calibration	March 14, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	11:12	End Time (MST)	13:30
Analyzer make	Thermo 43i-LTE	Analyzer serial #	1507864683

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	----	Correlation Coefficient	0.999952
75.0	74.7	1.0036		
42.0	42.4	0.9906	Slope	1.005674
25.0	25.2	0.9927		
			Intercept	-0.331567



TRS Calibration Plot Date: April 20, 2016



Wood Buffalo Environmental Association
THC / NMHC Calibration Report

W B E A

Station Information

Calibration Date	April-19-15	Last Calibration	March-14-15
Station Name	Athabasca Valley	Station Number	AMS 7

Reason: Routine

Start Time (MST)	7:20	End Time (MST)	12:15
Gas Cert Reference	S970259A	Cal Gas Expiry Date	9/26/2017
CH4 Cal Gas Conc.	490.0 ppm	CH4 Equiv Conc.	1040.0 ppm
C3H8 Cal Gas Conc.	200.0 ppm	Station temp.	22 Deg C
Calibrator Model	Sabio 4010	Serial Number	11021107
ZAG make/model	Teledyne API 701	Serial Number	1864
DACS make/model	Campbell Scientific CR3000	Serial Number	5564

Analyzer Information

	Before	*After*		*Before*	*After*
THC Range (ppm)	0 - 50 ppm		Column Temp	75.1	75.0
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	175.0	175.0
Analyzer IP address	192.168.1.55		Flame Temp	348.7	387.4
THC Calc slope	0.999652	1.003242	Carrier Pressure	36.8	36.8
THC Calc intercept	0.000000	0.022311	Fuel Pressure	42.1	42.1
NMHC Calc slope	0.995082	0.993719	Air Pressure	32.2	32.2
NMHC Calc intercept	0.000000	0.004200			

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	12.61	1.001
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	60.7	12.63	12.58	1.004
second point	5000	30.4	6.32	6.25	1.012
third point	5000	15.2	3.16	3.12	1.013
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	60.7	12.63	12.55	1.006
				Average Correction Factor	1.010

Corrected As found	12.61	Previous response	12.63	% change	0.2%

Notes:

zero adjusted, filter changed out, zero air for calibrator changed out

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

THC / NMHC Calibration Report

NMHC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0	0.00	0.00	----
as found span	5000	60.7	6.68	6.73	0.992
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	60.7	6.68	6.72	0.994
second point	5000	30.4	3.34	3.35	0.998
third point	5000	15.2	1.67	1.68	0.995
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	60.7	6.68	6.70	0.997
				Average Correction Factor	0.996

Corrected As found	6.73	Previous response	6.71	% change	-0.3%

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	5.88	1.012
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	60.7	5.95	5.87	1.013
second point	5000	30.4	2.98	2.91	1.024
third point	5000	15.2	1.49	1.44	1.034
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	60.7	5.95	5.85	1.017
				Average Correction Factor	1.024

Corrected As found	5.88	Previous response	5.92	% change	0.7%

Wood Buffalo Environmental Association

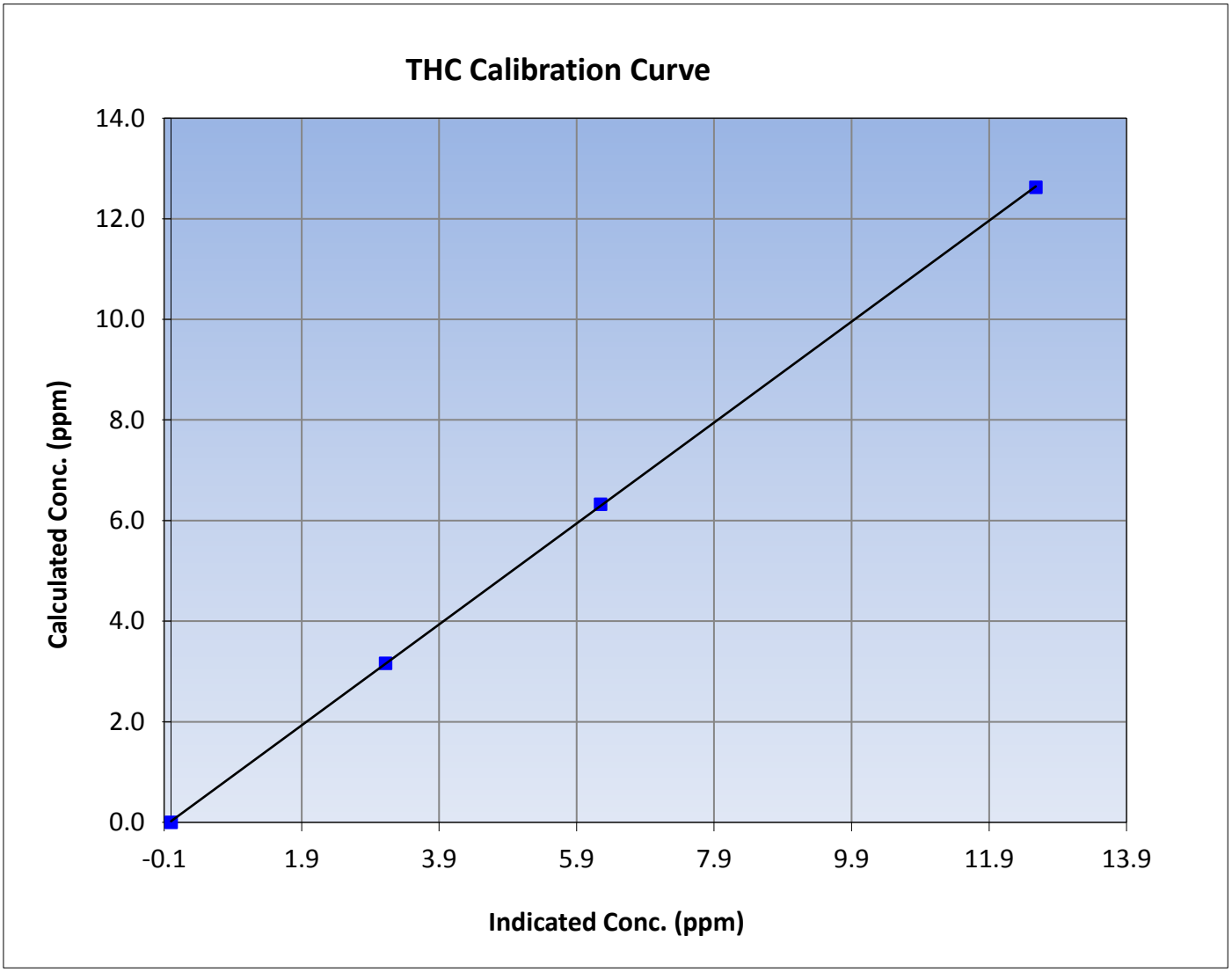
THC Calibration Summary

Station Information

Calibration Date	April 19, 2015	Previous Calibration	March 14, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	7:20	End Time (MST)	12:15
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	0.999979
12.63	12.58	1.0036		
6.32	6.25	1.0117	Slope	1.003242
3.16	3.12	1.0133		
			Intercept	0.022311



Wood Buffalo Environmental Association

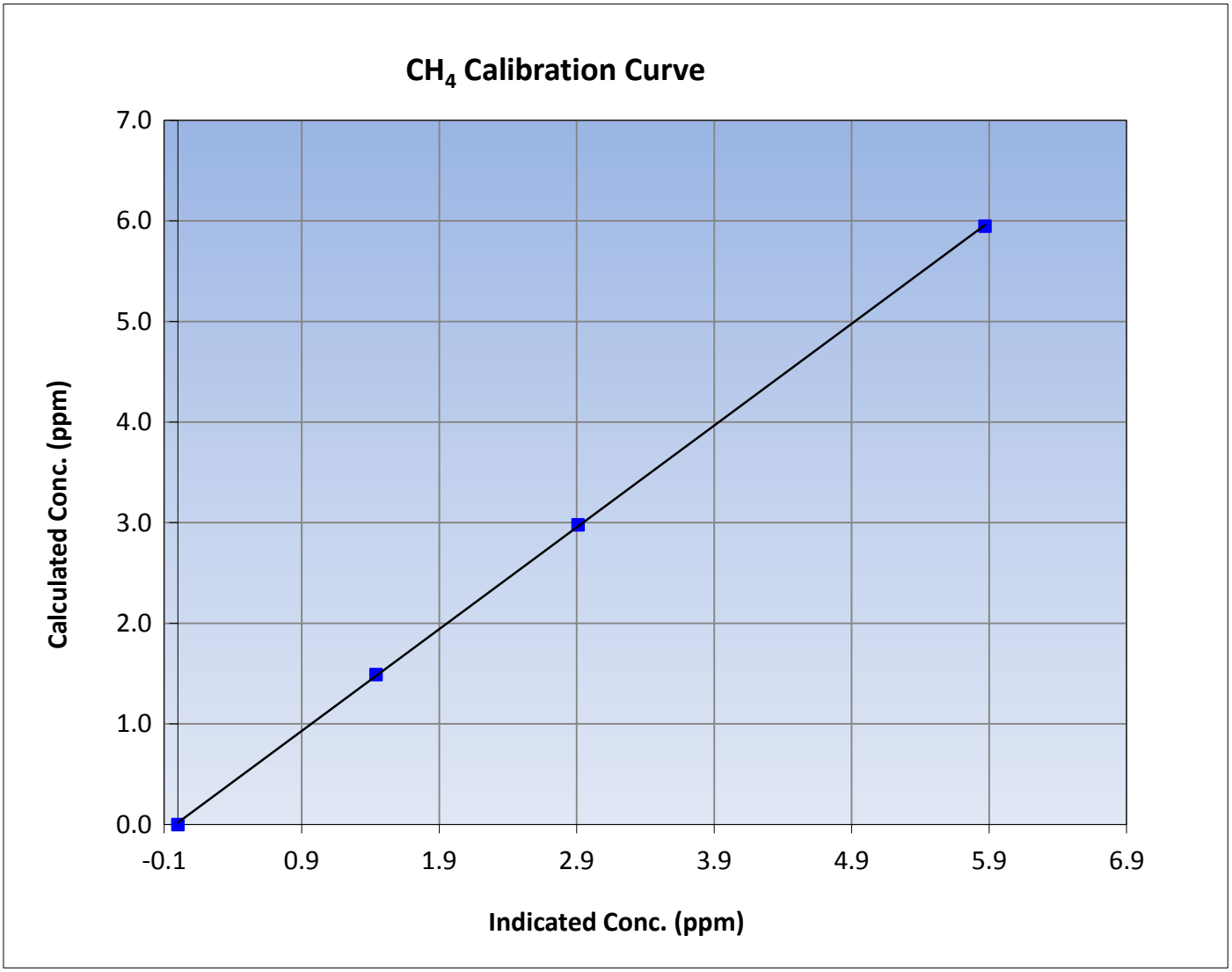
CH_4 Calibration Summary

Station Information

Calibration Date	April 19, 2015	Previous Calibration	March 14, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	7:20	End Time (MST)	12:15
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	0.999954
5.95	5.87	1.0134		
2.98	2.91	1.0238	Slope	1.012169
1.49	1.44	1.0344		
			Intercept	0.018259



Wood Buffalo Environmental Association

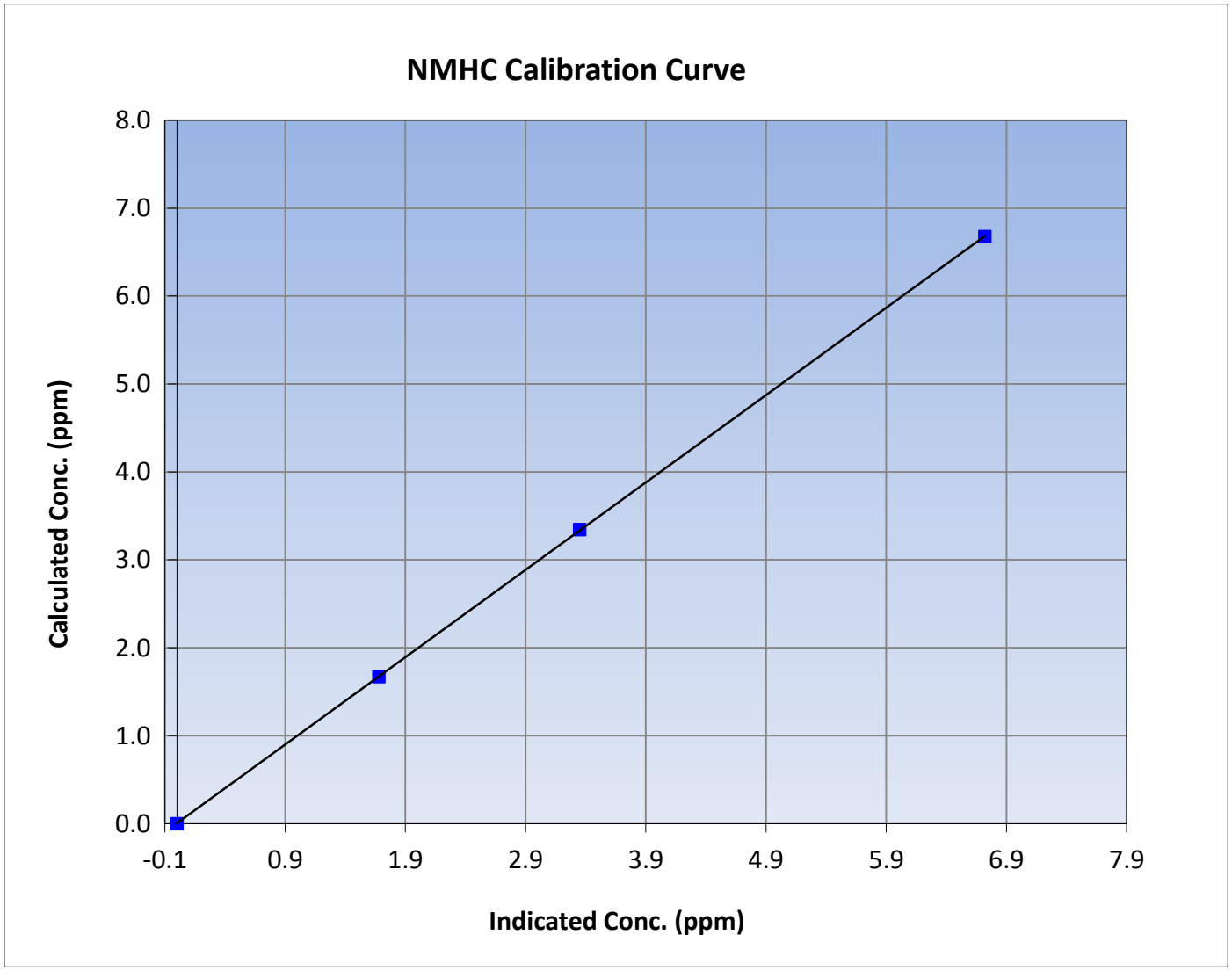
NMHC Calibration Summary

Station Information

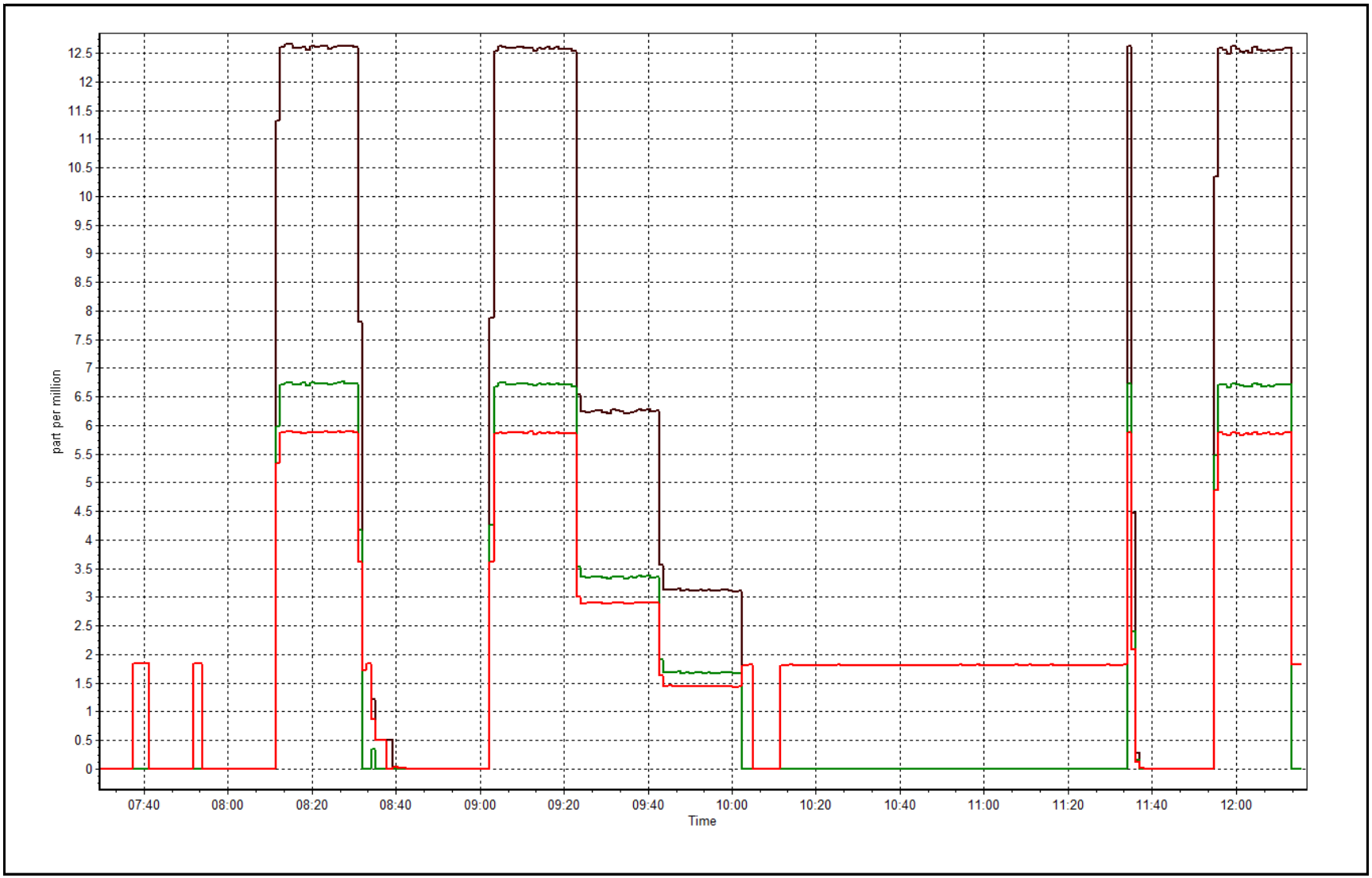
Calibration Date	April 19, 2015	Previous Calibration	March 14, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	7:20	End Time (MST)	12:15
Analyzer make	Thermo 55i	Analyzer serial #	1426262594

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999993
6.68	6.72	0.9936		
3.34	3.35	0.9982	Slope	0.993719
1.67	1.68	0.9952		
			Intercept	0.004200



THC Calibration Plot Date: April 19, 2015



Wood Buffalo Environmental Association
O_3 Calibration Report

Station Information

Calibration Date	April 20, 2016	Previous Calibration	March 8, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Routine		
Start Time (MST)	7:38	End Time (MST)	11:16
NO2 GPT Ref date	April-20-16	Transfer Standard	GPT
		Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11021107
ZAG make/model	Teledyne API 701	Serial Number	1864
DACS make/model	Campbell Scientific CR3000	Serial Number	5564

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 500 ppb		Bench temp.	27.7	26.3
Analyzer IP address	192.168.1.48		Lamp temp.	67.9	67.8
Calculated slope	1.007192	1.011399	Pressure	712.6	726.1
Calculated intercept	0.275301	1.399579	Flow cell A	0.737	0.747
Analyzer Background	0.2	0.2	Flow cell B	0.749	0.757
Analyzer Coefficient	0.943	0.943	Cell A Intensity	80294	77341
			Cell B Intensity	70452	67489

Analyzer make	TEI 49i	Analyzer serial #	1507964700

Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator Lamp Intensity	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.00	0.0	-0.3	----
as found span	5000	1.22	381.5	376.3	1.014
calibrator zero	5000	0.00	0.0	-0.3	----
high point	5000	1.22	381.5	376.3	1.014
second point	5000	0.70	191.4	187.5	1.021
third point	5000	0.43	98.3	94.6	1.039
as left zero	5000	0.00	0.0	-0.2	----
as left span	5000	1.22	381.5	364.5	1.047
				Average Correction Factor	1.025

Corrected As found	376.6	Previous response	378.5	% change	0.5%

Notes:

Filter changed out, No maintenance or adjustments done, calibration delayed after as founds to re-do the Nox GPT

Calibration Performed By: Melissa Lemay

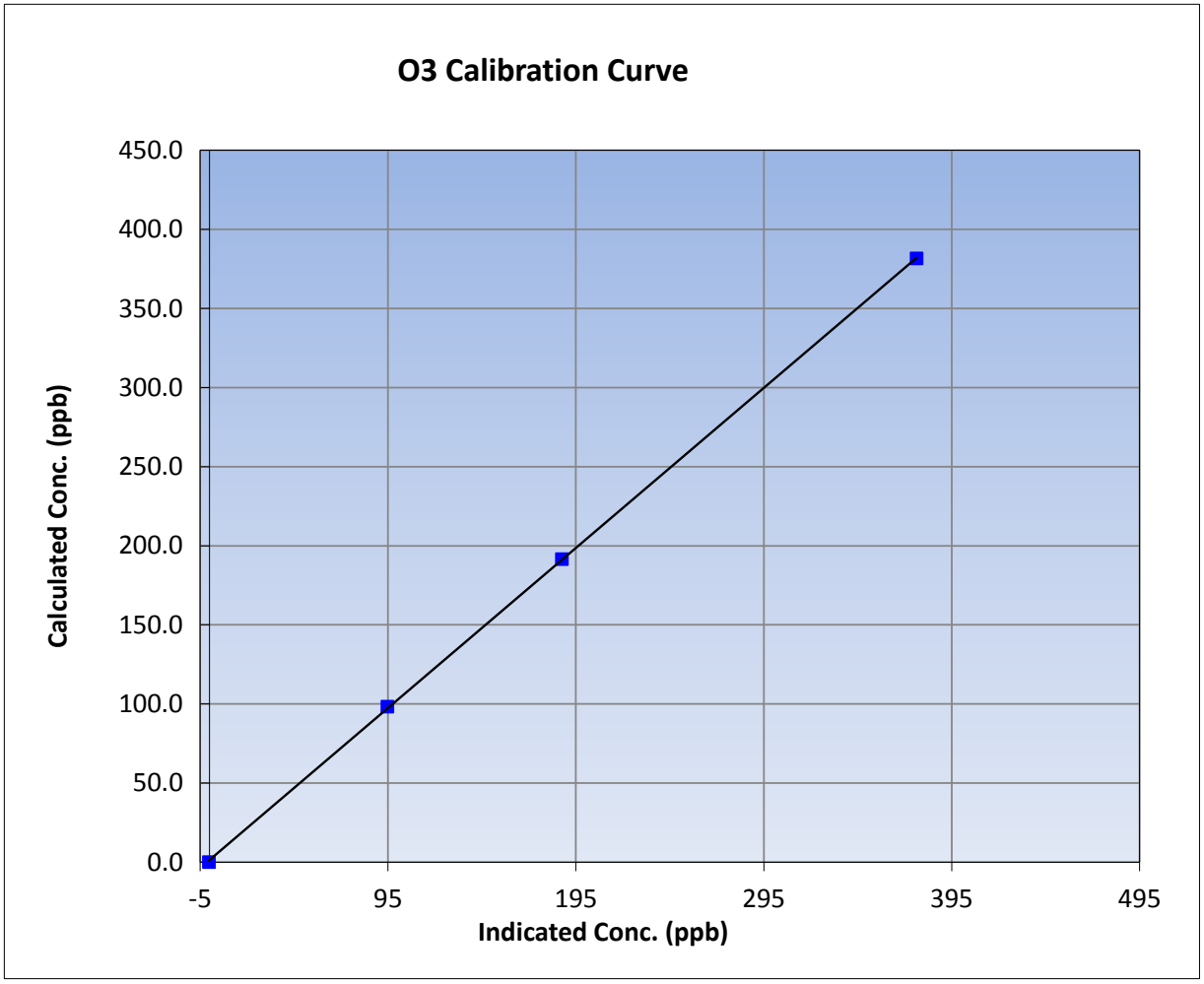
Wood Buffalo Environmental Association
O3 Calibration Report

Station Information

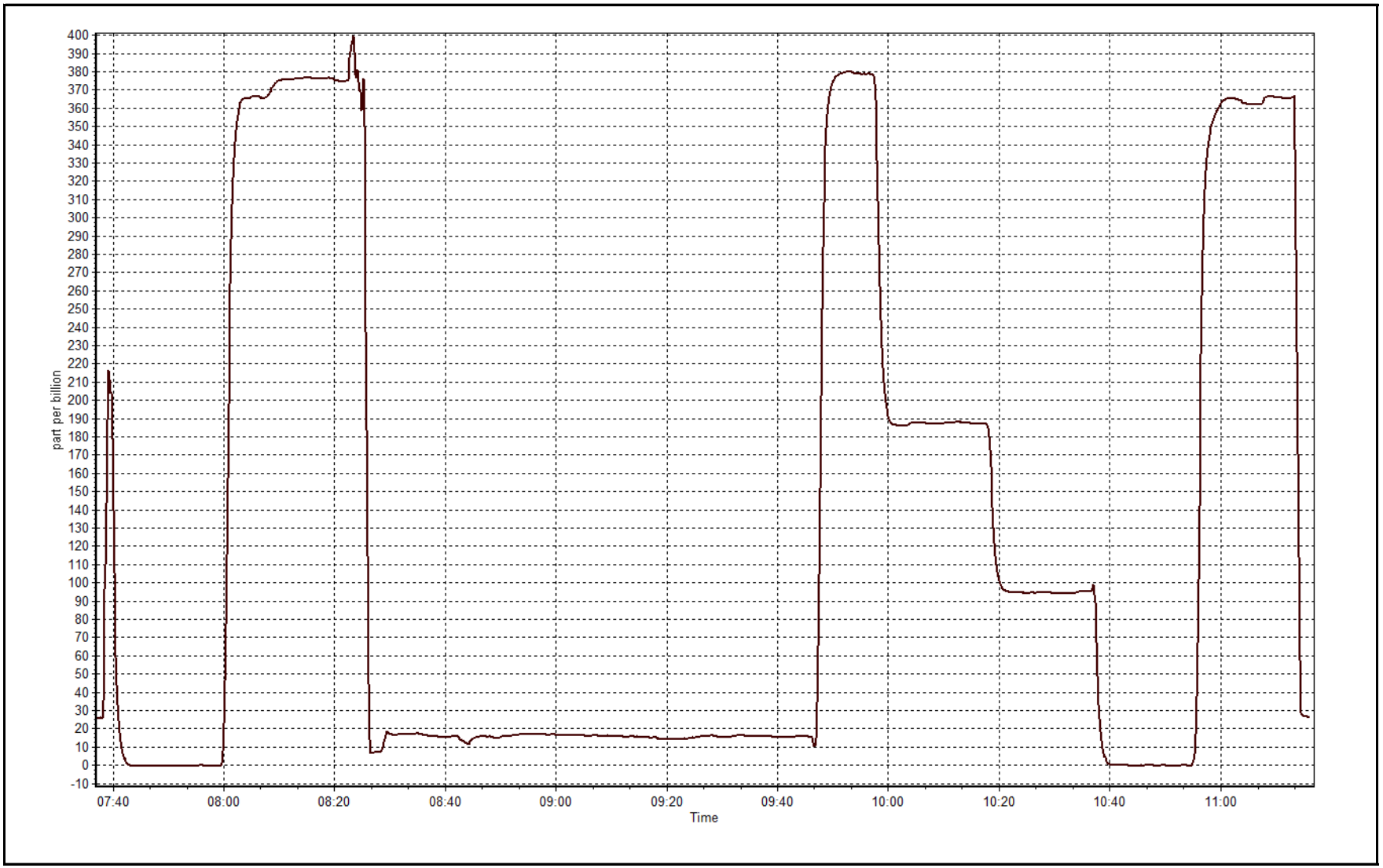
Calibration Date	April-20-16	Previous Calibration	March 8, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	7:38	End Time (MST)	11:16
Analyzer make	TEI 49i	Analyzer serial #	1507964700

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.3	----	Correlation Coefficient	0.999961
381.5	376.3	1.0138		
191.4	187.5	1.0208	Slope	1.011399
98.3	94.6	1.0391		
			Intercept	1.399579



O3 Calibration Plot Date: April 20, 2016



Wood Buffalo Environmental Association
NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	April 19, 2016	Previous Calibration	March 7, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Routine		
Start Time (MST)	8:20	End Time (MST)	12:14
NO Cal Gas Conc	49.4 ppm	Gas Cert Reference	S970259A
NOx Cal Gas Conc	49.4 ppm	Cal Gas Expiry Date	9/26/2017
Calibrator	Sabio 4010	Serial Number	11021107
Zero air Generator	Teledyne PAI T701	Serial Number	1864

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	5564

Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.997558	0.996930	1.003445
	Data Offset	1.824247	1.963622	-0.243397
Current Calibration	Data Slope	0.994877	0.994244	1.001652
	Data Offset	2.102095	2.342395	-0.264471

Analyzer Information

Analyzer make/model	Thermo 42C	Analyzer serial #	601114773

Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
Analyzer IP	192.168.1.103		192.168.1.103	
NO coefficient	0.988		0.988	
NOX coefficient	0.998		0.998	
NO2 coefficient	1.000		1.000	
NO bkgrnd	2.8		2.8	
NOX bkgrnd	2.9		2.9	
Chamber Temp	49.7	Deg C	49.8	Deg C
Moly Temp	324	Deg C	323	Deg C
PMT voltage	-784	V	-784	V
PMT Temp	-3.7	Deg C	-3.5	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	142.3	mmHg	141.2	mmHg
R Cell Press Nox	142.3	mmHg	141.2	mmHg
NO sample flow	0.889	lpm	0.88	lpm
Nox sample Flow	0.889	lpm	0.880	lpm

Notes:

filter changed out, no adjustments done, zero air for calibrator changed out

Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: April 19, 2016 Station Number: AMS 7

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	-0.2	----	----
as found span	5000	60.7	599.7	599.7	0.0	591.5	591.8	-0.1	1.0139	1.0134
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.2	----	----
high point	5000	60.7	599.7	599.7	0.0	602.0	602.3	0.0	0.9962	0.9957
second point	5000	30.4	300.4	300.4	0.0	297.9	297.5	0.6	1.0082	1.0096
third point	5000	15.2	150.2	150.2	0.0	147.3	147.2	0.3	1.0195	1.0202
as left zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.2	----	----
as left span	5000	60.7	599.7	242.4	357.3	599.3	241.1	358.4	1.0007	1.0054
								Average Correction Factor	1.0080	1.0085

Corrcted As found NO_X= 591.5 NO= 591.9 Percent Change NO_X= 1.3% NO= 1.3%

Previous Response NO_X= 599.4 NO= 599.6

GPT Calibration Data

Dilution Flow (total) 5000 ccm Source Gas Flow 60.70 ccm NOX ref calc conc = 599.7 ppb NO ref calc conc = 599.7 ppb

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
1st NO ref point		0.0	600.8	601.4	0.2	0.9982	0.9972	----	----
1st NO2 (300)	242.4	359.0	600.8	242.4	358.6	0.9982	----	1.0011	99.9%
2nd NO2 (200)	422.2	179.2	601.3	422.2	179.3	0.9974	----	0.9993	100.1%
3rd NO2 (100)	511.5	89.9	601.3	511.5	90.0	0.9974	----	0.9989	100.1%
2nd NO ref point		0.0	601.2	602.0	-0.6	0.9975	0.9962	----	----
				Average Correction Factor		0.9976		0.9998	100.0%

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

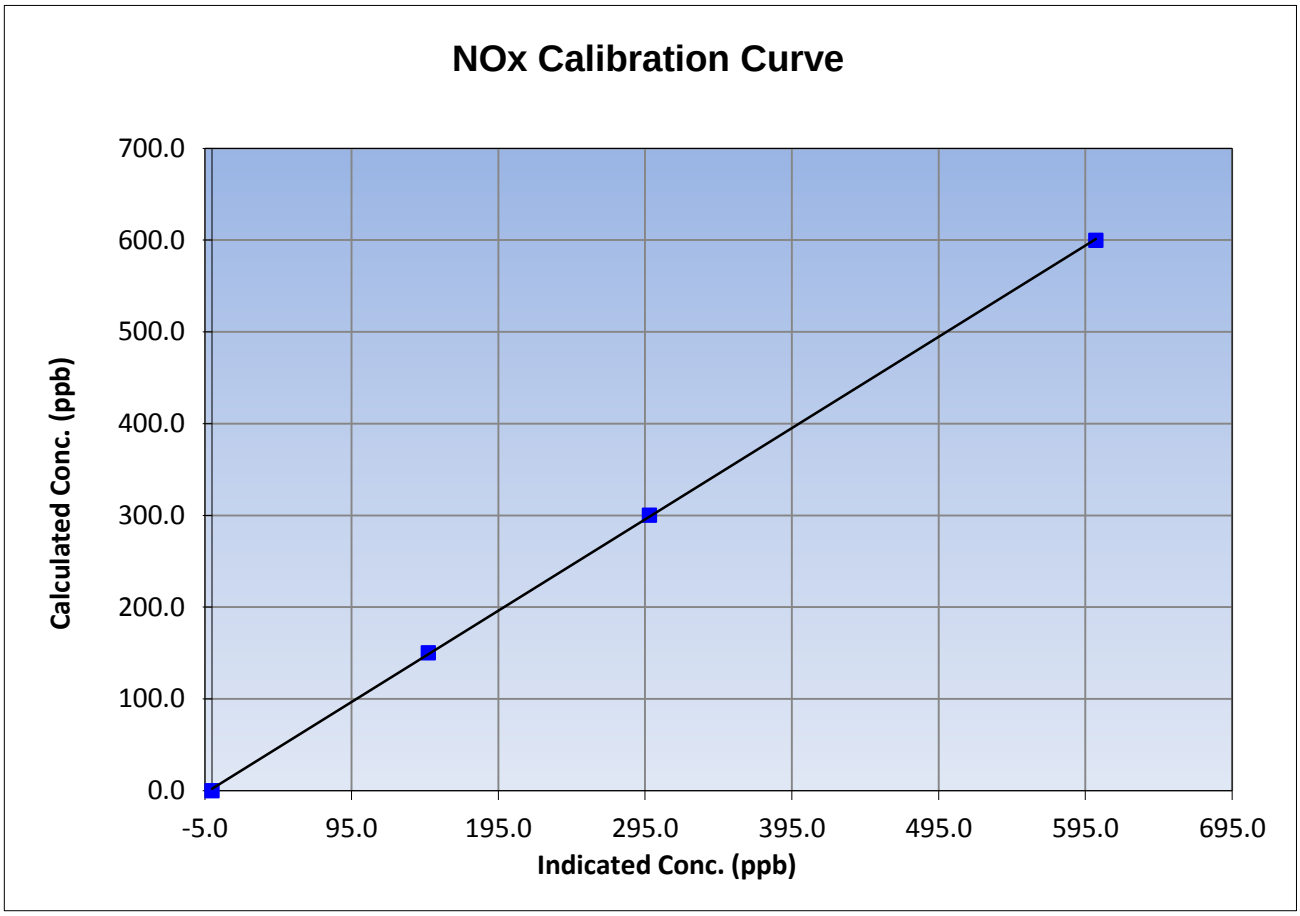
NO_X Calibration Summary

Station Information

Calibration Date	April 19, 2016	Previous Calibration	March 7, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	8:20	End Time (MST)	12:14
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	0.999939
599.7	602.0	0.9962		
300.4	297.9	1.0082	Slope	0.994877
150.2	147.3	1.0195		
			Intercept	2.102095



Wood Buffalo Environmental Association

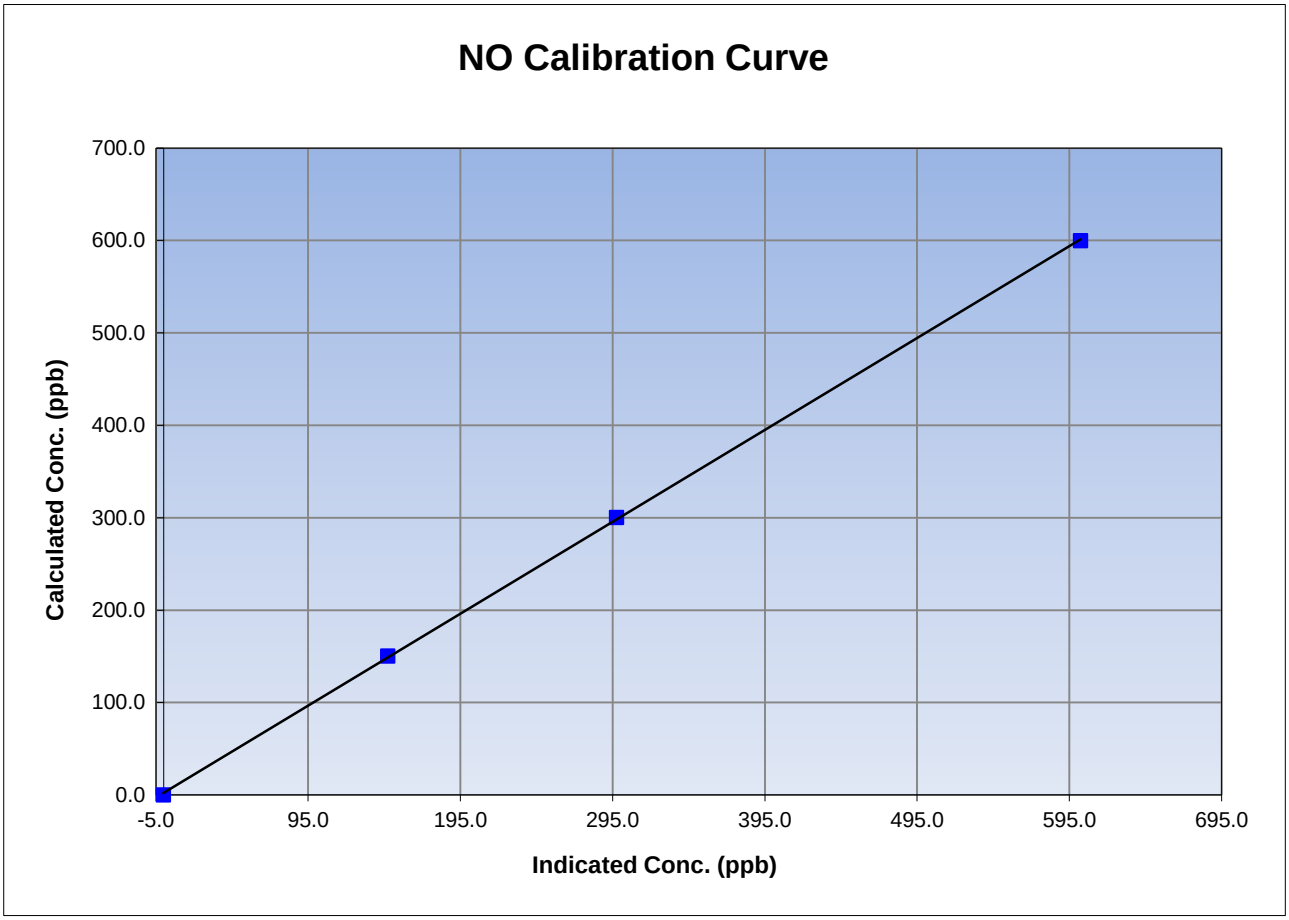
NO Calibration Summary

Station Information

Calibration Date	April 19, 2016	Previous Calibration	March 7, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	8:20	End Time (MST)	12:14
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	0.999927
599.7	602.3	0.9957		
300.4	297.5	1.0096	Slope	0.994244
150.2	147.2	1.0202		
			Intercept	2.342395



Wood Buffalo Environmental Association

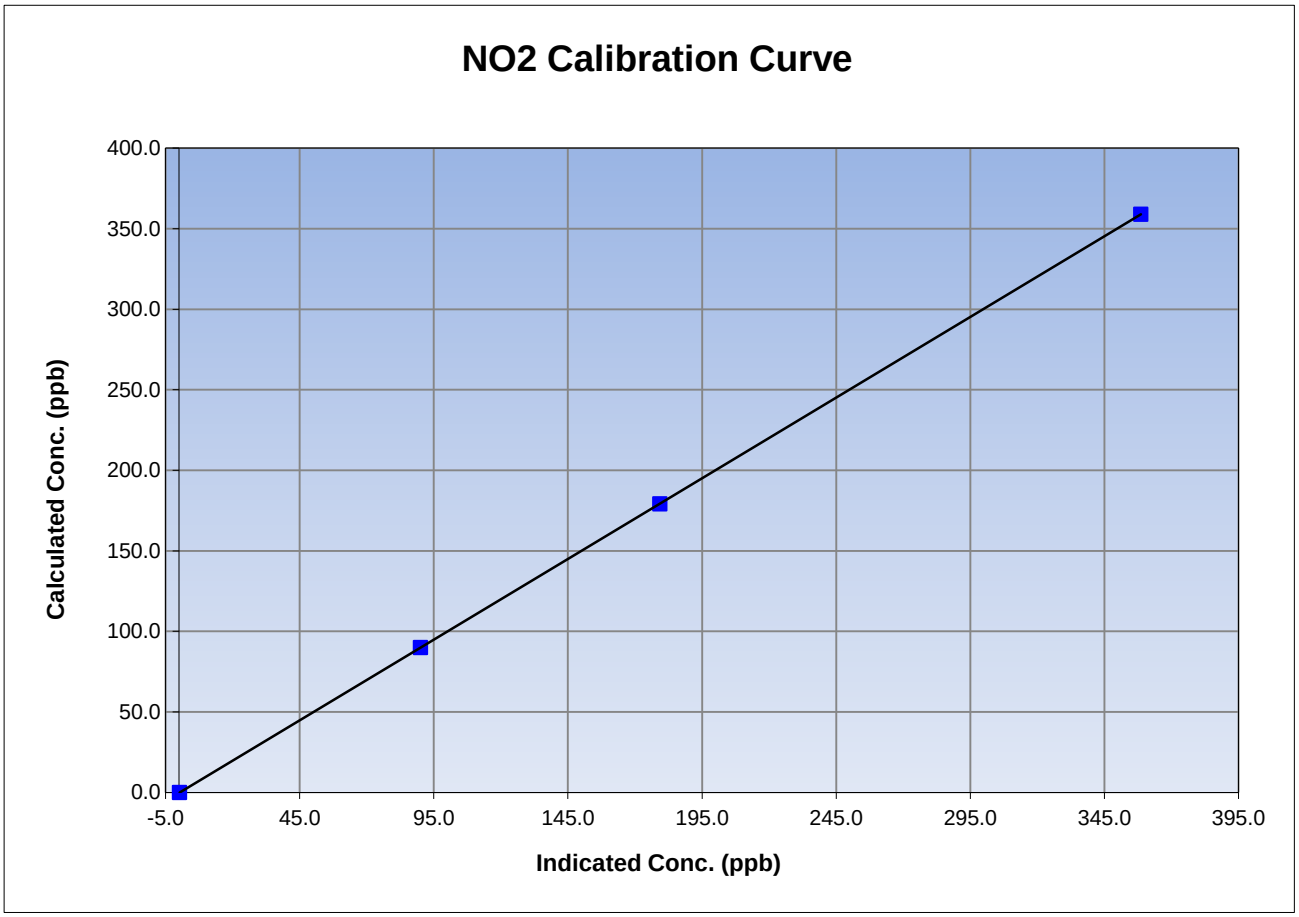
NO_2 Calibration Summary

Station Information

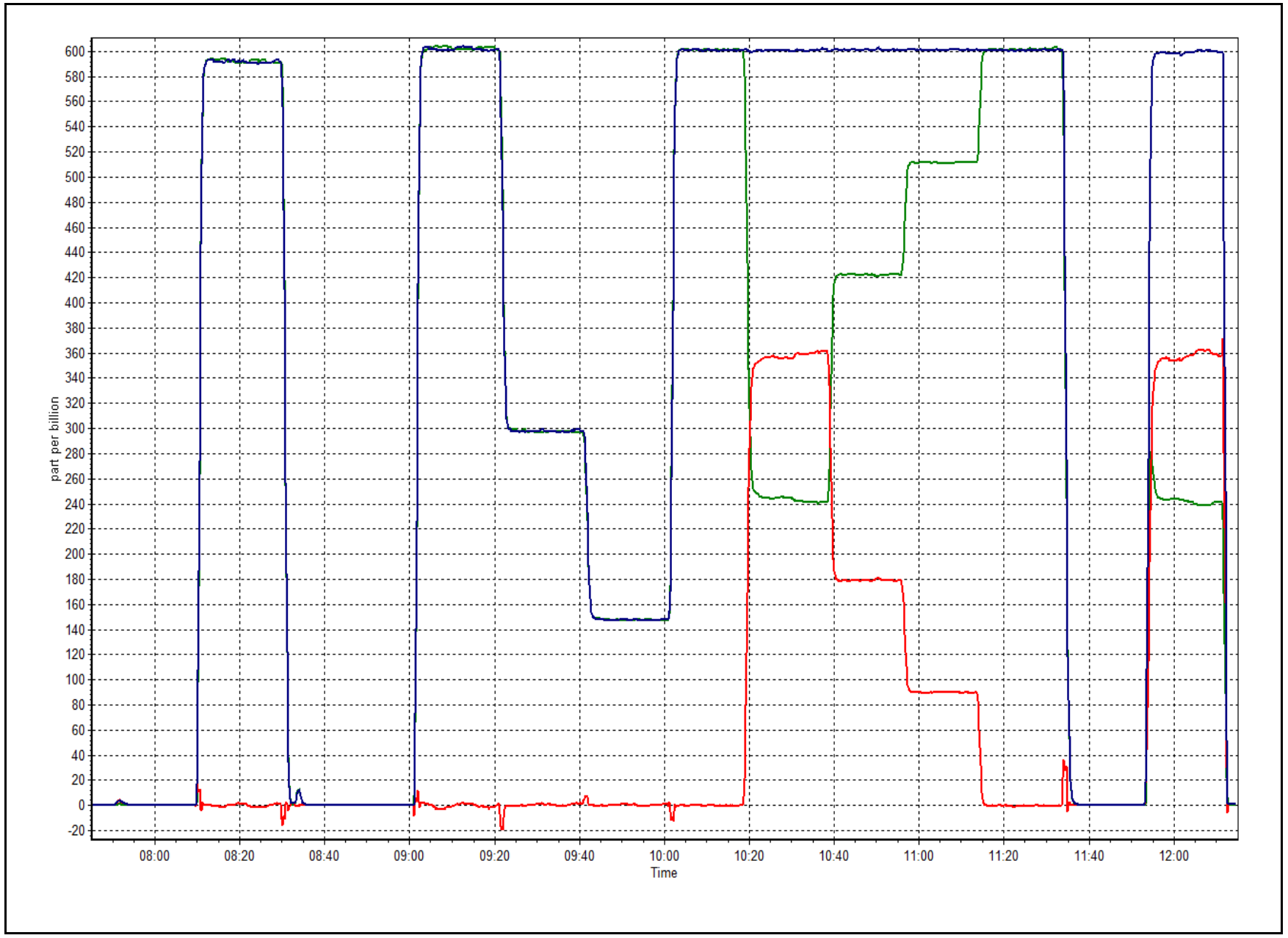
Calibration Date	April 19, 2016	Previous Calibration	March 7, 2016
Station Number	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	8:20	End Time (MST)	12:14
Analyzer make	Thermo 42C	Analyzer serial #	601114773

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	N/A	Correlation Coefficient	1.000000
359.0	358.6	1.0011		
179.2	179.3	0.9993	Slope	1.001652
89.9	90.0	0.9989		
			Intercept	-0.264471



NOX Calibration Plot Date: April 19, 2016



Wood Buffalo Environmental Association
NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	April 20, 2016	Previous Calibration	April 19, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Routine		
Start Time (MST)	8:40	End Time (MST)	9:48
NO Cal Gas Conc	49.4 ppm	Gas Cert Reference	S970259A
NOx Cal Gas Conc	49.4 ppm	Cal Gas Expiry Date	9/26/2017
Calibrator	Sabio 4010	Serial Number	11021107
Zero air Generator	Teledyne PAI T701	Serial Number	1864

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	5564

Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.997558	0.996930	1.003445
	Data Offset	1.824247	1.963622	-0.243397
Current Calibration	Data Slope	0.978968	0.979128	0.997342
	Data Offset	0.000000	0.097913	0.919791

Analyzer Information

Analyzer make/model	Thermo 42C	Analyzer serial #	601114773

Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
Analyzer IP	192.168.1.103		192.168.1.103	
NO coefficient	0.988		0.988	
NOX coefficient	0.998		0.998	
NO2 coefficient	1.000		1.000	
NO bkgrnd	2.8		2.8	
NOX bkgrnd	2.9		2.9	
Chamber Temp	49.7	Deg C	49.8	Deg C
Moly Temp	324	Deg C	323	Deg C
PMT voltage	-784	V	-784	V
PMT Temp	-3.7	Deg C	-3.5	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	142.3	mmHg	144	mmHg
R Cell Press Nox	142.3	mmHg	144	mmHg
NO sample flow	0.889	lpm	0.902	lpm
Nox sample Flow	0.889	lpm	0.902	lpm

Notes:

GPT check for O3

Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: April 20, 2016 Station Number: AMS 7

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.2	----	----
as found span	5000	60.7	599.7	599.7	0.0	612.6	612.4	0.6	0.9790	0.9793
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.2	----	----
high point	5000	60.7	599.7	599.7	0.0	612.6	612.4	0.6	0.9790	0.9793
second point	5000									
third point	5000									
as left zero	5000									
as left span	5000									
								Average Correction Factor	0.9790	0.9793

Corrcted As found NO_X= 612.6 NO= 612.5 Percent Change NO_X= -2.2% NO= -2.1%

Previous Response NO_X= 599.4 NO= 599.6

GPT Calibration Data

Dilution Flow (total) 5000 ccm Source Gas Flow 60.70 ccm NOX ref calc conc = 599.7 ppb NO ref calc conc = 599.7 ppb

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
1st NO ref point		0.0	612.6	612.4	0.2	0.9790	0.9793	----	----
1st NO2 (300)	230.9	381.5	612.9	230.9	381.9	0.9785	----	0.9990	100.1%
2nd NO2 (200)	421.0	191.4	612.1	421.0	191.2	0.9798	----	1.0010	99.9%
3rd NO2 (100)	514.1	98.3	609.9	514.1	96.0	0.9833	----	1.0240	97.7%
2nd NO ref point		0.0							
				Average Correction Factor		0.9805		1.0080	99.2%

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

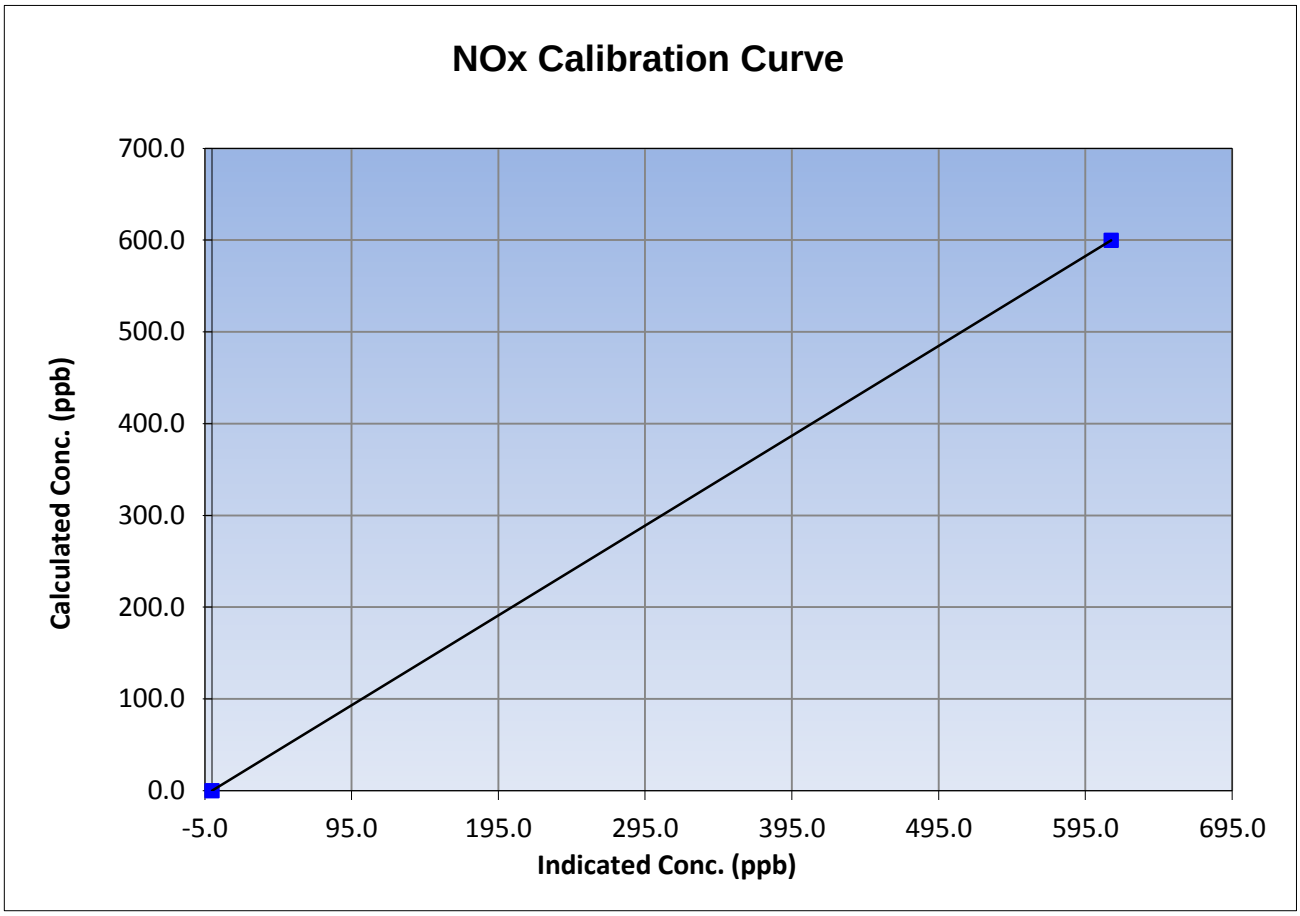
NO_X Calibration Summary

Station Information

Calibration Date	April 20, 2016	Previous Calibration	April 19, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	8:40	End Time (MST)	9:48
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	1.000000
599.7	612.6	0.9790		
			Slope	0.978968
			Intercept	0.000000



Wood Buffalo Environmental Association

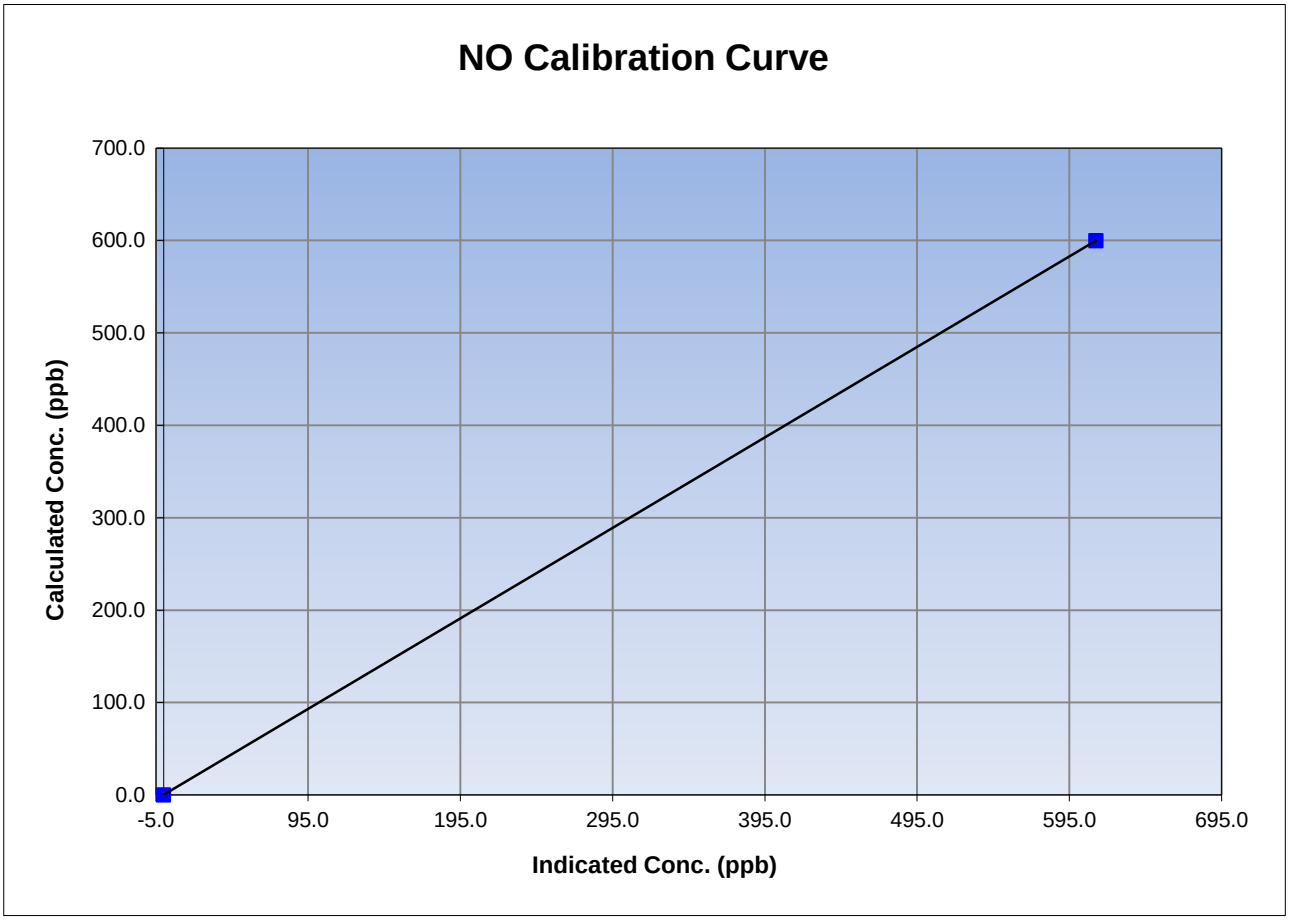
NO Calibration Summary

Station Information

Calibration Date	April 20, 2016	Previous Calibration	April 19, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	8:40	End Time (MST)	9:48
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	1.000000
599.7	612.4	0.9793		
			Slope	0.979128
			Intercept	0.097913



Wood Buffalo Environmental Association

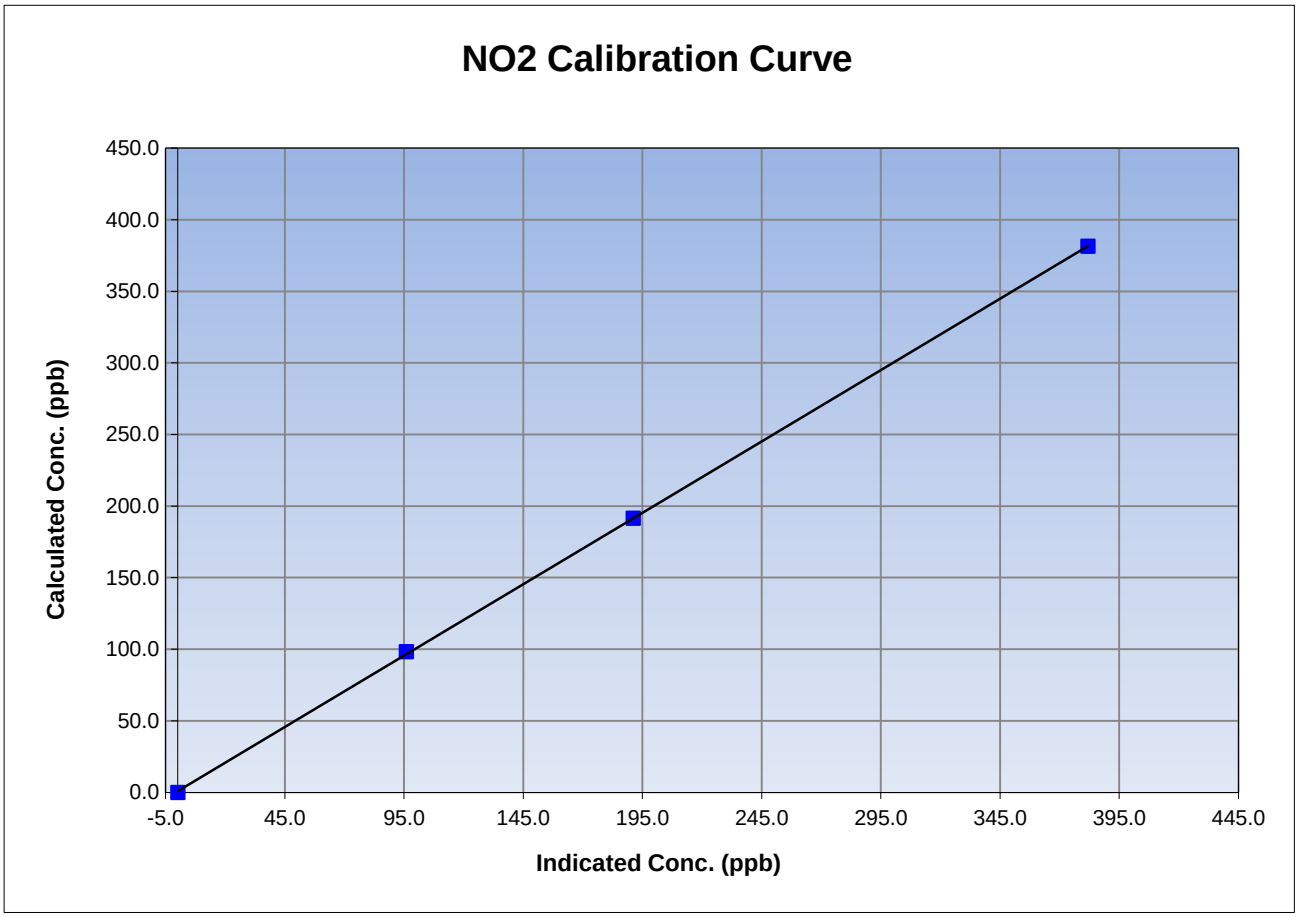
NO_2 Calibration Summary

Station Information

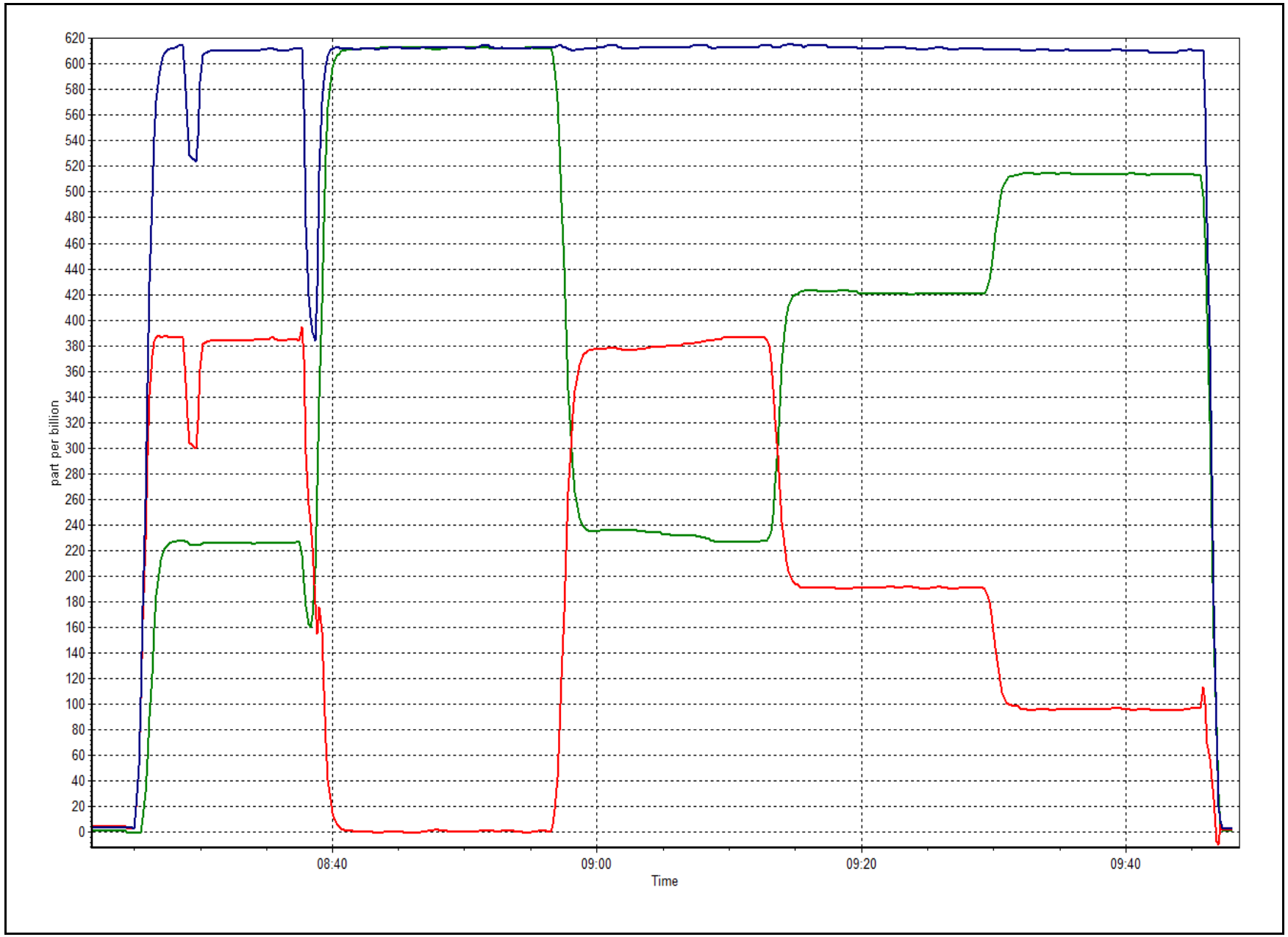
Calibration Date	April 20, 2016	Previous Calibration	April 19, 2016
Station Number	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	8:40	End Time (MST)	9:48
Analyzer make	Thermo 42C	Analyzer serial #	601114773

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	N/A	Correlation Coefficient	0.999949
381.5	381.9	0.9990		
191.4	191.2	1.0010	Slope	0.997342
98.3	96.0	1.0240		
			Intercept	0.919791



NOX Calibration Plot Date: April 20, 2016



Wood Buffalo Environmental Association

SHARP CALIBRATION

STATION INFORMATION

Calibration Date:	April 22, 2016	Previous Calibration:	08/05/16
Station Name:	Athabasca Valley	Station Number:	AMS 7
Start Time (MST):	8:16	End Time (MST):	10:23
Calibrator Make/Model:	Delta Cal	Calibrator Serial Number:	1097

SHARP INFORMATION

Particulate Fraction:	PM2.5
Make/Model:	Thermo / SHARP 5030
Serial Number	E515
C_{14} Source SN:	3256
Confirmation of Time settings:	Yes ☑ No ☐
Paremeters Checked:	T1 ☑ T2 ☑ T3 ☑ T4 ☑ P3 ☑ Main Flow ☑ Beta ☑ Neph ☑

CALIBRATION DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	1.0	1.0	0.0	1.0
T2	17.0	21.6	4.6	22.0
T3	18.0	21.6	3.6	22.0
T4	22.0	21.6	-0.4	22.0
RH (%)	15.0	14.5	-0.5	15.0

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	996	993.0	-3.0	996

Main Flow (Lph)

Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
1000	1005	5	1005	1000

Nephalometer Calibration

Parameter	As Founds	Zeroed (Limit +or- 2.0ug/m3)	As Left
Analog	242		242
Neph	2.6		2.6
C14	188.5		188.5
Indicated Concentration (ug/m3)	**0.6**	**No**	**0.6**
Offset 1			
Offset 2			

Leak Check (Quarterly)

Leak Check Date:	April 22, 2016	Previous Leak Check Date:	March 8, 2016

	Measured	Difference LPM (Limit +/- 0.42 LPM)
Flow without adaptor (LPM):	16.80	0.05
*Flow with adaptor (LPM):	16.75	

**Note - do not attach adaptor without shutting off the pump first*

Mass Foil Calibration (Annualy)

Foil Calibration Date:	April 22, 2016	Previous Foil Calibration:	NA
Zeroed?:	No		
Foil Mass:	1337	Mass foil set S/N:	5872
Previous Correction Factor:	6849		
New Correction Factor:	6853		

INSPECTION DATA

Item	Condition	Date of install or rebuild
Cyclone	Good / cleaned	22/04/2016
Pump	Good	NA
Filter Tape	Good	NA
Mass Foil Cal Set	na	NA
HEPA filter	Good	NA

NOTES:

T2,T3 adjusted, Leak check done after foil check

Calibration Performed By: **Melissa Lemay**

Wood Buffalo Environmental Association
CO Calibration Report

W B E A

Station Information

Calibration Date	April 22, 2016	Last Calibration	March 9, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Routine		
Start Time (MST)	6:40	End Time (MST)	9:36
Gas Cert Reference	CC101396	Station temp.	22 Deg C
Cal Gas Concentration	2970 ppm	Cal Gas Exp Date	02/02/2023
Calibrator Make/Model	Sabio 4010	Serial Number	11021107
ZAG Make/Model	API 701	Serial Number	5564
DACS make/model	Campbell Scientific CR3000	Serial Number	1864

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 1000 ppb		Chamber temp.	48.0	47.9
Analyzer IP address	192.168.1.48		Pressure	731.3	741.9
Calculated slope	0.992456	0.999937	Flow	0.490	0.498
Calculated intercept	0.047560	0.063463	Intensity	199712	199712
Analyzer Background	4.712	5.079	S/R ratio	1.173620	1.172987
Analyzer Coefficient	1.065	1.065			199549

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	42.6	0.973
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	69.7	41.4	41.4	1.001
second point	5000	35.2	20.9	20.8	1.006
third point	5000	15.2	9.0	8.9	1.010
as left zero	5000	0.0	0.0	0.0	----
as left span	5000	69.7	41.4	41.2	1.005
				Average Correction Factor	1.006

Corrected As found	42.3	Previous response	41.7	% change	-1.4%

Notes:

Filter changed out, zero adjusted, No maintenance done

Calibration Performed By: Melissa Lemay

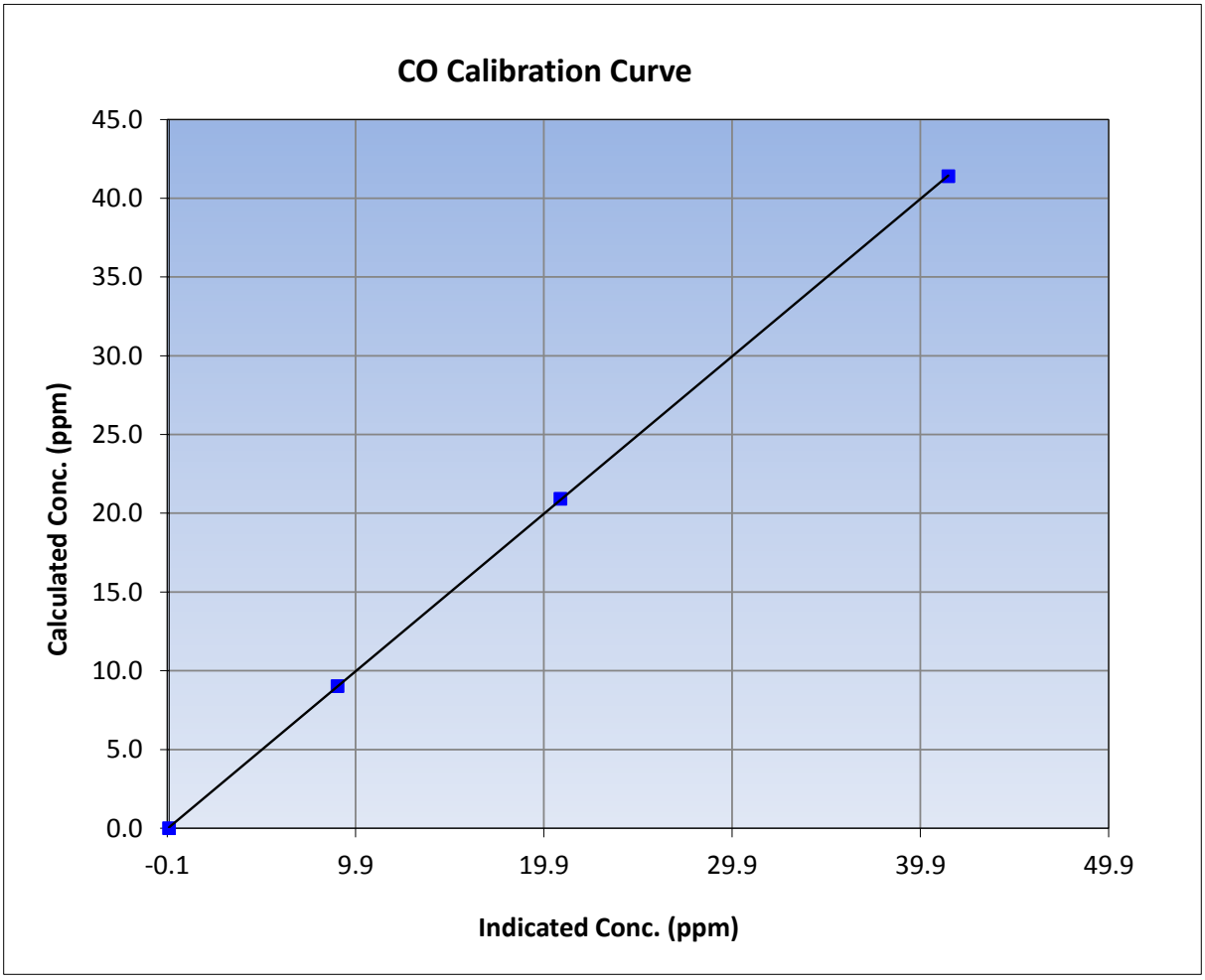
Wood Buffalo Environmental Association
CO Calibration Report

Station Information

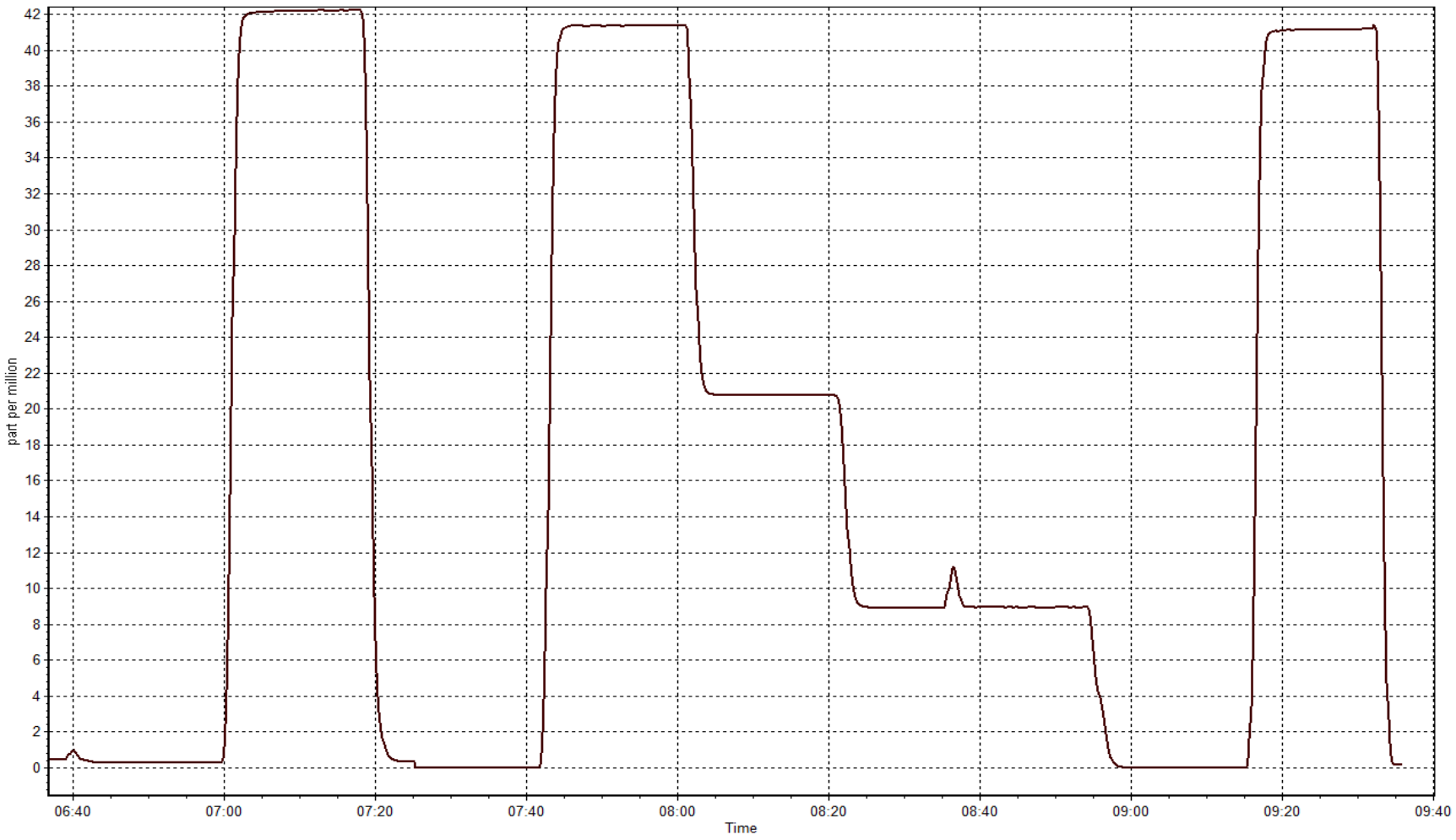
Calibration Date	April 22, 2016	Previous Calibration	March 9, 2016
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	6:40	End Time (MST)	9:36
Analyzer make	Thermo 48i-TLE	Analyzer serial #	1408761381

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999990
41.4	41.4	1.0005		
20.9	20.8	1.0062	Slope	0.999937
9.0	8.9	1.0099		
			Intercept	0.063463



CO Calibration Plot Date: April 22, 2016



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 8
FORT CHIPEWYAN
APRIL 2016

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

May 27, 2016

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS 8)
APRIL 2016

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	680	36	40	99.44	4	0	1	0
O3(ppb) Average	685	34	35	99.86	57	0	50	-
NO2(ppb) Average	678	36	42	99.17	8	0	3	-
NO(ppb) Average	678	36	42	99.17	2	-	1	-
NOX(ppb) Average	678	36	42	99.17	8	-	3	-
PM2.5(ug/m3) Average	687	8	33	96.53	24.9	-	5.9	0
Wind Speed 10 m (km/h) Average	720	0	0	100.00	40	-	31	-
Wind Direction 10 m (deg) Average	720	0	0	100.00	-	-	-	-
Temperature 2 m (C) Average	720	0	0	100.00	19.1	-	12.4	-
Relative Humidity (%) Average	720	0	0	100.00	100	-	93	-
Precipitation (mm) Total	720	0	0	100.00	1	-	4.6	-
Leaf Wetness (% of range) Average	720	0	0	100.00	58	-	37	-
Global Solar Radiation (W/m2) Average	720	0	0	100.00	825	-	304	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS 8)
APRIL 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

					Percentile						
Parameter	Number	Mean	StnDev	Total	Min	P10	Q1	Median	Q3	P90	Max
SO2(ppb) Average	680	0.1	0	-	0	0	0	0	0	0	4
O3(ppb) Average	685	40.6	6	-	19	32	38	42	44	47	57
NO2(ppb) Average	678	0.8	1	-	0	0	0	1	1	2	8
NO(ppb) Average	678	0.1	0	-	0	0	0	0	0	0	2
NOX(ppb) Average	678	0.9	1	-	0	0	0	1	1	2	8
PM2.5(ug/m3) Average	687	3.86	1.8	-	0.5	2.1	2.7	3.6	4.6	5.9	24.9
Wind Speed 10 m (km/h) Average	720	17.6	8	-	1	9	12	17	23	28	40
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-
Temperature 2 m (C) Average	720	-1.77	7.7	-	-17.6	-12.9	-6	-2.3	3.6	7.8	19.1
Relative Humidity (%) Average	720	67.3	15	-	24	47	59	69	77	85	100
Precipitation (mm) Total	720	-	-	5.33	-	-	-	-	-	-	-
Leaf Wetness (% of range) Average	720	1.9	10	-	-1	-1	0	0	0	0	58
Global Solar Radiation (W/m2) Average	720	203.6	253	-	0	0	0	66	373	658	825

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS 8)
APRIL 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2	18 Apr 2016 10:00	18 Apr 2016 13:00	4	Maintenance - tested daily zero and span system
O3	18 Apr 2016 11:00	18 Apr 2016 11:00	1	Maintenance - tested daily zero and span system
NO2	18 Apr 2016 09:00	18 Apr 2016 14:00	6	Maintenance - tested daily zero and span system
PM2.5	05 Apr 2016 19:00	06 Apr 2016 09:00	15	Unstable Operation - debris on filter tape
PM2.5	06 Apr 2016 10:00	06 Apr 2016 13:00	4	Maintenance - cleaning and re-confirm operation
PM2.5	08 Apr 2016 14:00	08 Apr 2016 19:00	6	Unstable operation - excessive baseline drift

Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO_2) - ppb

Fort Chipewyan - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 4 ppb on Apr 4 16:00 Maximum Daily Average: 0.6 ppb on Apr 4

Minimum Value: 0 ppb on Apr 19 10:00
Maximum Diurnal Average: 0.2 ppb at hour 16
Monthly Average: 0.1 ppb

Minimum Daily Average: 0.0 ppb on Apr 28
Minimum Diurnal Average: 0.1 ppb at hour 20
Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 0$ $P_{99} = 1$

Hours in Service:	720
Hours of Data:	680
Hours of Missing Data:	40
Hours of Calibration:	36
Percent Operational Time:	99.4

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-Apr	0	Z	0	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-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
3-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
4-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	1	2	3	4	2	0	0	0	0	0	0	0	0.6	4
5-Apr	1	0	0	0	0	Z	0	0	0	0	C	C	C	C	C	C	0	0	0	0	0	0	0	0	--	1
6-Apr	Z	0	0	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-Apr	0	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
8-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
9-Apr	0	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
10-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
11-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
12-Apr	Z	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
13-Apr	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
14-Apr	0	0	Z	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-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
16-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
17-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
18-Apr	Z	0	0	0	0	0	0	0	0	M	M	M	M	1	0	0	0	0	0	0	0	0	0	0	0.2	1
19-Apr	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
20-Apr	0	0	Z	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-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
22-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
23-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
24-Apr	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
25-Apr	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
26-Apr	0	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
27-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
28-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
29-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.1	1
30-Apr	Z	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Diurnal Average	
	1	0	1	0	1	1	1	1	1	0	0	0	1	2	3	4	2	0	0	0	0	0	0	1	Diurnal Maximum	

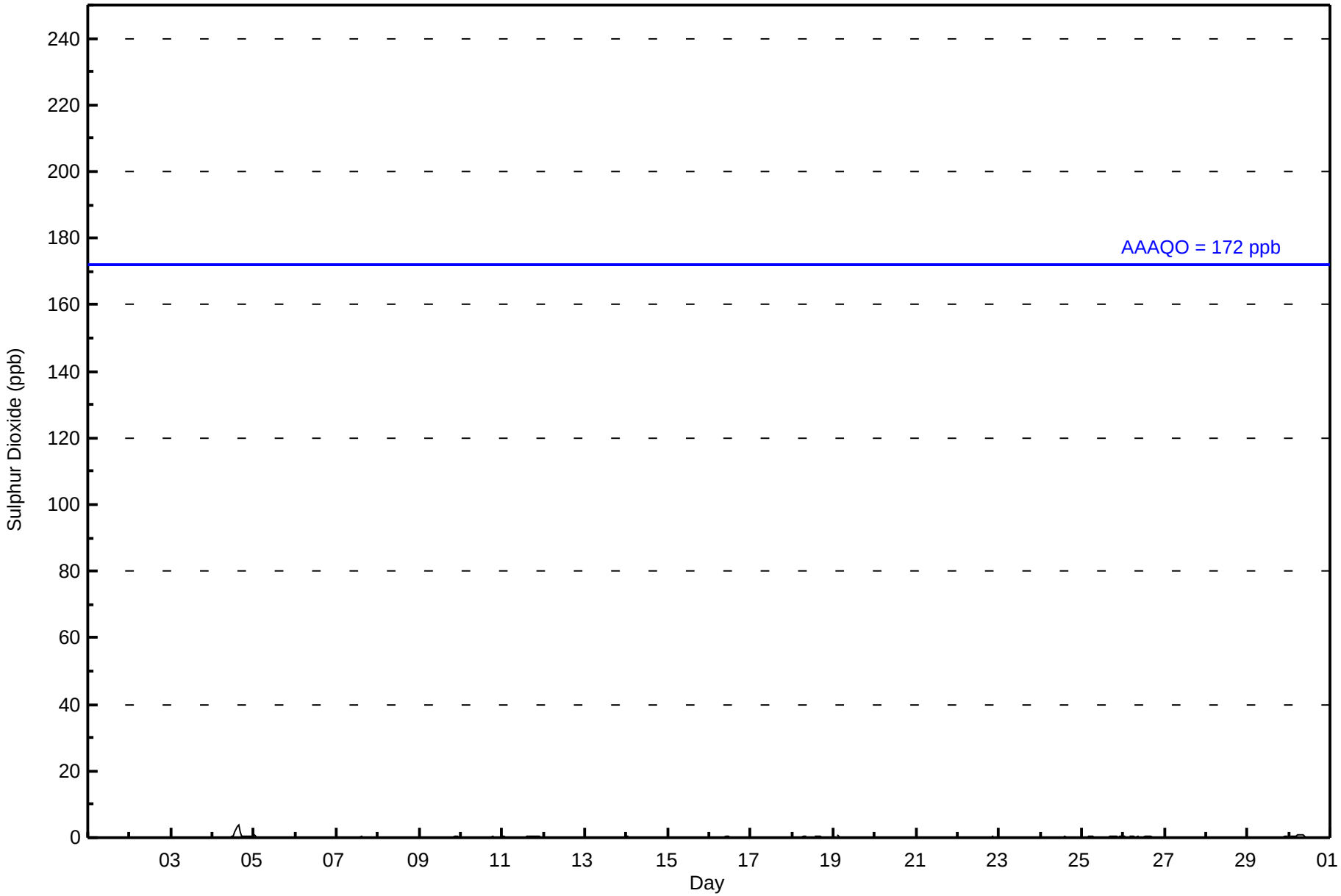
Z - zerospan C - Calibration M - Maintenance
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb

Wood Buffalo Environmental Association

Hourly Averages

Sulphur Dioxide (SO_2) - ppb

Fort Chipewyan - April 2016



Sulphur Dioxide (SO_2) - ppb
Fort Chipewyan - April 2016

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

Total Number of Valid Hours: 680

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

Fort Chipewyan - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 10	26	9	22	122	302	47	13	11	9	10	3	6	12	8	33	47	680
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	26	9	22	122	302	47	13	11	9	10	3	6	12	8	33	47	680

Total Number of Valid Hours: 680

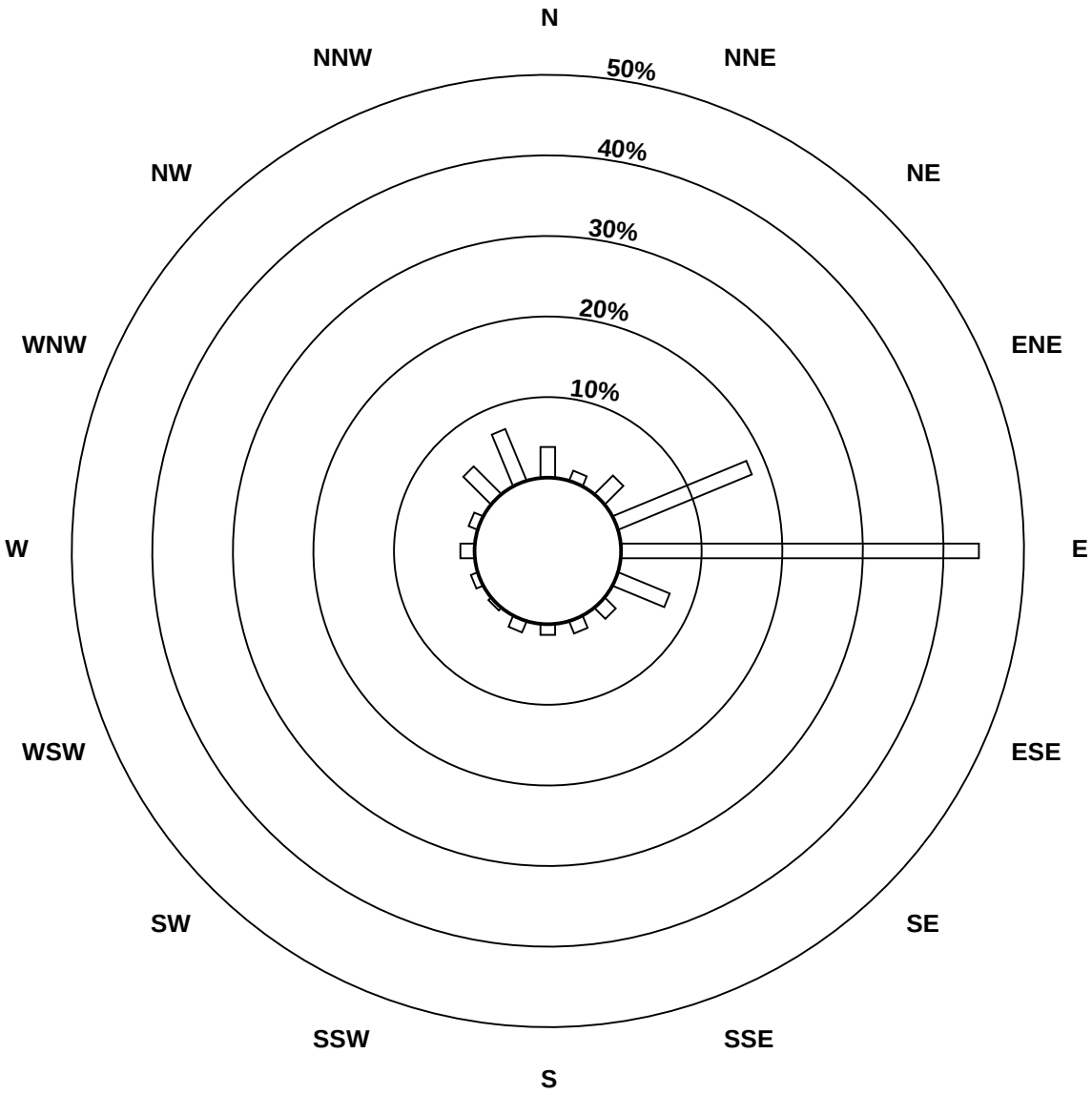
Total Number of Hours: 720

Wood Buffalo Environmental Association

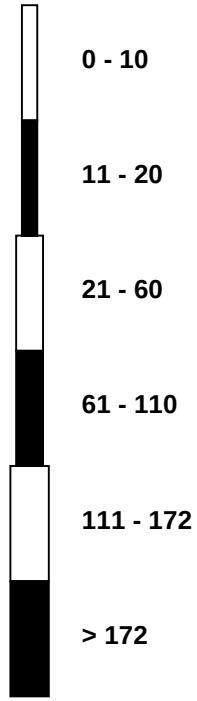
Wind Rose Apr 2016

Sulphur Dioxide (SO_2) - ppb

Fort Chipewyan (AMS 8)



Classes (ppb)



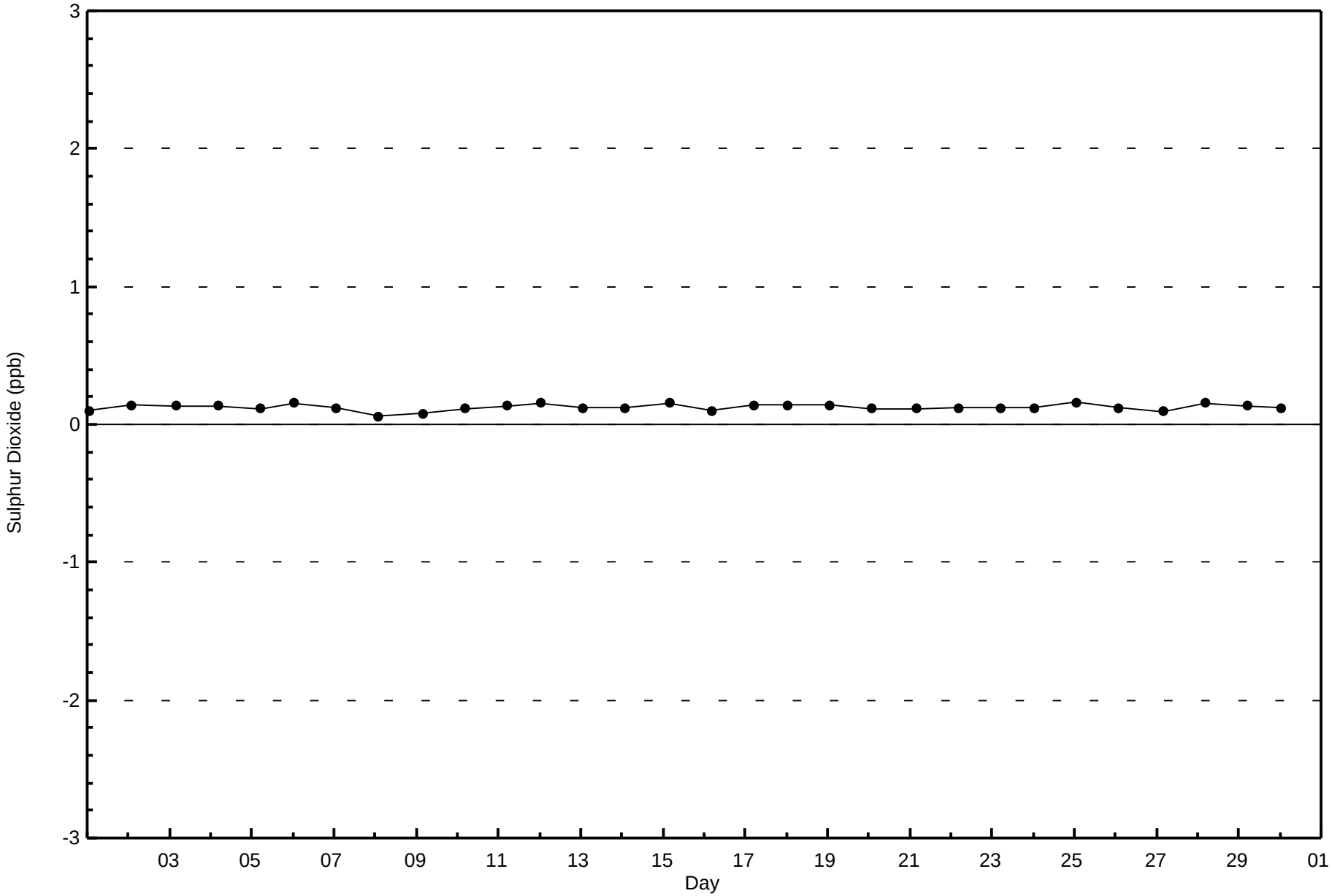
Total Number of Valid Hours: 680

Wood Buffalo Environmental Association

Zero Responses

Sulphur Dioxide (SO_2) - ppb

Fort Chipewyan - April 2016

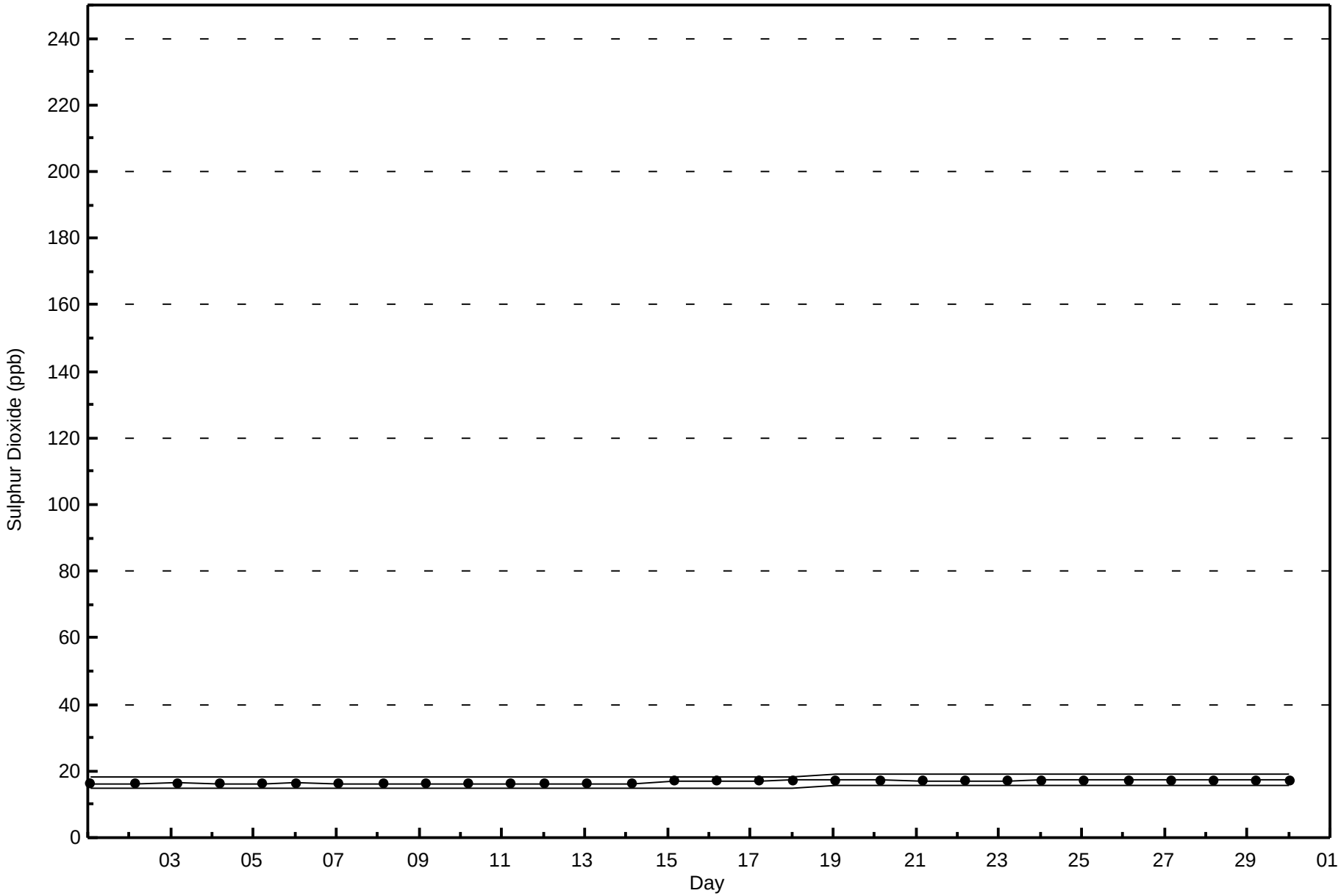


Wood Buffalo Environmental Association

Span Responses

Sulphur Dioxide (SO_2) - ppb

Fort Chipewyan - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

Fort Chipewyan - April 2016

Maximum Value: 2 ppb on Apr 26 11:00

Maximum Daily Average: 0.6 ppb on Apr 26

Minimum Value: 0 ppb on Apr 1 20:00

Minimum Daily Average: 0.0 ppb on Apr 20

Maximum Diurnal Average: 0.2 ppb at hour 11

Minimum Diurnal Average: 0.0 ppb at hour 24

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:	720
Hours of Data:	678
Hours of Missing Data:	42
Hours of Calibration:	36
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-Apr	0	Z	0	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-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
3-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
4-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	1	1	2	1	0	0	0	0	0	0	0	0	0.3	2
5-Apr	0	0	0	0	0	Z	0	0	0	0	C	C	C	C	C	C	0	0	0	0	0	0	0	0	--	0
6-Apr	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
7-Apr	0	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
8-Apr	0	0	Z	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-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
10-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
11-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
12-Apr	Z	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
13-Apr	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
14-Apr	0	0	Z	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-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
16-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
17-Apr	0	0	0	0	0	Z	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1
18-Apr	Z	0	0	0	0	0	0	0	M	M	M	M	M	M	0	0	0	0	0	0	0	0	0	0	--	0
19-Apr	0	Z	0	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-Apr	0	0	Z	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-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
22-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
23-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
24-Apr	Z	0	0	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-Apr	0	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
26-Apr	0	0	Z	0	0	0	0	0	1	1	2	2	2	1	1	0	0	0	0	0	0	0	0	0	0.6	2
27-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
28-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
29-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
30-Apr	Z	0	0	0	0	0	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2
	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	Diurnal Average	
	0	0	0	0	0	0	1	2	1	1	2	2	2	1	2	1	0	0	0	0	0	0	0	0	Diurnal Maximum	

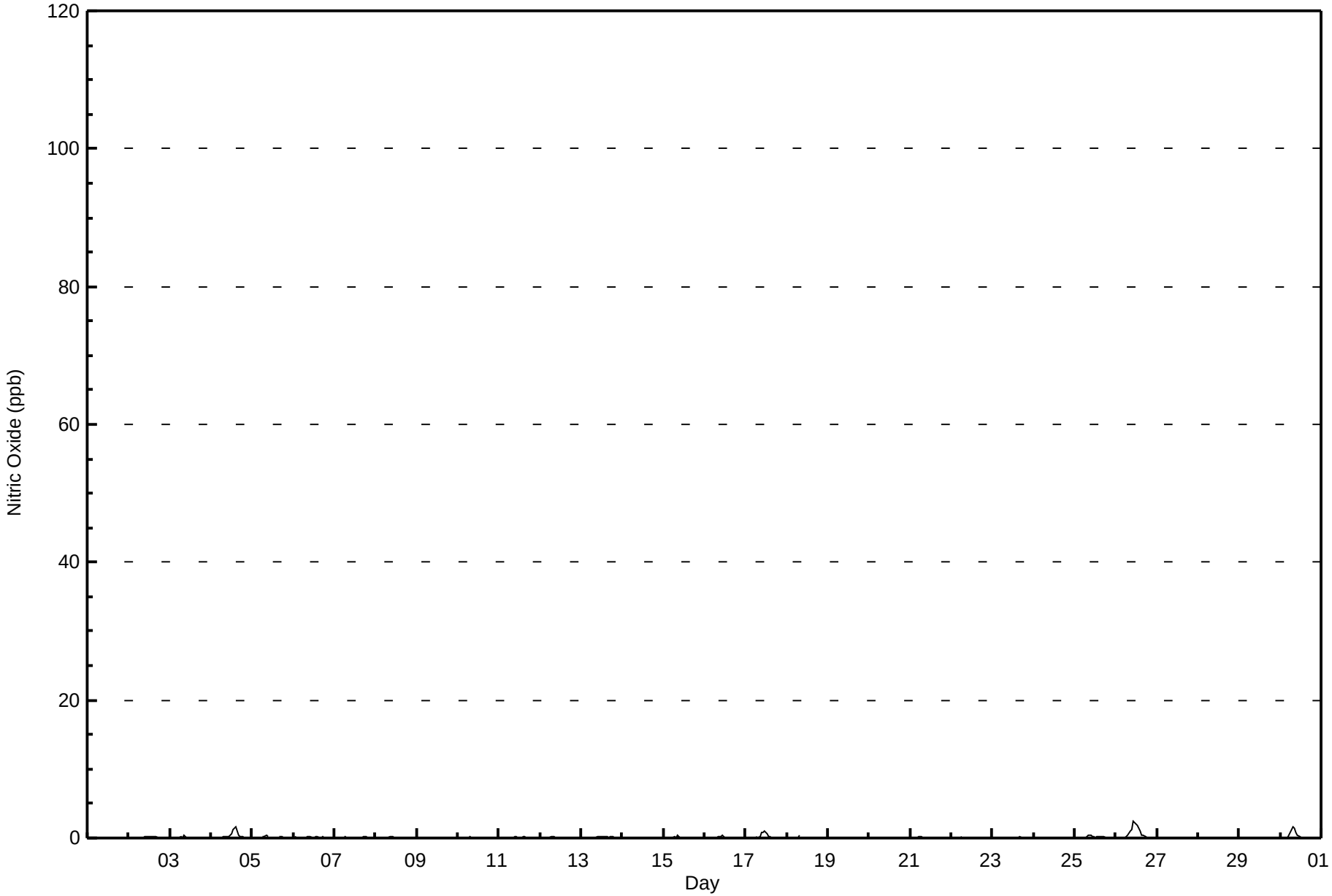
Z - zerospan C - Calibration M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Nitric Oxide (NO) - ppb

Fort Chipewyan - April 2016



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	678	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: 678

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitric Oxide (NO) - ppb

Fort Chipewyan - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	26	9	22	122	300	47	13	11	9	10	3	6	12	8	33	47	678
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	26	9	22	122	300	47	13	11	9	10	3	6	12	8	33	47	678

Total Number of Valid Hours: 678

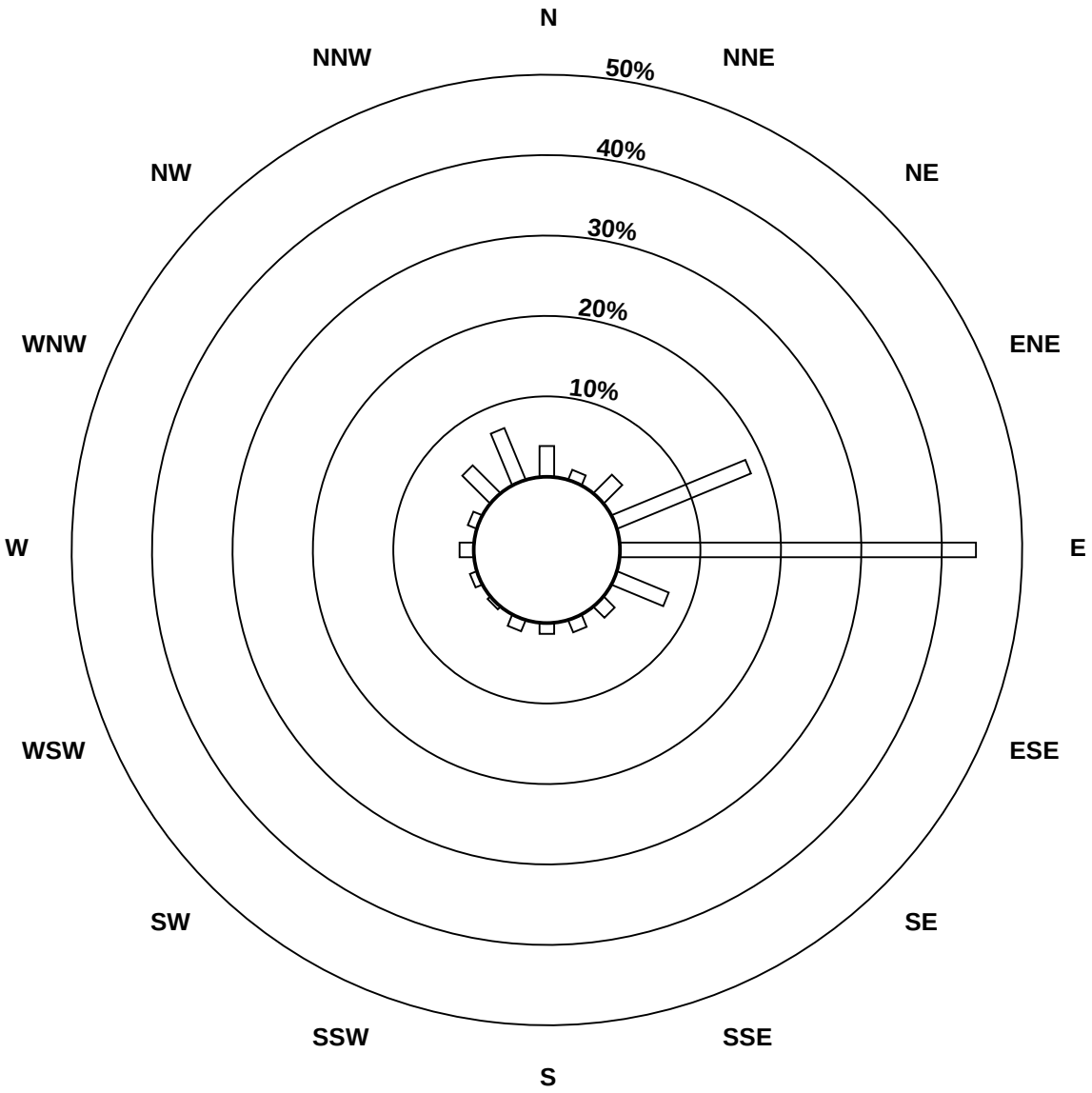
Total Number of Hours: 720

Wood Buffalo Environmental Association

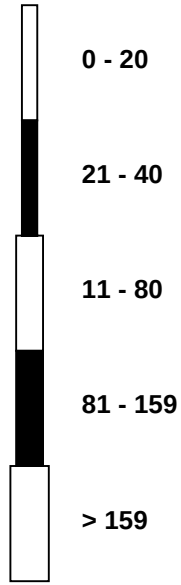
Wind Rose Apr 2016

Nitric Oxide (NO) - ppb

Fort Chipewyan (AMS 8)



Classes (ppb)



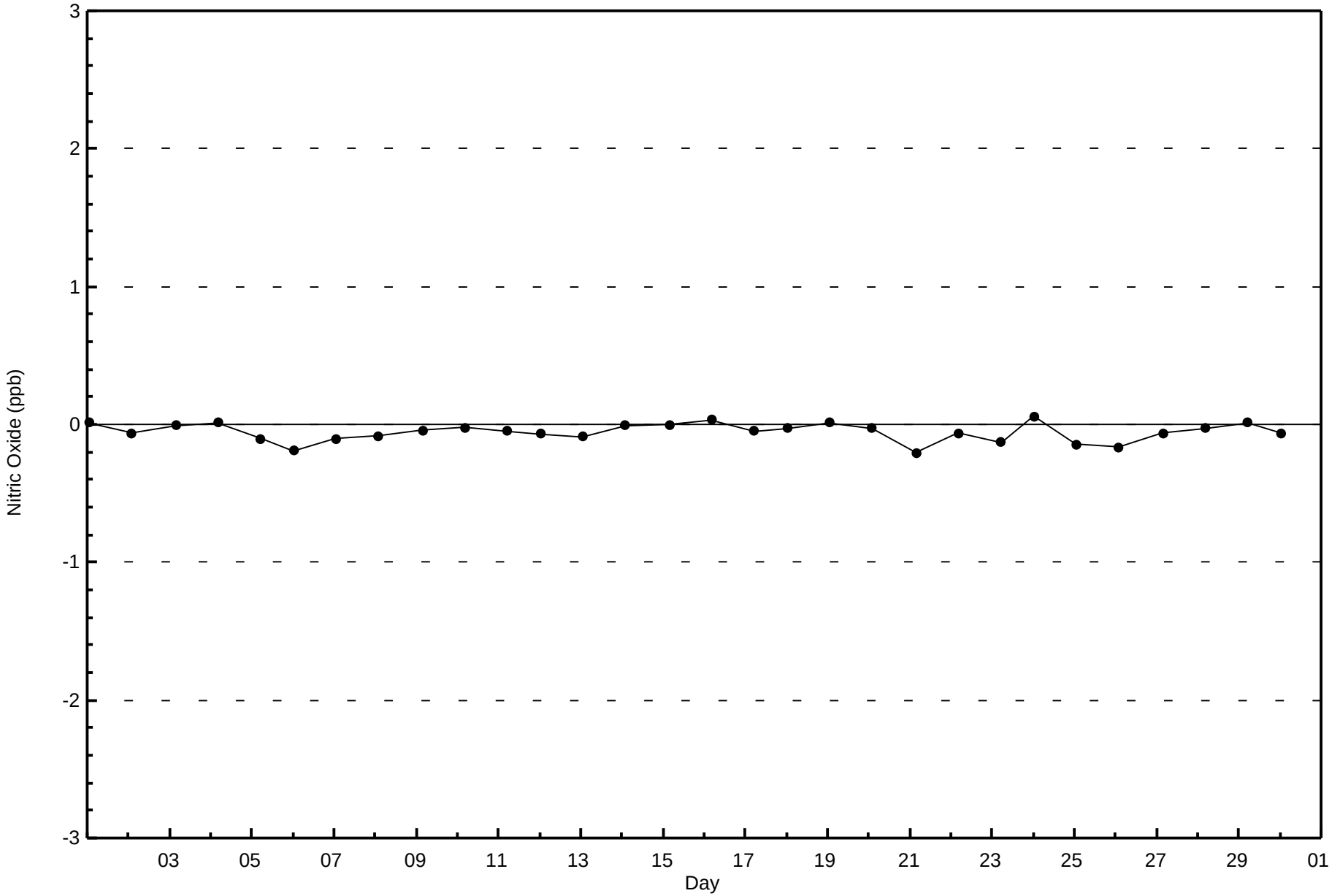
Total Number of Valid Hours: 678

Wood Buffalo Environmental Association

Zero Responses

Nitric Oxide (NO) - ppb

Fort Chipewyan - April 2016

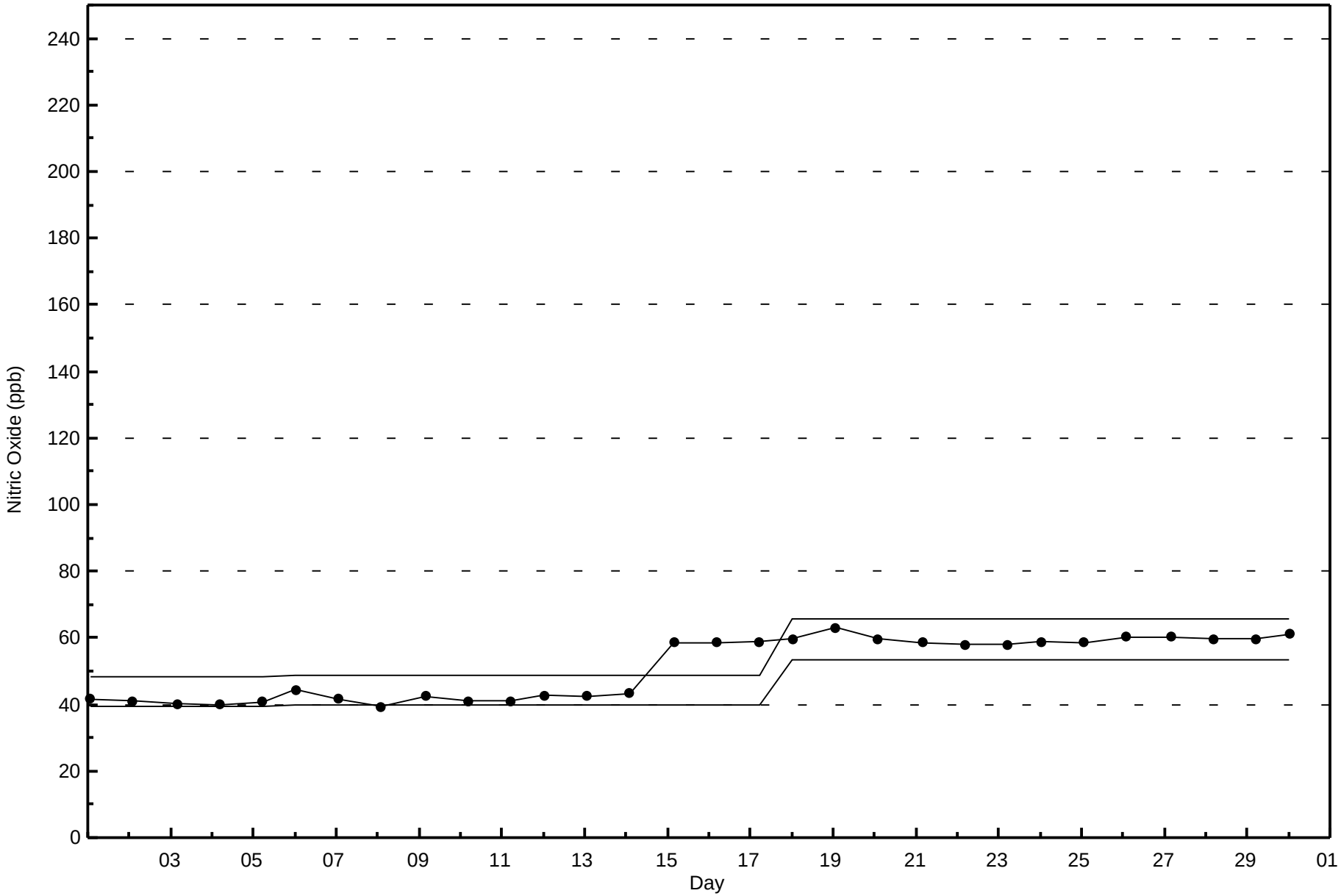


Wood Buffalo Environmental Association

Span Responses

Nitric Oxide (NO) - ppb

Fort Chipewyan - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO_2) - ppb

Fort Chipewyan - April 2016

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

Maximum Value: 8 ppb on Apr 30 06:00 Maximum Daily Average: 2.6 ppb on Apr 26

Minimum Value: 0 ppb on Apr 3 23:00 Minimum Daily Average: 0.4 ppb on Apr 28

Maximum Diurnal Average: 1.1 ppb at hour 6 Minimum Diurnal Average: 0.6 ppb at hour 24

Monthly Average: 0.8 ppb Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 1 $Q_3 = 1$ $P_{90} = 2$ $P_{99} = 5$

Hours in Service:	720
Hours of Data:	678
Hours of Missing Data:	42
Hours of Calibration:	36
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-Apr	1	Z	1	1	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.5	1
2-Apr	0	0	Z	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.6	1
3-Apr	1	0	0	Z	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
4-Apr	0	0	0	0	Z	0	0	1	0	0	1	1	1	2	3	3	2	1	1	2	1	1	1	1	0.9	3
5-Apr	1	1	0	1	0	Z	1	1	1	1	C	C	C	C	C	C	1	1	1	1	1	1	1	1	--	1
6-Apr	Z	1	1	1	0	0	0	1	1	1	1	0	0	1	0	1	1	1	1	1	0	0	0	0	0.5	1
7-Apr	1	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0.6	1
8-Apr	0	0	Z	0	1	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
9-Apr	0	0	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0.5	1
10-Apr	0	0	0	0	Z	0	0	1	1	1	1	1	1	1	1	0	0	0	1	2	2	1	1	1	0.7	2
11-Apr	1	1	0	0	0	Z	0	0	0	1	1	0	0	0	1	1	1	0	1	1	1	1	1	1	0.6	1
12-Apr	Z	2	1	1	1	1	2	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0.9	2
13-Apr	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	3	4	4	1	1	1	1.0	4
14-Apr	1	1	Z	1	1	1	1	1	1	1	1	0	0	0	1	1	0	1	1	1	1	1	1	1	0.6	1
15-Apr	0	1	1	Z	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	0	0	0	0.5	1
16-Apr	0	0	0	0	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	0.7	2
17-Apr	4	1	1	1	1	Z	2	1	1	2	2	3	2	2	1	1	1	1	1	1	1	1	1	1	1.3	4
18-Apr	Z	1	1	1	1	1	1	2	M	M	M	M	M	M	2	1	1	1	1	1	1	1	1	1	--	2
19-Apr	2	Z	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	3
20-Apr	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.4	1
21-Apr	1	1	2	Z	3	3	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	2	1	0	0.9	3
22-Apr	0	1	0	1	Z	1	1	1	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0.5	1
23-Apr	1	1	1	1	1	Z	1	1	1	0	0	1	0	0	0	1	1	0	1	1	1	0	0	0	0.5	1
24-Apr	Z	0	0	0	1	0	0	0	0	0	1	1	0	1	1	1	1	1	1	1	0	0	0	0	0.5	1
25-Apr	0	Z	1	1	1	2	1	2	3	3	2	1	1	1	1	2	2	2	2	2	1	1	1	1	1.4	3
26-Apr	2	2	Z	2	2	2	3	3	4	4	5	5	4	4	4	3	3	2	2	2	1	1	1	1	2.6	5
27-Apr	1	1	1	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0.5	1
28-Apr	1	1	1	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
29-Apr	0	0	0	0	0	Z	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0.6	1
30-Apr	Z	1	3	5	6	8	7	6	6	3	2	1	1	0	0	0	0	0	0	0	1	2	1	1	2.4	8
	0.7	0.7	0.8	0.8	1.0	1.1	1.0	0.9	0.9	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.9	0.9	0.8	0.6	0.6	Diurnal Average	
	4	2	3	5	6	8	7	6	6	4	5	5	4	4	4	3	3	2	3	4	4	2	1	1	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance

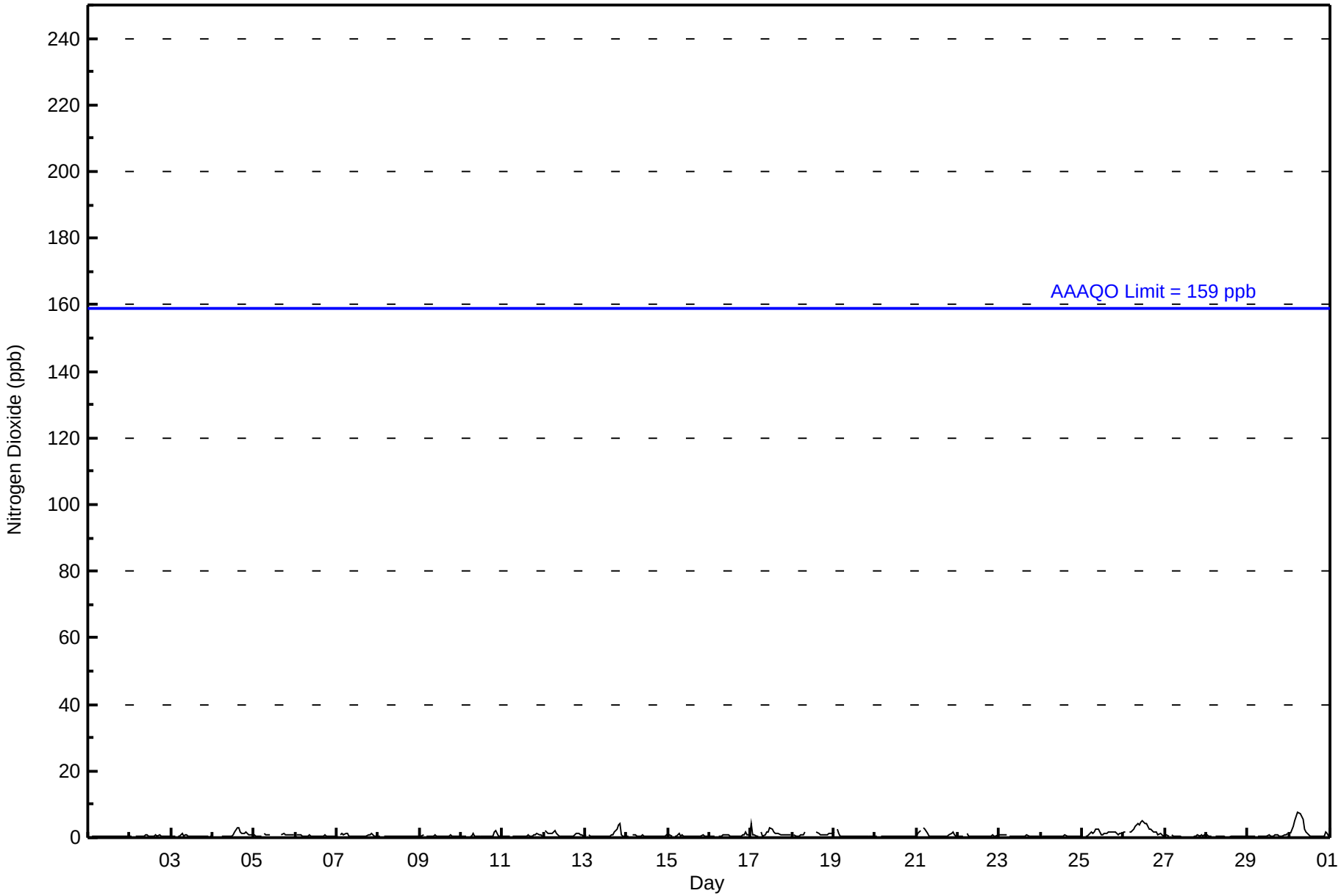
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Dioxide (NO_2) - ppb

Fort Chipewyan - April 2016



Nitrogen Dioxide (NO_2) - ppb
Fort Chipewyan - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	678	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: 678

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Dioxide (NO_2) - ppb

Fort Chipewyan - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	26	9	22	122	300	47	13	11	9	10	3	6	12	8	33	47	678
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	26	9	22	122	300	47	13	11	9	10	3	6	12	8	33	47	678

Total Number of Valid Hours: 678

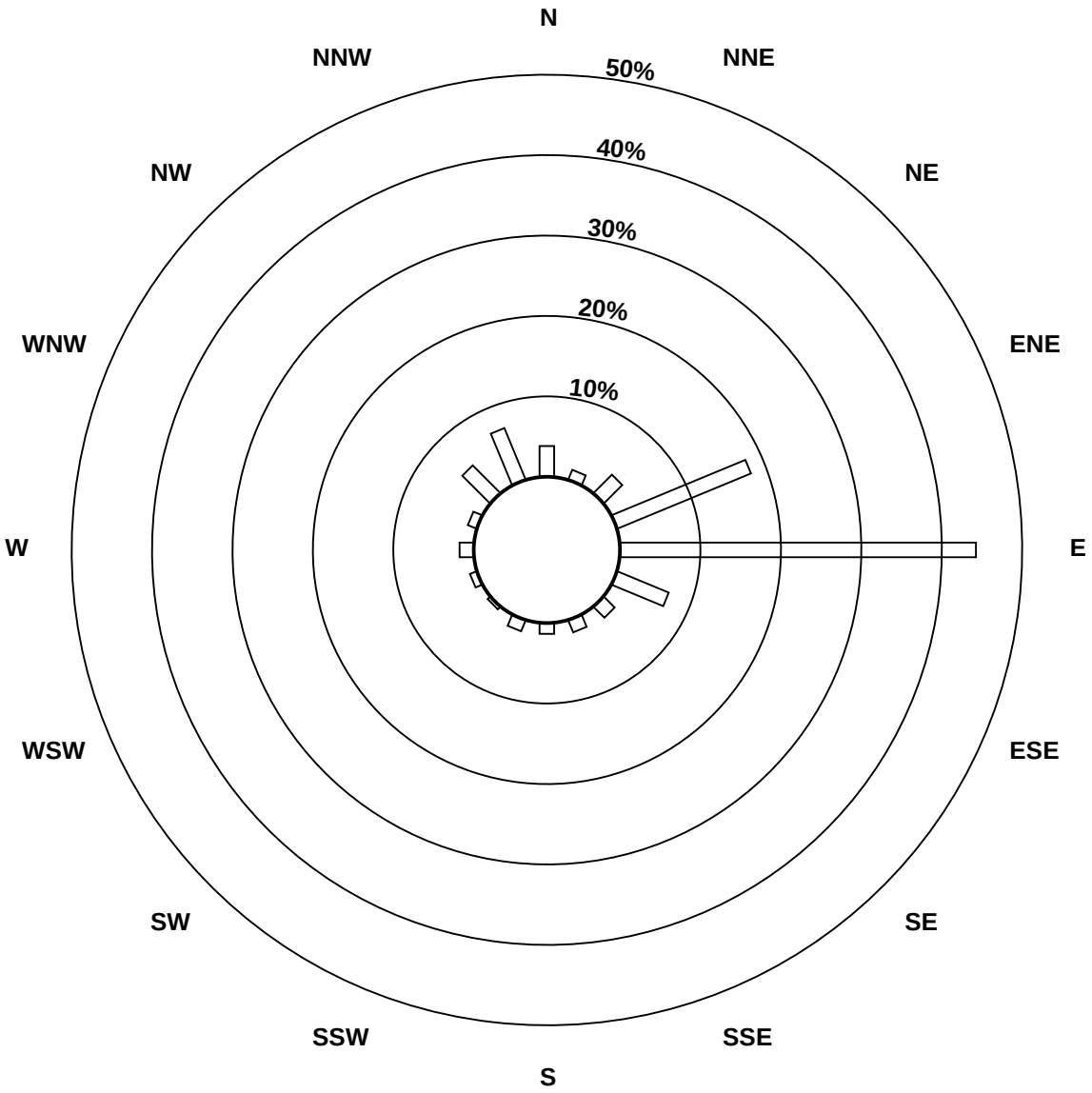
Total Number of Hours: 720

Wood Buffalo Environmental Association

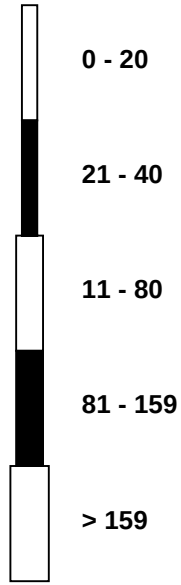
Wind Rose Apr 2016

Nitrogen Dioxide (NO_2) - ppb

Fort Chipewyan (AMS 8)



Classes (ppb)



0 - 20

21 - 40

11 - 80

81 - 159

> 159

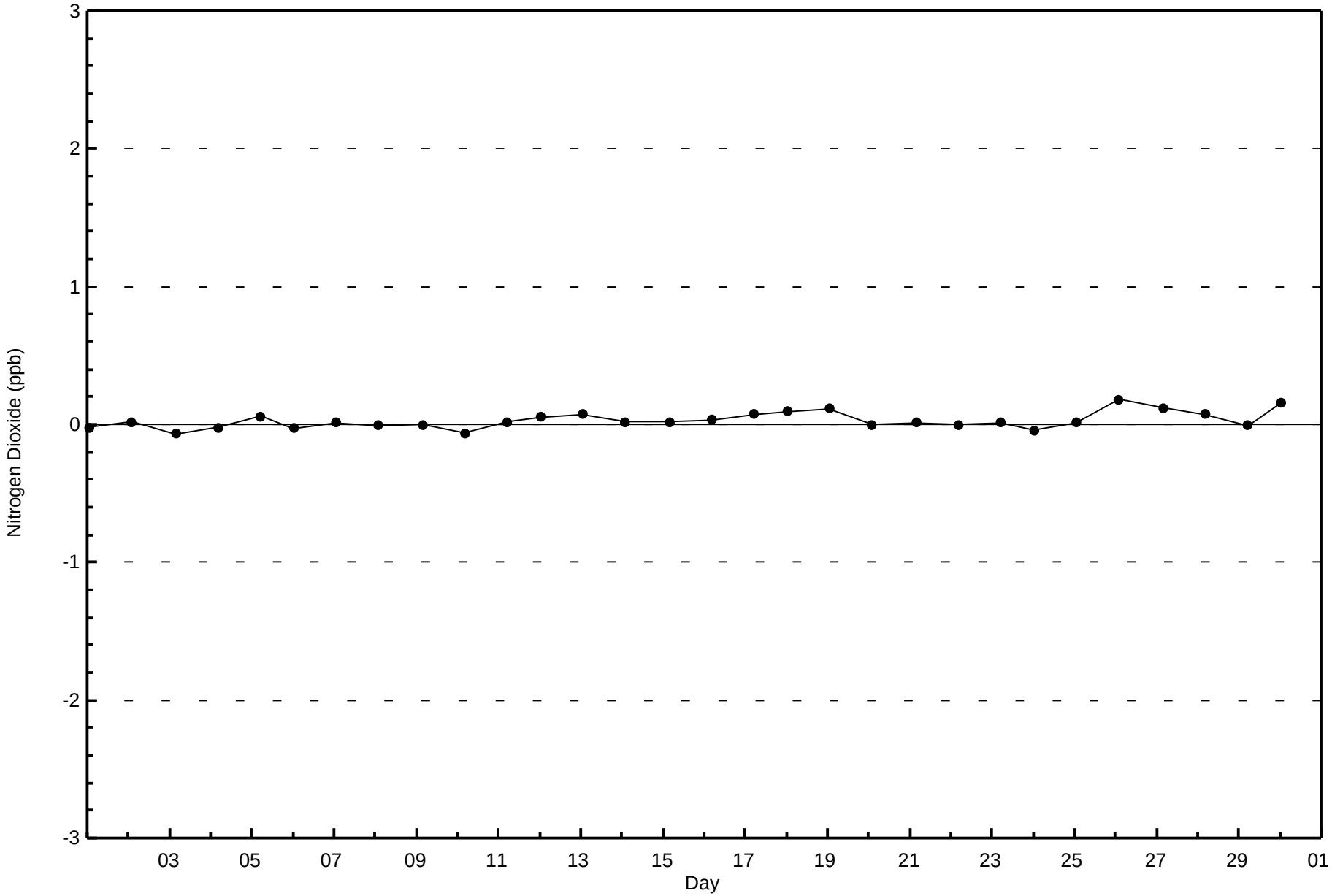
Total Number of Valid Hours: 678

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Dioxide (NO_2) - ppb

Fort Chipewyan - April 2016

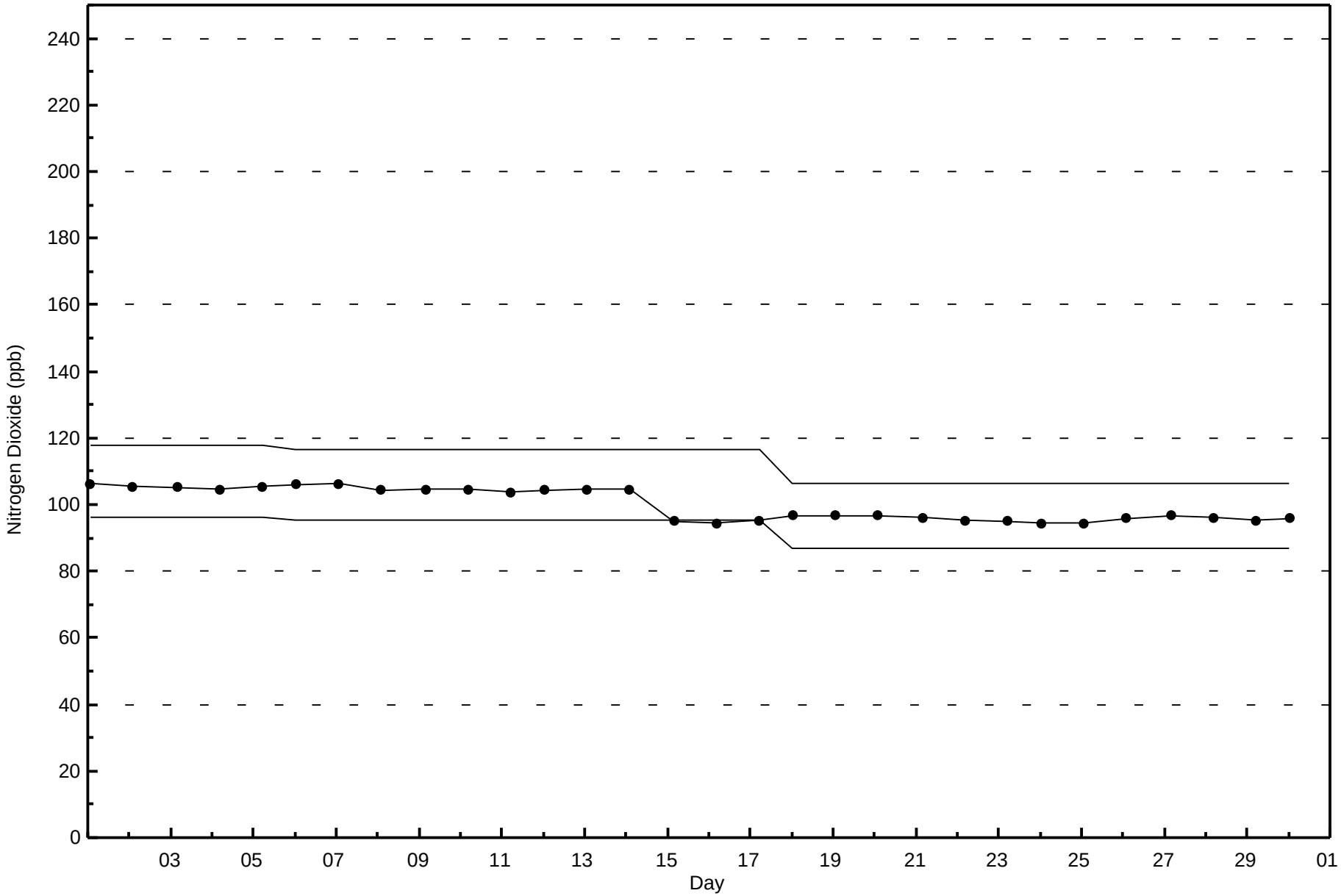


Wood Buffalo Environmental Association

Span Responses

Nitrogen Dioxide (NO_2) - ppb

Fort Chipewyan - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_X) - ppb

Fort Chipewyan - April 2016

Maximum Value: 8 ppb on Apr 30 07:00

Maximum Daily Average: 3.1 ppb on Apr 26

Minimum Value: 0 ppb on Apr 28 13:00

Minimum Daily Average: 0.4 ppb on Apr 28

Maximum Diurnal Average: 1.1 ppb at hour 7

Minimum Diurnal Average: 0.6 ppb at hour 24

Monthly Average: 0.9 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 1 $Q_3 = 1$ $P_{90} = 2$ $P_{99} = 6$

Hours in Service:	720
Hours of Data:	678
Hours of Missing Data:	42
Hours of Calibration:	36
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-Apr	1	Z	1	1	1	1	0	1	1	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0.5	1
2-Apr	0	0	Z	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0.6	1
3-Apr	0	0	0	Z	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1
4-Apr	0	0	0	0	Z	0	0	1	1	0	1	1	2	3	5	4	2	1	1	2	2	1	1	1	1.2	5
5-Apr	1	1	1	1	1	Z	1	1	1	1	C	C	C	C	C	C	1	1	1	1	1	1	1	1	--	1
6-Apr	Z	1	1	1	0	0	0	1	1	1	1	0	0	1	1	1	1	1	1	1	0	0	0	0	0.6	1
7-Apr	1	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0.7	1
8-Apr	0	0	Z	1	1	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
9-Apr	0	0	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0.5	1
10-Apr	0	0	0	0	Z	0	0	1	1	1	1	1	0	0	0	0	0	0	1	2	2	1	0	1	0.7	2
11-Apr	1	1	0	0	0	Z	0	0	0	1	1	0	0	0	1	1	1	0	1	1	1	1	1	1	0.6	1
12-Apr	Z	2	1	1	2	1	2	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1.0	2
13-Apr	1	Z	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	2	3	4	4	1	0	1	1.1	4
14-Apr	1	1	Z	1	1	1	1	1	1	1	0	0	1	0	0	0	0	1	1	1	0	1	0	1	0.6	1
15-Apr	0	1	1	Z	0	0	2	1	1	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0.6	2
16-Apr	0	0	0	0	Z	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	2
17-Apr	4	1	1	1	1	Z	2	1	1	2	3	4	3	2	1	2	1	1	1	1	1	1	1	1	1.5	4
18-Apr	Z	1	1	1	1	1	1	2	M	M	M	M	M	M	1	1	1	1	1	1	1	1	1	1	--	2
19-Apr	2	Z	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	3
20-Apr	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.4	1
21-Apr	0	1	2	Z	3	3	2	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0.9	3
22-Apr	0	0	0	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	1	1	0.5	1
23-Apr	1	1	1	1	1	Z	1	0	0	0	0	1	0	0	0	1	1	0	1	1	0	0	0	0	0.6	1
24-Apr	Z	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	0	1	0	1	0	0	0	0	0.5	1
25-Apr	0	Z	0	0	1	2	1	2	3	3	2	1	1	1	1	2	2	2	2	2	1	1	1	1	1.5	3
26-Apr	2	2	Z	2	2	2	3	4	5	5	7	7	6	6	5	3	3	2	2	2	1	1	1	1	3.1	7
27-Apr	1	1	1	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	1	0.5	1
28-Apr	1	0	0	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
29-Apr	0	0	0	0	0	Z	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0.6	1
30-Apr	Z	1	3	5	6	8	8	8	7	3	2	1	0	0	0	0	0	0	0	0	1	2	1	1	2.7	8
	0.8	0.7	0.8	0.8	1.0	1.1	1.1	1.1	1.1	1.0	1.0	0.9	0.8	0.8	0.9	0.8	0.7	0.7	0.8	0.9	0.9	0.8	0.6	0.6	Diurnal Average	
	4	2	3	5	6	8	8	8	7	5	7	7	6	6	5	4	3	2	3	4	4	2	1	1	Diurnal Maximum	

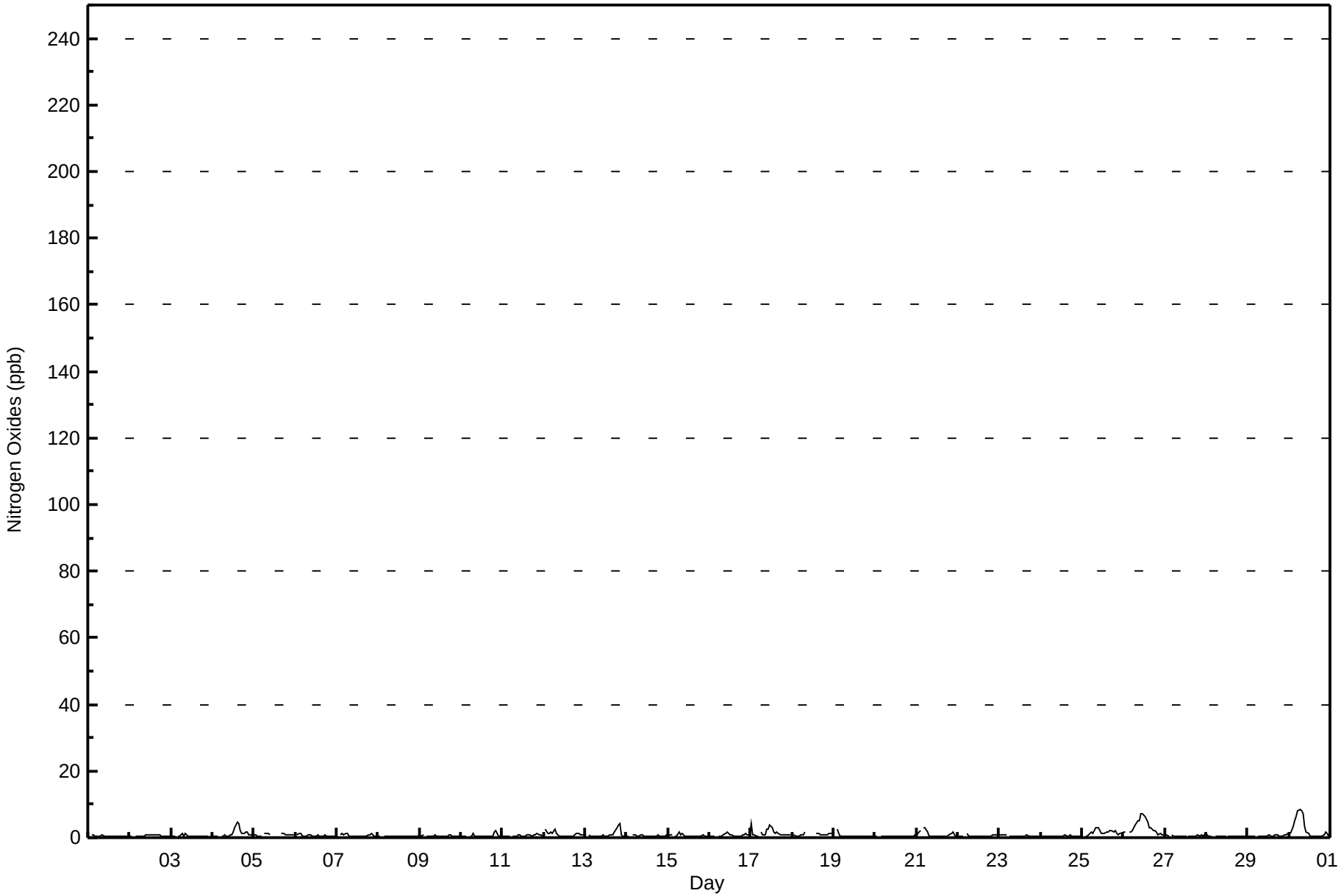
Z - zerospan C - Calibration M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Oxides (NO_X) - ppb

Fort Chipewyan - April 2016



Nitrogen Oxides (NO_X) - ppb
Fort Chipewyan - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	678	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: 678

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Oxides (NO_X) - ppb

Fort Chipewyan - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	26	9	22	122	300	47	13	11	9	10	3	6	12	8	33	47	678
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	26	9	22	122	300	47	13	11	9	10	3	6	12	8	33	47	678

Total Number of Valid Hours: 678

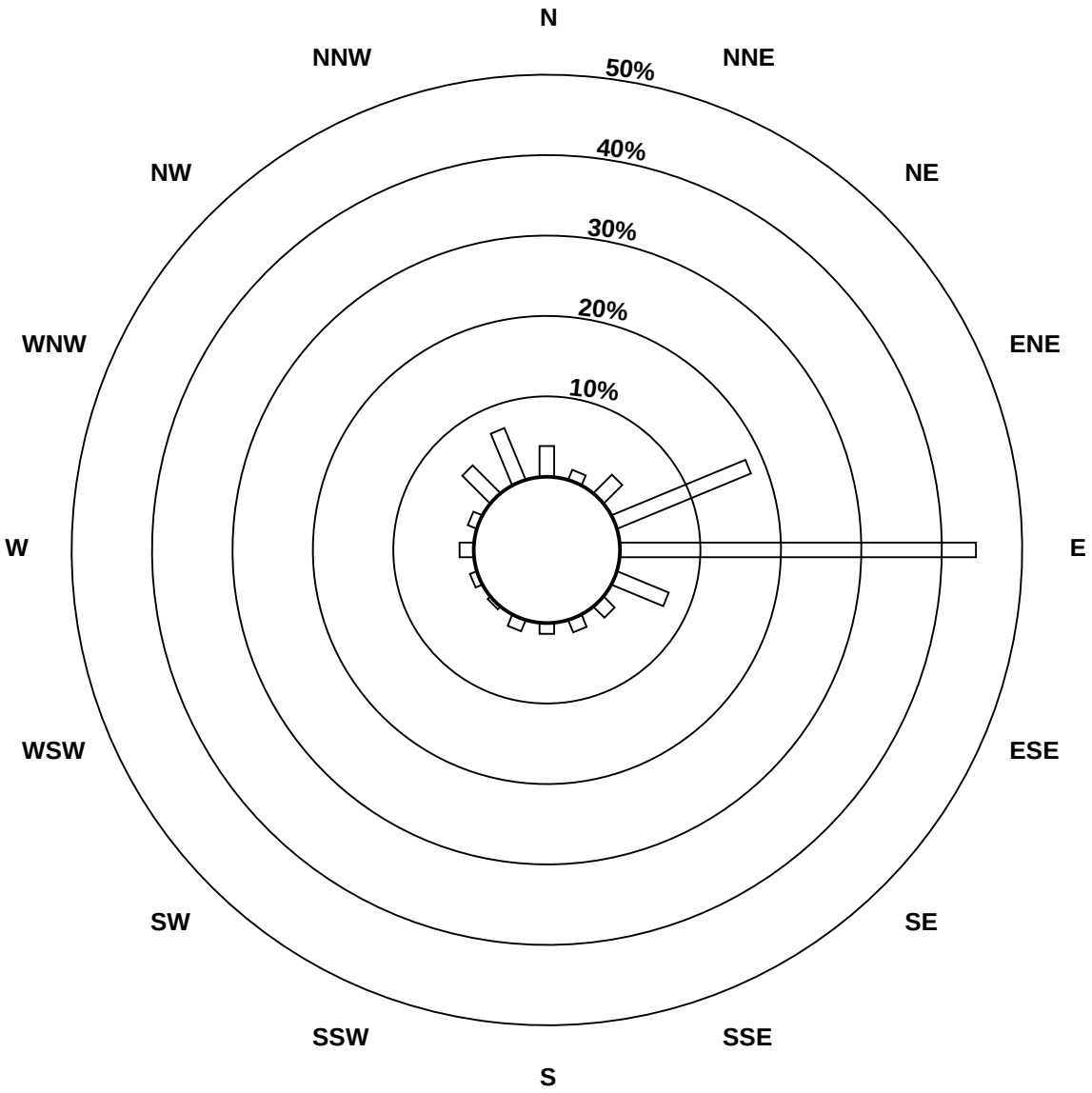
Total Number of Hours: 720

Wood Buffalo Environmental Association

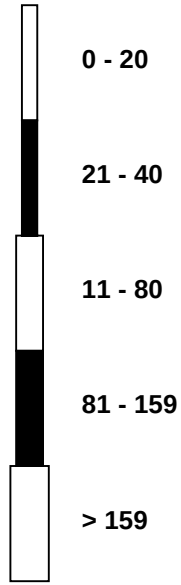
Wind Rose Apr 2016

Nitrogen Oxides (NO_X) - ppb

Fort Chipewyan (AMS 8)



Classes (ppb)



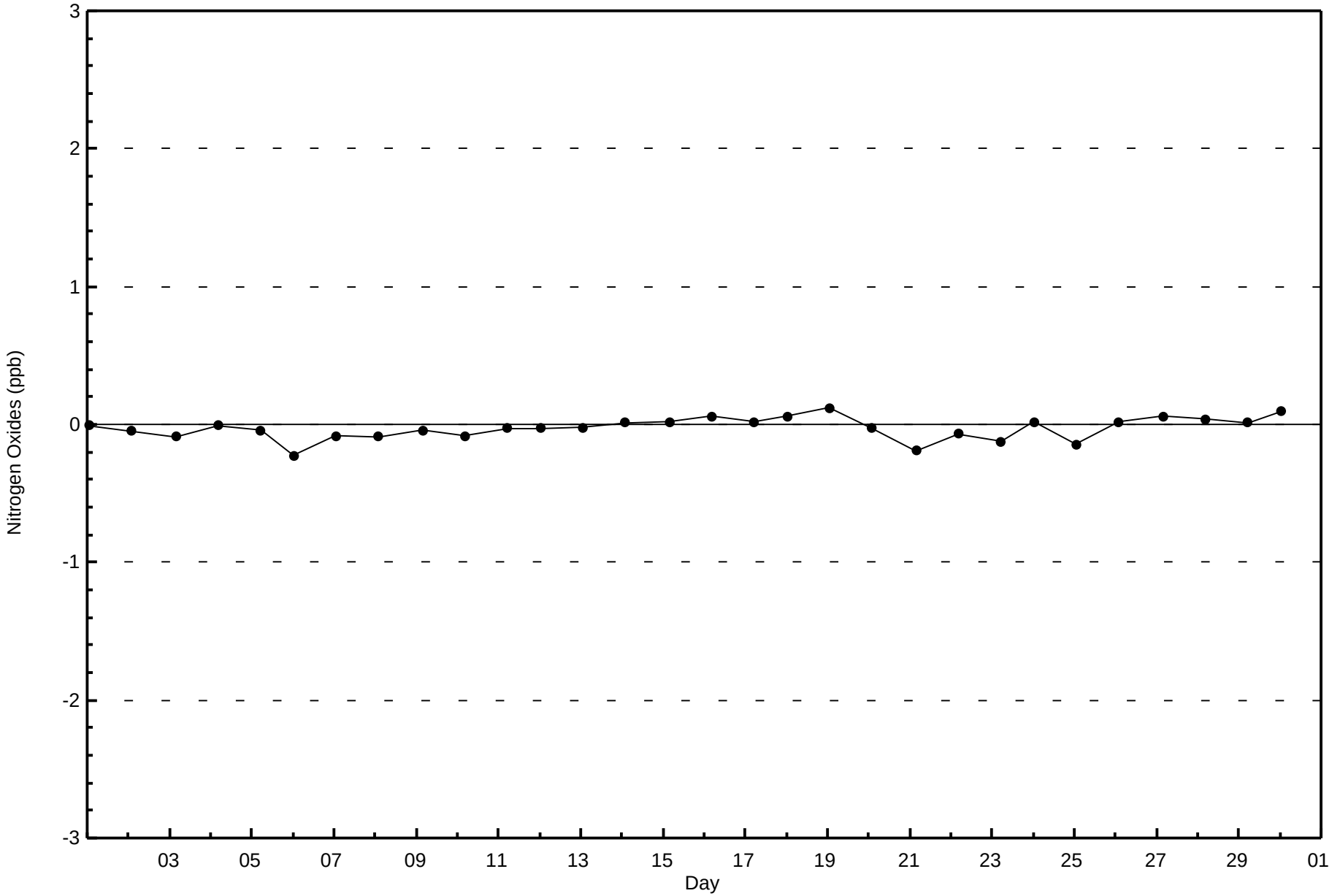
Total Number of Valid Hours: 678

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Oxides (NO_X) - ppb

Fort Chipewyan - April 2016

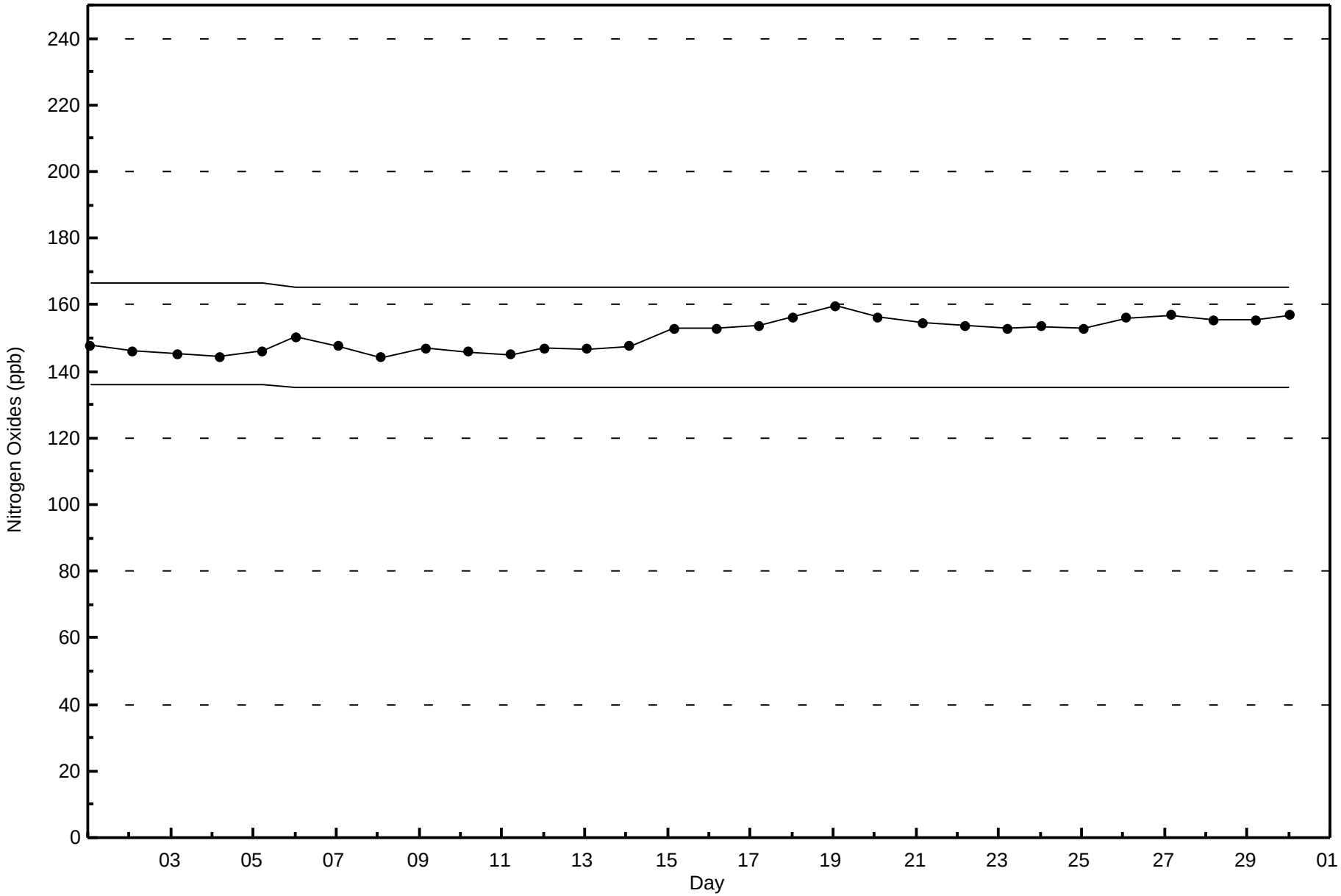


Wood Buffalo Environmental Association

Span Responses

Nitrogen Oxides (NO_X) - ppb

Fort Chipewyan - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O_3) - ppb

Fort Chipewyan - April 2016

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

Maximum Value: 57 ppb on Apr 18 15:00

Maximum Daily Average: 50.1 ppb on Apr 18

Minimum Value: 19 ppb on Apr 26 11:00

Minimum Daily Average: 25.7 ppb on Apr 26

Maximum Diurnal Average: 43.0 ppb at hour 18

Minimum Diurnal Average: 37.6 ppb at hour 9

Monthly Average: 40.6 ppb

Percentiles: P_1 = 23 P_{10} = 32 Q_1 = 38 Median = 42 Q_3 = 44 P_{90} = 47 P_{99} = 53

Hours in Service:	720
Hours of Data:	685
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-Apr	39	39	39	38	Z	38	40	41	41	41	41	41	42	43	43	43	43	42	42	42	42	42	42	42	41.2	43
2-Apr	42	42	42	42	42	Z	41	41	42	42	43	43	43	43	43	43	44	44	45	45	44	44	44	44	43.0	45
3-Apr	44	43	43	42	41	39	Z	36	35	35	33	31	31	32	31	32	32	33	34	33	33	32	31	32	35.2	44
4-Apr	34	35	35	35	34	34	34	Z	35	35	36	38	40	42	44	47	45	45	45	45	44	45	46	47	39.9	47
5-Apr	44	40	38	39	39	39	37	37	Z	37	37	37	38	37	37	C	C	C	C	37	37	38	38	38	38.3	44
6-Apr	38	38	38	Z	38	38	38	38	38	38	40	41	41	41	41	40	40	39	40	39	39	39	39	38	39.1	41
7-Apr	38	40	40	40	Z	40	41	42	42	42	42	41	41	41	41	41	42	44	45	46	46	45	45	45	42.2	46
8-Apr	45	44	44	43	43	Z	42	42	42	42	42	43	43	42	43	43	42	42	42	42	42	43	43	43	42.7	45
9-Apr	42	42	42	41	43	43	Z	43	43	43	43	43	43	43	43	44	44	45	45	45	45	44	44	43	43.3	45
10-Apr	43	42	42	42	42	41	41	Z	41	41	42	42	42	42	42	42	42	43	43	42	41	43	44	44	42.1	44
11-Apr	44	44	44	44	44	44	44	44	Z	43	43	43	43	44	46	46	47	47	47	47	46	45	46	45	44.8	47
12-Apr	45	43	44	Z	45	45	43	44	45	45	44	44	44	45	46	46	47	49	49	48	44	45	45	44	45.2	49
13-Apr	44	44	44	44	Z	43	42	42	41	41	41	42	43	43	43	43	43	42	40	39	38	41	41	41	42.0	44
14-Apr	41	41	41	41	40	Z	39	39	40	40	40	41	41	42	43	44	47	48	49	49	48	48	47	46	43.2	49
15-Apr	46	44	43	41	43	42	Z	41	42	42	42	43	45	46	46	47	47	46	44	43	43	43	42	42	43.5	47
16-Apr	43	43	43	43	43	42	42	Z	40	40	40	42	43	43	43	43	43	44	43	43	43	41	41	40	42.2	44
17-Apr	37	37	39	40	40	41	40	38	Z	40	42	44	50	53	53	52	50	50	51	50	49	49	50	52	45.5	53
18-Apr	53	51	52	Z	51	49	47	43	43	38	M	44	49	53	57	56	54	50	52	52	51	51	53	53	50.1	57
19-Apr	53	49	49	49	Z	46	47	48	47	48	49	49	49	49	48	47	46	44	44	41	38	36	35	35	45.5	53
20-Apr	35	34	32	30	30	Z	30	30	30	29	29	29	31	31	31	32	33	34	36	36	36	35	35	35	32.2	36
21-Apr	35	34	33	33	32	31	Z	33	34	36	37	38	38	38	38	39	40	41	42	43	44	43	44	44	37.8	44
22-Apr	44	42	42	42	42	41	42	Z	42	43	43	44	45	46	45	44	44	44	44	47	48	45	45	44	43.8	48
23-Apr	44	43	43	42	41	40	40	40	Z	41	42	43	44	45	45	45	45	45	45	46	46	46	45	45	43.5	46
24-Apr	44	44	44	Z	43	43	42	42	41	41	41	41	42	42	42	42	42	42	42	42	42	41	43	44	42.3	44
25-Apr	43	42	42	42	Z	37	36	34	33	33	35	36	36	37	38	40	40	40	39	39	41	41	39	36	38.2	43
26-Apr	33	32	31	28	27	Z	25	23	21	21	19	20	21	23	23	25	26	27	28	28	29	27	28	27	25.7	33
27-Apr	25	24	25	25	25	23	Z	24	24	26	27	27	26	28	31	31	33	36	38	38	37	35	33	31	29.3	38
28-Apr	30	30	28	27	27	26	26	Z	25	25	26	30	31	33	34	35	36	37	37	38	36	35	36	37	31.6	38
29-Apr	38	38	38	38	38	38	38	40	Z	40	42	45	50	52	52	52	53	51	50	47	46	46	43	42	44.1	53
30-Apr	42	41	37	Z	30	30	31	34	35	41	42	41	42	42	47	46	43	53	45	43	42	39	36	35	39.8	53
	40.9	40.3	39.8	38.8	38.6	39.0	38.7	38.3	37.6	38.3	38.7	39.5	40.5	41.3	42.0	42.4	42.6	43.0	43.0	42.5	42.0	41.7	41.5	41.2	Diurnal Average	
	53	51	52	49	51	49	47	48	47	48	49	49	50	53	57	56	54	53	52	52	51	51	53	53	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance

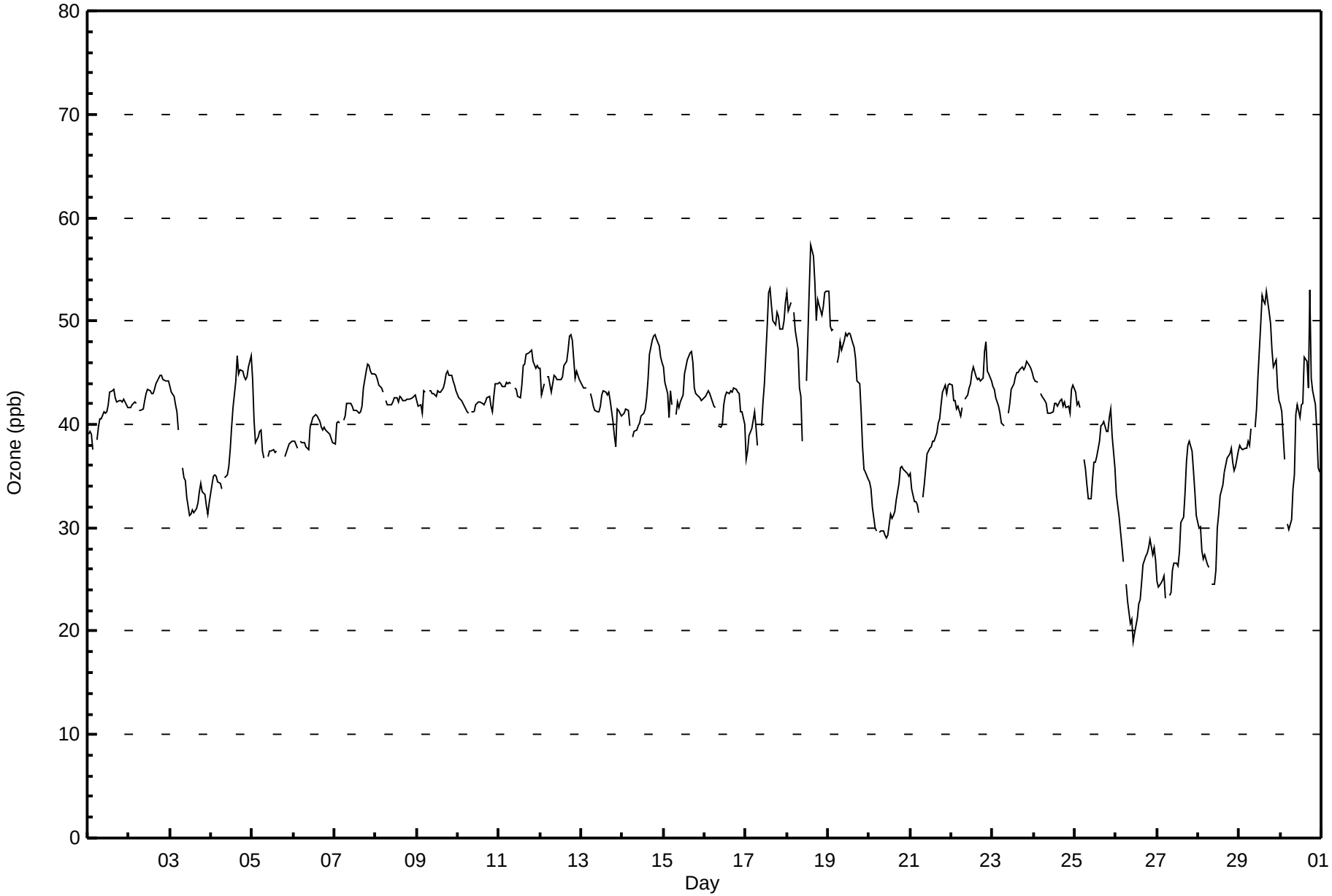
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb

Wood Buffalo Environmental Association

Hourly Averages

Ozone (O_3) - ppb

Fort Chipewyan - April 2016



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	2	0.29	0.29
21 - 50	657	95.91	96.20
51 - 82	26	3.80	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Ozone (O_3) - ppb

Fort Chipewyan - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2
21 - 50	28	9	22	126	298	39	12	6	1	10	3	6	12	7	34	44	657
51 - 82	0	0	0	0	9	5	1	4	6	1	0	0	0	0	0	0	26
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	28	9	22	126	307	44	13	10	9	11	3	6	12	7	34	44	685

Total Number of Valid Hours: 685

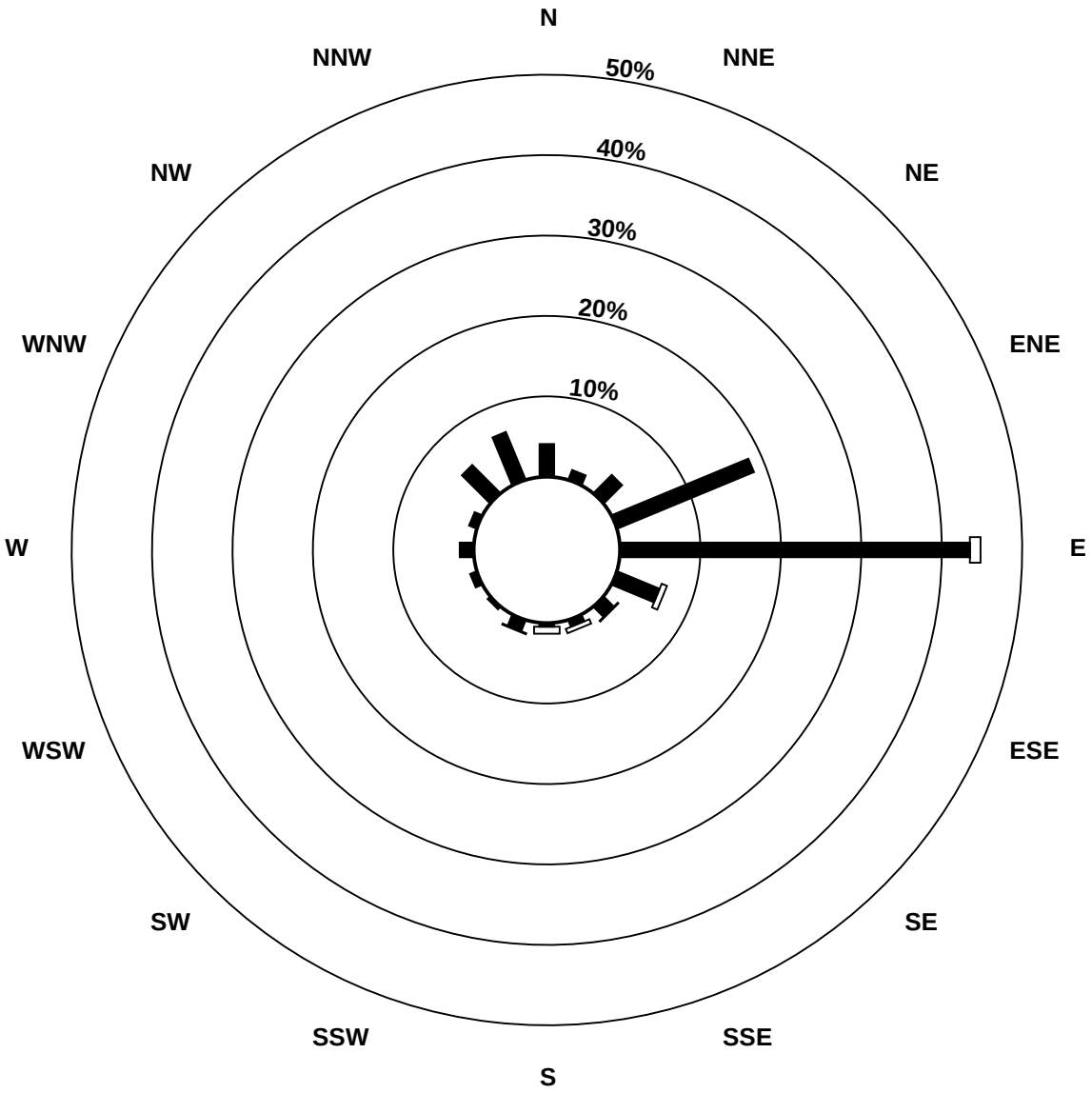
Total Number of Hours: 720

Wood Buffalo Environmental Association

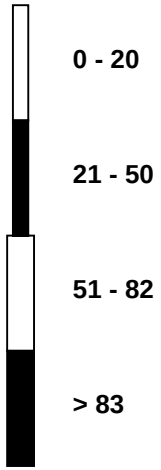
Wind Rose Apr 2016

Ozone (O_3) - ppb

Fort Chipewyan (AMS 8)



Classes (ppb)



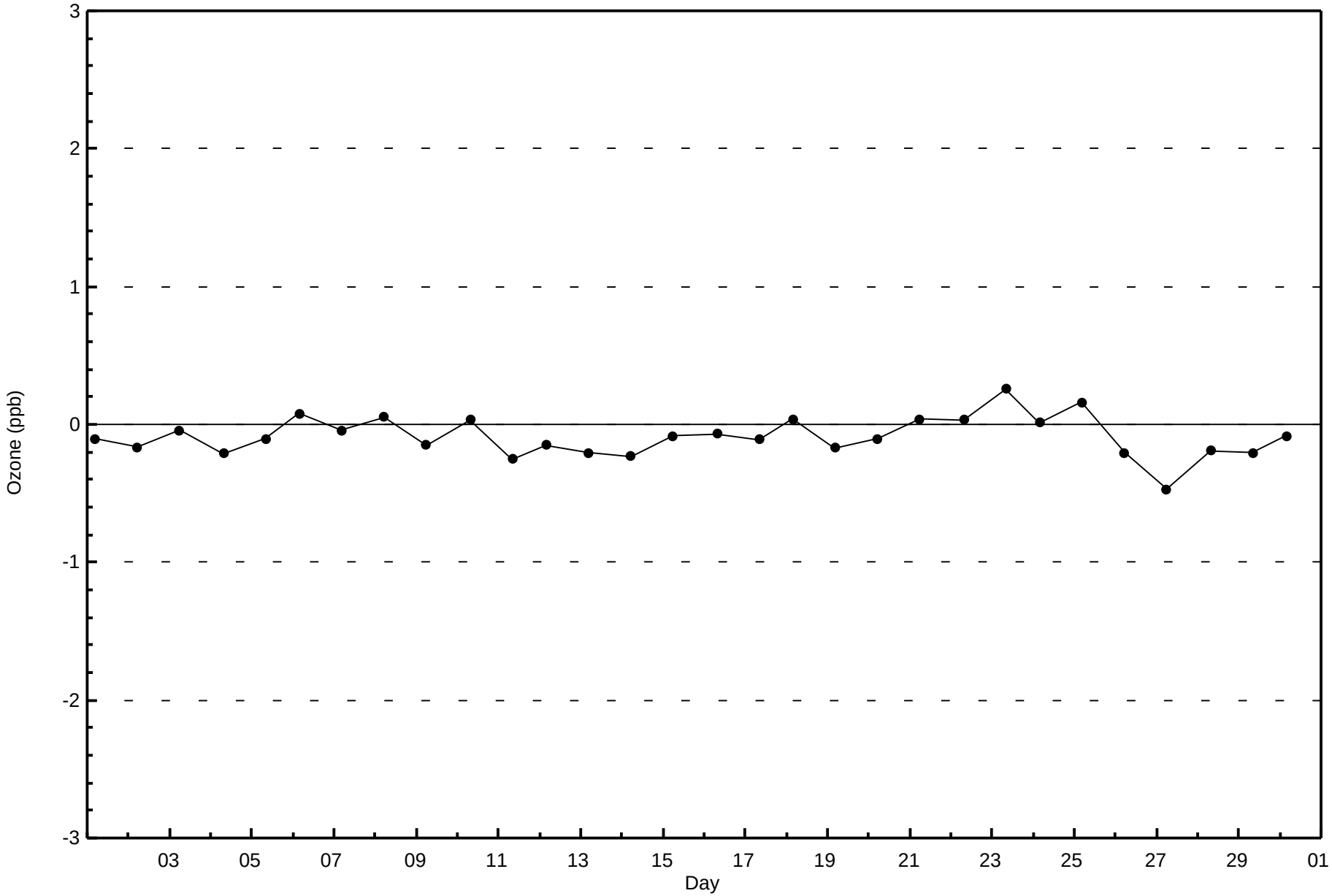
Total Number of Valid Hours: 685

Wood Buffalo Environmental Association

Zero Responses

Ozone (O_3) - ppb

Fort Chipewyan - April 2016

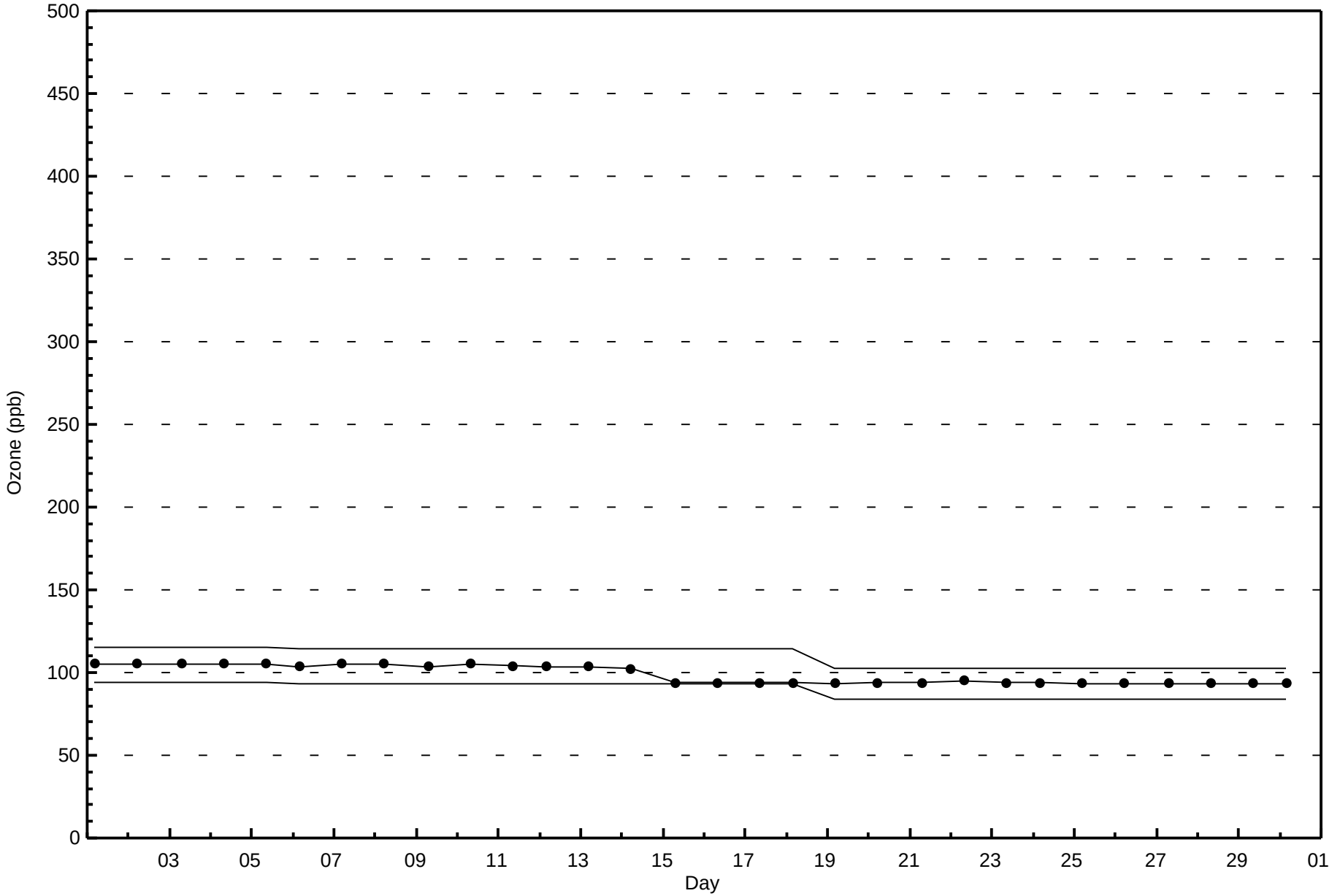


Wood Buffalo Environmental Association

Span Responses

Ozone (O_3) - ppb

Fort Chipewyan - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

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

Fort Chipewyan - April 2016

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

Maximum Value: 24.9 $\mu g/m^3$ on Apr 19 04:00

Maximum Daily Average: 5.9 $\mu g/m^3$ on Apr 26

Minimum Value: 0.5 $\mu g/m^3$ on Apr 8 20:00

Minimum Daily Average: 1.0 $\mu g/m^3$ on Apr 8

Maximum Diurnal Average: 4.8 $\mu g/m^3$ at hour 4

Minimum Diurnal Average: 3.2 $\mu g/m^3$ at hour 12

Monthly Average: 3.86 $\mu g/m^3$

Percentiles: $P_1 = 0.8$ $P_{10} = 2.1$ $Q_1 = 2.7$ Median = 3.6 $Q_3 = 4.6$ $P_{90} = 5.9$ $P_{99} = 9.7$

Hours in Service:	720
Hours of Data:	687
Hours of Missing Data:	33
Hours of Calibration:	8
Percent Operational Time:	96.5

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-Apr	2.7	2.6	2.5	2.1	2.4	2.1	2.1	2.2	2.3	2.6	2.4	2.6	2.9	3.0	2.8	3.1	3.1	2.6	2.4	2.4	2.7	2.8	2.5	2.4	2.6	3.1
2-Apr	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.6	2.6	2.5	2.7	2.7	2.7	2.8	3.2	3.9	4.0	4.3	4.2	3.9	3.8	3.9	3.8	3.1	3.1	4.3
3-Apr	2.9	3.0	3.1	3.1	3.1	3.4	4.0	3.6	3.2	3.2	3.3	3.4	3.7	3.7	3.4	3.3	3.1	2.8	2.9	3.0	3.2	3.1	3.1	3.2	3.2	4.0
4-Apr	3.3	3.5	3.5	3.7	3.7	3.6	3.6	4.0	3.3	3.0	3.1	3.9	4.0	5.9	7.7	10.1	6.1	4.3	10.9	3.6	3.0	2.5	3.2	3.3	4.4	10.9
5-Apr	3.2	3.3	3.6	3.8	3.7	3.7	3.9	3.7	3.4	3.4	C	C	C	C	C	C	C	C	UO	UO	UO	UO	UO	UO	--	3.9
6-Apr	UO	UO	UO	UO	UO	UO	UO	UO	UO	M	M	M	M	4.4	3.3	1.7	1.8	2.1	2.5	3.2	3.4	5.4	3.7	5.2	--	5.4
7-Apr	6.2	4.9	4.2	3.6	2.6	2.1	1.5	1.1	1.3	1.6	2.0	2.4	2.7	3.4	3.6	3.6	3.5	2.7	1.2	0.6	2.1	1.4	0.8	0.9	2.5	6.2
8-Apr	0.8	0.5	0.8	0.9	1.0	1.1	1.2	1.3	1.1	1.2	0.9	0.7	0.8	UO	UO	UO	UO	UO	UO	0.5	1.0	1.0	1.2	1.3	1.0	1.3
9-Apr	1.6	1.9	2.6	1.9	2.4	2.7	2.8	3.4	5.6	5.8	4.5	2.7	3.9	5.0	5.2	6.1	5.1	4.6	3.7	3.5	4.3	4.8	4.4	4.3	3.9	6.1
10-Apr	5.1	5.8	5.5	5.4	4.9	4.8	4.6	4.6	4.2	4.2	4.6	4.6	5.0	5.6	5.6	6.3	6.4	5.0	5.5	4.7	5.2	4.3	2.8	3.0	4.9	6.4
11-Apr	3.2	3.4	3.3	3.3	3.3	4.1	3.7	3.7	3.7	3.6	4.3	3.9	4.1	5.1	5.4	4.7	4.7	4.5	3.6	3.6	3.9	3.5	3.6	3.6	3.9	5.4
12-Apr	3.4	4.9	4.9	5.5	4.9	4.5	5.3	4.5	4.1	3.1	3.2	3.8	3.6	4.3	3.7	4.0	4.0	2.8	2.6	3.5	4.3	4.3	3.9	3.7	4.0	5.5
13-Apr	4.7	5.5	5.2	4.9	5.0	4.3	4.2	4.0	4.2	4.2	4.5	4.1	3.8	3.7	4.1	4.3	4.6	6.0	5.5	6.1	5.0	4.4	3.9	4.3	4.6	6.1
14-Apr	5.5	6.3	5.9	5.2	6.0	5.5	4.6	2.4	2.1	1.7	1.8	2.1	2.9	3.4	5.0	4.1	3.9	3.8	3.8	3.9	3.8	4.2	5.1	10.8	4.3	10.8
15-Apr	3.8	3.2	3.2	3.6	3.7	6.1	3.7	3.1	3.1	3.0	2.9	2.8	2.3	2.7	2.7	3.4	3.2	3.2	3.1	3.4	4.1	3.3	3.3	2.6	3.3	6.1
16-Apr	3.1	3.0	2.9	3.0	3.0	3.1	3.0	2.9	3.8	3.6	3.3	3.3	3.3	4.2	4.3	4.5	4.5	4.3	3.3	3.7	4.0	4.4	3.9	4.1	3.6	4.5
17-Apr	6.1	4.9	5.0	4.8	4.6	4.2	4.0	3.7	3.6	2.7	2.8	2.9	3.7	2.8	2.5	5.3	6.5	5.4	4.6	4.9	4.9	4.8	5.0	5.2	4.4	6.5
18-Apr	4.3	4.0	4.3	4.4	4.5	4.6	4.5	4.2	4.0	4.4	4.7	5.2	5.7	6.4	6.6	6.3	4.1	3.8	4.9	4.9	4.4	4.0	3.5	4.7	4.7	6.6
19-Apr	7.9	12.2	14.5	24.9	3.5	2.3	2.1	1.7	1.5	1.4	1.3	1.1	1.7	2.4	2.6	3.0	3.1	1.3	1.1	1.5	2.0	1.8	2.0	1.4	4.1	24.9
20-Apr	1.1	2.2	1.6	2.3	2.3	2.2	2.3	2.6	2.6	2.6	2.6	2.4	1.8	2.2	2.3	2.4	2.2	2.1	2.1	1.9	2.0	2.0	2.1	2.3	2.2	2.6
21-Apr	2.2	2.2	2.2	2.4	2.2	2.4	2.4	2.6	2.9	2.9	2.7	2.1	2.1	2.2	2.2	2.9	3.2	3.1	3.5	3.9	3.8	4.3	3.6	3.3	2.8	4.3
22-Apr	3.4	3.8	4.1	4.3	4.1	4.0	3.6	3.5	3.1	2.9	3.2	3.2	2.8	2.9	3.1	3.8	3.5	3.3	3.5	2.8	3.3	3.6	3.2	3.1	3.4	4.3
23-Apr	3.3	3.6	4.8	5.9	4.0	3.8	3.4	3.2	3.9	3.4	3.2	3.0	3.0	3.0	3.0	3.0	3.1	3.3	4.1	4.2	5.1	5.7	6.2	6.4	4.0	6.4
24-Apr	8.0	7.5	7.0	6.7	6.6	6.0	5.7	6.2	6.5	5.9	5.4	5.3	4.9	4.8	4.4	4.0	4.1	4.7	4.4	4.5	4.3	4.2	3.9	3.9	5.4	8.0
25-Apr	3.8	4.0	4.1	4.4	4.9	5.6	5.3	4.8	5.0	4.6	4.5	4.1	4.0	4.7	5.2	5.7	6.1	7.1	7.8	8.4	7.6	6.9	7.4	6.7	5.5	8.4
26-Apr	6.5	6.8	6.3	6.0	5.4	5.4	5.1	5.2	5.4	5.7	6.5	6.7	7.2	7.5	8.4	8.9	7.8	6.6	7.3	6.2	3.8	3.0	1.9	1.6	5.9	8.9
27-Apr	1.7	1.9	2.1	2.2	2.4	2.6	2.9	2.5	3.0	2.6	2.7	3.0	2.8	2.7	2.8	3.0	2.8	2.4	2.5	2.3	2.3	2.9	3.5	3.5	2.6	3.5
28-Apr	3.4	3.6	4.3	4.6	4.7	4.9	3.9	3.3	2.8	2.6	2.5	2.6	2.6	2.7	2.8	2.9	3.0	3.5	4.1	4.6	4.3	4.4	4.2	3.8	3.6	4.9
29-Apr	4.6	5.6	6.0	5.8	6.0	5.8	5.6	5.2	4.9	4.6	4.2	3.7	3.9	3.6	3.9	4.2	4.6	4.2	4.4	4.2	4.9	5.6	6.6	7.0	5.0	7.0
30-Apr	6.8	7.0	8.5	9.2	9.6	9.8	9.5	7.6	6.3	4.6	3.5	2.6	2.0	2.3	2.6	1.8	1.8	2.2	2.3	2.3	3.7	4.5	4.3	3.5	4.9	9.8
	4.0	4.3	4.4	4.8	4.0	4.0	3.8	3.6	3.6	3.4	3.3	3.2	3.4	3.8	4.0	4.3	4.1	3.8	4.0	3.7	3.8	3.8	3.7	3.9	Diurnal Average	
	8.0	12.2	14.5	24.9	9.6	9.8	9.5	7.6	6.5	5.9	6.5	6.7	7.2	7.5	8.4	10.1	7.8	7.1	10.9	8.4	7.6	6.9	7.4	10.8	Diurnal Maximum	

C - Calibration M - Maintenance UO - Unstable Operation

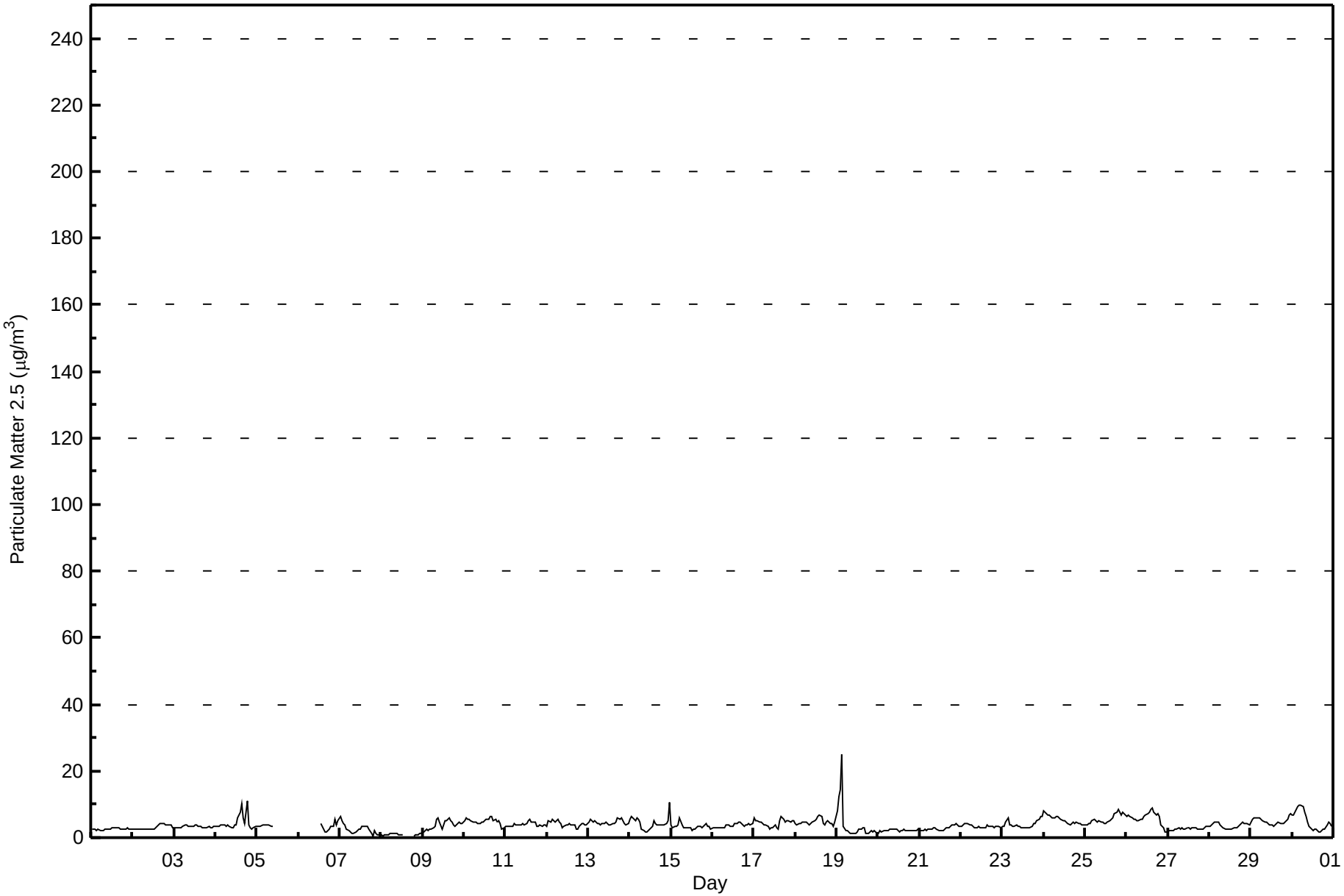
Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 $\mu g/m^3$

Wood Buffalo Environmental Association

Hourly Averages

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

Fort Chipewyan - April 2016



Concentration Ranges ($\mu g/m^3$)	Number of Hours	%	Cumulative %
1 - 5	584	85.01	85.01
6 - 15	89	12.95	97.96
16 - 25	1	0.15	98.11
26 - 80	0	0.00	98.11
> 81.0	0	0.00	98.11

Total Number of Valid Hours: 687

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

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

Fort Chipewyan - April 2016

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	19	7	23	112	260	36	8	5	7	7	2	6	11	8	29	44	584
6 - 15	7	3	0	6	48	5	5	6	2	4	1	0	0	0	1	1	89
16 - 25	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
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	26	10	23	118	308	41	13	11	9	11	3	6	12	8	30	45	674

Total Number of Valid Hours: 687

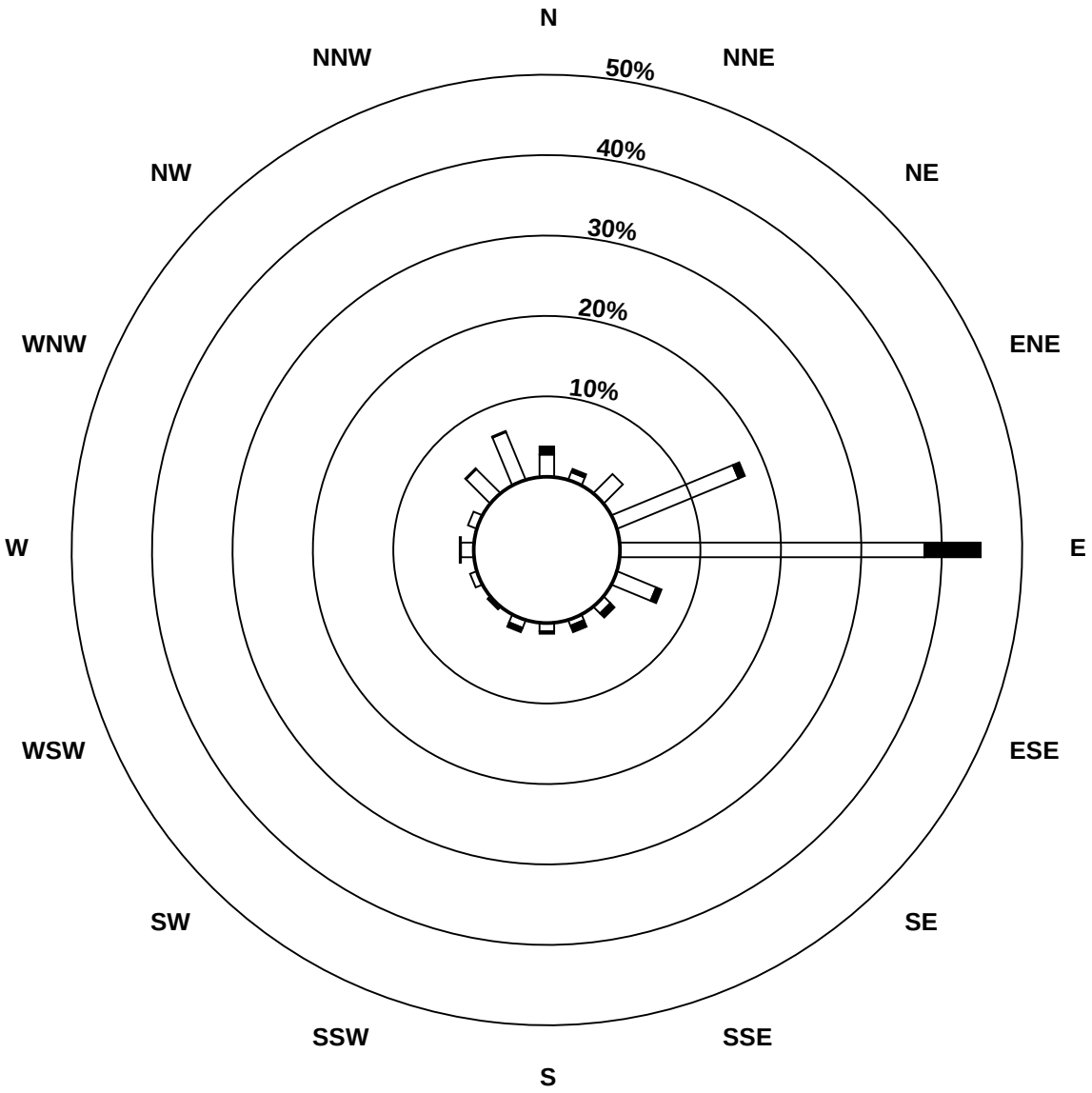
Total Number of Hours: 720

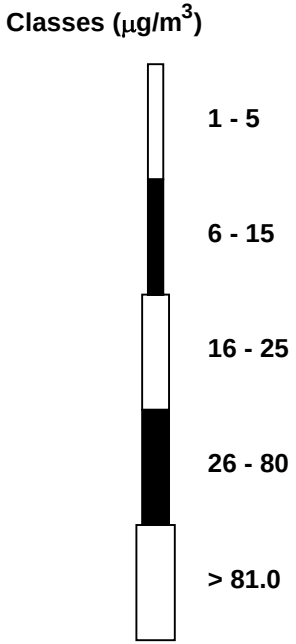
Wood Buffalo Environmental Association

Wind Rose Apr 2016

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

Fort Chipewyan (AMS 8)





Total Number of Valid Hours: 687

Maximum Value: 19.1 C on Apr 29 17:00

Maximum Daily Average: 12.4 C on Apr 30

Minimum Value: -17.6 C on Apr 3 23:00

Minimum Daily Average: -15.5 C on Apr 3

Maximum Diurnal Average: 0.8 C at hour 15

Minimum Diurnal Average: -4.5 C at hour 6

Monthly Average: -1.77 C

Percentiles: P_1 = -16.8 P_{10} = -12.9 Q_1 = -6.0 Median = -2.3 Q_3 = 3.6 P_{90} = 7.8 P_{99} = 17.3

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

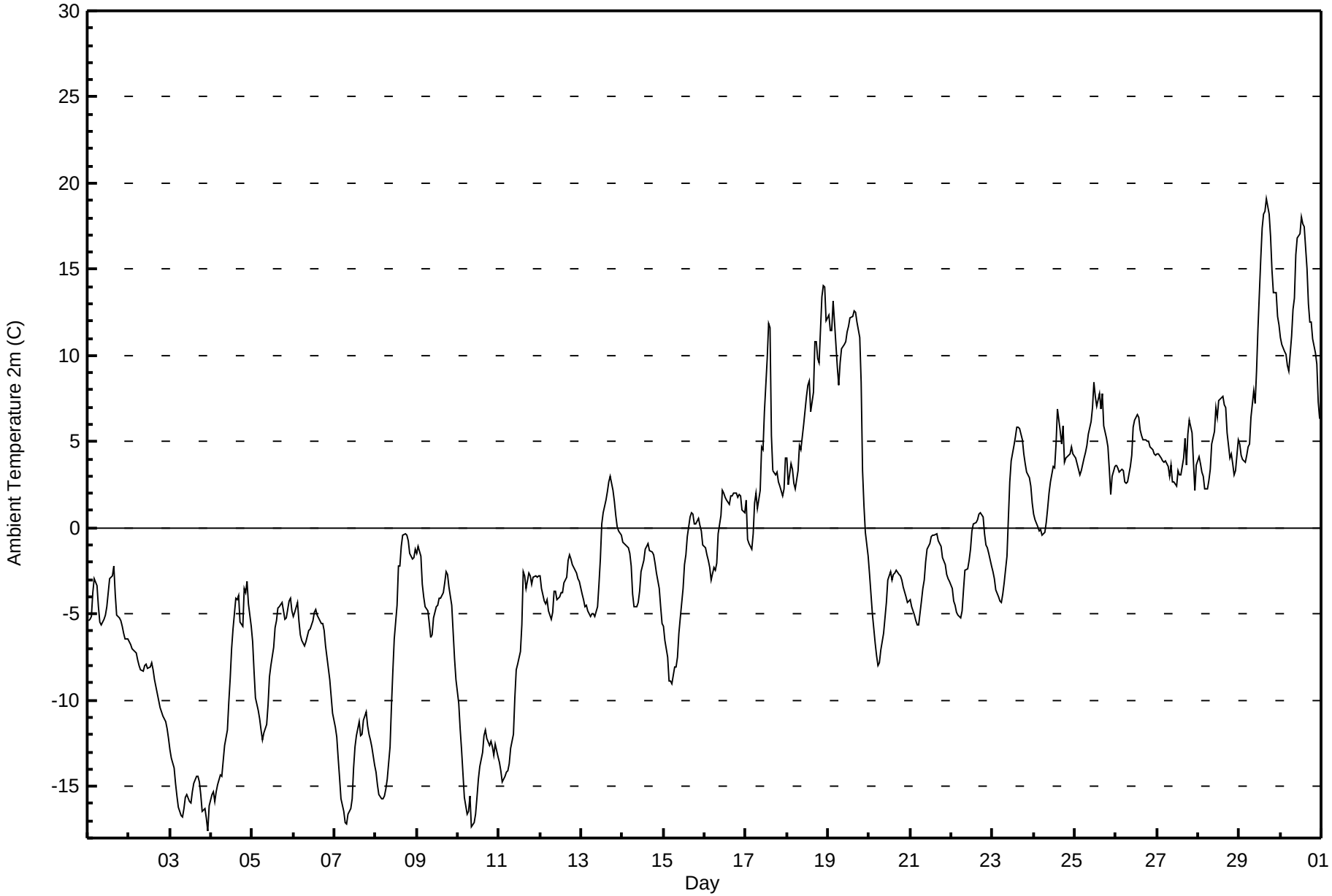
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	-5.4	-5.3	-5.1	-3.8	-2.9	-3.3	-4.6	-5.4	-5.6	-5.3	-5.1	-4.5	-3.8	-3.0	-2.8	-2.2	-3.9	-5.0	-5.3	-5.4	-5.7	-6.2	-6.4	-6.4	-4.7	-2.2
2-Apr	-6.6	-6.8	-7.0	-7.2	-7.3	-7.6	-8.0	-8.2	-8.3	-8.0	-7.9	-8.1	-8.1	-7.8	-8.2	-8.8	-9.2	-10.0	-10.4	-10.7	-11.0	-11.2	-11.7	-12.2	-8.8	-6.6
3-Apr	-12.9	-13.3	-13.9	-14.8	-15.6	-16.2	-16.7	-16.8	-16.3	-15.6	-15.5	-15.9	-16.0	-15.3	-14.8	-14.4	-14.4	-14.8	-15.5	-16.5	-16.3	-16.9	-17.6	-16.1	-15.5	-12.9
4-Apr	-15.5	-15.3	-15.9	-15.3	-14.9	-14.3	-14.5	-13.5	-12.6	-11.7	-10.1	-8.7	-7.0	-5.9	-4.1	-4.2	-4.0	-5.4	-5.7	-3.5	-3.8	-3.1	-4.4	-5.7	-9.1	-3.1
5-Apr	-6.6	-8.3	-9.9	-10.6	-11.1	-11.7	-12.3	-11.9	-11.4	-10.2	-8.7	-8.0	-6.9	-5.8	-5.4	-4.7	-4.6	-4.3	-4.8	-5.3	-5.2	-4.3	-4.1	-4.8	-7.5	-4.1
6-Apr	-5.2	-4.9	-4.3	-5.4	-6.2	-6.5	-6.8	-6.6	-6.3	-5.9	-5.9	-5.4	-4.9	-4.8	-5.0	-5.4	-5.5	-5.5	-5.9	-6.9	-8.2	-8.8	-9.8	-10.8	-6.3	-4.3
7-Apr	-11.6	-12.1	-13.3	-14.5	-15.7	-16.5	-17.1	-17.2	-16.6	-16.3	-15.7	-13.9	-12.7	-12.1	-11.3	-12.0	-12.0	-11.2	-10.7	-11.5	-12.0	-12.3	-12.7	-13.8	-13.5	-10.7
8-Apr	-14.2	-14.9	-15.5	-15.7	-15.7	-15.6	-15.2	-14.6	-12.7	-10.4	-8.3	-6.4	-4.5	-2.2	-2.2	-1.1	-0.5	-0.4	-0.5	-0.7	-1.5	-1.8	-1.7	-1.3	-7.4	-0.4
9-Apr	-1.5	-1.1	-1.6	-3.3	-4.0	-4.6	-4.8	-5.6	-6.4	-6.2	-5.3	-4.6	-4.5	-4.1	-4.1	-3.8	-3.2	-2.5	-2.7	-3.4	-4.5	-6.1	-7.5	-8.8	-4.3	-1.1
10-Apr	-10.2	-11.6	-12.9	-14.3	-15.6	-16.6	-16.4	-15.6	-17.4	-17.1	-16.6	-15.6	-14.6	-13.8	-13.0	-12.1	-11.7	-12.2	-12.6	-12.4	-12.7	-13.2	-12.6	-13.3	-13.9	-10.2
11-Apr	-13.6	-14.1	-14.7	-14.4	-14.2	-14.1	-13.7	-12.8	-12.0	-9.9	-8.2	-7.9	-7.2	-5.6	-2.6	-2.8	-3.5	-2.7	-2.8	-3.3	-2.9	-2.8	-2.9	-2.8	-8.0	-2.6
12-Apr	-2.8	-3.5	-4.3	-4.4	-4.1	-4.8	-5.3	-4.9	-3.7	-3.7	-4.1	-4.0	-3.8	-3.8	-3.2	-2.9	-1.9	-1.5	-1.8	-2.1	-2.5	-2.6	-2.9	-3.1	-3.4	-1.5
13-Apr	-3.8	-4.1	-4.6	-4.5	-4.8	-5.1	-5.0	-5.0	-5.1	-4.6	-3.3	-1.8	0.2	0.9	1.6	2.1	2.7	3.0	2.2	1.5	0.7	0.1	-0.2	-0.4	-1.6	3.0
14-Apr	-0.8	-0.9	-1.0	-1.2	-1.5	-2.2	-3.8	-4.6	-4.5	-4.4	-3.7	-2.6	-1.9	-1.2	-1.0	-0.9	-1.3	-1.4	-1.6	-2.1	-2.6	-3.5	-4.6	-5.6	-2.4	-0.8
15-Apr	-5.7	-6.5	-7.5	-8.9	-8.9	-9.1	-8.1	-8.1	-7.5	-6.2	-5.3	-3.5	-2.2	-1.6	-0.5	0.6	0.9	0.8	0.2	0.2	0.6	0.1	-0.2	-1.0	-3.6	0.9
16-Apr	-1.2	-1.6	-1.9	-2.3	-3.0	-2.3	-2.5	-2.1	-0.4	0.7	2.2	2.0	1.7	1.6	1.4	1.9	1.8	2.0	2.0	1.8	1.9	1.9	1.0	0.8	0.3	2.2
17-Apr	1.6	-0.7	-1.0	-1.2	-0.3	1.5	2.0	1.1	2.1	4.7	4.6	6.7	9.8	11.9	11.7	5.3	3.3	3.1	3.2	2.7	2.4	1.8	2.2	4.1	3.4	11.9
18-Apr	4.0	2.5	3.7	3.4	2.6	2.3	3.3	4.8	4.5	5.3	6.0	7.6	8.3	8.5	6.7	7.9	10.8	10.8	9.8	9.6	13.4	14.1	14.0	12.1	7.3	14.1
19-Apr	12.3	11.5	11.5	13.2	11.9	9.3	8.3	9.6	10.4	10.7	10.8	11.4	11.7	12.2	12.3	12.6	12.5	12.0	11.0	8.4	3.3	1.3	-0.3	-1.6	9.4	13.2
20-Apr	-2.7	-3.9	-5.0	-6.7	-7.4	-8.0	-7.8	-7.1	-6.1	-5.2	-4.4	-3.0	-2.6	-3.1	-2.7	-2.6	-2.5	-2.7	-2.8	-3.0	-3.4	-4.0	-4.3	-4.2	-4.4	-2.5
21-Apr	-4.2	-4.6	-5.1	-5.4	-5.7	-5.7	-4.3	-3.5	-3.0	-2.0	-1.2	-0.9	-0.5	-0.4	-0.5	-0.3	-0.7	-0.9	-1.1	-1.7	-2.2	-2.7	-3.0	-3.1	-2.6	-0.3
22-Apr	-3.5	-4.2	-4.5	-4.9	-5.1	-5.2	-4.8	-3.6	-2.4	-2.4	-1.9	-1.3	-0.1	0.2	0.3	0.4	0.8	0.8	0.6	-0.3	-1.0	-1.1	-1.5	-2.2	-1.9	0.8
23-Apr	-2.6	-3.0	-3.6	-4.0	-4.2	-4.3	-3.8	-3.2	-1.7	0.5	2.6	3.8	4.8	5.2	5.8	5.8	5.7	5.1	4.3	3.7	3.2	2.9	2.4	1.5	1.1	5.8
24-Apr	0.8	0.5	0.0	-0.2	-0.1	-0.4	-0.3	0.3	1.1	2.0	2.6	3.5	3.5	4.9	6.9	5.6	4.9	5.9	3.8	4.0	4.2	4.3	4.7	4.3	2.8	6.9
25-Apr	4.1	3.7	3.4	3.1	3.3	4.1	4.3	4.8	5.4	6.2	6.9	8.4	7.7	7.1	7.8	6.9	7.8	6.0	5.2	4.7	3.4	1.9	3.0	3.6	5.1	8.4
26-Apr	3.7	3.5	3.2	3.4	3.3	2.7	2.6	2.7	3.6	4.2	5.9	6.3	6.5	6.4	5.7	5.4	5.1	5.1	5.0	5.0	4.7	4.5	4.3	4.2	4.5	6.5
27-Apr	4.3	4.3	4.1	3.9	3.8	3.9	3.6	3.0	3.6	2.6	2.7	2.4	3.3	3.1	3.1	4.0	5.2	3.6	5.5	6.2	5.5	3.8	2.2	3.6	3.8	6.2
28-Apr	4.2	3.8	3.2	3.0	2.3	2.3	2.8	3.4	4.8	5.6	7.0	6.4	7.4	7.5	7.6	7.2	7.0	5.5	4.1	4.3	3.7	3.1	3.4	5.1	4.8	7.6
29-Apr	4.9	4.2	4.0	3.8	4.2	4.7	4.8	6.4	8.0	7.3	9.1	11.6	15.6	17.4	18.2	18.4	19.1	18.2	16.9	14.9	13.6	13.6	12.3	11.8	11.0	19.1
30-Apr	11.0	10.7	10.2	10.1	9.4	9.1	11.1	12.7	13.3	15.8	16.8	17.0	18.0	17.7	17.5	15.0	13.0	11.9	12.0	11.0	10.1	9.5	7.3	6.3	12.4	18.0
	-2.7	-3.2	-3.6	-4.0	-4.2	-4.5	-4.4	-4.1	-3.4	-2.6	-1.8	-1.0	-0.1	0.5	0.8	0.7	0.7	0.4	0.0	-0.4	-0.8	-1.3	-1.7	-2.0	Diurnal Average	
	12.3	11.5	11.5	13.2	11.9	9.3	11.1	12.7	13.3	15.8	16.8	17.0	18.0	17.7	18.2	18.4	19.1	18.2	16.9	14.9	13.6	14.1	14.0	12.1	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature 2m (AT 2m) - C

Fort Chipewyan - April 2016



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	437	60.69	60.69
0 - 10	227	31.53	92.22
10 - 20	56	7.78	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Fort Chipewyan - April 2016

Maximum Value: 100 % on Apr 27 06:00

Maximum Daily Average: 93.3 % on Apr 27

Minimum Value: 24 % on Apr 19 14:00

Minimum Daily Average: 38.9 % on Apr 19

Maximum Diurnal Average: 74.3 % at hour 6

Minimum Diurnal Average: 61.4 % at hour 15

Monthly Average: 67.3 %

Percentiles: P_1 = 28 P_{10} = 47 Q_1 = 59 Median = 69 Q_3 = 77 P_{90} = 85 P_{99} = 100

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

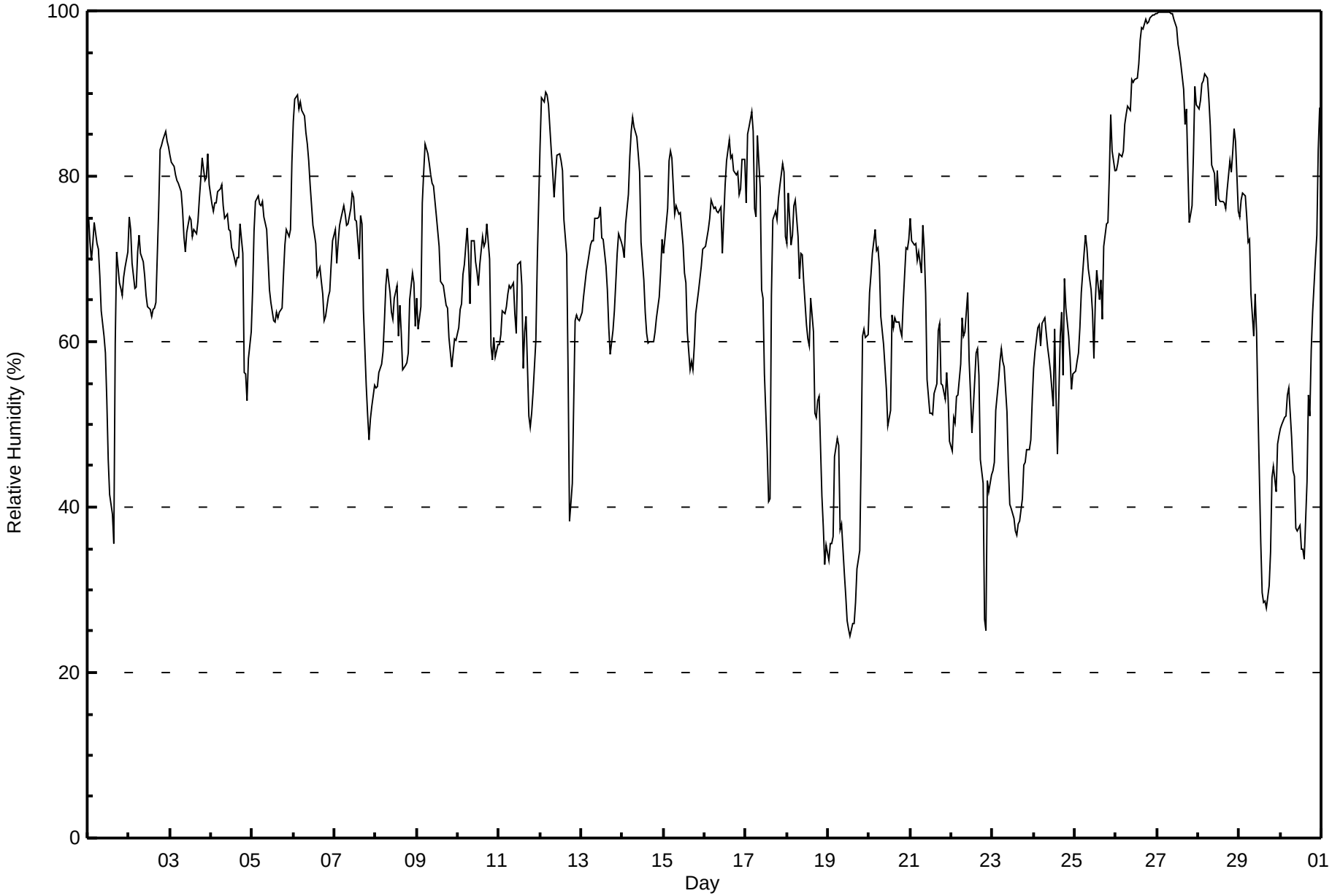
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	75	72	70	72	74	72	71	68	64	61	59	53	46	42	39	36	60	71	67	66	66	68	69	71	62.9	75
2-Apr	75	74	70	66	67	71	73	71	70	68	66	64	64	63	64	64	65	76	83	84	84	85	84	84	72.2	85
3-Apr	82	82	81	80	79	79	78	76	73	71	73	75	75	73	74	73	75	77	80	82	80	80	83	79	77.4	83
4-Apr	77	76	77	77	78	78	79	76	75	75	73	73	71	71	69	70	70	74	71	56	56	53	58	61	70.7	79
5-Apr	66	73	77	78	77	76	77	75	74	70	66	65	62	62	64	63	64	64	68	72	74	73	74	82	70.6	82
6-Apr	87	89	90	88	89	88	87	85	84	82	79	74	73	72	68	69	67	66	63	63	65	66	69	72	76.5	90
7-Apr	74	70	72	74	75	76	75	74	74	76	78	78	75	75	70	75	74	64	55	51	48	51	52	55	68.4	78
8-Apr	54	55	56	57	59	62	67	69	66	64	63	65	67	61	64	61	57	57	58	59	65	68	67	62	61.8	69
9-Apr	65	62	64	77	81	84	83	82	80	79	79	75	73	71	67	67	66	64	64	60	57	59	60	60	70.0	84
10-Apr	62	64	65	68	69	74	71	65	72	72	70	68	67	69	73	71	72	74	70	59	58	60	58	60	67.1	74
11-Apr	60	61	64	63	64	66	67	66	67	63	61	69	70	67	57	61	63	51	50	51	54	60	70	77	62.6	77
12-Apr	84	89	89	90	90	89	83	80	77	80	83	83	82	81	75	70	56	38	40	43	63	63	63	63	73.1	90
13-Apr	64	66	67	68	69	72	72	72	75	75	75	76	72	72	69	66	62	59	61	64	67	71	73	72	69.1	76
14-Apr	71	70	74	78	82	85	87	86	85	83	81	72	67	63	61	60	60	60	60	61	63	65	69	72	71.5	87
15-Apr	71	72	76	82	83	82	75	76	76	75	76	72	68	67	61	57	58	57	59	63	66	68	69	71	70.0	83
16-Apr	72	73	74	75	77	76	76	76	76	76	71	75	79	82	84	82	83	81	80	81	78	78	82	82	77.8	84
17-Apr	77	85	86	88	85	76	75	85	79	66	65	56	47	41	41	66	75	76	75	77	79	82	81	73	72.2	88
18-Apr	72	78	72	73	76	77	73	68	71	70	67	62	60	59	65	61	51	51	53	53	41	38	33	35	60.9	78
19-Apr	34	36	36	36	46	48	47	37	38	32	29	26	25	24	26	26	29	33	35	46	61	62	60	61	38.9	62
20-Apr	66	68	71	74	71	71	69	63	60	57	54	50	52	63	62	63	62	62	61	61	65	71	71	72	64.2	74
21-Apr	75	72	72	72	70	71	68	74	71	66	55	51	51	51	54	55	61	62	55	55	53	56	53	48	61.4	75
22-Apr	47	51	50	53	53	57	63	61	61	66	58	54	49	52	59	59	56	46	43	26	25	43	42	44	50.7	66
23-Apr	44	45	52	55	58	59	58	57	52	45	40	40	39	37	37	38	38	41	45	45	47	47	48	53	46.6	59
24-Apr	57	59	62	62	60	62	63	61	59	58	56	52	61	53	46	61	64	56	68	64	61	58	54	56	58.9	68
25-Apr	56	58	59	62	66	71	73	71	69	66	64	58	65	69	65	68	63	71	74	74	80	88	83	81	68.8	88
26-Apr	81	82	83	82	83	86	87	89	88	92	91	92	92	94	96	98	98	99	99	99	99	99	100	100	92.0	100
27-Apr	100	100	100	100	100	100	100	100	100	100	99	98	96	95	94	91	86	88	81	74	76	83	91	89	93.3	100
28-Apr	88	89	91	91	92	92	89	86	81	80	76	81	77	77	77	77	76	78	82	80	83	86	84	76	83.0	92
29-Apr	75	77	78	78	75	72	72	66	61	66	61	52	36	30	28	29	28	30	35	44	45	42	48	49	53.1	78
30-Apr	50	50	51	51	53	54	49	44	44	38	37	38	35	35	34	43	54	51	59	64	70	73	83	88	51.9	88
	68.6	69.8	70.8	72.4	73.4	74.3	73.6	72.0	70.7	69.1	66.8	64.9	63.2	62.4	61.4	62.6	63.0	62.6	63.1	62.6	64.3	66.5	67.7	68.2	Diurnal Average	
	100	100	100	100	100	100	100	100	100	100	99	98	96	95	96	98	98	99	99	99	99	99	100	100	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity (RH) - %

Fort Chipewyan - April 2016



Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	43	5.97	5.97
40 - 60	150	20.83	26.81
60 - 80	392	54.44	81.25
80 - 100	135	18.75	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Wood Buffalo Environmental Association

Summary of Hour Averages

Precipitation (PC) - mm

Fort Chipewyan - April 2016

Maximum Value: 1.0 mm on Apr 26 17:00

Maximum Daily Total: 4.6 mm on Apr 26

Minimum Value: 0.0 mm on Apr 1 01:00

Minimum Daily Total: 0.0 mm on Apr 1

Maximum Diurnal Total: 1.0 mm at hour 17

Minimum Diurnal Total: 0.0 mm at hour 2

Monthly Total: 5.33 mm

Percentiles: P_1 = 0.0 P_{10} = 0.0 Q_1 = 0.0 Median = 0.0 Q_3 = 0.0 P_{90} = 0.0 P_{99} = 0.3

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

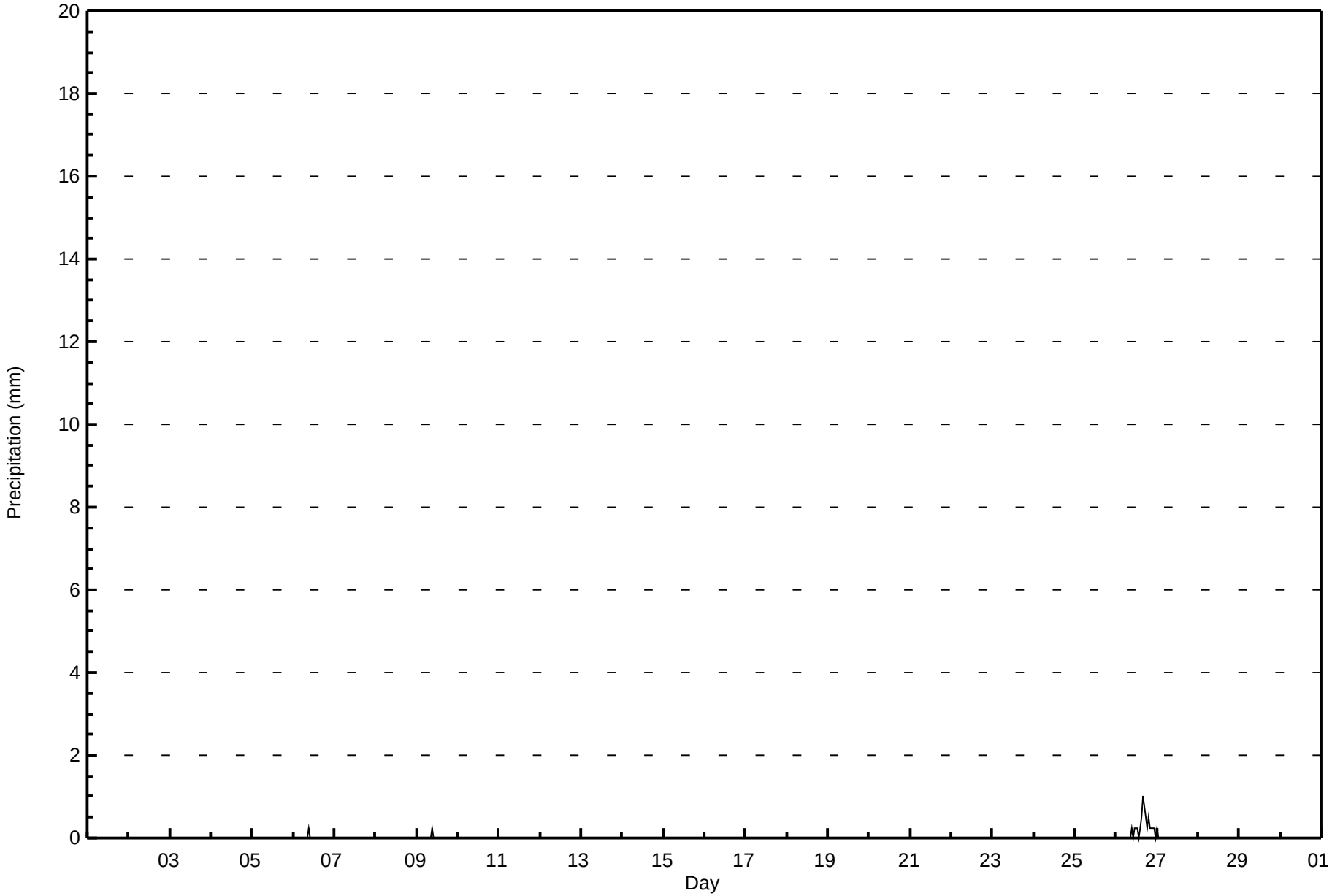
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3
7-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3
10-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.3	0.3	0.0	0.3	0.5	1.0	0.5	0.3	0.5	0.3	0.3	0.3	0.0	4.6	1.0
27-Apr	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
28-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.8	0.0	0.3	0.3	0.0	0.3	0.5	1.0	0.5	0.3	0.5	0.3	0.3	0.3	0.0	Diurnal Average	
	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.3	0.3	0.0	0.3	0.5	1.0	0.5	0.3	0.5	0.3	0.3	0.3	0.0	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Precipitation (PC) - mm

Fort Chipewyan - April 2016



Concentration Ranges (mm)	Number of Hours	%	Cumulative %
0 - 0.3	716	99.44	99.44
0.4 - 0.5	3	0.42	99.86
0.6 - 0.7	0	0.00	99.86
0.8 - 1.4	1	0.14	100.00
1.5 - 10	0	0.00	100.00
> 10	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Wood Buffalo Environmental Association

Summary of Hour Averages

Leaf Wetness (SW) - %

Fort Chipewyan - April 2016

Maximum Value: 58 % on Apr 27 07:00

Maximum Daily Average: 36.9 % on Apr 26

Minimum Value: -1 % on Apr 30 10:00

Minimum Daily Average: -0.6 % on Apr 19

Maximum Diurnal Average: 2.9 % at hour 10

Minimum Diurnal Average: 1.5 % at hour 18

Monthly Average: 1.9 %

Percentiles: $P_1 = -1$ $P_{10} = -1$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 0$ $P_{99} = 57$

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

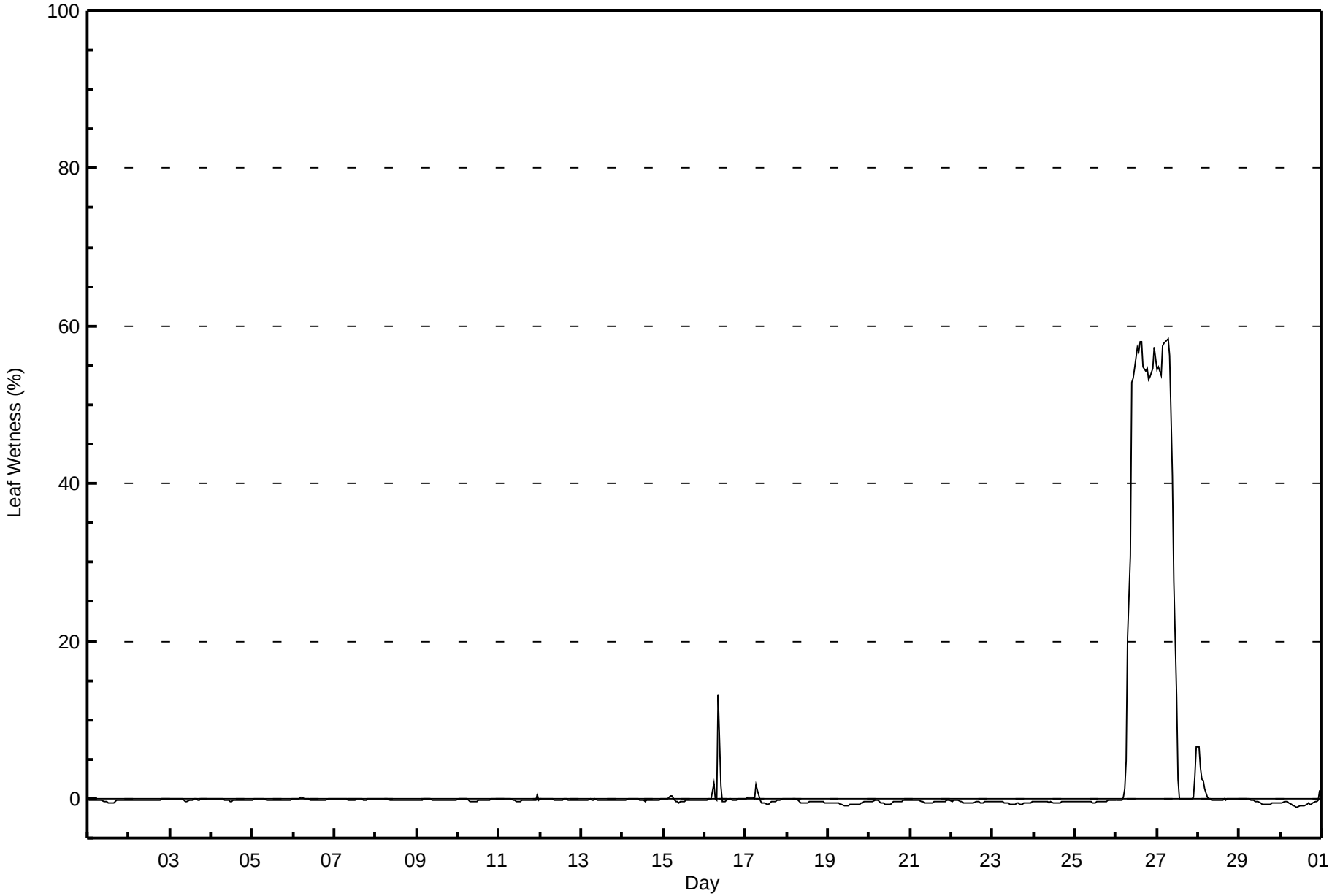
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	0	0	0	0	0	0	0	0	0	0	0	0	-1	0	0	0	0	0	0	0	0	0	0	0	-0.2	0
2-Apr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.2	0
3-Apr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.1	0
4-Apr	0	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-Apr	0	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-Apr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.1	0
7-Apr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.1	0
8-Apr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.2	0
9-Apr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.2	0
10-Apr	0	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-Apr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	-0.1	1
12-Apr	0	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
13-Apr	0	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
14-Apr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.1	0
15-Apr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.2	0
16-Apr	0	0	0	0	0	2	0	0	13	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	13
17-Apr	0	0	0	0	0	0	2	1	0	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	0	0	0	-0.1	2
18-Apr	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1	0	0	0	0	0	0	0	0	0	-1	0	-0.3	0
19-Apr	-1	0	0	-1	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	-0.6	0
20-Apr	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	0	0	0	0	-0.4	0
21-Apr	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1	0	0	0	0	0	0	0	0	0	0	0	-0.3	0
22-Apr	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	0	0	0	0	0	0	0	0	0	0	0	-0.4	0
23-Apr	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	-0.5	0
24-Apr	0	0	0	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1	0	0	0	0	0	0	0	0	-0.4	0
25-Apr	0	0	0	0	0	0	0	0	0	0	0	-1	-1	0	0	0	0	0	0	0	0	0	0	0	-0.4	0
26-Apr	0	0	0	0	0	1	5	20	31	53	53	55	57	57	58	58	55	54	55	53	53	55	57	56	36.9	58
27-Apr	55	55	54	57	58	58	58	56	49	41	28	13	3	0	0	0	0	0	0	0	0	0	3	7	24.7	58
28-Apr	7	4	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	7
29-Apr	0	0	0	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-0.4	0
30-Apr	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	1	-0.6	1
	1.9	1.8	1.7	1.9	1.9	1.9	2.0	2.4	2.8	2.9	2.3	1.9	1.6	1.5	1.6	1.6	1.5	1.5	1.6	1.6	1.6	1.6	1.9	2.0	Diurnal Average	
	55	55	54	57	58	58	58	56	49	53	53	55	57	57	58	58	55	54	55	53	53	55	57	56	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Leaf Wetness (SW) - %

Fort Chipewyan - April 2016



Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 0.3	43	48.31	48.31
0.4 - 0.5	0	0.00	48.31
0.6 - 0.7	1	1.12	49.44
0.8 - 1.4	4	4.49	53.93
1.5 - 10	11	12.36	66.29
> 10	30	33.71	100.00

Total Number of Valid Hours: 89

Total Number of Hours: 720

Wood Buffalo Environmental Association

Summary of Hour Averages

Global Radiation (GR) - W/m2

Fort Chipewyan - April 2016

Maximum Value: 825 W/m2 on Apr 22 13:00

Maximum Daily Average: 304.0 W/m2 on Apr 22

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

Minimum Daily Average: 77.0 W/m2 on Apr 26

Maximum Diurnal Average: 619.7 W/m2 at hour 13

Minimum Diurnal Average: 0.0 W/m2 at hour 4

Monthly Average: 203.6 W/m2

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 66 $Q_3 = 373$ $P_{90} = 658$ $P_{99} = 799$

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

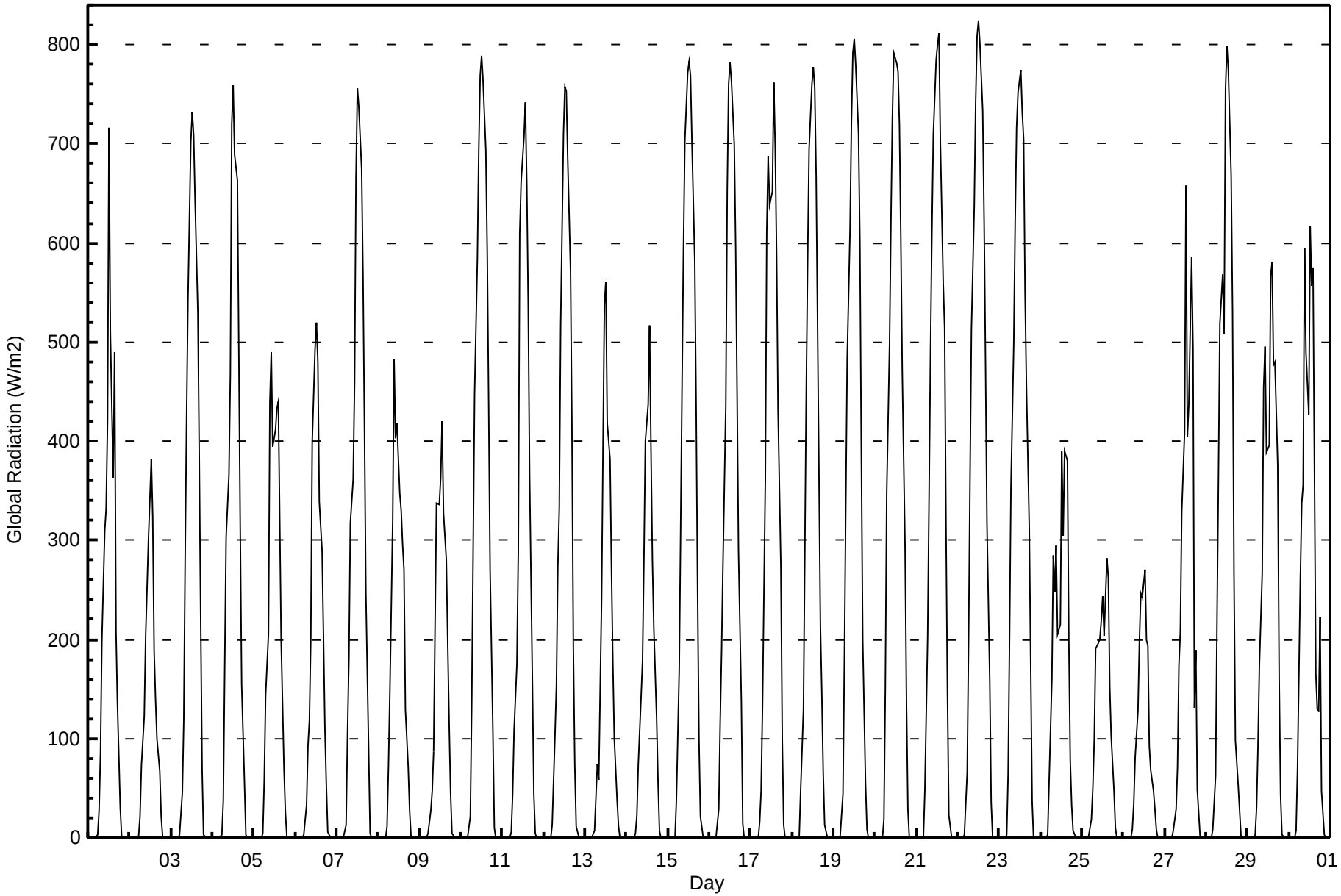
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	0	0	0	0	0	3	28	85	199	309	331	420	717	510	364	490	208	135	30	1	0	0	0	0	159.6	717
2-Apr	0	0	0	0	0	1	22	73	123	204	251	301	382	325	188	139	100	68	21	1	0	0	0	0	91.6	382
3-Apr	0	0	0	0	0	2	45	118	285	425	544	702	732	709	644	529	380	218	68	3	0	0	0	0	225.1	732
4-Apr	0	0	0	0	0	3	37	171	303	366	467	720	758	689	664	489	312	156	55	3	0	0	0	0	216.4	758
5-Apr	0	0	0	0	0	4	57	144	206	439	490	394	412	433	440	318	197	70	25	2	0	0	0	0	151.3	490
6-Apr	0	0	0	0	0	3	33	92	118	201	400	493	520	479	339	289	201	110	53	6	0	0	0	0	139.0	520
7-Apr	0	0	0	0	0	13	105	181	318	362	460	666	756	738	676	565	414	248	86	4	0	0	0	0	232.9	756
8-Apr	0	0	0	0	0	11	71	147	319	483	402	419	348	330	296	270	129	71	27	2	0	0	0	0	138.6	483
9-Apr	0	0	0	0	0	4	27	46	87	212	338	336	364	420	327	281	195	116	46	4	0	0	0	0	116.8	420
10-Apr	0	0	0	0	0	21	135	292	447	584	695	768	789	765	693	588	436	271	107	10	0	0	0	0	275.2	789
11-Apr	0	0	0	0	0	6	44	109	175	290	609	661	706	742	659	539	366	155	44	5	0	0	0	0	212.9	742
12-Apr	0	0	0	0	0	13	104	154	273	332	517	711	757	754	685	573	412	190	73	11	0	0	0	0	231.6	757
13-Apr	0	0	0	0	0	8	41	74	58	240	393	538	561	419	381	270	174	99	36	11	0	0	0	0	137.7	561
14-Apr	0	0	0	0	0	4	23	74	142	177	282	400	437	518	391	280	213	120	55	8	0	0	0	0	130.2	518
15-Apr	0	0	0	0	0	39	170	311	459	595	703	771	783	768	702	581	433	249	98	21	0	0	0	0	278.5	783
16-Apr	0	0	0	0	1	29	116	188	278	438	652	761	782	763	699	593	448	288	138	15	0	0	0	0	257.8	782
17-Apr	0	0	0	0	0	15	47	132	360	610	688	637	653	762	697	585	431	273	100	13	0	0	0	0	250.1	762
18-Apr	0	0	0	0	1	47	130	292	453	585	694	760	777	756	668	365	214	147	66	13	0	0	0	0	248.7	777
19-Apr	0	0	0	0	1	45	181	337	484	614	722	791	806	780	710	600	391	200	55	8	0	0	0	0	280.2	806
20-Apr	0	0	0	0	1	19	150	349	499	623	727	791	781	773	718	604	471	291	137	29	1	0	0	0	290.2	791
21-Apr	0	0	0	0	2	46	203	347	493	611	709	785	800	811	702	561	514	314	148	23	1	0	0	0	294.6	811
22-Apr	0	0	0	0	3	66	199	362	512	636	742	809	825	801	733	620	478	318	158	35	1	0	0	0	304.0	825
23-Apr	0	0	0	0	3	65	201	353	499	622	716	751	774	732	705	549	455	312	172	36	1	0	0	0	289.5	774
24-Apr	0	0	0	0	3	55	160	284	247	294	205	215	391	304	390	380	201	78	32	7	0	0	0	0	135.3	391
25-Apr	0	0	0	0	1	18	50	98	190	197	201	219	243	204	281	261	152	103	46	10	0	0	0	0	94.8	281
26-Apr	0	0	0	0	0	9	34	81	128	199	247	242	270	199	193	93	69	47	29	9	0	0	0	0	77.0	270
27-Apr	0	0	0	0	1	8	28	71	174	208	328	409	658	404	437	585	493	130	189	49	2	0	0	0	173.9	658
28-Apr	0	0	0	0	9	63	223	365	519	568	508	754	799	774	667	530	268	98	53	27	1	0	0	0	259.5	799
29-Apr	0	0	0	0	3	30	92	173	266	454	496	389	396	567	581	477	480	376	164	43	2	0	0	0	207.9	581
30-Apr	0	0	0	0	7	69	260	337	357	596	490	427	616	557	575	165	129	128	222	47	3	0	0	0	207.7	616
	0.0	0.0	0.0	0.0	1.2	23.9	100.5	194.7	299.1	415.8	500.2	568.1	619.7	592.8	540.1	439.0	312.1	179.3	84.5	15.3	0.4	0.0	0.0	0.0	Diurnal Average	
	0	0	0	0	9	69	260	365	519	636	742	809	825	811	733	620	514	376	222	49	3	0	0	0	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Global Radiation (GR) - W/m2

Fort Chipewyan - April 2016



Concentration Ranges (W/m2)	Number of Hours	%	Cumulative %
0 - 20	309	42.92	42.92
21 - 100	79	10.97	53.89
101 - 300	115	15.97	69.86
301 - 600	131	18.19	88.06
601 - 900	86	11.94	100.00
> 900	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Fort Chipewyan - April 2016

Maximum Speed: 40 km/h on Apr 8 17:00

Maximum Daily Speed Average: 30.7 km/h on Apr 8

Minimum Speed Value: 1 km/h on Apr 15 07:00

Minimum Daily Speed Average: 7.4 km/h on Apr 25

Maximum Diurnal Speed Average: 13.9 km/h at hour 18

Minimum Diurnal Speed Average: 10.2 km/h at hour 11

Monthly Average Velocity: 11.7 km/h 77.5 deg

Percentiles: $P_1 = 5$ $P_{10} = 9$ $Q_1 = 12$ Median = 17 $Q_3 = 23$ $P_{90} = 28$ $P_{99} = 36$

Hours in Service:	720
Hours of Data:	720
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-Apr	NW6	NW9	WNW10	NW13	NNW14	NNW17	NNW13	N18	N15	NNW14	NW13	NNW11	NNW12	NNW10	NNW11	N9	E12	E15	E18	E19	E19	E21	E23	E22	NNE8.4	E23
2-Apr	E24	E26	E26	E28	ENE30	ENE29	ENE30	ENE32	ENE32	ENE31	ENE28	ENE30	ENE32	NE29	NE28	NE31	NE29	NE32	ENE31	ENE32	ENE29	ENE30	ENE32	ENE33	ENE29.3	ENE33
3-Apr	ENE27	ENE25	NE24	NE22	NE17	NE13	NE15	NE14	NE12	ENE11	E13	E22	E20	E20	E18	ESE15	E15	E14	E13	E11	E13	E14	E9	E10	ENE14.6	ENE27
4-Apr	E10	E12	E13	E15	E17	E19	E20	E19	E21	E21	E17	E19	E17	E16	ESE15	E15	E17	E14	E7	ENE11	ENE12	NE19	ENE22	E22	E15.9	E22
5-Apr	ENE30	ENE30	ENE28	ENE27	ENE26	ENE21	ENE23	ENE26	ENE23	ENE23	ENE25	ENE23	ENE20	ENE20	ENE23	ENE25	ENE22	ENE16	ENE15	ENE17	ENE17	ENE15	ENE15	ENE19	ENE22.0	ENE30
6-Apr	ENE16	ENE14	NE7	NNW8	N9	N9	NNW10	NNW10	NNW11	NW14	NW16	NW18	NW16	NW15	NNW15	NNW13	NNW13	NNW12	NNW11	NNW10	NNW12	NNW11	NNW11	NNW10	NNW10.4	NW18
7-Apr	NNE7	ENE12	ENE14	ENE12	ENE15	ENE12	E13	E18	E15	E20	E22	E21	E22	E24	E24	E26	E23	E20	ENE19	ENE19	ENE17	E20	E22	E23	E17.9	E26
8-Apr	E24	E25	E24	E25	E23	E24	E28	E28	E29	E31	E33	E35	E32	ESE36	E38	ESE35	ESE40	ESE39	ESE35	ESE34	ESE31	E32	E35	E36	E30.7	ESE40
9-Apr	E33	ENE26	NE16	NNE11	N9	N12	NNW12	N14	N13	N13	NNW13	NNW18	NNW18	NNW19	NNW20	N17	NNW16	NNW15	NNW14	NNW17	NNW16	NNW10	N10	N9	N12.7	E33
10-Apr	NNW7	N10	N11	N10	N10	N10	N8	ENE6	ESE12	ESE13	ESE14	ESE15	E16	E16	E17	E17	E16	E19	E17	ENE15	ENE11	E12	E24	E23	ENE10.7	E24
11-Apr	E23	E22	E24	E25	E23	E23	E22	E22	E20	E19	E18	E20	E21	E21	E18	E19	E19	ENE18	ENE12	NE21	ENE23	ENE26	ENE22	NE16	E20.0	ENE26
12-Apr	NE17	NNE12	NNE12	NNE10	NNE9	NNE10	NNE9	NE10	NE8	E10	E20	E25	E25	E26	E28	E28	E26	ENE26	ENE21	ENE22	ENE20	ENE21	ENE22	ENE23	ENE16.7	E28
13-Apr	ENE21	ENE21	ENE23	ENE26	ENE29	ENE31	ENE28	ENE30	ENE34	ENE34	ENE33	E36	E38	E37	E29	ENE23	E21	ENE13	NNE10	NNE6	N6	N5	N9	N12	ENE21.7	E38
14-Apr	N13	N15	N15	NNW15	NNW13	NNW16	NW17	NW17	NW19	NW17	NW18	NW19	NW19	NW20	NW22	NW21	NW17	NW15	NW14	WNW12	WNW10	WNW8	NW7	NW6	NW14.6	NW22
15-Apr	NW7	NNW8	NW7	NNW5	N2	N3	ESE1	ESE5	E8	E9	E12	E13	E15	E19	E22	E23	E24	E26	E24	E23	E23	E26	E25	E27	E13.1	E27
16-Apr	E27	E24	E23	E22	E22	E21	E22	E23	E17	E16	E15	E16	E14	E12	ESE12	ESE10	E11	E12	E11	E10	E8	E7	E10	E8	E15.4	E27
17-Apr	E9	E9	E10	E10	E11	E9	E9	E9	E10	E8	E9	ENE6	ESE4	SE3	ESE5	E12	ESE10	E10	ESE12	E11	E11	E10	E11	E10	E8.9	ESE12
18-Apr	E12	ESE15	ESE14	ESE12	E11	E12	E12	E10	E12	E14	E15	E14	E16	E21	E21	E20	E25	E26	E24	ESE20	SSE23	S30	S32	S36	ESE15.4	S36
19-Apr	SSW28	SSW19	SW16	W16	WNW19	WNW22	W21	W20	WSW27	WSW29	W31	WSW31	W35	W39	W35	W34	W28	W23	WNW25	NW21	NW29	NW31	NW32	NW29	W22.8	W39
20-Apr	NW28	NW27	NNW21	NNW19	NNW17	NNW16	NNW16	NNW15	NNW12	NNW11	NW11	NNW9	ENE6	E19	E18	E21	E20	E20	E18	E16	E13	E12	E11	E10	NNE8.7	NW28
21-Apr	E10	E8	E8	E8	E7	E8	E8	ESE9	ESE11	ESE14	ESE17	ESE17	E20	E24	E24	E25	E23	E20	ENE19	ENE14	ENE13	ENE11	ENE8	ENE10	E13.6	E25
22-Apr	ENE11	ENE8	NE12	ENE14	ENE12	ENE9	E17	E15	E13	E15	E20	E23	E19	E21	E24	E24	E21	ENE23	ENE19	NE20	ENE24	ENE25	ENE24	ENE21	ENE17.3	ENE25
23-Apr	ENE21	ENE20	ENE18	ENE18	ENE20	ENE17	E23	E23	E23	E26	E24	ENE24	ENE23	ENE27	ENE25	ENE24	ENE28	ENE30	ENE27	ENE29	E31	E32	E34	E33	ENE24.8	E34
24-Apr	E30	E29	E29	E27	E24	E25	E25	E23	E20	E19	E19	E18	E19	E21	ENE18	E18	E20	E17	E18	E15	E15	ESE15	SE16	SE16	E20.1	E30
25-Apr	SE13	E12	E12	E10	ESE8	SE5	SSW10	SSW12	SSW13	SSW13	SSW12	SW5	E7	E8	E12	E14	ENE12	E13	E7	E6	E13	E13	E13	E13	ESE7.4	E14
26-Apr	E13	E12	E12	E11	E12	ESE10	E9	E8	E8	SE7	S14	S12	SSE10	SE10	E11	E12	E12	E14	ENE13	E10	E12	E9	E12	E12	ESE9.8	E14
27-Apr	ENE9	ENE10	ENE10	ENE9	ENE8	NE5	NE5	ENE5	E9	E10	ESE13	ESE8	ESE10	ESE9	E17	E16	E19	ESE17	E15	ENE14	ENE11	ENE8	E7	ENE9	E10.0	E19
28-Apr	E13	E16	E15	E16	E18	ENE18	E22	E23	E22	E23	E21	E20	E22	E21	E23	E22	E19	ESE16	ESE12	ESE12	ESE16	E14	E19	E20	E18.3	E23
29-Apr	E18	E16	E15	ESE12	E13	E17	E21	E19	E19	E18	E20	E22	SSE24	SSE28	SSE28	S26	S31	SSE27	SE23	SE19	SE15	SSE12	ESE8	E8	SE16.5	S31
30-Apr	ESE7	SE8	SSE8	SSE8	SE8	SSE6	SSE7	SSW15	SSW13	SW14	WSW17	WSW14	W20	W24	W27	WSW21	SSW21	S19	S17	SSW12	SE5	ESE7	E9	ESE7	SSW8.2	W27
	ENE12.5	ENE12.2	ENE11.6	ENE11.2	ENE11.3	ENE10.3	ENE10.6	ENE10.8	ENE10.4	E10.5	E10.2	E11.1	E11.3	E12.1	E12.6	E13.1	E13.9	E13.9	E12.0	ENE11.9	ENE12.1	E12.1	ENE13.2	ENE13.0	Diurnal Average	
	E33	ENE30	E29	E28	ENE30	ENE31	ENE30	ENE32	ENE34	ENE34	ENE33	E36	E38	W39	E38	ESE35	ESE40	ESE39	ESE35	ESE34	E31	E32	E35	E36	Diurnal Maximum	

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

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Speed (WS) - km/h

Fort Chipewyan - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 10 km/h on Apr 19 21:00

Minimum Value: 1 km/h on Apr 21 08:00

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

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

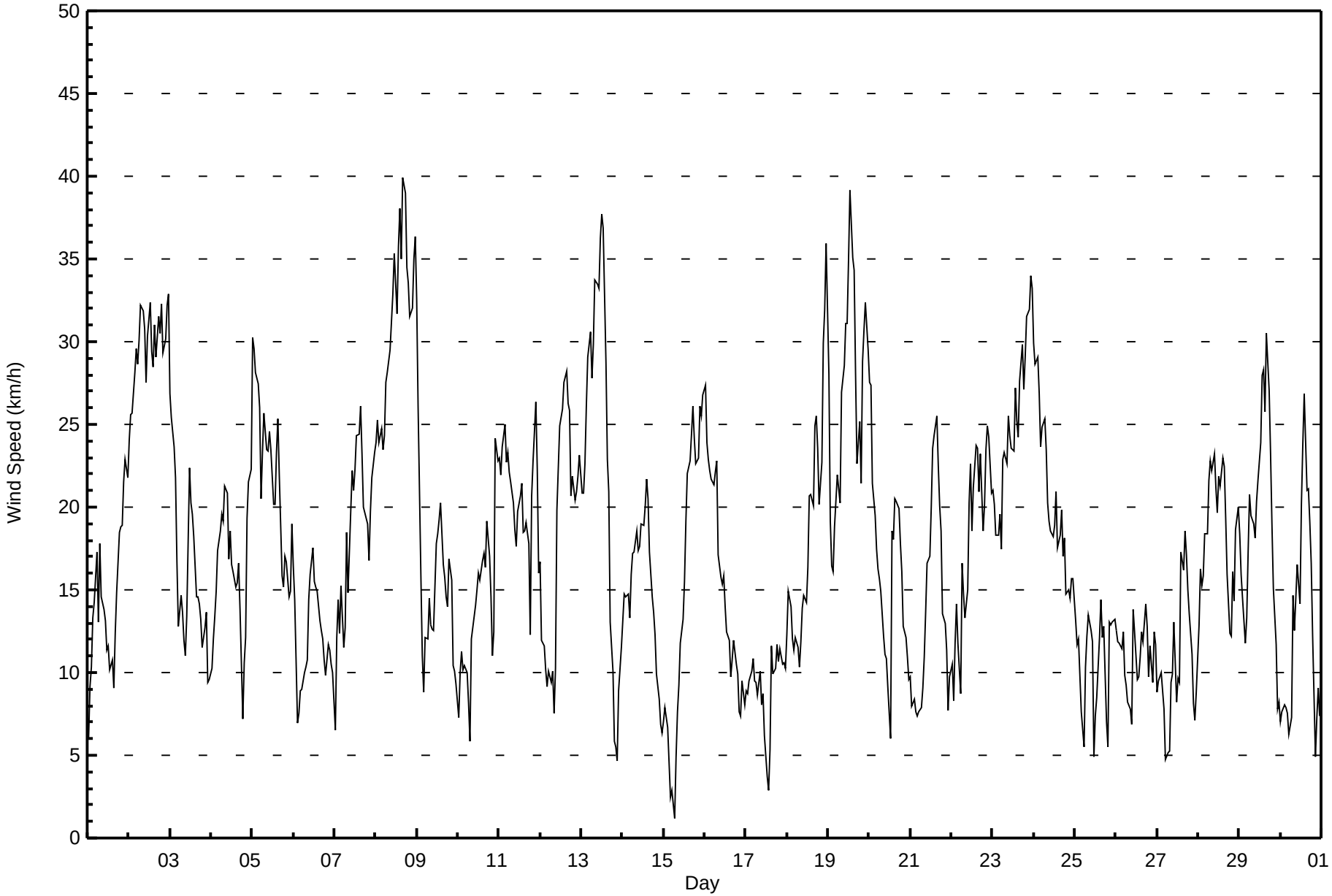
Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Apr	2	2	2	4	5	6	4	6	5	5	5	4	4	4	4	3	5	2	2	2	3	2	2	2	6
2-Apr	2	2	3	3	3	3	4	5	5	5	5	5	6	6	6	7	6	6	5	5	5	4	5	5	7
3-Apr	4	4	4	4	4	3	3	4	3	3	5	2	2	1	1	1	1	1	1	1	1	1	2	1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

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed (WS) - km/h

Fort Chipewyan - April 2016



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	15	2.08	2.08
6 - 11	155	21.53	23.61
12 - 19	272	37.78	61.39
20 - 28	207	28.75	90.14
29 - 38	68	9.44	99.58
> 38	3	0.42	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Wind Speed (WS) - km/h

Fort Chipewyan - April 2016

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	0	2	1	0	4	3	0	0	0	1	0	0	0	0	1	15
6 - 11	14	8	3	21	58	14	4	5	0	1	0	0	0	3	7	17	155
12 - 19	11	2	10	38	118	22	5	1	4	8	2	2	1	2	17	29	272
20 - 28	0	0	5	51	122	1	1	5	1	2	0	2	6	3	6	2	207
29 - 38	0	0	4	24	21	5	0	0	4	0	0	2	4	0	4	0	68
> 38	0	0	0	0	0	2	0	0	0	0	0	0	1	0	0	0	3
Totals	28	10	24	135	319	48	13	11	9	11	3	6	12	8	34	49	720

Total Number of Valid Hours: 720

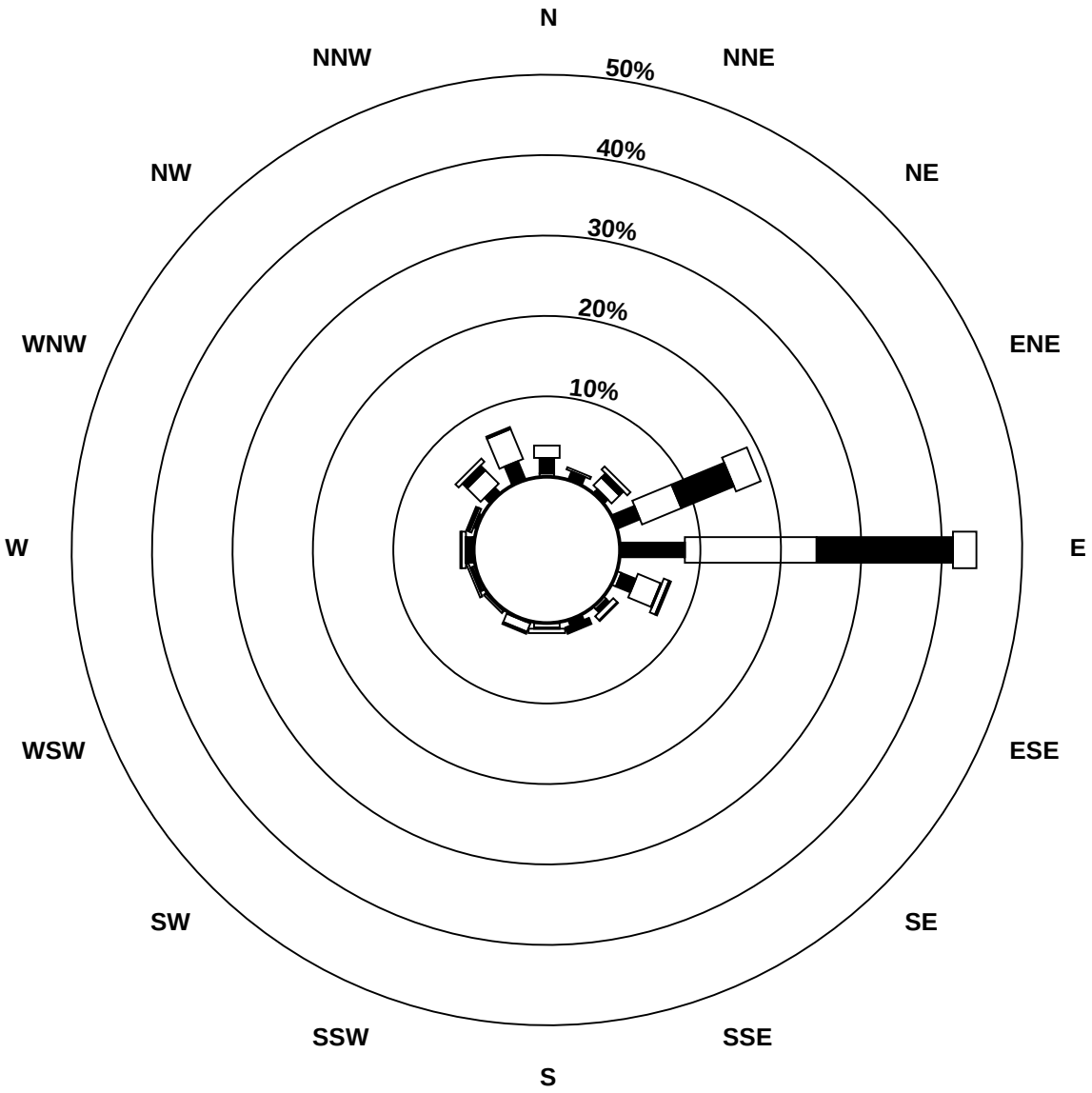
Total Number of Hours: 720

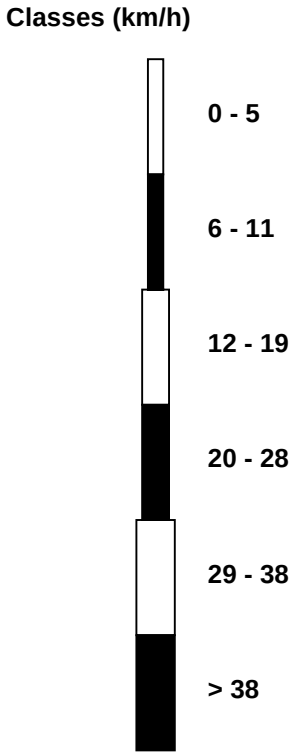
Wood Buffalo Environmental Association

Wind Rose Apr 2016

Wind Speed (WS) - km/h

Fort Chipewyan (AMS 8)





Total Number of Valid Hours: 720

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Fort Chipewyan - April 2016

Direction of Maximum Speed: 114 deg on Apr 8 17:00
Direction of Maximum Daily Speed Average: 95.7 deg on Apr 8

Direction of Minimum Speed: 117 deg on Apr 15 07:00
Direction of Minimum Daily Speed Average: 7.4 deg on Apr 25

Monthly Average Direction: 40.1 deg

Hours in Service:	720
Hours of Data:	720
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-Apr	326	305	300	325	334	347	347	350	356	341	321	338	334	339	346	357	84	90	86	89	81	84	83	83	22.0
2-Apr	89	86	81	79	76	75	72	66	66	63	61	59	57	54	51	54	53	55	59	63	66	68	66	64	65.5
3-Apr	58	57	54	50	46	39	42	47	34	73	100	101	99	97	97	104	100	101	99	98	94	99	98	95	76.9
4-Apr	91	93	92	90	93	89	85	85	87	88	91	97	95	98	102	97	96	101	97	59	69	56	73	82	87.5
5-Apr	74	65	66	64	66	61	67	67	65	70	68	72	71	72	75	68	67	71	67	66	65	66	69	67	67.9
6-Apr	69	68	52	345	360	352	344	344	336	320	320	322	326	320	333	341	345	341	341	340	345	337	344	347	344.9
7-Apr	19	60	64	68	67	65	83	91	101	100	99	100	96	95	87	89	89	82	74	76	73	80	84	85	84.0
8-Apr	88	86	84	84	85	91	91	89	83	87	84	85	94	108	98	109	114	116	114	113	104	94	87	84	95.7
9-Apr	86	77	43	22	359	353	345	352	356	356	343	342	346	346	345	351	348	341	333	337	341	344	350	355	1.2
10-Apr	348	351	355	350	356	352	1	57	109	104	105	107	101	97	97	94	93	96	89	74	76	81	83	85	77.0
11-Apr	84	88	90	88	88	87	86	89	90	87	85	97	95	94	79	87	87	71	57	56	57	65	58	44	80.2
12-Apr	46	25	22	15	19	24	24	36	50	98	99	100	95	92	88	89	80	76	65	66	66	69	68	72	70.8
13-Apr	73	74	71	77	78	75	73	74	72	78	78	82	82	83	81	76	79	57	26	27	5	8	354	350	72.1
14-Apr	350	355	355	347	343	331	323	323	318	319	318	315	315	316	313	316	316	318	305	300	295	290	307	321	321.8
15-Apr	325	332	325	331	8	349	117	108	89	89	95	95	94	91	88	87	85	82	81	84	85	89	89	89	82.7
16-Apr	88	88	90	92	93	94	98	97	98	99	95	96	95	101	105	104	97	88	88	92	93	90	89	79	93.6
17-Apr	80	98	100	98	91	89	100	91	85	99	84	76	102	146	116	93	107	101	102	97	96	93	96	94	95.4
18-Apr	100	102	102	108	96	97	95	92	94	94	94	94	95	92	96	95	89	90	100	118	154	176	173	182	115.1
19-Apr	197	210	230	277	298	282	275	260	250	258	261	258	267	270	266	267	270	278	286	319	326	320	321	322	275.2
20-Apr	325	323	338	348	340	342	344	345	346	347	319	329	59	101	98	92	91	92	87	86	85	87	86	89	28.7
21-Apr	94	86	86	84	81	81	87	102	108	104	107	109	93	92	93	89	89	88	76	73	77	70	57	58	88.4
22-Apr	57	60	56	58	60	66	79	86	94	98	96	94	97	94	93	93	86	71	60	51	62	72	72	70	77.6
23-Apr	71	71	70	71	73	74	81	81	79	83	79	69	65	62	68	62	61	62	64	72	79	80	81	83	72.8
24-Apr	85	85	86	83	83	87	88	85	85	87	85	81	88	82	69	88	87	86	95	93	101	119	129	134	89.5
25-Apr	134	101	94	95	103	140	195	206	203	197	213	216	95	94	90	91	76	87	87	79	97	100	91	90	116.4
26-Apr	90	94	93	96	95	102	99	101	94	136	176	173	158	125	95	92	94	86	71	80	87	86	86	87	101.7
27-Apr	74	62	66	61	57	42	56	72	82	99	107	120	117	107	97	95	92	103	86	69	61	71	79	78	84.9
28-Apr	80	82	82	79	82	78	82	85	86	89	89	94	94	95	96	97	99	115	118	111	102	100	94	89	91.8
29-Apr	97	99	96	103	93	94	91	93	92	98	96	93	147	157	158	170	171	150	142	138	144	168	118	100	125.8
30-Apr	111	127	165	163	144	147	162	202	210	223	240	253	274	281	270	246	206	190	189	209	146	102	98	112	212.9
	75.9	71.9	69.2	65.5	64.9	63.5	69.6	72.6	75.8	81.7	84.2	82.8	83.6	85.1	82.5	84.8	87.1	85.4	80.3	75.4	75.8	79.2	78.0	77.9	
	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: 75 deg on Apr 20 13:00

Minimum Value: 3 deg on Apr 7 13:00

Percentiles: $P_1 = 3$ $P_{10} = 5$ $Q_1 = 6$ Median = 8 $Q_3 = 15$ $P_{90} = 23$ $P_{99} = 42$

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

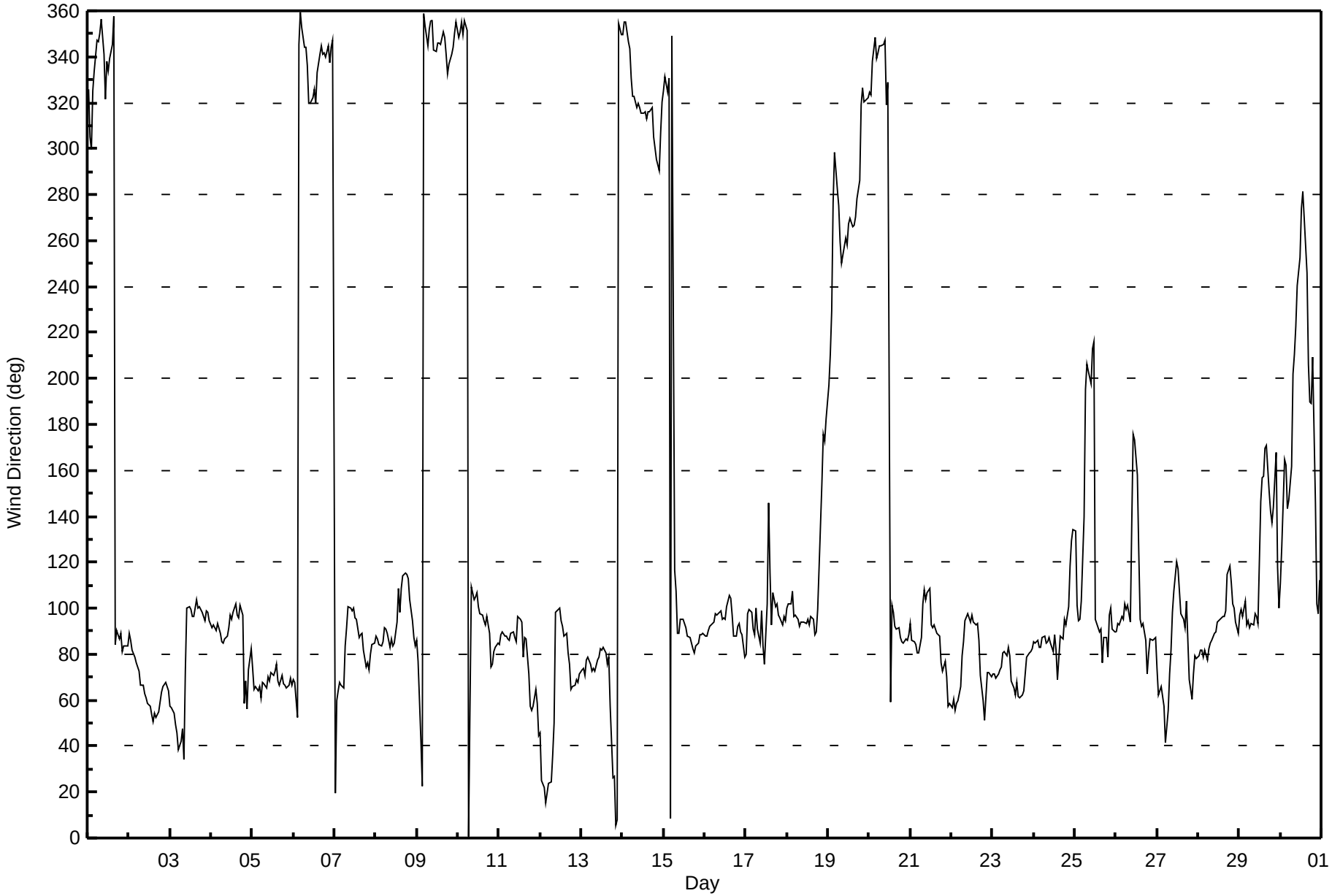
Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Apr	24	17	14	20	21	20	21	21	23	24	26	32	35	31	31	33	52	6	5	5	8	6	5	6	52
2-Apr	4	5	6	7	7	7	7	8	8	8	10	9	10	10	11	10	12	10	8	9	8	8	8	8	12
3-Apr	10	9	10	10	12	14	14	13	17	26	38	6	5	4	5	7	6	7	6	5	5	5	7	9	38
4-Apr	5	7	6	5	4	6	5	5	5	4	6	3	4	3	4	4	4	11	29	12	10	8	18	7	29
5-Apr	8	8	8	9	9	10	8	8	9	10	9	8	9	9	10	8	9	9	9	8	8	15	10	7	15
6-Apr	7	7	43	28	39	29	29	23	21	17	19	18	22	23	25	24	22	24	22	18	16	16	15	15	43
7-Apr	30	8	7	7	7	8	10	4	8	4	4	3	3	3	4	3	6	11	7	6	8	6	6	5	30
8-Apr	5	5	4	5	6	6	5	6	5	5	5	5	12	10	4	7	6	6	6	5	6	4	5	4	12
9-Apr	5	8	19	19	30	20	21	22	24	22	23	23	23	23	23	25	22	23	23	22	21	18	19	21	30
10-Apr	17	16	17	24	18	17	24	42	7	7	7	7	7	6	6	5	5	4	8	5	7	11	5	5	42
11-Apr	5	7	7	6	6	5	5	5	5	7	12	3	4	5	12	7	6	8	13	12	9	7	11	11	13
12-Apr	13	17	18	17	18	17	19	15	29	19	6	4	4	4	6	5	8	7	8	7	8	8	7	8	29
13-Apr	8	7	8	7	6	7	8	7	7	7	7	5	5	5	7	8	7	17	17	19	19	54	23	19	54
14-Apr	18	19	21	20	23	21	16	17	15	17	18	18	18	19	16	18	20	19	17	14	13	13	23	16	23
15-Apr	14	12	18	19	56	65	74	11	10	9	6	4	4	4	3	4	5	5	7	6	5	6	6	4	74
16-Apr	6	7	5	6	6	5	6	6	12	9	9	4	6	9	6	9	8	4	7	9	12	12	5	9	12
17-Apr	8	7	7	7	6	18	28	22	34	14	11	14	44	45	37	9	11	7	7	6	6	9	8	15	45
18-Apr	9	12	11	7	4	4	5	3	3	3	5	5	5	4	5	7	3	3	5	9	13	7	8	7	13
19-Apr	8	8	11	36	19	14	15	16	13	15	16	15	15	14	15	15	14	15	15	24	21	18	18	18	36
20-Apr	20	19	24	23	23	24	23	25	30	36	37	46	75	6	6	6	5	5	5	6	6	6	8	7	75
21-Apr	6	9	5	6	6	8	9	6	5	6	8	6	6	5	5	6	6	6	8	8	8	6	7	6	9
22-Apr	5	15	7	6	5	11	8	7	7	5	7	4	5	5	5	5	11	8	12	9	9	8	8	7	15
23-Apr	7	7	7	8	8	9	8	8	9	7	9	10	9	8	8	9	9	8	8	9	7	7	6	6	10
24-Apr	5	5	5	6	7	6	6	7	6	5	6	6	5	7	9	7	6	7	7	5	5	4	5	5	9
25-Apr	13	9	7	6	15	24	11	11	9	9	11	34	15	7	3	11	13	6	20	20	14	8	6	4	34
26-Apr	6	7	4	4	5	6	6	7	4	35	7	7	12	20	5	5	7	6	7	9	7	10	5	5	35
27-Apr	10	6	5	6	11	36	15	18	20	6	8	10	9	10	6	6	6	6	10	8	10	7	9	7	36
28-Apr	7	6	7	9	8	7	6	7	8	7	7	4	5	4	5	5	10	18	9	9	5	11	7	5	18
29-Apr	8	13	11	11	22	8	5	5	5	7	6	5	25	13	10	16	12	10	6	9	11	20	37	31	37
30-Apr	31	18	20	20	30	35	19	16	11	13	17	19	19	17	16	25	20	7	14	13	42	10	9	15	42
	31	19	43	36	56	65	74	42	34	36	38	46	75	45	37	33	52	24	29	24	42	54	37	31	
	Diurnal Maximum																								

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction (WD) - deg

Fort Chipewyan - April 2016



Wood Buffalo Environmental Association
SO2 Calibration Report

W B E A

Station Information

Calibration Date	April 5, 2016	Last Calibration	March 10, 2016
Station Name	Fort Chipewyan	Station Number	AMS 8
Reason:	Routine		
Start Time (MST)	10:30	End Time (MST)	15:15
Gas Cert Reference	LL79696	Station temp.	22 Deg C
Cal Gas Concentration	2.35 ppm	Cal Gas Exp Date	2/13/16
Calibrator Make/Model	Teledyne API T700	Serial Number	747
ZAG Make/Model	Teledyne API T701	Serial Number	4698
DACS make/model	Campbell Scientific CR3000	DACS serial No.	8205

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 1000 ppb		PMT voltage	-826	-826
Analyzer IP address	192.168.1.43		Lamp voltage	1016	1014
Calculated slope	1.008785	1.009918	Chamber temp	45.0	45.0
Calculated intercept	-0.085182	-0.162319	Pressure	694.9	714.0
Analyzer Background	1.22	1.18	Flow	0.425	0.437
Analyzer Coefficient	1.083	1.069	Intensity	91	90

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	44.8	17.5	17.3	1.014
calibrator zero	6000	0.0	0.0	0.1	----
high point	6000	44.8	17.5	17.5	1.002
second point	6000	23.9	9.4	9.5	0.991
third point	6000	12.0	4.7	4.8	0.973
as left zero	6000	0.0	0.0	0.1	----
as left span	6000	44.8	17.5	16.9	1.038
				Average Correction Factor	0.988

Corrected As found	17.2	Previous response	17.5	% change	1.6%

Notes:

Inlet filter changed after as founds. Span adjusted.

Calibration Performed By: Devin Russell

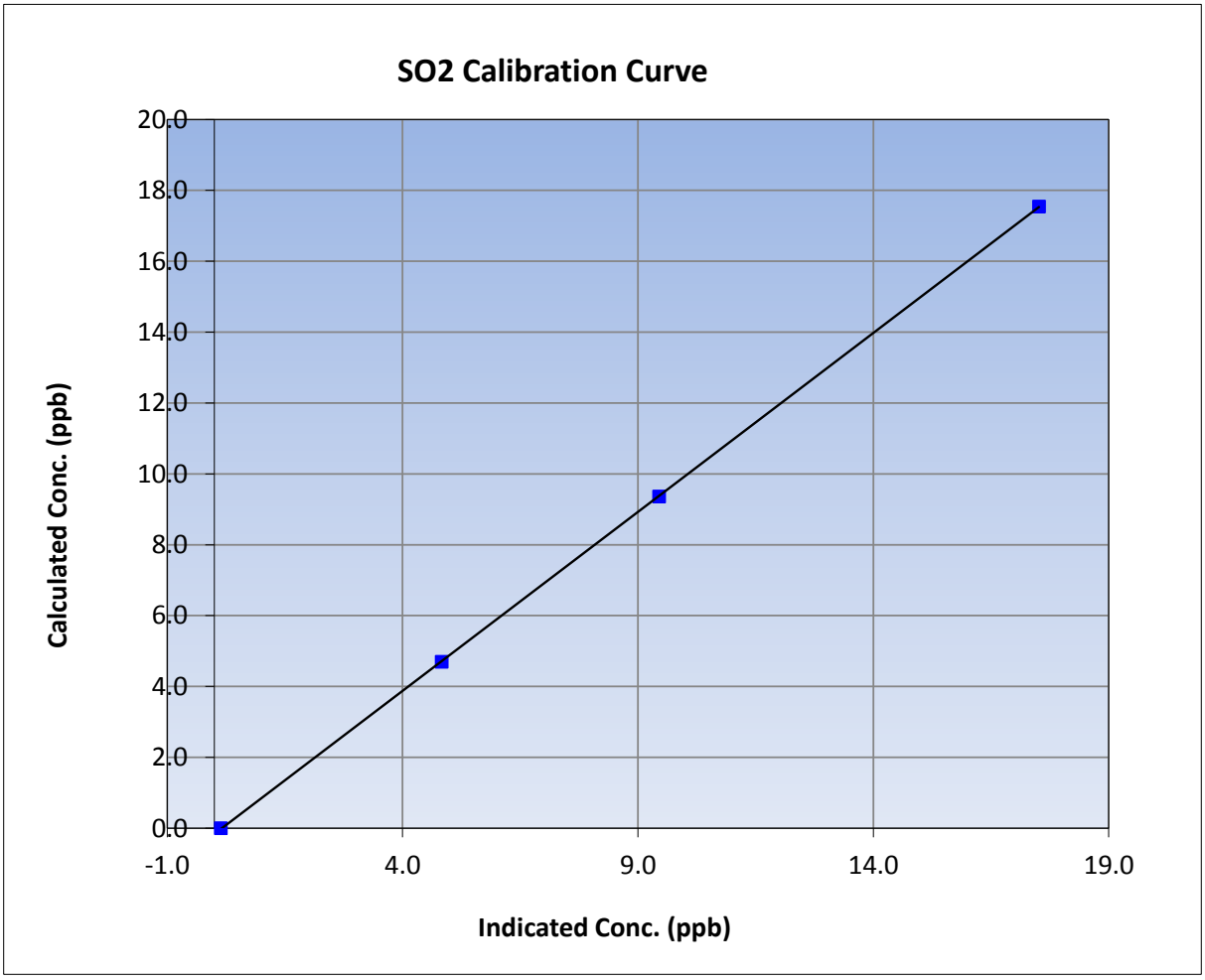
Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

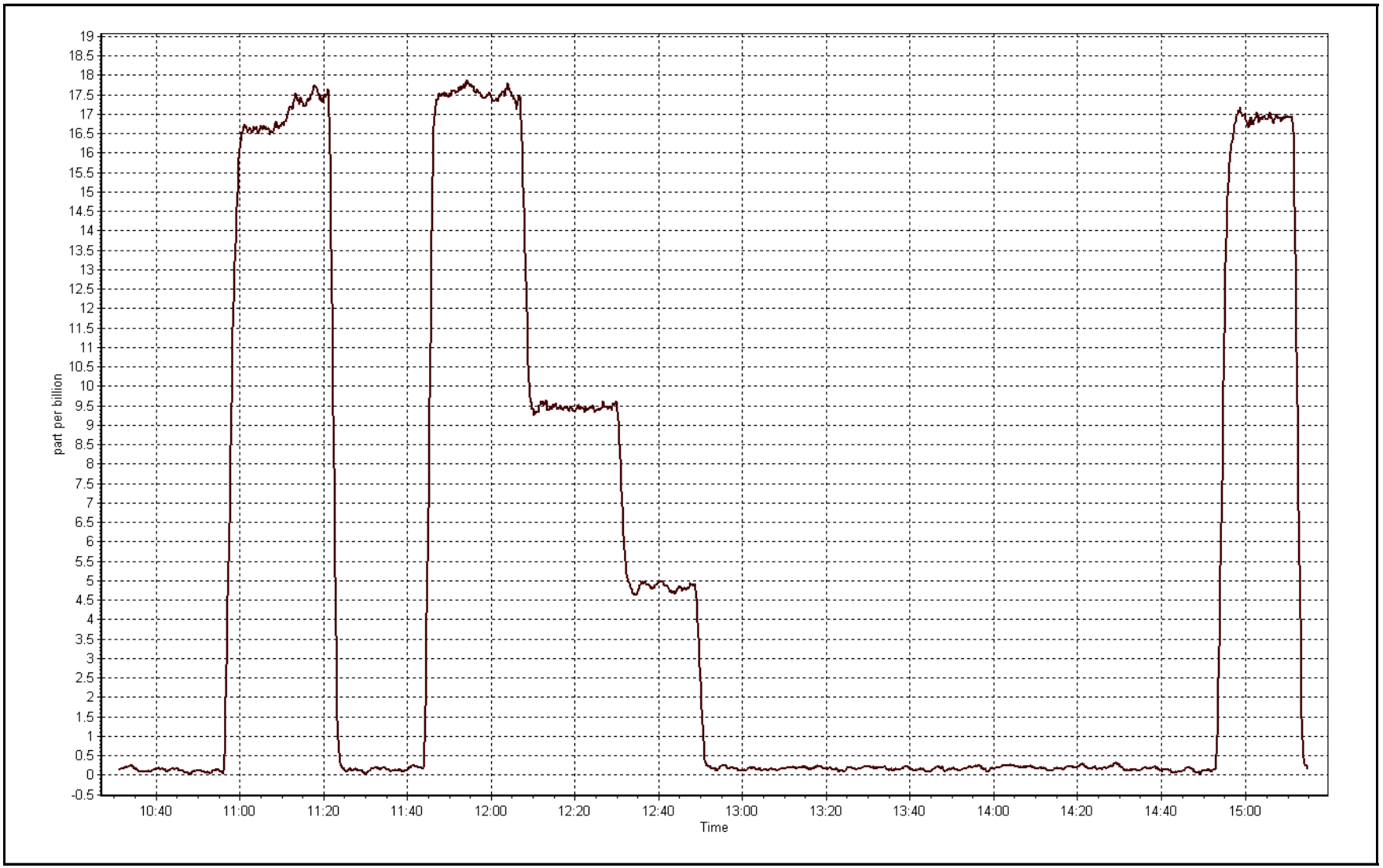
Calibration Date	April 5, 2016	Previous Calibration	March 10, 2016
Station Name	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	10:30	End Time (MST)	15:15
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1136451241

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	0.999992
17.5	17.5	1.0015		
9.4	9.5	0.9906	Slope	1.009918
4.7	4.8	0.9731		
			Intercept	-0.162319



SO2 Calibration Plot Date: April 5, 2016



Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

Calibration Date	April 18, 2016	Last Calibration	April 5, 2016
Station Name	Fort Chipewyan	Station Number	AMS 8
Reason:	Other:	Response/linearity check	
Start Time (MST)	9:00	End Time (MST)	12:55
Gas Cert Reference	LL79696	Station temp.	22 Deg C
Cal Gas Concentration	2.35 ppm	Cal Gas Exp Date	2/13/16
Calibrator Make/Model	Teledyne API T700	Serial Number	747
ZAG Make/Model	Teledyne API T701	Serial Number	4698
DACS make/model	Campbell Scientific CR3000	DACS serial No.	8205

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 1000 ppb		PMT voltage	-826	-826
Analyzer IP address	192.168.1.43		Lamp voltage	1014	1014
Calculated slope	1.009918	1.035627	Chamber temp	45.0	45.0
Calculated intercept	-0.162319	-0.194315	Pressure	714.0	714.0
Analyzer Background	1.18	1.18	Flow	0.437	0.437
Analyzer Coefficient	1.069	1.069	Intensity	90	90

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	6835	0.0	0.0	0.2	----
as found span	6840	53.5	18.4	17.9	1.030
calibrator zero	6835	0.0	0.0	0.2	----
high point	6840	53.5	18.4	17.9	1.030
second point	6849	32.5	11.2	11.1	1.003
third point	6847	20.8	7.1	7.0	1.014
as left zero					
as left span					
				Average Correction Factor	1.016

Corrected As found	17.7	Previous response	18.4	% change	3.7%

Notes:

Response/linearity check due to calibrator flow issue.

Calibration Performed By: Devin Russell

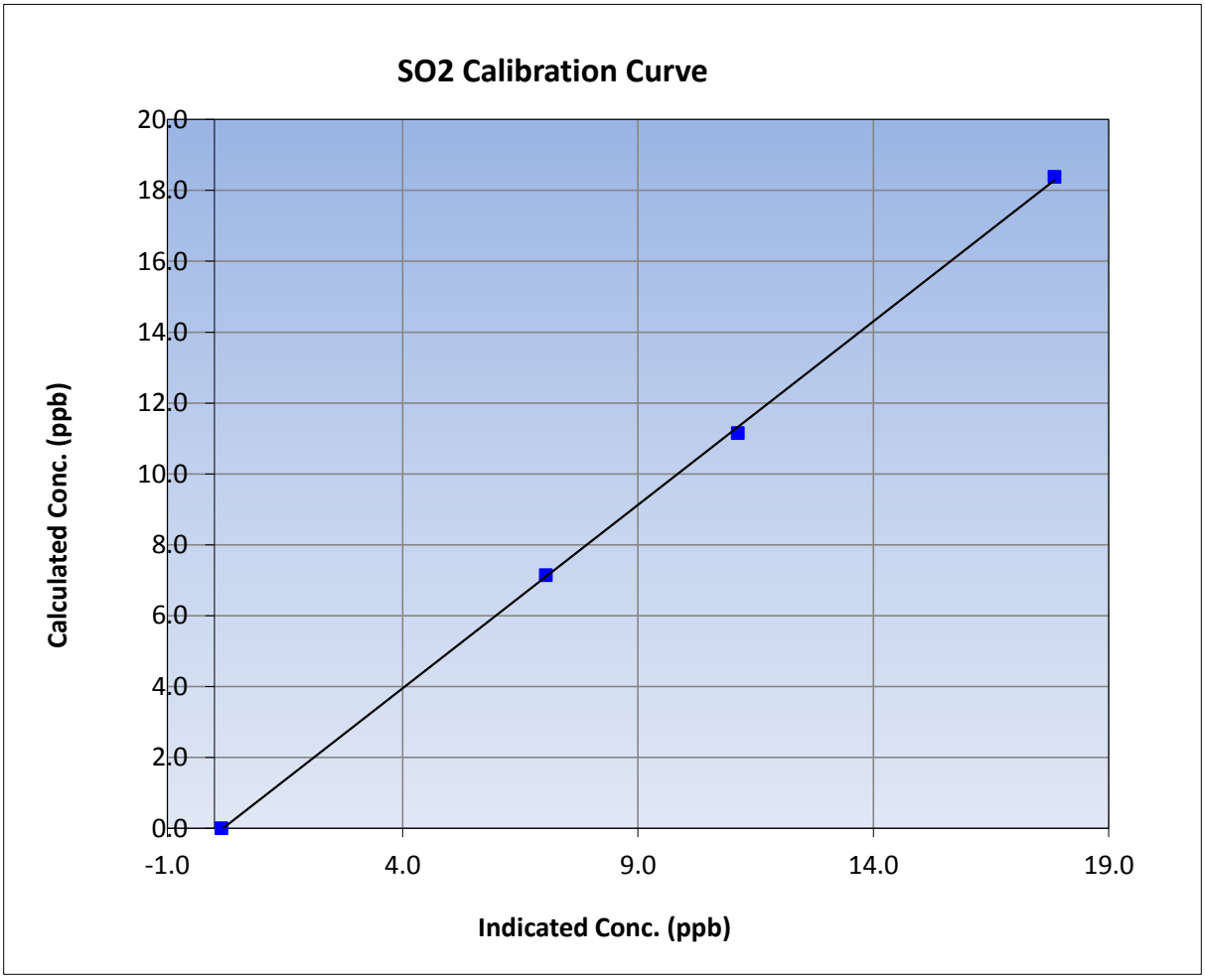
Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

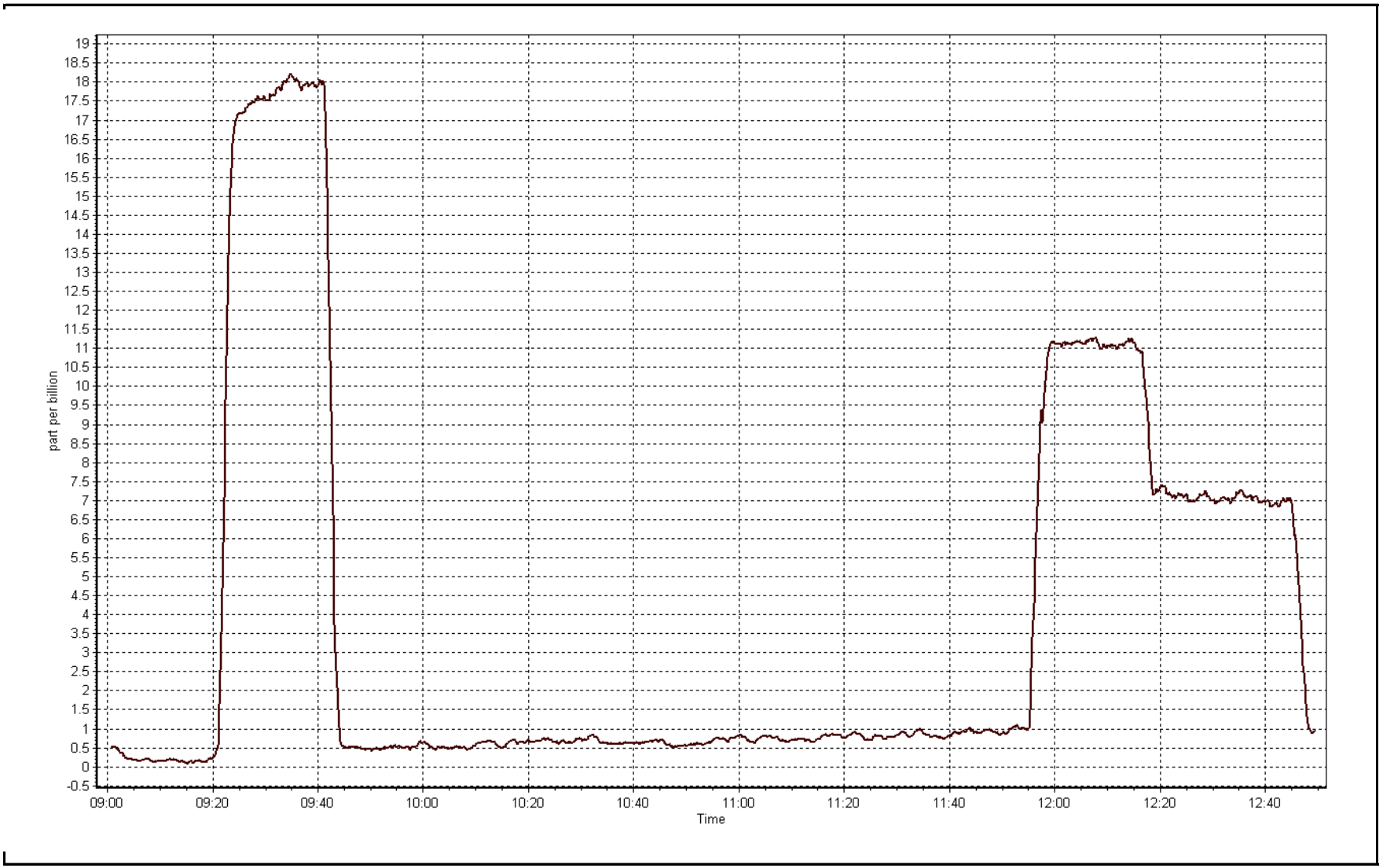
Calibration Date	April 18, 2016	Previous Calibration	April 5, 2016
Station Name	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	9:00	End Time (MST)	12:55
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1136451241

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	----	Correlation Coefficient	0.999772
18.4	17.9	1.0297		
11.2	11.1	1.0028	Slope	1.035627
7.1	7.0	1.0140		
			Intercept	-0.194315



SO2 Calibration Plot Date: April 18, 2016



Wood Buffalo Environmental Association
O_3 Calibration Report

Station Information

Calibration Date	April 5, 2016	Previous Calibration	March 11, 2016
Station Name	Fort Chipewyan	Station Number	AMS 8
Reason:	Routine		
Start Time (MST)	15:20	End Time (MST)	18:20
NO2 GPT Ref date	April-05-16	Transfer Standard	NO2
		Station temp.	23 Deg C
Calibrator Make/Model	Teledyne API 700	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.	38.4	38.8
Analyzer IP address	192.168.1.79		Lamp temp.	58.0	58.0
Calculated slope	0.999623	1.002347	Pressure	28.5	27.2
Calculated intercept	-0.139581	0.043811	Flow cell A	745	768
Analyzer Background	-0.4	-0.4	Flow cell B	745	768
Analyzer Coefficient	1.014	1.014	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 O3 generator reference voltage - generator drive voltage (ppb of O3 called from from calibrator)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
As found zero	6000	0.00	0.0	0.0	----
As found span	6000	237.0 - 830.8 (100ppb)	103.8	104.5	0.993
calibrator zero	6000	0.00	0.0	0.1	----
high point	6000	237.0 - 830.8 (100ppb)	103.8	103.7	1.001
second point	6000	188. - 797.0 (80ppb)	84.3	84.0	1.004
third point	6000	113.2 - 732.9 (50ppb)	53.3	52.9	1.007
as left zero	6000	0.00	0.0	0.0	----
as left span	6000	237.0 - 827.8 (100ppb)	103.8	104.4	0.995
				Average Correction Factor	1.004

Corrected As found	104.5	Previous response	104.0	% change	-0.5%

Notes:

Inlet filter changed after as founds. No adjustments made.

Calibration Performed By: Devin Russell

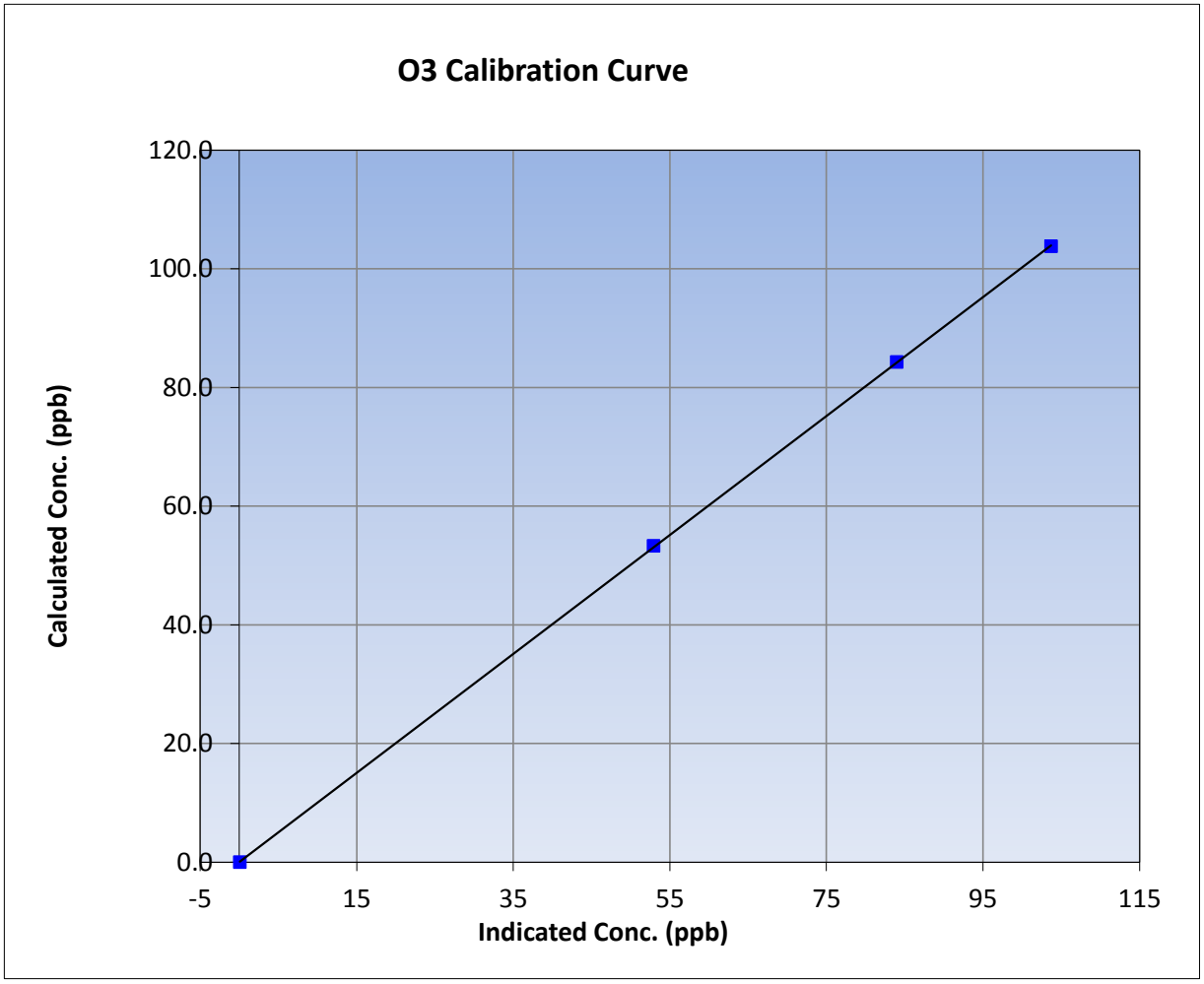
Wood Buffalo Environmental Association
O3 Calibration Report

Station Information

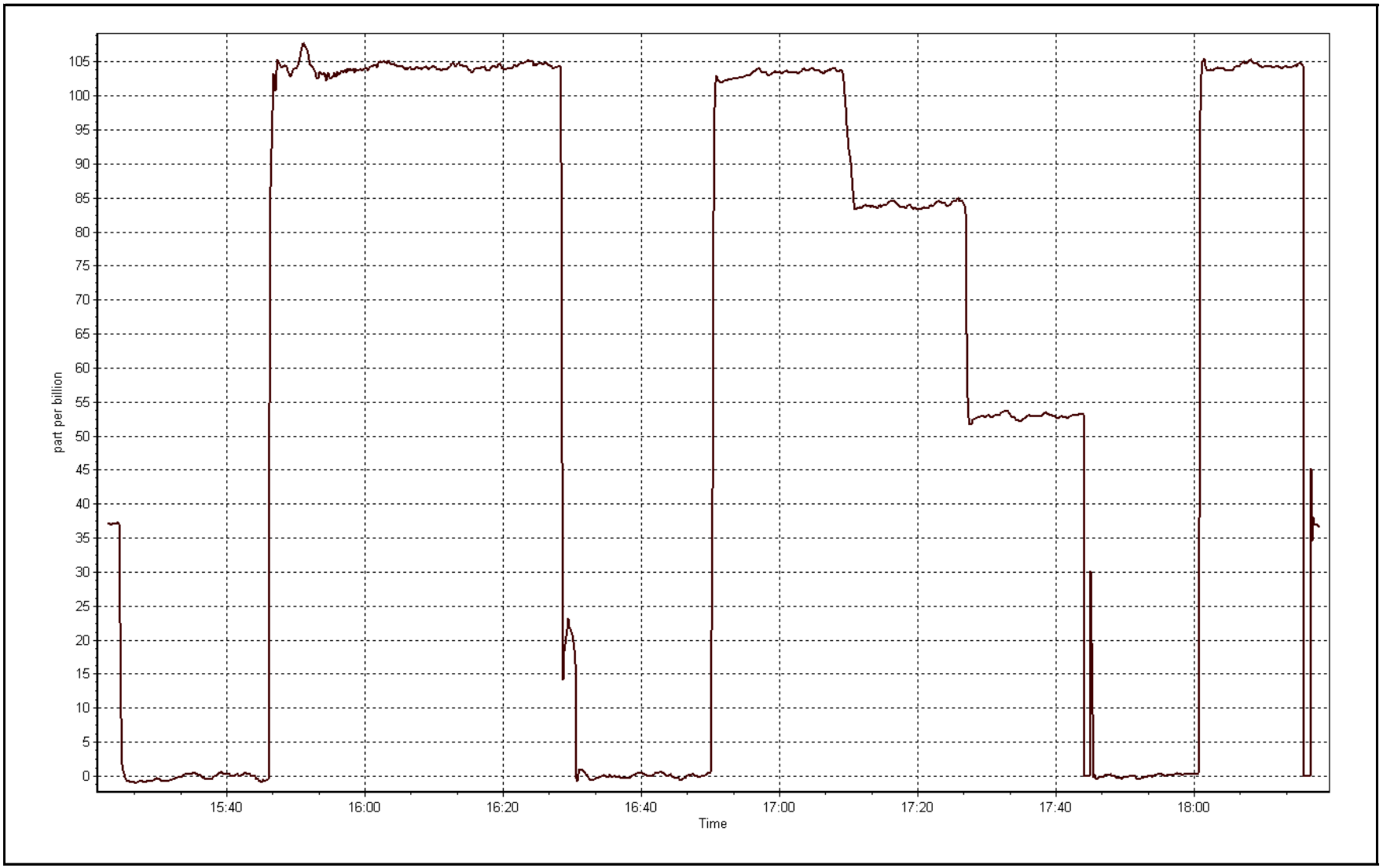
Calibration Date	April-05-16	Previous Calibration	March 11, 2016
Station Name	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	15:20	End Time (MST)	18:20
Analyzer make	Teledyne API T400	Analyzer serial #	1107

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	0.999986
103.8	103.7	1.0012		
84.3	84.0	1.0038	Slope	1.002347
53.3	52.9	1.0070		
			Intercept	0.043811



O3 Calibration Plot Date: April 5, 2016



Wood Buffalo Environmental Association
O_3 Calibration Report

Station Information

Calibration Date	April 18, 2016	Previous Calibration	April 5, 2016
Station Name	Fort Chipewyan	Station Number	AMS 8
Reason:	Other: Response check.		
Start Time (MST)	10:00	End Time (MST)	10:50
NO2 GPT Ref date	April-05-16	Transfer Standard	NO2
		Station temp.	23 Deg C
Calibrator Make/Model	Teledyne API 700	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.	38.8	38.8
Analyzer IP address	192.168.1.79		Lamp temp.	58.0	58.0
Calculated slope	1.002347	1.012241	Pressure	27.2	27.2
Calculated intercept	0.043811	-0.080979	Flow cell A	768	768
Analyzer Background	-0.4	-0.4	Flow cell B	768	768
Analyzer Coefficient	1.014	1.014	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 O3 generator reference voltage - generator drive voltage (ppb of O3 called from from calibrator)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
As found zero	6833	0.00	0.0	0.1	----
As found span	6724	238.2 - 829.7 (100ppb)	95.1	94.0	1.011
calibrator zero	6000	0.00	0.0	0.1	----
high point	6000	237.0 - 830.8 (100ppb)	95.1	94.0	1.011
second point					
third point					
as left zero					
as left span					
				Average Correction Factor	1.011

Corrected As found	94.0	Previous response	94.8	% change	0.9%

Notes:

Response check due to calibrator flow issue.

Calibration Performed By: Devin Russell

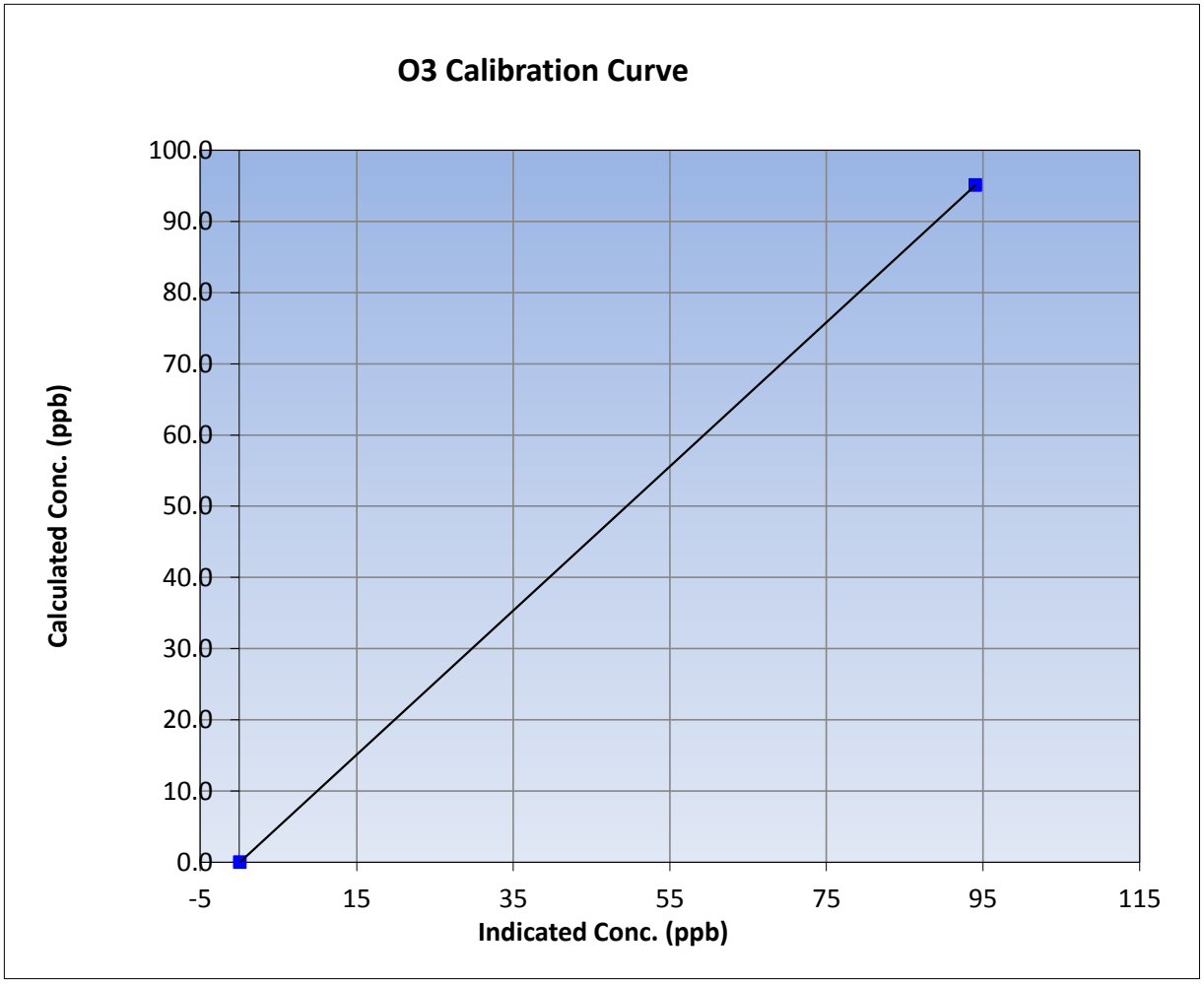
Wood Buffalo Environmental Association
O3 Calibration Report

Station Information

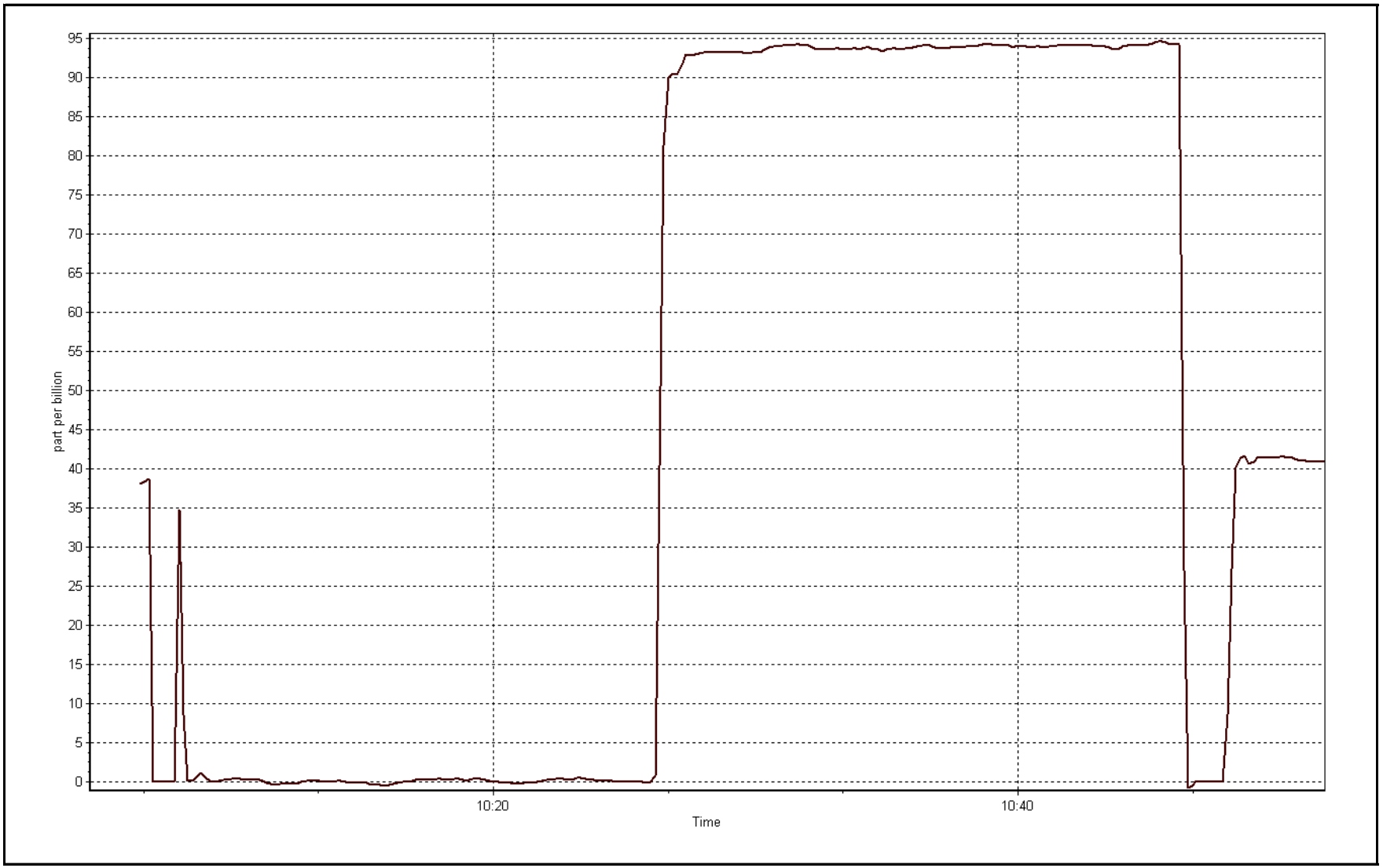
Calibration Date	April-18-16	Previous Calibration	April 5, 2016
Station Name	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	10:00	End Time (MST)	10:50
Analyzer make	Teledyne API T400	Analyzer serial #	1107

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	1.000000
95.1	94.0	1.0114		
			Slope	1.012241
			Intercept	-0.080979



O3 Calibration Plot Date: April 18, 2016



Wood Buffalo Environmental Association
NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	April 5, 2016	Previous Calibration	March 10, 2016
Station Name	Fort Chipewyan	Station Number	AMS 8
Reason:	Routine		
Start Time (MST)	10:30	End Time (MST)	15:15
NO Cal Gas Conc	20.1 ppm	Gas Cert Reference	LL79696
NOx Cal Gas Conc	20.1 ppm	Cal Gas Expiry Date	2/13/18
Calibrator	Teledyne API T700	Serial Number	747
Zero air Generator	Teledyne API 701	Serial Number	4698

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	8205

Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.998961	0.997295	1.005121
	Data Offset	0.562138	0.601448	0.024172
Current Calibration	Data Slope	1.003081	1.002726	1.003148
	Data Offset	-0.182881	-0.068690	0.146054

Analyzer Information

Analyzer make/model	Teledyne API T200u	Analyzer serial #	172

Test Point	before		after	
Concentration range	0-200	ppb	0-200	ppb
Analyzer IP	192.168.1.72		192.168.1.72	
NO coefficient	1.234		1.234	
NOX coefficient	1.244		1.244	
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	317.1	Deg C	314.5	Deg C
PMT voltage	502	V	502	V
PMT Temp	5	Deg C	5.1	Deg C
O3 flow	87	ccm	88	ccm
R Cell press NO	3.7	mmHg	3.8	mmHg
R Cell Press Nox	3.7	mmHg	3.8	mmHg
NO sample flow	1100	lpm	1111	lpm
Nox sample Flow	1100.000	lpm	1111.000	lpm

Notes:

Inlet filter changed after as founds. No adjustments made.

Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: April 5, 2016 Station Number: AMS 8

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	6000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
as found span	6000	44.8	150.1	150.1	0.0	146.7	146.6	0.1	1.0232	1.0239
calibrator zero	6000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
high point	6000	44.8	150.1	150.1	0.0	149.7	149.7	0.0	1.0029	1.0027
second point	6000	23.8	79.7	79.7	0.0	79.9	79.7	0.2	0.9977	1.0005
third point	6000	12.0	40.2	40.2	0.0	40.3	40.2	0.2	0.9965	1.0007
as left zero	6000	0.0	0.0	0.0	0.0	0.1	0.1	0.0	----	----
as left span	6000	44.8	150.1	45.3	104.8	149.2	45.3	103.9	1.0060	1.0002
								Average Correction Factor	0.9991	1.0013

Corrcted As found NO_X= 146.7 NO= 146.6 Percent Change NO_X= 2.0% NO= 2.2%

Previous Response NO_X= 149.7 NO= 149.9

GPT Calibration Data

Dilution Flow (total) 6000 ccm Source Gas Flow 44.80 ccm NOX ref calc conc = 150.1 ppb NO ref calc conc = 150.1 ppb

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
1st NO ref point		0.0	149.2	149.2	0.0	1.0057	1.0062	----	----
1st NO2 (300)	45.3	103.8	148.9	45.3	103.5	1.0082	----	1.0028	99.7%
2nd NO2 (200)	64.9	84.3	148.7	64.9	83.8	1.0093	----	1.0055	99.5%
3rd NO2 (100)	95.9	53.3	148.6	95.9	52.7	1.0103	----	1.0112	98.9%
2nd NO ref point	----	0.0	148.6	148.8	-0.1	1.0098	1.0089	----	----
				Average Correction Factor		1.0094		1.0065	99.4%

Calibration Performed By: Devin Russell

Wood Buffalo Environmental Association

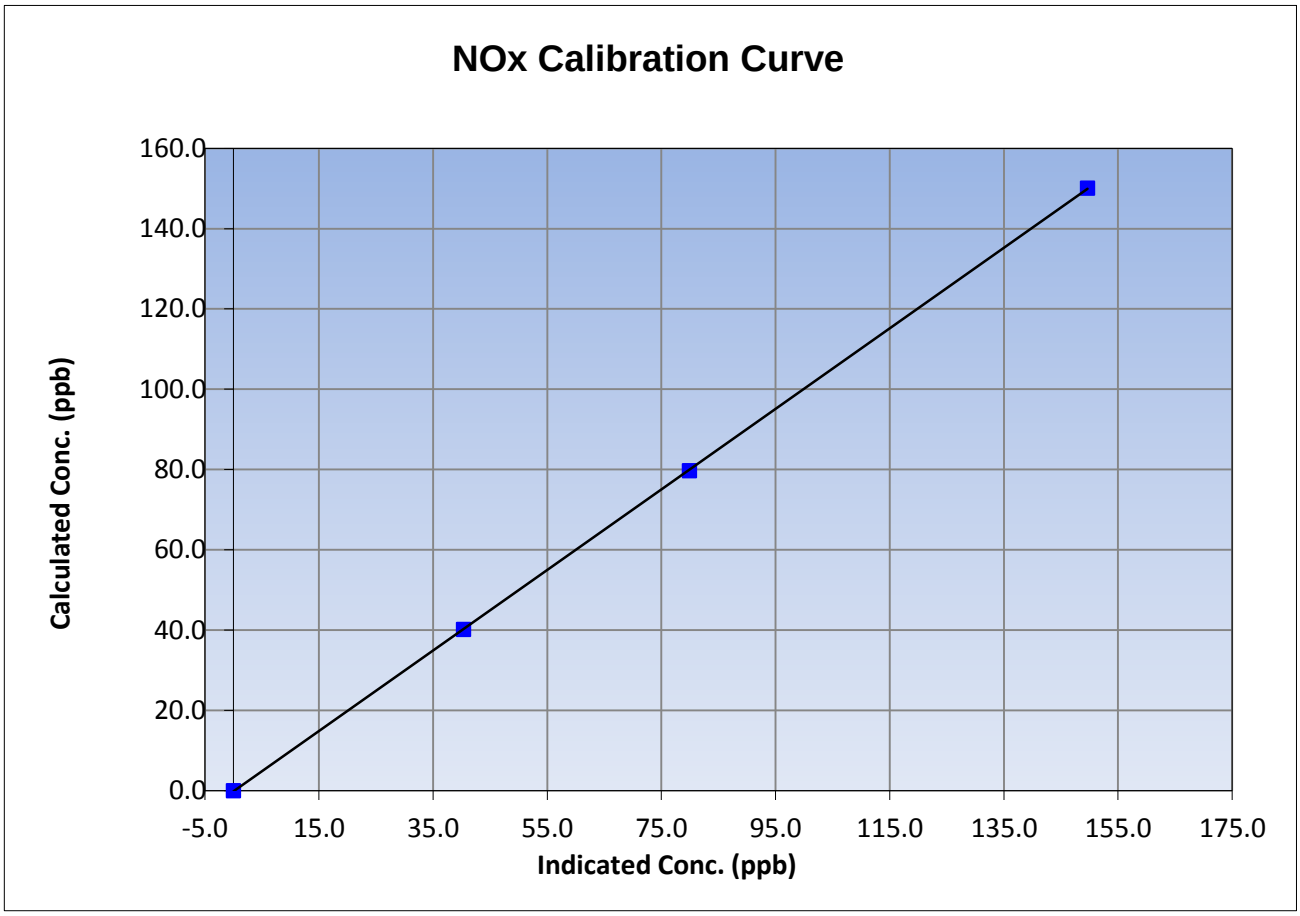
NO_X Calibration Summary

Station Information

Calibration Date	April 5, 2016	Previous Calibration	March 10, 2016
Station Name	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	10:30	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	----	Correlation Coefficient	0.999990
150.1	149.7	1.0029		
79.7	79.9	0.9977	Slope	1.003081
40.2	40.3	0.9965		
			Intercept	-0.182881



Wood Buffalo Environmental Association

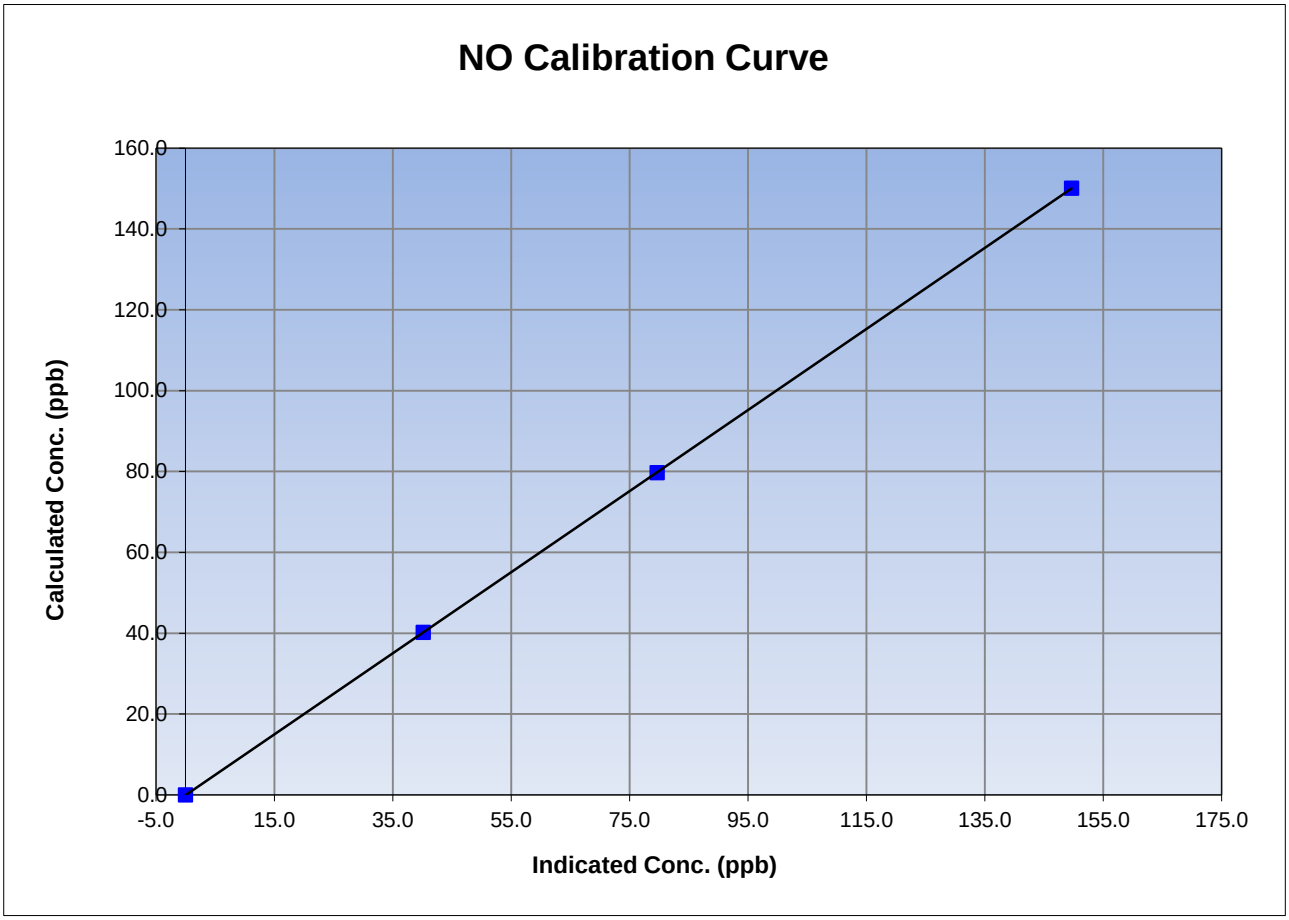
NO Calibration Summary

Station Information

Calibration Date	April 5, 2016	Previous Calibration	March 10, 2016
Station Name	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	10:30	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	0.999998
150.1	149.7	1.0027		
79.7	79.7	1.0005	Slope	1.002726
40.2	40.2	1.0007		
			Intercept	-0.068690



Wood Buffalo Environmental Association

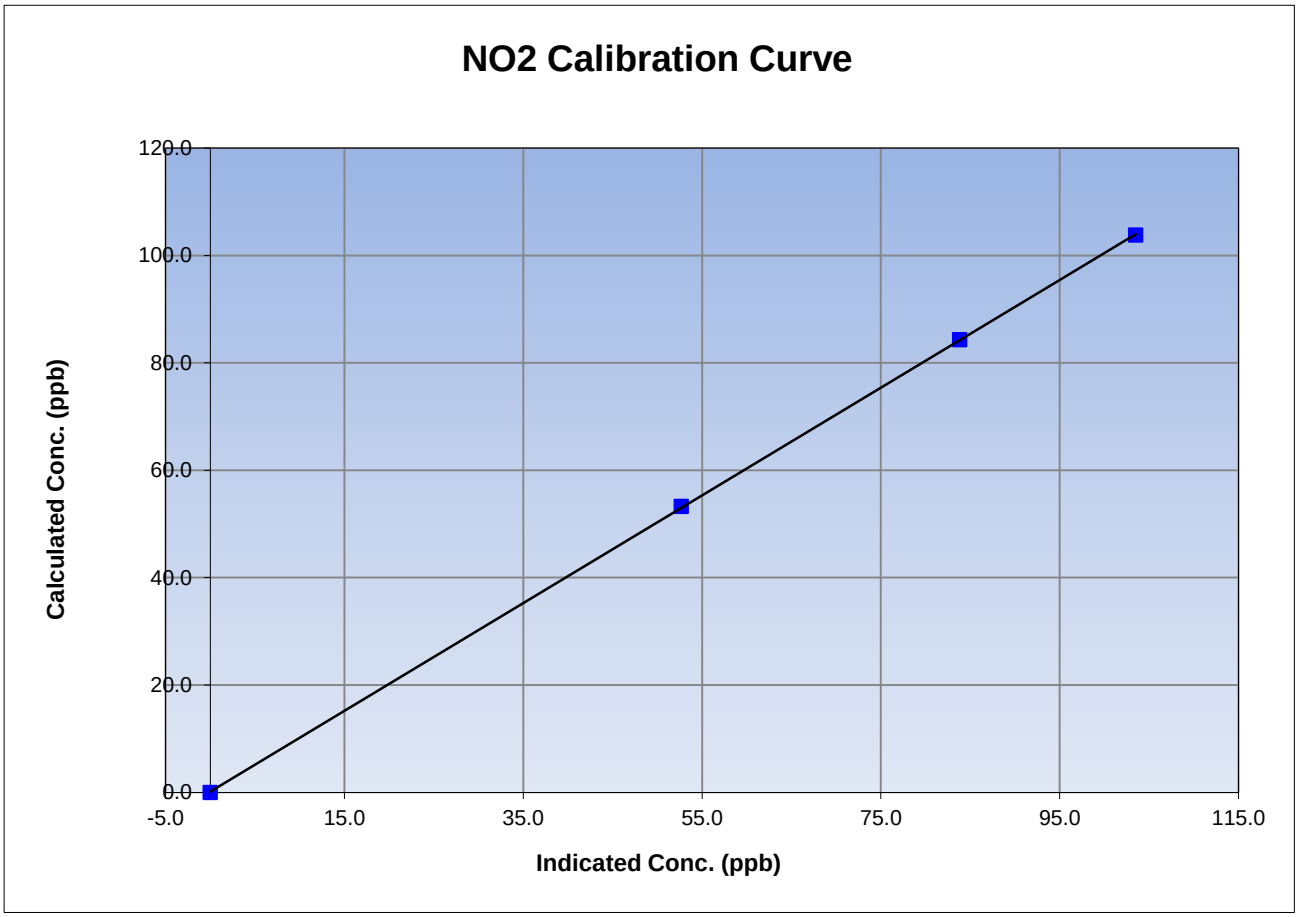
NO_2 Calibration Summary

Station Information

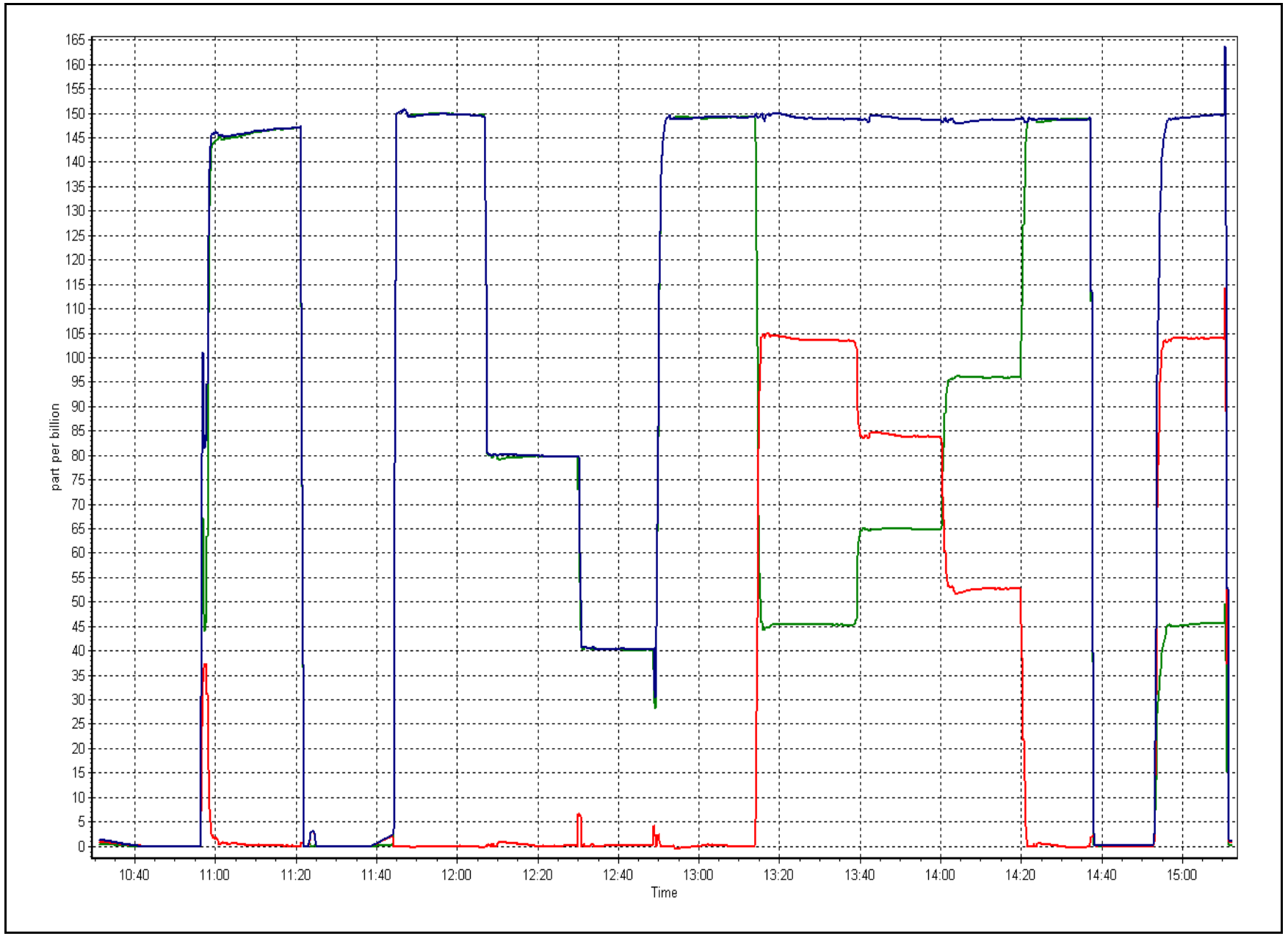
Calibration Date	April 5, 2016	Previous Calibration	March 10, 2016
Station Number	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	10:30	End Time (MST)	15:15
Analyzer make	Teledyne API T200u	Analyzer serial #	172

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999978
103.8	103.5	1.0028		
84.3	83.8	1.0055	Slope	1.003148
53.3	52.7	1.0112		
			Intercept	0.146054



NOX Calibration Plot Date: April 5, 2016



Wood Buffalo Environmental Association
NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	April 18, 2016	Previous Calibration	April 5, 2016
Station Name	Fort Chipewyan	Station Number	AMS 8
Reason:	Other: Response/linearity check		
Start Time (MST)	8:20	End Time (MST)	13:15
NO Cal Gas Conc	20.1 ppm	Gas Cert Reference	LL79696
NOx Cal Gas Conc	20.1 ppm	Cal Gas Expiry Date	2/13/18
Calibrator	Teledyne API T700	Serial Number	747
Zero air Generator	Teledyne API 701	Serial Number	4698

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	8205

Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	1.003081	1.002726	1.003148
	Data Offset	-0.182881	-0.068690	0.146054
Current Calibration	Data Slope	0.996769	0.994741	0.999159
	Data Offset	-0.109433	0.097563	-0.129891

Analyzer Information

Analyzer make/model	Teledyne API T200u	Analyzer serial #	172

Test Point	before		after	
Concentration range	0-200	ppb	0-200	ppb
Analyzer IP	192.168.1.72		192.168.1.72	
NO coefficient	1.234		1.234	
NOX coefficient	1.244		1.244	
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	314.5	Deg C	314.5	Deg C
PMT voltage	502	V	502	V
PMT Temp	5.1	Deg C	5.1	Deg C
O3 flow	88	ccm	88	ccm
R Cell press NO	3.8	mmHg	3.8	mmHg
R Cell Press Nox	3.8	mmHg	3.8	mmHg
NO sample flow	1111	lpm	1111	lpm
Nox sample Flow	1111.000	lpm	1111.000	lpm

Notes:

Response/linearity check due to calibrator flow issue.

Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: April 18, 2016 Station Number: AMS 8

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	6835	0.0	0.0	0.0	0.0	0.1	-0.1	0.1	----	----
as found span	6840	53.5	157.2	157.2	0.0	157.6	157.8	-0.2	0.9974	0.9964
calibrator zero	6835	0.0	0.0	0.0	0.0	0.1	-0.1	0.1	----	----
high point	6840	53.5	157.2	157.2	0.0	157.6	157.8	-0.2	0.9974	0.9964
second point	6849	32.5	95.4	95.4	0.0	96.4	96.3	0.0	0.9899	0.9904
third point	6847	20.8	61.1	61.1	0.0	61.1	60.9	0.2	1.0002	1.0030
as left zero										
as left span										
								Average Correction Factor	0.9958	0.9966

Corrcted As found NO_X= 157.5 NO= 157.8 Percent Change NO_X= -0.4% NO= -0.6%

Previous Response NO_X= 156.9 NO= 156.9

GPT Calibration Data

Dilution Flow (total) 6840 ccm Source Gas Flow 53.50 ccm NOX ref calc conc = 157.2 ppb NO ref calc conc = 157.2 ppb

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
1st NO ref point		0.0	157.6	157.8	0.1	0.9974	0.9964	----	----
1st NO2 (300)	62.7	95.1	158.0	62.7	95.3	0.9951	----	0.9978	100.2%
2nd NO2 (200)									
3rd NO2 (100)									
2nd NO ref point		0.0							
				Average Correction Factor		0.9951		0.9978	100.2%

Calibration Performed By: Devin Russell

Wood Buffalo Environmental Association

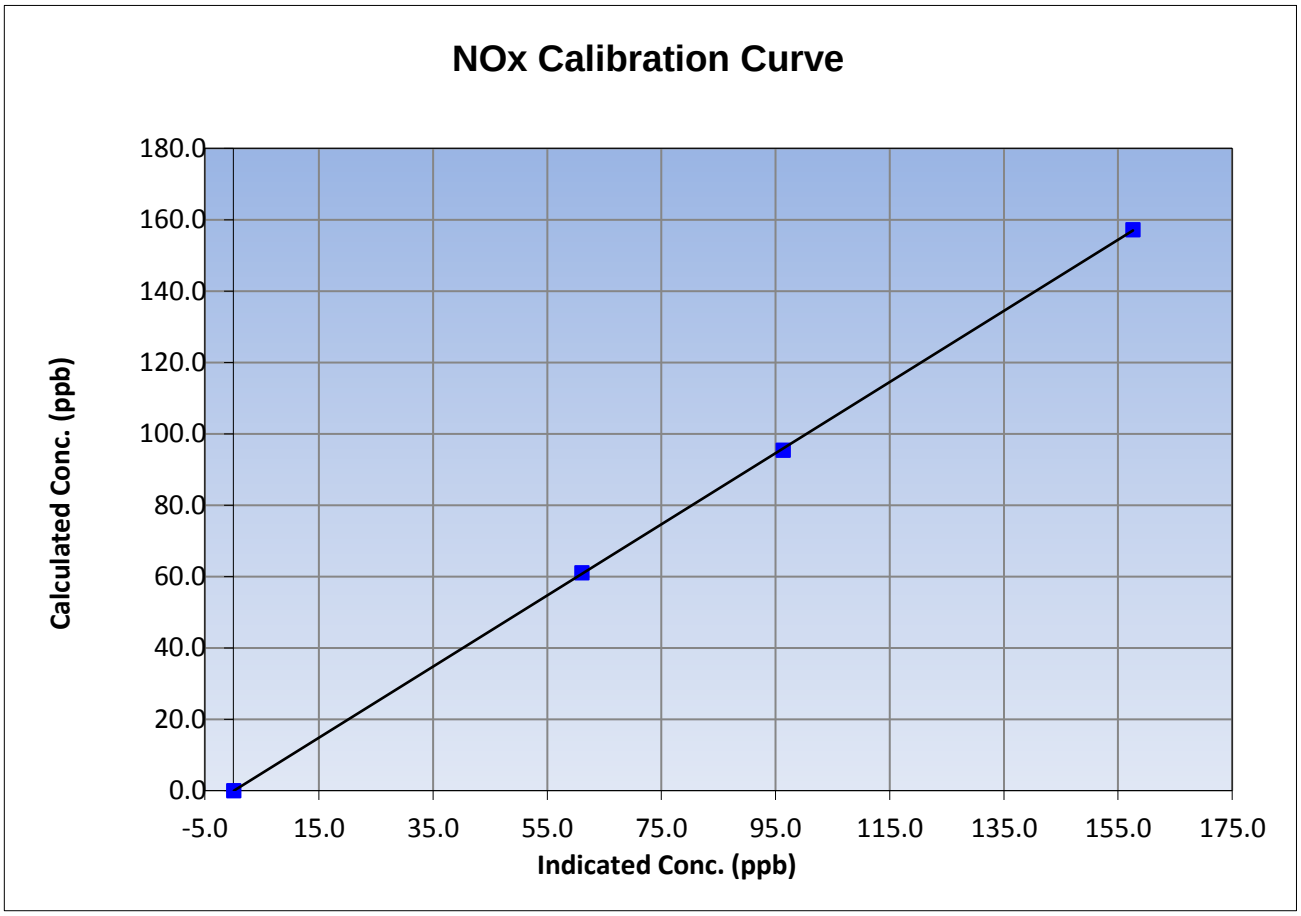
NO_X Calibration Summary

Station Information

Calibration Date	April 18, 2016	Previous Calibration	April 5, 2016
Station Name	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	8:20	End Time (MST)	13:15
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	0.999965
157.2	157.6	0.9974		
95.4	96.4	0.9899	Slope	0.996769
61.1	61.1	1.0002		
			Intercept	-0.109433



Wood Buffalo Environmental Association

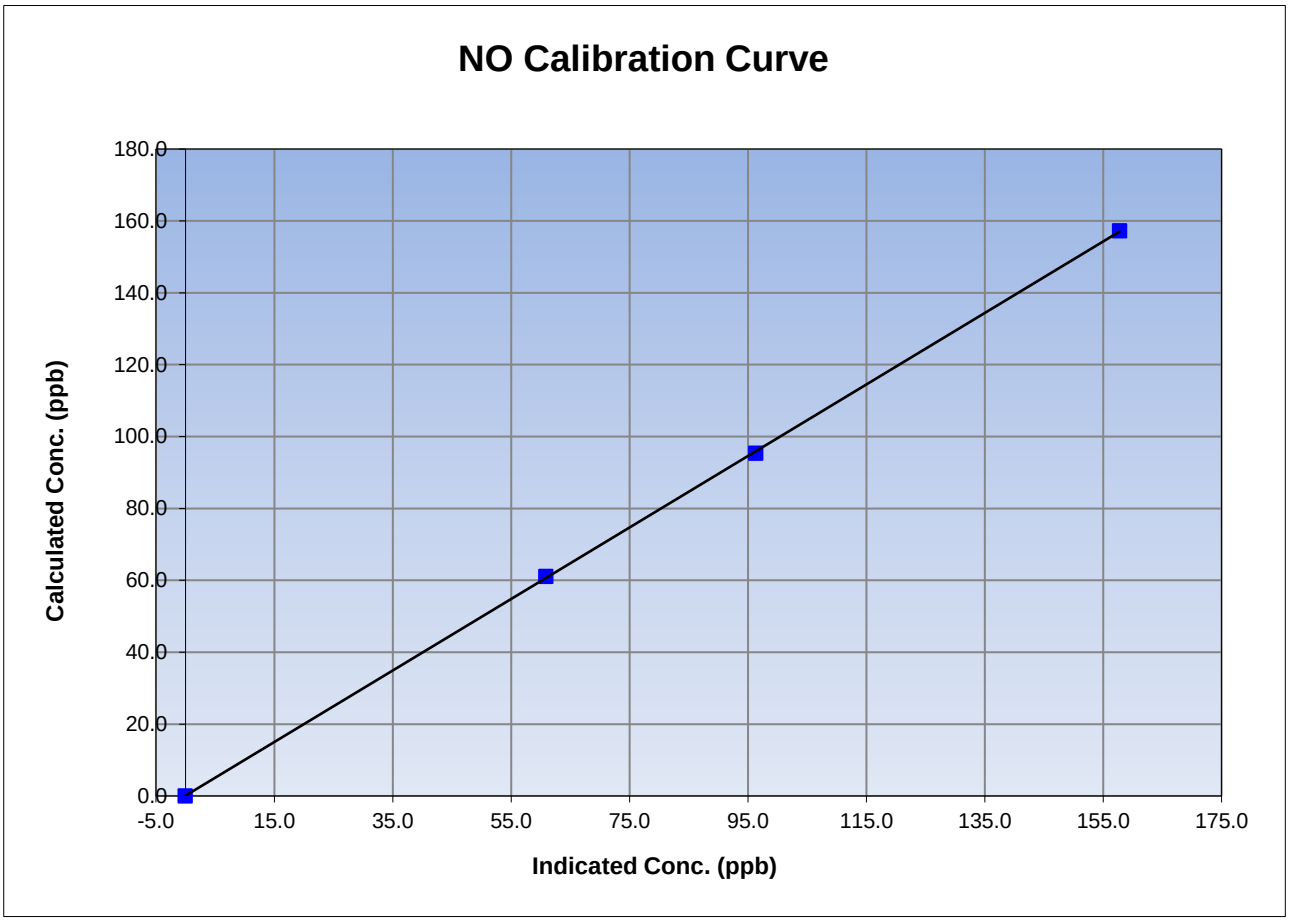
NO Calibration Summary

Station Information

Calibration Date	April 18, 2016	Previous Calibration	April 5, 2016
Station Name	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	8:20	End Time (MST)	13:15
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	0.999965
157.2	157.8	0.9964		
95.4	96.3	0.9904	Slope	0.994741
61.1	60.9	1.0030		
			Intercept	0.097563



Wood Buffalo Environmental Association

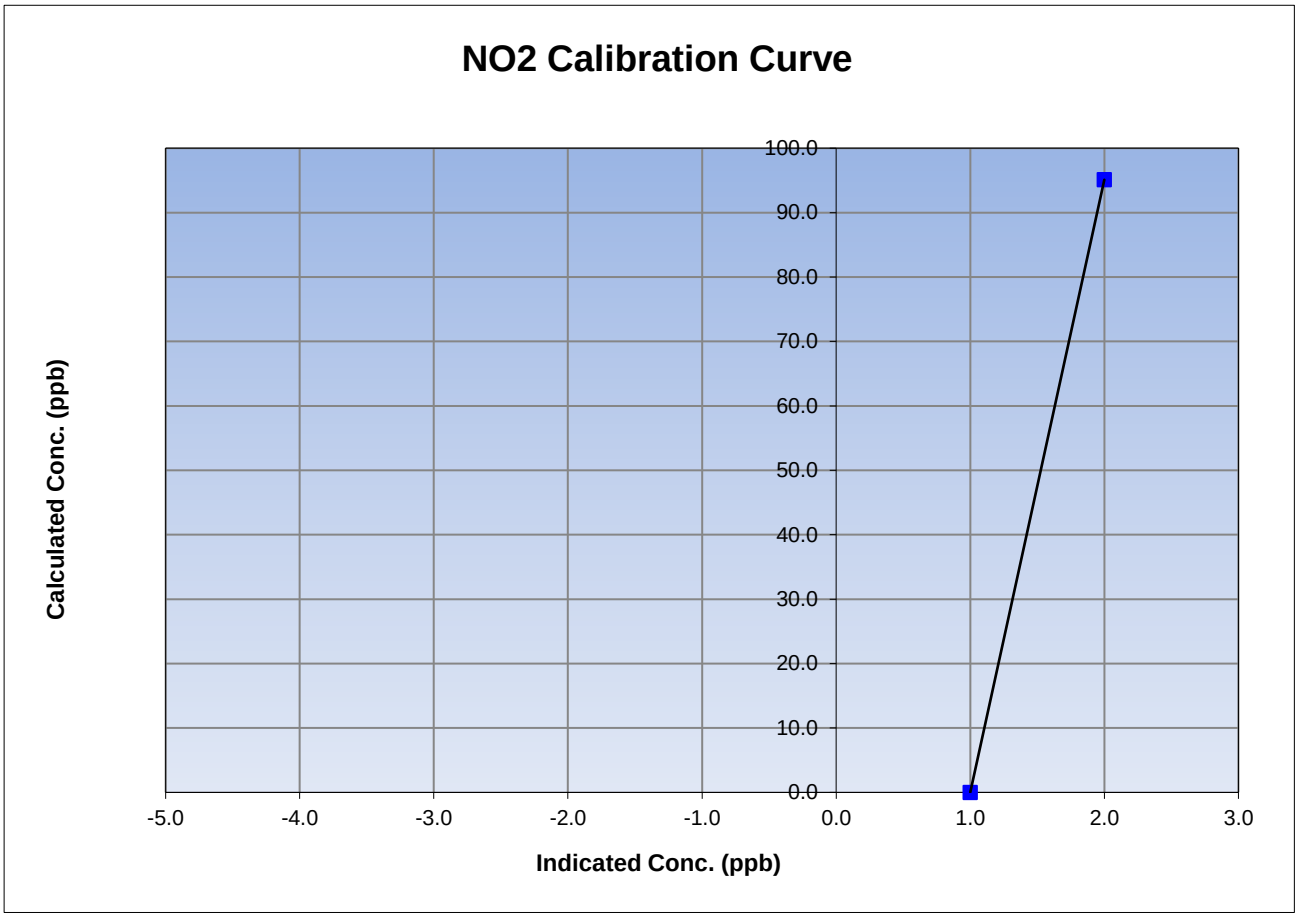
NO_2 Calibration Summary

Station Information

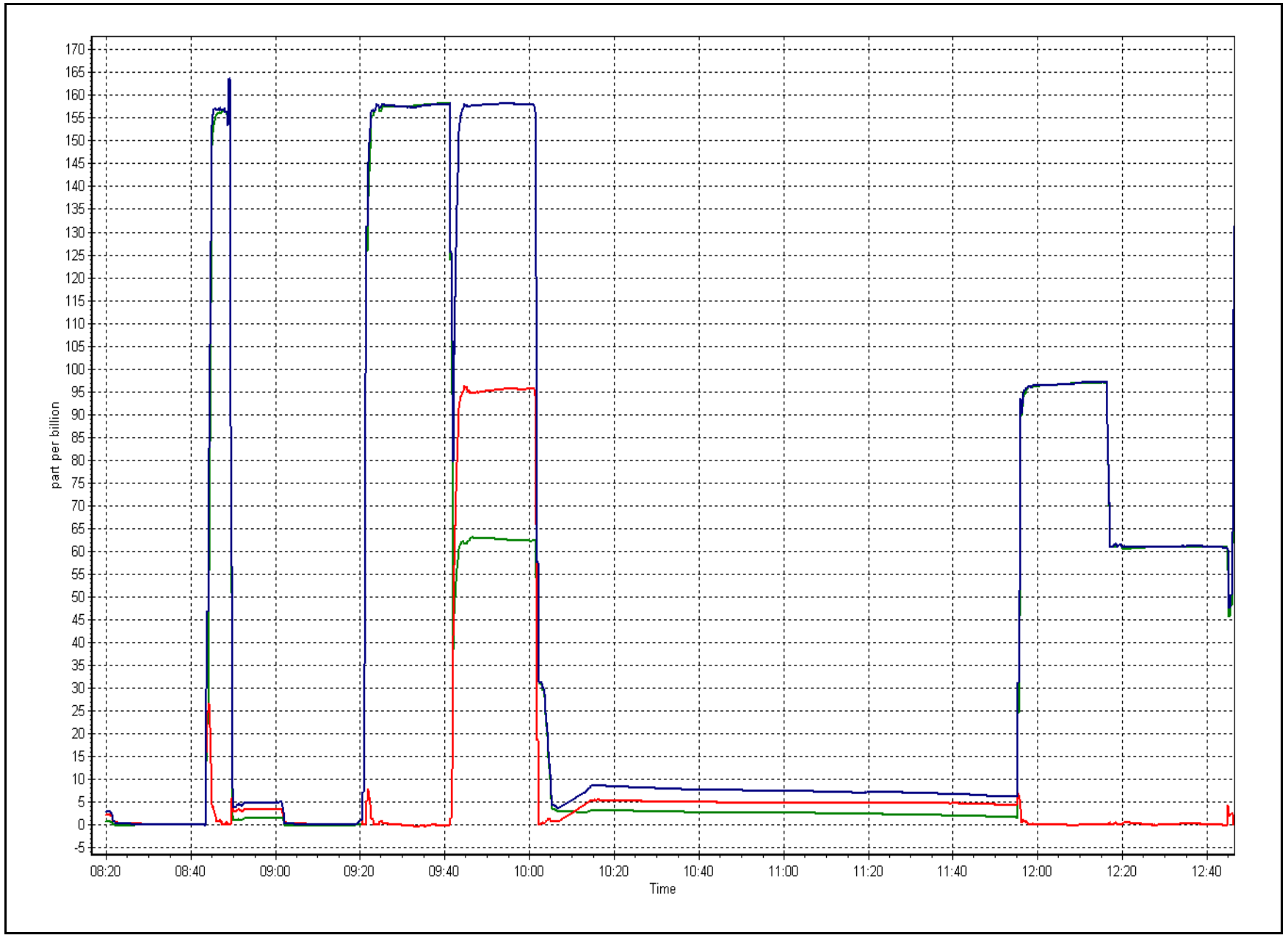
Calibration Date	April 18, 2016	Previous Calibration	April 5, 2016
Station Number	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	8:20	End Time (MST)	13:15
Analyzer make	Teledyne API T200u	Analyzer serial #	172

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	N/A	Correlation Coefficient	1.000000
95.1	95.3	0.9978		
			Slope	0.999159
			Intercept	-0.129891



NOX Calibration Plot Date: April 18, 2016



Wood Buffalo Environmental Association

SHARP CALIBRATION

STATION INFORMATION

Calibration Date:	April 5, 2016	Previous Calibration:	March 10, 2016
Station Name:	Fort Chipewyan	Station Number:	AMS 8
Start Time (MST):	10:40	End Time (MST):	17:20
Calibrator Make/Model:	Delta Cal	Calibrator Serial Number:	141228

SHARP INFORMATION

Particulate Fraction:	PM2.5
Make/Model:	Thermo / SHARP 5030
Serial Number	E-2025
C_{14} Source SN:	7414
Confirmation of Time settings:	Yes ☑ No ☐

Paremeters Checked: T1 ☑ T2 ☐ T3 ☐ T4 ☐ P3 ☐ Main Flow ☑ Beta ☐ Neph ☑

CALIBRATION DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	-7.0	-8.5	-1.5	-8.0
T2	17.0	na	na	18.0
T3	18.0	na	na	18.0
T4	20.0	na	na	20.0
RH (%)	15.0	na	na	15.0

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	990	984.1	-5.9	984

Main Flow (Lph)

Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
1000	1008	8	1000	1000

Nephalometer Calibration

Parameter	As Founds	Zeroed (Limit +or- 2.0ug/m3)	As Left
Analog	190		201
Neph	0		-0.1
C14	30.7		10.4
Indicated Concentration (ug/m3)	**0**	**yes**	**-0.1**
Offset 1	191.2		201.4
Offset 2	32		33

Leak Check (Quarterly)

Leak Check Date: March 10, 2016 Previous Leak Check Date: October 7, 2015

	Measured	Difference LPM (Limit +/- 0.42 LPM)
Flow without adaptor (LPM):	16.71	0.09
*Flow with adaptor (LPM):	16.62	

**Note - do not attach adaptor without shutting off the pump first*

Mass Foil Calibration (Annualy)

Foil Calibration Date: April 5, 2016 Previous Foil Calibration: May 6, 2015

Zeroed?:	
Foil Mass:	1324
Previous Correction Factor:	7022
New Correction Factor:	7108

Mass foil set S/N:5868

INSPECTION DATA

Item	Condition	Date of install or rebuild
Cyclone	Good/Clean	03/02/2016
Pump	Good	NA
Filter Tape	Good	NA
Mass Foil Cal Set	Good	NA
HEPA filter	Good	NA

NOTES:

Cyclone head did not require cleaning. T1, T2, T3, and T4 adjusted. RH adjusted. P1 adjusted. Flow adjusted. Nephalometer checked before and after maintenance. Zeroed after maintenance completed.

Calibration Performed By: **Devin Russell**

Wood Buffalo Environmental Association

SHARP CALIBRATION

STATION INFORMATION

Calibration Date:	April 6, 2016	Previous Calibration:	April 5, 2016
Station Name:	Fort Chipewyan	Station Number:	AMS 8
Start Time (MST):	8:25	End Time (MST):	13:00
Calibrator Make/Model:	Delta Cal	Calibrator Serial Number:	141228

SHARP INFORMATION

Particulate Fraction:	PM2.5
Make/Model:	Thermo / SHARP 5030
Serial Number	E-2025
C_{14} Source SN:	7414
Confirmation of Time settings:	Yes ☑ No ☐

Paremeters Checked: T1 ☐ T2 ☐ T3 ☐ T4 ☐ P3 ☐ Main Flow ☐ Beta ☐ Neph ☑

CALIBRATION DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1			0.0	
T2		na	na	
T3		na	na	
T4		na	na	
RH (%)		na	na	

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3			0.0	

Main Flow (Lph)

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

Nephalometer Calibration

Parameter	As Founds	Zeroed (Limit +or- 2.0ug/m3)	As Left
Analog	201		200
Neph	1.3		0
C14	85		31.1
Indicated Concentration (ug/m3)	**1.3**	**yes**	**0**
Offset 1	201.4		201.3
Offset 2	33		32.9

Leak Check (Quarterly)

Leak Check Date:	March 10, 2016	Previous Leak Check Date:	October 7, 2015

	Measured	Difference LPM (Limit +/- 0.42 LPM)
Flow without adaptor (LPM):	16.71	0.09
*Flow with adaptor (LPM):	16.62	

**Note - do not attach adaptor without shutting off the pump first*

Mass Foil Calibration (Annualy)

Foil Calibration Date:	April 5, 2016	Previous Foil Calibration:	May 6, 2015
Zeroed?:			
Foil Mass:	1324		Mass foil set S/N:5868
Previous Correction Factor:	7022		
New Correction Factor:	7108		

INSPECTION DATA

Item	Condition	Date of install or rebuild
Cyclone	Good/Clean	03/02/2016
Pump	Good	NA
Filter Tape	Good	NA
Mass Foil Cal Set	Good	05/04/2016
HEPA filter	Good	06/04/2016

NOTES:

Nephalometer zero checked. Beta attenuation chamber cleaned. Nephalometer zero adjusted.

Calibration Performed By: **Devin Russell**

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 9
BARGE LANDING
APRIL 2016

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

May 27, 2016

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BARGE LANDING (AMS 9)
APRIL 2016

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
TRS(ppb) Average	678	34	42	98.89	3	0	1	0
THC(ppm) Average	679	34	41	99.03	4.7	-	2.5	-
Temperature (C) Average	720	0	0	100.00	28.7	-	17.3	-
Relative Humidity (%) Average	720	0	0	100.00	99	-	92	-
Wind Speed 10 m (km/h) Average	674	0	46	93.61	22	-	12	-
Wind Direction 10 m (deg) Average	674	0	46	93.61	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BARGE LANDING (AMS 9)
APRIL 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

					Percentile						
Parameter	Number	Mean	StnDev	Total	Min	P10	Q1	Median	Q3	P90	Max
TRS(ppb) Average	678	0.3	0	-	0	0	0	0	0	1	3
THC(ppm) Average	679	2.29	0.2	-	2	2.1	2.2	2.2	2.3	2.5	4.7
Temperature (C) Average	720	3.89	8.2	-	-13.8	-6	-1.9	2.8	8.4	16.7	28.7
Relative Humidity (%) Average	720	57.4	22	-	13	26	40	58	75	87	99
Wind Speed 10 m (km/h) Average	674	7.4	4	-	0	3	5	7	10	12	22
Wind Direction 10 m (deg) Average	674	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BARGE LANDING (AMS 9)
APRIL 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
TRS	06 Apr 2016 19:00	07 Apr 2016 01:00	7	Station power failure
TRS	08 Apr 2016 13:00	08 Apr 2016 13:00	1	Maintenance - sample manifold cleaned
THC	06 Apr 2016 19:00	07 Apr 2016 01:00	7	Station power failure
Wind Speed, Wind Direction	06 Apr 2016 09:00	07 Apr 2016 14:00	30	Flat line in sensor output signal -sensor frozen
Wind Speed, Wind Direction	07 Apr 2016 17:00	08 Apr 2016 07:00	15	Flat line in sensor output signal -sensor frozen
Wind Speed, Wind Direction	15 Apr 2016 06:00	15 Apr 2016 06:00	1	Flat line in sensor output signal -sensor frozen

Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

Barge Landing - April 2016

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

Maximum Value: 3 ppb on Apr 18 18:00 Maximum Daily Average: 1.0 ppb on Apr 18

Minimum Value: 0 ppb on Apr 17 15:00 Minimum Daily Average: 0.2 ppb on Apr 20

Maximum Diurnal Average: 0.5 ppb at hour 9 Minimum Diurnal Average: 0.2 ppb at hour 20

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:	720
Hours of Data:	678
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-Apr	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
2-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
3-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
4-Apr	0	0	0	0	0	Z	0	0	1	2	1	1	1	1	1	1	1	0	0	0	2	0	0	0	0.6	2
5-Apr	0	0	0	0	0	0	Z	0	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.4	2
6-Apr	0	Z	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	PF	PF	PF	PF	PF	PF	--	1
7-Apr	PF	1	Z	0	0	0	0	0	0	0	0	C	C	C	C	1	0	0	0	0	0	0	0	0	0.4	1
8-Apr	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
9-Apr	0	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
10-Apr	0	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
11-Apr	0	0	0	0	0	0	Z	1	1	1	1	1	0	1	0	0	0	0	1	0	0	0	0	0	0.4	1
12-Apr	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.3	1
13-Apr	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
14-Apr	0	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
15-Apr	0	0	0	0	Z	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0.3	1
16-Apr	0	0	0	0	0	Z	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
17-Apr	1	1	1	0	0	0	Z	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2
18-Apr	0	Z	0	0	0	1	1	2	2	1	1	0	0	0	0	0	3	3	3	0	1	0	1	1	1.0	3
19-Apr	2	2	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2
20-Apr	0	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
21-Apr	0	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
22-Apr	0	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
23-Apr	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
24-Apr	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	1
25-Apr	0	0	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
26-Apr	0	0	0	Z	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.4	1
27-Apr	0	0	0	0	Z	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
28-Apr	0	0	0	0	0	Z	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
29-Apr	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.3	1
30-Apr	1	Z	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
	0.4	0.4	0.3	0.3	0.3	0.3	0.4	0.4	0.5	0.5	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.3	Diurnal Average	
	2	2	1	1	1	1	1	2	2	2	1	1	1	1	1	1	3	3	3	0	2	1	1	1	Diurnal Maximum	

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

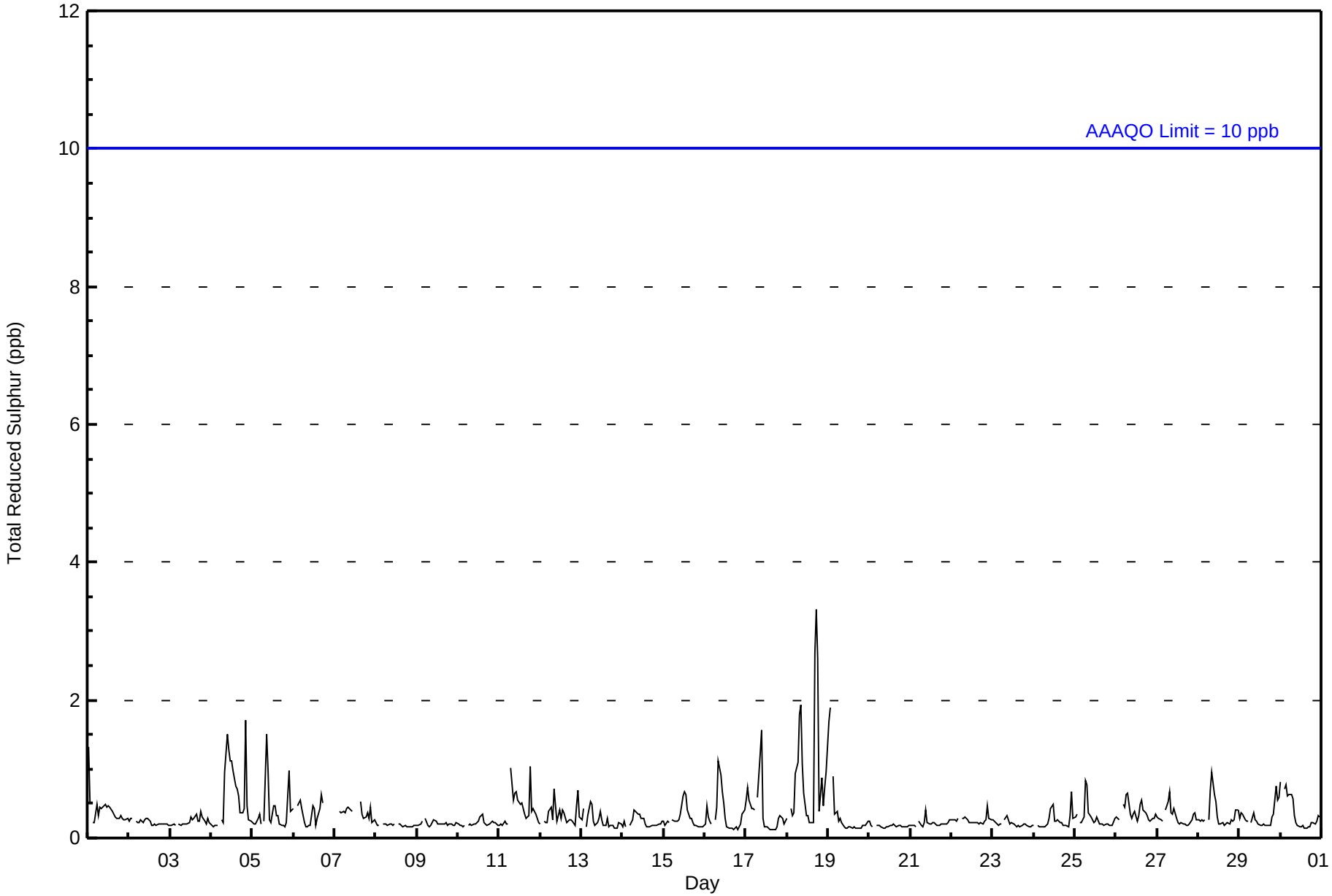
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb

Wood Buffalo Environmental Association

Hourly Averages

Total Reduced Sulphur (TRS) - ppb

Barge Landing - April 2016



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb

Barge Landing - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	675	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: 678

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Total Reduced Sulphur (TRS) - ppb

Barge Landing - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 2	89	89	55	26	9	12	60	70	89	38	18	7	20	10	10	39	641
3 - 4	0	0	0	0	0	0	0	0	3	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	89	89	55	26	9	12	60	70	92	38	18	7	20	10	10	39	644

Total Number of Valid Hours: 644

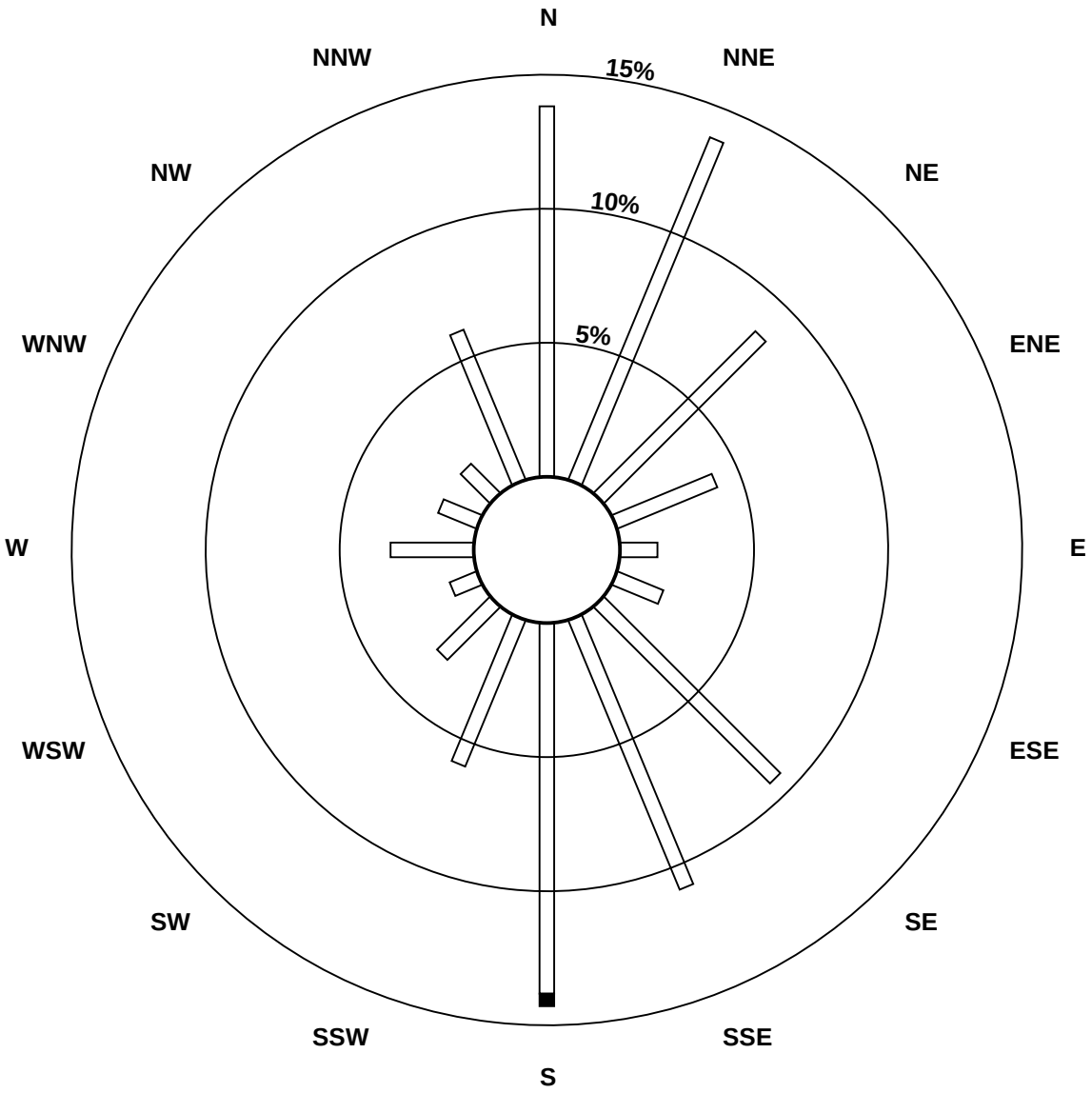
Total Number of Hours: 720

Wood Buffalo Environmental Association

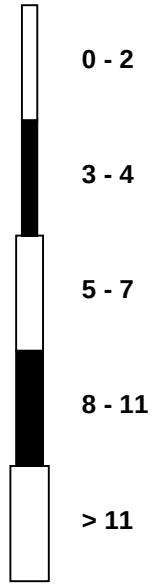
Wind Rose Apr 2016

Total Reduced Sulphur (TRS) - ppb

Barge Landing (AMS 9)



Classes (ppb)



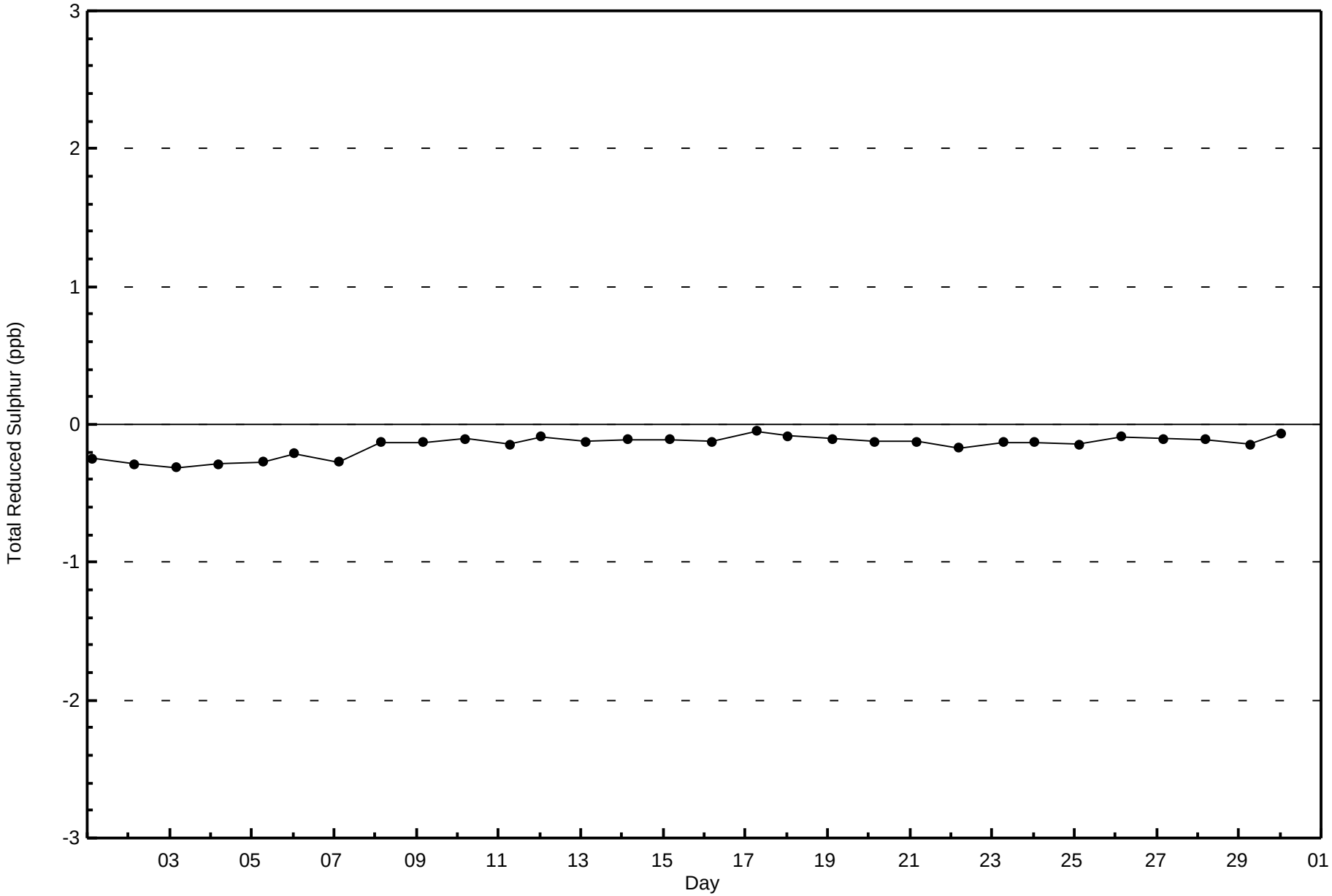
Total Number of Valid Hours: 644

Wood Buffalo Environmental Association

Zero Responses

Total Reduced Sulphur (TRS) - ppb

Barge Landing - April 2016

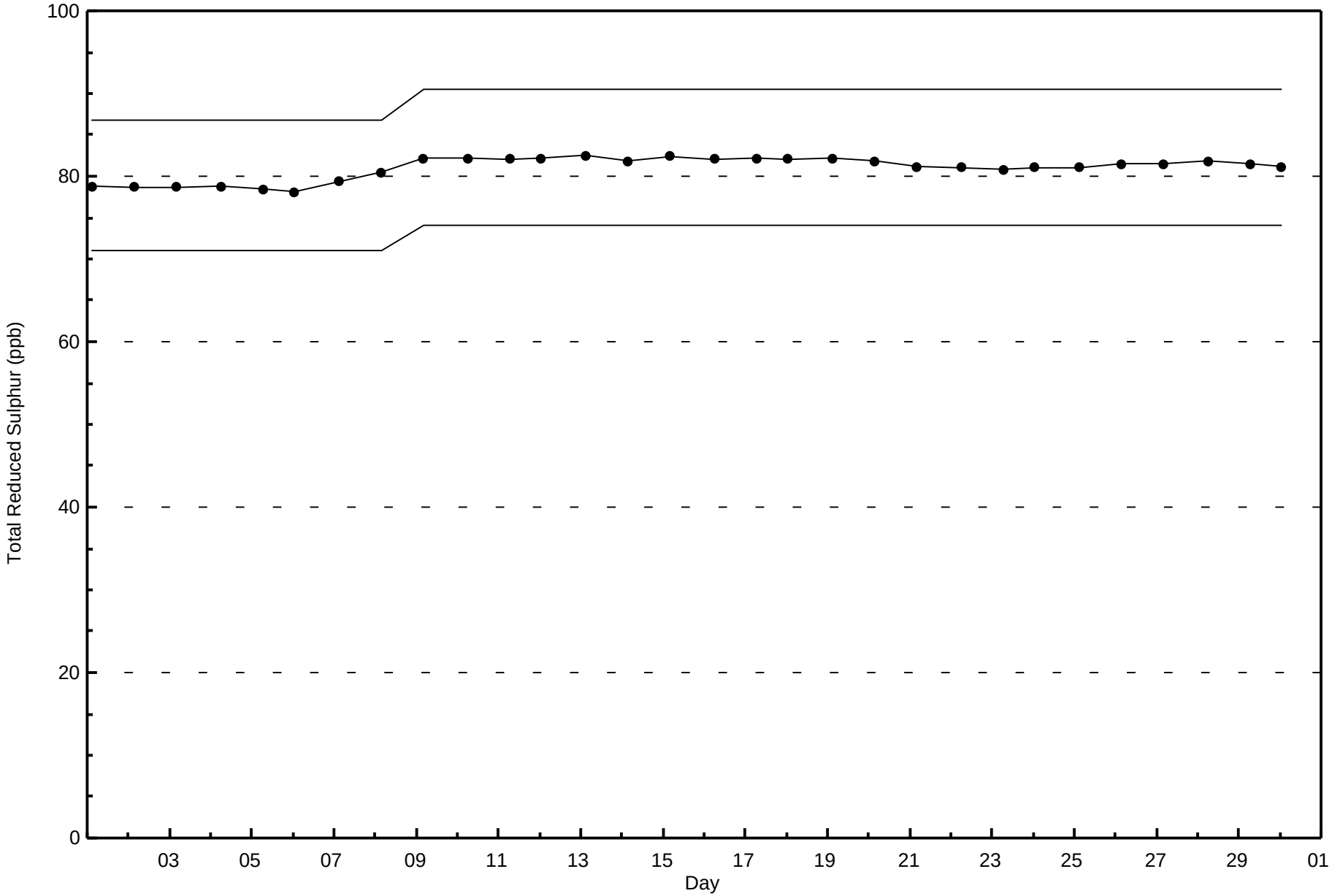


Wood Buffalo Environmental Association

Span Responses

Total Reduced Sulphur (TRS) - ppb

Barge Landing - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Barge Landing - April 2016

Maximum Value: 4.7 ppm on Apr 11 19:00

Maximum Daily Average: 2.5 ppm on Apr 27

Minimum Value: 2.0 ppm on Apr 19 17:00

Minimum Daily Average: 2.1 ppm on Apr 19

Maximum Diurnal Average: 2.4 ppm at hour 21

Minimum Diurnal Average: 2.2 ppm at hour 16

Monthly Average: 2.29 ppm

Percentiles: P_1 = 2.0 P_{10} = 2.1 Q_1 = 2.2 Median = 2.2 Q_3 = 2.3 P_{90} = 2.5 P_{99} = 3.0

Hours in Service:	720
Hours of Data:	679
Hours of Missing Data:	41
Hours of Calibration:	34
Percent Operational Time:	99.0

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-Apr	2.7	Z	2.2	2.2	2.2	2.9	2.5	2.4	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.3	2.2	2.3	2.3	2.3	2.9
2-Apr	2.3	2.3	Z	2.2	2.2	2.2	2.2	2.3	2.2	2.4	2.3	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.4
3-Apr	2.1	2.1	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.4	2.3	2.4	2.3	2.3	2.3	2.2	2.4	2.3	2.3	2.4
4-Apr	2.1	2.2	2.2	2.2	Z	2.2	2.3	2.3	2.5	2.4	2.4	2.3	2.3	2.6	2.5	2.6	2.9	2.5	2.5	2.8	2.9	2.4	2.4	2.3	2.4	2.9
5-Apr	2.4	2.2	2.3	2.7	2.5	Z	2.3	2.5	2.8	3.2	2.5	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.3	2.2	2.2	2.4	3.2
6-Apr	Z	2.2	2.3	2.3	2.4	2.3	2.2	2.1	2.3	2.3	2.3	2.6	2.4	2.2	2.4	2.3	2.5	2.3	PF	PF	PF	PF	PF	PF	--	2.6
7-Apr	PF	Z	2.3	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.5	2.4	2.4	2.3	2.3	2.3	2.3	2.4	2.5	2.4	2.3	2.3	2.5
8-Apr	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	C	C	C	C	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2
9-Apr	2.1	2.1	2.1	Z	2.5	2.5	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.5
10-Apr	2.2	2.2	2.2	2.2	Z	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.5	2.5	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.3	2.5
11-Apr	2.2	2.2	2.3	2.3	2.2	Z	2.3	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.8	4.7	2.7	2.7	2.5	2.3	2.2	2.4	4.7
12-Apr	Z	2.3	2.3	2.3	2.4	2.6	2.4	2.3	2.6	2.4	2.5	2.7	2.4	2.3	2.4	2.3	2.3	2.4	2.4	2.4	2.4	2.8	2.6	2.5	2.4	2.8
13-Apr	2.5	Z	2.6	2.2	2.5	2.7	2.7	2.2	2.2	2.2	2.5	2.6	2.4	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.7
14-Apr	2.2	2.6	Z	2.3	2.2	2.1	2.1	2.2	2.2	2.2	2.6	2.5	2.4	2.1	2.2	2.1	2.2	2.3	2.1	2.1	2.1	2.2	2.1	2.2	2.2	2.6
15-Apr	2.3	2.2	2.4	Z	2.4	2.3	2.3	2.3	2.3	2.5	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.1	2.3	2.5
16-Apr	2.2	2.3	2.2	2.2	Z	2.2	2.3	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	2.3	3.0	2.6	2.3	3.0
17-Apr	2.6	2.5	2.4	2.4	2.4	Z	2.4	2.5	2.6	2.5	2.3	2.2	2.1	2.1	2.0	2.0	2.0	2.1	2.2	3.1	3.6	2.8	2.3	2.3	2.4	3.6
18-Apr	Z	2.6	2.5	2.6	2.7	2.9	2.7	2.5	2.5	2.3	2.3	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.3	2.9
19-Apr	2.3	Z	2.4	2.4	2.2	2.3	2.2	2.2	2.1	2.1	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1	2.2	2.1	2.4
20-Apr	2.3	2.1	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.3
21-Apr	2.3	2.3	2.3	Z	2.3	2.3	2.2	2.2	2.2	2.5	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.4	2.5	2.6	2.5	2.3	2.6
22-Apr	2.6	2.5	2.4	2.4	Z	2.4	2.5	2.6	2.5	2.5	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.3	2.4	2.7	2.6	2.7	2.6	2.4	2.4	2.7
23-Apr	2.4	2.3	2.2	2.2	2.3	Z	2.3	2.7	2.9	2.4	2.3	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.9
24-Apr	Z	2.2	2.2	2.2	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	2.2	2.2	2.2	2.1	2.2
25-Apr	2.2	Z	2.1	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.5	2.2	2.5
26-Apr	2.4	2.3	Z	2.3	2.4	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.4
27-Apr	2.3	2.4	2.4	Z	2.4	2.5	2.6	2.6	2.5	2.6	2.7	2.4	2.3	2.3	2.4	2.4	2.3	2.2	2.2	2.3	3.1	3.0	2.8	2.3	2.5	3.1
28-Apr	2.3	2.3	2.3	2.5	Z	2.4	2.4	2.7	2.7	2.4	2.3	2.2	2.2	2.2	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.2	2.3	2.3	2.3	2.7
29-Apr	2.3	2.3	2.3	2.3	2.3	Z	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.4	2.3	2.4	2.2	2.4
30-Apr	Z	2.4	2.4	2.3	2.2	2.3	2.3	2.4	2.3	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.8	2.9	2.6	2.4	2.3	2.9
	2.3	2.3	2.3	2.3	2.3	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.4	2.3	2.3	2.3	Diurnal Average	
	2.7	2.6	2.6	2.7	2.7	2.9	2.7	2.7	2.9	3.2	2.7	2.7	2.4	2.6	2.5	2.6	2.9	2.8	4.7	3.1	3.6	3.0	3.0	2.6	Diurnal Maximum	

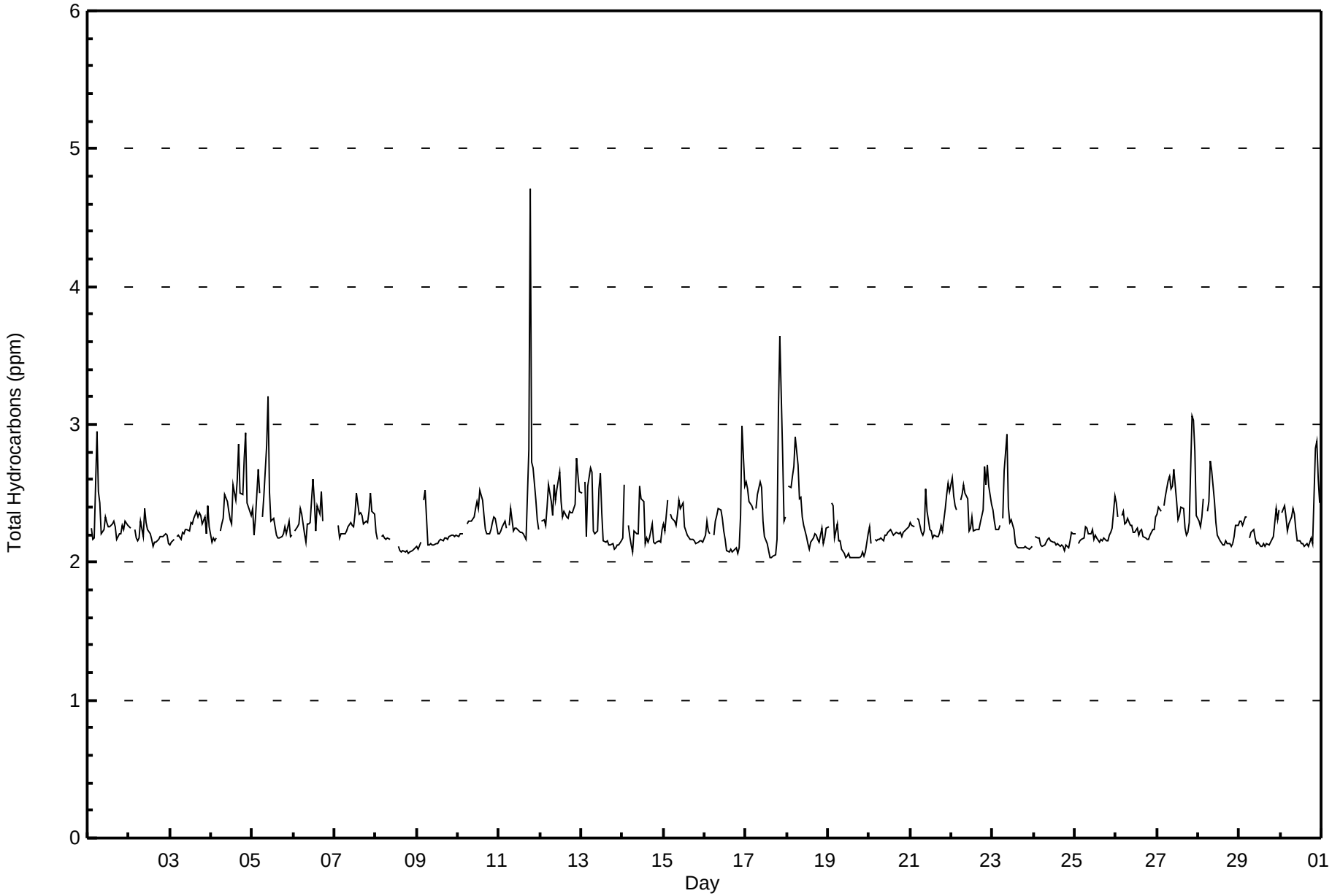
Z - zerospan C - Calibration PF - Power Failure

Wood Buffalo Environmental Association

Hourly Averages

Total Hydrocarbons (THC) - ppm

Barge Landing - April 2016



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm

Barge Landing - April 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	13	1.91	1.91
2.1 - 3.0	661	97.35	99.26
3.1 - 10.0	5	0.74	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 679

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Total Hydrocarbons (THC) - ppm

Barge Landing - April 2016

Concentration Ranges (ppm)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 2.0	0	0	0	0	0	0	0	0	0	0	0	0	7	5	1	0	13
2.1 - 3.0	89	86	54	26	8	11	62	67	92	36	17	8	13	5	10	40	624
3.1 - 10.0	0	1	1	1	0	1	1	0	0	0	0	0	0	0	0	0	5
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	89	87	55	27	8	12	63	67	92	36	17	8	20	10	11	40	642

Total Number of Valid Hours: 642

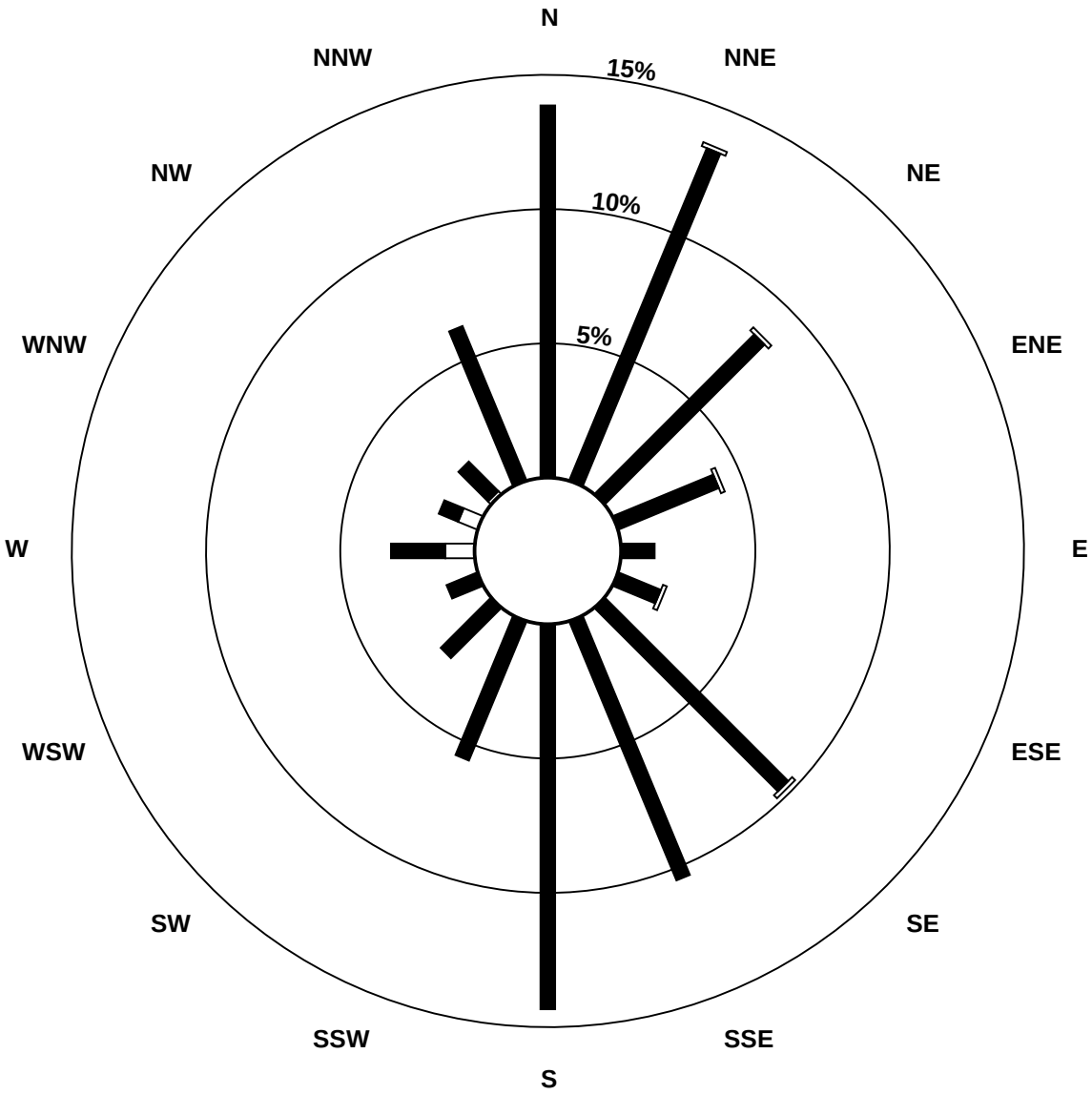
Total Number of Hours: 720

Wood Buffalo Environmental Association

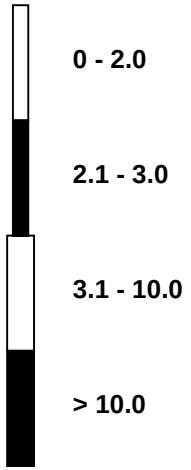
Wind Rose Apr 2016

Total Hydrocarbons (THC) - ppm

Barge Landing (AMS 9)



Classes (ppm)



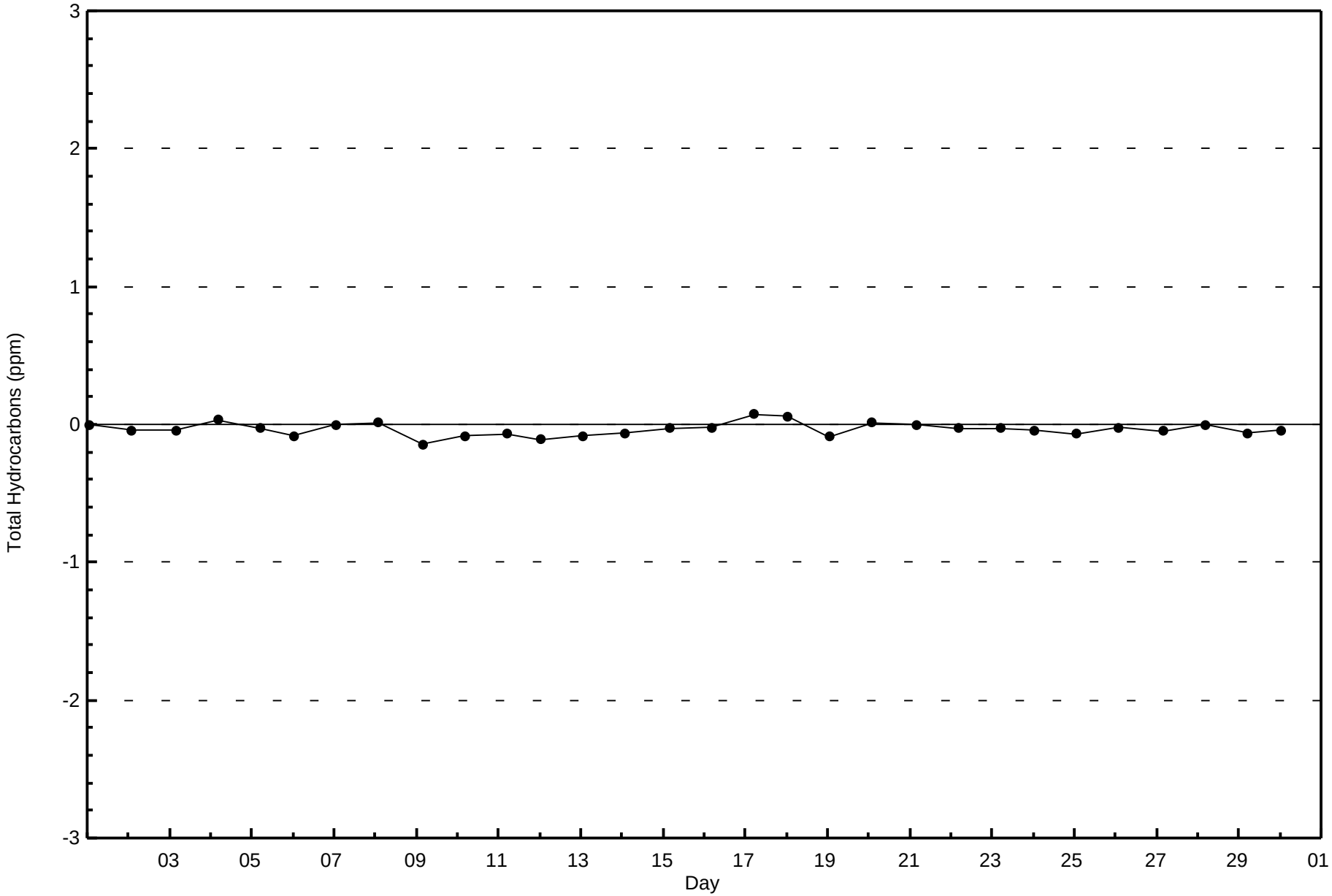
Total Number of Valid Hours: 642

Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Barge Landing - April 2016

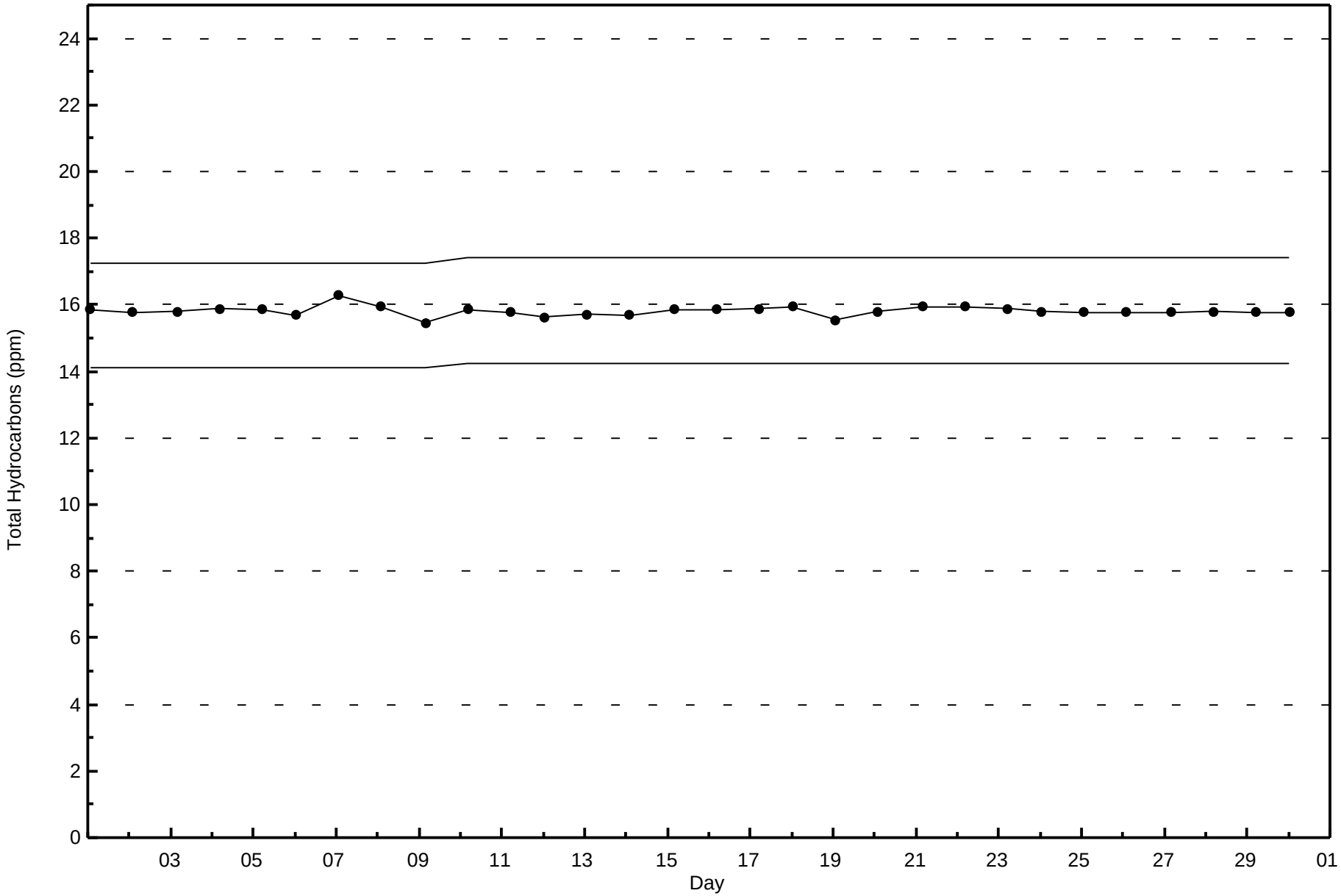


Wood Buffalo Environmental Association

Span Responses

Total Hydrocarbons (THC) - ppm

Barge Landing - April 2016



Maximum Value: 28.7 C on Apr 18 16:00

Maximum Daily Average: 17.3 C on Apr 18

Minimum Value: -13.8 C on Apr 4 06:00

Minimum Daily Average: -7.4 C on Apr 3

Maximum Diurnal Average: 8.7 C at hour 16

Minimum Diurnal Average: -1.2 C at hour 6

Monthly Average: 3.89 C

Percentiles: P_1 = -10.5 P_{10} = -6.0 Q_1 = -1.9 Median = 2.8 Q_3 = 8.4 P_{90} = 16.7 P_{99} = 22.9

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

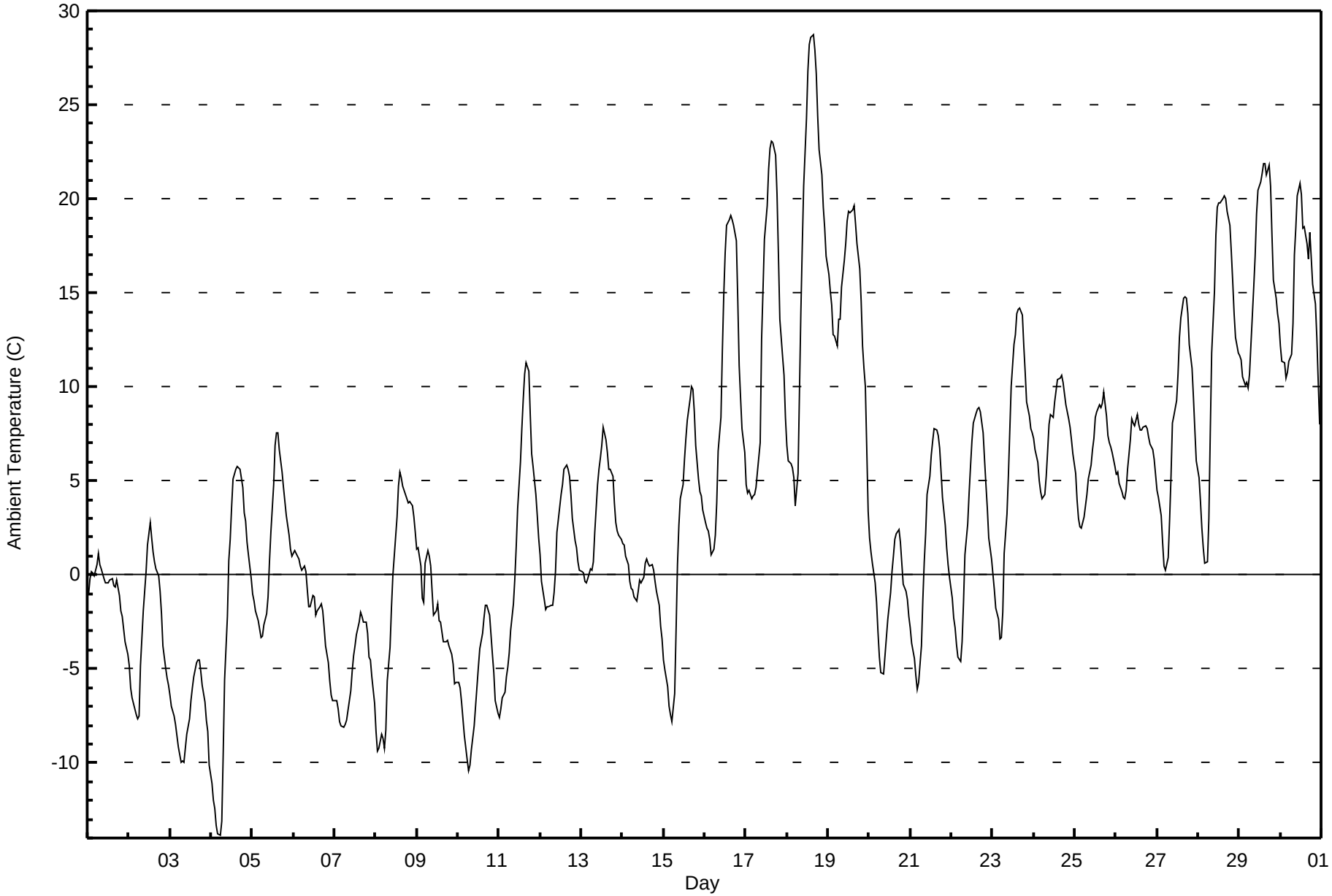
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	-1.0	-0.2	0.2	0.1	-0.1	0.6	1.1	0.5	0.3	-0.2	-0.4	-0.4	-0.4	-0.2	-0.2	-0.6	-0.6	-0.3	-1.1	-1.9	-2.2	-2.9	-3.5	-4.3	-0.7	1.1
2-Apr	-4.8	-6.0	-6.6	-7.1	-7.4	-7.7	-7.5	-4.9	-1.9	-0.9	0.1	1.6	2.8	2.0	1.2	0.7	0.3	0.0	-0.9	-2.1	-3.8	-4.9	-5.5	-5.9	-2.9	2.8
3-Apr	-6.4	-7.0	-7.5	-8.0	-8.6	-9.2	-10.0	-9.9	-10.0	-9.3	-8.4	-7.6	-6.7	-6.0	-5.4	-4.7	-4.5	-4.5	-5.1	-5.9	-6.7	-7.7	-8.3	-10.1	-7.4	-4.5
4-Apr	-11.1	-12.0	-12.4	-13.3	-13.8	-13.8	-13.1	-9.5	-5.6	-2.2	0.8	1.9	3.6	5.1	5.6	5.8	5.7	5.6	4.7	3.3	2.9	1.7	1.0	-0.2	-2.5	5.8
5-Apr	-1.1	-1.4	-1.9	-2.5	-2.9	-3.4	-3.2	-2.6	-2.1	-1.2	0.7	2.3	4.8	6.9	7.6	7.6	6.7	5.5	4.6	3.9	3.1	2.1	1.4	1.0	1.5	7.6
6-Apr	1.1	1.3	1.0	0.8	0.5	0.2	0.4	0.1	-0.8	-1.7	-1.7	-1.1	-1.1	-2.2	-1.9	-1.7	-1.6	-1.9	-2.8	-3.8	-4.7	-5.7	-6.4	-6.7	-1.7	1.3
7-Apr	-6.7	-6.7	-7.2	-7.8	-8.1	-8.1	-7.9	-7.7	-7.2	-6.2	-5.2	-4.3	-3.8	-3.2	-2.5	-2.0	-2.2	-2.5	-2.5	-3.1	-4.4	-4.5	-5.4	-6.9	-5.2	-2.0
8-Apr	-8.3	-9.4	-9.2	-8.5	-8.7	-9.2	-8.3	-5.6	-3.9	-1.8	-0.1	1.0	3.1	4.7	5.5	5.2	4.7	4.3	4.0	3.8	3.9	3.7	3.0	2.3	-1.0	5.5
9-Apr	1.4	1.5	0.5	-1.2	-1.5	0.6	1.3	1.0	0.4	-0.9	-2.1	-1.9	-1.5	-2.4	-2.5	-3.6	-3.6	-3.5	-3.5	-3.8	-4.3	-4.8	-5.8	-5.7	-1.9	1.5
10-Apr	-5.7	-6.1	-6.8	-7.7	-8.5	-9.8	-10.4	-10.1	-9.3	-8.0	-7.0	-6.0	-4.9	-3.9	-3.1	-2.3	-1.6	-1.6	-2.2	-3.2	-4.2	-5.2	-6.7	-7.4	-5.9	-1.6
11-Apr	-7.6	-7.2	-6.6	-6.3	-5.4	-4.9	-4.1	-3.0	-1.6	-0.2	1.5	3.5	6.0	7.8	9.3	10.7	11.3	10.8	8.5	6.4	5.8	4.3	3.1	1.9	1.8	11.3
12-Apr	1.1	-0.4	-1.3	-1.8	-1.7	-1.7	-1.6	-1.6	-1.0	0.2	2.3	3.6	4.2	4.8	5.6	5.8	5.6	5.2	4.2	3.0	1.8	1.4	0.7	0.2	1.6	5.8
13-Apr	0.2	0.1	-0.3	-0.4	-0.2	0.3	0.2	0.7	2.3	4.8	5.6	6.2	6.9	7.8	7.2	6.5	5.6	5.6	5.2	3.8	2.7	2.3	2.1	1.9	3.2	7.8
14-Apr	1.7	1.6	1.0	0.5	-0.3	-0.7	-0.8	-1.2	-1.4	-0.8	-0.3	-0.5	-0.2	0.6	0.9	0.6	0.4	0.5	0.3	-0.4	-0.9	-1.6	-2.7	-3.4	-0.3	1.7
15-Apr	-4.5	-5.1	-5.9	-7.0	-7.4	-7.8	-6.3	-3.0	0.5	2.6	4.0	4.8	6.1	7.2	8.2	9.4	10.0	9.9	8.7	6.9	5.1	4.4	4.2	3.5	2.0	10.0
16-Apr	2.8	2.4	2.3	1.9	1.1	1.4	2.1	3.8	6.6	8.4	11.9	14.9	17.1	18.6	18.9	19.1	18.9	18.6	17.8	14.6	11.1	9.4	7.8	6.5	9.9	19.1
17-Apr	4.8	4.4	4.5	4.0	4.2	4.3	4.7	5.4	7.0	12.5	15.1	17.9	19.6	21.6	22.7	23.1	23.0	22.3	20.2	17.1	13.6	11.5	10.6	8.4	12.6	23.1
18-Apr	6.9	6.1	5.9	5.7	5.2	3.7	5.4	9.7	14.0	17.4	20.7	24.3	26.8	28.2	28.6	28.7	27.9	26.6	24.4	22.6	21.3	19.6	18.4	16.9	17.3	28.7
19-Apr	16.0	15.1	14.3	12.8	12.7	12.2	13.6	13.6	15.3	16.7	17.6	18.8	19.4	19.3	19.4	19.6	18.7	17.7	16.3	14.5	12.2	11.0	10.0	3.4	15.0	19.6
20-Apr	2.0	1.2	0.6	-0.5	-1.5	-3.0	-4.4	-5.2	-5.2	-4.3	-3.3	-2.4	-0.9	0.2	1.0	1.9	2.2	2.4	1.7	0.7	-0.5	-0.9	-1.3	-2.2	-0.9	2.4
21-Apr	-2.8	-3.6	-4.5	-5.3	-6.1	-5.8	-3.8	-1.3	0.7	2.2	4.2	5.3	6.3	7.1	7.8	7.7	7.4	6.7	5.5	4.1	2.6	1.4	0.6	-0.1	1.5	7.8
22-Apr	-1.2	-2.3	-2.8	-3.7	-4.4	-4.6	-3.6	-1.5	1.0	2.7	4.3	5.8	7.1	8.1	8.6	8.8	8.9	8.7	7.5	6.1	4.8	3.5	2.0	0.8	2.7	8.9
23-Apr	0.0	-0.8	-1.8	-2.3	-3.4	-3.4	-2.0	1.1	3.2	5.2	7.6	10.0	12.3	12.8	13.9	14.1	14.2	13.8	12.2	10.8	9.2	8.4	7.8	7.6	6.3	14.2
24-Apr	7.2	6.7	6.0	5.0	4.4	4.0	4.3	5.2	6.6	8.0	8.5	8.4	9.2	9.8	10.4	10.5	10.6	10.2	9.6	9.0	8.3	7.8	7.2	6.4	7.6	10.6
25-Apr	5.4	4.0	3.0	2.6	2.5	3.1	3.7	4.3	5.1	5.8	6.7	7.3	8.4	8.7	9.1	8.9	9.2	9.8	8.4	7.4	7.1	6.8	6.5	5.8	6.2	9.8
26-Apr	5.3	5.5	4.9	4.4	4.1	4.0	4.5	5.6	7.2	8.3	8.1	7.9	8.5	8.0	7.7	7.7	7.9	7.9	7.7	7.3	6.9	6.6	6.1	5.3	6.6	8.5
27-Apr	4.5	4.1	3.2	1.7	0.4	0.3	0.9	3.0	5.3	8.1	8.5	9.3	10.7	12.6	13.7	14.7	14.8	14.7	13.9	12.3	11.0	9.4	7.7	6.1	7.9	14.8
28-Apr	5.2	3.9	2.5	1.4	0.6	0.7	3.0	7.5	11.8	15.1	18.1	19.5	19.8	19.8	20.0	20.1	20.0	19.3	18.6	17.1	15.6	13.9	12.6	11.8	12.4	20.1
29-Apr	11.7	11.4	10.5	10.1	10.2	10.0	10.7	12.3	15.3	17.0	19.2	20.4	20.9	21.3	21.8	21.9	21.3	21.8	20.7	18.0	15.7	14.7	13.9	13.3	16.0	21.9
30-Apr	12.2	11.3	11.3	10.5	10.8	11.3	11.7	13.4	17.0	18.4	20.2	20.8	20.3	18.4	18.5	17.6	16.8	18.2	16.8	15.5	14.4	12.6	10.2	8.0	14.8	20.8
	0.9	0.4	-0.1	-0.7	-1.1	-1.2	-0.6	0.7	2.3	3.9	5.2	6.4	7.5	8.1	8.6	8.7	8.6	8.4	7.5	6.1	4.9	4.0	3.0	1.9	Diurnal Average	
	16.0	15.1	14.3	12.8	12.7	12.2	13.6	13.6	17.0	18.4	20.7	24.3	26.8	28.2	28.6	28.7	27.9	26.6	24.4	22.6	21.3	19.6	18.4	16.9	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature (AT) - C

Barge Landing - April 2016



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	253	35.14	35.14
0 - 10	316	43.89	79.03
10 - 20	121	16.81	95.83
> 20	30	4.17	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Barge Landing - April 2016

Maximum Value: 99 % on Apr 27 08:00

Maximum Daily Average: 91.6 % on Apr 6

Minimum Value: 13 % on Apr 19 16:00

Minimum Daily Average: 24.0 % on Apr 19

Maximum Diurnal Average: 72.6 % at hour 6

Minimum Diurnal Average: 43.3 % at hour 16

Monthly Average: 57.4 %

Percentiles: $P_1 = 16$ $P_{10} = 26$ $Q_1 = 40$ Median = 58 $Q_3 = 75$ $P_{90} = 87$ $P_{99} = 99$

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

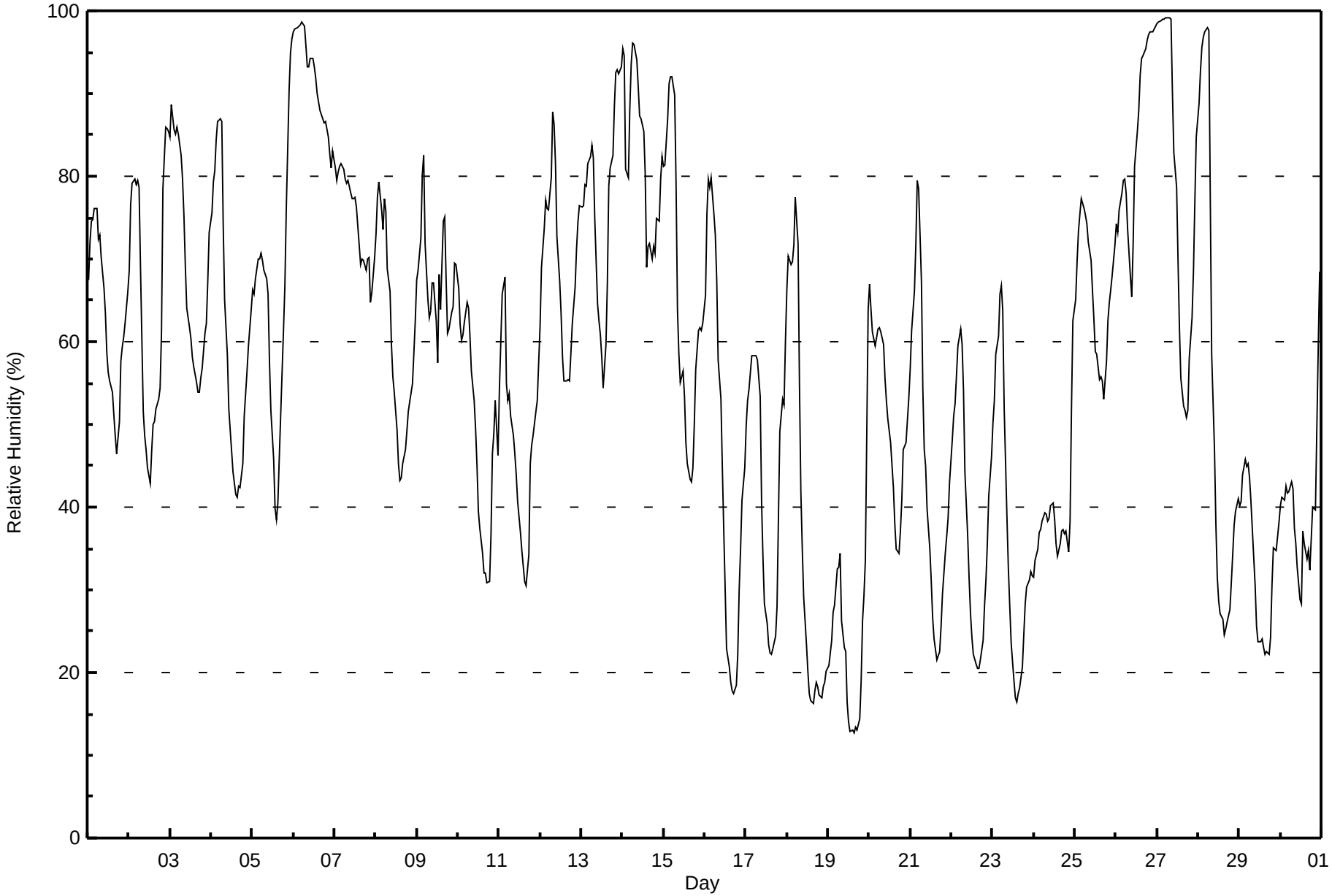
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	67	72	75	75	76	76	72	73	70	67	63	59	56	55	54	51	49	46	50	58	59	60	62	66	63.0	76
2-Apr	69	77	79	80	79	79	79	69	51	49	47	45	43	47	50	50	52	53	54	61	78	86	86	85	64.5	86
3-Apr	85	89	86	85	86	85	83	80	75	69	64	62	60	58	57	55	54	54	56	57	61	62	67	73	69.3	89
4-Apr	76	79	81	84	87	87	87	74	65	58	52	49	47	44	42	41	42	42	45	51	54	56	60	64	61.2	87
5-Apr	66	66	68	70	70	71	70	69	68	66	58	52	46	40	38	41	46	56	61	67	76	90	95	97	64.3	97
6-Apr	97	98	98	98	98	99	98	96	93	93	94	94	93	92	90	88	87	87	86	87	85	83	81	83	91.6	99
7-Apr	81	79	80	81	81	81	80	79	80	78	77	77	78	76	72	69	70	70	69	70	70	65	66	70	75.0	81
8-Apr	73	77	79	76	74	77	76	69	66	60	56	54	49	45	43	44	45	47	49	52	53	55	59	63	60.0	79
9-Apr	67	69	73	80	82	72	65	63	64	67	67	62	58	68	64	75	75	67	61	62	64	64	69	69	67.8	82
10-Apr	67	62	60	61	62	65	64	61	56	53	49	45	40	37	34	32	32	31	31	37	46	49	53	46	48.9	67
11-Apr	54	60	66	68	55	53	54	51	49	46	44	41	37	35	33	31	31	34	45	48	49	52	53	58	47.7	68
12-Apr	62	69	74	77	76	76	80	88	86	82	73	67	63	58	55	55	55	55	59	62	67	71	74	77	69.2	88
13-Apr	76	77	79	79	82	82	84	82	75	65	62	61	58	54	60	67	79	81	83	88	93	93	92	93	76.9	93
14-Apr	95	95	81	80	88	94	96	96	94	91	87	87	85	80	69	71	72	70	72	71	75	75	80	82	82.7	96
15-Apr	81	81	87	91	92	92	90	79	64	59	55	57	53	48	45	43	43	45	50	57	61	62	61	62	64.9	92
16-Apr	66	75	80	79	80	75	73	67	58	53	45	37	30	23	21	19	18	17	19	22	30	35	41	45	46.1	80
17-Apr	50	53	54	58	58	58	58	58	53	40	34	28	26	23	22	22	23	24	28	39	49	53	52	60	42.8	60
18-Apr	66	70	69	70	72	78	72	55	42	35	29	23	20	17	17	16	18	19	18	17	17	18	19	20	37.4	78
19-Apr	21	22	24	27	28	33	33	34	26	23	23	16	14	13	13	13	13	13	14	19	26	29	34	64	24.0	64
20-Apr	67	64	61	60	60	62	62	61	60	56	53	51	48	45	42	38	35	34	37	41	47	48	51	53	51.4	67
21-Apr	57	61	66	72	80	78	67	54	47	45	40	35	31	27	24	21	22	22	26	29	34	36	39	43	44.0	80
22-Apr	48	51	53	56	59	62	60	54	44	36	31	27	24	22	21	21	21	21	24	28	31	36	41	46	38.2	62
23-Apr	50	53	59	61	66	67	64	52	39	33	28	24	19	17	16	17	18	21	25	28	30	31	32	32	36.7	67
24-Apr	32	34	35	37	37	38	39	39	38	39	40	40	38	36	34	36	37	37	37	37	35	38	52	63	38.6	63
25-Apr	65	70	73	75	77	76	75	74	72	70	66	63	59	58	55	56	55	53	58	62	65	66	68	72	66.0	77
26-Apr	74	73	76	78	80	80	78	74	68	65	72	81	85	88	92	94	95	95	96	97	97	97	98	98	84.7	98
27-Apr	98	99	99	99	99	99	99	99	99	90	83	79	70	62	56	52	52	51	52	58	63	69	77	85	78.6	99
28-Apr	89	93	96	97	97	98	98	77	58	47	38	31	29	27	26	25	25	26	28	31	34	38	40	41	53.7	98
29-Apr	40	41	44	46	45	45	44	41	34	31	26	24	24	24	23	22	23	22	24	31	35	35	36	38	33.2	46
30-Apr	40	41	41	42	42	42	43	42	38	36	33	29	28	37	36	34	35	32	36	40	40	49	59	68	40.1	68
	66.0	68.3	69.8	71.4	72.3	72.6	71.3	67.0	61.1	56.6	53.0	50.0	47.1	45.3	43.5	43.3	44.0	44.3	46.4	50.2	54.1	56.7	59.9	63.9	Diurnal Average	
	98	99	99	99	99	99	99	99	99	93	94	94	93	92	92	94	95	95	96	97	97	97	98	98	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity (RH) - %

Barge Landing - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Barge Landing - April 2016

Maximum Speed: 22 km/h on Apr 19 14:00

Maximum Daily Speed Average: 9.8 km/h on Apr 29

Minimum Speed Value: 0 km/h on Apr 26 23:00

Minimum Daily Speed Average: 1.1 km/h on Apr 13

Maximum Diurnal Speed Average: 2.8 km/h at hour 20

Minimum Diurnal Speed Average: 0.4 km/h at hour 11

Monthly Average Velocity: 0.9 km/h 101.6 deg

Percentiles: $P_1 = 1$ $P_{10} = 3$ $Q_1 = 5$ Median = 7 $Q_3 = 10$ $P_{90} = 12$ $P_{99} = 18$

Hours in Service: 720

Hours of Data: 674

Hours of Missing Data: 46

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-Apr	SSW4	SW4	WSW3	WSW1	NW2	N5	NNE8	NNE9	NNE11	NNE12	NE10	NNE10	NE10	NE9	NE7	NE7	NE7	ENE7	ENE6	NE5	NE5	NE4	NNE2	NE3	NE5.1	NNE12
2-Apr	NNE3	N4	N4	NNW4	NNW6	NNW5	NNW5	N3	NE5	NNE7	NNE9	N10	N10	N12	N11	NNE13	N13	N13	N11	N12	N11	N9	N9	N8	N8.1	NNE13
3-Apr	N9	N9	N9	N10	N11	N10	N12	N11	NNE11	NNE11	NNE9	NNE9	NE8	NE8	NE8	NE8	NE7	NE7	NE6	NE6	NE5	NE4	NE4	N3	NNE7.5	N12
4-Apr	NNW3	NNW3	N2	S2	SSW3	SE1	SW2	SSW2	SSE5	SW5	WNW4	NW4	NNW4	NNE4	NE5	NE6	NNE6	N5	N5	N4	NNE6	NNW6	N6	N5	N2.2	NNE6
5-Apr	N4	N5	N4	NNE5	N4	NNW4	N5	N4	NNE6	NNE5	NNW5	NNW4	W4	SSW7	SSW9	S10	S10	SSW9	S8	S7	S8	SSE8	SSE8	SSE9	S1.5	S10
6-Apr	SSE6	SSE2	NW2	NW3	NNW7	NNW7	N7	N10	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	----	NNW10
7-Apr	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	NNE8	NNE8	AF	AF	AF	AF	AF	AF	AF	AF	----	NNE8
8-Apr	AF	AF	AF	AF	AF	AF	AF	SE6	S6	SSE12	SSE12	SE12	SE12	SE16	SE15	SE16	SE15	SE14	SE13	SE15	SE17	SSE7	SSE9	SE6	----	SE17
9-Apr	SE5	SE7	NW3	NNW2	NW4	NNW7	N7	NNW11	NNW11	N13	N13	N12	N12	N13	NNE13	N14	NNE11	N12	N14	N9	N9	N7	NNW4	N9	N8.2	N14
10-Apr	N9	N10	N11	N11	NNE10	N9	NNE9	NNE9	NNE8	NE8	NE8	NNE8	NE7	ENE7	ENE7	NE6	ENE6	ENE5	ENE5	ENE4	ESE4	E3	ESE4	SSE6	NE6.0	N11
11-Apr	SE3	ESE2	ESE1	SSE2	SSE6	S5	S5	S6	S7	S8	S8	S9	S9	S8	S6	S4	SSE3	NNE4	ENE3	ENE2	N4	NNW6	NNW5	NNW4	S2.7	S9
12-Apr	N3	NNW3	NNW3	N4	N7	NNE6	NNE10	NNE8	NE6	ENE6	NNE7	NE8	NE9	NNE10	NE10	NNE10	NE9	NNE8	NNE7	N8	N7	NNE7	N6	NNW4	NNE6.6	NNE10
13-Apr	N4	NNE4	N3	NNW5	ENE4	NNE3	N3	NNW5	NNW5	N4	NNW3	NNW3	NE2	SSE6	SSE7	SSE8	SE6	SE4	SSE5	SSE8	SSE6	SSE3	S2	E2	E1.1	SSE8
14-Apr	NE2	N5	N7	N9	N8	N7	N4	NNE6	NNE8	NNE6	NE5	NE5	NE5	N5	NNW7	NNE5	NNE5	NNW3	NNW5	N6	NNW3	WNW4	SW4	N3	N4.6	N9
15-Apr	E3	NE3	NNW2	NNE1	ESE2	AF	SE1	W2	SW2	S6	SSW8	S9	S8	S9	S9	S9	S8	SE9	SE10	SE9	SE5	SSE7	SSE10	SSE8	SSE5.0	SSE10
16-Apr	NW2	ESE8	SSE6	SSW4	SSW4	S5	S6	S9	S8	S8	S9	SSE9	W5	SW12	WSW14	WSW14	W14	W9	WSW5	SW4	S4	SSE5	SSE5	SE4	SSW5.0	WSW14
17-Apr	SSE3	SSE4	SSE4	SSE3	SE5	SSE3	SE4	SSW2	SW4	S9	WSW8	WSW6	S3	SSW7	W11	W10	W10	W7	NNE2	ESE3	SE4	SE5	SE4	NNE1	SSW2.8	W11
18-Apr	ESE2	SE6	SSE5	SSE6	S4	SW2	S4	S8	S8	SW6	SSW7	S10	SSE14	S18	SSW17	SSW18	S17	S15	S15	S13	SSE13	SSE14	SSE12	SSE9	S9.6	SSW18
19-Apr	S5	SSE8	SSE8	S4	SSW8	SW6	WNW10	NW10	NW9	W11	W14	W18	W19	W22	W22	WNW18	WNW18	WNW18	WNW15	NW12	NW9	WNW8	WNW8	NNE13	W9.3	W22
20-Apr	NNE9	NNE12	NNE11	NNE10	NNE12	NNE14	NNE13	NNE13	NNE13	NNE12	NNE12	NNE11	NE9	NE9	NE10	NE10	NE9	NNE7	NE7	ENE6	ENE5	ENE6	ENE5	E4	NNE9.0	NNE14
21-Apr	ENE3	ENE3	E3	E2	ENE1	E1	ESE3	ESE2	NE4	NNE6	NNE7	NNE9	NNE9	NNE10	NNE10	NE11	NNE11	NE12	NE11	NE10	NE9	NNE8	NNE8	NE9	NE6.4	NE12
22-Apr	NNE6	N7	N5	N4	N4	N5	N5	N6	N7	NNE8	NNE10	NNE10	NNE10	NNE10	NNE10	NNE10	NNE11	NNE10	NE10	NNE9	NNE9	N7	N5	N4	NNE7.4	NNE11
23-Apr	N6	N5	NNW4	N5	N4	N4	NNW5	N4	NNE6	NNE7	N6	N7	WNW6	NNW3	SE8	SE8	SE7	SE9	SE7	ESE8	SE11	SE12	SE10	SSE10	E2.2	SE12
24-Apr	SSE12	SSE10	SSE9	SE8	SE10	SE6	SSE9	SSE6	SSE9	SSE10	S11	S11	SSW9	S8	S10	S8	S8	SE7	SE8	SE9	SE11	SSE10	S10	SSW10	SSE8.5	SSE12
25-Apr	SSW10	S8	S8	S7	S7	S6	S6	S8	S10	S9	SSW9	SW10	SSW10	SSE10	SSW10	SSW9	SW8	SW10	SSW8	SSW8	SSW7	SSW6	SSW6	S4	SSW7.8	SW10
26-Apr	S5	SSW6	S6	S7	S6	SSE7	S8	S8	S8	S8	S8	S6	S6	S8	SSE7	SSE6	SSE6	SSE4	SE4	SE5	SE6	SSE5	S0	WSW2	S5.7	S8
27-Apr	S3	SE3	SSE3	SSE2	SE4	SE4	SE4	SSW2	W2	NE4	NNE6	NE4	NE3	ENE5	E6	ENE7	ENE7	ENE8	ENE7	ENE6	NE7	NNE5	NNW4	NNW4	ENE3.0	ENE8
28-Apr	NNW4	NNW3	ENE1	S1	SE3	SE3	S3	S7	S7	SSW8	SSW7	SSW10	SW9	S10	SSE11	S12	SSE10	SE10	SE9	SE7	SE7	SE7	SE7	SE8	SSE5.5	S12
29-Apr	SE8	SE7	SE7	SSE7	SSE8	SE8	SE9	SE10	S12	S13	S17	S17	S17	S16	SSW14	SSW16	SSW15	SSW14	SW8	SSE4	SSE7	SSE8	SSE7	SSE8	S9.8	S17
30-Apr	SSE8	SSE7	SSE7	SSE9	SSE9	S8	S8	S9	SSW11	S12	SSW15	SW16	SW15	W13	W14	W12	W8	S10	S8	ESE2	NNE5	ENE5	E2	ESE2	SSW6.1	SW16
	E0.9	E1.2	ENE0.8	NE0.8	ENE1.0	NNE1.3	NNE1.3	NNE0.9	ENE0.5	ESE1.0	S0.4	S0.5	SSW0.6	S1.3	S1.2	SE0.8	SE0.7	ESE1.3	E1.8	E2.8	E2.7	ESE2.0	SE1.5	ESE1.3	Diurnal Average	
	SSE12	NNE12	N11	N11	NNE12	NNE14	NNE13	NNE13	NNE13	S13	S17	W18	W19	W22	W22	SSW18	WNW18	WNW18	WNW15	SE15	SE17	SSE14	SSE12	NNE13	Diurnal Maximum	

AF - Analyzer Failure

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

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Speed (WS) - km/h

Barge Landing - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 8 km/h on Apr 19 14:00

Minimum Value: 1 km/h on Apr 27 02:00

Percentiles: P_1 = 1 P_{10} = 1 Q_1 = 1 Median = 2 Q_3 = 3 P_{90} = 4 P_{99} = 7

Hours in Service:	720
Hours of Data:	674
Hours of Missing Data:	46
Hours of Calibration:	0
Percent Operational Time:	93.6

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

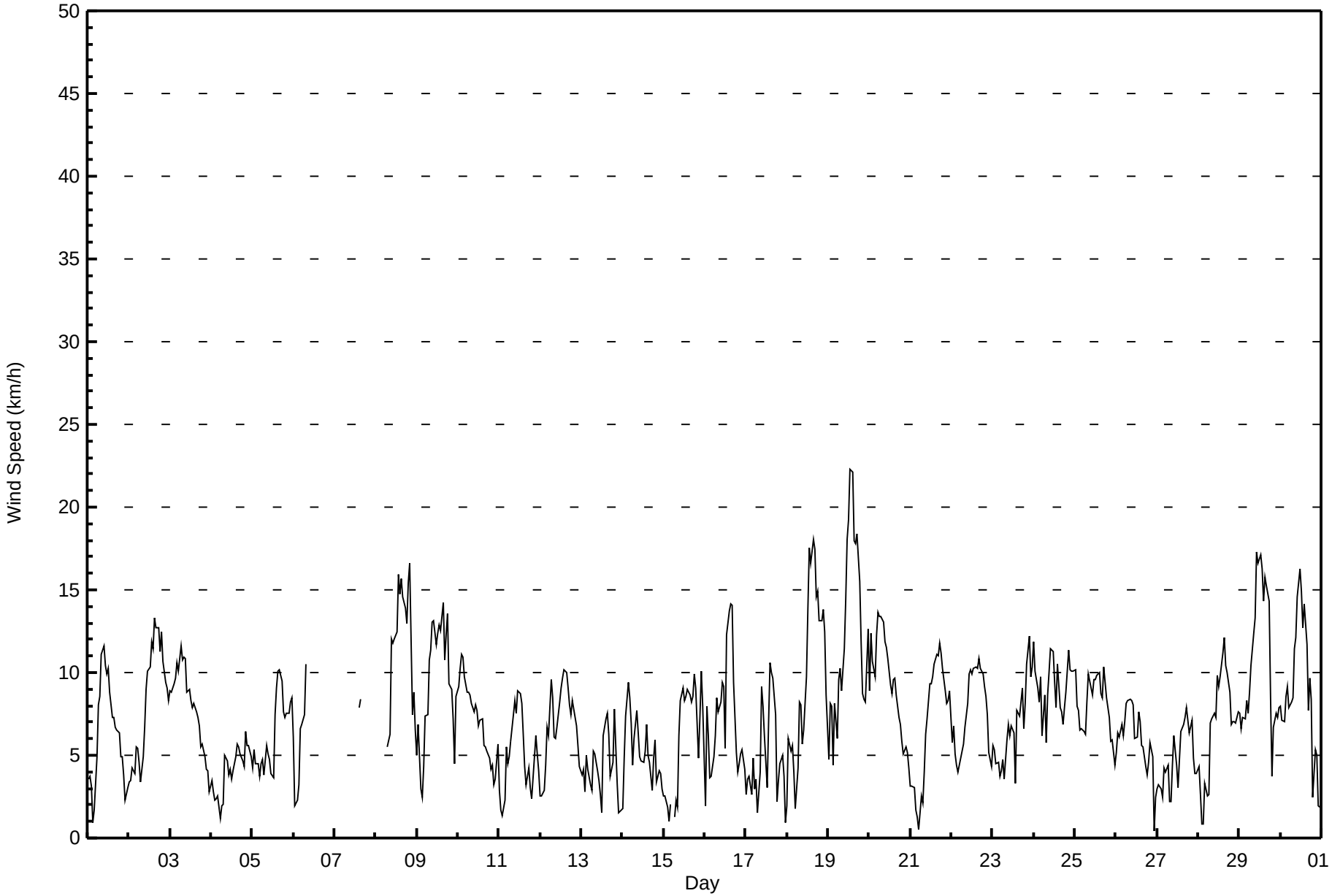
AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed (WS) - km/h

Barge Landing - April 2016



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	227	33.68	33.68
6 - 11	364	54.01	87.69
12 - 19	81	12.02	99.70
20 - 28	2	0.30	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 674

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Wind Speed (WS) - km/h

Barge Landing - April 2016

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	39	15	19	14	8	11	20	19	18	7	8	4	4	2	7	32	227
6 - 11	43	64	35	13	1	2	36	49	64	24	7	2	7	4	3	10	364
12 - 19	13	12	1	0	0	0	11	7	13	7	3	2	7	4	1	0	81
20 - 28	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	95	91	55	27	9	13	67	75	95	38	18	8	20	10	11	42	674

Total Number of Valid Hours: 674

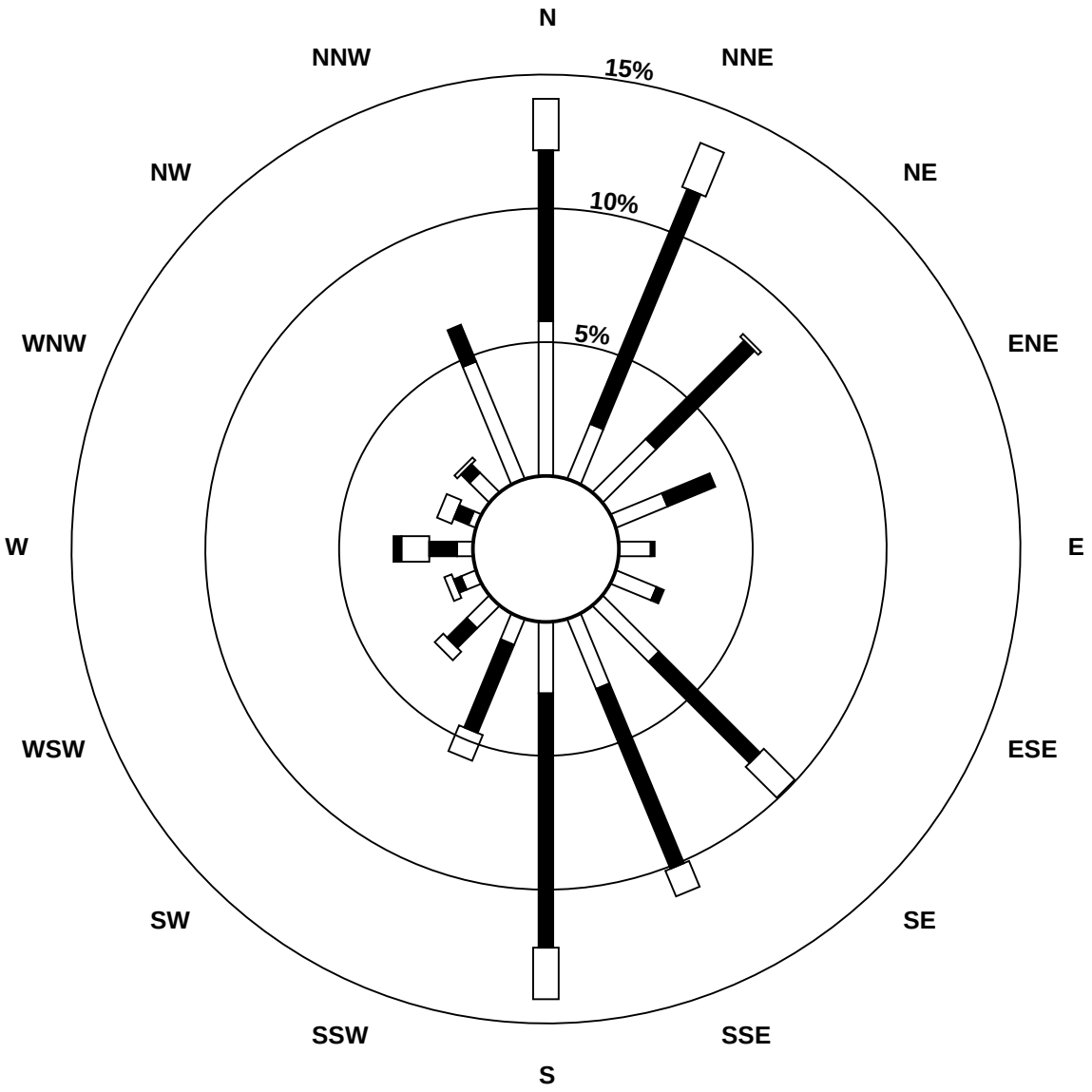
Total Number of Hours: 720

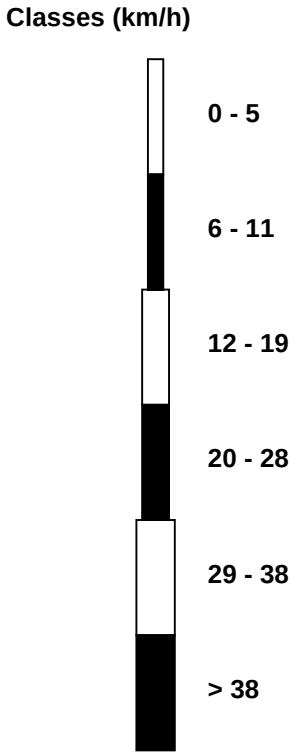
Wood Buffalo Environmental Association

Wind Rose Apr 2016

Wind Speed (WS) - km/h

Barge Landing (AMS 9)





Total Number of Valid Hours: 674

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Barge Landing - April 2016

Direction of Maximum Speed: 265 deg on Apr 19 14:00
Direction of Maximum Daily Speed Average: 175.8 deg on Apr 29

Direction of Minimum Speed: 191 deg on Apr 26 23:00

Direction of Minimum Daily Speed Average: 1.1 deg on Apr 13

Monthly Average Direction: 244.1 deg

Hours in Service:	720
Hours of Data:	674
Hours of Missing Data:	46
Percent Operational Time:	93.6

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-Apr	195	222	258	255	310	9	20	24	19	23	34	32	38	42	56	44	51	62	59	45	41	37	32	40	34.4
2-Apr	33	5	355	347	348	345	347	10	45	15	13	4	6	353	356	12	4	7	7	11	0	1	357	359	4.0
3-Apr	353	356	358	357	357	358	359	358	15	24	23	32	36	44	48	54	41	34	38	47	54	51	36	351	19.3
4-Apr	343	348	350	186	196	142	234	208	168	226	299	321	333	21	35	35	26	11	350	357	18	348	355	354	354.5
5-Apr	351	357	3	15	3	347	352	349	27	27	335	330	275	195	206	180	185	196	188	181	172	156	161	154	187.1
6-Apr	159	158	325	323	327	339	358	349	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--
7-Apr	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	27	32	AF	AF	AF	AF	AF	AF	AF	AF	--
8-Apr	AF	AF	AF	AF	AF	AF	AF	145	171	150	153	138	135	139	133	135	135	138	142	138	146	156	154	141	--
9-Apr	128	145	323	340	314	345	350	341	343	350	350	350	351	357	15	3	12	11	7	359	350	351	337	359	356.6
10-Apr	3	358	3	10	13	8	19	20	27	36	42	32	49	57	57	43	70	60	66	77	104	84	116	150	34.7
11-Apr	141	103	115	156	150	171	174	186	183	185	183	184	180	180	184	186	158	19	63	73	349	342	339	341	172.8
12-Apr	353	347	340	350	8	33	32	24	44	57	29	41	35	29	34	32	36	30	16	358	357	20	7	346	23.0
13-Apr	353	12	359	335	65	30	2	338	336	6	338	340	51	148	168	149	138	134	157	150	153	148	188	93	97.5
14-Apr	41	9	8	10	5	357	351	24	18	13	39	47	34	353	332	29	27	344	343	351	329	288	236	4	4.4
15-Apr	86	41	331	26	111	AF	140	273	225	174	197	169	184	187	172	171	190	144	133	127	137	161	163	159	163.2
16-Apr	311	123	156	193	192	174	174	183	171	175	181	163	271	235	247	253	266	279	255	232	174	165	149	137	207.2
17-Apr	148	149	161	164	141	149	145	209	221	187	237	239	176	206	265	270	264	274	16	113	131	130	134	21	207.5
18-Apr	114	139	151	167	175	216	187	183	190	218	193	182	167	188	193	199	187	183	182	170	162	161	165	164	178.7
19-Apr	180	162	168	186	201	219	297	317	317	264	266	262	262	265	264	285	298	287	289	316	316	297	303	13	277.5
20-Apr	24	16	13	15	19	20	18	25	23	28	30	30	39	41	40	47	37	31	36	66	73	75	75	86	31.9
21-Apr	74	77	91	81	61	88	111	112	38	24	23	19	23	26	25	34	33	39	40	50	38	29	27	46	37.7
22-Apr	14	350	1	359	357	350	354	9	357	22	28	24	21	18	24	28	29	33	36	33	28	10	354	349	17.3
23-Apr	350	355	348	353	360	357	342	6	23	12	1	4	300	340	133	132	137	139	131	120	127	136	146	159	86.6
24-Apr	157	161	158	145	141	141	150	161	162	153	177	170	195	189	180	186	181	142	125	127	135	160	181	204	162.4
25-Apr	196	189	180	179	175	173	177	175	185	176	195	217	194	161	204	211	218	217	202	196	194	198	206	181	192.5
26-Apr	184	196	169	169	174	164	171	176	186	184	172	175	183	170	163	159	158	160	131	134	145	159	191	255	170.5
27-Apr	191	141	163	165	141	129	141	209	261	45	23	42	40	66	91	66	58	76	70	58	52	30	347	343	70.0
28-Apr	347	339	62	187	129	129	174	184	175	195	194	206	216	174	154	177	166	146	137	136	140	137	144	142	165.3
29-Apr	143	142	137	150	149	137	140	140	177	182	182	184	191	187	192	192	208	207	225	154	154	163	162	166	175.8
30-Apr	168	164	166	151	159	180	179	189	208	186	210	214	228	271	261	271	271	172	185	119	20	78	98	113	202.3
	97.1	85.7	61.6	50.9	74.9	33.3	33.1	24.5	77.4	115.3	181.8	170.4	210.2	180.5	176.6	136.2	141.2	107.8	91.3	89.8	98.0	109.8	136.1	104.3	
	Diurnal Average																								

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

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg

Barge Landing - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 93 deg on Apr 17 13:00

Minimum Value: 7 deg on Apr 17 22:00

Percentiles: $P_1 = 9$ $P_{10} = 16$ $Q_1 = 20$ Median = 24 $Q_3 = 31$ $P_{90} = 44$ $P_{99} = 78$

Hours in Service:	720
Hours of Data:	674
Hours of Missing Data:	46
Hours of Calibration:	0
Percent Operational Time:	93.6

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-Apr	47	55	34	66	51	17	18	19	18	21	19	19	19	24	26	21	24	22	22	18	20	33	47	42	66
2-Apr	23	23	13	13	13	13	18	40	37	24	22	25	25	24	24	21	22	22	20	20	22	21	22	21	40
3-Apr	21	21	23	21	21	21	21	21	19	20	24	24	26	25	28	28	25	20	22	19	25	22	31	17	31
4-Apr	12	16	15	64	26	73	24	46	40	46	43	30	39	46	23	17	18	17	15	19	22	18	19	18	73
5-Apr	23	17	17	16	20	17	18	20	19	20	27	47	59	41	40	32	27	24	24	28	23	18	20	20	59
6-Apr	24	70	21	22	16	19	23	22	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	70
7-Apr	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	19	19	AF	AF	AF	AF	AF	AF	AF	AF	19
8-Apr	AF	AF	AF	AF	AF	AF	AF	43	66	24	22	22	20	19	22	19	18	16	16	14	23	24	20	18	66
9-Apr	25	29	60	40	36	20	22	21	22	21	21	23	25	24	21	23	22	22	23	22	20	21	19	20	60
10-Apr	21	22	21	20	19	19	21	21	22	26	30	30	36	35	30	44	33	24	18	18	23	17	36	11	44
11-Apr	16	31	62	79	13	31	26	33	31	28	31	31	33	34	38	65	60	26	43	62	60	16	16	30	79
12-Apr	20	27	16	15	26	18	20	24	22	28	32	25	23	23	22	19	19	17	19	20	19	19	24	24	32
13-Apr	38	25	52	28	29	49	27	22	21	43	51	55	76	33	28	23	21	29	26	21	19	26	51	20	76
14-Apr	38	23	22	21	21	21	20	18	18	22	26	23	26	28	25	22	22	36	20	21	22	31	11	55	55
15-Apr	27	22	19	50	32	AF	59	42	81	44	36	35	42	40	39	36	39	32	14	13	17	17	20	19	81
16-Apr	85	20	44	32	26	17	20	24	29	29	31	32	60	30	31	26	26	30	22	25	24	18	13	16	85
17-Apr	65	25	48	64	40	73	64	70	48	31	30	39	93	58	37	35	30	33	64	21	19	7	14	66	93
18-Apr	44	10	15	16	28	38	27	24	27	40	38	31	30	29	27	26	26	25	24	23	20	20	21	18	44
19-Apr	51	15	16	54	20	45	33	24	33	33	27	27	29	26	25	31	30	30	27	24	19	27	46	21	54
20-Apr	20	21	22	20	20	20	20	20	20	22	23	24	27	28	27	24	26	25	23	23	17	19	21	33	33
21-Apr	28	14	18	31	40	81	35	68	46	24	25	23	24	24	24	24	21	19	18	19	19	17	17	21	81
22-Apr	26	18	19	14	17	16	18	29	30	26	23	23	25	23	23	21	19	19	19	17	20	23	17	14	30
23-Apr	15	15	19	16	14	15	18	34	26	27	39	41	56	79	52	48	40	24	18	13	13	14	18	21	79
24-Apr	21	22	20	14	14	16	21	28	28	25	28	26	33	34	29	33	26	32	15	15	15	22	28	25	34
25-Apr	26	21	21	20	21	21	22	26	26	29	36	27	33	28	30	28	31	30	23	22	21	22	19	20	36
26-Apr	24	23	22	24	25	21	23	28	31	33	27	28	34	27	24	30	28	29	30	21	22	29	92	20	92
27-Apr	31	14	40	53	11	16	18	55	58	50	21	47	76	66	42	33	28	24	19	19	19	26	18	12	76
28-Apr	15	21	41	88	19	38	39	28	32	30	40	39	35	30	28	29	25	19	15	15	12	9	8	7	88
29-Apr	8	9	8	14	13	10	13	15	28	29	28	29	30	29	32	31	28	29	23	27	9	14	14	15	32
30-Apr	17	16	16	11	18	25	23	24	28	29	29	28	37	31	27	28	36	28	24	64	29	19	71	40	71
	85	70	62	88	51	81	64	70	81	50	51	55	93	79	52	65	60	36	64	64	60	33	92	66	
	Diurnal Maximum																								

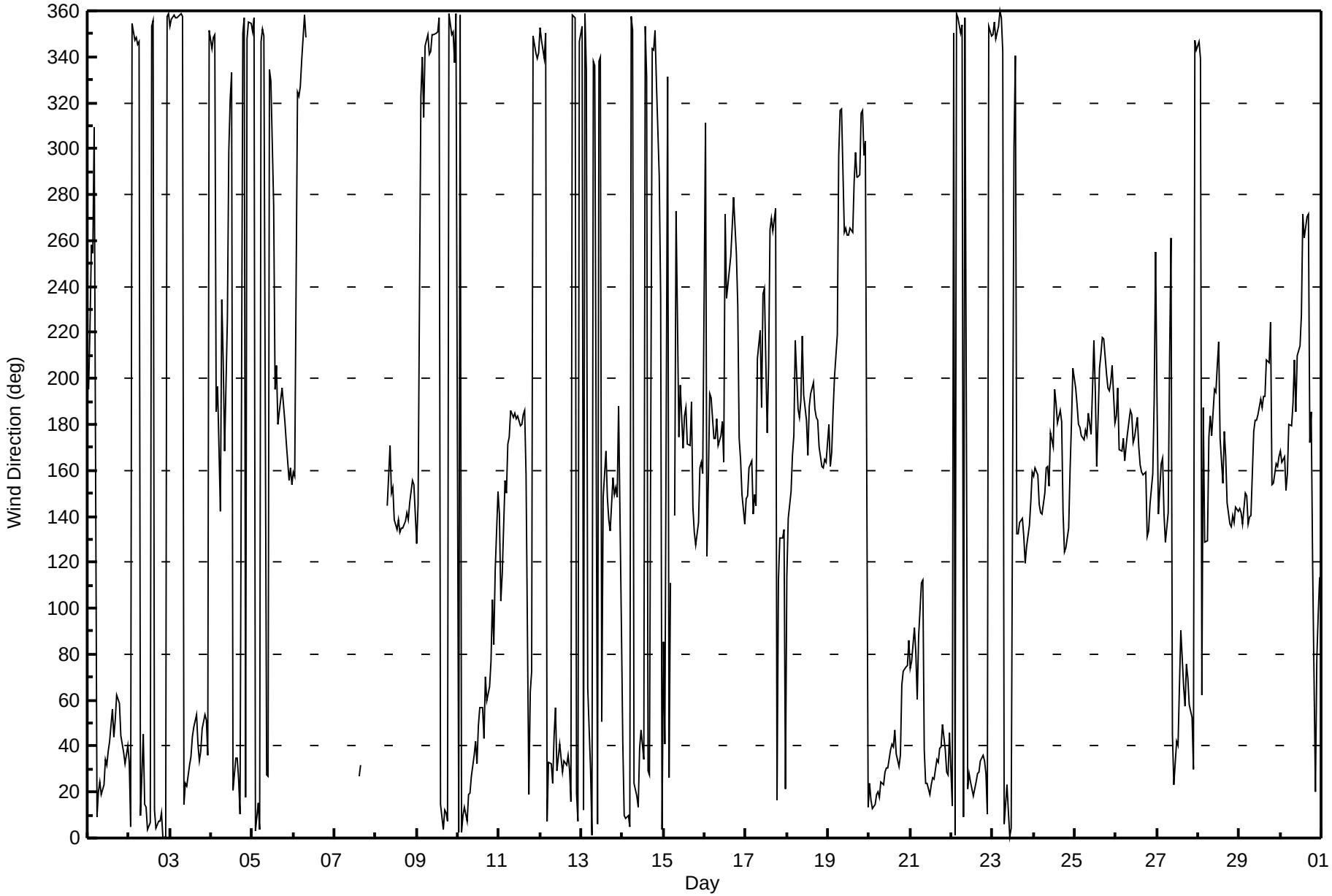
AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction (WD) - deg

Barge Landing - April 2016



Wood Buffalo Environmental Association
TRS Calibration Report

Station Information

Calibration Date	April 7, 2016	Last Calibration	March 2, 2016
Station Name	Barge Landing	Station Number	AMS 9
Reason:	Routine		
Start Time (MST)	11:10	End Time (MST)	14:55
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	47.8 ppm	SO2 gas cert/exp	LL104180 12/Feb/18

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-690	-690
Analyzer IP address	192.168.1.42		Lamp voltage	1022	1021
Calculated slope	1.000317	0.997508	Chamber temp	45	45
Calculated intercept	-0.050637	-0.052008	Pressure	694.3	699.4
Analyzer Background	2.27	2.1	Flow	0.436	0.441
Analyzer Coefficient	1.058	1.058	Intensity	91	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	-0.3	----
as found span	5000	83.8	79.9	79.6	1.005
SO2 scrubber check	5000	15.4	147.2	0.3	----
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	83.8	79.9	80.1	0.998
second point	5000	41.9	40.0	40.4	0.990
third point	5000	21.0	20.0	20.1	0.997
as left zero	6000	0.0	0.0	0.0	----
as left span	5000	83.8	79.9	79.8	1.002
				Average Correction Factor	0.995

Corrected As found	79.8	Previous response	80.0	% change	0.2%

Notes:

Inlet filter replaced and initial scrubber check done (2.2 ppb) after as founds. Scrubber beads changed out for preventative maintenance, scrubber check with new beads done before calibrator zero. Small adjustment on zero.

Calibration Performed By: Evan Magill

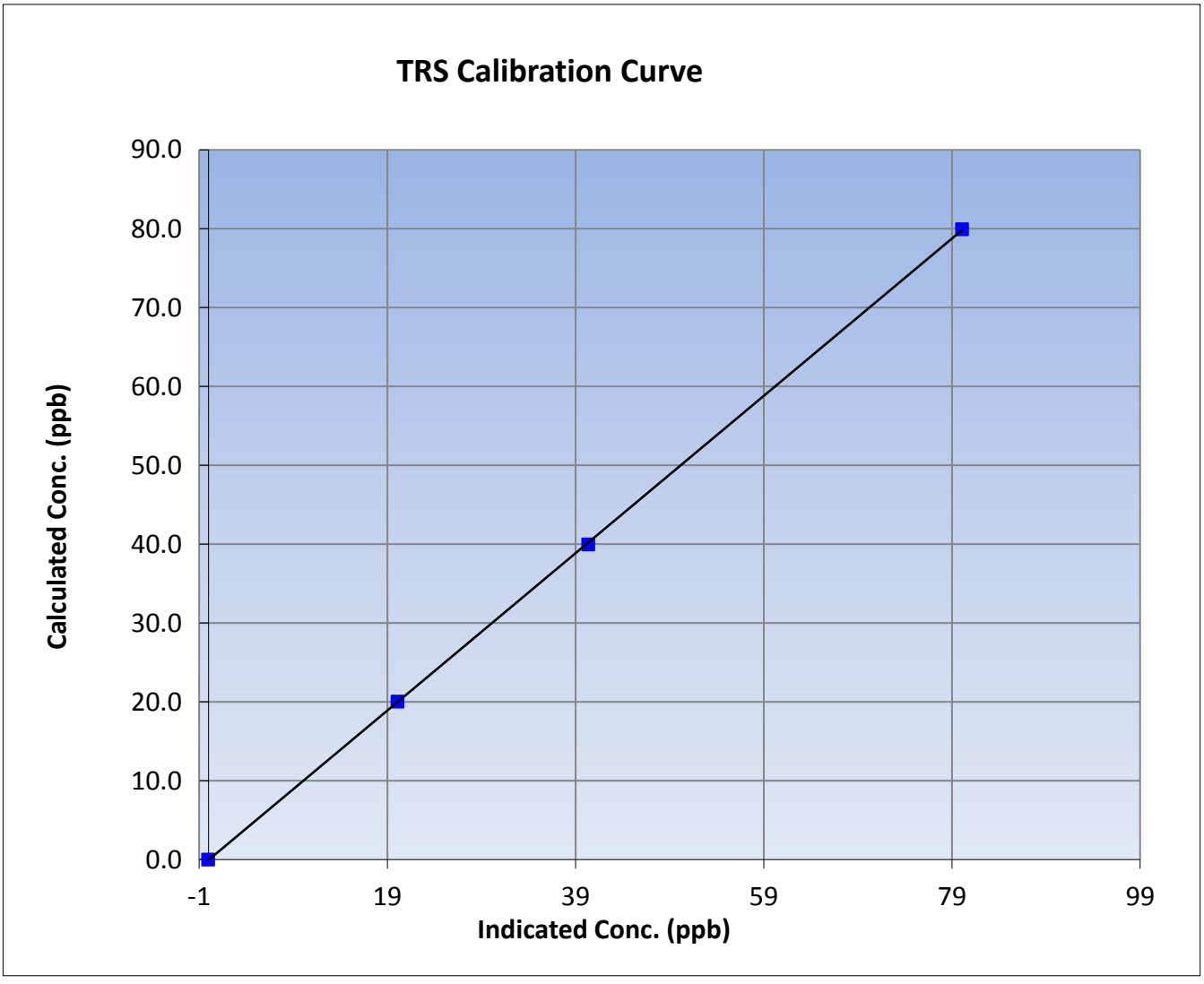
Wood Buffalo Environmental Association
TRS Calibration Report

Station Information

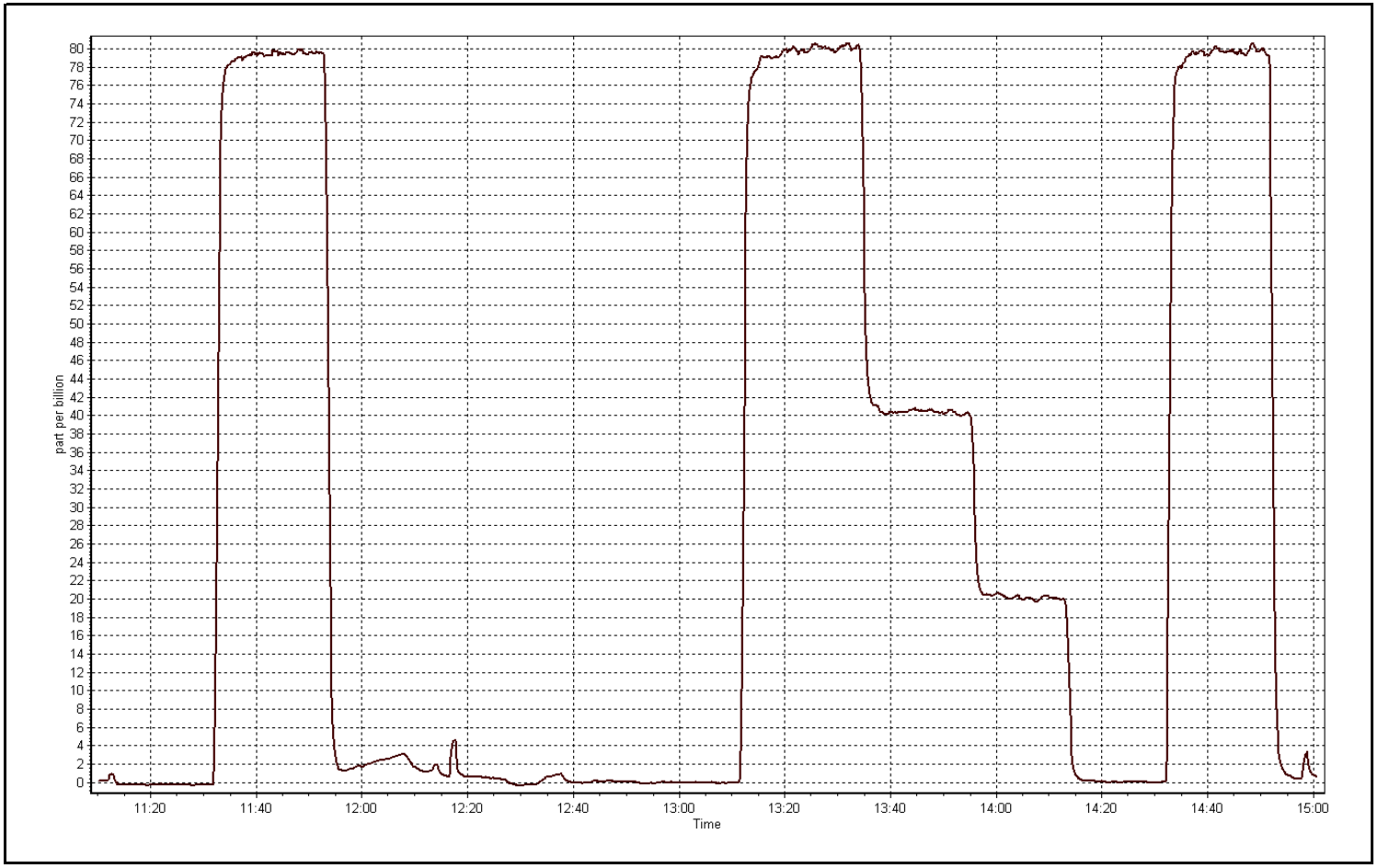
Calibration Date	April 7, 2016	Previous Calibration	March 2, 2016
Station Name	Barge Landing	Station Number	AMS 9
Start Time (MST)	11:10	End Time (MST)	14:55
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1218153461

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999978
79.9	80.1	0.9982		
40.0	40.4	0.9904	Slope	0.997508
20.0	20.1	0.9972		
			Intercept	-0.052008



TRS Calibration Plot Date: April 7, 2016



Wood Buffalo Environmental Association
THC Calibration Report

W B E A

Station Information

Calibration Date	April-08-16	Last Calibration	March-02-16
Station Name	Barge Landing	Station Number	AMS 9
Reason:	Routine		
Start Time (MST)	9:10	End Time (MST)	12:45
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	9.1
Analyzer IP address	192.168.1.51		Air or Bypass Press	34.7	34.7
Calculated slope	0.998071	0.999702	Fuel Pressure	24.1	24.1
Calculated intercept	0.024510	0.033413	Analyzer Coeff	4.319	4.264
			Analyzer BKG	5.62	5.62
Analyzer make	Thermo 51i-LT		Analyzer serial #	1327059296	

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	-0.04	----
as found span	5000	76.7	15.70	15.80	0.994
calibrator zero	5000	0.0	0.00	-0.02	----
high point	5000	76.7	15.70	15.68	1.001
second point	5000	41.0	8.39	8.35	1.005
third point	5000	15.4	3.15	3.11	1.014
as left zero	5000	0.0	0.00	-0.06	----
as left span	5000	76.7	15.70	15.61	1.006
				Average Correction Factor	1.007

Corrected As found	15.84	Previous response	15.71	% change	-0.8%

Notes:

Changed inlet filter after as founds. Changed pump for preventative maintenance. Adjusted zero and span.

Calibration Performed By: Evan Magill

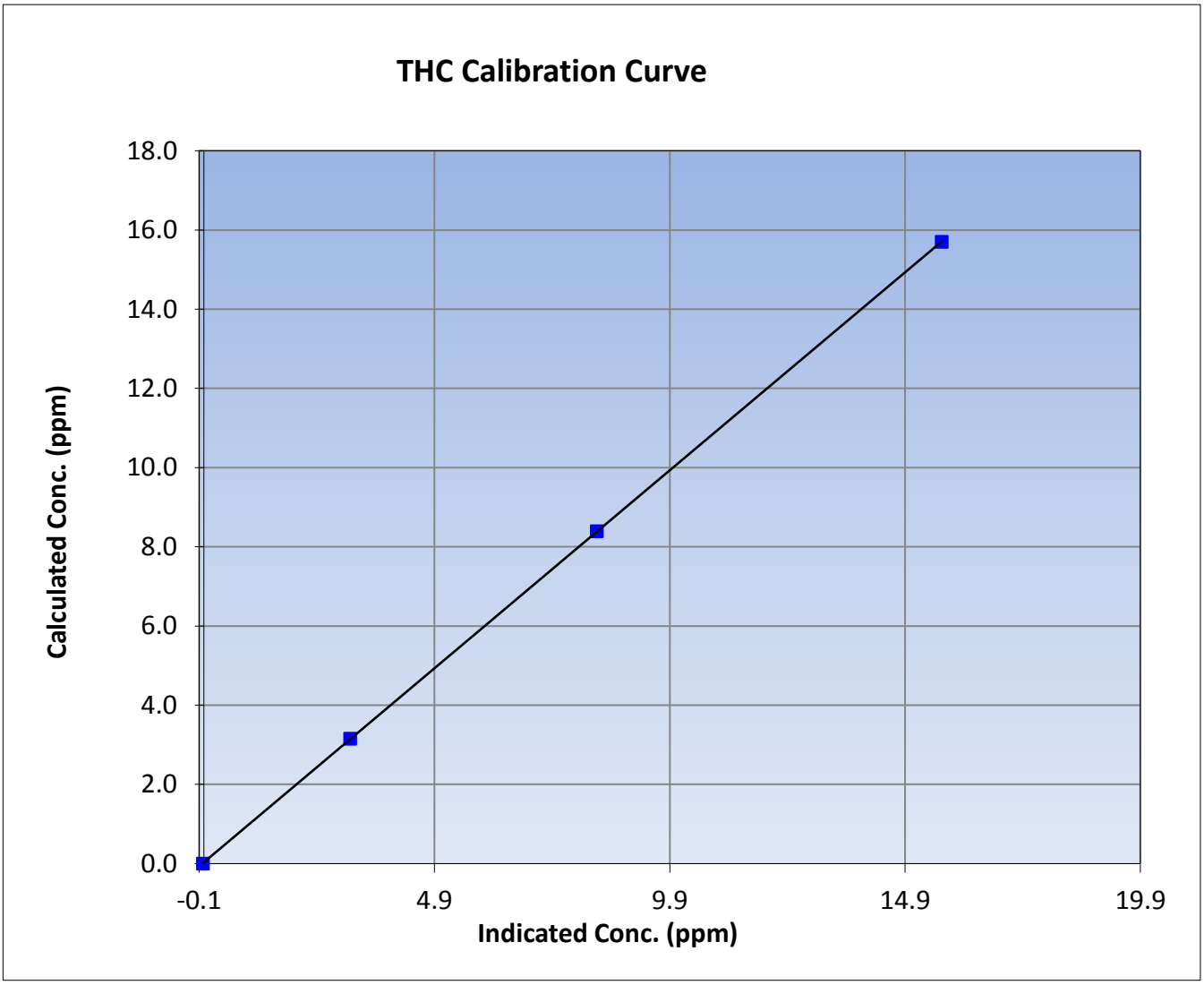
Wood Buffalo Environmental Association
THC Calibration Report

Station Information

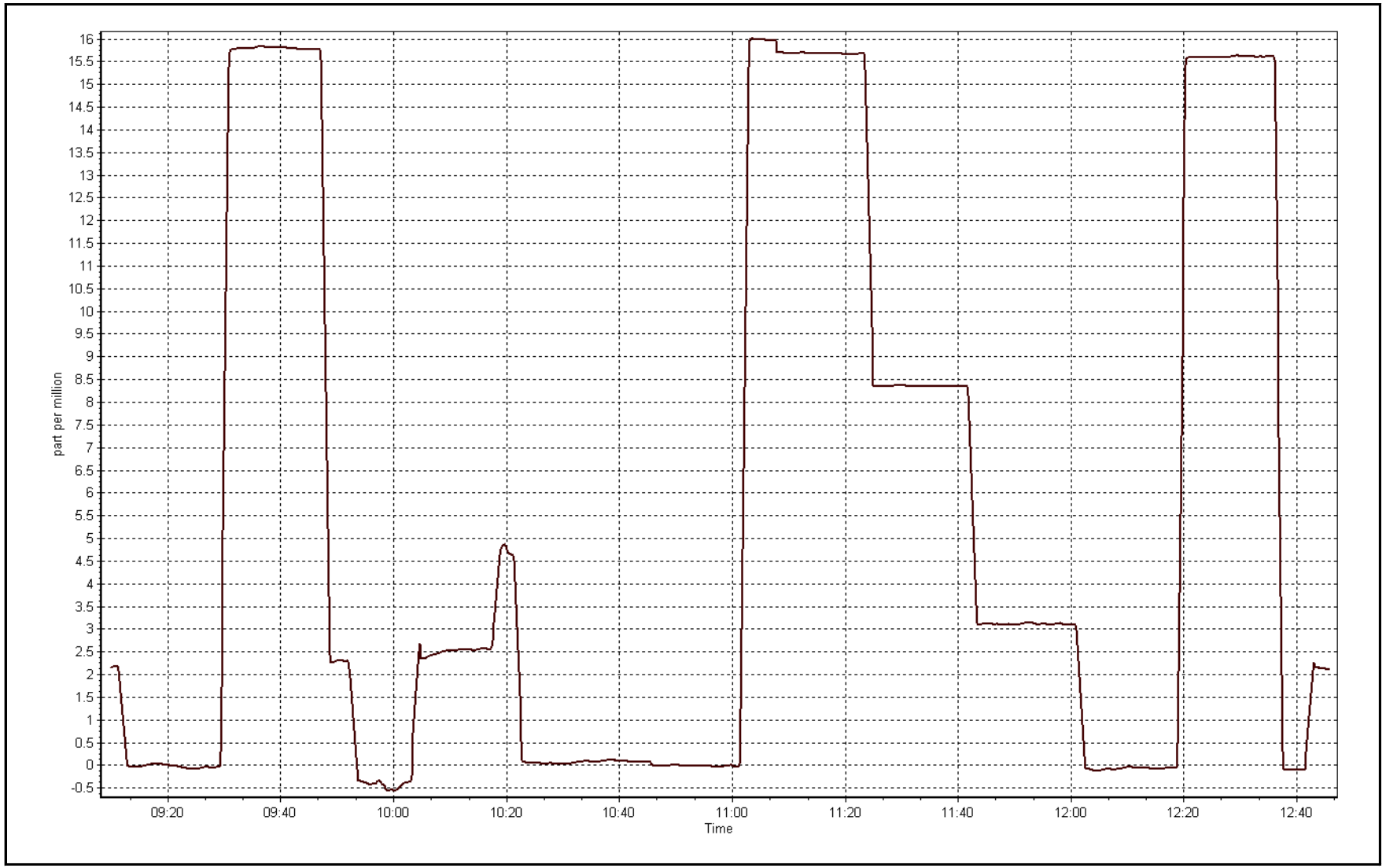
Calibration Date	April 8, 2016	Previous Calibration	March 2, 2016
Station Name	Barge Landing	Station Number	AMS 9
Start Time (MST)	9:10	End Time (MST)	12:45
Analyzer make	Thermo 51i-LT	Analyzer serial #	1327059296

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	-0.02	----	Correlation Coefficient	0.999997
15.70	15.68	1.0013		
8.39	8.35	1.0051	Slope	0.999702
3.15	3.11	1.0136		
			Intercept	0.033413



THC Calibration Plot Date: April 8, 2016



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 11
LOWER CAMP
APRIL 2016

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

May 27, 2016

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP (AMS 11)
APRIL 2016

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	682	38	38	100.00	43	0	6	0
H2S (ppb) Average	685	33	35	99.72	6	0	1	0
THC (ppm) Average	674	43	46	99.58	5.2	-	2.9	-
Temperature (C) Average	684	32	36	99.44	62	-	47	-
Relative Humidity (%) Average	677	38	43	99.31	30	-	12	-
Wind Speed 10 m (km/h) Average	677	38	43	99.31	25	-	4	-
Wind Direction 10 m (deg) Average	677	38	43	99.31	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP (AMS 11)
APRIL 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

					Percentile						
Parameter	Number	Mean	StnDev	Total	Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	685	2.2	7	-	0	0	0	0	1	5	98
H2S (ppb) Average	686	0.4	1	-	0	0	0	0	0	1	8
THC (ppm) Average	679	2.25	0.2	-	1.9	2	2.1	2.2	2.3	2.5	4.1
Temperature 2 m (C) Average	720	4.13	7.8	-	-12.1	-5	-1.3	2.8	8.6	16.1	29.2
Relative Humidity (%) Average	720	59.6	21	-	14	28	43	62	75	87	99
Wind Speed 10 m (km/h) Average	715	10.4	6	-	0	3	5	10	14	18	34
Wind Direction 10 m (deg) Average	715	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP (AMS 11)
APRIL 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2, THC	05 Apr 2016 13:00	05 Apr 2016 13:00	1	Maintenance - sample manifold cleaned
THC	14 Apr 2016 09:00	14 Apr 2016 14:00	6	Unstable operation - excessive baseline drift
Wind Speed, Wind Direction	06 Apr 2016 11:00	06 Apr 2016 12:00	2	Flat line in sensor output signal -sensor frozen
Wind Speed, Wind Direction	14 Apr 2016 05:00	14 Apr 2016 07:00	3	Flat line in sensor output signal -sensor frozen

Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO_2) - ppb

Lower Camp - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 98 ppb on Apr 25 21:00 Maximum Daily Average: 14.4 ppb on Apr 25

Minimum Value: 0 ppb on Apr 1 15:00 Minimum Daily Average: 0.0 ppb on Apr 2
Maximum Diurnal Average: 5.9 ppb at hour 20 Minimum Diurnal Average: 0.4 ppb at hour 5
Monthly Average: 2.2 ppb Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 1$ $P_{90} = 5$ $P_{99} = 30$

Hours in Service:	720
Hours of Data:	685
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-Apr	1	Z	2	3	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	3
2-Apr	0	0	Z	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-Apr	0	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
4-Apr	0	0	0	0	Z	0	0	1	1	1	7	C	C	C	C	1	0	1	1	1	1	1	1	1	0.8	7
5-Apr	0	0	0	0	0	Z	0	0	0	0	2	10	M	8	5	11	1	3	1	2	0	0	1	1	2.1	11
6-Apr	Z	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
7-Apr	0	Z	0	0	0	0	0	1	1	2	1	2	6	12	4	1	0	0	0	0	0	0	0	0	1.5	12
8-Apr	0	0	Z	0	0	0	0	0	1	2	1	0	0	0	0	0	0	0	0	0	1	4	0	0	0.5	4
9-Apr	0	0	0	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
10-Apr	0	0	0	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	6	12	3	1	1	5	1.4	12
11-Apr	2	2	0	1	0	Z	7	0	0	1	1	3	7	3	1	2	1	1	2	4	1	1	1	0	1.9	7
12-Apr	Z	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
13-Apr	0	Z	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1
14-Apr	0	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
15-Apr	0	0	0	Z	0	0	0	21	11	1	3	1	2	1	1	0	0	0	0	0	0	3	7	0	2.3	21
16-Apr	0	10	0	0	Z	0	0	1	0	0	0	5	4	0	0	0	1	1	6	2	5	2	1	0	1.8	10
17-Apr	0	0	0	0	0	Z	0	0	0	0	0	1	9	6	0	0	1	1	2	26	14	1	1	0	2.7	26
18-Apr	Z	0	0	0	0	0	0	0	0	0	0	3	4	12	11	19	10	2	1	0	6	11	10	3	4.2	19
19-Apr	2	Z	1	1	2	5	1	0	0	3	1	1	1	0	0	0	9	3	10	20	0	0	0	0	2.6	20
20-Apr	0	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
21-Apr	0	3	0	Z	0	0	0	1	24	15	15	7	0	0	1	0	0	0	0	0	0	0	0	0	3.0	24
22-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0.3	1
23-Apr	0	0	0	0	0	Z	0	0	0	2	0	1	0	0	1	1	1	0	0	0	0	0	0	41	2.1	41
24-Apr	Z	2	23	4	0	1	0	0	0	1	0	2	2	2	3	2	1	0	0	0	7	6	11	5	3.2	23
25-Apr	1	Z	2	1	0	0	1	2	1	0	1	1	3	3	2	11	16	22	38	74	98	24	3	28	14.4	98
26-Apr	48	2	Z	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	1	1	1	1	0	3	2.8	48
27-Apr	6	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	6
28-Apr	0	0	0	0	Z	2	0	0	1	0	1	3	5	5	3	1	6	0	0	3	6	1	0	0	1.7	6
29-Apr	0	0	0	0	0	Z	0	2	6	12	10	7	9	5	1	12	26	33	26	12	2	2	1	1	7.3	33
30-Apr	Z	1	0	1	1	1	1	1	1	1	10	13	31	22	1	1	1	8	1	17	1	2	1	8	5.4	31
	2.5	0.9	1.3	0.6	0.4	0.5	0.5	1.1	1.8	1.5	1.9	2.2	3.1	2.9	1.3	2.2	2.6	2.6	3.3	5.9	4.9	2.0	1.3	3.3	Diurnal Average	
	48	10	23	4	2	5	7	21	24	15	15	13	31	22	11	19	26	33	38	74	98	24	11	41	Diurnal Maximum	

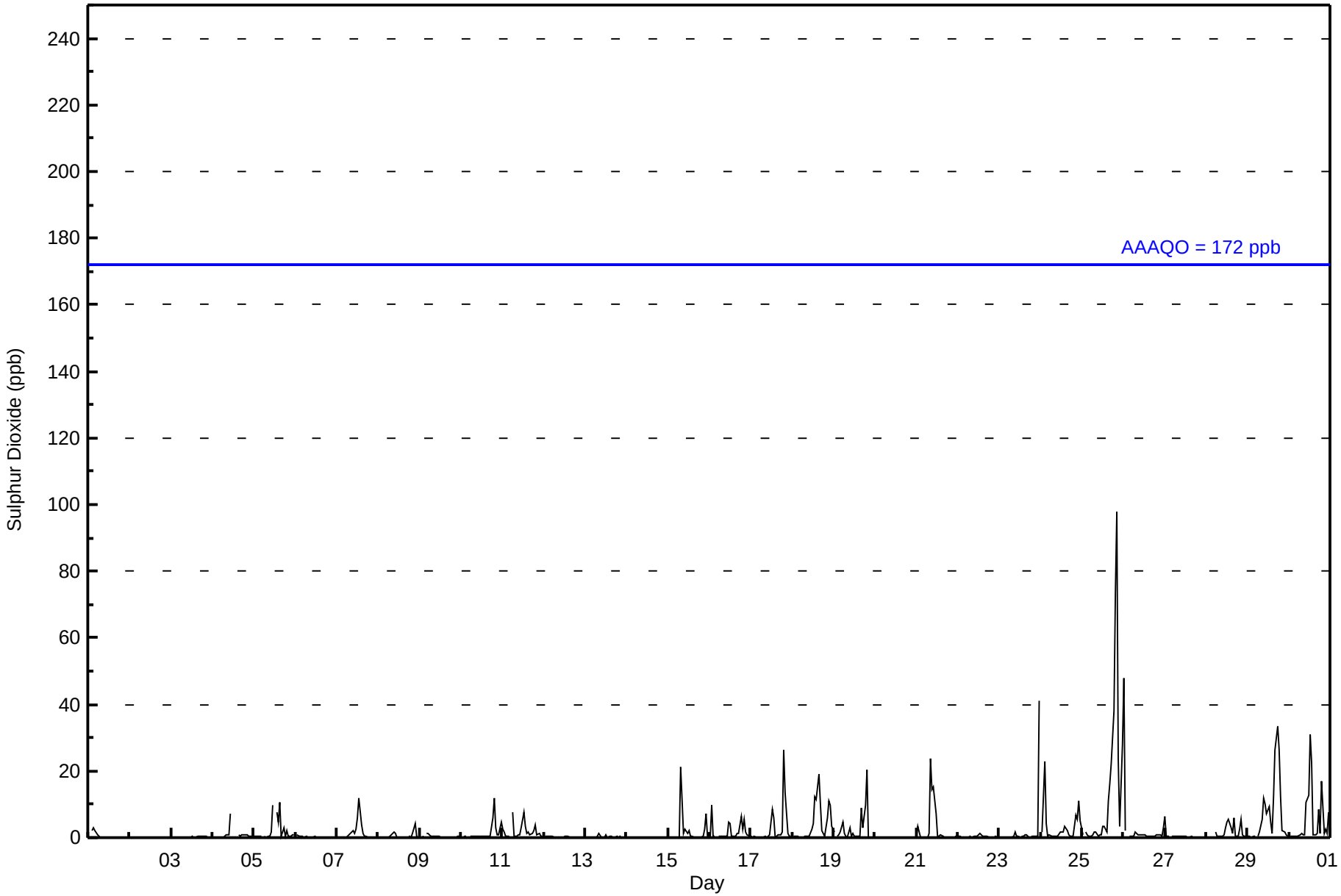
Z - zerospan C - Calibration M - Maintenance
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb

Wood Buffalo Environmental Association

Hourly Averages

Sulphur Dioxide (SO_2) - ppb

Lower Camp - April 2016



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

Lower Camp - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	648	94.60	94.60
11 - 20	20	2.92	97.52
21 - 60	15	2.19	99.71
61 - 110	2	0.29	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

Lower Camp - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 10	100	25	14	7	11	47	163	53	9	2	1	13	21	37	53	87	643
11 - 20	1	0	0	1	0	0	4	1	8	1	1	1	0	1	1	0	20
21 - 60	0	1	0	1	0	0	3	1	4	4	1	0	0	0	0	0	15
61 - 110	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	2
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	101	26	14	9	11	47	170	55	22	8	3	14	21	38	54	87	680

Total Number of Valid Hours: 680

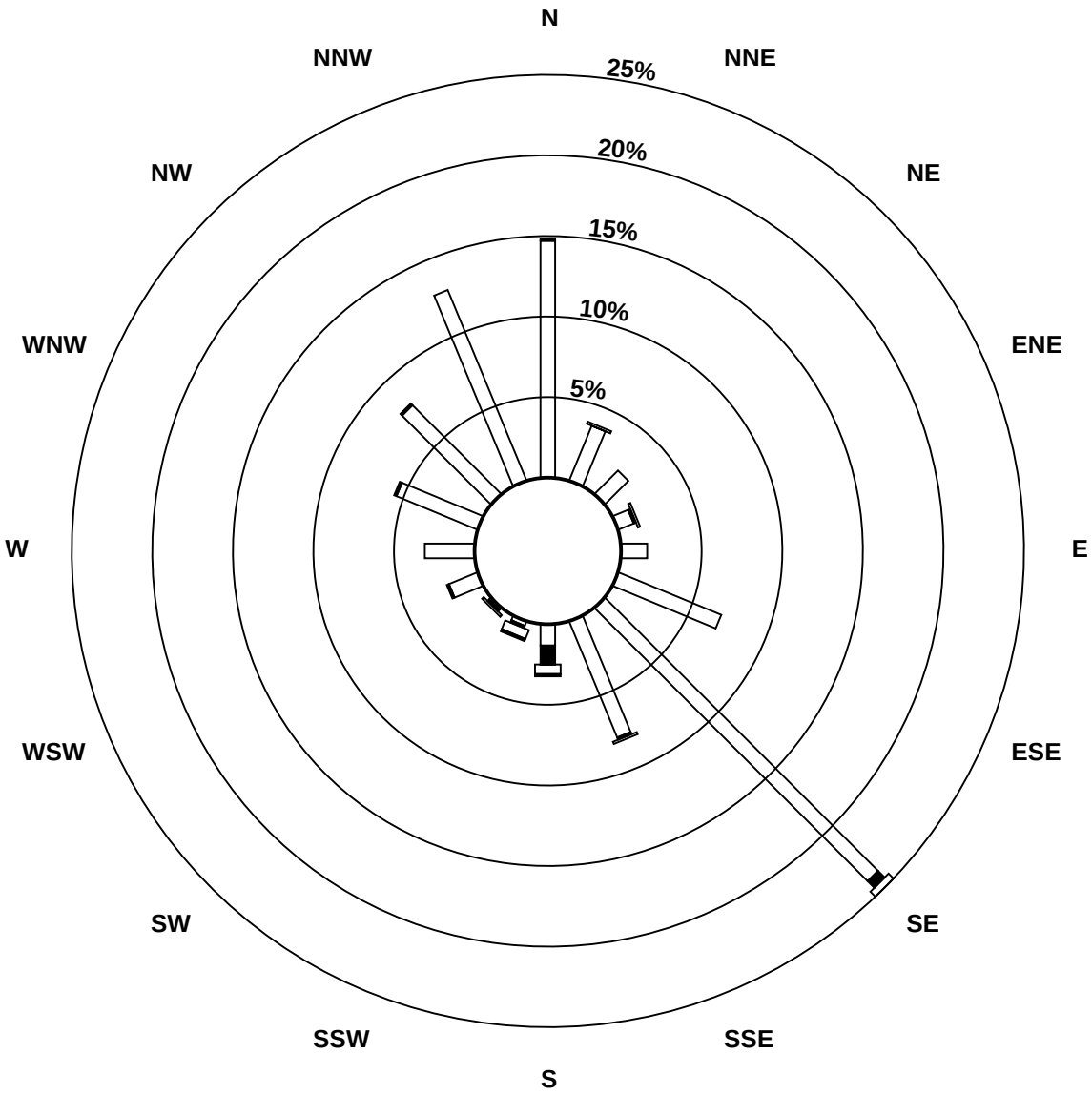
Total Number of Hours: 720

Wood Buffalo Environmental Association

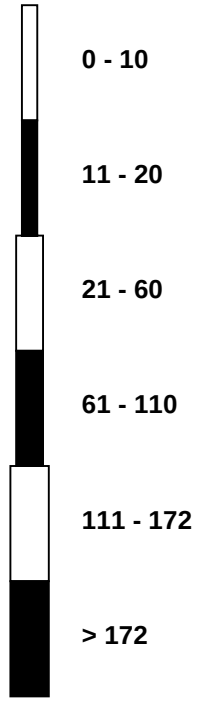
Wind Rose Apr 2016

Sulphur Dioxide (SO_2) - ppb

Lower Camp (AMS 11)



Classes (ppb)



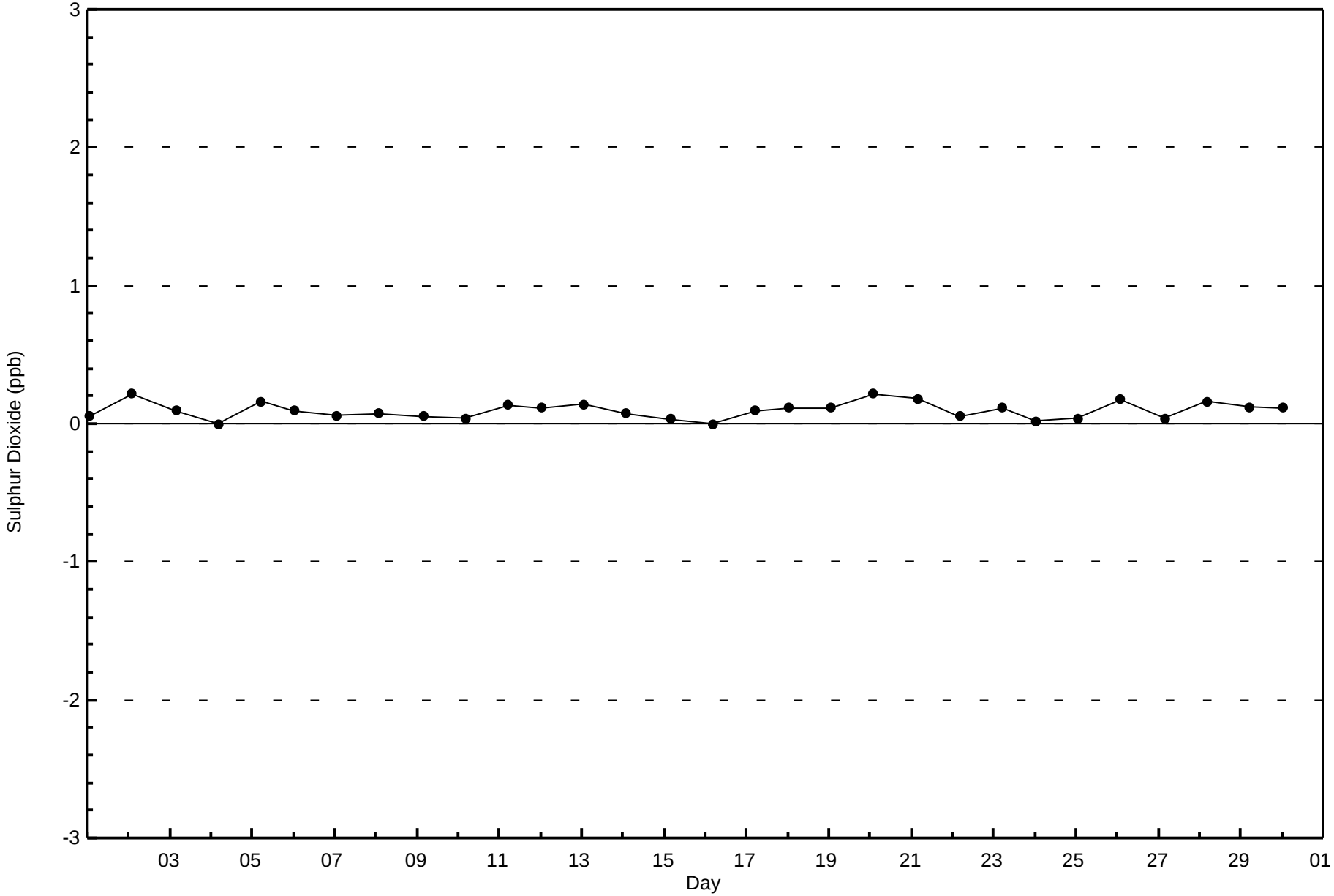
Total Number of Valid Hours: 680

Wood Buffalo Environmental Association

Zero Responses

Sulphur Dioxide (SO_2) - ppb

Lower Camp - April 2016

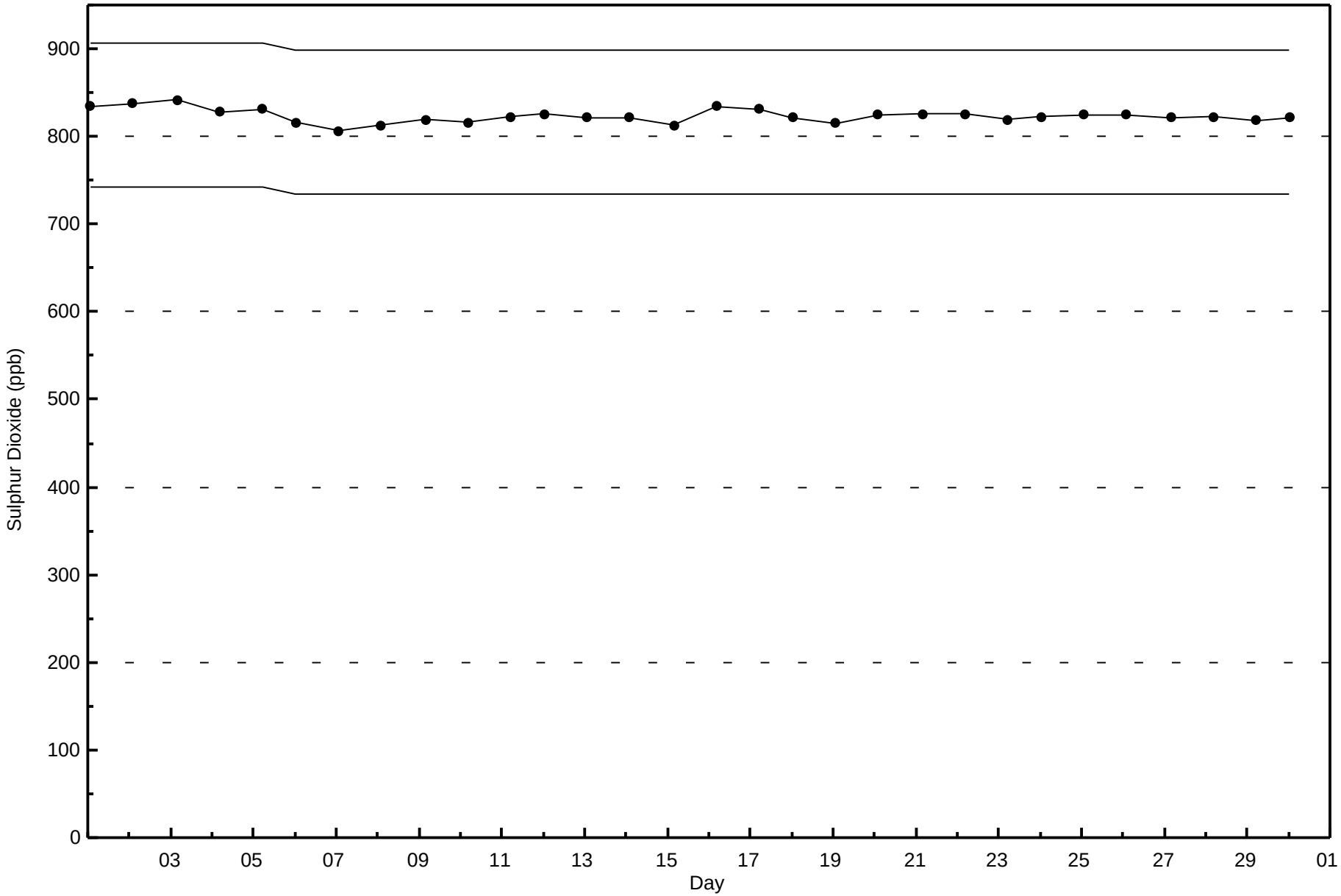


Wood Buffalo Environmental Association

Span Responses

Sulphur Dioxide (SO_2) - ppb

Lower Camp - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Hydrogen Sulphide (H_2S) - ppb

Lower Camp - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 8 ppb on Apr 25 21:00 Maximum Daily Average: 1.5 ppb on Apr 25

Minimum Value: 0 ppb on Apr 20 12:00
Maximum Diurnal Average: 0.7 ppb at hour 21
Monthly Average: 0.4 ppb

Minimum Daily Average: 0.1 ppb on Apr 20
Minimum Diurnal Average: 0.2 ppb at hour 15
Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 1$ $P_{99} = 3$

Hours in Service:	720
Hours of Data:	686
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-Apr	1	1	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
2-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
3-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
4-Apr	0	0	0	0	0	Z	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0.4	1
5-Apr	0	0	1	0	0	0	Z	0	0	0	C	C	C	C	0	0	0	0	0	0	0	1	1	1	0.4	1
6-Apr	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
7-Apr	0	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-Apr	0	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
9-Apr	0	0	0	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
10-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0.3	1
11-Apr	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	0.3	1
12-Apr	1	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
13-Apr	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
14-Apr	1	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
15-Apr	0	0	0	0	Z	0	0	5	3	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0.6	5
16-Apr	0	2	0	0	0	Z	0	0	0	0	0	1	1	0	0	0	0	0	0	0	2	1	1	1	0.5	2
17-Apr	0	0	0	0	0	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	5	3	1	1	1	0.7	5
18-Apr	1	Z	2	1	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	1	1	1	1	0.6	2
19-Apr	1	1	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	3	0	0	1	0	0	0	0	0.4	3
20-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
21-Apr	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
22-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.3	1
23-Apr	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.3	1
24-Apr	0	Z	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
25-Apr	0	0	Z	0	0	0	1	1	1	0	0	0	0	0	0	1	2	2	3	6	8	3	1	3	1.5	8
26-Apr	5	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0.5	5
27-Apr	2	1	1	1	Z	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2
28-Apr	0	0	0	0	1	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0.4	1
29-Apr	0	0	0	0	0	0	Z	0	1	1	1	0	0	0	0	1	1	2	1	1	1	1	1	0	0.6	2
30-Apr	0	Z	0	1	3	1	1	1	1	0	2	2	4	2	0	0	0	1	0	2	1	1	0	1	1.0	4
	0.6	0.5	0.5	0.4	0.5	0.3	0.3	0.5	0.4	0.3	0.3	0.3	0.4	0.3	0.2	0.3	0.4	0.3	0.4	0.7	0.7	0.5	0.5	0.6	Diurnal Average	
	5	2	2	1	3	1	1	5	3	1	2	2	4	2	1	1	3	2	3	6	8	3	1	3	Diurnal Maximum	

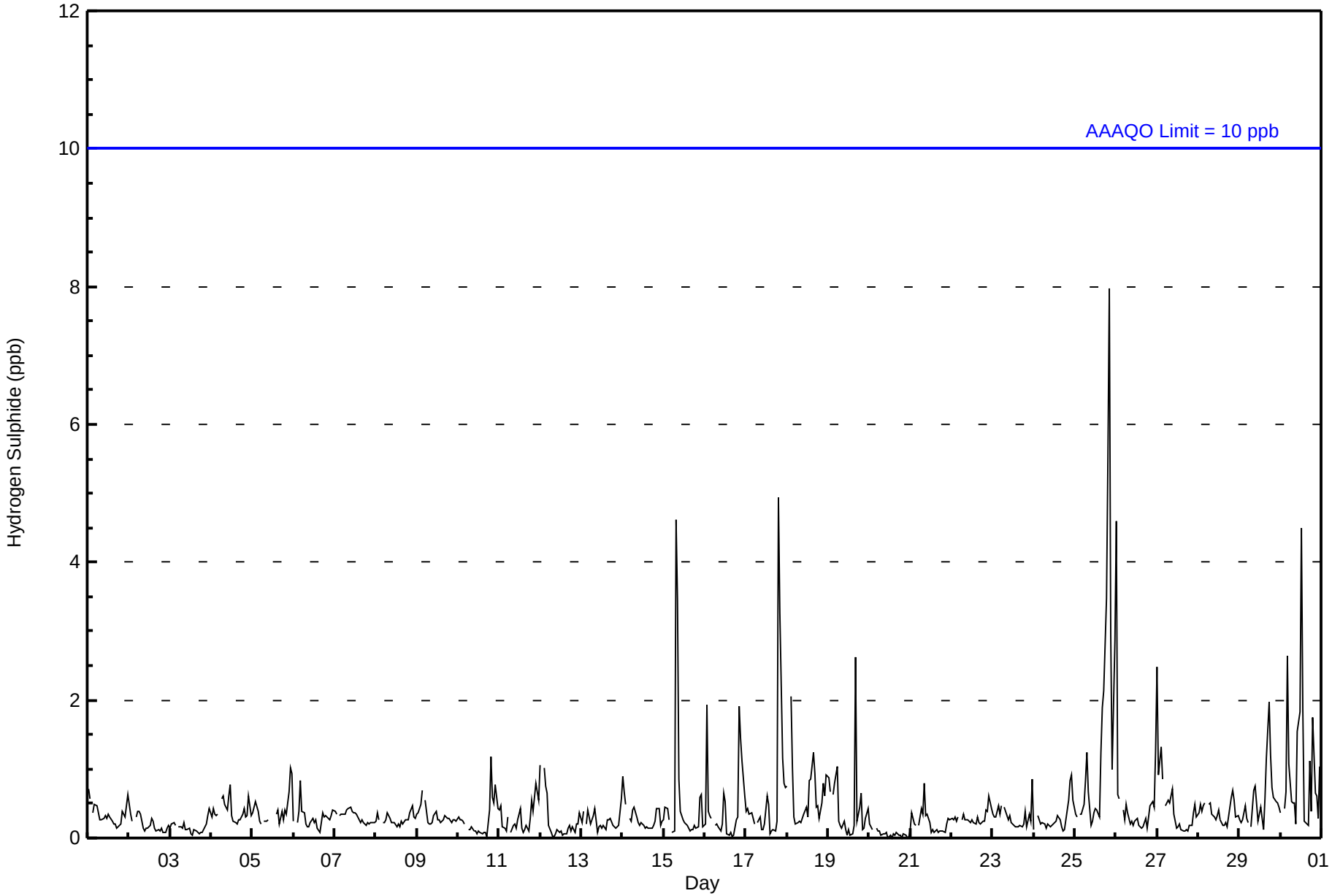
Z - zerospan C - Calibration
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb

Wood Buffalo Environmental Association

Hourly Averages

Hydrogen Sulphide (H_2S) - ppb

Lower Camp - April 2016



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Hydrogen Sulphide (H_2S) - ppb

Lower Camp - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	673	98.10	98.11
3 - 4	8	1.17	99.27
5 - 7	4	0.58	99.85
8 - 11	1	0.15	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Hydrogen Sulphide (H_2S) - ppb

Lower Camp - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 2	99	26	15	9	11	47	168	54	19	5	3	14	21	34	58	85	668
3 - 4	0	0	0	0	0	0	3	1	1	2	0	0	1	0	0	0	8
5 - 7	0	0	0	1	0	0	1	0	1	1	0	0	0	0	0	0	4
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	99	26	15	10	11	47	172	55	22	8	3	14	22	34	58	85	681

Total Number of Valid Hours: 681

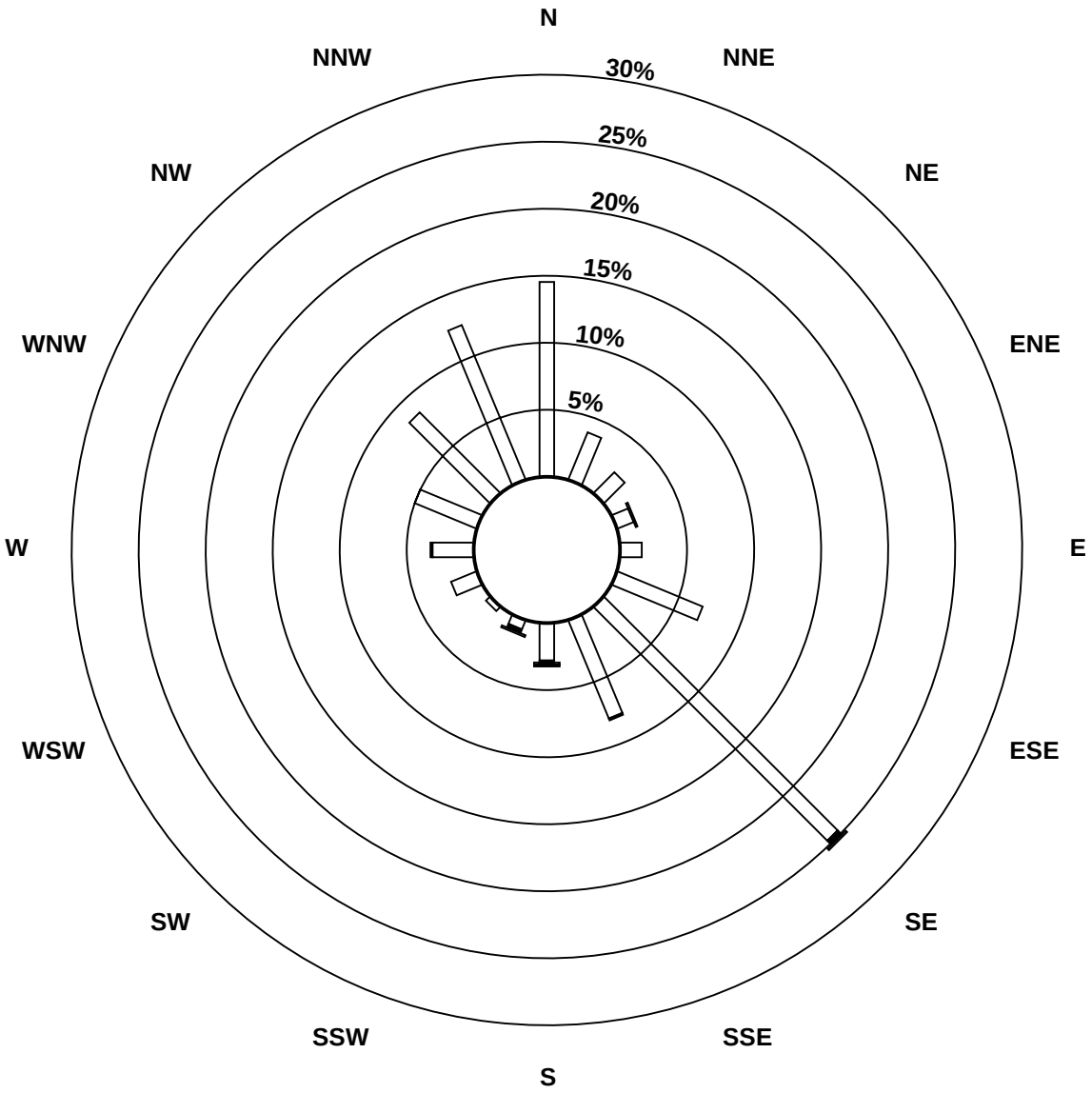
Total Number of Hours: 720

Wood Buffalo Environmental Association

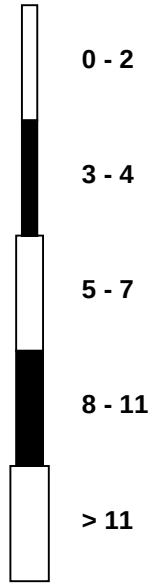
Wind Rose Apr 2016

Hydrogen Sulphide (H_2S) - ppb

Lower Camp (AMS 11)



Classes (ppb)



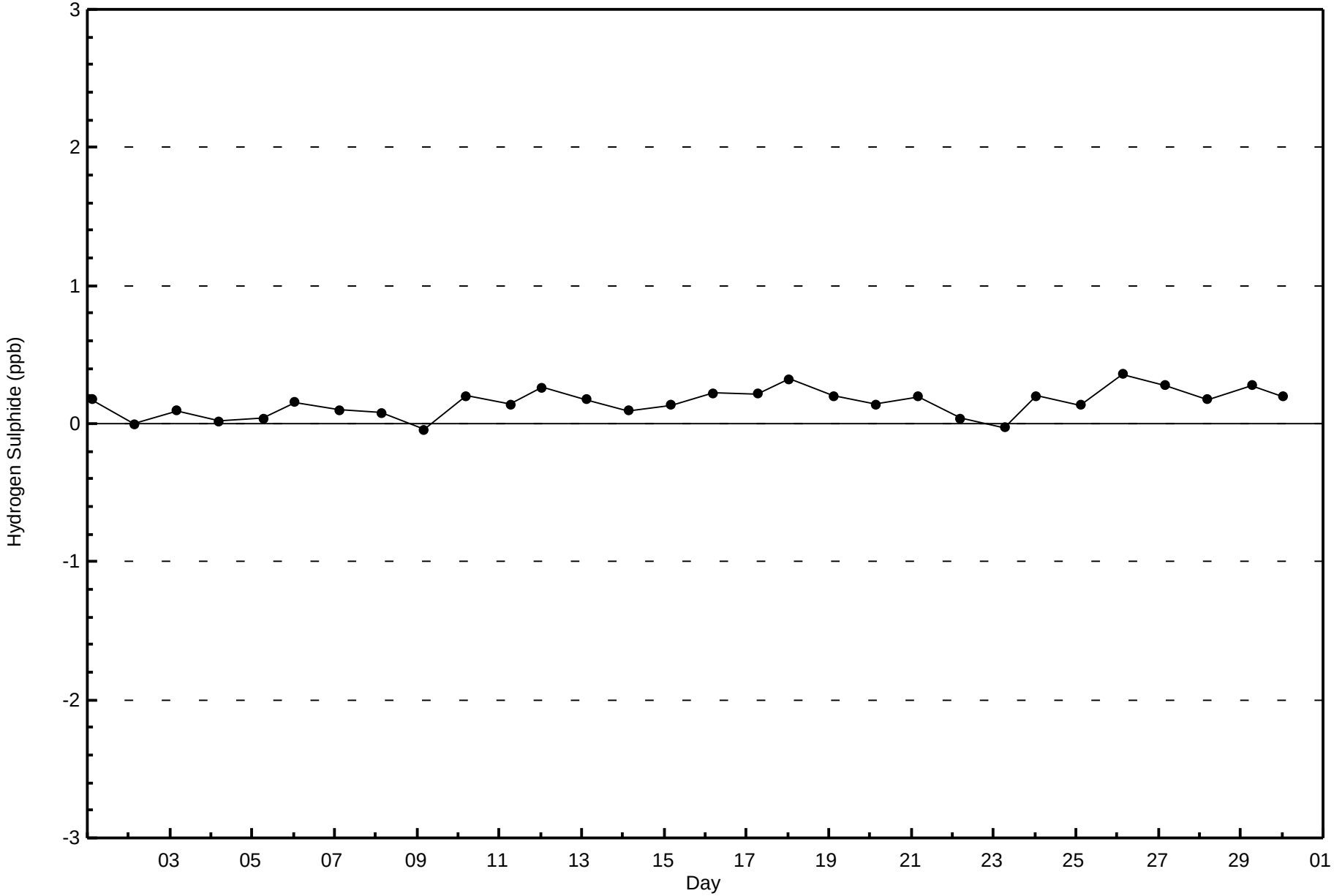
Total Number of Valid Hours: 681

Wood Buffalo Environmental Association

Zero Responses

Hydrogen Sulphide (H_2S) - ppb

Lower Camp - April 2016

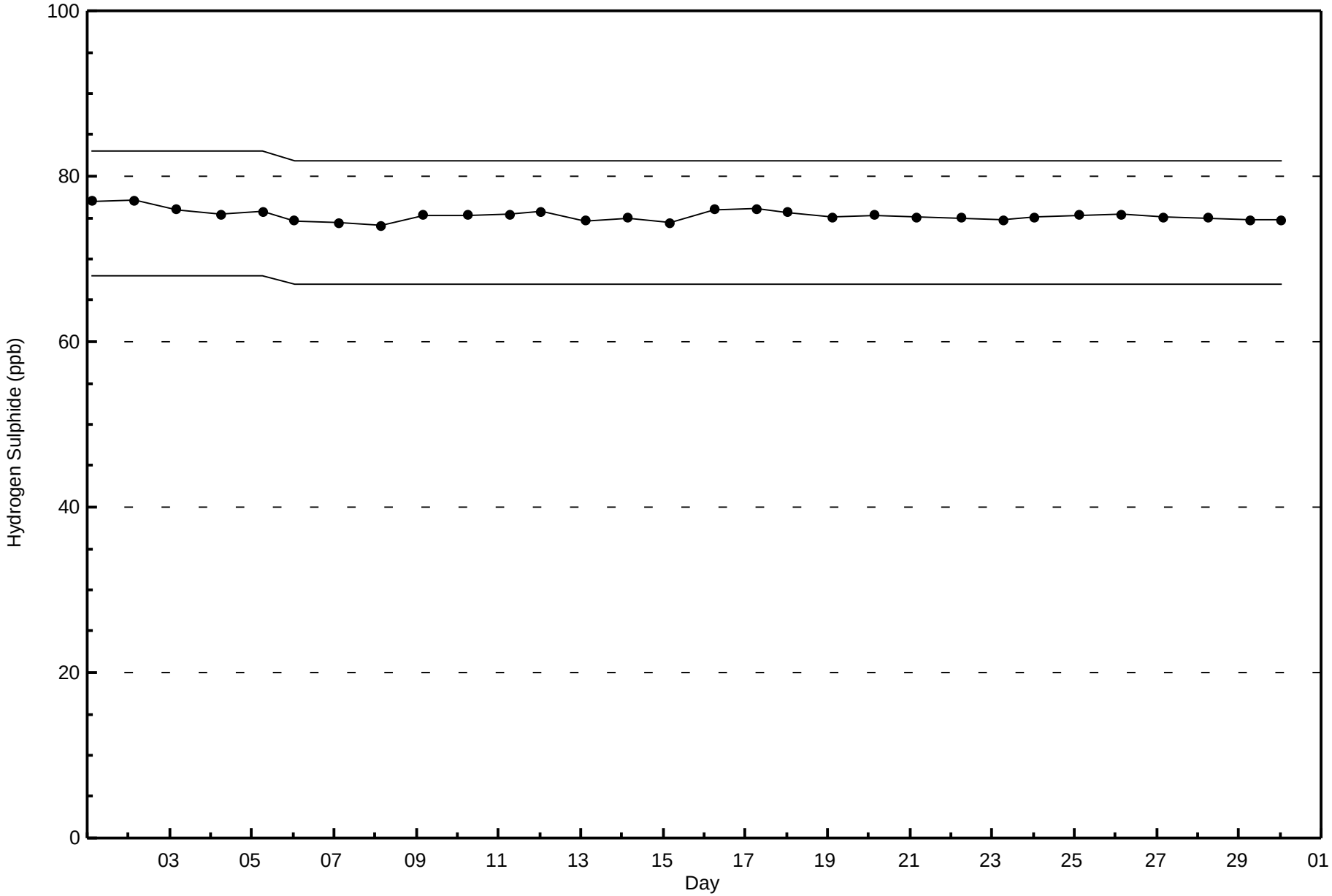


Wood Buffalo Environmental Association

Span Responses

Hydrogen Sulphide (H_2S) - ppb

Lower Camp - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Lower Camp - April 2016

Maximum Value: 4.3 ppm on Apr 15 09:00

Maximum Daily Average: 2.6 ppm on Apr 17

Minimum Value: 1.9 ppm on Apr 10 07:00

Minimum Daily Average: 2.1 ppm on Apr 9

Maximum Diurnal Average: 2.4 ppm at hour 22

Minimum Diurnal Average: 2.2 ppm at hour 15

Monthly Average: 2.30 ppm

Percentiles: P_1 = 1.9 P_{10} = 2.1 Q_1 = 2.2 Median = 2.3 Q_3 = 2.4 P_{90} = 2.6 P_{99} = 3.3

Hours in Service:	720
Hours of Data:	679
Hours of Missing Data:	41
Hours of Calibration:	34
Percent Operational Time:	99.0

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-Apr	2.6	Z	2.2	2.2	2.2	2.4	2.3	2.1	2.0	2.0	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.0	2.0	2.0	2.1	2.2	2.2	2.1	2.6
2-Apr	2.2	2.1	Z	2.0	2.0	2.1	2.2	2.1	2.0	2.1	2.1	2.2	2.2	2.3	2.3	2.2	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.2	2.1	2.3
3-Apr	2.2	2.2	2.2	Z	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.3
4-Apr	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	C	C	C	C	2.4	2.4	2.4	2.4	2.4	2.4	2.3	2.2	2.2	2.2	2.4
5-Apr	2.2	2.3	2.4	2.3	2.2	Z	2.2	2.3	2.2	2.1	2.2	2.7	M	2.4	2.4	2.3	2.3	2.4	2.3	2.5	2.2	2.2	2.2	2.2	2.3	2.7
6-Apr	Z	2.4	2.3	2.2	2.4	2.4	2.5	2.1	2.0	2.0	2.1	2.2	2.2	2.2	2.0	1.9	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.5
7-Apr	2.1	Z	2.0	1.9	1.9	2.0	2.1	2.1	2.2	2.3	2.2	2.1	2.1	2.0	2.1	2.2	2.2	2.1	2.0	2.0	2.1	2.1	2.2	2.1	2.1	2.3
8-Apr	2.2	2.2	Z	2.3	2.3	2.3	2.3	2.3	2.2	2.1	2.0	2.1	2.0	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.1	2.3
9-Apr	2.1	2.4	2.2	Z	2.3	2.4	2.0	1.9	1.9	2.1	2.1	2.2	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.4
10-Apr	2.1	2.1	2.1	2.1	Z	2.0	1.9	2.0	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.1	2.2	2.2	2.3	2.1	2.3
11-Apr	2.2	2.1	2.0	2.0	2.1	Z	2.2	2.0	2.0	2.2	2.2	2.1	2.2	2.2	2.2	2.3	2.3	2.3	2.5	2.5	2.4	2.4	2.5	2.5	2.2	2.5
12-Apr	Z	2.7	2.6	2.3	2.4	2.2	2.0	1.9	2.0	2.1	2.1	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.7
13-Apr	2.2	Z	2.3	2.2	2.2	2.2	2.3	2.4	2.4	2.3	2.3	2.3	2.2	2.4	2.1	2.3	2.5	2.3	2.3	2.1	2.2	2.1	2.2	2.2	2.3	2.5
14-Apr	2.3	2.3	Z	2.2	2.1	2.2	2.1	2.1	UO	UO	UO	UO	UO	UO	2.1	2.2	2.3	2.3	2.4	2.5	2.5	2.5	2.6	2.6	--	2.6
15-Apr	2.6	2.6	2.5	Z	2.4	2.4	2.4	2.6	4.3	3.3	2.8	2.7	2.7	2.8	2.5	2.3	2.3	2.3	2.4	2.5	2.3	2.3	2.2	2.2	2.6	4.3
16-Apr	2.2	2.6	2.4	2.6	Z	2.5	2.3	2.1	2.3	2.2	2.4	2.2	2.2	2.3	2.3	2.4	2.3	2.4	2.4	2.5	2.7	3.6	3.3	2.8	2.5	3.6
17-Apr	2.4	2.7	2.8	2.9	2.8	Z	2.6	2.5	2.6	2.3	2.3	2.4	2.5	2.4	2.4	2.3	2.4	2.4	2.6	2.9	3.1	3.3	3.2	3.2	2.6	3.3
18-Apr	Z	3.1	2.9	2.7	2.6	2.6	2.6	2.5	2.4	2.7	2.9	2.5	2.4	2.4	2.5	2.5	2.6	2.4	2.3	2.3	2.3	2.4	2.4	2.4	2.5	3.1
19-Apr	2.4	Z	2.5	2.4	2.6	2.7	2.2	2.3	2.2	2.3	2.3	2.2	2.3	2.3	2.3	2.2	2.3	2.3	2.4	2.5	2.3	2.4	2.7	3.1	2.4	3.1
20-Apr	2.2	2.1	Z	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2
21-Apr	2.2	2.3	2.2	Z	2.3	2.3	2.3	2.5	2.5	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.3	2.5
22-Apr	2.2	2.2	2.2	2.2	Z	2.3	2.3	2.3	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
23-Apr	2.2	2.3	2.3	2.2	2.2	Z	2.4	2.3	2.2	2.3	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.5	2.3	2.6	2.3	2.2	2.3	2.6
24-Apr	Z	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.3	2.4	2.4	2.2	2.4	2.3	2.2	2.4
25-Apr	2.2	Z	2.3	2.3	2.1	2.2	2.2	2.2	2.1	2.1	2.2	2.1	2.2	2.2	2.2	2.3	2.3	2.3	2.4	2.6	4.2	3.8	2.8	3.1	2.5	4.2
26-Apr	2.7	2.5	Z	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.4	2.5	2.3	2.6	2.3	2.7
27-Apr	2.7	2.7	2.7	Z	2.7	2.6	2.8	2.5	2.7	2.7	2.5	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.3	2.3	2.5	2.8
28-Apr	2.3	2.3	2.3	2.3	Z	2.6	2.6	2.7	2.5	2.5	2.5	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.9	2.6	2.6	2.8	2.6	2.3	2.5	2.9
29-Apr	2.4	2.4	2.5	2.8	2.5	Z	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.5	2.5	2.6	2.8	2.8	2.6	2.5	2.4	2.5	2.8
30-Apr	Z	2.4	2.4	2.4	2.5	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.6	2.4	2.4	2.4	2.5	2.4	2.4	2.6	2.5	2.3	2.4	2.4	2.6
	2.3	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.4	Diurnal Average	
	2.7	3.1	2.9	2.9	2.8	2.7	2.8	2.7	4.3	3.3	2.9	2.7	2.7	2.8	2.5	2.5	2.6	2.5	2.9	2.9	4.2	3.8	3.3	3.2	Diurnal Maximum	

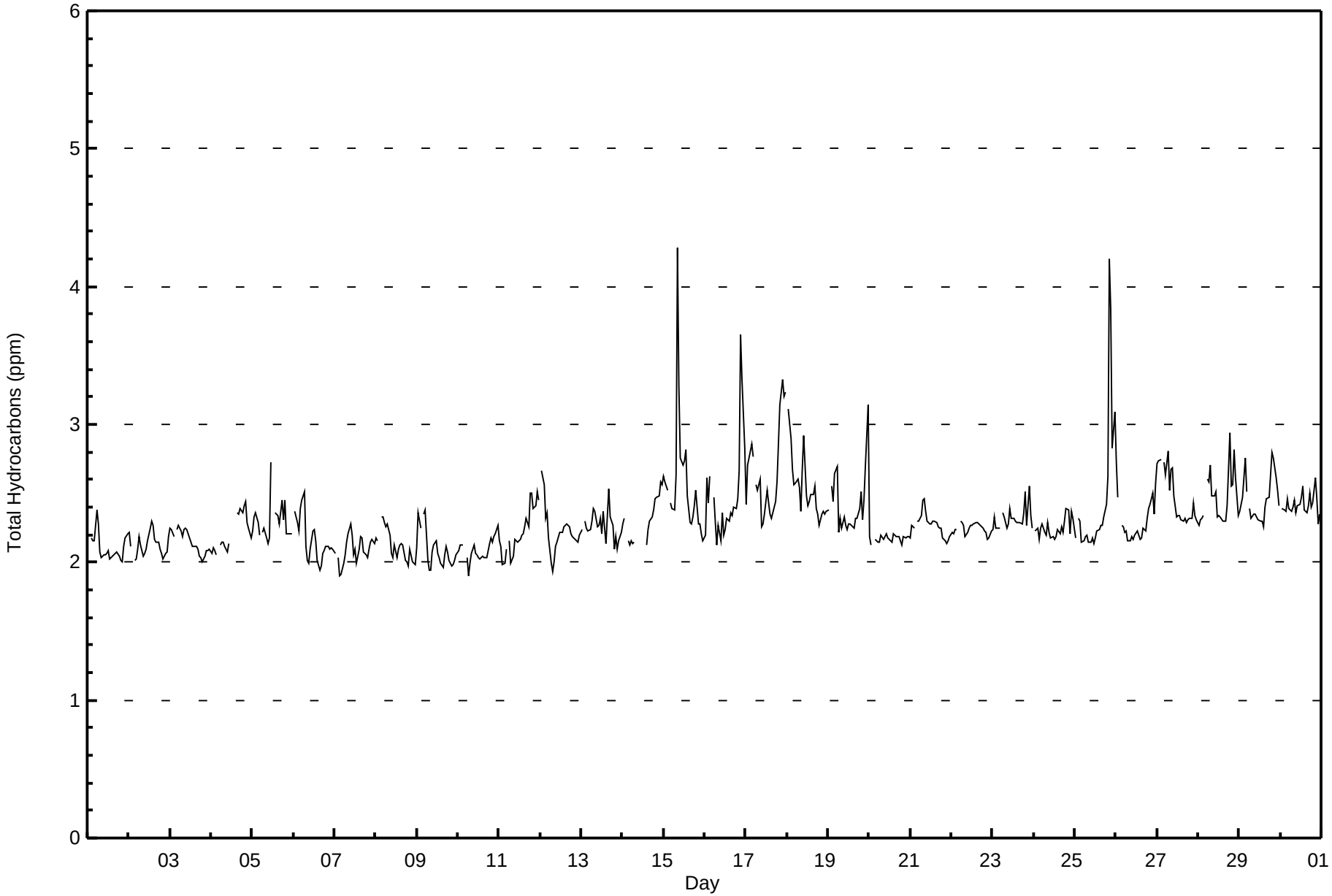
Z - zerospan C - Calibration M - Maintenance UO - Unstable Operation

Wood Buffalo Environmental Association

Hourly Averages

Total Hydrocarbons (THC) - ppm

Lower Camp - April 2016



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm

Lower Camp - April 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	61	8.98	8.98
2.1 - 3.0	605	89.10	98.09
3.1 - 10.0	13	1.91	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 679

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Total Hydrocarbons (THC) - ppm

Lower Camp - April 2016

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	20	3	4	1	3	1	11	0	0	0	0	0	0	1	6	11	61
2.1 - 3.0	77	23	10	7	8	46	151	54	20	8	3	14	21	37	47	74	600
3.1 - 10.0	0	0	0	1	0	0	8	1	2	0	0	0	0	0	0	1	13
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	97	26	14	9	11	47	170	55	22	8	3	14	21	38	53	86	674

Total Number of Valid Hours: 674

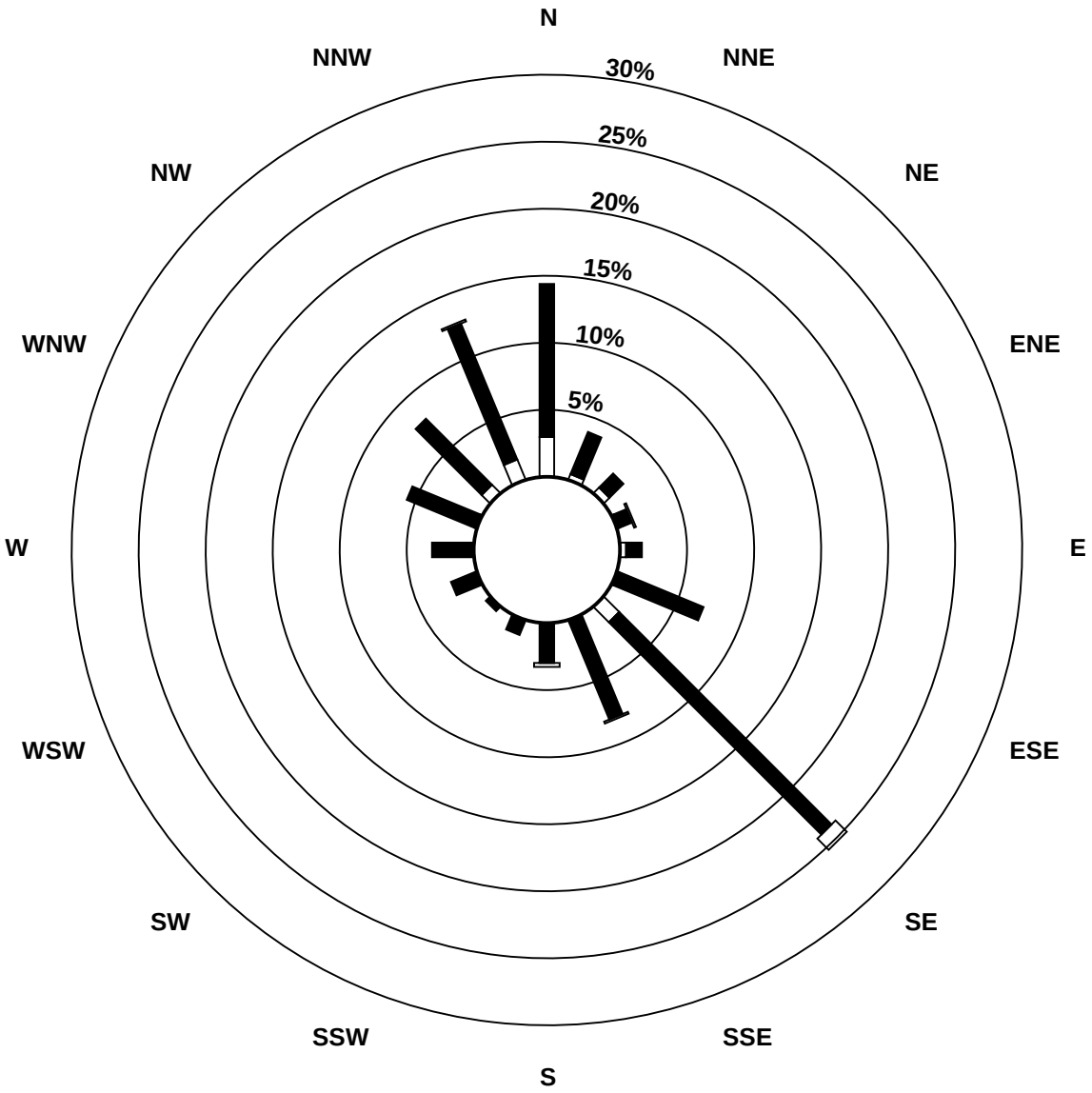
Total Number of Hours: 720

Wood Buffalo Environmental Association

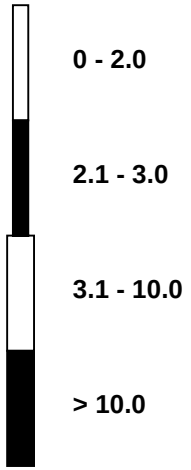
Wind Rose Apr 2016

Total Hydrocarbons (THC) - ppm

Lower Camp (AMS 11)



Classes (ppm)



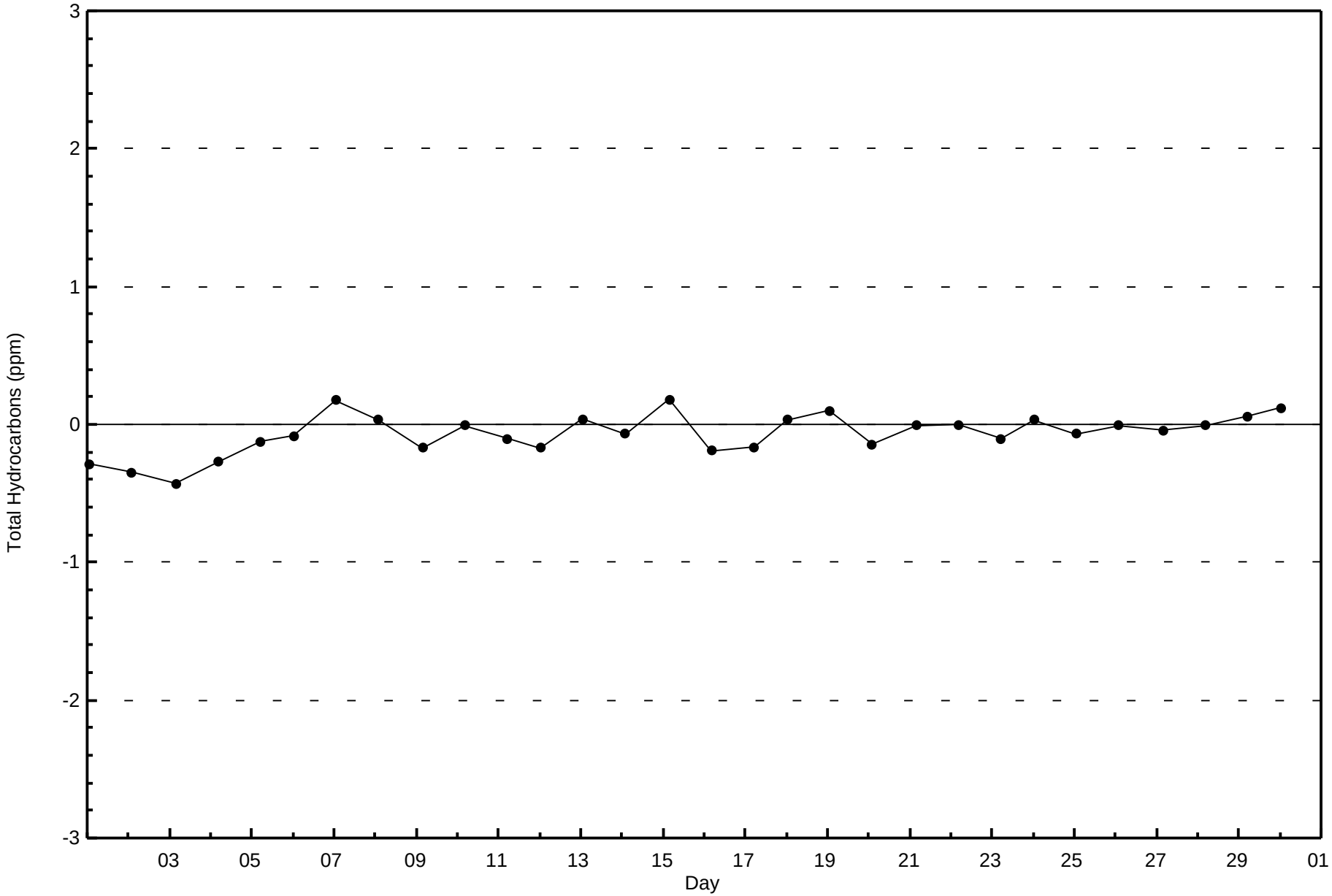
Total Number of Valid Hours: 674

Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Lower Camp - April 2016

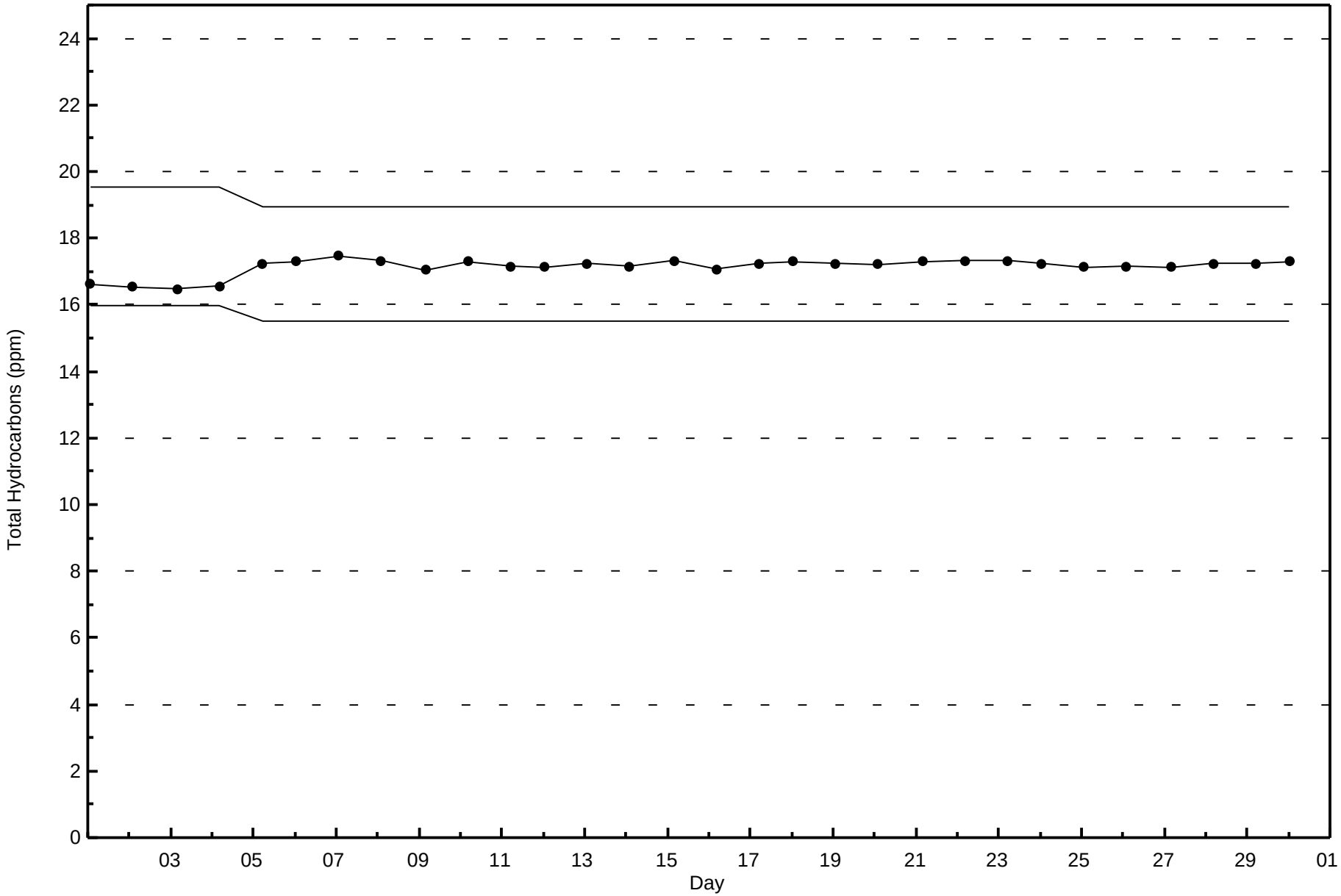


Wood Buffalo Environmental Association

Span Responses

Total Hydrocarbons (THC) - ppm

Lower Camp - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

Lower Camp - April 2016

Maximum Value: 29.2 C on Apr 18 15:00

Maximum Daily Average: 16.7 C on Apr 29

Minimum Value: -12.1 C on Apr 4 06:00

Minimum Daily Average: -6.3 C on Apr 3

Maximum Diurnal Average: 9.0 C at hour 16

Minimum Diurnal Average: -0.6 C at hour 6

Monthly Average: 4.13 C

Percentiles: P_1 = -9.7 P_{10} = -5.0 Q_1 = -1.3 Median = 2.8 Q_3 = 8.6 P_{90} = 16.1 P_{99} = 24.3

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

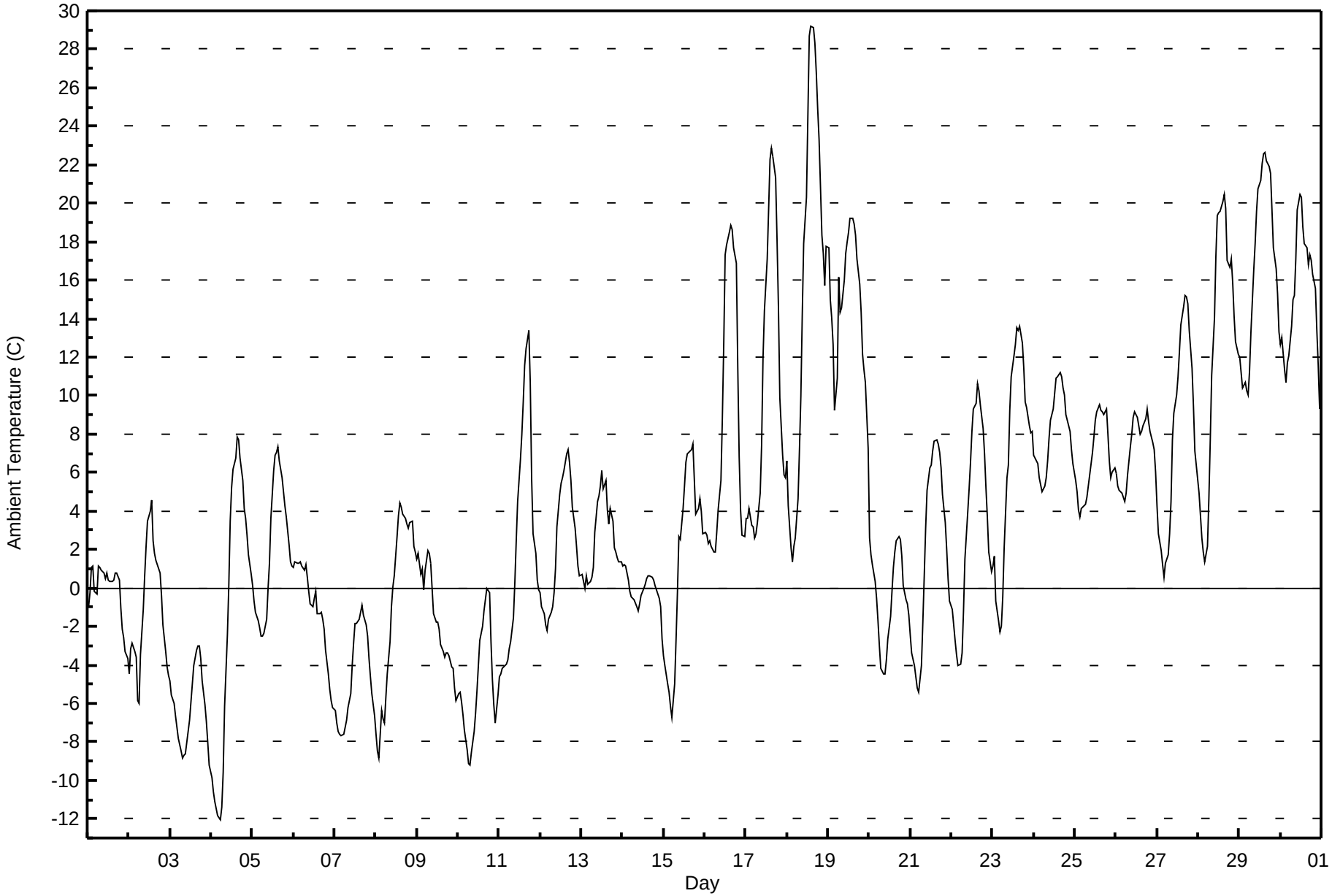
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	-1.0	-0.3	1.0	1.2	-0.1	-0.3	1.2	1.1	0.9	0.8	0.5	0.8	0.4	0.3	0.3	0.4	0.8	0.8	0.4	-1.1	-2.1	-2.6	-3.3	-3.7	-0.2	1.2
2-Apr	-4.5	-3.2	-2.8	-3.3	-3.6	-5.8	-6.0	-3.5	-1.2	0.7	2.1	3.5	4.0	4.5	2.5	1.8	1.4	1.0	0.8	-0.4	-1.9	-3.3	-4.1	-4.6	-1.1	4.5
3-Apr	-4.9	-5.5	-6.0	-6.6	-7.2	-7.8	-8.5	-8.9	-8.7	-8.6	-8.1	-6.9	-6.0	-5.0	-4.1	-3.3	-3.0	-3.0	-3.7	-4.9	-6.1	-7.0	-8.1	-9.2	-6.3	-3.0
4-Apr	-9.9	-10.6	-11.1	-11.5	-11.9	-12.1	-11.4	-9.6	-6.2	-2.4	0.1	3.5	5.2	6.2	6.7	7.9	7.7	6.8	5.5	4.1	3.6	2.7	1.7	0.7	-1.4	7.9
5-Apr	0.1	-0.7	-1.2	-1.7	-2.0	-2.5	-2.5	-2.3	-1.6	0.0	1.3	3.6	6.1	6.9	7.0	7.4	6.6	5.7	5.0	4.3	3.7	2.2	1.4	1.2	2.0	7.4
6-Apr	1.1	1.3	1.3	1.3	1.4	1.1	0.9	1.2	0.6	-0.1	-0.8	-0.9	-0.5	-0.1	-1.3	-1.3	-1.3	-1.7	-2.2	-3.2	-4.4	-5.3	-5.9	-6.2	-1.0	1.4
7-Apr	-6.4	-7.1	-7.5	-7.6	-7.7	-7.6	-7.3	-6.9	-6.2	-5.5	-4.1	-2.9	-1.9	-1.9	-1.7	-1.3	-0.9	-1.4	-1.9	-2.5	-3.7	-4.6	-5.5	-6.7	-4.6	-0.9
8-Apr	-7.6	-8.5	-8.9	-6.4	-6.8	-7.0	-5.7	-4.5	-2.8	-1.0	0.0	0.6	2.7	3.8	4.4	4.2	3.8	3.6	3.3	3.1	3.4	3.5	2.2	1.9	-0.8	4.4
9-Apr	1.5	1.8	0.7	1.0	-0.1	0.9	2.0	1.8	1.3	0.0	-1.3	-1.8	-1.8	-2.2	-2.9	-3.3	-3.6	-3.4	-3.4	-3.5	-4.1	-4.2	-5.2	-5.9	-1.5	2.0
10-Apr	-5.5	-5.4	-5.9	-6.6	-7.4	-8.4	-9.1	-9.2	-8.5	-7.4	-6.5	-5.3	-4.1	-2.7	-2.0	-1.2	-0.6	0.0	-0.2	-2.8	-4.8	-6.1	-7.0	-5.6	-5.1	0.0
11-Apr	-4.6	-4.5	-4.2	-4.1	-4.0	-3.8	-3.2	-2.8	-1.5	0.3	2.4	4.5	6.7	8.0	9.7	11.5	12.4	13.4	10.7	5.7	2.8	1.8	0.4	-0.1	2.4	13.4
12-Apr	-0.3	-1.0	-1.4	-1.9	-2.2	-1.6	-1.3	-1.0	-0.3	1.0	3.2	4.8	5.4	5.7	6.1	7.0	7.2	6.5	5.6	4.2	3.1	2.1	1.1	0.6	2.2	7.2
13-Apr	0.7	0.4	0.0	0.6	0.2	0.4	0.5	1.0	2.9	4.5	4.8	5.3	6.1	5.2	5.6	4.1	3.3	4.1	3.5	2.1	1.9	1.6	1.4	1.3	2.6	6.1
14-Apr	1.2	1.2	1.1	0.4	-0.2	-0.5	-0.6	-0.6	-0.9	-1.2	-0.8	-0.4	-0.1	0.2	0.5	0.6	0.6	0.5	0.4	0.1	-0.1	-0.5	-1.0	-2.7	-0.1	1.2
15-Apr	-3.6	-4.1	-5.0	-5.4	-6.1	-6.7	-5.0	-2.6	-0.2	2.7	2.5	4.1	5.3	6.5	6.9	7.1	7.2	7.4	5.7	3.8	4.1	4.7	4.0	2.8	1.5	7.4
16-Apr	2.9	2.7	2.3	2.5	2.1	1.9	1.8	2.9	4.1	5.6	8.8	12.6	17.3	17.8	18.5	18.8	18.6	17.7	16.9	11.5	6.8	4.0	2.7	2.7	8.5	18.8
17-Apr	3.6	3.6	4.2	3.3	3.2	2.6	2.8	3.4	4.9	7.4	11.9	14.4	17.1	19.7	22.3	22.9	22.4	21.3	18.1	14.6	9.9	6.9	5.9	5.7	10.5	22.9
18-Apr	6.6	4.2	2.1	1.4	2.2	2.6	4.7	7.2	10.0	14.2	17.9	20.3	24.6	28.7	29.2	29.2	28.4	26.8	24.9	23.3	18.3	17.4	15.7	17.7	15.7	29.2
19-Apr	17.7	15.0	14.0	12.6	9.2	10.9	16.2	14.3	14.6	16.0	17.4	18.0	18.4	19.2	19.2	18.9	18.3	17.1	15.8	14.3	12.1	11.3	10.7	7.3	14.9	19.2
20-Apr	2.6	1.7	1.2	0.3	-0.5	-1.7	-3.0	-4.2	-4.5	-4.5	-3.8	-2.6	-1.5	-0.2	1.1	1.8	2.4	2.7	2.5	1.7	0.1	-0.6	-0.8	-1.4	-0.5	2.7
21-Apr	-2.4	-3.4	-4.1	-4.6	-5.2	-5.4	-4.1	-1.8	0.6	3.1	5.1	6.3	6.4	7.1	7.6	7.7	7.5	7.0	6.3	4.9	3.4	2.0	0.5	-0.6	1.8	7.7
22-Apr	-1.1	-1.9	-2.7	-3.4	-4.0	-4.0	-3.4	-1.2	1.5	3.9	5.1	6.6	8.2	9.3	9.6	10.6	10.2	9.5	8.3	7.0	5.2	3.7	1.9	0.9	3.3	10.6
23-Apr	1.1	1.6	-0.7	-1.7	-2.3	-2.0	-0.5	2.1	5.7	6.4	9.2	11.0	12.1	12.7	13.5	13.4	13.6	12.8	11.4	9.6	9.4	8.4	8.1	8.1	6.8	13.6
24-Apr	6.9	6.8	6.5	5.7	5.3	5.0	5.3	5.7	6.6	7.8	8.7	9.3	10.1	10.9	11.0	11.2	11.0	10.4	10.0	9.0	8.4	8.2	7.2	6.4	8.1	11.2
25-Apr	5.6	5.0	4.1	3.7	4.1	4.3	4.3	4.7	5.3	6.5	7.0	7.8	8.7	9.2	9.5	9.2	9.1	9.0	9.3	8.0	6.6	5.7	6.0	6.2	6.6	9.5
26-Apr	5.9	5.3	5.1	4.9	4.7	4.5	4.9	5.8	7.3	8.0	8.9	9.2	8.9	8.4	8.0	8.1	8.4	8.8	9.3	8.6	8.1	7.6	7.2	6.0	7.2	9.3
27-Apr	4.3	2.8	1.9	1.2	0.6	1.3	1.7	2.8	4.5	7.7	9.1	10.0	11.0	12.3	13.7	14.6	15.2	15.1	14.8	13.4	11.4	9.5	7.1	6.4	8.0	15.2
28-Apr	4.9	3.7	2.6	1.8	1.4	2.2	4.6	7.7	11.1	14.0	17.2	19.4	19.5	19.6	20.1	20.4	19.7	17.0	16.7	17.1	15.9	14.1	12.8	12.2	12.3	20.4
29-Apr	12.0	11.2	10.4	10.7	10.2	10.1	11.3	13.3	16.5	17.9	19.5	20.7	21.2	22.0	22.6	22.6	22.2	21.9	21.6	19.6	17.7	16.6	15.3	13.3	16.7	22.6
30-Apr	12.7	13.0	11.3	10.7	11.7	12.0	13.6	15.0	15.2	17.1	19.6	20.4	20.3	18.8	17.9	17.7	16.8	17.3	17.0	16.3	15.6	13.4	11.5	9.3	15.2	20.4
	1.3	0.8	0.3	-0.1	-0.5	-0.6	0.1	1.0	2.4	3.8	5.2	6.5	7.7	8.4	8.7	9.0	8.9	8.5	7.7	6.3	4.8	3.8	2.8	2.1	Diurnal Average	
	17.7	15.0	14.0	12.6	11.7	12.0	16.2	15.0	16.5	17.9	19.6	20.7	24.6	28.7	29.2	29.2	28.4	26.8	24.9	23.3	18.3	17.4	15.7	17.7	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature (AT) - C

Lower Camp - April 2016



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	231	32.08	32.08
0 - 10	339	47.08	79.17
10 - 20	125	17.36	96.53
> 20	25	3.47	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Lower Camp - April 2016

Maximum Value: 99 % on Apr 27 08:00

Maximum Daily Average: 90.6 % on Apr 6

Minimum Value: 14 % on Apr 19 17:00

Minimum Daily Average: 25.5 % on Apr 19

Maximum Diurnal Average: 75.1 % at hour 6

Minimum Diurnal Average: 44.7 % at hour 16

Monthly Average: 59.6 %

Percentiles: $P_1 = 16$ $P_{10} = 28$ $Q_1 = 43$ Median = 62 $Q_3 = 75$ $P_{90} = 87$ $P_{99} = 98$

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

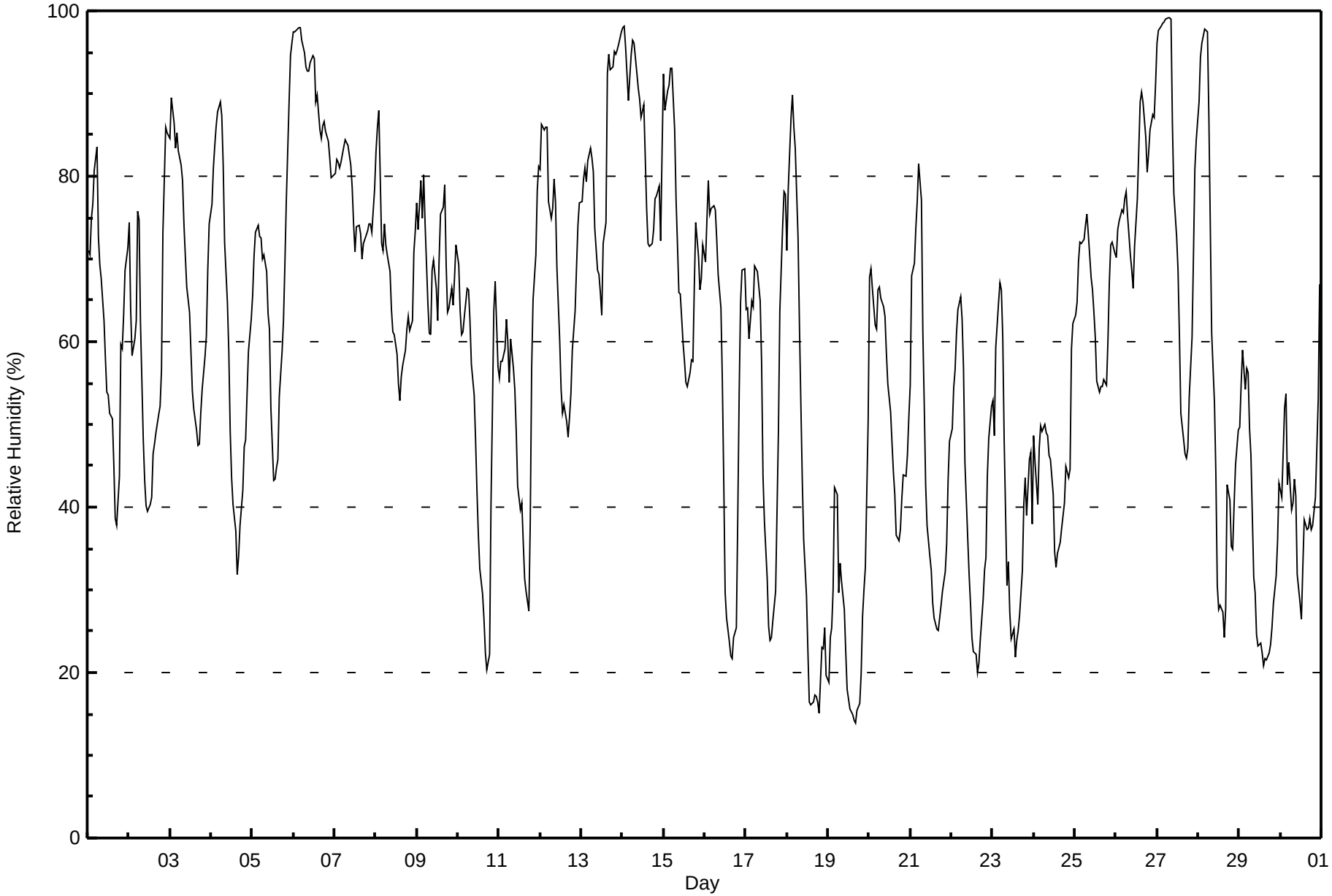
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	71	70	75	77	81	83	73	69	68	63	58	54	53	51	51	45	39	38	44	60	59	63	69	71	61.8	83
2-Apr	74	64	58	60	63	76	75	62	48	43	40	39	40	41	46	48	49	51	52	57	73	86	85	85	59.1	86
3-Apr	85	89	86	83	85	83	81	79	74	70	67	64	59	54	52	49	47	48	51	54	58	61	69	74	67.7	89
4-Apr	77	81	84	86	88	89	87	81	72	65	59	49	44	40	37	32	34	38	42	47	48	54	59	63	60.6	89
5-Apr	66	70	73	74	73	72	70	70	68	63	62	52	43	43	45	46	53	59	63	69	77	89	95	96	66.3	96
6-Apr	97	98	98	98	98	97	95	93	93	93	94	95	94	89	90	86	85	86	87	85	84	82	80	80	90.6	98
7-Apr	80	82	82	81	82	84	84	84	84	81	79	74	71	74	74	73	70	72	73	73	74	74	73	78	77.4	84
8-Apr	83	86	88	72	71	74	72	71	68	64	61	61	58	55	53	56	57	59	62	63	61	63	71	73	66.7	88
9-Apr	77	74	79	75	80	74	65	61	61	69	70	66	63	70	75	76	79	70	64	64	66	64	68	72	70.1	80
10-Apr	69	64	61	61	63	66	66	63	57	54	48	42	37	32	29	26	22	20	22	40	51	64	67	57	49.3	69
11-Apr	56	58	58	59	63	60	55	60	57	54	49	42	40	40	36	31	30	27	38	57	65	71	78	81	52.7	81
12-Apr	81	86	86	86	86	77	75	76	80	77	69	60	54	51	52	50	49	51	54	59	64	69	74	77	68.4	86
13-Apr	77	80	81	79	82	83	82	80	74	69	68	66	63	72	74	92	95	93	93	95	95	95	96	97	82.6	97
14-Apr	98	98	96	89	92	95	97	96	92	91	89	87	89	82	76	72	71	72	74	77	78	79	72	83	85.2	98
15-Apr	92	88	90	91	93	93	86	77	72	66	66	60	58	55	55	56	58	58	67	74	70	66	68	72	72.1	93
16-Apr	70	75	80	75	76	76	76	72	68	64	55	43	30	27	24	22	22	24	25	39	54	65	69	69	54.1	80
17-Apr	64	64	60	65	64	69	69	68	65	57	44	38	31	26	24	24	26	30	39	49	64	74	78	78	53.0	78
18-Apr	71	79	87	90	86	83	73	62	53	43	36	29	23	16	16	16	17	17	16	15	23	23	25	20	42.5	90
19-Apr	19	24	25	30	42	41	30	33	31	28	23	18	17	16	15	14	14	15	16	20	27	30	33	50	25.5	50
20-Apr	68	69	66	62	62	66	67	65	64	63	59	55	51	48	44	41	37	36	37	41	44	44	46	51	53.6	69
21-Apr	55	68	70	74	77	81	77	61	52	43	38	34	32	28	27	25	25	27	28	30	32	36	43	48	46.3	81
22-Apr	49	54	57	61	64	65	63	57	45	36	32	28	24	23	22	20	21	24	29	32	34	44	48	52	41.1	65
23-Apr	53	49	59	65	67	66	61	48	30	33	27	24	25	22	24	25	27	32	40	44	39	46	47	38	41.3	67
24-Apr	49	45	40	47	50	49	50	49	49	46	46	41	35	33	34	36	38	39	41	45	44	45	59	62	44.6	62
25-Apr	63	65	70	72	72	72	74	75	73	68	66	64	61	55	54	55	55	55	55	60	67	72	72	71	65.2	75
26-Apr	70	74	75	76	76	77	78	75	71	69	66	71	77	83	89	90	89	85	80	83	86	88	87	91	79.4	91
27-Apr	96	98	98	99	99	99	99	99	99	86	78	73	69	61	51	48	46	46	47	53	61	70	81	84	76.7	99
28-Apr	89	94	96	97	98	97	87	74	61	52	44	30	28	28	27	24	28	43	41	35	35	40	45	49	56.0	98
29-Apr	50	55	59	54	57	56	49	46	31	30	25	23	24	22	21	22	22	22	23	25	28	32	36	43	35.6	59
30-Apr	42	41	52	54	43	45	40	40	43	41	32	28	26	33	38	37	37	39	37	38	41	47	53	67	41.5	67
	69.7	71.4	73.0	73.1	74.3	75.1	71.8	68.4	63.5	59.4	54.9	50.4	47.3	45.7	45.2	44.7	44.7	45.8	48.0	52.8	56.7	61.1	64.8	67.8	Diurnal Average	
	98	98	98	99	99	99	99	99	99	93	94	95	94	89	90	92	95	93	93	95	95	95	96	97	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity (RH) - %

Lower Camp - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Lower Camp - April 2016

Maximum Speed: 34 km/h on Apr 8 15:00

Maximum Daily Speed Average: 21.3 km/h on Apr 8

Minimum Speed Value: 0 km/h on Apr 10 20:00

Minimum Daily Speed Average: 0.8 km/h on Apr 4

Maximum Diurnal Speed Average: 4.6 km/h at hour 10

Minimum Diurnal Speed Average: 1.0 km/h at hour 17

Monthly Average Velocity: 1.9 km/h 91.3 deg

Percentiles: $P_1 = 1$ $P_{10} = 3$ $Q_1 = 5$ Median = 10 $Q_3 = 14$ $P_{90} = 18$ $P_{99} = 28$

Hours in Service:	720
Hours of Data:	715
Hours of Missing Data:	5
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-Apr	ESE2	NE1	WNW5	W2	SE3	W4	WNW6	N13	N15	N21	N18	N15	NNE15	NE15	NNE12	N13	N10	NE12	NE11	NNE5	WNW4	N3	NE2	NW4	N7.3	N21
2-Apr	N3	E7	ENE8	E8	E8	NNW7	NW4	ENE4	E11	E6	ESE5	WNW3	NW11	WNW12	NNW18	NNW20	NNW21	NNW17	NNW15	N20	N16	NNW12	NNW12	NNW11	N7.6	NNW21
3-Apr	NNW12	NW11	NNW12	NNW14	NNW13	NNW16	N19	NNW18	NNW18	N19	NNW15	NNW13	NNW11	NNW11	N10	NNW9	N8	N9	N11	N8	NW5	NNW4	N4	NW4	NNW11.2	N19
4-Apr	WNW5	NNW3	NNW2	NNW1	NE2	NNW2	NW3	N2	ENE3	ESE7	ESE8	SE7	SE10	SE10	ESE7	SE4	SE5	N6	NNW7	WNW5	WNW8	NNW6	NNW6	WNW4	NE0.8	SE10
5-Apr	NW4	NW4	NNW4	NW4	NW4	NW5	NNW6	NNW6	NNW5	NW4	NNW5	WNW5	SSE8	SE12	SE14	SSE12	SSE11	SSE9	SSE7	SSE7	SSE9	SE12	SE14	SE15	SSE3.1	SE15
6-Apr	SE13	SE11	SE5	WNW4	NNW9	NW10	NW12	NW12	NNW12	NNW11	AF	AF	NNW7	NNW10	N11	N13	N13	N13	NNE12	NNE13	N12	N10	N9	NNW7	N7.4	SE13
7-Apr	N7	ENE6	ENE5	NE5	NNE6	NE4	N3	N3	NW3	NE2	SE7	SE9	ESE5	N7	N10	N11	N12	N14	N12	N10	N7	NW5	NNW5	N5	NNE5.0	N14
8-Apr	NW3	NW3	NW3	ESE19	SE20	SE19	SE22	SE24	SE26	SE26	SE26	SE28	SE32	SE32	SE34	SE32	SE28	SE27	SE23	SE22	SE27	SE22	SE14	SE18	SE21.3	SE34
9-Apr	SE19	ESE18	SE11	NNW6	WNW6	NW9	NW13	NW16	NNW17	N17	NNW20	NNW19	NNW20	NNW19	N20	N23	NNW17	N21	N24	N19	NNW9	NNW9	NW8	NW8	NNW11.2	N24
10-Apr	NNW13	NNW15	NNW15	NNW14	NNW13	N12	N12	N13	N13	NNW11	N11	NNW11	NNW10	NW7	NNW7	N6	N4	NW1	SSE2	ENE0	E1	ESE1	SE1	SE11	NNW7.1	NNW15
11-Apr	SE19	SE15	SE14	SE15	SE16	SE15	SE7	SE9	SE11	SE12	SE11	SE10	SE11	SE12	SE9	ESE6	ESE6	SE5	W3	SSE1	E0	WNW4	NW2	N0	SE8.3	SE19
12-Apr	NW2	NW1	W1	WNW4	WNW5	NW8	NNW8	NNW14	NNW10	NNW8	NNW9	NNW12	N12	N15	N14	N14	NNW13	NNW12	NNW11	NW8	NNW7	NNW6	NW5	NW5	NNW8.1	N15
13-Apr	NW4	NNW4	WNW4	NNW4	NW4	WNW5	NW5	NNW6	N4	ESE16	SE15	SE13	ESE11	SE12	SE5	ESE10	ESE10	SSE2	SE6	SE13	SE6	SE4	NE1	WNW3	ESE3.5	ESE16
14-Apr	NNW2	WNW4	NW8	NNW10	AF	AF	AF	NNW2	N9	N11	N11	N10	NNW9	NW12	NW13	N8	N8	N7	NNW5	NW5	N6	WNW3	WNW7	WNW1	NNW6.7	NW13
15-Apr	NW3	NW2	NW3	WNW3	NNW3	ENE2	NE2	ENE2	SE6	SE10	SE12	SE14	SE14	SE14	SE16	ESE18	ESE20	ESE18	SE16	SE15	SE16	SE17	SE21	ESE18	SE9.7	SE21
16-Apr	ESE7	SE2	SE14	SE14	SE10	SE12	SE15	SE15	SE18	SE18	SE16	SE12	WSW13	W16	WSW15	WSW16	WSW13	W11	WSW10	W1	ESE3	SE4	ENE3	SE8	SSE5.7	SE18
17-Apr	SE11	SE10	SE10	SE11	SE8	SE13	SE13	SE15	ESE14	SE16	SE16	ESE10	E5	ENE2	W11	W10	WSW16	W9	W5	SE4	SE3	SE7	SE2	SE3	SSE6.0	WSW16
18-Apr	SE6	SE2	NNE0	ESE6	ESE10	SE12	SE14	SE15	SE15	SE17	SE17	SE16	SE16	S14	S14	S14	S14	SSE14	SSE12	SSE12	SE16	SE17	SE17	SSE11	SSE11.8	SE17
19-Apr	SSE9	SE6	SE10	SE8	SE6	SW6	WSW16	NW17	NW11	W9	WSW17	WSW26	W25	W25	W28	W31	W31	WNW29	WNW27	WNW18	NW16	WNW13	WNW17	NNW19	W13.5	W31
20-Apr	NNE14	N20	N16	N18	N17	N23	N20	N23	N21	N20	N17	N16	NNE11	NNE13	N12	NNE12	N11	N11	NNE11	NNE9	NNW5	N3	NE5	NE5	N13.6	N23
21-Apr	NNW2	WNW2	W4	WNW4	WNW4	WNW4	WNW3	NNE4	NNE3	NW4	WSW7	W8	N13	N13	N14	N18	NNE20	NNE23	NNE21	NNE14	N10	NNW6	NW6	WNW5	N7.2	NNE23
22-Apr	NNW5	NW5	NW6	N4	NW5	N6	N6	NNW8	NNW9	NNW11	N11	NNE9	N6	NE4	N10	NW7	NNW10	N16	NNE16	NNE13	NW6	NNW4	WNW5	WNW4	NNW7.1	NNE16
23-Apr	ENE1	E10	NW4	W5	W5	W5	WNW4	NE4	ESE3	N4	SE8	SE11	SE14	SE12	SE13	SE13	SE14	ESE13	SE13	ESE8	ESE14	ESE19	SE21	SE19	SE7.7	SE21
24-Apr	SE20	SE22	SE19	SE17	ESE19	SE17	ESE18	ESE18	SE19	SE19	SE18	SSE12	SSE11	SSE12	SSE9	S9	SE12	ESE16	ESE18	SE21	SE18	SSE13	S9	S9	SE14.9	SE22
25-Apr	SSE9	S9	S7	S6	SSE8	SSE10	SSE11	SE11	SSE11	SSE12	SSE10	SE10	SE13	SSE9	SSE10	S8	SW8	SSW8	SSW9	SSW7	S5	SSE5	SSE5	S7	SSE8.2	SE13
26-Apr	S8	SSE7	SSE8	SSE9	SSE11	SE8	SE14	SE13	SE13	SE15	SE12	SE8	SSE8	SE8	ESE11	ESE11	SE12	SE10	SE7	SSE3	SSE7	SE8	SSE7	S2	SE8.8	SE15
27-Apr	NW1	ESE3	E1	ESE3	ESE3	ESE7	ESE7	ESE8	SE7	SE6	NNE5	N7	N11	N10	N10	N8	N8	NNE8	NNE10	N6	NW5	NNW3	W3	WNW4	NNE3.0	N11
28-Apr	NW2	NW2	N1	NNE1	E2	NE1	E3	SE11	ESE14	ESE13	SE15	S9	S9	SSE10	SSE12	SSE12	SE11	ESE17	SE11	SE7	SSE6	SE8	SE9	SE9	SE7.3	ESE17
29-Apr	SE10	SE12	SE11	SE11	SE9	ESE12	ESE14	SE13	SE17	SE17	SSE16	SSE14	SSE15	SSE14	SSE17	S14	S16	SSW13	S8	S7	SSE8	SSE7	SSE8	SSE10	SSE11.4	SE17
30-Apr	SE11	SE11	SE14	SE14	SE14	SSE12	SSE10	SE8	ESE11	SE14	SSW15	SSW14	SSW17	SW14	W17	WSW17	WSW14	SSE5	SSE6	S9	S5	WNW4	SSW2	SSE1	S7.3	SSW17
	ESE2.4	ESE2.7	ESE1.7	ESE2.1	ESE2.5	E1.9	E1.8	ENE3.3	E4.1	E4.6	ESE4.2	ESE2.5	ESE2.0	ESE1.3	NE1.0	NNE1.0	NNE1.0	NE2.5	NE2.8	ENE2.2	ESE1.5	SE1.9	SE1.6	SE1.9	Diurnal Average	
	SE20	SE22	SE19	ESE19	SE20	N23	SE22	SE24	SE26	SE26	SE26	SE28	SE32	SE32	SE34	SE32	W31	WNW29	WNW27	SE22	SE27	SE22	SE21	SE19	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

Lower Camp - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 10 km/h on Apr 19 11:00

Minimum Value: 1 km/h on Apr 21 07:00

Percentiles: P_1 = 1 P_{10} = 1 Q_1 = 2 Median = 3 Q_3 = 4 P_{90} = 5 P_{99} = 6

Hours in Service:	720
Hours of Data:	715
Hours of Missing Data:	5
Hours of Calibration:	0
Percent Operational Time:	99.3

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

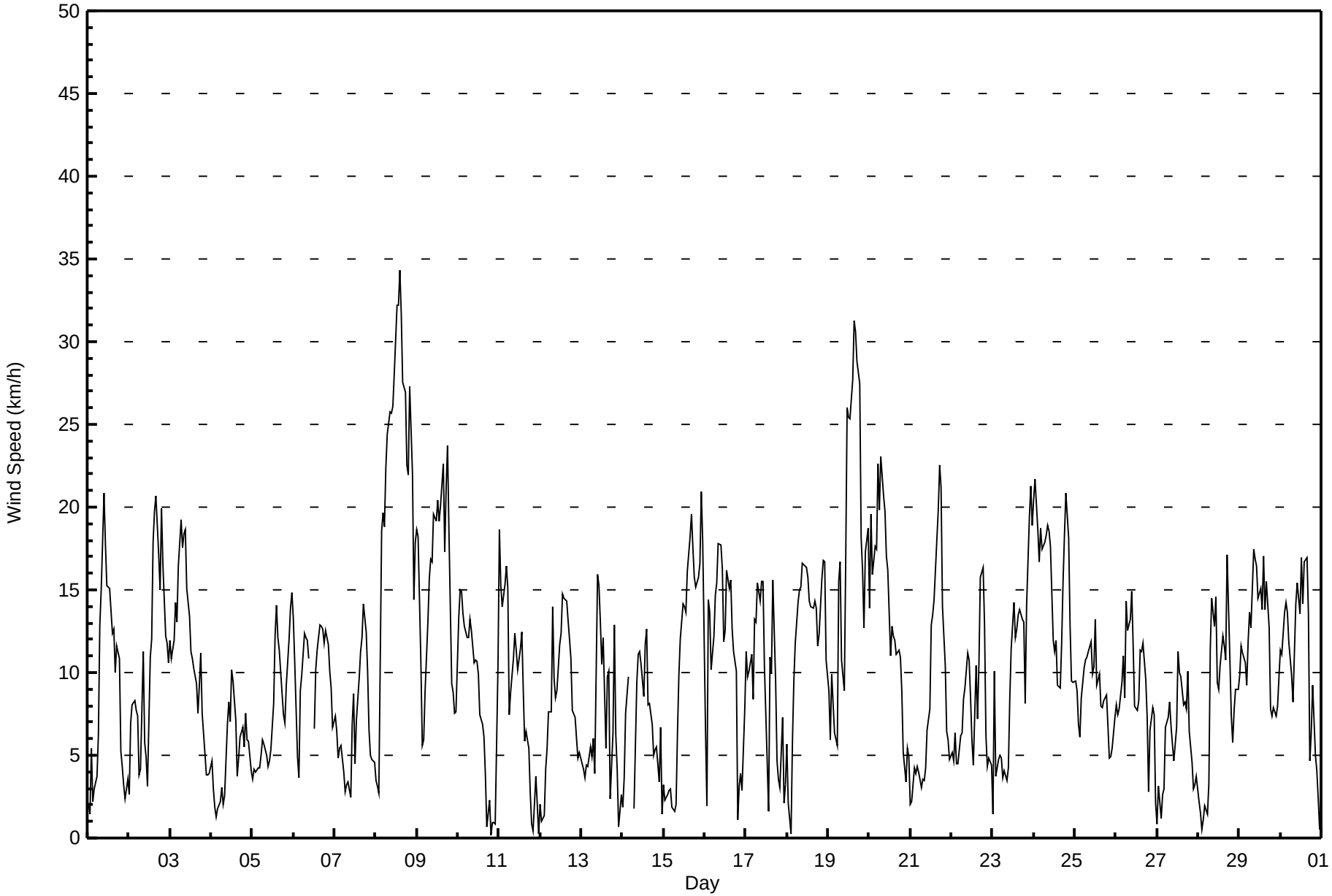
AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed (WS) - km/h

Lower Camp - April 2016



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	181	25.31	25.31
6 - 11	250	34.97	60.28
12 - 19	234	32.73	93.01
20 - 28	43	6.01	99.02
29 - 38	7	0.98	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 715

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Wind Speed (WS) - km/h

Lower Camp - April 2016

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	6	13	9	6	9	15	8	3	1	0	1	10	30	36	20	181
6 - 11	41	7	1	2	6	19	58	33	14	3	2	2	6	4	15	37	250
12 - 19	35	10	2	0	0	21	86	16	6	4	1	10	1	4	8	30	234
20 - 28	12	3	0	0	0	1	18	0	0	0	0	1	3	1	0	4	43
29 - 38	0	0	0	0	0	0	4	0	0	0	0	0	2	1	0	0	7
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	102	26	16	11	12	50	181	57	23	8	3	14	22	40	59	91	715

Total Number of Valid Hours: 715

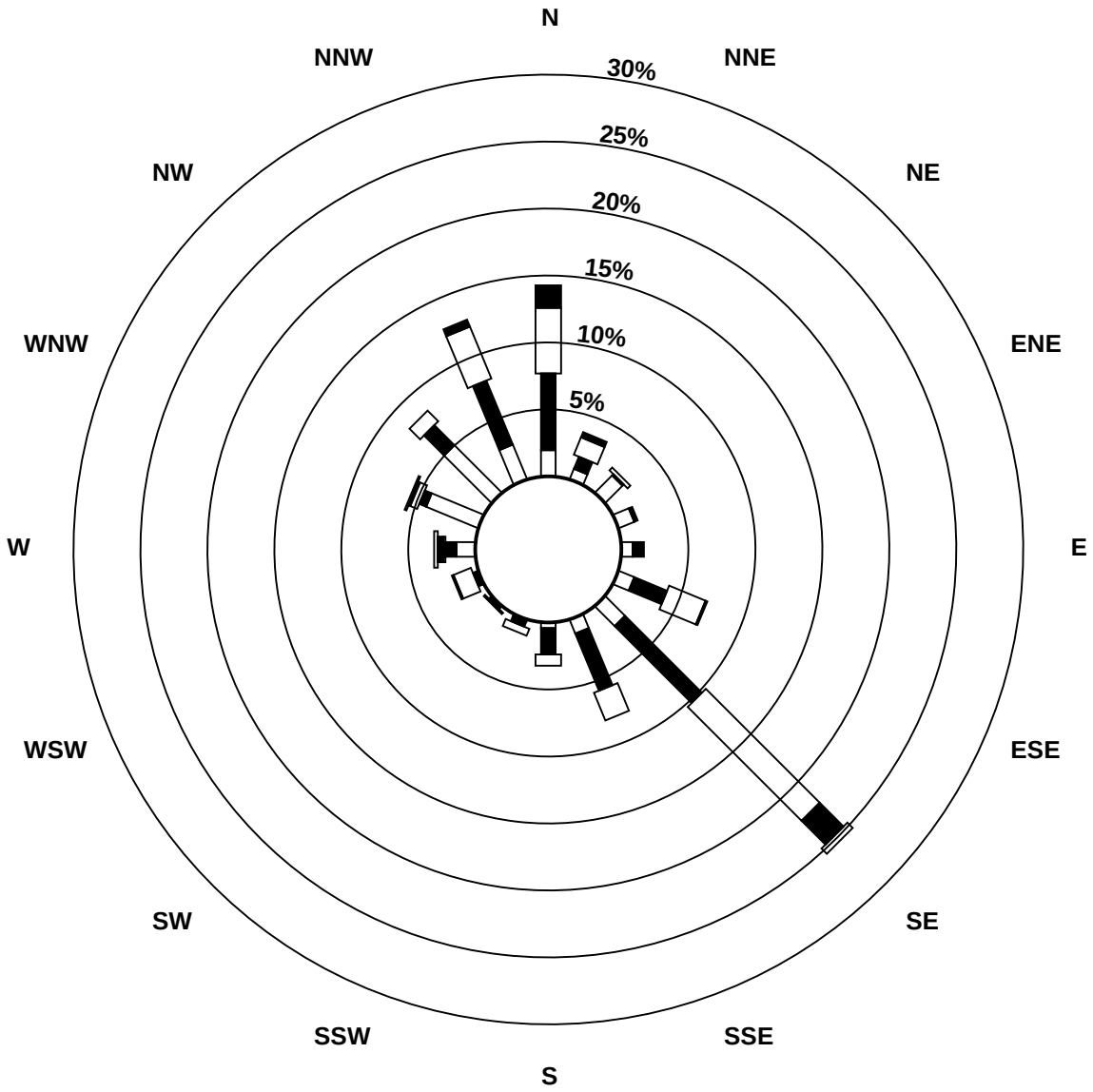
Total Number of Hours: 720

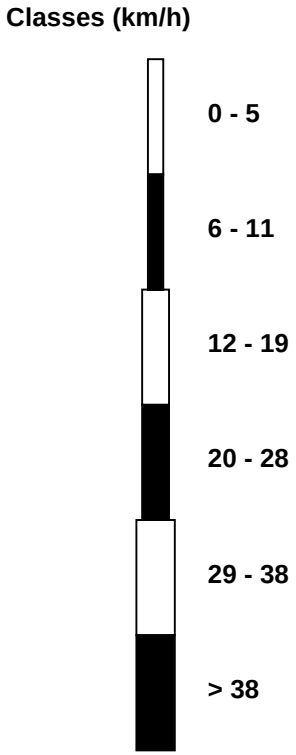
Wood Buffalo Environmental Association

Wind Rose Apr 2016

Wind Speed (WS) - km/h

Lower Camp (AMS 11)





Total Number of Valid Hours: 715

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Lower Camp - April 2016

Direction of Maximum Speed: 126 deg on Apr 8 15:00
Direction of Maximum Daily Speed Average: 128.0 deg on Apr 8

Direction of Minimum Speed: 75 deg on Apr 10 20:00

Direction of Minimum Daily Speed Average: 0.8 deg on Apr 4

Monthly Average Direction: 328.6 deg

Hours in Service:	720
Hours of Data:	715
Hours of Missing Data:	5
Percent Operational Time:	99.3

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-Apr	115	47	298	260	140	280	290	360	360	359	8	8	25	40	22	5	9	49	36	14	282	4	41	318	8.9
2-Apr	4	81	64	92	90	333	308	63	97	100	113	286	311	300	340	345	343	343	347	352	355	340	338	333	355.0
3-Apr	343	321	335	344	339	347	350	348	344	349	347	339	344	344	352	347	8	2	8	359	324	332	349	317	346.0
4-Apr	286	328	329	329	36	337	306	1	71	116	107	124	130	127	121	133	133	351	331	298	293	338	329	287	50.9
5-Apr	314	321	330	320	324	306	328	342	337	310	340	303	151	137	136	151	163	168	161	166	152	144	139	135	151.3
6-Apr	136	133	133	300	331	318	319	319	344	345	AF	AF	334	347	7	1	5	1	13	14	11	1	356	346	355.8
7-Apr	360	64	64	52	33	37	353	4	323	48	132	134	117	1	6	11	6	3	3	3	352	304	336	357	16.5
8-Apr	315	308	318	123	133	129	128	126	127	131	127	124	131	127	126	127	127	126	128	131	133	131	127	126	128.0
9-Apr	126	123	132	327	285	314	318	326	332	354	345	340	344	345	350	353	345	349	354	349	328	330	305	311	345.4
10-Apr	329	333	334	334	342	356	357	356	349	337	349	346	327	324	338	354	10	309	160	75	83	117	128	131	344.6
11-Apr	134	127	124	131	131	129	142	130	128	130	133	141	138	128	124	119	123	138	272	167	90	296	307	10	131.3
12-Apr	312	308	280	290	302	326	328	347	339	338	327	346	3	358	8	350	343	341	345	320	330	337	313	325	340.2
13-Apr	311	329	301	336	326	291	324	336	349	121	129	127	123	133	140	121	119	150	144	124	137	136	38	292	121.0
14-Apr	331	297	318	330	AF	AF	AF	345	2	354	349	350	332	323	313	353	3	5	343	320	350	302	291	295	336.5
15-Apr	312	324	324	292	327	61	46	69	127	130	125	130	128	130	124	122	123	119	126	124	125	135	125	122	123.8
16-Apr	121	128	130	135	134	137	137	136	131	132	130	141	248	265	256	258	256	260	252	262	109	127	76	130	165.6
17-Apr	136	138	139	137	136	135	132	130	122	127	131	121	82	57	261	260	258	260	259	133	142	138	145	129	146.3
18-Apr	132	127	30	118	121	127	131	133	134	132	131	131	141	178	177	181	177	168	166	156	143	143	141	148	146.4
19-Apr	149	132	142	141	124	224	246	306	311	279	258	255	260	259	270	271	280	287	292	289	304	286	289	337	274.5
20-Apr	13	9	1	355	2	6	11	358	5	7	1	359	24	14	1	13	10	11	24	26	329	3	47	45	7.6
21-Apr	334	295	279	292	287	284	293	15	22	305	242	274	8	9	8	7	16	13	14	12	3	338	317	301	353.4
22-Apr	332	305	309	2	308	356	357	346	346	346	9	21	6	49	350	311	336	351	12	12	323	339	284	288	347.8
23-Apr	61	93	319	269	281	280	302	52	121	356	127	132	133	131	132	127	132	123	126	114	116	122	130	138	125.6
24-Apr	128	132	137	130	123	127	123	123	126	128	128	148	163	157	167	172	131	116	117	125	135	155	186	175	135.0
25-Apr	167	170	172	169	164	155	148	143	148	151	157	146	141	156	160	181	218	205	202	196	186	164	156	184	165.2
26-Apr	189	158	156	154	148	145	128	129	132	126	129	144	147	142	118	120	135	126	132	150	157	138	156	191	139.2
27-Apr	320	103	84	109	117	121	114	121	128	128	26	351	351	356	350	355	358	25	26	357	304	331	278	288	23.8
28-Apr	316	317	9	32	95	37	89	125	123	123	125	173	178	149	148	158	145	123	129	144	159	144	139	135	137.4
29-Apr	139	139	137	140	133	122	120	129	146	145	152	168	163	165	162	174	190	206	181	172	165	159	152	147	154.3
30-Apr	145	146	139	136	143	148	150	133	123	132	208	204	205	235	259	256	258	160	159	176	170	295	193	157	179.8
	118.1	106.5	106.9	101.6	106.2	89.4	86.1	63.5	80.6	90.9	108.6	122.3	121.0	106.4	43.2	11.4	20.0	34.8	38.0	58.8	104.3	124.2	137.5	130.8	
	Diurnal Average																								

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

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg

Lower Camp - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 102 deg on May 1 00:00

Minimum Value: 3 deg on Apr 18 08:00

Percentiles: P_1 = 6 P_{10} = 9 Q_1 = 13 Median = 19 Q_3 = 29 P_{90} = 49 P_{99} = 92

Hours in Service:	720
Hours of Data:	715
Hours of Missing Data:	5
Hours of Calibration:	0
Percent Operational Time:	99.3

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-Apr	65	87	43	70	40	45	22	22	19	16	22	22	22	18	21	18	27	18	14	27	24	41	77	53	87
2-Apr	61	39	36	43	58	30	23	59	16	36	60	96	21	36	19	19	18	18	16	17	15	17	18	19	96
3-Apr	23	14	20	18	19	18	18	18	18	18	19	20	26	24	30	29	29	15	14	22	26	27	32	23	32
4-Apr	19	26	50	49	30	46	27	50	32	17	13	19	13	13	31	44	35	68	22	16	18	27	24	30	68
5-Apr	27	18	17	16	22	16	15	19	23	24	35	39	38	18	21	24	25	28	21	22	18	16	12	10	39
6-Apr	7	35	51	22	15	13	12	13	19	18	AF	AF	18	21	15	15	12	15	17	15	18	16	17	19	51
7-Apr	21	25	20	22	23	21	37	24	24	52	12	9	52	28	20	16	19	15	16	13	19	23	26	39	52
8-Apr	34	32	40	15	9	7	7	8	8	9	10	8	8	7	8	8	8	8	10	9	13	12	10	9	40
9-Apr	8	8	25	57	15	15	14	16	16	19	19	19	20	19	19	19	18	19	18	19	18	16	13	15	57
10-Apr	16	16	16	16	19	16	15	15	19	24	29	28	28	42	41	53	59	95	39	85	54	77	86	16	95
11-Apr	9	10	10	10	8	16	26	11	11	10	13	21	17	11	11	23	13	7	53	85	97	39	26	88	97
12-Apr	37	89	85	27	22	16	22	18	21	24	24	21	21	18	17	19	17	18	17	21	21	19	31	21	89
13-Apr	35	33	52	48	35	35	22	24	57	7	5	10	11	11	18	15	27	85	18	9	29	16	93	30	93
14-Apr	24	16	23	18	AF	AF	AF	16	16	16	18	16	23	18	15	16	17	14	24	20	19	19	11	84	84
15-Apr	26	29	33	22	19	36	38	33	28	6	9	12	11	10	12	9	9	9	8	6	8	12	10	8	38
16-Apr	91	89	10	7	12	10	7	6	6	6	7	44	23	12	18	14	14	12	11	93	38	37	55	21	93
17-Apr	8	9	10	9	11	9	8	6	9	6	6	9	31	82	17	17	11	12	53	49	61	9	85	40	85
18-Apr	24	83	92	19	10	8	4	3	4	3	5	10	19	33	30	31	29	27	24	23	15	13	11	20	92
19-Apr	26	39	13	16	33	69	14	20	24	22	18	12	12	12	13	11	15	13	10	12	12	8	9	37	69
20-Apr	18	15	18	19	16	15	18	19	17	20	24	23	36	30	25	32	25	23	23	14	38	54	24	33	54
21-Apr	57	80	17	17	11	9	21	26	37	37	46	45	26	22	24	22	19	16	14	14	16	25	31	28	80
22-Apr	30	30	13	26	24	22	20	20	21	24	32	51	67	80	37	49	38	25	13	13	32	26	25	38	80
23-Apr	91	15	55	33	19	23	27	48	57	45	25	15	9	17	12	16	14	13	9	18	9	10	9	15	91
24-Apr	11	9	10	11	7	10	7	7	7	8	10	27	29	28	31	30	33	12	10	8	18	22	27	26	33
25-Apr	24	25	20	18	19	19	19	17	24	26	30	26	27	33	30	38	22	27	27	19	15	13	16	24	38
26-Apr	29	20	17	17	16	28	14	18	14	10	21	23	24	22	9	11	10	14	12	30	23	18	17	77	77
27-Apr	92	24	62	36	29	21	14	10	12	27	48	36	19	19	20	30	36	32	24	36	35	51	69	25	92
28-Apr	61	59	79	63	50	79	47	11	8	7	8	42	37	30	27	29	26	8	11	18	23	12	7	7	79
29-Apr	7	8	7	9	13	10	9	15	21	21	27	34	32	31	27	32	28	27	27	17	14	16	13	12	34
30-Apr	12	14	9	10	13	16	22	34	15	23	31	34	27	37	12	13	13	58	22	31	78	49	66	102	102
	92	89	92	70	58	79	47	59	57	52	60	96	67	82	41	53	59	95	53	93	97	77	93	102	
	Diurnal Maximum																								

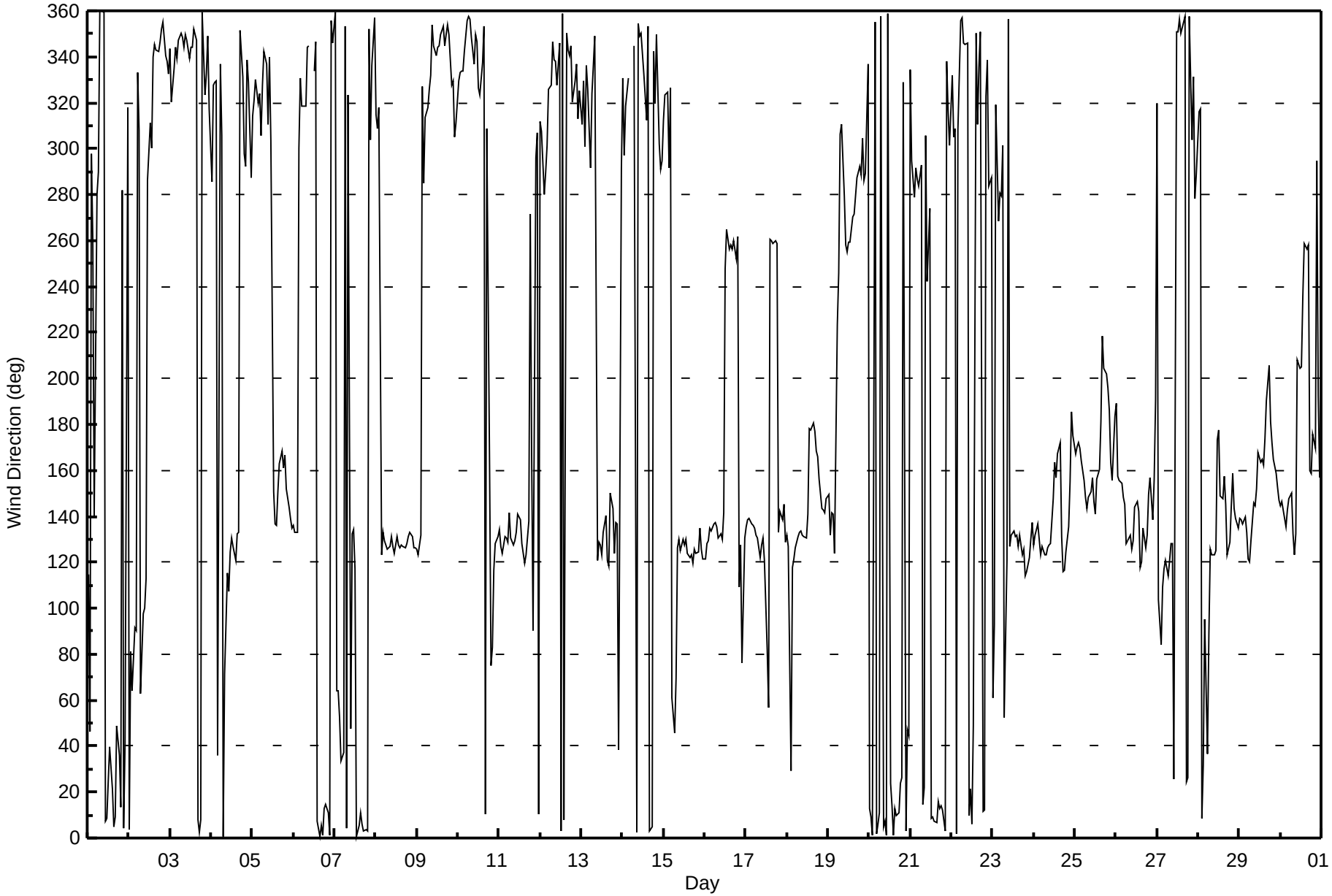
AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction (WD) - deg

Lower Camp - April 2016



Wood Buffalo Environmental Association
SO2 Calibration Report

W B E A

Station Information

Calibration Date	April 4, 2016	Last Calibration	March 7, 2016
Station Name	Lower Camp	Station Number	AMS 11
Reason:	Routine		
Start Time (MST)	11:30	End Time (MST)	14:15
Gas Cert Reference	LL110099	Station temp.	20 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	802	803
Calculated slope	0.999516	1.001192	Chamber temp	44.8	45.0
Calculated intercept	0.658396	0.725715	Pressure	705.7	709.6
Analyzer Background	11.3	11.0	Flow	0.485	0.486
Analyzer Coefficient	1.025	1.014	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	0.0	----
as found span	5000	80.9	830.0	841.3	0.987
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	80.9	830.0	828.5	1.002
second point	5000	40.9	419.6	418.5	1.003
third point	5000	20.5	210.3	208.3	1.010
as left zero	5000	0.0	0.0	0.3	----
as left span	5000	80.9	830.0	821.3	1.011
				Average Correction Factor	1.005

Corrected As found	841.3	Previous response	829.8	% change	-1.4%

Notes:

Changed inlet filter after as founds. Adjusted span.

Calibration Performed By: Evan Magill

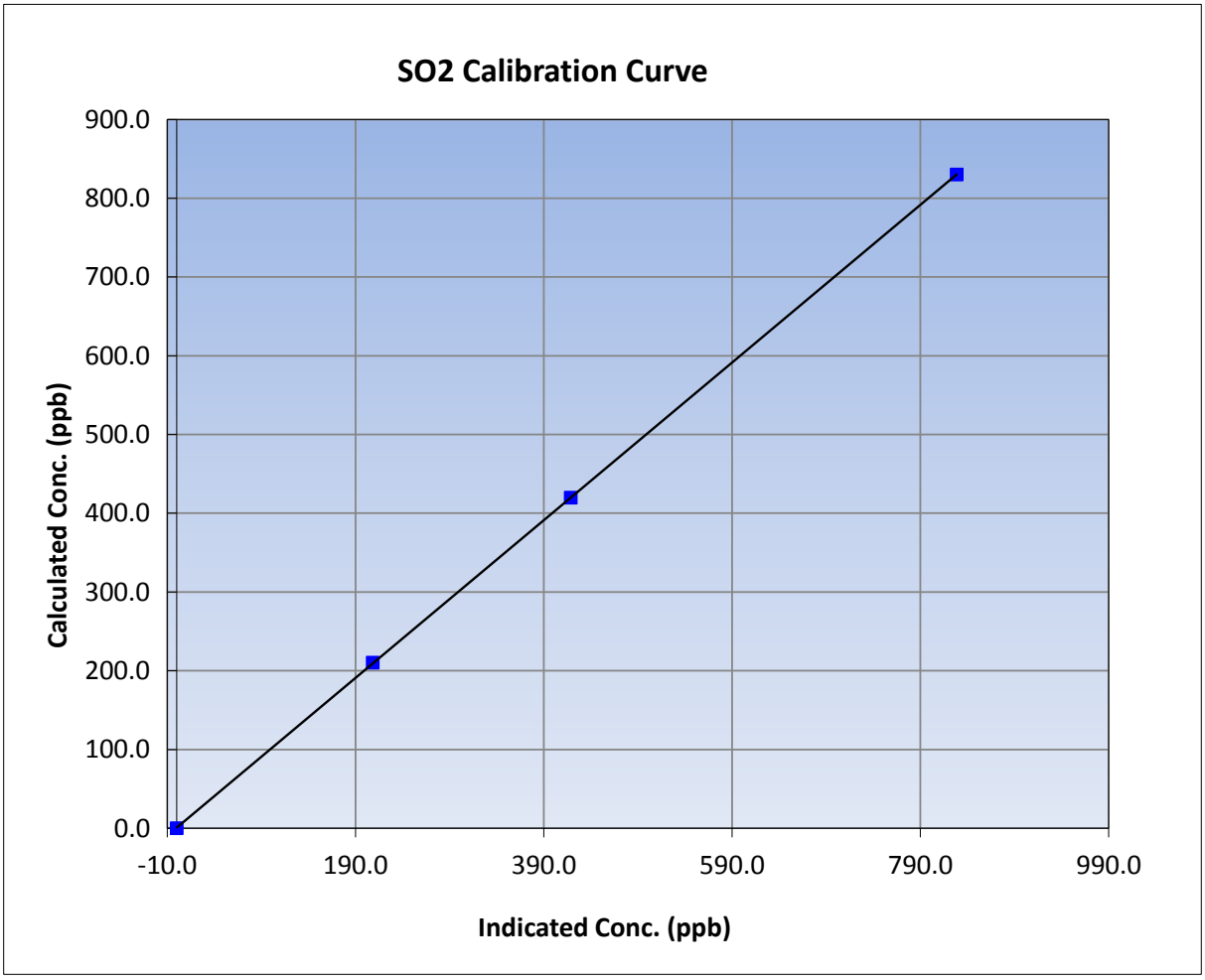
Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

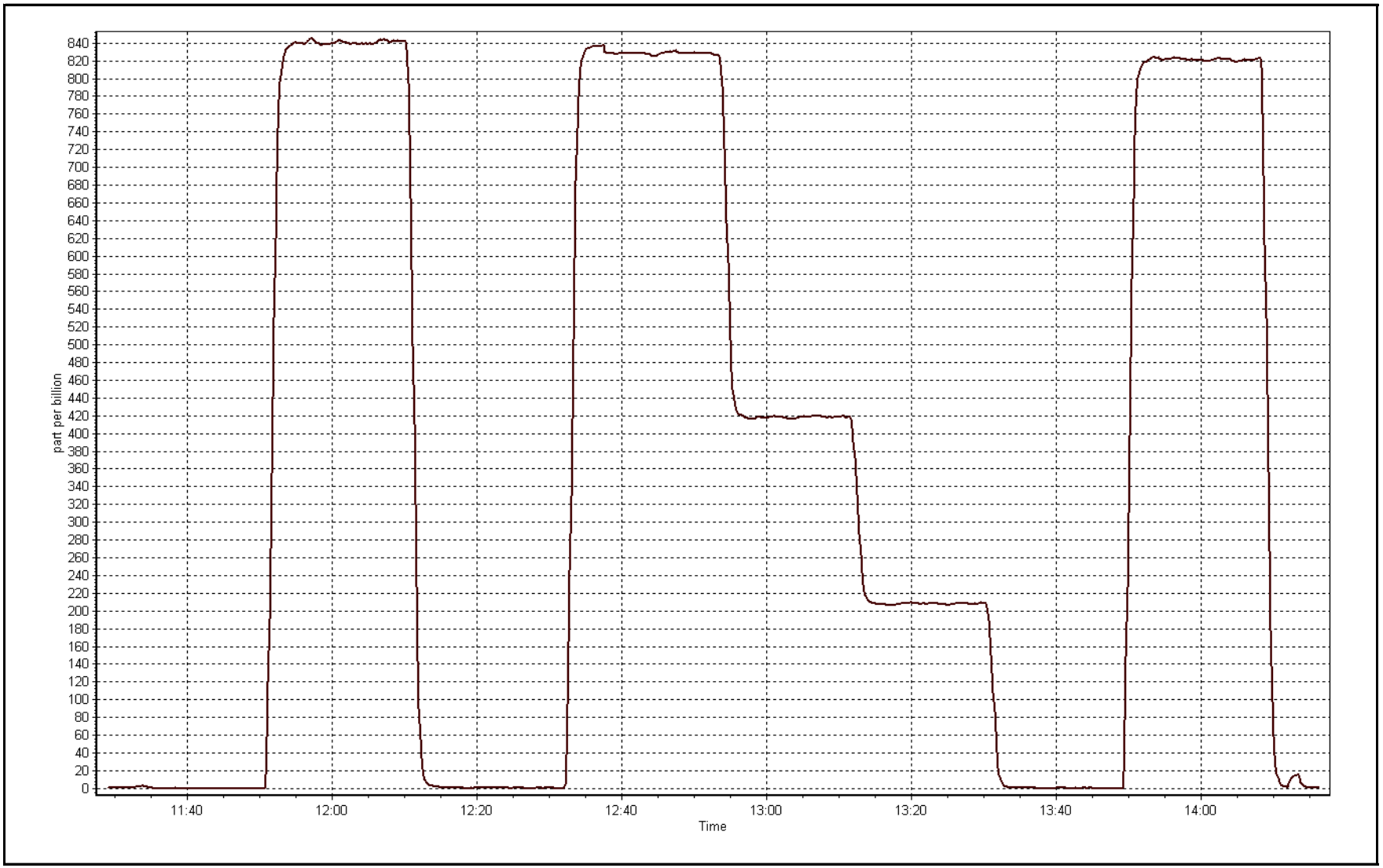
Calibration Date	April 4, 2016	Previous Calibration	March 7, 2016
Station Name	Lower Camp	Station Number	AMS 11
Start Time (MST)	11:30	End Time (MST)	14:15
Analyzer make	TEI 43i	Analyzer serial #	100841398

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999995
830.0	828.5	1.0018		
419.6	418.5	1.0027	Slope	1.001192
210.3	208.3	1.0099		
			Intercept	0.725715



SO2 Calibration Plot Date: April 4, 2016



Wood Buffalo Environmental Association
H2S Calibration Report

Station Information

Calibration Date	April 5, 2016	Last Calibration	March 3, 2016
Station Name	Lower Camp	Station Number	AMS 11
Reason:	Routine		
Start Time (MST)	10:30	End Time (MST)	13:10
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	-671	-671
Analyzer IP address	192.168.1.42		Lamp voltage	807	805
Calculated slope	0.996722	0.999559	Chamber temp	45	45
Calculated intercept	-0.086268	-0.203534	Pressure	592.3	590.2
Analyzer Background	10.8	10.7	Flow	1.063	1.059
Analyzer Coefficient	1.189	1.178	Intensity	91	91
			Converter temp.	325	326

Analyzer make/model	Thermo 450i	Analyzer serial #	1410661328
Converter make/model	NA	Converter serial #	NA

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.1	----
as found span	5000	72.8	75.0	76.0	0.986
SO2 scrubber check	5000	20.5	210.7	1.5	----
calibrator zero	5000	0.0	0.0	0.1	----
high point	5000	72.8	75.0	75.1	0.999
second point	5000	38.8	40.0	40.4	0.988
third point	5000	19.4	20.0	20.3	0.987
as left zero	5000	0.0	0.0	0.1	----
as left span	5000	72.8	75.0	75.1	0.999
				Average Correction Factor	0.991

Corrected As found	76.0	Previous response	75.3	% change	-0.9%

Notes:

Changed inlet filter and scrubber check done after as founds. Adjusted span.

Calibration Performed By: Evan Magill

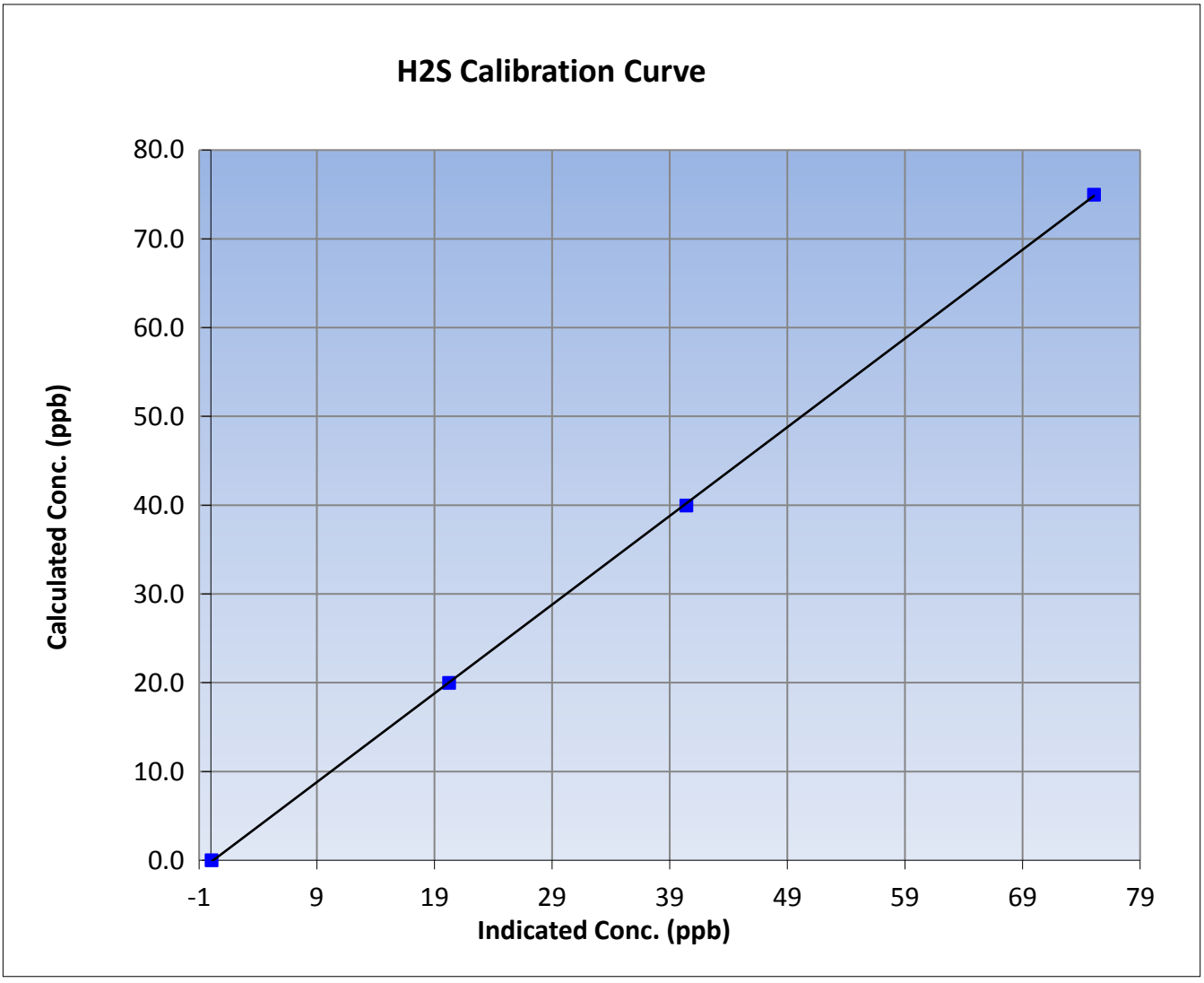
Wood Buffalo Environmental Association
H2S Calibration Report

Station Information

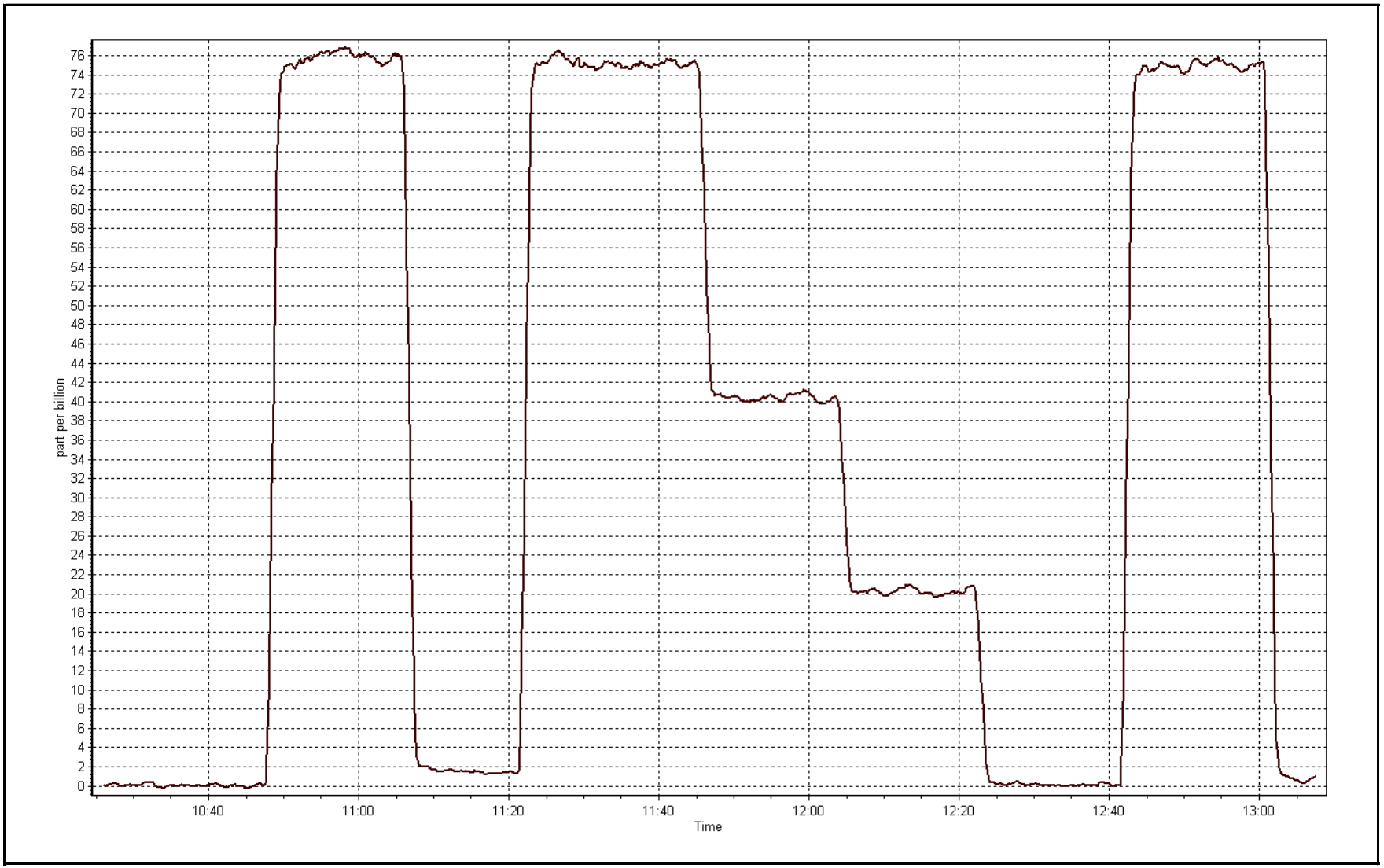
Calibration Date	April 5, 2016	Previous Calibration	March 3, 2016
Station Name	Lower Camp	Station Number	AMS 11
Start Time (MST)	10:30	End Time (MST)	13:10
Analyzer make	Thermo 450i	Analyzer serial #	1410661328

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	0.999965
75.0	75.1	0.9988		
40.0	40.4	0.9885	Slope	0.999559
20.0	20.3	0.9868		
			Intercept	-0.203534



H2S Calibration Plot Date: April 5, 2016



Wood Buffalo Environmental Association
THC Calibration Report

W B E A

Station Information

Calibration Date	April-04-16	Last Calibration	March-09-16
Station Name	Lower Camp	Station Number	AMS 11
Reason:	Routine		
Start Time (MST)	11:30	End Time (MST)	14:15
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	7.8	7.8
Analyzer IP address	192.168.1.51		Air or Bypass Press	40.1	40.2
Calculated slope	0.993062	1.002312	Fuel Pressure	25.1	25.1
Calculated intercept	0.027129	-0.031035	Analyzer Coeff	4.460	4.608
			Analyzer BKG	2.46	2.36

Analyzer make	51i-LT	Analyzer serial #	1218153353

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	-0.30	----
as found span	5000	80.9	17.32	16.52	1.048
calibrator zero	5000	0.0	0.00	0.01	----
high point	5000	80.9	17.32	17.29	1.002
second point	5000	40.9	8.76	8.81	0.994
third point	5000	20.5	4.39	4.41	0.995
as left zero	5000	0.0	0.00	0.13	----
as left span	5000	80.9	17.32	17.35	0.998
				Average Correction Factor	0.997

Corrected As found	16.82	Previous response	17.41	% change	3.5%

Notes:

Changed inlet filter after as founds. Adjusted zero and span.

Calibration Performed By: Evan Magill

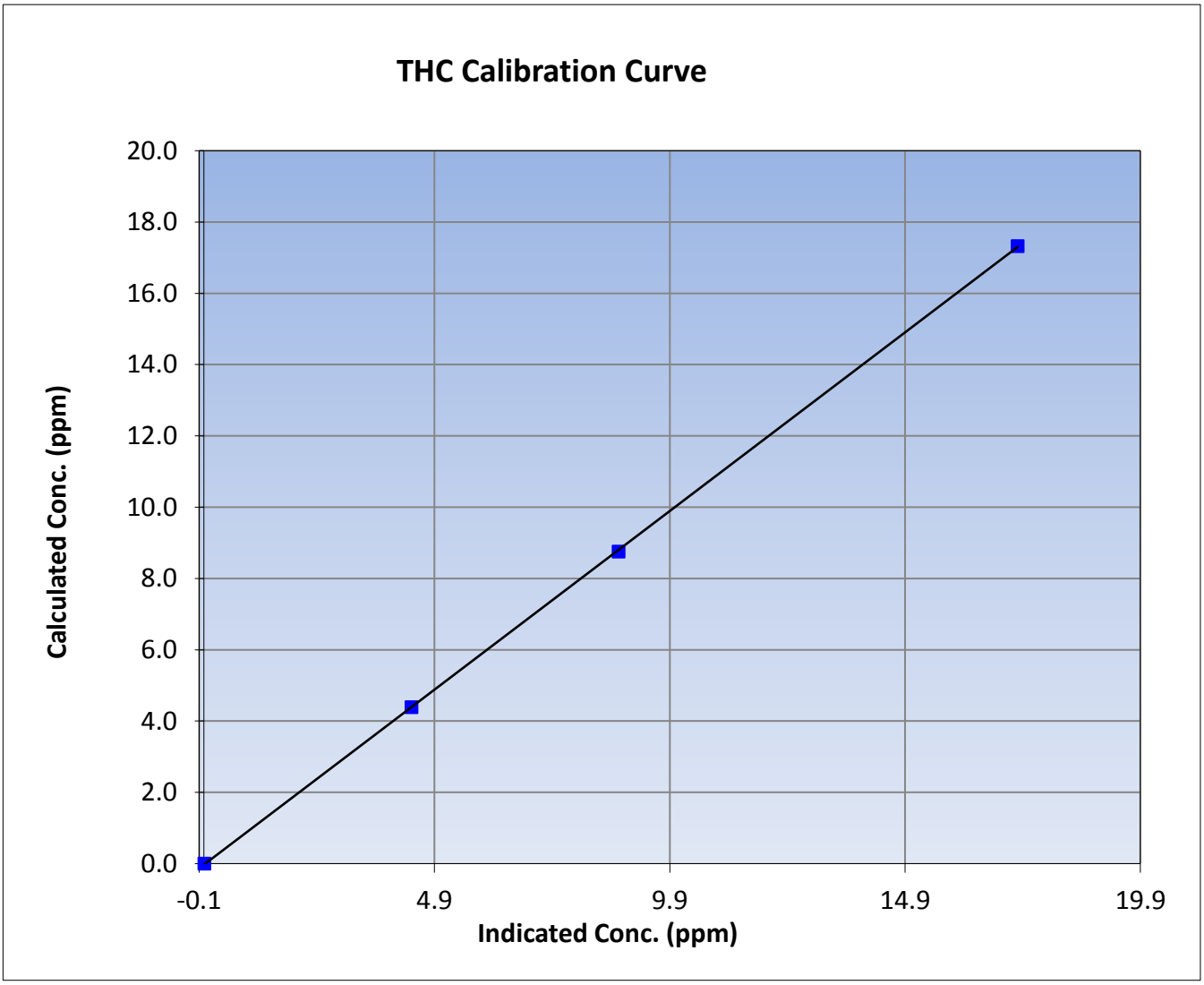
Wood Buffalo Environmental Association
THC Calibration Report

Station Information

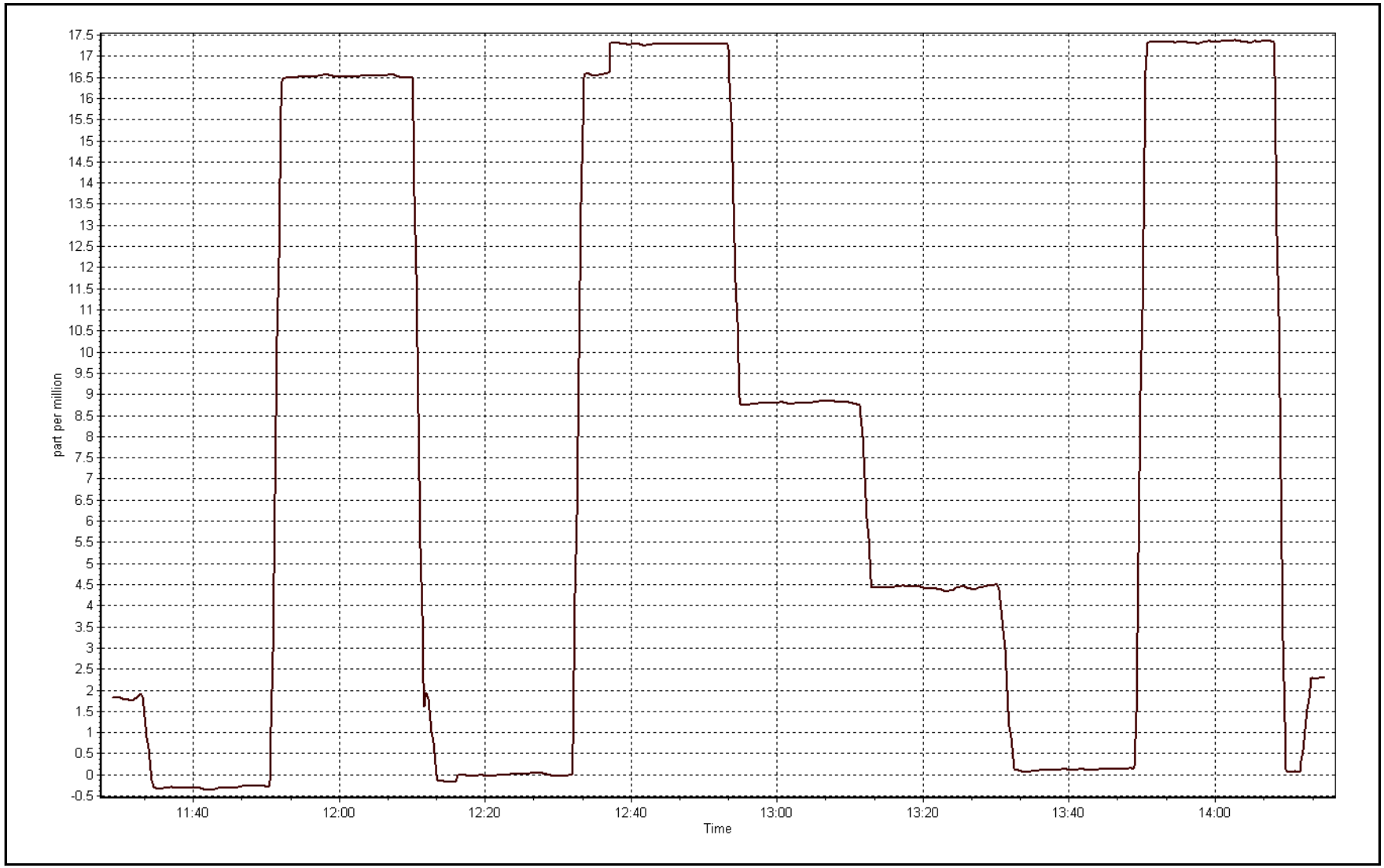
Calibration Date	April 4, 2016	Previous Calibration	March 9, 2016
Station Name	Lower Camp	Station Number	AMS 11
Start Time (MST)	11:30	End Time (MST)	14:15
Analyzer make	51i-LT	Analyzer serial #	1218153353

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.01	----	Correlation Coefficient	0.999983
17.32	17.29	1.0018		
8.76	8.81	0.9939	Slope	1.002312
4.39	4.41	0.9952		
			Intercept	-0.031035



THC Calibration Plot Date: April 4, 2016



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 13
FORT MCKAY SOUTH
APRIL 2016

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

May 27, 2016

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT McKAY SOUTH (AMS 13)
APRIL 2016

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	682	38	38	100.00	43	0	6	0
TRS(ppb) Average	685	33	35	99.72	6	0	1	0
THC(ppm) Average	674	43	46	99.58	5.2	-	2.9	-
O3(ppb) Average	684	32	36	99.44	62	0	47	-
NO2(ppb) Average	677	38	43	99.31	30	0	12	-
NO(ppb) Average	677	38	43	99.31	25	-	4	-
NOX(ppb) Average	677	38	43	99.31	52	-	14	-
PM2.5(ug/m3) Average	704	2	16	98.06	18.6	-	8.8	0
ET(C) Average	720	0	0	100.00	29.1	-	15.2	-
RH(%) Average	720	0	0	100.00	98	-	93	-
WS(km/h) Average	711	0	9	98.75	18	-	10	-
WD(deg) Average	711	0	9	98.75	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT McKAY SOUTH (AMS 13)
APRIL 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

					Percentile						
Parameter	Number	Mean	StnDev	Total	Min	P10	Q1	Median	Q3	P90	Max
SO2(ppb) Average	682	1.2	4	-	0	0	0	0	1	3	43
TRS(ppb) Average	685	0.3	0	-	0	0	0	0	0	0	6
THC(ppm) Average	674	2.33	0.3	-	2	2.2	2.2	2.3	2.4	2.5	5.2
O3(ppb) Average	684	28.5	14	-	1	8	19	30	39	45	62
NO2(ppb) Average	677	5.8	5	-	0	1	2	4	8	13	30
NO(ppb) Average	677	1.2	2	-	0	0	0	0	1	3	25
NOX(ppb) Average	677	7	7	-	0	1	2	5	9	16	52
PM2.5(ug/m3) Average	704	4.93	2.8	-	0.1	1.9	2.9	4.5	6.2	8.8	18.6
Temperature 2 m (C) Average	720	3.14	8.3	-	-17.2	-6.8	-2.1	1.7	7.5	15.2	29.1
Relative Humidity (%) Average	720	60.3	22	-	13	28	43	62	79	89	98
Wind Speed 10 m (km/h) Average	711	6.4	4	-	0	2	3	6	9	12	18
Wind Direction 10 m (deg) Average	711	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION -FORT McKAY SOUTH (AMS 13)
APRIL 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
TRS, THC, NO2, PM2.5	13 Apr 2016 11:00	13 Apr 2016 11:00	1	Station power failure
TRS	05 Apr 2016 08:00	05 Apr 2016 08:00	1	Maintenance - cleaned glass manifold
THC	05 Apr 2016 10:00	05 Apr 2016 11:00	2	Maintenance - rebuilt sample pump
O3	05 Apr 2016 08:00	05 Apr 2016 09:00	2	Maintenance - cleaned glass manifold
O3	13 Apr 2016 11:00	13 Apr 2016 12:00	2	Station power failure
NO2	06 Apr 2016 17:00	06 Apr 2016 17:00	1	Power spike
NO2	15 Apr 2016 08:00	15 Apr 2016 10:00	3	Maintenance - NOX reference point generated for O3 cal
PM2.5	13 Apr 2016 12:00	13 Apr 2016 19:00	8	Unstable operation - baseline drift
PM2.5	19 Apr 2016 10:00	19 Apr 2016 10:00	1	Unstable operation - baseline drift
PM2.5	19 Apr 2016 12:00	19 Apr 2016 15:00	4	Unstable operation - baseline drift
Wind Speed, Wind Direction	06 Apr 2016 09:00	06 Apr 2016 16:00	8	Flat line in sensor output signal -sensor frozen
Wind Speed, Wind Direction	14 Apr 2016 01:00	14 Apr 2016 01:00	1	Flat line in sensor output signal -sensor frozen

Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO_2) - ppb

Fort McKay South - April 2016

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

Maximum Value: 43 ppb on Apr 18 12:00 Maximum Daily Average: 6.4 ppb on Apr 18

Minimum Value: 0 ppb on Apr 1 15:00 Minimum Daily Average: 0.0 ppb on Apr 6

Maximum Diurnal Average: 3.9 ppb at hour 12 Minimum Diurnal Average: 0.3 ppb at hour 6

Monthly Average: 1.2 ppb Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 1$ $P_{90} = 3$ $P_{99} = 15$

Hours in Service:	720
Hours of Data:	682
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-Apr	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
2-Apr	0	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
3-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
4-Apr	0	0	0	0	Z	0	0	0	1	5	12	24	23	13	12	7	8	4	2	1	1	1	1	1	5.0	24
5-Apr	0	0	0	0	0	Z	0	C	C	C	C	C	C	C	C	1	0	0	0	0	0	0	0	0	--	1
6-Apr	Z	0	0	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-Apr	0	Z	0	0	0	0	0	0	0	1	3	7	7	4	1	0	0	0	0	0	0	0	0	0	1.0	7
8-Apr	0	0	Z	0	0	0	0	0	4	3	7	1	0	0	0	0	0	0	0	0	0	5	5	2	1.3	7
9-Apr	1	1	0	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
10-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
11-Apr	0	0	0	0	1	Z	1	0	2	5	5	6	10	12	11	9	10	7	8	2	1	1	1	1	4.1	12
12-Apr	Z	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
13-Apr	0	Z	0	0	0	0	0	0	1	1	0	9	12	7	3	2	1	1	2	1	0	1	0	0	1.8	12
14-Apr	0	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
15-Apr	0	0	0	Z	0	0	0	0	0	0	1	5	5	5	3	6	7	5	2	0	0	1	2	3	2.1	7
16-Apr	3	1	1	0	Z	1	1	1	3	3	3	4	1	0	0	0	0	0	0	0	0	0	0	0	1.0	4
17-Apr	0	0	0	0	0	Z	1	1	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	3
18-Apr	Z	0	1	0	0	0	1	1	3	27	40	43	5	1	0	0	1	1	2	13	2	0	1	4	6.4	43
19-Apr	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
20-Apr	0	0	Z	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-Apr	0	0	0	Z	0	0	0	0	4	5	6	0	0	1	1	0	0	0	0	0	0	0	0	0	0.8	6
22-Apr	0	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
23-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0.4	5
24-Apr	Z	6	5	4	6	1	4	13	28	17	6	3	5	4	1	2	5	2	1	0	1	3	1	0	5.1	28
25-Apr	0	Z	0	0	0	0	1	1	2	1	0	1	3	2	0	0	0	0	0	0	0	0	0	0	0.6	3
26-Apr	0	0	Z	0	0	0	1	1	1	1	1	0	1	1	0	0	0	1	2	1	0	0	0	0	0.6	2
27-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
28-Apr	0	0	0	0	Z	0	0	0	2	4	7	3	0	1	1	2	3	1	0	0	1	0	0	0	1.1	7
29-Apr	0	0	0	0	0	Z	1	7	9	4	4	2	2	2	3	2	0	0	0	0	0	0	0	0	1.7	9
30-Apr	Z	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
	0.4	0.4	0.4	0.3	0.5	0.3	0.5	1.1	2.3	2.8	3.5	3.9	2.6	1.9	1.3	1.1	1.3	0.8	0.6	0.7	0.3	0.5	0.4	0.6	Diurnal Average	
	3	6	5	4	6	1	4	13	28	27	40	43	23	13	12	9	10	7	8	13	2	5	5	5	Diurnal Maximum	

Z - zerospan C - Calibration

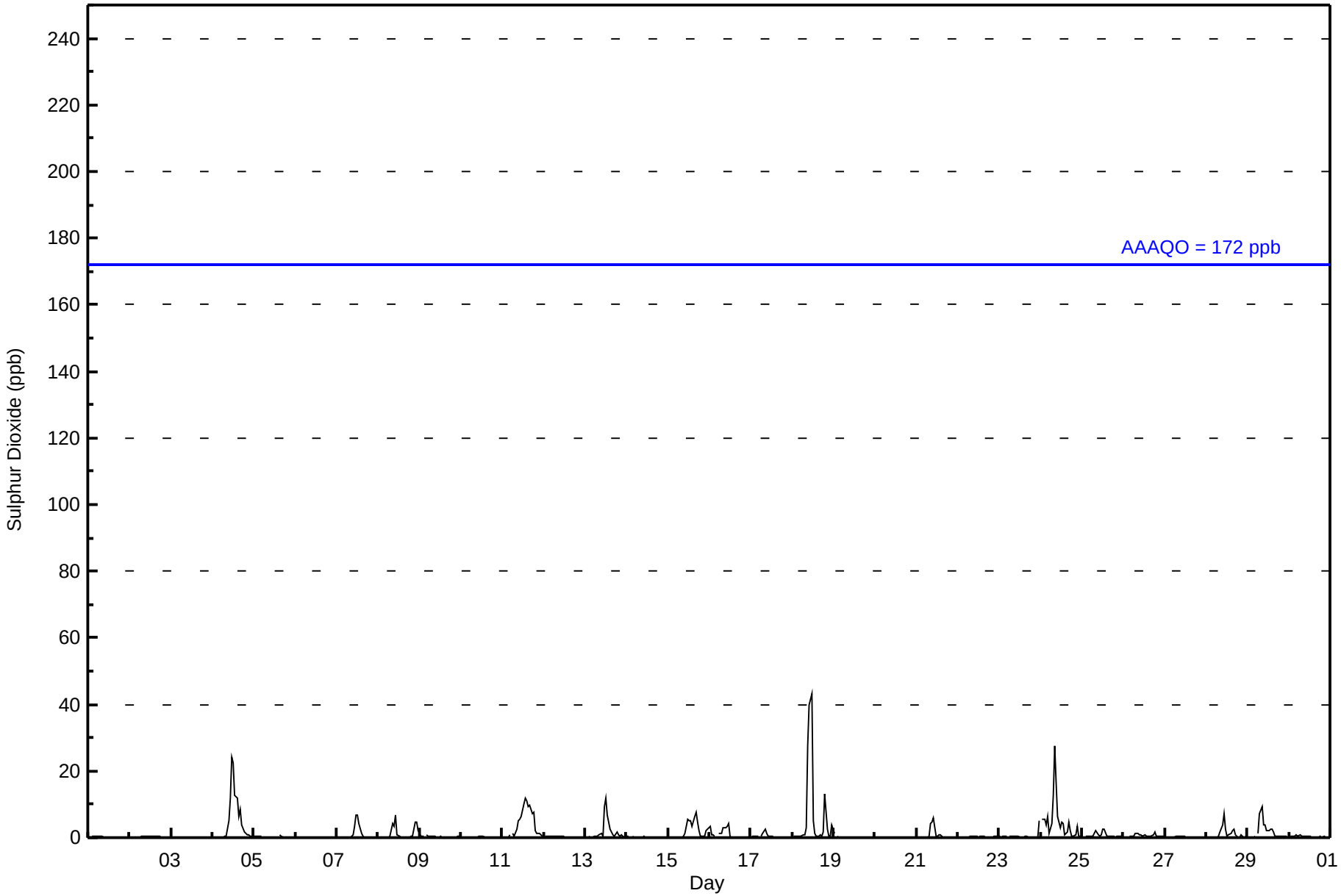
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb

Wood Buffalo Environmental Association

Hourly Averages

Sulphur Dioxide (SO_2) - ppb

Fort McKay South - April 2016



Sulphur Dioxide (SO_2) - ppb
Fort McKay South - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	667	97.80	97.80
11 - 20	9	1.32	99.12
21 - 60	6	0.88	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

Fort McKay South - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 10	114	114	25	8	5	14	38	74	76	38	35	30	20	11	18	38	658
11 - 20	0	0	0	0	0	2	4	2	1	0	0	0	0	0	0	0	9
21 - 60	0	0	0	0	0	0	5	1	0	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	114	114	25	8	5	16	47	77	77	38	35	30	20	11	18	38	673

Total Number of Valid Hours: 673

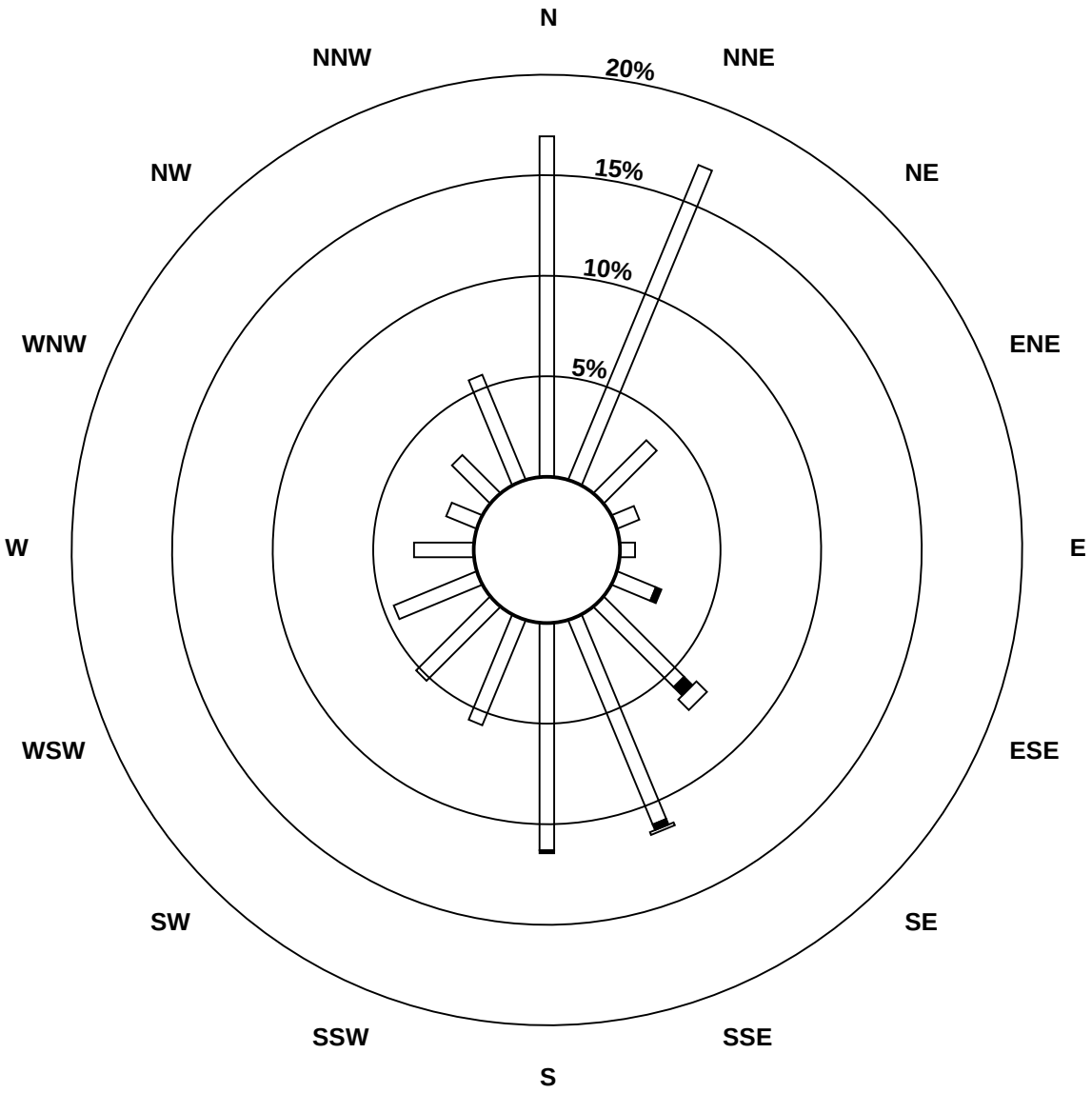
Total Number of Hours: 720

Wood Buffalo Environmental Association

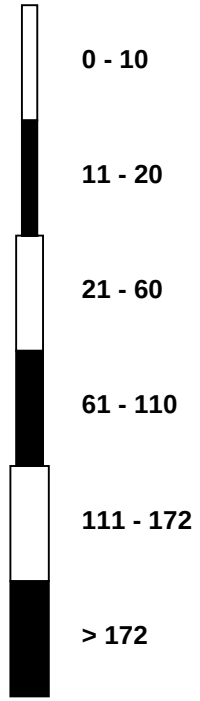
Wind Rose Apr 2016

Sulphur Dioxide (SO_2) - ppb

Fort McKay South (AMS 13)



Classes (ppb)



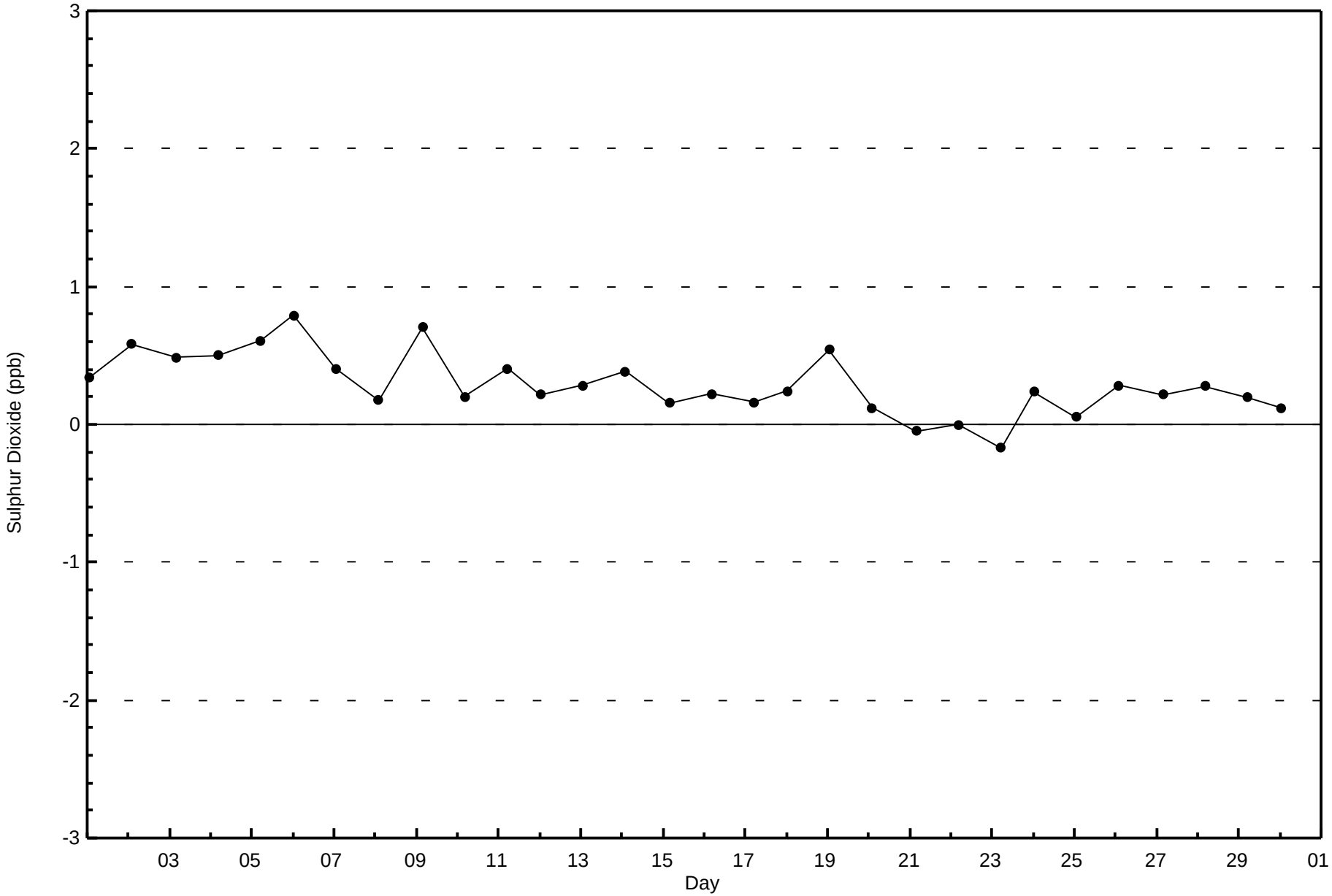
Total Number of Valid Hours: 673

Wood Buffalo Environmental Association

Zero Responses

Sulphur Dioxide (SO_2) - ppb

Fort McKay South - April 2016

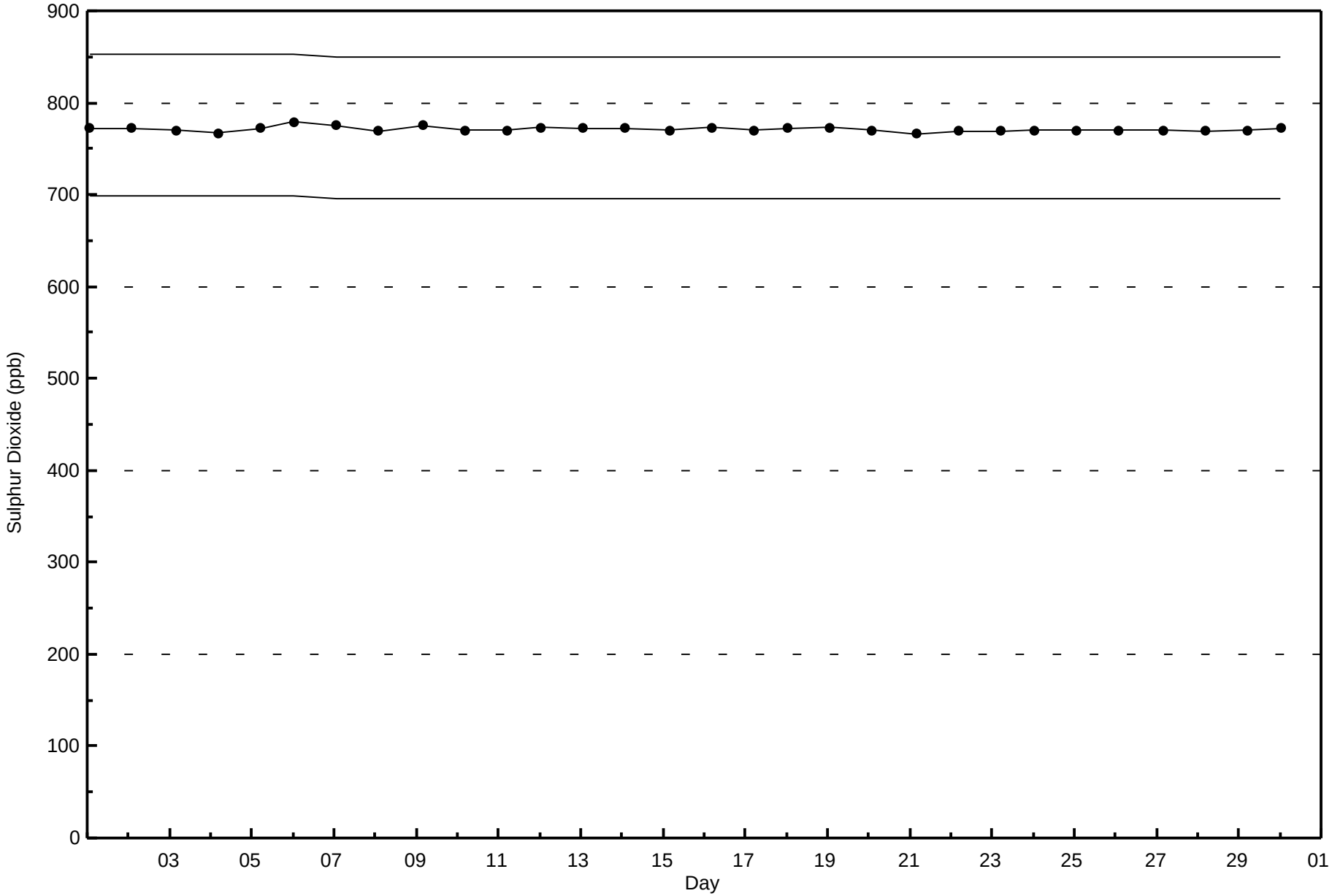


Wood Buffalo Environmental Association

Span Responses

Sulphur Dioxide (SO_2) - ppb

Fort McKay South - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

Fort McKay South - April 2016

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

Maximum Value: 6 ppb on Apr 18 20:00 Maximum Daily Average: 0.9 ppb on Apr 18

Minimum Value: 0 ppb on Apr 17 14:00 Minimum Daily Average: 0.1 ppb on Apr 20

Maximum Diurnal Average: 0.4 ppb at hour 20 Minimum Diurnal Average: 0.2 ppb at hour 18

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:	720
Hours of Data:	685
Hours of Missing Data:	35
Hours of Calibration:	33
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-Apr	0	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-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
3-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
4-Apr	0	0	0	0	0	Z	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.4	1
5-Apr	0	0	0	0	0	0	Z	M	0	1	0	1	1	0	0	0	0	0	0	0	0	0	1	1	0.3	1
6-Apr	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
7-Apr	0	0	Z	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
8-Apr	0	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
9-Apr	0	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
10-Apr	0	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-Apr	0	0	0	0	1	1	Z	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.4	1
12-Apr	0	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-Apr	0	0	Z	0	0	0	1	1	0	0	PF	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
14-Apr	0	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
15-Apr	0	0	0	0	Z	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1	0	0.3	1
16-Apr	0	1	1	0	1	Z	1	2	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2
17-Apr	0	0	0	0	0	0	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
18-Apr	1	Z	0	0	1	1	1	1	1	C	C	C	0	0	0	0	0	0	1	6	2	0	0	1	0.9	6
19-Apr	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
20-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
21-Apr	0	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
22-Apr	0	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
23-Apr	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
24-Apr	0	Z	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
25-Apr	0	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
26-Apr	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
27-Apr	0	0	0	0	Z	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
28-Apr	0	0	0	0	0	Z	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0.3	1
29-Apr	0	0	0	0	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
30-Apr	0	Z	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
	0.3	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.4	0.2	0.2	0.2	0.3	Diurnal Average	
	1	1	1	1	1	1	1	2	1	1	1	1	1	1	0	0	0	0	1	6	2	0	1	1	Diurnal Maximum	

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

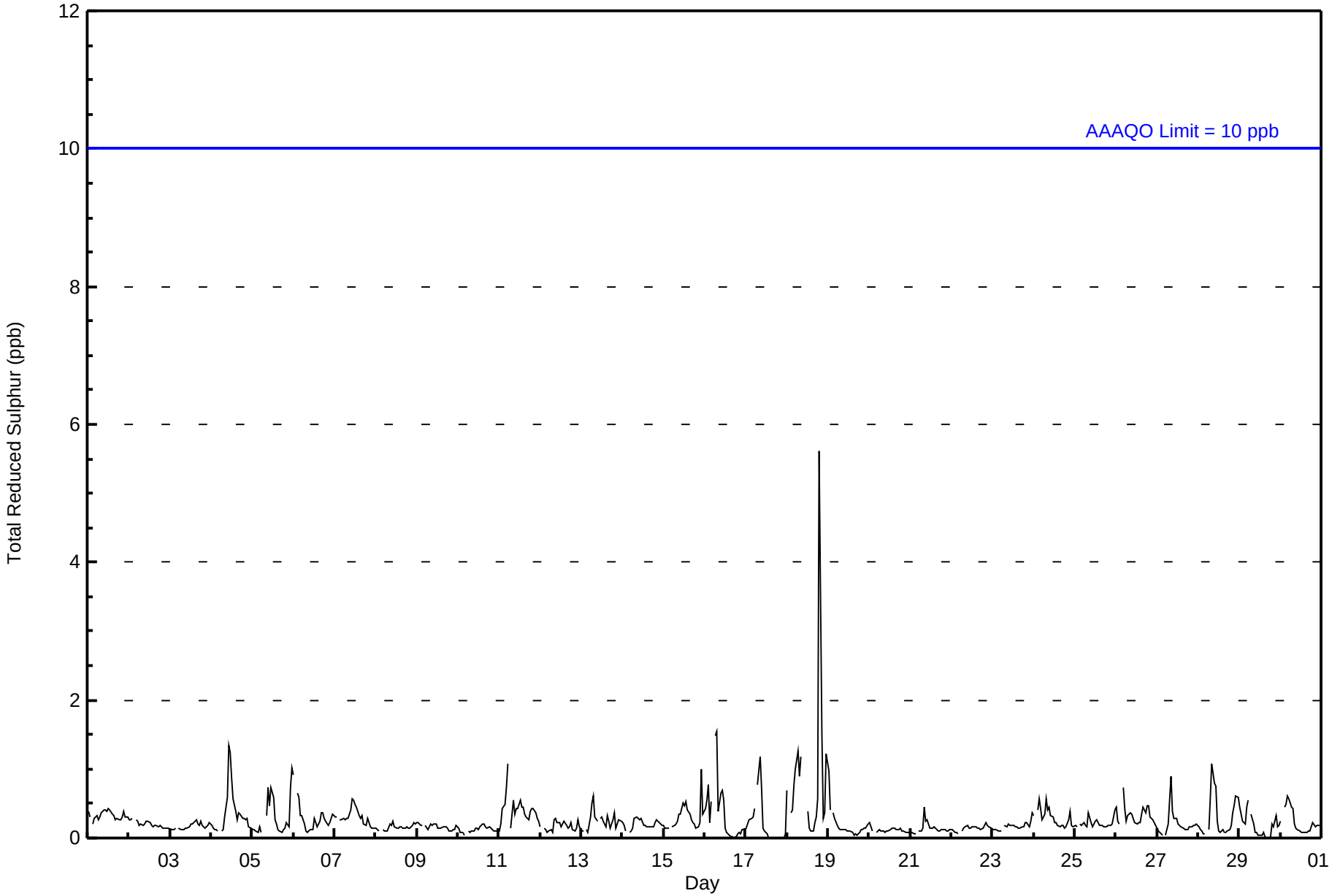
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb

Wood Buffalo Environmental Association

Hourly Averages

Total Reduced Sulphur (TRS) - ppb

Fort McKay South - April 2016



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb

Fort McKay South - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	684	99.85	99.85
3 - 4	0	0.00	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: 685

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Total Reduced Sulphur (TRS) - ppb

Fort McKay South - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 2	114	118	24	10	4	16	44	81	75	39	33	33	18	10	19	37	675
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	1	0	0	0	0	0	0	0	1
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	114	118	24	10	4	16	44	81	76	39	33	33	18	10	19	37	676

Total Number of Valid Hours: 676

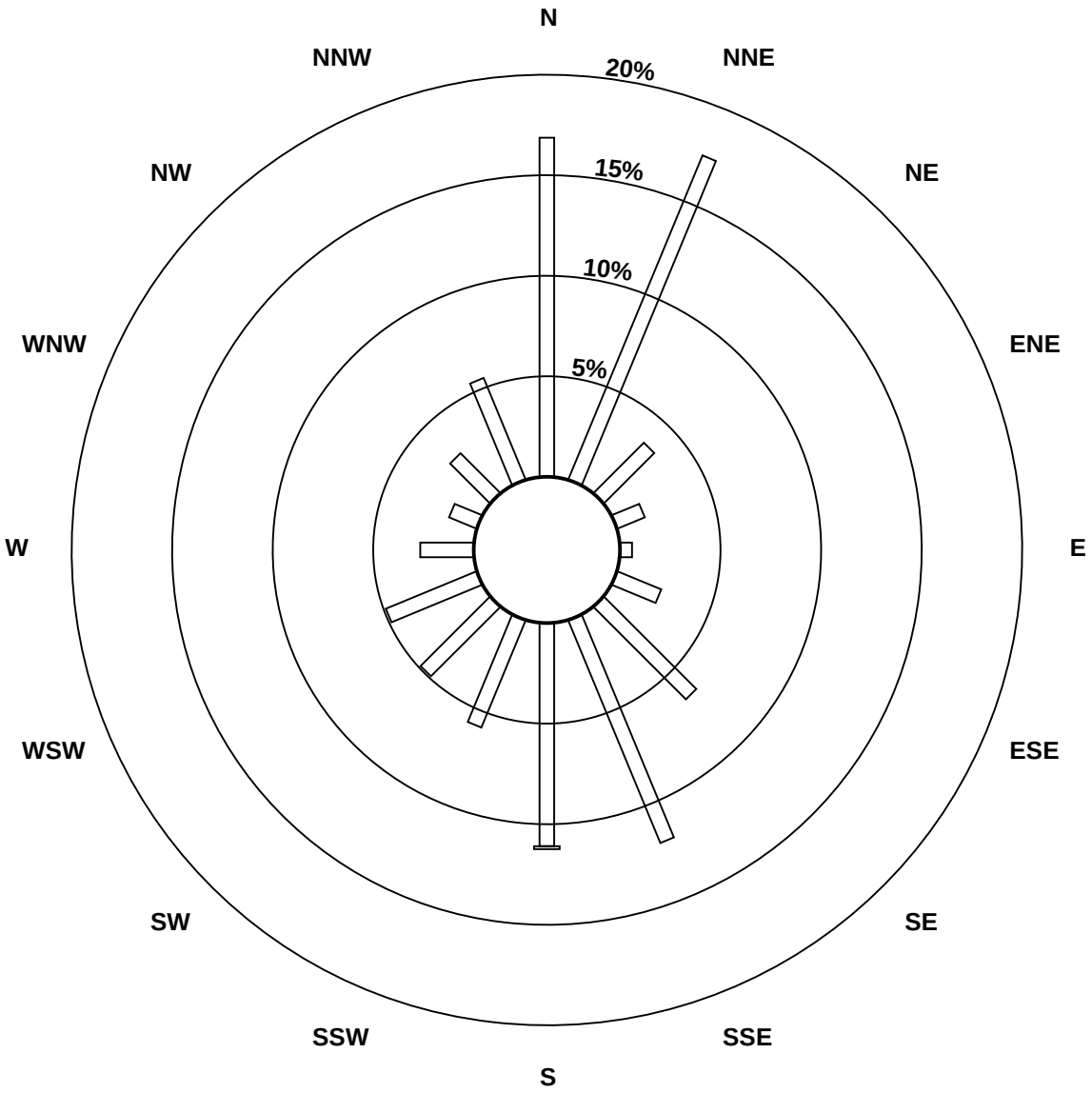
Total Number of Hours: 720

Wood Buffalo Environmental Association

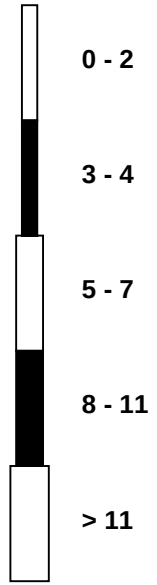
Wind Rose Apr 2016

Total Reduced Sulphur (TRS) - ppb

Fort McKay South (AMS 13)



Classes (ppb)



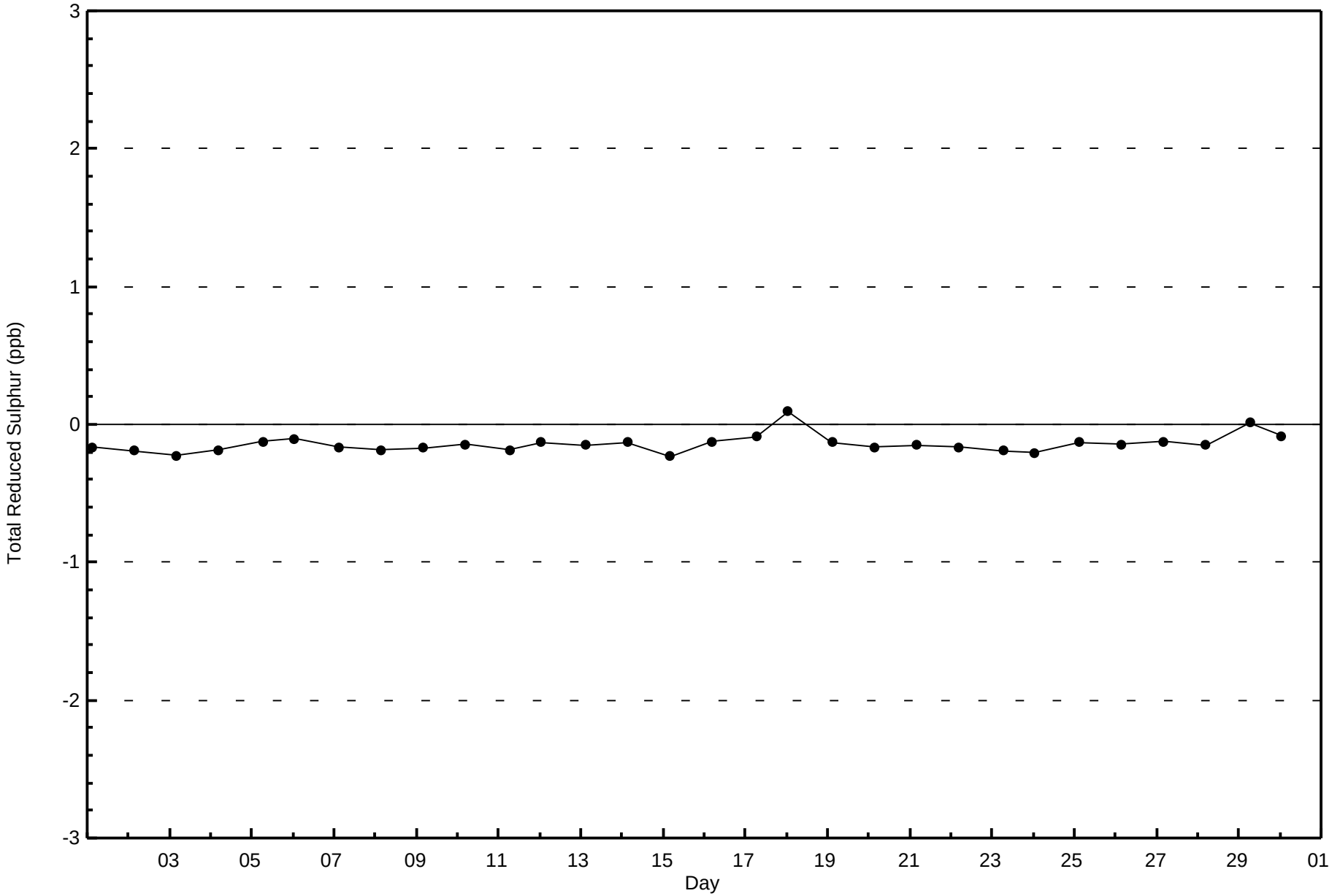
Total Number of Valid Hours: 676

Wood Buffalo Environmental Association

Zero Responses

Total Reduced Sulphur (TRS) - ppb

Fort McKay South - April 2016

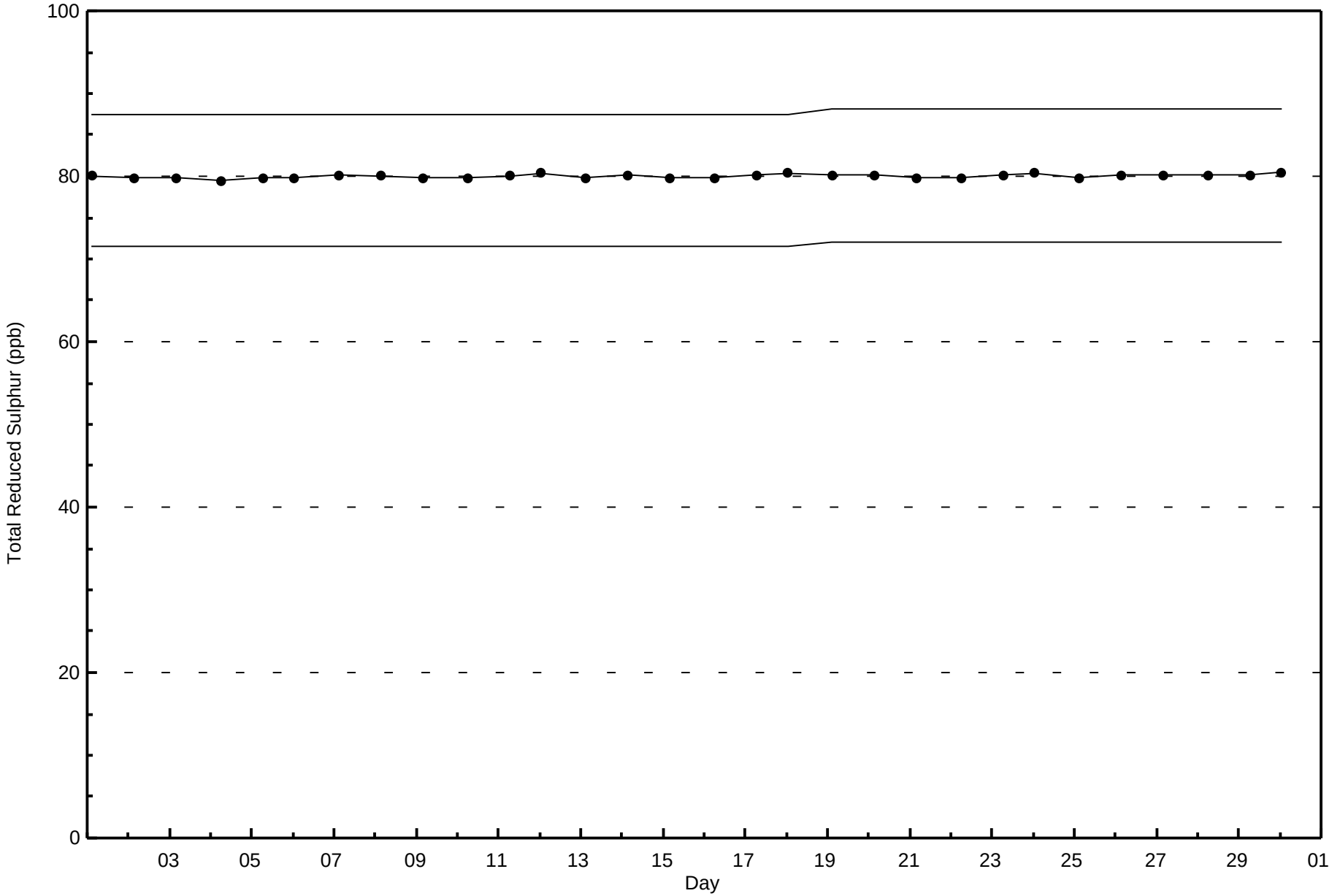


Wood Buffalo Environmental Association

Span Responses

Total Reduced Sulphur (TRS) - ppb

Fort McKay South - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Fort McKay South - April 2016

Maximum Value: 5.2 ppm on Apr 18 02:00

Maximum Daily Average: 2.9 ppm on Apr 18

Minimum Value: 2.0 ppm on Apr 6 08:00

Minimum Daily Average: 2.2 ppm on Apr 19

Maximum Diurnal Average: 2.5 ppm at hour 2

Minimum Diurnal Average: 2.2 ppm at hour 15

Monthly Average: 2.33 ppm

Percentiles: P_1 = 2.1 P_{10} = 2.2 Q_1 = 2.2 Median = 2.3 Q_3 = 2.4 P_{90} = 2.5 P_{99} = 3.5

Hours in Service:	720
Hours of Data:	674
Hours of Missing Data:	46
Hours of Calibration:	43
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-Apr	3.0	Z	2.2	2.2	2.3	2.3	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.4	2.4	2.3	3.0
2-Apr	2.3	2.3	Z	2.3	2.3	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4
3-Apr	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.3	2.2	2.3	2.3	2.2	2.3
4-Apr	2.3	2.3	2.3	2.3	Z	2.3	2.3	2.4	2.6	2.5	2.5	2.4	2.3	2.2	2.2	2.2	2.4	2.4	2.5	2.5	2.5	2.4	2.3	2.2	2.4	2.6
5-Apr	2.2	2.2	2.2	2.2	2.3	Z	2.3	C	C	M	M	C	C	C	C	2.3	2.3	2.3	2.3	2.4	2.3	2.1	2.4	2.3	--	2.4
6-Apr	Z	2.3	2.3	2.3	2.5	3.2	2.1	2.0	2.0	2.1	C	C	C	C	C	C	C	2.3	2.3	2.2	2.2	2.3	2.3	2.3	--	3.2
7-Apr	2.2	Z	2.3	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.5	2.4	2.3	2.4	2.4	2.4	2.4	2.3	2.2	2.3	2.3	2.4	2.3	2.3	2.3	2.5
8-Apr	2.3	2.3	Z	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
9-Apr	2.3	2.3	2.3	Z	2.5	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.5
10-Apr	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3
11-Apr	2.3	2.3	2.3	2.3	2.4	Z	2.4	2.3	2.5	2.5	2.6	2.5	2.3	2.4	2.3	2.3	2.2	2.3	2.8	2.8	2.9	2.8	2.6	2.5	2.5	2.9
12-Apr	Z	2.4	2.3	2.3	2.3	2.3	2.4	2.3	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.3	2.4	2.4	2.3	2.4
13-Apr	2.3	Z	2.3	2.3	2.2	2.6	2.8	2.7	2.5	2.3	PF	2.3	2.2	2.2	2.3	2.3	2.2	2.2	2.3	2.3	2.2	2.3	2.3	2.3	2.3	2.8
14-Apr	2.3	2.2	Z	2.2	2.2	2.2	2.1	2.2	2.3	2.2	2.2	2.4	2.3	2.3	2.3	2.3	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4
15-Apr	2.2	2.3	2.2	Z	2.3	2.3	2.3	2.4	2.5	2.7	2.5	2.5	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.7
16-Apr	2.4	2.5	2.4	2.4	Z	2.5	3.2	3.2	2.4	2.4	2.4	2.3	2.2	2.1	2.1	2.2	2.1	2.1	2.2	2.1	2.2	2.2	2.4	2.6	2.4	3.2
17-Apr	2.6	2.6	2.6	2.6	2.6	Z	2.7	2.8	2.9	2.8	2.4	2.3	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.5	2.4	2.9
18-Apr	Z	5.2	4.4	3.7	3.5	3.7	4.4	3.1	2.8	2.4	2.3	2.3	2.2	2.2	2.2	2.2	2.5	2.5	2.8	3.5	2.3	2.2	2.2	2.6	2.9	5.2
19-Apr	3.0	Z	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	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	3.0
20-Apr	2.3	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.2	2.3	2.3	2.2	2.3	2.2	2.2	2.3	2.2	2.3
21-Apr	2.3	2.3	2.3	Z	2.3	2.3	2.3	2.3	2.5	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.5
22-Apr	2.4	2.4	2.3	2.2	Z	2.3	2.4	2.5	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4	2.3	2.4	2.4	2.3	2.3	2.5
23-Apr	2.4	2.3	2.3	2.2	2.2	Z	2.3	2.4	2.4	2.5	2.3	2.3	2.2	2.1	2.1	2.2	2.2	2.1	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.5
24-Apr	Z	2.2	2.2	2.2	2.2	2.3	2.4	2.3	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.4	2.2	2.2	2.2	2.4
25-Apr	2.2	Z	2.4	2.3	2.3	2.3	2.2	2.2	2.5	2.3	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4	2.4	2.5	2.7	2.3	2.7
26-Apr	2.6	2.4	Z	2.6	3.0	2.6	2.3	2.4	2.5	2.5	2.4	2.3	2.2	2.2	2.2	2.3	2.2	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.4	3.0
27-Apr	2.5	2.5	2.4	Z	2.3	2.3	2.5	2.8	2.7	2.5	2.6	2.5	2.4	2.3	2.3	2.3	2.3	2.2	2.3	2.3	2.3	2.4	2.5	2.6	2.4	2.8
28-Apr	2.6	2.4	2.4	2.3	Z	2.3	2.6	3.1	3.1	2.5	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4	2.5	3.2	3.2	2.5	3.2
29-Apr	2.7	2.7	2.4	2.5	2.9	Z	2.5	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.8	2.5	2.6	2.4	2.9
30-Apr	Z	2.7	2.6	2.6	2.6	2.6	2.5	2.7	2.4	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.3	2.4	2.3	2.4	2.4	2.4	2.4	2.7
	2.4	2.5	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.4	Diurnal Average	
	3.0	5.2	4.4	3.7	3.5	3.7	4.4	3.2	3.1	2.8	2.6	2.5	2.4	2.4	2.4	2.4	2.5	2.5	2.8	3.5	2.9	2.8	3.2	3.2	Diurnal Maximum	

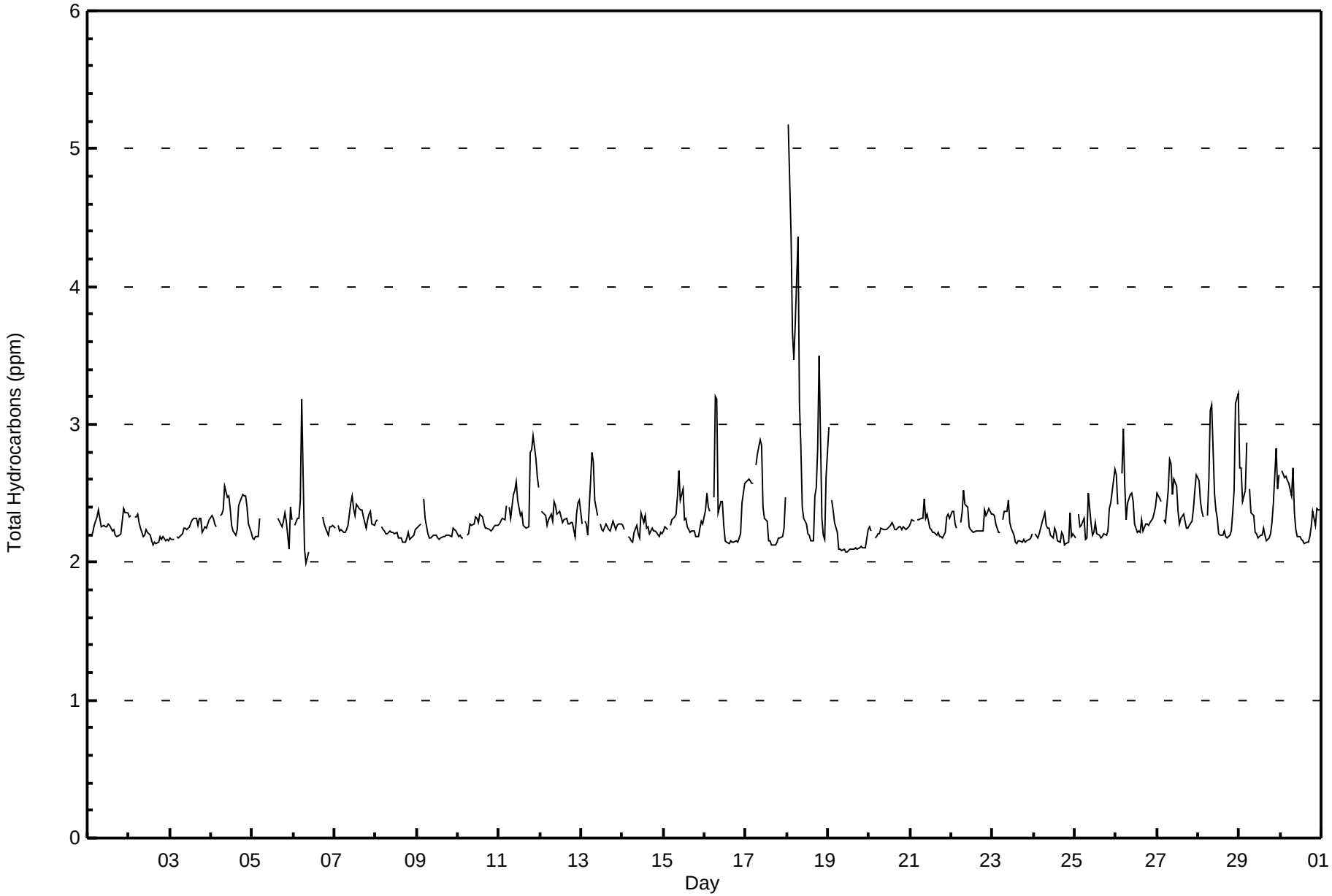
Z - zerospan C - Calibration M - Maintenance PF - Power Failure

Wood Buffalo Environmental Association

Hourly Averages

Total Hydrocarbons (THC) - ppm

Fort McKay South - April 2016



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm

Fort McKay South - April 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	2	0.30	0.30
2.1 - 3.0	657	97.48	97.77
3.1 - 10.0	15	2.23	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 674

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Total Hydrocarbons (THC) - ppm

Fort McKay South - April 2016

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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
2.1 - 3.0	113	113	24	8	5	16	46	74	72	35	33	30	20	11	18	37	655
3.1 - 10.0	0	0	0	0	0	0	1	3	5	3	2	0	0	0	0	1	15
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	114	113	24	8	5	16	47	77	77	38	35	30	20	11	18	38	671

Total Number of Valid Hours: 671

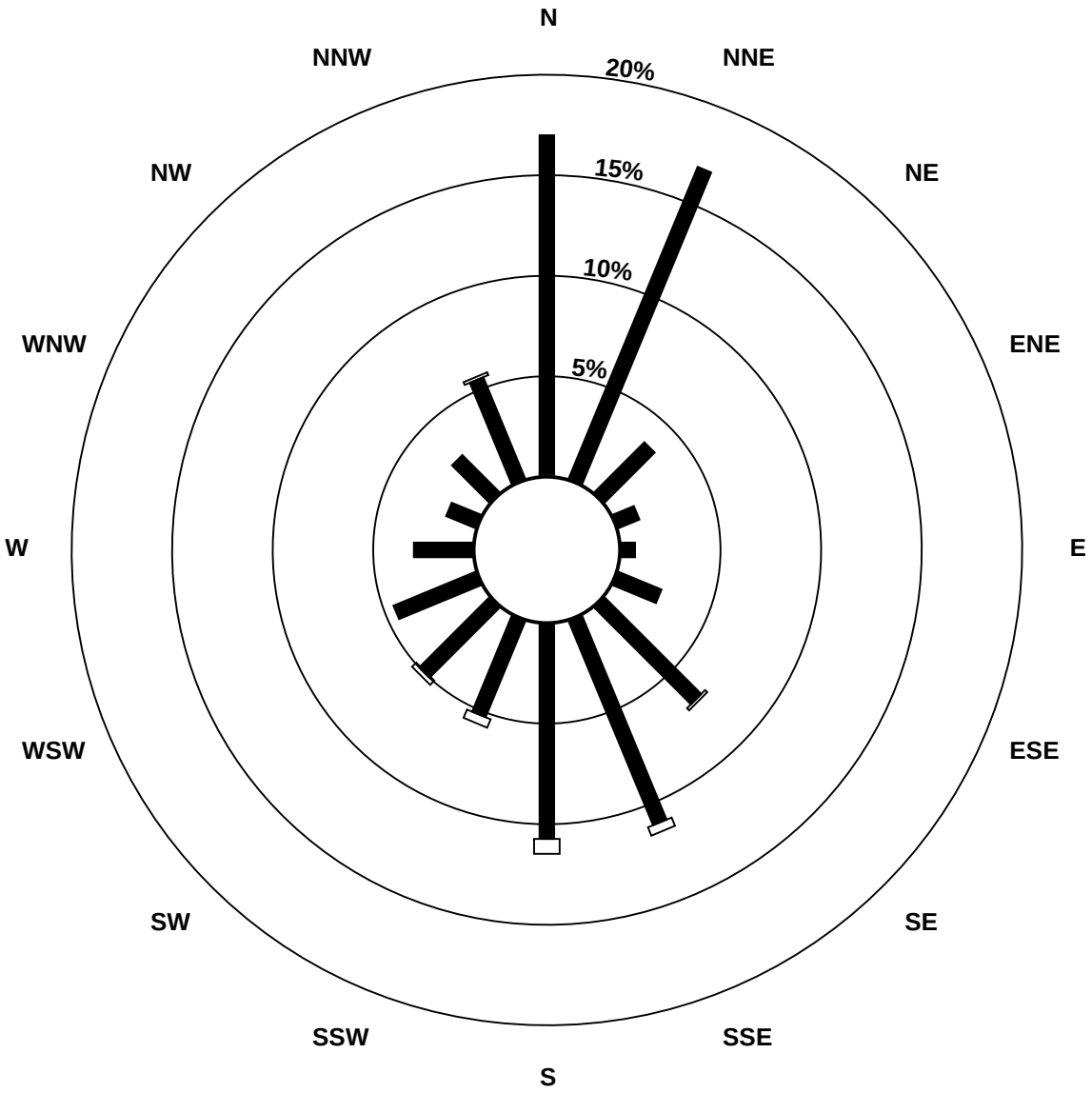
Total Number of Hours: 720

Wood Buffalo Environmental Association

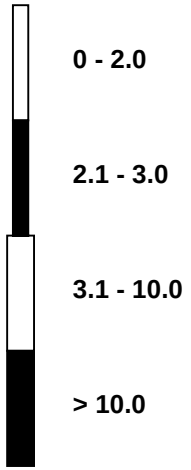
Wind Rose Apr 2016

Total Hydrocarbons (THC) - ppm

Fort McKay South (AMS 13)



Classes (ppm)



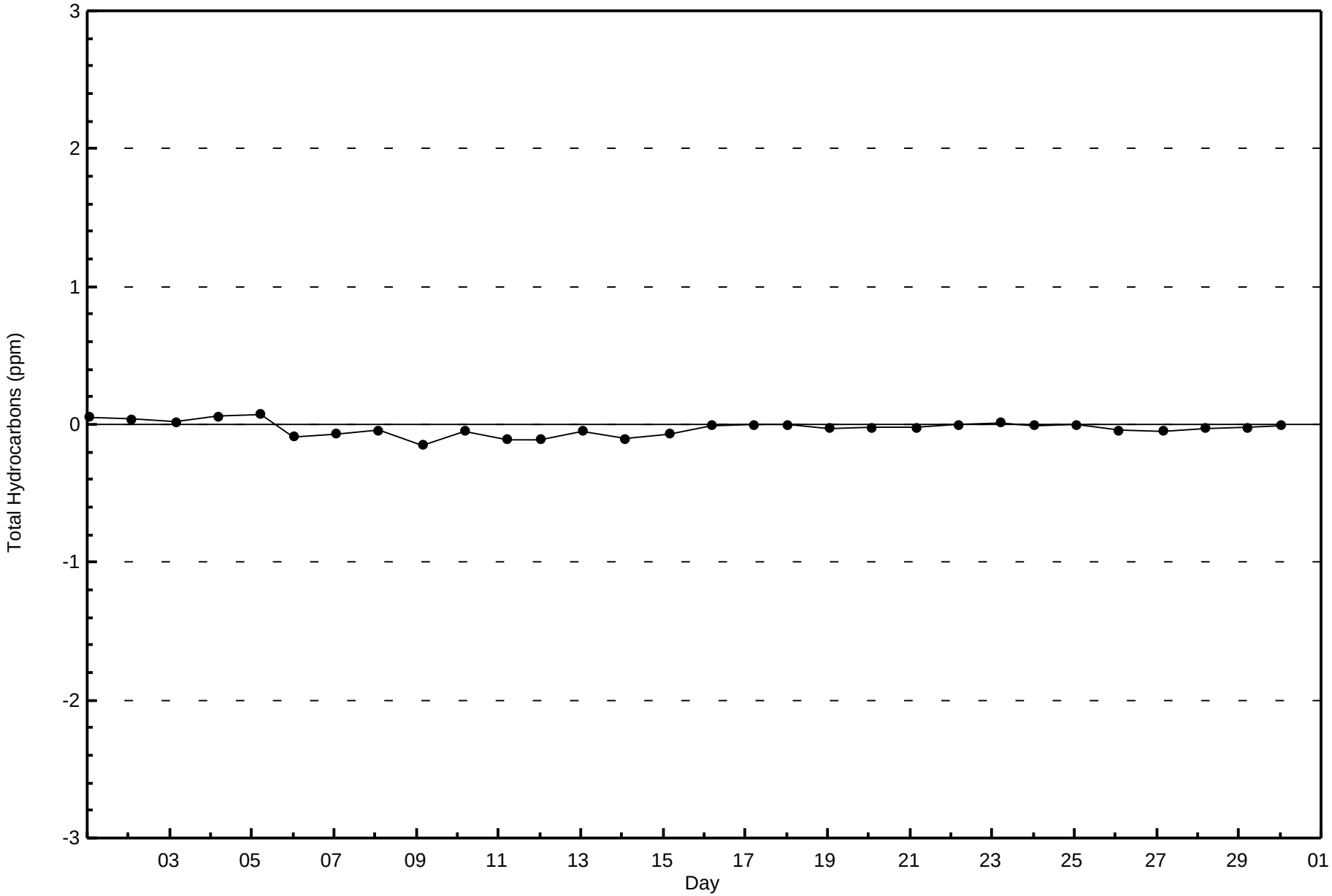
Total Number of Valid Hours: 671

Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Fort McKay South - April 2016

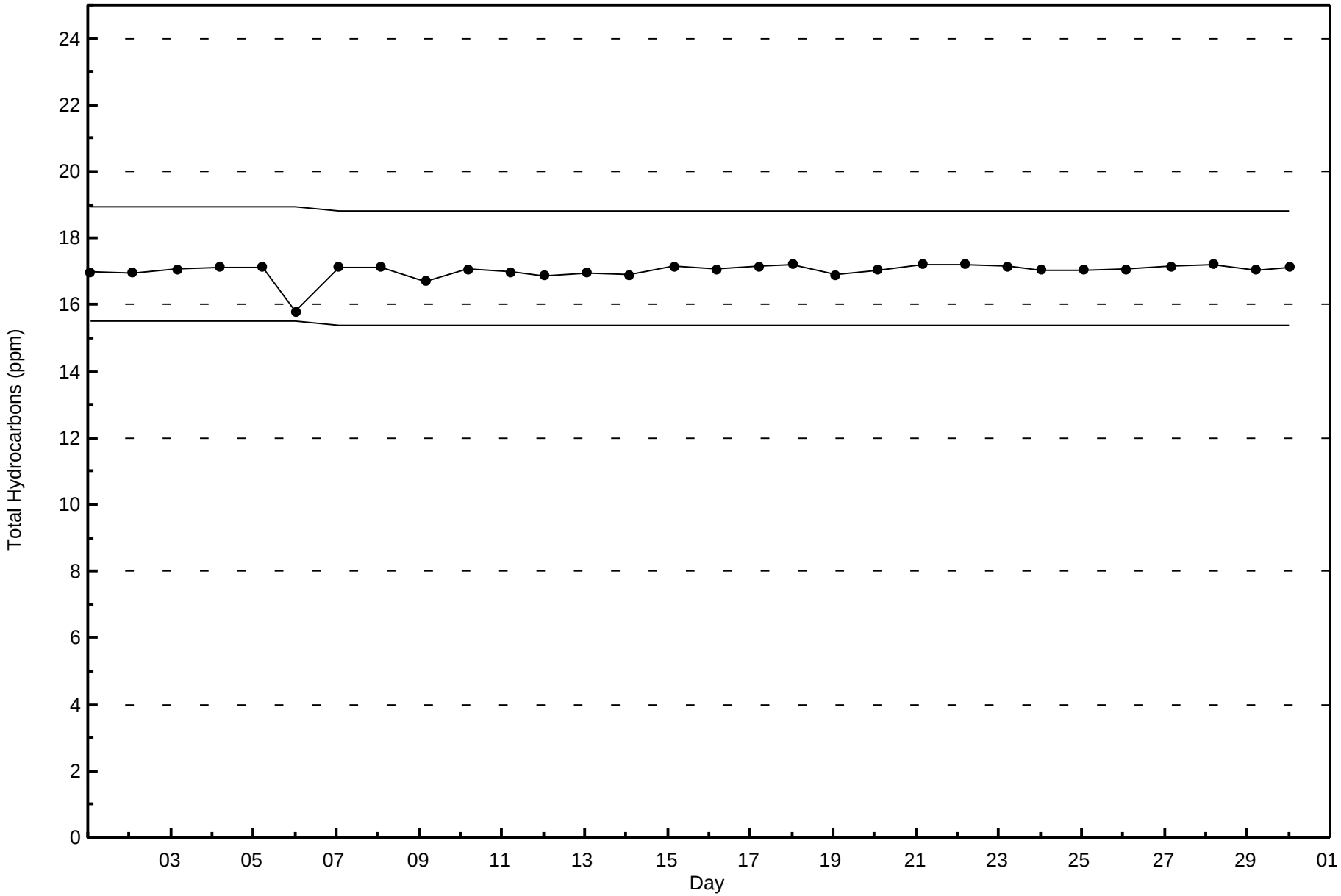


Wood Buffalo Environmental Association

Span Responses

Total Hydrocarbons (THC) - ppm

Fort McKay South - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O_3) - ppb

Fort McKay South - April 2016

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

Maximum Value: 62 ppb on Apr 19 12:00

Maximum Daily Average: 47.2 ppb on Apr 19

Minimum Value: 1 ppb on Apr 1 01:00

Minimum Daily Average: 14.2 ppb on Apr 27

Maximum Diurnal Average: 40.0 ppb at hour 16

Minimum Diurnal Average: 16.2 ppb at hour 5

Monthly Average: 28.5 ppb

Percentiles: $P_1 = 1$ $P_{10} = 8$ $Q_1 = 19$ Median = 30 $Q_3 = 39$ $P_{90} = 45$ $P_{99} = 58$

Hours in Service:	720
Hours of Data:	684
Hours of Missing Data:	36
Hours of Calibration:	32
Percent Operational Time:	99.4

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-Apr	1	8	34	24	Z	13	18	26	30	32	33	33	33	34	36	37	40	39	39	32	26	19	17	18	27.0	40
2-Apr	21	21	18	14	12	Z	14	25	35	37	37	38	38	40	41	40	40	40	39	40	39	40	39	39	32.5	41
3-Apr	39	40	40	41	41	41	Z	42	39	42	42	41	39	39	38	37	39	39	37	37	30	23	18	12	36.3	42
4-Apr	12	13	14	13	13	11	12	Z	20	24	28	28	28	34	36	36	28	22	12	10	15	18	27	31	21.0	36
5-Apr	32	33	31	30	23	21	25	M	M	15	20	26	28	35	36	38	39	33	29	26	25	22	20	18	27.5	39
6-Apr	14	6	3	Z	4	3	18	25	29	24	24	22	20	25	26	22	23	22	27	31	35	34	34	30	21.8	35
7-Apr	27	27	32	34	Z	33	33	31	29	29	27	22	20	23	28	32	31	34	37	28	18	13	29	22	27.8	37
8-Apr	10	10	8	7	7	Z	11	28	29	28	28	32	32	33	35	34	34	33	30	27	31	27	24	22	24.3	35
9-Apr	14	9	8	6	6	26	Z	35	37	38	40	40	43	42	43	42	42	42	43	44	43	40	38	39	33.1	44
10-Apr	42	43	43	43	42	41	41	Z	38	38	39	42	43	42	43	43	44	43	42	27	26	22	20	17	37.5	44
11-Apr	13	11	9	11	15	29	32	34	Z	29	30	32	33	33	35	36	36	39	23	12	6	9	12	11	23.1	39
12-Apr	11	11	8	Z	25	26	29	34	28	33	37	39	43	43	41	41	41	41	33	34	38	26	19	18	30.5	43
13-Apr	27	27	23	23	Z	8	4	11	18	24	PF	PF	26	27	23	29	25	25	20	24	22	22	9	4	20.1	29
14-Apr	5	11	27	37	37	Z	30	31	29	34	36	31	35	35	37	37	36	32	32	32	29	30	18	14	29.3	37
15-Apr	11	10	9	8	4	4	Z	23	20	22	C	C	C	34	38	37	35	34	31	33	27	18	13	17	21.4	38
16-Apr	17	17	15	8	3	4	19	Z	21	25	30	35	50	52	51	51	51	50	43	33	23	16	2	1	26.7	52
17-Apr	1	1	2	2	2	3	4	9	Z	32	33	41	47	49	45	45	43	43	30	21	19	16	13	9	22.2	49
18-Apr	4	2	1	Z	1	2	4	15	25	27	28	33	53	49	53	52	55	54	55	44	50	45	46	41	32.2	55
19-Apr	38	30	25	21	Z	30	48	48	49	53	58	62	60	59	58	58	61	58	55	50	46	44	43	31	47.2	62
20-Apr	27	30	34	33	33	Z	31	29	29	29	30	29	30	33	36	36	39	38	37	33	22	18	16	13	29.7	39
21-Apr	10	9	7	7	7	6	Z	24	23	28	30	37	40	42	43	44	45	45	45	43	37	30	29	33	28.8	45
22-Apr	27	21	27	28	23	21	23	Z	25	27	37	40	43	44	45	45	44	44	44	39	33	28	20	19	32.6	45
23-Apr	15	15	17	19	14	13	19	24	Z	29	35	39	43	46	45	43	42	40	35	30	32	37	35	32	30.4	46
24-Apr	33	32	32	Z	23	22	21	22	25	26	33	37	38	39	45	47	46	45	44	43	41	39	43	34	35.2	47
25-Apr	40	36	34	31	Z	21	30	31	33	32	31	31	32	33	33	32	33	32	30	26	5	5	2	2	26.7	40
26-Apr	9	15	10	14	14	Z	19	21	24	25	25	20	25	24	22	22	21	20	15	9	5	3	1	1	15.8	25
27-Apr	2	1	2	2	2	2	Z	4	6	13	16	17	23	29	32	32	33	33	33	23	9	8	4	2	14.2	33
28-Apr	2	2	2	1	1	1	4	Z	21	23	33	49	52	53	53	53	52	53	51	37	25	19	18	20	27.3	53
29-Apr	21	18	22	27	29	24	21	26	Z	44	50	53	53	52	53	52	51	51	46	28	26	35	31	13	36.0	53
30-Apr	15	26	22	Z	25	24	25	32	35	42	47	51	51	48	47	48	46	44	41	33	37	24	18	14	34.5	51
	18.0	17.7	18.6	19.3	16.2	17.2	21.4	26.3	27.9	30.1	33.4	35.8	38.0	39.0	40.0	40.0	39.8	38.9	35.9	31.0	27.3	24.4	21.9	19.2	Diurnal Average	
	42	43	43	43	42	41	48	48	49	53	58	62	60	59	58	58	61	58	55	50	50	45	46	41	Diurnal Maximum	

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

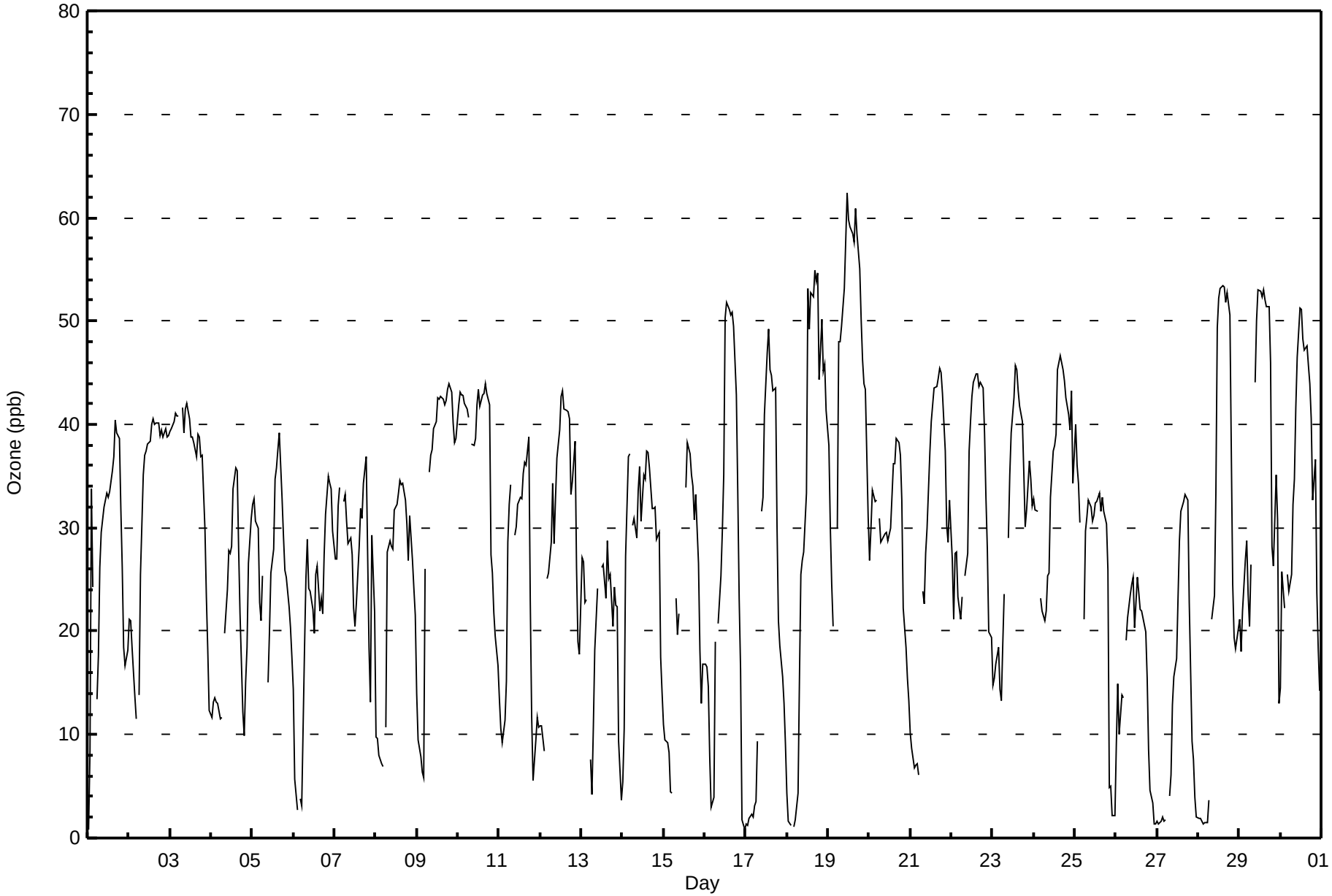
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb

Wood Buffalo Environmental Association

Hourly Averages

Ozone (O_3) - ppb

Fort McKay South - April 2016



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	183	26.75	26.75
21 - 50	465	67.98	94.74
51 - 82	36	5.26	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Ozone (O_3) - ppb

Fort McKay South - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	22	9	1	1	0	3	4	15	17	16	28	18	9	4	13	21	181
21 - 50	93	105	23	8	4	13	39	58	49	17	6	11	5	6	5	16	458
51 - 82	0	0	0	0	0	0	1	4	10	6	3	5	7	0	0	0	36
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	115	114	24	9	4	16	44	77	76	39	37	34	21	10	18	37	675

Total Number of Valid Hours: 675

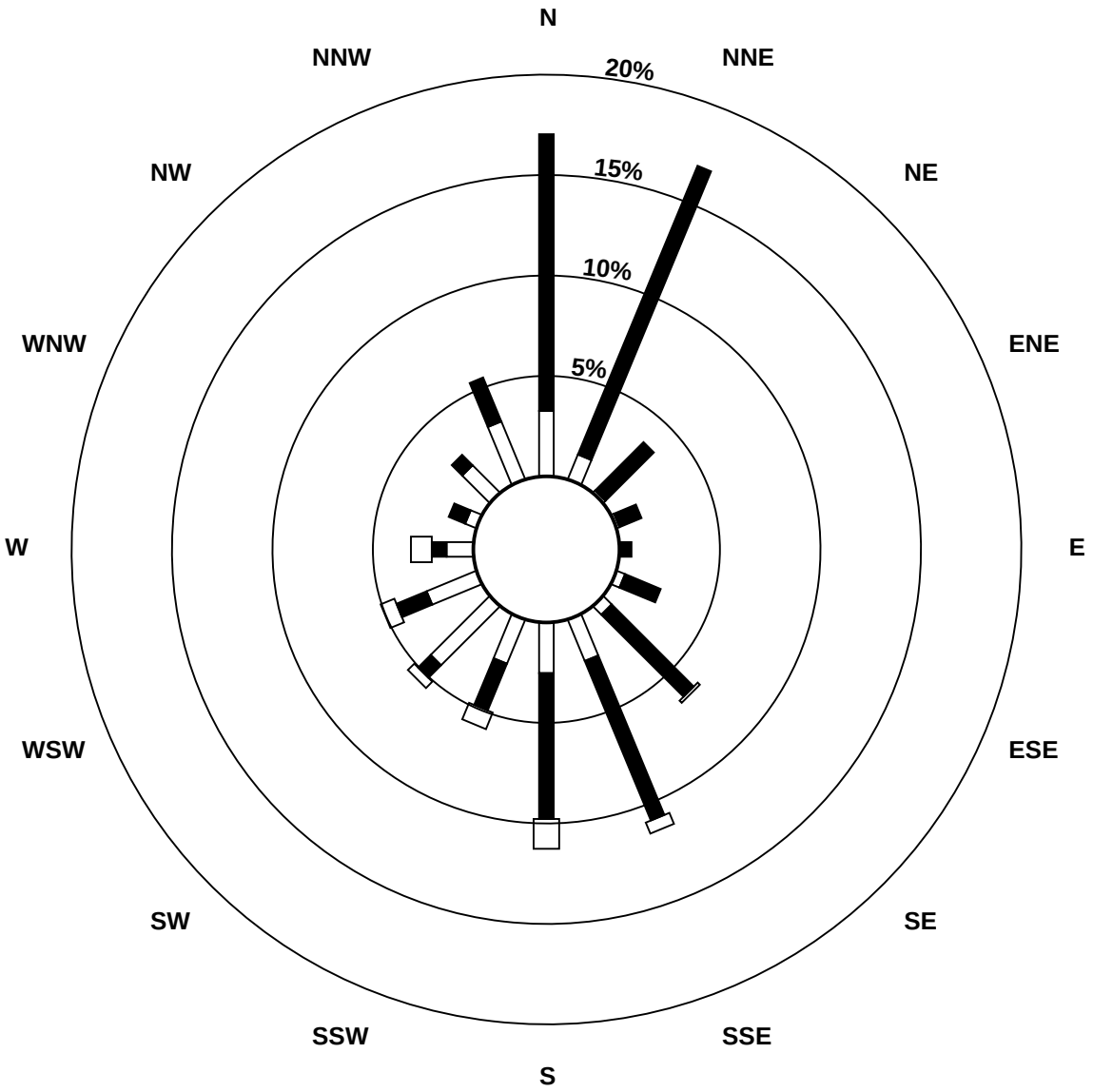
Total Number of Hours: 720

Wood Buffalo Environmental Association

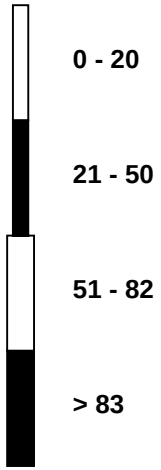
Wind Rose Apr 2016

Ozone (O_3) - ppb

Fort McKay South (AMS 13)



Classes (ppb)



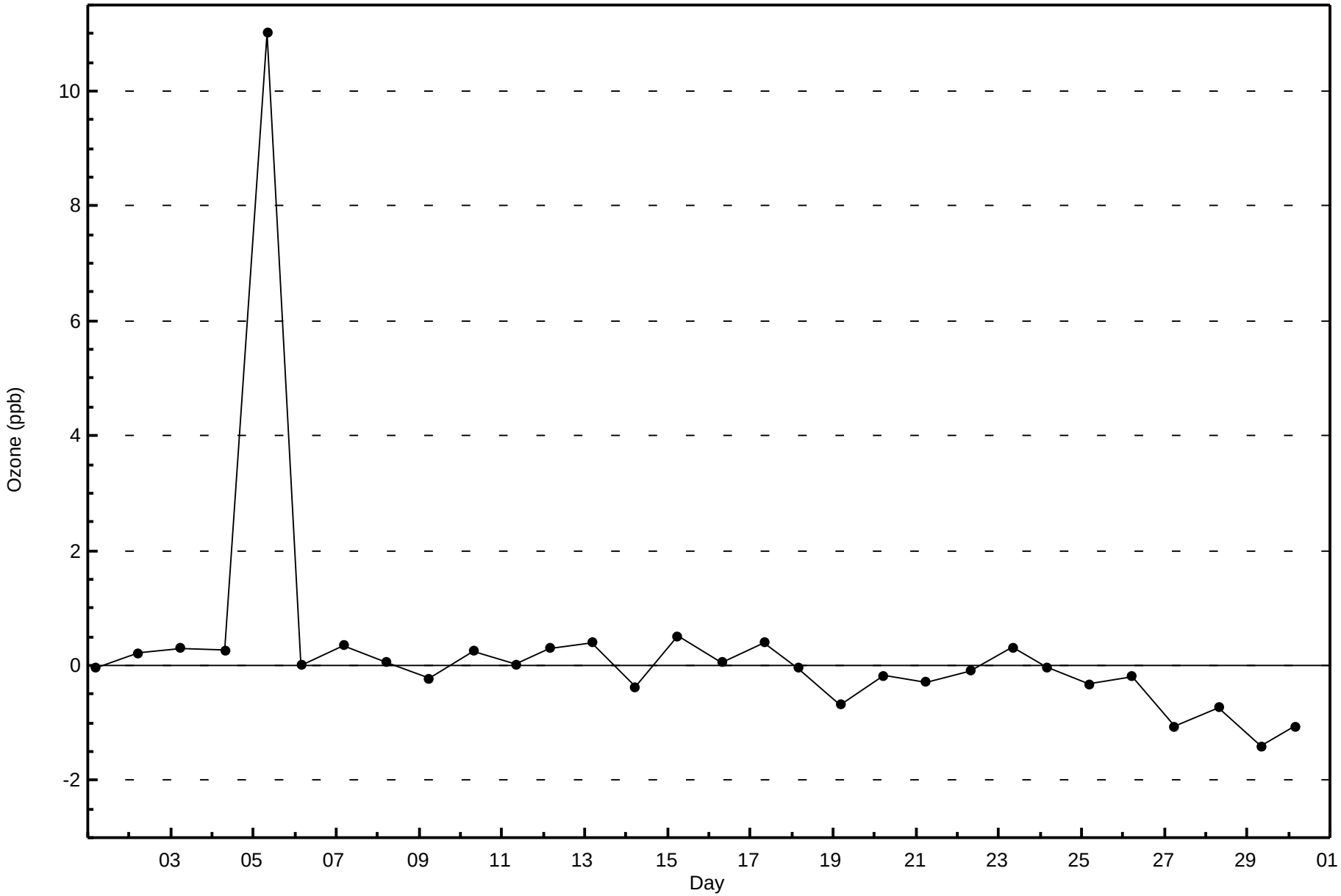
Total Number of Valid Hours: 675

Wood Buffalo Environmental Association

Zero Responses

Ozone (O_3) - ppb

Fort McKay South - April 2016

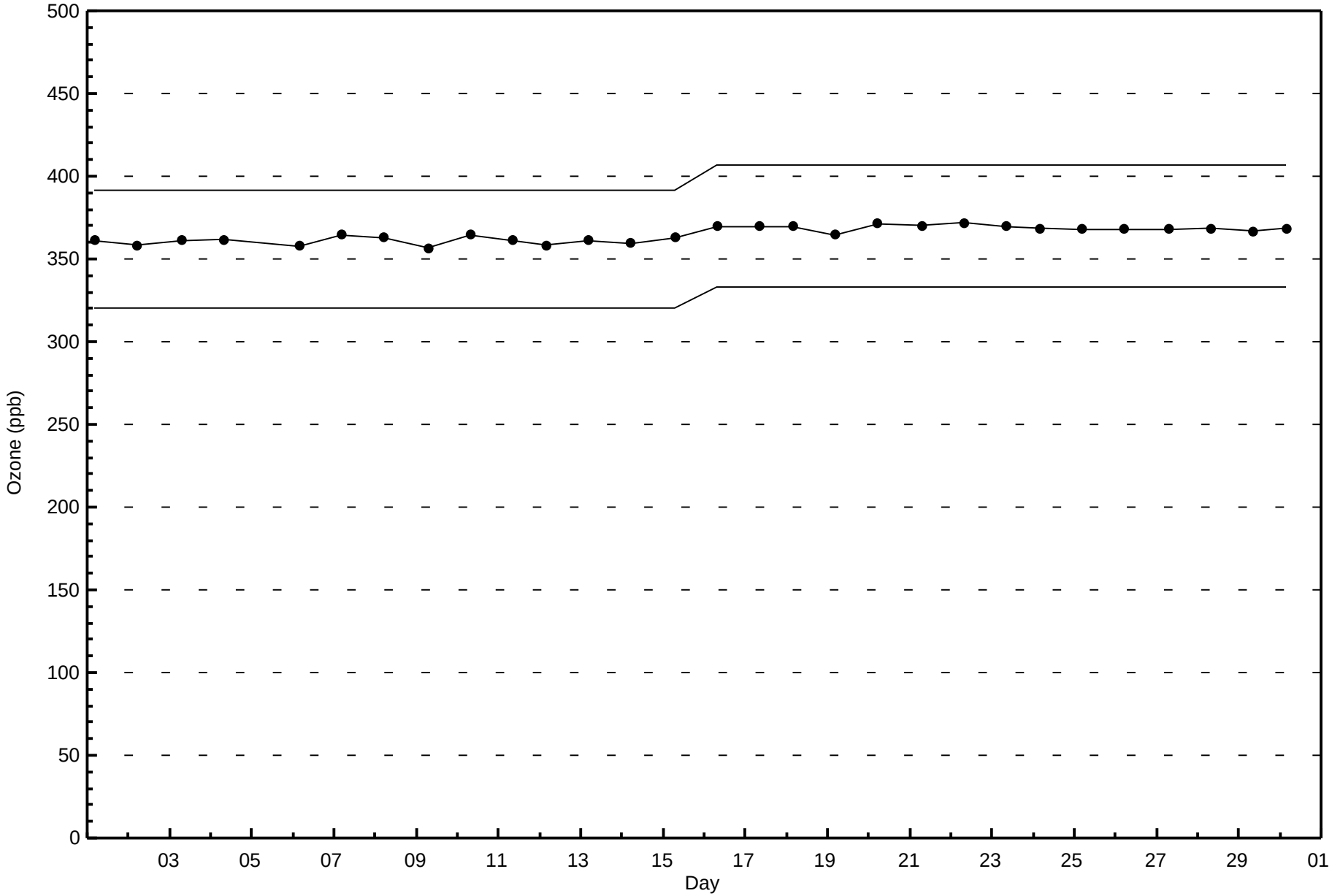


Wood Buffalo Environmental Association

Span Responses

Ozone (O_3) - ppb

Fort McKay South - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

Fort McKay South - April 2016

Maximum Value: 25 ppb on Apr 1 01:00

Maximum Daily Average: 4.5 ppb on Apr 18

Minimum Value: 0 ppb on Apr 1 03:00

Minimum Daily Average: 0.0 ppb on Apr 19

Maximum Diurnal Average: 3.4 ppb at hour 9

Minimum Diurnal Average: 0.1 ppb at hour 20

Monthly Average: 1.2 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 1$ $P_{90} = 3$ $P_{99} = 11$

Hours in Service:	720
Hours of Data:	677
Hours of Missing Data:	43
Hours of Calibration:	38
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-Apr	25	Z	0	0	0	0	1	1	1	1	2	2	2	2	1	1	0	0	0	0	0	0	0	0	1.6	25
2-Apr	0	0	Z	0	0	0	2	3	2	2	2	3	2	1	0	0	0	0	0	0	0	0	0	0	0.7	3
3-Apr	0	0	0	Z	0	0	0	0	1	1	1	1	3	3	3	3	1	1	0	0	0	0	0	0	0.7	3
4-Apr	0	0	0	0	Z	0	1	3	7	7	7	8	7	3	2	1	3	3	3	0	0	0	0	0	2.4	8
5-Apr	0	0	0	0	0	Z	1	C	C	C	C	C	C	C	C	0	0	0	0	0	0	0	0	0	--	1
6-Apr	Z	0	0	0	4	12	0	0	0	2	2	3	4	2	2	4	PF	1	0	0	0	0	0	0	1.7	12
7-Apr	0	Z	0	0	0	0	0	0	1	1	3	6	7	7	5	3	2	1	0	0	0	0	0	0	1.5	7
8-Apr	0	0	Z	0	0	0	1	1	2	3	3	1	1	1	0	0	0	0	0	0	0	0	0	0	0.6	3
9-Apr	0	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
10-Apr	0	0	0	0	Z	0	0	1	2	2	3	2	1	2	2	1	1	1	0	0	0	0	0	0	0.8	3
11-Apr	0	0	0	0	0	Z	0	0	1	3	4	4	4	4	3	2	2	1	3	1	0	0	0	0	1.5	4
12-Apr	Z	0	0	0	0	0	1	1	3	4	4	3	1	1	2	1	1	0	0	0	0	0	0	0	1.0	4
13-Apr	0	Z	0	0	0	2	10	11	8	6	PF	3	2	2	2	1	1	1	0	0	0	0	0	0	2.2	11
14-Apr	0	0	Z	0	0	0	0	0	1	1	0	3	1	2	0	0	0	0	0	0	0	0	0	0	0.4	3
15-Apr	0	0	0	Z	0	0	1	M	M	M	2	6	4	3	1	1	2	1	0	0	0	0	0	0	1.1	6
16-Apr	0	0	0	0	Z	2	0	1	3	3	3	2	0	0	0	0	0	0	0	0	0	0	5	6	1.1	6
17-Apr	3	1	1	0	0	Z	3	3	5	4	5	2	1	0	0	0	0	0	0	0	0	0	0	0	1.3	5
18-Apr	Z	7	19	20	9	4	7	6	4	7	9	9	1	0	0	0	0	0	0	0	0	0	0	0	4.5	20
19-Apr	0	Z	0	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-Apr	0	0	Z	0	0	0	0	0	0	1	1	1	2	1	1	1	1	0	0	0	0	0	0	0	0.4	2
21-Apr	0	0	0	Z	0	0	2	3	8	5	5	2	1	1	1	1	0	0	0	0	0	0	0	0	1.2	8
22-Apr	0	0	0	0	Z	0	3	10	7	7	2	1	1	1	1	1	0	0	0	0	0	0	0	0	1.6	10
23-Apr	0	0	0	0	0	Z	4	6	4	7	3	2	1	0	0	0	0	0	0	0	0	0	0	0	1.3	7
24-Apr	Z	0	0	0	0	0	2	3	3	4	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0.7	4
25-Apr	0	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	1	7	10	1.1	10
26-Apr	1	0	Z	0	0	0	1	1	1	1	1	2	1	0	0	0	0	1	1	0	0	0	0	0	0.5	2
27-Apr	1	1	0	Z	0	0	9	14	18	7	5	5	3	2	1	1	1	1	0	0	0	0	0	0	3.0	18
28-Apr	0	0	0	0	Z	0	3	9	5	5	4	1	0	0	0	0	0	0	0	0	0	0	0	0	1.3	9
29-Apr	0	0	0	0	0	Z	2	3	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	3
30-Apr	Z	0	0	0	0	0	0	1	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	3
	1.2	0.4	0.9	0.8	0.6	0.9	1.8	3.0	3.4	3.0	2.6	2.5	1.8	1.3	0.9	0.8	0.6	0.4	0.3	0.1	0.1	0.1	0.4	0.6	Diurnal Average	
	25	7	19	20	9	12	10	14	18	7	9	9	7	7	5	4	3	3	3	1	2	1	7	10	Diurnal Maximum	

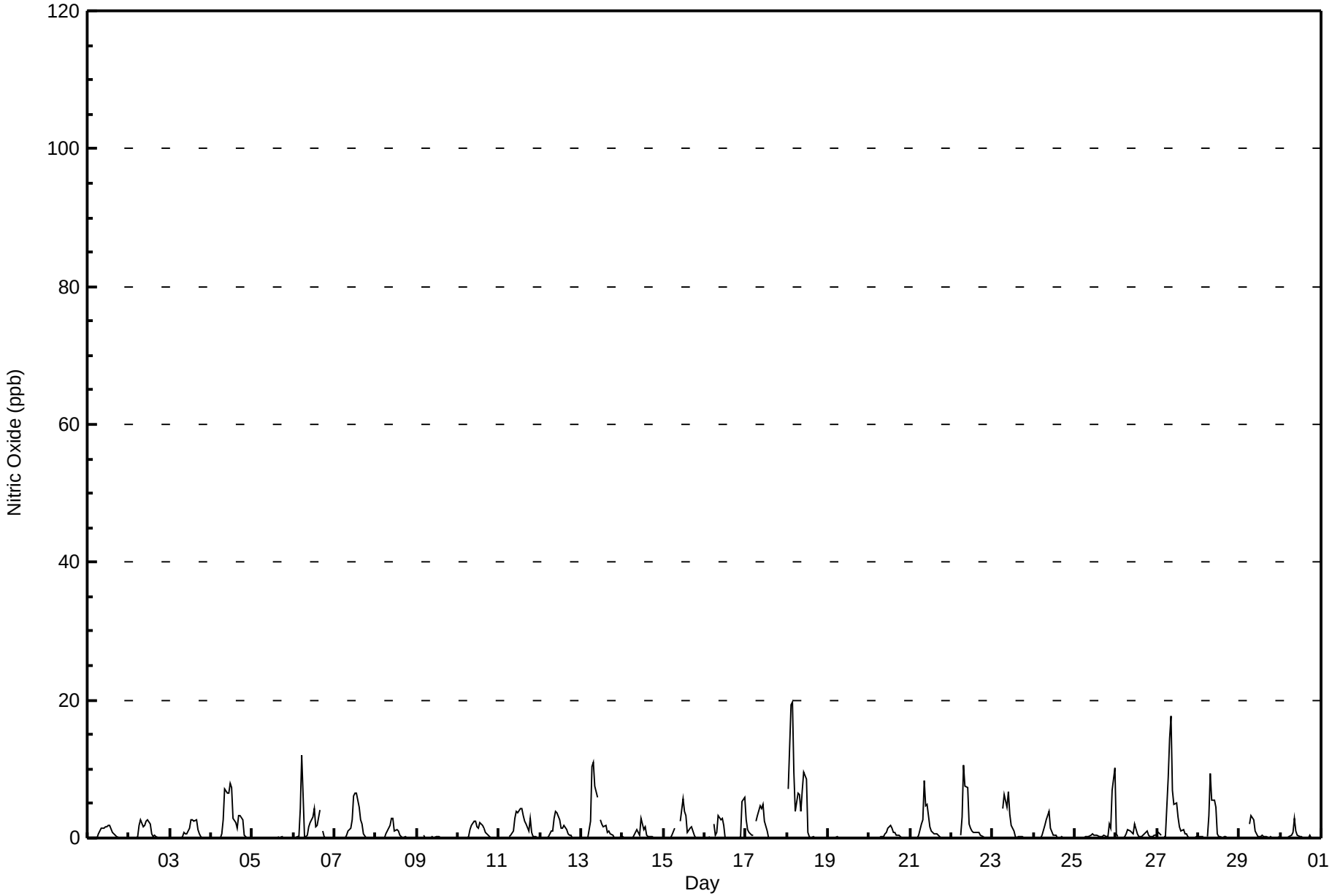
Z - zerospan C - Calibration M - Maintenance PF - Power Failure

Wood Buffalo Environmental Association

Hourly Averages

Nitric Oxide (NO) - ppb

Fort McKay South - April 2016



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	676	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: 677

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitric Oxide (NO) - ppb

Fort McKay South - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	114	113	24	7	5	15	47	76	77	37	35	30	20	11	18	38	667
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	114	113	24	7	5	15	47	76	77	38	35	30	20	11	18	38	668

Total Number of Valid Hours: 668

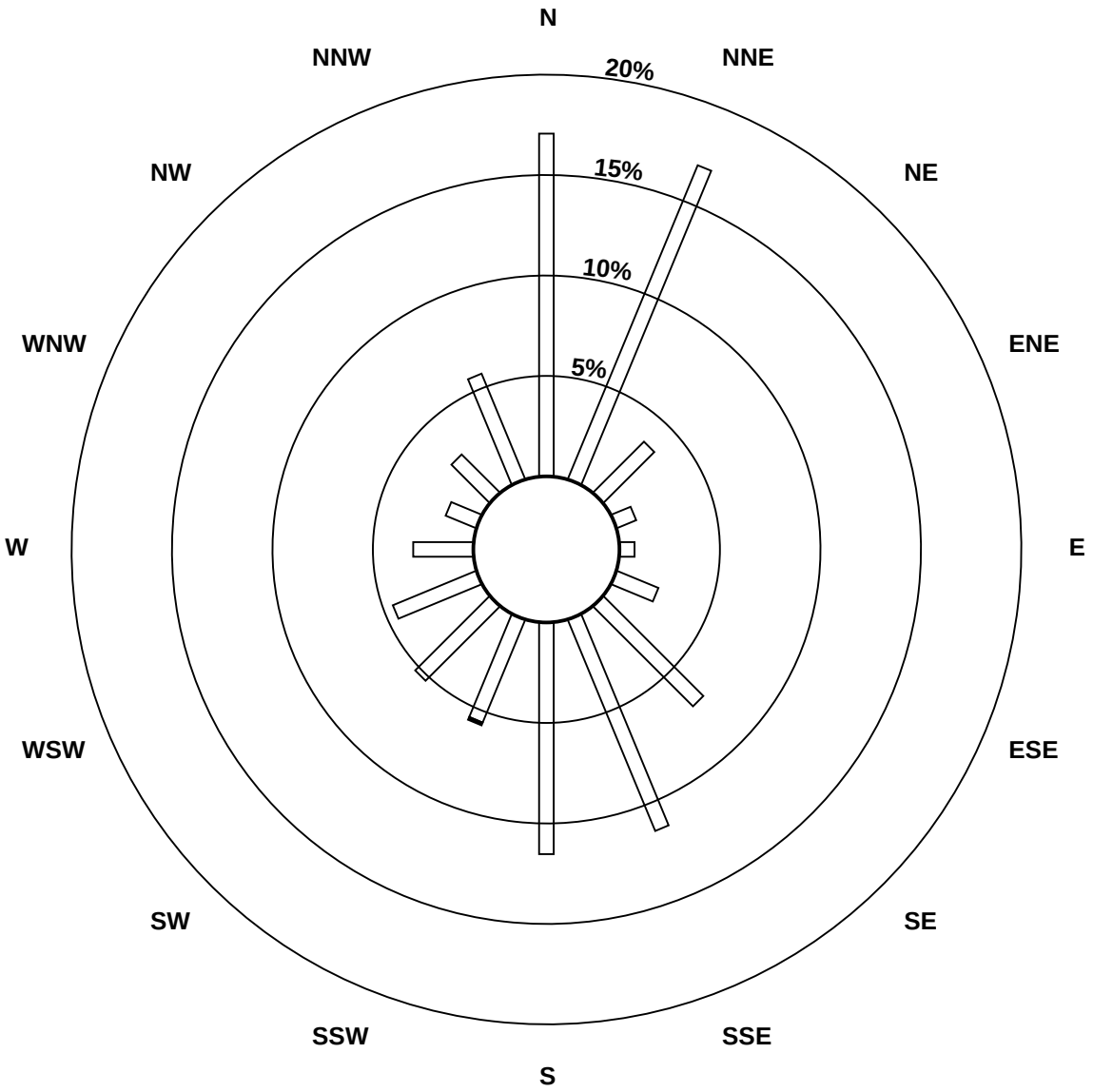
Total Number of Hours: 720

Wood Buffalo Environmental Association

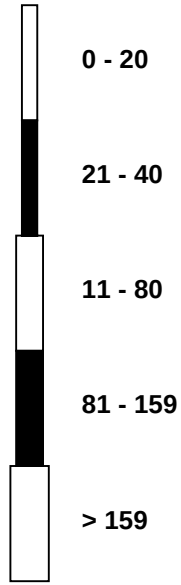
Wind Rose Apr 2016

Nitric Oxide (NO) - ppb

Fort McKay South (AMS 13)



Classes (ppb)



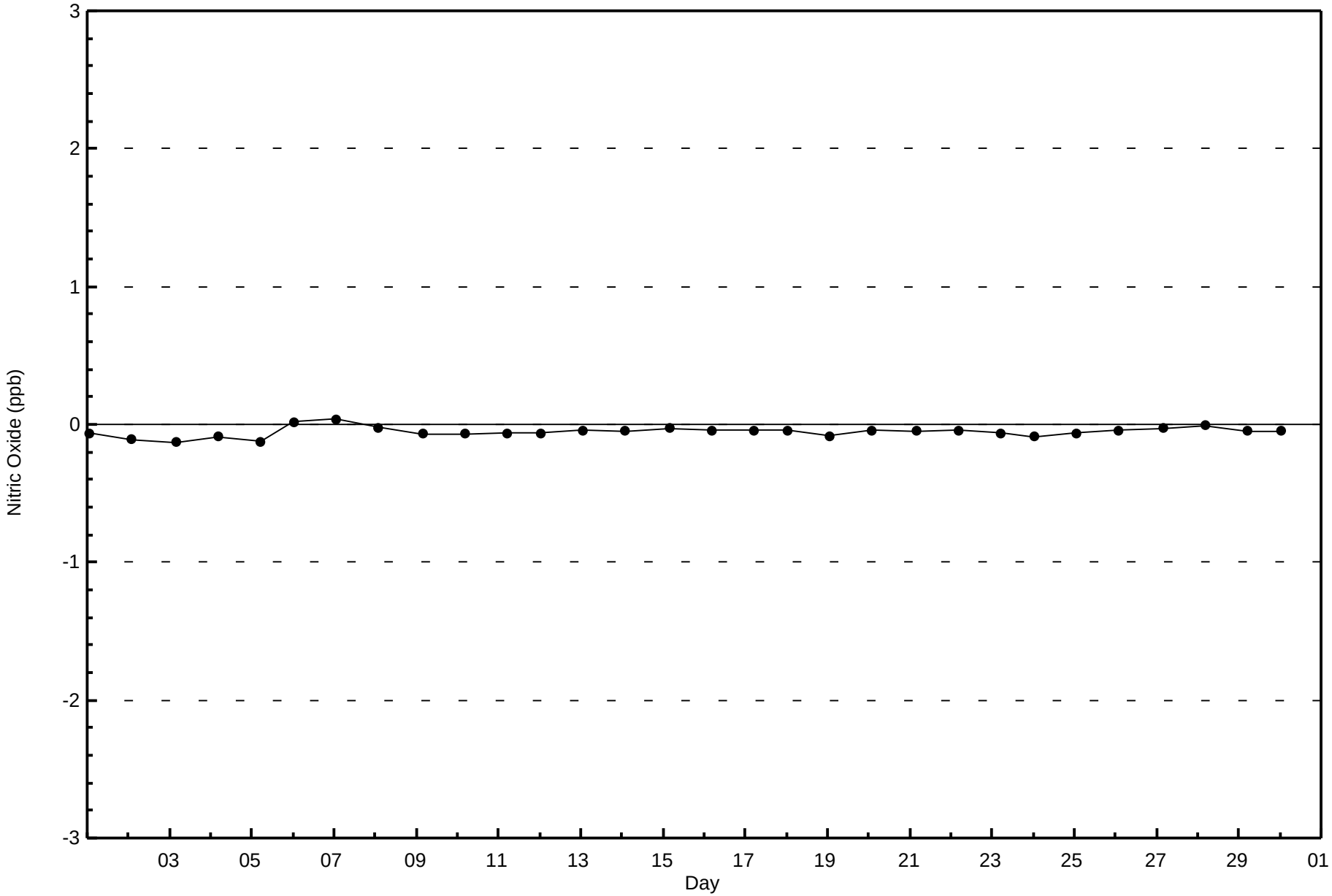
Total Number of Valid Hours: 668

Wood Buffalo Environmental Association

Zero Responses

Nitric Oxide (NO) - ppb

Fort McKay South - April 2016

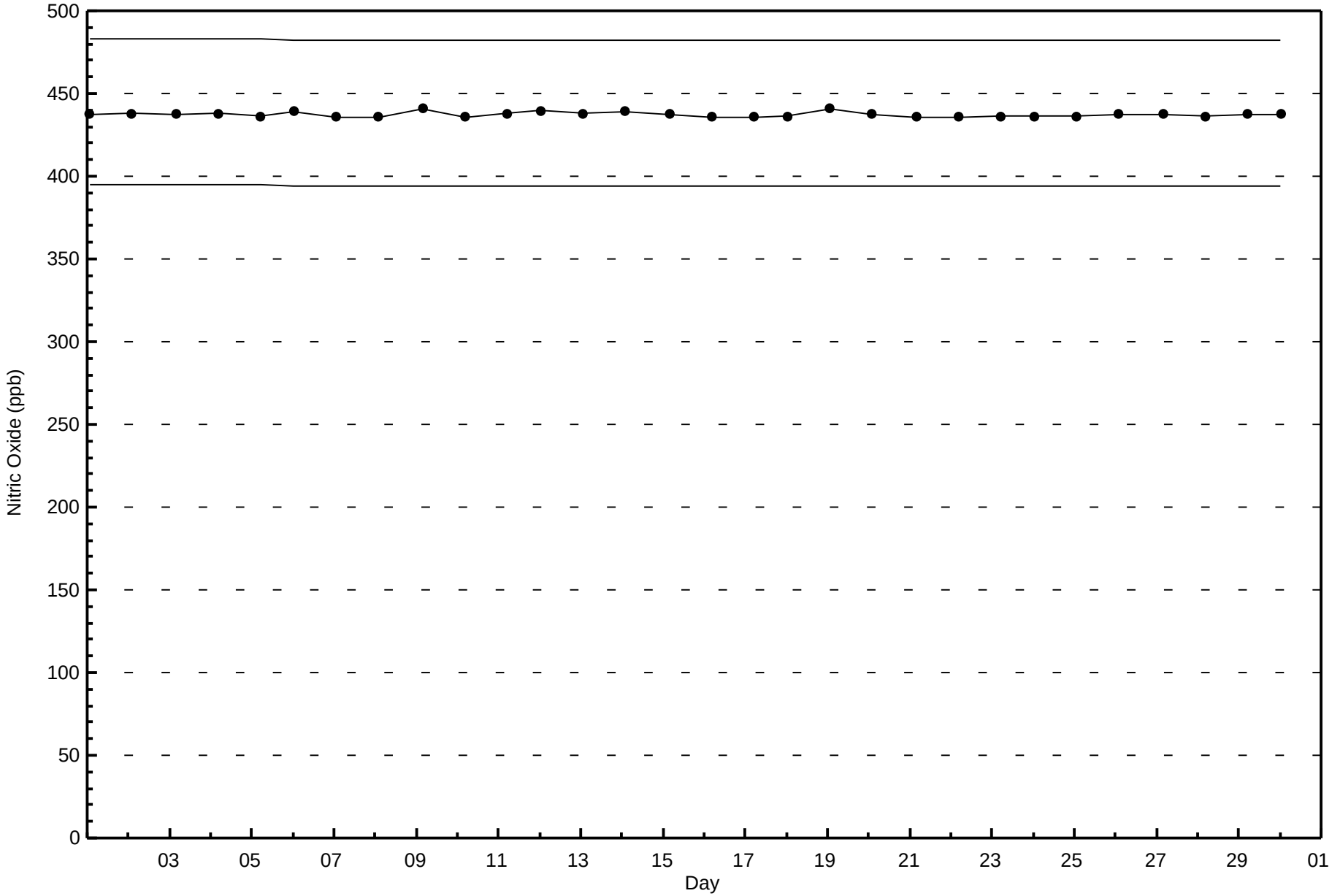


Wood Buffalo Environmental Association

Span Responses

Nitric Oxide (NO) - ppb

Fort McKay South - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO_2) - ppb

Fort McKay South - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 30 ppb on Apr 13 07:00 Maximum Daily Average: 11.8 ppb on Apr 4

Minimum Value: 0 ppb on Apr 14 23:00 Minimum Daily Average: 1.7 ppb on Apr 19
Maximum Diurnal Average: 8.3 ppb at hour 24 Minimum Diurnal Average: 3.2 ppb at hour 15
Monthly Average: 5.8 ppb Percentiles: $P_1 = 0$ $P_{10} = 1$ $Q_1 = 2$ Median = 4 $Q_3 = 8$ $P_{90} = 13$ $P_{99} = 25$

Hours in Service:	720
Hours of Data:	677
Hours of Missing Data:	43
Hours of Calibration:	38
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-Apr	27	Z	2	2	4	7	14	11	7	5	5	5	5	5	3	4	2	2	3	4	6	12	10	12	6.8	27
2-Apr	9	10	Z	12	12	17	16	10	5	4	6	6	6	2	1	2	1	2	3	3	3	2	2	2	5.8	17
3-Apr	1	1	1	Z	1	2	1	1	4	2	1	3	5	5	5	6	4	4	5	3	3	4	5	8	3.2	8
4-Apr	9	7	5	4	Z	4	4	7	12	11	12	15	14	8	7	6	14	19	25	27	23	19	12	8	11.8	27
5-Apr	6	5	7	8	14	Z	13	C	C	C	C	C	C	C	C	2	1	6	6	5	3	2	3	3	--	14
6-Apr	Z	2	2	2	8	16	4	2	4	8	8	8	11	6	6	11	PF	10	8	4	2	4	4	6	6.1	16
7-Apr	9	Z	3	2	3	2	2	5	7	6	7	11	12	12	9	7	7	5	3	9	15	12	5	5	6.9	15
8-Apr	7	6	Z	3	3	2	3	5	7	8	8	4	3	3	2	2	1	3	4	7	3	7	8	10	4.6	10
9-Apr	11	8	9	Z	13	6	3	2	2	2	2	2	1	1	1	1	1	1	1	0	1	3	3	2	3.2	13
10-Apr	1	1	1	1	Z	1	2	5	5	5	5	4	3	5	5	4	3	4	3	3	3	3	4	5	3.2	5
11-Apr	5	5	5	6	6	Z	5	5	6	11	12	10	10	11	9	9	11	9	20	23	22	21	14	9	10.6	23
12-Apr	Z	4	3	3	4	8	9	9	14	11	8	7	4	4	5	5	4	4	10	7	3	13	17	18	7.6	18
13-Apr	9	Z	11	12	7	24	30	23	16	12	PF	13	13	11	13	7	10	10	12	6	7	5	3	2	11.5	30
14-Apr	2	3	Z	1	1	2	2	3	7	3	2	8	4	5	2	2	2	4	2	2	1	0	0	0	2.5	8
15-Apr	1	2	1	Z	2	3	4	M	M	M	5	11	8	7	3	5	6	5	6	1	1	7	15	15	5.4	15
16-Apr	15	10	11	13	Z	15	6	6	11	8	7	5	1	1	0	0	0	0	0	0	0	3	20	23	6.7	23
17-Apr	21	21	16	14	13	Z	11	13	12	10	11	7	4	1	0	0	0	0	1	1	1	2	3	4	7.2	21
18-Apr	Z	12	15	15	11	8	8	12	10	15	20	19	4	1	1	2	1	1	2	10	4	8	5	5	8.2	20
19-Apr	4	Z	5	6	8	4	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	1.7	8
20-Apr	8	5	Z	1	2	1	2	3	2	2	2	2	3	3	2	2	2	2	2	2	2	2	3	6	2.6	8
21-Apr	7	8	7	Z	5	4	5	6	13	8	8	4	3	2	2	2	2	1	1	1	5	12	12	8	5.5	13
22-Apr	12	15	8	6	Z	9	12	19	13	13	5	4	3	3	3	3	4	4	3	6	12	14	14	12	8.6	19
23-Apr	10	10	8	7	6	Z	15	14	10	13	8	5	4	1	1	1	1	2	1	1	1	1	3	8	5.6	15
24-Apr	Z	7	7	4	13	13	17	17	14	13	6	3	4	4	1	2	3	2	1	2	3	4	2	8	6.4	17
25-Apr	2	Z	1	1	2	3	4	4	2	2	3	3	2	3	2	3	2	3	3	6	26	25	27	26	6.7	27
26-Apr	18	13	Z	6	5	5	5	5	4	3	3	6	3	2	2	2	3	5	7	6	4	3	1	1	4.9	18
27-Apr	2	1	1	Z	0	0	3	5	7	7	8	9	5	3	3	4	3	3	3	3	3	3	4	5	3.8	9
28-Apr	4	1	1	0	Z	0	2	9	10	10	10	4	2	2	2	2	3	2	4	7	10	6	3	3	4.2	10
29-Apr	4	3	2	2	2	Z	12	16	10	5	3	1	2	2	2	2	2	2	5	4	4	2	14	25	5.5	25
30-Apr	Z	5	3	4	6	6	5	5	10	4	2	1	2	1	1	1	0	3	3	3	3	5	4	3	3.5	10
	8.1	6.6	5.3	5.3	6.0	6.4	7.3	7.9	8.0	7.2	6.3	6.1	4.8	3.9	3.2	3.3	3.2	3.9	4.8	5.2	5.7	6.8	7.4	8.3	Diurnal Average	
	27	21	16	15	14	24	30	23	16	15	20	19	14	12	13	11	14	19	25	27	26	25	27	26	Diurnal Maximum	

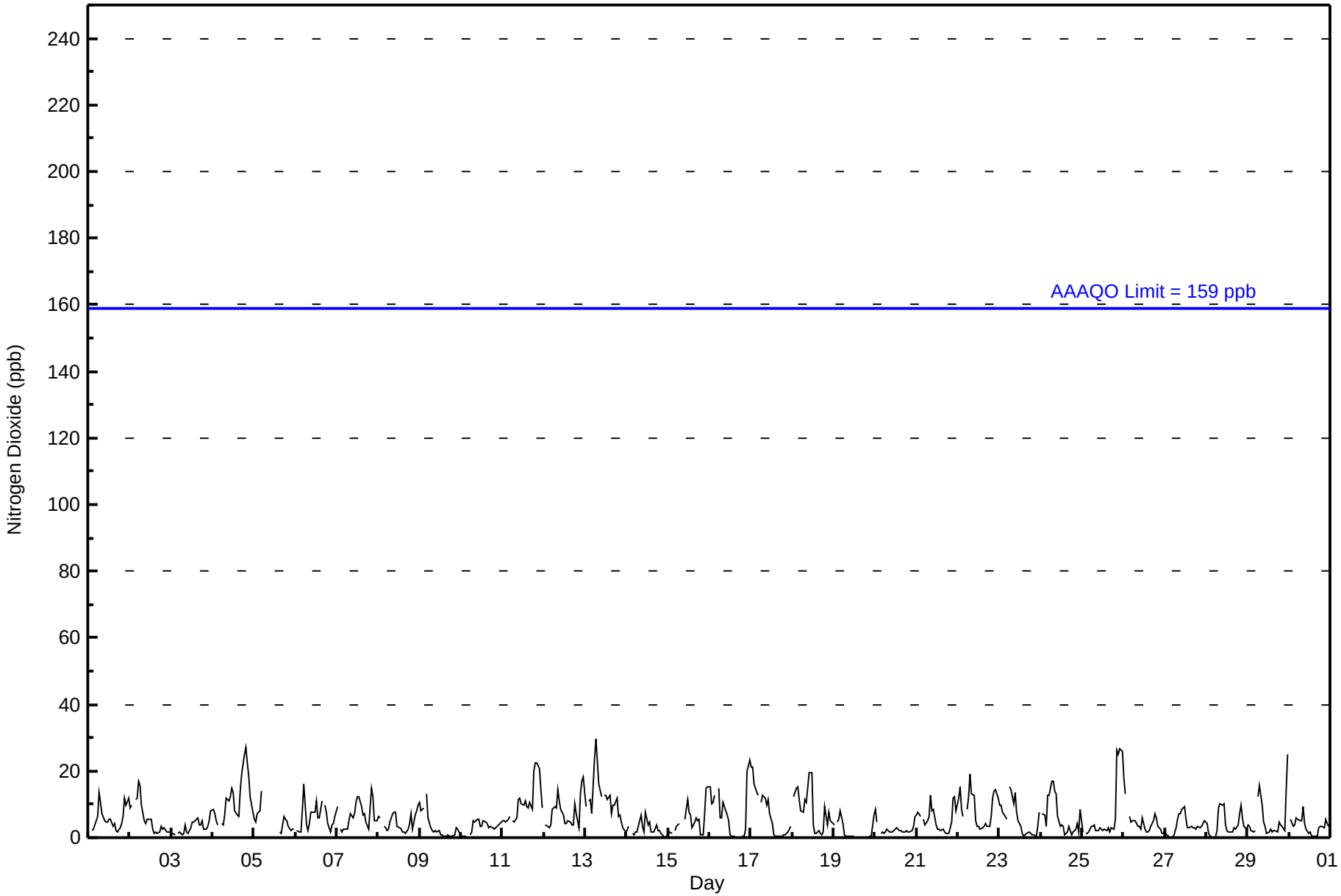
Z - zerospan C - Calibration M - Maintenance PF - Power Failure
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Dioxide (NO_2) - ppb

Fort McKay South - April 2016



Nitrogen Dioxide (NO_2) - ppb
Fort McKay South - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	659	97.34	97.34
21 - 40	18	2.66	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: 677

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Dioxide (NO_2) - ppb

Fort McKay South - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	109	113	24	7	5	15	47	75	76	34	33	29	20	11	17	35	650
21 - 40	5	0	0	0	0	0	0	1	1	4	2	1	0	0	1	3	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	114	113	24	7	5	15	47	76	77	38	35	30	20	11	18	38	668

Total Number of Valid Hours: 668

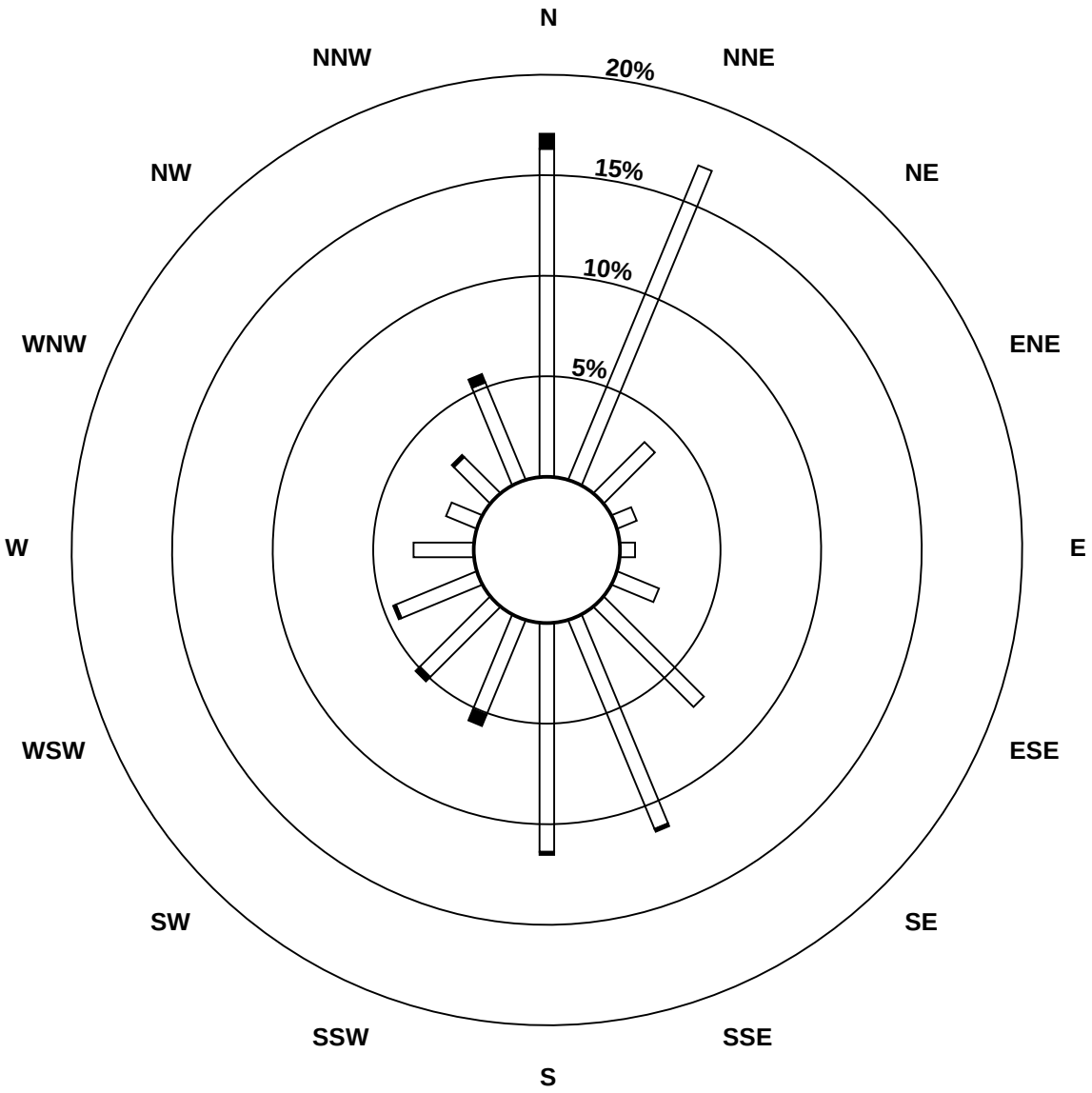
Total Number of Hours: 720

Wood Buffalo Environmental Association

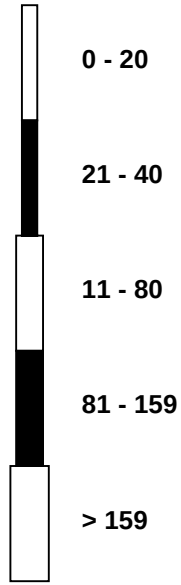
Wind Rose Apr 2016

Nitrogen Dioxide (NO_2) - ppb

Fort McKay South (AMS 13)



Classes (ppb)



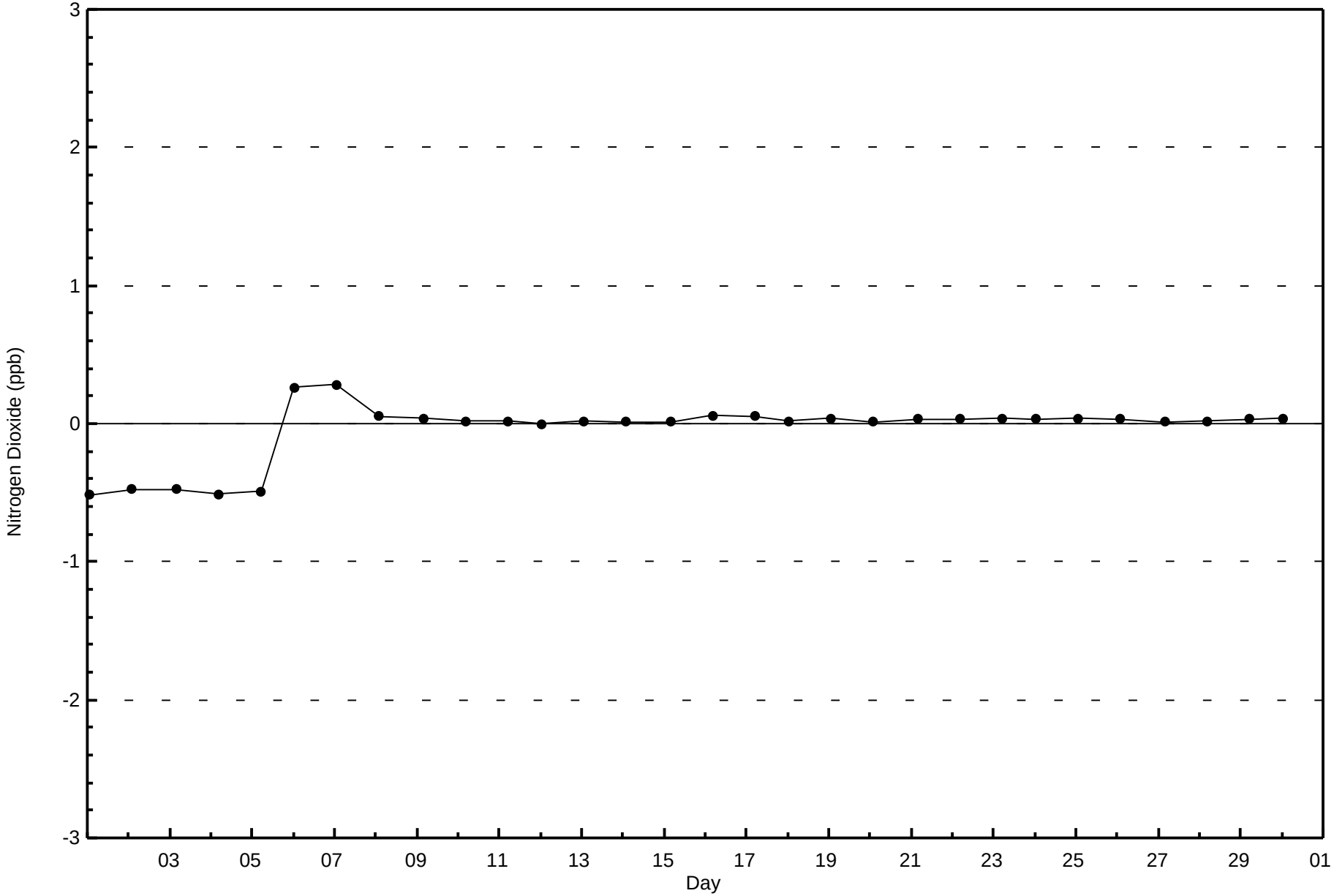
Total Number of Valid Hours: 668

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Dioxide (NO_2) - ppb

Fort McKay South - April 2016

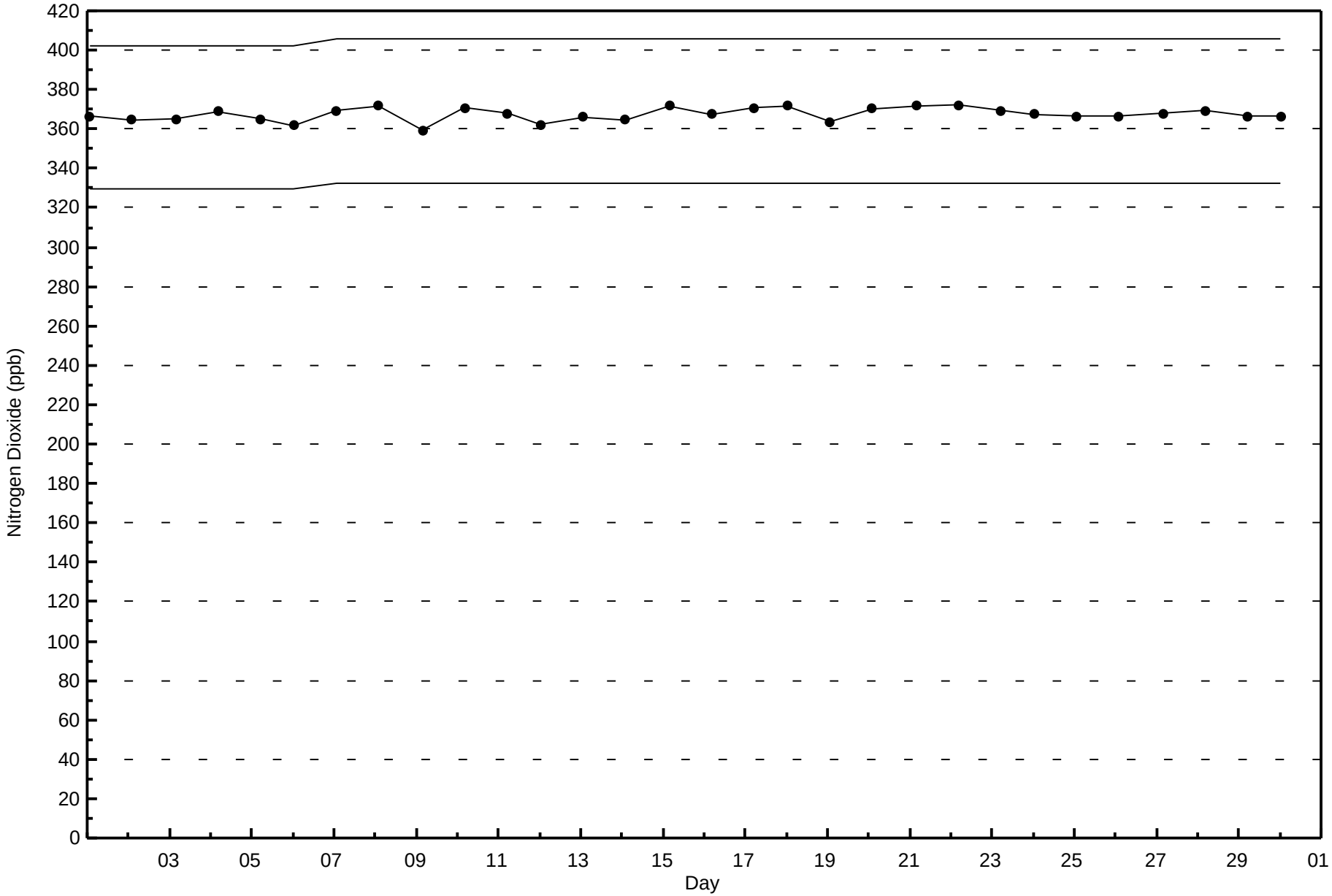


Wood Buffalo Environmental Association

Span Responses

Nitrogen Dioxide (NO_2) - ppb

Fort McKay South - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_X) - ppb

Fort McKay South - April 2016

Maximum Value: 52 ppb on Apr 1 01:00

Maximum Daily Average: 14.1 ppb on Apr 4

Minimum Value: 0 ppb on Apr 14 23:00

Minimum Daily Average: 1.7 ppb on Apr 19

Maximum Diurnal Average: 11.4 ppb at hour 9

Minimum Diurnal Average: 3.9 ppb at hour 17

Monthly Average: 7.0 ppb

Percentiles: $P_1 = 0$ $P_{10} = 1$ $Q_1 = 2$ Median = 5 $Q_3 = 9$ $P_{90} = 16$ $P_{99} = 34$

Hours in Service:	720
Hours of Data:	677
Hours of Missing Data:	43
Hours of Calibration:	38
Percent Operational Time:	99.3

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Apr	52	Z	2	2	4	7	14	12	9	6	6	6	7	7	4	5	2	2	3	4	6	12	10	12	8.5	52
2-Apr	9	10	Z	12	12	17	17	12	7	6	8	8	8	3	2	2	2	2	3	2	3	2	2	1	6.5	17
3-Apr	1	1	1	Z	1	2	1	1	5	3	2	4	8	7	8	9	5	5	5	3	3	3	5	8	3.9	9
4-Apr	9	7	5	4	Z	4	4	9	19	18	19	23	21	11	9	8	17	22	27	28	23	19	12	8	14.1	28
5-Apr	6	5	7	8	14	Z	14	C	C	C	C	C	C	C	C	2	1	7	6	5	3	2	3	3	--	14
6-Apr	Z	2	2	2	12	28	4	2	5	9	10	11	16	8	8	15	PF	11	8	4	2	4	4	6	7.8	28
7-Apr	9	Z	3	2	3	2	2	5	8	7	10	17	19	19	14	9	9	5	2	9	15	12	5	5	8.4	19
8-Apr	6	6	Z	3	3	2	3	6	9	11	11	5	4	4	2	2	1	3	4	7	3	7	8	10	5.2	11
9-Apr	11	8	9	Z	14	6	3	2	2	2	2	2	1	1	1	1	1	1	1	0	1	3	3	2	3.3	14
10-Apr	1	1	1	0	Z	1	2	6	7	8	8	5	5	7	6	6	4	4	3	3	3	3	4	4	4.0	8
11-Apr	5	5	5	5	6	Z	5	5	7	14	15	14	14	15	12	11	13	9	23	23	23	21	15	9	12.0	23
12-Apr	Z	4	3	3	4	8	10	10	17	15	12	9	6	6	7	6	4	4	11	7	3	13	17	18	8.6	18
13-Apr	9	Z	11	12	7	26	40	34	24	18	PF	15	15	13	15	8	11	10	12	6	7	5	3	2	13.7	40
14-Apr	2	3	Z	1	1	1	2	4	8	4	2	10	5	6	2	2	2	4	2	2	1	0	0	0	2.9	10
15-Apr	1	2	1	Z	2	4	6	M	M	M	8	17	11	10	4	6	8	6	6	1	1	7	15	15	6.5	17
16-Apr	15	10	11	13	Z	17	6	7	14	11	9	7	1	0	0	0	0	0	0	0	0	3	25	29	7.8	29
17-Apr	24	22	17	14	13	Z	13	16	17	14	16	9	5	1	0	0	0	0	1	1	1	2	3	4	8.4	24
18-Apr	Z	19	34	35	21	12	14	18	14	22	29	28	5	2	1	2	1	1	2	9	4	8	5	5	12.6	35
19-Apr	4	Z	5	6	8	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	1.7	8
20-Apr	8	5	Z	1	2	1	2	3	2	2	2	4	5	4	3	3	2	2	2	2	2	2	3	6	3.0	8
21-Apr	7	8	7	Z	6	4	7	9	21	13	13	5	4	3	3	3	2	2	1	1	5	12	12	8	6.7	21
22-Apr	12	15	8	6	Z	9	15	29	21	20	7	5	4	4	4	4	5	4	3	6	12	14	14	12	10.2	29
23-Apr	10	10	8	7	6	Z	20	21	15	20	11	7	5	1	1	1	2	2	1	1	1	0	3	8	6.8	21
24-Apr	Z	7	7	4	13	13	19	20	17	17	8	4	4	4	1	2	4	2	1	2	2	4	2	8	7.1	20
25-Apr	2	Z	1	1	1	3	4	4	3	2	4	3	3	3	2	3	2	3	3	6	28	27	34	36	7.8	36
26-Apr	19	13	Z	6	5	5	6	6	5	4	3	8	3	2	2	2	4	6	8	6	4	3	2	2	5.4	19
27-Apr	3	2	1	Z	0	0	12	20	25	14	13	14	8	5	4	5	4	3	3	3	3	3	4	5	6.8	25
28-Apr	4	2	1	0	Z	1	6	18	16	15	15	4	3	2	2	2	3	3	4	7	10	6	3	3	5.6	18
29-Apr	4	3	2	2	2	Z	14	19	12	6	4	2	2	3	2	2	2	2	5	4	4	2	14	25	5.9	25
30-Apr	Z	5	3	4	6	6	5	6	12	5	3	2	2	1	1	0	0	3	3	3	3	5	4	3	3.8	12
	9.3	7.0	6.1	6.1	6.6	7.4	9.1	10.8	11.4	10.3	8.9	8.6	6.6	5.2	4.1	4.1	3.9	4.3	5.1	5.2	5.8	6.8	7.8	8.8	Diurnal Average	
	52	22	34	35	21	28	40	34	25	22	29	28	21	19	15	15	17	22	27	28	28	27	34	36	Diurnal Maximum	

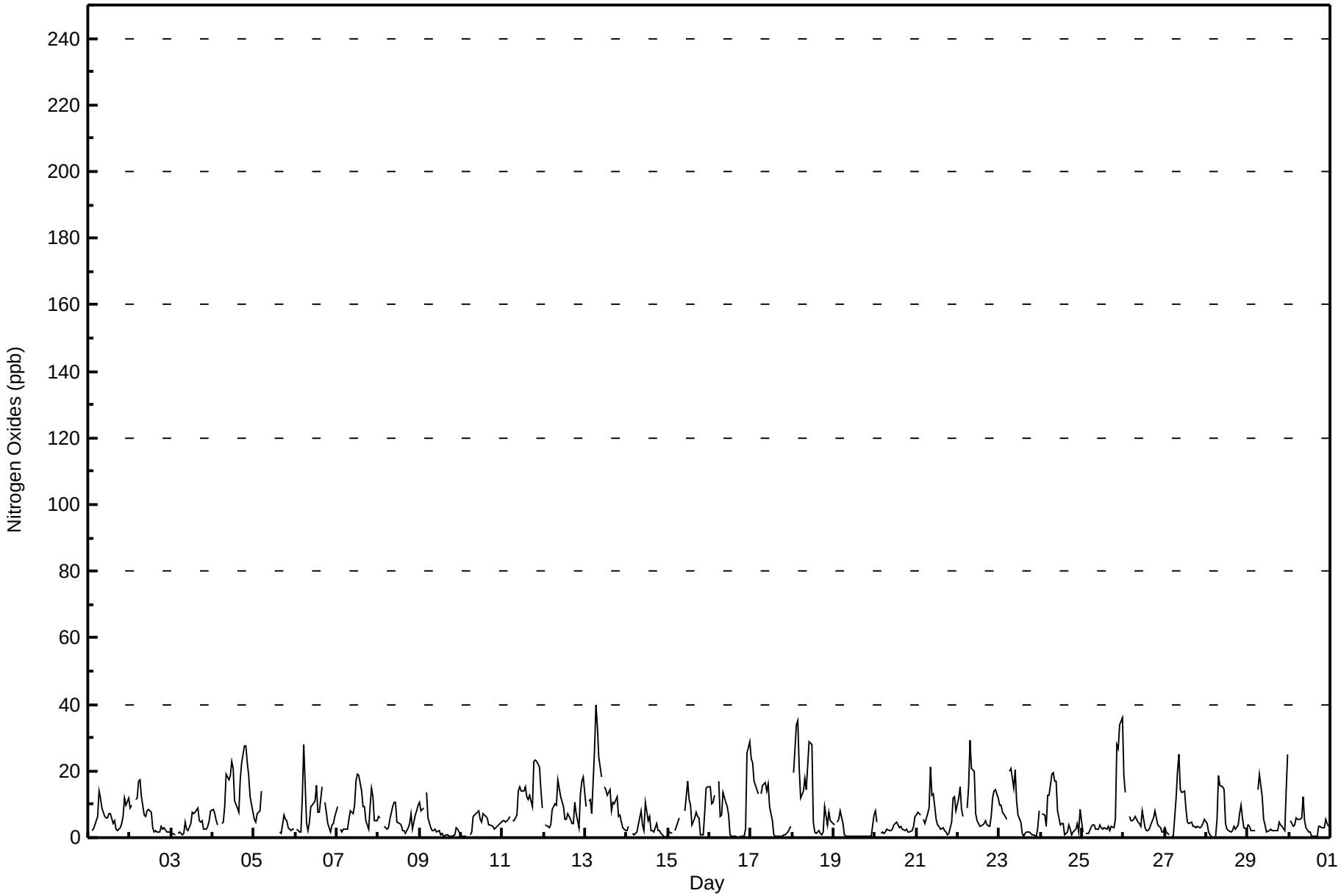
Z - zerospan C - Calibration M - Maintenance PF - Power Failure

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Oxides (NO_X) - ppb

Fort McKay South - April 2016



Nitrogen Oxides (NO_X) - ppb
Fort McKay South - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	641	94.68	94.68
21 - 40	35	5.17	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: 677

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Oxides (NO_X) - ppb

Fort McKay South - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	108	107	24	6	5	15	42	75	76	32	31	29	20	11	17	34	632
21 - 40	6	6	0	1	0	0	5	1	1	5	4	1	0	0	1	4	35
11 - 80	0	0	0	0	0	0	0	0	0	1	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	114	113	24	7	5	15	47	76	77	38	35	30	20	11	18	38	668

Total Number of Valid Hours: 668

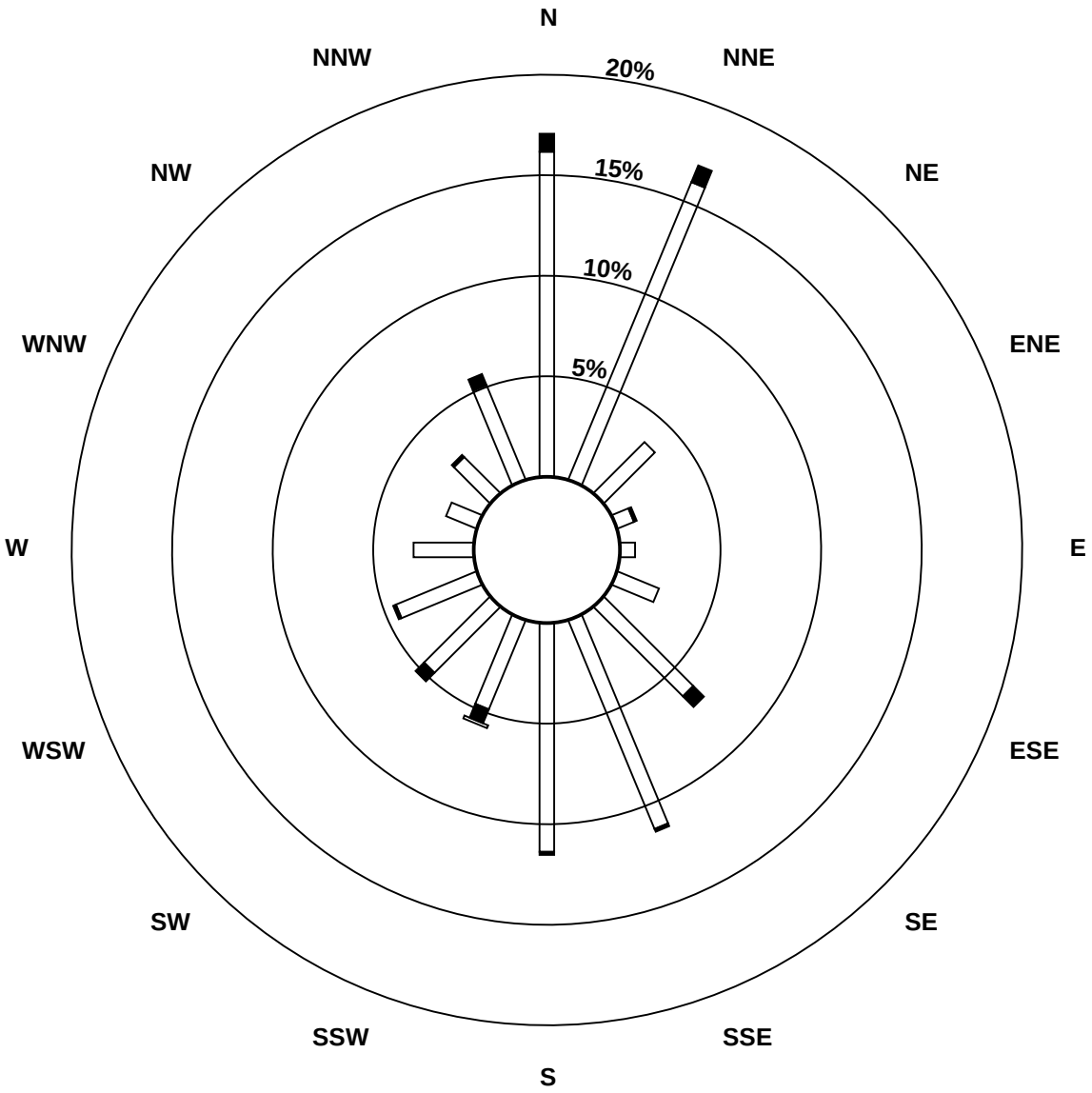
Total Number of Hours: 720

Wood Buffalo Environmental Association

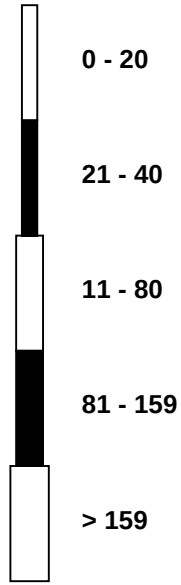
Wind Rose Apr 2016

Nitrogen Oxides (NO_X) - ppb

Fort McKay South (AMS 13)



Classes (ppb)



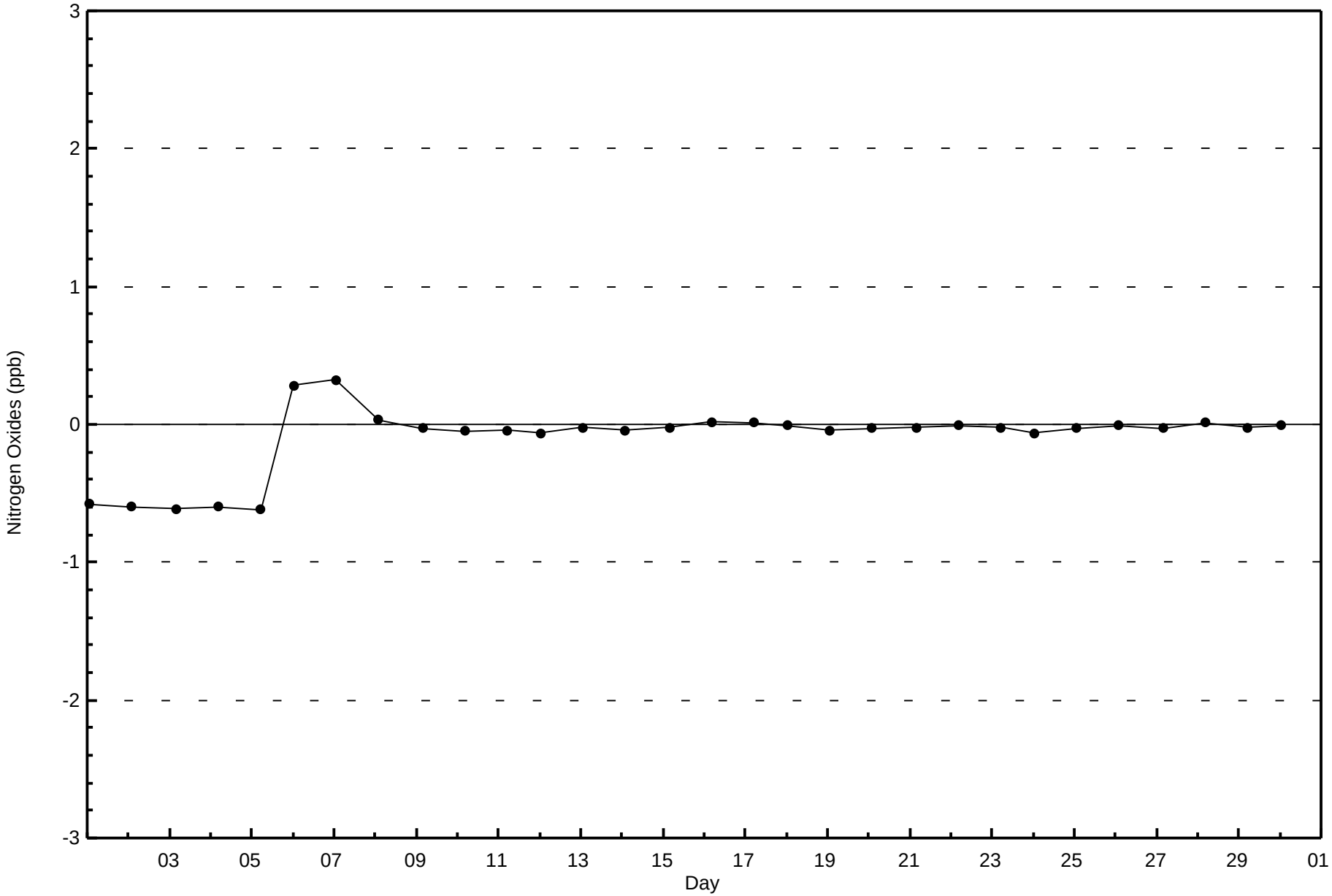
Total Number of Valid Hours: 668

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Oxides (NO_X) - ppb

Fort McKay South - April 2016

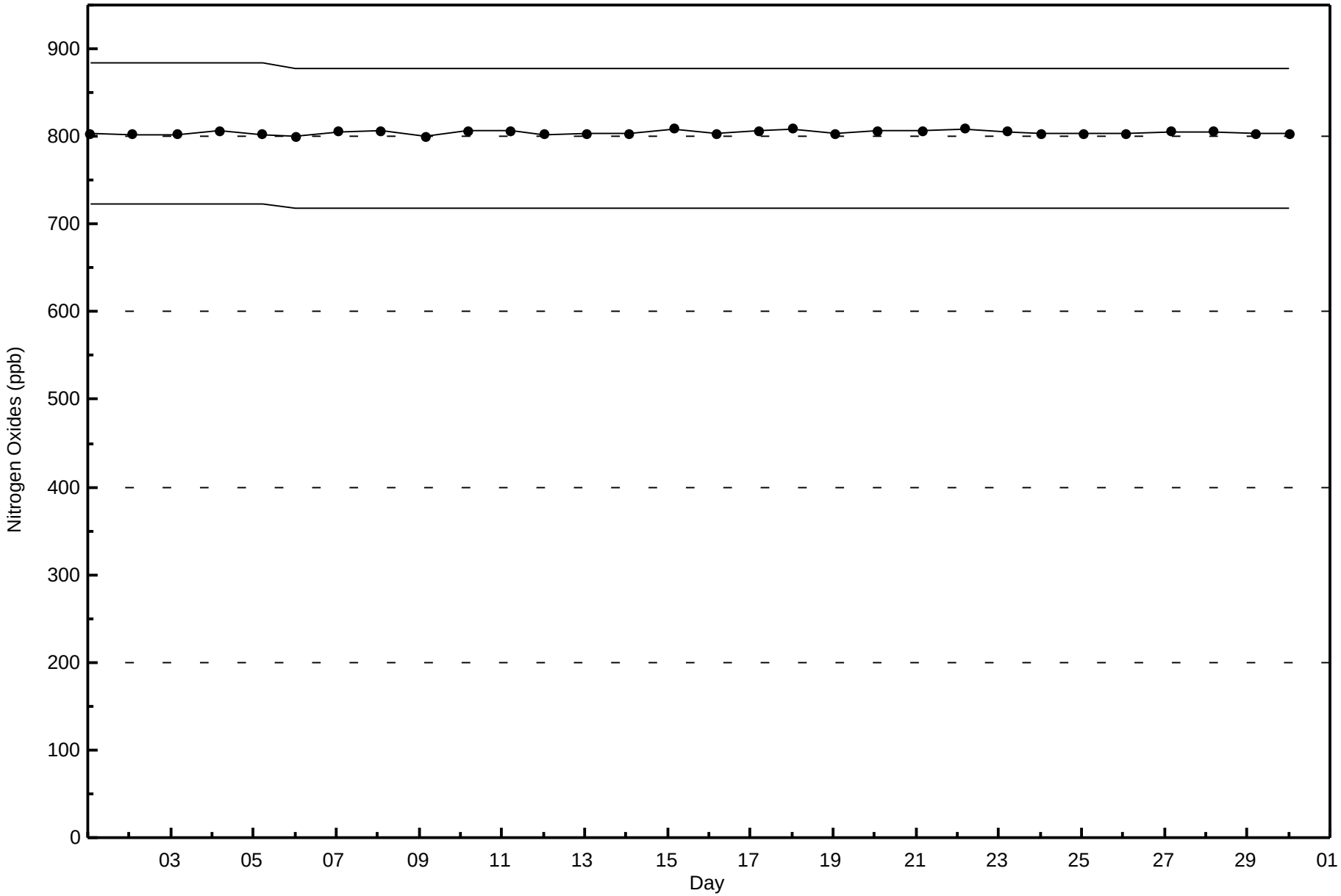


Wood Buffalo Environmental Association

Span Responses

Nitrogen Oxides (NO_X) - ppb

Fort McKay South - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

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

Fort McKay South - April 2016

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

Maximum Value: 18.6 $\mu g/m^3$ on Apr 19 00:00

Maximum Daily Average: 8.8 $\mu g/m^3$ on Apr 29

Minimum Value: 0.1 $\mu g/m^3$ on Apr 19 19:00

Minimum Daily Average: 2.8 $\mu g/m^3$ on Apr 3

Maximum Diurnal Average: 6.4 $\mu g/m^3$ at hour 1

Minimum Diurnal Average: 2.8 $\mu g/m^3$ at hour 16

Monthly Average: 4.93 $\mu g/m^3$

Percentiles: $P_1 = 0.7$ $P_{10} = 1.9$ $Q_1 = 2.9$ Median = 4.5 $Q_3 = 6.2$ $P_{90} = 8.8$ $P_{99} = 13.6$

Hours in Service:	720
Hours of Data:	704
Hours of Missing Data:	16
Hours of Calibration:	2
Percent Operational Time:	98.1

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-Apr	12.3	10.1	5.5	5.1	5.3	5.7	5.3	4.4	3.8	3.3	3.0	2.8	2.8	2.5	2.2	2.3	2.1	1.9	2.4	3.4	3.9	4.8	4.2	4.2	4.3	12.3
2-Apr	3.5	3.2	3.6	3.6	4.0	4.4	4.5	4.0	2.4	1.9	1.9	1.9	2.0	1.6	2.1	2.4	2.6	2.8	3.1	3.4	3.5	3.8	3.9	3.7	3.1	4.5
3-Apr	2.7	2.8	3.1	2.9	2.9	2.9	3.0	2.7	2.5	2.2	2.0	1.9	1.8	1.8	1.9	2.1	2.6	2.8	3.5	3.9	4.1	3.8	3.9	4.3	2.8	4.3
4-Apr	5.6	6.0	5.6	5.3	5.2	5.4	5.2	4.9	6.0	5.0	8.4	14.5	7.3	6.3	4.9	5.1	7.5	8.6	8.6	8.7	7.7	6.9	6.5	5.9	6.7	14.5
5-Apr	5.3	5.1	5.3	5.7	5.7	5.8	5.8	5.7	7.1	7.2	6.1	4.5	4.5	3.6	3.9	3.3	4.2	5.3	5.3	5.2	4.8	5.1	6.6	6.8	5.3	7.2
6-Apr	5.3	3.9	4.5	6.6	7.0	7.7	4.7	3.7	3.4	3.2	3.0	2.9	3.1	3.0	3.3	2.8	2.6	2.7	2.7	2.7	2.5	2.6	2.4	2.4	3.7	7.7
7-Apr	1.9	1.8	2.0	2.0	2.1	2.0	2.4	2.5	2.5	2.5	3.1	4.5	6.0	5.6	5.4	3.6	3.6	3.5	3.6	3.7	3.8	3.9	3.6	3.3	3.3	6.0
8-Apr	4.4	5.1	5.0	4.6	4.5	4.3	4.3	4.2	2.9	2.4	2.2	2.0	1.9	1.9	1.7	1.7	1.8	2.0	2.4	2.5	2.2	2.7	3.1	3.7	3.1	5.1
9-Apr	4.2	5.2	5.5	5.7	6.3	5.3	4.4	3.6	3.7	4.0	3.8	3.2	2.8	2.7	2.5	2.9	3.3	3.4	3.5	3.5	3.7	3.9	4.0	3.9	3.9	6.3
10-Apr	4.6	5.0	4.6	4.5	4.6	4.4	4.7	4.4	3.7	3.9	9.1	4.1	2.7	2.8	2.5	2.6	2.8	3.2	4.0	4.6	5.2	5.6	5.6	5.7	4.4	9.1
11-Apr	6.1	6.5	6.2	6.6	5.7	6.1	5.5	4.6	5.5	9.6	10.2	10.7	8.7	8.5	7.5	7.3	9.2	8.0	10.3	12.0	12.1	12.5	11.7	11.3	8.4	12.5
12-Apr	10.8	10.0	9.5	9.3	8.4	7.6	7.6	6.9	7.1	6.1	4.6	3.7	3.1	2.9	3.2	3.3	3.6	4.0	4.5	4.6	4.4	4.7	5.3	4.8	5.8	10.8
13-Apr	4.4	4.8	4.8	5.0	4.6	5.1	5.4	5.2	4.5	4.0	PF	UO	UO	UO	UO	UO	UO	UO	UO	4.0	4.3	4.3	4.1	3.8	--	5.4
14-Apr	4.4	5.8	4.4	3.9	4.4	4.8	4.5	3.7	3.2	2.7	2.3	2.1	1.8	1.6	1.6	1.5	1.8	2.1	2.1	2.2	2.3	2.2	2.2	2.6	2.9	5.8
15-Apr	2.5	2.9	3.2	3.0	3.2	3.1	3.0	2.5	2.7	2.5	2.2	2.9	2.6	2.6	2.1	2.3	2.5	2.9	3.7	4.2	4.8	6.0	7.1	6.3	3.4	7.1
16-Apr	4.9	4.6	5.0	4.9	5.2	6.3	5.6	5.0	5.2	3.7	3.4	3.0	2.0	1.5	1.3	1.5	1.5	1.4	1.8	2.6	3.8	4.8	7.2	7.3	3.9	7.3
17-Apr	5.6	4.6	4.7	5.1	4.8	4.6	5.0	6.1	6.1	5.2	3.1	2.6	2.5	2.0	1.6	1.4	1.6	1.7	2.3	3.7	4.9	5.7	5.7	6.3	4.0	6.3
18-Apr	7.0	7.6	7.9	8.8	8.9	9.2	10.6	8.2	6.2	5.7	5.9	C	C	1.7	1.5	1.9	3.3	6.7	7.4	18.2	9.9	10.9	13.9	18.6	8.2	18.6
19-Apr	15.8	16.8	15.2	12.3	11.4	11.8	10.1	2.1	0.2	UO	0.7	UO	UO	UO	UO	0.7	1.2	0.3	0.1	0.4	0.7	1.2	1.6	6.5	5.8	16.8
20-Apr	3.6	3.0	2.0	2.6	2.5	3.3	4.1	4.7	4.0	3.0	2.3	2.1	2.2	1.9	1.6	1.8	1.6	1.7	2.1	3.3	4.0	4.5	4.6	4.5	2.9	4.7
21-Apr	4.7	4.8	5.3	5.5	5.0	5.0	5.5	2.5	11.3	5.0	2.0	1.3	1.2	1.2	1.1	1.2	1.1	0.9	1.6	2.5	3.6	5.5	5.0	5.3	3.7	11.3
22-Apr	6.6	6.9	6.8	7.1	6.5	6.3	7.9	6.7	3.9	3.1	1.9	1.6	1.6	1.6	1.5	2.1	3.0	2.8	4.2	6.7	6.6	7.8	7.6	8.2	5.0	8.2
23-Apr	7.7	6.7	6.1	6.0	5.5	5.8	6.8	4.5	2.9	2.4	2.1	1.2	1.1	0.8	0.3	0.7	1.2	1.6	2.7	4.1	5.4	4.2	4.5	6.3	3.8	7.7
24-Apr	7.3	7.7	8.2	9.2	10.7	9.0	10.4	10.0	8.2	9.8	7.5	7.0	9.2	6.7	4.1	4.5	6.0	4.6	3.6	3.9	4.0	11.4	8.3	8.3	7.5	11.4
25-Apr	8.6	8.9	8.9	9.1	8.4	8.7	7.8	7.9	6.9	5.5	4.7	4.5	4.5	4.1	2.9	2.9	2.8	2.6	2.5	3.4	4.6	5.6	5.9	6.2	5.7	9.1
26-Apr	7.2	7.3	7.2	7.6	8.2	8.9	8.5	8.8	6.2	6.3	6.6	6.7	6.8	6.4	6.0	3.3	2.7	4.0	5.3	4.6	5.2	6.1	6.1	6.0	6.3	8.9
27-Apr	7.2	7.3	6.6	6.4	5.4	5.1	5.7	6.9	9.0	6.0	4.9	4.3	3.2	1.9	1.5	1.9	2.5	2.5	3.0	3.9	5.1	5.7	5.4	5.2	4.9	9.0
28-Apr	5.5	5.5	5.2	4.6	4.3	3.8	4.5	4.6	3.8	4.1	8.3	4.5	3.4	3.5	3.9	4.4	4.9	5.2	5.8	7.1	9.4	10.4	10.3	10.3	5.7	10.4
29-Apr	10.8	10.0	9.7	9.3	9.3	9.2	9.7	8.6	12.5	8.4	6.3	5.4	5.3	6.2	5.3	5.9	7.9	7.5	8.6	10.6	11.9	10.9	11.3	11.4	8.8	12.5
30-Apr	11.1	10.4	9.1	9.0	9.3	9.5	8.6	8.0	6.6	5.1	4.7	4.5	4.2	4.3	3.7	3.9	4.0	3.9	3.8	4.7	4.9	5.2	6.1	6.4	6.3	11.1
	6.4	6.3	6.0	6.0	6.0	6.0	6.0	5.3	5.1	4.6	4.3	4.1	3.6	3.3	2.9	2.8	3.3	3.5	3.9	4.9	5.1	5.8	5.9	6.3	Diurnal Average	
	15.8	16.8	15.2	12.3	11.4	11.8	10.6	10.0	12.5	9.8	10.2	14.5	9.2	8.5	7.5	7.3	9.2	8.6	10.3	18.2	12.1	12.5	13.9	18.6	Diurnal Maximum	

C - Calibration UO - Unstable Operation PF - Power Failure

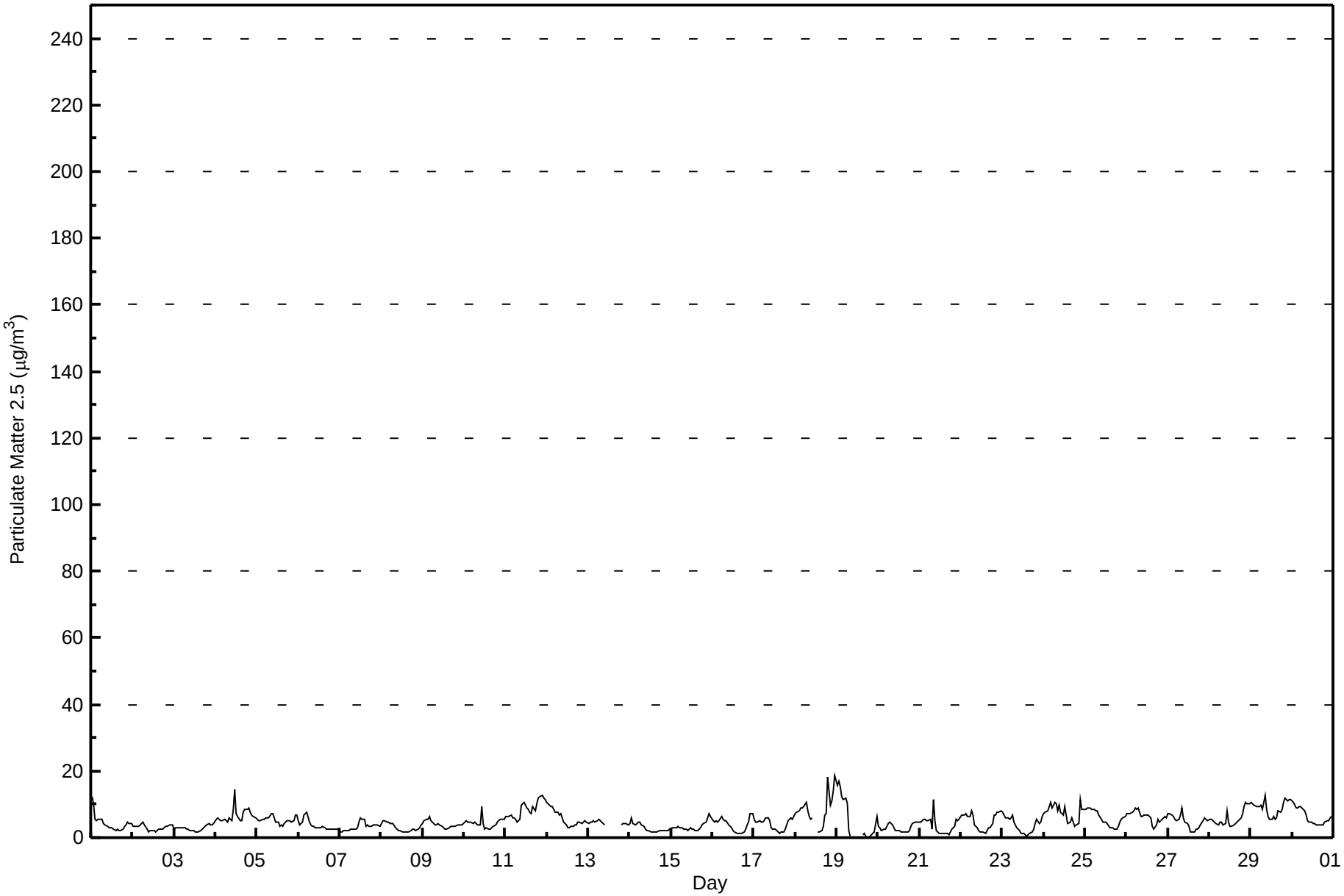
Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 $\mu g/m^3$

Wood Buffalo Environmental Association

Hourly Averages

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

Fort McKay South - April 2016



Concentration Ranges ($\mu g/m^3$)	**Number of Hours**	**%**	**Cumulative %**
1 - 5	461	65.48	65.48
6 - 15	228	32.39	97.87
16 - 25	4	0.57	98.44
26 - 80	0	0.00	98.44
> 81.0	0	0.00	98.44

Total Number of Valid Hours: 704

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

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

Fort McKay South - April 2016

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	92	103	22	9	4	10	31	33	33	17	22	17	12	7	11	29	452
6 - 15	28	16	2	1	1	5	13	43	44	23	15	13	4	2	7	11	228
16 - 25	0	0	0	0	0	0	0	0	3	1	0	0	0	0	0	0	4
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	120	119	24	10	5	15	44	76	80	41	37	30	16	9	18	40	684

Total Number of Valid Hours: 695

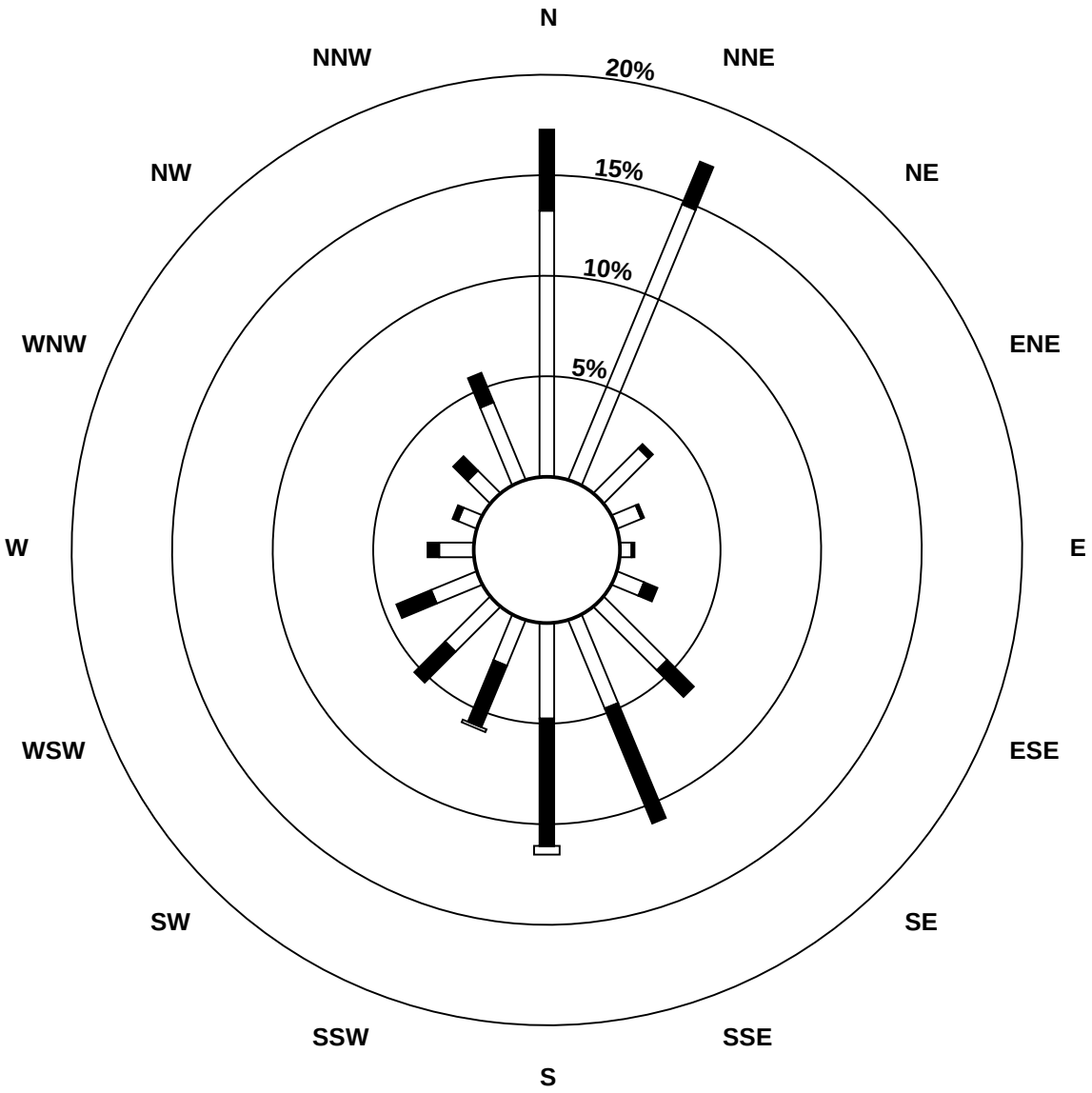
Total Number of Hours: 720

Wood Buffalo Environmental Association

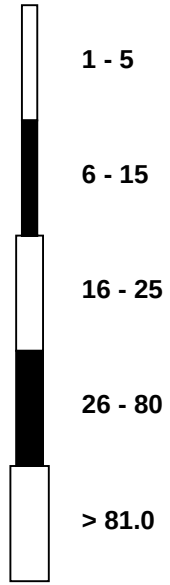
Wind Rose Apr 2016

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: 695

Maximum Value: 29.1 C on Apr 18 15:00

Maximum Daily Average: 15.2 C on Apr 18

Minimum Value: -17.2 C on Apr 4 06:00

Minimum Daily Average: -7.6 C on Apr 3

Maximum Diurnal Average: 9.0 C at hour 16

Minimum Diurnal Average: -2.9 C at hour 5

Monthly Average: 3.14 C

Percentiles: P_1 = -13.9 P_{10} = -6.8 Q_1 = -2.1 Median = 1.7 Q_3 = 7.5 P_{90} = 15.2 P_{99} = 22.6

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

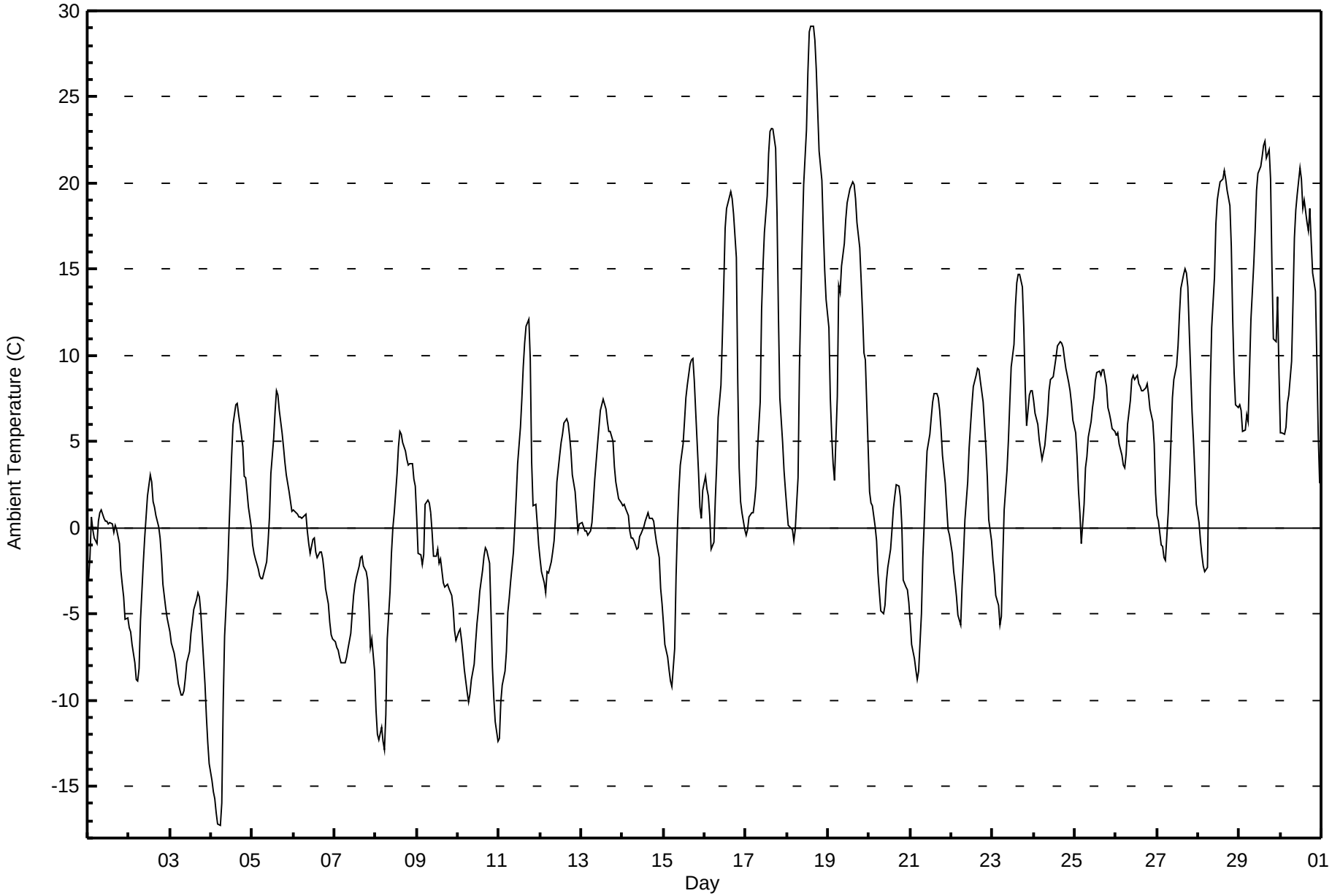
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	-3.0	-1.7	0.6	-0.1	-0.6	-0.9	0.4	0.9	1.0	0.6	0.4	0.4	0.3	0.3	0.2	-0.2	0.1	-0.1	-0.9	-2.4	-3.2	-4.0	-5.3	-5.2	-0.9	1.0
2-Apr	-5.8	-6.1	-6.8	-7.9	-8.8	-8.9	-8.1	-5.4	-2.1	-0.6	0.6	1.9	3.1	2.6	1.5	1.2	0.7	0.1	-0.6	-1.7	-3.2	-4.6	-5.2	-5.6	-2.9	3.1
3-Apr	-6.1	-6.7	-7.2	-7.7	-8.4	-9.0	-9.7	-9.7	-9.5	-8.7	-7.8	-7.2	-6.1	-5.5	-4.7	-4.2	-3.8	-4.0	-4.9	-6.3	-9.0	-10.9	-12.4	-13.7	-7.6	-3.8
4-Apr	-14.7	-15.3	-15.7	-16.5	-17.2	-17.2	-16.0	-10.2	-6.2	-3.0	-0.4	1.8	4.1	6.0	7.1	7.2	6.6	6.0	4.7	3.0	2.9	2.1	1.2	0.1	-3.3	7.2
5-Apr	-1.0	-1.4	-1.8	-2.3	-2.8	-3.0	-2.9	-2.6	-2.0	-0.9	0.6	3.1	5.2	6.8	7.9	7.7	6.8	5.5	4.7	3.8	3.0	2.1	1.6	1.0	1.6	7.9
6-Apr	1.0	1.0	0.8	0.7	0.6	0.5	0.7	0.8	-0.2	-0.9	-1.5	-0.7	-0.6	-1.4	-1.8	-1.4	-1.4	-1.8	-2.5	-3.5	-4.4	-5.5	-6.2	-6.4	-1.4	1.0
7-Apr	-6.6	-7.0	-7.1	-7.5	-7.8	-7.9	-7.8	-7.5	-7.0	-6.1	-5.0	-3.9	-3.3	-2.8	-2.2	-1.7	-1.7	-2.2	-2.5	-3.0	-4.7	-6.9	-6.5	-8.3	-5.3	-1.7
8-Apr	-10.6	-11.9	-12.3	-11.5	-12.3	-12.9	-10.8	-6.5	-3.7	-1.5	0.0	0.9	3.1	4.7	5.6	5.4	4.9	4.4	4.0	3.7	3.7	3.7	2.9	2.5	-1.9	5.6
9-Apr	0.6	-1.5	-1.6	-2.1	-1.5	1.3	1.6	1.5	0.9	-0.2	-1.6	-1.6	-1.3	-2.1	-1.8	-3.2	-3.5	-3.4	-3.3	-3.5	-3.9	-4.7	-6.0	-6.6	-2.0	1.6
10-Apr	-6.0	-5.9	-6.5	-7.4	-8.2	-9.5	-10.1	-9.6	-8.8	-7.9	-6.7	-5.6	-4.7	-3.7	-2.5	-1.7	-1.2	-1.3	-2.1	-4.9	-8.0	-9.9	-11.2	-12.4	-6.5	-1.2
11-Apr	-12.2	-10.1	-9.1	-8.3	-7.2	-4.9	-4.1	-3.1	-1.4	0.1	1.8	3.7	5.9	7.4	9.3	10.7	11.7	12.1	9.8	3.8	1.3	1.4	0.2	-1.0	0.7	12.1
12-Apr	-1.8	-2.6	-3.2	-3.7	-2.5	-2.6	-2.0	-1.4	-0.7	0.7	2.6	4.2	5.0	5.4	6.1	6.4	6.1	5.4	4.4	3.1	2.1	1.0	-0.2	0.2	1.3	6.4
13-Apr	0.3	0.1	-0.2	-0.2	-0.4	-0.2	0.3	1.5	2.8	4.9	5.8	6.9	7.2	7.5	6.9	6.2	5.6	5.6	5.0	3.5	2.7	2.2	1.7	1.4	3.2	7.5
14-Apr	1.3	1.4	1.2	0.7	-0.2	-0.6	-0.6	-0.7	-1.2	-1.2	-0.5	-0.4	0.0	0.4	0.6	0.9	0.6	0.5	0.4	-0.3	-0.9	-1.7	-3.5	-4.4	-0.3	1.4
15-Apr	-5.6	-6.8	-7.5	-8.2	-8.9	-9.2	-7.0	-2.8	0.1	2.2	3.6	4.8	6.1	7.5	8.3	9.5	9.7	9.9	8.5	6.7	3.2	1.2	0.5	2.2	1.2	9.9
16-Apr	3.0	2.2	1.8	0.7	-1.2	-0.8	1.7	3.7	6.4	8.3	11.1	14.1	17.4	18.6	19.2	19.5	19.1	18.2	15.7	8.5	3.5	1.6	0.9	-0.1	8.0	19.5
17-Apr	-0.4	-0.1	0.6	0.9	0.9	1.6	2.4	4.4	7.3	12.7	15.2	17.2	19.3	21.7	23.0	23.1	23.2	22.0	18.2	12.3	7.5	5.0	3.3	2.2	10.1	23.2
18-Apr	1.1	0.2	-0.1	-0.1	-0.8	-0.1	2.9	9.3	13.3	16.8	19.9	23.1	26.4	28.8	29.1	29.1	28.3	26.6	24.2	21.9	20.1	17.4	14.9	13.2	15.2	29.1
19-Apr	11.6	7.5	5.3	3.7	2.8	7.6	14.0	13.6	15.2	16.5	17.9	18.8	19.3	19.7	20.1	19.9	19.1	17.7	16.2	14.4	12.4	10.1	9.7	4.6	13.2	20.1
20-Apr	2.1	1.5	1.3	0.1	-0.8	-2.6	-3.8	-4.9	-5.0	-4.5	-3.1	-2.3	-1.2	-0.1	1.1	1.9	2.5	2.4	1.8	0.2	-3.1	-3.4	-3.6	-4.3	-1.2	2.5
21-Apr	-5.5	-6.8	-7.6	-8.3	-8.8	-8.3	-5.0	-1.8	0.3	2.6	4.5	5.4	6.4	7.3	7.8	7.8	7.5	6.9	5.7	4.2	2.6	1.2	-0.1	-0.4	0.7	7.8
22-Apr	-1.5	-2.6	-3.2	-4.0	-5.1	-5.6	-3.4	-1.6	0.5	2.6	4.6	5.9	7.1	8.2	8.8	9.2	9.2	8.5	7.3	6.0	4.7	2.9	0.5	-0.8	2.4	9.2
23-Apr	-1.9	-2.7	-3.9	-4.5	-5.7	-5.2	-1.8	1.0	3.3	5.0	7.2	9.3	10.6	12.8	14.2	14.7	14.7	14.0	11.6	8.2	5.9	7.7	8.0	8.0	5.4	14.7
24-Apr	7.4	6.7	6.0	5.1	4.5	4.0	4.8	5.6	6.6	7.9	8.6	8.7	9.3	9.9	10.5	10.8	10.7	10.5	9.9	9.2	8.5	8.0	7.2	6.2	7.8	10.8
25-Apr	5.5	4.1	2.2	0.9	-0.9	1.4	3.5	4.2	5.3	6.1	7.0	7.5	8.5	9.0	9.1	8.9	9.2	9.2	8.2	7.0	6.6	6.2	5.7	5.6	5.8	9.2
26-Apr	5.4	5.5	4.9	4.2	3.7	3.5	4.3	6.0	7.4	8.6	8.8	8.6	8.8	8.4	8.2	8.0	8.0	8.1	8.3	7.7	6.9	6.2	4.8	2.1	6.5	8.8
27-Apr	0.7	0.4	-1.0	-1.1	-1.8	-1.9	0.9	2.8	5.1	7.5	8.6	9.4	10.6	12.4	13.9	14.7	15.0	14.8	14.0	11.5	6.7	5.1	3.2	1.4	6.4	15.0
28-Apr	0.3	-0.7	-1.6	-2.2	-2.6	-2.3	2.9	8.2	11.6	14.5	17.6	19.0	19.6	20.1	20.2	20.7	20.2	19.5	18.7	16.4	12.1	9.0	7.1	7.0	10.6	20.7
29-Apr	7.1	6.9	5.6	5.7	6.6	6.2	9.2	12.1	15.3	17.2	19.6	20.6	21.0	21.6	22.2	22.4	21.4	21.9	20.3	15.1	10.9	10.8	13.4	8.9	14.3	22.4
30-Apr	5.5	5.5	5.5	5.9	7.2	7.7	9.7	13.1	16.8	18.4	19.4	20.9	20.2	18.5	19.0	17.7	17.2	18.6	16.6	14.8	13.7	9.8	5.4	2.6	12.9	20.9
	-1.0	-1.6	-2.0	-2.5	-2.9	-2.7	-1.1	0.7	2.4	3.9	5.3	6.5	7.6	8.3	8.9	9.0	8.9	8.5	7.4	5.3	3.3	2.1	1.1	0.0	Diurnal Average	
	11.6	7.5	6.0	5.9	7.2	7.7	14.0	13.6	16.8	18.4	19.9	23.1	26.4	28.8	29.1	29.1	28.3	26.6	24.2	21.9	20.1	17.4	14.9	13.2	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature (AT) - C

Fort McKay South - April 2016



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	272	37.78	37.78
0 - 10	330	45.83	83.61
10 - 20	88	12.22	95.83
> 20	30	4.17	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Maximum Value: 98 % on Apr 27 04:00

Maximum Daily Average: 92.8 % on Apr 6

Minimum Value: 13 % on Apr 19 17:00

Minimum Daily Average: 29.8 % on Apr 19

Maximum Diurnal Average: 78.6 % at hour 5

Minimum Diurnal Average: 42.7 % at hour 15

Monthly Average: 60.3 %

Percentiles: $P_1 = 16$ $P_{10} = 28$ $Q_1 = 43$ Median = 62 $Q_3 = 79$ $P_{90} = 89$ $P_{99} = 98$

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

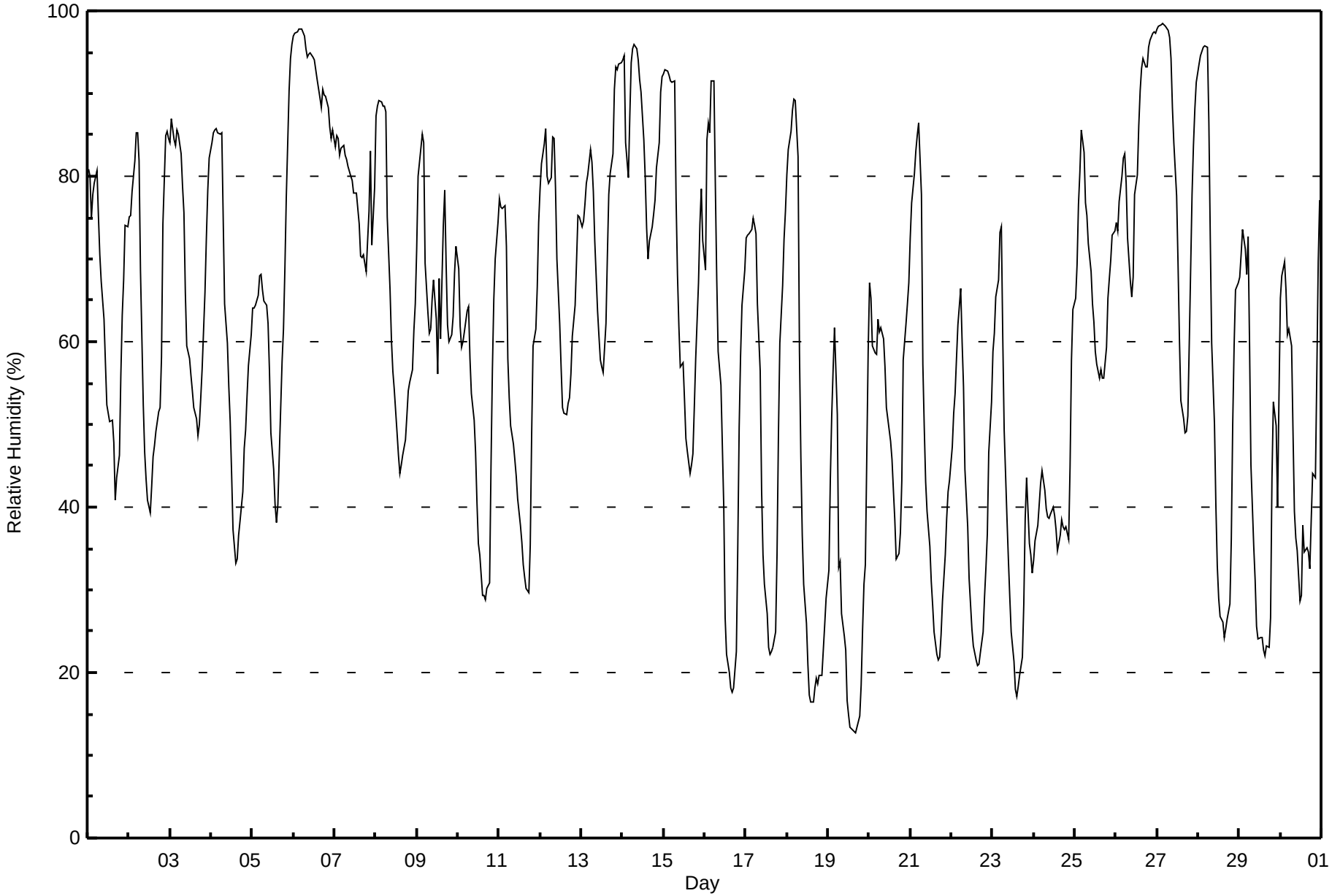
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	81	80	75	78	79	81	75	71	67	63	57	52	51	50	50	48	41	44	46	56	63	67	74	74	63.5	81
2-Apr	75	75	78	82	85	85	82	69	52	47	43	41	39	43	46	47	49	51	52	58	74	85	85	84	63.7	85
3-Apr	84	87	84	84	86	85	83	79	76	66	59	58	56	54	52	51	49	50	53	57	66	73	78	82	68.8	87
4-Apr	84	85	86	86	85	85	85	75	65	60	55	50	44	37	33	34	37	38	42	47	49	53	57	61	59.7	86
5-Apr	64	64	64	66	68	68	66	65	64	62	57	49	45	40	38	40	46	58	62	69	77	90	94	96	63.0	96
6-Apr	97	97	98	98	98	98	97	95	94	95	95	94	94	93	92	89	88	90	90	90	88	86	85	86	92.8	98
7-Apr	84	85	85	83	83	84	83	82	81	80	79	78	78	78	74	70	70	70	69	72	76	83	72	79	78.2	85
8-Apr	87	88	89	89	88	89	88	75	66	60	57	54	49	46	44	45	46	48	51	54	55	57	61	65	64.7	89
9-Apr	71	80	83	85	84	70	64	61	62	65	68	63	56	68	60	74	78	69	62	60	61	63	68	72	68.6	85
10-Apr	69	62	59	60	61	64	64	58	54	51	47	40	36	34	29	29	29	30	31	45	57	65	70	74	50.7	74
11-Apr	77	76	76	77	71	58	53	50	48	46	44	41	38	36	33	31	30	30	35	49	60	62	67	74	52.6	77
12-Apr	79	82	84	86	80	79	80	85	85	79	70	62	57	52	51	51	53	53	56	61	64	70	75	75	69.5	86
13-Apr	74	75	77	79	80	83	82	78	72	64	61	58	57	56	62	70	78	80	83	91	93	93	94	94	76.3	94
14-Apr	94	95	84	80	87	94	95	96	95	94	92	90	84	80	74	70	72	74	75	77	81	84	90	92	85.4	96
15-Apr	92	93	93	92	92	91	92	77	68	62	57	57	53	48	47	44	45	46	52	58	67	74	79	72	68.8	93
16-Apr	69	84	86	85	91	92	79	68	59	55	48	40	27	22	20	18	18	18	23	35	50	58	64	69	53.2	92
17-Apr	73	73	73	74	75	74	73	65	57	42	34	31	27	23	22	23	23	25	34	49	60	67	72	76	51.8	76
18-Apr	80	83	85	88	89	89	82	59	46	37	31	26	21	17	16	16	18	19	19	20	20	23	26	29	43.3	89
19-Apr	32	43	51	57	62	51	33	33	27	24	23	17	15	13	13	13	13	13	15	18	25	31	33	59	29.8	62
20-Apr	67	65	59	59	58	63	61	62	60	57	52	51	48	46	42	38	34	34	37	43	58	62	65	67	53.7	67
21-Apr	73	77	80	83	85	87	78	57	50	43	40	35	31	28	25	22	22	22	25	29	34	39	42	43	47.8	87
22-Apr	47	51	54	58	62	66	60	55	45	38	31	28	25	23	22	21	21	22	25	29	33	37	47	53	39.7	66
23-Apr	59	61	65	68	73	74	60	49	39	34	29	25	21	18	17	18	20	22	28	39	43	36	34	32	40.2	74
24-Apr	33	36	38	40	43	44	42	40	39	39	39	40	39	37	35	37	38	38	37	38	36	45	58	64	40.6	64
25-Apr	65	69	77	80	86	83	77	75	72	69	65	62	59	57	56	57	56	56	59	65	68	70	73	73	67.8	86
26-Apr	74	73	77	80	82	83	79	73	67	65	68	78	80	86	90	93	94	93	93	96	96	97	97	97	83.9	97
27-Apr	98	98	98	98	98	98	98	97	94	88	84	78	70	60	53	51	49	49	51	60	78	84	88	91	79.6	98
28-Apr	94	95	95	96	96	96	86	73	60	50	40	33	29	27	26	24	25	26	28	36	50	59	66	67	57.4	96
29-Apr	68	71	74	71	68	73	60	45	35	31	26	24	24	24	23	22	23	23	27	43	53	50	40	53	43.8	74
30-Apr	65	68	70	66	61	62	59	49	39	36	35	29	29	38	35	35	35	33	38	44	44	56	70	77	48.8	77
	73.6	75.7	76.6	77.5	78.6	78.2	73.9	67.1	61.3	56.6	52.8	49.5	46.1	44.6	42.7	42.8	43.3	44.2	46.6	52.9	59.3	63.9	67.5	71.0	Diurnal Average	
	98	98	98	98	98	98	98	97	95	95	95	94	94	93	92	93	94	93	93	96	96	97	97	97	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity (RH) - %

Fort McKay South - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Fort McKay South - April 2016

Maximum Speed: 18 km/h on Apr 19 16:00

Maximum Daily Speed Average: 9.1 km/h on Apr 20

Minimum Speed Value: 0 km/h on Apr 10 21:00

Minimum Daily Speed Average: 0.8 km/h on Apr 5

Maximum Diurnal Speed Average: 2.2 km/h at hour 8

Minimum Diurnal Speed Average: 0.5 km/h at hour 14

Monthly Average Velocity: 0.9 km/h 29.5 deg

Percentiles: $P_1 = 0$ $P_{10} = 2$ $Q_1 = 3$ Median = 6 $Q_3 = 9$ $P_{90} = 12$ $P_{99} = 16$

Hours in Service:	720
Hours of Data:	711
Hours of Missing Data:	9
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-Apr	SSW2	WSW3	W3	NE1	N2	NNW2	N6	NNE10	NNE10	NNE14	NNE12	NNE12	NNE12	NNE10	NNE7	NNE9	NE8	NE7	NE6	N4	N3	N3	NNE3	N5	NNE5.8	NNE14
2-Apr	N4	NNE5	NNE5	NNE3	NNE3	NNW3	N4	NNE6	NNE6	NNE7	NNE9	N12	NNE12	N13	N13	N14	N14	N12	N12	N13	N11	N11	N9	N9	N8.6	N14
3-Apr	N9	N10	N9	N10	N10	N10	N12	N12	NNE11	NNE13	NNE13	NNE10	NNE9	NE9	NNE9	NNE9	NE7	N8	NNE6	NNE5	NNE3	N3	NNW2	W1	NNE8.1	NNE13
4-Apr	WSW1	SW2	WSW1	SW2	SSW2	W1	WSW1	E1	ESE3	ESE5	ESE4	SE4	SE5	SE5	SE5	ENE5	NNE6	N5	N4	N5	N6	N6	N6	N6	NE1.3	NNE6
5-Apr	N5	N5	N5	N5	N4	N4	N4	NNE5	NNE7	N6	NNE5	ENE3	SSE2	SSE5	SSE7	S8	S8	SSW8	SSW7	S6	S5	S5	SSE6	SSE4	SE0.8	S8
6-Apr	SSE3	SW1	NW2	NW2	NW4	NNW5	N7	N7	AF	AF	AF	AF	AF	AF	AF	AF	NNE7	NNE5	NNE8	NE5	NE5	NNE8	NE4	N3	----	NNE8
7-Apr	NNE5	ENE3	E3	E4	ENE3	ENE2	NE3	NE3	NNE2	ESE3	E3	ENE1	NNE4	NNE7	NNE8	NNE9	NNE9	NNE9	NE7	NNE5	N5	N4	N6	N3	NNE4.1	NNE9
8-Apr	NW3	NNW1	NW1	NNW2	NW1	WNW1	N2	ESE1	SE7	SE8	SSE9	SSE10	SSE10	SE10	SE11	SE11	SE9	SE9	SE7	SSE8	SSE8	SSE9	SSE7	SSE5	SSE5.4	SE11
9-Apr	SE3	S3	SW1	NNW1	WNW5	NW8	NNW6	NNW10	NNW11	NNW13	NNW13	NNW13	N13	N13	N12	NNE14	NNE10	NNE12	N13	N10	NNW9	NNW8	NW5	NNW6	N7.9	NNE14
10-Apr	N9	N11	N12	N11	N10	N9	N9	NNE9	NNE9	NNE9	NNE9	NNE8	NNE7	NNE7	NE6	ENE6	NNE5	N6	N4	N3	NNE0	WSW2	WSW2	WSW2	NNE6.2	N12
11-Apr	W2	NNW2	SW1	S0	S4	S5	S7	S6	SSE6	SSE7	S7	SSE7	SE7	SE6	ESE5	E5	SE4	ESE4	NNE5	N4	NW3	NNW5	NW3	NW3	SSE2.0	S7
12-Apr	WSW2	W2	W2	N1	N7	N4	NNE8	NNE9	NNE7	NE6	NNE9	N11	NNE11	NNE13	NNE12	NNE12	NNE11	NNE10	NNE9	N9	N9	N7	N5	N5	N7.0	NNE13
13-Apr	N5	NNE5	NNW4	NNW4	NNE4	NNW4	N4	NNW4	NNE5	NE3	NE3	SE4	SE5	SSE5	SSE5	SSE6	SSE4	SSE4	SSE5	SE5	SSE4	SSE2	SE0	NNW1	E1.1	SSE6
14-Apr	AF	N3	NNE8	N10	N9	NNW5	N4	NNE6	NNE8	NNE8	NNE7	NE5	NNW7	NNW8	NNW5	NNE5	NE5	N3	NNW4	NNW5	NW4	W4	WSW3	NW2	N4.7	N10
15-Apr	NNW2	NW2	WSW2	WSW1	SW1	SW1	SSE1	ENE2	ESE5	SSE6	S8	S7	SSE8	SE8	ESE9	SE8	ESE8	SE7	SE5	SE6	SSE4	S4	S5	S7	SSE3.9	ESE9
16-Apr	SW4	SSE4	S6	S3	S3	S4	S7	SSE7	SSE6	SE7	SE8	E9	SW12	SW12	SW13	WSW12	W11	W8	WSW5	SW4	WSW6	SW3	SW3	WSW1	SSW4.6	SW13
17-Apr	SW1	SW2	WSW1	S1	SW2	SSW1	SSW2	SSW2	SE2	S7	SW5	SSW4	ESE8	WSW7	WSW11	WSW9	WSW11	W8	SW1	SW2	SW3	WSW2	SW2	W1	SW3.1	WSW11
18-Apr	SW2	SSW3	SSW4	SSW3	SW2	S1	S1	SSE3	SE5	SE6	SE7	SE8	SSE10	S16	SSW15	SSW16	S15	S14	S14	S10	SSE9	S8	S6	S5	S7.1	SSW16
19-Apr	S3	SSW3	S4	WSW2	S5	SW7	WNW8	NW8	WNW8	W10	W11	W15	WSW17	WSW17	W17	W18	W17	W15	W11	WNW8	NW7	WNW5	WNW7	N14	W8.1	WSW18
20-Apr	N9	N11	N11	N10	N11	NNE15	NNE14	NNE13	NNE12	NNE13	NNE12	NNE12	NNE11	NNE11	NNE11	NNE10	NNE9	NNE8	NNE7	NE5	N3	NNW2	NNW2	NNW2	NNE9.1	NNE15
21-Apr	NW2	W1	WNW2	W1	WSW1	WNW1	N1	ENE1	NNE5	NNE6	N7	N10	N12	N12	N14	NNE13	NNE14	NNE13	NE11	NNE10	NNE8	NNE7	N7	NNE8	NNE6.5	NNE14
22-Apr	N6	NNW5	N5	N5	N4	N4	N6	NNE9	NNE9	NNE11	NNE10	N12	N13	N13	N13	N14	N13	N11	NNE10	NNE8	NNE8	N6	N5	NNE3	N8.4	N14
23-Apr	NNW3	NNW4	NW3	NNW4	NW2	NNW4	NNW4	NNE4	N5	N7	NNE7	NNE7	NNE2	ESE5	SSE8	SSE7	SSE6	SE6	SE4	SE3	SSE4	SE5	SSE7	SSE10	E1.4	SSE10
24-Apr	SSE8	SSE7	S7	SSE5	SE4	SSE4	SSE5	SSE8	SSE8	SSE8	SSE9	SSE8	S10	S6	SSE8	S7	S6	SE6	ESE5	SE6	SE6	SSE7	S10	SSW10	SSE6.7	S10
25-Apr	S10	S8	S6	SSW4	SSW4	S4	S5	SSE6	S9	S9	SSW10	S8	SSE8	SSE7	SSW10	SSW9	SSW8	SSW9	S7	S7	S6	SSW5	SSW4	SSW5	S6.7	SSW10
26-Apr	SSW6	SW7	SSE4	SSE4	SSE3	SSE4	SSE5	SSE6	SSE7	SSE7	S7	SSW6	S7	SSE6	SSE5	SSE3	SE4	SE4	SE2	SSE3	SSW1	SSE1	WSW2	SW2	S4.0	S7
27-Apr	SSW3	SSW1	SW2	WSW3	SW2	SW1	SE2	ESE2	ENE2	NE4	N6	NNE5	NNE2	NE5	NE6	NE8	NNE9	NE8	NE7	NNE4	N4	N5	NNW3	WNW2	NNE2.6	NNE9
28-Apr	W2	WSW3	SW2	SW2	SW2	SW2	SSE1	SSE4	SE5	ESE6	SE6	SSW8	S8	SSE8	SSE8	S11	S9	SE7	SSE6	SSE3	SSW2	SSW2	SW1	S2	S4.0	S11
29-Apr	SSE3	S2	S3	S3	SSE4	SSE2	SSE4	SSE6	S11	SSE13	S16	S16	S16	S15	S16	SSW14	SSW15	SSW13	SW6	SSW2	S4	S6	SSW7	SSE2	S8.0	S16
30-Apr	SSE2	SSE4	S3	SSE4	S4	S3	S5	S7	SSW10	S11	SSW14	SSW16	SW14	W12	WSW13	W10	WSW4	S9	S7	S4	N6	N2	WSW3	SW3	SSW5.4	SSW16
	NNW0.6	NW0.7	NNW0.9	N1.1	N1.2	NNW1.4	N1.6	NE2.2	ENE2.2	ENE2.1	ENE1.6	ENE1.3	ESE0.8	ENE0.5	ESE0.6	ENE0.5	NNE1.0	NE1.2	NE1.6	NE1.4	N1.2	NNW0.7	W0.7	NW0.5	Diurnal Average	
	S10	N11	N12	N11	N11	NNE15	NNE14	NNE13	NNE12	NNE14	S16	S16	WSW17	WSW17	W17	WSW18	W17	W15	S14	N13	N11	N11	S10	N14	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

Fort McKay South - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 7 km/h on Apr 19 13:00

Minimum Value: 0 km/h on Apr 29 00:00

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

Hours in Service:	720
Hours of Data:	711
Hours of Missing Data:	9
Hours of Calibration:	0
Percent Operational Time:	98.8

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-Apr	1	2	2	1	1	1	2	3	4	5	5	4	4	3	3	3	3	2	2	1	1	1	1	1	5
2-Apr	1	1	1	2	1	1	1	1	2	2	3	3	4	4	4	4	5	4	4	4	4	3	3	3	5
3-Apr	3	3	3	3	3	3	4	4	3	4	5	3	3	3	3	3	3	2	2	1	1	1	1	1	5
4-Apr	1	1	0	1	1	1	1	1	1	2	2	2	2	2	2	2	2	1	1	2	2	2	2	2	2
5-Apr	1	1	1	1	1	1	2	2	2	2	2	2	2	2	3	3	3	3	2	2	2	2	2	2	3
6-Apr	1	1	1	1	2	2	2	3	AF	AF	AF	AF	AF	AF	AF	AF	2	2	2	2	2	3	2	2	3
7-Apr	2	2	1	2	1	2	1	1	1	1	1	1	2	3	2	3	3	3	2	2	2	1	2	2	3
8-Apr	1	1	1	1	1	1	1	3	3	3	4	4	4	4	4	4	4	4	3	3	4	4	2	3	4
9-Apr	1	1	1	1	3	3	2	4	4	5	4	5	5	5	5	5	3	4	4	4	3	3	2	2	5
10-Apr	3	4	4	4	3	3	3	3	3	3	3	3	3	3	3	2	2	2	1	1	1	1	1	1	4
11-Apr	1	1	1	1	2	2	3	2	2	2	2	3	2	2	2	2	1	1	2	1	1	1	1	1	3
12-Apr	1	1	1	1	3	1	4	3	2	2	3	3	4	3	4	4	3	3	3	3	3	2	1	1	4
13-Apr	2	1	1	2	1	1	1	1	1	2	1	2	2	2	2	2	2	1	2	2	2	1	1	1	2
14-Apr	AF	1	3	3	3	1	1	2	2	2	2	1	3	3	2	2	2	1	2	2	2	1	1	2	3
15-Apr	1	1	1	1	1	1	1	1	1	2	3	3	3	3	3	3	3	2	2	2	1	1	2	2	3
16-Apr	2	2	2	1	1	1	2	2	2	2	2	3	6	5	5	5	4	3	2	1	1	2	2	1	6
17-Apr	2	1	2	1	1	2	1	1	1	3	2	2	3	4	5	4	4	4	1	1	1	1	1	1	5
18-Apr	1	1	1	1	1	1	1	2	2	2	2	3	4	6	5	6	5	5	5	3	3	2	2	2	6
19-Apr	2	1	1	1	1	3	3	3	3	5	4	6	7	7	7	7	7	6	5	4	4	2	3	5	7
20-Apr	3	4	4	3	4	5	4	4	4	4	5	4	4	4	4	3	3	3	2	2	1	1	1	1	5
21-Apr	1	1	1	1	1	1	1	1	2	2	3	4	4	4	4	5	4	4	4	4	2	2	2	3	5
22-Apr	2	2	1	1	1	1	2	2	3	4	4	4	4	4	4	4	4	3	3	2	2	2	2	2	4
23-Apr	1	1	1	1	1	1	1	2	2	2	3	3	2	3	3	3	3	3	2	1	2	2	3	4	4
24-Apr	3	3	2	2	2	2	2	3	3	3	3	3	3	3	3	3	2	3	2	2	3	3	4	3	4
25-Apr	4	3	2	2	1	1	2	2	3	3	3	3	3	3	3	3	3	3	2	2	1	1	1	1	4
26-Apr	2	2	1	1	1	1	2	2	2	3	2	2	2	2	2	2	2	1	1	1	1	1	1	1	3
27-Apr	1	1	1	1	1	1	1	1	1	2	2	2	2	2	3	3	3	3	2	2	1	1	1	1	3
28-Apr	1	1	1	1	1	1	1	2	2	2	2	3	3	3	4	4	4	3	3	1	0	1	1	0	4
29-Apr	1	1	1	1	1	1	2	2	4	5	6	6	6	6	5	5	5	5	3	1	1	2	2	1	6
30-Apr	1	1	1	1	1	1	1	2	3	4	5	6	6	5	5	4	3	3	3	2	3	1	1	1	6
	4	4	4	4	4	5	4	4	4	5	6	6	7	7	7	7	7	6	5	4	4	4	4	5	
	Diurnal Maximum																								

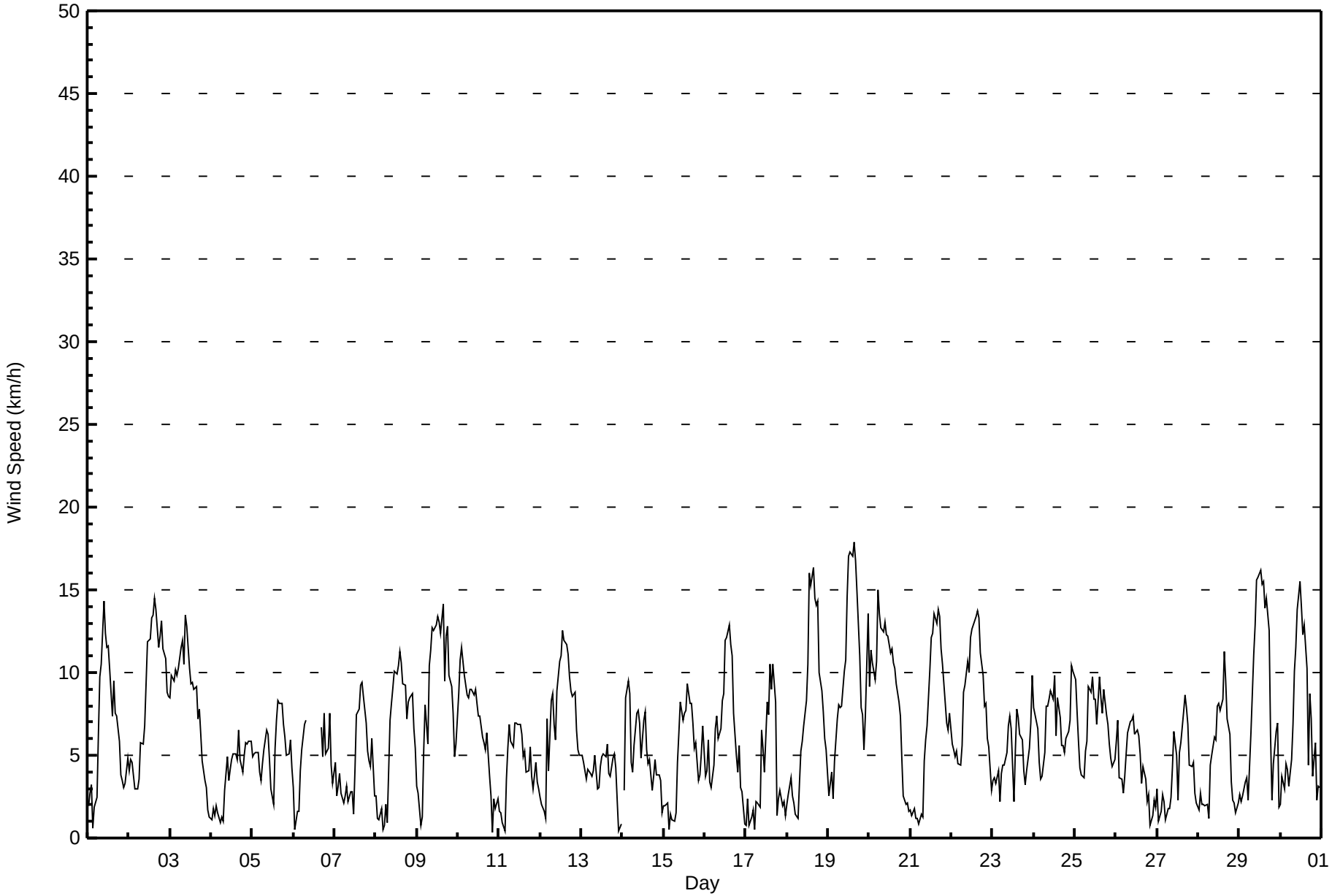
AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed (WS) - km/h

Fort McKay South - April 2016



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	340	47.82	47.82
6 - 11	290	40.79	88.61
12 - 19	81	11.39	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: 711

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Wind Speed (WS) - km/h

Fort McKay South - April 2016

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	46	28	13	9	4	12	22	40	30	21	30	23	10	7	16	29	340
6 - 11	49	70	12	1	1	4	25	44	41	13	3	5	7	4	3	8	290
12 - 19	25	22	0	0	0	0	0	1	9	7	4	6	4	0	0	3	81
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	120	120	25	10	5	16	47	85	80	41	37	34	21	11	19	40	711

Total Number of Valid Hours: 711

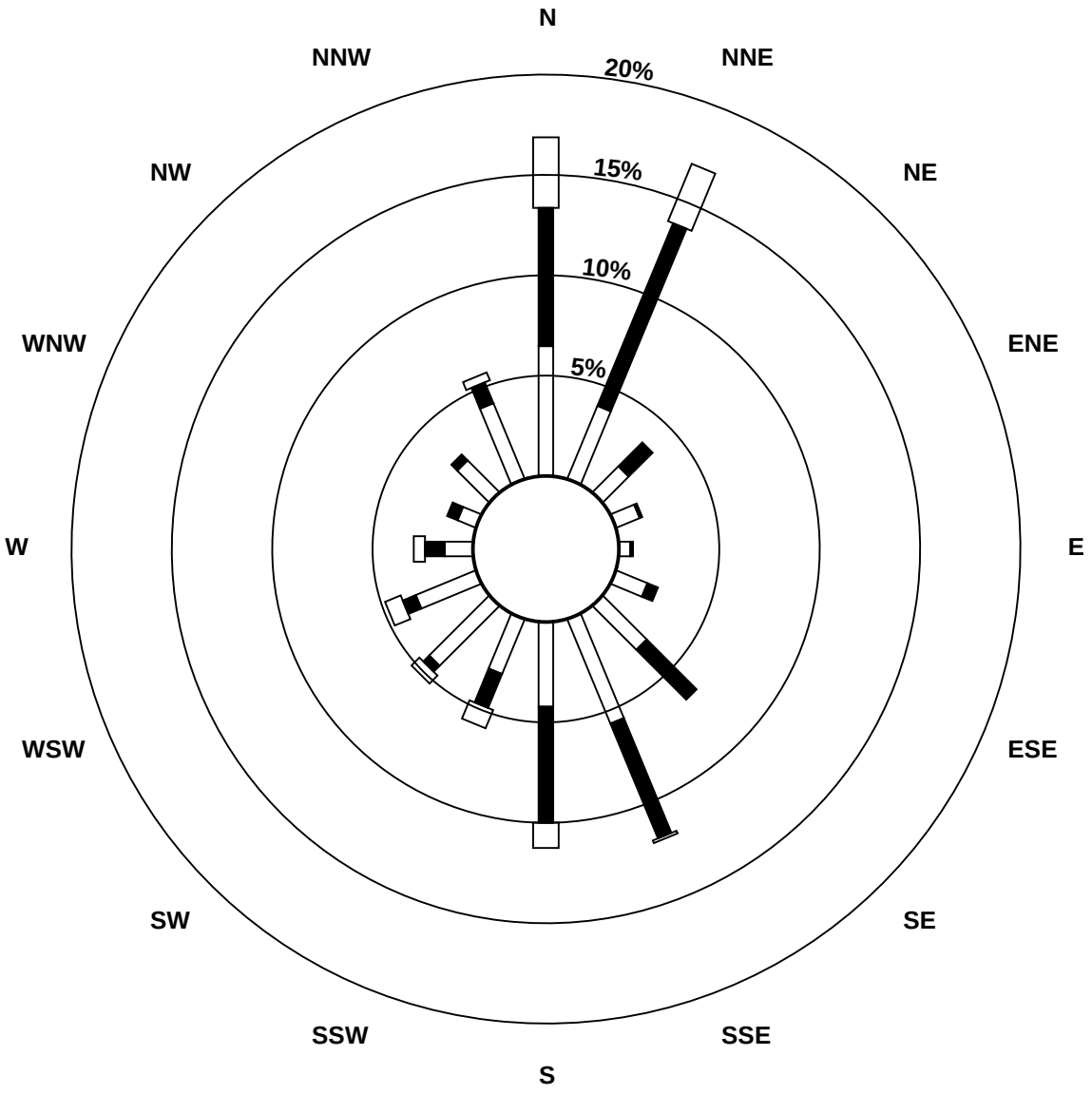
Total Number of Hours: 720

Wood Buffalo Environmental Association

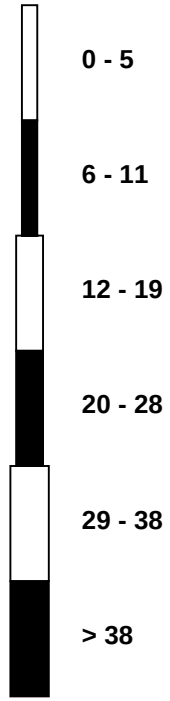
Wind Rose Apr 2016

Wind Speed (WS) - km/h

Fort McKay South (AMS 13)



Classes (km/h)



Total Number of Valid Hours: 711

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Fort McKay South - April 2016

Direction of Maximum Speed: 259 deg on Apr 19 16:00
Direction of Maximum Daily Speed Average: 17.0 deg on Apr 20

Direction of Minimum Speed: 21 deg on Apr 10 21:00
Direction of Minimum Daily Speed Average: 0.8 deg on Apr 5

Monthly Average Direction: 237.3 deg

Hours in Service:	720
Hours of Data:	711
Hours of Missing Data:	9
Percent Operational Time:	98.8

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-Apr	208	246	264	34	3	347	6	17	19	19	26	21	22	33	33	31	44	34	49	8	352	7	15	11	20.8
2-Apr	11	13	24	17	14	346	1	19	27	15	12	10	15	5	4	5	6	3	6	10	8	4	0	357	8.0
3-Apr	4	6	4	359	0	0	9	1	16	19	24	24	17	34	22	30	39	9	15	24	18	356	327	270	13.3
4-Apr	255	229	253	232	207	264	251	98	105	123	105	143	136	137	140	72	20	10	356	355	6	356	358	356	47.2
5-Apr	354	354	358	2	0	359	9	14	12	8	29	78	163	167	166	175	184	202	202	178	171	173	167	163	146.0
6-Apr	159	216	317	323	326	332	351	1	AF	AF	AF	AF	AF	AF	AF	AF	15	31	21	35	43	28	41	5	--
7-Apr	14	73	92	89	70	67	47	36	32	105	101	73	19	18	18	24	17	25	34	20	4	3	11	10	31.1
8-Apr	326	328	325	335	317	296	350	115	142	143	147	147	148	145	145	142	141	144	141	147	159	163	158	154	147.1
9-Apr	143	189	224	341	288	315	336	346	344	347	342	346	354	351	3	12	16	12	10	354	347	337	320	332	350.2
10-Apr	351	356	3	8	9	6	8	21	23	15	22	22	30	33	48	62	18	3	9	360	21	258	241	247	13.0
11-Apr	269	328	233	180	171	172	172	178	168	168	185	162	145	133	122	100	137	104	20	350	315	332	321	315	155.1
12-Apr	255	266	277	349	360	0	13	20	23	36	19	9	17	12	26	15	14	13	12	358	2	4	349	356	10.0
13-Apr	1	13	347	331	18	338	4	343	29	41	49	133	140	159	152	161	150	164	163	144	159	160	138	343	94.4
14-Apr	AF	4	14	11	10	348	356	28	18	14	16	35	345	345	346	22	39	9	328	335	319	281	249	324	0.8
15-Apr	335	315	248	257	231	227	148	64	107	155	182	178	158	143	118	129	122	132	138	136	159	174	182	178	150.6
16-Apr	216	148	175	184	186	174	172	168	162	136	128	101	220	229	229	245	267	262	245	236	240	218	217	257	206.3
17-Apr	215	223	247	191	234	196	196	200	130	178	218	210	119	244	249	240	252	261	214	235	231	240	231	275	226.5
18-Apr	232	206	199	193	218	175	169	147	137	129	134	135	149	187	194	197	183	182	180	174	165	175	172	175	175.1
19-Apr	184	192	185	243	186	226	285	324	299	260	274	259	249	257	263	259	267	277	277	302	320	291	285	7	270.7
20-Apr	11	11	355	1	5	12	13	18	18	18	28	29	27	33	31	32	18	17	19	35	2	334	342	340	17.0
21-Apr	324	271	298	260	255	292	355	71	18	13	9	3	3	5	11	21	16	25	34	33	22	14	11	21	14.0
22-Apr	3	345	352	356	356	354	9	18	23	15	12	9	0	5	8	6	10	11	15	14	14	6	359	13	7.9
23-Apr	348	345	320	333	312	343	348	33	7	11	22	27	26	122	163	162	157	136	128	138	151	139	152	163	94.6
24-Apr	156	163	171	159	137	160	161	154	155	156	161	164	184	188	160	172	187	133	123	127	140	164	184	199	163.5
25-Apr	186	189	184	193	194	169	169	168	174	186	200	190	167	163	197	203	205	202	190	191	191	198	207	206	188.6
26-Apr	203	215	166	157	162	163	168	164	166	167	176	198	181	158	156	148	146	133	143	150	201	156	255	219	172.3
27-Apr	196	192	224	242	216	221	138	108	60	41	10	31	26	42	47	40	29	38	35	22	351	353	341	286	27.7
28-Apr	261	242	228	231	224	221	158	153	127	123	131	195	191	162	159	180	171	145	148	163	206	212	219	180	171.2
29-Apr	151	174	172	170	156	163	156	148	176	167	175	175	181	185	183	199	199	195	224	198	188	189	196	167	182.1
30-Apr	156	162	178	161	170	177	179	185	193	188	202	207	224	260	258	259	246	183	179	186	3	353	249	230	210.5
	326.8	324.7	333.7	353.2	351.7	341.9	8.9	34.6	56.5	67.8	65.4	76.5	106.7	71.4	121.4	71.3	27.0	42.0	41.1	36.0	9.3	340.1	268.9	319.7	
	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

Fort McKay South - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 100 deg on Apr 17 06:00

Minimum Value: 3 deg on Apr 16 21:00

Percentiles: P_1 = 13 P_{10} = 20 Q_1 = 25 Median = 29 Q_3 = 37 P_{90} = 50 P_{99} = 89

Hours in Service:	720
Hours of Data:	711
Hours of Missing Data:	9
Hours of Calibration:	0
Percent Operational Time:	98.8

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-Apr	42	86	62	83	46	34	27	27	25	25	30	29	28	33	36	27	35	28	33	18	17	39	16	14	86
2-Apr	53	13	12	18	16	19	19	19	37	37	30	27	27	29	29	29	27	28	26	26	26	25	27	28	53
3-Apr	27	25	26	26	26	26	27	27	26	28	27	35	33	32	34	35	36	25	23	20	27	21	40	33	40
4-Apr	37	39	55	12	28	38	46	58	46	35	65	57	46	44	55	49	28	23	18	22	23	24	23	21	65
5-Apr	22	21	20	21	20	22	24	25	24	28	35	74	85	55	46	33	26	22	22	25	24	23	28	29	85
6-Apr	30	82	23	44	30	37	28	28	AF	AF	AF	AF	AF	AF	AF	AF	25	27	25	27	30	25	31	33	82
7-Apr	29	43	28	27	30	33	35	36	54	44	48	91	55	30	31	27	28	27	26	21	19	18	20	46	91
8-Apr	27	20	10	14	46	14	30	85	33	38	36	33	33	32	31	32	33	31	32	29	36	30	28	33	85
9-Apr	33	29	88	65	26	33	28	28	29	32	29	30	31	32	32	24	27	25	27	27	26	27	25	25	88
10-Apr	27	26	24	24	24	24	23	31	32	29	40	42	58	43	54	49	46	29	24	17	96	17	22	19	96
11-Apr	27	39	62	78	19	25	25	28	29	30	36	38	37	38	46	37	39	40	18	17	16	18	18	20	78
12-Apr	26	45	57	70	20	18	21	28	29	43	32	31	34	30	29	28	25	22	23	24	24	22	21	21	70
13-Apr	31	21	39	56	34	25	26	33	31	84	52	49	37	27	31	26	34	30	26	29	28	37	82	60	84
14-Apr	AF	30	22	22	24	26	27	27	24	25	29	34	37	32	43	41	32	29	33	26	26	21	10	62	62
15-Apr	35	16	25	47	52	57	31	50	32	37	33	43	47	45	34	38	33	35	26	27	26	18	19	20	57
16-Apr	54	37	20	33	25	16	20	22	27	29	28	42	41	33	30	35	35	30	23	12	3	34	59	89	89
17-Apr	98	41	95	81	75	100	59	48	66	37	56	73	40	68	41	37	36	29	73	20	22	28	26	60	100
18-Apr	56	39	16	32	23	57	44	38	32	31	31	33	35	28	28	25	25	24	25	25	25	19	22	23	57
19-Apr	73	37	13	56	15	32	39	38	42	41	37	34	31	33	33	32	34	34	34	35	30	34	35	30	73
20-Apr	26	26	29	27	28	26	27	27	28	28	34	35	38	34	37	34	34	32	26	23	29	30	25	49	49
21-Apr	50	28	41	18	13	43	29	75	39	51	52	35	30	30	27	31	27	27	28	28	25	22	21	25	75
22-Apr	27	23	21	17	18	16	25	27	25	31	39	30	30	29	29	29	27	25	24	21	20	22	21	69	69
23-Apr	28	22	30	18	22	23	23	41	46	34	36	46	91	68	49	42	49	45	31	29	25	33	30	30	91
24-Apr	31	26	24	24	37	32	30	26	28	31	27	29	26	41	30	32	35	37	32	31	30	26	21	22	41
25-Apr	22	18	15	18	14	22	24	28	28	32	28	37	31	44	26	24	32	28	20	17	17	16	13	15	44
26-Apr	16	20	18	31	54	25	27	26	31	29	27	28	27	26	33	72	36	33	38	35	84	73	35	45	84
27-Apr	25	69	52	32	20	38	42	41	53	43	28	46	89	58	50	39	33	29	27	29	16	14	15	41	89
28-Apr	35	19	26	25	29	31	55	29	37	32	45	41	39	35	40	29	31	32	27	31	22	24	45	27	55
29-Apr	32	43	28	16	17	24	22	26	27	27	30	27	26	28	26	30	26	26	20	32	12	14	15	31	43
30-Apr	40	23	31	21	16	37	16	20	30	29	28	29	42	30	33	30	72	29	26	45	33	46	16	33	72
	98	86	95	83	75	100	59	85	66	84	65	91	91	68	55	72	72	45	73	45	96	73	82	89	
	Diurnal Maximum																								

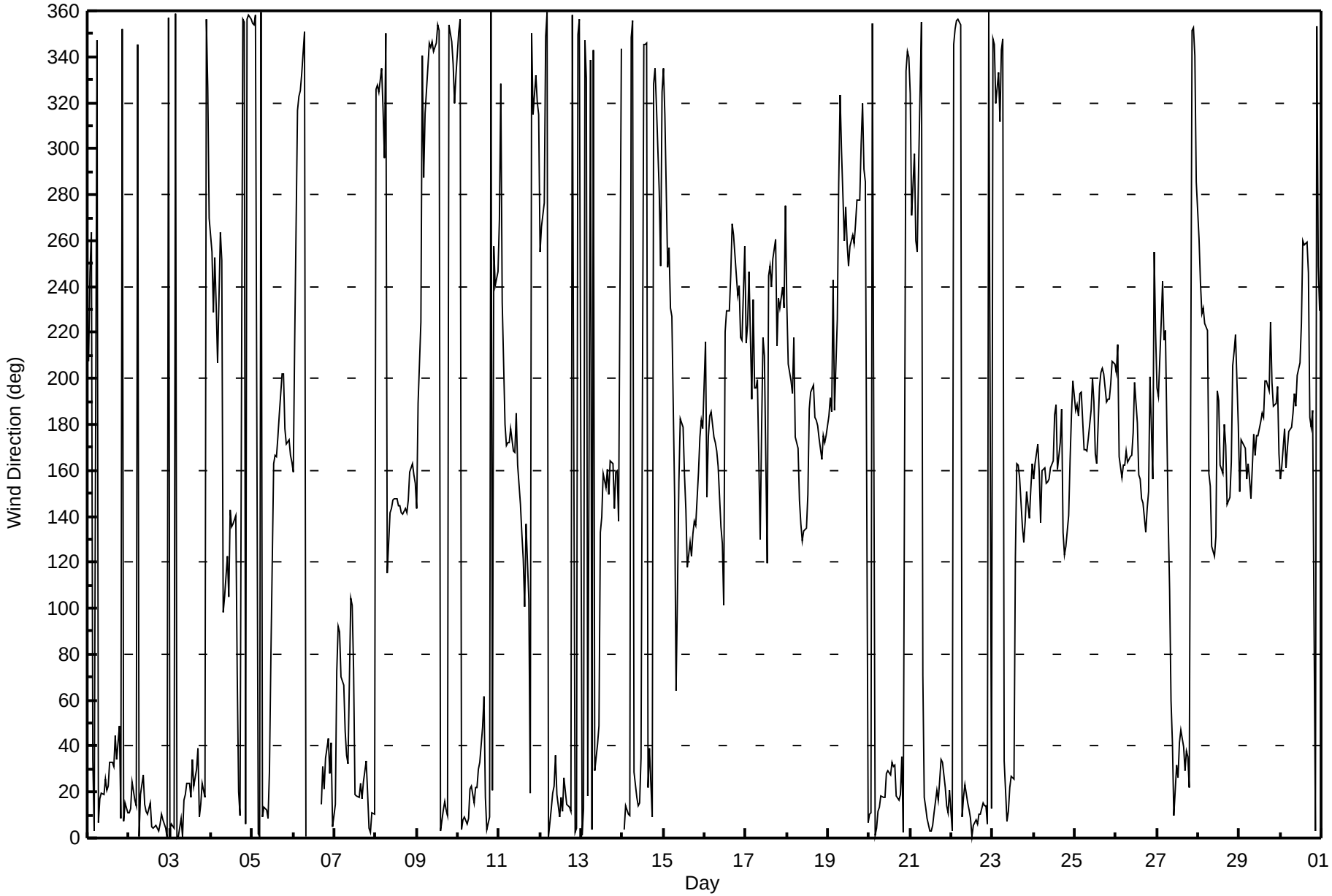
AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction (WD) - deg

Fort McKay South - April 2016



Wood Buffalo Environmental Association
SO2 Calibration Report

W B E A

Station Information

Calibration Date	April 5, 2016	Last Calibration	March 3, 2016
Station Name	Fort McKay South	Station Number	AMS 13
Reason:	Routine		
Start Time (MST)	7:33	End Time (MST)	14:16
Gas Cert Reference	LL110515	Station temp.	22 Deg C
Cal Gas Concentration	49.8 ppm	Cal Gas Exp Date	08/09/2018
Calibrator Make/Model	Sabio 4010	Serial Number	11041107
ZAG Make/Model	API 701	Serial Number	5613
DACS make/model	Campbell Scientific CR3000	DACS serial No.	1850

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Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 1000 ppb		HVPS voltage	547	548
Analyzer IP address	192.168.1.44		Lamp voltage	1590	1558
Calculated slope	0.993430	0.998661	Box temp	30.8	31.7
Calculated intercept	0.538802	-0.219128	Pressure	26.1	26.3
Analyzer Background	40.3	40.9	Flow	683	687
Analyzer Coefficient	0.985	0.985	Lamp Ratio	54	53

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	0.5	----
as found span	5000	78.9	785.8	785.3	1.001
calibrator zero	5000	0.0	0.0	0.2	----
high point	5000	78.9	785.8	787.0	0.999
second point	5000	39.4	392.4	393.5	0.997
third point	5000	19.7	196.2	196.5	0.999
as left zero	5000	0.0	0.0	0.6	----
as left span	5000	78.9	785.8	784.1	1.002
				Average Correction Factor	0.998

Corrected As found	784.8	Previous response	790.5	% change	0.7%

Notes:

No maintenance done, filter changed out, zeroadjusted

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Calibration Performed By: Melissa Lemay

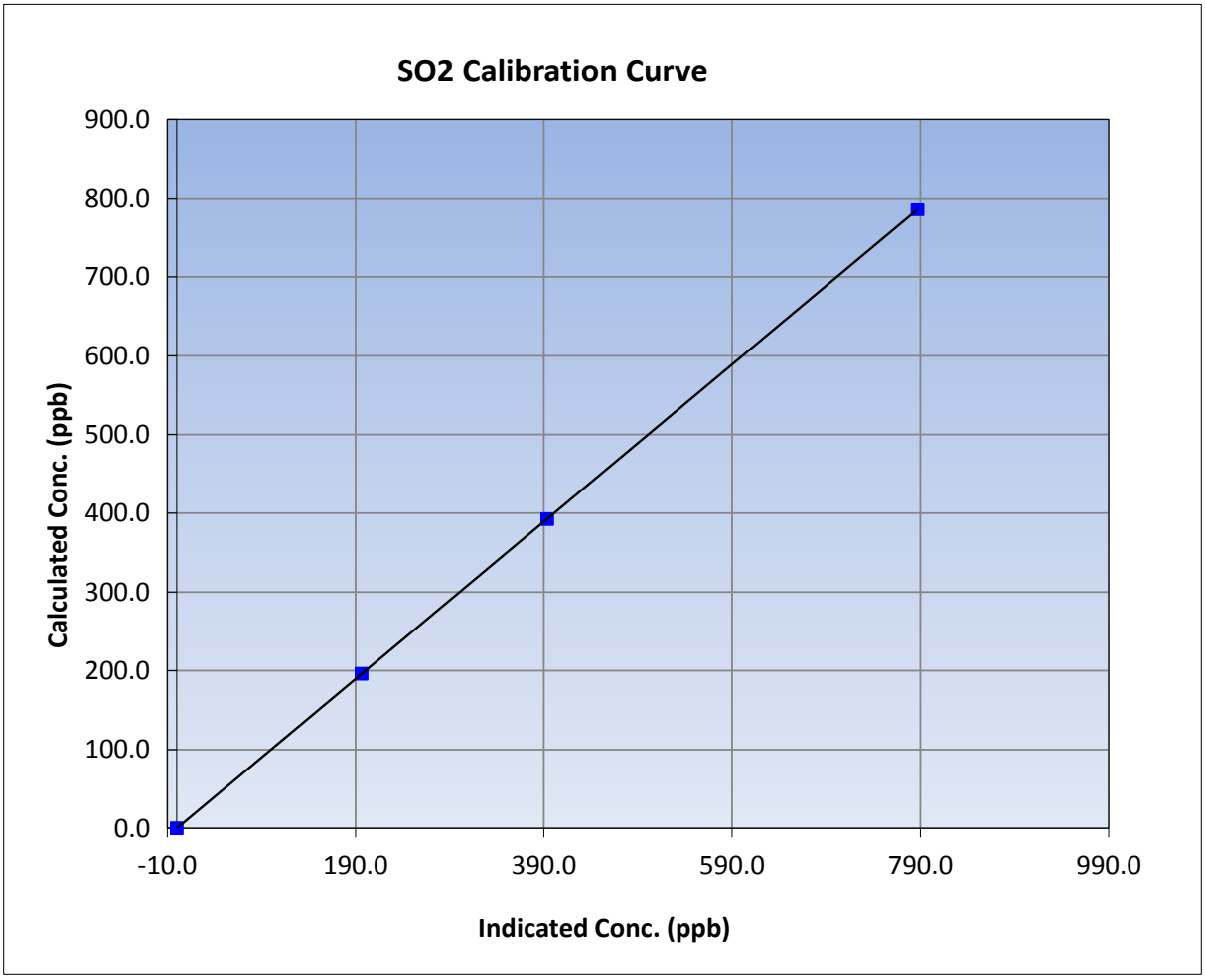
Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

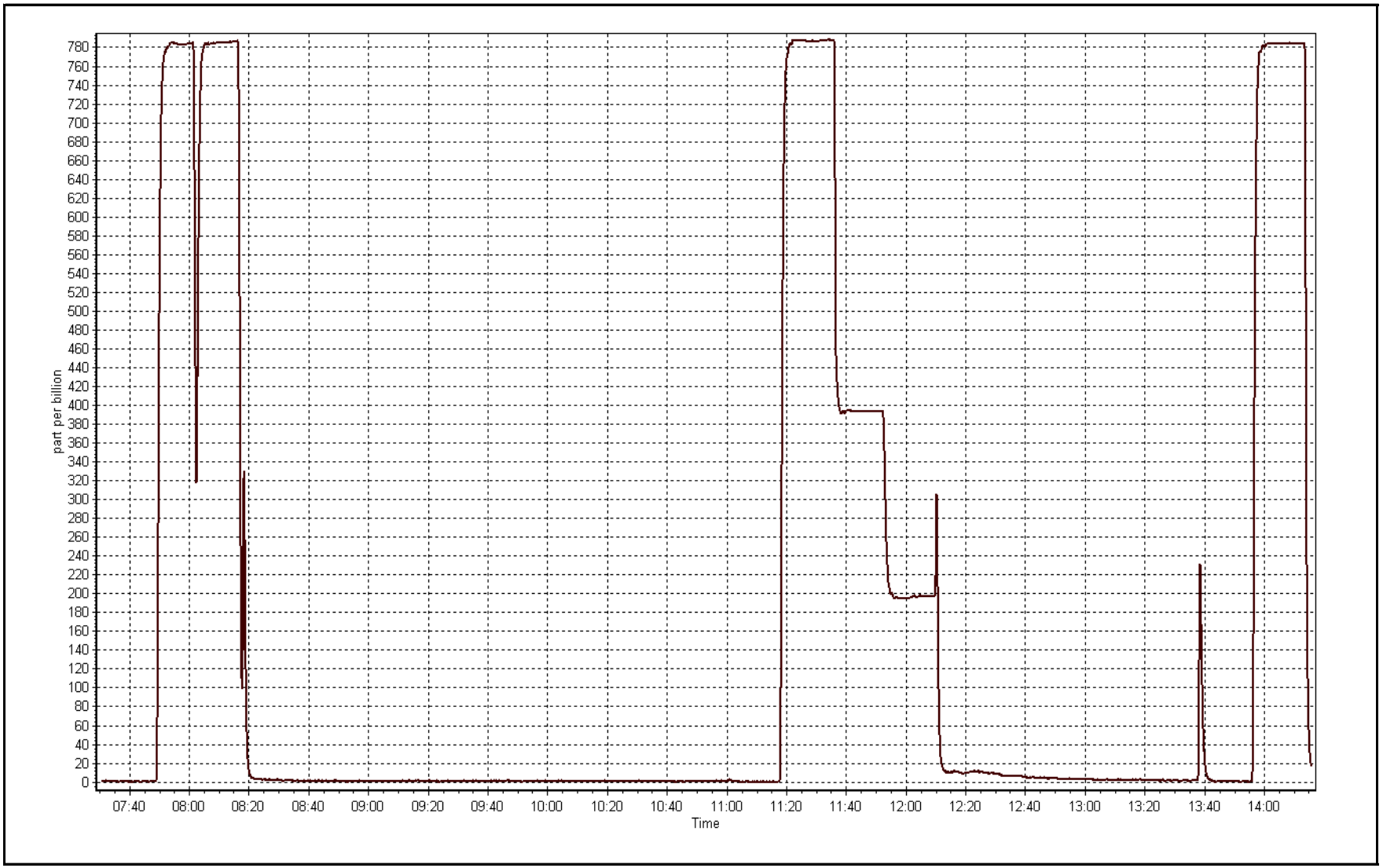
Calibration Date	April 5, 2016	Previous Calibration	March 3, 2016
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	7:33	End Time (MST)	14:16
Analyzer make	API T100	Analyzer serial #	599

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	----	Correlation Coefficient	1.000000
785.8	787.0	0.9985		
392.4	393.5	0.9973	Slope	0.998661
196.2	196.5	0.9985		
			Intercept	-0.219128



SO2 Calibration Plot Date: April 5, 2016



Wood Buffalo Environmental Association
TRS Calibration Report

Station Information

Calibration Date	April 18, 2016	Last Calibration	March 4, 2016
Station Name	Fort McKay South	Station Number	AMS 13
Reason:	Routine		
Start Time (MST)	8:45	End Time (MST)	11:18
Gas Cert Reference	CC178364	Station temp.	22 Deg C
Cal Gas Concentration	5.07 ppm	Cal Gas Exp Date	09/09/2017
Calibrator Make/Model	Sabio 4010	Serial Number	11041107
Dil air Make/Model	API 701	Serial Number	5613
DACS make/model	Campbell Scientific CR3000	DACS serial No.	1850
SO2 gas concentration	49.8 ppm	SO2 gas cert/exp	LL110515 8/Sep/18

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-727	-727
Analyzer IP address	192.168.1.44		Lamp voltage	1010	1010
Calculated slope	0.998198	0.994116	Chamber temp	45	45
Calculated intercept	0.420383	0.139234	Pressure	692.3	696.5
Analyzer Background	2.13	2.13	Flow	0.450	0.452
Analyzer Coefficient	1.038	1.038	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	-0.1	----
as found span	5000	78.9	80.0	80.3	0.996
SO2 scrubber check	5000	17.6	175.3	0.1	----
calibrator zero	5000	0.0	0.0	-0.1	----
high point	5000	78.9	80.0	80.3	0.996
second point	5000	39.4	40.0	40.2	0.994
third point	5000	19.7	20.0	19.8	1.009
as left zero	5000	0.0	0.0	-0.1	----
as left span	5000	78.9	80.0	80.6	0.993
				Average Correction Factor	1.000

Corrected As found	80.4	Previous response	79.7	% change	-0.8%

Notes:

no adjustments or maintenance done, filter changed out

Calibration Performed By: Melissa Lemay

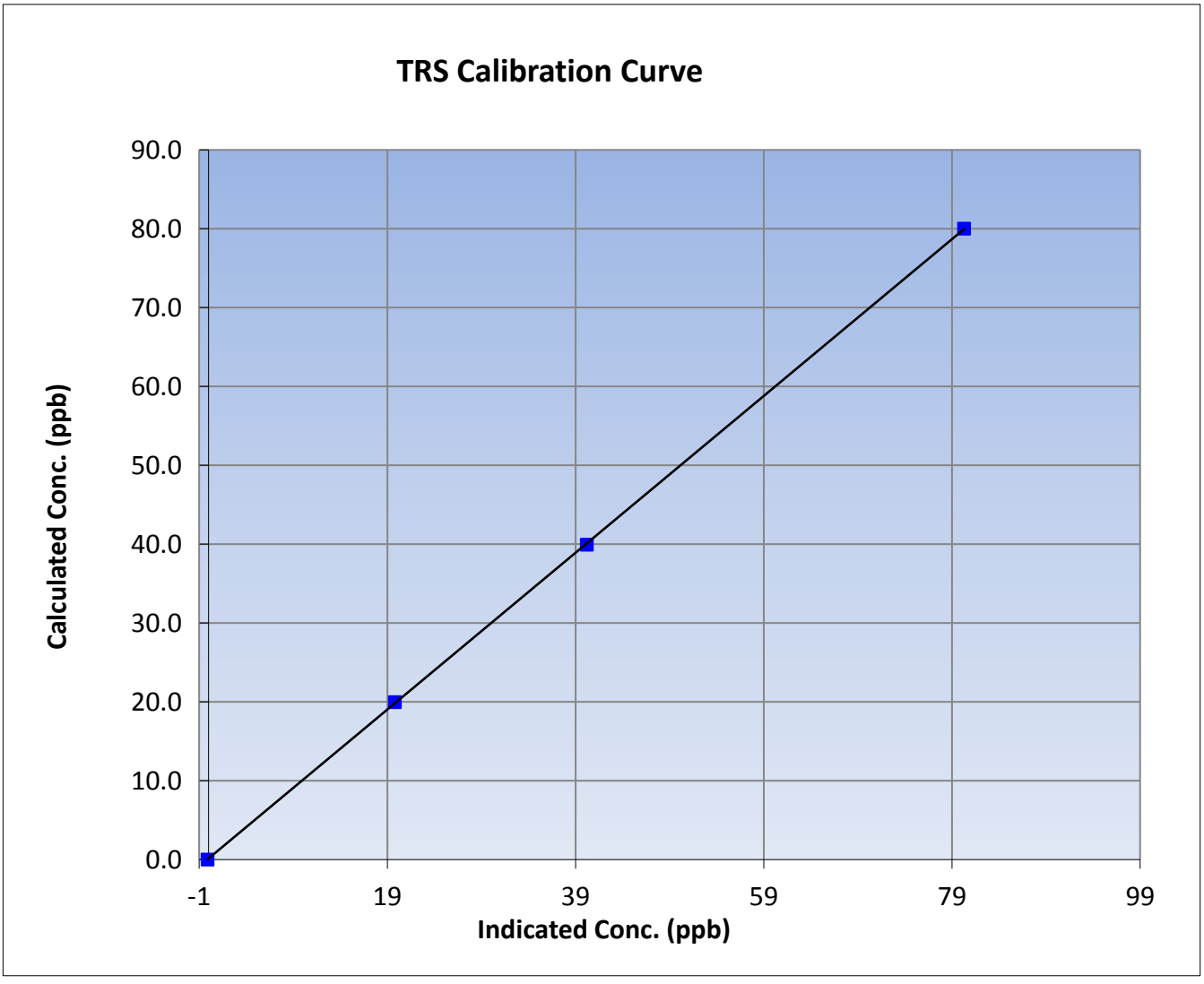
Wood Buffalo Environmental Association
TRS Calibration Report

Station Information

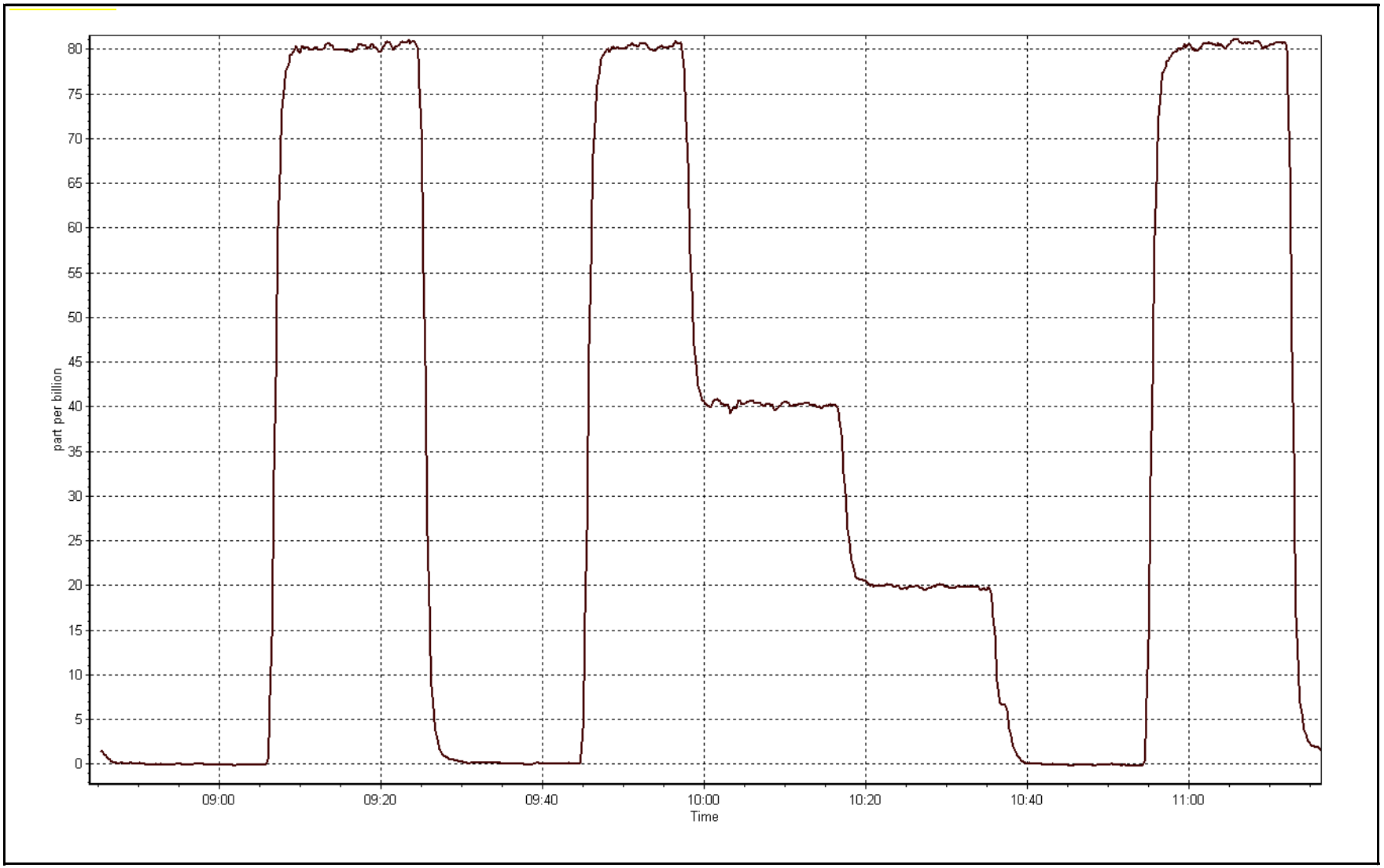
Calibration Date	April 18, 2016	Previous Calibration	March 4, 2016
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	8:45	End Time (MST)	11:18
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1218153359

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999986
80.0	80.3	0.9963		
40.0	40.2	0.9938	Slope	0.994116
20.0	19.8	1.0089		
			Intercept	0.139234



TRS Calibration Plot Date: April 18, 2016



Wood Buffalo Environmental Association
THC Calibration Report

Station Information

Calibration Date	April-05-16	Last Calibration	March-03-16
Station Name	Fort McKay South	Station Number	AMS 13
Reason:	Routine		
Start Time (MST)	7:33	End Time (MST)	14:16
Gas Cert Reference	LL110515	Cal Gas Expiry Date	08/09/2018
CH4 Cal Gas Conc.	517 ppm	CH4 Equiv Conc.	1067.0 ppm
C3H8 Cal Gas Conc.	200 ppm	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11041107
ZAG make/model	Teledyne API 701	Serial Number	5613
DACS make/model	Campbell Scientific CR3000	Serial Number	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	34.2	34.2
Calculated slope	1.002320	0.997903	Fuel Pressure	23.1	23.1
Calculated intercept	-0.012266	0.037695	Analyzer Coeff	3.137	3.294
			Analyzer BKG	1.310	1.440

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	0.08	----
as found span	5000	78.9	16.84	16.90	0.996
calibrator zero	5000	0.0	0.00	-0.02	----
high point	5000	78.9	16.84	16.84	1.000
second point	5000	39.4	8.41	8.39	1.002
third point	5000	19.7	4.20	4.15	1.013
as left zero	5000	0.0	0.00	0.01	----
as left span	5000	78.9	16.84	16.93	0.995
				Average Correction Factor	1.005

Corrected As found	16.82	Previous response	16.81	% change	-0.1%

Notes:

Pump rebuilt for preventative maintenance, zero and span adjusted, filter changed out

Calibration Performed By: Melissa Lemay

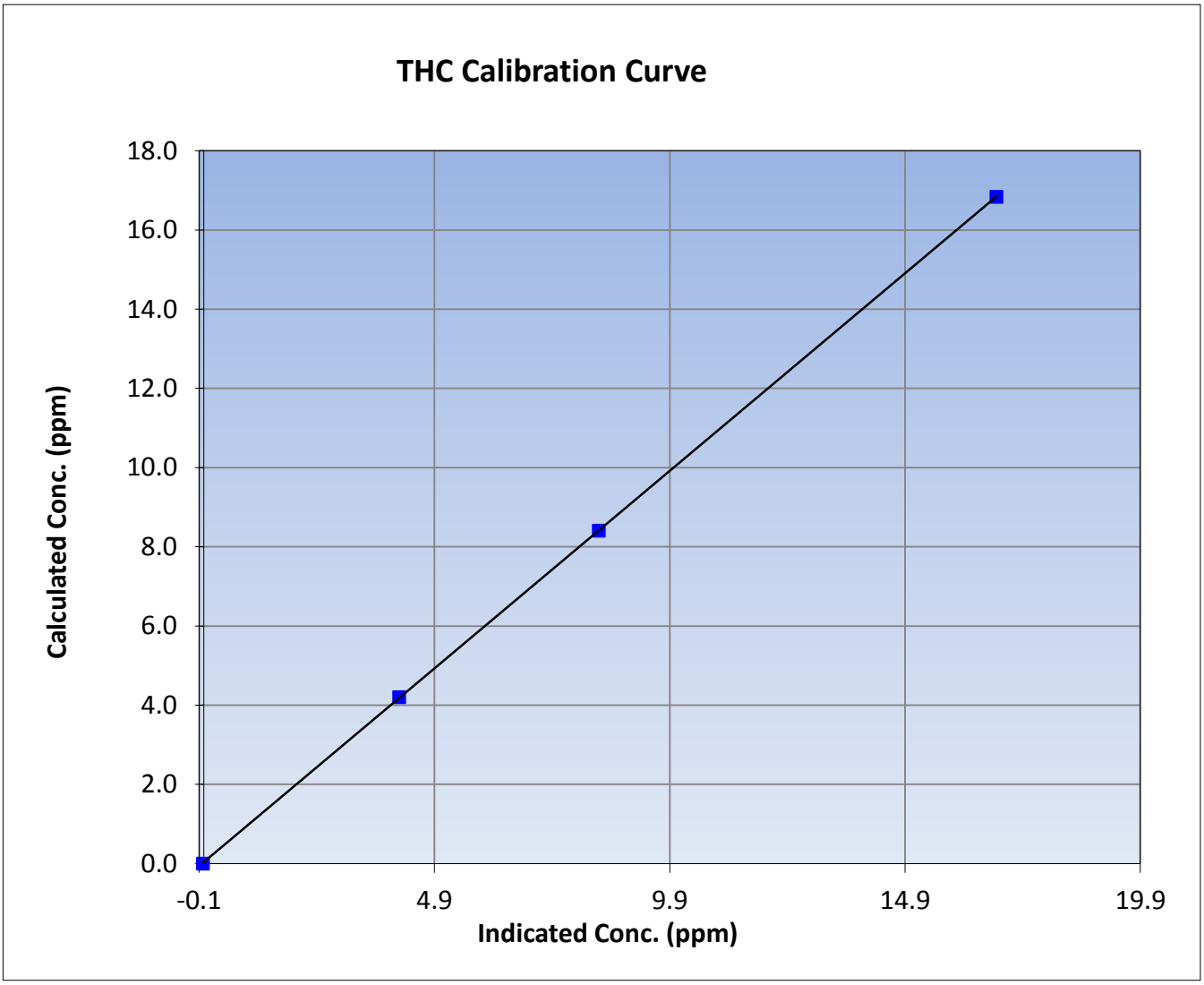
Wood Buffalo Environmental Association
THC Calibration Report

Station Information

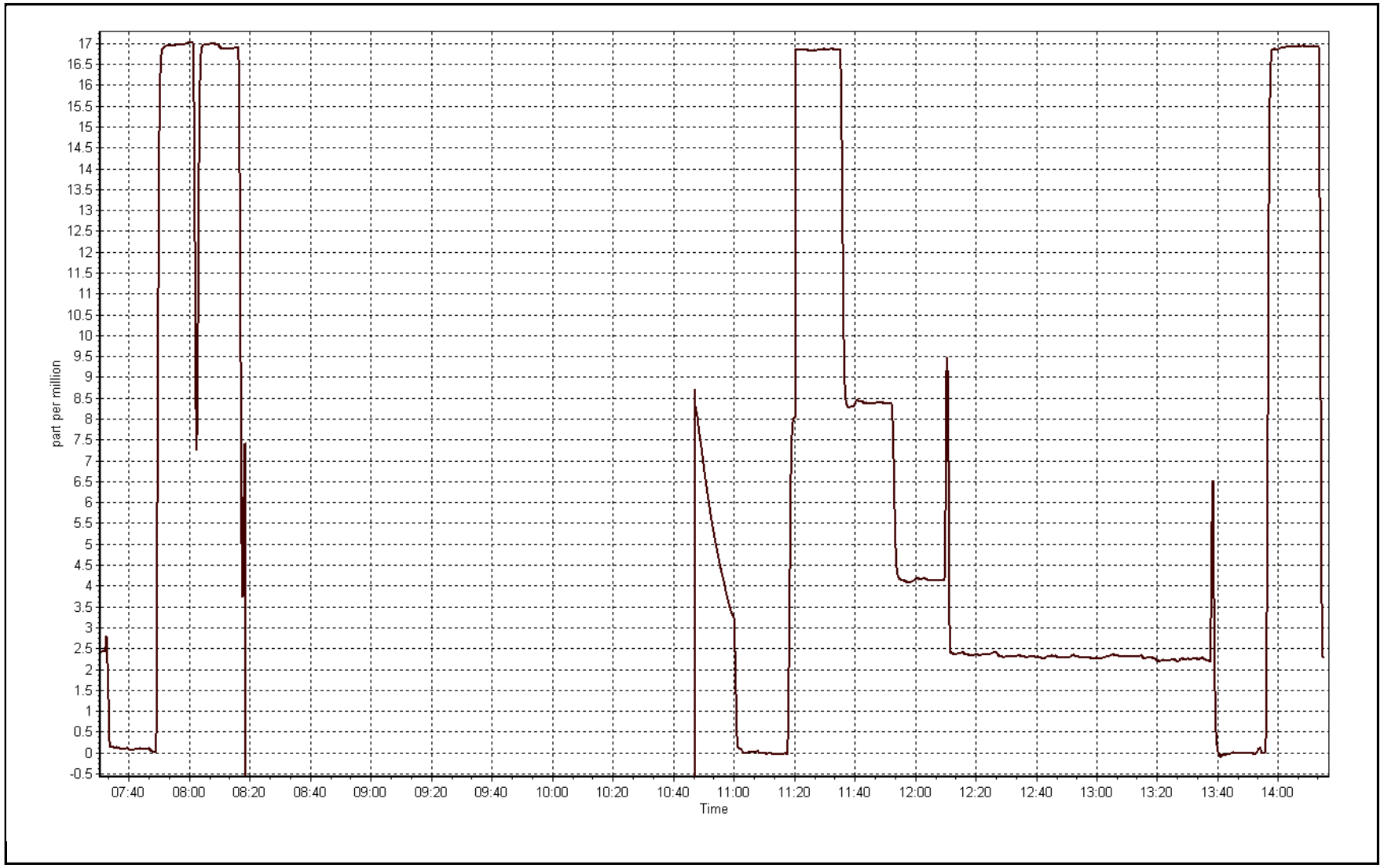
Calibration Date	April 5, 2016	Previous Calibration	March 3, 2016
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	7:33	End Time (MST)	14:16
Analyzer make	51i-LT	Analyzer serial #	1505164380

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	-0.02	----	Correlation Coefficient	0.999994
16.84	16.84	0.9998		
8.41	8.39	1.0021	Slope	0.997903
4.20	4.15	1.0130		
			Intercept	0.037695



THC Calibration Plot Date: April 5, 2016



Wood Buffalo Environmental Association
THC Calibration Report

W B E A

Station Information

Calibration Date	April-06-16	Last Calibration	April-05-16
Station Name	Fort McKay South	Station Number	AMS 13

Reason: Other: Drift since pump install on April 5

Start Time (MST)	10:02	End Time (MST)	16:10
Gas Cert Reference	LL110515	Cal Gas Expiry Date	08/09/2018
CH4 Cal Gas Conc.	517 ppm	CH4 Equiv Conc.	1067.0 ppm
C3H8 Cal Gas Conc.	200 ppm	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11041107
ZAG make/model	Teledyne API 701	Serial Number	5613
DACS make/model	Campbell Scientific CR3000	Serial Number	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	34.2	34.2
Calculated slope	0.997903	1.004906	Fuel Pressure	23.1	23.1
Calculated intercept	0.037695	0.034021	Analyzer Coeff	3.294	3.162
			Analyzer BKG	1.440	1.480

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	-0.07	----
as found span	5000	78.9	16.84	15.24	1.105
calibrator zero	5000	0.0	0.00	-0.03	----
high point	5000	78.9	16.84	16.71	1.008
second point	5000	39.4	8.41	8.37	1.005
third point	5000	19.7	4.20	4.12	1.020
as left zero	5000	0.0	0.00	-0.05	----
as left span	5000	78.9	16.84	16.88	0.997
				Average Correction Factor	1.011

Corrected As found	15.31	Previous response	16.83	% change	10.0%

Notes:

Re-calibrating because of drift since the pump change yesterday. After some troublshooting, changed out the pump again. Adjusted zero and span.

Calibration Performed By: Evan Magill

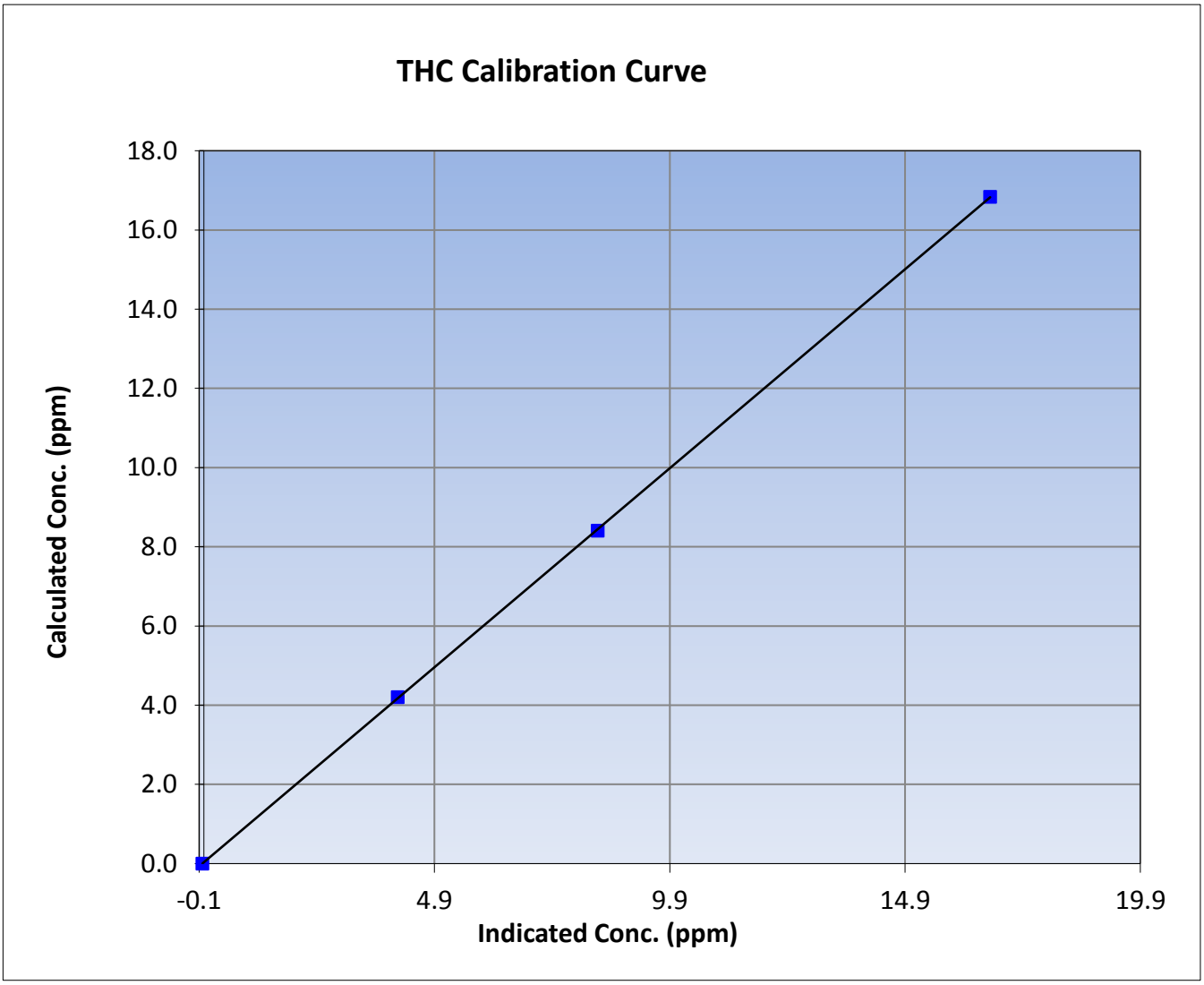
Wood Buffalo Environmental Association
THC Calibration Report

Station Information

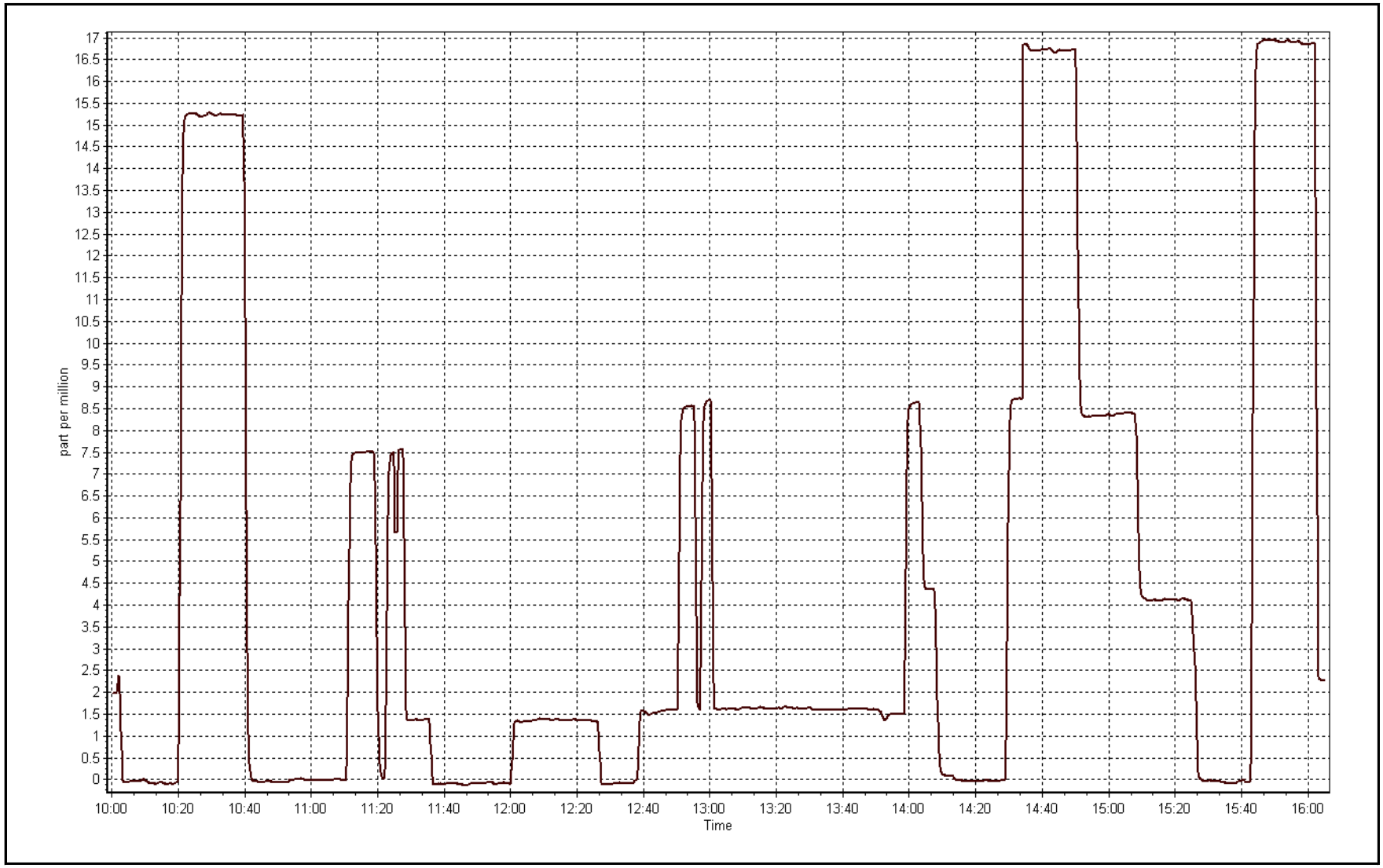
Calibration Date	April 6, 2016	Previous Calibration	April 5, 2016
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	10:02	End Time (MST)	16:10
Analyzer make	51i-LT	Analyzer serial #	1505164380

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	-0.03	----	Correlation Coefficient	0.999984
16.84	16.71	1.0076		
8.41	8.37	1.0045	Slope	1.004906
4.20	4.12	1.0204		
			Intercept	0.034021



THC Calibration Plot Date: April 6, 2016



Wood Buffalo Environmental Association
O_3 Calibration Report

W B E A

Station Information

Calibration Date	April 15, 2016	Previous Calibration	March 4, 2016
Station Name	Fort McKay South	Station Number	AMS 13
Reason:	Routine		
Start Time (MST)	9:50	End Time (MST)	12:46
NO2 GPT Ref date	April-15-15	Transfer Standard	NOX GPT
		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.	26.6	25.2
Analyzer IP address	192.168.1.79		Lamp temp.	58.0	58.0
Calculated slope	1.005041	1.001472	Pressure	26.6	26.7
Calculated intercept	0.624247	-0.527530	Flow	758.0	764.0
Analyzer Background	0.8	0.8	Intensity	2579.0	2549.3
Analyzer Coefficient	1.011	1.029			

Analyzer make	API T400	Analyzer serial #	825

Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator Lamp Intensity	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.00	0.0	0.3	----
as found span	5000	0.89	359.6	355.7	1.011
calibrator zero	5000	0.00	0.0	0.3	----
high point	5000	0.89	359.6	359.5	1.000
second point	5000	0.47	213.3	213.5	0.999
third point	5000	0.36	112.3	113.0	0.994
as left zero	5000	0.00	0.0	0.7	----
as left span	5000	0.89	359.6	369.9	0.972
				Average Correction Factor	0.998

Corrected As found	355.4	Previous response	357.2	% change	0.5%

Notes:

no maintenance done, filter changed out, span adjusted

Calibration Performed By: Melissa Lemay

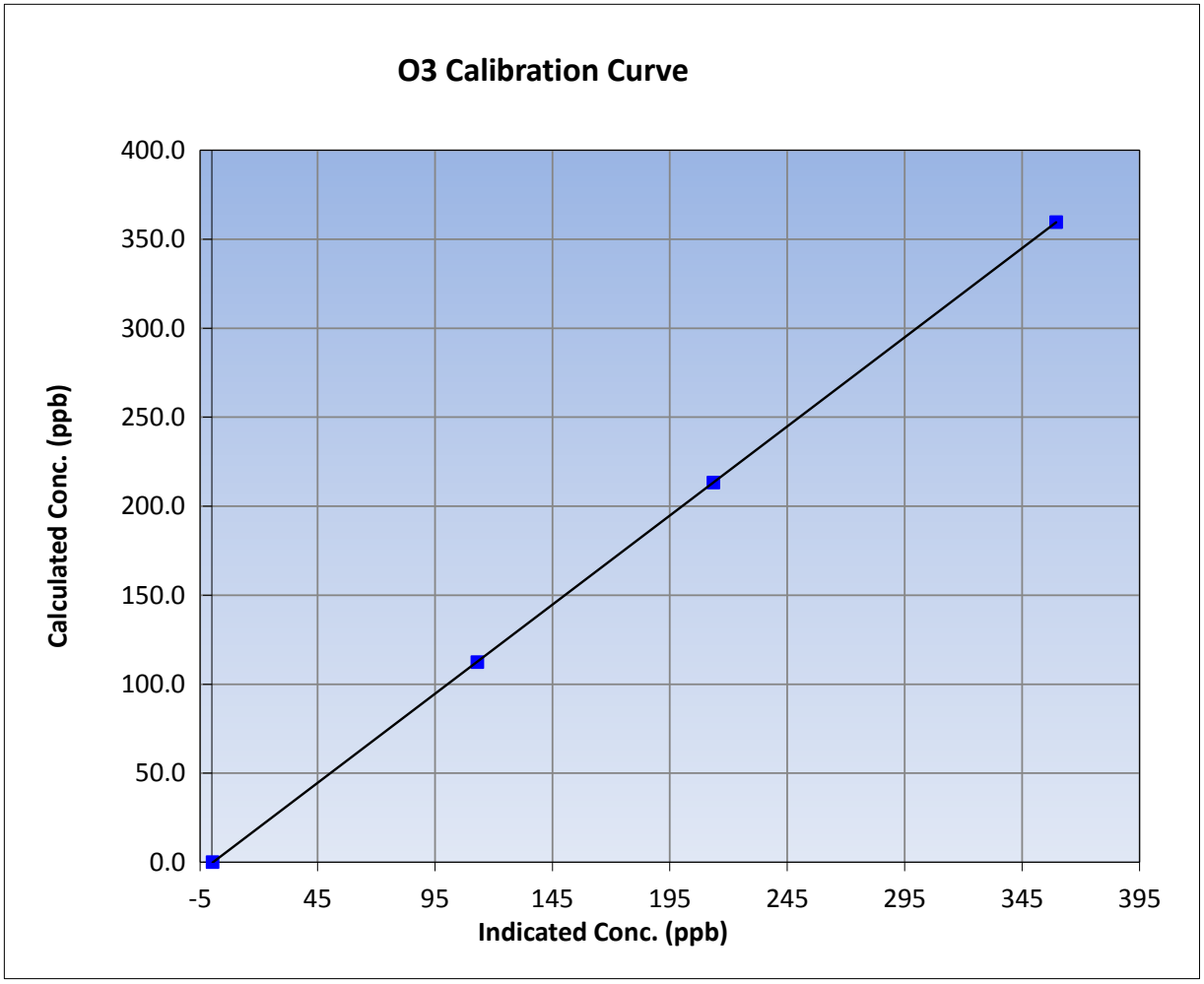
Wood Buffalo Environmental Association
O3 Calibration Report

Station Information

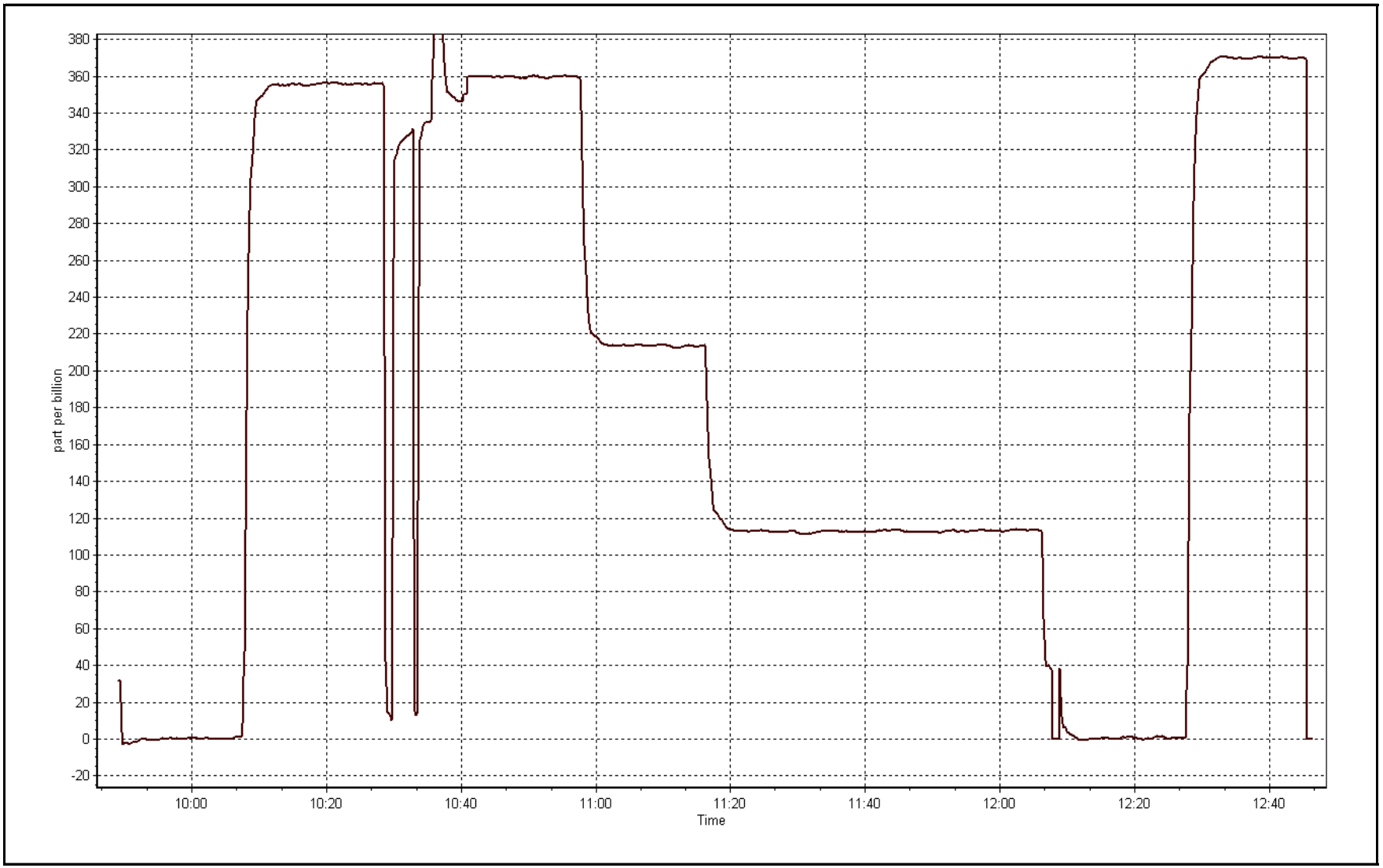
Calibration Date	April-15-16	Previous Calibration	March 4, 2016
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	9:50	End Time (MST)	12:46
Analyzer make	API T400	Analyzer serial #	825

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.3	----	Correlation Coefficient	0.999997
359.6	359.5	1.0003		
213.3	213.5	0.9991	Slope	1.001472
112.3	113.0	0.9938		
			Intercept	-0.527530



O3 Calibration Plot Date: April 15, 2016



Wood Buffalo Environmental Association
NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	April 5, 2016	Previous Calibration	March 3, 2016
Station Name	Fort McKay South	Station Number	AMS 13
Reason:	Routine		
Start Time (MST)	7:33	End Time (MST)	14:15
NO Cal Gas Conc	50.7 ppm	Gas Cert Reference	LL110515
NOx Cal Gas Conc	50.9 ppm	Cal Gas Expiry Date	08/09/2018
Calibrator	Sabio 4010	Serial Number	11041107
Zero air Generator	Teledyne API T701	Serial Number	5613

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	1850

Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	1.003129	1.002680	1.003509
	Data Offset	0.641387	0.421145	0.916642
Current Calibration	Data Slope	1.011116	1.011436	1.000963
	Data Offset	-0.102347	-0.101411	0.026417

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1410661329

Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
Analyzer IP	192.168.1.42		192.168.1.42	
NO coefficient	0.998		0.998	
NOX coefficient	1.002		1.002	
NO2 coefficient	1.000		1.000	
NO bkgrnd	7.5		7.4	
NOX bkgrnd	8.0		7.4	
Chamber Temp	50.3	Deg C	50.4	Deg C
Moly Temp	327.4	Deg C	326.8	Deg C
PMT voltage	-827.3	V	-827.3	V
PMT Temp	-2.9	Deg C	-3	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	177.6	mmHg	178.8	mmHg
R Cell Press Nox	177.6	mmHg	178.8	mmHg
NO sample flow	0.932	lpm	0.906	lpm
Nox sample Flow	0.932	lpm	0.906	lpm

Notes:

No maintenance done, zero adjusted, filter changed out'

Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: April 5, 2016 Station Number: AMS 13

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	-0.6	-0.1	-0.5	----	----
as found span	5000	78.9	803.2	800.0	3.2	796.0	792.8	3.3	1.0090	1.0091
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	----	----
high point	5000	78.9	803.2	800.0	3.2	794.5	791.1	3.4	1.0110	1.0113
second point	5000	39.4	401.1	399.5	1.6	396.6	394.9	1.7	1.0113	1.0117
third point	5000	19.7	200.5	199.8	0.8	198.7	198.0	0.7	1.0093	1.0089
as left zero	5000	0.0	0.0	0.0	0.0	0.2	0.0	0.2	----	----
as left span	5000	78.9	803.2	436.4	366.8	802.4	438.3	364.1	1.0010	0.9957
								Average Correction Factor	1.0105	1.0106

Corrcted As found NO_X= 796.6 NO= 792.9 Percent Change NO_X= 0.4% NO= 0.6%

Previous Response NO_X= 800.1 NO= 797.5

GPT Calibration Data

Dilution Flow (total) 5000 ccm Source Gas Flow 78.90 ccm NOX ref calc conc = 803.2 ppb NO ref calc conc = 800.0 ppb

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
1st NO ref point		3.2	795.7	792.9	0.0	1.0094	1.0090	----	----
1st NO2 (300)	436.4	359.7	795.6	436.4	359.1	1.0096	----	1.0015	99.8%
2nd NO2 (200)	581.7	214.4	796.3	581.7	214.6	1.0087	----	0.9989	100.1%
3rd NO2 (100)	681.7	114.4	795.5	681.7	113.9	1.0097	----	1.0040	99.6%
2nd NO ref point		3.2	794.9	792.2	2.7	1.0104	1.0099	----	----
				Average Correction Factor		1.0096		1.0015	99.9%

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

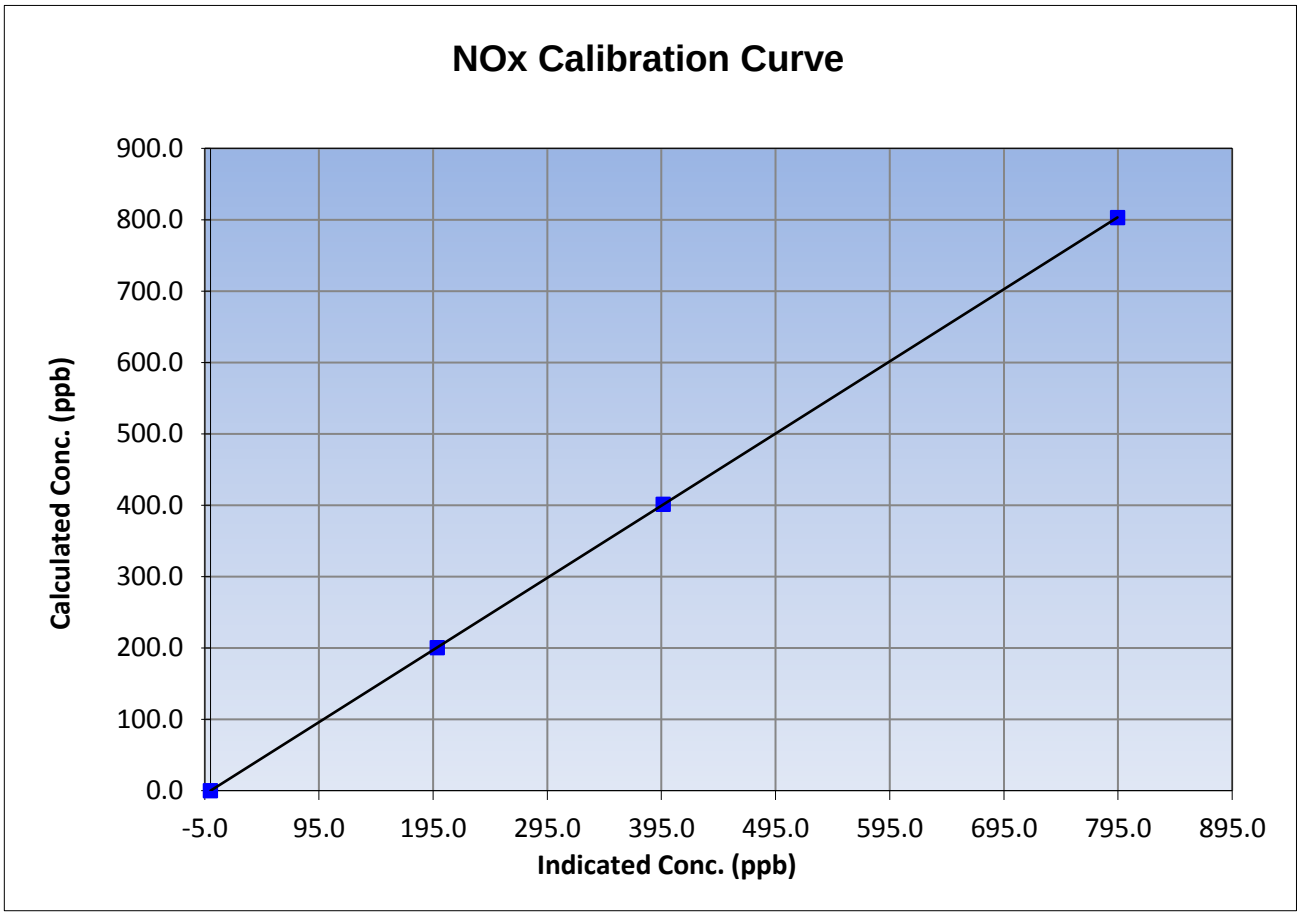
NO_X Calibration Summary

Station Information

Calibration Date	April 5, 2016	Previous Calibration	March 3, 2016
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	7:33	End Time (MST)	14:15
Analyzer make	Thermo 42i	Analyzer serial #	1410661329

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	1.000000
803.2	794.5	1.0110		
401.1	396.6	1.0113	Slope	1.011116
200.5	198.7	1.0093		
			Intercept	-0.102347



Wood Buffalo Environmental Association

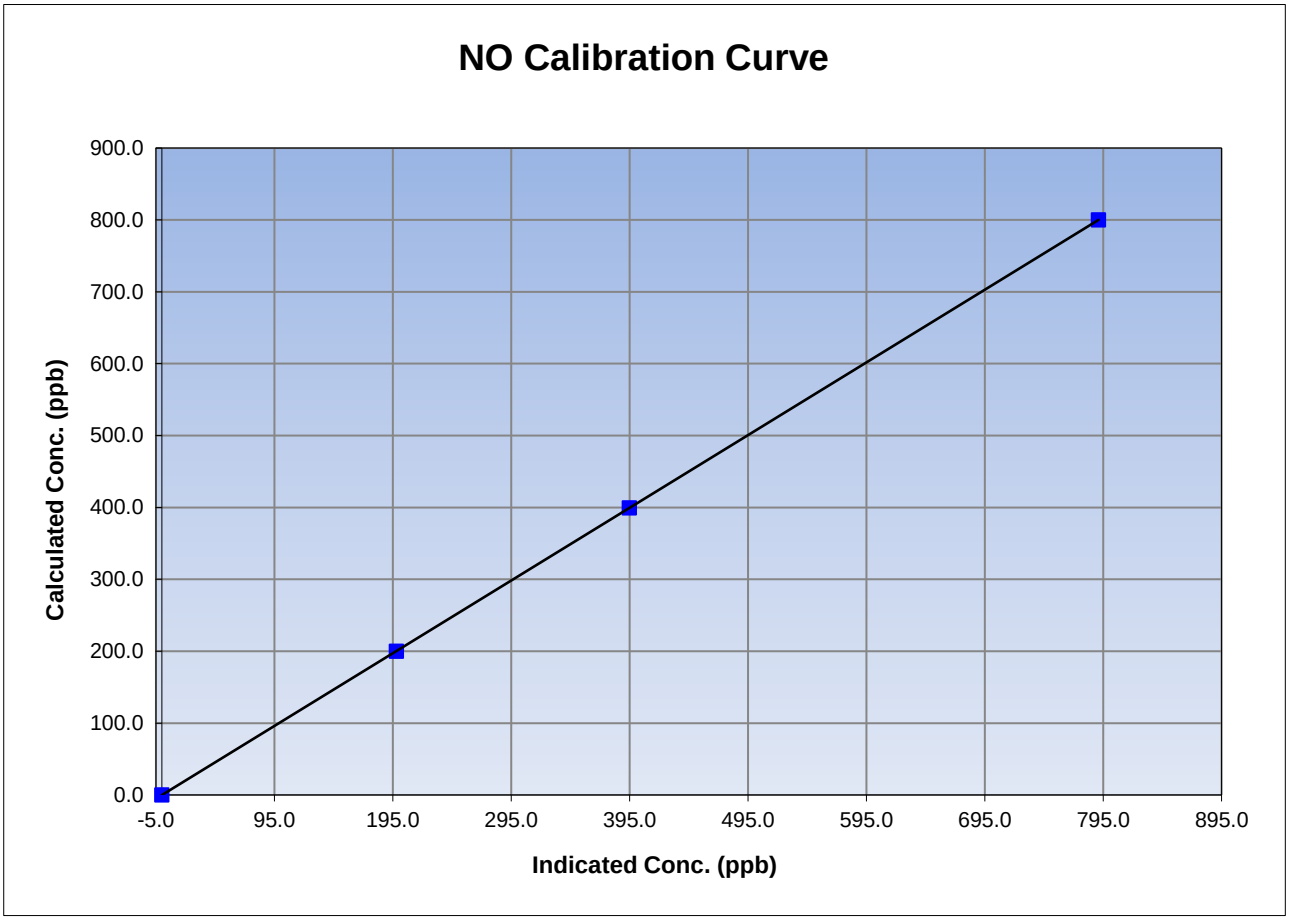
NO Calibration Summary

Station Information

Calibration Date	April 5, 2016	Previous Calibration	March 3, 2016
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	7:33	End Time (MST)	14:15
Analyzer make	Thermo 42i	Analyzer serial #	1410661329

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999999
800.0	791.1	1.0113		
399.5	394.9	1.0117	Slope	1.011436
199.8	198.0	1.0089		
			Intercept	-0.101411



Wood Buffalo Environmental Association

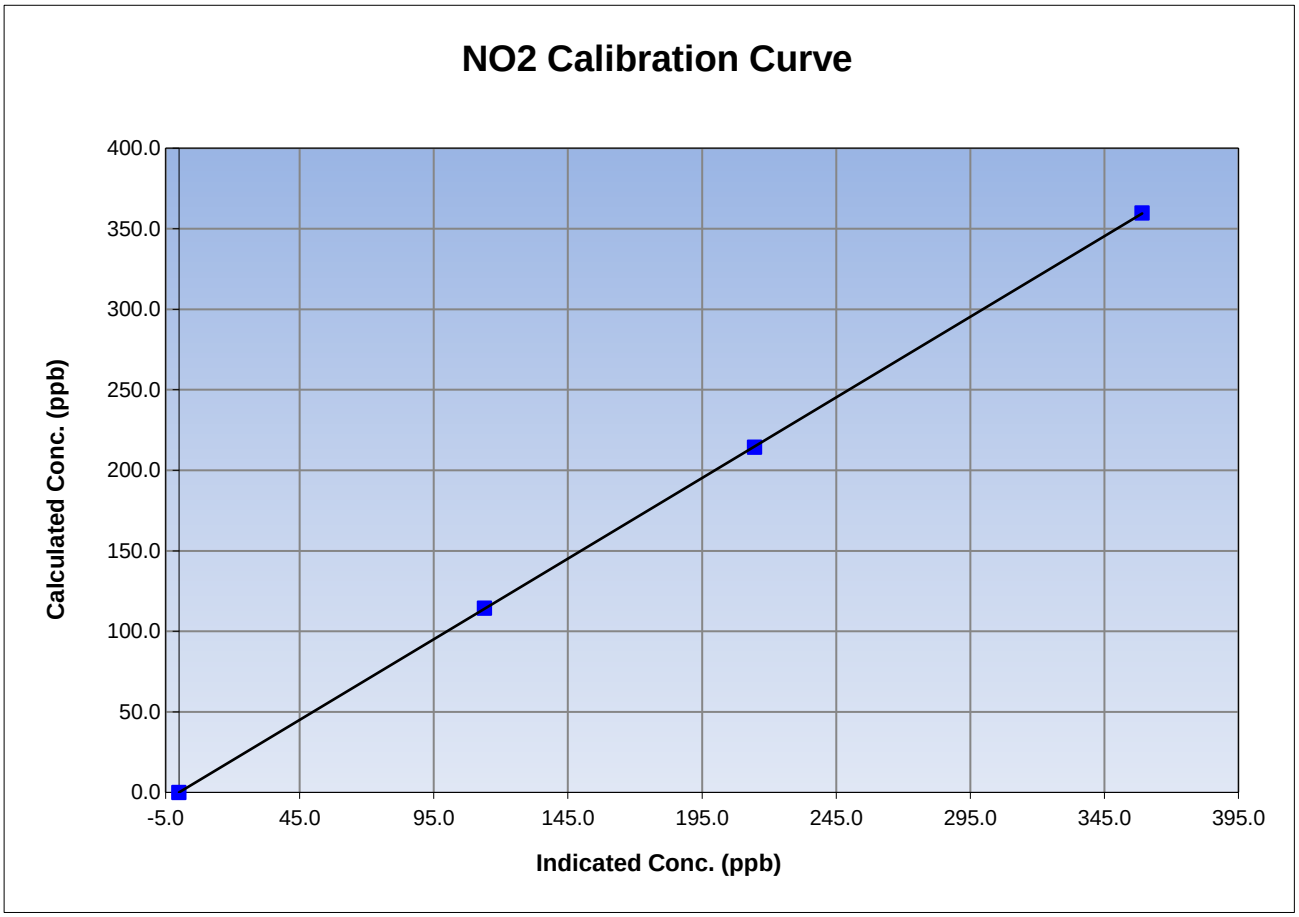
NO_2 Calibration Summary

Station Information

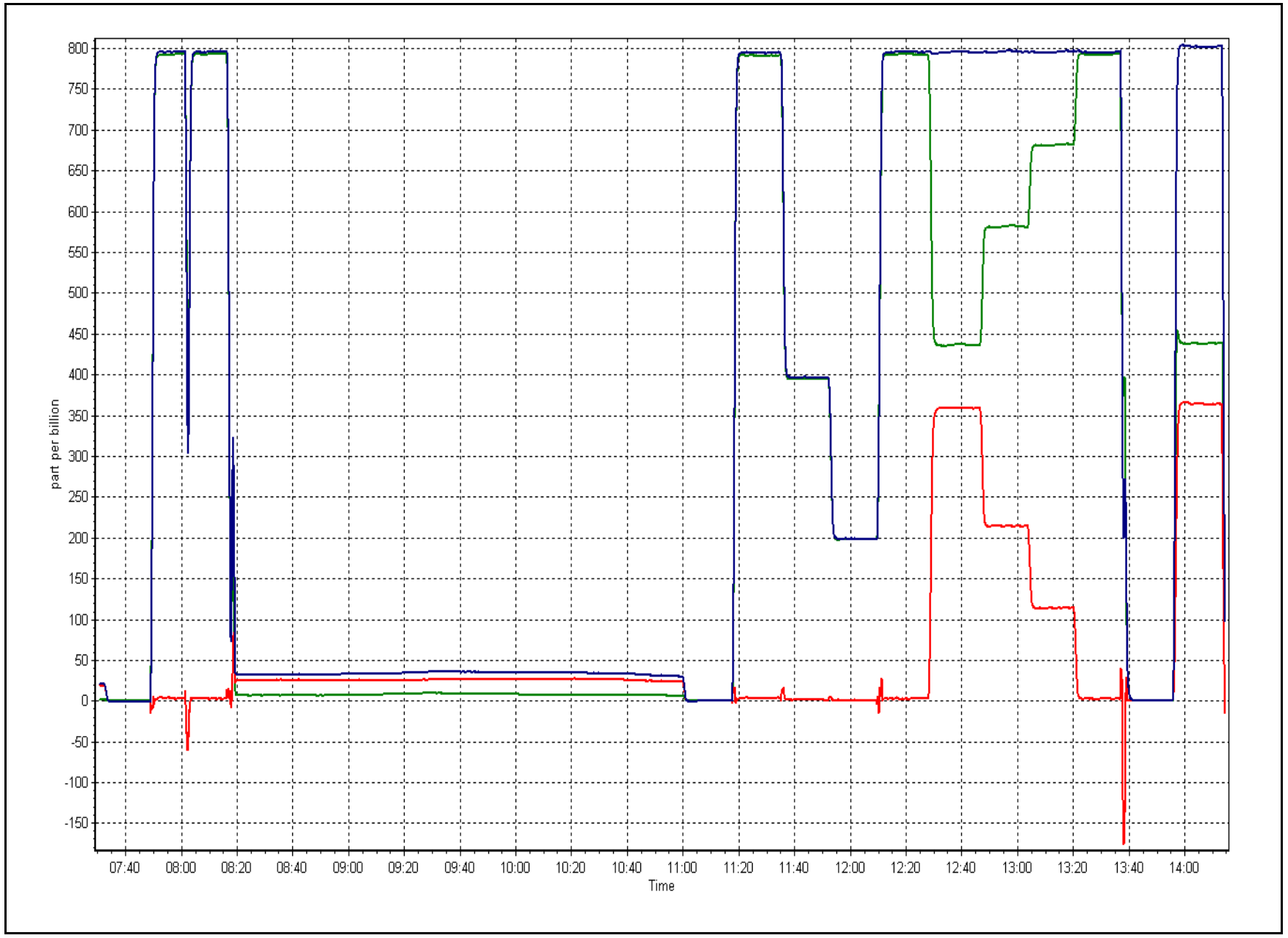
Calibration Date	April 5, 2016	Previous Calibration	March 3, 2016
Station Number	Fort McKay South	Station Number	AMS 13
Start Time (MST)	7:33	End Time (MST)	14:15
Analyzer make	Thermo 42i	Analyzer serial #	1410661329

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999995
359.7	359.1	1.0015		
214.4	214.6	0.9989	Slope	1.000963
114.4	113.9	1.0040		
			Intercept	0.026417



NOX Calibration Plot Date: April 5, 2016



Wood Buffalo Environmental Association
NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	April 15, 2016	Previous Calibration	April 5, 2016
Station Name	Fort McKay South	Station Number	AMS 13
Reason:	Routine		
Start Time (MST)	7:45	End Time (MST)	9:50
NO Cal Gas Conc	50.7 ppm	Gas Cert Reference	LL110515
NOx Cal Gas Conc	50.9 ppm	Cal Gas Expiry Date	08/09/2018
Calibrator	Sabio 4010	Serial Number	11041107
Zero air Generator	Teledyne API T701	Serial Number	5613

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	1850

Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	1.011116	1.011436	1.000963
	Data Offset	-0.102347	-0.101411	0.026417
Current Calibration	Data Slope	1.007150	1.008504	0.998900
	Data Offset	0.100715	0.100850	0.357861

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1410661329

Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
Analyzer IP	192.168.1.42		192.168.1.42	
NO coefficient	0.998		0.998	
NOX coefficient	1.002		1.002	
NO2 coefficient	1.000		1.000	
NO bkgrnd	7.4		7.4	
NOX bkgrnd	7.4		7.4	
Chamber Temp	50.4	Deg C	50.3	Deg C
Moly Temp	326.8	Deg C	326	Deg C
PMT voltage	-827.3	V	-827.3	V
PMT Temp	-3	Deg C	-2.9	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	178.8	mmHg	180.6	mmHg
R Cell Press Nox	178.8	mmHg	180.6	mmHg
NO sample flow	0.906	lpm	0.909	lpm
Nox sample Flow	0.906	lpm	0.909	lpm

Notes:

GPT for O3 calibration

Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: April 15, 2016 Station Number: AMS 13

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
as found span	5000	78.9	803.2	800.0	3.2	797.4	793.2	4.2	1.0073	1.0086
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
high point	5000	78.9	803.2	800.0	3.2	797.4	793.2	4.2	1.0073	1.0086
second point										
third point										
as left zero	5000	0.0	0.0	0.0	0.0	0.2	0.1	0.1	----	----
as left span										
								Average Correction Factor	1.0073	1.0086

Corrcted As found NO_X= 797.5 NO= 793.3 Percent Change NO_X= -0.4% NO= -0.3%

Previous Response NO_X= 794.5 NO= 791.1

GPT Calibration Data

Dilution Flow (total) 5000 ccm Source Gas Flow 78.90 ccm NOX ref calc conc = 803.2 ppb NO ref calc conc = 800.0 ppb

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
1st NO ref point		3.2	797.4	793.2	0.0	1.0073	1.0086	----	----
1st NO2 (300)	433.6	362.8	796.8	433.6	363.1	1.0080	----	0.9991	100.1%
2nd NO2 (200)	579.9	216.5	795.8	579.9	216.0	1.0093	----	1.0021	99.8%
3rd NO2 (100)	680.9	115.5	795.8	680.9	114.9	1.0093	----	1.0048	99.5%
2nd NO ref point		3.2	796.2	793.3	3.0	1.0088	1.0085	----	----
				Average Correction Factor		1.0089		1.0020	99.8%

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

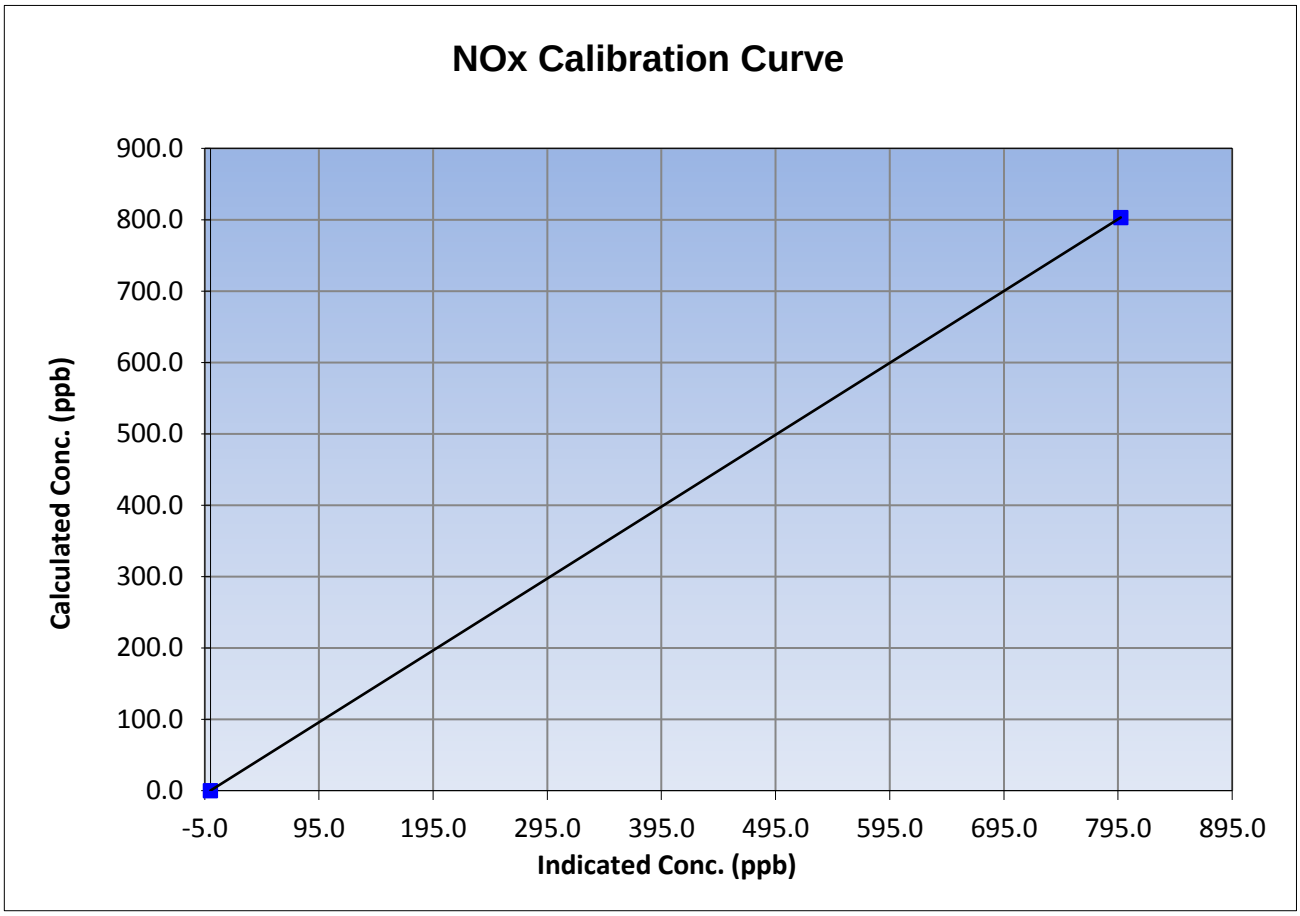
NO_X Calibration Summary

Station Information

Calibration Date	April 15, 2016	Previous Calibration	April 5, 2016
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	7:45	End Time (MST)	9:50
Analyzer make	Thermo 42i	Analyzer serial #	1410661329

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	1.000000
803.2	797.4	1.0073		
			Slope	1.007150
			Intercept	0.100715



Wood Buffalo Environmental Association

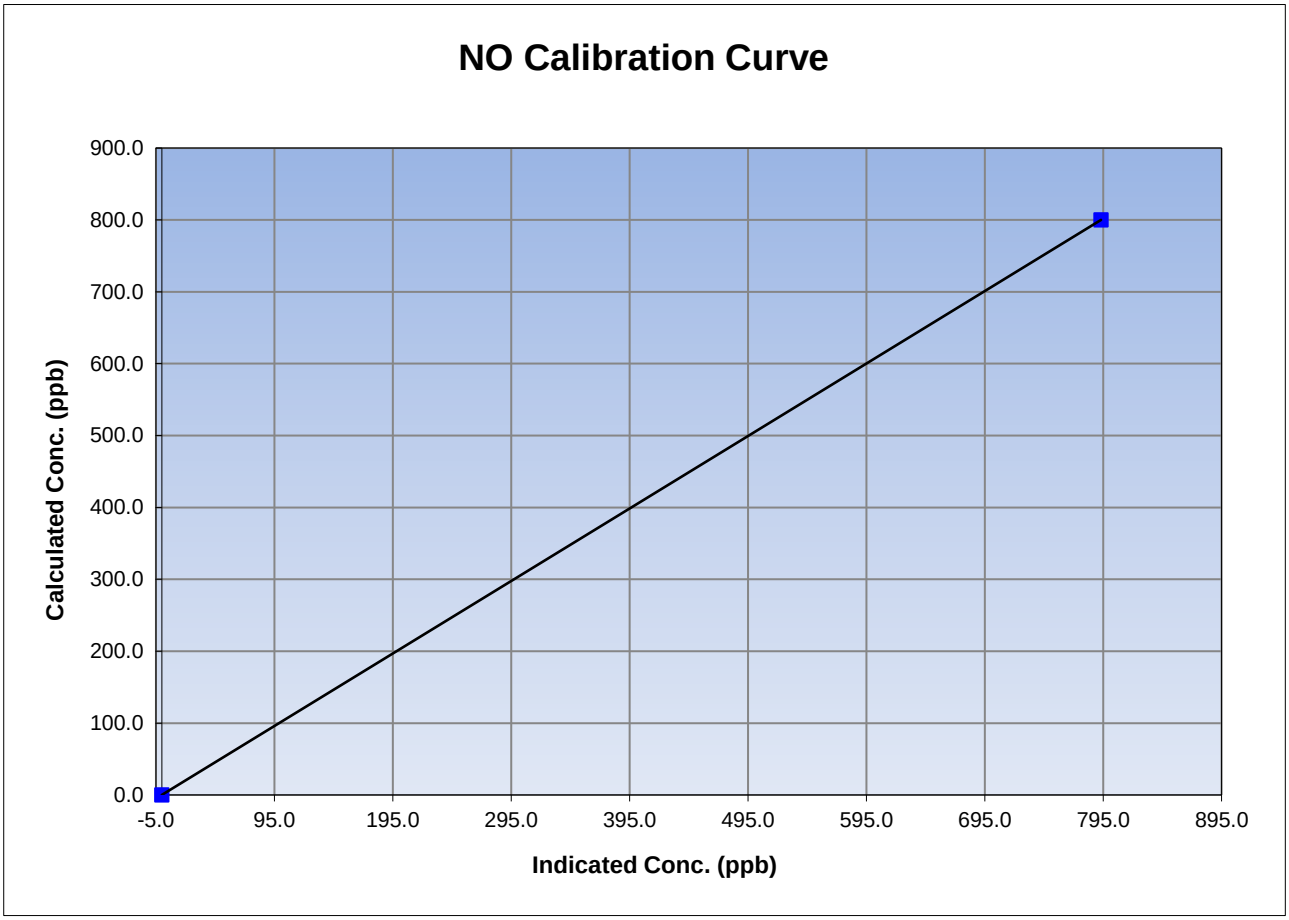
NO Calibration Summary

Station Information

Calibration Date	April 15, 2016	Previous Calibration	April 5, 2016
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	7:45	End Time (MST)	9:50
Analyzer make	Thermo 42i	Analyzer serial #	1410661329

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	1.000000
800.0	793.2	1.0086		
			Slope	1.008504
			Intercept	0.100850



Wood Buffalo Environmental Association

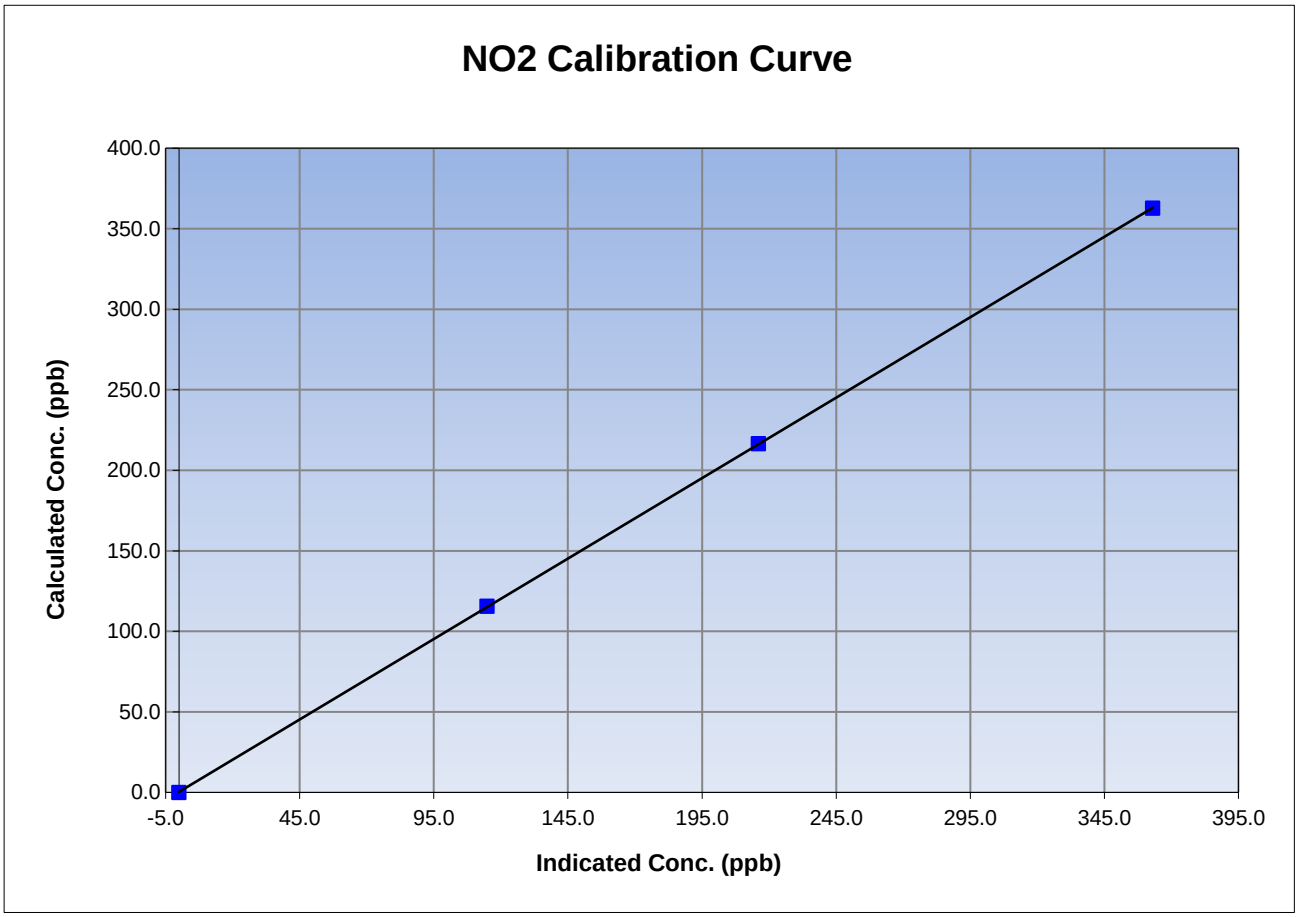
NO_2 Calibration Summary

Station Information

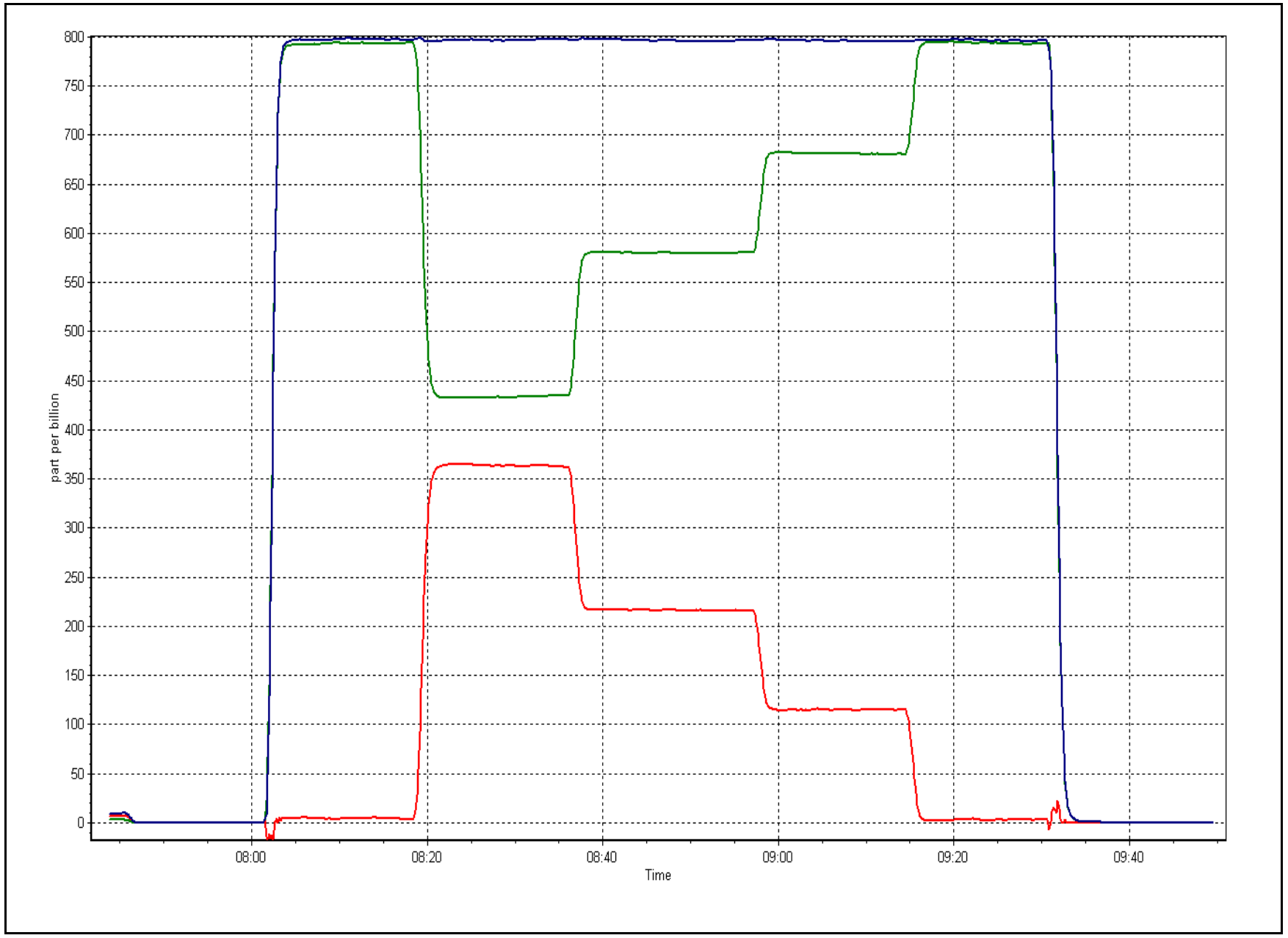
Calibration Date	April 15, 2016	Previous Calibration	April 5, 2016
Station Number	Fort McKay South	Station Number	AMS 13
Start Time (MST)	7:45	End Time (MST)	9:50
Analyzer make	Thermo 42i	Analyzer serial #	1410661329

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999994
362.8	363.1	0.9991		
216.5	216.0	1.0021	Slope	0.998900
115.5	114.9	1.0048		
			Intercept	0.357861



NOX Calibration Plot Date: April 15, 2016



Wood Buffalo Environmental Association

SHARP CALIBRATION

STATION INFORMATION

Calibration Date:	April 18, 2016	Previous Calibration:	March 4, 2016
Station Name:	Fort McKay South	Station Number:	AMS 13
Start Time (MST):	11:11	End Time (MST):	12:23
Calibrator Make/Model:	Delta Cal	Calibrator Serial Number:	1097

SHARP INFORMATION

Particulate Fraction:	PM2.5								
Make/Model:	Thermo / SHARP 5030								
Serial Number	E-803								
C_{14} Source SN:	4066								
Confirmation of Time settings:	Yes ☑	No ☐							
Paremeters Checked:	T1 ☑	T2 ☐	T3 ☐	T4 ☐	P3 ☑	Main Flow ☑	Beta ☐	Neph ☑	

CALIBRATION DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	21.0	22.6	1.6	21.0
T2	24.0	na	na	24.0
T3	23.0	na	na	23.0
T4	24.0	na	na	24.0
RH (%)	30.0	na	na	30.0

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	984	986.0	2.0	984

Main Flow (Lph)

Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
1000	985	-15	1000	1000

Nephalometer Calibration

Parameter	As Founds	Zeroed (Limit +or- 2.0ug/m3)	As Left
Analog	413		417
Neph	11.2		-0.4
C14	18.9		10.4
Indicated Concentration (ug/m3)	**3.1**	**Yes**	**-0.1**
Offset 1	418.2		418.7
Offset 2	54		53.8

Leak Check (Quarterly)

Leak Check Date:	April 18, 2015	Previous Leak Check Date:	March 4, 2015

	Measured	Difference LPM (Limit +/- 0.42 LPM)
Flow without adaptor (LPM):	16.45	-0.05
*Flow with adaptor (LPM):	16.50	

**Note - do not attach adaptor without shutting off the pump first*

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	18/04/2016
Pump	Good	
Filter Tape	Good	28/09/2015
Mass Foil Cal Set	na	
HEPA filter	Good	

NOTES:

Nepholometer adjusted; Nepholometer at 3.1ug/m3, leak check done passed, F&Z done Nepholometer reading 3.1ug/m3, cycles look good on tape, Flow adjusted, Sample head cleaned

Calibration Performed By: **Melissa Lemay**

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 14
ANZAC
APRIL 2016

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

May 27, 2016

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ANZAC (AMS 14)
APRIL 2016

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	683	35	37	99.72	4	0	1	0
TRS(ppb) Average	685	33	35	99.72	1	0	0	0
THC(ppm) Average	651	39	69	95.83	2.2	-	2	-
NMHC(ppm) Average	651	39	69	95.83	0.014	-	0.001	-
CH4(ppm) Average	651	39	69	95.83	2.2	-	2	-
NO2(ppb) Average	683	35	37	99.72	13	0	3	-
NO(ppb) Average	683	35	37	99.72	6	-	1	-
NOX(ppb) Average	683	35	37	99.72	17	-	3	-
O3(ppb) Average	686	33	34	99.86	64	0	54	-
PM2.5(ug/m3) Average	719	1	1	100.00	14.7	-	5.3	0
AT 2m(C) Average	720	0	0	100.00	25.7	-	16.7	-
RH(%) Average	720	0	0	100.00	99	-	93	-
Leaf Wetness (% of range) Average	719	0	1	99.86	67	-	20	-
WS(km/h) Average	691	0	29	95.97	29	-	16	-
WD(deg) Average	691	0	29	95.97	-	-	-	-
PC(mm) Total	720	0	0	100.00	1	-	2	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ANZAC (AMS 14)
APRIL 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

					Percentile						
Parameter	Number	Mean	StnDev	Total	Min	P10	Q1	Median	Q3	P90	Max
SO2(ppb) Average	683	0.4	0	-	0	0	0	0	0	1	4
TRS(ppb) Average	685	0.2	0	-	0	0	0	0	0	0	1
THC(ppm) Average	651	1.95	0	-	1.9	1.9	1.9	1.9	2	2	2.2
NMHC (ppm) Average	651	0	0.001	-	0	0	0	0	0	0	0.014
CH4(ppm) Average	651	1.95	0	-	1.9	1.9	1.9	1.9	2	2	2.2
NO2(ppb) Average	683	1.2	1	-	0	0	0	1	2	2	13
NO(ppb) Average	683	0.2	0	-	0	0	0	0	0	1	6
NOX(ppb) Average	683	1.3	2	-	0	0	0	1	2	3	17
O3(ppb) Average	686	37.8	9	-	4	26	33	38	43	49	64
PM2.5(ug/m3) Average	719	3.2	1.7	-	0.3	1.6	2	2.7	4.1	5.5	14.7
Temperature 2 m (C) Average	720	3.91	7.5	-	-11.2	-5.6	-1.2	2.8	8.3	16.1	25.7
Relative Humidity (%) Average	720	57.1	23	-	12	26	37	58	75	90	99
Leaf Wetness (% of range) Average	719	1.9	8	-	-1	-1	0	0	0	4	67
Wind Speed 20 m (km/h) Average	691	9.6	4	-	1	5	6	9	12	16	29
Wind Direction 20 m (deg) Average	691	-	-	-	-	-	-	-	-	-	-
Precipitation (mm) Total	720	-	-	4.32	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ANZAC (AMS 14)
APRIL 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2, THC, NO2	02 Apr 2016 11:00	02 Apr 2016 11:00	1	Maintenance - reinitiated daily QA check
SO2, THC, NO2	10 Apr 2016 12:00	10 Apr 2016 12:00	1	Maintenance - reinitiated daily QA check
TRS	02 Apr 2016 12:00	02 Apr 2016 12:00	1	Maintenance - reinitiated daily QA check
TRS, O3	10 Apr 2016 13:00	10 Apr 2016 13:00	1	Maintenance - reinitiated daily QA check
CH4, NMHC, THC	11 Apr 2016 12:00	12 Apr 2016 11:00	24	Maintenance - upgrade carrier gas system and stabilization
CH4, NMHC, THC	20 Apr 2016 08:00	20 Apr 2016 08:00	1	Maintenance - reinitiated daily QA check
CH4, NMHC, THC	25 Apr 2016 09:00	25 Apr 2016 09:00	1	Maintenance - reinitiated daily QA check
CH4, NMHC, THC	25 Apr 2016 12:00	25 Apr 2016 13:00	2	Maintenance - adjust span response
Surface Leaf Wetness	04 Apr 2016 10:00	04 Apr 2016 10:00	1	Maintenance - function check
Wind Speed, Wind Direction	07 Apr 2016 05:00	07 Apr 2016 10:00	6	Flat line in sensor output signal -sensor frozen
Wind Speed, Wind Direction	14 Apr 2016 00:00	14 Apr 2016 00:00	1	Flat line in sensor output signal -sensor frozen
Wind Speed, Wind Direction	14 Apr 2016 02:00	14 Apr 2016 12:00	11	Flat line in sensor output signal -sensor frozen
Wind Speed, Wind Direction	14 Apr 2016 21:00	15 Apr 2016 07:00	11	Flat line in sensor output signal -sensor frozen

Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO_2) - ppb

Anzac - April 2016

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

Maximum Value: 4 ppb on Apr 12 08:00 Maximum Daily Average: 0.9 ppb on Apr 9

Minimum Value: 0 ppb on Apr 22 17:00 Minimum Daily Average: 0.1 ppb on Apr 22

Maximum Diurnal Average: 0.6 ppb at hour 11 Minimum Diurnal Average: 0.3 ppb at hour 23

Monthly Average: 0.4 ppb Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 1$ $P_{99} = 2$

Hours in Service:	720
Hours of Data:	683
Hours of Missing Data:	37
Hours of Calibration:	35
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-Apr	0	Z	0	0	0	0	1	1	0	0	0	0	0	1	1	2	0	0	0	0	0	0	1	1	0.5	2
2-Apr	1	1	Z	1	1	0	1	1	1	0	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
3-Apr	0	0	0	Z	2	3	2	1	0	0	0	0	0	0	1	2	1	0	0	0	0	0	0	0	0.7	3
4-Apr	0	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
5-Apr	0	0	0	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
6-Apr	Z	0	0	0	0	0	0	1	1	1	2	1	0	0	0	0	0	2	2	2	0	0	0	0	0.7	2
7-Apr	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0.3	1
8-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	0	1	1	0	1	1	1	0	0.4	1
9-Apr	0	1	1	Z	1	1	1	1	2	2	2	2	1	2	2	1	0	0	0	0	0	0	0	0	0.9	2
10-Apr	0	0	0	0	Z	0	0	0	0	0	0	M	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
11-Apr	0	0	0	0	1	Z	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0.4	1
12-Apr	Z	0	0	0	0	0	0	4	2	1	1	2	1	1	1	0	0	0	0	0	0	0	0	0	0.8	4
13-Apr	0	Z	0	0	0	0	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
14-Apr	0	0	Z	0	0	0	0	0	2	2	3	3	2	1	0	0	0	0	0	0	1	1	0	1	0.8	3
15-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.3	1
16-Apr	1	1	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
17-Apr	0	0	0	0	0	Z	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1
18-Apr	Z	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1	1	0.3	1
19-Apr	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
20-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
21-Apr	0	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
22-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
23-Apr	0	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
24-Apr	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0.4	1
25-Apr	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
26-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
27-Apr	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
28-Apr	0	0	0	0	Z	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0.4	1
29-Apr	1	1	1	1	1	Z	1	1	1	1	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0.5	1
30-Apr	Z	0	0	0	0	0	0	0	0	1	1	1	0	0	1	1	1	1	0	0	0	0	0	0	0.4	1
	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.6	0.5	0.6	0.6	0.4	0.4	0.4	0.4	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.3	Diurnal Average	
	1	1	1	1	2	3	2	4	2	2	3	3	2	2	2	2	1	2	2	2	1	1	1	1	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance

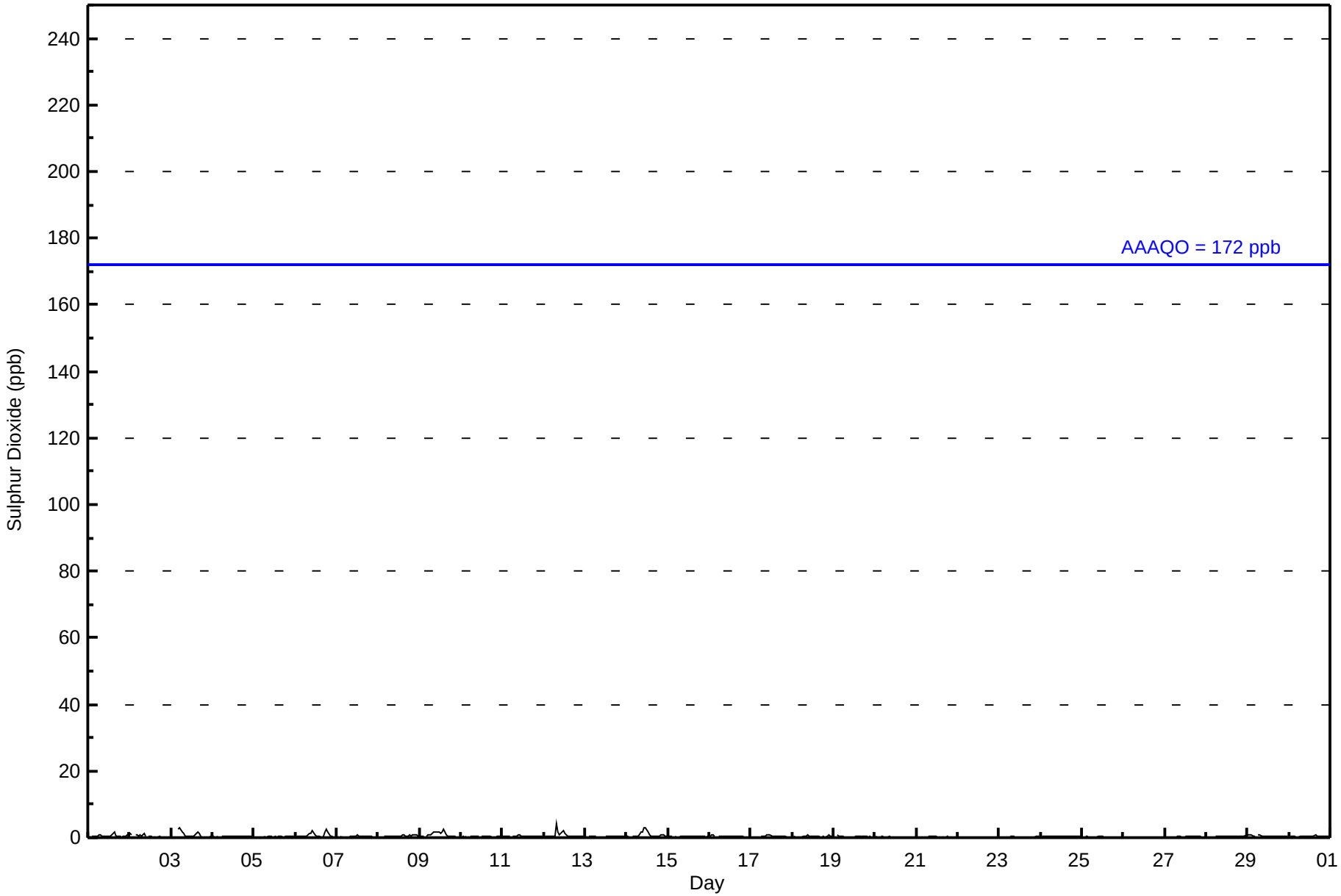
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb

Wood Buffalo Environmental Association

Hourly Averages

Sulphur Dioxide (SO_2) - ppb

Anzac - April 2016



Sulphur Dioxide (SO_2) - ppb

Anzac - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	683	100.00	100.00
11 - 20	0	0.00	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 683

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

Anzac - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 10	51	12	14	22	50	51	74	64	95	48	37	19	19	36	21	43	656
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	51	12	14	22	50	51	74	64	95	48	37	19	19	36	21	43	656

Total Number of Valid Hours: 656

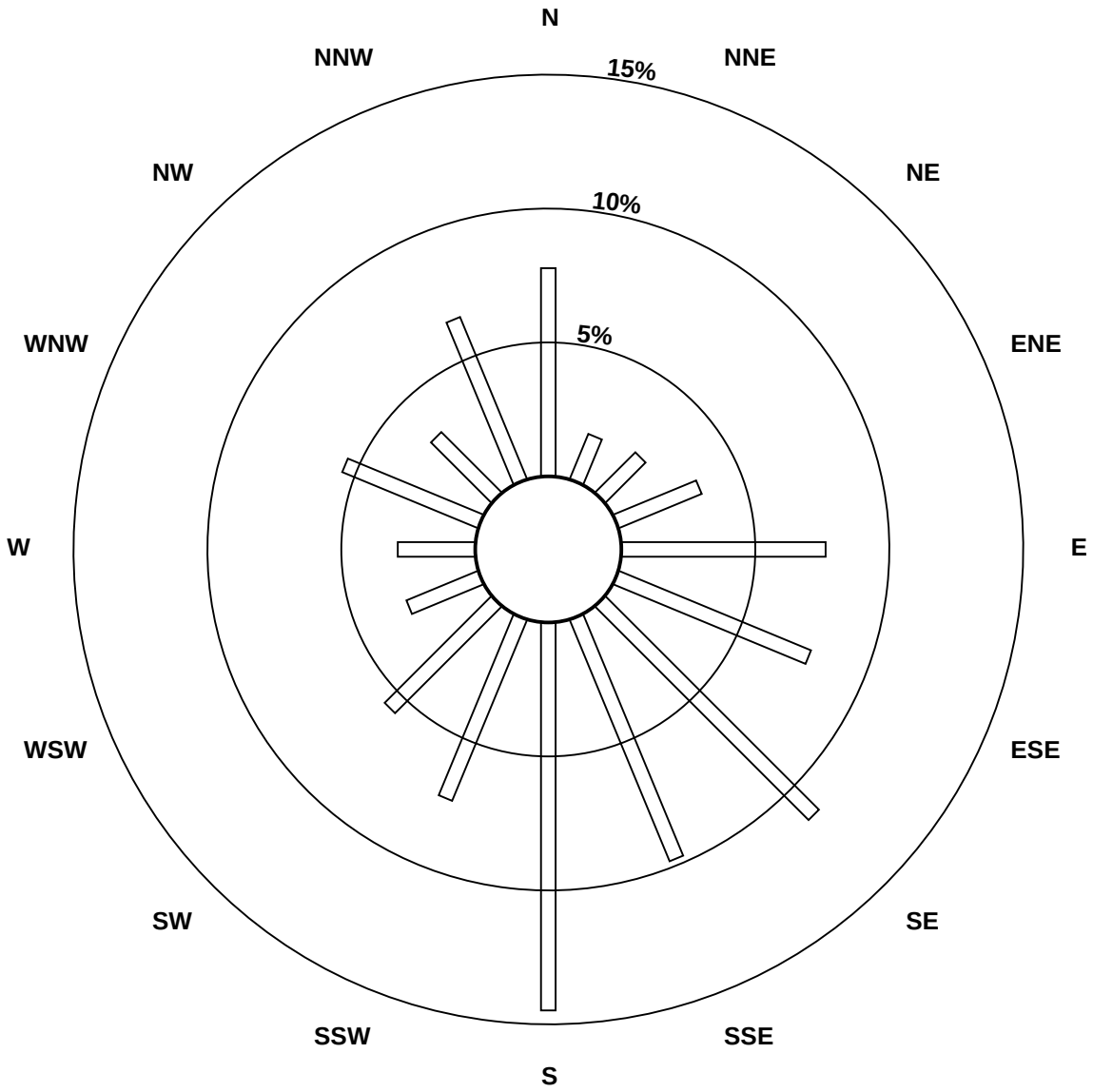
Total Number of Hours: 720

Wood Buffalo Environmental Association

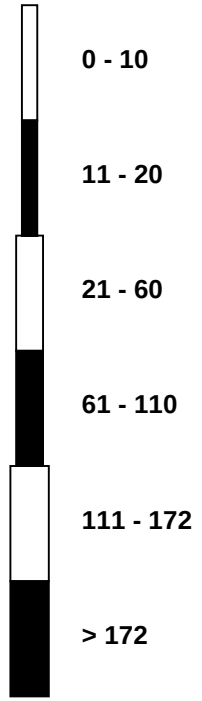
Wind Rose Apr 2016

Sulphur Dioxide (SO_2) - ppb

Anzac (AMS 14)



Classes (ppb)



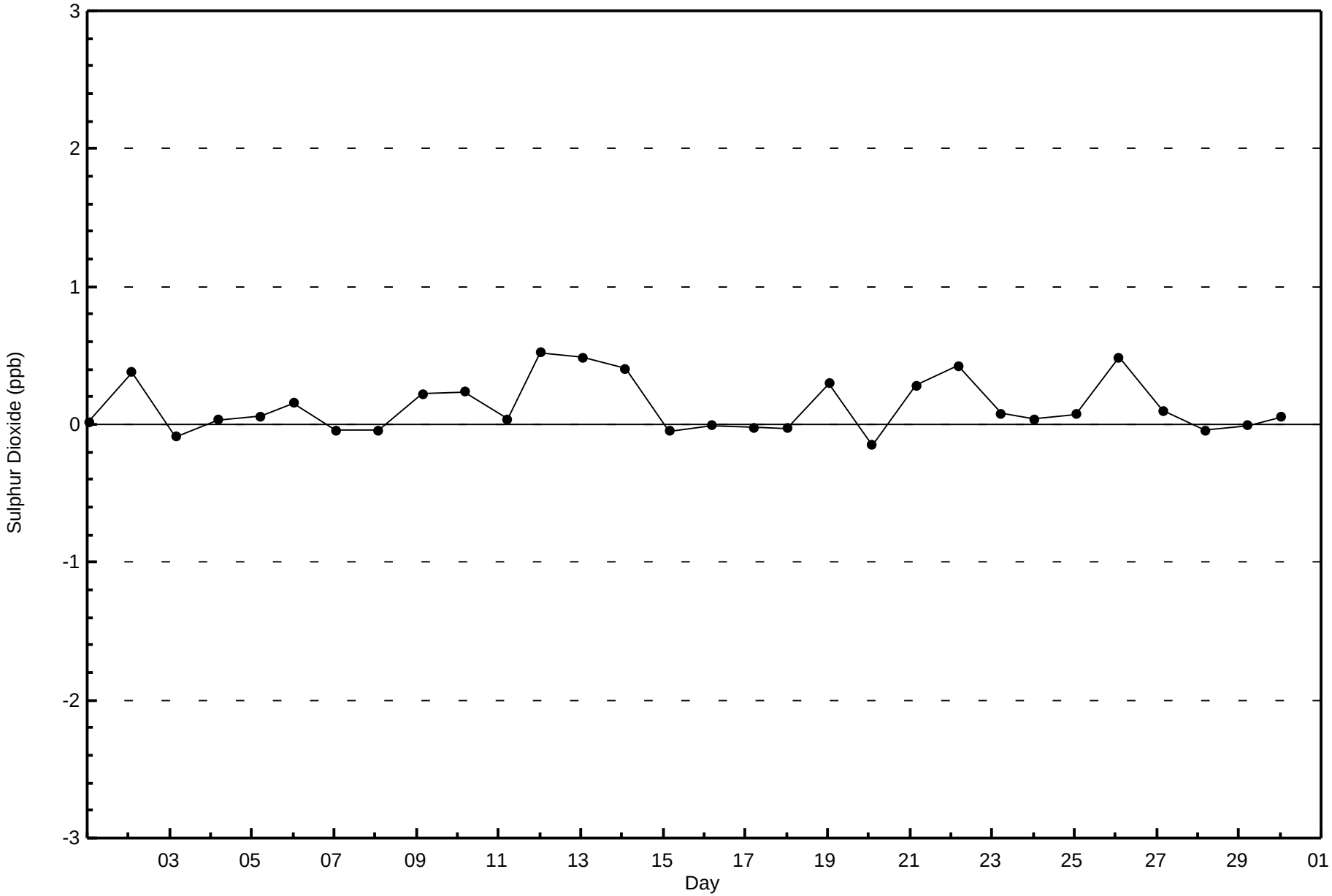
Total Number of Valid Hours: 656

Wood Buffalo Environmental Association

Zero Responses

Sulphur Dioxide (SO_2) - ppb

Anzac - April 2016

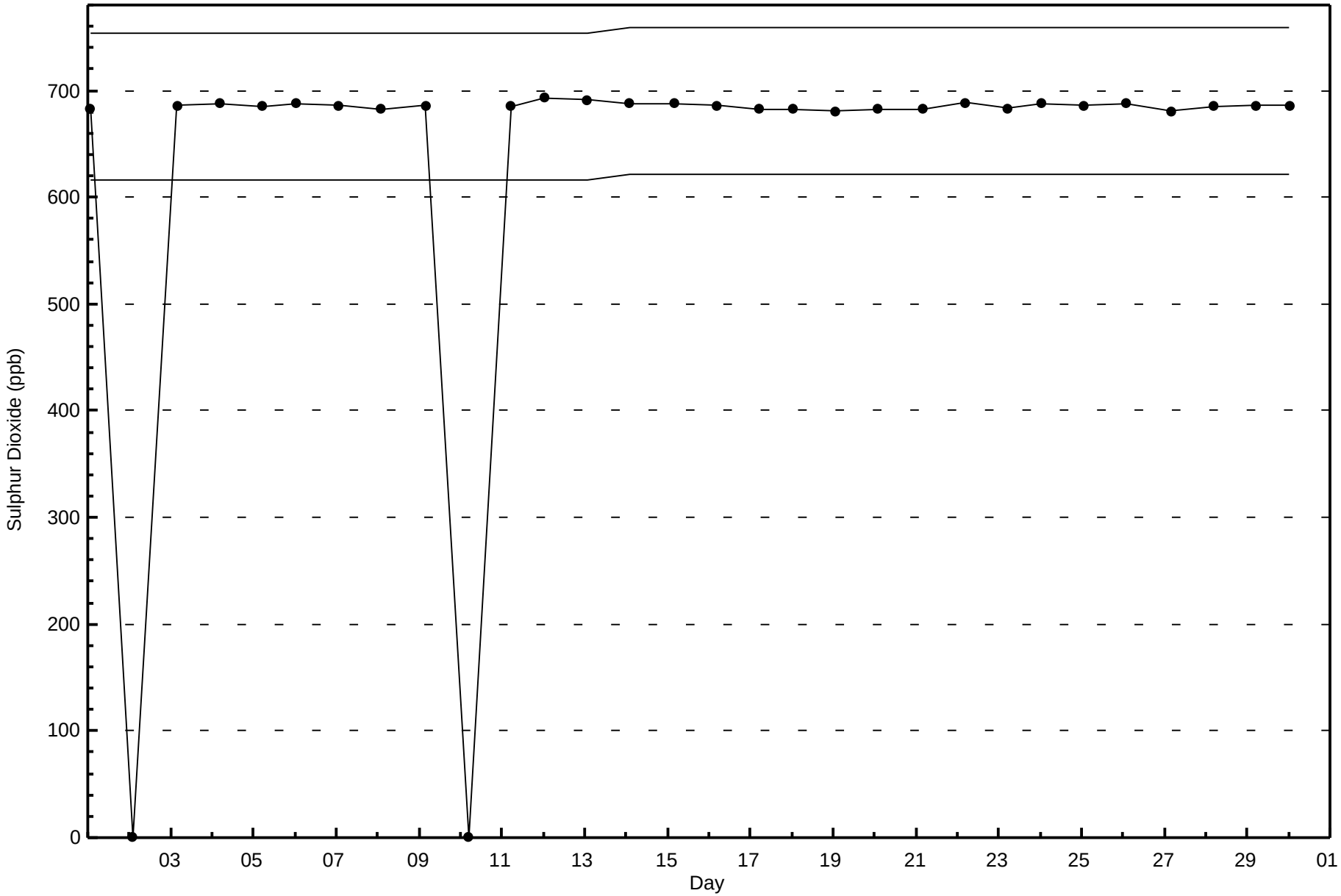


Wood Buffalo Environmental Association

Span Responses

Sulphur Dioxide (SO_2) - ppb

Anzac - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

Anzac - April 2016

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

Maximum Value: 1 ppb on Apr 18 16:00

Maximum Daily Average: 0.3 ppb on Apr 7

Minimum Value: 0 ppb on Apr 27 03:00

Minimum Daily Average: 0.2 ppb on Apr 27

Maximum Diurnal Average: 0.3 ppb at hour 16

Minimum Diurnal Average: 0.2 ppb at hour 24

Monthly Average: 0.2 ppb

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

Hours in Service:	720
Hours of Data:	685
Hours of Missing Data:	35
Hours of Calibration:	33
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-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.3	1
2-Apr	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
3-Apr	0	0	0	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
4-Apr	0	0	0	0	0	Z	0	0	0	0	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.2	0
5-Apr	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
6-Apr	0	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-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1
8-Apr	0	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
9-Apr	0	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-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	M	0	0	0	0	0	0	0	0	0	0	0	0.2	0
11-Apr	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
12-Apr	0	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-Apr	0	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
14-Apr	0	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
15-Apr	0	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
16-Apr	0	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
17-Apr	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
18-Apr	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0.3	1
19-Apr	0	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
20-Apr	0	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
21-Apr	0	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
22-Apr	0	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
23-Apr	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
24-Apr	0	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
25-Apr	0	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
26-Apr	0	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
27-Apr	0	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
28-Apr	0	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
29-Apr	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
30-Apr	0	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
	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	Diurnal Average	
	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance

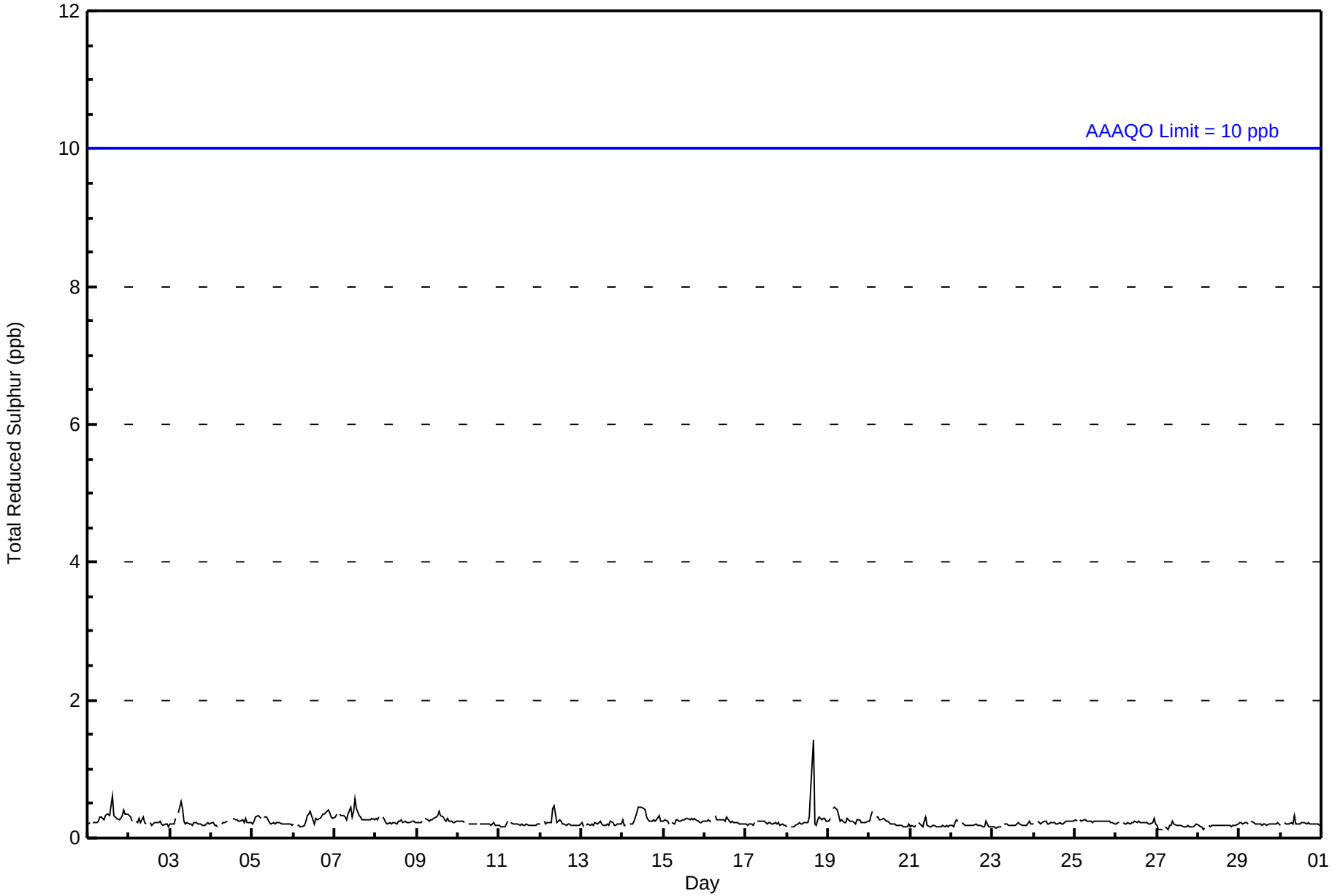
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb

Wood Buffalo Environmental Association

Hourly Averages

Total Reduced Sulphur (TRS) - ppb

Anzac - April 2016



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb

Anzac - April 2016

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

Total Number of Valid Hours: 685

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Total Reduced Sulphur (TRS) - ppb

Anzac - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 2	51	13	14	22	50	50	77	66	94	50	36	18	18	35	21	43	658
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	51	13	14	22	50	50	77	66	94	50	36	18	18	35	21	43	658

Total Number of Valid Hours: 658

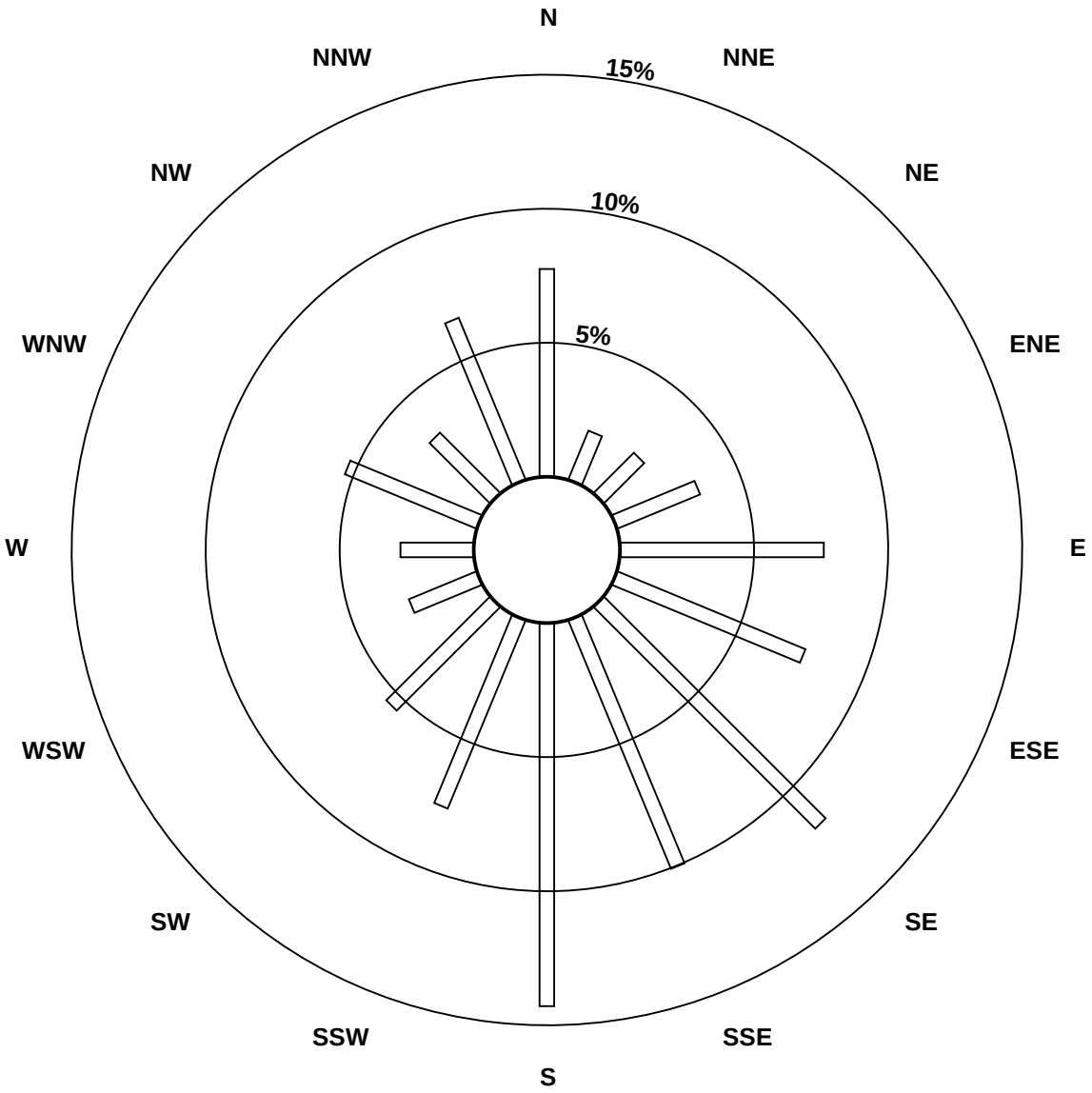
Total Number of Hours: 720

Wood Buffalo Environmental Association

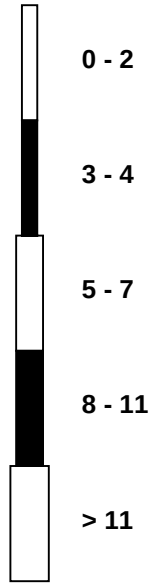
Wind Rose Apr 2016

Total Reduced Sulphur (TRS) - ppb

Anzac (AMS 14)



Classes (ppb)



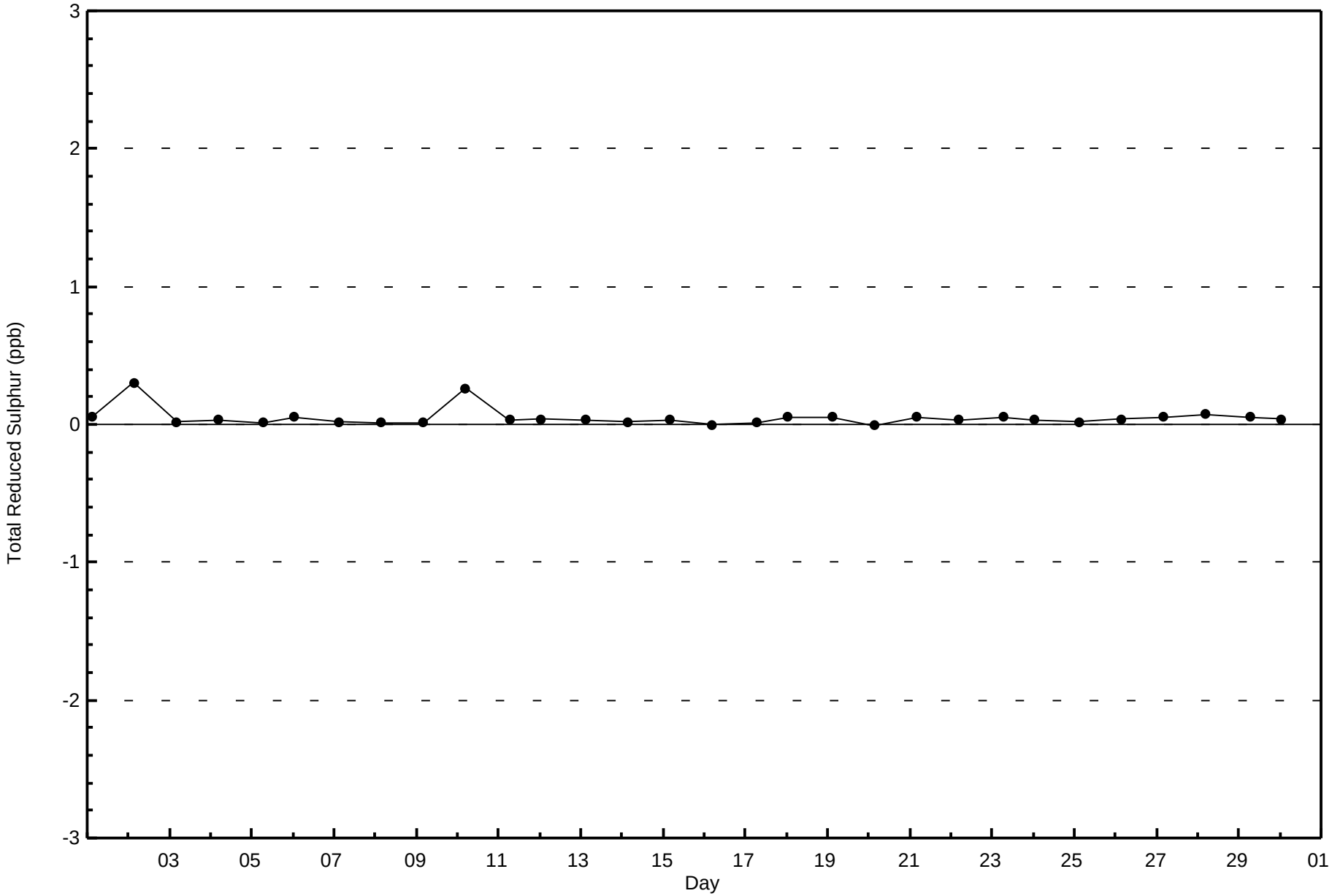
Total Number of Valid Hours: 658

Wood Buffalo Environmental Association

Zero Responses

Total Reduced Sulphur (TRS) - ppb

Anzac - April 2016

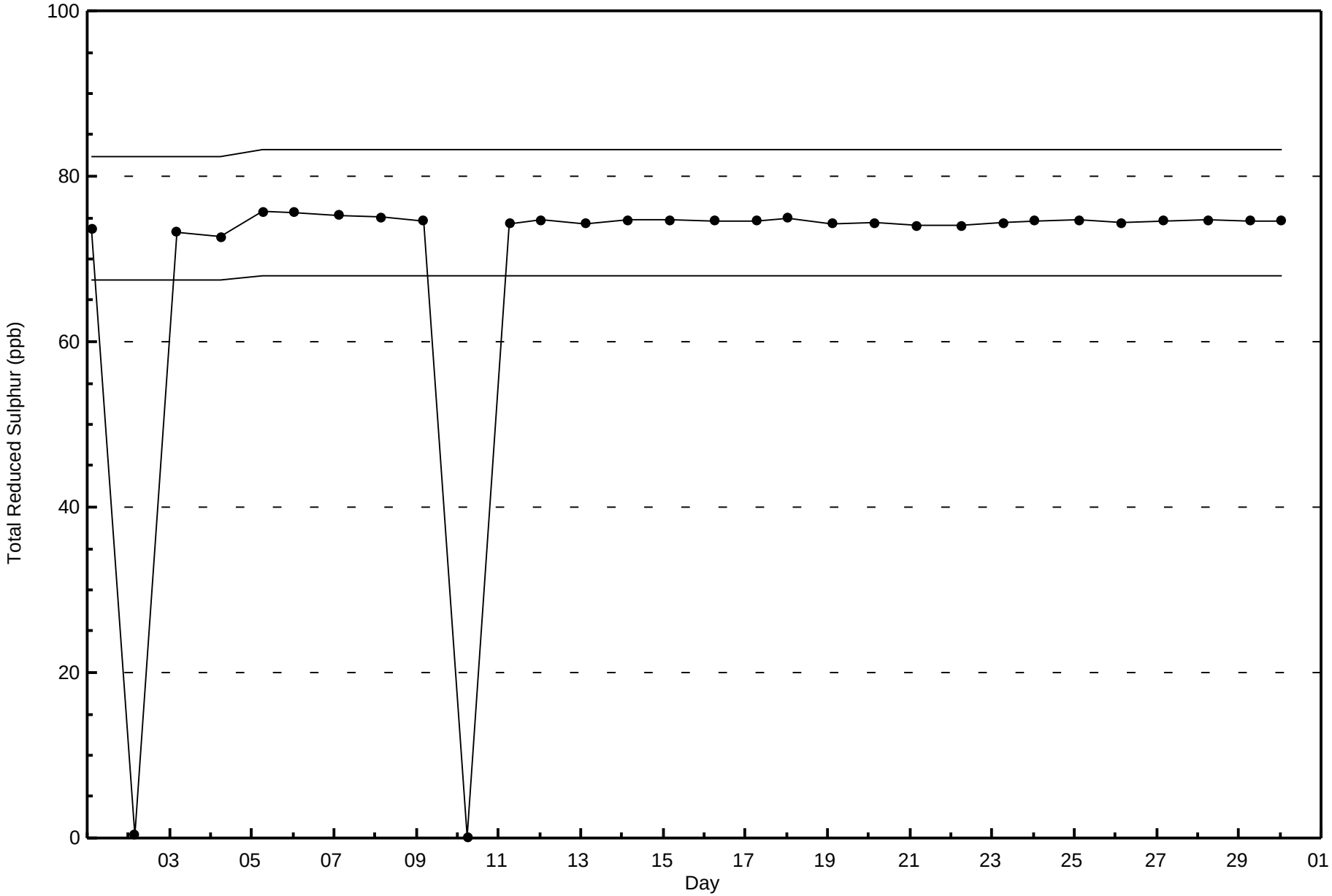


Wood Buffalo Environmental Association

Span Responses

Total Reduced Sulphur (TRS) - ppb

Anzac - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Anzac - April 2016

Maximum Value: 2.2 ppm on Apr 22 04:00

Maximum Daily Average: 2.0 ppm on Apr 26

Minimum Value: 1.9 ppm on Apr 24 20:00

Minimum Daily Average: 1.9 ppm on Apr 19

Maximum Diurnal Average: 2.0 ppm at hour 4

Minimum Diurnal Average: 1.9 ppm at hour 20

Monthly Average: 1.95 ppm

Percentiles: P_1 = 1.9 P_{10} = 1.9 Q_1 = 1.9 Median = 1.9 Q_3 = 2.0 P_{90} = 2.0 P_{99} = 2.1

Hours in Service:	720
Hours of Data:	651
Hours of Missing Data:	69
Hours of Calibration:	39
Percent Operational Time:	95.8

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-Apr	2.0	Z	1.9	1.9	1.9	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	2.0	2.1	2.0	2.0	2.0	2.1
2-Apr	2.0	2.0	Z	1.9	2.0	1.9	2.0	1.9	2.0	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	1.9	1.9	2.0
3-Apr	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	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.9	2.0
4-Apr	1.9	1.9	1.9	1.9	Z	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	2.0	2.0	2.0	1.9	1.9	2.0	2.0	2.0
5-Apr	2.0	2.0	2.1	2.2	2.1	Z	2.0	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.2
6-Apr	Z	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
7-Apr	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	2.0
8-Apr	2.0	2.0	Z	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1
9-Apr	1.9	1.9	1.9	Z	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
10-Apr	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	M	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	2.0
11-Apr	1.9	1.9	1.9	1.9	1.9	Z	1.9	2.0	2.0	C	C	M	M	M	M	M	M	M	M	M	M	M	M	M	--	2.0
12-Apr	M	M	M	M	M	M	M	M	M	M	M	C	C	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	--	2.0
13-Apr	2.0	Z	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	2.0	2.0	1.9	1.9	1.9	2.0	2.0	2.0	2.0
14-Apr	2.0	1.9	Z	2.0	2.0	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0
15-Apr	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
16-Apr	2.0	2.0	2.0	2.0	Z	2.0	2.1	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.1
17-Apr	2.0	1.9	1.9	1.9	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	2.0	2.0
18-Apr	Z	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	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	2.0	1.9	2.0
19-Apr	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
20-Apr	1.9	1.9	Z	1.9	1.9	1.9	1.9	M	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	2.0
21-Apr	2.0	2.0	1.9	Z	2.0	2.0	2.0	C	C	C	C	C	C	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	--	2.0
22-Apr	1.9	2.0	2.0	2.2	Z	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1	2.0	1.9	1.9	2.0	2.2
23-Apr	1.9	1.9	1.9	1.9	1.9	Z	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	1.9	1.9	1.9	2.0
24-Apr	Z	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
25-Apr	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	M	1.9	1.9	M	M	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
26-Apr	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
27-Apr	2.0	2.0	2.0	Z	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
28-Apr	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0
29-Apr	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
30-Apr	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	2.0	2.0
	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	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	Diurnal Average	
	2.0	2.0	2.1	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	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	Diurnal Maximum	

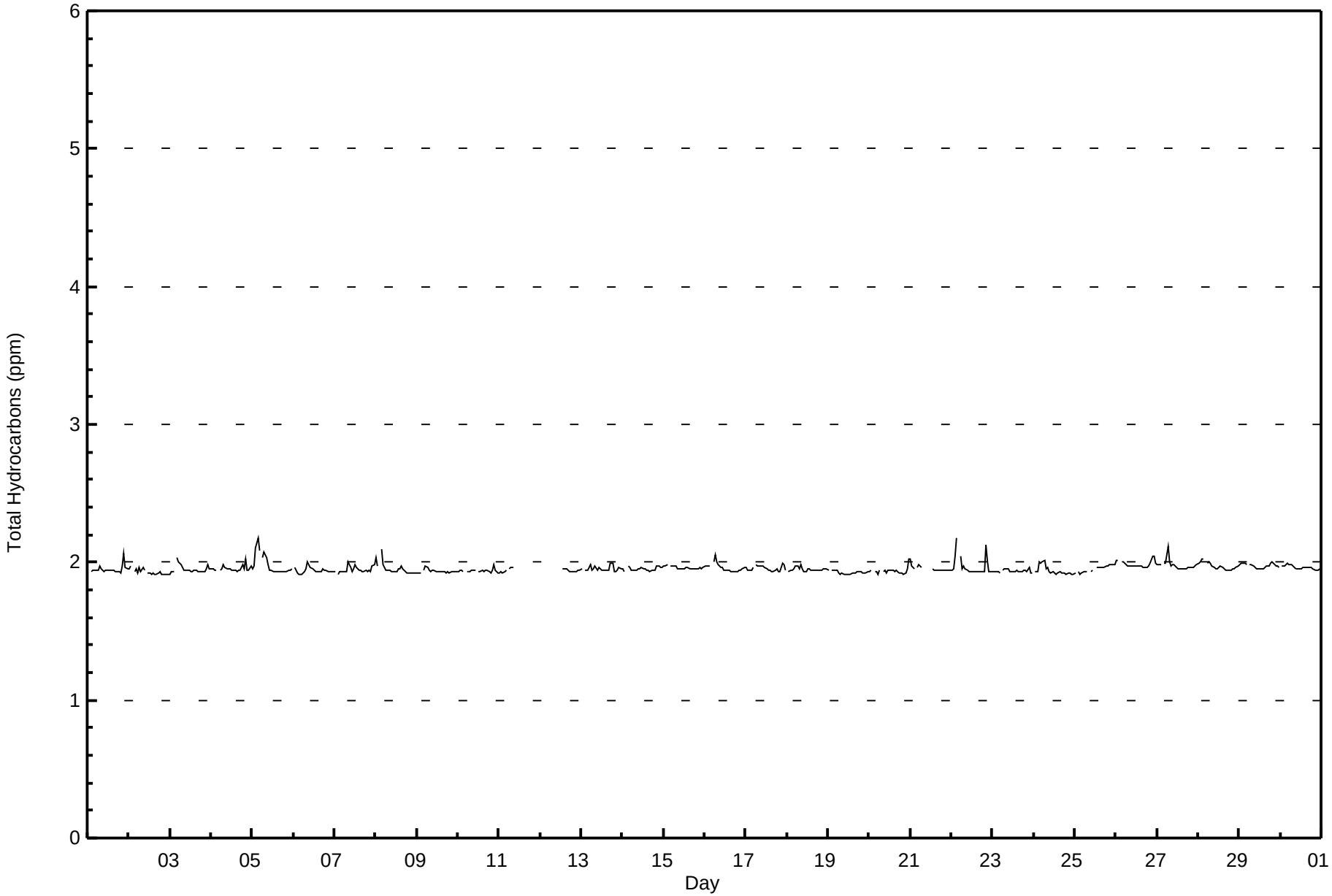
Z - zerospan C - Calibration M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Total Hydrocarbons (THC) - ppm

Anzac - April 2016



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm

Anzac - April 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	641	98.46	98.46
2.1 - 3.0	10	1.54	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 651

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Total Hydrocarbons (THC) - ppm

Anzac - April 2016

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	49	12	14	20	48	44	76	64	87	41	31	18	19	32	17	42	614
2.1 - 3.0	0	0	0	0	0	6	2	0	0	1	1	0	0	0	0	0	10
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	49	12	14	20	48	50	78	64	87	42	32	18	19	32	17	42	624

Total Number of Valid Hours: 624

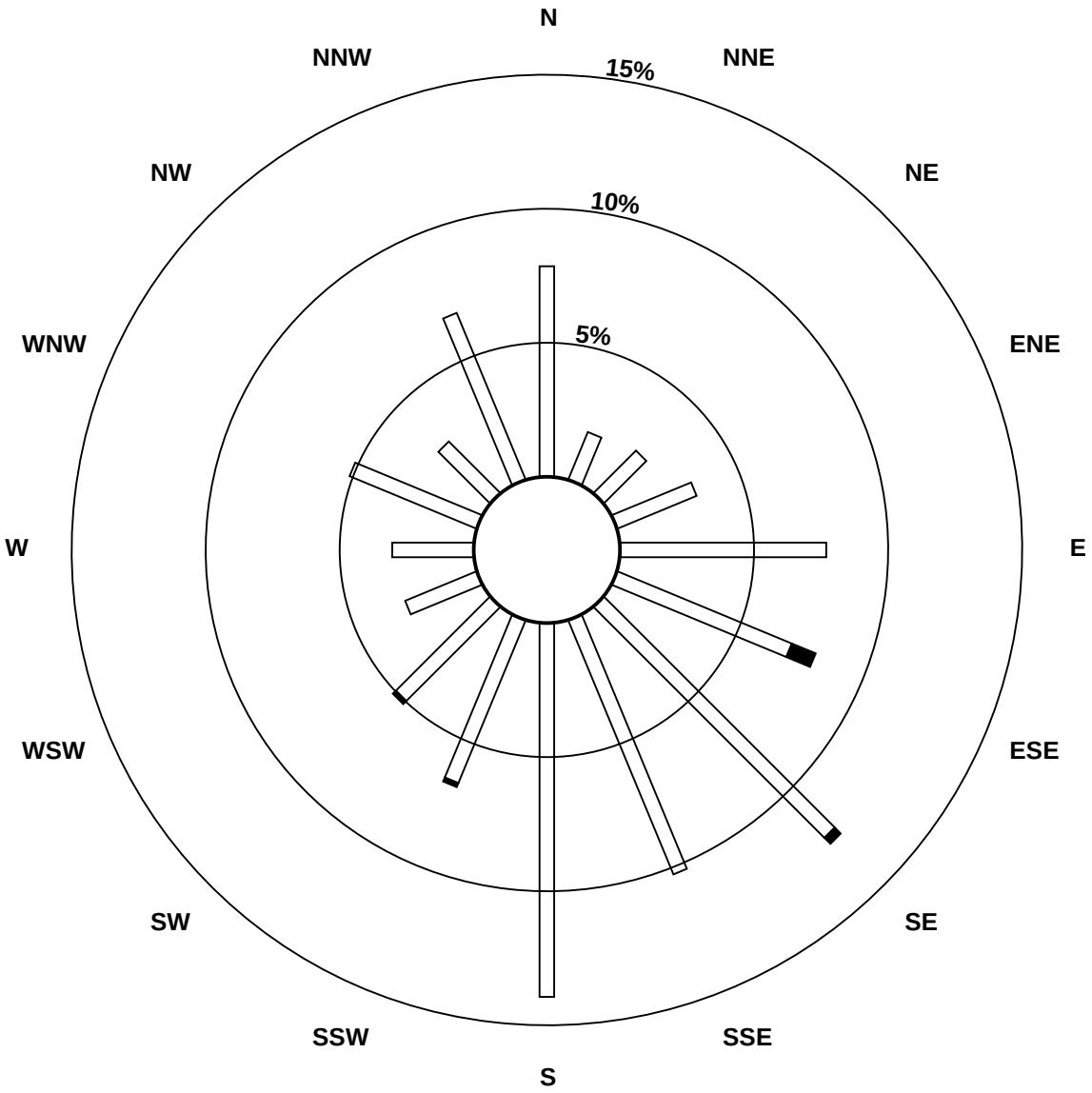
Total Number of Hours: 720

Wood Buffalo Environmental Association

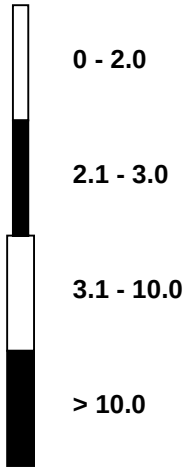
Wind Rose Apr 2016

Total Hydrocarbons (THC) - ppm

Anzac (AMS 14)



Classes (ppm)



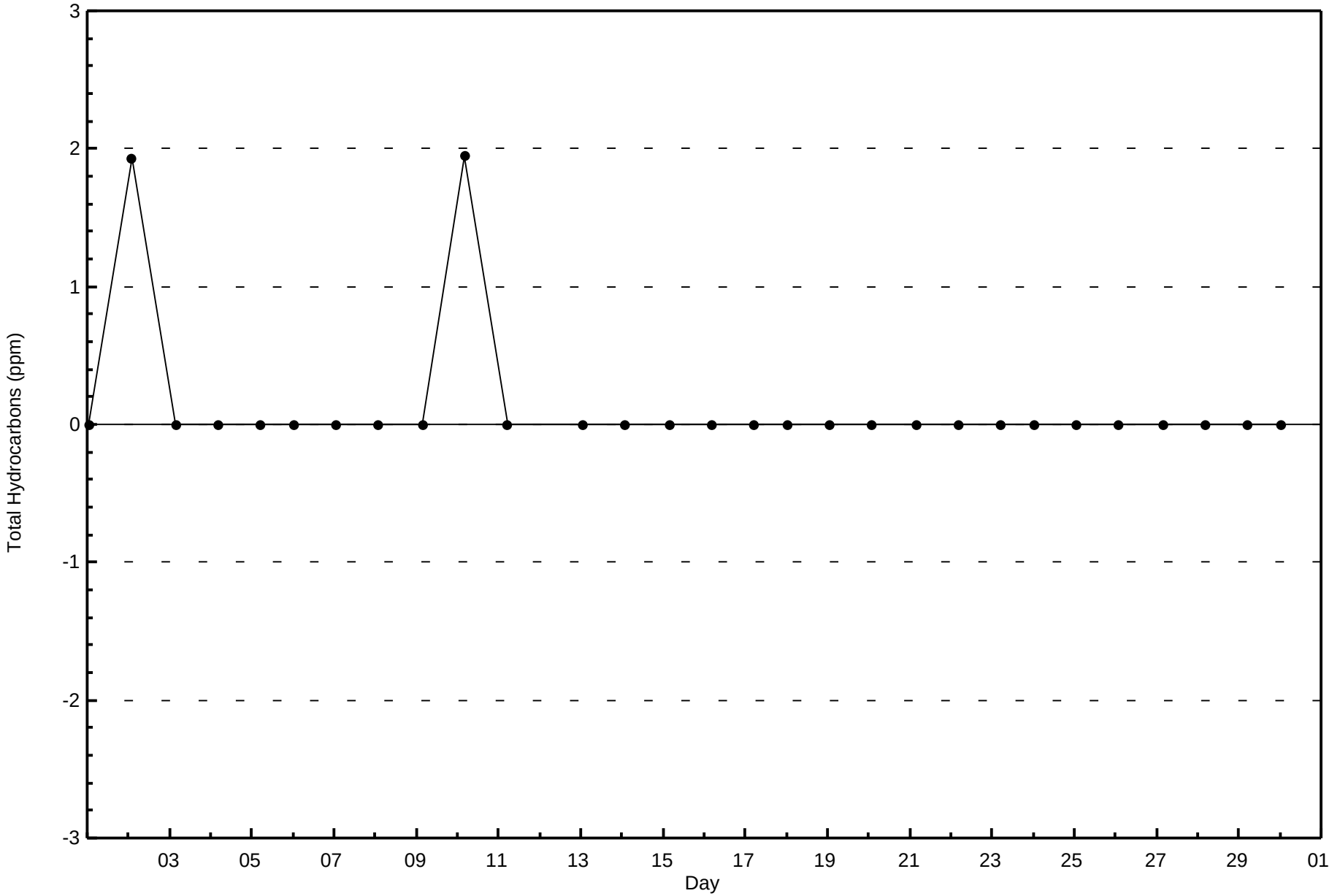
Total Number of Valid Hours: 624

Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Anzac - April 2016

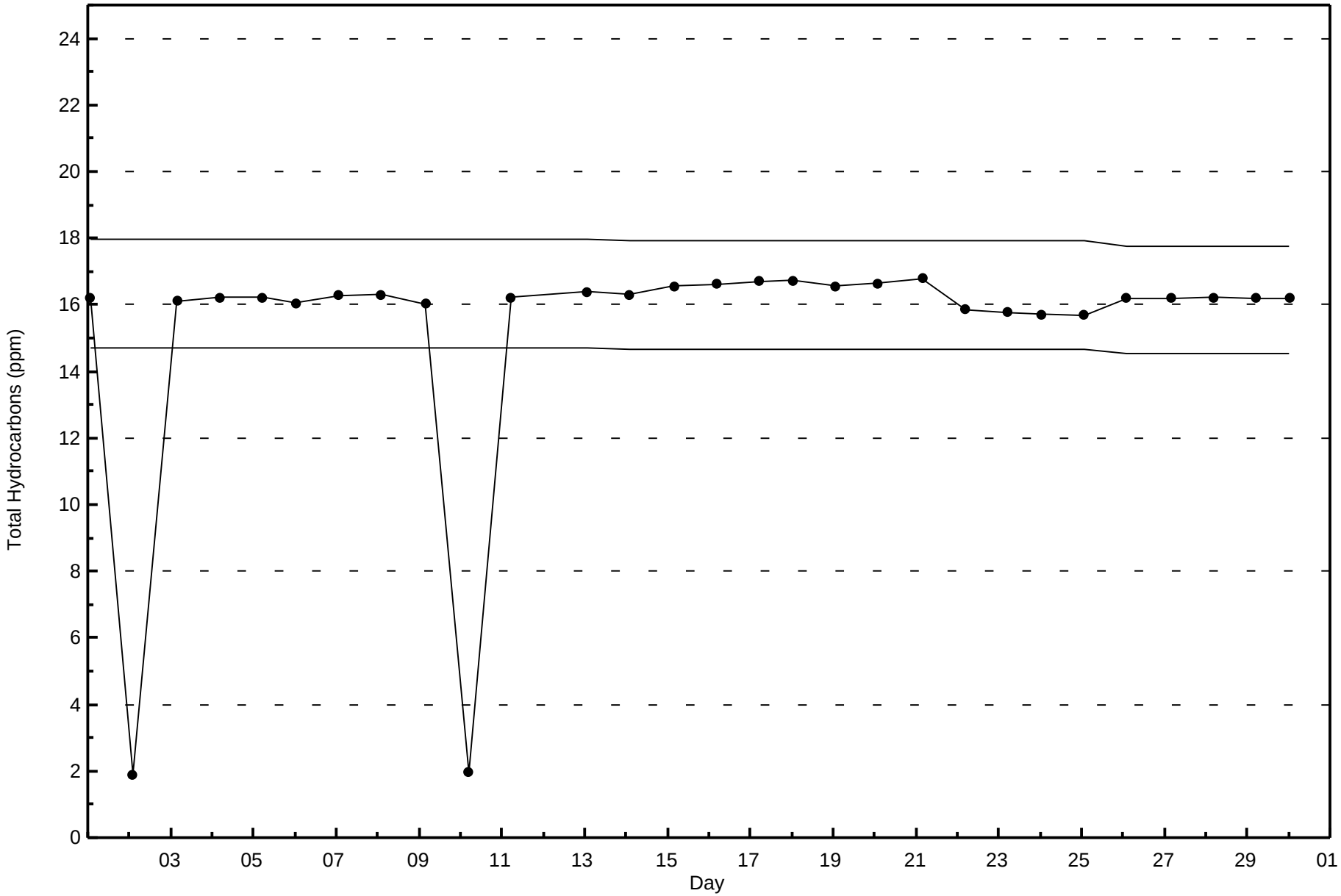


Wood Buffalo Environmental Association

Span Responses

Total Hydrocarbons (THC) - ppm

Anzac - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Non Methane Hydrocarbons (NMHC) - ppm

Anzac - April 2016

Maximum Value: 0.014 ppm on Apr 14 12:00

Maximum Daily Average: 0.001 ppm on Apr 14

Minimum Value: 0.000 ppm on Apr 1 01:00

Minimum Daily Average: 0.000 ppm on Apr 1

Maximum Diurnal Average: 0.001 ppm at hour 12

Minimum Diurnal Average: 0.000 ppm at hour 16

Monthly Average: 0.000 ppm

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

Hours in Service:	720
Hours of Data:	651
Hours of Missing Data:	69
Hours of Calibration:	39
Percent Operational Time:	95.8

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-Apr	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Apr	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	M	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3-Apr	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
4-Apr	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
5-Apr	0.000	0.000	0.003	0.002	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003
6-Apr	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Apr	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Apr	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
9-Apr	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
10-Apr	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	M	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11-Apr	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	C	C	M	M	M	M	M	M	M	M	M	M	M	M	M	--	0.000
12-Apr	M	M	M	M	M	M	M	M	M	M	M	C	C	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	--	0.000
13-Apr	0.000	Z	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.002	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.004
14-Apr	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.014	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.014
15-Apr	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
16-Apr	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
17-Apr	0.000	0.000	0.000	0.000	0.000	Z	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.003
18-Apr	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
19-Apr	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Apr	0.000	0.000	Z	0.000	0.000	0.000	0.000	M	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
21-Apr	0.000	0.000	0.000	Z	0.000	0.000	0.000	C	C	C	C	C	C	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	--	0.000
22-Apr	0.000	0.000	0.000	0.001	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.001	0.000	0.000	0.000	0.008
23-Apr	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
24-Apr	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Apr	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	M	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
26-Apr	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
27-Apr	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
28-Apr	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
29-Apr	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
30-Apr	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	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	0.000	0.000	Diurnal Average	
	0.000	0.000	0.003	0.002	0.000	0.000	0.001	0.000	0.000	0.001	0.001	0.014	0.000	0.001	0.000	0.000	0.000	0.002	0.004	0.000	0.008	0.001	0.000	0.000	Diurnal Maximum	

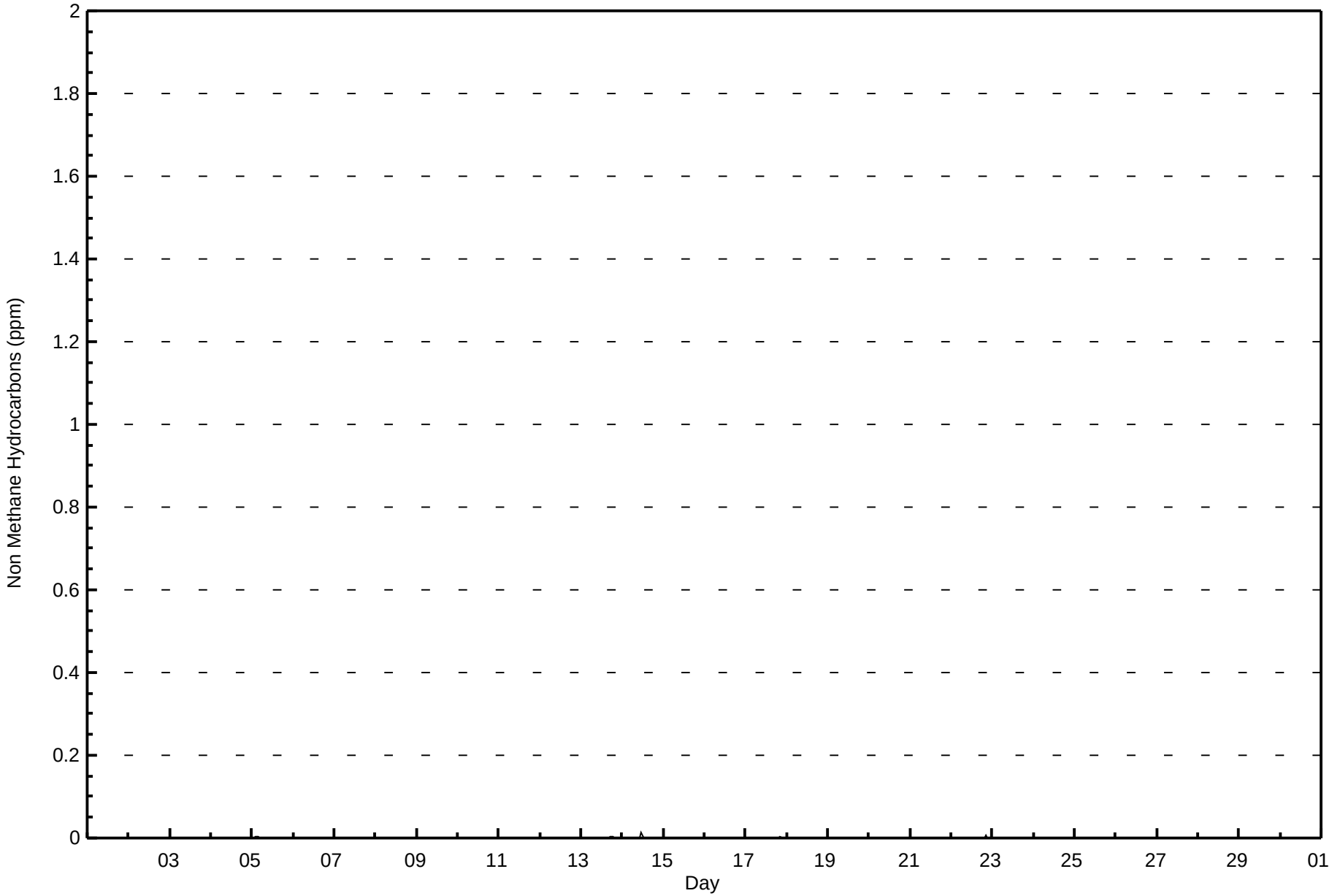
Z - zerospan C - Calibration M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Non Methane Hydrocarbons (NMHC) - ppm

Anzac - April 2016



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm

Anzac - April 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	649	99.69	99.69
0.006 - 0.05	2	0.31	100.00
0.06 - 0.1	0	0.00	100.00
> 0.1	0	0.00	100.00

Total Number of Valid Hours: 651

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm

Anzac - April 2016

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	49	12	14	20	48	49	78	64	87	42	32	18	19	32	17	42	623
0.006 - 0.05	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
0.06 - 0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	49	12	14	20	48	50	78	64	87	42	32	18	19	32	17	42	624

Total Number of Valid Hours: 624

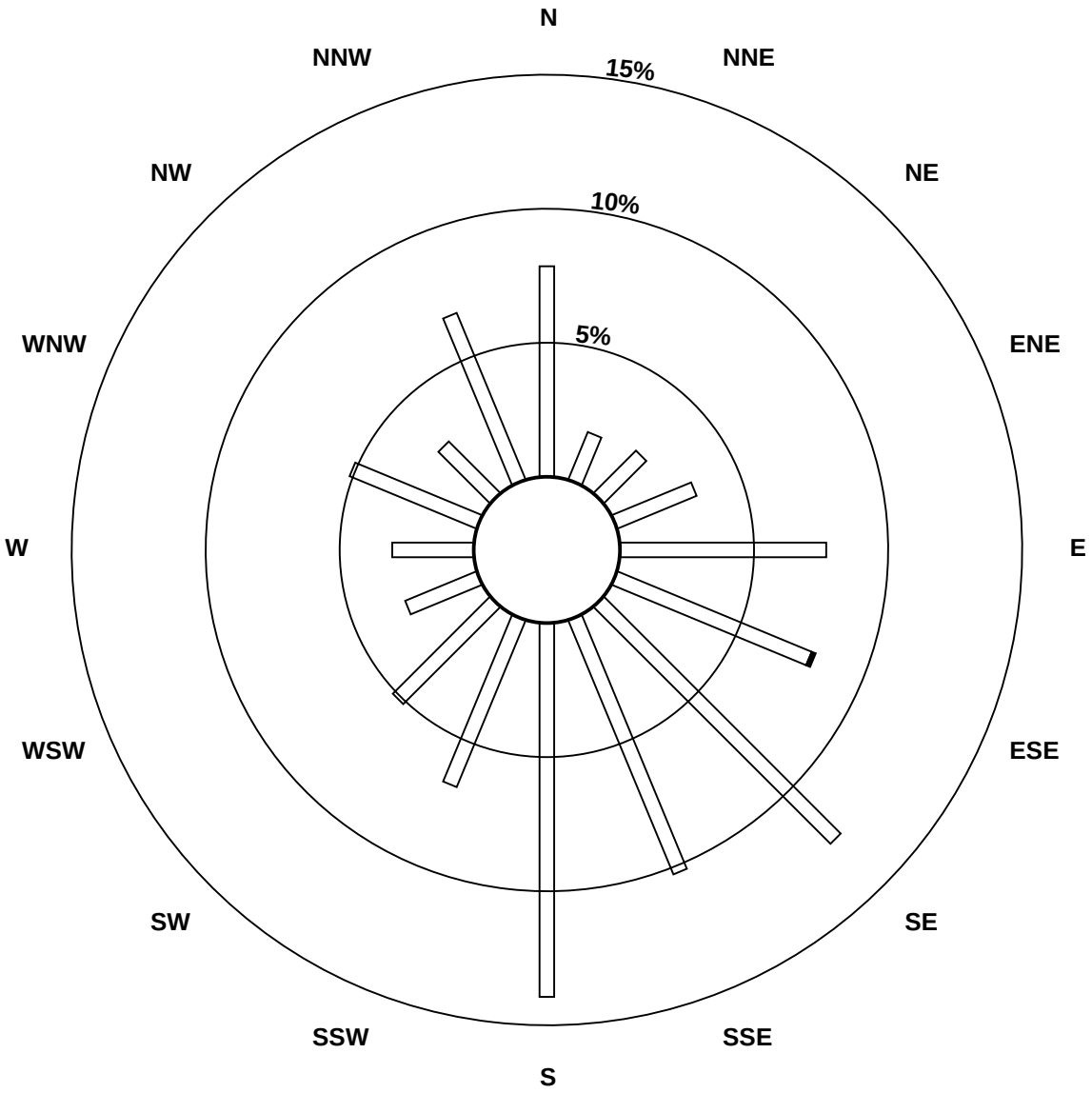
Total Number of Hours: 720

Wood Buffalo Environmental Association

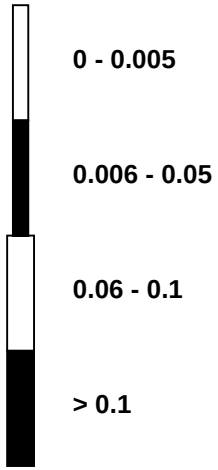
Wind Rose Apr 2016

Non Methane Hydrocarbons (NMHC) - ppm

Anzac (AMS 14)



Classes (ppm)



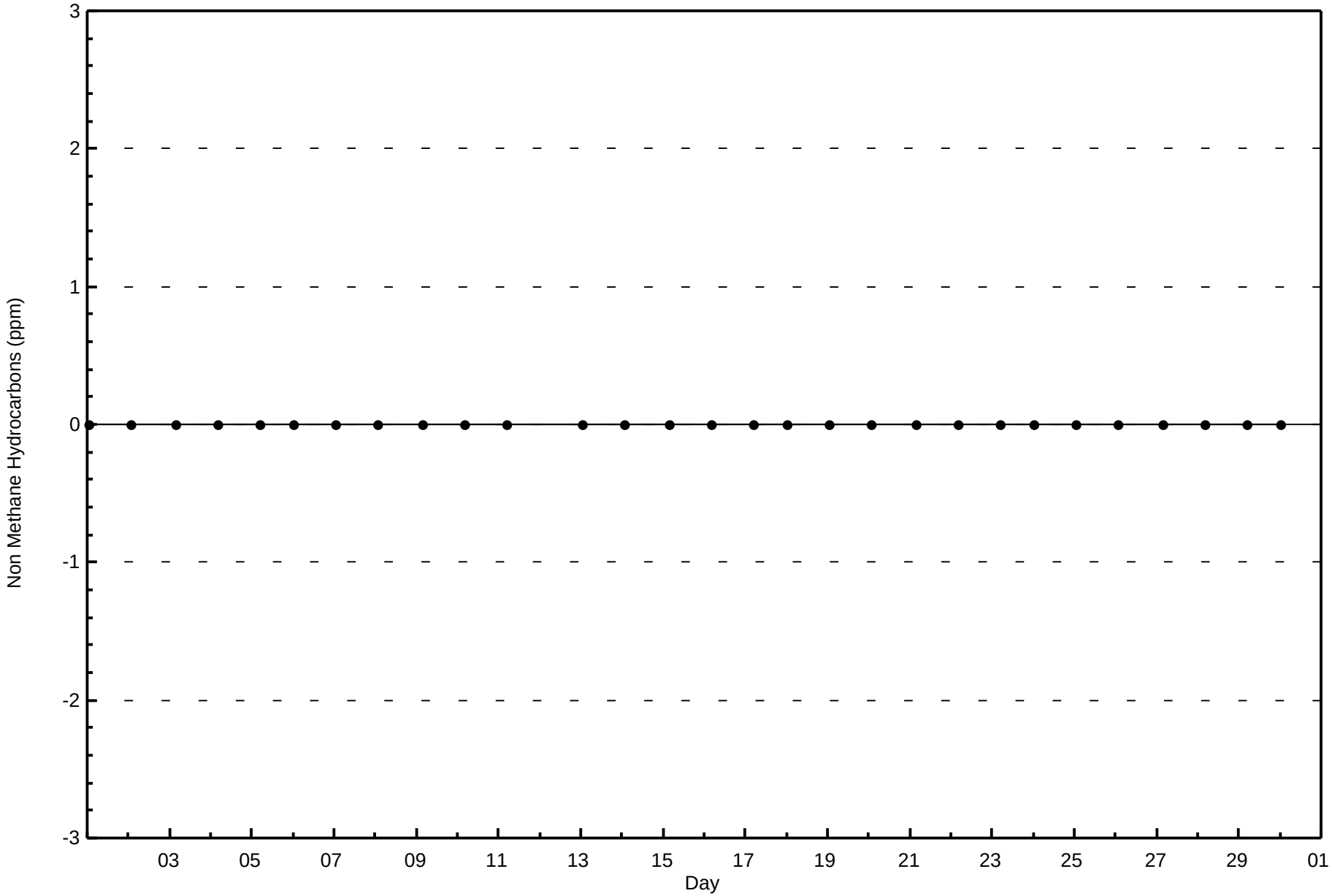
Total Number of Valid Hours: 624

Wood Buffalo Environmental Association

Zero Responses

Non Methane Hydrocarbons (NMHC) - ppm

Anzac - April 2016

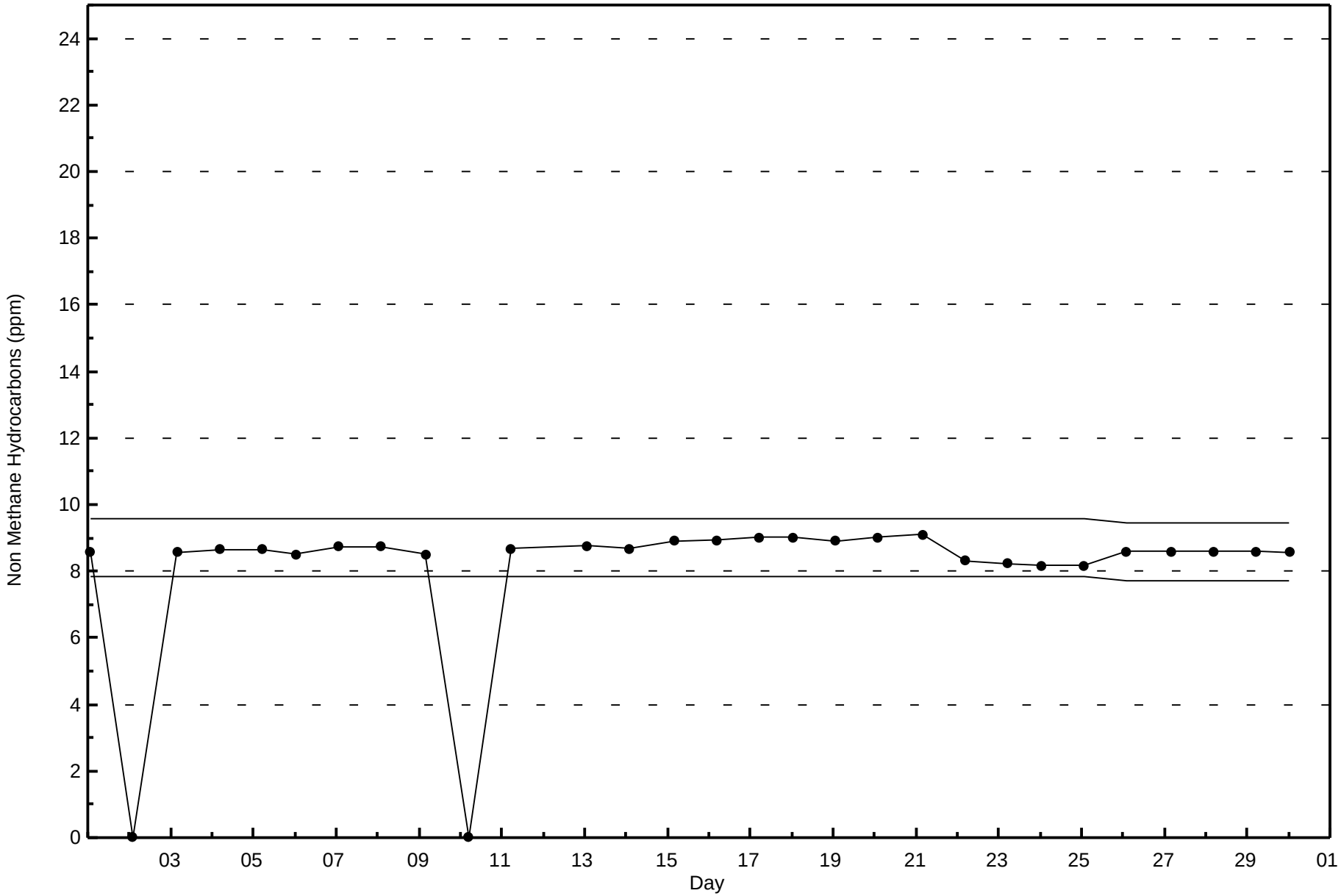


Wood Buffalo Environmental Association

Span Responses

Non Methane Hydrocarbons (NMHC) - ppm

Anzac - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Methane (CH_4) - ppm

Anzac - April 2016

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

Maximum Value: 2.2 ppm on Apr 22 04:00

Maximum Daily Average: 2.0 ppm on Apr 26

Minimum Value: 1.9 ppm on Apr 24 20:00

Minimum Daily Average: 1.9 ppm on Apr 19

Maximum Diurnal Average: 2.0 ppm at hour 4

Minimum Diurnal Average: 1.9 ppm at hour 20

Monthly Average: 1.95 ppm

Percentiles: P_1 = 1.9 P_{10} = 1.9 Q_1 = 1.9 Median = 1.9 Q_3 = 2.0 P_{90} = 2.0 P_{99} = 2.1

Hours in Service:	720
Hours of Data:	651
Hours of Missing Data:	69
Hours of Calibration:	39
Percent Operational Time:	95.8

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-Apr	2.0	Z	1.9	1.9	1.9	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	2.0	2.1	2.0	2.0	2.0	2.1
2-Apr	2.0	2.0	Z	1.9	2.0	1.9	2.0	1.9	2.0	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	1.9	1.9	2.0
3-Apr	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	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.9	2.0
4-Apr	1.9	1.9	1.9	1.9	Z	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	2.0	2.0	2.0	1.9	1.9	2.0	2.0	2.0
5-Apr	2.0	2.0	2.1	2.2	2.1	Z	2.0	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.2
6-Apr	Z	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
7-Apr	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	2.0
8-Apr	2.0	2.0	Z	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1
9-Apr	1.9	1.9	1.9	Z	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
10-Apr	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	M	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	2.0
11-Apr	1.9	1.9	1.9	1.9	1.9	Z	1.9	2.0	2.0	C	C	M	M	M	M	M	M	M	M	M	M	M	M	M	--	2.0
12-Apr	M	M	M	M	M	M	M	M	M	M	M	C	C	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	--	2.0
13-Apr	2.0	Z	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	2.0	2.0	1.9	1.9	1.9	2.0	2.0	2.0	2.0
14-Apr	2.0	1.9	Z	2.0	2.0	1.9	1.9	1.9	1.9	2.0	2.0	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0
15-Apr	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
16-Apr	2.0	2.0	2.0	2.0	Z	2.0	2.1	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.1
17-Apr	2.0	1.9	1.9	1.9	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	2.0	2.0
18-Apr	Z	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	1.9	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	2.0	1.9	2.0
19-Apr	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
20-Apr	1.9	1.9	Z	1.9	1.9	1.9	1.9	M	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	2.0
21-Apr	2.0	2.0	1.9	Z	2.0	2.0	2.0	C	C	C	C	C	C	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	--	2.0
22-Apr	1.9	1.9	2.0	2.2	Z	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1	2.0	1.9	1.9	2.0	2.2
23-Apr	1.9	1.9	1.9	1.9	1.9	Z	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	1.9	1.9	1.9	2.0
24-Apr	Z	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
25-Apr	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	M	1.9	1.9	M	M	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
26-Apr	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
27-Apr	2.0	2.0	2.0	Z	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
28-Apr	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0
29-Apr	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
30-Apr	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	2.0	2.0
	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	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	Diurnal Average	
	2.0	2.0	2.1	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	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	Diurnal Maximum	

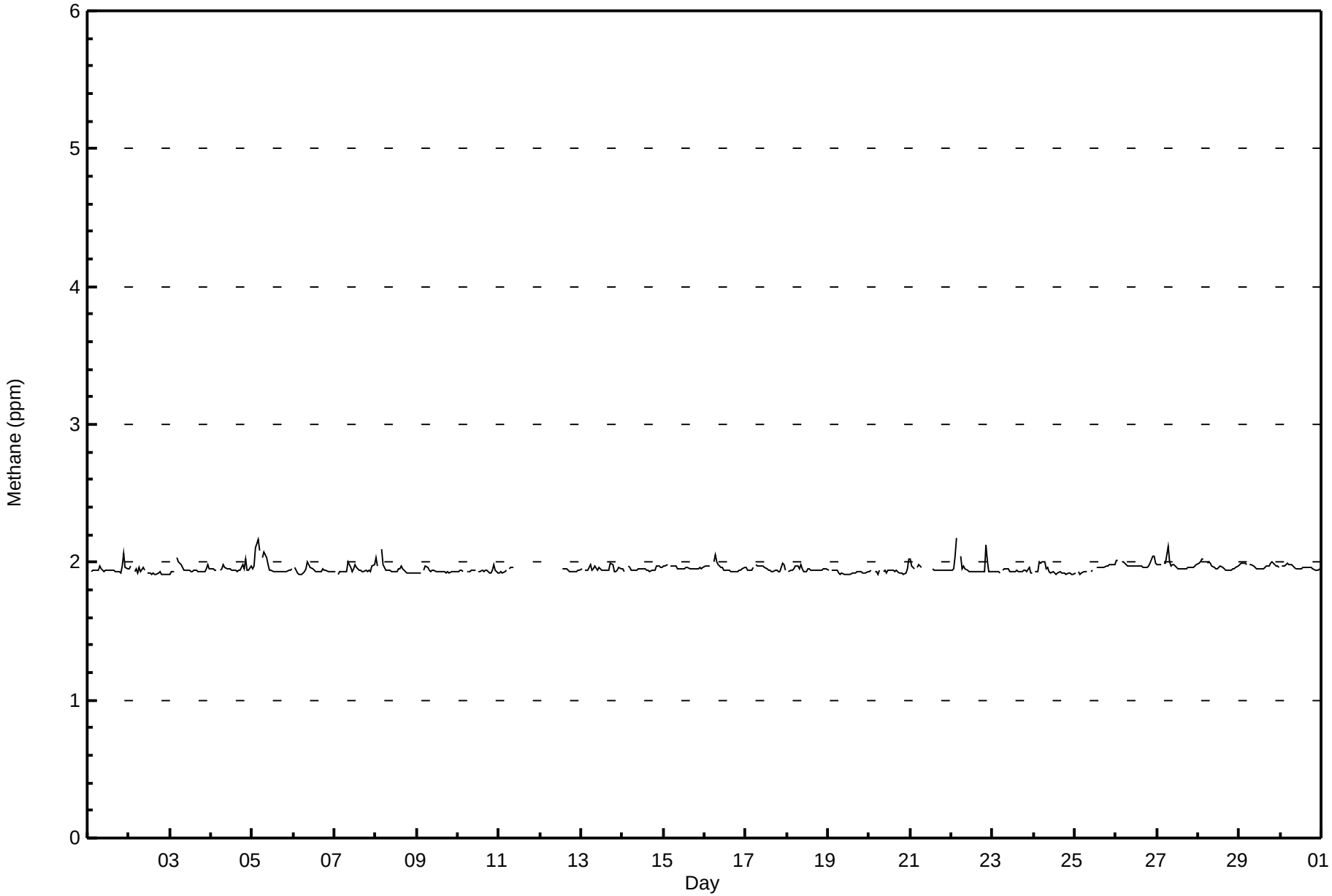
Z - zerospan C - Calibration M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Methane (CH_4) - ppm

Anzac - April 2016



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Methane (CH_4) - ppm

Anzac - April 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	641	98.46	98.46
2.1 - 3.0	10	1.54	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 651

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Methane (CH_4) - ppm

Anzac - April 2016

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	49	12	14	20	48	44	76	64	87	41	31	18	19	32	17	42	614
2.1 - 3.0	0	0	0	0	0	6	2	0	0	1	1	0	0	0	0	0	10
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	49	12	14	20	48	50	78	64	87	42	32	18	19	32	17	42	624

Total Number of Valid Hours: 624

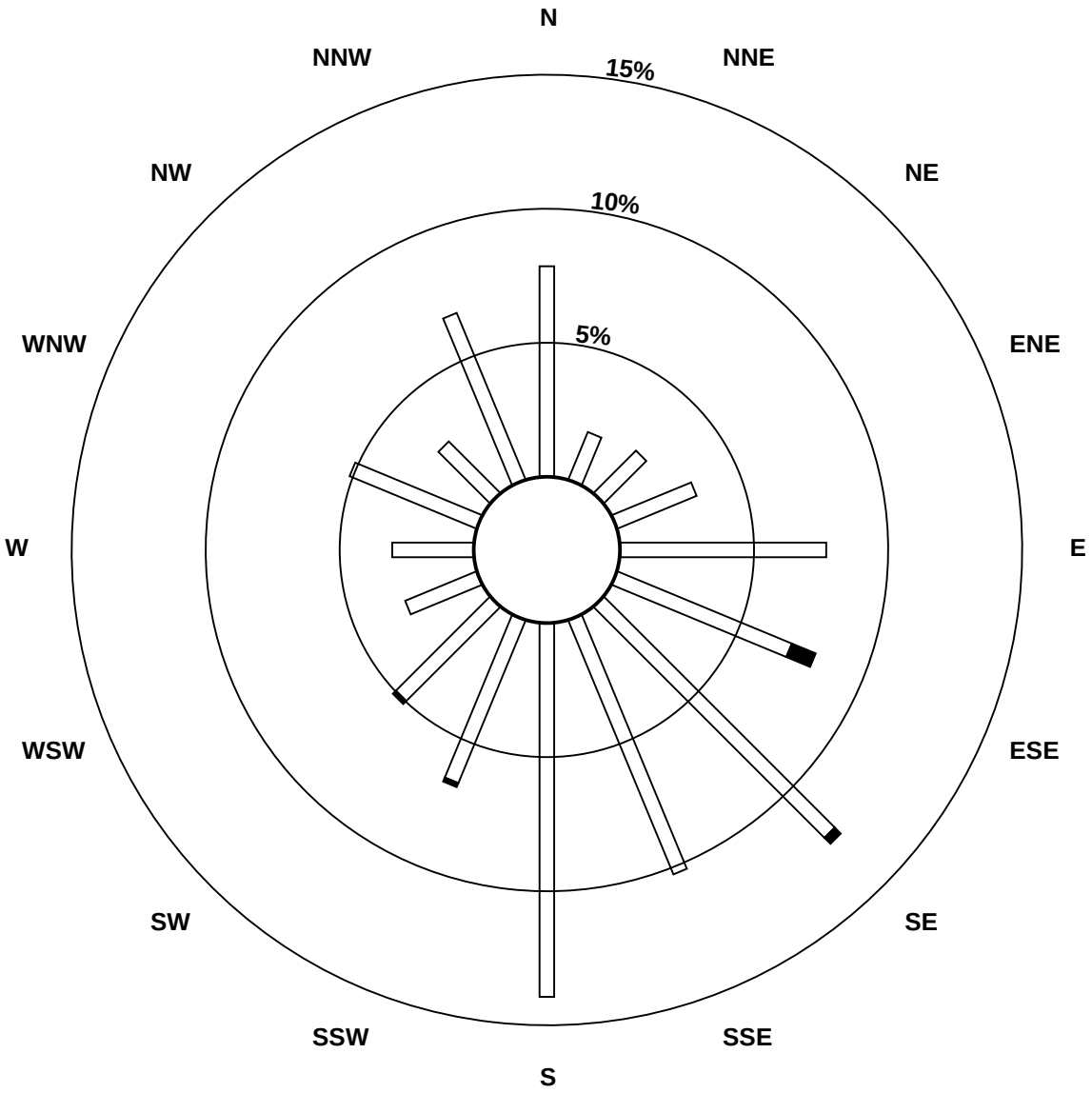
Total Number of Hours: 720

Wood Buffalo Environmental Association

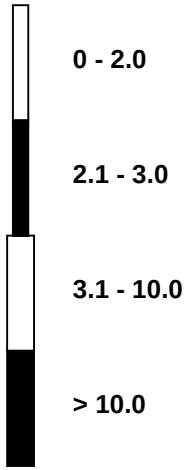
Wind Rose Apr 2016

Methane (CH_4) - ppm

Anzac (AMS 14)



Classes (ppm)



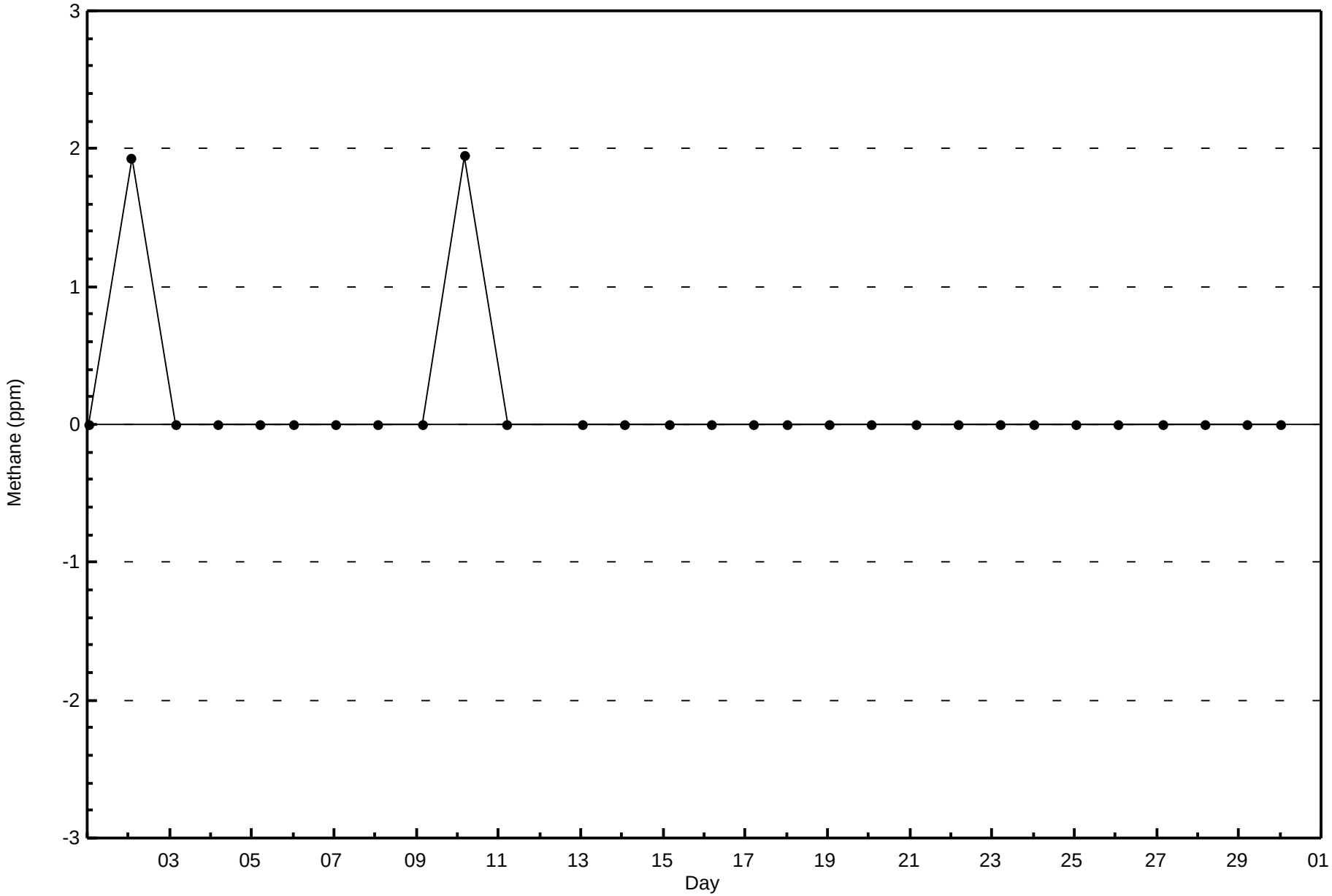
Total Number of Valid Hours: 624

Wood Buffalo Environmental Association

Zero Responses

Methane (CH_4) - ppm

Anzac - April 2016

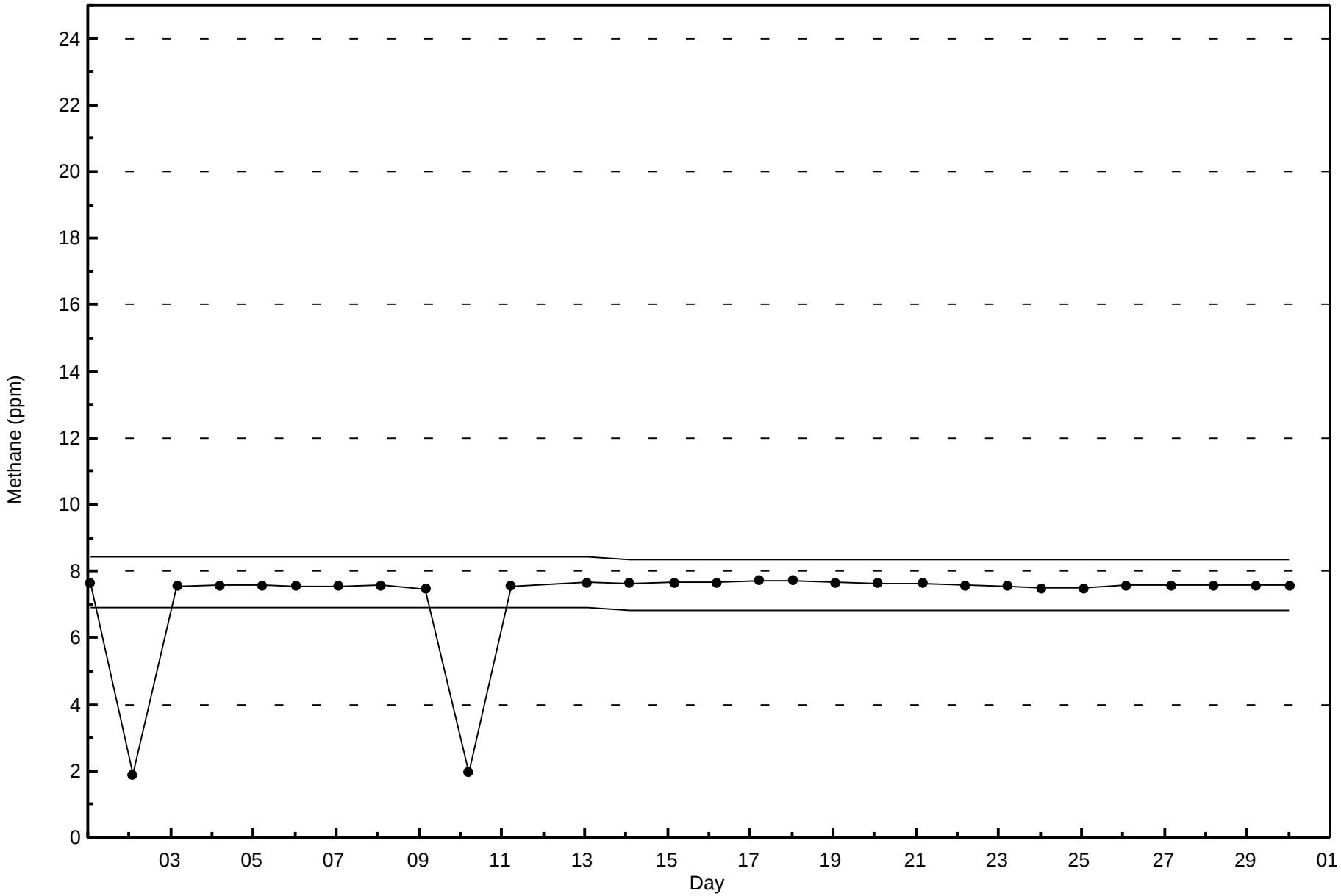


Wood Buffalo Environmental Association

Span Responses

Methane (CH_4) - ppm

Anzac - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

Anzac - April 2016

Maximum Value: 6 ppb on Apr 4 22:00

Maximum Daily Average: 0.7 ppb on Apr 12

Minimum Value: 0 ppb on Apr 1 19:00

Minimum Daily Average: 0.0 ppb on Apr 20

Maximum Diurnal Average: 0.5 ppb at hour 8

Minimum Diurnal Average: 0.0 ppb at hour 23

Monthly Average: 0.2 ppb

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

Hours in Service:	720
Hours of Data:	683
Hours of Missing Data:	37
Hours of Calibration:	35
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-Apr	0	Z	0	0	0	0	0	1	1	0	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0.2	1
2-Apr	0	0	Z	0	0	0	0	0	2	0	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	2
3-Apr	0	0	0	Z	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1
4-Apr	0	0	0	0	Z	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	6	0	0	0.4	6
5-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
6-Apr	Z	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0.3	1
7-Apr	0	Z	0	0	0	0	0	0	0	0	0	1	2	1	1	0	0	0	0	0	0	0	0	0	0.3	2
8-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	0	3	0	0	0	0	0	0	0.2	3
9-Apr	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
10-Apr	0	0	0	0	Z	0	0	0	0	0	0	M	0	0	1	1	1	0	0	0	0	0	0	0	0.1	1
11-Apr	0	1	0	0	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1
12-Apr	Z	0	0	0	0	1	0	4	4	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0.7	4
13-Apr	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
14-Apr	0	0	Z	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.3	1
15-Apr	0	0	0	Z	0	0	1	1	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0.3	1
16-Apr	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
17-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
18-Apr	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.1	1
19-Apr	0	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
20-Apr	0	0	Z	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-Apr	0	0	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
22-Apr	1	0	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
23-Apr	0	0	0	0	0	Z	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
24-Apr	Z	0	0	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-Apr	0	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
26-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.1	1
27-Apr	0	0	0	Z	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
28-Apr	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
29-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
30-Apr	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
	0.0	0.1	0.0	0.0	0.1	0.2	0.2	0.5	0.5	0.3	0.3	0.3	0.3	0.2	0.3	0.2	0.1	0.2	0.0	0.0	0.0	0.2	0.0	0.0	Diurnal Average	
	1	1	0	0	1	1	1	4	4	1	1	1	2	1	1	1	1	3	0	1	0	6	0	0	Diurnal Maximum	

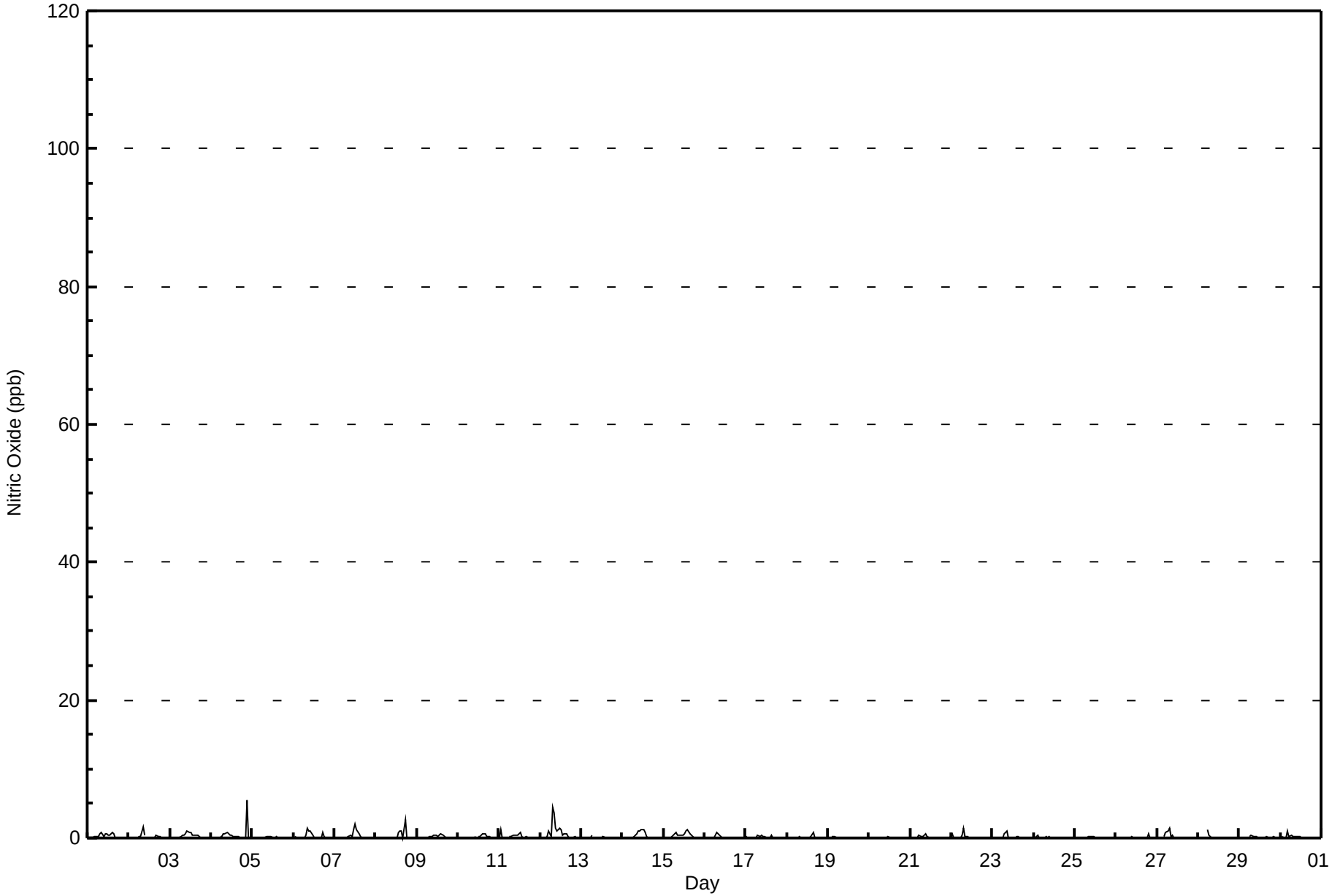
Z - zerospan C - Calibration M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Nitric Oxide (NO) - ppb

Anzac - April 2016



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	683	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: 683

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitric Oxide (NO) - ppb

Anzac - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	51	12	14	22	50	51	74	64	95	48	37	19	19	36	21	43	656
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	51	12	14	22	50	51	74	64	95	48	37	19	19	36	21	43	656

Total Number of Valid Hours: 656

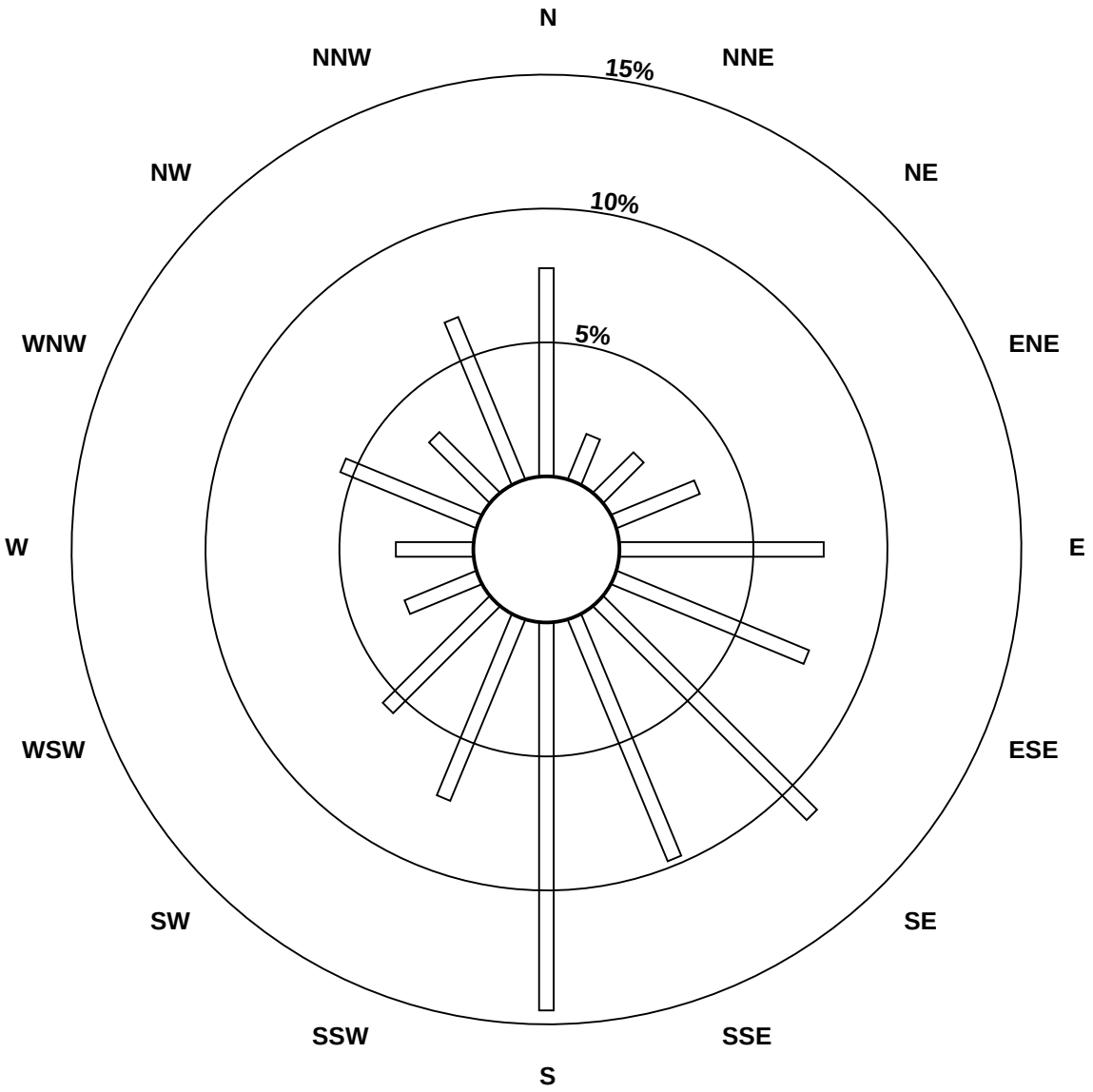
Total Number of Hours: 720

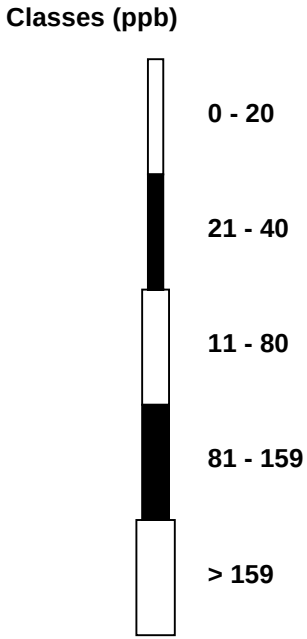
Wood Buffalo Environmental Association

Wind Rose Apr 2016

Nitric Oxide (NO) - ppb

Anzac (AMS 14)





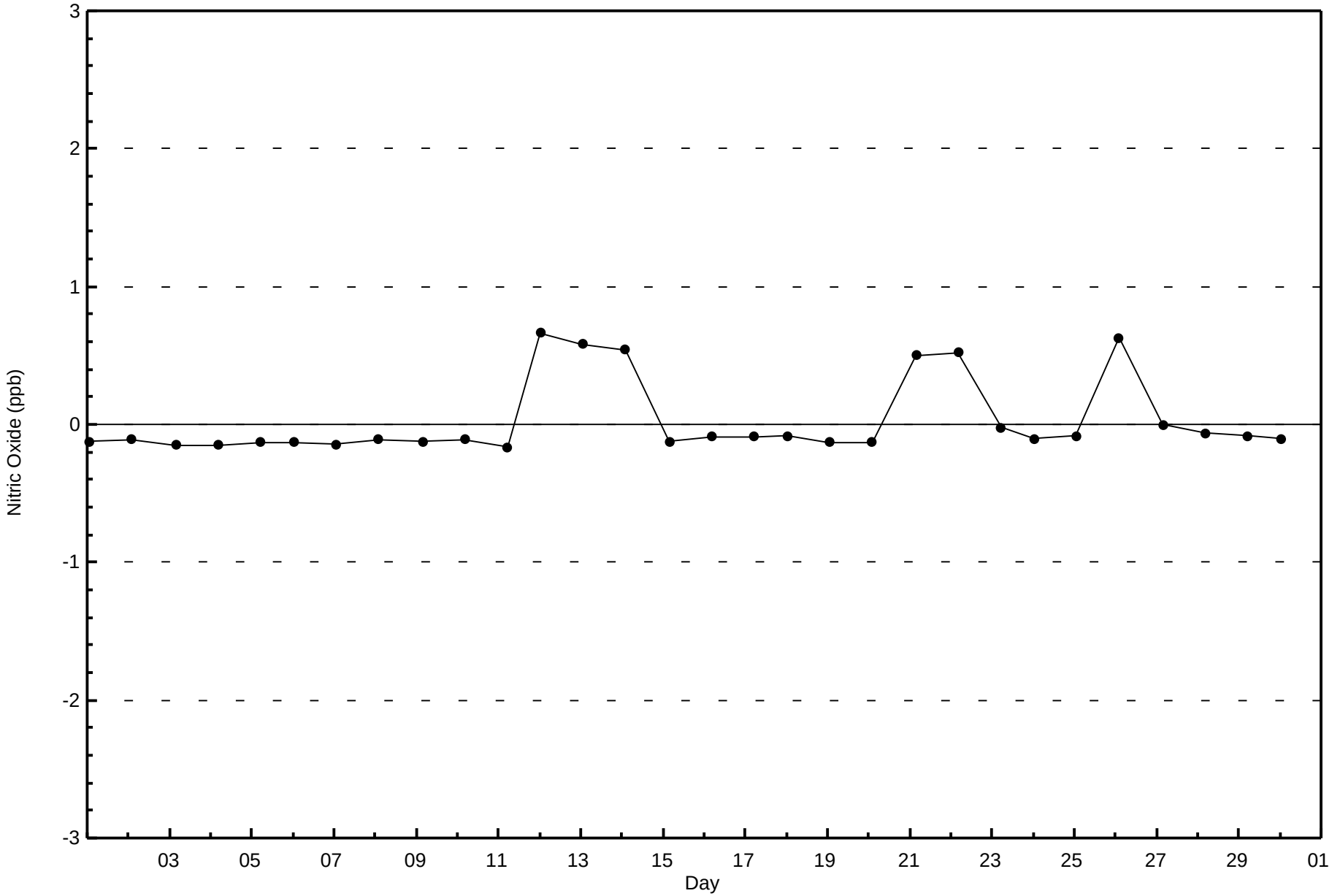
Total Number of Valid Hours: 656

Wood Buffalo Environmental Association

Zero Responses

Nitric Oxide (NO) - ppb

Anzac - April 2016

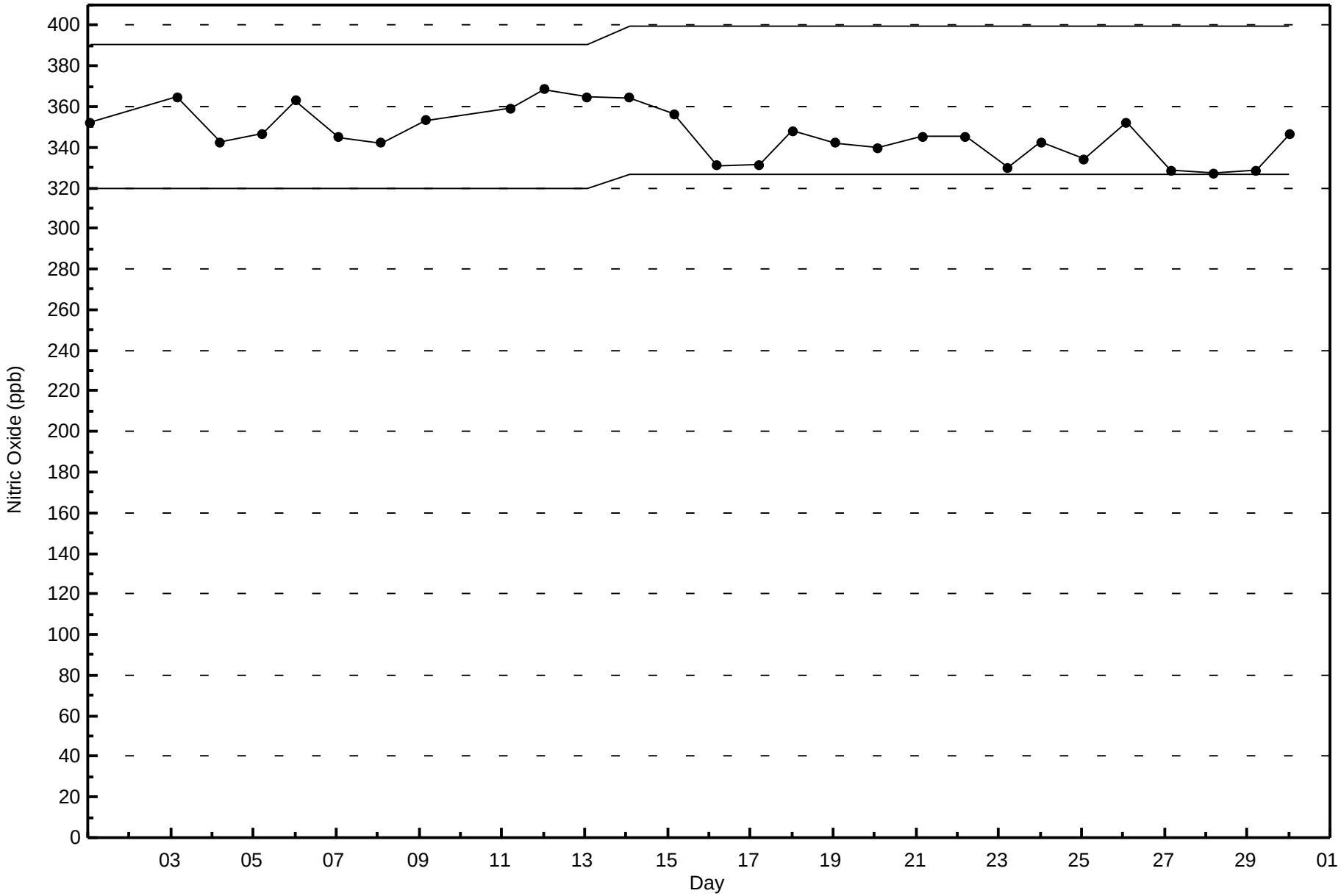


Wood Buffalo Environmental Association

Span Responses

Nitric Oxide (NO) - ppb

Anzac - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO_2) - ppb

Anzac - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 13 ppb on Apr 12 08:00 Maximum Daily Average: 2.5 ppb on Apr 12

Minimum Value: 0 ppb on Apr 13 17:00
Maximum Diurnal Average: 2.0 ppb at hour 8
Monthly Average: 1.2 ppb

Minimum Daily Average: 0.2 ppb on Apr 22
Minimum Diurnal Average: 0.8 ppb at hour 17
Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 1 $Q_3 = 2$ $P_{90} = 2$ $P_{99} = 6$

Hours in Service:	720
Hours of Data:	683
Hours of Missing Data:	37
Hours of Calibration:	35
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-Apr	2	Z	1	1	1	1	2	4	3	1	2	2	1	2	2	2	1	1	1	1	1	1	3	6	1.6	6
2-Apr	6	3	Z	4	1	0	2	1	4	1	M	0	1	0	0	0	1	2	4	1	0	0	0	0	1.5	6
3-Apr	0	0	0	Z	10	9	6	5	3	3	3	3	2	1	1	2	2	1	1	1	1	1	1	1	2.4	10
4-Apr	1	1	1	1	Z	2	2	2	2	2	1	1	1	1	1	1	1	1	1	0	0	3	1	0	1.2	3
5-Apr	0	0	0	0	0	Z	0	0	2	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	0.7	2
6-Apr	Z	1	1	1	1	1	1	3	6	4	5	2	1	0	0	0	1	6	5	3	1	1	1	1	1.9	6
7-Apr	1	Z	1	1	1	1	1	1	2	2	1	4	4	2	2	1	0	0	0	0	1	0	0	0	1.1	4
8-Apr	0	0	Z	4	5	5	1	1	0	0	0	0	0	2	3	4	0	2	2	1	2	2	2	1	1.7	5
9-Apr	0	1	1	Z	1	2	2	2	2	3	4	4	3	3	3	3	2	1	2	1	1	2	2	2	2.0	4
10-Apr	2	2	3	3	Z	1	1	0	0	1	1	M	1	1	2	2	2	2	2	1	1	1	1	0	1.3	3
11-Apr	0	1	0	1	1	Z	2	1	2	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1.0	2
12-Apr	Z	1	1	1	2	5	2	13	9	4	3	3	3	2	2	3	1	1	0	0	1	0	0	1	2.5	13
13-Apr	2	Z	0	0	0	0	1	C	C	C	C	C	1	0	0	0	0	0	0	0	0	0	0	0	0.4	2
14-Apr	0	0	Z	1	2	2	2	2	3	4	4	3	3	2	1	0	1	1	1	1	4	3	2	3	2.0	4
15-Apr	3	4	3	Z	2	2	2	2	1	1	1	1	1	2	2	1	2	1	2	1	1	1	1	1	1.6	4
16-Apr	1	2	2	2	Z	2	2	2	2	1	1	1	1	1	1	1	0	1	1	1	1	0	1	0	1.1	2
17-Apr	5	3	1	1	1	Z	1	3	2	2	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1.2	5
18-Apr	Z	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1
19-Apr	1	Z	1	2	2	2	1	1	1	0	0	1	0	0	1	0	0	1	0	0	1	1	1	1	0.8	2
20-Apr	0	1	Z	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
21-Apr	0	0	0	Z	1	2	1	1	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2
22-Apr	2	0	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2
23-Apr	0	0	0	0	0	Z	0	3	3	0	0	0	0	0	1	1	0	0	0	0	0	2	1	1	0.6	3
24-Apr	Z	0	2	2	1	1	2	2	1	1	1	0	0	0	0	1	0	1	1	1	1	1	1	1	0.9	2
25-Apr	1	Z	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1
26-Apr	1	1	Z	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	0.7	2
27-Apr	1	0	0	Z	1	2	1	2	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	0	0.8	2
28-Apr	0	0	1	1	Z	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.9	3
29-Apr	2	2	2	2	2	Z	3	2	2	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1.3	3
30-Apr	Z	1	1	1	7	5	3	1	2	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1.5	7
	1.2	1.0	0.9	1.3	1.8	2.0	1.5	2.0	1.9	1.4	1.3	1.2	1.0	0.9	1.0	1.0	0.8	0.9	1.0	0.8	0.8	0.9	0.8	0.9	Diurnal Average	
	6	4	3	4	10	9	6	13	9	4	5	4	4	3	3	4	2	6	5	3	4	3	3	6	Diurnal Maximum	

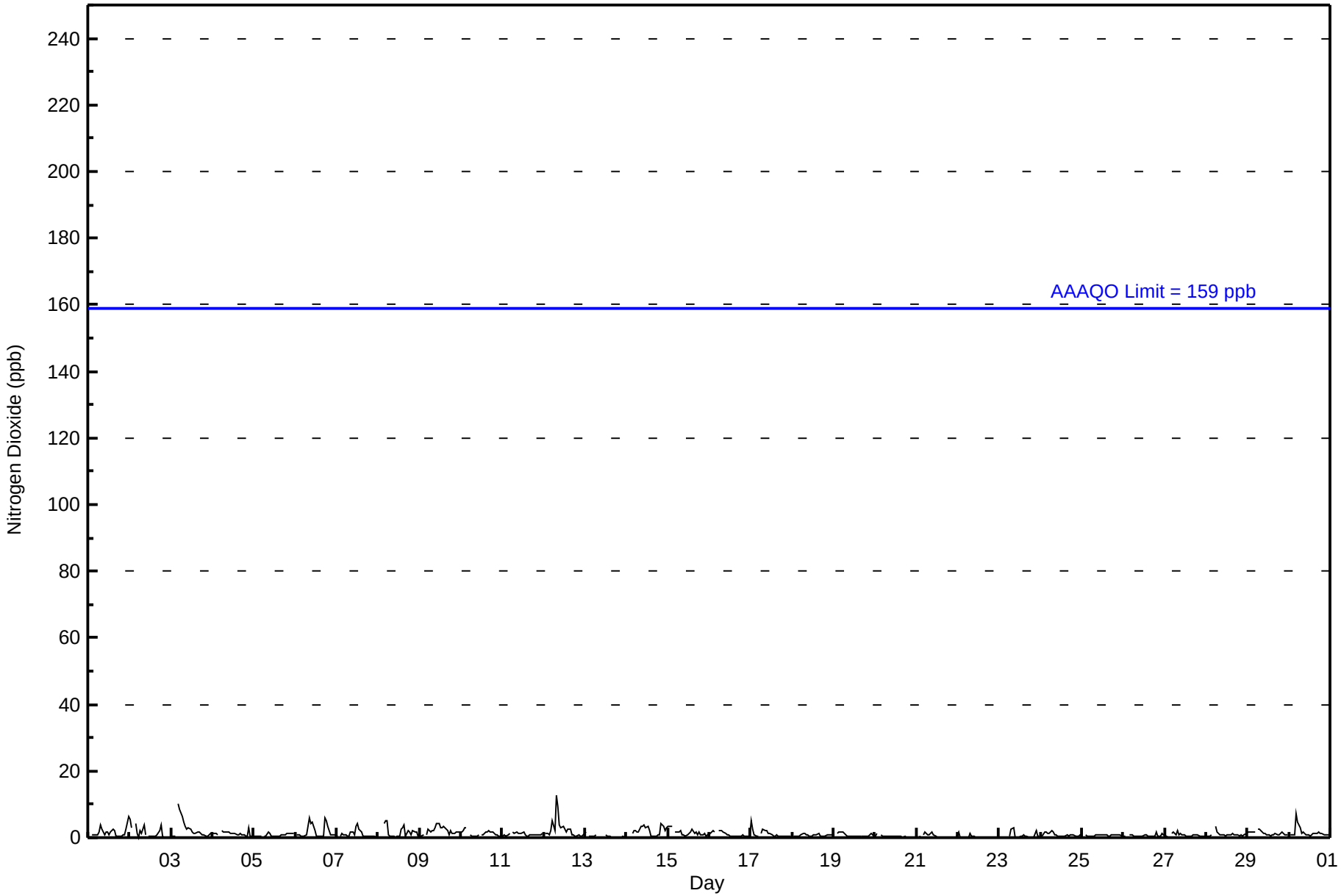
Z - zerospan C - Calibration M - Maintenance
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Dioxide (NO_2) - ppb

Anzac - April 2016



Nitrogen Dioxide (NO_2) - ppb

Anzac - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	683	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: 683

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Dioxide (NO_2) - ppb

Anzac - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	51	12	14	22	50	51	74	64	95	48	37	19	19	36	21	43	656
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	51	12	14	22	50	51	74	64	95	48	37	19	19	36	21	43	656

Total Number of Valid Hours: 656

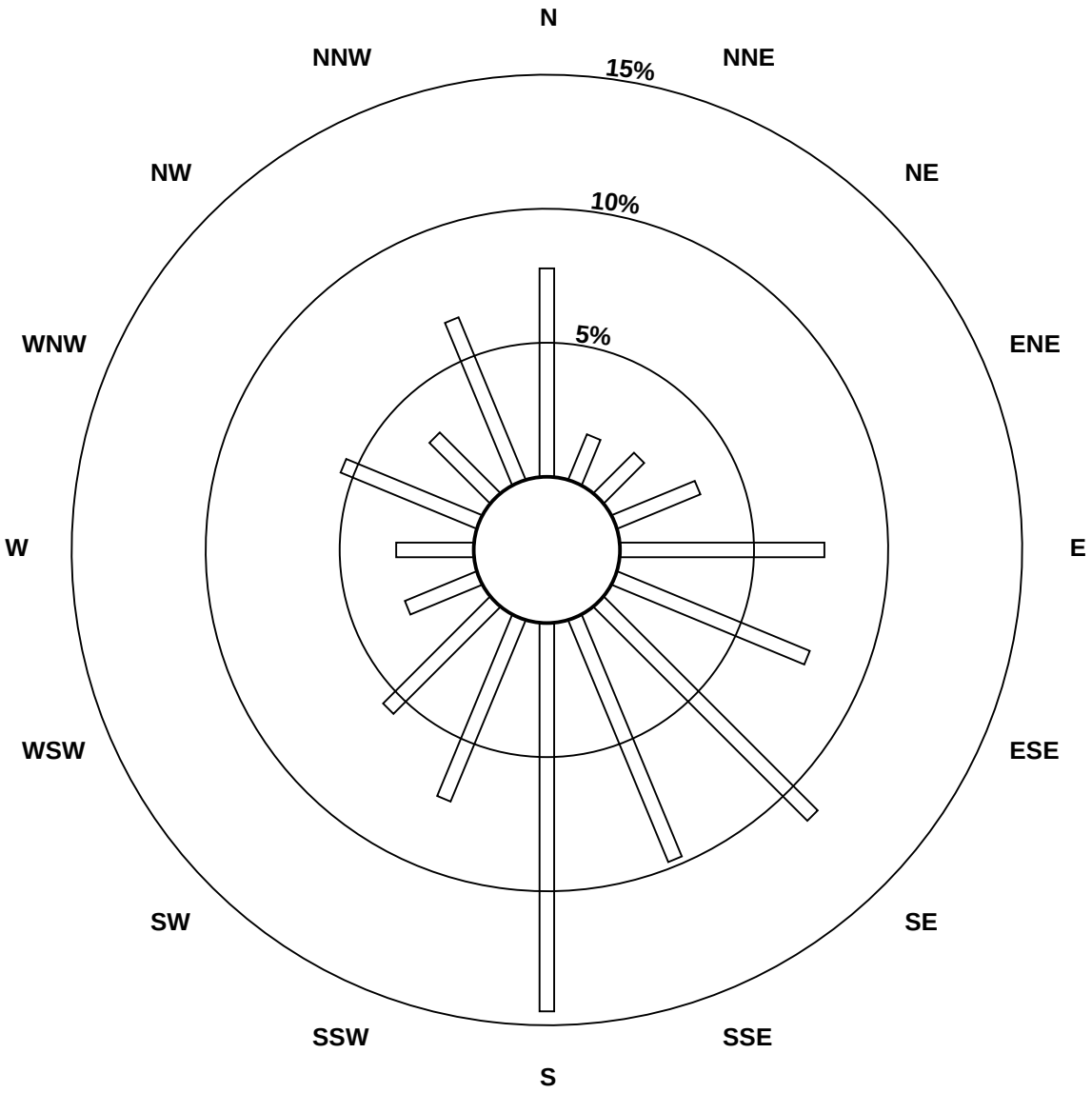
Total Number of Hours: 720

Wood Buffalo Environmental Association

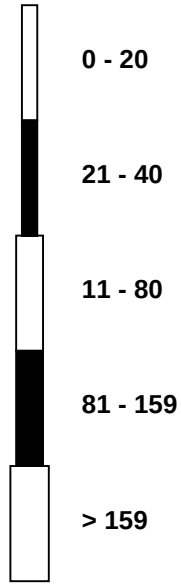
Wind Rose Apr 2016

Nitrogen Dioxide (NO_2) - ppb

Anzac (AMS 14)



Classes (ppb)



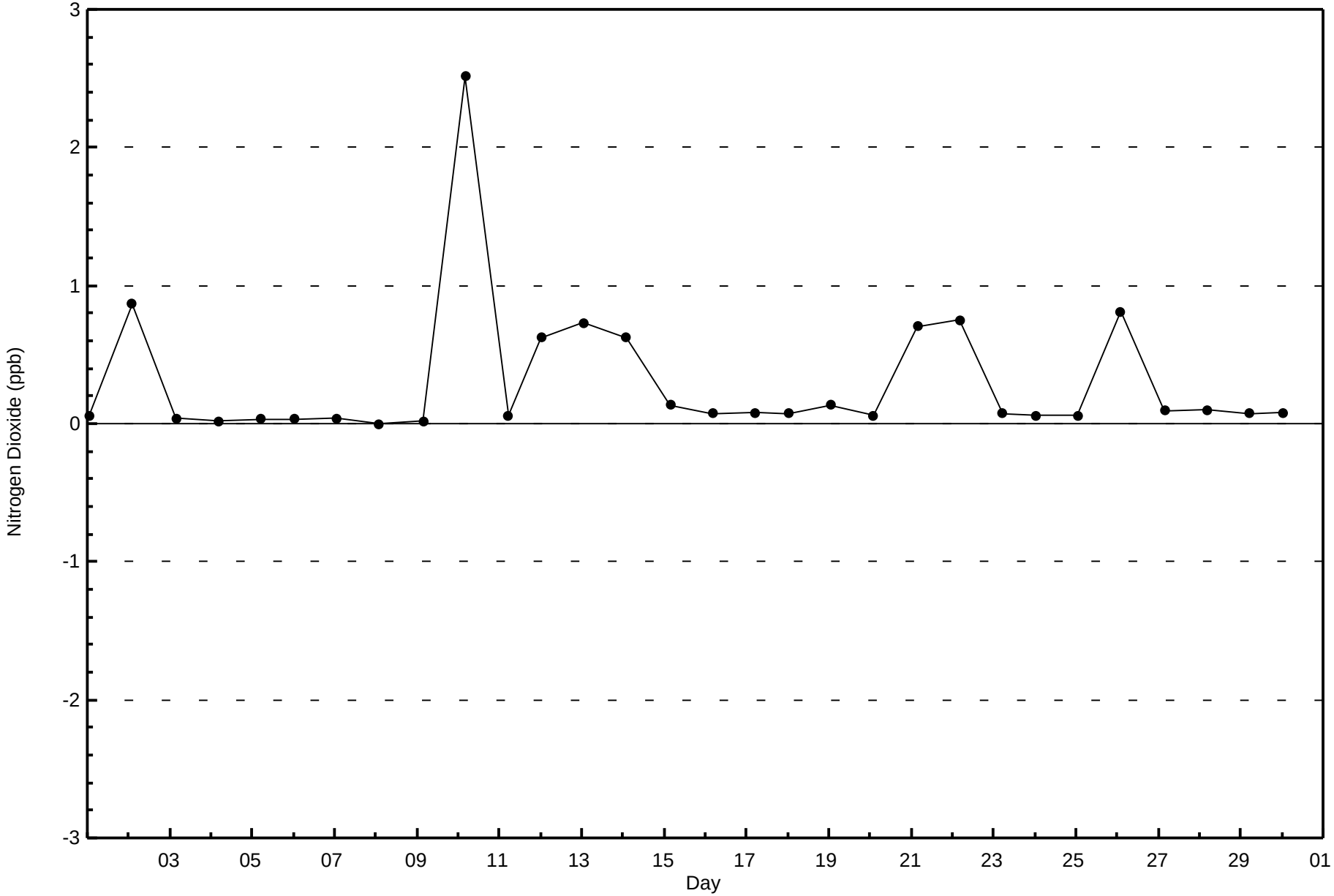
Total Number of Valid Hours: 656

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Dioxide (NO_2) - ppb

Anzac - April 2016

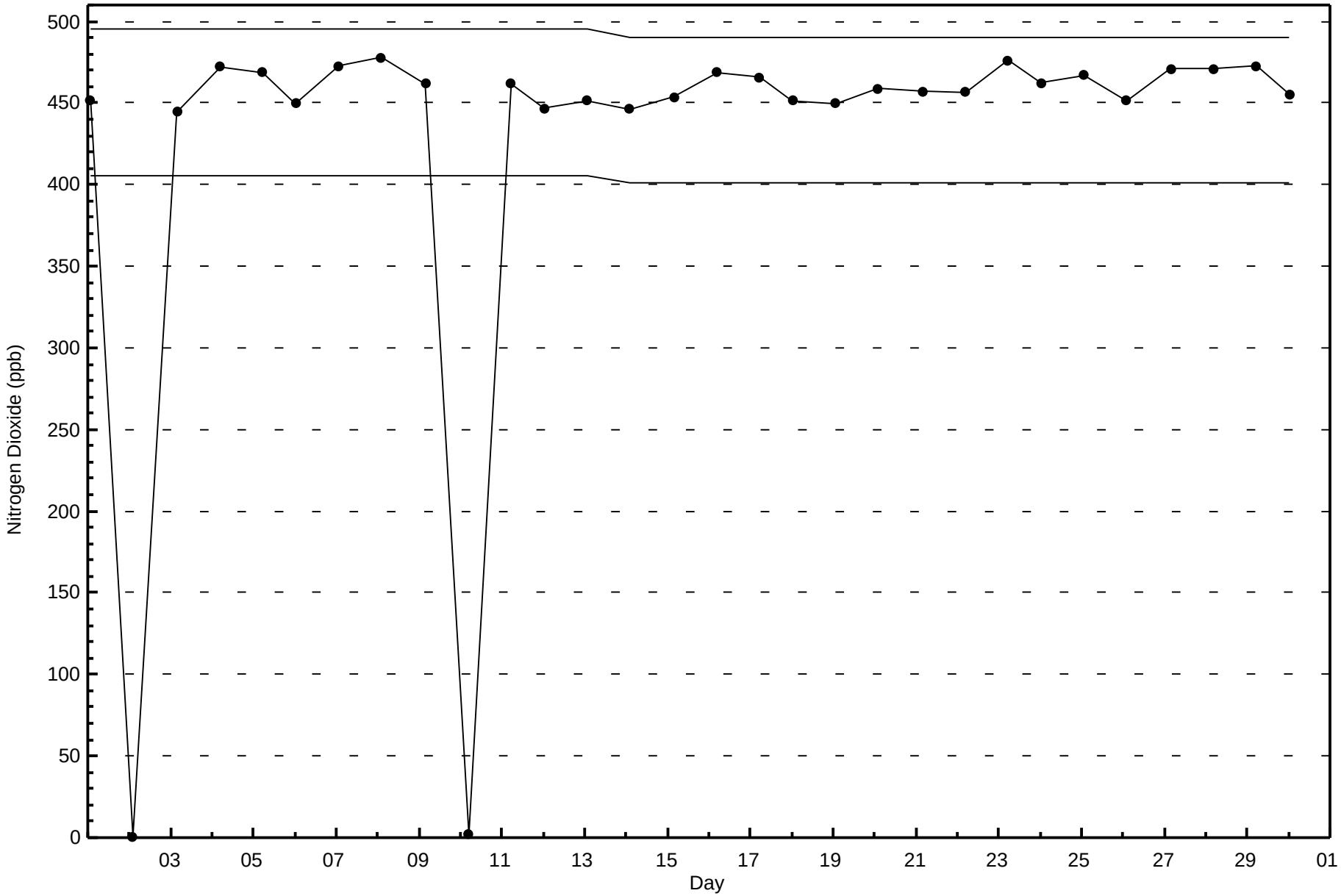


Wood Buffalo Environmental Association

Span Responses

Nitrogen Dioxide (NO_2) - ppb

Anzac - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_X) - ppb

Anzac - April 2016

Maximum Value: 17 ppb on Apr 12 08:00

Maximum Daily Average: 3.2 ppb on Apr 12

Minimum Value: 0 ppb on Apr 22 06:00

Minimum Daily Average: 0.3 ppb on Apr 22

Maximum Diurnal Average: 2.5 ppb at hour 8

Minimum Diurnal Average: 0.8 ppb at hour 20

Monthly Average: 1.3 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 1 $Q_3 = 2$ $P_{90} = 3$ $P_{99} = 7$

Hours in Service:	720
Hours of Data:	683
Hours of Missing Data:	37
Hours of Calibration:	35
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-Apr	2	Z	1	1	1	1	2	4	3	1	2	2	1	2	3	3	1	1	1	1	1	1	3	6	1.8	6
2-Apr	6	3	Z	4	1	0	2	2	6	1	M	0	0	0	0	0	1	2	4	1	0	0	0	0	1.6	6
3-Apr	0	0	0	Z	10	9	6	5	4	3	4	3	3	2	2	2	2	1	1	1	1	1	1	1	2.7	10
4-Apr	1	1	1	1	Z	2	2	2	2	2	2	2	1	1	1	1	1	1	1	0	0	8	0	0	1.6	8
5-Apr	0	0	0	0	0	Z	0	0	2	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	0.8	2
6-Apr	Z	1	1	1	1	1	1	4	7	5	6	2	0	0	0	0	1	7	5	3	1	1	1	1	2.2	7
7-Apr	1	Z	0	1	1	1	1	0	2	2	1	5	6	4	2	1	0	0	0	0	1	0	0	0	1.3	6
8-Apr	0	0	Z	4	5	5	1	1	0	0	0	0	0	3	4	5	0	5	2	1	2	2	2	1	1.9	5
9-Apr	0	1	1	Z	1	2	2	2	3	3	5	5	3	3	4	3	2	1	2	1	1	2	2	2	2.2	5
10-Apr	2	2	3	3	Z	1	1	0	0	1	1	M	1	1	3	2	3	2	2	1	1	1	0	0	1.4	3
11-Apr	0	2	0	1	1	Z	2	2	2	2	2	1	2	1	1	1	1	1	1	1	1	1	1	1	1.2	2
12-Apr	Z	1	1	1	2	6	2	17	13	5	4	5	4	2	3	3	1	1	0	0	1	0	0	1	3.2	17
13-Apr	2	Z	0	0	0	0	1	C	C	C	C	C	1	0	0	0	0	0	0	0	0	0	0	0	0.4	2
14-Apr	0	0	Z	1	2	2	2	2	4	5	5	4	5	3	1	0	1	1	1	1	4	3	2	3	2.3	5
15-Apr	3	4	3	Z	2	2	2	3	1	1	1	1	2	3	4	2	2	1	2	1	1	1	1	1	1.9	4
16-Apr	1	2	2	2	Z	2	2	3	2	1	1	1	1	1	1	1	0	1	1	1	0	0	0	0	1.1	3
17-Apr	5	3	1	1	1	Z	1	3	2	2	2	1	1	0	1	1	1	1	1	1	0	0	1	0	1.3	5
18-Apr	Z	0	0	0	0	1	1	2	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	0.8	2
19-Apr	1	Z	2	2	2	1	1	1	1	1	0	0	0	0	1	0	0	0	0	0	1	1	1	1	0.8	2
20-Apr	0	1	Z	1	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0.4	1
21-Apr	0	0	0	Z	1	2	1	1	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2
22-Apr	2	0	0	0	Z	0	1	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	3
23-Apr	0	0	0	0	0	Z	0	3	4	0	0	0	0	1	1	1	0	0	0	0	0	2	0	1	0.7	4
24-Apr	Z	0	2	2	1	1	2	2	1	1	0	0	0	0	0	1	0	1	1	1	1	1	1	1	0.9	2
25-Apr	1	Z	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.8	1
26-Apr	1	1	Z	1	1	1	1	0	1	1	1	1	1	1	1	1	1	0	1	2	1	1	1	1	0.8	2
27-Apr	1	0	0	Z	1	3	2	3	1	2	1	1	0	0	0	1	1	1	1	1	1	0	0	0	1.0	3
28-Apr	0	0	1	1	Z	5	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.0	5
29-Apr	2	2	2	2	2	Z	3	3	2	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1.4	3
30-Apr	Z	1	1	1	8	5	3	2	2	1	1	1	1	1	1	1	2	2	1	1	1	1	1	1	1.7	8
	1.3	1.1	1.0	1.3	1.9	2.1	1.6	2.5	2.4	1.7	1.5	1.5	1.3	1.2	1.3	1.2	0.9	1.1	1.0	0.8	0.8	1.1	0.8	0.9	Diurnal Average	
	6	4	3	4	10	9	6	17	13	5	6	5	6	4	4	5	3	7	5	3	4	8	3	6	Diurnal Maximum	

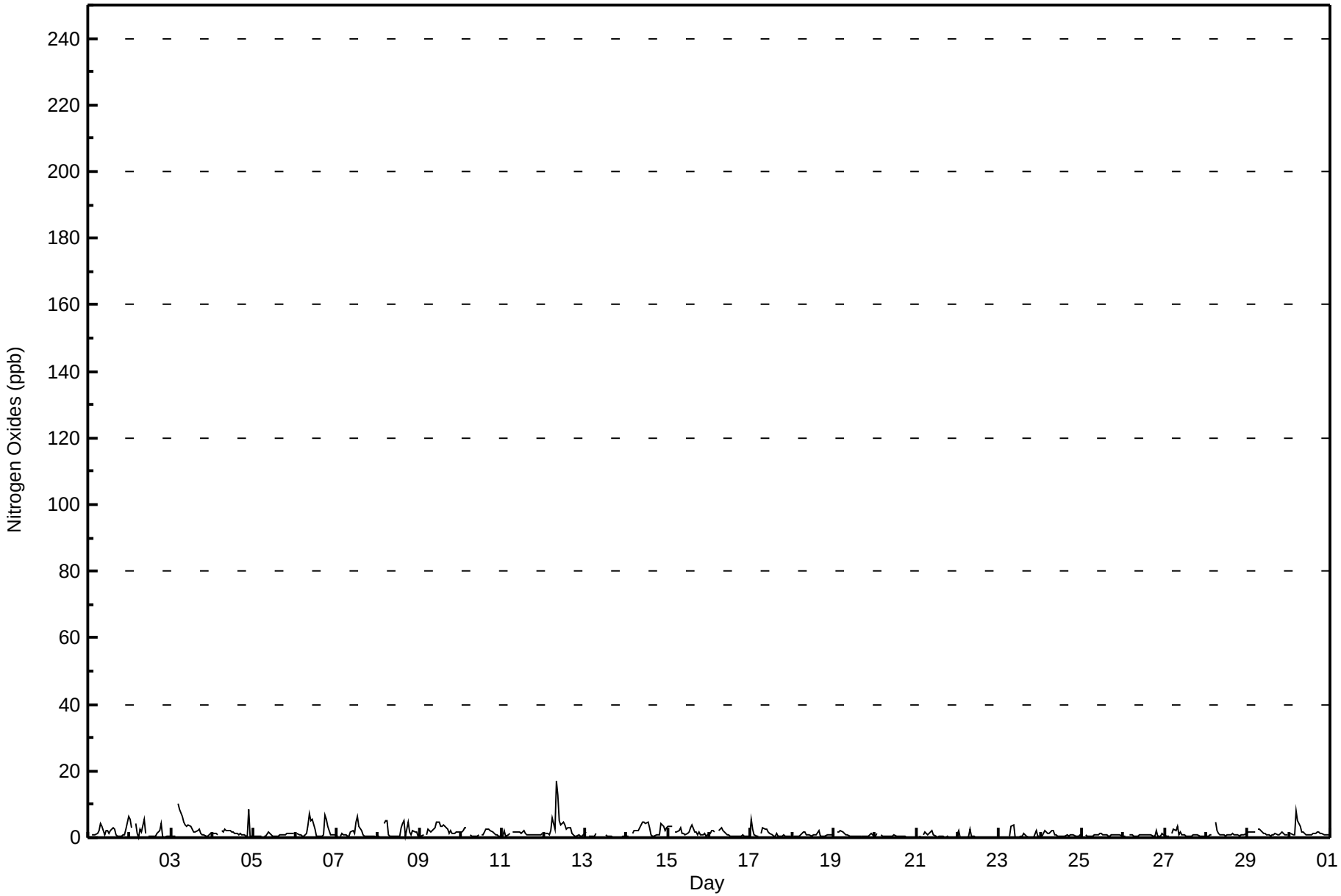
Z - zerospan C - Calibration M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Oxides (NO_X) - ppb

Anzac - April 2016



Nitrogen Oxides (NO_X) - ppb
Anzac - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	683	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: 683

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Oxides (NO_X) - ppb

Anzac - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	51	12	14	22	50	51	74	64	95	48	37	19	19	36	21	43	656
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	51	12	14	22	50	51	74	64	95	48	37	19	19	36	21	43	656

Total Number of Valid Hours: 656

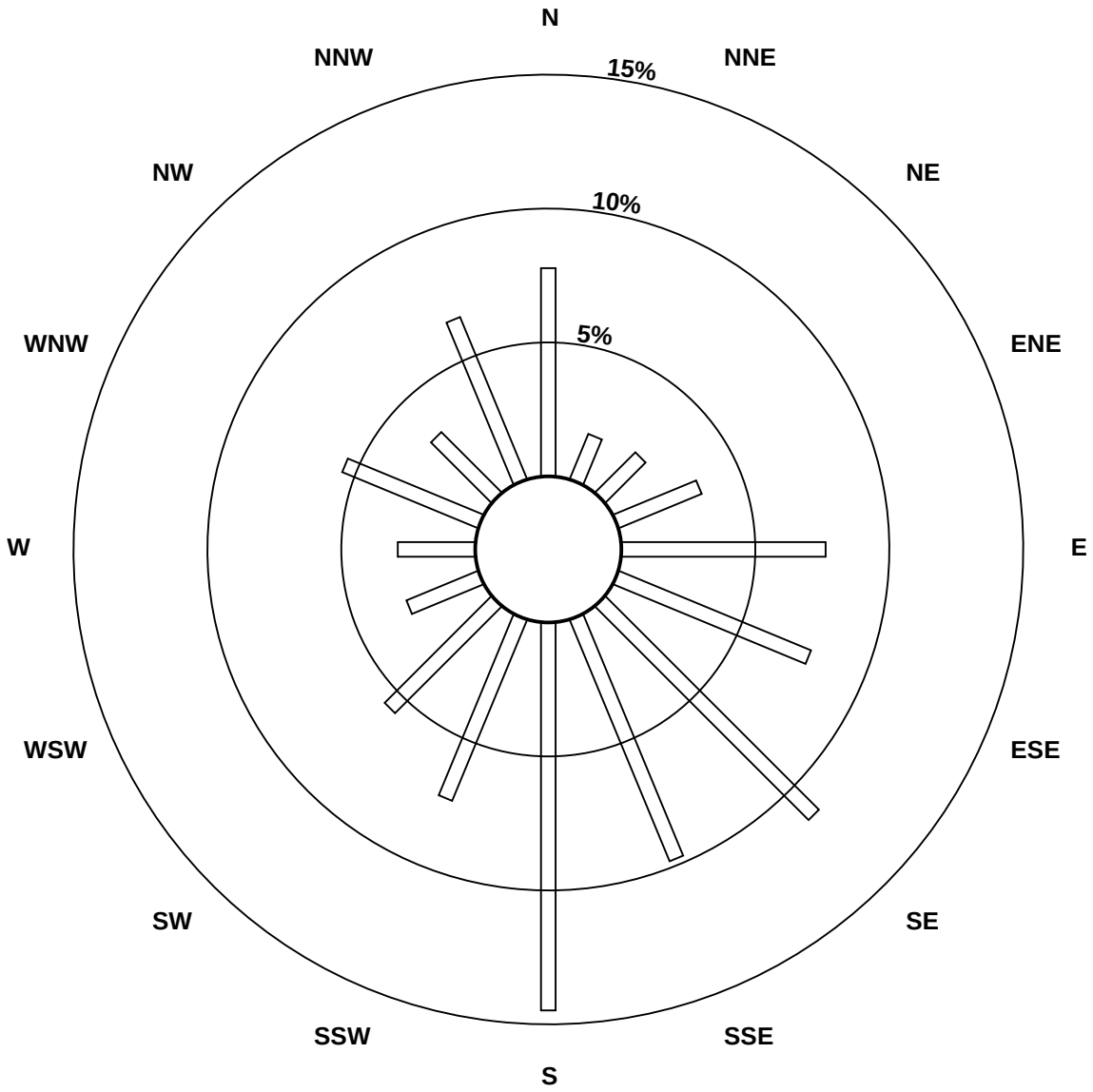
Total Number of Hours: 720

Wood Buffalo Environmental Association

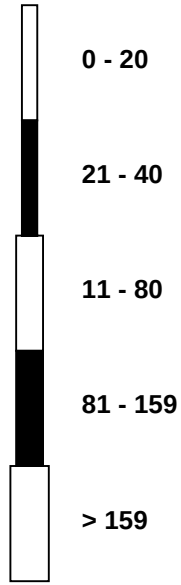
Wind Rose Apr 2016

Nitrogen Oxides (NO_X) - ppb

Anzac (AMS 14)



Classes (ppb)



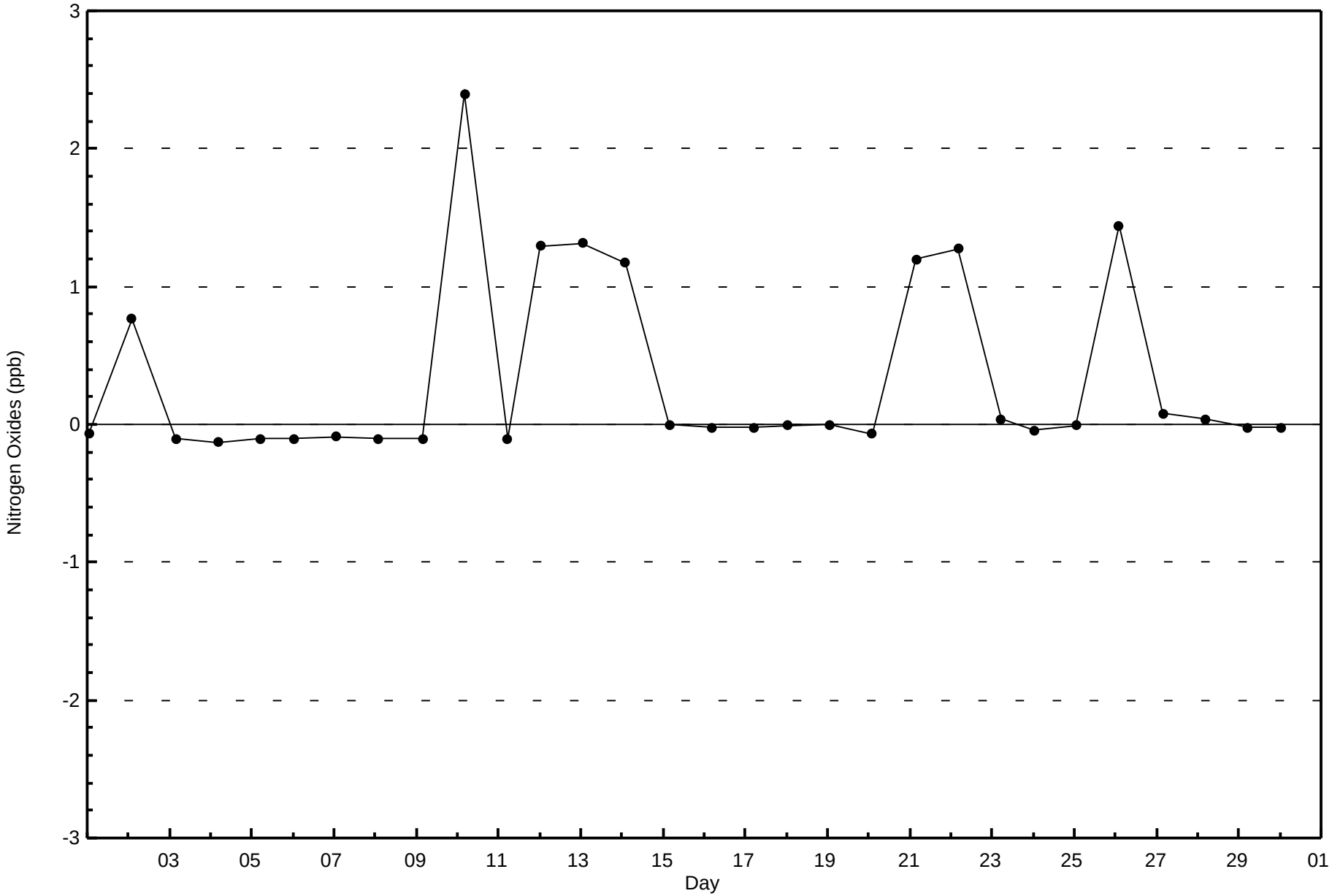
Total Number of Valid Hours: 656

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Oxides (NO_X) - ppb

Anzac - April 2016

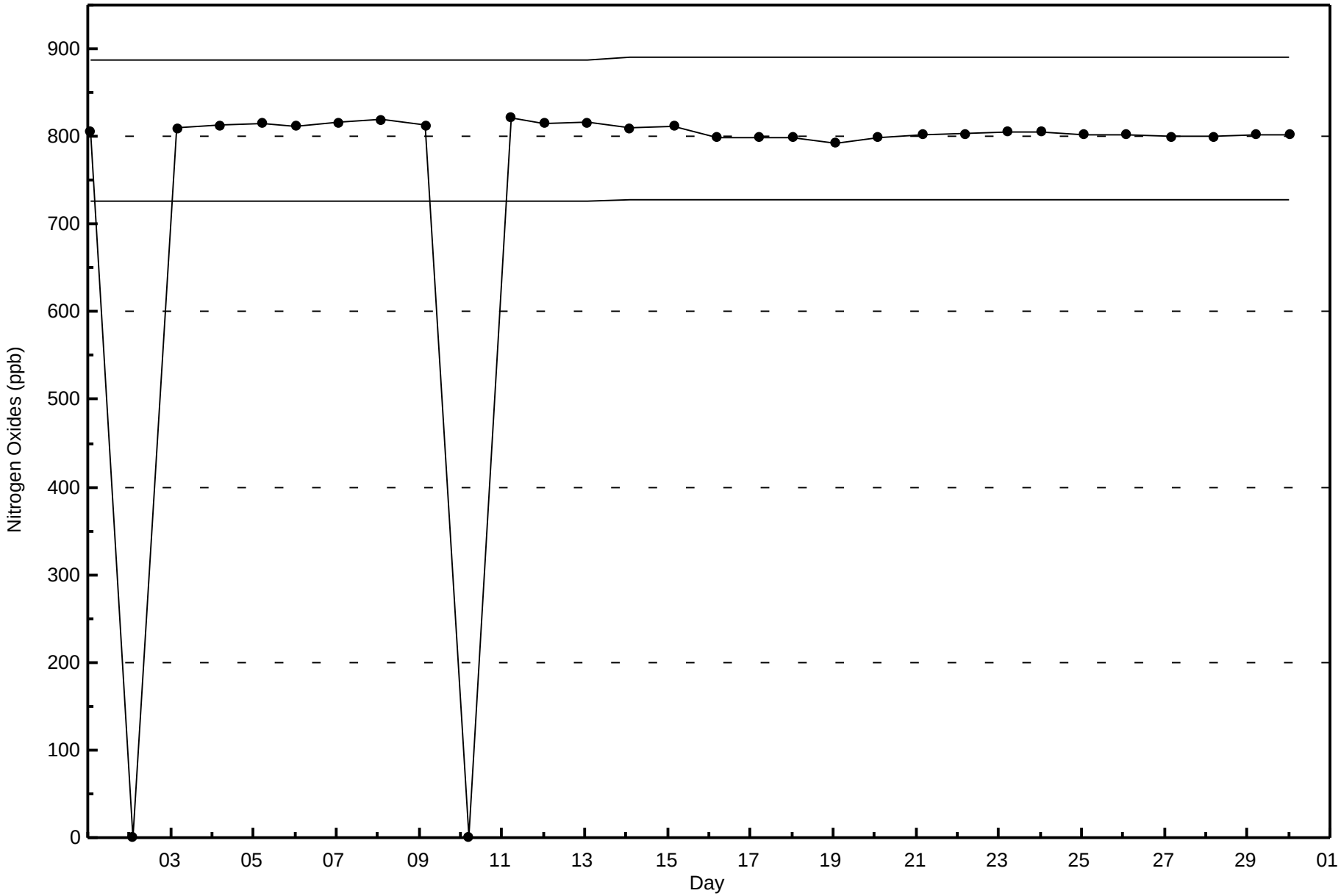


Wood Buffalo Environmental Association

Span Responses

Nitrogen Oxides (NO_X) - ppb

Anzac - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O_3) - ppb

Anzac - April 2016

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

Maximum Value: 64 ppb on Apr 19 16:00

Maximum Daily Average: 54.5 ppb on Apr 19

Minimum Value: 4 ppb on Apr 27 05:00

Minimum Daily Average: 26.0 ppb on Apr 26

Maximum Diurnal Average: 43.4 ppb at hour 17

Minimum Diurnal Average: 28.0 ppb at hour 5

Monthly Average: 37.8 ppb

Percentiles: $P_1 = 10$ $P_{10} = 26$ $Q_1 = 33$ Median = 38 $Q_3 = 43$ $P_{90} = 49$ $P_{99} = 59$

Hours in Service:	720
Hours of Data:	686
Hours of Missing Data:	34
Hours of Calibration:	33
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-Apr	25	31	38	37	Z	36	35	33	35	39	39	38	39	39	38	39	43	44	45	41	41	41	39	35	37.8	45
2-Apr	36	38	40	37	40	Z	39	39	37	40	41	42	43	43	43	43	43	41	37	42	43	43	43	43	40.7	43
3-Apr	42	41	40	34	24	27	Z	35	36	38	39	40	42	43	44	44	43	45	43	37	33	35	38	39	38.4	45
4-Apr	39	39	39	33	28	23	24	Z	34	35	35	36	37	38	40	42	41	41	39	37	38	35	37	36	35.9	42
5-Apr	32	32	30	32	33	33	32	34	Z	34	35	35	38	40	39	36	35	34	33	31	29	27	23	19	32.5	40
6-Apr	18	23	31	Z	28	28	24	26	23	27	28	28	31	30	31	33	31	26	28	29	32	35	35	35	28.6	35
7-Apr	36	37	39	38	Z	36	40	39	37	37	40	36	35	36	37	37	37	37	36	37	36	36	35	36	37.0	40
8-Apr	36	36	34	30	28	Z	31	32	34	35	35	36	37	36	35	35	37	37	39	37	35	35	34	34	34.7	39
9-Apr	34	34	33	30	23	27	Z	35	36	36	34	35	37	39	40	41	41	42	41	42	43	42	42	42	36.9	43
10-Apr	42	41	40	39	41	41	42	Z	44	44	45	45	M	46	46	45	45	46	45	36	39	39	43	43	42.6	46
11-Apr	42	40	41	39	38	37	37	40	Z	43	43	44	45	46	47	47	47	46	45	41	40	40	40	38	42.0	47
12-Apr	31	35	36	Z	25	16	31	27	32	40	41	42	45	46	46	48	49	49	46	44	43	43	42	41	38.9	49
13-Apr	40	41	40	39	Z	37	37	37	35	37	36	38	38	37	37	35	34	35	33	31	32	25	22	17	34.5	41
14-Apr	21	22	22	25	32	Z	34	33	C	C	C	33	33	34	37	37	36	35	34	32	27	27	26	26	30.3	37
15-Apr	25	24	21	14	9	10	Z	29	35	37	37	37	36	34	34	36	36	38	38	37	35	35	36	35	30.7	38
16-Apr	36	35	33	32	30	28	26	Z	40	44	46	49	51	51	51	51	51	50	49	39	36	33	28	28	39.9	51
17-Apr	22	26	32	27	26	38	46	48	Z	48	50	52	53	50	47	46	43	42	39	33	29	25	24	21	37.7	53
18-Apr	18	19	20	Z	26	32	40	47	51	58	54	53	58	58	58	56	57	57	58	58	58	59	58	56	48.2	59
19-Apr	55	53	51	48	Z	44	45	48	51	56	59	60	61	61	60	64	62	58	57	57	55	53	49	46	54.5	64
20-Apr	43	37	35	33	33	Z	34	34	32	31	31	30	31	33	35	36	36	37	40	35	29	31	34	32	34.1	43
21-Apr	27	28	27	22	20	19	Z	34	35	38	41	42	43	45	45	46	46	46	48	47	42	41	44	43	37.8	48
22-Apr	40	39	37	32	29	31	36	Z	41	43	45	46	47	47	47	47	47	46	45	44	43	43	43	43	41.8	47
23-Apr	42	41	41	41	40	40	40	38	Z	40	42	41	40	40	40	41	41	40	40	40	40	39	40	40	40.3	42
24-Apr	40	40	39	Z	38	38	36	36	36	39	42	45	47	49	48	46	48	47	47	45	45	45	44	43	42.9	49
25-Apr	41	40	38	37	Z	31	29	28	28	30	31	33	36	39	40	41	40	40	38	36	34	28	27	26	34.4	41
26-Apr	27	30	31	29	27	Z	25	25	27	29	29	28	27	26	26	26	34	37	34	25	16	11	12	19	26.0	37
27-Apr	13	5	5	5	4	5	Z	19	31	34	40	40	42	45	44	43	44	43	43	38	33	32	27	27	28.8	45
28-Apr	20	14	16	10	16	27	26	Z	46	50	52	53	52	53	54	54	54	54	53	52	52	52	49	46	41.6	54
29-Apr	46	45	43	43	43	42	43	44	Z	46	49	51	52	51	51	52	52	52	51	47	39	40	37	33	45.7	52
30-Apr	36	30	37	Z	17	20	29	41	43	47	50	50	50	49	49	49	49	46	42	38	33	28	27	21	38.3	50
	33.5	33.3	33.5	31.5	28.0	29.9	34.5	35.2	36.6	39.8	41.0	41.3	42.2	42.7	43.0	43.2	43.4	43.0	42.2	39.7	37.7	36.5	35.9	34.7	Diurnal Average	
	55	53	51	48	43	44	46	48	51	58	59	60	61	61	60	64	62	58	58	58	58	59	58	56	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance

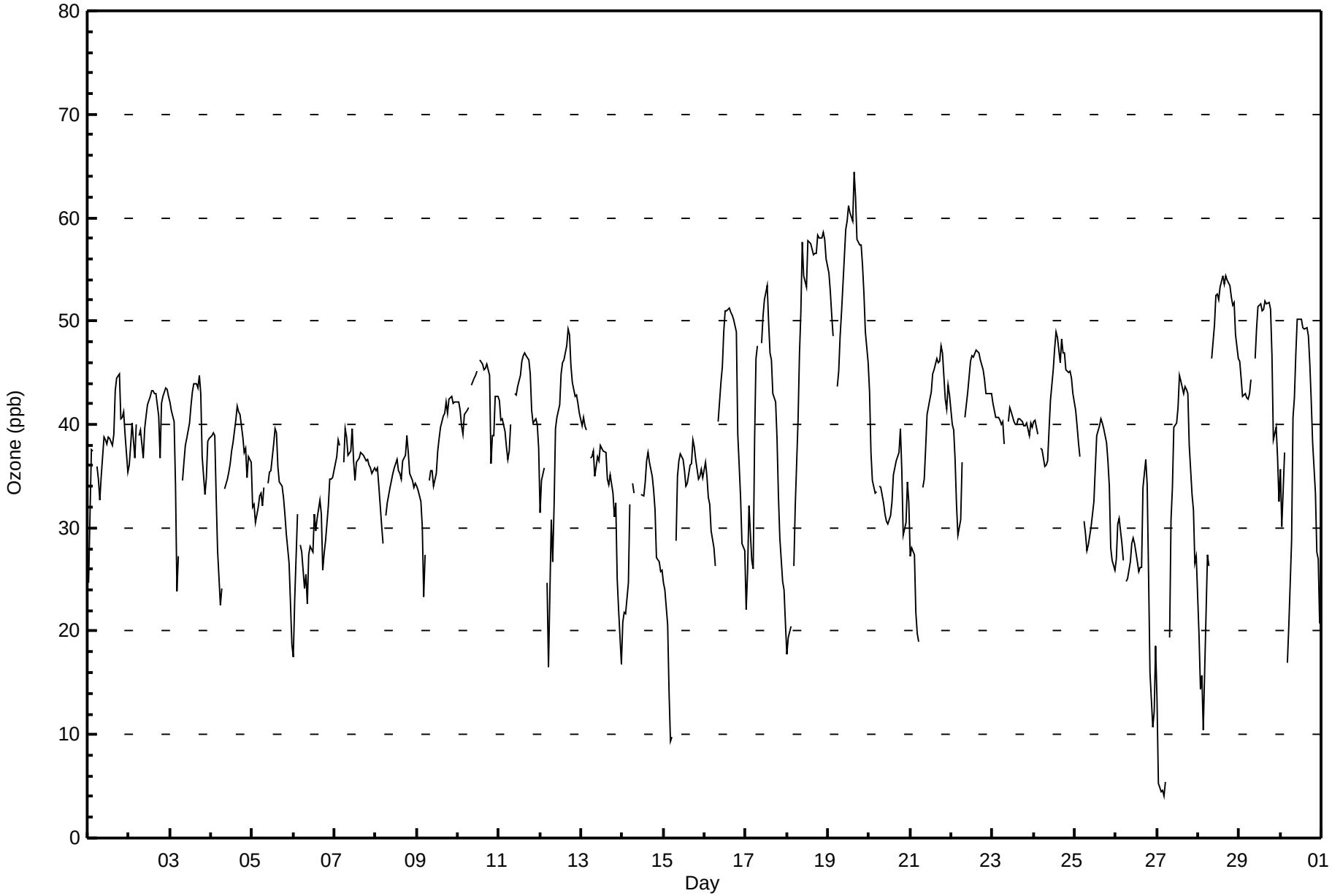
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb

Wood Buffalo Environmental Association

Hourly Averages

Ozone (O_3) - ppb

Anzac - April 2016



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	30	4.37	4.37
21 - 50	596	86.88	91.25
51 - 82	60	8.75	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Ozone (O_3) - ppb

Anzac - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	0	0	0	0	0	0	3	2	8	5	3	0	2	3	0	0	26
21 - 50	50	14	14	22	51	52	77	62	72	30	25	14	13	20	19	42	577
51 - 82	0	0	0	0	0	0	0	3	13	14	10	2	4	11	3	0	60
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	50	14	14	22	51	52	80	67	93	49	38	16	19	34	22	42	663

Total Number of Valid Hours: 663

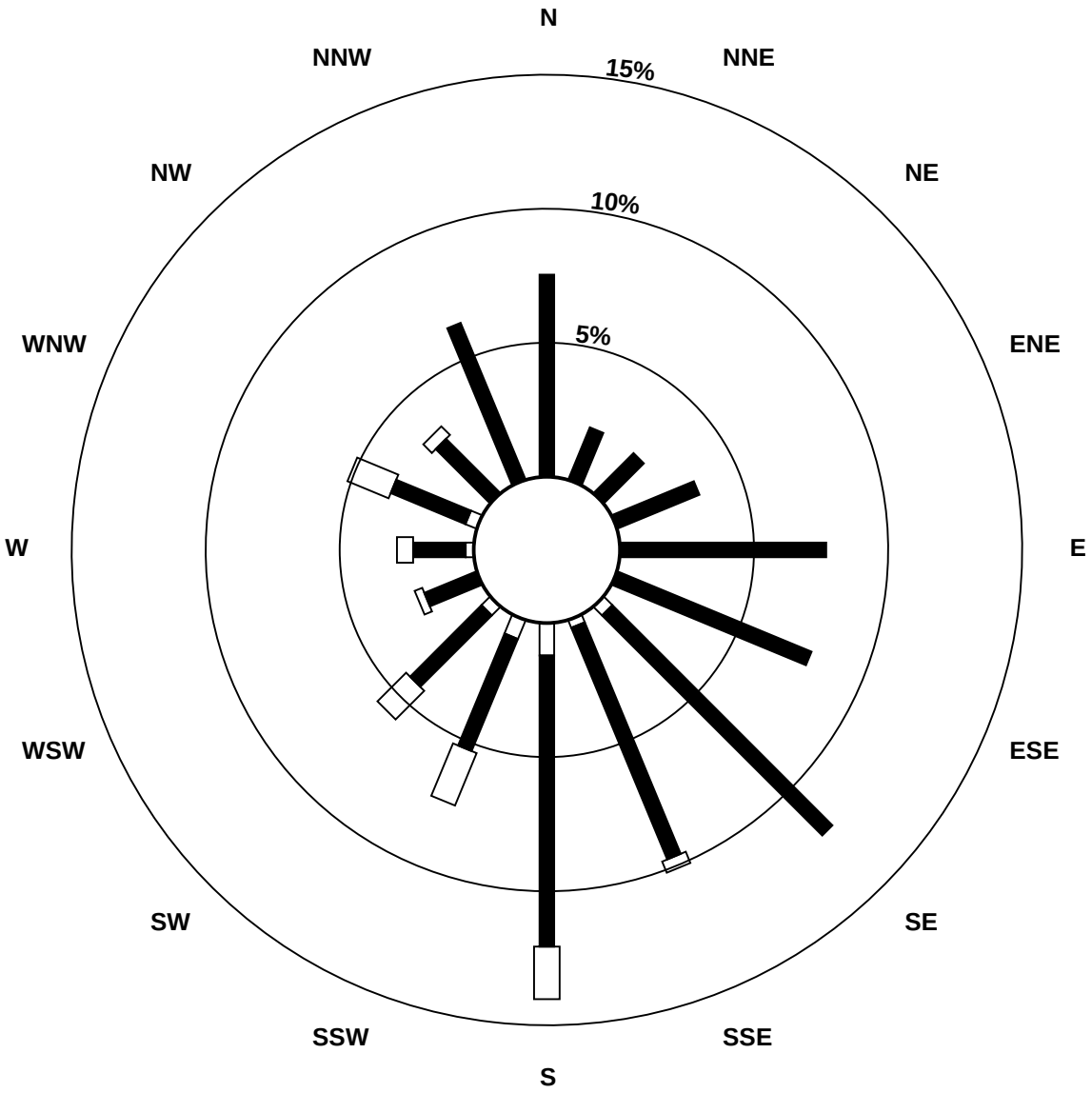
Total Number of Hours: 720

Wood Buffalo Environmental Association

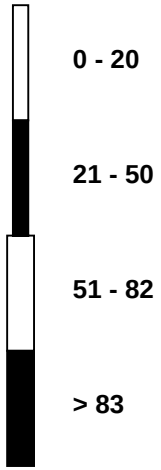
Wind Rose Apr 2016

Ozone (O_3) - ppb

Anzac (AMS 14)



Classes (ppb)



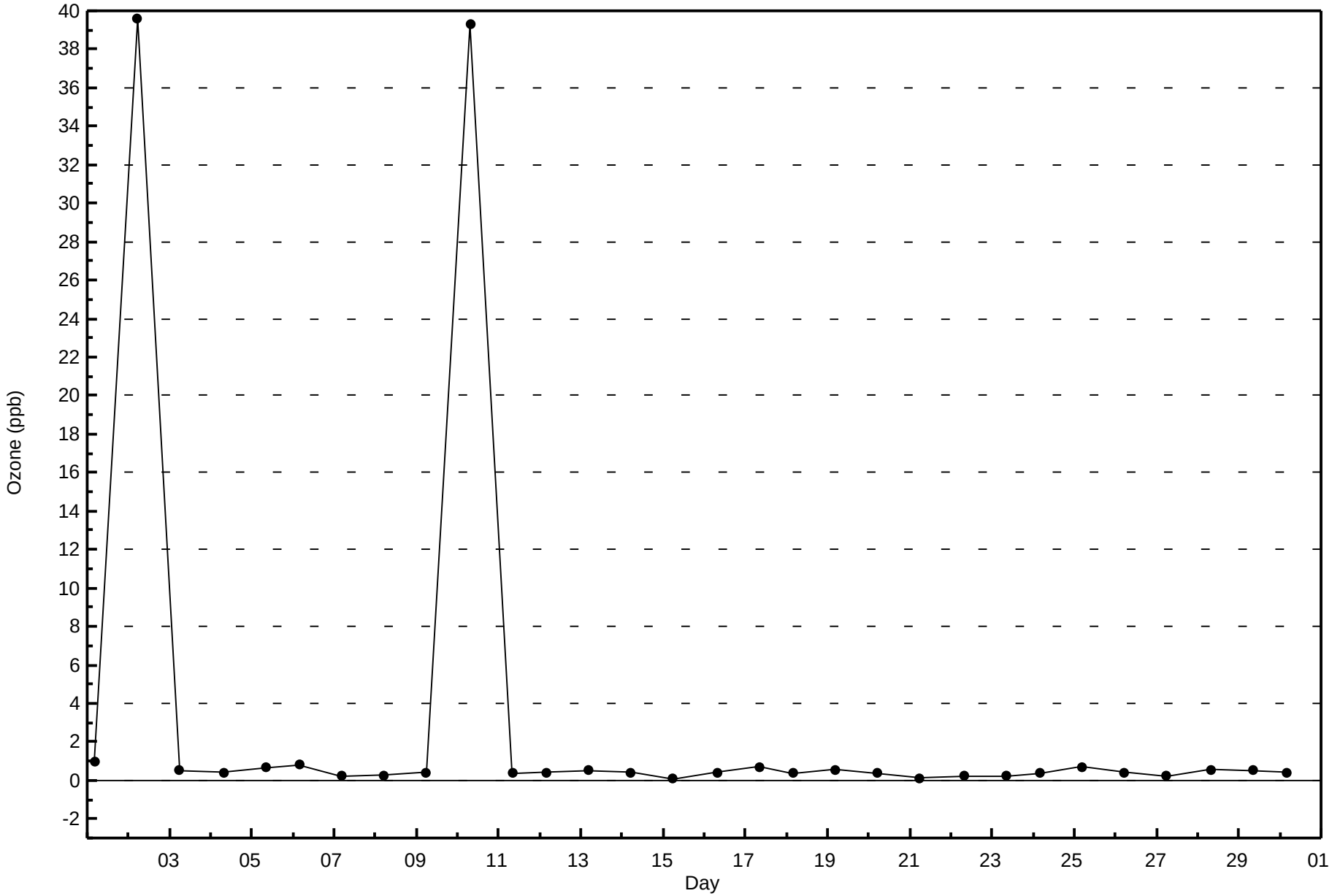
Total Number of Valid Hours: 663

Wood Buffalo Environmental Association

Zero Responses

Ozone (O_3) - ppb

Anzac - April 2016

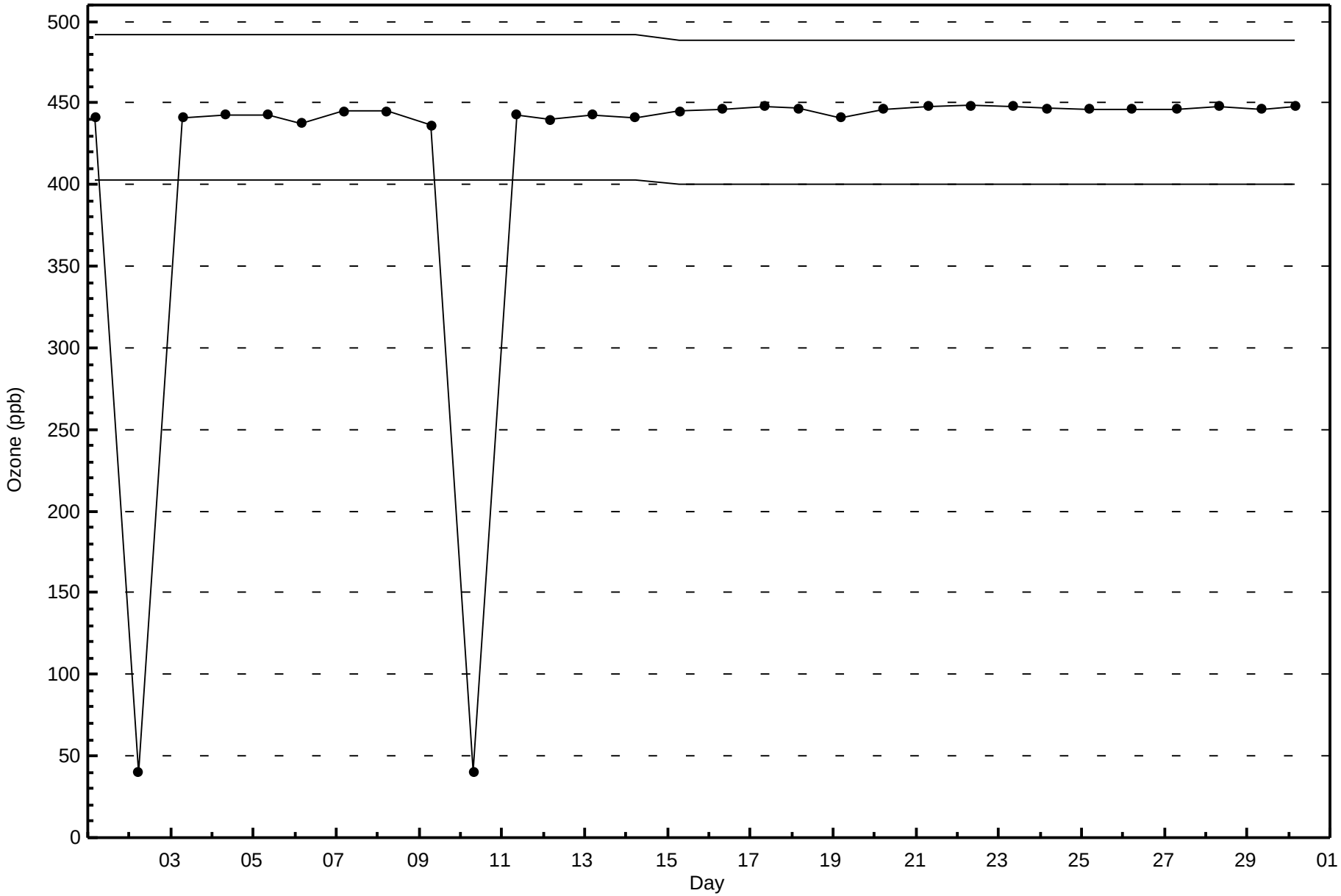


Wood Buffalo Environmental Association

Span Responses

Ozone (O_3) - ppb

Anzac - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

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

Anzac - April 2016

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

Maximum Value: 14.7 $\mu g/m^3$ on Apr 18 23:00

Maximum Daily Average: 5.3 $\mu g/m^3$ on Apr 29

Minimum Value: 0.3 $\mu g/m^3$ on Apr 6 06:00

Minimum Daily Average: 2.0 $\mu g/m^3$ on Apr 20

Maximum Diurnal Average: 4.6 $\mu g/m^3$ at hour 23

Minimum Diurnal Average: 2.2 $\mu g/m^3$ at hour 13

Monthly Average: 3.20 $\mu g/m^3$

Percentiles: $P_1 = 0.6$ $P_{10} = 1.6$ $Q_1 = 2.0$ Median = 2.7 $Q_3 = 4.1$ $P_{90} = 5.5$ $P_{99} = 9.2$

Hours in Service:	720
Hours of Data:	719
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-Apr	1.5	1.7	1.3	1.3	1.3	1.3	1.5	1.8	1.3	1.0	1.2	1.5	1.4	1.5	9.3	1.9	1.4	1.4	2.1	2.6	2.8	2.4	1.8	1.9	2.0	9.3
2-Apr	1.7	1.7	1.8	1.9	1.7	1.7	1.9	1.8	2.1	1.6	1.6	1.6	1.6	1.6	1.7	1.7	2.1	3.0	4.2	2.0	2.1	2.5	2.5	2.2	2.0	4.2
3-Apr	2.2	2.6	2.3	4.0	10.5	4.5	4.3	4.3	3.6	3.1	2.5	1.8	1.5	1.5	1.5	1.8	1.7	1.6	2.1	2.6	2.8	2.6	2.7	2.4	2.9	10.5
4-Apr	2.4	3.1	2.9	2.6	2.4	2.5	2.3	2.6	2.0	2.0	1.9	1.9	1.9	1.8	1.8	1.9	2.5	2.5	3.2	2.9	3.1	3.4	3.1	2.9	2.5	3.4
5-Apr	3.1	3.5	3.5	3.4	3.0	3.0	2.6	3.1	3.1	2.3	2.1	2.3	2.3	2.1	1.7	1.9	2.5	2.6	4.1	3.8	3.1	2.8	2.9	2.4	2.8	4.1
6-Apr	1.4	0.8	0.6	0.6	0.4	0.3	0.4	2.5	3.0	4.3	3.8	2.0	1.5	2.1	1.7	1.5	2.0	6.3	5.5	3.9	2.6	2.4	2.7	2.7	2.3	6.3
7-Apr	2.4	2.1	2.1	2.5	2.6	2.4	2.1	2.1	2.1	2.1	1.7	1.8	1.9	1.7	1.7	1.7	1.6	1.9	2.8	3.3	3.1	3.0	3.0	2.5	2.2	3.3
8-Apr	2.1	1.9	2.0	2.1	2.2	2.2	2.2	2.0	1.9	1.8	1.7	1.6	1.6	1.7	1.8	1.6	1.6	2.4	4.2	2.5	5.2	4.1	4.8	2.9	2.4	5.2
9-Apr	3.5	4.9	4.4	4.8	5.0	5.4	4.7	3.9	3.8	4.8	4.9	4.3	5.2	4.7	3.1	2.8	3.0	2.8	3.2	3.7	3.7	4.1	3.4	3.1	4.0	5.4
10-Apr	2.5	2.2	2.1	2.3	2.3	2.2	2.1	1.8	1.9	2.0	1.9	1.8	1.8	1.9	2.2	2.5	2.6	3.0	2.9	3.5	4.1	3.6	2.9	2.4	2.4	4.1
11-Apr	2.3	2.5	2.2	1.9	2.0	2.0	2.1	2.3	2.4	2.4	2.4	2.4	2.3	2.3	1.5	1.5	1.4	1.5	2.4	5.5	4.0	4.1	4.6	5.0	2.6	5.5
12-Apr	5.3	6.0	5.7	5.3	5.7	6.3	4.6	5.6	4.3	3.3	2.5	2.7	2.0	1.5	1.9	2.5	2.4	2.8	3.7	3.9	4.2	4.4	4.4	4.3	4.0	6.3
13-Apr	4.3	5.4	5.6	5.5	5.3	5.6	6.4	5.7	4.7	4.3	3.8	3.4	3.4	3.0	3.2	3.8	3.9	3.6	2.2	2.0	1.9	2.2	3.0	3.1	4.0	6.4
14-Apr	1.7	2.3	2.0	2.8	4.1	4.8	4.8	3.6	4.0	3.2	C	2.5	2.1	2.0	0.8	0.6	0.6	0.7	0.7	0.9	2.5	2.2	1.8	2.1	2.3	4.8
15-Apr	2.1	2.5	4.4	3.4	2.8	2.7	2.3	1.7	1.8	1.8	1.5	1.1	1.1	1.7	1.9	1.9	1.6	1.7	2.6	3.0	3.6	4.0	3.4	2.8	2.4	4.4
16-Apr	2.3	2.5	2.6	2.9	2.7	2.6	2.4	2.1	2.3	2.6	2.4	2.9	2.9	3.3	2.8	2.2	2.2	2.3	3.6	4.8	4.0	4.8	6.4	3.8	3.1	6.4
17-Apr	5.5	4.3	4.8	5.2	5.2	4.8	4.0	3.3	3.1	3.4	2.9	2.7	2.5	1.9	1.7	1.8	1.6	2.2	3.9	6.1	6.8	4.6	6.4	5.2	3.9	6.8
18-Apr	5.5	5.5	5.2	5.8	5.8	5.8	5.5	4.0	2.6	2.9	2.5	2.5	2.9	3.7	8.8	13.0	1.6	1.7	2.5	3.0	3.3	8.8	14.7	6.8	5.2	14.7
19-Apr	4.3	4.0	4.0	4.7	5.0	7.2	11.8	10.6	7.7	5.2	4.1	4.0	3.5	3.9	3.4	1.8	2.1	3.4	5.3	7.3	4.9	4.9	4.1	2.7	5.0	11.8
20-Apr	1.9	3.3	2.4	2.1	1.6	1.9	1.8	2.4	2.9	2.3	2.2	1.7	1.3	1.2	1.3	1.3	1.2	1.3	1.4	1.8	2.4	2.4	2.2	2.2	2.0	3.3
21-Apr	2.8	4.9	4.6	4.5	4.2	4.1	3.3	2.3	2.0	1.9	1.9	1.9	1.8	1.9	1.9	1.9	1.8	1.8	2.0	2.2	2.6	3.1	2.9	2.7	2.7	4.9
22-Apr	2.9	2.4	2.0	2.0	2.0	2.1	2.0	2.1	2.1	2.4	2.0	2.0	2.0	1.9	1.9	1.9	1.7	1.7	1.8	2.4	2.7	2.3	2.7	3.0	2.2	3.0
23-Apr	3.0	3.0	2.7	2.8	2.6	2.6	2.3	2.3	2.1	1.9	1.8	1.8	1.9	2.1	2.3	2.5	2.8	2.7	2.8	3.2	3.0	3.4	3.2	3.2	2.6	3.4
24-Apr	4.1	5.7	5.9	5.0	5.0	5.1	5.0	4.4	3.9	3.6	2.9	2.3	1.9	2.3	2.2	2.7	2.5	2.8	3.2	3.6	4.3	5.0	5.6	5.2	3.9	5.9
25-Apr	4.7	4.3	4.2	4.2	5.2	5.3	4.6	4.4	4.7	4.8	4.2	3.7	3.7	3.7	3.3	3.2	3.4	3.6	3.5	6.9	6.2	5.4	9.5	6.2	4.7	9.5
26-Apr	5.3	4.8	4.2	3.7	2.7	1.4	0.7	0.4	1.1	3.7	4.4	4.6	2.9	2.2	2.0	1.9	1.9	1.7	1.8	2.8	4.4	5.6	6.6	5.1	3.2	6.6
27-Apr	3.8	3.3	3.4	3.6	4.7	3.2	1.5	3.1	2.4	1.9	1.5	1.4	1.7	1.2	1.1	1.2	1.6	2.3	2.9	3.8	3.7	4.4	4.2	3.8	2.7	4.7
28-Apr	4.1	3.8	5.9	6.5	7.0	6.0	3.8	2.5	1.9	1.8	1.8	2.0	2.7	3.0	3.9	5.1	6.5	5.7	4.8	5.8	6.0	6.7	9.6	7.1	4.8	9.6
29-Apr	6.8	7.6	7.4	7.2	7.3	7.0	6.6	5.3	4.6	3.9	3.9	3.4	2.8	2.4	2.5	2.7	2.8	3.0	3.3	5.1	5.6	10.1	8.4	7.5	5.3	10.1
30-Apr	6.1	5.2	4.8	4.7	6.7	5.5	4.4	3.3	2.7	1.9	1.1	1.0	0.9	1.4	2.0	2.3	4.1	5.4	4.8	4.2	4.1	6.8	5.9	6.6	4.0	6.8
	3.4	3.6	3.6	3.6	4.0	3.7	3.5	3.3	2.9	2.8	2.5	2.3	2.2	2.2	2.6	2.5	2.3	2.6	3.1	3.6	3.7	4.2	4.6	3.8	Diurnal Average	
	6.8	7.6	7.4	7.2	10.5	7.2	11.8	10.6	7.7	5.2	4.9	4.6	5.2	4.7	9.3	13.0	6.5	6.3	5.5	7.3	6.8	10.1	14.7	7.5	Diurnal Maximum	

C - Calibration

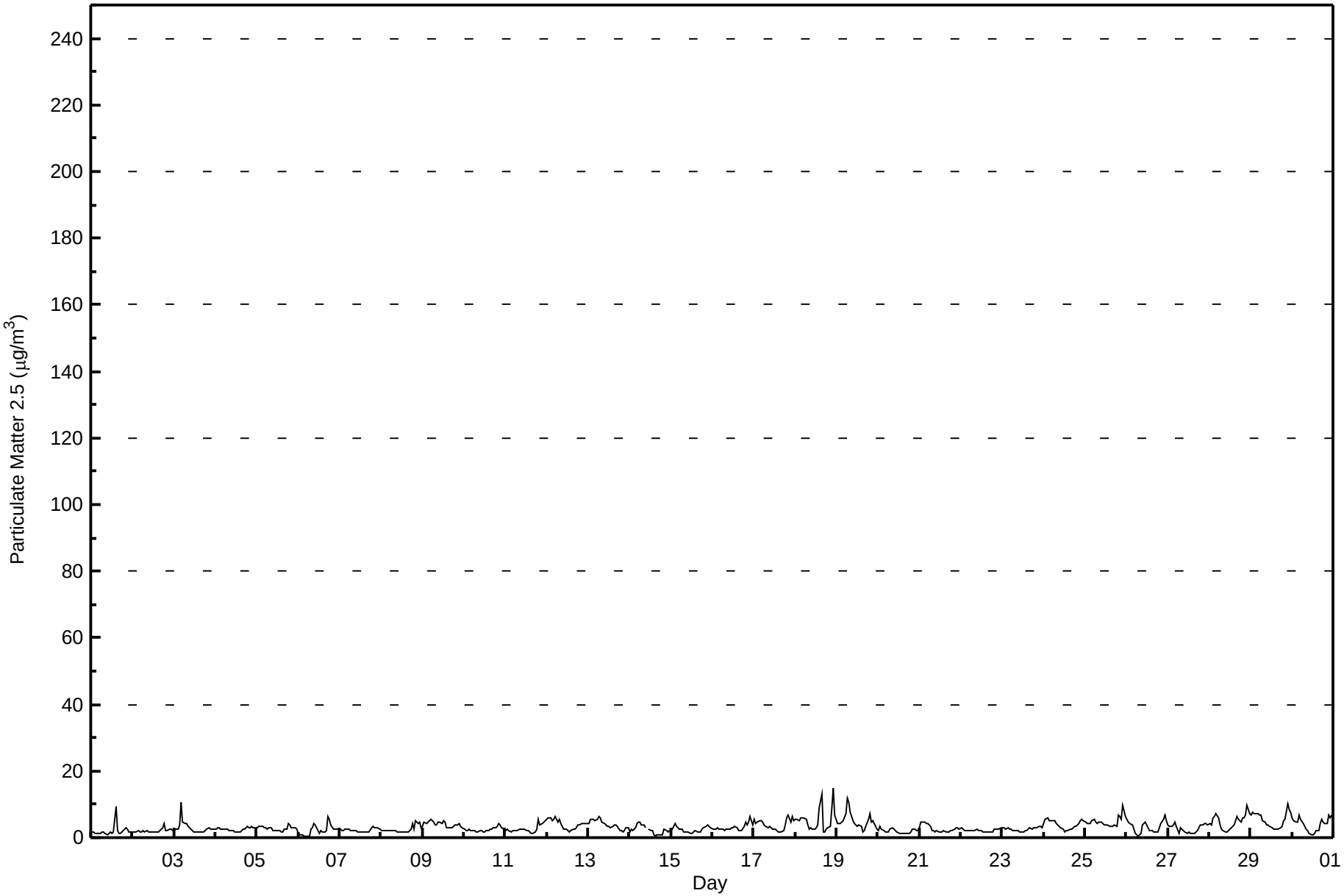
Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 $\mu g/m^3$

Wood Buffalo Environmental Association

Hourly Averages

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

Anzac - April 2016



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

Anzac - April 2016

Concentration Ranges ($\mu g/m^3$)	Number of Hours	%	Cumulative %
1 - 5	635	88.32	88.32
6 - 15	69	9.60	97.91
16 - 25	0	0.00	97.91
26 - 80	0	0.00	97.91
> 81.0	0	0.00	97.91

Total Number of Valid Hours: 719

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

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

Anzac - April 2016

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	50	13	13	22	51	52	77	61	81	40	26	18	17	30	17	39	607
6 - 15	1	0	0	0	0	2	8	8	14	12	12	0	2	5	3	2	69
16 - 25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	51	13	13	22	51	54	85	69	95	52	38	18	19	35	20	41	676

Total Number of Valid Hours: 691

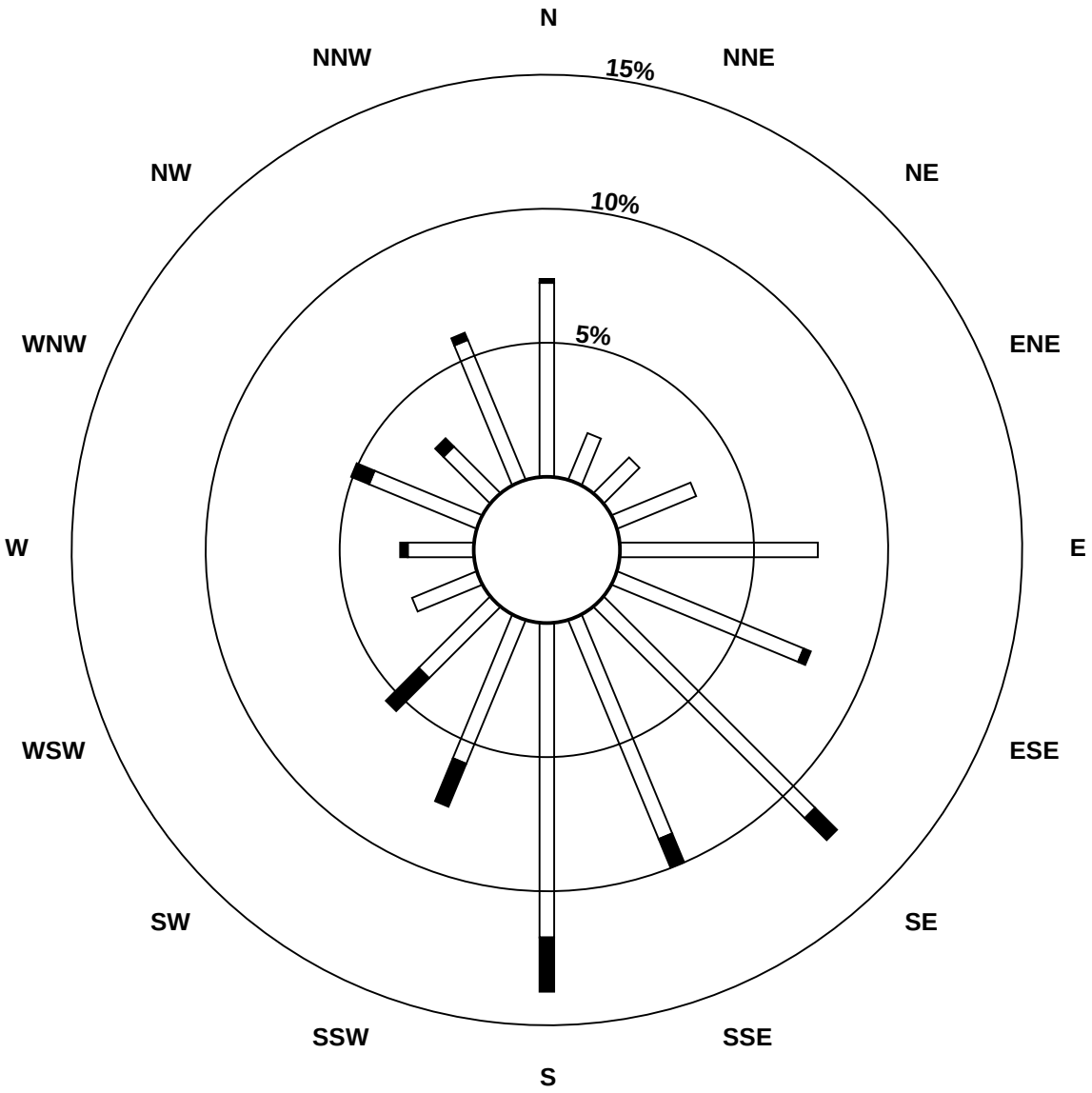
Total Number of Hours: 720

Wood Buffalo Environmental Association

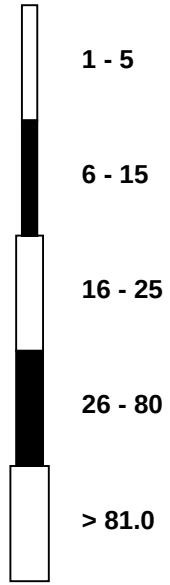
Wind Rose Apr 2016

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

Anzac (AMS 14)



Classes ($\mu g/m^3$)



1 - 5

6 - 15

16 - 25

26 - 80

> 81.0

Total Number of Valid Hours: 691

Maximum Value: 25.7 C on Apr 18 16:00

Maximum Daily Average: 16.7 C on Apr 18

Minimum Value: -11.2 C on Apr 4 06:00

Minimum Daily Average: -5.4 C on Apr 3

Maximum Diurnal Average: 8.8 C at hour 16

Minimum Diurnal Average: -1.1 C at hour 6

Monthly Average: 3.91 C

Percentiles: P_1 = -8.4 P_{10} = -5.6 Q_1 = -1.2 Median = 2.8 Q_3 = 8.3 P_{90} = 16.1 P_{99} = 23.7

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

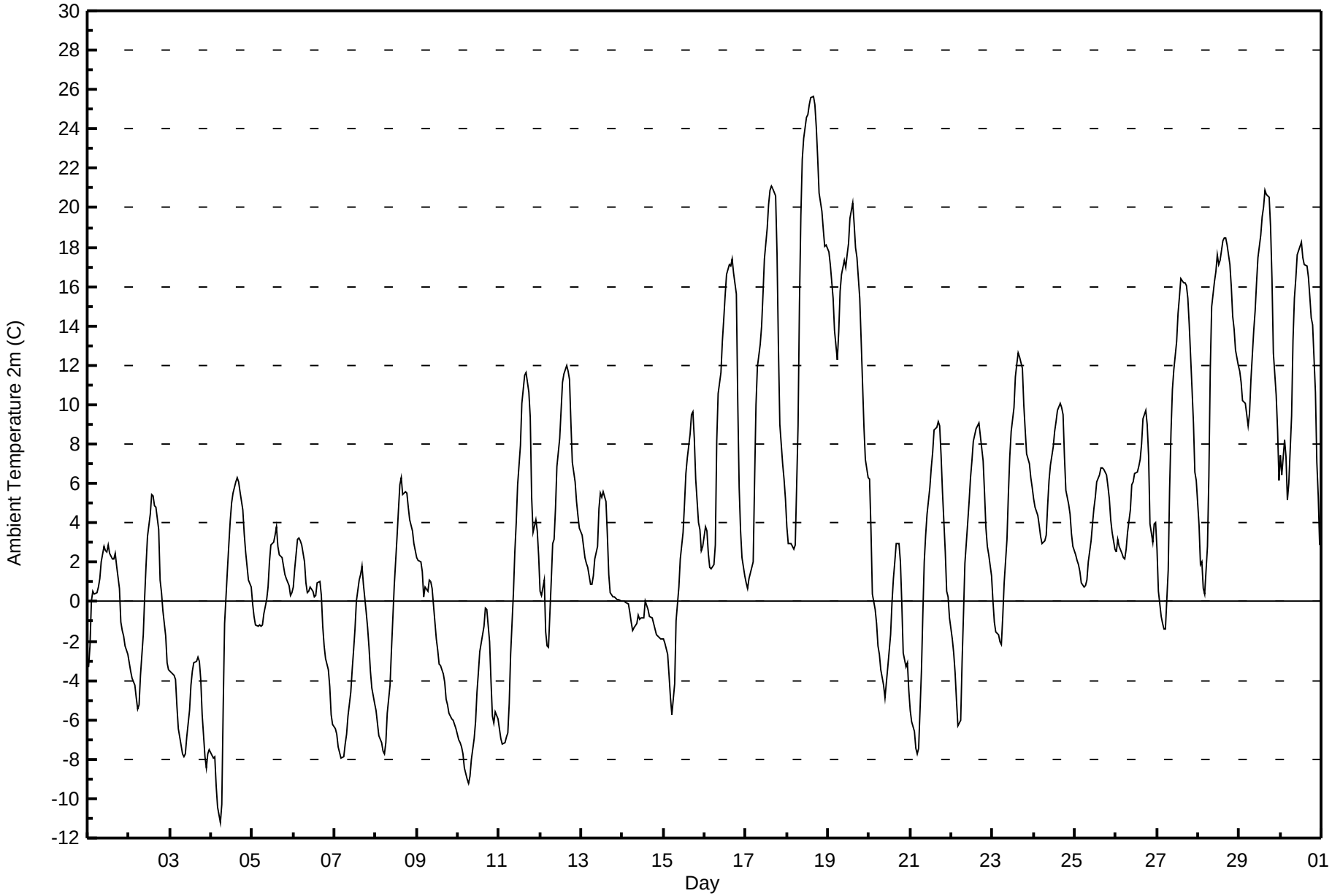
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	-3.3	-2.3	0.1	0.5	0.4	0.5	0.8	1.2	2.0	2.8	2.6	2.5	2.8	2.4	2.2	2.1	2.4	1.8	0.7	-1.0	-1.5	-1.7	-2.2	-2.7	0.5	2.8
2-Apr	-3.1	-3.5	-3.9	-4.2	-4.9	-5.4	-5.2	-3.8	-1.6	0.3	1.9	3.3	4.4	5.4	5.4	4.9	4.8	3.7	1.1	0.4	-0.5	-1.7	-3.1	-3.5	-0.4	5.4
3-Apr	-3.5	-3.6	-3.7	-3.9	-5.3	-6.5	-7.3	-7.7	-7.8	-7.7	-6.8	-5.5	-4.3	-3.5	-3.1	-3.1	-2.8	-3.0	-3.9	-5.7	-7.9	-8.4	-7.7	-7.5	-5.4	-2.8
4-Apr	-7.8	-7.9	-7.9	-9.4	-10.4	-11.2	-10.3	-5.4	-1.1	1.6	2.9	4.1	5.0	5.5	6.1	6.3	6.0	5.6	4.6	3.4	2.6	1.8	1.1	0.7	-0.6	6.3
5-Apr	-0.1	-0.7	-1.2	-1.2	-1.2	-1.3	-1.2	-0.6	0.1	0.7	2.0	2.8	3.0	3.4	3.8	2.8	2.4	2.2	1.8	1.4	1.1	0.8	0.3	0.4	0.9	3.8
6-Apr	0.8	1.7	3.2	3.2	3.1	2.9	2.0	1.0	0.5	0.5	0.8	0.5	0.2	0.3	1.0	1.0	0.3	-1.3	-2.3	-2.9	-3.4	-4.3	-5.7	-6.2	-0.1	3.2
7-Apr	-6.5	-6.7	-7.4	-7.6	-7.9	-7.9	-7.2	-6.8	-5.8	-4.6	-3.5	-2.5	-1.4	0.0	1.1	1.4	1.8	0.9	-0.6	-1.3	-2.3	-3.5	-4.4	-5.1	-3.7	1.8
8-Apr	-5.5	-6.2	-6.8	-7.2	-7.6	-7.7	-7.2	-5.7	-4.2	-2.5	-0.8	0.8	3.3	4.6	5.9	6.3	5.5	5.6	5.5	4.8	4.1	3.6	3.0	2.6	-0.2	6.3
9-Apr	2.2	2.1	2.0	1.5	0.3	0.7	0.5	1.1	1.0	0.7	-0.2	-1.9	-2.5	-3.1	-3.2	-3.7	-4.1	-4.9	-5.2	-5.6	-5.9	-6.0	-6.3	-6.4	-2.0	2.2
10-Apr	-7.0	-7.2	-7.4	-7.7	-8.4	-9.0	-9.2	-8.9	-8.0	-6.9	-6.1	-4.6	-3.6	-2.5	-1.7	-1.2	-0.3	-0.4	-2.0	-4.1	-5.8	-6.2	-5.6	-5.9	-5.4	-0.3
11-Apr	-6.4	-6.9	-7.2	-7.2	-6.9	-6.7	-5.2	-2.7	0.5	2.5	4.0	5.9	7.9	10.1	10.8	11.5	11.6	10.7	9.4	5.3	3.6	4.1	3.6	2.3	2.3	11.6
12-Apr	0.5	0.3	1.1	-1.6	-2.2	-2.3	1.1	3.0	3.1	4.7	6.8	8.3	9.7	11.1	11.6	12.0	11.7	11.3	9.1	7.1	6.1	5.1	4.3	3.7	5.2	12.0
13-Apr	3.4	2.8	2.2	1.9	1.7	0.9	0.9	1.3	2.2	2.8	4.7	5.5	5.3	5.6	5.1	3.4	1.4	0.4	0.3	0.2	0.2	0.1	0.1	0.1	2.2	5.6
14-Apr	0.0	0.0	-0.1	-0.1	-0.5	-1.0	-1.4	-1.3	-1.1	-0.7	-0.9	-0.8	-0.8	0.0	-0.2	-0.4	-0.8	-0.8	-1.1	-1.4	-1.7	-1.8	-1.9	-1.9	-0.9	0.0
15-Apr	-1.9	-2.1	-2.7	-3.7	-4.9	-5.8	-4.2	-1.0	-0.1	0.7	2.2	3.5	4.9	6.5	7.3	8.5	9.5	9.6	8.3	6.3	4.0	3.6	2.6	2.8	2.3	9.6
16-Apr	3.8	3.6	2.5	1.8	1.6	1.9	2.8	8.1	10.6	11.6	13.2	14.3	15.6	16.6	17.1	17.0	17.4	16.7	15.6	10.1	5.8	3.6	2.2	1.3	8.9	17.4
17-Apr	1.0	0.7	1.2	1.8	2.0	6.2	10.0	11.9	13.1	14.0	15.6	17.4	19.0	20.2	20.9	21.1	21.0	20.6	17.7	12.9	9.0	7.0	6.2	5.2	11.5	21.1
18-Apr	3.8	3.0	2.9	2.8	2.7	2.9	8.9	15.1	19.6	22.5	23.5	24.6	24.7	25.2	25.6	25.7	25.2	24.1	22.5	20.7	19.9	18.9	18.0	18.1	16.7	25.7
19-Apr	17.8	17.1	16.3	15.4	13.8	12.3	13.7	15.8	16.6	17.3	16.9	17.6	18.2	19.5	20.3	19.2	17.9	17.5	15.4	13.3	11.1	8.8	7.2	6.3	15.2	20.3
20-Apr	6.2	3.7	0.4	-0.4	-1.1	-2.3	-2.7	-3.5	-4.3	-4.9	-4.1	-3.3	-1.7	0.0	1.2	2.0	3.0	3.0	2.0	-0.1	-2.6	-3.3	-3.1	-4.5	-0.9	6.2
21-Apr	-5.5	-6.1	-6.6	-7.4	-7.7	-7.5	-3.5	-0.6	2.0	3.4	4.4	5.8	6.8	7.6	8.7	8.9	9.1	8.9	7.4	5.5	2.5	0.6	0.3	-0.8	1.5	9.1
22-Apr	-1.9	-2.6	-3.6	-5.0	-6.3	-6.0	-3.0	-0.6	2.0	4.0	5.1	6.3	7.1	8.2	8.8	8.9	9.0	8.5	7.2	5.5	3.7	2.8	2.4	1.3	2.6	9.0
23-Apr	0.1	-1.0	-1.5	-1.7	-2.1	-2.1	-0.8	1.0	3.2	5.5	7.4	8.7	9.9	11.4	12.1	12.7	12.4	11.8	10.0	8.7	7.5	7.0	6.3	5.8	5.5	12.7
24-Apr	5.2	4.8	4.3	3.9	3.3	3.0	3.1	3.4	4.9	6.2	6.9	7.8	8.7	9.1	9.7	10.0	9.9	9.5	7.4	5.6	5.0	4.4	3.4	2.8	5.9	10.0
25-Apr	2.4	2.1	1.9	1.5	0.9	0.7	0.8	1.1	2.0	3.1	3.9	4.7	5.3	6.1	6.5	6.8	6.8	6.7	6.5	5.9	5.2	4.1	3.5	2.6	3.8	6.8
26-Apr	2.5	3.2	2.8	2.4	2.3	2.2	2.7	3.5	4.6	5.9	6.1	6.5	6.6	6.9	7.2	8.0	9.3	9.7	9.0	7.4	3.9	3.0	3.9	4.0	5.2	9.7
27-Apr	2.7	0.5	-0.8	-1.1	-1.4	-1.4	1.6	5.8	8.6	10.8	11.8	13.2	14.6	15.5	16.4	16.2	16.2	16.0	15.4	14.1	10.8	9.1	6.6	6.2	8.6	16.4
28-Apr	3.9	1.9	2.0	0.7	0.4	2.8	6.4	11.8	14.9	16.2	16.7	17.6	17.1	17.3	18.3	18.5	18.5	18.1	17.1	16.0	14.5	13.8	12.8	12.0	12.1	18.5
29-Apr	11.7	11.1	10.2	10.1	9.5	9.0	9.6	11.3	13.7	14.7	16.2	17.5	18.6	19.6	20.0	20.9	20.6	20.5	19.1	16.4	12.6	10.5	8.7	6.1	14.1	20.9
30-Apr	7.5	6.4	8.2	7.4	5.2	6.0	9.4	13.3	15.4	16.4	17.6	18.0	18.2	17.5	17.1	17.0	16.5	15.5	14.4	14.1	10.6	7.1	5.4	2.9	12.0	18.2
	0.8	0.3	0.0	-0.5	-1.1	-1.1	0.2	2.0	3.6	4.7	5.7	6.6	7.4	8.2	8.7	8.8	8.7	8.3	7.1	5.4	3.7	2.8	2.1	1.4	Diurnal Average	
	17.8	17.1	16.3	15.4	13.8	12.3	13.7	15.8	19.6	22.5	23.5	24.6	24.7	25.2	25.6	25.7	25.2	24.1	22.5	20.7	19.9	18.9	18.0	18.1	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature 2m (AT 2m) - C

Anzac - April 2016



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	221	30.69	30.69
0 - 10	357	49.58	80.28
10 - 20	121	16.81	97.08
> 20	21	2.92	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Anzac - April 2016

Maximum Value: 99 % on Apr 14 04:00

Maximum Daily Average: 92.9 % on Apr 6

Minimum Value: 12 % on Apr 19 17:00

Minimum Daily Average: 22.6 % on Apr 19

Maximum Diurnal Average: 73.5 % at hour 5

Minimum Diurnal Average: 42.5 % at hour 17

Monthly Average: 57.1 %

Percentiles: $P_1 = 15$ $P_{10} = 26$ $Q_1 = 37$ Median = 58 $Q_3 = 75$ $P_{90} = 90$ $P_{99} = 98$

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

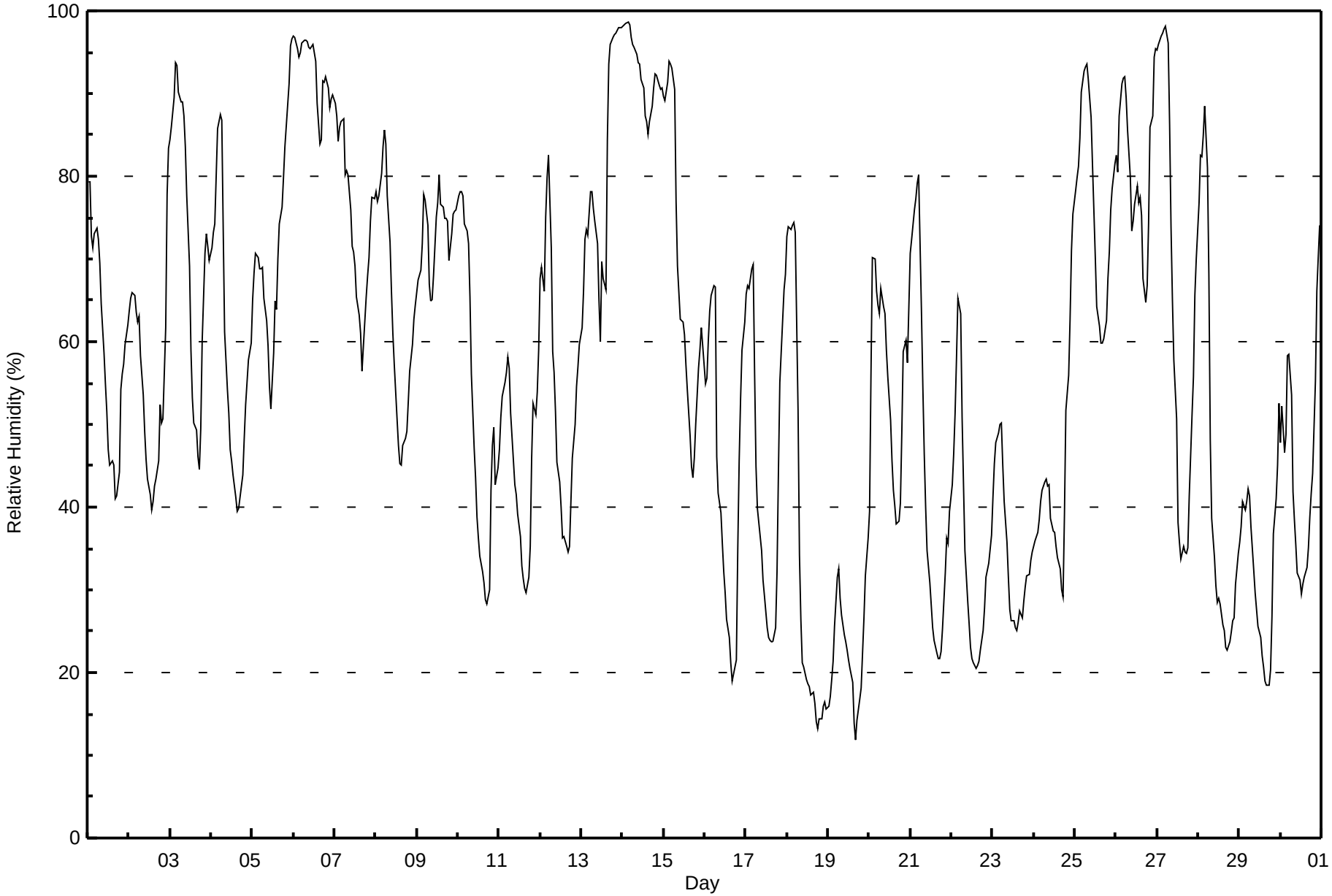
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	79	79	73	71	73	74	72	69	65	59	55	52	47	45	46	45	41	41	44	54	56	57	60	62	59.1	79
2-Apr	64	65	66	66	63	62	63	58	54	49	46	43	42	40	41	43	43	46	52	50	51	62	78	83	55.4	83
3-Apr	84	86	89	94	93	90	89	89	87	84	78	69	59	53	50	49	46	45	49	60	71	73	71	70	72.1	94
4-Apr	71	73	74	80	86	87	87	74	61	54	51	47	46	44	41	40	40	41	44	48	52	55	58	60	59.0	87
5-Apr	65	68	71	70	69	69	69	65	63	59	55	52	59	65	64	70	74	76	80	84	86	91	96	97	71.5	97
6-Apr	97	97	95	94	95	96	96	97	96	96	95	96	95	94	89	84	84	91	91	92	91	88	89	90	92.9	97
7-Apr	89	87	84	86	87	87	80	81	80	76	71	71	69	65	63	61	56	59	65	68	70	75	77	77	74.4	89
8-Apr	78	77	78	80	84	86	84	78	72	66	61	57	51	48	45	45	47	48	49	53	56	60	63	64	63.7	86
9-Apr	66	67	69	72	78	77	74	67	65	65	68	75	77	80	77	76	75	75	75	70	73	75	76	76	72.8	80
10-Apr	78	78	78	78	74	73	72	65	56	47	44	39	36	34	32	31	29	28	30	42	47	50	43	45	51.2	78
11-Apr	47	51	53	55	56	58	57	51	46	43	42	39	36	33	31	30	30	32	35	46	52	51	54	59	45.3	59
12-Apr	68	69	66	75	80	82	71	59	56	51	45	43	40	36	36	35	35	35	41	46	50	55	57	60	53.8	82
13-Apr	62	66	72	74	73	78	78	76	75	72	65	60	70	68	66	84	94	96	97	97	97	98	98	98	79.7	98
14-Apr	98	98	99	99	98	97	96	96	95	94	94	92	91	87	87	85	87	88	91	92	92	91	91	91	92.7	99
15-Apr	90	89	91	94	94	93	90	77	69	66	63	62	61	57	54	49	45	44	46	50	57	59	62	59	67.5	94
16-Apr	55	56	60	64	66	67	67	46	42	39	36	32	30	26	24	21	19	20	22	35	46	53	59	62	43.5	67
17-Apr	66	67	66	69	69	56	45	40	36	35	31	29	25	24	24	24	24	25	32	44	55	63	66	68	45.2	69
18-Apr	73	74	74	74	74	73	52	34	26	21	21	19	19	18	17	18	16	14	13	14	14	16	16	16	33.6	74
19-Apr	16	17	19	21	26	32	32	29	27	25	24	23	22	21	19	14	12	14	17	18	22	27	32	36	22.6	36
20-Apr	40	56	70	70	66	64	63	66	64	63	59	56	50	46	42	40	38	38	40	49	59	60	57	64	55.1	70
21-Apr	71	72	76	77	79	80	64	54	46	40	35	31	28	25	24	22	22	22	22	25	32	36	36	40	44.2	80
22-Apr	43	47	51	58	65	63	51	43	35	29	26	23	22	21	20	21	21	23	25	28	32	32	33	37	35.3	65
23-Apr	41	45	48	49	50	50	45	41	36	32	28	26	26	25	25	26	27	27	29	30	32	32	34	35	34.9	50
24-Apr	35	36	37	38	41	42	43	43	43	43	39	37	37	35	34	32	30	29	39	52	56	63	71	75	42.9	75
25-Apr	78	80	81	85	90	93	93	94	92	87	81	76	70	64	62	60	60	60	62	68	71	76	78	82	76.8	94
26-Apr	83	80	87	91	92	92	90	86	80	73	75	77	79	77	77	75	68	65	67	74	86	87	94	95	81.2	95
27-Apr	95	96	97	97	98	98	96	86	74	65	58	51	38	36	34	35	35	34	35	41	51	56	66	70	64.2	98
28-Apr	77	82	82	85	88	81	68	48	39	34	31	29	29	28	26	25	23	23	24	25	26	27	31	34	44.4	88
29-Apr	36	38	41	40	41	42	41	38	32	30	28	26	24	22	21	19	18	18	20	27	37	41	45	53	32.4	53
30-Apr	48	52	47	49	58	58	54	42	39	35	32	31	30	31	32	33	35	39	42	44	55	66	70	74	45.6	74
	66.4	68.3	69.8	71.8	73.5	73.4	69.4	63.0	58.3	54.4	51.1	48.7	46.9	45.0	43.4	43.1	42.5	43.3	46.0	50.9	55.9	59.1	62.0	64.4	Diurnal Average	
	98	98	99	99	98	98	96	97	96	96	95	96	95	94	89	85	94	96	97	97	97	98	98	98	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity (RH) - %

Anzac - April 2016



Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	27	3.75	3.75
20 - 40	175	24.31	28.06
40 - 60	184	25.56	53.61
60 - 80	199	27.64	81.25
80 - 100	135	18.75	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Wood Buffalo Environmental Association

Summary of Hour Averages

Leaf Wetness (SW) - %

Anzac - April 2016

Maximum Value: 67 % on Apr 13 19:00

Maximum Daily Average: 20.1 % on Apr 13

Minimum Value: -1 % on Apr 19 18:00

Minimum Daily Average: -0.8 % on Apr 19

Maximum Diurnal Average: 4.1 % at hour 23

Minimum Diurnal Average: 0.4 % at hour 15

Monthly Average: 1.9 %

Percentiles: $P_1 = -1$ $P_{10} = -1$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 4$ $P_{99} = 50$

Hours in Service:	720
Hours of Data:	719
Hours of Missing Data:	1
Hours of Calibration:	0
Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily	Daily
	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-Apr	0	0	0	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-Apr	0	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-Apr	0	1	1	3	4	4	4	4	3	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	1.2	4
4-Apr	0	0	0	0	1	1	1	1	0	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
5-Apr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	55	42	4.6	55
6-Apr	23	20	9	12	19	24	22	13	14	13	20	26	16	4	1	0	0	1	1	1	1	1	1	1	10.2	26
7-Apr	1	1	1	1	1	1	1	1	1	1	2	14	35	2	0	0	0	0	0	0	0	0	0	0	2.6	35
8-Apr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
9-Apr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
10-Apr	0	0	0	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-Apr	0	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-Apr	0	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
13-Apr	0	0	5	1	0	0	0	0	0	0	0	1	15	7	9	30	24	59	67	55	55	56	52	46	20.1	67
14-Apr	43	41	36	31	12	6	6	6	7	46	48	36	20	13	2	1	0	0	1	1	1	1	1	1	14.9	48
15-Apr	1	1	1	1	1	2	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2
16-Apr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1	0	0	0	0	0	-0.2	0
17-Apr	0	0	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	-0.3	0
18-Apr	0	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-0.5	0
19-Apr	-1	-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
20-Apr	-1	-1	0	0	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	0	0	0	0	0	-0.4	0
21-Apr	0	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	-0.4	0
22-Apr	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-0.6	0
23-Apr	-1	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-0.6	0
24-Apr	-1	-1	-1	-1	-1	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	-0.5	0
25-Apr	0	0	0	0	0	1	1	4	12	8	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1.2	12
26-Apr	0	1	6	17	13	9	4	2	0	1	4	6	6	4	11	5	1	0	0	0	2	5	17	9	5.2	17
27-Apr	12	7	1	2	2	3	8	5	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.6	12
28-Apr	0	1	0	1	3	4	2	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0.1	4
29-Apr	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	-0.6	0
30-Apr	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	0	-0.4	0
	2.6	2.3	1.9	2.2	1.9	1.8	1.7	1.1	1.2	2.4	2.4	2.5	2.8	0.7	0.4	0.9	0.5	1.6	2.0	1.7	1.8	2.3	4.1	3.2	Diurnal Average	
	43	41	36	31	19	24	22	13	14	46	48	36	35	13	11	30	24	59	67	55	55	56	55	46	Diurnal Maximum	

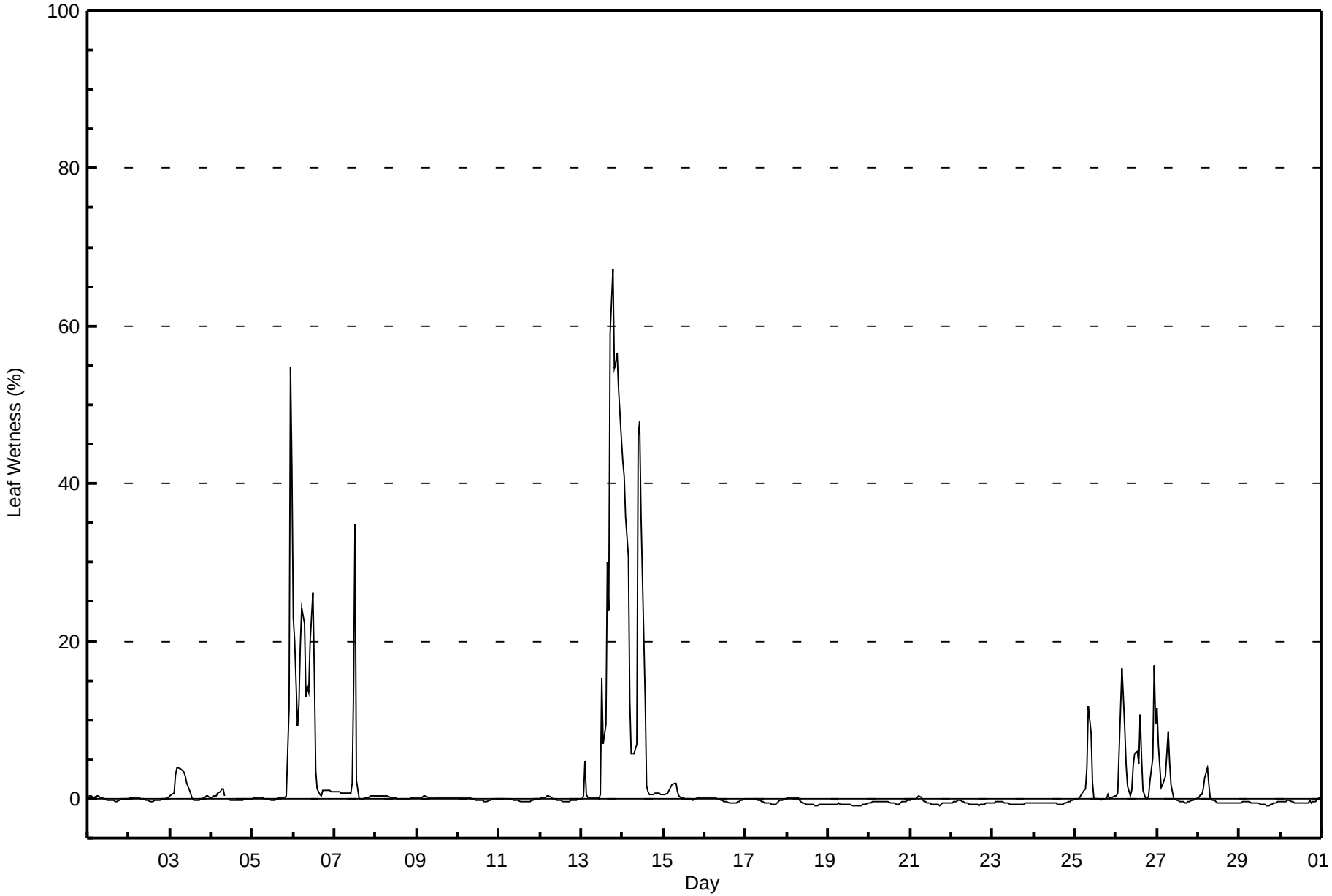
M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Leaf Wetness (SW) - %

Anzac - April 2016



Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 0.3	175	53.03	53.03
0.4 - 0.5	20	6.06	59.09
0.6 - 0.7	13	3.94	63.03
0.8 - 1.4	31	9.39	72.42
1.5 - 10	48	14.55	86.97
> 10	43	13.03	100.00

Total Number of Valid Hours: 330

Total Number of Hours: 720

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Anzac - April 2016

Maximum Speed: 29 km/h on Apr 19 02:00

Maximum Daily Speed Average: 15.0 km/h on Apr 8

Minimum Speed Value: 1 km/h on Apr 13 22:00

Minimum Daily Speed Average: 0.9 km/h on Apr 27

Maximum Diurnal Speed Average: 5.3 km/h at hour 24

Minimum Diurnal Speed Average: 0.9 km/h at hour 17

Monthly Average Velocity: 2.5 km/h 165.7 deg

Percentiles: $P_1 = 2$ $P_{10} = 5$ $Q_1 = 6$ Median = 9 $Q_3 = 12$ $P_{90} = 16$ $P_{99} = 21$

Hours in Service: 720

Hours of Data: 691

Hours of Missing Data: 29

Percent Operational Time: 96.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Apr	W2	NW5	NW12	NW12	WNW10	WNW9	NW8	NNW10	N12	NNW13	NNW15	NNW13	NNW10	NNW11	NNW9	NW7	NNE9	NE7	ENE6	ESE6	ESE8	SE9	SE11	SE13	NNW5.0	NNW15
2-Apr	SE14	SE15	SSE15	SE12	ESE9	ESE10	SE10	SE11	SE10	ESE11	ESE9	ESE12	E8	E9	E7	ENE7	NE7	NNE8	N9	E10	E9	E9	E7	ENE6	ESE8.0	SSE15
3-Apr	E4	ENE4	N2	NNW5	NNW10	NNW10	NNW10	NNW10	NNW9	NNW11	NNW11	NNW9	NNW10	NNW11	NNW11	NNW10	N9	N7	N5	E3	ESE5	SE7	S7	S9	NNW5.1	NNW11
4-Apr	S8	S9	S9	SSE5	SSE5	S5	S6	S5	SSE7	SSE6	SE9	SE8	SE9	SE11	SSE10	SSE9	SE9	SE7	ESE5	E8	E7	E6	ESE5	ESE5	SE6.6	SE11
5-Apr	E4	ESE5	ESE4	ESE5	ESE5	SE5	ESE4	ESE5	SE6	SE10	SSE12	S12	S15	S14	S13	S12	S11	S10	S11	S11	S10	S10	S9	SSE8	SSE7.9	S15
6-Apr	S6	WSW7	WNW11	WNW13	NW13	NW15	NNW15	NNW15	NNW13	NNW14	NNW11	NW10	NNW13	NNW11	NNW14	NNW15	NNW14	N12	N12	N11	N10	N9	N6	N7	NNW10.2	NNW15
7-Apr	NNE7	NNE7	NNE7	N5	AF	AF	AF	AF	AF	AF	SSE3	ESE5	E7	E6	ENE6	NNE8	NE8	ENE8	ENE8	ENE6	E7	E6	ESE6	ESE7	ENE5.4	NE8
8-Apr	SE8	ESE9	SE9	SE10	SE11	SE12	SE15	SE14	SSE15	SSE17	SSE18	SSE17	SSE20	SE19	SE21	SE17	SE17	SSE16	SSE17	SSE17	SSE20	SSE20	SSE16	SSE13	SSE15.0	SE21
9-Apr	SSE12	SSE10	SSE8	E4	WNW3	NW14	NNW15	NNW17	NNW16	NNW16	NNW17	N17	NNW17	NNW16	N17	N20	N19	N19	NNW17	N16	N15	N13	N13	N14	NNW11.4	N20
10-Apr	N13	N12	NNW12	N11	N11	N10	N10	N11	N12	NNE10	N8	NNE7	WNW5	WSW6	WSW8	W8	W5	WNW4	NW3	NE1	SE5	SSE7	SSE8	SSE11	NNW4.2	N13
11-Apr	SSE11	SSE12	SSE13	SSE11	SE8	SE8	SSE8	S11	S9	S8	S9	SSW10	SSW11	SSW10	SSW11	WSW11	SW12	SW12	SW9	SSW6	S8	S9	S8	S7	S8.3	SSE13
12-Apr	S5	SW5	SW7	N3	NW3	WNW6	NW11	NW8	WNW10	NW8	NNW6	WNW7	WNW6	N9	N9	NNE7	NE8	NE9	ENE9	ENE9	E8	ESE10	SE8	SE10	N2.3	NW11
13-Apr	SE8	SE10	ESE9	SE12	SE6	ESE8	SE13	SE14	SE11	SSE12	SE10	SE11	E5	ESE10	E5	ENE5	E7	ESE7	E6	E5	ESE5	WNW1	WNW2	AF	ESE7.3	SE14
14-Apr	NNW3	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	N10	NNW12	NNW12	NNW12	N9	N7	NNE5	NE3	AF	AF	AF	AF	----	NNW12
15-Apr	AF	AF	AF	AF	AF	AF	AF	SW4	NW5	SSE3	SSE7	SSE8	SE9	SE9	SE12	SE13	SE14	SE13	SE10	SE10	SE9	SE9	SSE11	S12	----	SE14
16-Apr	SSE15	SSE14	SSE9	SE10	ESE6	SE8	SSW6	WSW12	W6	WSW7	WSW5	W7	SW17	W15	WSW15	W13	W13	W13	W9	WSW4	SSW5	SW4	SW4	SSW5	SW6.5	SW17
17-Apr	SSW5	SW4	SSW3	S6	S7	SSW9	SSW8	SW10	WSW8	SW5	WNW7	WNW7	NW8	NW10	WNW10	WNW7	WNW9	W7	W4	SSW4	S5	S6	S6	S6	WSW4.4	SW10
18-Apr	SSW5	SSW6	SSW7	SSW7	SW7	W5	WSW9	SW6	SSW5	SSW11	SW16	SW17	SW18	SSW19	SW22	SSW21	SSW20	SSW18	SSW19	S17	S20	S20	S20	SSW21	SSW13.4	SW22
19-Apr	SW27	SW29	SW22	WSW17	WSW9	WNW7	WNW8	WNW13	WNW13	WNW16	WNW16	WNW16	WNW19	W22	W23	WNW20	WNW21	NW18	NW15	NW13	WNW9	WNW7	WNW7	WNW8	W13.5	SW29
20-Apr	NW11	N14	N13	N13	N14	N12	N14	N15	N15	N15	N15	N13	N11	N7	NNE9	NE7	NNE5	NNE7	NE7	ENE4	E6	E6	ESE6	ESE4	N8.8	N15
21-Apr	SE5	SSE6	SE6	SE6	SE5	SSE5	S5	SSE4	ENE2	E6	E6	ESE7	ENE9	ENE10	E9	ENE8	E8	E9	E10	E9	ENE9	ENE10	E12	E9	E6.3	E12
22-Apr	E5	ESE4	ESE5	ESE4	ESE5	E6	E7	SE8	ESE9	SE9	E8	ENE12	E10	E10	E10	E11	E10	E10	E10	E9	ESE7	ESE9	SE9	SE8	E7.8	ENE12
23-Apr	SE7	ESE8	ESE7	SE8	SE8	SE9	ESE10	SE10	ESE11	ESE10	ESE14	ESE14	ESE12	SE10	ESE11	ESE10	E12	ESE15	ESE11	ESE13	SE12	SE12	SSE12	SSE12	ESE10.4	ESE15
24-Apr	SSE11	SE10	SE10	SE10	SE9	ESE7	SE7	SE8	SE9	SSE12	S13	S16	S14	SSE12	SSE11	SE12	SSE13	SSE14	S17	S14	S12	S12	S12	S10	SSE10.8	S17
25-Apr	S8	SSE8	SSE8	SSE11	SSE11	SE8	SSE10	SSE11	S11	S11	S11	S11	SSW10	SSW9	SSW9	SSW8	SSW7	SW8	SW7	SW6	SW5	SSW4	S4	S5	S7.8	S11
26-Apr	S6	S11	S9	S8	S9	S10	S11	S10	S10	S9	S9	S9	S10	S10	SSW7	SSW3	W5	NE6	ENE6	E5	SE5	SE1	SSW3	S11	S6.4	S11
27-Apr	S5	S3	WNW2	WNW2	W3	W4	SW4	SSW4	S4	ENE5	NE5	WNW5	WNW7	WSW9	NW6	N8	NNE4	NE5	NE7	ENE4	NE6	E9	E9	ESE7	NNE0.9	WSW9
28-Apr	S5	S6	S6	S5	SW5	SW5	SSW5	SSW5	S5	SW9	SW12	S12	SSW10	SSW13	S13	S9	SSE13	S15	SSE11	SSE10	S8	S9	SSE7	SSE8	S8.1	S15
29-Apr	SSE9	SSE8	SSE7	SE9	SE9	SE8	SSE10	SSE13	SSE13	S16	S17	S18	S20	S18	SSW17	S16	SW17	SSW15	SSW12	SSW7	S6	S6	SSW6	SW6	S11.0	S20
30-Apr	SSW7	S6	S7	SSW7	SW7	SW5	SSW6	WSW5	SSW8	SSW13	SW18	SW19	SW21	SW19	WSW15	WSW18	WSW16	W8	NW5	S4	S6	SSW5	SW5	W5	SW8.9	SW21
	SSE4.7	SSE4.6	S3.5	SSE2.8	SSE1.9	SSE1.0	S1.4	S1.8	S1.2	S1.9	S2.2	S3.0	SSW2.8	SSW2.7	SW2.4	SW1.1	SSW0.9	SE1.2	ESE1.6	SE3.3	SE4.5	SE4.9	SSE5.0	SSE5.3	Diurnal Average	
	SW27	SW29	SW22	WSW17	N14	NW15	SE15	NNW17	NNW16	SSE17	SW18	SW19	SW21	W22	W23	SSW21	WNW21	N19	SSW19	S17	SSE20	SSE20	S20	SSW21	Diurnal Maximum	

AF - Analyzer Failure

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

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Speed (WS) - km/h

Anzac - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 9 km/h on Apr 19 15:00

Minimum Value: 1 km/h on Apr 10 20:00

Percentiles: $P_1 = 1$ $P_{10} = 1$ $Q_1 = 2$ Median = 3 $Q_3 = 4$ $P_{90} = 5$ $P_{99} = 8$

Hours in Service:	720
Hours of Data:	691
Hours of Missing Data:	29
Hours of Calibration:	0
Percent Operational Time:	96.0

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

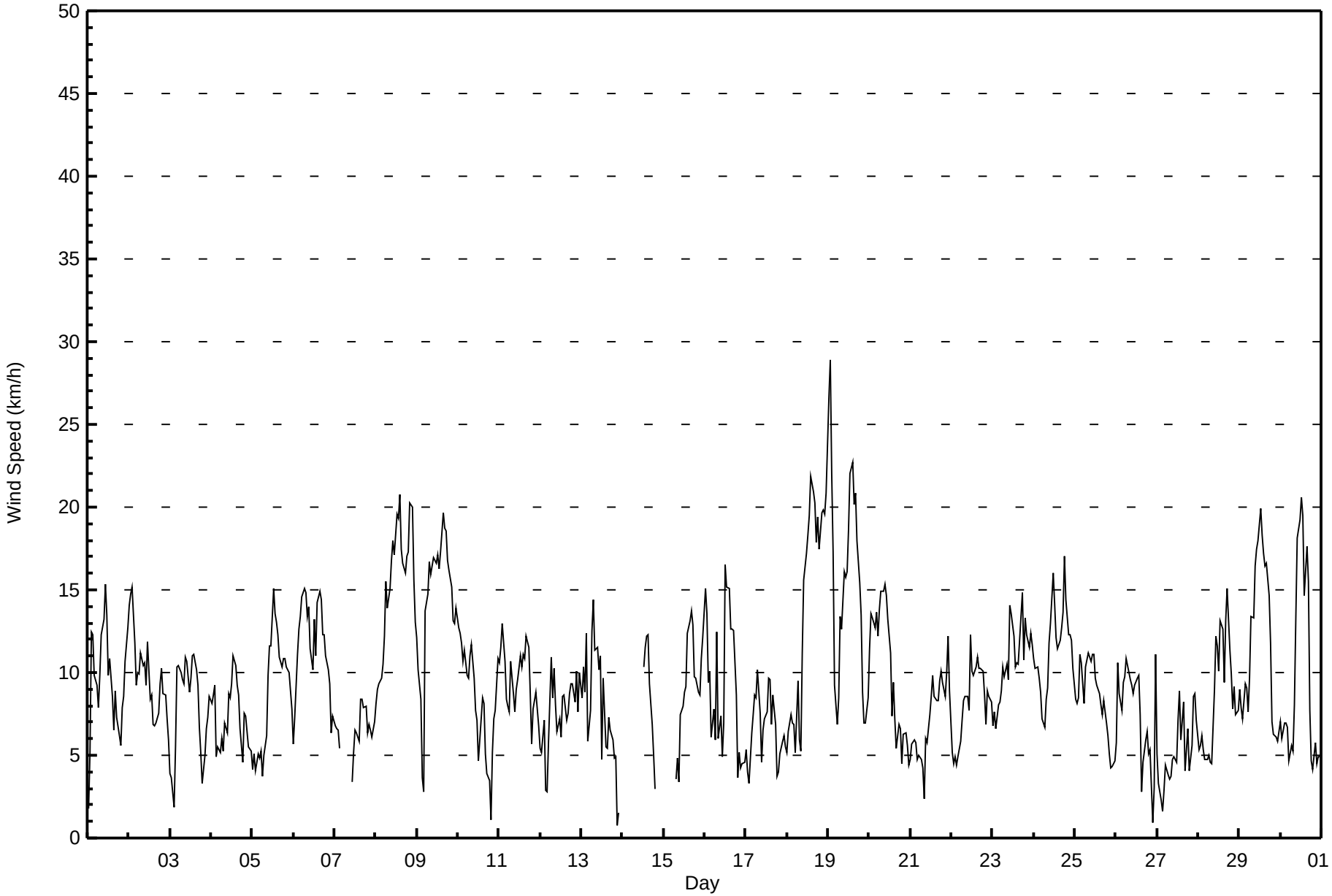
AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed (WS) - km/h

Anzac - April 2016



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	121	17.51	17.51
6 - 11	378	54.70	72.21
12 - 19	171	24.75	96.96
20 - 28	20	2.89	99.86
29 - 38	1	0.14	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 691

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Wind Speed (WS) - km/h

Anzac - April 2016

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	4	3	4	6	9	17	6	6	13	15	12	3	8	8	5	2	121
6 - 11	22	11	10	15	40	31	58	34	58	25	11	9	6	20	9	19	378
12 - 19	26	0	0	1	2	6	20	26	22	9	11	7	3	7	8	23	171
20 - 28	1	0	0	0	0	0	1	3	4	3	4	0	2	2	0	0	20
29 - 38	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	53	14	14	22	51	54	85	69	97	52	39	19	19	37	22	44	691

Total Number of Valid Hours: 691

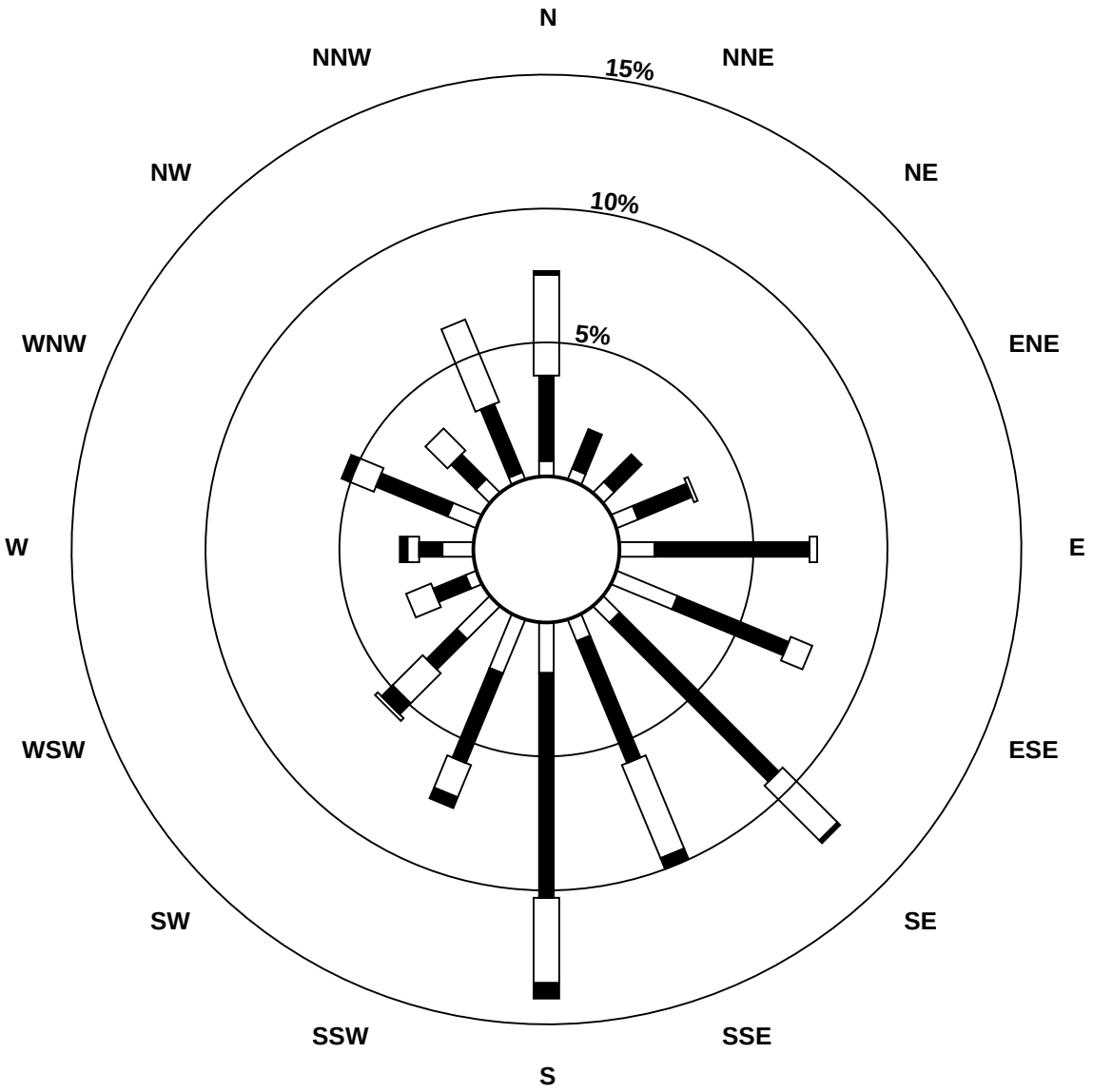
Total Number of Hours: 720

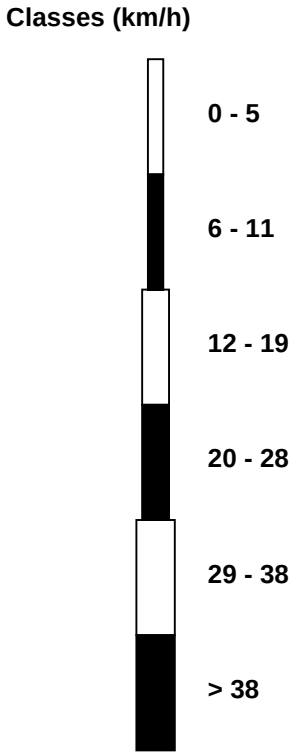
Wood Buffalo Environmental Association

Wind Rose Apr 2016

Wind Speed (WS) - km/h

Anzac (AMS 14)





Total Number of Valid Hours: 691

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Anzac - April 2016

Direction of Maximum Speed: 226 deg on Apr 19 02:00
Direction of Maximum Daily Speed Average: 147.6 deg on Apr 8

Direction of Minimum Speed: 296 deg on Apr 13 22:00

Direction of Minimum Daily Speed Average: 0.9 deg on Apr 27

Monthly Average Direction: 216.8 deg

Hours in Service:	720
Hours of Data:	691
Hours of Missing Data:	29
Percent Operational Time:	96.0

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-Apr	276	326	308	307	303	302	323	341	353	342	341	334	330	338	334	313	19	52	70	103	121	140	132	135	343.8
2-Apr	132	139	148	141	118	121	141	143	130	114	108	112	95	100	87	62	55	17	3	88	79	99	90	70	109.1
3-Apr	80	74	0	341	346	338	330	333	329	336	339	339	343	344	340	345	355	6	353	90	115	140	170	174	348.1
4-Apr	170	170	173	159	168	181	171	170	159	148	142	133	144	136	149	147	124	130	121	92	95	100	108	123	142.6
5-Apr	96	107	103	110	111	126	118	110	127	130	165	179	178	170	175	174	177	175	169	172	174	170	169	161	159.3
6-Apr	174	240	298	298	304	320	337	338	343	342	337	315	331	333	333	330	340	357	360	358	6	10	4	5	334.4
7-Apr	15	15	17	8	AF	AF	AF	AF	AF	AF	153	103	89	80	69	27	56	57	65	61	79	89	108	114	63.4
8-Apr	128	122	126	125	130	139	143	144	149	154	153	150	154	146	145	136	129	149	160	160	161	166	160	159	147.6
9-Apr	162	163	156	94	303	326	331	335	337	338	348	354	343	348	349	350	353	350	348	353	353	350	349	356	347.0
10-Apr	355	351	346	354	0	350	354	357	359	19	2	16	295	246	257	264	262	292	326	40	137	159	153	157	344.6
11-Apr	158	152	159	158	140	135	156	180	187	181	175	199	210	202	209	238	233	225	229	201	185	182	187	182	186.9
12-Apr	191	217	224	6	320	298	315	318	298	305	348	283	297	5	8	12	38	50	65	67	96	111	126	140	3.7
13-Apr	132	125	118	128	125	115	129	132	137	147	133	146	83	108	96	74	98	116	85	97	116	296	300	AF	121.7
14-Apr	341	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	352	339	333	346	349	350	14	39	AF	AF	AF	AF	--
15-Apr	AF	AF	AF	AF	AF	AF	AF	218	312	151	160	164	131	133	128	143	141	141	141	130	138	145	164	172	--
16-Apr	168	164	158	145	114	133	199	241	260	248	258	269	235	259	247	260	263	262	269	252	213	217	219	209	225.7
17-Apr	203	229	196	181	183	203	210	219	245	215	284	302	304	306	302	301	282	276	277	196	184	183	180	177	239.2
18-Apr	195	206	199	211	221	260	248	222	196	211	220	215	222	208	218	213	213	210	197	188	184	181	170	204	205.8
19-Apr	218	226	235	242	249	293	294	292	289	290	284	283	284	277	277	292	294	316	321	322	297	290	287	302	276.7
20-Apr	315	2	3	358	2	5	1	359	4	3	360	0	353	8	18	40	26	33	50	64	82	88	102	119	10.9
21-Apr	146	148	139	135	144	160	171	147	74	82	100	120	70	59	86	72	80	99	92	82	70	72	79	85	96.2
22-Apr	92	120	116	106	112	92	95	131	116	129	93	76	82	100	92	85	85	89	90	94	107	119	126	130	101.2
23-Apr	130	123	119	130	132	132	123	127	118	112	113	106	110	124	122	118	97	104	108	119	127	142	149	149	121.5
24-Apr	147	145	142	128	126	120	124	125	138	159	178	170	178	160	167	135	167	147	176	178	171	181	181	176	158.6
25-Apr	172	164	165	165	159	144	156	166	169	170	174	178	198	200	203	200	196	233	223	219	217	199	190	189	181.9
26-Apr	180	179	180	177	173	174	174	180	188	182	184	175	170	172	193	199	262	49	69	93	132	140	197	176	173.2
27-Apr	177	176	294	284	261	261	219	204	190	73	48	288	285	258	310	1	19	47	41	64	52	79	83	112	31.1
28-Apr	173	174	179	186	219	214	197	198	180	214	232	191	199	195	182	169	167	170	167	168	179	170	164	163	184.0
29-Apr	160	163	149	146	145	142	148	162	163	170	172	187	186	178	201	191	222	207	201	201	184	187	193	224	180.5
30-Apr	195	191	183	199	218	225	203	237	212	212	225	227	230	224	247	245	242	273	308	184	182	211	230	267	225.9
	165.2	165.3	169.8	157.8	158.0	159.1	172.3	190.2	179.2	173.8	185.3	188.6	212.6	198.4	216.9	230.4	203.9	127.9	115.9	124.9	137.8	145.8	150.6	158.9	
	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

Anzac - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 86 deg on Apr 26 22:00

Minimum Value: 10 deg on Apr 18 00:00

Percentiles: P_1 = 13 P_{10} = 16 Q_1 = 19 Median = 22 Q_3 = 29 P_{90} = 39 P_{99} = 68

Hours in Service:	720
Hours of Data:	691
Hours of Missing Data:	29
Hours of Calibration:	0
Percent Operational Time:	96.0

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-Apr	65	34	20	22	23	21	27	19	21	22	21	21	30	28	29	41	28	26	21	20	21	17	19	16	65
2-Apr	18	19	20	19	21	23	19	23	24	26	35	30	39	37	37	24	25	36	32	24	21	30	27	22	39
3-Apr	30	24	49	29	18	16	18	21	22	21	22	28	28	26	24	26	28	28	22	30	18	17	15	14	49
4-Apr	13	13	15	16	18	16	16	21	22	29	25	34	27	27	28	24	25	22	24	20	23	24	27	22	34
5-Apr	20	24	20	19	21	18	24	25	24	21	26	28	22	28	26	23	20	20	17	17	16	16	16	17	28
6-Apr	32	27	28	24	24	22	20	18	18	17	17	24	19	18	21	20	20	16	17	18	18	18	16	18	32
7-Apr	19	20	18	20	AF	AF	AF	AF	AF	AF	54	39	30	45	49	27	31	22	22	21	21	22	26	25	54
8-Apr	22	21	18	18	20	21	21	23	21	21	22	21	22	23	22	23	21	22	19	20	18	19	20	20	23
9-Apr	18	20	18	42	69	20	17	18	19	19	19	19	19	19	20	20	18	19	19	18	18	18	17	17	69
10-Apr	18	18	17	16	15	16	17	20	20	28	45	54	73	61	34	31	46	46	21	47	27	13	18	18	73
11-Apr	17	16	15	16	17	16	20	20	28	27	25	32	27	36	31	33	27	23	17	18	17	18	19	23	36
12-Apr	21	19	30	25	38	20	16	22	21	33	43	34	50	33	35	42	29	28	18	18	24	25	20	22	50
13-Apr	22	24	24	20	35	24	20	19	23	23	28	22	55	24	38	29	25	27	23	23	32	65	34	AF	65
14-Apr	38	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	17	21	21	17	20	18	19	19	AF	AF	AF	AF	38
15-Apr	AF	AF	AF	AF	AF	AF	AF	26	40	72	42	42	36	36	29	26	24	22	19	15	14	18	16	14	72
16-Apr	15	17	19	20	37	16	41	16	39	37	59	57	24	32	33	34	34	27	29	34	15	16	18	21	59
17-Apr	18	14	25	15	17	21	23	21	43	27	46	38	33	31	27	35	34	32	28	16	12	12	13	10	46
18-Apr	16	13	15	13	20	17	17	24	36	26	27	28	27	28	27	27	26	27	25	22	20	18	19	29	36
19-Apr	22	19	23	23	45	26	27	30	29	30	31	32	29	29	30	32	28	27	24	21	24	21	22	24	45
20-Apr	21	22	18	17	19	19	19	20	20	19	21	24	30	61	40	51	62	36	24	18	13	15	22	18	62
21-Apr	17	14	12	11	12	18	26	31	84	57	61	53	44	34	48	45	44	29	24	19	17	17	17	25	84
22-Apr	28	33	23	24	23	16	26	26	34	40	61	34	42	42	39	32	34	26	23	21	26	24	22	20	61
23-Apr	20	20	22	19	19	17	20	26	24	33	26	28	35	47	45	42	38	26	27	25	21	22	19	19	47
24-Apr	20	19	19	18	17	20	23	21	26	27	24	28	32	31	27	28	27	22	20	18	18	22	22	22	32
25-Apr	22	20	18	16	17	20	16	17	17	20	21	24	32	31	29	33	31	21	19	19	22	20	19	17	33
26-Apr	16	15	16	16	16	16	18	22	27	30	30	27	24	22	31	80	57	52	25	24	21	86	62	15	86
27-Apr	22	45	47	66	13	19	12	26	43	56	62	68	44	42	54	34	69	34	30	49	20	16	13	26	69
28-Apr	16	14	15	13	19	19	20	29	45	33	35	34	35	31	31	40	25	23	20	22	19	17	16	16	45
29-Apr	16	17	16	16	18	18	19	18	23	23	23	30	25	24	30	31	27	29	28	24	20	18	17	21	31
30-Apr	21	25	16	20	15	18	23	32	31	28	23	26	23	24	29	25	23	33	34	39	18	25	19	20	39
	65	45	49	66	69	26	41	32	84	72	62	68	73	61	54	80	69	52	34	49	32	86	62	29	
	Diurnal Maximum																								

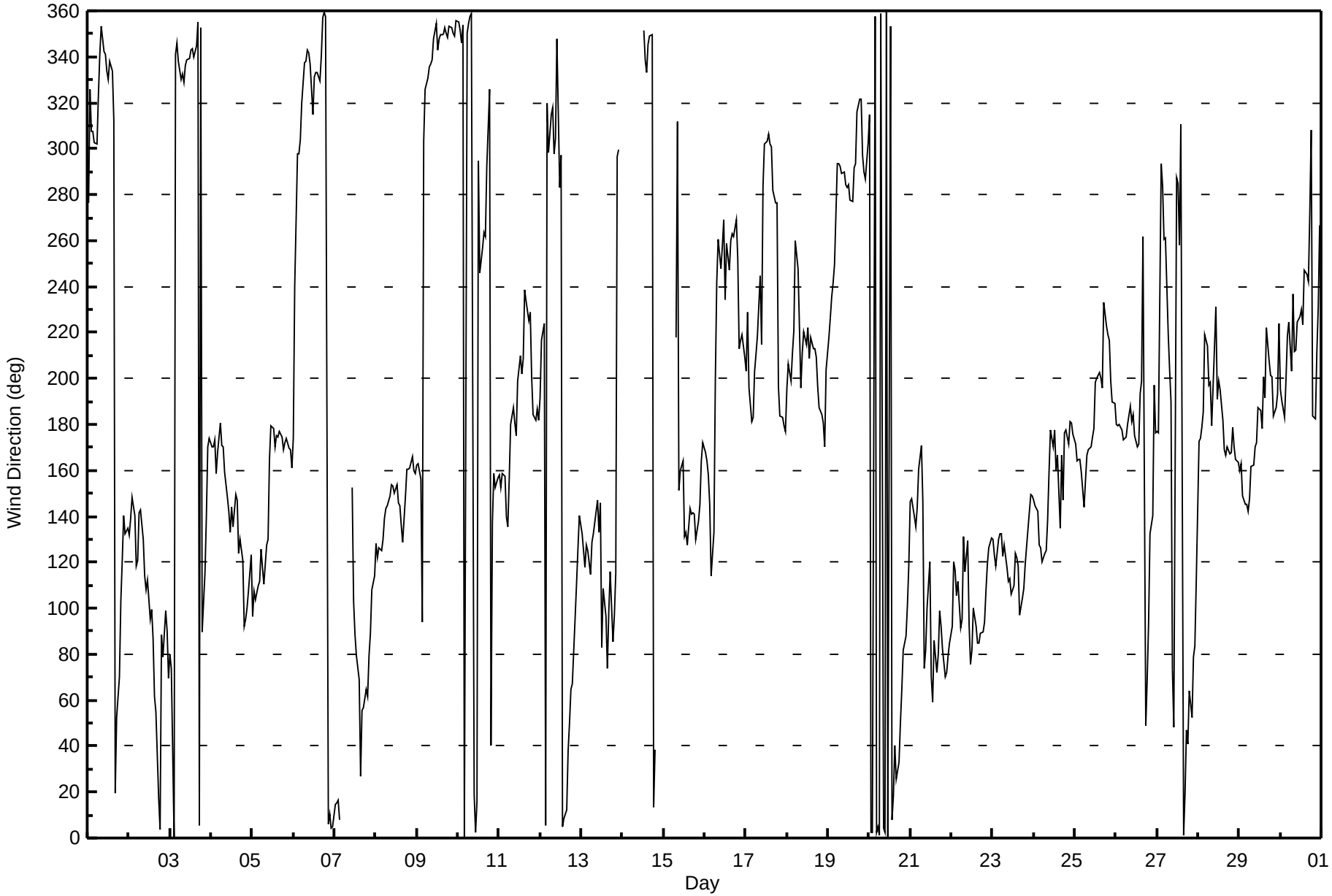
AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction (WD) - deg

Anzac - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Precipitation (PC) - mm

Anzac - April 2016

Maximum Value: 1.0 mm on Apr 5 23:00

Maximum Daily Total: 2.0 mm on Apr 5

Minimum Value: 0.0 mm on Apr 1 01:00

Minimum Daily Total: 0.0 mm on Apr 1

Maximum Diurnal Total: 1.0 mm at hour 23

Minimum Diurnal Total: 0.0 mm at hour 1

Monthly Total: 4.32 mm

Percentiles: P_1 = 0.0 P_{10} = 0.0 Q_1 = 0.0 Median = 0.0 Q_3 = 0.0 P_{90} = 0.0 P_{99} = 0.3

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

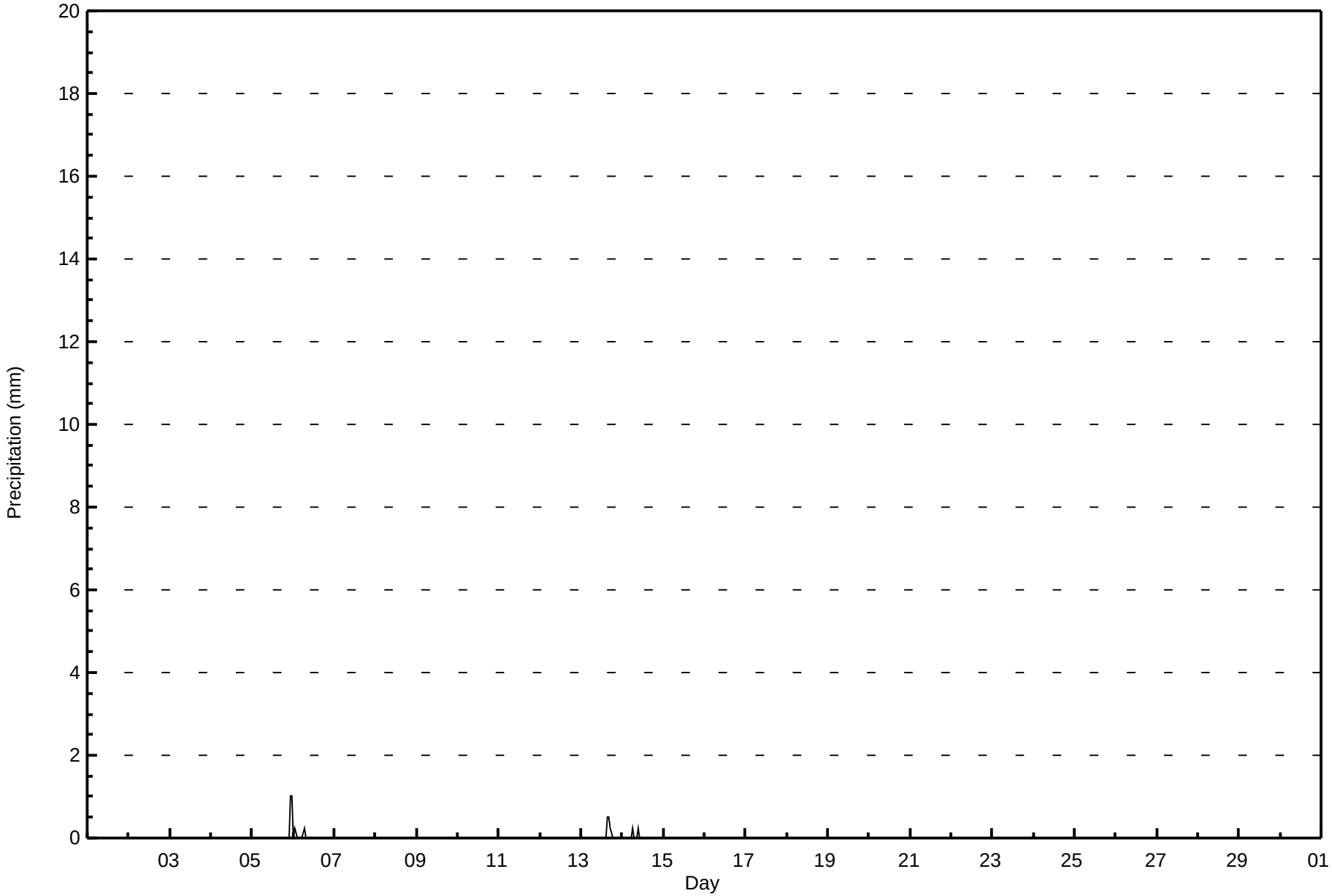
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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
6-Apr	0.0	0.3	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.3
7-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.5
14-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.3
15-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.5	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.3	0.0	0.0	0.0	0.0	1.0	1.0	Diurnal Average	
	0.0	0.3	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.3	0.0	0.0	0.0	0.0	1.0	1.0	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Precipitation (PC) - mm

Anzac - April 2016



Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

Calibration Date	April 13, 2016	Last Calibration	March 15, 2016
Station Name	Anzac	Station Number	AMS 14
Reason:	Routine		
Start Time (MST)	7:35	End Time (MST)	11:30
Gas Cert Reference	SA130026A	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	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		PMT voltage	524	524
Analyzer IP address	192.168.1.43		Lamp voltage	2524	2500
Calculated slope	1.007637	1.010586	Chamber temp	50.0	50.0
Calculated intercept	-0.099807	-0.222312	Pressure	25.2	25.4
Analyzer Background	18.8	18.8	Flow	635	618
Analyzer Coefficient	1.063	1.063	Intensity	62	62

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	700.0	1.010
calibrator zero	5000	0.0	0.0	0.2	----
high point	5000	74.9	707.1	700.0	1.010
second point	5000	37.5	354.0	350.1	1.011
third point	5000	18.7	176.5	175.2	1.008
as left zero	5000	0.0	0.0	0.2	----
as left span	5000	74.9	707.1	691.7	1.022
				Average Correction Factor	1.010

Corrected As found	699.8	Previous response	701.8	% change	0.3%

Notes:

filter changed out, no adjustments or maintenance done

Calibration Performed By: Melissa Lemay

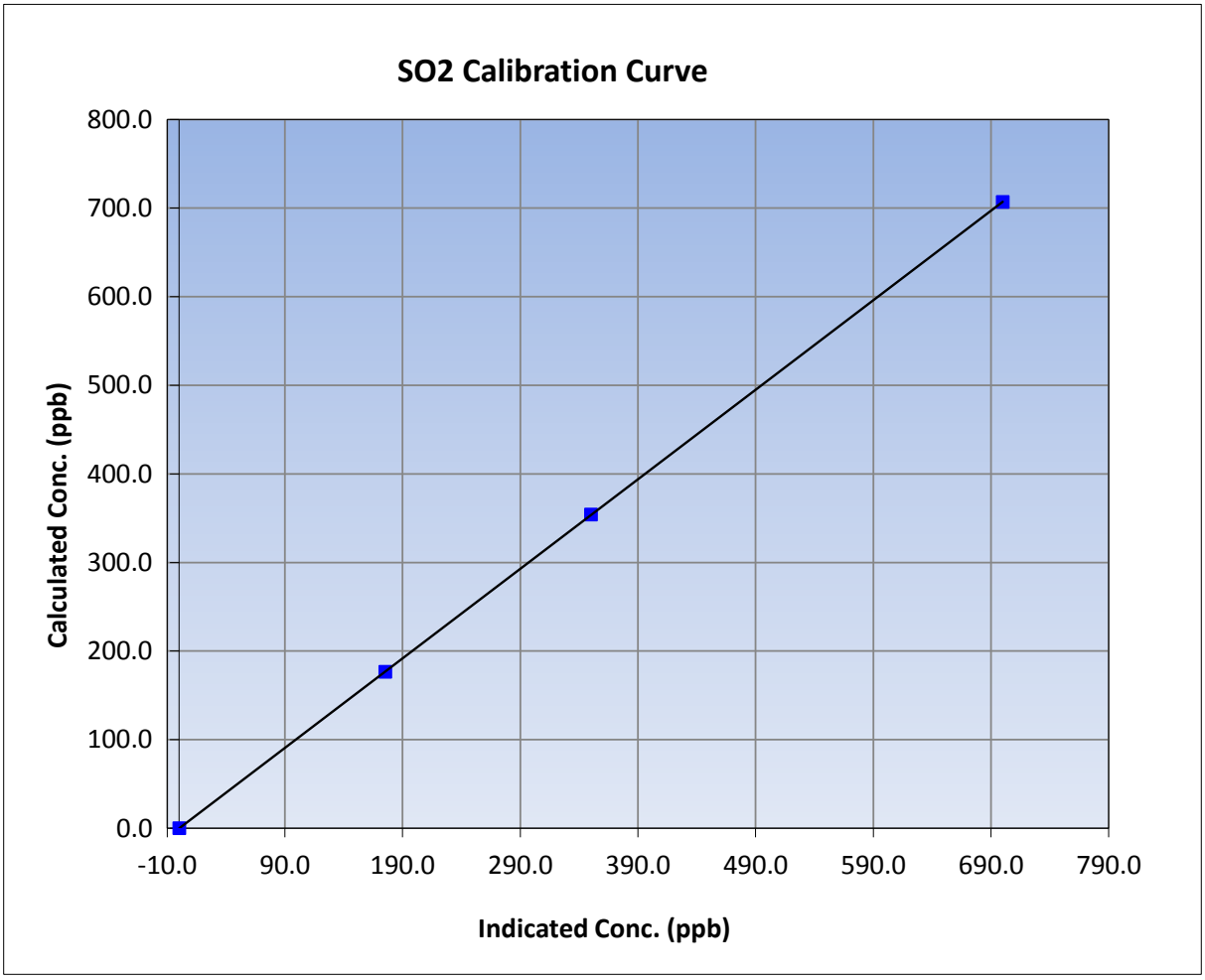
Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

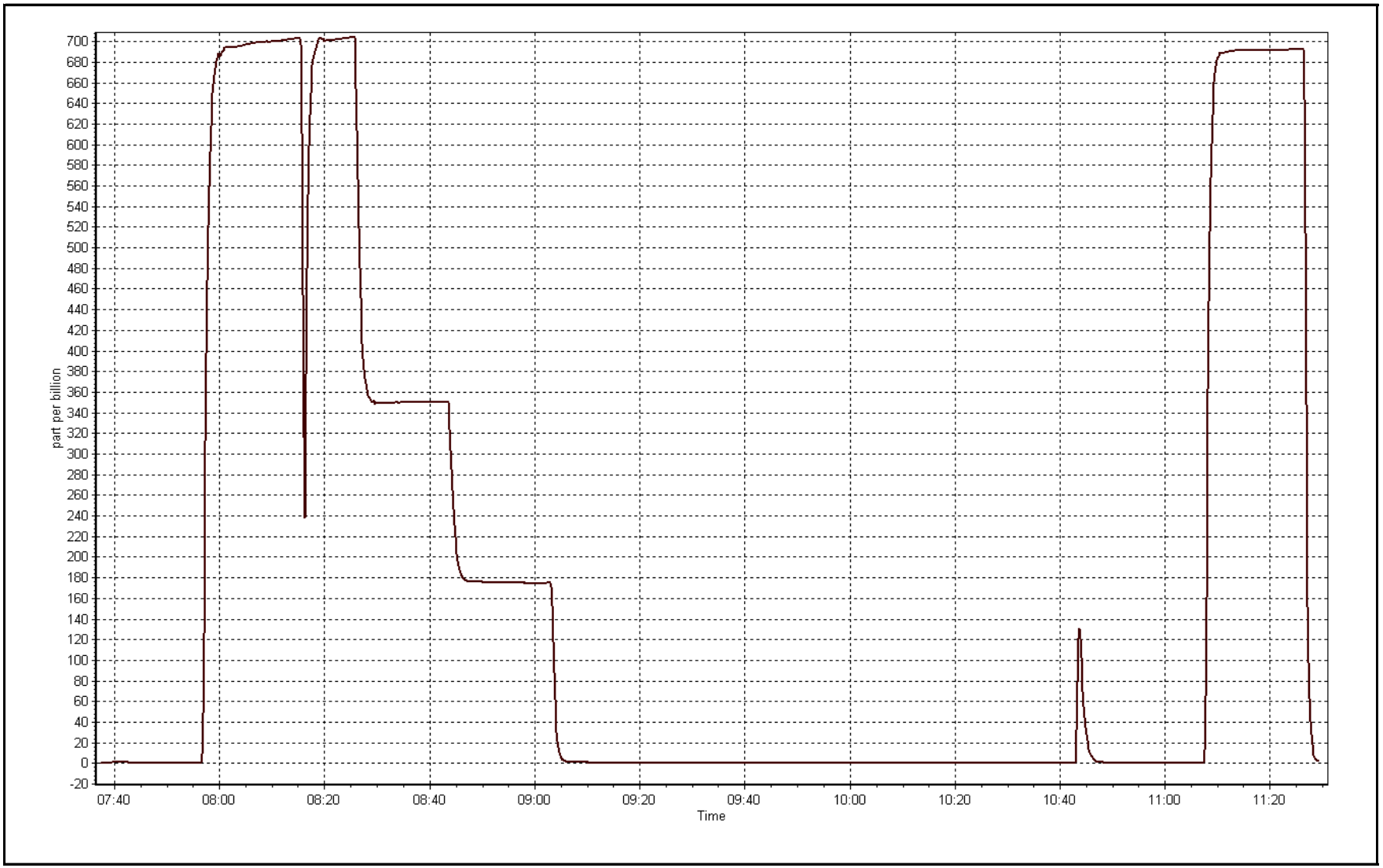
Calibration Date	April 13, 2016	Previous Calibration	March 15, 2016
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	7:35	End Time (MST)	11:30
Analyzer make	API T100	Analyzer serial #	723

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	----	Correlation Coefficient	0.999999
707.1	700.0	1.0101		
354.0	350.1	1.0111	Slope	1.010586
176.5	175.2	1.0076		
			Intercept	-0.222312



SO2 Calibration Plot Date: April 13, 2016



Wood Buffalo Environmental Association
TRS Calibration Report

Station Information

Calibration Date	April 4, 2016	Last Calibration	March 16, 2016
Station Name	Anzac	Station Number	AMS 14
Reason:	Routine		
Start Time (MST)	9:45	End Time (MST)	12:32
Gas Cert Reference	ALM033528	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 12/Dec/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	997	998
Calculated slope	1.010490	0.999251	Chamber temp	45	45
Calculated intercept	-0.299311	-0.165326	Pressure	653.5	659.2
Analyzer Background	1.7	1.75	Flow	0.403	0.407
Analyzer Coefficient	1.192	1.207	Intensity	98	99
			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	73.8	1.017
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	75.2	0.998
second point	5000	39.6	40.0	40.2	0.995
third point	5000	19.8	20.0	20.4	0.980
as left zero	5000	0.0	0.0	0.2	----
as left span	5000	74.3	75.0	75.8	0.990
				Average Correction Factor	0.991

Corrected As found	73.8	Previous response	74.6	% change	1.0%

Notes:

No maintenance done, filter changed out, span adjusted

Calibration Performed By: Melissa Lemay

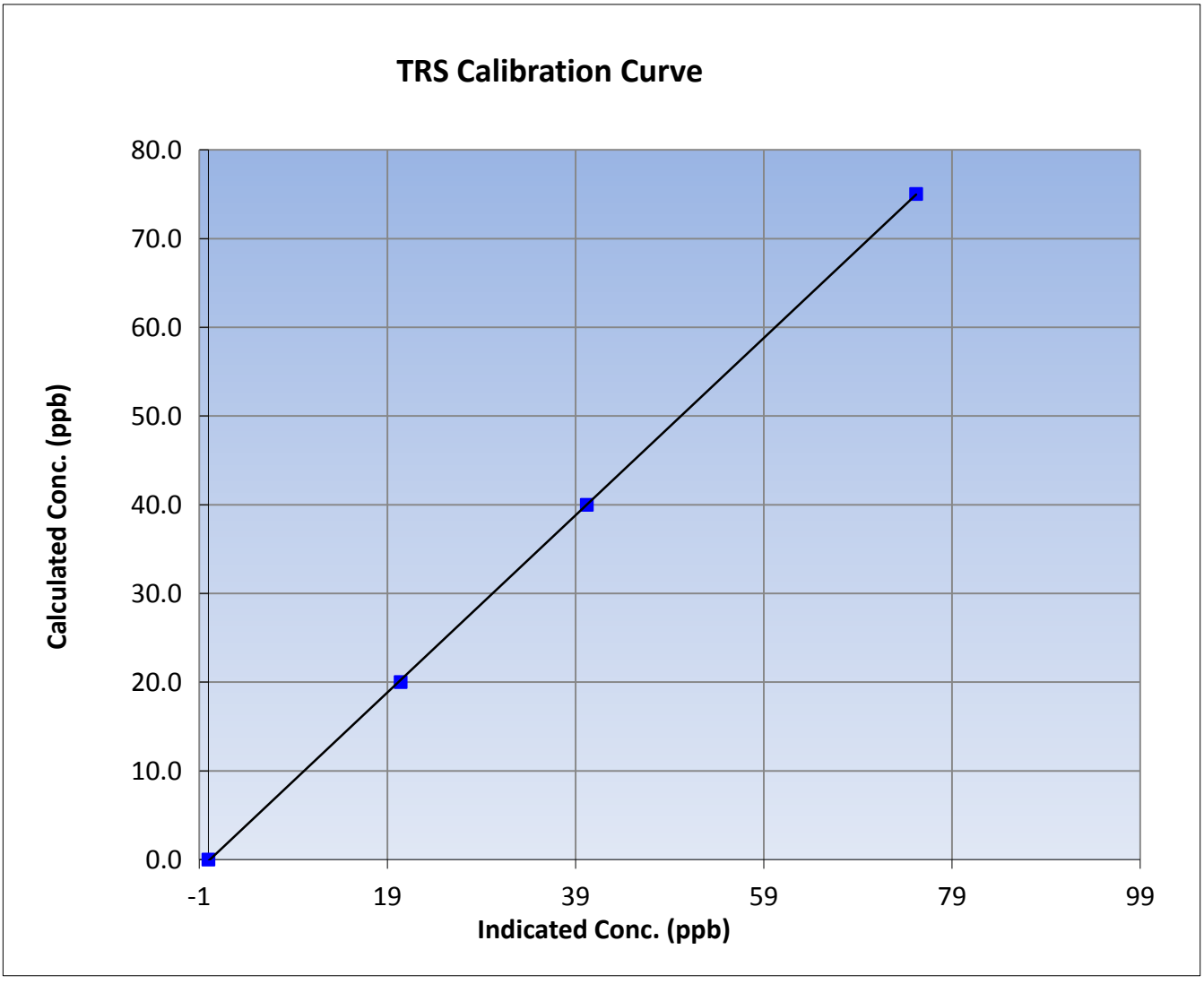
Wood Buffalo Environmental Association
TRS Calibration Report

Station Information

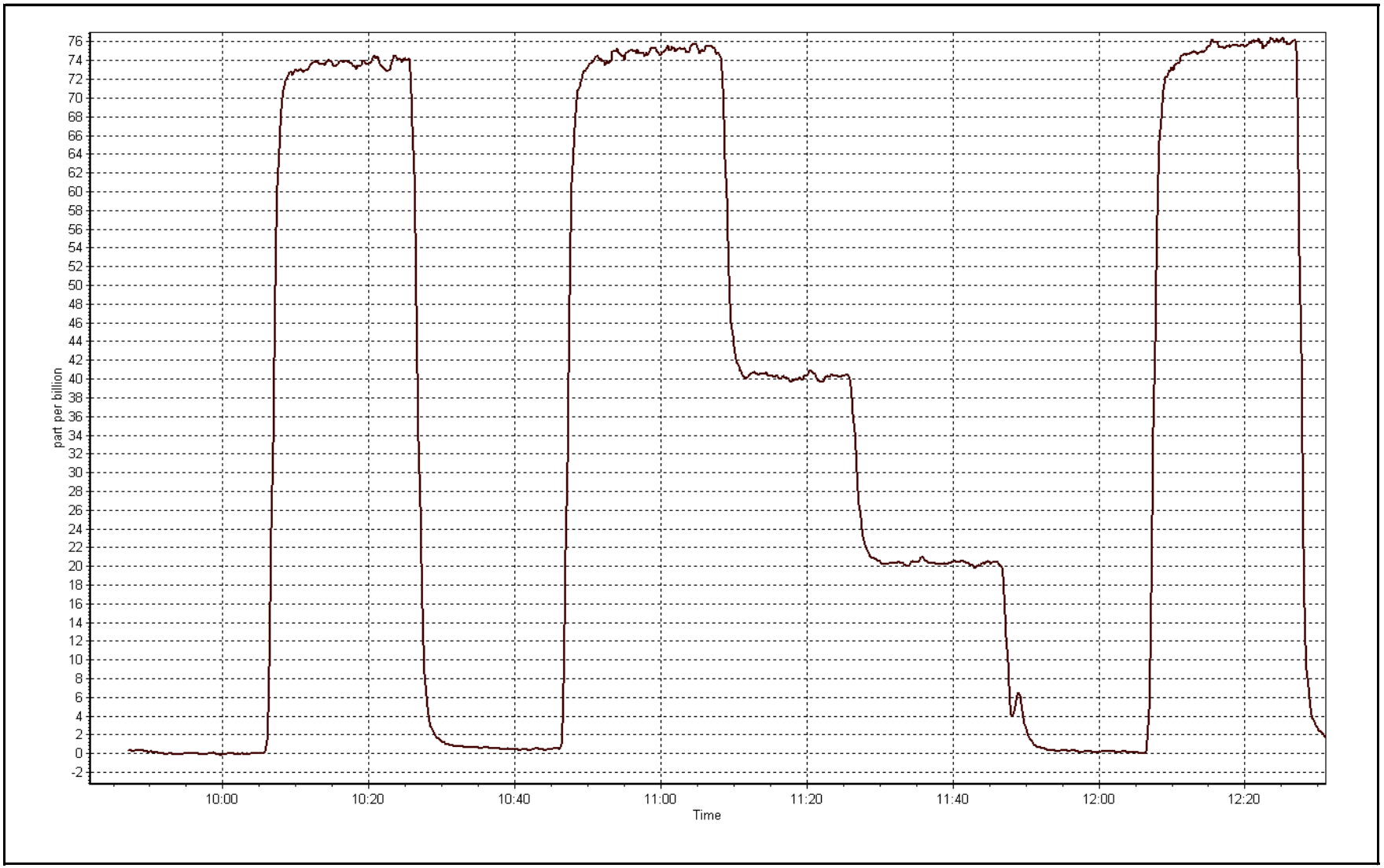
Calibration Date	April 4, 2016	Previous Calibration	March 16, 2016
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	9:45	End Time (MST)	12:32
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1300156232

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999974
75.0	75.2	0.9979		
40.0	40.2	0.9949	Slope	0.999251
20.0	20.4	0.9803		
			Intercept	-0.165326



TRS Calibration Plot Date: April 4, 2016



Wood Buffalo Environmental Association
THC / NMHC Calibration Report

W B E A

Station Information

Calibration Date	April-11-16	Last Calibration	March-23-16
Station Name	Anzac	Station Number	AMS 14
Reason:	Routine		
Start Time (MST)	10:30	End Time (MST)	12:55
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.	22 Deg C
Calibrator Model	Sabio 4010	Serial Number	8400311
ZAG make/model	Teledyne API 701	Serial Number	4764
DACS make/model	Campbell Scientific CR3000	Serial Number	8790

Analyzer Information

	Before	*After*		*Before*	*After*
THC Range (ppm)	0 - 50 ppm		Column Temp	74.9	74.9
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	175.0	175.0
Analyzer IP address	192.168.1.55		Flame Temp	405.0	398.7
THC Calc slope	1.002460	0.998038	Carrier Pressure	33.8	37.8
THC Calc intercept	0.012162	0.036201	Fuel Pressure	41.4	41.4
NMHC Calc slope	1.002501	0.997332	Air Pressure	32.6	32.6
NMHC Calc intercept	-0.005964	0.005447			

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	16.25	1.007
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	74.9	16.36	16.39	0.998
second point	5000	37.5	8.19	8.11	1.010
third point	5000	18.7	4.09	4.05	1.009
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	74.9	16.36	16.38	0.999
				Average Correction Factor	1.006

Corrected As found	16.25	Previous response	16.31	% change	0.4%

Notes:

As founds were from April 11,2016; Investigation into spiking in baseline,From Chromatograms Carrier increased to 38PSI. hydrogen changed out, nitrogen trapped put in, 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	74.9	8.69	8.69	1.000
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	74.9	8.69	8.72	0.997
second point	5000	37.5	4.35	4.33	1.004
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	8.72	0.997
				Average Correction Factor	0.999

Corrected As found	8.69	Previous response	8.68	% change	-0.2%

CH4 Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0	0.00	0.00	----
as found span	5000	74.9	7.67	7.55	1.016
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	3.77	1.019
third point	5000	18.7	1.91	1.88	1.019
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	74.9	7.67	7.66	1.001
				Average Correction Factor	1.012

Corrected As found	7.55	Previous response	7.63	% change	1.1%

Wood Buffalo Environmental Association

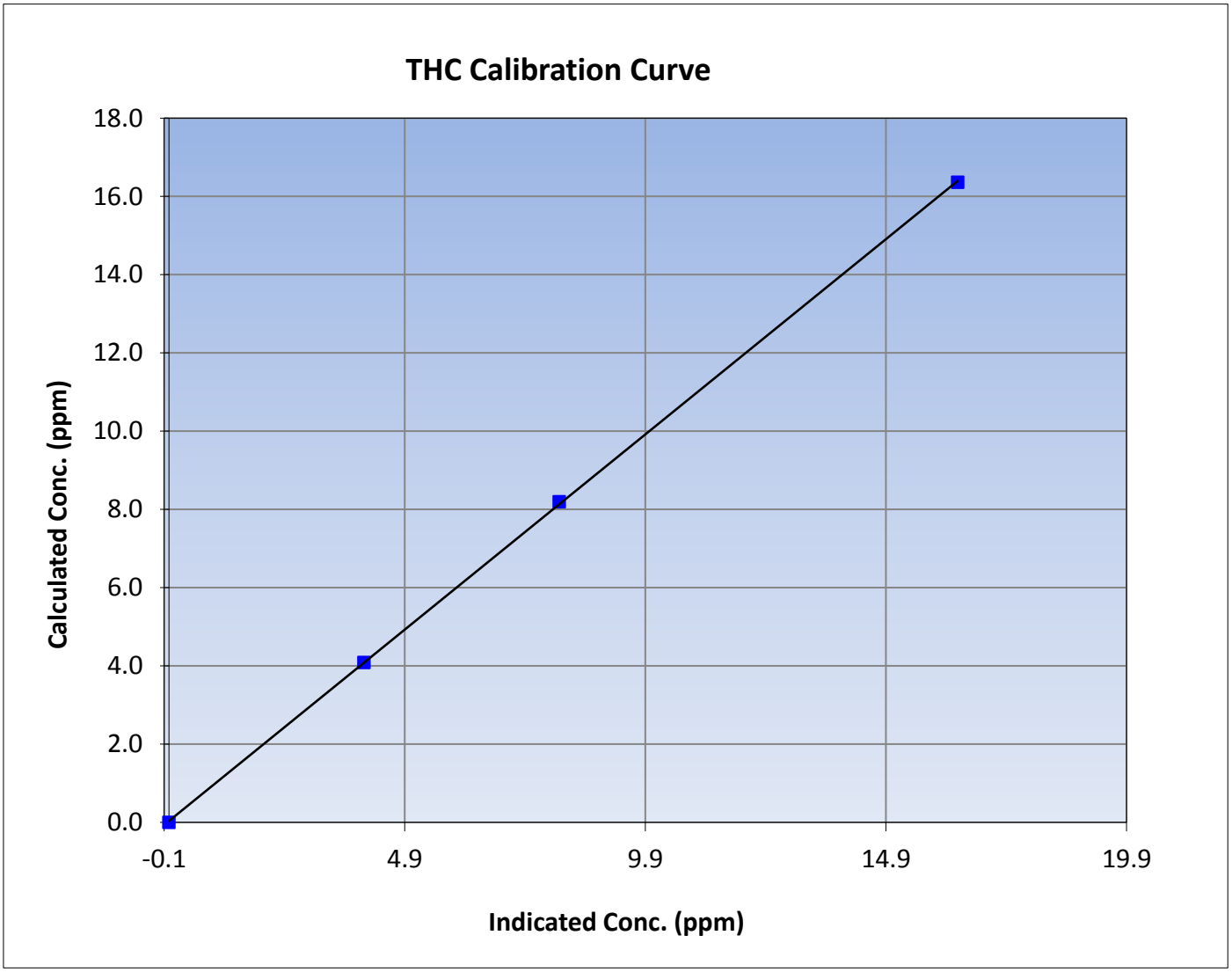
THC Calibration Summary

Station Information

Calibration Date	April 11, 2016	Previous Calibration	March 23, 2016
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	10:30	End Time (MST)	12:55
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	0.999958
16.36	16.39	0.9983		
8.19	8.11	1.0101	Slope	0.998038
4.09	4.05	1.0086		
			Intercept	0.036201



Wood Buffalo Environmental Association

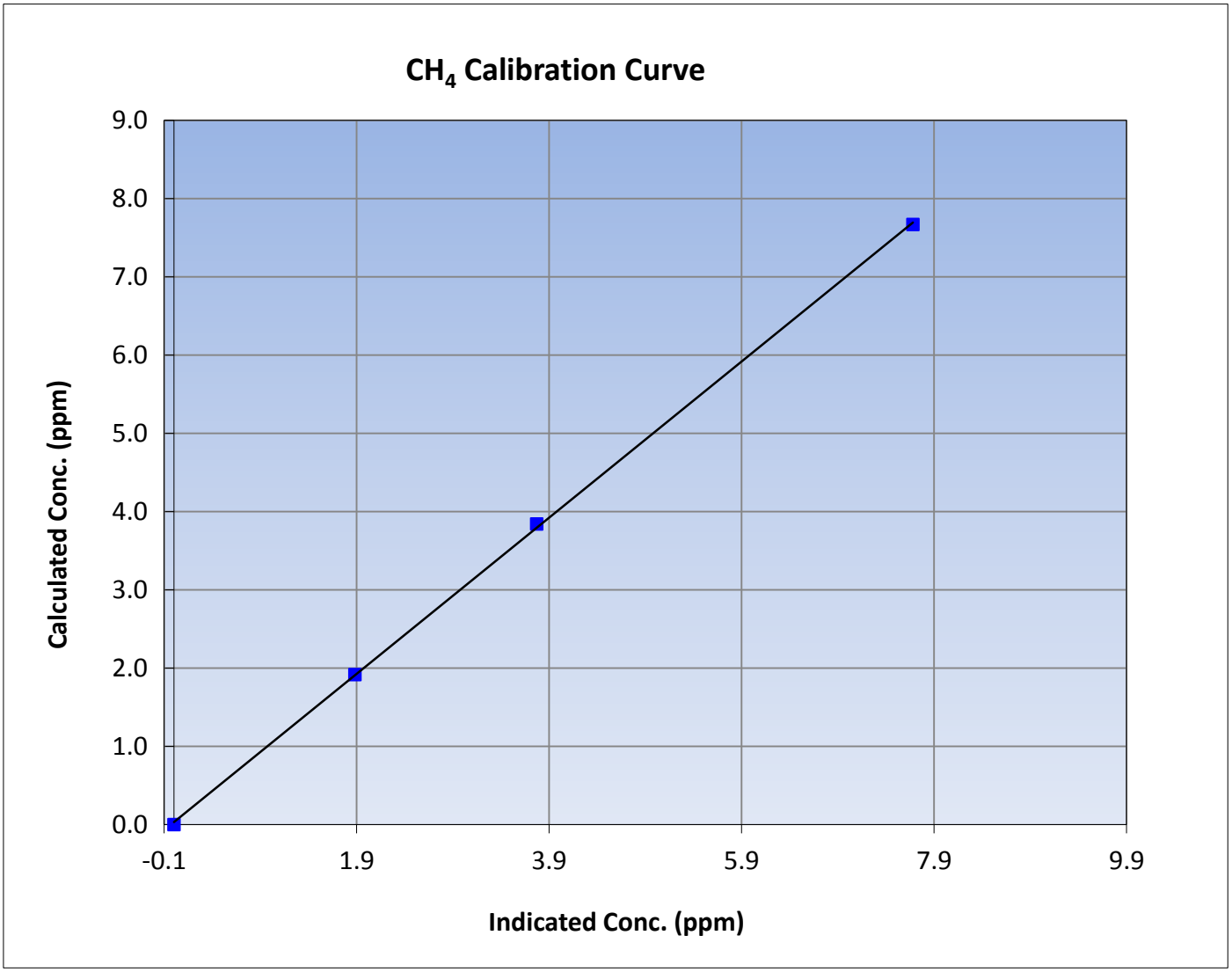
CH_4 Calibration Summary

Station Information

Calibration Date	April 11, 2016	Previous Calibration	March 23, 2016
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	10:30	End Time (MST)	12:55
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	0.999880
7.67	7.68	0.9987		
3.84	3.77	1.0186	Slope	0.998002
1.91	1.88	1.0186		
			Intercept	0.030319



Wood Buffalo Environmental Association

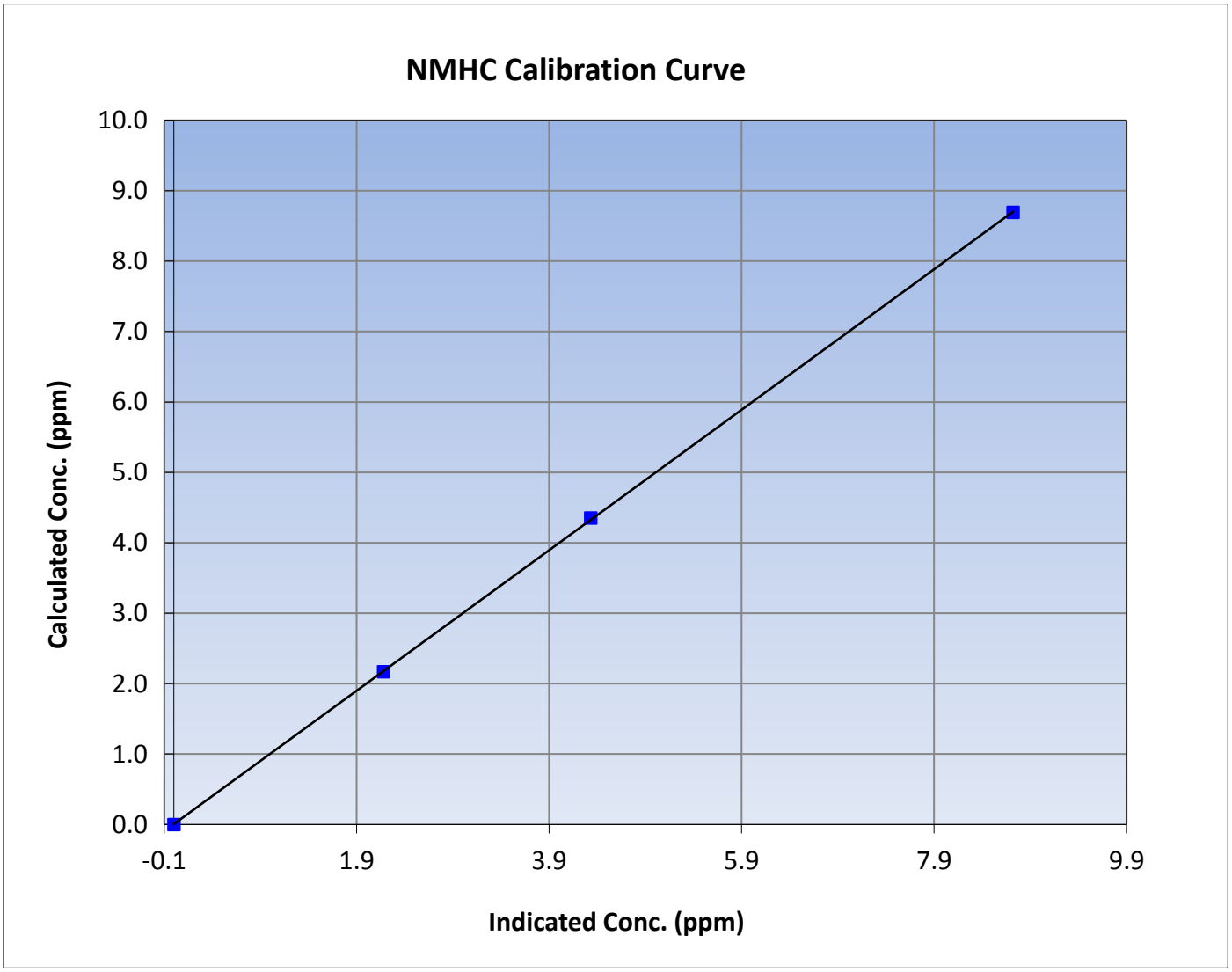
NMHC Calibration Summary

Station Information

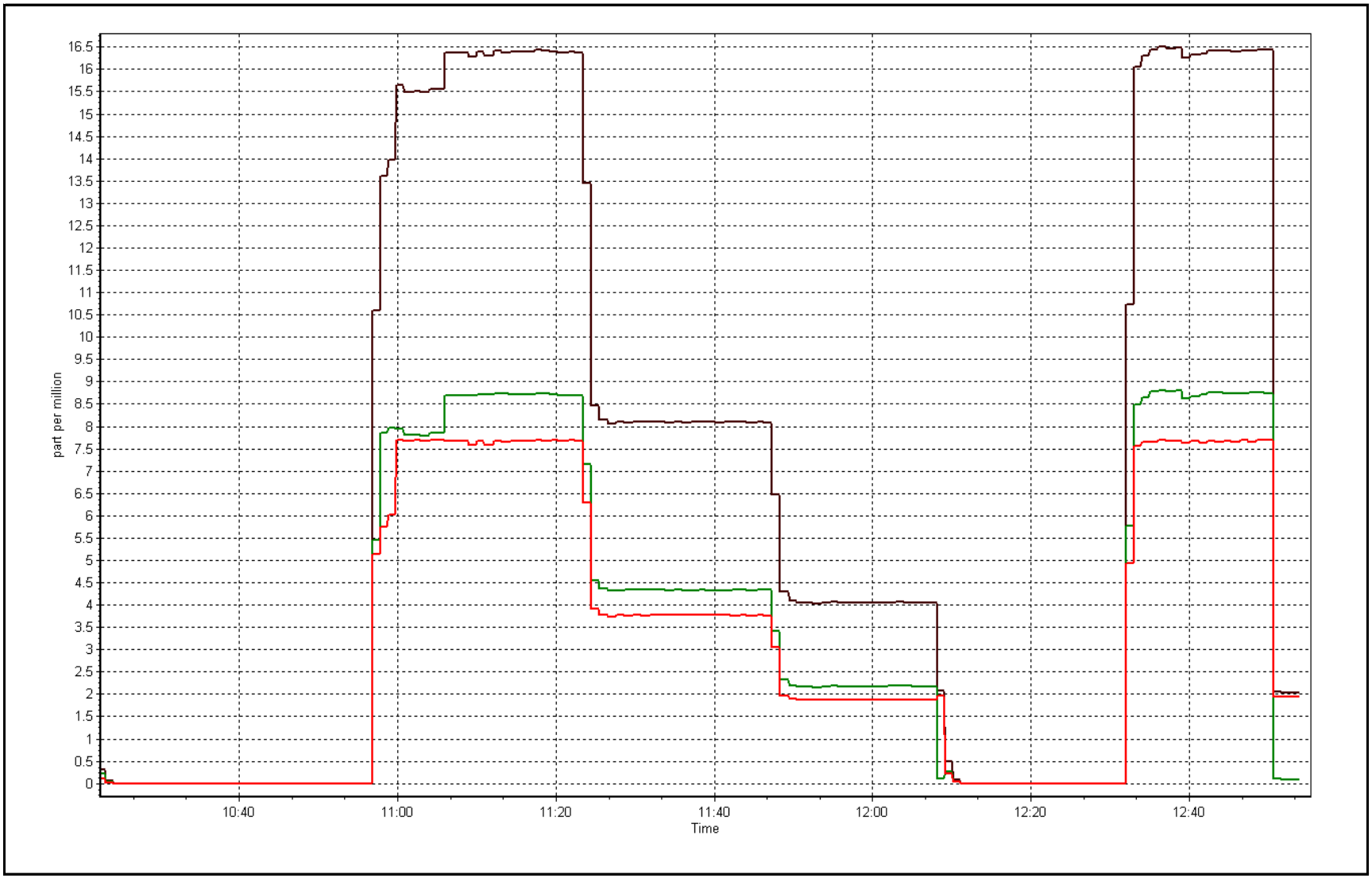
Calibration Date	April 11, 2016	Previous Calibration	March 23, 2016
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	10:30	End Time (MST)	12:55
Analyzer make	Thermo 55i	Analyzer serial #	1218153355

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999980
8.69	8.72	0.9968		
4.35	4.33	1.0044	Slope	0.997332
2.17	2.18	0.9955		
			Intercept	0.005447



THC Calibration Plot Date: April 11, 2016



Wood Buffalo Environmental Association
THC / NMHC Calibration Report

W B E A

Station Information

Calibration Date	April-21-16	Last Calibration	April-11-16
Station Name	Anzac	Station Number	AMS 14

Reason: Removal

Start Time (MST)	7:35	End Time (MST)	9:00
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.	22 Deg C
Calibrator Model	Sabio 4010	Serial Number	8400311
ZAG make/model	Teledyne API 701	Serial Number	4764
DACS make/model	Campbell Scientific CR3000	Serial Number	8790

Analyzer Information

	Before	*After*		*Before*	*After*
THC Range (ppm)	0 - 50 ppm		Column Temp	74.9	74.9
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	175.0	175.0
Analyzer IP address	192.168.1.55		Flame Temp	398.7	405.0
THC Calc slope	0.998038	0.984820	Carrier Pressure	37.8	37.8
THC Calc intercept	0.036201	0.019755	Fuel Pressure	41.4	41.4
NMHC Calc slope	0.997332	0.953832	Air Pressure	32.6	32.5
NMHC Calc intercept	0.005447	0.019210			

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	16.61	0.985
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	74.9	16.36	16.61	0.985
second point	5000	37.5	8.19	8.27	0.991
third point	5000	18.7	4.09	4.12	0.992
as left zero					
as left span					
				Average Correction Factor	0.989

Corrected As found	16.61	Previous response	16.36	% change	-1.5%

Notes:

Removal Calibration due to spiking on CH4 channel

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Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

THC / NMHC Calibration Report

NMHC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0	0.00	0.00	----
as found span	5000	74.9	8.69	9.11	0.954
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	74.9	8.69	9.11	0.954
second point	5000	37.5	4.35	4.51	0.965
third point	5000	18.7	2.17	2.25	0.965
as left zero					
as left span					
				Average Correction Factor	0.961

Corrected As found	9.11	Previous response	8.71	% change	-4.4%

CH4 Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0	0.00	0.00	----
as found span	5000	74.9	7.67	7.49	1.024
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	74.9	7.67	7.49	1.024
second point	5000	37.5	3.84	3.75	1.024
third point	5000	18.7	1.91	1.87	1.024
as left zero					
as left span					
				Average Correction Factor	1.024

Corrected As found	7.49	Previous response	7.65	% change	2.1%

Wood Buffalo Environmental Association

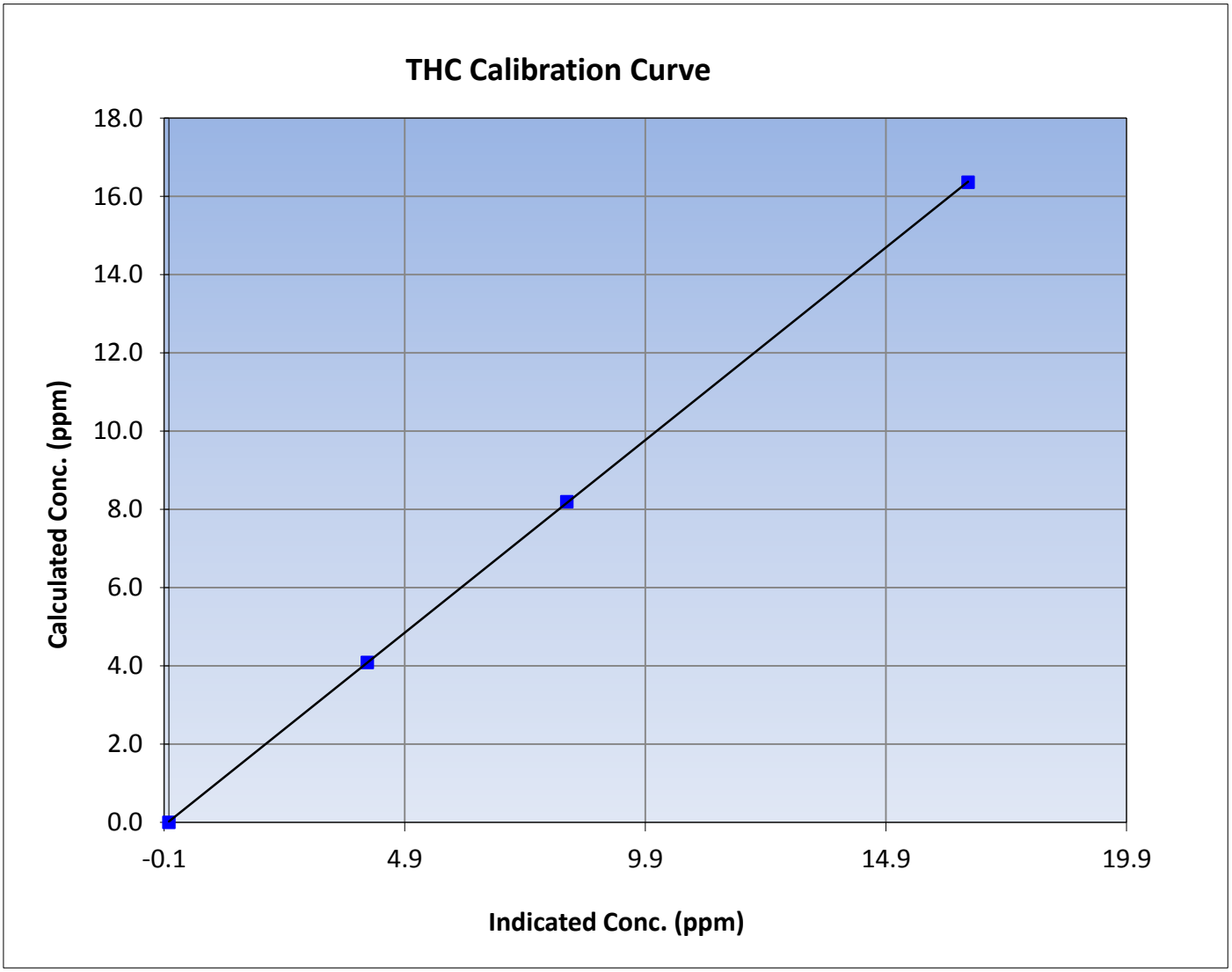
THC Calibration Summary

Station Information

Calibration Date	April 21, 2016	Previous Calibration	April 11, 2016
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	7:35	End Time (MST)	9:00
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	0.999990
16.36	16.61	0.9851		
8.19	8.27	0.9906	Slope	0.984820
4.09	4.12	0.9915		
			Intercept	0.019755



Wood Buffalo Environmental Association

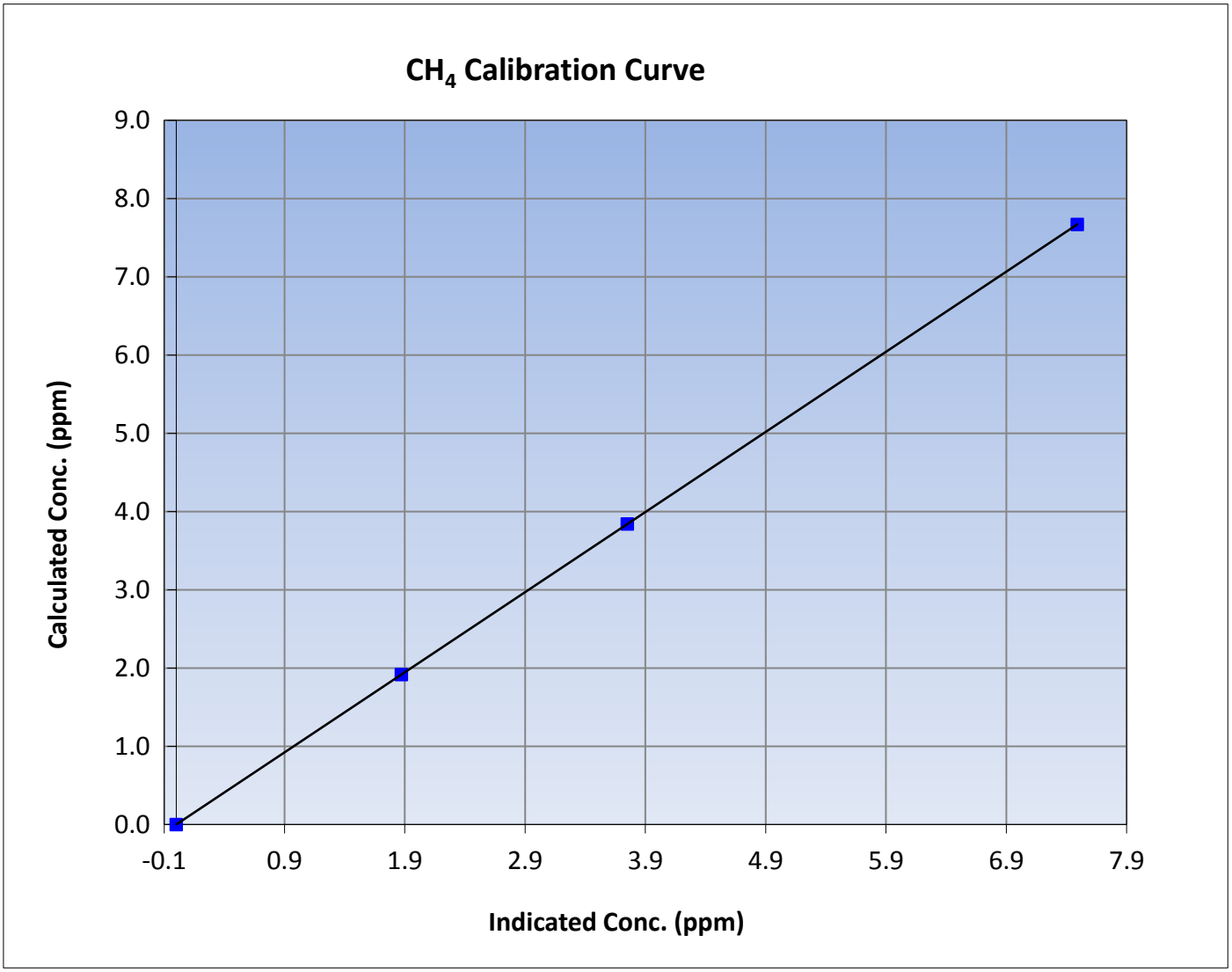
CH_4 Calibration Summary

Station Information

Calibration Date	April 21, 2016	Previous Calibration	April 11, 2016
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	7:35	End Time (MST)	9:00
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	1.000000
7.67	7.49	1.0240		
3.84	3.75	1.0240	Slope	1.024000
1.91	1.87	1.0240		
			Intercept	0.000000



Wood Buffalo Environmental Association

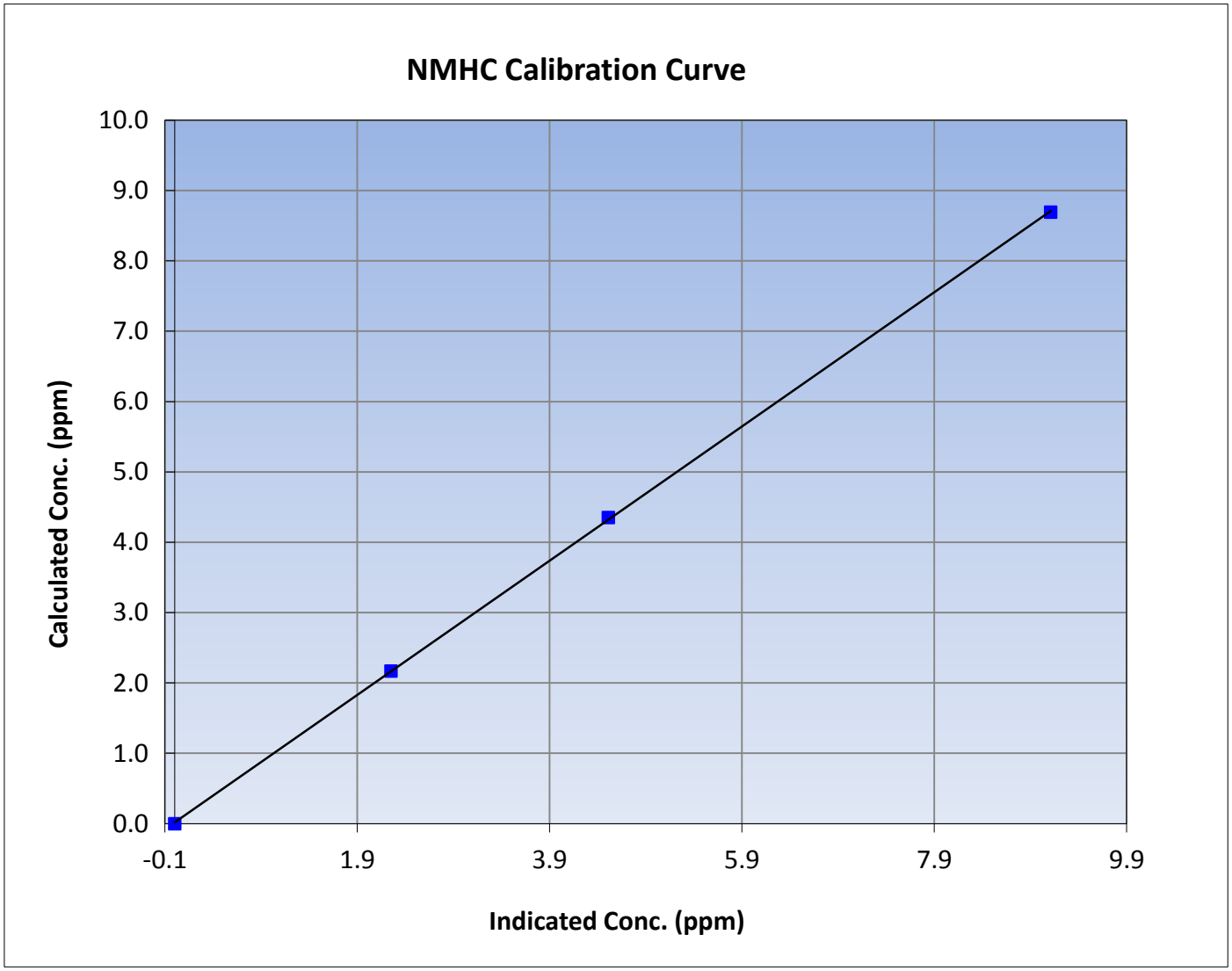
NMHC Calibration Summary

Station Information

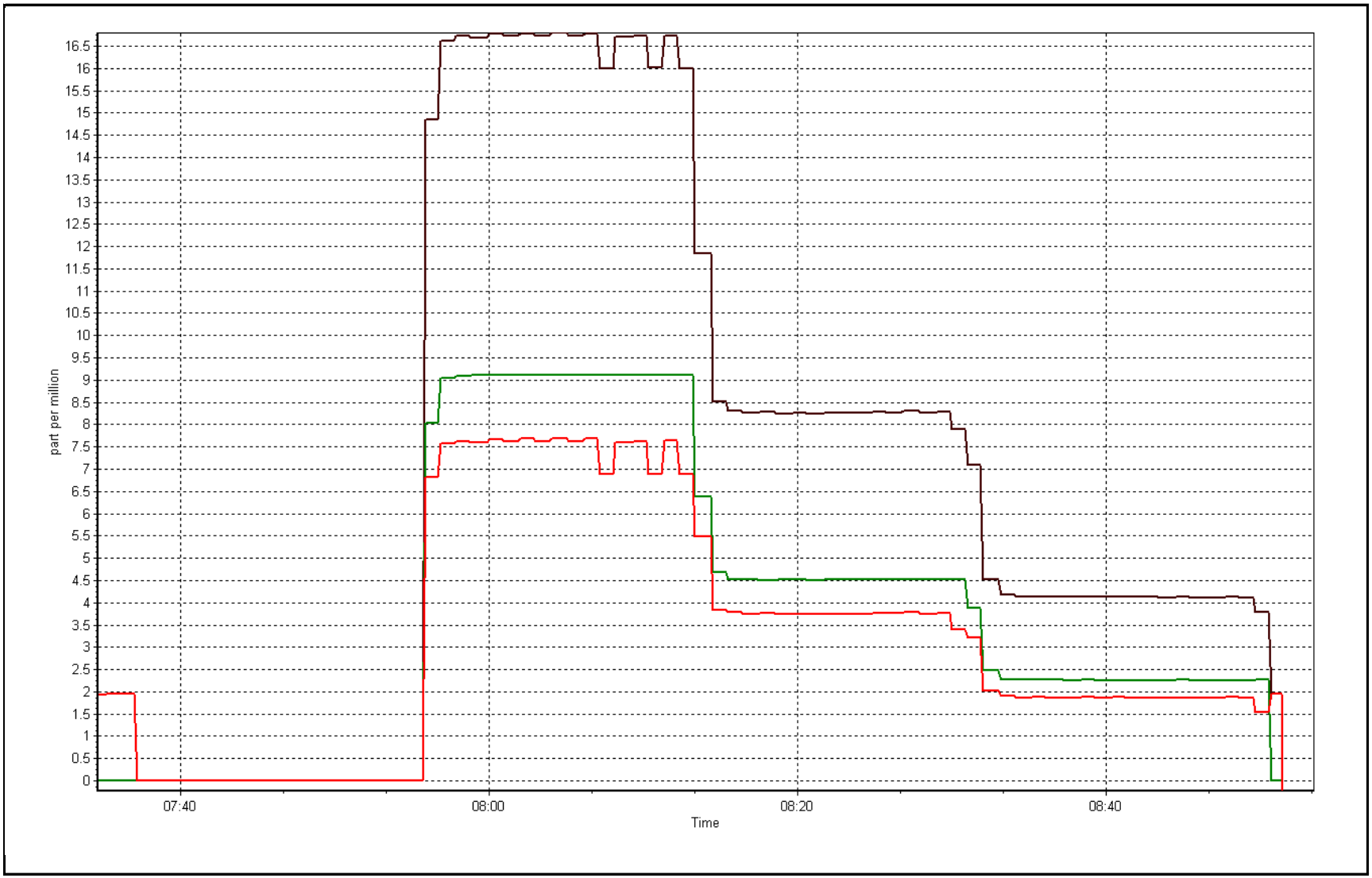
Calibration Date	April 21, 2016	Previous Calibration	April 11, 2016
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	7:35	End Time (MST)	9:00
Analyzer make	Thermo 55i	Analyzer serial #	1218153355

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999961
8.69	9.11	0.9541		
4.35	4.51	0.9649	Slope	0.953832
2.17	2.25	0.9645		
			Intercept	0.019210



THC Calibration Plot Date: April 21, 2016



Wood Buffalo Environmental Association
THC / NMHC Calibration Report

Station Information

Calibration Date	April-21-16	Last Calibration	
Station Name	Anzac	Station Number	AMS 14

Reason: Install

Start Time (MST)	10:25	End Time (MST)	12:35
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.	22 Deg C
Calibrator Model	Sabio 4010	Serial Number	8400311
ZAG make/model	Teledyne API 701	Serial Number	4764
DACS make/model	Campbell Scientific CR3000	Serial Number	8790

Analyzer Information

	Before	*After*		*Before*	*After*
THC Range (ppm)	0 - 50 ppm		Column Temp		75.2
NMHC Range (ppm)	0 - 25 ppm		Detector Temp		175.1
Analyzer IP address	192.168.1.55		Flame Temp		356.6
THC Calc slope	0.998038	1.000837	Carrier Pressure		32.0
THC Calc intercept	0.036201	0.026232	Fuel Pressure		44.6
NMHC Calc slope	0.997332	1.004728	Air Pressure		32.7
NMHC Calc intercept	0.005447	0.018228			

Analyzer make	Thermo 55i	Analyzer serial #	1317958219

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					
as found span					
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	74.9	16.36	16.35	1.001
second point	5000	37.5	8.19	8.10	1.011
third point	5000	18.7	4.09	4.06	1.006
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	74.9	16.36	16.10	1.016
				Average Correction Factor	1.006

Corrected As found	NA	Previous response	NA	% change	NA

Notes:

Installed due to previous needing repair work

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Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

THC / NMHC Calibration Report

NMHC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero					
as found span					
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	74.9	8.69	8.65	1.005
second point	5000	37.5	4.35	4.28	1.017
third point	5000	18.7	2.17	2.14	1.014
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	74.9	8.69	8.49	1.024
				Average Correction Factor	1.012

Corrected As found	NA	Previous response	NA	% change	NA

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					
as found span					
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	74.9	7.67	7.70	0.996
second point	5000	37.5	3.84	3.82	1.005
third point	5000	18.7	1.91	1.92	0.997
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	74.9	7.67	7.60	1.009
				Average Correction Factor	1.000

Corrected As found	NA	Previous response	NA	% change	NA

Wood Buffalo Environmental Association

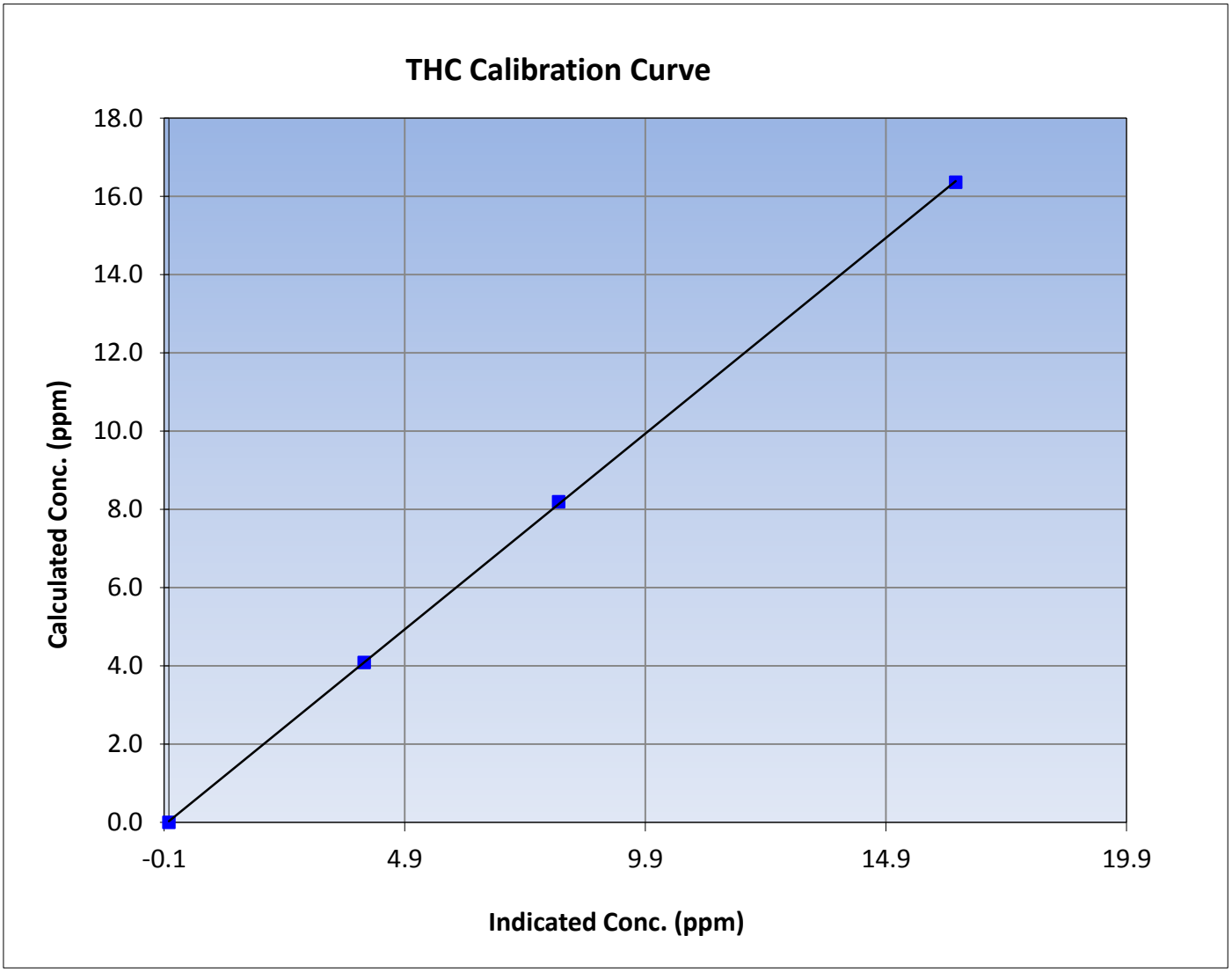
THC Calibration Summary

Station Information

Calibration Date	April 21, 2016	Previous Calibration	
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	10:25	End Time (MST)	12:35
Analyzer make	Thermo 55i	Analyzer serial #	1317958219

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999966
16.36	16.35	1.0007		
8.19	8.10	1.0113	Slope	1.000837
4.09	4.06	1.0062		
			Intercept	0.026232



Wood Buffalo Environmental Association

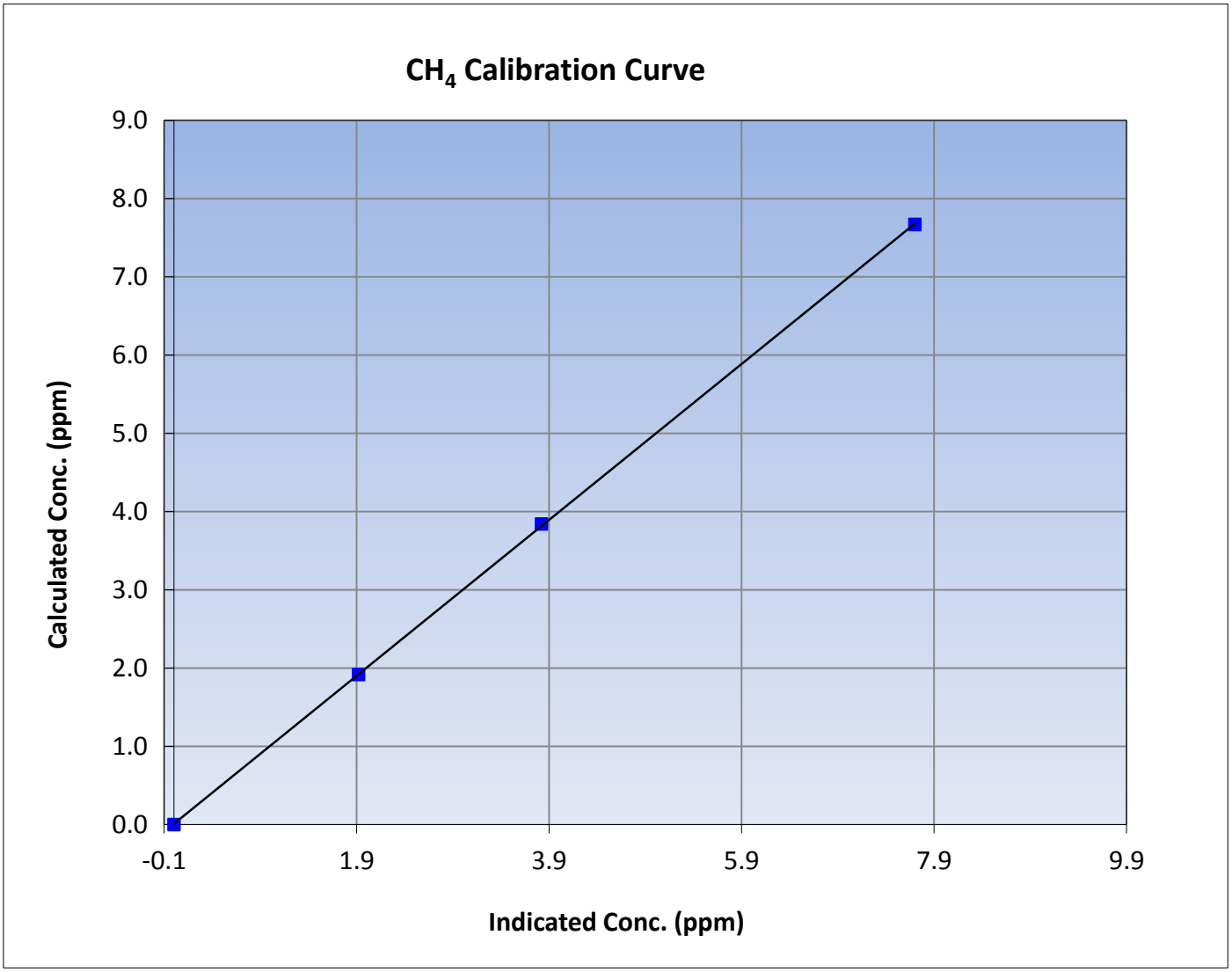
CH_4 Calibration Summary

Station Information

Calibration Date	April 21, 2016	Previous Calibration	
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	10:25	End Time (MST)	12:35
Analyzer make	Thermo 55i	Analyzer serial #	1317958219

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999973
7.67	7.70	0.9961		
3.84	3.82	1.0052	Slope	0.996462
1.91	1.92	0.9973		
			Intercept	0.008048



Wood Buffalo Environmental Association

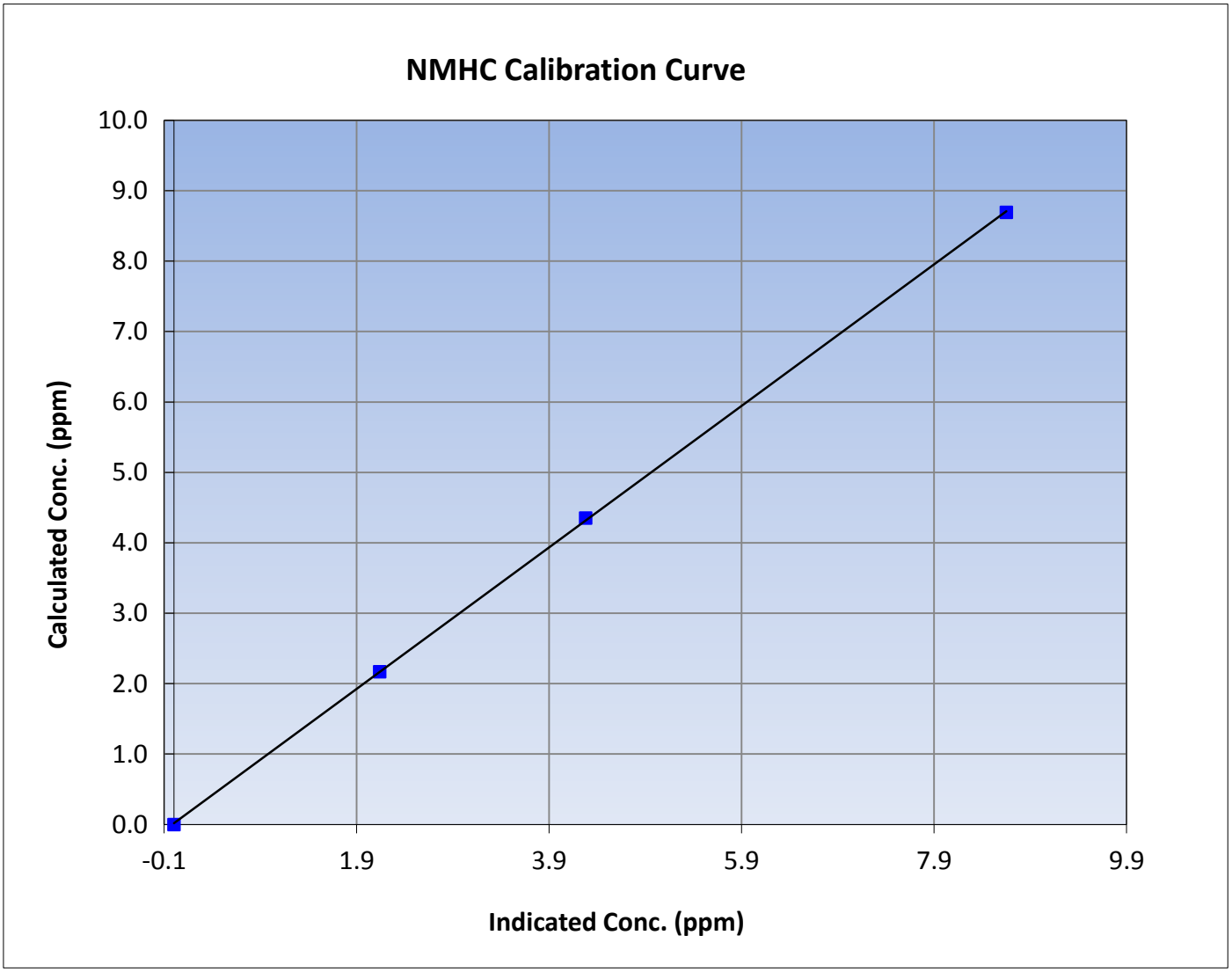
NMHC Calibration Summary

Station Information

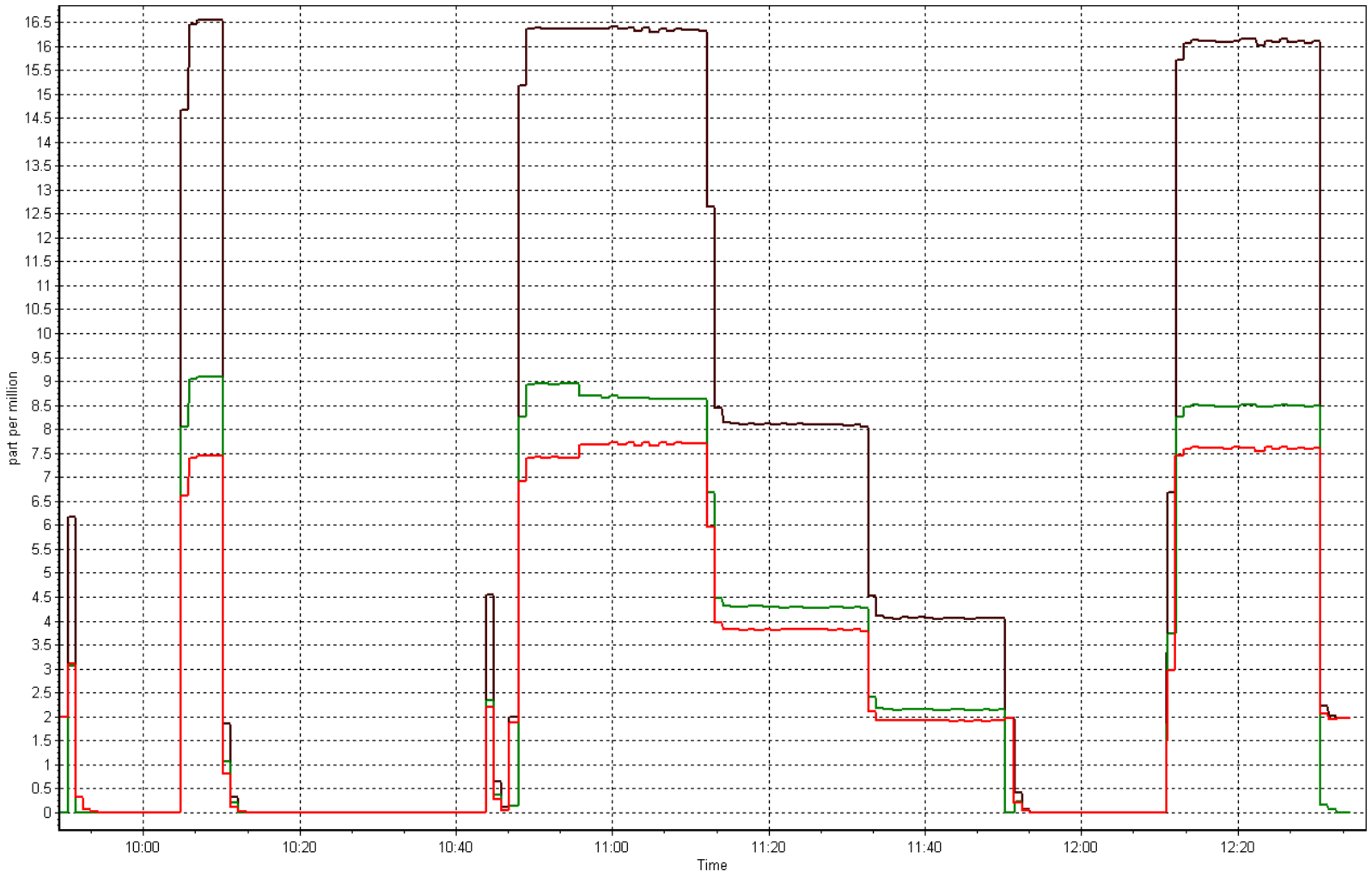
Calibration Date	April 21, 2016	Previous Calibration	
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	10:25	End Time (MST)	12:35
Analyzer make	Thermo 55i	Analyzer serial #	1317958219

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999958
8.69	8.65	1.0049		
4.35	4.28	1.0168	Slope	1.004728
2.17	2.14	1.0141		
			Intercept	0.018228



THC Calibration Plot Date: April 21, 2016



Wood Buffalo Environmental Association
O_3 Calibration Report

W B E A

Station Information

Calibration Date	April 14, 2016	Previous Calibration	March 16, 2016
Station Name	Anzac	Station Number	AMS 14
Reason:	Routine		
Start Time (MST)	7:55	End Time (MST)	10:20
NO2 GPT Ref date	April-13-16	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.	27.7	27.7
Analyzer IP address	192.168.1.48		Lamp temp.	53.8	53.8
Calculated slope	0.990769	1.002922	Pressure	661.6	655.2
Calculated intercept	-1.729027	-0.616427	Flow cell A	0.707	0.703
Analyzer Background	-2.0	-2.0	Flow cell B	0.709	0.705
Analyzer Coefficient	1.006	1.006	Cell A Intensity	111108	108491
			Cell B Intensity	116931	115324

Analyzer make	Thermo 49i	Analyzer serial #	1426262596

Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator Lamp Intensity	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.00	0.0	0.3	----
as found span	5000	1.19	446.8	446.1	1.002
calibrator zero	5000	0.00	0.0	0.3	----
high point	5000	1.19	446.8	446.1	1.002
second point	5000	0.85	305.8	305.2	1.002
third point	5000	0.51	159.8	160.6	0.995
as left zero	5000	0.00	0.0	0.6	----
as left span	5000	1.19	446.8	442.7	1.009
				Average Correction Factor	1.000

Corrected As found	445.8	Previous response	452.7	% change	1.5%

Notes:

No maintenance or adjustments done, filter changed out,

Calibration Performed By: Melissa Lemay

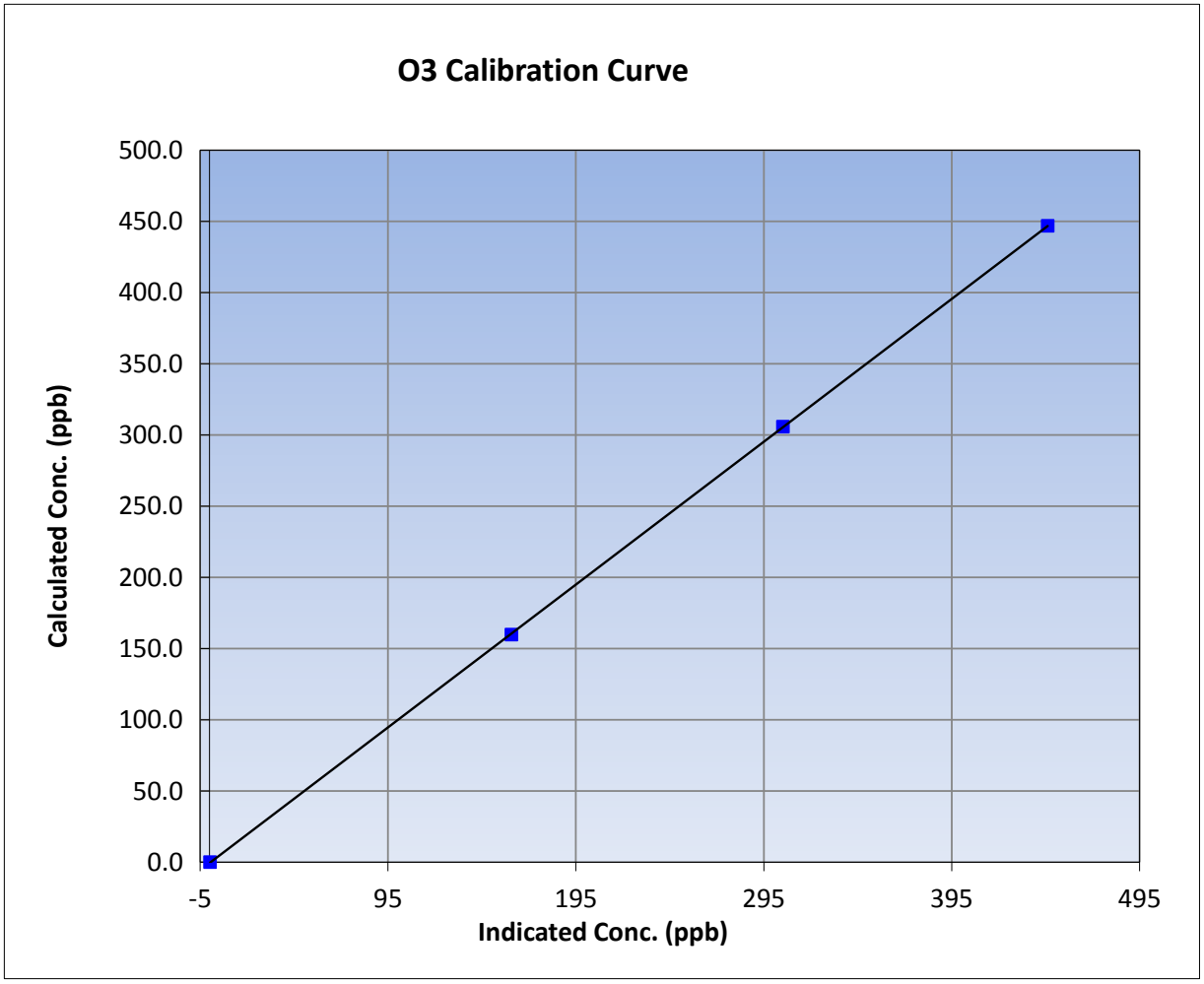
Wood Buffalo Environmental Association
O3 Calibration Report

Station Information

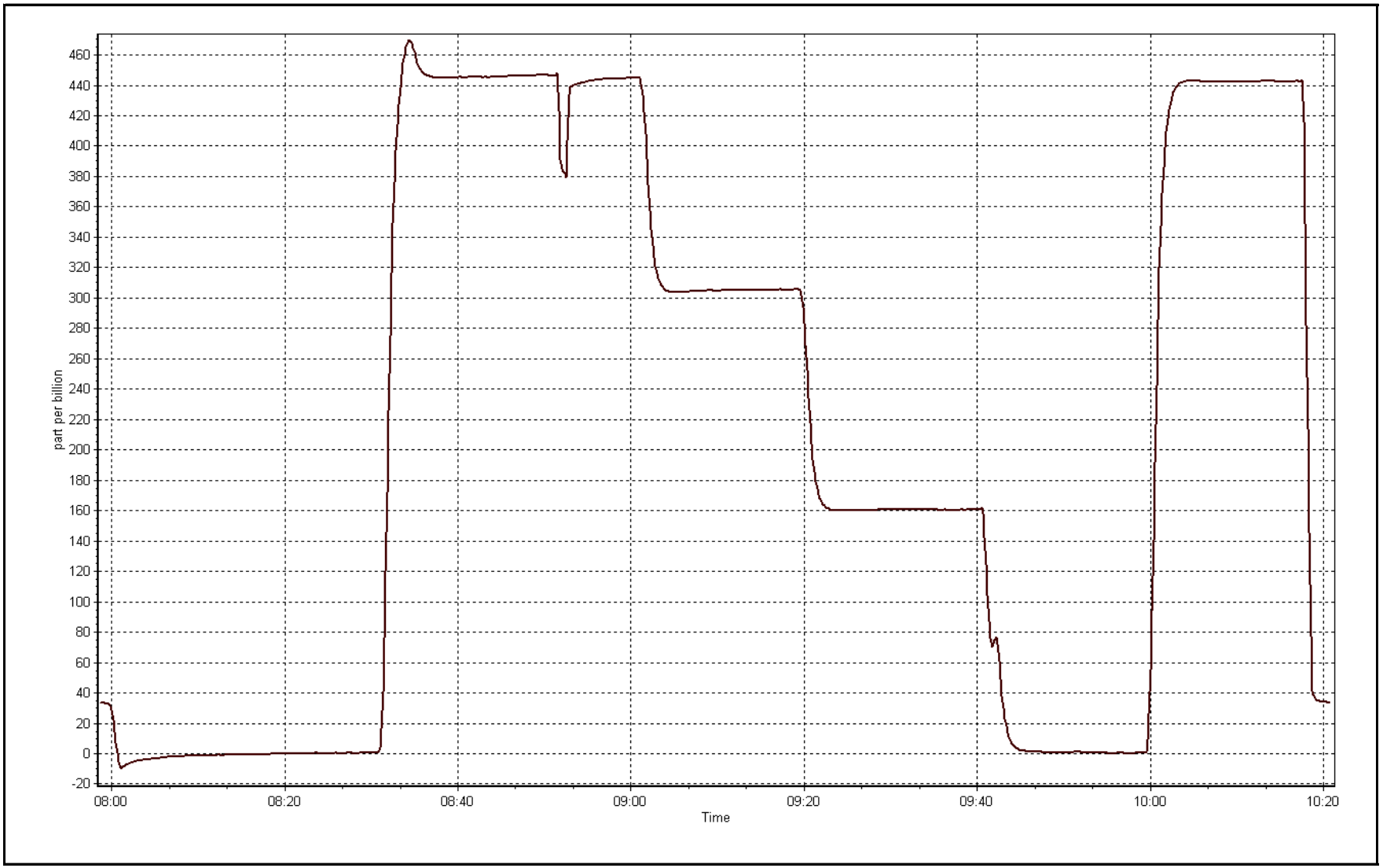
Calibration Date	April-14-16	Previous Calibration	March 16, 2016
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	7:55	End Time (MST)	10:20
Analyzer make	Thermo 49i	Analyzer serial #	1426262596

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.3	----	Correlation Coefficient	0.999994
446.8	446.1	1.0016		
305.8	305.2	1.0020	Slope	1.002922
159.8	160.6	0.9950		
			Intercept	-0.616427



O3 Calibration Plot Date: April 14, 2016



Wood Buffalo Environmental Association
NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	April 13, 2016	Previous Calibration	March 15, 2016
Station Name	Anzac	Station Number	AMS 14
Reason:	Routine		
Start Time (MST)	7:35	End Time (MST)	11:30
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 PAI 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	1.001048	0.998991	1.004582
	Data Offset	0.220915	0.240300	-1.098146
Current Calibration	Data Slope	0.993757	0.993814	1.002908
	Data Offset	0.656876	0.537304	0.013749

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1426262592

Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
Analyzer IP	192.168.1.43		192.168.1.43	
NO coefficient	0.985		0.985	
NOX coefficient	1.000		1.000	
NO2 coefficient	0.997		0.997	
NO bkgrnd	3.6		3.6	
NOX bkgrnd	3.6		3.6	
Chamber Temp	50.3	Deg C	50	Deg C
Moly Temp	326.6	Deg C	323.4	Deg C
PMT voltage	-808.1	V	-808.1	V
PMT Temp	-2.7	Deg C	-3.1	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	156.1	mmHg	145.1	mmHg
R Cell Press Nox	156.1	mmHg	145.1	mmHg
NO sample flow	0.808	lpm	0.8	lpm
Nox sample Flow	0.808	lpm	0.800	lpm

Notes:

filter changed out, no maintenance or adjustments done

Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: April 13, 2016 Station Number: AMS 14

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
as found span	5000	74.9	799.9	799.9	0.0	804.8	804.8	-0.1	0.9940	0.9940
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
high point	5000	74.9	799.9	799.9	0.0	804.8	804.8	-0.1	0.9940	0.9940
second point	5000	37.5	400.5	400.5	0.0	401.4	401.6	-0.3	0.9978	0.9973
third point	5000	18.7	199.7	199.7	0.0	200.2	200.4	-0.2	0.9976	0.9966
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1	----	----
as left span	5000	74.9	799.9	359.1	440.8	815.6	365.9	449.7	0.9808	0.9814
									0.9964	0.9959

Corrcted As found NO_X= 804.9 NO= 804.9 Percent Change NO_X= -0.7% NO= -0.5%

Previous Response NO_X= 798.9 NO= 800.5

GPT Calibration Data

Dilution Flow (total) 5000 ccm Source Gas Flow 74.90 ccm NOX ref calc conc = 799.9 ppb NO ref calc conc = 799.9 ppb

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
1st NO ref point		0.0	804.6	805.9	0.0	0.9942	0.9926	----	----
1st NO2 (300)	359.1	446.8	804.7	359.1	445.6	0.9941	----	1.0027	99.7%
2nd NO2 (200)	500.1	305.8	804.8	500.1	304.7	0.9940	----	1.0036	99.6%
3rd NO2 (100)	646.1	159.8	805.5	646.1	159.4	0.9931	----	1.0025	99.7%
2nd NO ref point		0.0	805.1	806.4	-1.3	0.9936	0.9920	----	----
				Average Correction Factor		0.9937		1.0029	99.7%

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

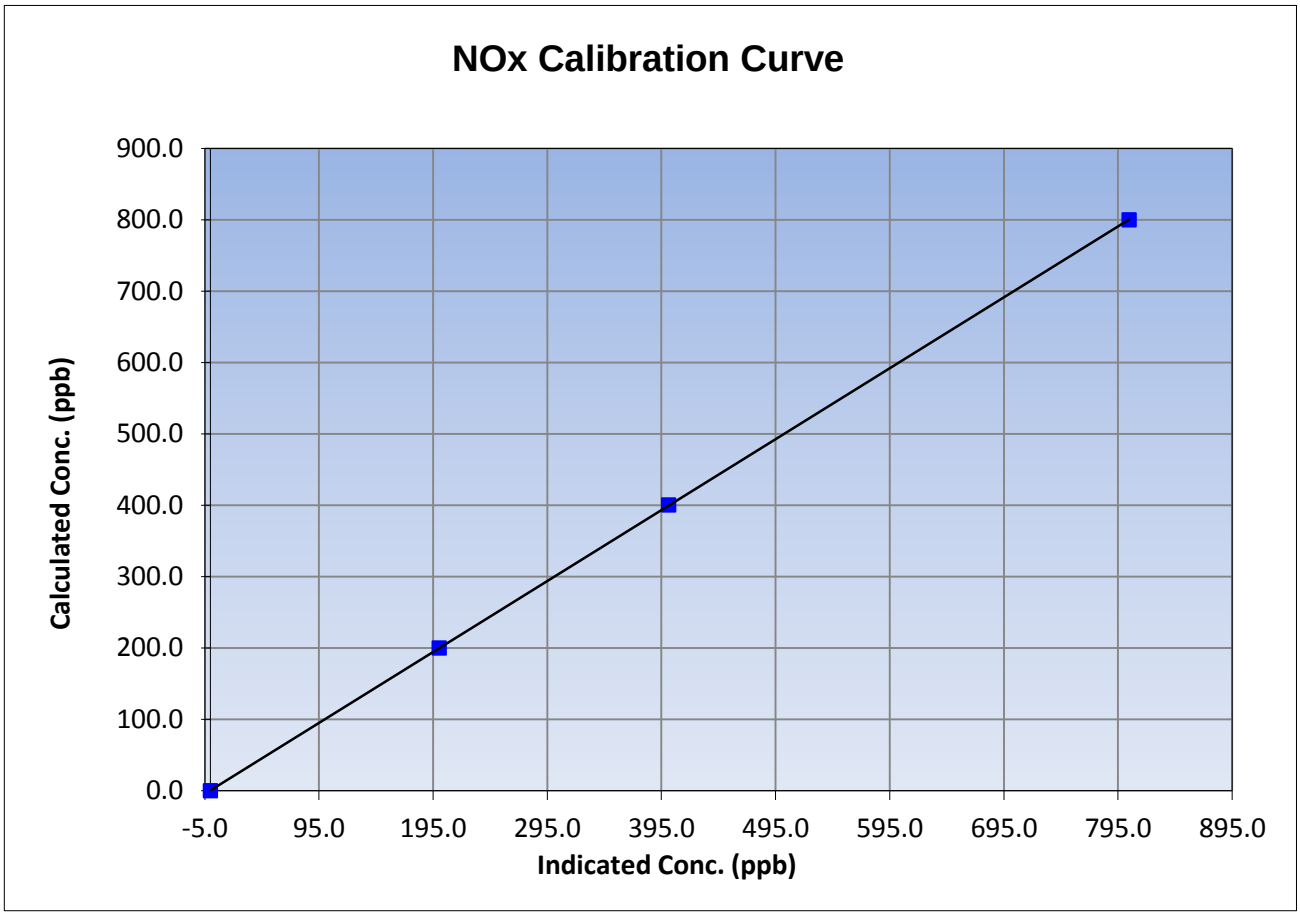
NO_X Calibration Summary

Station Information

Calibration Date	April 13, 2016	Previous Calibration	March 15, 2016
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	7:35	End Time (MST)	11:30
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	-0.1	----	Correlation Coefficient	0.999996
799.9	804.8	0.9940		
400.5	401.4	0.9978	Slope	0.993757
199.7	200.2	0.9976		
			Intercept	0.656876



Wood Buffalo Environmental Association

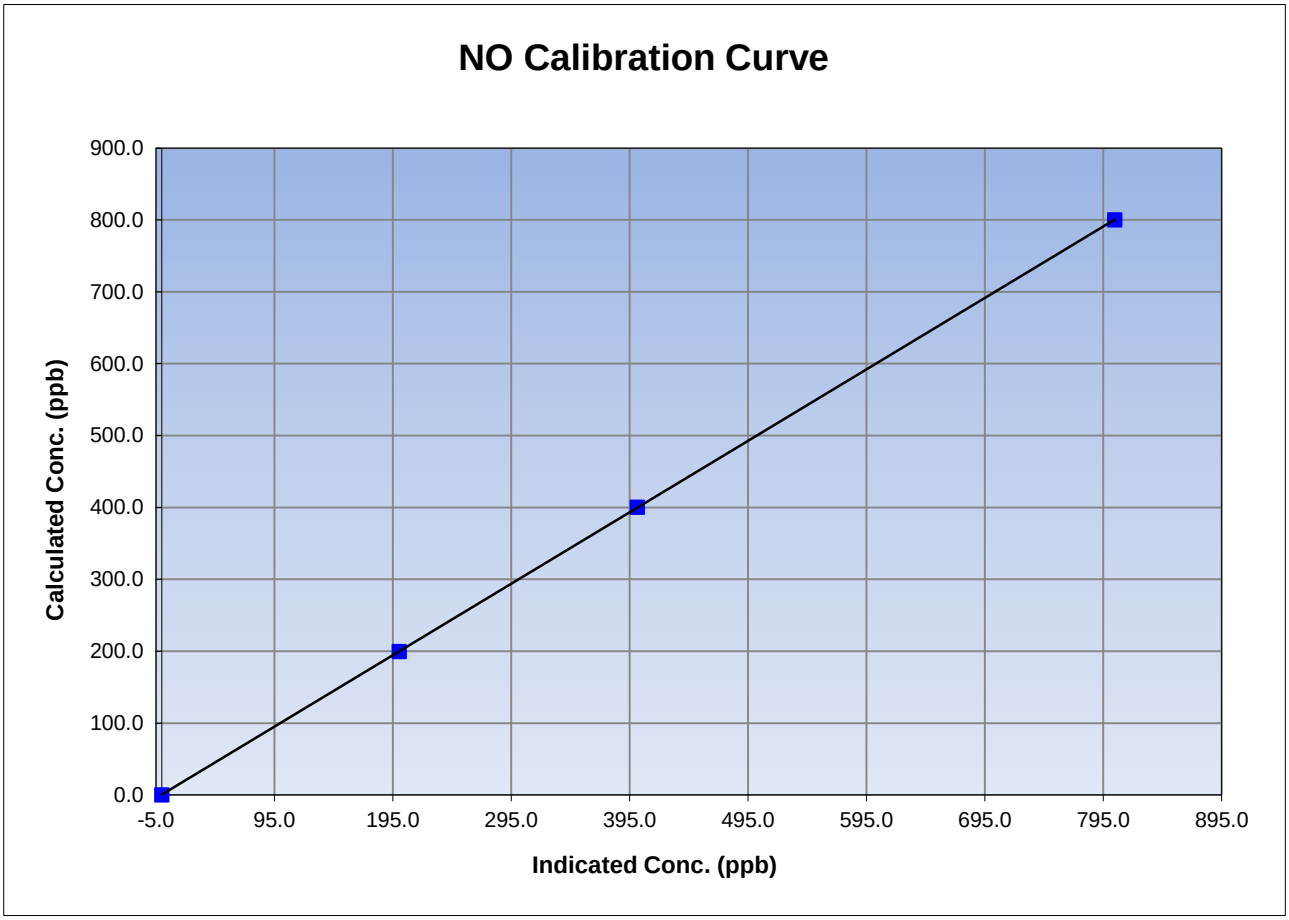
NO Calibration Summary

Station Information

Calibration Date	April 13, 2016	Previous Calibration	March 15, 2016
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	7:35	End Time (MST)	11:30
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	-0.1	N/A	Correlation Coefficient	0.999997
799.9	804.8	0.9940		
400.5	401.6	0.9973	Slope	0.993814
199.7	200.4	0.9966		
			Intercept	0.537304



Wood Buffalo Environmental Association

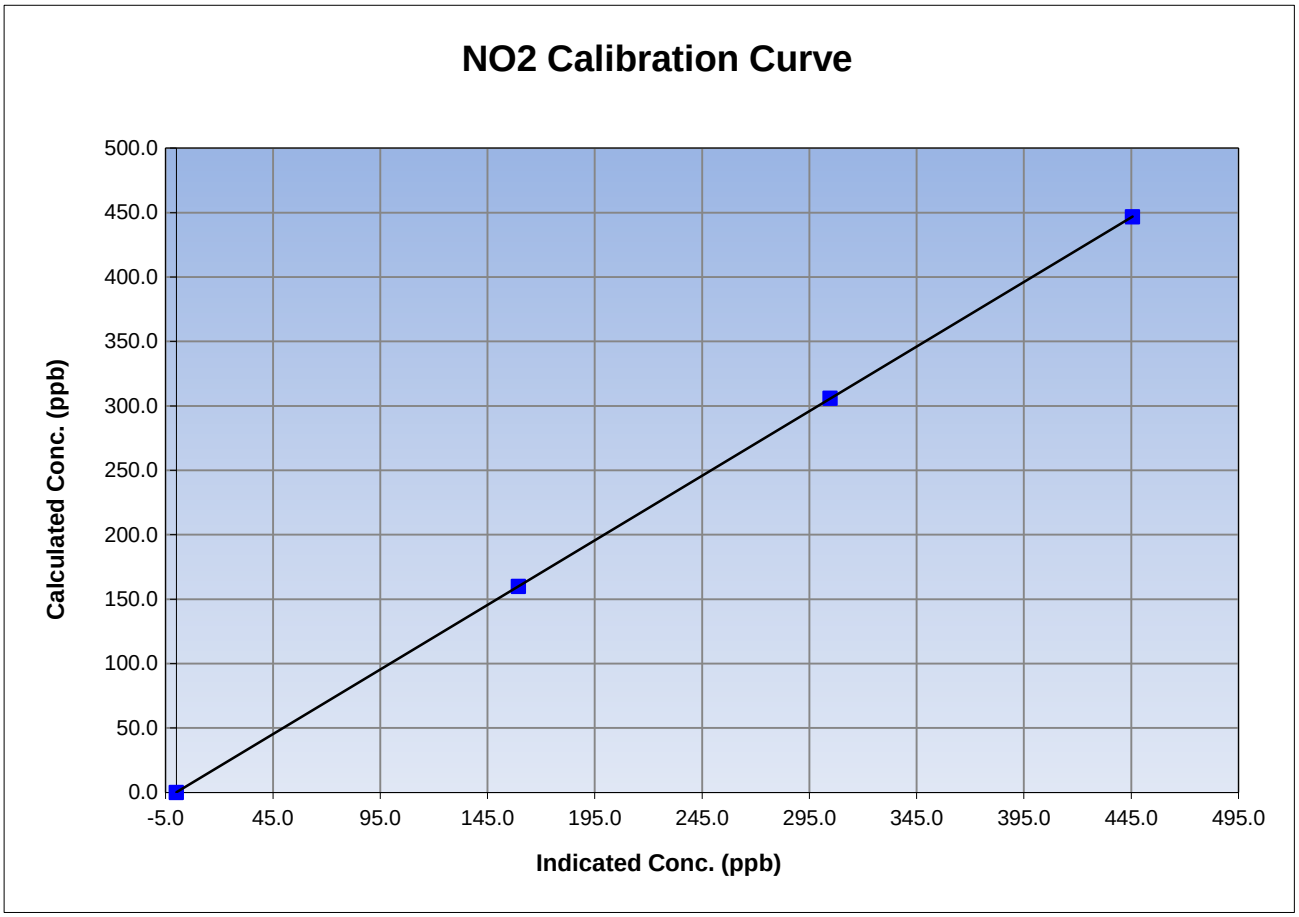
NO_2 Calibration Summary

Station Information

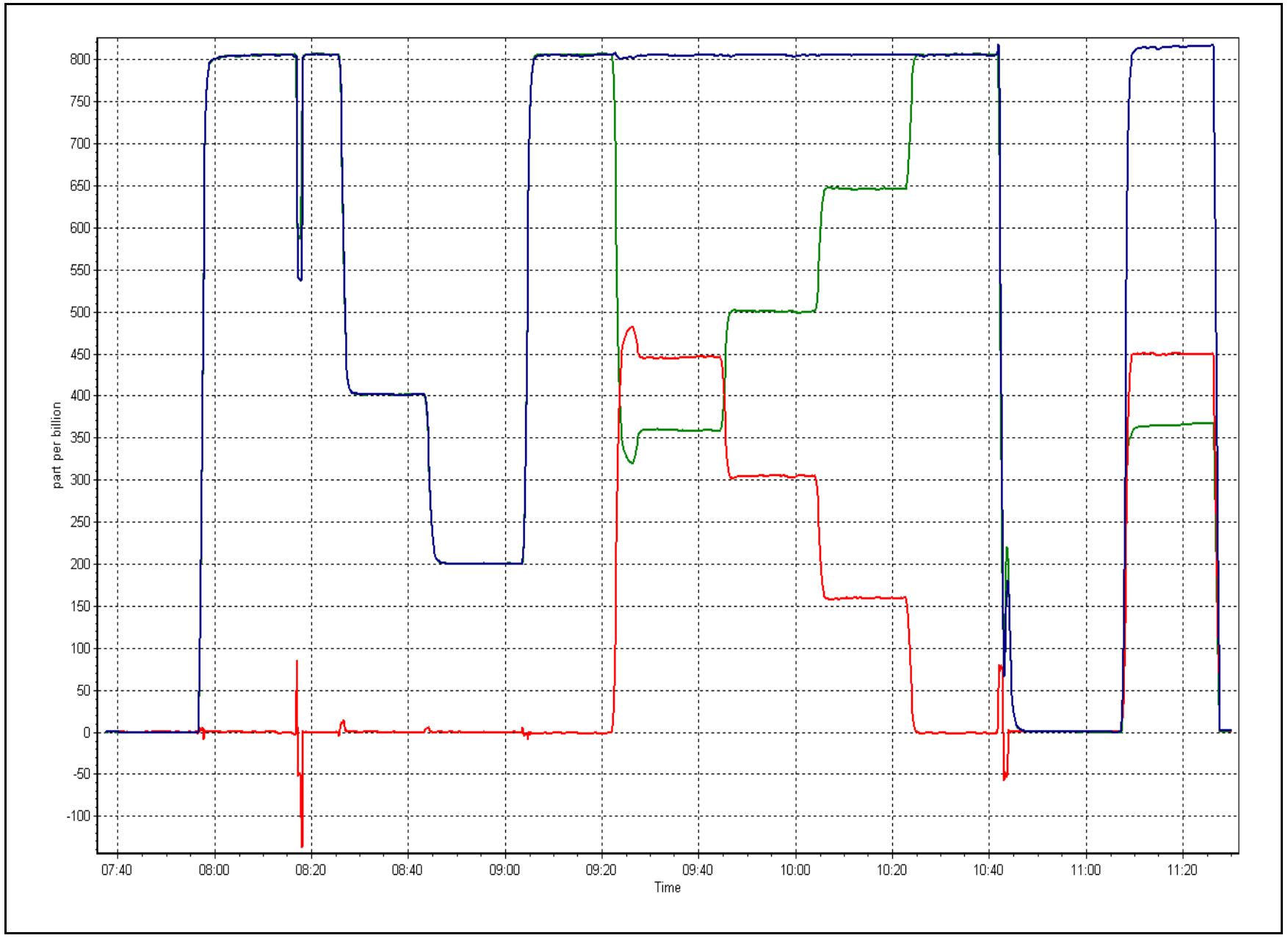
Calibration Date	April 13, 2016	Previous Calibration	March 15, 2016
Station Number	Anzac	Station Number	AMS 14
Start Time (MST)	7:35	End Time (MST)	11:30
Analyzer make	Thermo 42i	Analyzer serial #	1426262592

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999999
446.8	445.6	1.0027		
305.8	304.7	1.0036	Slope	1.002908
159.8	159.4	1.0025		
			Intercept	0.013749



NOX Calibration Plot Date: April 13, 2016



Wood Buffalo Environmental Association

SHARP CALIBRATION

STATION INFORMATION

Calibration Date:	April 14, 2016	Previous Calibration:	March 16, 2016
Station Name:	Anzac	Station Number:	AMS 14
Start Time (MST):	10:20	End Time (MST):	10:57
Calibrator Make/Model:	Delta Cal	Calibrator Serial Number:	1450

SHARP INFORMATION

Particulate Fraction:	PM2.5
Make/Model:	Thermo / SHARP 5030
Serial Number	E1093
C_{14} Source SN:	4933
Confirmation of Time settings:	Yes ☑ No ☐

Paremeters Checked: T1 ☑ T2 ☐ T3 ☐ T4 ☐ P3 ☑ Main Flow ☑ Beta ☐ Neph ☑

CALIBRATION DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	0.0	1.0	1.0	0.0
T2	27.0	na	na	27.0
T3	25.0	na	na	25.0
T4	19.0	na	na	19.0
RH (%)	17.0	na	na	17.0

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	950	949.0	-1.0	950

Main Flow (Lph)

Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
1000	1008	8	1008	1000

Nephalometer Calibration

Parameter	As Founds	Zeroed (Limit +or- 2.0ug/m3)	As Left
Analog	192		192
Neph	0.4		0.4
C14	19.1		19.1
Indicated Concentration (ug/m3)	**0.2**	**No**	**0.2**
Offset 1			
Offset 2			

Leak Check (Quarterly)

Leak Check Date:	March 1, 2016	Previous Leak Check Date:	February 12, 2015

	Measured	Difference LPM (Limit +/- 0.42 LPM)
Flow without adaptor (LPM):	16.78	0.00
*Flow with adaptor (LPM):	16.78	

**Note - do not attach adaptor without shutting off the pump first*

Mass Foil Calibration (Annualy)

Foil Calibration Date:	March 16, 2016	Previous Foil Calibration:	June 17, 2015
Zeroed?:			
Foil Mass:	1337	Mass foil set S/N:	2520
Previous Correction Factor:	6935		
New Correction Factor:	7125		

INSPECTION DATA

Item	Condition	Date of install or rebuild
Cyclone	Good / cleaned	Apr 14,2016
Pump	Good	NA
Filter Tape	Good	Mar 1,2016
Mass Foil Cal Set	na	NA
HEPA filter	Good	NA

NOTES:

No parameters adjusted, cyclone head cleaned

Melissa Lemay

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 15
CNRL HORIZON
APRIL 2016

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

May 27, 2016

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CNRL HORIZON (AMS 15)
APRIL 2016

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	686	34	34	100.00	21	0	5	0
TRS (ppb) Average	663	33	57	96.67	2	0	0	0
THC (ppm) Average	681	34	39	99.31	5	-	2.6	-
NO2 (ppb) Average	680	37	40	99.58	37	0	9	-
NO (ppb) Average	680	37	40	99.58	66	-	6	-
NOX (ppb) Average	680	37	40	99.58	86	-	15	-
PM2.5 (ug/m3) Average	719	1	1	100.00	20	-	8	0
Temperature 2 m (C) Average	720	0	0	100.00	28.5	-	16.5	-
Wind Speed 10 m (km/h) Average	684	0	36	95.00	24	-	15	-
Wind Direction 10 m (deg) Average	684	0	36	95.00	-	-	-	-
Precipitation (mm) Total	720	0	0	100.00	1.5	-	3.3	-
Relative Humidity (%) Average	720	0	0	100.00	99	-	88	-
Global Solar Radiation (W/m2) Average	720	0	0	100.00	788	-	276	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CNRL HORIZON (AMS 15)
APRIL 2016

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	0.8	2	-	0	0	0	0	0	2	21
TRS (ppb) Average	663	0.2	0	-	0	0	0	0	0	0	2
THC (ppm) Average	681	2.18	0.2	-	2	2	2.1	2.1	2.2	2.3	5
NO2 (ppb) Average	680	4.5	5	-	0	1	1	3	6	11	37
NO (ppb) Average	680	1.3	4	-	0	0	0	0	1	3	66
NOX (ppb) Average	680	5.8	8	-	0	1	1	3	8	14	86
PM2.5 (ug/m3) Average	719	4.57	2.7	-	1	2	2.6	3.7	5.8	8.6	20
Temperature 2 m (C) Average	720	3.31	8.1	-	-16.3	-6.8	-2.4	2.4	8	15.3	28.5
Wind Speed 10 m (km/h) Average	684	9.3	4	-	0	4	6	9	12	15	24
Wind Direction 10 m (deg) Average	684	-	-	-	-	-	-	-	-	-	-
Precipitation (mm) Total	720	-	-	12.19	-	-	-	-	-	-	-
Relative Humidity (%) Average	720	57.4	21	-	14	27	41	59	73	85	99
Global Solar Radiation (W/m2) Average	720	181.5	237	-	0	0	0	52	301	602	788

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CNRL HORIZON (AMS 15)
APRIL 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
TRS	27 Apr 2016 10:00	27 Apr 2016 16:00	7	Maintenance - station cleanup
TRS	27 Apr 2016 17:00	28 Apr 2016 08:00	16	Analyzer Failure - TRS converter failed
TRS	30 Apr 2016 09:00	30 Apr 2016 09:00	1	Data collection to analyzer interrupted
THC	16 Apr 2016 05:00	16 Apr 2016 05:00	1	Power spike
THC	30 Apr 2016 01:00	30 Apr 2016 01:00	1	Data collection to analyzer interrupted
THC	30 Apr 2016 07:00	30 Apr 2016 07:00	1	Data collection to analyzer interrupted
THC	30 Apr 2016 09:00	30 Apr 2016 09:00	1	Data collection to analyzer interrupted
THC	01 May 2016 00:00	01 May 2016 00:00	1	Data collection to analyzer interrupted
NO2, NO, NOX	30 Apr 2016 01:00	30 Apr 2016 01:00	1	Data collection to analyzer interrupted
NO2, NO, NOX	30 Apr 2016 09:00	30 Apr 2016 09:00	1	Data collection to analyzer interrupted
NO2, NO, NOX	01 May 2016 00:00	01 May 2016 00:00	1	Data collection to analyzer interrupted
Wind Speed, Wind Direction	04 Apr 2016 02:00	04 Apr 2016 02:00	1	Flat line in sensor output signal -sensor frozen
Wind Speed, Wind Direction	06 Apr 2016 09:00	07 Apr 2016 16:00	32	Flat line in sensor output signal -sensor frozen
Wind Speed, Wind Direction	11 Apr 2016 03:00	11 Apr 2016 03:00	1	Flat line in sensor output signal -sensor frozen
Wind Speed, Wind Direction	15 Apr 2016 03:00	15 Apr 2016 04:00	2	Flat line in sensor output signal -sensor frozen

Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO_2) - ppb

CNRL Horizon - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 21 ppb on Apr 24 10:00 Maximum Daily Average: 5.0 ppb on Apr 24

Minimum Value: 0 ppb on Apr 1 08:00
Maximum Diurnal Average: 1.3 ppb at hour 10
Monthly Average: 0.8 ppb

Minimum Daily Average: 0.1 ppb on Apr 1
Minimum Diurnal Average: 0.2 ppb at hour 2
Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 2$ $P_{99} = 12$

Hours in Service:	720
Hours of Data:	686
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-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
2-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
3-Apr	0	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
4-Apr	0	0	0	0	0	Z	0	0	0	1	1	2	6	18	14	12	9	5	1	2	1	1	1	0	3.2	18
5-Apr	Z	0	0	0	0	0	0	0	0	0	0	1	7	5	5	4	1	0	0	0	0	0	0	1	1.2	7
6-Apr	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.2	1
7-Apr	0	0	Z	0	0	0	0	0	0	0	0	1	1	2	0	0	0	0	0	0	0	0	0	0	0.3	2
8-Apr	0	0	0	Z	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0.3	1
9-Apr	0	0	1	1	Z	0	0	1	0	0	0	1	0	1	1	1	1	0	0	2	0	2	3	3	0.9	3
10-Apr	1	0	0	0	0	Z	0	0	0	0	0	0	0	1	1	1	0	1	0	0	0	0	0	0	0.4	1
11-Apr	Z	0	0	0	1	1	1	1	1	0	0	0	0	1	2	3	6	5	5	3	2	2	2	1	1.7	6
12-Apr	1	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
13-Apr	0	0	Z	0	0	0	0	0	0	1	0	0	0	1	2	3	4	1	0	0	1	4	3	1	1.0	4
14-Apr	1	0	0	Z	0	0	0	1	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	3
15-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	2	4	5	6	3	0	0	0	0	0	1.0	6
16-Apr	2	1	2	1	0	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2
17-Apr	Z	0	0	0	0	2	3	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.6	3
18-Apr	0	Z	0	0	0	0	0	0	0	0	0	12	13	2	0	0	0	0	0	0	1	4	3	2	1.7	13
19-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
20-Apr	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
21-Apr	0	0	0	0	Z	0	0	0	4	8	5	2	1	2	0	0	0	0	0	0	0	0	0	0	1.1	8
22-Apr	1	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.2	1
23-Apr	Z	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
24-Apr	5	Z	7	8	9	1	1	8	15	21	10	8	6	2	2	3	4	3	1	0	0	1	0	0	5.0	21
25-Apr	0	0	Z	0	0	0	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0.1	0
26-Apr	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
27-Apr	0	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
28-Apr	0	0	0	0	0	Z	0	0	0	0	0	1	0	0	0	0	1	1	1	0	0	1	1	0	0.3	1
29-Apr	Z	1	0	1	2	3	1	8	9	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1.4	9
30-Apr	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.2	1
	0.5	0.2	0.5	0.6	0.7	0.4	0.3	0.9	1.2	1.3	0.8	1.1	1.3	1.3	1.1	1.2	1.1	0.8	0.5	0.4	0.3	0.6	0.6	0.4	Diurnal Average	
	5	1	7	8	9	3	3	8	15	21	10	12	13	18	14	12	9	6	5	3	2	4	3	3	Diurnal Maximum	

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

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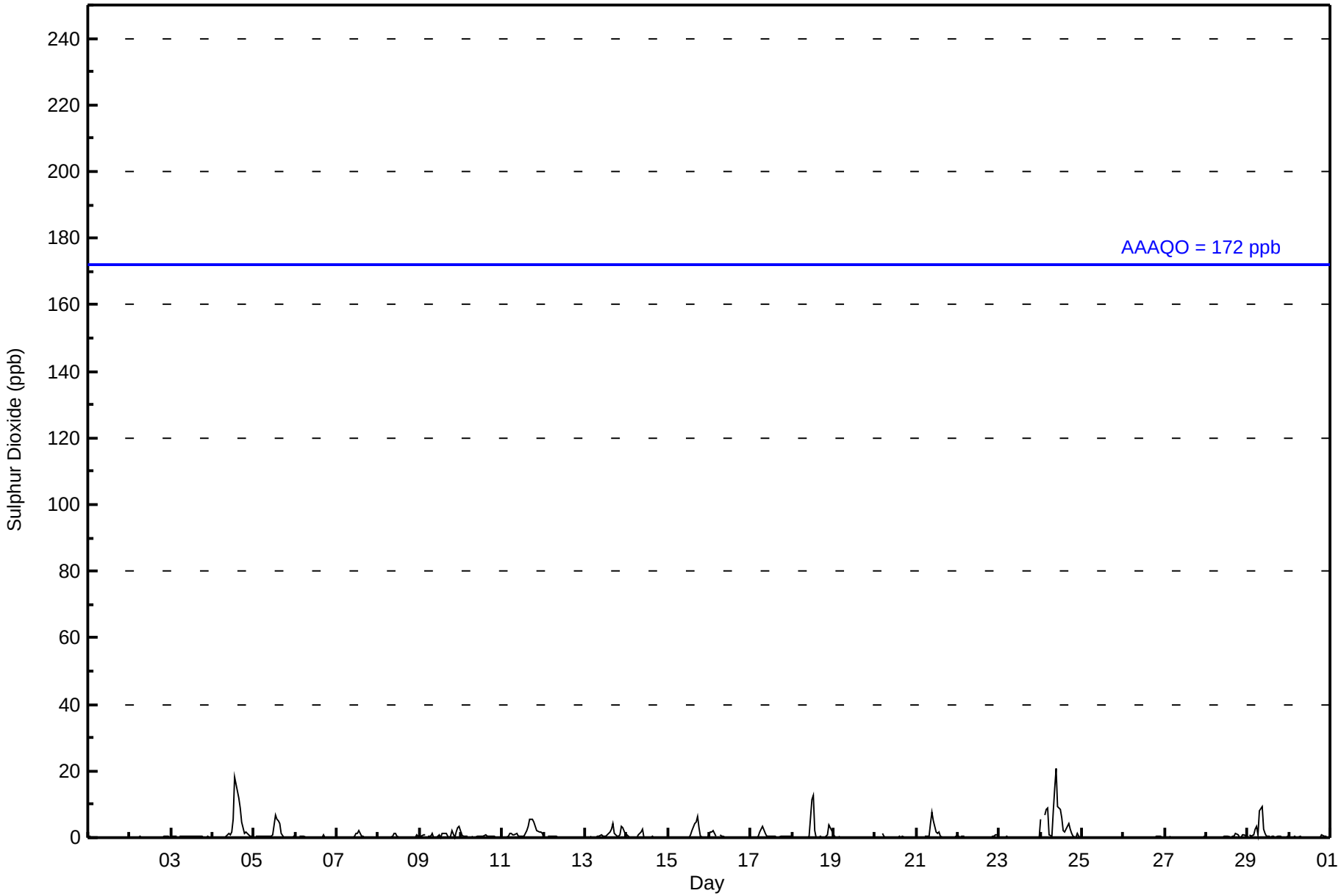
Hourly Averages

Sulphur Dioxide (SO_2) - ppb

CNRL Horizon - April 2016



Sulphur Dioxide (SO_2) - ppb

CNRL Horizon - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	679	98.98	98.98
11 - 20	6	0.87	99.85
21 - 60	1	0.15	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

CNRL Horizon - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 10	99	109	48	22	11	20	29	74	103	25	20	10	13	12	19	30	644
11 - 20	0	1	1	0	0	1	0	3	0	0	0	0	0	0	0	0	6
21 - 60	0	0	0	0	0	0	0	1	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	99	110	49	22	11	21	29	78	103	25	20	10	13	12	19	30	651

Total Number of Valid Hours: 651

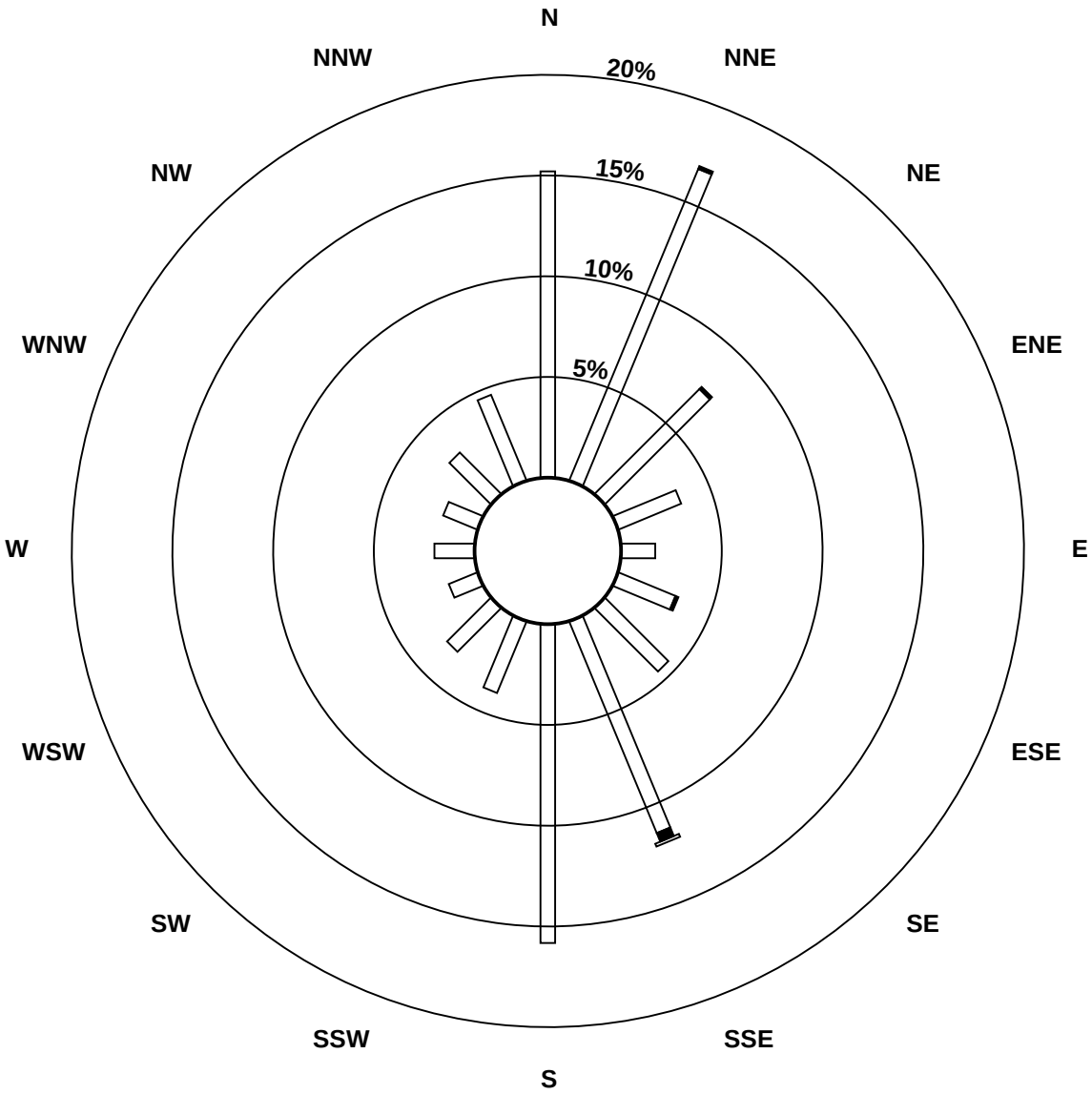
Total Number of Hours: 720

Wood Buffalo Environmental Association

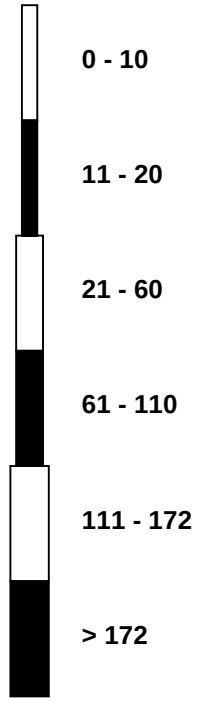
Wind Rose Apr 2016

Sulphur Dioxide (SO_2) - ppb

CNRL Horizon (AMS 15)



Classes (ppb)



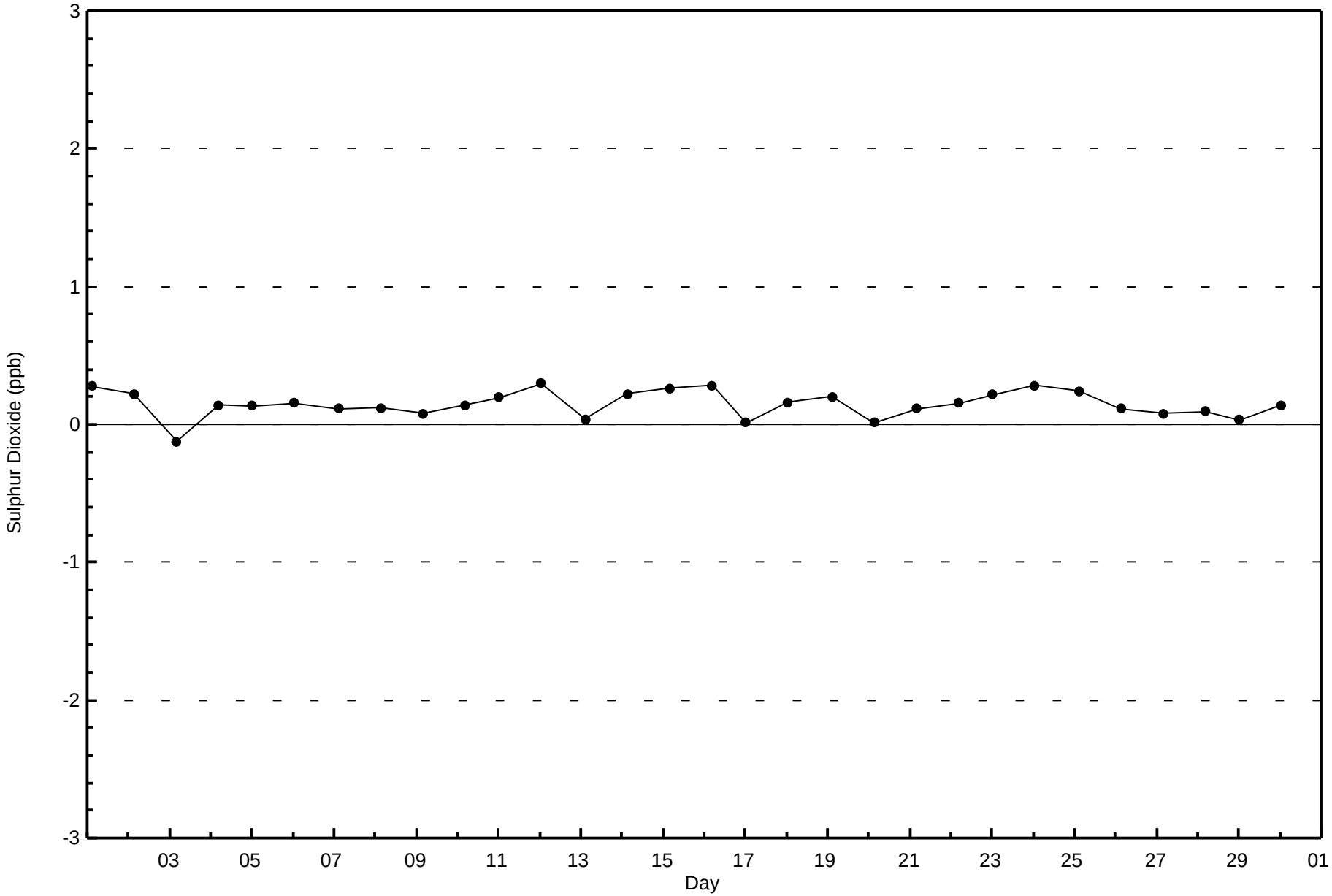
Total Number of Valid Hours: 651

Wood Buffalo Environmental Association

Zero Responses

Sulphur Dioxide (SO_2) - ppb

CNRL Horizon - April 2016



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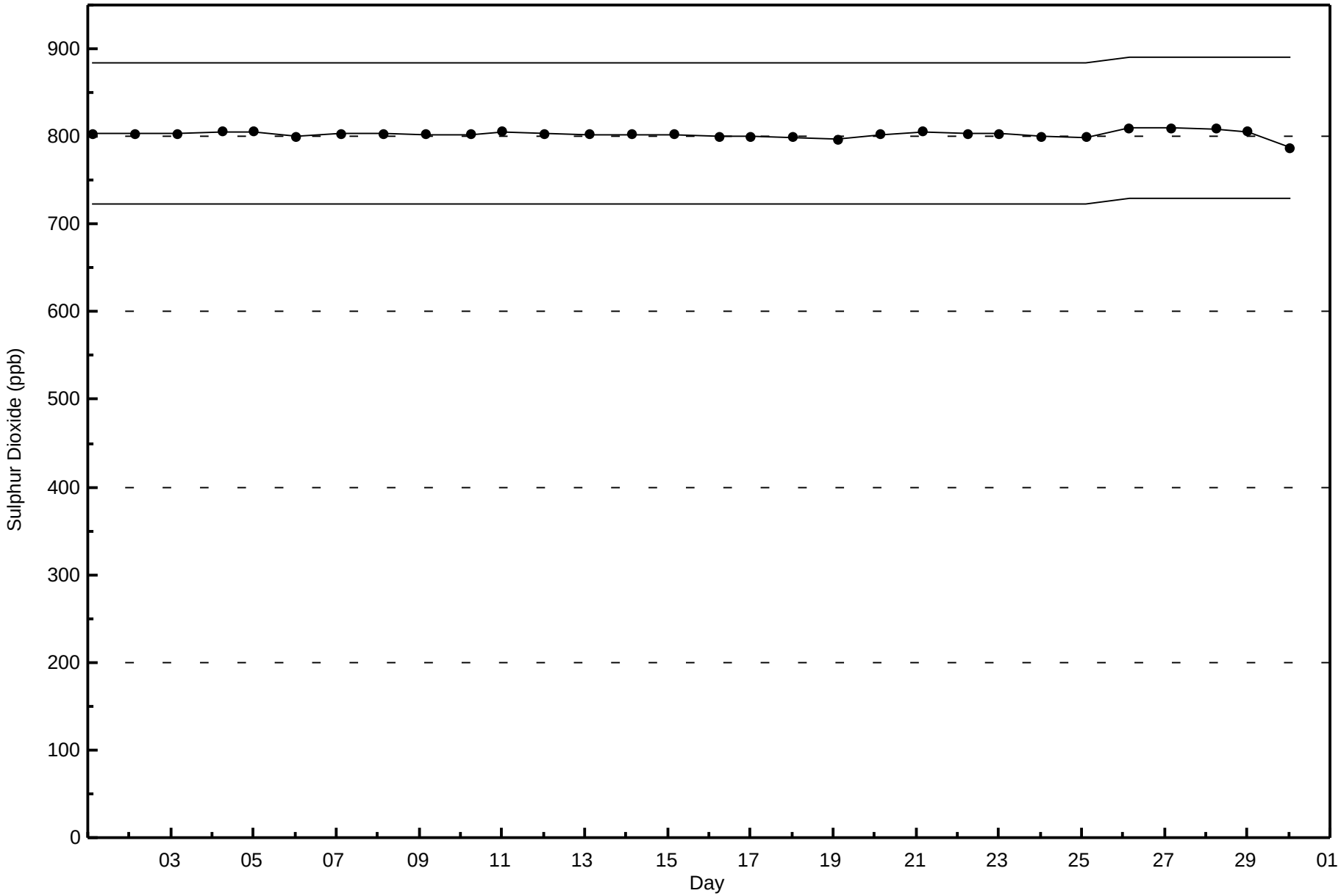
Span Responses

Sulphur Dioxide (SO_2) - ppb

CNRL Horizon - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

CNRL Horizon - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 2 ppb on Apr 19 00:00 Maximum Daily Average: 0.5 ppb on Apr 18

Minimum Value: 0 ppb on Apr 21 22:00 Minimum Daily Average: 0.1 ppb on Apr 20
Maximum Diurnal Average: 0.3 ppb at hour 5 Minimum Diurnal Average: 0.2 ppb at hour 18
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:	720
Hours of Data:	663
Hours of Missing Data:	57
Hours of Calibration:	33
Percent Operational Time:	96.7

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-Apr	0	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-Apr	0	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-Apr	0	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-Apr	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
5-Apr	0	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-Apr	1	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
7-Apr	0	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-Apr	0	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-Apr	0	0	1	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.3	1
10-Apr	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-Apr	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	1
12-Apr	0	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-Apr	0	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
14-Apr	0	0	0	0	Z	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
15-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
16-Apr	0	0	0	1	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
17-Apr	0	Z	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.4	1
18-Apr	0	0	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	2	2	0.5	2
19-Apr	1	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
20-Apr	0	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-Apr	0	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-Apr	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
23-Apr	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
24-Apr	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
25-Apr	0	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-Apr	0	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-Apr	0	0	0	0	0	Z	0	0	0	M	M	M	M	M	M	M	AF	AF	AF	AF	AF	AF	AF	AF	--	0
28-Apr	AF	AF	AF	AF	AF	AF	AF	AF	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	--	0
29-Apr	1	Z	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
30-Apr	0	0	Z	0	0	1	0	0	UO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
	0.2	0.2	0.2	0.3	0.3	0.3	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	Diurnal Average	
	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	2	2	2	Diurnal Maximum	

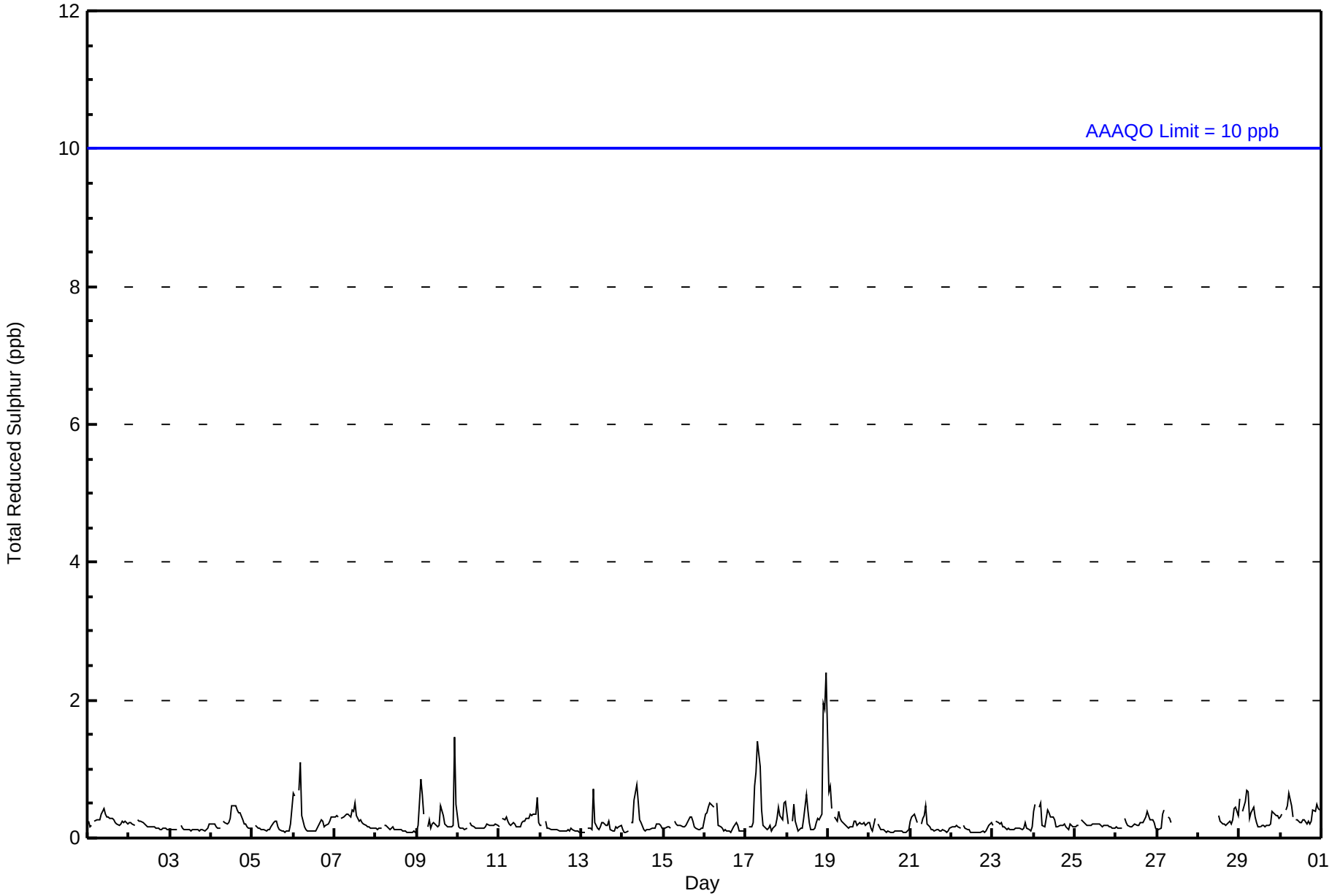
Z - zerospan C - Calibration M - Maintenance AF - Analyzer Failure UO - Unstable Operation
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb

Wood Buffalo Environmental Association

Hourly Averages

Total Reduced Sulphur (TRS) - ppb

CNRL Horizon - April 2016



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	663	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: 663

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Total Reduced Sulphur (TRS) - ppb

CNRL Horizon - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 2	94	108	45	17	9	20	29	78	98	28	19	10	13	10	21	29	628
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	94	108	45	17	9	20	29	78	98	28	19	10	13	10	21	29	628

Total Number of Valid Hours: 628

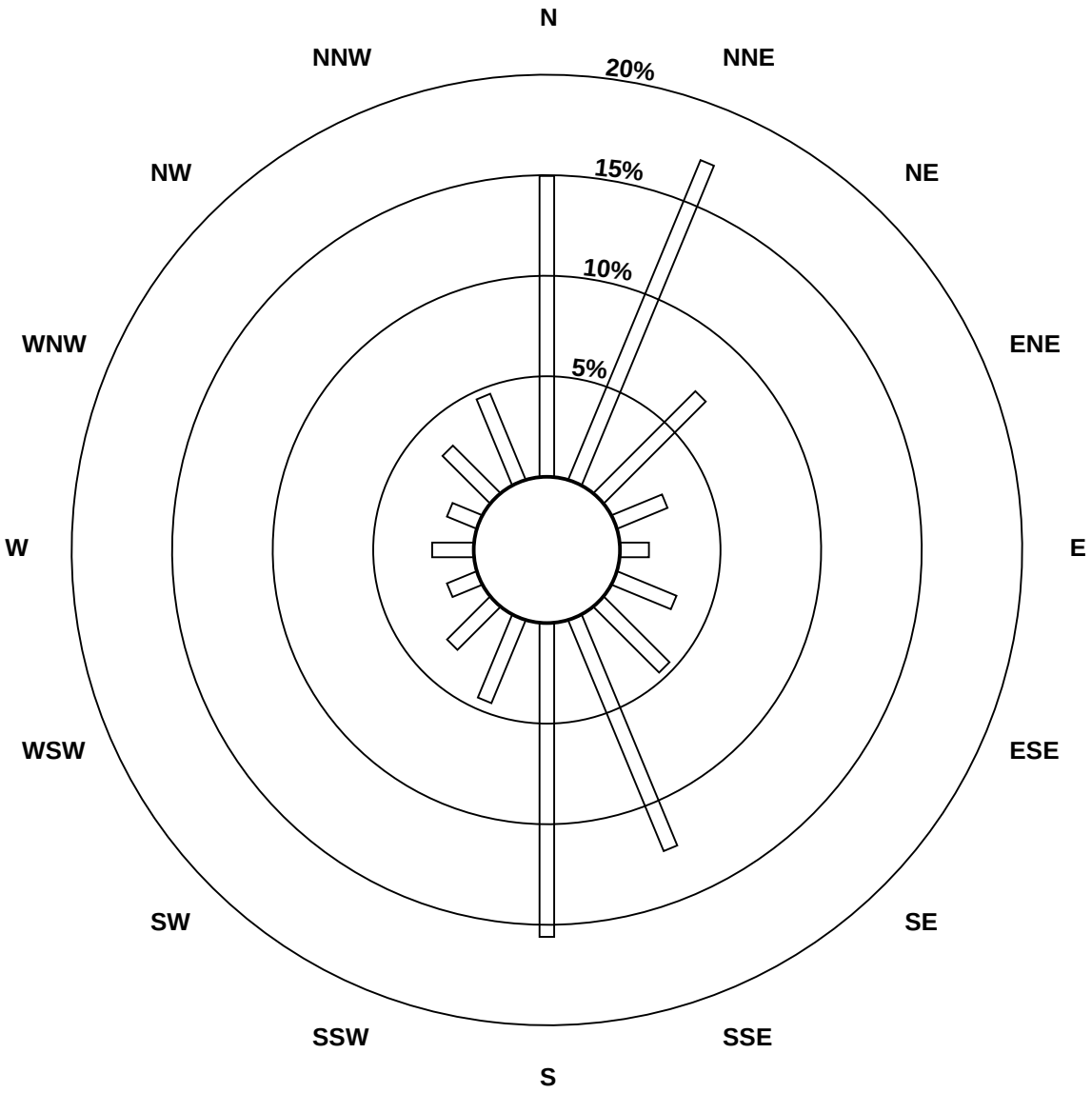
Total Number of Hours: 720

Wood Buffalo Environmental Association

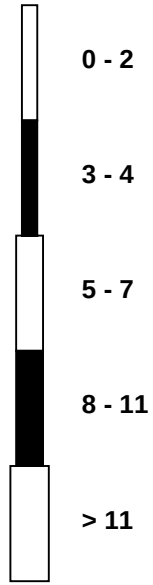
Wind Rose Apr 2016

Total Reduced Sulphur (TRS) - ppb

CNRL Horizon (AMS 15)



Classes (ppb)



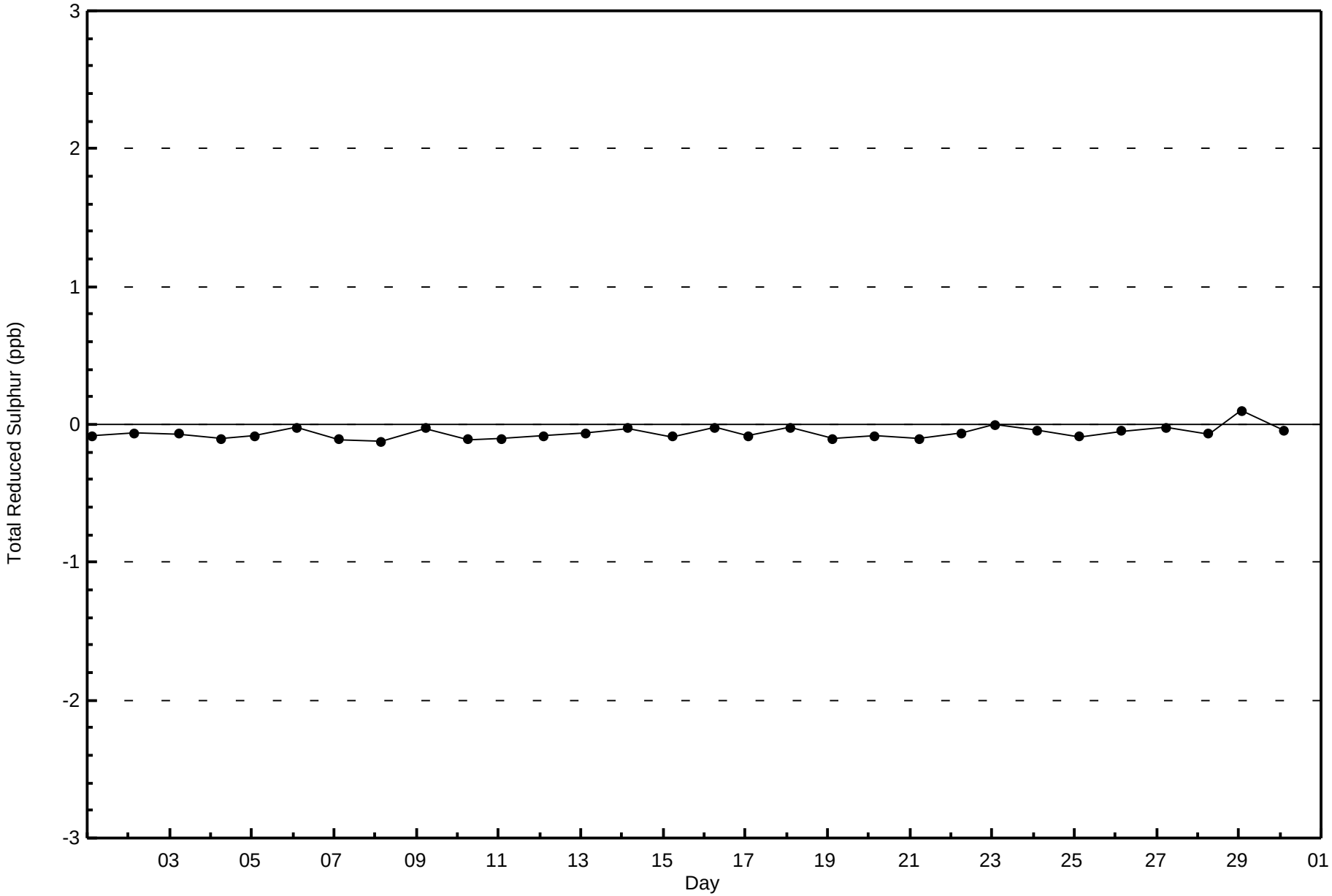
Total Number of Valid Hours: 628

Wood Buffalo Environmental Association

Zero Responses

Total Reduced Sulphur (TRS) - ppb

CNRL Horizon - April 2016

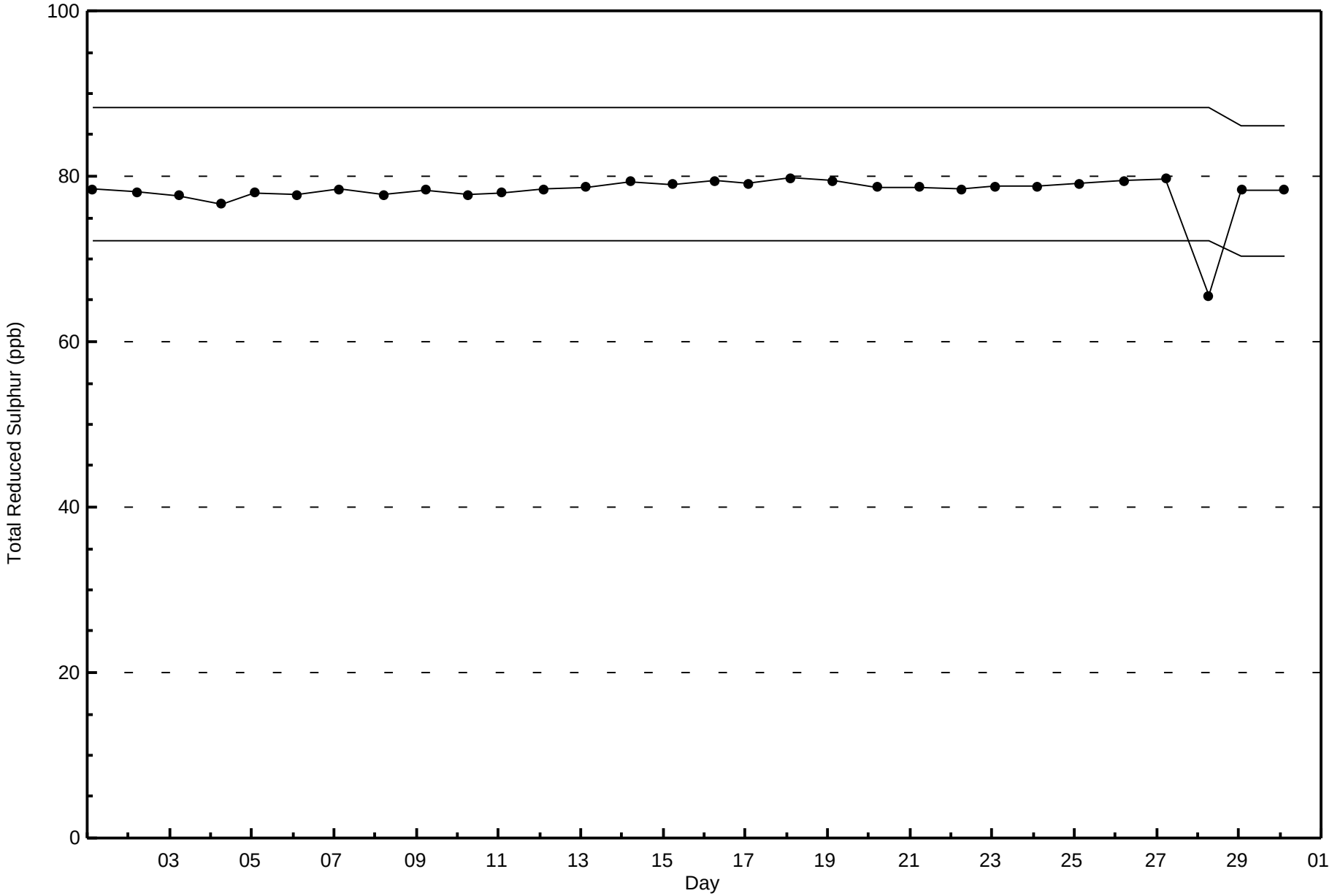


Wood Buffalo Environmental Association

Span Responses

Total Reduced Sulphur (TRS) - ppb

CNRL Horizon - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

CNRL Horizon - April 2016

Maximum Value: 5.0 ppm on Apr 18 00:00

Maximum Daily Average: 2.6 ppm on Apr 17

Minimum Value: 2.0 ppm on Apr 8 21:00

Minimum Daily Average: 2.0 ppm on Apr 8

Maximum Diurnal Average: 2.3 ppm at hour 4

Minimum Diurnal Average: 2.1 ppm at hour 11

Monthly Average: 2.18 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} = 3.2

Hours in Service:	720
Hours of Data:	681
Hours of Missing Data:	39
Hours of Calibration:	34
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-Apr	2.0	2.0	Z	2.0	2.1	2.4	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.4
2-Apr	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1	2.1
3-Apr	2.0	2.0	2.0	2.0	Z	2.1	2.0	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.1	2.3
4-Apr	2.2	2.3	2.4	2.5	2.4	Z	2.2	2.2	2.3	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.3	2.5	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.5
5-Apr	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	2.1	2.2	2.2	2.3	2.3	2.1	2.3
6-Apr	2.3	Z	2.6	2.9	2.5	2.4	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.9
7-Apr	2.1	2.0	Z	2.1	2.0	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.4	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.4
8-Apr	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
9-Apr	2.1	2.3	3.9	3.2	Z	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	2.0	2.1	2.1	2.1	2.1	2.1	2.2	3.9
10-Apr	2.0	2.0	2.1	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.2
11-Apr	Z	2.2	2.2	2.2	2.2	2.3	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.3	2.3	2.3	2.2	2.2	2.4	2.4	2.4	2.3	2.2	2.2	2.2	2.4
12-Apr	2.1	Z	2.5	2.1	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.5
13-Apr	2.0	2.0	Z	2.1	2.0	2.0	2.1	2.1	2.1	2.0	2.1	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.3
14-Apr	2.1	2.1	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.4	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.4	2.5	2.1	2.0	2.1	2.5
15-Apr	2.0	2.0	2.1	2.2	Z	2.4	2.4	2.3	2.1	2.1	2.1	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.1	2.1	2.2	2.2	2.4
16-Apr	2.4	2.3	2.3	2.3	PF	Z	2.5	2.5	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.3	2.2	2.1	2.1	2.1	2.1	2.2	2.5
17-Apr	Z	2.1	2.1	2.0	2.1	2.5	2.5	2.6	2.9	2.4	2.2	2.2	2.1	2.1	2.2	2.0	2.2	2.2	2.4	3.3	3.2	2.8	4.3	5.0	2.6	5.0
18-Apr	3.3	Z	2.2	2.1	2.0	2.0	2.0	2.1	2.2	2.2	2.4	2.3	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.3	2.3	2.5	2.2	3.3
19-Apr	2.2	2.2	Z	2.1	2.1	2.1	3.0	2.6	2.4	2.1	2.1	2.2	2.1	2.1	2.1	2.3	2.3	2.3	2.4	2.5	2.9	2.3	2.3	2.1	2.3	3.0
20-Apr	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	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2
21-Apr	2.2	2.3	2.4	2.3	Z	2.2	2.1	2.4	2.3	2.4	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.0	2.1	2.0	2.2	2.4
22-Apr	2.1	2.1	2.0	2.1	2.1	Z	2.1	2.0	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.2
23-Apr	Z	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.1	2.3	2.2	2.1	2.0	2.1	2.3
24-Apr	2.1	Z	2.2	2.1	2.2	2.1	2.1	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.2
25-Apr	2.1	2.1	Z	2.1	2.1	2.2	2.2	2.1	2.1	2.1	C	C	C	C	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.1	2.2
26-Apr	2.2	2.1	2.1	Z	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.3
27-Apr	2.1	2.1	2.2	4.4	Z	2.5	2.7	2.7	2.4	2.3	2.4	2.5	2.4	2.4	2.3	2.4	2.4	2.2	2.2	2.2	2.3	2.2	2.2	2.3	2.4	4.4
28-Apr	2.4	2.3	2.3	2.3	2.3	Z	2.8	2.6	2.3	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.3	2.4	2.5	2.3	2.8
29-Apr	Z	2.6	2.4	2.6	2.4	2.3	2.2	2.3	2.3	2.2	2.2	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.2	2.2	2.2	2.6
30-Apr	UO	Z	2.3	2.3	2.3	2.4	UO	2.2	UO	2.2	2.2	2.1	2.1	2.3	2.2	2.1	2.2	2.1	2.1	2.3	2.3	2.2	2.5	UO	2.2	2.5
	2.2	2.1	2.3	2.3	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	Diurnal Average	
	3.3	2.6	3.9	4.4	2.5	2.5	3.0	2.7	2.9	2.4	2.4	2.5	2.4	2.4	2.3	2.4	2.4	2.5	2.4	3.3	3.2	2.8	4.3	5.0	Diurnal Maximum	

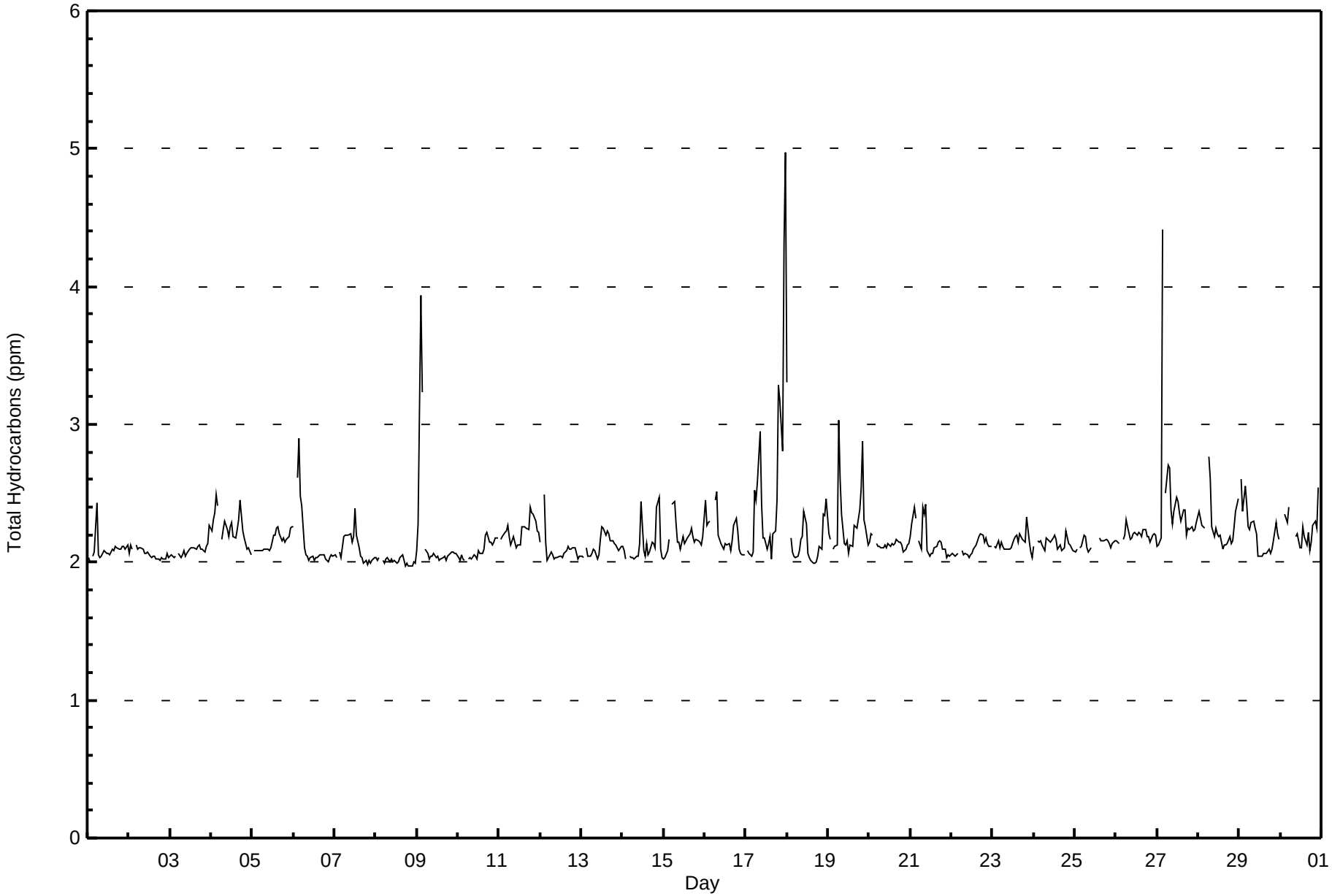
Z - zerospan C - Calibration UO - Unstable Operation PF - Power Failure

Wood Buffalo Environmental Association

Hourly Averages

Total Hydrocarbons (THC) - ppm

CNRL Horizon - April 2016



Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	136	19.97	19.97
2.1 - 3.0	537	78.85	98.83
3.1 - 10.0	8	1.17	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 681

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Total Hydrocarbons (THC) - ppm

CNRL Horizon - April 2016

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	32	32	10	2	1	8	6	4	12	0	1	1	1	0	2	8	120
2.1 - 3.0	67	78	39	20	10	13	22	73	87	24	18	8	12	11	15	21	518
3.1 - 10.0	0	0	0	0	0	0	1	1	1	1	0	0	0	1	2	1	8
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	99	110	49	22	11	21	29	78	100	25	19	9	13	12	19	30	646

Total Number of Valid Hours: 646

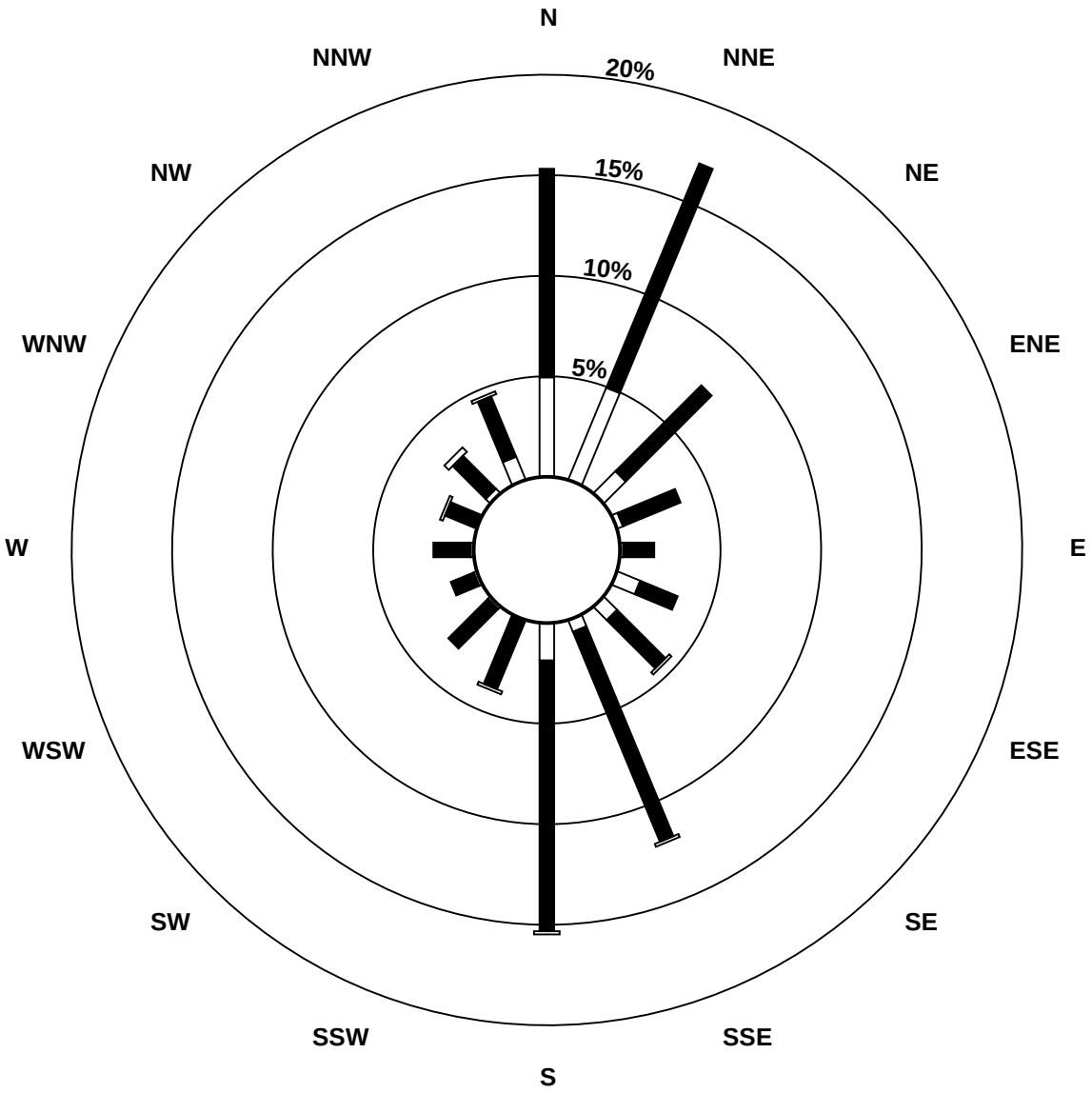
Total Number of Hours: 720

Wood Buffalo Environmental Association

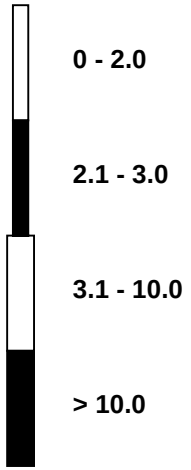
Wind Rose Apr 2016

Total Hydrocarbons (THC) - ppm

CNRL Horizon (AMS 15)



Classes (ppm)



0 - 2.0

2.1 - 3.0

3.1 - 10.0

> 10.0

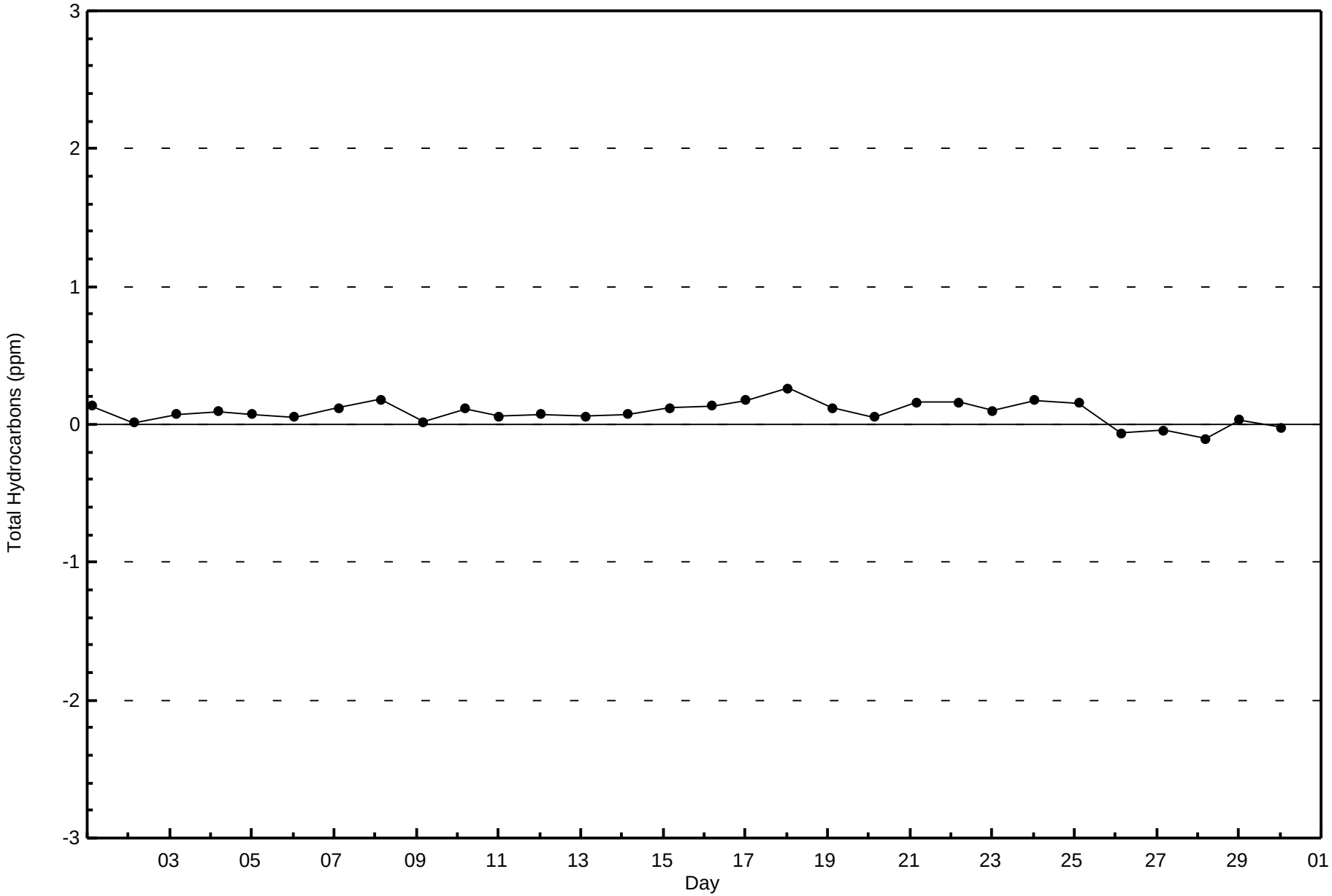
Total Number of Valid Hours: 646

Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

CNRL Horizon - April 2016

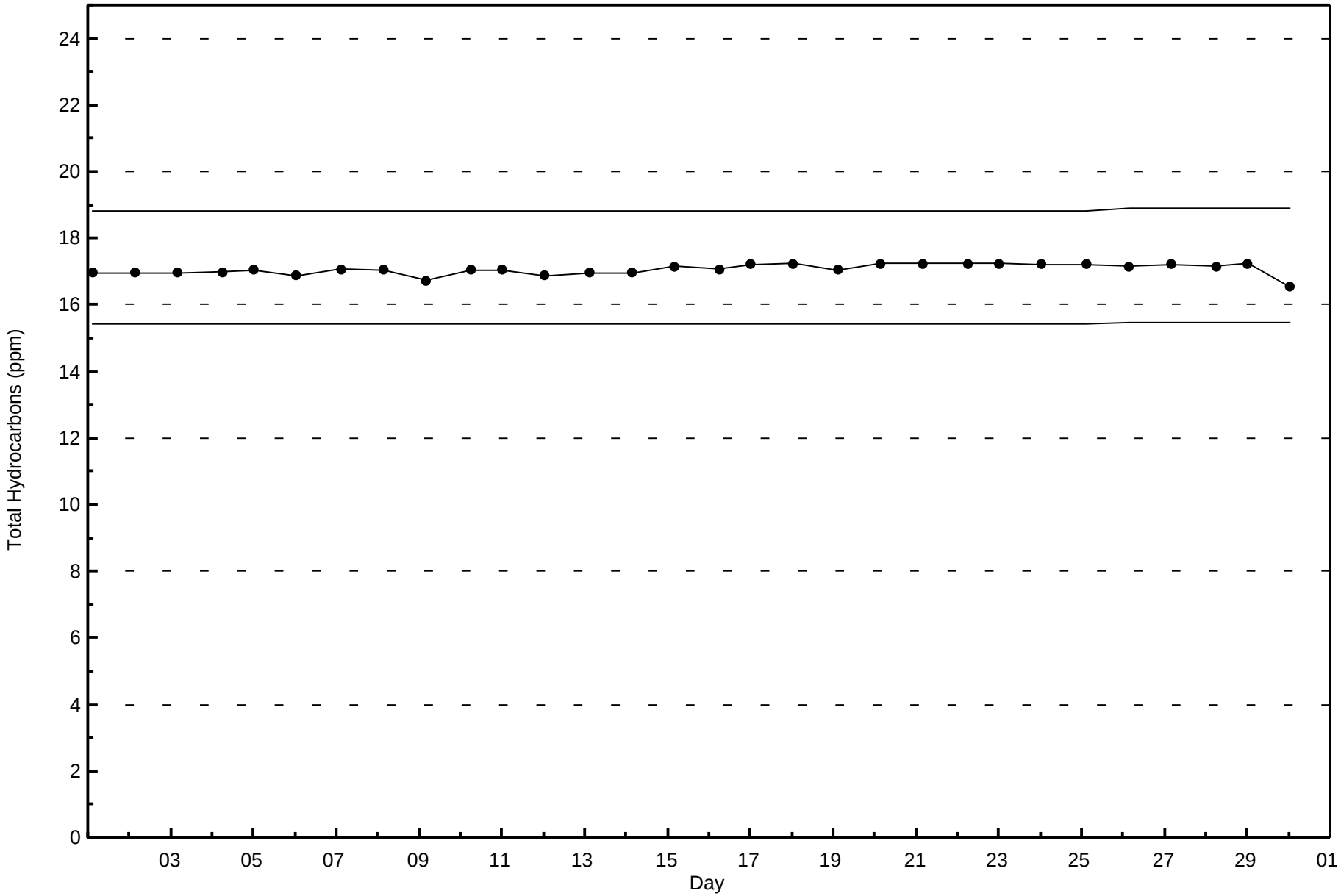


Wood Buffalo Environmental Association

Span Responses

Total Hydrocarbons (THC) - ppm

CNRL Horizon - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

CNRL Horizon - April 2016

Maximum Value: 66 ppb on Apr 27 04:00

Maximum Daily Average: 5.7 ppb on Apr 27

Minimum Value: 0 ppb on Apr 1 01:00

Minimum Daily Average: 0.1 ppb on Apr 25

Maximum Diurnal Average: 4.5 ppb at hour 4

Minimum Diurnal Average: 0.3 ppb at hour 22

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:	720
Hours of Data:	680
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-Apr	0	0	Z	0	0	1	5	0	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0.5	5
2-Apr	0	0	0	Z	0	0	0	2	5	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.5	5
3-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0.2	1
4-Apr	0	0	0	0	0	Z	0	2	5	5	3	4	4	4	5	4	4	5	1	0	0	0	0	0	2.0	5
5-Apr	Z	0	0	0	0	0	1	1	1	0	1	2	5	3	2	1	1	0	0	0	0	0	0	0	0.8	5
6-Apr	0	Z	4	5	2	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0.7	5
7-Apr	0	0	Z	0	0	0	1	1	2	4	4	5	10	9	3	1	0	0	0	0	0	0	0	0	1.7	10
8-Apr	0	0	0	Z	0	0	1	1	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2
9-Apr	0	2	39	23	Z	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	2.9	39
10-Apr	0	0	0	0	0	Z	0	1	0	0	0	0	1	1	1	1	2	2	1	0	0	0	0	0	0.4	2
11-Apr	Z	0	0	0	0	0	0	1	1	1	2	2	2	1	1	1	1	1	1	0	0	0	0	0	0.8	2
12-Apr	0	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-Apr	0	0	Z	0	0	0	0	1	1	1	1	2	2	2	2	2	1	1	0	0	0	0	0	0	0.8	2
14-Apr	0	0	0	Z	0	0	0	0	1	1	2	4	1	0	0	0	0	0	0	0	0	0	0	0	0.5	4
15-Apr	0	0	0	0	Z	1	4	3	1	1	1	3	1	1	2	2	1	2	1	0	0	0	0	0	1.1	4
16-Apr	6	0	0	0	0	Z	2	2	4	2	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0.8	6
17-Apr	Z	0	0	0	0	0	0	0	2	4	2	1	0	1	1	0	1	0	1	6	4	2	49	50	5.5	50
18-Apr	3	Z	0	0	0	0	0	1	1	2	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0.6	3
19-Apr	0	0	Z	0	0	0	6	3	1	0	0	0	0	0	0	0	0	0	1	0	3	0	1	3	0.9	6
20-Apr	3	0	0	Z	1	0	1	1	1	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0.5	3
21-Apr	1	2	4	0	Z	1	6	14	11	16	5	2	1	1	1	2	2	0	2	7	3	0	2	4	3.8	16
22-Apr	0	1	2	5	5	Z	1	2	2	1	1	1	0	1	1	1	0	0	6	4	2	4	4	3	2.1	6
23-Apr	Z	5	2	3	1	0	1	2	2	3	2	1	1	1	1	1	1	1	0	0	0	0	0	0	1.3	5
24-Apr	0	Z	0	0	0	0	0	2	4	3	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.6	4
25-Apr	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
26-Apr	0	0	0	Z	0	0	1	2	0	C	C	C	C	C	C	C	0	0	0	0	0	0	0	0	--	2
27-Apr	0	0	0	66	Z	8	10	9	6	4	5	7	6	4	2	2	2	1	0	0	0	0	1	0	5.7	66
28-Apr	5	0	2	9	15	Z	3	8	4	2	3	1	0	0	0	0	0	0	0	0	0	0	0	0	2.3	15
29-Apr	Z	0	0	0	0	0	1	3	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	3
30-Apr	UO	Z	0	0	0	0	0	0	UO	0	0	0	0	0	0	0	0	0	0	8	0	0	0	UO	0.6	8
	0.8	0.4	2.2	4.5	1.0	0.5	1.5	2.1	2.1	1.9	1.3	1.4	1.4	1.1	0.8	0.7	0.7	0.5	0.5	1.0	0.5	0.3	2.0	2.2	Diurnal Average	
	6	5	39	66	15	8	10	14	11	16	5	7	10	9	5	4	4	5	6	8	4	4	49	50	Diurnal Maximum	

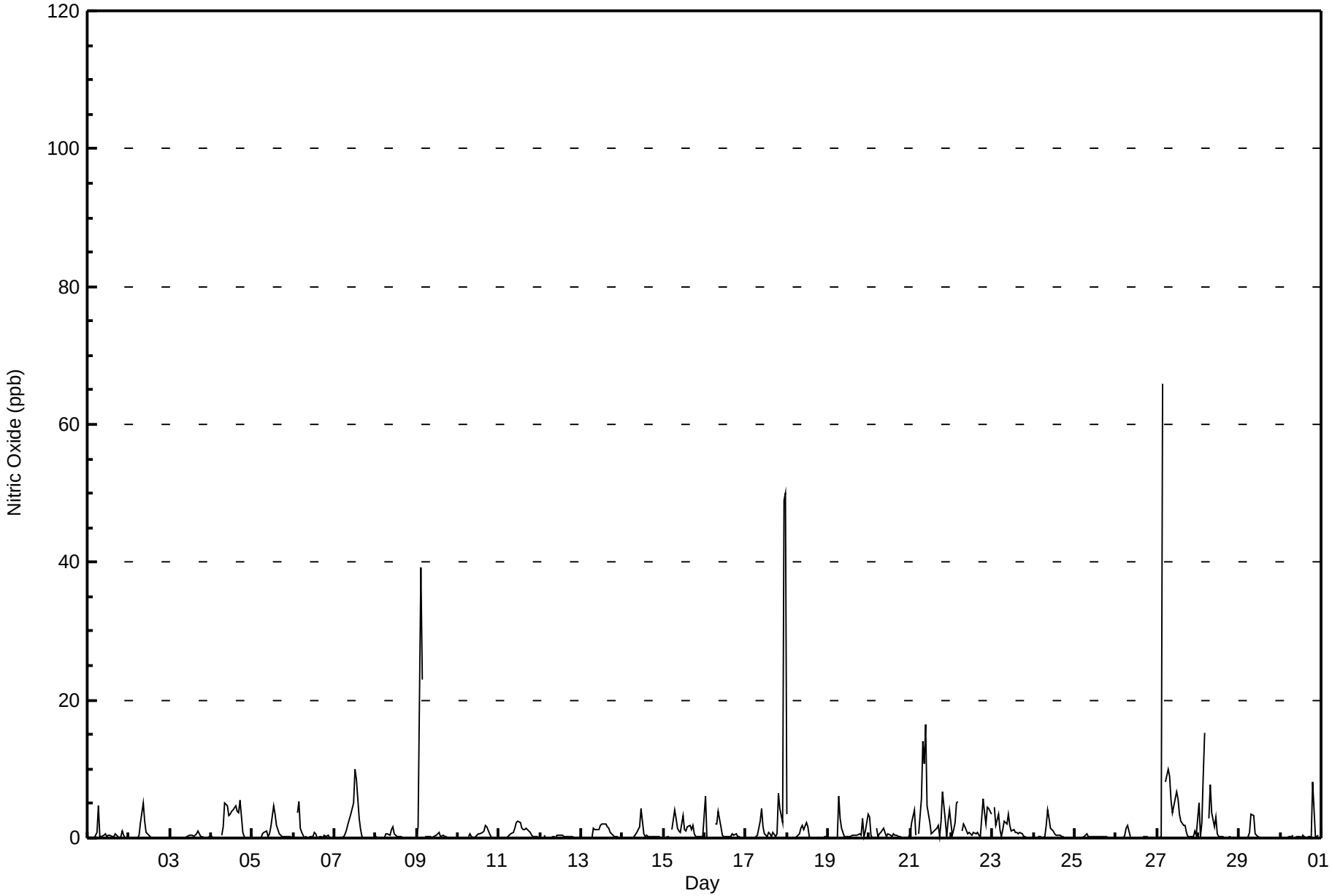
Z - zerospan C - Calibration UO - Unstable Operation

Wood Buffalo Environmental Association

Hourly Averages

Nitric Oxide (NO) - ppb

CNRL Horizon - April 2016



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	675	99.26	99.26
21 - 40	2	0.29	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: 680

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitric Oxide (NO) - ppb

CNRL Horizon - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	99	110	49	22	11	21	29	73	100	27	20	9	13	11	17	29	640
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2
11 - 80	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	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	99	110	49	22	11	21	29	74	100	27	20	9	13	12	19	30	645

Total Number of Valid Hours: 645

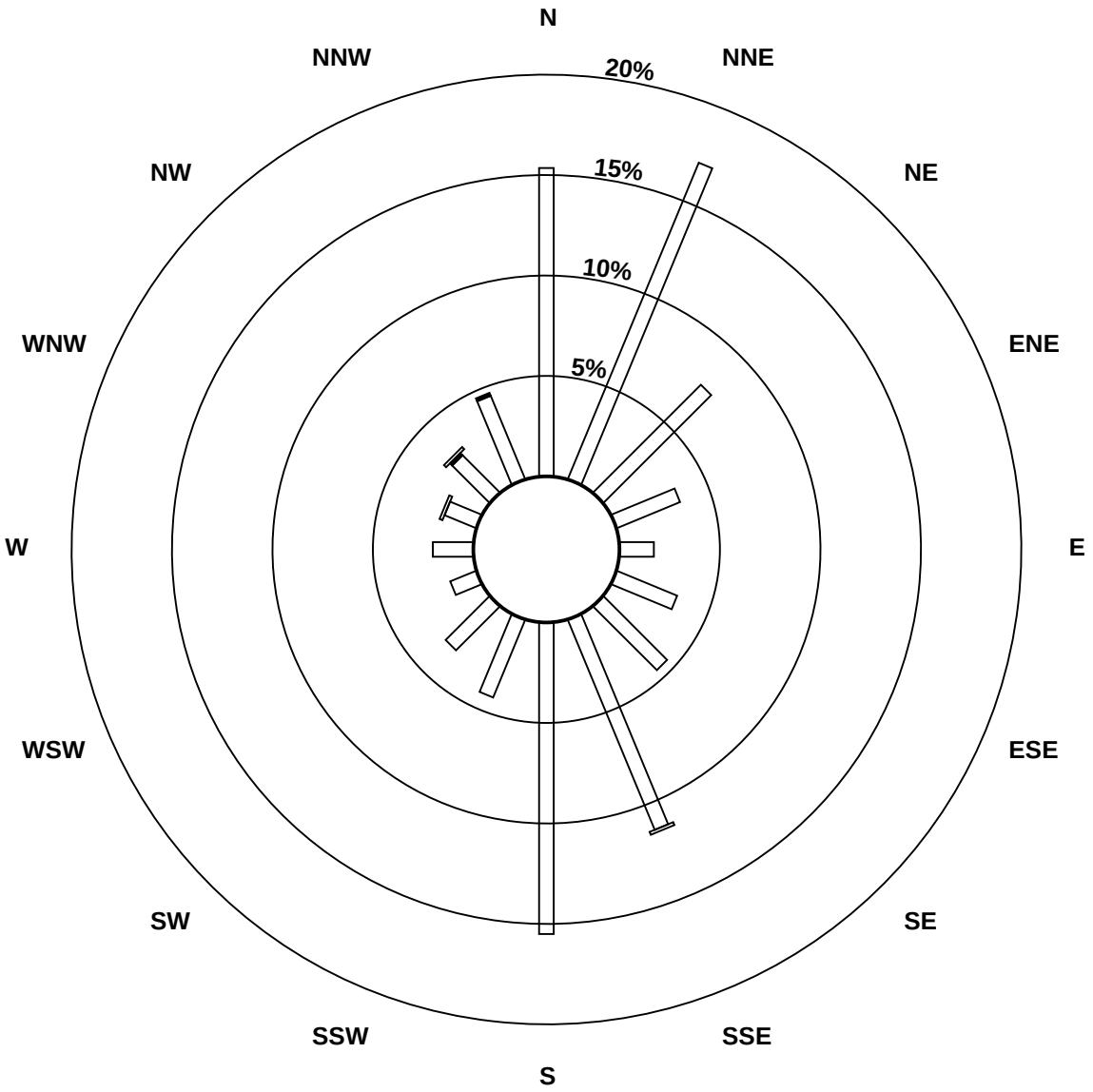
Total Number of Hours: 720

Wood Buffalo Environmental Association

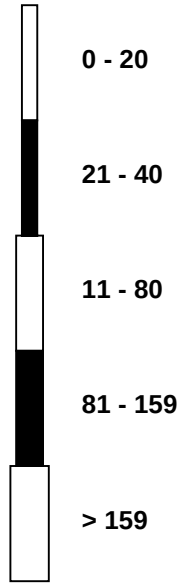
Wind Rose Apr 2016

Nitric Oxide (NO) - ppb

CNRL Horizon (AMS 15)



Classes (ppb)



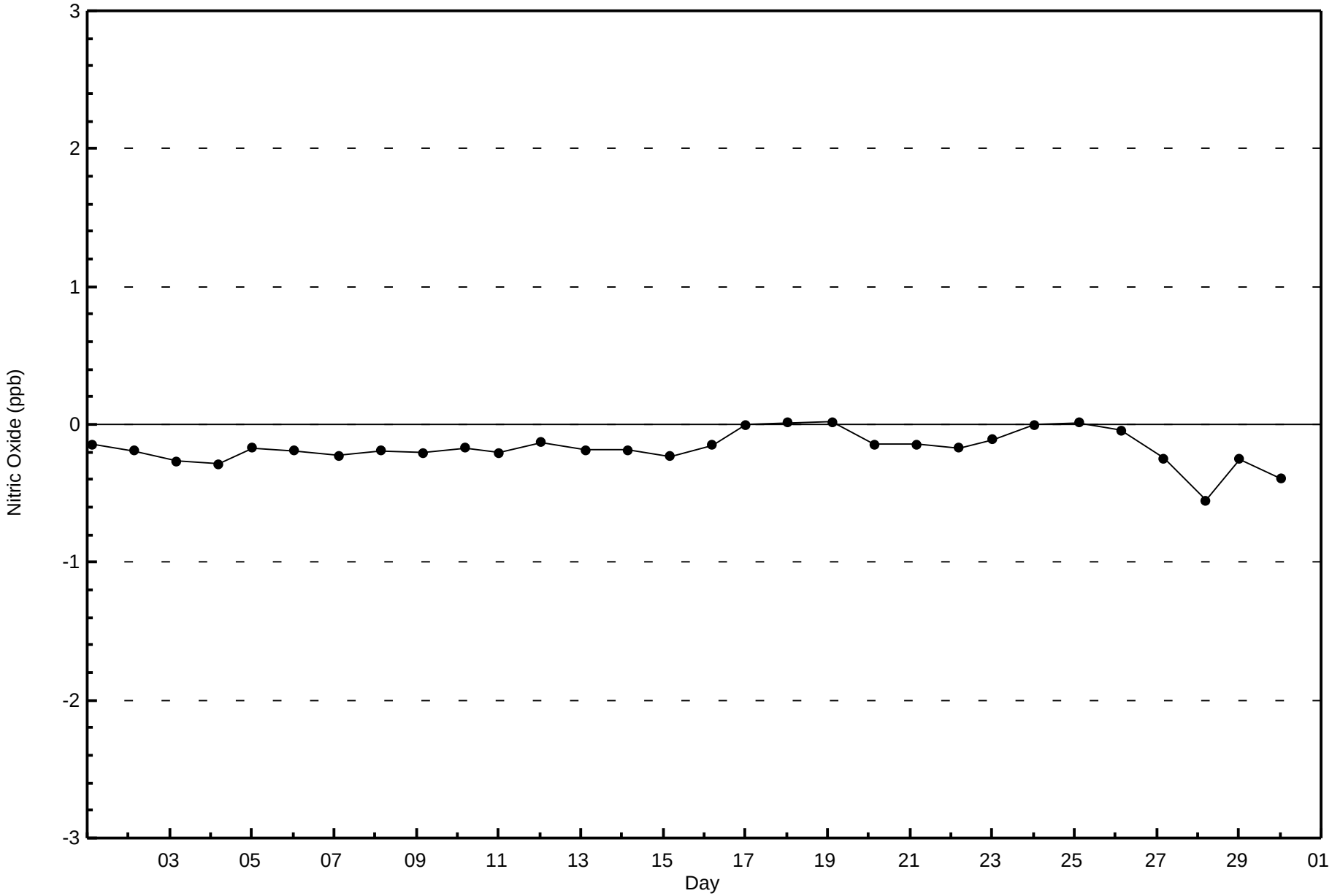
Total Number of Valid Hours: 645

Wood Buffalo Environmental Association

Zero Responses

Nitric Oxide (NO) - ppb

CNRL Horizon - April 2016

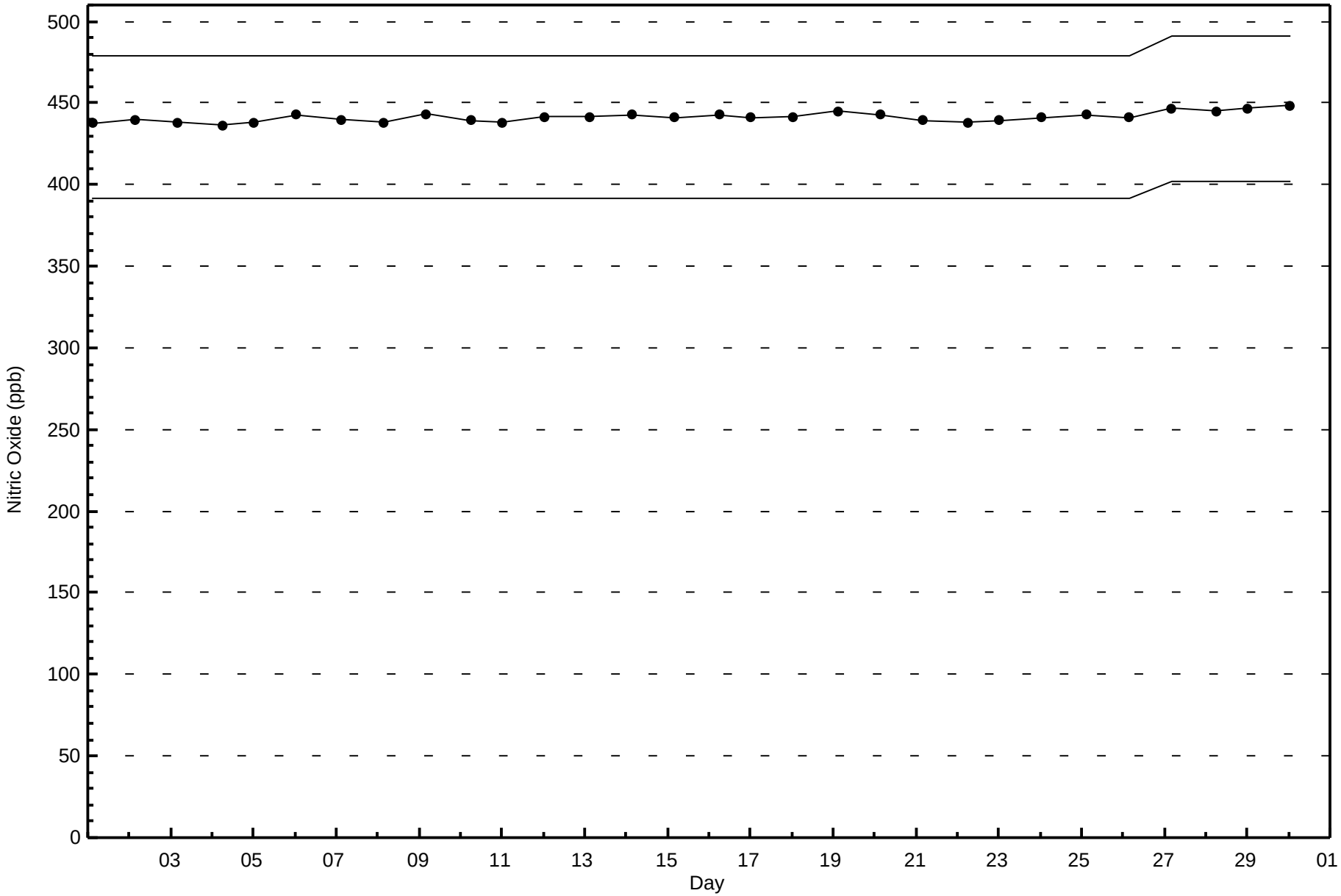


Wood Buffalo Environmental Association

Span Responses

Nitric Oxide (NO) - ppb

CNRL Horizon - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO_2) - ppb

CNRL Horizon - April 2016

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

Maximum Value: 37 ppb on Apr 17 23:00 Maximum Daily Average: 9.5 ppb on Apr 21

Minimum Value: 0 ppb on Apr 27 02:00 Minimum Daily Average: 1.7 ppb on Apr 25

Maximum Diurnal Average: 7.4 ppb at hour 4 Minimum Diurnal Average: 2.5 ppb at hour 15

Monthly Average: 4.5 ppb Percentiles: $P_1 = 0$ $P_{10} = 1$ $Q_1 = 1$ Median = 3 $Q_3 = 6$ $P_{90} = 11$ $P_{99} = 22$

Hours in Service:	720
Hours of Data:	680
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-Apr	3	1	Z	1	3	14	14	1	1	1	1	1	1	1	1	1	3	2	2	6	10	6	4	3	3.5	14
2-Apr	1	2	2	Z	3	1	2	6	10	5	2	2	1	0	0	0	0	0	1	1	1	1	0	1	1.9	10
3-Apr	1	1	1	1	Z	1	0	1	0	0	1	1	1	1	1	1	3	2	2	5	3	3	5	12	1.9	12
4-Apr	9	9	8	7	8	Z	3	5	9	8	6	7	8	10	10	10	13	20	8	4	3	2	1	1	7.2	20
5-Apr	Z	1	1	1	1	1	4	3	3	1	2	3	8	7	4	4	2	1	1	1	5	4	3	4	2.8	8
6-Apr	4	Z	10	10	13	10	2	1	1	0	1	1	3	3	1	1	1	1	1	2	3	1	1	1	3.0	13
7-Apr	0	2	Z	1	4	15	12	10	12	11	10	10	17	13	7	4	1	1	1	1	2	1	1	2	5.9	17
8-Apr	6	3	1	Z	2	2	4	3	2	3	5	2	1	1	1	0	1	1	1	1	1	1	3	4	2.0	6
9-Apr	4	16	29	25	Z	4	5	4	2	2	2	2	3	3	2	3	1	1	1	3	2	5	6	5	5.6	29
10-Apr	2	2	1	1	1	Z	1	2	1	1	1	1	2	2	2	3	6	7	8	8	9	8	11	10	3.7	11
11-Apr	Z	8	8	9	9	9	8	6	4	6	7	6	5	5	5	5	7	8	12	15	10	7	7	7	7.5	15
12-Apr	8	Z	12	4	1	2	1	1	2	1	2	1	1	1	1	1	1	1	1	2	1	0	1	1	1.9	12
13-Apr	1	1	Z	4	1	2	2	7	5	4	6	9	10	10	10	10	11	8	9	7	4	5	5	4	5.7	11
14-Apr	3	2	1	Z	1	1	1	2	4	3	5	10	2	1	2	1	1	2	2	5	15	17	2	1	3.7	17
15-Apr	1	5	19	12	Z	8	9	8	4	2	2	6	3	3	4	5	5	7	4	2	1	2	6	11	5.5	19
16-Apr	17	10	11	10	8	Z	11	8	10	5	1	1	1	1	0	0	3	3	7	3	1	0	0	0	4.8	17
17-Apr	Z	1	1	1	2	7	6	6	9	11	5	3	1	3	3	1	4	3	9	30	26	12	37	29	9.1	37
18-Apr	10	Z	2	1	1	3	3	3	4	5	4	8	7	2	1	1	1	1	1	3	3	4	4	4	3.2	10
19-Apr	5	5	Z	1	1	1	22	12	6	1	0	0	0	0	1	2	2	2	6	7	15	5	4	7	4.5	22
20-Apr	6	2	1	Z	7	3	2	1	2	1	0	1	1	1	1	1	1	1	1	1	2	7	8	11	2.6	11
21-Apr	19	22	23	12	Z	9	10	17	14	18	8	5	2	2	2	3	4	1	5	14	7	1	11	11	9.5	23
22-Apr	4	7	10	18	16	Z	2	4	3	1	2	2	1	2	2	2	1	0	13	10	7	14	15	16	6.7	18
23-Apr	Z	20	13	19	14	5	4	6	6	8	5	3	4	3	2	2	3	3	1	1	1	0	0	2	5.4	20
24-Apr	6	Z	6	7	11	5	3	11	13	11	7	7	5	3	3	3	4	4	2	1	1	3	3	1	5.1	13
25-Apr	1	1	Z	1	5	7	7	5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.7	7
26-Apr	1	1	1	Z	1	4	9	6	1	C	C	C	C	C	C	C	1	2	3	4	5	5	5	2	--	9
27-Apr	0	0	1	14	Z	3	4	5	6	5	7	10	8	6	5	5	4	3	2	2	2	3	5	5	4.6	14
28-Apr	11	5	9	15	12	Z	2	8	6	4	8	3	2	1	1	1	1	2	2	2	3	6	8	10	5.3	15
29-Apr	Z	6	4	4	6	10	10	14	10	3	2	1	1	1	1	1	1	1	1	1	1	10	4	1	3.9	14
30-Apr	UO	Z	8	8	6	4	4	2	UO	1	1	1	1	2	0	0	0	0	0	11	3	5	22	UO	4.0	22
	5.2	5.2	7.3	7.4	5.5	5.2	5.5	5.6	5.2	4.2	3.5	3.6	3.4	3.0	2.5	2.5	2.8	2.9	3.5	5.0	4.8	4.6	6.0	5.6	Diurnal Average	
	19	22	29	25	16	15	22	17	14	18	10	10	17	13	10	10	13	20	13	30	26	17	37	29	Diurnal Maximum	

Z - zerospan C - Calibration UO - Unstable Operation

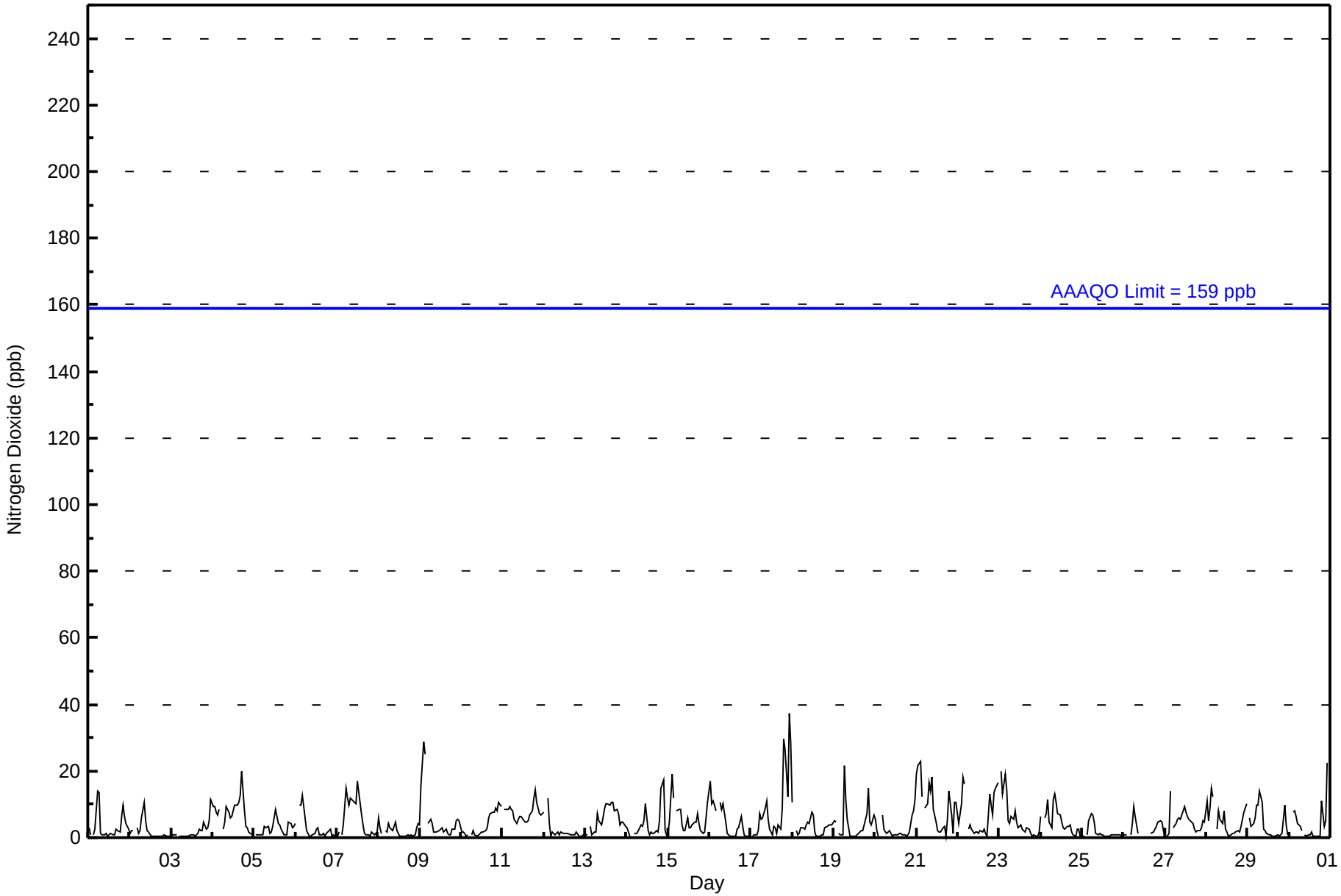
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Dioxide (NO_2) - ppb

CNRL Horizon - April 2016



Nitrogen Dioxide (NO_2) - ppb

CNRL Horizon - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	670	98.53	98.53
21 - 40	10	1.47	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: 680

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Dioxide (NO_2) - ppb

CNRL Horizon - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	97	110	49	22	11	21	28	73	99	27	20	9	13	9	18	29	635
21 - 40	2	0	0	0	0	0	1	1	1	0	0	0	0	3	1	1	10
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	99	110	49	22	11	21	29	74	100	27	20	9	13	12	19	30	645

Total Number of Valid Hours: 645

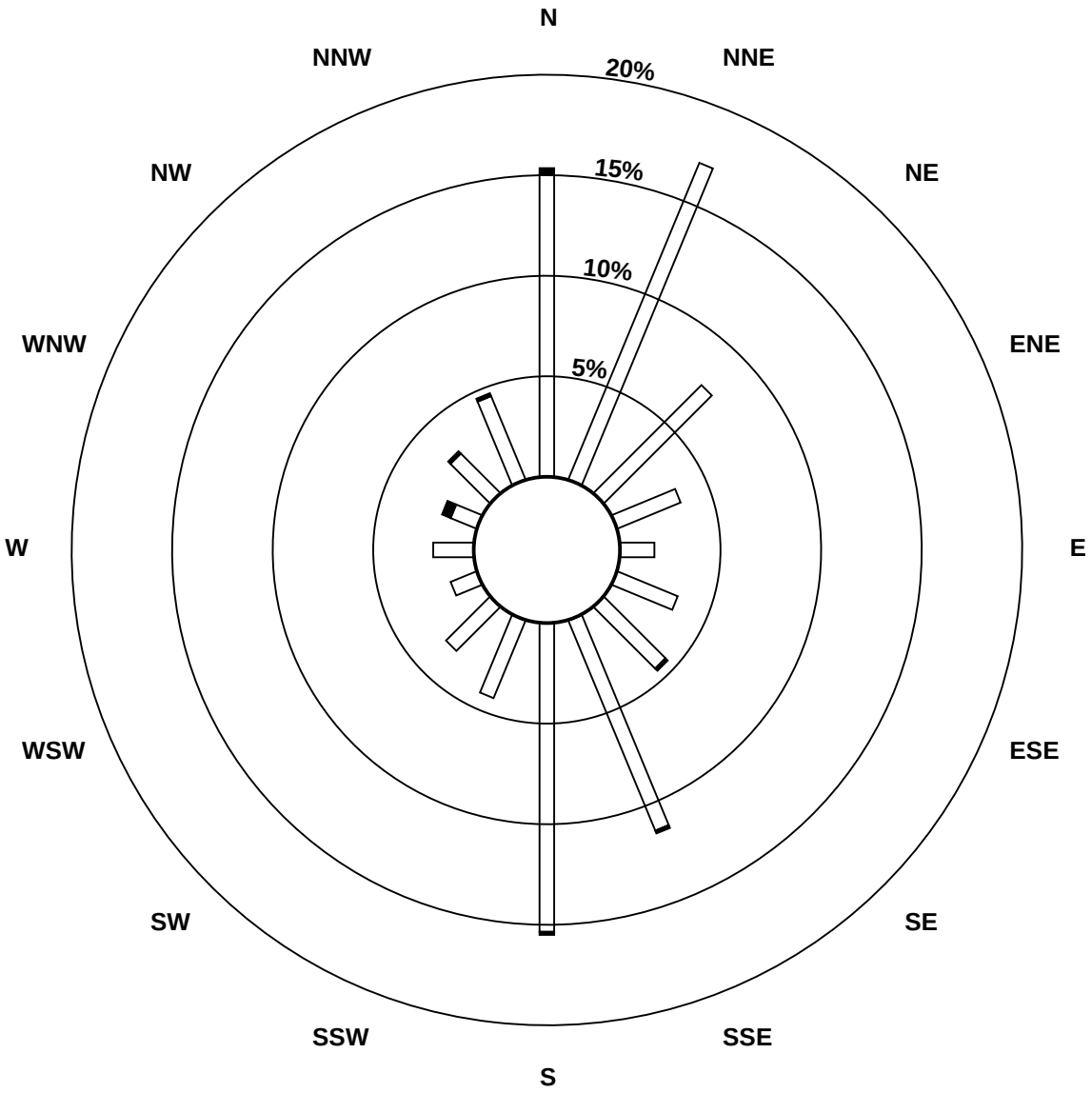
Total Number of Hours: 720

Wood Buffalo Environmental Association

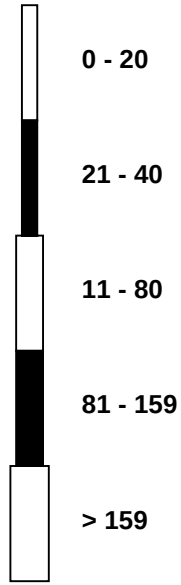
Wind Rose Apr 2016

Nitrogen Dioxide (NO_2) - ppb

CNRL Horizon (AMS 15)



Classes (ppb)



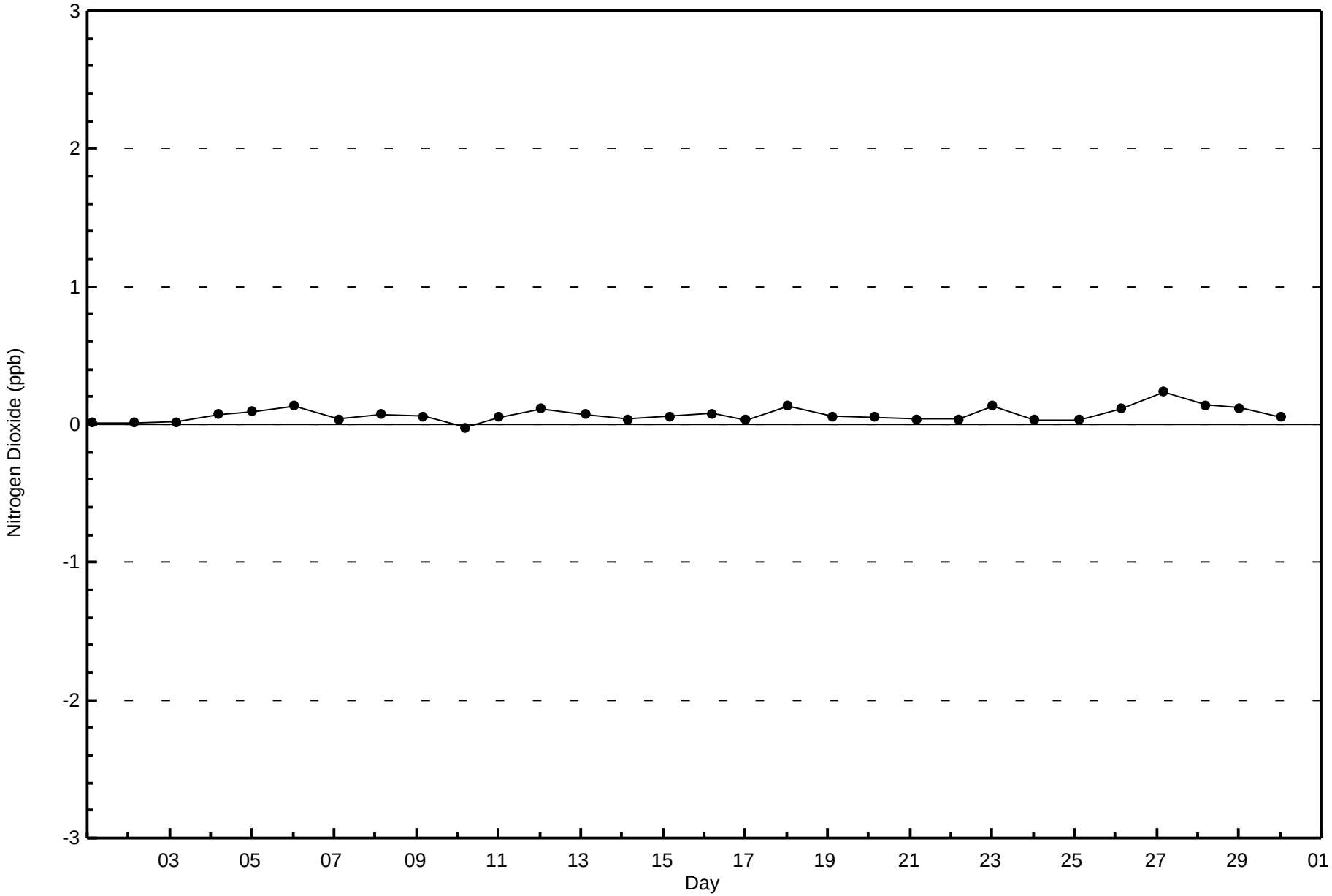
Total Number of Valid Hours: 645

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Dioxide (NO_2) - ppb

CNRL Horizon - April 2016

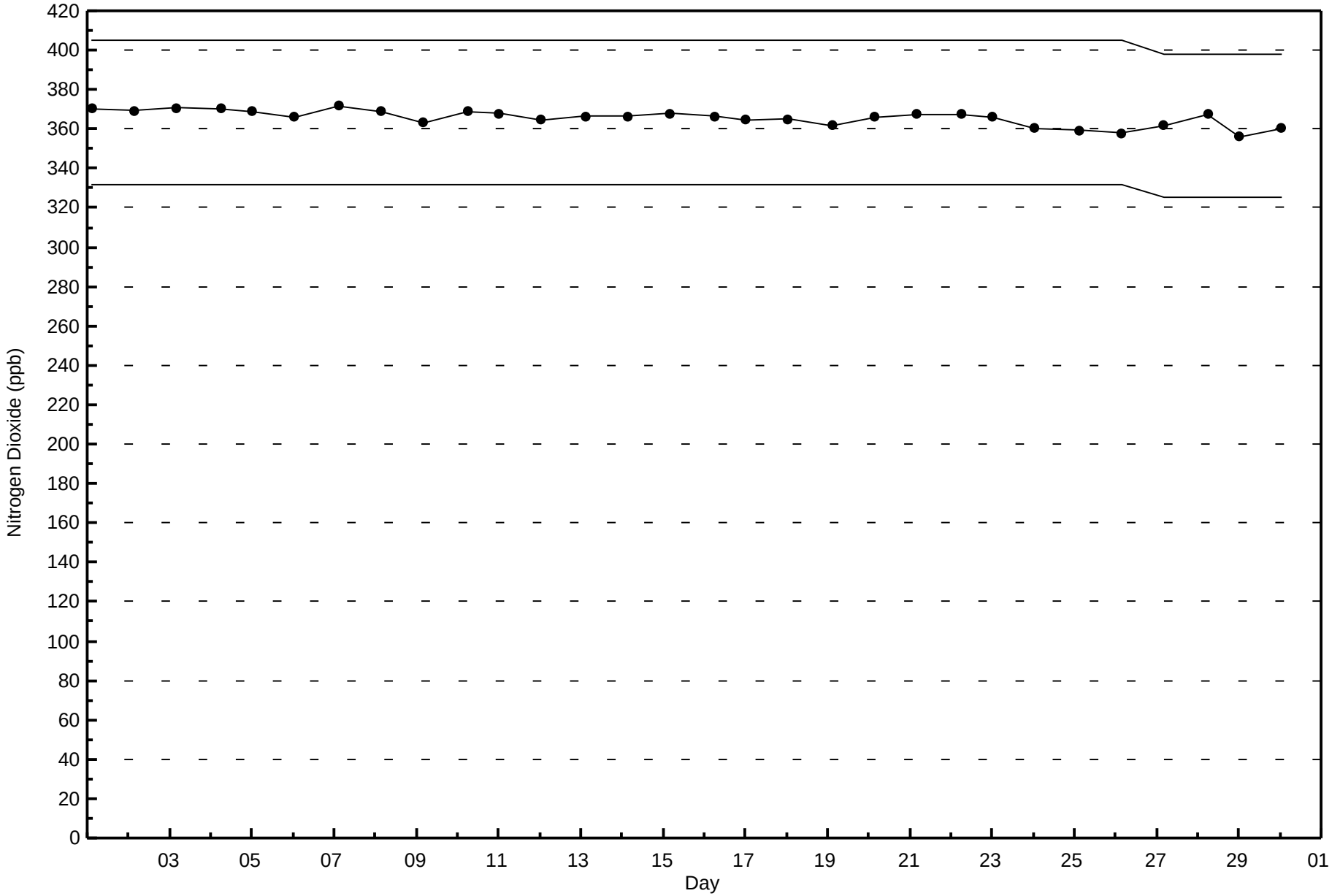


Wood Buffalo Environmental Association

Span Responses

Nitrogen Dioxide (NO_2) - ppb

CNRL Horizon - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_X) - ppb

CNRL Horizon - April 2016

Maximum Value: 86 ppb on Apr 17 23:00

Maximum Daily Average: 14.5 ppb on Apr 17

Minimum Value: 0 ppb on Apr 27 02:00

Minimum Daily Average: 1.8 ppb on Apr 25

Maximum Diurnal Average: 11.9 ppb at hour 4

Minimum Diurnal Average: 3.2 ppb at hour 16

Monthly Average: 5.8 ppb

Percentiles: $P_1 = 0$ $P_{10} = 1$ $Q_1 = 1$ Median = 3 $Q_3 = 8$ $P_{90} = 14$ $P_{99} = 34$

Hours in Service:	720
Hours of Data:	680
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-Apr	3	1	Z	1	3	15	18	2	1	1	2	1	1	1	1	1	3	3	2	7	11	7	4	2	4.0	18
2-Apr	1	2	2	Z	3	1	3	8	15	8	3	2	1	0	0	0	0	0	1	1	1	1	0	0	2.4	15
3-Apr	0	1	1	1	Z	1	1	1	0	0	1	1	1	1	1	2	4	3	3	5	3	3	5	12	2.1	12
4-Apr	9	9	8	7	9	Z	3	6	14	12	9	10	12	14	14	14	16	25	9	4	3	2	1	1	9.3	25
5-Apr	Z	1	1	1	1	1	4	4	4	1	2	5	13	10	6	5	3	1	1	1	5	4	3	4	3.5	13
6-Apr	4	Z	13	15	14	10	2	1	1	0	1	2	3	4	1	1	1	1	2	2	3	1	1	1	3.6	15
7-Apr	0	1	Z	1	4	15	12	11	14	15	15	15	27	22	9	5	2	1	1	1	2	1	1	2	7.7	27
8-Apr	6	3	1	Z	2	2	5	3	3	4	7	3	1	1	1	1	1	1	1	1	0	1	3	4	2.3	7
9-Apr	4	17	68	48	Z	4	6	5	2	2	2	3	3	4	2	3	1	1	1	3	2	5	6	5	8.5	68
10-Apr	2	2	1	1	1	Z	1	3	1	1	1	2	2	2	3	4	8	9	8	8	9	8	11	10	4.1	11
11-Apr	Z	8	8	9	10	9	8	6	5	7	9	9	7	6	6	6	8	9	13	15	11	7	7	7	8.3	15
12-Apr	8	Z	12	5	1	2	1	2	2	1	2	2	2	2	1	1	1	1	1	2	1	1	1	1	2.1	12
13-Apr	1	1	Z	4	1	2	2	9	6	5	7	10	12	12	12	12	12	9	9	7	4	5	5	4	6.5	12
14-Apr	3	1	1	Z	1	1	1	2	4	5	7	15	3	1	2	1	1	2	2	5	15	18	2	1	4.2	18
15-Apr	2	5	19	12	Z	9	13	11	5	3	3	9	4	4	6	6	6	9	5	2	1	2	6	11	6.6	19
16-Apr	23	10	11	10	8	Z	13	10	14	6	2	1	1	1	1	0	3	4	7	4	1	0	0	0	5.7	23
17-Apr	Z	1	1	1	2	7	6	6	11	15	7	3	1	4	4	1	5	3	10	36	31	14	86	79	14.5	86
18-Apr	14	Z	2	1	1	3	3	3	5	6	6	10	8	2	1	1	1	1	1	3	3	4	4	4	3.8	14
19-Apr	5	5	Z	1	1	1	28	14	7	1	1	1	0	0	2	2	3	2	6	8	18	5	5	10	5.4	28
20-Apr	9	3	1	Z	8	3	2	2	4	2	0	1	1	1	2	2	1	1	1	1	2	7	8	12	3.2	12
21-Apr	20	24	27	13	Z	10	16	31	25	34	13	7	3	3	3	4	5	1	8	21	9	1	13	14	13.2	34
22-Apr	5	8	12	23	21	Z	3	6	4	2	3	2	2	3	2	3	1	1	19	14	9	18	19	20	8.7	23
23-Apr	Z	24	15	22	16	5	5	9	8	12	7	4	5	4	3	3	4	3	1	1	1	0	0	2	6.6	24
24-Apr	6	Z	6	7	11	5	3	13	17	14	8	8	5	3	3	4	4	4	2	1	1	3	3	1	5.7	17
25-Apr	1	1	Z	1	5	8	7	5	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.8	8
26-Apr	1	1	1	Z	1	5	11	8	2	C	C	C	C	C	C	C	2	2	3	4	5	5	5	2	--	11
27-Apr	0	0	1	80	Z	11	14	14	11	9	11	16	13	10	8	6	6	3	2	2	2	3	6	5	10.3	80
28-Apr	16	5	11	24	27	Z	5	16	9	6	11	3	2	1	1	1	1	2	2	2	3	6	8	10	7.5	27
29-Apr	Z	6	3	4	6	10	11	17	14	3	3	1	1	1	1	1	1	1	1	1	1	10	4	1	4.3	17
30-Apr	UO	Z	8	8	6	5	4	3	UO	1	1	1	1	2	1	1	1	0	0	19	4	5	23	UO	4.6	23
	6.0	5.6	9.4	11.9	6.5	5.7	7.0	7.7	7.3	6.1	4.9	5.1	4.7	4.1	3.3	3.2	3.5	3.4	4.0	5.9	5.3	4.9	8.0	7.7	Diurnal Average	
	23	24	68	80	27	15	28	31	25	34	15	16	27	22	14	14	16	25	19	36	31	18	86	79	Diurnal Maximum	

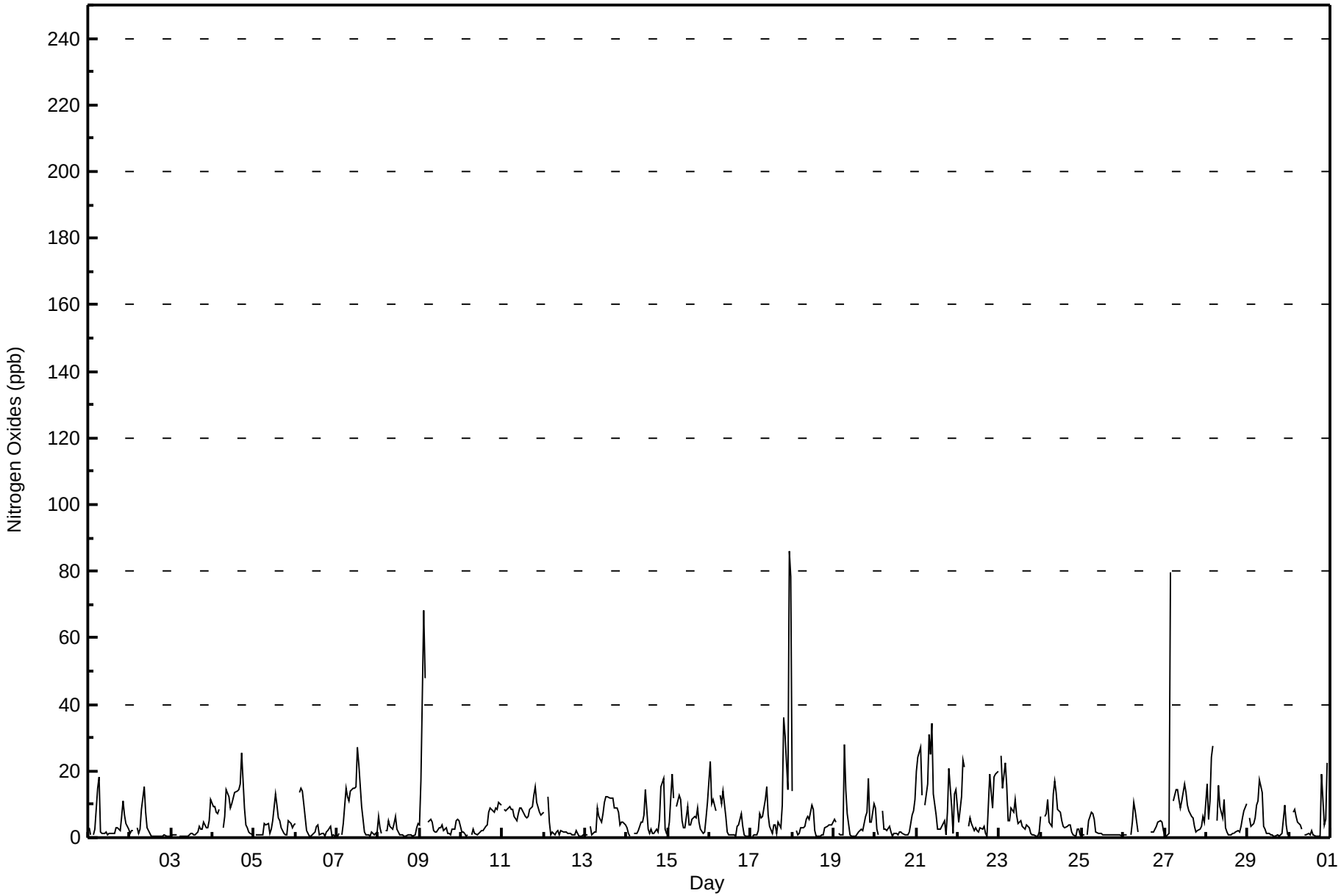
Z - zerospan C - Calibration UO - Unstable Operation

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Oxides (NO_X) - ppb

CNRL Horizon - April 2016



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	655	96.32	96.32
21 - 40	20	2.94	99.26
11 - 80	4	0.59	99.85
81 - 159	1	0.15	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 680

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Oxides (NO_X) - ppb

CNRL Horizon - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	94	105	48	21	11	21	28	73	99	27	19	9	13	8	17	29	622
21 - 40	5	5	1	1	0	0	1	0	1	0	1	0	0	3	0	0	18
11 - 80	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2	1	4
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	99	110	49	22	11	21	29	74	100	27	20	9	13	12	19	30	645

Total Number of Valid Hours: 645

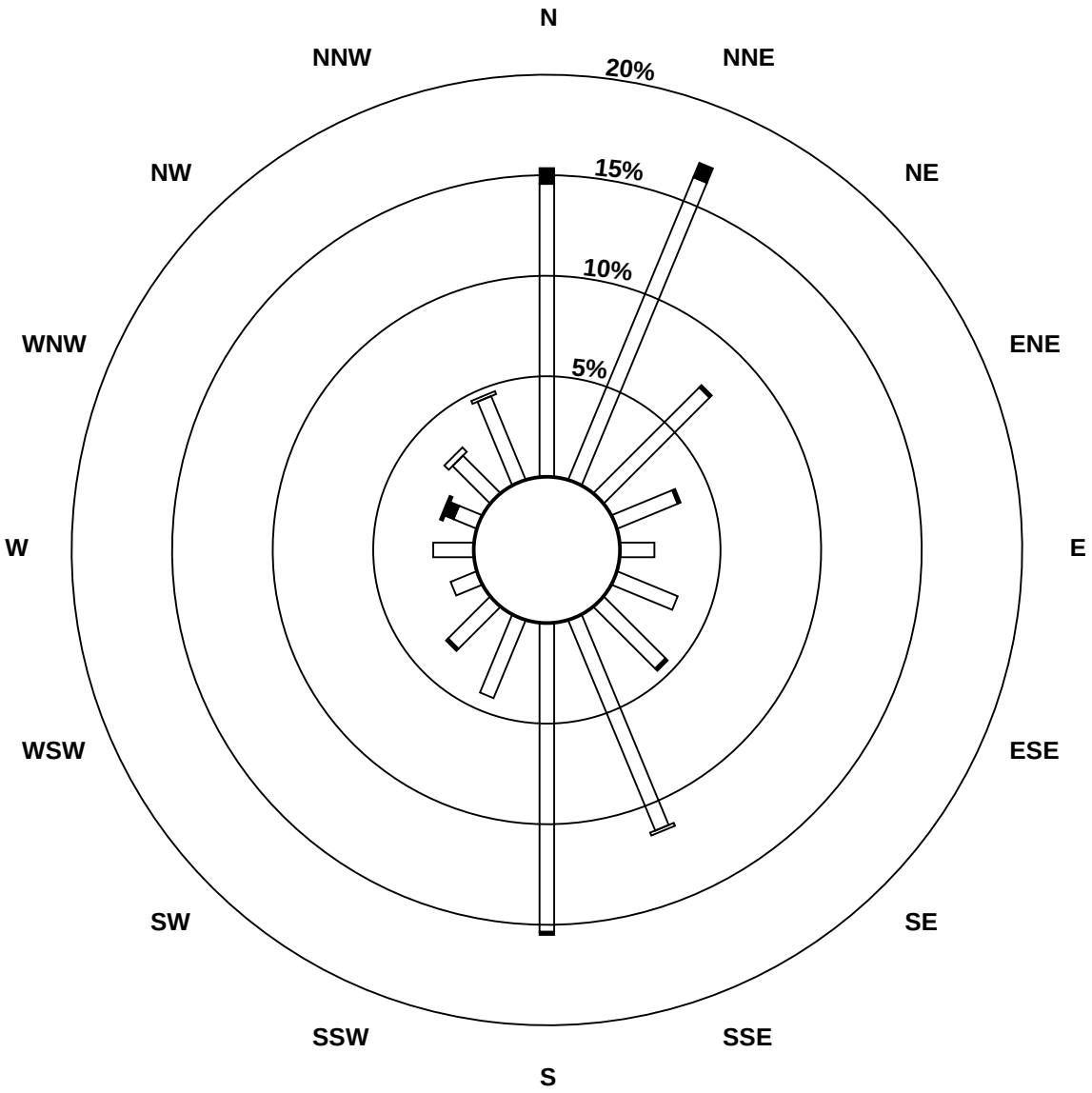
Total Number of Hours: 720

Wood Buffalo Environmental Association

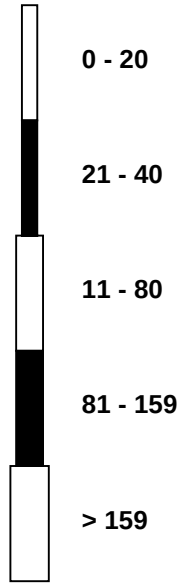
Wind Rose Apr 2016

Nitrogen Oxides (NO_X) - ppb

CNRL Horizon (AMS 15)



Classes (ppb)



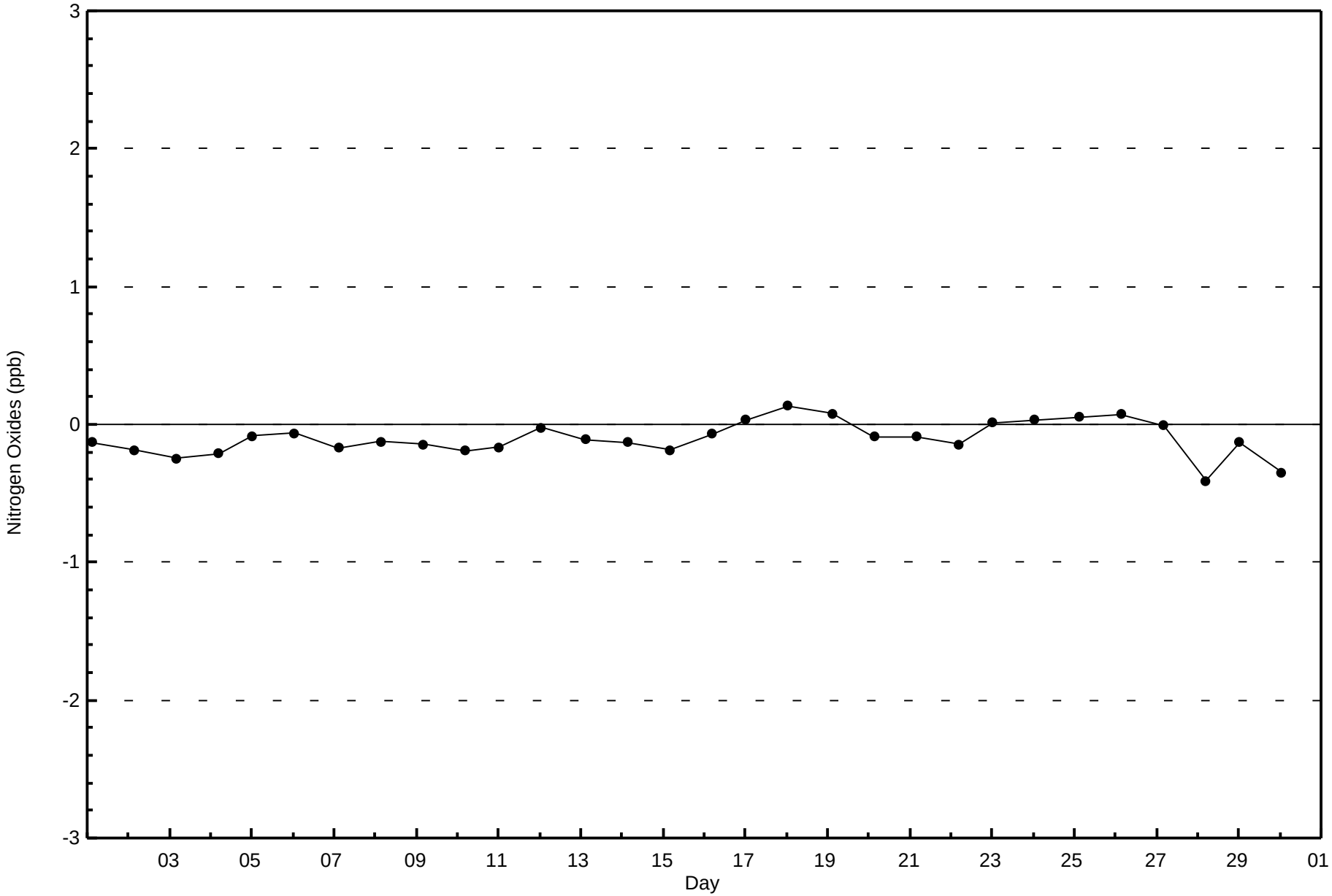
Total Number of Valid Hours: 645

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Oxides (NO_X) - ppb

CNRL Horizon - April 2016

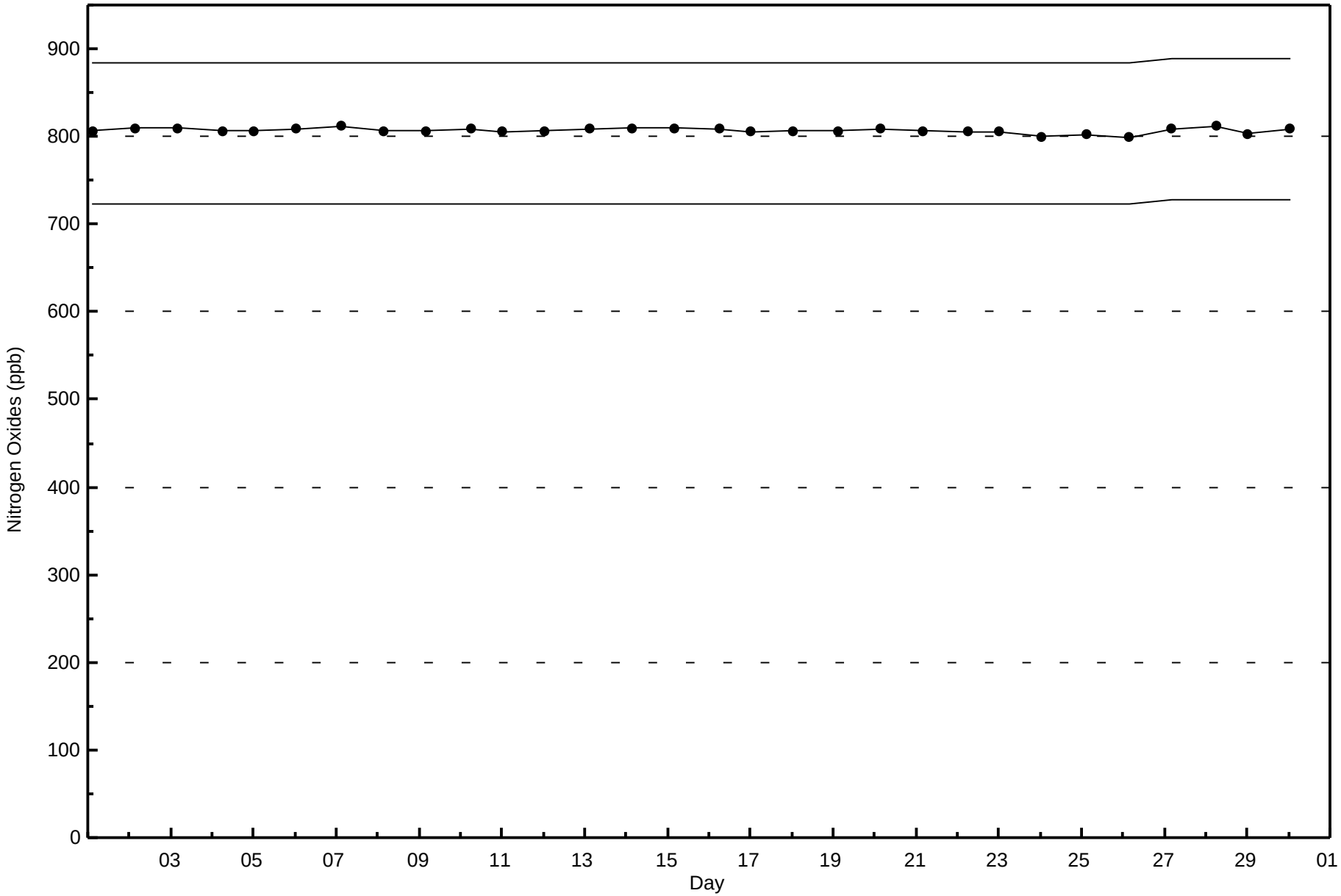


Wood Buffalo Environmental Association

Span Responses

Nitrogen Oxides (NO_X) - ppb

CNRL Horizon - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

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

CNRL Horizon - April 2016

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

Maximum Value: 20.0 $\mu g/m^3$ on Apr 17 23:00

Maximum Daily Average: 8.0 $\mu g/m^3$ on Apr 28

Minimum Value: 1.0 $\mu g/m^3$ on Apr 14 17:00

Minimum Daily Average: 2.4 $\mu g/m^3$ on Apr 8

Maximum Diurnal Average: 6.2 $\mu g/m^3$ at hour 4

Minimum Diurnal Average: 3.3 $\mu g/m^3$ at hour 15

Monthly Average: 4.57 $\mu g/m^3$

Percentiles: P_1 = 1.3 P_{10} = 2.0 Q_1 = 2.6 Median = 3.7 Q_3 = 5.8 P_{90} = 8.6 P_{99} = 12.8

Hours in Service:	720
Hours of Data:	719
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-Apr	3.3	2.3	2.0	1.9	2.0	4.1	3.0	1.9	1.9	1.9	1.8	1.6	1.6	1.8	1.8	2.0	3.0	2.1	2.1	3.1	3.7	5.4	5.8	4.3	2.7	5.8
2-Apr	3.1	3.5	3.4	3.7	3.8	3.9	5.2	3.4	3.4	2.1	1.7	1.9	1.3	1.6	1.8	1.9	2.0	2.2	2.5	3.0	3.7	3.4	3.0	3.1	2.9	5.2
3-Apr	3.2	3.7	3.8	4.0	3.7	3.5	3.4	3.2	3.2	2.8	2.0	1.9	1.9	1.9	1.9	1.9	2.1	2.2	2.6	3.5	3.8	4.4	4.3	4.2	3.0	4.4
4-Apr	6.0	5.9	7.3	11.6	10.7	6.8	5.1	5.1	6.0	4.1	3.8	4.2	6.4	9.2	7.7	7.1	6.8	7.3	5.2	4.7	5.0	4.6	4.1	3.7	6.2	11.6
5-Apr	3.3	3.2	3.7	3.8	3.9	3.8	3.6	3.3	3.1	2.6	2.4	2.0	3.0	3.1	2.8	2.7	2.9	2.1	2.5	2.6	4.0	4.3	4.1	6.8	3.3	6.8
6-Apr	8.3	10.5	12.9	10.3	11.1	5.2	1.8	1.8	2.1	2.4	2.3	2.5	2.6	2.7	2.6	2.4	2.0	2.0	2.3	2.6	2.7	2.7	2.6	2.5	4.2	12.9
7-Apr	2.5	2.4	2.7	2.8	3.1	3.7	3.5	3.3	3.1	3.0	3.0	4.5	5.1	7.8	2.7	2.7	2.5	2.5	2.3	2.4	2.5	2.4	2.5	2.6	3.1	7.8
8-Apr	3.0	3.2	3.2	4.4	3.5	4.5	3.3	2.4	2.4	2.1	2.2	1.8	1.4	1.4	1.4	1.4	1.5	1.7	1.7	1.7	1.8	2.1	2.9	2.8	2.4	4.5
9-Apr	4.1	8.7	10.4	8.2	7.3	3.7	3.5	3.5	3.6	3.4	2.7	2.4	2.7	2.7	2.8	3.1	3.1	3.5	4.4	4.2	4.3	4.3	4.2	3.6	4.4	10.4
10-Apr	3.4	4.0	4.0	4.5	3.9	3.7	3.5	2.8	2.7	2.2	2.4	2.3	2.2	2.2	2.3	2.4	3.1	3.6	3.9	4.6	6.0	5.3	6.6	6.9	3.7	6.9
11-Apr	7.6	8.1	7.2	6.8	6.4	6.0	5.5	4.7	5.0	5.1	5.2	4.8	4.5	4.4	4.3	5.6	9.0	9.1	10.0	11.7	11.3	9.2	8.3	9.7	7.1	11.7
12-Apr	9.2	6.9	8.6	6.3	3.8	4.1	3.5	3.1	3.1	2.8	2.7	2.9	3.1	3.2	3.0	3.0	2.7	2.9	3.1	3.5	3.2	3.1	3.1	3.1	3.9	9.2
13-Apr	3.5	3.2	3.7	4.6	4.0	4.2	4.5	4.7	3.4	2.9	2.7	3.6	3.7	4.0	4.1	4.5	6.8	5.3	5.4	5.7	5.5	4.7	4.5	4.2	4.3	6.8
14-Apr	3.9	3.5	4.4	5.4	5.7	5.6	5.0	2.9	1.5	1.3	1.3	1.6	1.1	1.1	1.1	1.3	1.0	1.0	1.3	1.7	1.9	2.3	2.1	2.9	2.5	5.7
15-Apr	4.1	4.8	6.3	5.9	5.5	5.1	4.1	2.8	2.3	1.8	1.6	2.1	2.0	2.1	2.6	3.4	3.9	5.0	4.2	2.7	3.1	3.9	5.6	7.1	3.8	7.1
16-Apr	10.0	9.9	9.2	8.7	9.9	11.2	8.9	5.9	3.0	2.5	1.6	1.2	1.4	1.6	1.4	1.4	1.8	1.9	2.5	2.5	2.6	1.9	1.9	1.9	4.4	11.2
17-Apr	2.2	2.5	2.8	2.8	3.4	6.6	6.0	7.5	6.7	4.0	2.6	2.5	2.3	3.2	3.1	2.1	2.8	2.9	7.2	11.0	9.0	6.5	20.0	17.9	5.7	20.0
18-Apr	6.1	5.0	4.8	4.5	4.4	4.7	4.0	3.2	3.1	3.5	4.1	6.2	6.9	5.1	3.7	3.5	3.8	4.3	6.7	6.7	6.8	12.0	12.3	12.3	5.7	12.3
19-Apr	13.9	13.5	11.2	11.6	9.3	8.6	8.5	3.4	2.9	2.5	2.6	2.3	2.2	2.1	2.6	2.9	4.4	3.8	4.9	4.4	6.9	4.3	3.1	1.8	5.6	13.9
20-Apr	1.9	2.1	2.4	3.9	5.0	4.5	3.9	3.9	3.5	2.5	2.1	2.0	1.9	1.9	1.9	2.4	3.7	3.0	3.5	4.7	7.5	10.5	8.2	9.5	4.0	10.5
21-Apr	13.1	11.7	11.3	6.1	8.5	10.0	4.8	6.0	6.5	11.2	5.1	3.3	3.1	2.9	2.3	2.3	2.5	3.2	2.7	3.4	3.5	3.3	3.8	8.0	5.8	13.1
22-Apr	13.6	4.1	6.9	7.7	5.6	3.5	3.0	2.6	2.3	2.0	2.2	2.6	1.9	1.9	1.8	1.7	2.0	2.0	3.5	3.7	5.2	7.1	11.7	9.9	4.5	13.6
23-Apr	4.7	4.5	5.1	7.6	7.5	4.2	3.3	2.7	2.6	3.2	2.6	2.5	2.2	2.9	2.6	3.0	4.2	4.0	5.7	4.6	4.4	3.7	3.2	3.5	3.9	7.6
24-Apr	6.1	6.9	6.2	6.7	8.5	13.0	6.0	8.8	10.3	9.8	8.5	8.8	8.1	6.2	6.0	5.7	5.2	5.2	5.8	5.4	4.6	4.9	4.9	4.5	6.9	13.0
25-Apr	4.5	5.0	4.8	4.9	5.8	6.0	5.8	5.3	4.7	4.4	3.9	3.3	3.0	3.1	3.1	2.8	2.4	2.1	2.1	2.2	2.4	2.3	2.4	2.6	3.7	6.0
26-Apr	3.6	4.7	5.6	5.9	6.2	6.7	8.0	6.5	5.3	4.8	4.7	5.3	5.8	6.4	7.2	5.7	5.4	6.4	6.8	7.2	7.4	7.2	5.3	3.7	5.9	8.0
27-Apr	2.7	2.9	2.8	6.0	5.8	2.5	3.2	3.5	4.1	3.2	2.5	2.9	3.1	2.2	2.6	2.6	2.4	2.9	2.7	2.6	3.3	3.5	4.1	4.2	3.3	6.0
28-Apr	5.2	5.0	6.0	7.2	6.3	5.4	4.9	4.8	C	7.3	8.1	8.6	8.1	6.9	8.1	9.0	8.9	8.9	9.1	7.9	9.5	10.9	13.0	13.8	8.0	13.8
29-Apr	11.9	11.5	9.3	10.8	10.2	10.1	8.9	9.1	12.8	8.1	7.4	7.5	6.7	6.2	5.4	4.5	4.1	4.6	4.6	4.7	5.4	9.1	5.6	4.5	7.6	12.8
30-Apr	4.9	6.2	6.4	7.1	6.5	7.2	7.2	4.8	4.8	3.7	2.7	3.1	4.3	3.5	2.7	2.9	2.7	2.3	2.6	3.3	3.4	4.2	6.8	6.6	4.6	7.2
	5.8	5.6	5.9	6.2	6.0	5.7	4.8	4.2	4.1	3.8	3.3	3.4	3.5	3.5	3.3	3.3	3.6	3.7	4.1	4.4	4.8	5.1	5.7	5.7	Diurnal Average	
	13.9	13.5	12.9	11.6	11.1	13.0	8.9	9.1	12.8	11.2	8.5	8.8	8.1	9.2	8.1	9.0	9.0	9.1	10.0	11.7	11.3	12.0	20.0	17.9	Diurnal Maximum	

C - Calibration

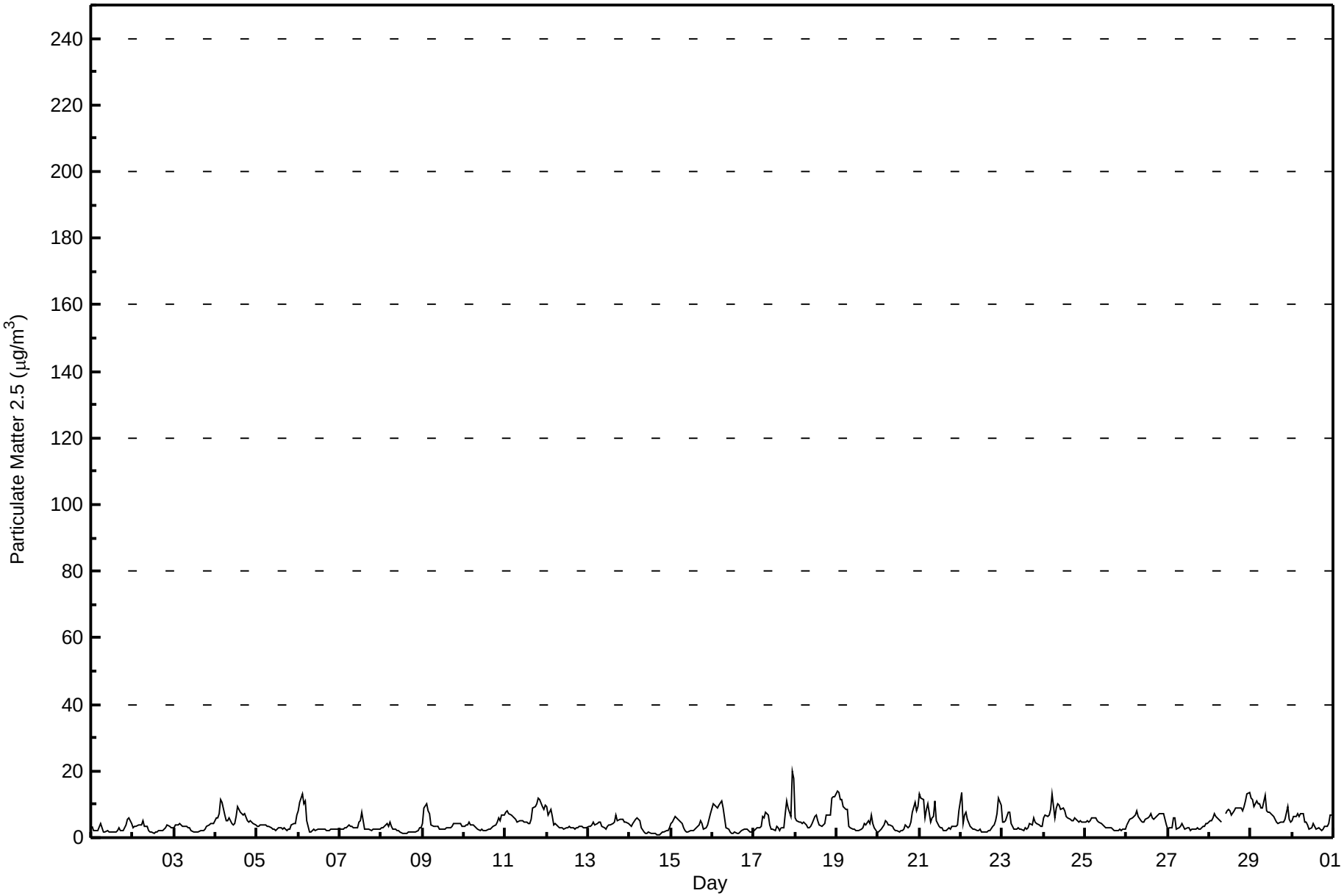
Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 $\mu g/m^3$

Wood Buffalo Environmental Association

Hourly Averages

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

CNRL Horizon - April 2016



Concentration Ranges ($\mu g/m^3$)	Number of Hours	%	Cumulative %
1 - 5	523	72.74	72.74
6 - 15	194	26.98	99.72
16 - 25	2	0.28	100.00
26 - 80	0	0.00	100.00
> 81.0	0	0.00	100.00

Total Number of Valid Hours: 719

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

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

CNRL Horizon - April 2016

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	81	104	42	20	10	16	15	27	76	21	13	10	13	6	15	23	492
6 - 15	25	9	7	2	1	5	14	53	33	10	8	1	0	5	7	9	189
16 - 25	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	2
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	106	113	49	22	11	21	29	81	109	31	21	11	13	12	22	32	683

Total Number of Valid Hours: 683

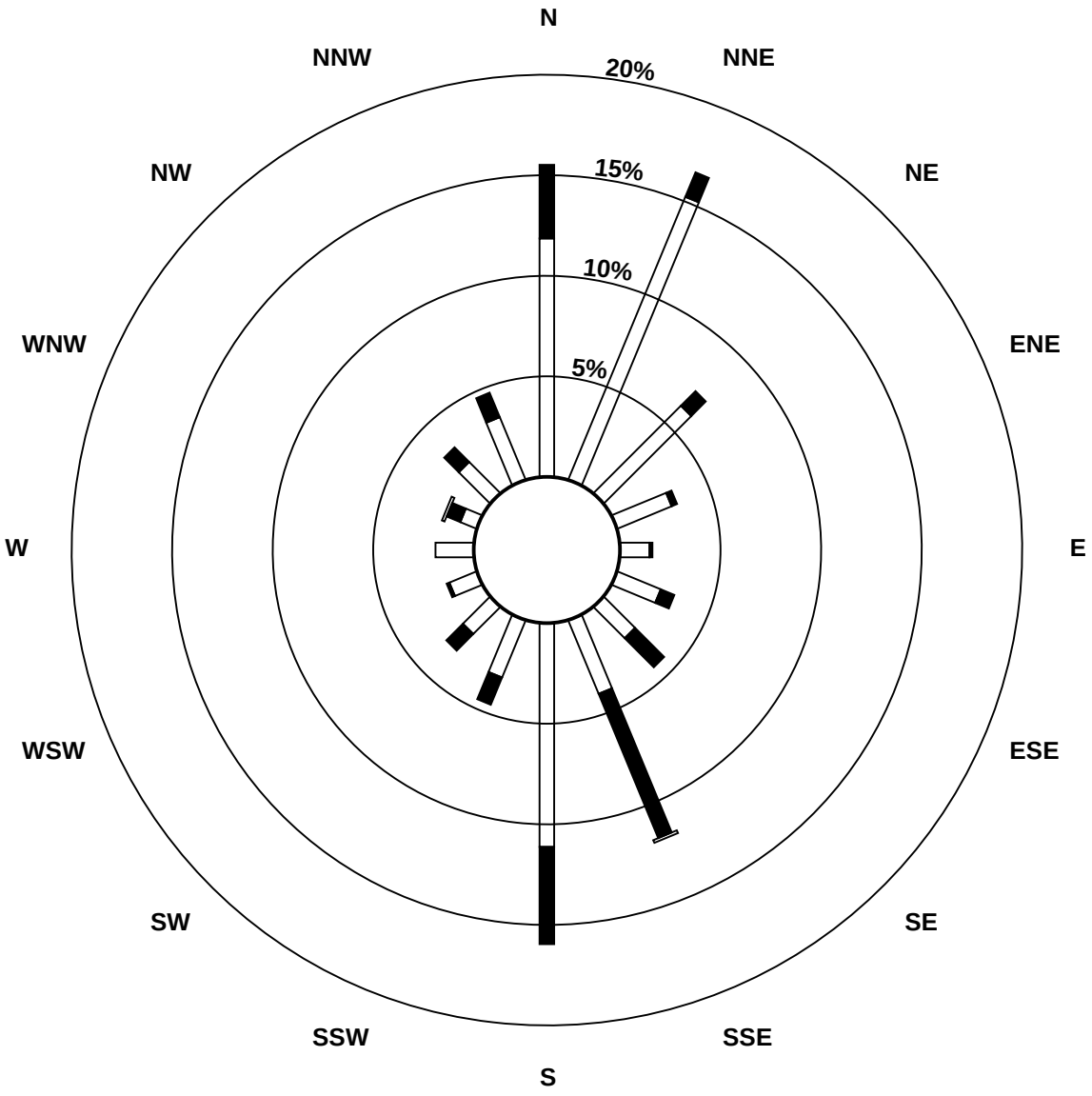
Total Number of Hours: 720

Wood Buffalo Environmental Association

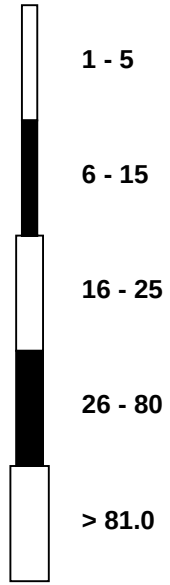
Wind Rose Apr 2016

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: 683

Maximum Value: 28.5 C on Apr 18 16:00

Maximum Daily Average: 16.5 C on Apr 18

Minimum Value: -16.3 C on Apr 4 05:00

Minimum Daily Average: -8.0 C on Apr 3

Maximum Diurnal Average: 8.3 C at hour 16

Minimum Diurnal Average: -1.8 C at hour 5

Monthly Average: 3.31 C

Percentiles: P_1 = -12.4 P_{10} = -6.8 Q_1 = -2.4 Median = 2.4 Q_3 = 8.0 P_{90} = 15.3 P_{99} = 24.0

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

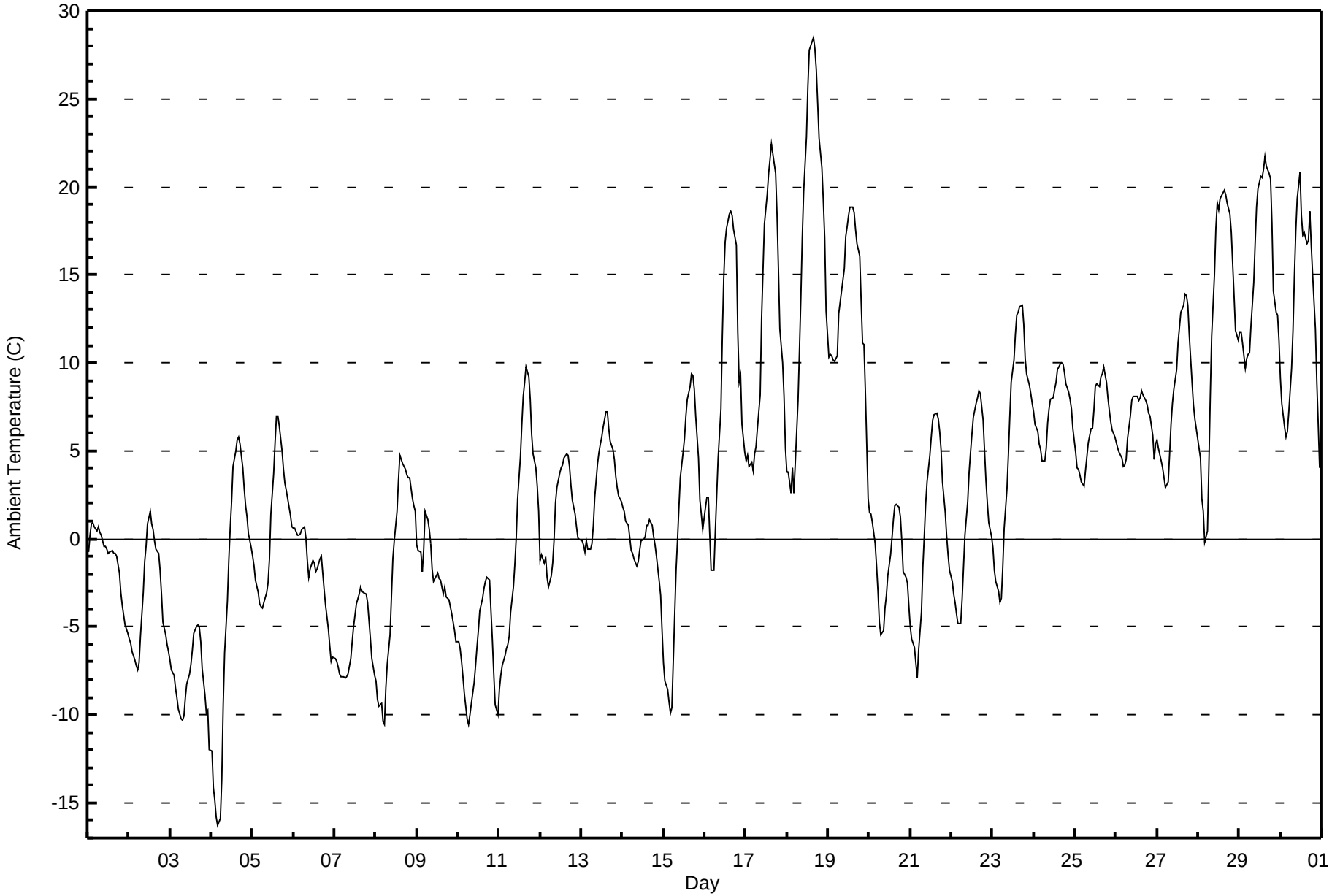
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	-0.7	0.2	0.9	0.9	0.6	0.4	0.7	0.3	0.2	-0.4	-0.4	-0.6	-0.8	-0.8	-0.7	-0.8	-0.8	-0.9	-1.9	-3.0	-3.8	-4.4	-4.9	-5.4	-1.1	0.9
2-Apr	-5.7	-6.0	-6.4	-6.9	-7.2	-7.5	-7.0	-5.5	-3.0	-1.3	-0.4	0.8	1.6	0.9	0.5	-0.1	-0.6	-0.9	-1.7	-3.1	-4.7	-5.5	-6.0	-6.4	-3.4	1.6
3-Apr	-6.8	-7.4	-7.8	-8.5	-9.1	-9.6	-10.2	-10.3	-10.1	-9.0	-8.3	-7.7	-7.1	-6.3	-5.4	-5.0	-4.9	-5.1	-5.8	-7.4	-8.9	-9.9	-9.7	-12.0	-8.0	-4.9
4-Apr	-12.0	-14.1	-14.9	-15.8	-16.3	-15.8	-13.7	-9.4	-6.5	-3.6	-1.2	0.6	2.1	4.1	5.0	5.6	5.8	5.4	4.0	2.8	1.9	1.2	0.3	-0.5	-3.5	5.8
5-Apr	-1.0	-1.5	-2.3	-3.1	-3.7	-3.9	-4.0	-3.6	-3.1	-2.5	-1.1	1.4	3.7	5.5	7.0	7.0	6.4	5.0	3.9	3.2	2.8	1.8	1.3	0.7	0.8	7.0
6-Apr	0.6	0.6	0.2	0.2	0.3	0.5	0.7	0.1	-1.2	-2.2	-1.7	-1.2	-1.4	-1.9	-1.7	-1.1	-1.0	-2.0	-2.9	-3.8	-5.1	-6.1	-7.0	-6.7	-1.8	0.7
7-Apr	-6.8	-7.0	-7.2	-7.7	-7.8	-7.8	-7.9	-7.9	-7.7	-6.8	-5.9	-5.0	-4.3	-3.7	-3.2	-2.7	-2.9	-3.0	-3.2	-3.6	-4.7	-5.7	-6.8	-7.7	-5.7	-2.7
8-Apr	-8.0	-9.1	-9.5	-9.4	-10.4	-10.6	-8.5	-7.1	-5.5	-3.3	-1.2	-0.1	1.5	3.3	4.7	4.5	4.3	3.9	3.6	3.5	3.5	2.3	1.9	1.5	-1.8	4.7
9-Apr	-0.4	-0.7	-0.7	-1.8	-0.6	1.5	1.1	0.5	-0.2	-1.7	-2.4	-2.1	-1.9	-2.2	-2.4	-3.1	-2.7	-3.3	-3.4	-3.5	-4.3	-4.7	-5.2	-5.9	-2.1	1.5
10-Apr	-5.8	-6.2	-7.0	-7.9	-8.8	-10.3	-10.5	-10.0	-9.4	-8.2	-7.2	-6.2	-5.2	-4.1	-3.4	-2.8	-2.4	-2.2	-2.4	-4.1	-5.7	-7.7	-9.5	-10.0	-6.5	-2.2
11-Apr	-8.6	-7.8	-7.2	-6.7	-6.3	-6.0	-5.5	-4.2	-2.8	-1.5	0.1	2.3	4.7	6.5	8.1	8.9	9.8	9.2	7.9	5.9	4.8	4.0	3.0	1.5	0.8	9.8
12-Apr	-1.2	-0.9	-1.4	-1.1	-2.2	-2.7	-2.1	-1.4	0.0	2.0	2.9	3.7	4.0	4.2	4.5	4.8	4.8	4.1	3.1	2.2	1.4	0.7	0.0	0.0	1.2	4.8
13-Apr	-0.1	-0.3	-0.7	-0.1	-0.6	-0.6	-0.3	0.8	2.4	4.3	4.9	5.4	5.8	6.3	7.2	7.2	6.2	5.5	5.1	4.5	3.6	2.9	2.4	2.1	3.1	7.2
14-Apr	1.8	1.6	1.0	0.7	0.0	-0.7	-0.8	-1.1	-1.5	-1.3	-0.7	-0.1	0.0	0.2	0.7	0.8	1.1	0.8	0.1	-0.4	-1.0	-2.4	-3.2	-5.2	-0.4	1.8
15-Apr	-7.0	-8.1	-8.6	-9.3	-9.9	-9.6	-4.3	-1.8	-0.1	1.7	3.4	4.9	5.7	7.0	7.9	8.6	9.4	9.3	8.5	6.9	4.6	2.2	1.4	0.6	1.0	9.4
16-Apr	1.8	2.4	2.3	0.3	-1.8	-1.8	0.5	2.5	4.6	7.4	11.6	14.8	16.9	17.7	18.5	18.6	18.4	17.6	16.7	11.8	8.9	9.3	6.5	4.9	8.8	18.6
17-Apr	4.5	4.7	4.1	4.4	3.9	4.8	5.2	6.3	8.2	12.5	15.3	17.9	19.6	20.8	21.6	22.5	21.9	20.8	18.5	15.3	11.9	10.0	8.1	5.2	12.0	22.5
18-Apr	3.8	3.8	2.6	4.0	2.6	4.2	7.8	10.7	13.6	17.1	19.8	22.8	25.7	27.8	28.0	28.5	27.8	26.7	24.7	22.7	21.1	19.2	17.1	13.0	16.5	28.5
19-Apr	10.3	10.5	10.4	10.2	10.1	10.4	12.8	13.4	14.0	15.3	17.2	17.8	18.4	18.8	18.8	18.5	17.6	16.8	16.0	13.5	11.1	11.0	8.4	2.3	13.5	18.8
20-Apr	1.5	1.4	0.9	-0.3	-1.5	-3.0	-4.7	-5.4	-5.2	-4.0	-3.2	-2.1	-0.9	0.0	1.1	1.9	1.9	1.8	1.3	-0.1	-1.9	-2.2	-2.5	-3.8	-1.2	1.9
21-Apr	-5.0	-5.7	-6.1	-7.1	-7.9	-6.3	-4.2	-1.6	0.1	2.0	3.3	4.8	5.8	6.8	7.0	7.1	6.8	6.1	5.1	3.2	1.5	0.1	-0.9	-1.8	0.5	7.1
22-Apr	-2.5	-3.2	-3.6	-4.3	-4.8	-4.8	-3.5	-1.6	0.2	2.1	3.8	4.9	5.9	6.9	7.7	8.0	8.5	8.3	6.7	5.0	3.3	2.0	0.9	0.2	1.9	8.5
23-Apr	-0.5	-1.8	-2.5	-2.9	-3.6	-3.4	-1.6	0.6	2.8	4.7	6.9	8.9	10.2	11.6	12.7	12.9	13.2	13.3	12.2	10.3	9.4	8.8	8.3	7.7	5.8	13.3
24-Apr	7.2	6.5	6.1	5.4	5.0	4.4	4.4	5.2	6.6	7.4	7.9	8.0	8.5	8.9	9.6	9.9	10.0	10.0	9.4	8.8	8.4	7.9	7.4	6.3	7.5	10.0
25-Apr	4.9	4.1	3.9	3.6	3.3	3.0	3.9	4.6	5.5	6.2	6.3	7.3	8.6	8.8	8.7	9.2	9.3	9.8	8.9	8.0	7.3	6.7	6.2	5.8	6.4	9.8
26-Apr	5.5	5.1	4.9	4.6	4.1	4.2	4.5	5.7	6.9	7.9	8.1	8.1	8.1	7.9	8.0	8.4	8.2	7.9	7.6	7.2	7.0	5.8	4.5	5.4	6.5	8.4
27-Apr	5.6	5.1	4.5	4.0	3.5	3.0	3.3	4.8	6.5	7.7	8.5	9.6	11.1	12.0	12.9	13.3	13.9	13.8	13.3	11.6	8.9	7.6	6.8	6.3	8.2	13.9
28-Apr	5.1	4.6	2.3	1.5	-0.2	0.5	4.1	8.1	11.5	15.0	17.7	19.1	18.7	19.3	19.7	19.8	19.6	19.1	18.5	17.4	15.6	13.7	11.8	11.3	12.2	19.8
29-Apr	11.8	11.8	11.1	9.7	10.2	10.5	10.5	12.1	14.5	16.8	18.8	19.9	20.6	20.5	21.0	21.7	21.2	20.8	20.4	17.9	14.1	12.9	12.7	11.3	15.5	21.7
30-Apr	9.1	7.7	6.3	5.8	6.1	7.2	9.7	11.8	15.0	17.5	19.4	20.8	18.4	17.3	17.4	16.8	16.9	18.6	16.7	15.0	11.9	8.9	6.5	4.0	12.7	20.8
	0.0	-0.3	-0.8	-1.2	-1.8	-1.7	-0.7	0.6	1.9	3.4	4.7	6.0	6.8	7.5	8.1	8.3	8.3	7.9	7.0	5.6	4.1	3.0	2.0	0.8	Diurnal Average	
	11.8	11.8	11.1	10.2	10.2	10.5	12.8	13.4	15.0	17.5	19.8	22.8	25.7	27.8	28.0	28.5	27.8	26.7	24.7	22.7	21.1	19.2	17.1	13.0	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature (AT) - C

CNRL Horizon - April 2016



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	272	37.78	37.78
0 - 10	316	43.89	81.67
10 - 20	109	15.14	96.81
> 20	23	3.19	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Maximum Value: 1.5 mm on Apr 14 12:00

Maximum Daily Total: 3.3 mm on Apr 26

Minimum Value: 0.0 mm on Apr 1 01:00

Minimum Daily Total: 0.0 mm on Apr 1

Maximum Diurnal Total: 1.8 mm at hour 12

Minimum Diurnal Total: 0.0 mm at hour 4

Monthly Total: 12.19 mm

Percentiles: P_1 = 0.0 P_{10} = 0.0 Q_1 = 0.0 Median = 0.0 Q_3 = 0.0 P_{90} = 0.0 P_{99} = 0.3

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

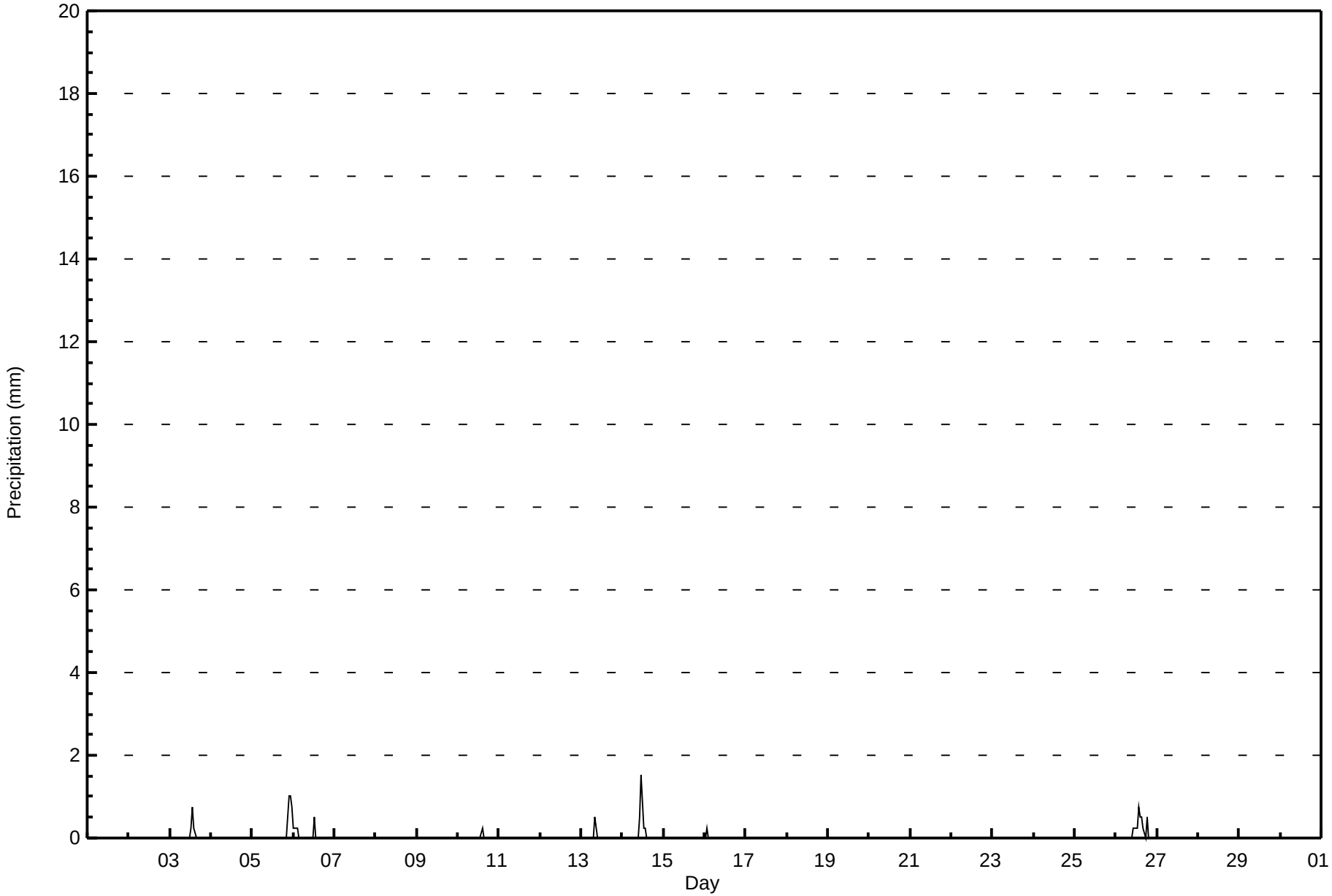
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.8
4-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.8	2.8	1.0
6-Apr	0.3	0.3	0.3	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	1.3	0.5
7-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	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	0.3	0.3
11-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	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	0.0	0.0	0.0	0.0	0.5	0.5
14-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.5	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	1.5
15-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3
17-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.8	0.5	0.5	0.3	0.0	0.5	0.0	0.0	0.0	0.0	0.0	3.3	0.8
27-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.3	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.8	1.8	1.3	1.8	1.0	0.5	0.3	0.0	0.5	0.0	0.0	1.0	1.0	0.8	Diurnal Average	
	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.5	1.5	0.5	0.8	0.5	0.5	0.3	0.0	0.5	0.0	0.0	1.0	1.0	0.8	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Precipitation (PC) - mm

CNRL Horizon - April 2016



Maximum Value: 99 % on Apr 27 00:00

Maximum Daily Average: 88.4 % on Apr 6

Minimum Value: 14 % on Apr 19 18:00

Minimum Daily Average: 27.5 % on Apr 19

Maximum Diurnal Average: 72.8 % at hour 5

Minimum Diurnal Average: 42.2 % at hour 16

Monthly Average: 57.4 %

Percentiles: $P_1 = 16$ $P_{10} = 27$ $Q_1 = 41$ Median = 59 $Q_3 = 73$ $P_{90} = 85$ $P_{99} = 98$

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

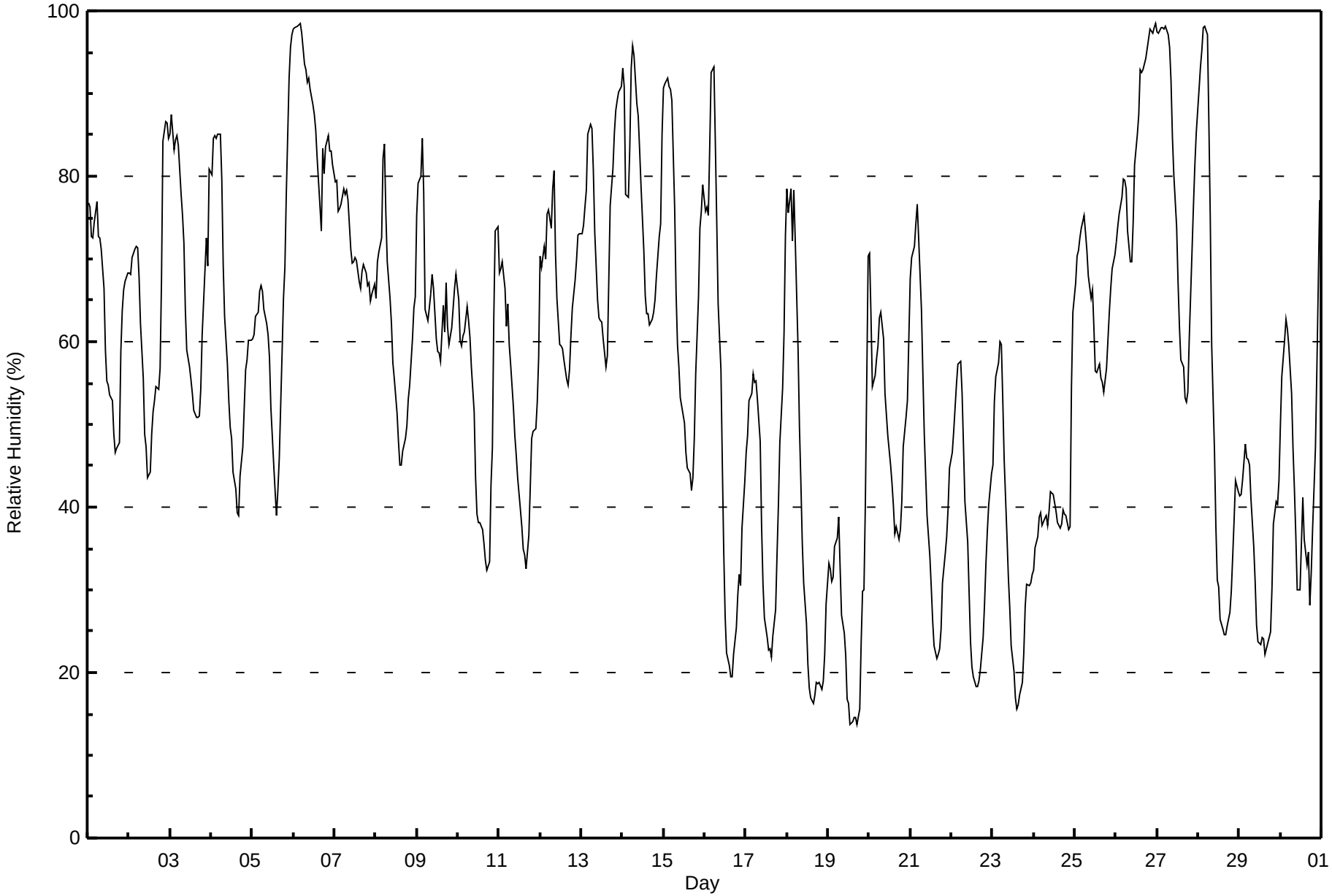
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	77	76	73	72	74	77	73	73	71	66	59	55	55	53	53	49	47	47	48	59	64	66	67	68	63.4	77
2-Apr	68	68	70	71	71	71	68	62	56	49	47	44	44	49	52	53	55	54	57	67	84	87	86	85	63.3	87
3-Apr	85	87	83	84	85	84	78	75	72	64	59	57	55	54	52	51	51	51	54	61	69	72	69	81	68.0	87
4-Apr	80	85	85	85	85	85	80	69	63	57	53	50	48	44	42	39	39	44	47	52	57	58	60	60	61.1	85
5-Apr	60	61	63	64	66	67	66	64	62	61	58	52	45	42	39	42	46	59	65	69	78	92	96	97	63.1	97
6-Apr	98	98	98	98	99	97	93	93	91	92	91	89	88	86	82	77	73	83	80	84	85	83	83	81	88.4	99
7-Apr	79	79	76	76	77	78	78	78	77	71	69	70	70	70	67	67	69	69	68	67	67	65	66	67	71.7	79
8-Apr	65	70	71	73	82	84	76	70	65	62	57	56	51	48	45	45	47	48	50	53	55	60	64	65	60.9	84
9-Apr	75	79	80	85	78	64	62	64	66	68	66	60	59	59	58	64	61	67	62	60	62	64	66	68	66.6	85
10-Apr	65	60	59	61	61	64	63	61	57	52	44	39	38	38	37	36	33	32	33	43	47	63	73	74	51.4	74
11-Apr	68	69	70	66	62	65	60	57	52	49	46	44	40	38	35	34	33	37	42	48	49	49	53	58	51.0	70
12-Apr	70	69	71	70	75	76	74	78	81	71	65	60	59	59	58	55	55	57	61	64	67	70	73	73	67.2	81
13-Apr	73	74	76	78	85	86	86	81	73	65	63	63	62	60	57	58	67	76	81	85	88	89	90	91	75.4	91
14-Apr	93	91	78	77	84	93	96	95	89	87	83	79	71	66	63	63	62	63	64	65	68	73	74	85	77.5	96
15-Apr	91	91	92	91	90	89	76	66	60	57	53	51	50	47	45	44	42	44	48	56	65	74	76	79	65.7	92
16-Apr	76	76	75	84	92	93	84	75	65	57	45	34	27	22	21	20	20	22	25	29	32	30	38	43	49.4	93
17-Apr	47	49	53	54	56	55	55	53	48	38	31	27	24	23	23	22	24	28	34	40	48	54	61	73	42.4	73
18-Apr	79	76	78	72	78	72	59	50	43	36	31	26	21	18	17	16	17	19	19	19	18	19	22	28	38.9	79
19-Apr	33	33	31	32	35	36	39	33	27	25	22	17	16	14	14	15	15	14	16	24	30	30	41	70	27.5	70
20-Apr	71	63	55	56	58	59	63	64	60	54	51	49	45	43	40	37	38	36	37	41	47	51	53	60	51.3	71
21-Apr	68	70	72	74	77	73	64	56	49	44	39	34	30	26	23	22	22	23	25	31	34	36	40	45	44.9	77
22-Apr	47	49	52	55	57	58	54	47	41	36	30	24	21	20	18	18	19	20	24	28	33	37	40	44	36.3	58
23-Apr	45	53	56	57	60	60	53	46	37	32	28	23	20	17	16	16	17	19	22	28	31	31	31	32	34.5	60
24-Apr	32	35	36	39	39	38	39	39	38	39	42	42	41	39	38	37	38	40	39	39	37	38	55	64	40.1	64
25-Apr	67	70	71	72	74	75	73	71	68	65	66	62	56	56	57	56	55	54	57	60	63	66	69	71	64.8	75
26-Apr	72	74	75	77	80	80	79	73	70	70	74	81	85	87	93	93	93	94	95	97	98	97	98	99	84.7	99
27-Apr	97	97	98	98	98	98	97	96	91	85	80	74	67	62	58	57	53	53	54	60	71	76	81	85	78.7	98
28-Apr	90	93	95	98	98	97	86	75	60	47	38	31	30	26	25	25	25	26	27	30	34	39	43	42	53.3	98
29-Apr	41	41	43	48	46	46	45	41	35	31	26	24	23	24	24	22	23	24	25	30	38	41	40	43	34.4	48
30-Apr	50	56	60	63	61	60	54	47	42	37	30	30	36	41	36	33	35	28	32	38	47	56	67	77	46.4	77
	68.8	69.7	69.9	71.0	72.8	72.7	69.0	65.0	60.3	55.5	51.6	48.1	46.0	44.4	42.9	42.2	42.4	44.3	46.5	50.9	55.5	58.9	62.5	66.9	Diurnal Average	
	98	98	98	98	99	98	97	96	91	92	91	89	88	87	93	93	93	94	95	97	98	97	98	99	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity (RH) - %

CNRL Horizon - April 2016



Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	28	3.89	3.89
20 - 40	148	20.56	24.44
40 - 60	198	27.50	51.94
60 - 80	237	32.92	84.86
80 - 100	109	15.14	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Wood Buffalo Environmental Association

Summary of Hour Averages

Global Radiation (GR) - W/m2

CNRL Horizon - April 2016

Maximum Value: 788 W/m2 on Apr 29 13:00

Maximum Daily Average: 276.2 W/m2 on Apr 15

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

Minimum Daily Average: 49.8 W/m2 on Apr 6

Maximum Diurnal Average: 528.9 W/m2 at hour 13

Minimum Diurnal Average: 0.0 W/m2 at hour 1

Monthly Average: 181.5 W/m2

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 52 $Q_3 = 301$ $P_{90} = 602$ $P_{99} = 758$

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

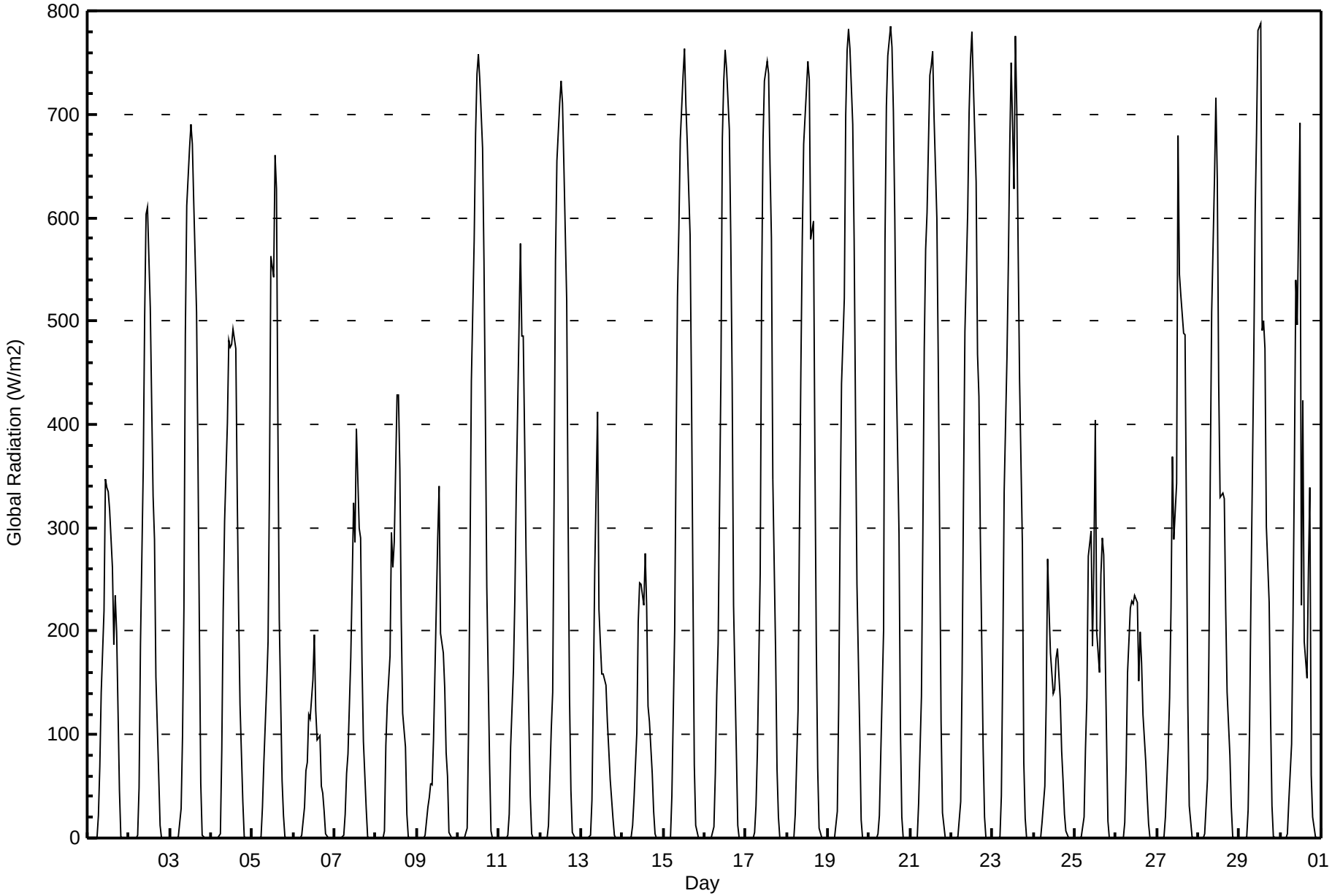
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	0	0	0	0	0	0	22	68	141	220	346	338	335	317	262	187	234	199	47	2	0	0	0	0	113.3	346
2-Apr	0	0	0	0	0	2	48	188	359	506	603	610	512	418	330	289	156	60	12	0	0	0	0	0	170.6	610
3-Apr	0	0	0	0	0	1	28	99	222	486	611	668	691	672	614	509	367	206	52	2	0	0	0	0	217.8	691
4-Apr	0	0	0	0	0	4	85	220	307	402	481	474	477	493	473	334	219	129	36	1	0	0	0	0	172.3	493
5-Apr	0	0	0	0	0	1	30	74	146	190	342	563	542	660	627	402	211	56	22	1	0	0	0	0	161.1	660
6-Apr	0	0	0	0	0	3	30	65	73	119	116	153	197	123	95	99	50	44	26	4	0	0	0	0	49.8	197
7-Apr	0	0	0	0	0	3	23	63	81	175	248	324	286	396	299	290	169	94	29	2	0	0	0	0	103.4	396
8-Apr	0	0	0	0	0	7	89	129	177	296	262	285	428	428	356	211	120	88	22	2	0	0	0	0	120.9	428
9-Apr	0	0	0	0	0	2	30	40	52	52	94	224	290	340	198	179	145	83	60	6	0	0	0	0	74.8	340
10-Apr	0	0	0	0	0	10	104	263	442	578	681	739	757	734	667	558	410	243	72	7	0	0	0	0	261.0	757
11-Apr	0	0	0	0	0	3	23	88	163	230	333	414	574	485	485	386	275	116	41	4	0	0	0	0	150.9	574
12-Apr	0	0	0	0	0	12	106	141	330	558	655	711	733	711	649	520	310	137	46	6	0	0	0	0	234.4	733
13-Apr	0	0	0	0	0	2	37	141	259	412	222	189	159	159	147	113	86	57	19	3	0	0	0	0	83.6	412
14-Apr	0	0	0	0	0	1	12	38	102	209	247	246	226	275	225	128	113	62	25	4	0	0	0	0	79.7	275
15-Apr	0	0	0	0	0	41	200	373	524	590	675	738	763	709	672	583	431	248	70	12	0	0	0	0	276.2	763
16-Apr	0	0	0	0	0	11	62	139	189	450	676	733	762	745	684	582	442	225	83	13	0	0	0	0	241.5	762
17-Apr	0	0	0	0	0	6	31	85	256	525	673	732	752	739	650	581	348	179	66	20	0	0	0	0	235.0	752
18-Apr	0	0	0	0	0	24	124	301	452	577	671	724	751	733	579	597	372	189	68	9	0	0	0	0	257.1	751
19-Apr	0	0	0	0	0	25	130	303	439	522	700	762	782	763	691	577	407	245	102	18	0	0	0	0	269.5	782
20-Apr	0	0	0	0	0	4	22	82	200	576	707	757	785	765	703	601	455	294	106	21	0	0	0	0	253.3	785
21-Apr	0	0	0	0	1	34	137	292	473	569	604	738	747	760	697	599	460	295	112	24	0	0	0	0	272.6	760
22-Apr	0	0	0	0	1	36	158	332	490	606	702	752	779	731	635	468	428	293	87	20	0	0	0	0	271.6	779
23-Apr	0	0	0	0	1	41	169	335	465	558	670	750	628	775	705	565	442	284	73	19	0	0	0	0	270.0	775
24-Apr	0	0	0	0	0	15	51	133	270	221	179	139	144	173	183	134	84	56	23	7	0	0	0	0	75.6	270
25-Apr	0	0	0	0	1	20	87	135	272	297	186	267	404	200	160	255	290	274	99	17	0	0	0	0	123.4	404
26-Apr	0	0	0	0	0	15	71	160	222	229	226	235	228	151	199	170	120	73	40	13	0	0	0	0	89.7	235
27-Apr	0	0	0	0	1	20	86	135	222	369	288	343	680	545	524	488	487	310	128	31	1	0	0	0	194.2	680
28-Apr	0	0	0	0	3	57	174	351	508	637	716	637	441	329	334	328	221	142	81	30	1	0	0	0	208.0	716
29-Apr	0	0	0	0	1	27	103	233	462	603	681	781	788	491	500	473	301	228	118	31	2	0	0	0	242.6	788
30-Apr	0	0	0	0	4	36	90	211	361	540	496	691	226	423	189	155	259	339	62	20	2	0	0	0	171.0	691
	0.0	0.0	0.0	0.0	0.5	15.4	78.8	173.9	288.6	410.1	469.8	523.9	528.9	508.2	451.1	378.7	280.3	174.9	60.9	11.6	0.3	0.0	0.0	0.0	Diurnal Average	
	0	0	0	0	4	57	200	373	524	637	716	781	788	775	705	601	487	339	128	31	2	0	0	0	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Global Radiation (GR) - W/m2

CNRL Horizon - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

CNRL Horizon - April 2016

Maximum Speed: 24 km/h on Apr 29 13:00

Maximum Daily Speed Average: 13.5 km/h on Apr 9

Minimum Speed Value: 0 km/h on Apr 14 00:00

Minimum Daily Speed Average: 0.8 km/h on Apr 11

Maximum Diurnal Speed Average: 3.0 km/h at hour 20

Minimum Diurnal Speed Average: 0.9 km/h at hour 9

Monthly Average Velocity: 1.3 km/h 48.0 deg

Percentiles: $P_1 = 2$ $P_{10} = 4$ $Q_1 = 6$ Median = 9 $Q_3 = 12$ $P_{90} = 15$ $P_{99} = 22$

Hours in Service:	720
Hours of Data:	684
Hours of Missing Data:	36
Percent Operational Time:	95.0

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-Apr	S7	SW8	WSW10	WSW8	W4	NNE7	NNE9	NNE12	NNE11	NNE16	NNE16	NE15	NNE15	NE13	NE10	NE11	NE10	NE10	NE9	NNE6	N6	NNE7	N6	N6	NNE6.7	NNE16
2-Apr	N7	N7	N7	N7	N7	NNE7	N8	NNE9	NNE7	NNE9	NNE11	NNE12	NNE16	NNE19	N20	N22	N21	N19	N20	N20	N18	N15	N13	N13	N13.0	N22
3-Apr	N14	N15	N15	N15	N14	N15	N14	NNE14	NNE12	NNE12	NE15	NE14	NE11	NE10	NNE9	NE8	ENE9	ENE9	NE8	NE7	NNE5	N5	N6	N5	NNE10.3	N15
4-Apr	N6	AF	SSE3	SSW6	SW7	SSW6	SSW6	S6	S8	SSE7	SSE5	ESE4	ENE3	ESE3	NNE5	NE5	NNE5	NNE5	N8	N9	N9	N12	N11	N10	NNE1.6	N12
5-Apr	NNE9	NNE10	NNE11	NNE11	NNE8	NNE8	NNE8	NNE9	NNE9	N8	N7	N4	SSE4	SE4	S10	S12	S12	S11	S10	S9	SSE10	SSE9	SSE9	SE6	E1.6	S12
6-Apr	SSE5	NW2	WNW2	NNW5	NNW5	N8	N10	NNE9	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	----	N10
7-Apr	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	NNE11	NNE10	NNE9	NNE8	NNE8	NNE8	NNE9	N7	----	NNE11
8-Apr	N7	NNE6	NNE6	NNE6	ENE3	E4	NNE4	NE3	ESE2	SE6	SE9	ESE9	ESE10	ESE10	ESE13	ESE13	ESE12	ESE11	ESE8	SE11	SE10	S4	SSE7	SE6	ESE5.7	ESE13
9-Apr	N2	NNW5	NW6	NNW2	NW9	NW16	NNW13	NNW16	NNW18	NNW19	NNW19	NNW18	NNW21	NNW20	NNW20	NNW18	N15	NNE16	N17	N16	NW16	NNW12	NNW12	N10	NNW13.5	NNW21
10-Apr	N13	N15	N14	NNE14	NNE14	NNE12	NNE11	NNE10	NNE8	NE9	NE11	NE10	NE7	ENE6	ENE6	ENE8	ENE7	E6	E6	ENE5	NE5	N5	N3	NNE4	NNE7.9	N15
11-Apr	NNW2	ESE1	AF	NW1	S4	SW2	SW3	S7	S7	SSW8	S9	SSW8	S8	S8	SSE4	E3	ESE4	NE6	NNE5	N6	N8	NNW8	NNW8	N6	S0.8	S9
12-Apr	NNE3	NW5	NNW6	N10	NNE8	NNE8	NNE10	NNE11	NNE10	NE9	NE11	NE12	NE12	NE13	NE15	NE14	NNE13	NNE12	NNE12	N12	NNE12	NNE12	N9	N9	NNE9.7	NE15
13-Apr	NNE7	NNE9	N8	N8	NNE9	N7	N7	NNW7	N6	ENE3	ESE5	NE3	N3	NNW3	SSW2	SSE5	SE8	SSE5	SE6	SE6	SSE7	SSE5	SSE3	E0	NE2.3	NNE9
14-Apr	NNE5	NNE10	N8	N9	N11	N8	N5	N9	N13	N10	NW5	NW7	NW12	NW11	NNW7	NNE6	NNW12	NW13	NW13	NW10	WNW7	WSW7	NNW3	NNE5	NNW7.4	N13
15-Apr	NE2	NW3	AF	AF	SSW3	SW4	SW3	SSE4	S6	S8	S8	S9	SSE10	S9	SSE9	SSE10	SSE10	SE9	ESE7	SE7	E4	SE2	SSE5	SSE4	SSE5.4	SSE10
16-Apr	SW5	SE7	SSE5	SSW4	SW4	SW5	SSW7	S8	S9	S12	S13	SSW14	SSW12	SW15	SW13	WSW14	W13	WNW8	NW1	SSW5	SSW7	SW8	SW7	SW6	SSW7.1	SW15
17-Apr	S9	S8	S7	S4	SSE5	S6	SSE4	SSW3	S7	SSW7	S5	S5	ESE3	NNW2	NNW7	W11	WNW12	NW10	NW4	SE4	S4	SW4	WNW4	SSE3	SSW2.9	WNW12
18-Apr	SSW6	SSW7	S6	SSW8	S6	S9	S11	S13	S10	S8	SSE8	SSE11	SSE15	S18	S22	S23	S23	S19	S21	SSE17	SSE16	SSE13	SSE10	SSE5	S12.5	S23
19-Apr	SSE6	SSE8	S8	S8	S10	SSW10	WNW13	WNW15	WNW14	WSW13	WSW18	W21	W18	WSW23	W21	W21	W23	W20	W19	WNW17	WNW11	W13	NW10	NNE15	W11.1	WSW23
20-Apr	NNE13	NNW16	NW22	NNW17	NNW19	N17	NNE17	NNE14	NNE15	NNE14	NNE13	NNE13	NNE13	NE12	NE11	NE11	ENE11	ENE11	ENE10	ENE7	NE6	NE5	NE5	N4	NNE10.6	NW22
21-Apr	N5	N5	N5	N5	N4	N5	NNE3	NNE3	ENE5	NE8	NE7	NNE9	NE10	NNE13	NNE15	NNE15	NNE16	NNE16	NNE15	NNE14	NNE12	NNE10	NNE10	N9	NNE9.0	NNE16
22-Apr	N9	N8	N9	NNE8	NNE9	N8	NNE10	NNE10	NNE11	NNE11	NNE11	NE12	NE12	NNE12	NNE13	NNE13	NNE13	NNE14	N15	NNE14	NNE11	N10	N9	N7	NNE10.6	N15
23-Apr	N8	N7	N6	N7	N6	N7	N8	N6	NNE6	NNE6	NE6	ENE6	E5	NE6	E10	E11	ENE10	ENE9	ESE6	ESE7	SE11	SE13	SE13	SE9	ENE4.8	SE13
24-Apr	SE8	SSE7	SSE8	SSE7	SE7	SE8	SE8	SSE8	SSE10	SSE11	SSE13	SSE11	SSE12	SSE11	S7	S6	S9	S6	ESE7	ESE7	SE9	SSE12	S14	S17	SSE9.0	S17
25-Apr	S13	S11	S9	S9	S9	S8	S11	S13	S12	S12	S10	SSW11	S13	SSW10	SW9	SSW10	S13	S12	S13	S11	S9	S8	S8	S9	S10.3	S13
26-Apr	S8	S10	S10	SSW5	S7	SSE7	S9	S10	S9	S8	S8	S9	SSE10	SSE10	SSE9	S7	SSE7	SSE6	SSE5	SSE5	SE5	S5	SSE4	SW7	S7.3	S10
27-Apr	WSW7	SW5	W2	NW4	SSE1	SSW4	NW3	ESE4	SSE5	NE4	NNE5	NE5	E8	E6	ENE7	ENE9	ENE10	ENE10	NE10	NE8	NNE6	N7	N8	N8	NE3.2	ENE10
28-Apr	N6	N6	NNW3	N4	WNW1	S3	S5	S8	S9	S8	SSE10	S12	S12	S13	S14	SSE13	SSE14	SSE12	SE9	SE8	SSE7	SSE7	S7	SSE7	SSE6.3	SSE14
29-Apr	SSE8	SSE8	SSE7	SSE7	SSE9	SSE8	SE8	SSE10	SSE15	SSE16	SSE22	S23	SSE24	S22	S20	S21	S21	S17	S15	SSE7	SSE6	S9	S9	SSW8	S13.0	SSE24
30-Apr	S7	S6	SW2	SE2	SSW3	S7	S7	SSW8	S13	SSW12	SW11	S15	SW16	W14	WSW15	WSW15	SSW11	SSW14	SSW9	NNW7	N5	NE4	WNW2	WSW2	SW6.4	SW16
	NNE1.3	N1.6	NNW1.8	N2.3	N1.7	N1.6	NNE2.1	NNE1.7	ENE0.9	E1.2	ESE1.9	ESE1.9	ESE1.9	ESE1.0	E0.9	E1.0	E1.7	ENE2.1	ENE2.5	NE3.0	NE1.9	NE1.1	NNE1.1	NNE1.5	Diurnal Average	
	N14	NNW16	NW22	NNW17	NNW19	N17	NNE17	NNW16	NNW18	NNW19	SSE22	S23	SSE24	WSW23	S22	S23	S23	W20	S21	N20	N18	N15	S14	S17	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 - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 7 km/h on Apr 19 14:00

Minimum Value: 0 km/h on Apr 15 00:00

Percentiles: P_1 = 1 P_{10} = 1 Q_1 = 2 Median = 2 Q_3 = 3 P_{90} = 4 P_{99} = 7

Hours in Service:	720
Hours of Data:	684
Hours of Missing Data:	36
Hours of Calibration:	0
Percent Operational Time:	95.0

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-Apr	2	2	2	2	1	2	2	4	3	4	4	3	4	3	3	2	2	3	3	1	1	1	1	1	4
2-Apr	1	1	2	1	1	1	2	2	2	2	3	3	4	5	5	5	5	5	5	5	4	4	3	3	5
3-Apr	3	4	4	4	4	3	4	4	3	3	4	4	3	3	3	2	3	2	2	1	1	1	1	1	4
4-Apr	1	AF	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	1	2	2	2	3	2	2	3
5-Apr	2	2	2	2	2	2	2	2	2	2	2	1	2	3	3	3	3	3	2	2	2	2	2	2	3
6-Apr	1	1	2	1	2	2	3	3	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	3
7-Apr	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	3	3	2	2	2	2	2	2	3
8-Apr	2	1	1	1	1	1	1	1	2	2	3	3	3	3	4	4	4	3	2	4	5	2	2	1	5
9-Apr	1	1	2	2	6	4	3	4	5	5	4	5	5	5	5	5	4	4	4	4	4	3	3	2	6
10-Apr	3	4	4	4	3	3	3	2	2	3	3	3	3	3	3	2	3	2	2	1	2	1	1	2	4
11-Apr	1	1	AF	1	2	2	1	2	2	2	2	2	2	2	2	2	2	2	1	1	1	2	1	2	2
12-Apr	1	1	1	3	3	2	3	3	3	3	3	3	3	4	4	4	3	3	3	3	3	3	2	2	4
13-Apr	2	2	2	2	2	2	1	2	2	2	2	2	1	1	1	3	2	1	1	2	2	1	1	2	3
14-Apr	1	3	2	4	3	2	1	4	4	3	2	3	3	3	2	2	3	3	3	2	2	1	2	0	4
15-Apr	1	1	AF	AF	1	1	1	1	1	3	3	3	3	3	3	4	3	3	2	2	3	2	2	1	4
16-Apr	2	2	1	1	1	1	1	2	2	3	3	4	5	5	5	5	4	3	2	2	2	1	1	1	5
17-Apr	2	2	2	2	2	3	4	2	2	2	3	2	3	3	3	4	4	3	2	2	1	1	2	2	4
18-Apr	1	1	2	2	1	2	2	3	3	2	2	4	4	7	6	7	6	5	5	4	4	3	2	1	7
19-Apr	1	1	1	2	2	2	3	4	4	4	7	7	7	7	7	7	7	7	7	5	3	4	5	5	7
20-Apr	4	6	5	5	5	7	4	4	4	4	4	4	4	4	4	3	3	3	3	2	1	1	1	1	7
21-Apr	1	1	1	1	1	1	1	1	2	2	2	3	4	4	5	4	4	4	4	3	3	2	2	2	5
22-Apr	2	2	2	2	2	2	3	2	3	3	4	4	4	4	4	4	3	4	4	3	2	2	2	2	4
23-Apr	2	1	1	1	1	1	2	2	2	2	3	3	4	4	4	4	4	3	2	1	3	4	4	4	4
24-Apr	3	2	2	2	2	2	2	3	3	3	4	3	4	4	2	3	2	2	3	2	3	3	4	4	4
25-Apr	3	2	2	2	2	2	3	3	3	3	2	3	4	3	3	3	3	4	3	3	2	2	1	2	4
26-Apr	2	2	2	2	1	2	2	2	3	2	2	2	2	2	2	2	2	2	1	1	2	1	2	1	3
27-Apr	1	2	1	1	2	1	1	1	2	2	2	2	2	3	3	3	3	3	2	2	1	1	1	2	3
28-Apr	1	1	2	2	1	2	1	2	2	2	3	5	4	4	5	4	4	3	3	2	1	1	1	1	5
29-Apr	1	2	2	2	2	2	2	3	4	4	6	6	7	6	6	6	6	5	4	3	1	1	2	1	7
30-Apr	1	1	2	2	2	1	1	3	4	3	4	6	6	4	5	5	4	4	4	4	1	2	2	1	6
	4	6	5	5	6	7	4	4	5	5	7	7	7	7	7	7	7	7	7	5	5	4	5	5	
	Diurnal Maximum																								

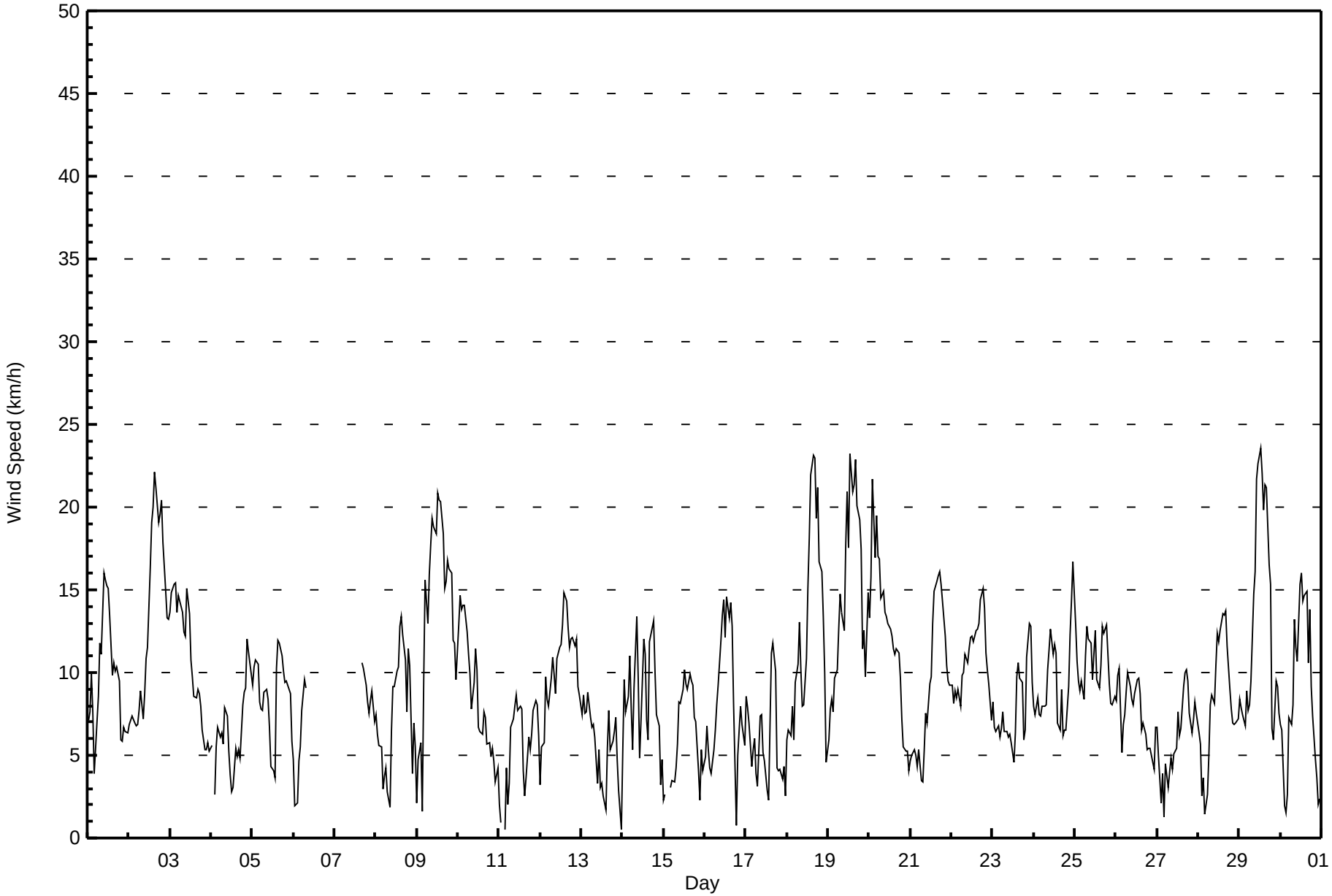
AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed (WS) - km/h

CNRL Horizon - April 2016



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	137	20.03	20.03
6 - 11	362	52.92	72.95
12 - 19	159	23.25	96.20
20 - 28	26	3.80	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Wind Speed (WS) - km/h

CNRL Horizon - April 2016

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	17	13	10	5	5	8	5	23	8	8	10	1	2	4	9	9	137
6 - 11	61	58	27	17	6	10	22	44	68	19	8	4	1	3	7	7	362
12 - 19	23	42	12	0	0	3	2	12	25	4	3	5	5	5	5	13	159
20 - 28	5	0	0	0	0	0	0	2	9	0	0	1	5	0	1	3	26
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	106	113	49	22	11	21	29	81	110	31	21	11	13	12	22	32	684

Total Number of Valid Hours: 684

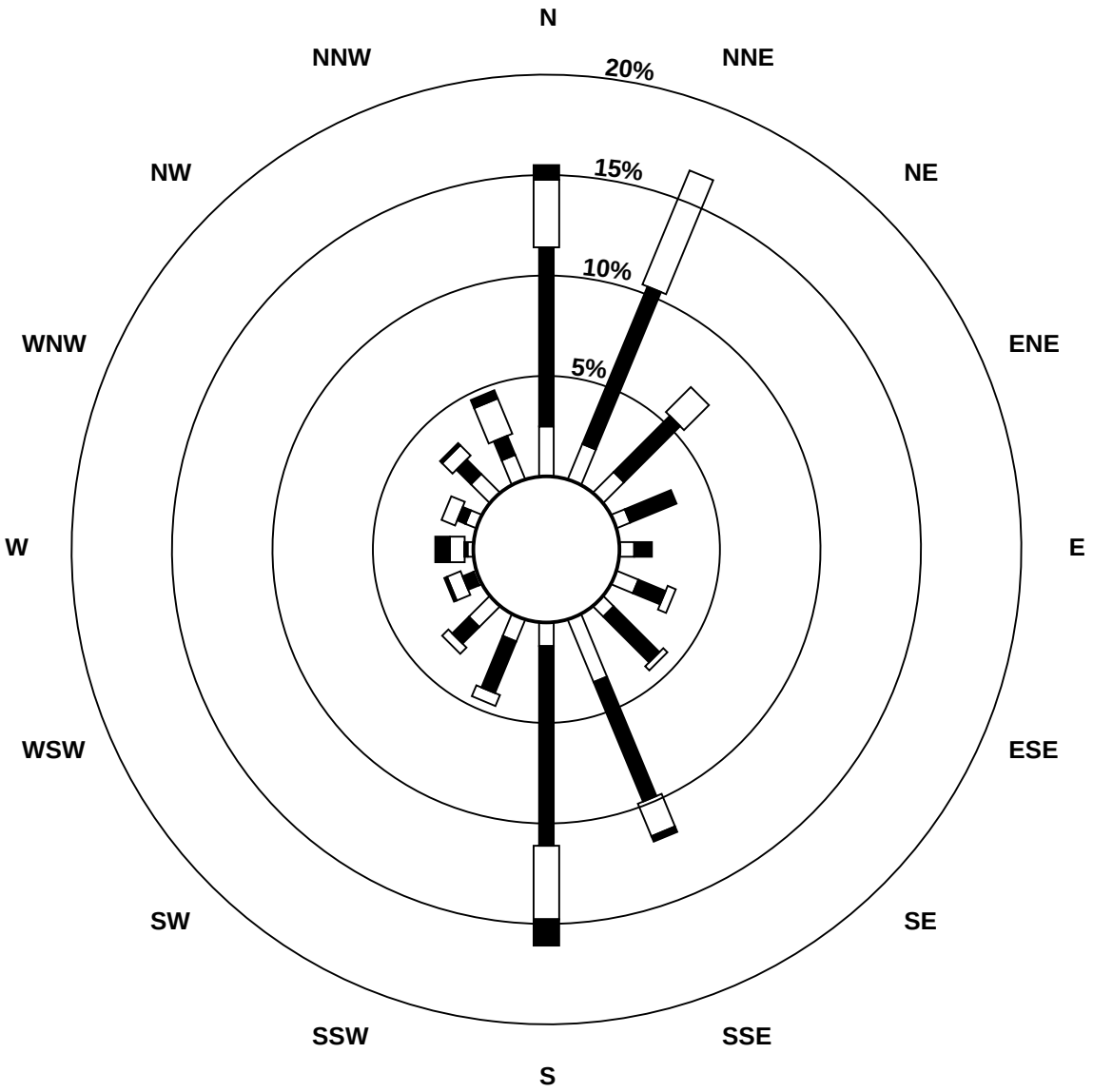
Total Number of Hours: 720

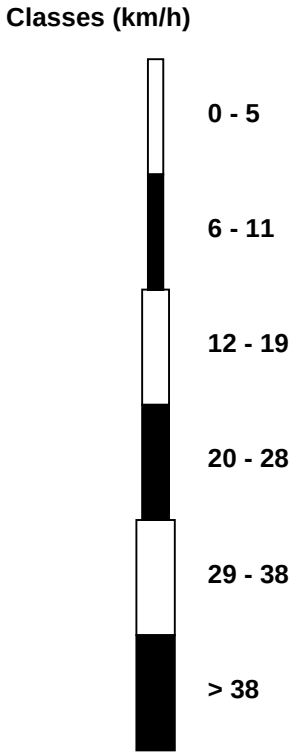
Wood Buffalo Environmental Association

Wind Rose Apr 2016

Wind Speed (WS) - km/h

CNRL Horizon (AMS 15)





Total Number of Valid Hours: 684

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

CNRL Horizon - April 2016

Direction of Maximum Speed: 163 deg on Apr 29 13:00
Direction of Maximum Daily Speed Average: 339.9 deg on Apr 9

Direction of Minimum Speed: 100 deg on Apr 14 00:00

Direction of Minimum Daily Speed Average: 0.8 deg on Apr 11

Monthly Average Direction: 212.0 deg

Hours in Service:	720
Hours of Data:	684
Hours of Missing Data:	36
Percent Operational Time:	95.0

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-Apr	186	219	245	243	278	17	21	20	24	23	26	37	32	36	39	38	53	53	53	28	6	15	8	9	26.0
2-Apr	10	8	9	8	359	14	10	19	20	22	21	17	19	13	9	8	7	10	8	9	7	7	5	3	10.4
3-Apr	3	5	7	8	5	9	11	16	17	22	37	35	45	36	19	53	57	60	43	42	31	3	359	353	21.5
4-Apr	7	AF	155	210	216	203	203	186	185	160	162	123	63	112	29	42	28	12	10	10	5	8	4	9	31.8
5-Apr	14	17	17	23	16	15	18	16	19	4	11	359	152	145	177	183	174	184	188	183	167	163	167	143	95.8
6-Apr	154	304	284	345	333	351	4	29	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--
7-Apr	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	14	19	14	19	12	19	14	2	--
8-Apr	0	13	15	21	58	79	23	51	107	125	139	110	123	117	121	116	121	121	117	130	144	169	149	137	111.5
9-Apr	6	337	310	328	308	325	334	338	331	330	328	335	333	345	342	344	4	17	4	353	321	340	345	351	339.9
10-Apr	1	4	7	12	12	18	28	29	33	38	43	42	52	75	78	72	59	89	91	62	48	356	7	23	32.0
11-Apr	338	116	AF	309	183	234	214	191	175	194	189	193	191	181	162	91	112	38	21	5	351	347	347	359	188.3
12-Apr	14	314	328	11	16	17	19	22	26	40	43	47	41	48	40	37	20	23	12	8	14	17	10	8	22.9
13-Apr	14	16	7	355	23	2	3	346	7	62	105	36	2	348	198	155	129	155	130	134	148	168	167	100	49.7
14-Apr	19	19	11	9	3	1	0	359	352	352	313	313	318	316	335	21	332	312	321	314	283	245	337	33	339.2
15-Apr	42	317	AF	AF	201	215	216	163	178	175	180	173	166	173	152	163	164	139	121	124	100	135	156	167	161.2
16-Apr	223	134	167	195	219	217	192	188	186	185	184	196	210	221	226	245	278	299	314	200	204	217	220	218	211.4
17-Apr	190	176	173	188	162	190	152	192	180	209	188	175	119	336	344	269	300	309	307	142	174	219	292	159	213.5
18-Apr	210	196	180	197	175	169	178	181	180	182	160	152	164	172	182	183	181	172	169	164	162	157	159	164	173.4
19-Apr	164	156	180	173	189	200	291	301	292	251	237	261	260	249	271	280	279	270	275	302	287	267	319	18	266.4
20-Apr	23	347	322	341	344	354	16	26	23	27	31	33	33	50	52	53	72	69	68	59	56	44	39	11	22.1
21-Apr	353	2	1	10	7	3	16	24	57	44	49	29	36	29	28	21	18	21	21	16	20	20	15	5	21.5
22-Apr	2	5	5	14	12	9	13	14	19	25	33	45	34	29	33	24	29	16	10	13	14	9	10	7	18.7
23-Apr	354	7	351	0	358	357	2	7	31	33	35	66	96	44	87	83	64	65	115	114	126	139	140	143	65.1
24-Apr	142	159	156	157	146	140	142	153	151	157	165	158	161	165	179	180	171	169	122	112	126	149	175	185	157.1
25-Apr	183	184	179	178	180	186	185	182	185	189	181	195	184	205	236	210	188	191	183	179	181	185	185	186	187.7
26-Apr	186	184	184	194	171	166	175	179	191	186	176	177	161	165	163	169	156	160	152	147	138	173	167	214	173.5
27-Apr	239	232	266	320	161	211	306	123	166	42	25	53	85	81	57	62	70	67	53	46	21	4	349	353	45.5
28-Apr	351	3	342	1	294	176	183	181	176	179	165	177	174	179	179	154	161	153	129	134	150	149	172	162	164.3
29-Apr	160	157	158	156	162	153	142	156	162	160	167	174	163	181	180	185	188	185	178	168	165	183	188	192	171.8
30-Apr	184	177	223	135	211	172	185	198	189	193	214	187	234	261	242	256	206	197	206	348	358	35	295	257	214.7
	13.3	7.5	341.4	0.4	356.2	4.8	11.3	29.9	73.9	93.9	113.6	113.6	116.4	118.9	94.1	94.4	79.3	68.9	56.6	44.7	51.5	40.6	20.4	25.4	
	Diurnal Average																								

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: 94 deg on Apr 11 04:00

Minimum Value: 7 deg on Apr 4 05:00

Percentiles: P_1 = 9 P_{10} = 14 Q_1 = 17 Median = 20 Q_3 = 26 P_{90} = 37 P_{99} = 82

Hours in Service:	720
Hours of Data:	684
Hours of Missing Data:	36
Hours of Calibration:	0
Percent Operational Time:	95.0

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-Apr	22	16	17	14	43	25	19	20	20	19	19	17	18	20	23	18	23	18	17	15	15	14	14	12	43
2-Apr	14	16	17	14	12	15	17	17	22	24	25	27	21	21	21	21	21	20	20	19	19	20	20	20	27
3-Apr	19	19	19	20	21	19	19	20	22	20	15	19	23	25	28	32	27	24	15	13	12	10	12	10	32
4-Apr	10	AF	22	9	7	11	15	19	16	21	43	57	73	71	33	35	25	18	15	17	17	18	19	17	73
5-Apr	17	17	17	16	16	17	17	20	21	19	22	42	59	79	26	22	18	17	17	15	14	14	15	19	79
6-Apr	21	46	24	28	25	23	17	17	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	46
7-Apr	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	21	20	19	18	17	16	18	21	21
8-Apr	17	13	10	9	31	31	20	58	63	34	29	27	27	26	23	22	21	20	22	20	24	33	22	17	63
9-Apr	64	22	19	54	26	15	18	21	16	17	17	19	19	22	22	22	24	19	21	22	16	22	19	16	64
10-Apr	20	19	20	19	19	16	18	21	28	29	23	25	53	49	55	37	34	35	23	14	23	12	17	12	55
11-Apr	18	68	AF	94	33	58	24	17	19	23	23	24	29	22	48	63	46	15	17	16	15	18	15	15	94
12-Apr	23	11	14	16	17	18	17	19	21	30	20	22	21	20	20	20	20	18	17	18	18	18	18	17	30
13-Apr	17	16	22	22	16	21	18	18	21	67	33	44	34	47	83	32	22	17	16	19	18	19	14	75	83
14-Apr	19	17	17	19	18	18	21	24	19	20	29	38	18	20	24	31	19	18	16	16	20	12	66	15	66
15-Apr	75	28	AF	AF	26	15	14	24	34	31	36	34	32	37	42	35	30	25	17	15	25	84	11	23	84
16-Apr	39	25	19	25	15	11	14	15	15	17	19	22	30	26	30	26	33	26	71	33	19	17	18	22	71
17-Apr	14	13	23	37	34	61	79	62	20	31	70	64	85	93	38	32	25	21	15	50	35	65	21	72	93
18-Apr	18	12	23	15	23	12	13	15	21	26	29	27	22	27	21	18	18	16	15	15	15	15	14	14	29
19-Apr	17	16	9	18	15	16	27	17	23	30	28	26	29	25	27	22	21	23	21	14	18	20	50	21	50
20-Apr	19	30	16	24	21	28	19	19	20	23	25	26	26	27	32	29	25	24	20	16	11	11	12	20	32
21-Apr	9	7	9	16	8	11	18	36	34	33	38	34	34	30	26	24	23	22	20	18	17	16	16	17	38
22-Apr	17	20	17	15	16	16	18	20	21	26	29	27	27	26	27	23	22	21	20	17	17	18	17	17	29
23-Apr	17	13	15	13	15	14	18	21	33	37	43	66	87	66	47	33	32	30	30	13	17	20	19	22	87
24-Apr	24	25	17	17	20	20	20	21	23	21	20	22	22	22	34	34	18	16	21	16	19	21	17	15	34
25-Apr	15	16	15	14	15	15	17	18	20	23	23	24	23	30	26	27	23	24	18	15	14	13	12	13	30
26-Apr	13	13	14	25	9	15	15	20	22	26	25	22	19	17	19	24	18	24	24	19	19	15	30	15	30
27-Apr	19	32	60	16	85	22	37	31	35	47	34	42	31	53	52	31	26	23	18	13	17	14	11	12	85
28-Apr	12	12	24	13	44	68	13	19	22	33	27	29	27	22	27	22	20	21	18	15	24	13	11	10	68
29-Apr	13	14	12	15	13	16	18	18	20	19	20	22	19	20	21	21	18	19	16	13	13	10	12	10	22
30-Apr	9	11	58	53	50	15	15	19	20	23	32	35	35	27	24	22	30	22	41	47	25	40	66	41	66
	75	68	60	94	85	68	79	62	63	67	70	66	87	93	83	63	46	35	71	50	35	84	66	75	
	Diurnal Maximum																								

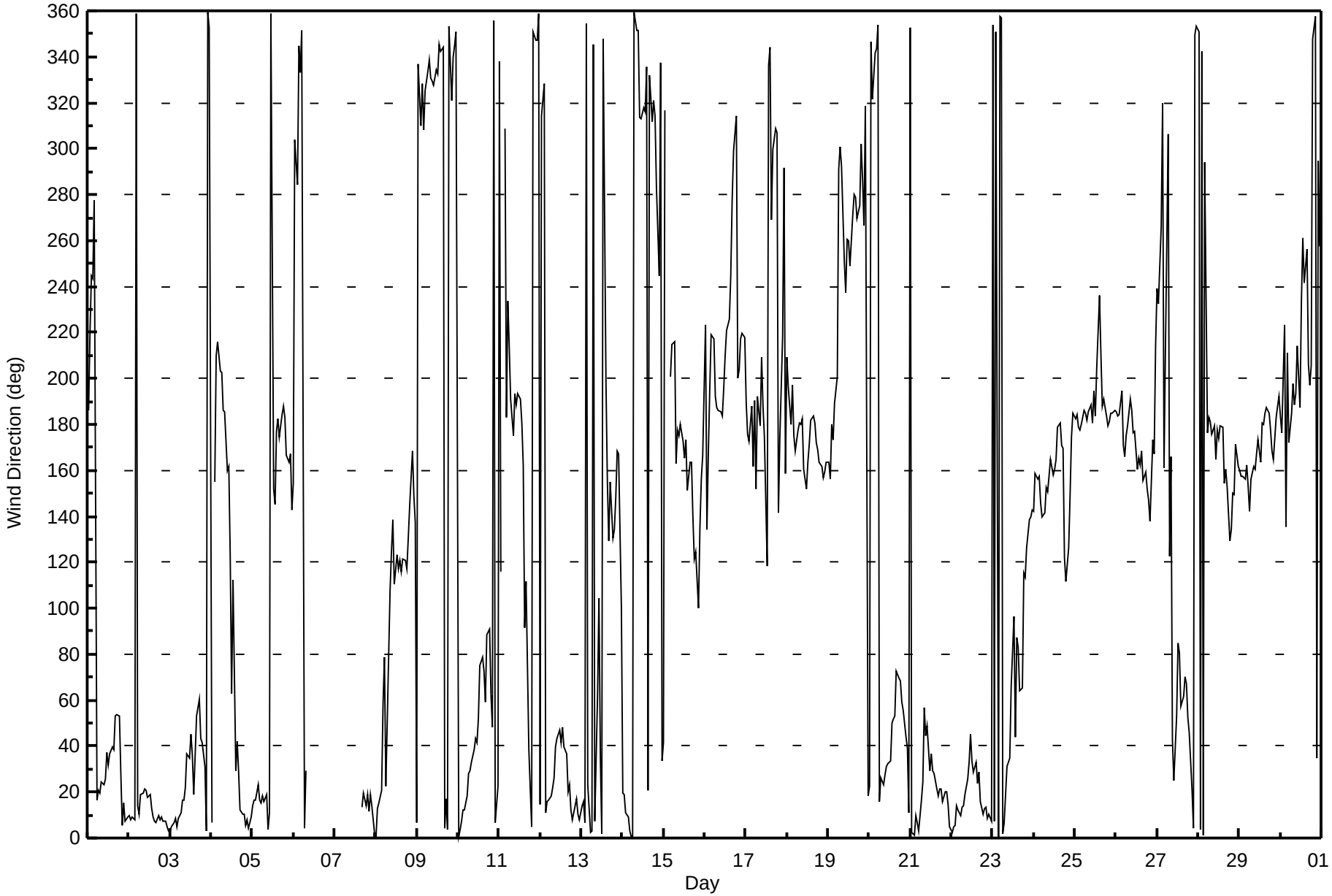
AF - Analyzer Failure

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction (WD) - deg

CNRL Horizon - April 2016



Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

Calibration Date	April 25, 2016	Last Calibration	March 15, 2016
Station Name	CNRL Horizon	Station Number	AMS 15
Reason:	Routine		
Start Time (MST)	9:50	End Time (MST)	13:40
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

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 1000 ppb		PMT voltage	-622	-622
Analyzer IP address	192.168.1.43		Lamp voltage	855	855
Calculated slope	0.997015	0.997989	Chamber temp	45.0	45.3
Calculated intercept	-0.388728	-0.247579	Pressure	708.1	706.9
Analyzer Background	18.6	18.7	Flow	0.431	0.428
Analyzer Coefficient	1.003	1.012	Intensity	91	91

Analyzer make	Thermo 43i	Analyzer serial #	710321322

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.2	----
as found span	5000	81.5	815.0	804.9	1.013
calibrator zero	5000	0.0	0.0	0.2	----
high point	5000	81.5	815.0	816.5	0.998
second point	5000	40.6	406.0	408.3	0.994
third point	5000	20.2	202.0	201.8	1.001
as left zero	5000	0.0	0.0	0.4	----
as left span	5000	81.5	815.0	816.3	0.998
				Average Correction Factor	0.998

Corrected As found	804.6	Previous response	817.8	% change	1.6%

Notes:

Sample inlet filter replaced after as founds. Conditioned the calibrated after as founds. Slightly adjusted span.

Calibration Performed By: Asad Hidayat

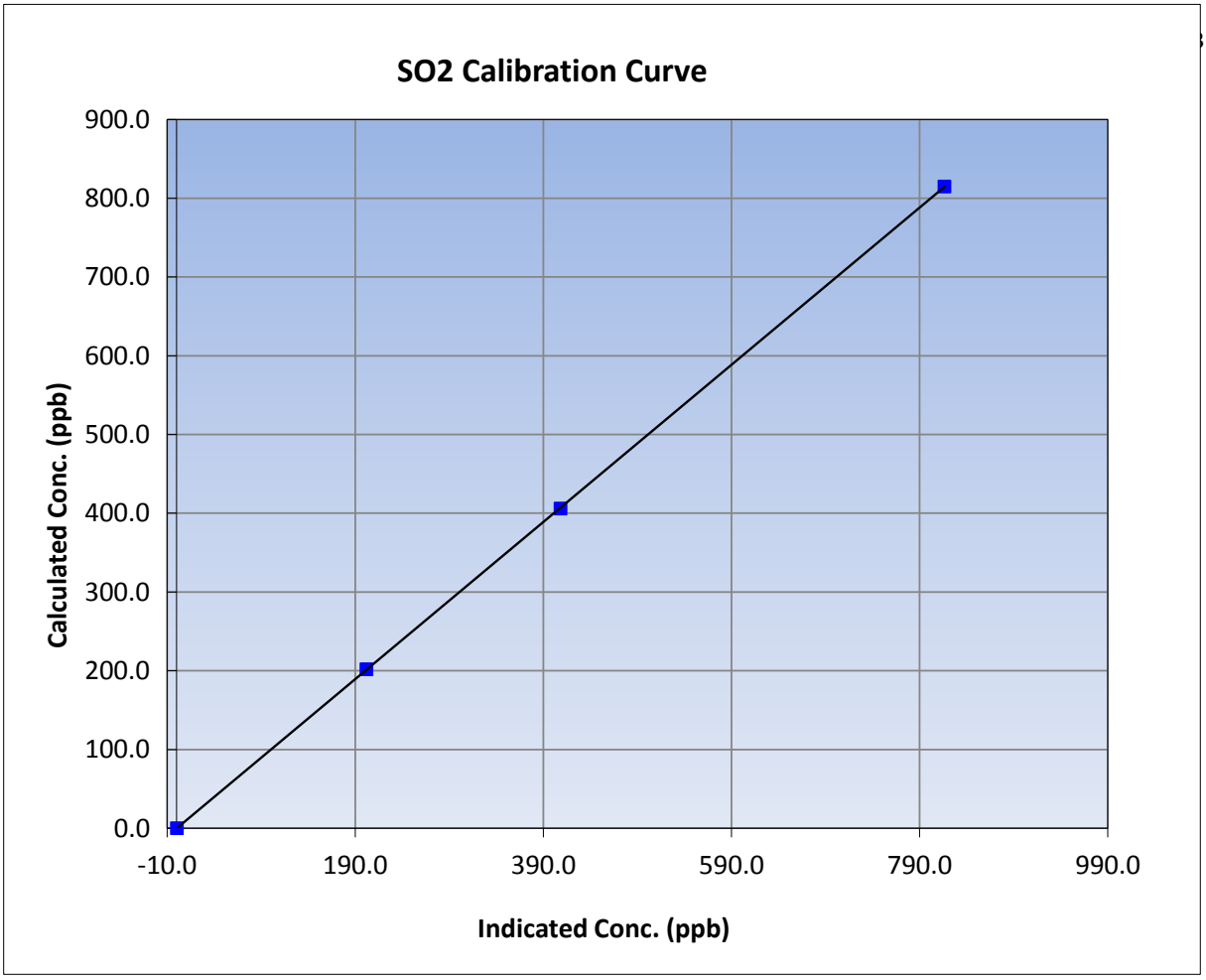
Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

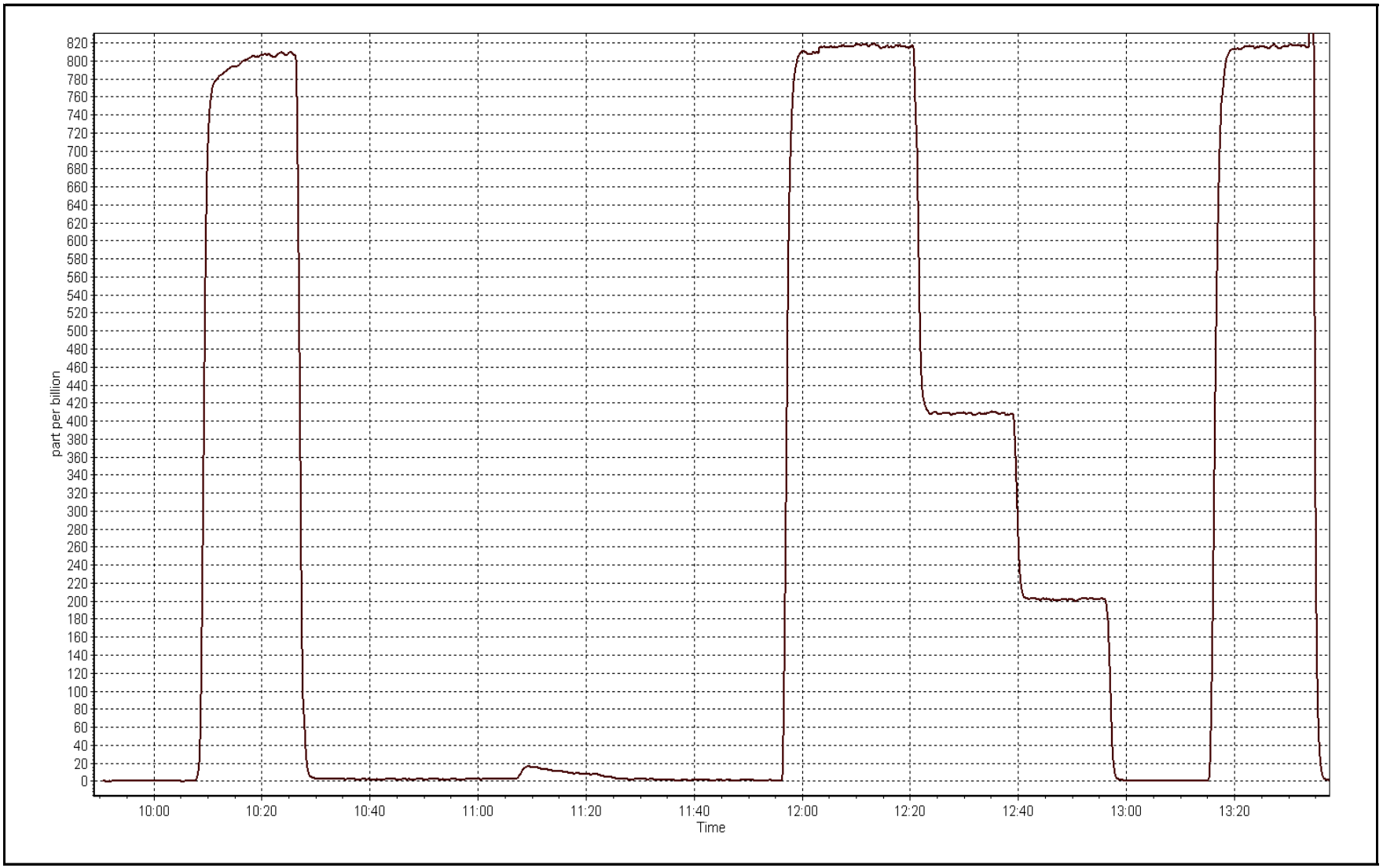
Calibration Date	April 25, 2016	Previous Calibration	March 15, 2016
Station Name	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	9:50	End Time (MST)	13:40
Analyzer make	Thermo 43i	Analyzer serial #	710321322

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	----	Correlation Coefficient	0.999993
815.0	816.5	0.9982		
406.0	408.3	0.9943	Slope	0.997989
202.0	201.8	1.0008		
			Intercept	-0.247579



SO2 Calibration Plot Date: April 25, 2016



Wood Buffalo Environmental Association
Repair TRS Calibration Report

Station Information

Calibration Date	April 28, 2016	Last Calibration	April 27, 2016
Station Name	CNRL Horizon	Station Number	AMS 15
Reason:	Routine		
Start Time (MST)	7:50	End Time (MST)	11:20
Gas Cert Reference	LL82745	Station temp.	22 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	1005
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2580
SO2 gas concentration	50 ppm	SO2 gas cert/exp	S0002486 26/Sep/17

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-694	-694
Analyzer IP address	192.168.1.44		Lamp voltage	986	982
Calculated slope	0.985537	1.003270	Chamber temp	45	45
Calculated intercept	0.014363	0.002949	Pressure	690.5	647.5
Analyzer Background	1.47	1.35	Flow	0.436	0.411
Analyzer Coefficient	1.060	0.946	Intensity	91	91
			Converter temp.	801	800

Analyzer make/model	Thermo 43i TLE	Analyzer serial #	1150840012
Converter make/model	CDN-101	Converter serial #	461/531

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.1	----
as found span	5000	41.7	80.1	81.8	0.979
SO2 scrubber check	5000	20.4	204.0	0.6	----
calibrator zero	5000	0.0	0.0	0.2	----
high point	5000	41.7	80.1	79.9	1.002
second point	5000	20.8	39.9	39.7	1.006
third point	5000	10.4	20.0	19.7	1.014
as left zero	5000	0.0	0.0	0.2	----
as left span	5000	41.4	79.5	79.7	0.997
				Average Correction Factor	1.007

Corrected As found	81.7	Previous response	81.2	% change	-0.6%

Notes:

Converter changed out, old converter temperature fluctuating, new converter put in after as founds, flow and pressure changed after converter change out. Old converter serial #461, New Converter #531

Calibration Performed By: Melissa Lemay

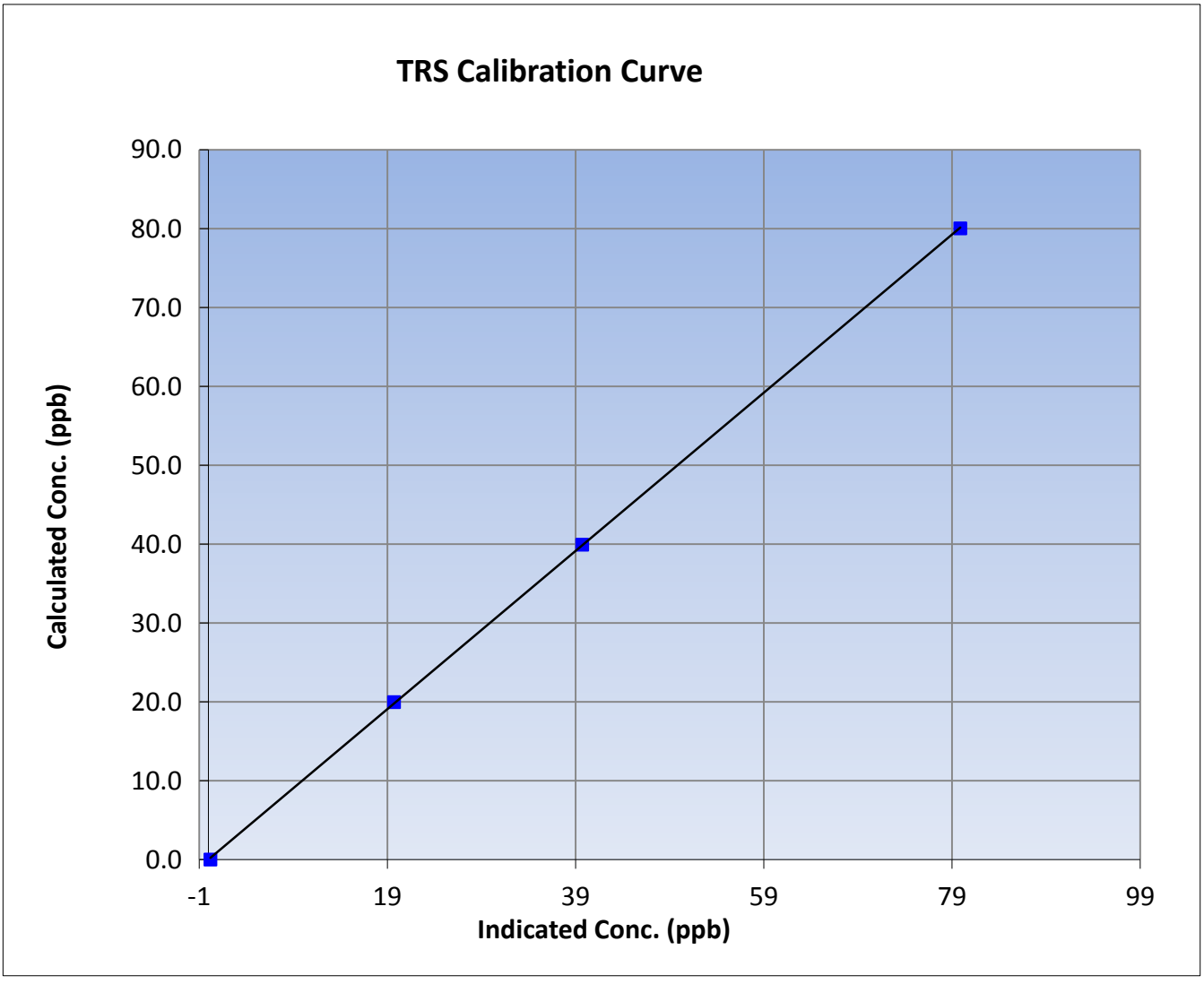
Wood Buffalo Environmental Association
TRS Calibration Report

Station Information

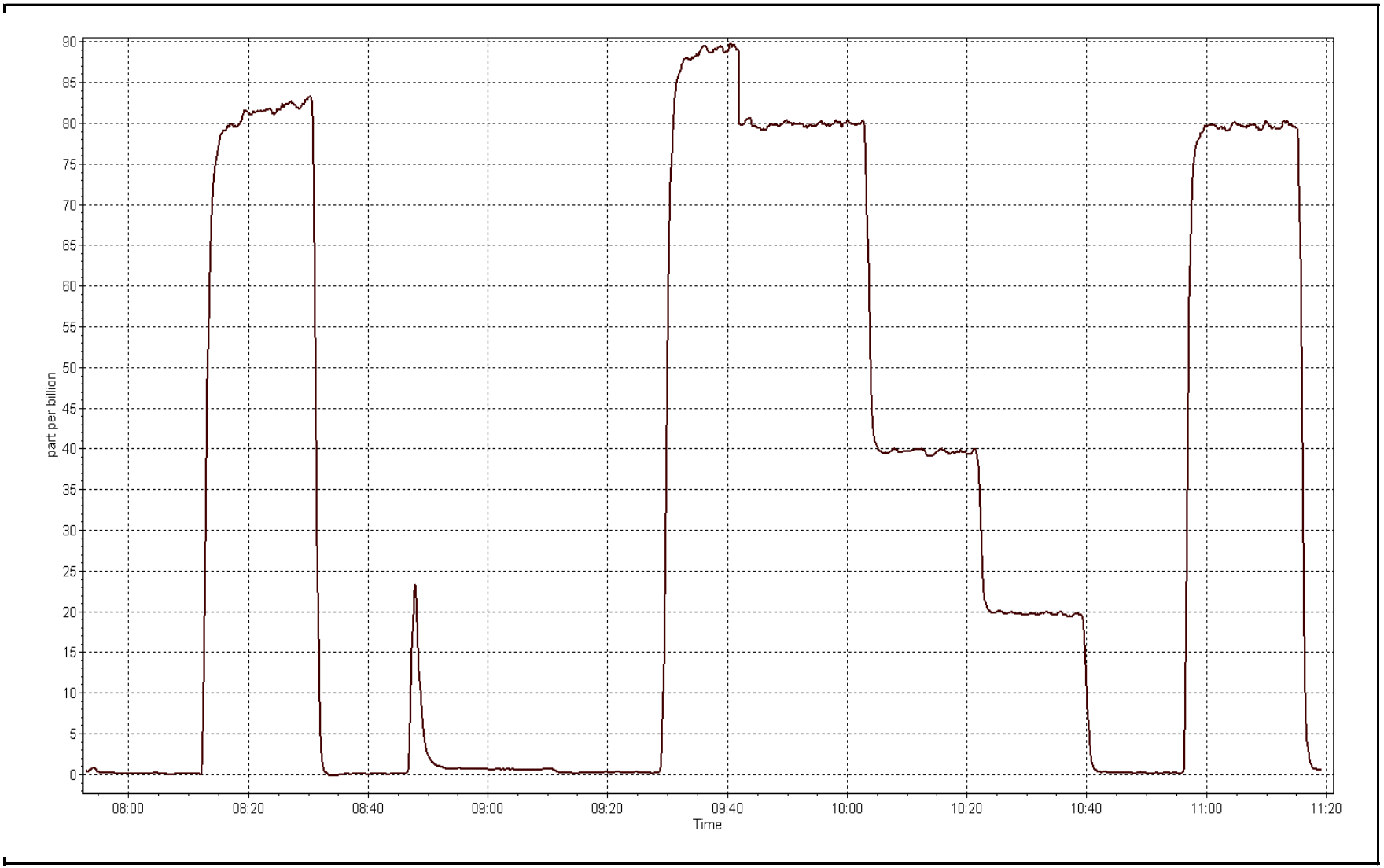
Calibration Date	April 28, 2016	Previous Calibration	April 27, 2016
Station Name	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	7:50	End Time (MST)	11:20
Analyzer make	Thermo 43i TLE	Analyzer serial #	1150840012

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	----	Correlation Coefficient	0.999971
80.1	79.9	1.0021		
39.9	39.7	1.0059	Slope	1.003270
20.0	19.7	1.0136		
			Intercept	0.002949



TRS Calibration Plot Date: April 28, 2016



Wood Buffalo Environmental Association
THC Calibration Report

W B E A

Station Information

Calibration Date	April-25-16	Last Calibration	March-15-16
Station Name	CNRL Horizon	Station Number	AMS 15
Reason:	Routine		
Start Time (MST)	9:50	End Time (MST)	13:36
Gas Cert Reference	S0002486	Cal Gas Expiry Date	26-Sep-17
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	8.7	8.7
Analyzer IP address	192.168.1.51		Air or Bypass Press	38.0	38.0
Calculated slope	1.006812	0.999873	Fuel Pressure	26.3	26.3
Calculated intercept	-0.043058	-0.018927	Analyzer Coeff	3.1	3.2
			Analyzer BKG	1.850	2.080

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	0.16	----
as found span	5000	81.5	17.06	17.08	0.999
calibrator zero	5000	0.0	0.00	0.02	----
high point	5000	81.5	17.06	17.08	0.999
second point	5000	40.6	8.50	8.53	0.996
third point	5000	20.2	4.23	4.24	0.997
as left zero	5000	0.0	0.00	0.01	----
as left span	5000	81.5	17.06	17.15	0.995
				Average Correction Factor	0.998

Corrected As found	16.92	Previous response	16.99	% change	0.4%

Notes:

Sample inlet filter replaced after as founds. Conditioned the calibrated after as founds. Adjusted zero.

Calibration Performed By: Asad Hidayat

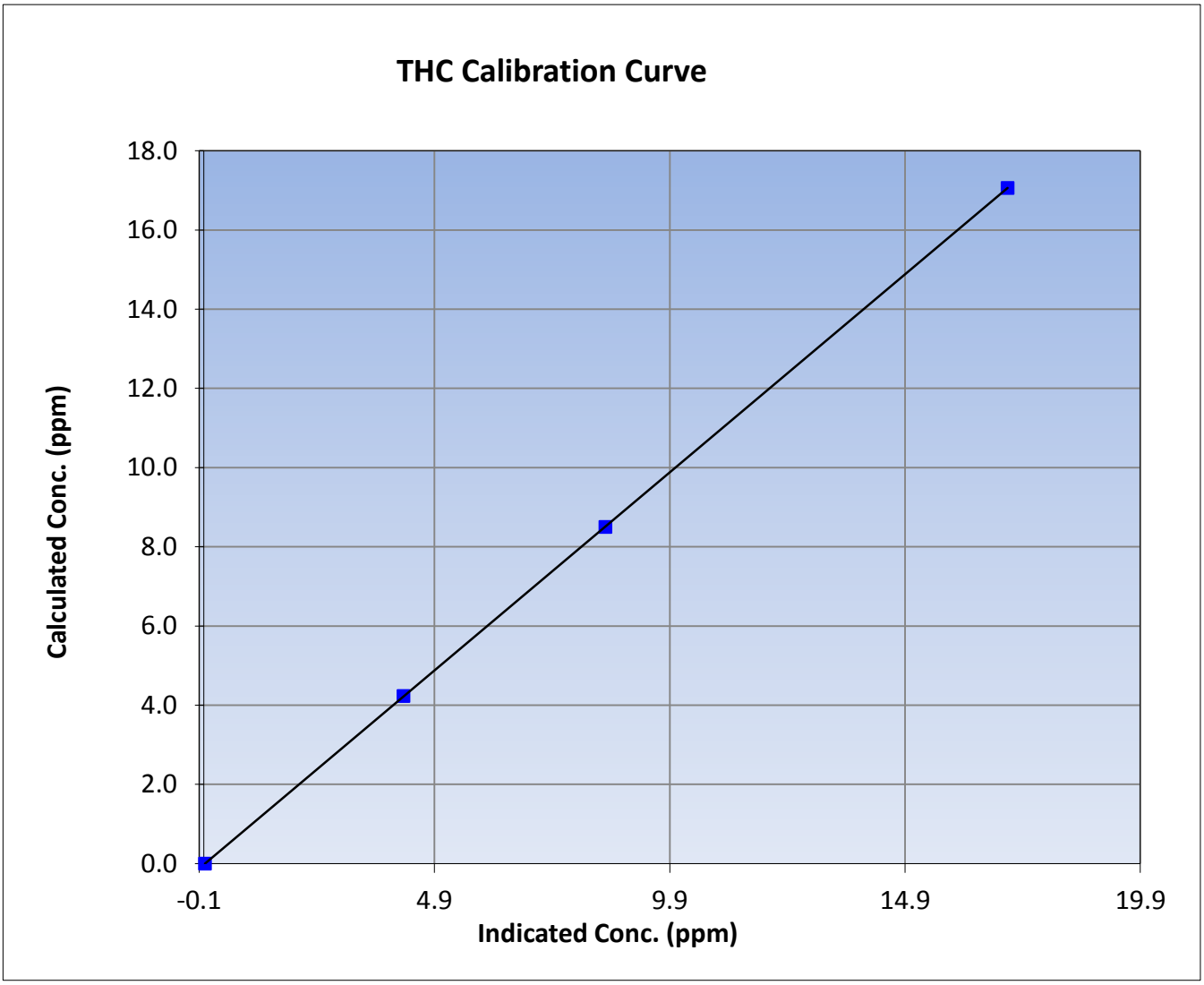
Wood Buffalo Environmental Association
THC Calibration Report

Station Information

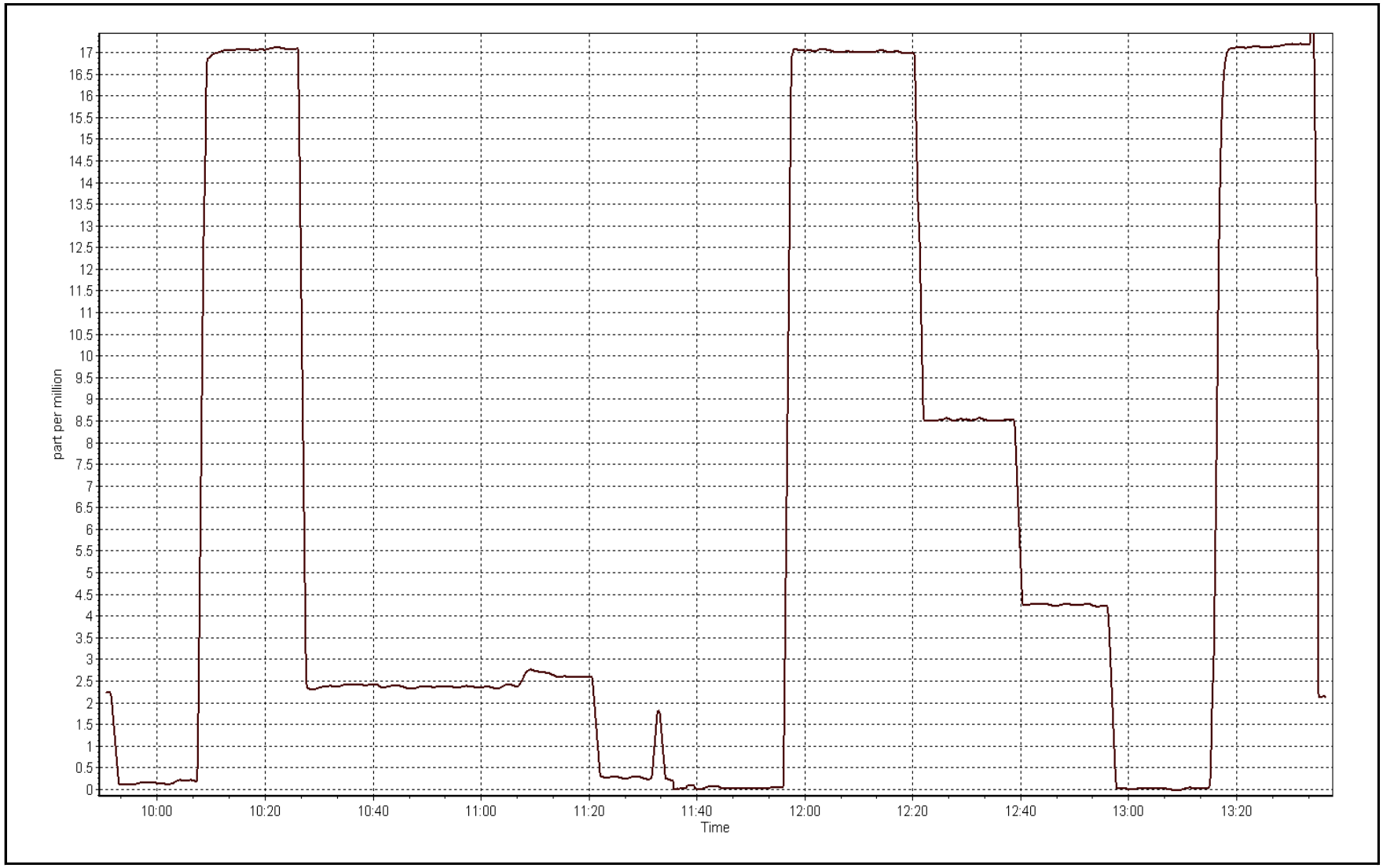
Calibration Date	April 25, 2016	Previous Calibration	March 15, 2016
Station Name	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	9:50	End Time (MST)	13:36
Analyzer make	Thermo 51i-LT	Analyzer serial #	1327059295

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.02	----	Correlation Coefficient	0.999999
17.06	17.08	0.9989		
8.50	8.53	0.9964	Slope	0.999873
4.23	4.24	0.9974		
			Intercept	-0.018927



THC Calibration Plot Date: April 25, 2016



Wood Buffalo Environmental Association
NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	April 26, 2016	Previous Calibration	March 15, 2016
Station Name	CNRL Horizon	Station Number	AMS 15
Reason:	Routine		
Start Time (MST)	9:33	End Time (MST)	15:35
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	0.995441	0.994933	0.996958
	Data Offset	-0.351542	-0.041879	-0.369293
Current Calibration	Data Slope	0.997024	0.997210	0.997029
	Data Offset	-0.638681	-0.379520	-0.339091

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	710321429

Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
Analyzer IP	192.168.1.42		192.168.1.42	
NO coefficient	0.982		0.954	
NOX coefficient	0.999		0.999	
NO2 coefficient	1.000		1.000	
NO bkgrnd	11.3		11.2	
NOX bkgrnd	11.3		11.2	
Chamber Temp	49.9	Deg C	49.8	Deg C
Moly Temp	325.3	Deg C	326.3	Deg C
PMT voltage	-779.2	V	-779.2	V
PMT Temp	-3.1	Deg C	-2.7	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	174.3	mmHg	181.2	mmHg
R Cell Press Nox	174	mmHg	181.5	mmHg
NO sample flow	0.630	lpm	0.681	lpm
Nox sample Flow	0.628	lpm	0.682	lpm

Notes:

Sample inlet filter replaced after as founds. Replaced O rings for preventative maintenance after as founds. Adjusted both zero and span.

Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: April 26, 2016 Station Number: AMS 15

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1	----	----
as found span	5000	81.5	797.1	797.1	0.0	796.0	794.4	1.5	1.0014	1.0033
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
high point	5000	81.5	797.1	797.1	0.0	799.1	798.9	0.3	0.9974	0.9978
second point	5000	40.6	397.1	397.1	0.0	401.1	400.6	0.5	0.9900	0.9911
third point	5000	20.2	197.6	197.6	0.0	198.2	197.7	0.5	0.9969	0.9994
as left zero	5000	0.0	0.0	0.0	0.0	1.2	1.0	0.1	----	----
as left span	5000	81.5	797.1	451.4	345.7	801.0	449.8	351.2	0.9951	1.0035
								Average Correction Factor	0.9948	0.9961

Corrcted As found NO_X= 795.9 NO= 794.4 Percent Change NO_X= 0.7% NO= 0.8%

Previous Response NO_X= 801.1 NO= 801.2

GPT Calibration Data

Dilution Flow (total) 5000 ccm Source Gas Flow 81.50 ccm NOX ref calc conc = 797.1 ppb NO ref calc conc = 797.1 ppb

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
1st NO ref point		0.0	798.5	796.2	0.0	0.9982	1.0011	----	----
1st NO2 (300)	451.4	344.8	797.7	451.4	346.3	0.9992	----	0.9957	100.4%
2nd NO2 (200)	559.7	236.5	796.7	559.7	236.9	1.0005	----	0.9981	100.2%
3rd NO2 (100)	672.9	123.3	797.3	672.9	124.7	0.9997	----	0.9882	101.2%
2nd NO ref point		0.0	799.0	796.7	2.5	0.9975	1.0005	----	----
				Average Correction Factor		0.9992		0.9940	100.6%

Calibration Performed By: Asad Hidayat

Wood Buffalo Environmental Association

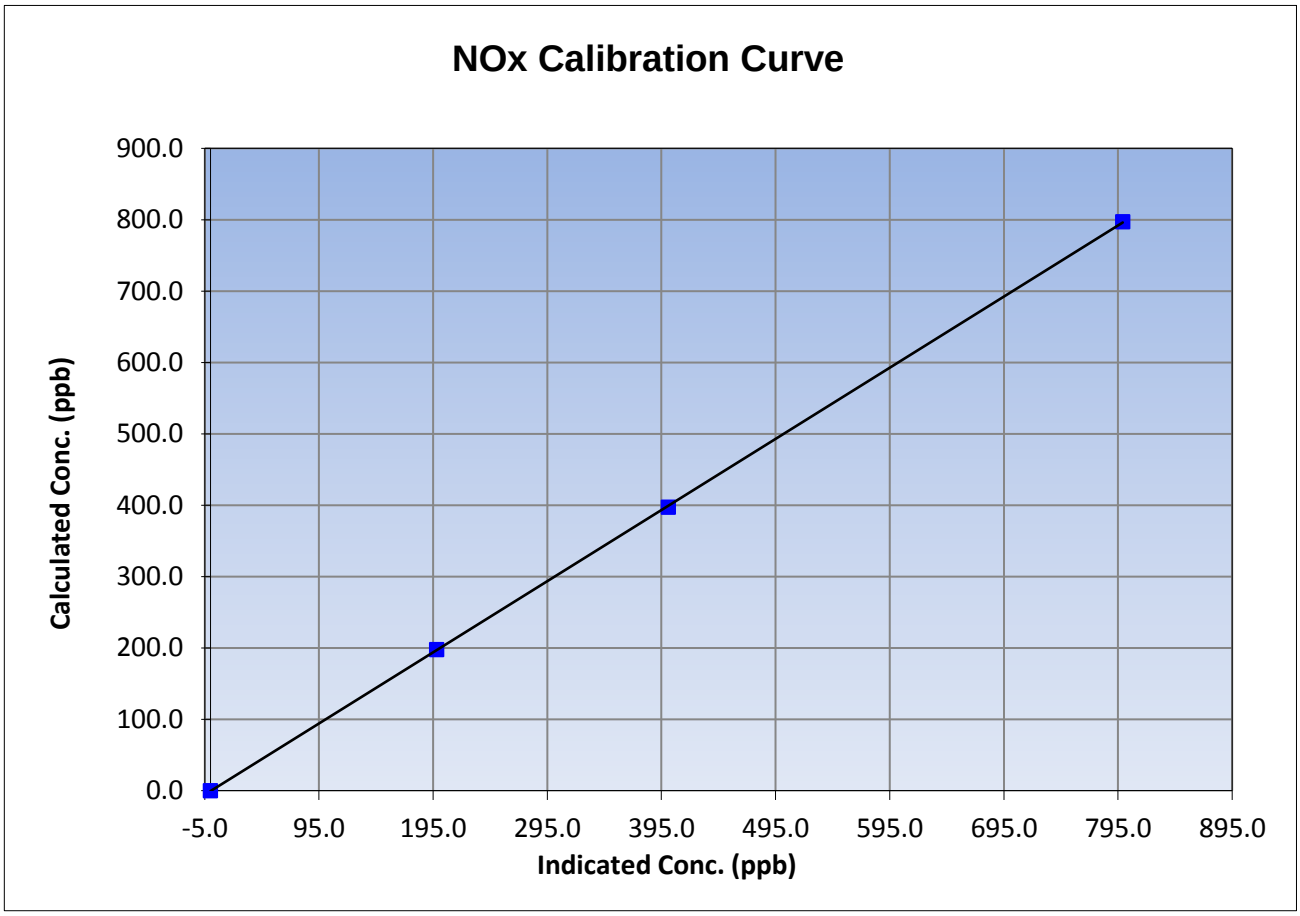
NO_X Calibration Summary

Station Information

Calibration Date	April 26, 2016	Previous Calibration	March 15, 2016
Station Name	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	9:33	End Time (MST)	15:35
Analyzer make	Thermo 42i	Analyzer serial #	710321429

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999981
797.1	799.1	0.9974		
397.1	401.1	0.9900	Slope	0.997024
197.6	198.2	0.9969		
			Intercept	-0.638681



Wood Buffalo Environmental Association

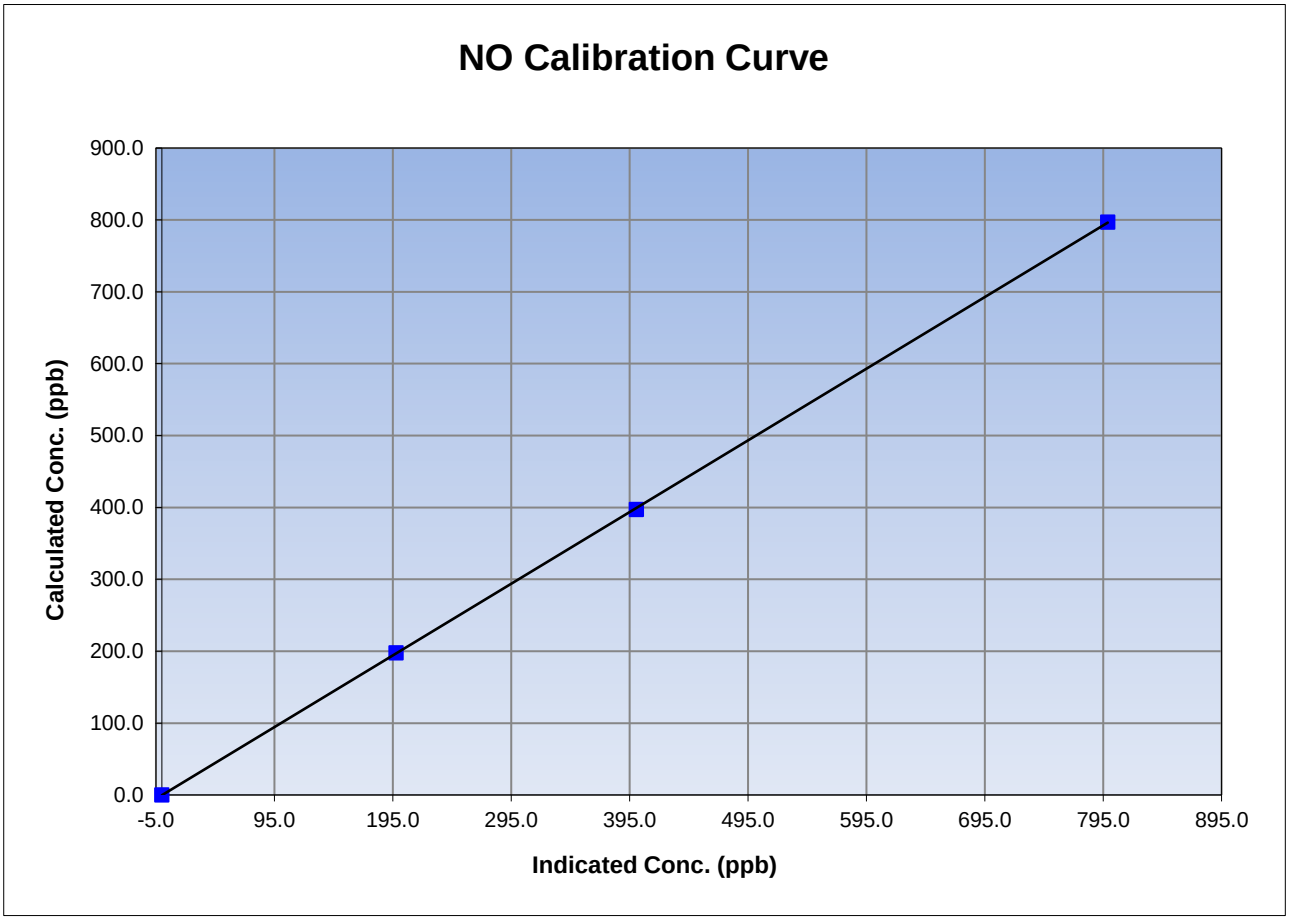
NO Calibration Summary

Station Information

Calibration Date	April 26, 2016	Previous Calibration	March 15, 2016
Station Name	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	9:33	End Time (MST)	15:35
Analyzer make	Thermo 42i	Analyzer serial #	710321429

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999983
797.1	798.9	0.9978		
397.1	400.6	0.9911	Slope	0.997210
197.6	197.7	0.9994		
			Intercept	-0.379520



Wood Buffalo Environmental Association

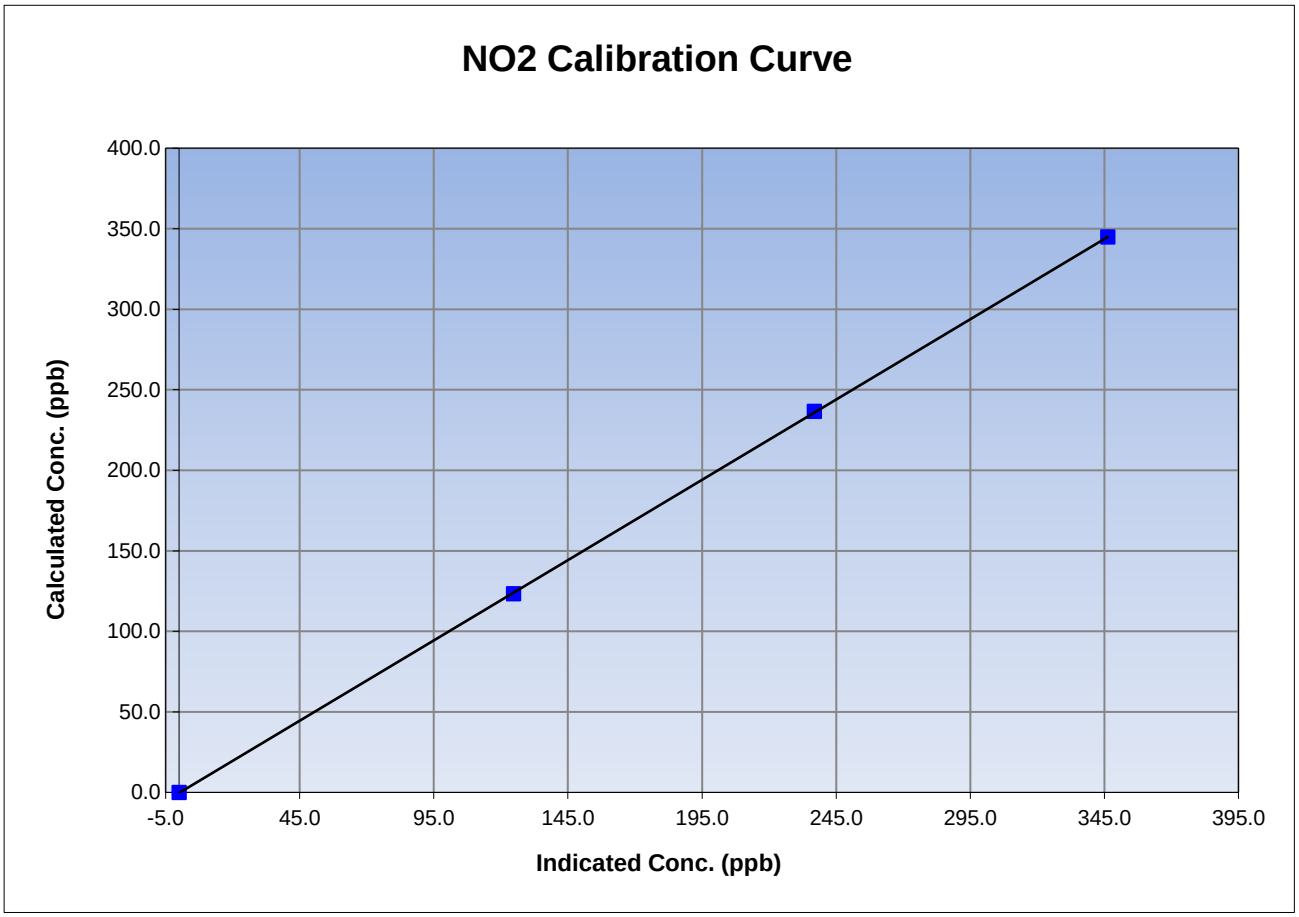
NO_2 Calibration Summary

Station Information

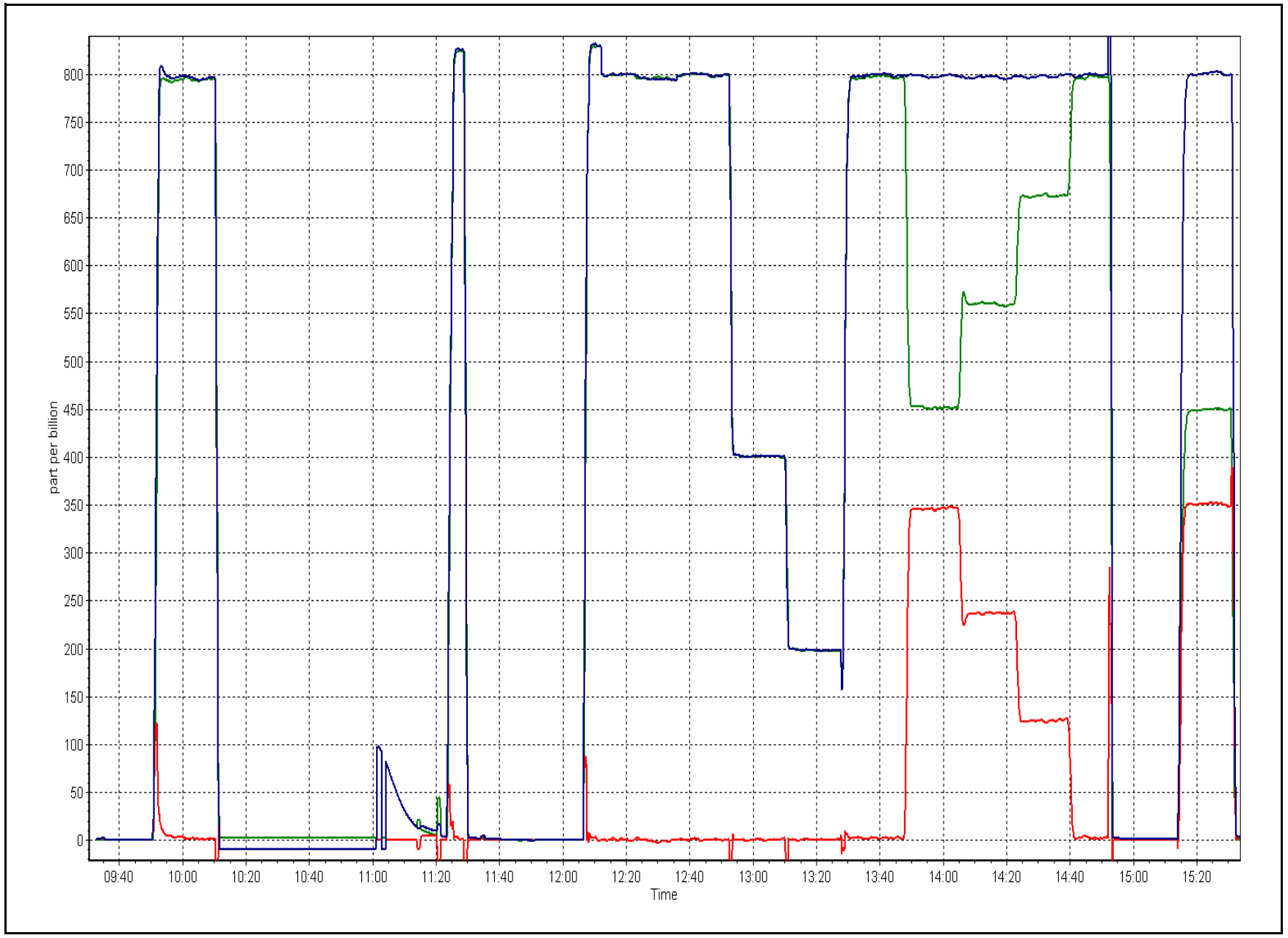
Calibration Date	April 26, 2016	Previous Calibration	March 15, 2016
Station Number	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	9:33	End Time (MST)	15:35
Analyzer make	Thermo 42i	Analyzer serial #	710321429

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999984
344.8	346.3	0.9957		
236.5	236.9	0.9981	Slope	0.997029
123.3	124.7	0.9882		
			Intercept	-0.339091



NOX Calibration Plot Date: April 26, 2016



Wood Buffalo Environmental Association

SHARP CALIBRATION

STATION INFORMATION

Calibration Date:	April 28, 2016	Previous Calibration:	March 15, 2016
Station Name:	CNRL Horizon	Station Number:	AMS 15
Start Time (MST):	8:33	End Time (MST):	9:07
Calibrator Make/Model:	Delta Cal	Calibrator Serial Number:	1451

SHARP INFORMATION

Particulate Fraction:	PM2.5
Make/Model:	Thermo / SHARP 5030
Serial Number	E-2020
C_{14} Source SN:	7409
Confirmation of Time settings:	Yes ☑ No ☐

Paremeters Checked: T1 ☑ T2 ☐ T3 ☐ T4 ☐ P3 ☑ Main Flow ☑ Beta ☐ Neph ☑

CALIBRATION DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	11.0	12.3	1.3	11.0
T2	22.0	na	na	22.0
T3	21.0	na	na	21.0
T4	19.0	na	na	19.0
RH (%)	30.0	na	na	30.0

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	981	983.0	2.0	981

Main Flow (Lph)

Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
1000	1006	6	1006	1000

Nephalometer Calibration

Parameter	As Founds	Zeroed (Limit +or- 2.0ug/m3)	As Left
Analog	165		165
Neph	0.9		0.9
C14	168.8		168.8
Indicated Concentration (ug/m3)	**0.4**	**NO**	**0.4**
Offset 1			
Offset 2			

Leak Check (Quarterly)

Leak Check Date:	April 28, 2016	Previous Leak Check Date:	January 13, 2016

	Measured	Difference LPM (Limit +/- 0.42 LPM)
Flow without adaptor (LPM):	16.81	0.11
*Flow with adaptor (LPM):	16.70	

**Note - do not attach adaptor without shutting off the pump first*

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	28/04/2016
Pump	Good	09/06/2014
Filter Tape	Good	09/06/2014
Mass Foil Cal Set	Good	06/22/2015
HEPA filter	Good	15/03/2016

NOTES:

No adjustments. Cleaned cyclone head.

Calibration Performed By: **Melissa Lemay**

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 16
SHELL MUSKEG RIVER
APRIL 2016

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

May 27, 2016

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SHELL MUSKEG RIVER (AMS 16)
APRIL 2016

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	683	37	37	100.00	21	0	6	0
THC (ppm) Average	680	40	40	100.00	4.5	-	2.8	-
NO2 (ppb) Average	683	37	37	100.00	40	0	17	-
NO (ppb) Average	683	37	37	100.00	101	-	16	-
NOX (ppb) Average	683	37	37	100.00	140	-	33	-
PM2.5 (ug/m3) Average	717	3	3	100.00	44.1	-	16.3	0
Temperature 2 m (C) Average	720	0	0	100.00	27.9	-	16.9	-
Relative Humidity (%) Average	720	0	0	100.00	100	-	90	-
Barometric Pressure (inHg) Average	720	0	0	100.00	29.3	-	29.2	-
Wind Speed 10 m (km/h) Average	720	0	0	100.00	35	-	20	-
Wind Direction 10 m (deg) Average	720	0	0	100.00	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SHELL MUSKEG RIVER (AMS 16)
APRIL 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

					Percentile						
Parameter	Number	Mean	StnDev	Total	Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	683	1.1	2	-	0	0	0	0	1	3	21
THC (ppm) Average	680	2.37	0.4	-	1.9	2.1	2.1	2.3	2.5	2.7	4.5
NO2 (ppb) Average	683	8.3	8	-	0	0	2	6	12	19	40
NO (ppb) Average	683	5	11	-	0	0	0	1	6	13	101
NOX (ppb) Average	683	13.3	18	-	0	1	2	8	20	29	140
PM2.5 (ug/m3) Average	717	6.07	5	-	0.6	2.2	3.3	4.8	7.1	10.5	44.1
Temperature 2 m (C) Average	720	3.28	8.1	-	-14.8	-6.4	-2.4	2.2	7.9	15.6	27.9
Relative Humidity (%) Average	720	58.8	21	-	14	29	42	61	74	87	100
Barometric Pressure (inHg) Average	720	28.96	0.2	-	28.4	28.7	28.8	29	29.1	29.2	29.3
Wind Speed 10 m (km/h) Average	720	12.3	6	-	0	5	8	11	16	21	35
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SHELL MUSKEG RIVER (AMS 16)
APRIL 2016

OPERATIONAL NOTES

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

Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO_2) - ppb

Shell Muskeg River - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 21 ppb on Apr 11 13:00 Maximum Daily Average: 5.6 ppb on Apr 11

Minimum Value: 0 ppb on Apr 21 04:00 Minimum Daily Average: 0.3 ppb on Apr 8
Maximum Diurnal Average: 2.6 ppb at hour 10 Minimum Diurnal Average: 0.4 ppb at hour 22
Monthly Average: 1.1 ppb Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 1$ $P_{90} = 3$ $P_{99} = 10$

Hours in Service:	720
Hours of Data:	683
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-Apr	2	1	Z	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2
2-Apr	0	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
3-Apr	0	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
4-Apr	0	0	0	0	0	Z	0	1	3	8	9	9	9	8	4	2	1	1	1	1	1	1	0	0	2.6	9
5-Apr	Z	1	0	0	0	0	0	0	0	0	0	1	3	9	3	4	4	2	1	1	1	0	0	1	1.4	9
6-Apr	1	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
7-Apr	0	0	Z	0	0	0	0	0	0	0	0	3	3	1	1	1	1	0	0	0	0	0	0	0	0.6	3
8-Apr	0	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
9-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0
10-Apr	0	1	0	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0.5	1
11-Apr	Z	0	0	0	0	0	0	1	5	8	10	11	21	14	11	10	13	9	6	3	2	2	2	1	5.6	21
12-Apr	1	Z	1	1	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0.4	1
13-Apr	0	0	Z	0	0	0	0	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0.4	1
14-Apr	0	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
15-Apr	0	0	0	0	Z	0	0	0	2	1	1	4	5	7	5	1	0	1	0	0	0	0	0	0	1.3	7
16-Apr	0	1	0	0	0	Z	0	1	6	4	3	4	2	0	0	0	0	0	0	0	0	0	0	1	1.1	6
17-Apr	Z	1	2	1	1	1	1	0	0	5	2	1	1	0	0	0	0	0	1	1	1	0	1	1	0.9	5
18-Apr	0	Z	0	0	0	0	1	8	10	11	9	8	3	2	1	1	1	1	3	6	2	1	2	6	3.3	11
19-Apr	7	5	Z	4	2	1	1	0	0	C	C	C	C	C	C	C	0	0	0	1	1	0	0	0	--	7
20-Apr	1	0	0	Z	1	0	0	0	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0.4	1
21-Apr	0	0	0	0	Z	0	0	0	8	3	1	1	1	1	0	0	0	0	0	0	1	1	0	0	0.8	8
22-Apr	0	0	0	0	0	Z	0	0	1	1	1	0	1	1	1	1	1	1	1	0	1	0	1	0	0.5	1
23-Apr	Z	1	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
24-Apr	1	Z	0	0	0	0	0	0	1	2	1	1	1	1	1	3	2	1	1	1	1	1	1	1	0.9	3
25-Apr	0	1	Z	1	2	1	0	3	5	5	4	4	3	3	3	0	0	2	2	0	1	1	0	1	1.8	5
26-Apr	1	1	1	Z	2	3	5	5	4	3	6	6	1	2	2	2	2	1	1	0	0	0	0	0	2.2	6
27-Apr	0	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
28-Apr	0	0	0	0	0	Z	0	3	6	7	8	5	5	1	3	2	1	0	0	0	0	0	0	0	1.9	8
29-Apr	Z	0	0	0	0	0	0	0	1	8	2	2	1	2	1	1	1	2	0	0	1	1	2	2	1.3	8
30-Apr	3	Z	3	3	2	3	3	3	1	5	6	0	1	0	0	0	0	0	2	1	0	0	0	0	1.6	6
	0.9	0.6	0.5	0.6	0.6	0.6	0.6	1.1	1.9	2.6	2.4	2.2	2.3	1.9	1.4	1.2	1.1	0.9	0.7	0.7	0.5	0.4	0.5	0.6	Diurnal Average	
	7	5	3	4	2	3	5	8	10	11	10	11	21	14	11	10	13	9	6	6	2	2	2	6	Diurnal Maximum	

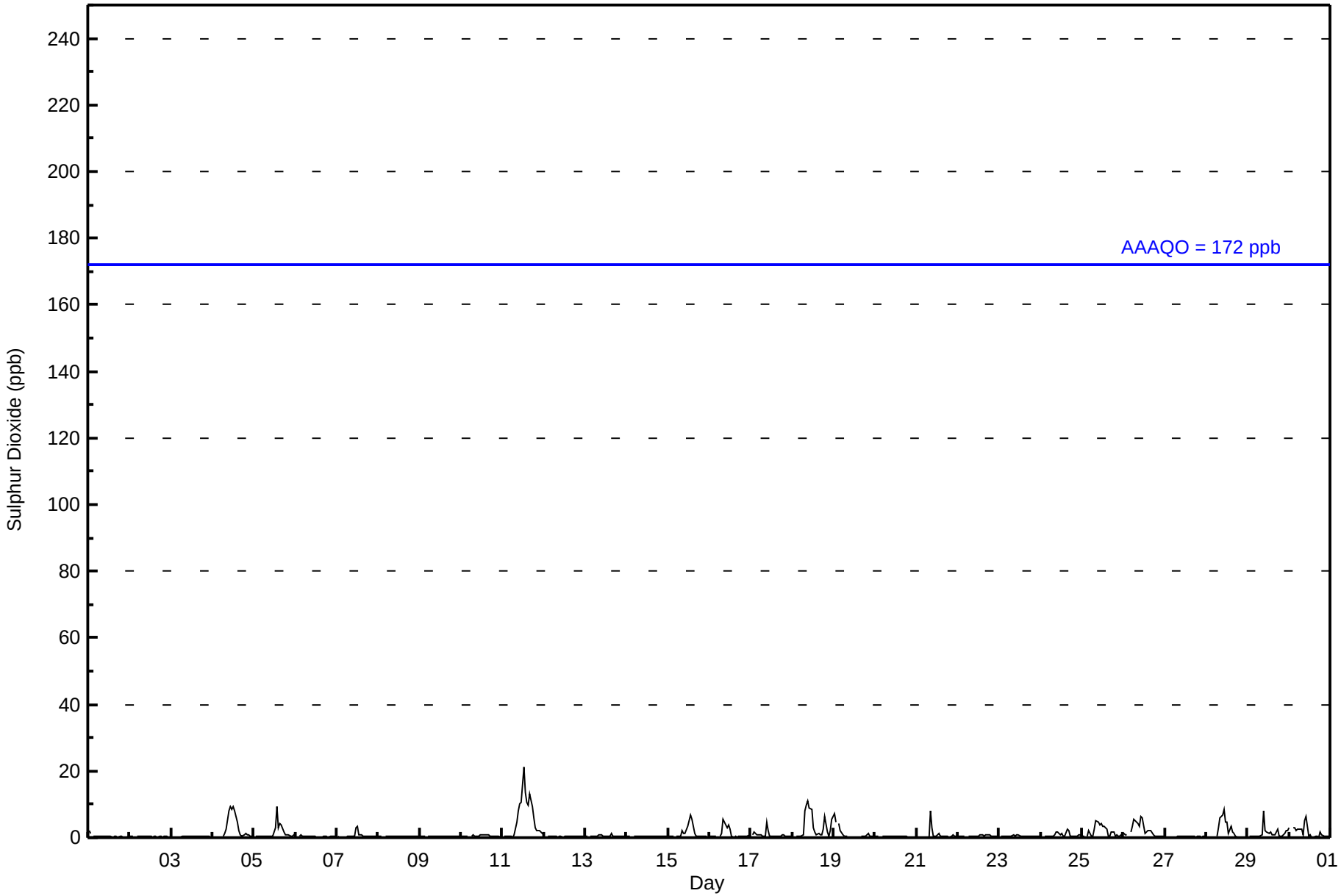
Z - zerospan C - Calibration
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb

Wood Buffalo Environmental Association

Hourly Averages

Sulphur Dioxide (SO_2) - ppb

Shell Muskeg River - April 2016



Sulphur Dioxide (SO_2) - ppb
Shell Muskeg River - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	677	99.12	99.12
11 - 20	5	0.73	99.85
21 - 60	1	0.15	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 683

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

Shell Muskeg River - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 10	72	71	124	35	13	13	37	66	135	39	8	8	9	9	18	20	677
11 - 20	0	0	0	0	0	0	0	0	1	4	0	0	0	0	0	0	5
21 - 60	0	0	0	0	0	0	0	0	0	1	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	72	71	124	35	13	13	37	66	136	44	8	8	9	9	18	20	683

Total Number of Valid Hours: 683

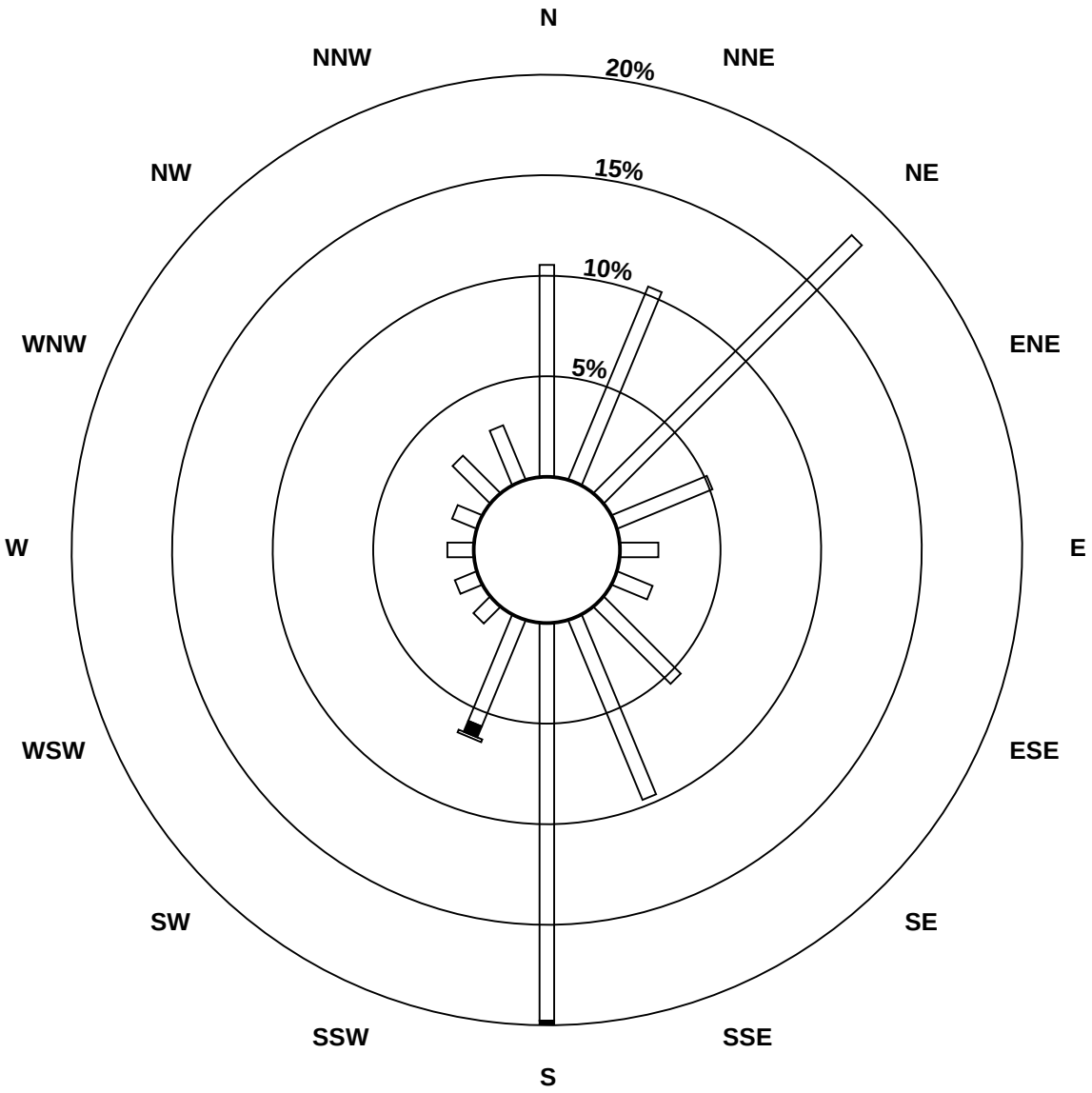
Total Number of Hours: 720

Wood Buffalo Environmental Association

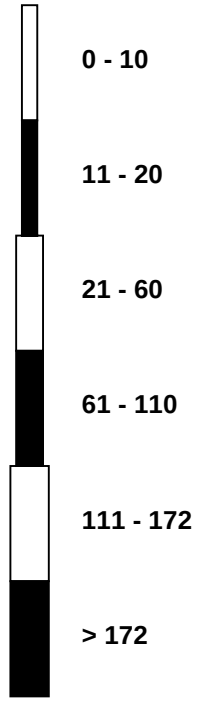
Wind Rose Apr 2016

Sulphur Dioxide (SO_2) - ppb

Shell Muskeg River (AMS 16)



Classes (ppb)



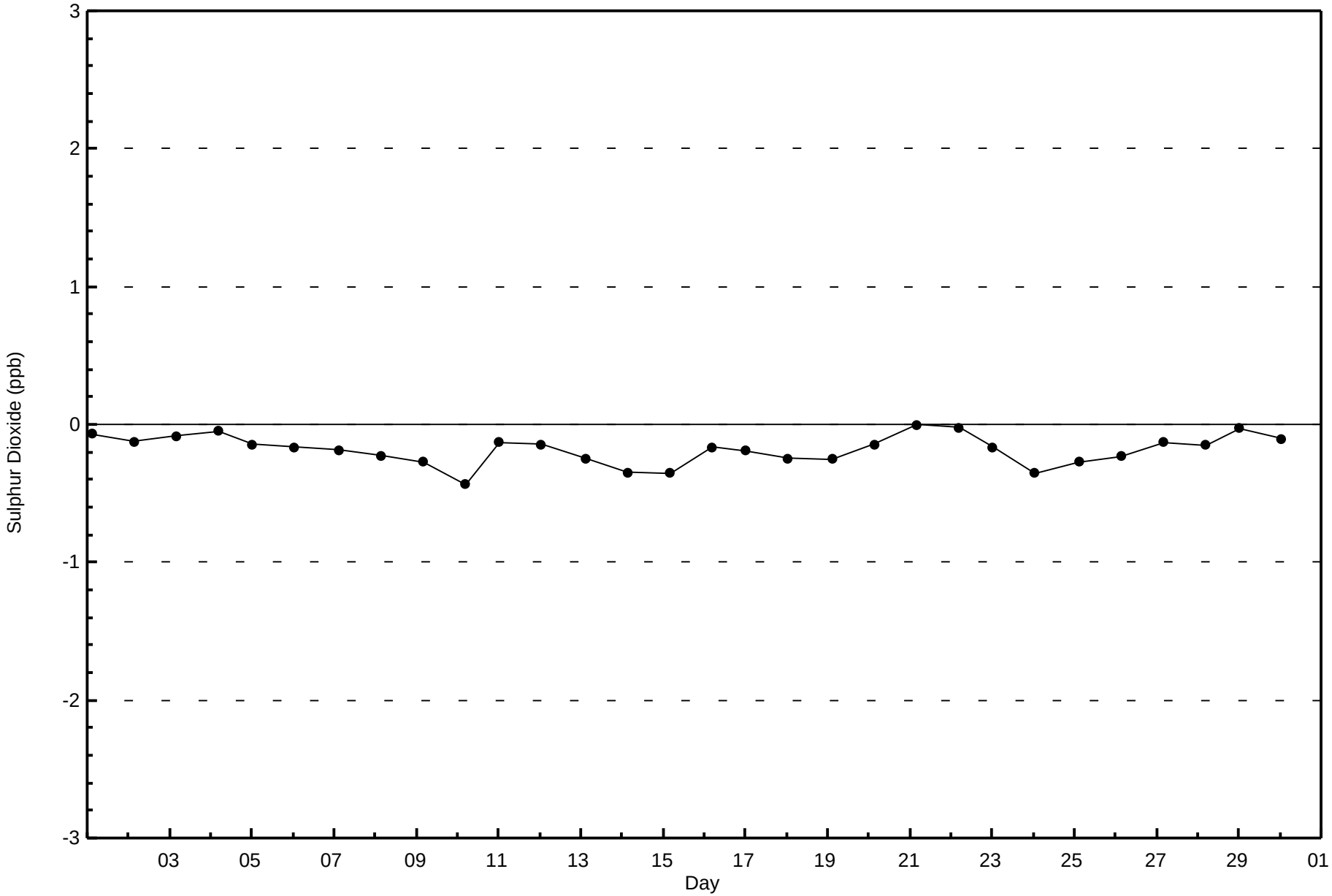
Total Number of Valid Hours: 683

Wood Buffalo Environmental Association

Zero Responses

Sulphur Dioxide (SO_2) - ppb

Shell Muskeg River - April 2016

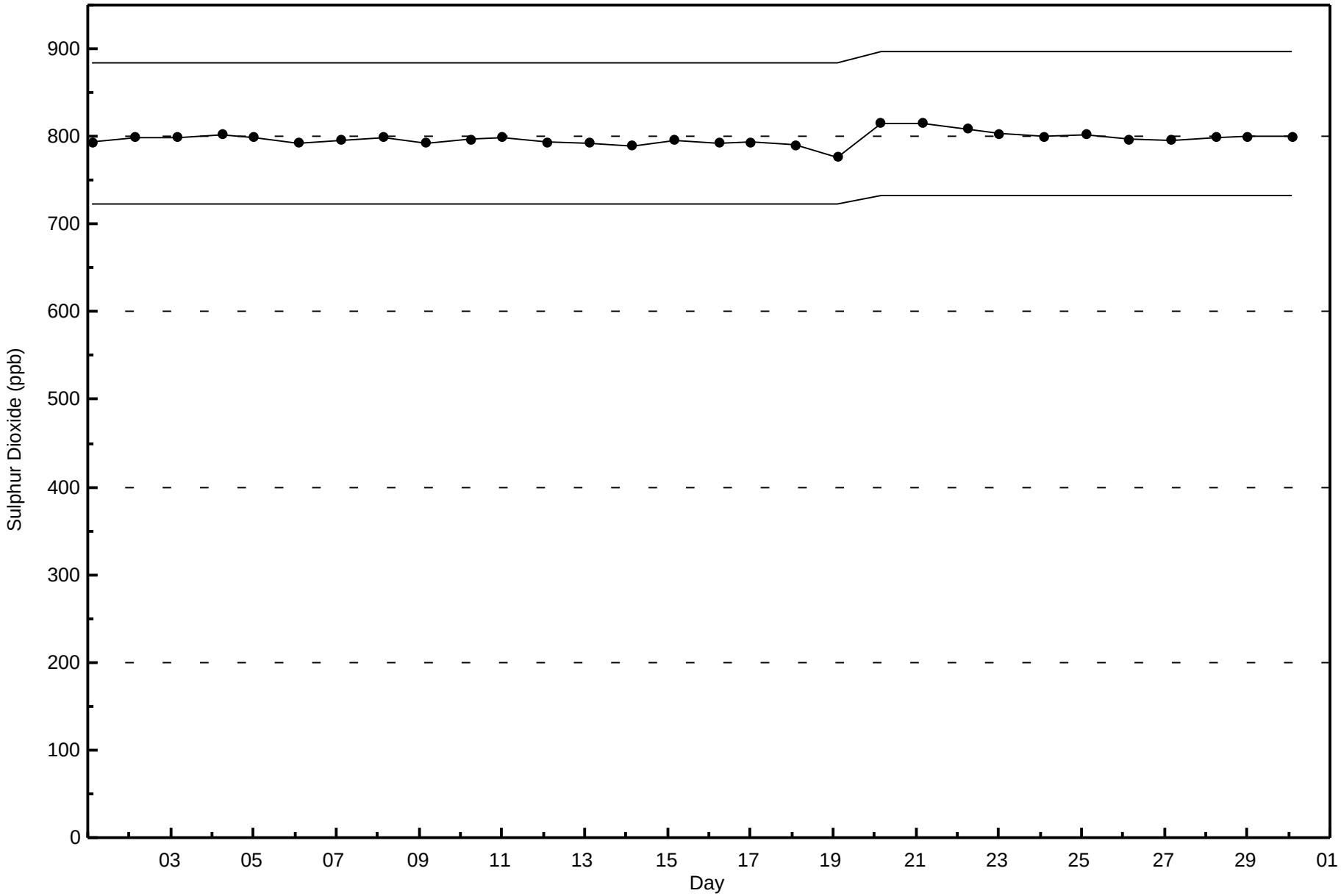


Wood Buffalo Environmental Association

Span Responses

Sulphur Dioxide (SO_2) - ppb

Shell Muskeg River - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Shell Muskeg River - April 2016

Maximum Value: 4.5 ppm on Apr 11 22:00

Maximum Daily Average: 2.8 ppm on Apr 18

Minimum Value: 1.9 ppm on Apr 12 10:00

Minimum Daily Average: 2.1 ppm on Apr 8

Maximum Diurnal Average: 2.5 ppm at hour 4

Minimum Diurnal Average: 2.3 ppm at hour 8

Monthly Average: 2.37 ppm

Percentiles: P_1 = 2.0 P_{10} = 2.1 Q_1 = 2.1 Median = 2.3 Q_3 = 2.5 P_{90} = 2.7 P_{99} = 3.9

Hours in Service:	720
Hours of Data:	680
Hours of Missing Data:	40
Hours of Calibration:	40
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-Apr	2.4	2.6	Z	2.6	2.8	3.2	2.5	2.3	2.9	2.6	2.6	2.4	2.2	2.1	2.0	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.2	2.3	3.2
2-Apr	2.2	2.2	2.1	Z	2.1	2.1	2.2	2.1	2.1	2.3	2.4	2.4	2.6	2.6	2.5	2.8	2.6	2.8	2.7	2.7	2.5	2.5	2.5	2.6	2.4	2.8
3-Apr	2.6	2.6	2.4	2.5	Z	2.5	2.5	2.5	2.6	2.5	2.3	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.2	2.1	2.3	2.6
4-Apr	2.1	2.2	2.3	2.3	2.3	Z	2.2	2.3	2.4	2.2	2.9	4.3	3.9	3.9	3.1	2.8	2.6	3.1	3.0	2.8	2.6	2.6	2.6	2.5	2.7	4.3
5-Apr	Z	2.5	2.5	2.4	2.6	2.6	2.4	2.3	2.3	2.3	2.8	3.1	2.4	2.4	2.2	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.1	2.2	2.3	3.1
6-Apr	2.2	Z	2.2	2.5	3.4	2.7	2.5	2.5	2.4	2.3	2.4	2.2	2.1	2.1	2.1	2.2	2.4	2.3	2.1	2.0	2.1	2.1	2.1	2.2	2.3	3.4
7-Apr	2.6	2.2	Z	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.3	2.2	2.2	2.2	2.2	2.1	2.1	2.5	2.3	2.2	2.1	2.1	2.2	2.6
8-Apr	2.2	2.2	2.2	Z	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.2
9-Apr	2.1	2.1	2.1	3.3	Z	2.6	2.7	2.6	2.6	2.5	2.4	2.5	2.4	2.5	2.5	2.4	2.5	2.5	2.7	2.7	2.6	2.7	2.6	2.5	2.5	3.3
10-Apr	2.6	2.6	2.6	2.6	2.5	Z	2.4	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.3	2.6
11-Apr	Z	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1	2.1	2.2	2.1	2.1	2.1	2.8	2.7	2.3	2.7	4.5	4.4	3.9	2.4	4.5
12-Apr	3.6	Z	3.7	3.7	2.3	2.0	2.0	2.0	1.9	1.9	1.9	2.0	2.1	2.2	2.1	2.1	2.2	2.2	2.4	2.7	2.7	2.2	2.3	2.2	2.4	3.7
13-Apr	2.2	2.3	Z	2.8	3.3	2.2	2.4	3.0	3.9	4.2	2.9	2.8	2.9	2.0	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.1	2.1	2.5	4.2
14-Apr	2.2	2.5	2.4	Z	2.4	2.4	2.3	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.5	2.5	2.5	2.3	2.4	2.3	2.5
15-Apr	2.2	2.2	2.1	2.2	Z	2.4	2.3	2.1	2.2	2.2	2.3	2.5	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	2.5
16-Apr	2.2	2.3	2.2	2.1	2.2	Z	2.1	2.2	2.3	2.2	2.2	2.2	2.3	2.3	2.4	2.6	2.6	2.7	3.0	3.0	2.9	2.6	2.4	2.3	2.4	3.0
17-Apr	Z	2.7	2.6	2.7	2.7	2.7	2.7	2.6	2.3	2.4	2.4	2.5	2.5	2.6	2.8	2.9	3.0	3.1	3.5	3.5	3.5	3.3	2.9	2.6	2.8	3.5
18-Apr	2.3	Z	2.3	2.2	2.3	2.3	2.5	2.4	2.3	2.4	2.5	2.7	2.9	3.1	3.2	3.3	3.4	3.4	3.5	3.4	3.3	3.2	3.1	3.0	2.8	3.5
19-Apr	3.0	2.9	Z	2.7	2.6	2.4	2.6	2.6	2.4	C	C	C	C	C	C	C	2.4	2.4	2.4	2.5	2.5	2.4	2.3	2.2	--	3.0
20-Apr	2.2	2.2	2.2	Z	2.2	2.2	2.1	2.1	2.1	C	C	C	2.5	2.5	2.4	2.4	2.4	2.3	2.3	2.3	2.4	2.4	2.3	2.3	2.3	2.5
21-Apr	2.3	2.3	2.3	2.4	Z	2.3	2.4	2.4	2.4	2.4	2.4	2.3	2.3	2.4	2.3	2.3	2.3	2.3	2.3	2.2	2.3	2.3	2.2	2.2	2.3	2.4
22-Apr	2.3	2.3	2.4	2.4	2.4	Z	2.3	2.5	2.3	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.5
23-Apr	Z	3.1	2.9	2.9	2.5	2.3	2.3	2.3	2.3	2.4	2.5	2.4	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	3.1
24-Apr	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1
25-Apr	2.1	2.1	Z	2.2	2.3	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.0	2.0	2.1	2.1	2.2	2.1	2.1	2.1	2.3
26-Apr	2.3	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	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.2	2.4	2.2	2.4
27-Apr	2.4	2.5	2.6	2.7	Z	2.4	2.5	2.7	2.8	2.4	2.4	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.3	2.2	2.2	2.2	2.5	2.4	2.4	2.8
28-Apr	2.3	2.4	2.5	2.6	2.6	Z	2.6	2.5	2.4	2.3	2.3	2.3	2.5	2.4	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.4	2.4	2.4	2.5	2.6
29-Apr	Z	2.2	2.3	2.2	2.2	2.2	2.2	2.1	2.2	2.3	2.3	2.4	2.5	2.5	2.5	2.5	2.5	2.5	2.7	3.1	2.6	2.5	2.4	2.3	2.4	3.1
30-Apr	2.2	Z	2.2	2.3	2.3	2.3	2.2	2.2	2.3	2.4	2.4	2.5	2.5	2.5	2.5	2.5	2.4	2.5	2.4	2.6	2.6	2.3	2.3	2.3	2.4	2.6
	2.4	2.4	2.4	2.5	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.4	Diurnal Average	
	3.6	3.1	3.7	3.7	3.4	3.2	2.7	3.0	3.9	4.2	2.9	4.3	3.9	3.9	3.2	3.3	3.4	3.4	3.5	3.5	3.5	4.5	4.4	3.9	Diurnal Maximum	

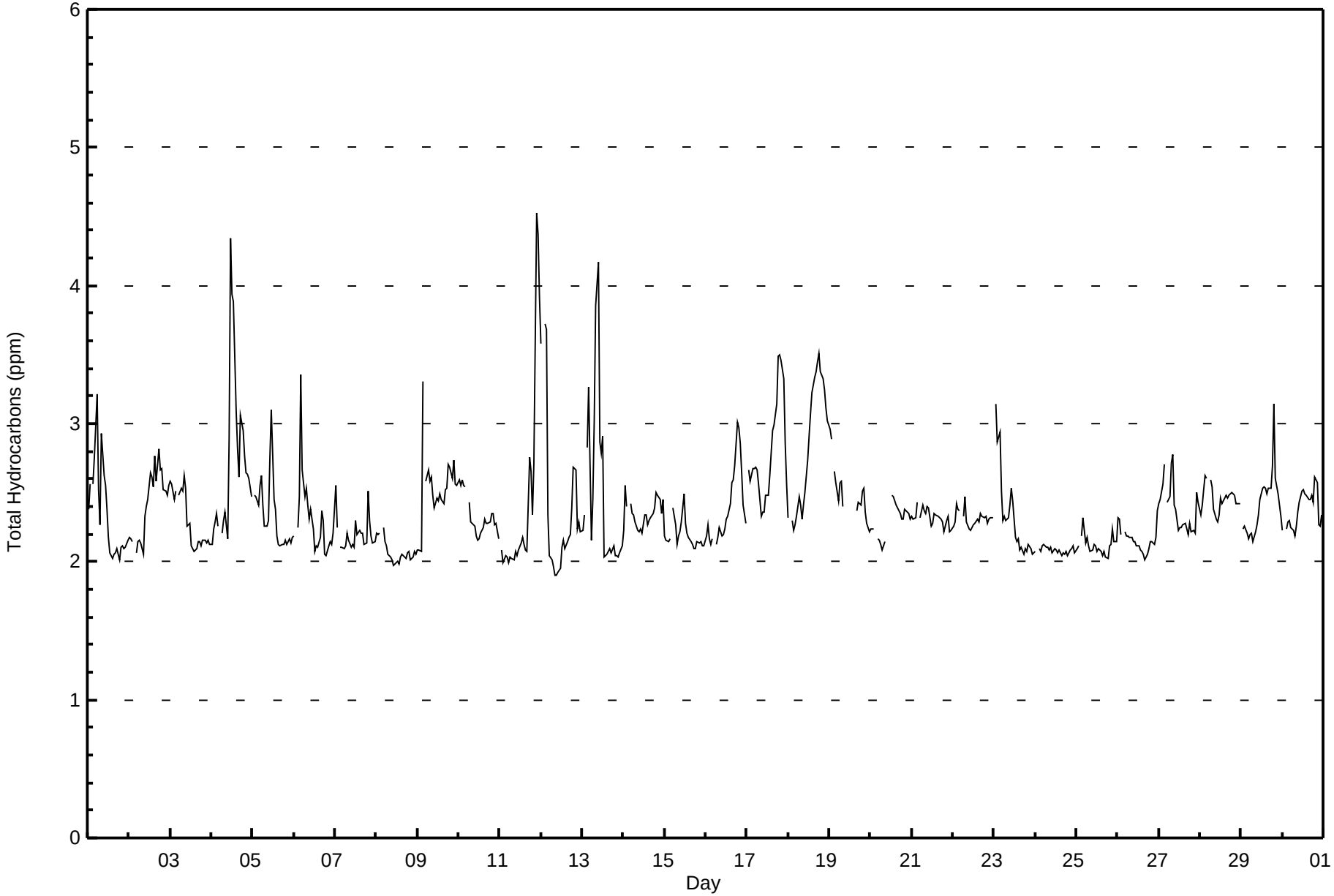
Z - zerospan C - Calibration

Wood Buffalo Environmental Association

Hourly Averages

Total Hydrocarbons (THC) - ppm

Shell Muskeg River - April 2016



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm

Shell Muskeg River - April 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	41	6.03	6.03
2.1 - 3.0	604	88.82	94.85
3.1 - 10.0	35	5.15	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 680

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Total Hydrocarbons (THC) - ppm

Shell Muskeg River - April 2016

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	1	6	3	0	0	8	11	8	4	0	0	0	0	0	0	41
2.1 - 3.0	69	65	116	32	13	11	29	52	118	40	8	8	9	9	12	13	604
3.1 - 10.0	3	2	2	0	0	2	0	3	10	0	0	0	0	0	6	7	35
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	72	68	124	35	13	13	37	66	136	44	8	8	9	9	18	20	680

Total Number of Valid Hours: 680

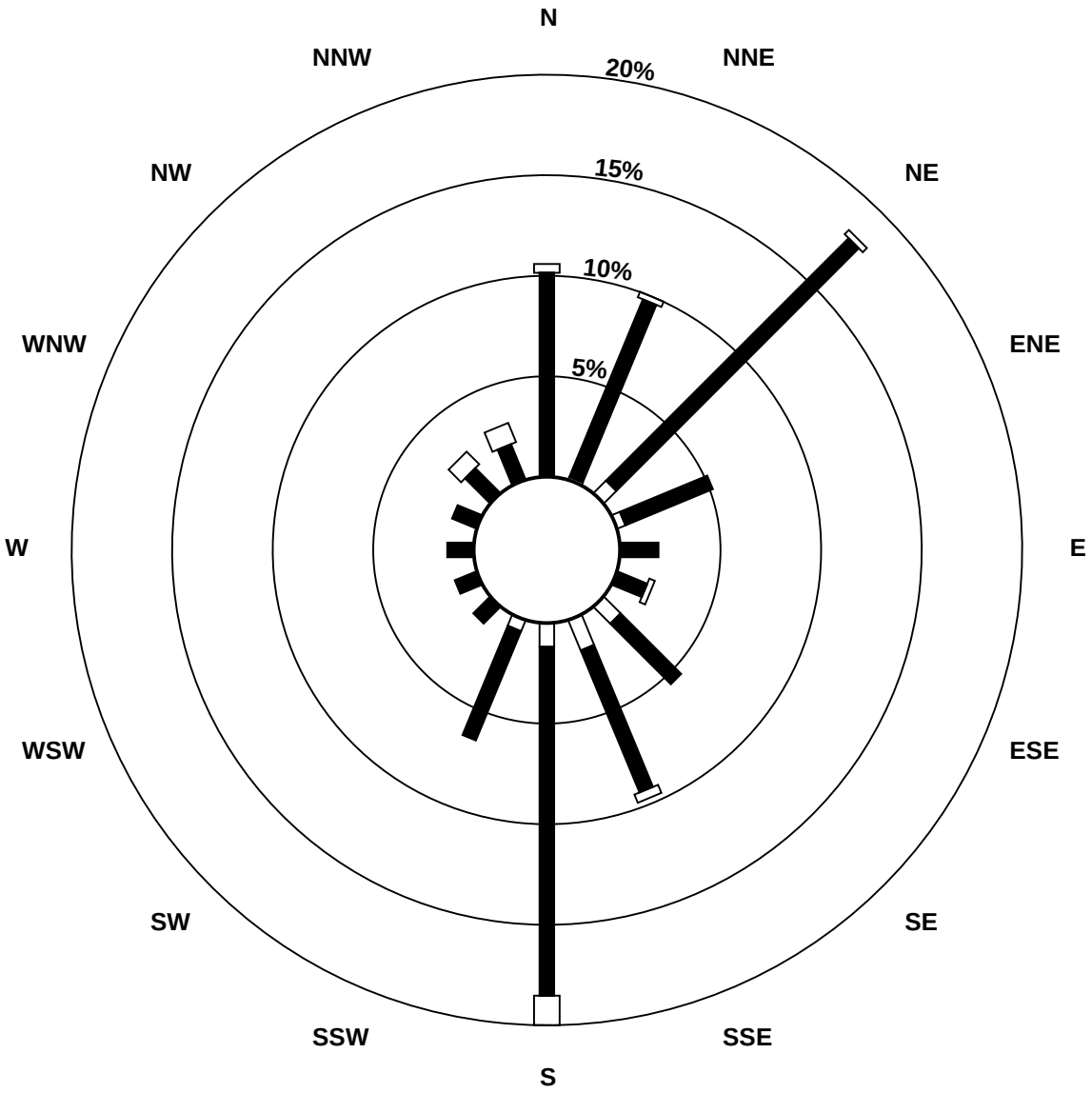
Total Number of Hours: 720

Wood Buffalo Environmental Association

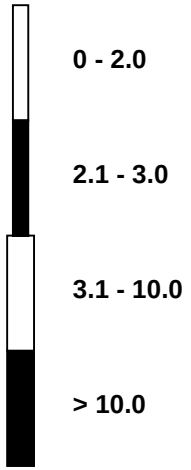
Wind Rose Apr 2016

Total Hydrocarbons (THC) - ppm

Shell Muskeg River (AMS 16)



Classes (ppm)



0 - 2.0

2.1 - 3.0

3.1 - 10.0

> 10.0

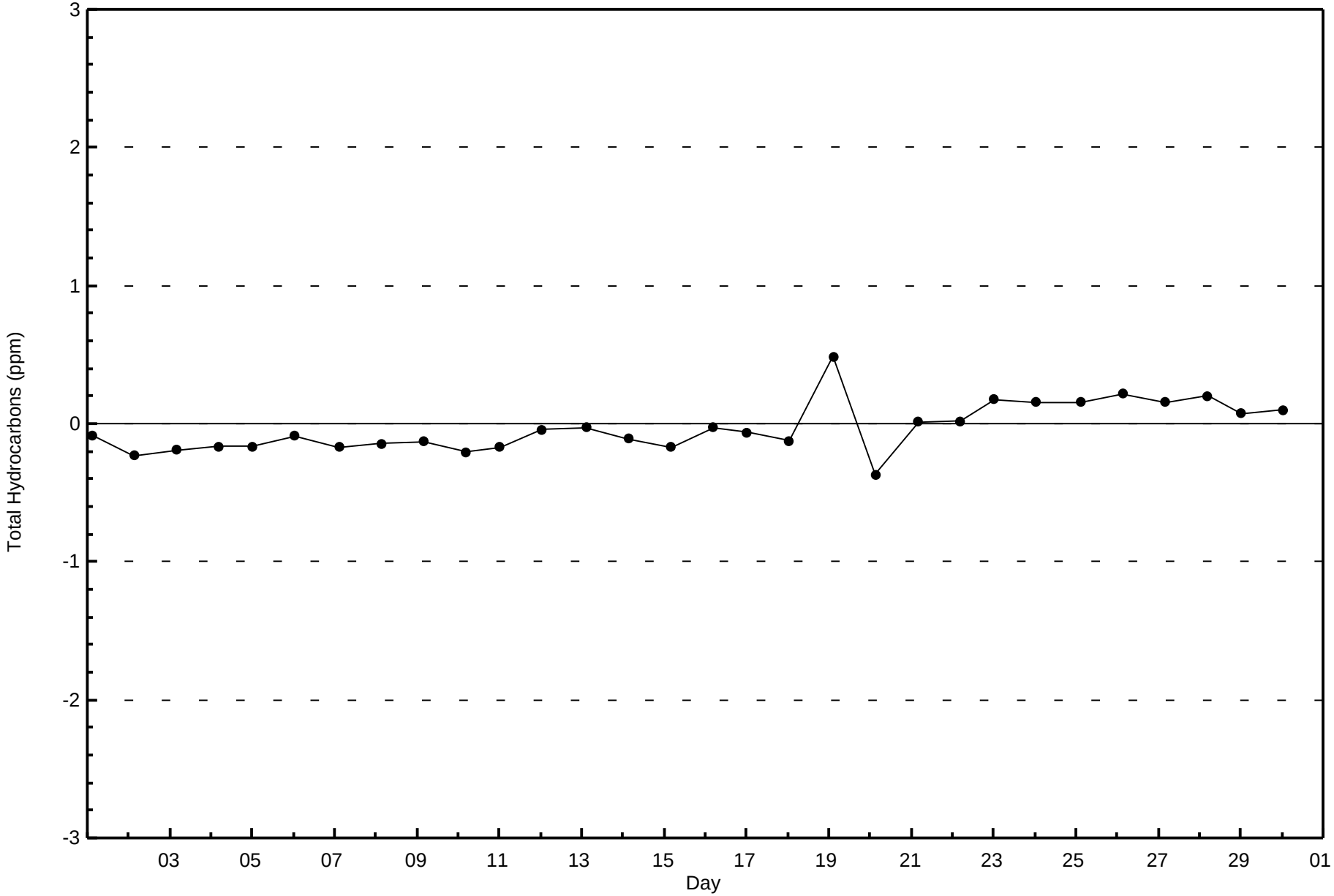
Total Number of Valid Hours: 680

Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Shell Muskeg River - April 2016

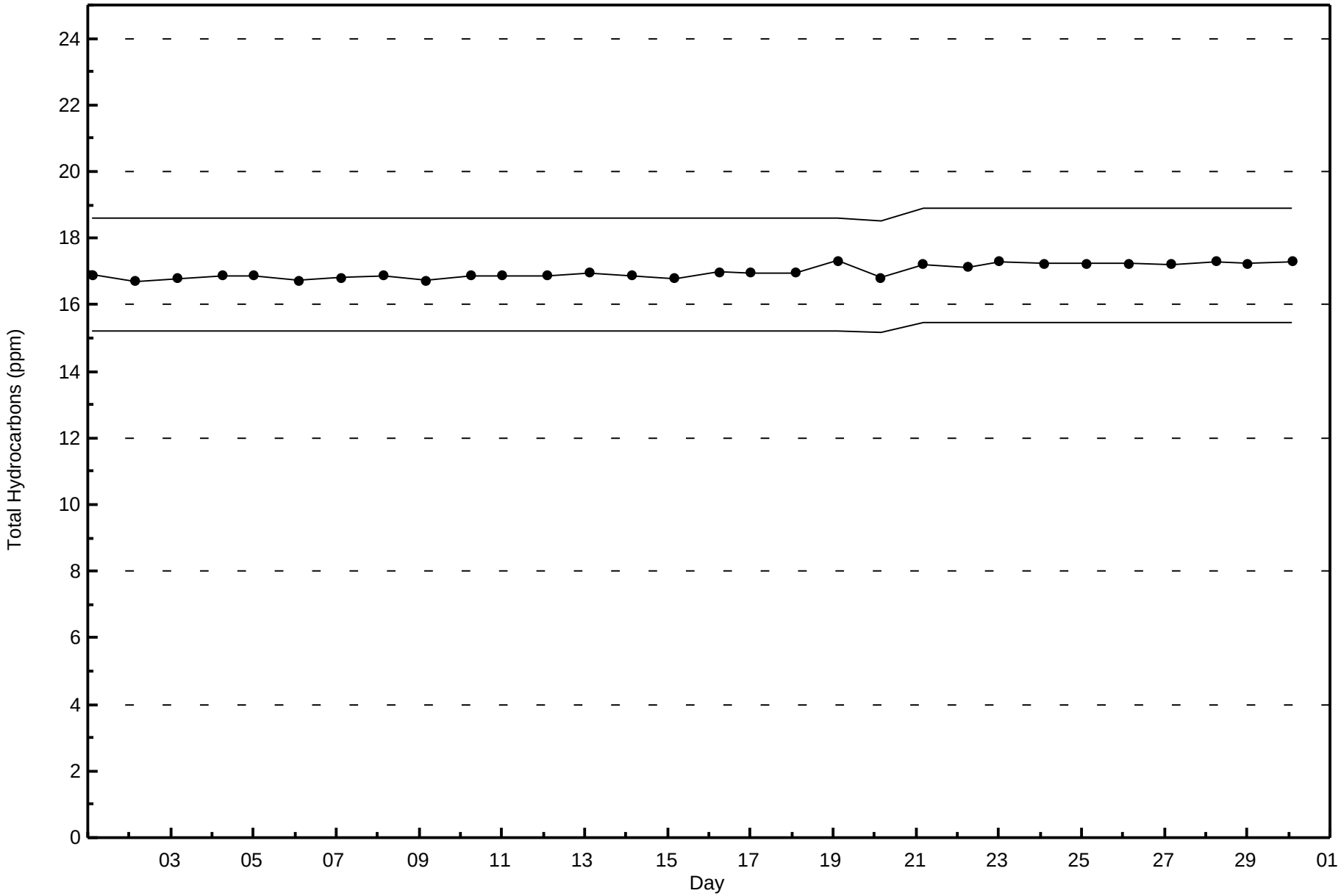


Wood Buffalo Environmental Association

Span Responses

Total Hydrocarbons (THC) - ppm

Shell Muskeg River - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

Shell Muskeg River - April 2016

Maximum Value: 101 ppb on Apr 4 13:00

Maximum Daily Average: 16.4 ppb on Apr 4

Minimum Value: 0 ppb on Apr 1 22:00

Minimum Daily Average: 0.1 ppb on Apr 8

Maximum Diurnal Average: 9.3 ppb at hour 12

Minimum Diurnal Average: 1.5 ppb at hour 20

Monthly Average: 5.0 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 1 $Q_3 = 6$ $P_{90} = 13$ $P_{99} = 61$

Hours in Service:	720
Hours of Data:	683
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-Apr	0	0	Z	0	4	20	15	18	12	13	12	11	11	2	0	2	1	1	0	0	0	0	0	0	5.3	20
2-Apr	0	0	0	Z	0	0	0	1	1	7	4	6	6	6	6	6	4	7	3	5	3	2	3	3	3.3	7
3-Apr	5	5	4	4	Z	4	6	5	7	6	4	8	1	2	3	3	5	5	1	1	0	0	0	0	3.4	8
4-Apr	0	0	0	3	1	Z	1	5	6	7	28	101	101	43	15	12	11	7	8	8	10	7	2	3	16.4	101
5-Apr	Z	2	2	1	1	1	1	0	0	1	23	42	9	4	1	1	0	0	0	0	0	0	0	0	4.0	42
6-Apr	0	Z	0	5	40	20	14	5	4	7	4	2	0	0	0	0	2	4	4	1	2	7	3	6	5.6	40
7-Apr	2	6	Z	0	0	0	0	3	1	1	1	1	10	13	16	12	11	6	3	5	9	1	0	0	4.4	16
8-Apr	0	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
9-Apr	0	0	0	42	Z	4	7	6	9	6	5	8	7	10	15	8	8	5	6	4	7	5	4	4	7.4	42
10-Apr	5	6	5	4	4	Z	7	10	7	5	3	1	2	2	7	11	4	2	0	0	0	0	0	0	3.8	11
11-Apr	Z	0	0	0	0	0	0	1	2	2	3	4	5	3	2	2	2	14	1	0	10	94	85	67	13.0	94
12-Apr	28	Z	46	52	7	6	11	3	0	0	0	0	18	11	10	19	16	9	6	4	4	7	6	6	11.6	52
13-Apr	2	0	Z	19	39	0	1	57	98	95	16	12	12	0	0	0	0	0	0	0	0	0	0	0	15.4	98
14-Apr	0	6	6	Z	3	2	3	3	5	4	5	6	8	5	3	2	3	4	2	3	2	1	0	1	3.4	8
15-Apr	0	0	0	0	Z	1	1	1	3	3	2	2	2	2	1	1	1	0	0	0	0	0	0	0	0.9	3
16-Apr	0	0	0	0	0	Z	0	2	3	2	2	2	1	0	0	0	0	0	5	1	0	0	0	0	0.8	5
17-Apr	Z	1	2	11	8	10	11	8	6	9	3	2	1	1	3	1	1	1	10	2	0	1	0	0	4.0	11
18-Apr	0	Z	0	0	0	1	7	15	6	3	2	2	0	0	0	0	0	0	0	0	0	0	0	0	1.6	15
19-Apr	0	0	Z	0	0	0	6	13	2	C	C	C	C	C	C	C	0	0	0	0	1	0	6	13	--	13
20-Apr	19	13	10	Z	15	10	12	15	14	16	17	12	8	12	10	9	15	6	6	0	0	0	0	0	9.6	19
21-Apr	0	0	0	0	Z	1	5	8	10	19	16	13	8	13	15	12	10	13	11	0	15	18	5	2	8.4	19
22-Apr	7	5	3	6	4	Z	2	9	7	10	13	13	12	16	16	13	18	18	12	9	3	7	2	2	8.9	18
23-Apr	Z	55	5	25	4	1	2	3	17	8	10	8	0	0	0	0	0	0	0	0	0	0	0	0	6.0	55
24-Apr	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
25-Apr	0	0	Z	0	0	0	1	1	1	1	1	1	1	1	0	0	1	1	0	0	0	0	0	0	0.4	1
26-Apr	0	0	0	Z	0	0	1	1	1	2	2	2	0	1	1	0	0	1	0	0	0	0	0	0	0.5	2
27-Apr	0	0	3	2	Z	2	8	27	22	14	14	8	3	2	3	5	4	2	1	0	0	0	1	0	5.3	27
28-Apr	0	1	1	5	11	Z	11	15	12	5	3	1	1	0	0	0	0	0	0	0	0	0	0	0	2.8	15
29-Apr	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
30-Apr	0	Z	0	0	0	1	1	1	1	1	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0.3	2
	2.8	4.0	3.5	7.1	5.7	3.4	4.5	7.9	8.7	8.6	6.7	9.3	7.9	5.2	4.4	4.2	3.9	3.5	2.6	1.5	2.2	5.0	3.9	3.6	Diurnal Average	
	28	55	46	52	40	20	15	57	98	95	28	101	101	43	16	19	18	18	12	9	15	94	85	67	Diurnal Maximum	

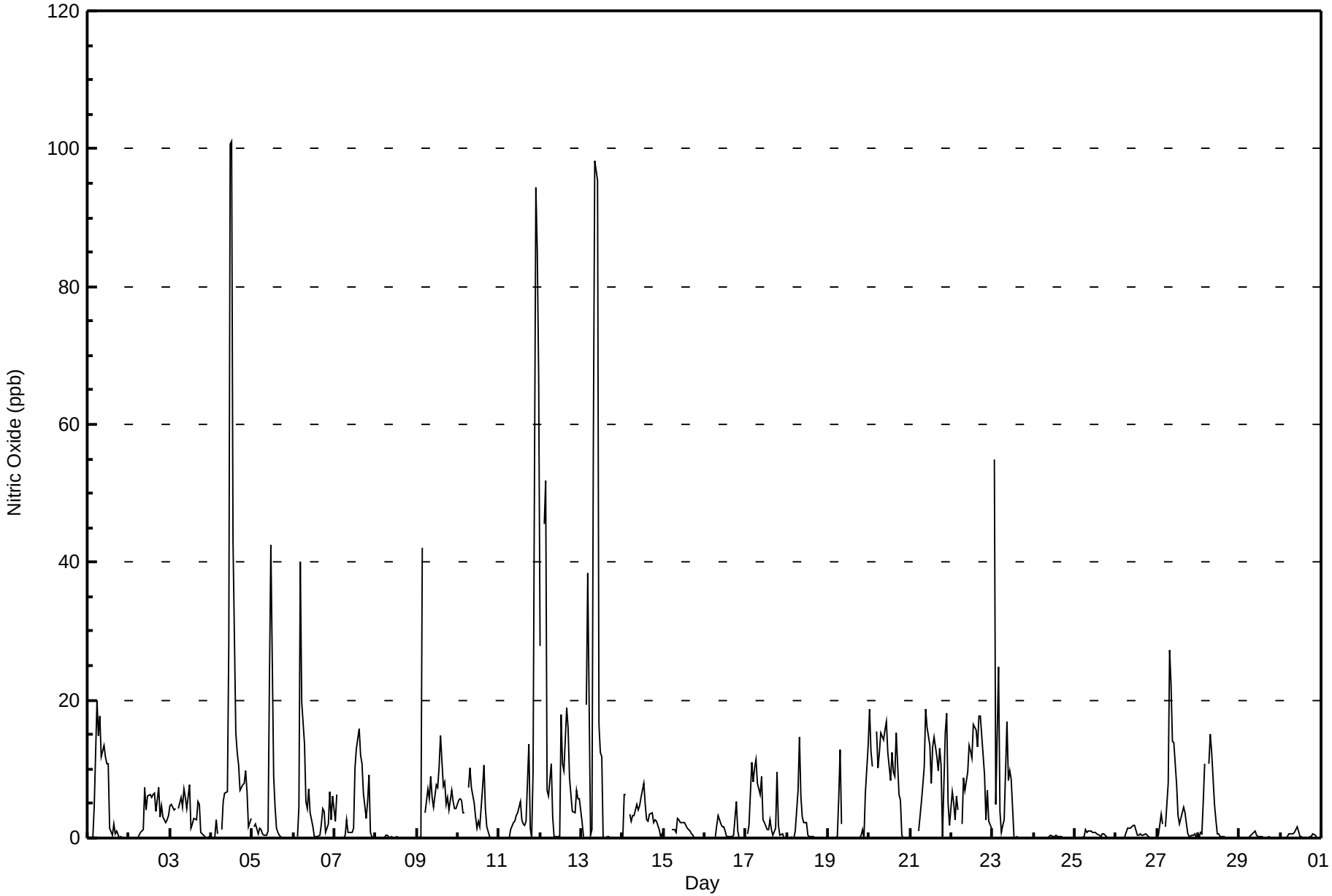
Z - zerospan C - Calibration

Wood Buffalo Environmental Association

Hourly Averages

Nitric Oxide (NO) - ppb

Shell Muskeg River - April 2016



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	661	96.78	96.78
21 - 40	8	1.17	97.95
11 - 80	8	1.17	99.12
81 - 159	6	0.88	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 683

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitric Oxide (NO) - ppb

Shell Muskeg River - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	70	70	122	34	13	12	37	66	135	43	8	8	9	8	12	14	661
21 - 40	1	0	1	1	0	1	0	0	1	1	0	0	0	1	1	0	8
11 - 80	1	1	1	0	0	0	0	0	0	0	0	0	0	0	3	2	8
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	4	6
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	72	71	124	35	13	13	37	66	136	44	8	8	9	9	18	20	683

Total Number of Valid Hours: 683

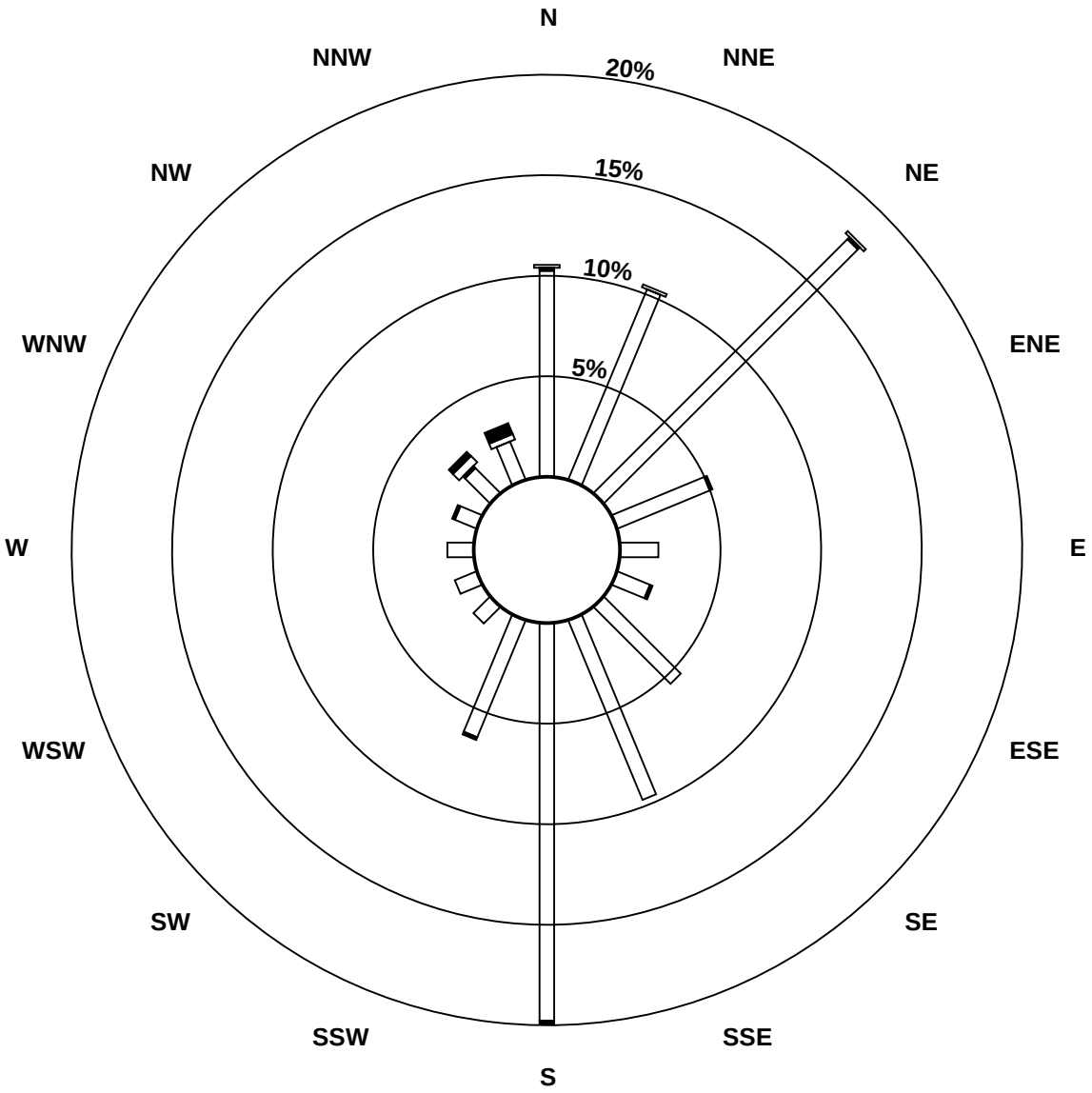
Total Number of Hours: 720

Wood Buffalo Environmental Association

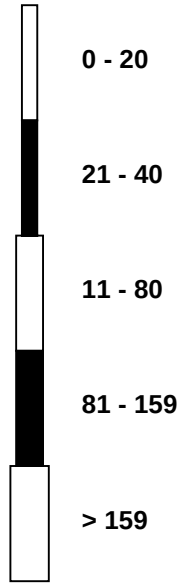
Wind Rose Apr 2016

Nitric Oxide (NO) - ppb

Shell Muskeg River (AMS 16)



Classes (ppb)



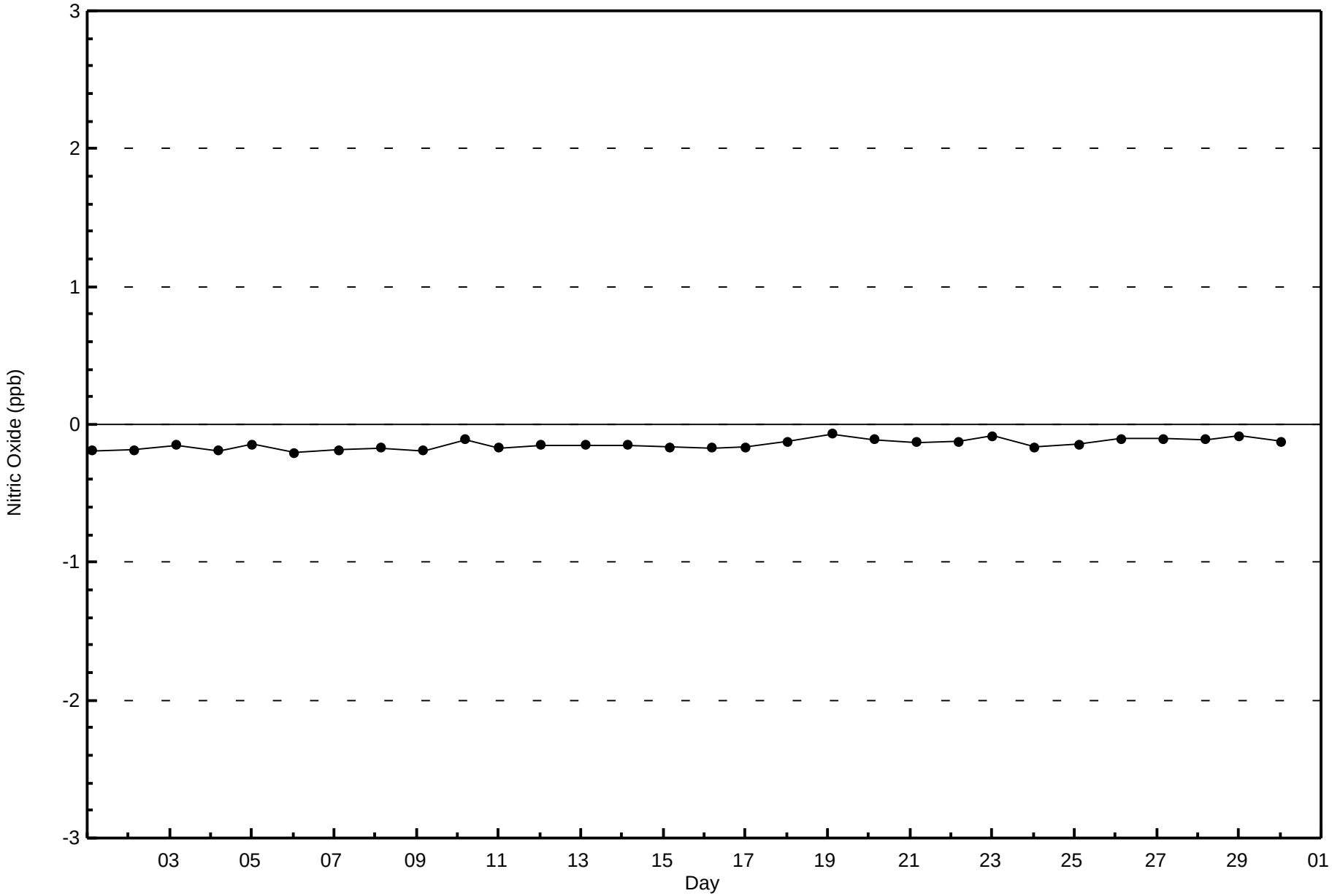
Total Number of Valid Hours: 683

Wood Buffalo Environmental Association

Zero Responses

Nitric Oxide (NO) - ppb

Shell Muskeg River - April 2016

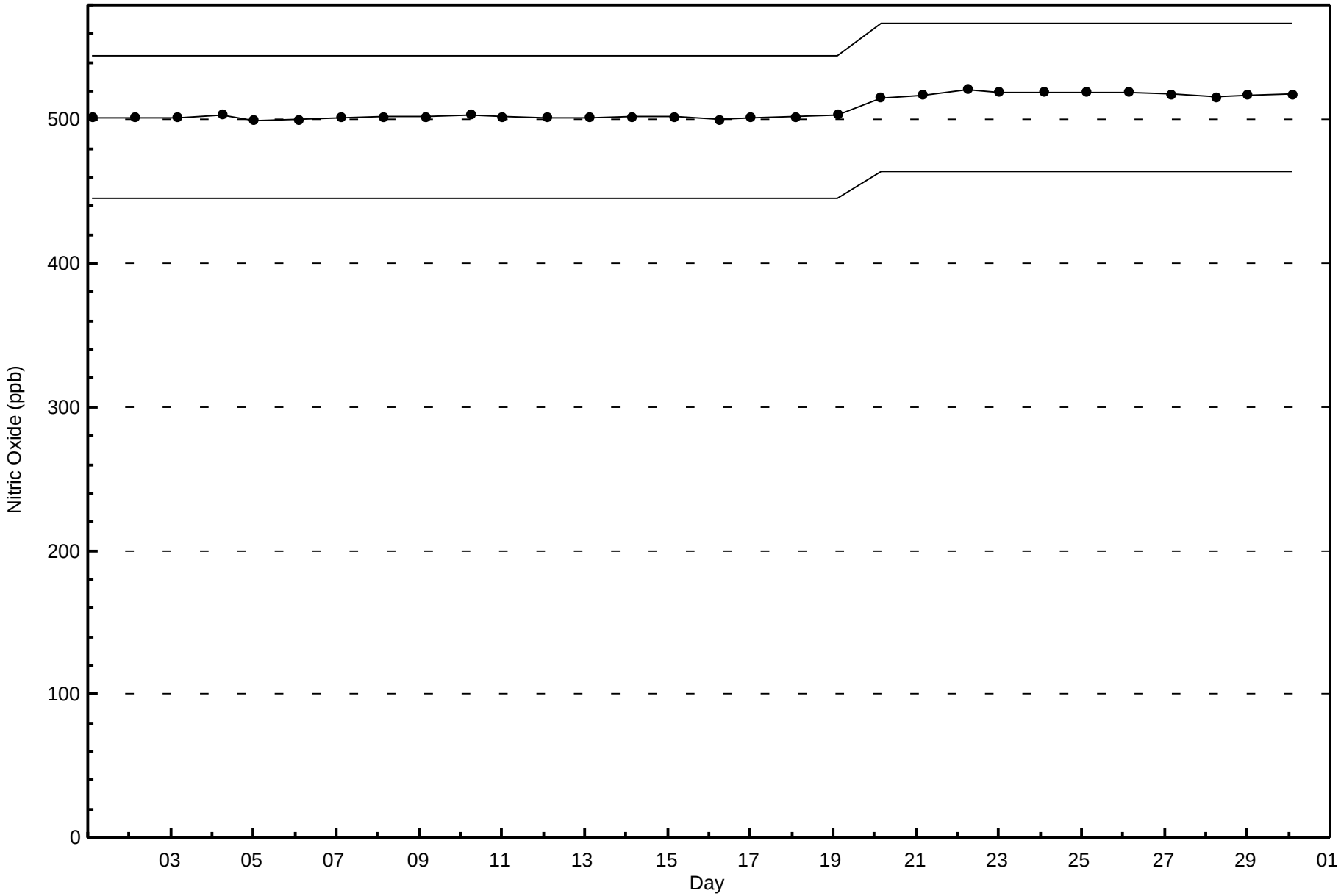


Wood Buffalo Environmental Association

Span Responses

Nitric Oxide (NO) - ppb

Shell Muskeg River - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO_2) - ppb

Shell Muskeg River - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 40 ppb on Apr 11 22:00 Maximum Daily Average: 16.7 ppb on Apr 9

Minimum Value: 0 ppb on Apr 8 22:00
Maximum Diurnal Average: 11.4 ppb at hour 5
Monthly Average: 8.3 ppb

Minimum Daily Average: 1.2 ppb on Apr 24
Minimum Diurnal Average: 5.1 ppb at hour 15
Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 2$ Median = 6 $Q_3 = 12$ $P_{90} = 19$ $P_{99} = 36$

Hours in Service:	720
Hours of Data:	683
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-Apr	6	9	Z	9	15	28	19	18	17	15	13	11	9	2	1	3	1	1	1	3	2	2	4	4	8.3	28
2-Apr	6	7	4	Z	3	3	8	5	2	9	7	10	10	10	11	10	7	12	10	11	13	9	11	18	8.4	18
3-Apr	20	21	17	19	Z	18	15	9	13	8	6	7	1	1	2	3	6	5	2	2	1	1	2	3	7.8	21
4-Apr	3	4	5	14	15	Z	8	12	11	10	19	39	39	31	19	19	21	19	17	19	15	13	9	14	16.2	39
5-Apr	Z	10	11	4	9	11	7	5	2	3	23	29	13	8	3	2	2	1	1	1	2	11	12	12	7.8	29
6-Apr	9	Z	9	10	21	23	22	16	9	10	8	3	0	1	1	2	6	8	5	2	4	10	5	11	8.4	23
7-Apr	13	12	Z	1	9	9	5	12	5	3	2	2	13	11	13	12	11	8	5	15	18	3	3	3	8.1	18
8-Apr	4	5	6	Z	8	3	3	2	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	1.5	8
9-Apr	1	1	6	28	Z	21	25	15	19	15	15	16	12	14	17	15	16	12	15	19	29	25	24	24	16.7	29
10-Apr	25	23	24	18	15	Z	14	12	8	6	3	2	2	2	8	12	7	3	3	7	3	6	12	2	9.5	25
11-Apr	Z	0	0	0	0	0	1	10	10	9	9	8	10	6	5	6	10	23	15	7	16	40	37	35	11.2	40
12-Apr	30	Z	26	23	14	9	13	6	1	0	0	0	14	10	8	15	16	13	17	12	12	14	11	14	12.0	30
13-Apr	10	4	Z	29	31	8	11	29	36	37	18	23	25	1	1	3	2	1	1	0	0	0	0	0	11.7	37
14-Apr	2	14	13	Z	17	16	17	10	9	7	7	9	13	10	6	8	9	17	18	21	26	20	7	10	12.4	26
15-Apr	2	3	3	4	Z	11	4	2	5	4	4	5	4	3	3	3	2	1	0	0	0	2	1	0	2.8	11
16-Apr	2	6	2	1	1	Z	2	6	9	6	3	3	2	0	0	0	0	1	24	18	12	11	13	8	5.7	24
17-Apr	Z	19	31	29	27	24	22	19	16	14	7	6	4	3	5	4	2	9	27	24	19	22	14	6	15.2	31
18-Apr	6	Z	11	8	12	15	16	19	12	7	6	7	2	1	1	1	0	0	0	3	4	4	3	4	6.2	19
19-Apr	7	7	Z	7	6	5	15	21	7	C	C	C	C	C	C	C	1	1	1	10	20	4	8	16	--	21
20-Apr	18	18	16	Z	17	14	13	13	13	11	10	7	5	9	6	7	12	7	7	2	2	2	3	4	9.4	18
21-Apr	6	8	9	8	Z	12	9	13	13	16	15	11	9	13	12	10	10	12	11	3	19	25	10	5	11.2	25
22-Apr	12	11	9	18	13	Z	6	13	10	12	13	12	13	17	14	12	18	19	16	14	5	14	8	8	12.4	19
23-Apr	Z	39	19	21	18	10	8	8	16	13	13	12	1	0	1	0	0	0	0	0	0	1	1	0	7.9	39
24-Apr	0	Z	0	0	0	1	1	0	1	1	2	2	2	2	1	2	2	0	0	0	1	3	6	1	1.2	6
25-Apr	1	1	Z	1	1	4	10	6	4	4	3	4	3	2	2	1	2	3	2	2	1	1	1	1	2.6	10
26-Apr	2	4	2	Z	5	6	7	6	4	3	5	5	1	2	2	2	3	5	5	5	5	5	4	4	4.0	7
27-Apr	5	8	11	8	Z	7	8	14	15	10	8	7	4	3	4	5	5	3	4	4	6	4	8	7	6.7	15
28-Apr	4	6	5	7	7	Z	5	12	13	10	6	3	3	1	2	1	1	1	1	0	1	1	10	21	5.3	21
29-Apr	Z	10	10	4	1	1	2	2	3	4	2	1	1	1	0	0	0	2	1	2	3	4	7	8	3.0	10
30-Apr	8	Z	10	11	19	13	8	4	3	4	4	1	1	0	0	0	0	0	2	4	3	3	14	15	5.5	19
	8.0	10.0	10.3	11.3	11.4	10.8	10.1	10.6	9.4	8.7	7.9	8.4	7.3	5.6	5.1	5.4	5.7	6.3	7.1	7.1	8.1	8.5	8.2	8.6	Diurnal Average	
	30	39	31	29	31	28	25	29	36	37	23	39	39	31	19	19	21	23	27	24	29	40	37	35	Diurnal Maximum	

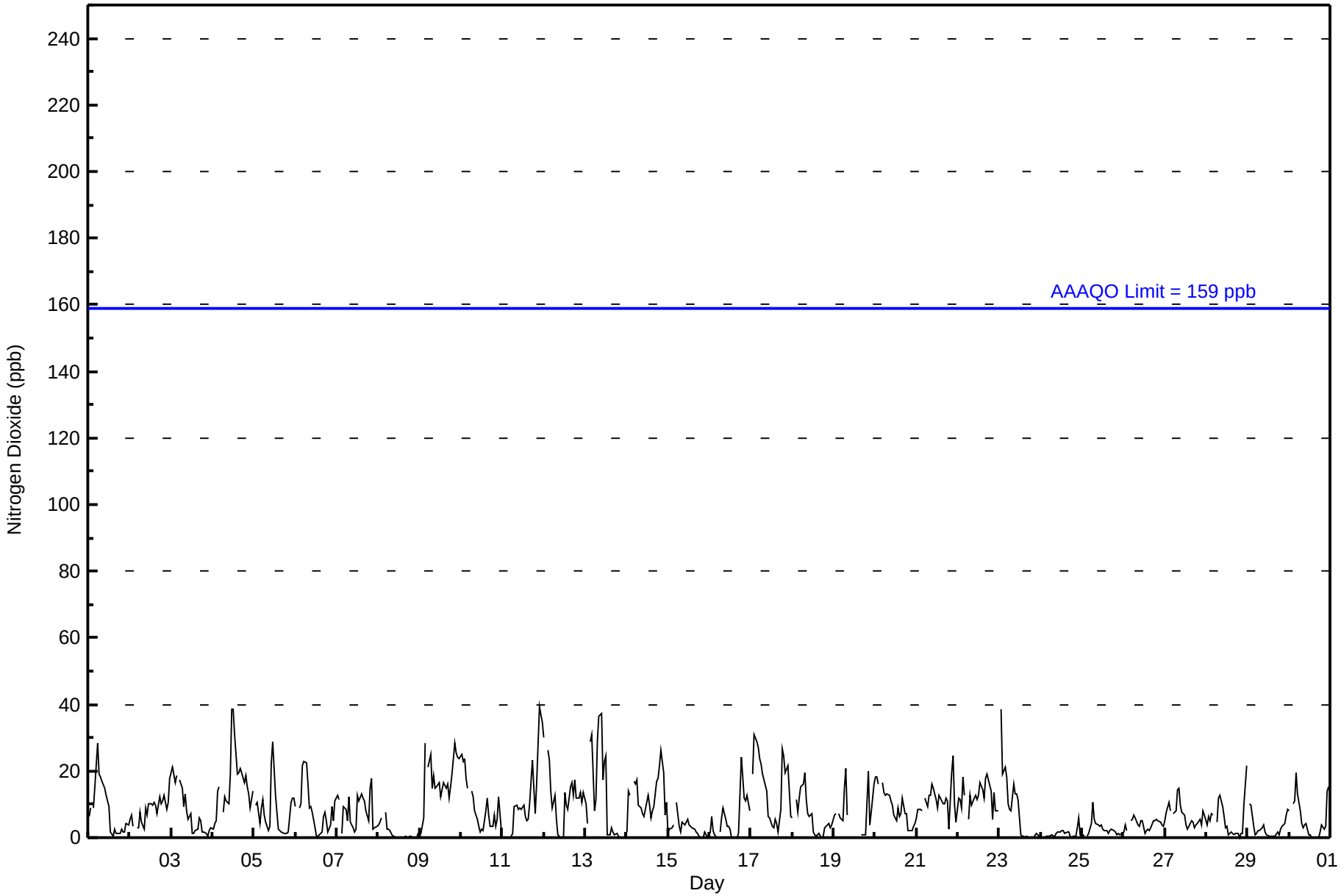
Z - zerospan C - Calibration
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Dioxide (NO_2) - ppb

Shell Muskeg River - April 2016



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Nitrogen Dioxide (NO_2) - ppb

Shell Muskeg River - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	632	92.53	92.53
21 - 40	51	7.47	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: 683

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Dioxide (NO_2) - ppb

Shell Muskeg River - April 2016

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	67	122	34	13	11	37	64	131	44	8	8	8	8	7	9	632
21 - 40	11	4	2	1	0	2	0	2	5	0	0	0	1	1	11	11	51
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	72	71	124	35	13	13	37	66	136	44	8	8	9	9	18	20	683

Total Number of Valid Hours: 683

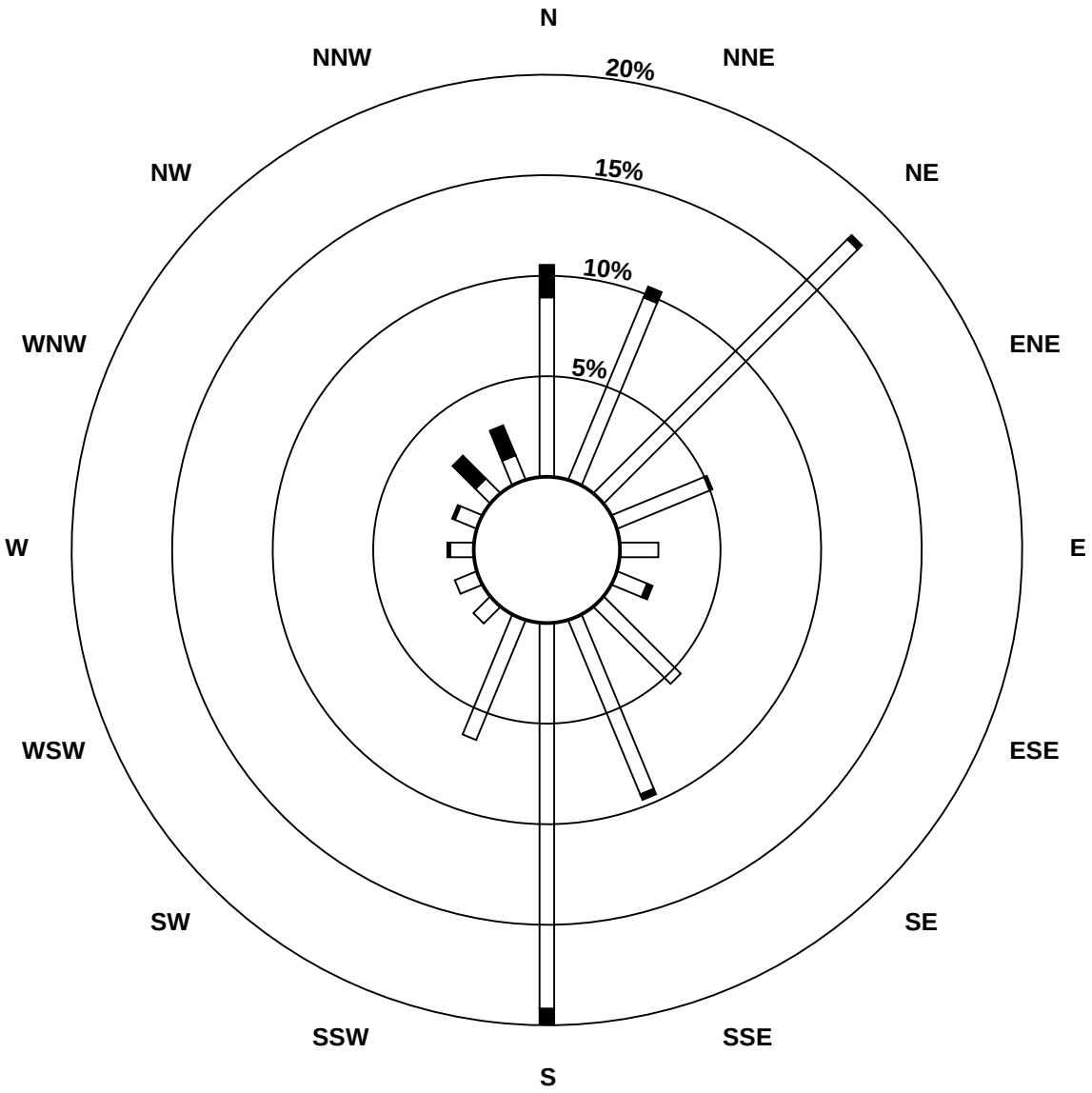
Total Number of Hours: 720

Wood Buffalo Environmental Association

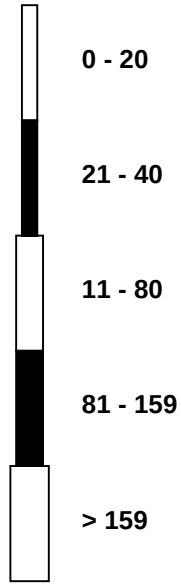
Wind Rose Apr 2016

Nitrogen Dioxide (NO_2) - ppb

Shell Muskeg River (AMS 16)



Classes (ppb)



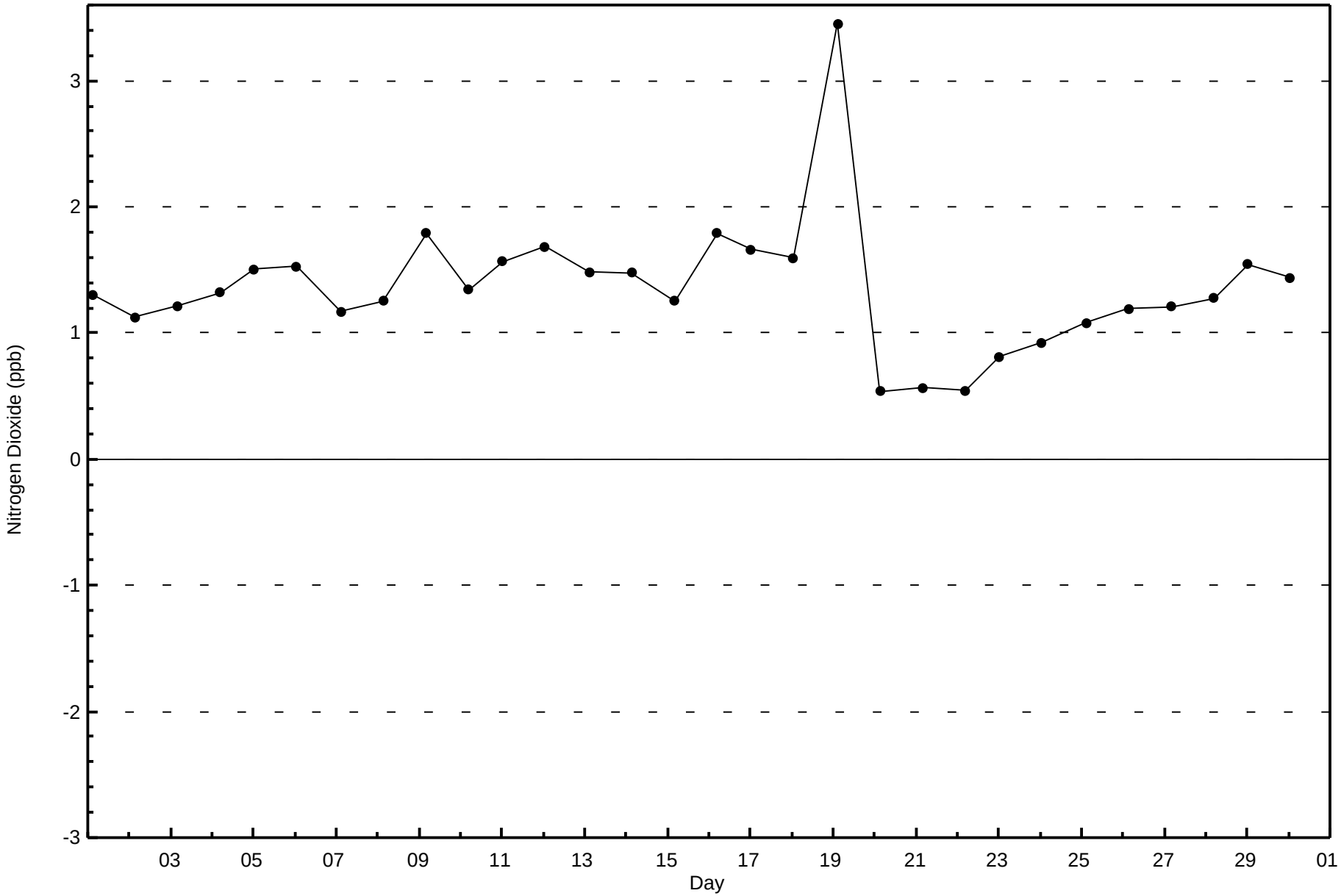
Total Number of Valid Hours: 683

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Dioxide (NO_2) - ppb

Shell Muskeg River - April 2016

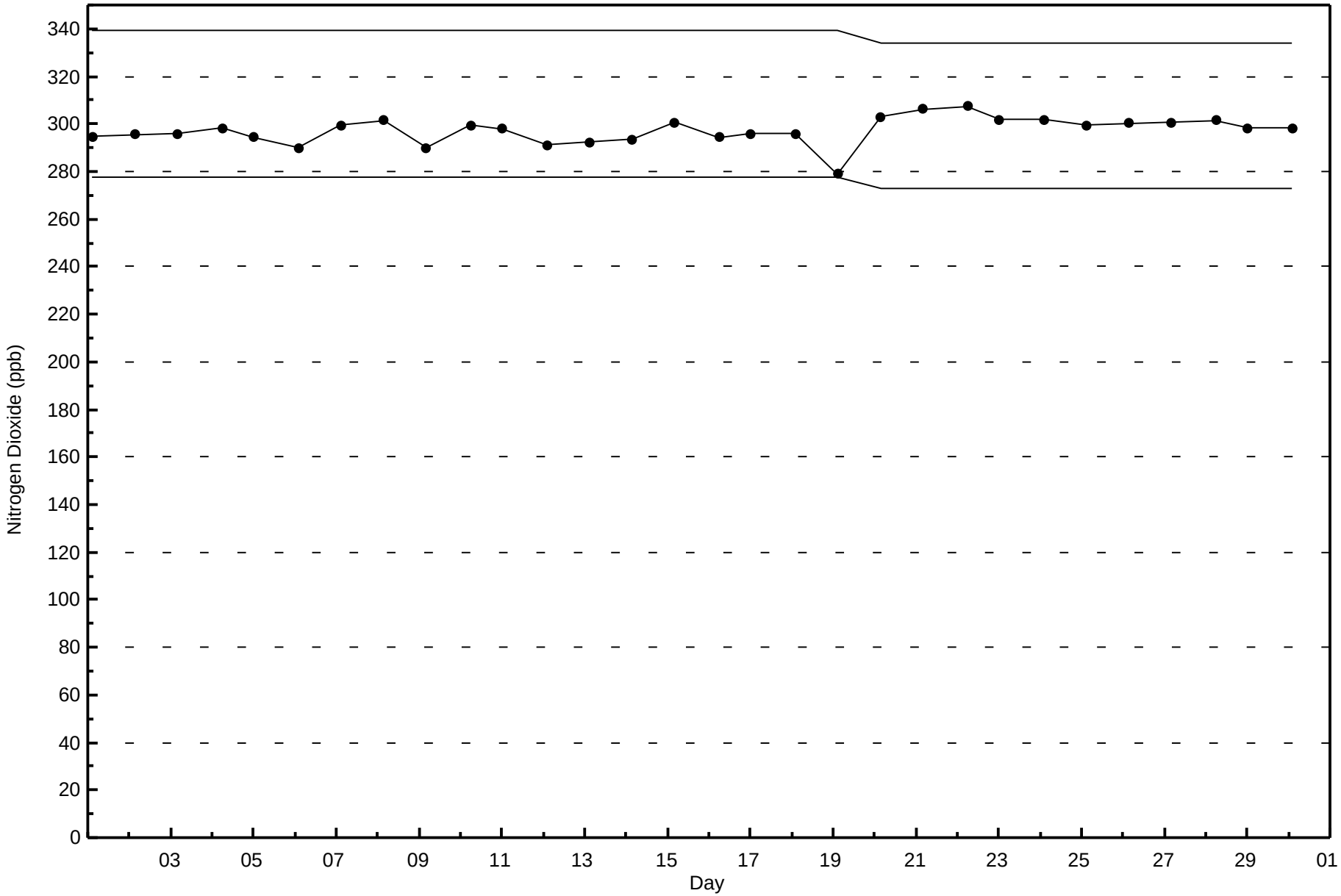


Wood Buffalo Environmental Association

Span Responses

Nitrogen Dioxide (NO_2) - ppb

Shell Muskeg River - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_X) - ppb

Shell Muskeg River - April 2016

Maximum Value: 140 ppb on Apr 4 13:00

Maximum Daily Average: 32.7 ppb on Apr 4

Minimum Value: 0 ppb on Apr 11 02:00

Minimum Daily Average: 1.3 ppb on Apr 24

Maximum Diurnal Average: 18.4 ppb at hour 8

Minimum Diurnal Average: 8.6 ppb at hour 20

Monthly Average: 13.3 ppb

Percentiles: $P_1 = 0$ $P_{10} = 1$ $Q_1 = 2$ Median = 8 $Q_3 = 20$ $P_{90} = 29$ $P_{99} = 95$

Hours in Service:	720
Hours of Data:	683
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-Apr	6	9	Z	9	20	48	34	36	29	28	24	22	20	3	1	5	2	2	1	3	2	2	4	4	13.6	48
2-Apr	6	7	4	Z	3	3	8	5	4	16	11	16	16	16	17	16	11	19	13	16	16	11	13	21	11.7	21
3-Apr	24	26	21	23	Z	22	21	14	20	14	10	15	2	3	5	5	11	10	2	2	1	1	2	3	11.2	26
4-Apr	3	4	5	17	16	Z	9	18	18	17	47	139	140	74	34	32	31	26	24	27	25	20	10	17	32.7	140
5-Apr	Z	12	13	5	10	13	7	5	2	4	46	71	21	12	4	3	2	1	1	1	2	11	12	12	11.8	71
6-Apr	9	Z	9	15	61	42	36	21	13	16	11	5	0	1	1	2	9	12	9	3	6	16	7	17	14.1	61
7-Apr	15	18	Z	1	9	9	6	15	5	4	2	4	23	24	29	24	22	15	8	20	27	3	3	3	12.6	29
8-Apr	4	4	6	Z	8	3	3	3	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1.6	8
9-Apr	1	1	6	70	Z	25	32	21	28	21	20	24	20	25	32	22	24	17	21	23	35	31	28	28	24.1	70
10-Apr	31	29	29	22	18	Z	21	22	15	11	6	3	5	4	15	23	11	5	4	7	3	6	12	2	13.2	31
11-Apr	Z	0	0	0	0	0	1	11	12	11	12	12	15	9	7	7	12	37	16	7	26	134	122	102	24.1	134
12-Apr	58	Z	72	75	21	15	24	9	1	1	0	0	31	20	18	34	32	21	24	16	15	21	17	19	23.6	75
13-Apr	13	4	Z	48	69	9	13	86	135	133	34	35	36	1	1	3	2	1	1	0	0	0	0	0	27.1	135
14-Apr	2	20	19	Z	21	19	21	13	14	11	11	15	21	15	8	10	13	21	20	24	29	21	7	11	15.8	29
15-Apr	2	2	3	4	Z	12	5	2	7	7	6	8	6	5	4	4	2	2	0	0	0	2	1	0	3.6	12
16-Apr	2	6	2	1	1	Z	2	8	12	8	5	5	3	0	0	0	0	2	30	19	12	11	13	8	6.5	30
17-Apr	Z	20	33	40	35	34	33	27	22	23	9	8	5	4	8	5	2	10	36	26	20	22	14	6	19.2	40
18-Apr	6	Z	12	8	12	16	23	34	18	10	9	10	2	1	1	1	0	0	0	3	4	4	3	4	7.8	34
19-Apr	7	7	Z	7	6	5	20	33	9	C	C	C	C	C	C	C	1	1	1	11	21	4	14	30	--	33
20-Apr	37	31	26	Z	32	24	25	28	27	27	27	19	13	21	16	16	27	14	13	2	2	2	3	4	19.0	37
21-Apr	6	8	9	8	Z	13	15	20	23	35	31	25	17	26	26	22	20	25	22	3	35	43	15	6	19.6	43
22-Apr	19	17	12	24	17	Z	8	21	17	21	26	24	24	33	30	25	35	37	28	23	8	21	11	10	21.3	37
23-Apr	Z	94	24	46	22	11	10	11	33	21	23	20	1	0	1	0	0	0	0	0	0	1	1	0	13.9	94
24-Apr	0	Z	0	0	0	1	1	0	1	1	2	2	2	3	2	2	2	0	0	0	1	3	6	1	1.3	6
25-Apr	1	0	Z	1	1	5	12	6	5	5	4	5	3	3	3	1	3	3	2	2	1	1	1	1	3.0	12
26-Apr	2	4	2	Z	5	6	8	7	5	5	7	7	1	3	3	2	3	6	6	6	5	5	4	4	4.5	8
27-Apr	5	8	14	10	Z	9	16	41	37	24	22	15	7	5	6	10	8	5	5	5	6	4	8	7	12.0	41
28-Apr	4	7	6	12	17	Z	15	27	25	14	9	4	4	1	2	1	1	1	2	0	1	1	10	21	8.1	27
29-Apr	Z	10	10	4	1	1	2	2	4	5	2	1	1	1	0	0	0	2	1	3	3	4	7	8	3.2	10
30-Apr	8	Z	10	11	19	14	8	5	4	5	6	1	1	0	0	0	0	0	2	4	3	3	14	15	5.9	19
	10.8	14.0	13.8	18.4	17.0	14.2	14.6	18.4	18.2	17.2	14.6	17.7	15.3	10.8	9.5	9.6	9.6	9.8	9.7	8.6	10.3	13.5	12.1	12.2	Diurnal Average	
	58	94	72	75	69	48	36	86	135	133	47	139	140	74	34	34	35	37	36	27	35	134	122	102	Diurnal Maximum	

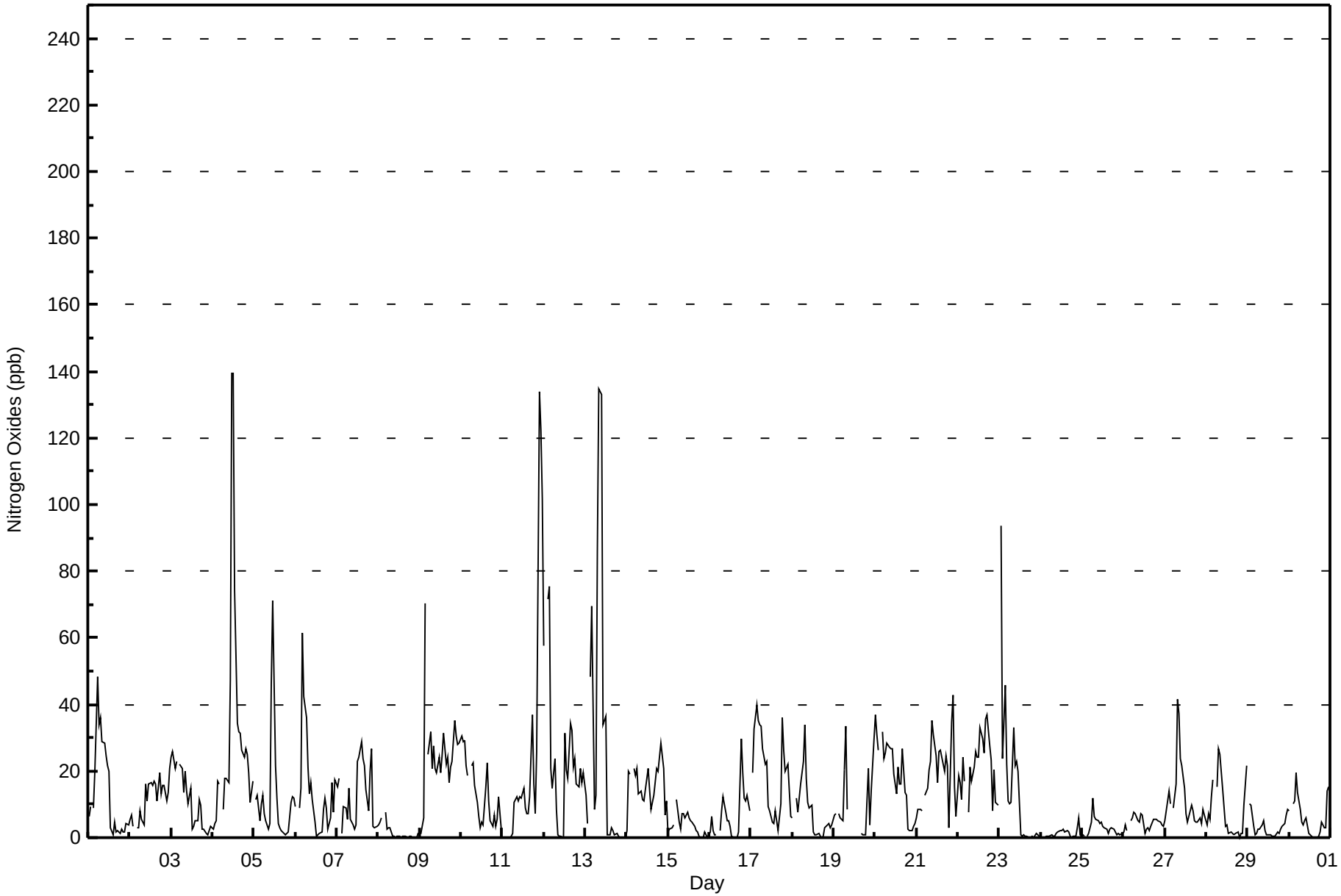
Z - zerospan C - Calibration

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Oxides (NO_X) - ppb

Shell Muskeg River - April 2016



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Nitrogen Oxides (NO_X) - ppb

Shell Muskeg River - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	522	76.43	76.43
21 - 40	136	19.91	96.34
11 - 80	16	2.34	98.68
81 - 159	9	1.32	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 683

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Oxides (NO_X) - ppb

Shell Muskeg River - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	34	24	98	34	13	11	37	64	126	41	7	8	7	7	5	6	522
21 - 40	36	44	24	0	0	1	0	2	9	3	1	0	2	1	6	7	136
11 - 80	1	3	1	1	0	1	0	0	1	0	0	0	0	1	4	3	16
81 - 159	1	0	1	0	0	0	0	0	0	0	0	0	0	0	3	4	9
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	72	71	124	35	13	13	37	66	136	44	8	8	9	9	18	20	683

Total Number of Valid Hours: 683

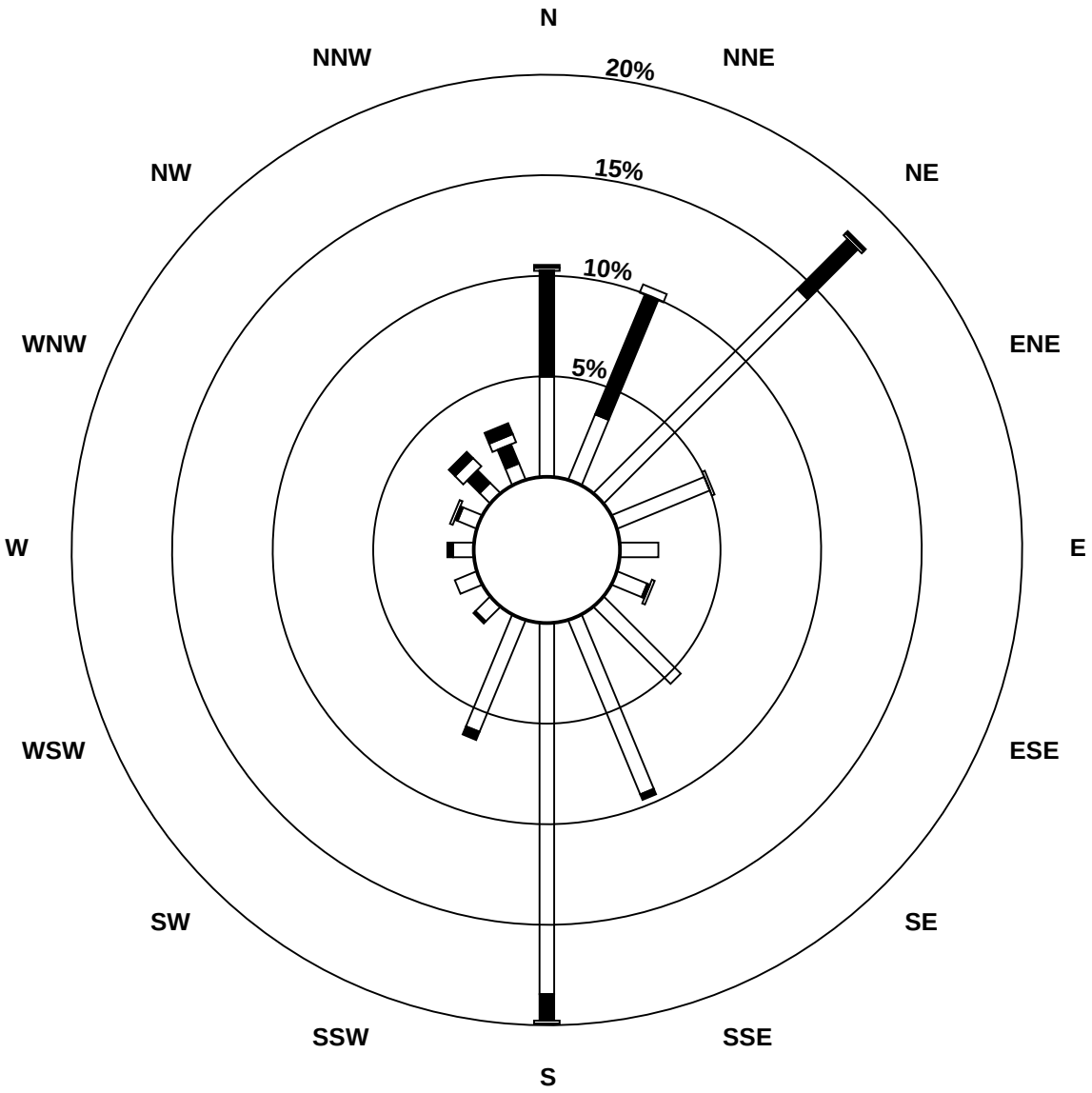
Total Number of Hours: 720

Wood Buffalo Environmental Association

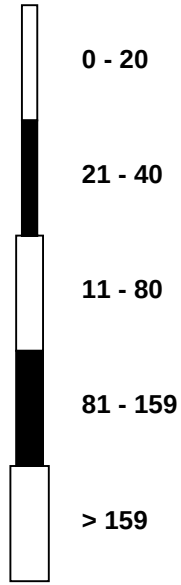
Wind Rose Apr 2016

Nitrogen Oxides (NO_X) - ppb

Shell Muskeg River (AMS 16)



Classes (ppb)



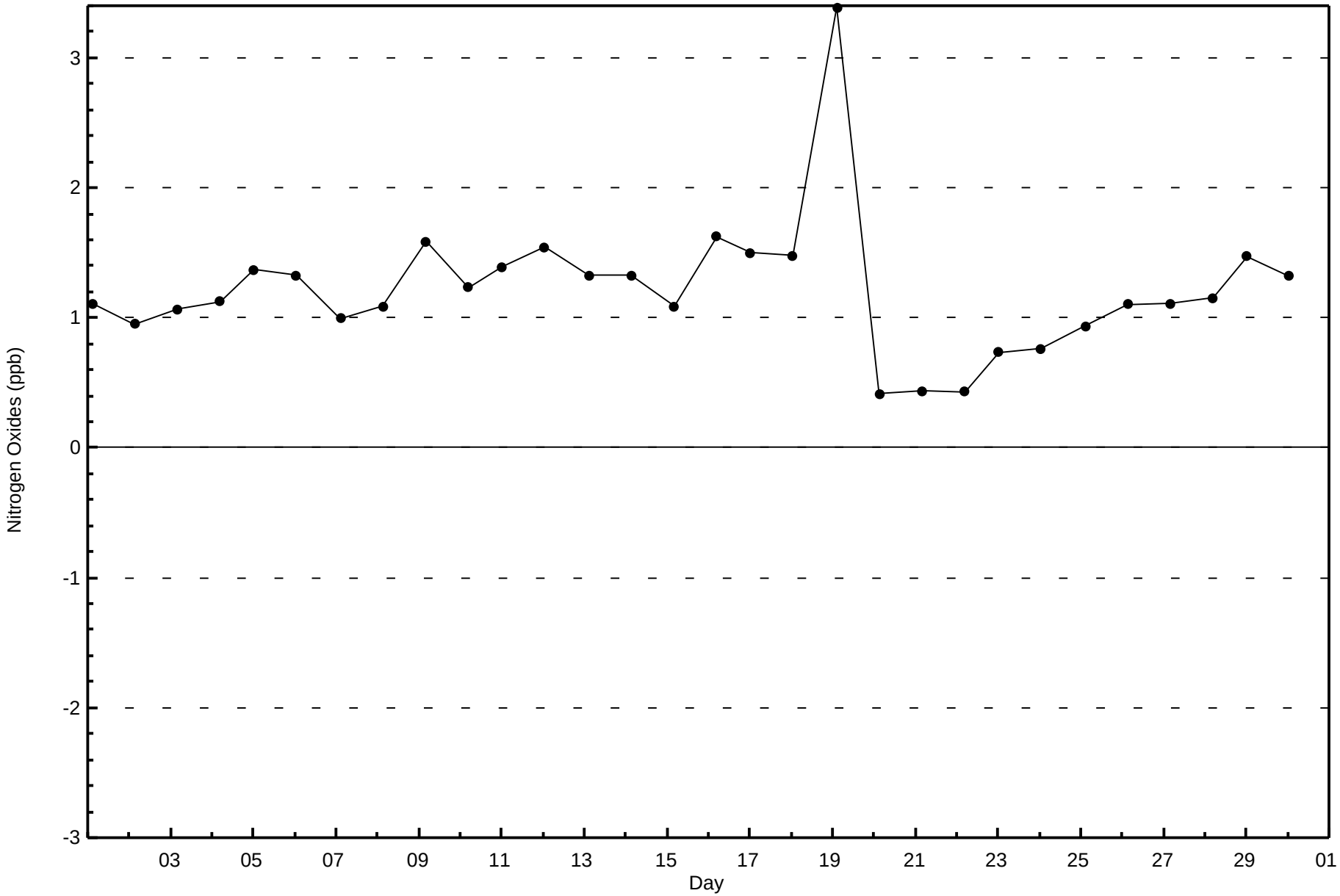
Total Number of Valid Hours: 683

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Oxides (NO_X) - ppb

Shell Muskeg River - April 2016

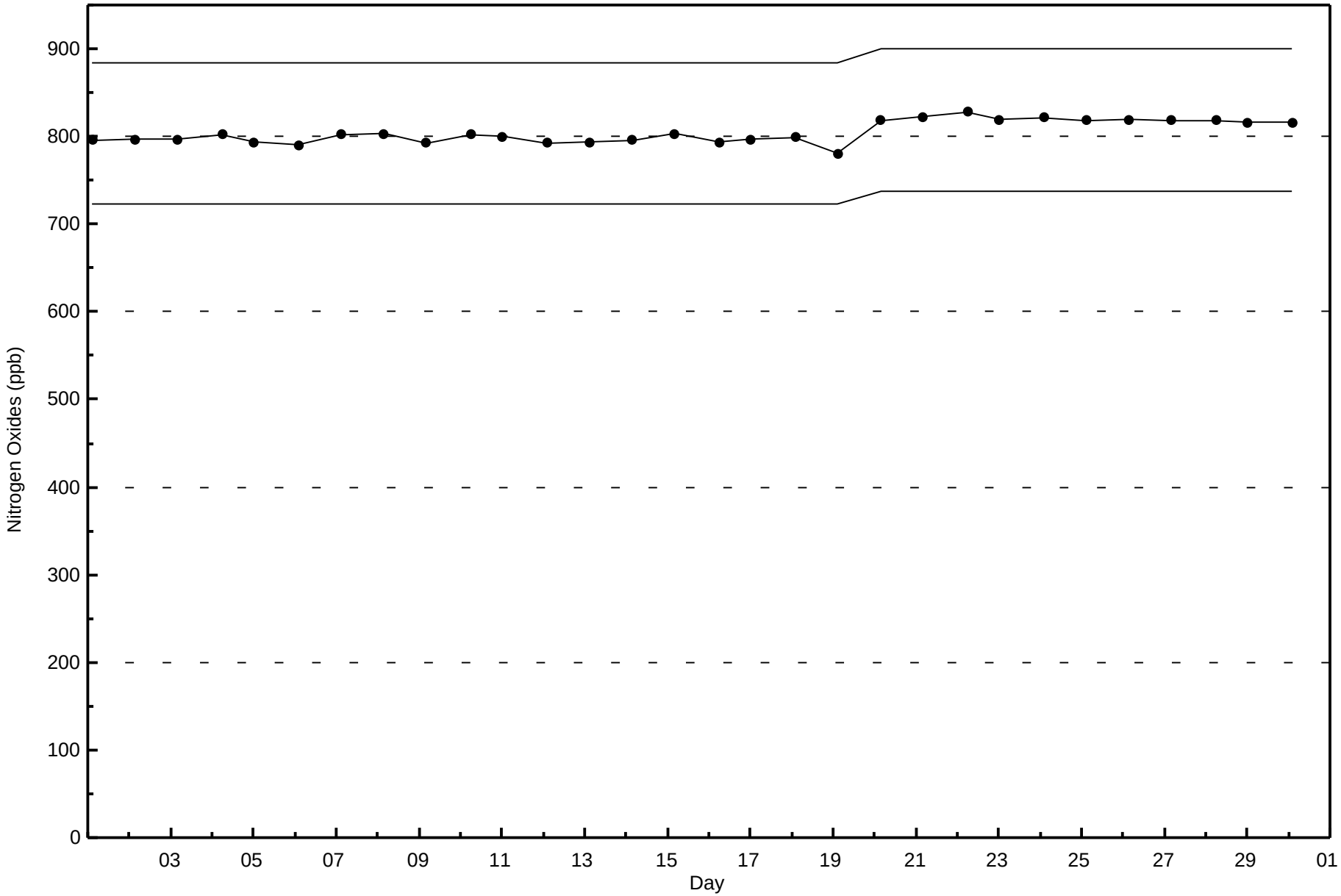


Wood Buffalo Environmental Association

Span Responses

Nitrogen Oxides (NO_X) - ppb

Shell Muskeg River - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

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

Shell Muskeg River - April 2016

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

Maximum Value: 44.1 $\mu g/m^3$ on Apr 17 19:00

Maximum Daily Average: 16.3 $\mu g/m^3$ on Apr 19

Minimum Value: 0.6 $\mu g/m^3$ on Apr 14 15:00

Minimum Daily Average: 2.1 $\mu g/m^3$ on Apr 8

Maximum Diurnal Average: 8.2 $\mu g/m^3$ at hour 4

Minimum Diurnal Average: 3.5 $\mu g/m^3$ at hour 16

Monthly Average: 6.07 $\mu g/m^3$

Percentiles: $P_1 = 0.9$ $P_{10} = 2.2$ $Q_1 = 3.3$ Median = 4.8 $Q_3 = 7.1$ $P_{90} = 10.5$ $P_{99} = 27.0$

Hours in Service:	720
Hours of Data:	717
Hours of Missing Data:	3
Hours of Calibration:	3
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-Apr	5.2	5.5	3.2	3.4	3.9	4.1	2.3	2.6	4.1	3.9	3.5	3.3	2.7	2.3	2.7	3.4	2.7	1.7	1.8	2.7	3.6	2.9	3.2	3.6	3.3	5.5
2-Apr	4.5	5.4	5.2	6.5	5.9	5.5	10.6	7.4	3.2	2.2	3.5	6.1	6.9	9.1	15.3	9.5	7.4	5.9	6.7	6.7	7.3	7.2	6.7	6.6	6.7	15.3
3-Apr	7.2	6.1	5.8	6.1	7.2	6.1	6.8	4.9	5.8	8.7	4.2	2.6	1.9	1.7	1.6	1.6	1.6	1.7	2.0	2.7	3.0	3.0	4.1	4.1	4.2	8.7
4-Apr	3.8	3.3	3.7	6.7	7.2	4.6	3.9	10.6	6.8	3.6	7.1	19.8	24.5	19.2	9.5	9.2	10.3	7.5	6.2	5.8	3.9	4.2	4.2	5.9	8.0	24.5
5-Apr	5.7	5.2	5.3	5.5	6.4	7.1	6.1	5.2	4.6	4.1	11.5	13.5	6.6	5.5	2.0	2.1	2.1	2.8	4.2	4.5	4.8	7.7	9.6	8.9	5.9	13.5
6-Apr	8.3	9.2	11.1	14.5	18.6	7.4	3.3	3.5	3.3	4.0	4.7	3.4	2.7	2.7	2.6	2.4	2.5	2.5	2.7	3.0	3.1	3.3	3.3	3.9	5.2	18.6
7-Apr	4.9	3.5	2.9	3.2	3.4	3.6	3.4	4.7	3.3	2.5	2.0	4.6	5.9	3.5	2.4	2.7	2.8	2.2	2.5	7.1	3.3	2.7	2.9	3.9	3.5	7.1
8-Apr	3.7	3.9	4.2	4.3	4.0	3.6	4.5	2.8	1.3	1.3	1.2	1.1	1.1	1.0	1.0	0.9	0.9	0.9	0.9	0.9	1.5	1.8	2.0	2.4	2.1	4.5
9-Apr	3.6	4.7	28.5	27.5	9.7	5.9	5.9	5.6	6.0	5.5	3.9	4.2	6.0	6.2	7.9	6.6	5.9	7.2	7.6	7.8	8.1	9.6	7.3	6.1	8.2	28.5
10-Apr	8.2	8.4	8.2	13.7	9.1	8.1	8.0	5.1	13.9	4.6	2.9	3.9	6.0	2.5	1.7	1.5	1.5	1.7	2.4	4.7	5.1	8.7	8.1	4.7	5.9	13.9
11-Apr	5.1	6.5	4.5	4.0	4.5	4.8	4.4	8.8	8.5	8.0	10.5	10.1	6.8	5.9	5.2	5.6	6.6	16.3	11.1	6.9	9.8	22.4	19.3	16.1	8.8	22.4
12-Apr	12.2	14.4	15.0	12.4	7.1	6.3	7.6	11.5	11.1	6.7	4.0	3.7	4.2	3.3	2.7	2.8	2.6	3.0	4.4	5.3	6.1	5.1	5.3	5.4	6.8	15.0
13-Apr	4.7	4.5	4.3	7.1	7.5	4.5	5.6	8.1	8.2	8.4	4.6	7.0	6.7	2.5	3.0	4.2	5.0	4.8	4.7	3.9	3.1	2.6	2.6	2.6	5.0	8.4
14-Apr	4.3	6.3	3.9	4.5	6.3	6.4	5.1	3.4	2.4	1.9	1.6	1.2	1.1	0.8	0.6	0.7	1.1	1.7	1.5	2.3	2.7	3.0	2.8	4.1	2.9	6.4
15-Apr	4.0	4.7	5.1	5.6	6.5	11.5	4.6	3.2	3.5	2.4	3.2	4.5	1.8	1.8	1.7	1.9	1.6	1.7	1.5	2.8	4.2	4.9	4.7	3.9	3.8	11.5
16-Apr	3.6	4.4	3.0	2.7	2.7	2.7	2.4	2.3	3.6	4.3	3.4	3.7	3.0	1.5	1.8	1.7	2.6	3.3	24.9	37.3	31.4	11.2	7.4	7.6	7.2	37.3
17-Apr	7.9	9.4	8.5	9.1	9.6	10.2	7.9	6.4	4.4	4.9	2.9	2.2	2.0	1.4	1.8	2.4	2.2	14.9	44.1	22.7	17.4	14.4	26.0	8.7	10.1	44.1
18-Apr	6.3	7.1	5.5	5.2	5.9	6.5	6.8	6.9	5.6	4.5	4.0	3.4	2.7	2.1	2.8	4.8	4.5	5.7	13.0	4.4	12.3	21.8	20.7	17.0	7.5	21.8
19-Apr	39.5	30.8	21.5	25.5	39.7	24.8	25.0	11.5	5.9	4.8	5.1	5.6	15.0	C	C	C	13.4	8.6	6.5	9.2	20.0	11.8	12.7	5.1	16.3	39.7
20-Apr	5.3	6.9	7.1	7.0	7.5	8.4	10.8	8.5	8.4	6.3	5.4	5.6	7.1	5.7	3.8	4.1	3.9	3.4	3.3	4.2	5.0	5.1	4.9	5.1	5.9	10.8
21-Apr	5.5	5.9	6.3	7.0	6.7	6.4	5.2	4.3	3.0	2.6	2.7	2.8	2.9	2.4	2.4	2.9	3.5	3.5	3.9	4.0	6.5	6.4	5.5	5.0	4.5	7.0
22-Apr	5.6	6.2	6.2	6.5	6.7	4.9	4.4	5.4	4.6	3.4	2.6	2.8	3.6	2.5	2.4	2.9	2.9	3.1	3.6	4.7	4.9	5.5	7.3	6.1	4.5	7.3
23-Apr	8.3	18.0	10.8	10.7	8.8	7.9	7.0	4.8	3.5	4.3	4.0	3.7	1.6	1.5	1.7	1.8	2.0	2.0	3.4	4.8	6.3	6.7	4.8	3.8	5.5	18.0
24-Apr	4.5	4.1	4.7	5.2	4.8	4.6	4.5	4.1	3.6	3.0	3.2	3.9	4.2	3.9	3.5	3.4	3.6	3.1	4.0	4.4	4.2	4.7	6.3	7.5	4.3	7.5
25-Apr	8.6	9.4	8.8	8.8	10.9	9.2	8.3	6.5	9.2	10.6	8.4	7.7	6.1	4.6	3.9	2.7	3.0	3.3	3.2	4.2	4.5	6.3	4.4	7.3	6.7	10.9
26-Apr	8.0	7.2	6.7	7.1	7.9	7.5	6.7	8.2	8.8	6.8	9.7	10.8	5.7	6.6	5.9	4.7	4.5	4.2	4.4	5.2	4.8	5.1	5.6	5.2	6.6	10.8
27-Apr	4.0	7.0	5.7	4.2	4.6	4.8	6.0	9.5	8.3	2.1	1.2	1.3	1.7	1.7	1.8	2.2	2.6	3.4	3.5	4.0	4.4	4.8	5.9	6.1	4.2	9.5
28-Apr	6.9	7.2	7.0	7.0	7.5	6.7	5.6	7.2	5.1	6.3	5.0	2.7	4.3	3.1	3.1	4.2	4.6	5.4	5.9	5.9	6.1	7.0	11.1	14.1	6.2	14.1
29-Apr	12.1	10.2	9.6	8.1	6.6	6.2	6.1	5.7	5.6	4.7	4.7	3.9	3.9	4.1	5.2	5.0	6.2	6.6	8.1	11.7	11.0	13.1	13.5	13.0	7.7	13.5
30-Apr	10.8	9.2	8.6	7.8	7.8	6.6	6.4	8.1	5.5	6.6	5.4	3.3	3.4	4.3	3.7	3.2	5.0	3.0	4.2	4.0	4.5	4.7	7.9	10.8	6.0	10.8
	7.4	7.8	7.7	8.2	8.2	6.9	6.5	6.2	5.7	4.8	4.5	5.1	5.1	3.9	3.6	3.5	4.0	4.5	6.5	6.6	7.1	7.3	7.7	6.8	Diurnal Average	
	39.5	30.8	28.5	27.5	39.7	24.8	25.0	11.5	13.9	10.6	11.5	19.8	24.5	19.2	15.3	9.5	13.4	16.3	44.1	37.3	31.4	22.4	26.0	17.0	Diurnal Maximum	

C - Calibration

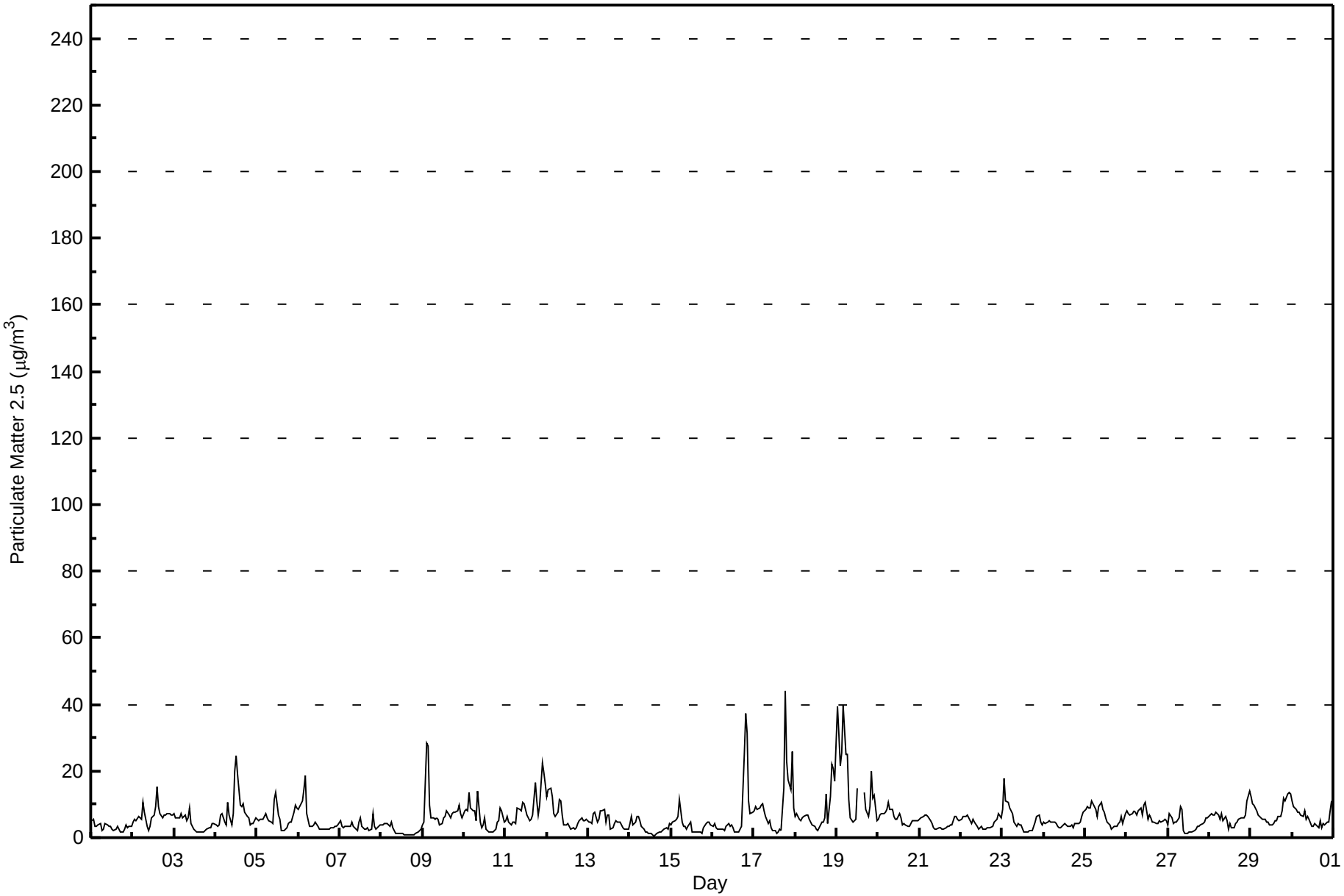
Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 $\mu g/m^3$

Wood Buffalo Environmental Association

Hourly Averages

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

Shell Muskeg River - April 2016



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

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

Shell Muskeg River - April 2016

Concentration Ranges ($\mu g/m^3$)	Number of Hours	%	Cumulative %
1 - 5	401	55.93	55.93
6 - 15	278	38.77	94.70
16 - 25	19	2.65	97.35
26 - 80	10	1.39	98.74
> 81.0	0	0.00	98.74

Total Number of Valid Hours: 717

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

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

Shell Muskeg River - April 2016

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	22	45	101	28	7	9	26	45	63	22	6	9	8	1	1	8	401
6 - 15	52	27	26	9	6	3	7	21	79	17	2	3	2	6	14	4	278
16 - 25	1	1	1	0	0	1	0	1	4	1	0	0	0	1	5	3	19
26 - 80	0	0	0	0	0	0	0	2	1	4	0	0	0	1	0	2	10
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	75	73	128	37	13	13	33	69	147	44	8	12	10	9	20	17	708

Total Number of Valid Hours: 717

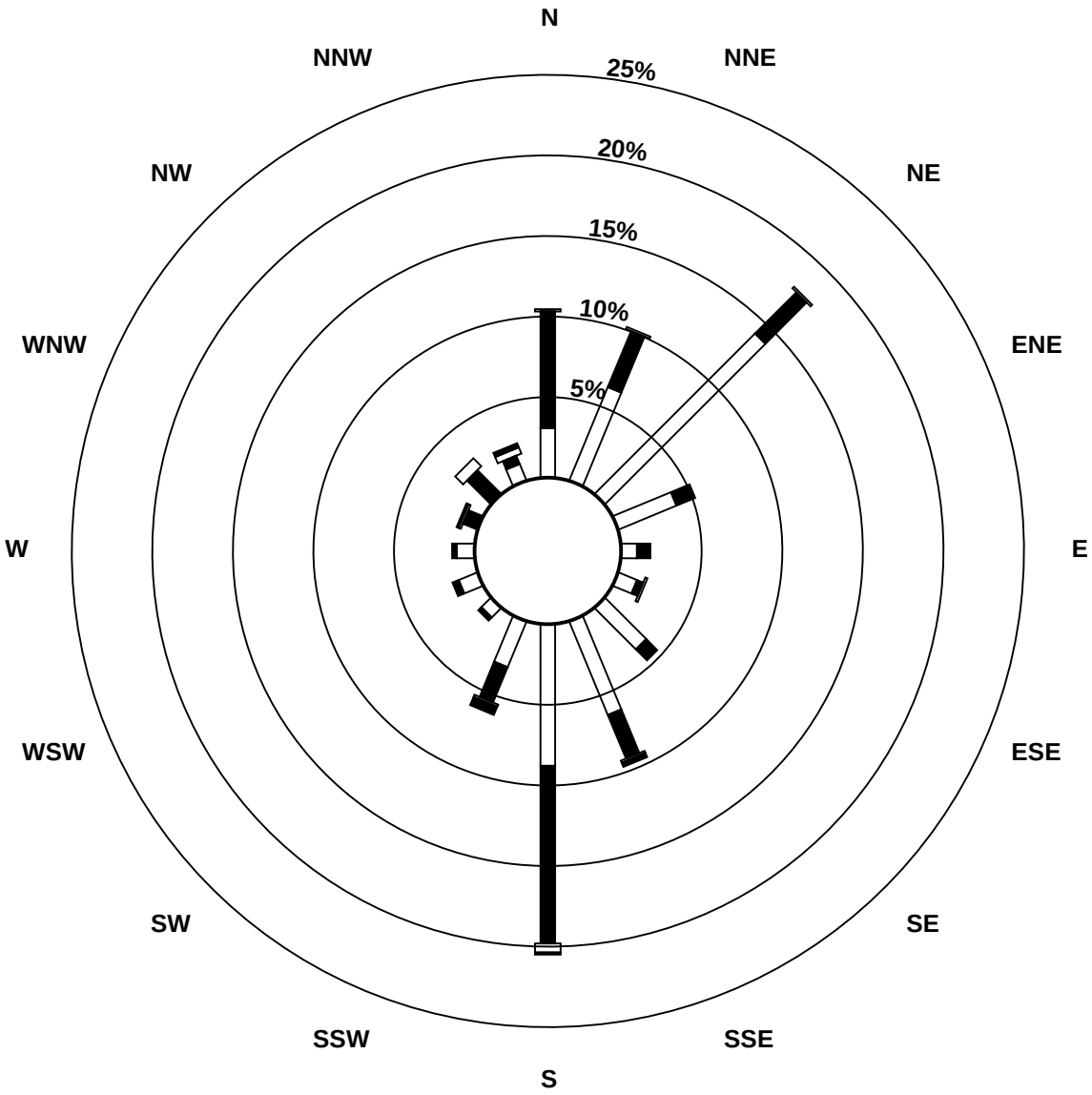
Total Number of Hours: 720

Wood Buffalo Environmental Association

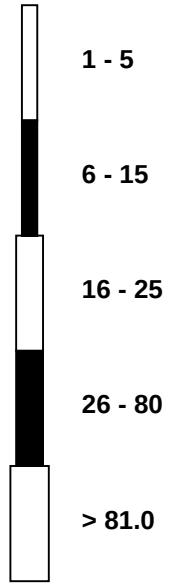
Wind Rose Apr 2016

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: 717

Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Shell Muskeg River - April 2016

Maximum Value: 100 % on Apr 27 08:00

Maximum Daily Average: 90.2 % on Apr 6

Minimum Value: 14 % on Apr 19 16:00

Minimum Daily Average: 27.5 % on Apr 19

Maximum Diurnal Average: 73.1 % at hour 5

Minimum Diurnal Average: 45.2 % at hour 16

Monthly Average: 58.8 %

Percentiles: $P_1 = 16$ $P_{10} = 29$ $Q_1 = 42$ Median = 61 $Q_3 = 74$ $P_{90} = 87$ $P_{99} = 99$

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

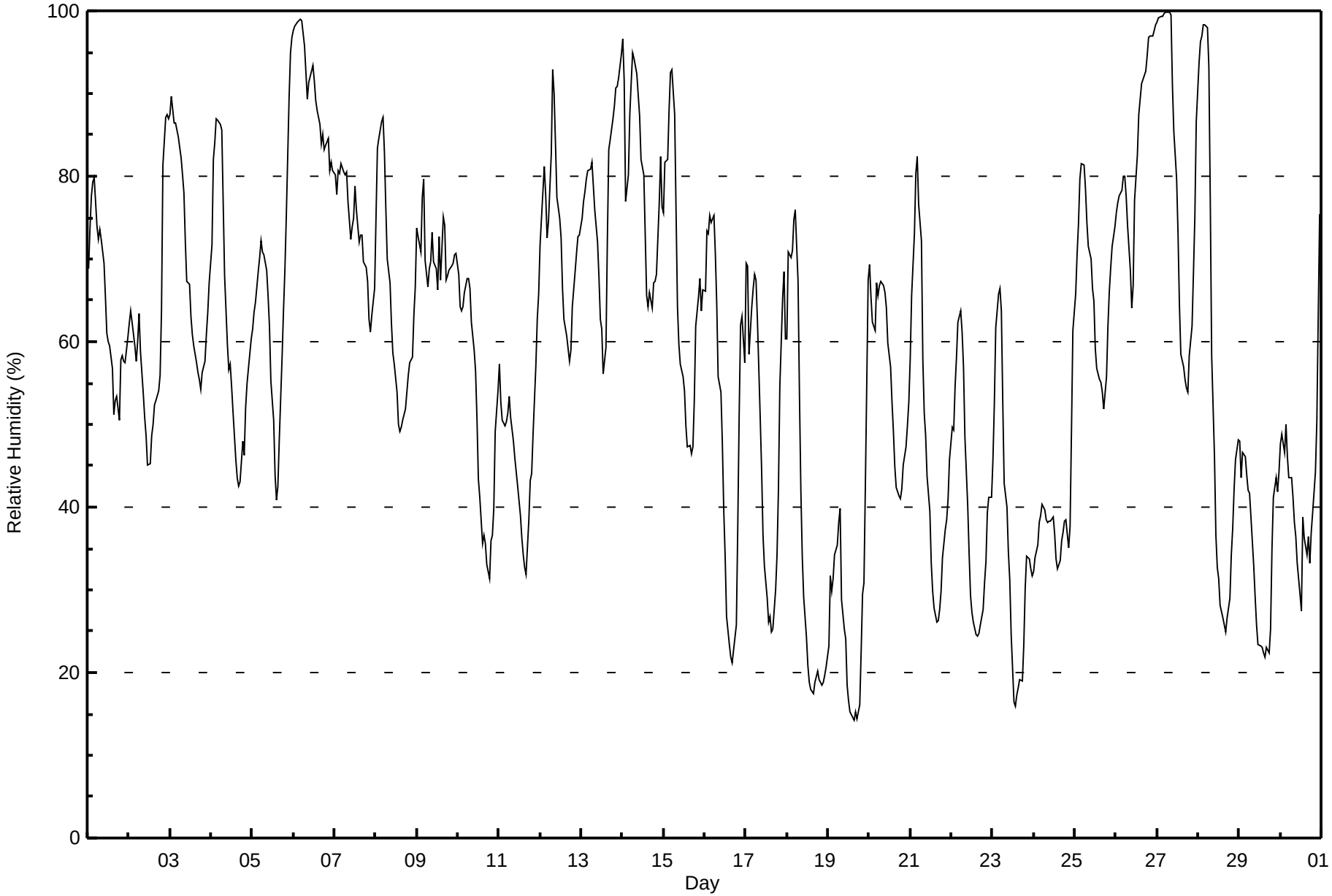
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	69	74	78	79	80	74	72	74	72	69	65	61	60	59	57	51	53	53	51	58	58	58	58	61	64.3	80
2-Apr	62	64	62	59	58	60	63	59	54	51	49	45	45	49	50	52	53	54	56	64	81	87	87	87	60.5	87
3-Apr	88	90	86	86	86	85	82	80	78	72	67	67	63	61	59	57	56	55	54	56	58	61	64	67	70.0	90
4-Apr	72	82	84	87	87	86	86	77	68	60	57	57	55	52	46	44	43	43	48	46	52	55	57	60	62.5	87
5-Apr	62	64	65	68	70	72	71	70	69	66	62	55	51	44	41	42	48	58	64	69	75	90	95	97	65.2	97
6-Apr	98	98	99	99	99	99	96	93	89	91	92	93	92	89	88	86	84	85	83	84	84	81	82	81	90.2	99
7-Apr	80	78	81	80	82	80	80	81	77	72	74	75	79	76	72	73	73	70	69	67	63	61	63	67	73.8	82
8-Apr	75	83	85	87	87	83	76	70	67	62	59	57	54	50	49	50	51	52	54	56	57	58	63	67	64.6	87
9-Apr	74	73	71	77	80	70	67	69	70	73	70	69	66	73	67	75	74	67	68	69	69	70	71	71	70.9	80
10-Apr	68	64	64	64	66	68	68	66	62	59	56	51	43	41	36	37	36	33	31	36	37	40	49	54	51.2	68
11-Apr	57	53	51	50	50	51	53	51	48	46	44	43	39	36	34	33	32	39	43	44	49	57	63	66	47.1	66
12-Apr	72	75	81	78	73	75	83	93	90	84	77	75	72	66	63	61	59	58	59	64	69	71	73	73	72.6	93
13-Apr	75	77	78	80	81	81	82	79	76	72	68	63	61	56	59	72	83	84	87	88	91	91	92	95	77.9	95
14-Apr	97	91	77	80	87	91	95	94	92	90	87	82	80	73	66	64	66	64	67	67	68	77	82	76	79.8	97
15-Apr	76	82	82	88	93	93	87	76	64	60	57	56	54	50	47	48	46	47	53	62	65	68	64	66	66.0	93
16-Apr	66	73	73	75	74	75	71	65	56	54	48	40	34	27	23	22	21	23	26	38	51	62	63	57	50.7	75
17-Apr	69	69	58	64	66	68	68	63	51	45	37	33	29	26	27	25	25	30	34	42	55	65	68	60	49.1	69
18-Apr	60	71	70	71	75	76	67	54	42	34	29	24	21	19	18	18	19	19	20	19	18	19	20	21	37.7	76
19-Apr	23	32	30	31	34	35	38	40	29	25	24	19	17	15	15	14	15	14	16	23	30	31	43	67	27.5	67
20-Apr	69	65	62	61	67	66	67	67	67	66	64	60	57	53	49	45	42	41	41	42	45	47	50	53	56.1	69
21-Apr	58	66	73	80	82	77	72	58	51	49	44	40	33	30	28	26	26	28	30	34	37	38	41	46	47.8	82
22-Apr	50	49	54	58	62	64	61	57	49	40	34	29	27	26	25	24	25	26	28	31	33	39	41	41	40.6	64
23-Apr	46	52	62	66	66	64	53	43	40	35	31	25	17	16	17	18	19	19	23	30	34	34	32	32	36.4	66
24-Apr	32	34	35	38	39	40	40	39	38	38	38	39	37	34	32	34	36	37	38	38	35	38	49	61	38.3	61
25-Apr	66	71	74	80	82	81	78	74	72	70	66	65	59	57	55	55	54	52	56	62	66	69	72	74	67.0	82
26-Apr	76	77	78	78	80	80	78	74	69	64	67	77	83	87	89	91	92	93	95	97	97	97	98	98	83.9	98
27-Apr	99	99	99	99	100	100	100	100	99	91	85	80	73	64	59	57	55	54	54	58	62	68	75	87	79.9	100
28-Apr	94	96	97	98	98	98	93	77	58	46	37	33	31	28	27	26	25	27	29	34	38	42	46	48	55.2	98
29-Apr	48	44	47	46	44	42	42	39	33	29	26	23	23	23	22	22	23	22	25	35	41	44	42	44	34.5	48
30-Apr	48	49	47	50	46	44	44	41	38	36	33	29	27	39	36	34	37	33	37	39	44	50	63	75	42.5	75
	67.5	69.8	70.1	72.0	73.1	72.6	71.0	67.3	62.3	58.3	54.9	52.1	49.4	47.3	45.2	45.2	45.7	46.1	48.0	51.8	55.4	58.9	62.1	65.0	Diurnal Average	
	99	99	99	99	100	100	100	100	99	91	92	93	92	89	89	91	92	93	95	97	97	97	98	98	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity (RH) - %

Shell Muskeg River - April 2016



Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	23	3.19	3.19
20 - 40	142	19.72	22.92
40 - 60	190	26.39	49.31
60 - 80	238	33.06	82.36
80 - 100	127	17.64	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Maximum Value: 27.9 C on Apr 18 15:00

Maximum Daily Average: 16.9 C on Apr 18

Minimum Value: -14.8 C on Apr 4 04:00

Minimum Daily Average: -7.9 C on Apr 3

Maximum Diurnal Average: 8.0 C at hour 17

Minimum Diurnal Average: -1.6 C at hour 5

Monthly Average: 3.28 C

Percentiles: P_1 = -11.7 P_{10} = -6.4 Q_1 = -2.4 Median = 2.2 Q_3 = 7.9 P_{90} = 15.6 P_{99} = 22.5

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

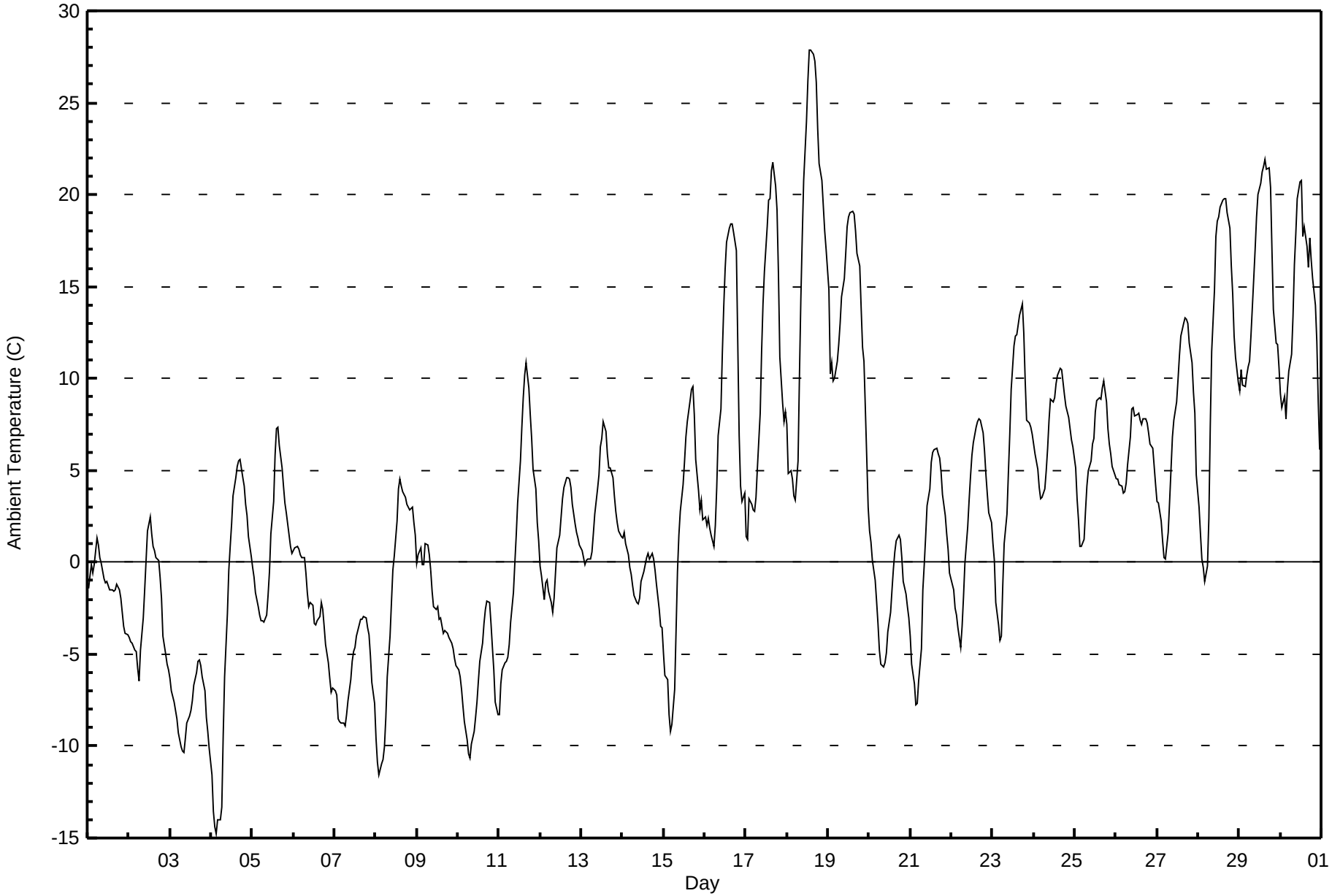
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	-1.4	-0.7	-0.1	-0.6	-0.1	1.3	1.0	0.3	-0.1	-0.9	-1.1	-1.1	-1.2	-1.5	-1.5	-1.5	-1.5	-1.2	-1.5	-2.0	-2.7	-3.4	-3.9	-3.9	-1.2	1.3
2-Apr	-4.1	-4.3	-4.4	-4.7	-4.8	-5.8	-6.5	-4.8	-3.0	-1.5	0.1	1.7	2.4	1.5	0.9	0.6	0.3	0.1	-0.8	-2.0	-4.0	-5.0	-5.6	-5.9	-2.5	2.4
3-Apr	-6.3	-7.0	-7.6	-8.0	-8.5	-9.2	-10.0	-10.3	-10.3	-9.6	-8.7	-8.4	-8.1	-7.5	-6.7	-6.0	-5.4	-5.3	-5.6	-6.3	-7.0	-8.5	-9.2	-10.1	-7.9	-5.3
4-Apr	-11.5	-13.5	-14.4	-14.8	-14.0	-14.0	-13.3	-9.4	-6.2	-2.8	-0.4	0.9	2.1	3.6	4.6	5.2	5.5	5.6	4.6	4.1	3.2	2.5	1.4	0.4	-2.9	5.6
5-Apr	-0.3	-0.8	-1.6	-2.4	-2.9	-3.2	-3.2	-3.3	-2.9	-1.8	-0.5	1.6	3.3	5.8	7.3	7.4	6.4	5.1	4.1	3.3	2.7	1.5	0.8	0.4	1.1	7.4
6-Apr	0.6	0.8	0.9	0.7	0.4	0.3	0.3	-0.6	-1.6	-2.4	-2.2	-2.4	-3.3	-3.4	-3.1	-2.9	-2.2	-2.6	-3.5	-4.5	-5.5	-6.3	-7.1	-6.9	-2.4	0.9
7-Apr	-7.0	-7.2	-8.5	-8.6	-8.7	-8.7	-8.9	-8.3	-7.5	-6.4	-5.4	-4.9	-4.6	-4.0	-3.4	-3.1	-3.1	-3.0	-3.0	-3.5	-3.9	-5.1	-6.6	-7.7	-5.9	-3.0
8-Apr	-9.6	-10.9	-11.5	-10.9	-10.7	-10.1	-8.5	-6.2	-4.0	-2.2	-0.4	0.3	2.3	4.0	4.5	4.1	3.9	3.5	3.2	3.0	2.9	3.0	2.2	1.5	-1.9	4.5
9-Apr	0.0	0.4	0.8	-0.1	-0.1	1.1	0.9	0.4	-0.4	-1.6	-2.4	-2.6	-2.4	-3.1	-3.0	-3.8	-3.7	-3.8	-3.9	-4.1	-4.4	-4.7	-5.2	-5.6	-2.1	1.1
10-Apr	-5.8	-6.2	-6.9	-7.8	-8.6	-9.7	-10.4	-10.6	-9.9	-9.2	-8.5	-7.6	-6.5	-5.4	-4.4	-3.3	-2.5	-2.1	-2.2	-3.4	-4.6	-5.9	-7.6	-8.3	-6.6	-2.1
11-Apr	-8.3	-6.6	-5.8	-5.5	-5.4	-5.2	-4.5	-3.3	-1.6	-0.1	1.5	3.2	5.5	7.3	8.9	10.2	10.9	9.5	8.0	6.8	5.0	4.0	2.2	1.2	1.6	10.9
12-Apr	-0.2	-0.7	-2.0	-1.1	-0.9	-1.6	-2.2	-2.7	-2.0	-0.6	0.8	1.5	2.5	3.4	4.0	4.6	4.6	4.5	4.1	3.1	2.1	1.6	1.3	1.0	1.0	4.6
13-Apr	0.6	0.3	-0.1	0.1	0.2	0.1	0.6	1.6	2.6	4.0	4.7	6.3	6.7	7.7	7.1	5.9	5.2	5.1	4.6	3.6	2.8	2.1	1.7	1.4	3.1	7.7
14-Apr	1.3	1.6	1.0	0.4	-0.3	-0.7	-1.3	-1.8	-2.2	-2.3	-2.0	-1.0	-0.5	-0.2	0.3	0.5	0.1	0.5	0.1	-0.4	-1.2	-2.6	-3.5	-3.5	-0.7	1.6
15-Apr	-4.9	-6.2	-6.4	-8.3	-9.2	-8.8	-6.9	-3.7	-0.5	1.5	2.8	4.2	5.4	6.8	7.6	8.8	9.4	9.6	8.0	5.6	3.9	2.8	3.4	2.3	1.1	9.6
16-Apr	2.5	2.0	2.4	1.9	1.5	0.9	2.0	4.1	6.9	8.3	11.4	13.9	15.9	17.4	18.2	18.4	18.4	17.9	17.0	12.0	6.9	4.2	3.3	3.8	8.8	18.4
17-Apr	1.4	1.3	3.5	3.1	2.9	2.8	3.5	5.2	8.1	11.4	14.1	15.8	18.2	19.7	19.8	21.3	21.8	20.5	19.1	15.7	11.2	8.6	7.6	8.2	11.0	21.8
18-Apr	7.5	4.8	5.0	4.5	3.6	3.4	5.5	10.2	14.3	17.7	20.7	24.0	26.2	27.8	27.9	27.7	27.2	26.1	23.6	21.7	20.8	19.4	18.0	17.0	16.9	27.9
19-Apr	14.8	10.2	10.9	9.9	10.0	10.9	11.8	13.0	14.4	15.5	16.8	18.2	18.8	19.0	19.1	18.9	18.0	16.8	16.1	13.8	11.7	11.0	8.3	3.0	13.8	19.1
20-Apr	1.7	1.1	0.1	-1.0	-2.1	-3.3	-4.8	-5.5	-5.7	-5.5	-4.9	-3.8	-2.7	-1.5	-0.4	0.5	1.2	1.5	1.3	0.2	-1.1	-1.8	-2.4	-3.0	-1.7	1.7
21-Apr	-4.0	-5.5	-6.6	-7.7	-7.6	-6.4	-4.7	-1.5	-0.1	1.4	3.1	4.0	5.4	6.0	6.1	6.2	5.9	5.6	4.9	3.7	2.5	1.6	0.7	-0.6	0.5	6.2
22-Apr	-1.2	-1.5	-2.5	-2.9	-3.6	-4.6	-3.5	-1.9	0.0	1.9	3.4	4.7	5.8	6.5	7.3	7.6	7.8	7.8	7.1	6.0	4.7	3.7	2.7	2.1	2.4	7.8
23-Apr	1.0	0.1	-2.2	-3.4	-4.2	-4.0	-1.3	1.0	2.6	4.8	6.9	9.4	11.8	12.3	12.4	12.9	13.5	14.0	12.5	9.8	7.7	7.6	7.4	7.0	5.8	14.0
24-Apr	6.4	5.9	5.1	4.0	3.5	3.5	4.0	5.0	6.2	7.8	8.9	8.7	9.0	9.7	10.2	10.6	10.5	9.8	9.1	8.5	7.9	7.3	6.7	6.3	7.3	10.6
25-Apr	5.2	3.5	2.3	0.9	0.9	1.3	2.7	4.2	5.0	5.5	6.4	6.7	8.2	8.8	8.9	8.8	9.5	9.9	8.7	7.3	6.4	5.9	5.2	4.7	5.7	9.9
26-Apr	4.6	4.5	4.3	4.1	3.8	3.8	4.3	5.3	6.8	8.3	8.5	8.0	8.1	8.1	7.8	7.5	7.8	7.8	7.6	7.0	6.4	6.2	5.2	4.2	6.2	8.5
27-Apr	3.3	3.2	2.2	1.2	0.2	0.2	1.6	3.3	5.0	6.8	7.7	8.7	10.0	11.3	12.3	13.0	13.3	13.2	13.0	11.9	10.8	9.3	8.1	4.7	7.3	13.3
28-Apr	3.0	1.6	0.2	-0.3	-1.0	-0.2	2.4	7.4	11.5	14.8	17.8	18.6	18.8	19.3	19.7	19.8	19.8	19.0	18.1	16.1	14.6	12.3	11.1	9.8	11.4	19.8
29-Apr	9.4	10.5	9.6	9.6	10.2	10.6	11.0	12.3	15.5	17.0	18.8	20.0	20.7	21.2	21.6	21.9	21.4	21.4	20.4	17.0	13.8	11.9	11.9	10.7	15.3	21.9
30-Apr	9.2	8.4	9.0	7.8	9.4	10.4	11.3	13.4	16.2	17.9	19.7	20.7	20.7	17.7	18.3	17.2	16.1	17.6	16.5	15.4	14.0	12.0	8.7	6.1	13.9	20.7
	0.3	-0.4	-0.8	-1.3	-1.6	-1.5	-0.9	0.4	1.9	3.3	4.6	5.6	6.6	7.3	7.7	8.0	8.0	7.8	7.0	5.6	4.3	3.2	2.2	1.3	Diurnal Average	
	14.8	10.5	10.9	9.9	10.2	10.9	11.8	13.4	16.2	17.9	20.7	24.0	26.2	27.8	27.9	27.7	27.2	26.1	23.6	21.7	20.8	19.4	18.0	17.0	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature (AT) - C

Shell Muskeg River - April 2016



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	266	36.94	36.94
0 - 10	321	44.58	81.53
10 - 20	109	15.14	96.67
> 20	24	3.33	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Maximum Value: 29.3 inHg on Apr 20 13:00

Maximum Daily Average: 29.2 inHg on Apr 20

Minimum Value: 28.4 inHg on Apr 9 02:00

Minimum Daily Average: 28.7 inHg on Apr 2

Maximum Diurnal Average: 29.0 inHg at hour 9

Minimum Diurnal Average: 28.9 inHg at hour 19

Monthly Average: 28.96 inHg

Percentiles: P_1 = 28.4 P_{10} = 28.7 Q_1 = 28.8 Median = 29.0 Q_3 = 29.1 P_{90} = 29.2 P_{99} = 29.3

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

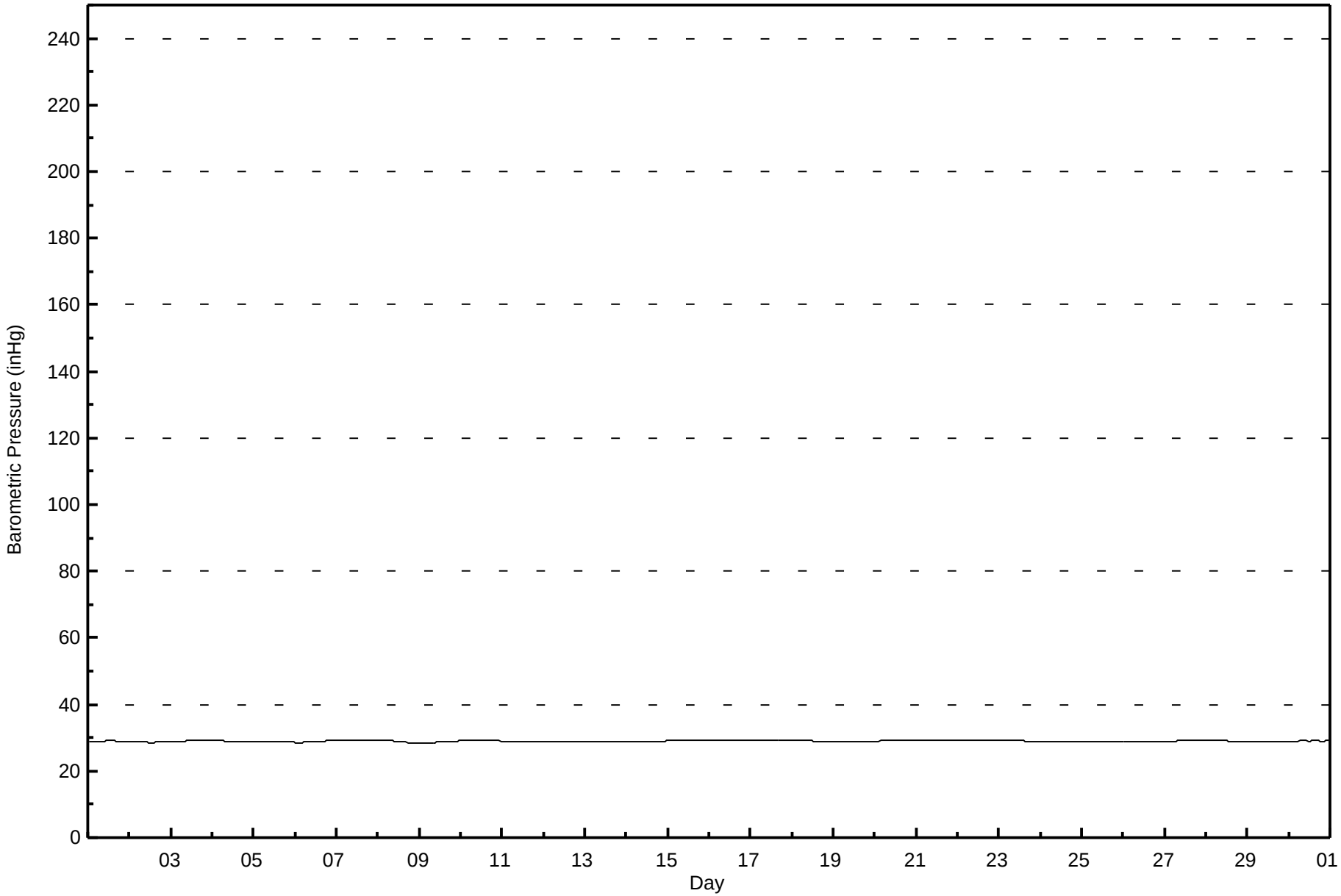
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.8	29.0	29.0
2-Apr	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.7	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.7	28.7	28.7	28.7	28.7	28.8	28.7	28.8
3-Apr	28.8	28.8	28.8	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.0	29.1
4-Apr	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	28.9	28.9	28.9	29.0	29.1
5-Apr	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.6	28.6	28.9	29.0
6-Apr	28.6	28.6	28.5	28.5	28.6	28.6	28.7	28.7	28.7	28.8	28.8	28.8	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.2	28.8	29.2
7-Apr	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.3	29.3	29.2	29.3	29.3	29.3	29.2	29.3
8-Apr	29.3	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.1	29.0	29.0	28.9	28.8	28.8	28.7	28.7	28.6	28.6	28.5	28.5	28.4	28.4	28.4	28.4	28.8	29.3
9-Apr	28.4	28.4	28.4	28.4	28.4	28.5	28.5	28.5	28.6	28.6	28.6	28.7	28.7	28.7	28.8	28.8	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.0	28.7	29.0
10-Apr	29.0	29.1	29.1	29.1	29.1	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.0	29.0	29.0	29.1	29.2
11-Apr	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.8	29.0
12-Apr	28.7	28.7	28.7	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8
13-Apr	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	28.7	28.8	28.8
14-Apr	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	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.0	28.8	29.0
15-Apr	29.0	29.0	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.0	29.0	29.1	29.1	29.1	29.1	29.1	29.1
16-Apr	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	29.0	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1
17-Apr	29.1	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.2	29.1	29.2
18-Apr	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.1	29.0	29.0	29.0	28.9	28.9	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	29.0	29.2
19-Apr	28.7	28.6	28.6	28.7	28.7	28.7	28.7	28.7	28.8	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.8	28.8	28.8	28.9	28.7	28.9
20-Apr	28.9	29.0	29.0	29.1	29.1	29.2	29.2	29.2	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.2	29.3
21-Apr	29.3	29.3	29.3	29.3	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.3
22-Apr	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.2	29.2
23-Apr	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.1	29.1
24-Apr	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.0
25-Apr	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	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0
26-Apr	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
27-Apr	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.1	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.0	29.1
28-Apr	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	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.1
29-Apr	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
30-Apr	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0
	28.9	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0	Diurnal Average	
	29.3	29.3	29.3	29.3	29.2	29.2	29.2	29.2	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Barometric Pressure (BP) - inHg

Shell Muskeg River - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Shell Muskeg River - April 2016

Maximum Speed: 35 km/h on Apr 19 14:00

Maximum Daily Speed Average: 17.9 km/h on Apr 20

Minimum Speed Value: 0 km/h on Apr 12 03:00

Minimum Daily Speed Average: 2.7 km/h on Apr 13

Maximum Diurnal Speed Average: 5.8 km/h at hour 20

Minimum Diurnal Speed Average: 0.3 km/h at hour 12

Monthly Average Velocity: 2.7 km/h 59.7 deg

Percentiles: $P_1 = 2$ $P_{10} = 5$ $Q_1 = 8$ Median = 11 $Q_3 = 16$ $P_{90} = 21$ $P_{99} = 28$

Hours in Service: 720

Hours of Data: 720

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-Apr	SSW7	SSW7	WSW6	SW5	N3	NNE15	NNE21	NNE21	NNE21	NNE25	NNE19	NNE17	NE18	NE22	NE17	NE18	NE14	NE15	ENE12	NE12	NE10	ENE11	ENE10	NE10	NE11.5	NNE25
2-Apr	NE11	NE10	NE12	NE12	NE11	NE10	NE7	ENE10	NE10	NNE11	N14	N15	N21	N24	N27	N25	N26	N23	N22	N22	N22	N21	N20	N18	NNE15.7	N27
3-Apr	N17	N19	N22	N21	N22	N22	N26	N23	N19	N19	N16	NNE14	NE17	NE15	NE15	NE15	NE14	NE15	NE15	NE14	NE15	NE11	NE11	NE9	NNE15.4	N26
4-Apr	ENE8	E5	ESE5	S6	SSW7	S7	S6	S6	S6	SSW6	WNW3	NW6	NNW6	NNW7	N5	NNE6	N6	N10	NE13	NNE17	NNE17	NNE18	NNE22	NNE20	NNE4.7	NNE22
5-Apr	NNE16	NNE13	NNE15	NE11	NNE10	NE7	NE9	ENE9	NE11	NE8	N6	NW7	NW5	SW7	SSE11	S15	S16	S14	S10	S11	S11	SSE13	SSE12	SSE11	ESE3.0	NNE16
6-Apr	SSE8	SSE4	W4	NW7	NW10	NNW13	NNW17	N19	NNE17	NNE15	N9	NE10	NE11	NE9	NE8	NE6	NNE9	NNE15	NE17	NE16	NE18	NE20	NE14	NNE15	NNE9.7	NE20
7-Apr	N12	NNE17	ENE11	ENE8	E6	ENE6	ENE8	E4	ESE4	SE4	ESE5	E3	NE8	NE13	NNE15	NE16	NE16	NE17	NE14	NNE13	NNE16	NE17	NE14	NE10	NNE9.8	NNE17
8-Apr	ENE7	ENE6	SE3	SE3	SE5	ESE4	SSE4	S5	SSE15	SSE14	SSE13	SE15	SE15	SE17	SE18	SE21	SE19	SE17	SE15	SE17	SE21	SSE13	SSE11	SSE9	SE11.3	SE21
9-Apr	SE9	SSE8	WNW4	NNW3	NW10	NW16	NNW14	N14	N19	N18	NNW20	N22	N23	N24	N26	N26	N23	N29	N25	N19	N15	N15	N19	N22	N15.9	N29
10-Apr	N22	N22	N20	N22	N18	N18	NNE18	NNE15	NNE12	NNE11	NE11	NE13	NE12	ENE12	NE12	NE10	ENE9	ENE8	E5	ENE7	ENE10	ENE8	SE6	S7	NNE10.3	N22
11-Apr	S9	S10	S10	S11	SSE11	S7	S7	S8	S11	SSW11	SSW9	SSW10	SSW12	SSW10	SSW7	S5	S5	NNE8	NE12	NE12	NNE5	NNW7	NW5	NE6	S4.7	NE12
12-Apr	ESE2	NW3	NW0	NNE10	NNE19	NE16	NNE21	NE17	NE13	ENE11	NE14	NE17	NNE16	NE16	NE18	NNE19	NE18	NNE18	NNE20	N18	N17	NE18	NE16	NNE18	NNE14.3	NNE21
13-Apr	NE13	NE8	NE9	NW6	NE10	NE10	NE8	NW5	NW4	NNW6	NNE5	WNW6	W2	SSE9	SSE10	SE11	SE6	SE5	SE6	SSE9	SSE10	SSE5	SSE2	E4	E2.7	NE13
14-Apr	ENE3	NNE15	N23	N20	N20	N18	N15	N15	N16	N14	N10	NNW8	NNW9	NNW13	NNW12	NNW9	NNE10	NNW11	NNW13	NNW12	NW8	W11	W8	NE8	N11.3	N23
15-Apr	ENE7	ENE6	ENE4	E4	SE4	SSE4	S3	SW2	S6	SSW9	S11	S12	S11	S11	SSE10	SSE11	S12	SSE11	SE10	SE10	ESE6	S9	S9	SSE13	SSE6.6	SSE13
16-Apr	SW6	SE8	SSE9	S5	SSW5	S7	S7	S8	S12	S12	S13	SSW13	WSW11	WSW12	WSW18	WSW21	WSW18	W9	NW5	SSE4	S6	S8	S7	S6	SSW7.5	WSW21
17-Apr	S8	S7	S6	SSE5	S4	S3	SSE6	S3	SW5	S11	SW13	SW10	SSW6	NE1	ENE6	WNW3	W14	NW10	NNW6	ESE3	SSE5	S4	SSW4	SSW6	SSW3.8	W14
18-Apr	S8	S9	S7	S7	S5	SSW6	S6	S7	S9	SSW7	S8	S13	S21	S20	S23	S22	S23	S22	S21	S19	SSE24	S22	S20	S18	S14.4	SSE24
19-Apr	SSW8	SSE11	S10	SSW8	SSW11	SSW11	WNW14	NW14	NW12	W16	WSW24	WSW28	WSW32	WSW35	W32	W32	WNW32	WNW32	WNW25	NW20	NW17	WNW19	NW14	NNE25	W15.2	WSW35
20-Apr	NNE25	NNE24	N22	NNE21	NNE25	N24	N28	NNE27	NNE22	NNE23	NNE21	NNE20	NE18	NE16	NE16	NE17	NE16	NE15	NE15	ENE12	ENE13	ENE12	ENE13	ENE11	NNE17.9	N28
21-Apr	ENE8	E4	E5	E6	ENE6	ENE5	ESE4	ESE3	NE3	NE8	NE12	NE15	N14	NNE16	NE18	NE20	NE20	NE22	NE23	NE18	NNE19	NNE19	NE20	NE16	NE12.0	NE23
22-Apr	NE15	NNE17	NNE16	NNE14	NNE13	NE8	NE11	NNE10	N11	N12	NNE16	NNE17	NNE18	NNE19	NNE19	NNE20	NE20	NE21	NE20	NE22	NE17	NE14	NE9	NNE15.6	NE22
23-Apr	NE5	N7	NNE3	ENE5	NE2	NE5	ENE3	NE4	NNE8	NNW8	N10	N6	SE10	SE10	ENE13	E9	E9	SE11	SE10	SE10	SE11	SE16	SSE17	SSE16	E5.4	SSE17
24-Apr	SSE15	SSE12	SSE10	SSE12	SSE10	SE11	SE11	SSE12	SSE13	SSE15	S15	S16	S17	SSE16	S15	S10	S10	SE13	SE9	SE12	SE15	SSE17	S17	S15	SSE12.9	S17
25-Apr	SSW15	S12	S11	S9	S8	S9	S9	S14	S15	S13	S12	SSW10	S13	S13	S12	SSW13	SSW13	SSW14	SSW12	SSW9	S8	S6	S7	S7	S10.7	S15
26-Apr	S7	S8	S10	S10	S10	S10	S11	S13	S12	S12	SSW11	S10	S10	S11	S11	SSE10	SSE9	SSE6	SSE6	S6	SSE9	SSE5	E4	SSE4	S8.6	S13
27-Apr	S5	S5	SSE5	S4	SSE5	S5	S5	S5	SSW4	NNE9	NE11	NE9	NE6	NE7	NE8	NE11	NE12	NE14	NE15	NE14	NE16	NE14	NE10	NE3	NE5.5	NE16
28-Apr	SW1	SSE2	ESE4	ESE4	SSE3	S4	S5	S7	SSW9	S8	SSW12	SSW13	SW13	SSW12	S15	SSE17	S15	SSE14	SE11	SE10	SE10	SSE8	S7	S7	S7.8	SSE17
29-Apr	S9	S8	S5	SSE8	SSE12	SSE11	SSE9	SSE12	SSE19	S19	SSE24	S23	S23	S22	S22	S21	SSW20	SSW18	SW15	SSE5	S6	S10	S11	S12	S13.9	SSE24
30-Apr	S13	S12	S12	S12	S14	S11	S10	S11	SSW15	S16	S18	SSW23	SSW21	W22	WSW23	W18	W15	S12	S12	NE1	NE14	ENE9	E4	SSE5	SSW9.0	WSW23
	E2.8	ENE2.6	ENE2.3	ENE2.2	NE2.5	NE2.8	NE3.6	NE2.9	ENE1.8	NE1.5	NE0.7	NE0.3	E0.7	ENE1.5	ENE2.0	ENE1.9	NE2.1	NE3.9	NE5.0	ENE5.8	ENE5.8	ENE4.1	ENE3.8	ENE3.8	Diurnal Average	
	NNE25	NNE24	N23	N22	NNE25	N24	N28	NNE27	NNE22	NNE25	SSE24	WSW28	WSW32	WSW35	W32	W32	WNW32	WNW32	WNW25	N22	SSE24	S22	NNE22	NNE25	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: 8 km/h on Apr 19 23:00

Minimum Value: 1 km/h on Apr 15 06:00

Percentiles: P_1 = 1 P_{10} = 1 Q_1 = 2 Median = 3 Q_3 = 4 P_{90} = 5 P_{99} = 7

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

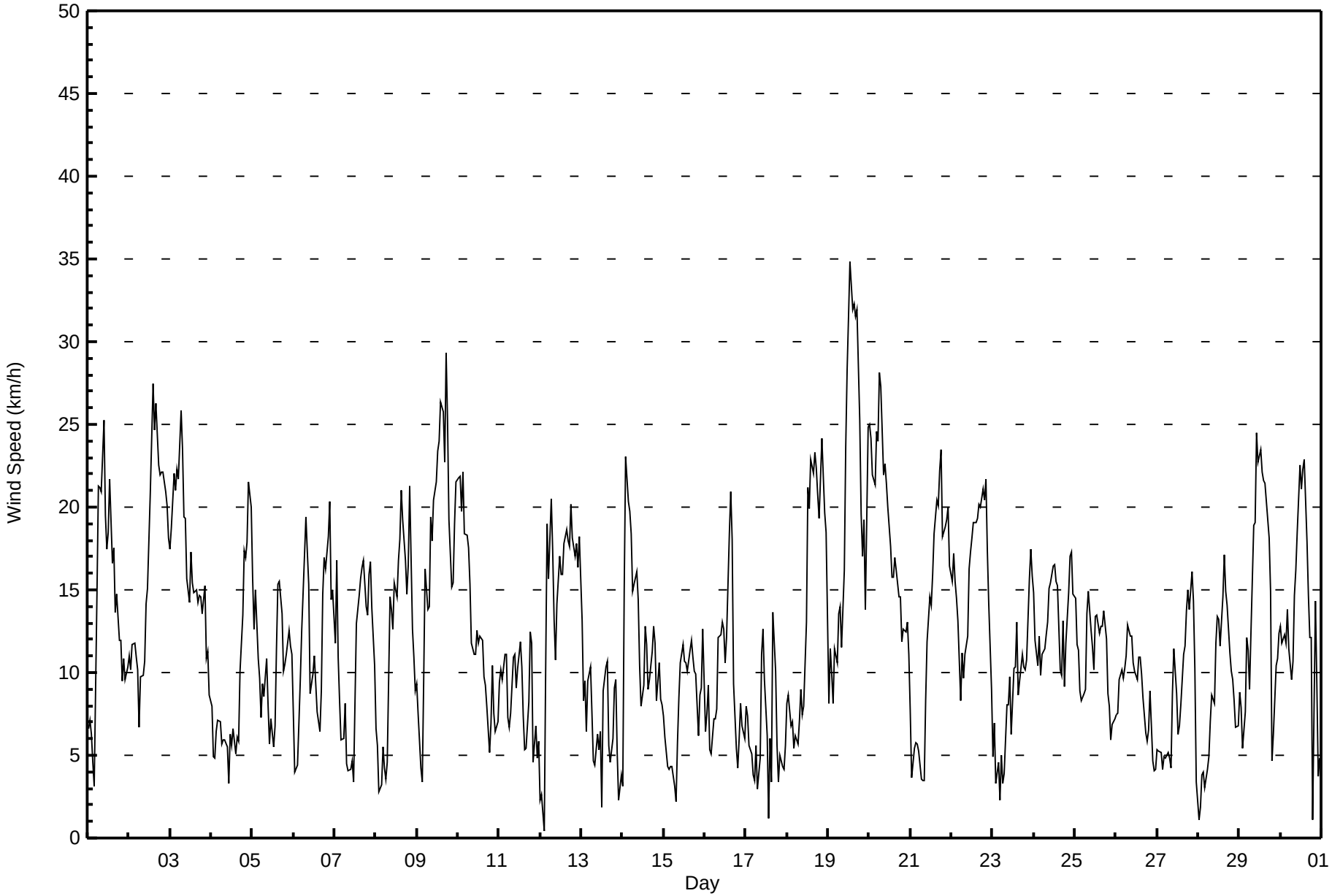
Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Apr	2	2	3	1	2	5	4	4	5	6	5	3	4	3	3	3	3	2	3	2	1	2	1	1	6
2-Apr	2	1	2	1	1	2	1	2	2	3	3	4	5	5	6	5	5	5	5	5	4	4	5	4	6
3-Apr	3	4	4	5	4	5	5	5	4	4	4	3	3	3	3	3	2	2	3	3	2	2	3	1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

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed (WS) - km/h

Shell Muskeg River - April 2016



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	99	13.75	13.75
6 - 11	267	37.08	50.83
12 - 19	253	35.14	85.97
20 - 28	94	13.06	99.03
29 - 38	7	0.97	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Wind Speed (WS) - km/h

Shell Muskeg River - April 2016

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	2	3	8	5	9	11	6	16	17	5	2	2	2	3	6	2	99
6 - 11	9	11	43	24	4	2	19	28	77	23	3	2	3	1	8	10	267
12 - 19	28	40	66	8	0	0	12	23	39	13	3	3	4	2	5	7	253
20 - 28	35	19	11	0	0	0	2	2	14	3	0	4	1	1	1	1	94
29 - 38	1	0	0	0	0	0	0	0	0	0	0	2	2	2	0	0	7
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	75	73	128	37	13	13	39	69	147	44	8	13	12	9	20	20	720

Total Number of Valid Hours: 720

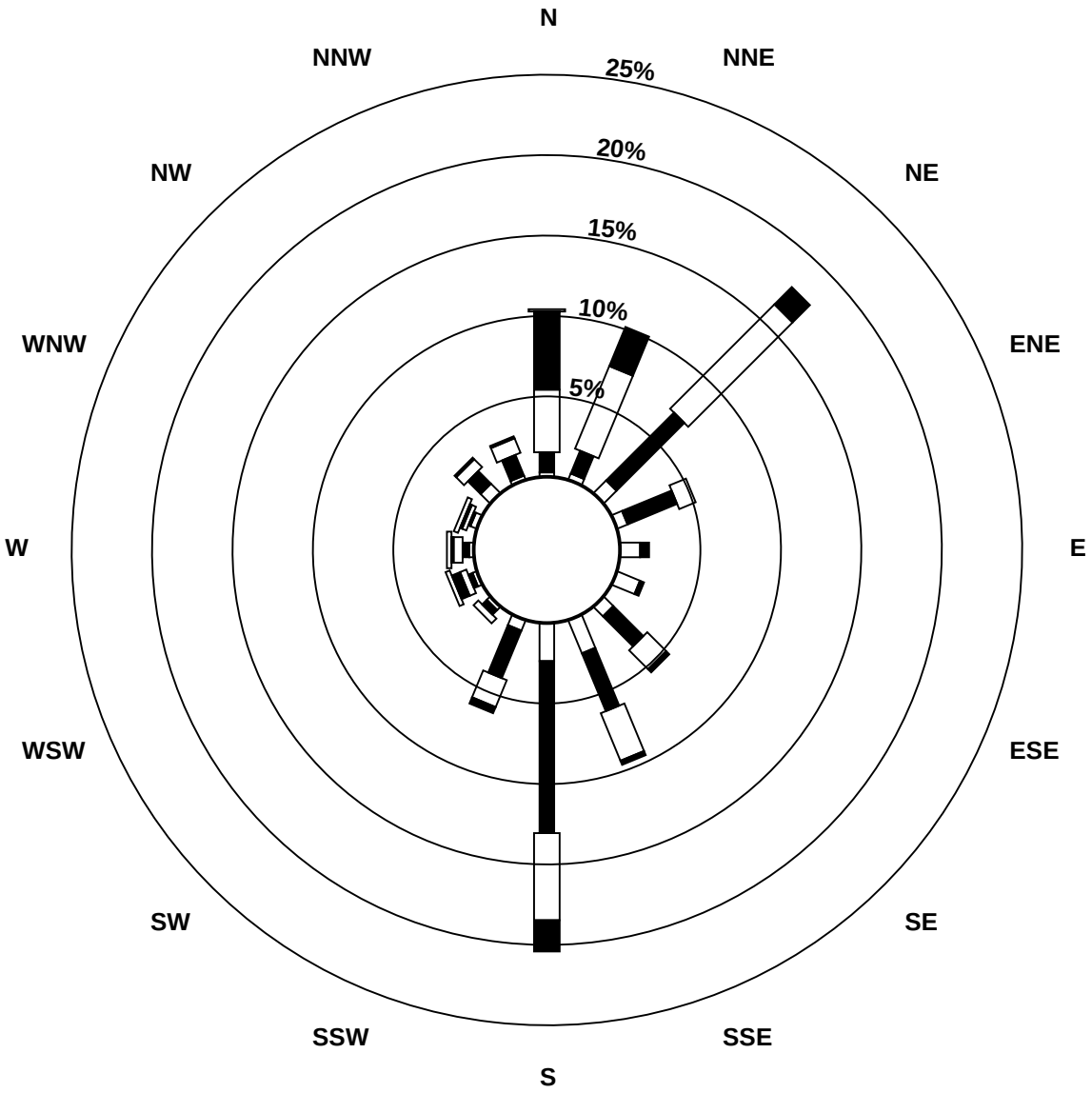
Total Number of Hours: 720

Wood Buffalo Environmental Association

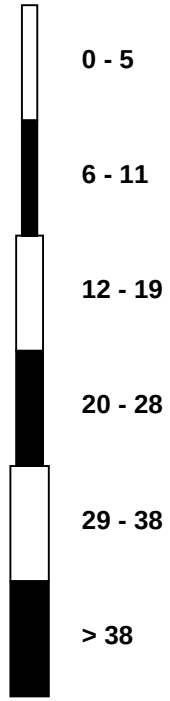
Wind Rose Apr 2016

Wind Speed (WS) - km/h

Shell Muskeg River (AMS 16)



Classes (km/h)



Total Number of Valid Hours: 720

Direction of Maximum Speed: 248 deg on Apr 19 14:00

Direction of Maximum Daily Speed Average: 29.5 deg on Apr 20

Direction of Minimum Speed: 326 deg on Apr 12 03:00

Direction of Minimum Daily Speed Average: 2.7 deg on Apr 13

Monthly Average Direction: 188.6 deg

Hours in Service:	720
Hours of Data:	720
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-Apr	192	211	240	236	358	33	26	26	16	20	22	26	37	46	49	44	52	52	59	46	54	63	65	48	37.3
2-Apr	47	48	48	52	52	55	56	64	47	22	352	356	359	359	3	4	1	11	2	7	360	2	3	0	13.1
3-Apr	2	359	3	1	2	357	1	358	3	358	349	16	48	50	53	52	50	49	52	54	48	54	52	54	20.9
4-Apr	67	94	116	177	192	189	184	174	187	199	297	324	337	347	11	23	3	10	34	24	24	25	25	27	29.1
5-Apr	27	28	26	45	30	41	45	59	51	51	357	316	313	233	163	178	181	181	183	172	170	160	164	162	111.3
6-Apr	168	163	269	305	324	340	344	353	14	22	8	38	53	52	55	47	12	29	45	50	44	35	48	22	23.7
7-Apr	6	31	72	69	79	74	60	90	116	141	121	81	48	37	32	39	38	45	47	21	31	44	49	48	46.6
8-Apr	59	75	130	128	137	123	154	171	161	152	150	145	134	131	133	135	140	137	142	143	143	161	159	149	140.8
9-Apr	136	165	290	336	309	326	340	11	5	356	338	353	358	3	4	359	358	3	3	358	352	354	351	350	355.1
10-Apr	352	353	351	354	359	7	15	19	23	20	40	55	54	57	45	48	57	74	85	69	65	73	141	188	26.1
11-Apr	180	174	170	169	168	175	178	182	184	192	198	193	196	196	193	187	173	33	51	51	32	335	322	36	172.3
12-Apr	111	317	326	27	22	43	33	45	56	58	48	49	29	36	36	32	34	33	25	11	10	34	40	25	33.5
13-Apr	37	53	51	316	56	56	52	326	326	347	24	300	261	162	166	145	126	135	136	154	154	165	165	101	89.5
14-Apr	58	16	3	8	2	355	353	3	7	0	4	344	340	341	335	334	21	343	336	338	312	270	268	46	352.5
15-Apr	65	78	62	80	124	147	188	229	189	195	190	190	187	171	161	160	169	156	130	126	123	184	187	165	159.9
16-Apr	223	140	150	190	198	183	183	189	188	185	190	198	249	247	248	250	253	280	315	159	177	185	185	188	212.3
17-Apr	175	184	191	165	173	181	147	191	227	191	223	216	201	56	57	294	267	305	330	104	163	185	193	201	205.8
18-Apr	180	175	183	191	188	193	189	187	190	194	174	174	177	185	185	189	182	180	180	174	166	170	173	176	179.7
19-Apr	195	163	177	194	204	205	287	316	304	270	246	256	251	248	264	269	290	282	284	306	310	284	325	19	270.7
20-Apr	25	12	11	14	18	9	11	17	14	24	26	26	41	38	38	43	38	44	46	67	70	68	69	71	29.5
21-Apr	76	100	94	90	75	77	107	118	36	39	34	35	9	22	38	40	40	40	41	48	33	28	42	45	42.5
22-Apr	41	24	20	27	33	54	53	27	7	9	25	17	20	28	25	30	32	35	39	40	42	37	42	41	31.0
23-Apr	38	354	32	65	56	53	57	49	33	346	5	355	138	124	76	93	94	133	125	124	125	143	147	162	100.8
24-Apr	164	166	167	159	153	145	145	161	166	164	169	169	172	154	171	188	175	135	127	132	140	154	170	190	160.6
25-Apr	192	183	183	182	181	172	175	182	183	187	189	201	187	186	187	213	211	209	208	195	186	185	176	172	189.8
26-Apr	175	179	177	178	177	174	178	181	187	189	198	186	183	173	173	156	155	157	163	171	148	155	101	160	173.6
27-Apr	177	181	167	171	168	180	177	180	195	30	38	43	39	35	36	43	47	42	42	48	41	39	35	53	54.1
28-Apr	236	148	114	119	151	180	191	189	192	179	203	204	223	201	172	161	177	158	141	126	146	154	179	174	174.0
29-Apr	169	178	174	166	160	155	151	155	168	184	166	181	183	177	191	189	194	204	218	164	181	185	184	176	179.5
30-Apr	171	176	177	174	170	175	174	189	194	184	191	202	205	266	256	265	272	181	179	49	45	70	92	164	198.9
	82.1	71.2	58.7	56.6	52.7	50.7	35.1	39.8	57.5	48.7	39.4	34.4	96.3	66.3	67.7	63.9	45.1	53.2	53.2	59.3	64.8	69.5	75.1	73.5	
	Diurnal Average																								

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

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg

Shell Muskeg River - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 104 deg on Apr 17 14:00

Minimum Value: 5 deg on Apr 2 04:00

Percentiles: $P_1 = 7$ $P_{10} = 10$ $Q_1 = 13$ Median = 17 $Q_3 = 23$ $P_{90} = 34$ $P_{99} = 78$

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

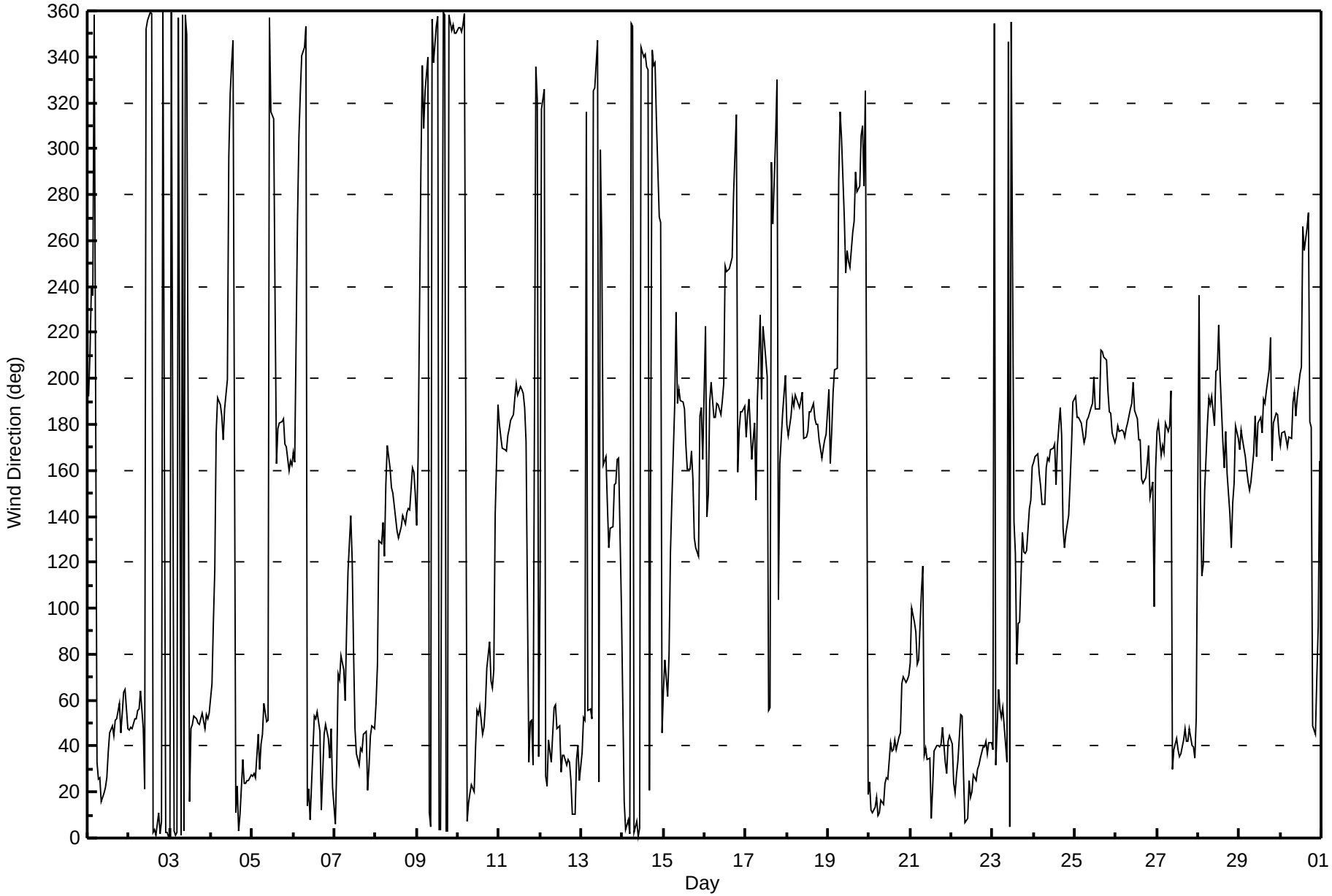
Day	Hourly Period Ending At (MST)																								Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Maximum
1-Apr	16	21	29	31	64	20	12	17	18	17	17	19	14	10	11	9	9	9	10	9	10	8	12	7	64
2-Apr	6	6	7	5	6	11	10	10	13	26	19	18	18	15	15	16	14	17	16	17	14	15	14	14	26
3-Apr	13	15	12	15	13	15	14	15	16	17	19	27	9	11	13	11	13	11	8	9	8	9	8	7	27
4-Apr	15	23	18	14	12	11	12	16	23	31	62	29	34	26	37	44	37	18	20	10	8	9	7	8	62
5-Apr	8	10	8	12	14	18	12	11	8	9	34	25	51	48	30	21	19	17	16	16	12	10	12	9	51
6-Apr	17	20	33	24	15	18	14	16	20	19	23	24	15	14	17	19	31	25	12	11	11	13	12	19	33
7-Apr	18	16	12	24	17	19	11	35	35	32	42	64	31	17	14	13	12	10	12	15	13	8	9	8	64
8-Apr	21	14	52	19	19	16	29	28	14	18	19	18	18	16	17	16	15	15	14	13	16	19	12	13	52
9-Apr	12	21	40	49	20	21	23	18	17	23	19	17	17	17	18	17	19	16	17	17	16	17	16	15	49
10-Apr	15	17	15	16	16	19	19	19	29	30	27	12	14	12	17	24	24	27	20	10	7	9	41	19	41
11-Apr	13	14	12	13	13	18	16	18	18	20	25	24	22	25	29	48	41	37	8	8	66	31	60	39	66
12-Apr	67	82	93	37	17	14	14	11	8	15	7	7	13	16	15	13	13	12	8	16	16	12	9	7	93
13-Apr	12	16	12	35	29	16	31	49	35	33	34	22	78	21	20	14	19	18	17	13	13	16	34	15	78
14-Apr	40	22	14	17	14	15	16	15	17	16	22	27	21	21	22	22	28	20	18	18	19	9	30	27	40
15-Apr	17	14	23	23	22	12	24	55	35	28	26	27	31	29	30	26	25	24	15	13	22	15	18	11	55
16-Apr	53	43	44	29	23	14	16	21	19	19	25	24	27	28	21	15	18	30	24	68	13	8	13	12	68
17-Apr	14	10	17	45	51	62	52	57	37	23	25	25	60	104	43	78	26	15	54	42	31	9	15	19	104
18-Apr	9	8	16	17	14	19	15	22	23	27	32	24	20	24	21	20	20	17	16	14	12	14	14	14	32
19-Apr	19	10	12	17	17	20	37	18	26	26	15	14	16	12	16	18	13	14	12	17	16	11	52	16	52
20-Apr	13	17	17	17	16	17	18	17	19	17	16	21	17	18	20	13	13	14	12	13	8	9	9	12	21
21-Apr	9	24	17	12	14	14	22	32	71	21	20	19	26	22	15	13	11	11	10	11	14	10	10	9	71
22-Apr	10	8	13	10	13	13	10	23	18	22	18	17	19	15	15	15	12	12	10	10	8	10	8	11	23
23-Apr	22	16	60	48	40	27	34	19	27	33	28	69	44	35	34	70	49	25	17	14	14	13	14	14	70
24-Apr	13	14	14	10	11	13	13	15	15	16	18	19	18	16	19	24	21	16	15	15	13	11	16	20	24
25-Apr	19	16	15	13	12	11	17	19	19	22	23	24	23	22	24	20	24	23	20	18	15	15	12	9	24
26-Apr	11	17	14	16	13	14	16	17	23	25	24	19	20	17	19	13	12	14	14	22	12	27	15	21	27
27-Apr	10	11	15	27	14	16	20	23	37	29	13	23	48	51	33	29	24	15	14	14	10	10	14	61	61
28-Apr	82	62	35	40	35	20	22	25	26	29	26	28	24	29	24	19	21	14	13	12	13	11	16	13	82
29-Apr	10	15	17	16	12	14	16	14	17	20	20	23	21	22	24	22	22	23	12	29	16	14	14	11	29
30-Apr	9	10	12	9	12	16	15	21	25	22	24	24	29	16	14	13	19	26	17	88	9	14	43	24	88
	82	82	93	49	64	62	52	57	71	33	62	69	78	104	43	78	49	37	54	88	66	31	60	61	
	Diurnal Maximum																								

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction (WD) - deg

Shell Muskeg River - April 2016



Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

Calibration Date	April 19, 2016	Last Calibration	March 17, 2016
Station Name	Shell Muskeg River	Station Number	AMS 16
Reason:	Routine		
Start Time (MST)	9:15	End Time (MST)	15:15
Gas Cert Reference	LL104193	Station temp.	22 Deg C
Cal Gas Concentration	48.3 ppm	Cal Gas Exp Date	12-Feb-18
Calibrator Make/Model	API T700	Serial Number	493
ZAG Make/Model	API 701	Serial Number	2155
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2632

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 1000 ppb		PMT voltage	-710	-710
Analyzer IP address	192.168.1.43		Lamp voltage	773	820
Calculated slope	0.998447	0.999092	Chamber temp	45.0	45.0
Calculated intercept	2.195503	2.517841	Pressure	716.5	701.2
Analyzer Background	8.6	9.0	Flow	0.456	0.444
Analyzer Coefficient	1.215	1.036	Intensity	90	107

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	-0.2	----
as found span	5000	83.6	807.6	789.7	1.023
calibrator zero	5000	0.0	0.0	-0.1	----
high point	5000	83.6	807.6	807.7	1.000
second point	5000	42.0	405.7	400.1	1.014
third point	5000	21.1	203.8	200.6	1.016
as left zero	6000	0.0	0.0	0.2	----
as left span	5000	83.6	807.6	805.2	1.003
				Average Correction Factor	1.010

Corrected As found	789.9	Previous response	806.6	% change	2.1%

Notes:

Changed inlet filter after as founds. Adjusted Lamp voltage up slightly from 780 V to 820 V in order to lower the noise levels, changed averaging time from 60 to 90 seconds for the same reason. Adjusted zero and span.

Calibration Performed By: Evan Magill

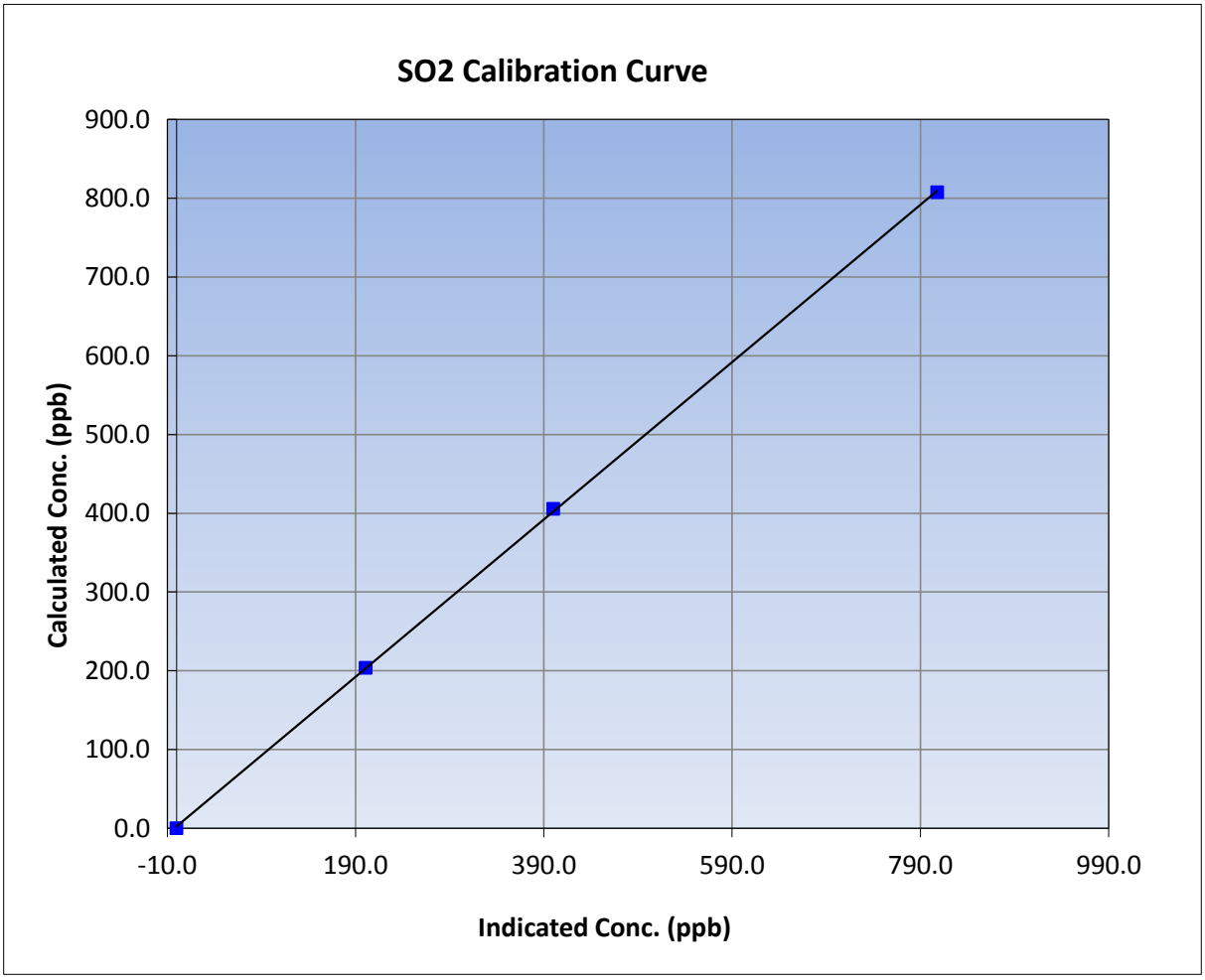
Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

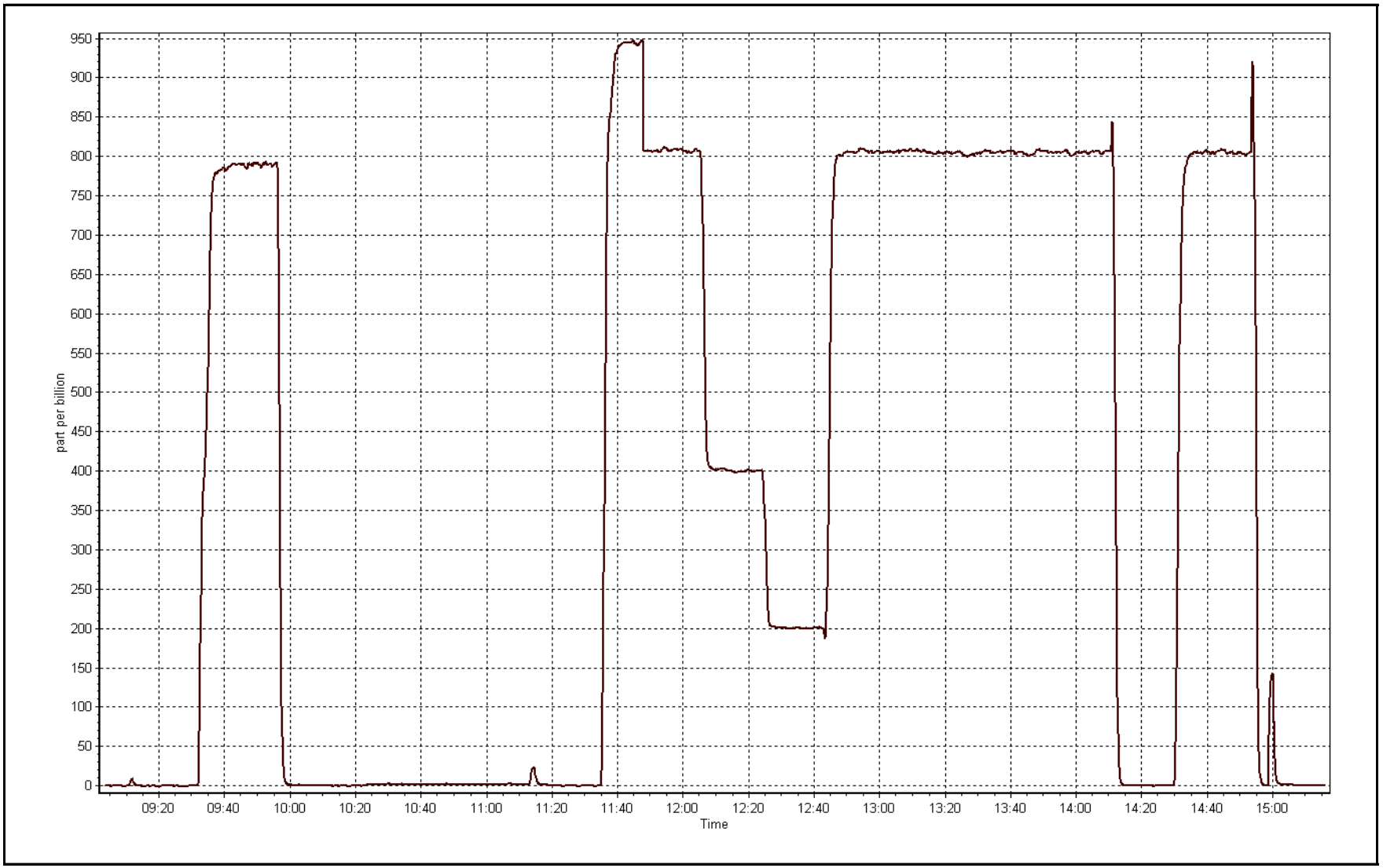
Calibration Date	April 19, 2016	Previous Calibration	March 17, 2016
Station Name	Shell Muskeg River	Station Number	AMS 16
Start Time (MST)	9:15	End Time (MST)	15:15
Analyzer make	Thermo 43i	Analyzer serial #	1118148498

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999937
807.6	807.7	0.9998		
405.7	400.1	1.0141	Slope	0.999092
203.8	200.6	1.0160		
			Intercept	2.517841



SO2 Calibration Plot Date: April 19, 2016



Wood Buffalo Environmental Association
THC Calibration Report

W B E A

Station Information

Calibration Date	April-19-16	Last Calibration	March-17-16
Station Name	Shell Muskeg River	Station Number	AMS 16
Reason:	Routine		
Start Time (MST)	9:15	End Time (MST)	15:15
Gas Cert Reference	LL104193	Cal Gas Expiry Date	12-Feb-18
CH4 Cal Gas Conc.	487 ppm	CH4 Equiv Conc.	1017.8 ppm
C3H8 Cal Gas Conc.	193 ppm	Station temp.	22 Deg C
Calibrator Make/Model	API T700	Serial Number	493
ZAG make/model	Teledyne API 701	Serial Number	2155
DACS make/model	Campbell Scientific CR3000	Serial Number	2632

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 50 ppm		Sample Pressure	8.2	8.2
Analyzer IP address	192.168.1.51		Air or Bypass Press	34.7	34.9
Calculated slope	0.997741	1.000778	Fuel Pressure	24.2	24.2
Calculated intercept	0.044495	0.004395	Analyzer Coeff	4.568	4.414
			Analyzer BKG	2.47	2.48

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	0.17	----
as found span	5000	83.6	17.02	17.02	1.000
calibrator zero	5000	0.0	0.00	0.01	----
high point	5000	83.6	17.02	17.01	1.000
second point	5000	42.0	8.55	8.52	1.003
third point	5000	21.1	4.29	4.28	1.003
as left zero	6000	0.0	0.00	-0.07	----
as left span	5000	83.6	17.02	16.97	1.003
				Average Correction Factor	1.002

Corrected As found	16.85	Previous response	17.01	% change	1.0%

Notes:

Changed inlet filter after as founds. Changed pump after as founds for preventative maintenance. Adjusted zero and span.

Calibration Performed By: Evan Magill

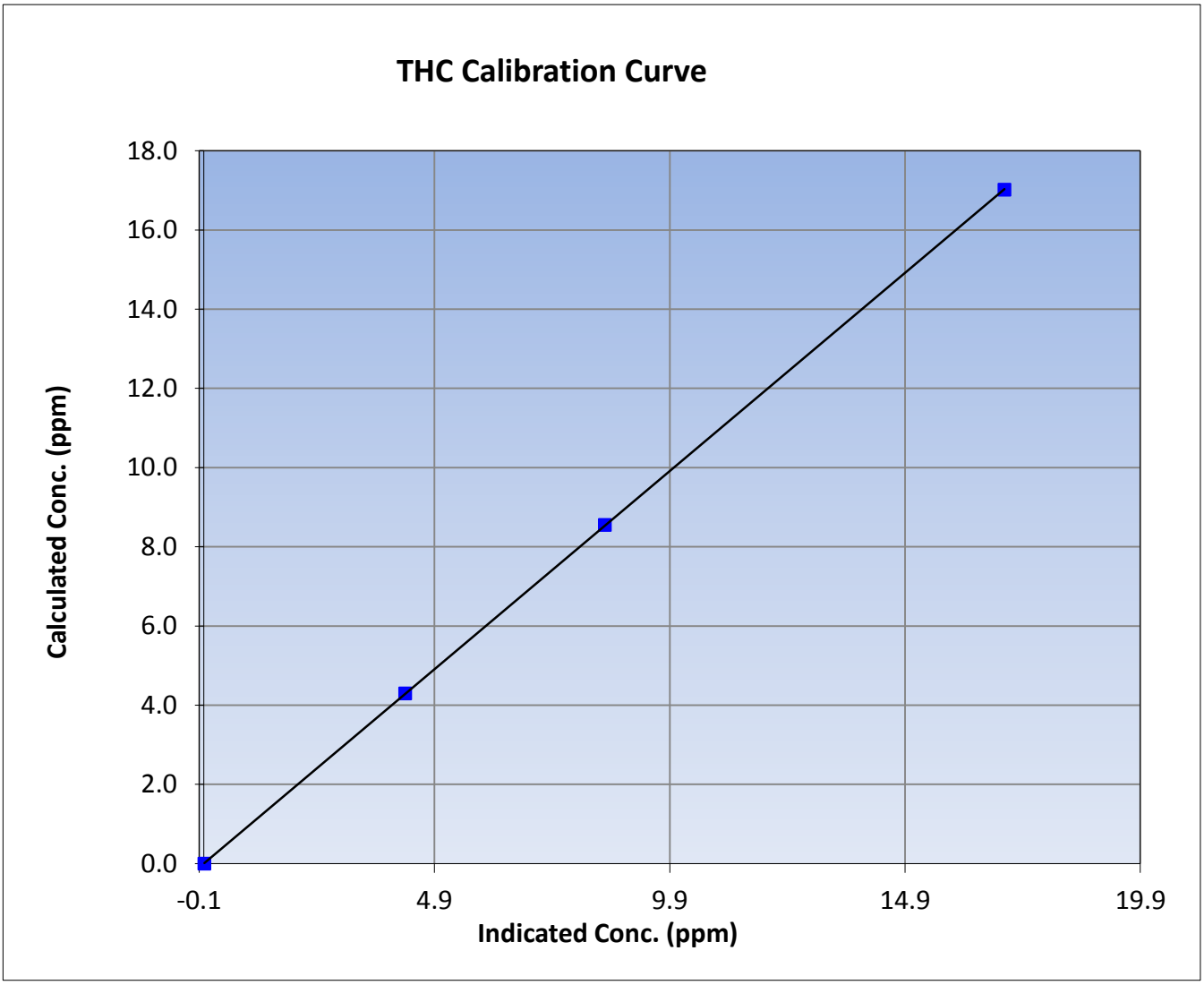
Wood Buffalo Environmental Association
THC Calibration Report

Station Information

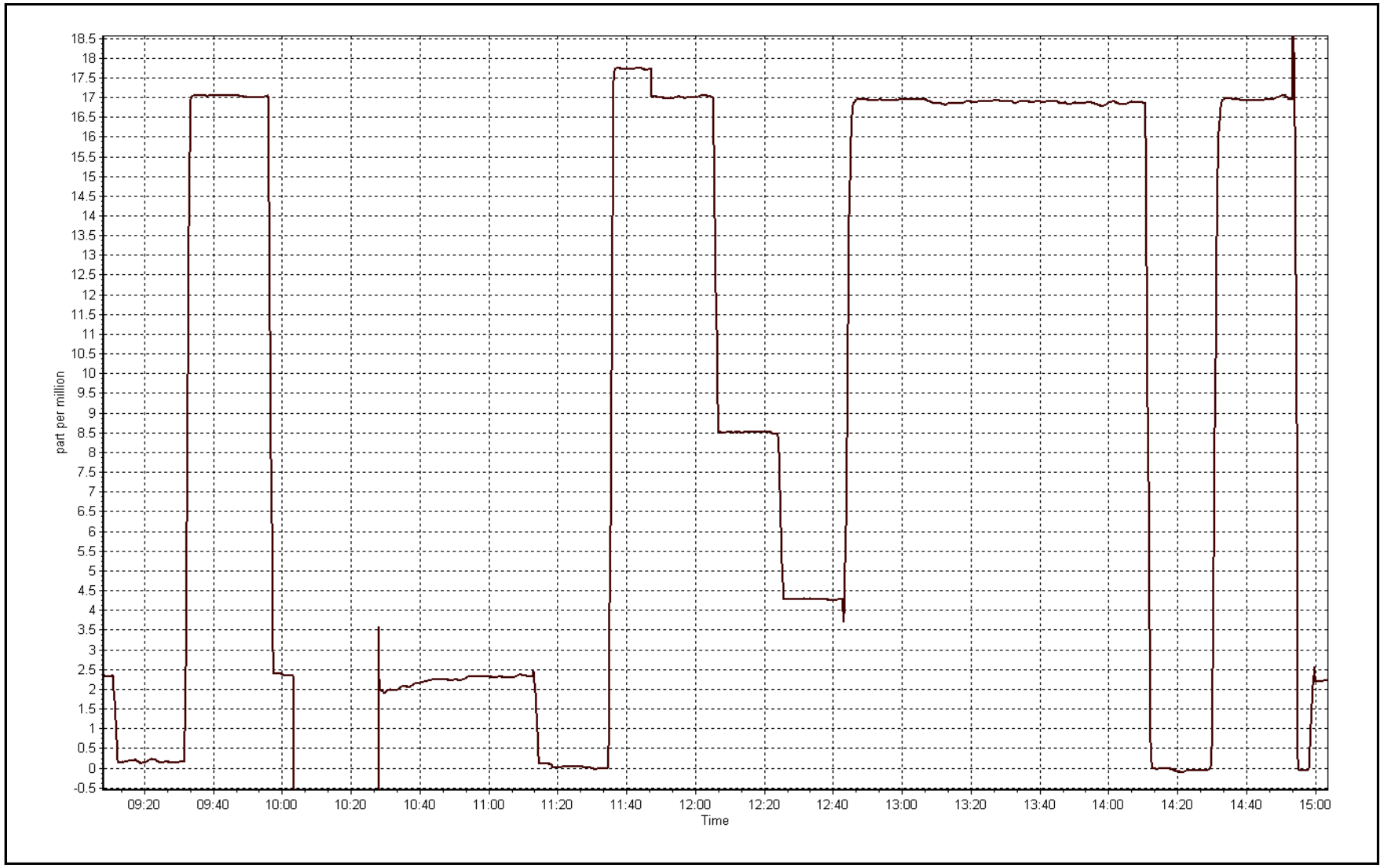
Calibration Date	April 19, 2016	Previous Calibration	March 17, 2016
Station Name	Shell Muskeg River	Station Number	AMS 16
Start Time (MST)	9:15	End Time (MST)	15:15
Analyzer make	Thermo 51i-LT	Analyzer serial #	1218153458

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.01	----	Correlation Coefficient	0.999996
17.02	17.01	1.0004		
8.55	8.52	1.0034	Slope	1.000778
4.29	4.28	1.0035		
			Intercept	0.004395



THC Calibration Plot Date: April 19, 2016



Wood Buffalo Environmental Association
THC Calibration Report

W B E A

Station Information

Calibration Date	April-20-16	Last Calibration	April-19-16
Station Name	Shell Muskeg River	Station Number	AMS 16

Reason: Other: Zero drifted from pump change.

Start Time (MST)	9:25	End Time (MST)	12:12
Gas Cert Reference	LL104193	Cal Gas Expiry Date	12-Feb-18
CH4 Cal Gas Conc.	487 ppm	CH4 Equiv Conc.	1017.8 ppm
C3H8 Cal Gas Conc.	193 ppm	Station temp.	22 Deg C
Calibrator Make/Model	API T700	Serial Number	493
ZAG make/model	Teledyne API 701	Serial Number	2155
DACS make/model	Campbell Scientific CR3000	Serial Number	2632

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 50 ppm		Sample Pressure	8.2	8.2
Analyzer IP address	192.168.1.51		Air or Bypass Press	34.9	34.9
Calculated slope	1.000778	0.996273	Fuel Pressure	24.2	24.2
Calculated intercept	0.004395	0.040469	Analyzer Coeff	4.414	4.431
			Analyzer BKG	2.48	2.24

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	-0.29	----
as found span	5000	83.6	17.02	16.82	1.012
calibrator zero	5000	0.0	0.00	-0.03	----
high point	5000	83.6	17.02	17.06	0.997
second point	5000	42.0	8.55	8.49	1.007
third point	5000	21.1	4.29	4.29	1.001
as left zero	6000	0.0	0.00	0.03	----
as left span	5000	83.6	17.02	17.07	0.997
				Average Correction Factor	1.002

Corrected As found	17.11	Previous response	17.00	% change	-0.6%

Notes:

Re-calibrated because of drift from pump change yesterday. Adjusted zero and span.

Calibration Performed By: Evan Magill

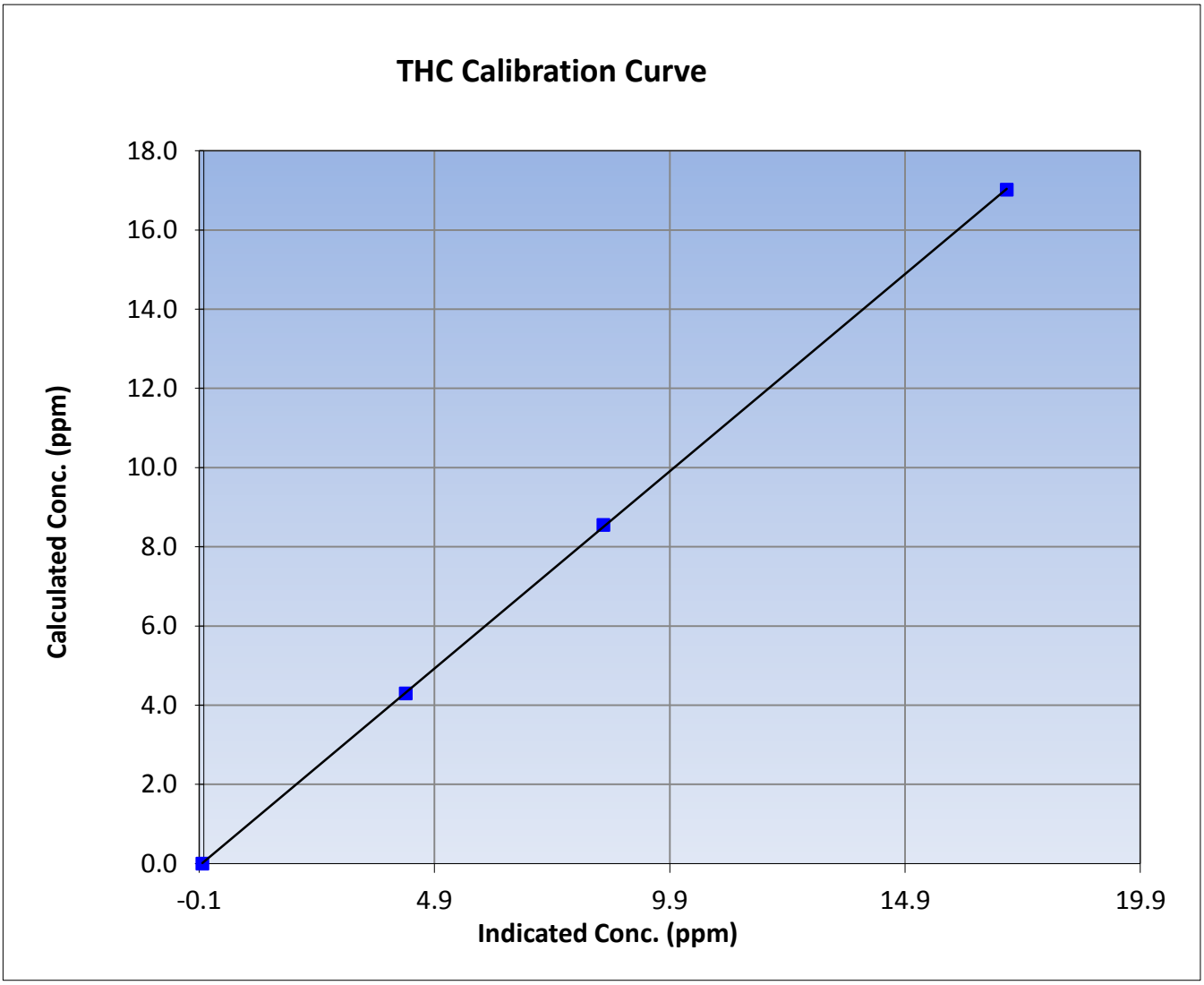
Wood Buffalo Environmental Association
THC Calibration Report

Station Information

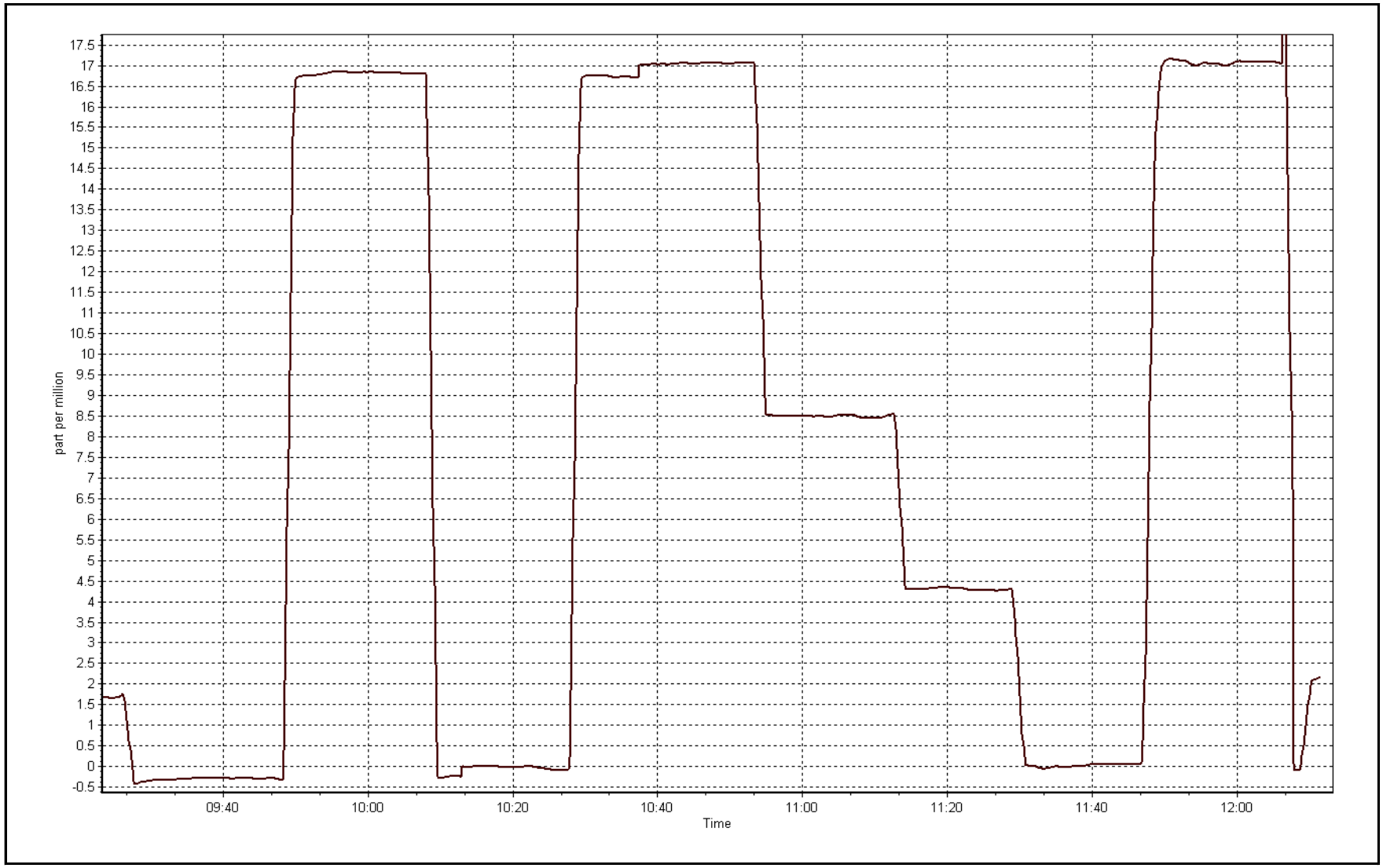
Calibration Date	April 20, 2016	Previous Calibration	April 19, 2016
Station Name	Shell Muskeg River	Station Number	AMS 16
Start Time (MST)	9:25	End Time (MST)	12:12
Analyzer make	Thermo 51i-LT	Analyzer serial #	1218153458

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	-0.03	----	Correlation Coefficient	0.999978
17.02	17.06	0.9975		
8.55	8.49	1.0070	Slope	0.996273
4.29	4.29	1.0011		
			Intercept	0.040469



THC Calibration Plot Date: April 20, 2016



Wood Buffalo Environmental Association
NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	April 19, 2016	Previous Calibration	March 17, 2016
Station Name	Shell Muskeg River	Station Number	AMS 16
Reason:	Routine		
Start Time (MST)	9:15	End Time (MST)	15:15
NO Cal Gas Conc	48 ppm	Gas Cert Reference	LL104193
NOx Cal Gas Conc	48 ppm	Cal Gas Expiry Date	February 12, 2018
Calibrator	API T700	Serial Number	493
Zero air Generator	Teledyne API T701	Serial Number	2155

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	2632

Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.998117	0.996253	0.998385
	Data Offset	1.499037	2.041585	0.077432
Current Calibration	Data Slope	1.001923	0.999845	0.998316
	Data Offset	1.286889	1.999260	0.381508

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1426262593

Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
Analyzer IP	192.168.1.43		192.168.1.43	
NO coefficient	0.996		1.038	
NOX coefficient	0.996		0.996	
NO2 coefficient	1.000		1.000	
NO bkgrnd	8.2		8.6	
NOX bkgrnd	8.3		8.7	
Chamber Temp	50.6	Deg C	50.5	Deg C
Moly Temp	325	Deg C	325.5	Deg C
PMT voltage	-744.4	V	-744.4	V
PMT Temp	-3	Deg C	-2.8	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	165.5	mmHg	164.9	mmHg
R Cell Press Nox	165.2	mmHg	164.6	mmHg
NO sample flow	0.932	lpm	0.904	lpm
Nox sample Flow	0.935	lpm	0.905	lpm

Notes:

Changed inlet filter after as founds. Adjusted span.

Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: April 19, 2016 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	0.0	-0.2	0.1	----	----
as found span	5000	83.6	802.6	802.6	0.0	773.3	772.4	0.8	1.0379	1.0390
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	-0.2	0.1	----	----
high point	5000	83.6	802.6	802.6	0.0	800.6	801.8	-1.2	1.0025	1.0009
second point	5000	42.0	403.2	403.2	0.0	399.8	399.7	0.2	1.0084	1.0088
third point	5000	21.1	202.6	202.6	0.0	200.1	199.2	0.9	1.0124	1.0169
as left zero	6000	0.0	0.0	0.0	0.0	1.5	-0.1	1.5	----	----
as left span	5000	83.6	802.6	519.3	283.2	798.4	514.0	284.5	1.0052	1.0105
								Average Correction Factor	1.0078	1.0089

Corrcted As found NO_X= 773.3 NO= 772.6 Percent Change NO_X= 3.8% NO= 4.0%

Previous Response NO_X= 802.6 NO= 803.5

GPT Calibration Data

Dilution Flow 5000 ccm Source Gas Flow 83.60 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)	----	519.3	277.7	797.6	519.3	278.2	0.9897	1.0000	0.9982	100.2%
2nd NO2 (200)	----	606.0	191.1	796.8	606.0	190.8	0.9907	1.0000	1.0016	99.8%
3rd NO2 (100)	----	697.7	99.4	796.2	697.7	98.5	0.9914	1.0000	1.0090	99.1%
4th NO2 (0)	797.1	----	0.8	797.9	797.1	0.8	0.9894	1.0000	N/A	----
					Average Correction Factor		0.9903	1.0000	1.0029	99.7%

Calibration Performed By: Evan Magill

Wood Buffalo Environmental Association

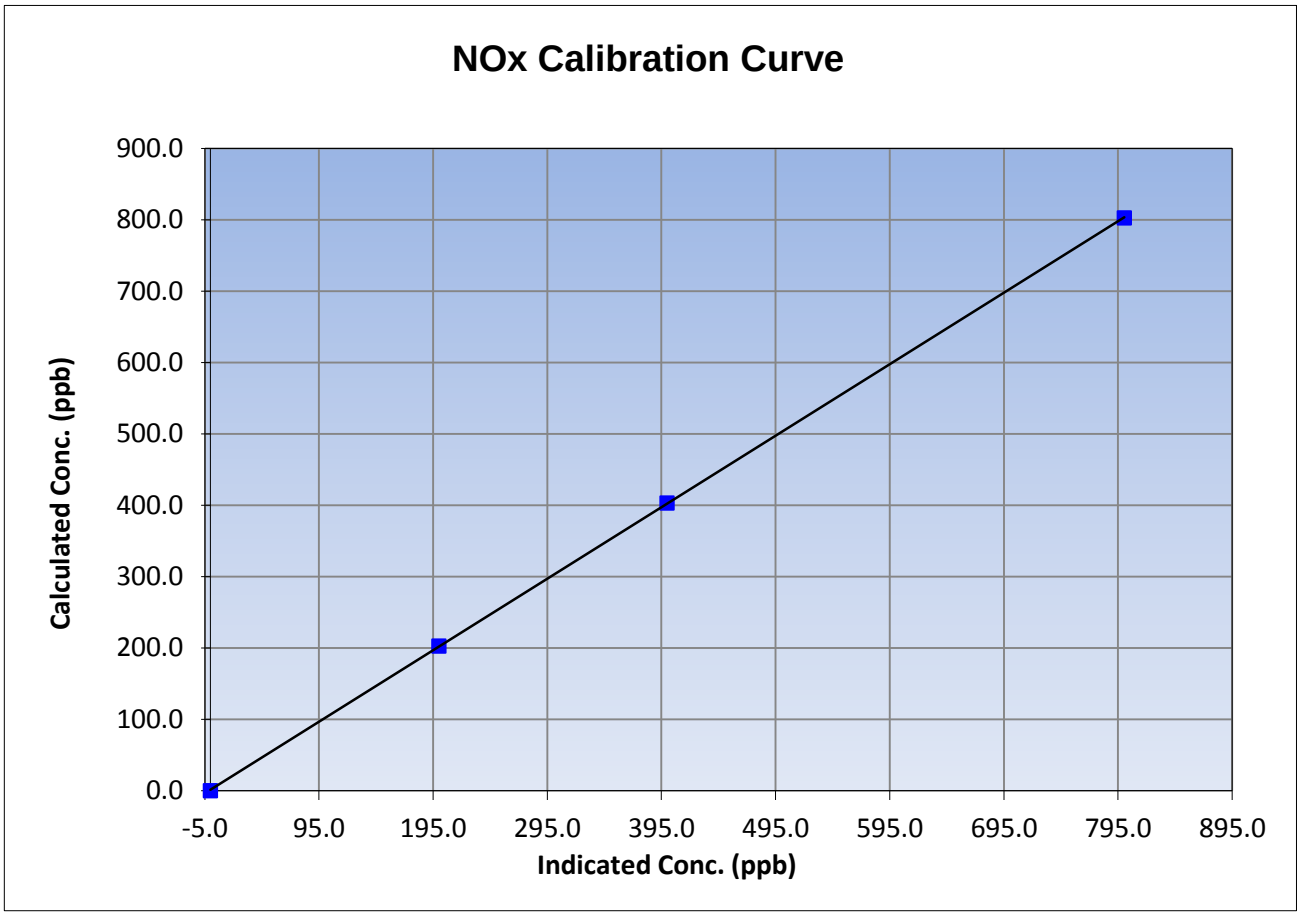
NO_X Calibration Summary

Station Information

Calibration Date	April 19, 2016	Previous Calibration	March 17, 2016
Station Name	Shell Muskeg River	Station Number	AMS 16
Start Time (MST)	9:15	End Time (MST)	15:15
Analyzer make	Thermo 42i	Analyzer serial #	1426262593

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999987
802.6	800.6	1.0025		
403.2	399.8	1.0084	Slope	1.001923
202.6	200.1	1.0124		
			Intercept	1.286889



Wood Buffalo Environmental Association

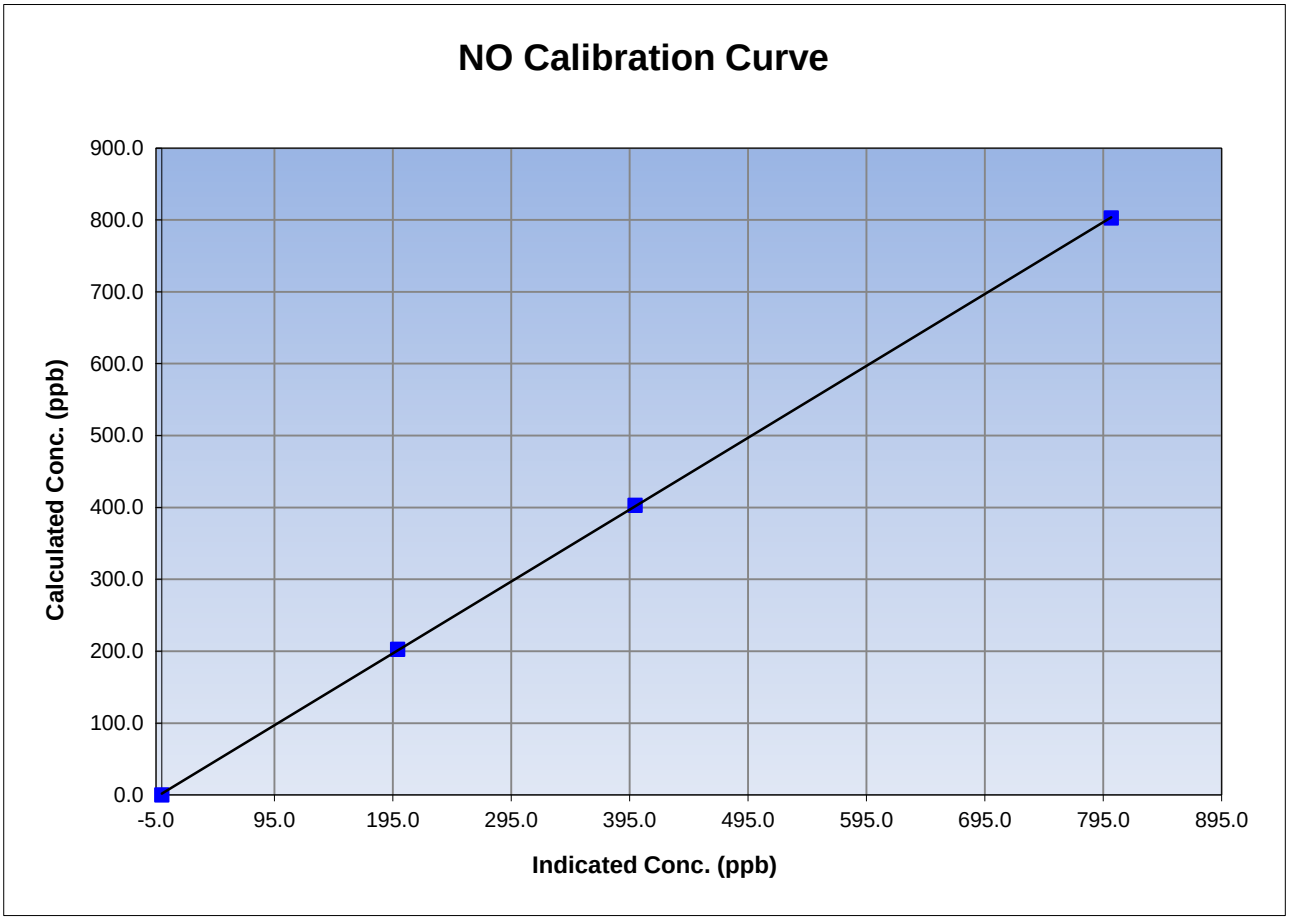
NO Calibration Summary

Station Information

Calibration Date	April 19, 2016	Previous Calibration	March 17, 2016
Station Name	Shell Muskeg River	Station Number	AMS 16
Start Time (MST)	9:15	End Time (MST)	15:15
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	-0.2	N/A	Correlation Coefficient	0.999974
802.6	801.8	1.0009		
403.2	399.7	1.0088	Slope	0.999845
202.6	199.2	1.0169		
			Intercept	1.999260



Wood Buffalo Environmental Association

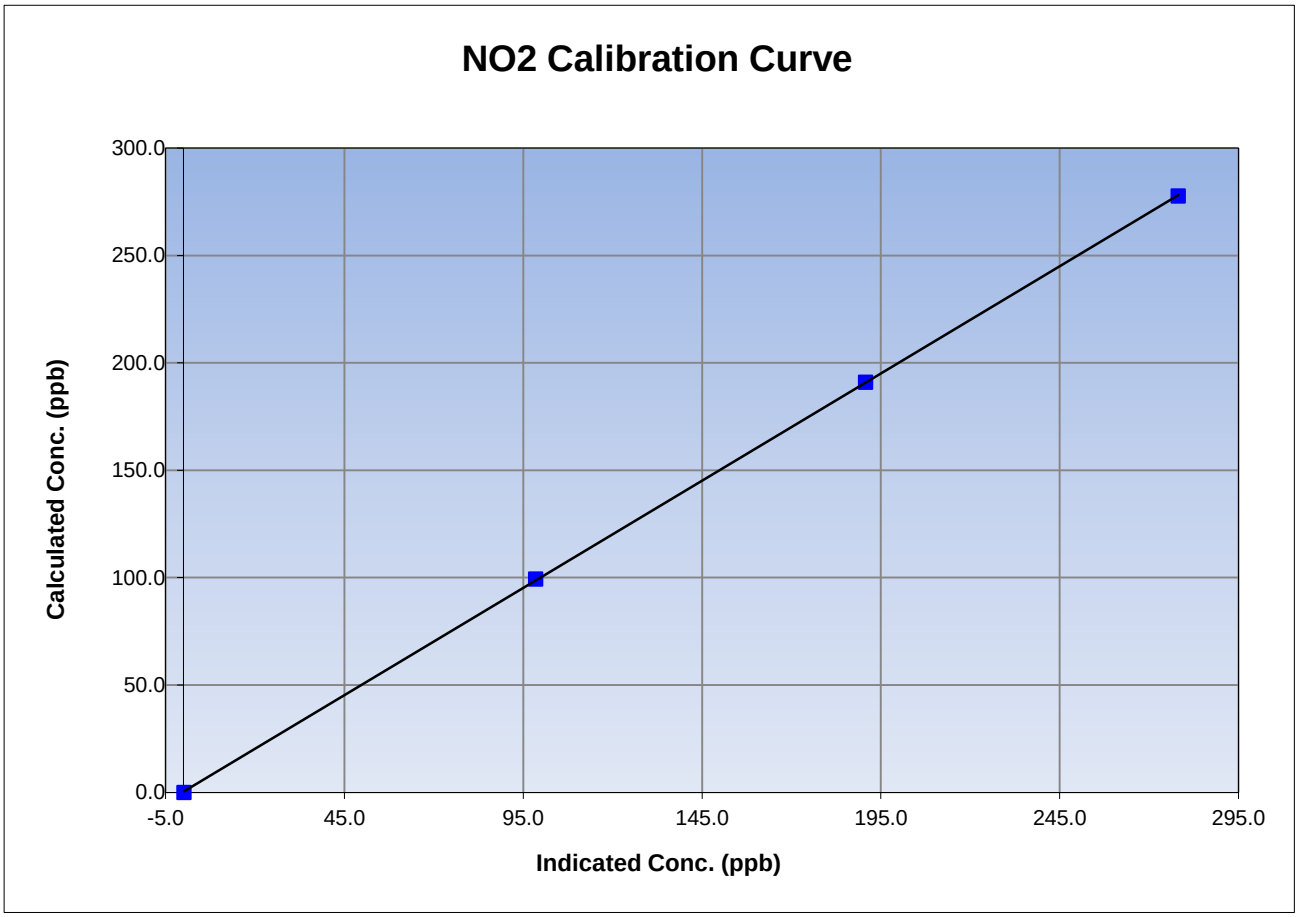
NO_2 Calibration Summary

Station Information

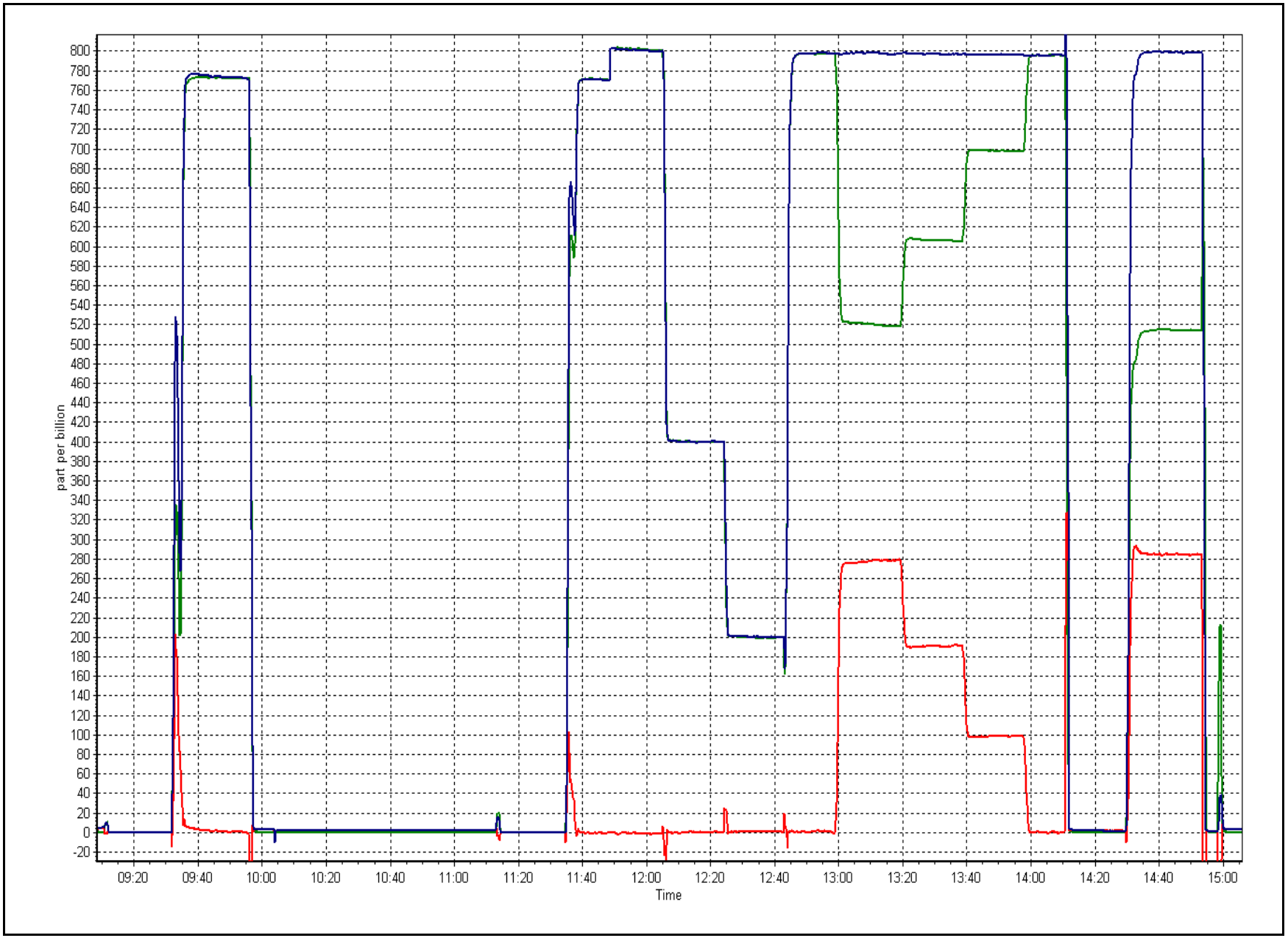
Calibration Date	April 19, 2016	Previous Calibration	March 17, 2016
Station Number	Shell Muskeg River	Station Number	AMS 16
Start Time (MST)	9:15	End Time (MST)	15:15
Analyzer make	Thermo 42i	Analyzer serial #	1426262593

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	N/A	Correlation Coefficient	0.999978
277.7	278.2	0.9982		
191.1	190.8	1.0016	Slope	0.998316
99.4	98.5	1.0090		
			Intercept	0.381508



NOX Calibration Plot Date: April 19, 2016



Wood Buffalo Environmental Association

SHARP CALIBRATION

STATION INFORMATION

Calibration Date:	April 19, 2016	Previous Calibration:	March 17, 2016
Station Name:	Shell Muskeg River	Station Number:	AMS 16
Start Time (MST):	13:35	End Time (MST):	16:09
Calibrator Make/Model:	Delta Cal	Calibrator Serial Number:	1102

SHARP INFORMATION

Particulate Fraction:	PM2.5										
Make/Model:	Thermo / SHARP 5030										
Serial Number	E-798										
C_{14} Source SN:	4142										
Confirmation of Time settings:	Yes ☑	No ☐									
Paremeters Checked:	T1 ☑	T2 ☐	T3 ☐	T4 ☐	P3 ☑	Main Flow ☑	Beta ☐	Neph ☑			

CALIBRATION DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	19.4	19.0	-0.4	19.4
T2		na	na	
T3		na	na	
T4		na	na	
RH (%)		na	na	

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	972	971.9	-0.1	972

Main Flow (Lph)

Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
1000	1011	11	1011	1000

Nephalometer Calibration

Parameter	As Founds	Zeroed (Limit +or- 2.0ug/m3)	As Left
Analog	542		542
Neph	-0.6		-0.1
C14	18.7		20.1
Indicated Concentration (ug/m3)	**-0.4**	**yes**	**-0.1**
Offset 1	542.9		542.9
Offset 2	68.9		68.9

Leak Check (Quarterly)

Leak Check Date:	January 25, 2016	Previous Leak Check Date:	October 29, 2015

	Measured	Difference LPM (Limit +/- 0.42 LPM)
Flow without adaptor (LPM):	16.70	0.09
*Flow with adaptor (LPM):	16.61	

**Note - do not attach adaptor without shutting off the pump first*

Mass Foil Calibration (Annually)

Foil Calibration Date:	May 25, 2015	Previous Foil Calibration:	na
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:

Adjusted zero. Cyclone head cleaned at station. Filter tape changed out after calibration, no issues with filter tape change.

Calibration Performed By: **Evan Magill**

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 17
WAPASU
APRIL 2016

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

May 27, 2016

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WAPASU (AMS 17)
APRIL 2016

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	685	35	35	100.00	7	0	1	0
H2S (ppb) Average	687	33	33	100.00	1	0	0	0
THC (ppm) Average	685	35	35	100.00	2.4	-	2.2	-
O3 (ppb) Average	687	33	33	100.00	60	0	49	-
NO2 (ppb) Average	685	35	35	100.00	16	0	3	-
NO (ppb) Average	685	35	35	100.00	3	-	1	-
NOX (ppb) Average	685	35	35	100.00	16	-	3	-
PM2.5 (ug/m3) Average	719	1	1	100.00	19.7	-	6.9	0
Temperature 2 m (C) Average	720	0	0	100.00	25	-	17.3	-
Relative Humidity (%) Average	720	0	0	100.00	99	-	94	-
Precipitation (mm) Total	720	0	0	100.00	1.9	-	10.3	-
Wind Speed 10 m (km/h) Average	719	0	1	99.86	28	-	20	-
Wind Direction 10 m (deg) Average	719	0	1	99.86	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WAPASU (AMS 17)
APRIL 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

					Percentile						
Parameter	Number	Mean	StnDev	Total	Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	685	0.3	0	-	0	0	0	0	0	1	7
H2S (ppb) Average	687	0.2	0	-	0	0	0	0	0	0	1
THC (ppm) Average	685	2.16	0	-	2	2.1	2.1	2.2	2.2	2.2	2.4
O3 (ppb) Average	687	38.5	8	-	8	29	35	40	43	47	60
NO2 (ppb) Average	685	1.2	1	-	0	0	0	1	2	3	16
NO (ppb) Average	685	0.3	0	-	0	0	0	0	0	1	3
NOX (ppb) Average	685	1.5	2	-	0	0	1	1	2	3	16
PM2.5 (ug/m3) Average	719	3.29	1.8	-	0.4	1.7	2.1	2.9	3.8	5.4	19.7
Temperature 2 m (C) Average	720	2.53	8.1	-	-15.4	-7.5	-3.6	2.3	7.3	14	25
Relative Humidity (%) Average	720	57.4	23	-	15	26	38	56	76	90	99
Precipitation (mm) Total	720	-	-	39.33	-	-	-	-	-	-	-
Wind Speed 10 m (km/h) Average	719	9.8	4	-	1	5	7	9	12	16	28
Wind Direction 10 m (deg) Average	719	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WAPASU (AMS 17)
APRIL 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
Wind Speed, Wind Direction	14 Apr 2016 00:00	14 Apr 2016 00:00	1	Flat line in sensor output signal -sensor frozen

Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO_2) - ppb

Wapasu - April 2016

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

Maximum Value: 7 ppb on Apr 1 01:00

Maximum Daily Average: 0.9 ppb on Apr 17

Minimum Value: 0 ppb on Apr 6 23:00

Minimum Daily Average: 0.1 ppb on Apr 9

Maximum Diurnal Average: 0.5 ppb at hour 1

Minimum Diurnal Average: 0.2 ppb at hour 21

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:	720
Hours of Data:	685
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-Apr	7	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.6	7
2-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1
3-Apr	0	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
4-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.3	1
5-Apr	0	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
6-Apr	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
7-Apr	0	Z	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	0.2	1
8-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
9-Apr	0	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
10-Apr	0	0	0	0	Z	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0.4	1
11-Apr	0	0	0	1	1	Z	1	0	0	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0.6	1
12-Apr	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
13-Apr	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
14-Apr	0	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
15-Apr	0	0	0	Z	0	0	0	0	0	2	5	3	0	0	0	0	0	0	0	0	0	0	0	0	0.6	5
16-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	1	2	1	1	0	0	0	0	0	0	1	1	0.5	2
17-Apr	2	1	0	0	0	Z	0	0	1	0	1	1	4	3	0	1	1	0	0	0	0	0	1	1	0.9	4
18-Apr	Z	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	1	0.4	1
19-Apr	0	Z	0	0	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2
20-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
21-Apr	0	0	0	Z	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0.3	1
22-Apr	0	0	1	0	Z	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	2	0	0	0.4	2
23-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
24-Apr	Z	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
25-Apr	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.3	1
26-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
27-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
28-Apr	0	0	0	0	Z	0	0	4	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	4
29-Apr	0	0	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.4	1
30-Apr	Z	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0	0	0	1	1	0	0	1	0	0.5	1
	0.5	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.3	0.3	0.3	Diurnal Average	
	7	1	1	1	1	2	2	4	4	2	5	3	4	3	1	1	1	1	1	1	0	2	1	1	Diurnal Maximum	

Z - zerospan C - Calibration

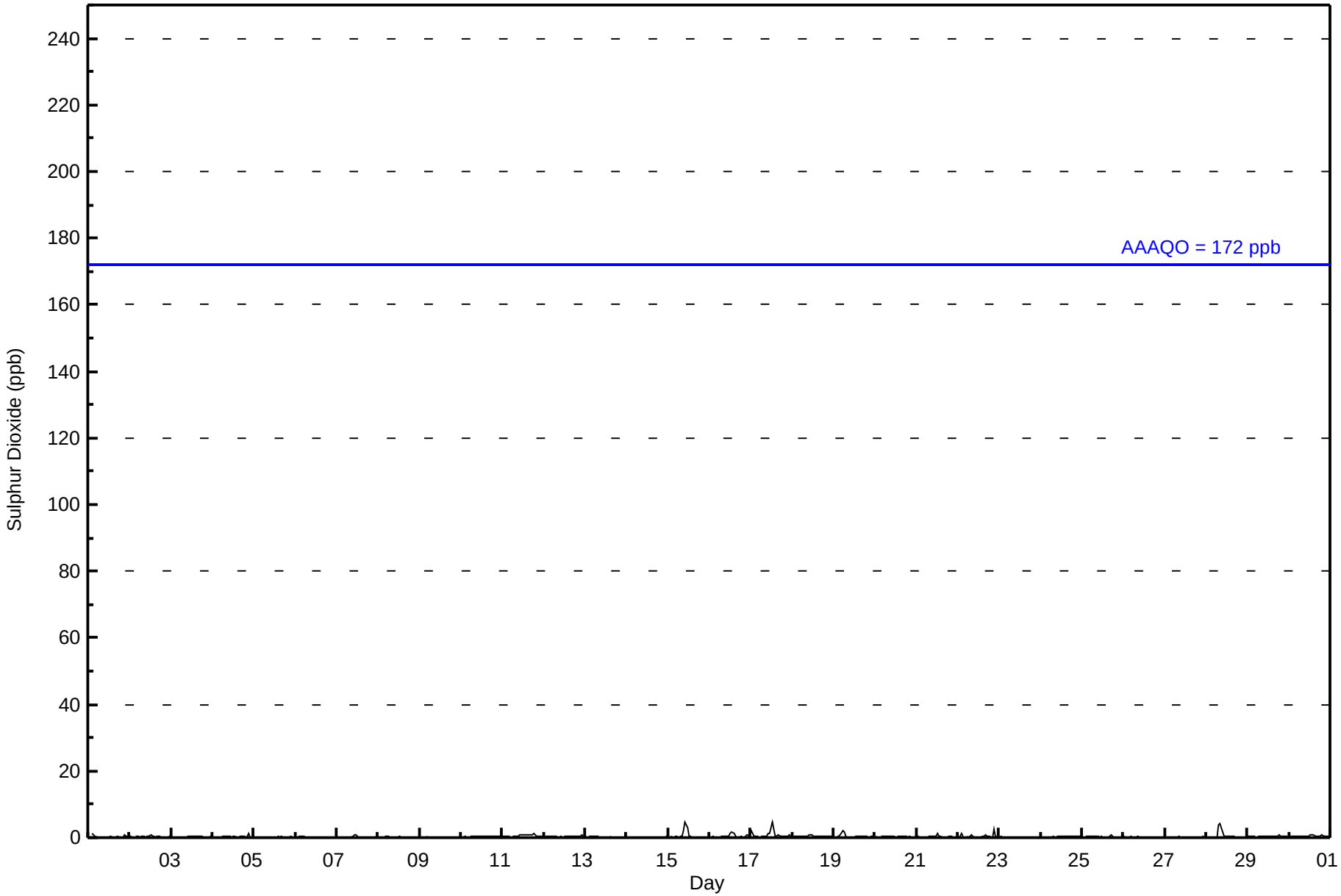
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb

Wood Buffalo Environmental Association

Hourly Averages

Sulphur Dioxide (SO_2) - ppb

Wapasu - April 2016



Sulphur Dioxide (SO_2) - ppb

Wapasu - April 2016

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

Total Number of Valid Hours: 685

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

Wapasu - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 10	37	28	18	24	30	95	115	92	69	26	11	10	9	11	26	83	684
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	37	28	18	24	30	95	115	92	69	26	11	10	9	11	26	83	684

Total Number of Valid Hours: 684

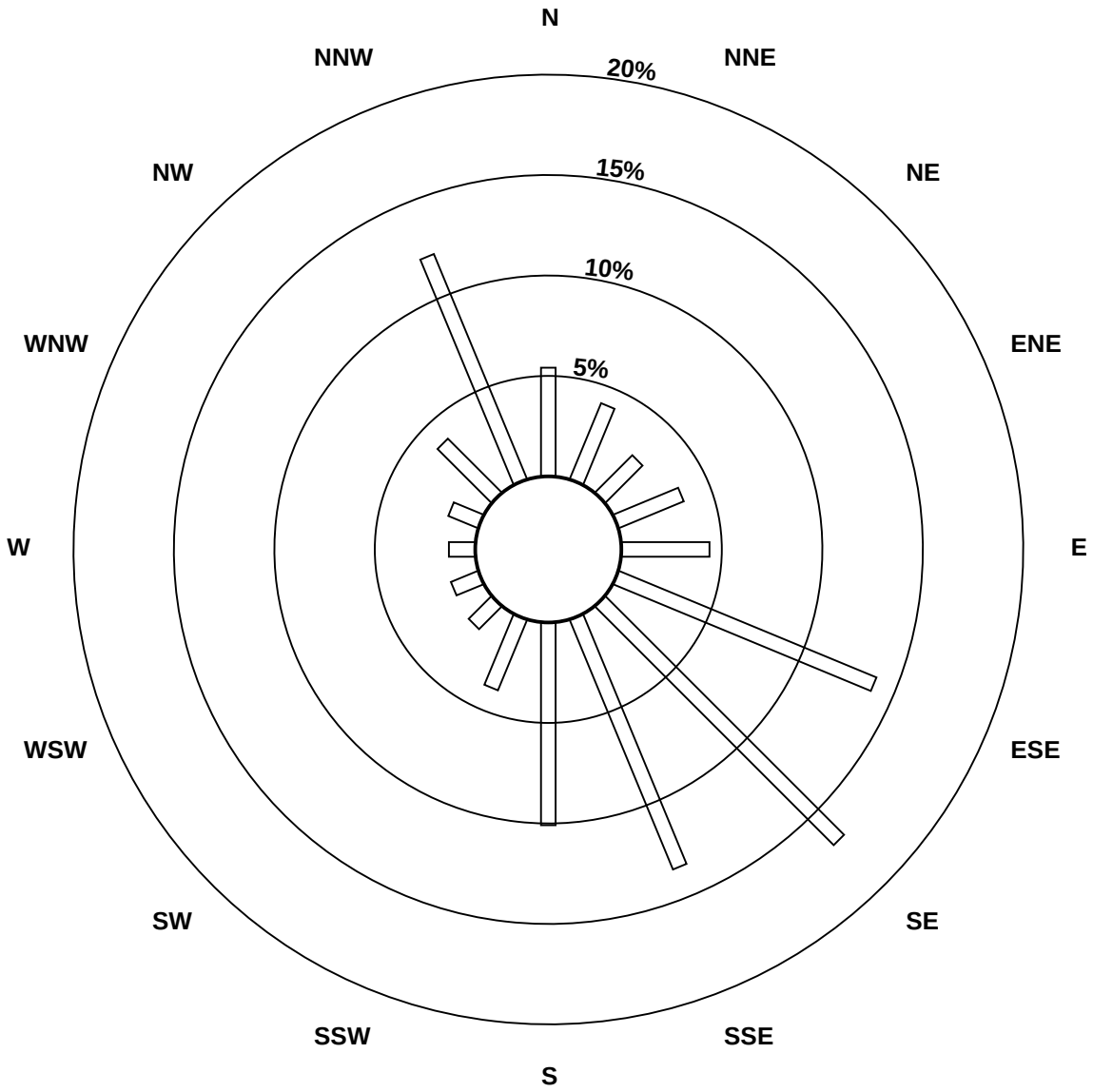
Total Number of Hours: 720

Wood Buffalo Environmental Association

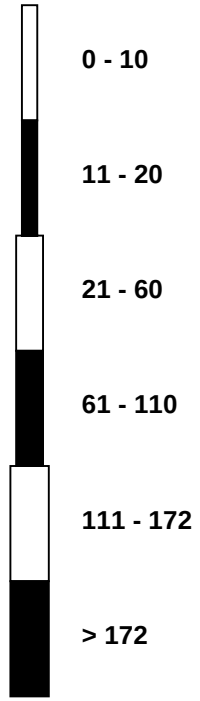
Wind Rose Apr 2016

Sulphur Dioxide (SO_2) - ppb

Wapasu (AMS 17)



Classes (ppb)



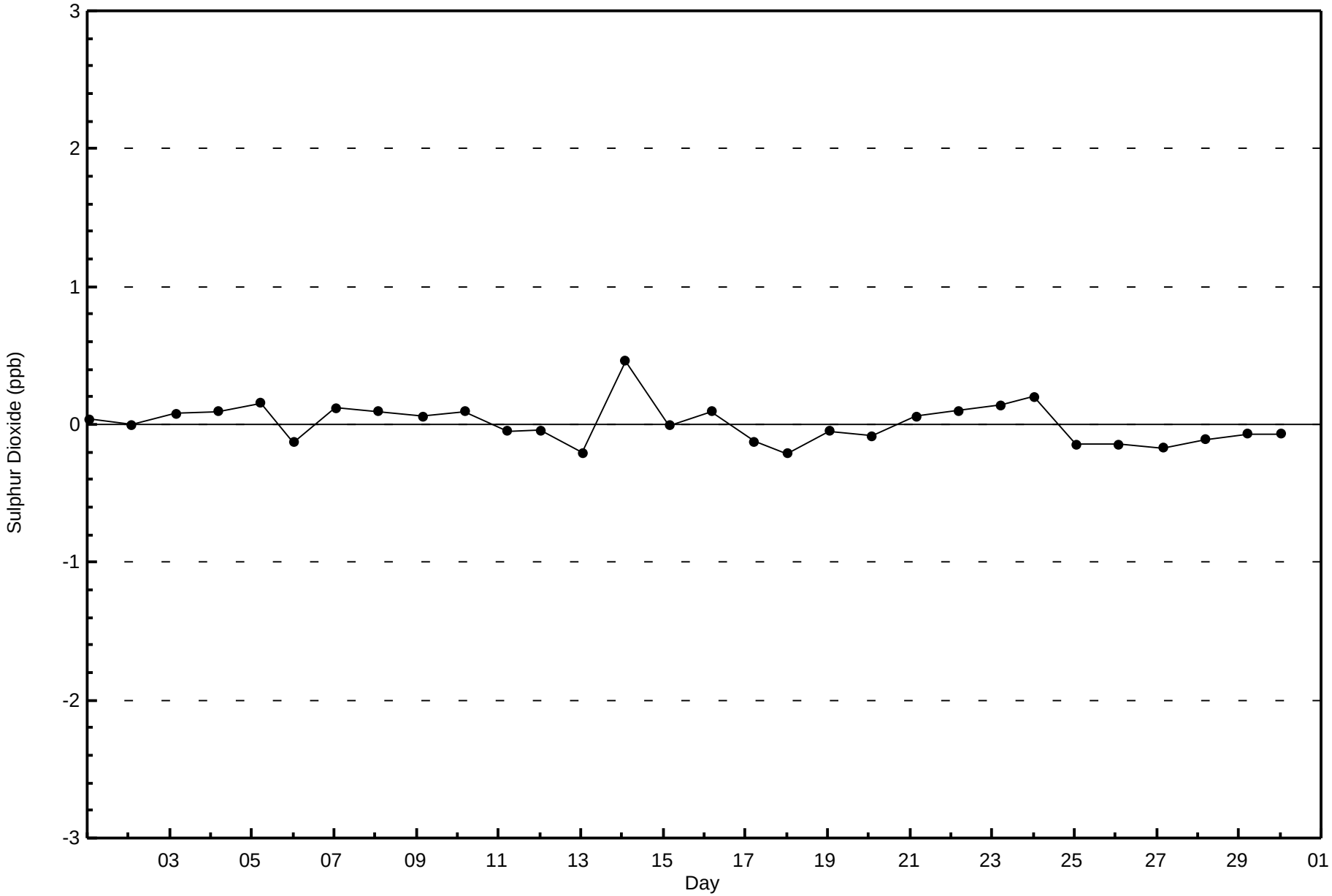
Total Number of Valid Hours: 684

Wood Buffalo Environmental Association

Zero Responses

Sulphur Dioxide (SO_2) - ppb

Wapasu - April 2016

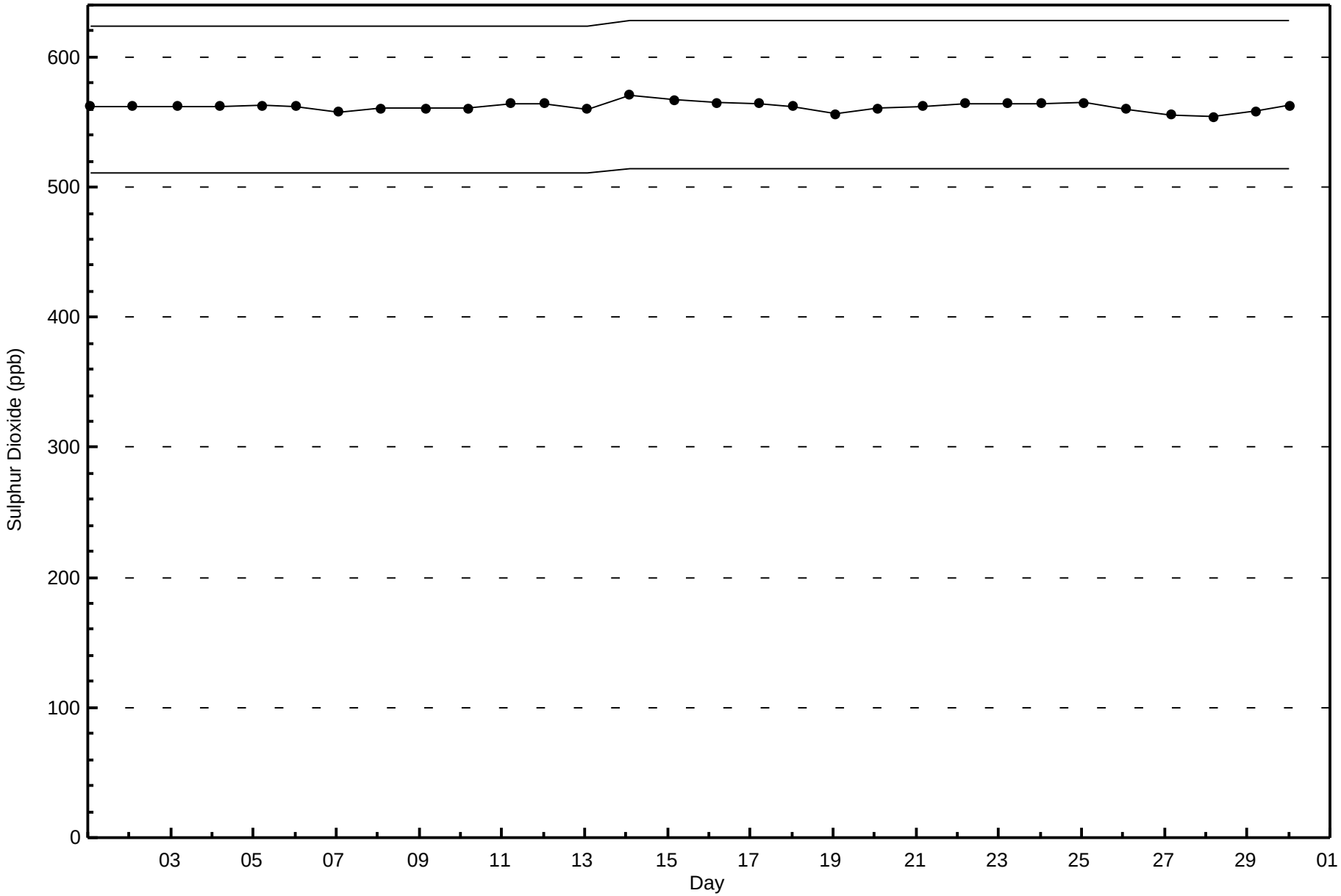


Wood Buffalo Environmental Association

Span Responses

Sulphur Dioxide (SO_2) - ppb

Wapasu - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Hydrogen Sulphide (H_2S) - ppb

Wapasu - April 2016

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

Maximum Value: 1 ppb on Apr 1 10:00

Maximum Daily Average: 0.5 ppb on Apr 1

Minimum Value: 0 ppb on Apr 22 20:00

Minimum Daily Average: 0.0 ppb on Apr 23

Maximum Diurnal Average: 0.3 ppb at hour 7

Minimum Diurnal Average: 0.2 ppb at hour 18

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:	720
Hours of Data:	687
Hours of Missing Data:	33
Hours of Calibration:	33
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-Apr	0	1	Z	1	1	0	0	1	1	1	1	1	1	0	1	1	0	0	0	0	0	0	0	0	0.5	1
2-Apr	0	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
3-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
4-Apr	0	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-Apr	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
6-Apr	0	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-Apr	0	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-Apr	0	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
9-Apr	0	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-Apr	0	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-Apr	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
12-Apr	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
13-Apr	0	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
14-Apr	0	0	0	Z	0	0	0	0	0	0	0	C	C	C	0	0	0	0	0	0	0	0	0	0	0.2	0
15-Apr	0	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
16-Apr	0	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
17-Apr	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
18-Apr	0	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
19-Apr	0	0	Z	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
20-Apr	0	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
21-Apr	0	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
22-Apr	0	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
23-Apr	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
24-Apr	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
25-Apr	0	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
26-Apr	0	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
27-Apr	0	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
28-Apr	0	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
29-Apr	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
30-Apr	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	Diurnal Average	
	0	1	0	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	0	0	0	0	0	0	Diurnal Maximum	

Z - zerospan C - Calibration

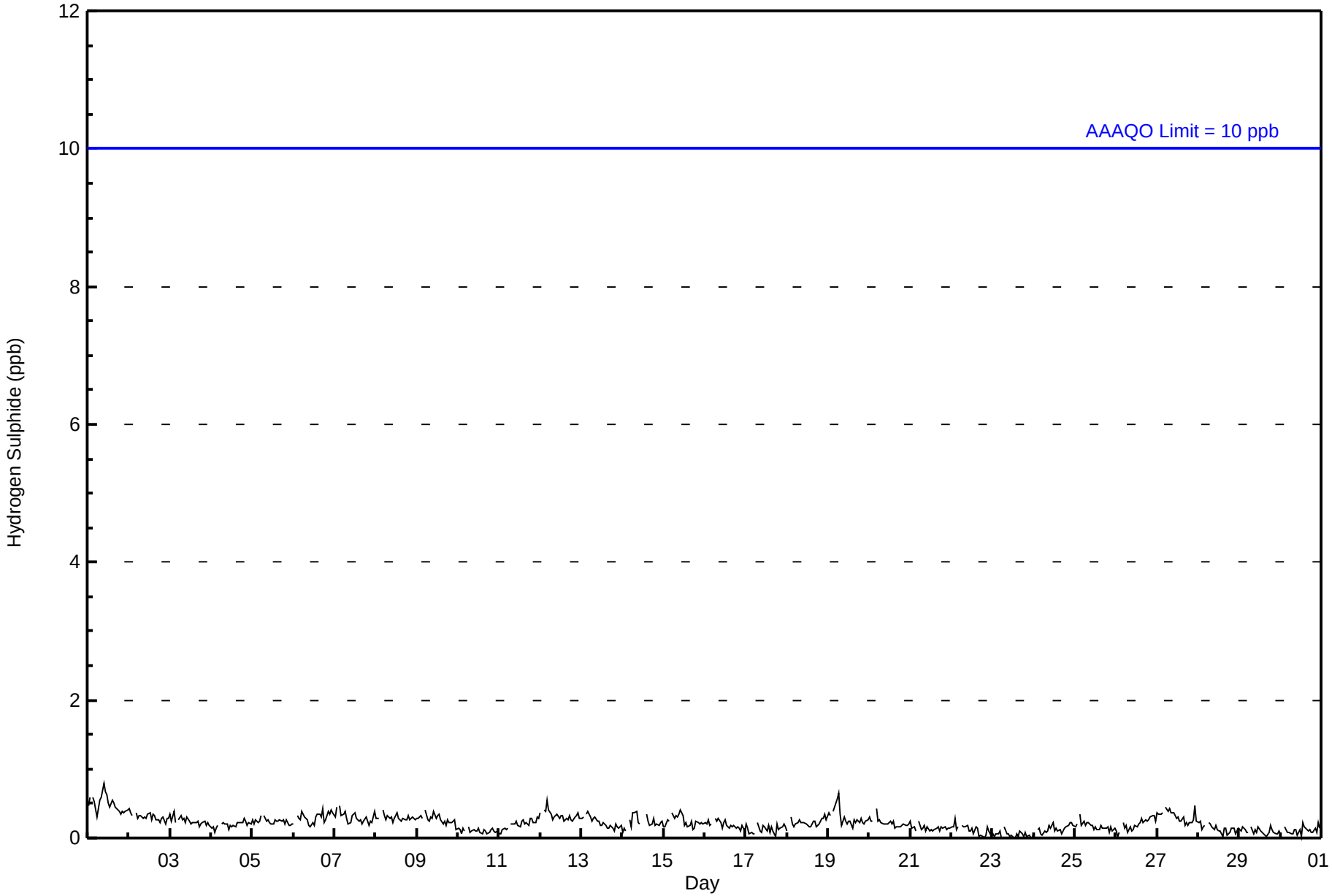
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb

Wood Buffalo Environmental Association

Hourly Averages

Hydrogen Sulphide (H_2S) - ppb

Wapasu - April 2016



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Hydrogen Sulphide (H_2S) - ppb

Wapasu - April 2016

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

Total Number of Valid Hours: 687

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Hydrogen Sulphide (H_2S) - ppb

Wapasu - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 2	37	27	18	24	29	97	116	94	71	26	12	9	9	10	23	84	686
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	37	27	18	24	29	97	116	94	71	26	12	9	9	10	23	84	686

Total Number of Valid Hours: 686

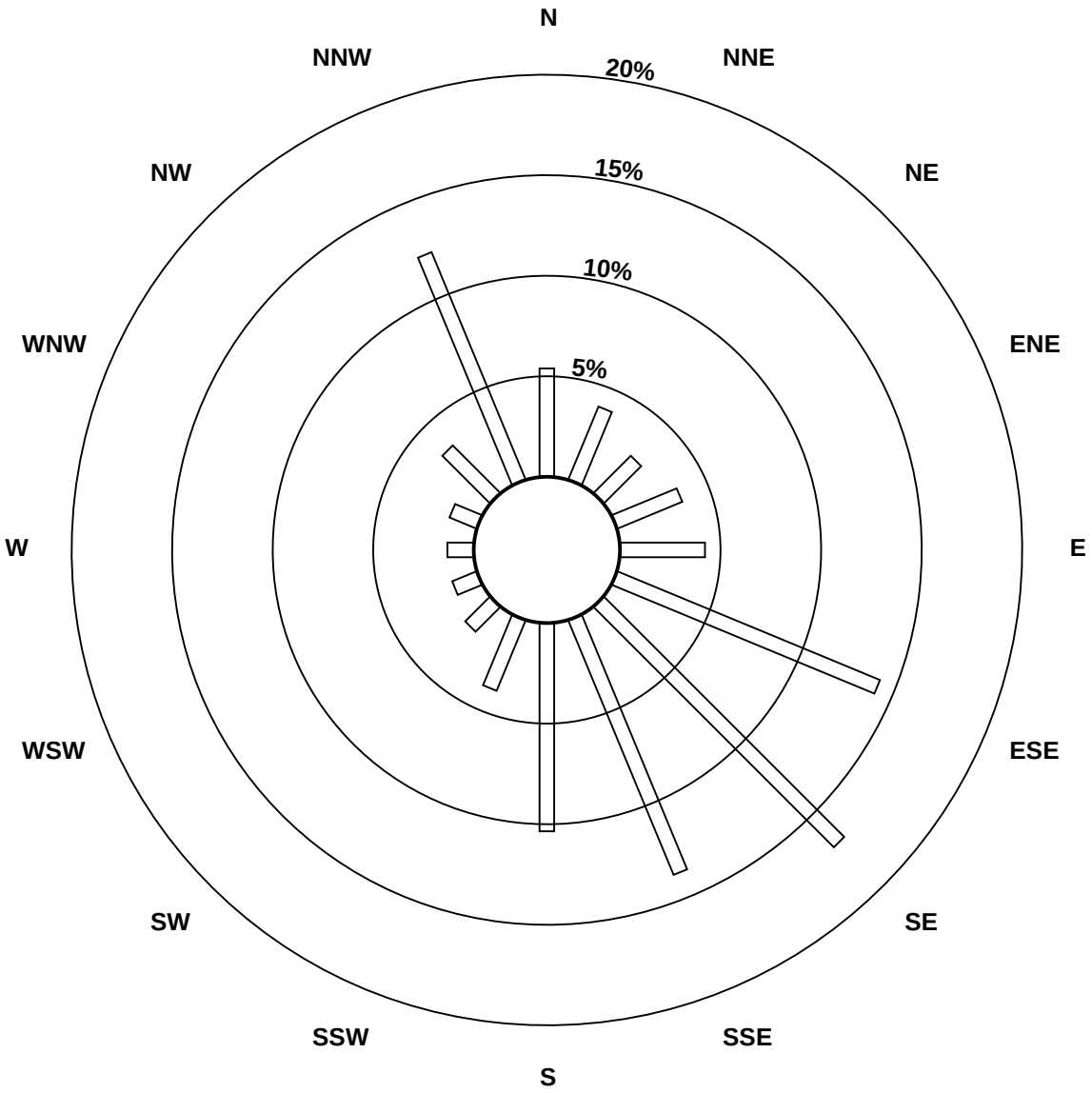
Total Number of Hours: 720

Wood Buffalo Environmental Association

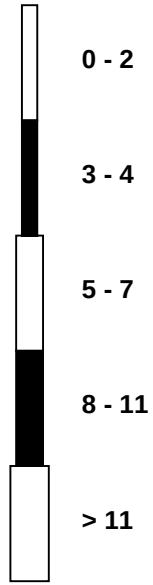
Wind Rose Apr 2016

Hydrogen Sulphide (H_2S) - ppb

Wapasu (AMS 17)



Classes (ppb)



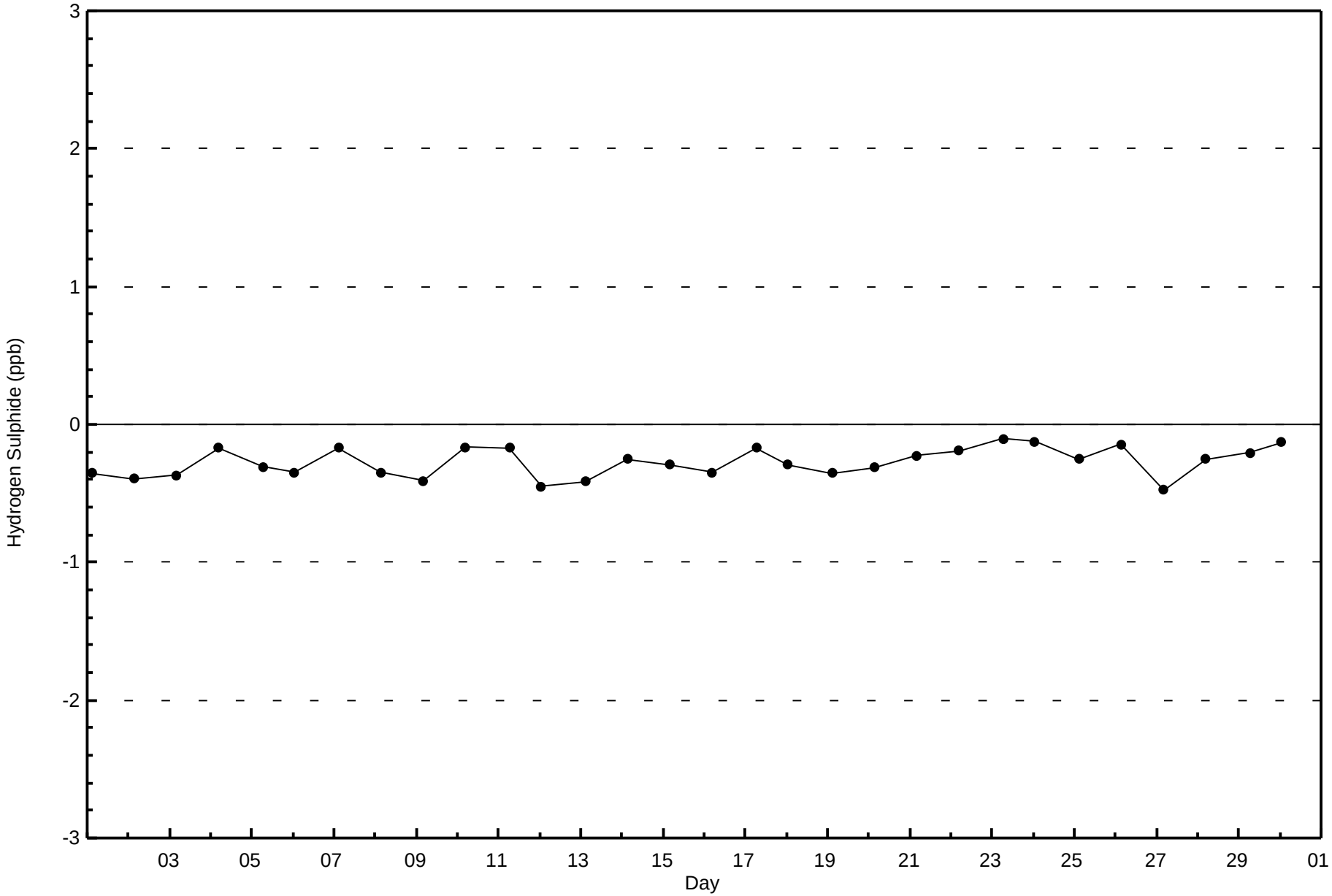
Total Number of Valid Hours: 686

Wood Buffalo Environmental Association

Zero Responses

Hydrogen Sulphide (H_2S) - ppb

Wapasu - April 2016

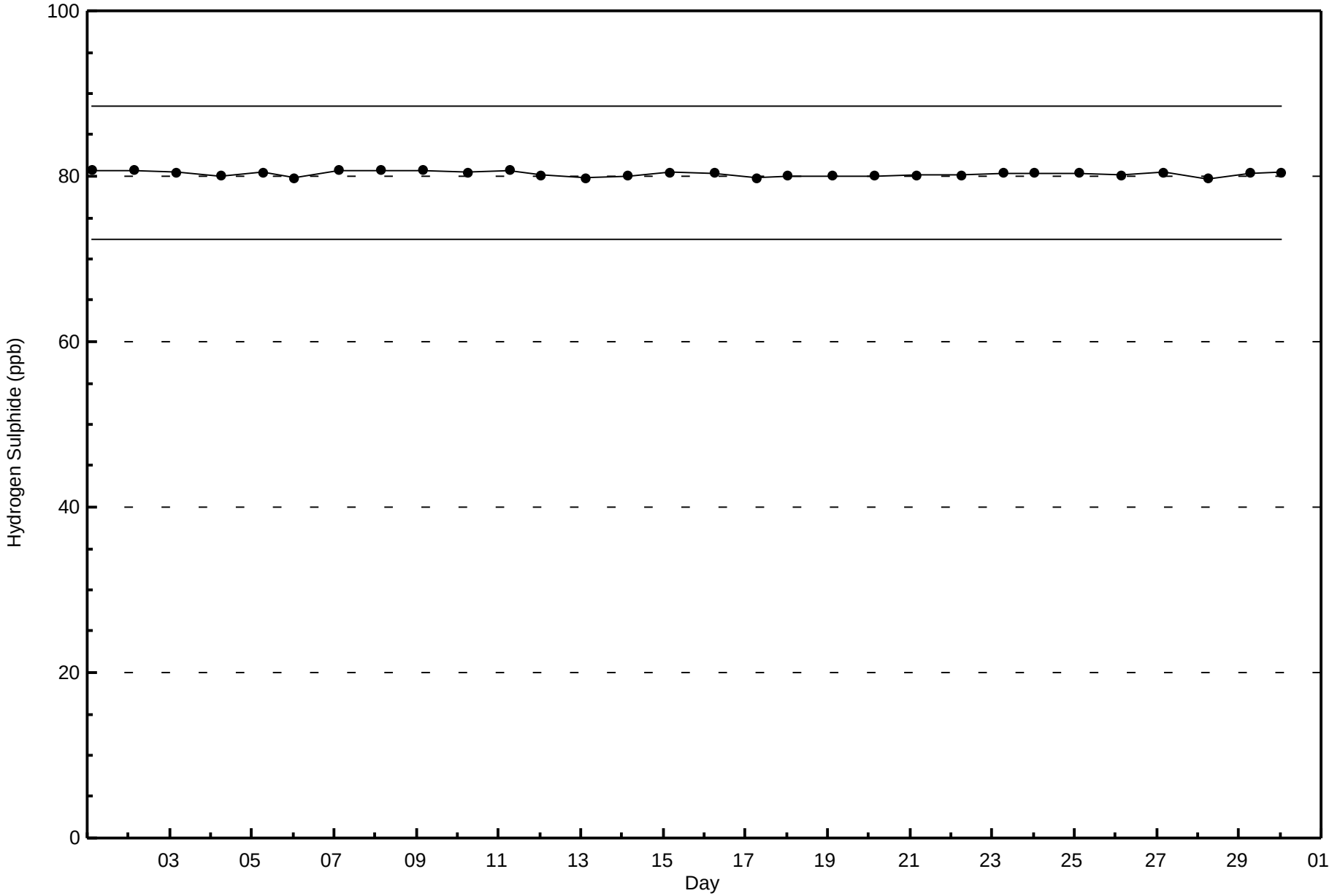


Wood Buffalo Environmental Association

Span Responses

Hydrogen Sulphide (H_2S) - ppb

Wapasu - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Wapasu - April 2016

Maximum Value: 2.4 ppm on Apr 11 16:00

Maximum Daily Average: 2.2 ppm on Apr 27

Minimum Value: 2.0 ppm on Apr 23 18:00

Minimum Daily Average: 2.1 ppm on Apr 23

Maximum Diurnal Average: 2.2 ppm at hour 6

Minimum Diurnal Average: 2.1 ppm at hour 17

Monthly Average: 2.16 ppm

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

Hours in Service:	720
Hours of Data:	685
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-Apr	2.2	Z	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
2-Apr	2.1	2.2	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2
3-Apr	2.1	2.1	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2
4-Apr	2.2	2.2	2.2	2.1	Z	2.2	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.1	2.2
5-Apr	2.2	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2
6-Apr	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2
7-Apr	2.2	Z	2.2	2.2	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.3
8-Apr	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2
9-Apr	2.1	2.1	2.1	Z	2.1	2.2	2.2	2.1	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
10-Apr	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2
11-Apr	2.2	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4
12-Apr	Z	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.3
13-Apr	2.1	Z	2.2	2.1	2.2	2.1	2.1	2.1	2.1	C	C	C	C	C	2.2	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2
14-Apr	2.1	2.2	Z	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.2
15-Apr	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.1	2.2
16-Apr	2.1	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2
17-Apr	2.2	2.1	2.2	2.2	2.1	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.3	2.4	2.3	2.2	2.1	2.2	2.4
18-Apr	Z	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2
19-Apr	2.2	Z	2.2	2.2	2.2	2.3	2.2	2.2	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3
20-Apr	2.1	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2
21-Apr	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2
22-Apr	2.1	2.1	2.2	2.2	Z	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2
23-Apr	2.1	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1
24-Apr	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2
25-Apr	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
26-Apr	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
27-Apr	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.3	2.2	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.3
28-Apr	2.2	2.2	2.2	2.1	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2
29-Apr	2.1	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2
30-Apr	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.1	2.2	2.1	2.1	2.2	2.1	2.1	2.2	2.2	2.2	2.1	2.1	2.2	2.1	2.2	2.2
	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	Diurnal Average	
	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.3	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.2	2.2	2.2	2.3	2.4	2.3	2.2	2.2	Diurnal Maximum	

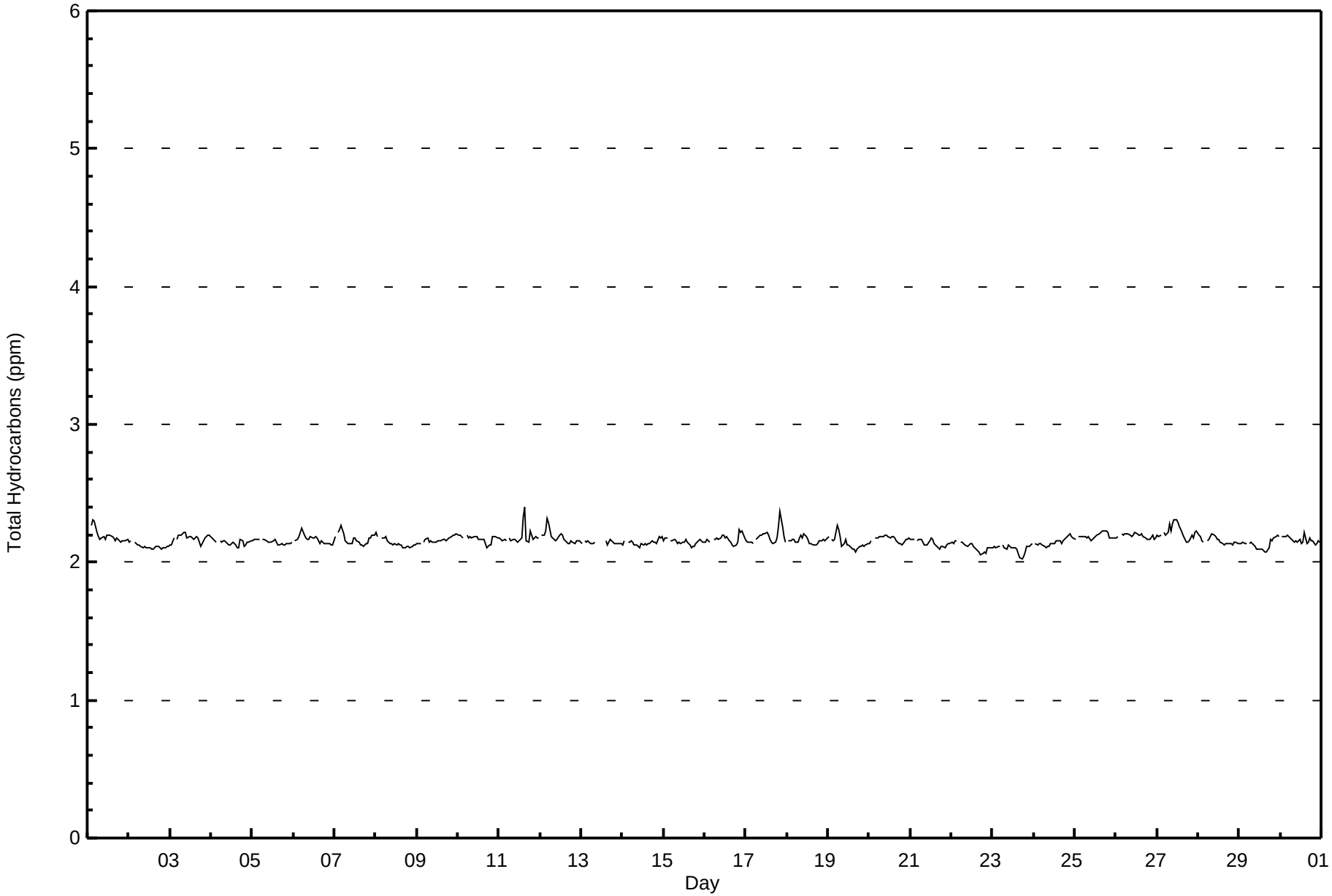
Z - zerospan C - Calibration

Wood Buffalo Environmental Association

Hourly Averages

Total Hydrocarbons (THC) - ppm

Wapasu - April 2016



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm

Wapasu - April 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	3	0.44	0.44
2.1 - 3.0	682	99.56	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Total Hydrocarbons (THC) - ppm

Wapasu - April 2016

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	3	0	0	0	0	0	0	0	0	0	0	3
2.1 - 3.0	37	28	18	24	30	92	115	92	69	26	11	10	9	11	26	83	681
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	37	28	18	24	30	95	115	92	69	26	11	10	9	11	26	83	684

Total Number of Valid Hours: 684

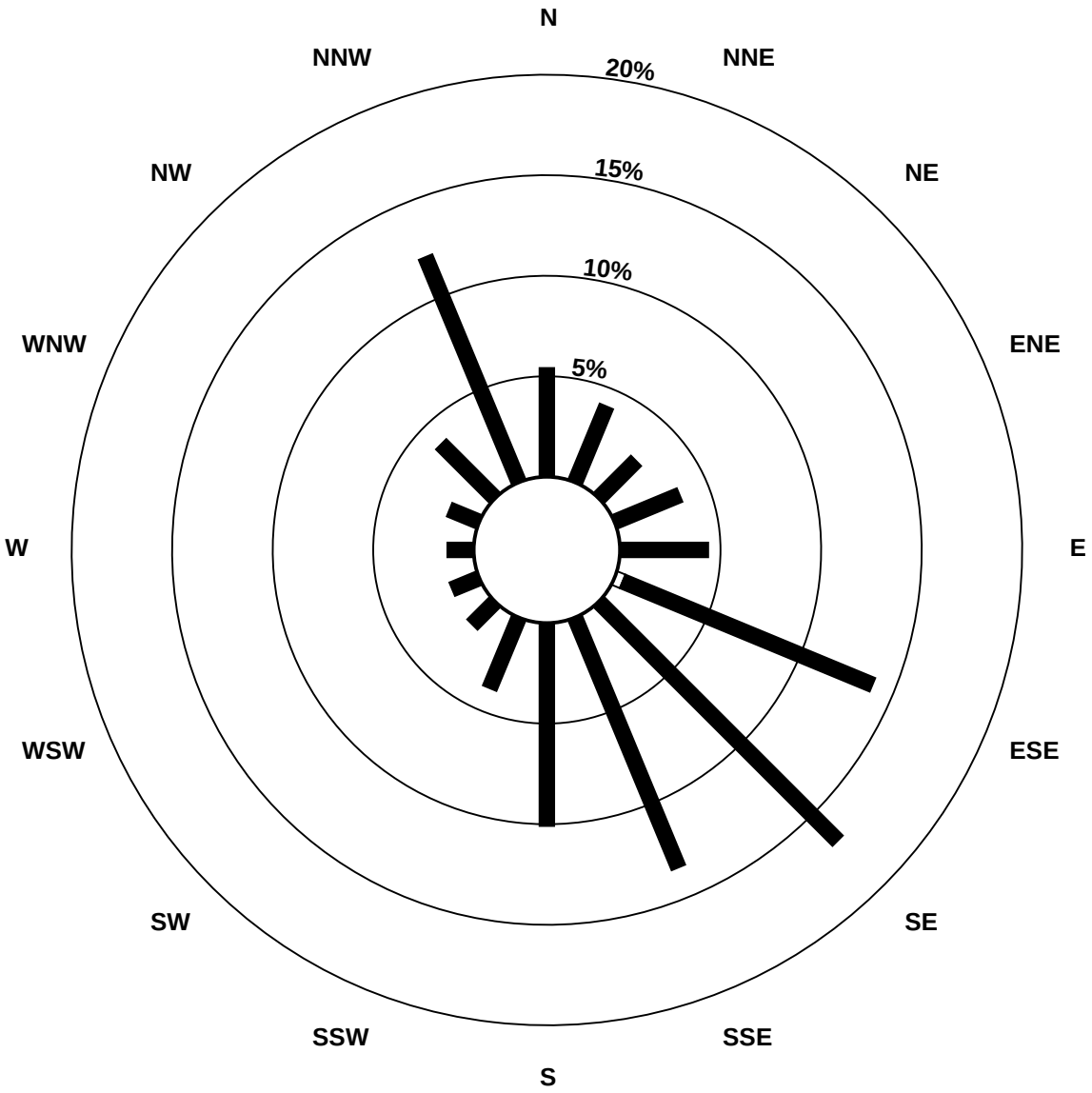
Total Number of Hours: 720

Wood Buffalo Environmental Association

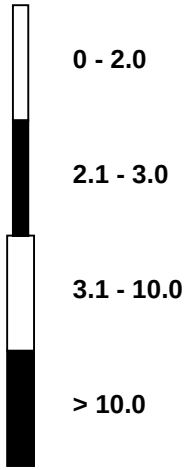
Wind Rose Apr 2016

Total Hydrocarbons (THC) - ppm

Wapasu (AMS 17)



Classes (ppm)



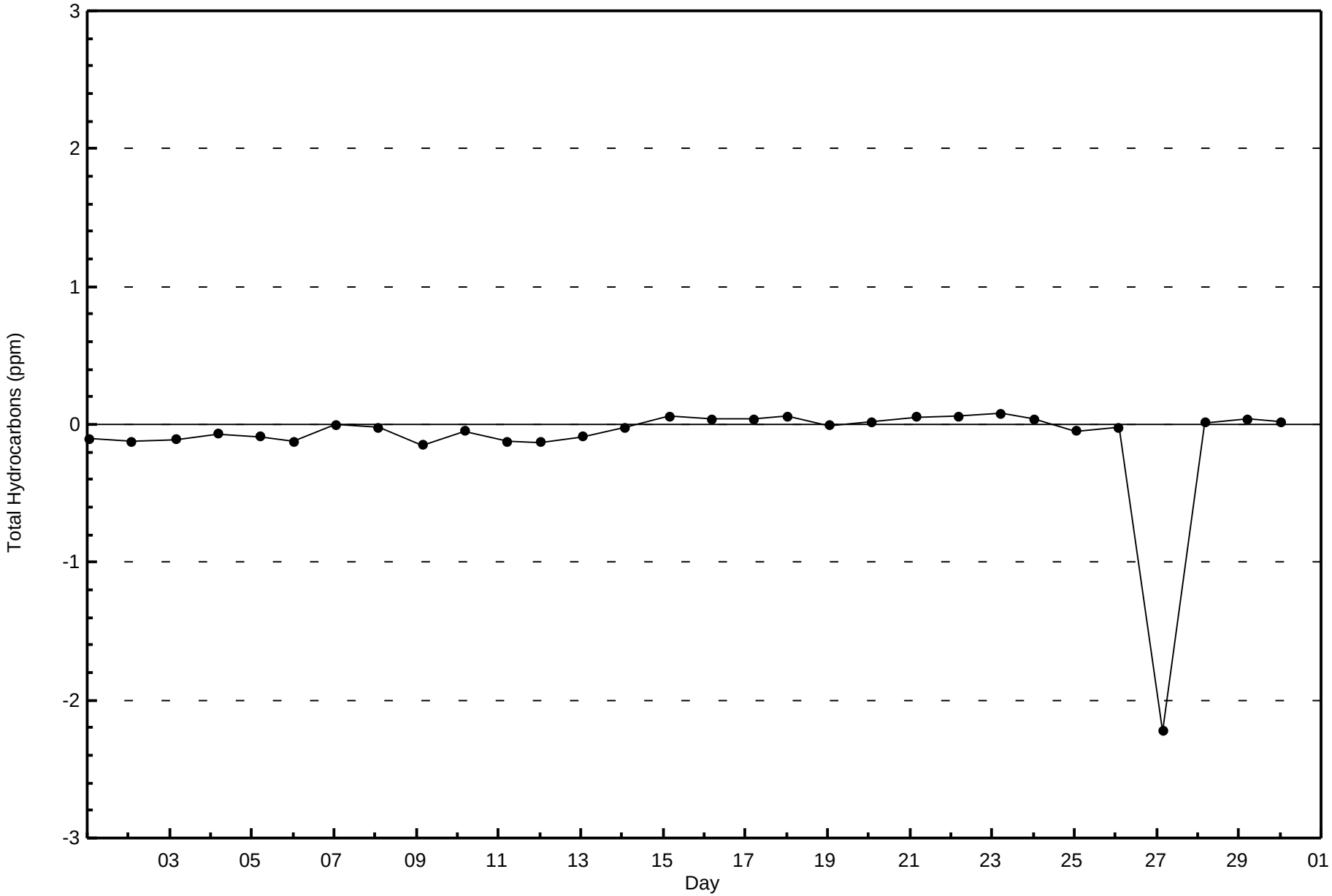
Total Number of Valid Hours: 684

Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Wapasu - April 2016

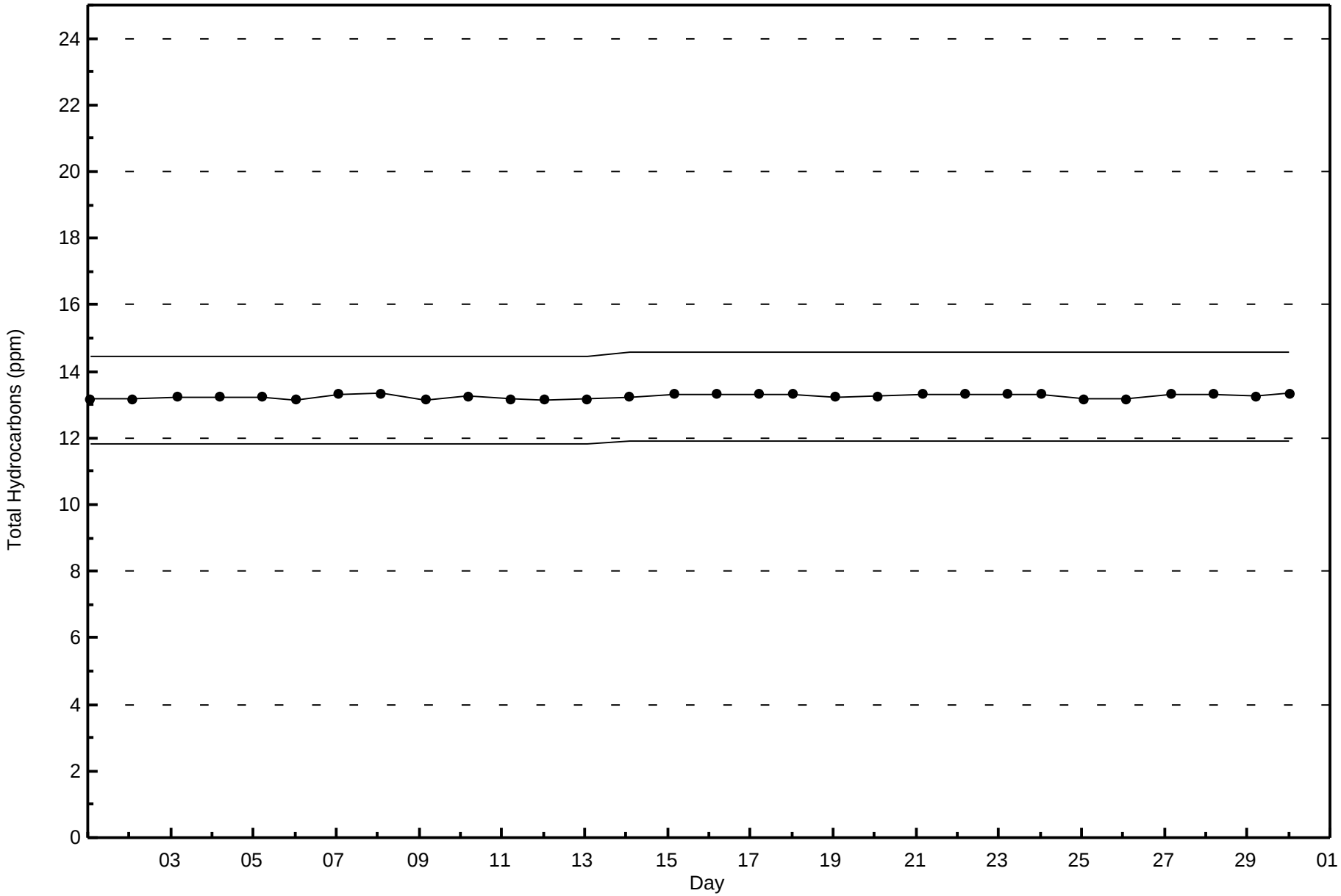


Wood Buffalo Environmental Association

Span Responses

Total Hydrocarbons (THC) - ppm

Wapasu - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O_3) - ppb

Wapasu - April 2016

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

Maximum Value: 60 ppb on Apr 18 12:00

Maximum Daily Average: 48.8 ppb on Apr 19

Minimum Value: 8 ppb on Apr 27 06:00

Minimum Daily Average: 21.6 ppb on Apr 27

Maximum Diurnal Average: 42.4 ppb at hour 16

Minimum Diurnal Average: 33.9 ppb at hour 6

Monthly Average: 38.5 ppb

Percentiles: $P_1 = 12$ $P_{10} = 29$ $Q_1 = 35$ Median = 40 $Q_3 = 43$ $P_{90} = 47$ $P_{99} = 55$

Hours in Service:	720
Hours of Data:	687
Hours of Missing Data:	33
Hours of Calibration:	33
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-Apr	28	33	32	30	Z	34	37	36	36	36	37	37	37	38	39	39	39	39	41	43	41	40	42	42	37.2	43
2-Apr	42	43	44	43	43	Z	43	43	43	44	44	44	43	44	42	42	43	43	43	43	43	42	41	40	42.8	44
3-Apr	41	40	34	40	41	40	Z	41	39	40	43	42	42	42	42	41	42	41	40	39	37	36	36	38	39.9	43
4-Apr	40	40	41	41	38	39	39	Z	36	37	38	40	40	40	41	41	42	40	37	39	37	37	38	38	39.0	42
5-Apr	38	37	36	37	38	39	39	40	Z	40	41	40	39	39	40	40	40	41	40	34	33	32	29	26	37.2	41
6-Apr	23	20	18	Z	16	14	20	27	32	34	33	33	34	33	33	34	35	37	39	39	40	38	37	36	30.6	40
7-Apr	36	32	30	24	Z	20	29	34	37	36	35	34	35	36	38	39	39	38	38	31	27	34	38	40	33.9	40
8-Apr	40	40	40	40	40	Z	40	39	39	38	38	38	38	38	39	38	38	37	37	37	37	36	36	35	38.1	40
9-Apr	35	35	34	33	28	29	Z	38	39	41	42	42	42	42	42	42	41	41	40	41	39	39	40	41	38.5	42
10-Apr	41	40	42	42	41	41	41	Z	42	42	43	44	45	44	45	47	48	49	47	43	38	43	44	44	43.3	49
11-Apr	44	44	44	43	42	42	41	42	Z	41	41	41	42	43	43	44	45	45	35	36	41	42	40	40	41.8	45
12-Apr	38	39	38	Z	22	33	41	41	42	42	43	43	45	45	45	44	44	43	42	41	41	39	42	42	40.6	45
13-Apr	43	42	42	42	Z	39	41	41	41	42	43	43	44	39	36	38	39	38	39	34	29	22	18	19	37.2	44
14-Apr	22	25	36	37	36	Z	35	36	36	C	C	C	39	38	38	38	38	36	37	36	31	22	16	12	32.3	39
15-Apr	12	12	14	17	19	19	Z	36	38	36	36	37	39	40	40	39	39	39	38	36	37	39	39	39	32.1	40
16-Apr	38	37	35	34	34	34	34	Z	36	37	38	43	47	49	51	51	50	50	48	38	32	40	38	33	40.3	51
17-Apr	37	38	42	41	43	43	46	47	Z	48	48	49	49	53	52	51	48	44	39	28	27	31	35	42	42.7	53
18-Apr	43	41	40	Z	35	33	37	39	41	43	52	60	53	48	51	53	54	53	54	53	55	56	54	54	47.9	60
19-Apr	54	52	50	48	Z	38	42	43	46	48	51	57	59	57	56	54	54	55	52	47	45	42	39	34	48.8	59
20-Apr	34	33	32	33	33	Z	30	28	28	28	29	30	31	34	36	37	38	39	39	36	33	28	28	34	32.6	39
21-Apr	33	32	32	32	33	33	Z	36	38	39	40	41	42	44	45	45	45	45	45	44	42	41	41	40	39.5	45
22-Apr	38	37	33	37	36	37	38	Z	42	43	44	45	46	47	47	46	46	46	45	43	43	40	42	43	42.0	47
23-Apr	42	42	42	42	42	41	40	40	Z	44	47	47	46	47	46	44	41	41	40	39	39	38	38	42	42.2	47
24-Apr	42	43	42	Z	41	40	40	39	38	39	40	41	41	41	42	47	48	45	46	45	43	44	44	42	42.3	48
25-Apr	41	40	36	36	Z	36	36	36	35	34	33	33	33	34	35	35	35	33	33	31	31	32	31	31	34.3	41
26-Apr	30	29	29	29	30	Z	29	29	28	28	29	29	28	27	26	21	22	21	19	15	13	14	15	14	24.2	30
27-Apr	15	14	11	9	9	8	Z	15	17	17	18	22	25	29	30	30	32	32	31	29	23	27	26	27	21.6	32
28-Apr	28	29	30	32	33	32	35	Z	41	47	51	51	51	51	51	51	51	52	50	47	45	45	45	46	43.3	52
29-Apr	46	46	46	45	45	44	44	45	Z	47	49	49	50	51	52	51	50	49	48	44	43	43	45	45	46.7	52
30-Apr	43	44	44	Z	44	42	43	42	42	44	47	49	49	47	42	44	43	35	36	39	34	33	33	34	41.3	49
	36.2	36.0	35.6	35.5	34.4	33.9	37.5	37.4	37.3	39.2	40.4	41.5	41.8	42.0	42.2	42.4	42.4	41.6	40.6	38.4	36.5	36.4	36.3	36.4	Diurnal Average	
	54	52	50	48	45	44	46	47	46	48	52	60	59	57	56	54	54	55	54	53	55	56	54	54	Diurnal Maximum	

Z - zerospan C - Calibration

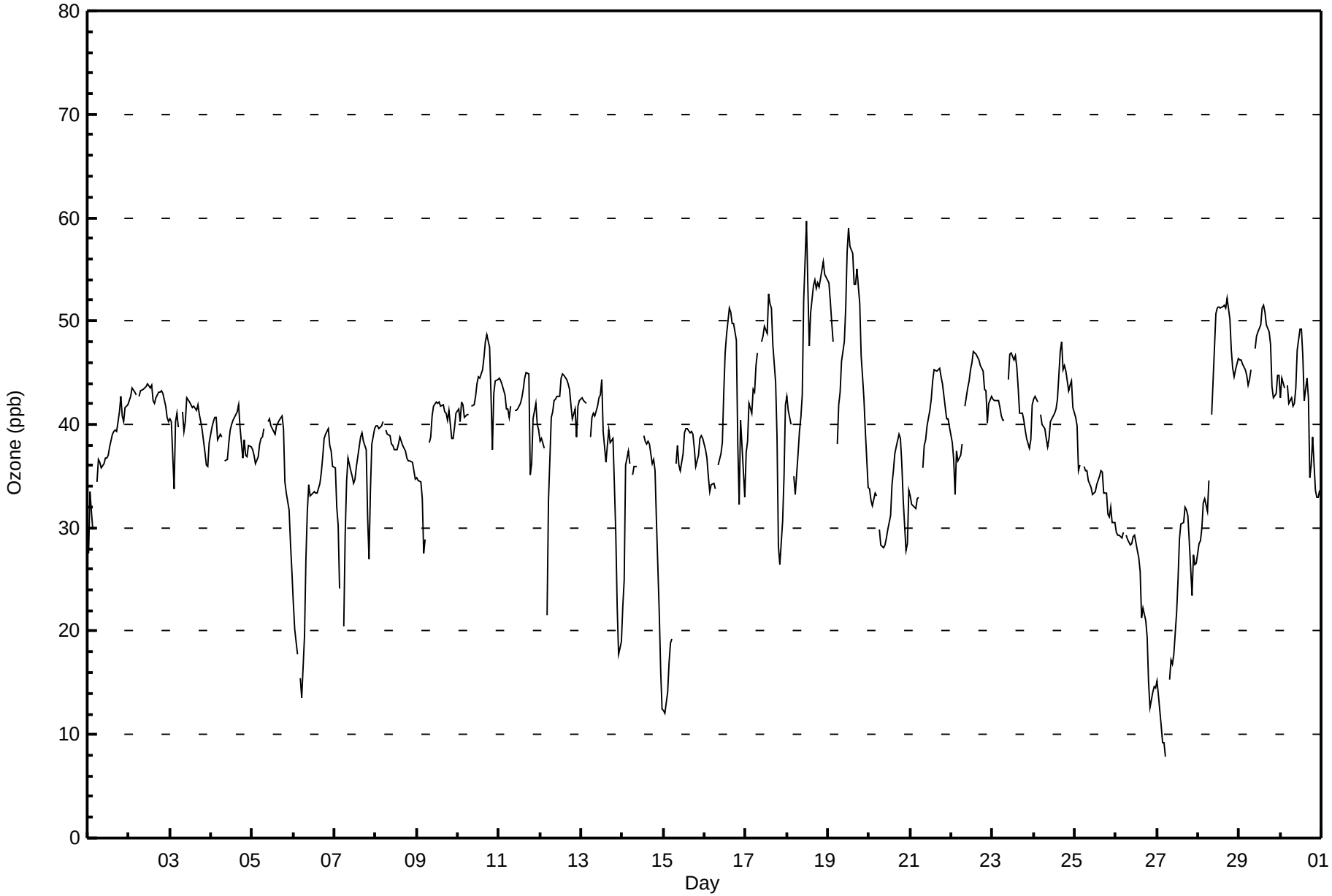
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb

Wood Buffalo Environmental Association

Hourly Averages

Ozone (O_3) - ppb

Wapasu - April 2016



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	32	4.66	4.66
21 - 50	615	89.52	94.18
51 - 82	40	5.82	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Ozone (O_3) - ppb

Wapasu - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	1	2	0	0	1	7	9	4	2	0	0	0	0	0	3	2	31
21 - 50	36	26	18	24	27	91	110	79	54	23	10	6	3	8	21	79	615
51 - 82	0	0	0	0	0	0	1	11	12	3	2	4	5	2	0	0	40
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	37	28	18	24	28	98	120	94	68	26	12	10	8	10	24	81	686

Total Number of Valid Hours: 686

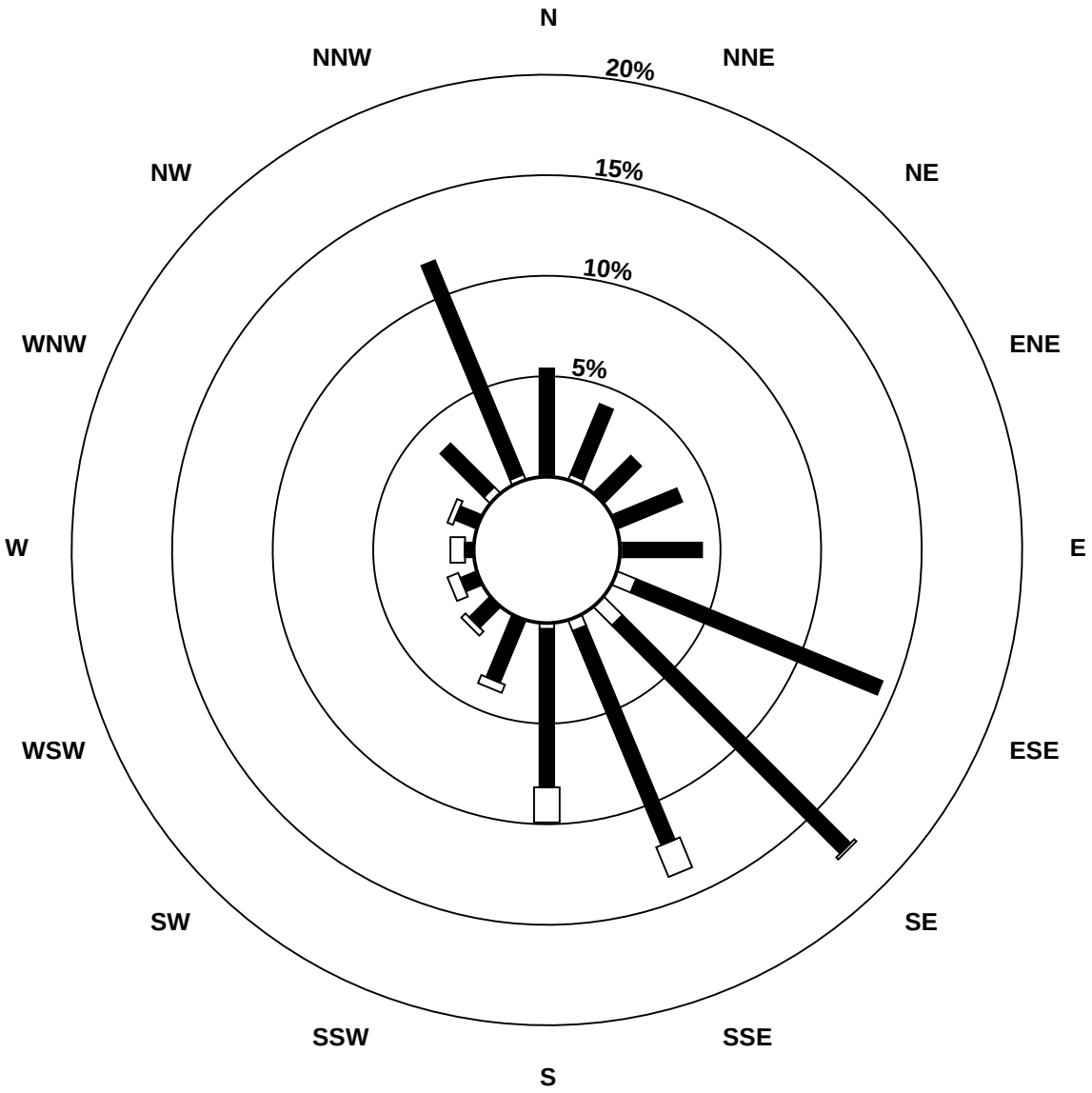
Total Number of Hours: 720

Wood Buffalo Environmental Association

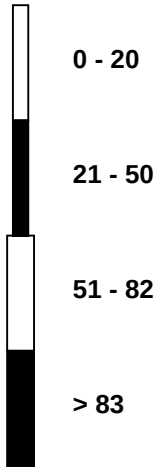
Wind Rose Apr 2016

Ozone (O_3) - ppb

Wapasu (AMS 17)



Classes (ppb)



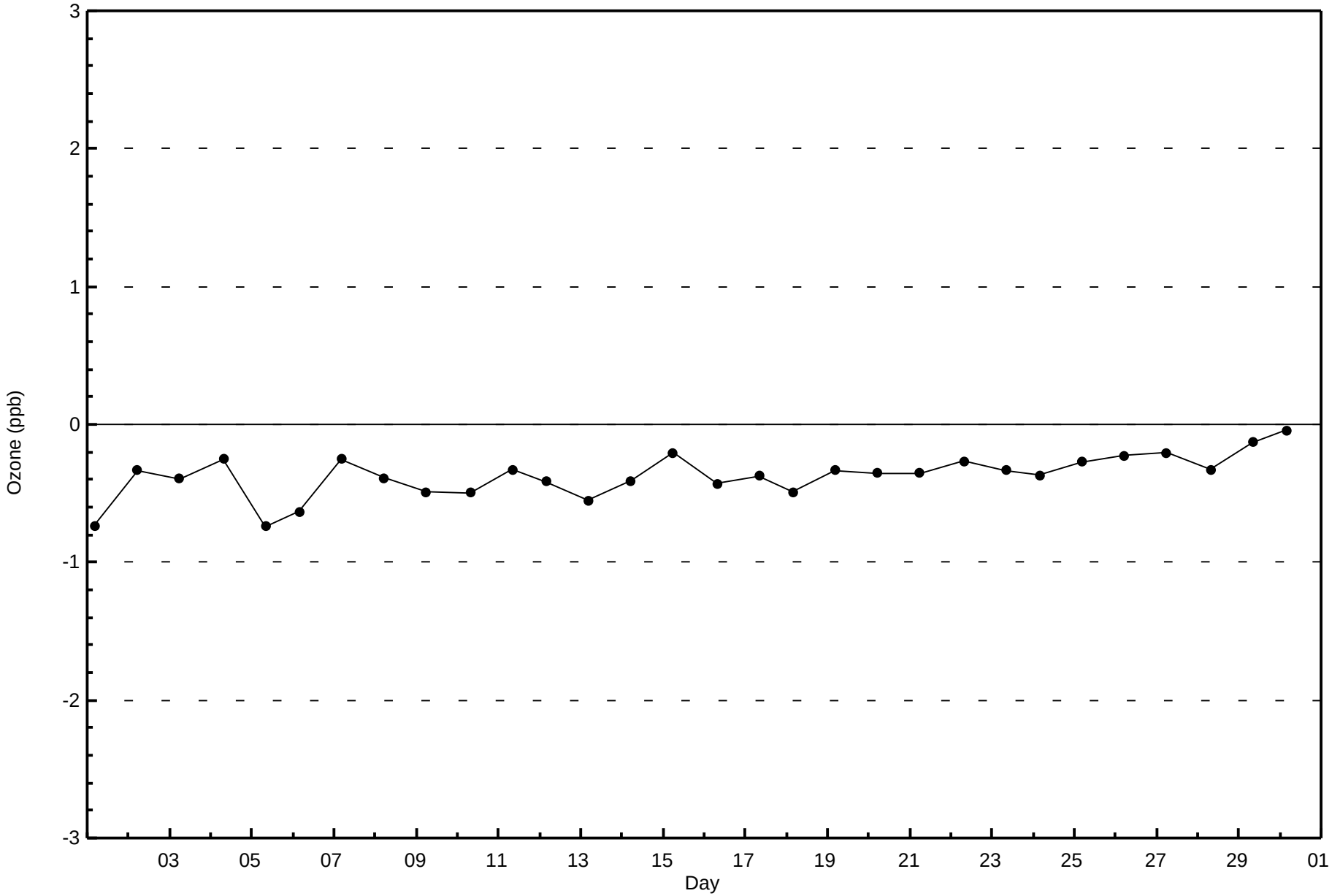
Total Number of Valid Hours: 686

Wood Buffalo Environmental Association

Zero Responses

Ozone (O_3) - ppb

Wapasu - April 2016

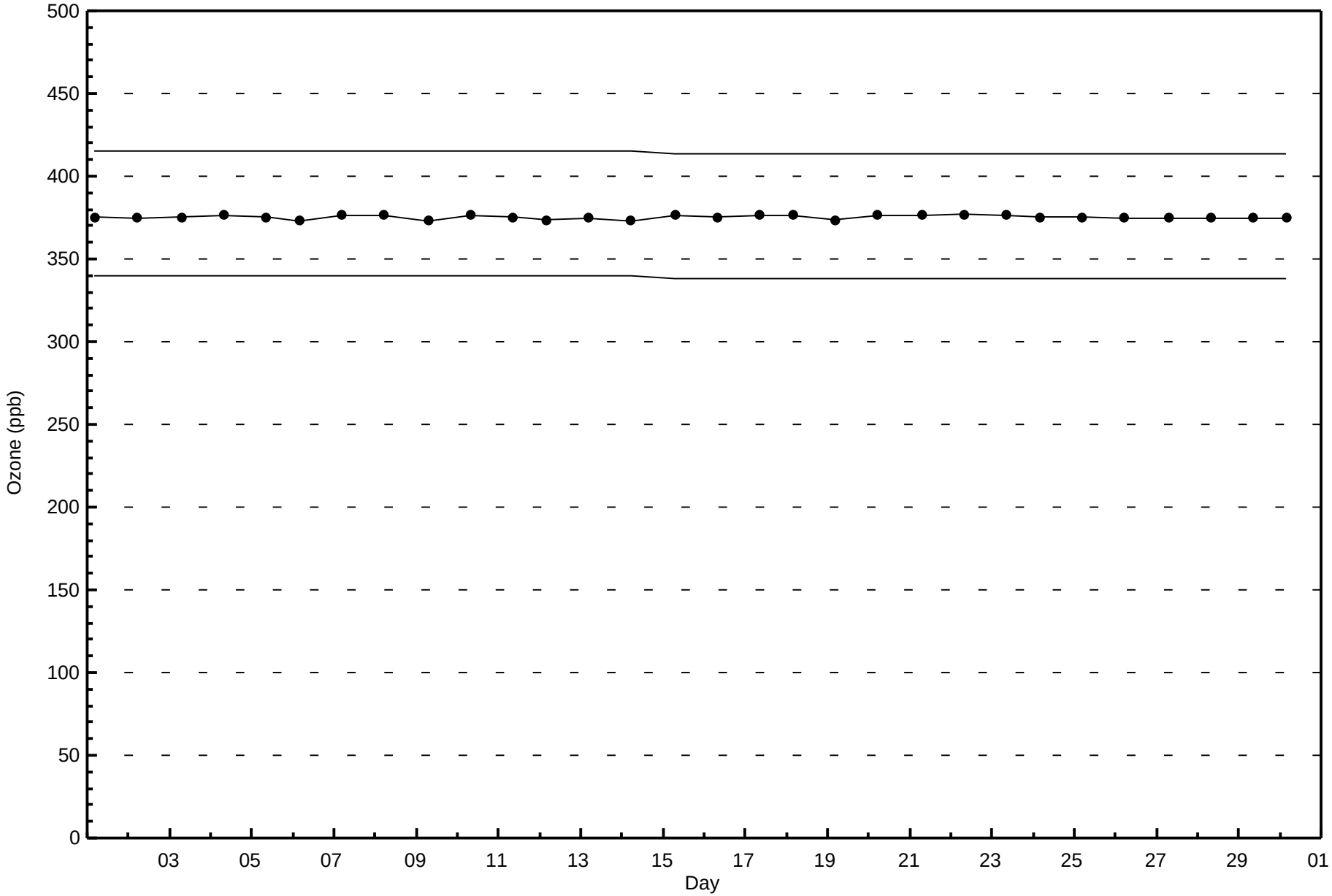


Wood Buffalo Environmental Association

Span Responses

Ozone (O_3) - ppb

Wapasu - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

Wapasu - April 2016

Maximum Value: 3 ppb on Apr 15 11:00

Maximum Daily Average: 0.6 ppb on Apr 15

Minimum Value: 0 ppb on Apr 3 22:00

Minimum Daily Average: 0.0 ppb on Apr 8

Maximum Diurnal Average: 0.5 ppb at hour 11

Minimum Diurnal Average: 0.1 ppb at hour 2

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:	720
Hours of Data:	685
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-Apr	1	Z	1	0	1	1	1	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0.6	1
2-Apr	0	0	Z	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1
3-Apr	0	0	0	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
4-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
5-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
6-Apr	Z	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0.4	1
7-Apr	0	Z	0	0	0	0	0	0	0	1	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0.3	2
8-Apr	0	0	Z	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-Apr	0	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
10-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
11-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	1	1	0	1	0	0	0	0	0	0.3	1
12-Apr	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
13-Apr	0	Z	0	0	0	0	0	0	0	C	C	C	C	C	1	1	0	0	0	0	0	1	1	0	0.3	1
14-Apr	1	0	Z	0	0	1	1	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0.5	1
15-Apr	0	0	0	Z	0	0	0	2	1	2	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0.6	3
16-Apr	0	0	0	0	Z	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.2	1
17-Apr	0	0	0	0	0	Z	0	0	0	0	1	1	2	1	0	0	0	0	0	0	0	0	0	0	0.3	2
18-Apr	Z	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0.5	1
19-Apr	0	Z	1	0	0	1	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
20-Apr	0	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
21-Apr	0	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
22-Apr	0	0	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.2	1
23-Apr	0	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
24-Apr	Z	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	1	0.4	1
25-Apr	0	Z	1	0	1	0	1	0	1	0	0	0	0	1	0	0	1	1	0	1	0	0	0	0	0.4	1
26-Apr	0	0	Z	0	0	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.3	1
27-Apr	0	0	0	Z	0	0	0	1	1	1	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0.5	2
28-Apr	0	0	0	0	Z	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
29-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
30-Apr	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1
	0.2	0.1	0.2	0.2	0.2	0.2	0.3	0.4	0.4	0.5	0.5	0.5	0.4	0.4	0.3	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	Diurnal Average	
	1	0	1	1	1	1	1	2	1	2	3	2	2	1	1	1	1	1	1	1	1	1	1	1	Diurnal Maximum	

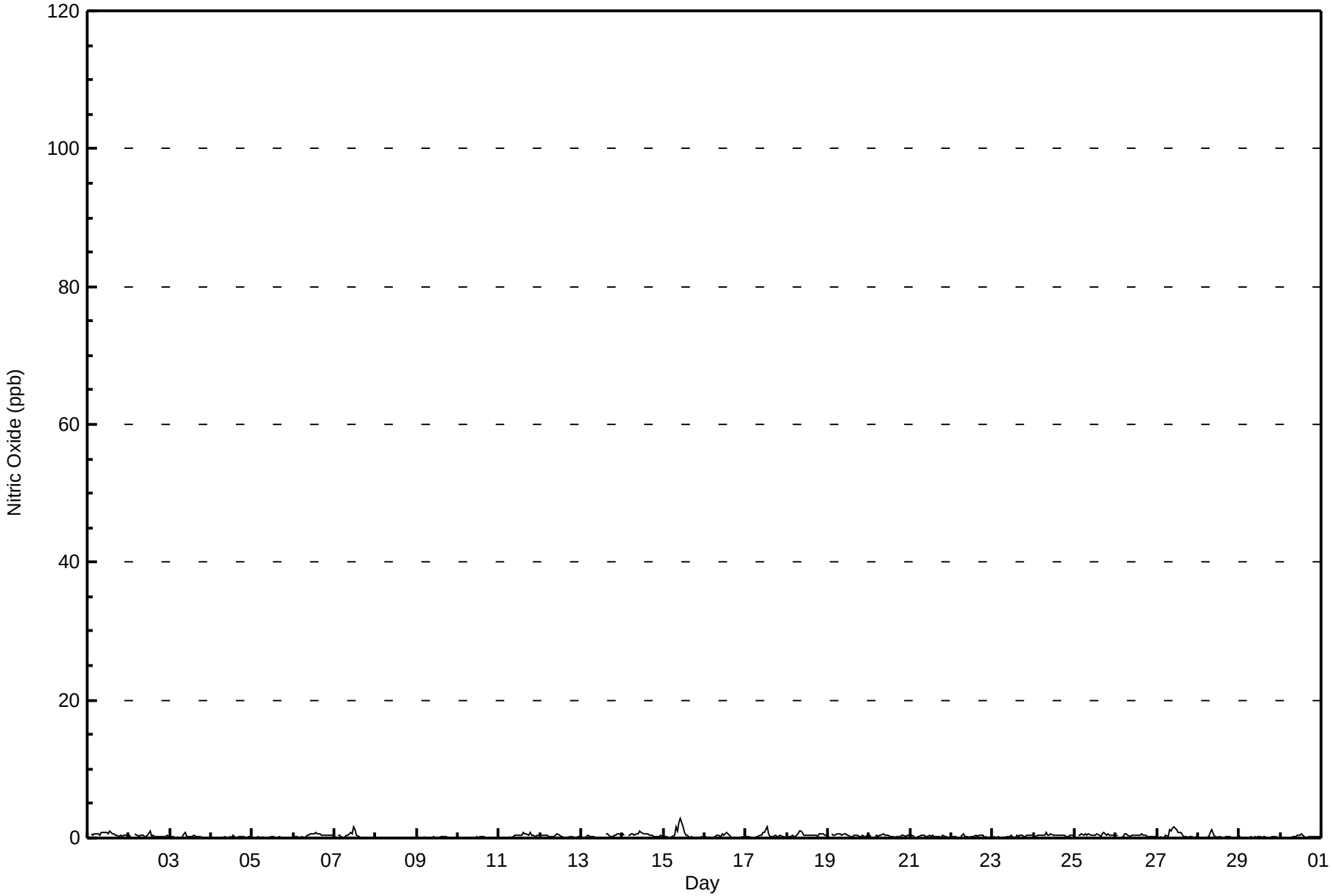
Z - zerospan C - Calibration

Wood Buffalo Environmental Association

Hourly Averages

Nitric Oxide (NO) - ppb

Wapasu - April 2016



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	685	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: 685

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitric Oxide (NO) - ppb

Wapasu - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	37	28	18	24	30	95	115	92	69	26	11	10	9	11	26	83	684
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	37	28	18	24	30	95	115	92	69	26	11	10	9	11	26	83	684

Total Number of Valid Hours: 684

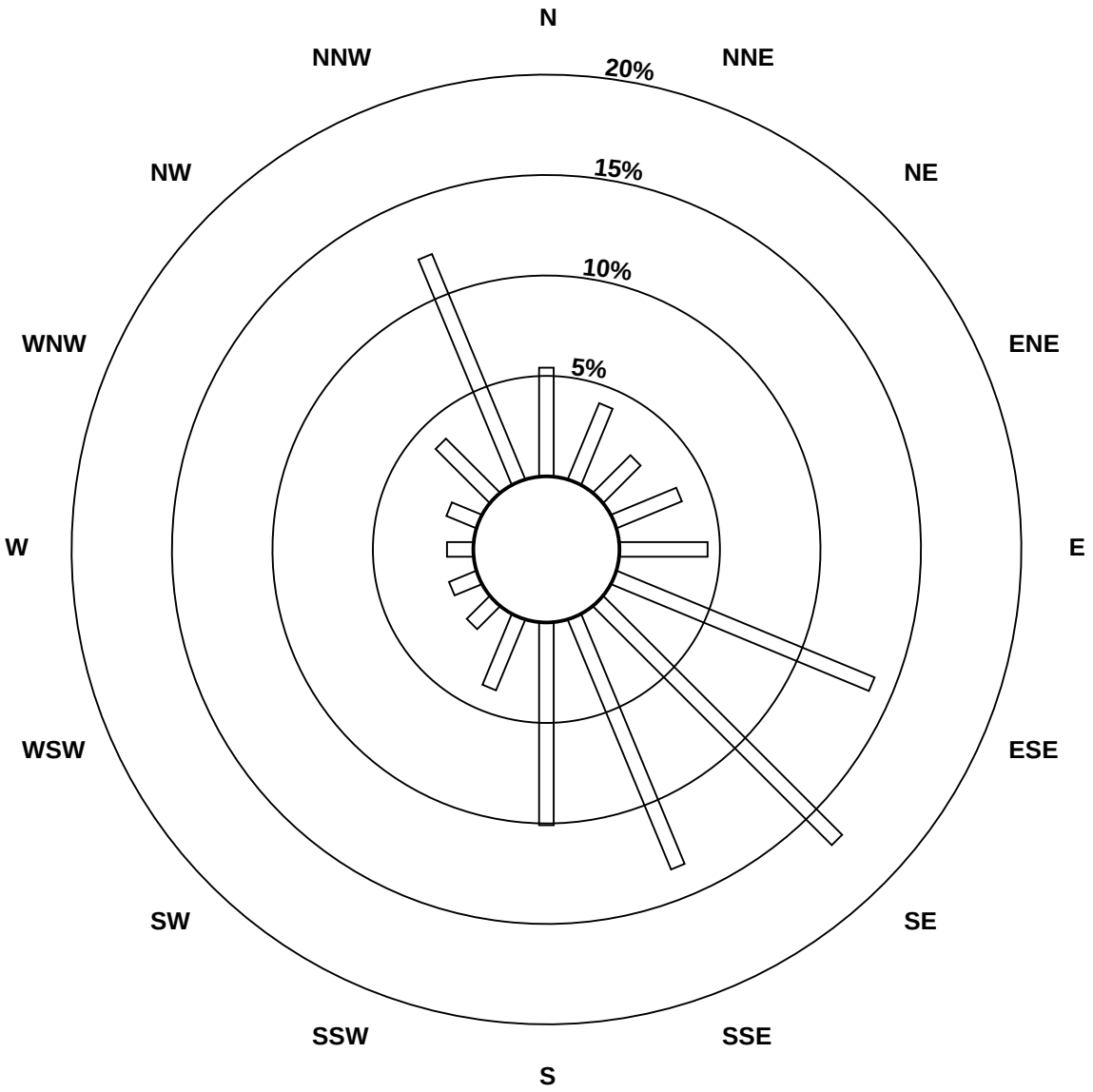
Total Number of Hours: 720

Wood Buffalo Environmental Association

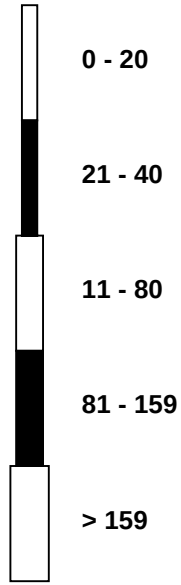
Wind Rose Apr 2016

Nitric Oxide (NO) - ppb

Wapasu (AMS 17)



Classes (ppb)



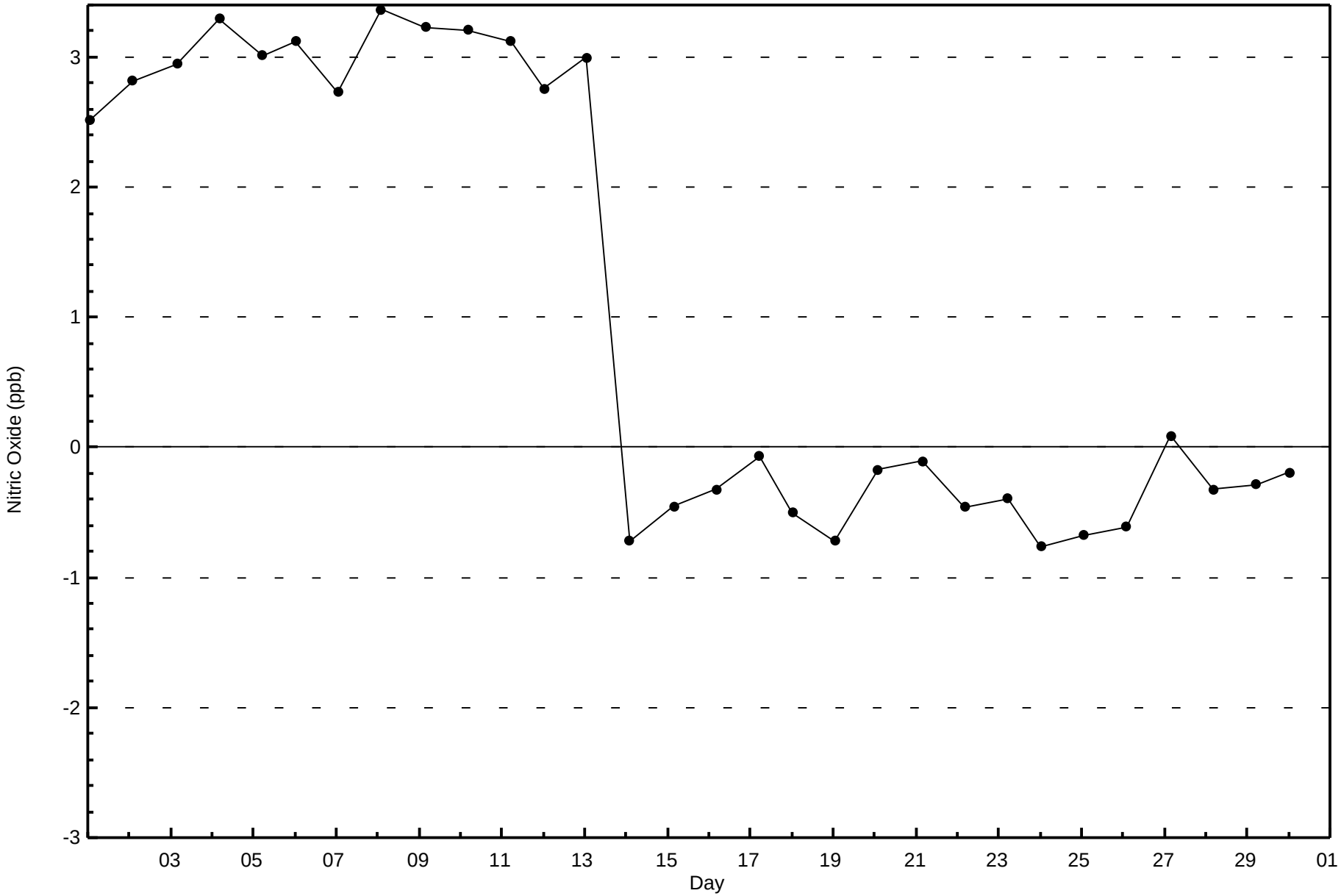
Total Number of Valid Hours: 684

Wood Buffalo Environmental Association

Zero Responses

Nitric Oxide (NO) - ppb

Wapasu - April 2016

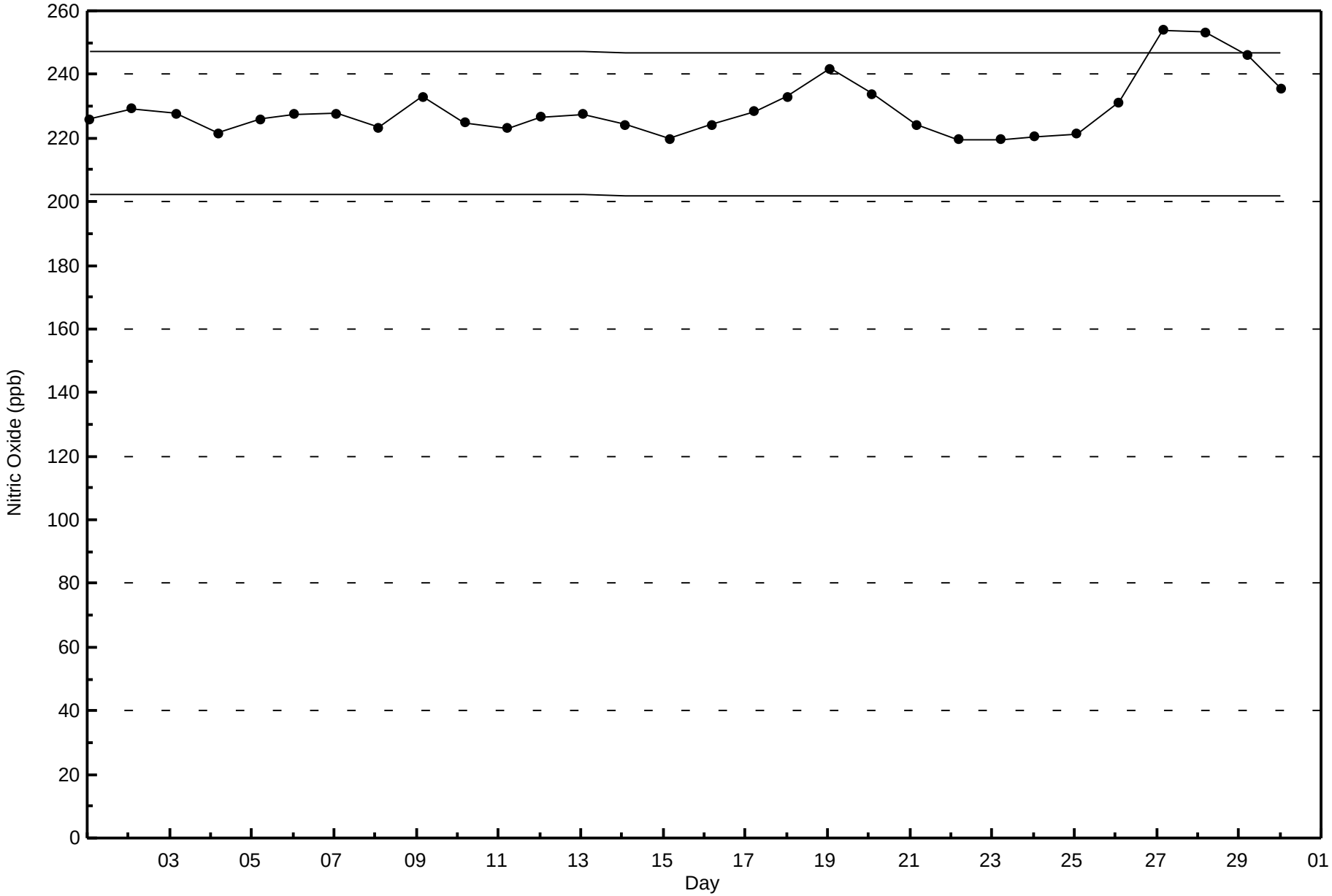


Wood Buffalo Environmental Association

Span Responses

Nitric Oxide (NO) - ppb

Wapasu - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO_2) - ppb

Wapasu - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 16 ppb on Apr 12 05:00 Maximum Daily Average: 2.6 ppb on Apr 6

Minimum Value: 0 ppb on Apr 1 21:00
Maximum Diurnal Average: 2.2 ppb at hour 6
Monthly Average: 1.2 ppb

Minimum Daily Average: 0.2 ppb on Apr 8
Minimum Diurnal Average: 0.8 ppb at hour 17
Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 1 $Q_3 = 2$ $P_{90} = 3$ $P_{99} = 7$

Hours in Service:	720
Hours of Data:	685
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-Apr	12	Z	6	7	8	4	1	0	1	2	1	1	1	2	1	1	1	1	0	0	0	0	0	0	2.3	12
2-Apr	0	0	Z	0	0	0	0	0	0	0	0	1	2	0	1	0	0	0	0	0	0	0	0	0	0.3	2
3-Apr	0	0	5	Z	0	1	1	1	3	3	1	1	1	1	1	2	1	1	2	1	1	0	1	1	1.2	5
4-Apr	0	1	1	1	Z	2	1	2	2	2	1	1	1	1	1	1	1	2	4	1	1	2	1	1	1.2	4
5-Apr	1	1	1	1	0	Z	0	0	0	1	0	0	1	0	1	0	1	1	1	1	1	2	2	2	0.7	2
6-Apr	Z	3	4	3	5	8	6	3	4	2	2	2	3	3	3	3	2	2	1	1	1	1	1	1	2.6	8
7-Apr	2	Z	5	3	2	1	0	1	1	3	3	4	3	2	1	1	0	0	0	0	1	1	1	1	1.5	5
8-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
9-Apr	0	0	0	Z	2	3	2	1	1	2	1	1	1	1	2	2	2	2	2	2	4	5	4	2	1.8	5
10-Apr	2	3	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	0	0	0.9	3
11-Apr	0	0	0	0	1	Z	2	1	1	1	1	1	1	1	2	2	2	2	8	5	2	1	2	2	1.8	8
12-Apr	Z	2	2	6	16	7	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	3	1	1	2.1	16
13-Apr	0	Z	1	0	2	1	1	0	1	C	C	C	C	C	1	1	0	0	0	0	0	0	0	0	0.4	2
14-Apr	0	3	Z	1	2	2	3	2	2	1	2	1	1	1	1	1	1	2	1	1	2	1	1	1	1.5	3
15-Apr	1	1	1	Z	1	0	1	4	3	4	5	3	1	1	1	1	1	1	0	0	0	1	0	0	1.3	5
16-Apr	0	1	1	1	Z	1	2	2	1	1	2	2	2	2	2	1	0	0	1	1	1	1	3	8	1.6	8
17-Apr	4	3	1	2	0	Z	1	1	1	2	2	3	5	3	1	1	2	1	1	2	2	2	2	1	1.8	5
18-Apr	Z	0	1	5	5	7	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1.9	7
19-Apr	2	Z	2	2	2	8	5	4	1	2	2	0	0	0	0	1	1	1	2	1	0	1	2	1	1.7	8
20-Apr	0	1	Z	1	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
21-Apr	0	0	0	Z	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0.3	1
22-Apr	0	1	4	1	Z	1	1	1	1	1	0	0	0	0	1	1	1	2	1	0	0	3	0	0	0.9	4
23-Apr	0	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
24-Apr	Z	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	3	0.4	3
25-Apr	3	Z	3	3	1	2	2	1	1	1	1	1	1	1	1	1	2	3	2	3	2	1	1	1	1.5	3
26-Apr	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	3	1	1	1	1	3	1	1	1	1.1	3
27-Apr	1	2	1	Z	1	1	1	5	4	4	4	3	2	2	2	1	1	1	1	0	0	1	1	1	1.6	5
28-Apr	1	0	1	0	Z	2	2	4	4	2	1	1	1	1	0	1	1	1	1	0	0	0	0	0	1.0	4
29-Apr	0	0	1	1	1	Z	1	1	1	1	0	0	1	1	1	0	0	1	4	3	1	2	1	1	0.9	4
30-Apr	Z	1	2	2	2	3	1	1	1	1	1	2	2	4	3	1	1	2	2	1	1	1	2	1	1.7	4
	1.3	1.0	1.7	1.6	2.1	2.2	1.3	1.4	1.4	1.3	1.2	1.1	1.2	1.1	1.0	0.9	0.8	1.0	1.3	1.0	0.9	1.0	1.0	1.0	Diurnal Average	
	12	3	6	7	16	8	6	5	4	4	5	4	5	4	3	3	2	3	8	5	4	5	4	8	Diurnal Maximum	

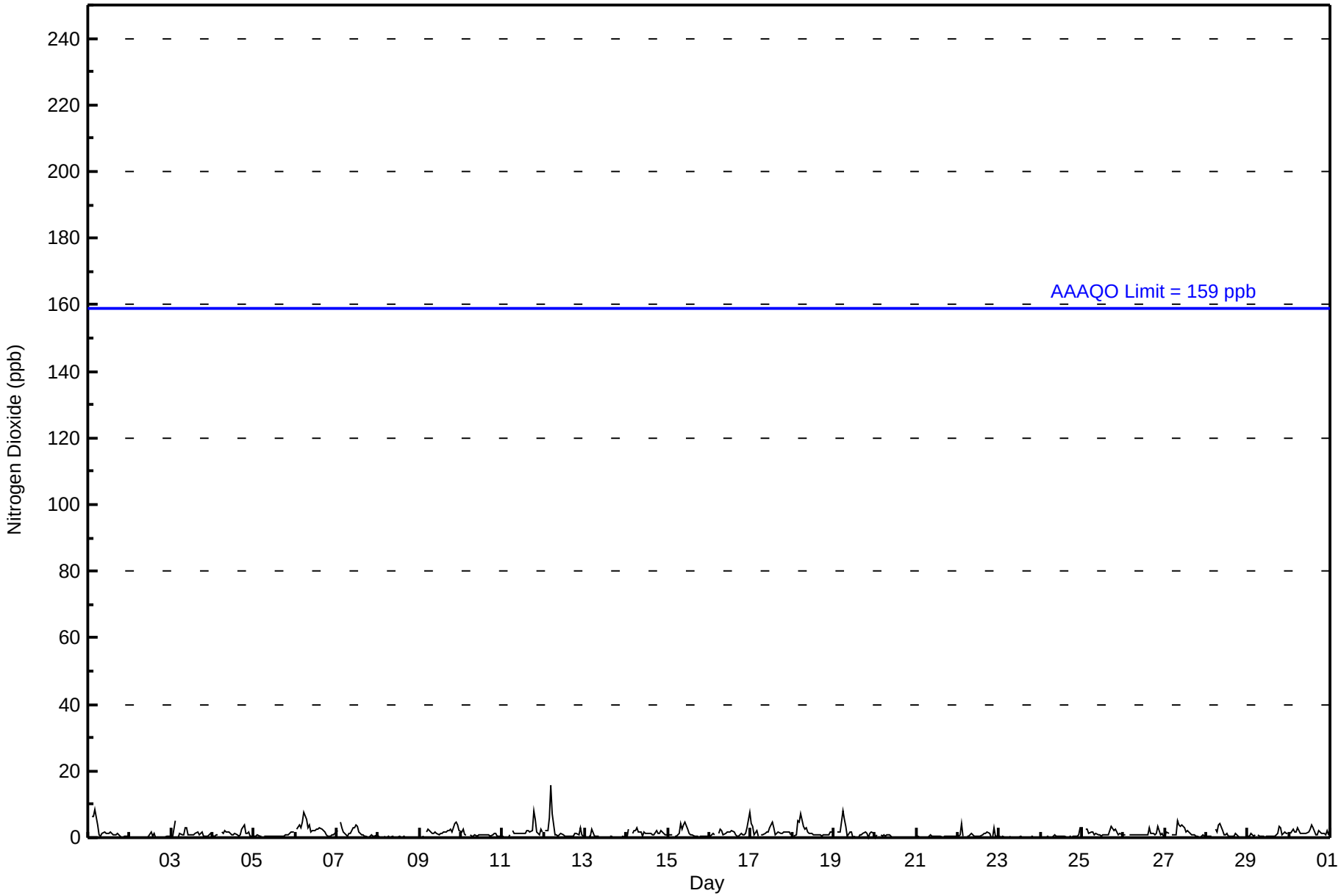
Z - zerospan C - Calibration
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Dioxide (NO_2) - ppb

Wapasu - April 2016



Nitrogen Dioxide (NO_2) - ppb
Wapasu - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	685	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: 685

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Dioxide (NO_2) - ppb

Wapasu - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	37	28	18	24	30	95	115	92	69	26	11	10	9	11	26	83	684
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	37	28	18	24	30	95	115	92	69	26	11	10	9	11	26	83	684

Total Number of Valid Hours: 684

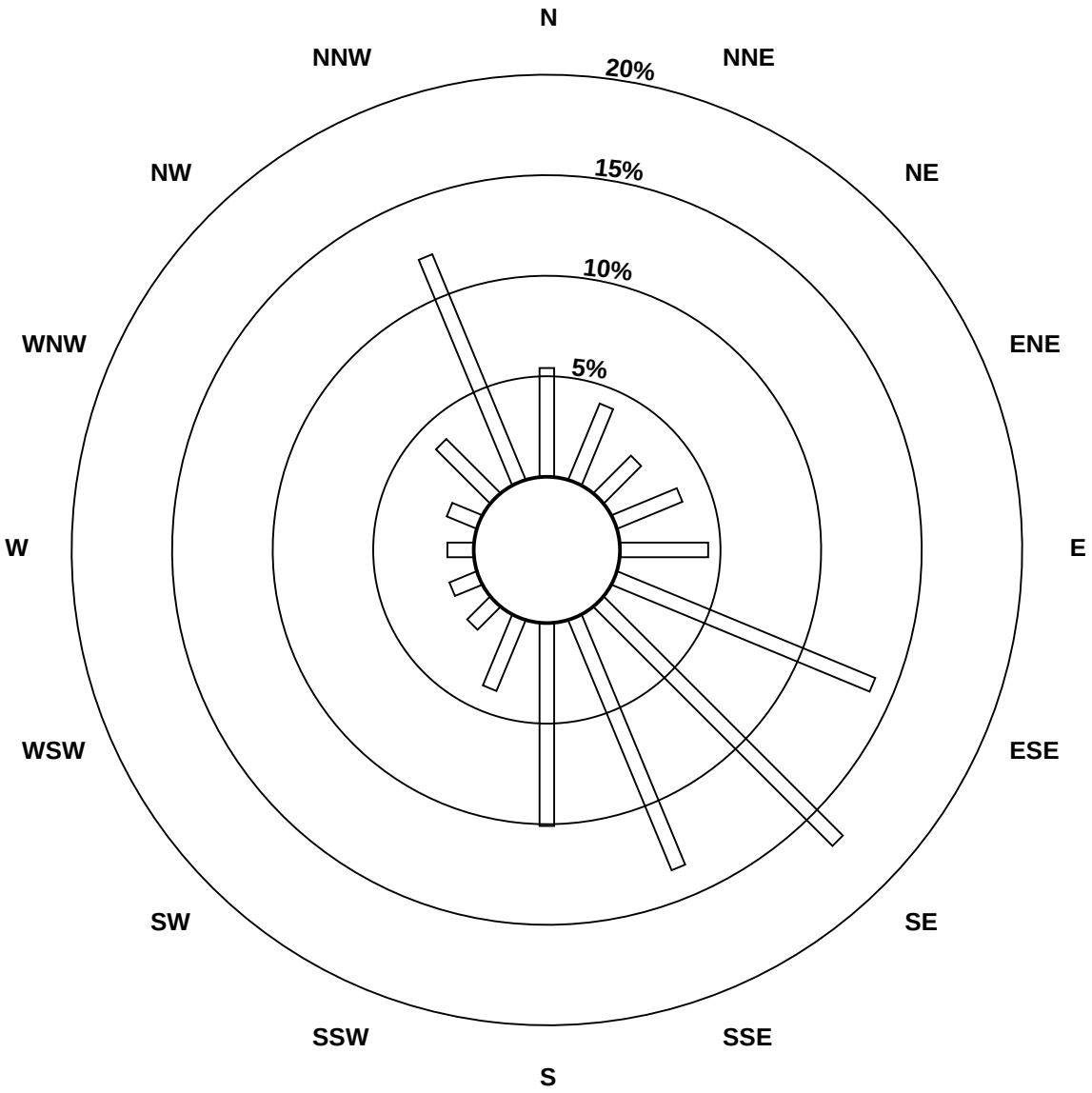
Total Number of Hours: 720

Wood Buffalo Environmental Association

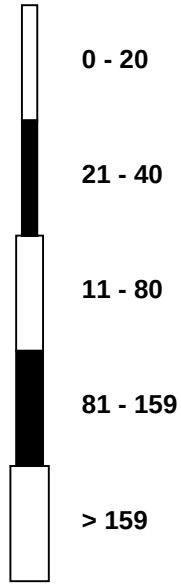
Wind Rose Apr 2016

Nitrogen Dioxide (NO_2) - ppb

Wapasu (AMS 17)



Classes (ppb)



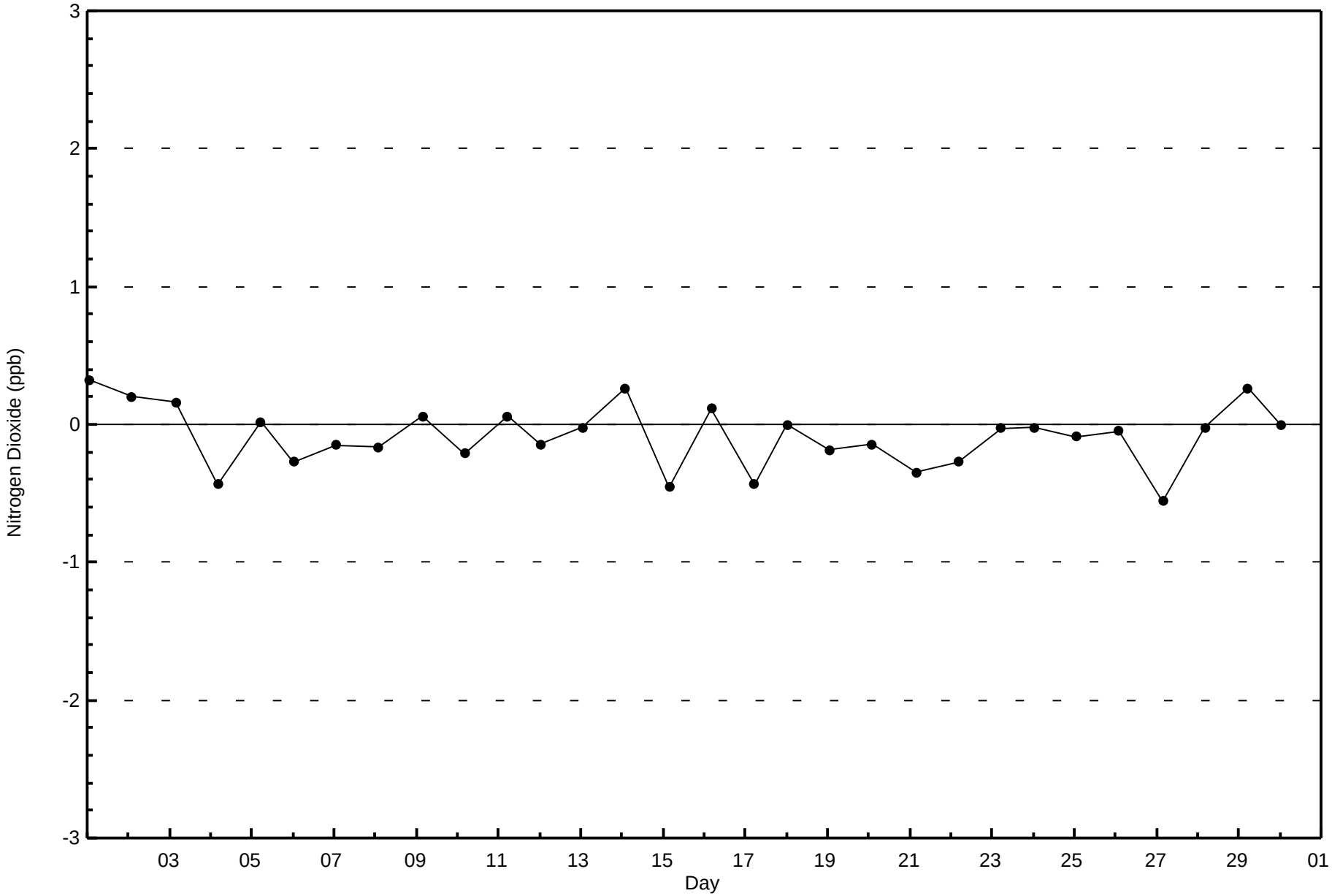
Total Number of Valid Hours: 684

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Dioxide (NO_2) - ppb

Wapasu - April 2016

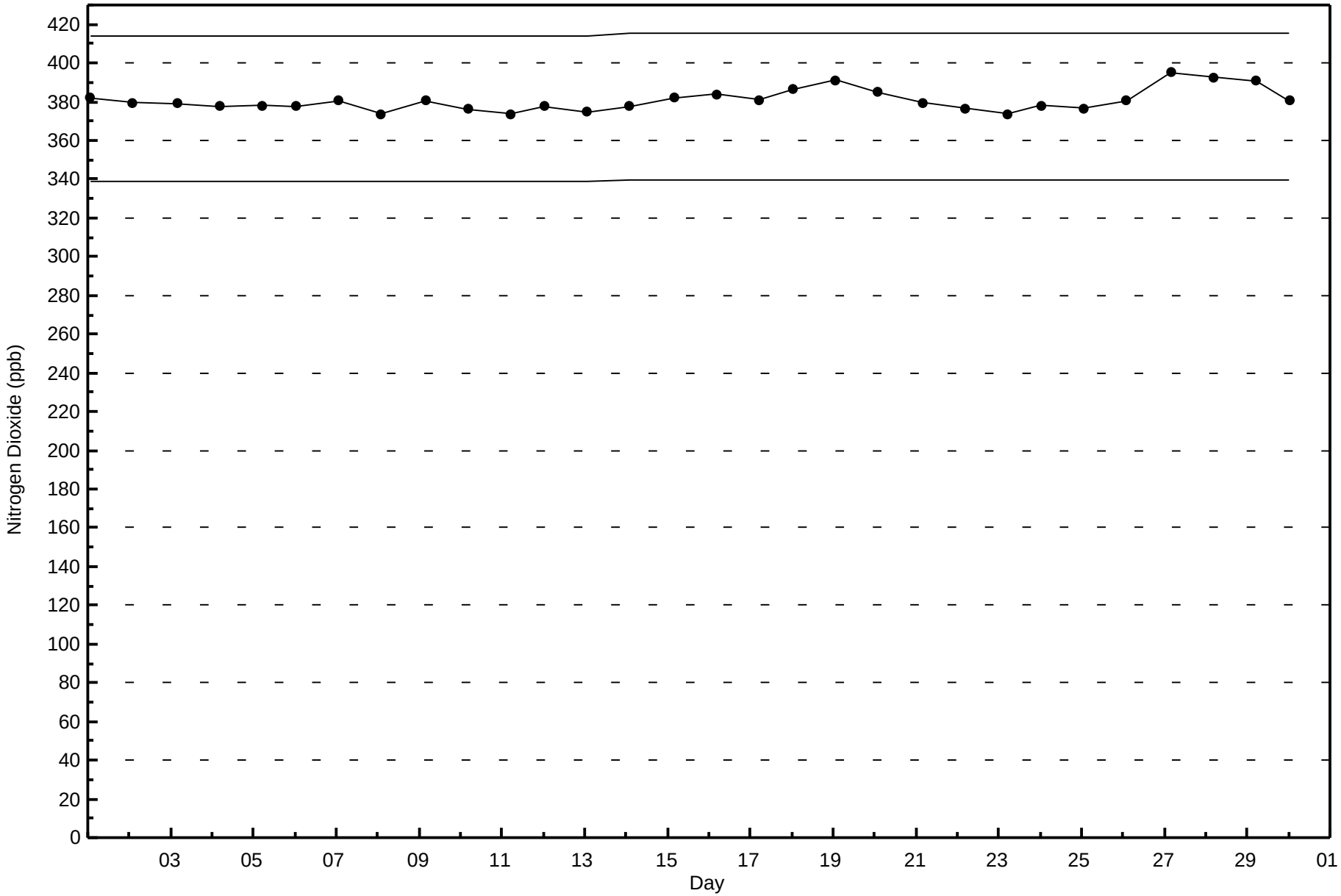


Wood Buffalo Environmental Association

Span Responses

Nitrogen Dioxide (NO_2) - ppb

Wapasu - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_X) - ppb

Wapasu - April 2016

Maximum Value: 16 ppb on Apr 12 05:00

Maximum Daily Average: 3.0 ppb on Apr 6

Minimum Value: 0 ppb on Apr 8 17:00

Minimum Daily Average: 0.2 ppb on Apr 8

Maximum Diurnal Average: 2.5 ppb at hour 6

Minimum Diurnal Average: 1.1 ppb at hour 17

Monthly Average: 1.5 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 1$ Median = 1 $Q_3 = 2$ $P_{90} = 3$ $P_{99} = 7$

Hours in Service:	720
Hours of Data:	685
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-Apr	13	Z	7	7	9	4	1	1	2	2	2	2	2	3	1	1	1	2	1	1	0	1	1	1	2.8	13
2-Apr	0	0	Z	1	0	0	0	1	1	0	0	1	3	1	2	0	0	0	0	0	0	1	1	0	0.6	3
3-Apr	0	0	5	Z	0	1	1	1	3	4	1	1	1	1	2	2	1	1	2	1	1	0	1	1	1.4	5
4-Apr	0	1	1	1	Z	2	1	2	2	2	1	1	1	1	1	1	1	2	4	1	1	1	1	1	1.3	4
5-Apr	1	0	1	1	0	Z	1	0	0	0	0	1	1	0	0	0	1	1	1	1	1	2	2	1	0.7	2
6-Apr	Z	3	4	3	5	8	6	3	4	2	3	3	3	4	3	3	2	2	1	1	1	1	1	2	3.0	8
7-Apr	2	Z	5	3	2	1	1	2	1	4	4	6	5	2	1	1	0	0	0	0	1	0	0	1	1.8	6
8-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
9-Apr	0	0	0	Z	2	3	2	1	1	2	1	1	1	1	2	2	2	2	2	2	4	5	4	2	1.9	5
10-Apr	2	3	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	0	0	0.9	3
11-Apr	0	0	0	0	1	Z	2	1	1	1	2	2	2	2	3	3	2	3	9	6	2	1	3	2	2.1	9
12-Apr	Z	2	2	6	16	8	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	3	1	2.3	16
13-Apr	1	Z	0	1	3	1	1	1	1	C	C	C	C	C	1	1	0	0	0	0	0	1	1	0	0.7	3
14-Apr	1	3	Z	2	3	3	3	2	2	1	3	2	2	2	2	1	1	3	2	1	3	1	1	1	1.9	3
15-Apr	1	1	1	Z	0	1	2	6	4	6	8	4	2	1	1	1	1	1	0	0	0	0	0	0	1.8	8
16-Apr	1	1	1	1	Z	1	3	2	1	1	2	2	2	3	2	1	0	0	1	1	1	1	3	7	1.8	7
17-Apr	5	4	1	2	0	Z	1	1	2	2	3	4	6	4	1	1	2	1	2	2	2	2	2	1	2.1	6
18-Apr	Z	0	1	6	5	7	4	4	4	3	2	1	1	1	1	1	1	1	1	2	1	2	2	2	2.3	7
19-Apr	2	Z	2	2	2	9	6	4	1	2	3	1	1	0	0	1	1	1	2	1	0	1	2	2	2.0	9
20-Apr	0	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
21-Apr	1	1	0	Z	0	0	1	1	1	1	1	1	1	1	0	0	1	1	0	1	0	1	1	0	0.6	1
22-Apr	1	1	5	1	Z	1	1	1	2	1	0	1	0	1	1	1	2	2	1	0	0	3	0	0	1.1	5
23-Apr	0	1	0	1	0	Z	1	0	0	0	1	0	0	0	1	0	1	1	0	0	1	1	1	1	0.4	1
24-Apr	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	0.9	3
25-Apr	3	Z	3	3	2	2	2	1	2	1	1	1	1	1	1	1	3	4	3	3	2	1	2	1	1.9	4
26-Apr	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	3	2	2	1	1	3	1	2	1	1.4	3
27-Apr	1	2	1	Z	1	1	1	6	5	5	6	4	3	3	2	1	1	1	1	1	0	0	1	1	2.1	6
28-Apr	0	0	0	0	Z	3	2	4	6	2	1	1	1	1	0	0	1	1	1	0	0	0	0	0	1.1	6
29-Apr	0	0	1	1	1	Z	1	1	1	1	0	0	1	1	1	0	0	1	4	3	1	2	1	1	1.0	4
30-Apr	Z	1	2	2	2	3	1	1	1	1	1	2	3	4	3	1	1	2	2	2	1	1	2	1	1.9	4
	1.5	1.1	1.9	1.8	2.3	2.5	1.6	1.8	1.8	1.7	1.7	1.6	1.6	1.4	1.3	1.1	1.1	1.3	1.5	1.2	1.1	1.1	1.2	1.2	Diurnal Average	
	13	4	7	7	16	9	6	6	6	6	8	6	6	4	3	3	3	4	9	6	4	5	4	7	Diurnal Maximum	

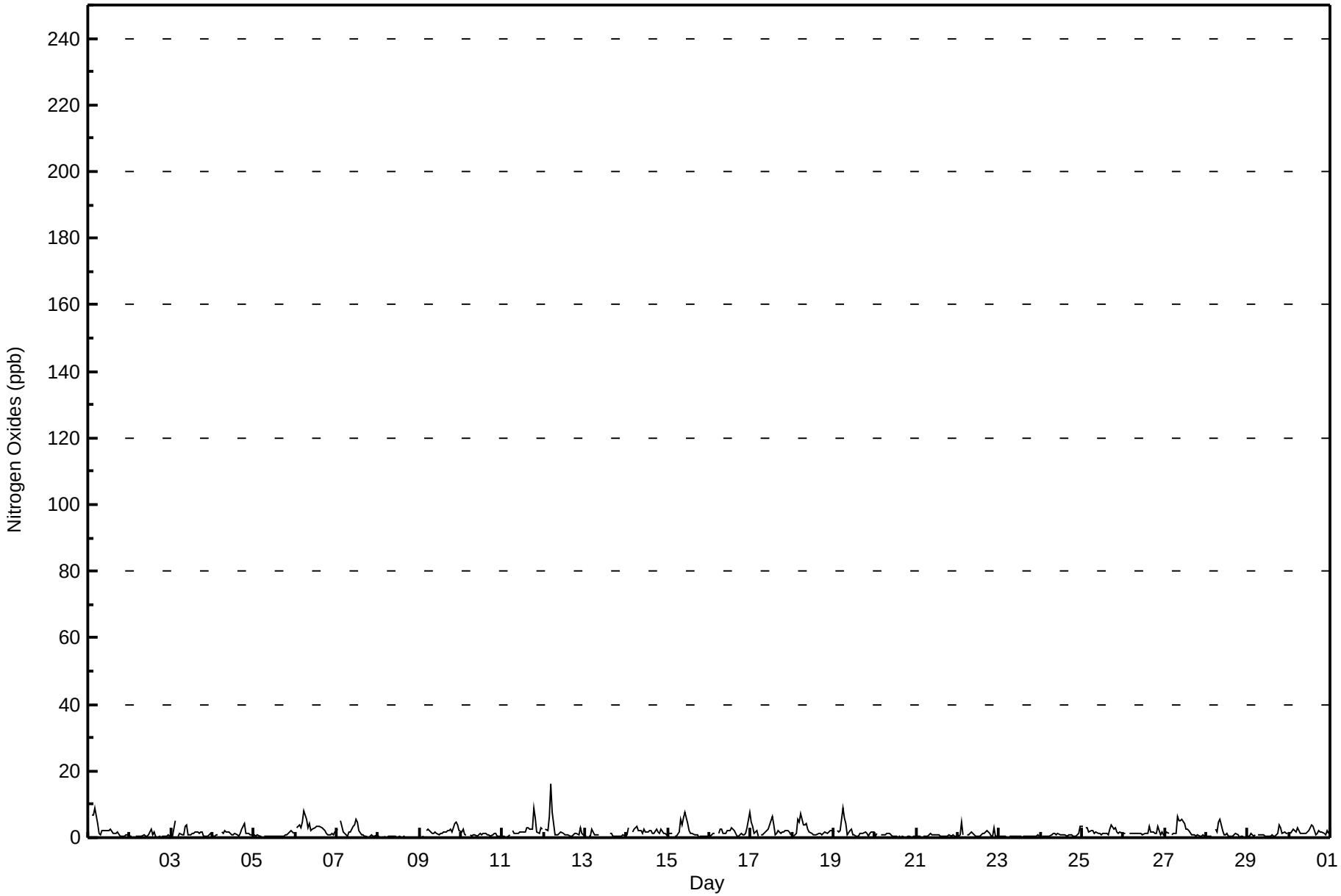
Z - zerospan C - Calibration

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Oxides (NO_X) - ppb

Wapasu - April 2016



Nitrogen Oxides (NO_X) - ppb

Wapasu - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	685	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: 685

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Oxides (NO_X) - ppb

Wapasu - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	37	28	18	24	30	95	115	92	69	26	11	10	9	11	26	83	684
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	37	28	18	24	30	95	115	92	69	26	11	10	9	11	26	83	684

Total Number of Valid Hours: 684

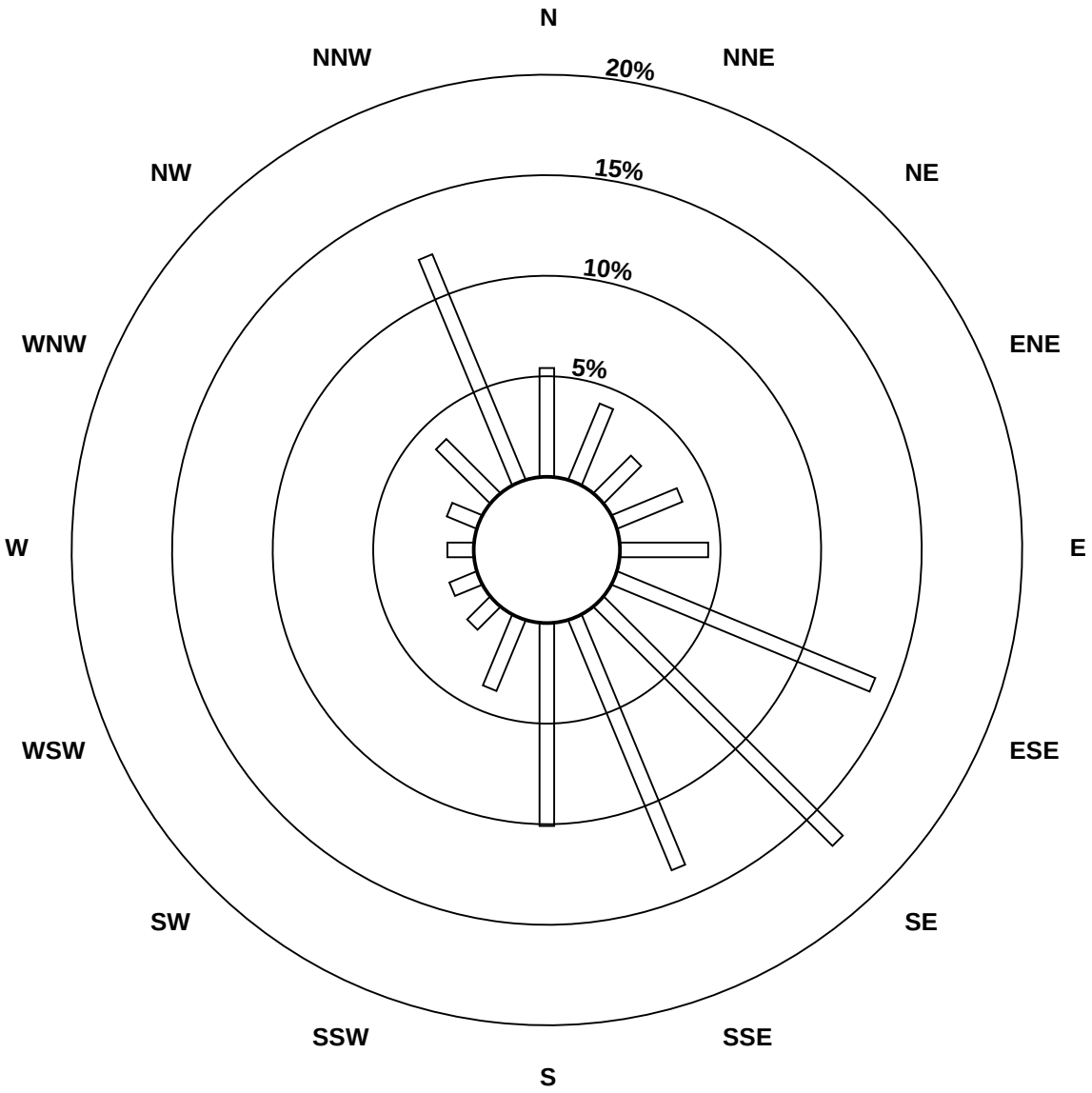
Total Number of Hours: 720

Wood Buffalo Environmental Association

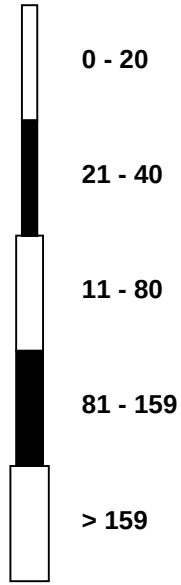
Wind Rose Apr 2016

Nitrogen Oxides (NO_X) - ppb

Wapasu (AMS 17)



Classes (ppb)



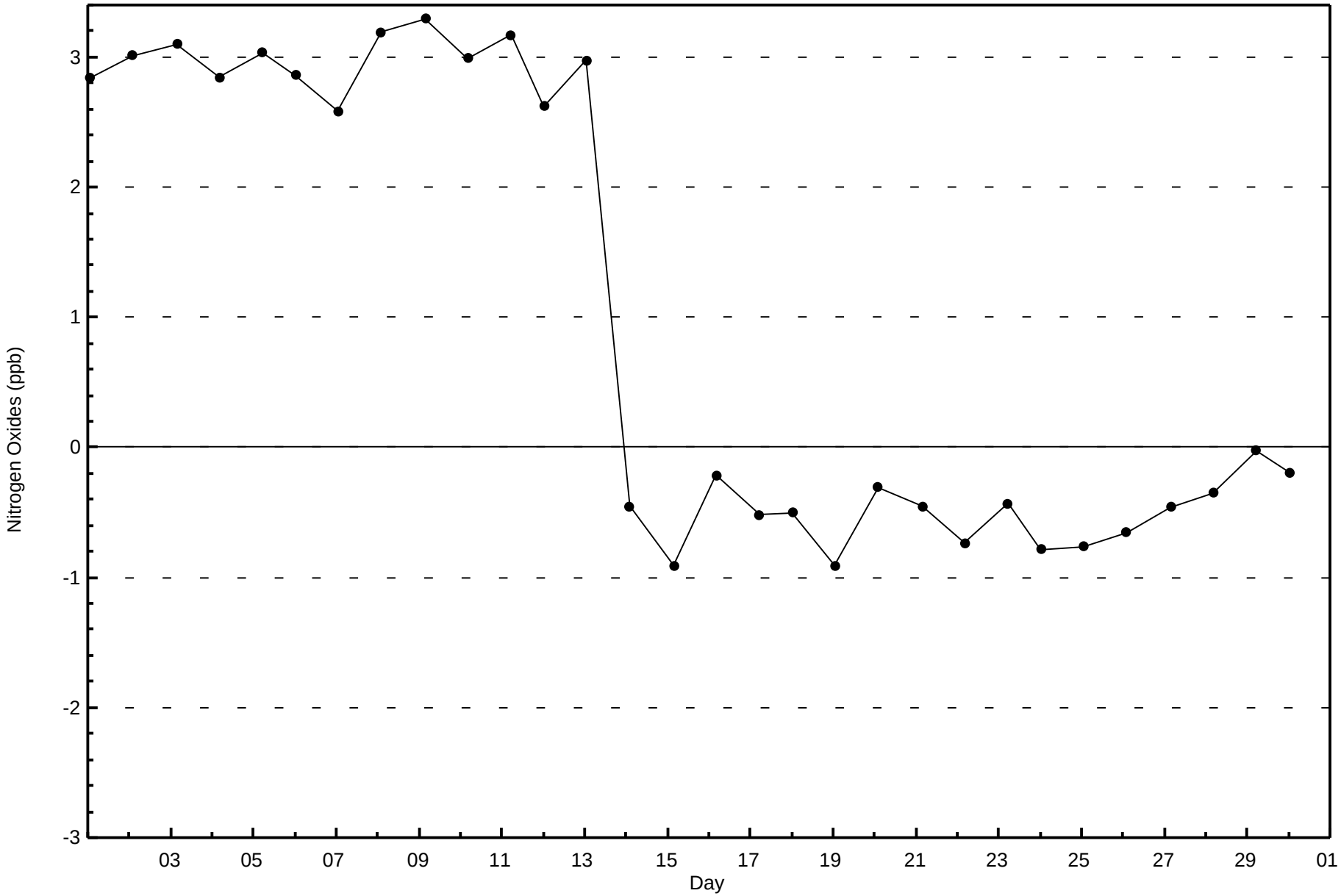
Total Number of Valid Hours: 684

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Oxides (NO_X) - ppb

Wapasu - April 2016

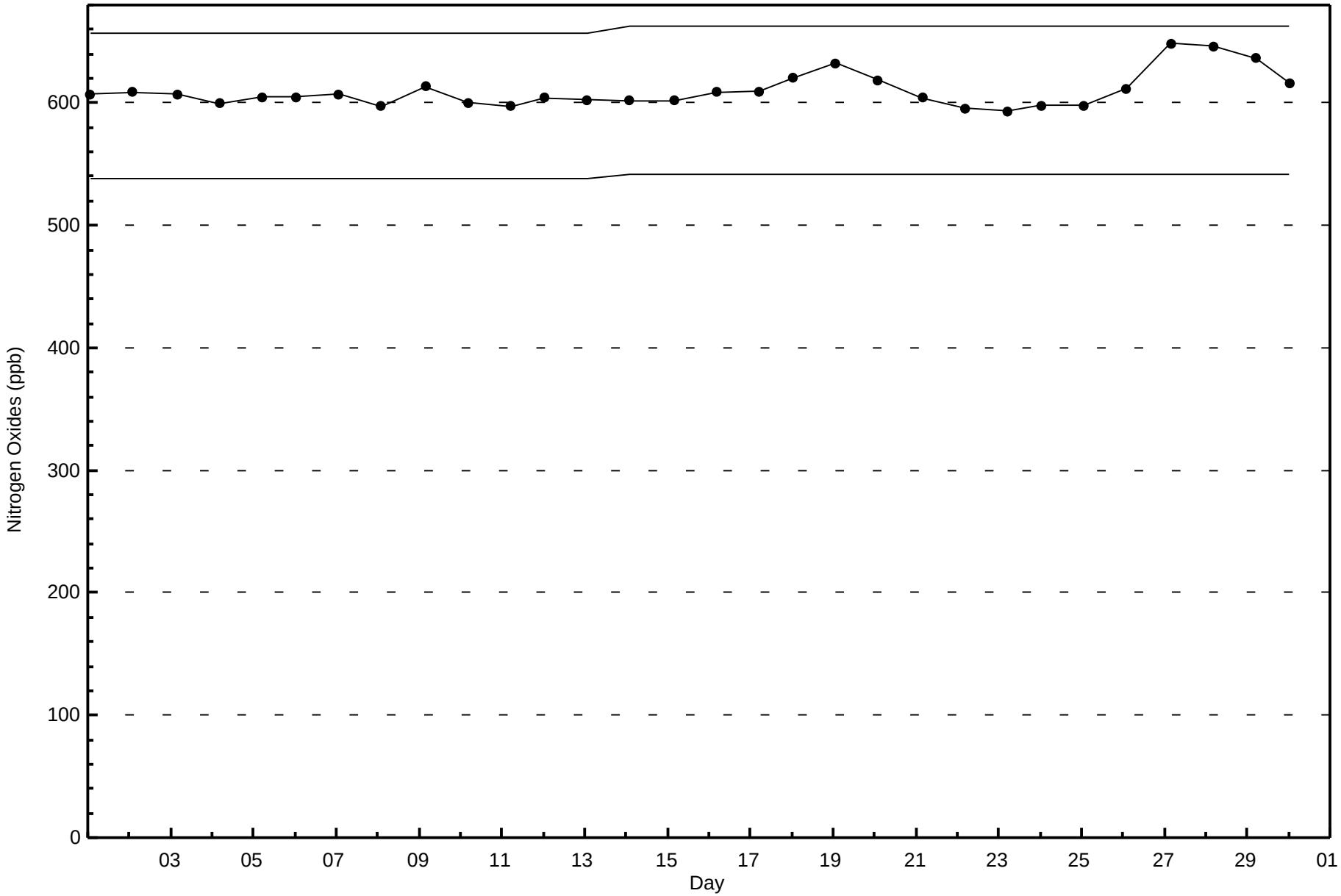


Wood Buffalo Environmental Association

Span Responses

Nitrogen Oxides (NO_X) - ppb

Wapasu - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

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

Wapasu - April 2016

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

Maximum Value: 19.7 $\mu g/m^3$ on Apr 19 07:00

Maximum Daily Average: 6.9 $\mu g/m^3$ on Apr 19

Minimum Value: 0.4 $\mu g/m^3$ on Apr 14 00:00

Minimum Daily Average: 1.9 $\mu g/m^3$ on Apr 14

Maximum Diurnal Average: 4.1 $\mu g/m^3$ at hour 6

Minimum Diurnal Average: 2.7 $\mu g/m^3$ at hour 15

Monthly Average: 3.29 $\mu g/m^3$

Percentiles: P_1 = 0.9 P_{10} = 1.7 Q_1 = 2.1 Median = 2.9 Q_3 = 3.8 P_{90} = 5.4 P_{99} = 10.2

Hours in Service:	720
Hours of Data:	719
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-Apr	3.0	4.2	3.7	3.0	2.9	2.7	2.2	1.8	2.1	2.4	2.1	2.2	2.1	2.2	1.8	1.9	2.0	2.8	1.8	1.8	2.0	2.1	2.1	1.7	2.4	4.2
2-Apr	2.2	2.8	3.1	2.9	2.9	2.9	2.7	2.2	1.9	1.9	1.8	1.7	1.5	1.5	1.7	2.0	2.1	2.6	3.2	3.5	3.6	3.6	3.4	2.9	2.5	3.6
3-Apr	2.2	2.1	2.5	2.3	2.3	2.3	1.8	1.6	2.0	2.6	2.4	2.3	2.3	2.3	2.3	2.4	2.3	2.4	2.3	2.4	1.9	1.7	1.9	2.0	2.2	2.6
4-Apr	1.8	2.3	2.9	3.0	3.1	3.1	3.0	2.5	2.7	2.9	1.7	1.4	1.3	1.3	1.1	1.2	1.3	2.6	4.5	2.9	3.1	3.7	3.1	3.0	2.5	4.5
5-Apr	2.5	2.4	2.9	2.8	2.7	2.8	2.3	2.0	1.9	1.8	1.8	1.8	2.0	1.8	1.9	1.7	2.1	2.1	2.3	2.7	3.2	3.3	2.9	2.3	2.3	3.3
6-Apr	1.0	0.6	1.0	2.7	1.3	1.1	1.4	1.5	4.5	4.7	3.8	3.2	3.0	2.7	2.7	2.7	2.8	2.5	2.6	2.7	2.7	2.6	2.6	2.5	2.5	4.7
7-Apr	2.3	2.8	2.6	2.3	1.9	1.8	1.8	2.0	2.2	2.1	2.2	2.1	2.0	2.1	2.1	2.1	2.1	1.7	1.9	2.3	2.5	2.2	2.1	2.1	2.1	2.8
8-Apr	2.9	3.4	3.4	3.2	3.1	3.0	2.8	2.4	2.0	1.9	1.7	1.6	1.7	1.6	1.6	1.6	1.7	1.7	1.6	1.8	1.8	2.0	2.1	2.3	2.2	3.4
9-Apr	3.0	3.2	3.1	3.1	3.8	4.2	3.2	3.0	3.0	3.2	2.3	2.1	2.1	2.5	2.9	3.2	3.4	3.5	4.0	4.0	4.2	3.6	3.4	3.4	3.2	4.2
10-Apr	3.6	4.8	3.9	3.7	4.4	4.3	3.9	3.3	3.0	3.0	2.8	2.4	2.2	2.0	1.9	1.7	1.5	1.4	1.8	2.8	2.8	2.8	2.5	2.3	2.9	4.8
11-Apr	3.1	3.4	3.2	3.1	3.0	3.4	3.6	3.9	3.8	4.5	4.6	3.2	2.6	2.7	2.6	2.6	3.2	3.2	9.2	7.0	4.0	3.3	2.7	2.6	3.7	9.2
12-Apr	3.2	3.7	4.0	5.2	7.7	7.3	4.7	3.9	3.7	3.2	3.3	4.1	3.5	2.7	2.6	2.5	2.5	2.7	3.2	3.6	4.1	3.8	3.7	3.3	3.8	7.7
13-Apr	3.0	2.7	3.0	2.9	3.7	3.7	3.3	2.8	2.8	2.6	2.0	1.8	2.0	3.1	3.7	3.0	3.1	3.2	1.9	0.9	0.7	0.7	0.7	0.4	2.4	3.7
14-Apr	0.5	0.8	3.6	3.8	3.6	3.4	3.0	2.6	1.8	C	1.2	1.0	1.1	1.2	1.3	1.1	1.3	1.9	2.6	2.4	1.8	1.7	1.6	1.6	1.9	3.8
15-Apr	1.6	1.6	1.5	1.3	1.3	1.1	2.0	5.4	3.9	6.8	13.5	4.3	3.5	3.2	2.8	2.9	2.8	3.1	3.1	3.8	3.9	3.4	3.4	3.2	3.5	13.5
16-Apr	3.7	3.9	4.0	4.1	3.5	3.3	3.1	2.9	2.5	1.9	2.0	2.2	2.3	2.7	2.5	2.4	1.5	1.4	2.1	2.6	3.3	3.4	4.3	3.4	2.9	4.3
17-Apr	3.6	3.2	2.3	2.2	2.2	2.9	3.6	3.7	4.2	4.4	4.1	4.2	6.2	6.1	3.3	3.5	3.4	2.8	5.2	4.5	3.5	3.6	3.6	3.4	3.7	6.2
18-Apr	2.8	2.7	2.9	3.1	3.2	3.7	3.4	3.0	3.0	2.5	3.6	5.4	6.8	4.6	5.4	7.5	5.6	4.0	3.8	3.0	3.6	4.2	5.8	11.9	4.4	11.9
19-Apr	11.8	8.7	6.7	6.5	7.9	12.3	19.7	9.1	1.9	3.2	2.4	3.3	5.4	6.8	5.8	5.8	6.5	10.9	6.2	5.1	1.2	2.8	8.4	7.9	6.9	19.7
20-Apr	3.2	4.2	3.4	3.9	3.7	5.0	4.4	3.5	3.6	3.3	2.8	2.5	2.2	1.9	1.5	1.6	1.8	1.8	2.2	2.5	2.7	2.6	2.7	2.4	2.9	5.0
21-Apr	2.6	3.1	2.9	2.9	2.9	2.7	2.4	2.1	2.0	1.7	1.8	1.8	1.7	1.6	1.4	1.5	1.5	1.7	2.0	2.9	3.4	2.9	2.5	2.4	2.3	3.4
22-Apr	2.4	2.5	2.8	2.8	2.8	2.7	2.4	2.2	1.9	1.8	1.8	1.8	1.8	1.7	1.7	1.7	1.7	1.8	1.8	2.4	4.0	3.7	3.0	2.5	2.3	4.0
23-Apr	3.0	3.3	3.4	3.7	3.6	3.4	3.0	2.4	2.0	1.9	1.8	2.0	1.8	1.9	1.7	1.7	1.8	2.0	2.3	2.7	3.1	3.1	2.9	3.1	2.6	3.7
24-Apr	3.6	4.3	4.3	4.5	4.5	4.6	3.9	3.6	3.3	3.6	4.1	3.4	3.1	2.8	2.8	2.4	2.6	2.7	2.9	2.8	3.1	3.2	3.3	4.1	3.5	4.6
25-Apr	5.6	7.8	8.0	7.1	6.5	6.0	5.7	5.9	5.7	5.6	5.1	4.2	3.4	2.9	3.0	3.0	3.4	3.8	3.1	3.4	4.1	4.4	3.9	3.9	4.8	8.0
26-Apr	4.7	5.7	6.4	6.8	6.6	6.0	5.1	4.1	4.0	3.7	3.5	3.2	3.4	3.4	2.8	6.2	4.6	3.0	3.1	2.9	2.8	2.3	2.2	2.3	4.1	6.8
27-Apr	2.7	3.4	3.6	4.1	4.6	5.0	5.0	6.4	4.2	3.9	4.0	2.9	1.8	1.4	1.3	1.1	1.2	1.2	1.2	1.4	1.9	2.1	2.6	3.1	2.9	6.4
28-Apr	3.0	3.3	4.4	5.1	5.1	5.1	3.8	2.5	2.0	1.9	2.1	2.5	2.7	3.0	3.1	3.4	3.7	4.4	4.5	4.7	5.1	5.5	5.9	5.5	3.8	5.9
29-Apr	7.2	8.6	8.2	7.9	7.7	7.6	7.4	6.7	5.4	4.7	4.8	4.7	4.6	4.5	4.4	4.9	6.4	5.0	8.1	11.8	5.3	4.7	4.5	4.2	6.2	11.8
30-Apr	5.1	5.9	5.7	6.1	5.9	5.7	5.4	9.1	6.6	4.8	5.1	5.2	5.6	4.0	7.9	4.1	4.0	3.9	3.8	3.1	3.6	3.5	3.4	3.5	5.0	9.1
	3.4	3.7	3.8	3.9	4.0	4.1	4.0	3.6	3.1	3.2	3.2	2.8	2.9	2.7	2.7	2.8	2.8	2.9	3.3	3.3	3.1	3.1	3.2	3.3	Diurnal Average	
	11.8	8.7	8.2	7.9	7.9	12.3	19.7	9.1	6.6	6.8	13.5	5.4	6.8	6.8	7.9	7.5	6.5	10.9	9.2	11.8	5.3	5.5	8.4	11.9	Diurnal Maximum	

C - Calibration

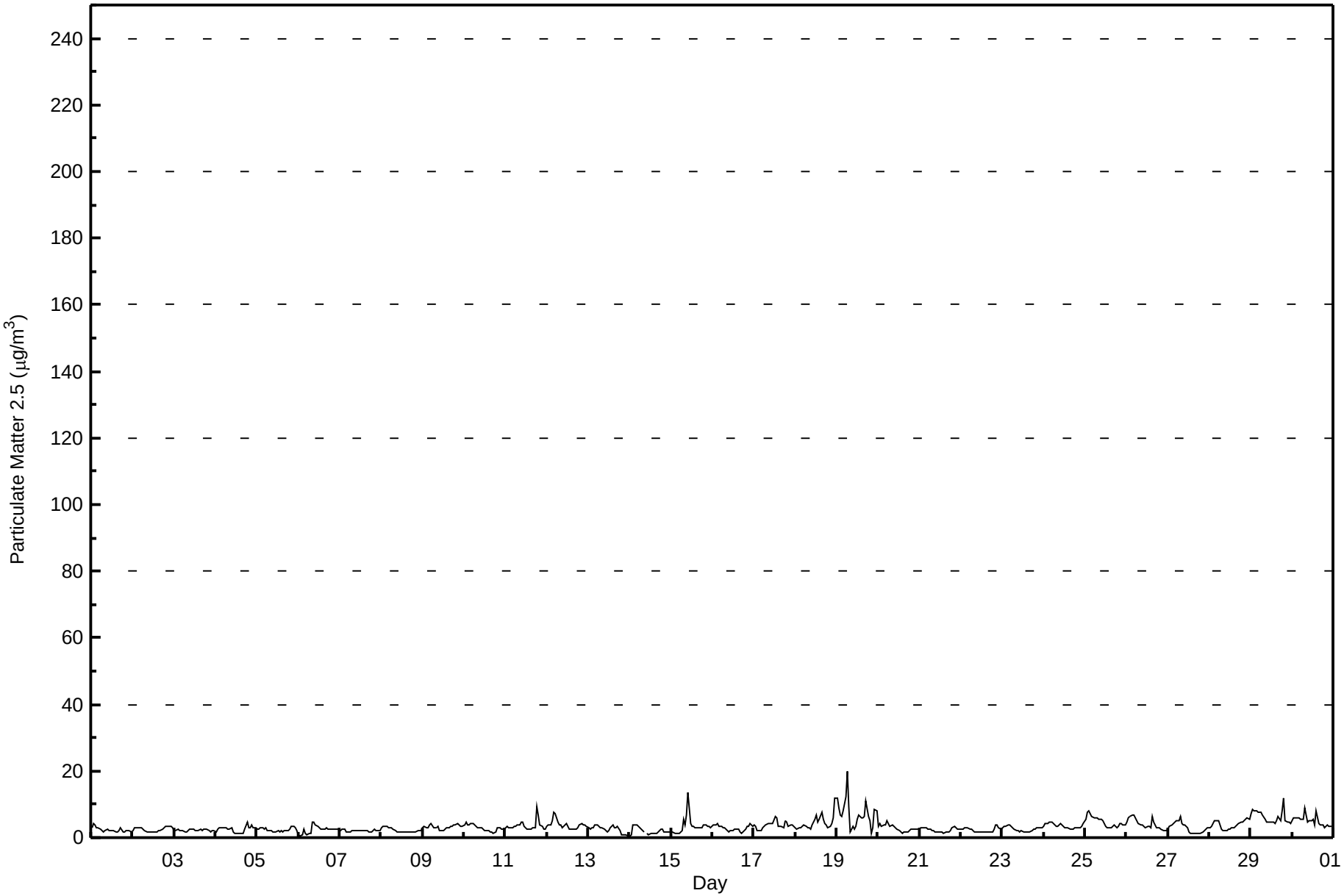
Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 $\mu g/m^3$

Wood Buffalo Environmental Association

Hourly Averages

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

Wapasu - April 2016



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

Wapasu - April 2016

Concentration Ranges ($\mu g/m^3$)	Number of Hours	%	Cumulative %
1 - 5	642	89.29	89.29
6 - 15	67	9.32	98.61
16 - 25	1	0.14	98.75
26 - 80	0	0.00	98.75
> 81.0	0	0.00	98.75

Total Number of Valid Hours: 719

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

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

Wapasu - April 2016

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	37	26	18	24	29	101	112	85	52	24	9	7	6	9	20	83	642
6 - 15	0	2	0	0	1	0	11	16	20	2	2	3	3	2	2	3	67
16 - 25	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	37	28	18	24	30	101	123	101	72	26	12	10	9	11	22	86	710

Total Number of Valid Hours: 718

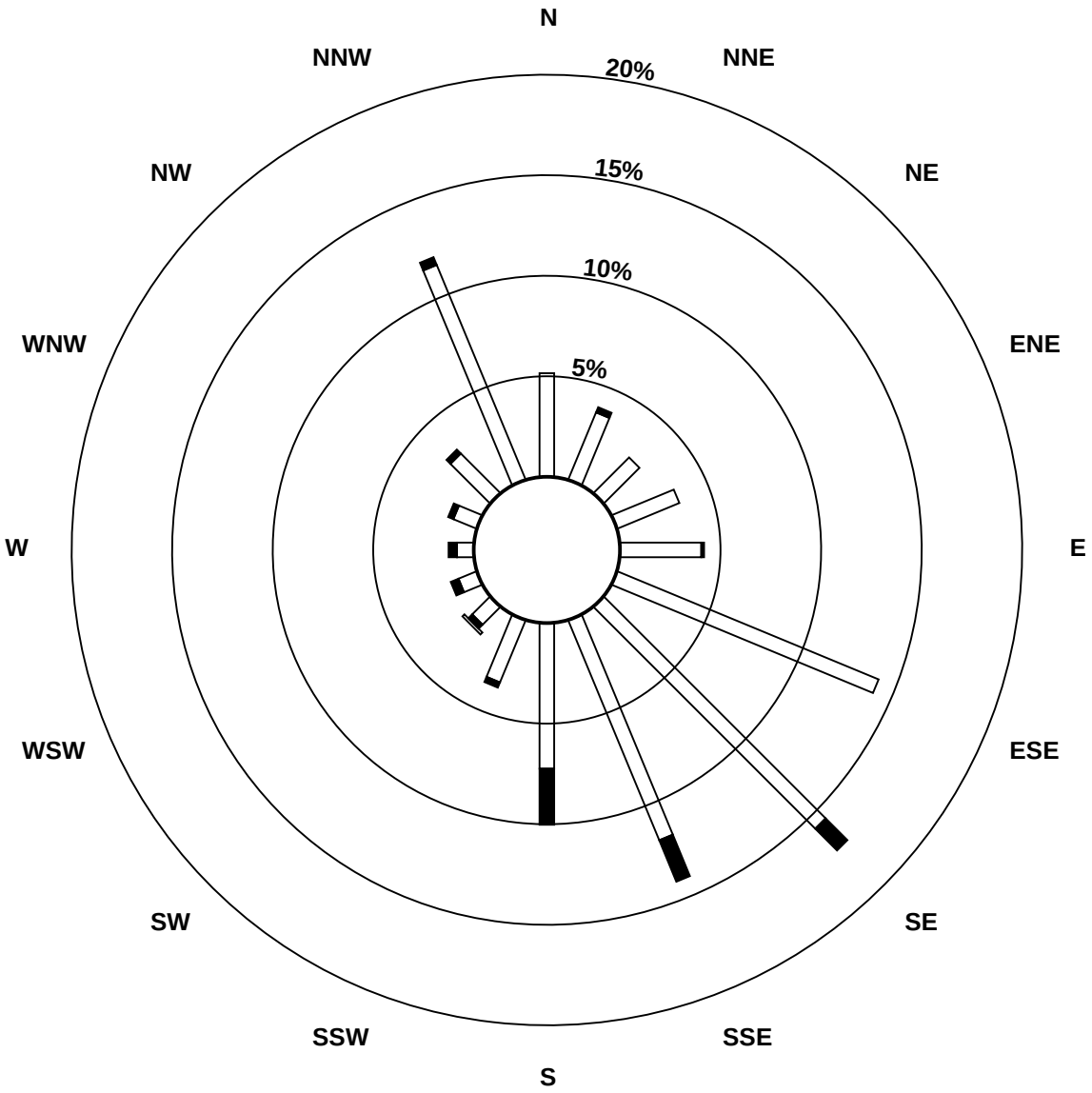
Total Number of Hours: 720

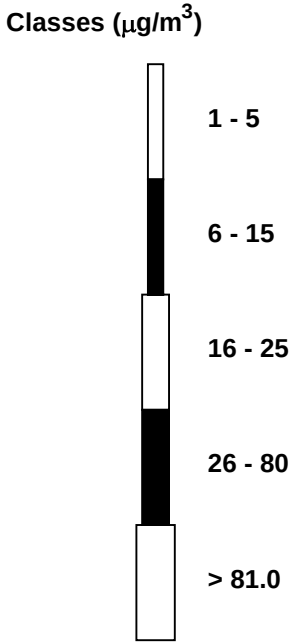
Wood Buffalo Environmental Association

Wind Rose Apr 2016

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

Wapasu (AMS 17)





Total Number of Valid Hours: 718

Maximum Value: 25.0 C on Apr 18 15:00

Maximum Daily Average: 17.3 C on Apr 18

Minimum Value: -15.4 C on Apr 15 05:00

Minimum Daily Average: -8.6 C on Apr 3

Maximum Diurnal Average: 6.7 C at hour 16

Minimum Diurnal Average: -1.4 C at hour 6

Monthly Average: 2.53 C

Percentiles: P_1 = -13.7 P_{10} = -7.5 Q_1 = -3.6 Median = 2.3 Q_3 = 7.3 P_{90} = 14.0 P_{99} = 22.2

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

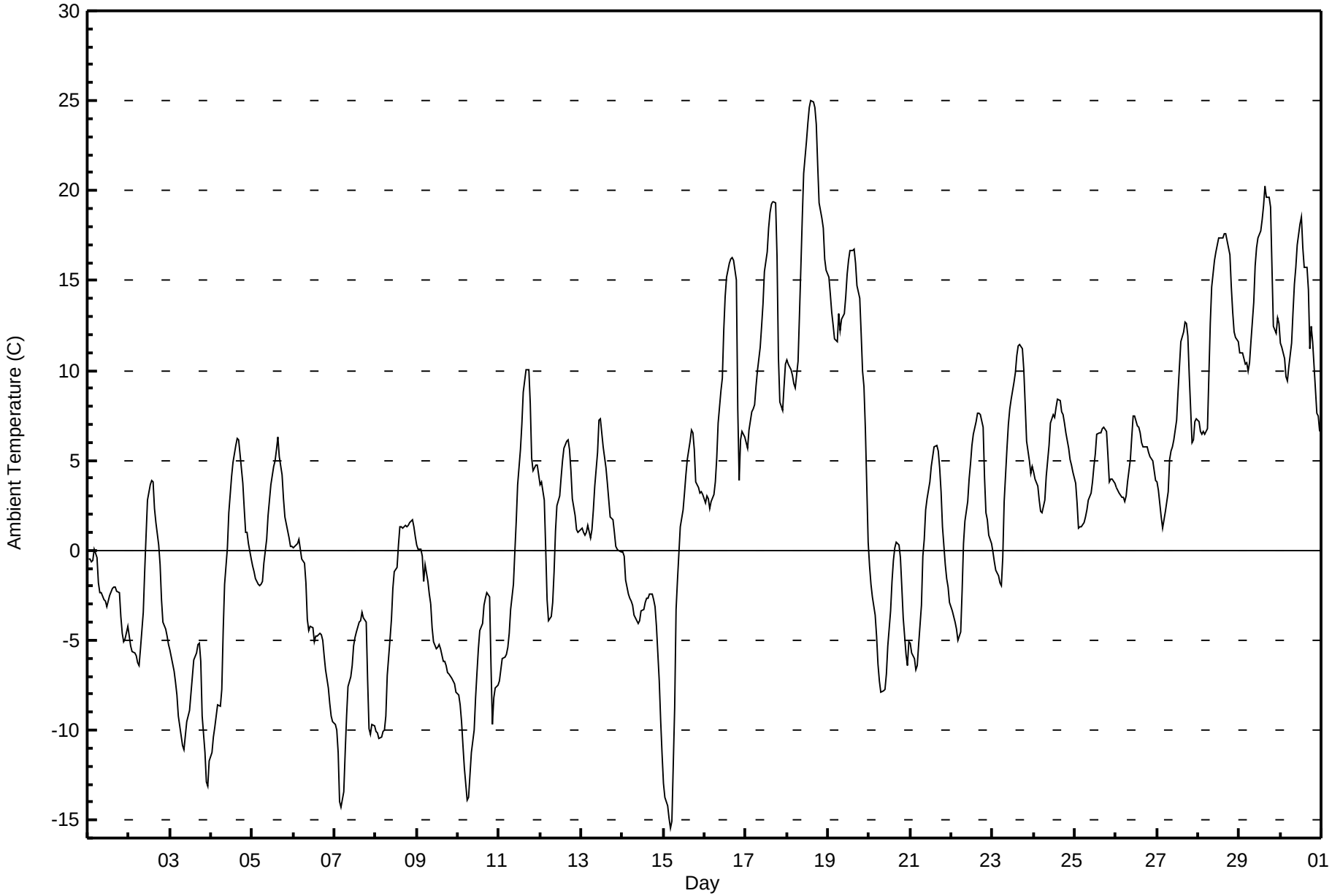
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	-0.5	-0.5	-0.7	-0.5	0.1	-0.4	-1.8	-2.3	-2.4	-2.7	-2.8	-3.1	-2.8	-2.5	-2.1	-2.0	-2.1	-2.3	-2.4	-3.7	-4.6	-5.1	-4.9	-4.2	-2.3	0.1
2-Apr	-4.8	-5.4	-5.6	-5.7	-5.8	-6.3	-6.4	-5.4	-3.5	-1.2	0.9	2.8	3.7	3.9	3.8	2.3	1.5	0.3	-0.8	-2.8	-4.0	-4.4	-4.8	-5.2	-2.2	3.9
3-Apr	-5.5	-5.9	-6.7	-7.4	-8.0	-9.2	-10.3	-10.9	-11.1	-10.3	-9.5	-8.9	-7.9	-7.0	-6.1	-5.7	-5.3	-5.2	-6.2	-9.2	-11.3	-12.9	-13.1	-11.7	-8.6	-5.2
4-Apr	-11.2	-10.4	-9.8	-9.2	-8.6	-8.7	-7.8	-4.5	-1.9	0.1	2.1	3.1	4.1	4.9	5.8	6.2	6.2	5.3	3.8	2.3	1.0	1.0	0.4	-0.5	-1.1	6.2
5-Apr	-0.8	-1.2	-1.6	-1.9	-1.9	-1.9	-1.7	-0.7	0.6	1.9	2.8	3.6	4.6	5.0	5.6	6.3	5.2	4.2	2.9	1.9	1.5	0.7	0.2	0.2	1.5	6.3
6-Apr	0.2	0.2	0.4	0.6	0.0	-0.4	-0.7	-1.8	-3.9	-4.4	-4.2	-4.3	-5.1	-4.8	-4.8	-4.6	-4.7	-5.0	-5.8	-6.6	-7.7	-8.5	-9.2	-9.5	-4.0	0.6
7-Apr	-9.7	-10.0	-11.2	-13.9	-14.3	-13.4	-11.2	-9.2	-7.6	-7.0	-6.4	-5.3	-4.9	-4.5	-4.0	-3.9	-3.5	-3.7	-4.0	-7.2	-9.9	-10.2	-9.7	-9.8	-8.1	-3.5
8-Apr	-10.1	-10.2	-10.5	-10.4	-10.1	-10.0	-9.2	-6.9	-4.9	-3.8	-2.1	-1.2	-1.0	0.3	1.3	1.3	1.3	1.4	1.3	1.4	1.5	1.7	1.3	0.7	-3.2	1.7
9-Apr	0.3	0.0	0.1	-0.3	-1.7	-0.8	-1.7	-2.5	-3.0	-4.3	-5.1	-5.4	-5.4	-5.3	-5.4	-6.2	-6.2	-6.4	-6.8	-6.9	-7.1	-7.3	-7.4	-7.9	-4.3	0.3
10-Apr	-8.1	-8.6	-9.5	-10.8	-12.1	-13.9	-13.7	-12.5	-11.2	-10.0	-8.2	-6.8	-5.5	-4.5	-4.1	-3.1	-2.7	-2.3	-2.6	-6.4	-9.7	-8.2	-7.7	-7.5	-7.9	-2.3
11-Apr	-7.2	-6.6	-6.0	-5.9	-5.8	-5.4	-4.6	-3.3	-1.9	-0.1	1.6	3.6	5.6	7.0	8.8	9.4	10.0	10.0	8.2	5.1	4.5	4.7	4.8	4.2	1.7	10.0
12-Apr	3.7	3.8	2.8	0.2	-2.7	-3.9	-3.7	-2.9	-1.2	1.1	2.5	3.0	4.1	5.0	5.6	6.1	6.2	5.6	4.4	2.8	2.0	1.2	1.0	1.1	2.0	6.2
13-Apr	1.3	1.0	0.8	1.0	1.4	0.7	1.1	2.3	3.6	5.4	7.3	7.3	6.5	5.7	4.6	3.7	2.8	1.9	1.7	1.0	0.2	0.0	0.0	-0.1	2.6	7.3
14-Apr	-0.1	-0.3	-1.6	-2.4	-2.7	-2.8	-3.1	-3.6	-4.0	-4.1	-3.9	-3.4	-3.3	-2.9	-2.7	-2.6	-2.4	-2.4	-2.8	-3.1	-4.2	-7.3	-9.4	-11.3	-3.6	-0.1
15-Apr	-12.9	-13.7	-14.2	-14.9	-15.4	-15.1	-8.8	-3.3	-1.6	-0.2	1.3	2.2	3.2	4.2	5.1	6.0	6.6	6.5	5.6	3.8	3.5	3.2	3.3	3.1	-1.8	6.6
16-Apr	2.6	3.0	2.9	2.3	2.8	3.1	3.8	5.1	7.1	8.9	9.6	12.2	14.1	15.2	16.0	16.2	16.3	16.1	15.1	7.8	3.8	6.1	6.6	6.3	8.5	16.3
17-Apr	6.0	5.7	6.7	7.7	7.8	8.1	9.1	10.0	11.3	12.4	13.7	15.5	16.6	17.9	18.8	19.2	19.4	19.3	16.4	10.8	8.2	7.8	9.1	10.3	12.0	19.4
18-Apr	10.6	10.3	10.1	9.7	9.2	9.0	10.5	13.1	15.7	18.5	20.9	22.8	23.8	24.6	25.0	25.0	24.6	23.7	21.4	19.3	18.4	17.9	16.2	15.5	17.3	25.0
19-Apr	15.2	14.2	13.2	12.5	11.8	11.6	13.2	12.2	12.8	13.2	14.1	15.4	16.1	16.7	16.7	16.7	16.0	14.8	14.0	12.1	10.0	9.1	6.8	0.4	12.9	16.7
20-Apr	-0.8	-1.9	-2.6	-3.6	-4.7	-6.3	-7.3	-7.9	-7.9	-7.7	-6.9	-5.3	-3.3	-1.7	-0.5	0.1	0.5	0.3	-0.4	-2.0	-3.8	-5.8	-6.4	-5.1	-3.8	0.5
21-Apr	-5.2	-5.7	-6.0	-6.6	-6.4	-5.3	-3.0	-0.3	0.6	2.2	2.9	3.8	4.7	5.2	5.7	5.8	5.5	4.6	3.3	1.3	-0.8	-1.6	-2.1	-2.9	0.0	5.8
22-Apr	-3.4	-3.7	-4.0	-4.4	-5.0	-4.6	-2.3	0.3	1.7	2.7	4.0	4.9	5.8	6.4	7.2	7.6	7.6	7.6	6.8	4.0	2.1	1.7	0.9	0.4	1.8	7.6
23-Apr	-0.1	-0.6	-1.1	-1.4	-1.8	-2.0	-0.4	2.7	5.6	7.0	7.8	8.4	9.3	9.9	10.8	11.3	11.4	11.2	10.1	8.1	6.1	5.0	4.3	4.7	5.3	11.4
24-Apr	4.4	4.0	3.6	2.8	2.1	2.1	2.8	4.1	5.0	5.9	7.1	7.5	7.4	7.9	8.4	8.3	7.7	7.5	7.1	6.5	5.7	5.1	4.7	4.3	5.5	8.4
25-Apr	3.7	2.6	1.2	1.3	1.3	1.5	1.9	2.3	2.8	3.2	3.8	4.6	5.4	6.4	6.6	6.5	6.7	6.9	6.6	5.3	3.8	4.0	4.0	3.7	4.0	6.9
26-Apr	3.5	3.4	3.2	2.9	2.9	2.7	3.0	3.8	5.0	6.3	7.5	7.5	6.9	6.9	6.5	6.0	5.8	5.7	5.8	5.5	5.2	5.0	4.4	3.9	5.0	7.5
27-Apr	3.8	3.3	1.9	1.2	1.7	2.2	3.3	5.0	5.5	5.7	6.1	7.2	8.8	10.2	11.6	12.1	12.7	12.6	11.9	9.7	6.0	6.1	7.1	7.3	6.8	12.7
28-Apr	7.2	6.6	6.4	6.6	6.4	6.8	9.7	12.6	14.6	16.2	16.6	17.0	17.4	17.4	17.4	17.6	17.6	17.3	16.4	14.6	13.2	12.1	11.8	11.6	13.0	17.6
29-Apr	11.0	11.0	10.9	10.4	10.4	10.0	10.5	11.6	13.8	15.8	16.9	17.4	17.8	18.4	19.1	20.3	19.6	19.6	19.1	15.7	12.4	12.1	12.9	12.6	14.5	20.3
30-Apr	11.5	11.3	10.7	9.7	9.4	10.2	11.5	13.2	14.8	15.7	17.0	18.1	18.5	16.8	15.7	15.7	14.5	11.2	12.5	11.6	9.0	7.6	7.5	6.6	12.5	18.5
	0.1	-0.1	-0.5	-1.0	-1.3	-1.4	-0.6	0.7	1.8	2.9	3.9	4.8	5.5	6.1	6.5	6.7	6.6	6.2	5.4	3.4	1.8	1.4	1.1	0.7	Diurnal Average	
	15.2	14.2	13.2	12.5	11.8	11.6	13.2	13.2	15.7	18.5	20.9	22.8	23.8	24.6	25.0	25.0	24.6	23.7	21.4	19.3	18.4	17.9	16.2	15.5	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature (AT) - C

Wapasu - April 2016



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	280	38.89	38.89
0 - 10	307	42.64	81.53
10 - 20	123	17.08	98.61
> 20	10	1.39	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Wapasu - April 2016

Maximum Value: 99 % on Apr 27 07:00

Maximum Daily Average: 93.6 % on Apr 6

Minimum Value: 15 % on Apr 19 15:00

Minimum Daily Average: 27.1 % on Apr 19

Maximum Diurnal Average: 68.0 % at hour 6

Minimum Diurnal Average: 45.7 % at hour 15

Monthly Average: 57.4 %

Percentiles: $P_1 = 18$ $P_{10} = 26$ $Q_1 = 38$ Median = 56 $Q_3 = 76$ $P_{90} = 90$ $P_{99} = 99$

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

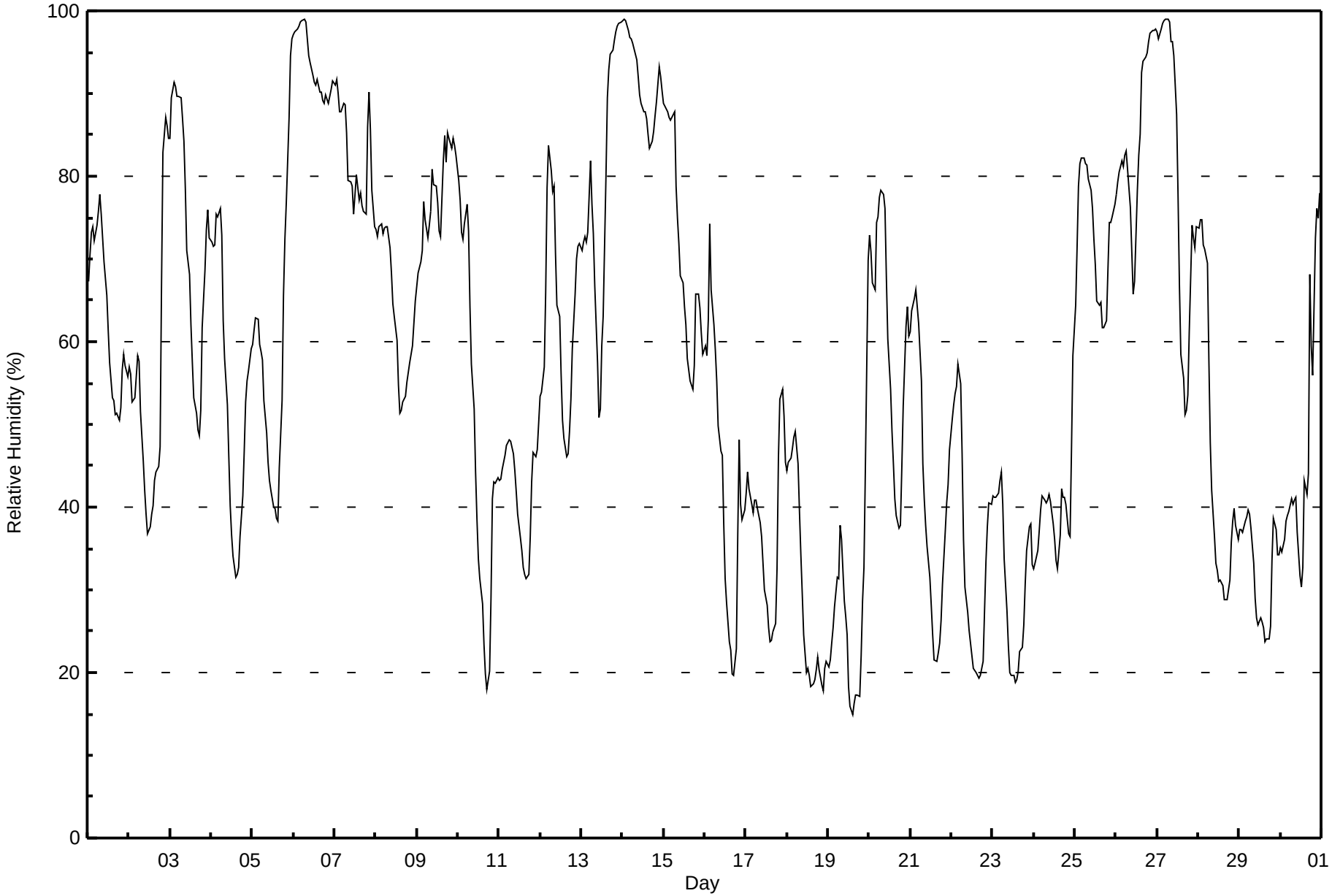
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	67	71	73	74	72	74	76	78	75	70	68	66	61	58	53	53	51	51	51	52	57	59	57	56	63.4	78
2-Apr	57	56	53	53	56	58	58	52	46	42	39	37	38	39	40	43	44	45	47	67	83	87	86	85	54.6	87
3-Apr	85	90	91	91	90	90	90	87	84	78	71	68	62	57	53	51	49	49	52	62	69	74	76	73	72.5	91
4-Apr	72	72	72	75	75	76	73	63	58	52	46	40	37	34	31	32	33	36	41	47	53	55	56	59	53.7	76
5-Apr	60	61	63	63	60	59	58	53	49	45	43	42	40	40	39	38	45	53	66	72	77	87	95	97	58.4	97
6-Apr	97	98	98	98	99	99	99	99	97	95	94	92	91	91	92	90	90	89	89	90	89	90	91	92	93.6	99
7-Apr	91	92	90	88	88	89	89	85	79	79	79	75	78	80	77	78	76	76	75	86	90	86	78	74	82.4	92
8-Apr	73	73	74	74	73	74	74	74	71	68	65	63	60	55	51	52	53	53	55	56	58	59	62	65	64.0	74
9-Apr	67	68	70	71	77	75	73	74	76	81	79	79	77	73	73	82	85	82	85	84	83	85	84	83	77.7	85
10-Apr	80	77	73	72	74	77	73	64	57	52	44	38	34	31	28	23	20	18	20	29	41	43	43	43	48.2	80
11-Apr	43	43	45	46	47	48	48	48	46	44	42	39	36	35	33	32	31	32	36	43	47	46	47	50	42.0	50
12-Apr	53	54	57	66	79	84	81	78	79	71	64	63	56	50	48	46	46	49	53	59	66	70	72	72	63.2	84
13-Apr	71	72	73	72	73	82	77	73	67	57	51	52	60	63	80	89	93	95	95	96	98	98	98	99	78.5	99
14-Apr	99	99	99	98	97	97	96	95	94	92	90	89	88	88	87	85	83	84	85	87	89	93	92	90	91.5	99
15-Apr	89	88	88	87	87	87	88	79	75	72	68	67	64	62	58	55	55	54	57	66	66	64	61	59	70.6	89
16-Apr	59	58	63	74	66	62	59	55	50	47	46	38	31	29	24	23	20	20	23	37	48	40	39	40	43.8	74
17-Apr	42	44	42	40	39	41	41	40	38	36	33	30	28	25	24	24	25	26	33	46	53	54	51	45	37.6	54
18-Apr	44	45	46	47	48	49	45	39	34	30	25	20	21	20	18	19	19	20	22	20	19	18	21	21	29.6	49
19-Apr	21	22	24	25	28	32	31	38	36	29	27	25	18	16	15	16	17	17	17	22	29	33	45	70	27.1	70
20-Apr	73	71	67	66	74	75	78	78	78	76	68	60	54	49	45	41	39	37	38	45	52	62	64	61	60.5	78
21-Apr	61	64	65	66	64	62	55	45	41	38	35	32	28	25	21	21	22	24	26	31	37	41	43	47	41.4	66
22-Apr	51	52	54	55	57	55	47	36	30	27	25	24	22	20	20	20	19	20	21	27	33	38	40	40	34.8	57
23-Apr	41	41	41	42	43	44	40	34	27	23	20	20	20	19	19	20	22	23	26	31	35	38	38	33	30.8	44
24-Apr	33	33	35	37	40	41	41	40	41	42	41	38	36	34	33	37	42	41	41	40	37	36	47	58	39.3	58
25-Apr	64	71	79	82	82	82	82	81	80	78	76	72	69	65	64	65	62	62	63	69	74	74	75	77	72.8	82
26-Apr	78	79	81	82	81	82	83	81	76	71	66	67	78	83	85	93	94	94	95	96	97	98	98	98	84.8	98
27-Apr	97	97	98	99	99	99	99	99	96	96	95	87	78	67	58	56	51	52	54	61	74	72	71	74	80.4	99
28-Apr	74	75	75	72	71	70	58	48	42	36	33	32	31	31	31	29	29	29	31	36	38	40	38	36	45.1	75
29-Apr	37	37	37	38	39	40	39	38	33	29	27	26	27	26	26	24	24	24	26	34	39	37	34	34	32.2	40
30-Apr	35	35	36	38	39	40	41	40	41	41	37	32	30	33	43	41	44	68	59	56	73	76	75	78	47.2	78
	63.8	64.6	65.3	66.4	67.3	68.0	66.3	63.1	59.9	56.6	53.2	50.4	48.5	46.6	45.7	45.9	46.2	47.4	49.4	54.9	60.0	61.7	62.5	63.6	Diurnal Average	
	99	99	99	99	99	99	99	99	97	96	95	92	91	91	92	93	94	95	95	96	98	98	98	99	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity (RH) - %

Wapasu - April 2016



Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	25	3.47	3.47
20 - 40	177	24.58	28.06
40 - 60	191	26.53	54.58
60 - 80	187	25.97	80.56
80 - 100	140	19.44	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Maximum Value: 1.9 mm on Apr 13 20:00

Maximum Daily Total: 10.3 mm on Apr 13

Minimum Value: 0.0 mm on Apr 1 01:00

Minimum Daily Total: 0.0 mm on Apr 1

Maximum Diurnal Total: 2.8 mm at hour 4

Minimum Diurnal Total: 0.9 mm at hour 12

Monthly Total: 39.33 mm

Percentiles: P_1 = 0.0 P_{10} = 0.0 Q_1 = 0.0 Median = 0.0 Q_3 = 0.0 P_{90} = 0.1 P_{99} = 1.1

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

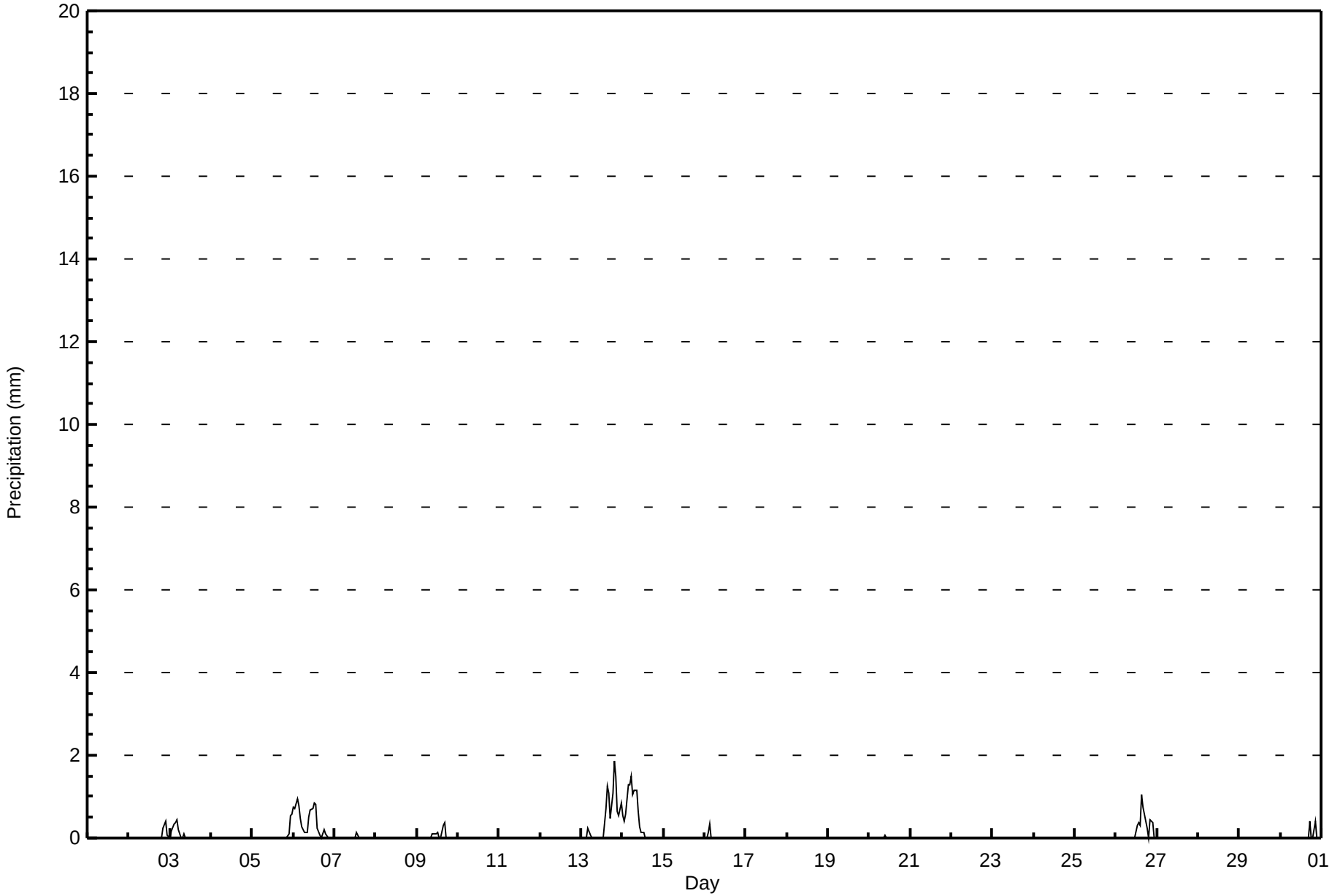
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.4	0.1	0.1	0.8	0.4
3-Apr	0.0	0.2	0.4	0.4	0.4	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.4
4-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.5	0.6	1.2	0.6
6-Apr	0.7	0.7	0.9	0.8	0.5	0.3	0.1	0.1	0.1	0.5	0.7	0.7	0.8	0.8	0.3	0.1	0.0	0.1	0.2	0.1	0.0	0.0	0.0	0.0	8.6	0.9
7-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
8-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	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	0.3	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.4
10-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	1.2	1.1	0.5	1.1	1.9	1.5	0.7	0.6	0.9	10.3	1.9
14-Apr	0.5	0.4	0.6	1.3	1.3	1.5	1.1	1.1	1.1	0.6	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.1	1.5
15-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.1	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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
17-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
21-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.4	0.3	1.1	0.7	0.4	0.2	0.0	0.5	0.4	0.0	0.0	4.2	1.1
27-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.4	0.0	0.0	0.0	0.8	0.4
	1.3	1.3	2.0	2.8	2.4	2.0	1.2	1.3	1.4	1.3	1.0	0.9	1.4	1.3	1.3	2.6	2.2	1.4	1.5	2.0	2.6	1.5	1.2	1.5	Diurnal Average	
	0.7	0.7	0.9	1.3	1.3	1.5	1.1	1.1	1.1	0.6	0.7	0.7	0.8	0.8	0.7	1.2	1.1	0.5	1.1	1.9	1.5	0.7	0.6	0.9	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Precipitation (PC) - mm

Wapasu - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Wapasu - April 2016

Maximum Speed: 28 km/h on Apr 8 17:00

Maximum Daily Speed Average: 20.3 km/h on Apr 8

Minimum Speed Value: 1 km/h on Apr 17 17:00

Minimum Daily Speed Average: 2.8 km/h on Apr 7

Maximum Diurnal Speed Average: 7.9 km/h at hour 24

Minimum Diurnal Speed Average: 1.2 km/h at hour 15

Monthly Average Velocity: 3.4 km/h 130.5 deg

Percentiles: $P_1 = 2$ $P_{10} = 5$ $Q_1 = 7$ Median = 9 $Q_3 = 12$ $P_{90} = 16$ $P_{99} = 23$

Hours in Service: 720

Hours of Data: 719

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-Apr	SW8	SW8	WSW6	WNW4	NNW10	N15	N14	N14	NNW17	NNW16	NNW13	NNW11	NNW11	NNW11	NNW8	NNW8	NNW6	NNE6	ENE7	ENE6	E4	ESE5	ESE9	ESE11	NNW5.6	NNW17
2-Apr	ESE13	ESE14	ESE16	ESE18	ESE16	ESE15	ESE16	ESE16	ESE15	ESE12	ESE12	E11	E11	E12	E9	ENE14	ENE12	NE11	ENE9	ENE8	E7	ENE5	E6	E5	E11.1	ESE18
3-Apr	ESE5	E3	NW7	NNW7	N8	NNW10	NNW10	NNW11	NNW11	NNW12	NNW12	NNW11	NNW9	NNW9	NNW9	N8	N7	NNW7	N5	NE5	E5	E6	ESE5	ESE8	N5.9	NNW12
4-Apr	SE7	SE8	SE9	SSE10	SSE9	SE10	SE8	SSE8	S8	SSW7	SSW7	S5	SSE6	S3	E2	E5	E7	NNE5	N6	NE7	ENE5	ESE8	E8	ESE7	SE4.8	SE10
5-Apr	ESE8	ESE7	ESE6	ESE7	ESE8	ESE10	ESE10	ESE10	SE7	SE12	SE12	SSE10	SSE10	SSE8	S9	SSE10	S11	S11	S10	SSE9	SSE10	SSE10	SSE10	SSE9	SSE8.6	SE12
6-Apr	SSE8	SSE6	S4	W6	NW8	NW11	NW11	NW13	NW12	NNW12	NNW10	NNW9	NNW9	NNW8	NNW8	NNW10	N7	N9	N9	N9	N9	N7	N6	NNW6	NNW6.8	NW13
7-Apr	NNW7	N4	NNE3	ENE2	ESE3	ESE3	SE4	SSE3	SSE3	WSW3	WSW2	SSW1	NNW3	NNE6	NNE7	NNE7	NE8	NNE6	NNE5	NNE3	ENE5	E7	E8	ESE11	NE2.8	ESE11
8-Apr	ESE11	ESE14	ESE13	SE13	SE15	SE14	ESE16	SE19	SE21	SE21	SE22	SE20	SE23	ESE24	SE22	SE25	SE28	SE26	SE25	SE25	SE26	SE24	SE22	SE22	SE20.3	SE28
9-Apr	SE20	SE14	SE14	SSE4	WNW2	NNW8	NNW12	NNW15	NNW16	NW18	NW21	NW20	NW21	NNW19	NNW19	NW21	NNW18	NNW16	NNW14	NNW15	NNW14	NNW13	NNW13	NNW11	NNW10.6	NW21
10-Apr	NNW12	NNW12	NNW12	NNW8	NNW8	NNW7	N7	N9	NNW11	NNW10	NNW7	NNW7	NNW7	NNW5	NW5	NNW5	ENE5	ESE3	WNW3	NNE3	ESE6	SE10	SE13	SE14	N4.1	SE14
11-Apr	SE15	SE15	SE15	SSE13	SSE12	SSE12	SSE11	SSE11	S11	S10	S10	S10	S11	S10	SSW9	SSW8	SSW7	SW4	NNE4	E6	ESE7	SE6	SSE7	SSE7	SSE8.4	SE15
12-Apr	SSE7	SSE7	S5	WNW3	NNW6	NNW8	N8	N8	N10	NNW8	N9	NNW10	N9	NNE10	NNE10	NE11	NE11	NE10	NE6	NE6	ENE6	E5	ESE9	ESE15	NNE4.9	ESE15
13-Apr	ESE15	ESE14	ESE15	SE9	SSE4	ESE10	ESE13	ESE14	SSE5	SSE7	SSE6	SSE11	SE9	SE11	SSE7	SE6	ESE11	ESE13	ESE7	SE5	ESE3	N2	NNW3	AF	SE7.9	ESE15
14-Apr	NW4	NW8	NNW12	NNW11	NNW12	NNW13	NNW13	NW13	NW12	NW13	NNW12	NW12	NW12	NW11	NNW9	NW8	NW7	NNW5	N5	N4	NW2	SE2	ESE2	ESE3	NNW7.9	NNW13
15-Apr	E3	ESE3	SE4	ESE3	ESE4	SE4	SE5	SSE4	SW6	SW7	S7	SSW8	SSE9	SSE9	SSE10	SE9	SE10	SE10	SE10	SE12	SE16	SE16	SE16	SE16	SE7.5	SE16
16-Apr	SE14	SSE9	SE10	SE12	SE12	SSE12	SSE11	SSE11	S12	S10	S10	S10	SW12	SW13	SW13	SW13	SW14	WSW12	WNW6	SE3	SE7	SE7	SE7	SE8	S7.9	SE14
17-Apr	SE7	SE7	SSE7	SSE8	SE6	SE7	SE6	SE8	SSE8	SSW9	SSW10	SSW8	SW11	WSW9	W5	S2	WNW1	SSW4	SSW3	SE4	SE7	SE7	ESE9	SE11	SSE5.2	SW11
18-Apr	SE9	SE9	SSE7	SSE8	SSE8	SSE8	SSE9	SSE8	SSE9	SSE8	S9	S10	S14	S16	S15	S16	S15	S12	SSE13	SSE14	SSE17	SSE19	SSE17	SSE18	SSE11.7	SSE19
19-Apr	SSE17	S11	SSE11	SSE10	S8	S7	SW9	NW10	WNW10	WSW11	W15	W16	WSW20	WSW21	WSW23	W18	WNW20	W19	W15	WNW12	WNW10	W11	NW16	NNW14	W9.9	WSW23
20-Apr	N14	NNW15	NNW16	NNW16	NNW15	NNW17	NNW15	NNW16	NNW15	NNW14	NNW12	NNW12	N10	NNE9	N9	N9	N8	NNE8	NNE7	NNE5	NE4	ENE4	E6	ESE8	N9.8	NNW17
21-Apr	ESE6	ESE6	ESE6	SE6	SE6	SE5	ESE4	NE3	NW2	N6	N7	N7	N9	NNE10	NNE10	NNE11	NNE11	NNE12	NNE10	NNE8	NE7	NE8	NE9	NE8	NE5.5	NNE12
22-Apr	ENE8	E9	ESE9	ESE9	ESE8	E8	ESE7	E6	ENE6	ENE5	E6	ENE8	E8	ENE8	ESE7	ESE7	ESE7	ENE8	ENE8	ENE7	E9	ESE12	ESE14	ESE15	E8.0	ESE15
23-Apr	ESE15	ESE14	ESE14	ESE13	ESE13	ESE13	ESE12	SE9	ESE8	ESE11	ESE13	ESE10	ESE11	ESE10	E11	ESE11	ESE12	ESE11	ESE11	ESE8	ESE11	ESE14	ESE16	SE19	ESE12.1	SE19
24-Apr	SE17	SE16	SE15	SE13	SE11	SE11	SE12	SE11	SE10	SSE10	SSE12	SSE11	SSE13	SSE11	SE11	SE13	SE11	SE12	SE11	SE11	SE12	SE13	SSE12	SSE12	SE11.9	SE17
25-Apr	S10	S9	SSE6	SSE8	SSE9	SSE9	SSE11	SSE12	S10	S10	S9	S10	S10	S11	S9	S9	SSW9	SSW9	SSW8	S7	S6	S6	S6	S6	S8.5	SSE12
26-Apr	S6	S7	S8	S9	S8	S9	S10	SSE10	S10	S10	S8	S8	SSW7	S7	S6	S5	SSE6	SSE6	SE6	SSE4	SE6	SSE6	SE7	SE6	SSE7.0	S10
27-Apr	SE6	S4	SE5	SE6	SE4	ESE3	E2	NNE3	NNE4	NNW6	N5	N5	N6	NNE7	N4	NE8	NNW3	NNE7	NE8	ENE6	ENE6	E9	ESE11	ESE12	ENE3.4	ESE12
28-Apr	ESE12	ESE11	ESE9	SE9	SSE8	SSE8	SSE6	S6	SSW7	SSW10	SSW11	SSW11	SSW10	S10	S8	SSE12	SE9	SSE9	SE9	ESE8	ESE9	SE10	SE10	SE10	SSE8.0	SSE12
29-Apr	SE10	SE11	SE12	SE11	SE12	SE11	SE13	SE16	SSE17	SSE17	SSE19	SSE17	SSE16	SSE18	SSE17	S14	S12	SSW11	SSW9	SE5	SE7	SE8	SSE10	SSE9	SSE11.9	SSE19
30-Apr	SSE10	SSE10	SSE10	SSE9	SSE12	SSE12	SSE10	S11	S11	S14	S15	SSW16	SSW16	SSW14	W10	WSW12	W8	S2	SE8	SSE7	NE5	E8	ESE7	ESE7	S7.6	SSW16
	SE7.0	SE6.1	SE5.5	SE4.9	SE4.1	ESE3.8	ESE3.6	SE2.5	SSE1.6	S1.7	S2.2	SSW2.2	S2.2	SSE2.0	S1.2	SE1.6	SE1.8	ESE1.9	E2.6	E3.7	ESE5.0	ESE6.1	SE6.6	SE7.9	Diurnal Average	
	SE20	SE16	ESE16	ESE18	ESE16	NNW17	ESE16	SE19	SE21	SE21	SE22	NW20	SE23	ESE24	WSW23	SE25	SE28	SE26	SE25	SE25	SE26	SE24	SE22	SE22	Diurnal Maximum	

AF - Analyzer Failure

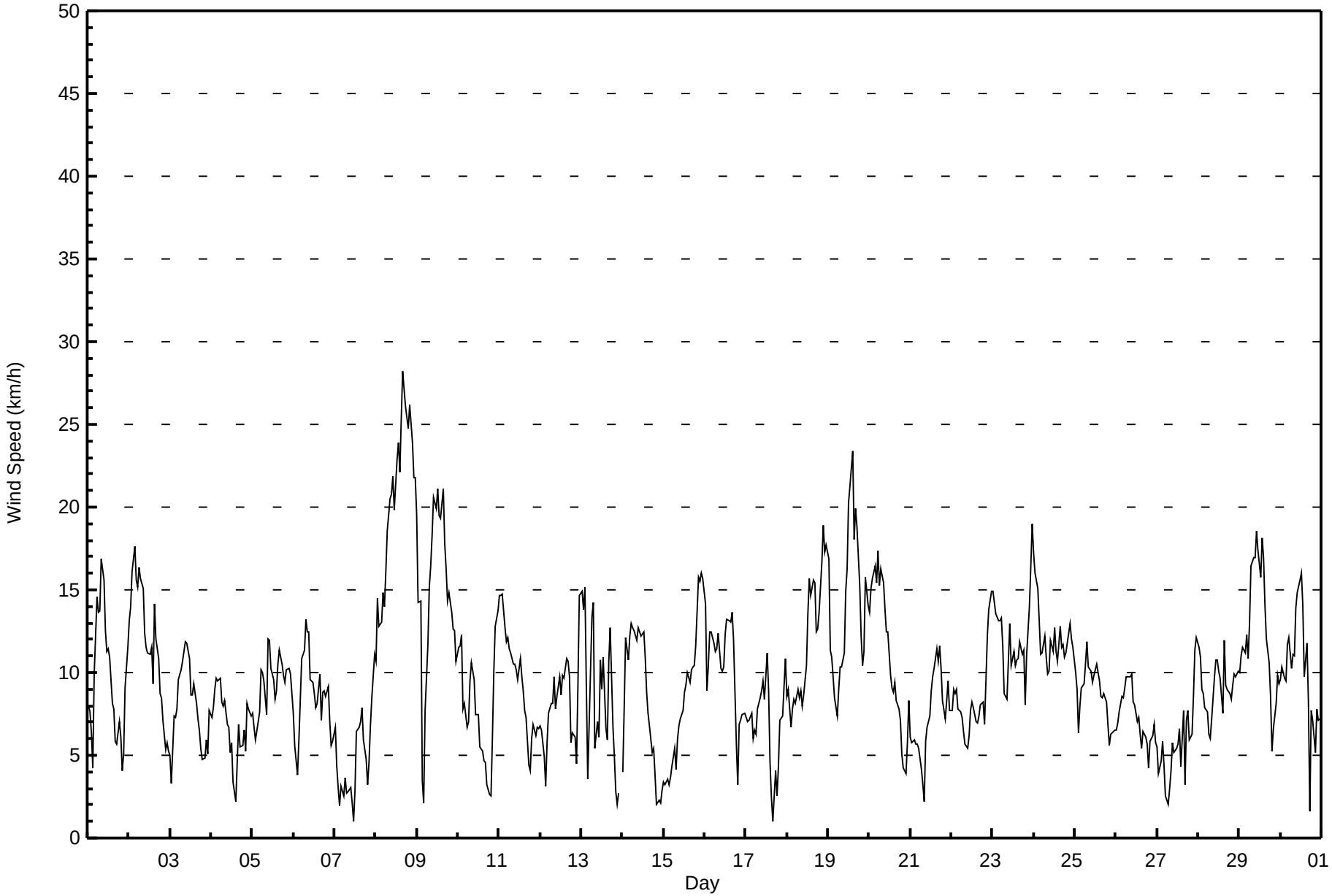
All monthly, daily, and diurnal averages have been calculated using vector methods

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed (WS) - km/h

Wapasu - April 2016



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	100	13.91	13.91
6 - 11	414	57.58	71.49
12 - 19	180	25.03	96.52
20 - 28	25	3.48	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 719

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Wind Speed (WS) - km/h

Wapasu - April 2016

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	8	9	4	8	8	14	12	7	8	3	1	2	1	5	4	6	100
6 - 11	26	18	14	14	21	50	61	69	53	20	6	3	4	3	9	43	414
12 - 19	4	1	0	2	1	37	35	26	11	3	5	2	4	2	9	38	180
20 - 28	0	0	0	0	0	1	16	0	0	0	0	3	0	1	4	0	25
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	38	28	18	24	30	102	124	102	72	26	12	10	9	11	26	87	719

Total Number of Valid Hours: 719

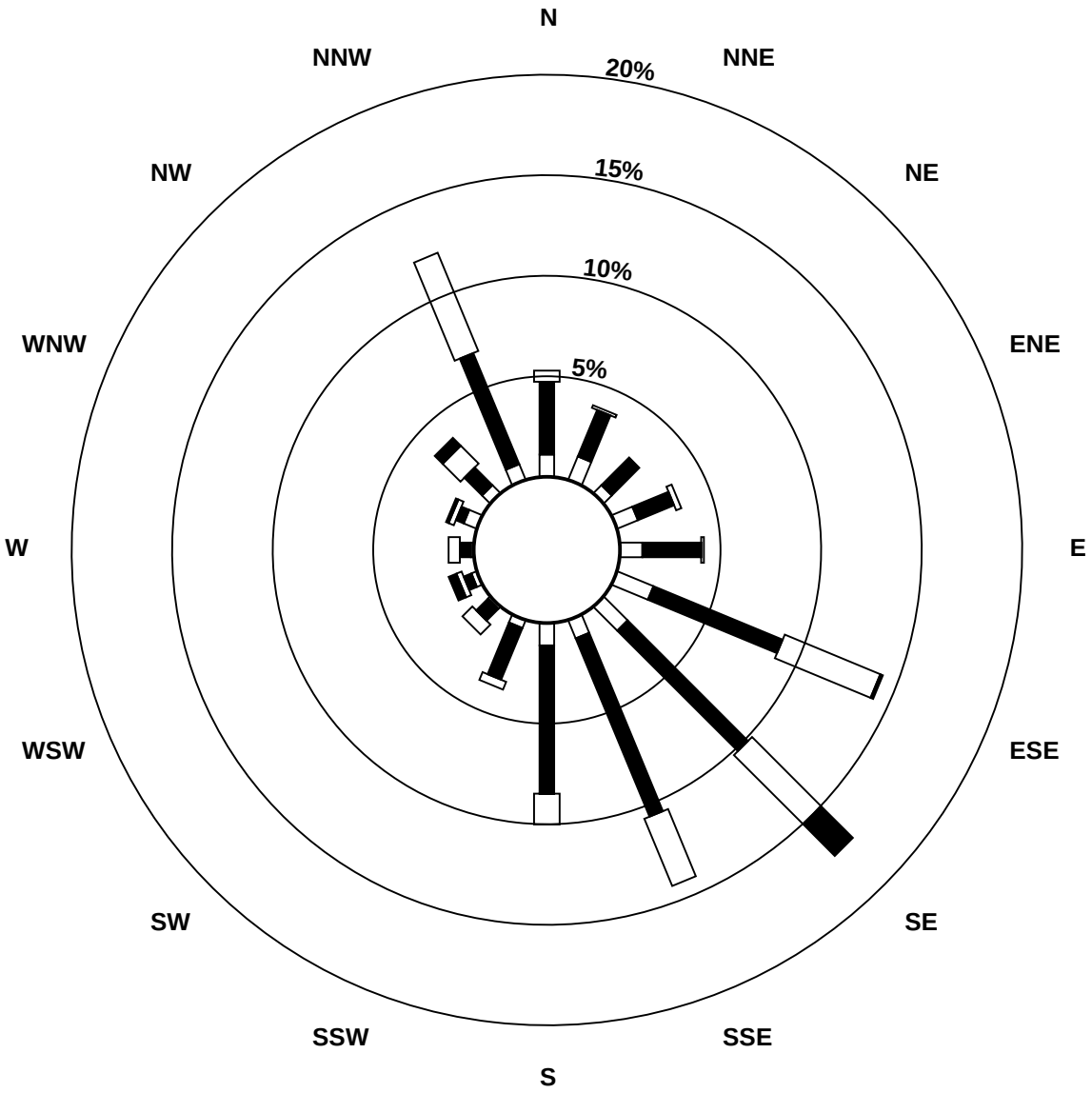
Total Number of Hours: 720

Wood Buffalo Environmental Association

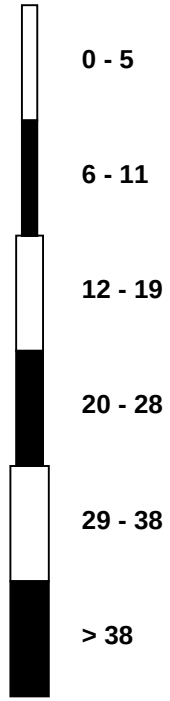
Wind Rose Apr 2016

Wind Speed (WS) - km/h

Wapasu (AMS 17)



Classes (km/h)



Total Number of Valid Hours: 719

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

Maximum Value: 8 km/h on Apr 19 15:00

Minimum Value: 0 km/h on Apr 15 04:00

Percentiles: $P_1 = 1$ $P_{10} = 1$ $Q_1 = 2$ Median = 3 $Q_3 = 4$ $P_{90} = 5$ $P_{99} = 7$

Hours in Service:	720
Hours of Data:	719
Hours of Missing Data:	1
Hours of Calibration:	0
Percent Operational Time:	99.9

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

AF - Analyzer Failure

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Wapasu - April 2016

Direction of Maximum Speed: 124 deg on Apr 8 17:00
Direction of Maximum Daily Speed Average: 127.7 deg on Apr 8

Direction of Minimum Speed: 297 deg on Apr 17 17:00
Direction of Minimum Daily Speed Average: 2.8 deg on Apr 7

Monthly Average Direction: 141.0 deg

Hours in Service:	720
Hours of Data:	719
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-Apr	215	225	255	295	338	349	350	349	337	335	335	344	335	343	340	337	327	21	68	78	81	104	115	116	347.8
2-Apr	115	108	113	113	117	112	116	114	116	109	107	96	99	88	82	74	61	54	69	60	84	77	85	94	98.4
3-Apr	103	80	323	346	1	344	340	340	332	338	347	333	342	338	331	351	352	346	359	45	79	83	111	123	354.2
4-Apr	124	132	141	149	152	143	139	158	181	195	195	189	162	177	95	100	95	28	356	35	61	103	99	105	132.3
5-Apr	116	114	118	114	115	119	121	122	125	131	143	161	163	165	175	163	173	177	172	166	157	154	153	158	147.0
6-Apr	153	157	188	264	306	324	325	325	326	333	342	344	347	340	342	336	350	350	349	357	357	355	358	334	336.1
7-Apr	338	350	28	73	118	117	126	155	147	246	248	193	345	13	20	23	38	29	25	32	64	82	100	104	52.8
8-Apr	109	119	122	129	127	124	120	130	137	132	128	129	125	122	126	126	124	126	127	133	129	132	144	132	127.7
9-Apr	137	140	136	161	298	338	338	331	329	326	322	319	323	329	329	323	329	329	330	331	330	329	332	334	329.5
10-Apr	343	342	341	339	343	348	350	350	341	337	342	341	327	342	305	331	78	114	297	26	119	129	133	137	356.3
11-Apr	139	144	141	148	150	155	157	166	169	178	182	181	189	186	208	194	194	225	26	85	118	137	160	157	161.6
12-Apr	161	168	173	302	341	344	0	2	353	344	358	347	7	20	23	38	35	43	43	46	73	82	106	112	30.8
13-Apr	113	120	117	134	163	105	117	120	151	157	155	152	144	126	158	145	119	110	122	128	104	7	330	AF	126.5
14-Apr	314	314	334	336	329	328	328	322	324	321	327	321	325	325	328	319	325	341	353	349	315	134	115	108	328.0
15-Apr	86	121	125	103	104	129	138	166	222	222	183	192	161	168	154	142	142	142	132	126	127	133	135	139	144.8
16-Apr	141	161	142	136	139	147	159	167	177	185	181	190	221	217	230	230	232	257	296	133	135	139	140	145	179.0
17-Apr	136	143	148	152	130	141	141	143	148	193	194	202	229	251	271	187	297	208	196	132	134	128	123	130	163.2
18-Apr	143	144	151	155	154	154	153	159	168	166	187	184	177	172	176	182	180	176	164	159	157	156	152	157	164.5
19-Apr	158	170	160	167	175	188	231	309	288	258	263	261	253	251	254	274	284	281	272	292	293	278	306	347	260.0
20-Apr	354	340	337	337	340	337	340	332	328	340	336	339	352	13	2	3	3	14	29	33	48	78	80	103	351.2
21-Apr	115	123	118	126	126	128	122	42	310	356	358	3	10	33	25	26	15	21	28	30	37	45	49	54	41.8
22-Apr	76	93	106	107	103	101	111	91	69	66	86	75	90	69	113	102	108	78	74	66	84	104	106	111	93.2
23-Apr	114	114	113	113	113	117	122	125	120	109	120	120	113	112	98	119	114	116	119	115	118	118	122	128	116.6
24-Apr	131	136	139	136	127	126	127	137	146	149	158	157	147	155	141	141	134	136	129	126	126	134	155	164	139.5
25-Apr	170	182	168	161	153	153	153	156	170	176	176	171	172	182	174	177	213	199	194	179	173	173	172	173	173.2
26-Apr	170	173	177	174	178	174	171	166	171	175	183	183	193	181	191	188	160	152	134	148	140	147	139	138	168.6
27-Apr	146	178	144	136	140	105	99	28	16	340	356	351	351	16	11	46	343	28	50	63	74	92	105	111	65.2
28-Apr	121	122	122	135	151	150	165	185	204	197	205	202	196	181	170	149	145	149	130	115	122	128	137	140	153.6
29-Apr	142	138	138	132	134	134	134	139	147	157	160	163	159	153	160	186	186	198	208	142	141	145	156	158	154.5
30-Apr	152	157	159	154	152	156	167	182	181	171	188	201	206	211	262	242	265	175	144	158	43	87	108	123	176.3
	129.7	134.8	131.6	132.7	127.1	118.2	122.1	123.9	164.1	182.2	181.5	191.9	185.9	161.9	179.1	139.8	125.7	105.0	98.9	99.1	109.3	119.4	123.9	125.6	
	Diurnal Average																								

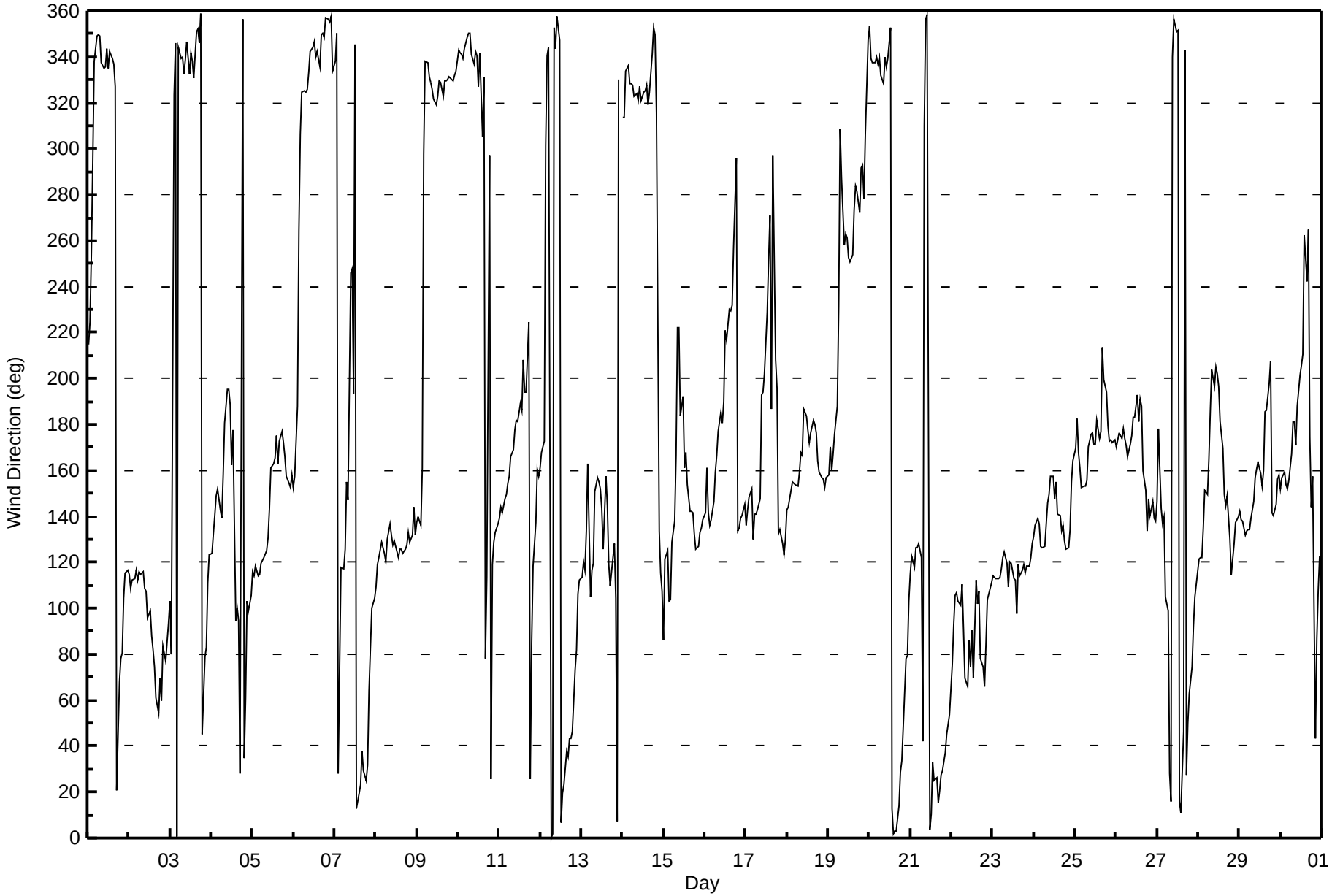
AF - Analyzer Failure
All monthly, daily, and diurnal averages have been calculated using vector methods

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction (WD) - deg

Wapasu - April 2016



Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg

Wapasu - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 96 deg on Apr 4 15:00

Minimum Value: 4 deg on Apr 16 21:00

Percentiles: P_1 = 10 P_{10} = 17 Q_1 = 20 Median = 28 Q_3 = 35 P_{90} = 44 P_{99} = 80

Hours in Service:	720
Hours of Data:	719
Hours of Missing Data:	1
Hours of Calibration:	0
Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily
	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-Apr	32	24	29	34	30	37	35	36	31	31	32	38	32	33	42	34	38	37	30	18	18	25	17	19	42
2-Apr	19	19	19	19	19	19	20	21	22	25	31	31	32	26	33	24	27	25	25	26	25	27	26	26	33
3-Apr	23	50	24	33	36	31	32	34	30	33	36	31	43	39	38	43	47	40	38	19	28	12	13	12	50
4-Apr	12	15	19	24	24	18	18	29	37	42	46	57	56	75	96	64	30	40	28	26	21	17	17	16	96
5-Apr	16	17	15	17	18	16	17	21	23	24	25	36	39	39	46	38	33	35	32	30	28	28	26	26	46
6-Apr	24	27	35	25	25	24	26	24	24	29	36	35	37	33	36	30	36	36	35	36	35	36	35	26	37
7-Apr	28	51	22	44	22	31	25	43	55	79	73	80	81	41	35	34	34	34	26	28	13	16	15	16	81
8-Apr	18	17	16	16	18	17	18	17	21	19	18	20	19	19	21	20	19	20	19	19	19	20	22	18	22
9-Apr	20	21	19	74	80	29	32	30	25	25	23	23	24	29	27	23	27	28	27	27	27	27	26	27	80
10-Apr	33	30	34	33	34	35	31	34	33	39	47	46	51	73	83	65	66	67	57	47	16	13	17	18	83
11-Apr	18	21	20	25	24	27	27	30	31	35	34	36	36	35	39	39	42	50	47	13	15	17	20	20	50
12-Apr	22	27	27	68	32	35	33	36	34	44	42	42	44	43	41	34	29	25	23	21	20	31	21	20	68
13-Apr	20	20	20	53	46	18	19	22	39	33	50	32	29	25	33	24	20	20	47	24	22	45	30	AF	53
14-Apr	16	20	29	33	28	27	24	23	26	24	25	24	25	27	27	26	26	39	30	27	64	18	54	24	64
15-Apr	22	20	20	11	12	9	10	36	29	33	42	40	33	35	33	30	25	26	17	16	17	18	18	20	42
16-Apr	19	33	21	18	17	25	34	29	33	35	35	40	35	36	32	29	28	28	19	67	4	8	9	11	67
17-Apr	10	13	16	21	18	40	40	25	24	37	38	41	27	42	76	81	80	41	43	11	5	8	10	14	81
18-Apr	19	14	21	18	19	22	24	30	31	33	39	37	36	34	38	36	36	34	29	26	26	26	23	26	39
19-Apr	27	29	26	28	27	31	35	27	29	29	30	28	26	26	26	30	25	26	26	26	25	25	38	37	38
20-Apr	37	35	32	34	35	34	33	29	30	36	32	38	44	50	50	43	46	39	31	25	19	11	12	17	50
21-Apr	17	15	14	16	11	12	23	47	85	54	59	54	52	43	39	40	41	36	31	28	22	20	22	21	85
22-Apr	20	20	18	18	17	19	20	36	60	65	62	48	53	68	60	54	36	35	23	18	19	19	20	20	68
23-Apr	18	19	19	19	20	18	20	24	29	28	28	39	35	34	40	46	29	30	20	15	16	18	17	18	46
24-Apr	19	19	20	19	17	17	19	22	27	30	29	34	28	31	28	25	24	22	18	19	18	20	26	29	34
25-Apr	33	29	29	25	26	26	26	25	35	34	34	36	33	34	37	35	34	39	36	28	26	27	27	27	39
26-Apr	28	31	30	32	33	30	29	31	34	34	38	34	38	36	35	34	28	24	18	18	21	20	19	19	38
27-Apr	18	39	17	9	10	23	29	56	47	35	41	43	48	57	74	46	85	35	27	18	12	16	18	19	85
28-Apr	17	16	14	17	23	19	29	35	39	41	38	37	43	36	40	27	29	27	19	15	15	15	17	18	43
29-Apr	19	18	18	16	18	17	18	19	25	29	32	31	33	31	32	42	35	37	38	17	13	19	25	24	42
30-Apr	23	25	26	26	24	26	31	34	35	32	36	38	35	33	29	24	27	74	26	30	63	22	18	13	74
	37	51	35	74	80	40	40	56	85	79	73	80	81	75	96	81	85	74	57	67	64	45	54	37	
	Diurnal Maximum																								

AF - Analyzer Failure

Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

Calibration Date	April 13, 2016	Last Calibration	March 21, 2016
Station Name	Wapasu	Station Number	AMS 17
Reason:	Routine		
Start Time (MST)	8:45	End Time (MST)	13:20
Gas Cert Reference	SA130010A	Station temp.	22 Deg C
Cal Gas Concentration	47.8 ppm	Cal Gas Exp Date	12/12/2016
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	879	881
Calculated slope	0.996525	0.988879	Chamber temp	44.9	44.8
Calculated intercept	1.533392	1.657100	Pressure	694.6	688.9
Analyzer Background	8.6	8.7	Flow	0.455	0.452
Analyzer Coefficient	0.850	0.855	Intensity	82	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	-0.1	----
as found span	5000	60.4	577.4	573.6	1.007
calibrator zero	5000	0.0	0.0	0.2	----
high point	5000	60.4	577.4	583.1	0.990
second point	5000	30.2	288.7	289.6	0.997
third point	5000	15.2	145.3	143.3	1.014
as left zero	5000	0.0	0.0	0.2	----
as left span	5000	60.4	577.4	584.3	0.988
				Average Correction Factor	1.000

Corrected As found	573.7	Previous response	577.9	% change	0.7%

Notes:

Inlet filter changed after as founds. Span adjusted.

Calibration Performed By: Devin Russell

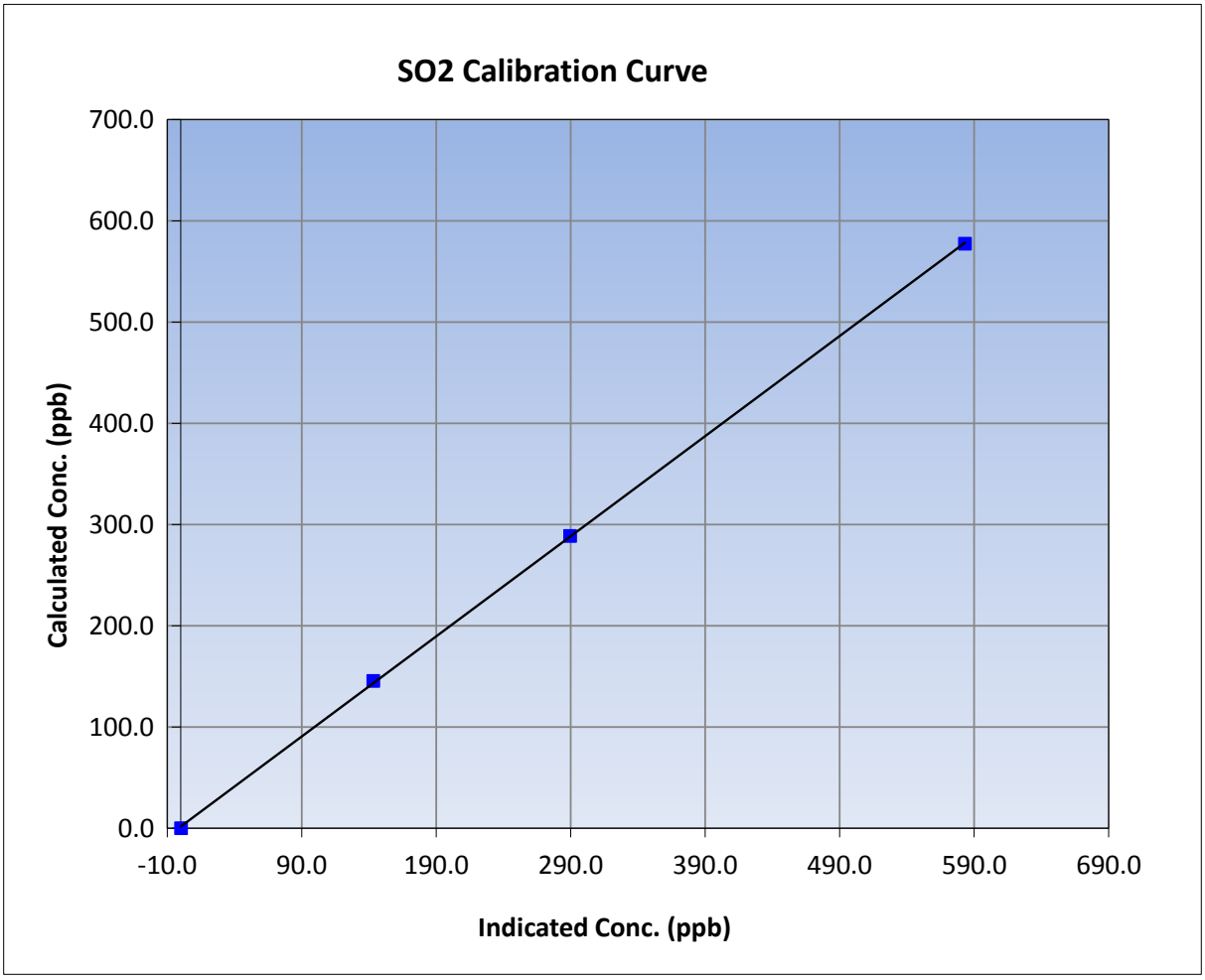
Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

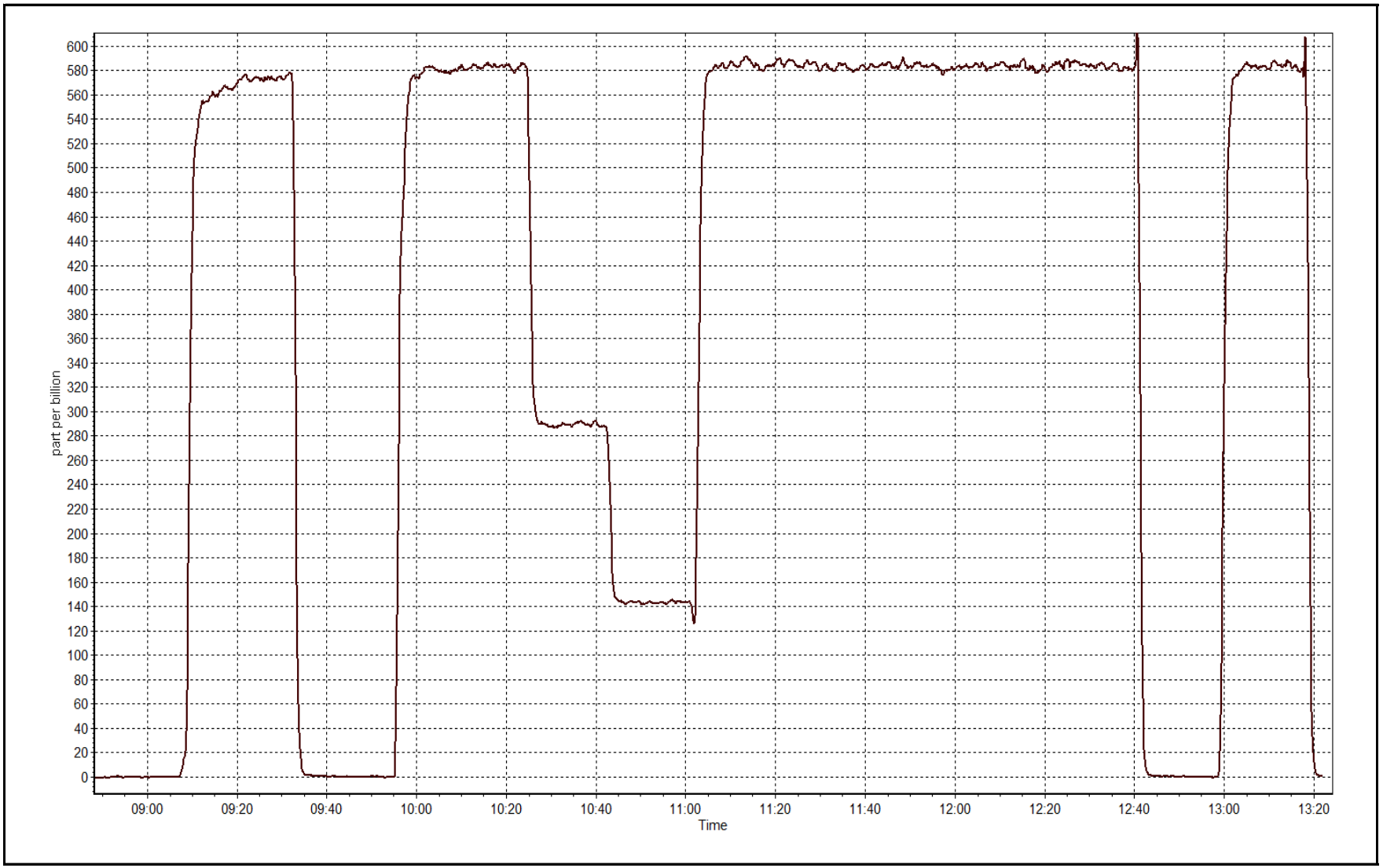
Calibration Date	April 13, 2016	Previous Calibration	March 21, 2016
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	8:45	End Time (MST)	13:20
Analyzer make	Thermo 43i	Analyzer serial #	1218153459

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	----	Correlation Coefficient	0.999954
577.4	583.1	0.9903		
288.7	289.6	0.9970	Slope	0.988879
145.3	143.3	1.0140		
			Intercept	1.657100



SO2 Calibration Plot Date: April 13, 2016



Wood Buffalo Environmental Association
H2S Calibration Report

Station Information

Calibration Date	April 14, 2016	Last Calibration	March 29, 2016
Station Name	Wapasu	Station Number	AMS 17
Reason:	Routine		
Start Time (MST)	11:30	End Time (MST)	14:05
Gas Cert Reference	CC107167	Station temp.	21 Deg C
Cal Gas Concentration	5.1 ppm	Cal Gas Exp Date	09/09/2017
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 12-Dec-16

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-651	-651
Analyzer IP address	192.168.1.45		Lamp voltage	798	797
Calculated slope	0.987594	0.987279	Chamber temp	45	45
Calculated intercept	0.073698	0.383508	Pressure	549.5	551.3
Analyzer Background	14.9	15	Flow	0.974	980.000
Analyzer Coefficient	1.246	1.246	Intensity	112	112
			Converter temp.	342	343

Analyzer make/model	Thermo 450i	Analyzer serial #	1218153583
Converter make/model	na	Converter serial #	na

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.4	----
as found span	5000	78.4	80.0	80.7	0.992
SO2 scrubber check	5000	20.9	199.8	1.6	----
calibrator zero	5000	0.0	0.0	-0.4	----
high point	5000	78.4	80.0	80.7	0.992
second point	5000	39.3	40.1	40.1	1.001
third point	5000	19.7	20.1	20.1	0.999
as left zero	5000	0.0	0.0	0.0	----
as left span	5000	78.5	80.1	80.4	0.996
				Average Correction Factor	0.997

Corrected As found	81.1	Previous response	80.9	% change	-0.2%

Notes:

No adjustments made. Scrubber check completed after third point.

Calibration Performed By: Devin Russell

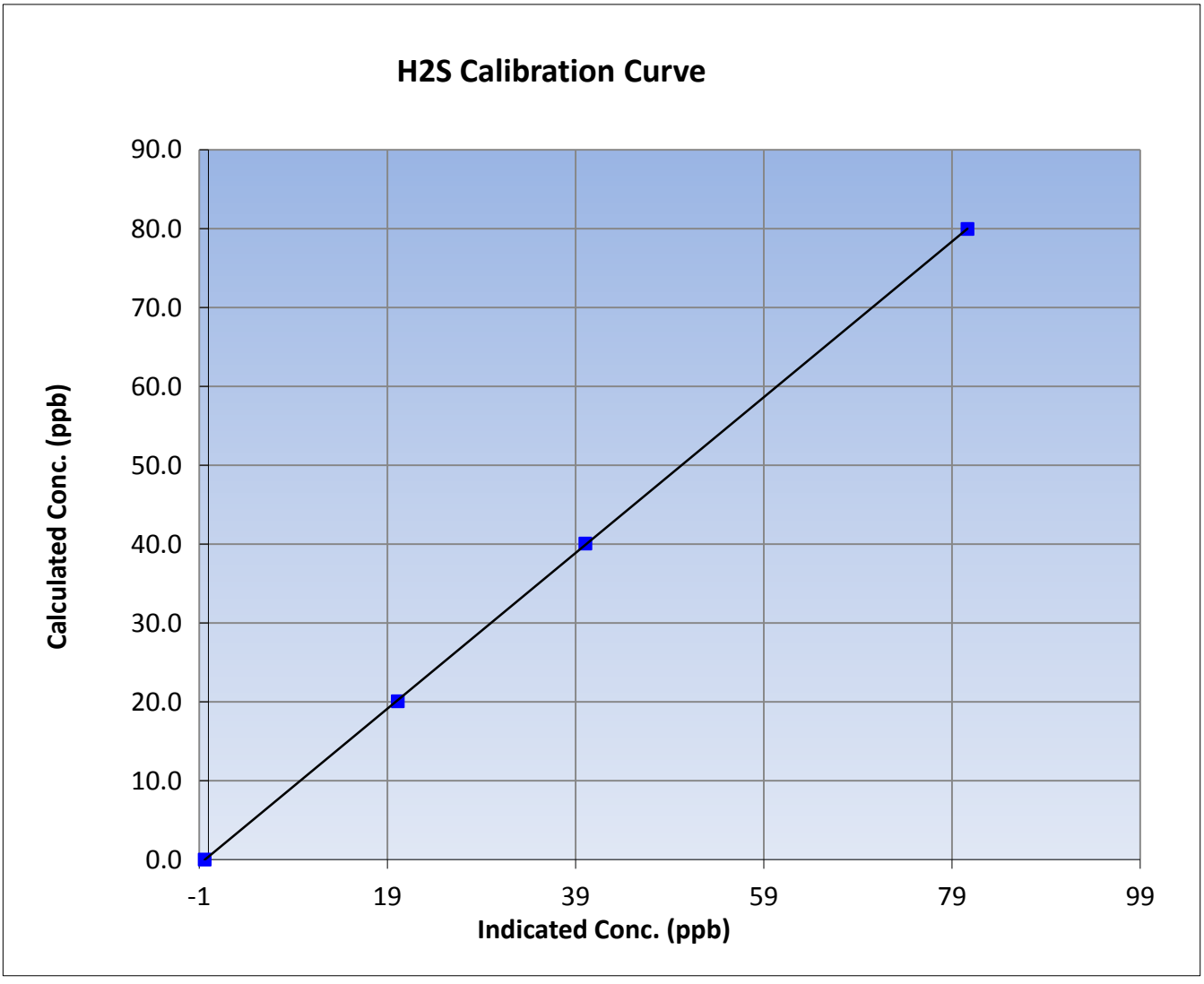
Wood Buffalo Environmental Association
H2S Calibration Report

Station Information

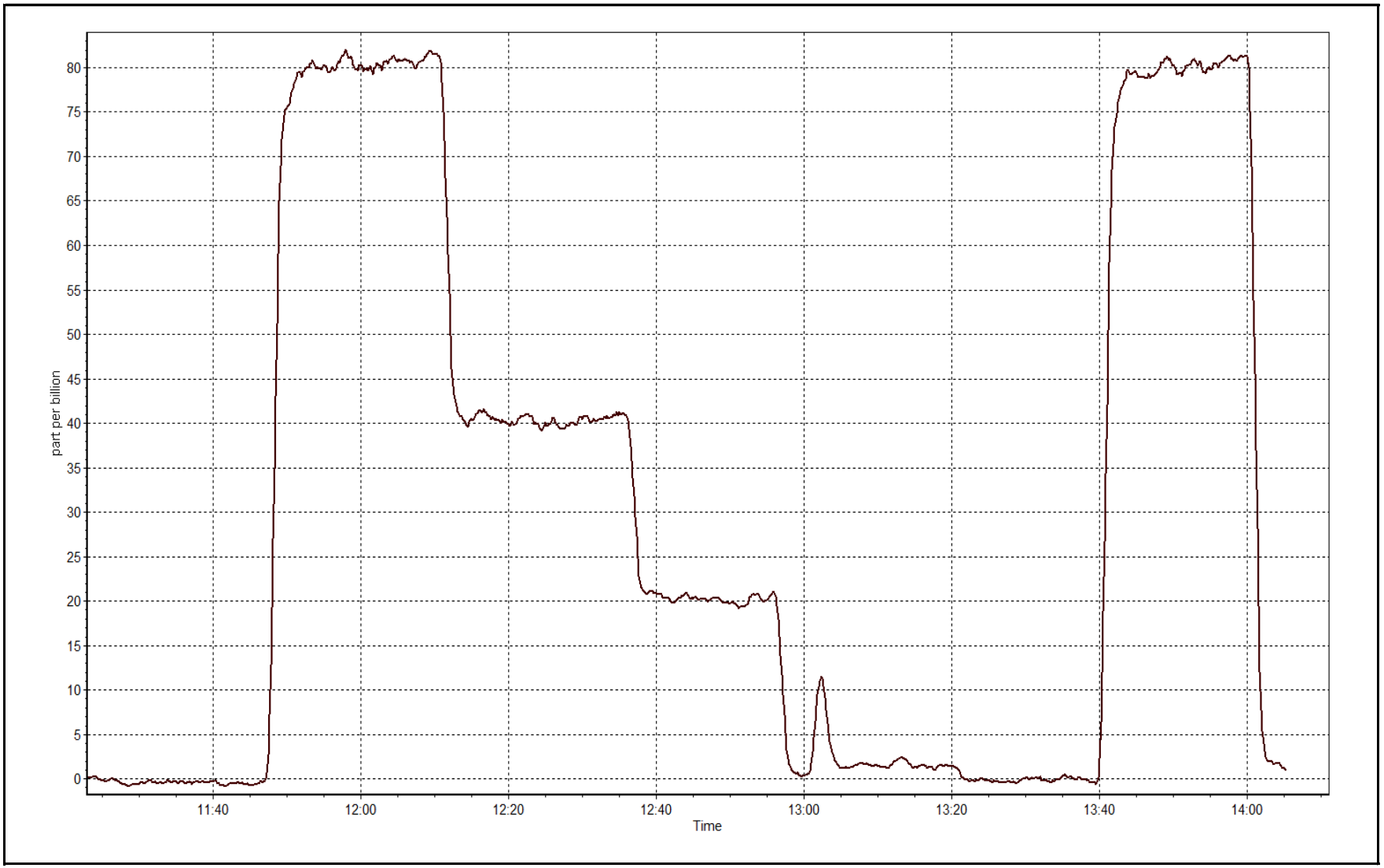
Calibration Date	April 14, 2016	Previous Calibration	March 29, 2016
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	11:30	End Time (MST)	14:05
Analyzer make	Thermo 450i	Analyzer serial #	1218153583

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.4	----	Correlation Coefficient	0.999987
80.0	80.7	0.9915		
40.1	40.1	1.0006	Slope	0.987279
20.1	20.1	0.9992		
			Intercept	0.383508



H2S Calibration Plot Date: April 14, 2016



Wood Buffalo Environmental Association
THC Calibration Report

Station Information

Calibration Date	April 13, 2016	Last Calibration	March 21, 2016
Station Name	Wapasu	Station Number	AMS 17
Reason:	Routine		
Start Time (MST)	8:45	End Time (MST)	13:20
Gas Cert Reference	SA130010A	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	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	41.0	41.0
Calculated slope	0.998894	0.997871	Fuel Pressure	24.8	24.8
Calculated intercept	0.026873	0.002821	Analyzer Coeff	4.4	4.3
			Analyzer BKG	3.000	2.880

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	-0.11	----
as found span	5000	60.4	13.19	13.15	1.003
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	60.4	13.19	13.21	0.999
second point	5000	30.2	6.60	6.64	0.994
third point	5000	15.2	3.32	3.30	1.006
as left zero	5000	0.0	0.00	0.04	----
as left span	5000	60.4	13.19	13.17	1.002
				Average Correction Factor	1.000

Corrected As found	13.26	Previous response	13.18	% change	-0.6%

Notes:

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

Calibration Performed By: Devin Russell

Wood Buffalo Environmental Association
THC Calibration Report

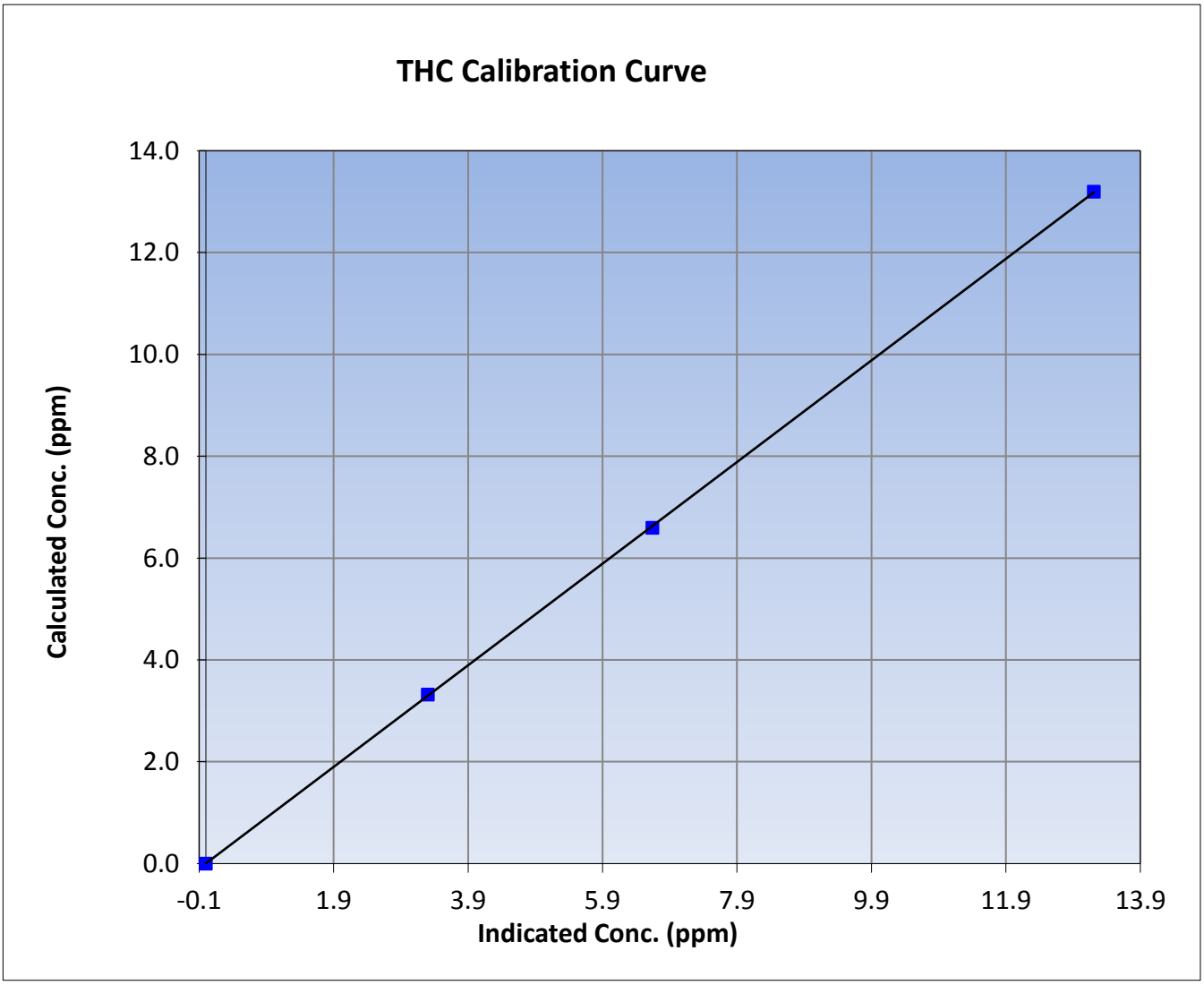
W B E A

Station Information

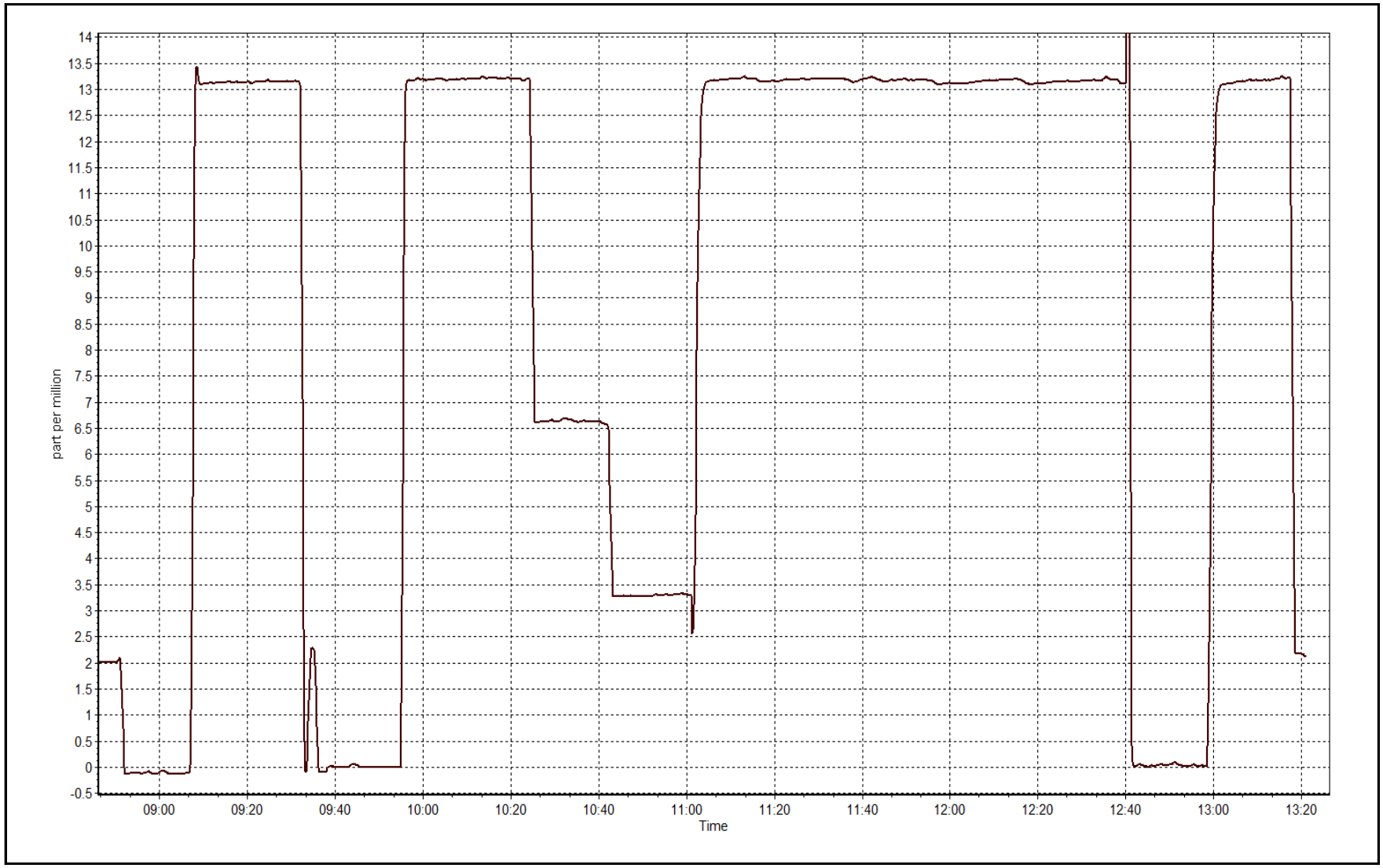
Calibration Date	April 13, 2016	Previous Calibration	March 21, 2016
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	8:45	End Time (MST)	13:20
Analyzer make	Thermo 51i-LT	Analyzer serial #	1218153352

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999982
13.19	13.21	0.9988		
6.60	6.64	0.9936	Slope	0.997871
3.32	3.30	1.0062		
			Intercept	0.002821



THC Calibration Plot Date: April 13, 2016



Wood Buffalo Environmental Association
O_3 Calibration Report

Station Information

Calibration Date	April 14, 2016	Previous Calibration	March 24, 2016
Station Name	Wapasu	Station Number	AMS 17
Reason:	Routine		
Start Time (MST)	8:50	End Time (MST)	11:25
NO2 GPT Ref date	April 13, 2016	Transfer Standard	NOX GPT
		Station temp.	23 Deg C
Calibrator Make/Model	Teledyne API 700	Serial Number	997
ZAG make/model	Teledyne API 701	Serial Number	4427
DACS make/model	Campbell Scientific CR3000	Serial Number	6894

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 500 ppb		Bench temp.	28.1	27.4
Analyzer IP address	192.168.1.48		Lamp temp.	58.0	58.0
Calculated slope	0.998737	0.996497	Pressure	25.8	25.7
Calculated intercept	-0.696834	0.404988	Flow cell A	713	707
Analyzer Background	6.2	6.2	Flow cell B	713	722
Analyzer Coefficient	0.986	0.986	O3 measure	4536.7	4536
			O3 reference	4537.1	4538

Analyzer make	Teledyne API T400	Analyzer serial #	824

Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator Lamp Intensity	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000		0.0	-0.1	----
as found span	5000	713.6/1082.0	376.1	379.2	0.992
calibrator zero	5000		0.0	-0.1	----
high point	5000	713.6/1082.0	376.1	376.9	0.998
second point	5000	496.5/973.6	253.6	254.6	0.996
third point	5000	260.3/849.3	131.4	130.7	1.005
as left zero	5000		0.0	-0.4	----
as left span	5000	713.6/1082.0	376.1	373.8	1.006
				Average Correction Factor	1.000

Corrected As found	379.3	Previous response	377.3	% change	-0.5%

Notes:

Inlet filter changed after as founds. No adjustments made.

Calibration Performed By: Devin Russell

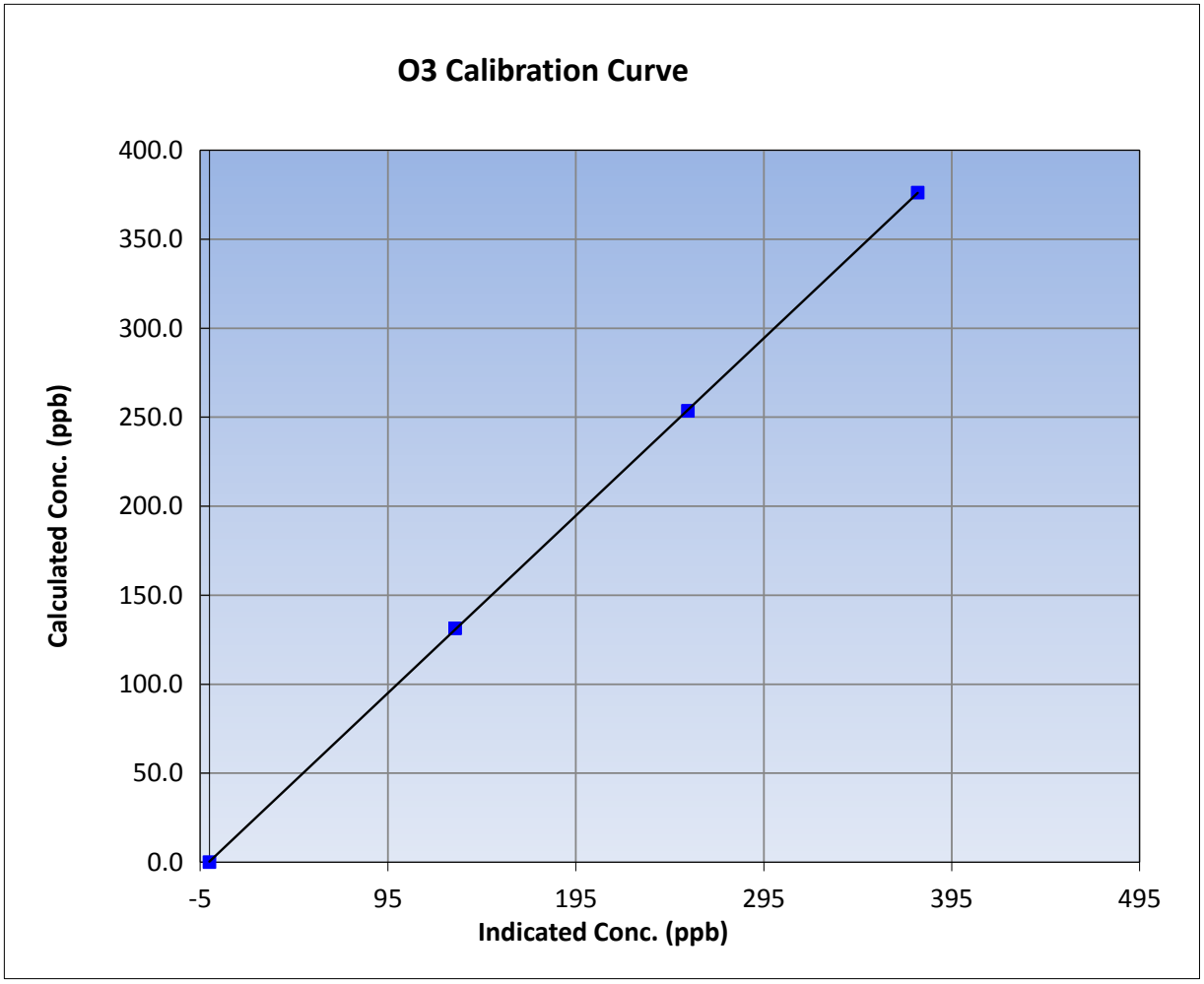
Wood Buffalo Environmental Association
O3 Calibration Report

Station Information

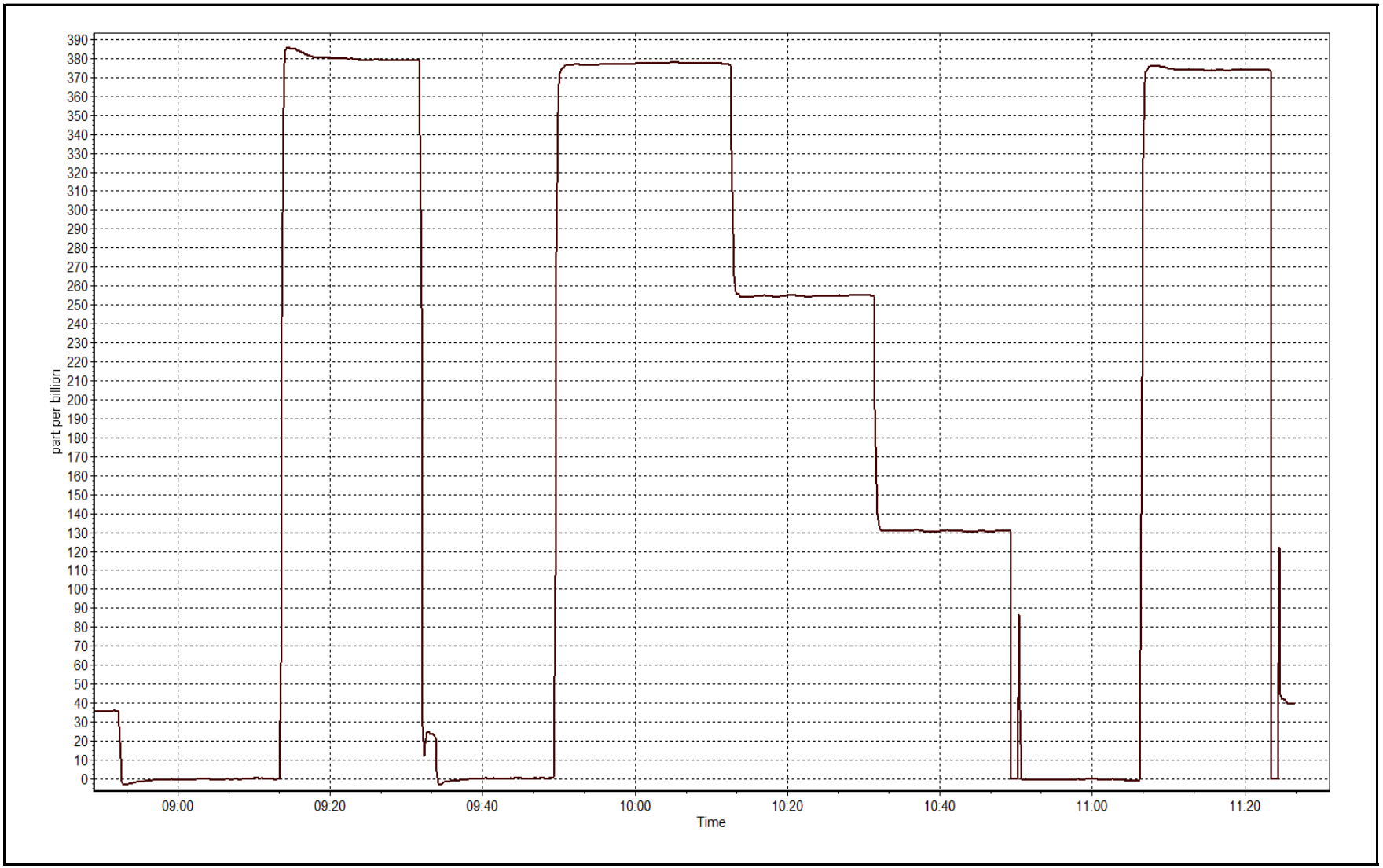
Calibration Date	April-14-16	Previous Calibration	March 24, 2016
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	8:50	End Time (MST)	11:25
Analyzer make	Teledyne API T400	Analyzer serial #	824

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999989
376.1	376.9	0.9978		
253.6	254.6	0.9962	Slope	0.996497
131.4	130.7	1.0051		
			Intercept	0.404988



O3 Calibration Plot Date: April 14, 2016



Wood Buffalo Environmental Association
NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	April 13, 2016	Previous Calibration	March 23, 2016
Station Name	Wapasu	Station Number	AMS 17
Reason:	Routine		
Start Time (MST)	8:45	End Time (MST)	13:20
NO Cal Gas Conc	49.7 ppm	Gas Cert Reference	SA130010A
NOx Cal Gas Conc	49.7 ppm	Cal Gas Expiry Date	12/12/2016
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	0.996567	0.999993	0.994240
	Data Offset	-0.469569	-0.197634	-1.129949
Current Calibration	Data Slope	0.993655	0.993733	1.005839
	Data Offset	3.221371	2.388407	0.770084

Analyzer Information

Analyzer make/model	API T200	Analyzer serial #	833

Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
Analyzer IP	192.168.1.72		192.168.1.72	
NO coefficient	0.980		1.001	
NOX coefficient	0.985		0.999	
NO2 coefficient	1.000		1.000	
NO bkgrnd	-6.2		0.7	
NOX bkgrnd	-5.8		1.4	
Chamber Temp	50	Deg C	50	Deg C
Moly Temp	316.3	Deg C	314.1	Deg C
PMT voltage	781	V	781	V
PMT Temp	7	Deg C	7	Deg C
O3 flow	72	ccm	71	ccm
R Cell press NO	5.8	mmHg	5.8	mmHg
R Cell Press Nox	5.8	mmHg	5.8	mmHg
NO sample flow	0.445	lpm	0.442	lpm
Nox sample Flow	0.445	lpm	0.442	lpm

Notes:

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

Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: April 13, 2016 Station Number: AMS 17

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	3.2	3.1	0.1	----	----
as found span	5000	60.4	600.4	600.4	0.0	598.0	593.1	4.9	1.0039	1.0123
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.5	-0.2	-0.3	----	----
high point	5000	60.4	600.4	600.4	0.0	602.1	602.2	-0.2	0.9972	0.9969
second point	5000	30.2	300.2	300.2	0.0	298.3	300.3	-2.1	1.0064	0.9995
third point	5000	15.2	151.1	151.1	0.0	145.6	146.3	-0.8	1.0380	1.0326
as left zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.2	-0.1	----	----
as left span	5000	60.4	600.4	222.8	377.5	595.3	222.4	372.9	1.0086	1.0020
								Average Correction Factor	1.0139	1.0097

Corrcted As found NO_X= 594.8 NO= 590.0 Percent Change NO_X= 1.4% NO= 1.8%

Previous Response NO_X= 602.9 NO= 600.6

GPT Calibration Data

Dilution Flow (total) 5000 ccm Source Gas Flow 60.40 ccm NOX ref calc conc = 600.4 ppb NO ref calc conc = 600.4 ppb

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
1st NO ref point		0.0	600.0	598.9	-0.3	1.0007	1.0024	----	----
1st NO2 (300)	222.8	376.1	596.2	222.8	373.4	1.0070	----	1.0072	99.3%
2nd NO2 (200)	345.3	253.6	596.7	345.3	251.4	1.0061	----	1.0088	99.1%
3rd NO2 (100)	467.6	131.4	596.6	467.6	129.0	1.0063	----	1.0180	98.2%
2nd NO ref point	----	0.0	598.2	598.6	-0.4	1.0036	1.0030	----	----
				Average Correction Factor		1.0058		1.0113	98.9%

Calibration Performed By: Devin Russell

Wood Buffalo Environmental Association

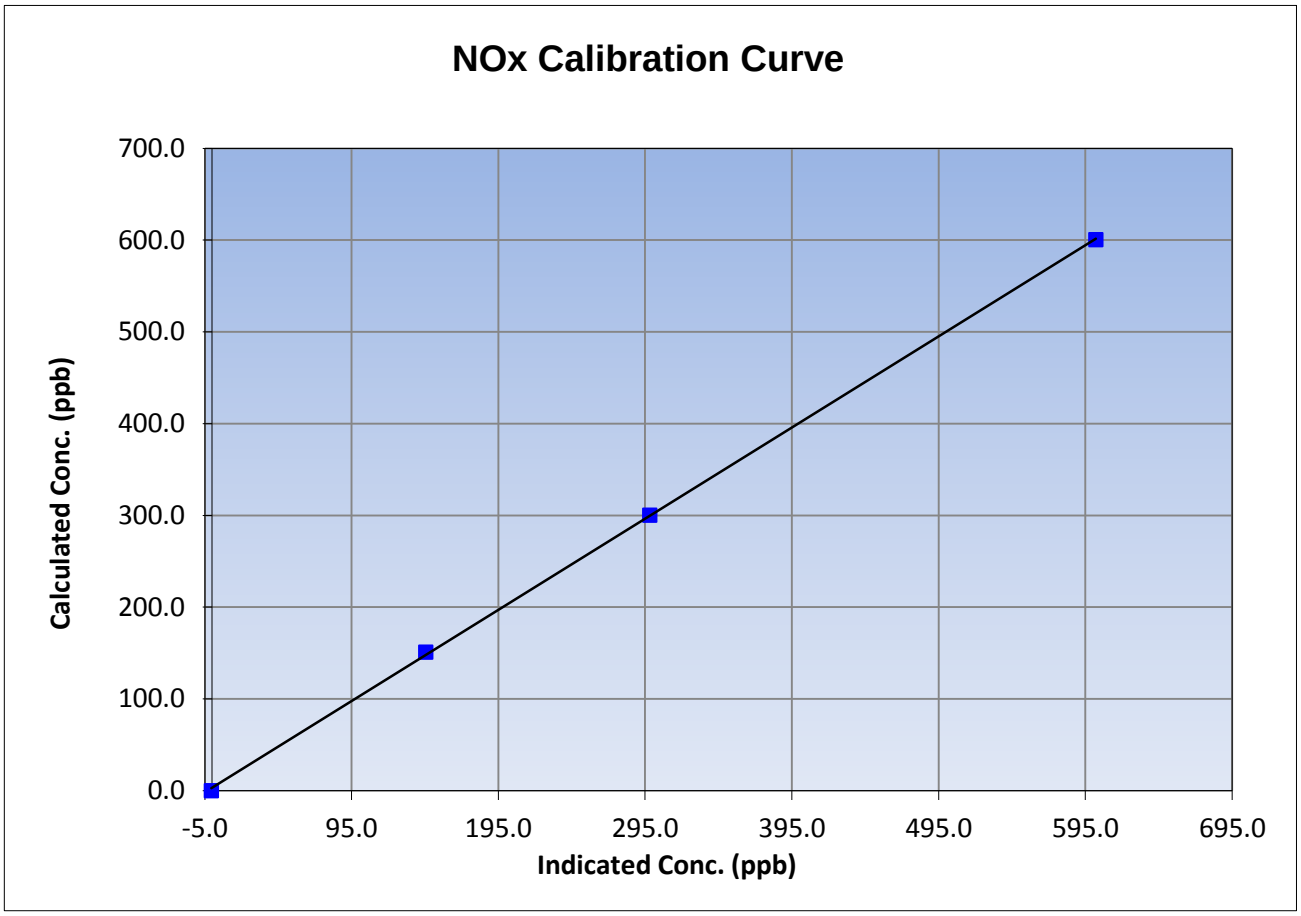
NO_X Calibration Summary

Station Information

Calibration Date	April 13, 2016	Previous Calibration	March 23, 2016
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	8:45	End Time (MST)	13:20
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	-0.5	----	Correlation Coefficient	0.999901
600.4	602.1	0.9972		
300.2	298.3	1.0064	Slope	0.993655
151.1	145.6	1.0380		
			Intercept	3.221371



Wood Buffalo Environmental Association

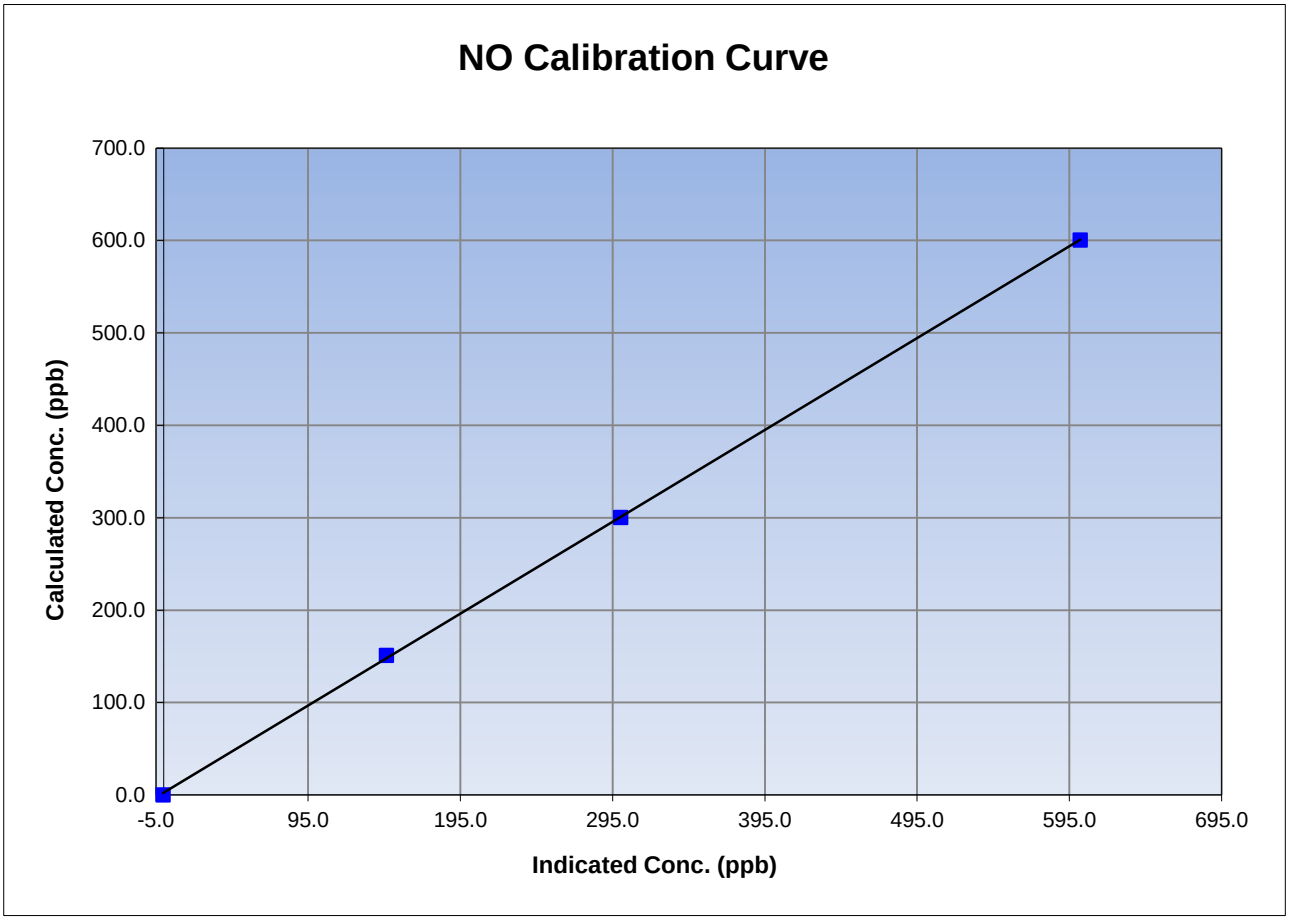
NO Calibration Summary

Station Information

Calibration Date	April 13, 2016	Previous Calibration	March 23, 2016
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	8:45	End Time (MST)	13:20
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	-0.2	N/A	Correlation Coefficient	0.999918
600.4	602.2	0.9969		
300.2	300.3	0.9995	Slope	0.993733
151.1	146.3	1.0326		
			Intercept	2.388407



Wood Buffalo Environmental Association

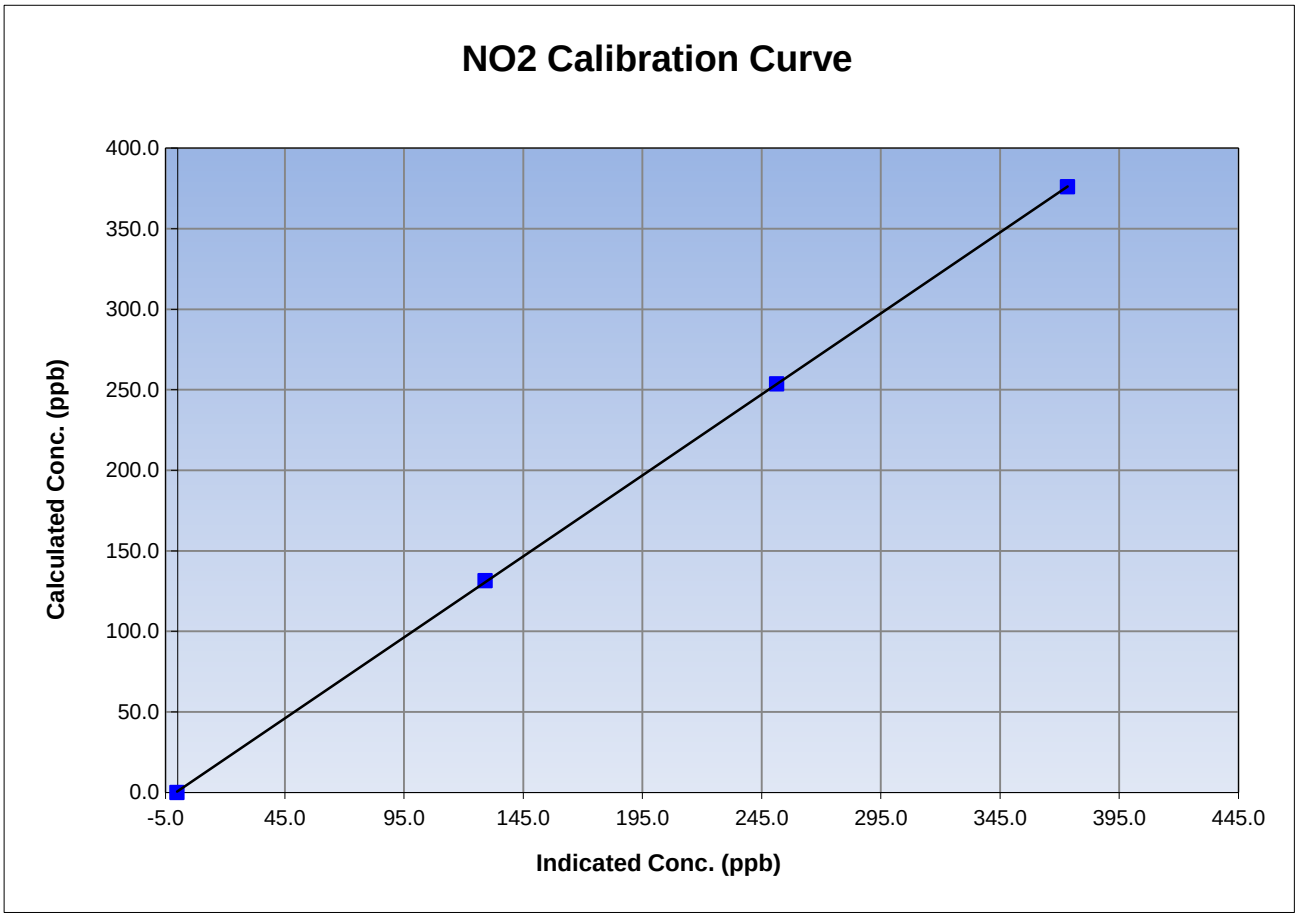
NO_2 Calibration Summary

Station Information

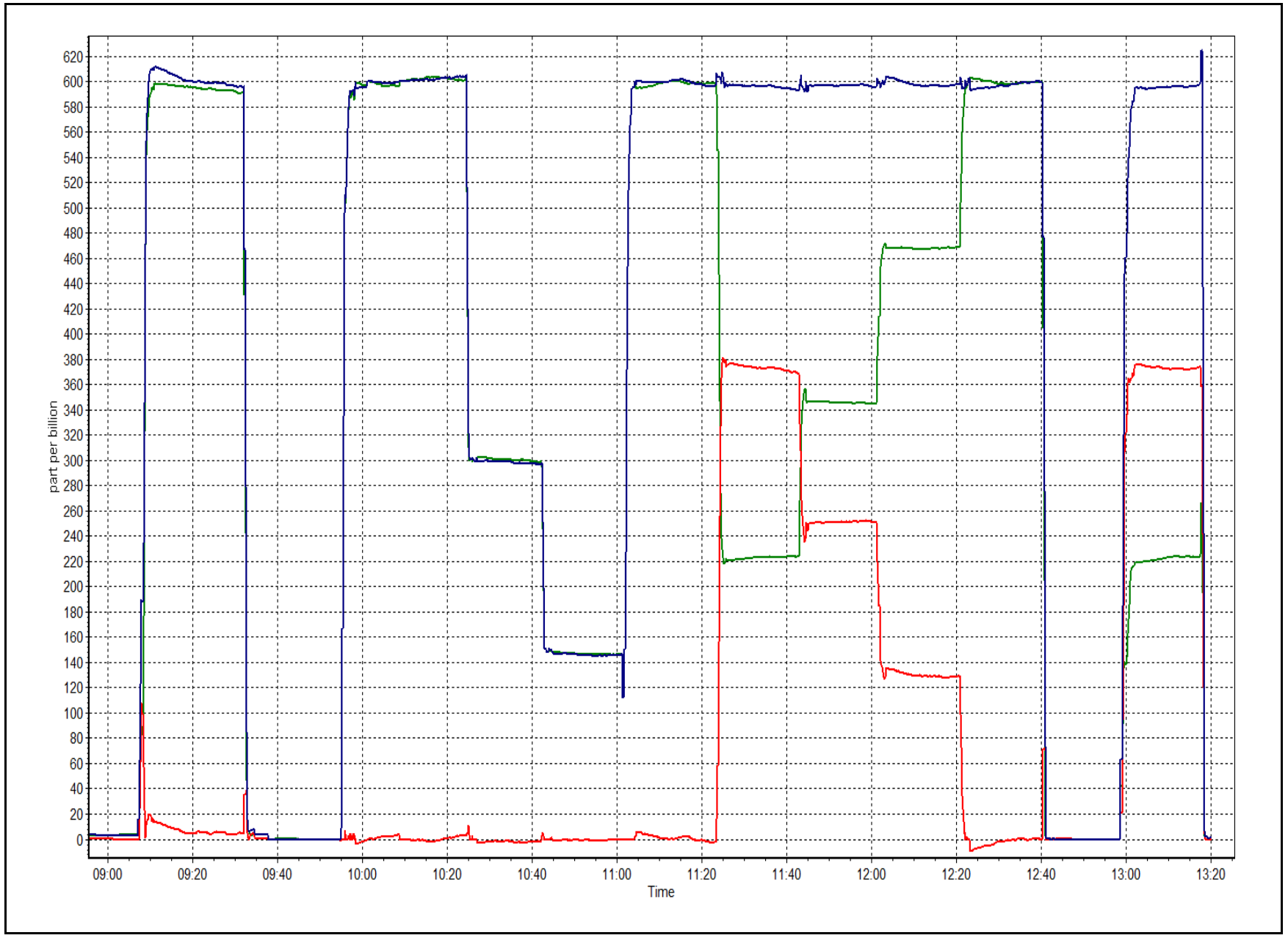
Calibration Date	April 13, 2016	Previous Calibration	March 23, 2016
Station Number	Wapasu	Station Number	AMS 17
Start Time (MST)	8:45	End Time (MST)	13:20
Analyzer make	API T200	Analyzer serial #	833

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.3	N/A	Correlation Coefficient	0.999988
376.1	373.4	1.0072		
253.6	251.4	1.0088	Slope	1.005839
131.4	129.0	1.0180		
			Intercept	0.770084



NOX Calibration Plot Date: April 13, 2016



Wood Buffalo Environmental Association

SHARP CALIBRATION

STATION INFORMATION

Calibration Date:	April 14, 2016	Previous Calibration:	March 29, 2016
Station Name:	Wapasu	Station Number:	AMS 17
Start Time (MST):	9:00	End Time (MST):	10:00
Calibrator Make/Model:	Delta Cal	Calibrator Serial Number:	141228

SHARP INFORMATION

Particulate Fraction:	PM2.5
Make/Model:	Thermo / SHARP 5030
Serial Number	E-1107
C_{14} Source SN:	2518
Confirmation of Time settings:	Yes ☑ No ☐

Paremeters Checked: T1 ☑ T2 ☐ T3 ☐ T4 ☐ P3 ☑ Main Flow ☑ Beta ☐ Neph ☑

CALIBRATION DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	-4.0	-4.6	-0.6	8.0
T2	17.0	na	na	
T3	19.0	na	na	
T4	19.0	na	na	
RH (%)	18.0	na	na	

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	948	946.6	-1.4	953

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	200		200
Neph	0.5		0.5
C14	3.8		3.8
Indicated Concentration (ug/m3)	**0.3**	**no**	**0.3**
Offset 1	199.8		199.8
Offset 2	32		32

Leak Check (Quarterly)

Leak Check Date: March 29, 2016 Previous Leak Check Date: February 17, 2016

	Measured	Difference LPM (Limit +/- 0.42 LPM)
Flow without adaptor (LPM):	16.71	0.03
*Flow with adaptor (LPM):	16.68	

**Note - do not attach adaptor without shutting off the pump first*

Mass Foil Calibration (Annualy)

Foil Calibration Date: Previous Foil Calibration:

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 / clean	29/03/2016
Pump	Good	
Filter Tape	Good	
Mass Foil Cal Set	na	
HEPA filter	Good	

NOTES:

Zero checked. No adjustments made. Filter tape has about 25% of the roll left.

Calibration Performed By: Devin Russell

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 18
CONKLIN LOOKOUT
APRIL 2016

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

May 27, 2016

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONKLIN LOOKOUT (AMS 18)
APRIL 2016

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	686	34	34	100.00	2	0	1	0
TRS(ppb) Average	686	34	34	100.00	1	0	0	0
THC(ppm) Average	670	39	50	98.47	2.2	-	2.1	-
NMHC(ppm) Average	670	39	50	98.47	0.047	-	0.011	-
CH4(ppm) Average	670	39	50	98.47	2.2	-	2.1	-
O3 (ppb) Average	687	33	33	100.00	63	0	56	-
NO2 (ppb) Average	686	34	34	100.00	3	0	1	-
NO (ppb) Average	686	34	34	100.00	1	-	0	-
NOX (ppb) Average	686	34	34	100.00	4	-	1	-
PM2.5 (ug/m3) Average	718	1	2	99.86	46.1	-	7.6	0
Wind Speed 10 m (km/h) Average	720	0	0	100.00	25	-	17	-
Wind Direction 10 m (deg) Average	720	0	0	100.00	-	-	-	-
Temperature 2 m (C) Average	720	0	0	100.00	23.2	-	17.1	-
Relative Humidity (%) Average	720	0	0	100.00	99	-	95.0	-
Precipitation (mm) Total	720	0	0	100.00	1.7	-	7.0	-
Leaf Wetness (% of range) Average	720	0	0	100.00	92	-	28.0	-
Global Solar Radiation (W/m2) Average	720	0	0	100.00	877	-	299.0	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONKLIN LOOKOUT (AMS 18)
APRIL 2016

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	0.3	0	-	0	0	0	0	0	1	2
TRS (ppb) Average	686	0.3	0	-	0	0	0	0	0	0	1
THC (ppm) Average	670	1.97	0.1	-	1.8	1.9	1.9	2	2	2	2.2
NMHC(ppm) Average	670	0.001	0.004	-	0	0	0	0	0	0	0.047
CH4(ppm) Average	670	1.97	0.1	-	1.8	1.9	1.9	2	2	2	2.2
O3 (ppb) Average	687	42.9	8	-	25	34	38	42	48	54	63
NO2 (ppb) Average	686	0.9	0	-	0	0	1	1	1	2	3
NO (ppb) Average	686	0.1	0	-	0	0	0	0	0	0	1
NOX (ppb) Average	686	1	1	-	0	0	1	1	1	2	4
PM2.5 (ug/m3) Average	718	2.94	2.6	-	0.2	0.8	1.5	2.4	3.9	5.6	46.1
Wind Speed 10 m (km/h) Average	720	9.6	4	-	1	5	7	9	12	15	25
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-
Temperature 2 m (C) Average	720	4.52	6.9	-	-8.2	-3.4	-0.4	3.1	8.9	15.1	23.2
Relative Humidity (%) Average	720	56.7	24	-	11	25	37	54	76	93	99
Precipitation (mm) Total	720	-	-	17.11	-	-	-	-	-	-	-
Surface Wetness (% of range) Average	720	5	12	-	0	1	1	1	2	13	92
Global Solar Radiation (W/m2) Average	720	188	251	-	0	0	0	48	312	625	877

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONKLIN LOOKOUT (AMS 18)
APRIL 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
THC	01 Apr 2016 16:00	01 Apr 2016 16:00	1	Power spike
THC	02 Apr 2016 10:00	02 Apr 2016 10:00	1	Maintenance - reinitiated daily QA check
THC	02 Apr 2016 12:00	02 Apr 2016 12:00	1	Maintenance - diagnostic capture
THC	03 Apr 2016 12:00	03 Apr 2016 16:00	5	Maintenance - sample pump replaced
THC	04 Apr 2016 11:00	04 Apr 2016 13:00	3	Maintenance - diagnostics and troubleshooting
PM2.5	21 Apr 2016 13:00	21 Apr 2016 13:00	1	Unstable operation - excessive baseline drift

Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO_2) - ppb

Conklin Lookout - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 2 ppb on Apr 18 09:00 Maximum Daily Average: 0.7 ppb on Apr 1

Minimum Value: 0 ppb on Apr 18 16:00
Maximum Diurnal Average: 0.5 ppb at hour 10
Monthly Average: 0.3 ppb

Minimum Daily Average: 0.1 ppb on Apr 26
Minimum Diurnal Average: 0.3 ppb at hour 19
Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 1$ $P_{99} = 1$

Hours in Service:	720
Hours of Data:	686
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-Apr	0	0	Z	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0.7	1
2-Apr	0	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
3-Apr	0	0	0	1	Z	0	0	0	0	0	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0.5	1
4-Apr	0	0	0	0	0	Z	0	0	0	0	0	1	0	0	1	1	1	0	0	0	0	0	0	0	0.3	1
5-Apr	Z	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
6-Apr	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
7-Apr	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
8-Apr	0	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
9-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.2	1
10-Apr	1	1	0	0	1	Z	1	1	1	0	0	0	0	0	0	0	1	1	0	1	1	1	1	1	0.6	1
11-Apr	Z	1	1	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	1	0	1	0.5	1
12-Apr	1	Z	1	1	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1
13-Apr	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
14-Apr	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
15-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.3	1
16-Apr	0	1	1	1	0	Z	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
17-Apr	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
18-Apr	0	Z	0	0	1	1	0	1	2	1	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0.4	2
19-Apr	0	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
20-Apr	0	0	0	Z	0	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0.3	1
21-Apr	0	0	0	0	Z	0	0	1	1	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0.5	1
22-Apr	0	1	1	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
23-Apr	Z	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
24-Apr	0	Z	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
25-Apr	0	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
26-Apr	0	0	0	Z	0	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.1	0
27-Apr	0	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
28-Apr	0	0	0	0	0	Z	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.3	1
29-Apr	Z	1	1	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1
30-Apr	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.5	0.4	0.4	0.3	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	Diurnal Average	
	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Diurnal Maximum	

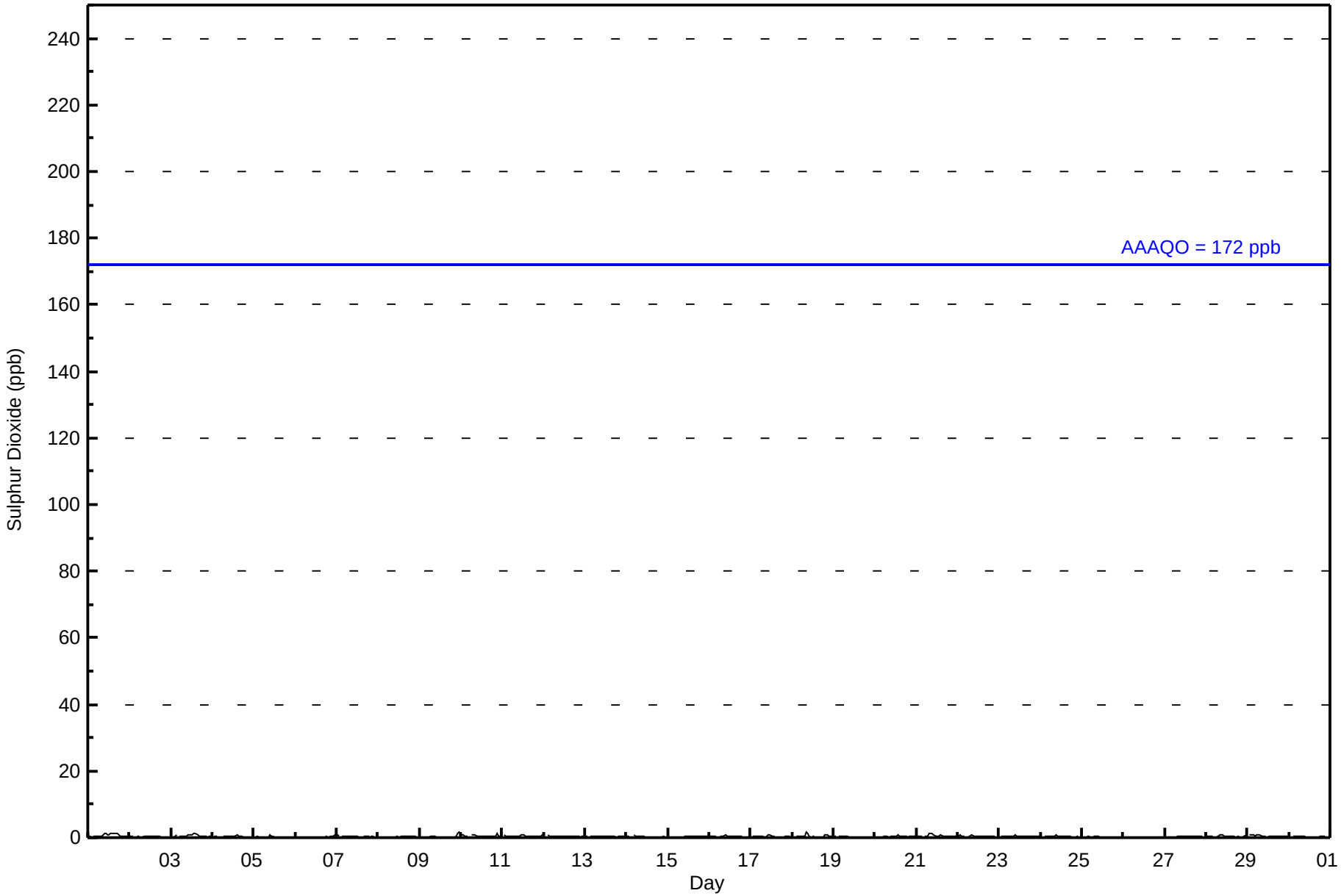
Z - zerospan C - Calibration
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb

Wood Buffalo Environmental Association

Hourly Averages

Sulphur Dioxide (SO_2) - ppb

Conklin Lookout - April 2016



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

Conklin Lookout - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	686	100.00	100.00
11 - 20	0	0.00	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

Conklin Lookout - April 2016

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	29	24	24	41	31	35	73	85	122	31	12	16	31	46	54	686
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	32	29	24	24	41	31	35	73	85	122	31	12	16	31	46	54	686

Total Number of Valid Hours: 686

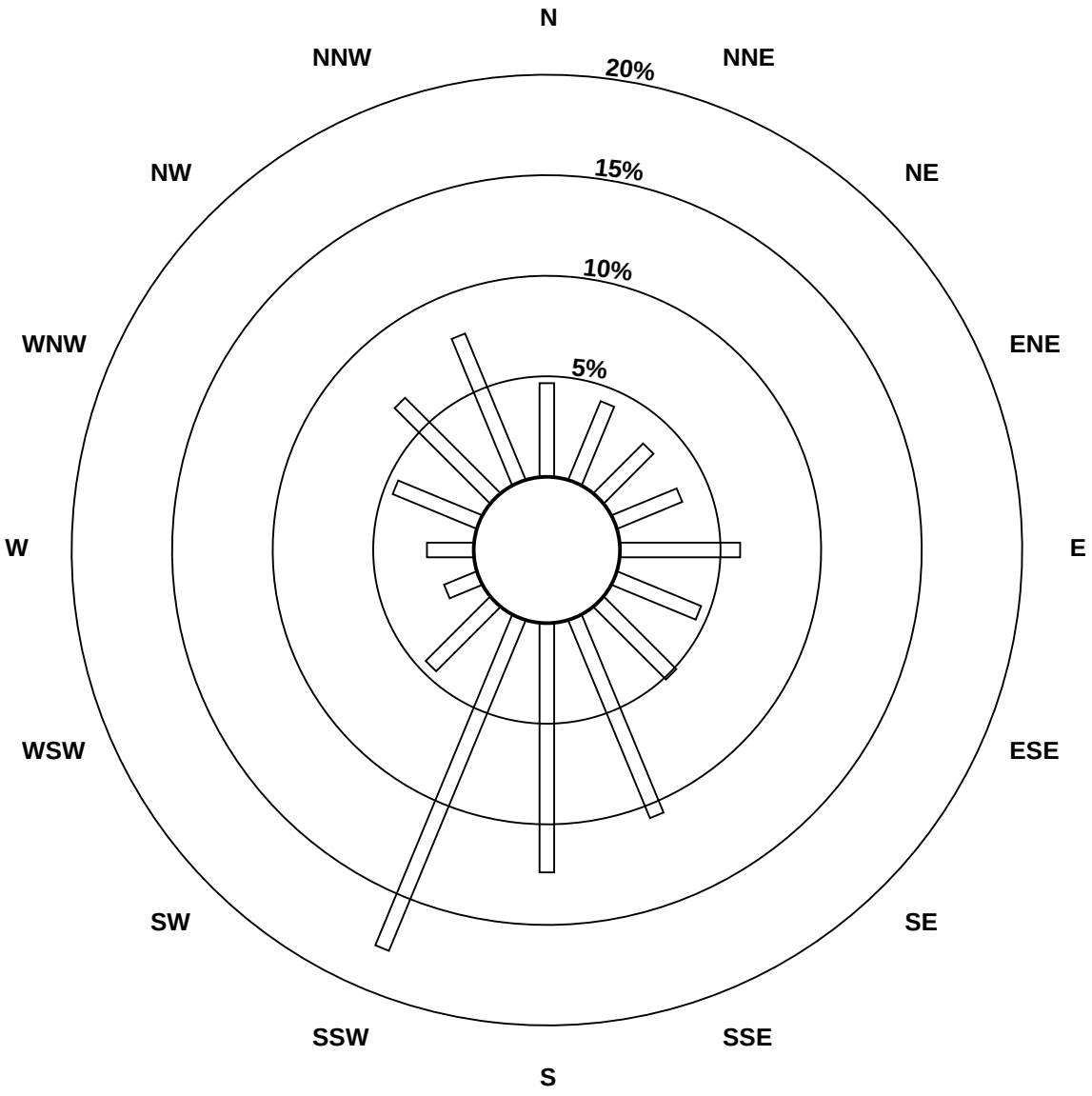
Total Number of Hours: 720

Wood Buffalo Environmental Association

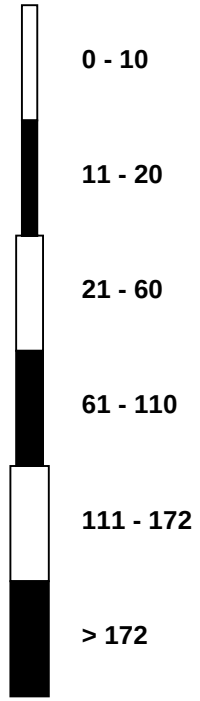
Wind Rose Apr 2016

Sulphur Dioxide (SO_2) - ppb

Conklin Lookout (AMS 18)



Classes (ppb)



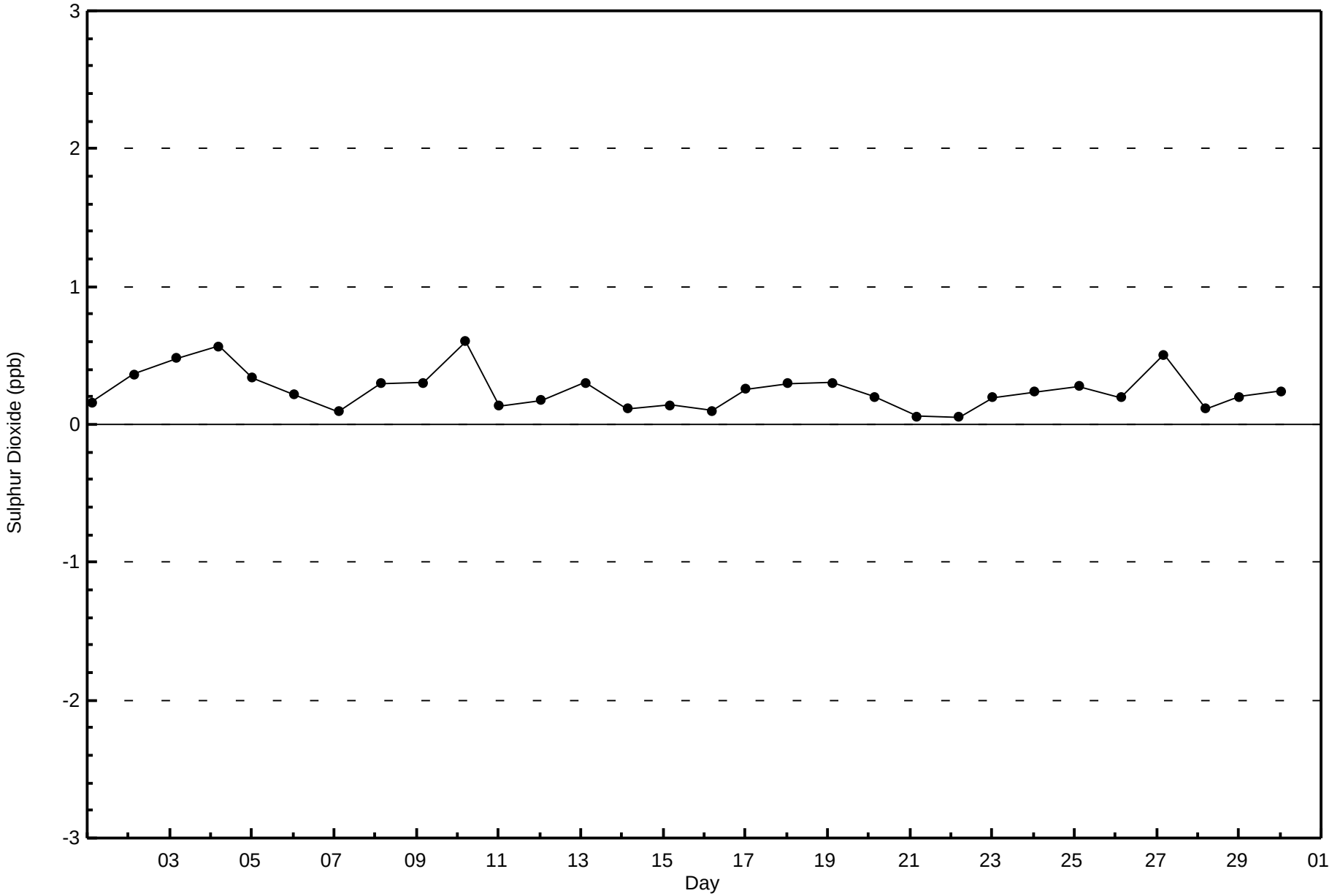
Total Number of Valid Hours: 686

Wood Buffalo Environmental Association

Zero Responses

Sulphur Dioxide (SO_2) - ppb

Conklin Lookout - April 2016



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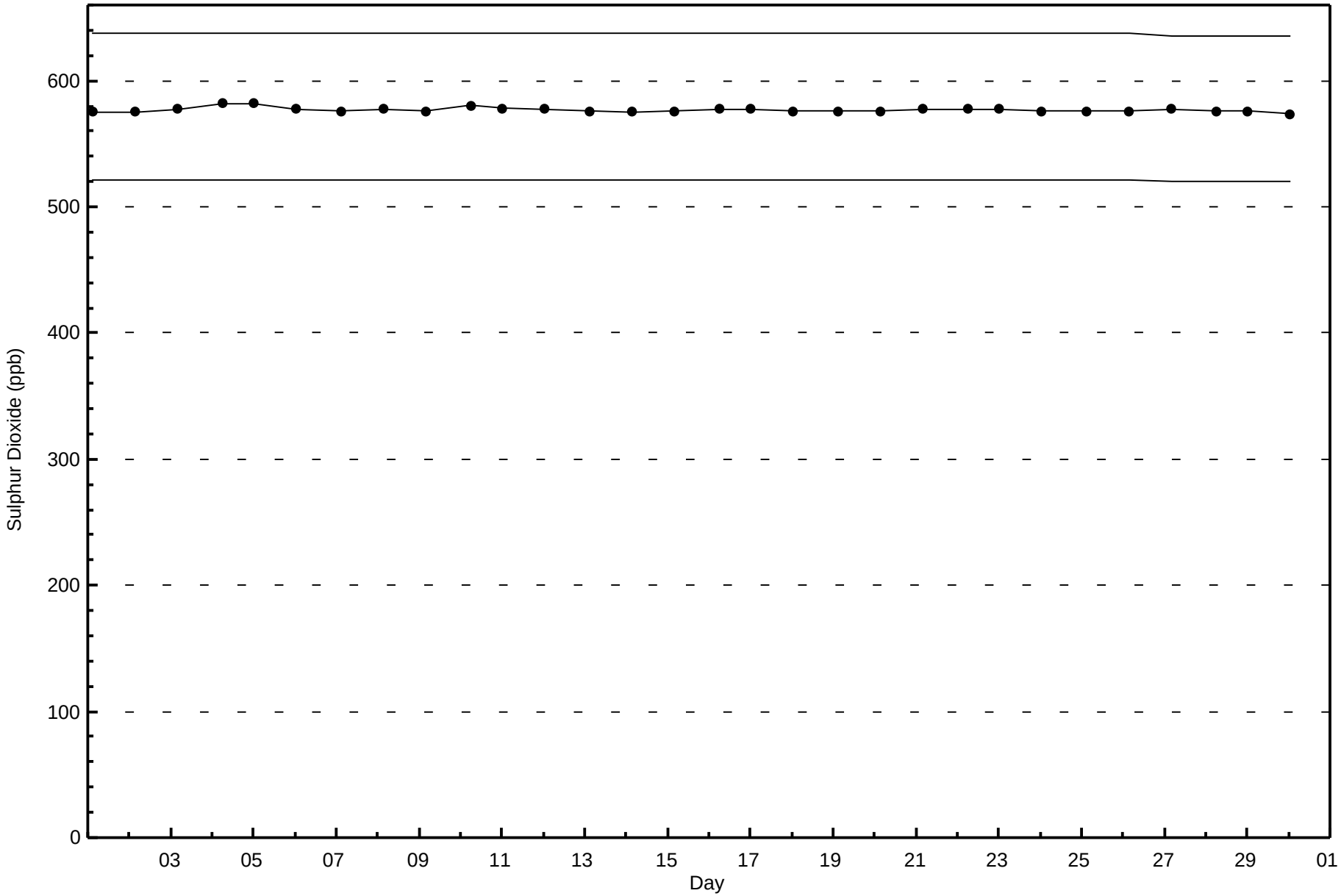
Span Responses

Sulphur Dioxide (SO_2) - ppb

Conklin Lookout - April 2016



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Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

Conklin Lookout - April 2016

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

Maximum Value: 1 ppb on Apr 19 05:00 Maximum Daily Average: 0.4 ppb on Apr 7

Minimum Value: 0 ppb on Apr 14 01:00 Minimum Daily Average: 0.3 ppb on Apr 22

Maximum Diurnal Average: 0.4 ppb at hour 7 Minimum Diurnal Average: 0.3 ppb at hour 16

Monthly Average: 0.3 ppb Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 0$ $P_{99} = 0$

Hours in Service:	720
Hours of Data:	686
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-Apr	0	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
2-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
3-Apr	0	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-Apr	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
5-Apr	0	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-Apr	0	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-Apr	0	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
8-Apr	0	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-Apr	0	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
10-Apr	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
11-Apr	0	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-Apr	0	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-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
14-Apr	0	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
15-Apr	0	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
16-Apr	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
17-Apr	0	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
18-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0
19-Apr	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
20-Apr	0	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-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
22-Apr	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
23-Apr	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
24-Apr	0	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
25-Apr	0	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
26-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	C	0	0	0	0	0	0	0	0	0	0	0	0.3	0
27-Apr	0	0	0	0	0	Z	0	0	0	0	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.3	0
28-Apr	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
29-Apr	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0
30-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0
	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	Diurnal Average	
	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Diurnal Maximum	

Z - zerospan C - Calibration

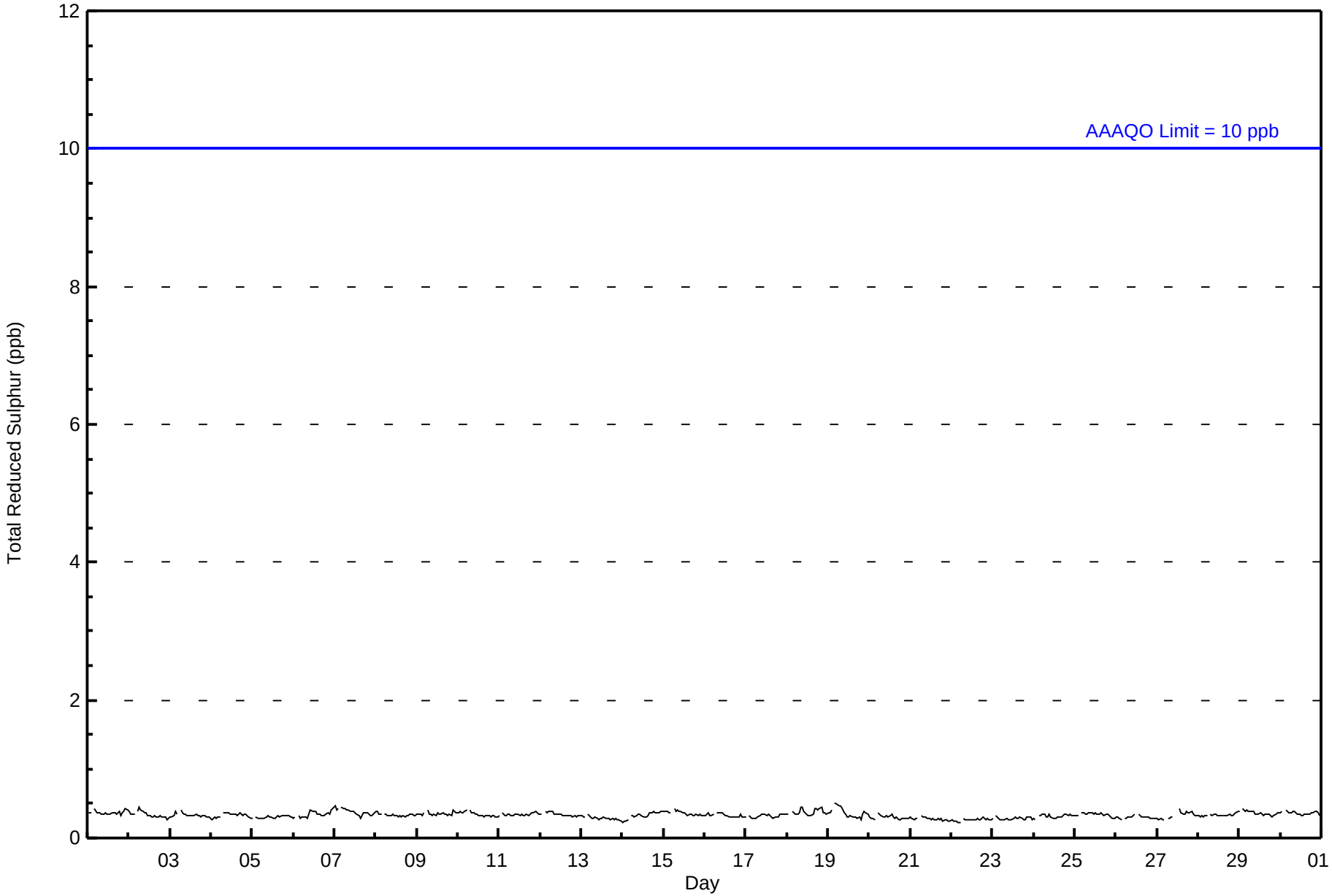
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb

Wood Buffalo Environmental Association

Hourly Averages

Total Reduced Sulphur (TRS) - ppb

Conklin Lookout - April 2016



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb

Conklin Lookout - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	686	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Total Reduced Sulphur (TRS) - ppb

Conklin Lookout - April 2016

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	30	24	24	41	30	34	74	86	122	30	13	15	33	45	54	686
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	31	30	24	24	41	30	34	74	86	122	30	13	15	33	45	54	686

Total Number of Valid Hours: 686

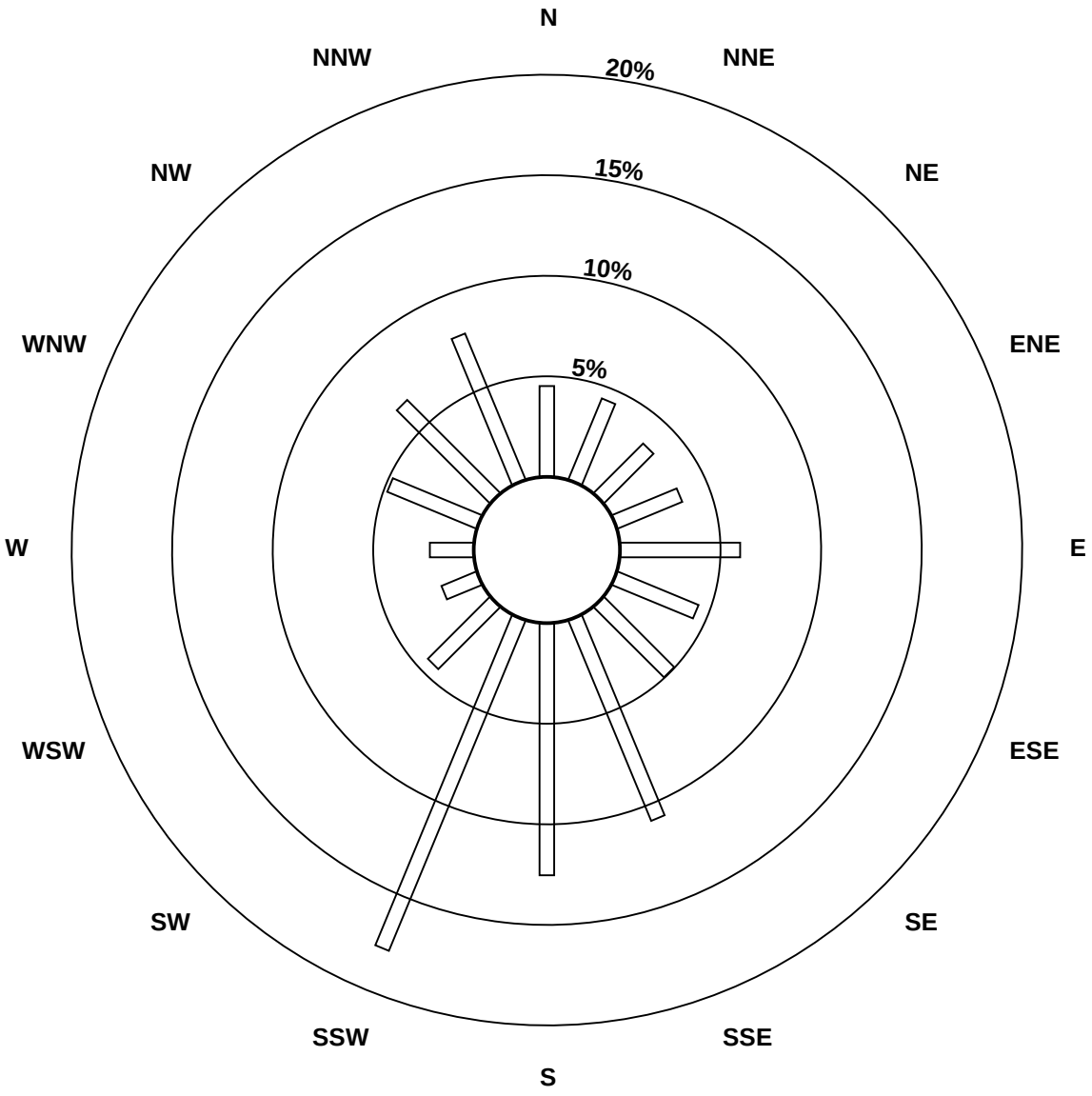
Total Number of Hours: 720

Wood Buffalo Environmental Association

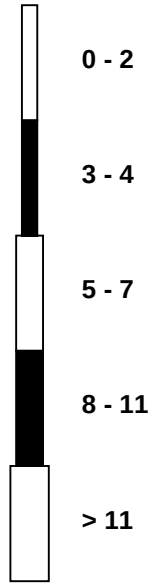
Wind Rose Apr 2016

Total Reduced Sulphur (TRS) - ppb

Conklin Lookout (AMS 18)



Classes (ppb)



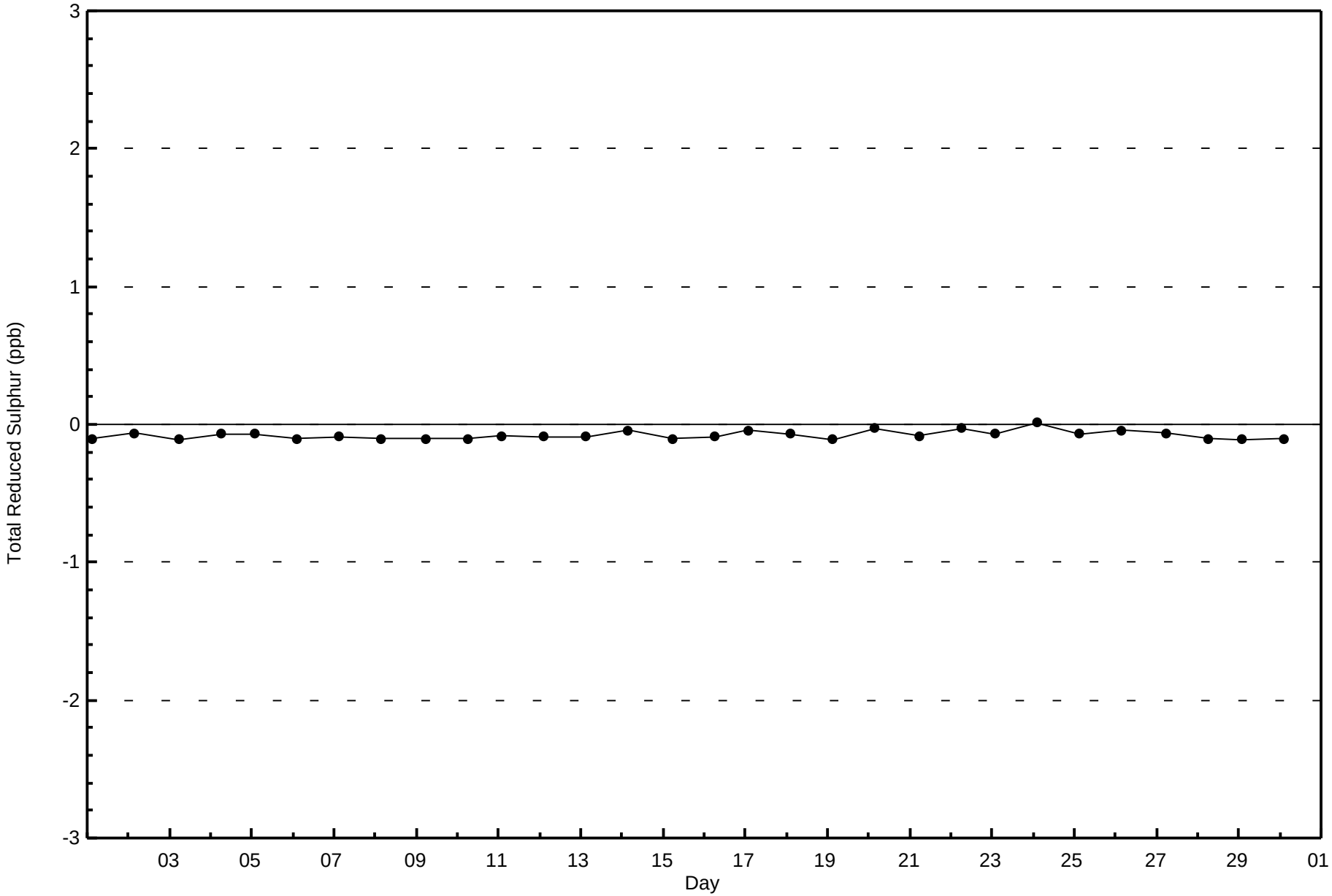
Total Number of Valid Hours: 686

Wood Buffalo Environmental Association

Zero Responses

Total Reduced Sulphur (TRS) - ppb

Conklin Lookout - April 2016

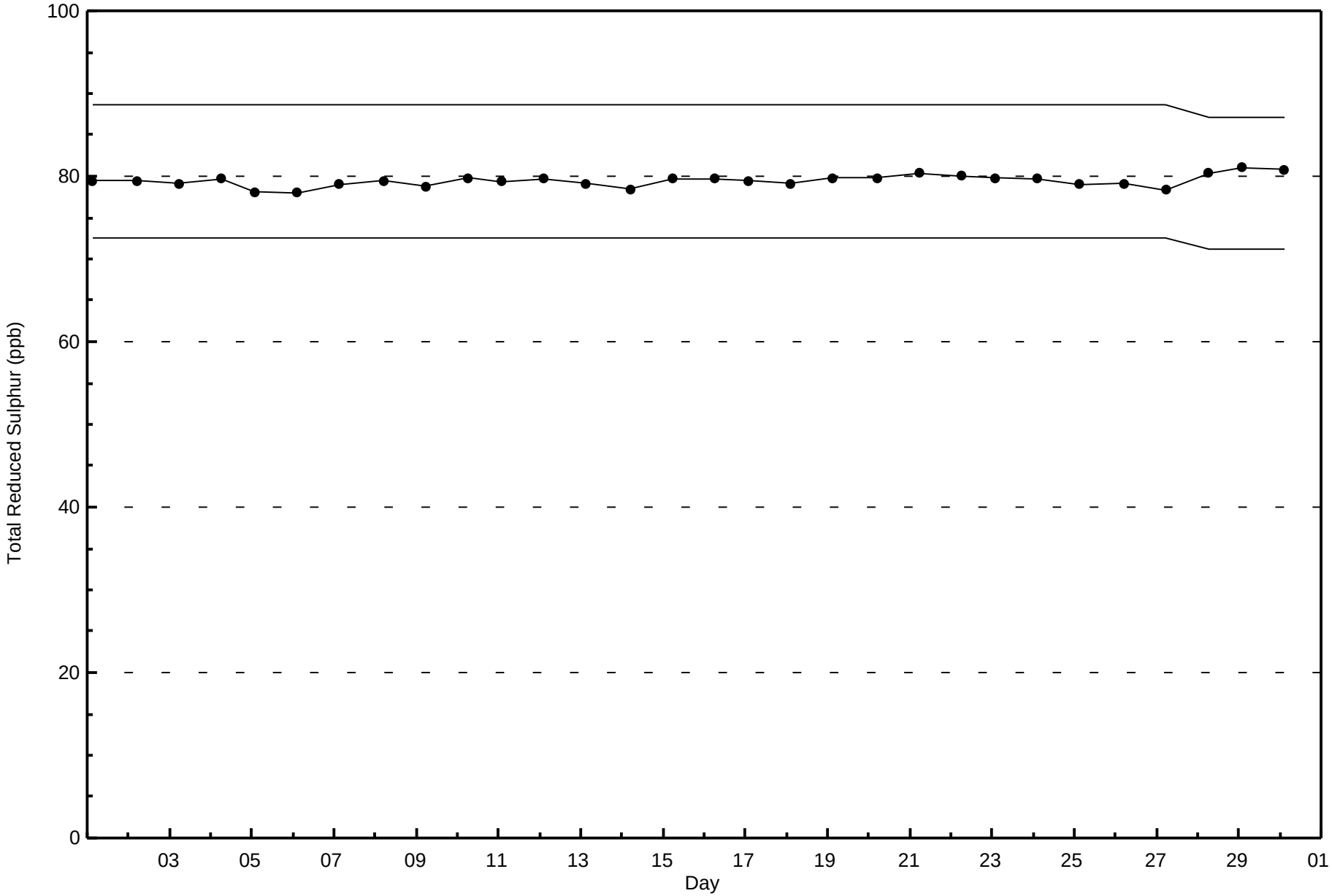


Wood Buffalo Environmental Association

Span Responses

Total Reduced Sulphur (TRS) - ppb

Conklin Lookout - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Conklin Lookout - April 2016

Maximum Value: 2.2 ppm on Apr 9 06:00

Maximum Daily Average: 2.1 ppm on Apr 8

Minimum Value: 1.8 ppm on Apr 2 14:00

Minimum Daily Average: 1.8 ppm on Apr 2

Maximum Diurnal Average: 2.0 ppm at hour 6

Minimum Diurnal Average: 2.0 ppm at hour 17

Monthly Average: 1.97 ppm

Percentiles: P_1 = 1.8 P_{10} = 1.9 Q_1 = 1.9 Median = 2.0 Q_3 = 2.0 P_{90} = 2.0 P_{99} = 2.1

Hours in Service:	720
Hours of Data:	670
Hours of Missing Data:	50
Hours of Calibration:	39
Percent Operational Time:	98.5

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-Apr	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	PF	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9
2-Apr	1.8	1.8	1.8	Z	1.8	1.8	1.8	1.8	1.8	M	1.8	M	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
3-Apr	1.8	1.8	1.8	1.9	Z	1.8	1.8	1.8	1.8	1.8	1.8	M	M	M	M	M	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
4-Apr	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	M	M	M	C	C	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0
5-Apr	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-Apr	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
7-Apr	2.1	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
8-Apr	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
9-Apr	2.1	2.1	2.1	2.1	Z	2.2	2.2	2.1	2.1	C	C	C	2.0	2.0	2.0	1.9	1.9	1.9	2.0	1.9	1.9	2.0	2.0	2.0	2.0	2.2
10-Apr	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	1.9	2.0	1.9	1.9	2.0	1.9	1.9	1.9	2.0	2.0
11-Apr	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
12-Apr	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	1.9	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	2.0	2.0
13-Apr	2.0	1.9	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
14-Apr	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
15-Apr	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
16-Apr	2.0	2.0	2.0	2.0	2.0	Z	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	2.0	2.0	2.0	2.0	2.1
17-Apr	Z	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	2.0	2.1
18-Apr	1.9	Z	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0
19-Apr	1.9	1.9	Z	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
20-Apr	1.9	1.9	1.9	Z	1.9	2.0	2.0	2.0	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	2.0	2.0	1.9	2.0
21-Apr	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0
22-Apr	2.0	1.9	1.9	2.0	2.0	Z	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
23-Apr	Z	1.9	1.9	1.9	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
24-Apr	1.9	Z	2.0	2.0	1.9	2.0	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	1.9	1.9	1.9	1.9	2.0
25-Apr	1.9	1.9	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
26-Apr	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	C	C	C	C	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
27-Apr	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
28-Apr	2.0	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
29-Apr	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
30-Apr	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0
	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	Diurnal Average	
	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	Diurnal Maximum	

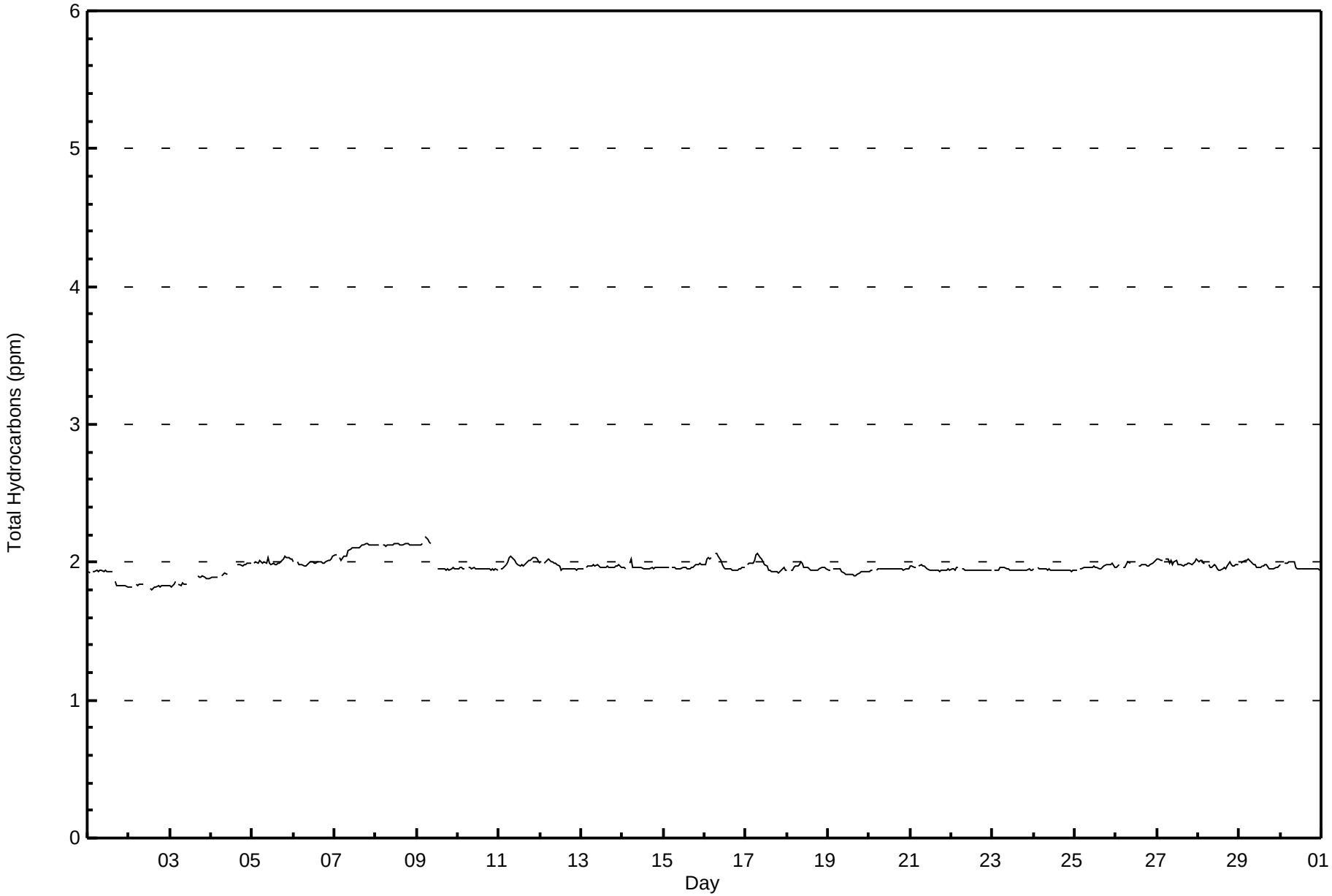
Z - zerospan C - Calibration M - Maintenance PF - Power Failure

Wood Buffalo Environmental Association

Hourly Averages

Total Hydrocarbons (THC) - ppm

Conklin Lookout - April 2016



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm

Conklin Lookout - April 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	617	92.09	92.09
2.1 - 3.0	53	7.91	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 670

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Total Hydrocarbons (THC) - ppm

Conklin Lookout - April 2016

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	30	26	21	21	39	29	27	55	80	118	31	12	14	30	35	49	617
2.1 - 3.0	2	1	3	3	2	2	6	15	5	4	0	0	2	1	7	0	53
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	32	27	24	24	41	31	33	70	85	122	31	12	16	31	42	49	670

Total Number of Valid Hours: 670

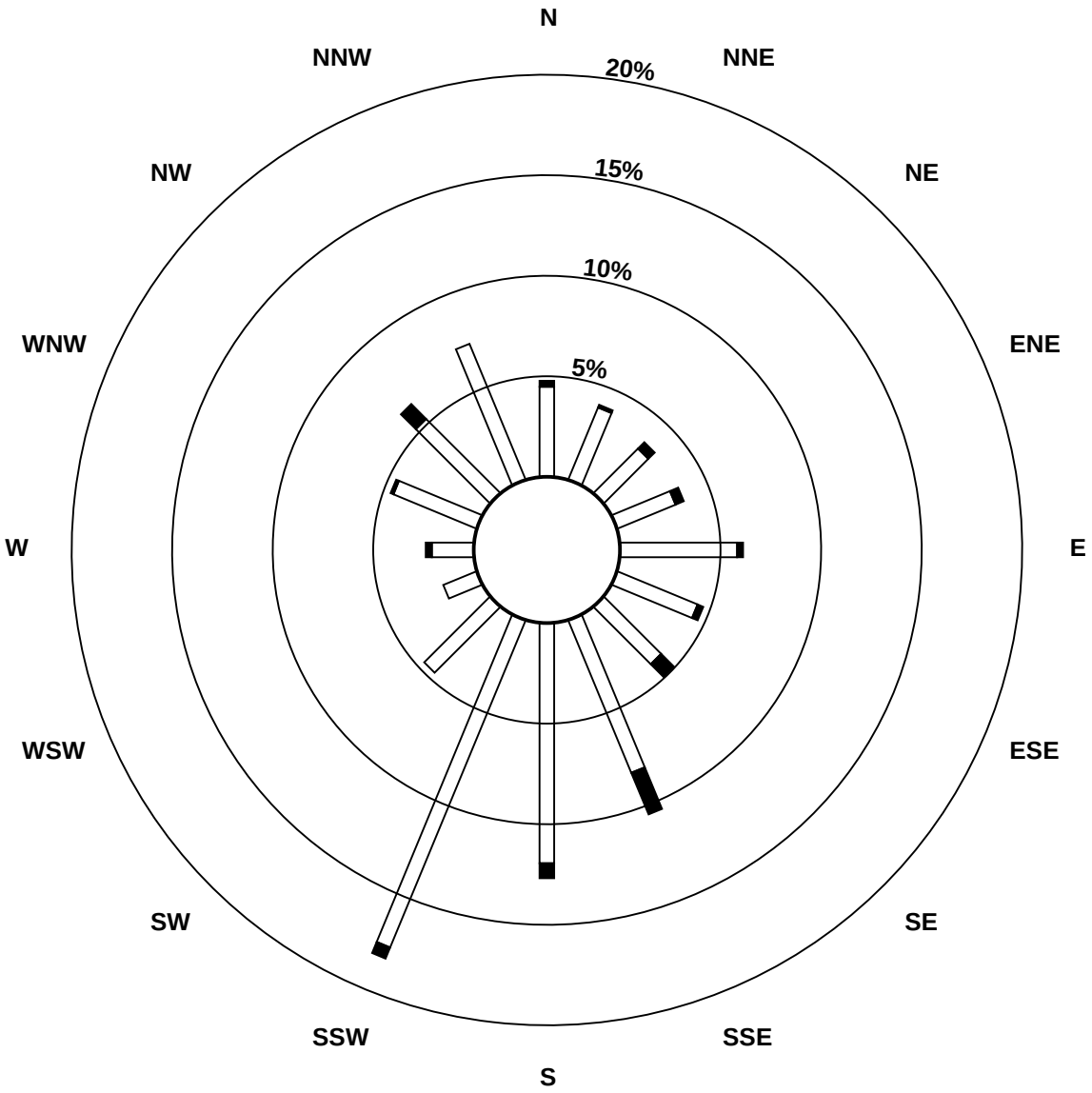
Total Number of Hours: 720

Wood Buffalo Environmental Association

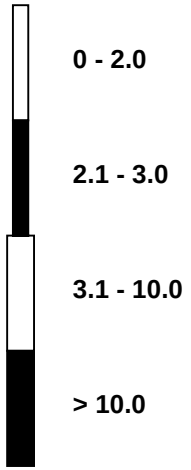
Wind Rose Apr 2016

Total Hydrocarbons (THC) - ppm

Conklin Lookout (AMS 18)



Classes (ppm)



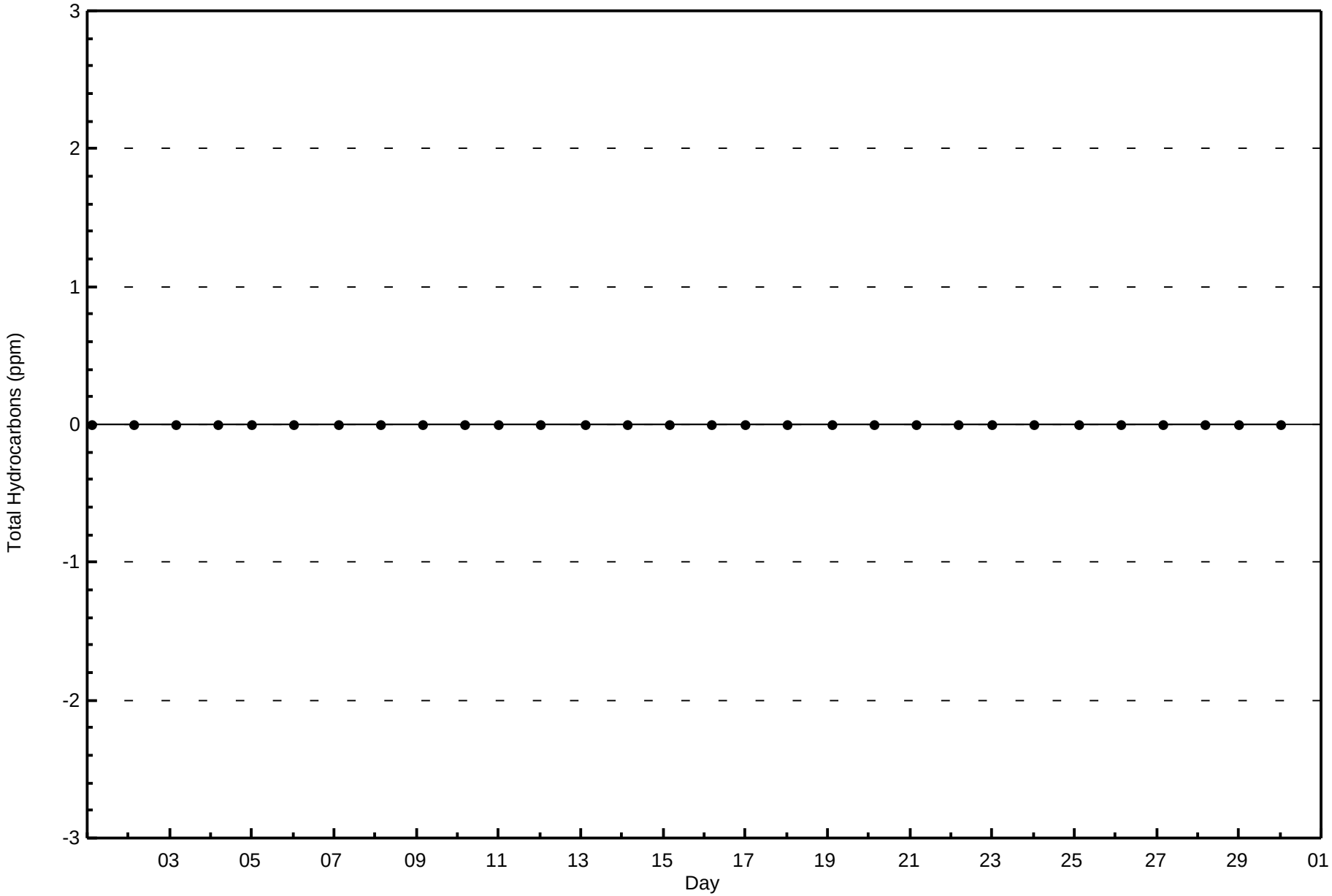
Total Number of Valid Hours: 670

Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Conklin Lookout - April 2016

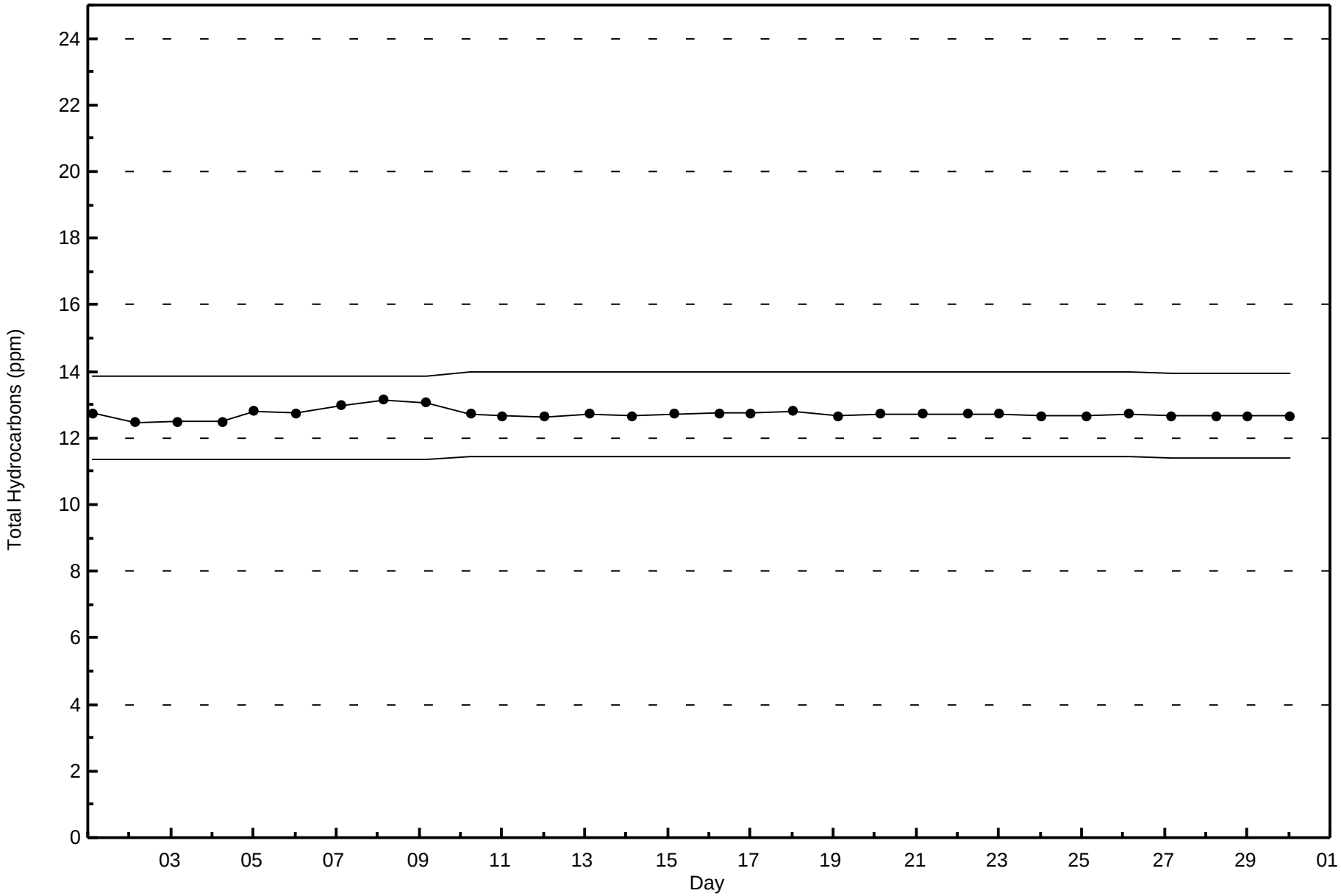


Wood Buffalo Environmental Association

Span Responses

Total Hydrocarbons (THC) - ppm

Conklin Lookout - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Non Methane Hydrocarbons (NMHC) - ppm

Conklin Lookout - April 2016

Maximum Value: 0.047 ppm on Apr 14 06:00

Maximum Daily Average: 0.011 ppm on Apr 27

Minimum Value: 0.000 ppm on Apr 1 01:00

Minimum Daily Average: 0.000 ppm on Apr 22

Maximum Diurnal Average: 0.003 ppm at hour 6

Minimum Diurnal Average: 0.001 ppm at hour 13

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:	720
Hours of Data:	670
Hours of Missing Data:	50
Hours of Calibration:	39
Percent Operational Time:	98.5

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-Apr	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	PF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
2-Apr	0.000	0.000	0.000	Z	0.009	0.001	0.003	0.001	0.000	M	0.000	M	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.009
3-Apr	0.000	0.000	0.005	0.005	Z	0.001	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	0.000	0.000	0.001	0.005
4-Apr	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	M	M	M	C	C	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.001
5-Apr	Z	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.001	0.033	0.003	0.001	0.001	0.001	0.001	0.002	0.002	0.000	0.001	0.002	0.001	0.001	0.001	0.001	0.002	0.033
6-Apr	0.001	Z	0.008	0.005	0.005	0.001	0.002	0.003	0.005	0.005	0.002	0.002	0.001	0.001	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.001	0.001	0.002	0.008
7-Apr	0.001	0.000	Z	0.000	0.001	0.004	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	0.004
8-Apr	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
9-Apr	0.000	0.000	0.000	0.008	Z	0.008	0.005	0.003	0.000	C	C	C	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.008
10-Apr	0.001	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
11-Apr	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.000	0.002
12-Apr	0.000	Z	0.000	0.001	0.000	0.000	0.001	0.002	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
13-Apr	0.000	0.000	Z	0.000	0.000	0.006	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.008	0.001	0.003	0.002	0.003	0.009	0.011	0.019	0.007	0.003	0.019
14-Apr	0.007	0.008	0.001	Z	0.028	0.047	0.002	0.000	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.002	0.000	0.000	0.000	0.004	0.047
15-Apr	0.002	0.002	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002
16-Apr	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
17-Apr	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.001
18-Apr	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002
19-Apr	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	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
20-Apr	0.000	0.000	0.000	Z	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
21-Apr	0.001	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
22-Apr	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
23-Apr	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Apr	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Apr	0.000	0.000	Z	0.001	0.001	0.000	0.001	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001
26-Apr	0.001	0.000	0.000	Z	0.001	0.000	0.001	0.000	0.000	C	C	C	C	0.009	0.009	0.014	0.011	0.023	0.025	0.019	0.017	0.016	0.011	0.018	0.009	0.025
27-Apr	0.023	0.015	0.008	0.009	Z	0.003	0.003	0.004	0.019	0.017	0.024	0.027	0.013	0.007	0.009	0.008	0.010	0.014	0.015	0.014	0.010	0.006	0.002	0.000	0.011	0.027
28-Apr	0.001	0.002	0.000	0.000	0.000	Z	0.002	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002
29-Apr	Z	0.000	0.000	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
30-Apr	0.000	Z	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.001
	0.001	0.001	0.001	0.001	0.002	0.003	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	Diurnal Average	
	0.023	0.015	0.008	0.009	0.028	0.047	0.005	0.007	0.019	0.033	0.024	0.027	0.013	0.009	0.009	0.014	0.011	0.023	0.025	0.019	0.017	0.016	0.019	0.018	Diurnal Maximum	

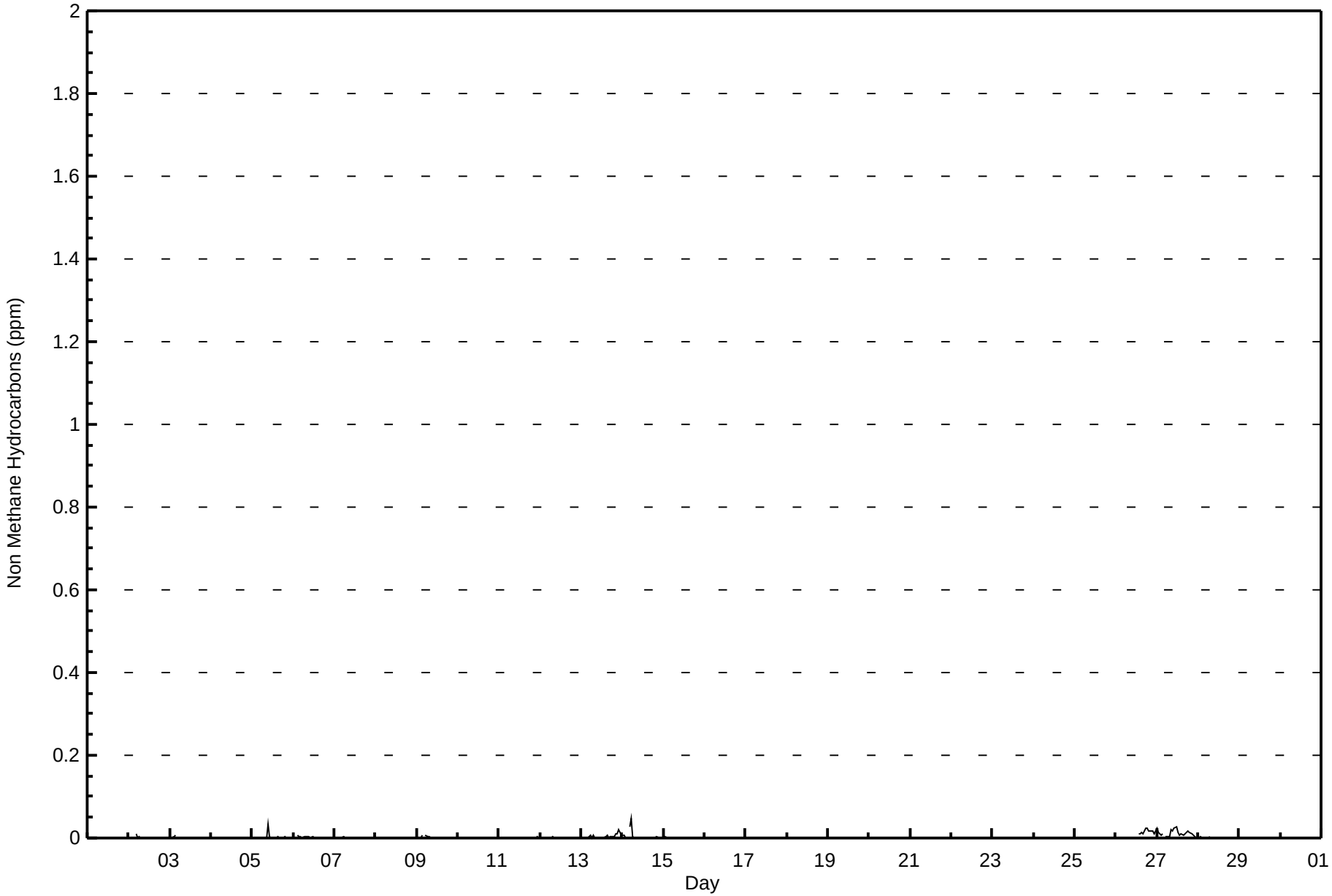
Z - zerospan C - Calibration M - Maintenance PF - Power Failure

Wood Buffalo Environmental Association

Hourly Averages

Non Methane Hydrocarbons (NMHC) - ppm

Conklin Lookout - April 2016



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm

Conklin Lookout - April 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	625	93.28	93.28
0.006 - 0.05	45	6.72	100.00
0.06 - 0.1	0	0.00	100.00
> 0.1	0	0.00	100.00

Total Number of Valid Hours: 670

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm

Conklin Lookout - April 2016

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	31	25	23	24	41	29	32	69	76	113	27	10	15	28	37	45	625
0.006 - 0.05	1	2	1	0	0	2	1	1	9	9	4	2	1	3	5	4	45
0.06 - 0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	32	27	24	24	41	31	33	70	85	122	31	12	16	31	42	49	670

Total Number of Valid Hours: 670

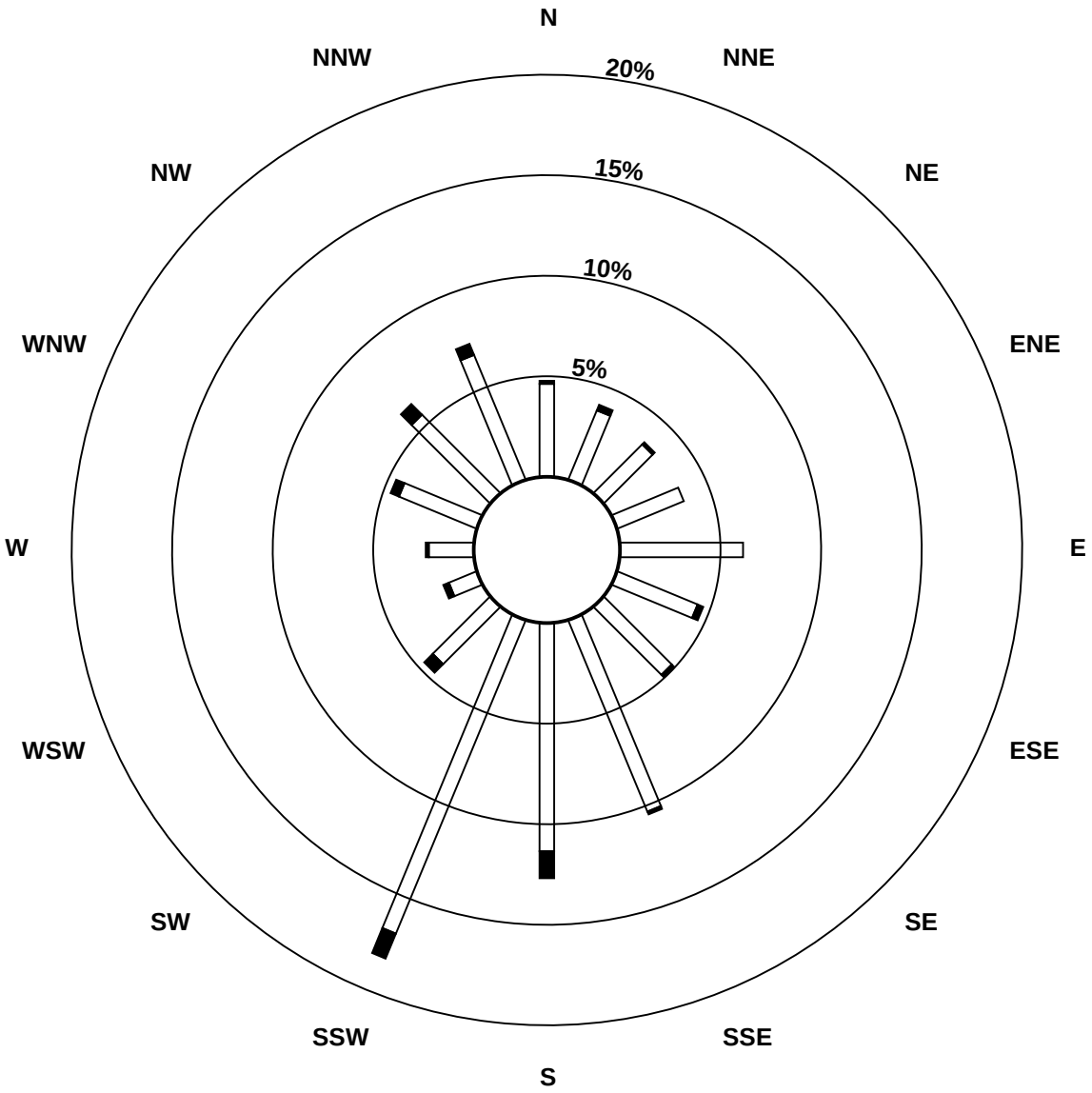
Total Number of Hours: 720

Wood Buffalo Environmental Association

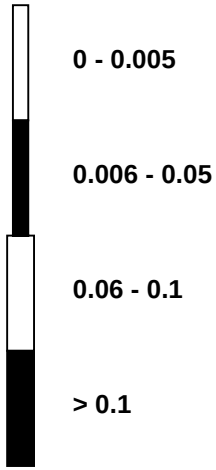
Wind Rose Apr 2016

Non Methane Hydrocarbons (NMHC) - ppm

Conklin Lookout (AMS 18)



Classes (ppm)



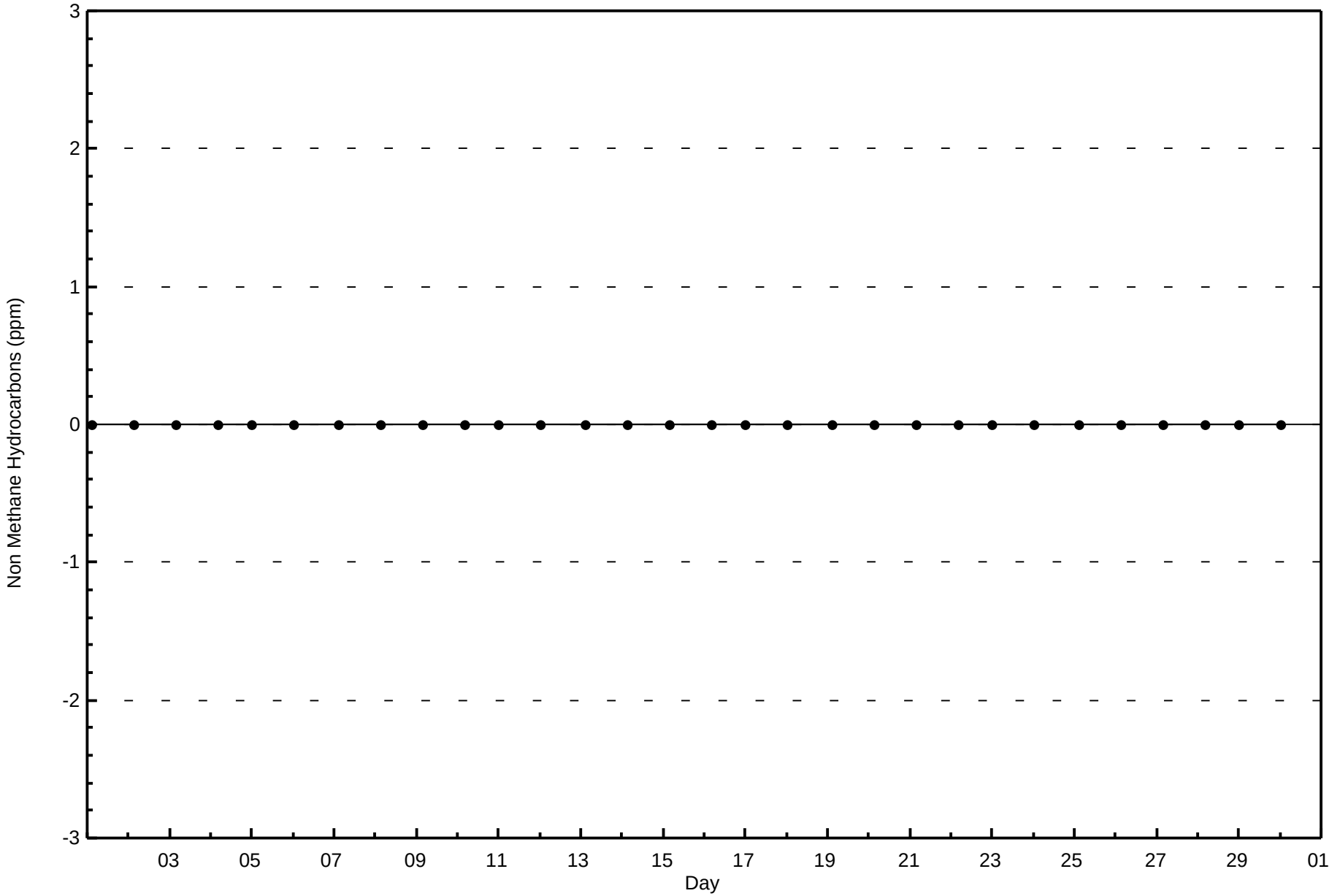
Total Number of Valid Hours: 670

Wood Buffalo Environmental Association

Zero Responses

Non Methane Hydrocarbons (NMHC) - ppm

Conklin Lookout - April 2016

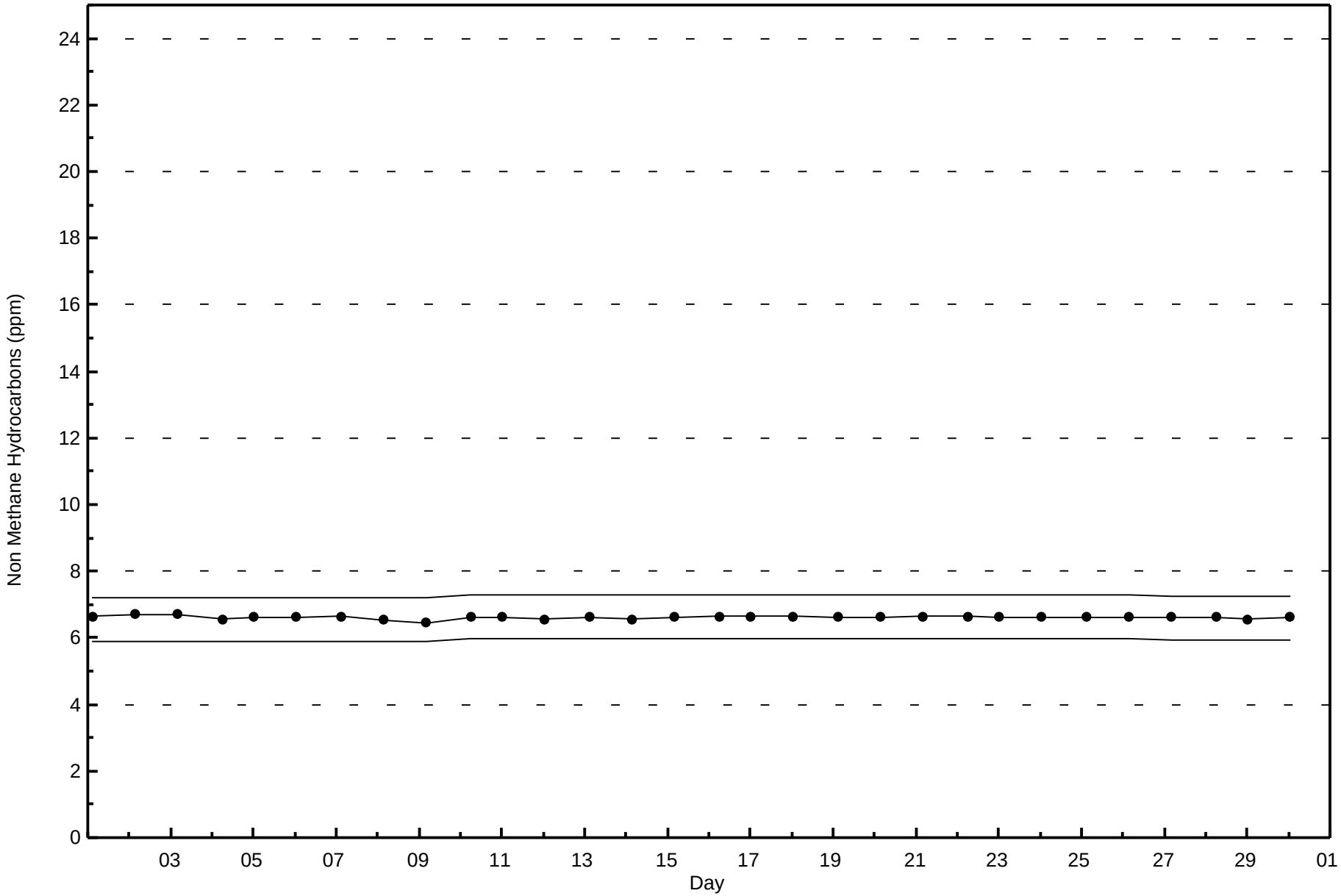


Wood Buffalo Environmental Association

Span Responses

Non Methane Hydrocarbons (NMHC) - ppm

Conklin Lookout - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Methane (CH_4) - ppm

Conklin Lookout - April 2016

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

Maximum Value: 2.2 ppm on Apr 9 06:00 Maximum Daily Average: 2.1 ppm on Apr 8

Minimum Value: 1.8 ppm on Apr 2 14:00 Minimum Daily Average: 1.8 ppm on Apr 2

Maximum Diurnal Average: 2.0 ppm at hour 6 Minimum Diurnal Average: 2.0 ppm at hour 17

Monthly Average: 1.97 ppm Percentiles: P_1 = 1.8 P_{10} = 1.9 Q_1 = 1.9 Median = 2.0 Q_3 = 2.0 P_{90} = 2.0 P_{99} = 2.1

Hours in Service:	720
Hours of Data:	670
Hours of Missing Data:	50
Hours of Calibration:	39
Percent Operational Time:	98.5

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-Apr	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	PF	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9
2-Apr	1.8	1.8	1.8	Z	1.8	1.8	1.8	1.8	1.8	M	1.8	M	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
3-Apr	1.8	1.8	1.8	1.9	Z	1.8	1.8	1.8	1.8	1.8	1.8	M	M	M	M	M	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
4-Apr	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	M	M	M	C	C	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0
5-Apr	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-Apr	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
7-Apr	2.1	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
8-Apr	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
9-Apr	2.1	2.1	2.1	2.1	Z	2.2	2.2	2.1	2.1	C	C	C	2.0	2.0	2.0	1.9	1.9	1.9	2.0	1.9	1.9	2.0	2.0	2.0	2.0	2.2
10-Apr	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	1.9	2.0	1.9	1.9	2.0	1.9	1.9	1.9	2.0	2.0
11-Apr	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
12-Apr	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	1.9	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	2.0	2.0
13-Apr	2.0	1.9	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
14-Apr	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
15-Apr	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
16-Apr	2.0	2.0	2.0	2.0	2.0	Z	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	2.0	2.0	2.0	2.0	2.1
17-Apr	Z	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	2.0	2.1
18-Apr	1.9	Z	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0
19-Apr	1.9	1.9	Z	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
20-Apr	1.9	1.9	1.9	Z	1.9	2.0	2.0	2.0	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	2.0	2.0	1.9	2.0
21-Apr	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0
22-Apr	2.0	1.9	1.9	2.0	2.0	Z	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
23-Apr	Z	1.9	1.9	1.9	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
24-Apr	1.9	Z	2.0	2.0	1.9	2.0	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	1.9	1.9	1.9	1.9	2.0
25-Apr	1.9	1.9	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
26-Apr	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	C	C	C	C	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0
27-Apr	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
28-Apr	2.0	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
29-Apr	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
30-Apr	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0
	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	Diurnal Average	
	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	Diurnal Maximum	

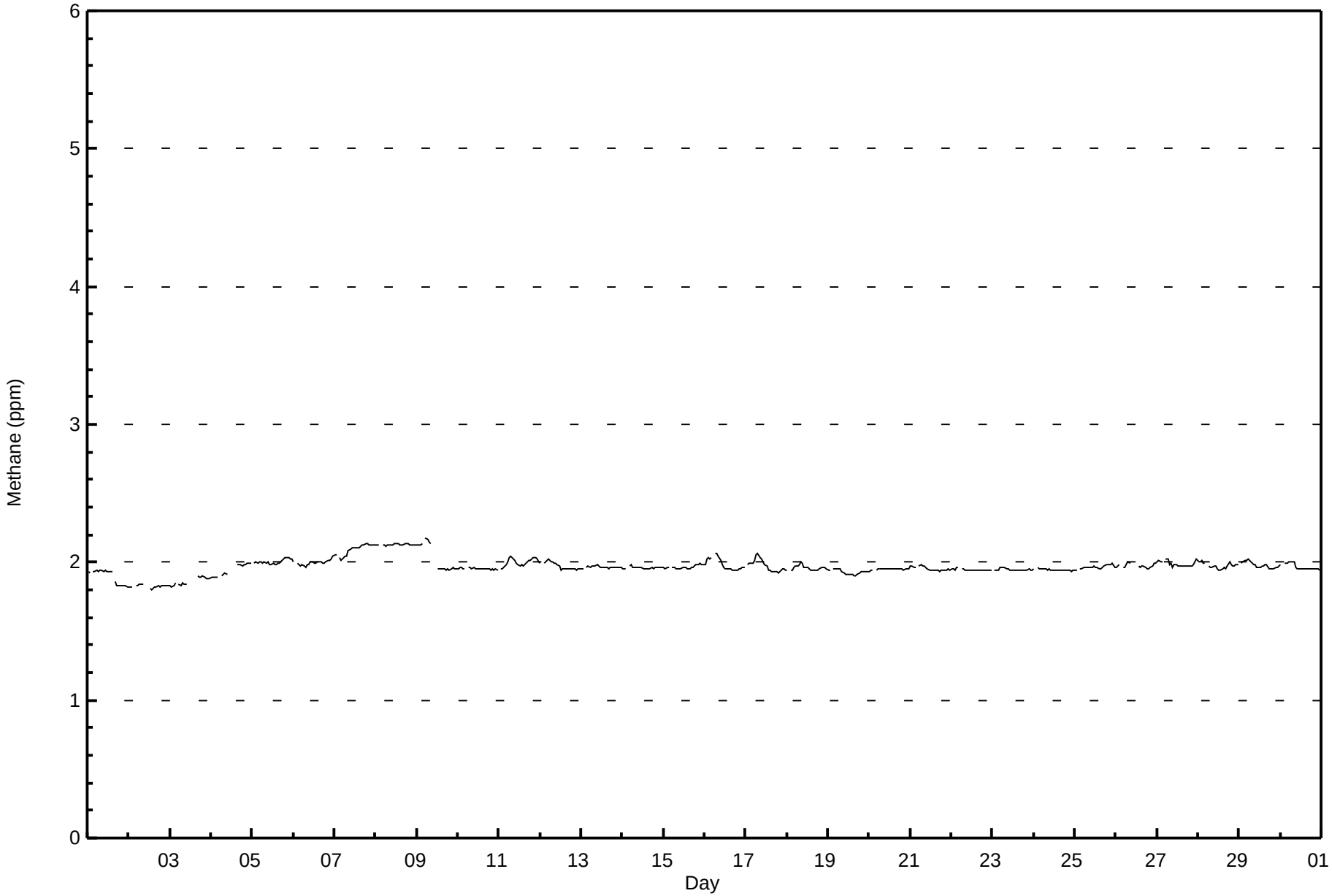
Z - zerospan C - Calibration M - Maintenance PF - Power Failure

Wood Buffalo Environmental Association

Hourly Averages

Methane (CH_4) - ppm

Conklin Lookout - April 2016



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Methane (CH_4) - ppm

Conklin Lookout - April 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	617	92.09	92.09
2.1 - 3.0	53	7.91	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 670

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Methane (CH_4) - ppm

Conklin Lookout - April 2016

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	30	26	21	21	39	29	27	55	80	118	31	12	14	30	35	49	617
2.1 - 3.0	2	1	3	3	2	2	6	15	5	4	0	0	2	1	7	0	53
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	32	27	24	24	41	31	33	70	85	122	31	12	16	31	42	49	670

Total Number of Valid Hours: 670

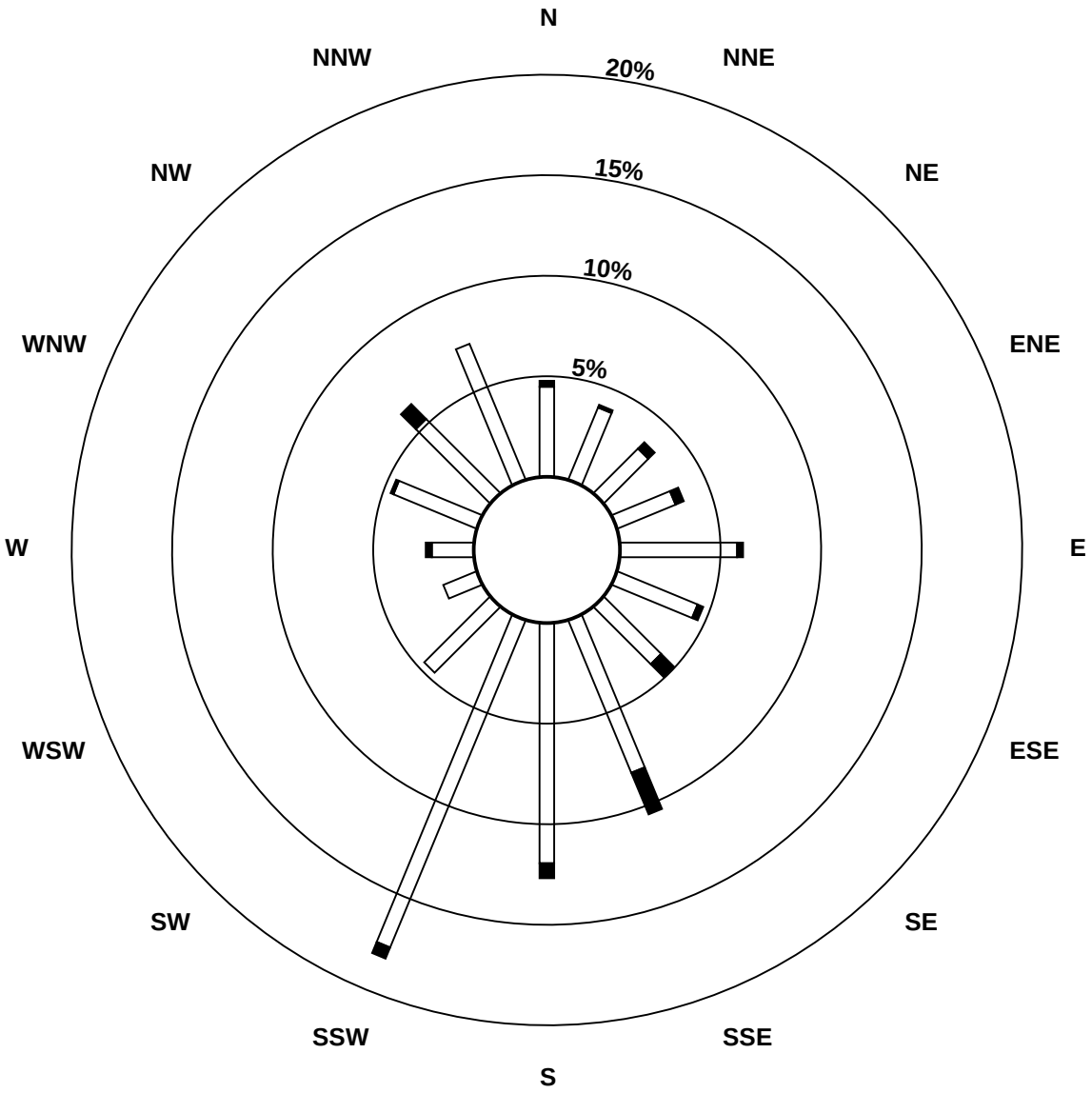
Total Number of Hours: 720

Wood Buffalo Environmental Association

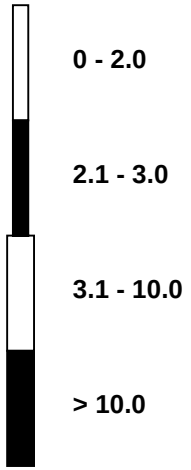
Wind Rose Apr 2016

Methane (CH_4) - ppm

Conklin Lookout (AMS 18)



Classes (ppm)



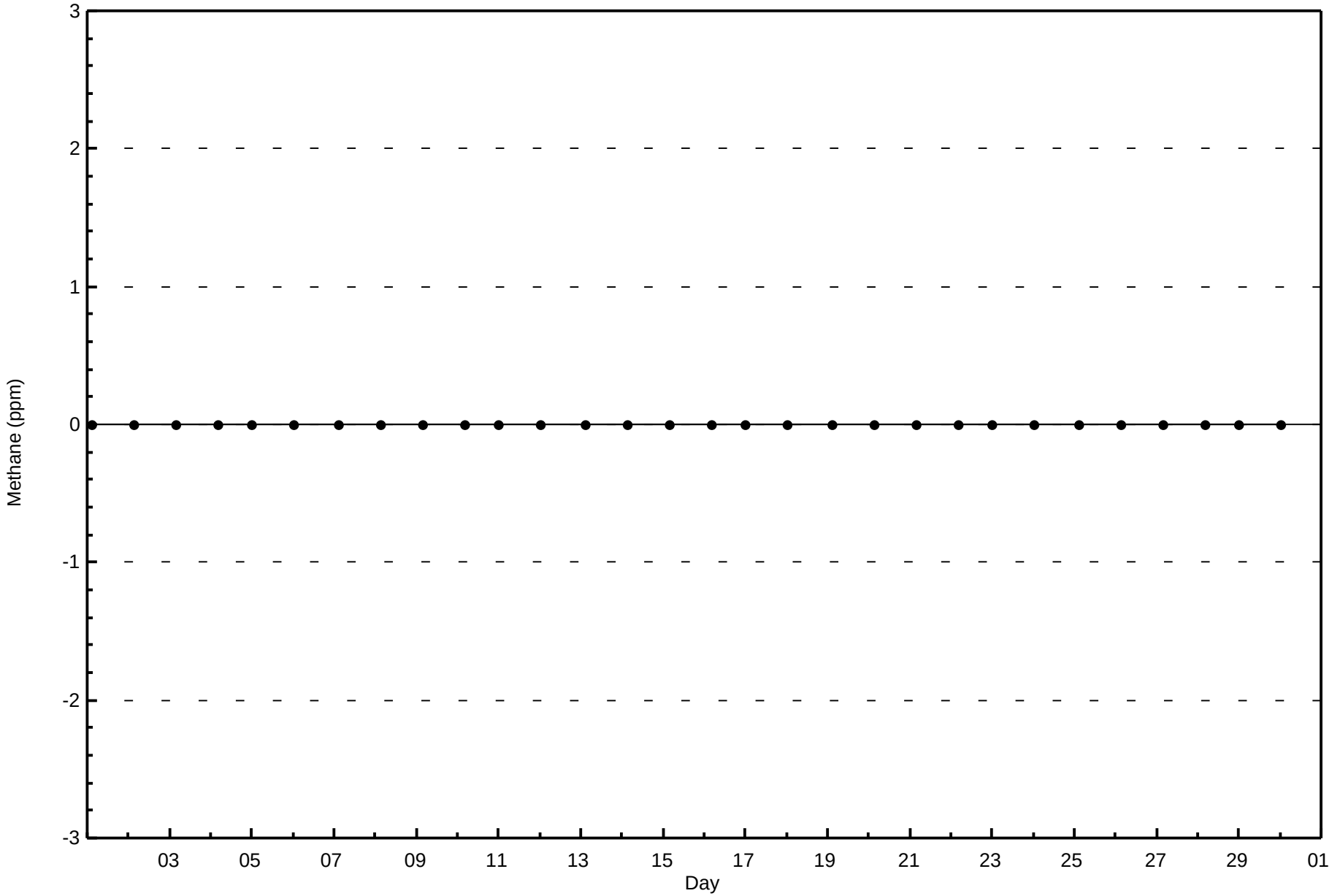
Total Number of Valid Hours: 670

Wood Buffalo Environmental Association

Zero Responses

Methane (CH_4) - ppm

Conklin Lookout - April 2016

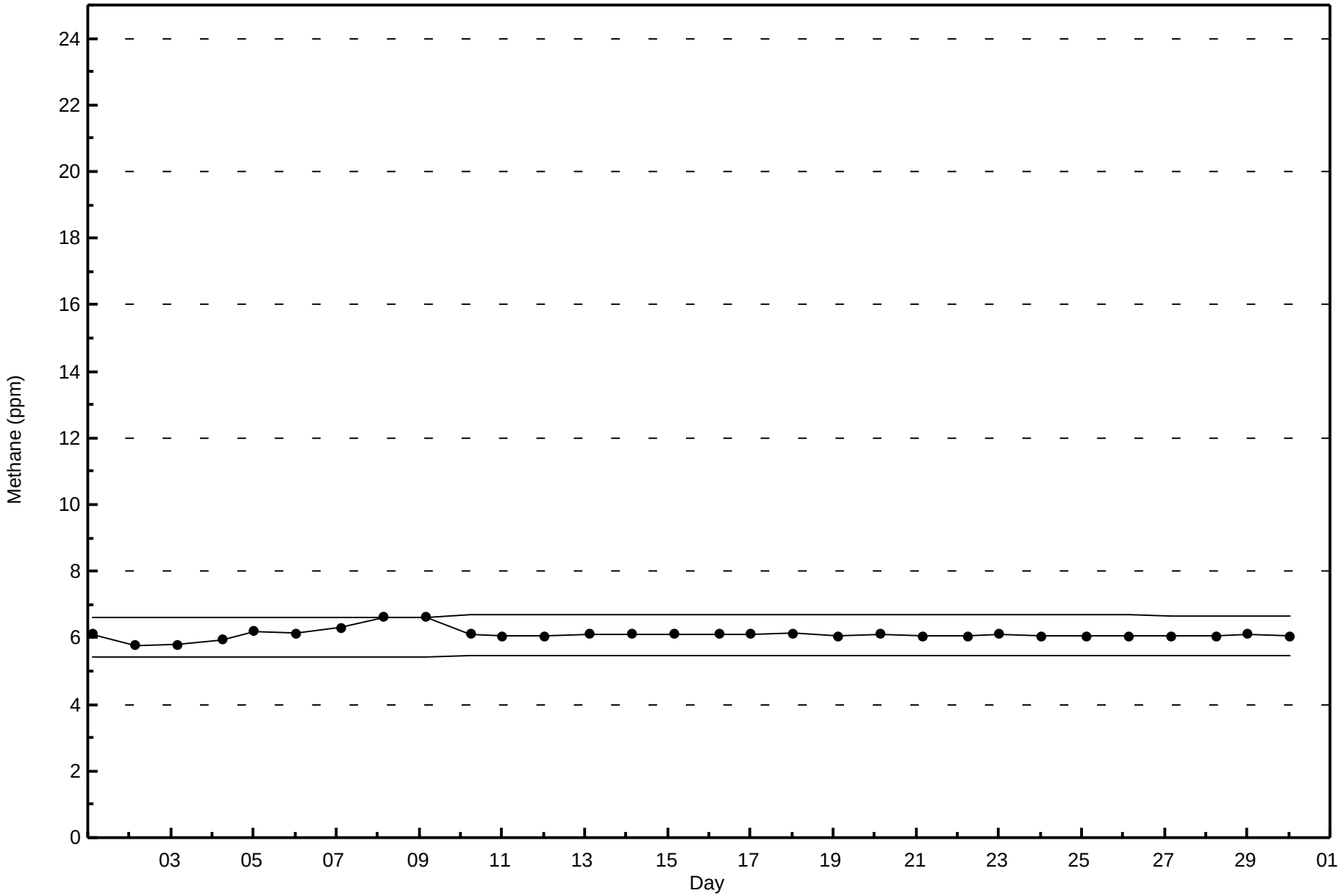


Wood Buffalo Environmental Association

Span Responses

Methane (CH_4) - ppm

Conklin Lookout - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

Conklin Lookout - April 2016

Maximum Value: 1 ppb on Apr 2 09:00

Maximum Daily Average: 0.2 ppb on Apr 21

Minimum Value: 0 ppb on Apr 13 21:00

Minimum Daily Average: 0.0 ppb on Apr 14

Maximum Diurnal Average: 0.3 ppb at hour 9

Minimum Diurnal Average: 0.0 ppb at hour 23

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:	720
Hours of Data:	686
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-Apr	0	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
2-Apr	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
3-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0.2	1
4-Apr	0	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
5-Apr	Z	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-Apr	0	Z	0	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-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
8-Apr	0	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
9-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
10-Apr	0	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-Apr	Z	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-Apr	0	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
13-Apr	0	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-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
15-Apr	0	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-Apr	0	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
17-Apr	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
18-Apr	0	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
19-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
20-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.2	1
21-Apr	0	0	0	0	Z	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
22-Apr	0	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
23-Apr	Z	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
24-Apr	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
25-Apr	0	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
26-Apr	0	0	0	Z	0	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.1	0
27-Apr	0	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
28-Apr	0	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
29-Apr	Z	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
30-Apr	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	Diurnal Average	
	0	0	0	0	0	0	0	1	1	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	Diurnal Maximum	

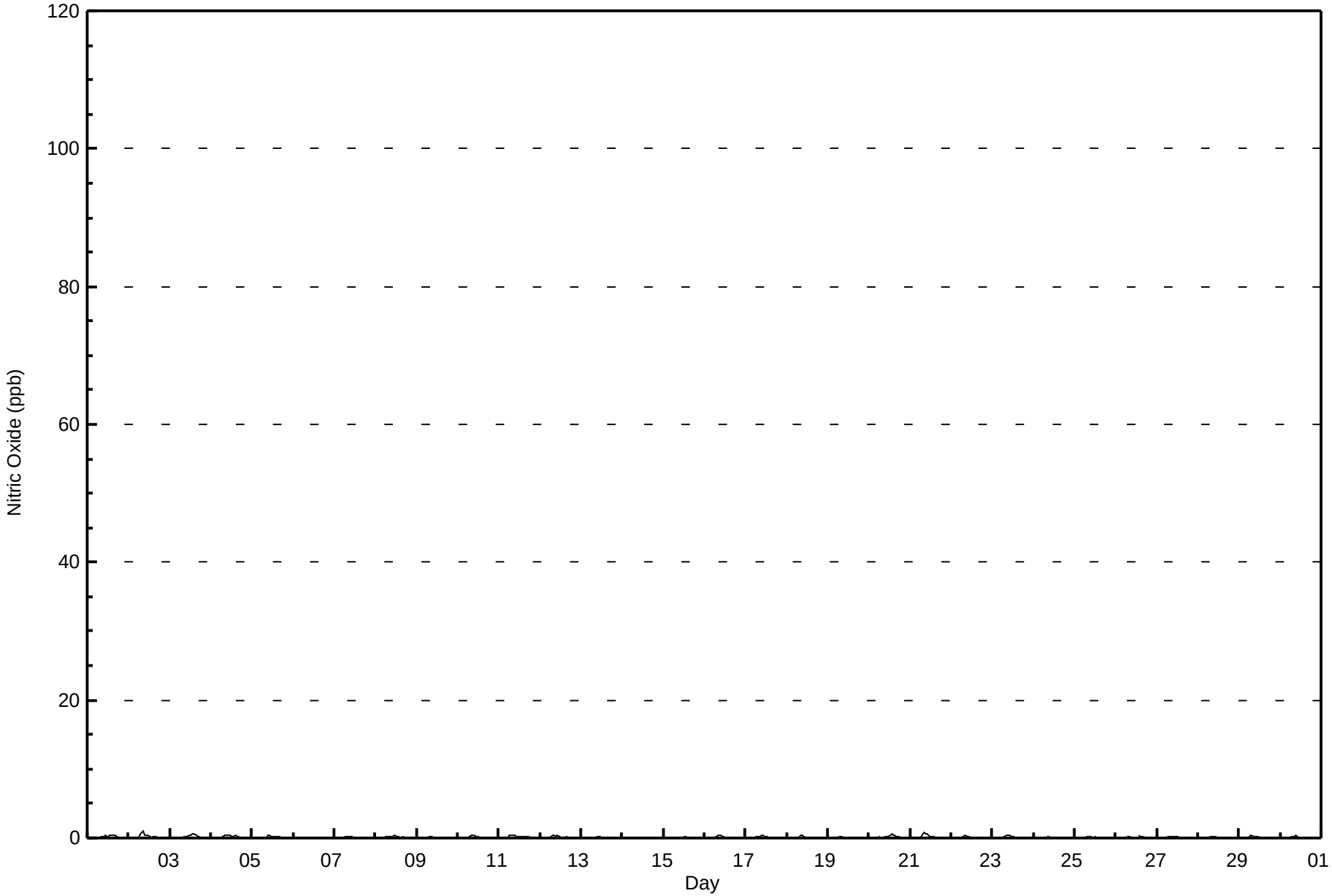
Z - zerospan C - Calibration

Wood Buffalo Environmental Association

Hourly Averages

Nitric Oxide (NO) - ppb

Conklin Lookout - April 2016



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: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitric Oxide (NO) - ppb

Conklin Lookout - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	32	29	24	24	41	31	35	73	85	122	31	12	16	31	46	54	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	32	29	24	24	41	31	35	73	85	122	31	12	16	31	46	54	686

Total Number of Valid Hours: 686

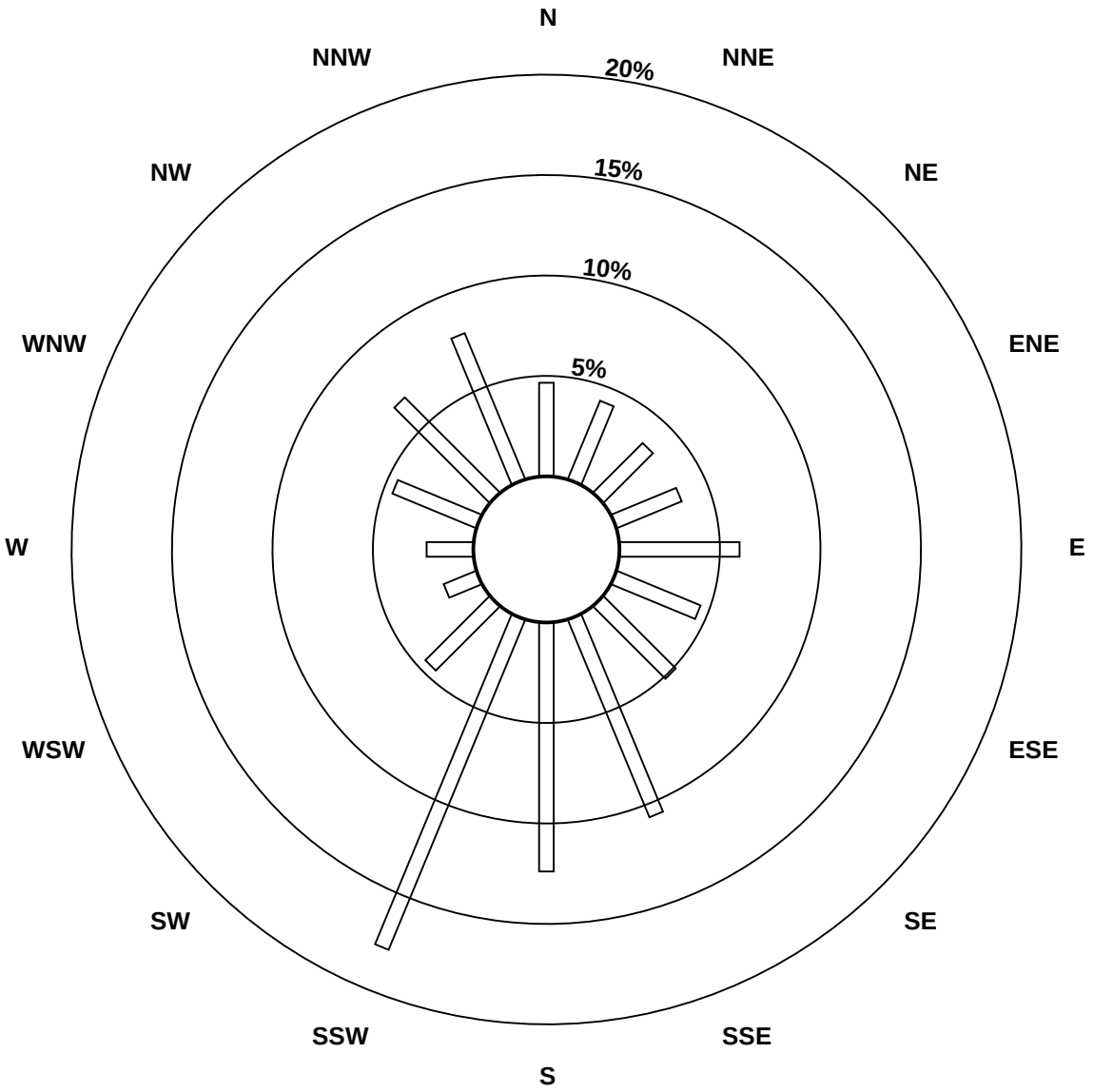
Total Number of Hours: 720

Wood Buffalo Environmental Association

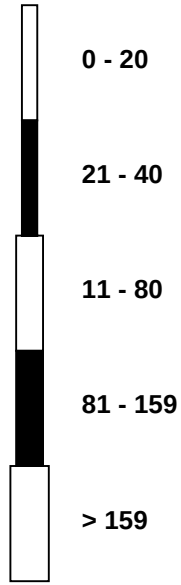
Wind Rose Apr 2016

Nitric Oxide (NO) - ppb

Conklin Lookout (AMS 18)



Classes (ppb)



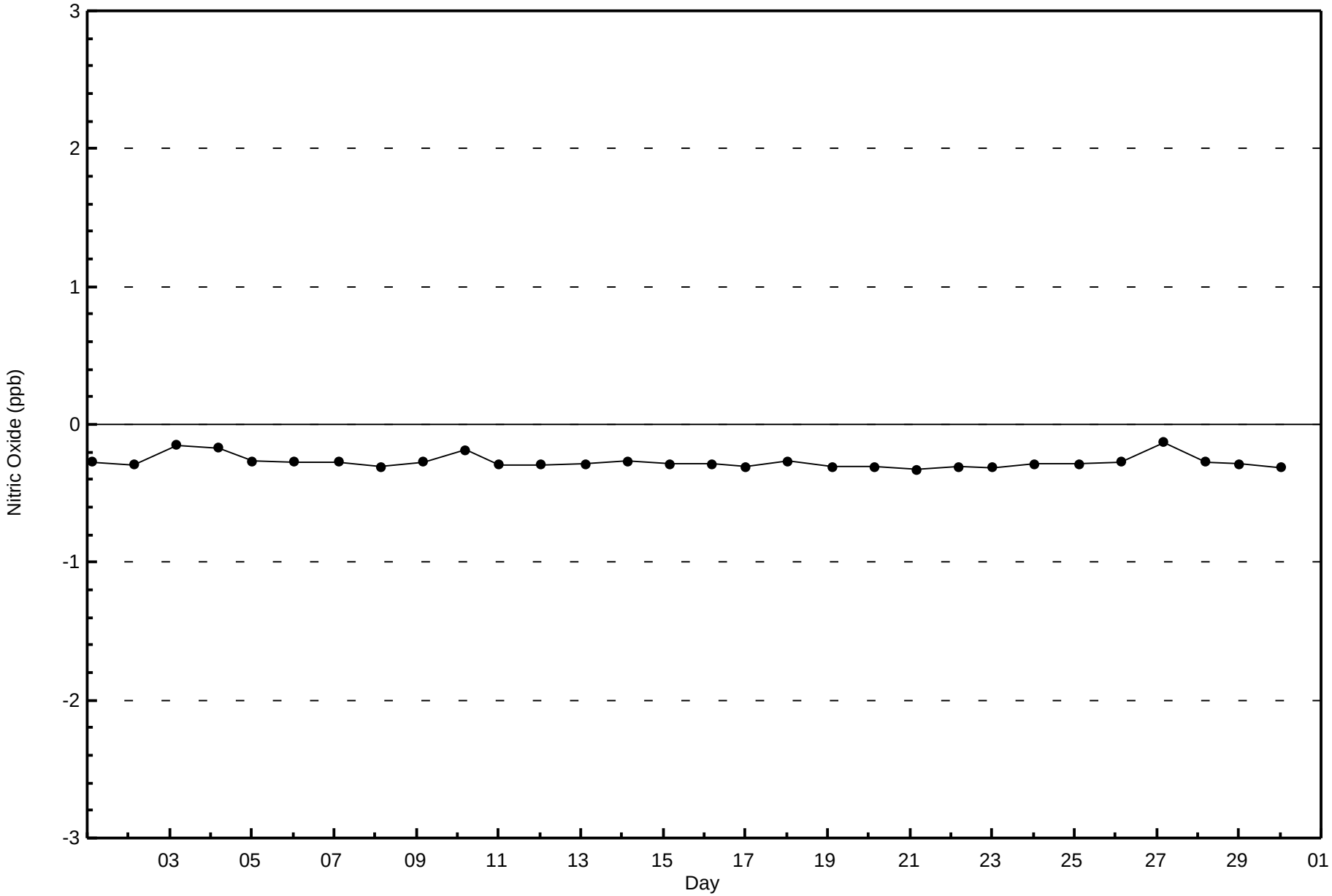
Total Number of Valid Hours: 686

Wood Buffalo Environmental Association

Zero Responses

Nitric Oxide (NO) - ppb

Conklin Lookout - April 2016

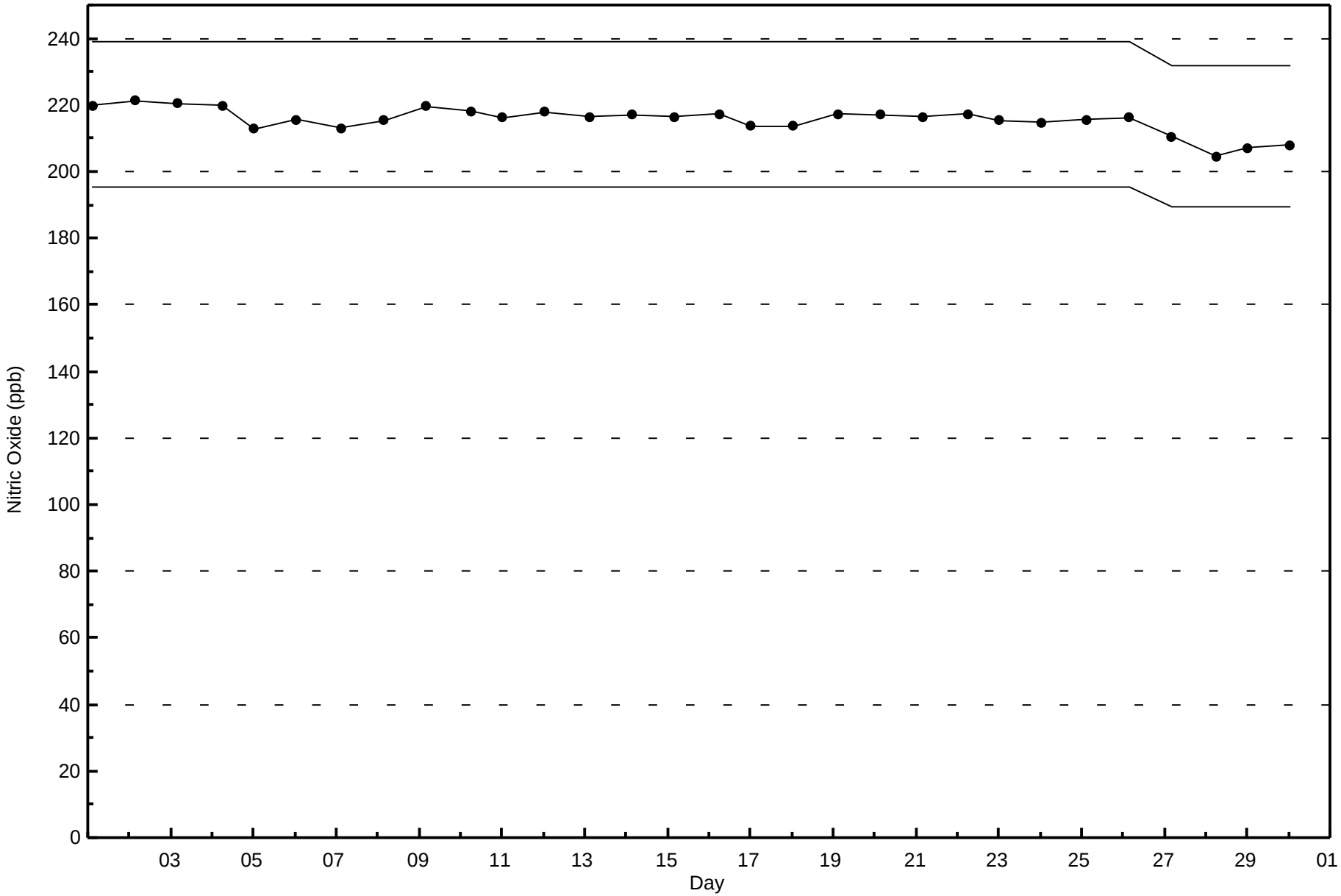


Wood Buffalo Environmental Association

Span Responses

Nitric Oxide (NO) - ppb

Conklin Lookout - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO_2) - ppb

Conklin Lookout - April 2016

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

Maximum Value: 3 ppb on Apr 11 07:00

Maximum Daily Average: 1.3 ppb on Apr 11

Minimum Value: 0 ppb on Apr 6 08:00

Minimum Daily Average: 0.4 ppb on Apr 6

Maximum Diurnal Average: 1.3 ppb at hour 7

Minimum Diurnal Average: 0.7 ppb at hour 16

Monthly Average: 0.9 ppb

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

Hours in Service:	720
Hours of Data:	686
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-Apr	1	1	Z	1	1	1	1	1	1	1	1	1	1	2	2	2	2	1	1	2	1	1	1	1	1.1	2
2-Apr	1	1	1	Z	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1.1	2
3-Apr	0	1	2	2	Z	1	1	1	1	1	1	2	1	2	2	1	1	1	1	2	2	2	2	1	1.3	2
4-Apr	1	2	1	1	1	Z	1	1	1	1	1	1	1	1	2	1	2	2	1	1	1	1	1	1	1.2	2
5-Apr	Z	1	2	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.9	2
6-Apr	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	0.4	2
7-Apr	3	1	Z	1	1	2	1	1	1	0	0	0	0	0	1	0	1	1	1	1	0	0	1	1	0.8	3
8-Apr	1	1	1	Z	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.8	1
9-Apr	1	1	1	1	Z	1	1	1	1	1	0	0	0	1	0	0	0	0	0	0	1	2	2	2	0.8	2
10-Apr	2	2	2	1	1	Z	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.9	2
11-Apr	Z	2	1	1	1	1	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2	1.3	3
12-Apr	2	Z	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	0	1	1	1.3	2
13-Apr	1	1	Z	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	0	0	1	1	0	0.9	2
14-Apr	0	0	0	Z	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2
15-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	1	1	0	0	1	1	1	1	1	1	1	2	0.6	2
16-Apr	2	2	1	1	1	Z	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.0	2
17-Apr	Z	1	1	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1.2	2
18-Apr	1	Z	1	1	1	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1.1	2
19-Apr	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	0	1	0	0	0	0.7	1
20-Apr	0	0	1	Z	0	1	1	1	0	1	1	1	1	1	1	1	1	1	0	1	0	0	1	1	0.6	1
21-Apr	1	0	0	0	Z	1	1	2	1	1	1	1	0	1	1	0	0	0	0	0	1	1	0	0	0.6	2
22-Apr	1	1	1	1	1	Z	1	1	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0.6	1
23-Apr	Z	0	1	1	1	1	1	1	2	2	1	1	1	1	0	0	0	0	0	0	1	1	1	1	0.7	2
24-Apr	1	Z	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	0	0	0.7	1
25-Apr	1	1	Z	1	2	1	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.0	2
26-Apr	1	1	1	Z	1	0	1	1	1	C	C	C	C	1	1	1	1	1	1	1	1	1	1	1	0.8	1
27-Apr	2	2	2	1	Z	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1.3	2
28-Apr	1	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1.0	2
29-Apr	Z	2	3	3	2	2	3	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.3	3
30-Apr	1	Z	2	1	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.1	2
	1.0	1.0	1.1	1.1	1.1	1.2	1.3	1.2	1.1	1.0	0.9	0.9	0.8	0.8	0.8	0.7	0.8	0.7	0.8	0.8	0.9	0.8	0.8	0.9	Diurnal Average	
	3	2	3	3	2	2	3	2	2	2	2	2	1	2	2	2	2	2	1	2	2	2	2	2	Diurnal Maximum	

Z - zerospan C - Calibration

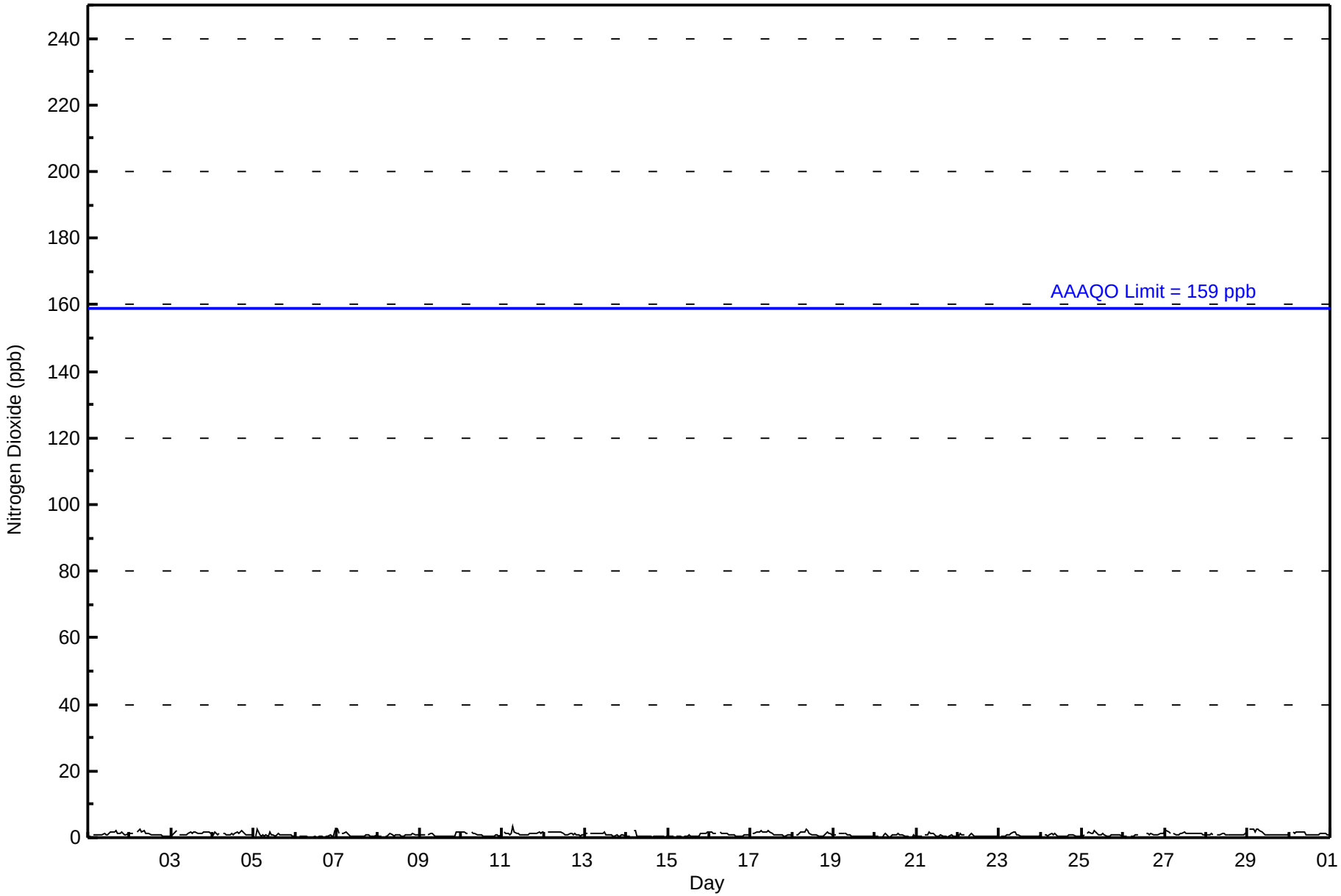
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Dioxide (NO_2) - ppb

Conklin Lookout - April 2016



Nitrogen Dioxide (NO_2) - ppb
Conklin Lookout - April 2016

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: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Dioxide (NO_2) - ppb

Conklin Lookout - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	32	29	24	24	41	31	35	73	85	122	31	12	16	31	46	54	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	32	29	24	24	41	31	35	73	85	122	31	12	16	31	46	54	686

Total Number of Valid Hours: 686

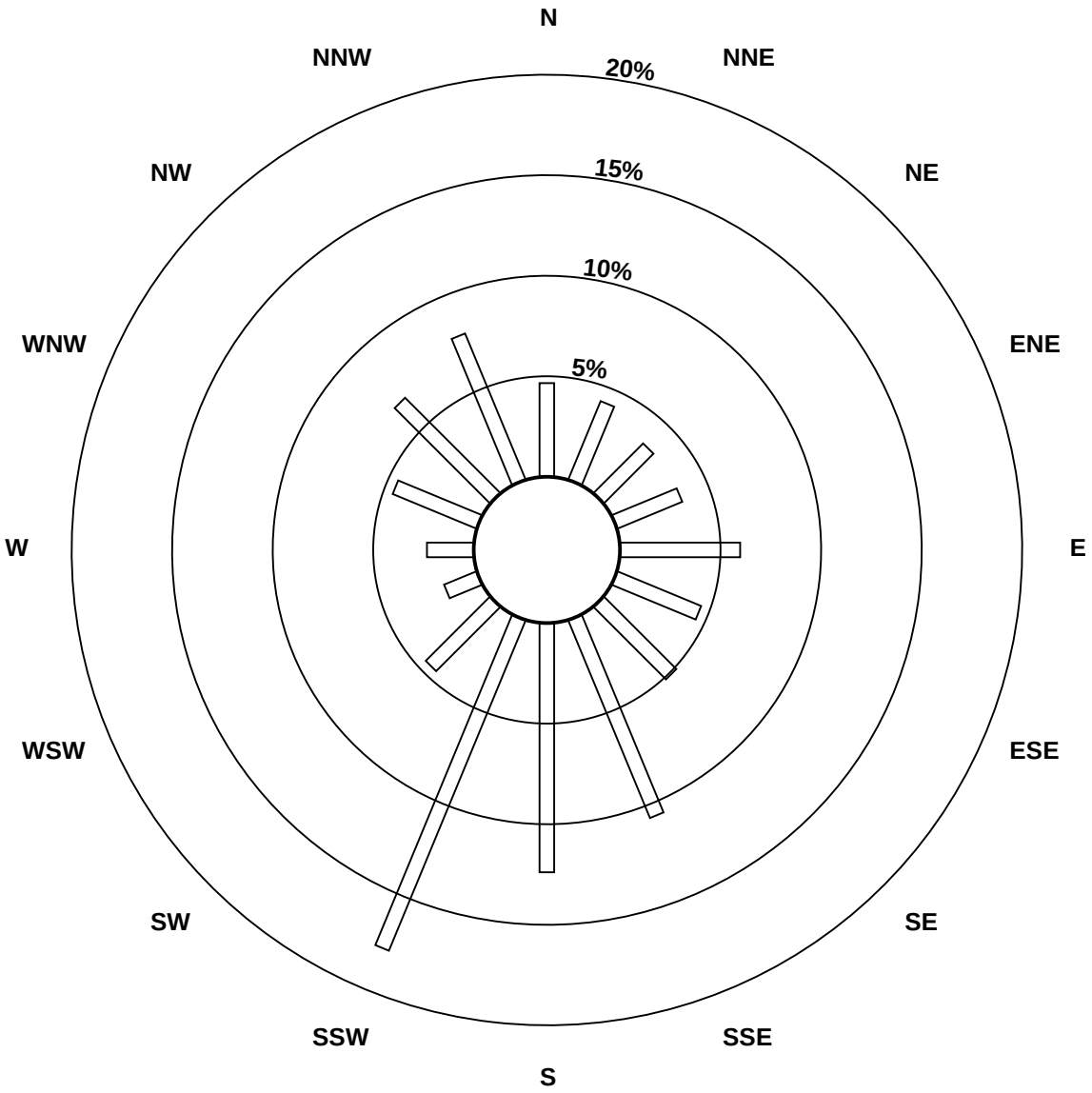
Total Number of Hours: 720

Wood Buffalo Environmental Association

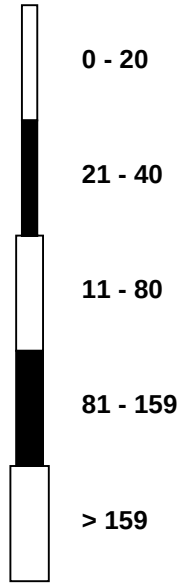
Wind Rose Apr 2016

Nitrogen Dioxide (NO_2) - ppb

Conklin Lookout (AMS 18)



Classes (ppb)



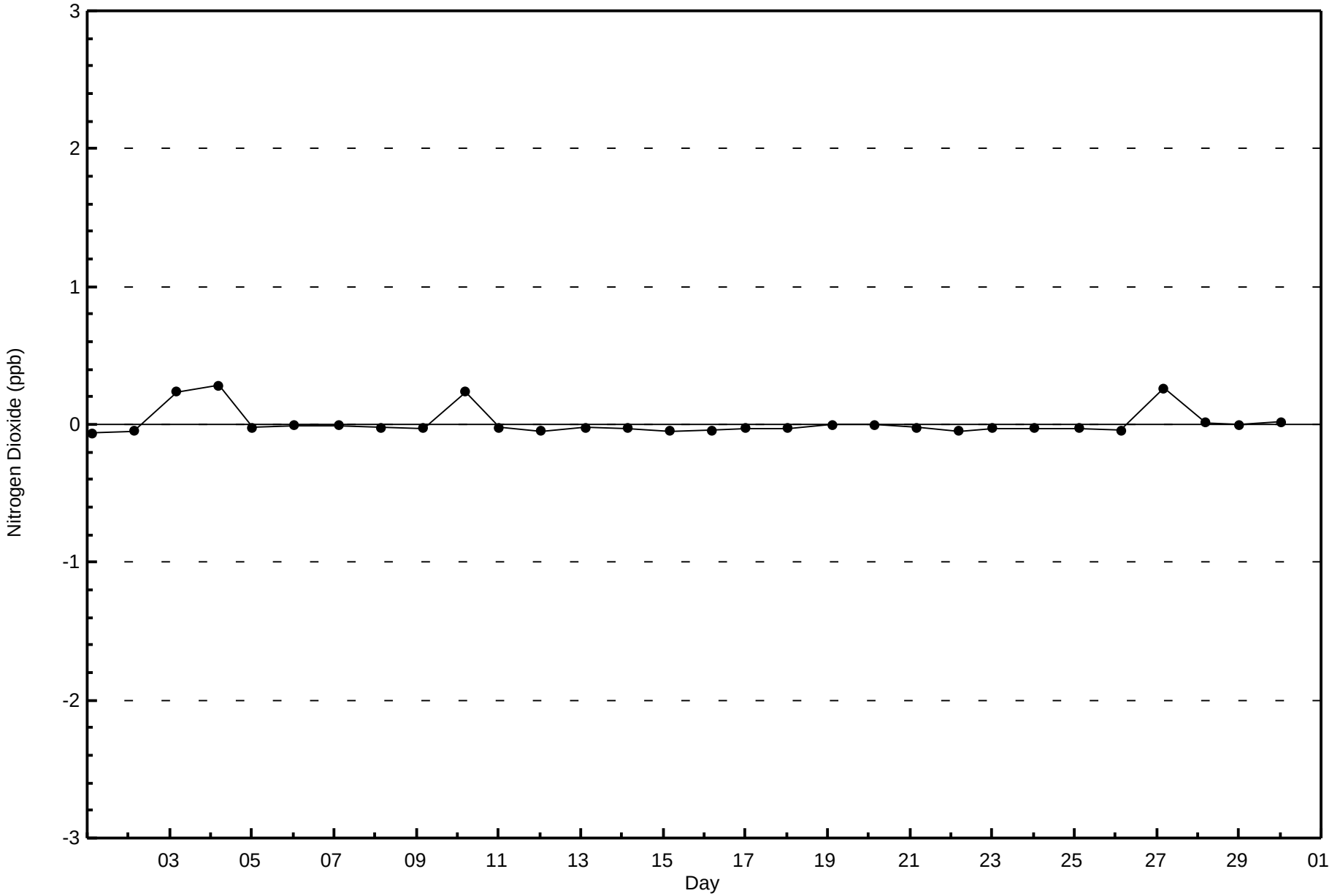
Total Number of Valid Hours: 686

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Dioxide (NO_2) - ppb

Conklin Lookout - April 2016

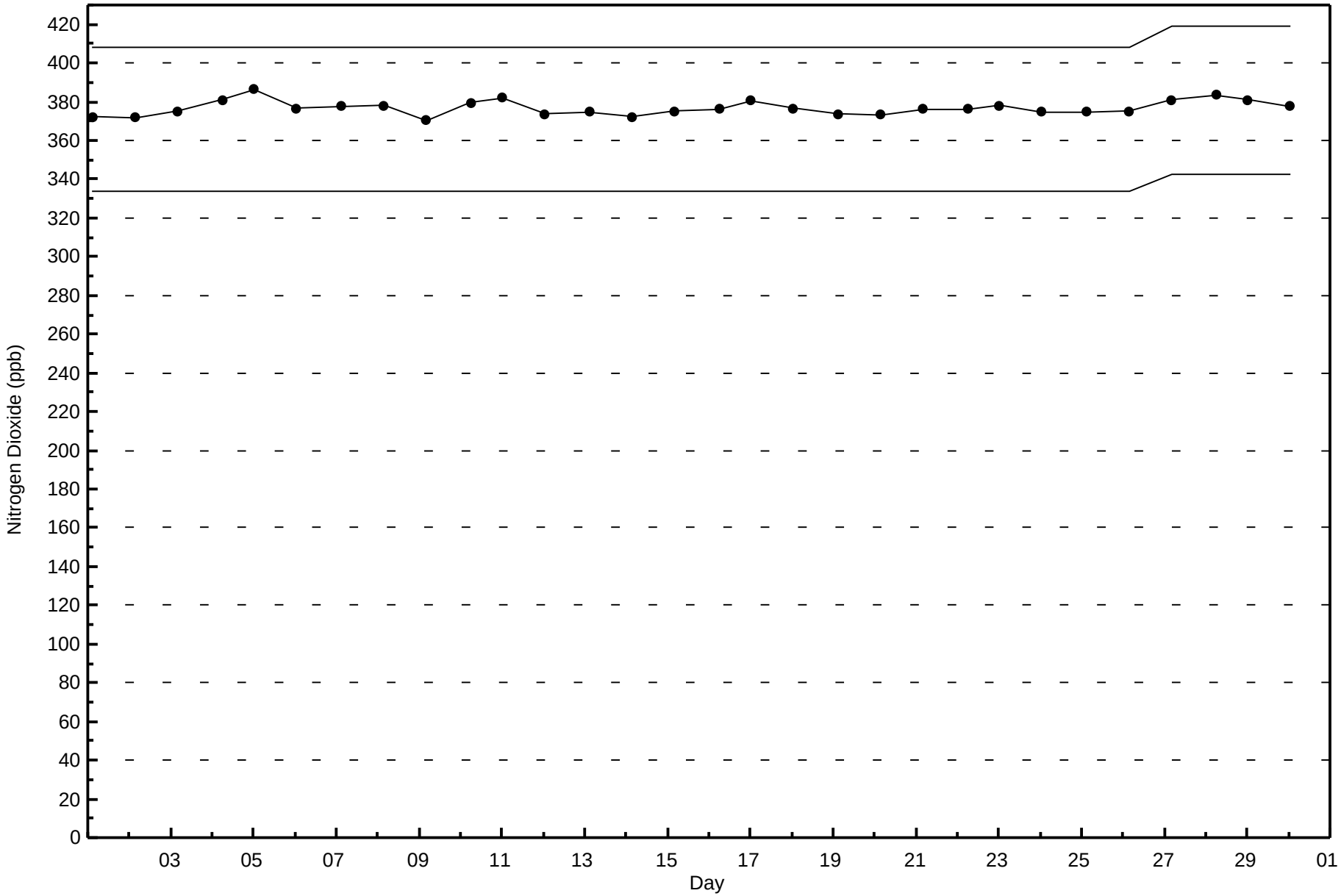


Wood Buffalo Environmental Association

Span Responses

Nitrogen Dioxide (NO_2) - ppb

Conklin Lookout - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_X) - ppb

Conklin Lookout - April 2016

Maximum Value: 4 ppb on Apr 11 07:00

Maximum Daily Average: 1.5 ppb on Apr 3

Minimum Value: 0 ppb on Apr 6 17:00

Minimum Daily Average: 0.5 ppb on Apr 6

Maximum Diurnal Average: 1.4 ppb at hour 8

Minimum Diurnal Average: 0.8 ppb at hour 19

Monthly Average: 1.0 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 1$ Median = 1 $Q_3 = 1$ $P_{90} = 2$ $P_{99} = 3$

Hours in Service:	720
Hours of Data:	686
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-Apr	1	0	Z	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	1	2	1	1	1	1	1.3	2
2-Apr	1	1	1	Z	2	2	3	2	3	2	2	2	1	1	1	1	1	1	1	0	0	1	0	0	1.3	3
3-Apr	0	1	2	2	Z	1	1	1	1	1	2	2	2	2	2	2	2	1	1	2	2	1	2	1	1.5	2
4-Apr	1	2	1	1	1	Z	1	1	1	1	1	2	1	1	2	1	2	2	1	1	1	1	1	1	1.3	2
5-Apr	Z	1	2	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.9	2
6-Apr	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	0.5	2
7-Apr	3	1	Z	1	1	2	1	1	1	1	1	1	0	1	1	0	1	1	1	1	0	1	1	1	0.9	3
8-Apr	1	1	1	Z	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.9	1
9-Apr	1	1	1	1	Z	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	2	2	2	0.8	2
10-Apr	2	2	2	1	1	Z	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.0	2
11-Apr	Z	1	1	1	1	1	4	2	2	1	1	1	1	1	1	1	1	2	1	1	1	1	1	2	1.4	4
12-Apr	2	Z	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	0	1	1	1.4	2
13-Apr	1	1	Z	1	1	1	1	1	1	2	1	2	1	1	1	1	1	1	1	0	0	1	1	0	1.0	2
14-Apr	0	0	0	Z	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2
15-Apr	0	0	0	0	Z	0	0	0	0	0	0	1	1	1	1	1	0	1	1	1	1	1	1	2	0.6	2
16-Apr	2	1	1	1	1	Z	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.1	2
17-Apr	Z	1	2	1	1	2	2	2	2	2	2	2	1	1	1	1	1	1	1	0	1	1	1	1	1.3	2
18-Apr	1	Z	1	1	1	2	2	2	3	3	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1.2	3
19-Apr	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0.8	1
20-Apr	0	0	0	Z	0	1	1	1	0	1	1	1	1	2	1	1	1	1	0	1	0	0	1	1	0.8	2
21-Apr	1	1	0	0	Z	1	1	2	2	2	2	1	1	1	1	1	0	0	0	0	1	0	0	0	0.8	2
22-Apr	0	1	1	1	1	Z	1	1	2	1	1	0	0	0	0	0	0	0	1	1	1	0	0	0	0.7	2
23-Apr	Z	0	1	1	1	1	1	2	2	2	1	1	1	1	0	1	0	0	0	0	0	1	1	1	0.8	2
24-Apr	1	Z	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	0	0	0.7	1
25-Apr	1	1	Z	1	2	1	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.1	2
26-Apr	0	1	0	Z	0	0	1	1	1	C	C	C	C	2	1	1	1	1	1	1	1	1	1	1	0.9	2
27-Apr	2	2	2	1	Z	1	1	1	1	1	2	2	2	2	1	1	1	1	1	2	1	1	1	1	1.4	2
28-Apr	1	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	1
29-Apr	Z	2	3	3	2	2	3	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.4	3
30-Apr	1	Z	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.2	2
	1.0	1.0	1.1	1.1	1.1	1.2	1.4	1.4	1.4	1.3	1.1	1.0	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.9	0.8	0.8	0.9	Diurnal Average	
	3	2	3	3	2	2	4	2	3	3	2	2	2	2	2	2	2	2	1	2	2	2	2	2	Diurnal Maximum	

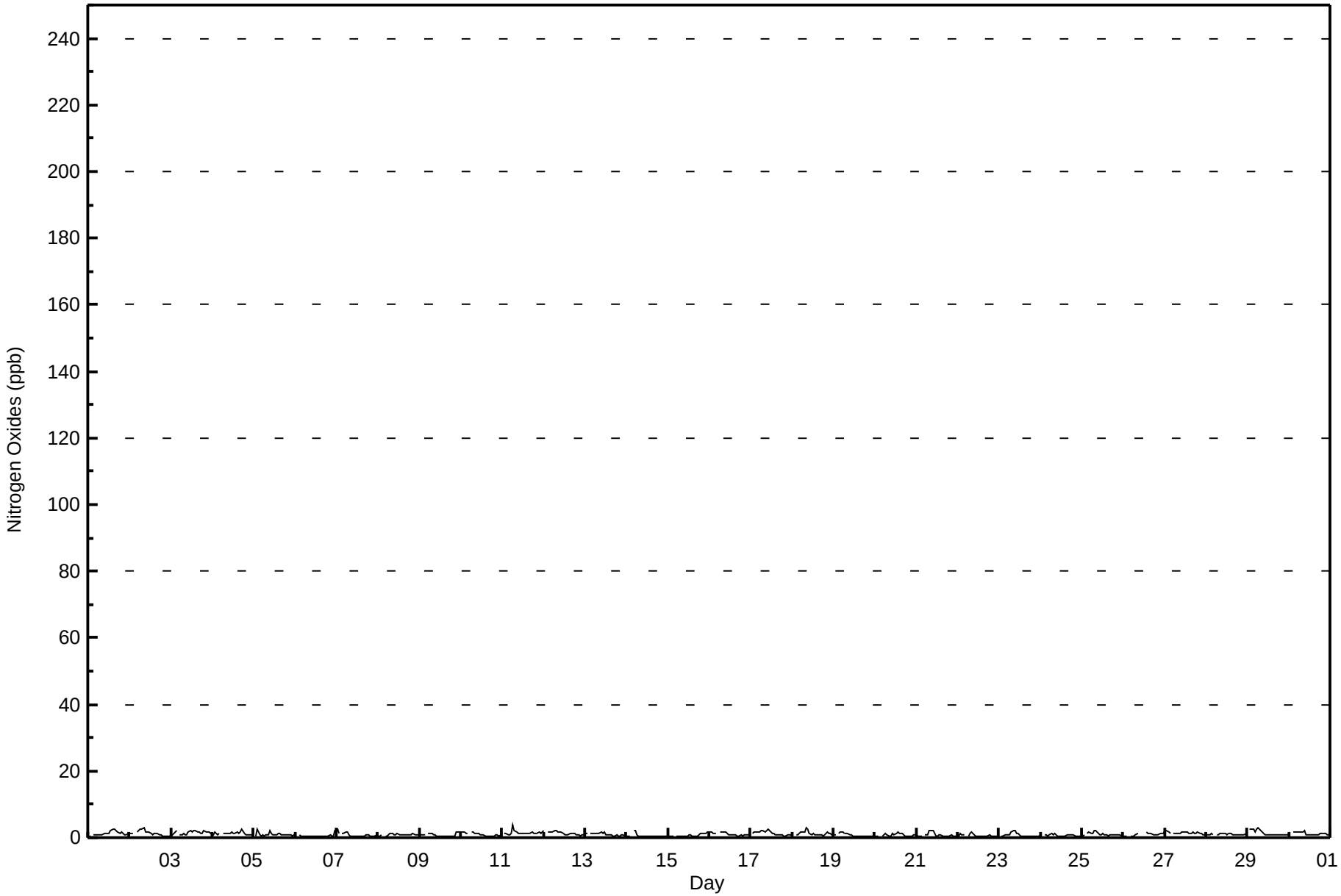
Z - zerospan C - Calibration

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Oxides (NO_X) - ppb

Conklin Lookout - April 2016



Nitrogen Oxides (NO_X) - ppb
Conklin Lookout - April 2016

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: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Oxides (NO_X) - ppb

Conklin Lookout - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	32	29	24	24	41	31	35	73	85	122	31	12	16	31	46	54	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	32	29	24	24	41	31	35	73	85	122	31	12	16	31	46	54	686

Total Number of Valid Hours: 686

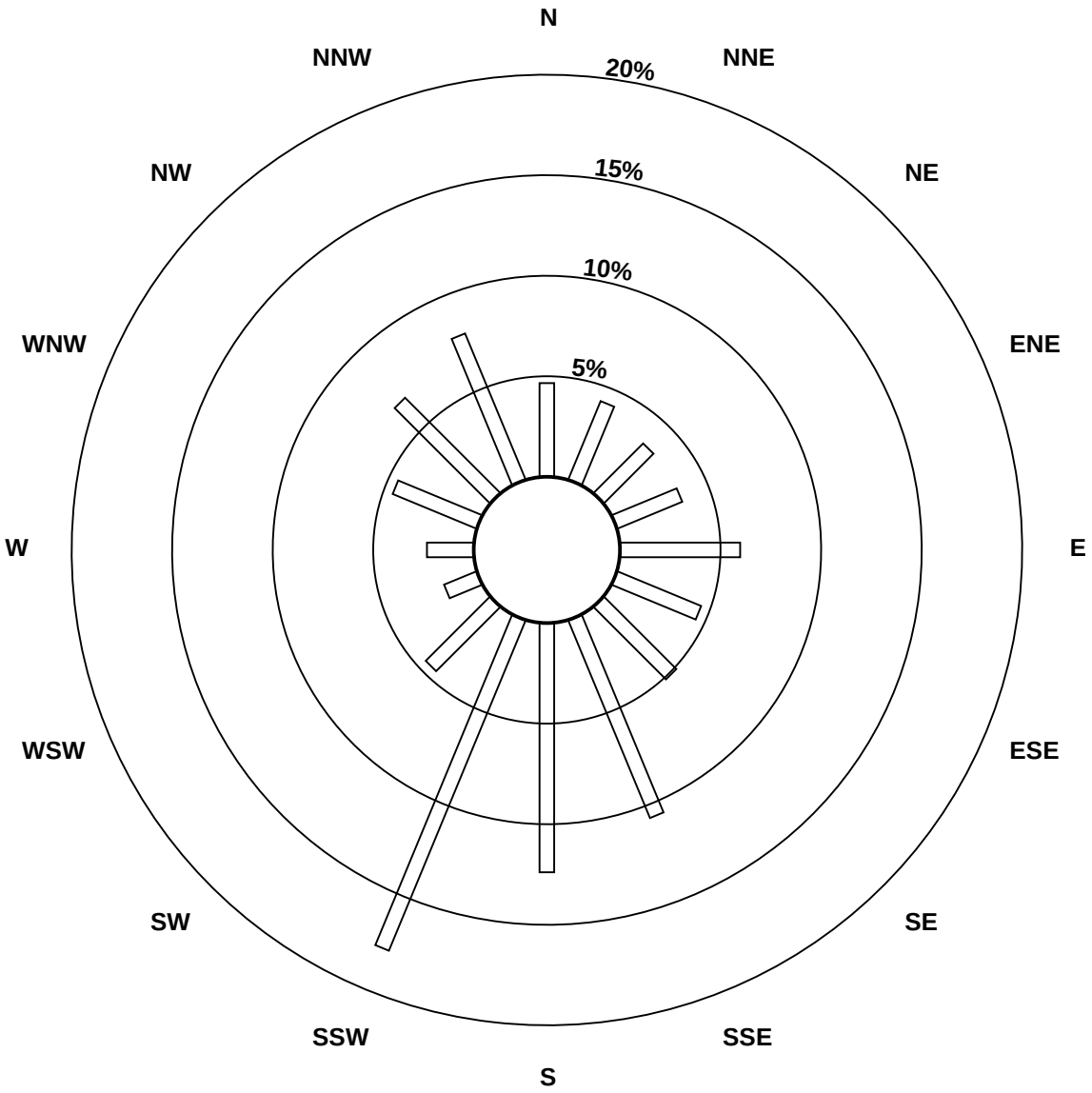
Total Number of Hours: 720

Wood Buffalo Environmental Association

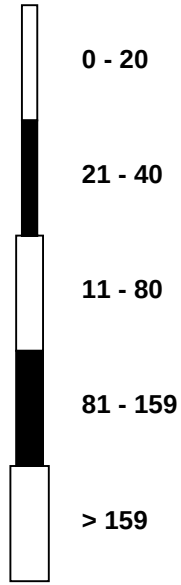
Wind Rose Apr 2016

Nitrogen Oxides (NO_X) - ppb

Conklin Lookout (AMS 18)



Classes (ppb)



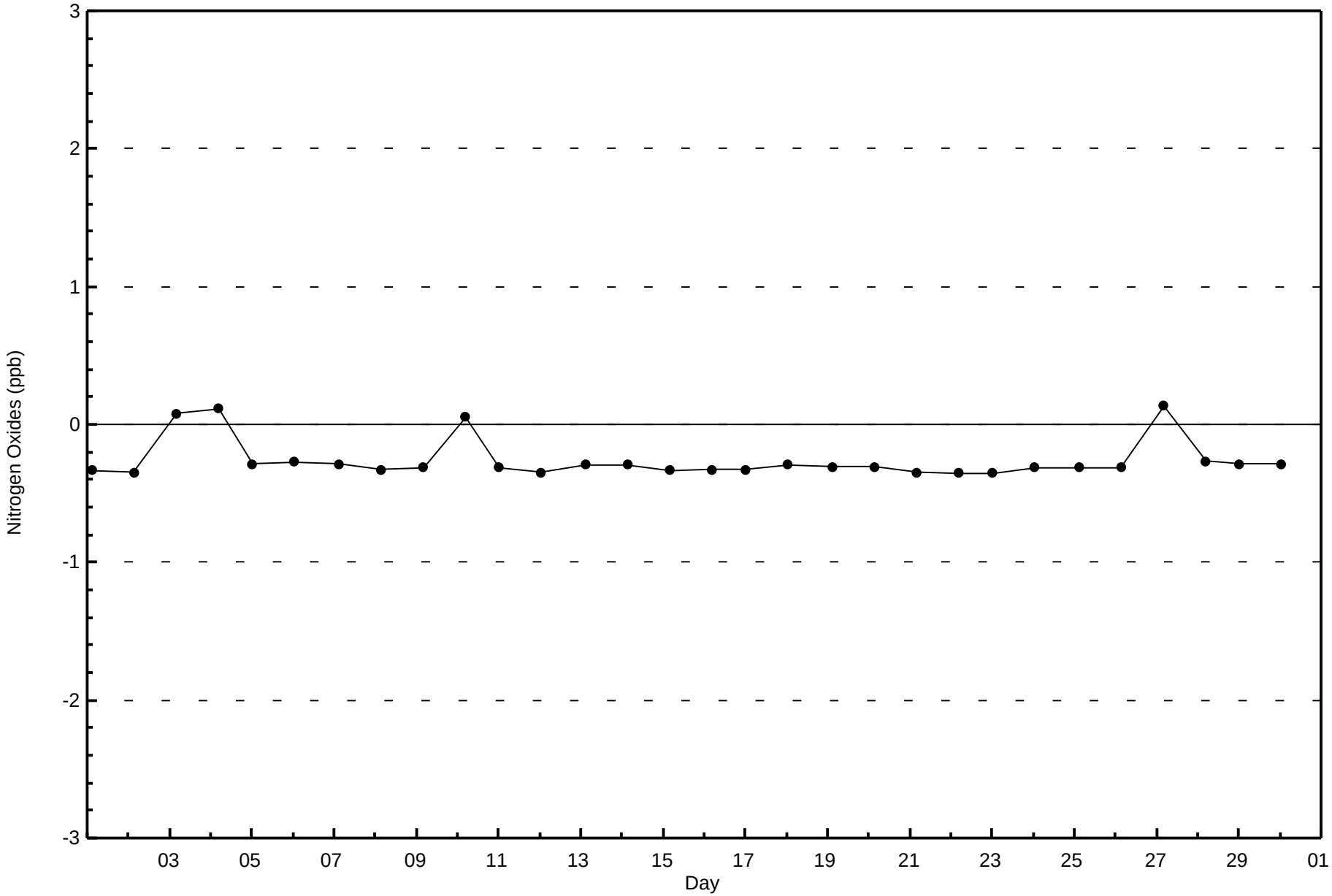
Total Number of Valid Hours: 686

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Oxides (NO_X) - ppb

Conklin Lookout - April 2016

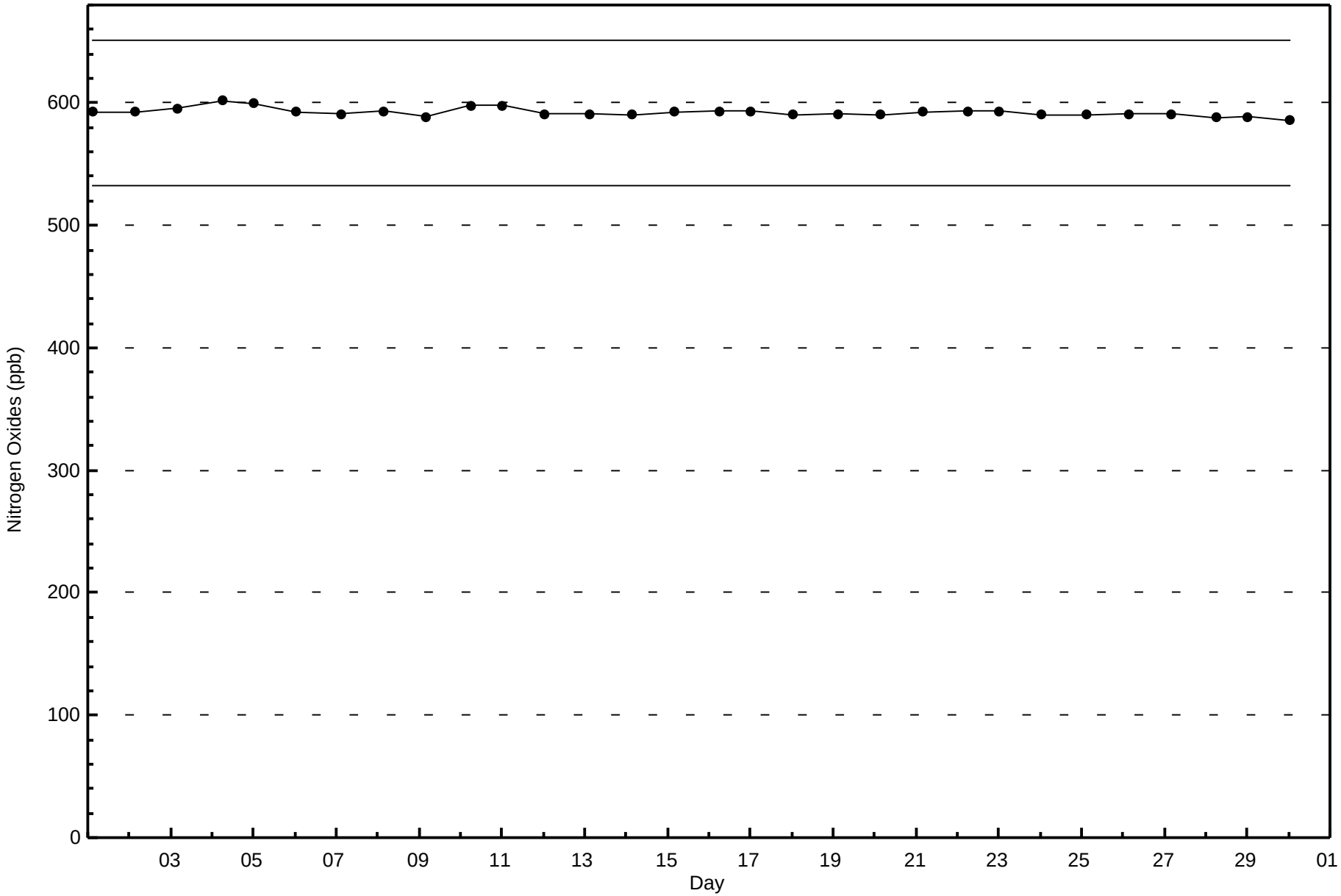


Wood Buffalo Environmental Association

Span Responses

Nitrogen Oxides (NO_X) - ppb

Conklin Lookout - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O_3) - ppb

Conklin Lookout - April 2016

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

Maximum Value: 63 ppb on Apr 19 20:00

Maximum Daily Average: 56.3 ppb on Apr 18

Minimum Value: 25 ppb on Apr 6 00:00

Minimum Daily Average: 31.7 ppb on Apr 26

Maximum Diurnal Average: 46.5 ppb at hour 17

Minimum Diurnal Average: 38.6 ppb at hour 5

Monthly Average: 42.9 ppb

Percentiles: $P_1 = 26$ $P_{10} = 34$ $Q_1 = 38$ Median = 42 $Q_3 = 48$ $P_{90} = 54$ $P_{99} = 61$

Hours in Service:	720
Hours of Data:	687
Hours of Missing Data:	33
Hours of Calibration:	33
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-Apr	45	45	45	44	43	Z	41	40	41	41	42	44	44	45	46	47	47	47	45	44	42	41	41	40	43.5	47
2-Apr	39	39	39	39	38	36	Z	34	34	35	37	40	44	45	44	44	45	44	43	44	43	42	42	42	40.5	45
3-Apr	43	42	39	38	40	40	41	Z	42	42	43	43	44	44	45	45	46	46	46	45	45	43	42	41	42.8	46
4-Apr	40	39	39	39	38	37	36	36	Z	39	40	41	42	41	41	41	42	40	40	38	36	35	34	35	38.6	42
5-Apr	37	37	34	Z	36	33	34	34	34	35	34	35	36	35	34	31	29	30	29	27	26	26	26	25	32.0	37
6-Apr	25	29	36	37	Z	36	36	35	33	32	32	33	31	34	39	41	41	42	40	38	36	37	37	33	35.3	42
7-Apr	32	35	36	35	34	Z	32	35	38	39	39	39	41	42	43	44	42	40	41	39	39	38	37	36	38.0	44
8-Apr	35	33	32	32	35	35	Z	36	37	38	39	40	42	44	45	45	42	41	40	39	38	38	37	36	38.3	45
9-Apr	35	33	31	30	29	30	34	Z	39	40	41	40	39	39	41	42	44	45	44	44	44	43	44	44	38.8	45
10-Apr	42	42	43	44	43	42	42	44	Z	46	48	49	50	50	50	51	51	51	51	51	49	48	48	47	47.0	51
11-Apr	44	44	45	Z	43	42	40	42	44	44	46	47	47	47	47	48	49	48	47	47	46	45	44	43	45.2	49
12-Apr	42	42	41	41	Z	40	41	41	42	43	45	46	47	47	48	51	53	54	54	53	50	49	49	48	46.4	54
13-Apr	47	46	46	45	42	Z	41	39	38	39	38	40	41	42	39	36	37	34	33	31	32	32	30	31	38.2	47
14-Apr	33	36	34	34	32	31	Z	37	36	35	36	38	39	39	39	39	39	38	38	39	39	39	39	38	36.7	39
15-Apr	38	40	40	40	40	39	40	Z	40	39	40	40	41	42	43	43	42	43	43	41	41	41	41	39	40.7	43
16-Apr	39	40	39	41	40	38	37	36	Z	40	45	50	53	54	54	54	55	54	54	53	53	53	52	51	47.1	55
17-Apr	51	50	49	Z	49	47	44	44	44	44	48	52	55	58	55	54	53	52	52	49	51	54	53	52	50.5	58
18-Apr	52	51	50	51	Z	51	52	51	49	51	57	59	61	60	60	61	62	62	60	62	63	59	57	56	56.3	63
19-Apr	55	53	51	49	47	Z	45	45	49	51	52	56	58	58	57	56	58	59	63	63	59	58	58	57	54.6	63
20-Apr	55	52	46	43	42	38	Z	35	36	36	35	36	36	36	37	37	37	37	37	37	36	35	34	35	38.6	55
21-Apr	34	34	34	34	33	33	32	Z	32	35	37	40	43	44	46	47	47	48	46	48	48	44	44	44	40.2	48
22-Apr	43	42	43	41	39	40	40	41	Z	44	45	47	47	47	46	46	46	45	44	44	43	42	42	41	43.4	47
23-Apr	41	40	39	Z	37	37	37	36	37	37	39	40	42	43	42	42	42	42	41	40	39	39	39	40	39.6	43
24-Apr	39	38	37	40	Z	42	42	44	44	43	47	51	51	49	50	49	48	48	45	44	43	41	39	37	44.0	51
25-Apr	35	34	33	34	35	Z	34	33	36	40	41	41	42	43	45	47	47	46	44	42	40	39	38	40	39.5	47
26-Apr	36	33	32	31	30	30	Z	32	32	30	30	28	28	28	31	33	36	35	40	36	31	28	30	29	31.7	40
27-Apr	27	28	27	26	26	26	27	Z	C	C	C	46	48	52	52	53	50	50	49	48	48	49	52	52	41.8	53
28-Apr	51	50	50	51	50	51	51	51	Z	54	57	59	59	60	60	59	60	61	59	58	58	56	54	52	55.3	61
29-Apr	50	49	48	Z	46	46	46	47	50	52	54	54	55	56	56	56	56	56	57	56	54	54	54	53	52.2	57
30-Apr	51	50	50	49	Z	48	46	44	44	47	52	53	53	53	50	51	51	52	54	53	51	51	50	51	50.1	54
	41.2	40.8	40.3	39.5	38.6	38.7	39.6	39.6	39.5	41.1	42.6	44.2	45.3	45.9	46.1	46.4	46.5	46.3	46.0	45.1	44.1	43.4	42.9	42.3	Diurnal Average	
	55	53	51	51	50	51	52	51	50	54	57	59	61	60	60	61	62	62	63	63	63	59	58	57	Diurnal Maximum	

Z - zerospan C - Calibration

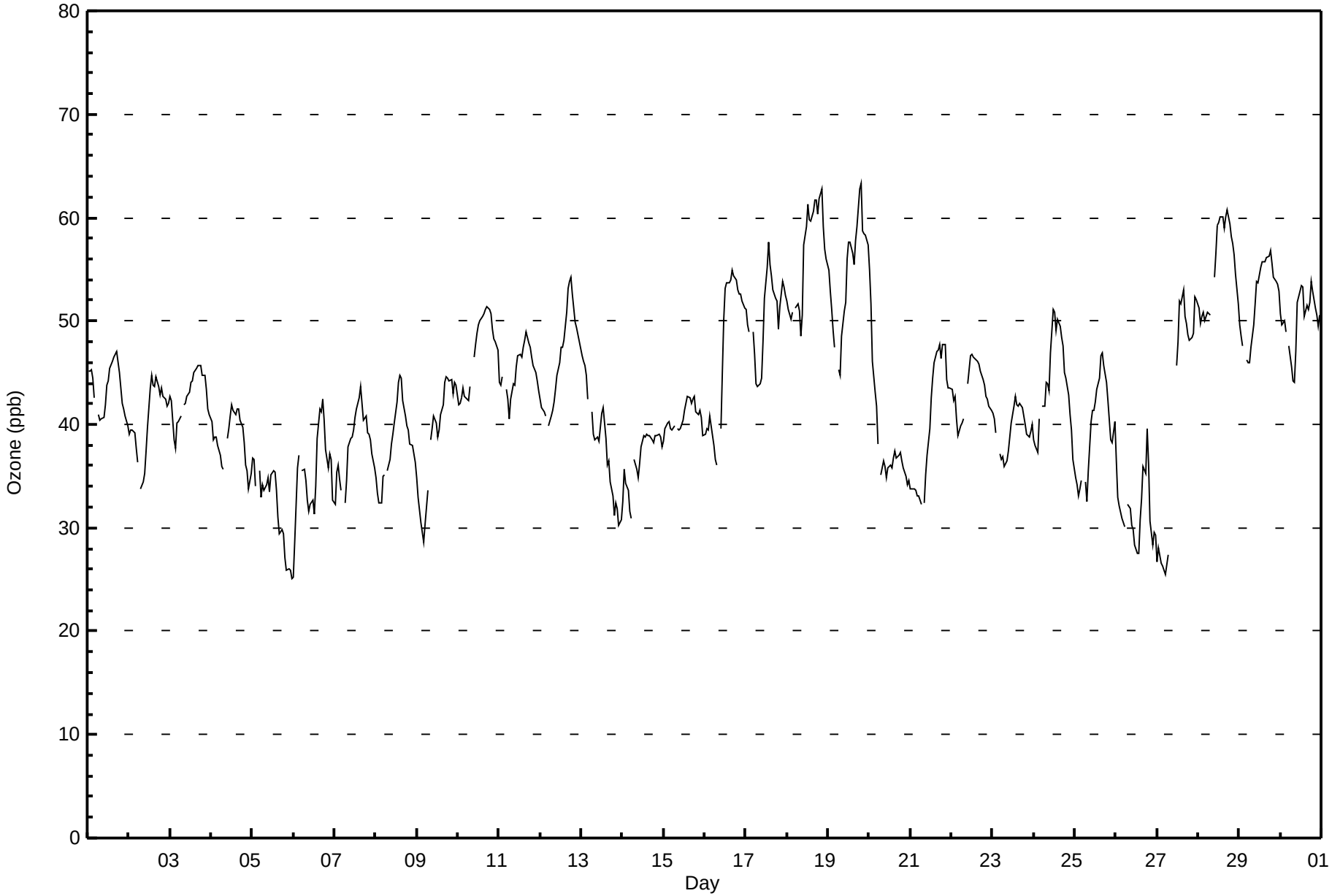
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb

Wood Buffalo Environmental Association

Hourly Averages

Ozone (O_3) - ppb

Conklin Lookout - April 2016



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
21 - 50	556	80.93	80.93
51 - 82	131	19.07	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Ozone (O_3) - ppb

Conklin Lookout - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 50	30	29	22	21	41	29	31	66	56	86	18	7	6	21	41	52	556
51 - 82	1	0	3	3	1	2	2	6	29	40	13	7	10	11	3	0	131
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	31	29	25	24	42	31	33	72	85	126	31	14	16	32	44	52	687

Total Number of Valid Hours: 687

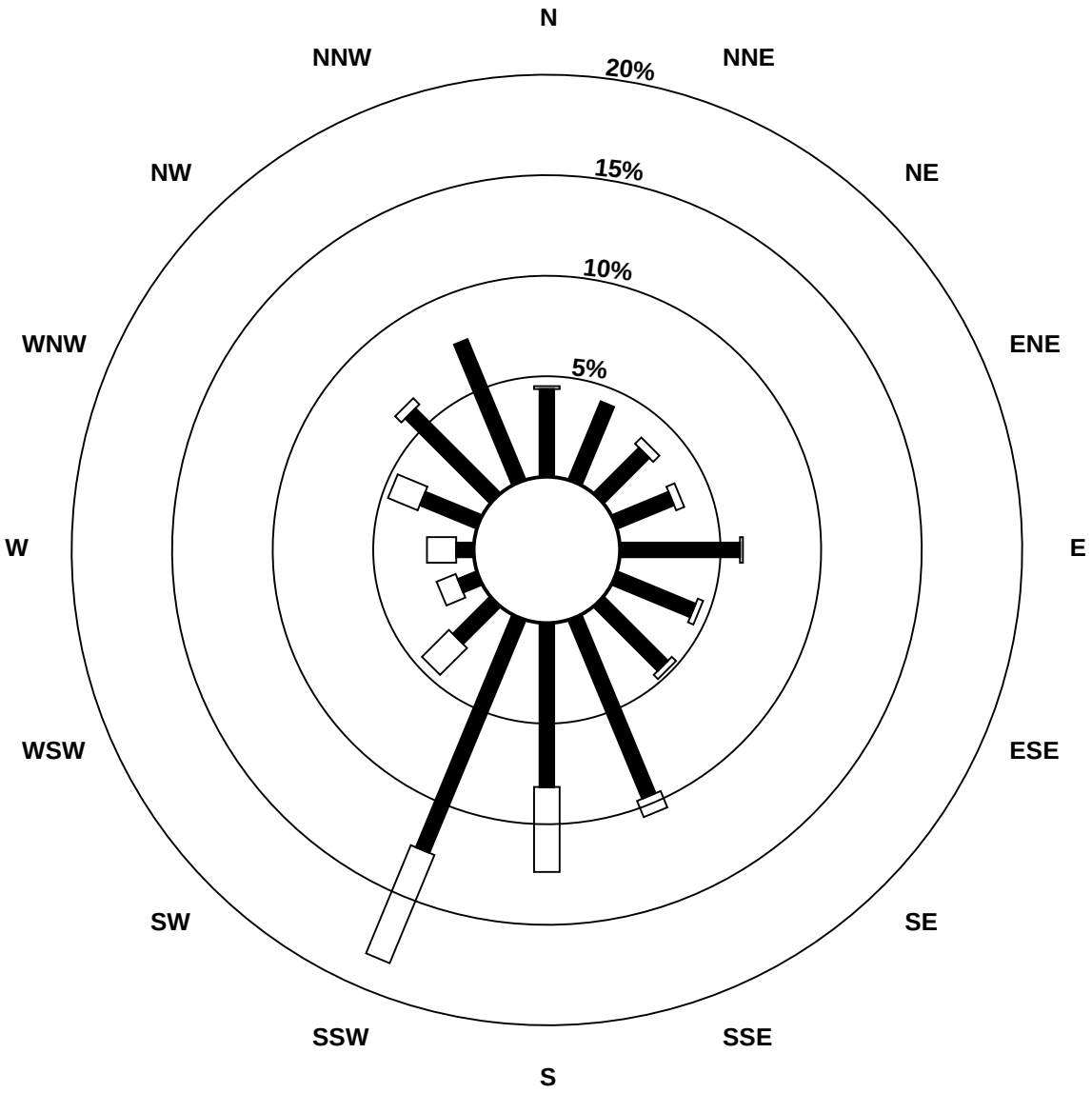
Total Number of Hours: 720

Wood Buffalo Environmental Association

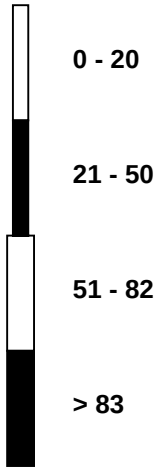
Wind Rose Apr 2016

Ozone (O_3) - ppb

Conklin Lookout (AMS 18)



Classes (ppb)



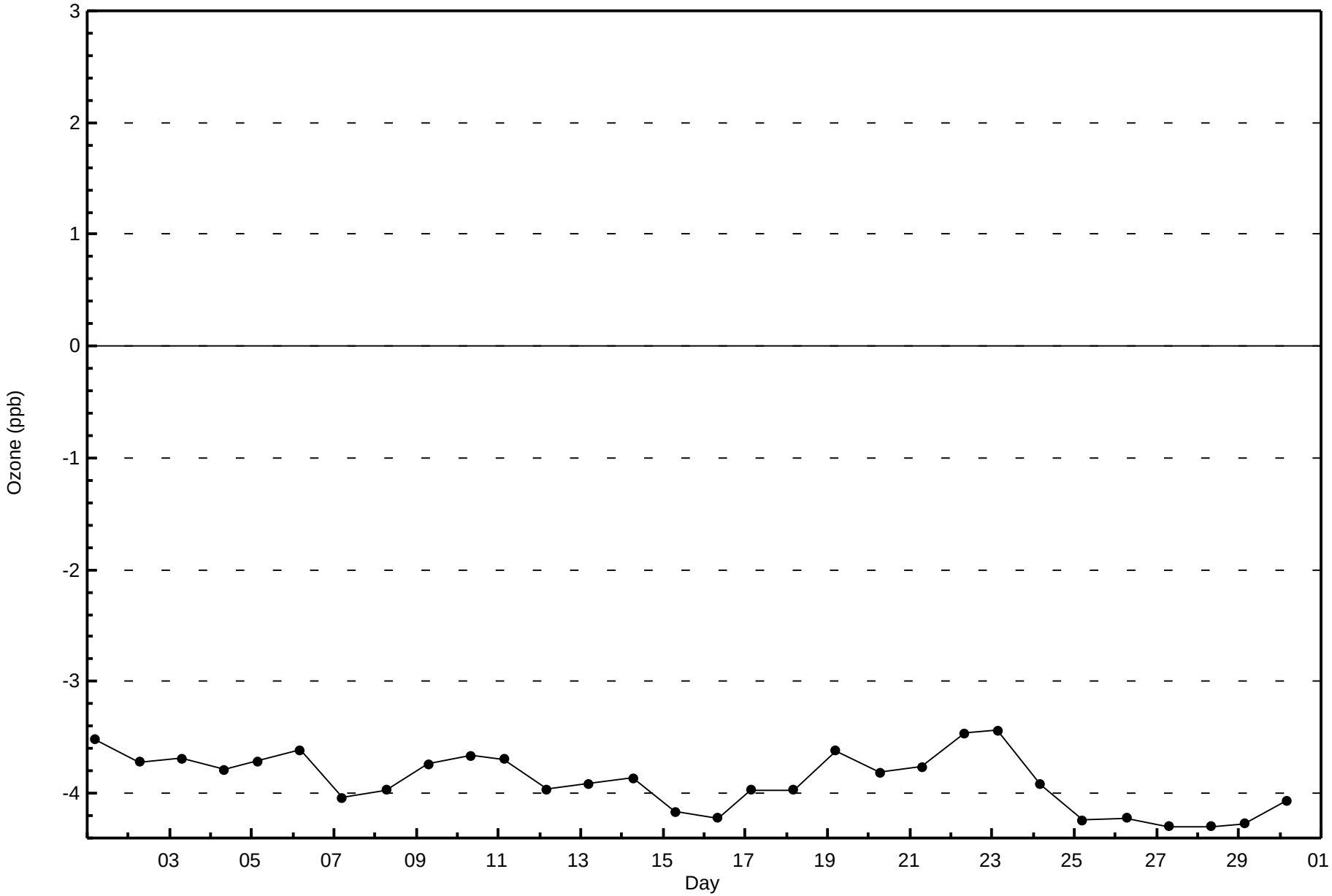
Total Number of Valid Hours: 687

Wood Buffalo Environmental Association

Zero Responses

Ozone (O_3) - ppb

Conklin Lookout - April 2016

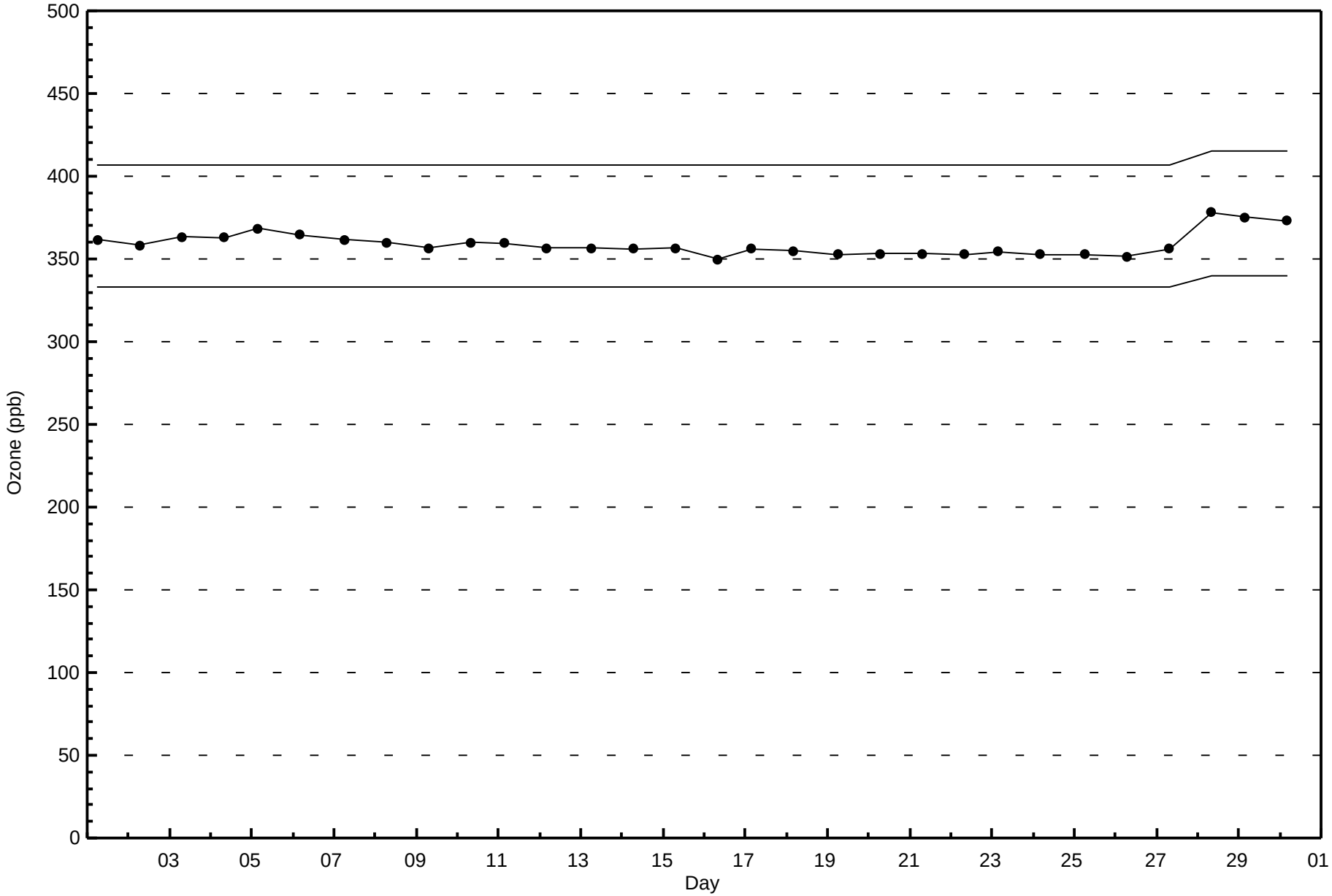


Wood Buffalo Environmental Association

Span Responses

Ozone (O_3) - ppb

Conklin Lookout - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

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

Conklin Lookout - April 2016

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

Maximum Value: 46.1 $\mu g/m^3$ on Apr 18 21:00

Maximum Daily Average: 7.6 $\mu g/m^3$ on Apr 27

Minimum Value: 0.2 $\mu g/m^3$ on Apr 15 16:00

Minimum Daily Average: 0.6 $\mu g/m^3$ on Apr 15

Maximum Diurnal Average: 4.5 $\mu g/m^3$ at hour 21

Minimum Diurnal Average: 2.5 $\mu g/m^3$ at hour 12

Monthly Average: 2.94 $\mu g/m^3$

Percentiles: $P_1 = 0.2$ $P_{10} = 0.8$ $Q_1 = 1.5$ Median = 2.4 $Q_3 = 3.9$ $P_{90} = 5.6$ $P_{99} = 9.6$

Hours in Service:	720
Hours of Data:	718
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-Apr	1.4	1.4	1.4	1.3	1.4	1.4	1.4	1.4	1.3	1.2	1.2	0.6	0.7	1.0	1.3	1.6	1.6	1.0	1.1	0.9	1.7	1.5	1.6	1.5	1.3	1.7
2-Apr	1.4	1.4	1.4	1.5	1.6	1.7	1.8	1.9	1.8	1.5	1.0	1.2	1.8	2.3	2.2	2.8	3.1	2.3	2.0	2.3	2.2	2.3	2.2	2.2	1.9	3.1
3-Apr	2.4	3.4	4.9	6.3	4.9	3.9	3.5	3.5	3.2	2.7	2.2	2.6	2.5	2.7	3.5	2.4	1.9	2.0	3.0	4.2	4.8	3.6	3.0	2.5	3.3	6.3
4-Apr	2.7	2.9	2.7	2.8	2.7	2.7	2.8	2.4	2.2	1.9	2.0	2.2	1.9	1.7	1.9	2.2	3.7	5.0	4.9	4.3	3.9	3.7	3.8	3.4	2.9	5.0
5-Apr	3.8	4.1	4.1	3.7	3.4	3.5	3.8	3.3	2.5	2.1	1.8	1.5	1.5	1.7	2.0	2.2	2.2	3.0	3.3	3.0	2.6	2.2	1.9	1.7	2.7	4.1
6-Apr	1.7	1.9	1.3	0.9	0.7	0.7	0.7	0.7	0.6	0.6	0.5	0.5	0.6	0.8	0.8	0.8	0.7	0.6	0.7	1.0	1.3	1.4	1.4	2.5	1.0	2.5
7-Apr	3.0	2.9	2.5	2.8	2.7	2.2	1.8	1.6	1.3	1.0	1.0	1.0	0.5	0.4	0.3	0.3	0.6	1.5	3.5	2.3	2.1	1.7	1.8	1.8	1.7	3.5
8-Apr	1.8	1.7	1.6	1.6	1.5	1.5	1.4	1.3	1.2	1.2	1.1	1.1	1.1	0.7	0.6	0.7	0.9	1.3	1.7	1.9	2.1	2.2	2.3	2.5	1.5	2.5
9-Apr	4.2	5.0	4.7	4.7	4.1	3.2	3.1	3.2	2.4	2.1	2.3	2.7	3.0	2.2	1.5	1.2	1.4	1.5	1.6	1.8	2.0	3.1	3.2	3.4	2.8	5.0
10-Apr	4.1	4.6	4.1	3.1	3.2	3.8	3.6	2.6	2.0	1.4	1.1	1.0	1.0	1.0	0.6	0.5	0.5	0.6	1.1	1.5	1.7	1.4	1.2	1.2	2.0	4.6
11-Apr	1.2	1.2	1.2	1.2	1.3	1.3	1.4	1.6	2.0	2.0	2.1	2.3	2.8	1.9	1.5	1.5	1.9	3.0	3.6	4.7	5.1	4.6	4.1	3.5	2.4	5.1
12-Apr	3.6	3.3	3.6	3.6	3.7	3.8	3.2	2.2	1.6	1.4	1.7	2.0	1.5	1.8	1.9	2.6	3.5	2.7	2.3	2.3	2.5	1.8	2.2	2.7	2.6	3.8
13-Apr	4.3	4.3	3.9	4.7	5.0	5.1	5.2	5.0	4.9	4.7	4.4	3.9	3.5	3.5	4.4	6.1	5.9	5.4	3.7	2.2	1.5	2.0	1.9	2.3	4.1	6.1
14-Apr	2.9	2.8	2.9	3.5	7.2	8.8	4.4	3.1	1.8	1.6	1.6	1.7	1.5	1.8	1.9	1.5	1.5	1.3	1.1	0.9	0.9	0.9	0.8	0.7	2.4	8.8
15-Apr	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.5	0.5	0.3	0.2	0.4	0.5	0.3	0.2	0.3	0.4	0.5	0.6	0.6	1.1	1.3	1.5	0.6	1.5
16-Apr	1.5	1.5	1.6	1.6	1.6	1.8	1.8	1.9	1.9	1.5	1.3	1.4	1.5	2.1	2.7	3.1	2.9	3.1	3.7	4.5	4.7	4.1	3.3	2.6	2.4	4.7
17-Apr	2.4	2.8	2.9	2.7	2.6	3.1	2.8	2.3	1.9	2.0	2.4	3.1	4.0	4.3	4.5	4.6	4.3	4.5	4.7	4.1	4.9	4.9	3.9	3.0	3.4	4.9
18-Apr	2.8	3.3	3.4	3.2	3.2	3.2	2.9	2.6	3.0	2.5	2.5	3.4	4.9	4.5	4.0	2.8	5.6	5.1	3.9	14.4	46.1	17.3	6.4	4.1	6.5	46.1
19-Apr	3.0	2.5	2.6	2.7	2.4	2.3	2.4	3.5	7.6	7.2	6.5	4.5	4.2	5.0	5.1	4.7	4.5	3.4	1.6	1.1	1.9	2.8	3.0	2.3	3.6	7.6
20-Apr	1.5	1.3	0.9	0.7	0.6	1.0	1.3	1.1	0.7	0.8	1.7	1.6	1.9	2.4	1.2	1.0	0.9	0.5	0.7	1.0	1.2	1.3	1.3	1.4	1.2	2.4
21-Apr	1.4	1.4	1.4	1.4	1.6	1.6	1.5	1.5	1.1	1.0	1.0	0.2	UO	0.2	0.2	0.3	0.5	0.6	0.9	0.9	1.1	1.6	1.8	1.7	1.1	1.8
22-Apr	1.7	1.7	1.6	1.7	1.8	1.6	1.3	1.3	1.3	1.1	0.5	0.4	0.4	0.5	0.6	0.7	0.8	0.9	1.2	1.0	1.2	2.0	1.7	1.6	1.2	2.0
23-Apr	1.5	1.6	1.7	1.7	1.8	1.9	2.0	2.1	1.9	1.9	1.7	1.7	1.9	2.7	2.4	2.5	2.4	2.5	2.4	3.7	3.9	4.0	3.6	2.8	2.4	4.0
24-Apr	4.4	5.6	5.4	4.7	4.5	4.1	4.0	3.7	3.5	2.9	2.2	1.4	1.1	1.4	2.3	3.3	4.6	5.8	5.9	5.3	4.6	4.1	3.8	3.7	3.8	5.9
25-Apr	4.9	6.3	6.0	6.1	6.6	7.5	6.7	6.4	5.9	4.4	4.0	4.2	4.6	3.8	3.5	3.3	3.7	4.0	3.9	3.7	3.6	3.4	3.4	2.2	4.7	7.5
26-Apr	1.9	1.8	1.6	1.5	1.5	1.6	1.3	1.6	3.1	3.9	4.2	5.9	6.6	7.5	5.8	5.5	4.3	6.0	4.0	2.5	4.5	6.9	7.2	7.0	4.1	7.5
27-Apr	6.6	7.7	7.3	6.8	6.2	5.7	6.1	C	9.1	12.9	12.8	11.1	10.2	8.7	7.8	6.0	7.6	7.7	7.5	6.8	6.3	5.9	3.7	3.3	7.6	12.9
28-Apr	3.8	3.8	3.9	3.9	3.9	3.9	3.3	2.7	2.7	3.1	4.7	6.0	6.1	6.5	6.1	6.4	6.5	6.3	6.6	5.7	5.2	4.9	4.3	4.2	4.8	6.6
29-Apr	4.3	5.1	5.5	5.6	5.6	5.3	5.0	4.0	3.8	3.6	3.5	3.4	3.7	4.2	4.4	4.7	5.7	5.1	5.2	5.3	6.5	6.3	4.3	3.6	4.7	6.5
30-Apr	5.5	6.9	6.3	5.8	5.8	5.8	5.4	5.1	4.9	2.9	1.6	2.1	2.4	2.2	2.3	2.4	2.7	2.7	3.6	4.2	4.2	4.3	3.8	2.4	4.0	6.9
	2.9	3.2	3.1	3.1	3.1	3.2	2.9	2.6	2.7	2.6	2.5	2.5	2.7	2.7	2.6	2.6	2.9	3.0	3.0	3.3	4.5	3.6	2.9	2.6	Diurnal Average	
	6.6	7.7	7.3	6.8	7.2	8.8	6.7	6.4	9.1	12.9	12.8	11.1	10.2	8.7	7.8	6.4	7.6	7.7	7.5	14.4	46.1	17.3	7.2	7.0	Diurnal Maximum	

C - Calibration UO - Unstable Operation

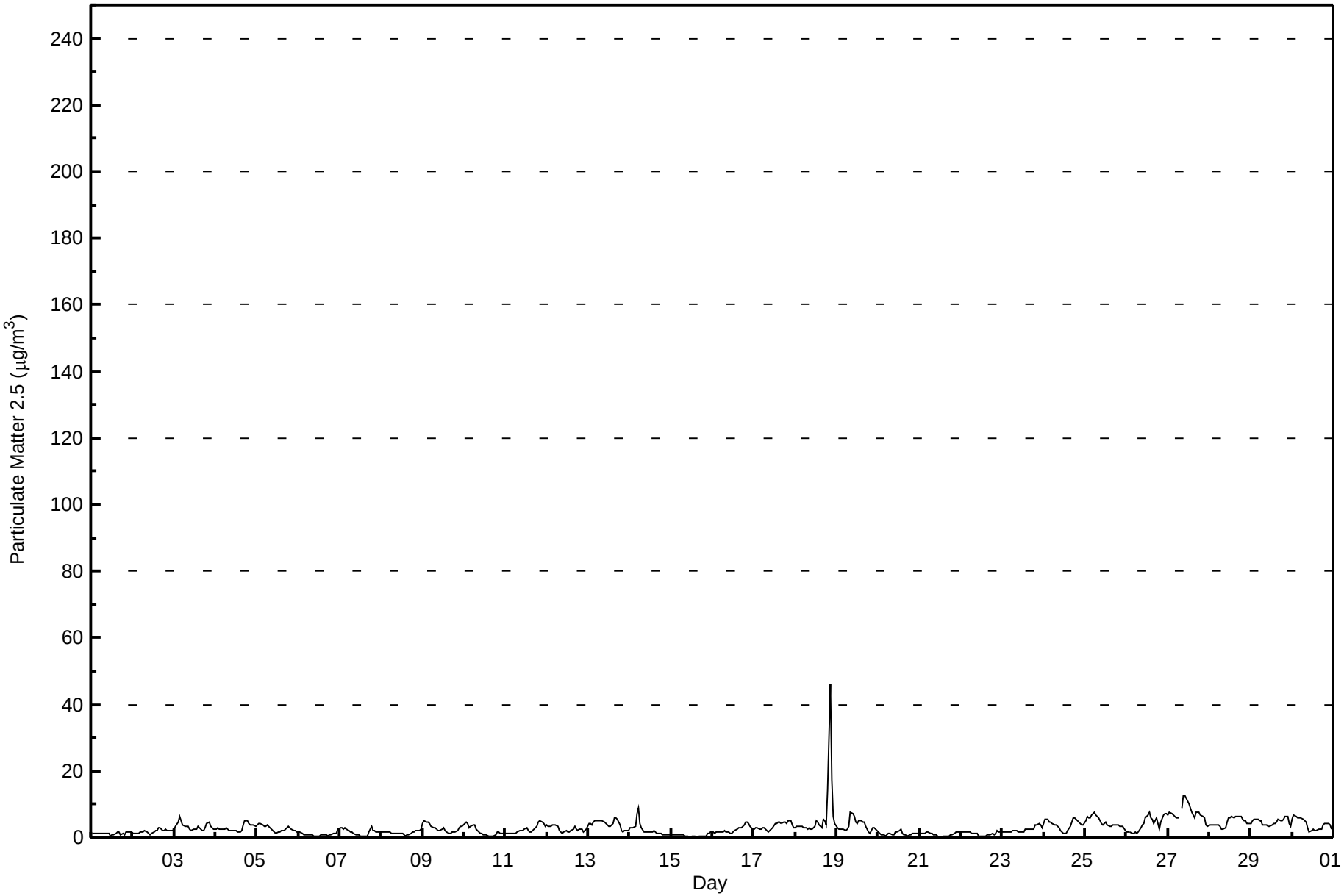
Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 $\mu g/m^3$

Wood Buffalo Environmental Association

Hourly Averages

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

Conklin Lookout - April 2016



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

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

Conklin Lookout - April 2016

Concentration Ranges ($\mu g/m^3$)	Number of Hours	%	Cumulative %
1 - 5	554	77.16	77.16
6 - 15	71	9.89	87.05
16 - 25	1	0.14	87.19
26 - 80	1	0.14	87.33
> 81.0	0	0.00	87.33

Total Number of Valid Hours: 718

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

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

Conklin Lookout - April 2016

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	23	26	16	21	28	27	34	55	61	110	30	12	14	23	32	42	554
6 - 15	1	1	1	1	0	2	2	12	18	21	3	1	0	4	2	2	71
16 - 25	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
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	24	27	17	22	28	29	36	67	81	131	33	13	14	27	34	44	627

Total Number of Valid Hours: 718

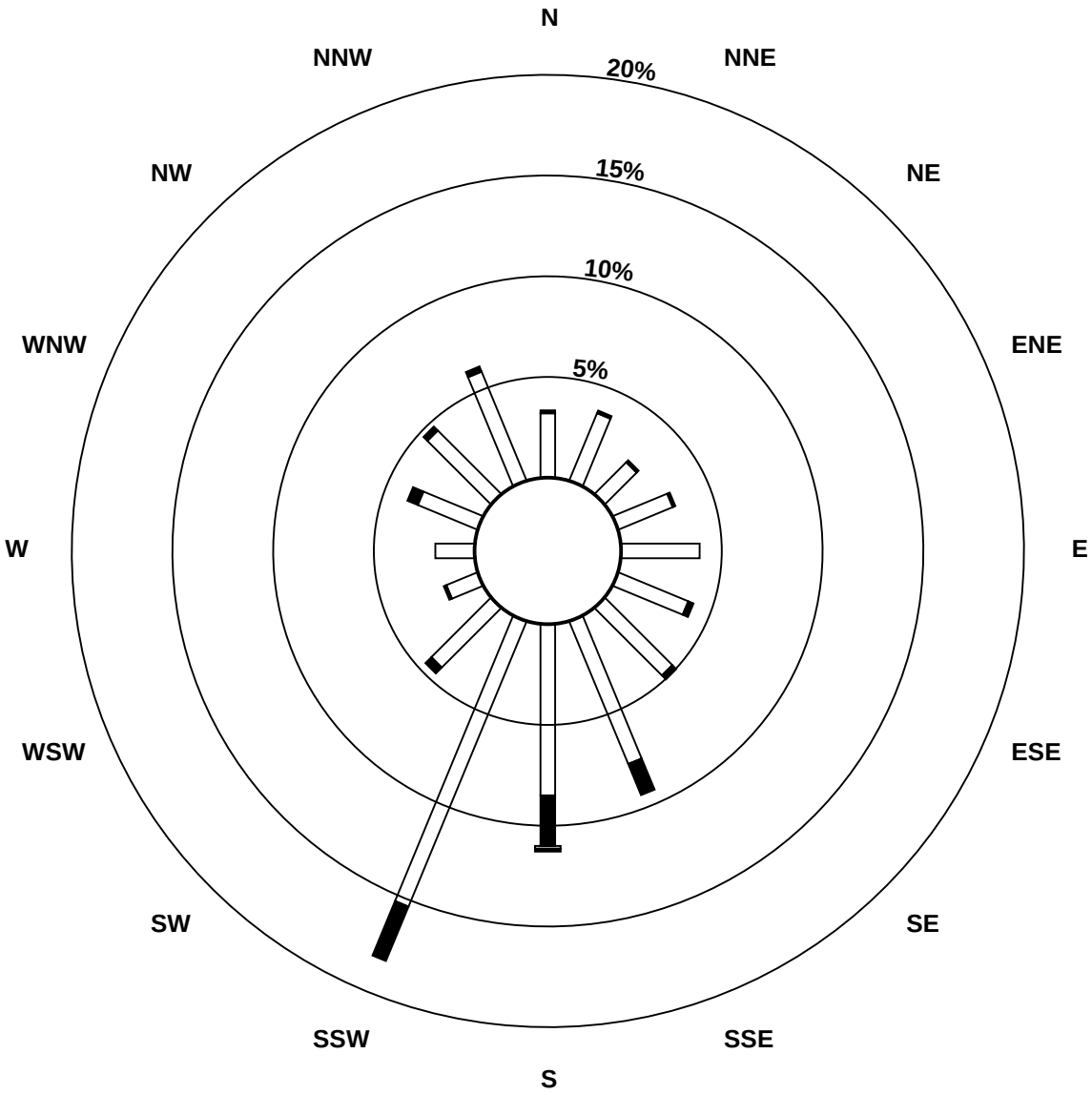
Total Number of Hours: 720

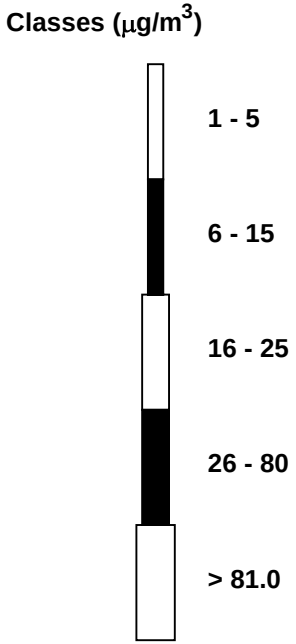
Wood Buffalo Environmental Association

Wind Rose Apr 2016

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

Conklin Lookout (AMS 18)





Total Number of Valid Hours: 718

Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature 2m (AT 2m) - C

Conklin Lookout - April 2016

Maximum Value: 23.2 C on Apr 18 14:00

Maximum Daily Average: 17.1 C on Apr 18

Minimum Value: -8.2 C on Apr 10 07:00

Minimum Daily Average: -4.5 C on Apr 10

Maximum Diurnal Average: 9.0 C at hour 16

Minimum Diurnal Average: 0.4 C at hour 6

Monthly Average: 4.52 C

Percentiles: P_1 = -7.5 P_{10} = -3.4 Q_1 = -0.4 Median = 3.1 Q_3 = 8.9 P_{90} = 15.1 P_{99} = 22.1

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

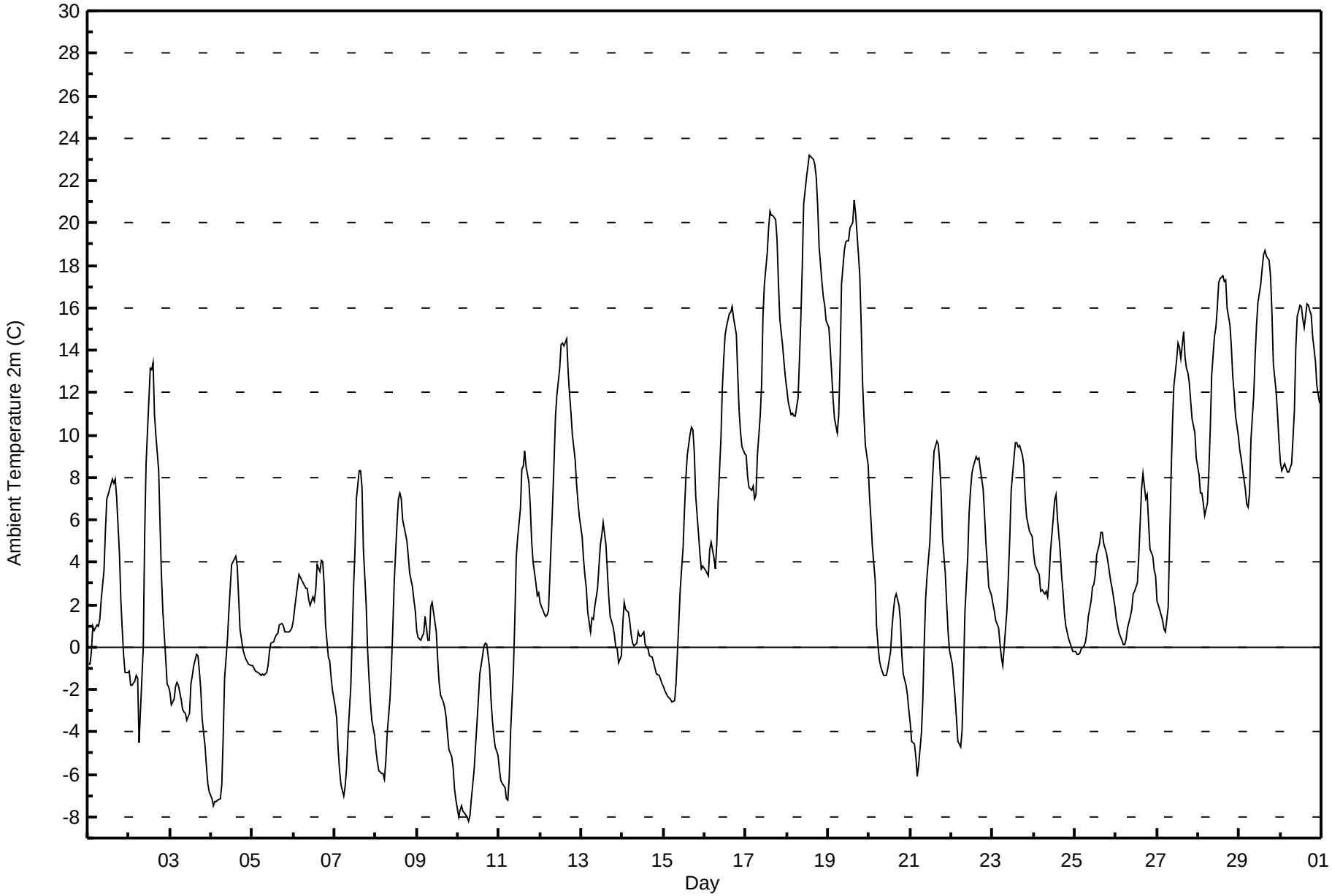
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	-0.8	-0.8	-0.2	1.0	0.8	1.0	1.0	1.3	2.2	3.7	5.5	7.0	7.2	7.5	7.9	7.7	7.9	7.1	4.4	2.3	0.8	-0.4	-1.2	-1.2	3.0	7.9
2-Apr	-1.2	-1.8	-1.8	-1.6	-1.3	-1.4	-4.5	-3.0	0.0	5.2	8.7	10.2	13.2	13.1	13.4	11.0	9.9	8.3	5.7	3.3	1.6	-0.6	-1.7	-1.9	3.4	13.4
3-Apr	-2.1	-2.7	-2.5	-1.9	-1.6	-1.8	-2.4	-2.9	-3.1	-3.1	-3.4	-3.1	-1.7	-1.4	-0.9	-0.4	-0.4	-1.1	-2.0	-3.4	-4.6	-5.6	-6.4	-6.8	-2.7	-0.4
4-Apr	-7.1	-7.5	-7.3	-7.3	-7.2	-7.1	-6.5	-4.2	-1.5	0.3	1.6	2.8	3.9	4.0	4.3	3.8	2.4	0.9	0.0	-0.4	-0.5	-0.7	-0.8	-0.8	-1.5	4.3
5-Apr	-0.9	-1.0	-1.2	-1.2	-1.3	-1.3	-1.2	-1.3	-1.2	-0.9	-0.2	0.2	0.2	0.5	0.6	0.7	1.0	1.1	1.0	0.7	0.7	0.7	0.8	0.9	-0.1	1.1
6-Apr	1.3	1.8	2.9	3.4	3.3	3.2	2.9	2.7	2.8	2.2	2.0	2.4	2.2	2.7	3.9	3.5	4.1	4.0	3.0	1.0	-0.5	-0.7	-1.5	-2.1	2.1	4.1
7-Apr	-2.8	-3.4	-4.8	-5.8	-6.5	-7.0	-6.5	-5.7	-4.2	-1.8	0.4	2.8	4.6	7.0	8.3	8.3	7.5	4.6	2.0	-0.1	-1.5	-2.6	-3.5	-4.2	-0.6	8.3
8-Apr	-4.9	-5.4	-5.8	-6.0	-6.0	-6.2	-5.4	-4.0	-2.4	-0.9	1.0	3.1	5.9	7.0	7.3	7.0	6.0	5.4	5.0	4.3	3.5	2.8	2.2	1.7	0.6	7.3
9-Apr	0.8	0.5	0.3	0.5	0.7	1.4	0.3	0.3	1.9	2.1	1.6	0.7	-0.6	-1.7	-2.2	-2.6	-2.8	-3.3	-4.1	-4.8	-5.1	-5.7	-6.7	-7.2	-1.5	2.1
10-Apr	-8.0	-7.7	-7.5	-7.7	-7.8	-8.0	-8.2	-7.9	-7.2	-5.7	-4.7	-3.6	-2.4	-1.3	-0.4	0.1	0.2	0.1	-1.0	-2.5	-3.5	-4.2	-4.7	-5.1	-4.5	0.2
11-Apr	-5.8	-6.3	-6.5	-6.6	-7.1	-7.2	-6.2	-4.0	-1.1	1.3	4.2	5.2	6.5	8.4	8.5	9.3	8.5	7.8	6.7	5.0	4.0	3.0	2.5	2.6	1.4	9.3
12-Apr	2.1	1.9	1.6	1.5	1.5	1.7	5.1	6.9	8.8	10.9	11.9	13.2	14.3	14.3	14.2	14.6	13.0	11.9	11.1	10.0	8.9	7.7	6.9	6.1	8.3	14.6
13-Apr	5.2	4.2	3.4	2.7	1.7	0.7	1.4	1.3	1.9	2.8	3.8	4.8	5.3	5.9	4.8	3.5	2.4	1.4	1.0	0.6	0.0	-0.1	-0.7	-0.4	2.4	5.9
14-Apr	1.1	2.1	1.8	1.6	1.2	0.6	0.2	0.1	0.2	0.7	0.5	0.5	0.7	0.1	0.0	-0.1	-0.4	-0.5	-0.7	-1.0	-1.2	-1.4	-1.5	-1.7	0.1	2.1
15-Apr	-1.9	-2.0	-2.3	-2.4	-2.5	-2.6	-2.5	-1.7	-0.2	1.2	2.8	4.7	6.4	8.0	9.0	10.0	10.4	10.2	9.2	7.1	5.3	4.4	3.7	3.8	3.3	10.4
16-Apr	3.6	3.5	3.4	4.6	4.9	4.2	3.7	4.8	6.9	9.8	12.2	13.6	14.7	15.1	15.7	15.8	16.1	15.5	14.8	12.8	11.1	10.1	9.5	9.1	9.8	16.1
17-Apr	9.1	8.0	7.5	7.4	7.6	7.0	7.2	9.1	10.9	12.3	15.7	17.1	18.6	19.7	20.5	20.3	20.4	20.1	19.2	17.2	15.5	14.2	13.4	12.7	13.8	20.5
18-Apr	12.2	11.5	11.0	11.0	10.9	10.9	11.8	13.5	15.5	17.9	20.9	22.1	22.7	23.2	23.1	23.0	22.7	22.1	20.8	18.9	17.2	16.5	16.1	15.4	17.1	23.2
19-Apr	15.1	14.0	12.9	11.7	10.8	10.1	10.9	13.5	17.1	18.7	19.1	19.2	19.1	19.7	20.0	21.1	20.4	19.6	17.5	15.2	12.5	10.9	9.5	8.6	15.3	21.1
20-Apr	7.1	6.0	4.8	3.1	1.0	0.1	-0.6	-0.9	-1.3	-1.3	-1.4	-1.0	-0.2	0.9	1.7	2.3	2.5	2.0	1.2	-0.4	-1.3	-1.8	-2.3	-3.0	0.7	7.1
21-Apr	-3.6	-4.5	-4.6	-5.1	-6.1	-5.6	-4.1	-2.4	0.2	2.3	3.4	5.0	6.6	8.1	9.2	9.7	9.6	8.7	7.3	5.2	3.5	2.1	0.7	-0.2	1.9	9.7
22-Apr	-0.8	-1.6	-2.4	-3.4	-4.5	-4.7	-3.9	-1.3	1.6	4.2	6.3	7.4	8.2	8.5	9.0	8.9	8.9	8.4	7.5	6.3	4.9	3.9	2.8	2.4	3.2	9.0
23-Apr	2.0	1.7	1.3	0.9	0.2	-0.5	-0.9	0.0	1.8	3.3	5.1	7.4	8.9	9.7	9.7	9.5	9.5	9.0	8.6	7.1	6.1	5.5	5.4	5.2	4.8	9.7
24-Apr	4.4	3.9	3.6	3.4	2.6	2.7	2.5	2.7	2.4	3.2	4.5	6.1	6.9	7.2	6.1	4.5	3.4	2.6	1.5	1.0	0.4	0.2	0.0	-0.2	3.1	7.2
25-Apr	-0.2	-0.3	-0.3	-0.2	-0.1	0.0	0.3	0.7	1.5	2.2	2.8	3.0	3.4	4.3	4.9	5.4	5.4	4.9	4.4	4.1	3.5	3.1	2.8	1.9	2.4	5.4
26-Apr	1.3	1.0	0.7	0.3	0.1	0.1	0.4	0.9	1.5	1.8	2.5	2.7	3.1	4.3	5.9	7.4	8.2	7.0	7.2	5.9	4.6	4.3	3.7	3.3	3.3	8.2
27-Apr	2.2	2.0	1.5	1.2	0.9	0.7	1.9	5.0	7.9	10.4	12.3	13.6	14.4	14.1	13.6	14.8	13.7	13.2	13.0	12.5	10.8	10.4	10.1	8.9	8.7	14.8
28-Apr	8.2	7.3	7.2	6.8	6.2	6.8	8.3	10.3	12.8	14.7	15.1	16.0	17.2	17.4	17.5	17.3	17.3	16.0	15.2	14.2	12.8	11.9	10.9	9.9	12.4	17.5
29-Apr	9.3	8.9	8.4	7.5	6.8	6.6	7.3	9.8	11.9	13.8	15.2	16.3	17.1	17.9	18.5	18.7	18.4	18.2	17.4	15.7	13.3	12.0	11.0	9.7	12.9	18.7
30-Apr	8.7	8.3	8.7	8.4	8.3	8.2	8.7	9.9	11.2	14.2	15.6	16.1	16.0	15.5	15.1	16.2	16.2	15.9	15.7	14.7	13.5	12.4	11.9	11.5	12.5	16.2
	1.8	1.4	1.1	0.9	0.6	0.4	0.7	1.8	3.3	4.8	6.2	7.2	8.1	8.7	9.0	9.0	8.7	8.0	7.1	5.8	4.5	3.8	3.1	2.6	Diurnal Average	
	15.1	14.0	12.9	11.7	10.9	10.9	11.8	13.5	17.1	18.7	20.9	22.1	22.7	23.2	23.1	23.0	22.7	22.1	20.8	18.9	17.2	16.5	16.1	15.4	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature 2m (AT 2m) - C

Conklin Lookout - April 2016



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	199	27.64	27.64
0 - 10	367	50.97	78.61
10 - 20	138	19.17	97.78
> 20	16	2.22	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Conklin Lookout - April 2016

Maximum Value: 99 % on Apr 14 01:00

Maximum Daily Average: 95.2 % on Apr 5

Minimum Value: 11 % on Apr 19 20:00

Minimum Daily Average: 21.6 % on Apr 19

Maximum Diurnal Average: 71.0 % at hour 6

Minimum Diurnal Average: 42.7 % at hour 15

Monthly Average: 56.7 %

Percentiles: $P_1 = 15$ $P_{10} = 25$ $Q_1 = 37$ Median = 54 $Q_3 = 76$ $P_{90} = 93$ $P_{99} = 98$

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

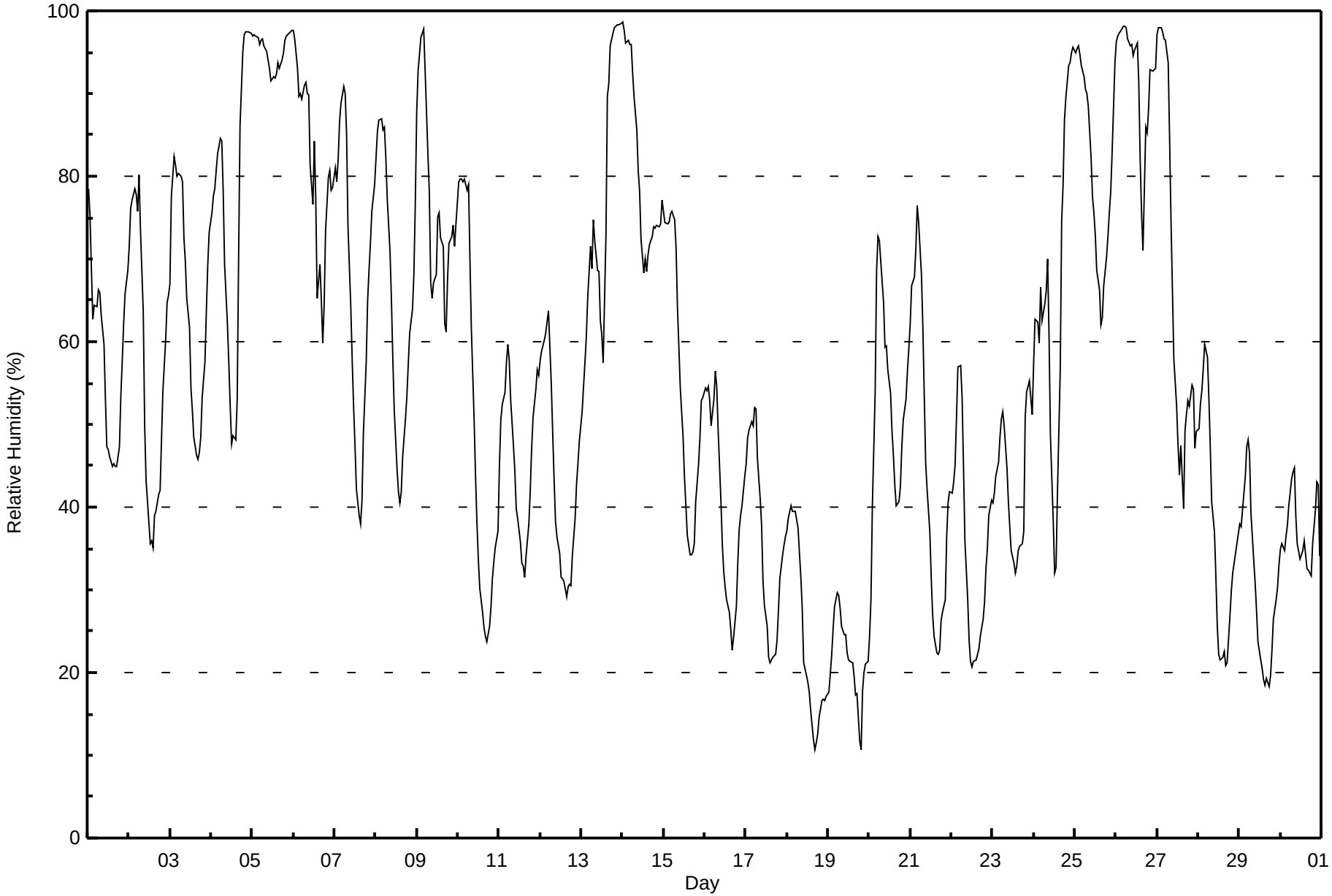
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	78	75	69	63	64	64	66	66	63	60	53	47	47	46	45	45	45	45	47	53	58	62	66	69	58.2	78
2-Apr	72	76	77	79	78	76	80	73	64	50	43	41	36	36	35	39	39	42	42	48	54	60	65	66	57.0	80
3-Apr	67	77	82	81	80	80	80	79	73	70	65	62	54	52	48	46	46	47	48	53	58	64	69	73	64.8	82
4-Apr	76	78	78	81	83	84	84	78	69	62	57	52	48	49	48	53	70	86	95	97	97	97	97	97	75.8	97
5-Apr	97	97	97	97	96	96	97	96	95	94	93	92	92	92	92	94	93	94	95	96	97	97	97	98	95.2	98
6-Apr	98	97	93	90	90	89	91	91	90	90	81	77	84	77	65	69	65	60	64	73	80	81	78	79	81.4	98
7-Apr	81	79	82	87	89	91	90	85	74	64	58	52	47	42	39	38	41	49	57	65	69	72	76	79	66.9	91
8-Apr	82	85	87	87	86	86	82	77	71	65	58	52	44	42	41	42	46	51	53	57	61	64	68	77	65.2	87
9-Apr	88	93	97	97	98	93	83	78	67	65	67	68	75	76	73	72	62	61	67	72	73	74	71	74	76.8	98
10-Apr	79	80	80	79	80	78	79	70	62	50	44	38	34	30	27	26	24	24	26	28	31	33	35	37	48.9	80
11-Apr	45	51	52	54	57	60	58	53	48	44	40	39	36	33	33	31	34	38	42	47	51	54	57	56	46.3	60
12-Apr	58	59	60	61	62	64	55	49	43	38	36	34	32	31	31	29	30	31	31	34	39	43	45	48	43.5	64
13-Apr	52	55	57	61	65	71	69	75	72	69	68	62	61	57	73	90	91	96	97	98	98	98	98	98	76.4	98
14-Apr	99	98	96	96	96	96	93	90	86	81	78	72	68	70	68	71	72	73	74	74	74	74	74	77	81.2	99
15-Apr	76	74	74	74	75	76	75	71	64	59	54	48	44	40	37	34	34	35	36	41	45	48	53	53	55.0	76
16-Apr	54	54	55	53	50	53	56	55	49	41	35	32	30	29	27	25	23	24	28	33	37	39	40	44	40.3	56
17-Apr	45	48	49	50	50	52	52	46	41	38	31	28	26	22	21	22	22	22	24	28	31	34	35	36	35.6	52
18-Apr	37	39	40	40	40	39	37	34	31	28	21	20	19	18	15	12	11	11	12	15	17	17	17	17	24.4	40
19-Apr	18	20	22	25	28	30	29	28	26	25	25	22	22	21	21	19	17	17	12	11	18	20	21	21	21.6	30
20-Apr	24	29	40	54	68	73	72	70	65	59	59	57	54	49	46	43	40	41	42	47	50	53	56	59	52.2	73
21-Apr	62	67	68	71	76	74	68	62	54	45	42	37	31	27	24	22	22	23	26	27	29	36	41	42	44.9	76
22-Apr	42	43	45	51	57	57	53	45	36	29	24	21	21	21	22	22	23	24	26	29	33	35	39	41	34.9	57
23-Apr	40	42	44	45	48	51	52	50	45	41	38	35	33	32	33	35	35	36	37	51	54	55	53	51	43.1	55
24-Apr	57	63	62	60	67	63	65	66	70	61	49	38	32	33	42	57	75	79	87	90	93	94	95	96	66.3	96
25-Apr	95	95	96	95	93	92	91	90	89	82	77	76	73	69	66	62	63	67	70	73	76	78	83	94	81.0	96
26-Apr	96	97	97	98	98	98	98	97	96	96	95	95	96	91	82	75	71	86	85	88	93	93	93	93	92.0	98
27-Apr	97	98	98	97	97	96	94	84	75	66	58	52	47	44	47	40	49	51	53	52	55	54	47	49	66.8	98
28-Apr	49	53	54	57	60	58	53	47	41	37	31	26	22	22	22	23	21	21	27	30	32	33	34	37	37.1	60
29-Apr	38	38	40	44	47	48	47	39	34	31	28	24	22	21	19	19	19	18	20	23	26	29	30	33	30.6	48
30-Apr	35	36	35	37	38	40	43	44	45	39	36	34	34	35	36	33	32	32	32	36	40	43	43	34	37.1	45
	64.6	66.5	67.6	68.8	70.5	71.0	69.7	66.3	61.2	55.9	51.5	47.8	45.4	43.5	42.7	42.9	43.9	46.1	48.6	52.3	55.6	57.9	59.3	60.9	Diurnal Average	
	99	98	98	98	98	98	98	97	96	96	95	95	96	92	92	94	93	96	97	98	98	98	98	98	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity (RH) - %

Conklin Lookout - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Precipitation (PC) - mm

Conklin Lookout - April 2016

Maximum Value: 1.7 mm on Apr 26 18:00

Maximum Daily Total: 7.0 mm on Apr 5

Minimum Value: 0.0 mm on Apr 1 01:00

Minimum Daily Total: 0.0 mm on Apr 1

Maximum Diurnal Total: 1.7 mm at hour 18

Minimum Diurnal Total: 0.0 mm at hour 14

Monthly Total: 17.11 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:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

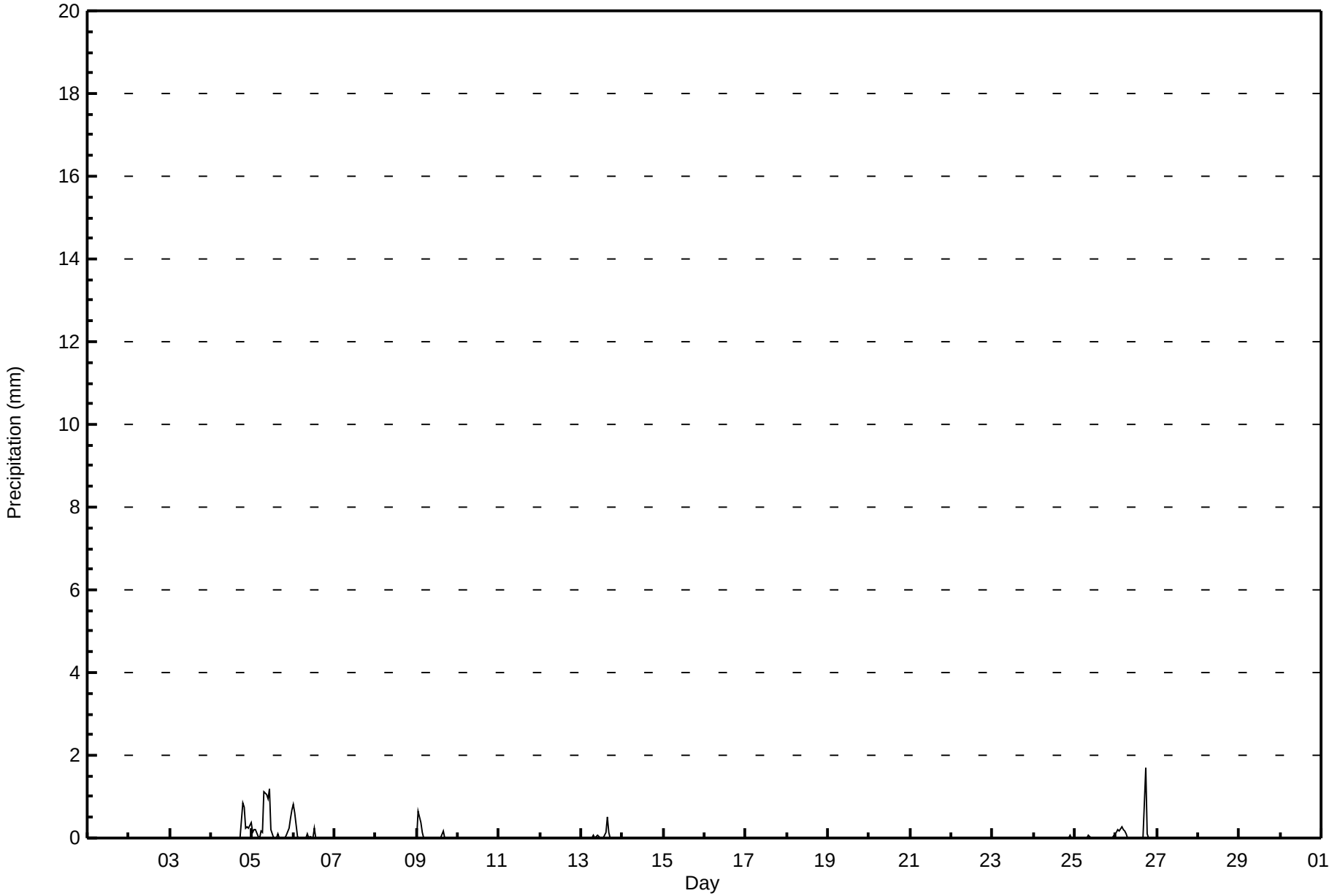
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.7	0.3	0.3	0.3	0.4	2.7	0.8
5-Apr	0.1	0.2	0.2	0.1	0.0	0.2	0.2	1.1	1.1	1.0	1.2	0.2	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.3	0.5	0.7	7.0	1.2
6-Apr	0.8	0.6	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	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	1.9	0.8
7-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.6	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.6
10-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.5
14-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.1	0.1
25-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.1
26-Apr	0.1	0.2	0.2	0.3	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	0.1	0.0	0.0	0.0	0.0	0.0	3.0	1.7
27-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1.1	1.7	0.8	0.5	0.2	0.3	0.2	1.2	1.2	1.0	1.3	0.2	0.3	0.0	0.1	0.8	0.1	1.7	1.0	0.7	0.3	0.6	0.7	1.1	Diurnal Average	
	0.8	0.6	0.4	0.3	0.2	0.2	0.2	1.1	1.1	1.0	1.2	0.2	0.3	0.0	0.1	0.5	0.1	1.7	0.8	0.7	0.3	0.3	0.5	0.7	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Precipitation (PC) - mm

Conklin Lookout - April 2016



Concentration Ranges (mm)	Number of Hours	%	Cumulative %
0 - 0.3	705	97.92	97.92
0.4 - 0.5	4	0.56	98.47
0.6 - 0.7	4	0.56	99.03
0.8 - 1.4	6	0.83	99.86
1.5 - 10	1	0.14	100.00
> 10	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Maximum Value: 92 % on Apr 26 06:00

Maximum Daily Average: 28.2 % on Apr 26

Minimum Value: 0 % on Apr 18 17:00

Minimum Daily Average: 0.5 % on Apr 19

Maximum Diurnal Average: 9.4 % at hour 5

Minimum Diurnal Average: 1.6 % at hour 15

Monthly Average: 5.0 %

Percentiles: $P_1 = 0$ $P_{10} = 1$ $Q_1 = 1$ Median = 1 $Q_3 = 2$ $P_{90} = 13$ $P_{99} = 72$

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

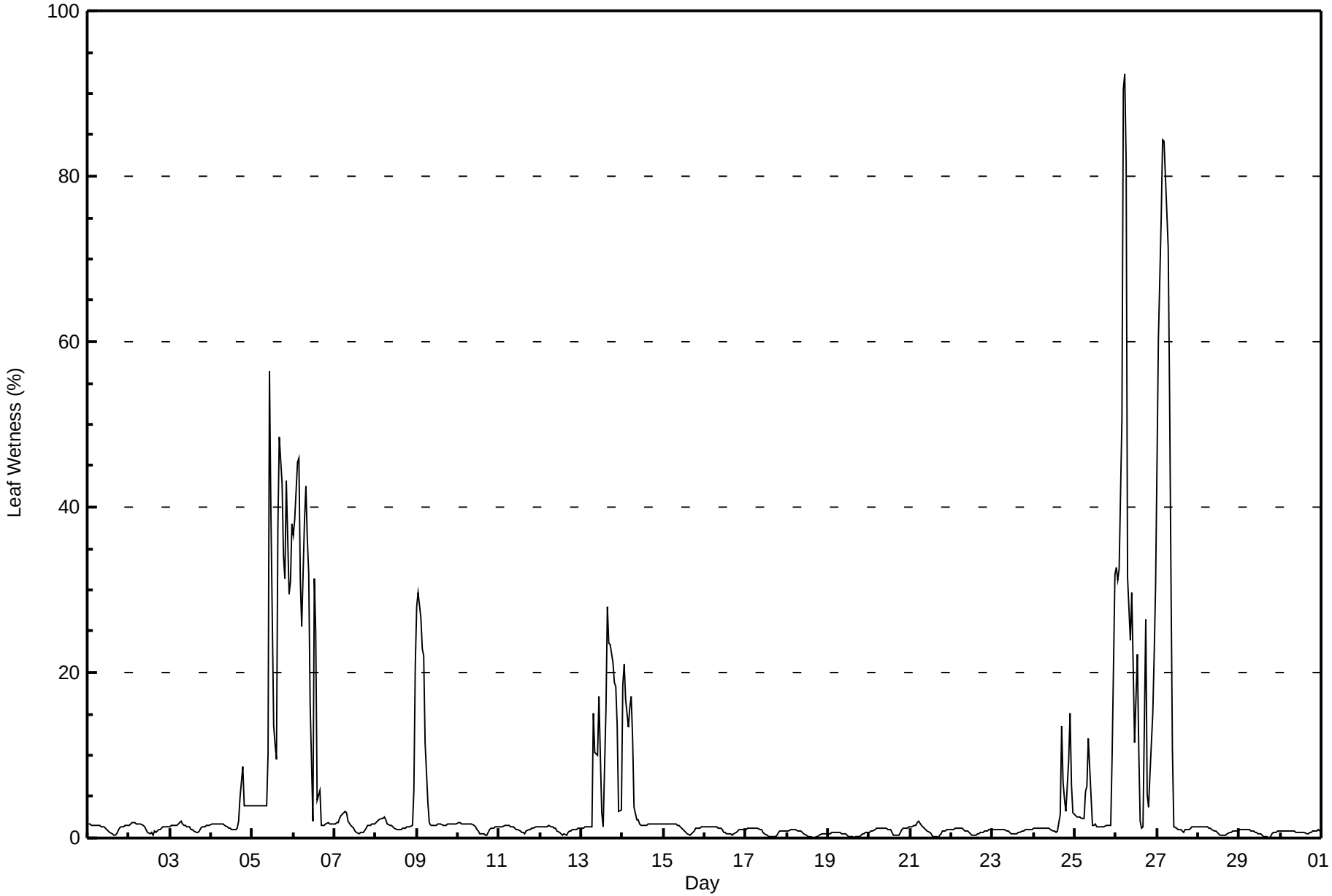
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	2	2	2	2	2	2	2	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1	1	1	1.2	2
2-Apr	2	2	2	2	2	2	2	2	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1.2	2
3-Apr	1	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1.4	2
4-Apr	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	2	5	9	4	4	4	4	4	2.4	9
5-Apr	4	4	4	4	4	4	4	4	4	10	57	40	14	11	10	38	49	43	34	31	43	29	31	38	21.3	57
6-Apr	37	39	46	46	31	26	38	43	36	32	16	2	31	25	5	6	2	1	2	2	2	2	2	2	19.6	46
7-Apr	2	2	2	2	3	3	3	3	2	2	1	1	1	1	1	1	1	1	1	1	2	2	2	2	1.6	3
8-Apr	2	2	2	2	2	3	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	2	6	21	2.6	21
9-Apr	28	30	27	23	22	11	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	7.2	30
10-Apr	2	2	2	2	2	2	2	2	2	2	1	1	1	1	0	0	0	0	1	1	1	1	1	1	1.2	2
11-Apr	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.2	1
12-Apr	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1.0	1
13-Apr	1	1	1	1	1	1	1	15	10	10	17	10	3	1	16	28	24	23	21	19	18	14	3	3	10.2	28
14-Apr	18	21	17	13	16	17	12	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	6.1	21
15-Apr	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1.3	2
16-Apr	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1	1	1	1.0	1
17-Apr	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	0.8	1
18-Apr	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.5	1
19-Apr	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.5	1
20-Apr	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	1	1	0.9	1
21-Apr	1	1	1	2	2	2	2	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1.0	2
22-Apr	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	1	1	1	1	1	1	1	1	0.8	1
23-Apr	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.9	1
24-Apr	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	14	7	5	3	9	15	6	3	3.4	15
25-Apr	3	3	3	3	2	2	6	6	12	5	2	2	2	1	1	1	1	1	1	1	2	2	10	32	4.3	32
26-Apr	33	31	33	51	90	92	82	31	24	30	21	12	22	11	2	1	1	27	5	4	8	15	22	30	28.2	92
27-Apr	45	60	75	84	84	80	71	53	31	11	1	1	1	1	1	1	1	1	1	1	1	1	1	1	25.4	84
28-Apr	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	1	1	1	0.9	1
29-Apr	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	0.7	1
30-Apr	1	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
	6.6	7.3	7.8	8.5	9.4	8.9	8.4	6.3	4.9	4.2	4.6	2.9	3.0	2.2	1.6	3.0	3.5	4.1	3.2	2.9	3.7	3.6	3.7	5.3	Diurnal Average	
	45	60	75	84	90	92	82	53	36	32	57	40	31	25	16	38	49	43	34	31	43	29	31	38	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Leaf Wetness (LW) - %

Conklin Lookout - April 2016



Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 0.3	40	5.56	5.56
0.4 - 0.5	48	6.67	12.22
0.6 - 0.7	66	9.17	21.39
0.8 - 1.4	291	40.42	61.81
1.5 - 10	175	24.31	86.11
> 10	86	11.94	98.06

Total Number of Valid Hours: 720

Total Number of Hours: 720

Wood Buffalo Environmental Association

Summary of Hour Averages

Global Radiation (GR) - W/m2

Conklin Lookout - April 2016

Maximum Value: 877 W/m2 on Apr 29 13:00

Maximum Daily Average: 299.2 W/m2 on Apr 29

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

Minimum Daily Average: 25.6 W/m2 on Apr 5

Maximum Diurnal Average: 571.0 W/m2 at hour 13

Minimum Diurnal Average: 0.0 W/m2 at hour 4

Monthly Average: 188.0 W/m2

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 48 $Q_3 = 312$ $P_{90} = 625$ $P_{99} = 824$

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

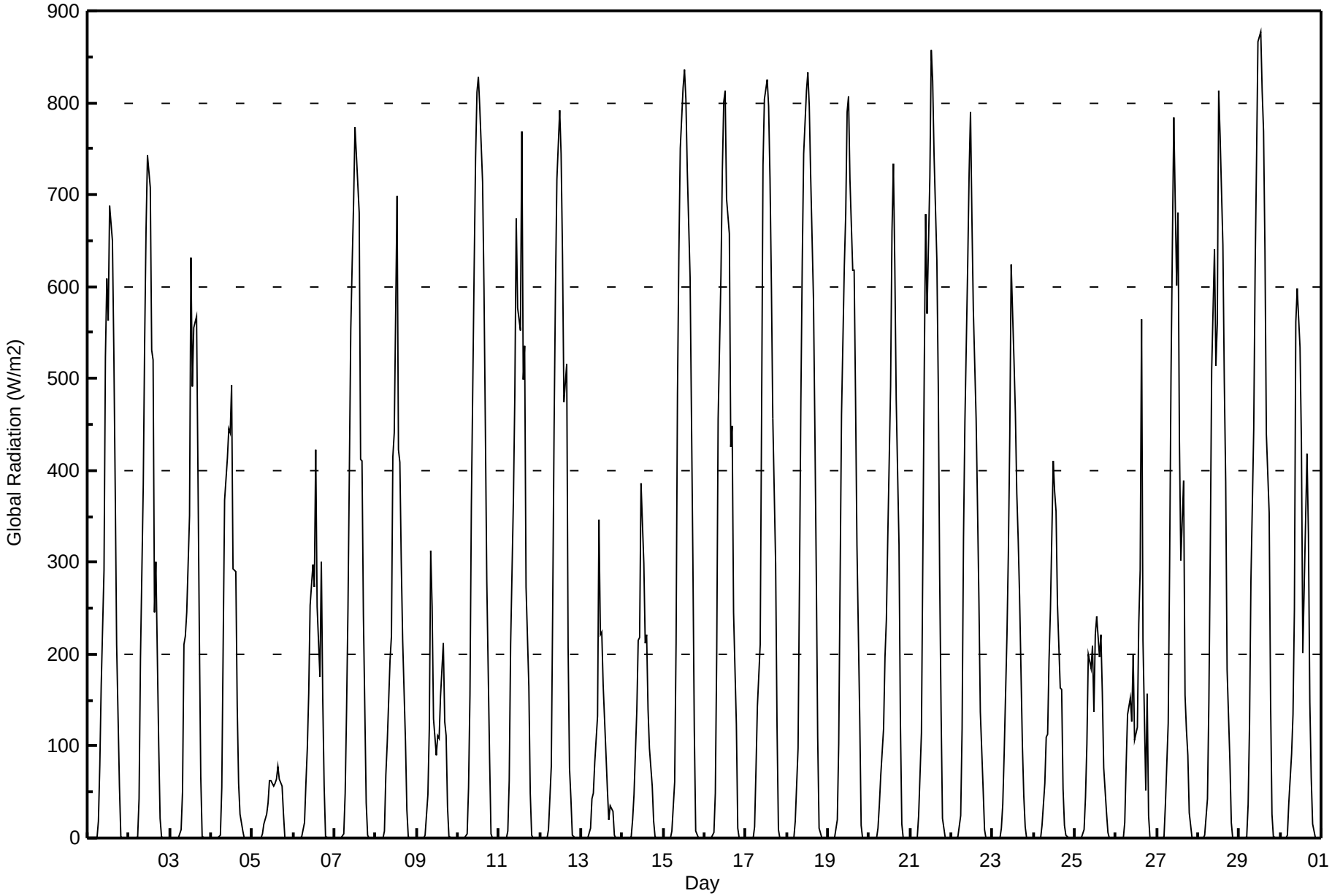
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	0	0	0	0	0	0	18	80	166	292	524	609	562	688	649	530	378	211	57	1	0	0	0	0	198.5	688
2-Apr	0	0	0	0	0	2	43	195	385	542	664	743	707	531	520	245	301	102	22	1	0	0	0	0	208.4	743
3-Apr	0	0	0	0	0	0	10	51	210	220	245	351	631	491	556	567	399	219	67	2	0	0	0	0	167.4	631
4-Apr	0	0	0	0	0	3	56	211	367	414	445	441	492	294	290	144	59	26	8	0	0	0	0	0	135.4	492
5-Apr	0	0	0	0	0	0	5	15	25	39	62	62	57	59	64	77	64	56	25	1	0	0	0	0	25.6	77
6-Apr	0	0	0	0	0	1	17	60	97	158	254	298	273	422	251	176	300	153	57	2	0	0	0	0	104.9	422
7-Apr	0	0	0	0	0	5	49	140	250	553	626	691	773	742	680	411	410	243	38	3	0	0	0	0	234.0	773
8-Apr	0	0	0	0	0	8	68	103	193	219	415	440	699	423	409	301	215	106	30	1	0	0	0	0	151.3	699
9-Apr	0	0	0	0	0	3	47	119	313	252	129	90	112	109	154	212	126	111	33	2	0	0	0	0	75.5	313
10-Apr	0	0	0	0	0	4	54	156	362	621	740	812	829	795	714	598	443	280	87	5	0	0	0	0	270.9	829
11-Apr	0	0	0	0	0	8	62	210	368	481	674	577	552	769	498	535	273	165	49	4	0	0	0	0	217.7	769
12-Apr	0	0	0	0	0	10	78	249	445	600	717	792	744	635	474	515	208	76	43	3	0	0	0	0	232.9	792
13-Apr	0	0	0	0	0	10	43	48	82	133	347	221	224	166	92	53	21	35	29	2	0	0	0	0	62.7	347
14-Apr	0	0	0	0	0	1	20	48	139	215	218	386	299	212	221	141	98	56	19	2	0	0	0	0	86.5	386
15-Apr	0	0	0	0	0	7	61	211	483	635	750	816	836	804	725	611	456	301	118	7	0	0	0	0	284.3	836
16-Apr	0	0	0	0	0	7	48	203	456	612	727	800	813	695	658	426	449	246	123	11	0	0	0	0	261.5	813
17-Apr	0	0	0	0	0	12	74	143	211	460	732	804	826	796	717	599	457	298	122	10	0	0	0	0	260.8	826
18-Apr	0	0	0	0	0	19	97	274	474	626	745	812	833	797	720	586	444	289	109	11	0	0	0	0	284.9	833
19-Apr	0	0	0	0	0	19	102	282	461	623	680	789	807	717	618	617	478	319	130	14	1	0	0	0	277.4	807
20-Apr	0	0	0	0	1	11	36	69	118	197	238	328	491	661	733	624	478	319	126	15	0	0	0	0	185.1	733
21-Apr	0	0	0	0	0	25	114	306	508	679	571	719	858	824	742	629	492	285	139	22	0	0	0	0	288.0	858
22-Apr	0	0	0	0	1	25	119	327	453	624	724	789	674	575	456	360	258	137	53	9	0	0	0	0	232.6	789
23-Apr	0	0	0	0	0	11	36	91	221	312	436	624	520	463	375	325	263	101	46	12	0	0	0	0	159.8	624
24-Apr	0	0	0	0	0	14	60	110	112	194	249	410	377	355	254	164	162	53	14	3	0	0	0	0	105.5	410
25-Apr	0	0	0	0	0	10	44	102	200	184	209	138	221	242	196	221	159	76	28	6	0	0	0	0	84.7	242
26-Apr	0	0	0	0	0	17	80	134	152	127	200	106	121	234	291	564	215	52	157	25	0	0	0	0	103.1	564
27-Apr	0	0	0	0	2	37	125	297	503	650	784	601	681	432	302	389	156	117	90	27	0	0	0	0	216.4	784
28-Apr	0	0	0	0	3	43	147	313	509	640	514	559	812	764	645	498	388	183	84	17	0	0	0	0	255.0	812
29-Apr	0	0	0	0	1	37	124	281	445	619	738	866	877	812	769	639	439	354	151	27	1	0	0	0	299.2	877
30-Apr	0	0	0	0	3	38	92	135	249	561	597	533	430	202	275	418	332	147	66	15	1	0	0	0	170.6	597
	0.0	0.0	0.0	0.0	0.4	13.0	64.3	165.4	298.6	416.1	498.5	540.3	571.0	523.6	468.4	405.8	297.2	170.5	70.6	8.6	0.1	0.0	0.0	0.0	Diurnal Average	
	0	0	0	0	3	43	147	327	509	679	784	866	877	824	769	639	492	354	157	27	1	0	0	0	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Global Radiation (GR) - W/m2

Conklin Lookout - April 2016



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Global Radiation (GR) - W/m2

Conklin Lookout - April 2016

Concentration Ranges (W/m2)	Number of Hours	%	Cumulative %
0 - 20	329	45.69	45.69
21 - 100	79	10.97	56.67
101 - 300	126	17.50	74.17
301 - 600	101	14.03	88.19
601 - 900	85	11.81	100.00
> 900	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Conklin Lookout - April 2016

Maximum Speed: 25 km/h on Apr 19 17:00

Maximum Daily Speed Average: 16.2 km/h on Apr 18

Minimum Speed Value: 1 km/h on Apr 27 01:00

Minimum Daily Speed Average: 0.7 km/h on Apr 12

Maximum Diurnal Speed Average: 4.8 km/h at hour 1

Minimum Diurnal Speed Average: 1.8 km/h at hour 18

Monthly Average Velocity: 3.0 km/h 194.4 deg

Percentiles: $P_1 = 2$ $P_{10} = 5$ $Q_1 = 7$ Median = 9 $Q_3 = 12$ $P_{90} = 15$ $P_{99} = 21$

Hours in Service: 720

Hours of Data: 720

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-Apr	SW15	SW15	WSW12	W13	WNW10	NW9	NW7	NW6	NW7	NW8	NW8	NNW9	NNW9	N9	N7	NNE6	NE6	ENE9	E9	E9	E9	ESE9	SE8	SSE12	NW2.3	SW15
2-Apr	SSE8	SSE2	SSE3	WSW4	SW6	WSW5	NNW5	NNW4	NNW4	NNW4	N4	NNE5	WNW8	WNW11	NNW8	NNE9	NNE8	NNE9	NNE10	NNE9	NNE7	NNE8	N6	NNW4	N3.5	WNW11
3-Apr	N4	NNW2	NW4	WNW8	NW10	NW8	NNW8	NNW7	NNW9	NNW8	NNW9	NNW9	NNW9	NNW8	NW8	NW8	NNW7	NNE6	NNE6	ENE6	E8	ESE7	SE8	SSE8	NNW4.4	NW10
4-Apr	SSE8	S9	SSW10	SSW9	SSW10	SSW10	SSW9	S9	S10	S12	SSE10	SSE9	SSE9	SE8	SE8	SE6	E7	ESE8	ESE6	ESE6	ESE5	ESE4	E5	E5	SSE6.5	S12
5-Apr	ENE6	E7	ESE6	SE7	ESE5	E4	ESE4	ESE6	ESE7	SE8	SE7	SE9	SE8	SE7	SE6	S5	SSW5	SSW6	SSW6	SSW7	SSW10	SSW9	SSW11	SSW14	SSE5.3	SSW14
6-Apr	SSW13	SW14	WSW15	W17	WNW17	WNW18	WNW18	WNW16	NW15	NW15	NW17	NW14	NW12	NW17	NW13	NW14	NW13	NNW13	NNW8	NNW6	NNW5	NNW7	NNW7	N8	NW10.8	WNW18
7-Apr	NNE7	N6	NNE5	N3	N4	NNE2	SE5	S5	SSE2	SSE2	N3	W4	WNW4	NW7	NW8	NW10	NE11	NE14	NE11	ENE9	ENE10	ENE9	E8	E8	NE3.7	NE14
8-Apr	ESE6	ESE8	SE9	SE10	SSE11	SSE10	SSE12	SE10	SE10	SSE14	SE14	SE14	SE16	SSE17	SSE17	SSE17	SSE19	SSE15	SSE14	SSE14	SSE16	SSE18	S16	S14	SSE13.0	SSE19
9-Apr	S11	S5	S9	W3	NW8	NW13	NW14	NW12	NW14	NNW13	NW14	NW15	NNW12	NNW12	NNW13	NNW13	NNW14	NNW13	NNW13	NNW10	N11	N12	N12	N9	NNW9.3	NW15
10-Apr	NNW5	NNW6	NNW7	N7	N6	N7	N7	N9	N8	NNE9	NNE9	N7	NE8	NE7	NNE4	N3	NE3	E3	ESE6	ESE6	SE7	SSE6	SSE7	S7	NNE3.5	N9
11-Apr	S9	S9	S12	S12	SSW13	SSW14	SSW14	SSW15	SSW17	SSW14	SSW14	SSW15	SSW12	SSW11	SSW13	SSW12	SSW15	SSW13	S8	SSE9	S8	S8	S10	SSW13	SSW11.8	SSW17
12-Apr	SSW14	SSW14	SW12	SW13	SW12	WSW9	WNW9	WNW8	NW7	NNW6	NNE6	NNW3	NNW7	N6	NNW3	ENE8	NE12	NE11	ENE10	ENE10	E12	E11	ESE10	ESE12	E0.7	SSW14
13-Apr	ESE10	ESE10	E6	E8	ENE7	NNW5	NE8	NNE4	NE5	NNE5	NNE7	NNE6	NNE7	NNE6	NNW5	NNW5	ENE6	NE5	NNE4	N4	NNW4	NW3	NW3	WNW2	NE3.8	ESE10
14-Apr	WNW8	WNW9	WNW10	WNW8	NW8	NW10	NW10	NW11	NW13	WNW13	NW12	NW15	WNW14	WNW14	WNW13	NW10	NW10	NW7	NNW6	NNW5	N4	NNE5	N4	NNE3	NW8.8	NW15
15-Apr	NNW3	N2	NNW3	W3	WNW3	SSW2	WSW2	NW2	SSE3	SSE6	S6	SSE6	SSE7	SSE7	S8	S8	SSW10	S10	S9	S7	S8	S9	S10	S13	S4.9	S13
16-Apr	S14	S14	SSW14	SSW14	SSW15	SSW15	SSW16	SSW16	SSW16	SSW15	SW10	SW10	WSW11	SW12	WSW13	WSW11	WSW14	SW11	SW10	SSW7	SSW8	SSW9	SSW10	SSW11	SSW11.7	SSW16
17-Apr	SSW10	SSW11	SSW11	SSW12	SSW12	SSW12	SSW13	SSW14	SSW12	SSW10	SW8	W11	W8	W11	W10	W10	W11	W8	WSW6	SW6	SSW7	SW9	SSW9	SSW10	SW8.9	SSW14
18-Apr	SSW10	SSW11	SSW12	SSW12	SSW13	SSW13	SSW13	SSW14	SSW14	SSW15	SSW19	SSW21	SSW22	SSW21	SSW22	SSW21	SSW20	SSW20	S14	S14	S15	S18	S19	SSW23	SSW16.2	SSW23
19-Apr	SSW25	SSW22	SSW22	SSW21	SW19	SW16	SW15	SW11	W12	WNW17	WNW19	WNW20	WNW18	W15	W17	W22	W25	WNW18	WNW18	WNW15	NW9	WNW10	WNW10	WNW11	W13.3	W25
20-Apr	NW9	NW10	NW11	NNW8	NNW7	N8	N8	NNW8	N10	N9	NNW9	NNW9	N10	N10	NNE10	NNE9	NE10	NE11	NE8	ENE6	ENE6	E6	ESE5	SE6	N6.1	NE11
21-Apr	SE6	SSE5	SSE5	SSE4	SSE4	ESE4	E5	SE6	SE5	ENE7	E9	ESE10	E12	E11	E12	E13	ENE14	ENE14	NE14	NE12	ENE9	E10	E9	ESE8	E7.5	ENE14
22-Apr	E8	ENE10	ENE8	NE9	NE8	NE11	NE11	ENE9	E10	E13	E13	E12	E12	E13	E12	ESE12	E11	E11	E10	E10	E8	E8	E8	E7	E9.6	E13
23-Apr	E8	ENE7	ENE8	ENE8	NE7	NE6	NE7	ENE7	ENE7	E9	E9	ESE9	SE11	ESE11	SSE13	SSE12	SSE10	SSE9	SSE8	SSW7	SSW7	SSW6	SSE7	SSE5	ESE5.7	SSE13
24-Apr	S4	S4	SE7	SSE11	SSE8	SSE9	SSE9	S10	SSE10	SSE10	SE13	SE13	SE13	SSE12	SE13	S11	SSE10	SSE10	SSE8	SSE9	SSE7	SSE6	SE6	SE6	SSE8.9	SE13
25-Apr	SE6	SE6	SSE5	SE5	SSE5	SSE6	SSE7	SSE8	S9	S10	S10	S9	SSW9	SSW8	S9	SSW11	SSW12	SSW10	SSW8	SW5	SSW6	SSW5	S7	S9	S7.1	SSW12
26-Apr	S8	S7	S7	S7	S7	S7	S8	SSW10	SSW11	SSW10	SSW12	SSW10	SSW9	SSW10	SW10	SSW10	S7	SSW3	S7	S9	S8	S10	S7	WSW3	SSW8.1	SSW12
27-Apr	NNW1	ESE3	SSE5	S7	SSW8	SSW10	SSW10	SSW8	SSW7	SSW8	SSW11	SW8	SW11	SW10	S8	SSW8	N5	NNE6	NE6	ESE4	S3	SSW6	SW7	SSW8	SSW5.1	SSW11
28-Apr	SSW10	SW10	SW10	SW8	SW10	SW8	SSW6	S6	SE7	SSE9	S10	SSE12	S12	S14	S14	S14	S13	S14	SSE9	S10	S7	SSE7	SSE6	SSE6	S9.1	S14
29-Apr	SSE6	SSE7	S7	SSE7	SSE9	SSE9	SSE10	SSE11	SSE14	S15	S17	S18	S18	S17	S17	S15	S13	S13	S11	S8	S6	SSW8	SSW8	SSW7	S11.1	S18
30-Apr	SSW8	SSW9	SSW9	SSW9	SSW8	SSW8	SSW9	SSW9	SSW10	SSW13	S17	SSW16	SSW15	SSW15	SSW14	SSW16	SW15	SW13	SW11	SW7	SW7	WSW7	W7	W9	SSW10.4	S17
	S4.8	S4.5	SSW4.7	SSW4.3	SW3.8	SW3.5	SW2.8	SW3.1	SSW2.6	SSW2.5	SSW2.6	SSW3.1	SSW2.9	SSW2.8	SSW3.4	SSW3.1	SSW2.0	SSE1.8	SE2.0	SE2.5	SSE3.2	SSE3.6	SSE3.9	S4.6	Diurnal Average	
	SSW25	SSW22	SSW22	SSW21	SW19	WNW18	WNW18	SSW16	SSW17	WNW17	SSW19	SSW21	SSW22	SSW21	SSW22	W22	W25	SSW20	WNW18	WNW15	SSE16	S18	S19	SSW23	Diurnal Maximum	

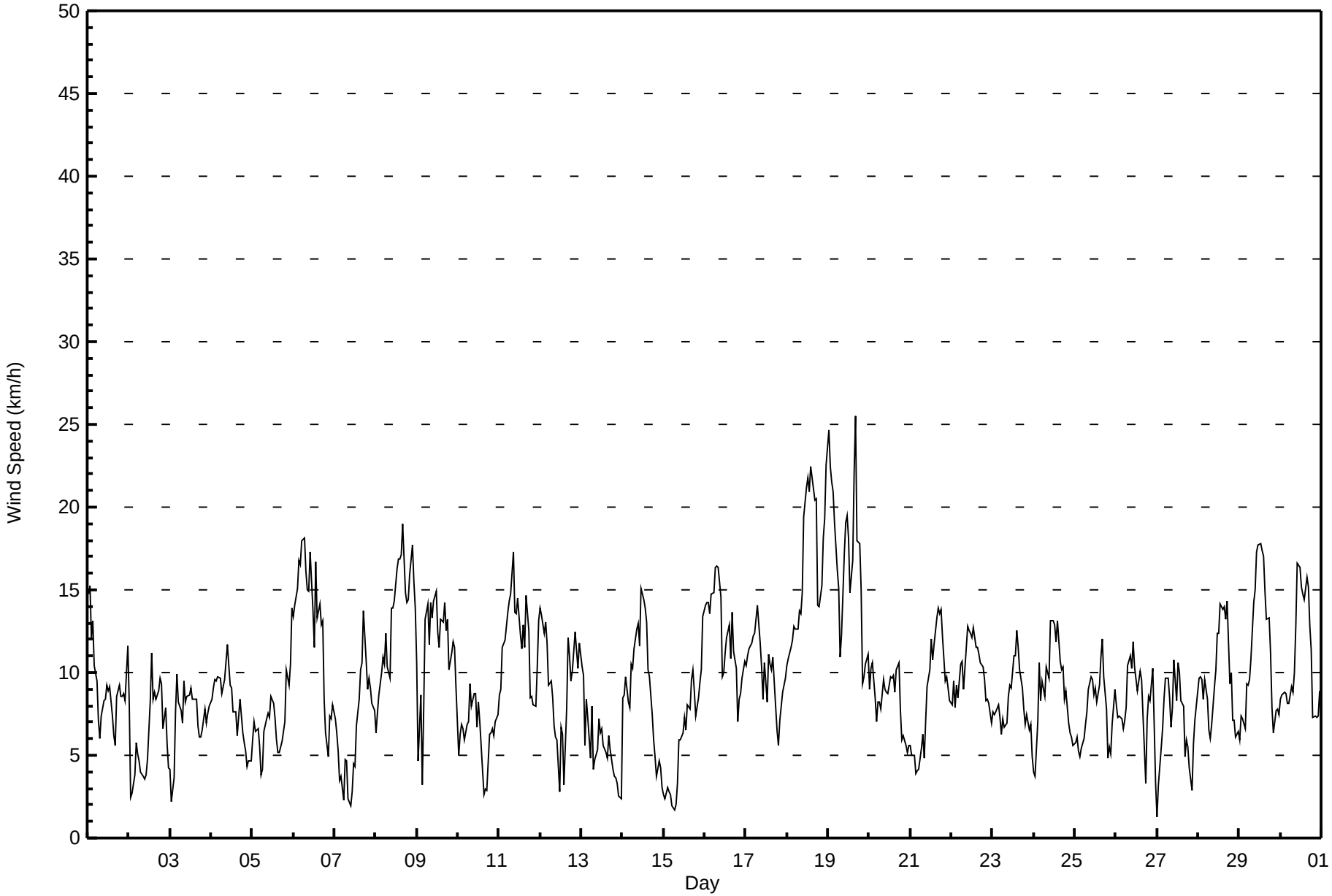
All monthly, daily, and diurnal averages have been calculated using vector methods

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed (WS) - km/h

Conklin Lookout - April 2016



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	95	13.19	13.19
6 - 11	426	59.17	72.36
12 - 19	184	25.56	97.92
20 - 28	15	2.08	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Wind Speed (WS) - km/h

Conklin Lookout - April 2016

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	10	9	3	0	4	9	3	13	6	5	0	4	3	3	4	19	95
6 - 11	21	21	18	23	29	20	26	46	53	68	21	6	7	14	26	27	426
12 - 19	2	0	4	2	10	2	7	17	29	49	12	4	4	15	18	9	184
20 - 28	0	0	0	0	0	0	0	0	0	12	0	0	2	1	0	0	15
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	33	30	25	25	43	31	36	76	88	134	33	14	16	33	48	55	720

Total Number of Valid Hours: 720

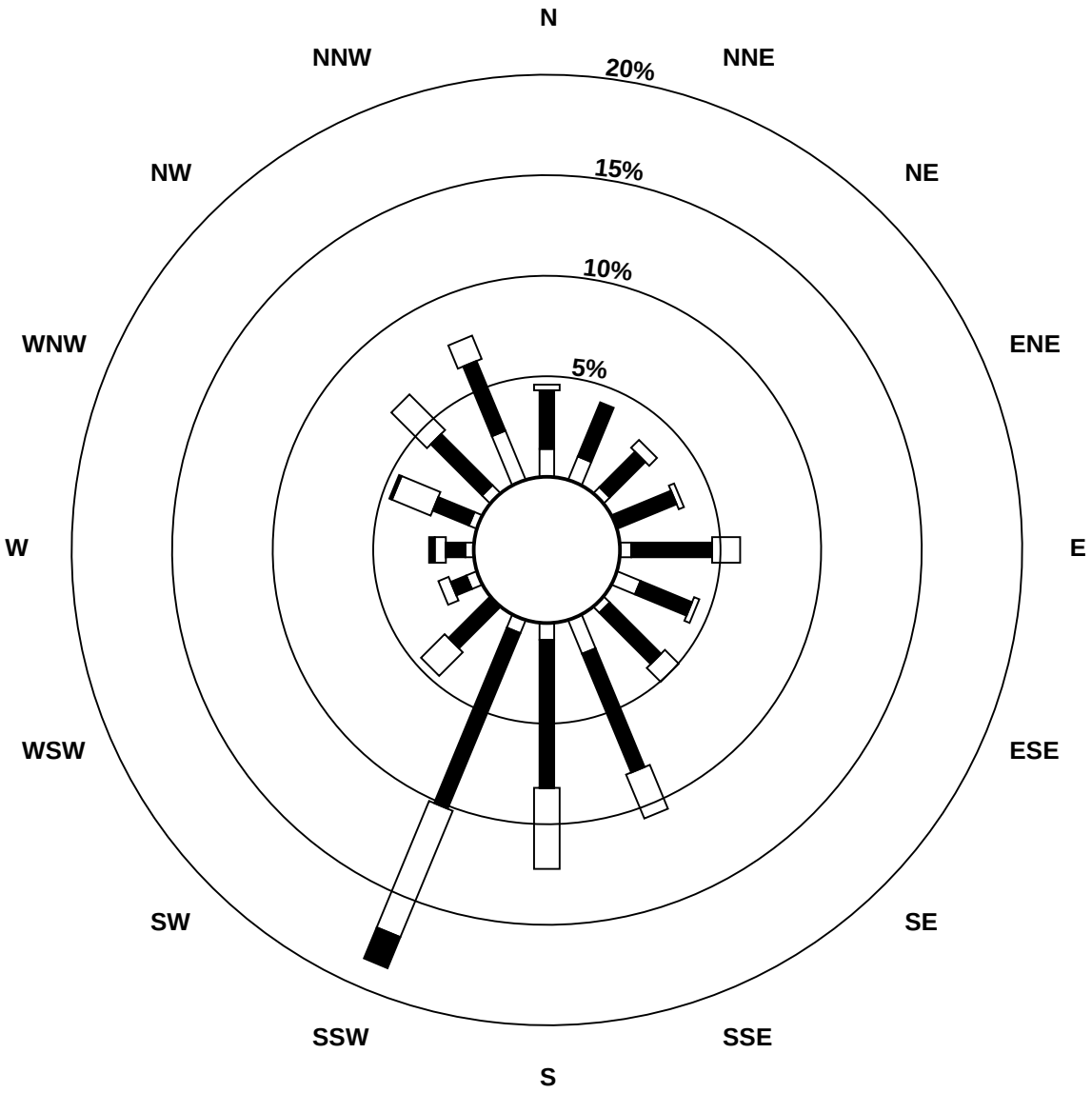
Total Number of Hours: 720

Wood Buffalo Environmental Association

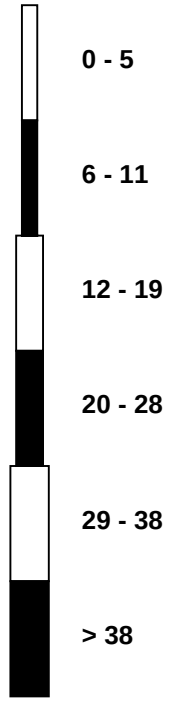
Wind Rose Apr 2016

Wind Speed (WS) - km/h

Conklin Lookout (AMS 18)



Classes (km/h)



Total Number of Valid Hours: 720

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Speed (WS) - km/h

Conklin Lookout - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 9 km/h on Apr 19 17:00

Minimum Value: 1 km/h on Apr 21 05:00

Percentiles: $P_1 = 1$ $P_{10} = 1$ $Q_1 = 2$ Median = 3 $Q_3 = 4$ $P_{90} = 5$ $P_{99} = 7$

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

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

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Conklin Lookout - April 2016

Direction of Maximum Speed: 281 deg on Apr 19 17:00
Direction of Maximum Daily Speed Average: 199.3 deg on Apr 18

Direction of Minimum Speed: 347 deg on Apr 27 01:00

Direction of Minimum Daily Speed Average: 0.7 deg on Apr 12

Monthly Average Direction: 233.5 deg

Hours in Service:	720
Hours of Data:	720
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-Apr	222	224	243	276	295	305	311	317	311	320	320	327	335	356	349	25	40	65	86	86	96	114	127	163	312.9
2-Apr	168	158	164	246	236	248	340	347	344	330	357	31	290	300	335	15	17	26	32	20	28	22	1	347	352.1
3-Apr	1	335	313	303	313	319	334	337	339	341	337	333	328	330	321	317	345	18	23	68	95	121	140	151	343.0
4-Apr	164	189	197	197	202	203	195	187	174	189	158	148	155	143	142	138	90	118	116	117	117	114	81	85	160.1
5-Apr	74	96	117	130	117	93	107	115	105	127	132	135	134	137	146	180	208	202	198	195	198	201	206	205	154.3
6-Apr	213	221	251	271	284	293	295	299	310	321	319	320	315	305	316	320	326	327	344	348	343	343	346	10	304.3
7-Apr	12	7	20	3	358	28	146	174	163	153	356	278	299	304	323	326	34	50	51	67	72	77	82	95	35.5
8-Apr	104	122	129	141	150	151	147	144	143	147	141	143	145	157	154	160	161	162	156	161	159	162	169	179	152.5
9-Apr	191	186	191	274	311	320	324	325	322	328	324	319	335	344	335	340	340	344	342	348	356	1	4	358	332.1
10-Apr	341	347	342	2	2	2	2	3	10	21	18	355	44	38	19	351	34	92	104	119	143	154	162	172	28.2
11-Apr	182	181	189	191	195	196	194	196	201	203	209	203	194	197	196	193	202	201	177	166	170	174	187	203	193.7
12-Apr	209	212	215	218	227	239	289	297	320	335	19	336	328	360	348	58	53	53	66	78	91	99	109	111	95.7
13-Apr	113	119	93	100	71	344	53	13	35	28	21	19	16	26	340	339	58	43	26	353	339	322	324	293	39.6
14-Apr	285	298	289	301	325	316	315	308	305	302	305	306	298	295	290	308	305	309	329	335	349	21	4	17	308.1
15-Apr	340	11	333	275	288	212	251	322	155	168	183	163	150	161	171	172	198	179	170	183	178	178	181	187	180.8
16-Apr	187	183	195	200	198	200	202	205	208	208	222	234	245	233	241	247	239	230	216	209	213	210	208	209	212.7
17-Apr	210	208	207	205	204	203	203	205	207	198	226	259	281	260	277	280	270	259	242	215	205	214	212	211	225.1
18-Apr	210	211	208	209	213	212	210	206	201	197	207	200	205	195	206	206	201	193	183	179	178	184	189	195	199.3
19-Apr	198	199	201	207	215	223	223	232	281	294	286	284	284	274	267	270	281	288	295	297	312	302	294	302	259.4
20-Apr	310	312	316	327	332	358	355	346	352	349	343	342	3	10	32	21	49	53	52	76	76	88	109	124	7.5
21-Apr	126	156	164	166	151	115	101	128	138	67	87	110	89	82	86	83	63	60	51	51	61	83	100	103	88.2
22-Apr	87	64	66	51	45	43	50	70	85	90	84	92	90	82	100	110	98	88	82	79	84	93	96	93	81.0
23-Apr	88	72	71	78	55	50	52	73	66	84	92	114	128	113	154	152	156	159	164	202	206	196	163	159	119.1
24-Apr	180	175	144	163	149	158	159	181	168	152	138	146	144	149	141	175	166	160	159	157	148	147	143	144	155.1
25-Apr	141	144	147	144	153	163	157	155	174	191	181	184	192	195	179	193	206	211	208	214	212	205	186	190	183.0
26-Apr	188	186	186	182	178	180	184	192	199	199	196	201	212	205	216	195	182	201	176	180	174	188	184	254	192.4
27-Apr	347	102	164	185	199	197	204	208	195	193	208	214	219	215	179	198	356	32	49	103	173	202	217	207	197.2
28-Apr	213	217	223	219	219	217	208	185	146	151	181	160	174	174	174	180	173	183	165	170	176	167	162	165	182.7
29-Apr	166	167	171	153	154	158	160	165	165	172	177	185	178	173	177	177	179	183	189	182	184	198	202	197	175.7
30-Apr	200	197	204	208	212	209	205	208	208	196	189	197	205	207	213	207	222	226	229	225	223	245	263	259	212.2
	188.3	190.1	199.8	207.7	215.9	225.0	217.5	213.8	212.1	202.4	205.3	209.6	210.8	209.8	208.2	209.5	201.7	164.8	136.5	140.1	147.4	158.9	168.7	180.1	
	Diurnal Average																								

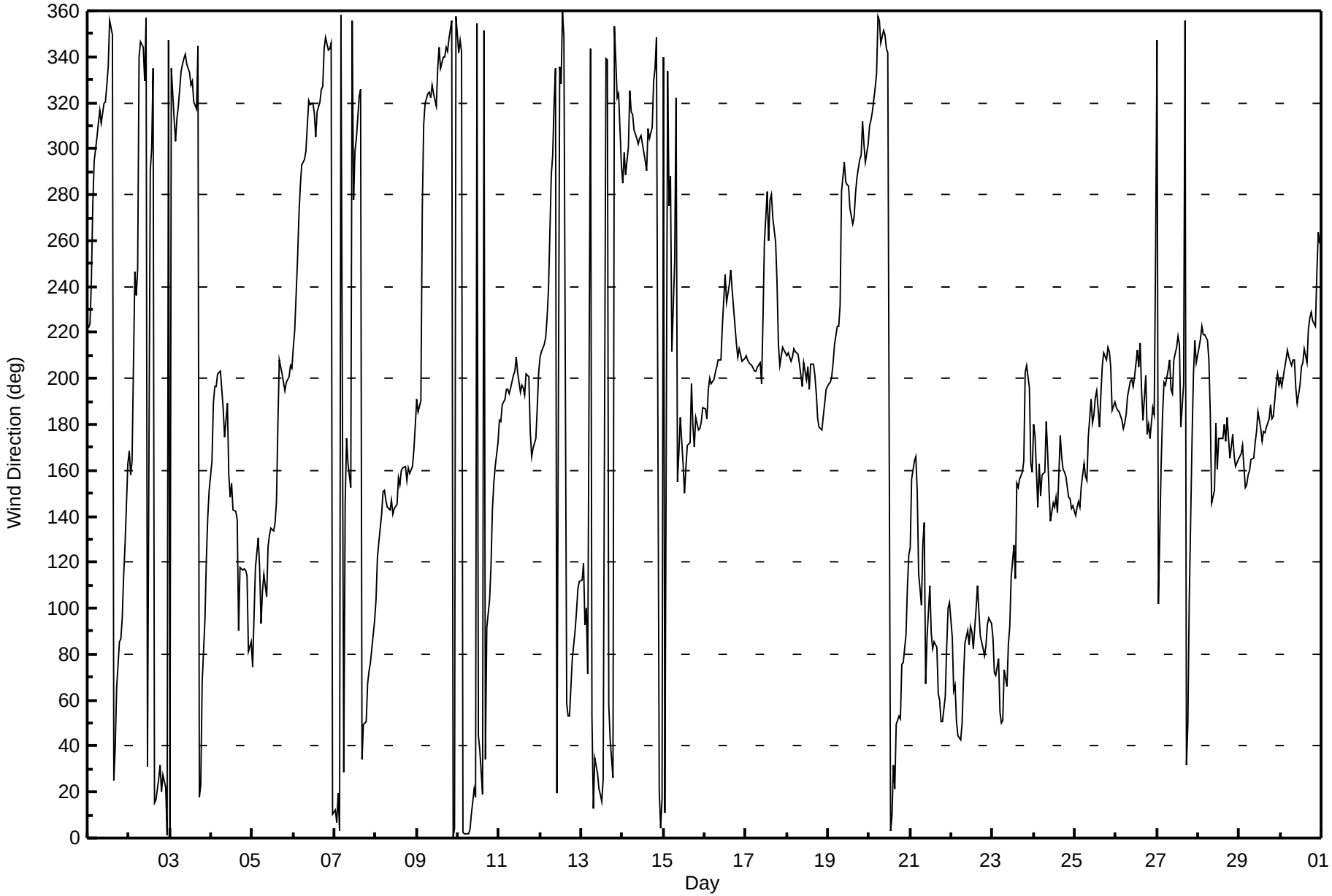
All monthly, daily, and diurnal averages have been calculated using vector methods

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction (WD) - deg

Conklin Lookout - April 2016



Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg

Conklin Lookout - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 93 deg on Apr 7 10:00

Minimum Value: 10 deg on Apr 21 05:00

Percentiles: P_1 = 13 P_{10} = 16 Q_1 = 18 Median = 23 Q_3 = 29 P_{90} = 37 P_{99} = 84

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily
	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-Apr	18	17	23	23	20	19	19	18	21	26	32	32	35	32	37	56	56	24	17	16	18	16	20	17	56
2-Apr	18	72	31	22	18	46	12	20	25	40	51	50	48	38	37	22	24	21	19	20	22	21	23	29	72
3-Apr	26	59	42	23	24	26	29	30	30	31	32	30	33	37	37	35	40	41	23	27	19	18	16	17	59
4-Apr	18	14	14	13	14	15	16	21	26	25	28	33	32	29	31	41	26	20	20	20	22	32	19	17	41
5-Apr	21	20	21	18	22	20	20	22	20	20	25	25	21	25	22	29	23	19	17	18	17	16	17	18	29
6-Apr	19	18	23	23	21	23	23	23	23	24	24	26	27	24	26	26	30	29	31	29	26	30	30	29	31
7-Apr	23	28	27	22	22	51	25	32	81	93	75	60	68	44	34	31	39	19	17	18	17	18	19	17	93
8-Apr	18	19	15	18	16	16	18	20	22	20	21	22	24	25	24	23	24	22	20	21	20	18	21	22	25
9-Apr	25	31	26	49	20	22	21	23	24	27	29	25	31	32	28	32	30	31	30	30	27	27	26	25	49
10-Apr	26	31	31	25	28	26	27	26	34	38	39	50	49	50	86	88	83	78	18	16	17	17	16	18	88
11-Apr	17	16	14	14	14	15	16	18	18	20	26	25	28	34	29	30	23	23	22	18	16	15	15	16	34
12-Apr	16	16	16	15	18	23	19	20	30	35	44	85	43	59	90	72	17	17	18	19	21	20	22	20	90
13-Apr	18	18	36	29	33	38	19	30	28	27	26	30	28	32	31	29	21	29	24	21	26	21	32	45	45
14-Apr	33	23	20	23	25	22	21	22	24	24	26	25	24	26	26	25	25	25	30	28	32	24	35	34	35
15-Apr	42	58	42	62	43	70	88	84	75	53	69	51	47	65	46	46	35	28	25	21	18	17	17	17	88
16-Apr	17	17	19	19	18	17	17	19	21	22	36	38	37	35	31	35	29	24	22	15	13	13	14	15	38
17-Apr	15	15	15	15	15	16	17	17	23	30	41	36	47	39	38	37	37	34	25	12	12	13	14	13	47
18-Apr	14	15	15	15	16	16	16	19	19	23	22	23	23	24	22	22	22	22	22	23	23	22	21	19	24
19-Apr	19	18	17	17	18	18	17	27	28	27	25	28	27	29	26	25	24	26	24	23	21	21	21	21	29
20-Apr	18	20	21	25	27	30	31	33	31	33	32	36	30	33	36	38	32	25	25	15	14	15	15	17	38
21-Apr	16	13	14	11	10	19	18	24	58	52	36	33	31	34	32	28	22	22	18	16	16	19	18	17	58
22-Apr	26	17	16	14	14	14	15	19	23	26	28	32	32	25	31	24	25	23	20	18	18	19	16	17	32
23-Apr	17	18	17	17	17	17	17	19	30	26	29	39	37	30	27	28	28	27	25	19	18	20	24	26	39
24-Apr	25	25	20	22	19	23	22	26	28	27	24	27	25	31	28	26	26	23	22	22	19	19	19	18	31
25-Apr	17	17	17	16	18	19	16	20	24	26	26	27	28	31	30	30	22	23	22	22	18	21	20	20	31
26-Apr	19	21	20	20	20	19	20	21	21	21	20	23	22	24	24	28	32	63	32	18	17	16	17	60	63
27-Apr	82	38	20	15	15	14	16	22	32	36	30	35	35	35	28	36	37	26	15	29	29	13	11	14	82
28-Apr	14	15	14	11	15	15	20	24	34	35	32	32	31	32	30	29	29	25	26	23	21	21	19	21	35
29-Apr	21	21	23	20	19	18	20	23	25	28	28	28	27	28	29	32	28	29	27	22	17	15	13	16	32
30-Apr	14	15	16	15	14	16	18	19	19	25	25	26	26	25	23	25	24	25	23	20	17	29	18	19	29
	82	72	42	62	43	70	88	84	81	93	75	85	68	65	90	88	83	78	32	30	32	32	35	60	
	Diurnal Maximum																								

Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

Calibration Date	April 26, 2016	Last Calibration	March 10, 2016
Station Name	Conklin Lookout	Station Number	AMS 18
Reason:	Routine		
Start Time (MST)	8:58	End Time (MST)	12:30
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	-601	-601
Analyzer IP address	192.168.1.43		Lamp voltage	897	896
Calculated slope	0.979446	0.984816	Chamber temp	45.0	45.0
Calculated intercept	-0.764080	0.316996	Pressure	647.3	659.0
Analyzer Background	21.6	21.6	Flow	0.413	0.395
Analyzer Coefficient	0.918	0.918	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	0.1	----
as found span	5000	58.6	574.3	583.1	0.985
calibrator zero	5000	0.0	0.0	0.1	----
high point	5000	58.6	574.3	583.1	0.985
second point	5000	29.3	287.1	290.8	0.987
third point	5000	14.6	143.1	144.7	0.989
as left zero	5000	0.0	0.0	0.3	----
as left span	5000	58.6	574.3	581.6	0.987
				Average Correction Factor	0.987

Corrected As found	583.0	Previous response	587.1	% change	0.7%

Notes:

no maintenance or adjustments done, filter changed out

Calibration Performed By: Melissa Lemay

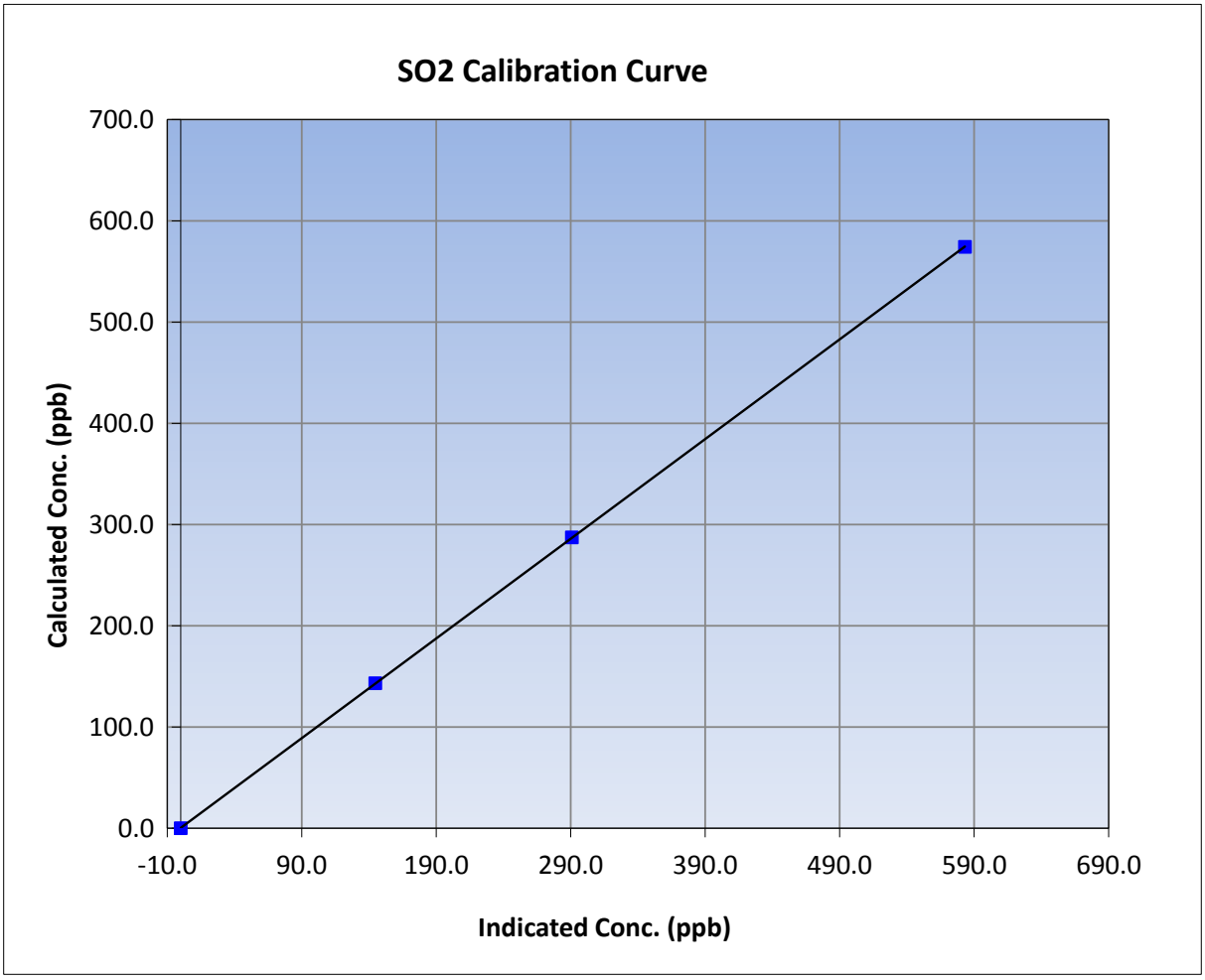
Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

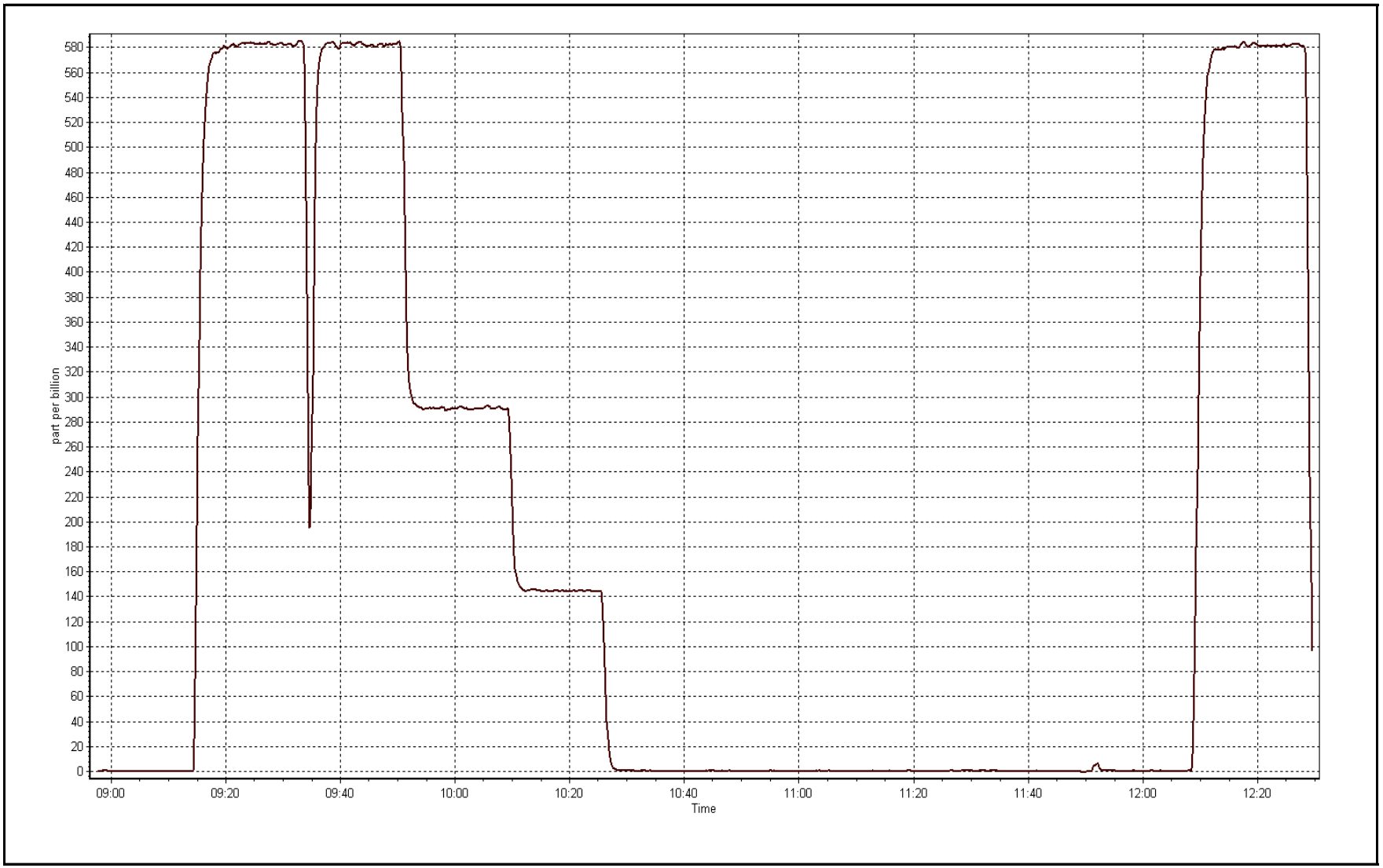
Calibration Date	April 26, 2016	Previous Calibration	March 10, 2016
Station Name	Conklin Lookout	Station Number	AMS 18
Start Time (MST)	8:58	End Time (MST)	12:30
Analyzer make	Thermo 43i	Analyzer serial #	JC1501301453

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	0.999997
574.3	583.1	0.9849		
287.1	290.8	0.9874	Slope	0.984816
143.1	144.7	0.9888		
			Intercept	0.316996



SO2 Calibration Plot Date: April 26, 2016



Wood Buffalo Environmental Association
TRS Calibration Report

Station Information

Calibration Date	April 27, 2016	Last Calibration	March 11, 2016
Station Name	Conklin Lookout	Station Number	AMS 18
Reason:	Routine		
Start Time (MST)	10:26	End Time (MST)	12:48
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 10/Jun/15

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-699	-699
Analyzer IP address	192.168.1.42		Lamp voltage	1014	1013
Calculated slope	1.009617	1.010643	Chamber temp	45	45
Calculated intercept	-0.019709	-0.080571	Pressure	626.3	638.1
Analyzer Background	2.99	2.99	Flow	0.404	0.410
Analyzer Coefficient	1.121	1.121	Intensity	91	92
			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	0.0	----
as found span	5000	82.0	80.0	79.2	1.011
SO2 scrubber check	5000	19.5	191.1	0.6	----
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	82.0	80.0	79.2	1.011
second point	5000	41.0	40.0	39.8	1.005
third point	5000	20.5	20.0	19.9	1.005
as left zero	5000	0.0	0.0	0.1	----
as left span	5000	82.0	80.0	81.1	0.987
				Average Correction Factor	1.007

Corrected As found	79.2	Previous response	79.3	% change	0.1%

Notes:

no maintenance or adjustments done, filter changed out,

Calibration Performed By: Melissa Lemay

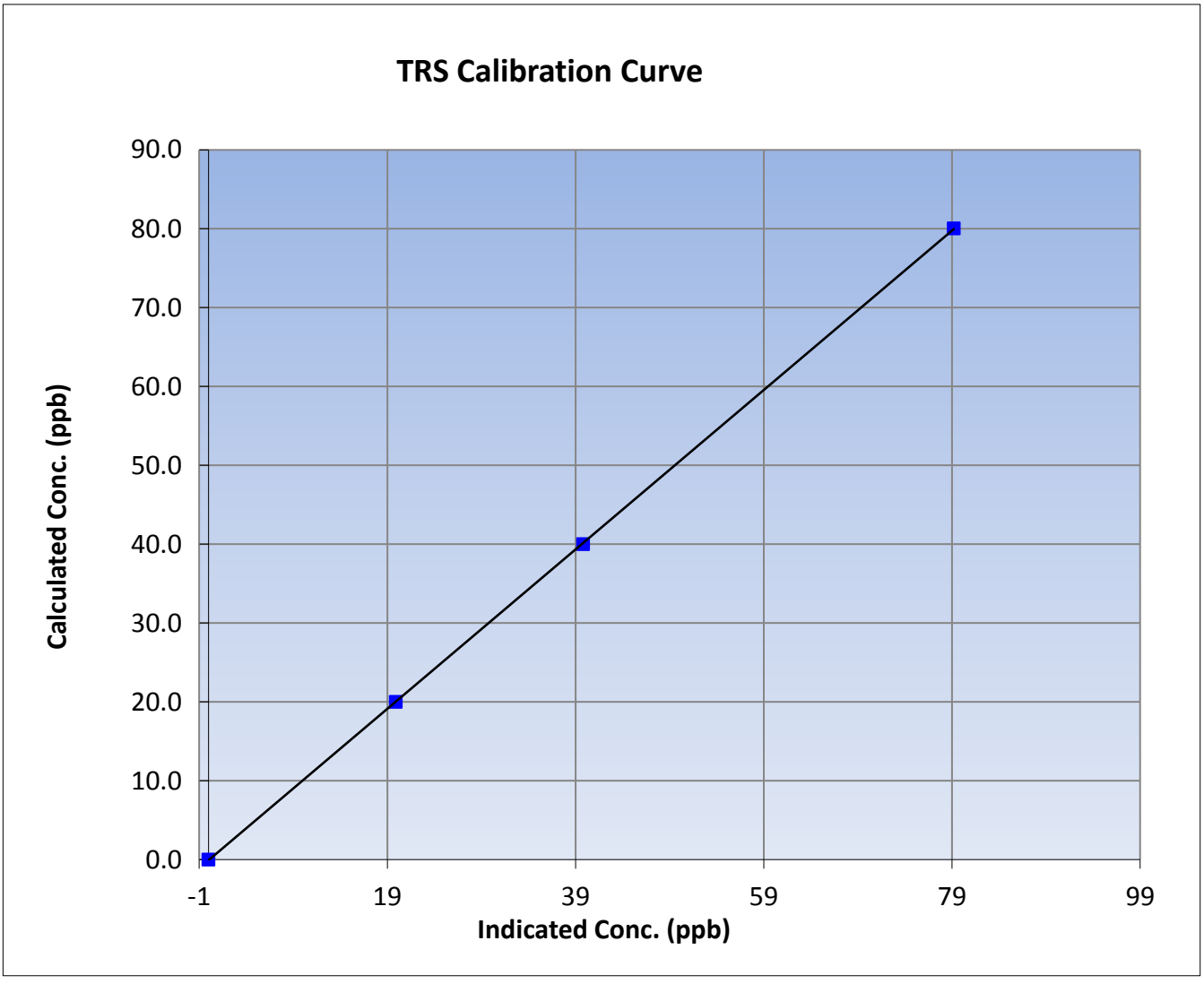
Wood Buffalo Environmental Association
TRS Calibration Report

Station Information

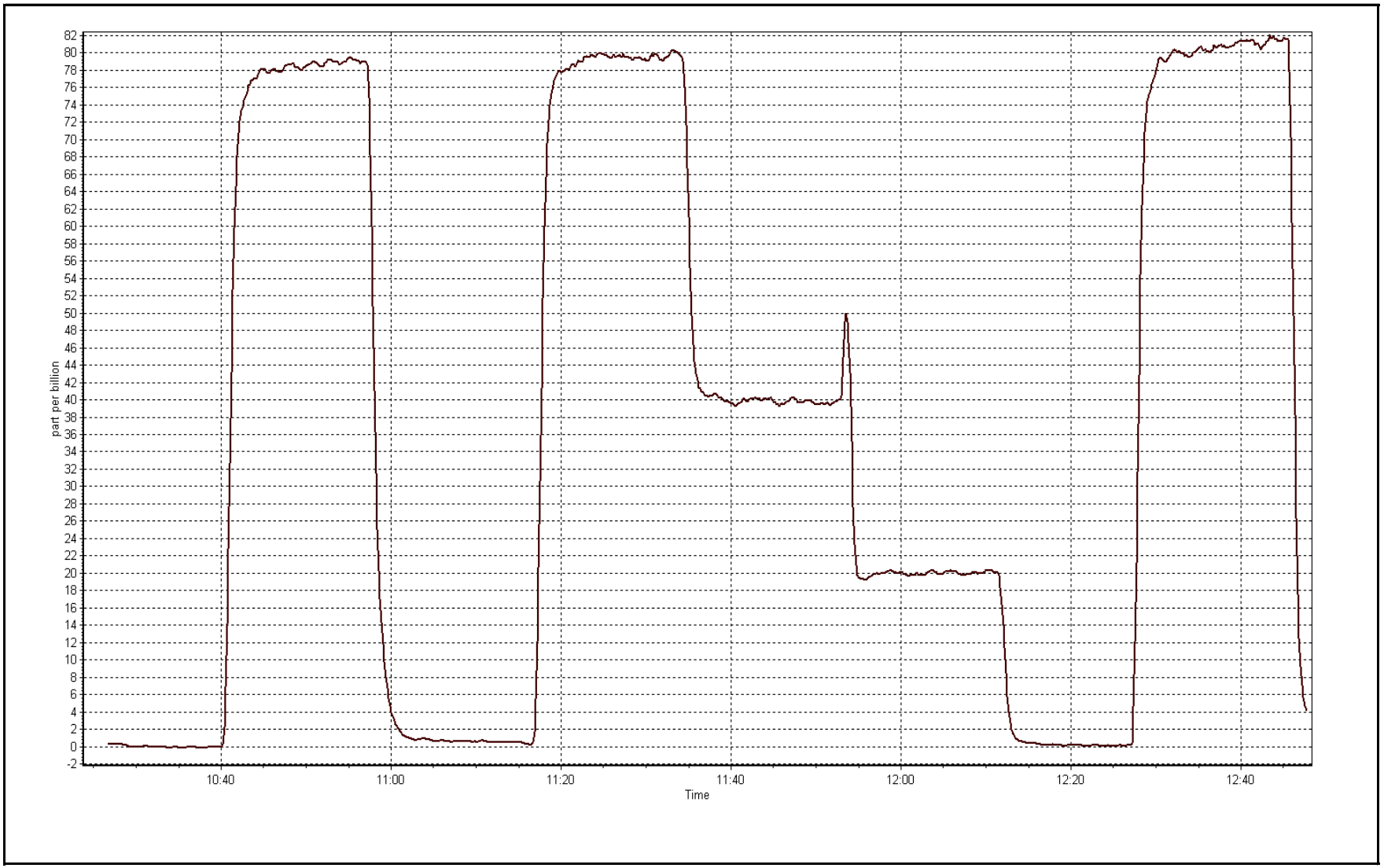
Calibration Date	April 27, 2016	Previous Calibration	March 11, 2016
Station Name	Conklin Lookout	Station Number	AMS 18
Start Time (MST)	10:26	End Time (MST)	12:48
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1336160090

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999992
80.0	79.2	1.0105		
40.0	39.8	1.0054	Slope	1.010643
20.0	19.9	1.0054		
			Intercept	-0.080571



TRS Calibration Plot Date: April 27, 2016



Wood Buffalo Environmental Association
THC / NMHC Calibration Report

Station Information

Calibration Date	April 3, 2016	Last Calibration	March 10, 2016
Station Name	Conklin Lookout	Station Number	AMS 18

Reason: As Found

Start Time (MST)	11:45	End Time (MST)	12:55
Gas Cert Reference	EY0000368	Cal Gas Expiry Date	June 10, 2016
CH4 Cal Gas Conc.	518.0 ppm	CH4 Equiv Conc.	1076.3 ppm
C3H8 Cal Gas Conc.	203.0 ppm	Station temp.	22 Deg C
Calibrator Model	API T700	Serial Number	1222
ZAG make/model	Teledyne API 701	Serial Number	5610
DACS make/model	Campbell Scientific CR3000	Serial Number	9035

Analyzer Information

	Before	*After*		*Before*	*After*
THC Range (ppm)	0 - 50 ppm		Column Temp	75.3	75.1
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	174.8	175.0
Analyzer IP address	192.168.1.55		Flame Temp	405.0	405.0
THC Calc slope	1.002461	1.008873	Carrier Pressure	31.7	31.7
THC Calc intercept	-0.000258	-0.000232	Fuel Pressure	43.5	43.2
NMHC Calc slope	0.999909	0.979215	Air Pressure	32.5	32.5
NMHC Calc intercept	-0.006207	-0.008068			

Analyzer make	Thermo 55i	Analyzer serial #	1218153354

THC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	0.00	----
as found span	5000	58.6	12.61	12.51	1.008
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	58.6	12.61	12.51	1.008
second point	5000	29.3	6.31	6.23	1.012
third point	5000	14.6	3.14	3.13	1.004
as left zero					
as left span					
				Average Correction Factor	1.008

Corrected As found	12.51	Previous response	12.58	% change	0.6%

Notes:

As Found calibration. Changing the pump because of noisy signal/altered span response, has been present since a power out that occurred on Apr 1.

Calibration Performed By: Evan Magill

Wood Buffalo Environmental Association

THC / NMHC Calibration Report

NMHC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0	0.00	0.00	----
as found span	5000	58.6	6.54	6.69	0.978
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	58.6	6.54	6.69	0.978
second point	5000	29.3	3.27	3.34	0.979
third point	5000	14.6	1.63	1.69	0.965
as left zero					
as left span					
				Average Correction Factor	0.974

Corrected As found	6.69	Previous response	6.55	% change	-2.1%

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	58.6	6.07	5.81	1.045
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	58.6	6.07	5.81	1.045
second point	5000	29.3	3.04	2.88	1.054
third point	5000	14.6	1.51	1.44	1.050
as left zero					
as left span					
				Average Correction Factor	1.050

Corrected As found	5.81	Previous response	6.03	% change	3.8%

Wood Buffalo Environmental Association

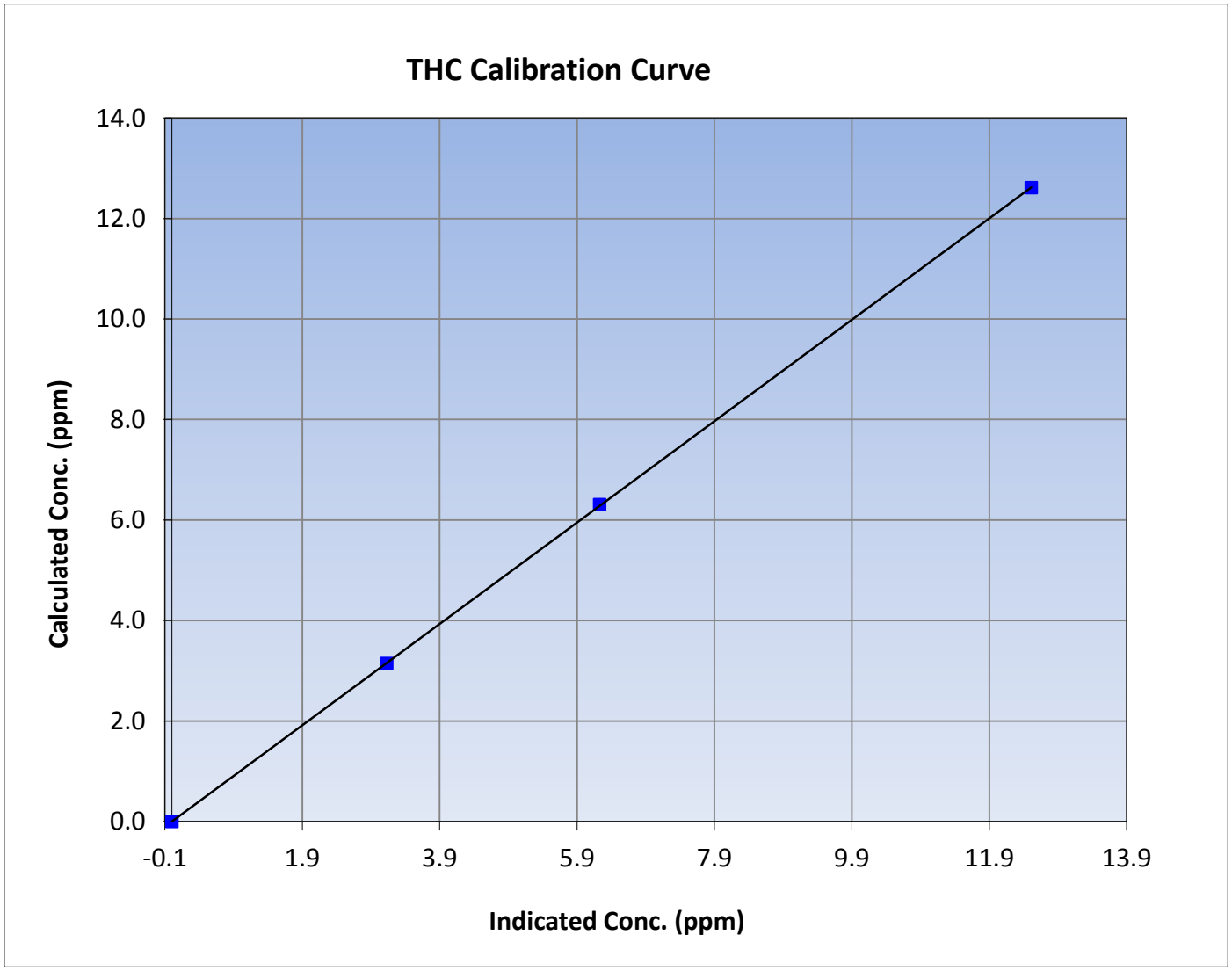
THC Calibration Summary

Station Information

Calibration Date	April 3, 2016	Previous Calibration	March 10, 2016
Station Name	Conklin Lookout	Station Number	AMS 18
Start Time (MST)	11:45	End Time (MST)	12:55
Analyzer make	Thermo 55i	Analyzer serial #	1218153354

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999991
12.61	12.51	1.0083		
6.31	6.23	1.0123	Slope	1.008873
3.14	3.13	1.0040		
			Intercept	-0.000232



Wood Buffalo Environmental Association

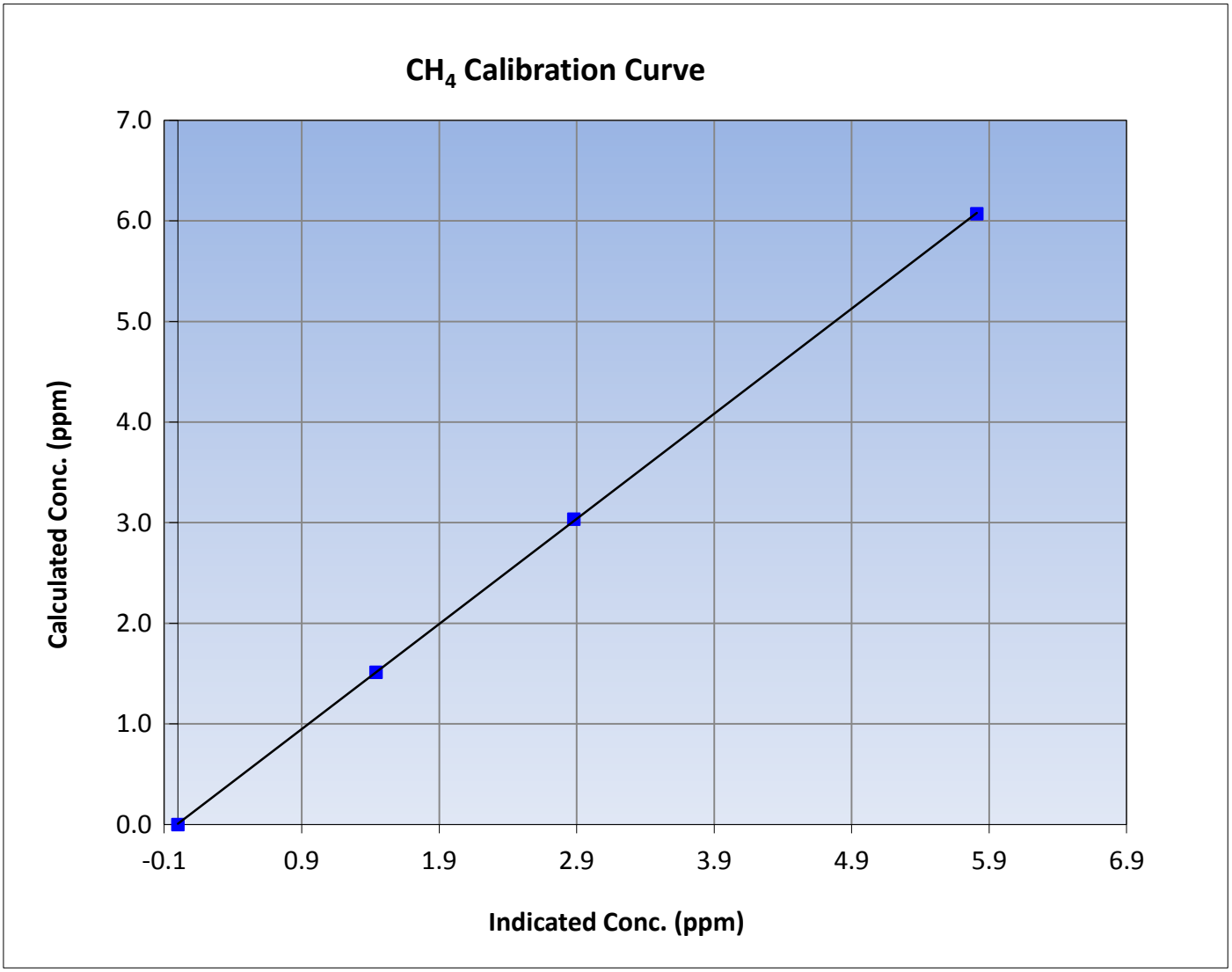
CH_4 Calibration Summary

Station Information

Calibration Date	April 3, 2016	Previous Calibration	March 10, 2016
Station Name	Conklin Lookout	Station Number	AMS 18
Start Time (MST)	11:45	End Time (MST)	12:55
Analyzer make	Thermo 55i	Analyzer serial #	1218153354

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999977
6.07	5.81	1.0449		
3.04	2.88	1.0540	Slope	1.044941
1.51	1.44	1.0504		
			Intercept	0.008437



Wood Buffalo Environmental Association

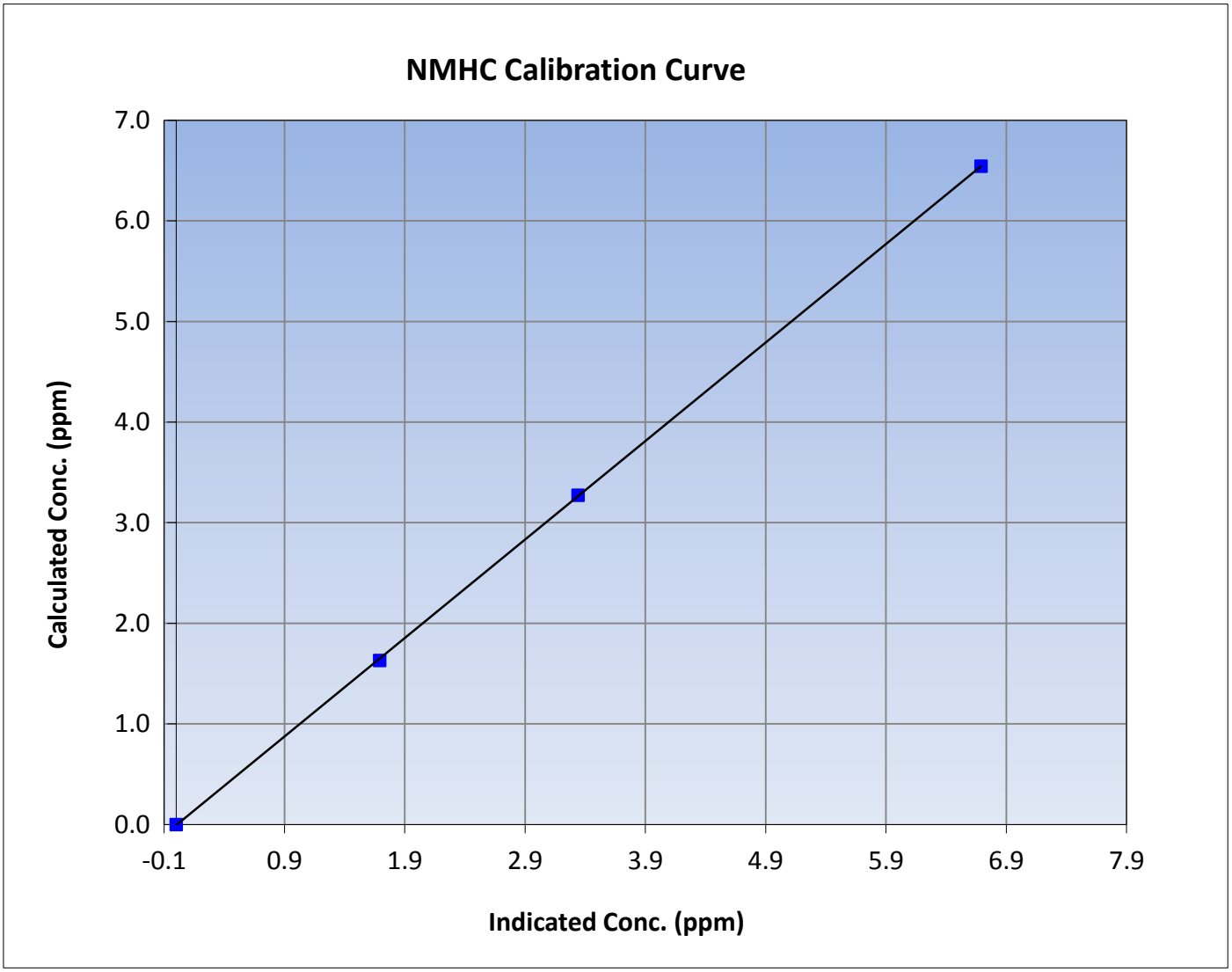
NMHC Calibration Summary

Station Information

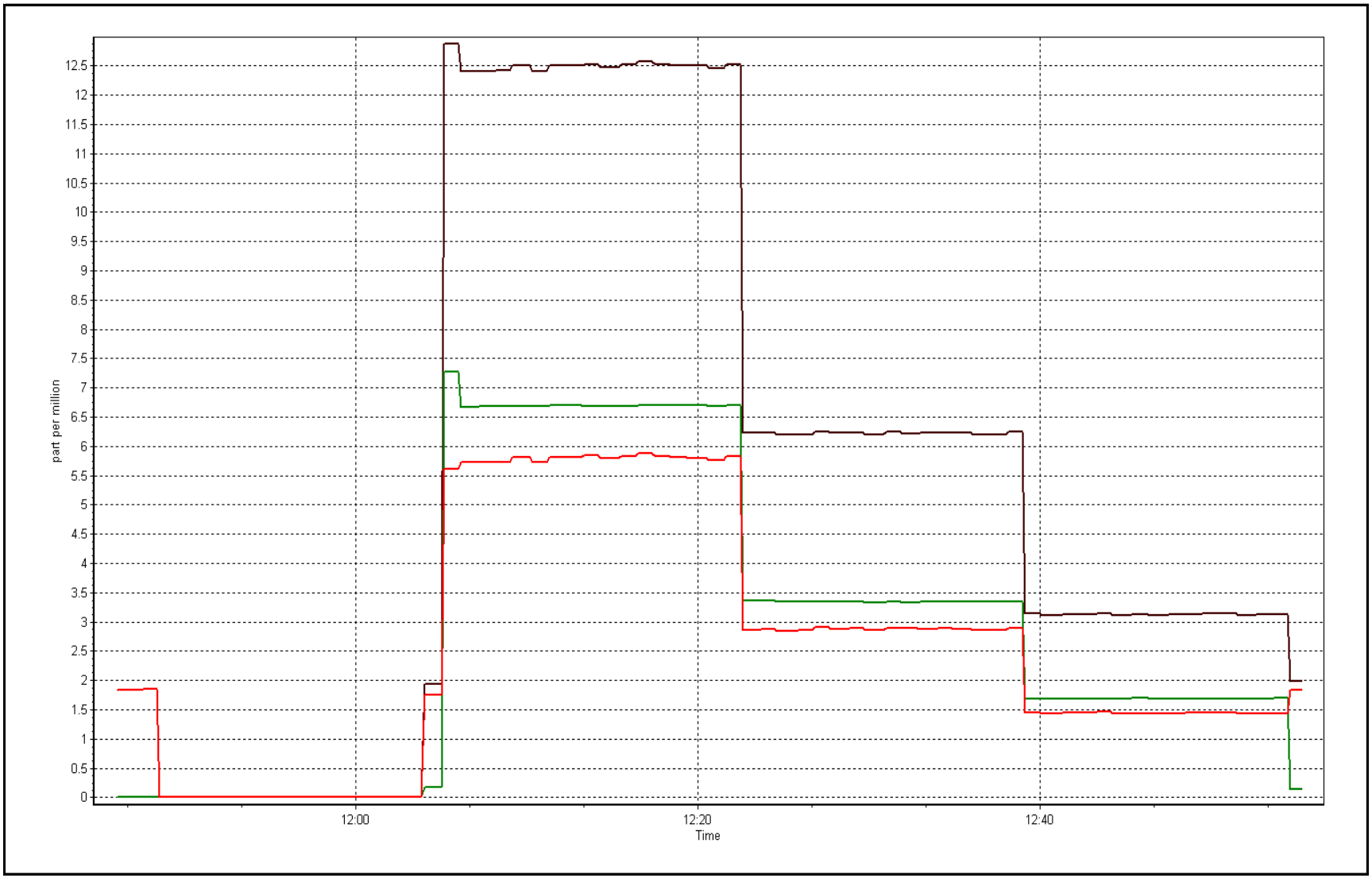
Calibration Date	April 3, 2016	Previous Calibration	March 10, 2016
Station Name	Conklin Lookout	Station Number	AMS 18
Start Time (MST)	11:45	End Time (MST)	12:55
Analyzer make	Thermo 55i	Analyzer serial #	1218153354

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999982
6.54	6.69	0.9780		
3.27	3.34	0.9794	Slope	0.979215
1.63	1.69	0.9646		
			Intercept	-0.008068



THC Calibration Plot Date: April 3, 2016



Wood Buffalo Environmental Association
THC / NMHC Calibration Report

W B E A

Station Information

Calibration Date	April 3, 2016	Last Calibration	April 3, 2016
Station Name	Conklin Lookout	Station Number	AMS 18

Reason: Other: Pump replacement

Start Time (MST)	13:50	End Time (MST)	15:50
Gas Cert Reference	EY0000368	Cal Gas Expiry Date	June 10, 2016
CH4 Cal Gas Conc.	518.0 ppm	CH4 Equiv Conc.	1076.3 ppm
C3H8 Cal Gas Conc.	203.0 ppm	Station temp.	22 Deg C
Calibrator Model	API T700	Serial Number	1222
ZAG make/model	Teledyne API 701	Serial Number	5610
DACS make/model	Campbell Scientific CR3000	Serial Number	9035

Analyzer Information

	Before	*After*		*Before*	*After*
THC Range (ppm)	0 - 50 ppm		Column Temp	75.1	75.4
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	175.0	175.0
Analyzer IP address	192.168.1.55		Flame Temp	405.0	405.0
THC Calc slope	1.008873	0.999815	Carrier Pressure	31.7	31.7
THC Calc intercept	-0.000232	0.011799	Fuel Pressure	43.2	43.2
NMHC Calc slope	0.979215	1.001482	Air Pressure	32.5	32.5
NMHC Calc intercept	-0.008068	-0.008216			

Analyzer make	Thermo 55i	Analyzer serial #	1218153354

THC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero					
as found span					
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	58.6	12.61	12.62	0.999
second point	5000	29.3	6.31	6.26	1.007
third point	5000	14.6	3.14	3.14	1.001
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	58.6	12.61	12.63	0.999
				Average Correction Factor	1.003

Corrected As found	NA	Previous response	NA	% change	NA

Notes:

Changed the pump prior to calibration to determine if it's the cause of the recent noisy signal/altered span response. Adjusted span.

Calibration Performed By: Evan Magill

Wood Buffalo Environmental Association

THC / NMHC Calibration Report

NMHC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero					
as found span					
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	58.6	6.54	6.54	1.000
second point	5000	29.3	3.27	3.27	1.000
third point	5000	14.6	1.63	1.65	0.988
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	58.6	6.54	6.57	0.996
				Average Correction Factor	0.996

Corrected As found	NA	Previous response	NA	% change	NA

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					
as found span					
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	58.6	6.07	6.07	1.000
second point	5000	29.3	3.04	2.99	1.015
third point	5000	14.6	1.51	1.49	1.015
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	58.6	6.07	6.06	1.002
				Average Correction Factor	1.010

Corrected As found	NA	Previous response	NA	% change	NA

Wood Buffalo Environmental Association

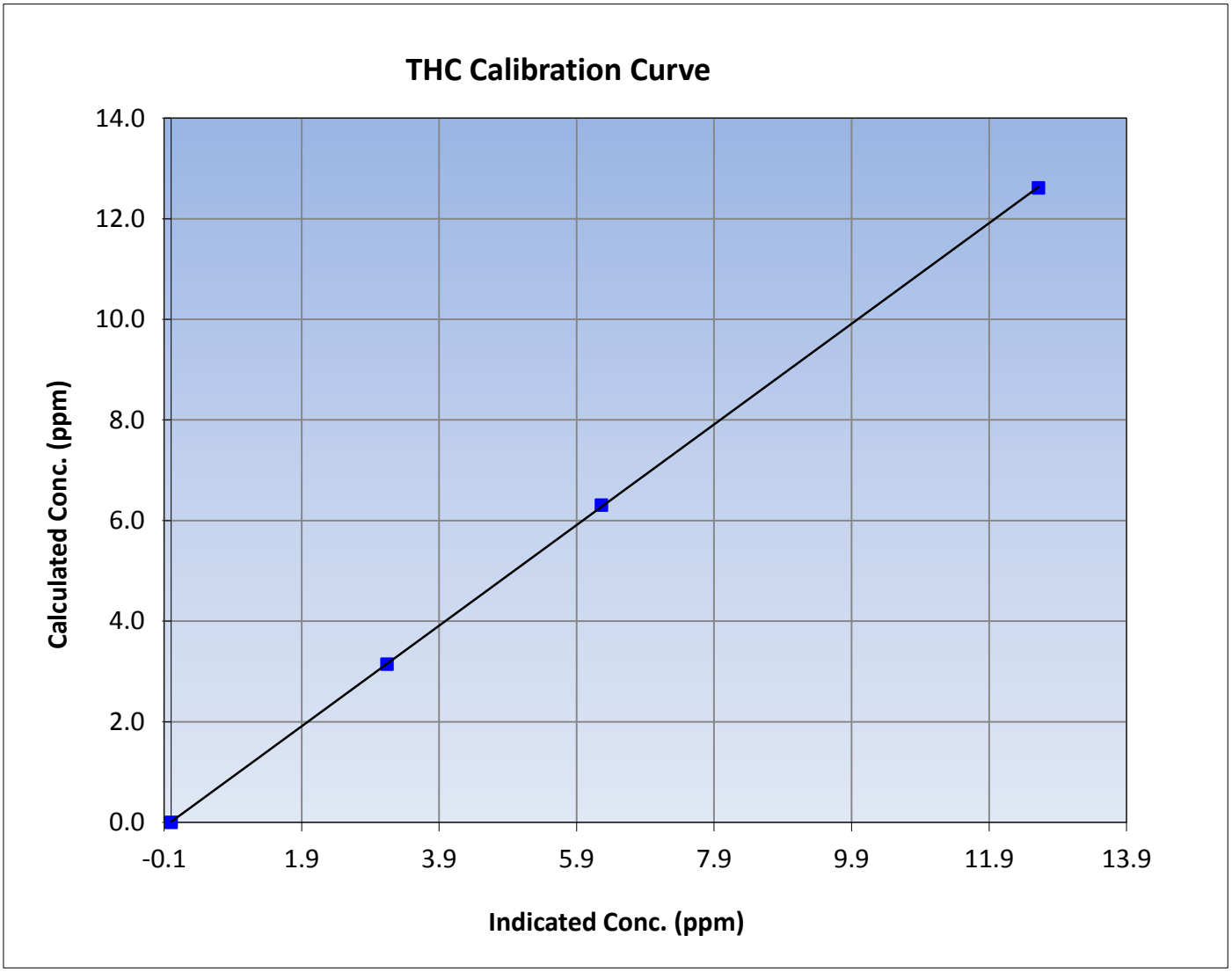
THC Calibration Summary

Station Information

Calibration Date	April 3, 2016	Previous Calibration	April 3, 2016
Station Name	Conklin Lookout	Station Number	AMS 18
Start Time (MST)	13:50	End Time (MST)	15:50
Analyzer make	Thermo 55i	Analyzer serial #	1218153354

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999980
12.61	12.62	0.9995		
6.31	6.26	1.0075	Slope	0.999815
3.14	3.14	1.0008		
			Intercept	0.011799



Wood Buffalo Environmental Association

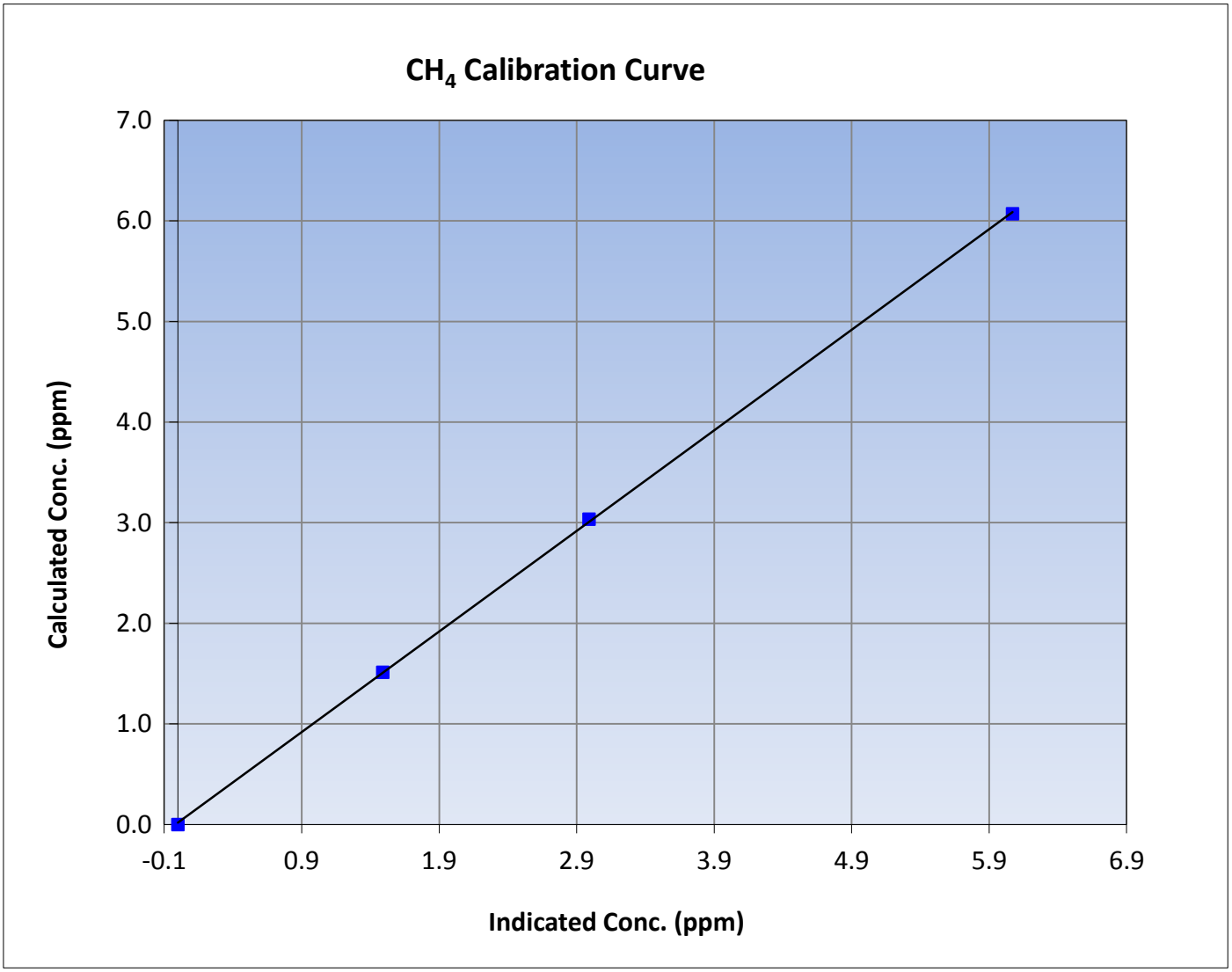
CH_4 Calibration Summary

Station Information

Calibration Date	April 3, 2016	Previous Calibration	April 3, 2016
Station Name	Conklin Lookout	Station Number	AMS 18
Start Time (MST)	13:50	End Time (MST)	15:50
Analyzer make	Thermo 55i	Analyzer serial #	1218153354

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999931
6.07	6.07	1.0002		
3.04	2.99	1.0152	Slope	0.999675
1.51	1.49	1.0151		
			Intercept	0.018107



Wood Buffalo Environmental Association

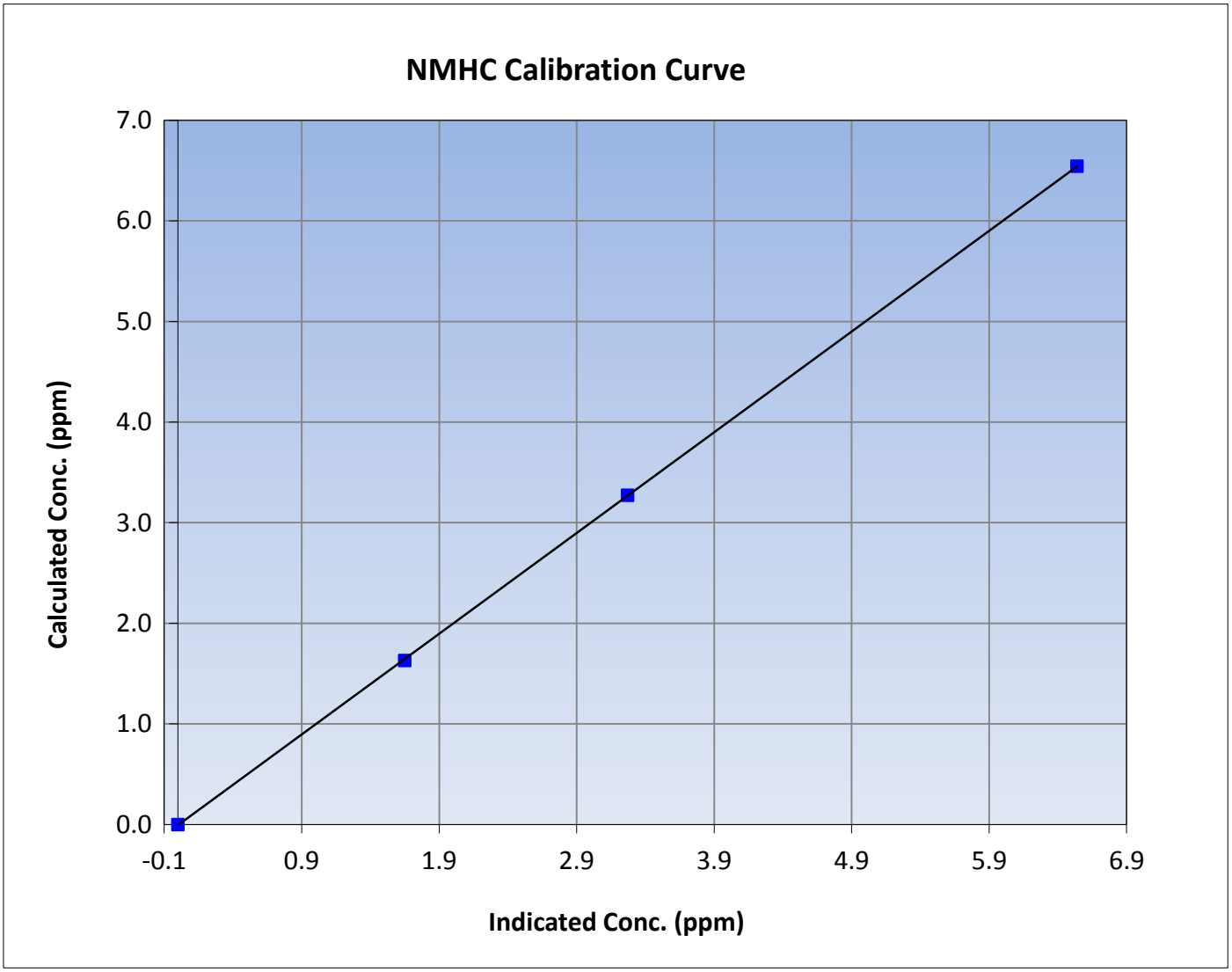
NMHC Calibration Summary

Station Information

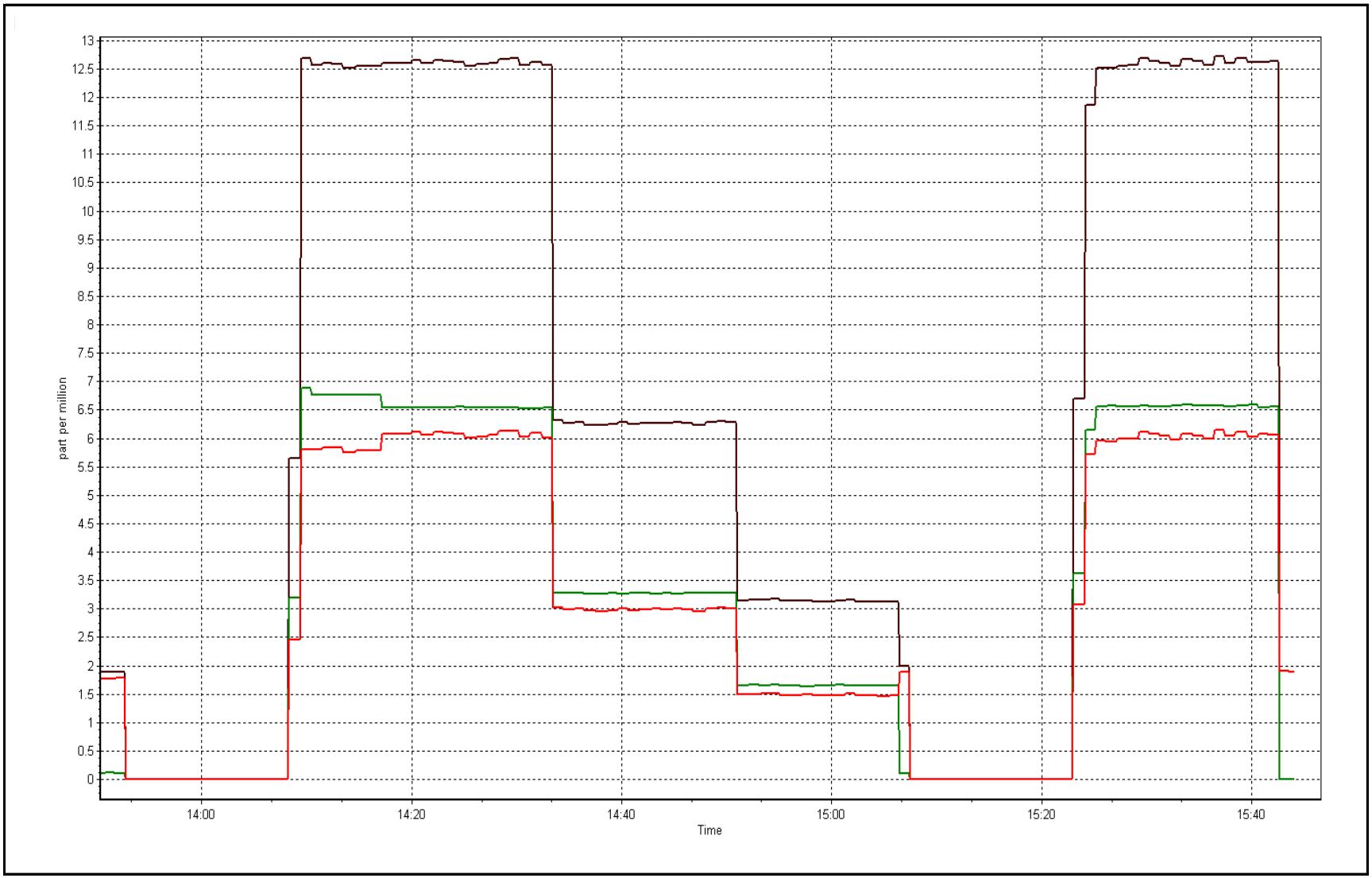
Calibration Date	April 3, 2016	Previous Calibration	April 3, 2016
Station Name	Conklin Lookout	Station Number	AMS 18
Start Time (MST)	13:50	End Time (MST)	15:50
Analyzer make	Thermo 55i	Analyzer serial #	1218153354

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999988
6.54	6.54	1.0004		
3.27	3.27	1.0004	Slope	1.001482
1.63	1.65	0.9879		
			Intercept	-0.008216



THC Calibration Plot Date: April 3, 2016



Wood Buffalo Environmental Association
THC / NMHC Calibration Report

W B E A

Station Information

Calibration Date	April 4, 2016	Last Calibration	April 3, 2016
Station Name	Conklin Lookout	Station Number	AMS 18

Reason: Other: repair

Start Time (MST)	9:50	End Time (MST)	15:50
Gas Cert Reference	EY0000368	Cal Gas Expiry Date	June 10, 2016
CH4 Cal Gas Conc.	518.0 ppm	CH4 Equiv Conc.	1076.3 ppm
C3H8 Cal Gas Conc.	203.0 ppm	Station temp.	22 Deg C
Calibrator Model	API T700	Serial Number	1222
ZAG make/model	Teledyne API 701	Serial Number	5610
DACS make/model	Campbell Scientific CR3000	Serial Number	9035

Analyzer Information

	Before	*After*		*Before*	*After*
THC Range (ppm)	0 - 50 ppm		Column Temp	75.1	75.4
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	175.0	175.0
Analyzer IP address	192.168.1.55		Flame Temp	405.0	405.0
THC Calc slope	0.999815	1.002520	Carrier Pressure	31.8	31.0
THC Calc intercept	0.011799	-0.038182	Fuel Pressure	43.2	44.5
NMHC Calc slope	1.001482	1.001642	Air Pressure	32.5	34.5
NMHC Calc intercept	-0.008216	-0.016186			

Analyzer make	Thermo 55i	Analyzer serial #	1218153354

THC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	0.00	----
as found span	5000	58.6	12.61	12.50	1.009
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	58.6	12.61	12.60	1.001
second point	5000	29.3	6.31	6.35	0.993
third point	5000	14.6	3.14	3.21	0.979
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	58.6	12.61	12.78	0.987
				Average Correction Factor	0.991

Corrected As found	12.50	Previous response	12.60	% change	0.8%

Notes:

Pump replacement on April 3 2016 did not resolve the elevated noise issue. Input board calibration performed, as well as flame optimization and carrier flow optimization. Carrier flow optimization appears to have slightly re-duced noise. Instrument re-calibrated, calibration passed.

Calibration Performed By: Zach Eastman

Wood Buffalo Environmental Association

THC / NMHC Calibration Report

NMHC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0	0.00	0.00	----
as found span	5000	58.6	6.54	6.54	1.000
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	58.6	6.54	6.54	1.000
second point	5000	29.3	3.27	3.29	0.994
third point	5000	14.6	1.63	1.66	0.982
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	58.6	6.54	6.62	0.988
				Average Correction Factor	0.992

Corrected As found	6.54	Previous response	6.54	% change	0.0%

CH4 Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0	0.00	0.00	----
as found span	5000	58.6	6.07	5.96	1.019
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	58.6	6.07	6.06	1.002
second point	5000	29.3	3.04	3.05	0.995
third point	5000	14.6	1.51	1.55	0.976
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	58.6	6.07	6.16	0.986
				Average Correction Factor	0.991

Corrected As found	5.96	Previous response	6.06	% change	1.7%

Wood Buffalo Environmental Association

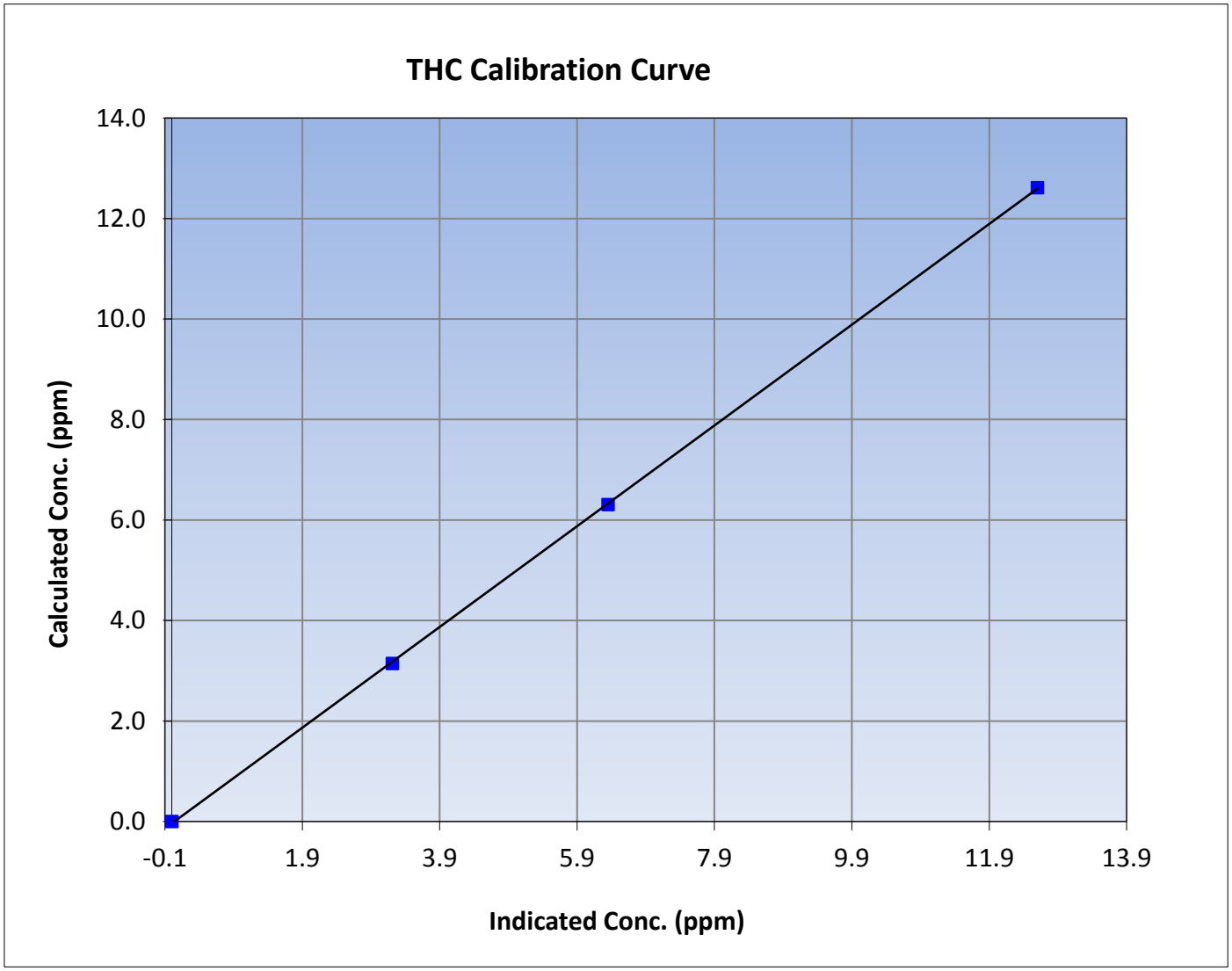
THC Calibration Summary

Station Information

Calibration Date	April 4, 2016	Previous Calibration	April 3, 2016
Station Name	Conklin Lookout	Station Number	AMS 18
Start Time (MST)	9:50	End Time (MST)	15:50
Analyzer make	Thermo 55i	Analyzer serial #	1218153354

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999958
12.61	12.60	1.0011		
6.31	6.35	0.9932	Slope	1.002520
3.14	3.21	0.9790		
			Intercept	-0.038182



Wood Buffalo Environmental Association

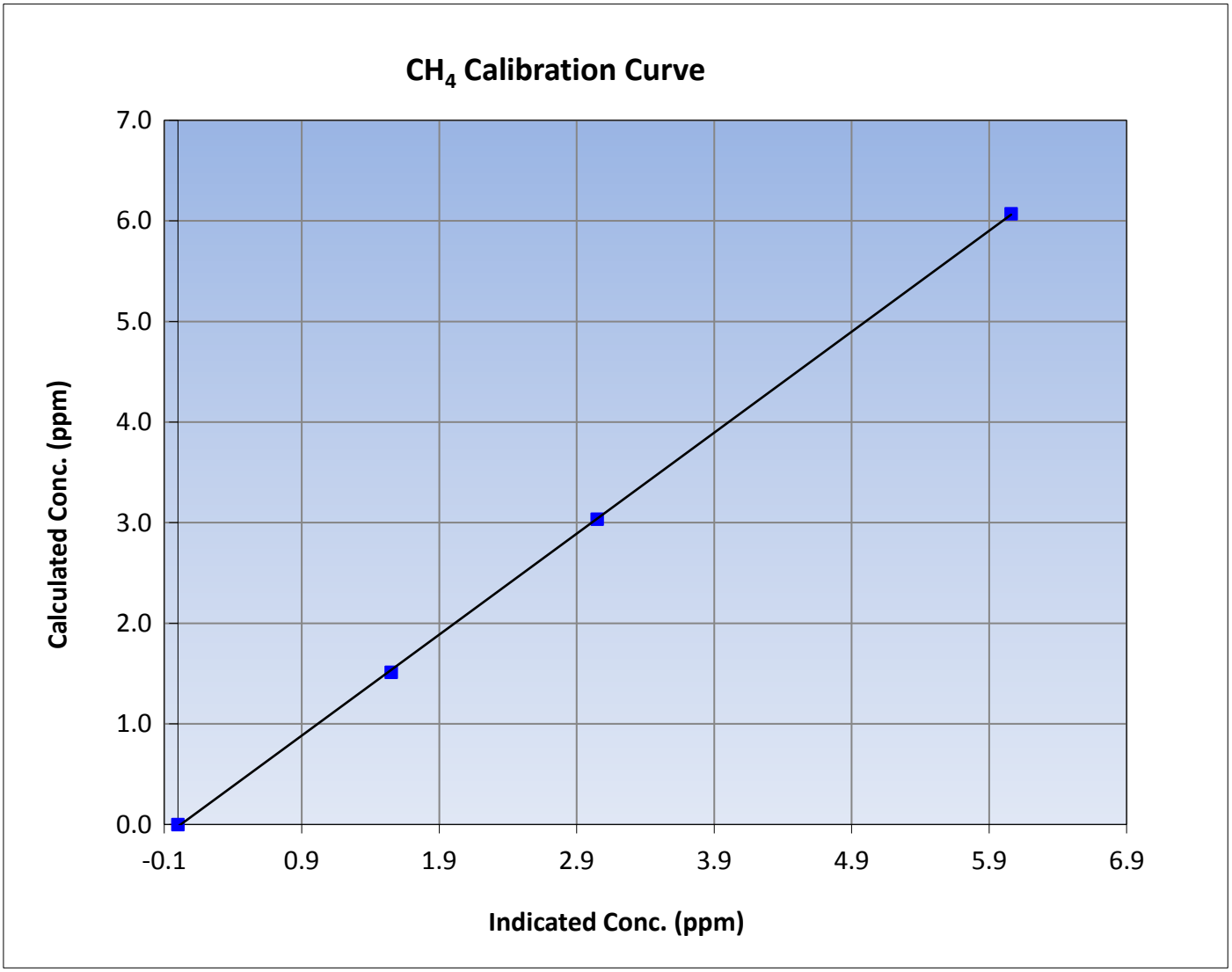
CH_4 Calibration Summary

Station Information

Calibration Date	April 4, 2016	Previous Calibration	April 3, 2016
Station Name	Conklin Lookout	Station Number	AMS 18
Start Time (MST)	9:50	End Time (MST)	15:50
Analyzer make	Thermo 55i	Analyzer serial #	1218153354

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999948
6.07	6.06	1.0018		
3.04	3.05	0.9952	Slope	1.003665
1.51	1.55	0.9758		
			Intercept	-0.020016



Wood Buffalo Environmental Association

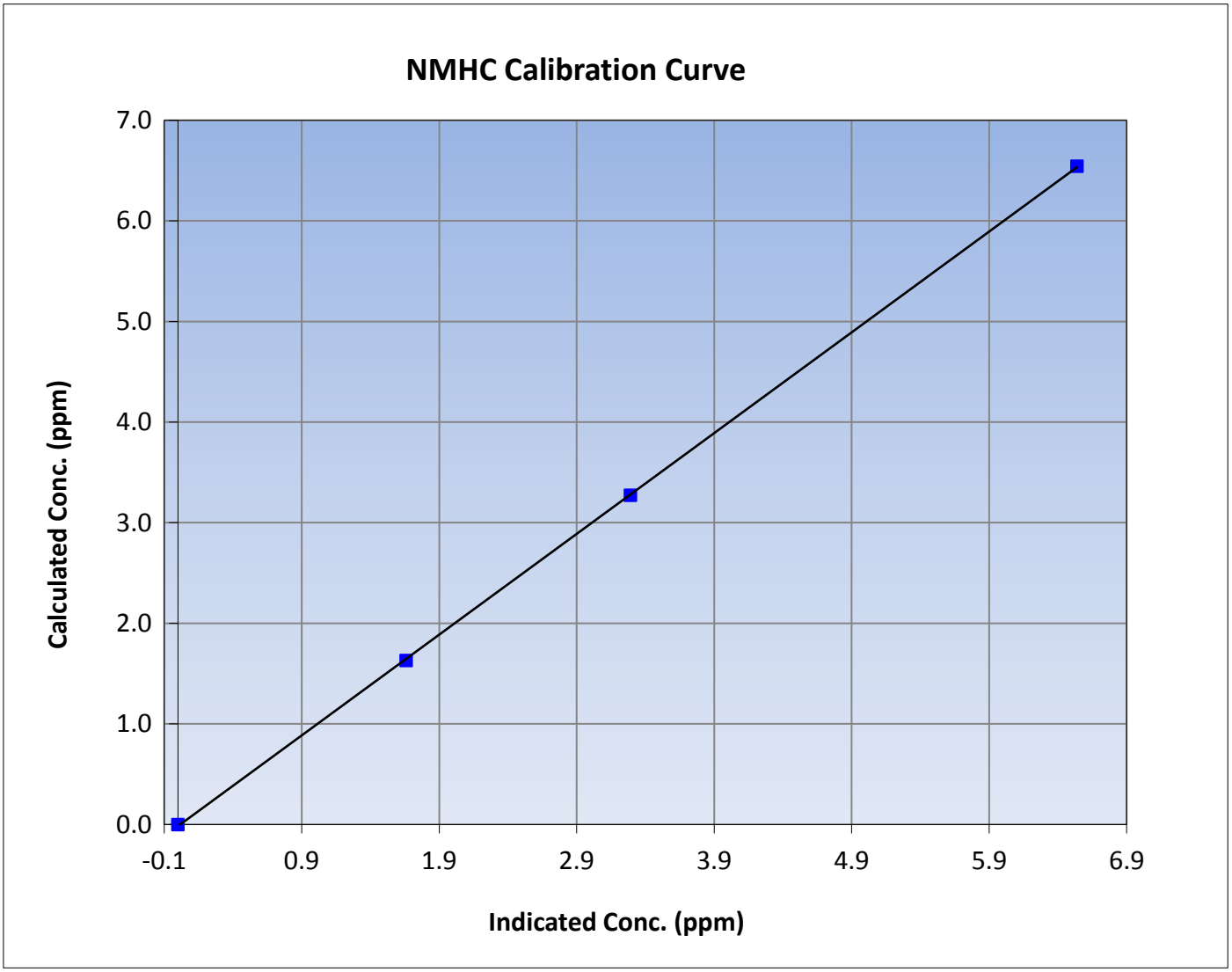
NMHC Calibration Summary

Station Information

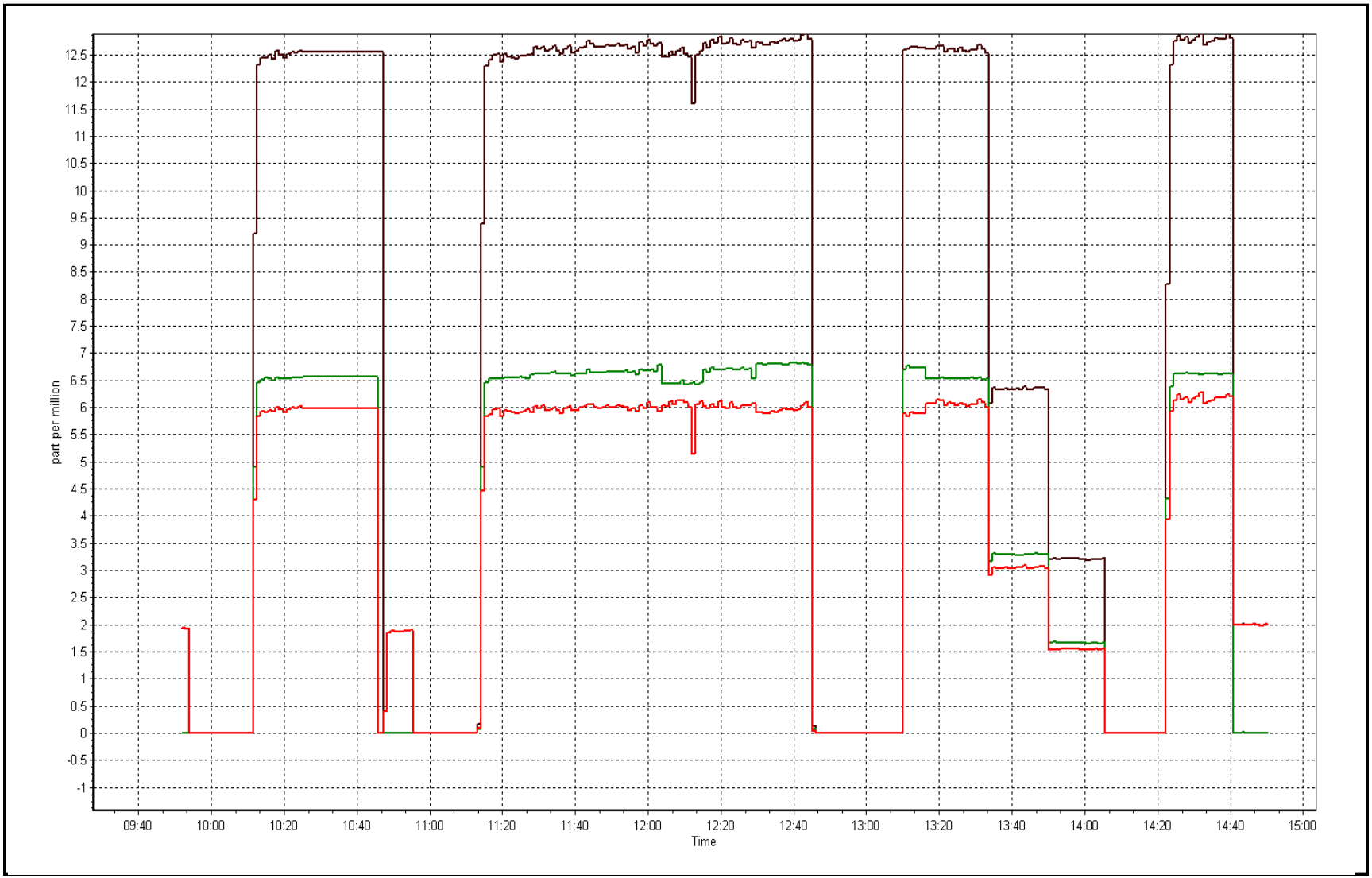
Calibration Date	April 4, 2016	Previous Calibration	April 3, 2016
Station Name	Conklin Lookout	Station Number	AMS 18
Start Time (MST)	9:50	End Time (MST)	15:50
Analyzer make	Thermo 55i	Analyzer serial #	1218153354

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999972
6.54	6.54	1.0004		
3.27	3.29	0.9943	Slope	1.001642
1.63	1.66	0.9820		
			Intercept	-0.016186



THC Calibration Plot Date: April 4, 2016



Wood Buffalo Environmental Association
THC / NMHC Calibration Report

Station Information

Calibration Date	April 9, 2016	Last Calibration	April 4, 2016
Station Name	Conklin Lookout	Station Number	AMS 18
Reason:	Routine		
Start Time (MST)	9:07	End Time (MST)	11:30
Gas Cert Reference	EY0000368	Cal Gas Expiry Date	June 10, 2016
CH4 Cal Gas Conc.	518.0 ppm	CH4 Equiv Conc.	1076.3 ppm
C3H8 Cal Gas Conc.	203.0 ppm	Station temp.	22 Deg C
Calibrator Model	API T700	Serial Number	1222
ZAG make/model	Teledyne API 701	Serial Number	5610
DACS make/model	Campbell Scientific CR3000	Serial Number	9035

Analyzer Information

	Before	*After*		*Before*	*After*
THC Range (ppm)	0 - 50 ppm		Column Temp	75.4	75.5
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	175.0	175.0
Analyzer IP address	192.168.1.55		Flame Temp	405.0	405.0
THC Calc slope	1.002520	0.999913	Carrier Pressure	31.0	30.9
THC Calc intercept	-0.038182	-0.016236	Fuel Pressure	44.5	44.3
NMHC Calc slope	1.001642	1.000250	Air Pressure	34.5	34.4
NMHC Calc intercept	-0.016186	-0.012187			

Analyzer make	Thermo 55i	Analyzer serial #	1218153354

THC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	0.00	----
as found span	5000	58.6	12.61	13.08	0.964
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	58.6	12.61	12.63	0.999
second point	5000	29.3	6.31	6.31	0.999
third point	5000	14.6	3.14	3.19	0.985
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	58.6	12.61	12.66	0.996
				Average Correction Factor	0.994

Corrected As found	13.08	Previous response	12.62	% change	-3.5%

Notes:

Remotely logged in to calibrate the equipment due to CH4 daily span being out by 9.6% during last nights daily z/s cycle. Adjusted span.

Calibration Performed By: Asad Hidayat

Wood Buffalo Environmental Association

THC / NMHC Calibration Report

NMHC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0	0.00	0.00	----
as found span	5000	58.6	6.54	6.44	1.016
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	58.6	6.54	6.55	0.999
second point	5000	29.3	3.27	3.28	0.997
third point	5000	14.6	1.63	1.66	0.982
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	58.6	6.54		
				Average Correction Factor	0.993

Corrected As found	6.44	Previous response	6.55	% change	1.7%

CH4 Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0	0.00	0.00	----
as found span	5000	58.6	6.07	6.64	0.914
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	58.6	6.07	6.08	0.999
second point	5000	29.3	3.04	3.03	1.002
third point	5000	14.6	1.51	1.53	0.989
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	58.6	6.07	6.09	0.997
				Average Correction Factor	0.996

Corrected As found	6.64	Previous response	6.07	% change	-8.6%

Wood Buffalo Environmental Association

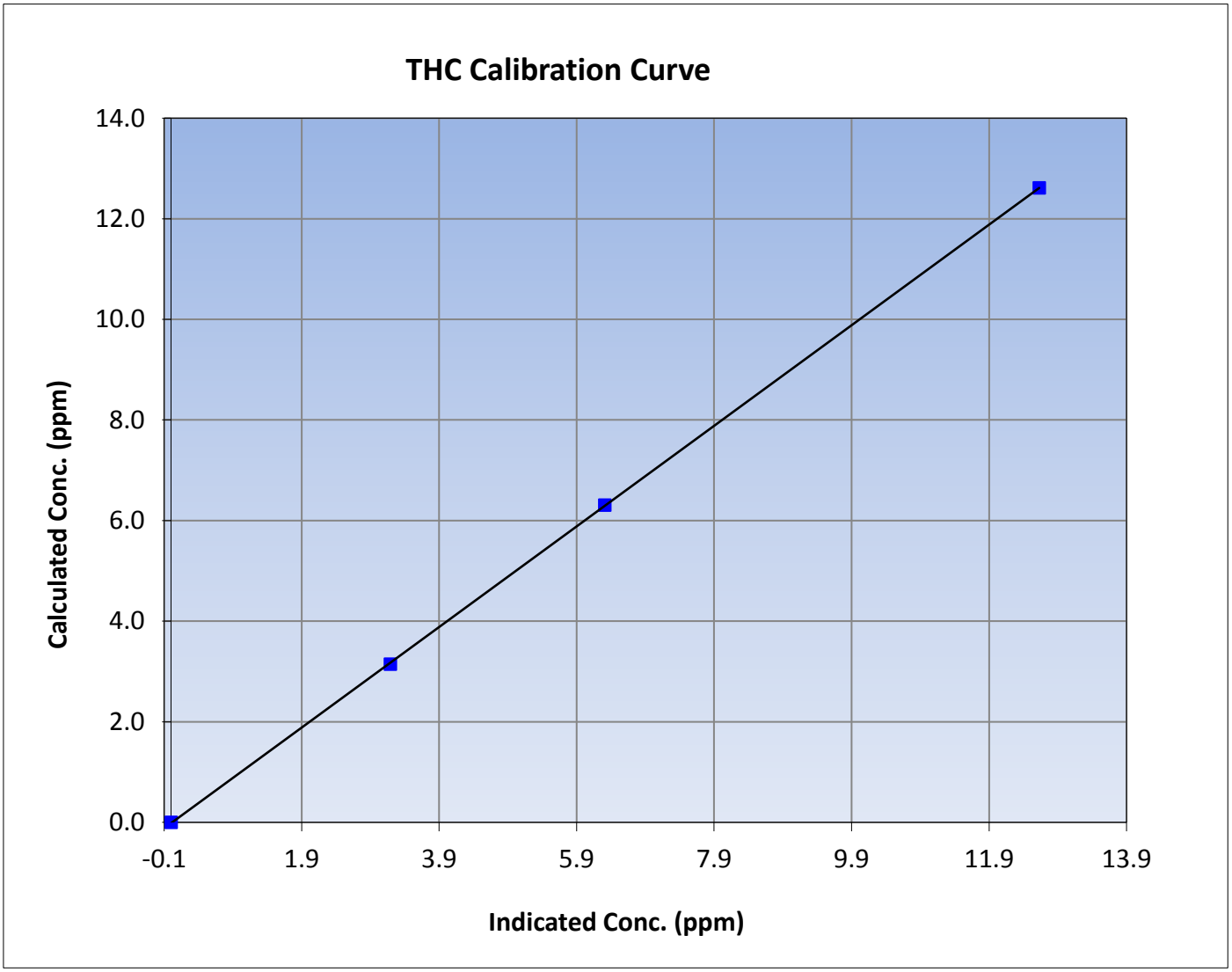
THC Calibration Summary

Station Information

Calibration Date	April 9, 2016	Previous Calibration	April 4, 2016
Station Name	Conklin Lookout	Station Number	AMS 18
Start Time (MST)	9:07	End Time (MST)	11:30
Analyzer make	Thermo 55i	Analyzer serial #	1218153354

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999984
12.61	12.63	0.9987		
6.31	6.31	0.9995	Slope	0.999913
3.14	3.19	0.9852		
			Intercept	-0.016236



Wood Buffalo Environmental Association

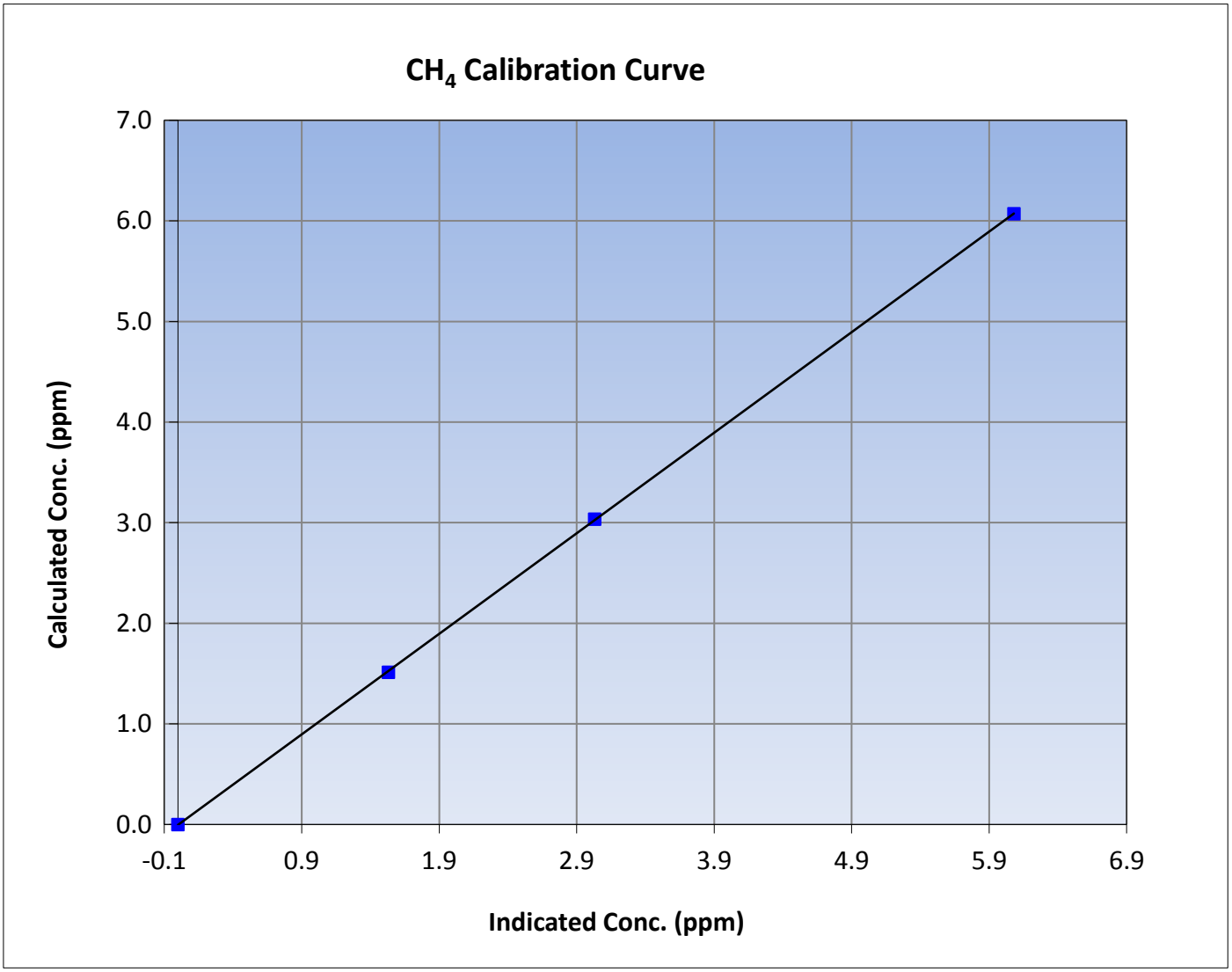
CH_4 Calibration Summary

Station Information

Calibration Date	April 9, 2016	Previous Calibration	April 4, 2016
Station Name	Conklin Lookout	Station Number	AMS 18
Start Time (MST)	9:07	End Time (MST)	11:30
Analyzer make	Thermo 55i	Analyzer serial #	1218153354

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999985
6.07	6.08	0.9985		
3.04	3.03	1.0018	Slope	0.999545
1.51	1.53	0.9886		
			Intercept	-0.004040



Wood Buffalo Environmental Association

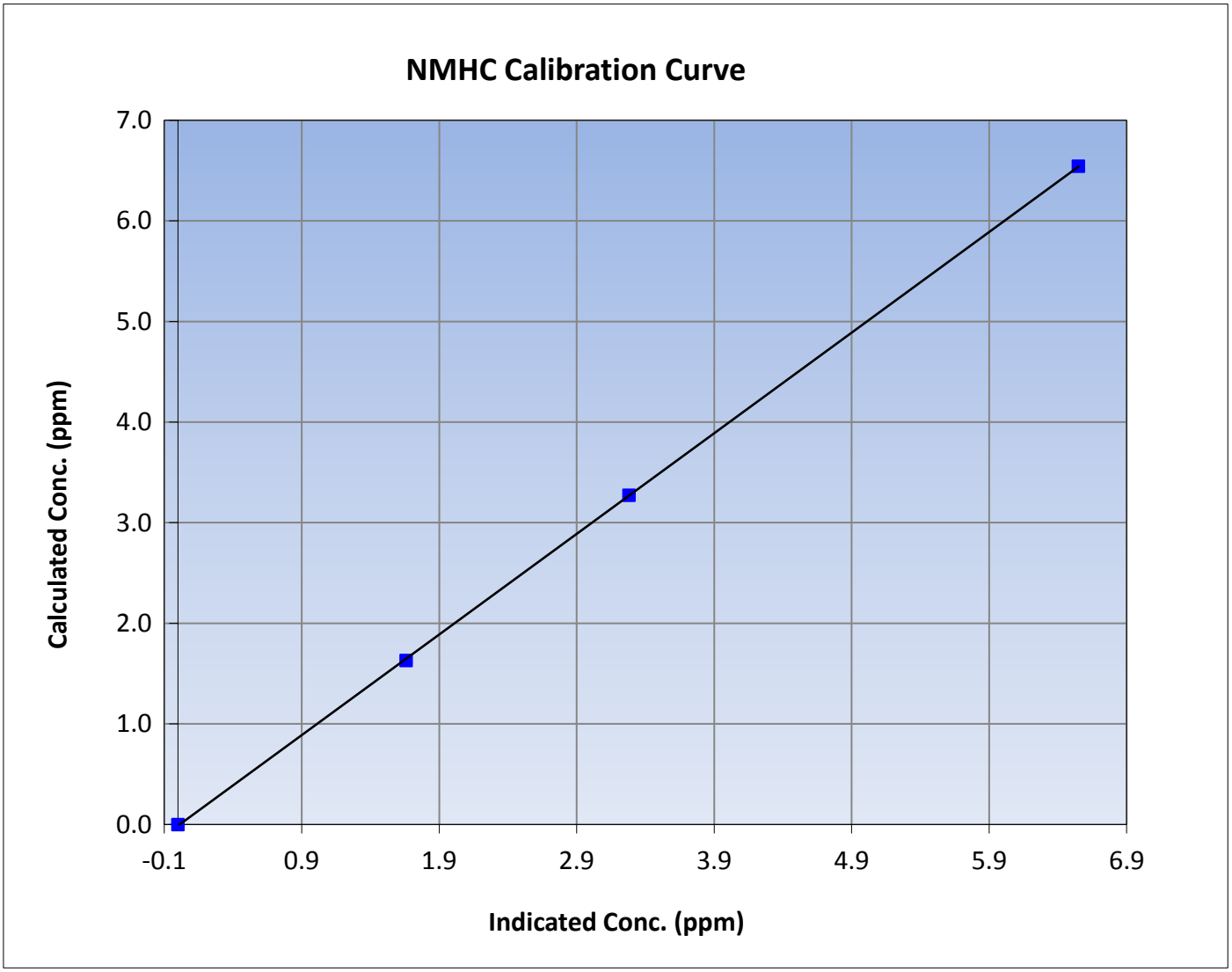
NMHC Calibration Summary

Station Information

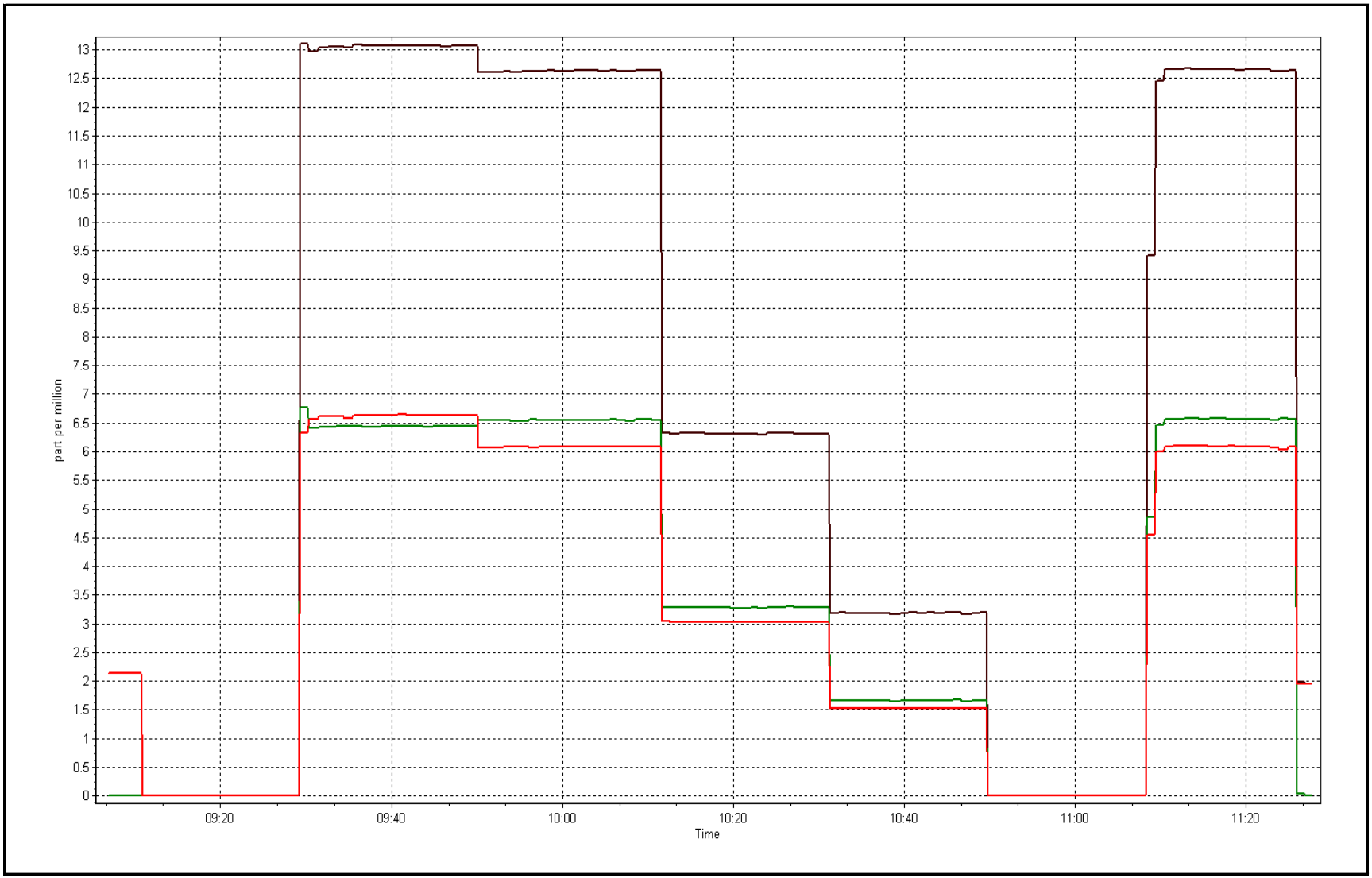
Calibration Date	April 9, 2016	Previous Calibration	April 4, 2016
Station Name	Conklin Lookout	Station Number	AMS 18
Start Time (MST)	9:07	End Time (MST)	11:30
Analyzer make	Thermo 55i	Analyzer serial #	1218153354

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999979
6.54	6.55	0.9989		
3.27	3.28	0.9974	Slope	1.000250
1.63	1.66	0.9820		
			Intercept	-0.012187



THC Calibration Plot Date: April 9, 2016



Wood Buffalo Environmental Association
THC / NMHC Calibration Report

Station Information

Calibration Date	April 26, 2016	Last Calibration	March 10, 2016
Station Name	Conklin Lookout	Station Number	AMS 18

Reason: Routine

Start Time (MST)	8:58	End Time (MST)	12:30
Gas Cert Reference	EY0000368	Cal Gas Expiry Date	June 10, 2016
CH4 Cal Gas Conc.	518.0 ppm	CH4 Equiv Conc.	1076.3 ppm
C3H8 Cal Gas Conc.	203.0 ppm	Station temp.	22 Deg C
Calibrator Model	API T700	Serial Number	1222
ZAG make/model	Teledyne API 701	Serial Number	5610
DACS make/model	Campbell Scientific CR3000	Serial Number	9035

Analyzer Information

	Before	*After*		*Before*	*After*
THC Range (ppm)	0 - 50 ppm		Column Temp	75.3	75.0
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	174.8	174.8
Analyzer IP address	192.168.1.55		Flame Temp	405.0	404.6
THC Calc slope	0.999913	1.000559	Carrier Pressure	31.7	30.9
THC Calc intercept	-0.016236	-0.002303	Fuel Pressure	43.5	44.3
NMHC Calc slope	1.000250	0.998170	Air Pressure	32.5	34.4
NMHC Calc intercept	-0.012187	-0.006213			

Analyzer make	Thermo 55i	Analyzer serial #	1218153354

THC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	0.00	----
as found span	5000	58.6	12.61	12.61	1.000
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	58.6	12.61	12.61	1.000
second point	5000	29.3	6.31	6.30	1.001
third point	5000	14.6	3.14	3.15	0.998
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	58.6	12.61	12.61	1.000
				Average Correction Factor	1.000

Corrected As found	12.61	Previous response	12.63	% change	0.2%

Notes:

No adjustments or maintenance done, filter changed out

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

THC / NMHC Calibration Report

NMHC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0	0.00	0.00	----
as found span	5000	58.6	6.54	6.56	0.997
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	58.6	6.54	6.56	0.997
second point	5000	29.3	3.27	3.28	0.997
third point	5000	14.6	1.63	1.65	0.988
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	58.6	6.54	6.58	0.994
				Average Correction Factor	0.994

Corrected As found	6.56	Previous response	6.55	% 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	58.6	6.07	6.05	1.003
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	58.6	6.07	6.05	1.003
second point	5000	29.3	3.04	3.02	1.005
third point	5000	14.6	1.51	1.50	1.008
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	58.6	6.07	6.03	1.007
				Average Correction Factor	1.006

Corrected As found	6.05	Previous response	6.08	% change	0.5%

Wood Buffalo Environmental Association

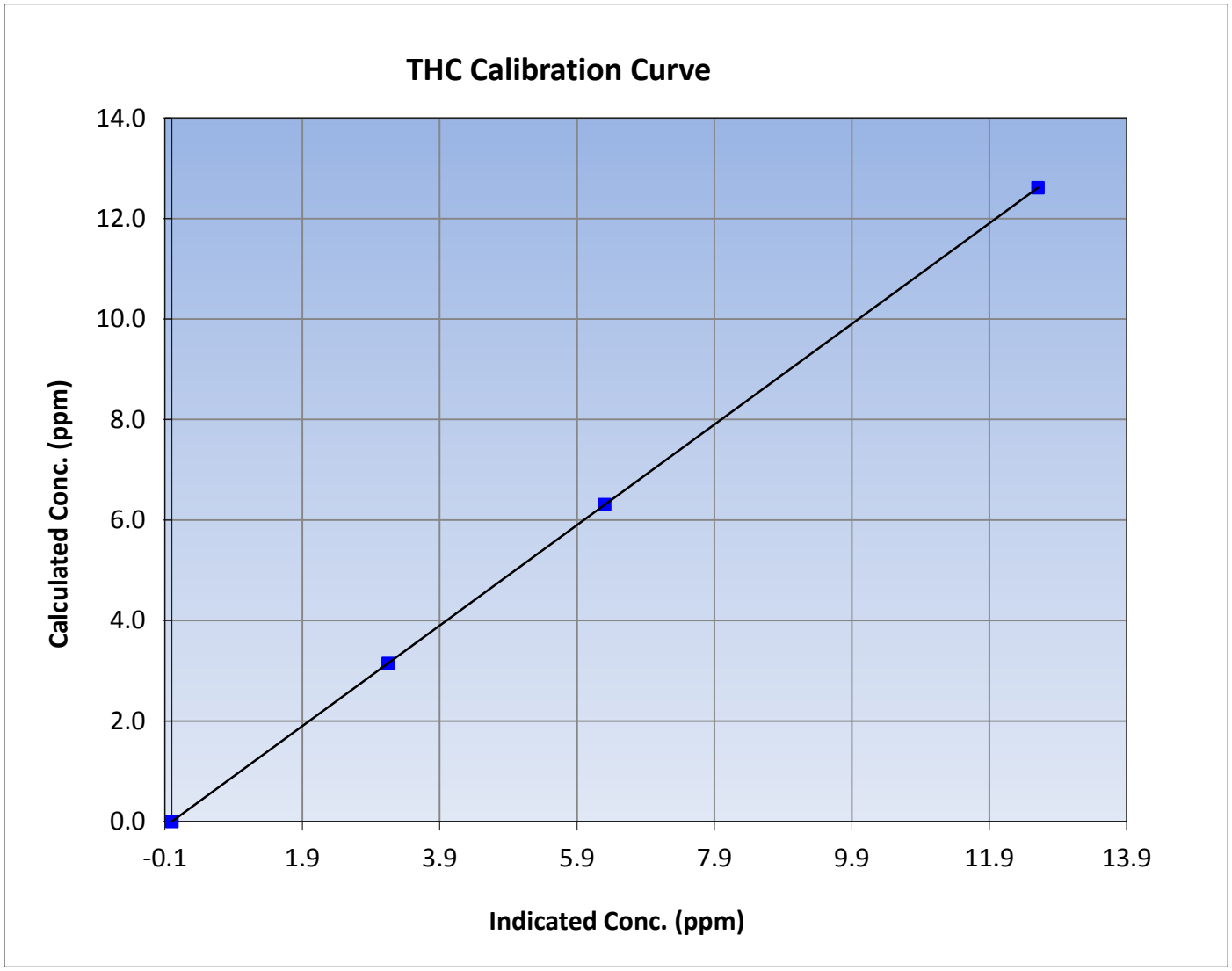
THC Calibration Summary

Station Information

Calibration Date	April 26, 2016	Previous Calibration	March 10, 2016
Station Name	Conklin Lookout	Station Number	AMS 18
Start Time (MST)	8:58	End Time (MST)	12:30
Analyzer make	Thermo 55i	Analyzer serial #	1218153354

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999999
12.61	12.61	1.0003		
6.31	6.30	1.0011	Slope	1.000559
3.14	3.15	0.9977		
			Intercept	-0.002303



Wood Buffalo Environmental Association

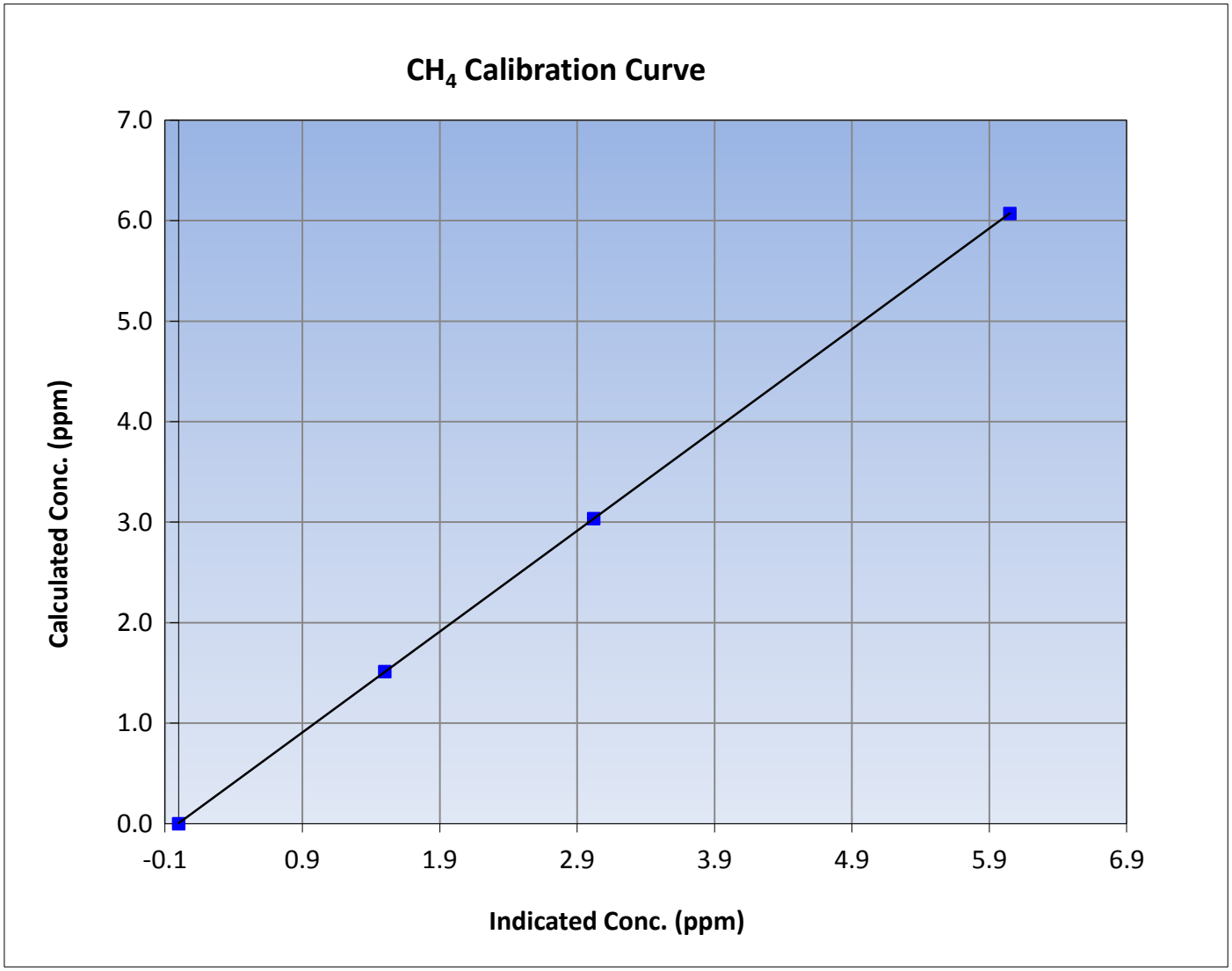
CH_4 Calibration Summary

Station Information

Calibration Date	April 26, 2016	Previous Calibration	March 10, 2016
Station Name	Conklin Lookout	Station Number	AMS 18
Start Time (MST)	8:58	End Time (MST)	12:30
Analyzer make	Thermo 55i	Analyzer serial #	1218153354

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999998
6.07	6.05	1.0035		
3.04	3.02	1.0051	Slope	1.003139
1.51	1.50	1.0084		
			Intercept	0.003955



Wood Buffalo Environmental Association

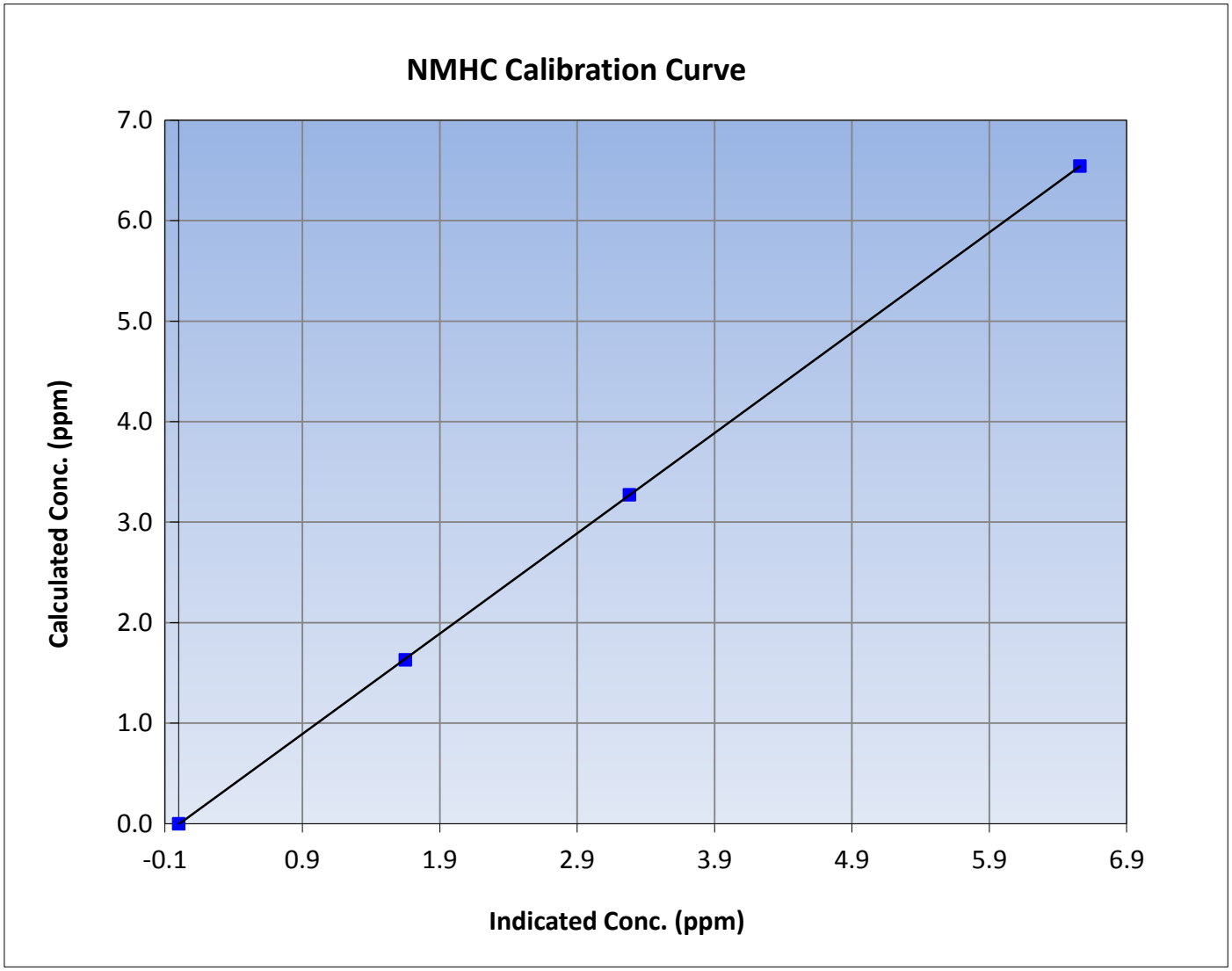
NMHC Calibration Summary

Station Information

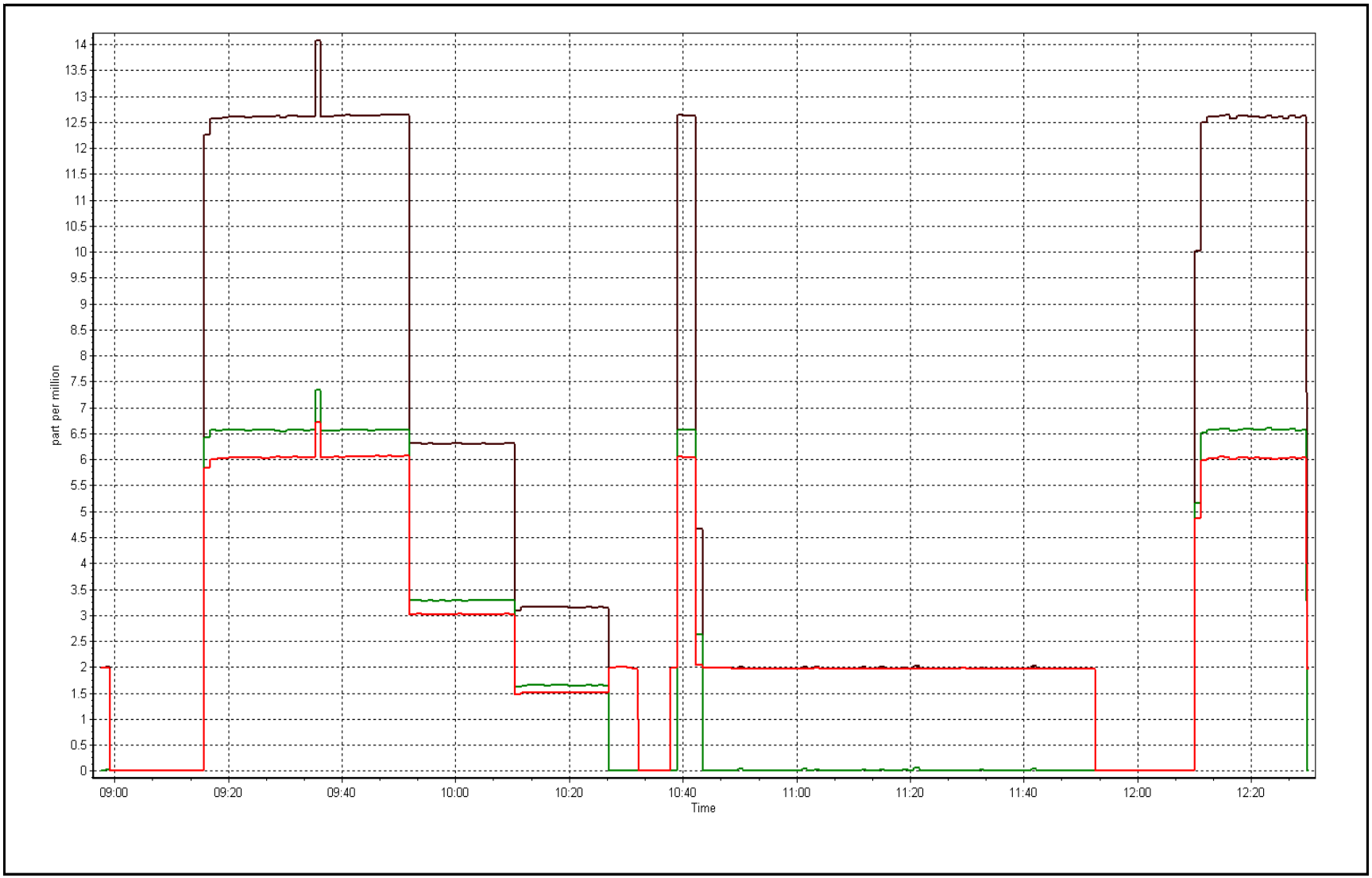
Calibration Date	April 26, 2016	Previous Calibration	March 10, 2016
Station Name	Conklin Lookout	Station Number	AMS 18
Start Time (MST)	8:58	End Time (MST)	12:30
Analyzer make	Thermo 55i	Analyzer serial #	1218153354

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999993
6.54	6.56	0.9974		
3.27	3.28	0.9974	Slope	0.998170
1.63	1.65	0.9879		
			Intercept	-0.006213



THC Calibration Plot Date: April 26, 2016



Wood Buffalo Environmental Association
O_3 Calibration Report

W B E A

Station Information

Calibration Date	April 27, 2016	Previous Calibration	March 11, 2016
Station Name	Conklin Lookout	Station Number	AMS 18
Reason:	Routine		
Start Time (MST)	7:36	End Time (MST)	10:29
NO2 GPT Ref date	April-26-16	Transfer Standard	GPT
		Station temp.	22 Deg C
Calibrator Make/Model	Teledyne API 700	Serial Number	1222
ZAG make/model	Teledyne API 701	Serial Number	5610
DACS make/model	Campbell Scientific CR3000	Serial Number	9305

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 500 ppb		Bench temp.	28.1	27.7
Analyzer IP address	192.168.1.48		Lamp temp.	53.3	53.3
Calculated slope	0.997552	0.995645	Pressure	605.9	618.5
Calculated intercept	0.915894	0.540049	Flow cell A	0.686	0.681
Analyzer Background	-1.1	-1.2	Flow cell B	0.686	0.694
Analyzer Coefficient	1.114	1.174	Cell A Intensity	72876	72592
			Cell B Intensity	69207	69637

Analyzer make	Thermo 49i	Analyzer serial #	1501663733

Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator Lamp Intensity	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.00	0.0	-1.7	----
as found span	5000	757.00	381.6	358.0	1.066
calibrator zero	5000	0.00	0.0	0.0	----
high point	5000	757.00	381.6	381.8	0.999
second point	5000	520.00	254.2	257.2	0.988
third point	5000	270.00	134.6	132.6	1.015
as left zero	5000	0.00	0.0	0.7	----
as left span	5000	757.00	381.6	383.6	0.995
				Average Correction Factor	1.001

Corrected As found	359.7	Previous response	381.6	% change	6.1%

Notes:

No maintenance done, filter changed out, span adjusted; diagonstics are similar to last month.

Calibration Performed By: Melissa Lemay

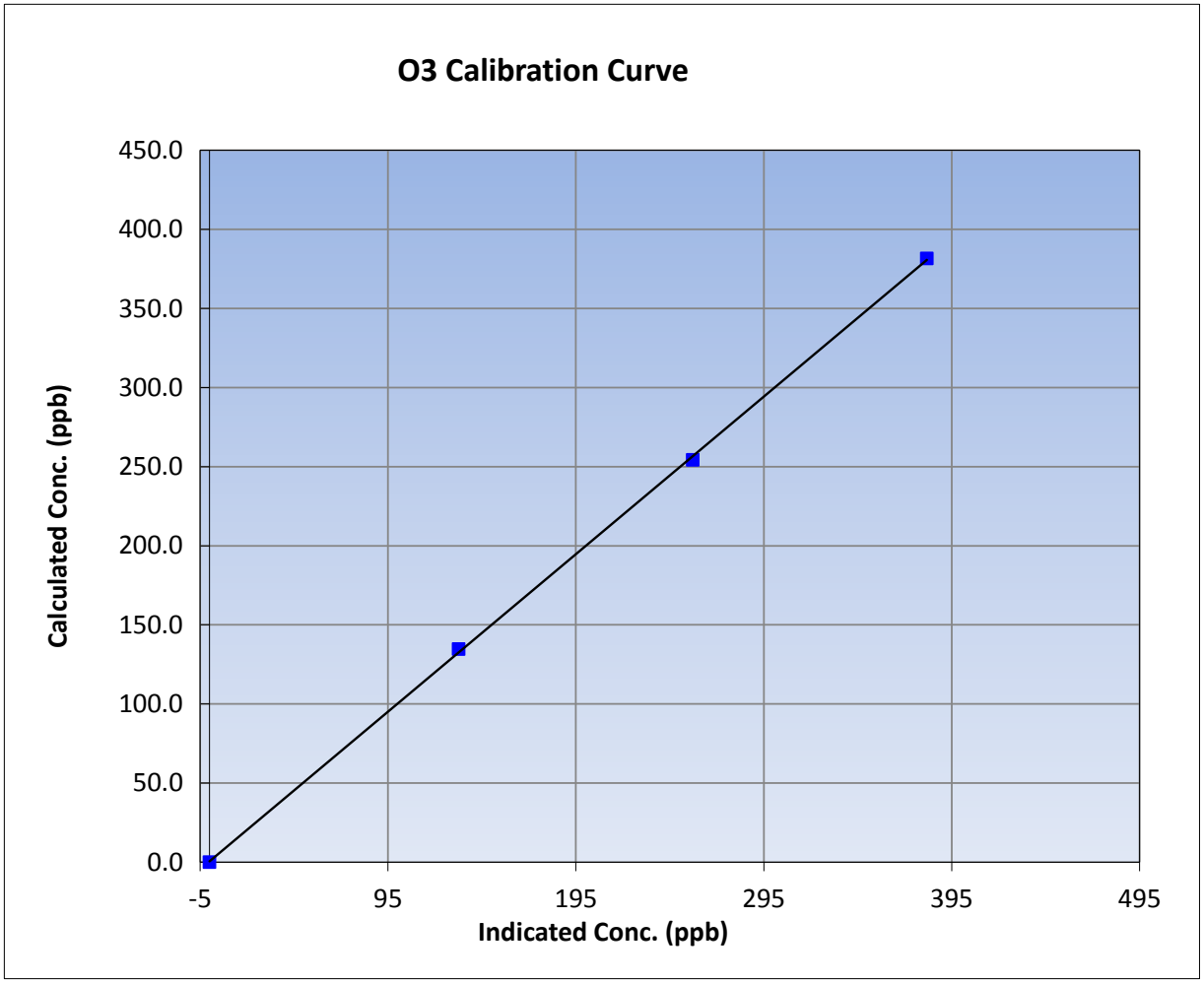
Wood Buffalo Environmental Association
O3 Calibration Report

Station Information

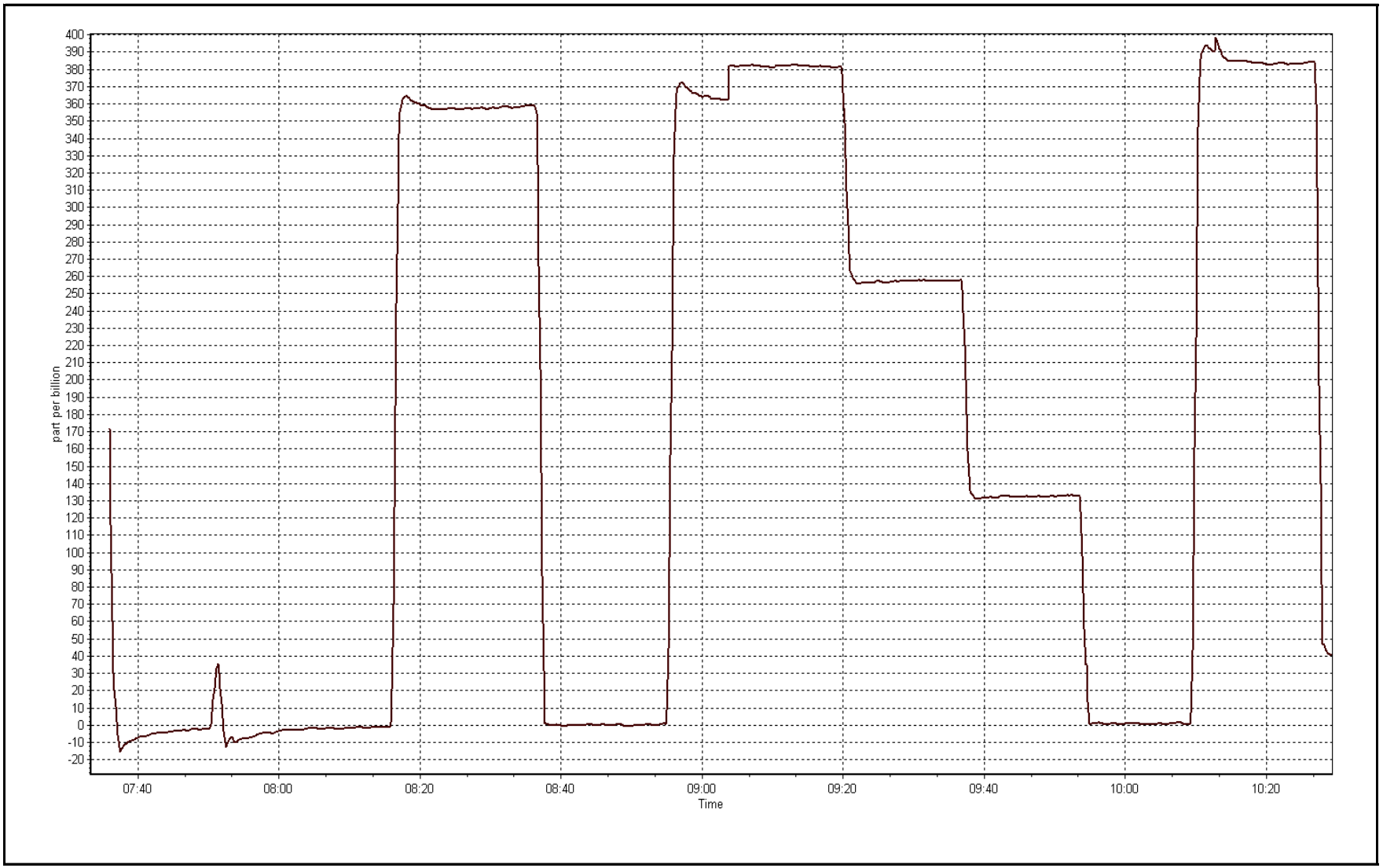
Calibration Date	April-27-16	Previous Calibration	March 11, 2016
Station Name	Conklin Lookout	Station Number	AMS 18
Start Time (MST)	7:36	End Time (MST)	10:29
Analyzer make	Thermo 49i	Analyzer serial #	1501663733

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999861
381.6	381.8	0.9995		
254.2	257.2	0.9883	Slope	0.995645
134.6	132.6	1.0151		
			Intercept	0.540049



O3 Calibration Plot Date: April 27, 2016



Wood Buffalo Environmental Association
NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	April 26, 2016	Previous Calibration	March 10, 2016
Station Name	Conklin Lookout	Station Number	AMS 18
Reason:	Routine		
Start Time (MST)	8:58	End Time (MST)	12:30
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	1.000220	0.999865	1.001397
	Data Offset	-0.682761	-0.164611	0.835034
Current Calibration	Data Slope	1.002345	1.003148	0.999229
	Data Offset	0.036097	0.377666	0.248333

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1336160088

Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
Analyzer IP	192.168.1.42		192.168.1.42	
NO coefficient	1.005		1.005	
NOX coefficient	0.997		0.997	
NO2 coefficient	0.999		0.999	
NO bkgrnd	1.8		1.8	
NOX bkgrnd	1.9		1.9	
Chamber Temp	50	Deg C	50.2	Deg C
Moly Temp	326	Deg C	326.6	Deg C
PMT voltage	-814	V	-814	V
PMT Temp	-3.1	Deg C	-2.7	Deg C
O3 flow	Ok	ccm	Ok	ccm
R Cell press NO	150.9	mmHg	153.6	mmHg
R Cell Press Nox	150.6	mmHg	153.6	mmHg
NO sample flow	0.96	lpm	0.972	lpm
Nox sample Flow	0.956	lpm	0.972	lpm

Notes:

No maintenance or adjustments done, filter changed out

Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: April 26, 2016 Station Number: AMS 18

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.3	0.0	----	----
as found span	5000	58.6	600.1	600.1	0.0	598.4	597.7	0.1	1.0028	1.0040
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.3	0.0	----	----
high point	5000	58.6	600.1	600.1	0.0	598.4	597.7	0.1	1.0028	1.0040
second point	5000	29.3	300.0	300.0	0.0	299.7	299.1	0.6	1.0011	1.0031
third point	5000	14.6	149.5	149.5	0.0	149.2	148.3	0.9	1.0020	1.0081
as left zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.2	0.0	----	----
as left span	5000	58.6	600.1	217.8	382.3	600.8	212.1	388.7	0.9988	1.0269
								Average Correction Factor	1.0020	1.0051

Corrcted As found NO_X= 598.7 NO= 598.0 Percent Change NO_X= 0.3% NO= 0.4%

Previous Response NO_X= 600.6 NO= 600.3

GPT Calibration Data

Dilution Flow (total) 5000 ccm Source Gas Flow 58.60 ccm NOX ref calc conc = 600.1 ppb NO ref calc conc = 600.1 ppb

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
1st NO ref point		0.0	599.4	599.4	0.0	1.0011	1.0011	----	----
1st NO2 (300)	217.8	381.6	599.7	217.8	381.9	1.0006	----	0.9992	100.1%
2nd NO2 (200)	345.2	254.2	599.0	345.2	253.9	1.0018	----	1.0012	99.9%
3rd NO2 (100)	464.8	134.6	598.4	464.8	134.2	1.0028	----	1.0030	99.7%
2nd NO ref point		0.0	598.5	599.1	-0.6	1.0026	1.0016	----	----
				Average Correction Factor		1.0019		1.0011	99.9%

Calibration Performed By: Melissa Lemay

Wood Buffalo Environmental Association

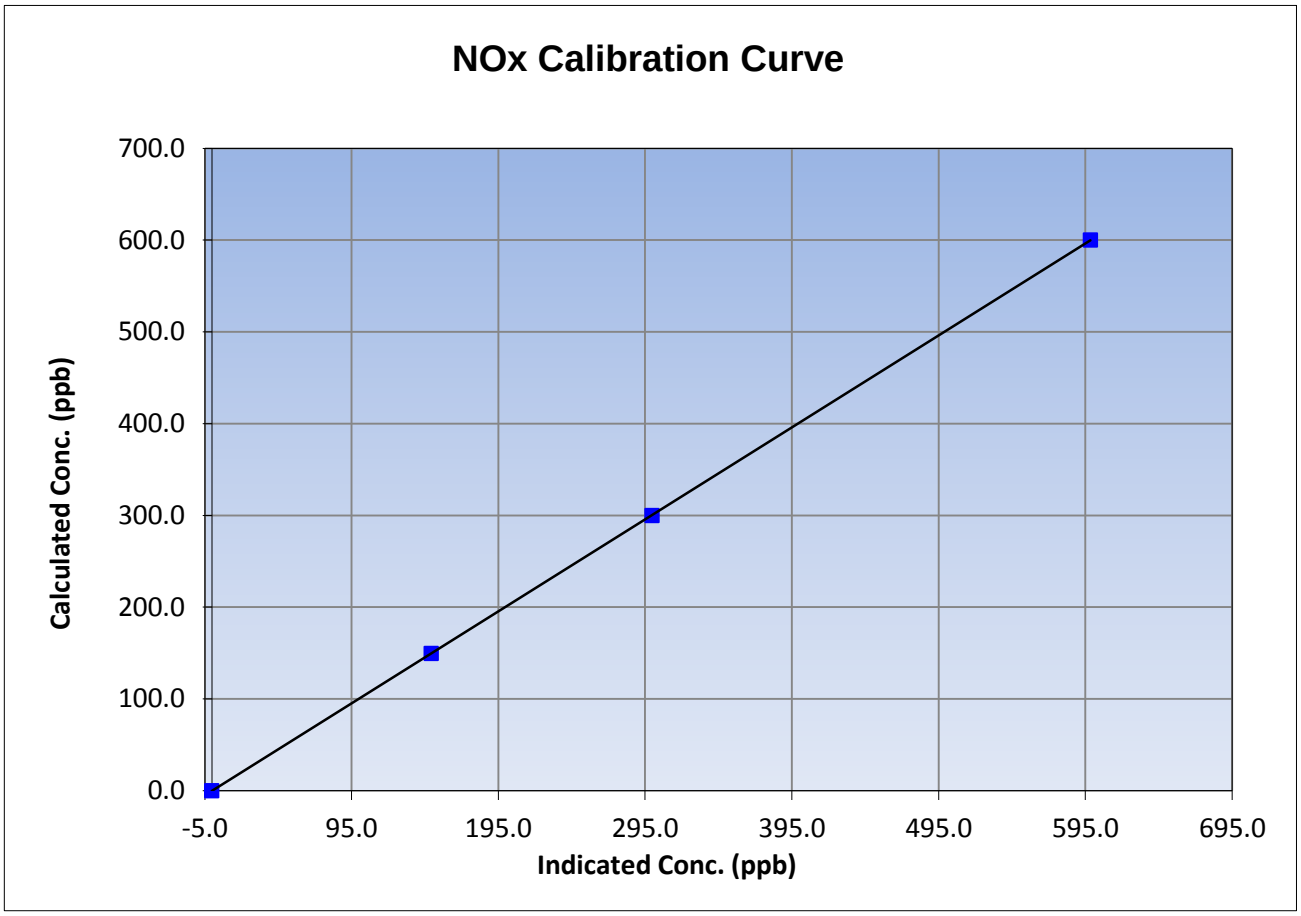
NO_X Calibration Summary

Station Information

Calibration Date	April 26, 2016	Previous Calibration	March 10, 2016
Station Name	Conklin Lookout	Station Number	AMS 18
Start Time (MST)	8:58	End Time (MST)	12:30
Analyzer make	Thermo 42i	Analyzer serial #	1336160088

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.3	----	Correlation Coefficient	0.999999
600.1	598.4	1.0028		
300.0	299.7	1.0011	Slope	1.002345
149.5	149.2	1.0020		
			Intercept	0.036097



Wood Buffalo Environmental Association

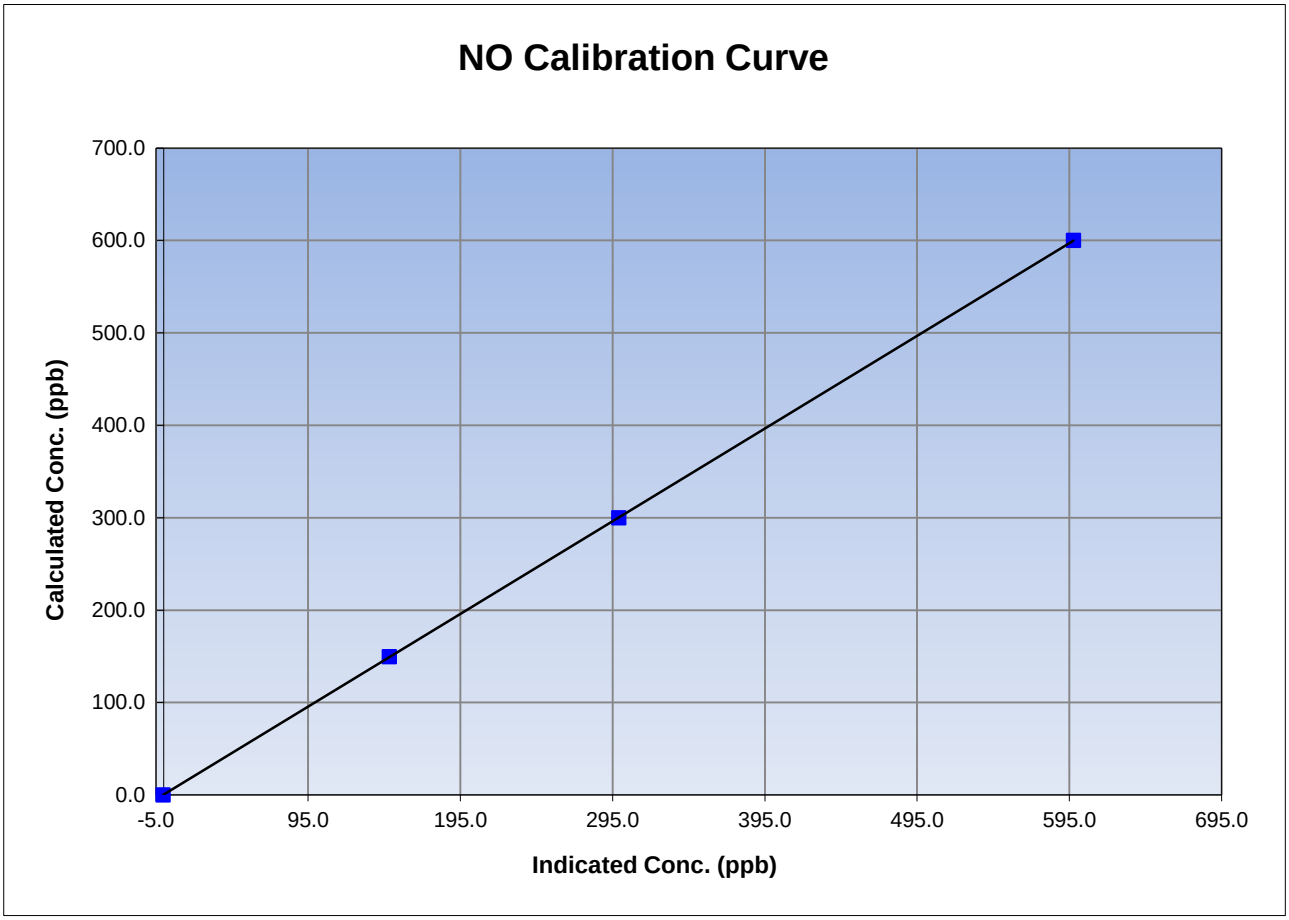
NO Calibration Summary

Station Information

Calibration Date	April 26, 2016	Previous Calibration	March 10, 2016
Station Name	Conklin Lookout	Station Number	AMS 18
Start Time (MST)	8:58	End Time (MST)	12:30
Analyzer make	Thermo 42i	Analyzer serial #	1336160088

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.3	N/A	Correlation Coefficient	0.999998
600.1	597.7	1.0040		
300.0	299.1	1.0031	Slope	1.003148
149.5	148.3	1.0081		
			Intercept	0.377666



Wood Buffalo Environmental Association

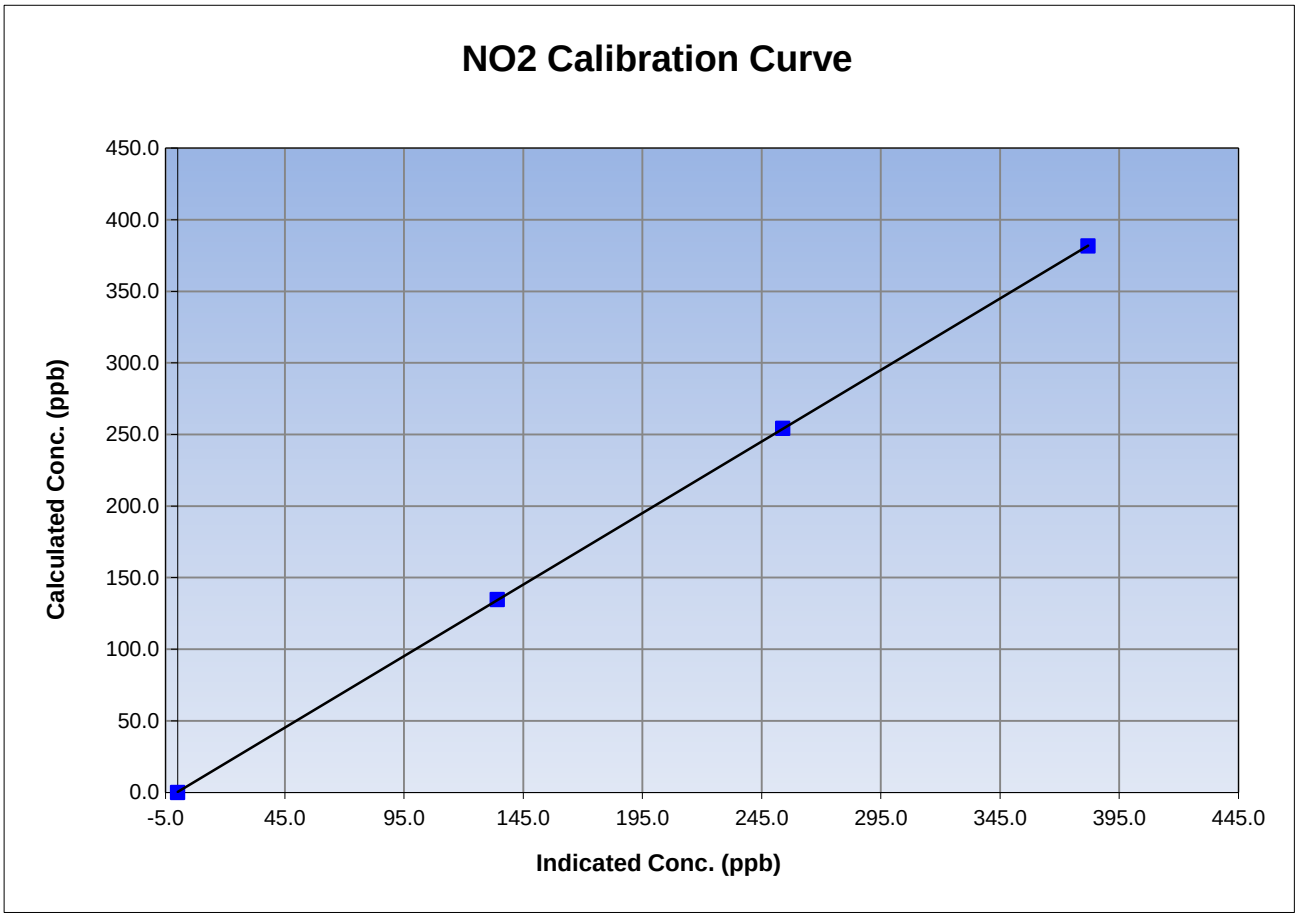
NO_2 Calibration Summary

Station Information

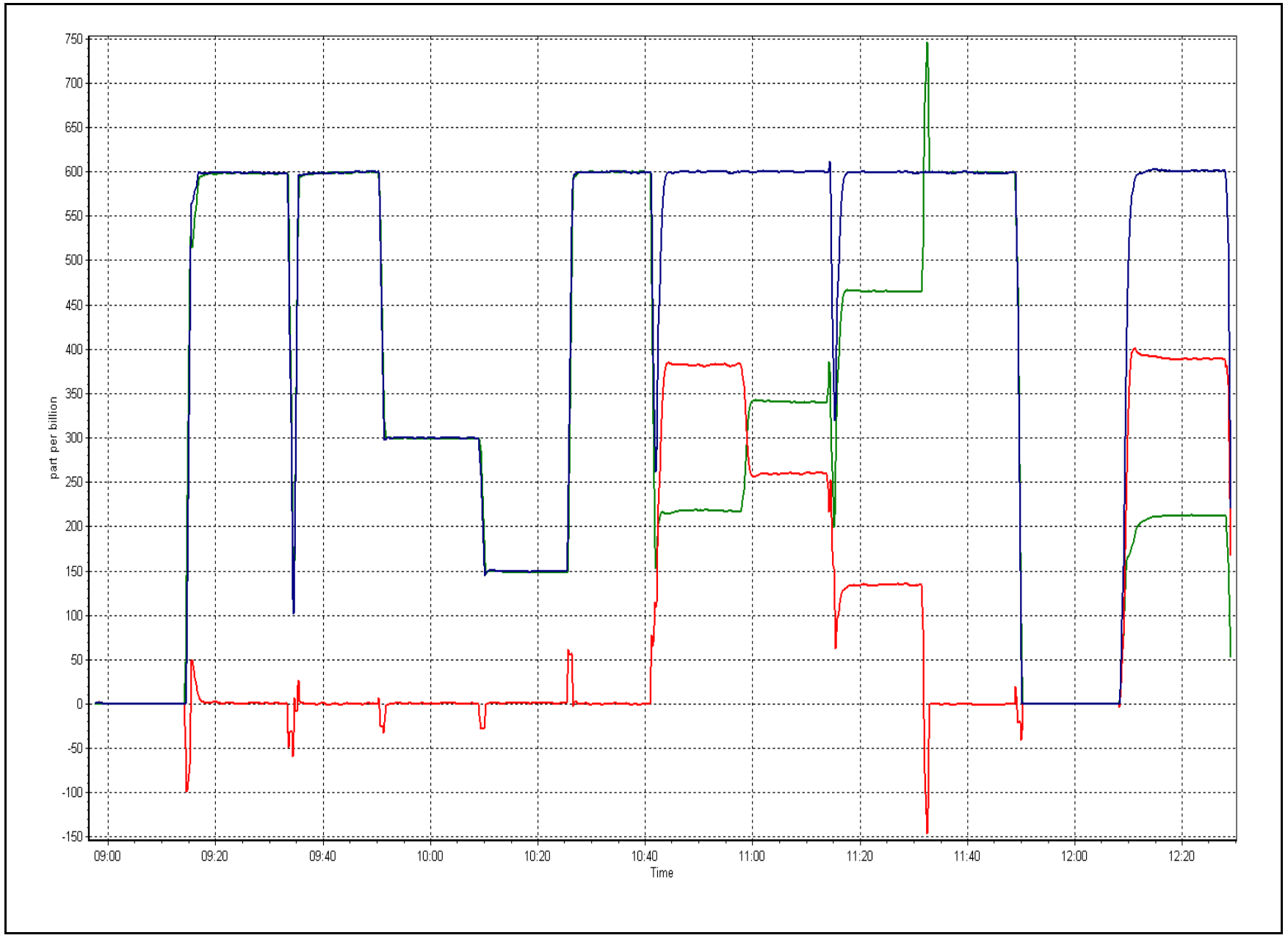
Calibration Date	April 26, 2016	Previous Calibration	March 10, 2016
Station Number	Conklin Lookout	Station Number	AMS 18
Start Time (MST)	8:58	End Time (MST)	12:30
Analyzer make	Thermo 42i	Analyzer serial #	1336160088

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999997
381.6	381.9	0.9992		
254.2	253.9	1.0012	Slope	0.999229
134.6	134.2	1.0030		
			Intercept	0.248333



NOX Calibration Plot Date: April 26, 2016



Wood Buffalo Environmental Association

SHARP CALIBRATION

STATION INFORMATION

Calibration Date:	April 27, 2016	Previous Calibration:	March 13, 2016
Station Name:	Conklin Lookout	Station Number:	AMS 18
Start Time (MST):	7:20	End Time (MST):	7:53
Calibrator Make/Model:	Delta Cal	Calibrator Serial Number:	1450

SHARP INFORMATION

Particulate Fraction:	PM2.5							
Make/Model:	Thermo / SHARP 5030							
Serial Number	E-781							
C_{14} Source SN:								
Confirmation of Time settings:	Yes ☑	No ☐						
Paremeters Checked:	T1 ☑	T2 ☐	T3 ☐	T4 ☐	P3 ☑	Main Flow ☑	Beta ☐	Neph ☑

CALIBRATION DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	4.0	4.7	0.7	4.0
T2	21.0	na	na	21.0
T3	29.0	na	na	29.0
T4	19.0	na	na	19.0
RH (%)	25.0	na	na	25.0

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	941	936.0	-5.0	941

Main Flow (Lph)

Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
1000	1005	5	1005	1000

Nephalometer Calibration

Parameter	As Founds	Zeroed (Limit +or- 2.0ug/m3)	As Left
Analog	297		297
Neph	1.5		1.5
C14	1.2		1.2
Indicated Concentration (ug/m3)	**0.6**	**No**	**0.6**
Offset 1			
Offset 2			

Leak Check (Quarterly)

Leak Check Date:	March 13, 2016	Previous Leak Check Date:	February 18, 2016

	Measured	Difference LPM (Limit +/- 0.42 LPM)
Flow without adaptor (LPM):	16.70	0.16
*Flow with adaptor (LPM):	16.54	

**Note - do not attach adaptor without shutting off the pump first*

Mass Foil Calibration (Annualy)

Foil Calibration Date:	March 13, 2015	Previous Foil Calibration:	June 30, 2015
Zeroed?:	Yes		
Foil Mass:	1337	Mass foil set S/N:	5872
Previous Correction Factor:	7050		
New Correction Factor:	7027		

INSPECTION DATA

Item	Condition	Date of install or rebuild
Cyclone	Good / cleaned	Apr 27,2016
Pump	Good	Jun 30,2015
Filter Tape	Good	Jun 30,2015
Mass Foil Cal Set	na	NA
HEPA filter	Good	Jun 30,2015

NOTES:

No adjustments done, Sample head cleaned

Calibration Performed By: **Melissa Lemay**

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 19
SUNCOR FIREBAG
APRIL 2016

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

May 27, 2016

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FIREBAG (AMS 19)
APRIL 2016
MONTHLY SUMMARY for
AMD SECTION III.B.1(c)

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	686	34	34	100.00	20	0	2	0
H2S (ppb) Average	687	33	33	100.00	1	0	0	0
THC (ppm) Average	686	34	34	100.00	2.4	-	2.2	-
NO2 (ppb) Average	686	34	34	100.00	34	0	6	-
NO (ppb) Average	686	34	34	100.00	14	-	2	-
NOX (ppb) Average	686	34	34	100.00	49	-	7	-
Temperature 2 m (C) Average	720	0	0	100.00	22.9	-	15.7	-
Relative Humidity (%) Average	720	0	0	100.00	100	-	93	-
Wind Speed 10 m (km/h) Average	685	0	35	95.14	36	-	26	-
Wind Direction 10 m (deg) Average	685	0	35	95.14	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FIREBAG (AMS 19)
APRIL 2016

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	0.4	1	-	0	0	0	0	0	1	20
H2S (ppb) Average	687	0.2	0	-	0	0	0	0	0	0	1
THC (ppm) Average	686	2.18	0	-	2.1	2.1	2.2	2.2	2.2	2.2	2.4
NO2 (ppb) Average	686	1.9	2	-	0	0	1	1	2	4	34
NO (ppb) Average	686	0.4	1	-	0	0	0	0	0	1	14
NOX (ppb) Average	686	2.3	3	-	0	0	1	1	3	5	49
Temperature 2 m (C) Average	720	1.67	7.8	-	-15.3	-8.5	-4.1	1.4	6.5	13	22.9
Relative Humidity (%) Average	720	59.7	22	-	16	29	41	60	79	89	100
Wind Speed 10 m (km/h) Average	685	15.5	7	-	0	8	11	15	19	26	36
Wind Direction 10 m (deg) Average	685	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FIREBAG (AMS 19)
APRIL 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
Wind Speed, Wind Direction	13 Apr 2016 23:00	15 Apr 2016 09:00	35	Flat line in sensor output signal - sensor frozen

Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO_2) - ppb

Firebag - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 20 ppb on Apr 22 22:00 Maximum Daily Average: 2.1 ppb on Apr 22

Minimum Value: 0 ppb on Apr 6 17:00 Minimum Daily Average: 0.1 ppb on Apr 8
Maximum Diurnal Average: 1.1 ppb at hour 22 Minimum Diurnal Average: 0.2 ppb at hour 24
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:	720
Hours of Data:	686
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-Apr	2	2	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0.6	2
2-Apr	0	0	0	Z	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	1	3	1	0.5	3
3-Apr	0	0	2	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2
4-Apr	0	1	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	1	0	3	3	2	0	0	0.6	3
5-Apr	Z	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-Apr	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
7-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
8-Apr	0	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
9-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
10-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0.4	2
11-Apr	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0.2	1
12-Apr	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0.3	2
13-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0.3	2
14-Apr	0	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
15-Apr	0	0	0	0	Z	0	0	0	0	1	8	1	0	0	0	0	0	0	0	0	0	0	0	0	0.5	8
16-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	1	1	0	0.4	1
17-Apr	Z	1	0	0	0	0	0	0	0	0	0	0	1	3	1	0	1	1	0	0	1	1	1	0	0.6	3
18-Apr	1	Z	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0.3	1
19-Apr	0	0	Z	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
20-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.2	1
21-Apr	0	0	0	0	Z	1	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.4	1
22-Apr	0	1	7	0	0	Z	0	2	4	0	0	0	0	1	2	1	1	1	2	0	0	20	3	0	2.1	20
23-Apr	Z	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
24-Apr	0	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
25-Apr	0	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
26-Apr	0	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
27-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0.4	2
28-Apr	0	0	0	0	0	Z	0	0	1	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.3	1
29-Apr	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
30-Apr	0	Z	0	0	0	0	0	0	1	1	1	0	1	0	0	1	1	0	0	1	0	0	2	0	0.5	2
	0.3	0.3	0.6	0.3	0.2	0.3	0.3	0.3	0.4	0.2	0.5	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.4	0.3	0.4	1.1	0.6	0.2	Diurnal Average	
	2	2	7	1	1	1	1	2	4	1	8	1	1	3	2	1	1	1	2	3	3	20	3	1	Diurnal Maximum	

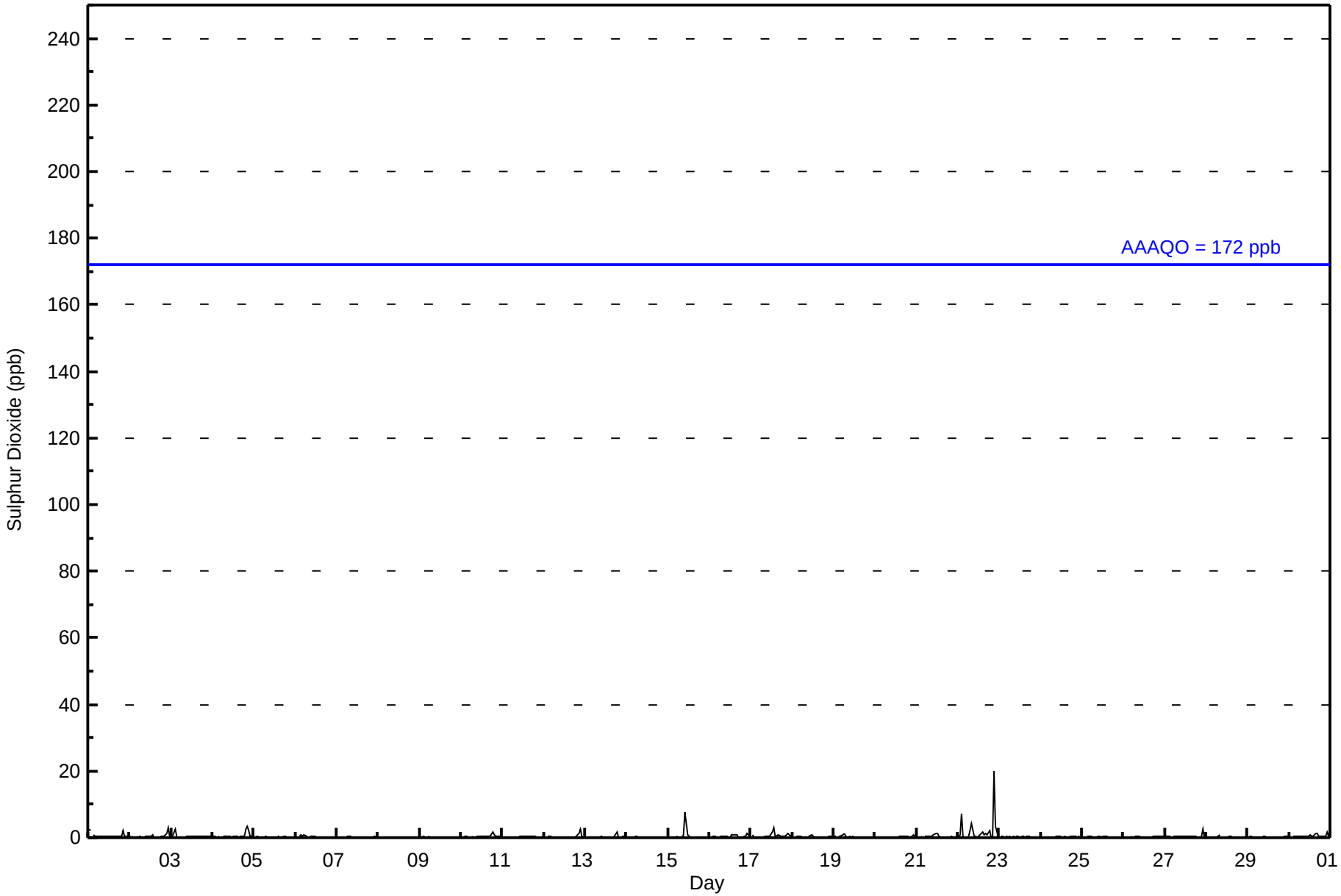
Z - zerospan C - Calibration
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb

Wood Buffalo Environmental Association

Hourly Averages

Sulphur Dioxide (SO_2) - ppb

Firebag - April 2016



Sulphur Dioxide (SO_2) - ppb
Firebag - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	685	99.85	99.85
11 - 20	1	0.15	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

Firebag - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 10	71	32	23	14	27	56	88	68	93	87	21	12	10	8	10	32	652
11 - 20	0	0	0	0	0	1	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	71	32	23	14	27	57	88	68	93	87	21	12	10	8	10	32	653

Total Number of Valid Hours: 653

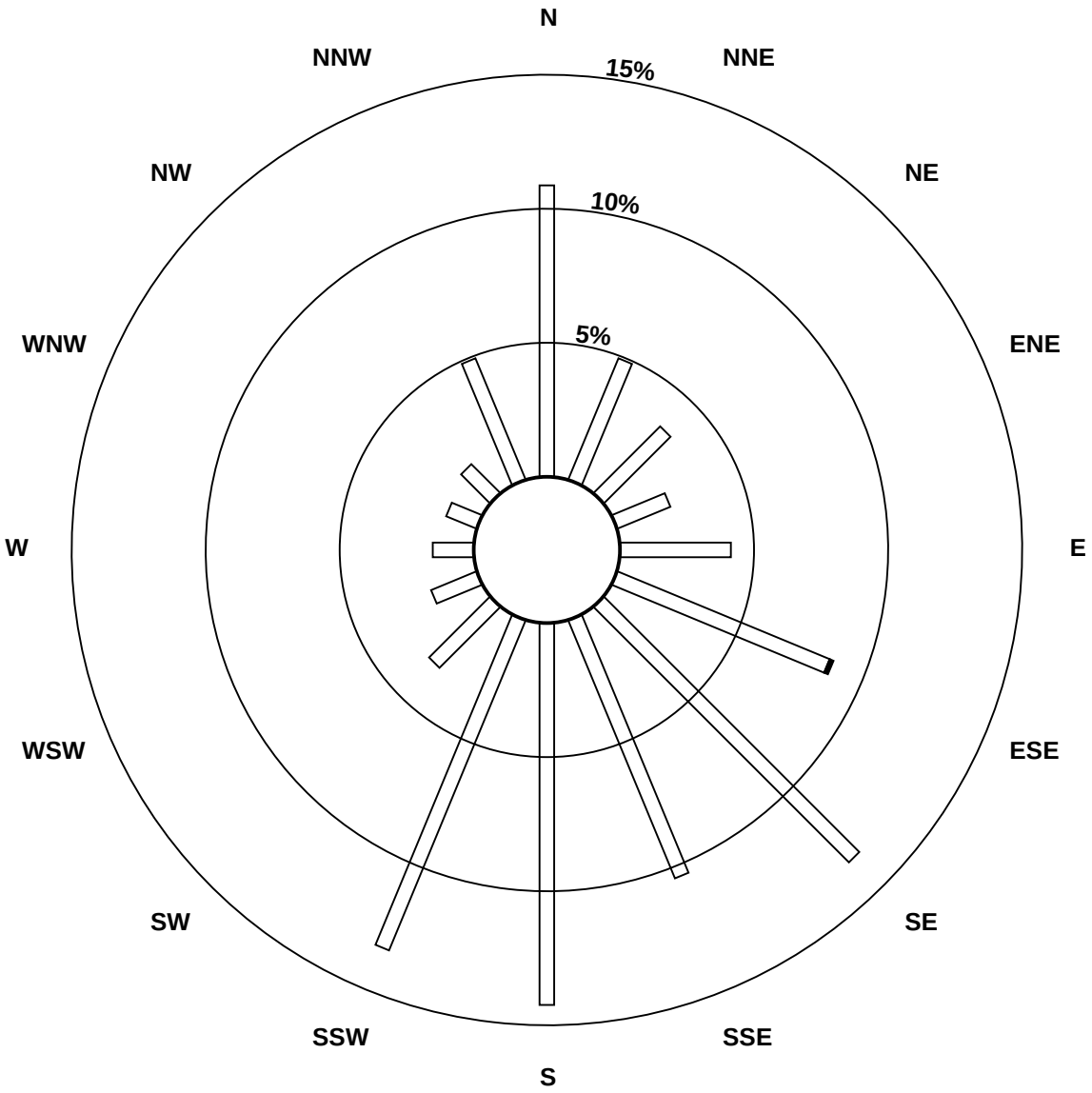
Total Number of Hours: 720

Wood Buffalo Environmental Association

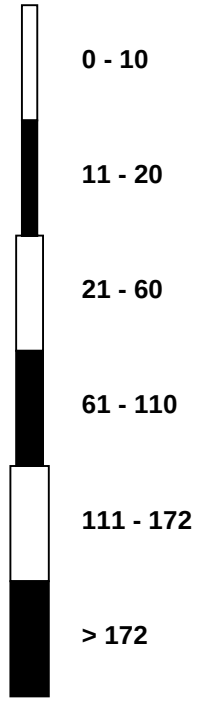
Wind Rose Apr 2016

Sulphur Dioxide (SO_2) - ppb

Firebag (AMS 19)



Classes (ppb)



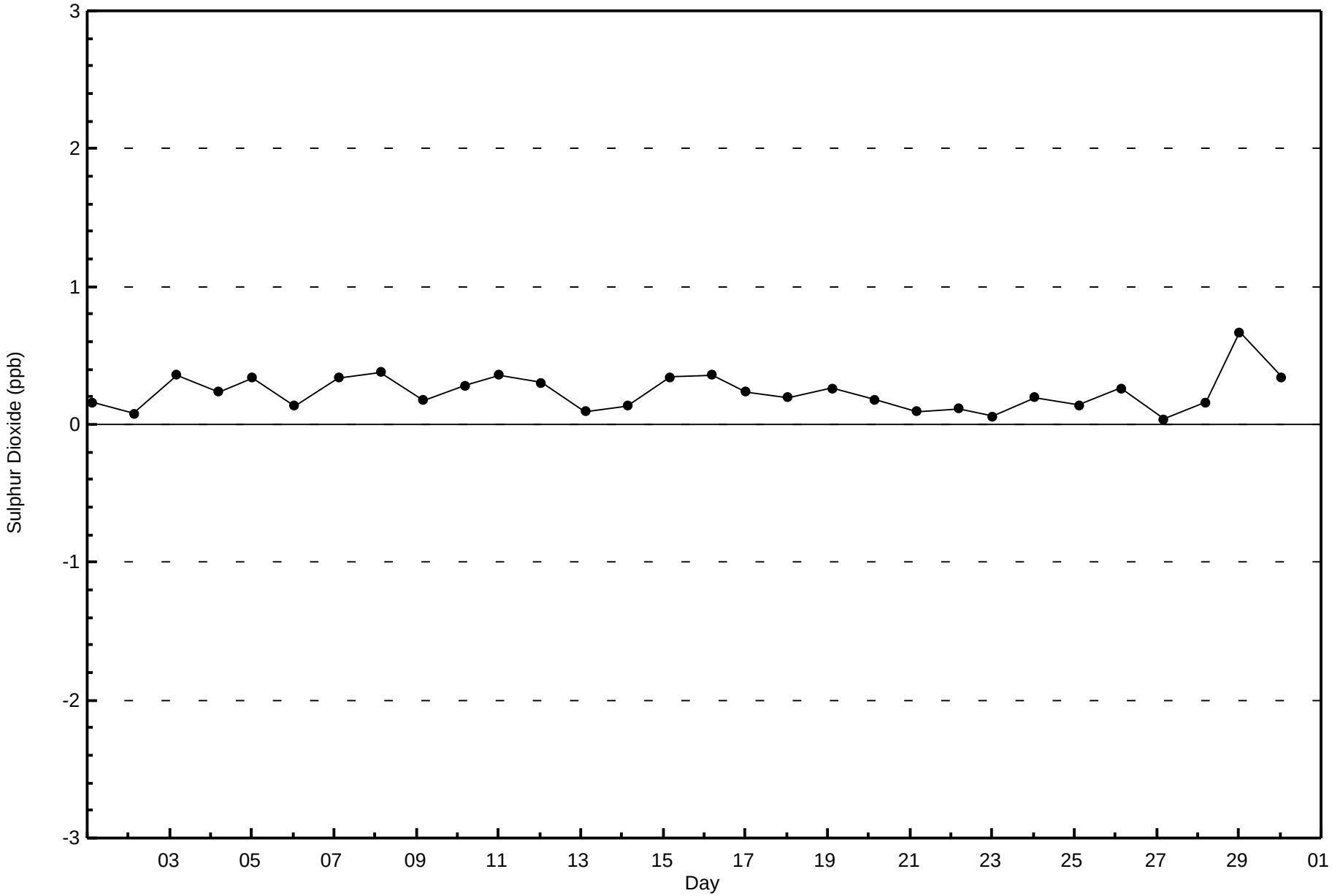
Total Number of Valid Hours: 653

Wood Buffalo Environmental Association

Zero Responses

Sulphur Dioxide (SO_2) - ppb

Firebag - April 2016

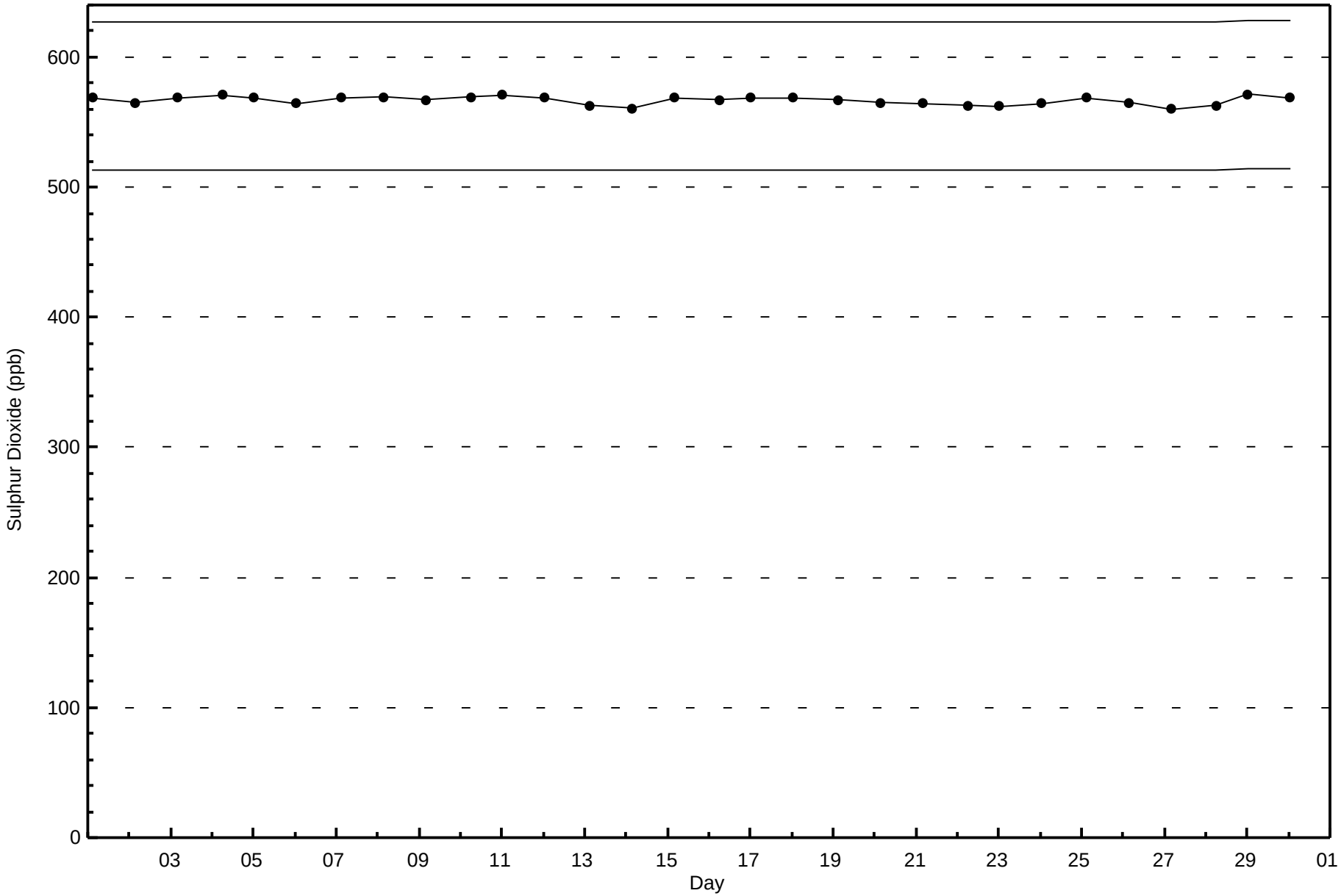


Wood Buffalo Environmental Association

Span Responses

Sulphur Dioxide (SO_2) - ppb

Firebag - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Hydrogen Sulphide (H_2S) - ppb

Firebag - April 2016

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

Maximum Value: 1 ppb on Apr 27 22:00 Maximum Daily Average: 0.4 ppb on Apr 1

Minimum Value: 0 ppb on Apr 10 05:00 Minimum Daily Average: 0.1 ppb on Apr 10

Maximum Diurnal Average: 0.3 ppb at hour 22 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:	720
Hours of Data:	687
Hours of Missing Data:	33
Hours of Calibration:	33
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-Apr	0	0	0	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.4	1
2-Apr	0	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-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.2	1
4-Apr	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0.3	1
5-Apr	0	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-Apr	0	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-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.3	1
8-Apr	0	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-Apr	0	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-Apr	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
11-Apr	0	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-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0.2	1
13-Apr	0	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-Apr	0	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-Apr	0	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-Apr	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-Apr	0	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-Apr	0	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-Apr	0	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-Apr	0	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-Apr	0	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-Apr	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
23-Apr	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
24-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
25-Apr	0	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-Apr	0	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-Apr	0	0	0	0	0	Z	0	0	0	0	0	C	C	C	0	0	0	0	0	0	0	1	1	0	0.3	1
28-Apr	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
29-Apr	0	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
30-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2	Diurnal Average	
	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1	1	0	Diurnal Maximum	

Z - zerospan C - Calibration

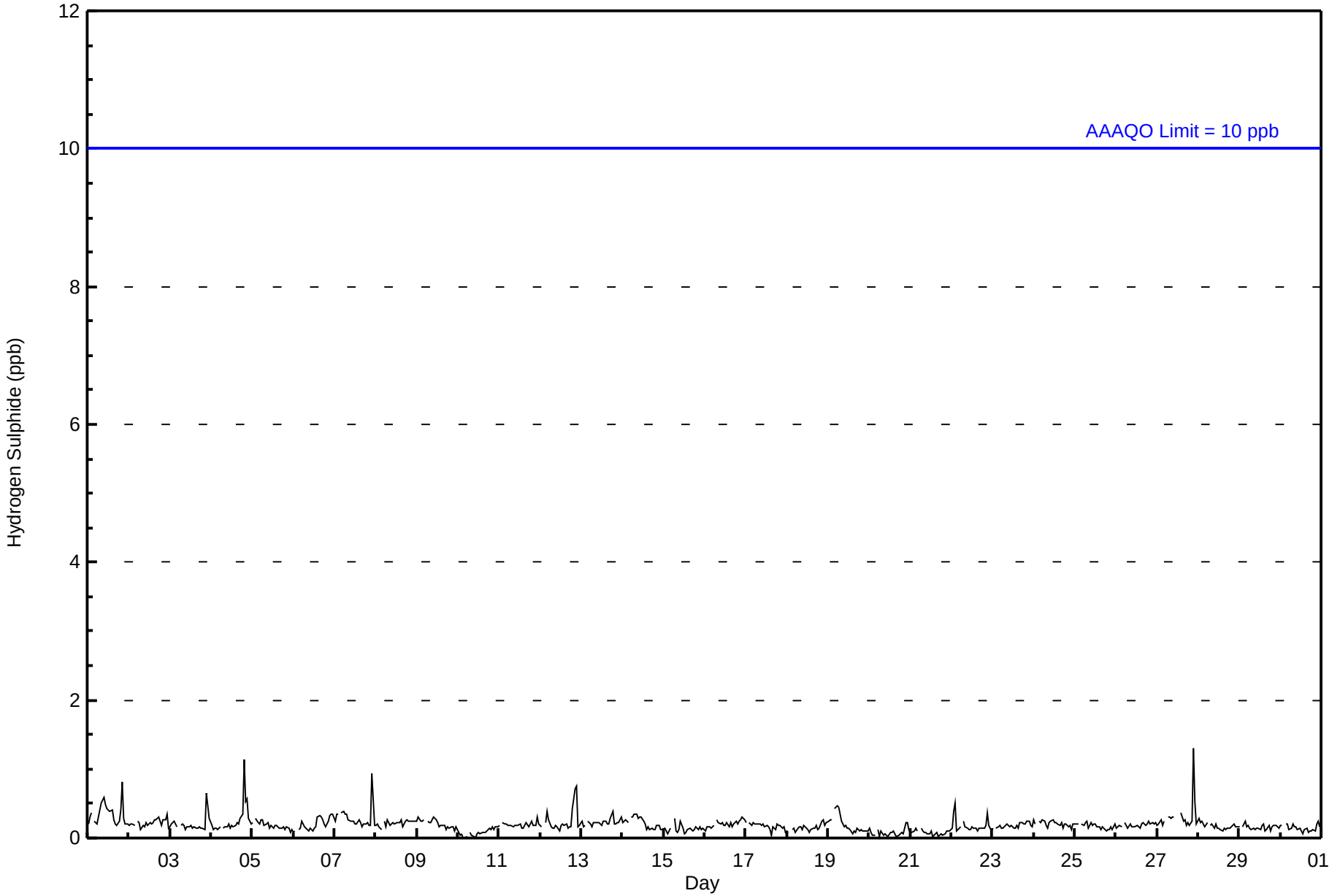
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb

Wood Buffalo Environmental Association

Hourly Averages

Hydrogen Sulphide (H_2S) - ppb

Firebag - April 2016



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Hydrogen Sulphide (H_2S) - ppb

Firebag - April 2016

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

Total Number of Valid Hours: 687

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Hydrogen Sulphide (H_2S) - ppb

Firebag - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 2	68	30	24	14	27	56	89	67	93	95	19	12	10	9	10	31	654
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	68	30	24	14	27	56	89	67	93	95	19	12	10	9	10	31	654

Total Number of Valid Hours: 654

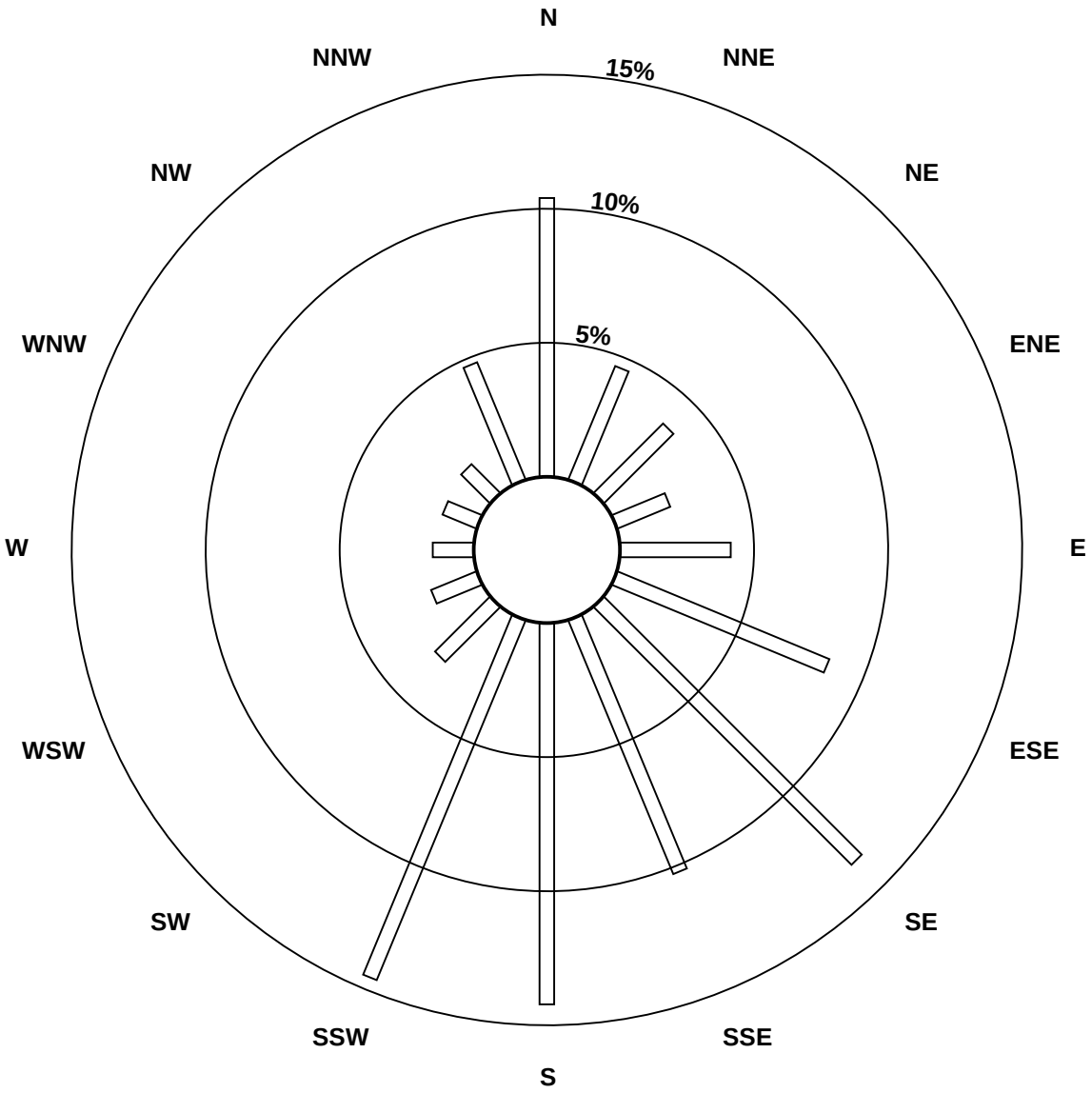
Total Number of Hours: 720

Wood Buffalo Environmental Association

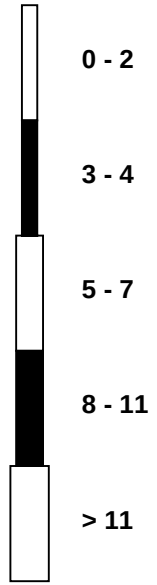
Wind Rose Apr 2016

Hydrogen Sulphide (H_2S) - ppb

Firebag (AMS 19)



Classes (ppb)



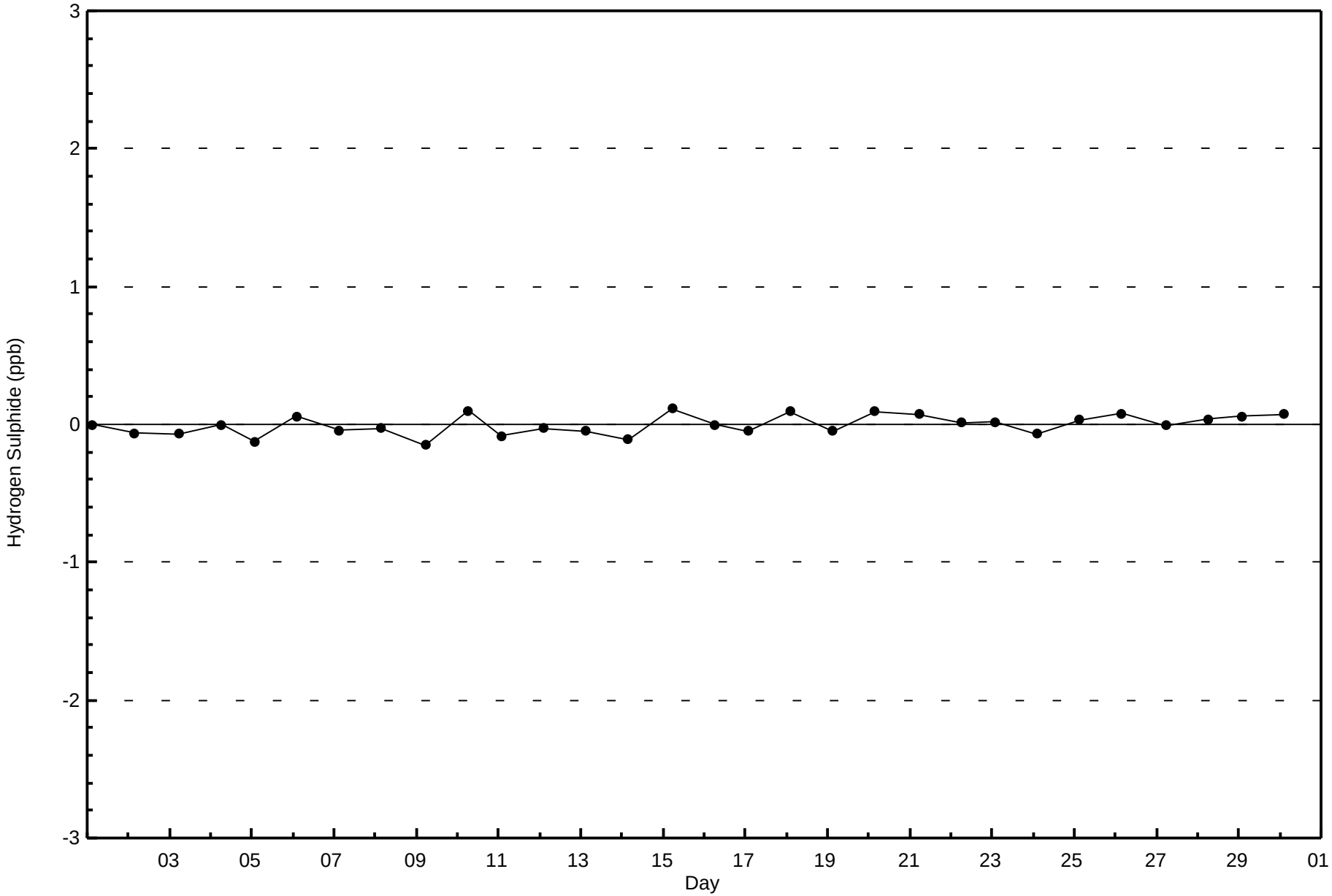
Total Number of Valid Hours: 654

Wood Buffalo Environmental Association

Zero Responses

Hydrogen Sulphide (H_2S) - ppb

Firebag - April 2016

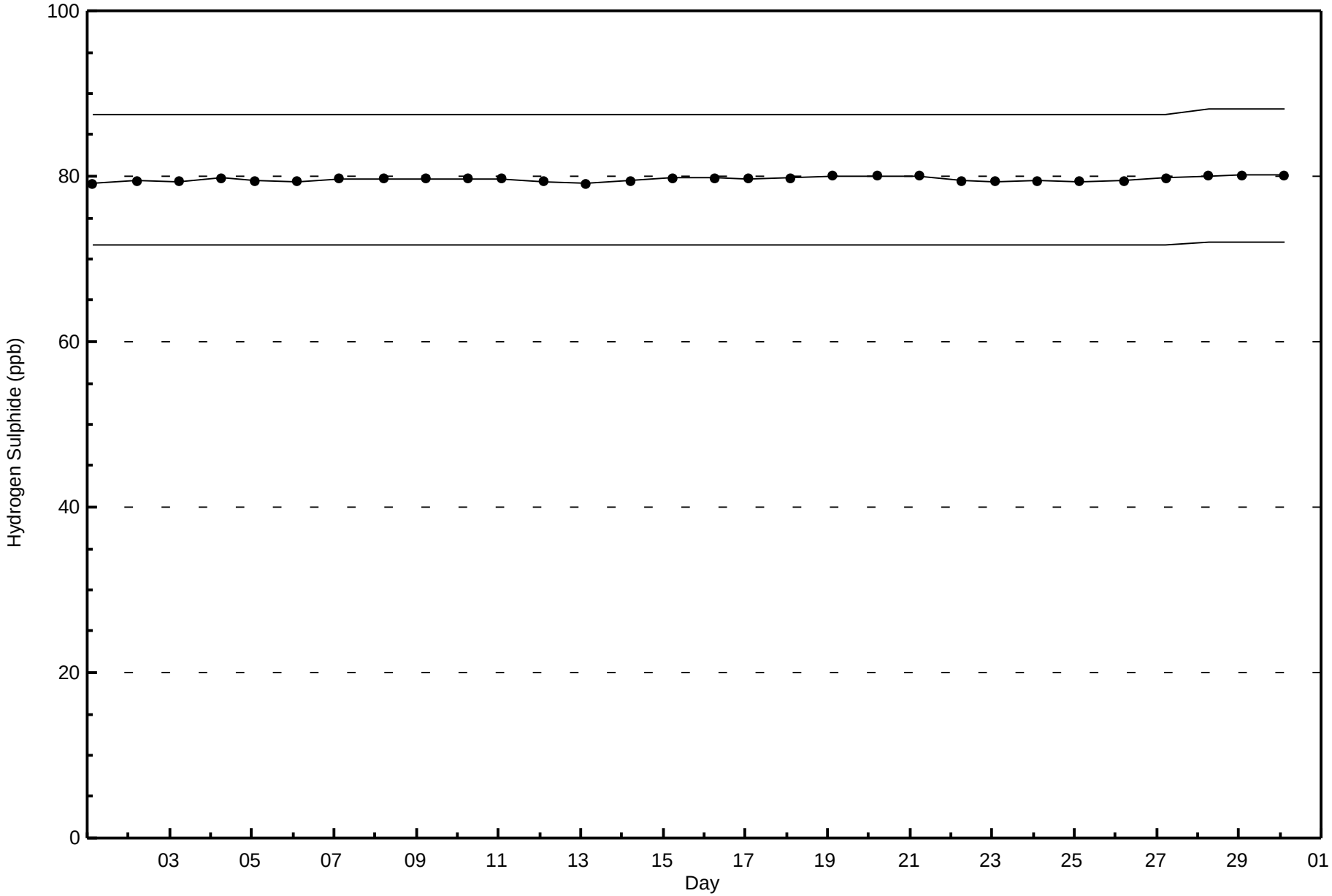


Wood Buffalo Environmental Association

Span Responses

Hydrogen Sulphide (H_2S) - ppb

Firebag - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Firebag - April 2016

Maximum Value: 2.4 ppm on Apr 27 22:00

Maximum Daily Average: 2.2 ppm on Apr 7

Minimum Value: 2.1 ppm on Apr 22 18:00

Minimum Daily Average: 2.1 ppm on Apr 24

Maximum Diurnal Average: 2.2 ppm at hour 22

Minimum Diurnal Average: 2.2 ppm at hour 10

Monthly Average: 2.18 ppm

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

Hours in Service:	720
Hours of Data:	686
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-Apr	2.2	2.2	Z	2.3	2.3	2.1	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.3
2-Apr	2.2	2.2	2.2	Z	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2
3-Apr	2.2	2.2	2.2	2.2	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.3	2.2	2.3
4-Apr	2.2	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.4	2.3	2.2	2.2	2.2	2.2	2.4
5-Apr	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2
6-Apr	2.2	Z	2.2	2.2	2.2	2.3	2.2	2.1	2.1	2.2	2.1	2.1	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	2.3
7-Apr	2.2	2.2	Z	2.2	2.3	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.3	2.2	2.2	2.3
8-Apr	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2
9-Apr	2.1	2.1	2.1	2.1	Z	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.1	2.2
10-Apr	2.2	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.3
11-Apr	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.2	2.3
12-Apr	2.2	Z	2.3	2.3	2.4	2.3	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4
13-Apr	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.3
14-Apr	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.3
15-Apr	2.3	2.3	2.3	2.3	Z	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4
16-Apr	2.2	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	2.2	2.2	2.2	2.3	2.2	2.3	2.2	2.2	2.3
17-Apr	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.3
18-Apr	2.2	Z	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.2
19-Apr	2.1	2.1	Z	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.2
20-Apr	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.3
21-Apr	2.3	2.2	2.3	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3
22-Apr	2.1	2.2	2.2	2.1	2.2	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	2.2	2.2	2.2	2.2	2.2	2.2
23-Apr	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2
24-Apr	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2
25-Apr	2.1	2.1	Z	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
26-Apr	2.2	2.2	2.2	Z	2.3	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
27-Apr	2.2	2.2	2.2	2.3	Z	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4	2.3	2.3	2.2	2.4
28-Apr	2.3	2.2	2.2	2.3	2.2	Z	2.1	2.1	2.1	C	C	C	C	2.3	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.3
29-Apr	Z	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.3	2.2	2.2	2.2	2.2	2.3
30-Apr	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	Diurnal Average	
	2.3	2.3	2.3	2.3	2.4	2.4	2.3	2.3	2.3	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.3	2.4	2.3	2.3	Diurnal Maximum	

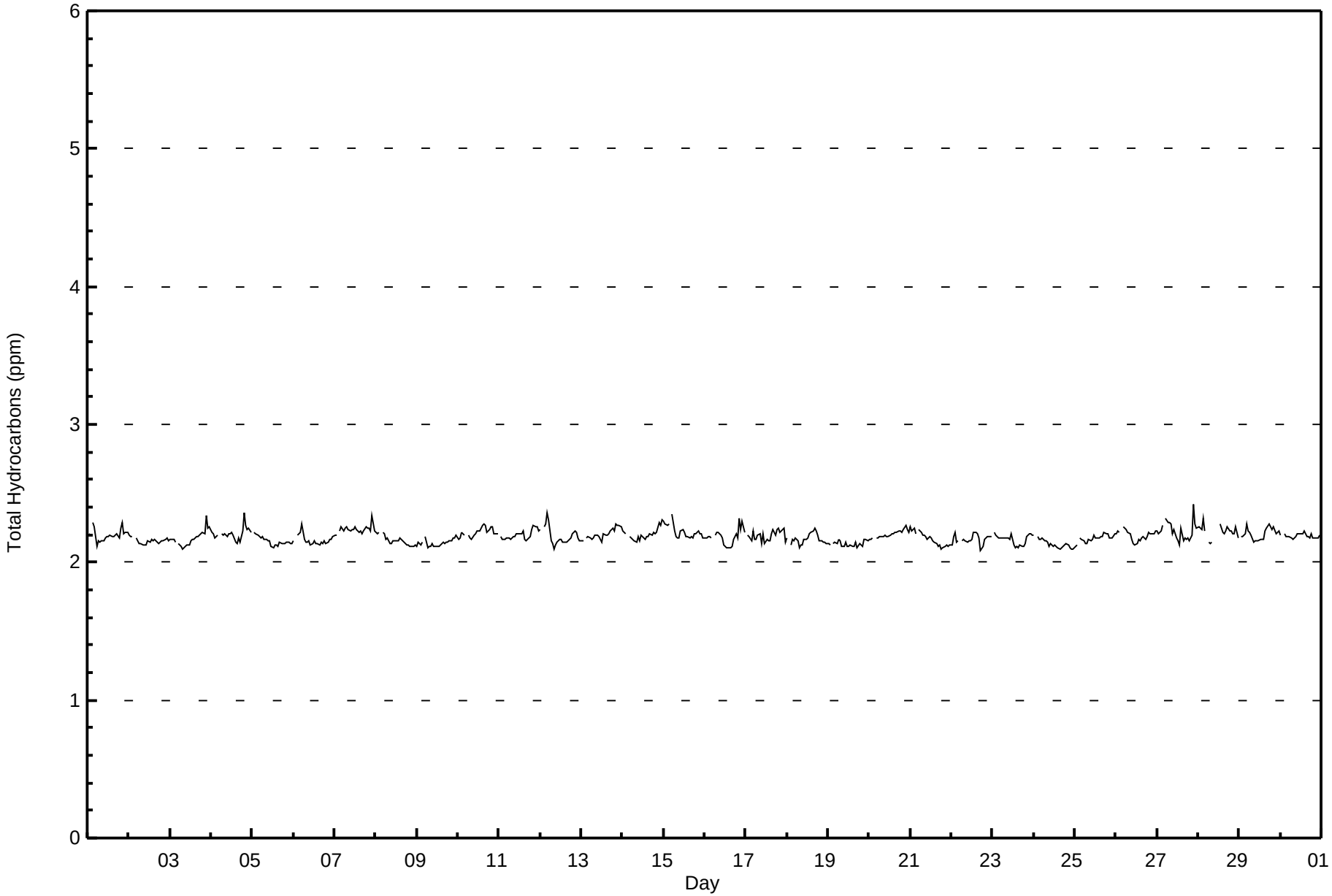
Z - zerospan C - Calibration

Wood Buffalo Environmental Association

Hourly Averages

Total Hydrocarbons (THC) - ppm

Firebag - April 2016



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm

Firebag - April 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	0	0.00	0.00
2.1 - 3.0	686	100.00	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Total Hydrocarbons (THC) - ppm

Firebag - April 2016

Concentration Ranges (ppm)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 2.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.1 - 3.0	71	32	23	14	27	57	88	68	93	87	21	12	10	8	10	32	653
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	71	32	23	14	27	57	88	68	93	87	21	12	10	8	10	32	653

Total Number of Valid Hours: 653

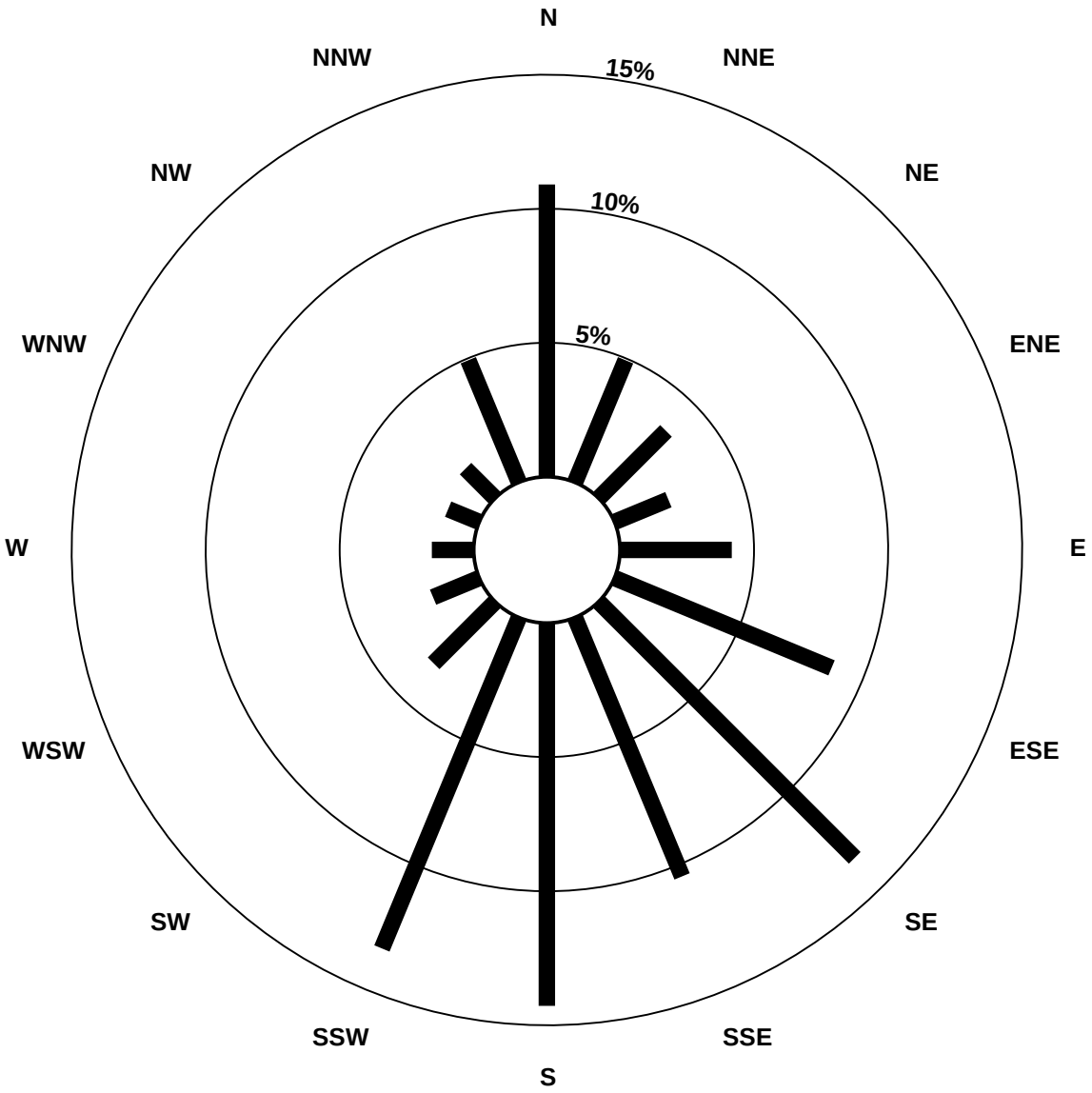
Total Number of Hours: 720

Wood Buffalo Environmental Association

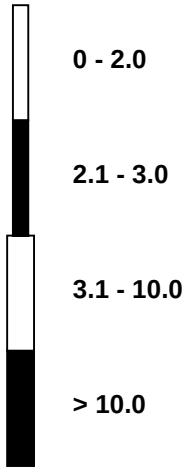
Wind Rose Apr 2016

Total Hydrocarbons (THC) - ppm

Firebag (AMS 19)



Classes (ppm)



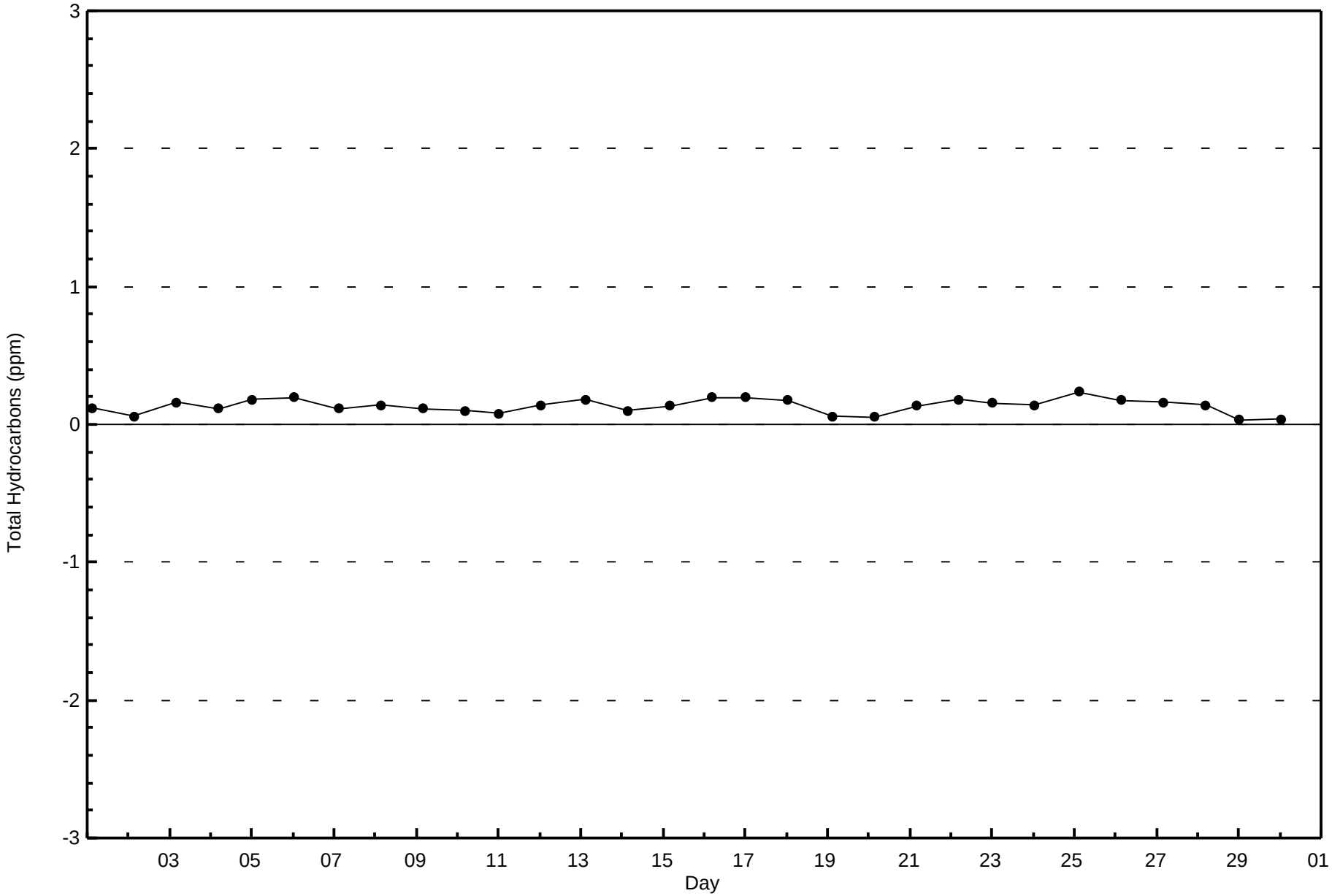
Total Number of Valid Hours: 653

Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Firebag - April 2016

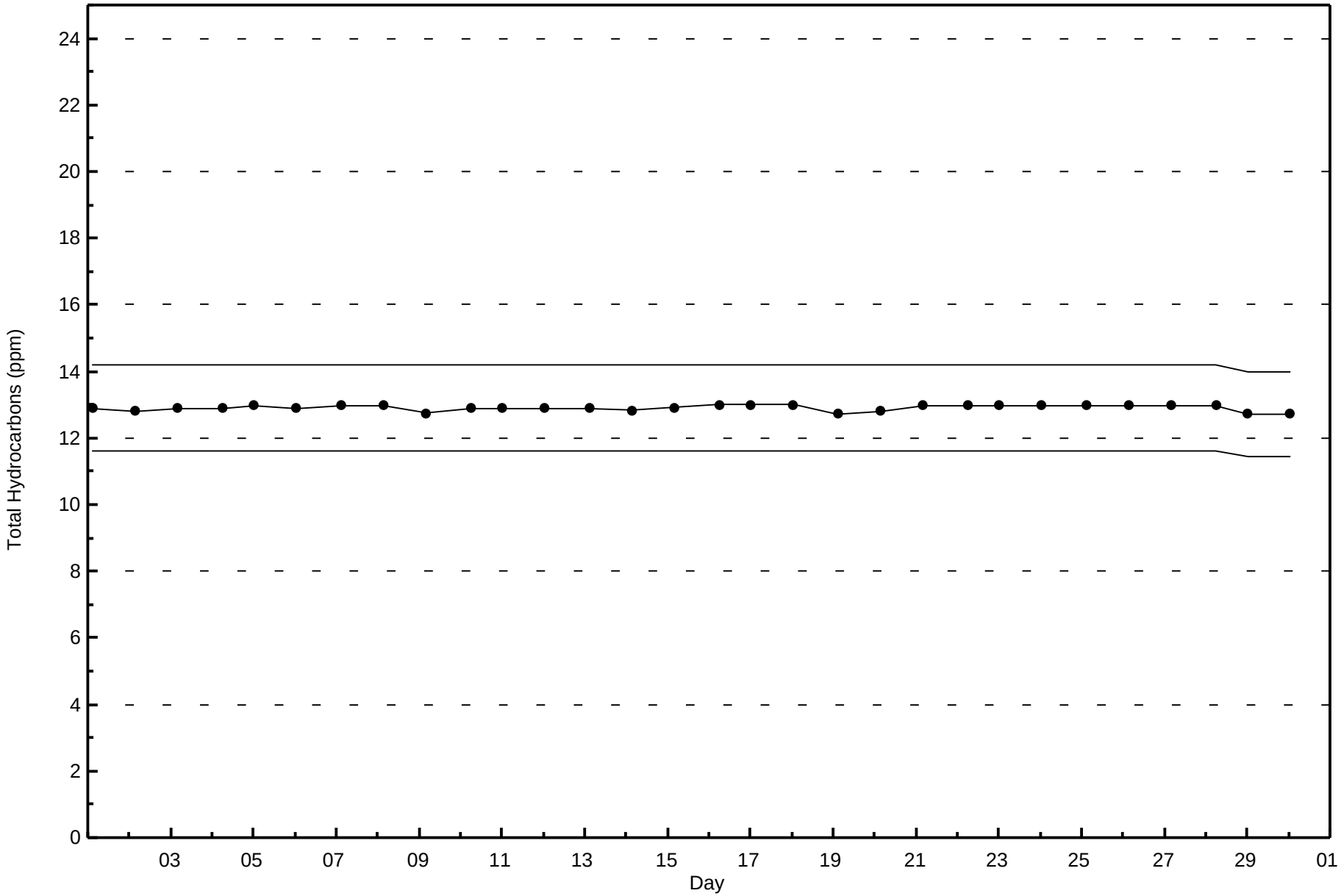


Wood Buffalo Environmental Association

Span Responses

Total Hydrocarbons (THC) - ppm

Firebag - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxide (NO) - ppb

Firebag - April 2016

Maximum Value: 14 ppb on Apr 15 06:00

Maximum Daily Average: 1.8 ppb on Apr 15

Minimum Value: 0 ppb on Apr 3 08:00

Minimum Daily Average: 0.0 ppb on Apr 6

Maximum Diurnal Average: 0.9 ppb at hour 6

Minimum Diurnal Average: 0.2 ppb at hour 23

Monthly Average: 0.4 ppb

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

Hours in Service:	720
Hours of Data:	686
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-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
2-Apr	0	0	0	Z	1	1	0	0	1	0	0	0	0	1	1	0	0	1	0	1	0	0	0	0	0.5	1
3-Apr	0	0	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	2	0.3	2
4-Apr	2	0	1	1	1	Z	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0.5	2
5-Apr	Z	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
6-Apr	0	Z	0	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-Apr	0	0	Z	0	0	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	1	0	1	0.4	1
8-Apr	1	0	0	Z	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	0	0	0.8	2
9-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
10-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	1	0.2	1
11-Apr	Z	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1
12-Apr	0	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
13-Apr	0	0	Z	0	0	0	0	0	0	1	1	1	0	1	2	1	1	1	1	0	0	0	0	0	0.5	2
14-Apr	0	0	0	Z	0	0	0	0	0	0	0	1	9	0	0	2	0	0	0	0	0	0	0	1	0.6	9
15-Apr	0	1	1	2	Z	14	6	1	1	5	4	1	0	0	0	0	0	0	0	1	0	1	0	0	1.8	14
16-Apr	0	0	0	0	1	Z	0	0	1	1	0	0	1	0	1	1	1	0	0	0	0	0	0	0	0.4	1
17-Apr	Z	0	0	0	0	0	0	0	1	0	1	1	1	1	0	0	1	1	1	0	1	0	1	0	0.5	1
18-Apr	0	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
19-Apr	0	0	Z	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
20-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.1	1
21-Apr	0	0	2	1	Z	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2
22-Apr	1	0	0	0	1	Z	0	1	2	1	1	1	0	1	1	1	1	1	0	1	0	0	0	0	0.7	2
23-Apr	Z	0	0	0	1	1	0	1	0	0	2	2	0	0	1	1	1	0	1	0	0	0	0	0	0.5	2
24-Apr	1	Z	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.3	1
25-Apr	0	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
26-Apr	0	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
27-Apr	0	0	0	0	Z	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	2	0	0	0	0.4	2
28-Apr	0	0	0	1	0	Z	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.3	1
29-Apr	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
30-Apr	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0.2	1
	0.3	0.2	0.3	0.3	0.4	0.9	0.5	0.4	0.4	0.5	0.5	0.3	0.6	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.4	0.2	0.3	Diurnal Average	
	2	1	2	2	1	14	6	1	2	5	4	2	9	1	2	2	1	1	1	1	2	1	1	2	Diurnal Maximum	

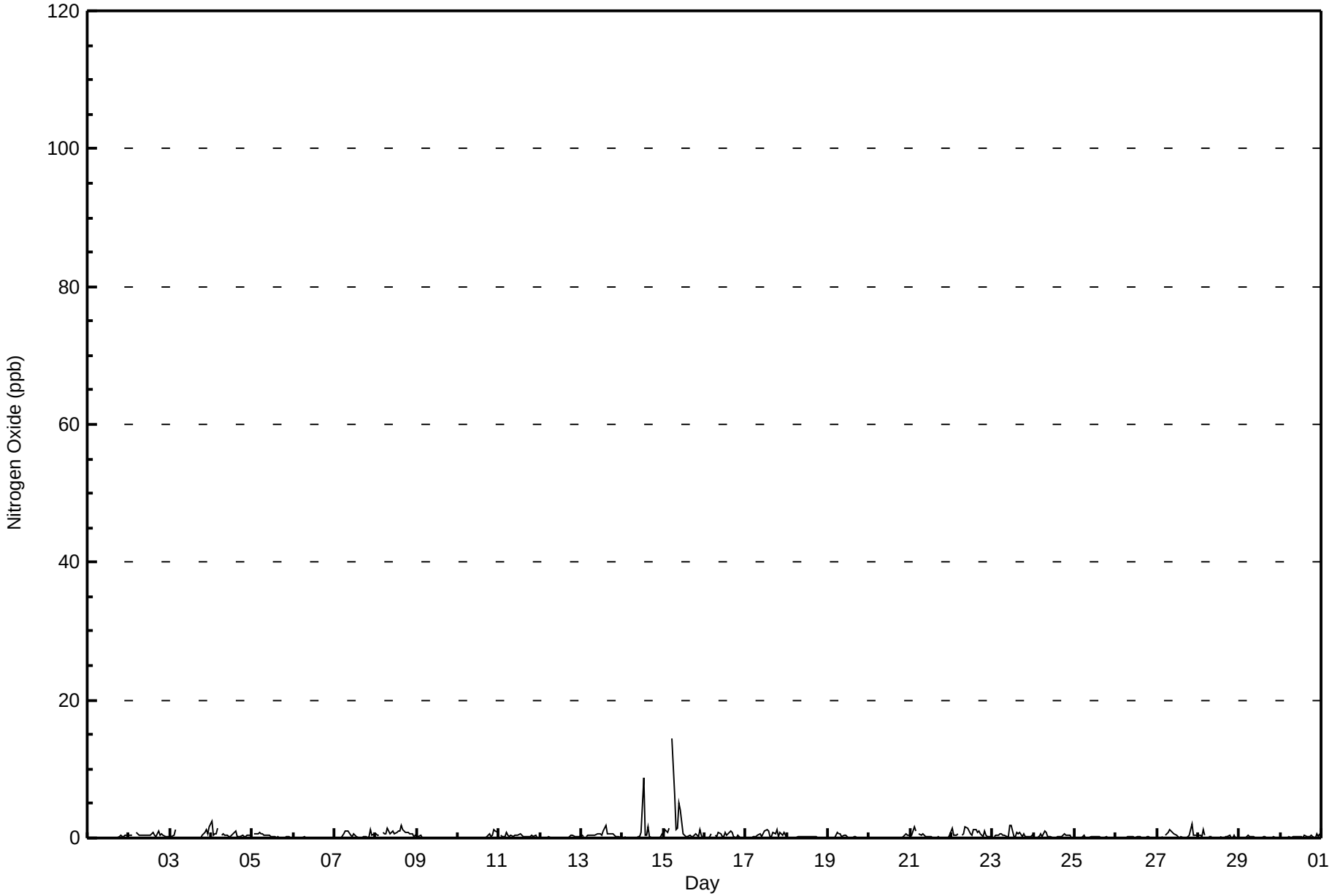
Z - zerospan C - Calibration

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Oxide (NO) - ppb

Firebag - April 2016



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: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Oxide (NO) - ppb

Firebag - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	71	32	23	14	27	57	88	68	93	87	21	12	10	8	10	32	653
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	71	32	23	14	27	57	88	68	93	87	21	12	10	8	10	32	653

Total Number of Valid Hours: 653

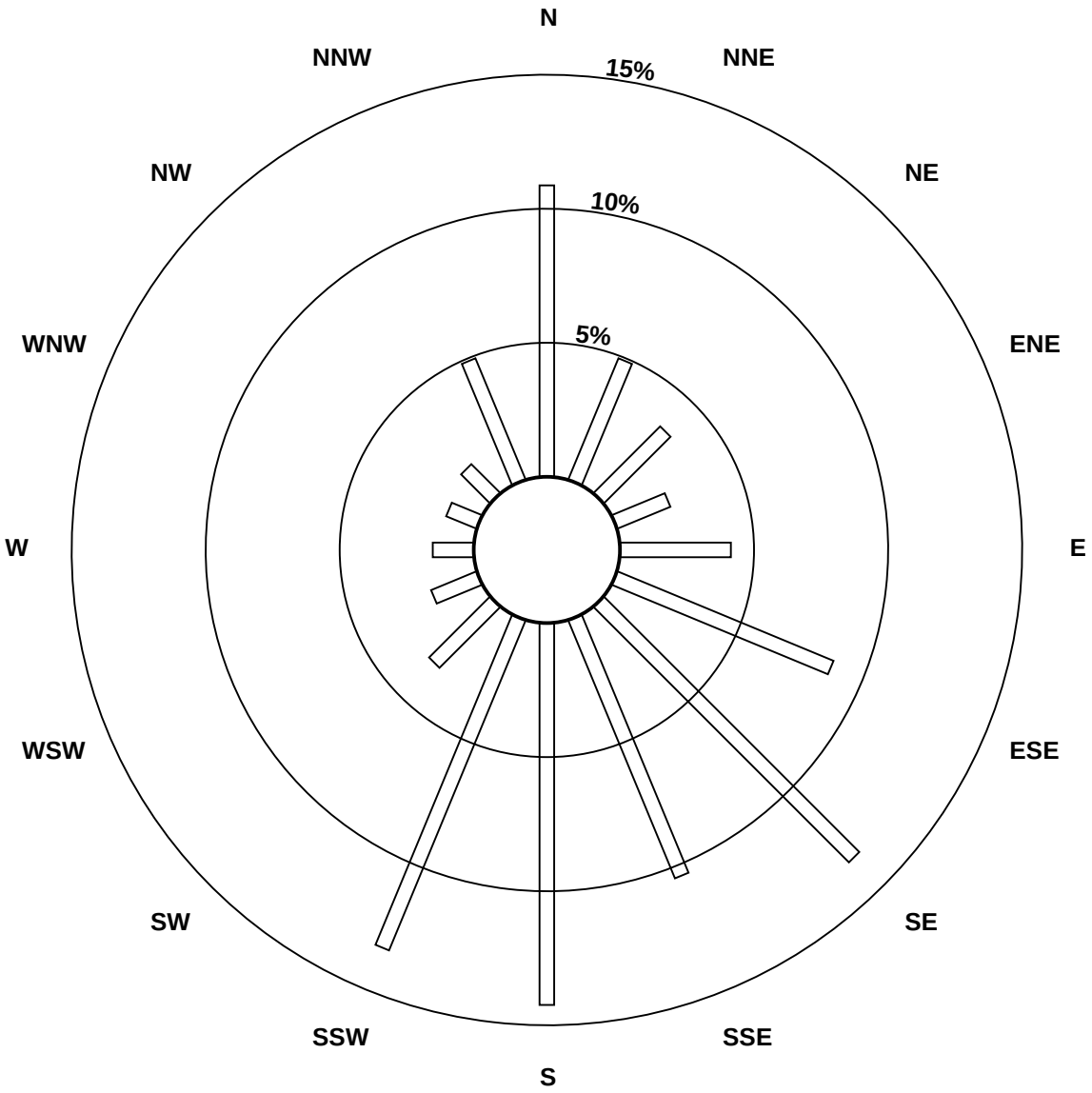
Total Number of Hours: 720

Wood Buffalo Environmental Association

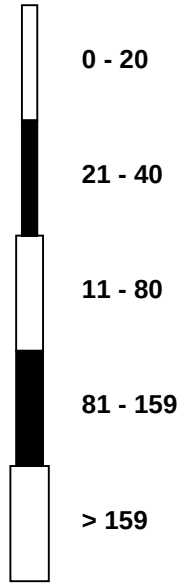
Wind Rose Apr 2016

Nitrogen Oxide (NO) - ppb

Firebag (AMS 19)



Classes (ppb)



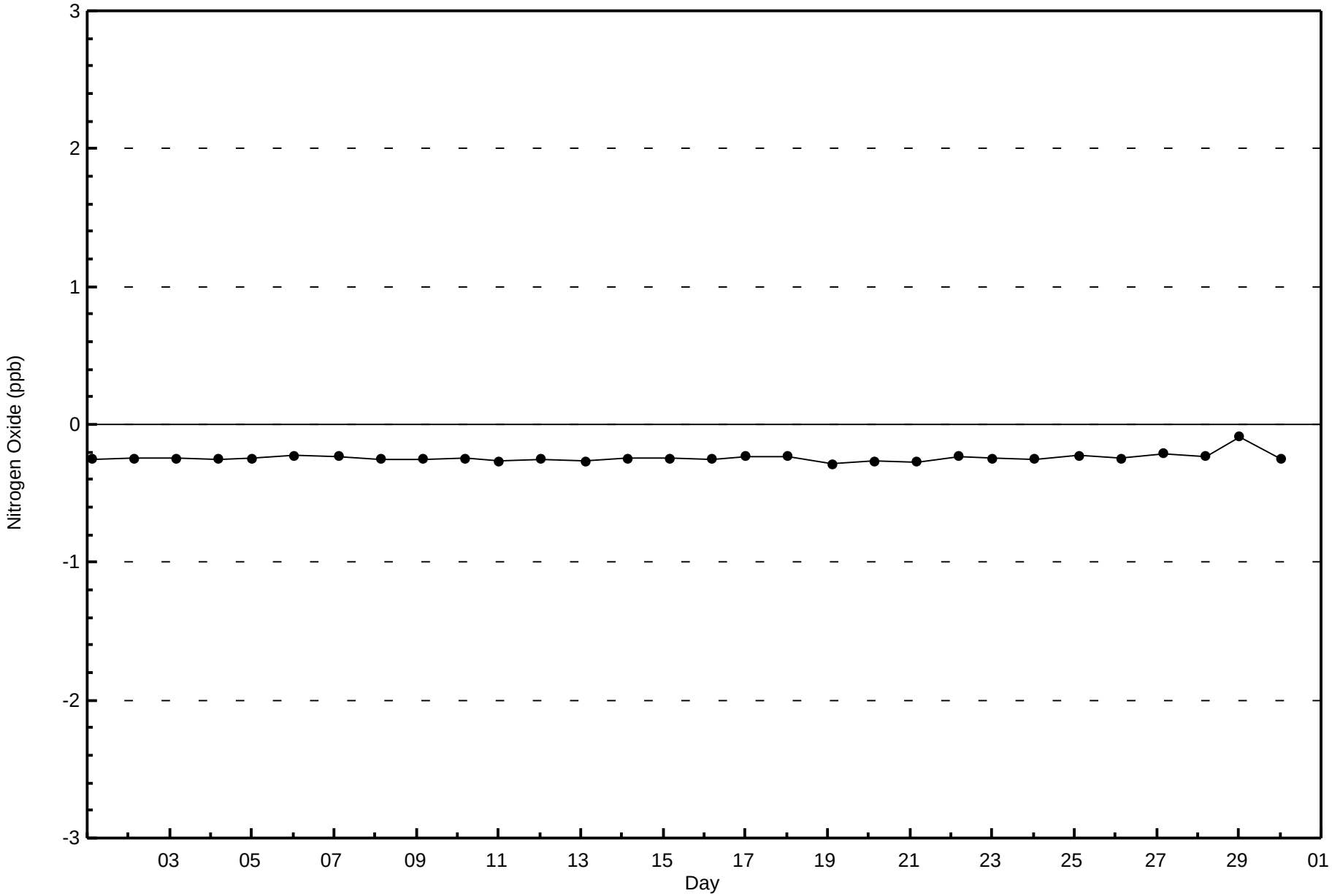
Total Number of Valid Hours: 653

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Oxide (NO) - ppb

Firebag - April 2016

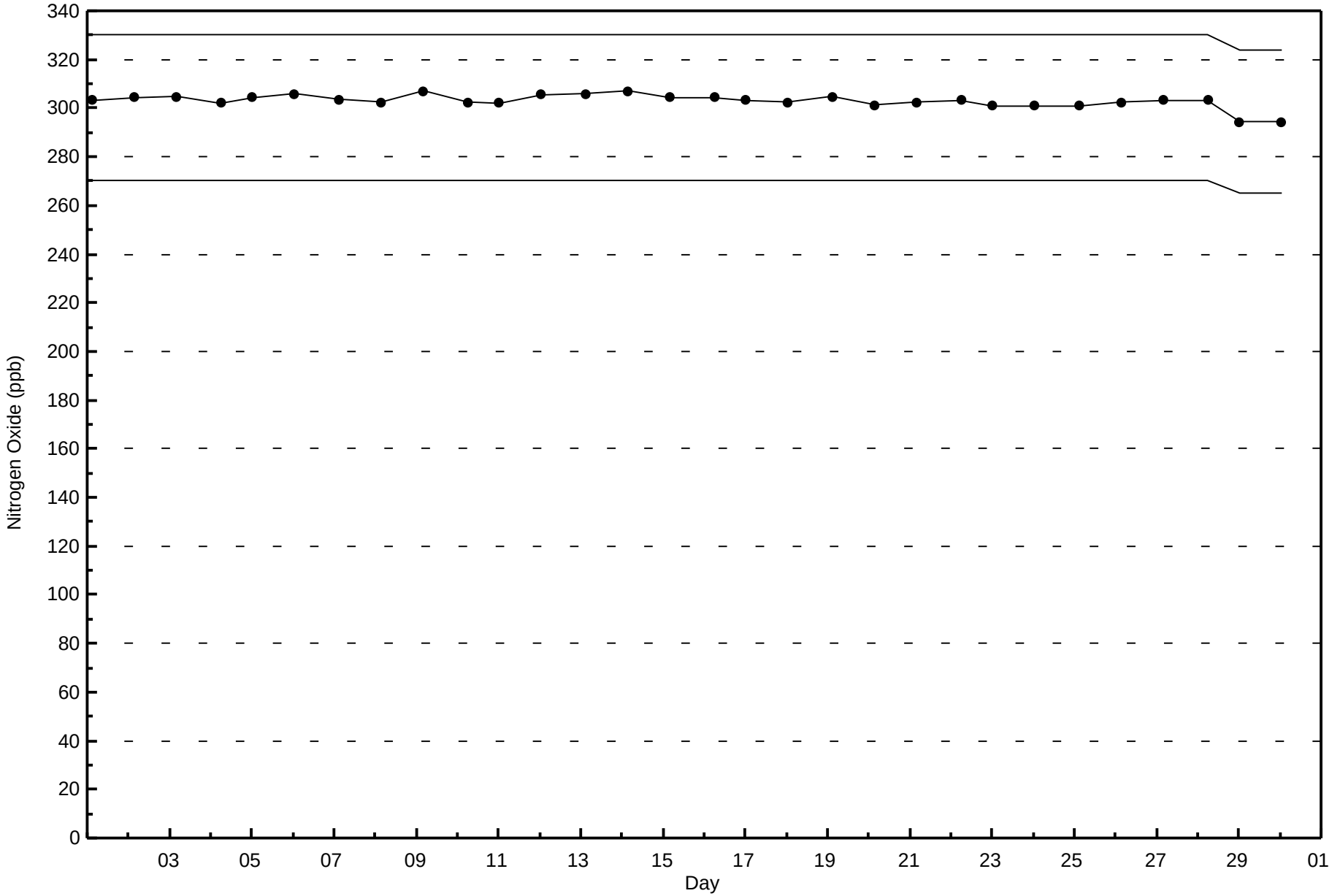


Wood Buffalo Environmental Association

Span Responses

Nitrogen Oxide (NO) - ppb

Firebag - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO_2) - ppb

Firebag - April 2016

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

Maximum Value: 34 ppb on Apr 15 06:00 Maximum Daily Average: 5.5 ppb on Apr 15

Minimum Value: 0 ppb on Apr 20 02:00 Minimum Daily Average: 0.6 ppb on Apr 20

Maximum Diurnal Average: 4.1 ppb at hour 6 Minimum Diurnal Average: 0.9 ppb at hour 14

Monthly Average: 1.9 ppb Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 1$ Median = 1 $Q_3 = 2$ $P_{90} = 4$ $P_{99} = 11$

Hours in Service:	720
Hours of Data:	686
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-Apr	3	4	Z	5	5	1	0	0	0	0	0	0	0	0	0	0	0	0	1	3	2	2	2	2	1.5	5
2-Apr	2	2	2	Z	3	2	2	1	1	1	1	1	1	1	2	1	1	3	2	3	2	2	2	2	1.6	3
3-Apr	2	1	2	4	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	4	6	5	10	1.7	10
4-Apr	13	2	2	3	8	Z	2	2	1	1	1	1	1	1	2	1	1	2	3	4	4	3	3	3	2.7	13
5-Apr	Z	4	4	5	6	5	4	2	1	1	1	1	1	1	0	1	0	0	1	1	1	1	1	1	1.9	6
6-Apr	2	Z	1	3	4	7	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	7
7-Apr	0	0	Z	0	1	6	6	3	2	1	1	1	1	1	0	0	0	1	1	0	1	4	4	3	1.7	6
8-Apr	3	2	2	Z	4	3	2	3	1	1	1	1	1	1	1	2	2	2	2	2	2	1	1	1	1.8	4
9-Apr	1	1	2	1	Z	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	4
10-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	1	0	1	5	6	5	6	5	3	1.6	6
11-Apr	Z	1	1	1	3	2	1	2	1	1	1	1	1	1	1	1	1	2	4	9	5	8	2	1	2.2	9
12-Apr	1	Z	1	1	13	9	1	1	0	1	1	1	1	1	1	1	1	1	1	2	4	4	2	1	2.0	13
13-Apr	2	1	Z	1	3	3	2	1	2	2	2	2	2	3	4	3	4	3	4	2	2	2	3	1	2.3	4
14-Apr	1	2	4	Z	0	0	0	0	0	1	1	1	2	1	2	1	1	1	0	0	2	3	3	12	1.6	12
15-Apr	8	11	10	13	Z	34	16	3	2	3	5	1	1	1	1	1	1	1	2	4	3	5	2	1	5.5	34
16-Apr	1	1	2	2	3	Z	2	1	2	1	1	1	1	1	2	3	2	1	2	9	7	4	5	6	2.5	9
17-Apr	Z	4	2	2	9	3	3	4	3	1	2	3	4	3	2	2	4	4	12	6	11	6	7	5	4.3	12
18-Apr	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.9	1
19-Apr	1	1	Z	1	1	3	4	4	1	1	2	1	1	1	1	1	1	1	2	2	0	1	1	0	1.3	4
20-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	2	2	0.6	3
21-Apr	3	3	10	6	Z	4	2	2	1	1	1	1	1	0	0	0	1	0	0	0	0	0	0	2	1.7	10
22-Apr	5	5	8	3	4	Z	2	2	4	3	3	2	1	3	3	2	3	2	2	4	3	4	2	2	3.1	8
23-Apr	Z	2	2	2	3	3	2	2	1	1	2	2	1	1	1	1	1	1	3	3	2	1	1	2	1.7	3
24-Apr	3	Z	1	1	4	2	4	3	1	1	1	1	0	0	1	1	1	2	5	3	4	3	1	1	1.9	5
25-Apr	1	1	Z	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.0	2
26-Apr	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1.1	2
27-Apr	2	1	2	3	Z	4	4	5	3	2	1	1	1	1	1	1	1	1	1	1	6	3	3	2	2.1	6
28-Apr	2	3	2	5	3	Z	1	1	1	C	C	C	C	1	1	1	2	2	4	2	2	4	1	1	2.0	5
29-Apr	Z	1	1	1	2	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1.1	4
30-Apr	1	Z	1	1	1	2	1	1	1	1	1	1	1	1	3	2	2	4	3	1	2	4	3	6	2.0	6
	2.2	2.2	2.6	2.6	3.4	4.1	2.3	1.6	1.2	1.1	1.1	0.9	1.0	0.9	1.1	1.0	1.2	1.3	2.1	2.5	2.6	2.8	2.2	2.5	Diurnal Average	
	13	11	10	13	13	34	16	5	4	3	5	3	4	3	4	3	4	4	12	9	11	8	7	12	Diurnal Maximum	

Z - zerospan C - Calibration

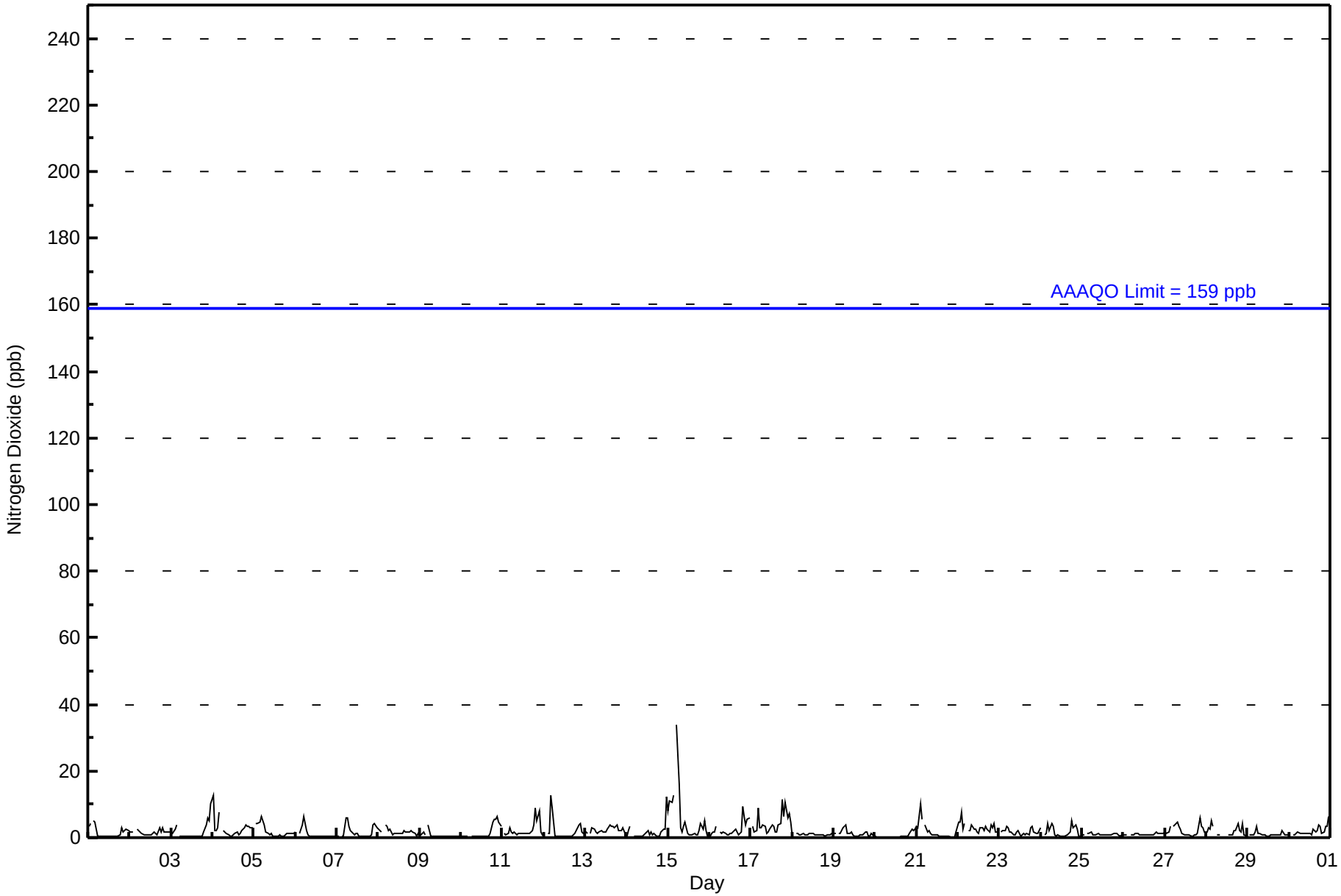
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Dioxide (NO_2) - ppb

Firebag - April 2016



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Nitrogen Dioxide (NO_2) - ppb

Firebag - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	685	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: 686

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Dioxide (NO_2) - ppb

Firebag - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	71	32	23	14	27	57	88	68	93	87	21	12	10	8	10	32	653
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	71	32	23	14	27	57	88	68	93	87	21	12	10	8	10	32	653

Total Number of Valid Hours: 653

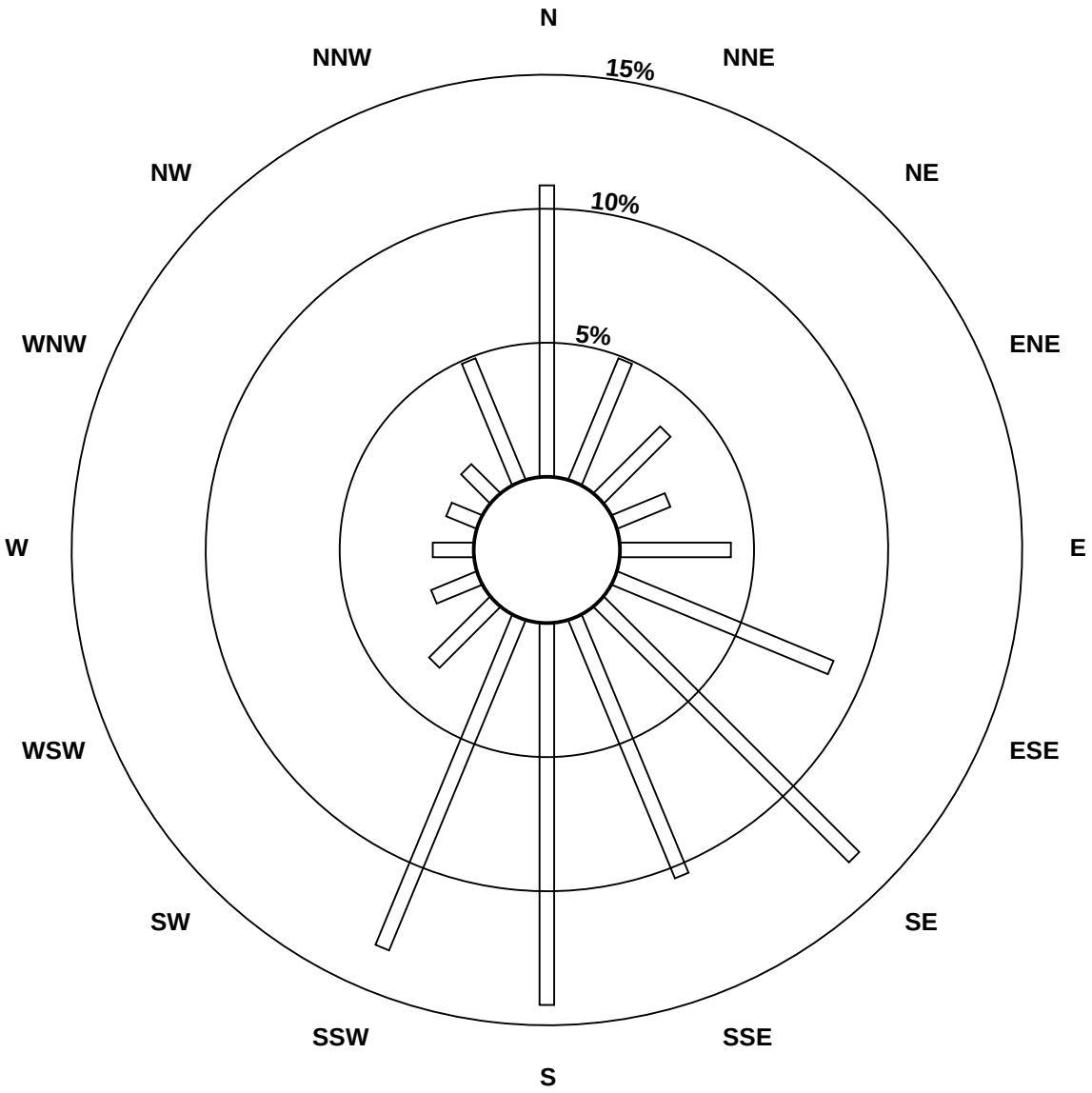
Total Number of Hours: 720

Wood Buffalo Environmental Association

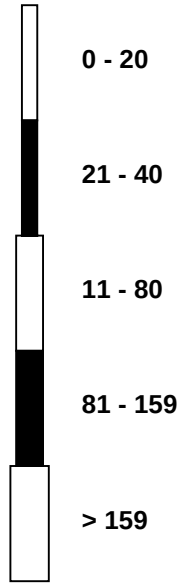
Wind Rose Apr 2016

Nitrogen Dioxide (NO_2) - ppb

Firebag (AMS 19)



Classes (ppb)



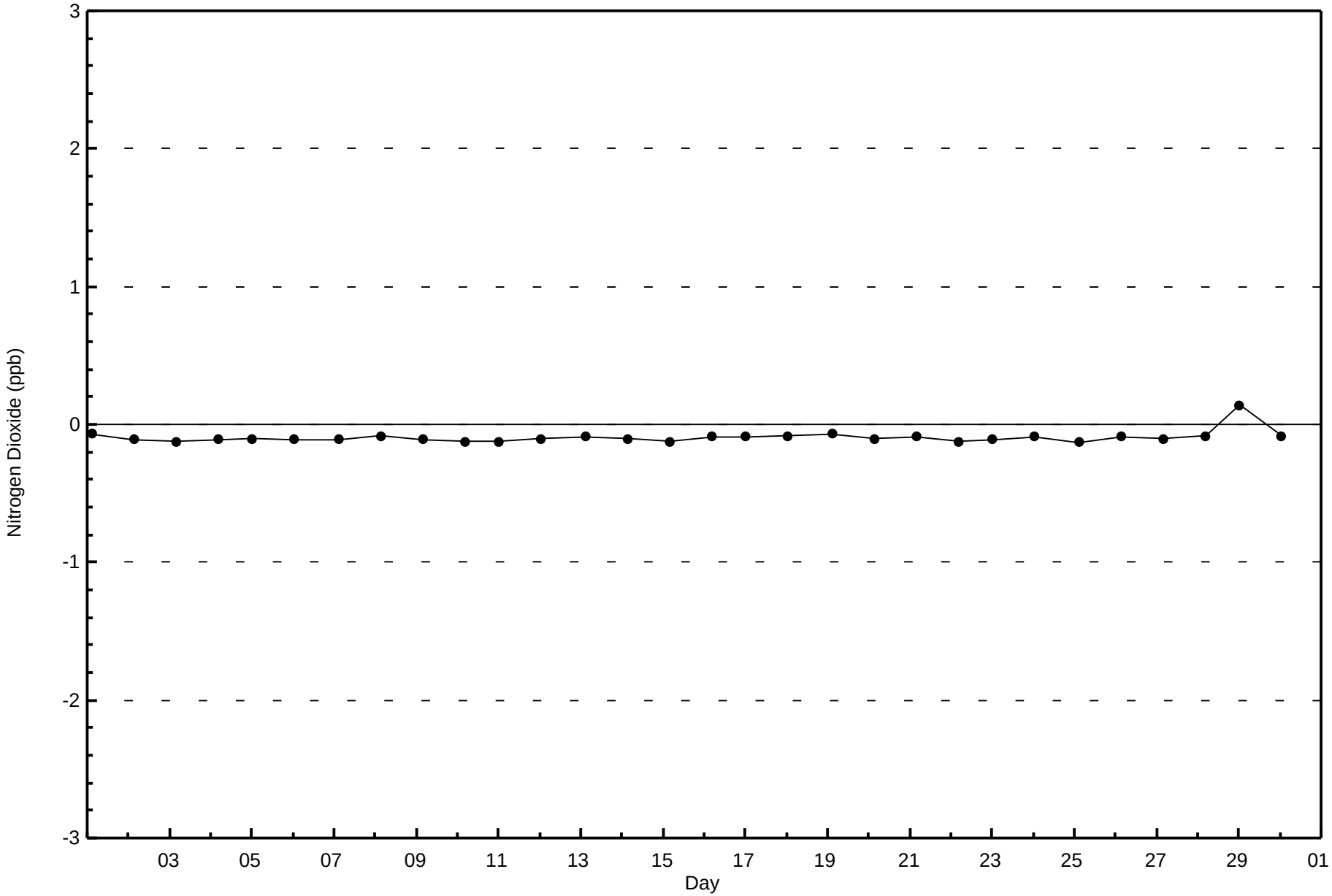
Total Number of Valid Hours: 653

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Dioxide (NO_2) - ppb

Firebag - April 2016

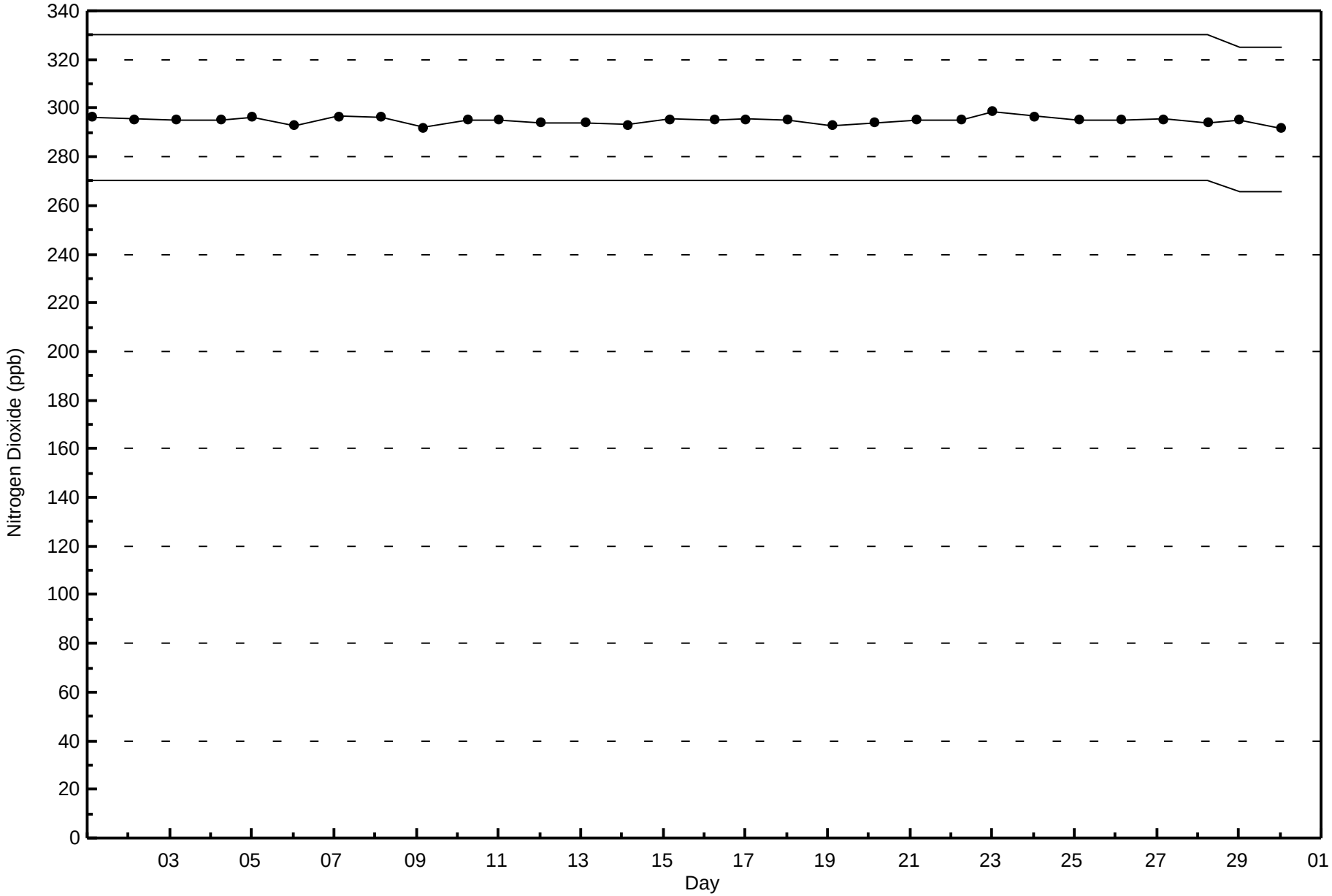


Wood Buffalo Environmental Association

Span Responses

Nitrogen Dioxide (NO_2) - ppb

Firebag - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_X) - ppb

Firebag - April 2016

Maximum Value: 49 ppb on Apr 15 06:00

Maximum Daily Average: 7.3 ppb on Apr 15

Minimum Value: 0 ppb on Apr 20 10:00

Minimum Daily Average: 0.7 ppb on Apr 20

Maximum Diurnal Average: 5.0 ppb at hour 6

Minimum Diurnal Average: 1.2 ppb at hour 14

Monthly Average: 2.3 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 1$ Median = 1 $Q_3 = 3$ $P_{90} = 5$ $P_{99} = 13$

Hours in Service:	720
Hours of Data:	686
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-Apr	3	4	Z	5	5	1	0	0	0	0	0	0	0	0	0	0	0	0	1	3	2	2	3	2	1.5	5
2-Apr	2	2	2	Z	3	3	2	2	2	1	1	1	1	2	3	2	1	4	2	4	2	2	2	2	2.1	4
3-Apr	2	1	3	5	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	5	7	6	12	2.0	12
4-Apr	15	3	3	4	9	Z	3	2	2	1	1	1	1	2	2	1	1	2	3	4	4	4	3	3	3.2	15
5-Apr	Z	5	5	5	7	6	4	2	2	1	2	1	1	1	1	1	0	0	1	1	1	2	1	1	2.2	7
6-Apr	2	Z	1	3	4	7	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	7
7-Apr	0	0	Z	0	0	6	7	4	3	2	1	2	2	1	0	0	0	1	1	0	1	5	5	4	2.1	7
8-Apr	3	2	2	Z	5	4	3	4	2	2	2	2	2	2	2	4	3	3	2	3	2	2	1	2	2.5	5
9-Apr	1	1	2	1	Z	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	4
10-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	2	5	6	6	7	6	4	1.8	7
11-Apr	Z	1	1	1	4	2	1	2	1	1	1	1	2	2	1	1	1	3	4	9	5	8	2	1	2.5	9
12-Apr	1	Z	1	1	13	9	1	0	1	1	1	1	1	1	1	1	1	1	2	2	4	4	2	2	2.1	13
13-Apr	2	2	Z	1	4	3	2	2	2	3	2	2	2	4	6	4	4	3	4	2	3	2	3	1	2.8	6
14-Apr	1	2	4	Z	0	0	0	0	0	1	1	2	11	1	2	2	1	1	0	0	2	2	3	13	2.2	13
15-Apr	9	12	11	14	Z	49	22	4	3	8	9	2	1	1	1	2	1	1	3	5	3	6	3	1	7.3	49
16-Apr	1	1	2	2	4	Z	2	1	3	2	1	1	2	2	3	3	3	1	2	10	7	4	5	6	2.9	10
17-Apr	Z	4	2	2	9	3	3	4	4	1	2	4	5	4	2	2	5	5	13	7	11	6	8	5	4.9	13
18-Apr	1	Z	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1.0	2
19-Apr	1	1	Z	1	1	4	4	5	1	2	2	1	1	1	1	1	1	1	2	2	0	1	1	0	1.5	5
20-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	3	3	0.7	3
21-Apr	4	3	12	7	Z	4	2	3	2	1	1	1	1	0	0	0	1	0	0	0	0	0	0	2	2.0	12
22-Apr	6	5	8	3	5	Z	3	3	6	4	4	2	2	4	4	3	4	3	2	5	3	4	2	2	3.8	8
23-Apr	Z	2	3	3	4	3	2	2	1	1	3	4	1	1	2	2	2	1	4	3	2	2	2	3	2.2	4
24-Apr	4	Z	1	2	5	3	5	4	1	1	1	1	0	0	1	1	1	2	6	3	4	3	1	1	2.2	6
25-Apr	1	1	Z	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.0	2
26-Apr	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1	1	1.2	2
27-Apr	2	1	2	3	Z	4	5	6	4	3	2	1	1	1	1	1	1	1	1	2	8	4	3	2	2.6	8
28-Apr	2	3	3	6	4	Z	1	1	1	C	C	C	C	1	1	1	2	2	5	2	2	5	1	1	2.3	6
29-Apr	Z	1	1	1	2	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1.1	4
30-Apr	1	Z	1	1	1	2	1	1	2	1	1	1	1	1	3	2	2	4	4	2	2	4	4	7	2.1	7
	2.6	2.5	2.9	3.0	3.7	5.0	2.8	2.0	1.6	1.5	1.5	1.3	1.5	1.2	1.4	1.3	1.4	1.5	2.4	2.8	2.9	3.2	2.4	2.8	Diurnal Average	
	15	12	12	14	13	49	22	6	6	8	9	4	11	4	6	4	5	5	13	10	11	8	8	13	Diurnal Maximum	

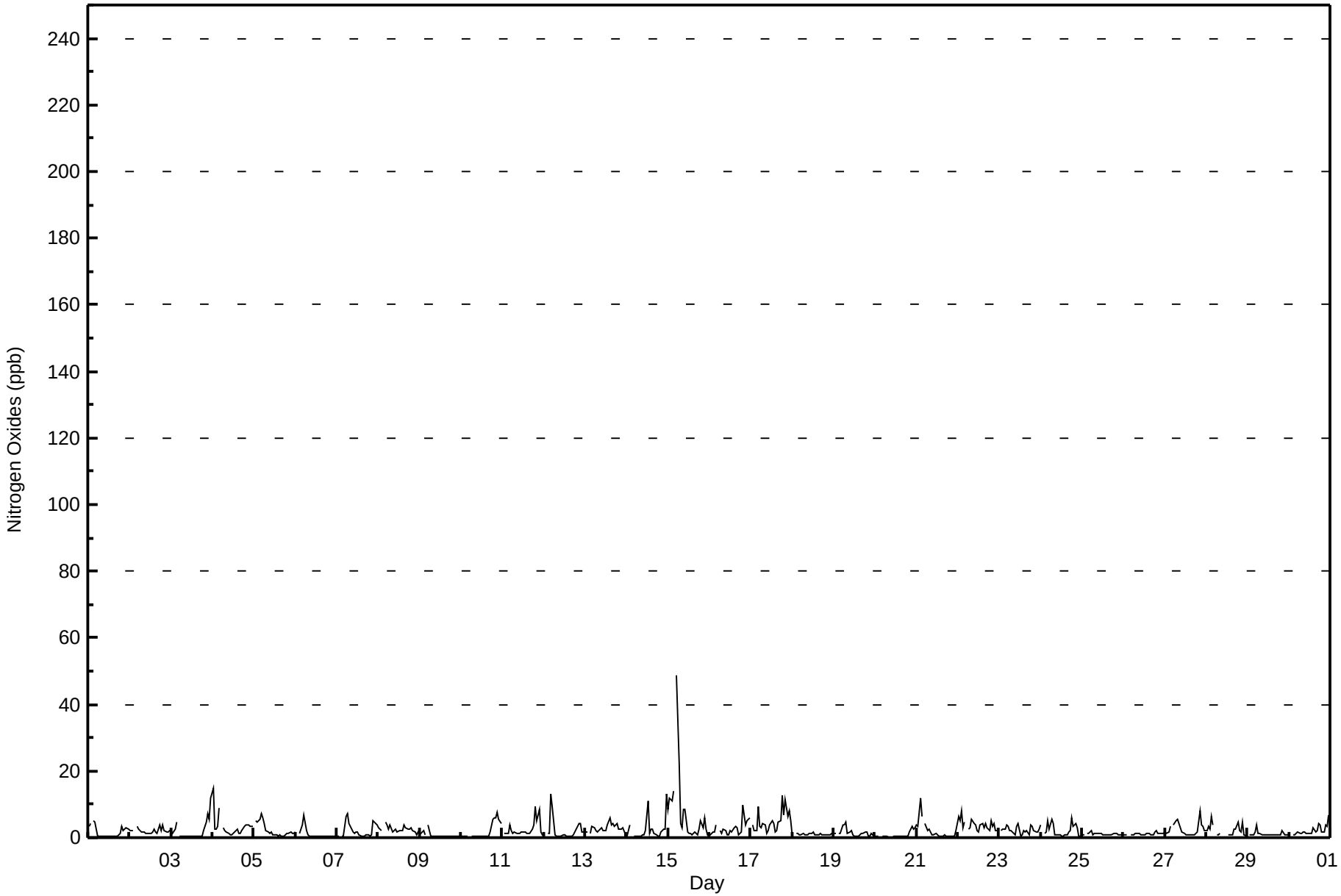
Z - zerospan C - Calibration

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Oxides (NO_X) - ppb

Firebag - April 2016



Nitrogen Oxides (NO_X) - ppb
Firebag - April 2016

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: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Oxides (NO_X) - ppb

Firebag - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	71	32	23	14	27	57	88	68	93	87	21	12	10	8	10	32	653
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	71	32	23	14	27	57	88	68	93	87	21	12	10	8	10	32	653

Total Number of Valid Hours: 653

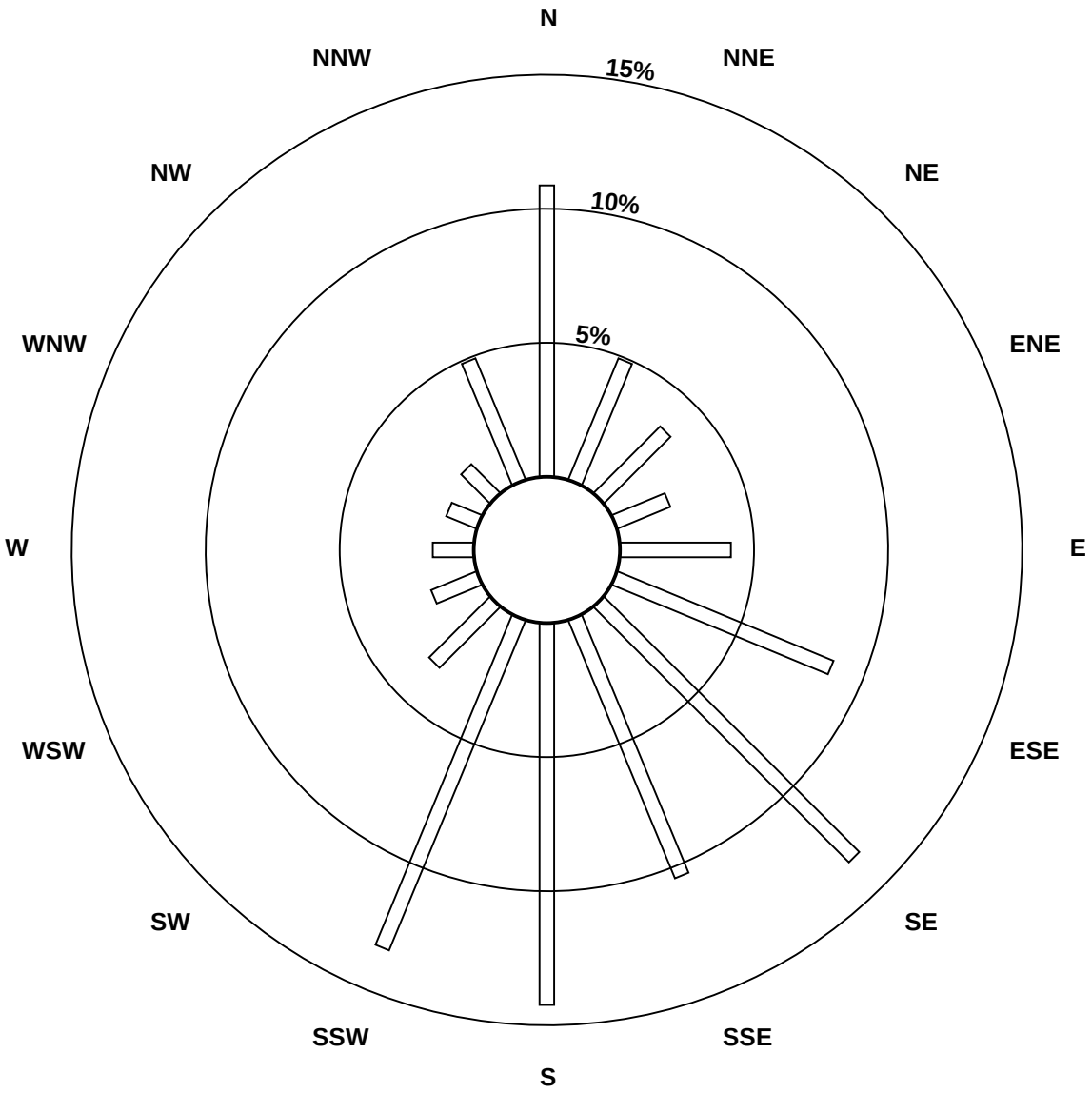
Total Number of Hours: 720

Wood Buffalo Environmental Association

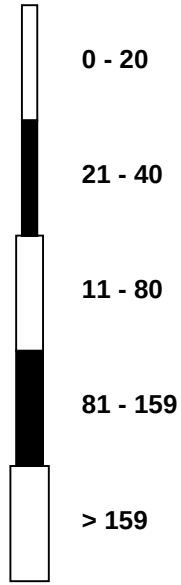
Wind Rose Apr 2016

Nitrogen Oxides (NO_X) - ppb

Firebag (AMS 19)



Classes (ppb)



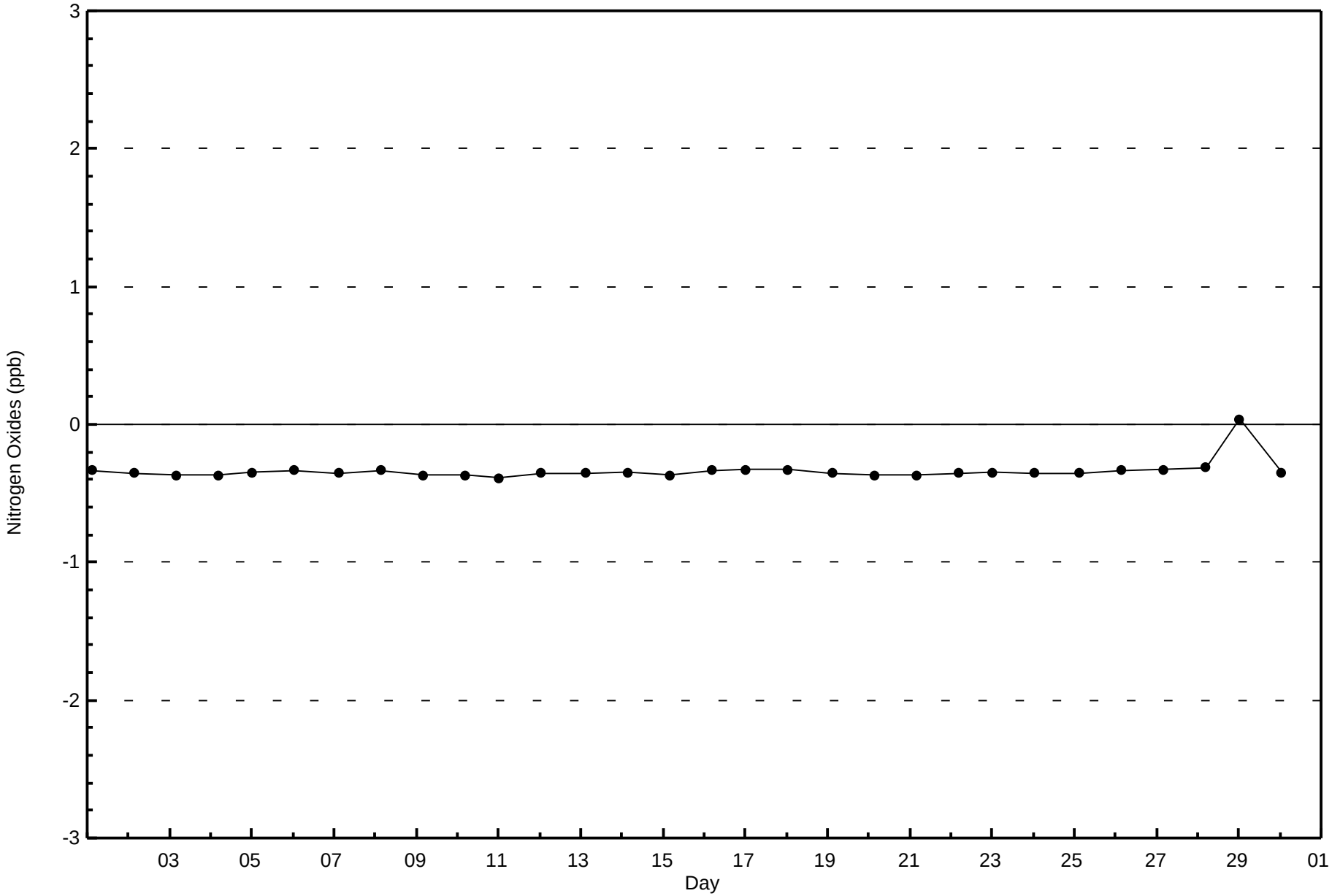
Total Number of Valid Hours: 653

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Oxides (NO_X) - ppb

Firebag - April 2016

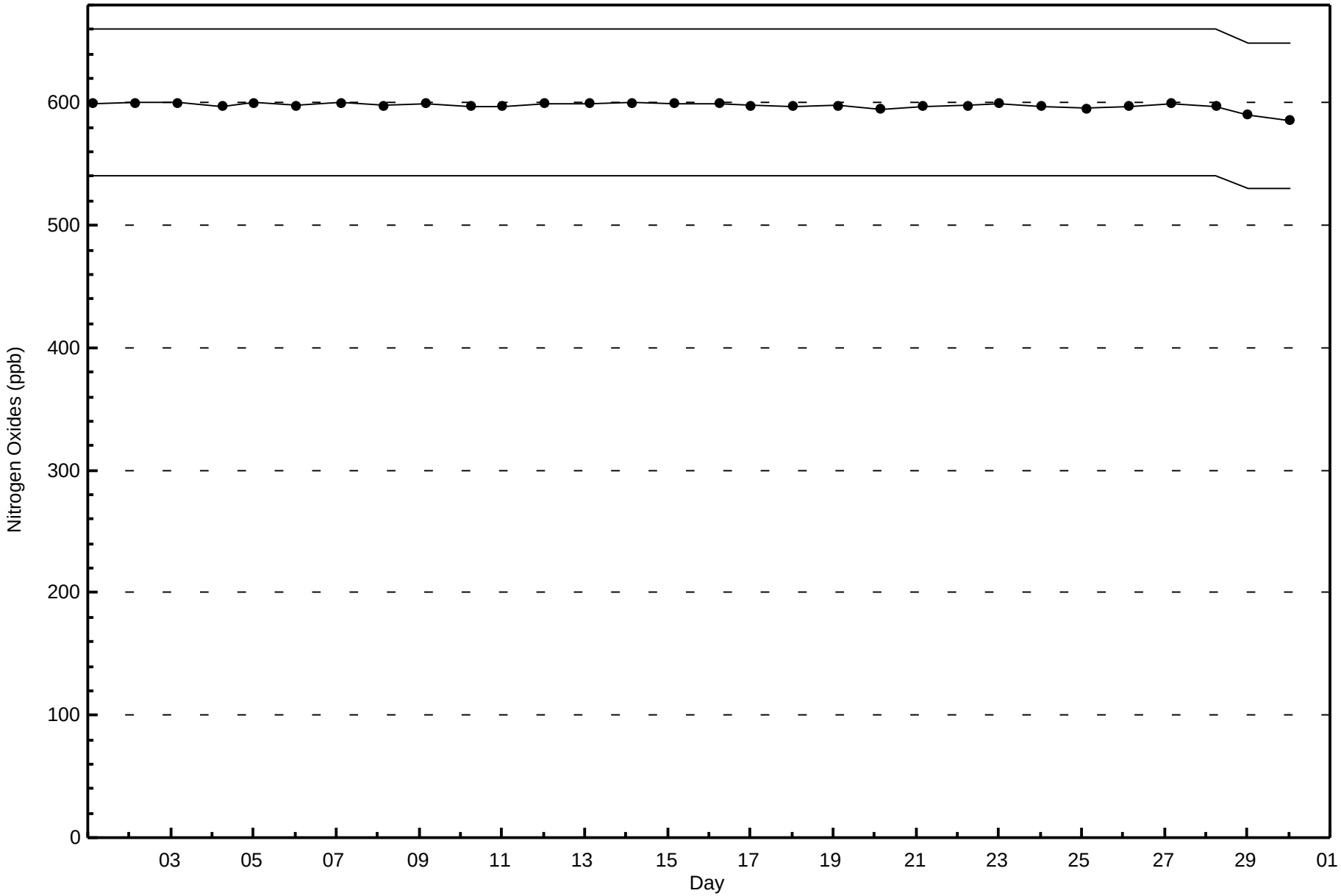


Wood Buffalo Environmental Association

Span Responses

Nitrogen Oxides (NO_X) - ppb

Firebag - April 2016



Maximum Value: 22.9 C on Apr 18 17:00

Maximum Daily Average: 15.7 C on Apr 18

Minimum Value: -15.3 C on Apr 10 06:00

Minimum Daily Average: -9.0 C on Apr 3

Maximum Diurnal Average: 5.3 C at hour 17

Minimum Diurnal Average: -2.0 C at hour 6

Monthly Average: 1.67 C

Percentiles: P_1 = -13.0 P_{10} = -8.5 Q_1 = -4.1 Median = 1.4 Q_3 = 6.5 P_{90} = 13.0 P_{99} = 19.6

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

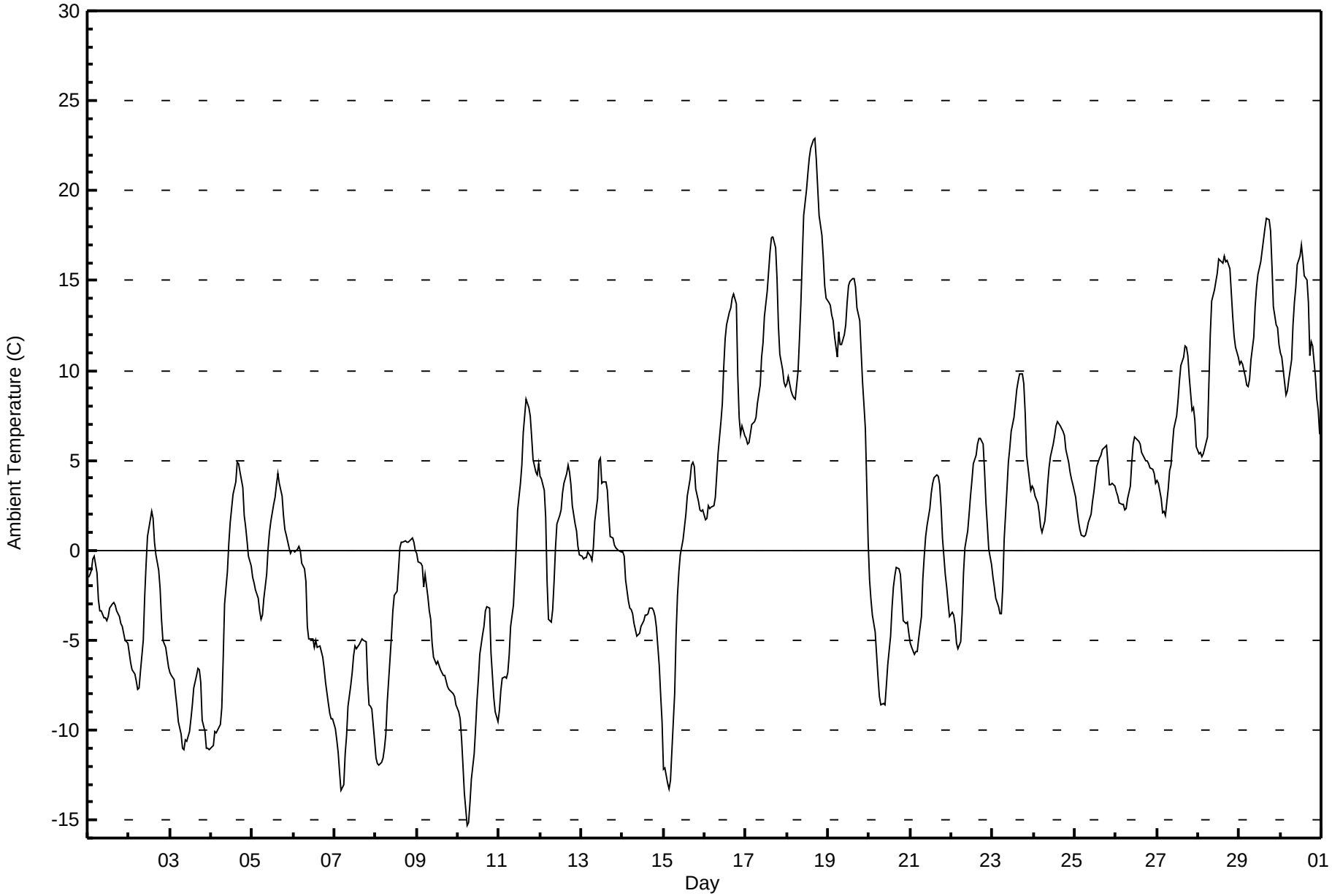
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	-1.5	-1.4	-1.1	-0.5	-0.3	-1.2	-2.8	-3.3	-3.4	-3.8	-3.8	-3.9	-3.7	-3.2	-3.0	-2.9	-3.0	-3.4	-3.7	-4.1	-4.2	-4.6	-5.0	-5.1	-3.0	-0.3
2-Apr	-5.7	-6.2	-6.6	-6.9	-7.3	-7.8	-7.6	-6.8	-5.0	-2.6	-0.8	0.8	1.7	2.2	1.8	0.4	-0.2	-1.1	-2.1	-3.9	-5.0	-5.4	-5.9	-6.5	-3.6	2.2
3-Apr	-6.8	-7.0	-7.2	-8.0	-8.6	-9.5	-10.2	-11.0	-11.1	-10.5	-10.6	-10.1	-9.4	-8.6	-7.6	-6.9	-6.6	-6.6	-7.3	-9.4	-10.1	-11.0	-11.0	-11.1	-9.0	-6.6
4-Apr	-10.9	-10.9	-10.1	-10.2	-10.0	-9.7	-8.8	-6.1	-3.0	-1.2	0.4	1.5	2.3	3.1	3.8	4.9	4.8	4.4	3.5	1.9	1.3	0.5	-0.3	-0.8	-2.1	4.9
5-Apr	-1.5	-1.8	-2.2	-2.7	-3.4	-3.8	-3.6	-2.6	-1.3	0.0	1.0	1.7	2.5	2.9	3.7	4.2	3.7	3.0	1.9	1.1	0.8	0.1	-0.2	0.0	0.1	4.2
6-Apr	0.0	-0.1	0.1	0.2	0.0	-0.7	-1.0	-1.7	-4.2	-4.9	-4.9	-4.9	-5.4	-5.0	-5.4	-5.4	-5.6	-6.0	-6.6	-7.4	-8.5	-9.1	-9.4	-9.4	-4.4	0.2
7-Apr	-9.9	-10.6	-11.3	-12.3	-13.4	-13.1	-11.3	-10.3	-8.7	-7.5	-6.8	-5.9	-5.3	-5.5	-5.3	-5.1	-4.9	-5.0	-5.1	-7.3	-8.6	-8.7	-8.9	-10.6	-8.4	-4.9
8-Apr	-11.6	-11.9	-12.0	-11.8	-11.5	-11.0	-10.2	-8.5	-6.0	-4.8	-3.4	-2.5	-2.3	-1.1	0.1	0.4	0.5	0.5	0.4	0.5	0.6	0.7	0.5	0.0	-4.3	0.7
9-Apr	-0.2	-0.6	-0.7	-0.9	-2.1	-1.4	-2.6	-3.4	-3.8	-5.1	-6.0	-6.4	-6.2	-6.4	-6.7	-6.9	-7.0	-7.3	-7.6	-7.7	-7.9	-8.0	-8.1	-8.6	-5.1	-0.2
10-Apr	-9.0	-9.4	-10.4	-12.0	-13.5	-15.3	-15.2	-14.1	-12.7	-11.3	-9.9	-8.4	-7.2	-5.8	-4.7	-4.3	-3.4	-3.1	-3.2	-5.7	-6.9	-8.2	-9.0	-9.6	-8.8	-3.1
11-Apr	-8.9	-7.8	-7.1	-7.0	-7.2	-6.8	-5.8	-4.2	-3.0	-1.5	0.2	2.2	3.7	4.7	6.5	7.5	8.4	8.0	7.4	6.3	5.1	4.4	4.2	4.8	0.6	8.4
12-Apr	4.1	4.0	3.3	1.8	-1.7	-3.9	-4.0	-3.3	-1.7	0.2	1.4	1.9	2.3	3.2	3.7	4.2	4.7	4.4	3.7	2.5	1.5	1.1	0.2	-0.3	1.4	4.7
13-Apr	-0.3	-0.5	-0.4	-0.4	-0.1	-0.3	-0.5	0.1	1.6	2.9	5.0	5.2	3.7	3.8	3.8	3.3	1.9	0.8	0.7	0.3	0.1	0.1	0.0	-0.1	1.3	5.2
14-Apr	-0.1	-0.3	-1.6	-2.8	-3.2	-3.3	-3.5	-4.1	-4.7	-4.7	-4.6	-4.2	-3.9	-3.6	-3.6	-3.5	-3.2	-3.2	-3.4	-3.7	-4.3	-6.4	-8.1	-9.6	-3.9	-0.1
15-Apr	-12.2	-12.1	-13.0	-13.3	-12.8	-11.1	-8.0	-4.7	-2.5	-1.2	-0.3	0.6	1.3	2.0	3.0	4.0	4.7	4.9	4.7	3.4	2.7	2.2	2.2	2.2	-2.2	4.9
16-Apr	1.7	1.8	2.4	2.4	2.4	2.5	3.0	4.2	5.4	7.2	8.1	10.2	11.7	12.5	13.3	13.5	14.0	14.3	13.7	9.7	7.4	6.5	6.9	6.4	7.5	14.3
17-Apr	6.2	5.9	6.0	7.0	7.1	7.2	7.4	8.2	9.2	10.7	11.5	13.0	14.4	15.5	16.6	17.3	17.5	16.8	15.1	12.4	10.9	10.1	9.3	9.1	11.0	17.5
18-Apr	9.3	9.6	8.8	8.6	8.5	8.4	10.0	11.8	13.7	16.2	18.6	20.0	21.0	21.8	22.4	22.8	22.9	21.7	20.1	18.6	17.5	16.3	14.7	14.1	15.7	22.9
19-Apr	13.8	13.6	13.1	12.8	11.9	10.8	12.1	11.5	11.4	12.0	12.5	13.8	14.7	14.9	15.1	15.1	14.6	13.5	12.8	11.1	9.3	8.1	6.8	0.4	11.9	15.1
20-Apr	-1.6	-2.7	-3.6	-4.6	-5.8	-7.1	-8.2	-8.6	-8.5	-8.6	-7.5	-6.3	-4.8	-3.2	-2.0	-1.4	-1.0	-1.0	-1.3	-2.6	-3.9	-4.0	-4.0	-4.6	-4.5	-1.0
21-Apr	-5.2	-5.4	-5.8	-5.7	-5.6	-4.9	-3.7	-1.6	-0.4	0.7	1.4	2.3	3.2	3.8	4.1	4.2	4.1	3.7	2.4	0.7	-1.3	-2.1	-2.9	-3.7	-0.7	4.2
22-Apr	-3.5	-3.6	-4.2	-5.2	-5.5	-5.1	-3.6	-1.3	0.1	1.1	2.0	3.0	3.9	4.8	5.3	5.9	6.2	6.2	5.9	4.5	2.6	1.4	0.1	-0.8	0.8	6.2
23-Apr	-1.5	-2.0	-2.7	-3.1	-3.5	-3.5	-2.1	0.6	3.4	4.9	5.7	6.6	7.4	8.2	9.0	9.4	9.8	9.8	9.3	7.7	5.3	4.0	3.3	3.5	3.7	9.8
24-Apr	3.4	3.0	2.6	2.1	1.3	1.0	1.6	2.5	3.7	4.6	5.2	5.9	6.4	7.0	7.2	6.9	6.7	6.6	6.4	5.6	4.9	4.4	4.0	3.6	4.4	7.2
25-Apr	3.0	2.2	1.6	1.2	0.8	0.7	0.9	1.1	1.5	2.0	2.7	3.3	4.0	4.7	5.1	5.3	5.6	5.7	5.9	4.8	3.6	3.6	3.7	3.6	3.2	5.9
26-Apr	3.3	3.0	2.6	2.5	2.5	2.3	2.4	2.8	3.6	4.9	5.9	6.3	6.2	6.0	5.9	5.4	5.3	5.0	5.0	4.8	4.6	4.5	4.3	3.8	4.3	6.3
27-Apr	3.9	3.7	2.9	2.1	2.1	2.0	3.4	4.5	4.7	5.8	6.7	7.5	8.3	9.4	10.3	10.8	11.3	11.3	10.9	9.6	7.8	8.0	7.2	5.7	6.7	11.3
28-Apr	5.4	5.4	5.2	5.3	5.6	6.3	9.3	12.0	13.9	14.4	15.0	15.5	16.2	16.1	16.0	16.4	16.1	16.1	15.6	14.3	13.0	12.0	11.3	10.7	12.0	16.4
29-Apr	10.3	10.5	10.3	9.7	9.2	9.1	9.5	10.6	11.8	13.6	14.7	15.4	16.0	16.7	17.3	17.9	18.5	18.4	17.7	15.8	13.5	12.5	12.4	11.4	13.5	18.5
30-Apr	11.0	10.7	9.3	8.6	8.9	9.5	10.6	12.5	13.8	14.6	15.9	16.4	17.0	16.2	15.3	15.0	13.8	10.8	11.6	11.4	9.6	8.4	7.8	6.5	11.9	17.0
	-0.5	-0.7	-1.0	-1.4	-1.8	-2.0	-1.4	-0.4	0.6	1.6	2.5	3.3	4.0	4.6	5.0	5.3	5.3	5.0	4.5	3.2	2.0	1.4	0.9	0.2	Diurnal Average	
	13.8	13.6	13.1	12.8	11.9	10.8	12.1	12.5	13.9	16.2	18.6	20.0	21.0	21.8	22.4	22.8	22.9	21.7	20.1	18.6	17.5	16.3	14.7	14.1	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature (AT) - C

Firebag - April 2016



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	311	43.19	43.19
0 - 10	293	40.69	83.89
10 - 20	108	15.00	98.89
> 20	8	1.11	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Firebag - April 2016

Maximum Value: 100 % on Apr 27 07:00

Maximum Daily Average: 92.7 % on Apr 6

Minimum Value: 16 % on Apr 19 15:00

Minimum Daily Average: 28.9 % on Apr 19

Maximum Diurnal Average: 70.6 % at hour 6

Minimum Diurnal Average: 48.3 % at hour 16

Monthly Average: 59.7 %

Percentiles: P_1 = 20 P_{10} = 29 Q_1 = 41 Median = 60 Q_3 = 79 P_{90} = 89 P_{99} = 99

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

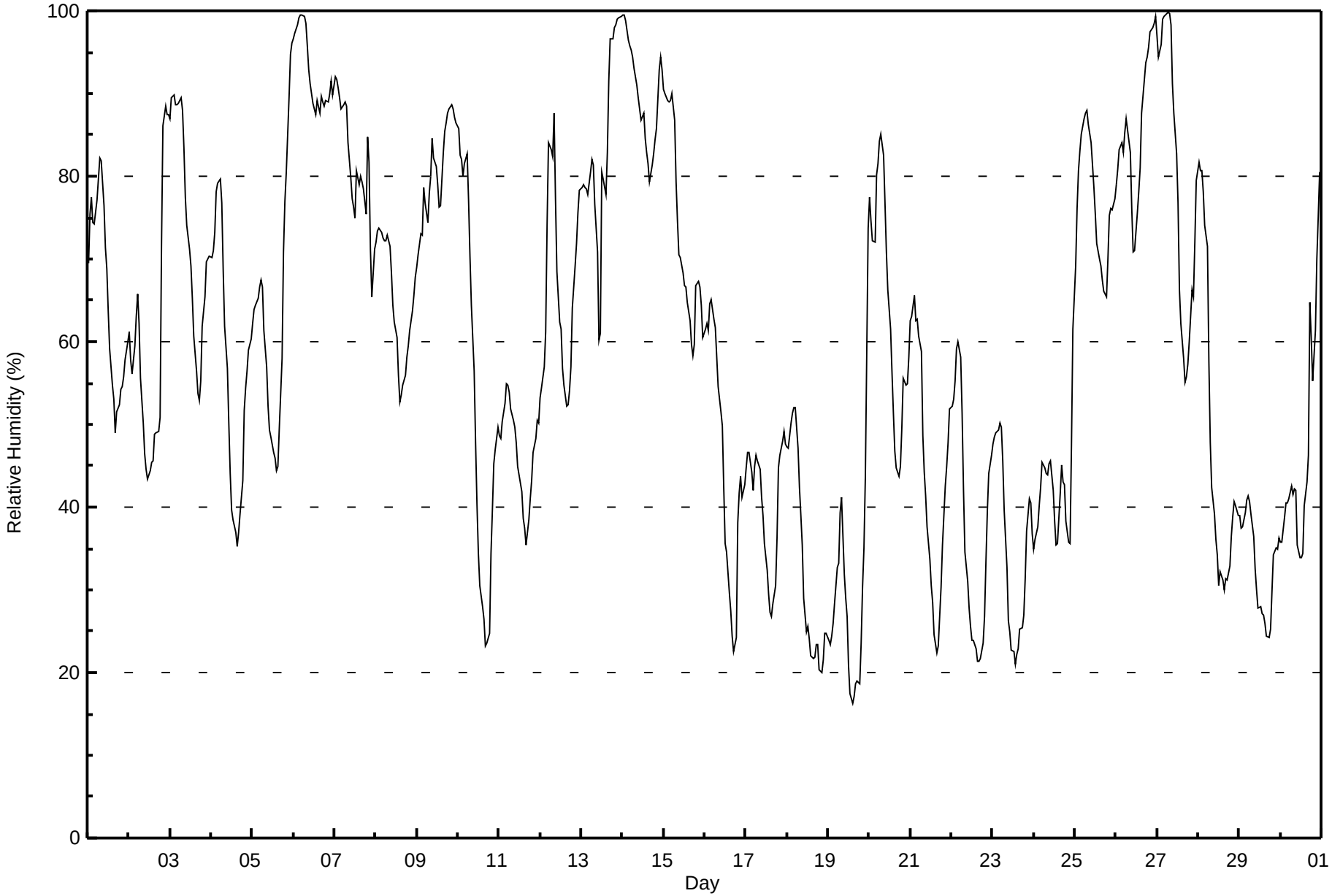
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	70	75	78	74	74	77	80	82	82	76	71	69	64	59	55	53	49	52	52	54	55	56	58	60	65.6	82
2-Apr	61	58	56	59	63	66	62	56	50	46	45	43	44	45	46	49	49	49	51	71	86	89	88	87	59.2	89
3-Apr	87	90	90	89	89	89	90	88	83	78	74	71	69	65	61	56	54	53	55	62	65	70	70	70	73.6	90
4-Apr	70	71	73	78	79	80	77	69	62	57	50	44	40	38	37	35	37	39	43	52	54	56	59	60	56.7	80
5-Apr	62	64	64	65	67	67	67	61	57	52	49	48	47	46	44	45	49	58	71	77	81	90	95	96	63.5	96
6-Apr	97	97	98	99	99	99	99	99	96	93	91	89	88	88	89	88	90	89	88	89	89	90	92	90	92.7	99
7-Apr	92	92	91	89	88	89	89	88	84	80	77	76	75	81	79	80	79	78	75	85	82	71	65	71	81.6	92
8-Apr	72	73	74	73	73	72	72	73	72	68	64	62	60	56	53	53	55	56	58	59	61	64	66	68	64.9	74
9-Apr	69	70	73	73	79	77	74	78	80	85	82	81	79	76	76	83	85	86	88	88	89	88	87	86	80.6	89
10-Apr	86	83	82	80	82	83	77	70	64	56	48	40	34	31	28	26	23	24	25	34	40	45	47	50	52.4	86
11-Apr	49	48	50	53	55	55	54	52	50	50	48	45	43	42	39	38	35	38	41	43	47	48	50	50	46.8	55
12-Apr	53	54	57	61	74	84	83	82	88	77	68	62	62	57	55	52	52	54	57	64	69	72	76	78	66.4	88
13-Apr	79	79	79	78	78	80	82	81	77	71	60	61	81	80	78	83	91	97	97	98	98	99	99	99	83.5	99
14-Apr	99	100	99	96	96	95	94	93	91	90	88	87	88	85	83	82	79	81	83	84	86	93	94	93	90.0	100
15-Apr	90	90	89	89	89	90	87	79	75	71	70	68	67	67	65	63	60	58	60	67	67	67	64	60	73.0	90
16-Apr	62	62	61	65	65	63	62	58	55	51	50	42	36	35	30	27	24	23	24	38	42	44	41	43	45.9	65
17-Apr	45	47	47	44	42	45	46	46	45	41	39	36	32	30	27	27	28	30	36	45	46	48	49	48	40.3	49
18-Apr	47	47	50	51	52	52	47	42	39	35	29	25	26	24	22	22	22	23	23	20	20	21	25	25	33.0	52
19-Apr	24	23	24	26	28	33	33	39	41	32	29	27	21	18	16	17	19	19	19	23	30	35	44	74	28.9	74
20-Apr	77	75	72	72	80	82	84	85	83	77	71	66	62	56	51	47	45	44	45	49	56	55	55	58	64.4	85
21-Apr	62	63	66	63	63	61	59	49	44	41	38	34	31	28	25	22	23	27	30	35	42	45	48	52	43.8	66
22-Apr	52	53	55	59	60	58	51	42	35	31	28	26	24	24	23	21	21	22	23	27	33	40	44	46	37.5	60
23-Apr	48	48	49	49	50	50	46	40	33	26	25	23	23	21	22	23	25	25	27	31	37	41	40	37	34.9	50
24-Apr	35	36	38	40	42	45	45	44	44	45	46	42	38	35	36	42	45	43	43	38	36	36	47	62	41.8	62
25-Apr	69	76	81	83	85	87	88	88	86	84	81	79	75	72	70	69	68	66	65	70	75	76	76	77	77.0	88
26-Apr	79	81	83	84	83	85	87	86	83	76	71	71	76	78	81	88	90	94	94	96	97	98	98	99	85.7	99
27-Apr	97	94	96	99	99	100	100	100	98	91	88	83	77	66	62	58	55	56	57	60	66	65	72	79	80.0	100
28-Apr	82	81	81	78	74	71	58	48	42	39	36	34	31	32	31	30	31	31	33	36	39	41	40	39	47.5	82
29-Apr	39	37	38	39	41	41	41	39	36	33	30	28	28	27	27	26	24	24	25	30	34	35	35	36	33.1	41
30-Apr	36	36	39	40	41	41	43	42	42	42	35	34	34	34	40	43	46	65	61	55	61	70	75	81	47.3	81
	66.3	66.8	67.7	68.4	69.6	70.6	69.2	66.6	63.9	59.8	56.1	53.2	51.7	49.9	48.3	48.3	48.5	50.1	51.7	56.1	59.5	61.5	63.3	65.9	Diurnal Average	
	99	100	99	99	99	100	100	100	98	93	91	89	88	88	89	88	91	97	97	98	98	99	99	99	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity (RH) - %

Firebag - April 2016



Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	7	0.97	0.97
20 - 40	155	21.53	22.50
40 - 60	200	27.78	50.28
60 - 80	188	26.11	76.39
80 - 100	170	23.61	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Firebag - April 2016

Maximum Speed: 36 km/h on Apr 19 14:00

Maximum Daily Speed Average: 25.4 km/h on Apr 8

Minimum Speed Value: 0 km/h on Apr 7 10:00

Minimum Daily Speed Average: 3.1 km/h on Apr 27

Maximum Diurnal Speed Average: 9.6 km/h at hour 1

Minimum Diurnal Speed Average: 2.5 km/h at hour 8

Monthly Average Velocity: 5.0 km/h 161.6 deg

Percentiles: $P_1 = 2$ $P_{10} = 8$ $Q_1 = 11$ Median = 15 $Q_3 = 19$ $P_{90} = 26$ $P_{99} = 33$

Hours in Service:	720
Hours of Data:	685
Hours of Missing Data:	35
Percent Operational Time:	95.1

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-Apr	WSW14	W13	WNW14	NW15	N26	N31	N28	N28	N26	N22	N21	N19	N20	N17	N13	NNE13	N9	NE9	ENE12	E9	ESE11	ESE11	SE12	SE12	N11.2	N31
2-Apr	SE14	SE15	SE16	SE19	ESE18	ESE18	ESE19	ESE20	ESE22	ESE20	SE19	ESE17	ESE16	ESE16	E16	E21	E21	ENE16	E14	E12	E10	ESE10	ESE12	ESE10	ESE15.8	ESE22
3-Apr	ESE10	ESE9	E7	ENE8	NE10	NNE11	NNE14	N17	N18	N18	N18	N16	N13	N12	N11	N10	NNE8	NNE8	NNE8	NE8	E7	E6	SE9	SE11	NNE8.0	N18
4-Apr	SSE12	SSE13	S16	S14	S12	S13	SSE13	S12	SSW12	SSW12	SSW11	S8	SE7	SE7	SSE6	SSE3	SE2	ESE4	E7	E10	ESE11	ESE11	ESE11	ESE11	SSE8.3	S16
5-Apr	SE11	SE10	SE11	SE10	SE11	SE11	SE10	SE12	SE13	SE16	SSE17	S16	S16	S15	S18	S20	SSW21	SSW23	S18	S19	S19	S18	S19	S17	SSE14.0	SSW23
6-Apr	S14	S9	SW7	WNW9	NW13	NNW18	NNW19	NNW20	NNW21	NNW19	N18	N17	NNW17	NNW16	N17	NNW17	N16	N17	N16	N18	N15	N14	N13	N13	NNW12.9	NNW21
7-Apr	N12	NNW9	N7	NNE3	NE1	ENE3	SE3	S4	S2	ENE0	E1	SSE1	NNE3	NE9	NNE9	NNE9	NE13	NE11	NE6	NNE6	ENE10	E10	ESE11	ESE12	NE4.5	NE13
8-Apr	SE13	SE14	SE15	SE16	SE15	SE17	SE17	SSE21	SSE27	SSE28	SE28	SE30	SE30	SE29	SE30	SE33	SE35	SE32	SE33	SSE32	SE34	SSE30	SSE32	SSE26	SE25.4	SE35
9-Apr	SSE25	SSE22	S15	S8	NW5	N17	NNW25	NNW25	NNW27	NNW31	NNW32	NNW32	NNW29	NNW33	NNW32	NNW33	NNW31	NNW32	NNW29	NNW28	NNW28	NNW22	N24	N21	NNW19.4	NNW33
10-Apr	N19	N19	NNW15	N15	N15	N14	N13	N15	N17	N13	N11	N9	NNE8	N4	NW4	NNW4	WNW2	SW3	SSW2	ESE5	SE11	SSE15	SSE16	SSE16	N5.6	N19
11-Apr	SSE19	S22	S20	S19	S17	S19	S15	SSW19	SSW20	SSW19	SSW18	SSW16	SSW19	SSW18	SW15	SW10	SW14	SSW7	S2	SE8	SE10	SSE11	SSW11	SSW15	S14.0	S22
12-Apr	SSW16	SSW16	SW13	WSW10	NNW9	NNW9	N13	N15	NNE15	N12	NNE13	NNE14	N12	NNE15	NNE14	NE16	NE13	NE15	ENE12	E14	E15	ESE15	ESE16	ESE18	NE6.3	ESE18
13-Apr	ESE18	SE19	SE17	SE17	S9	ESE15	SE17	SE18	SE16	SE14	SE16	SSE20	SE17	SE13	SSE12	SSE16	SE13	ESE17	ESE16	ESE10	SE8	ESE8	AF	AF	SE14.4	SSE20
14-Apr	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	----	----
15-Apr	AF	AF	AF	AF	AF	AF	AF	AF	AF	WSW10	SW10	SSW13	S12	S14	S14	SSE14	S16	S16	SSE15	SE13	SE16	SSE19	SSE21	SSE22	----	SSE22
16-Apr	SSE18	S16	S16	SSE16	SSE15	S17	S18	SSW20	SSW23	SW20	SSW20	SSW20	WSW20	SW21	WSW22	WSW19	WSW16	W15	WNW9	SSW2	SSE7	S9	S10	S10	SSW13.2	SSW23
17-Apr	SSW10	S10	S10	SSW11	SSE8	S11	S11	SSE9	SSE13	SSW16	SW18	SW14	WSW15	W15	W9	N1	ESE2	SE2	SSE6	SSE6	SE7	SE12	SE14	SSE14	S7.7	SW18
18-Apr	SSE14	SSE15	S12	SSW12	SSW14	SSW15	SSW16	SSW16	SSW15	SSW11	SSW15	SSW19	S23	S29	SSW28	SSW30	SSW27	SSW25	S27	S28	S31	S31	S31	S31	S21.1	S31
19-Apr	S29	SSW23	SSW23	SSW22	SW20	SW16	WSW16	NW17	NW15	W18	W21	W25	W31	W36	W34	WNW31	WNW29	WNW30	WNW25	NW18	NW19	WNW17	NW23	N27	W17.2	W36
20-Apr	N27	N31	N30	N28	N31	N28	N28	N26	N23	N23	N20	N21	NNE16	NNE14	NNE14	NNE14	NNE14	NNE12	NNE11	NNE9	NE7	E8	ESE11	ESE11	N16.9	N31
21-Apr	SE9	SE10	SE8	SSE10	S8	SSE7	SSE5	NE3	ENE4	NNE7	NNE8	NNE8	NNE12	NNE13	NE15	NE16	NE14	NE17	NE19	NE16	NE12	NE13	NE14	ENE10	NE7.6	NE19
22-Apr	E13	E13	ESE12	ESE11	ESE10	ESE9	ESE9	ESE7	E9	ENE8	E10	ENE11	ENE9	E8	ESE10	E9	ESE9	ESE10	ESE12	E14	E18	ESE18	ESE15	ESE15	E10.6	ESE18
23-Apr	SE14	SE14	ESE14	ESE15	ESE15	SE15	SE14	SE12	SE12	SE16	ESE17	SE17	SE15	SE14	ESE14	ESE16	SE15	SE14	SE15	SE10	SE13	SE16	SE16	SE19	SE14.6	SE19
24-Apr	SSE21	SSE21	SSE21	SSE18	SE12	SE12	SE15	SSE13	SSE17	S16	S21	S19	S20	S20	S19	SSE20	SSE19	SSE18	SSE15	SE17	SE16	SSE17	S19	S21	SSE17.3	S21
25-Apr	SSW24	SSW20	SSW17	S16	S17	S16	S17	S19	S18	SSW19	SSW17	SSW19	SSW19	SSW18	SSW18	SSW16	SW14	SSW15	SW16	SW11	SSW10	SSW11	SSW12	SSW12	SSW16.0	SSW24
26-Apr	SSW13	SSW14	SSW14	SSW16	SSW18	SSW18	SSW17	SSW18	S19	SSW17	SSW14	SSW11	SSW13	SSW15	SSW15	SSW14	SSW12	SSW9	S8	S8	S10	S10	S11	S10	SSW13.4	S19
27-Apr	S9	SSW9	SSW6	SSW4	SSW4	NNW2	N5	NNE6	NW3	NNW3	N7	N10	N9	N10	N7	N9	NNW8	NE10	NE12	ENE9	E9	E11	ESE15	ESE13	NE3.1	ESE15
28-Apr	SE13	SE14	SE13	SSE13	S14	SSW12	SSW10	SW10	SW12	SSW15	SSW16	SSW16	SSW19	SSW17	SSW18	S18	SSE17	SSE18	SSE12	SE9	SE12	SSE14	SSE15	S14	S12.6	SSW19
29-Apr	S15	SSE17	SSE17	SSE17	SSE17	SSE18	SSE18	SSE22	S27	S31	S33	S34	S32	S32	S31	S29	SSW26	SSW21	SSW17	S9	SSE12	S15	S15	S14	S21.1	S34
30-Apr	S16	S15	S16	S18	S20	S19	SSW19	SSW23	SSW25	SSW24	SSW29	SW26	SW26	SW22	WSW18	WSW19	WSW14	NW6	SSE11	SSW15	NE6	E13	ESE11	SE11	SSW13.9	SSW29
	SSE9.6	SSE9.0	SSE8.3	SSE7.4	SSE4.9	SSE4.0	SSE3.5	SSE2.5	S3.6	S3.8	SSW4.3	SSW4.3	SSW4.6	SSW4.1	SSW3.5	S2.8	S3.0	SE2.6	SE3.9	ESE5.0	SE6.8	SE8.6	SSE9.4	SSE9.5	Diurnal Average	
	S29	N31	N30	N28	N31	N31	N28	N28	SSE27	S31	S33	S34	S32	W36	W34	NNW33	SE35	SE32	SE33	SSE32	SE34	S31	SSE32	S31	Diurnal Maximum	

AF - Analyzer Failure

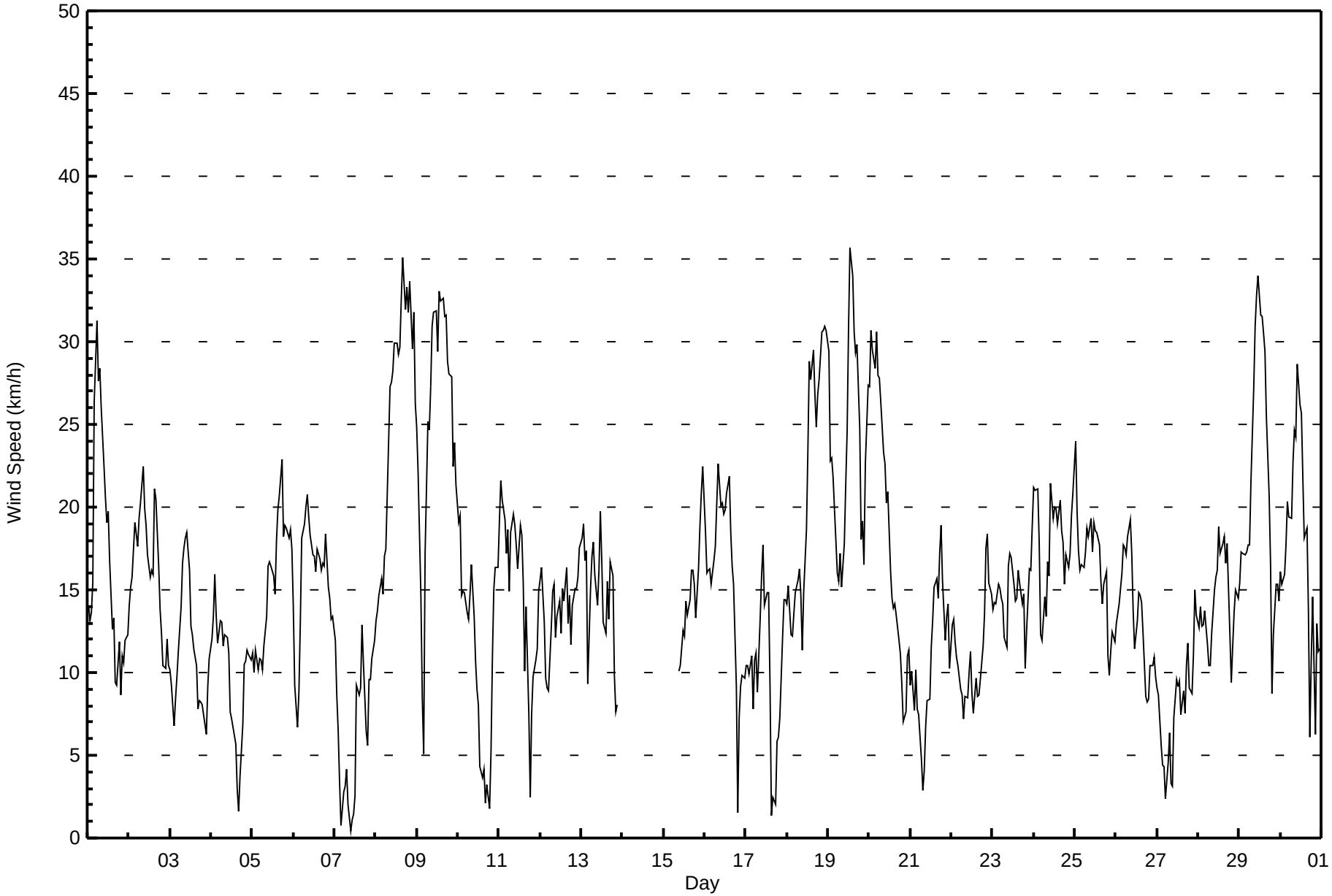
All monthly, daily, and diurnal averages have been calculated using vector methods

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed (WS) - km/h

Firebag - April 2016



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	35	5.11	5.11
6 - 11	161	23.50	28.61
12 - 19	351	51.24	79.85
20 - 28	91	13.28	93.14
29 - 38	47	6.86	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Wind Speed (WS) - km/h

Firebag - April 2016

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	2	3	1	3	3	3	3	4	1	0	0	1	3	3	35
6 - 11	12	15	8	8	14	24	22	10	18	15	5	2	1	2	1	4	161
12 - 19	36	15	14	3	10	28	58	41	53	57	9	8	4	2	6	7	351
20 - 28	19	0	0	0	2	3	1	14	12	20	6	2	2	1	1	8	91
29 - 38	4	0	0	0	0	0	9	3	13	2	0	0	3	3	0	10	47
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	74	32	24	14	27	58	93	71	99	98	21	12	10	9	11	32	685

Total Number of Valid Hours: 685

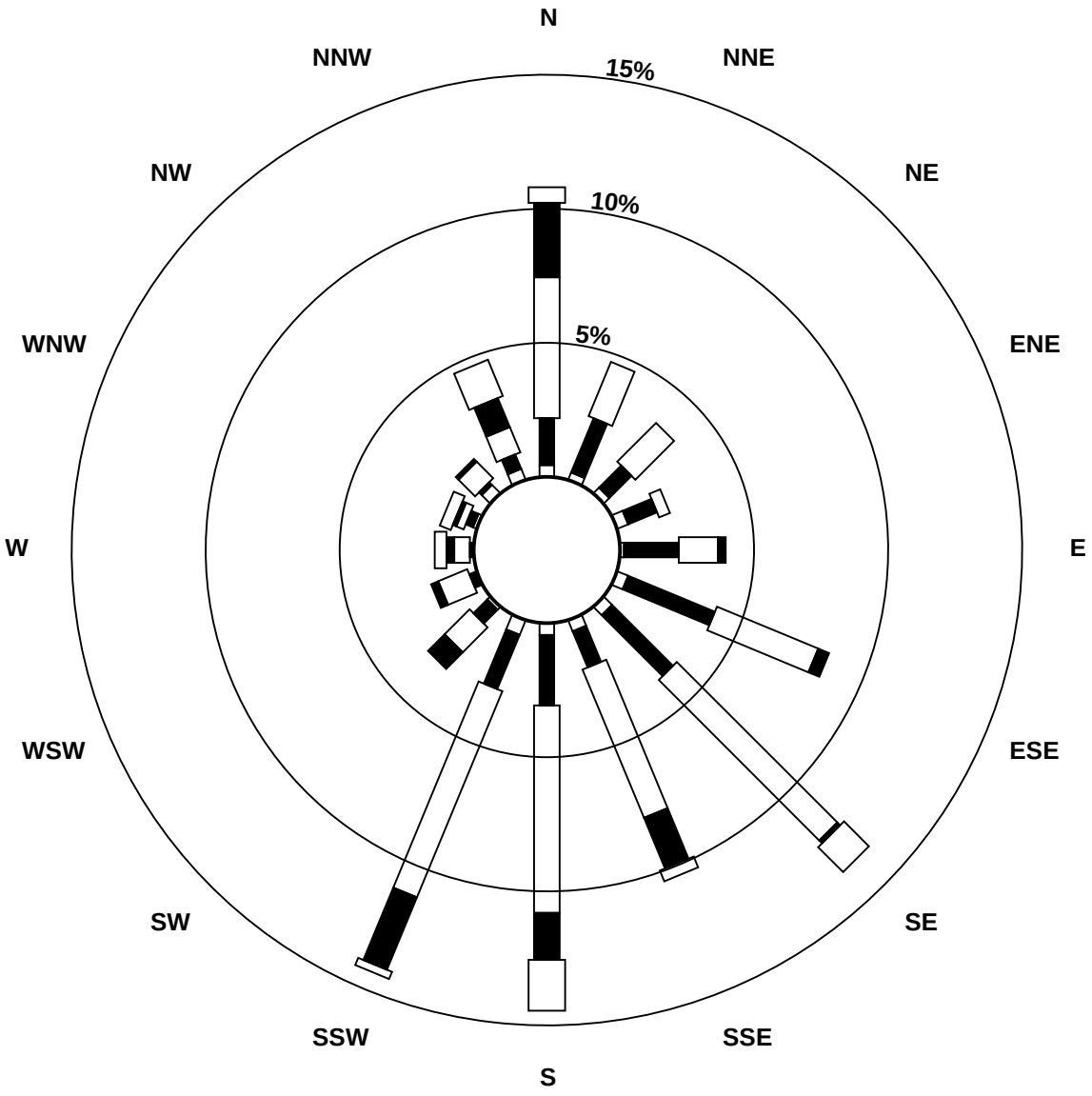
Total Number of Hours: 720

Wood Buffalo Environmental Association

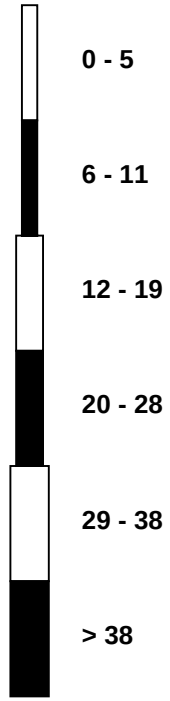
Wind Rose Apr 2016

Wind Speed (WS) - km/h

Firebag (AMS 19)



Classes (km/h)



Total Number of Valid Hours: 685

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

Maximum Value: 8 km/h on Apr 19 15:00

Minimum Value: 1 km/h on Apr 17 02:00

Percentiles: P_1 = 1 P_{10} = 2 Q_1 = 2 Median = 3 Q_3 = 4 P_{90} = 5 P_{99} = 7

Hours in Service:	720
Hours of Data:	685
Hours of Missing Data:	35
Hours of Calibration:	0
Percent Operational Time:	95.1

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

AF - Analyzer Failure

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Firebag - April 2016

Direction of Maximum Speed: 267 deg on Apr 19 14:00
Direction of Maximum Daily Speed Average: 144.4 deg on Apr 8

Direction of Minimum Speed: 62 deg on Apr 7 10:00

Direction of Minimum Daily Speed Average: 3.1 deg on Apr 27

Monthly Average Direction: 185.2 deg

Hours in Service:	720
Hours of Data:	685
Hours of Missing Data:	35
Percent Operational Time:	95.1

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-Apr	240	260	288	320	349	351	350	355	351	358	354	354	355	356	358	12	11	37	60	92	107	120	125	127	358.0
2-Apr	126	125	124	126	121	119	120	120	122	121	128	119	119	113	92	96	97	70	90	79	97	103	108	118	111.8
3-Apr	119	112	92	70	42	18	18	0	357	357	358	6	355	352	7	2	12	28	22	43	85	101	130	145	26.3
4-Apr	148	162	175	180	182	179	167	182	201	198	205	183	135	138	166	147	136	119	88	100	110	118	117	123	158.1
5-Apr	130	131	124	129	127	131	131	137	135	132	155	175	173	170	178	177	194	198	189	188	179	176	183	186	165.6
6-Apr	182	186	214	284	317	343	346	346	336	344	352	350	338	345	352	344	355	358	359	1	353	4	2	6	345.8
7-Apr	358	344	359	19	37	77	128	181	178	62	82	160	12	34	32	31	42	52	49	33	58	87	108	120	50.7
8-Apr	124	137	135	138	135	137	140	149	158	155	145	143	141	137	135	141	139	142	144	148	146	149	161	161	144.4
9-Apr	168	163	169	189	311	351	347	347	342	340	342	346	346	346	342	340	344	344	347	348	348	345	351	354	344.5
10-Apr	353	354	347	353	356	359	360	359	360	1	1	358	13	355	312	338	283	214	208	113	139	152	156	157	5.5
11-Apr	166	171	171	171	174	178	178	195	201	201	200	210	204	205	221	222	230	205	188	137	136	147	196	210	189.5
12-Apr	211	213	216	240	337	348	8	8	18	11	26	12	11	12	30	38	44	55	63	92	97	104	117	122	45.1
13-Apr	122	128	131	131	170	119	130	130	138	144	144	155	134	128	154	157	134	118	119	119	125	111	AF	AF	133.7
14-Apr	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--
15-Apr	AF	AF	AF	AF	AF	AF	AF	AF	AF	251	216	200	190	190	176	164	169	175	161	141	140	150	155	163	--
16-Apr	167	177	183	167	162	172	182	197	209	214	204	208	238	234	239	255	253	273	294	206	163	180	186	191	206.8
17-Apr	192	188	183	197	167	180	174	166	158	196	224	230	252	268	278	357	109	138	155	166	133	134	144	155	188.3
18-Apr	163	168	175	194	197	195	199	200	199	200	209	197	190	188	196	199	203	192	190	188	188	184	185	183	190.8
19-Apr	182	198	197	203	215	224	243	320	309	279	281	278	262	267	278	288	296	297	291	304	310	297	318	353	273.2
20-Apr	359	353	351	352	351	351	353	352	354	352	352	3	18	19	18	17	29	15	17	32	55	91	117	121	4.8
21-Apr	126	129	145	156	173	165	162	41	57	14	21	16	14	18	36	36	37	37	36	38	40	48	52	62	51.7
22-Apr	83	93	108	120	117	113	122	115	100	74	80	58	76	82	105	83	111	103	105	85	94	111	117	123	99.9
23-Apr	127	128	123	121	120	127	131	135	132	125	118	131	136	127	121	117	134	137	145	136	126	127	132	142	128.9
24-Apr	147	151	159	158	142	135	146	148	166	171	180	174	181	172	169	163	163	160	149	142	145	155	177	188	161.4
25-Apr	194	198	192	188	185	175	176	184	185	194	206	199	193	206	208	204	216	213	225	215	204	201	202	208	197.9
26-Apr	208	206	201	201	199	199	195	199	189	195	202	204	210	201	193	203	196	196	178	174	185	180	179	182	195.9
27-Apr	189	198	209	208	192	334	358	13	322	334	1	357	5	353	349	5	342	35	50	64	79	99	116	123	43.5
28-Apr	132	143	141	157	174	195	205	220	221	213	209	194	203	205	197	190	159	159	154	134	136	147	161	171	177.2
29-Apr	174	168	167	160	159	155	160	163	171	172	176	182	186	183	181	180	200	202	202	191	164	174	179	176	177.0
30-Apr	184	182	179	182	189	189	195	203	208	198	203	225	224	222	253	255	251	308	167	194	45	79	119	141	201.6
	160.0	163.6	165.9	166.8	164.8	153.0	153.0	165.2	181.0	191.2	194.0	196.4	200.2	201.5	199.1	179.2	173.7	143.2	131.0	123.2	124.9	135.0	147.3	151.7	
	Diurnal Average																								

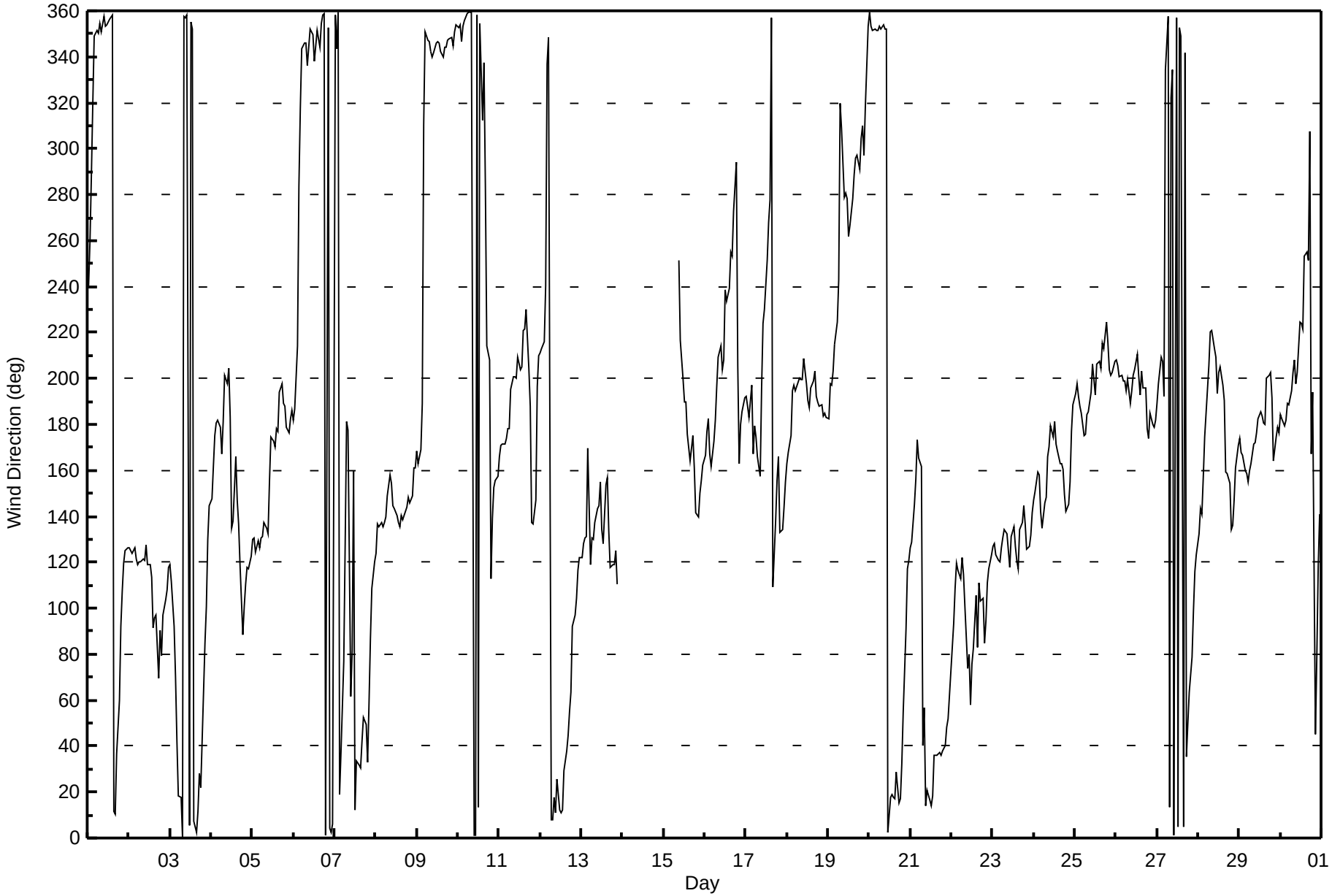
AF - Analyzer Failure
All monthly, daily, and diurnal averages have been calculated using vector methods

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction (WD) - deg

Firebag - April 2016



Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg

Firebag - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 90 deg on Apr 10 19:00

Minimum Value: 3 deg on Apr 16 23:00

Percentiles: $P_1 = 5$ $P_{10} = 8$ $Q_1 = 10$ Median = 12 $Q_3 = 16$ $P_{90} = 27$ $P_{99} = 82$

Hours in Service:	720
Hours of Data:	685
Hours of Missing Data:	35
Hours of Calibration:	0
Percent Operational Time:	95.1

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-Apr	12	10	13	14	13	13	12	15	14	15	17	15	15	16	17	16	17	14	11	19	12	14	11	12	19
2-Apr	12	11	11	12	11	10	13	12	12	12	15	18	19	18	14	12	11	13	13	16	16	14	13	13	19
3-Apr	12	13	22	10	15	11	12	14	14	16	15	20	20	24	20	23	29	20	14	14	25	22	9	7	29
4-Apr	6	7	7	7	6	7	7	9	11	9	20	30	29	32	28	53	88	46	19	11	12	12	9	11	88
5-Apr	11	11	9	10	10	11	11	11	11	11	15	16	14	15	14	15	12	9	13	7	9	8	8	7	16
6-Apr	9	15	23	14	13	11	11	12	10	12	14	14	12	13	11	15	13	14	14	12	12	11	11	13	23
7-Apr	14	15	12	26	57	30	27	17	36	90	81	55	45	17	13	16	15	11	15	16	11	10	15	11	90
8-Apr	11	11	11	9	11	10	11	9	9	9	10	11	11	11	12	11	11	12	10	10	11	13	9	11	13
9-Apr	10	11	12	68	20	15	13	12	12	11	11	14	15	13	13	12	11	11	11	13	12	11	11	11	68
10-Apr	12	13	11	11	10	12	12	12	14	19	21	29	40	68	69	77	82	38	90	25	11	8	9	9	90
11-Apr	7	8	7	7	8	9	10	9	8	9	11	16	11	12	15	21	15	20	74	21	9	11	16	7	74
12-Apr	6	7	10	29	9	12	12	14	16	17	19	17	18	19	19	13	13	11	10	17	11	12	10	11	29
13-Apr	11	11	12	12	38	11	12	12	11	11	15	10	11	12	13	11	14	13	13	13	15	9	AF	AF	38
14-Apr	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--
15-Apr	AF	AF	AF	AF	AF	AF	AF	AF	AF	18	21	13	19	13	16	16	13	12	10	10	10	8	8	8	21
16-Apr	7	11	9	11	14	8	8	9	8	9	7	13	18	14	13	13	18	15	14	51	6	9	3	4	51
17-Apr	7	6	5	7	9	39	15	27	14	21	11	16	12	23	30	84	67	60	16	8	14	7	10	7	84
18-Apr	7	6	7	8	4	4	6	6	7	11	11	11	12	11	11	11	10	9	7	8	8	8	7	7	12
19-Apr	8	8	7	8	8	8	15	21	15	17	17	14	13	14	14	16	14	13	13	14	14	11	28	16	28
20-Apr	17	13	15	15	15	14	15	15	16	14	17	20	22	25	23	24	18	23	15	10	28	17	12	11	28
21-Apr	12	11	9	11	9	9	18	54	48	66	39	45	31	26	24	22	21	14	12	8	7	8	8	13	66
22-Apr	13	11	16	12	11	11	16	31	35	42	28	31	43	47	45	46	27	26	22	11	11	11	11	11	47
23-Apr	11	11	11	11	10	11	12	14	19	16	20	24	28	25	31	22	23	27	15	12	13	11	12	10	31
24-Apr	10	10	9	9	11	12	10	11	10	13	11	14	14	14	14	11	11	11	11	12	11	11	10	8	14
25-Apr	10	7	8	7	7	8	8	8	9	10	11	13	13	13	15	12	13	12	10	9	8	8	7	9	15
26-Apr	8	9	7	8	7	7	8	8	10	12	16	17	13	12	15	10	8	10	14	13	11	13	12	12	17
27-Apr	10	4	17	28	11	71	16	24	82	79	29	28	31	37	53	42	41	24	13	10	12	10	11	11	82
28-Apr	11	10	9	9	10	5	11	12	14	17	20	22	26	18	20	19	19	12	13	12	11	11	8	7	26
29-Apr	7	8	8	8	8	10	8	10	9	11	12	14	12	13	13	14	16	15	10	8	9	9	8	8	16
30-Apr	6	8	10	10	5	6	8	10	10	10	12	16	14	14	27	14	10	90	13	32	65	24	15	8	90
	17	15	23	68	57	71	27	54	82	90	81	55	45	68	69	84	88	90	90	51	65	24	28	16	
	Diurnal Maximum																								

AF - Analyzer Failure

Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

Calibration Date	April 28, 2016	Last Calibration	March 30, 2016
Station Name	Firebag	Station Number	AMS 19
Reason:	Routine		
Start Time (MST)	9:00	End Time (MST)	12:45
Gas Cert Reference	SA130123A	Station temp.	Deg C
Cal Gas Concentration	49.3 ppm	Cal Gas Exp Date	12/12/2016
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	-606
Analyzer IP address	192.168.1.43		Lamp voltage	804	800
Calculated slope	0.992613	0.997202	Chamber temp	44.9	44.9
Calculated intercept	-0.797805	-1.127161	Pressure	681.6	687.7
Analyzer Background	7.6	7.6	Flow	0.452	0.456
Analyzer Coefficient	0.978	0.974	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	573.1	1.003
calibrator zero	5000	0.0	0.0	0.3	----
high point	5000	58.3	574.8	577.2	0.996
second point	5000	29.3	288.9	291.2	0.992
third point	5000	14.7	144.9	147.4	0.984
as left zero	5000	0.0	0.0	0.9	----
as left span	5000	58.3	574.8	574.2	1.001
				Average Correction Factor	0.991

Corrected As found	572.8	Previous response	579.9	% change	1.2%

Notes:

Span adjusted slightly. No maintenance completed.

Calibration Performed By: Devin Russell

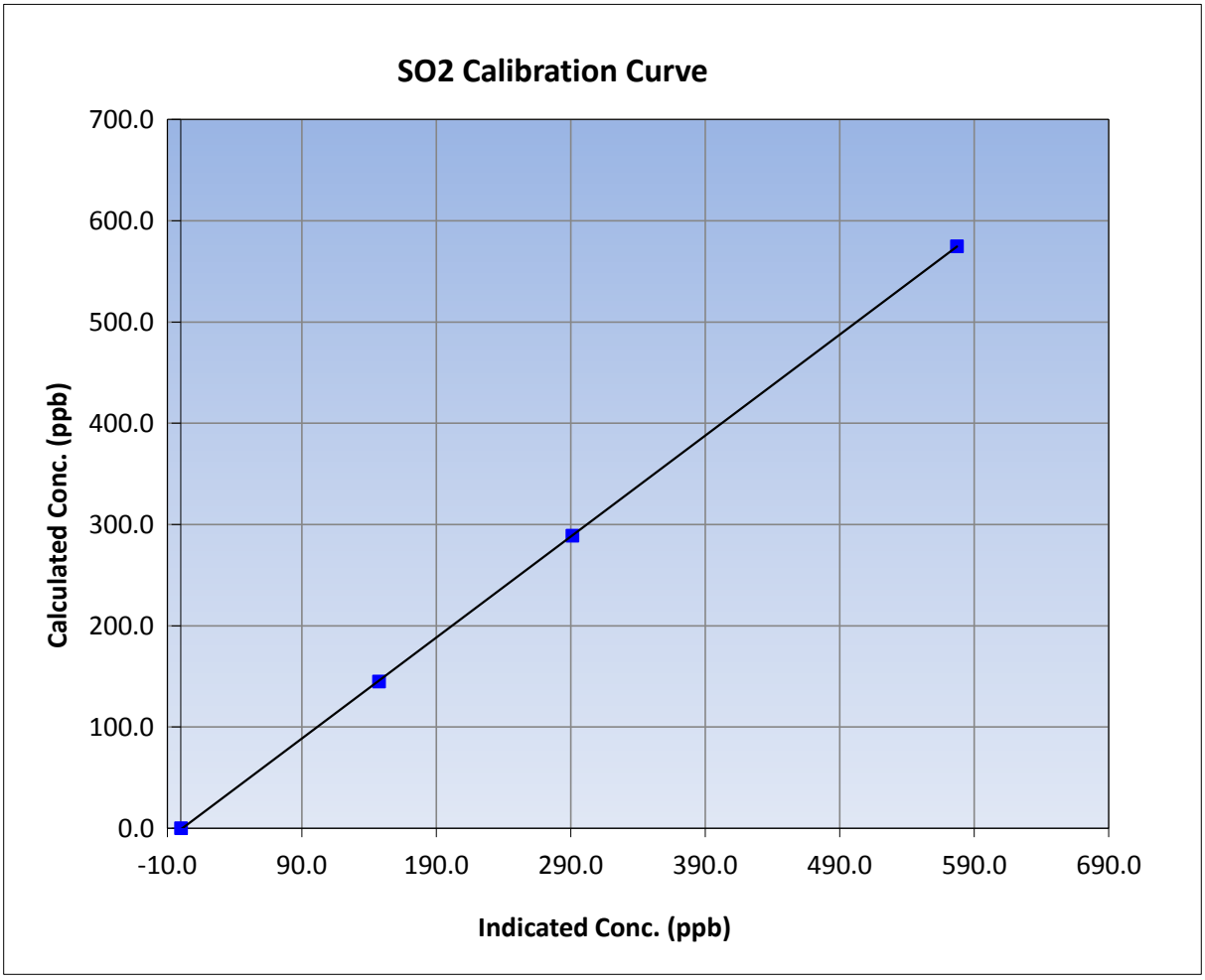
Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

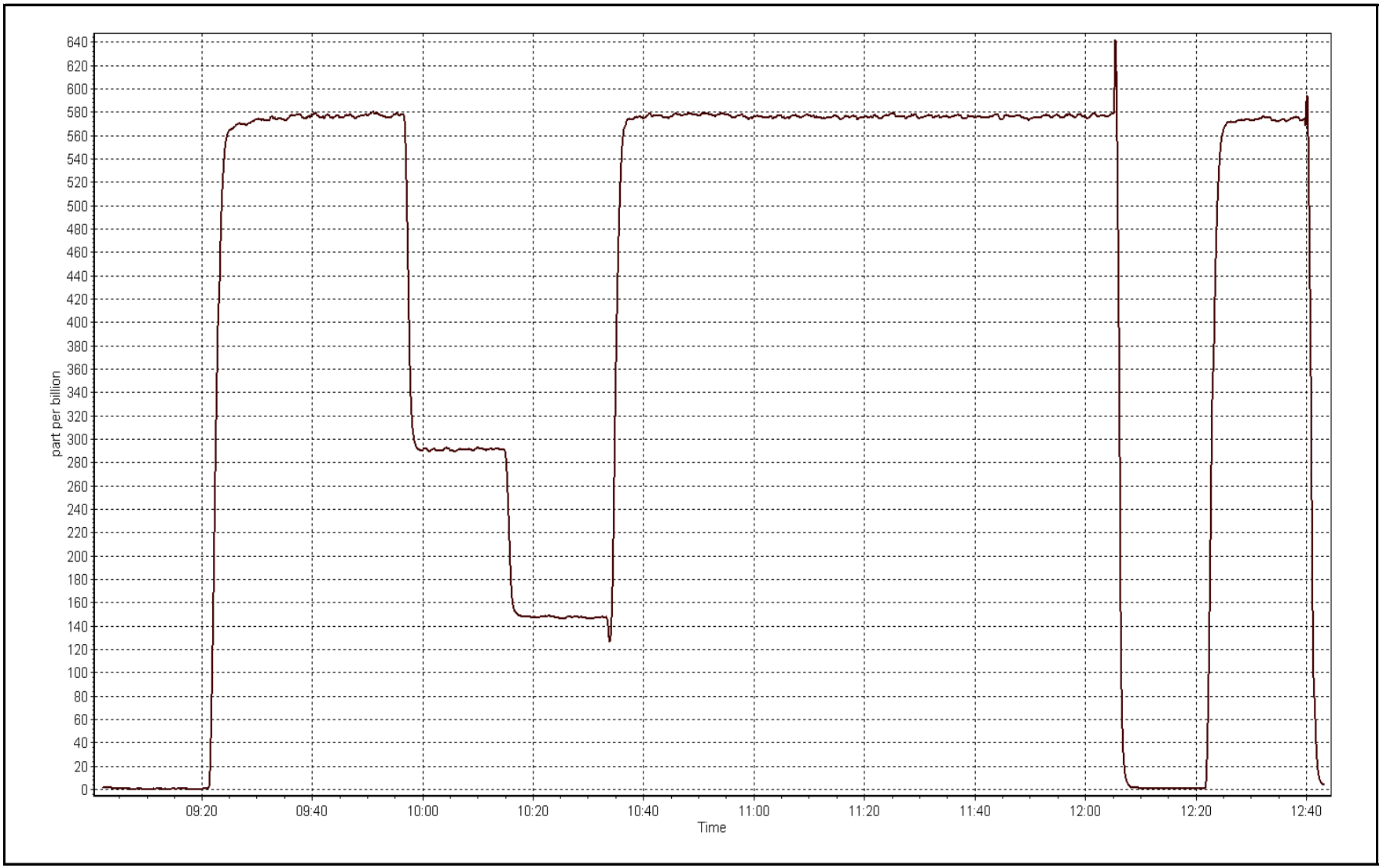
Calibration Date	April 28, 2016	Previous Calibration	March 30, 2016
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	9:00	End Time (MST)	12:45
Analyzer make	Thermo 43i	Analyzer serial #	1410661308

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.3	----	Correlation Coefficient	0.999990
574.8	577.2	0.9959		
288.9	291.2	0.9921	Slope	0.997202
144.9	147.4	0.9836		
			Intercept	-1.127161



SO2 Calibration Plot Date: April 28, 2016



Wood Buffalo Environmental Association
H2S Calibration Report

Station Information

Calibration Date	April 27, 2016	Last Calibration	March 29, 2016
Station Name	Firebag	Station Number	AMS 19
Reason:	Routine		
Start Time (MST)	9:46	End Time (MST)	13:45
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	192.168.1.45		Lamp voltage	936	933
Calculated slope	1.000762	1.000515	Chamber temp	45	45
Calculated intercept	-0.122803	-0.289121	Pressure	542.8	547.3
Analyzer Background	13	13	Flow	0.962	0.969
Analyzer Coefficient	1.164	1.164	Intensity	85	85
			Converter temp.	333	334

Analyzer make/model	Thermo 450i	Analyzer serial #	815129098
Converter make/model	NA	Converter serial #	NA

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.1	----
as found span	5000	83.3	80.8	79.9	1.011
SO2 scrubber check	5000	15.2	149.9	1.2	----
calibrator zero	5000	0.0	0.0	0.3	----
high point	5000	83.3	80.8	81.0	0.997
second point	5000	41.8	40.5	40.9	0.992
third point	5000	21.0	20.4	20.6	0.989
as left zero	5000	0.0	0.0	0.3	----
as left span	5000	83.4	80.9	80.9	1.000
				Average Correction Factor	0.993

Corrected As found	79.9	Previous response	80.9	% change	1.2%

Notes:

Inlet filter changed after as founds. Scrubber check completed after as founds. No adjustments made.

Calibration Performed By: Devin Russell

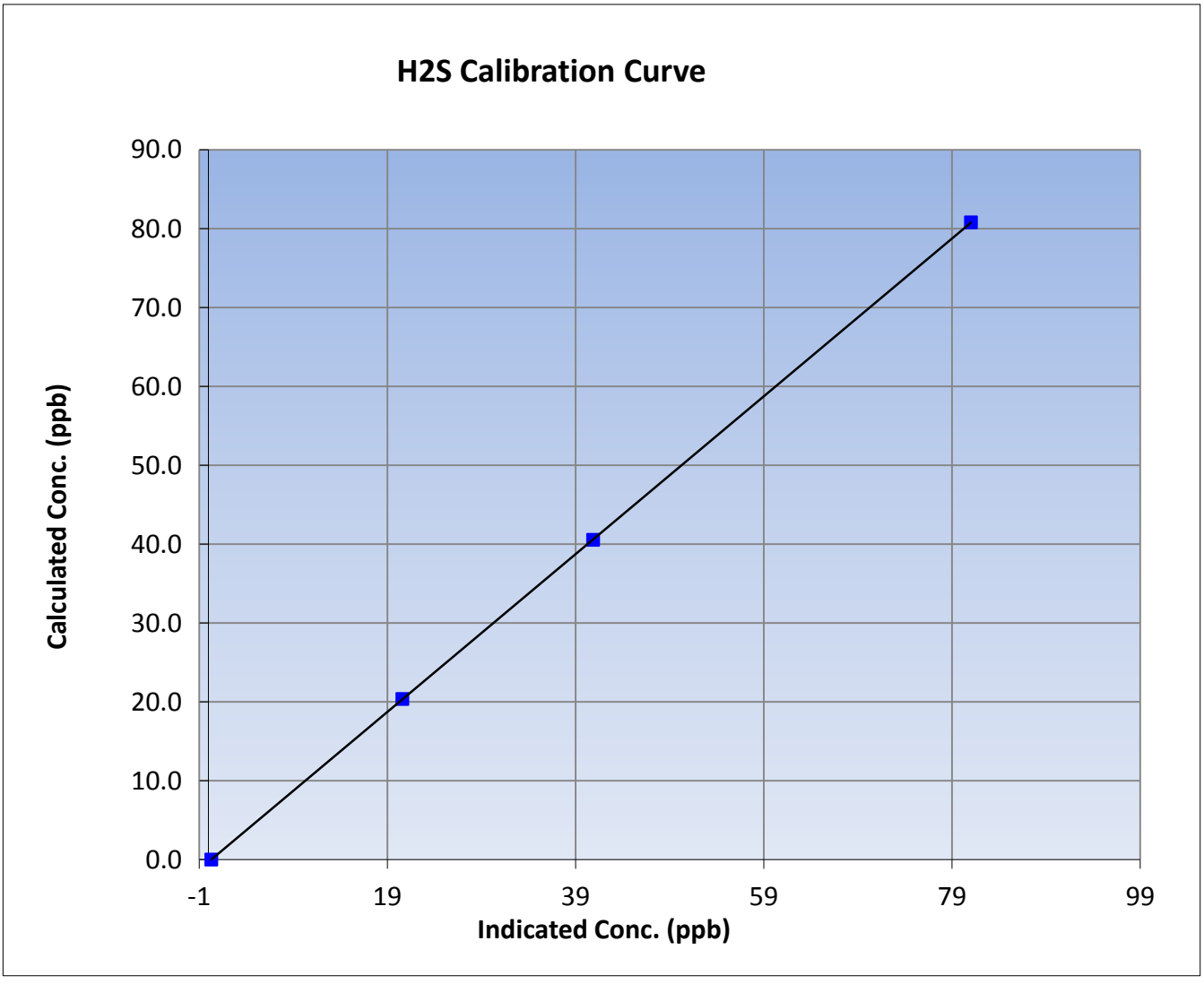
Wood Buffalo Environmental Association
H2S Calibration Report

Station Information

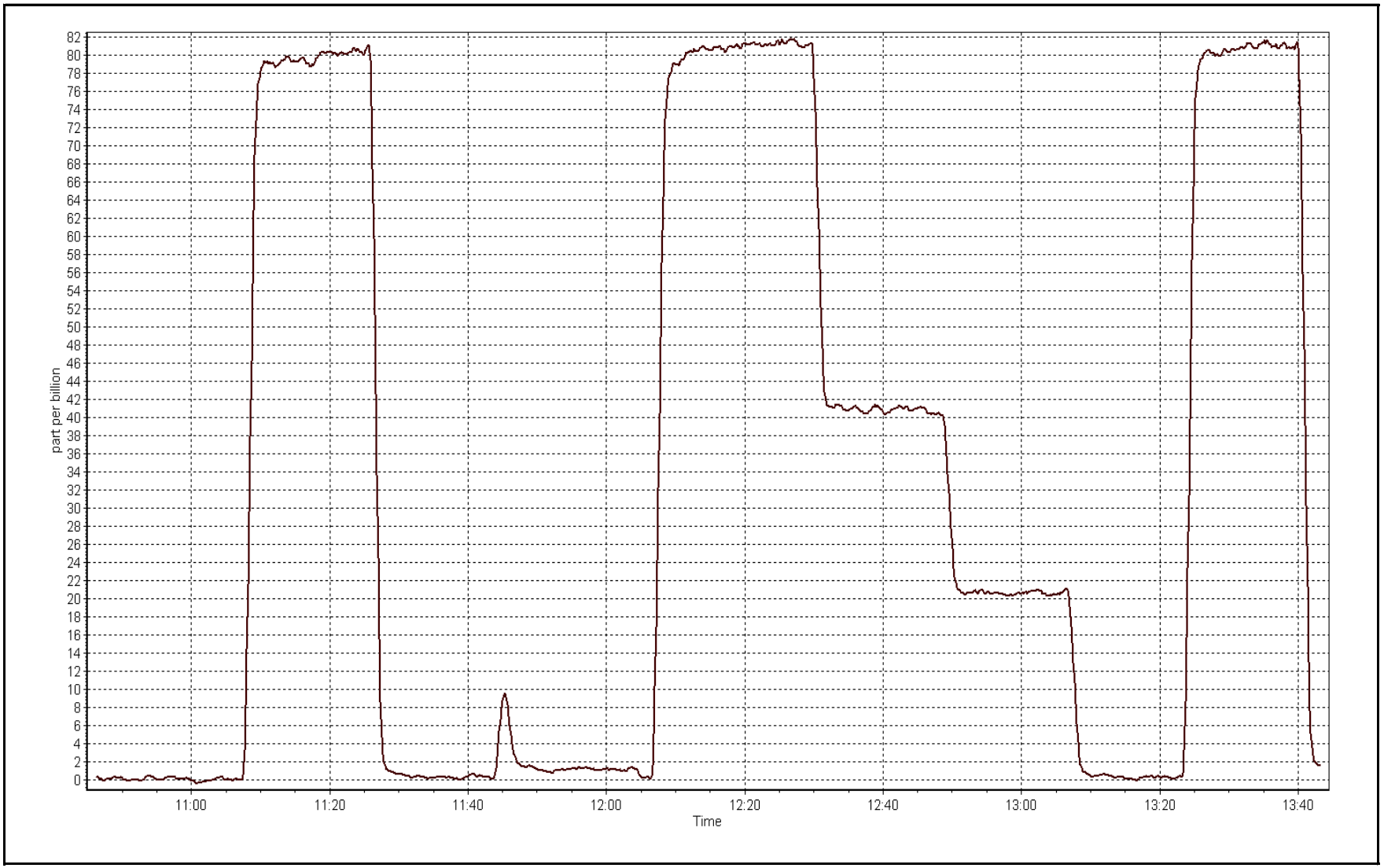
Calibration Date	April 27, 2016	Previous Calibration	March 29, 2016
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	9:46	End Time (MST)	13:45
Analyzer make	Thermo 450i	Analyzer serial #	815129098

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.3	----	Correlation Coefficient	0.999998
80.8	81.0	0.9972		
40.5	40.9	0.9918	Slope	1.000515
20.4	20.6	0.9893		
			Intercept	-0.289121



H2S Calibration Plot Date: April 27, 2016



Wood Buffalo Environmental Association
THC Calibration Report

Station Information

Calibration Date	April 28, 2016	Last Calibration	March 30, 2016
Station Name	Firebag	Station Number	AMS 19
Reason:	Routine		
Start Time (MST)	9:00	End Time (MST)	12:45
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	8.5	8.6
Analyzer IP address	192.168.1.51		Air or Bypass Press	34.9	34.9
Calculated slope	0.998664	1.013065	Fuel Pressure	23.0	23.0
Calculated intercept	-0.068074	-0.144554	Analyzer Coeff	3.551	3.5
			Analyzer BKG	4.890	4.840

Analyzer make	Thermo 51i-LT	Analyzer serial #	1336160089

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	0.13	----
as found span	5000	58.3	12.74	12.84	0.992
calibrator zero	5000	0.0	0.00	0.13	----
high point	5000	58.3	12.74	12.71	1.002
second point	5000	29.3	6.40	6.46	0.991
third point	5000	14.7	3.21	3.33	0.964
as left zero	5000	0.0	0.00	0.17	----
as left span	5000	58.3	12.74	12.83	0.993
				Average Correction Factor	0.986

Corrected As found	12.71	Previous response	12.82	% change	0.9%

Notes:

Span adjusted. No maintenance completed.

Calibration Performed By: Devin Russell

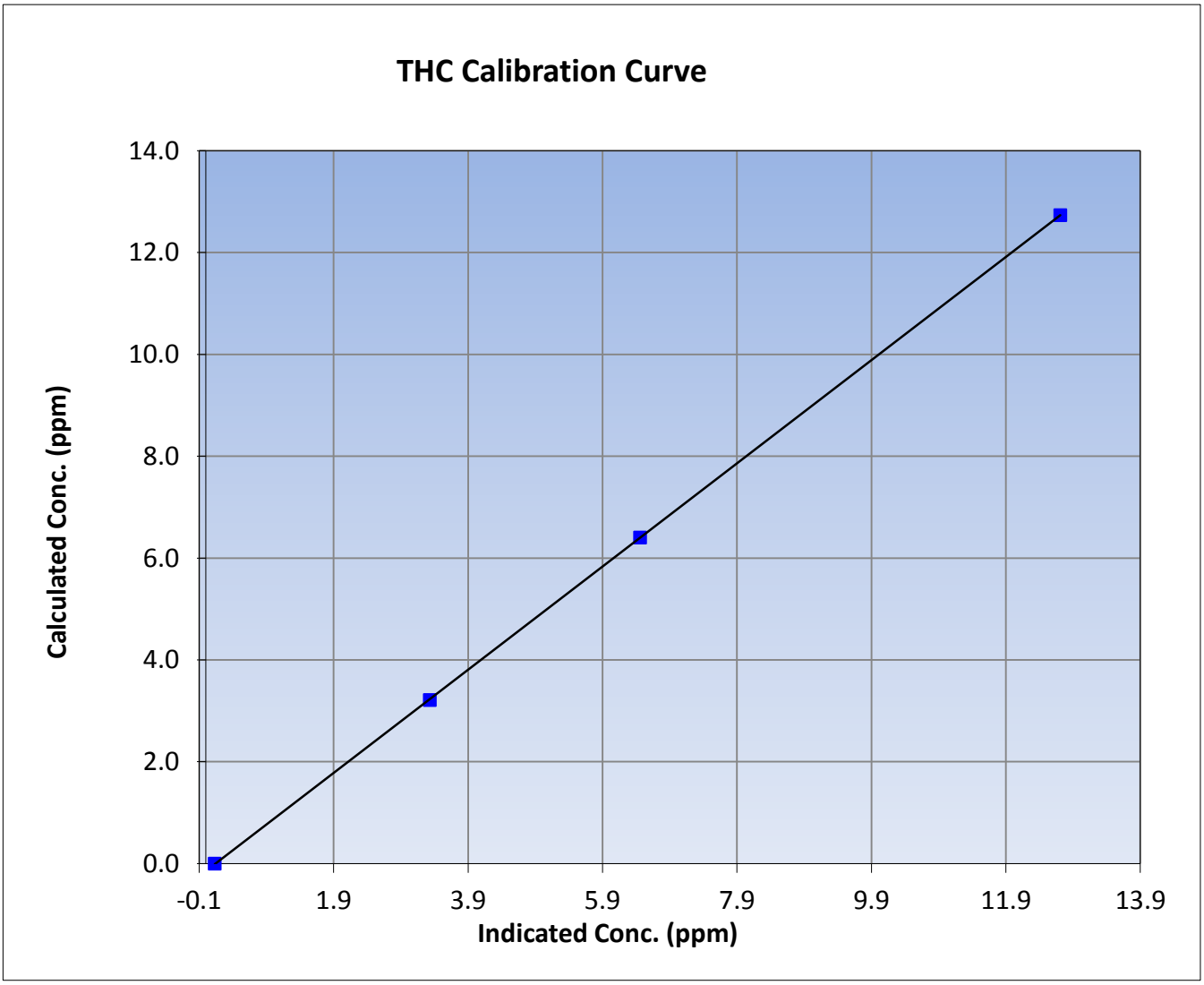
Wood Buffalo Environmental Association
THC Calibration Report

Station Information

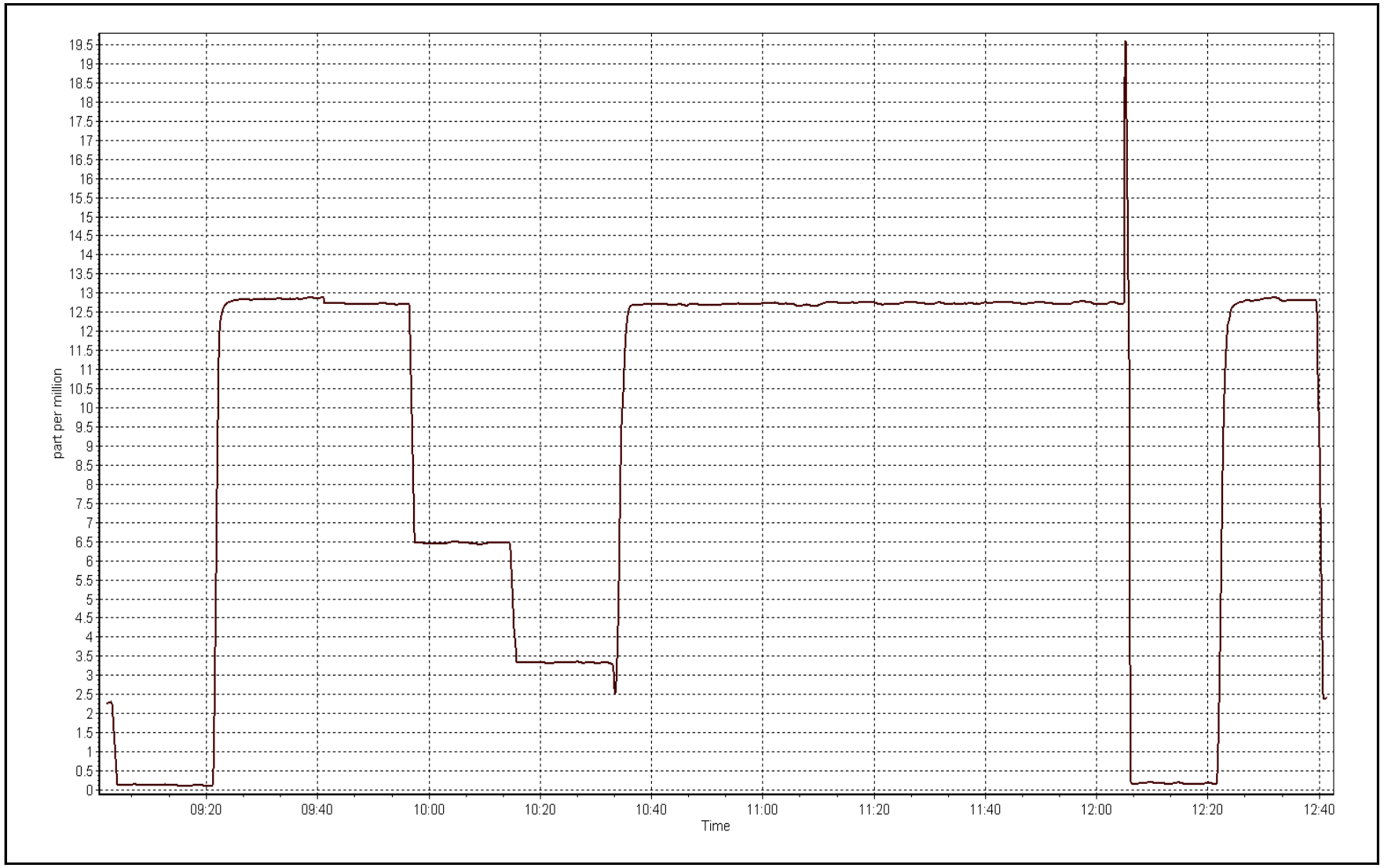
Calibration Date	April 28, 2016	Previous Calibration	March 30, 2016
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	9:00	End Time (MST)	12:45
Analyzer make	Thermo 51i-LT	Analyzer serial #	1336160089

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.13	----	Correlation Coefficient	0.999994
12.74	12.71	1.0020		
6.40	6.46	0.9908	Slope	1.013065
3.21	3.33	0.9643		
			Intercept	-0.144554



THC Calibration Plot Date: April 28, 2016



Wood Buffalo Environmental Association
NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	April 28, 2016	Previous Calibration	March 30, 2016
Station Name	Firebag	Station Number	AMS 19
Reason:	Routine		
Start Time (MST)	9:00	End Time (MST)	12:45
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	0.999026	0.997158	0.989179
	Data Offset	-0.570051	-0.350629	-0.389519
Current Calibration	Data Slope	1.002360	1.001576	0.998345
	Data Offset	-0.584046	-0.490358	-0.421270

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1410661309

Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
Analyzer IP	192.168.1.43		192.168.1.43	
NO coefficient	0.957		0.985	
NOX coefficient	0.998		0.998	
NO2 coefficient	1.000		1.000	
NO bkgrnd	4.3		4.4	
NOX bkgrnd	4.4		4.6	
Chamber Temp	50.8	Deg C	50.5	Deg C
Moly Temp	325.5	Deg C	327.1	Deg C
PMT voltage	-780.3	V	-780.3	V
PMT Temp	-3.1	Deg C	-2.7	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	168.2	mmHg	175	mmHg
R Cell Press Nox	168.2	mmHg	175	mmHg
NO sample flow	0.59	lpm	0.591	lpm
Nox sample Flow	0.590	lpm	0.591	lpm

Notes:

Span adjusted. No maintenance competed.

Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: April 28, 2016 Station Number: AMS 19

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.2	-0.1	----	----
as found span	5000	58.3	600.5	600.5	0.0	582.2	581.9	0.3	1.0314	1.0319
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.2	-0.1	----	----
high point	5000	58.3	600.5	600.5	0.0	599.3	599.8	-0.5	1.0020	1.0012
second point	5000	29.3	301.8	301.8	0.0	301.8	301.9	-0.1	1.0001	0.9996
third point	5000	14.7	151.4	151.4	0.0	152.8	152.6	0.2	0.9910	0.9924
as left zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1	----	----
as left span	5000	58.3	600.5	304.4	296.1	596.4	299.1	297.3	1.0068	1.0178
								Average Correction Factor	0.9977	0.9977

Corrcted As found NO_X= 582.5 NO= 582.2 Percent Change NO_X= 3.3% NO= 3.5%

Previous Response NO_X= 601.6 NO= 602.6

GPT Calibration Data

Dilution Flow (total) 5000 ccm Source Gas Flow 58.30 ccm NOX ref calc conc = 600.5 ppb NO ref calc conc = 600.5 ppb

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
1st NO ref point		0.0	598.7	598.5	-0.1	1.0030	1.0034	----	----
1st NO2 (300)	304.4	294.0	599.0	304.4	294.6	1.0025	----	0.9981	100.2%
2nd NO2 (200)	400.3	198.1	599.4	400.3	199.0	1.0019	----	0.9955	100.4%
3rd NO2 (100)	498.3	100.1	599.7	498.3	101.4	1.0013	----	0.9872	101.3%
2nd NO ref point	----	0.0	600.1	599.8	0.3	1.0007	1.0012	----	----
				Average Correction Factor		1.0016		0.9936	100.6%

Calibration Performed By: Devin Russell

Wood Buffalo Environmental Association

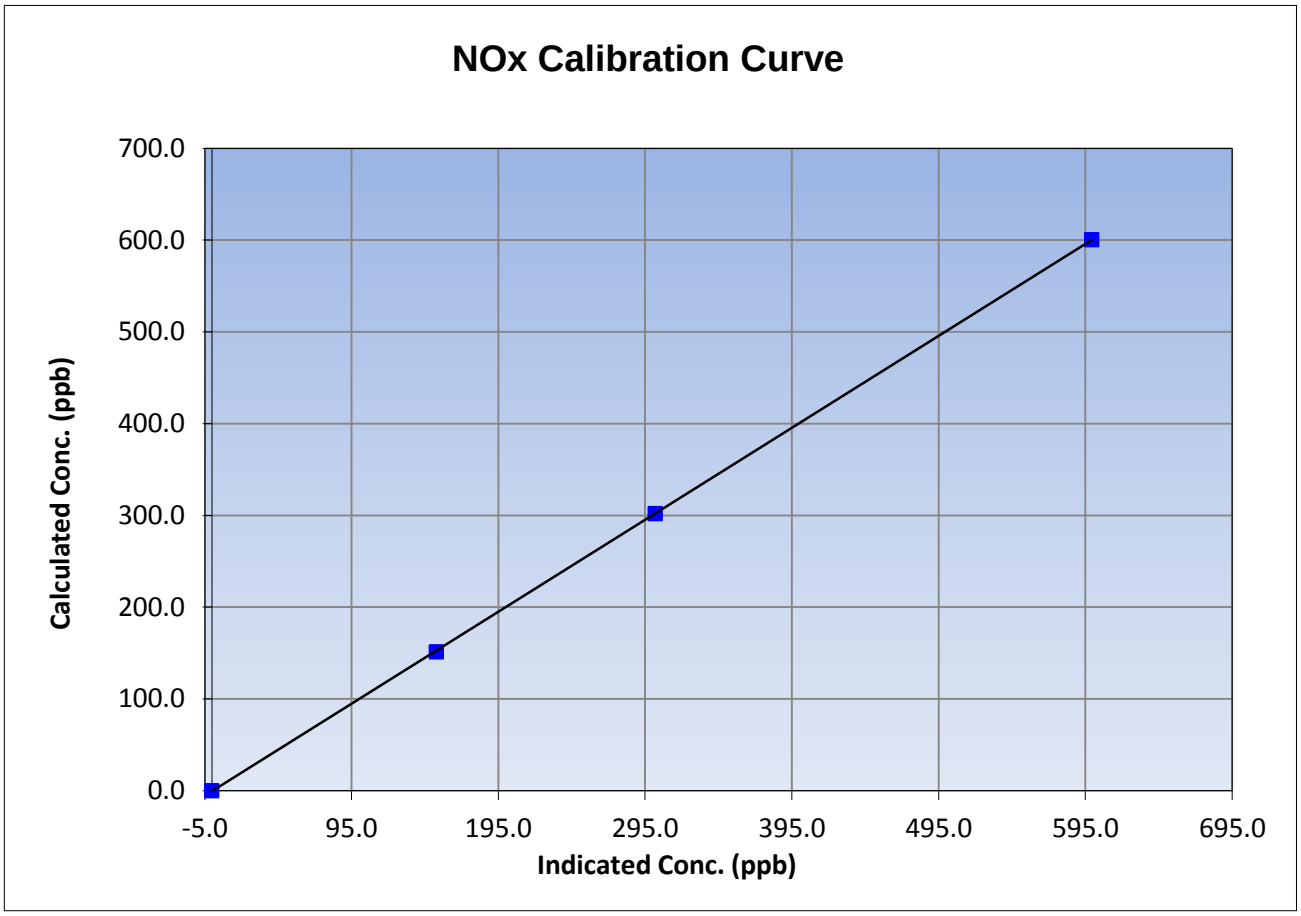
NO_X Calibration Summary

Station Information

Calibration Date	April 28, 2016	Previous Calibration	March 30, 2016
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	9:00	End Time (MST)	12:45
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	-0.3	----	Correlation Coefficient	0.999988
600.5	599.3	1.0020		
301.8	301.8	1.0001	Slope	1.002360
151.4	152.8	0.9910		
			Intercept	-0.584046



Wood Buffalo Environmental Association

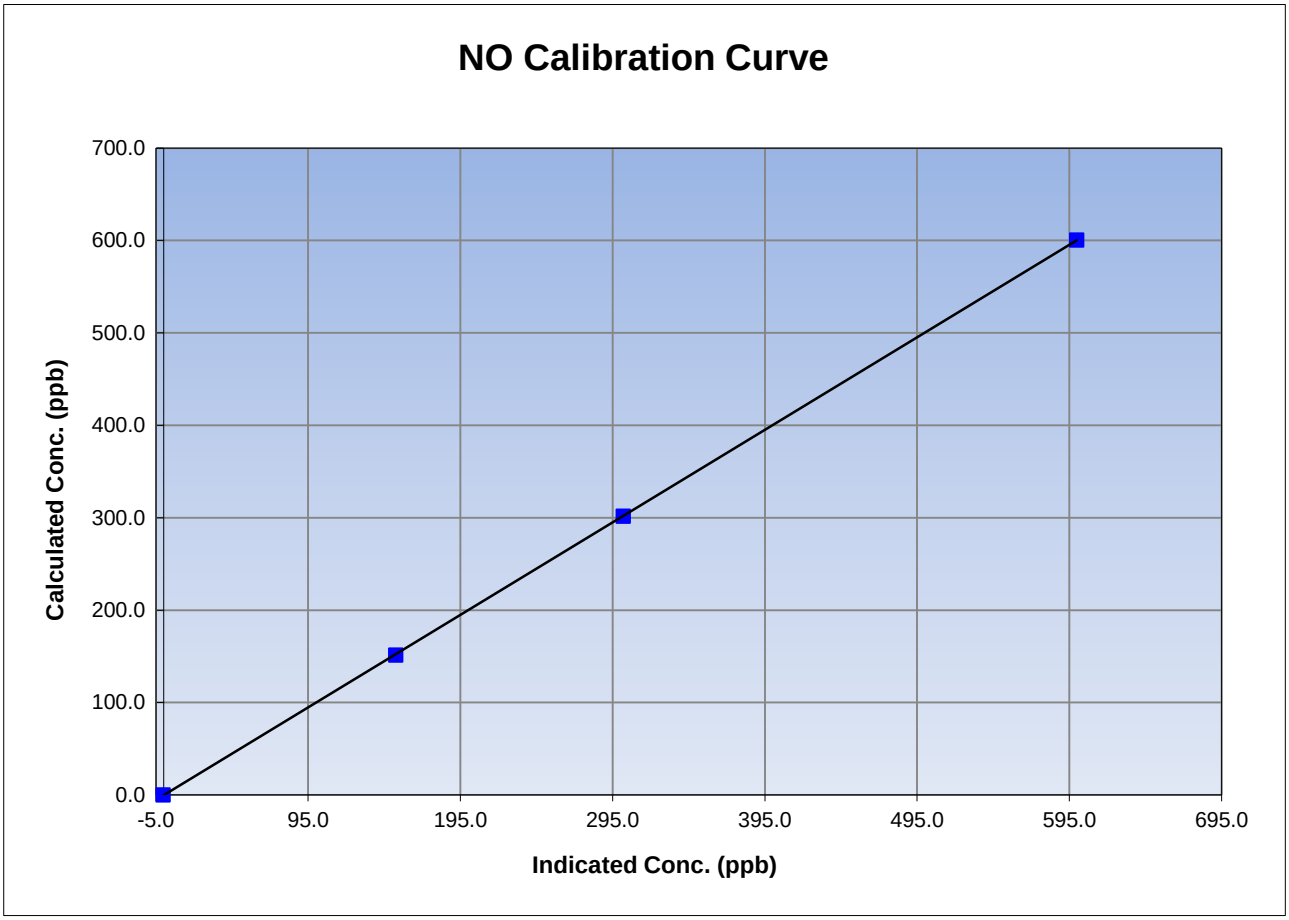
NO Calibration Summary

Station Information

Calibration Date	April 28, 2016	Previous Calibration	March 30, 2016
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	9:00	End Time (MST)	12:45
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	-0.2	N/A	Correlation Coefficient	0.999993
600.5	599.8	1.0012		
301.8	301.9	0.9996	Slope	1.001576
151.4	152.6	0.9924		
			Intercept	-0.490358



Wood Buffalo Environmental Association

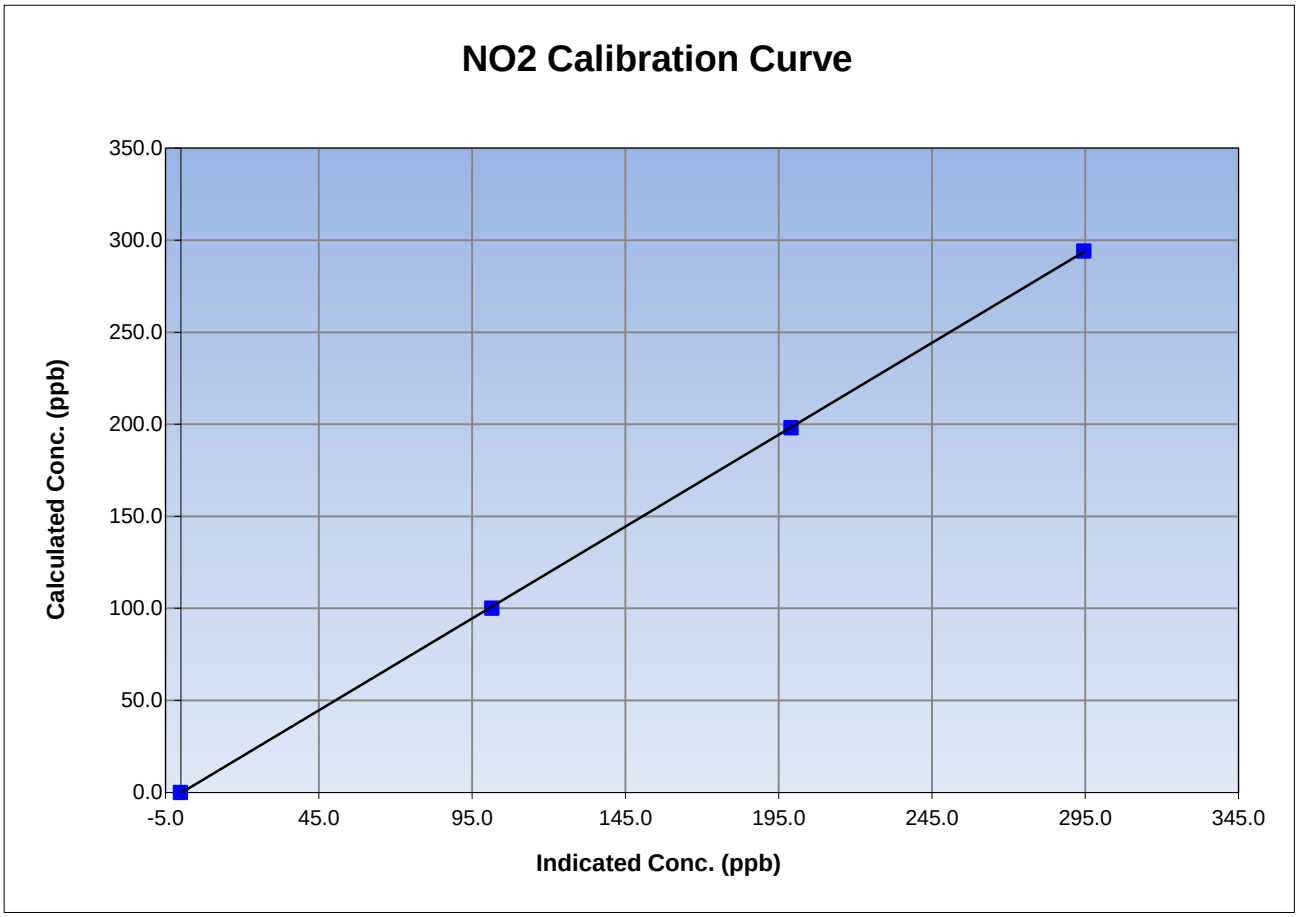
NO_2 Calibration Summary

Station Information

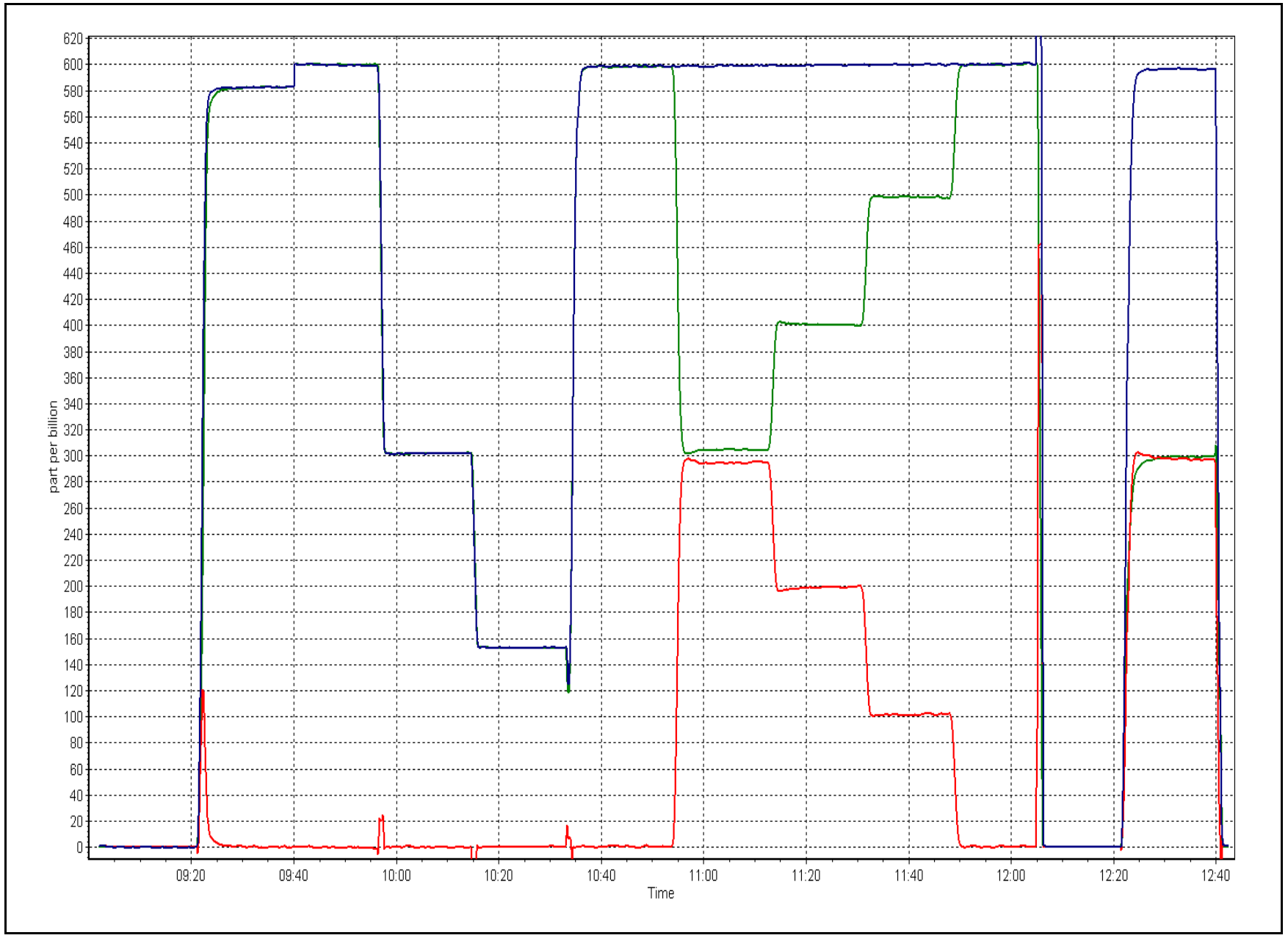
Calibration Date	April 28, 2016	Previous Calibration	March 30, 2016
Station Number	Firebag	Station Number	AMS 19
Start Time (MST)	9:00	End Time (MST)	12:45
Analyzer make	Thermo 42i	Analyzer serial #	1410661309

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999981
294.0	294.6	0.9981		
198.1	199.0	0.9955	Slope	0.998345
100.1	101.4	0.9872		
			Intercept	-0.421270



NOX Calibration Plot Date: April 28, 2016



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 20
BRION MACKAY RIVER
APRIL 2016

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

May 27, 2016

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BRION MACKAY RIVER (AMS 20)
APRIL 2016
MONTHLY SUMMARY for
AMD SECTION III.B.1(c)

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	684	36	36	100.00	11	0	3	0
H2S (ppb) Average	687	33	33	100.00	1	0	0	0
THC (ppm) Average	684	36	36	100.00	2.6	-	2.3	-
NO2 (ppb) Average	685	34	35	99.86	26	0	6	-
NO (ppb) Average	685	34	35	99.86	8	-	1	-
NOX (ppb) Average	685	34	35	99.86	26	-	7	-
Temperature 2 m (C) Average	720	0	0	100.00	26.3	-	16.2	-
Relative Humidity (%) Average	720	0	0	100.00	98	-	84	-
Wind Speed 10 m (km/h) Average	697	0	23	96.81	21	-	13	-
Wind Direction 10 m (deg) Average	697	0	23	96.81	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BRION MACKAY RIVER (AMS 20)
APRIL 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

					Percentile						
Parameter	Number	Mean	StnDev	Total	Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	684	0.6	1	-	0	0	0	0	0	2	11
H2S (ppb) Average	687	0.2	0	-	0	0	0	0	0	0	1
THC (ppm) Average	684	2.19	0.1	-	2	2.1	2.1	2.2	2.2	2.3	2.6
NO2 (ppb) Average	685	2.2	3	-	0	0	1	1	3	6	26
NO (ppb) Average	685	0.2	1	-	0	0	0	0	0	1	8
NOX (ppb) Average	685	2.4	4	-	0	0	1	1	3	6	26
Temperature 2 m (C) Average	720	3.52	7.5	-	-13.7	-5.9	-1.5	2.6	7.8	15.1	26.3
Relative Humidity (%) Average	720	57.2	22	-	12	26	40	58	74	86	98
Wind Speed 10 m (km/h) Average	697	8	4	-	1	3	5	8	10	14	21
Wind Direction 10 m (deg) Average	697	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BRION MACKAY RIVER (AMS 20)
APRIL 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
NO2, NO, NOX	04 Apr 2016 14:00	04 Apr 2016 14:00	1	Maintenance - Station operator on site
Wind Speed, Wind Direction	06 Apr 2016 20:00	07 Apr 2016 12:00	17	Flat line in sensor output signal -sensor frozen
Wind Speed, Wind Direction	27 Apr 2016 01:00	27 Apr 2016 06:00	6	Flat line in sensor output signal -sensor frozen

Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO_2) - ppb

Brion MacKay River - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 11 ppb on Apr 7 17:00 Maximum Daily Average: 3.0 ppb on Apr 7

Minimum Value: 0 ppb on Apr 1 01:00 Minimum Daily Average: 0.0 ppb on Apr 6
Maximum Diurnal Average: 1.2 ppb at hour 19 Minimum Diurnal Average: 0.3 ppb at hour 5
Monthly Average: 0.6 ppb Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 2$ $P_{99} = 7$

Hours in Service:	720
Hours of Data:	684
Hours of Missing Data:	36
Hours of Calibration:	36
Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily	Daily
	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-Apr	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	4	5	7	10	8	4	2	2	1	1.8	10
2-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	10	5	3	2	0	0	0	0	0	0	0	0	1.0	10
3-Apr	0	0	0	Z	0	1	1	1	1	0	0	0	0	0	0	0	0	0	2	3	1	1	1	0	0.7	3
4-Apr	0	0	0	0	Z	0	0	0	0	C	C	C	C	C	C	0	0	0	0	3	2	2	2	2	--	3
5-Apr	1	1	2	2	1	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2
6-Apr	Z	0	0	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-Apr	0	Z	2	1	2	3	5	3	3	2	2	1	1	1	1	6	11	7	3	3	5	4	2	1	3.0	11
8-Apr	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
9-Apr	0	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
10-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	2	4	5	4	2	1	1	1.0	5
11-Apr	1	0	0	0	0	Z	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0.4	1
12-Apr	Z	0	0	0	0	0	0	0	0	0	1	3	4	3	4	5	3	6	4	2	1	3	3	2	1.9	6
13-Apr	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
14-Apr	0	0	Z	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-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
16-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
17-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
18-Apr	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
19-Apr	0	Z	0	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-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	3	3	1	1	0	0	0.6	3
21-Apr	1	0	0	Z	0	0	0	0	0	0	0	0	0	8	4	4	3	2	2	0	0	2	0	1	1.3	8
22-Apr	1	3	3	2	Z	1	1	1	1	0	0	0	0	0	0	0	1	2	2	0	0	0	1	1	1.0	3
23-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
24-Apr	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
25-Apr	0	Z	0	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-Apr	0	0	Z	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-Apr	0	0	0	Z	0	0	0	0	4	2	4	8	10	9	6	5	4	4	4	3	2	1	0	0	2.9	10
28-Apr	0	0	0	0	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
29-Apr	0	0	0	0	0	Z	1	1	0	1	1	0	1	1	0	0	1	0	0	0	0	0	0	0	0.5	1
30-Apr	Z	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
	0.3	0.3	0.4	0.3	0.3	0.3	0.4	0.3	0.4	0.4	0.4	0.6	1.0	1.0	0.8	1.0	1.1	1.1	1.2	1.1	0.8	0.6	0.5	0.4	Diurnal Average	
	1	3	3	2	2	3	5	3	4	2	4	8	10	9	6	6	11	7	10	8	5	4	3	2	Diurnal Maximum	

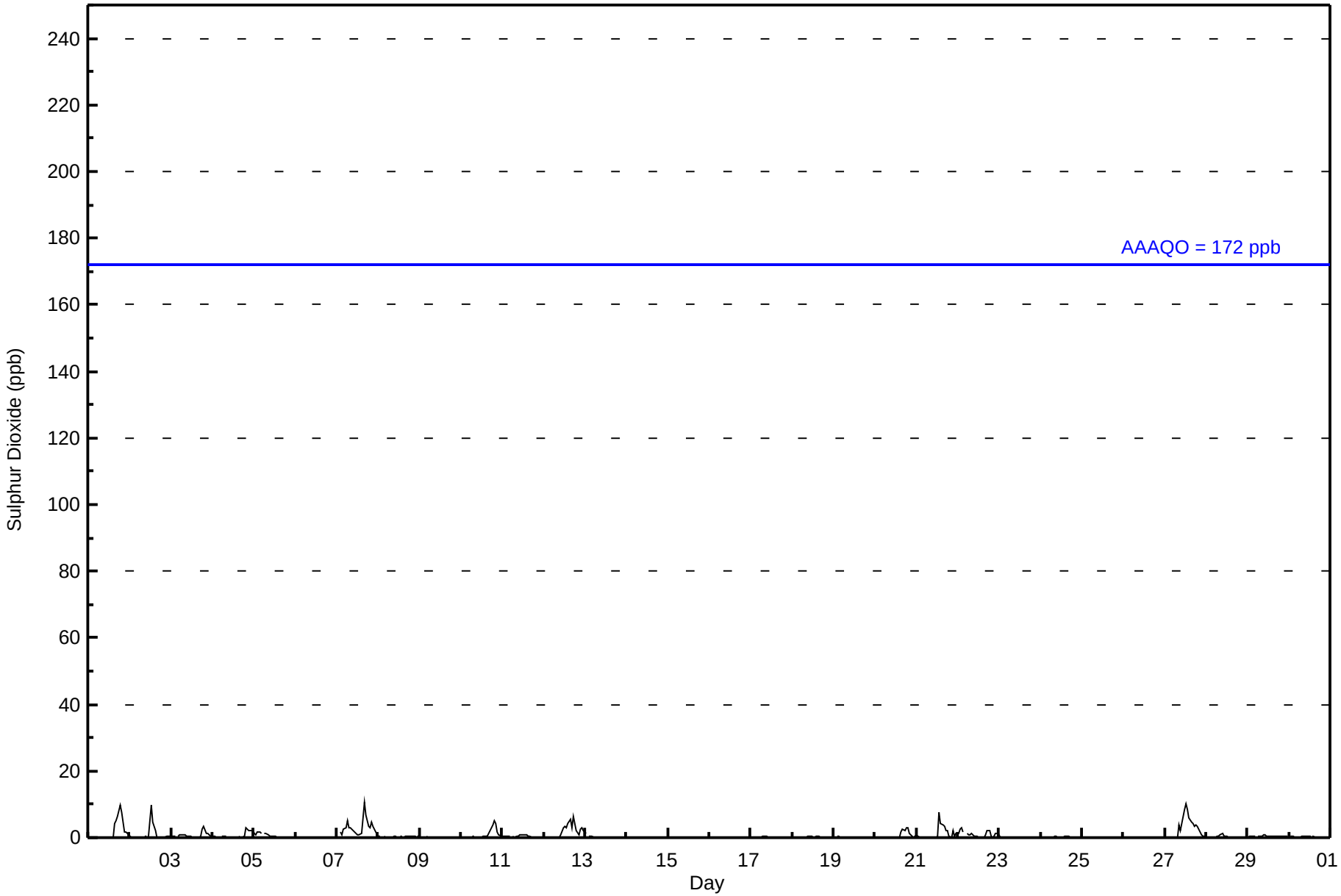
Z - zerospan C - Calibration
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb

Wood Buffalo Environmental Association

Hourly Averages

Sulphur Dioxide (SO_2) - ppb

Brion MacKay River - April 2016



Sulphur Dioxide (SO_2) - ppb
Brion MacKay River - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	683	99.85	99.85
11 - 20	1	0.15	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

Brion MacKay River - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 10	21	51	69	40	23	57	54	74	113	24	15	15	20	16	39	31	662
11 - 20	0	0	1	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	51	70	40	23	57	54	74	113	24	15	15	20	16	39	31	663

Total Number of Valid Hours: 663

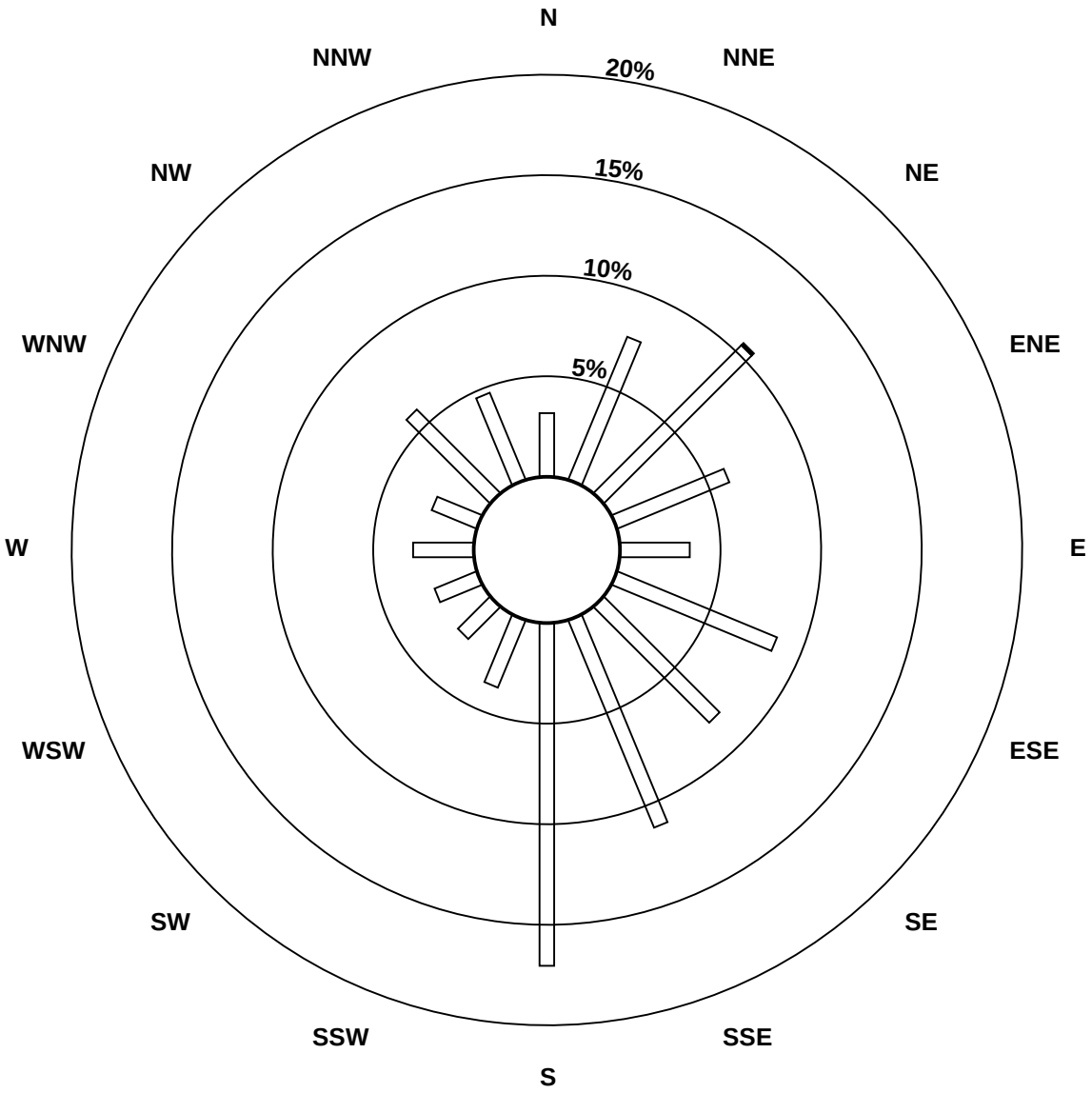
Total Number of Hours: 720

Wood Buffalo Environmental Association

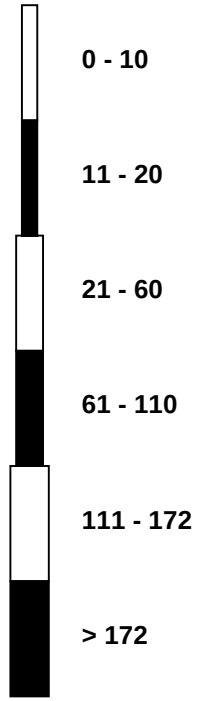
Wind Rose Apr 2016

Sulphur Dioxide (SO_2) - ppb

Brion MacKay River (AMS 20)



Classes (ppb)



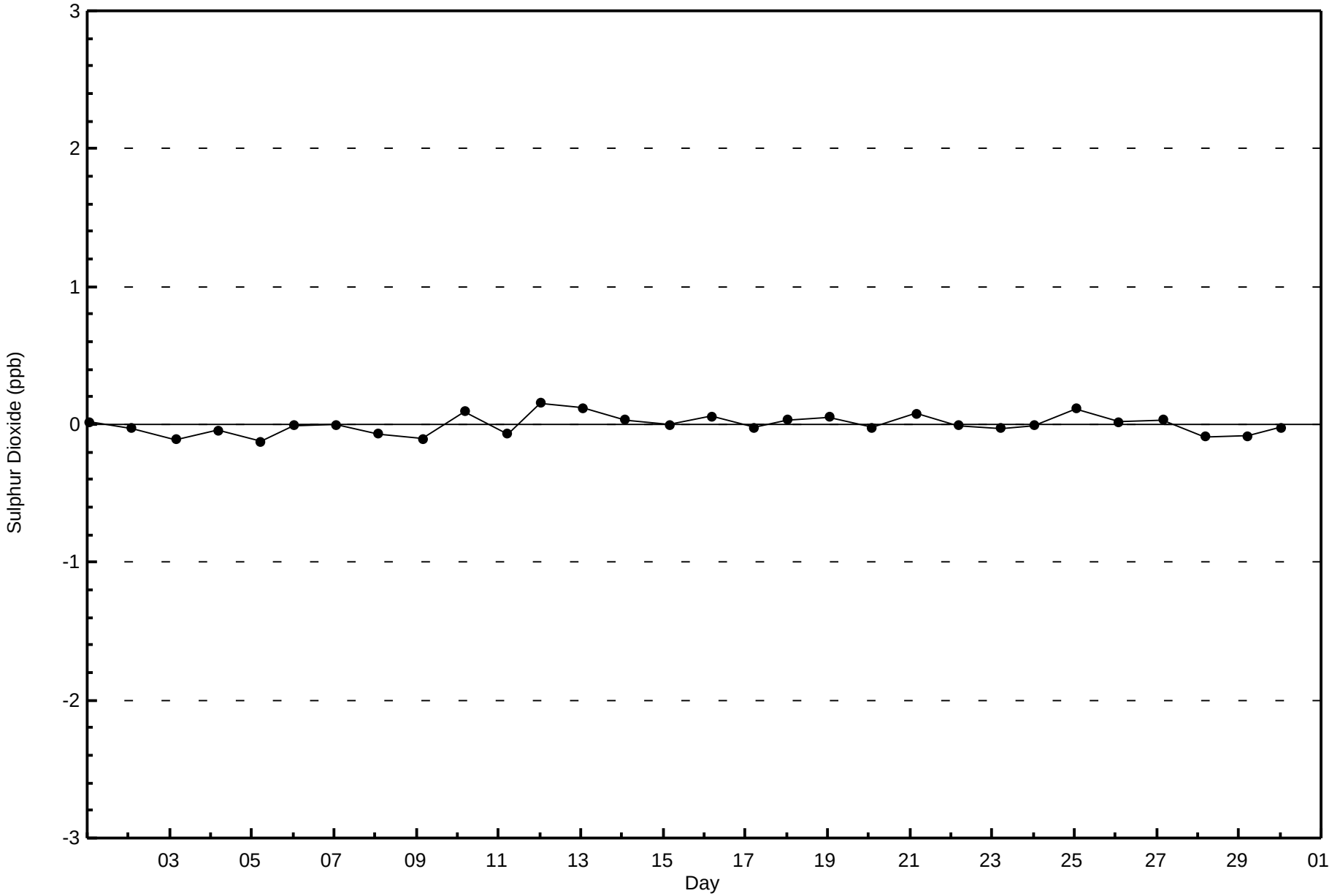
Total Number of Valid Hours: 663

Wood Buffalo Environmental Association

Zero Responses

Sulphur Dioxide (SO_2) - ppb

Brion MacKay River - April 2016

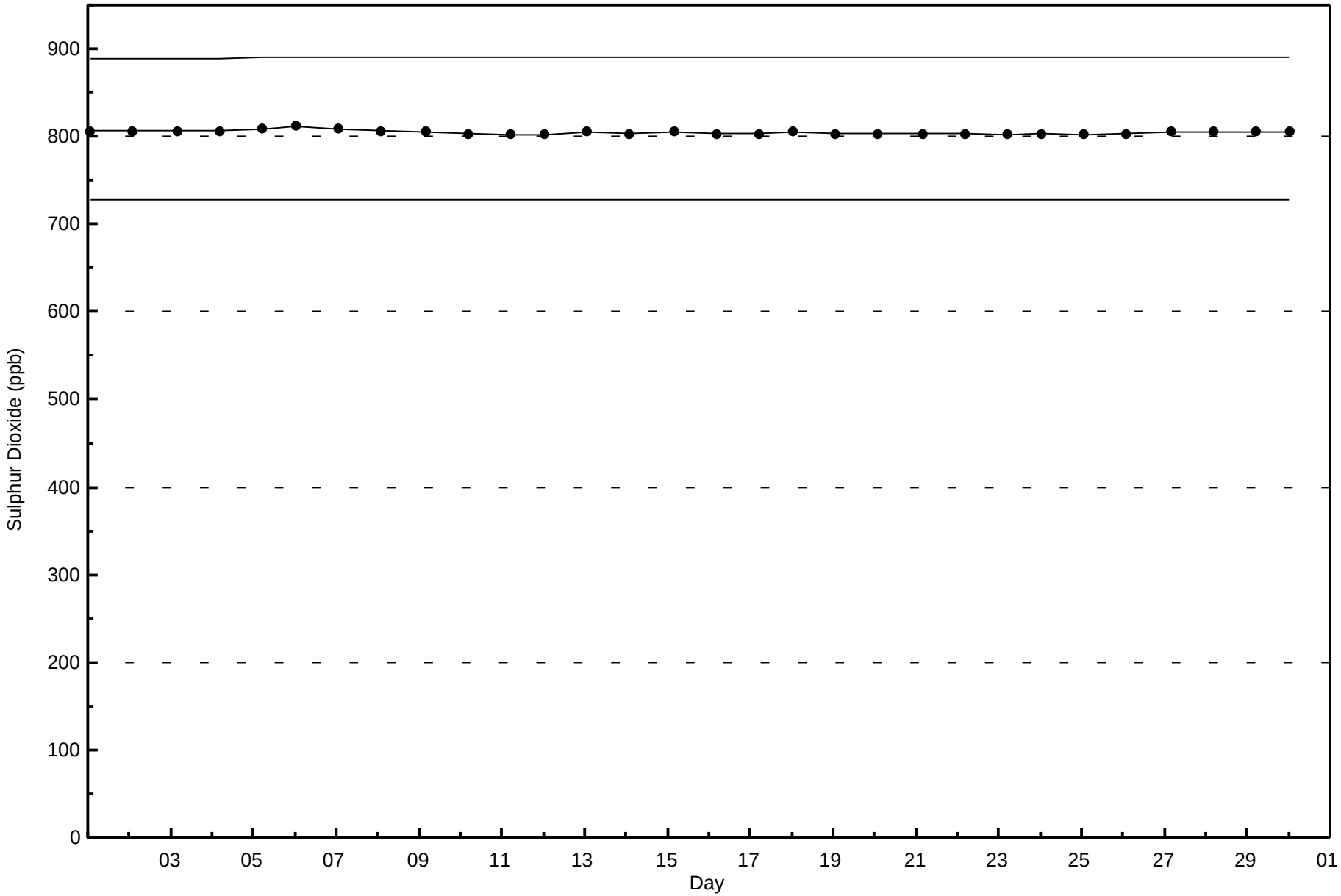


Wood Buffalo Environmental Association

Span Responses

Sulphur Dioxide (SO_2) - ppb

Brion MacKay River - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Hydrogen Sulphide (H_2S) - ppb

Brion MacKay River - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 1 ppb on Apr 22 09:00 Maximum Daily Average: 0.4 ppb on Apr 9

Minimum Value: 0 ppb on Apr 17 02:00 Minimum Daily Average: 0.1 ppb on Apr 17
Maximum Diurnal Average: 0.2 ppb at hour 2 Minimum Diurnal Average: 0.2 ppb at hour 11
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:	720
Hours of Data:	687
Hours of Missing Data:	33
Hours of Calibration:	33
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-Apr	0	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
2-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0.3	1
3-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
4-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0.3	1
5-Apr	0	0	0	0	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
6-Apr	0	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-Apr	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0.4	1
8-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.4	1
9-Apr	1	1	1	1	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
10-Apr	0	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-Apr	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
12-Apr	0	Z	0	0	0	0	0	0	0	0	0	C	C	C	0	0	0	0	0	0	0	0	0	0	0.2	0
13-Apr	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
14-Apr	0	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
15-Apr	0	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
16-Apr	0	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
17-Apr	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
18-Apr	0	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
19-Apr	0	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
20-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
21-Apr	0	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
22-Apr	0	0	1	1	0	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
23-Apr	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
24-Apr	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
25-Apr	0	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
26-Apr	0	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
27-Apr	0	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
28-Apr	0	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
29-Apr	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
30-Apr	0	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
	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	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	0	1	1	1	1	0	0	0	1	1	0	0	1	1	0	0	1	1	1	1	Diurnal Maximum	

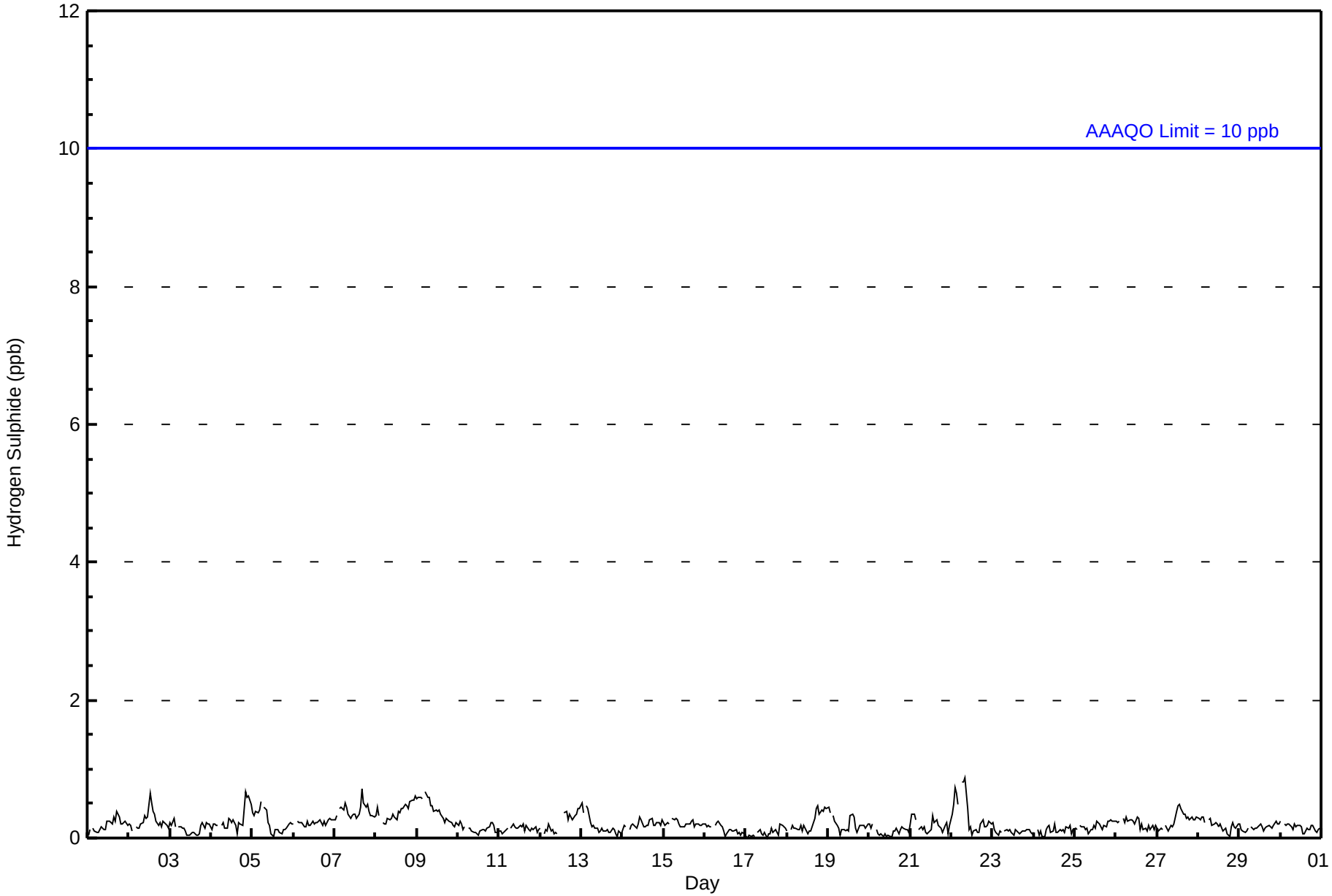
Z - zerospan C - Calibration
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb

Wood Buffalo Environmental Association

Hourly Averages

Hydrogen Sulphide (H_2S) - ppb

Brion MacKay River - April 2016



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Hydrogen Sulphide (H_2S) - ppb

Brion MacKay River - April 2016

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

Total Number of Valid Hours: 687

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Hydrogen Sulphide (H_2S) - ppb

Brion MacKay River - April 2016

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	47	69	42	24	59	55	76	114	24	14	15	20	16	38	32	666
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	47	69	42	24	59	55	76	114	24	14	15	20	16	38	32	666

Total Number of Valid Hours: 666

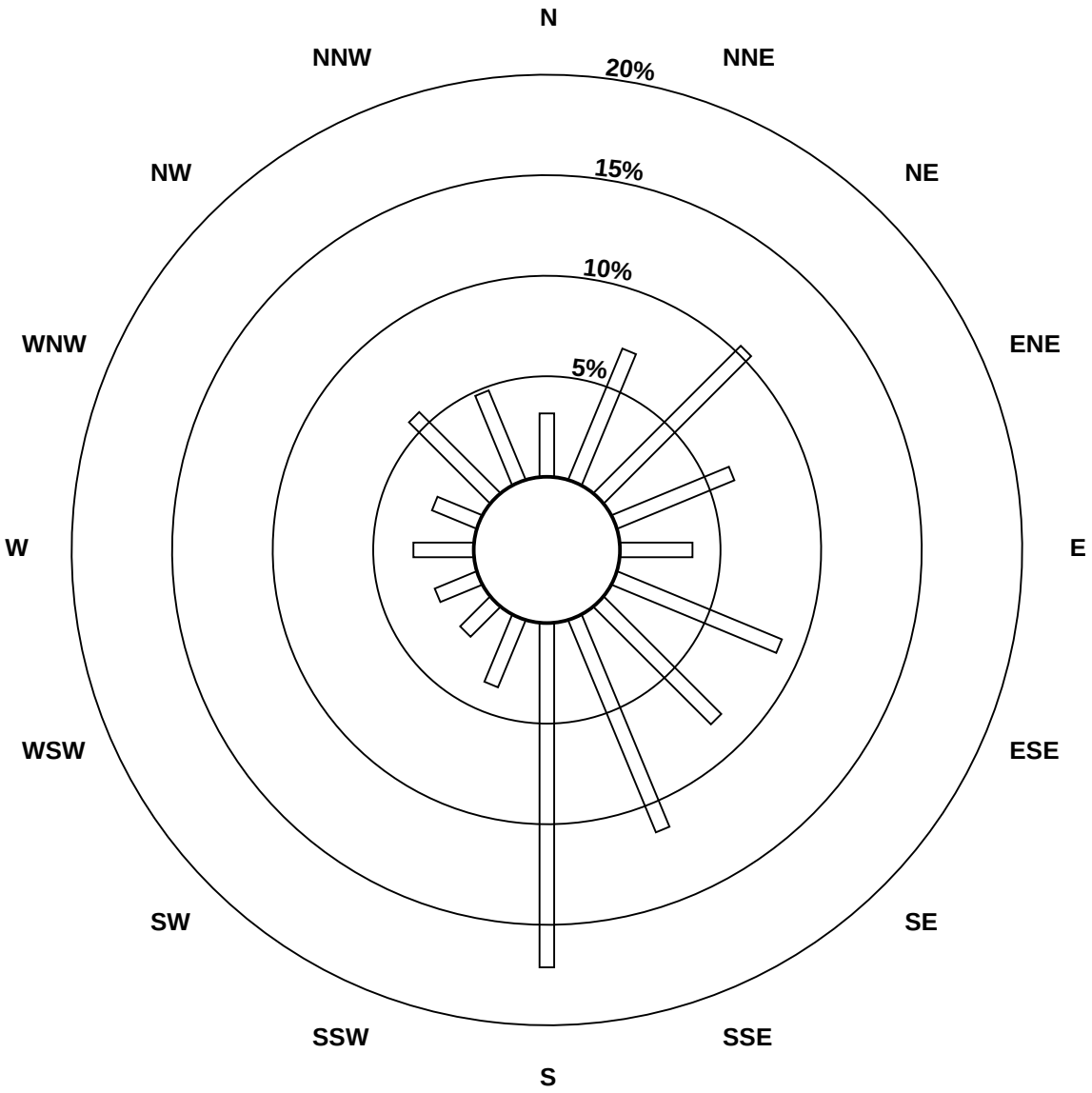
Total Number of Hours: 720

Wood Buffalo Environmental Association

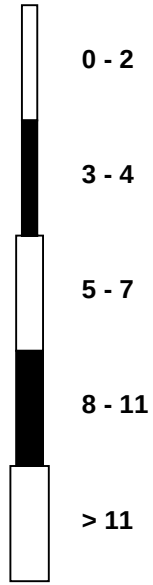
Wind Rose Apr 2016

Hydrogen Sulphide (H_2S) - ppb

Brion MacKay River (AMS 20)



Classes (ppb)



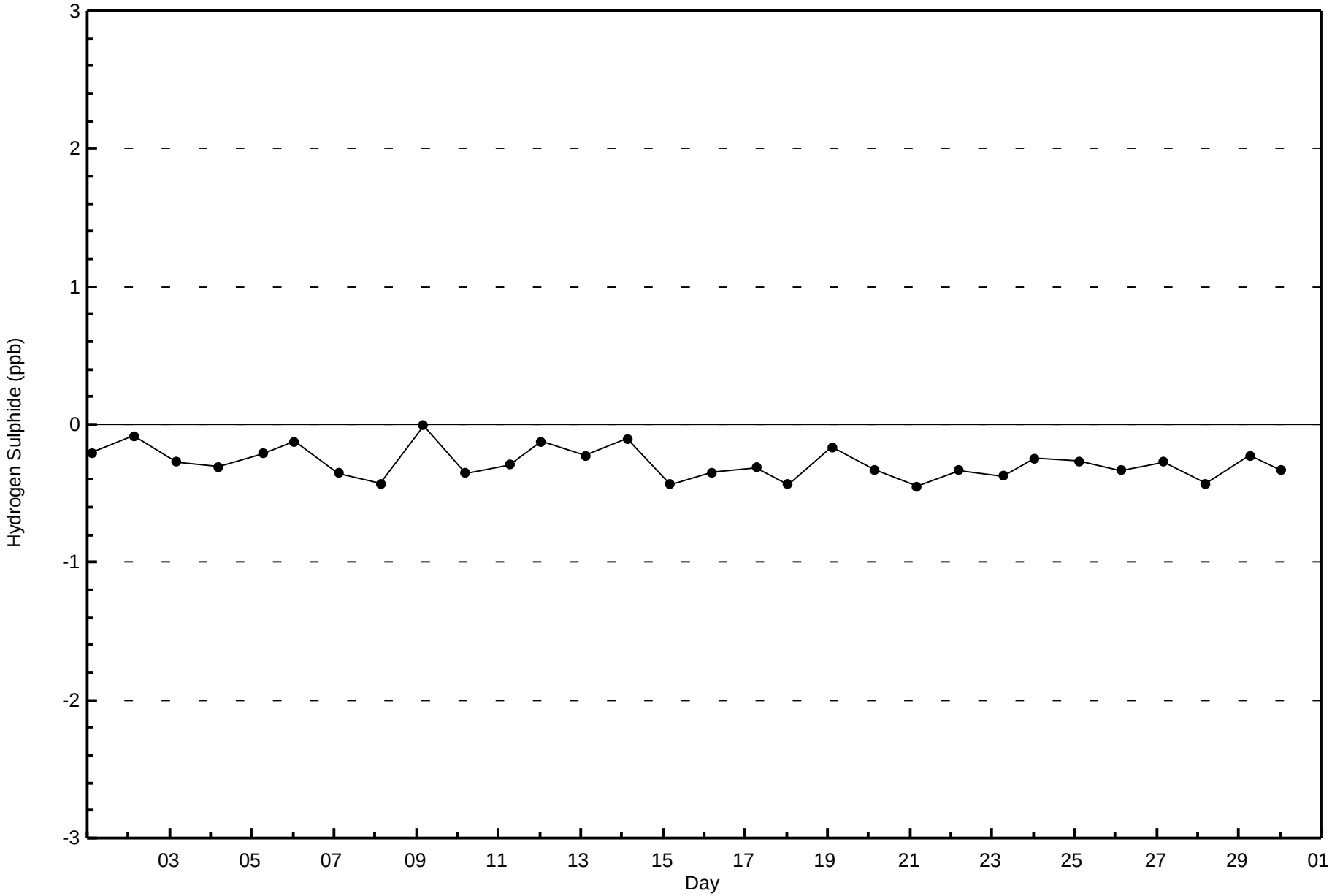
Total Number of Valid Hours: 666

Wood Buffalo Environmental Association

Zero Responses

Hydrogen Sulphide (H_2S) - ppb

Brion MacKay River - April 2016

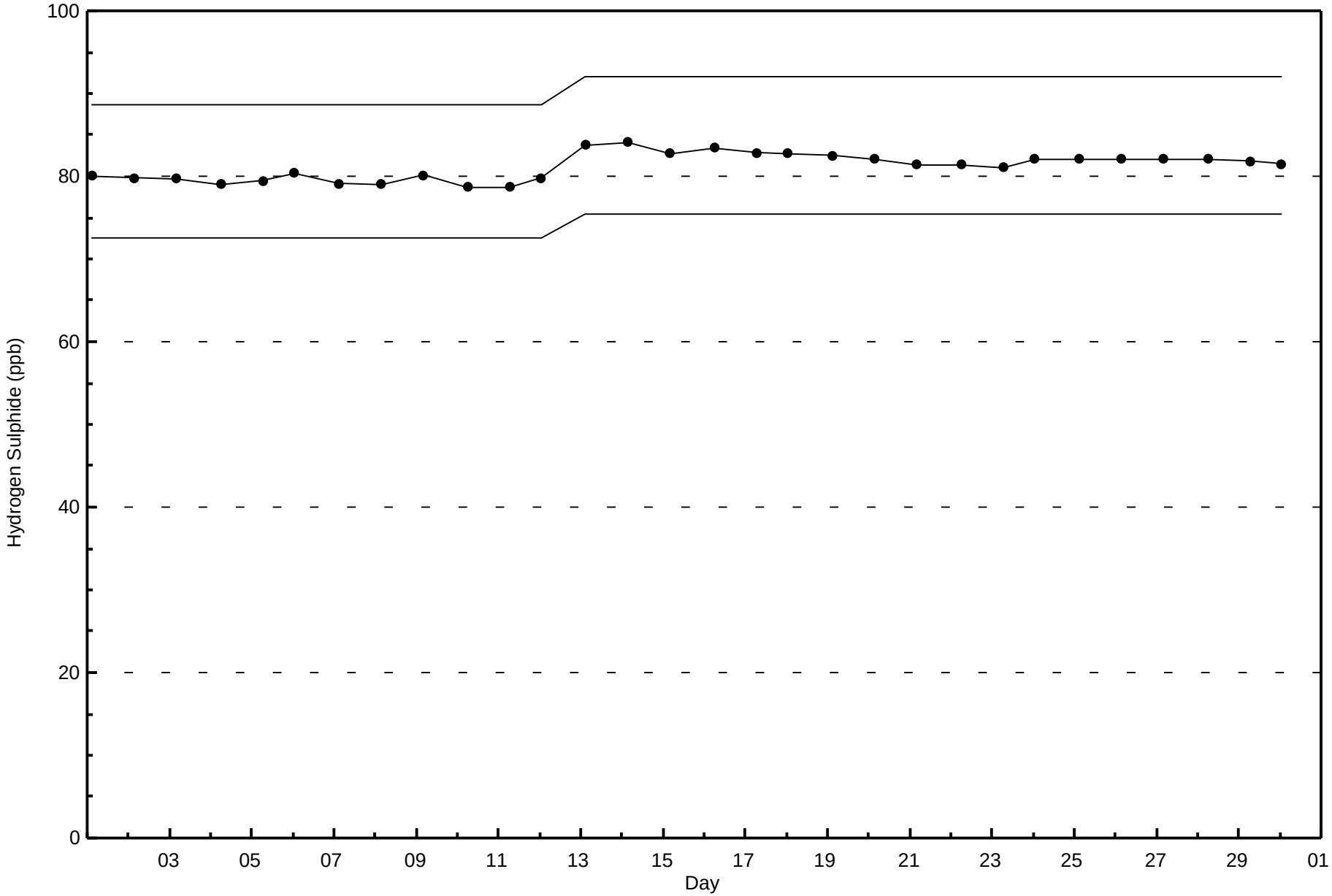


Wood Buffalo Environmental Association

Span Responses

Hydrogen Sulphide (H_2S) - ppb

Brion MacKay River - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Brion MacKay River - April 2016

Maximum Value: 2.6 ppm on Apr 5 07:00

Maximum Daily Average: 2.3 ppm on Apr 22

Minimum Value: 2.0 ppm on Apr 17 15:00

Minimum Daily Average: 2.1 ppm on Apr 18

Maximum Diurnal Average: 2.2 ppm at hour 1

Minimum Diurnal Average: 2.2 ppm at hour 14

Monthly Average: 2.19 ppm

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

Hours in Service:	720
Hours of Data:	684
Hours of Missing Data:	36
Hours of Calibration:	36
Percent Operational Time:	100.0

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

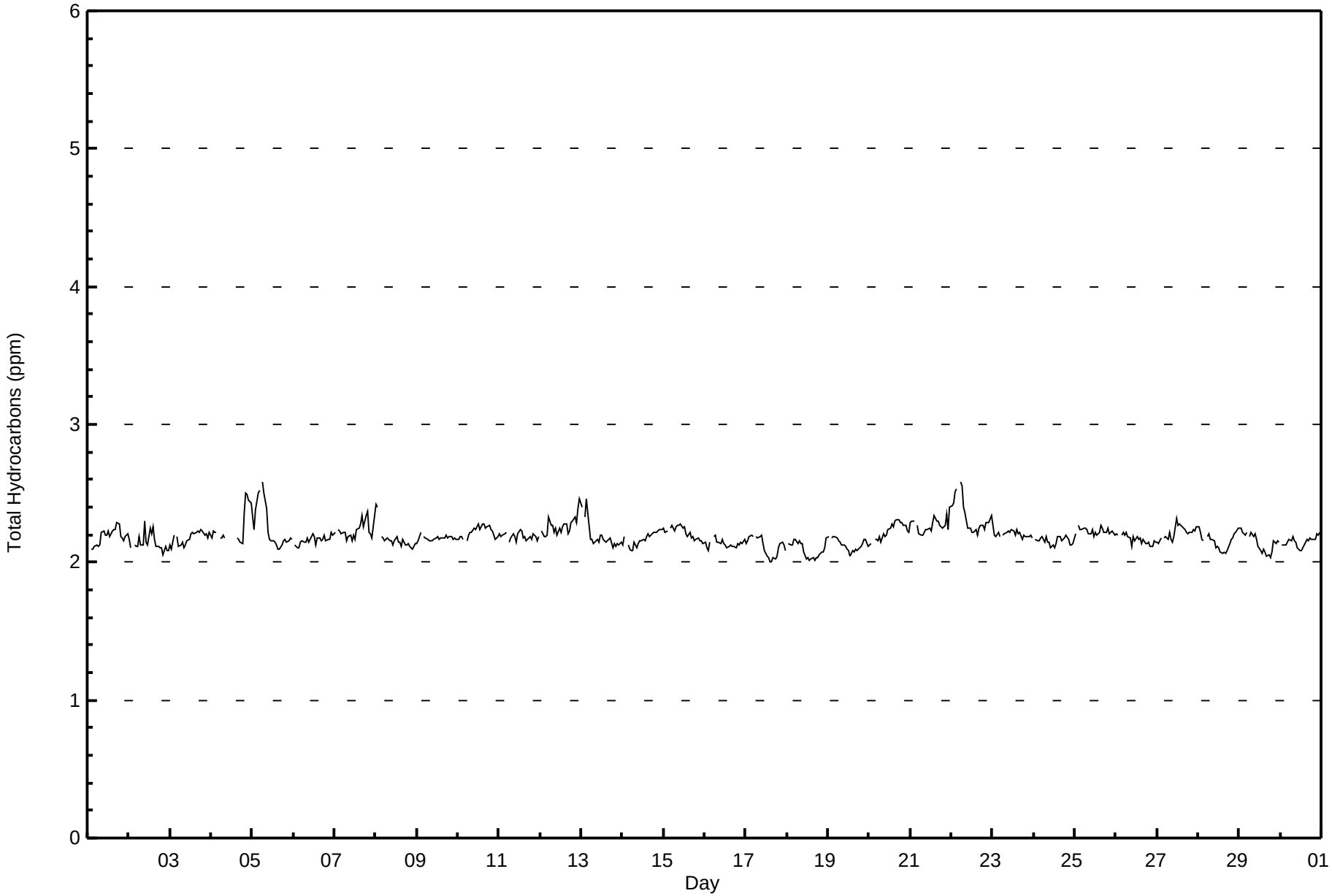
Z - zerospan C - Calibration

Wood Buffalo Environmental Association

Hourly Averages

Total Hydrocarbons (THC) - ppm

Brion MacKay River - April 2016



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm

Brion MacKay River - April 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	18	2.63	2.63
2.1 - 3.0	666	97.37	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Total Hydrocarbons (THC) - ppm

Brion MacKay River - April 2016

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	9	1	1	2	5	0	0	0	18
2.1 - 3.0	21	51	70	40	23	57	54	74	104	23	14	13	15	16	39	31	645
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	51	70	40	23	57	54	74	113	24	15	15	20	16	39	31	663

Total Number of Valid Hours: 663

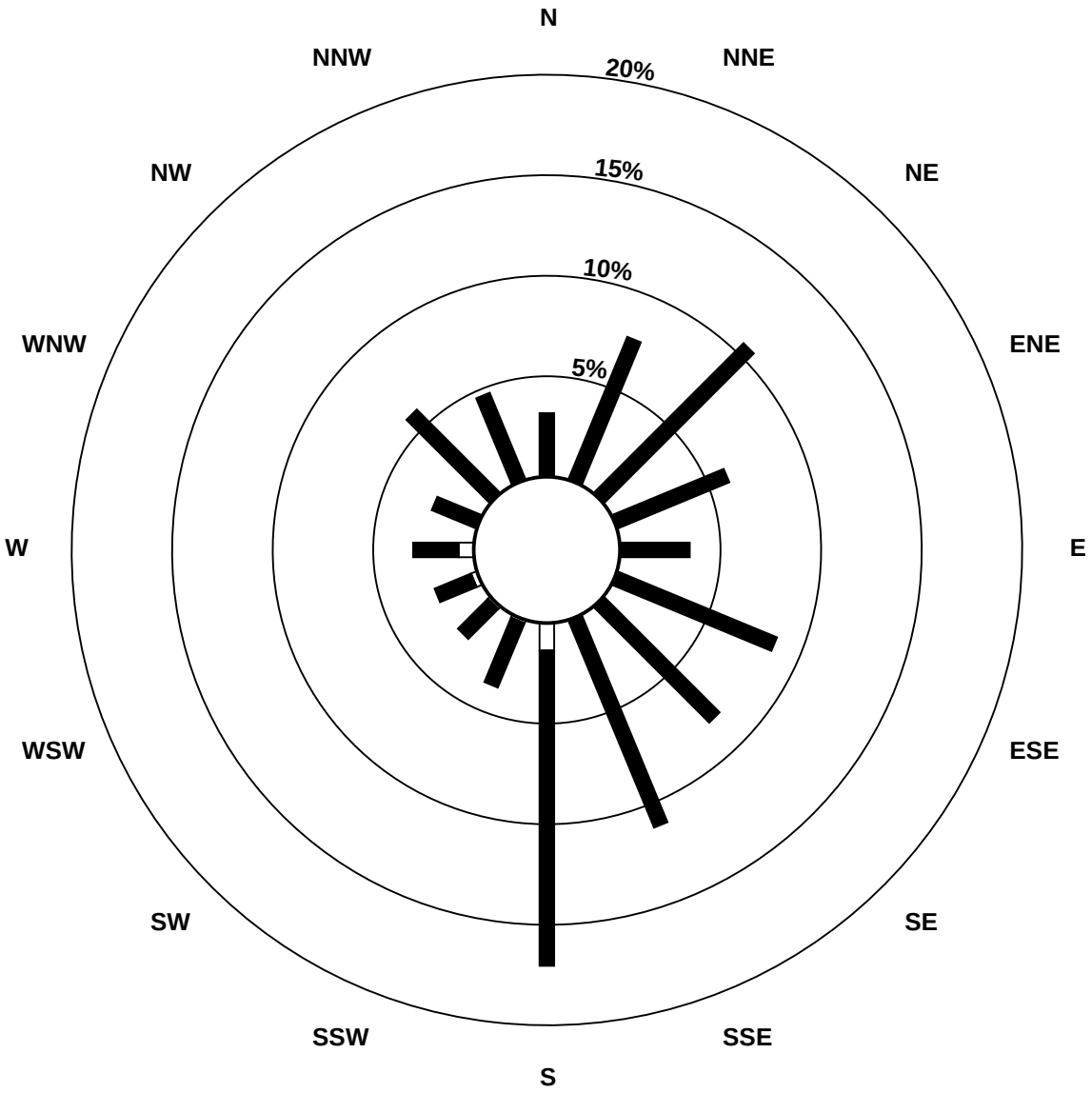
Total Number of Hours: 720

Wood Buffalo Environmental Association

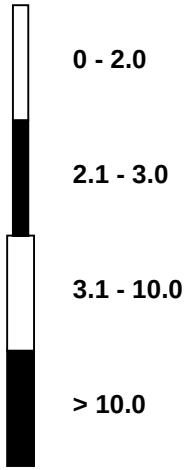
Wind Rose Apr 2016

Total Hydrocarbons (THC) - ppm

Brion MacKay River (AMS 20)



Classes (ppm)



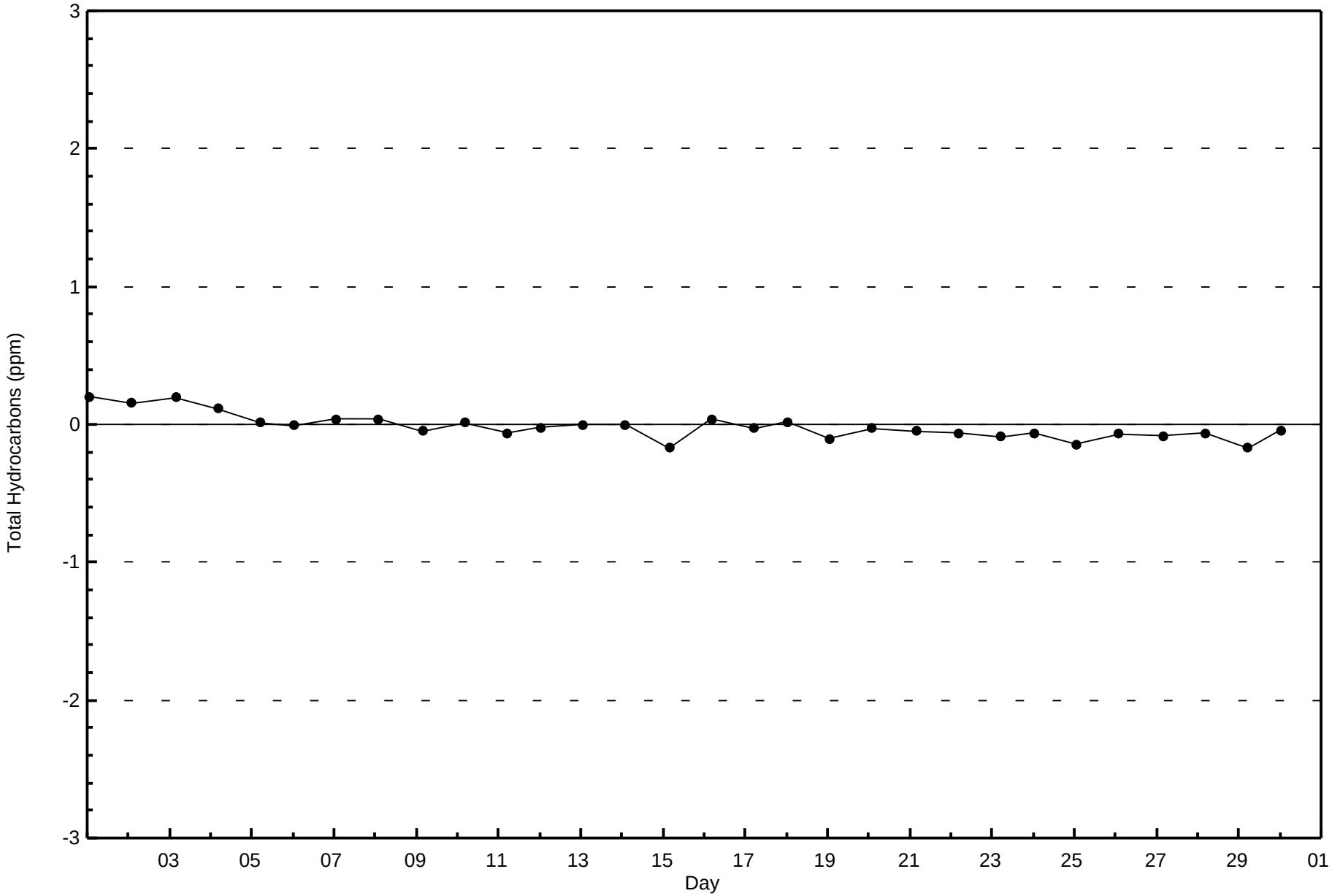
Total Number of Valid Hours: 663

Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Brion MacKay River - April 2016

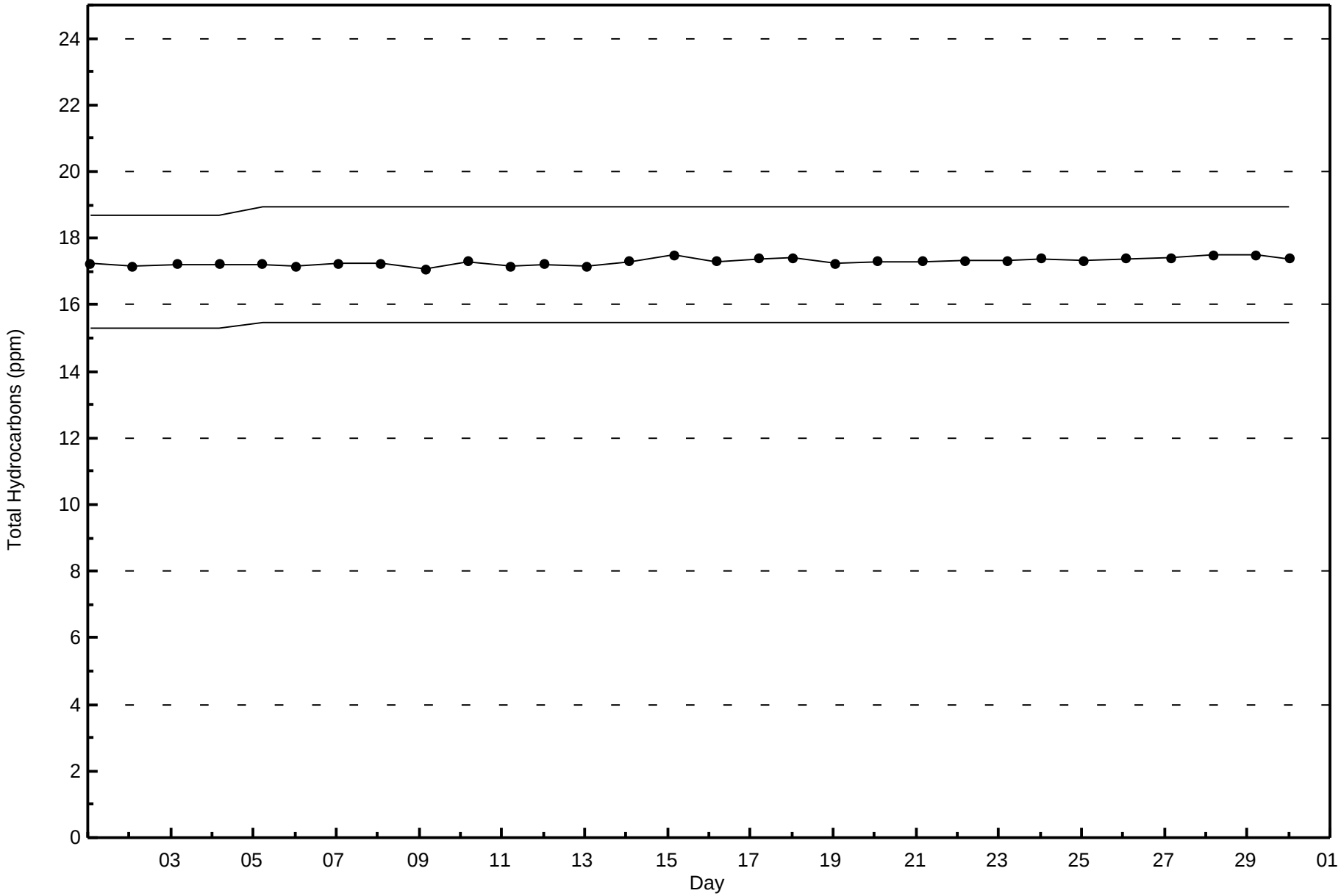


Wood Buffalo Environmental Association

Span Responses

Total Hydrocarbons (THC) - ppm

Brion MacKay River - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxide (NO) - ppb

Brion MacKay River - April 2016

Maximum Value: 8 ppb on Apr 7 17:00

Maximum Daily Average: 1.1 ppb on Apr 27

Minimum Value: 0 ppb on Apr 1 01:00

Minimum Daily Average: 0.0 ppb on Apr 24

Maximum Diurnal Average: 0.6 ppb at hour 13

Minimum Diurnal Average: 0.0 ppb at hour 24

Monthly Average: 0.2 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:	720
Hours of Data:	685
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-Apr	0	Z	0	0	0	0	0	1	1	2	1	1	1	1	1	2	2	1	0	0	0	0	0	0	0.6	2
2-Apr	0	0	Z	0	0	0	0	0	1	3	0	1	4	2	2	1	0	0	0	0	0	0	0	0	0.6	4
3-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
4-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	M	0	0	0	0	0	0	0	0	0	0	0.1	0
5-Apr	0	0	0	0	0	Z	1	2	2	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.2	2
6-Apr	Z	0	0	0	0	0	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0.2	1
7-Apr	0	Z	0	0	0	0	0	0	1	1	1	1	1	1	1	4	8	4	1	0	0	0	0	0	1.0	8
8-Apr	0	0	Z	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-Apr	0	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
10-Apr	0	0	0	0	Z	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0.3	1
11-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
12-Apr	Z	0	0	0	0	0	0	1	1	1	1	2	3	2	2	2	1	1	0	0	0	0	0	0	0.8	3
13-Apr	0	Z	0	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-Apr	0	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
15-Apr	0	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
16-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
17-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
18-Apr	Z	0	0	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-Apr	0	Z	0	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-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0.2	1
21-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	2	1	1	1	1	0	0	0	0	0	0	0.3	2
22-Apr	0	0	0	0	Z	2	4	3	2	1	1	1	1	0	0	0	0	1	0	0	0	0	0	0	0.7	4
23-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
24-Apr	Z	0	0	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-Apr	0	Z	0	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-Apr	0	0	Z	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-Apr	0	0	0	Z	0	0	1	1	1	1	2	4	4	4	3	2	1	1	0	0	0	0	0	0	1.1	4
28-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
29-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
30-Apr	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	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	0.4	0.4	0.4	0.4	0.4	0.6	0.5	0.4	0.5	0.5	0.3	0.1	0.0	0.0	0.0	0.0	0.0	Diurnal Average	
	0	0	0	0	0	2	4	3	2	3	2	4	4	4	3	4	8	4	1	0	0	0	0	0	Diurnal Maximum	

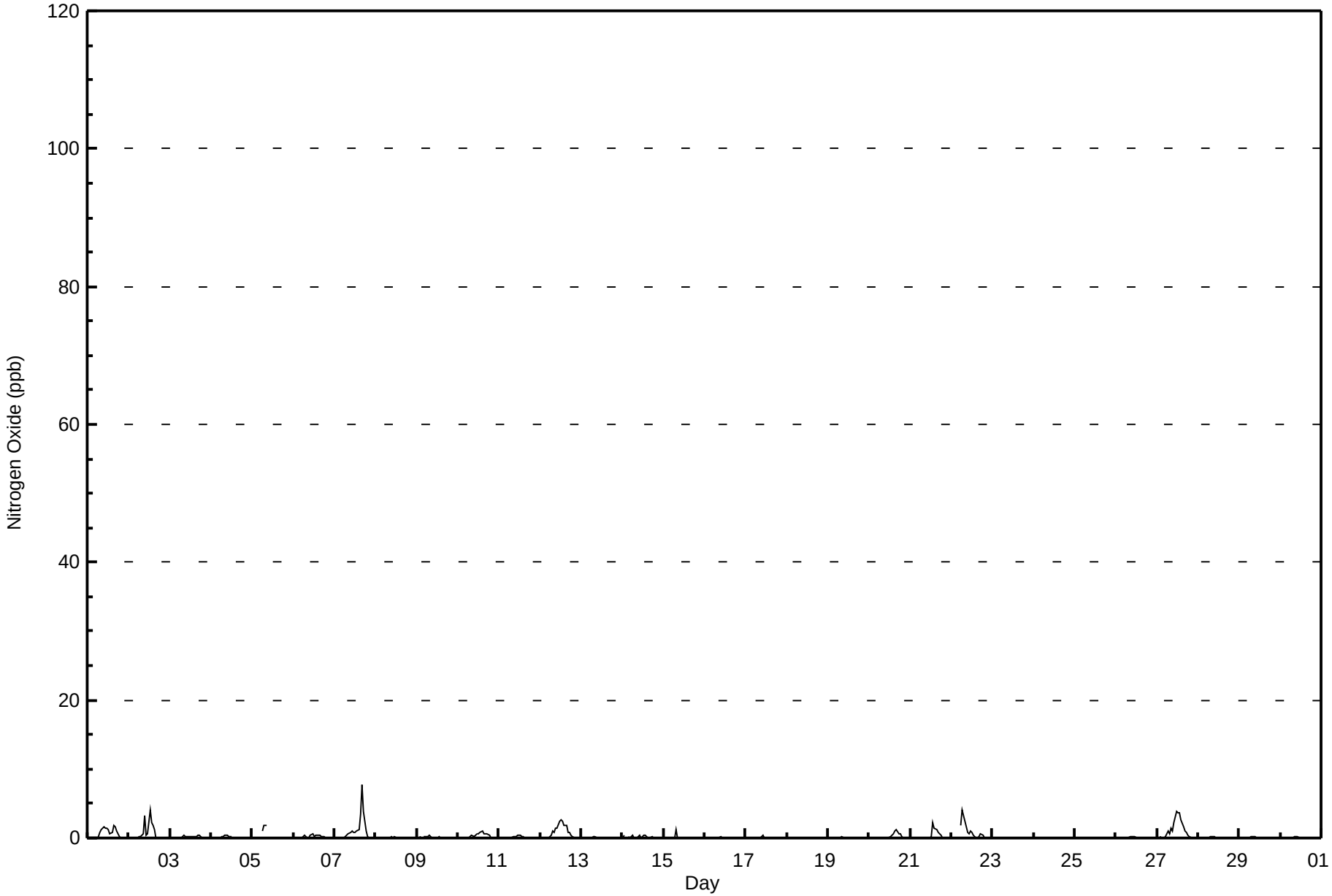
Z - zerospan C - Calibration M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Oxide (NO) - ppb

Brion MacKay River - April 2016



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	685	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: 685

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Oxide (NO) - ppb

Brion MacKay River - April 2016

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	51	70	40	23	58	54	74	113	24	15	15	20	16	39	31	664
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	51	70	40	23	58	54	74	113	24	15	15	20	16	39	31	664

Total Number of Valid Hours: 664

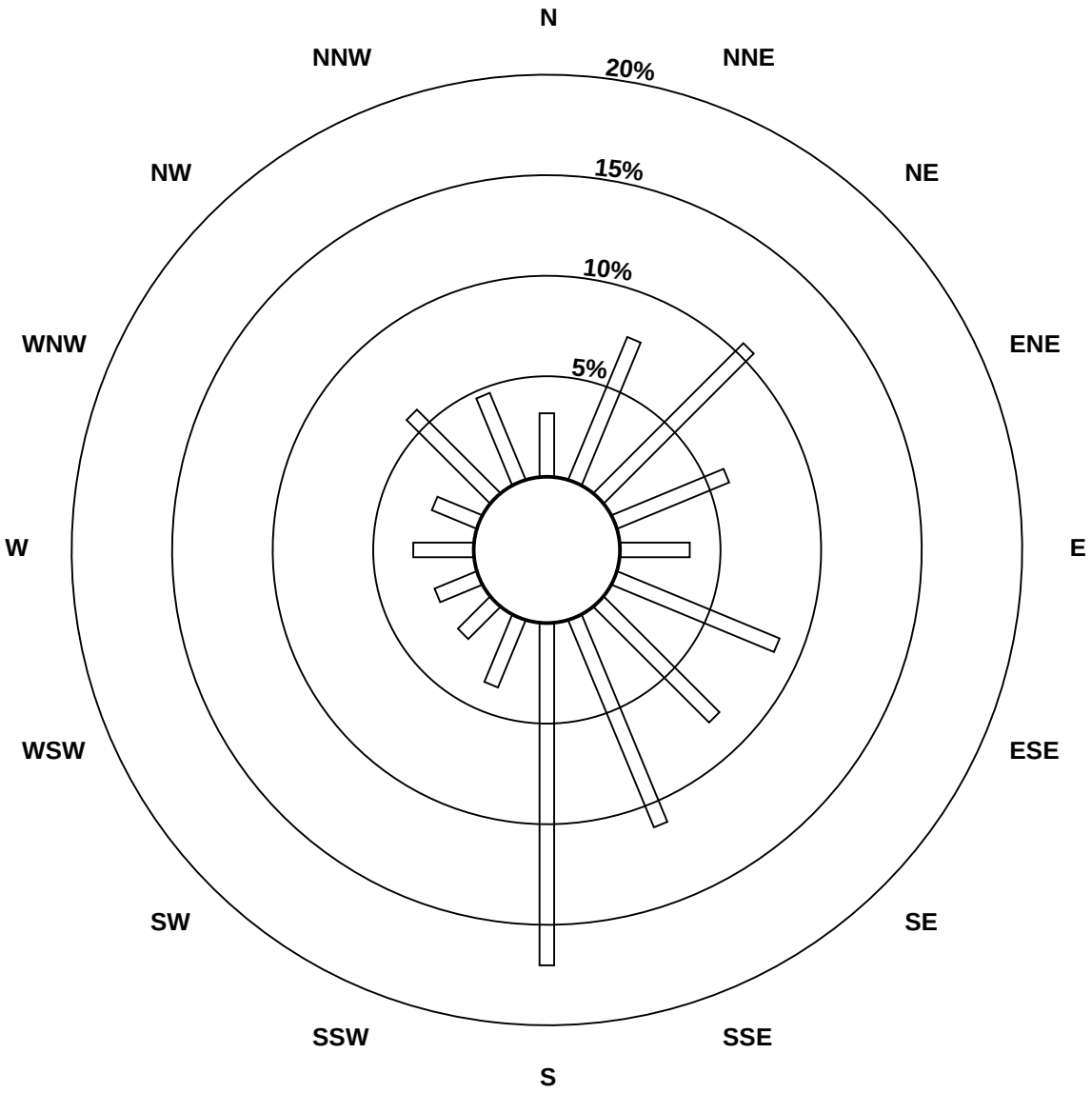
Total Number of Hours: 720

Wood Buffalo Environmental Association

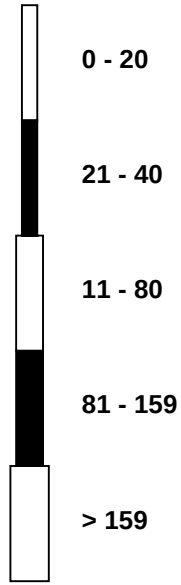
Wind Rose Apr 2016

Nitrogen Oxide (NO) - ppb

Brion MacKay River (AMS 20)



Classes (ppb)



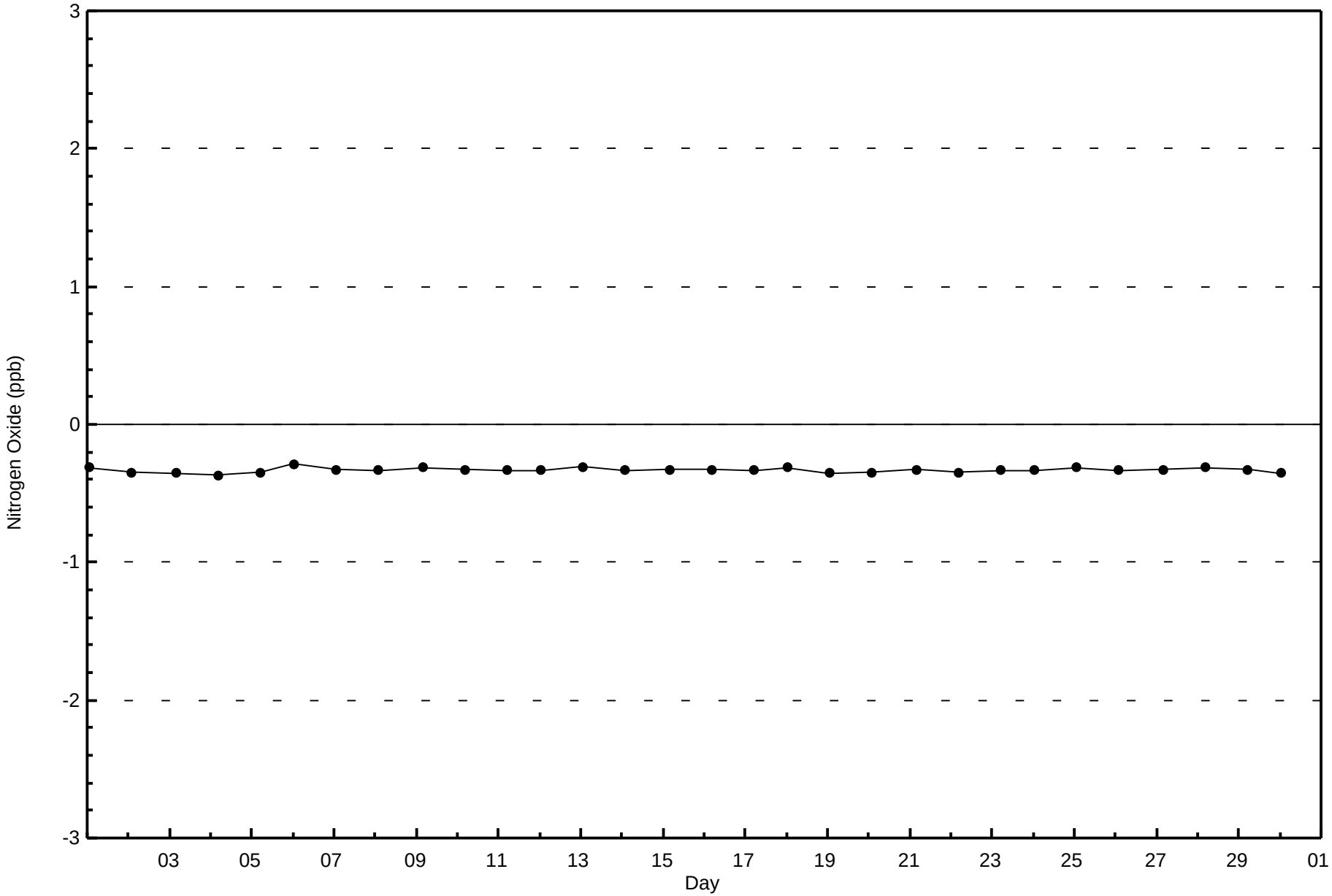
Total Number of Valid Hours: 664

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Oxide (NO) - ppb

Brion MacKay River - April 2016

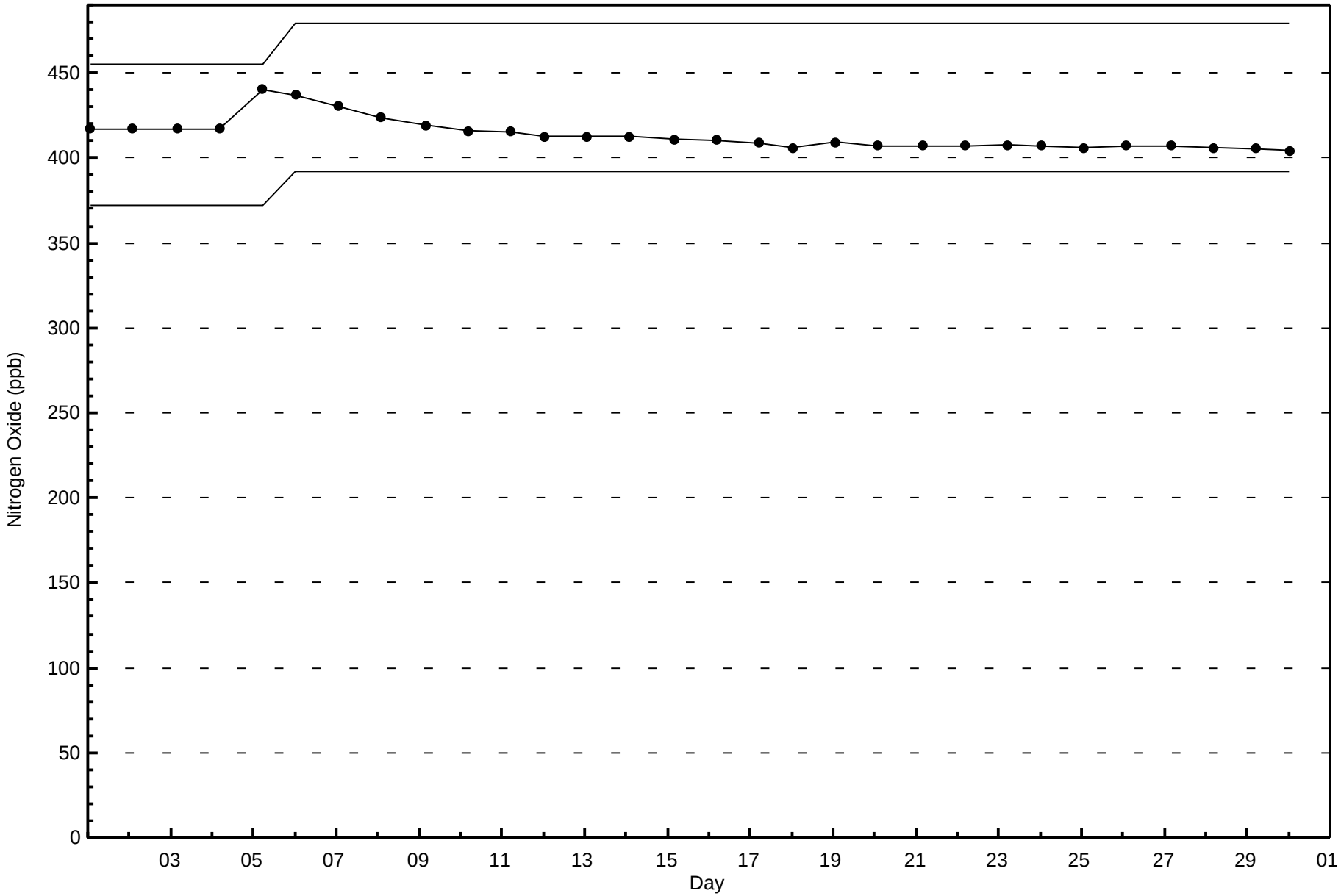


Wood Buffalo Environmental Association

Span Responses

Nitrogen Oxide (NO) - ppb

Brion MacKay River - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO_2) - ppb

Brion MacKay River - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 26 ppb on Apr 4 22:00 Maximum Daily Average: 6.3 ppb on Apr 12

Minimum Value: 0 ppb on Apr 15 03:00
Maximum Diurnal Average: 2.9 ppb at hour 4
Monthly Average: 2.2 ppb

Minimum Daily Average: 0.5 ppb on Apr 16
Minimum Diurnal Average: 1.3 ppb at hour 11
Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 1$ Median = 1 $Q_3 = 3$ $P_{90} = 6$ $P_{99} = 16$

Hours in Service:	720
Hours of Data:	685
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-Apr	1	Z	7	2	1	1	5	5	4	4	4	4	3	2	2	4	5	6	6	6	5	4	3	2	3.6	7
2-Apr	2	1	Z	1	1	1	3	2	2	6	1	2	9	6	6	5	1	1	1	1	1	2	2	1	2.3	9
3-Apr	2	2	3	Z	4	3	3	3	2	1	1	1	1	1	1	1	2	2	5	5	4	4	3	2	2.3	5
4-Apr	2	3	3	3	Z	2	2	1	1	1	1	1	1	M	1	1	1	1	1	9	25	26	25	20	5.9	26
5-Apr	11	7	11	14	14	Z	19	16	11	C	C	C	C	1	0	1	1	1	1	1	1	1	1	1	5.6	19
6-Apr	Z	1	1	3	1	2	4	2	1	1	2	3	1	2	2	3	2	2	3	1	0	0	5	3	1.9	5
7-Apr	3	Z	5	4	5	4	5	3	3	3	3	2	2	2	3	7	13	11	11	10	6	5	6	6	5.2	13
8-Apr	9	10	Z	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.5	10
9-Apr	1	1	3	Z	5	5	5	3	3	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1.4	5
10-Apr	0	0	0	0	Z	0	1	1	1	1	1	1	2	2	3	2	3	4	6	4	3	3	3	3	2.0	6
11-Apr	2	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	2
12-Apr	Z	1	1	1	1	6	5	5	3	4	4	6	6	6	6	6	5	8	10	13	10	13	16	13	6.3	16
13-Apr	11	Z	8	17	9	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	2.8	17
14-Apr	3	9	Z	7	5	5	6	1	1	1	2	0	2	2	1	1	0	2	1	0	0	0	1	1	2.2	9
15-Apr	0	0	0	Z	0	0	0	3	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0.5	3
16-Apr	1	1	1	1	Z	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1
17-Apr	0	0	0	0	1	Z	1	1	1	1	2	1	1	1	0	0	0	1	1	1	0	0	0	0	0.6	2
18-Apr	Z	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.6	1
19-Apr	1	Z	1	1	1	2	1	1	1	1	1	0	0	0	1	1	1	0	0	0	1	4	1	2	0.9	4
20-Apr	2	2	Z	0	0	0	0	0	0	0	0	0	1	1	2	3	4	3	5	6	5	4	2	2	1.8	6
21-Apr	3	3	3	Z	1	1	1	1	1	0	1	1	1	5	5	4	4	3	4	2	3	5	1	7	2.5	7
22-Apr	8	9	10	13	Z	20	15	9	6	2	2	3	3	2	1	1	2	4	5	4	4	6	8	8	6.2	20
23-Apr	4	0	1	1	1	Z	1	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0.6	4
24-Apr	Z	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	0.6	1
25-Apr	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0.6	1
26-Apr	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0.7	1
27-Apr	1	2	2	Z	1	0	1	1	2	2	4	6	7	7	6	5	5	4	5	4	3	3	2	1	3.2	7
28-Apr	1	1	1	1	Z	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.8	2
29-Apr	1	1	1	1	1	Z	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.9	2
30-Apr	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
	2.8	2.3	2.5	2.9	2.2	2.3	2.9	2.3	1.8	1.4	1.3	1.4	1.7	1.7	1.6	1.7	1.8	2.0	2.4	2.5	2.7	2.9	2.8	2.7	Diurnal Average	
	11	10	11	17	14	20	19	16	11	6	4	6	9	7	6	7	13	11	11	13	25	26	25	20	Diurnal Maximum	

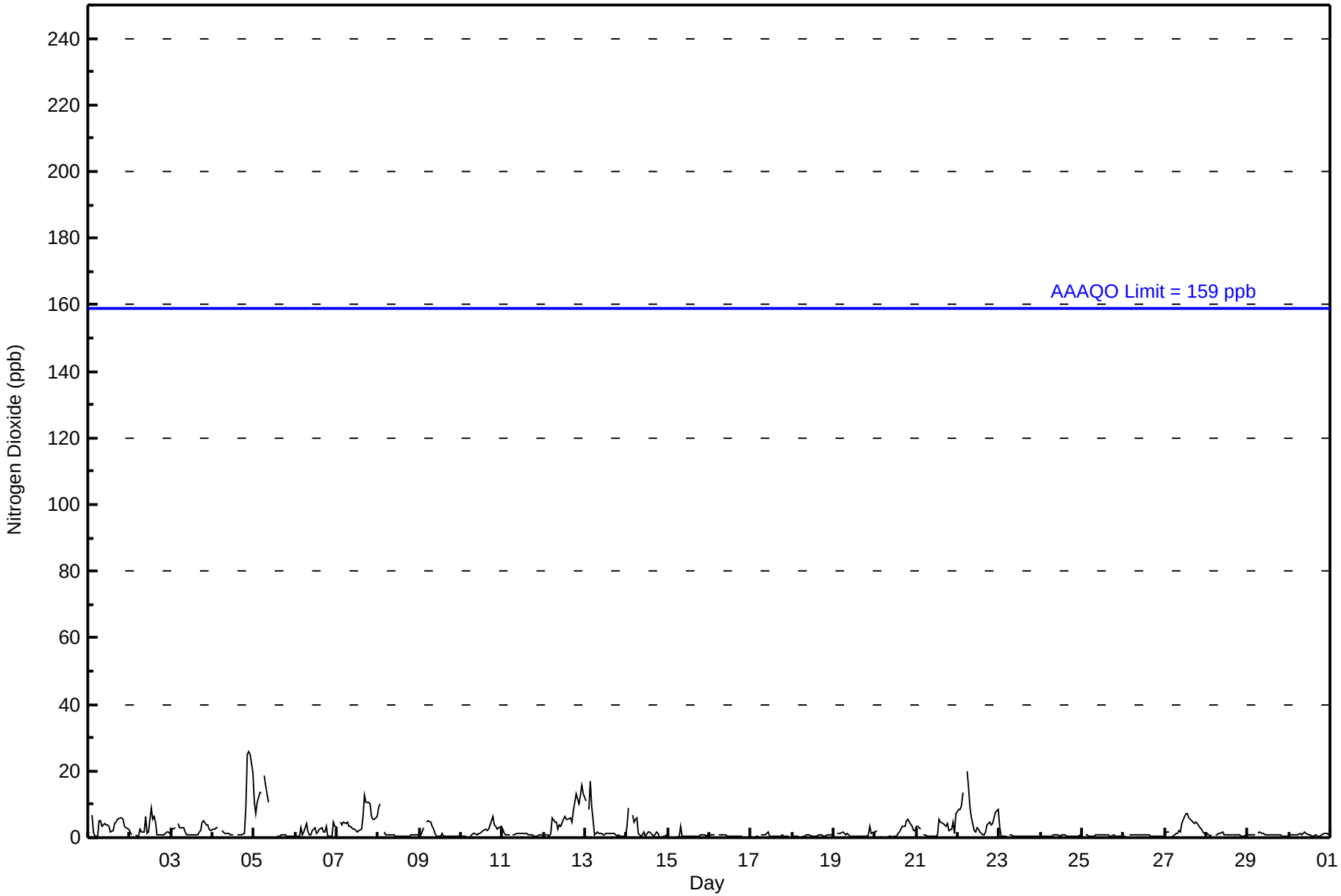
Z - zerospan C - Calibration M - Maintenance
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Dioxide (NO_2) - ppb

Brion MacKay River - April 2016



Nitrogen Dioxide (NO_2) - ppb
Brion MacKay River - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	682	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: 685

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Dioxide (NO_2) - ppb

Brion MacKay River - April 2016

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	51	67	40	23	58	54	74	113	24	15	15	20	16	39	31	661
21 - 40	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	3
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	21	51	70	40	23	58	54	74	113	24	15	15	20	16	39	31	664

Total Number of Valid Hours: 664

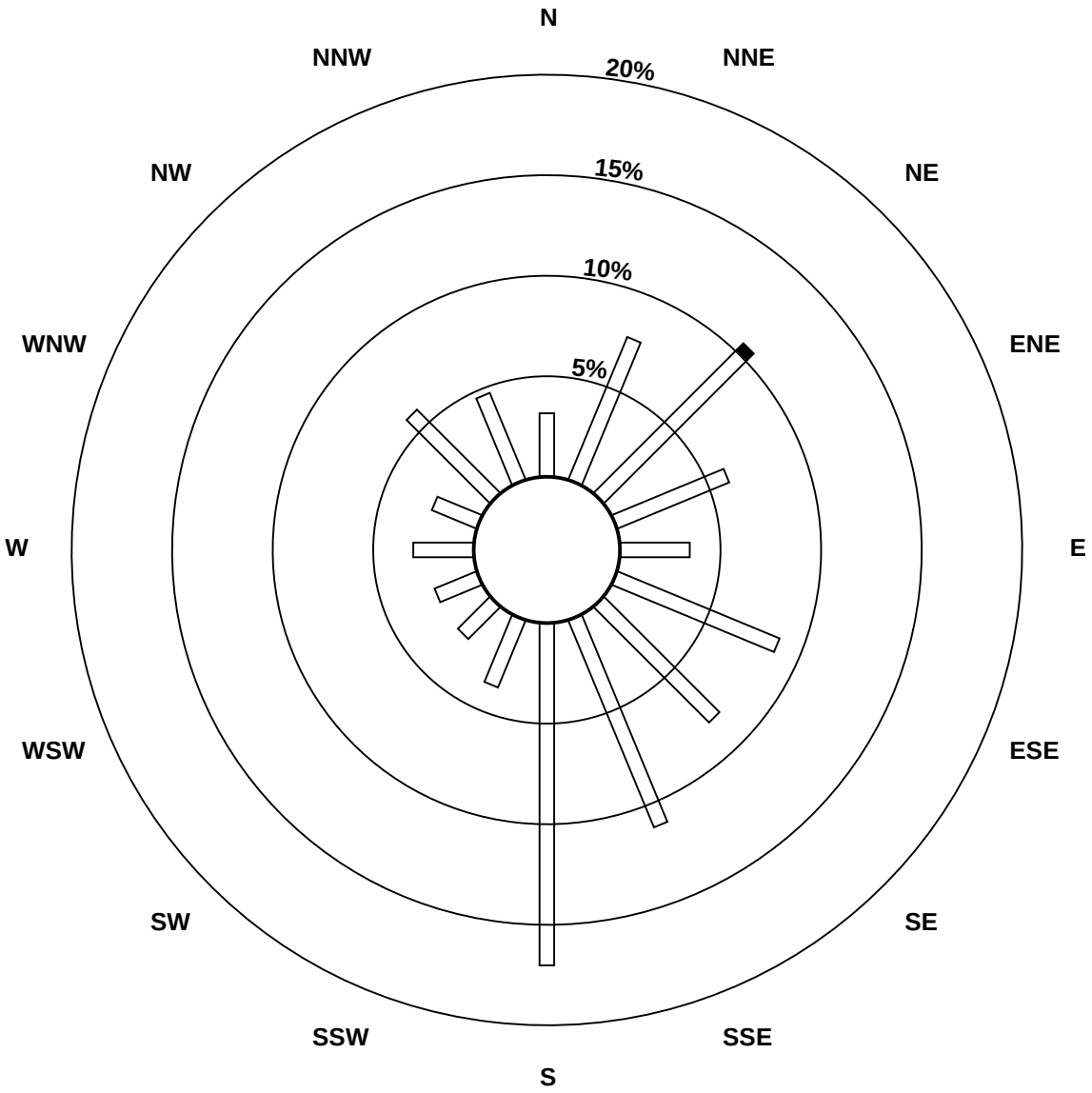
Total Number of Hours: 720

Wood Buffalo Environmental Association

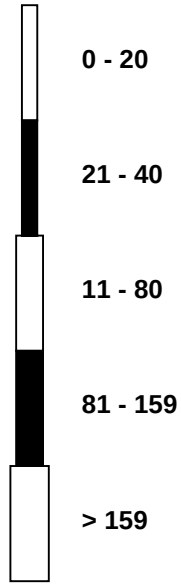
Wind Rose Apr 2016

Nitrogen Dioxide (NO_2) - ppb

Brion MacKay River (AMS 20)



Classes (ppb)



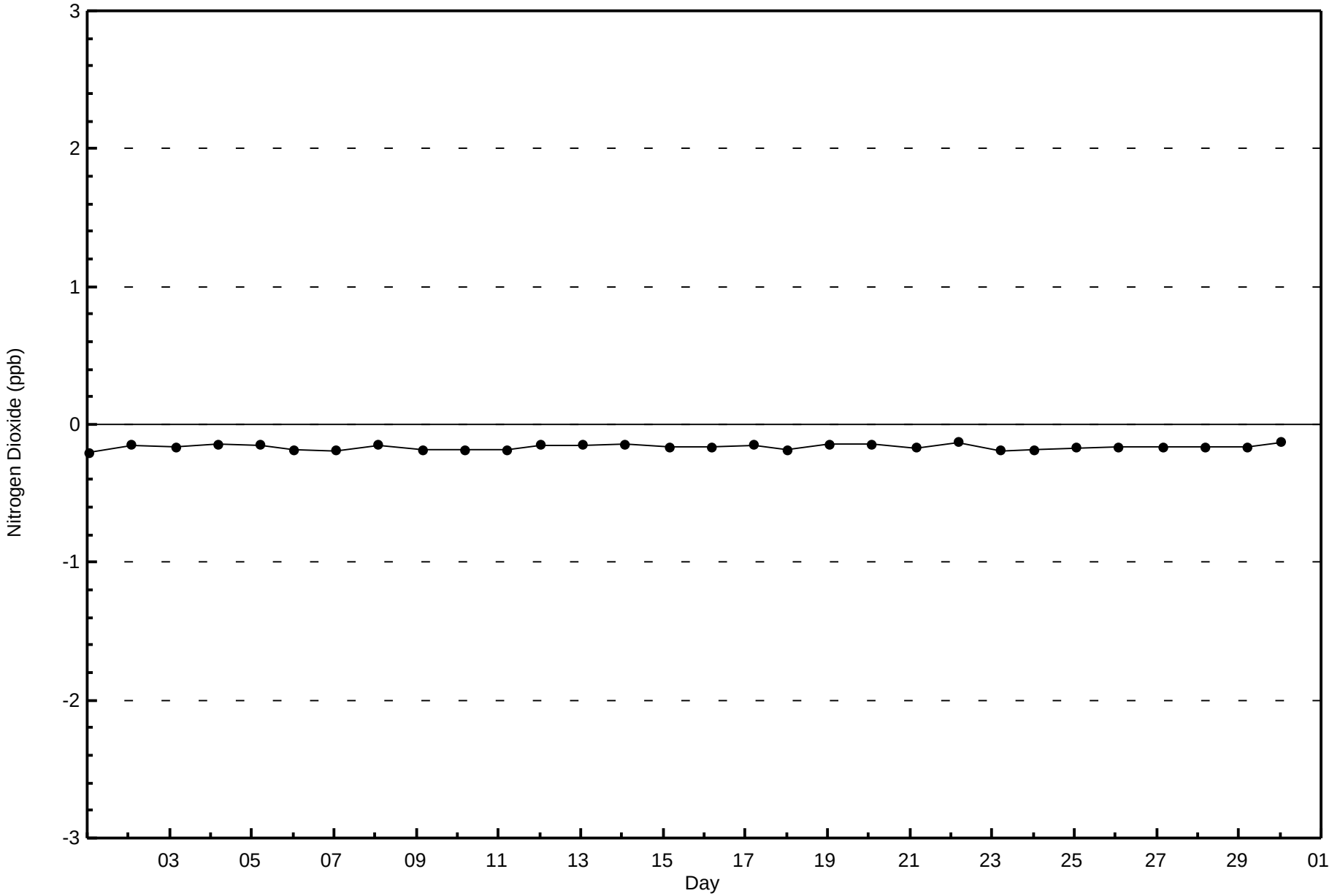
Total Number of Valid Hours: 664

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Dioxide (NO_2) - ppb

Brion MacKay River - April 2016

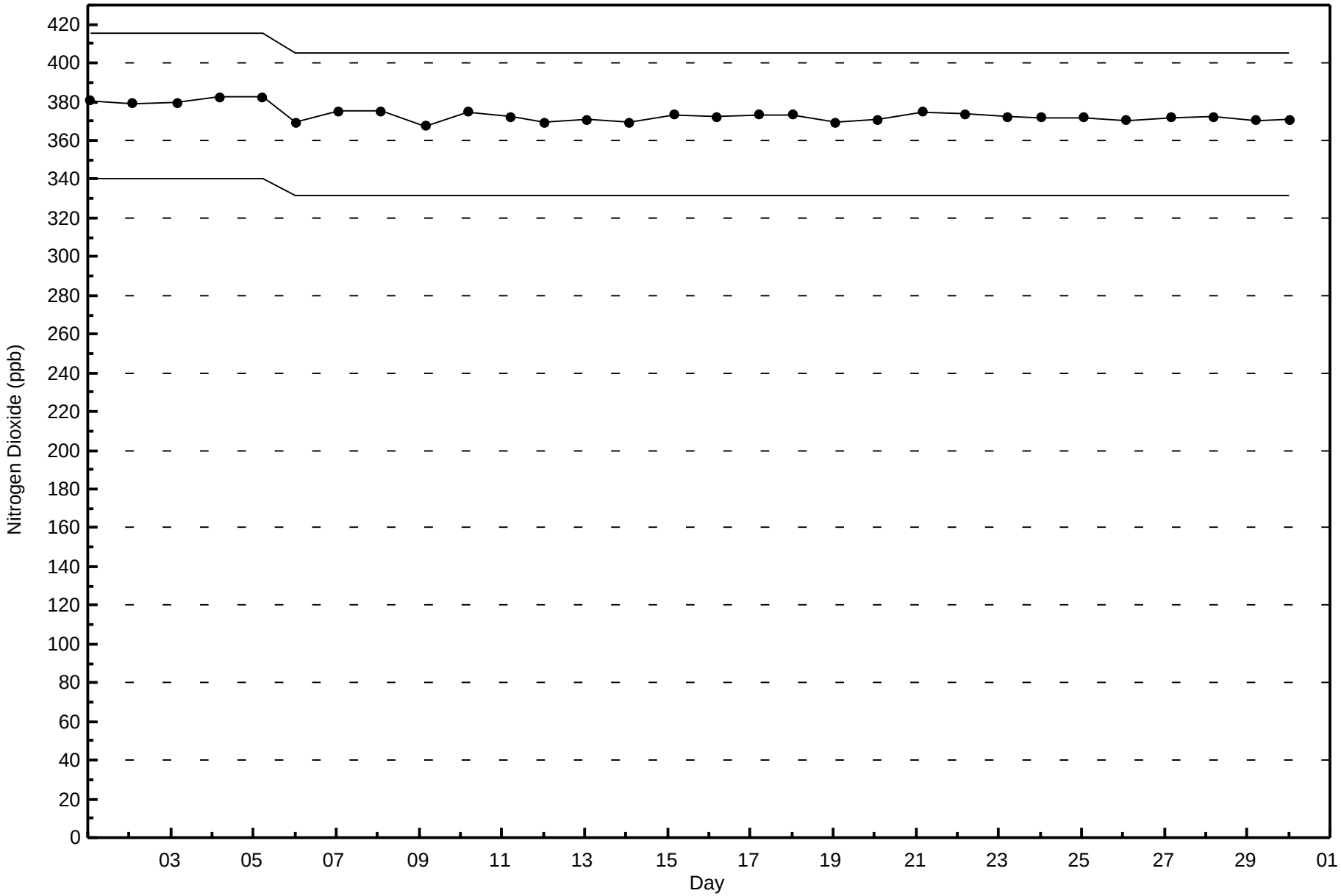


Wood Buffalo Environmental Association

Span Responses

Nitrogen Dioxide (NO_2) - ppb

Brion MacKay River - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_X) - ppb

Brion MacKay River - April 2016

Maximum Value: 26 ppb on Apr 4 22:00

Maximum Daily Average: 7.1 ppb on Apr 12

Minimum Value: 0 ppb on Apr 15 05:00

Minimum Daily Average: 0.6 ppb on Apr 16

Maximum Diurnal Average: 3.2 ppb at hour 7

Minimum Diurnal Average: 1.6 ppb at hour 11

Monthly Average: 2.4 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 1$ Median = 1 $Q_3 = 3$ $P_{90} = 6$ $P_{99} = 20$

Hours in Service:	720
Hours of Data:	685
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-Apr	0	Z	7	2	1	1	5	6	5	6	5	5	5	2	3	6	6	7	6	6	5	4	3	2	4.3	7
2-Apr	2	1	Z	1	1	1	3	2	2	10	2	2	13	8	8	6	1	1	1	1	1	2	1	1	3.0	13
3-Apr	2	2	3	Z	4	3	3	3	2	1	1	1	1	1	1	1	2	2	5	5	4	4	3	2	2.5	5
4-Apr	2	3	3	3	Z	2	2	2	2	1	1	1	1	M	1	1	1	1	1	9	25	26	25	20	6.0	26
5-Apr	11	7	10	13	14	Z	20	17	13	C	C	C	C	1	0	1	1	1	1	1	1	1	1	1	5.9	20
6-Apr	Z	0	0	3	1	2	5	2	1	1	3	4	2	2	3	3	2	2	3	1	0	0	5	3	2.1	5
7-Apr	3	Z	5	4	5	4	5	4	4	3	4	3	2	3	4	10	20	14	12	10	6	5	6	6	6.2	20
8-Apr	9	10	Z	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1.5	10
9-Apr	1	1	3	Z	5	5	5	4	3	2	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1.5	5
10-Apr	0	0	0	0	Z	0	1	2	2	1	1	2	2	3	3	3	3	5	7	4	3	3	3	3	2.3	7
11-Apr	2	1	1	1	1	Z	1	1	1	1	1	2	2	2	1	1	1	1	1	1	1	1	1	1	1.1	2
12-Apr	Z	1	1	1	1	6	5	6	4	5	5	8	9	8	7	8	5	9	11	13	10	12	15	13	7.1	15
13-Apr	11	Z	8	17	9	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	2.8	17
14-Apr	3	9	Z	7	5	6	7	1	0	1	2	0	2	2	1	1	0	2	1	0	0	0	0	1	2.3	9
15-Apr	0	0	0	Z	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0.6	4
16-Apr	1	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
17-Apr	0	0	0	0	0	Z	1	1	1	2	2	1	0	0	0	0	0	1	1	0	0	0	0	0	0.6	2
18-Apr	Z	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.6	1
19-Apr	1	Z	1	1	1	2	1	1	1	1	0	0	0	0	0	1	0	0	0	0	1	4	1	2	1.0	4
20-Apr	2	2	Z	0	0	0	0	0	0	0	0	0	1	2	2	3	5	4	6	6	5	4	2	2	2.1	6
21-Apr	3	3	3	Z	1	1	1	1	1	0	0	1	1	7	6	5	5	4	4	2	3	5	1	7	2.8	7
22-Apr	8	9	10	13	Z	22	19	12	8	3	3	4	3	2	1	1	2	4	5	4	4	6	8	8	6.9	22
23-Apr	4	0	1	1	1	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.6	4
24-Apr	Z	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	0.6	1
25-Apr	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	0.7	1
26-Apr	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0.7	1
27-Apr	0	2	2	Z	0	0	2	2	4	3	7	10	11	11	9	7	6	5	5	4	3	2	2	1	4.3	11
28-Apr	1	1	1	1	Z	1	1	1	2	2	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0.8	2
29-Apr	1	1	1	1	1	Z	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.9	2
30-Apr	Z	1	1	1	1	1	1	1	1	2	2	1	1	1	1	1	1	0	0	1	1	1	1	1	1.0	2
	2.8	2.3	2.5	3.0	2.2	2.4	3.2	2.7	2.2	1.8	1.6	1.8	2.2	2.2	2.0	2.2	2.3	2.3	2.5	2.5	2.7	2.8	2.8	2.7	Diurnal Average	
	11	10	10	17	14	22	20	17	13	10	7	10	13	11	9	10	20	14	12	13	25	26	25	20	Diurnal Maximum	

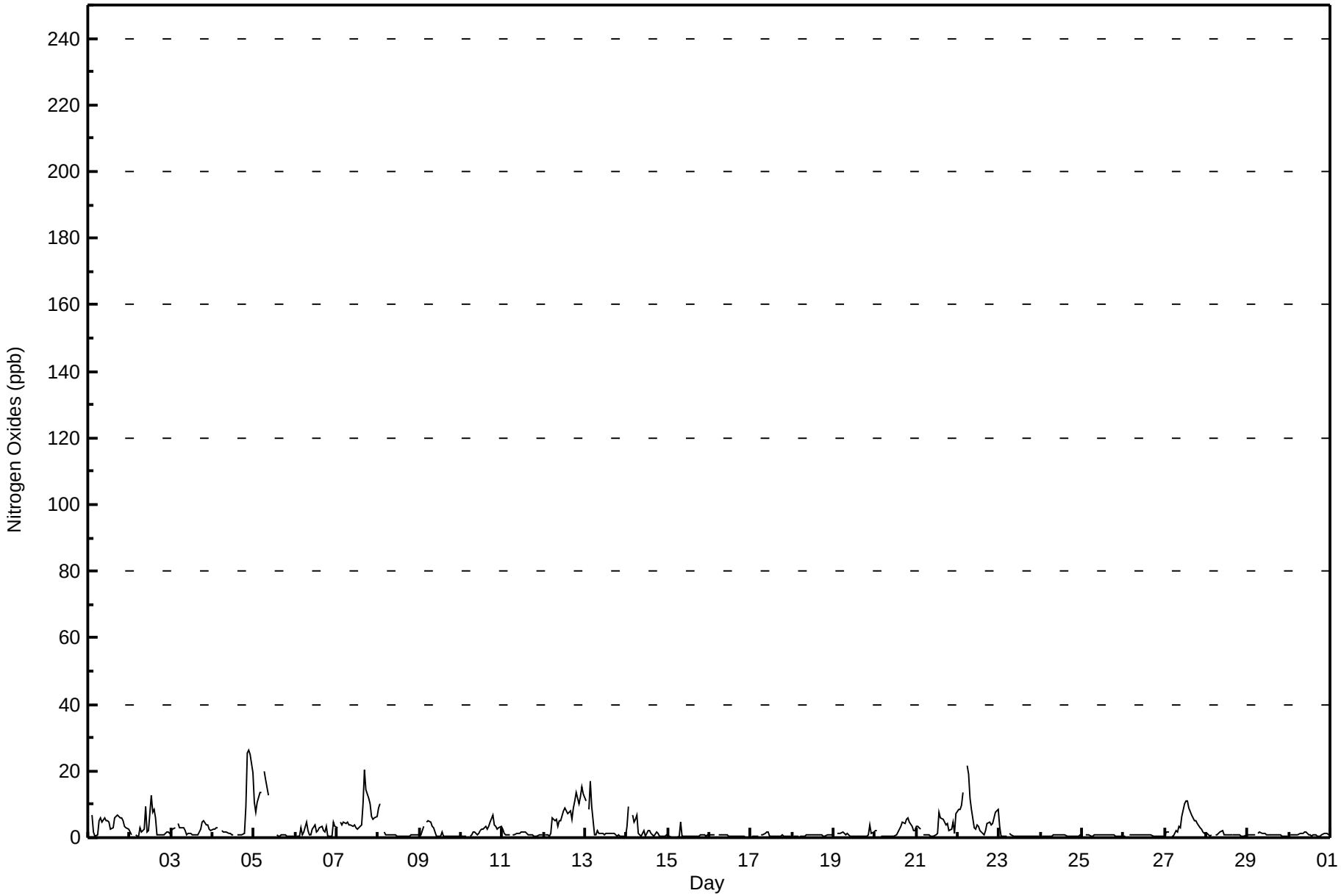
Z - zerospan C - Calibration M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Oxides (NO_X) - ppb

Brion MacKay River - April 2016



Nitrogen Oxides (NO_X) - ppb
Brion MacKay River - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	681	99.42	99.42
21 - 40	4	0.58	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: 685

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Oxides (NO_X) - ppb

Brion MacKay River - April 2016

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	50	67	40	23	58	54	74	113	24	15	15	20	16	39	31	660
21 - 40	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	4
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	21	51	70	40	23	58	54	74	113	24	15	15	20	16	39	31	664

Total Number of Valid Hours: 664

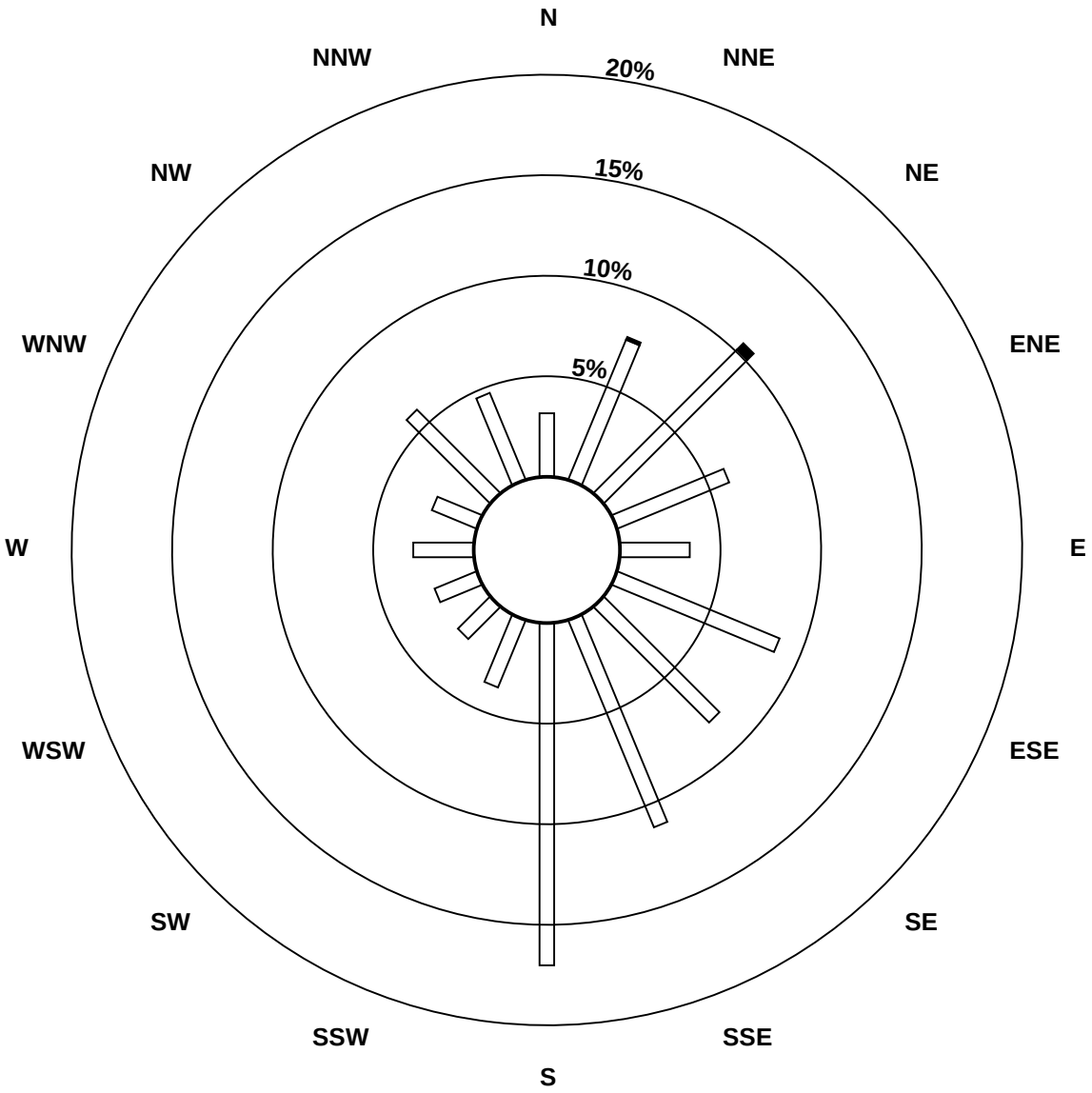
Total Number of Hours: 720

Wood Buffalo Environmental Association

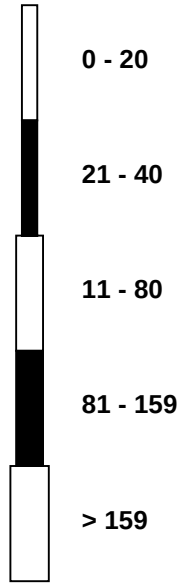
Wind Rose Apr 2016

Nitrogen Oxides (NO_X) - ppb

Brion MacKay River (AMS 20)



Classes (ppb)



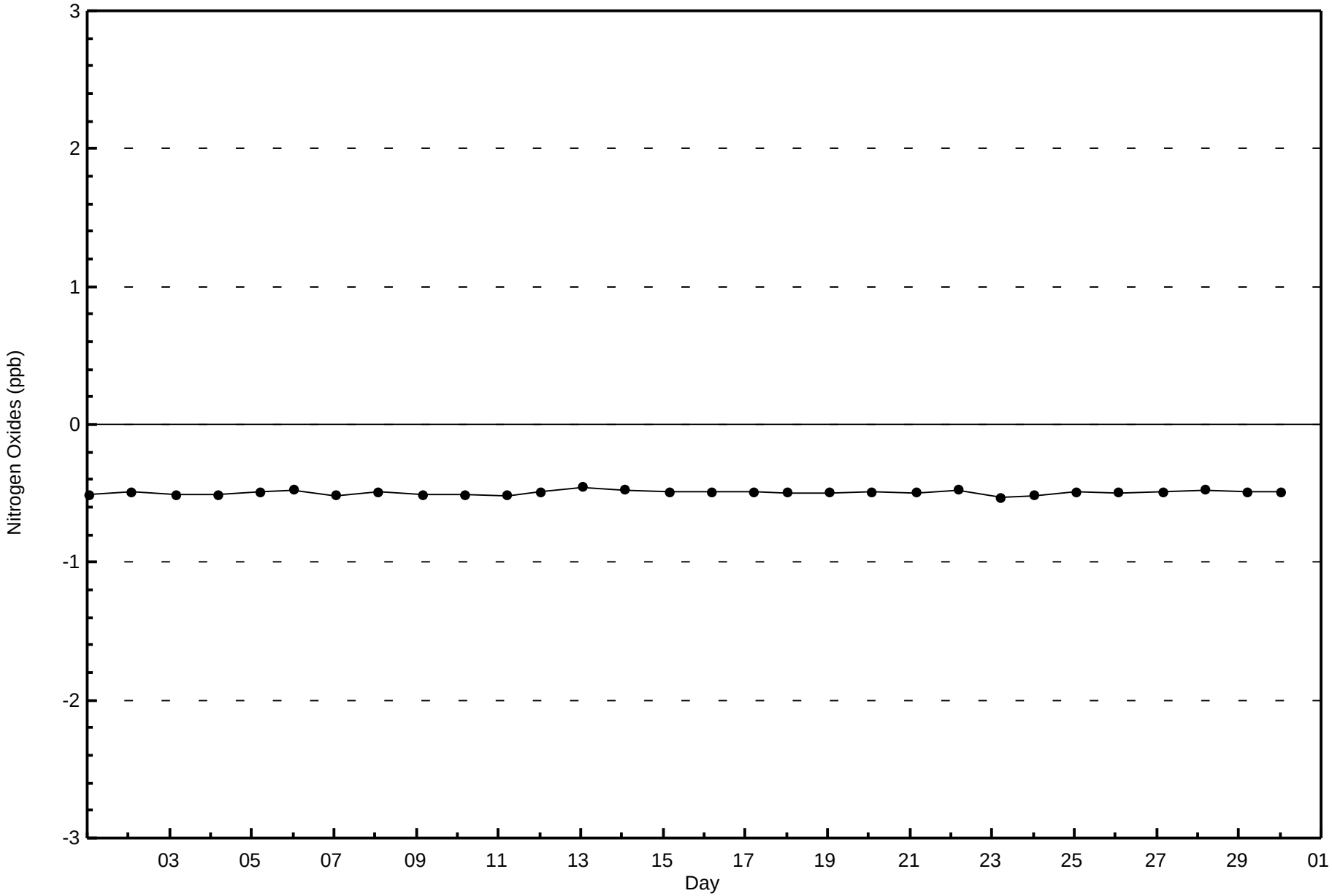
Total Number of Valid Hours: 664

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Oxides (NO_X) - ppb

Brion MacKay River - April 2016

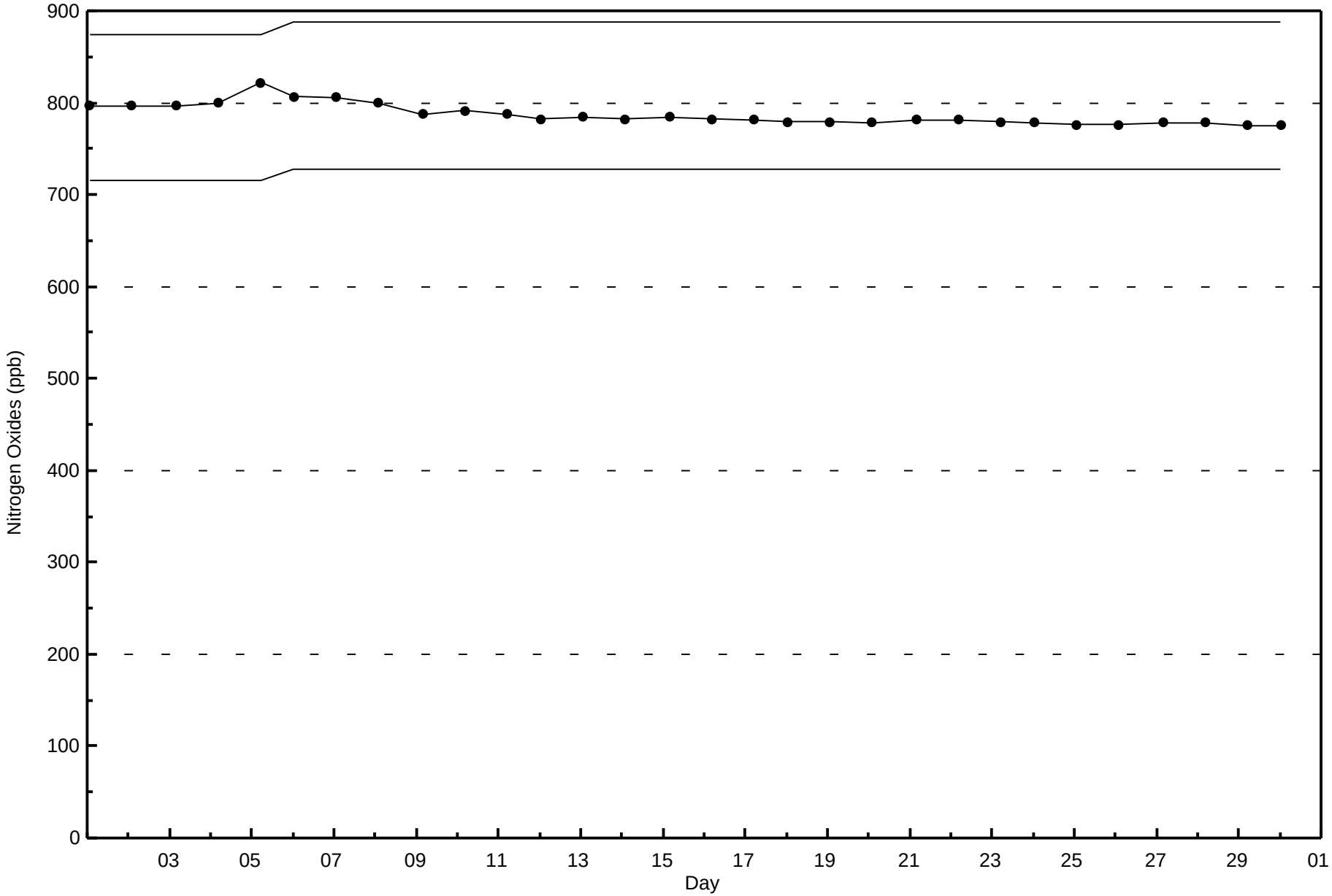


Wood Buffalo Environmental Association

Span Responses

Nitrogen Oxides (NO_X) - ppb

Brion MacKay River - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

Brion MacKay River - April 2016

Maximum Value: 26.3 C on Apr 18 16:00

Maximum Daily Average: 16.2 C on Apr 18

Minimum Value: -13.7 C on Apr 4 03:00

Minimum Daily Average: -5.9 C on Apr 3

Maximum Diurnal Average: 8.6 C at hour 17

Minimum Diurnal Average: -1.4 C at hour 5

Monthly Average: 3.52 C

Percentiles: P_1 = -10.5 P_{10} = -5.9 Q_1 = -1.5 Median = 2.6 Q_3 = 7.8 P_{90} = 15.1 P_{99} = 24.2

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

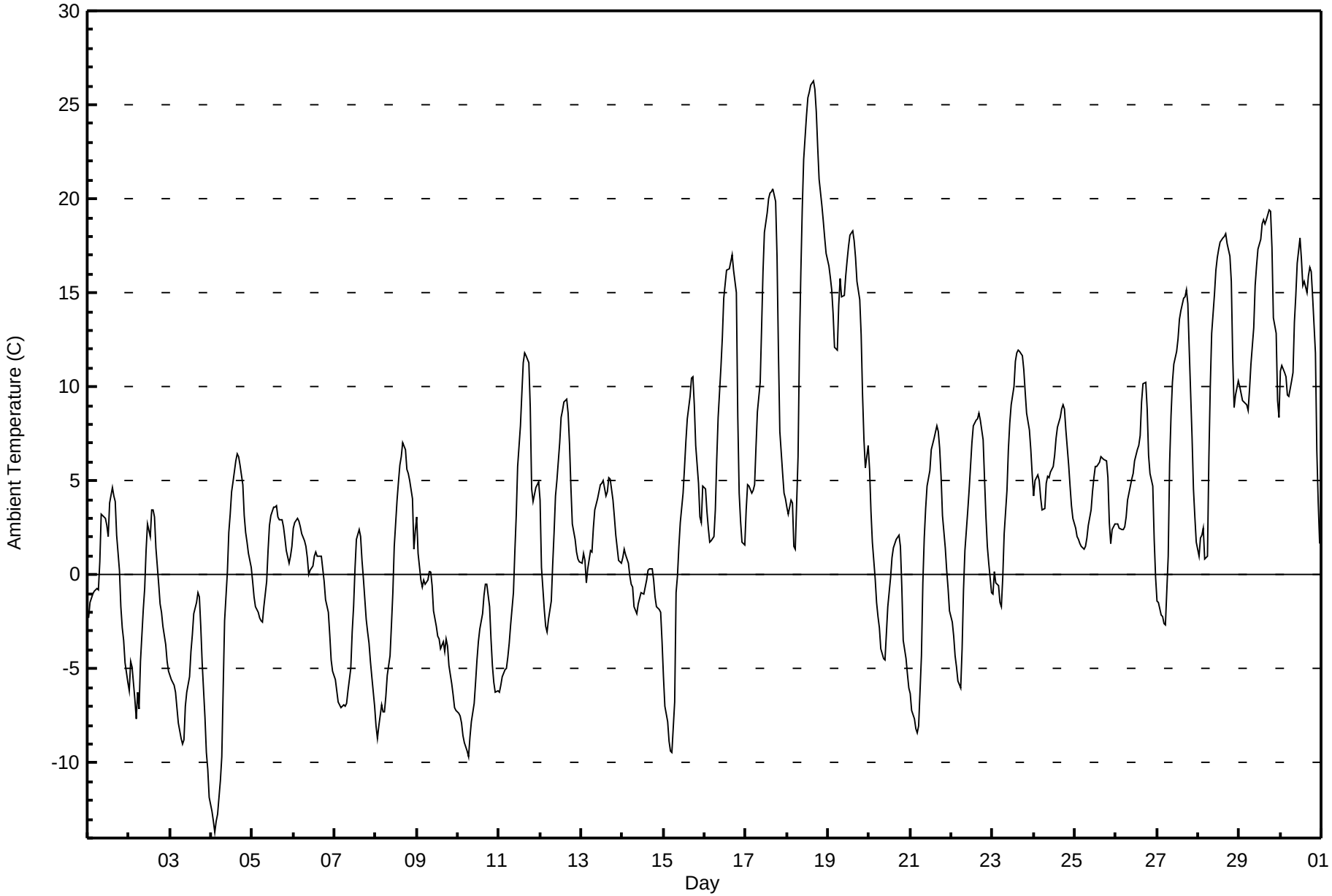
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	-2.3	-1.5	-1.2	-1.0	-0.9	-0.8	-0.8	0.7	3.2	3.0	3.0	2.6	2.0	3.8	4.6	4.2	3.9	2.1	0.3	-1.7	-2.8	-3.5	-4.7	-5.7	0.3	4.6
2-Apr	-6.2	-4.6	-4.9	-6.6	-7.7	-6.2	-7.2	-4.6	-1.9	-0.7	1.3	2.7	2.1	3.4	3.5	3.1	1.4	-0.5	-1.5	-2.0	-2.7	-3.7	-4.6	-5.1	-2.2	3.5
3-Apr	-5.4	-5.6	-5.9	-6.3	-7.0	-7.9	-8.7	-9.0	-8.8	-7.0	-6.2	-5.4	-4.1	-3.2	-2.1	-1.5	-1.0	-1.2	-2.7	-4.6	-7.6	-9.5	-10.3	-11.9	-5.9	-1.0
4-Apr	-12.6	-13.1	-13.7	-13.1	-12.8	-10.9	-9.6	-6.0	-2.4	0.1	2.2	3.2	4.4	4.9	6.1	6.4	6.3	5.8	4.8	3.2	2.2	1.7	1.1	0.4	-1.7	6.4
5-Apr	-0.4	-1.2	-1.7	-2.0	-2.3	-2.5	-2.5	-1.7	-0.3	1.3	2.6	3.1	3.6	3.6	3.7	3.0	3.0	2.9	2.5	2.0	1.3	0.6	1.0	1.5	0.9	3.7
6-Apr	2.5	2.8	3.0	2.9	2.6	2.2	1.8	1.5	0.9	0.0	0.3	0.5	1.0	1.2	1.0	1.0	1.0	0.3	-0.3	-1.3	-2.0	-3.2	-4.6	-5.1	0.4	3.0
7-Apr	-5.6	-6.2	-6.8	-6.9	-7.1	-6.9	-7.0	-6.8	-6.2	-4.9	-3.1	-1.7	0.3	1.9	2.4	2.0	0.7	-0.2	-2.3	-3.0	-3.7	-4.6	-5.4	-7.0	-3.7	2.4
8-Apr	-8.0	-8.7	-8.1	-6.9	-7.3	-7.3	-6.5	-5.4	-4.3	-2.7	-0.9	1.5	3.9	4.9	5.8	6.2	7.0	6.7	5.6	5.4	5.0	4.1	1.3	2.4	-0.3	7.0
9-Apr	3.1	1.1	-0.3	-0.6	-0.2	-0.5	-0.3	0.2	0.2	-0.6	-1.9	-2.7	-3.3	-3.4	-3.9	-3.6	-4.1	-3.4	-3.8	-4.8	-5.8	-6.4	-7.1	-7.2	-2.5	3.1
10-Apr	-7.4	-7.5	-7.9	-8.6	-9.0	-9.4	-9.7	-8.6	-7.8	-6.8	-5.7	-4.5	-3.5	-2.9	-2.0	-1.1	-0.5	-0.5	-1.7	-3.4	-4.8	-5.8	-6.2	-6.2	-5.5	-0.5
11-Apr	-6.3	-5.9	-5.4	-5.1	-5.0	-4.4	-3.7	-2.6	-1.0	1.2	3.1	5.8	7.9	9.6	11.3	11.8	11.7	11.3	8.9	4.5	3.9	4.6	4.8	4.9	2.8	11.8
12-Apr	4.0	0.4	-1.8	-2.8	-3.0	-2.4	-1.4	0.5	2.3	4.2	5.0	7.1	8.4	8.7	9.2	9.3	8.6	7.0	4.6	2.7	1.9	1.2	0.8	0.7	3.1	9.3
13-Apr	0.6	1.2	0.8	-0.5	0.3	1.3	1.2	2.5	3.5	4.1	4.4	4.8	4.9	5.0	4.2	4.4	5.2	5.1	4.0	3.1	2.1	1.5	0.8	0.6	2.7	5.2
14-Apr	0.9	1.4	1.1	0.6	-0.1	-0.5	-0.6	-1.7	-2.1	-1.6	-1.3	-1.0	-1.0	-0.7	-0.3	0.2	0.3	0.3	-0.3	-1.2	-1.7	-1.9	-2.0	-3.6	-0.7	1.4
15-Apr	-5.4	-7.0	-7.8	-8.9	-9.4	-9.5	-6.8	-1.0	0.0	1.5	2.8	4.4	5.7	7.1	8.3	9.5	10.5	10.5	9.1	6.9	4.9	3.1	2.8	4.8	1.5	10.5
16-Apr	4.6	3.4	2.5	1.7	1.8	2.0	3.5	6.1	8.4	11.0	12.7	14.7	15.5	16.2	16.3	16.6	17.0	16.2	15.0	8.4	4.3	2.8	1.8	1.6	8.5	17.0
17-Apr	3.4	4.8	4.7	4.4	4.5	4.8	6.8	8.6	10.3	13.2	16.1	18.2	19.3	20.0	20.3	20.4	20.6	19.8	16.9	11.9	7.6	5.4	4.3	4.1	11.3	20.6
18-Apr	3.6	3.2	3.9	3.8	1.5	1.3	6.3	12.2	16.1	19.5	22.1	24.4	25.4	25.7	26.0	26.3	25.8	24.7	22.8	21.0	19.6	18.8	17.9	17.1	16.2	26.3
19-Apr	16.5	15.8	15.2	13.9	12.1	12.0	14.3	15.7	14.8	14.8	15.9	16.7	17.5	18.0	18.3	17.8	16.9	15.6	14.6	12.7	9.6	7.2	5.7	6.9	14.1	18.3
20-Apr	5.6	3.4	1.7	-0.2	-1.5	-2.2	-2.8	-4.0	-4.5	-4.5	-3.1	-1.7	-0.2	0.9	1.4	1.7	1.9	2.1	1.5	-0.7	-3.5	-4.4	-5.3	-6.0	-1.0	5.6
21-Apr	-6.3	-7.2	-7.7	-8.2	-8.4	-8.0	-4.3	-0.4	1.9	3.5	4.7	5.6	6.6	6.9	7.3	7.9	7.6	6.8	5.2	3.1	1.4	0.2	-0.7	-1.9	0.7	7.9
22-Apr	-2.5	-3.3	-4.3	-4.9	-5.6	-6.0	-4.0	-0.8	1.3	3.4	4.5	5.8	7.0	7.9	8.2	8.3	8.6	8.2	7.2	5.1	3.1	1.5	0.6	-1.0	2.0	8.6
23-Apr	-1.0	0.2	-0.4	-0.6	-1.5	-1.7	-0.1	2.2	4.5	6.7	8.1	9.0	10.0	11.3	11.8	12.0	11.9	11.7	10.9	9.7	8.6	7.7	6.7	5.3	6.0	12.0
24-Apr	4.2	5.0	5.3	5.0	4.2	3.5	3.5	4.9	5.2	5.2	5.5	5.7	6.4	7.3	7.8	8.3	8.8	9.0	8.8	7.7	5.8	4.7	3.7	3.0	5.8	9.0
25-Apr	2.5	2.1	1.9	1.7	1.5	1.4	1.5	1.9	2.6	3.5	4.5	5.2	5.7	5.8	6.0	6.3	6.2	6.1	6.0	5.2	2.7	1.6	2.4	2.7	3.6	6.3
26-Apr	2.7	2.7	2.4	2.4	2.4	2.5	3.0	3.9	4.7	5.1	5.4	6.1	6.7	6.9	7.4	9.2	10.2	10.2	8.8	6.3	5.4	4.7	1.9	-0.2	5.0	10.2
27-Apr	-1.4	-1.5	-2.1	-2.2	-2.6	-2.7	1.0	5.9	8.4	10.2	11.2	11.9	12.6	13.6	14.0	14.7	14.8	15.2	14.4	11.9	7.3	4.6	3.1	1.8	6.8	15.2
28-Apr	1.0	2.0	2.1	2.5	0.9	1.0	6.2	10.0	12.9	14.9	16.2	16.9	17.3	17.7	17.9	18.0	18.1	17.6	17.0	15.6	11.6	8.9	9.6	10.3	11.1	18.1
29-Apr	10.0	9.6	9.3	9.1	9.1	8.8	9.9	11.2	13.2	15.4	16.4	17.3	17.8	18.6	18.9	18.6	18.9	19.4	19.3	17.4	13.6	12.8	9.3	8.4	13.8	19.4
30-Apr	10.8	11.1	10.7	10.5	9.6	9.5	10.3	10.8	13.4	14.9	16.6	17.9	16.8	15.4	15.6	15.0	15.9	16.4	16.2	14.8	11.8	6.6	3.8	1.6	12.3	17.9
	0.2	-0.1	-0.5	-0.9	-1.4	-1.3	-0.2	1.5	2.9	4.3	5.4	6.5	7.2	7.9	8.3	8.5	8.6	8.2	7.1	5.2	3.3	2.0	1.1	0.6	Diurnal Average	
	16.5	15.8	15.2	13.9	12.1	12.0	14.3	15.7	16.1	19.5	22.1	24.4	25.4	25.7	26.0	26.3	25.8	24.7	22.8	21.0	19.6	18.8	17.9	17.1	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature (AT) - C

Brion MacKay River - April 2016



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	239	33.19	33.19
0 - 10	347	48.19	81.39
10 - 20	120	16.67	98.06
> 20	14	1.94	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Brion MacKay River - April 2016

Maximum Value: 98 % on Apr 27 04:00

Maximum Daily Average: 84.0 % on Apr 26

Minimum Value: 12 % on Apr 19 14:00

Minimum Daily Average: 22.2 % on Apr 19

Maximum Diurnal Average: 73.4 % at hour 5

Minimum Diurnal Average: 41.5 % at hour 17

Monthly Average: 57.2 %

Percentiles: $P_1 = 15$ $P_{10} = 26$ $Q_1 = 40$ Median = 58 $Q_3 = 74$ $P_{90} = 86$ $P_{99} = 97$

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

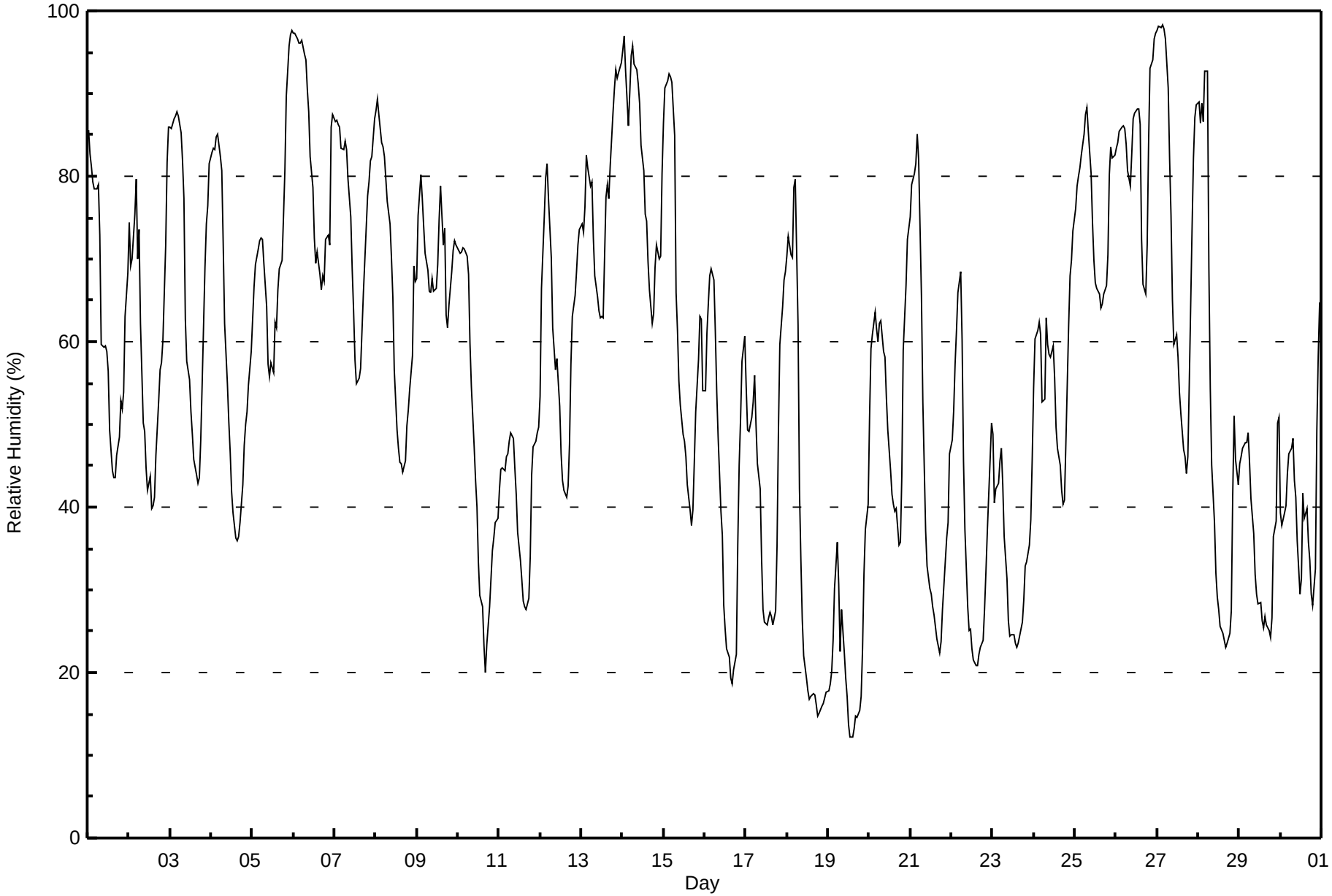
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	86	83	81	79	78	78	79	73	60	59	59	59	56	49	44	44	44	46	48	53	52	54	63	68	62.4	86
2-Apr	74	69	70	75	80	70	74	62	50	49	45	42	44	40	40	41	46	53	57	57	60	72	82	86	59.9	86
3-Apr	86	86	87	87	88	87	85	82	77	63	58	55	51	49	46	44	43	44	48	55	69	74	76	82	67.6	88
4-Apr	83	83	83	85	85	82	81	72	62	55	50	47	42	39	36	36	36	38	43	47	50	51	55	59	58.4	85
5-Apr	63	67	69	71	72	73	72	69	64	57	56	57	56	62	62	66	69	70	75	81	90	96	97	98	71.4	98
6-Apr	97	97	97	96	96	96	95	94	90	88	82	79	73	69	71	68	66	68	67	72	73	72	86	87	82.5	97
7-Apr	87	87	86	86	83	83	84	83	80	75	69	64	58	55	56	57	61	66	74	78	79	82	82	87	75.1	87
8-Apr	88	89	88	84	83	82	80	77	74	70	65	57	49	47	45	45	44	46	50	52	54	58	69	67	65.2	89
9-Apr	68	75	80	77	74	71	69	66	66	68	66	66	69	75	79	72	74	63	62	64	68	71	72	72	70.3	80
10-Apr	71	71	71	71	71	70	68	60	55	47	43	40	33	29	28	23	20	23	28	31	35	36	38	39	45.9	71
11-Apr	42	45	45	44	46	46	48	49	48	45	41	37	34	31	29	28	28	29	34	44	47	48	49	50	41.1	50
12-Apr	53	66	75	80	82	77	70	62	59	57	58	52	47	43	42	41	42	48	57	63	66	68	72	74	60.6	82
13-Apr	74	73	76	82	81	79	79	73	68	65	64	63	63	63	78	79	77	81	88	91	93	92	93	94	77.9	94
14-Apr	95	97	93	86	90	95	96	94	93	91	89	84	81	75	75	70	66	62	63	69	72	70	70	80	81.5	97
15-Apr	86	91	91	92	92	91	85	66	61	55	52	49	48	46	43	40	38	40	45	51	58	63	63	54	62.6	92
16-Apr	54	61	65	68	69	67	61	54	48	39	37	28	25	23	22	19	19	20	22	35	45	51	58	61	43.8	69
17-Apr	55	49	49	51	53	56	50	45	42	34	28	26	26	27	27	27	26	28	35	49	60	64	67	69	43.4	69
18-Apr	70	73	71	70	79	80	62	42	34	26	22	19	18	17	17	17	17	16	15	15	16	16	17	18	35.3	80
19-Apr	18	19	20	24	30	36	31	23	28	22	19	17	14	12	12	13	15	15	15	17	23	32	37	40	22.2	40
20-Apr	51	59	61	64	61	60	62	63	59	58	53	49	44	42	40	39	40	35	36	44	59	67	72	74	53.9	74
21-Apr	75	79	80	82	85	82	66	53	45	37	33	30	29	28	27	24	23	22	24	28	33	36	38	46	46.1	85
22-Apr	48	52	57	61	66	68	60	46	37	28	25	25	23	21	21	21	22	23	24	28	32	37	41	50	38.2	68
23-Apr	49	40	42	43	46	47	43	36	31	26	24	25	25	23	23	24	24	26	29	33	33	35	38	46	33.9	49
24-Apr	54	60	61	62	61	53	53	63	60	58	58	59	56	50	47	45	42	40	41	48	62	68	70	73	56.1	73
25-Apr	76	79	80	81	83	85	87	88	85	80	74	70	67	66	66	64	65	66	67	71	80	84	82	82	76.2	88
26-Apr	83	84	85	86	86	86	84	81	79	83	87	88	88	88	86	72	67	66	72	84	93	94	97	97	84.0	97
27-Apr	98	98	98	98	98	97	91	82	75	65	60	61	58	54	51	47	46	44	46	55	74	82	87	89	73.0	98
28-Apr	89	87	89	87	93	93	69	54	45	38	32	29	28	26	25	24	23	24	25	27	41	51	46	43	49.4	93
29-Apr	45	46	47	48	48	49	46	41	37	32	29	28	28	26	25	27	26	25	24	27	36	38	50	51	36.7	51
30-Apr	39	38	39	40	44	46	47	48	43	41	36	29	31	42	39	40	36	34	30	28	33	49	58	65	40.7	65
	68.6	70.1	71.3	72.1	73.4	72.9	69.2	63.3	58.6	53.8	50.5	47.8	45.5	43.9	43.4	41.9	41.5	42.0	44.8	49.9	56.2	60.4	64.2	66.6	Diurnal Average	
	98	98	98	98	98	97	96	94	93	91	89	88	88	88	86	79	77	81	88	91	93	96	97	98	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity (RH) - %

Brion MacKay River - April 2016



Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	28	3.89	3.89
20 - 40	148	20.56	24.44
40 - 60	204	28.33	52.78
60 - 80	201	27.92	80.69
80 - 100	139	19.31	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Brion MacKay River - April 2016

Maximum Speed: 21 km/h on Apr 19 16:00

Maximum Daily Speed Average: 11.7 km/h on Apr 18

Minimum Speed Value: 1 km/h on Apr 21 02:00

Minimum Daily Speed Average: 3.7 km/h on Apr 1

Maximum Diurnal Speed Average: 2.7 km/h at hour 21

Minimum Diurnal Speed Average: 0.5 km/h at hour 7

Monthly Average Velocity: 1.2 km/h 130.3 deg

Percentiles: P_1 = 1 P_{10} = 3 Q_1 = 5 Median = 8 Q_3 = 10 P_{90} = 14 P_{99} = 18

Hours in Service: 720

Hours of Data: 697

Hours of Missing Data: 23

Percent Operational Time: 96.8

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-Apr	WSW3	W3	W4	WSW3	SSW3	SW3	W2	NNW3	NNE10	NNE7	NNE9	NNE9	NE9	NNE4	NNE9	ENE9	ENE10	ENE10	ENE8	ENE5	ENE5	ENE4	ENE3	NE3	NE3.7	ENE10
2-Apr	ENE3	E4	ENE4	NNE4	NNE3	ESE4	N4	NNE5	NNE5	NNE9	NE10	NNE9	N11	NNE9	NE10	NNE12	NNE14	NNE12	NNE10	NNE10	NNE10	NNE9	NNE9	N7	NNE7.3	NNE14
3-Apr	N6	N6	N7	N8	NNE7	NNE8	NNE9	NNE10	NNE9	NNE12	NNE10	N8	NNW7	NNW4	N6	N4	NE8	NE7	ENE6	E4	ENE2	E1	ESE2	NE2	NNE5.7	NNE12
4-Apr	ESE1	ESE1	SSE3	SSE3	SSE5	SSE6	SSE6	SSE7	S7	S7	SSE7	SSE8	SE8	ESE8	ESE7	ESE6	E5	E5	ENE5	NE7	NE7	NE6	NE6	NE5	ESE3.9	SSE8
5-Apr	NE5	NE5	NE5	NNE4	NE5	NE6	NE5	NE4	ENE5	SE7	SSE8	S9	SSE8	SSE8	SSE11	S10	S9	S7	S6	SSE6	SSE8	SSE7	S7	S7	SSE3.8	SSE11
6-Apr	SW7	SW6	WSW7	W9	WNW10	NW10	NW11	NW11	NW14	WNW14	NW13	NW14	NW15	NW15	NW15	NW15	NW17	NW16	NW14	AF	AF	AF	AF	AF	WNW11.4	NW17
7-Apr	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	SE5	NNE10	NNE12	NE12	NE12	NE11	NE10	NE8	NE9	NE7	NE4	NE3	----	NNE12
8-Apr	NE3	ENE2	E2	ESE5	ESE7	ESE9	ESE9	ESE9	SE11	SE12	SE11	SE15	ESE15	ESE13	ESE15	ESE13	SE12	SE12	SE9	SE11	SSE14	SE7	ESE3	SSE7	SE9.0	ESE15
9-Apr	SSE7	SSE2	NW4	NW11	NW13	NW11	NW10	NW11	NW15	NNW17	NNW17	NNW16	NNW18	NW19	NNW16	NNW17	NNW14	NNW15	NNW16	NNW12	N7	NNW7	NNW7	NNW7	NNW11.0	NW19
10-Apr	NNW8	NNW8	NNW8	N8	NNW8	N7	NNE8	NNE8	NNE8	NNE9	N8	N7	NE6	N7	N7	ENE5	E3	NE6	E6	ESE7	ESE6	SE6	SE7	SE8	NNE4.5	NNE9
11-Apr	SE8	SE8	SSE7	SSE7	SSE7	SSE8	S8	S8	S8	S9	S9	S9	S8	S9	SSW10	SW9	SSW7	SSW8	SSW5	S4	S5	S6	S6	S7	S7.0	SSW10
12-Apr	S5	SW1	SSE3	SSE2	WNW2	N5	NNE7	NNE8	NNE9	ENE7	E7	NNE7	NNE9	NE11	NE11	ENE10	ENE11	NE9	NE10	NE8	NE10	NE10	NE6	NNE5	NE6.0	ENE11
13-Apr	ENE6	ENE5	NW3	NE4	ENE5	ESE4	E5	ESE7	ESE8	ESE6	ESE7	E4	E5	ESE6	SE7	E3	ENE3	ESE5	ESE7	SE7	SE7	SE3	S2	N2	ESE4.2	ESE8
14-Apr	WNW3	NW7	NW8	NW9	NW9	NW8	NW9	NW11	WNW11	NW11	NW11	NNW11	NW10	NW9	NW9	WNW9	WNW9	NW9	NNW9	NNW7	NNW5	NNW5	NW3	SSE1	NW7.7	NW11
15-Apr	S2	SSE2	SSE2	SE2	SSE2	SSE3	SSE2	SE1	S5	SSE7	SSE8	SSE9	SE10	SE10	SE10	SE10	ESE9	ESE10	ESE10	SE8	SE7	SE6	SE7	SE8	SE6.0	SE10
16-Apr	SE7	SE2	ESE4	SE5	SSE6	SSE6	SSW8	SSW8	SW8	SW9	S10	SW12	WSW12	WSW11	W11	W10	WSW10	WSW10	WSW6	S3	S4	SSW5	S4	S6	SW5.6	SW12
17-Apr	S6	S7	S6	S6	SSE5	S3	S6	SSW8	SW5	W6	NW9	W10	W11	WSW10	W11	W10	W9	W6	SW1	SSE3	SSE3	SSE4	SSE4	S5	SW4.0	W11
18-Apr	SSE5	S6	S6	S5	SSE4	S5	SSW7	S8	S7	S9	S12	S16	S17	S17	S17	S17	S17	S19	S15	SSE14	SSE13	S16	S16	S16	S11.7	S19
19-Apr	S15	SSW12	SSW12	SSW9	SW7	WSW6	W10	W12	NW11	W12	W14	W17	WSW18	WSW19	W18	WNW21	WNW18	WNW17	W14	WNW10	WNW7	WNW5	WNW6	NW13	W10.7	WNW21
20-Apr	NW14	NW17	NW16	NNW17	NNW14	NNW13	NNW15	NNW15	NNW13	N11	NNE11	N10	NNE11	NE12	NE11	NE11	NE10	ENE7	ENE7	ENE4	ENE1	E2	ENE2	ENE1	N8.4	NNW17
21-Apr	E2	ENE1	ESE2	ESE3	SE1	SSE2	SE4	SSE4	ESE2	E8	ESE8	ENE10	NE10	NE12	NNE13	NNE12	NE14	NNE14	NE14	NE12	NE10	NE9	NE8	NE7	NE6.5	NNE14
22-Apr	NE8	NE5	NE5	NE5	NNE6	NNE5	NE7	NE8	ENE9	E10	ENE10	ENE9	E9	ENE10	ENE10	ENE9	NE9	NE12	NE11	NE9	NE8	NE6	NE6	NE3	NE7.5	NE12
23-Apr	ESE6	ESE9	ESE9	E7	ESE8	ESE8	ESE8	ESE8	ESE9	ESE11	ESE12	ESE11	SE10	ESE10	E9	ESE9	E8	E7	E7	ESE9	SE8	SE7	SE6	SSE3	ESE8.2	ESE12
24-Apr	SSE3	SSE5	SSE5	SE4	ESE5	ESE5	SE3	SSE7	SSE10	SSE11	SSE13	SSE11	SSE11	SSE10	SSE10	SE8	SE7	ESE6	ESE5	SSE10	S12	S12	S12	S11	SSE7.8	SSE13
25-Apr	S8	SSE6	SSE6	SSE5	SSE4	SSE4	SSE5	S7	S8	S9	S10	S10	S10	SSW9	SSW7	SW6	SW6	SSW6	S7	S5	S3	S3	S4	S4	S6.0	S10
26-Apr	S5	S5	S5	S6	S6	S6	S7	S8	S9	SSW8	S7	S7	SSE8	S7	SE5	SE5	ESE7	ENE6	NNE5	WNW3	SSE5	SSE4	W1	SE1	SSE4.5	S9
27-Apr	AF	AF	AF	AF	AF	AF	NNW2	NNE3	NNE5	NE6	NE2	N8	NNE8	NE8	NE8	NE5	ENE6	ENE8	E8	E4	ESE2	ESE2	ESE2	E2	NE4.3	NNE8
28-Apr	SE4	SE6	SSE5	SSE6	SSE6	SSE6	S7	S7	S7	SSW10	S10	S11	S14	S13	S13	S11	S11	S12	S10	SSE6	SSE3	SE4	SE5	SE5	S7.7	S14
29-Apr	SE5	SE7	SE7	SE8	SE9	SE8	SE10	SSE13	SSE14	S16	SSE18	S18	S17	S16	S15	S15	S14	S10	S12	S8	SSE4	S5	SSE4	S5	SSE10.4	SSE18
30-Apr	S8	S9	S8	S8	S7	S8	S8	SSW9	SSW11	SSW12	SSW14	S16	SW12	W11	W10	WSW8	SSW11	S9	SSW8	SW6	SW4	WSW3	S2	SSE2	SSW7.5	S16
	SSE2.0	SSE1.5	S1.1	SSE0.6	SE0.6	SE0.9	SE0.5	S0.7	SSE0.6	SSE1.4	SSE2.2	S1.8	SSE1.6	SSE0.7	E0.6	E0.6	ENE1.3	E1.7	ENE2.1	ESE2.5	ESE2.7	ESE2.4	SE2.0	SE1.9	Diurnal Average	
	S15	NW17	NNW16	NNW17	NNW14	NNW13	NNW15	NNW15	NW15	NNW17	SSE18	S18	NNW18	WSW19	W18	WNW21	WNW18	S19	NNW16	SSE14	SSE14	S16	S16	S16	Diurnal Maximum	

AF - Analyzer Failure

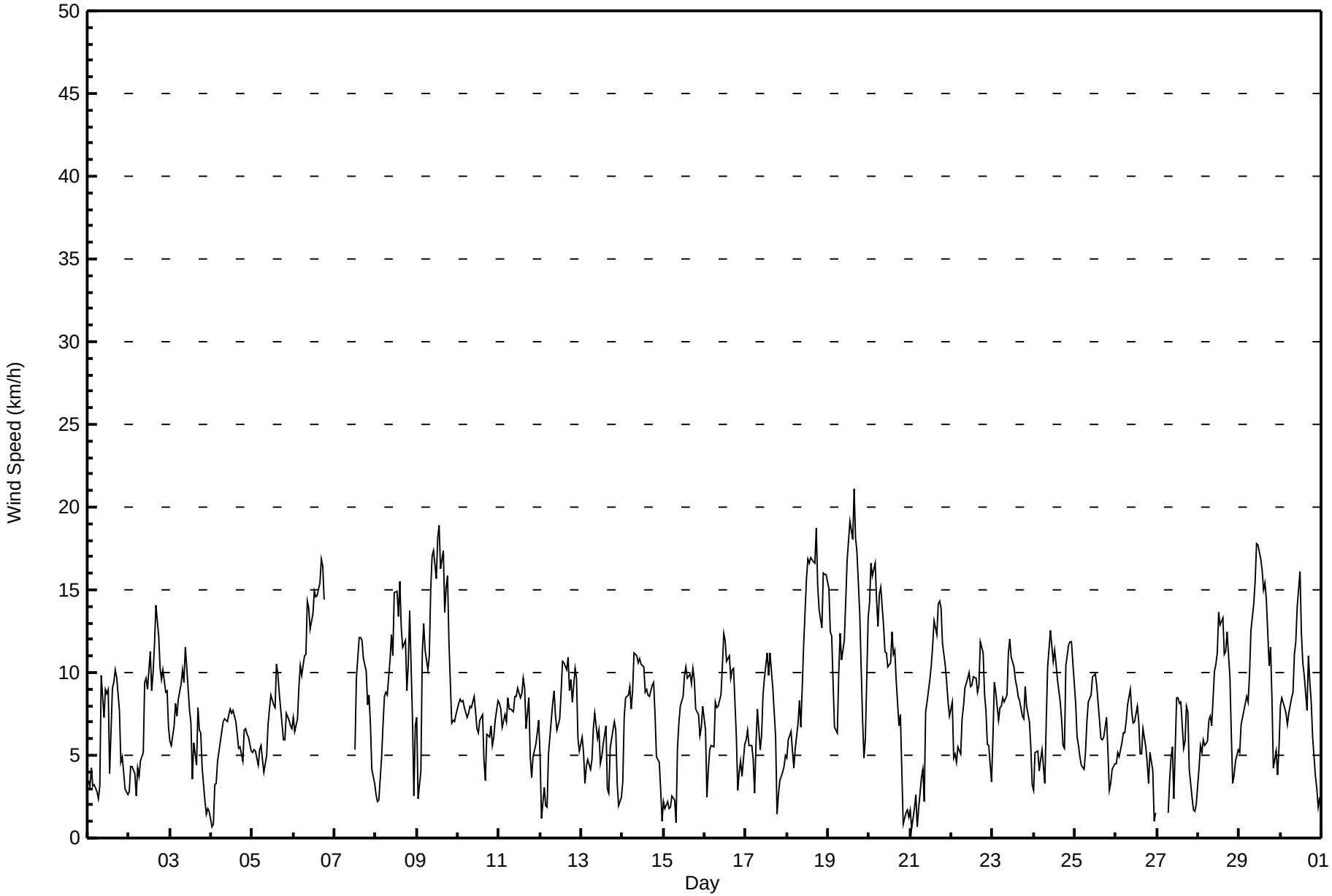
All monthly, daily, and diurnal averages have been calculated using vector methods

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed (WS) - km/h

Brion MacKay River - April 2016



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	191	27.40	27.40
6 - 11	393	56.38	83.79
12 - 19	112	16.07	99.86
20 - 28	1	0.14	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 697

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Wind Speed (WS) - km/h

Brion MacKay River - April 2016

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	4	11	19	19	15	19	17	36	24	3	5	3	4	4	3	5	191
6 - 11	18	33	44	23	9	36	37	40	66	17	9	8	13	7	22	11	393
12 - 19	0	8	8	0	0	6	3	7	28	5	2	4	4	4	16	17	112
20 - 28	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	22	52	71	42	24	61	57	83	118	25	16	15	21	16	41	33	697

Total Number of Valid Hours: 697

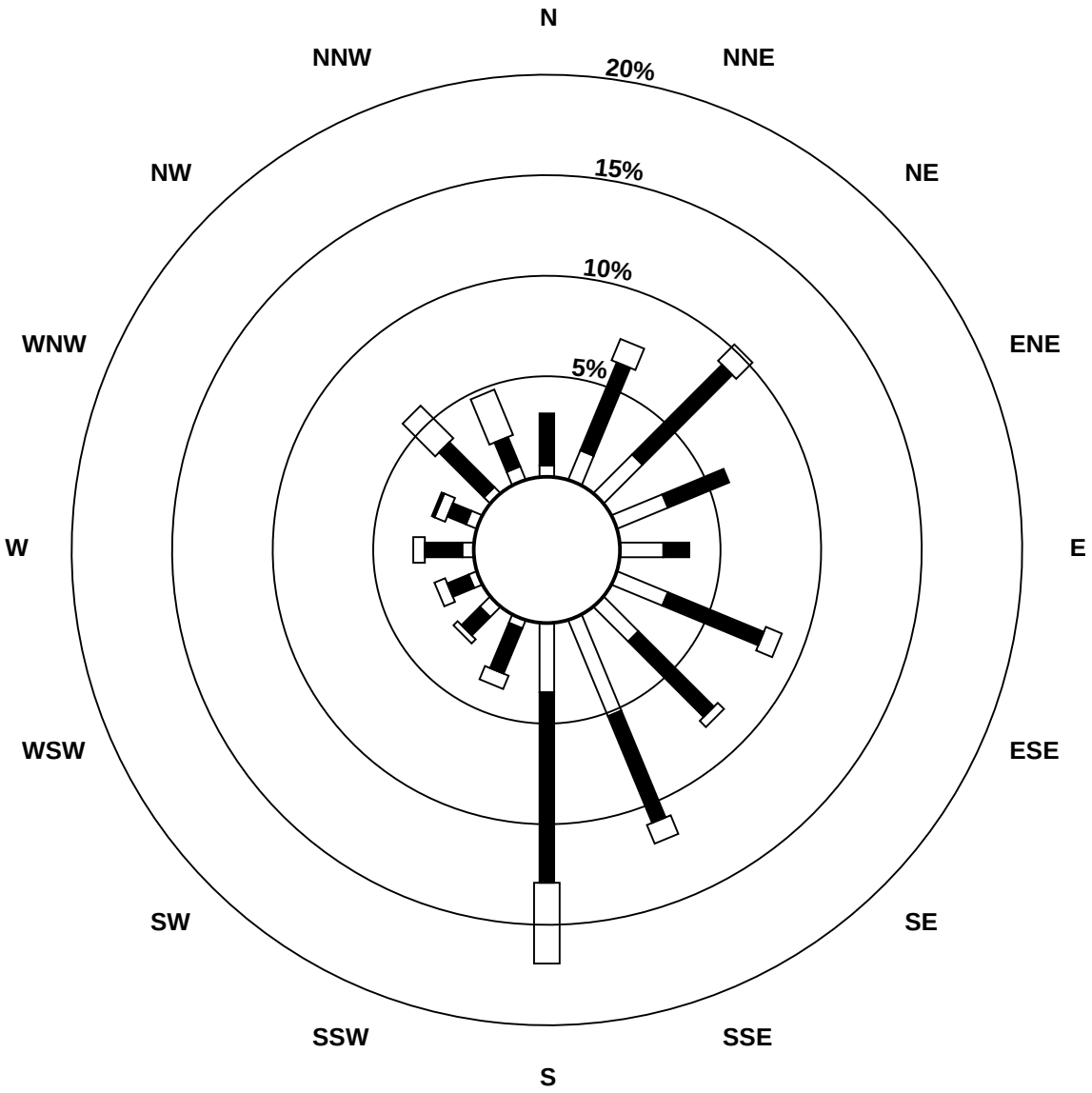
Total Number of Hours: 720

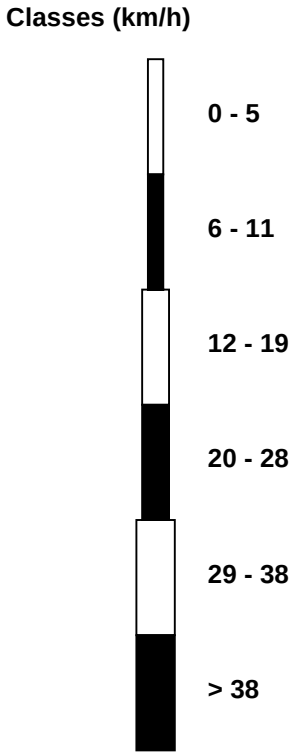
Wood Buffalo Environmental Association

Wind Rose Apr 2016

Wind Speed (WS) - km/h

Brion MacKay River (AMS 20)





Total Number of Valid Hours: 697

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Speed (WS) - km/h

Brion MacKay River - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 9 km/h on Apr 19 14:00

Minimum Value: 0 km/h on Apr 17 22:00

Percentiles: P_1 = 1 P_{10} = 1 Q_1 = 2 Median = 3 Q_3 = 4 P_{90} = 5 P_{99} = 7

Hours in Service:	720
Hours of Data:	697
Hours of Missing Data:	23
Hours of Calibration:	0
Percent Operational Time:	96.8

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-Apr	1	1	1	1	1	2	1	2	3	3	3	3	3	2	3	3	3	3	3	2	2	1	1	1	3
2-Apr	1	1	1	1	1	2	1	1	3	3	3	4	3	3	3	4	4	4	3	3	3	3	3	2	4
3-Apr	2	2	2	2	3	2	3	3	3	3	3	3	3	3	3	3	2	2	2	2	1	1	1	1	3
4-Apr	1	1	1	1	1	1	1	3	2	3	3	3	3	2	3	3	2	2	2	2	2	2	2	2	3
5-Apr	1	2	1	1	2	2	1	1	2	2	3	3	3	3	3	3	3	2	2	2	2	2	2	2	3
6-Apr	3	2	3	4	3	3	3	4	5	5	4	5	5	5	5	5	5	6	4	AF	AF	AF	AF	AF	6
7-Apr	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	3	4	4	4	4	3	3	3	3	2	2	1	4
8-Apr	1	1	1	1	2	3	3	3	3	4	4	4	4	4	5	4	4	4	3	4	4	4	2	2	5
9-Apr	2	2	4	3	4	4	3	4	5	5	5	5	6	6	5	5	5	5	5	4	2	2	2	2	6
10-Apr	3	3	3	2	2	2	2	3	3	3	3	3	3	3	3	3	3	2	2	2	2	2	2	2	3
11-Apr	2	2	2	2	2	3	2	2	3	3	3	3	3	4	4	4	3	3	1	1	1	1	2	2	4
12-Apr	2	1	1	1	2	1	2	3	3	2	3	3	3	3	4	3	4	3	3	3	3	3	2	3	4
13-Apr	2	2	2	2	2	2	2	3	3	2	2	1	1	2	3	1	1	2	2	2	2	1	1	1	3
14-Apr	2	2	2	2	3	2	3	4	3	3	3	3	3	3	3	3	3	3	3	2	1	2	2	1	4
15-Apr	1	1	1	1	1	1	1	2	2	3	3	3	4	3	3	3	3	3	3	2	2	2	2	2	4
16-Apr	2	2	2	2	1	2	3	3	3	3	4	5	5	5	5	4	5	5	4	1	1	1	2	1	5
17-Apr	1	1	1	1	2	2	2	2	2	2	3	5	5	4	5	4	4	3	1	1	1	0	1	1	5
18-Apr	1	1	1	1	1	1	2	2	2	3	4	5	6	6	6	6	6	6	5	5	4	5	5	5	6
19-Apr	5	5	4	3	2	3	4	5	4	5	6	7	8	9	8	8	7	7	6	5	3	2	2	5	9
20-Apr	5	6	5	5	5	4	4	4	4	3	4	4	5	5	4	4	3	3	2	2	1	1	1	1	6
21-Apr	1	1	1	1	1	1	1	1	2	3	3	4	4	4	4	4	4	5	5	4	4	3	3	2	5
22-Apr	2	2	1	2	2	2	2	2	3	3	4	4	4	4	4	3	4	4	4	3	2	2	2	1	4
23-Apr	4	3	3	2	3	2	3	3	3	4	4	4	4	4	4	4	3	3	3	3	2	2	2	1	4
24-Apr	1	2	2	1	1	2	1	3	3	4	4	4	4	4	3	3	2	2	2	5	4	4	4	3	5
25-Apr	3	2	2	1	1	1	2	2	2	3	3	3	3	3	2	2	2	2	2	2	1	1	1	1	3
26-Apr	1	2	1	2	2	2	2	3	3	2	2	2	3	2	2	2	3	2	3	3	2	2	1	1	3
27-Apr	AF	AF	AF	AF	AF	AF	1	1	1	2	2	4	3	4	3	2	3	3	3	2	1	1	1	1	4
28-Apr	1	2	1	1	1	1	2	2	3	4	4	4	5	4	5	4	4	4	3	2	1	1	1	1	5
29-Apr	1	2	2	2	2	2	3	4	5	5	6	6	6	6	5	5	5	4	4	4	1	2	1	2	6
30-Apr	2	2	2	2	2	2	3	3	4	4	5	6	5	4	4	4	4	3	3	2	1	1	1	1	6
	5	6	5	5	5	4	4	5	5	5	6	7	8	9	8	8	7	7	6	5	4	5	5	5	
	Diurnal Maximum																								

AF - Analyzer Failure

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Brion MacKay River - April 2016

Direction of Maximum Speed: 284 deg on Apr 19 16:00
Direction of Maximum Daily Speed Average: 178.0 deg on Apr 18

Direction of Minimum Speed: 64 deg on Apr 21 02:00

Direction of Minimum Daily Speed Average: 3.7 deg on Apr 1

Monthly Average Direction: 198.8 deg

Hours in Service:	720
Hours of Data:	697
Hours of Missing Data:	23
Percent Operational Time:	96.8

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-Apr	242	264	273	257	209	235	272	336	12	23	33	31	43	24	26	65	57	68	71	76	62	70	61	42	38.5
2-Apr	73	86	58	30	33	106	7	15	30	22	44	33	9	32	34	30	13	17	17	14	16	24	17	4	25.9
3-Apr	3	358	351	2	14	19	18	23	15	28	12	9	347	339	5	0	36	53	72	95	61	92	123	50	19.5
4-Apr	104	110	150	152	150	153	151	166	174	171	149	160	136	123	121	116	91	93	70	42	43	40	41	37	120.0
5-Apr	35	35	40	33	36	36	35	54	63	136	157	182	164	155	152	187	188	184	185	167	167	163	169	177	146.4
6-Apr	219	233	253	278	288	306	307	304	305	302	310	310	307	308	311	314	317	319	315	AF	AF	AF	AF	AF	302.7
7-Apr	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	124	17	21	35	41	43	46	55	56	50	54	40	--
8-Apr	52	73	79	117	118	117	113	115	128	136	124	124	122	119	116	117	132	138	144	141	149	141	112	155	126.1
9-Apr	157	160	304	307	308	314	308	308	320	331	332	346	334	324	341	335	339	347	343	347	353	346	336	339	330.8
10-Apr	344	342	339	349	345	349	17	30	21	30	11	10	35	5	4	66	91	40	81	109	122	131	139	139	28.3
11-Apr	143	143	151	151	158	163	174	188	189	187	176	185	183	179	194	215	200	208	192	174	180	182	180	176	178.5
12-Apr	183	217	159	147	289	349	17	24	31	68	89	29	33	35	41	60	63	54	39	35	45	47	50	17	44.3
13-Apr	72	75	310	38	75	106	98	104	109	109	116	101	79	115	134	93	60	119	123	128	131	133	171	3	103.4
14-Apr	292	316	316	313	312	318	312	304	303	307	326	337	324	309	307	297	300	311	329	344	347	329	326	149	315.5
15-Apr	178	157	150	142	149	150	157	131	174	167	158	154	143	132	145	139	123	118	118	128	133	136	143	143	140.7
16-Apr	136	129	123	143	157	166	192	202	220	217	190	226	240	250	259	266	251	256	254	186	169	197	180	171	214.2
17-Apr	172	181	180	169	153	170	175	198	232	279	310	270	275	257	264	278	281	275	219	160	156	159	167	170	232.3
18-Apr	166	169	178	185	161	172	194	183	172	176	173	178	184	191	191	184	181	176	169	166	167	171	180	181	178.0
19-Apr	189	201	202	200	219	243	269	279	304	280	265	259	256	258	269	284	289	289	281	293	297	295	287	304	265.5
20-Apr	313	309	326	335	341	339	347	344	338	353	13	359	19	34	41	38	41	67	64	61	77	84	63	71	357.9
21-Apr	82	64	119	117	133	151	142	157	121	86	109	74	56	50	32	32	35	33	40	36	39	44	44	43	52.9
22-Apr	43	40	38	41	32	23	39	53	63	79	77	67	81	67	59	72	49	40	41	40	42	47	44	44	53.1
23-Apr	105	118	114	101	109	108	103	105	117	117	114	119	136	109	100	122	98	101	98	114	126	132	136	149	113.8
24-Apr	151	162	160	145	119	120	140	163	154	162	161	164	166	166	154	142	136	120	113	165	174	174	181	179	158.3
25-Apr	178	163	159	150	149	147	159	170	175	181	190	190	186	195	213	229	219	206	190	190	174	172	176	178	183.0
26-Apr	178	181	171	171	181	175	181	189	186	194	191	172	160	171	142	139	110	78	33	299	159	159	272	145	168.1
27-Apr	AF	AF	AF	AF	AF	AF	335	29	31	47	51	359	17	36	36	45	60	77	84	97	108	106	107	83	48.2
28-Apr	128	132	153	152	155	165	173	182	177	201	189	190	172	180	176	174	174	179	173	160	157	136	139	141	170.8
29-Apr	144	139	143	142	139	139	141	153	154	170	168	175	174	181	186	180	183	176	175	172	161	174	162	169	166.0
30-Apr	179	188	186	187	176	173	188	193	199	199	196	191	220	276	260	257	196	189	212	225	235	244	185	160	203.9
	154.2	161.4	174.0	150.7	133.0	126.5	138.7	169.3	146.5	151.9	147.2	168.9	161.9	161.5	94.7	89.3	77.1	79.5	78.7	103.7	113.0	121.8	132.8	144.2	
	Diurnal Average																								

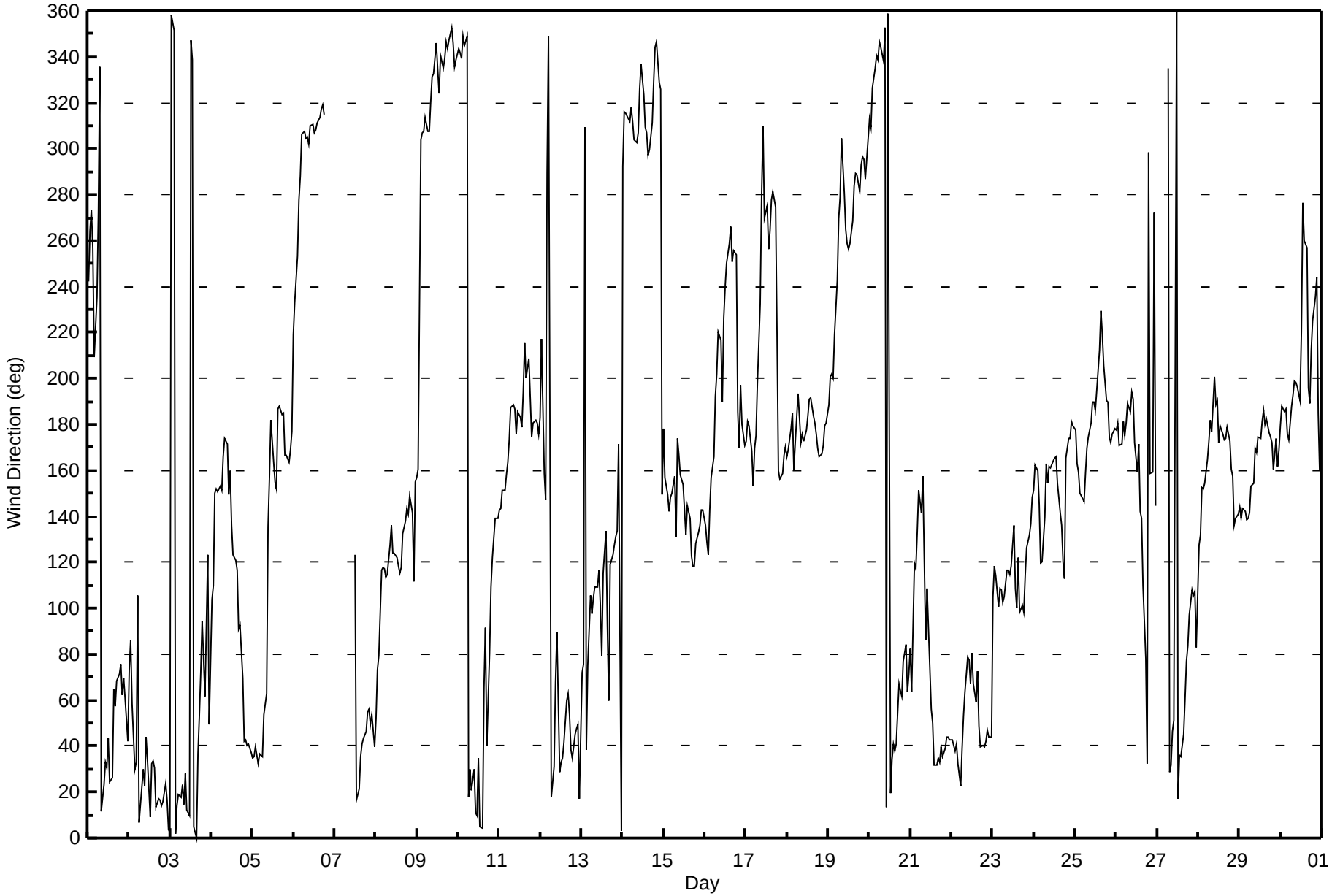
AF - Analyzer Failure
All monthly, daily, and diurnal averages have been calculated using vector methods

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction (WD) - deg

Brion MacKay River - April 2016



Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg

Brion MacKay River - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 94 deg on Apr 21 09:00

Minimum Value: 7 deg on Apr 17 22:00

Percentiles: P_1 = 10 P_{10} = 19 Q_1 = 23 Median = 27 Q_3 = 35 P_{90} = 45 P_{99} = 75

Hours in Service:	720
Hours of Data:	697
Hours of Missing Data:	23
Hours of Calibration:	0
Percent Operational Time:	96.8

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-Apr	33	40	34	52	29	62	36	49	30	37	31	26	31	70	37	30	31	30	31	33	33	36	28	20	70
2-Apr	38	36	35	16	20	36	29	27	52	28	33	42	29	39	27	26	26	26	25	26	23	25	24	26	52
3-Apr	26	22	23	25	24	23	25	22	28	27	36	42	48	86	55	75	33	28	30	27	21	35	26	46	86
4-Apr	40	34	14	17	12	16	18	25	25	33	32	41	45	30	40	44	36	32	29	21	23	25	24	23	45
5-Apr	23	23	21	21	22	22	22	24	27	30	37	35	37	32	25	27	28	25	27	25	25	23	23	23	37
6-Apr	32	33	43	39	28	21	21	22	22	23	21	20	24	24	23	21	21	23	20	AF	AF	AF	AF	AF	43
7-Apr	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	60	36	28	27	25	24	23	29	27	26	33	19	60
8-Apr	27	32	32	24	24	23	23	23	24	24	27	22	25	25	23	23	24	21	21	21	23	45	53	25	53
9-Apr	26	52	51	21	22	20	22	25	21	22	21	25	24	24	25	23	23	25	24	22	21	21	19	22	52
10-Apr	24	23	22	21	22	22	27	29	36	40	46	58	57	50	47	67	75	54	34	22	21	18	18	19	75
11-Apr	19	20	25	21	23	25	28	26	27	30	29	40	42	40	45	47	46	29	20	14	17	17	20	20	47
12-Apr	27	63	17	24	68	21	25	25	28	32	46	40	33	29	30	32	27	29	23	23	24	25	28	36	68
13-Apr	41	42	68	50	41	38	30	34	30	32	30	40	29	32	19	42	46	28	24	21	22	21	66	56	68
14-Apr	24	20	19	20	21	20	20	23	22	24	23	23	23	33	32	32	25	23	21	23	24	34	41	67	67
15-Apr	31	16	14	12	12	9	11	89	60	49	44	40	37	31	36	33	31	27	23	22	16	17	20	20	89
16-Apr	22	75	51	22	22	23	29	28	37	36	32	44	44	50	47	46	45	42	44	29	10	20	29	14	75
17-Apr	12	14	16	15	19	54	23	25	45	44	32	43	41	49	44	42	43	43	59	12	8	7	9	10	59
18-Apr	10	11	13	16	14	12	19	22	26	29	30	28	29	30	29	31	30	27	26	26	26	26	26	26	31
19-Apr	26	32	24	24	28	38	41	43	32	39	42	42	44	45	42	34	34	31	39	25	21	22	24	22	45
20-Apr	21	22	24	23	24	23	26	25	26	32	30	44	40	34	34	33	32	41	28	30	37	32	20	47	47
21-Apr	27	25	35	18	26	19	15	39	94	48	44	44	39	33	30	32	28	24	24	22	24	25	25	24	94
22-Apr	23	26	19	25	22	23	26	26	32	37	40	38	48	37	36	42	42	25	25	23	21	27	23	19	48
23-Apr	28	21	23	26	24	22	26	33	31	30	36	37	40	49	46	48	35	32	31	25	24	19	21	25	49
24-Apr	13	27	27	25	19	24	30	27	25	26	27	27	28	30	30	28	27	27	22	28	26	25	28	24	30
25-Apr	27	25	25	21	20	21	23	26	26	29	31	35	34	34	36	44	39	32	27	24	14	16	16	19	44
26-Apr	20	22	23	24	24	26	27	31	24	28	30	29	26	25	34	59	48	39	57	69	43	38	86	73	86
27-Apr	AF	AF	AF	AF	AF	AF	33	35	36	47	88	55	40	44	36	63	50	33	34	28	24	35	46	34	88
28-Apr	18	14	13	13	12	13	20	25	35	33	42	39	30	33	30	29	31	27	25	26	22	13	16	19	42
29-Apr	21	20	21	20	19	19	22	24	26	30	28	31	30	30	31	28	29	30	28	25	23	22	17	19	31
30-Apr	23	24	24	22	21	21	23	23	28	31	30	29	44	40	46	54	30	29	30	31	29	33	40	26	54
	41	75	68	52	68	62	41	89	94	49	88	58	60	86	55	75	75	54	59	69	43	45	86	73	
	Diurnal Maximum																								

AF - Analyzer Failure

Wood Buffalo Environmental Association
SO2 Calibration Report

W B E A

Station Information

Calibration Date	April 4, 2016	Last Calibration	March 4, 2016
Station Name	Brion Mackay River	Station Number	AMS 20
Reason:	Routine		
Start Time (MST)	9:43	End Time (MST)	14:14
Gas Cert Reference	EY0000372	Station temp.	22 Deg C
Cal Gas Concentration	50.7 ppm	Cal Gas Exp Date	10-Jun-16
Calibrator Make/Model	API T700	Serial Number	1220
ZAG Make/Model	API 701	Serial Number	4766
DACS make/model	Campbell Scientific CR3000	DACS serial No.	9627

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 1000 ppb		PMT voltage	-633	-634
Analyzer IP address	192.168.1.43		Lamp voltage	835	836
Calculated slope	1.001837	0.995691	Chamber temp	45	45.3
Calculated intercept	0.381851	1.531712	Pressure	666.5	667.5
Analyzer Background	12.6	12.5	Flow	0.484	0.485
Analyzer Coefficient	0.998	0.987	Intensity	88	88

Analyzer make	Thermo 43i	Analyzer serial #	1501301450

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.0	----
as found span	5000	79.8	809.2	815.0	0.993
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	79.8	809.2	812.0	0.996
second point	5000	40.1	406.6	405.7	1.002
third point	5000	20.1	203.8	201.8	1.010
as left zero	5000	0.0	0.0	0.3	----
as left span	5000	79.8	809.2	813.4	0.995
				Average Correction Factor	1.003

Corrected As found	815.0	Previous response	807.3	% change	-0.9%

Notes:

Sample inlet filter replaced after as founds. Adjusted span. As left zero/span cycle began at 13:32 MST. Analyzer pulling ambient air from 13:03-13:24 MST.

Calibration Performed By: Asad Hidayat

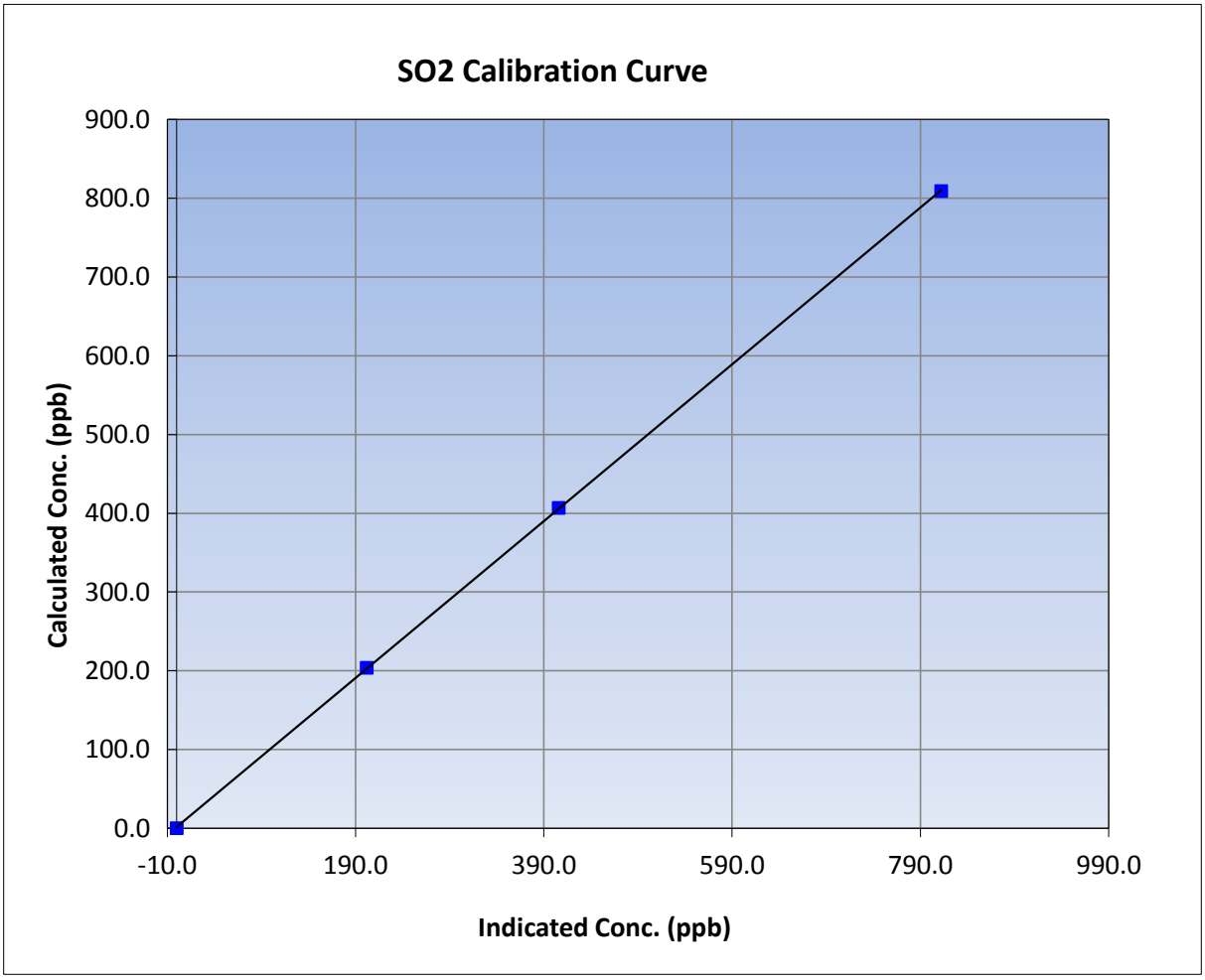
Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

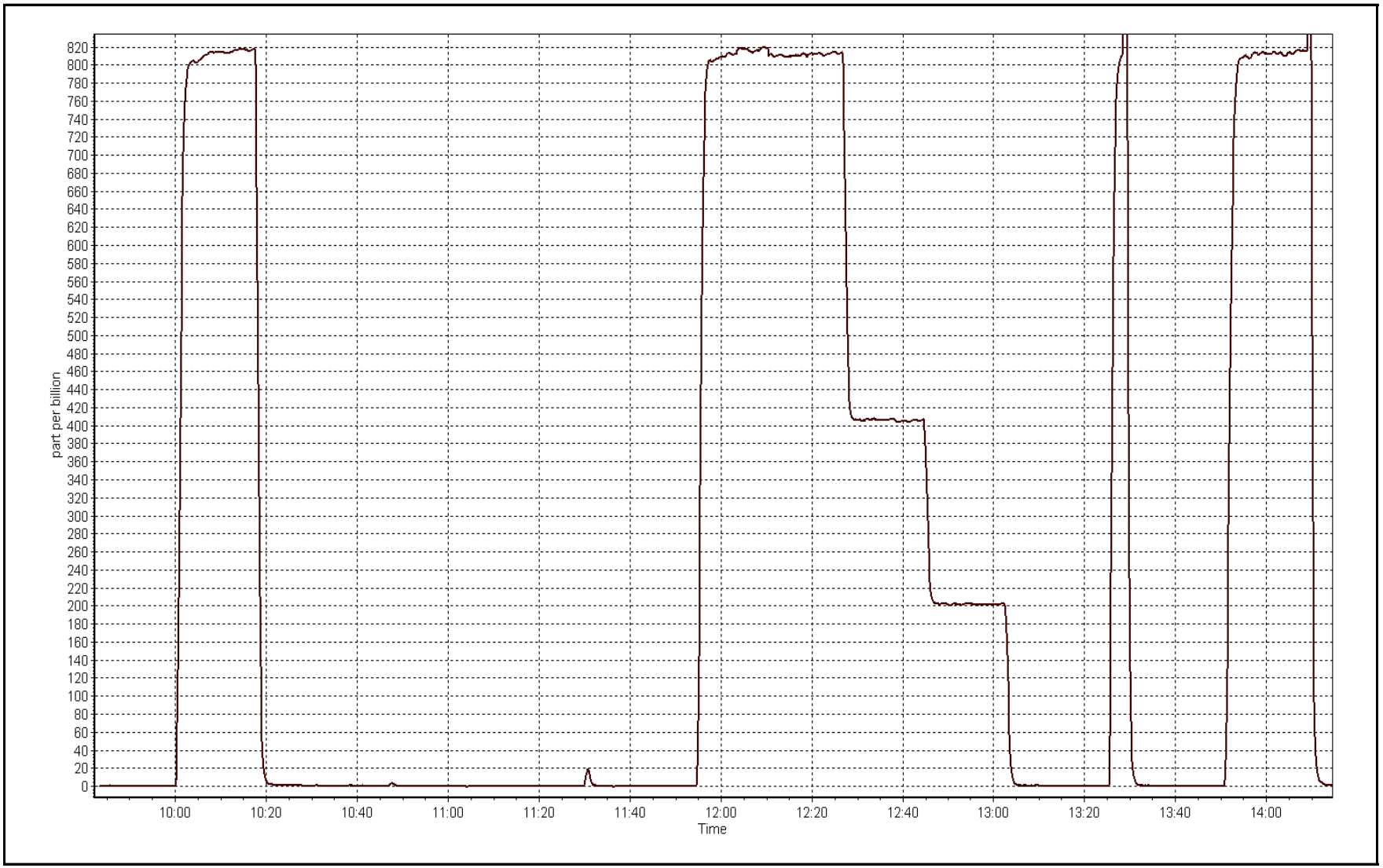
Calibration Date	April 4, 2016	Previous Calibration	March 4, 2016
Station Name	Brion Mackay River	Station Number	AMS 20
Start Time (MST)	9:43	End Time (MST)	14:14
Analyzer make	Thermo 43i	Analyzer serial #	1501301450

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999982
809.2	812.0	0.9965		
406.6	405.7	1.0023	Slope	0.995691
203.8	201.8	1.0098		
			Intercept	1.531712



SO2 Calibration Plot Date: April 4, 2016



Wood Buffalo Environmental Association
H2S Calibration Report

Station Information

Calibration Date	April 12, 2016	Last Calibration	March 3, 2016
Station Name	Brion Mackay River	Station Number	AMS 20
Reason:	Routine		
Start Time (MST)	10:50	End Time (MST)	13:50
Gas Cert Reference	LL119508	Station temp.	22 Deg C
Cal Gas Concentration	5.35 ppm	Cal Gas Exp Date	13/02/2018
Calibrator Make/Model	API 700	Serial Number	1220
ZAG air Make/Model	API 701	Serial Number	4766
DACS make/model	Campbell Scientific CR3000	Serial Number	9627
SO2 gas concentration	50.7 ppm	SO2 gas cert/exp	EY0000372 10-Jun-16

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	504	504
Analyzer IP address	192.168.1.75		Lamp voltage	3292	3133
Calculated slope	1.012361	0.993329	Chamber temp	50	50
Calculated intercept	0.013656	0.168154	Pressure	23.1	23.1
Analyzer Background	25.2	25.2	Flow	0.612	0.613
Analyzer Coefficient	1.039	1.072	Intensity	81	77
			Converter temp.	317	317

Analyzer make/model	API T101	Analyzer serial #	196
Converter make/model	NA	Converter serial #	NA

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.1	----
as found span	5000	75.6	80.9	80.0	1.011
SO2 scrubber check	5000	19.8	200.8	3.5	----
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	75.6	80.9	81.4	0.994
second point	5000	37.9	40.6	40.5	1.000
third point	5000	19.0	20.3	20.1	1.011
as left zero	5000	0.0	0.0	0.2	----
as left span	5000	75.6	80.9	79.4	1.019
				Average Correction Factor	1.002

Corrected As found	80.1	Previous response	79.9	% change	-0.3%

Notes:

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

Calibration Performed By: Asad Hidayat

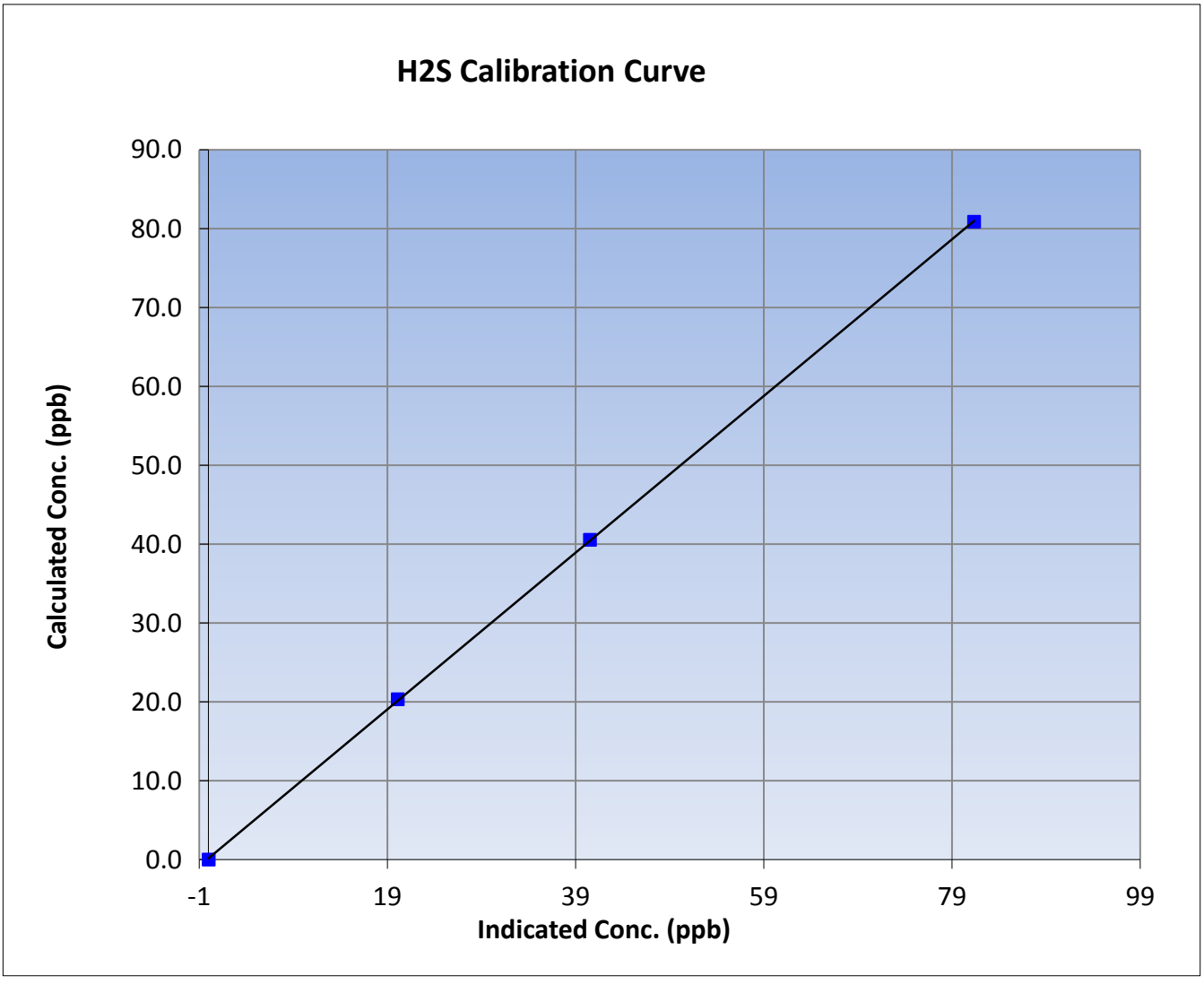
Wood Buffalo Environmental Association
H2S Calibration Report

Station Information

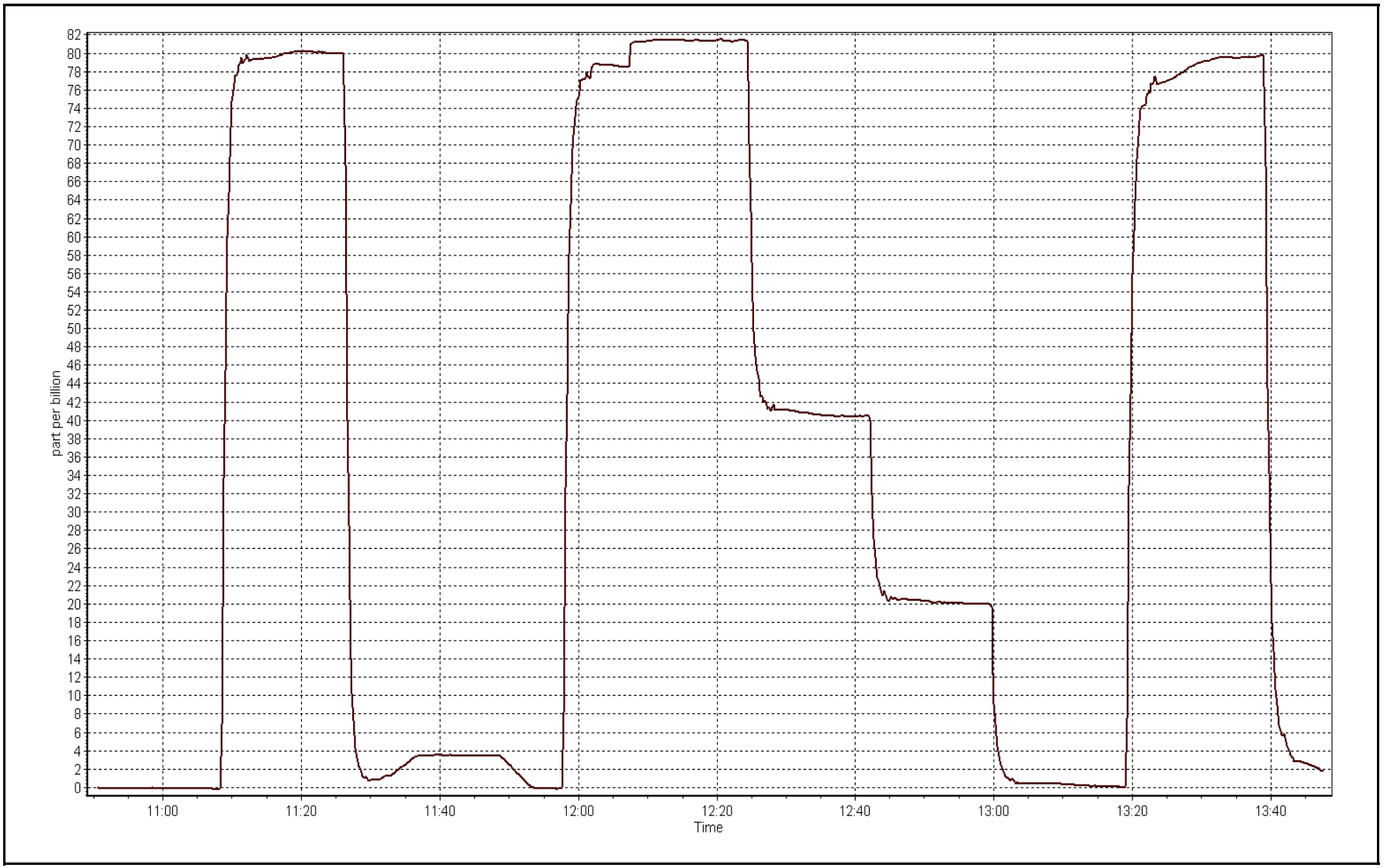
Calibration Date	April 12, 2016	Previous Calibration	March 3, 2016
Station Name	Brion Mackay River	Station Number	AMS 20
Start Time (MST)	10:50	End Time (MST)	13:50
Analyzer make	API T101	Analyzer serial #	196

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999973
80.9	81.4	0.9941		
40.6	40.5	1.0003	Slope	0.993329
20.3	20.1	1.0109		
			Intercept	0.168154



H2S Calibration Plot Date: April 12, 2016



Wood Buffalo Environmental Association
THC Calibration Report

W B E A

Station Information

Calibration Date	April-04-16	Last Calibration	March-04-16
Station Name	Brion Mackay River	Station Number	AMS 20
Reason:	Routine		
Start Time (MST)	9:43	End Time (MST)	14:13
Gas Cert Reference	EY0000372	Cal Gas Expiry Date	10/06/2016
CH4 Cal Gas Conc.	517 ppm	CH4 Equiv Conc.	1072.5 ppm
C3H8 Cal Gas Conc.	202 ppm	Station temp.	22 Deg C
Calibrator Make/Model	API T700	Serial Number	1220
ZAG make/model	Teledyne API 701	Serial Number	4766
DACS make/model	Campbell Scientific CR3000	Serial Number	9627

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 50 ppm		Sample Pressure	8.6	8.6
Analyzer IP address	192.168.1.51		Air or Bypass Press	34.3	34.3
Calculated slope	1.002874	0.998798	Fuel Pressure	23.9	23.9
Calculated intercept	0.023202	0.021506	Analyzer Coeff	4.3	4.5
			Analyzer BKG	1.800	2.100

Analyzer make	51i-LT	Analyzer serial #	1501663727

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	0.20	----
as found span	5000	79.8	17.12	17.18	0.996
calibrator zero	5000	0.0	0.00	0.01	----
high point	5000	79.8	17.12	17.14	0.999
second point	5000	40.1	8.60	8.55	1.006
third point	5000	20.1	4.31	4.28	1.007
as left zero	5000	0.0	0.00	0.04	----
as left span	5000	79.9	17.14	17.16	0.999
				Average Correction Factor	1.004

Corrected As found	16.98	Previous response	17.04	% change	0.4%

Notes:

Sample inlet filter and sample pump replaced after as founds. Adjusted both zero and span.

Calibration Performed By: Asad Hidayat

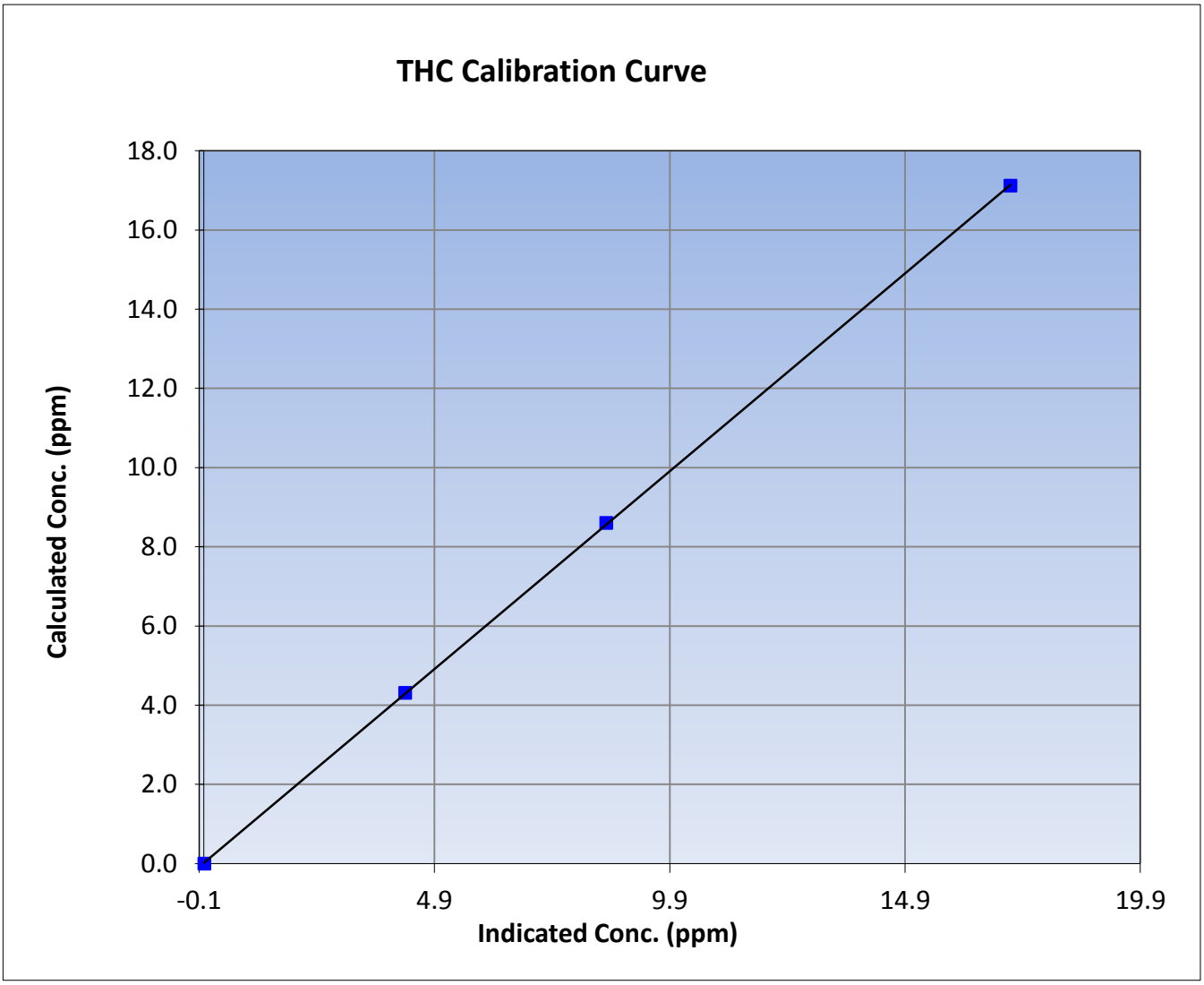
Wood Buffalo Environmental Association
THC Calibration Report

Station Information

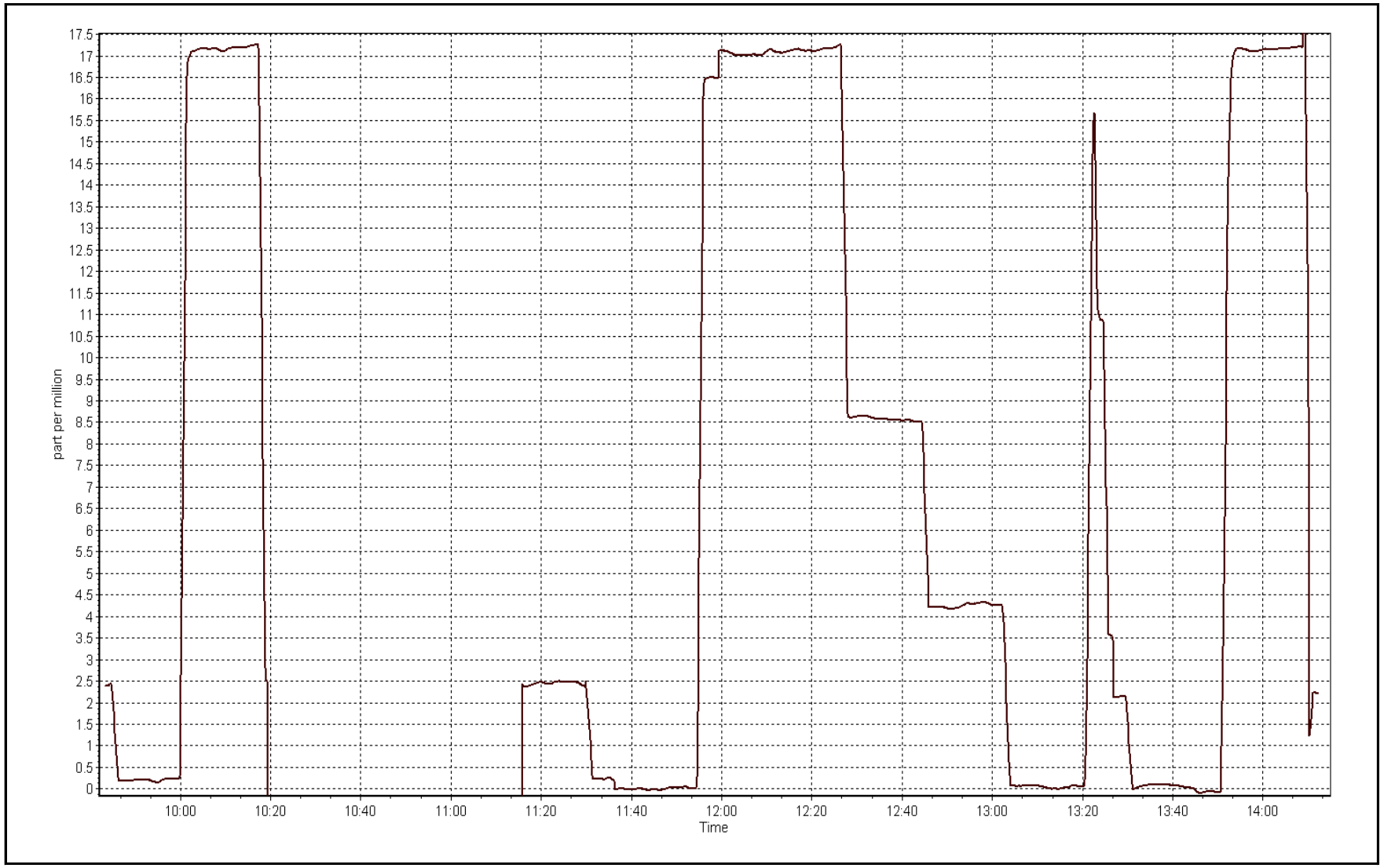
Calibration Date	April 4, 2016	Previous Calibration	March 4, 2016
Station Name	Brion Mackay River	Station Number	AMS 20
Start Time (MST)	9:43	End Time (MST)	14:13
Analyzer make	51i-LT	Analyzer serial #	1501663727

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.01	----	Correlation Coefficient	0.999979
17.12	17.14	0.9987		
8.60	8.55	1.0060	Slope	0.998798
4.31	4.28	1.0073		
			Intercept	0.021506



THC Calibration Plot Date: April 4, 2016



Wood Buffalo Environmental Association
NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	April 5, 2016	Previous Calibration	March 4, 2016
Station Name	Brion Mackay River	Station Number	AMS 20
Reason:	Routine		
Start Time (MST)	8:48	End Time (MST)	12:38
NO Cal Gas Conc	50.1 ppm	Gas Cert Reference	EY0000372
NOx Cal Gas Conc	50.4 ppm	Cal Gas Expiry Date	June 10, 2016
Calibrator	API T700	Serial Number	1220
Zero air Generator	Teledyne API T701	Serial Number	4766

DACS Information

DACS make & model	Cambell Scientific CR3000	DACS serial No.	9627

Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.995013	0.994452	1.004774
	Data Offset	0.022380	0.133870	-1.179450
Current Calibration	Data Slope	1.000564	0.999749	0.996005
	Data Offset	0.366278	0.620307	-1.582589

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1505164379

Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
Analyzer IP	192.168.1.42		192.168.1.42	
NO coefficient	1.107		1.084	
NOX coefficient	1.003		1.004	
NO2 coefficient	0.995		0.995	
NO bkgrnd	3.4		3.3	
NOX bkgrnd	3.6		3.5	
Chamber Temp	50.5	Deg C	50.6	Deg C
Moly Temp	326	Deg C	322.4	Deg C
PMT voltage	-767	V	-767	V
PMT Temp	-2.6	Deg C	-3.1	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	171.1	mmHg	170.8	mmHg
R Cell Press Nox	171.1	mmHg	171.1	mmHg
NO sample flow	0.81	lpm	0.803	lpm
Nox sample Flow	0.812	lpm	0.802	lpm

Notes:

Sample inlet filter replaced after as founds. Adjusted span. Used 2nd GPT point to determine converter efficiency test.

Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: April 5, 2016 Station Number: AMS 20

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.2	-0.1	----	----
as found span	5000	79.9	805.4	800.6	4.8	823.8	819.2	4.6	0.9777	0.9773
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.2	-0.1	----	----
high point	5000	79.9	805.4	800.6	4.8	804.1	799.9	4.2	1.0017	1.0009
second point	5000	40.0	403.2	400.8	2.4	404.2	401.6	2.6	0.9975	0.9979
third point	5000	20.1	202.6	201.4	1.2	201.0	199.4	1.6	1.0083	1.0102
as left zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.2	-0.1	----	----
as left span	5000	79.9	805.4	438.6	366.8	818.1	444.2	373.9	0.9845	0.9875
								Average Correction Factor	1.0025	1.0030

Corrcted As found NO_X= 824.1 NO= 819.4 Percent Change NO_X= -1.8% NO= -1.8%

Previous Response NO_X= 809.4 NO= 804.9

GPT Calibration Data

Dilution Flow (total) 5000 ccm Source Gas Flow 79.90 ccm NOX ref calc conc = 805.4 ppb NO ref calc conc = 800.6 ppb

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
1st NO ref point		4.8	809.2	802.9	-0.1	0.9953	0.9971	----	----
1st NO2 (300)	438.6	369.1	808.8	438.6	370.3	0.9957	----	0.9969	100.3%
2nd NO2 (200)	557.4	250.4	812.2	557.4	254.8	0.9917	----	0.9825	101.8%
3rd NO2 (100)	678.6	129.1	811.6	678.6	132.9	0.9924	----	0.9711	103.0%
2nd NO ref point		4.8	809.2	802.9	6.3	0.9953	0.9971	----	----
				Average Correction Factor		0.9938		0.9835	101.7%

Calibration Performed By: Asad Hidayat

Wood Buffalo Environmental Association

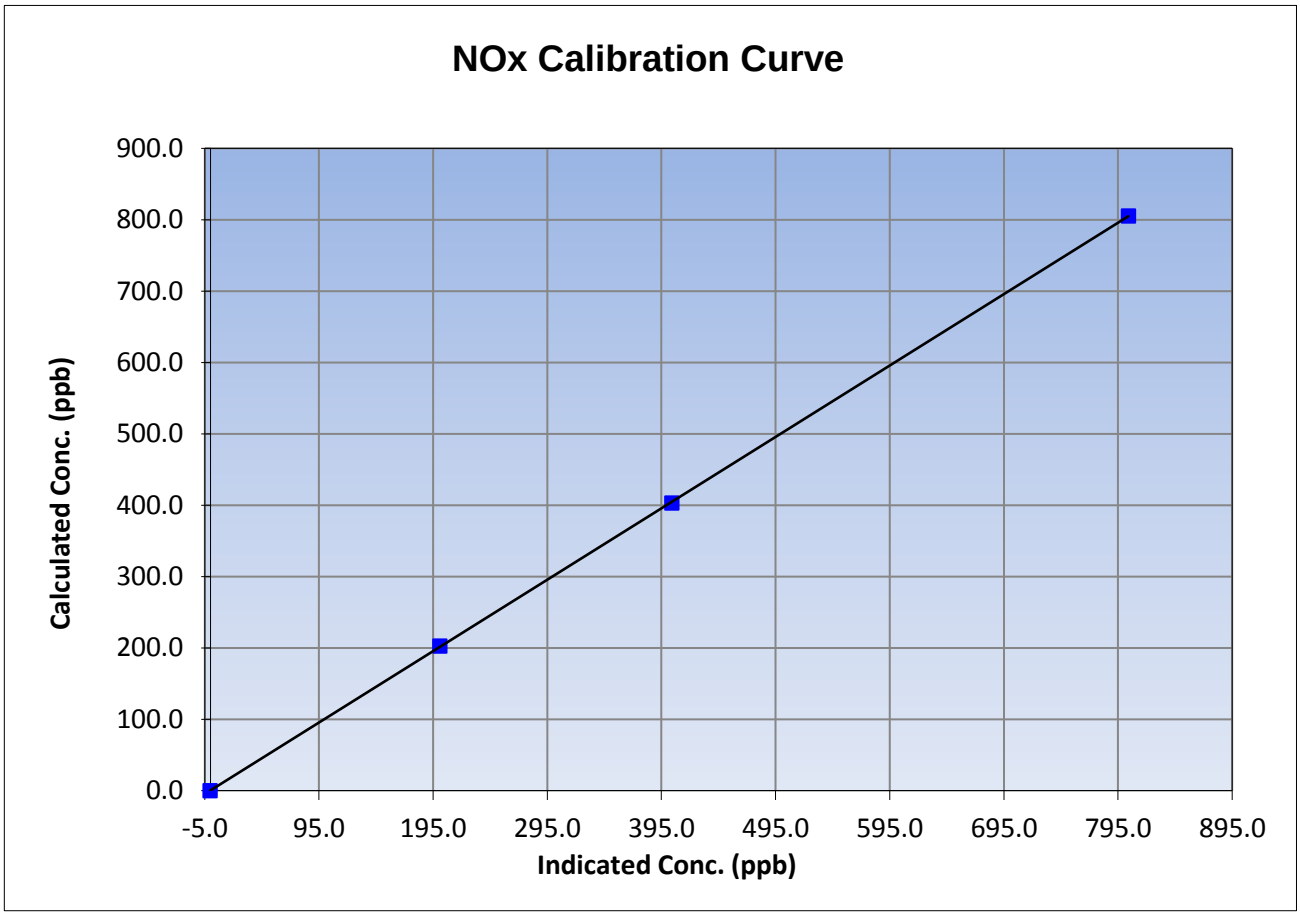
NO_X Calibration Summary

Station Information

Calibration Date	April 5, 2016	Previous Calibration	March 4, 2016
Station Name	Brion Mackay River	Station Number	AMS 20
Start Time (MST)	8:48	End Time (MST)	12:38
Analyzer make	Thermo 42i	Analyzer serial #	1505164379

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.3	----	Correlation Coefficient	0.999988
805.4	804.1	1.0017		
403.2	404.2	0.9975	Slope	1.000564
202.6	201.0	1.0083		
			Intercept	0.366278



Wood Buffalo Environmental Association

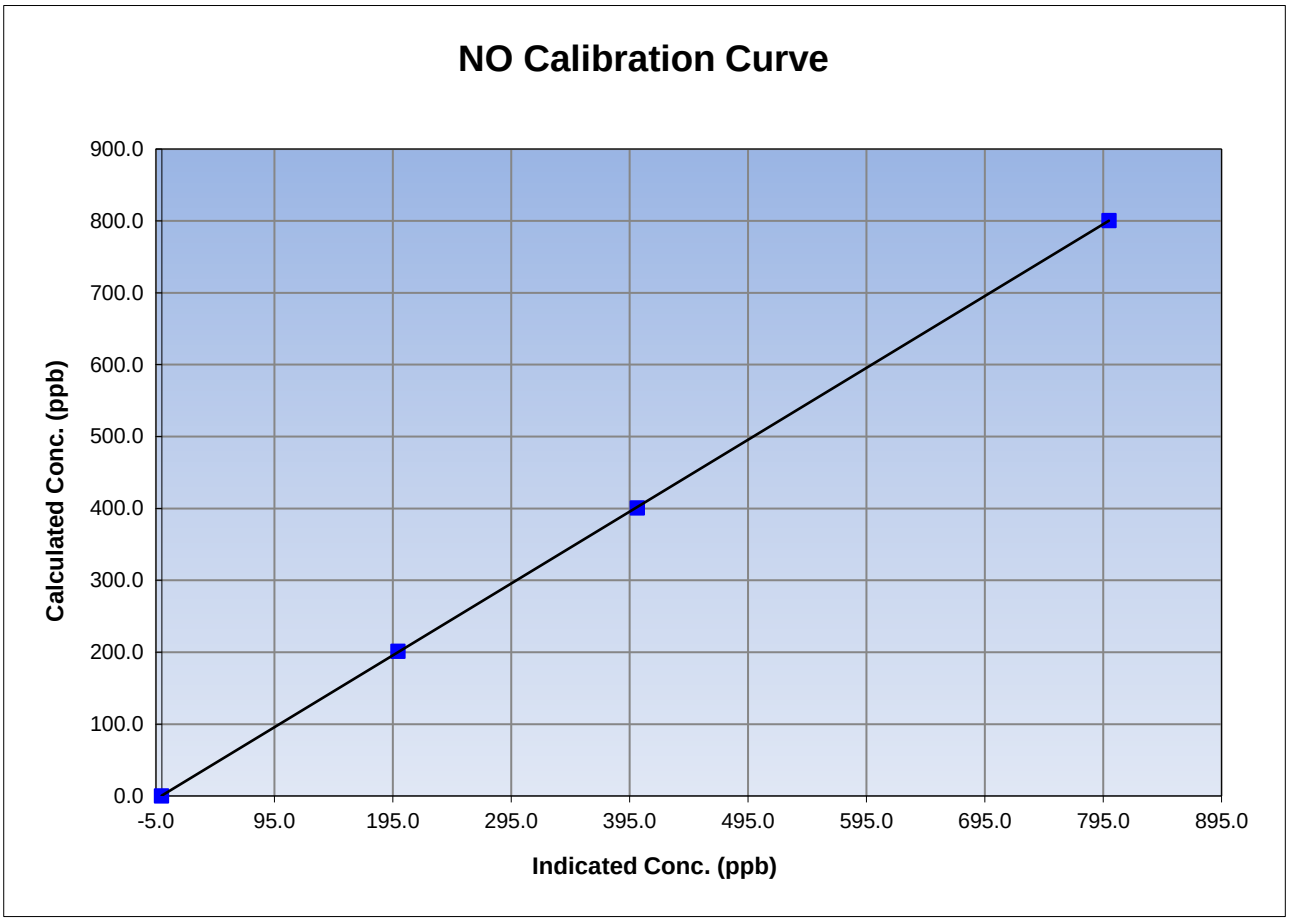
NO Calibration Summary

Station Information

Calibration Date	April 5, 2016	Previous Calibration	March 4, 2016
Station Name	Brion Mackay River	Station Number	AMS 20
Start Time (MST)	8:48	End Time (MST)	12:38
Analyzer make	Thermo 42i	Analyzer serial #	1505164379

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	N/A	Correlation Coefficient	0.999988
800.6	799.9	1.0009		
400.8	401.6	0.9979	Slope	0.999749
201.4	199.4	1.0102		
			Intercept	0.620307



Wood Buffalo Environmental Association

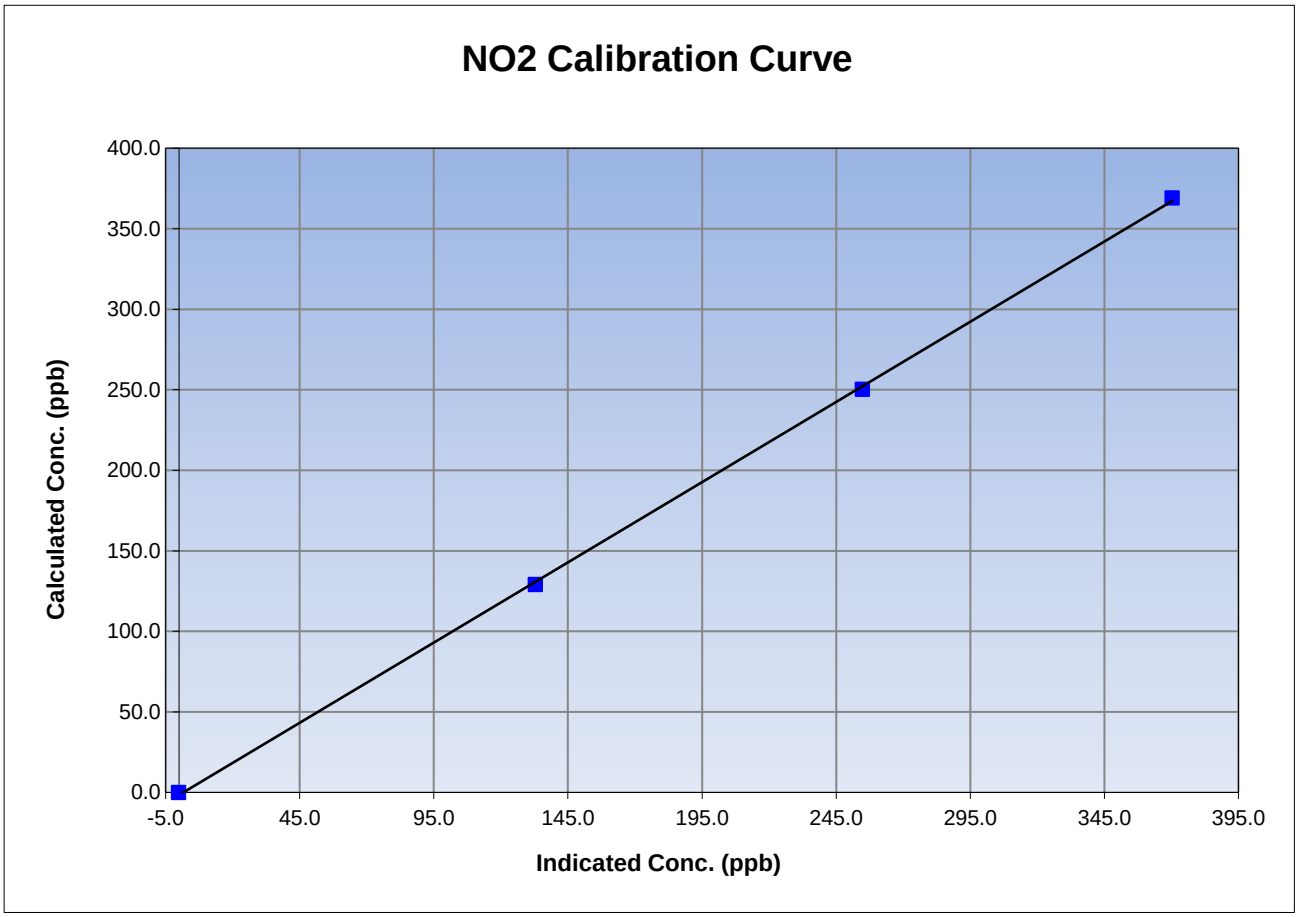
NO_2 Calibration Summary

Station Information

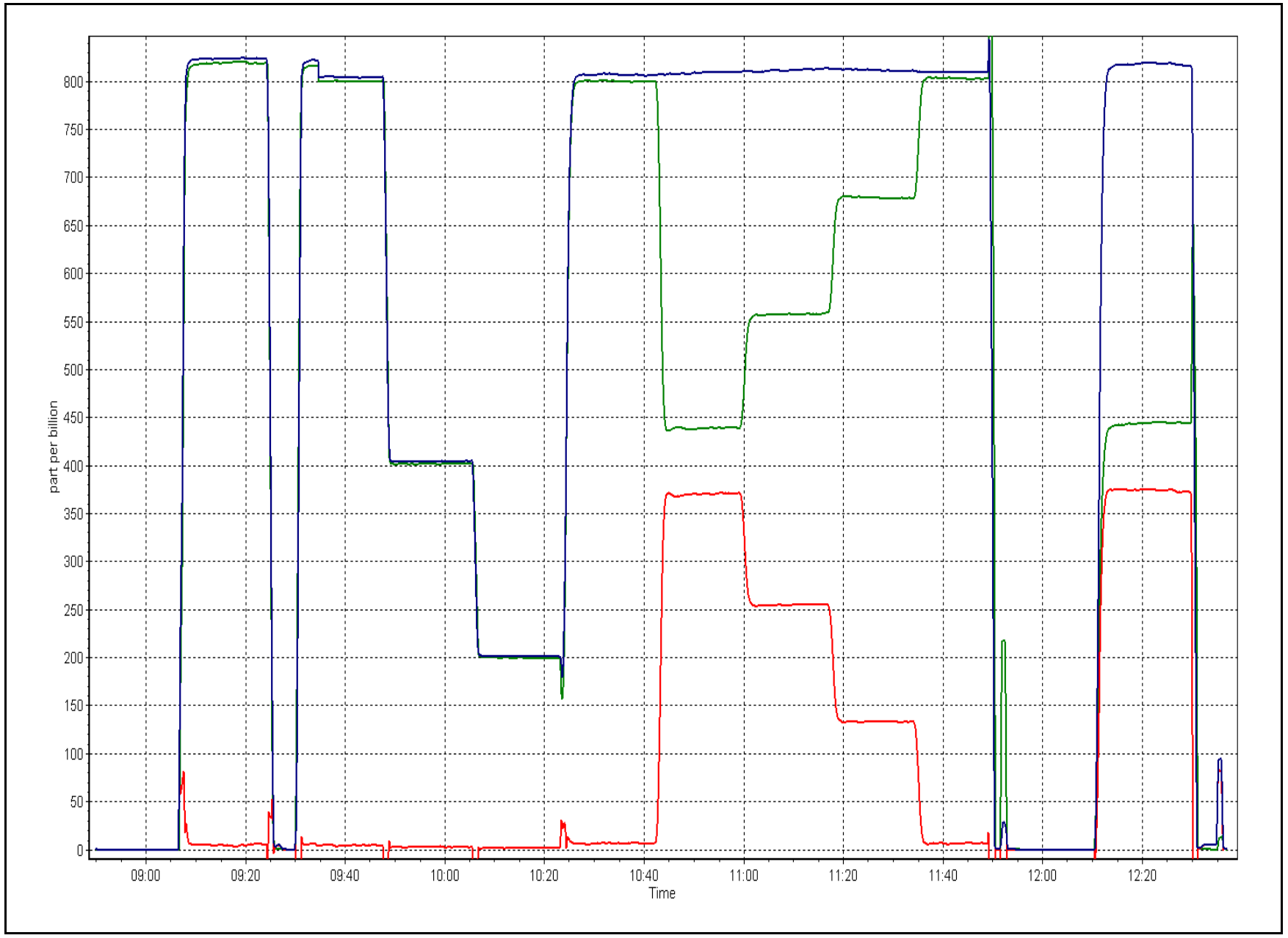
Calibration Date	April 5, 2016	Previous Calibration	March 4, 2016
Station Number	Brion Mackay River	Station Number	AMS 20
Start Time (MST)	8:48	End Time (MST)	12:38
Analyzer make	Thermo 42i	Analyzer serial #	1505164379

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999830
369.1	370.3	0.9969		
250.4	254.8	0.9825	Slope	0.996005
129.1	132.9	0.9711		
			Intercept	-1.582589



NOX Calibration Plot Date: April 5, 2016



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 21
CONKLIN COMMUNITY
APRIL 2016

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

May 27, 2016

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONKLIN COMMUNITY (AMS 21)
APRIL 2016

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	681	34	39	99.31	6	0	1	0
TRS(ppb) Average	684	36	36	100.00	0	0	0	0
THC(ppm) Average	686	34	34	100.00	2.2	-	2	-
NMHC(ppm) Average	686	34	34	100.00	0.302	-	0.016	-
CH4(ppm) Average	686	34	34	100.00	2.1	-	2	-
O3 (ppb) Average	685	35	35	100.00	62	0	51	-
NO2 (ppb) Average	684	34	36	99.72	19	0	2	-
NO (ppb) Average	684	34	36	99.72	13	-	1	-
NOX (ppb) Average	684	34	36	99.72	32	-	3	-
PM2.5 (ug/m3) Average	718	2	2	100.00	57.1	-	7.7	0
Wind Speed 10 m (km/h) Average	680	0	40	94.44	23	-	15	-
Wind Direction 10 m (deg) Average	680	0	40	94.44	-	-	-	-
Temperature 2 m (C) Average	720	0	0	100.00	24.2	-	15.6	-
Relative Humidity (%) Average	720	0	0	100.00	99	-	94.0	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONKLIN COMMUNITY (AMS 21)
APRIL 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

					Percentile						
Parameter	Number	Mean	StnDev	Total	Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	681	0.3	0	-	0	0	0	0	0	1	6
TRS (ppb) Average	684	0.2	0	-	0	0	0	0	0	0	0
THC (ppm) Average	686	1.91	0.1	-	1.8	1.9	1.9	1.9	1.9	2	2.2
NMHC(ppm) Average	686	0.001	0.012	-	0	0	0	0	0	0	0.302
CH4(ppm) Average	686	1.91	0.1	-	1.8	1.9	1.9	1.9	1.9	2	2.1
O3 (ppb) Average	685	36.6	11	-	3	21	30	37	44	51	62
NO2 (ppb) Average	684	1.3	1	-	0	1	1	1	2	2	19
NO (ppb) Average	684	0.3	1	-	0	0	0	0	0	0	13
NOX (ppb) Average	684	1.5	2	-	0	1	1	1	2	2	32
PM2.5 (ug/m3) Average	718	3.81	3.5	-	0.8	1.5	2.1	3.2	4.5	6.1	57.1
Wind Speed 10 m (km/h) Average	680	8.1	5	-	0	2	4	7	11	15	23
Wind Direction 10 m (deg) Average	680	-	-	-	-	-	-	-	-	-	-
Temperature 2 m (C) Average	720	4.21	7.2	-	-10.6	-4.2	-0.4	2.9	8.1	15.3	24.2
Relative Humidity (%) Average	720	58.7	24	-	11	25	39	60	78	92	99

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONKLIN COMMUNITY (AMS 21)
APRIL 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2	01 Apr 2016 20:00	01 Apr 2016 22:00	3	Unstable operation - excessive baseline drift
SO2	02 Apr 2016 04:00	02 Apr 2016 05:00	2	Unstable operation - excessive baseline drift
NO2, NO, NOX	13 Apr 2016 10:00	13 Apr 2016 11:00	2	Maintenance - confirmed calibration points for Ozone
Wind Speed, Wind Direction	07 Apr 2016 01:00	07 Apr 2016 09:00	9	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	07 Apr 2016 22:00	08 Apr 2016 10:00	13	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	10 Apr 2016 01:00	10 Apr 2016 01:00	1	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	10 Apr 2016 20:00	11 Apr 2016 08:00	13	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	12 Apr 2016 02:00	12 Apr 2016 05:00	4	Flat line in sensor output signal - Sensor frozen

Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO_2) - ppb

Conklin Community - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 6 ppb on Apr 29 04:00 Maximum Daily Average: 0.9 ppb on Apr 29

Minimum Value: 0 ppb on Apr 13 22:00 Minimum Daily Average: 0.1 ppb on Apr 14
Maximum Diurnal Average: 0.4 ppb at hour 10 Minimum Diurnal Average: 0.2 ppb at hour 23
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:	720
Hours of Data:	681
Hours of Missing Data:	39
Hours of Calibration:	34
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-Apr	0	Z	0	0	0	0	0	0	0	1	2	1	1	1	2	1	1	1	1	UO	UO	UO	0	0	0.7	2
2-Apr	0	0	Z	UO	UO	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0.4	1
3-Apr	0	0	0	Z	1	1	0	1	0	0	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0.6	1
4-Apr	0	0	0	0	Z	0	0	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0.5	1
5-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
6-Apr	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.2	1
7-Apr	1	Z	0	0	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
8-Apr	0	0	Z	0	0	0	0	1	1	1	1	1	1	1	0	0	0	1	1	1	0	1	0	0	0.5	1
9-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.3	1
10-Apr	1	1	1	0	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1
11-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.3	1
12-Apr	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.3	1
13-Apr	0	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
14-Apr	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
15-Apr	0	0	0	Z	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	1	0	0	0.3	1
16-Apr	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
17-Apr	0	0	0	0	0	Z	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1
18-Apr	Z	0	0	0	0	0	0	0	2	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0.4	2
19-Apr	0	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
20-Apr	0	0	Z	0	0	0	1	1	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.4	1
21-Apr	0	0	0	Z	0	0	0	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2
22-Apr	0	0	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
23-Apr	0	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
24-Apr	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	1	0	0	0	0	0.4	1
25-Apr	0	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
26-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
27-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
28-Apr	0	0	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0.3	1
29-Apr	1	1	1	6	2	Z	3	1	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.9	6
30-Apr	Z	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
	0.3	0.2	0.3	0.4	0.3	0.3	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.2	0.2	Diurnal Average	
	1	1	1	6	2	1	3	1	2	1	2	1	1	1	2	1	1	1	1	1	1	1	1	1	Diurnal Maximum	

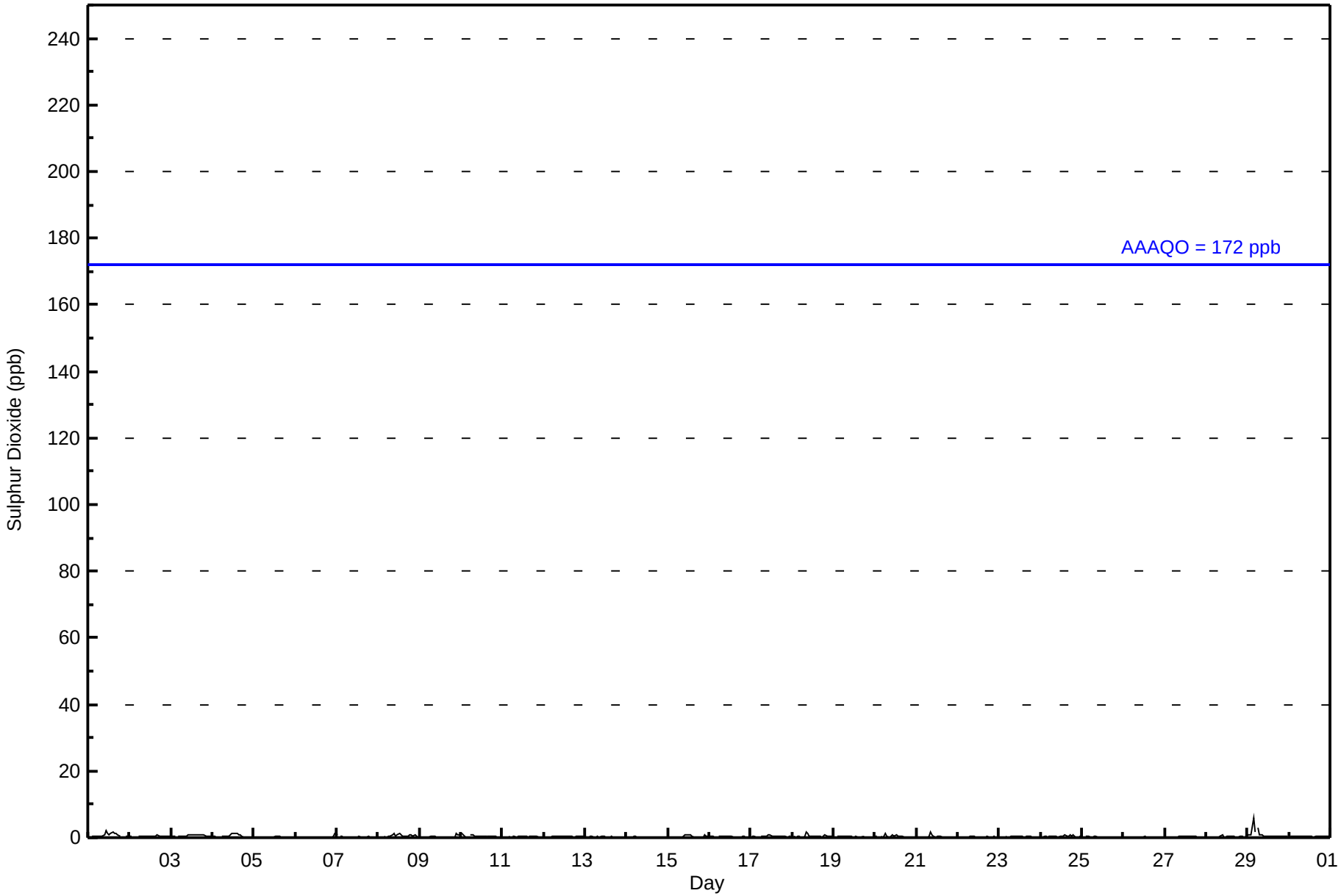
Z - zerospan C - Calibration UO - Unstable Operation
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb

Wood Buffalo Environmental Association

Hourly Averages

Sulphur Dioxide (SO_2) - ppb

Conklin Community - April 2016



Sulphur Dioxide (SO_2) - ppb

Conklin Community - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	681	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: 681

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

Conklin Community - April 2016

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	28	19	19	34	45	44	88	74	64	24	10	12	19	54	61	645
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	50	28	19	19	34	45	44	88	74	64	24	10	12	19	54	61	645

Total Number of Valid Hours: 645

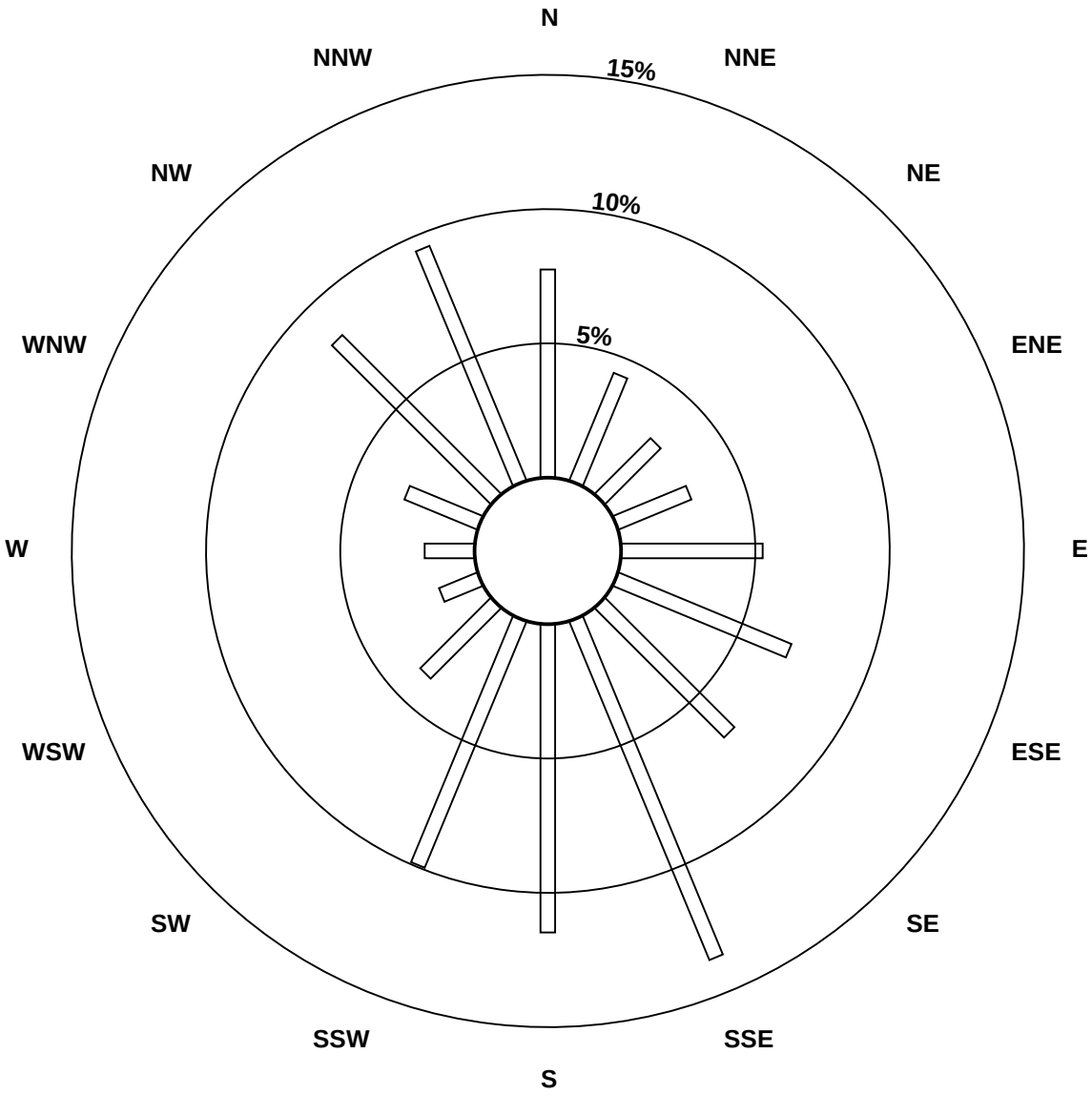
Total Number of Hours: 720

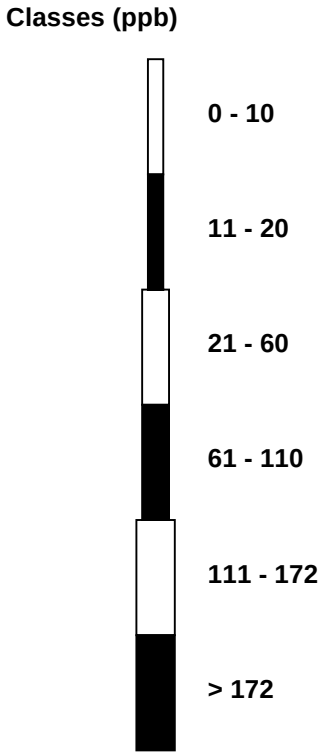
Wood Buffalo Environmental Association

Wind Rose Apr 2016

Sulphur Dioxide (SO_2) - ppb

Conklin Community (AMS 21)





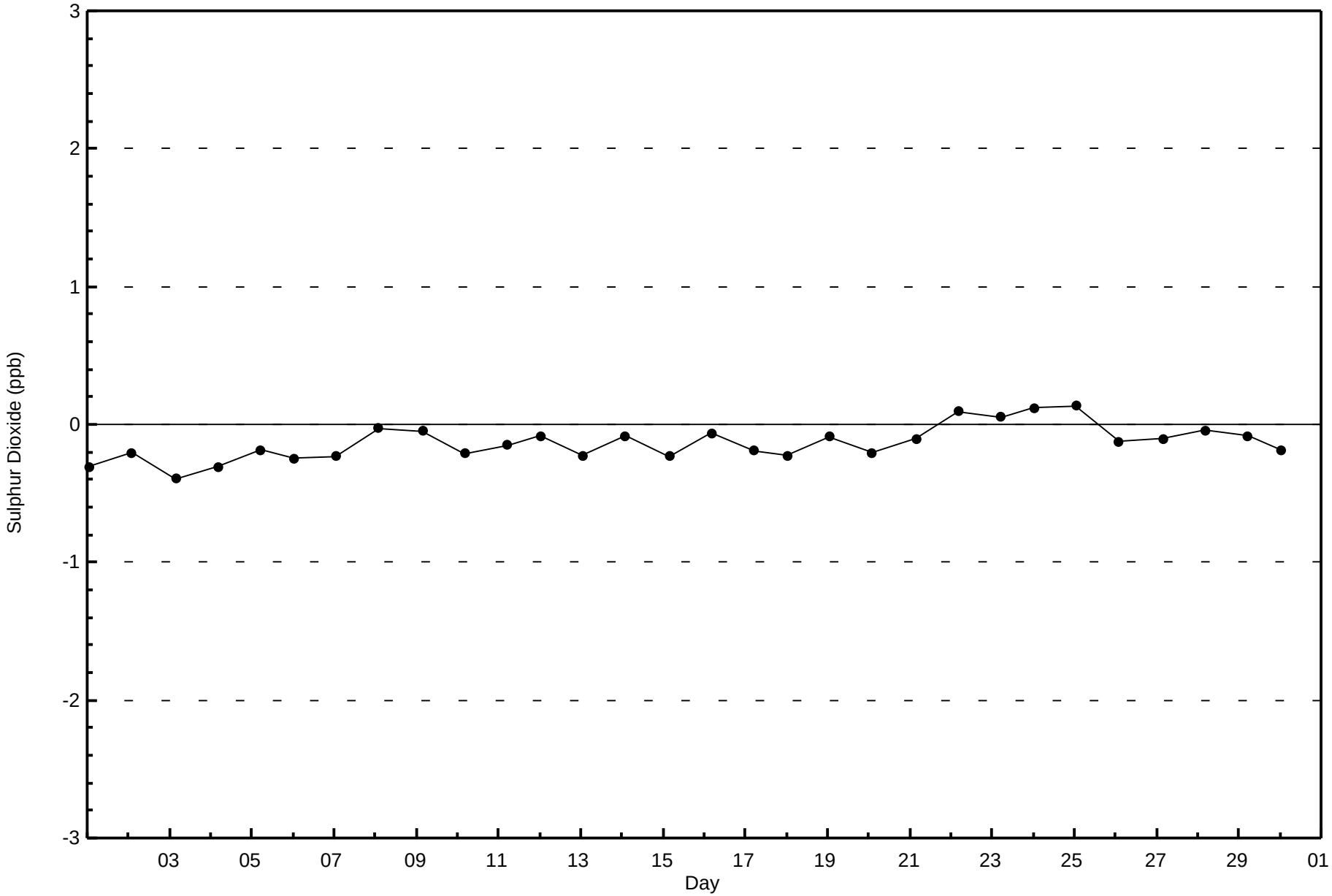
Total Number of Valid Hours: 645

Wood Buffalo Environmental Association

Zero Responses

Sulphur Dioxide (SO_2) - ppb

Conklin Community - April 2016

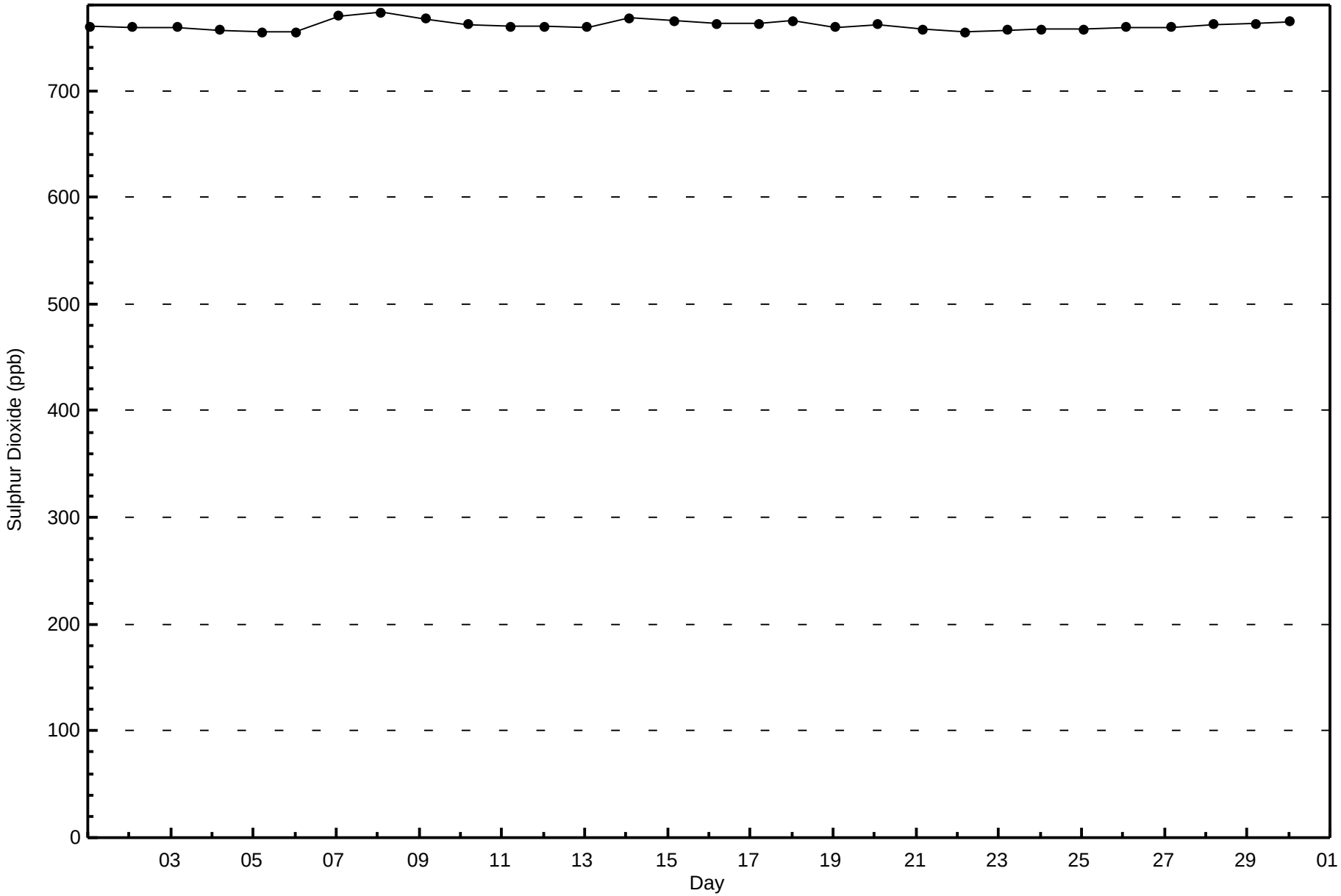


Wood Buffalo Environmental Association

Span Responses

Sulphur Dioxide (SO_2) - ppb

Conklin Community - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

Conklin Community - April 2016

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

Maximum Value: 0 ppb on Apr 18 09:00 Maximum Daily Average: 0.3 ppb on Apr 1

Minimum Value: 0 ppb on Apr 27 04:00 Minimum Daily Average: 0.2 ppb on Apr 22

Maximum Diurnal Average: 0.3 ppb at hour 10 Minimum Diurnal Average: 0.2 ppb at hour 3

Monthly Average: 0.2 ppb Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 0$ $P_{99} = 0$

Hours in Service:	720
Hours of Data:	684
Hours of Missing Data:	36
Hours of Calibration:	36
Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily	Daily
	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-Apr	0	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-Apr	0	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
3-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
4-Apr	0	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-Apr	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
6-Apr	0	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-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	C	C	C	C	C	C	0	0	0	0	0	0	--	0
8-Apr	0	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
9-Apr	0	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-Apr	0	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
11-Apr	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
12-Apr	0	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-Apr	0	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
14-Apr	0	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
15-Apr	0	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
16-Apr	0	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
17-Apr	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
18-Apr	0	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
19-Apr	0	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
20-Apr	0	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
21-Apr	0	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
22-Apr	0	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
23-Apr	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
24-Apr	0	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
25-Apr	0	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
26-Apr	0	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
27-Apr	0	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
28-Apr	0	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
29-Apr	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
30-Apr	0	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
	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.2	0.2	Diurnal Average	
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Diurnal Maximum	

Z - zerospan C - Calibration

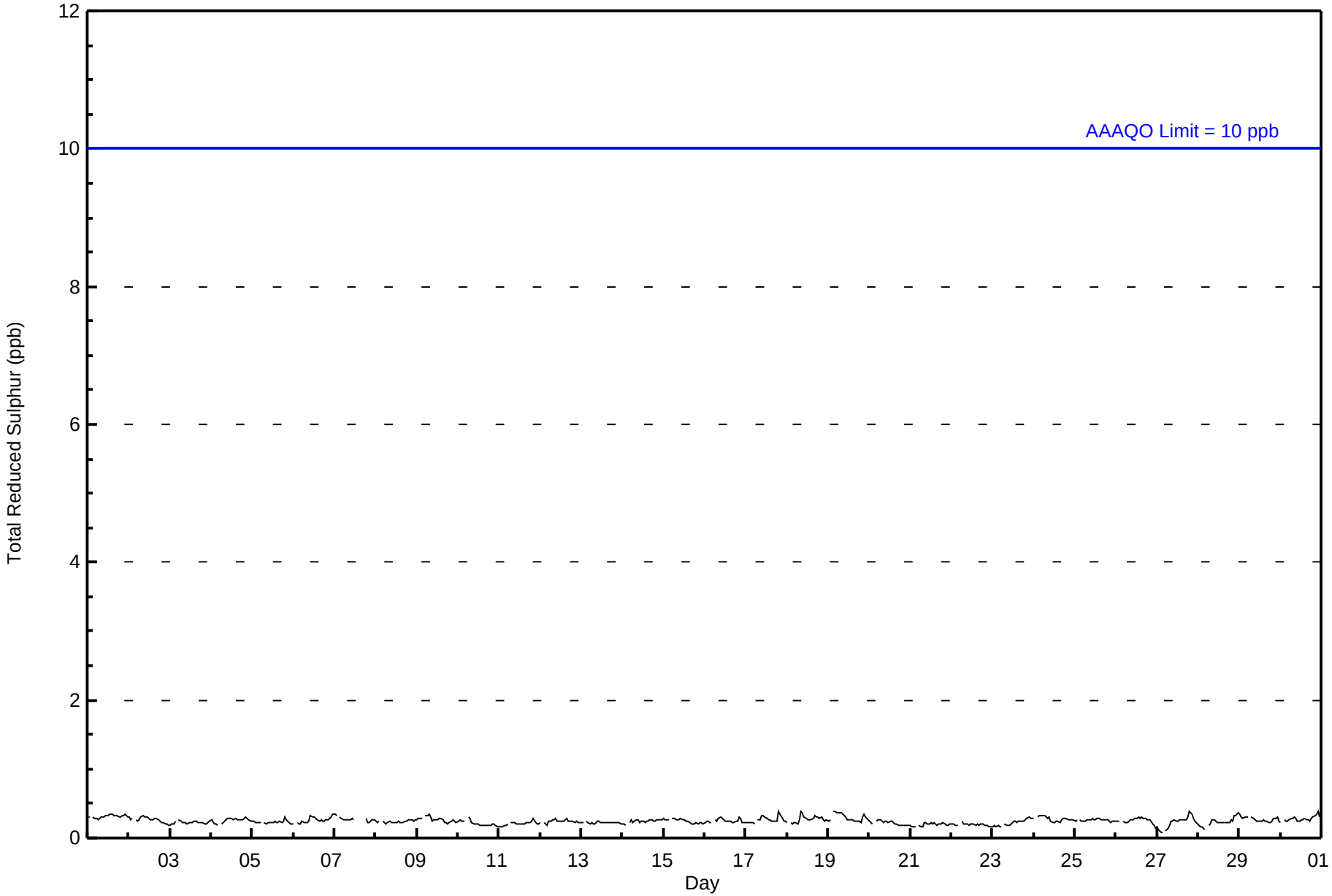
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb

Wood Buffalo Environmental Association

Hourly Averages

Total Reduced Sulphur (TRS) - ppb

Conklin Community - April 2016



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb

Conklin Community - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	684	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Total Reduced Sulphur (TRS) - ppb

Conklin Community - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 2	53	29	17	22	34	47	45	87	73	67	25	10	13	17	51	58	648
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	53	29	17	22	34	47	45	87	73	67	25	10	13	17	51	58	648

Total Number of Valid Hours: 648

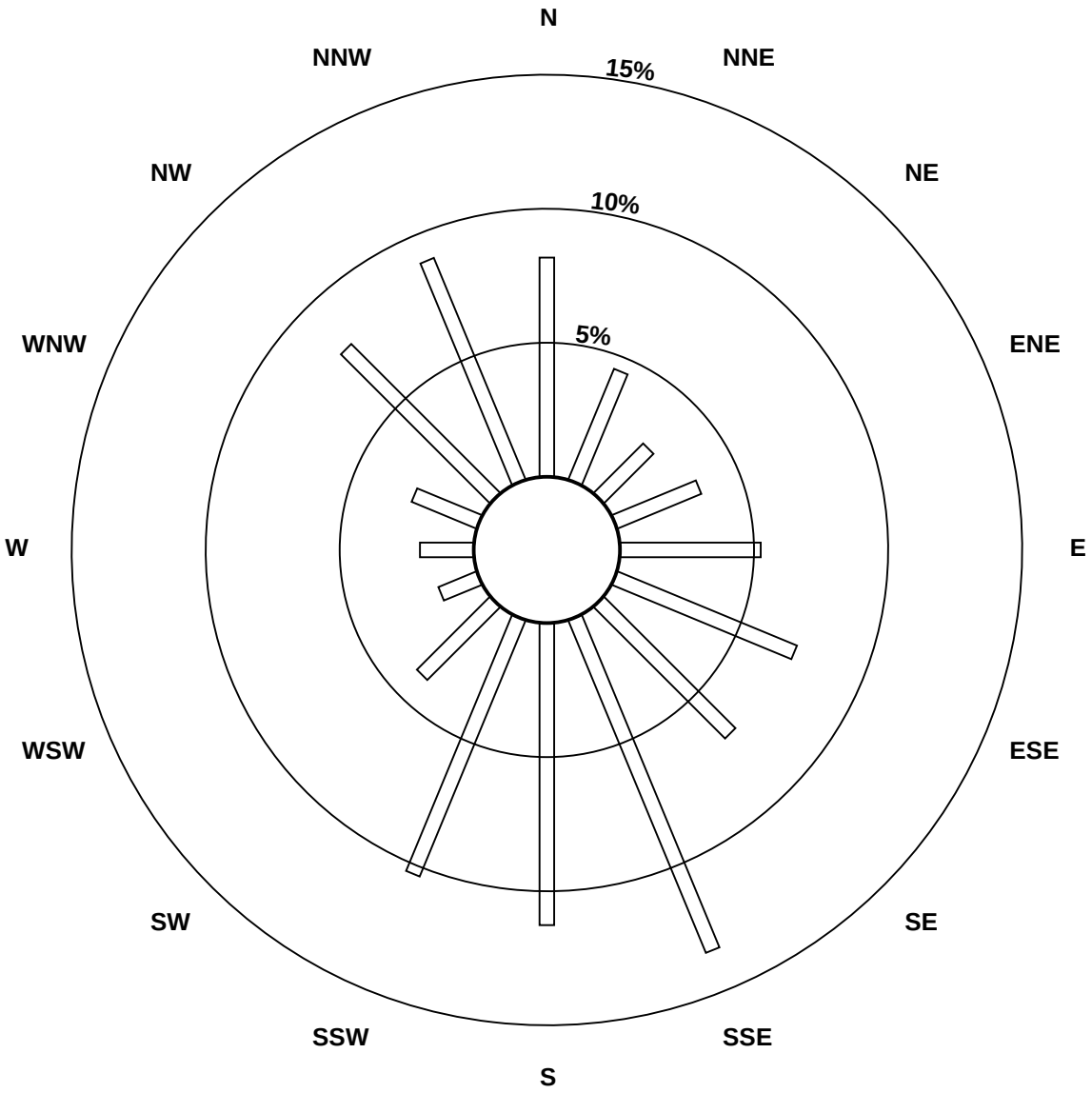
Total Number of Hours: 720

Wood Buffalo Environmental Association

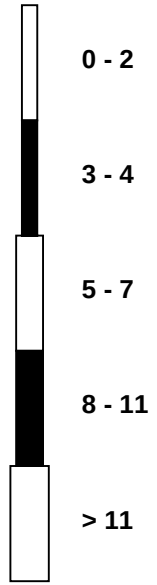
Wind Rose Apr 2016

Total Reduced Sulphur (TRS) - ppb

Conklin Community (AMS 21)



Classes (ppb)



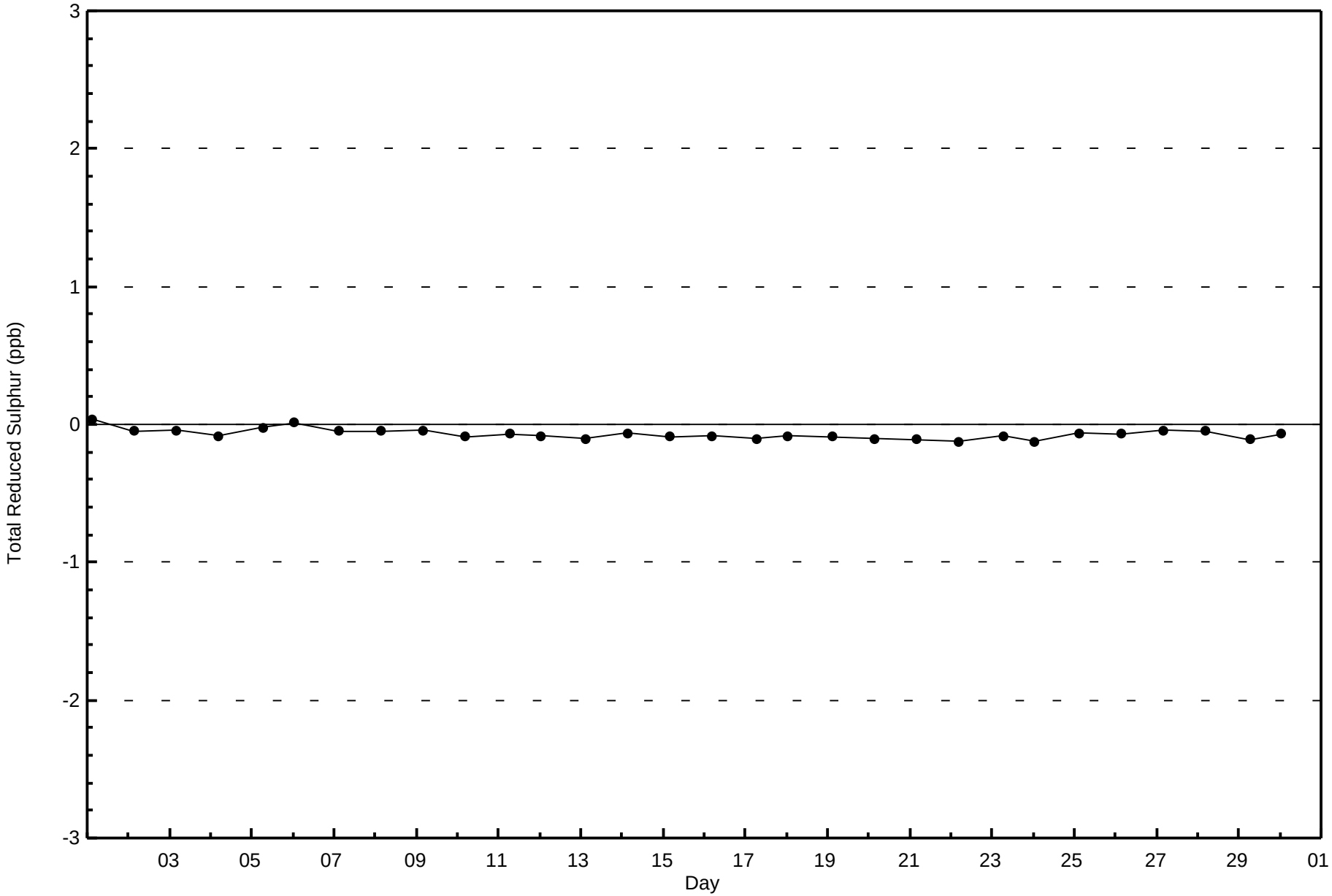
Total Number of Valid Hours: 648

Wood Buffalo Environmental Association

Zero Responses

Total Reduced Sulphur (TRS) - ppb

Conklin Community - April 2016

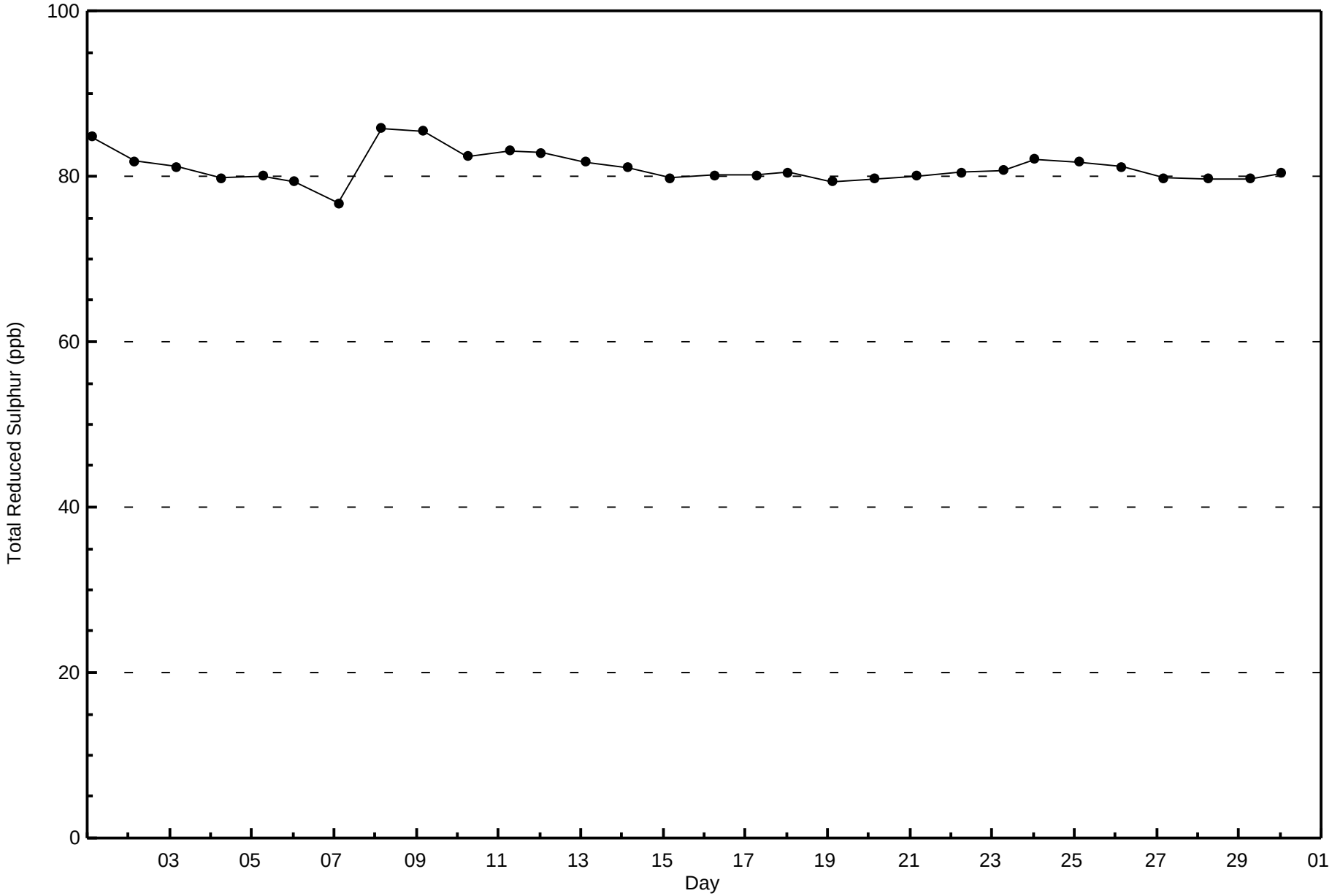


Wood Buffalo Environmental Association

Span Responses

Total Reduced Sulphur (TRS) - ppb

Conklin Community - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Conklin Community - April 2016

Maximum Value: 2.2 ppm on Apr 17 20:00

Maximum Daily Average: 2.0 ppm on Apr 27

Minimum Value: 1.8 ppm on Apr 19 16:00

Minimum Daily Average: 1.9 ppm on Apr 19

Maximum Diurnal Average: 1.9 ppm at hour 2

Minimum Diurnal Average: 1.9 ppm at hour 17

Monthly Average: 1.91 ppm

Percentiles: P_1 = 1.8 P_{10} = 1.9 Q_1 = 1.9 Median = 1.9 Q_3 = 1.9 P_{90} = 2.0 P_{99} = 2.1

Hours in Service:	720
Hours of Data:	686
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-Apr	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	2.0
2-Apr	2.1	2.0	Z	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	1.9	1.9	1.9	1.9	2.1
3-Apr	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	2.0	1.9	2.0
4-Apr	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
5-Apr	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	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.1
6-Apr	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
7-Apr	1.9	Z	1.9	2.0	1.9	1.9	1.9	1.9	C	C	C	C	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
8-Apr	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
9-Apr	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
10-Apr	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
11-Apr	1.9	1.9	1.9	1.9	1.9	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	2.0	2.1	2.1	2.1	2.1	2.0	2.1
12-Apr	Z	2.1	2.1	2.1	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	1.9	1.9	2.1
13-Apr	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
14-Apr	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
15-Apr	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
16-Apr	1.9	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
17-Apr	1.9	1.9	1.9	1.9	1.9	Z	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.2	2.0	2.0	2.0	2.0	1.9	2.2
18-Apr	Z	1.9	2.0	2.0	2.0	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1
19-Apr	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	1.9	1.9	1.9	1.9	1.9	1.9	1.9
20-Apr	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.9	2.0
21-Apr	2.0	2.0	1.9	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	2.0
22-Apr	2.0	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
23-Apr	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	2.0	1.9	1.9	2.0
24-Apr	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
25-Apr	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	2.0
26-Apr	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.9	2.0
27-Apr	2.1	2.1	2.2	Z	2.0	2.1	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	2.1	2.1	2.1	2.0	2.2
28-Apr	2.0	2.0	2.0	2.1	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
29-Apr	2.0	2.0	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	1.9	2.0
30-Apr	Z	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	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.0
	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	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	2.1	2.1	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.2	2.1	2.1	2.1	2.1	Diurnal Maximum	

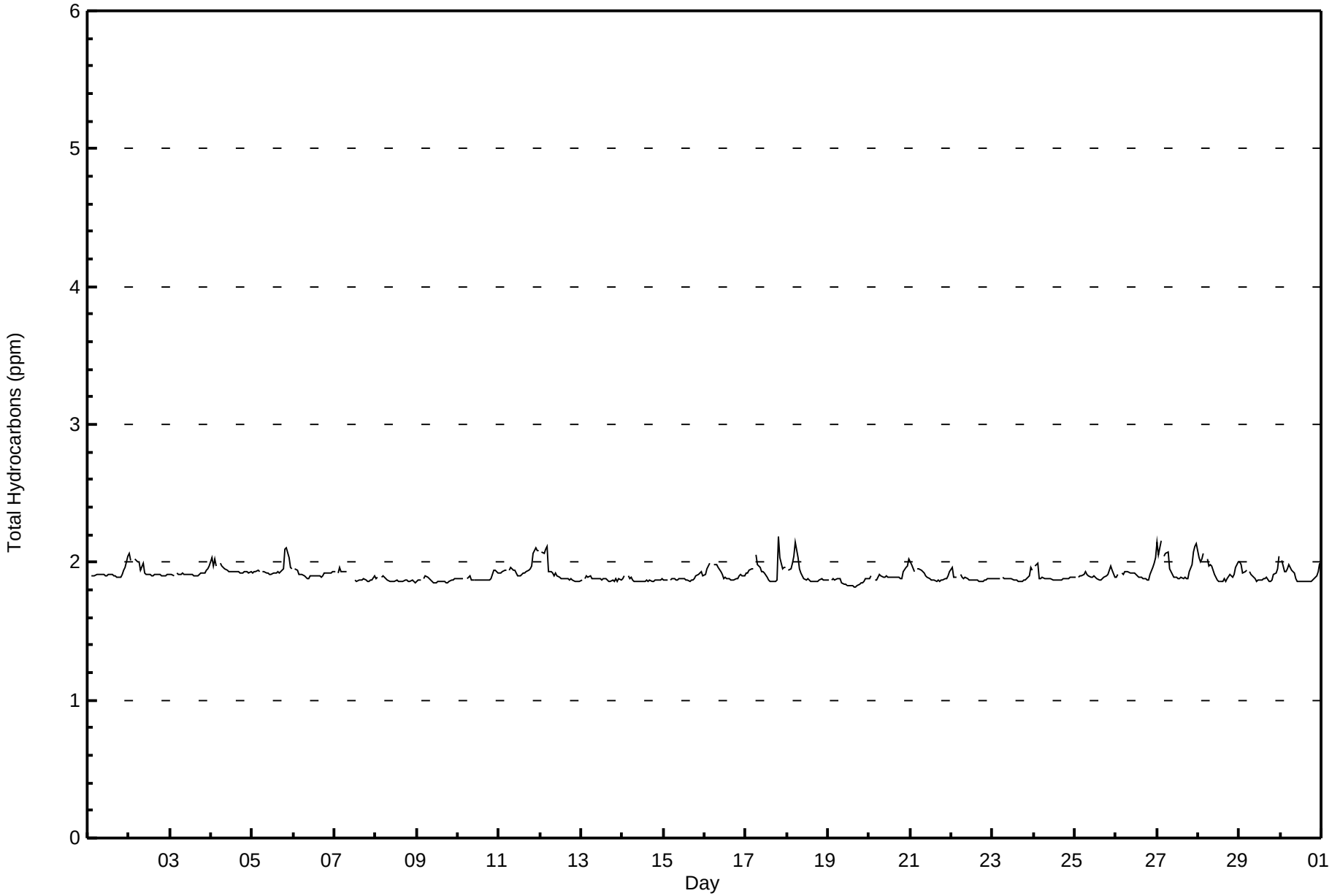
Z - zerospan C - Calibration

Wood Buffalo Environmental Association

Hourly Averages

Total Hydrocarbons (THC) - ppm

Conklin Community - April 2016



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm

Conklin Community - April 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	663	96.65	96.65
2.1 - 3.0	23	3.35	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Total Hydrocarbons (THC) - ppm

Conklin Community - April 2016

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	51	29	19	22	34	44	39	77	73	63	24	10	12	19	54	61	631
2.1 - 3.0	0	0	0	0	0	1	5	11	1	1	0	0	0	0	0	0	19
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	51	29	19	22	34	45	44	88	74	64	24	10	12	19	54	61	650

Total Number of Valid Hours: 650

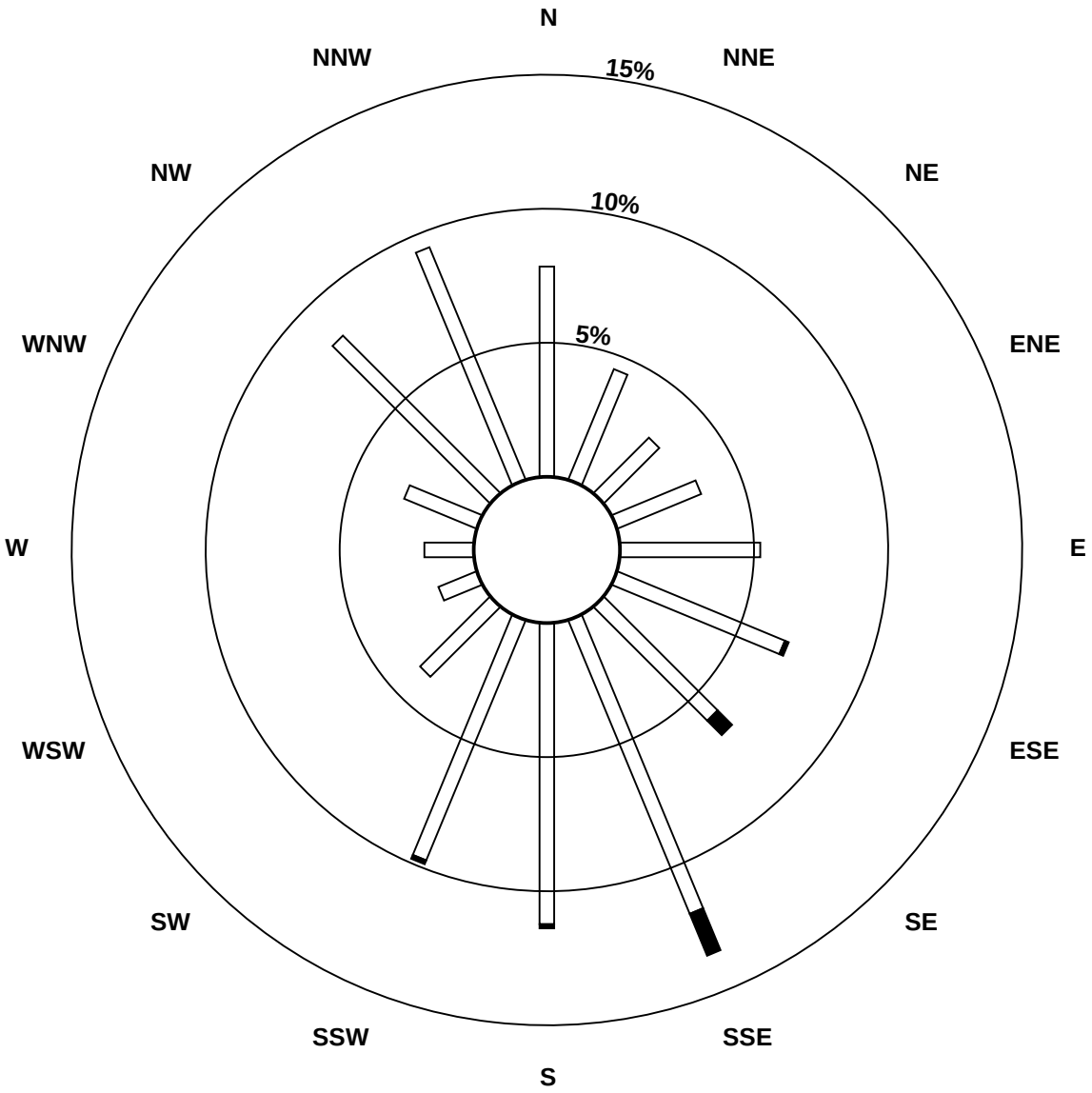
Total Number of Hours: 720

Wood Buffalo Environmental Association

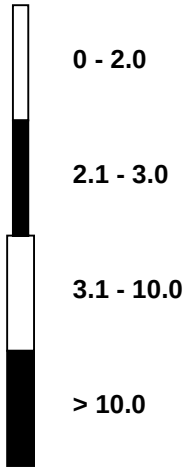
Wind Rose Apr 2016

Total Hydrocarbons (THC) - ppm

Conklin Community (AMS 21)



Classes (ppm)



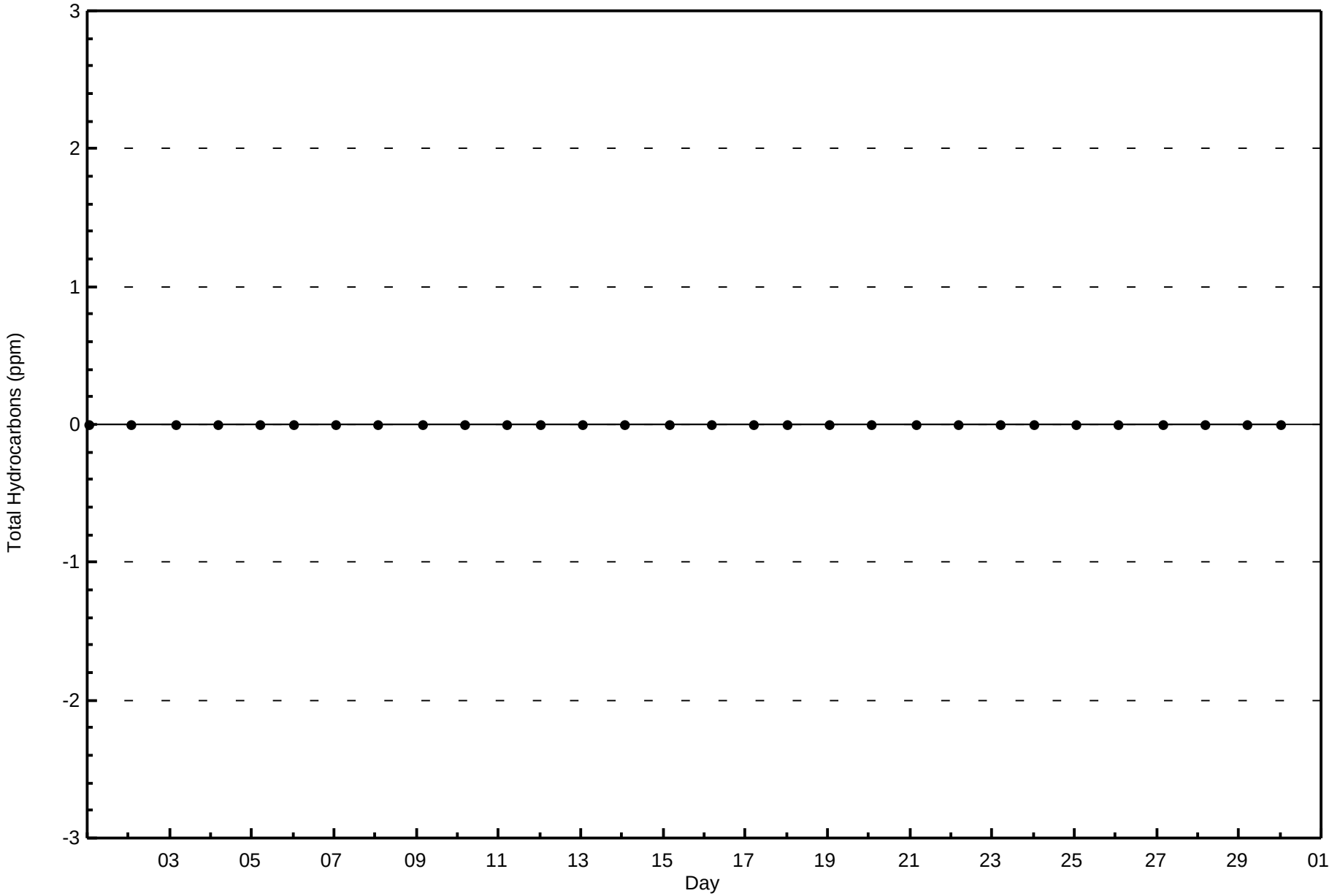
Total Number of Valid Hours: 650

Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Conklin Community - April 2016

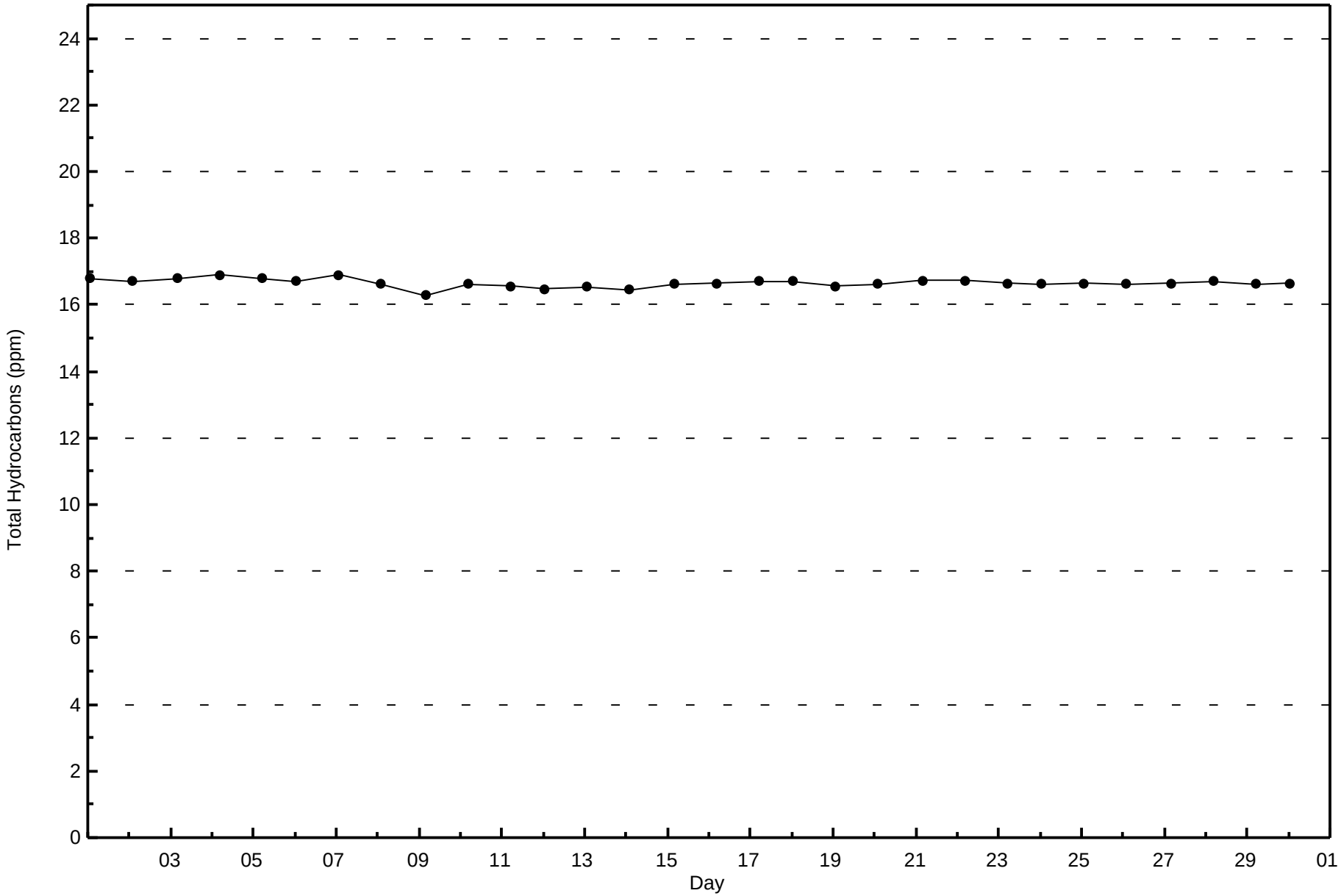


Wood Buffalo Environmental Association

Span Responses

Total Hydrocarbons (THC) - ppm

Conklin Community - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Non Methane Hydrocarbons (NMHC) - ppm

Conklin Community - April 2016

Maximum Value: 0.302 ppm on Apr 17 20:00

Maximum Daily Average: 0.016 ppm on Apr 17

Minimum Value: 0.000 ppm on Apr 1 01:00

Minimum Daily Average: 0.000 ppm on Apr 1

Maximum Diurnal Average: 0.012 ppm at hour 20

Minimum Diurnal Average: 0.000 ppm at hour 4

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:	720
Hours of Data:	686
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-Apr	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Apr	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	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008
3-Apr	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
4-Apr	0.017	0.000	0.000	0.000	Z	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.017
5-Apr	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	0.042	0.034	0.016	0.000	0.000	0.004	0.042
6-Apr	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Apr	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	C	C	C	C	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.003
8-Apr	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
9-Apr	0.000	0.002	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002
10-Apr	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
11-Apr	0.000	0.000	0.000	0.000	0.004	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.006	0.000	0.000	0.000	0.001	0.006
12-Apr	Z	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
13-Apr	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Apr	0.001	0.006	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006
15-Apr	0.000	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	0.004	0.000	0.000	0.004
16-Apr	0.000	0.000	0.000	0.000	Z	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.001	0.009	0.000	0.000	0.001	0.009
17-Apr	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	0.009	0.302	0.067	0.002	0.000	0.000	0.016	0.302
18-Apr	Z	0.000	0.000	0.000	0.007	0.017	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.017
19-Apr	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Apr	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.011
21-Apr	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
22-Apr	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
23-Apr	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
24-Apr	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Apr	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Apr	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	0.004	0.005	0.000	0.005
27-Apr	0.034	0.002	0.018	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.000	0.002	0.000	0.003	0.034
28-Apr	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
29-Apr	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	0.002	0.009	0.005	0.003	0.000	0.001	0.009
30-Apr	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002
	0.002	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.004	0.001	0.000	0.001	Diurnal Average	
	0.034	0.006	0.018	0.000	0.007	0.017	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.008	0.000	0.000	0.000	0.001	0.009	0.302	0.067	0.016	0.004	0.011	Diurnal Maximum	

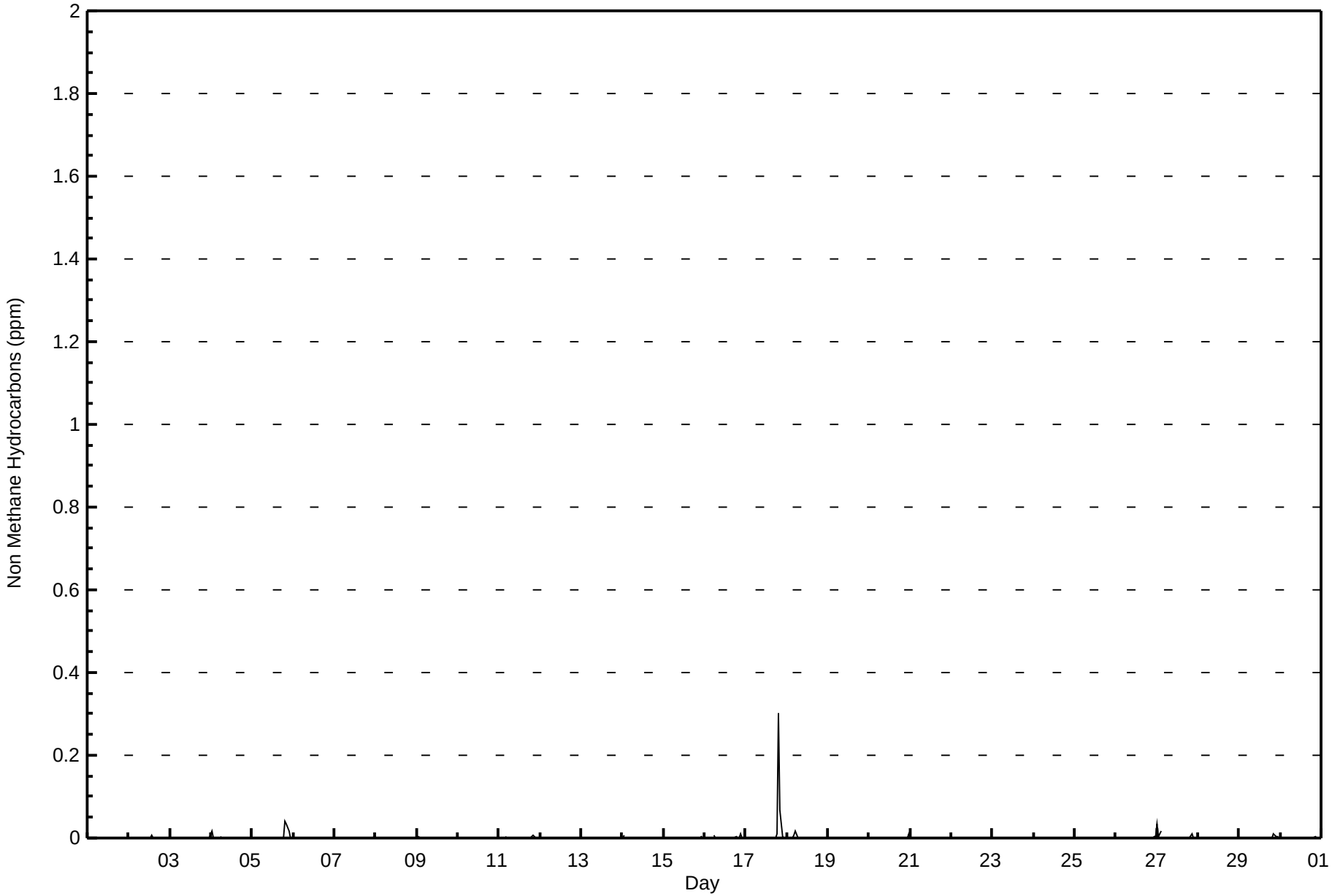
Z - zerospan C - Calibration

Wood Buffalo Environmental Association

Hourly Averages

Non Methane Hydrocarbons (NMHC) - ppm

Conklin Community - April 2016



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm

Conklin Community - April 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	668	97.38	97.38
0.006 - 0.05	16	2.33	99.71
0.06 - 0.1	1	0.15	99.85
> 0.1	1	0.15	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm

Conklin Community - April 2016

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	51	28	19	22	33	45	42	82	71	61	24	9	12	19	53	61	632
0.006 - 0.05	0	1	0	0	1	0	2	6	3	1	0	1	0	0	1	0	16
0.06 - 0.1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
> 0.1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Totals	51	29	19	22	34	45	44	88	74	64	24	10	12	19	54	61	650

Total Number of Valid Hours: 650

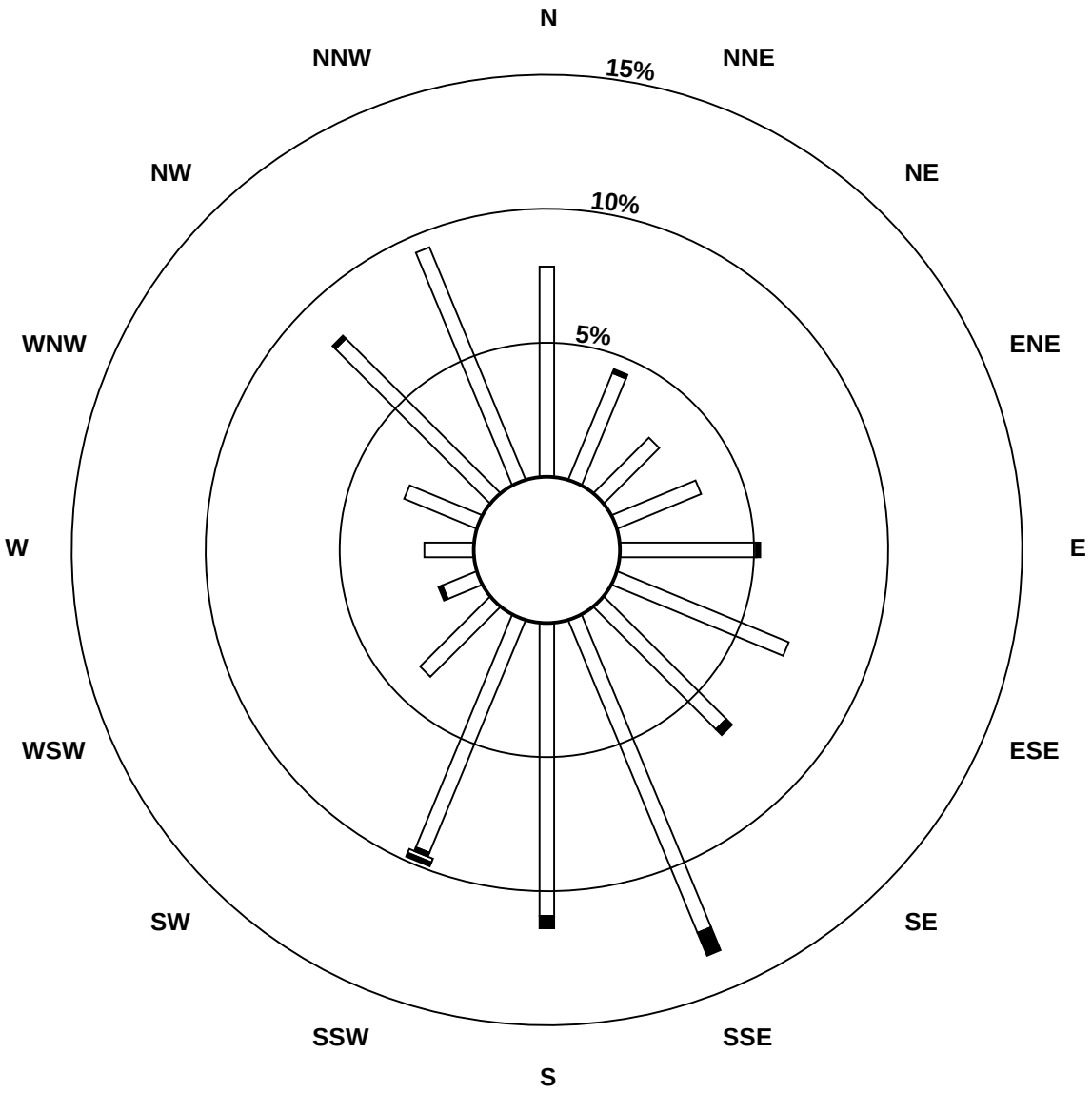
Total Number of Hours: 720

Wood Buffalo Environmental Association

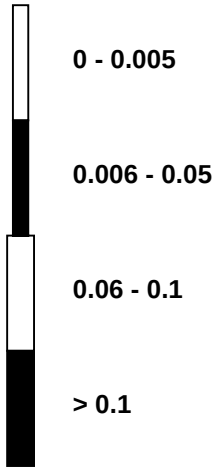
Wind Rose Apr 2016

Non Methane Hydrocarbons (NMHC) - ppm

Conklin Community (AMS 21)



Classes (ppm)



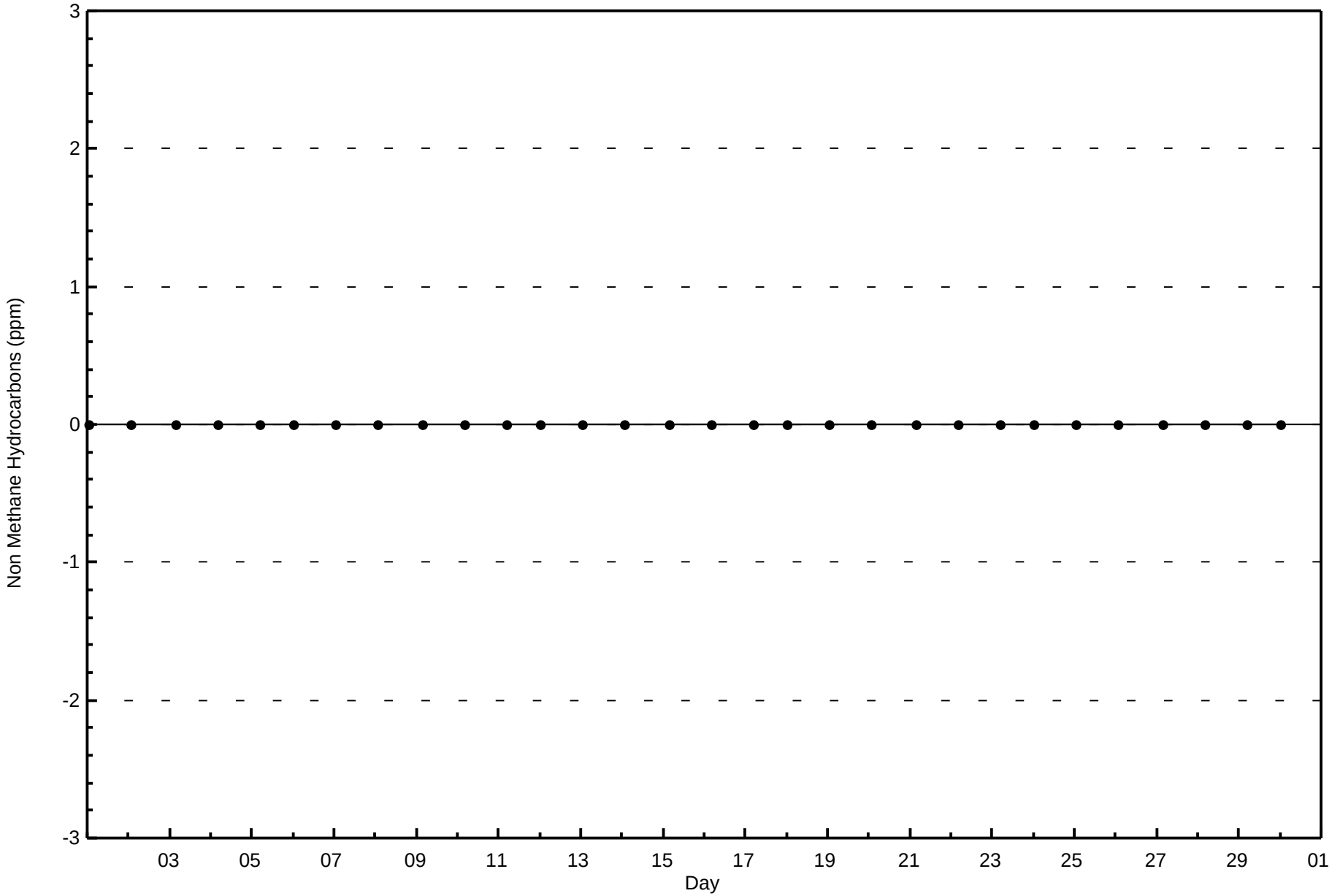
Total Number of Valid Hours: 650

Wood Buffalo Environmental Association

Zero Responses

Non Methane Hydrocarbons (NMHC) - ppm

Conklin Community - April 2016

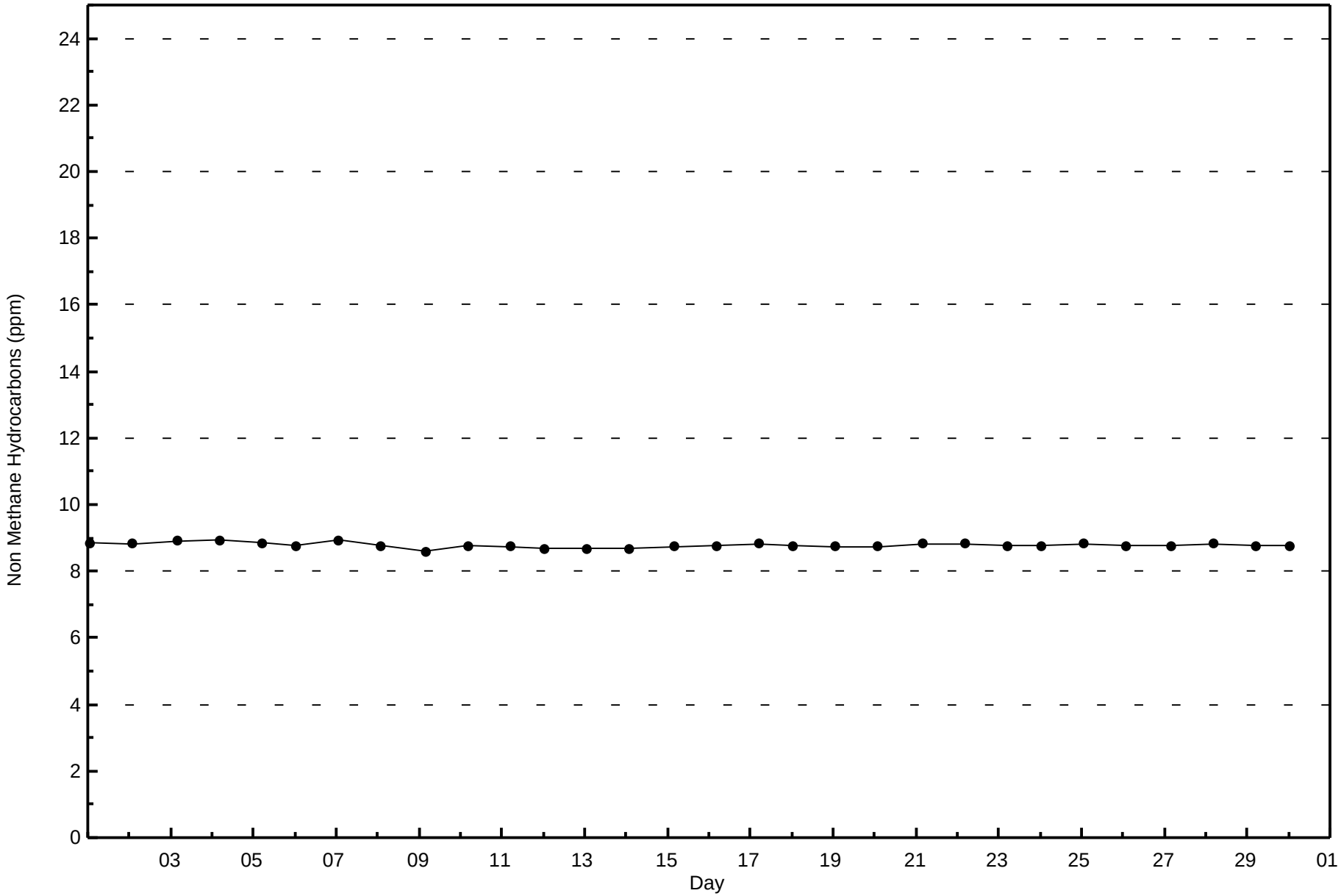


Wood Buffalo Environmental Association

Span Responses

Non Methane Hydrocarbons (NMHC) - ppm

Conklin Community - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Methane (CH_4) - ppm

Conklin Community - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 2.1 ppm on Apr 27 03:00 Maximum Daily Average: 2.0 ppm on Apr 27

Minimum Value: 1.8 ppm on Apr 19 16:00 Minimum Daily Average: 1.9 ppm on Apr 19
Maximum Diurnal Average: 1.9 ppm at hour 2 Minimum Diurnal Average: 1.9 ppm at hour 17
Monthly Average: 1.91 ppm Percentiles: P_1 = 1.8 P_{10} = 1.9 Q_1 = 1.9 Median = 1.9 Q_3 = 1.9 P_{90} = 2.0 P_{99} = 2.1

Hours in Service:	720
Hours of Data:	686
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-Apr	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	2.0
2-Apr	2.1	2.0	Z	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	1.9	1.9	1.9	1.9	2.1
3-Apr	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	2.0	1.9	2.0
4-Apr	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
5-Apr	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	2.0	2.1	2.1	2.0	2.0	2.0	1.9	2.1
6-Apr	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
7-Apr	1.9	Z	1.9	2.0	1.9	1.9	1.9	1.9	C	C	C	C	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
8-Apr	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
9-Apr	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
10-Apr	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
11-Apr	1.9	1.9	1.9	1.9	1.9	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	2.0	2.1	2.1	2.1	2.1	2.0	2.1
12-Apr	Z	2.1	2.1	2.1	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	1.9	1.9	2.1
13-Apr	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
14-Apr	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
15-Apr	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
16-Apr	1.9	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
17-Apr	1.9	1.9	1.9	1.9	1.9	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	2.0	2.0	2.0	2.0	1.9	2.1
18-Apr	Z	1.9	2.0	2.0	2.0	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1
19-Apr	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	1.9	1.9	1.9	1.9	1.9	1.9	1.9
20-Apr	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.9	2.0
21-Apr	2.0	2.0	1.9	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	2.0
22-Apr	2.0	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
23-Apr	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	2.0	1.9	1.9	2.0
24-Apr	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
25-Apr	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	2.0
26-Apr	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.9	2.0
27-Apr	2.1	2.1	2.1	Z	2.0	2.1	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	2.1	2.1	2.1	2.0	2.1
28-Apr	2.0	2.0	2.0	2.1	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
29-Apr	2.0	2.0	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	1.9	2.0
30-Apr	Z	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	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.0
	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	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	2.1	2.1	2.1	2.1	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1	2.1	2.1	2.1	2.1	Diurnal Maximum	

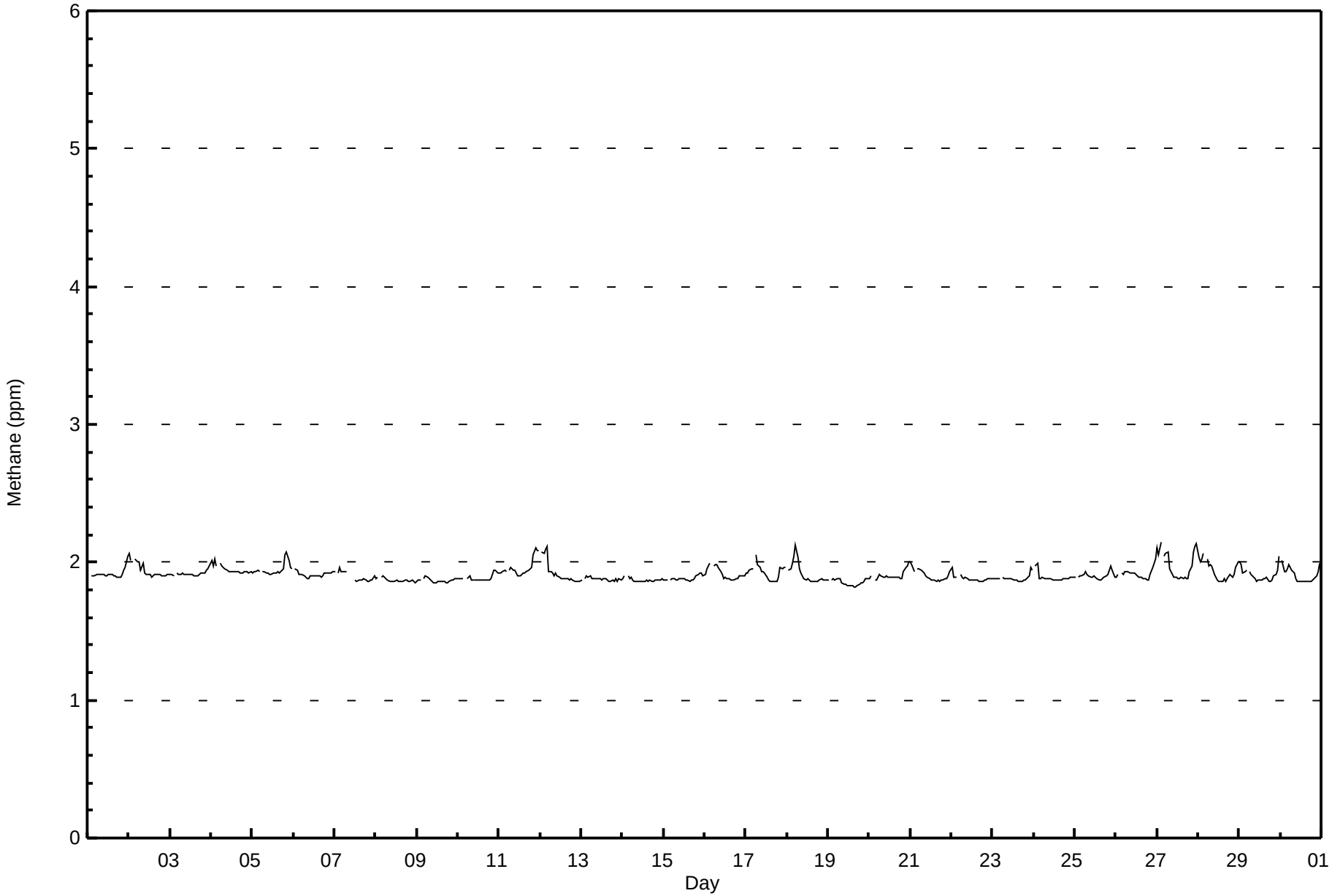
Z - zerospan C - Calibration

Wood Buffalo Environmental Association

Hourly Averages

Methane (CH_4) - ppm

Conklin Community - April 2016



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Methane (CH_4) - ppm

Conklin Community - April 2016

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	664	96.79	96.79
2.1 - 3.0	22	3.21	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Methane (CH_4) - ppm

Conklin Community - April 2016

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	51	29	19	22	34	44	39	77	73	64	24	10	12	19	54	61	632
2.1 - 3.0	0	0	0	0	0	1	5	11	1	0	0	0	0	0	0	0	18
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	51	29	19	22	34	45	44	88	74	64	24	10	12	19	54	61	650

Total Number of Valid Hours: 650

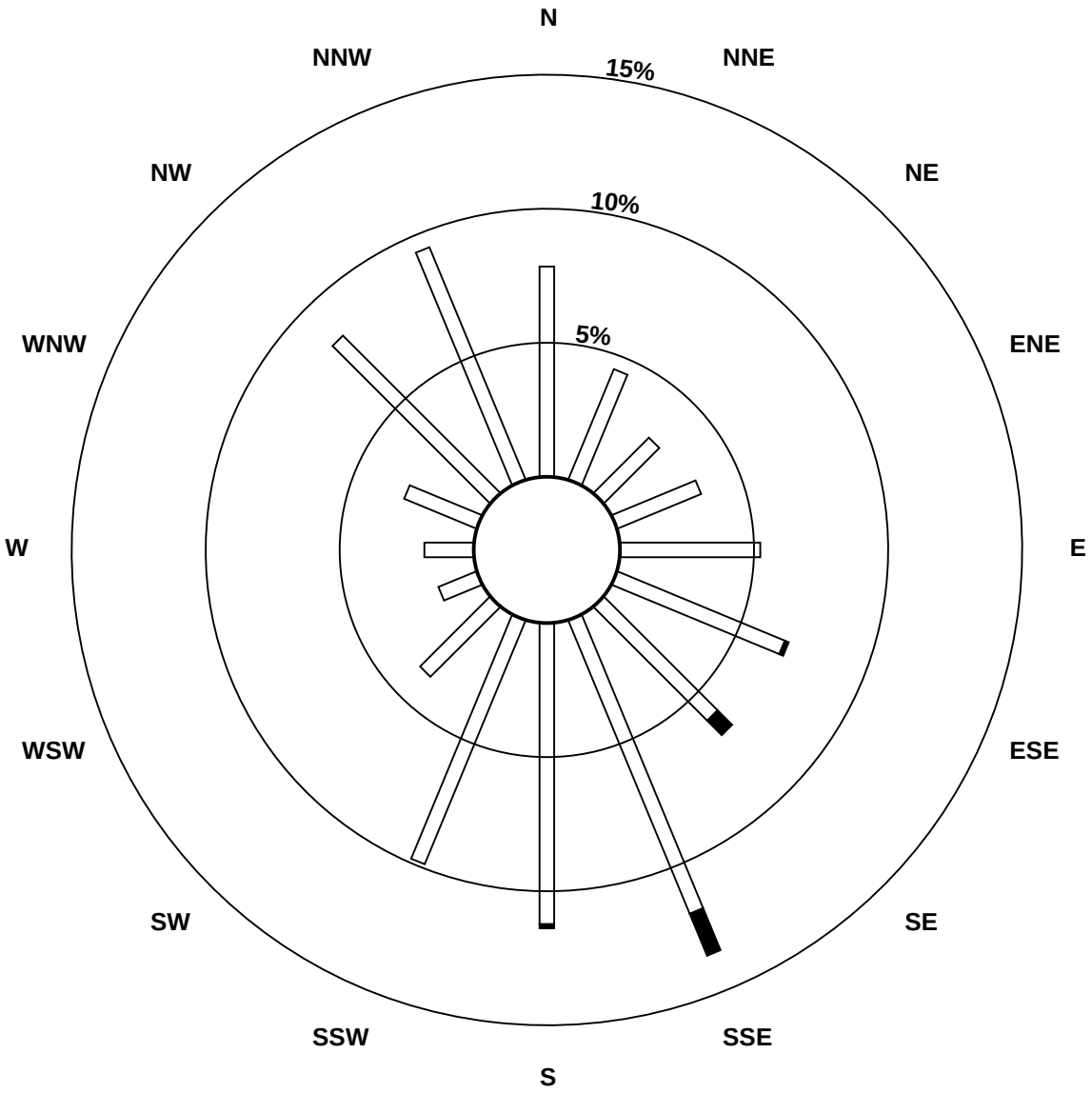
Total Number of Hours: 720

Wood Buffalo Environmental Association

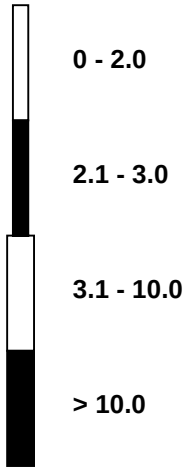
Wind Rose Apr 2016

Methane (CH_4) - ppm

Conklin Community (AMS 21)



Classes (ppm)



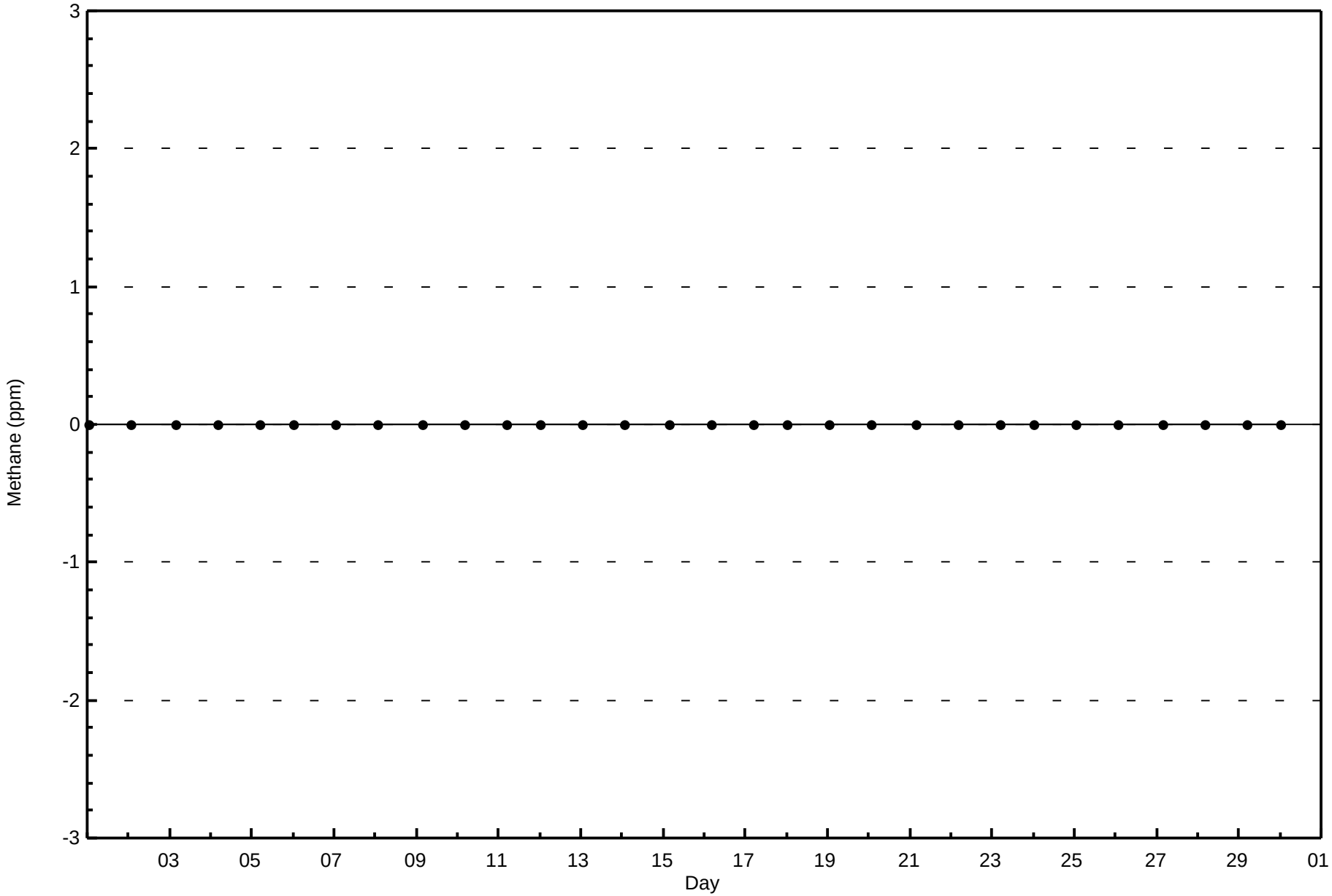
Total Number of Valid Hours: 650

Wood Buffalo Environmental Association

Zero Responses

Methane (CH_4) - ppm

Conklin Community - April 2016

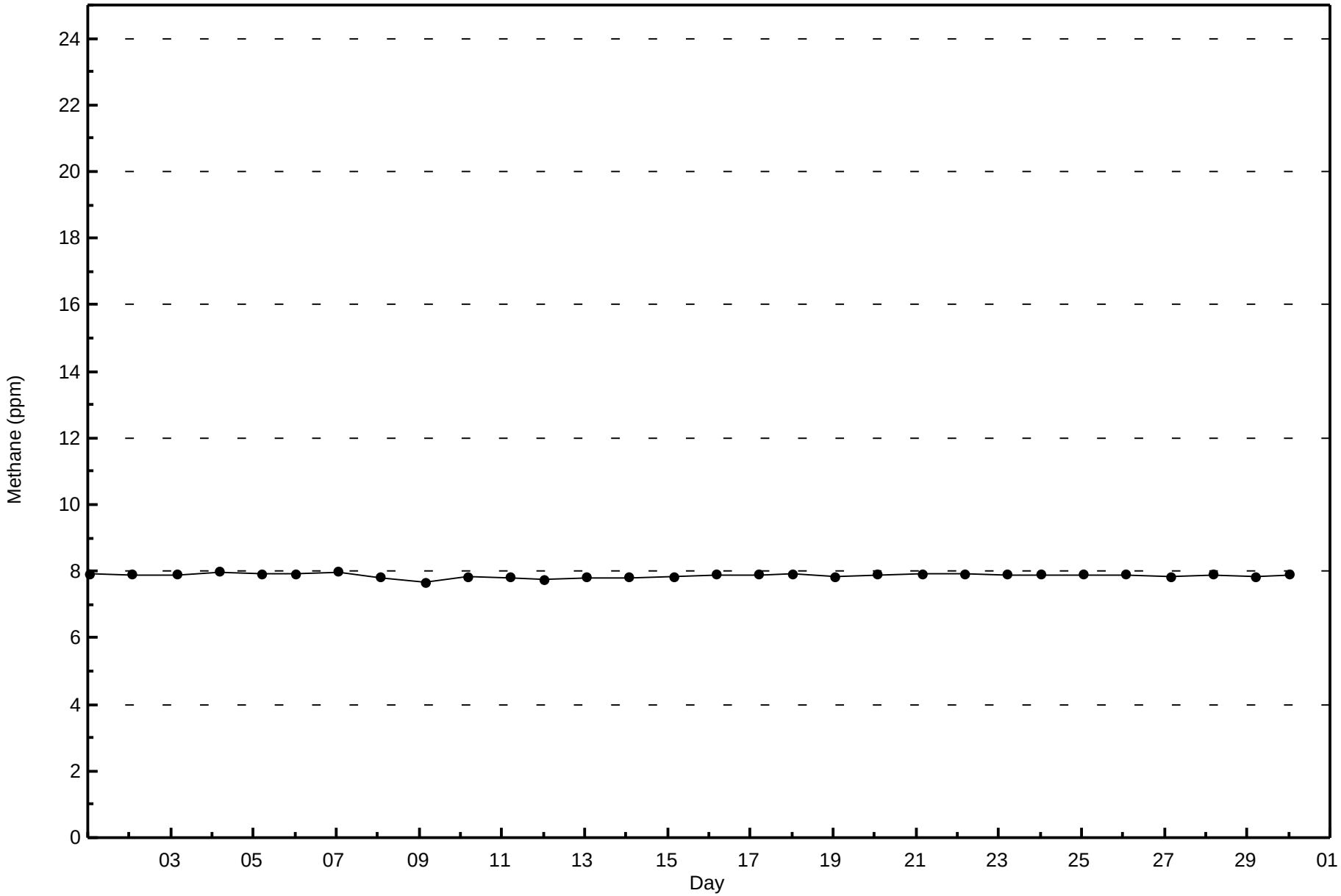


Wood Buffalo Environmental Association

Span Responses

Methane (CH_4) - ppm

Conklin Community - April 2016



Maximum Value: 13 ppb on Apr 16 21:00

Maximum Daily Average: 0.8 ppb on Apr 16

Minimum Value: 0 ppb on Apr 1 20:00

Minimum Daily Average: 0.0 ppb on Apr 13

Maximum Diurnal Average: 0.9 ppb at hour 15

Minimum Diurnal Average: 0.1 ppb at hour 19

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:	720
Hours of Data:	684
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-Apr	0	Z	0	0	0	0	0	0	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2
2-Apr	0	0	Z	0	0	0	0	0	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1
3-Apr	0	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
4-Apr	0	0	0	1	Z	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1
5-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0.2	1
6-Apr	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0.4	7
7-Apr	0	Z	0	0	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
8-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
9-Apr	0	0	0	Z	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	2
10-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
11-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.2	1
12-Apr	Z	0	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
13-Apr	0	Z	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
14-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	7	1	0	1	0	0	0	0	0	0	0.5	7
15-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
16-Apr	0	0	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	13	1	0	0	0.8	13
17-Apr	0	0	0	0	0	Z	1	0	0	0	0	1	0	0	6	0	0	0	0	0	0	0	0	0	0.5	6
18-Apr	Z	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
19-Apr	0	Z	0	0	0	0	0	0	1	1	2	0	1	1	1	2	1	0	0	0	0	0	0	0	0.5	2
20-Apr	0	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
21-Apr	0	0	0	Z	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
22-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
23-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
24-Apr	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
25-Apr	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	3	0	1	0	0	0	0	0	0	0	0.3	3
26-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	1	0	0	0.4	4
27-Apr	1	1	0	Z	0	0	1	0	2	0	0	1	1	0	0	0	0	0	0	2	0	0	0	0	0.5	2
28-Apr	1	1	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
29-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
30-Apr	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
	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.6	0.3	0.3	0.2	0.3	0.3	0.9	0.3	0.2	0.2	0.1	0.2	0.6	0.1	0.1	0.1	Diurnal Average	
	1	1	0	1	1	1	1	1	2	1	2	1	1	1	7	4	1	1	1	2	13	1	1	0	Diurnal Maximum	

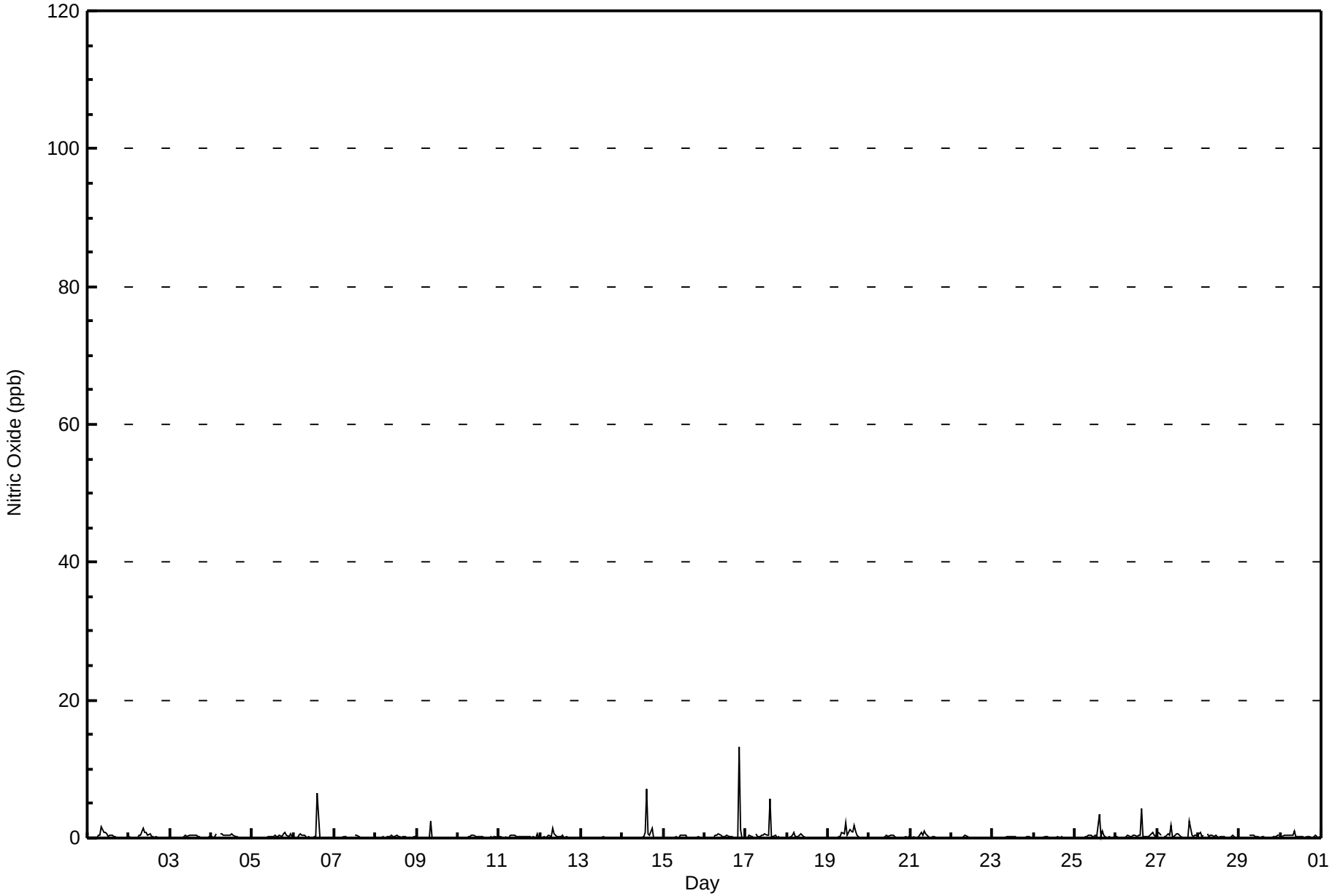
Z - zerospan C - Calibration M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Nitric Oxide (NO) - ppb

Conklin Community - April 2016



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	684	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: 684

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitric Oxide (NO) - ppb

Conklin Community - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	50	28	19	22	34	45	44	88	74	64	24	10	12	19	54	61	648
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	50	28	19	22	34	45	44	88	74	64	24	10	12	19	54	61	648

Total Number of Valid Hours: 648

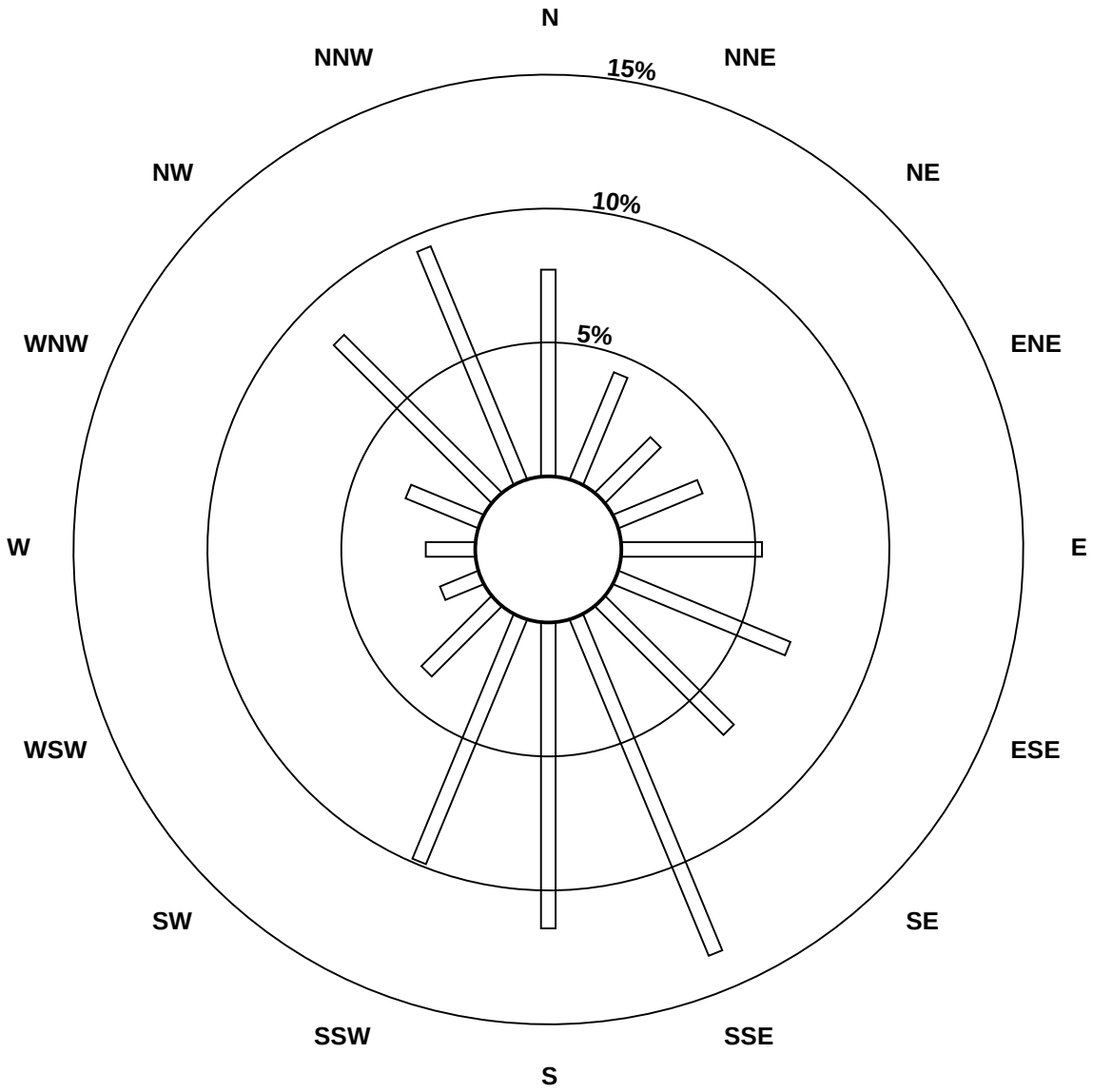
Total Number of Hours: 720

Wood Buffalo Environmental Association

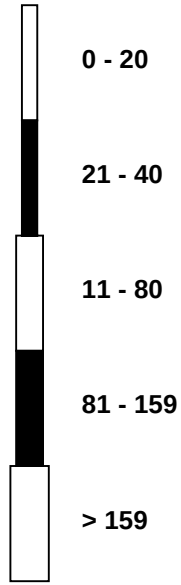
Wind Rose Apr 2016

Nitric Oxide (NO) - ppb

Conklin Community (AMS 21)



Classes (ppb)



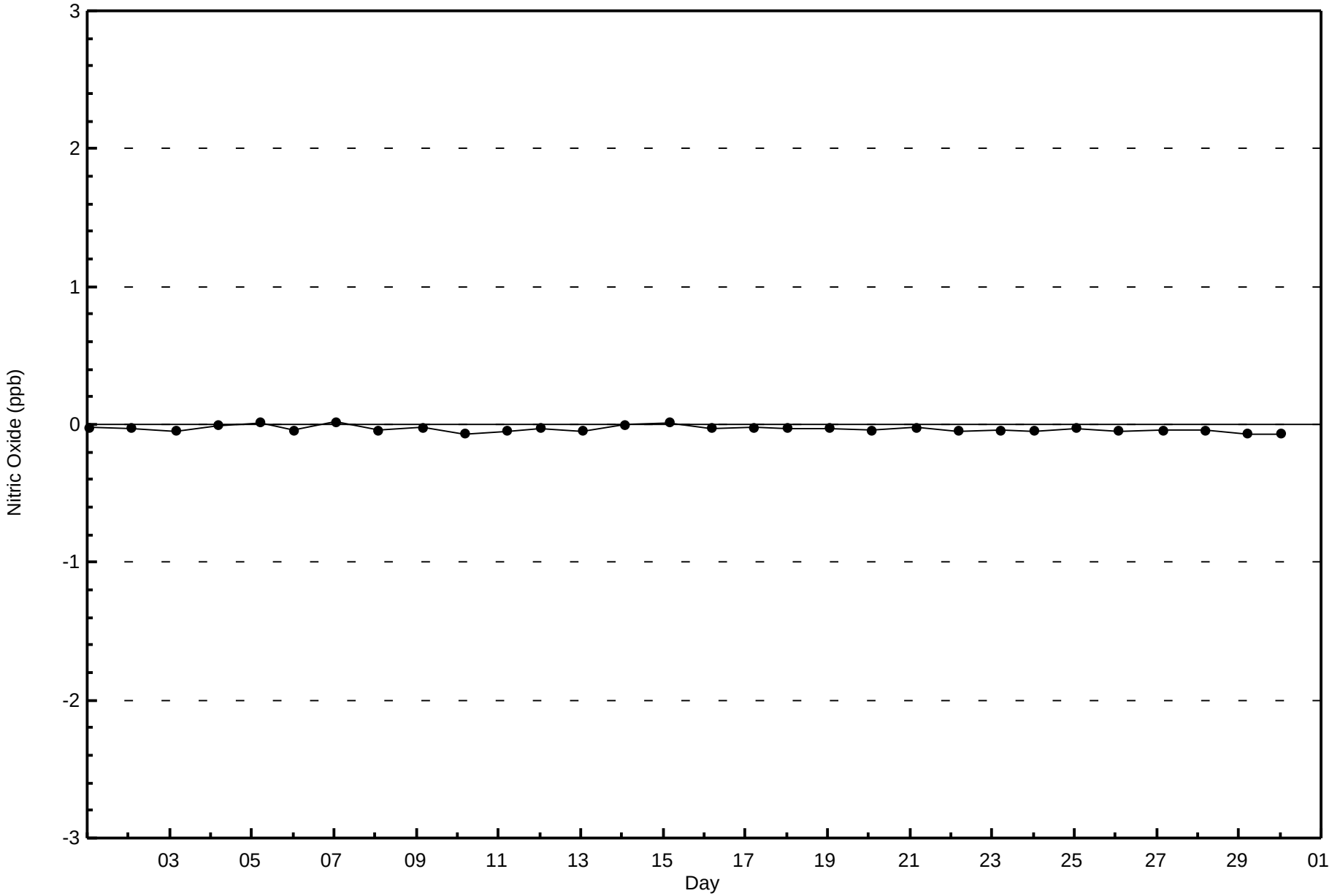
Total Number of Valid Hours: 648

Wood Buffalo Environmental Association

Zero Responses

Nitric Oxide (NO) - ppb

Conklin Community - April 2016

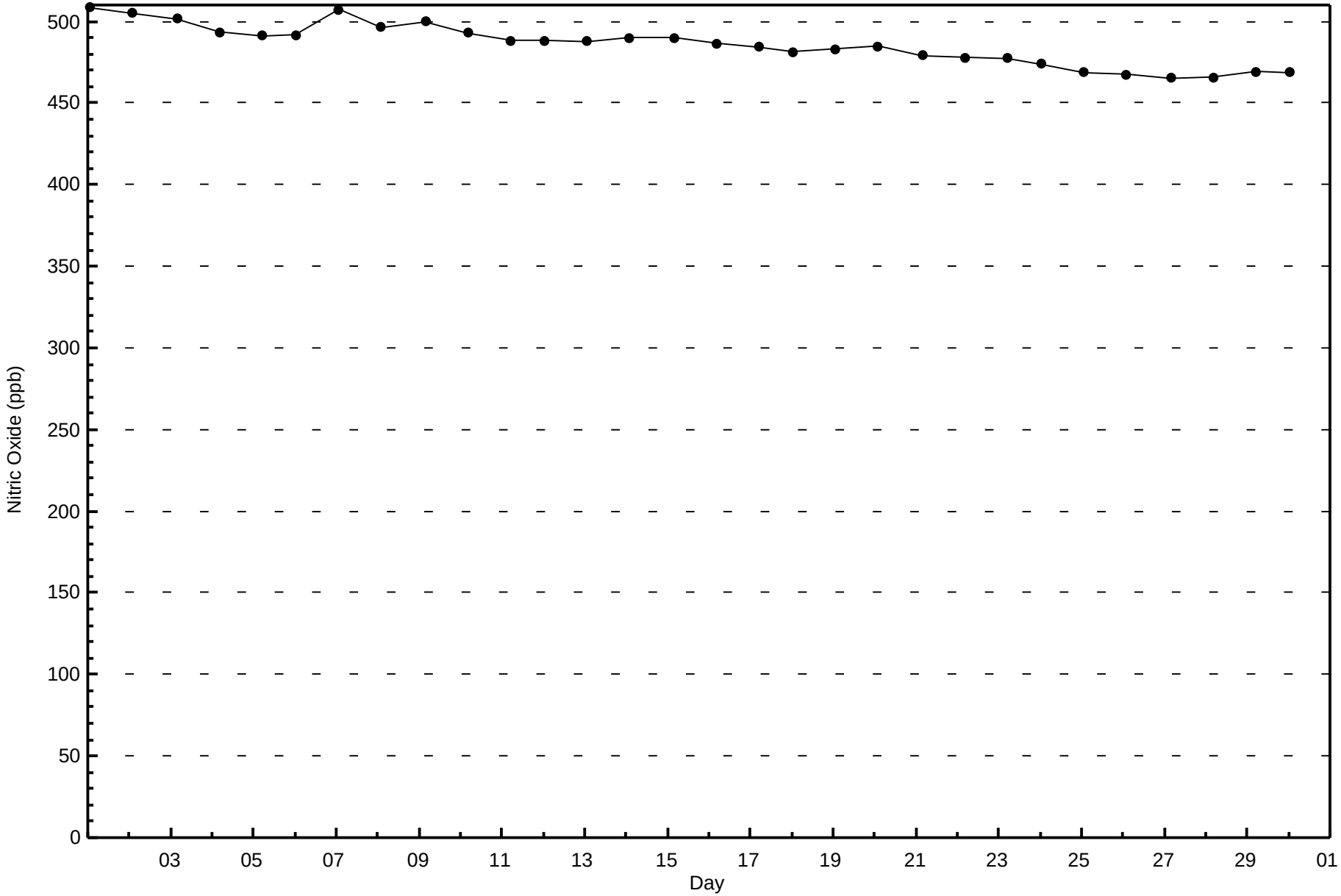


Wood Buffalo Environmental Association

Span Responses

Nitric Oxide (NO) - ppb

Conklin Community - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO_2) - ppb

Conklin Community - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 19 ppb on Apr 16 21:00 Maximum Daily Average: 2.1 ppb on Apr 16

Minimum Value: 0 ppb on Apr 26 16:00
Maximum Diurnal Average: 2.3 ppb at hour 21
Monthly Average: 1.3 ppb

Minimum Daily Average: 0.6 ppb on Apr 22
Minimum Diurnal Average: 0.9 ppb at hour 19
Percentiles: $P_1 = 0$ $P_{10} = 1$ $Q_1 = 1$ Median = 1 $Q_3 = 2$ $P_{90} = 2$ $P_{99} = 5$

Hours in Service:	720
Hours of Data:	684
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-Apr	1	Z	1	1	1	2	4	4	6	2	2	1	1	2	2	1	1	1	1	1	3	2	1	1	1.8	6
2-Apr	1	1	Z	1	1	2	3	2	3	2	2	1	2	1	1	1	1	1	1	1	0	0	1	1	1.3	3
3-Apr	1	1	1	Z	2	1	1	1	1	1	2	2	2	1	2	2	1	1	2	2	2	2	2	2	1.4	2
4-Apr	2	2	1	2	Z	2	2	2	2	1	2	1	2	2	2	2	2	1	1	1	1	1	1	1	1.4	2
5-Apr	1	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	2	1	2	2	1	1	1	1	1.0	2
6-Apr	Z	1	1	1	2	1	1	1	1	1	1	1	1	1	3	0	0	0	1	1	1	1	1	4	1.0	4
7-Apr	3	Z	1	2	1	1	1	1	C	C	C	C	1	1	1	0	1	1	1	0	0	0	0	1	1.0	3
8-Apr	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1.0	2
9-Apr	1	1	1	Z	2	2	1	1	2	1	1	1	1	1	0	0	0	0	0	1	1	3	2	2	0.9	3
10-Apr	2	2	2	1	Z	2	2	2	1	1	1	1	1	1	1	1	1	1	1	2	5	3	2	1	1.4	5
11-Apr	1	1	1	1	1	Z	2	2	1	1	1	1	1	1	1	1	1	1	2	2	3	2	2	1	1.4	3
12-Apr	Z	2	2	2	1	2	2	4	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.4	4
13-Apr	1	Z	1	1	1	2	1	1	1	M	M	1	1	1	1	1	0	0	1	0	1	1	1	1	0.8	2
14-Apr	1	1	Z	2	2	3	2	1	1	1	1	1	1	1	3	2	2	3	1	0	1	1	1	0	1.2	3
15-Apr	0	0	1	Z	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	2	2	2	2	0.9	2
16-Apr	2	2	2	2	Z	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	19	4	1	1	2.1	19
17-Apr	1	1	2	1	1	Z	2	2	2	2	2	2	2	2	0	1	1	2	1	5	3	1	1	1	1.7	5
18-Apr	Z	1	1	1	2	1	1	2	2	2	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1.1	2
19-Apr	1	Z	1	1	1	2	2	1	3	2	4	1	3	4	2	4	3	2	1	1	1	1	1	1	1.8	4
20-Apr	1	1	Z	1	0	1	2	1	1	1	2	1	1	1	1	1	1	0	0	0	1	2	1	1	1.0	2
21-Apr	1	1	1	Z	1	1	2	1	2	2	1	0	0	1	1	0	0	0	0	0	0	1	1	2	0.9	2
22-Apr	2	1	0	0	Z	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0.6	2
23-Apr	0	0	1	1	1	Z	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0.7	1
24-Apr	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.9	1
25-Apr	1	Z	2	2	2	2	2	2	2	1	1	1	1	1	1	1	4	2	1	1	2	1	1	1	1.5	4
26-Apr	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	0	1	2	1	2	2	2	2	1	1.1	2
27-Apr	2	1	1	Z	1	0	1	1	3	1	1	2	2	2	1	1	1	1	1	10	4	2	2	1	1.8	10
28-Apr	1	1	0	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1	1.1	2
29-Apr	2	2	3	6	3	Z	4	2	2	1	1	1	1	1	1	1	1	1	1	1	5	3	5	2	2.0	6
30-Apr	Z	1	2	2	1	2	2	2	3	1	1	1	1	1	1	1	1	1	1	1	3	2	2	1	1.4	3
	1.1	1.0	1.1	1.3	1.2	1.4	1.5	1.5	1.7	1.2	1.2	1.0	1.1	1.2	1.1	0.9	1.1	1.1	0.9	1.5	2.3	1.5	1.3	1.1	Diurnal Average	
	3	2	3	6	3	3	4	4	6	2	4	2	3	4	3	4	4	3	2	10	19	4	5	4	Diurnal Maximum	

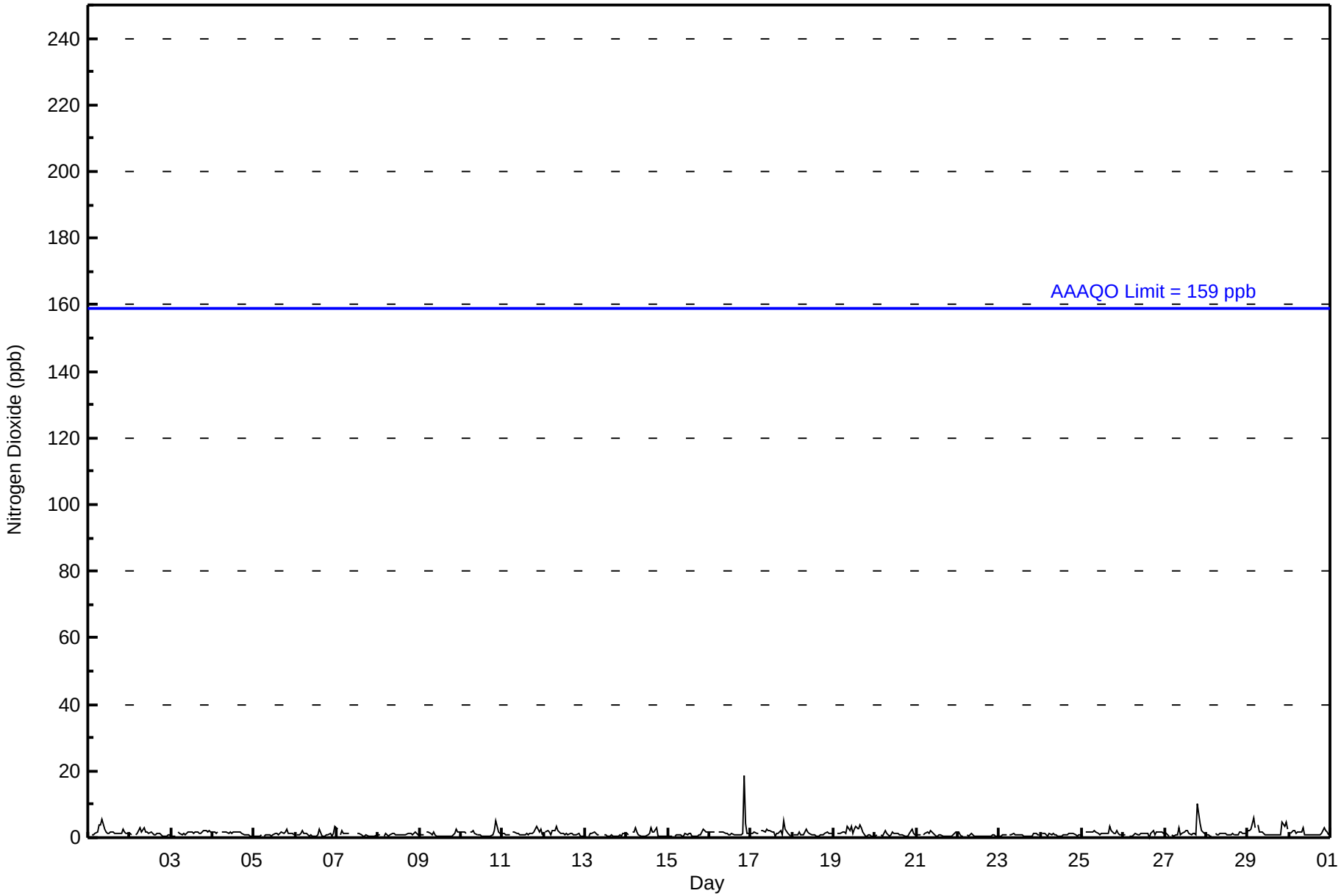
Z - zerospan C - Calibration M - Maintenance
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Dioxide (NO_2) - ppb

Conklin Community - April 2016



Nitrogen Dioxide (NO_2) - ppb
Conklin Community - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	684	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: 684

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Dioxide (NO_2) - ppb

Conklin Community - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	50	28	19	22	34	45	44	88	74	64	24	10	12	19	54	61	648
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	50	28	19	22	34	45	44	88	74	64	24	10	12	19	54	61	648

Total Number of Valid Hours: 648

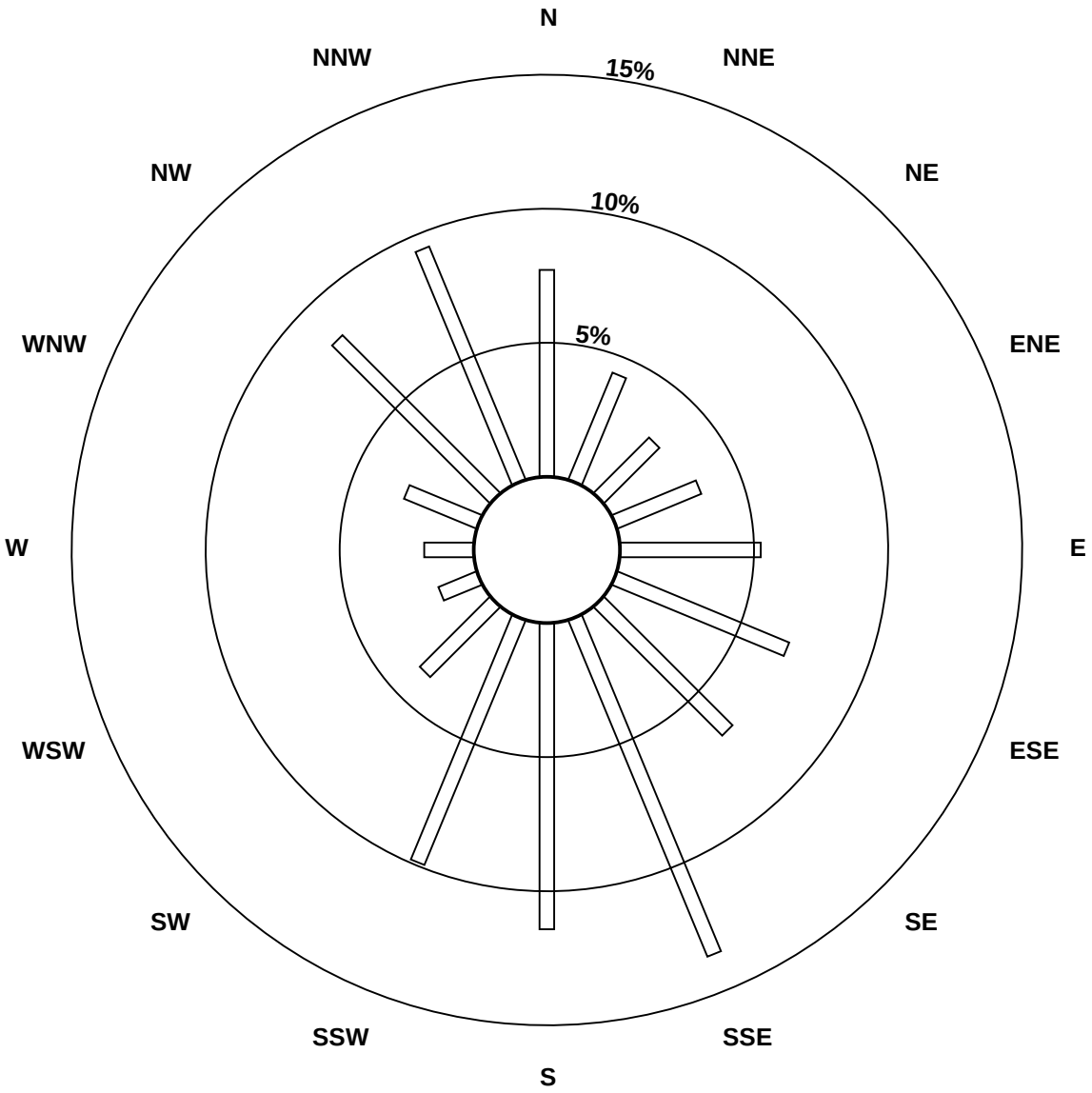
Total Number of Hours: 720

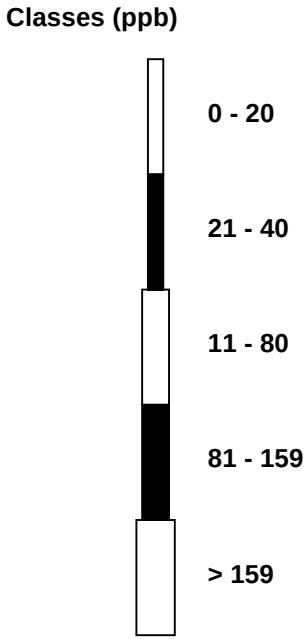
Wood Buffalo Environmental Association

Wind Rose Apr 2016

Nitrogen Dioxide (NO_2) - ppb

Conklin Community (AMS 21)





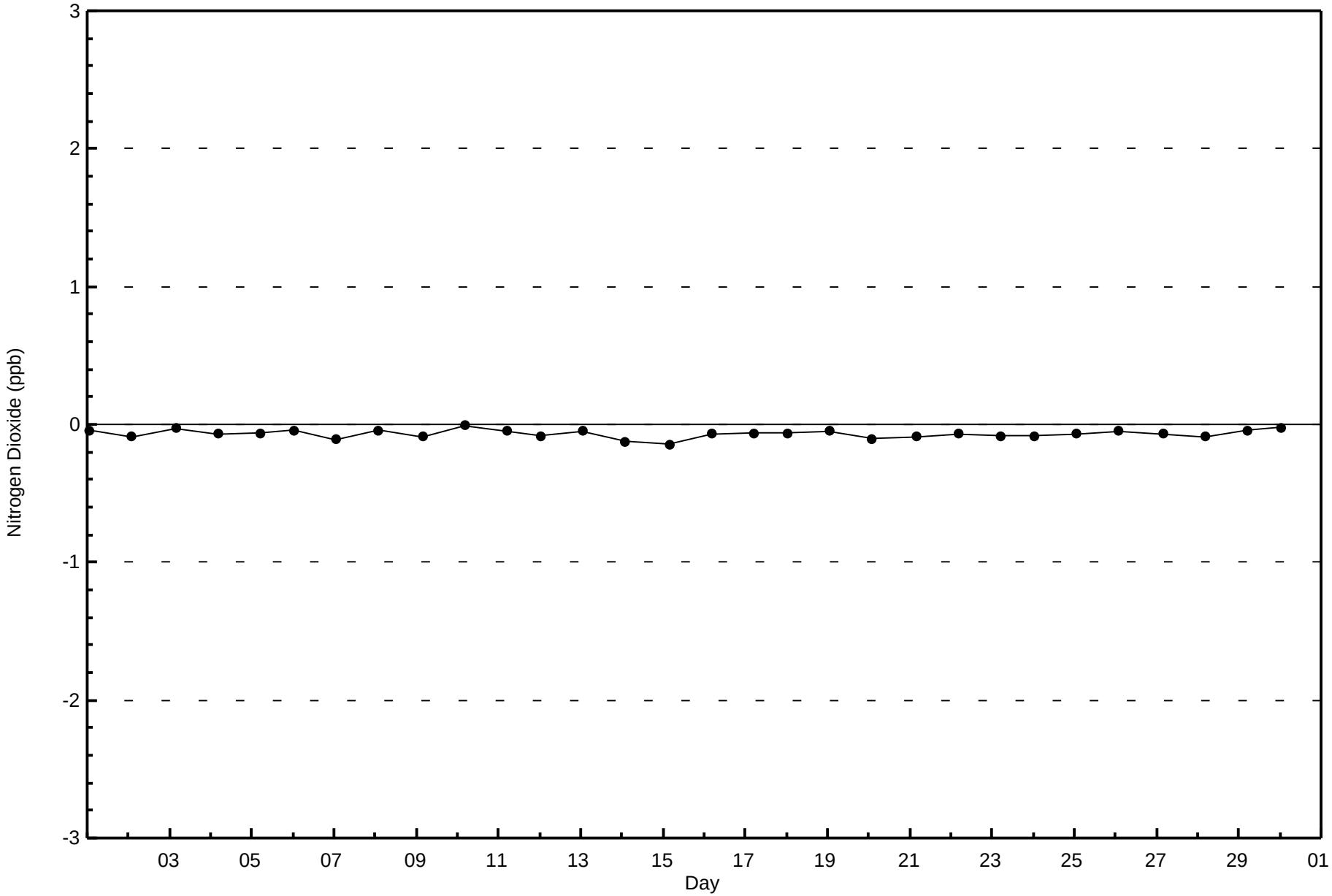
Total Number of Valid Hours: 648

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Dioxide (NO_2) - ppb

Conklin Community - April 2016

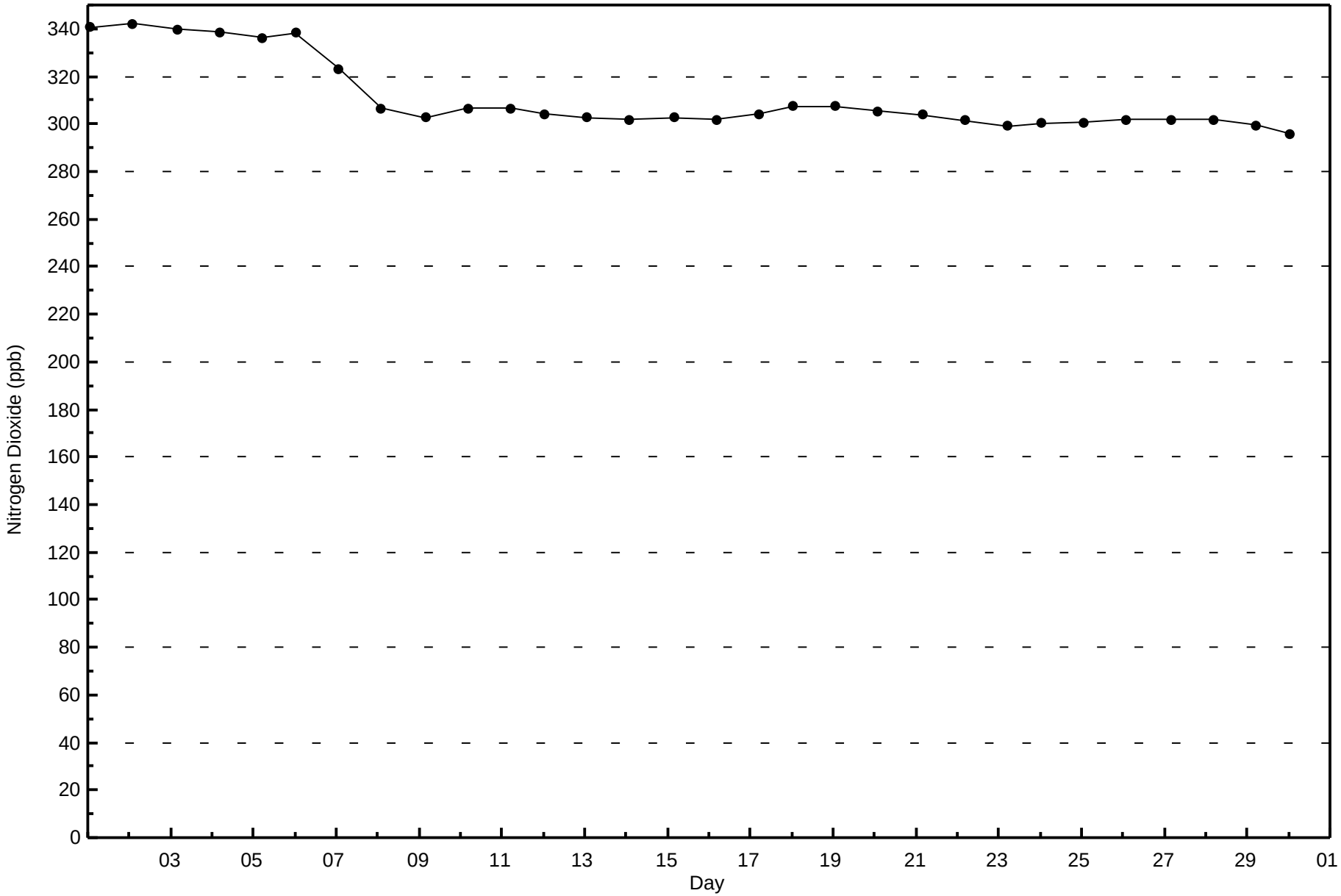


Wood Buffalo Environmental Association

Span Responses

Nitrogen Dioxide (NO_2) - ppb

Conklin Community - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_X) - ppb

Conklin Community - April 2016

Maximum Value: 32 ppb on Apr 16 21:00

Maximum Daily Average: 2.9 ppb on Apr 16

Minimum Value: 0 ppb on Apr 21 21:00

Minimum Daily Average: 0.6 ppb on Apr 22

Maximum Diurnal Average: 2.9 ppb at hour 21

Minimum Diurnal Average: 0.9 ppb at hour 19

Monthly Average: 1.5 ppb

Percentiles: $P_1 = 0$ $P_{10} = 1$ $Q_1 = 1$ Median = 1 $Q_3 = 2$ $P_{90} = 2$ $P_{99} = 6$

Hours in Service:	720
Hours of Data:	684
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-Apr	1	Z	1	1	1	2	4	4	7	3	3	2	1	2	2	2	1	1	1	1	3	2	1	1	2.1	7
2-Apr	1	1	Z	1	1	2	3	2	4	3	3	2	2	1	1	1	1	1	1	1	0	0	1	1	1.5	4
3-Apr	1	1	1	Z	2	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2	1.6	2
4-Apr	2	2	1	2	Z	2	3	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1.7	3
5-Apr	1	1	0	1	1	Z	1	1	1	1	1	1	1	2	1	1	2	2	2	3	2	2	2	1	1.3	3
6-Apr	Z	1	1	2	3	2	2	1	1	1	1	1	1	1	9	0	0	0	1	1	1	1	1	4	1.5	9
7-Apr	2	Z	1	2	1	1	1	1	C	C	C	C	1	2	1	1	1	1	1	0	0	0	0	1	1.0	2
8-Apr	1	1	Z	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1.1	2
9-Apr	1	1	1	Z	2	1	1	1	4	1	1	0	1	1	0	0	0	0	0	1	1	3	2	2	1.1	4
10-Apr	2	2	2	1	Z	2	2	2	2	1	1	1	1	1	1	1	1	1	1	2	5	3	2	1	1.6	5
11-Apr	2	1	1	1	1	Z	2	2	2	1	1	1	1	1	1	1	1	2	2	2	3	2	3	1	1.6	3
12-Apr	Z	2	2	1	1	2	2	5	3	2	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1.6	5
13-Apr	1	Z	1	1	1	2	1	1	1	M	M	1	1	1	1	1	0	0	0	0	1	1	1	1	0.8	2
14-Apr	1	1	Z	2	2	3	1	1	1	1	1	1	1	2	10	2	2	4	0	0	1	1	1	0	1.6	10
15-Apr	0	0	0	Z	1	1	1	1	1	1	2	1	2	2	1	0	0	1	1	1	3	2	2	2	1.0	3
16-Apr	2	2	2	1	Z	2	2	2	2	2	1	1	1	2	1	1	1	1	1	1	32	5	1	1	2.9	32
17-Apr	1	1	2	2	2	Z	3	3	2	3	2	3	2	2	6	1	2	3	1	5	3	1	1	1	2.2	6
18-Apr	Z	1	1	1	2	1	1	2	3	2	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1.2	3
19-Apr	1	Z	1	1	1	2	2	2	4	3	6	1	3	5	3	6	4	2	1	1	1	1	1	0	2.2	6
20-Apr	1	1	Z	1	0	1	2	1	0	1	2	1	2	2	1	1	1	0	0	0	1	3	1	1	1.1	3
21-Apr	1	1	1	Z	1	1	2	2	3	2	1	0	1	1	1	0	0	0	0	0	0	1	1	2	1.0	3
22-Apr	2	1	0	0	Z	1	1	1	1	1	0	0	0	0	1	0	0	1	1	0	1	1	0	0	0.6	2
23-Apr	0	0	1	1	1	Z	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	0.8	1
24-Apr	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1.0	1
25-Apr	1	Z	2	2	2	2	2	2	2	2	1	1	2	1	5	1	5	3	1	2	2	1	1	1	1.9	5
26-Apr	1	1	Z	1	1	1	1	2	1	1	1	2	2	2	1	4	1	2	1	2	2	3	2	1	1.5	4
27-Apr	3	2	1	Z	1	1	1	1	5	1	2	3	3	2	1	1	2	1	1	13	5	2	2	2	2.4	13
28-Apr	1	2	1	1	Z	2	1	1	2	2	2	1	1	1	1	1	1	1	1	2	2	1	1	1	1.3	2
29-Apr	2	2	2	6	3	Z	4	2	2	2	1	1	1	1	1	1	1	1	1	1	5	4	5	3	2.2	6
30-Apr	Z	1	3	2	2	2	2	2	4	1	1	1	1	1	1	1	1	1	1	2	3	2	2	1	1.7	4
	1.2	1.2	1.2	1.5	1.3	1.6	1.7	1.8	2.2	1.6	1.5	1.2	1.3	1.5	2.0	1.3	1.3	1.3	0.9	1.7	2.9	1.6	1.4	1.2	Diurnal Average	
	3	2	3	6	3	3	4	5	7	3	6	3	3	5	10	6	5	4	2	13	32	5	5	4	Diurnal Maximum	

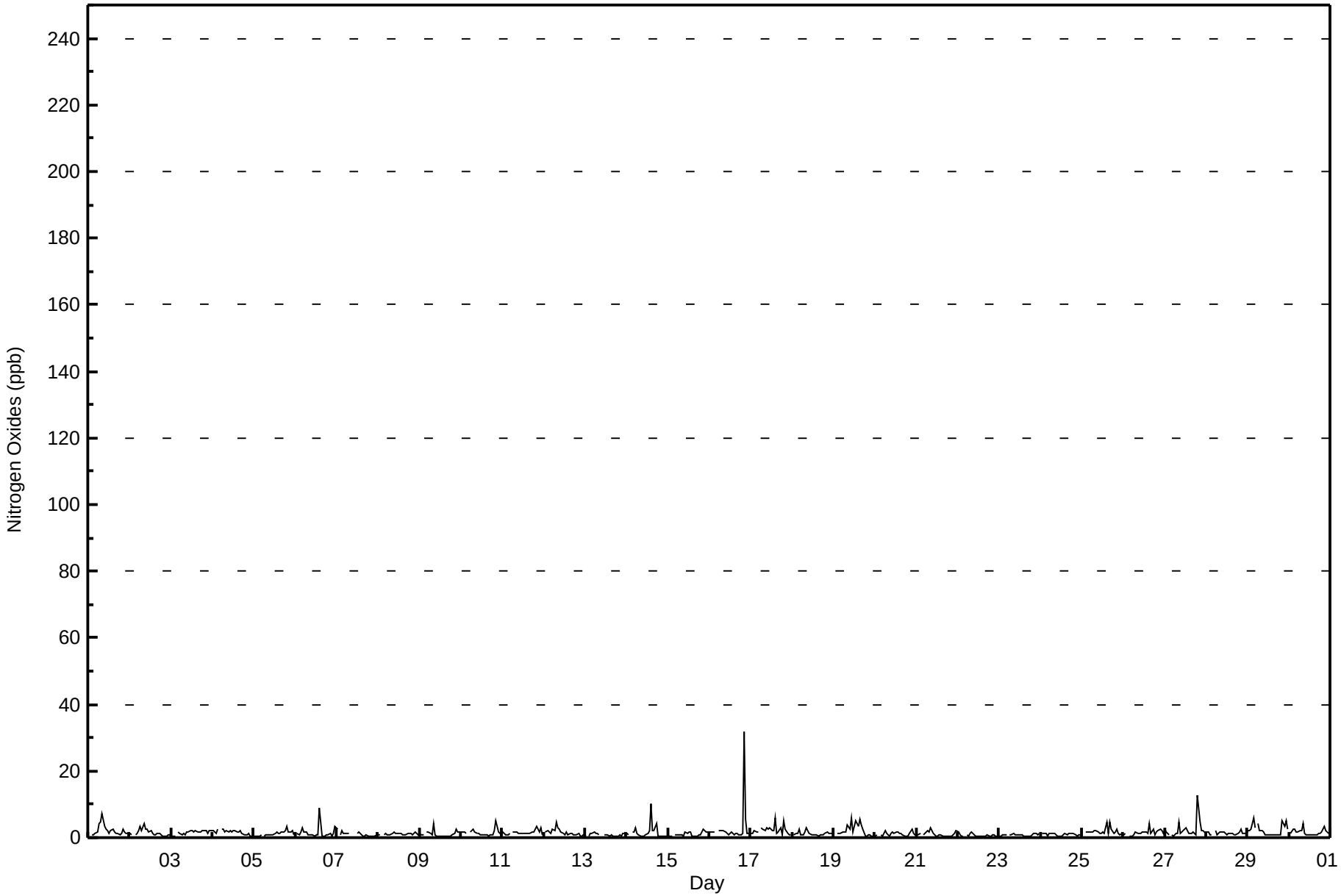
Z - zerospan C - Calibration M - Maintenance

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Oxides (NO_X) - ppb

Conklin Community - April 2016



Nitrogen Oxides (NO_X) - ppb
Conklin Community - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	683	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: 684

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Oxides (NO_X) - ppb

Conklin Community - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	50	28	19	22	34	45	44	88	74	63	24	10	12	19	54	61	647
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	50	28	19	22	34	45	44	88	74	64	24	10	12	19	54	61	648

Total Number of Valid Hours: 648

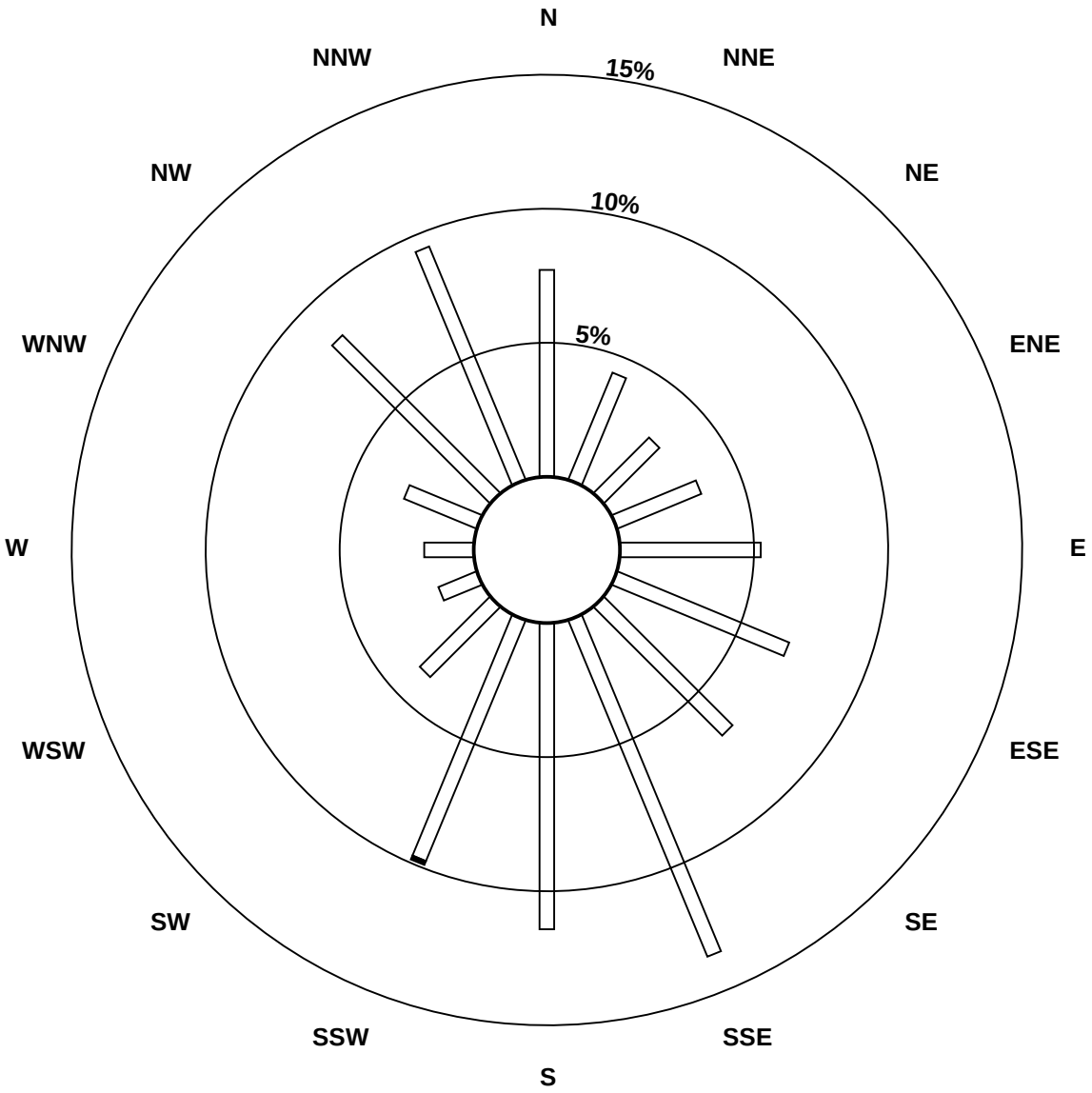
Total Number of Hours: 720

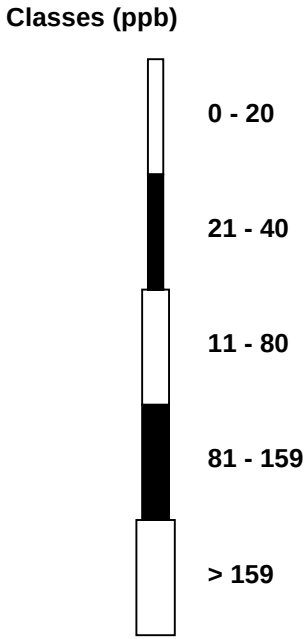
Wood Buffalo Environmental Association

Wind Rose Apr 2016

Nitrogen Oxides (NO_X) - ppb

Conklin Community (AMS 21)





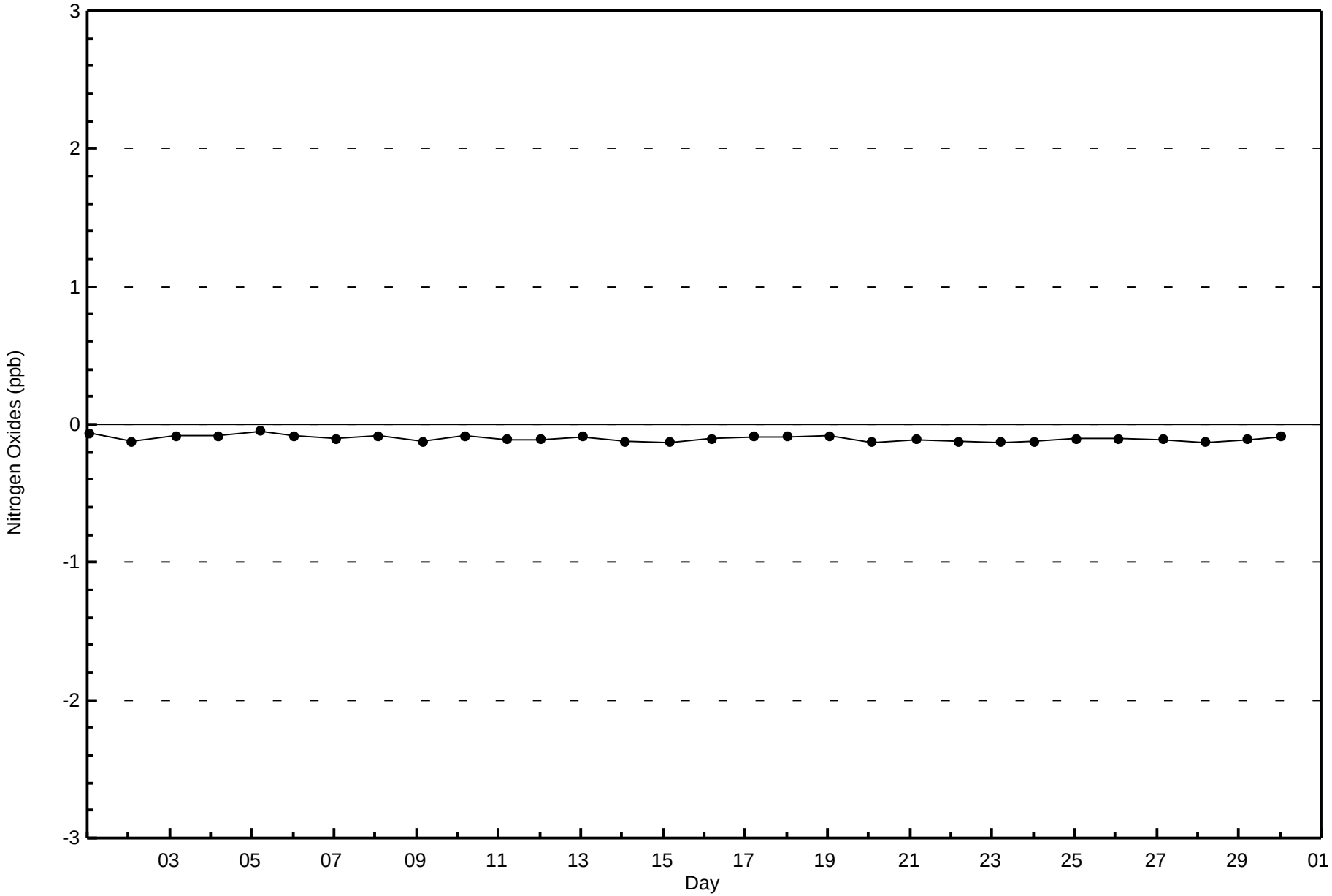
Total Number of Valid Hours: 648

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Oxides (NO_X) - ppb

Conklin Community - April 2016

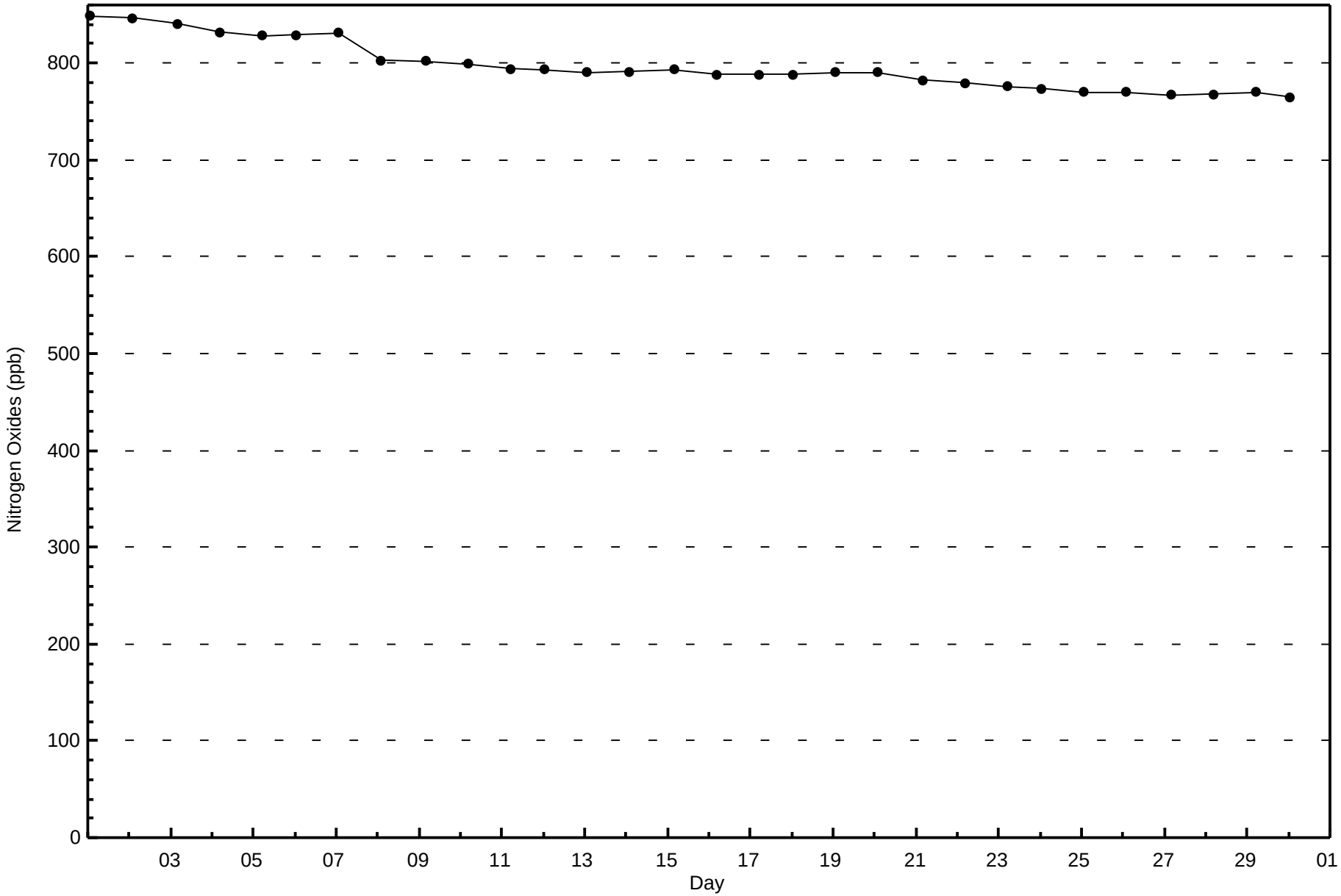


Wood Buffalo Environmental Association

Span Responses

Nitrogen Oxides (NO_X) - ppb

Conklin Community - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O_3) - ppb

Conklin Community - April 2016

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

Maximum Value: 62 ppb on Apr 18 17:00

Maximum Daily Average: 50.7 ppb on Apr 19

Minimum Value: 3 ppb on Apr 27 04:00

Minimum Daily Average: 24.1 ppb on Apr 27

Maximum Diurnal Average: 44.7 ppb at hour 17

Minimum Diurnal Average: 26.5 ppb at hour 5

Monthly Average: 36.6 ppb

Percentiles: $P_1 = 8$ $P_{10} = 21$ $Q_1 = 30$ Median = 37 $Q_3 = 44$ $P_{90} = 51$ $P_{99} = 59$

Hours in Service:	720
Hours of Data:	685
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-Apr	41	41	40	39	Z	36	33	33	33	37	39	40	41	43	45	45	46	44	43	41	36	34	28	22	38.2	46
2-Apr	18	18	18	15	16	Z	17	29	31	32	35	37	40	42	41	42	44	42	41	41	40	39	39	40	32.9	44
3-Apr	40	40	39	33	35	37	Z	38	40	40	40	41	42	43	43	44	44	43	43	42	41	38	31	24	39.2	44
4-Apr	22	19	17	18	17	16	16	Z	33	36	37	38	39	39	39	39	39	39	36	33	31	29	29	26	29.9	39
5-Apr	27	31	30	24	22	17	16	27	Z	32	32	34	33	33	32	29	24	22	24	21	21	21	20	22	25.9	34
6-Apr	23	25	29	Z	32	31	31	30	28	28	28	29	29	30	33	37	38	40	37	35	34	35	33	28	31.4	40
7-Apr	31	34	34	29	Z	25	31	34	35	37	36	37	38	39	39	41	39	38	38	37	36	36	34	31	35.1	41
8-Apr	28	26	28	29	28	Z	34	C	C	C	40	41	42	45	46	45	44	42	40	40	39	38	38	37	37.4	46
9-Apr	35	32	27	23	19	25	Z	37	38	40	41	41	40	41	42	44	46	47	46	46	46	44	47	46	38.8	47
10-Apr	44	44	43	45	45	45	44	Z	47	49	50	51	52	53	54	54	54	54	53	46	29	25	23	23	44.8	54
11-Apr	20	18	21	27	39	42	43	43	Z	46	48	49	48	48	49	50	50	50	49	45	30	25	20	21	38.3	50
12-Apr	27	17	12	Z	12	33	30	34	42	43	47	48	48	49	50	54	56	57	57	54	51	50	50	50	42.3	57
13-Apr	48	47	35	37	Z	37	40	40	40	41	38	C	C	38	38	36	33	30	31	29	29	27	29	28	35.7	48
14-Apr	23	16	13	17	26	Z	28	32	32	31	32	34	35	35	34	35	34	33	36	36	36	36	35	33	30.6	36
15-Apr	34	35	36	36	35	36	Z	37	37	36	36	37	37	38	40	41	40	40	41	39	35	38	38	35	37.3	41
16-Apr	34	38	36	29	31	36	34	Z	34	37	42	48	50	51	52	52	52	52	51	49	27	34	31	30	40.5	52
17-Apr	27	28	23	23	29	25	30	37	Z	43	47	49	53	55	51	52	50	48	49	30	22	24	22	22	36.5	55
18-Apr	22	23	20	Z	17	13	17	31	44	50	55	57	60	58	57	58	62	61	59	60	60	56	55	54	45.6	62
19-Apr	52	51	49	47	Z	44	43	42	44	47	47	53	53	53	53	51	53	55	59	60	56	52	51	52	50.7	60
20-Apr	50	46	43	41	41	Z	33	33	35	34	32	33	33	34	35	35	35	35	35	34	24	15	12	11	33.0	50
21-Apr	9	9	11	11	8	8	Z	25	30	32	35	38	39	42	44	45	46	46	45	47	46	41	35	25	31.2	47
22-Apr	24	39	39	38	26	32	37	Z	40	43	45	46	45	45	45	45	45	44	43	42	41	40	40	39	40.1	46
23-Apr	39	38	37	36	36	35	34	35	Z	37	37	39	41	42	40	40	40	40	38	37	34	30	27	31	36.7	42
24-Apr	28	26	28	Z	41	39	39	42	42	41	44	49	50	48	47	47	46	45	44	42	40	36	35	33	40.5	50
25-Apr	32	31	30	29	Z	24	25	28	32	37	39	39	40	42	42	45	42	43	42	40	36	35	36	36	35.9	45
26-Apr	33	30	27	26	24	Z	25	30	31	29	27	25	25	25	27	29	34	31	35	34	23	12	8	6	25.8	35
27-Apr	5	4	3	3	4	4	Z	21	23	31	38	40	42	46	43	46	46	44	40	19	17	14	10	11	24.1	46
28-Apr	10	10	11	9	11	10	16	Z	32	49	52	54	55	55	56	55	56	56	55	52	51	48	33	31	37.6	56
29-Apr	28	36	43	39	42	42	42	44	Z	47	49	49	51	51	51	52	52	52	53	51	40	33	21	18	42.8	53
30-Apr	18	17	37	Z	27	28	36	35	35	45	48	49	50	49	47	48	47	47	50	47	39	36	29	24	38.5	50
	29.1	28.9	28.6	28.1	26.5	28.7	31.0	34.0	35.8	39.0	40.6	42.3	43.2	43.6	43.9	44.5	44.7	44.1	43.8	41.0	36.3	34.0	31.2	29.6	Diurnal Average	
	52	51	49	47	45	45	44	44	47	50	55	57	60	58	57	58	62	61	59	60	60	56	55	54	Diurnal Maximum	

Z - zerospan C - Calibration

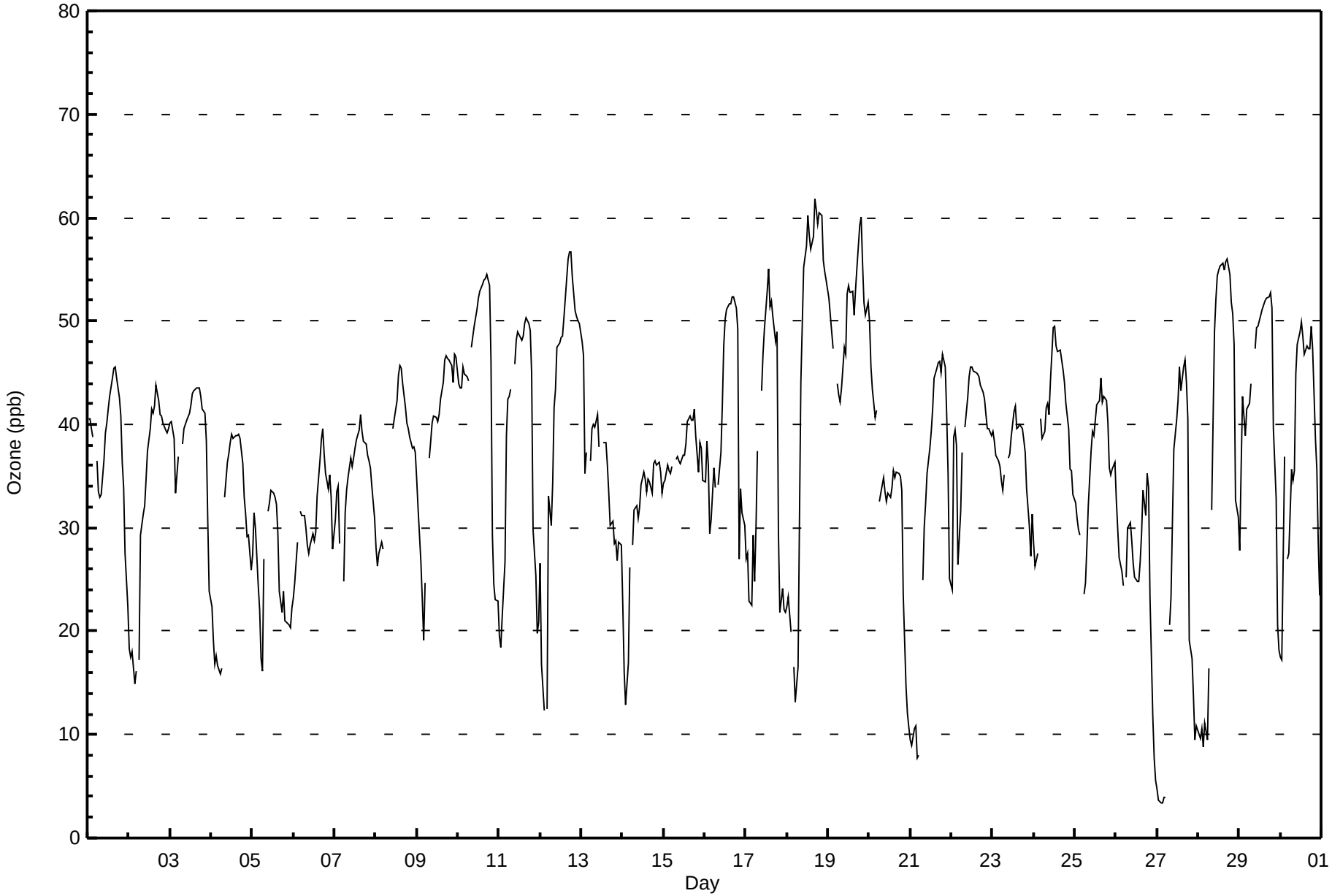
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb

Wood Buffalo Environmental Association

Hourly Averages

Ozone (O_3) - ppb

Conklin Community - April 2016



Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	62	9.05	9.05
21 - 50	551	80.44	89.49
51 - 82	72	10.51	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Ozone (O_3) - ppb

Conklin Community - April 2016

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	1	0	1	5	11	13	7	1	2	3	1	0	3	2	57
21 - 50	43	25	15	18	29	39	35	61	50	59	20	5	6	10	48	59	522
51 - 82	4	1	3	2	2	2	0	12	19	5	3	2	5	9	3	0	72
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	51	29	19	20	32	46	46	86	76	65	25	10	12	19	54	61	651

Total Number of Valid Hours: 651

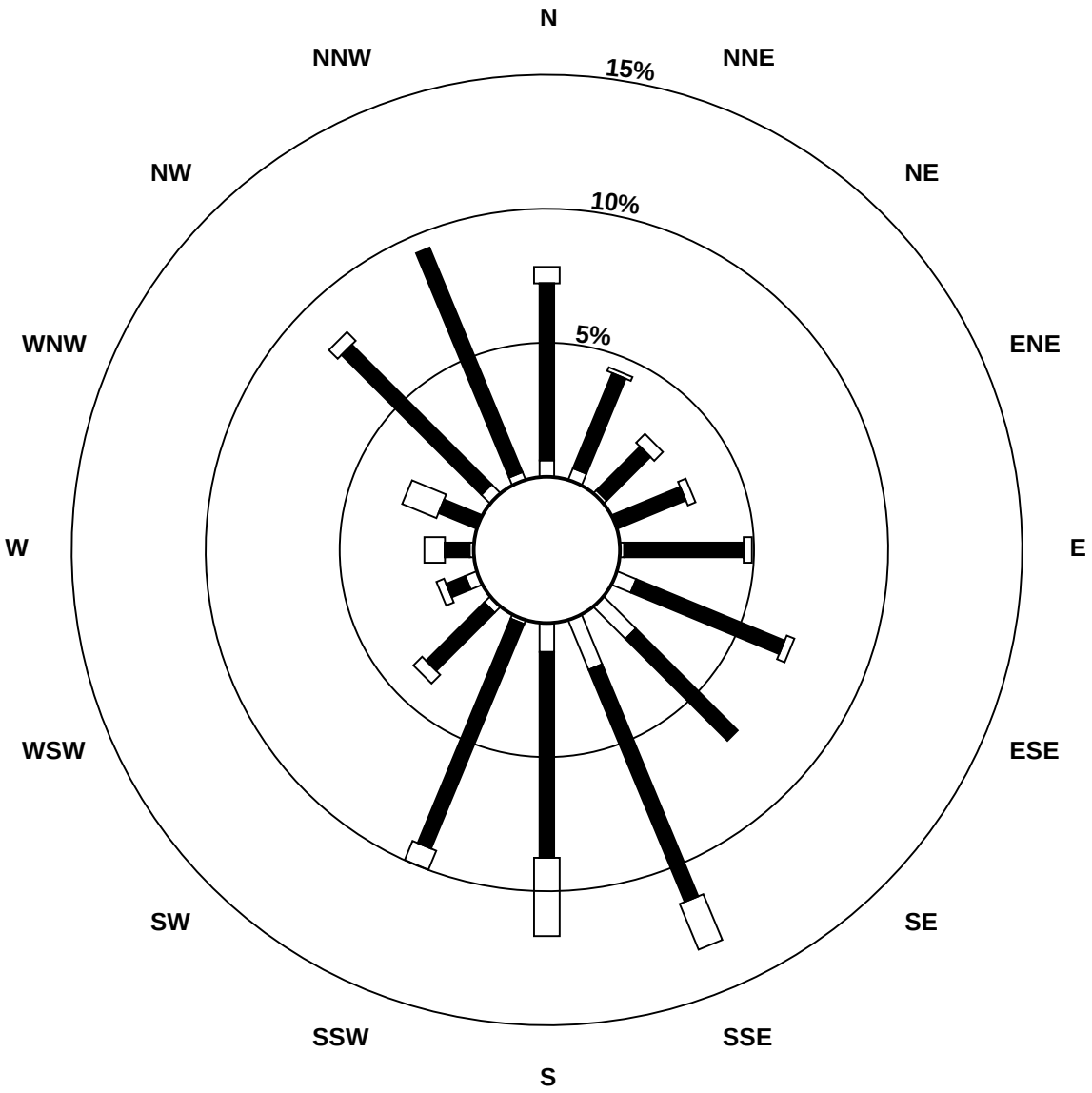
Total Number of Hours: 720

Wood Buffalo Environmental Association

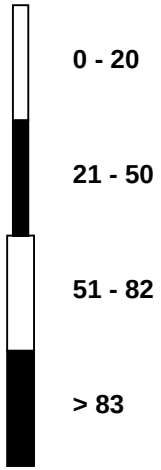
Wind Rose Apr 2016

Ozone (O_3) - ppb

Conklin Community (AMS 21)



Classes (ppb)



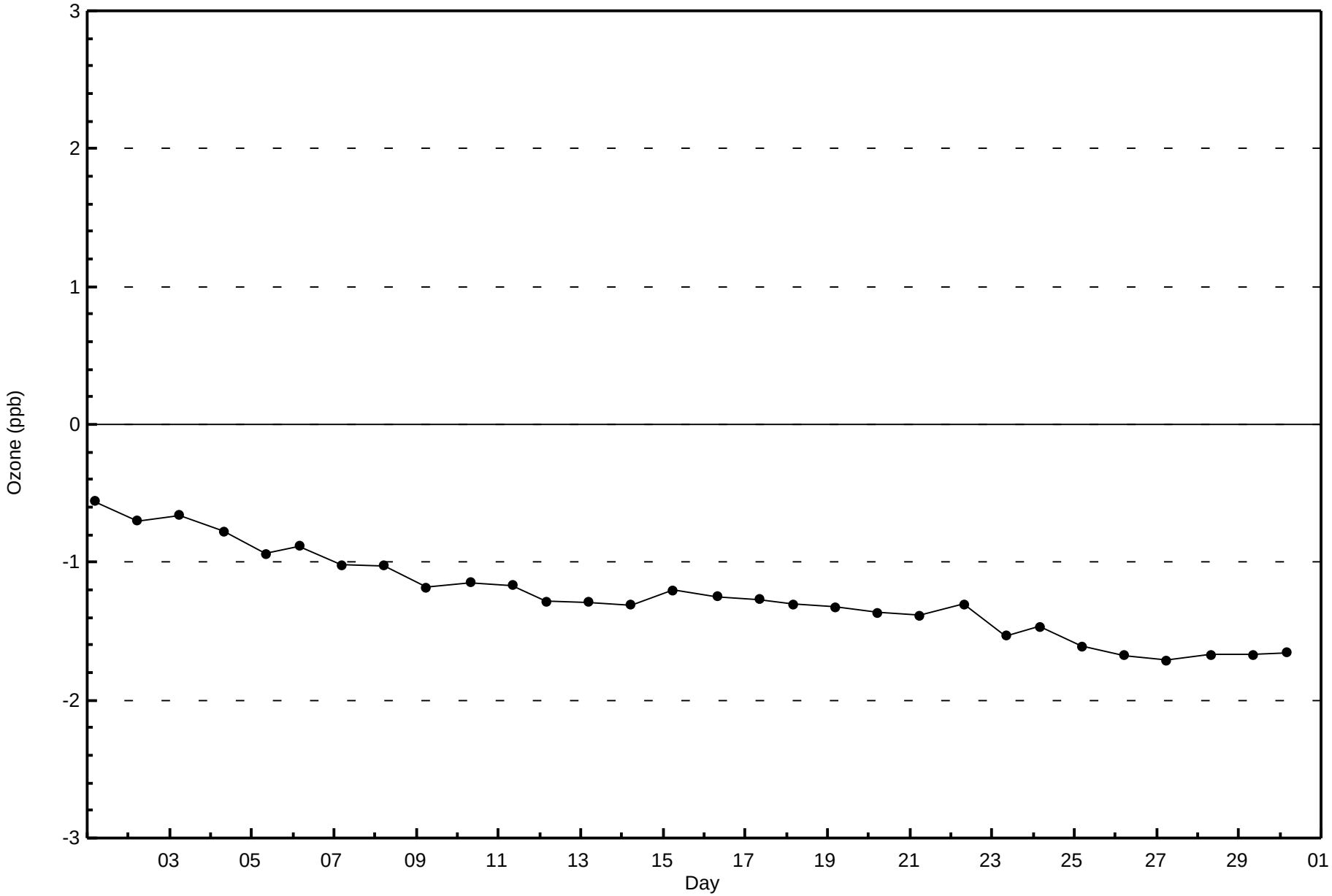
Total Number of Valid Hours: 651

Wood Buffalo Environmental Association

Zero Responses

Ozone (O_3) - ppb

Conklin Community - April 2016

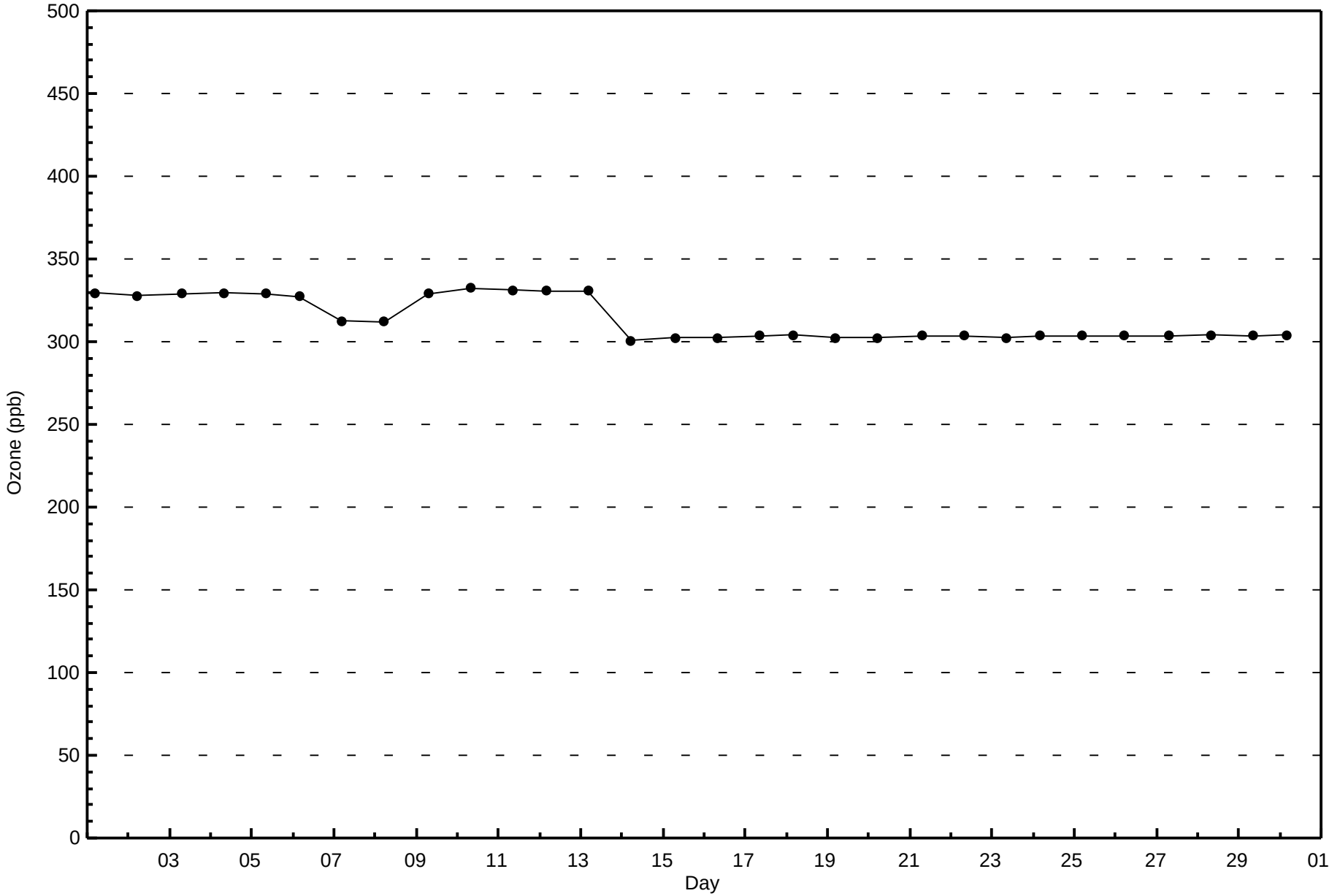


Wood Buffalo Environmental Association

Span Responses

Ozone (O_3) - ppb

Conklin Community - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

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

Conklin Community - April 2016

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

Maximum Value: 57.1 $\mu g/m^3$ on Apr 17 20:00

Maximum Daily Average: 7.7 $\mu g/m^3$ on Apr 17

Minimum Value: 0.8 $\mu g/m^3$ on Apr 6 10:00

Minimum Daily Average: 1.5 $\mu g/m^3$ on Apr 6

Maximum Diurnal Average: 7.1 $\mu g/m^3$ at hour 21

Minimum Diurnal Average: 2.6 $\mu g/m^3$ at hour 11

Monthly Average: 3.81 $\mu g/m^3$

Percentiles: $P_1 = 0.9$ $P_{10} = 1.5$ $Q_1 = 2.1$ Median = 3.2 $Q_3 = 4.5$ $P_{90} = 6.1$ $P_{99} = 17.0$

Hours in Service:	720
Hours of Data:	718
Hours of Missing Data:	2
Hours of Calibration:	2
Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily	Daily
	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-Apr	3.0	2.9	2.9	4.5	2.5	2.5	2.2	2.3	2.1	2.0	1.9	2.0	1.8	2.1	2.3	2.1	2.1	2.0	2.4	2.0	3.0	3.4	3.3	2.4	2.5	4.5
2-Apr	1.9	2.2	2.0	1.8	1.7	2.0	2.1	1.9	2.0	2.0	2.1	2.2	2.5	2.9	2.6	2.5	4.8	5.4	4.4	3.9	3.2	3.4	3.0	3.8	2.8	5.4
3-Apr	4.5	4.4	4.2	5.5	4.8	4.7	4.4	4.4	4.1	3.2	3.1	3.2	3.3	3.4	3.2	2.8	2.9	3.1	3.5	7.1	6.7	4.8	4.2	4.0	4.1	7.1
4-Apr	5.1	4.3	3.2	3.7	3.0	4.2	3.5	2.4	2.2	2.1	1.8	2.0	2.3	2.2	2.7	3.0	3.5	4.2	3.8	4.7	5.0	4.0	3.6	4.3	3.4	5.1
5-Apr	4.8	4.6	4.7	4.2	11.5	3.9	3.7	3.6	3.1	2.6	2.0	1.7	1.7	1.8	1.8	1.9	2.0	2.2	2.7	3.2	2.9	2.6	2.2	2.2	3.2	11.5
6-Apr	2.6	2.2	1.7	1.3	1.1	1.1	1.1	1.0	0.9	0.8	0.9	0.9	1.0	1.2	1.6	1.2	1.2	1.2	1.2	1.7	2.1	2.0	2.3	3.9	1.5	3.9
7-Apr	4.3	3.5	3.1	3.5	3.3	3.1	3.2	2.4	1.9	1.9	1.8	1.8	1.7	1.6	1.5	1.4	1.7	2.9	3.3	3.0	3.4	3.1	3.7	5.5	2.8	5.5
8-Apr	6.0	3.4	2.2	2.0	1.8	1.8	1.8	1.5	C	C	1.5	1.5	1.5	1.4	1.5	1.5	1.7	1.8	2.2	2.2	2.5	2.5	2.5	2.4	2.1	6.0
9-Apr	2.7	2.5	2.4	2.5	2.9	2.5	2.4	2.3	2.1	1.8	1.7	2.0	2.4	2.1	1.5	1.3	1.5	1.7	1.9	2.2	2.8	4.9	4.7	3.9	2.5	4.9
10-Apr	4.4	4.4	4.1	3.4	3.7	3.8	3.5	3.2	2.4	2.0	1.7	1.4	1.5	1.5	1.6	1.6	1.6	1.9	2.7	7.6	7.4	17.8	19.3	4.3	4.5	19.3
11-Apr	3.1	3.0	2.1	1.7	2.0	2.1	2.0	2.0	2.0	2.0	2.1	2.2	2.6	2.4	2.5	2.1	2.6	3.4	4.3	7.3	15.1	10.9	5.9	3.4	3.7	15.1
12-Apr	9.3	6.1	5.3	4.3	4.7	5.8	3.8	2.2	1.4	1.5	1.4	1.5	1.5	1.6	1.9	3.0	3.0	3.0	3.2	3.7	4.7	5.1	4.1	4.3	3.6	9.3
13-Apr	3.5	4.3	3.8	3.9	4.1	3.7	3.9	3.4	3.6	2.9	2.9	2.4	2.6	3.1	3.1	3.7	4.4	4.1	2.1	2.1	2.6	2.3	2.2	1.8	3.2	4.4
14-Apr	2.9	4.3	2.9	2.3	3.7	6.9	4.1	2.7	1.7	1.3	1.3	1.6	1.4	1.5	1.6	1.6	1.7	1.5	1.0	1.0	1.0	0.9	0.9	0.9	2.1	6.9
15-Apr	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.2	1.5	1.7	1.8	1.5	1.4	1.6	2.7	2.6	4.7	6.0	3.5	3.2	3.2	1.9	6.0
16-Apr	4.3	3.5	2.8	3.2	3.7	12.6	5.3	2.4	2.0	1.8	1.9	1.8	2.4	2.4	2.5	3.6	3.5	3.8	4.6	7.4	16.8	9.1	5.8	4.8	4.7	16.8
17-Apr	6.1	6.0	11.4	11.9	6.7	3.5	3.7	2.8	2.6	2.0	2.0	2.7	2.3	2.0	1.9	2.1	2.3	2.6	8.7	57.1	26.9	7.8	4.5	4.1	7.7	57.1
18-Apr	3.9	3.6	3.5	4.1	5.2	4.0	6.1	4.2	2.7	2.3	2.3	2.6	2.8	2.8	2.6	2.4	7.2	5.3	3.3	13.0	28.9	12.1	6.4	6.6	5.7	28.9
19-Apr	6.1	4.6	4.7	4.6	5.0	5.4	5.4	4.7	9.1	7.7	7.6	8.3	8.1	4.8	5.7	14.9	31.7	8.9	4.0	4.3	4.1	4.7	5.4	5.2	7.3	31.7
20-Apr	4.9	3.9	2.6	1.7	1.3	2.0	2.5	2.3	1.8	2.3	3.4	3.1	3.3	3.1	2.2	2.1	1.5	1.4	1.9	2.7	6.3	11.0	7.7	5.9	3.4	11.0
21-Apr	4.9	7.3	3.1	2.2	3.1	2.8	3.4	1.5	1.6	1.3	1.3	1.1	1.1	1.4	1.3	1.3	1.4	1.5	2.3	2.7	3.1	4.4	3.8	5.4	2.6	7.3
22-Apr	4.7	3.3	3.1	3.0	3.0	2.7	2.3	2.0	1.9	1.8	1.9	1.9	1.9	2.2	2.5	2.8	3.6	3.7	3.7	4.3	3.4	3.4	2.7	2.5	2.8	4.7
23-Apr	2.4	2.4	2.3	2.4	2.3	3.0	3.1	3.1	2.6	2.4	2.5	2.6	3.2	3.6	3.3	3.3	3.4	3.5	4.4	3.8	6.2	8.2	8.5	6.8	3.7	8.5
24-Apr	8.0	6.8	4.7	3.8	3.8	3.8	3.5	3.1	3.2	3.5	2.6	2.5	1.8	2.7	3.2	3.6	4.7	4.7	4.9	4.6	4.1	3.6	4.1	4.8	4.0	8.0
25-Apr	4.5	4.6	4.9	5.0	5.3	5.6	5.0	5.8	5.5	4.2	3.8	3.7	3.8	3.1	3.9	3.0	3.6	4.3	4.0	3.7	4.1	3.7	3.1	2.2	4.2	5.8
26-Apr	2.0	1.6	1.3	1.2	1.2	1.2	1.1	1.9	3.1	6.0	4.7	6.3	7.0	6.5	6.1	5.6	4.1	5.3	4.2	3.1	3.7	4.6	4.7	4.8	3.8	7.0
27-Apr	6.3	7.2	5.8	5.1	5.2	4.8	5.1	4.0	3.9	4.6	6.1	5.5	5.2	6.4	6.0	4.8	4.5	5.0	5.4	9.3	9.3	7.5	6.1	5.5	5.8	9.3
28-Apr	5.5	4.9	4.2	3.7	3.4	3.8	3.2	2.2	2.5	3.2	4.0	4.8	4.6	5.4	4.9	4.8	4.7	5.1	6.6	5.8	5.7	5.9	6.1	5.1	4.6	6.6
29-Apr	4.8	5.3	5.1	3.7	3.7	3.6	4.5	3.5	3.8	4.2	4.4	4.1	4.0	4.0	3.5	3.2	4.0	4.0	4.2	5.9	15.0	18.9	9.3	4.1	5.5	18.9
30-Apr	4.7	4.1	3.3	3.9	4.1	3.9	4.4	5.3	3.0	2.8	2.4	2.7	3.0	2.8	2.8	2.8	3.1	4.0	4.2	6.1	7.6	6.5	16.7	5.7	4.6	16.7
	4.4	4.1	3.6	3.5	3.6	3.7	3.4	2.8	2.8	2.7	2.6	2.7	2.8	2.8	2.8	3.1	4.0	3.5	3.6	6.3	7.1	6.1	5.3	4.1	Diurnal Average	
	9.3	7.3	11.4	11.9	11.5	12.6	6.1	5.8	9.1	7.7	7.6	8.3	8.1	6.5	6.1	14.9	31.7	8.9	8.7	57.1	28.9	18.9	19.3	6.8	Diurnal Maximum	

C - Calibration

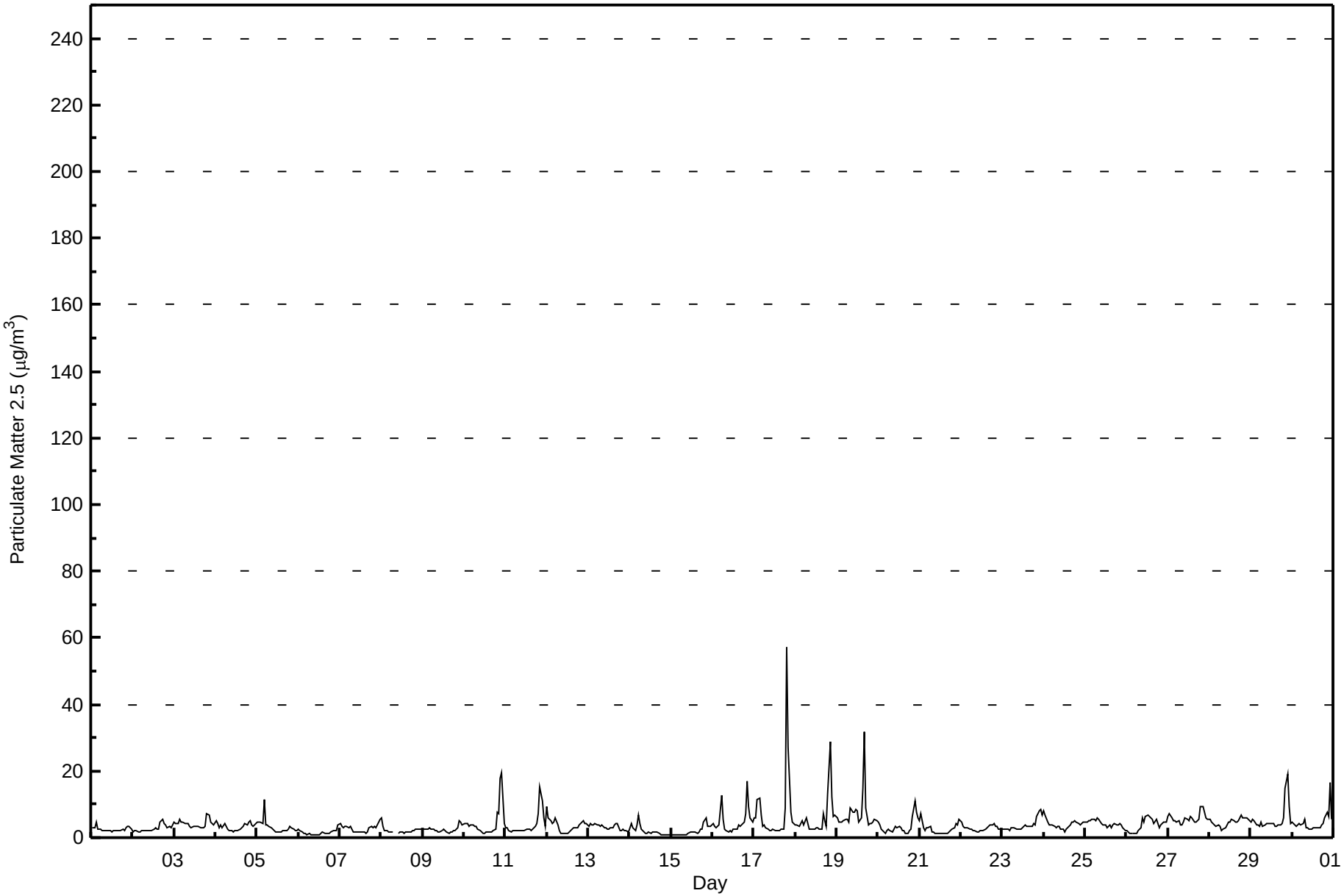
Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 $\mu g/m^3$

Wood Buffalo Environmental Association

Hourly Averages

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

Conklin Community - April 2016



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

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

Conklin Community - April 2016

Concentration Ranges ($\mu g/m^3$)	Number of Hours	%	Cumulative %
1 - 5	606	84.40	84.40
6 - 15	84	11.70	96.10
16 - 25	5	0.70	96.80
26 - 80	4	0.56	97.35
> 81.0	0	0.00	97.35

Total Number of Valid Hours: 718

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

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

Conklin Community - April 2016

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	48	28	19	22	30	46	40	69	64	45	22	9	7	15	49	61	574
6 - 15	1	1	0	0	4	2	6	19	12	20	3	2	5	4	1	0	80
16 - 25	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	3
26 - 80	0	0	0	0	0	0	0	1	0	2	0	0	1	0	0	0	4
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	49	29	19	22	34	48	46	89	76	69	26	11	13	19	50	61	661

Total Number of Valid Hours: 680

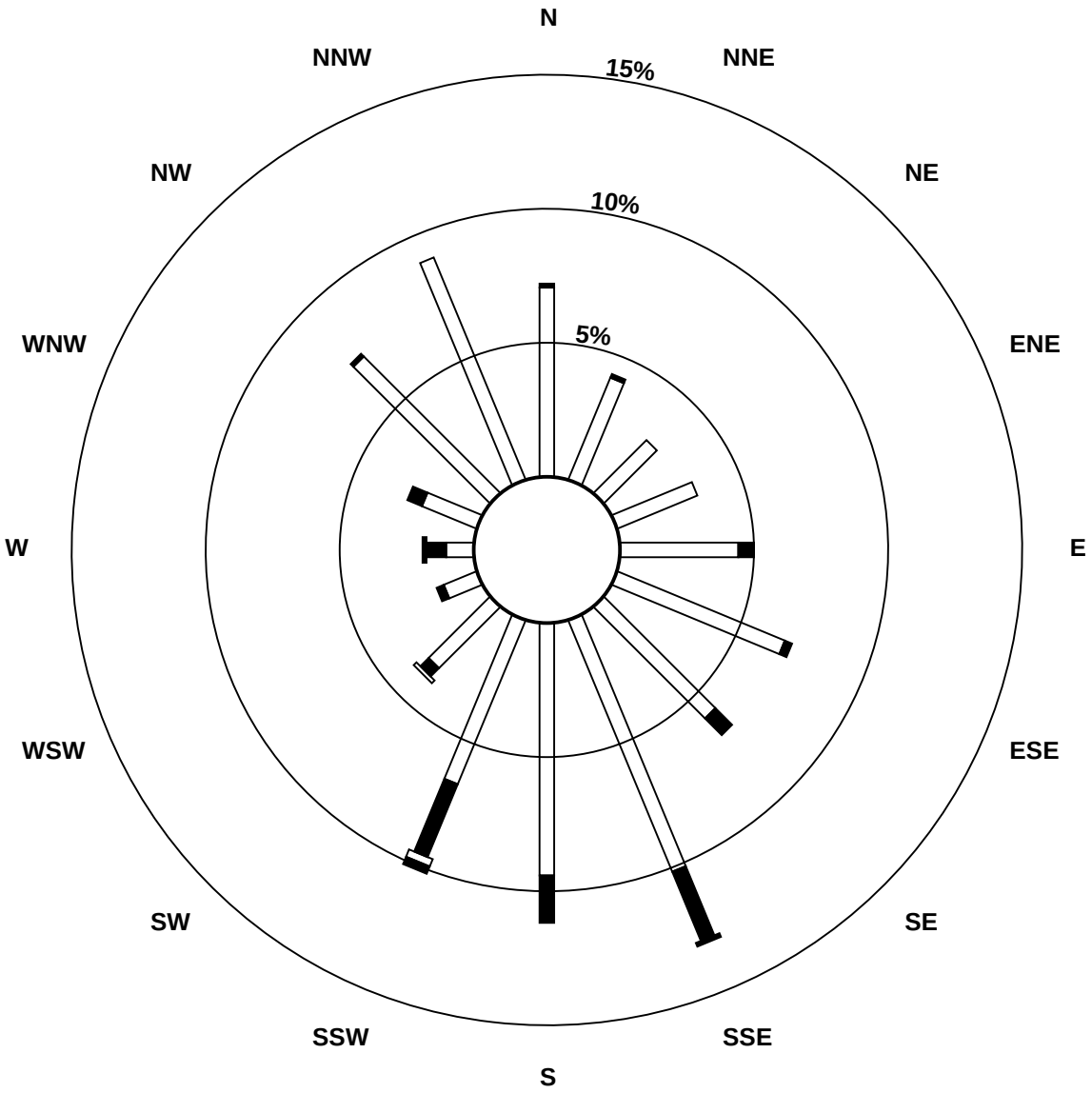
Total Number of Hours: 720

Wood Buffalo Environmental Association

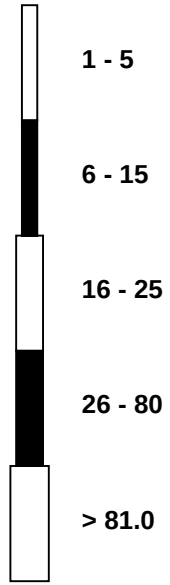
Wind Rose Apr 2016

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

Conklin Community (AMS 21)



Classes ($\mu g/m^3$)



1 - 5

6 - 15

16 - 25

26 - 80

> 81.0

Total Number of Valid Hours: 680

Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

Conklin Community - April 2016

Maximum Value: 24.2 C on Apr 18 15:00

Maximum Daily Average: 15.6 C on Apr 19

Minimum Value: -10.6 C on Apr 4 06:00

Minimum Daily Average: -4.5 C on Apr 10

Maximum Diurnal Average: 9.8 C at hour 16

Minimum Diurnal Average: -0.9 C at hour 5

Monthly Average: 4.21 C

Percentiles: P_1 = -9.7 P_{10} = -4.2 Q_1 = -0.4 Median = 2.9 Q_3 = 8.1 P_{90} = 15.3 P_{99} = 22.9

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

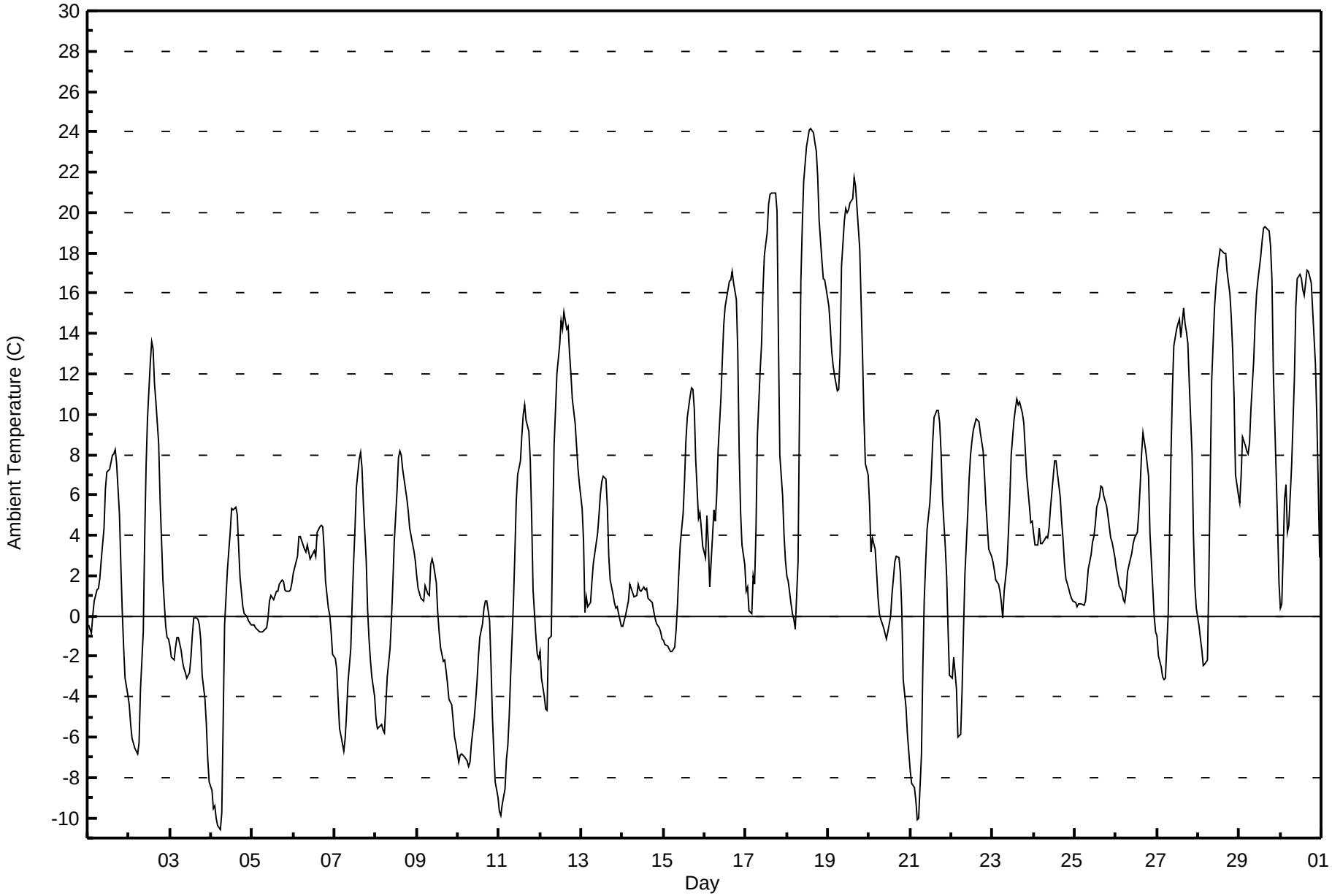
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	-0.4	-0.6	-0.8	0.1	0.8	1.3	1.4	1.9	2.8	4.4	6.3	7.1	7.2	7.3	8.0	8.0	8.2	7.6	5.1	2.5	0.3	-1.5	-3.1	-3.9	2.9	8.2
2-Apr	-4.4	-5.4	-6.0	-6.5	-6.7	-6.8	-6.2	-3.7	-0.8	3.8	7.4	9.8	12.5	13.6	13.3	11.5	10.6	8.6	5.7	3.8	1.8	-0.5	-1.1	-1.1	2.2	13.6
3-Apr	-1.5	-2.1	-2.2	-1.6	-1.1	-1.1	-1.7	-2.2	-2.6	-2.8	-3.1	-2.8	-2.0	-0.9	-0.1	-0.1	-0.2	-0.4	-1.2	-2.9	-4.1	-5.4	-7.1	-8.2	-2.4	-0.1
4-Apr	-8.7	-9.5	-9.4	-10.0	-10.4	-10.6	-9.7	-5.1	-0.5	2.3	3.2	4.2	5.4	5.2	5.4	5.0	3.4	1.9	0.4	0.1	0.0	-0.1	-0.3	-0.4	-1.6	5.4
5-Apr	-0.5	-0.4	-0.5	-0.7	-0.8	-0.8	-0.8	-0.7	-0.6	-0.1	0.7	1.0	0.8	1.0	1.2	1.2	1.6	1.8	1.7	1.3	1.2	1.2	1.3	1.7	0.5	1.8
6-Apr	2.1	2.4	2.9	3.9	3.9	3.7	3.3	3.2	3.5	3.2	2.8	3.1	3.3	3.0	4.2	4.5	4.5	4.4	3.3	1.7	0.4	0.1	-0.8	-1.9	2.7	4.5
7-Apr	-2.1	-2.7	-4.2	-5.6	-5.9	-6.7	-6.1	-4.8	-3.3	-1.6	0.7	2.7	4.4	6.4	7.7	8.1	7.3	5.5	2.8	0.3	-1.2	-2.2	-3.0	-4.0	-0.3	8.1
8-Apr	-5.1	-5.6	-5.5	-5.4	-5.6	-5.8	-4.4	-3.0	-1.6	-0.1	1.6	3.7	6.2	7.8	8.2	7.9	7.3	6.3	5.8	5.2	4.3	3.6	3.2	2.8	1.3	8.2
9-Apr	2.0	1.3	0.9	0.8	0.8	1.5	1.1	1.0	2.5	2.9	2.5	1.6	0.2	-0.8	-1.5	-2.2	-2.2	-2.7	-3.4	-4.1	-4.4	-5.2	-6.0	-6.4	-0.8	2.9
10-Apr	-7.3	-6.9	-6.8	-6.9	-7.0	-7.2	-7.5	-7.3	-6.3	-5.1	-4.3	-3.3	-2.0	-1.1	-0.4	0.4	0.7	0.8	-0.2	-2.4	-5.0	-6.7	-8.2	-9.0	-4.5	0.8
11-Apr	-9.7	-9.9	-9.3	-8.6	-7.1	-6.4	-4.9	-2.9	0.7	3.0	5.7	7.0	7.7	8.9	10.0	10.5	9.7	9.2	7.8	4.9	1.3	-1.0	-1.9	-2.1	0.9	10.5
12-Apr	-1.8	-3.1	-4.0	-4.6	-4.7	-1.2	-1.0	4.2	8.5	10.2	12.0	13.5	14.6	14.2	15.1	14.2	14.3	13.0	12.0	10.7	9.5	8.5	7.3	6.6	7.0	15.1
13-Apr	5.4	3.7	0.2	1.0	0.5	0.7	1.7	2.6	3.1	4.1	5.0	6.0	6.7	6.9	6.8	5.4	3.0	1.8	1.1	0.7	0.4	0.5	0.1	-0.5	2.8	6.9
14-Apr	-0.5	-0.3	0.0	0.7	1.5	1.4	1.2	1.0	1.0	1.6	1.3	1.2	1.5	1.3	1.4	0.9	0.8	0.6	0.3	-0.1	-0.4	-0.6	-0.8	-1.1	0.6	1.6
15-Apr	-1.2	-1.4	-1.5	-1.6	-1.7	-1.8	-1.6	-0.7	0.5	2.2	3.6	5.0	6.7	8.6	9.8	10.9	11.3	11.2	10.3	7.8	4.9	5.1	4.3	3.5	3.9	11.3
16-Apr	2.9	5.0	3.6	1.4	2.7	5.2	4.7	6.0	8.2	10.8	12.7	14.4	15.3	15.8	16.6	16.7	17.1	16.5	15.7	13.1	8.2	5.2	3.5	2.5	9.3	17.1
17-Apr	1.2	1.5	0.3	0.1	2.0	1.6	4.3	8.9	12.2	13.5	16.2	17.9	19.1	20.4	20.9	21.0	20.9	21.0	20.1	13.8	8.0	6.0	4.0	2.7	10.7	21.0
18-Apr	2.0	1.7	0.6	0.1	-0.2	-0.6	2.7	9.9	16.6	19.3	21.5	23.2	23.7	24.1	24.2	23.9	23.5	23.0	21.8	19.7	17.6	16.7	16.7	16.3	14.5	24.2
19-Apr	15.3	14.3	13.1	12.4	12.0	11.2	11.3	13.1	17.3	19.6	20.2	20.0	20.1	20.5	20.7	21.7	21.3	20.3	18.2	15.5	12.9	9.9	7.5	7.0	15.6	21.7
20-Apr	5.6	3.2	3.9	3.3	2.2	0.9	0.2	-0.2	-0.6	-0.9	-1.2	-0.8	0.0	1.1	1.9	2.7	2.9	2.9	2.2	0.3	-3.1	-4.6	-5.9	-6.8	0.4	5.6
21-Apr	-7.7	-8.3	-8.5	-9.1	-10.1	-10.0	-6.9	-2.5	0.8	2.6	4.3	5.6	7.0	8.6	9.8	10.2	10.2	9.6	8.1	5.8	3.5	1.9	-0.7	-3.0	0.9	10.2
22-Apr	-3.1	-2.0	-2.8	-3.6	-6.0	-5.8	-3.6	-0.7	2.0	5.1	6.8	8.0	8.6	9.3	9.8	9.7	9.7	9.1	8.2	7.0	5.5	4.4	3.3	3.0	3.4	9.8
23-Apr	2.7	2.3	1.8	1.6	1.2	0.7	-0.1	1.2	2.6	4.1	5.7	8.0	9.7	10.3	10.8	10.5	10.6	10.0	9.6	8.3	7.0	5.5	4.7	4.7	5.6	10.8
24-Apr	4.1	3.5	3.5	4.4	3.6	3.6	3.8	4.0	3.8	4.4	5.4	6.9	7.7	7.7	7.1	5.9	4.7	3.8	2.7	1.9	1.4	1.1	0.9	0.7	4.0	7.7
25-Apr	0.7	0.5	0.6	0.6	0.6	0.5	0.8	1.5	2.3	3.0	3.7	3.9	4.6	5.4	5.9	6.4	6.4	6.0	5.4	5.0	4.4	3.9	3.6	2.9	3.3	6.4
26-Apr	2.3	2.0	1.5	1.2	0.8	0.7	1.2	2.2	2.9	3.1	3.6	3.9	4.1	5.1	6.5	8.0	9.1	8.2	7.6	7.0	4.1	1.4	0.0	-0.8	3.6	9.1
27-Apr	-1.0	-2.0	-2.5	-3.0	-3.2	-3.1	0.1	4.1	8.0	11.2	13.4	14.3	14.5	14.7	13.8	15.3	14.5	14.1	13.6	11.6	8.1	4.0	1.5	0.4	6.8	15.3
28-Apr	-0.5	-1.2	-1.7	-2.4	-2.4	-2.2	2.0	6.9	11.6	15.2	16.3	17.1	17.7	18.2	18.0	18.0	18.0	17.1	16.0	14.8	13.1	10.7	7.0	6.0	9.7	18.2
29-Apr	5.6	7.0	8.9	8.5	8.2	8.1	8.6	10.2	12.7	14.7	15.9	16.7	17.8	18.6	19.2	19.3	19.2	19.1	18.3	16.6	12.0	7.1	4.6	1.6	12.4	19.3
30-Apr	0.4	0.6	5.8	6.5	4.1	4.5	7.4	9.6	11.8	15.3	16.7	16.9	16.7	16.2	15.9	17.1	17.1	16.8	16.5	15.2	12.5	9.9	6.5	2.9	11.0	17.1
	-0.1	-0.4	-0.6	-0.8	-0.9	-0.8	0.0	1.9	4.0	5.6	6.9	7.9	8.7	9.3	9.7	9.8	9.5	8.9	7.8	6.2	4.1	2.6	1.4	0.5	Diurnal Average	
	15.3	14.3	13.1	12.4	12.0	11.2	11.3	13.1	17.3	19.6	21.5	23.2	23.7	24.1	24.2	23.9	23.5	23.0	21.8	19.7	17.6	16.7	16.7	16.3	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature (AT) - C

Conklin Community - April 2016



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	201	27.92	27.92
0 - 10	379	52.64	80.56
10 - 20	117	16.25	96.81
> 20	23	3.19	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Conklin Community - April 2016

Maximum Value: 99 % on Apr 14 02:00

Maximum Daily Average: 94.3 % on Apr 5

Minimum Value: 11 % on Apr 18 17:00

Minimum Daily Average: 22.2 % on Apr 19

Maximum Diurnal Average: 76.4 % at hour 5

Minimum Diurnal Average: 40.4 % at hour 16

Monthly Average: 58.7 %

Percentiles: P_1 = 16 P_{10} = 25 Q_1 = 39 Median = 60 Q_3 = 78 P_{90} = 92 P_{99} = 97

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

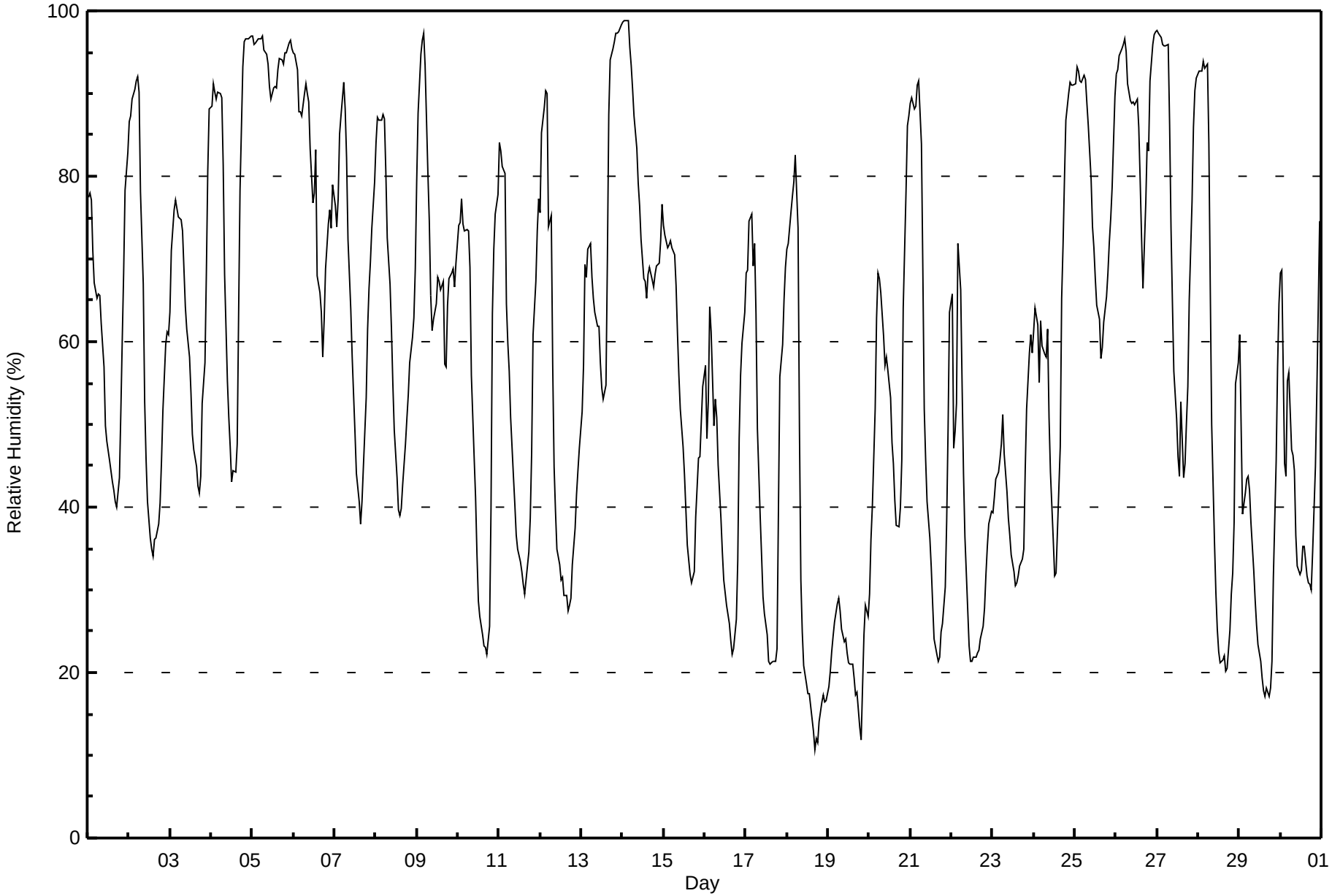
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	77	78	77	71	67	65	66	66	62	57	50	48	47	46	43	42	41	40	44	52	60	68	78	83	59.5	83
2-Apr	87	87	89	91	91	92	90	78	67	53	46	41	36	35	34	36	36	38	40	46	52	60	61	61	60.3	92
3-Apr	64	71	76	77	76	75	75	73	69	64	62	58	54	49	47	45	43	42	44	53	57	68	81	88	62.9	88
4-Apr	89	91	90	89	90	90	89	81	68	55	51	47	43	44	44	48	63	78	93	96	97	97	97	97	76.2	97
5-Apr	97	96	96	97	97	97	97	95	95	94	91	89	91	91	91	93	94	94	94	95	95	96	96	95	94.3	97
6-Apr	95	95	93	88	88	87	90	91	90	89	83	77	78	83	68	66	63	58	62	69	74	76	74	79	79.8	95
7-Apr	76	74	77	85	87	91	88	82	72	64	58	54	49	44	41	38	41	45	53	61	66	70	74	79	65.5	91
8-Apr	84	87	87	87	88	87	80	73	67	62	55	49	44	40	39	40	43	48	51	54	57	61	63	69	63.0	88
9-Apr	79	88	95	96	97	93	80	75	66	61	63	65	68	67	66	67	57	57	64	68	68	69	67	70	72.7	97
10-Apr	74	74	77	74	73	74	73	69	56	46	41	34	29	27	25	23	23	22	26	40	63	71	75	78	52.8	78
11-Apr	84	83	81	80	65	60	56	51	44	40	37	35	33	32	31	30	31	35	39	47	61	67	73	77	53.0	84
12-Apr	76	85	88	90	90	74	75	57	45	39	35	33	31	32	29	29	27	28	29	33	37	42	44	47	49.9	90
13-Apr	52	57	69	68	71	72	68	65	64	62	62	57	54	53	55	70	87	94	95	96	97	97	97	98	73.4	98
14-Apr	99	99	99	99	96	93	91	87	83	79	77	72	68	67	65	68	69	68	67	68	69	70	72	77	79.2	99
15-Apr	74	73	71	72	72	71	70	67	61	56	52	47	44	40	35	32	31	32	32	39	46	46	50	55	52.8	74
16-Apr	57	48	53	64	61	50	53	51	45	39	35	31	30	28	26	24	22	23	26	34	48	56	60	64	42.8	64
17-Apr	68	69	75	75	69	72	63	49	39	34	29	27	25	21	21	21	21	21	23	39	56	60	65	69	46.3	75
18-Apr	71	72	76	78	79	83	74	49	31	25	21	19	17	17	16	13	11	12	12	14	16	17	16	17	35.7	83
19-Apr	18	20	22	24	26	28	29	28	25	24	24	22	21	21	21	19	17	18	13	12	18	25	28	27	22.2	29
20-Apr	29	36	40	52	63	68	68	66	61	57	58	57	53	48	45	41	38	38	40	46	64	78	86	87	54.9	87
21-Apr	89	89	88	89	91	92	84	69	52	46	41	36	33	28	24	22	21	22	25	26	30	38	49	64	52.0	92
22-Apr	66	47	49	53	72	66	55	44	36	28	23	21	21	22	22	22	23	24	26	28	32	35	38	40	37.2	72
23-Apr	39	41	43	44	46	48	51	46	42	39	37	34	32	31	31	32	33	34	35	44	52	59	61	59	42.2	61
24-Apr	61	64	62	55	62	59	58	58	61	51	44	36	32	32	37	47	65	72	80	87	90	91	91	91	62.0	91
25-Apr	91	93	93	91	91	92	92	89	86	80	74	71	68	64	63	58	59	62	65	68	72	75	79	90	77.8	93
26-Apr	92	93	95	95	96	97	95	91	89	89	89	89	89	86	79	73	66	77	84	83	91	96	97	98	88.7	98
27-Apr	98	97	97	96	96	96	96	86	74	65	57	51	46	44	53	43	45	50	55	65	77	86	90	92	73.1	98
28-Apr	93	93	93	94	93	94	84	66	50	36	30	25	22	21	22	22	20	21	25	30	32	38	55	57	50.6	94
29-Apr	61	50	39	42	43	44	42	38	32	29	26	23	21	19	18	17	18	17	18	21	32	46	57	65	34.1	65
30-Apr	68	69	45	44	55	56	47	46	44	37	33	32	32	35	35	32	31	31	30	35	45	54	64	75	44.8	75
	73.6	74.0	74.5	75.3	76.4	75.5	72.7	66.3	59.2	53.2	49.4	46.1	43.7	42.3	40.8	40.4	41.4	43.3	46.3	51.6	58.6	63.7	68.0	71.5	Diurnal Average	
	99	99	99	99	97	97	97	95	95	94	91	89	91	91	91	93	94	94	95	96	97	97	97	98	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity (RH) - %

Conklin Community - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Conklin Community - April 2016

Maximum Speed: 23 km/h on Apr 9 16:00

Maximum Daily Speed Average: 13.3 km/h on Apr 9

Minimum Speed Value: 0 km/h on Apr 21 07:00

Minimum Daily Speed Average: 1.9 km/h on Apr 27

Maximum Diurnal Speed Average: 2.7 km/h at hour 14

Minimum Diurnal Speed Average: 0.6 km/h at hour 8

Monthly Average Velocity: 1.5 km/h 186.5 deg

Percentiles: $P_1 = 1$ $P_{10} = 2$ $Q_1 = 4$ Median = 7 $Q_3 = 11$ $P_{90} = 15$ $P_{99} = 21$

Hours in Service:	720
Hours of Data:	680
Hours of Missing Data:	40
Percent Operational Time:	94.4

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Apr	SSW8	SW15	WSW8	WSW2	NNW4	NNW5	N2	NNW3	NW4	NW7	NW11	NW9	NW11	NNW10	NNW11	N9	NNE7	NE7	E6	ENE4	ENE3	ENE2	ENE2	E2	NNW3.3	SW15
2-Apr	ESE2	N2	N3	N3	NNE2	NNE3	N4	N6	N4	NNE2	N4	NNE5	NW4	NW8	NNW9	N9	NNE9	NNE10	NNE9	N7	NNE6	N7	NNW6	N6	N5.1	NNE10
3-Apr	NNW6	N4	N2	NNW3	NW7	NW9	NNW10	NNW12	NNW16	NNW14	NNW13	NNW13	NW10	NW10	NW9	NW10	NNW10	NNW8	N6	E5	E4	E4	E2	E2	NNW6.8	NNW16
4-Apr	E2	E2	SE4	SE3	ESE3	SE4	ESE3	E3	SSE8	S11	S10	SE10	SE9	SE9	ESE8	ESE7	E5	E7	ESE4	ESE3	E3	ENE2	NE2	NNE2	SE4.3	S11
5-Apr	NE3	E4	E3	ENE2	NNE2	NNE1	NE1	ESE4	E5	E5	ESE7	ESE9	ESE7	ESE7	ESE7	ESE5	ESE3	ESE3	SSE4	SSE4	SSE6	S6	S6	S8	ESE3.7	ESE9
6-Apr	SSW9	SW10	SW13	WSW14	W11	WNW10	WNW10	NW9	NW10	NW6	NW16	NW17	NW14	NW13	NW14	NNW15	NW16	NNW18	NNW13	NNW10	NNW8	NNW12	NNW11	NNE8	NW9.6	NNW18
7-Apr	AF	AF	AF	AF	AF	AF	AF	AF	AF	SSW1	W1	SSW4	WNW3	WNW5	NNW6	NNW12	NNE9	NE11	NE7	NE5	NE6	AF	AF	AF	----	NNW12
8-Apr	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	SE15	SE15	SE17	SSE21	SE20	SSE20	SSE20	SSE17	SSE14	SSE14	SSE11	SSE13	SSE13	SSE10	----	SSE21
9-Apr	S6	SE3	SSE5	N2	NW2	NW11	NW19	NW15	NW17	NW18	NW18	NNW19	NNW21	NNW20	NNW20	NNW23	NNW22	NNW22	NNW21	NNW18	NNW16	N15	N12	NNW6	NNW13.3	NNW23
10-Apr	AF	NNW2	NNW2	NNW5	NNW3	NNW2	NNW2	NNW4	N9	NNE8	NNE7	N9	NNE8	N6	N7	N3	E3	ESE7	ESE6	AF	AF	AF	AF	AF	NNE4.1	N9
11-Apr	AF	AF	AF	AF	AF	AF	AF	AF	SSW14	SSW13	SSW13	SSW15	SSW13	S12	SSE12	SSW12	S12	SSW12	S8	SSE5	SSE4	SSE4	SSE5	SE3	----	SSW15
12-Apr	SE1	AF	AF	AF	AF	SSW4	S2	SW4	NW7	N6	N6	NW3	N4	NNW4	NNE4	ENE9	NE8	NE8	NE6	ENE6	E8	E6	ESE5	E6	NE2.9	ENE9
13-Apr	E4	ESE3	NNW4	NE2	N1	NNW5	N3	NNW5	N4	NNE5	N9	N8	N9	N7	N7	ENE7	NNE5	N5	N5	N6	NNW4	NW3	NNW3	W3	N4.1	N9
14-Apr	S2	NNE1	NNW2	NW4	NW8	NW10	NW9	NW10	NW12	NW11	NW12	NW12	NW12	WNW11	WNW10	NW9	WNW8	NW7	NW8	NW8	NNW6	NNW7	N5	N3	NW7.4	NW12
15-Apr	NNE3	N2	NNW3	N3	N3	N2	S1	SE4	SSE4	ESE8	ESE5	ESE6	ESE6	SE9	SSE7	S8	SSE11	SSE11	S10	SSE7	SSE6	SSE8	SSE7	SSE5	SE4.1	SSE11
16-Apr	SSE6	S13	SSW1	ENE2	SW3	SSW11	SSW12	SSW14	SSW16	SSW14	SSW10	SW9	SSW12	SW12	WSW13	SW13	WSW13	SW12	SSW9	SW4	SSW5	SSW7	SSW6	SSW6	SSW8.8	SSW16
17-Apr	SSW6	SSW6	S5	S6	S6	S6	S5	SSW4	SSW5	SSW9	SW10	WSW10	WNW9	W10	WNW11	WNW9	W9	W6	WSW6	SSW2	SSW5	SSW7	S6	S5	SW5.1	WNW11
18-Apr	SSW6	S5	SSE5	SSE5	SE5	SE6	SE4	ESE5	SSW9	S14	SSW18	SSW19	S22	S20	S20	S21	S22	S21	S18	SSE13	SSE12	S17	S20	S19	S13.1	S22
19-Apr	SSW18	SSW16	SSW15	SSW17	SW14	SW15	SW15	SW13	W9	WNW12	WNW14	WNW16	W17	WNW15	W16	W20	W20	WNW14	WNW12	NW10	NW10	WNW4	WNW3	NW5	WSW10.5	W20
20-Apr	NW4	NW4	NW8	NW10	NNW13	N13	NNW12	NNW14	NNW16	NNW14	NNW14	N13	N13	N13	N10	NNE9	NNE9	NNE9	NE7	NE4	N1	W1	SW1	S1	N7.9	NNW16
21-Apr	WSW0	SW1	SSW2	WSW1	NW1	WSW1	W0	ESE5	ESE6	E6	SE10	SE12	SE11	ESE9	E10	ENE11	NE12	NE11	NE11	NE8	NNE5	ENE4	E2	SW0	E4.3	NE12
22-Apr	NNE2	NNE4	NNE4	N5	NW4	NNW6	N6	ENE7	E7	E11	ESE11	ESE12	ESE11	ESE11	ESE10	ESE11	ESE10	E8	ENE8	ENE7	ENE6	E4	ENE4	E3	E5.7	ESE12
23-Apr	ENE4	NNE4	NE3	ENE3	NE4	N3	NNW5	NE5	ENE6	E7	ESE9	ESE11	ESE13	ESE12	SE13	SE13	SSE12	SSE11	SSE8	S6	SSW3	E1	ESE2	SSE3	ESE4.9	SE13
24-Apr	ESE2	SSE1	SE5	SSE12	SSE6	SSE7	SSE7	S10	S9	SE11	SE13	SE15	SE16	SE14	SSE13	SSE12	SSE11	SSE12	SSE11	SSE8	SSE6	SE4	SE6	SE5	SSE8.9	SE16
25-Apr	SE5	SE6	SE6	ESE4	ESE3	E2	SE5	SE7	SSE9	S9	S11	S11	S10	S9	S9	S10	SSW9	SW9	SW8	SW4	SW3	S4	SSE6	S7	S6.0	S11
26-Apr	S6	S5	SSE4	SSE5	SE5	SSE5	SSE7	S10	SSW11	SSW10	S10	S9	SSW10	SSW10	SSW10	SSW10	S7	SSW4	SSE5	S7	SSE5	ESE2	SSE0	NNW3	S6.0	SSW11
27-Apr	SSE2	SSE2	SSE4	S3	S2	SE3	SE4	SSE1	E2	W0	SSW5	WSW7	SW8	SSW8	SE6	ESE5	NNW4	N4	N3	SE2	SSE2	SSE4	SSE4	SSE5	S1.9	SW8
28-Apr	SSE5	SSE5	SSE4	SE4	SE5	ESE2	SE5	ESE5	ESE5	SE9	SSE13	SSE14	SSE14	S16	S16	SSE15	SSE16	S15	SSE10	SSE9	SSE7	SE6	SSE1	NW1	SSE8.0	S16
29-Apr	SSE3	SSE6	SSE7	SSE7	SSE10	SSE11	SSE13	SSE13	SSE14	S16	S18	S21	SSE19	S18	S18	S18	S16	S15	SSE13	S11	S5	SW3	SSW4	S3	S11.4	S21
30-Apr	S3	S4	SSW7	SSW7	S6	S6	S6	S4	S4	S13	SSW16	SSW16	SSW16	SSW13	SSW12	SSW15	SSW15	SW11	SW11	SSW4	S5	SSW5	SSW4	SSW6	SSW8.5	SSW16
	S2.5	S2.4	S1.9	SSW1.3	WSW0.8	W1.0	WSW1.0	SW0.6	WSW1.1	SSW1.7	SSW2.4	SSW2.7	SSW2.6	SSW2.7	S2.1	S2.2	S1.6	SSE1.1	SE1.5	SE1.3	SE1.2	SSE1.4	SSE1.7	SSE1.9		Diurnal Average
	SSW18	SSW16	SSW15	SSW17	SW14	SW15	NW19	NW15	NW17	NW18	SSW18	S21	S22	SSE21	SE20	NNW23	NNW22	NNW22	NNW21	NNW18	NNW16	S17	S20	S19		Diurnal Maximum

AF - Analyzer Failure

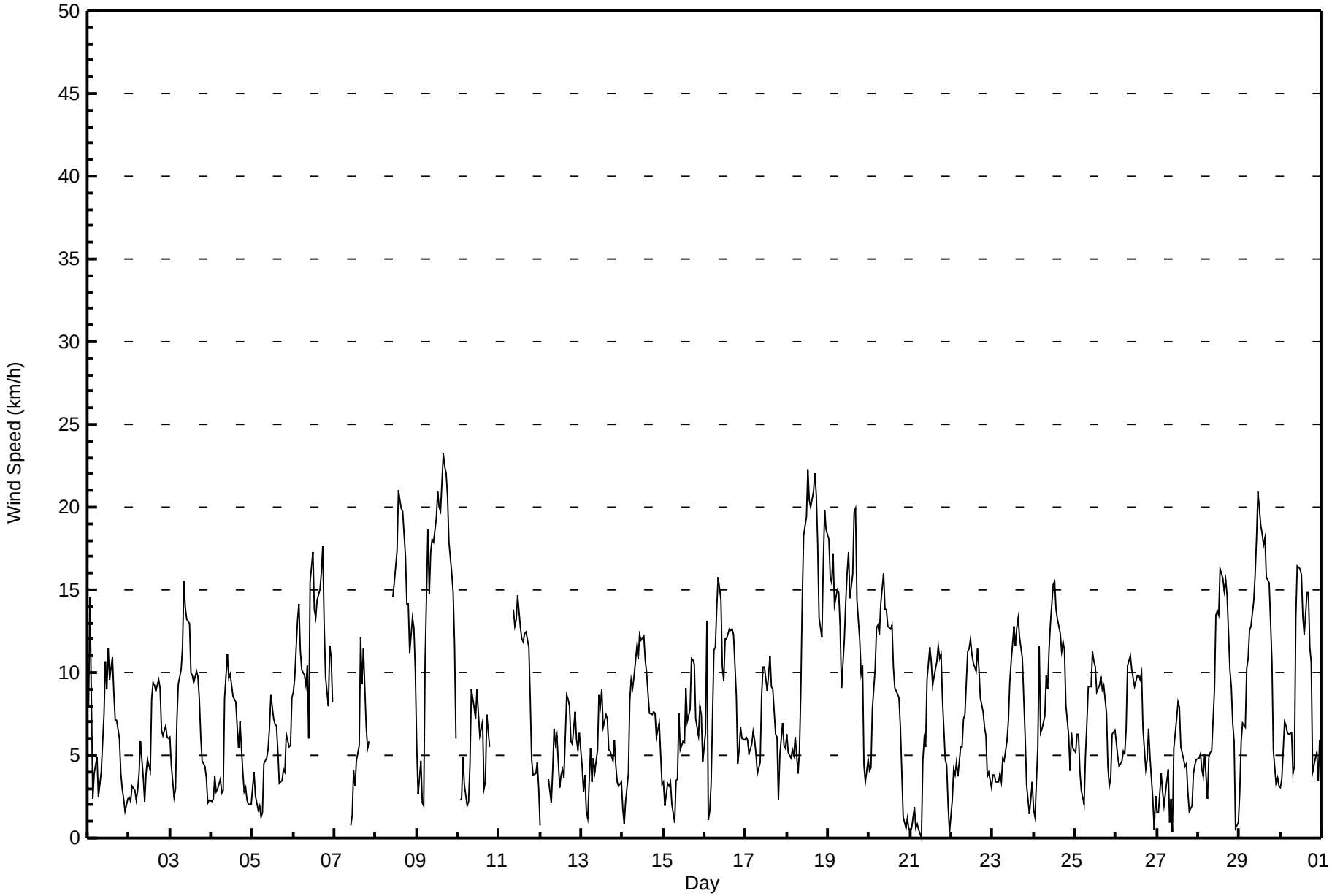
All monthly, daily, and diurnal averages have been calculated using vector methods

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed (WS) - km/h

Conklin Community - April 2016



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	256	37.65	37.65
6 - 11	263	38.68	76.32
12 - 19	140	20.59	96.91
20 - 28	21	3.09	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 680

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Wind Speed (WS) - km/h

Conklin Community - April 2016

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	28	17	8	12	23	23	21	32	18	18	9	4	5	4	12	22	256
6 - 11	21	13	10	10	11	22	15	32	34	25	8	4	4	9	29	16	263
12 - 19	6	0	1	0	0	3	10	23	17	26	9	3	2	6	15	19	140
20 - 28	0	0	0	0	0	0	1	3	8	0	0	0	2	0	0	7	21
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	55	30	19	22	34	48	47	90	77	69	26	11	13	19	56	64	680

Total Number of Valid Hours: 680

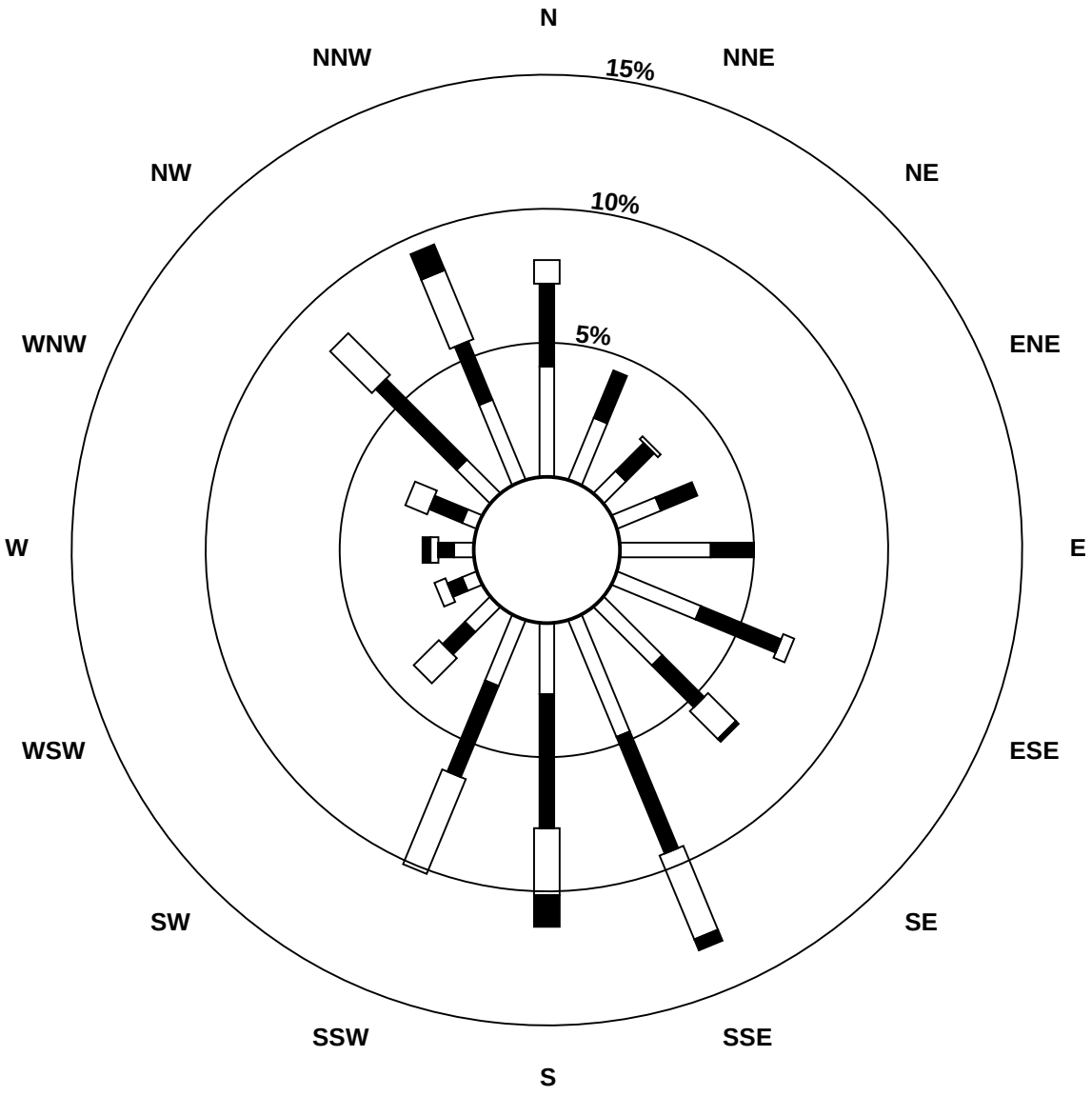
Total Number of Hours: 720

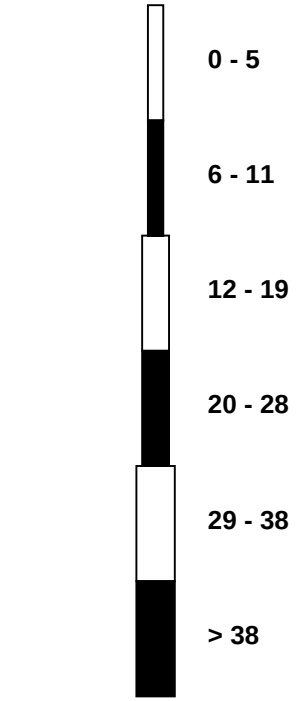
Wood Buffalo Environmental Association

Wind Rose Apr 2016

Wind Speed (WS) - km/h

Conklin Community (AMS 21)





Total Number of Valid Hours: 680

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Speed (WS) - km/h

Conklin Community - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 9 km/h on Apr 19 17:00

Minimum Value: 0 km/h on Apr 28 02:00

Percentiles: $P_1 = 1$ $P_{10} = 1$ $Q_1 = 1$ Median = 3 $Q_3 = 4$ $P_{90} = 5$ $P_{99} = 7$

Hours in Service:	720
Hours of Data:	680
Hours of Missing Data:	40
Hours of Calibration:	0
Percent Operational Time:	94.4

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-Apr	3	4	3	3	2	2	2	1	1	4	4	3	4	4	3	4	3	3	3	2	1	1	1	1	4
2-Apr	1	1	1	1	1	1	1	1	1	2	2	2	3	3	3	3	3	3	3	2	3	2	1	1	3
3-Apr	2	1	1	1	2	3	3	3	4	4	3	4	4	4	4	4	3	3	2	1	1	1	1	1	4
4-Apr	1	1	1	0	1	1	0	1	3	3	3	3	3	2	2	3	2	2	2	1	1	1	1	1	3
5-Apr	1	1	1	1	1	1	1	2	1	2	2	2	2	2	1	2	1	1	1	1	2	1	1	3	3
6-Apr	2	3	3	4	4	5	4	3	5	4	5	5	5	6	5	5	5	5	4	4	2	3	4	2	6
7-Apr	AF	AF	AF	AF	AF	AF	AF	AF	AF	2	2	2	2	3	3	5	3	4	3	2	2	AF	AF	AF	5
8-Apr	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	3	4	5	6	5	6	7	5	4	5	3	3	4	4	7
9-Apr	3	2	2	1	1	6	6	4	5	5	5	6	6	6	7	6	6	6	5	5	5	7	6	6	7
10-Apr	AF	3	3	4	5	3	3	5	5	4	5	4	4	4	4	3	3	2	2	AF	AF	AF	AF	AF	5
11-Apr	AF	AF	AF	AF	AF	AF	AF	AF	4	4	3	4	4	4	4	4	4	4	2	2	1	1	1	3	4
12-Apr	1	AF	AF	AF	AF	2	2	2	2	2	3	3	3	3	4	4	3	3	2	2	3	2	2	2	4
13-Apr	1	2	2	2	2	2	1	2	1	1	3	2	3	2	2	3	2	2	1	1	1	1	1	2	3
14-Apr	1	1	2	2	3	3	3	4	4	4	4	4	5	4	4	3	3	3	3	2	2	2	2	1	5
15-Apr	2	1	2	1	2	1	2	3	3	3	3	3	3	3	3	3	4	3	3	1	2	2	2	3	4
16-Apr	3	4	3	1	4	3	3	4	4	4	4	4	4	5	5	4	4	4	3	2	1	1	1	1	5
17-Apr	1	1	1	1	1	1	1	2	2	3	3	4	3	4	4	4	4	3	3	1	1	1	1	1	4
18-Apr	1	1	1	1	1	1	2	1	4	4	5	6	6	6	6	6	6	6	5	4	3	5	6	5	6
19-Apr	5	5	4	5	5	4	4	4	4	5	6	8	7	6	8	8	9	7	5	4	3	2	1	1	9
20-Apr	2	2	2	4	4	5	4	4	4	4	4	4	4	4	4	4	3	3	2	1	1	1	1	1	5
21-Apr	1	1	1	1	1	1	1	1	2	2	3	3	4	4	4	4	4	4	3	3	1	2	2	1	4
22-Apr	1	1	1	1	1	1	1	2	2	4	4	4	4	3	4	3	3	3	3	2	2	2	2	1	4
23-Apr	2	1	1	2	2	2	1	2	2	2	3	3	4	3	4	4	3	3	2	2	1	1	1	1	4
24-Apr	1	2	2	4	2	3	2	3	3	3	3	4	4	4	4	4	4	3	3	2	2	1	1	1	4
25-Apr	1	1	1	1	1	1	1	2	3	3	3	3	3	3	3	4	3	2	2	2	1	1	3	2	4
26-Apr	2	1	1	1	1	1	2	2	3	3	2	2	3	3	3	3	2	2	4	2	1	1	1	2	4
27-Apr	2	1	1	1	1	1	1	2	1	2	2	3	3	3	2	2	2	2	1	1	1	1	1	2	3
28-Apr	1	0	1	2	1	1	1	1	1	3	5	4	5	5	4	4	5	4	3	2	1	1	1	1	5
29-Apr	1	2	2	2	3	3	3	3	4	4	5	6	6	6	6	5	4	5	4	3	2	1	1	1	6
30-Apr	1	1	2	2	1	1	1	1	2	4	5	4	5	4	4	4	5	4	4	1	1	1	2	2	5
	5	5	4	5	5	6	6	5	5	5	6	8	7	6	8	8	9	7	5	5	5	7	6	6	
	Diurnal Maximum																								

AF - Analyzer Failure

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Conklin Community - April 2016

Direction of Maximum Speed: 334 deg on Apr 9 16:00
Direction of Maximum Daily Speed Average: 333.3 deg on Apr 9

Direction of Minimum Speed: 273 deg on Apr 21 07:00
Direction of Minimum Daily Speed Average: 1.9 deg on Apr 27

Monthly Average Direction: 252.5 deg

Hours in Service:	720
Hours of Data:	680
Hours of Missing Data:	40
Percent Operational Time:	94.4

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-Apr	209	226	248	240	332	328	2	346	315	320	326	314	324	339	336	1	20	44	79	61	75	73	78	101	330.9
2-Apr	119	359	5	5	13	15	349	350	355	28	0	16	325	321	348	6	17	18	18	10	14	353	347	351	1.5
3-Apr	347	349	5	333	319	323	330	329	335	330	329	330	321	321	310	321	338	344	1	82	79	100	95	99	335.8
4-Apr	94	100	124	132	120	130	117	91	162	190	172	130	141	145	116	121	88	100	102	111	98	76	47	22	129.1
5-Apr	41	91	91	74	31	29	43	103	92	100	107	112	108	109	111	118	114	119	156	165	163	170	179	191	121.3
6-Apr	202	221	227	257	274	288	297	306	322	311	320	318	318	313	318	327	325	334	347	344	334	338	344	15	312.0
7-Apr	AF	AF	AF	AF	AF	AF	AF	AF	AF	192	268	205	284	287	342	348	25	34	49	45	54	AF	AF	AF	--
8-Apr	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	133	135	140	150	146	149	164	157	147	156	147	151	166	167	--
9-Apr	171	143	151	353	312	321	322	325	322	326	324	327	332	332	337	334	336	335	338	339	346	356	349	345	333.3
10-Apr	AF	327	329	345	346	343	338	346	10	21	19	358	22	8	10	6	98	105	108	AF	AF	AF	AF	AF	16.1
11-Apr	AF	AF	AF	AF	AF	AF	AF	AF	195	201	195	208	197	185	166	195	188	206	170	150	156	166	158	138	--
12-Apr	126	AF	AF	AF	AF	207	190	220	321	359	351	309	352	332	24	73	46	44	53	63	91	91	108	89	47.0
13-Apr	100	103	342	39	9	332	7	339	2	20	357	355	353	4	7	73	32	11	4	352	341	320	335	262	3.6
14-Apr	179	19	346	318	326	317	315	311	312	311	312	309	309	302	293	311	302	307	318	319	327	340	357	3	314.7
15-Apr	29	3	348	7	4	354	180	127	147	104	115	116	107	126	164	185	164	165	172	168	165	160	158	148	145.0
16-Apr	160	178	195	73	233	198	195	203	203	209	208	219	197	225	237	227	240	227	206	214	201	202	203	202	208.9
17-Apr	199	197	189	184	181	170	172	193	210	201	214	239	284	277	302	283	281	272	243	206	200	202	187	191	227.1
18-Apr	198	170	157	150	142	133	136	122	197	191	196	199	189	187	173	179	178	177	174	167	162	170	175	185	177.9
19-Apr	199	198	200	204	214	215	223	225	274	292	290	283	275	283	266	269	278	287	300	304	316	303	291	306	256.9
20-Apr	312	315	316	326	327	353	346	343	336	341	348	350	1	3	11	14	23	32	56	55	356	274	224	181	351.3
21-Apr	243	222	192	252	321	243	273	107	107	99	130	126	124	116	100	63	52	41	42	35	29	61	87	219	84.1
22-Apr	33	21	16	5	323	331	5	71	90	96	103	102	107	114	105	112	109	83	69	64	66	80	64	79	82.6
23-Apr	64	27	42	65	36	10	331	56	68	101	122	123	119	116	136	143	153	157	153	186	199	97	121	151	121.1
24-Apr	119	155	146	162	152	151	165	174	170	130	136	141	145	138	155	152	156	150	152	153	151	146	136	130	149.1
25-Apr	134	129	135	120	103	82	130	144	167	186	178	171	187	191	187	186	211	214	228	220	216	170	166	175	175.9
26-Apr	173	177	154	147	142	151	167	187	197	196	191	186	206	194	198	202	187	210	153	178	157	116	157	328	183.3
27-Apr	157	159	164	180	181	132	141	153	94	268	210	248	233	204	124	119	340	6	360	140	165	160	157	165	175.4
28-Apr	160	157	149	131	142	121	127	119	123	145	155	167	168	171	175	167	161	179	167	159	159	143	162	320	159.6
29-Apr	163	153	160	156	147	151	156	156	156	172	178	170	160	177	179	184	174	171	166	169	178	229	202	190	168.8
30-Apr	184	188	206	192	191	178	177	177	187	191	201	207	198	193	206	205	213	227	230	203	185	208	201	193	201.0
	173.6	182.7	188.8	194.1	242.2	261.1	256.8	228.7	239.0	202.2	199.5	201.1	195.9	196.2	188.6	185.7	187.4	167.8	136.7	131.8	128.0	146.7	159.0	168.0	
	Diurnal Average																								

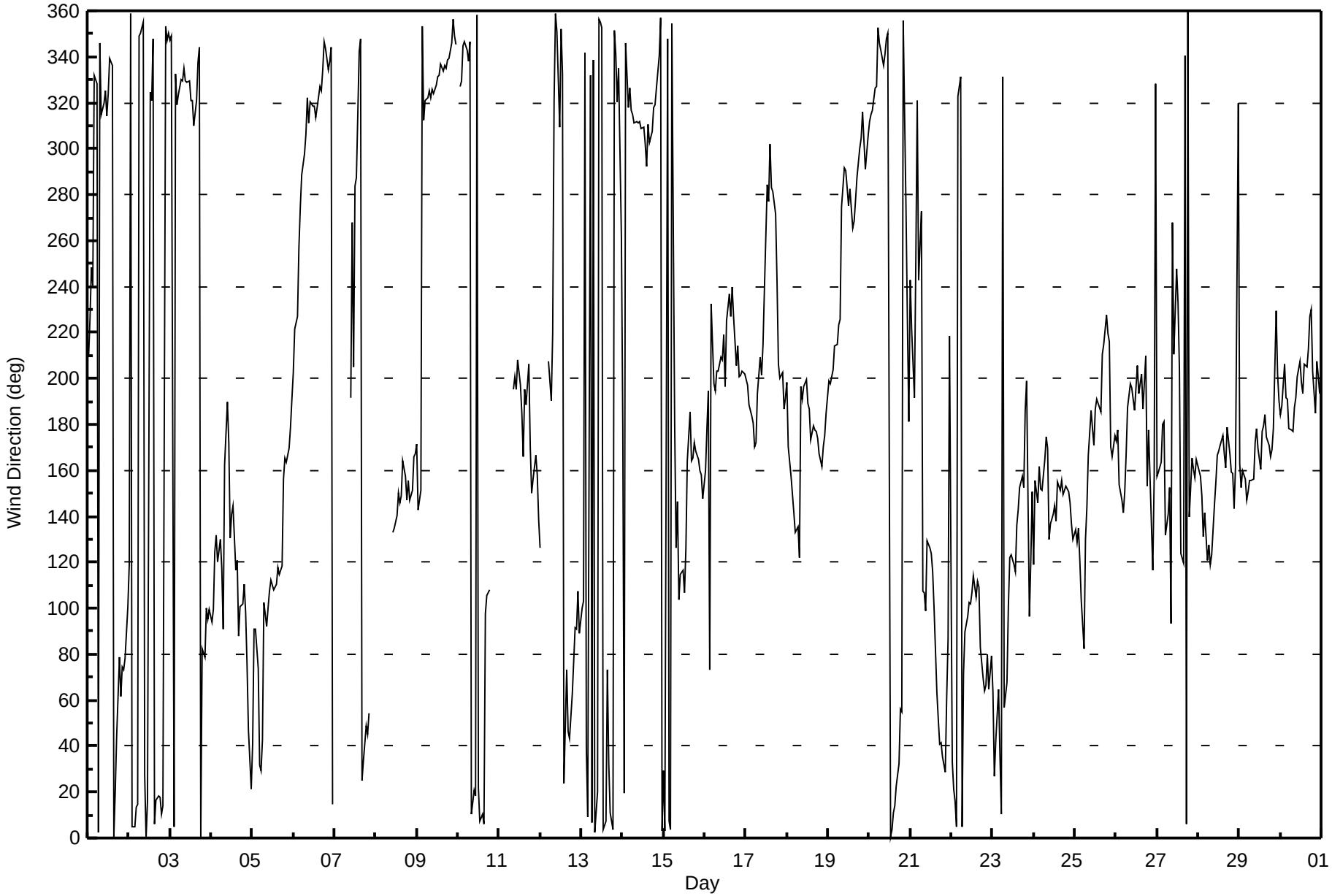
AF - Analyzer Failure
All monthly, daily, and diurnal averages have been calculated using vector methods

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction (WD) - deg

Conklin Community - April 2016



Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg

Conklin Community - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 114 deg on Apr 27 10:00

Minimum Value: 7 deg on Apr 17 01:00

Percentiles: P_1 = 9 P_{10} = 16 Q_1 = 19 Median = 25 Q_3 = 35 P_{90} = 56 P_{99} = 93

Hours in Service:	720
Hours of Data:	680
Hours of Missing Data:	40
Hours of Calibration:	0
Percent Operational Time:	94.4

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-Apr	41	21	34	98	51	36	36	35	46	37	34	33	25	32	31	38	48	41	26	24	25	30	31	34	98
2-Apr	36	28	18	15	19	14	17	22	42	60	69	55	64	40	34	26	25	23	22	22	19	18	19	18	69
3-Apr	22	24	25	51	21	20	19	19	19	22	21	24	32	35	33	28	29	24	33	26	27	19	25	25	51
4-Apr	23	22	18	26	18	15	23	24	31	23	31	25	31	30	33	43	46	24	29	30	35	44	21	17	46
5-Apr	18	23	15	12	18	44	8	26	22	21	19	17	17	18	17	24	21	27	22	30	18	24	20	27	44
6-Apr	21	21	21	22	28	36	36	31	38	72	22	20	23	26	20	20	21	20	19	16	17	19	26	20	72
7-Apr	AF	AF	AF	AF	AF	AF	AF	AF	AF	98	100	61	87	76	58	34	28	24	28	30	31	AF	AF	AF	100
8-Apr	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	17	18	18	18	17	20	19	17	17	16	17	17	18	26	26
9-Apr	60	91	49	42	27	15	17	17	18	19	19	19	19	18	19	19	20	20	19	19	18	22	20	17	91
10-Apr	AF	12	13	17	16	19	12	13	28	33	39	40	47	75	62	92	90	28	24	AF	AF	AF	AF	AF	92
11-Apr	AF	AF	AF	AF	AF	AF	AF	AF	20	20	22	25	27	30	30	30	23	22	19	15	24	22	15	47	47
12-Apr	63	AF	AF	AF	AF	28	62	46	28	42	45	92	80	73	83	45	36	26	32	39	33	35	38	33	92
13-Apr	43	77	22	78	90	31	46	26	30	24	25	25	25	26	27	37	25	29	23	17	17	21	30	31	90
14-Apr	77	80	28	21	19	17	19	21	23	25	24	27	25	29	31	26	27	27	23	19	15	18	23	18	80
15-Apr	43	45	23	25	23	34	92	87	80	40	71	65	67	35	52	46	26	23	17	13	16	14	17	53	92
16-Apr	53	18	93	72	78	17	21	18	20	22	34	38	30	33	30	32	26	23	20	26	15	9	7	7	93
17-Apr	7	10	9	9	11	11	17	42	50	44	35	39	32	37	31	39	38	33	23	51	8	7	20	16	51
18-Apr	10	21	20	10	13	11	69	15	41	19	22	22	22	24	21	20	21	19	18	17	16	18	17	20	69
19-Apr	20	19	19	17	26	20	20	22	35	30	30	32	31	31	31	26	30	30	28	25	15	19	20	21	35
20-Apr	20	17	15	17	17	21	18	19	20	25	24	26	26	31	40	41	34	35	33	30	64	47	56	97	97
21-Apr	54	70	63	60	46	65	63	35	39	55	39	23	35	43	44	38	37	32	25	23	24	42	73	94	94
22-Apr	63	23	23	25	14	15	25	38	41	34	38	35	40	33	38	24	24	38	34	35	35	44	47	54	63
23-Apr	44	39	47	57	48	47	17	43	41	36	25	25	24	29	24	23	22	19	16	20	35	74	69	42	74
24-Apr	68	91	29	16	15	20	21	24	30	23	18	21	20	24	28	26	25	21	16	15	13	15	15	15	91
25-Apr	17	16	14	24	30	39	12	18	21	25	21	22	28	29	26	29	25	23	23	26	24	18	16	20	39
26-Apr	18	20	17	12	12	12	17	16	22	21	21	22	22	23	23	30	37	51	56	22	13	68	93	39	93
27-Apr	89	84	32	41	75	55	22	96	63	114	56	39	31	31	34	54	78	28	21	69	65	25	13	28	114
28-Apr	20	17	24	37	13	56	11	14	25	41	27	30	33	30	24	27	24	21	18	14	18	11	87	42	87
29-Apr	60	28	15	17	15	15	17	17	20	23	23	22	22	23	27	24	23	23	19	15	32	32	27	42	60
30-Apr	31	29	16	14	9	14	17	28	31	23	23	26	22	23	24	28	25	25	23	24	15	34	55	13	55
	89	91	93	98	90	65	92	96	80	114	100	92	87	76	83	92	90	51	56	69	65	74	93	97	
	Diurnal Maximum																								

AF - Analyzer Failure

Wood Buffalo Environmental Association
SO2 Calibration Report

W B E A

Station Information

Calibration Date	March 23, 2016	Last Calibration	n/a
Station Name	Conklin Townsite	Station Number	AMS 21
Reason:	Install		
Start Time (MST)	9:25	End Time (MST)	15:40
Gas Cert Reference	EY0000359	Station temp.	Deg C
Cal Gas Concentration	51.4 ppm	Cal Gas Exp Date	Feb-09-2018
Calibrator Make/Model	API T700	Serial Number	1221
ZAG Make/Model	API 701	Serial Number	5611
DACS make/model	Campbell Scientific CR3000	DACS serial No.	9628

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 1000 ppb		PMT voltage	-655	-655
Analyzer IP address	192.168.1.43		Lamp voltage	846	846
Calculated slope		0.996565	Chamber temp	45.0	45.0
Calculated intercept		2.566231	Pressure	658.7	656.4
Analyzer Background	21.6	20.9	Flow	0.485	0.483
Analyzer Coefficient	0.959	0.923	Intensity	92	92

Analyzer make	Thermo 43i	Analyzer serial #	JC1428701363

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero					
as found span					
calibrator zero	5000	0.0	0.0	0.2	----
high point	5000	76.5	786.4	788.3	0.998
second point	5000	38.3	393.7	390.0	1.009
third point	5000	19.3	198.4	194.6	1.020
as left zero	5000	0.0	0.0	0.3	----
as left span	5000	78.1	802.9	781.7	1.027
				Average Correction Factor	1.009

Corrected As found	NA	Previous response	NA	% change	NA

Notes:

Changed sample inlet filter prior to cal. Adjusted span. Maintenance being done on 55i, as well as purged cal gases through the calibrator during calibration.

Calibration Performed By: Asad Hidayat

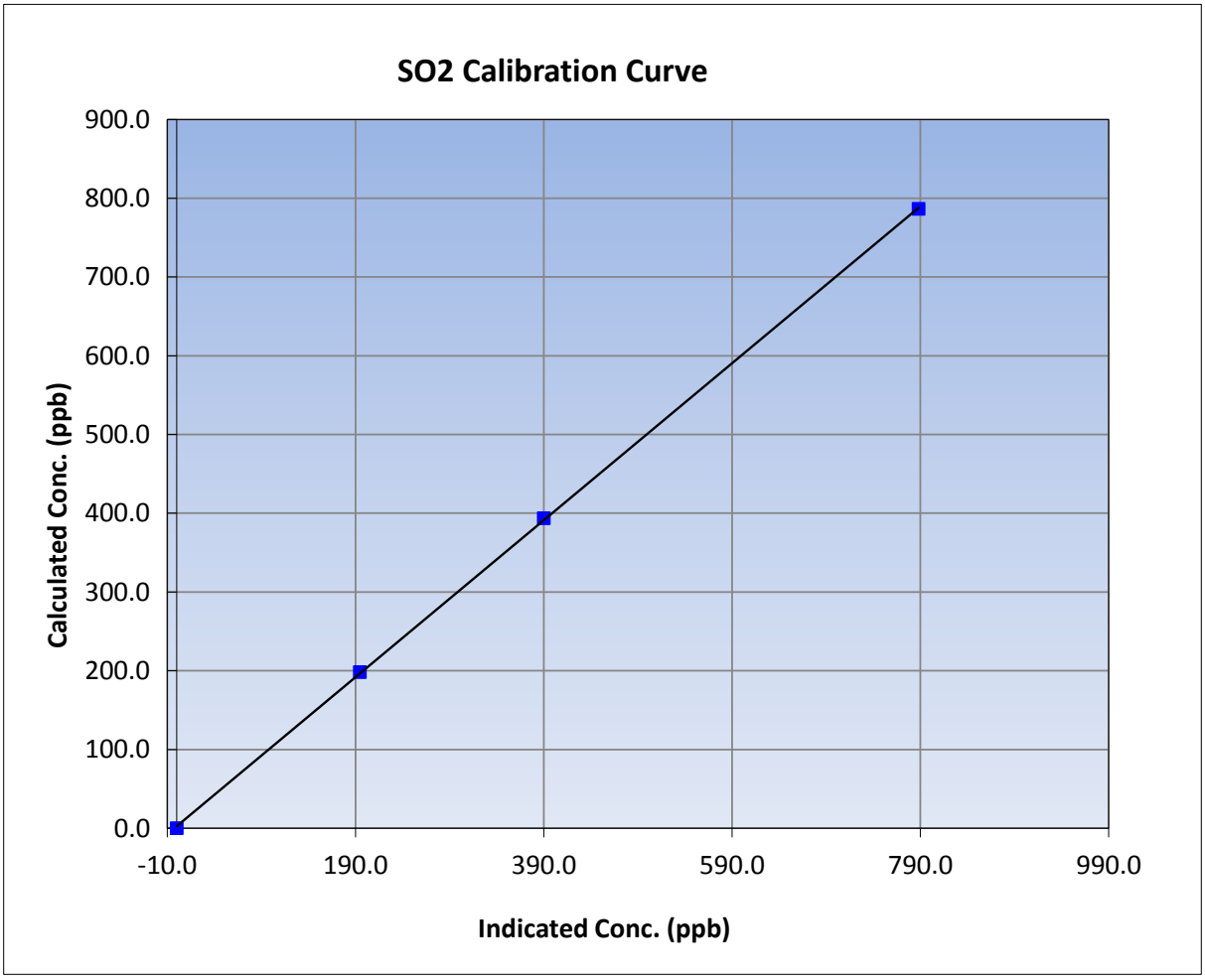
Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

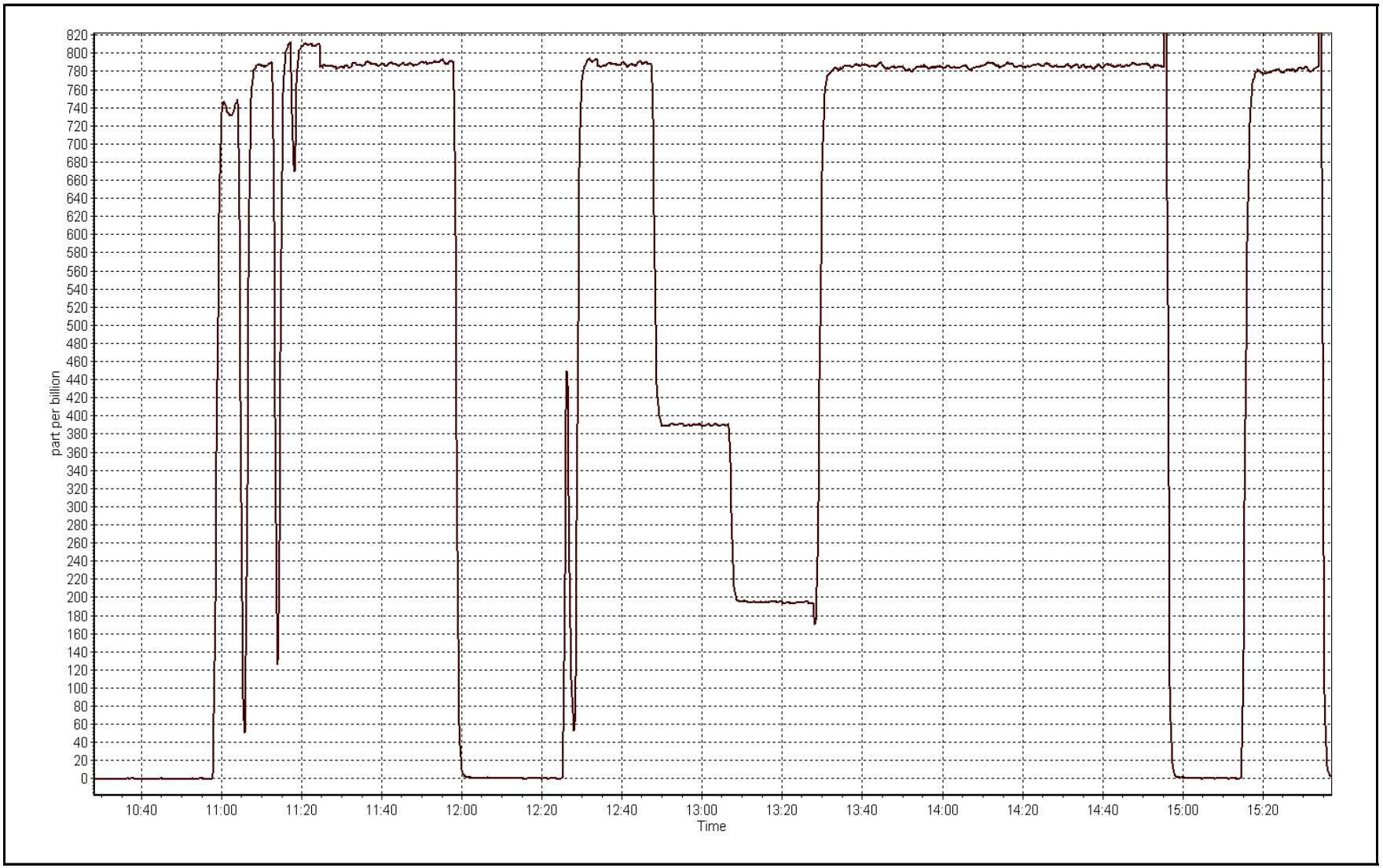
Calibration Date	March 23, 2016	Previous Calibration	n/a
Station Name	Conklin Townsite	Station Number	AMS 21
Start Time (MST)	9:25	End Time (MST)	15:40
Analyzer make	Thermo 43i	Analyzer serial #	JC1428701363

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	----	Correlation Coefficient	0.999940
786.4	788.3	0.9977		
393.7	390.0	1.0095	Slope	0.996565
198.4	194.6	1.0198		
			Intercept	2.566231



SO2 Calibration Plot Date: March 23, 2016



Wood Buffalo Environmental Association
TRS Calibration Report

Station Information

Calibration Date	March 31, 2016	Last Calibration	March 24, 2016
Station Name	Conklin Townsite	Station Number	AMS 21
Reason:	Other:	Systems check following sensitivity drop	
Start Time (MST)	11:05	End Time (MST)	13:55
Gas Cert Reference	LL119411	Station temp.	22 Deg C
Cal Gas Concentration	4.97 ppm	Cal Gas Exp Date	12/02/2019
Calibrator Make/Model	API T700	Serial Number	1221
Dil air Make/Model	API 701	Serial Number	5611
DACS make/model	Campbell Scientific CR3000	DACS serial No.	9628
SO2 gas concentration	51.4 ppm	SO2 gas cert/exp	EY0000359 9/Feb/18

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-637	-637
Analyzer IP address	192.168.1.44		Lamp voltage	923	927
Calculated slope	0.995646	0.989098	Chamber temp	45	45
Calculated intercept	0.240747	0.370379	Pressure	662.8	669.4
Analyzer Background	2.7	2.85	Flow	0.426	0.430
Analyzer Coefficient	0.996	1.058	Intensity	91	91
			Converter temp.	800	800

Analyzer make/model	Thermo 43i-TLE	Analyzer serial #	1410661331
Converter make/model	CDN-101	Converter serial #	521

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	80.5	80.0	76.0	1.053
SO2 scrubber check					
calibrator zero	5000	0.0	0.0	-0.1	----
high point	5000	80.5	80.0	80.7	0.992
second point	5000	40.2	40.0	39.9	1.002
third point	5000	20.1	20.0	19.5	1.025
as left zero	5000	0.0	0.0	0.1	----
as left span	5000	80.5	80.0	78.6	1.018
				Average Correction Factor	1.006

Corrected As found	76.1	Previous response	80.1	% change	5.3%

Notes:

Analyzer tested for sensitivity change; noted analyzer response drop since initial installation calibration. Cylinder regulator is suspected to be the cause of sensitivity loss. Calibration system will be purged regularly throughout the week to stabilize system.

Calibration Performed By: Kelly Baragar

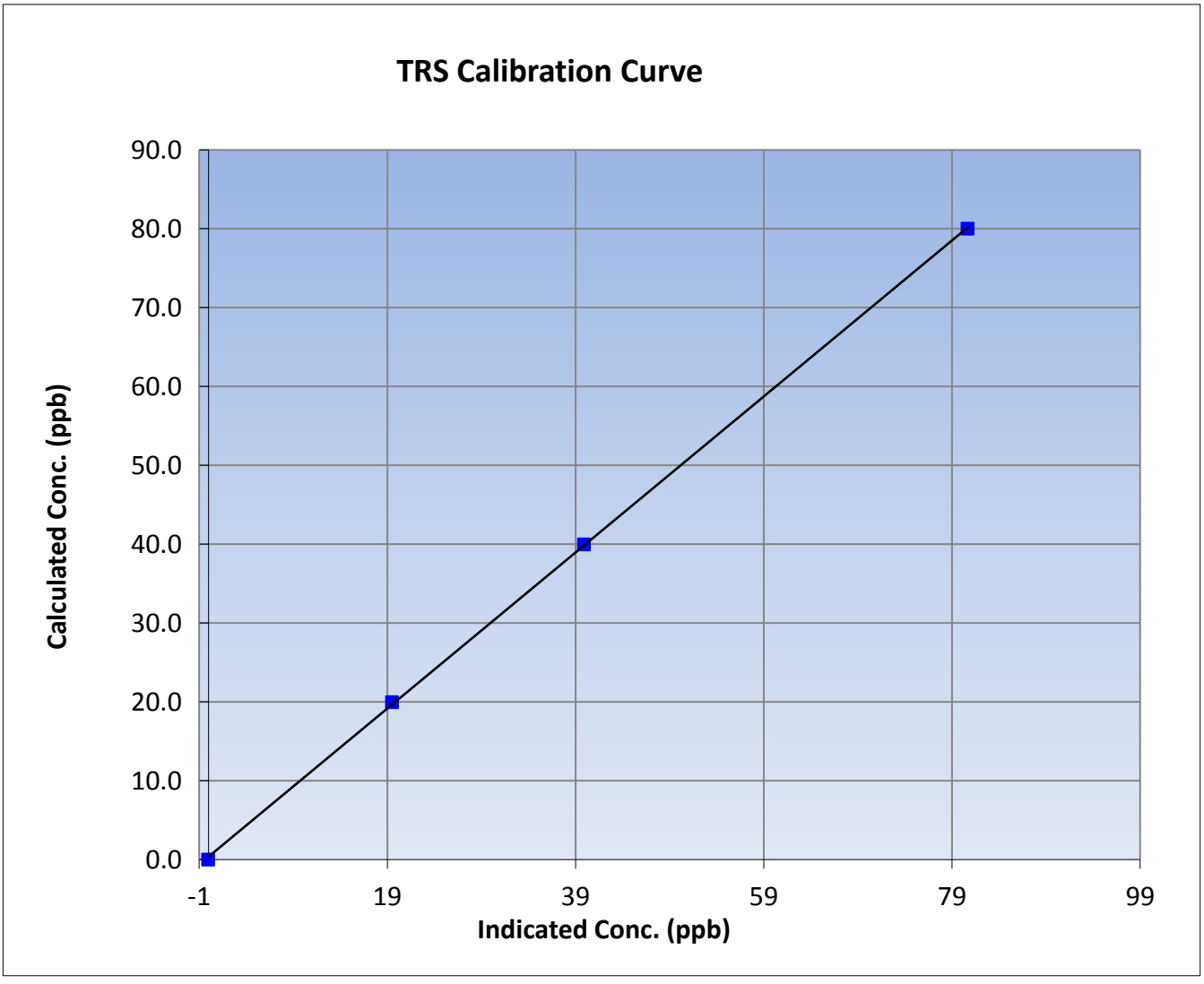
Wood Buffalo Environmental Association
TRS Calibration Report

Station Information

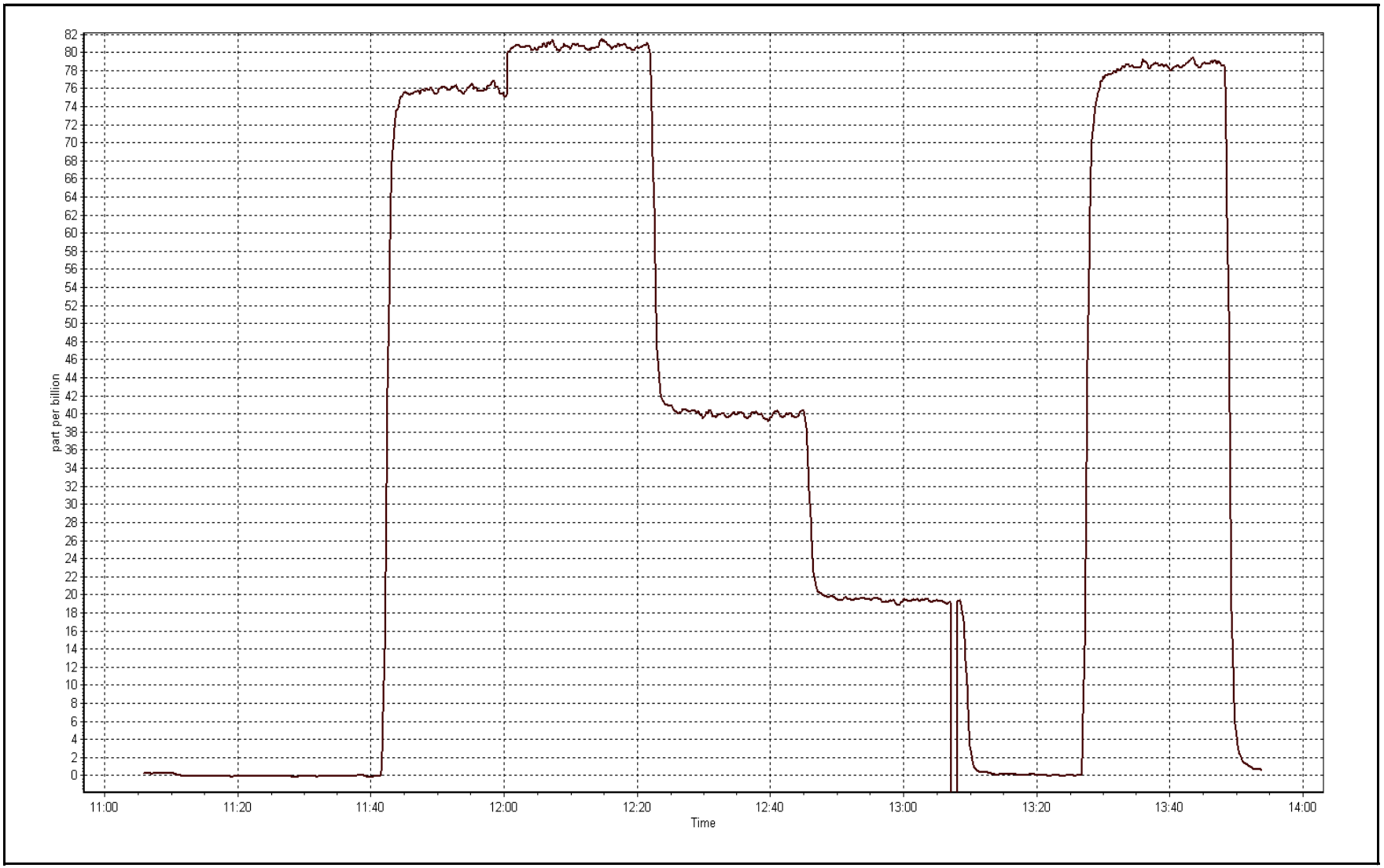
Calibration Date	March 31, 2016	Previous Calibration	March 24, 2016
Station Name	Conklin Townsite	Station Number	AMS 21
Start Time (MST)	11:05	End Time (MST)	13:55
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1410661331

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999932
80.0	80.7	0.9919		
40.0	39.9	1.0017	Slope	0.989098
20.0	19.5	1.0246		
			Intercept	0.370379



TRS Calibration Plot Date: March 31, 2016



Wood Buffalo Environmental Association
THC / NMHC Calibration Report

Station Information

Calibration Date	March-30-16	Last Calibration	March-23-16
Station Name	Conklin Townsite	Station Number	AMS 21
Reason:	Install		
Start Time (MST)	13:45	End Time (MST)	14:55
Gas Cert Reference	EY0000359	Cal Gas Expiry Date	Feb-09-2018
CH4 Cal Gas Conc.	512.0 ppm	CH4 Equiv Conc.	1084.0 ppm
C3H8 Cal Gas Conc.	208.0 ppm	Station temp.	21 Deg C
Calibrator Model	API T700	Serial Number	1221
ZAG make/model	Teledyne API 701	Serial Number	5611
DACS make/model	Campbell Scientific CR3000	Serial Number	9628

Analyzer Information

	Before	*After*		*Before*	*After*
THC Range (ppm)	0 - 50 ppm		Column Temp	75.0	75.0
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	175.0	175.0
Analyzer IP address	192.168.1.55		Flame Temp	405.0	405.0
THC Calc slope	NA	0.996713	Carrier Pressure	37.0	37.0
THC Calc intercept	NA	0.064785	Fuel Pressure	49.6	49.6
NMHC Calc slope	NA	0.994438	Air Pressure	34.2	34.3
NMHC Calc intercept	NA	0.012264			

Analyzer make	Thermo 55i	Analyzer serial #	1152430011

THC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	76.3	16.54	16.58	0.998
second point	5000	38.2	8.28	8.16	1.015
third point	5000	19.1	4.14	4.06	1.020
				Average Correction Factor	1.011

Corrected As found	NA	Previous response	NA	% change	NA

Notes:

Initial install calibration failed due to fuel source supply issue. Issue resolved and instrument re-calibrated. Cal passed calibratio performance criteria. As lefts not performed due to time constraint of contractor cutting power to site for electrical work.

Calibration Performed By: Zach Eastman

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)
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	76.3	8.73	8.77	0.995
second point	5000	38.2	4.37	4.38	0.998
third point	5000	19.1	2.19	2.17	1.007
				Average Correction Factor	1.000

Corrected As found	NA	Previous response	NA	% change	NA

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)
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	76.3	7.81	7.80	1.002
second point	5000	38.2	3.91	3.82	1.024
third point	5000	19.1	1.96	1.89	1.035
				Average Correction Factor	1.020

Corrected As found	NA	Previous response	NA	% change	NA

Wood Buffalo Environmental Association

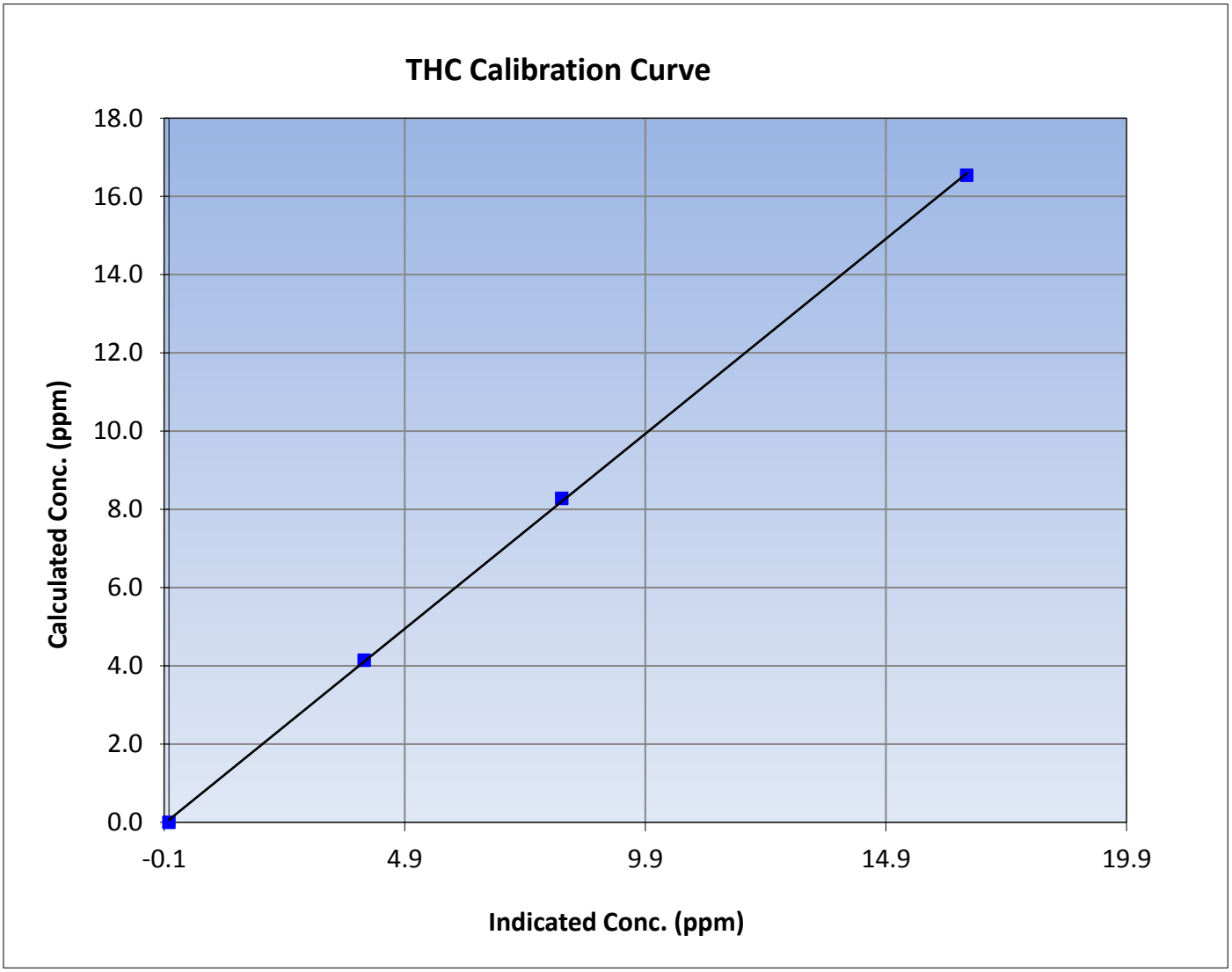
THC Calibration Summary

Station Information

Calibration Date	March 30, 2016	Previous Calibration	March 23, 2016
Station Name	Conklin Townsite	Station Number	AMS 21
Start Time (MST)	13:45	End Time (MST)	14:55
Analyzer make	Thermo 55i	Analyzer serial #	1152430011

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999904
16.54	16.58	0.9977		
8.28	8.16	1.0149	Slope	0.996713
4.14	4.06	1.0199		
			Intercept	0.064785



Wood Buffalo Environmental Association

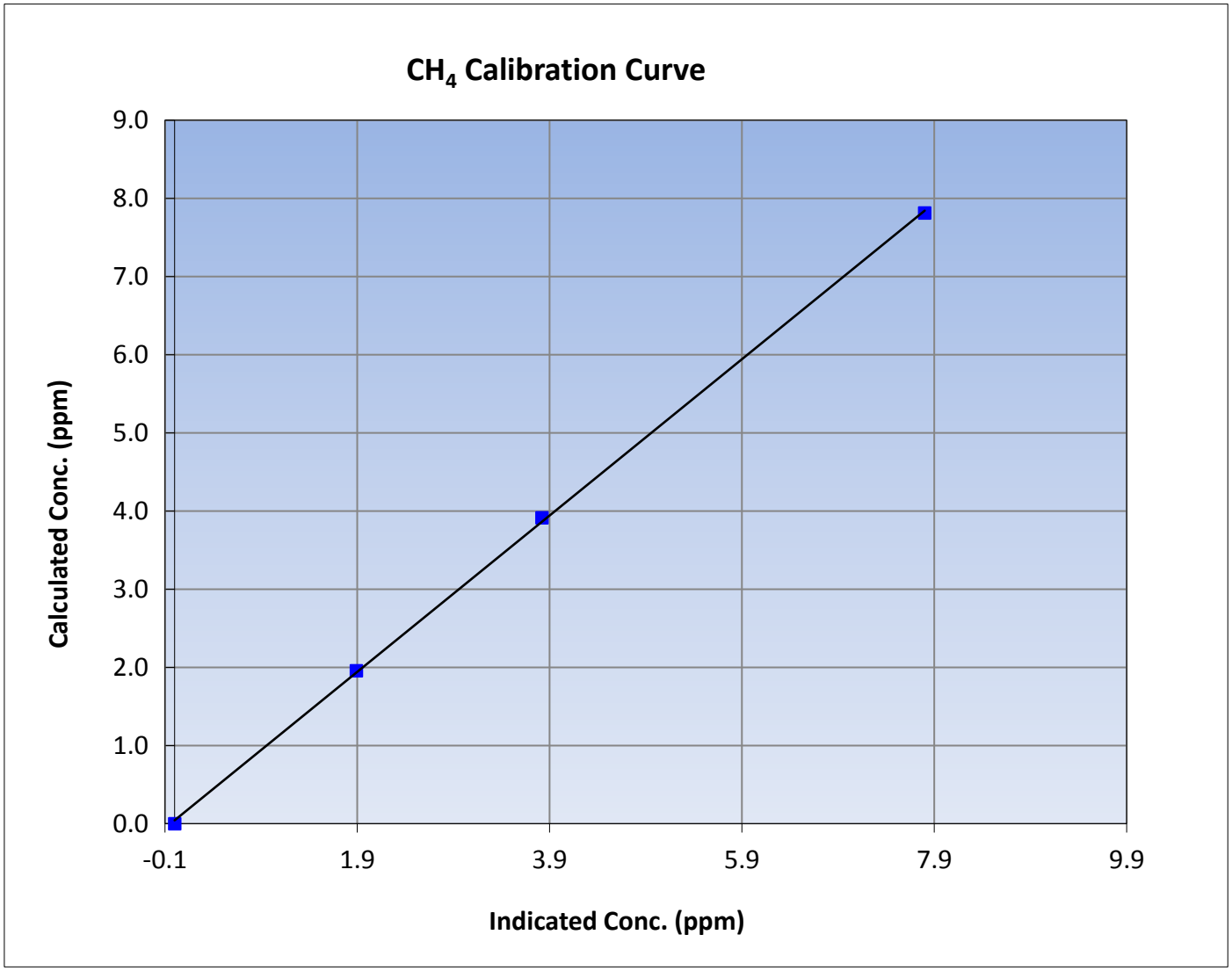
CH_4 Calibration Summary

Station Information

Calibration Date	March 30, 2016	Previous Calibration	March 23, 2016
Station Name	Conklin Townsite	Station Number	AMS 21
Start Time (MST)	13:45	End Time (MST)	14:55
Analyzer make	Thermo 55i	Analyzer serial #	1152430011

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999831
7.81	7.80	1.0017		
3.91	3.82	1.0240	Slope	1.000020
1.96	1.89	1.0348		
			Intercept	0.042594



Wood Buffalo Environmental Association

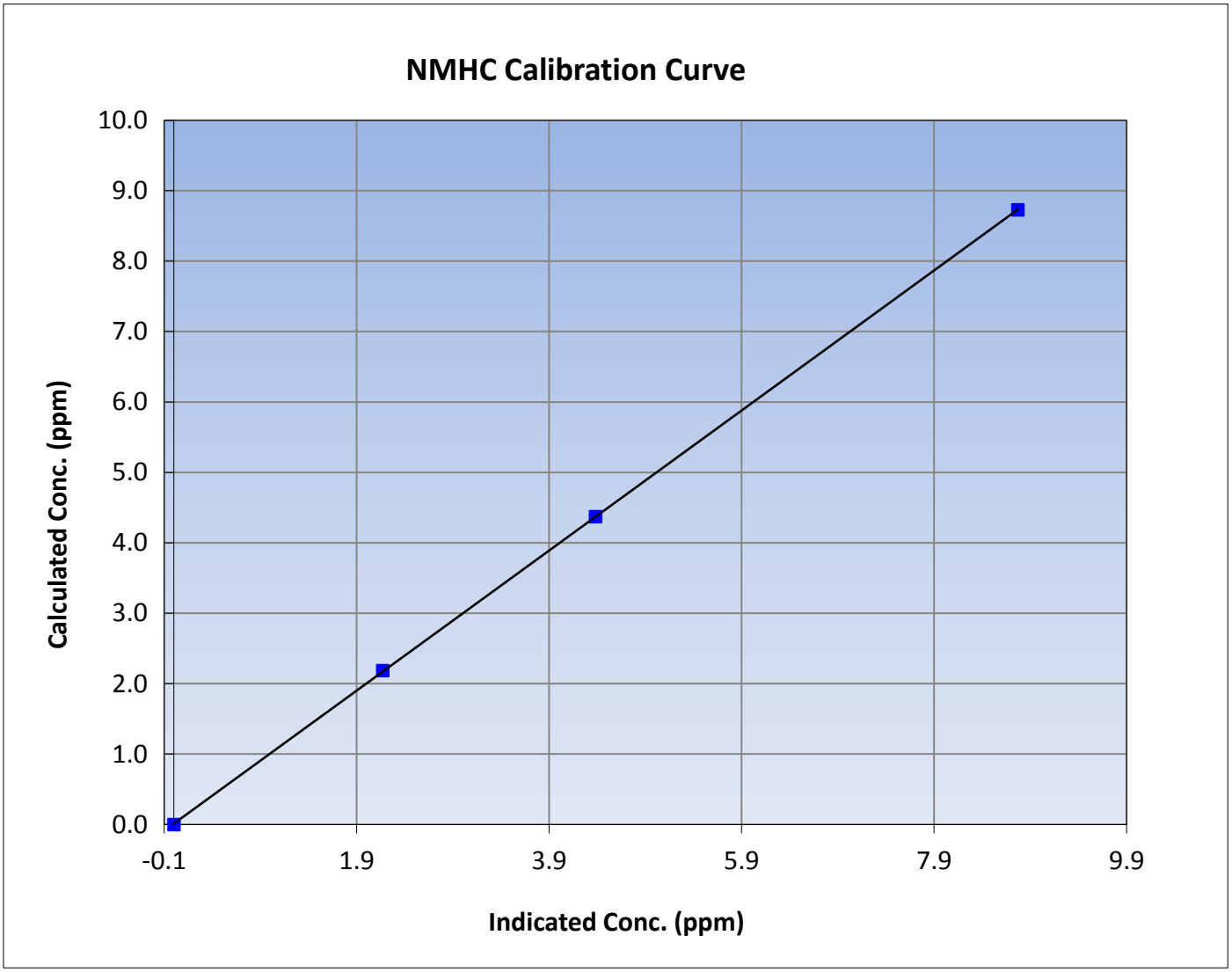
NMHC Calibration Summary

Station Information

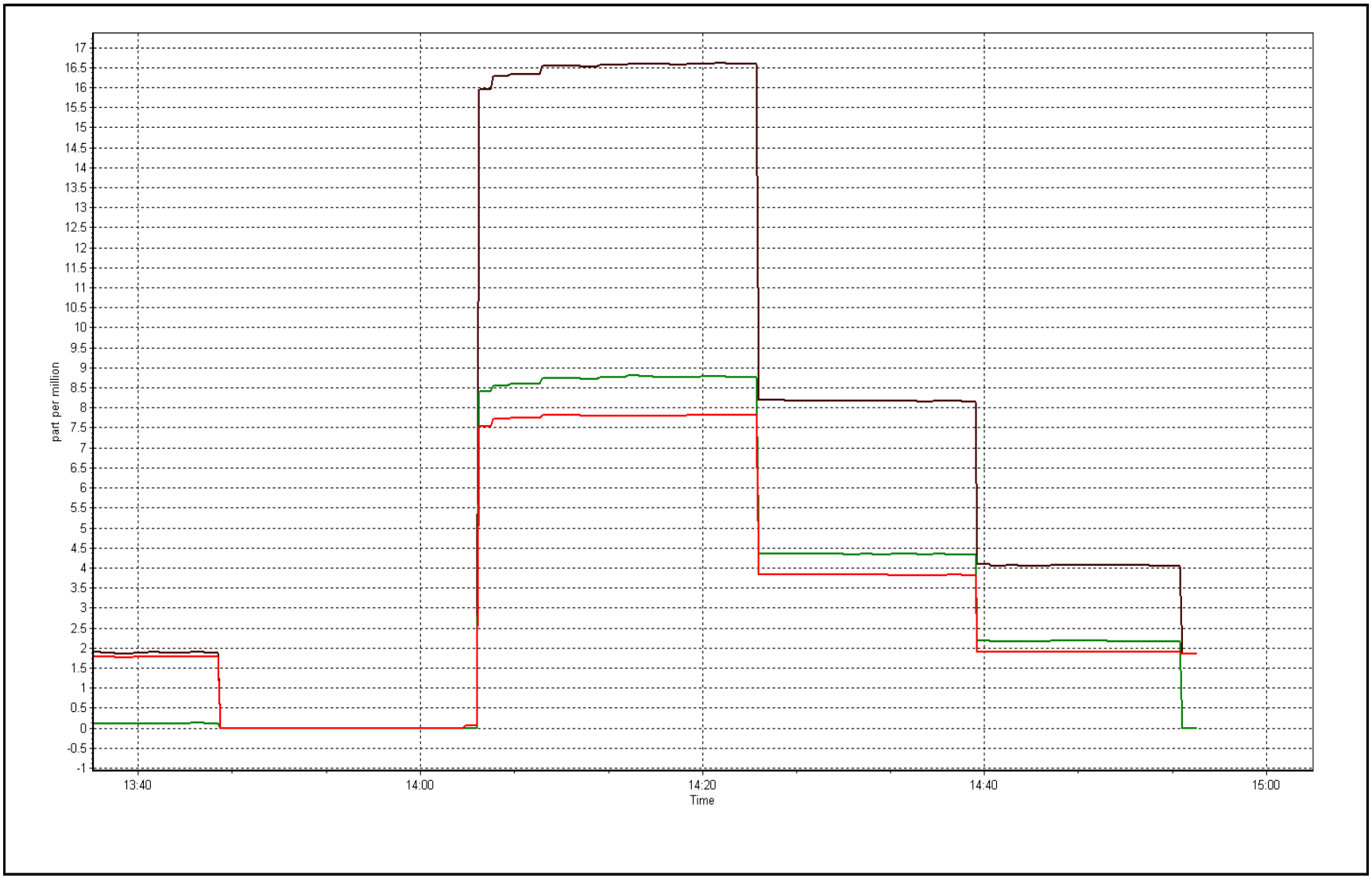
Calibration Date	March 30, 2016	Previous Calibration	March 23, 2016
Station Name	Conklin Townsite	Station Number	AMS 21
Start Time (MST)	13:45	End Time (MST)	14:55
Analyzer make	Thermo 55i	Analyzer serial #	1152430011

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999990
8.73	8.77	0.9953		
4.37	4.38	0.9977	Slope	0.994438
2.19	2.17	1.0069		
			Intercept	0.012264



THC Calibration Plot Date: March 30, 2016



Wood Buffalo Environmental Association
O_3 Calibration Report

Station Information

Calibration Date	March 29, 2016	Previous Calibration	NA
Station Name	Conklin Townsite	Station Number	AMS 21
Reason:	Install		
Start Time (MST)	11:25	End Time (MST)	13:45
NO2 GPT Ref date	March-29-16	Transfer Standard	23
		Station temp.	23 Deg C
Calibrator Make/Model	Teledyne API 700	Serial Number	1221
ZAG make/model	Teledyne API 701	Serial Number	5611
DACS make/model	Campbell Scientific CR3000	Serial Number	9628

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 500 ppb		Bench temp.	NA	26.1
Analyzer IP address	192.168.1.48		Lamp temp.	NA	53.4
Calculated slope	NA	0.997018	Pressure	NA	648.9
Calculated intercept	NA	0.352655	Flow cell A	NA	0.735
Analyzer Background	NA	-0.6	Flow cell B	NA	0.728
Analyzer Coefficient	NA	1.042	Cell A Intensity	NA	73737
			Cell B Intensity	NA	79924

Analyzer make	Thermo 49i	Analyzer serial #	1501663734

Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator Lamp Intensity	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero					
as found span					
calibrator zero	5000	190.5/800	0.0	0.4	----
high point	5000	569.7/997.0	328.1	329.3	0.996
second point	5000	375.2/910.1	218.1	218.1	1.000
third point	5000	190.8/798.1	110.7	109.7	1.009
as left zero	5000	190.5/800	0.0	0.1	----
as left span	5000	569.7/997		332.1	
				Average Correction Factor	1.002

Corrected As found	NA	Previous response	NA	% change	NA

Notes:

Installation calibration. Zero adjusted. No maintenance completed. Initial as left span point was set to 400 ppb in the calibrator instead of 300 ppb. Set point in calibrator changed to 300 ppb and as left span point continued.

Calibration Performed By: Devin Russell

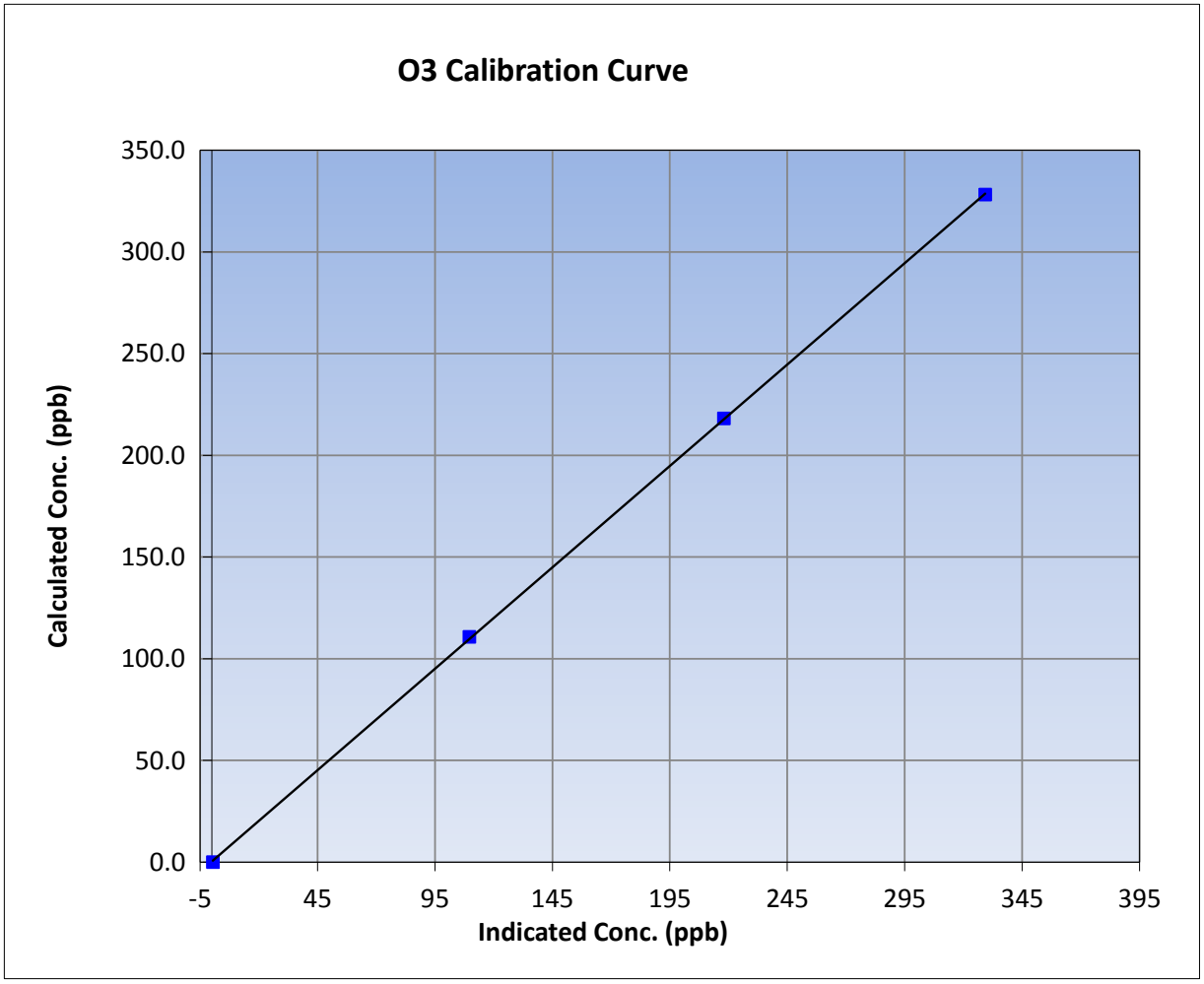
Wood Buffalo Environmental Association
O3 Calibration Report

Station Information

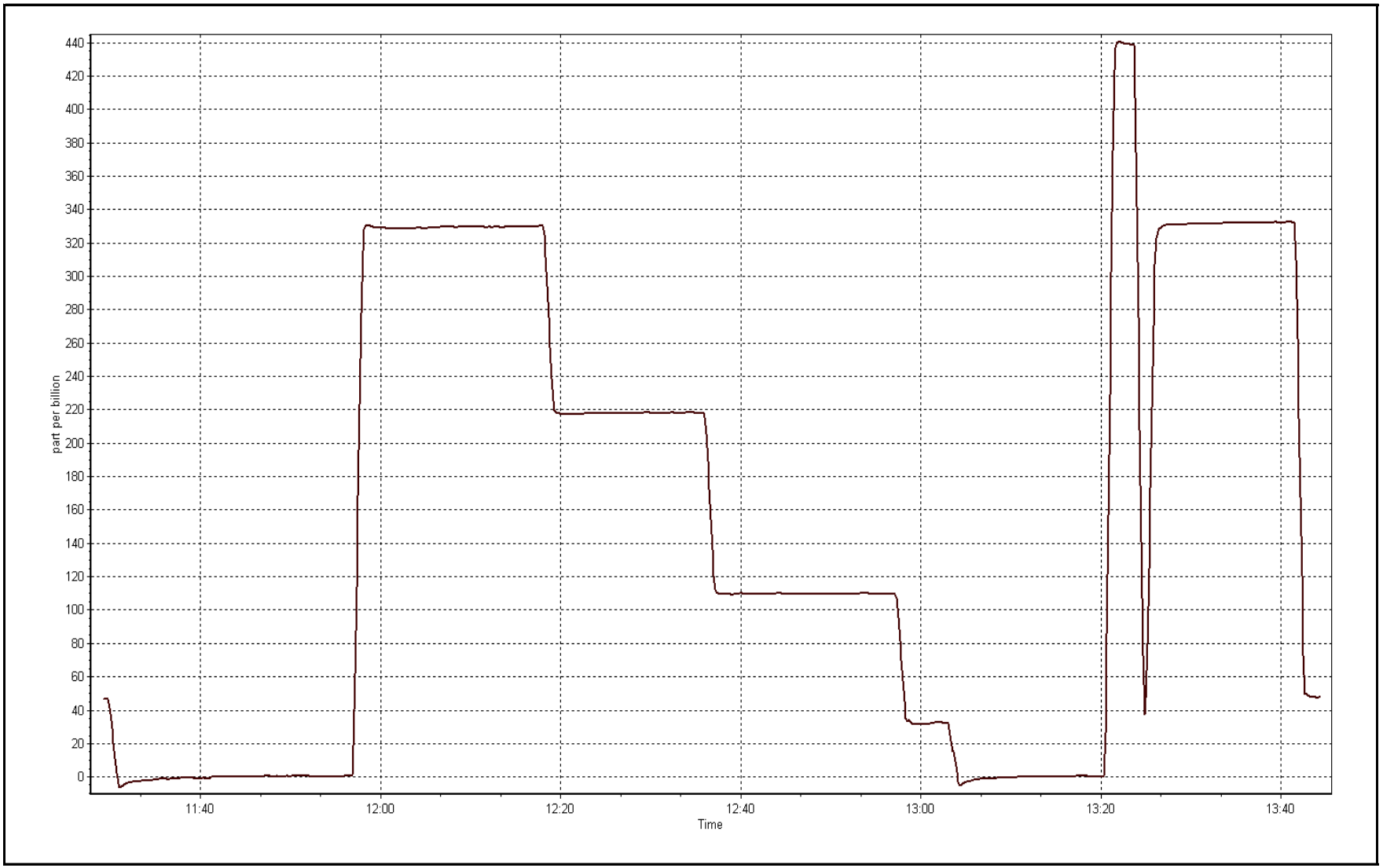
Calibration Date	March-29-16	Previous Calibration	NA
Station Name	Conklin Townsite	Station Number	AMS 21
Start Time (MST)	11:25	End Time (MST)	13:45
Analyzer make	Thermo 49i	Analyzer serial #	1501663734

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.4	----	Correlation Coefficient	0.999968
328.1	329.3	0.9964		
218.1	218.1	1.0001	Slope	0.997018
110.7	109.7	1.0091		
			Intercept	0.352655



O3 Calibration Plot Date: March 29, 2016



Wood Buffalo Environmental Association
NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	March 29, 2016	Previous Calibration	March 23, 2016
Station Name	Conklin Townsite	Station Number	AMS 21
Reason:	Install		
Start Time (MST)	10:50	End Time (MST)	14:20
NO Cal Gas Conc	52.4 ppm	Gas Cert Reference	EY0000359
NOx Cal Gas Conc	52.4 ppm	Cal Gas Expiry Date	Feb-09-2018
Calibrator	API T700	Serial Number	1221
Zero air Generator	API 701	Serial Number	5611

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	9628

Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.996740	0.995798	0.992716
	Data Offset	1.229528	1.759496	6.217462
Current Calibration	Data Slope	0.999948	1.000001	1.001734
	Data Offset	1.910180	2.301642	0.451496

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1501663731

Test Point	before		after	
Concentration range	0-1000 ppb	ppb	0-1000 ppb	ppb
Analyzer IP	192.168.1.43		192.168.1.43	
NO coefficient	1.017		1.034	
NOX coefficient	0.998		0.998	
NO2 coefficient	1.000		1.000	
NO bkgrnd	6.6		6.7	
NOX bkgrnd	6.7		6.8	
Chamber Temp	50	Deg C	49.9	Deg C
Moly Temp	327.1	Deg C	327.4	Deg C
PMT voltage	-841	V	-841	V
PMT Temp	-2.7	Deg C	-3	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	169.4	mmHg	167.9	mmHg
R Cell Press Nox	169.4	mmHg	167.9	mmHg
NO sample flow	0.656	lpm	0.655	lpm
Nox sample Flow	0.656	lpm	0.655	lpm

Notes:

Purged the calibration gas on the back of the calibrator prior to calibration. Adjusted span. As Left span point was set to 400 O3, changed to 300 O3.

Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: March 29, 2016 Station Number: AMS 21

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero										
as found span										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1	----	----
high point	5000	76.5	801.7	801.7	0.0	801.0	800.8	0.2	1.0009	1.0012
second point	5000	38.3	401.4	401.4	0.0	397.8	397.2	0.6	1.0091	1.0106
third point	5000	19.3	202.3	202.3	0.0	199.1	198.3	0.9	1.0157	1.0202
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.1	0.0	----	----
as left span	5000	76.5	801.7	467.9	333.8	804.3	472.7	331.6	0.9968	0.9898
								Average Correction Factor	1.0086	1.0107

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 (total) 5000 ccm Source Gas Flow 76.50 ccm NOX ref calc conc = 801.7 ppb NO ref calc conc = 801.7 ppb

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
1st NO ref point		0.0	797.5	796.0	-0.1	1.0053	1.0072	----	----
1st NO2 (300)	467.9	328.1	795.4	467.9	327.5	1.0079	----	1.0018	99.8%
2nd NO2 (200)	577.9	218.1	794.7	577.9	216.8	1.0089	----	1.0061	99.4%
3rd NO2 (100)	685.3	110.7	795.0	685.3	109.8	1.0084	----	1.0087	99.1%
2nd NO ref point		0.0	795.3	793.7	1.6	1.0080	1.0101	----	----
				Average Correction Factor		1.0083		1.0056	99.4%

Calibration Performed By: Evan Magill

Wood Buffalo Environmental Association

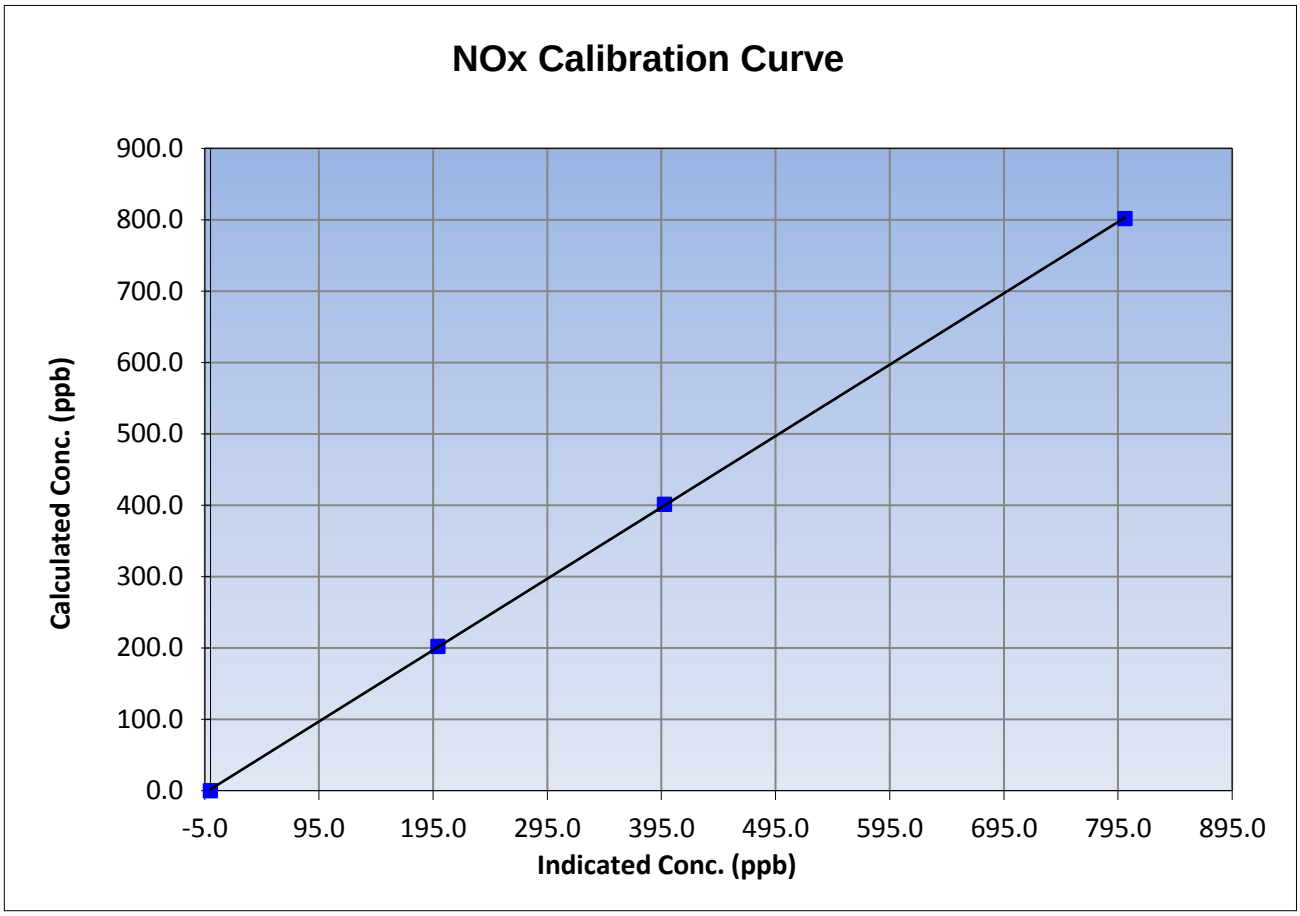
NO_X Calibration Summary

Station Information

Calibration Date	March 29, 2016	Previous Calibration	March 23, 2016
Station Name	Conklin Townsite	Station Number	AMS 21
Start Time (MST)	10:50	End Time (MST)	14:20
Analyzer make	Thermo 42i	Analyzer serial #	1501663731

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999974
801.7	801.0	1.0009		
401.4	397.8	1.0091	Slope	0.999948
202.3	199.1	1.0157		
			Intercept	1.910180



Wood Buffalo Environmental Association

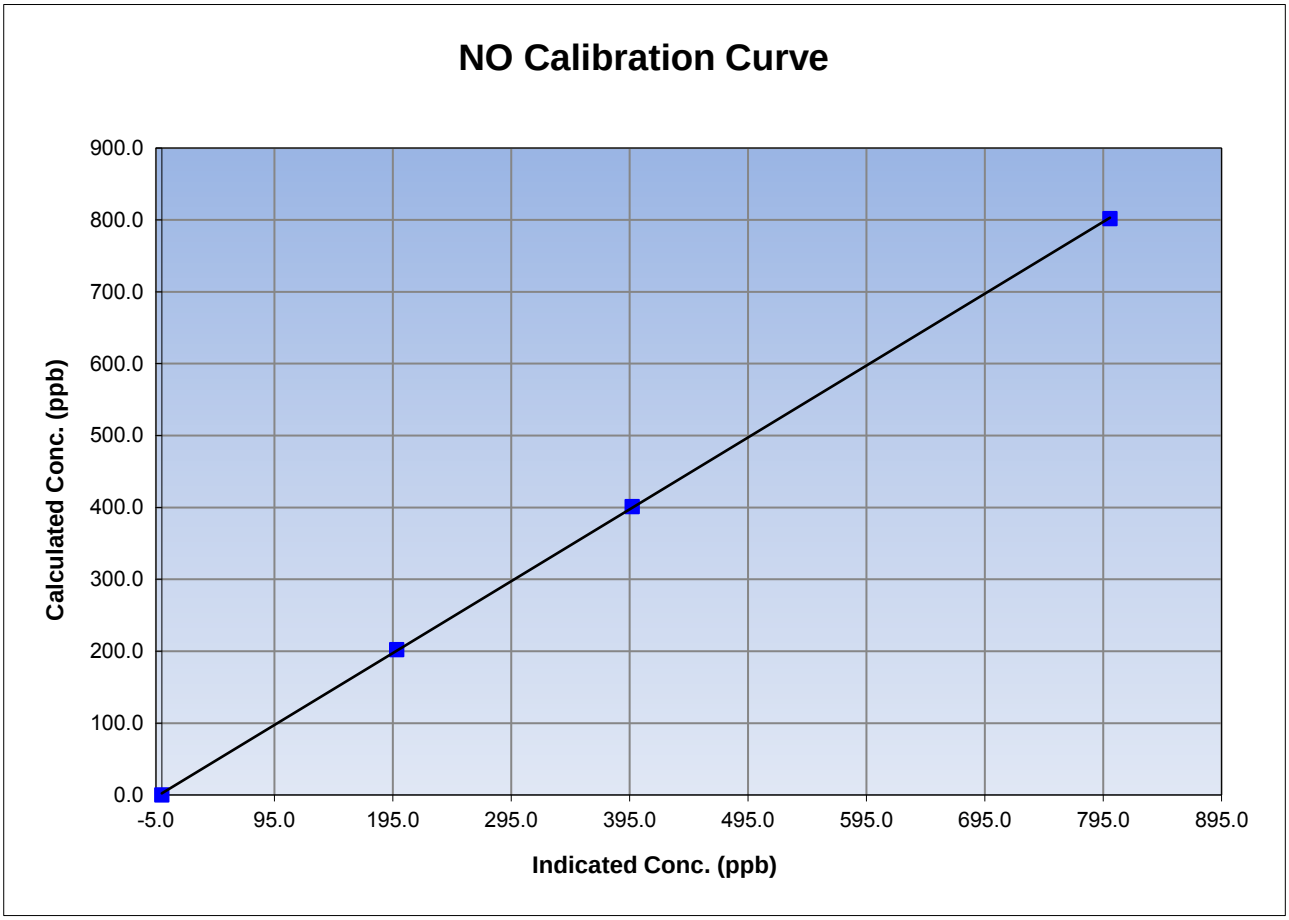
NO Calibration Summary

Station Information

Calibration Date	March 29, 2016	Previous Calibration	March 23, 2016
Station Name	Conklin Townsite	Station Number	AMS 21
Start Time (MST)	10:50	End Time (MST)	14:20
Analyzer make	Thermo 42i	Analyzer serial #	1501663731

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999962
801.7	800.8	1.0012		
401.4	397.2	1.0106	Slope	1.000001
202.3	198.3	1.0202		
			Intercept	2.301642



Wood Buffalo Environmental Association

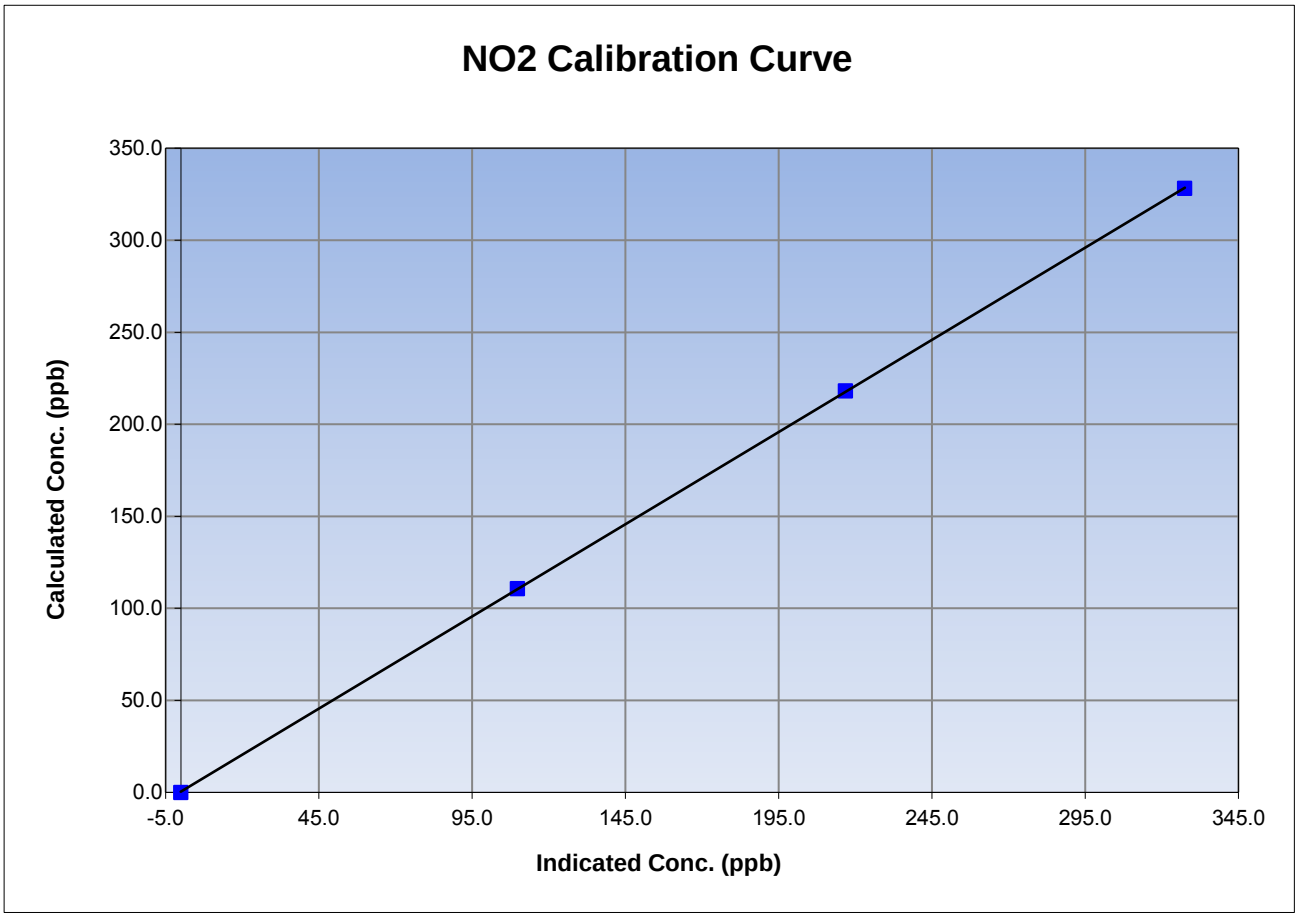
NO_2 Calibration Summary

Station Information

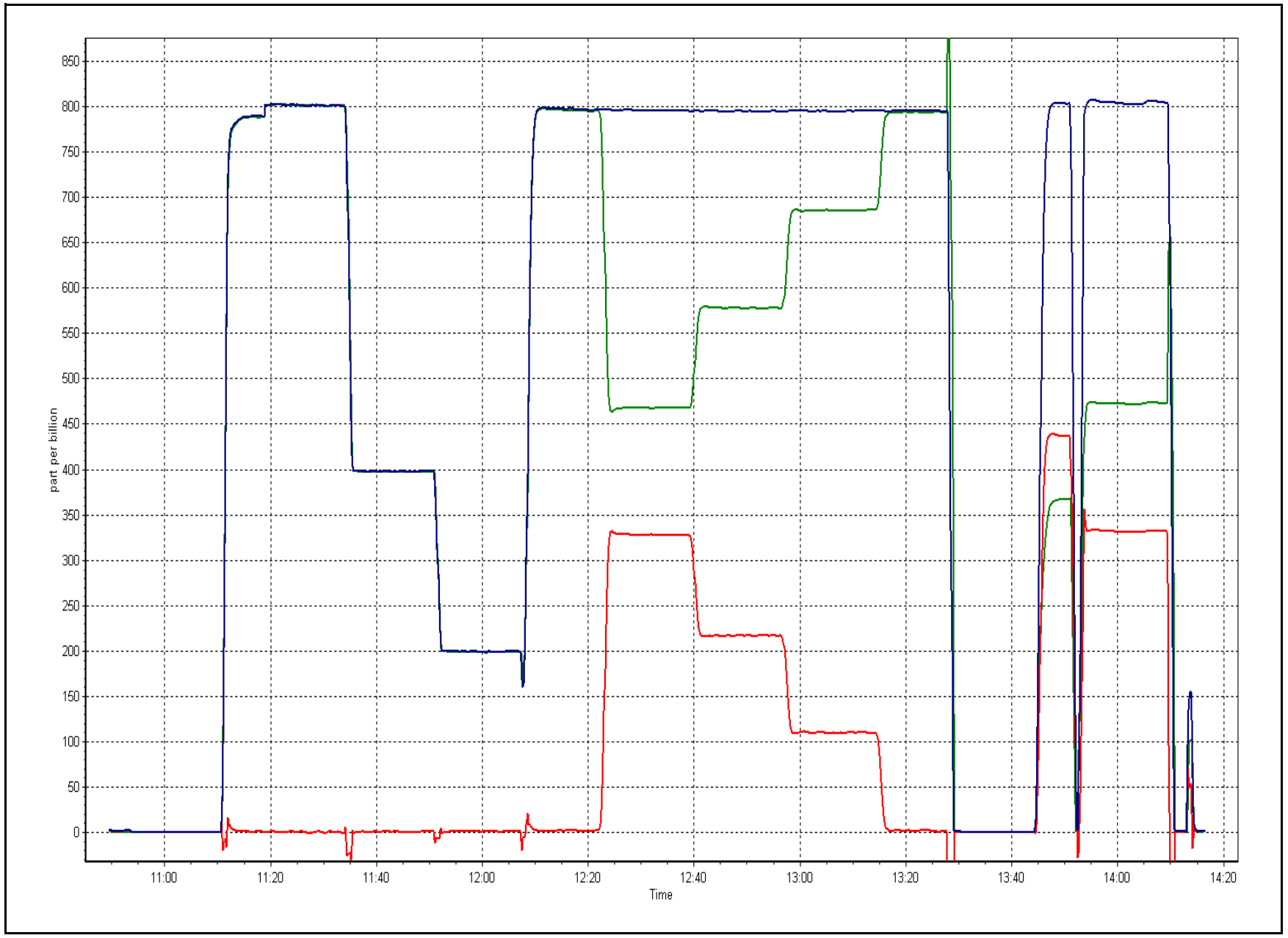
Calibration Date	March 29, 2016	Previous Calibration	March 23, 2016
Station Number	Conklin Townsite	Station Number	AMS 21
Start Time (MST)	10:50	End Time (MST)	14:20
Analyzer make	Thermo 42i	Analyzer serial #	1501663731

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999988
328.1	327.5	1.0018		
218.1	216.8	1.0061	Slope	1.001734
110.7	109.8	1.0087		
			Intercept	0.451496



NOX Calibration Plot Date: March 29, 2016



Wood Buffalo Environmental Association

SHARP CALIBRATION

STATION INFORMATION

Calibration Date:		Previous Calibration:	
Station Name:	Conklin Townsite	Station Number:	AMS 21
Start Time (MST):	9:39	End Time (MST):	10:25
Calibrator Make/Model:	Delta Cal	Calibrator Serial Number:	1097

SHARP INFORMATION

Particulate Fraction:	PM2.5
Make/Model:	Thermo / SHARP 5030
Serial Number	7494
C_{14} Source SN:	CM-0404
Confirmation of Time settings:	Yes ☐ No ☐

Paremeters Checked: ☑ T1 ☐ T ☐ T4 ☐ P3 ☑ Main Flow ☑ Beta ☑ Neph ☑

CALIBRATION DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	-4.0	-6.0	-2.0	-6.0
T2	17.0	na	na	17.0
T3	19.0	na	na	19.0
T4	19.0	na	na	19.0
RH (%)	40.0	na	na	40.0

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	950	952.0	2.0	950

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	170		170
Neph	1		1
C14	24.4		24.4
Indicated Concentration (ug/m3)	**0.5**	**no**	**0.5**
Offset 1			
Offset 2			

Leak Check (Quarterly)

Leak Check Date: March 24, 2016 Previous Leak Check Date:

	Measured	Difference LPM (Limit +/- 0.42 LPM)
Flow without adaptor (LPM):	16.70	0.16
*Flow with adaptor (LPM):	16.54	

**Note - do not attach adaptor without shutting off the pump first*

Mass Foil Calibration (Annualy)

Foil Calibration Date:	March 24, 2016	Previous Foil Calibration:	
Zeroed?:			
Foil Mass:	1337	**Mass foil set S/N:**	5872
Previous Correction Factor:	7048		
New Correction Factor:	7056		

INSPECTION DATA

Item	Condition	Date of install or rebuild
Cyclone	Good / cleaned	24/03/2016
Pump	Good	21/03/2016
Filter Tape	Good	21/03/2016
Mass Foil Cal Set	na	24/03/2016
HEPA filter	Good	24/03/2016

NOTES:

Install calibration, cyclone head cleaning

Calibration Performed By: **Melissa Lemay**

Wood Buffalo Environmental Association

WS/WD Calibration Report

Station Information

Calibration Date	March-23-16	Previous Calibration	n/a
Station Name	Conklin Townsite	Station Number	AMS 21
Reason:	Routine / Installation / Removal		
Start Time (MST)	12:30	End Time (MST)	13:45
Barometric Press	n/a	Station Temp	22 Deg C
WS Calibrator	MetOne 053-120	Serial Number	K13090

WIND SPEED

Sensor make/model	Met One 010C-1	Sensor serial #	A1406
DACS make	Campbel Scientific CR3000	DACS serial No.	9628
DACS voltage range	5000	DACS channel #	NA

	Before		After
Calculated slope	NA	Calculated slope	0.988691
Calculated intercept	NA	Calculated intercept	0.240824

Wind Speed Calibration Data

Shaft RPM	Actual Speed (K/hr)	Indicated Speed (K/hr)	Correction factor
0	0.0	0.0	n/a
200	20.2	20.1	1.0031
400	39.4	39.4	0.9990
600	58.6	58.5	1.0009
800	77.8	78.9	0.9861
Average Correction Factor			0.9973

WIND DIRECTION

Sensor make/model	Met One 020C-1	Sensor serial #	P22886
DACS make	Campbel Scientific CR3000	DACS serial No.	9628
DACS voltage range	5000	DACS channel #	NA

	Before		After
Calculated slope	NA	Calculated slope	0.986794
Calculated intercept	NA	Calculated intercept	-0.255746

As Found Declination (west of North) _____ As Left Declination (west of North) 14.000000

Wind Direction Calibration Data

Physical Direction (Degrees)	Indicated Direction (Degrees)	Correction factor
0	0.0	n/a
90	91.5	0.9837
180	180.2	0.9992
270	280.6	0.9621
357	358.0	0.9972
Average Correction Factor		0.9856

Notes:

Calibration Performed By: Asad Hidayat / Melissa Lemay

Wood Buffalo Environmental Association
SO2 Calibration Report

W B E A

Station Information

Calibration Date	April 7, 2016	Last Calibration	March 23, 2016
Station Name	Conklin Townsite	Station Number	AMS 21
Reason:	Routine		
Start Time (MST)	8:00	End Time (MST)	11:55
Gas Cert Reference	EY0000359	Station temp.	22 Deg C
Cal Gas Concentration	51.4 ppm	Cal Gas Exp Date	Feb-09-2018
Calibrator Make/Model	API T700	Serial Number	1221
ZAG Make/Model	API 701	Serial Number	5611
DACS make/model	Campbell Scientific CR3000	DACS serial No.	9628

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 1000 ppb		PMT voltage	-655	-655
Analyzer IP address	192.168.1.43		Lamp voltage	846	846
Calculated slope	0.996565	0.996229	Chamber temp	45.0	45.0
Calculated intercept	2.566231	2.504102	Pressure	656.4	664.6
Analyzer Background	20.9	20.9	Flow	0.483	0.489
Analyzer Coefficient	0.923	0.916	Intensity	92	92

Analyzer make	Thermo 43i	Analyzer serial #	JC1428701363

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.1	----
as found span	5000	76.5	786.4	790.9	0.994
calibrator zero	5000	0.0	0.0	-0.1	----
high point	5000	76.5	786.4	788.0	0.998
second point	5000	38.2	392.7	390.8	1.005
third point	5000	19.3	198.4	194.0	1.023
as left zero	5000	0.0	0.0	-0.1	----
as left span	5000	76.5	786.4	782.7	1.005
				Average Correction Factor	1.009

Corrected As found	791.0	Previous response	786.6	% change	-0.6%

Notes:

Sample inlet filter replaced after as founds. Adjusted span. As lefts began at 11:53 MST.

Calibration Performed By: Asad Hidayat

Wood Buffalo Environmental Association
SO2 Calibration Report

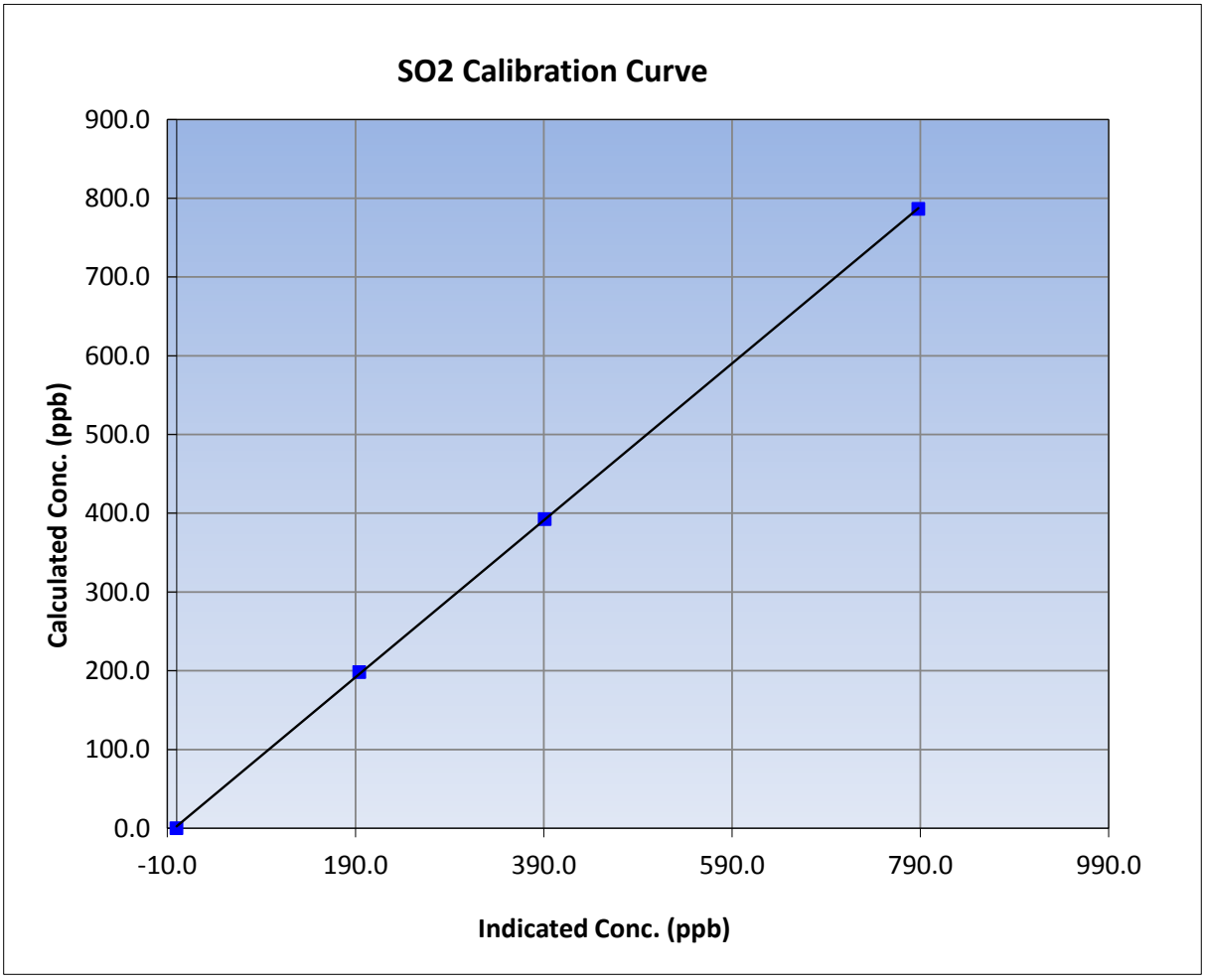
W B E A

Station Information

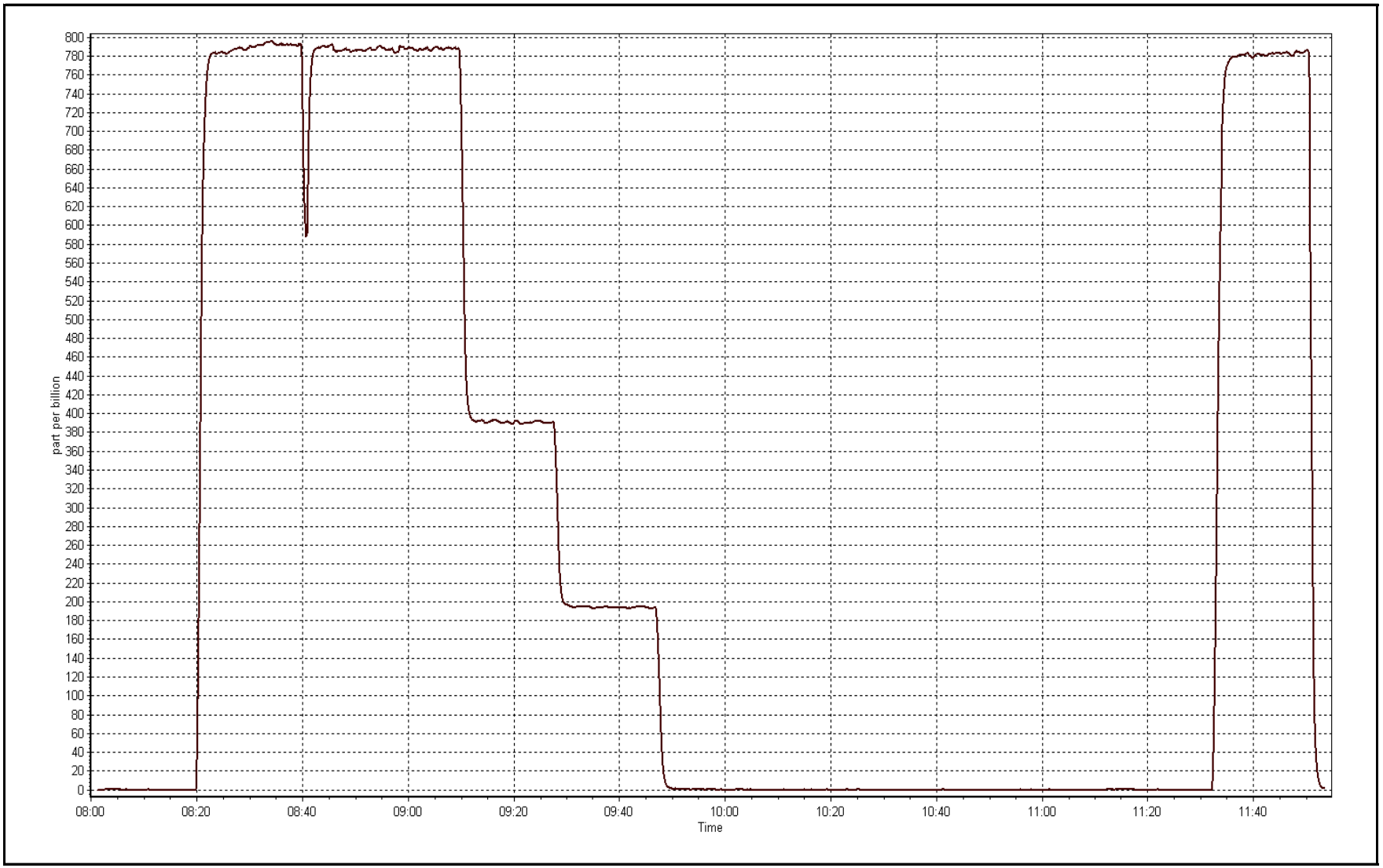
Calibration Date	April 7, 2016	Previous Calibration	March 23, 2016
Station Name	Conklin Townsite	Station Number	AMS 21
Start Time (MST)	8:00	End Time (MST)	11:55
Analyzer make	Thermo 43i	Analyzer serial #	JC1428701363

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999957
786.4	788.0	0.9981		
392.7	390.8	1.0048	Slope	0.996229
198.4	194.0	1.0227		
			Intercept	2.504102



SO2 Calibration Plot Date: April 7, 2016



Wood Buffalo Environmental Association
TRS Calibration Report

Station Information

Calibration Date	April 7, 2016	Last Calibration	March 31, 2016
Station Name	Conklin Townsite	Station Number	AMS 21
Reason:	Routine		
Start Time (MST)	12:30	End Time (MST)	17:45
Gas Cert Reference	LL119411	Station temp.	22 Deg C
Cal Gas Concentration	4.97 ppm	Cal Gas Exp Date	12/02/2019
Calibrator Make/Model	API T700	Serial Number	1221
Dil air Make/Model	API 701	Serial Number	5611
DACS make/model	Campbell Scientific CR3000	DACS serial No.	9628
SO2 gas concentration	51.4 ppm	SO2 gas cert/exp	EY0000359 9/Feb/18

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-637	-637
Analyzer IP address	192.168.1.44		Lamp voltage	927	926
Calculated slope	0.989098	0.977671	Chamber temp	45	45
Calculated intercept	0.370379	0.462364	Pressure	669.4	666.7
Analyzer Background	2.85	2.9	Flow	0.430	0.429
Analyzer Coefficient	1.058	1.078	Intensity	91	90
			Converter temp.	800	800

Analyzer make/model	Thermo 43i-TLE	Analyzer serial #	1410661331
Converter make/model	CDN-101	Converter serial #	521

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	80.5	80.0	81.7	0.979
SO2 scrubber check	5000	19.4	199.4	0.6	----
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	80.5	80.0	81.6	0.980
second point	5000	40.2	40.0	40.0	0.999
third point	5000	20.1	20.0	19.7	1.016
as left zero	5000	0.0	0.0	0.1	----
as left span	5000	80.5	80.0	80.0	1.000
				Average Correction Factor	0.998

Corrected As found	81.7	Previous response	80.5	% change	-1.5%

Notes:

Sample inlet filter replaced and scrubber check done after as founds. Adjusted span. However, 2nd point failed. Purged the gas from back of the calibrator. 3rd point failed after purging. Conditioned the calibrator from 15:35-16:00 MST. Seems to help a bit. Will continue to condition the calibrator throughout next week.

Calibration Performed By: Asad Hidayat

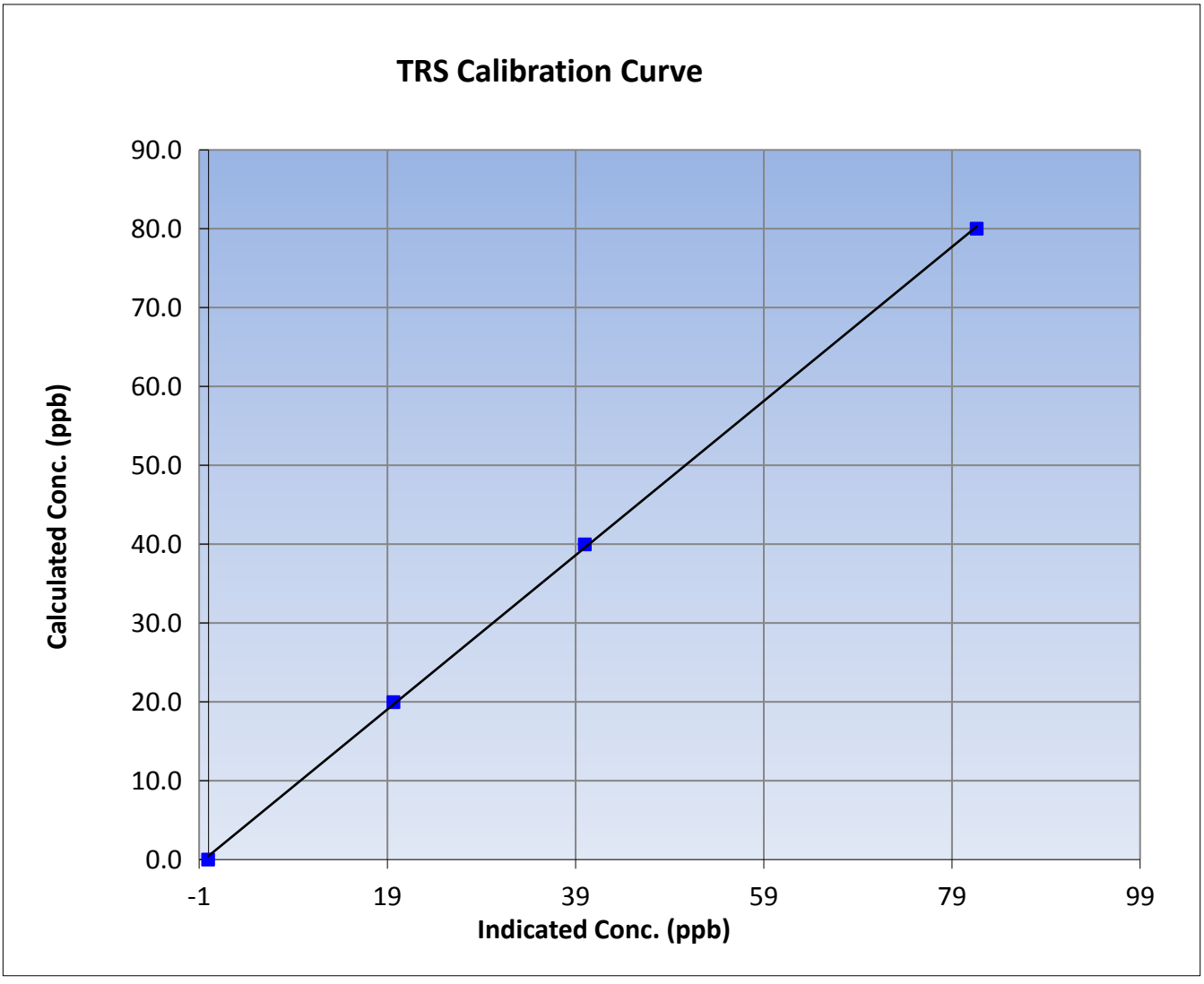
Wood Buffalo Environmental Association
TRS Calibration Report

Station Information

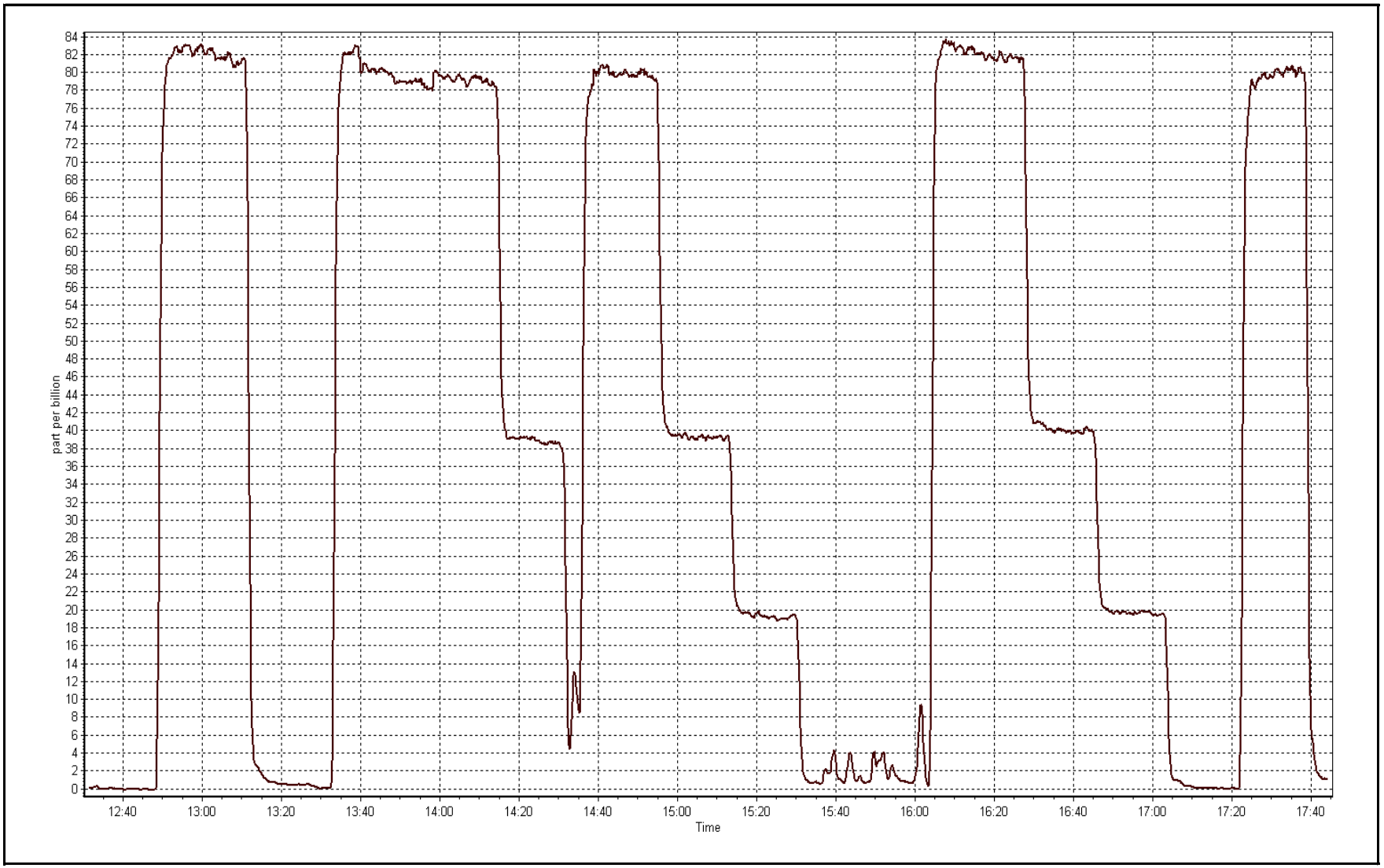
Calibration Date	April 7, 2016	Previous Calibration	March 31, 2016
Station Name	Conklin Townsite	Station Number	AMS 21
Start Time (MST)	12:30	End Time (MST)	17:45
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1410661331

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999861
80.0	81.6	0.9801		
40.0	40.0	0.9990	Slope	0.977671
20.0	19.7	1.0162		
			Intercept	0.462364



TRS Calibration Plot Date: April 7, 2016



Wood Buffalo Environmental Association
THC / NMHC Calibration Report

W B E A

Station Information

Calibration Date	April-07-16	Last Calibration	March-30-16
Station Name	Conklin Townsite	Station Number	AMS 21

Reason: Routine

Start Time (MST)	8:00	End Time (MST)	11:55
Gas Cert Reference	EY0000359	Cal Gas Expiry Date	Feb-09-2018
CH4 Cal Gas Conc.	512.0 ppm	CH4 Equiv Conc.	1084.0 ppm
C3H8 Cal Gas Conc.	208.0 ppm	Station temp.	21 Deg C
Calibrator Model	API T700	Serial Number	1221
ZAG make/model	Teledyne API 701	Serial Number	5611
DACS make/model	Campbell Scientific CR3000	Serial Number	9628

Analyzer Information

	Before	*After*		*Before*	*After*
THC Range (ppm)	0 - 50 ppm		Column Temp	75.0	75.0
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	175.0	175.0
Analyzer IP address	192.168.1.55		Flame Temp	405.0	405.0
THC Calc slope	0.996713	0.996139	Carrier Pressure	37.0	37.0
THC Calc intercept	0.064785	0.078884	Fuel Pressure	49.6	49.6
NMHC Calc slope	0.994438	0.996208	Air Pressure	34.3	34.3
NMHC Calc intercept	0.012264	0.030388			

Analyzer make	Thermo 55i	Analyzer serial #	1152430011

THC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	0.00	----
as found span	5000	76.5	16.59	16.95	0.978
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	76.3	16.54	16.58	0.998
second point	5000	38.2	8.28	8.15	1.016
third point	5000	19.1	4.14	4.03	1.028
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	76.5	16.59	16.56	1.002
				Average Correction Factor	1.014

Corrected As found	16.95	Previous response	16.58	% change	-2.2%

Notes:

Sample inlet filter replaced after as founds. Adjusted span. As lefts began at 11:53 MST.

Calibration Performed By: Asad Hidayat

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)
	5000	0	0.00	0.00	----
	5000	76.5	8.75	8.95	0.978
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	76.3	8.73	8.75	0.998
second point	5000	38.2	4.37	4.33	1.009
third point	5000	19.1	2.19	2.14	1.021
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	76.5	8.75	8.76	0.999
				Average Correction Factor	1.009

Corrected As found	8.95	Previous response	8.79	% 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)
	5000	0	0.00	0.00	----
	5000	76.5	7.83	8.00	0.979
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	76.3	7.81	7.83	0.998
second point	5000	38.2	3.91	3.83	1.021
third point	5000	19.1	1.96	1.89	1.035
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	76.5	7.83	7.80	1.004
				Average Correction Factor	1.018

Corrected As found	8.00	Previous response	7.79	% change	-2.7%

Wood Buffalo Environmental Association

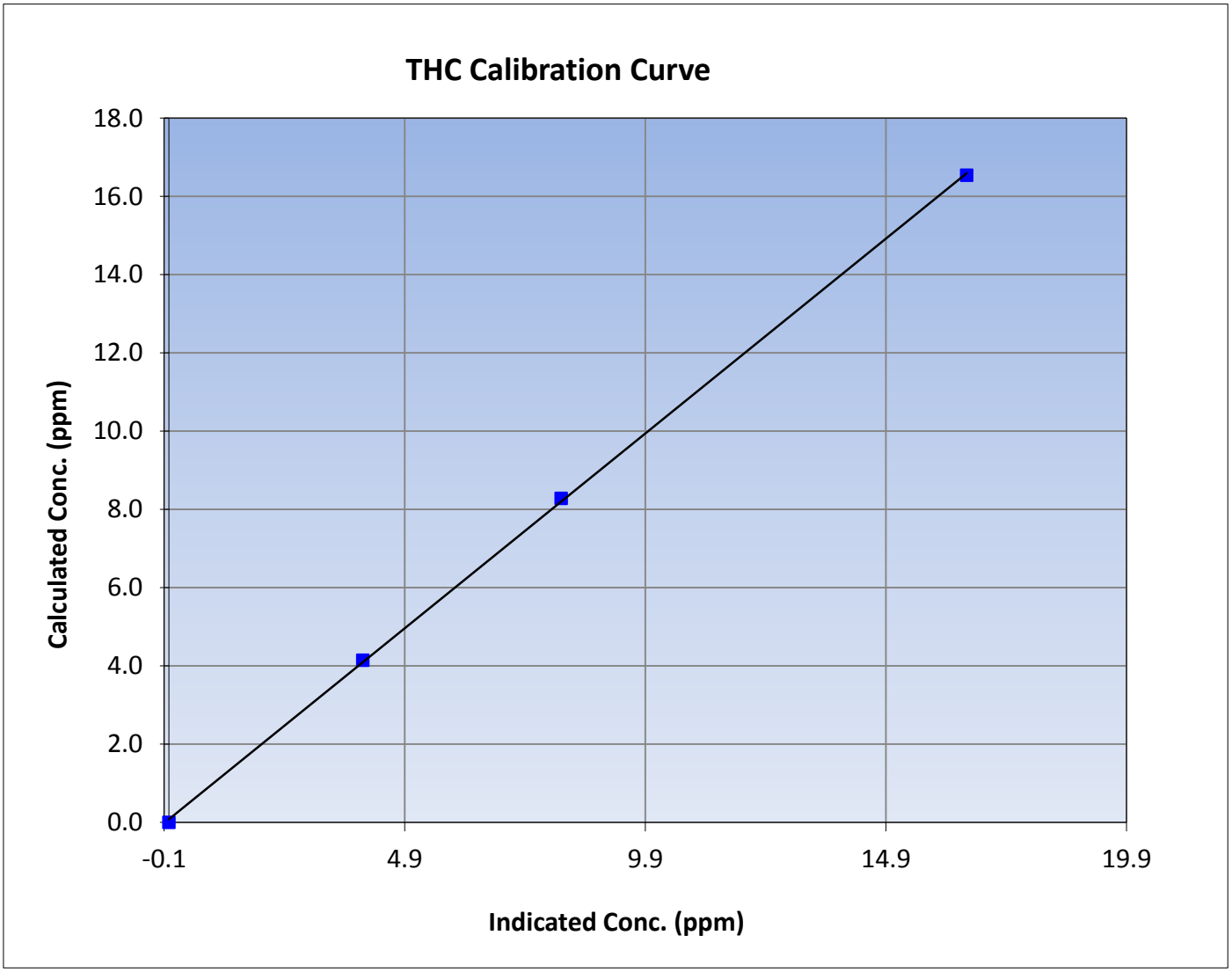
THC Calibration Summary

Station Information

Calibration Date	April 7, 2016	Previous Calibration	March 30, 2016
Station Name	Conklin Townsite	Station Number	AMS 21
Start Time (MST)	8:00	End Time (MST)	11:55
Analyzer make	Thermo 55i	Analyzer serial #	1152430011

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999877
16.54	16.58	0.9977		
8.28	8.15	1.0162	Slope	0.996139
4.14	4.03	1.0275		
			Intercept	0.078884



Wood Buffalo Environmental Association

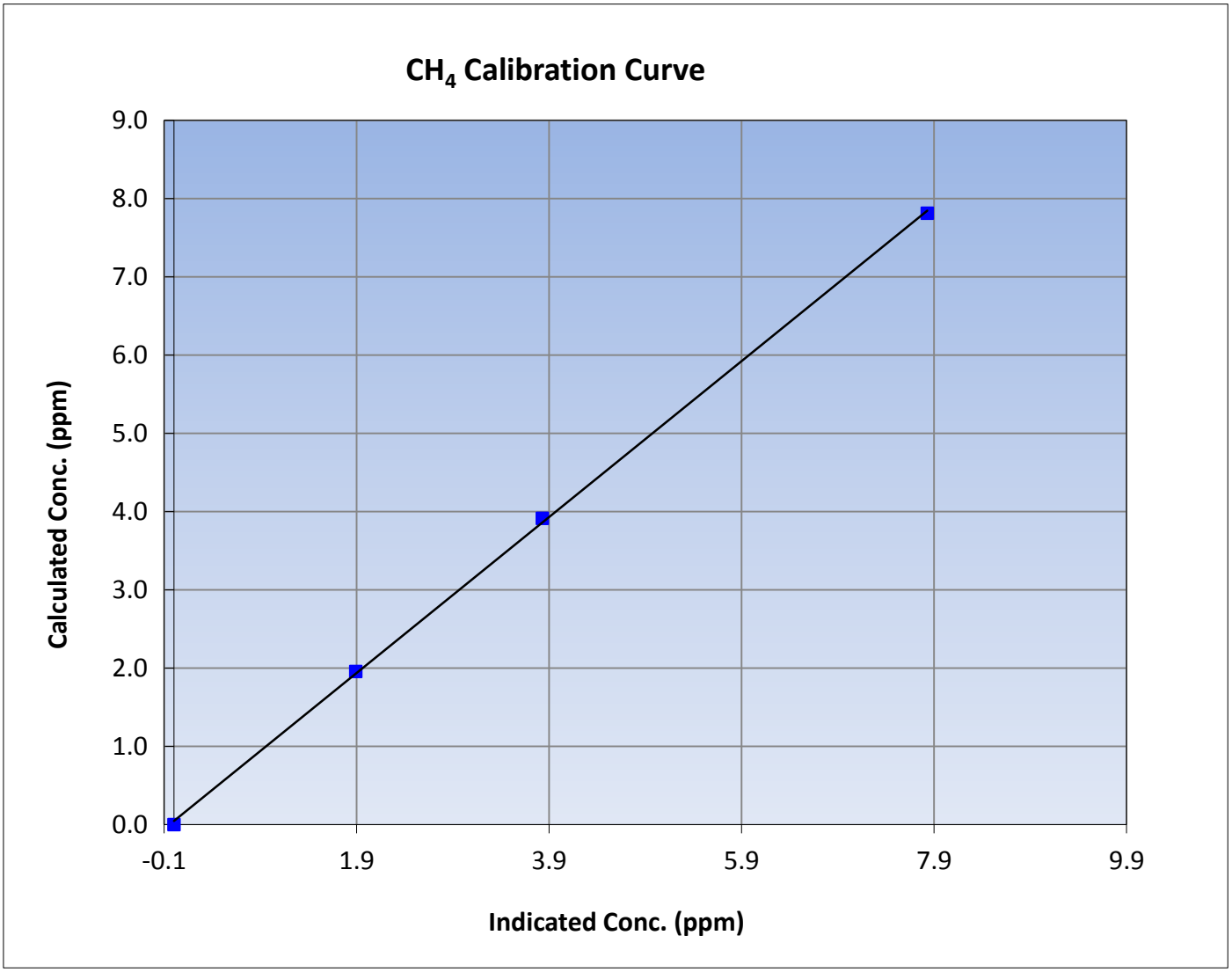
CH_4 Calibration Summary

Station Information

Calibration Date	April 7, 2016	Previous Calibration	March 30, 2016
Station Name	Conklin Townsite	Station Number	AMS 21
Start Time (MST)	8:00	End Time (MST)	11:55
Analyzer make	Thermo 55i	Analyzer serial #	1152430011

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999806
7.81	7.83	0.9978		
3.91	3.83	1.0213	Slope	0.995915
1.96	1.89	1.0348		
			Intercept	0.046496



Wood Buffalo Environmental Association

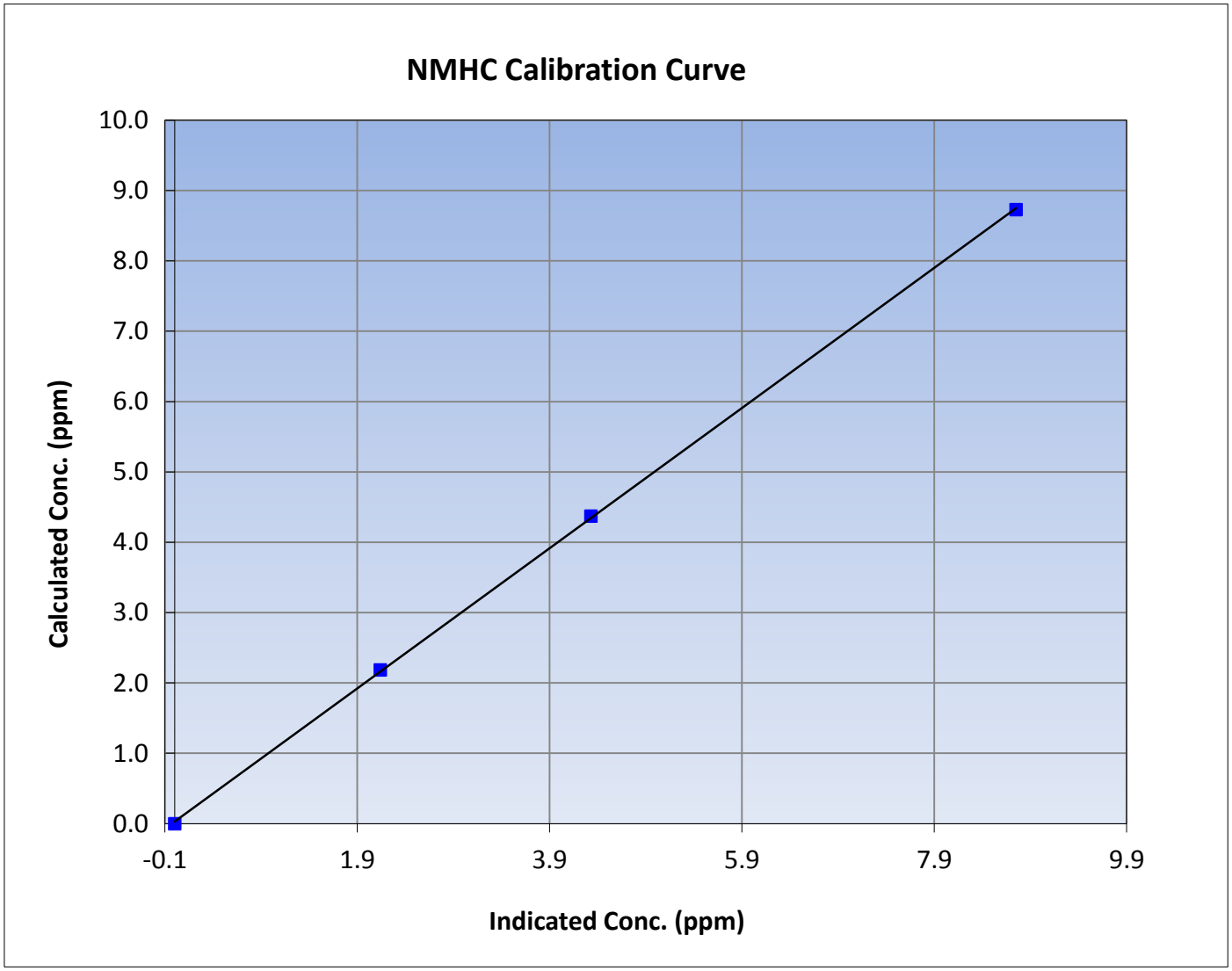
NMHC Calibration Summary

Station Information

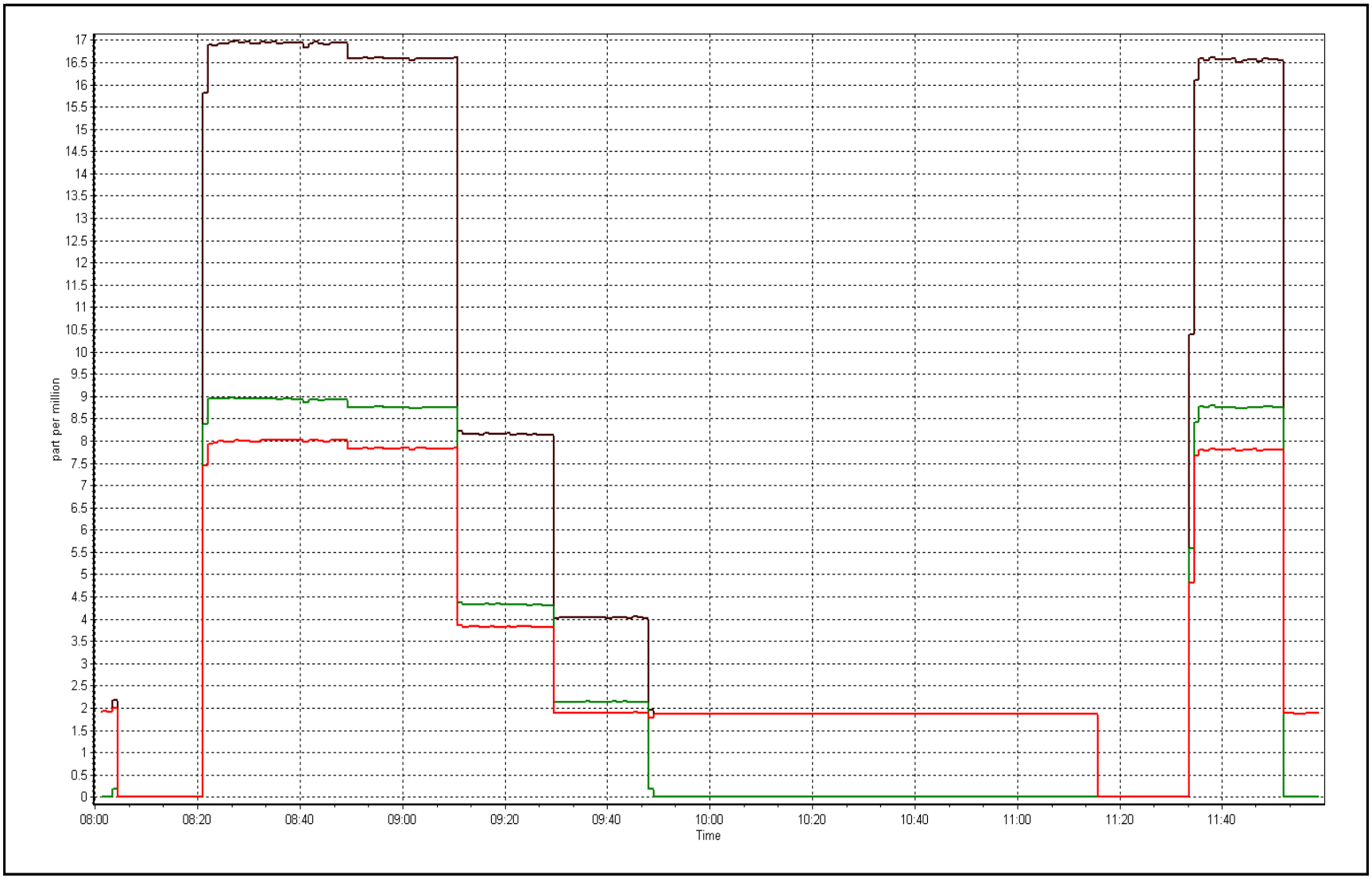
Calibration Date	April 7, 2016	Previous Calibration	March 30, 2016
Station Name	Conklin Townsite	Station Number	AMS 21
Start Time (MST)	8:00	End Time (MST)	11:55
Analyzer make	Thermo 55i	Analyzer serial #	1152430011

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999941
8.73	8.75	0.9976		
4.37	4.33	1.0093	Slope	0.996208
2.19	2.14	1.0210		
			Intercept	0.030388



THC Calibration Plot Date: April 7, 2016



Wood Buffalo Environmental Association
O_3 Calibration Report

Station Information

Calibration Date	April 8, 2016	Previous Calibration	March 29, 2016
Station Name	Conklin Townsite	Station Number	AMS 21
Reason:	Routine		
Start Time (MST)	7:24	End Time (MST)	9:47
NO2 GPT Ref date	April-07-16	Transfer Standard	23
		Station temp.	23 Deg C
Calibrator Make/Model	Teledyne API 700	Serial Number	1221
ZAG make/model	Teledyne API 701	Serial Number	5611
DACS make/model	Campbell Scientific CR3000	Serial Number	9628

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 500 ppb		Bench temp.	26.1	25.8
Analyzer IP address	192.168.1.48		Lamp temp.	53.4	53.3
Calculated slope	0.997018	0.992890	Pressure	648.9	654.0
Calculated intercept	0.352655	0.442782	Flow cell A	0.735	0.730
Analyzer Background	-0.6	-0.6	Flow cell B	0.728	0.731
Analyzer Coefficient	1.042	1.111	Cell A Intensity	73737	73447
			Cell B Intensity	79924	78993

Analyzer make	Thermo 49i	Analyzer serial #	1501663734

Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator Lamp Intensity	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	187.9/800	0.0	-0.1	----
as found span	5000	568.5/1001.8	328.1	309.0	1.062
calibrator zero	5000	190.5/800	0.0	-0.1	----
high point	5000	569.7/1001.9	328.1	330.2	0.994
second point	5000	381.6/914.1	218.1	219.1	0.995
third point	5000	190.6/802.8	110.7	110.6	1.001
as left zero	5000	190.5/800	0.0	0.1	----
as left span	5000	569.7/997	328.1	332.1	0.988
				Average Correction Factor	0.997

Corrected As found	309.1	Previous response	328.7	% change	6.4%

Notes:

Sample inlet filter replaced after as founds. Adjusted span.

Calibration Performed By: Asad Hidayat

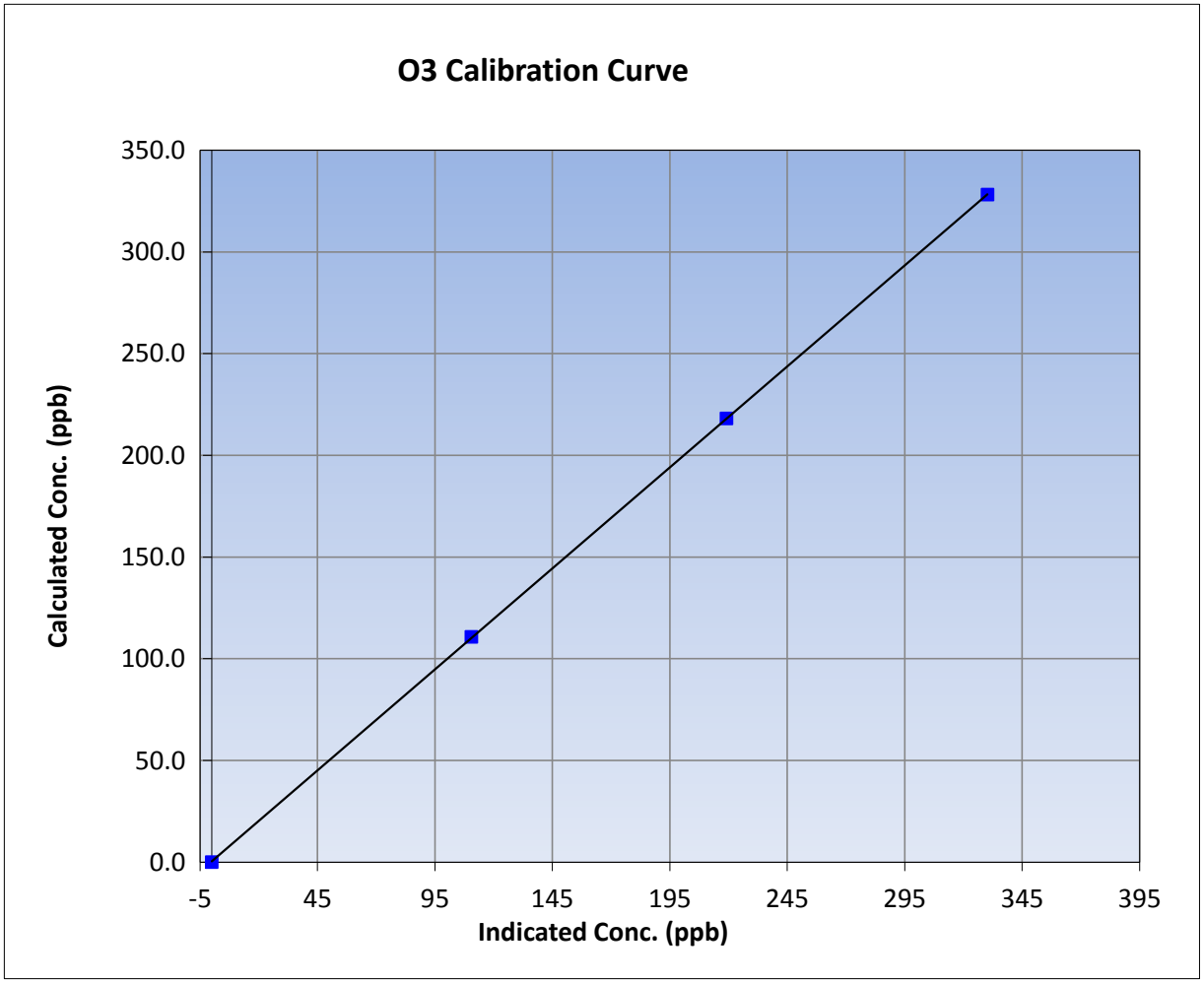
Wood Buffalo Environmental Association
O3 Calibration Report

Station Information

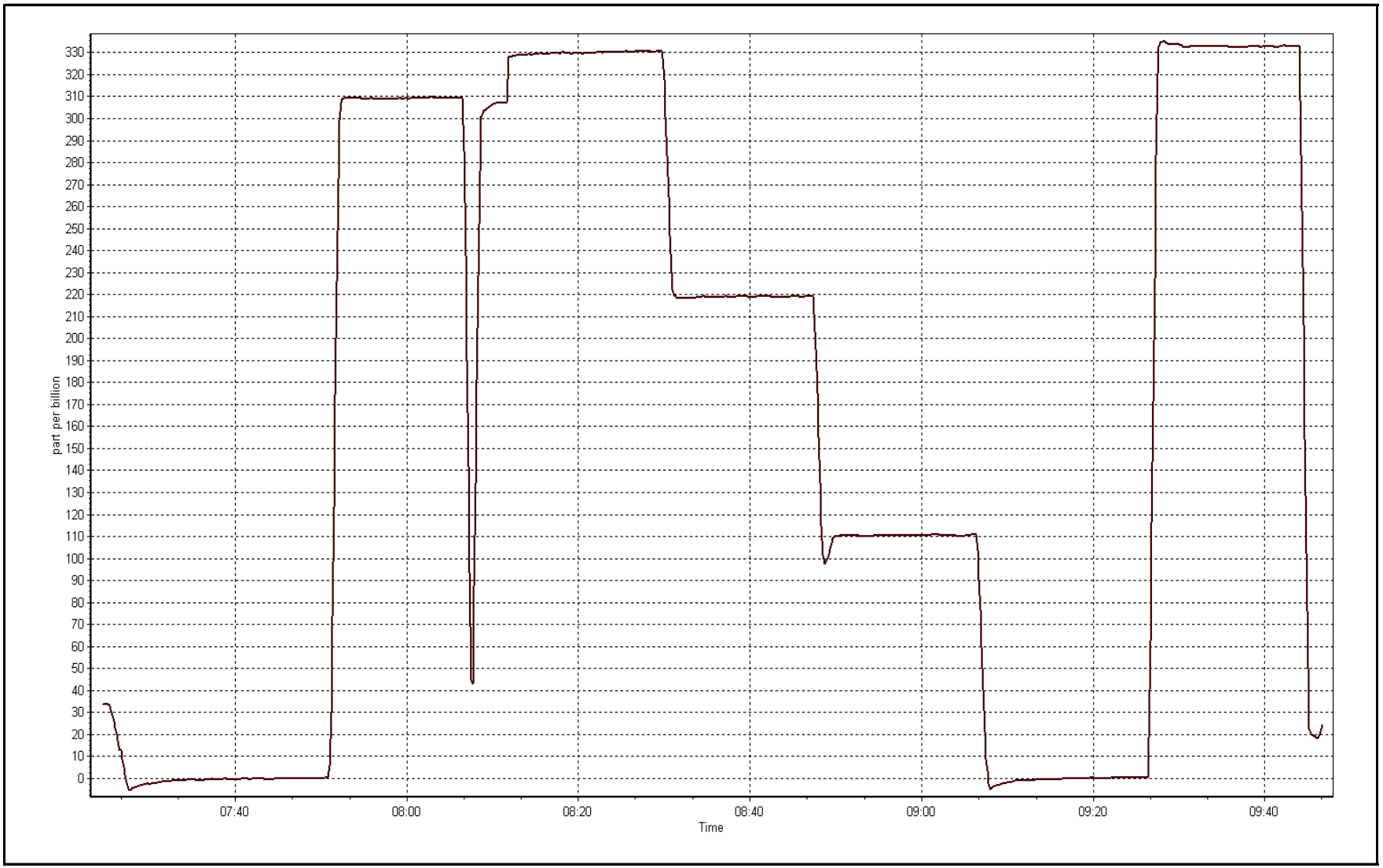
Calibration Date	April-08-16	Previous Calibration	March 29, 2016
Station Name	Conklin Townsite	Station Number	AMS 21
Start Time (MST)	7:24	End Time (MST)	9:47
Analyzer make	Thermo 49i	Analyzer serial #	1501663734

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999993
328.1	330.2	0.9935		
218.1	219.1	0.9954	Slope	0.992890
110.7	110.6	1.0014		
			Intercept	0.442782



O3 Calibration Plot Date: April 8, 2016



Wood Buffalo Environmental Association
O_3 Calibration Report

Station Information

Calibration Date	April 13, 2016	Previous Calibration	April 8, 2016
Station Name	Conklin Townsite	Station Number	AMS 21
Reason:	Routine		
Start Time (MST)	10:57	End Time (MST)	13:10
NO2 GPT Ref date	April-13-16	Transfer Standard	23
		Station temp.	21 Deg C
Calibrator Make/Model	Teledyne API 700	Serial Number	1221
ZAG make/model	Teledyne API 701	Serial Number	5611
DACS make/model	Campbell Scientific CR3000	Serial Number	9628

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 500 ppb		Bench temp.	25.8	27.0
Analyzer IP address	192.168.1.48		Lamp temp.	53.3	53.4
Calculated slope	0.992890	0.999930	Pressure	654.0	647.7
Calculated intercept	0.442782	0.922978	Flow cell A	0.730	0.726
Analyzer Background	-0.6	-0.6	Flow cell B	0.731	0.728
Analyzer Coefficient	1.111	1.012	Cell A Intensity	73447	73420
			Cell B Intensity	78993	78866

Analyzer make	Thermo 49i	Analyzer serial #	1501663734

Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator Lamp Intensity	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	185.2/800	0.0	0.0	----
as found span	5000	570.4/1004.8	301.2	329.9	0.913
calibrator zero	5000	185.2/800	0.0	0.0	----
high point	5000	569.7/1004.9	301.2	301.1	1.000
second point	5000	381.6/914.1	201.1	199.5	1.008
third point	5000	191.5/804	102.4	100.4	1.020
as left zero	5000	184.7/800	0.0	-0.1	----
as left span	5000	569.7/1003.3	301.2	302.4	0.996
				Average Correction Factor	1.009

Corrected As found	329.9	Previous response	302.9	% change	-8.2%

Notes:

Recalibrating instrument due to last cal did not having correct NO2 numbers from Nox GPT cal carried over. Adjusted span.

Calibration Performed By: Asad Hidayat

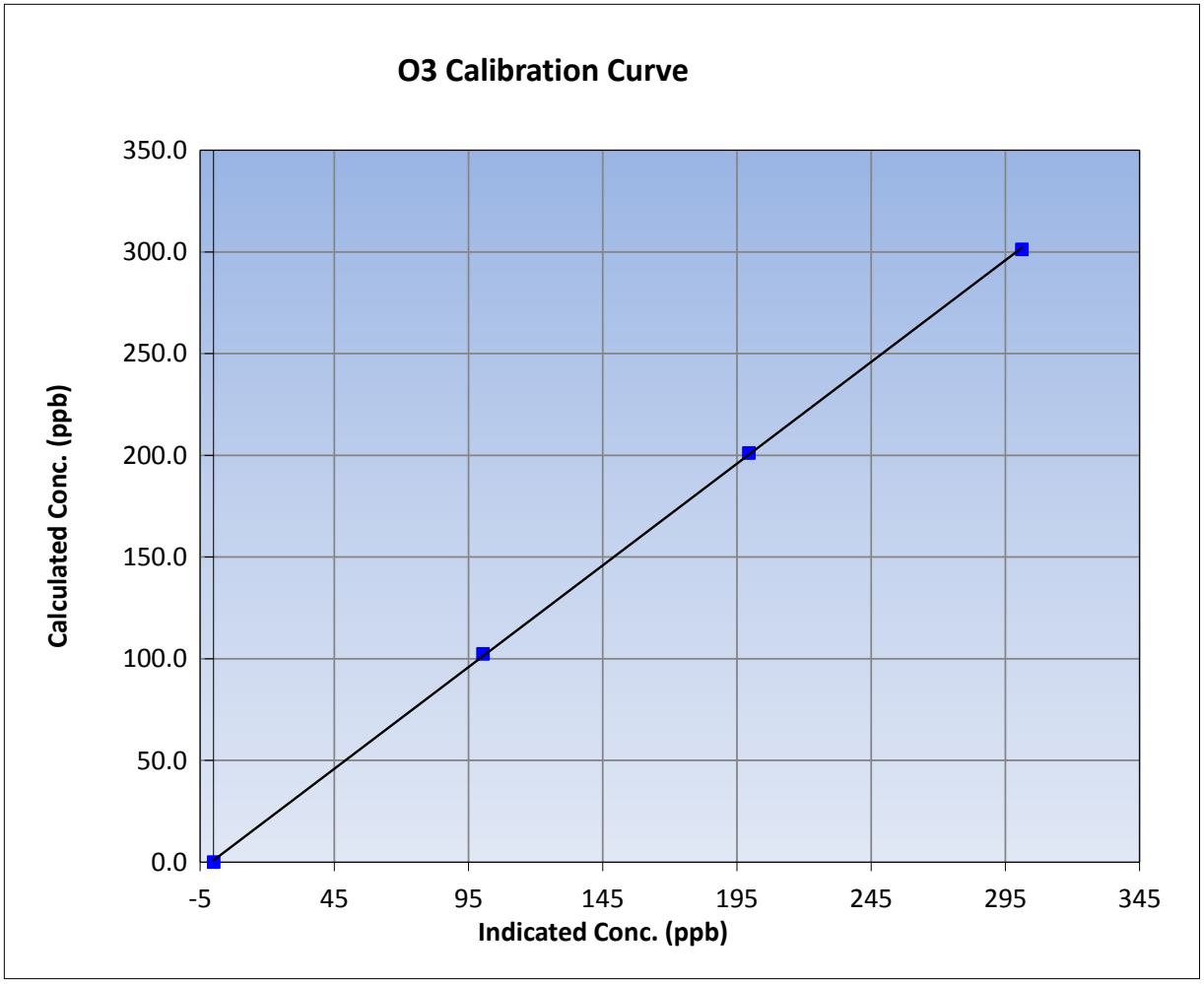
Wood Buffalo Environmental Association
O3 Calibration Report

Station Information

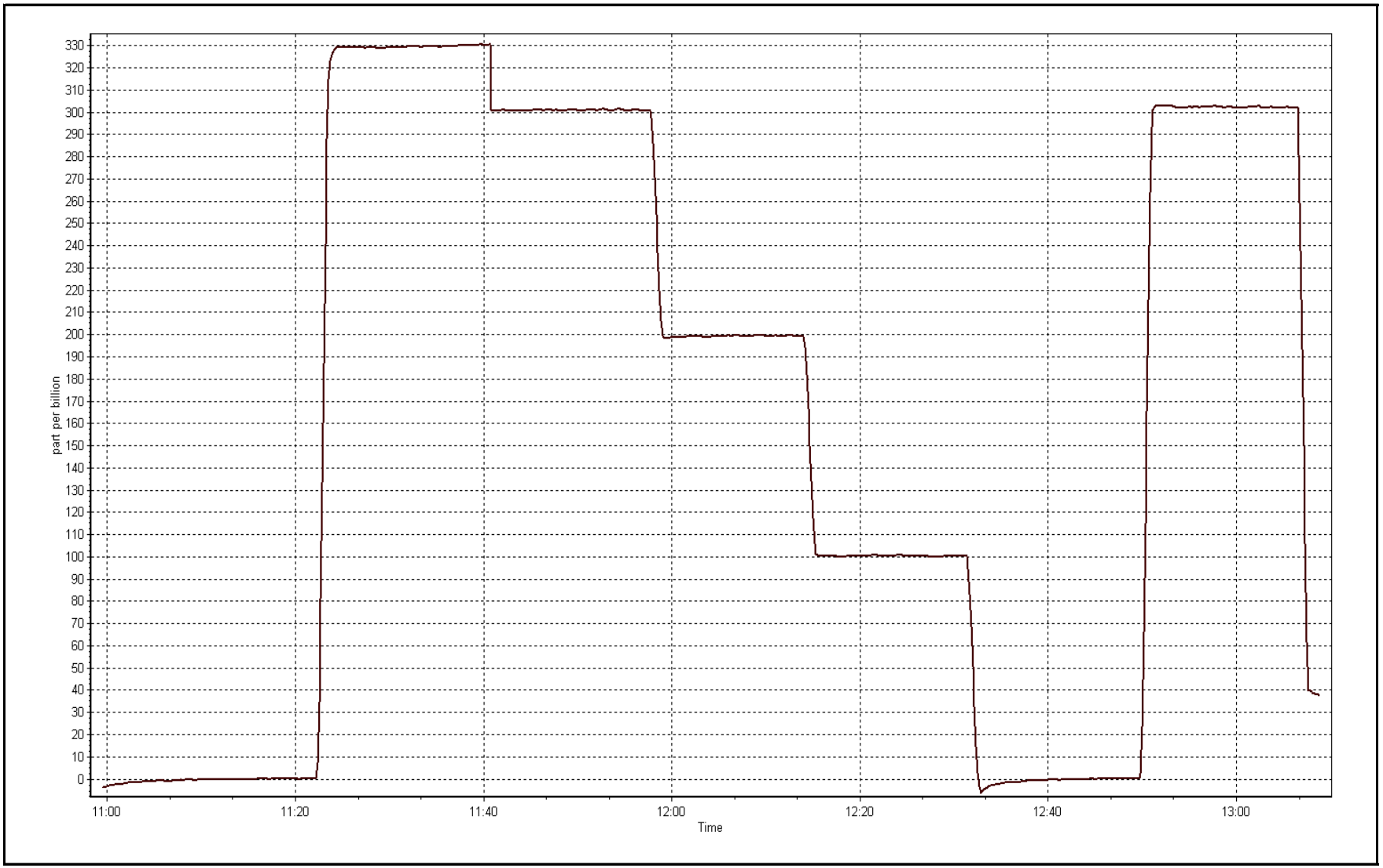
Calibration Date	April-13-16	Previous Calibration	April 8, 2016
Station Name	Conklin Townsite	Station Number	AMS 21
Start Time (MST)	10:57	End Time (MST)	13:10
Analyzer make	Thermo 49i	Analyzer serial #	1501663734

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999933
301.2	301.1	1.0002		
201.1	199.5	1.0083	Slope	0.999930
102.4	100.4	1.0197		
			Intercept	0.922978



O3 Calibration Plot Date: April 13, 2016



Wood Buffalo Environmental Association
NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	April 7, 2016	Previous Calibration	March 29, 2016
Station Name	Conklin Townsite	Station Number	AMS 21
Reason:	Routine		
Start Time (MST)	8:00	End Time (MST)	11:55
NO Cal Gas Conc	52.4 ppm	Gas Cert Reference	EY0000359
NOx Cal Gas Conc	52.4 ppm	Cal Gas Expiry Date	Feb-09-2018
Calibrator	API T700	Serial Number	1221
Zero air Generator	API 701	Serial Number	5611

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	9628

Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.999948	1.000001	1.001734
	Data Offset	1.910180	2.301642	0.451496
Current Calibration	Data Slope	1.000560	0.998710	0.997795
	Data Offset	1.684580	2.135822	0.984790

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1501663731

Test Point	before		after	
Concentration range	0-1000 ppb	ppb	0-1000 ppb	ppb
Analyzer IP	192.168.1.43		192.168.1.43	
NO coefficient	1.034		0.989	
NOX coefficient	0.998		0.997	
NO2 coefficient	1.000		1.000	
NO bkgrnd	6.7		6.4	
NOX bkgrnd	6.8		6.5	
Chamber Temp	49.9	Deg C	49.9	Deg C
Moly Temp	327.4	Deg C	327.9	Deg C
PMT voltage	-841	V	-841	V
PMT Temp	-3	Deg C	-2.8	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	167.9	mmHg	164.7	mmHg
R Cell Press Nox	167.9	mmHg	165.1	mmHg
NO sample flow	0.655	lpm	0.685	lpm
Nox sample Flow	0.655	lpm	0.685	lpm

Notes:

Sample inlet filter replaced after as founds. Adjusted span.

Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: April 7, 2016 Station Number: AMS 21

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	0.0	0.1	-0.1	----	----
as found span	5000	76.5	801.7	801.7	0.0	838.7	838.8	-0.1	0.9559	0.9558
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1	----	----
high point	5000	76.5	801.7	801.7	0.0	800.1	801.4	-1.3	1.0020	1.0004
second point	5000	38.2	400.3	400.3	0.0	398.4	398.3	0.1	1.0049	1.0051
third point	5000	19.3	202.3	202.3	0.0	198.4	197.9	0.5	1.0194	1.0221
as left zero	5000	0.0	0.0	0.0	0.0	0.0	0.1	-0.1	----	----
as left span	5000	76.5	801.7	491.2	310.5	796.4	489.3	307.2	1.0066	1.0040
								Average Correction Factor	1.0088	1.0092

Corrcted As found NO_X= 838.7 NO= 838.7 Percent Change NO_X= -4.6% NO= -4.7%

Previous Response NO_X= 799.9 NO= 799.4

GPT Calibration Data

Dilution Flow (total) 5000 ccm Source Gas Flow 76.50 ccm NOX ref calc conc = 801.7 ppb NO ref calc conc = 801.7 ppb

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
1st NO ref point		0.0	798.8	797.8	-0.1	1.0036	1.0050	----	----
1st NO2 (300)	491.2	306.5	798.0	491.2	306.8	1.0047	----	0.9993	100.1%
2nd NO2 (200)	594.3	203.5	797.1	594.3	202.8	1.0058	----	1.0033	99.7%
3rd NO2 (100)	693.4	104.4	795.6	693.4	102.3	1.0076	----	1.0202	98.0%
2nd NO ref point		0.0	799.4	797.3	2.1	1.0029	1.0055	----	----
				Average Correction Factor		1.0053		1.0076	99.3%

Calibration Performed By: Asad Hidayat

Wood Buffalo Environmental Association

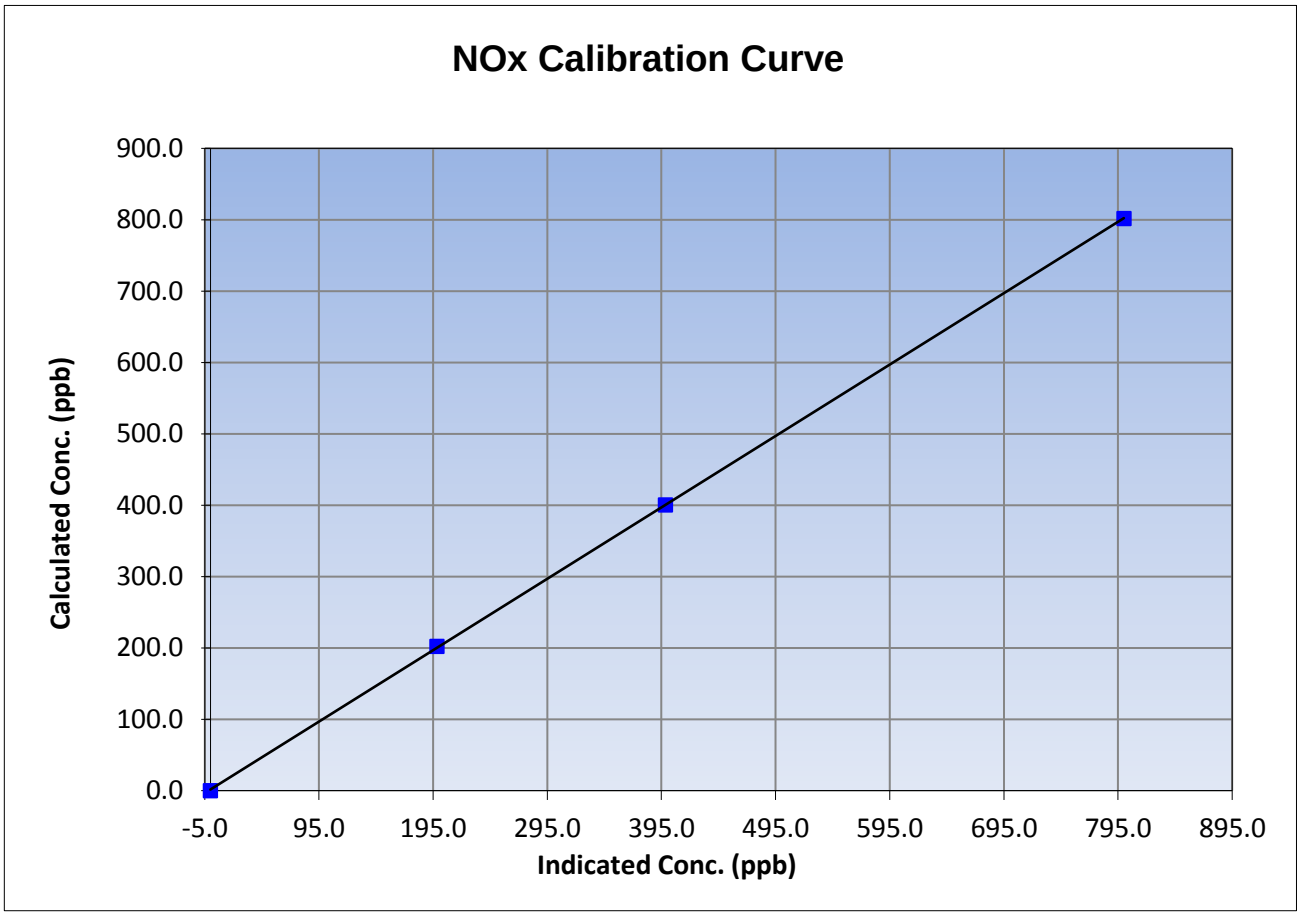
NO_X Calibration Summary

Station Information

Calibration Date	April 7, 2016	Previous Calibration	March 29, 2016
Station Name	Conklin Townsite	Station Number	AMS 21
Start Time (MST)	8:00	End Time (MST)	11:55
Analyzer make	Thermo 42i	Analyzer serial #	1501663731

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999980
801.7	800.1	1.0020		
400.3	398.4	1.0049	Slope	1.000560
202.3	198.4	1.0194		
			Intercept	1.684580



Wood Buffalo Environmental Association

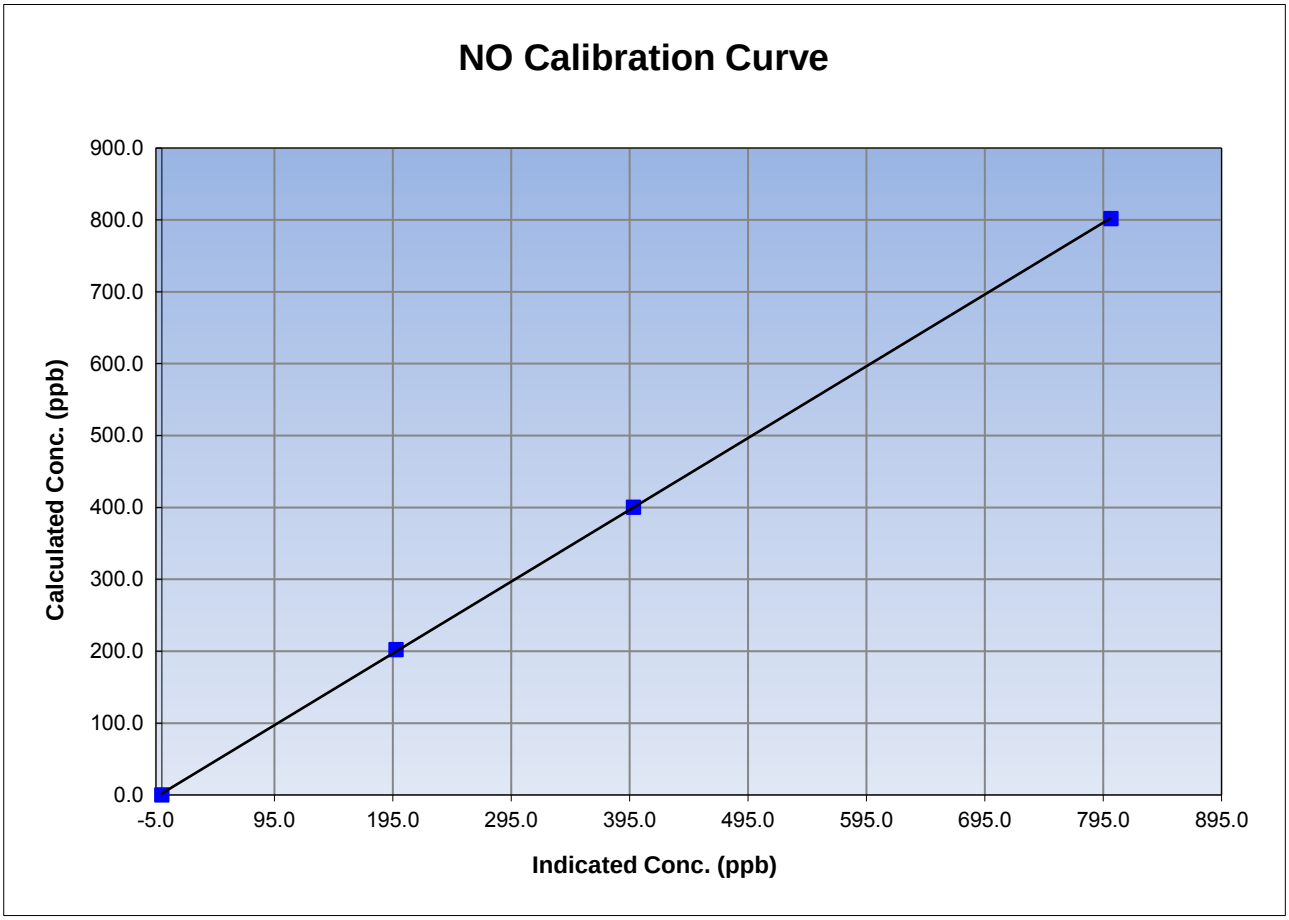
NO Calibration Summary

Station Information

Calibration Date	April 7, 2016	Previous Calibration	March 29, 2016
Station Name	Conklin Townsite	Station Number	AMS 21
Start Time (MST)	8:00	End Time (MST)	11:55
Analyzer make	Thermo 42i	Analyzer serial #	1501663731

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999968
801.7	801.4	1.0004		
400.3	398.3	1.0051	Slope	0.998710
202.3	197.9	1.0221		
			Intercept	2.135822



Wood Buffalo Environmental Association

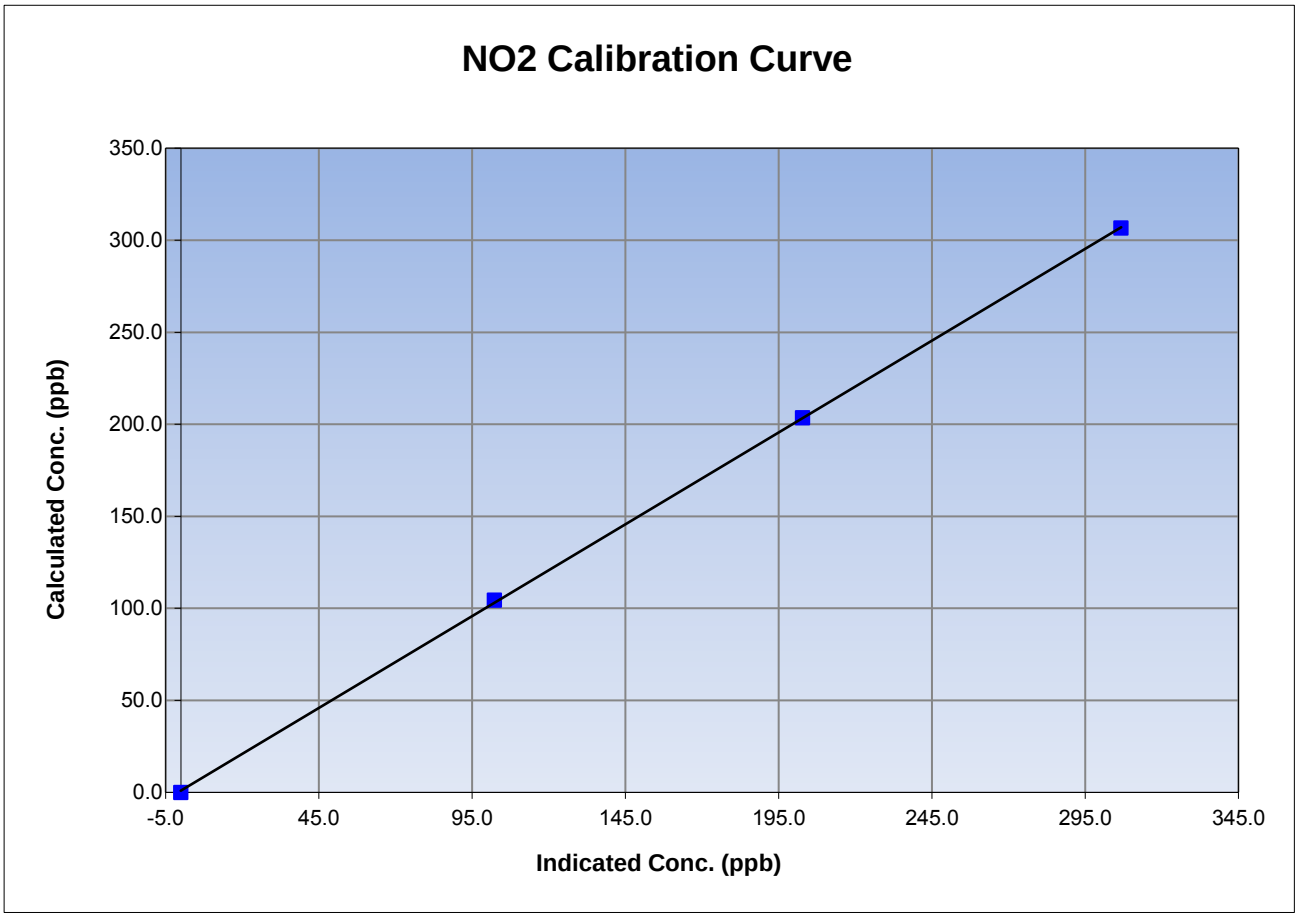
NO_2 Calibration Summary

Station Information

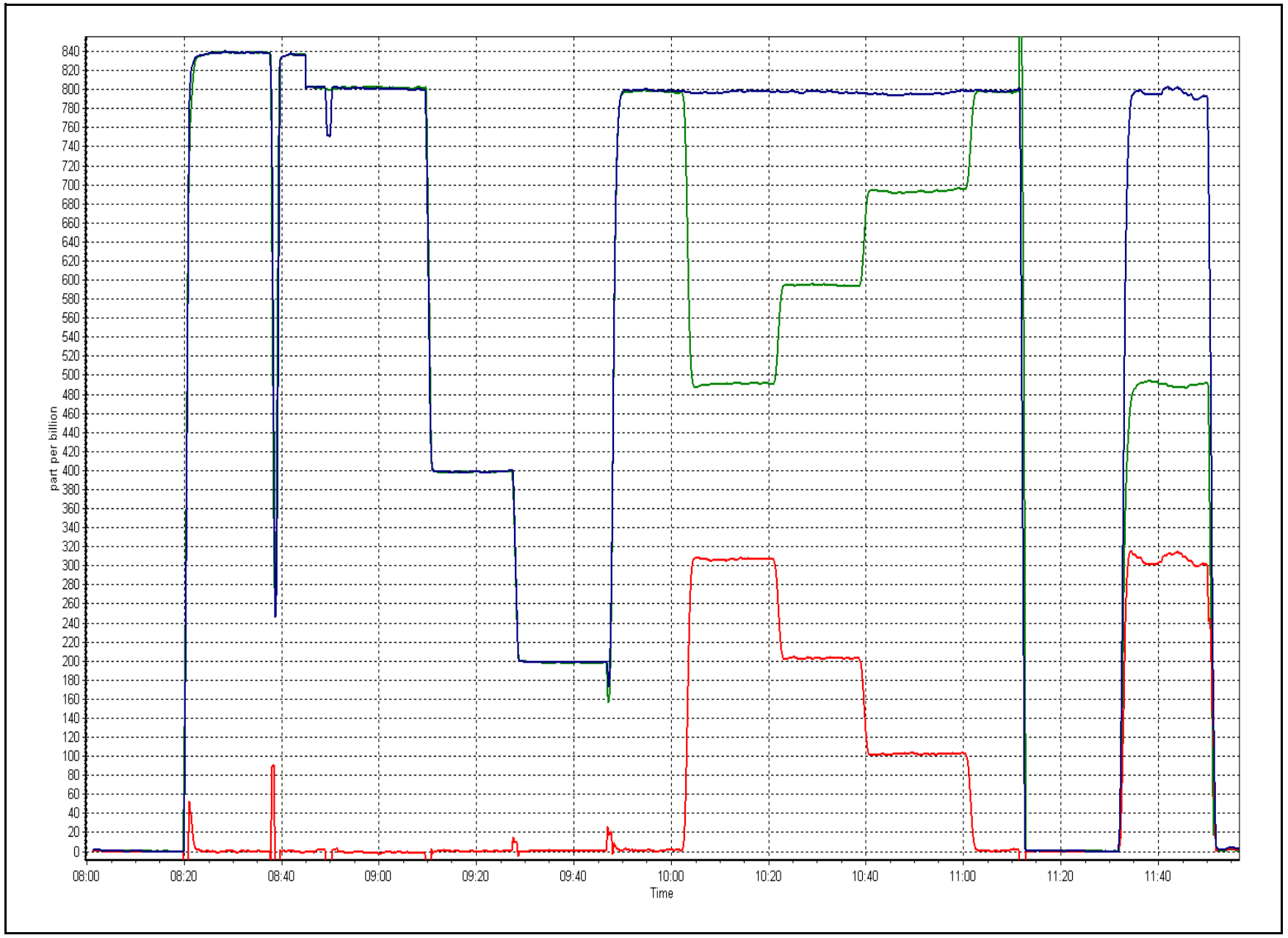
Calibration Date	April 7, 2016	Previous Calibration	March 29, 2016
Station Number	Conklin Townsite	Station Number	AMS 21
Start Time (MST)	8:00	End Time (MST)	11:55
Analyzer make	Thermo 42i	Analyzer serial #	1501663731

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999945
306.5	306.8	0.9993		
203.5	202.8	1.0033	Slope	0.997795
104.4	102.3	1.0202		
			Intercept	0.984790



NOX Calibration Plot Date: April 7, 2016



Wood Buffalo Environmental Association
NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	April 13, 2016	Previous Calibration	April 7, 2016
Station Name	Conklin Townsite	Station Number	AMS 21
Reason:	Other: GPT reference for O3 cal		
Start Time (MST)	8:55	End Time (MST)	10:55
NO Cal Gas Conc	52.4 ppm	Gas Cert Reference	EY0000359
NOx Cal Gas Conc	52.4 ppm	Cal Gas Expiry Date	Feb-09-2018
Calibrator	API T700	Serial Number	1221
Zero air Generator	API 701	Serial Number	5611

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	9628

Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	1.001849	1.000287	0.997795
	Data Offset	0.120222	0.060017	0.984790
Current Calibration	Data Slope	1.020299	1.022785	1.002235
	Data Offset	0.102030	0.051139	1.015227

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1501663731

Test Point	before		after	
Concentration range	0-1000 ppb	ppb	0-1000 ppb	ppb
Analyzer IP	192.168.1.43		192.168.1.43	
NO coefficient	0.989		0.989	
NOX coefficient	0.997		0.997	
NO2 coefficient	1.000		1.000	
NO bkgrnd	6.4		6.4	
NOX bkgrnd	6.5		6.5	
Chamber Temp	49.9	Deg C	50.2	Deg C
Moly Temp	327.9	Deg C	323	Deg C
PMT voltage	-841	V	-841	V
PMT Temp	-2.8	Deg C	-3.1	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	164.7	mmHg	162.9	mmHg
R Cell Press Nox	165.1	mmHg	162.9	mmHg
NO sample flow	0.685	lpm	0.674	lpm
Nox sample Flow	0.685	lpm	0.674	lpm

Notes:

GPT reference for O3 calibration.

Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: April 13, 2016 Station Number: AMS 21

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1	----	----
as found span	5000	76.5	801.7	801.7	0.0	785.7	783.8	1.9	1.0204	1.0228
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1	----	----
high point	5000	76.5	801.7	801.7	0.0	785.7	783.8	1.9	1.0204	1.0228
second point										
third point										
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.1	0.0	----	----
as left span										
								Average Correction Factor	1.0204	1.0228

Corrcted As found NO_X= 785.8 NO= 783.9 Percent Change NO_X= 1.8% NO= 2.2%

Previous Response NO_X= 800.1 NO= 801.4

GPT Calibration Data

Dilution Flow (total) 5000 ccm Source Gas Flow 76.50 ccm NOX ref calc conc = 801.7 ppb NO ref calc conc = 801.7 ppb

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
1st NO ref point		0.0	785.7	783.8	-0.1	1.0204	1.0228	----	----
1st NO2 (300)	482.6	301.2	783.1	482.6	300.4	1.0238	----	1.0026	99.7%
2nd NO2 (200)	582.7	201.1	781.5	582.7	198.8	1.0259	----	1.0118	98.8%
3rd NO2 (100)	681.5	102.4	781.6	681.5	100.1	1.0258	----	1.0222	97.8%
2nd NO ref point		0.0	782.1	780.8	1.2	1.0251	1.0268	----	----
				Average Correction Factor		1.0252		1.0122	98.8%

Calibration Performed By: Asad Hidayat

Wood Buffalo Environmental Association

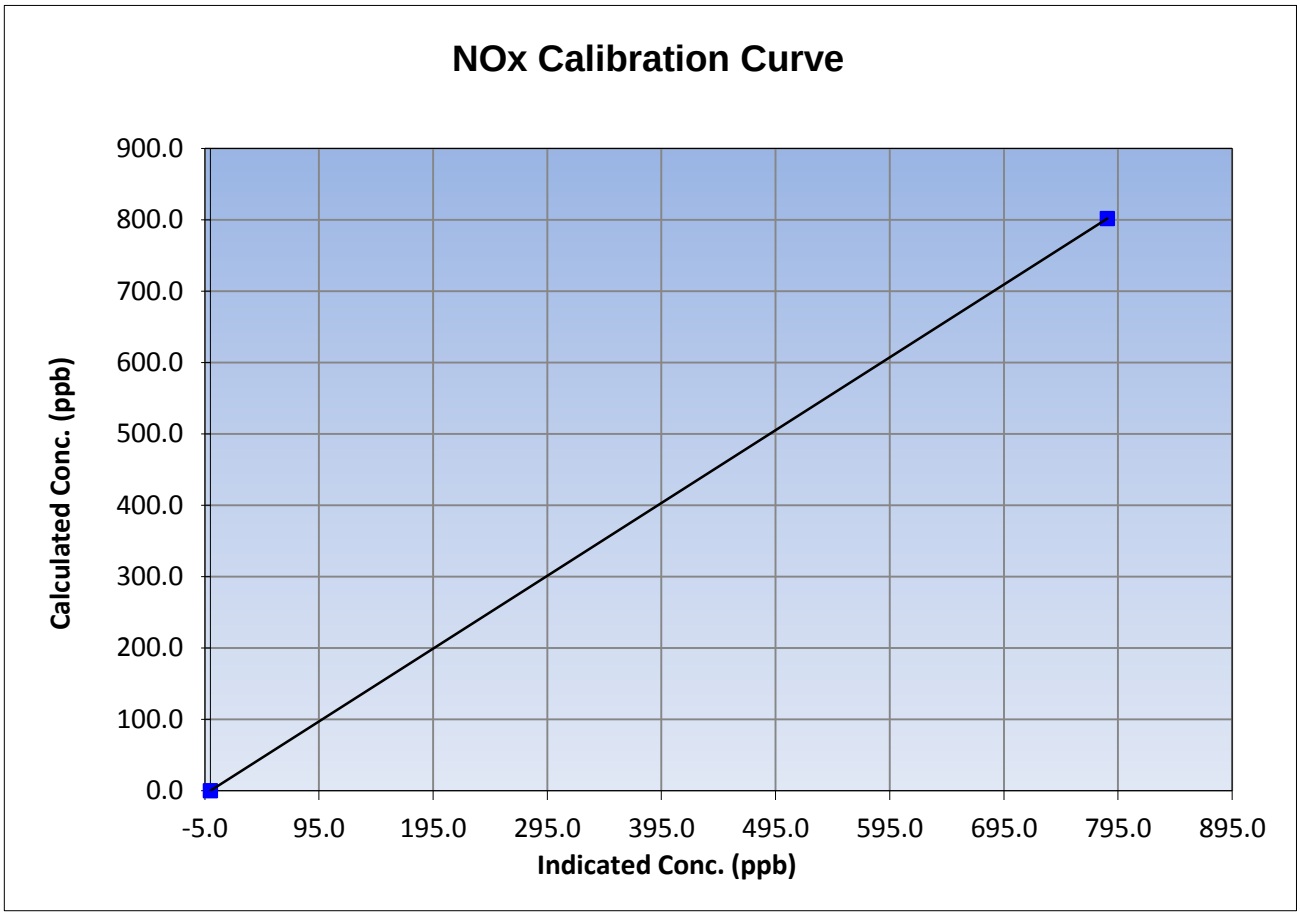
NO_X Calibration Summary

Station Information

Calibration Date	April 13, 2016	Previous Calibration	April 7, 2016
Station Name	Conklin Townsite	Station Number	AMS 21
Start Time (MST)	8:55	End Time (MST)	10:55
Analyzer make	Thermo 42i	Analyzer serial #	1501663731

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	1.000000
801.7	785.7	1.0204		
			Slope	1.020299
			Intercept	0.102030



Wood Buffalo Environmental Association

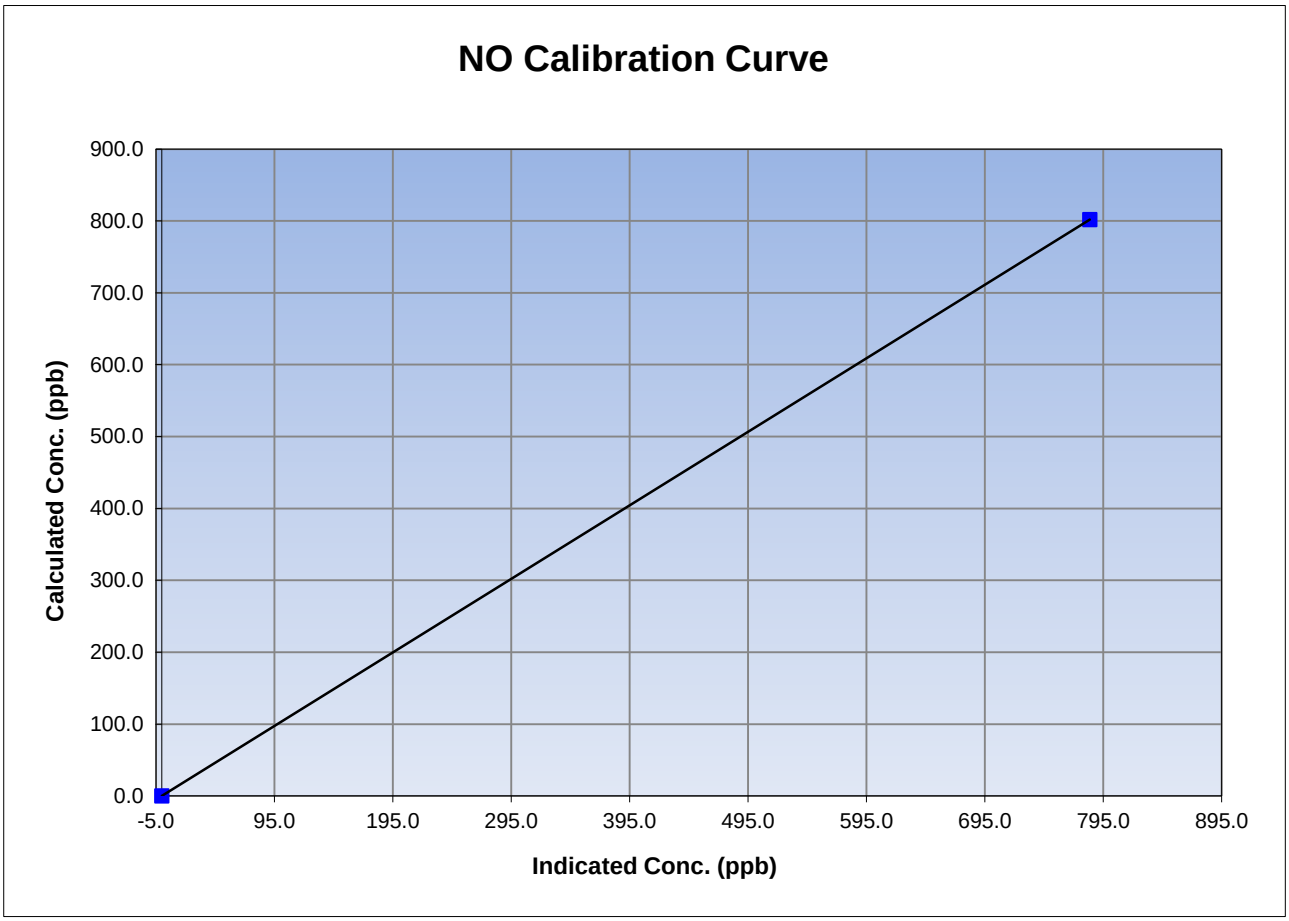
NO Calibration Summary

Station Information

Calibration Date	April 13, 2016	Previous Calibration	April 7, 2016
Station Name	Conklin Townsite	Station Number	AMS 21
Start Time (MST)	8:55	End Time (MST)	10:55
Analyzer make	Thermo 42i	Analyzer serial #	1501663731

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	1.000000
801.7	783.8	1.0228		
			Slope	1.022785
			Intercept	0.051139



Wood Buffalo Environmental Association

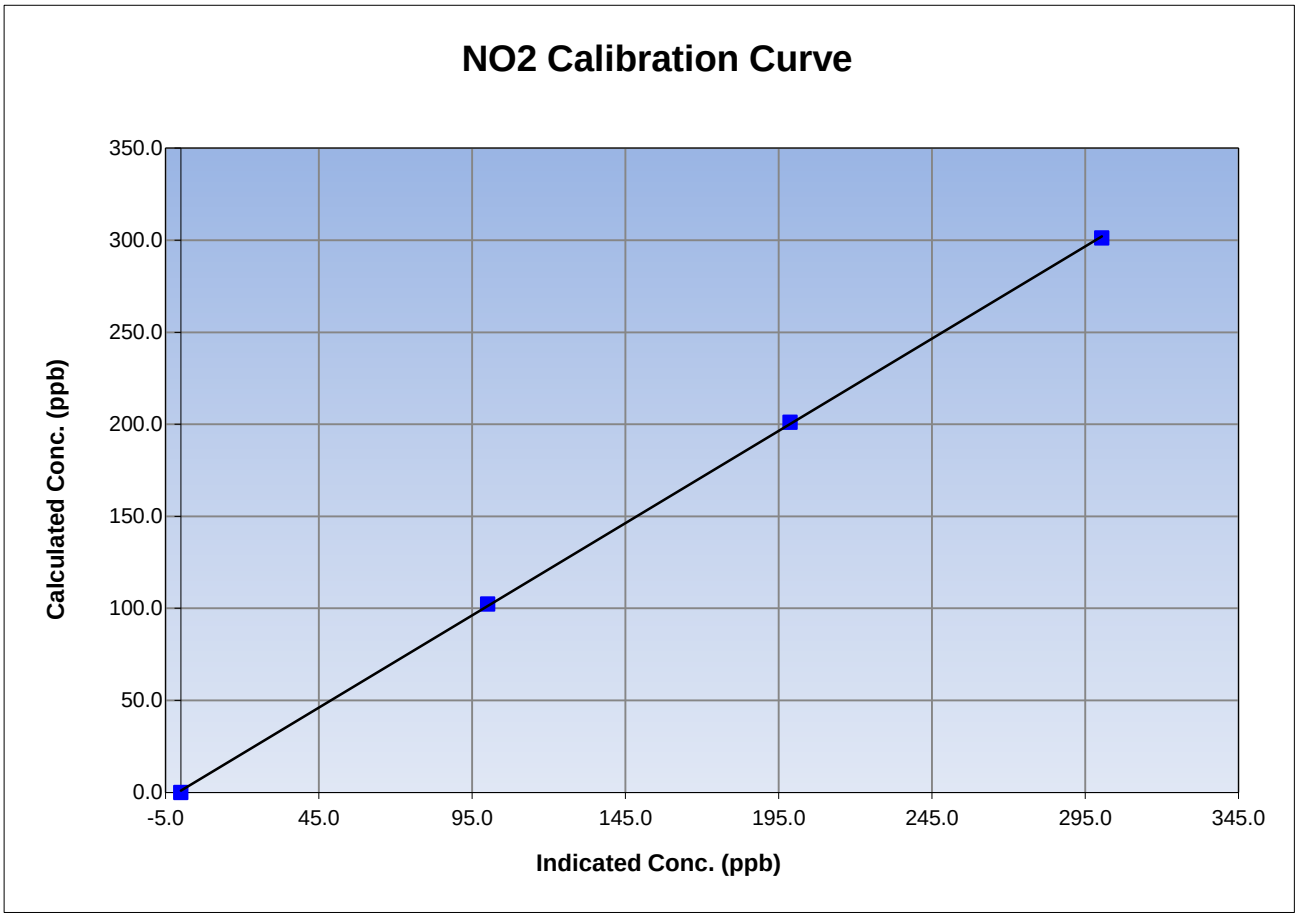
NO_2 Calibration Summary

Station Information

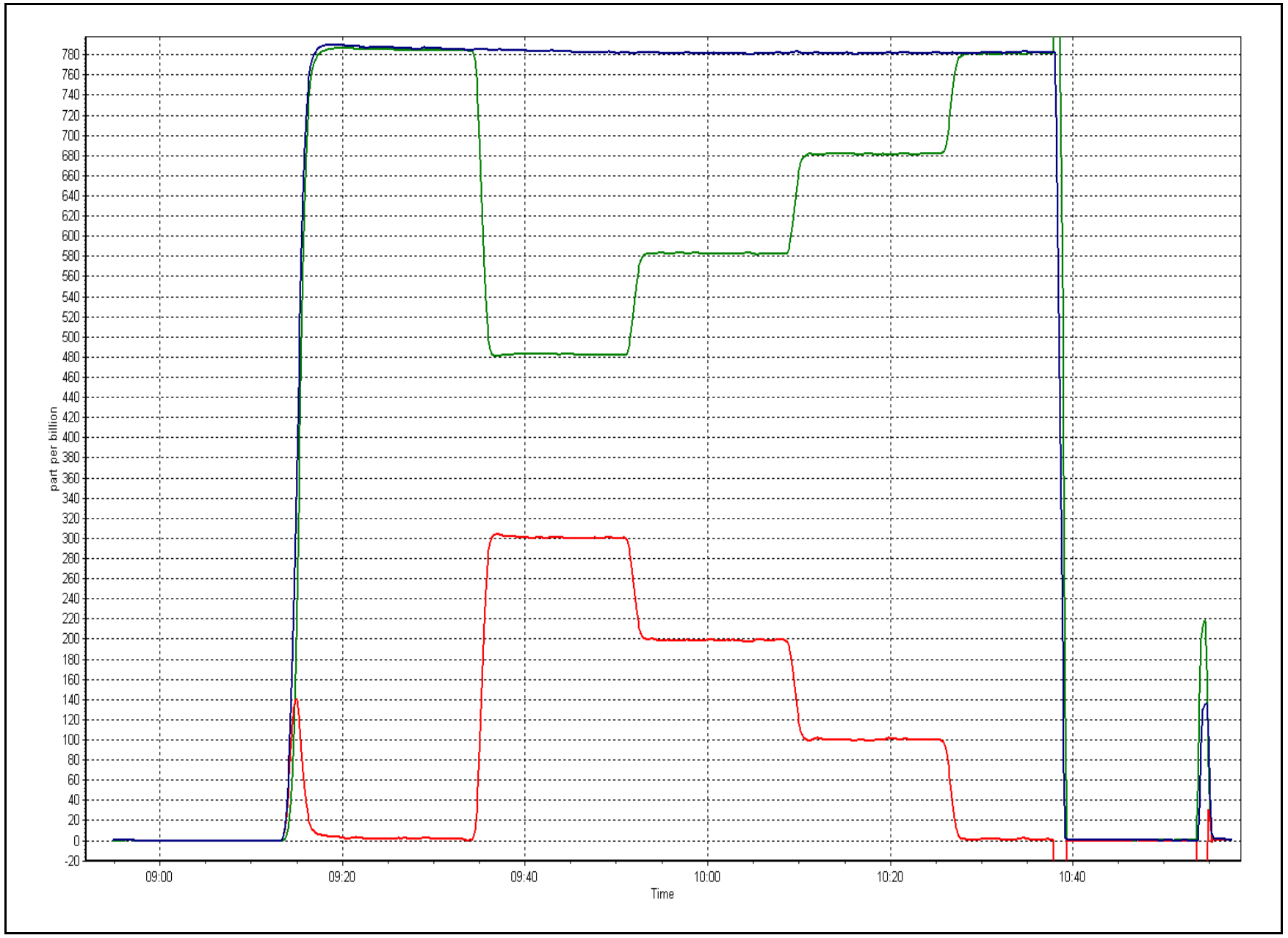
Calibration Date	April 13, 2016	Previous Calibration	April 7, 2016
Station Number	Conklin Townsite	Station Number	AMS 21
Start Time (MST)	8:55	End Time (MST)	10:55
Analyzer make	Thermo 42i	Analyzer serial #	1501663731

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999930
301.2	300.4	1.0026		
201.1	198.8	1.0118	Slope	1.002235
102.4	100.1	1.0222		
			Intercept	1.015227



NOX Calibration Plot Date: April 13, 2016



Wood Buffalo Environmental Association

SHARP CALIBRATION

STATION INFORMATION

Calibration Date:	April 8, 2016	Previous Calibration:	March 24, 2016
Station Name:	Conklin Townsite	Station Number:	AMS 21
Start Time (MST):	7:59	End Time (MST):	9:20
Calibrator Make/Model:	Delta Cal	Calibrator Serial Number:	1451

SHARP INFORMATION

Particulate Fraction:	PM2.5							
Make/Model:	Thermo / SHARP 5030							
Serial Number	7494							
C_{14} Source SN:	CM-0404							
Confirmation of Time settings:	Yes ☐	No ☐						
Paremeters Checked:	T1 ☑	T2 ☐	T3 ☐	T4 ☐	P3 ☑	Main Flow ☑	Beta ☑	Neph ☑

CALIBRATION DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	-3.0	-1.9	1.1	-2.0
T2	17.0	na	na	17.0
T3	20.0	na	na	19.0
T4	20.0	na	na	19.0
RH (%)	42.0	na	na	40.0

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	956	952.0	-4.0	956

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	170		170
Neph	1		1
C14	6.9		6.9
Indicated Concentration (ug/m3)	**0.5**	**no**	**0.5**
Offset 1			
Offset 2			

Leak Check (Quarterly)

Leak Check Date:	March 24, 2016	Previous Leak Check Date:	NA

	Measured	Difference LPM (Limit +/- 0.42 LPM)
Flow without adaptor (LPM):	16.70	0.16
*Flow with adaptor (LPM):	16.54	

**Note - do not attach adaptor without shutting off the pump first*

Mass Foil Calibration (Annualy)

Foil Calibration Date:	March 24, 2016	Previous Foil Calibration:	NA
Zeroed?:			
Foil Mass:	1337	Mass foil set S/N:	5872
Previous Correction Factor:	7048		
New Correction Factor:	7056		

INSPECTION DATA

Item	Condition	Date of install or rebuild
Cyclone	Good / cleaned	08/04/2016
Pump	Good	21/03/2016
Filter Tape	Good	21/03/2016
Mass Foil Cal Set	na	24/03/2016
HEPA filter	Good	24/03/2016

NOTES:

No adjustments. Cyclone head cleaned.

Calibration Performed By: **Asad Hidayat**

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 500
CENOVUS
CHRISTINA LAKE
APRIL 2016

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

May 27, 2016

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CENOVUS CHRISTINA LAKE (AMS 500)
APRIL 2016

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	682	38	38	100	9	0	2	0
H2S (ppb) Average	687	33	33	100	1	0	0	0
NO2 (ppb) Average	626	43	94	92.92	18	0	5	-
NO (ppb) Average	626	43	94	92.92	14	-	4	-
NOX (ppb) Average	626	43	94	92.92	25	-	7	-
Temperature 2 m (C) Average	720	0	0	100	23.6	-	16.8	-
Relative Humidity (%) Average	720	0	0	100	98	-	94	-
Wind Speed 10 m (km/h) Average	720	0	0	100	30	-	19	-
Wind Direction 10 m (deg) Average	720	0	0	100	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CENOVUS CHRISTINA LAKE (AMS 500)
APRIL 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

					Percentile						
Parameter	Number	Mean	StnDev	Total	Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	682	0.8	1	-	0	0	0	0	1	2	9
H2S (ppb) Average	687	0.1	0	-	0	0	0	0	0	0	1
NO2 (ppb) Average	626	1.9	2	-	0	0	1	1	2	4	18
NO (ppb) Average	626	0.8	1	-	0	0	0	1	1	1	14
NOX (ppb) Average	626	2.7	3	-	0	1	1	2	3	5	25
Temperature 2 m (C) Average	720	4.71	6.9	-	-7.5	-3.2	0.1	3.6	8.6	15.6	23.6
Relative Humidity (%) Average	720	58	23	-	12	27	40	55	77	91	98
Wind Speed 10 m (km/h) Average	720	11.1	6	-	1	5	7	10	14	19	30
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CENOVUS CHRISTINA LAKE (AMS 500)
APRIL 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
NO2, NO, NOX	20 Apr 2016 08:00	20 Apr 2016 08:00	1	Power spike
NO2, NO, NOX	24 Apr 2016 04:00	25 Apr 2016 09:00	30	Unstable Operation - intermittent sample pump failure
NO2, NO, NOX	25 Apr 2016 10:00	26 Apr 2016 05:00	20	Maintenance - pump replacement

Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO_2) - ppb

Cenovus - Christina Lake - April 2016

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

Maximum Value: 9 ppb on Apr 20 02:00 Maximum Daily Average: 2.4 ppb on Apr 14

Minimum Value: 0 ppb on Apr 6 05:00 Minimum Daily Average: 0.1 ppb on Apr 5

Maximum Diurnal Average: 1.3 ppb at hour 10 Minimum Diurnal Average: 0.4 ppb at hour 24

Monthly Average: 0.8 ppb Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 1$ $P_{90} = 2$ $P_{99} = 6$

Hours in Service:	720
Hours of Data:	682
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-Apr	1	1	0	Z	0	4	3	5	5	2	1	2	1	1	2	1	1	1	1	1	0	0	0	0	1.5	5
2-Apr	0	0	0	0	Z	0	0	0	0	1	1	0	0	2	1	0	0	0	0	0	0	0	0	0	0.5	2
3-Apr	0	0	0	1	2	Z	0	0	1	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0.6	2
4-Apr	Z	0	1	0	1	1	5	4	2	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1.0	5
5-Apr	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.1	1
6-Apr	0	1	Z	0	0	0	0	2	8	6	6	5	5	3	4	2	1	0	0	0	0	0	1	1	2.0	8
7-Apr	0	0	0	Z	0	0	0	1	0	1	2	2	1	0	1	0	0	0	0	0	0	0	0	0	0.4	2
8-Apr	0	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-Apr	0	0	1	0	0	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	0	0	0.5	1
10-Apr	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.3	1
11-Apr	0	Z	1	1	1	1	0	0	0	1	1	1	1	1	1	0	1	1	1	0	0	0	3	1	0.7	3
12-Apr	1	1	Z	1	0	0	0	1	1	1	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0.5	1
13-Apr	0	0	0	Z	0	0	1	1	1	1	2	3	2	0	0	0	0	0	0	0	0	0	0	0	0.6	3
14-Apr	0	0	0	0	Z	1	2	4	4	6	4	5	4	6	5	4	3	2	3	1	0	0	0	1	2.4	6
15-Apr	0	0	1	0	0	Z	0	1	1	4	2	1	1	1	1	1	1	1	1	2	1	1	1	1	1.0	4
16-Apr	Z	5	4	1	1	1	1	1	1	2	1	1	1	1	1	0	0	0	0	1	1	0	0	0	1.1	5
17-Apr	1	Z	0	0	1	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.5	1
18-Apr	0	0	Z	4	1	1	2	2	2	1	1	0	0	0	1	0	1	0	1	2	5	2	0	0	1.2	5
19-Apr	0	0	0	Z	1	1	1	1	1	5	4	3	1	0	0	0	0	1	8	2	2	9	1	1	1.9	9
20-Apr	7	9	6	3	Z	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.3	9
21-Apr	0	0	0	0	0	Z	0	0	0	0	0	C	C	C	C	C	C	C	C	1	0	0	0	0	--	1
22-Apr	Z	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
23-Apr	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
24-Apr	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
25-Apr	0	0	0	Z	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0.4	1
26-Apr	1	1	1	0	Z	0	1	0	0	0	0	0	0	1	1	1	1	0	0	1	1	1	0	0	0.5	1
27-Apr	0	0	0	0	0	Z	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0.4	1
28-Apr	Z	0	0	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0.5	2
29-Apr	1	Z	1	1	1	1	1	1	1	1	1	0	0	0	0	0	1	0	0	2	1	1	0	0	0.6	2
30-Apr	1	5	Z	1	1	1	1	1	3	2	0	0	0	0	0	0	0	1	1	1	1	4	2	0	1.1	5
	0.6	1.0	0.8	0.7	0.5	0.6	0.8	1.0	1.2	1.3	1.2	1.1	0.9	0.8	0.8	0.6	0.5	0.5	0.8	0.6	0.6	0.8	0.5	0.4	Diurnal Average	
	7	9	6	4	2	4	5	5	8	6	6	5	5	6	5	4	3	2	8	2	5	9	3	1	Diurnal Maximum	

Z - zerospan C - Calibration

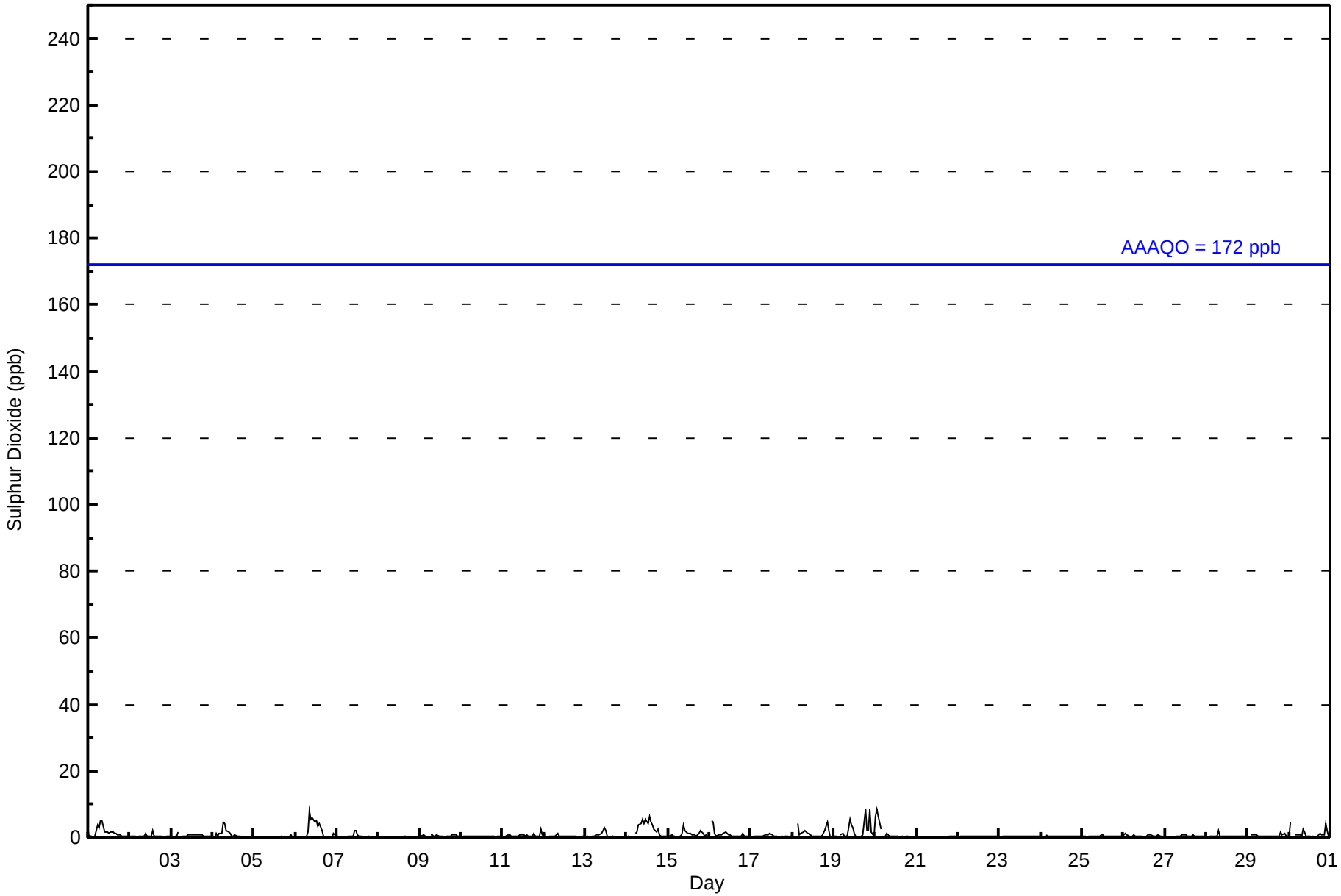
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb

Wood Buffalo Environmental Association

Hourly Averages

Sulphur Dioxide (SO_2) - ppb

Cenovus - Christina Lake - April 2016



Sulphur Dioxide (SO_2) - ppb

Cenovus - Christina Lake - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	682	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: 682

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

Cenovus - Christina Lake - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 10	33	57	27	34	45	48	63	83	106	44	20	16	16	18	43	29	682
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	33	57	27	34	45	48	63	83	106	44	20	16	16	18	43	29	682

Total Number of Valid Hours: 682

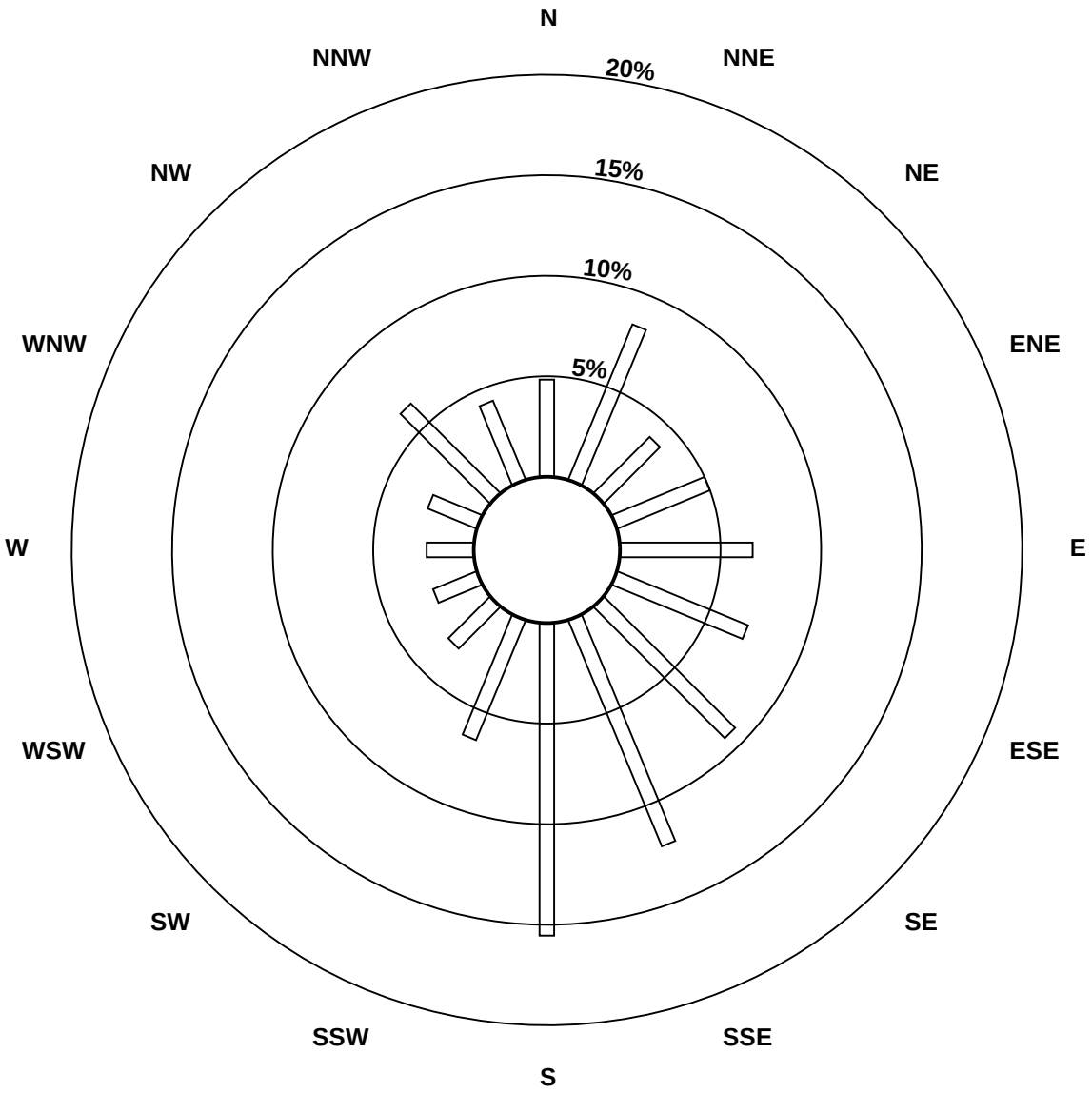
Total Number of Hours: 720

Wood Buffalo Environmental Association

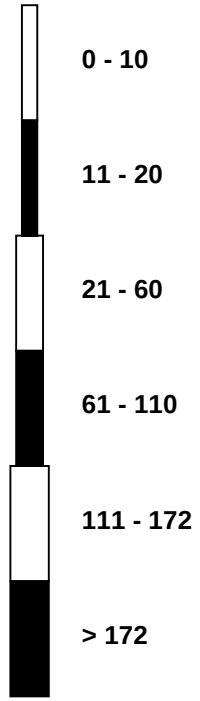
Wind Rose Apr 2016

Sulphur Dioxide (SO_2) - ppb

Cenovus - Christina Lake (AMS500)



Classes (ppb)



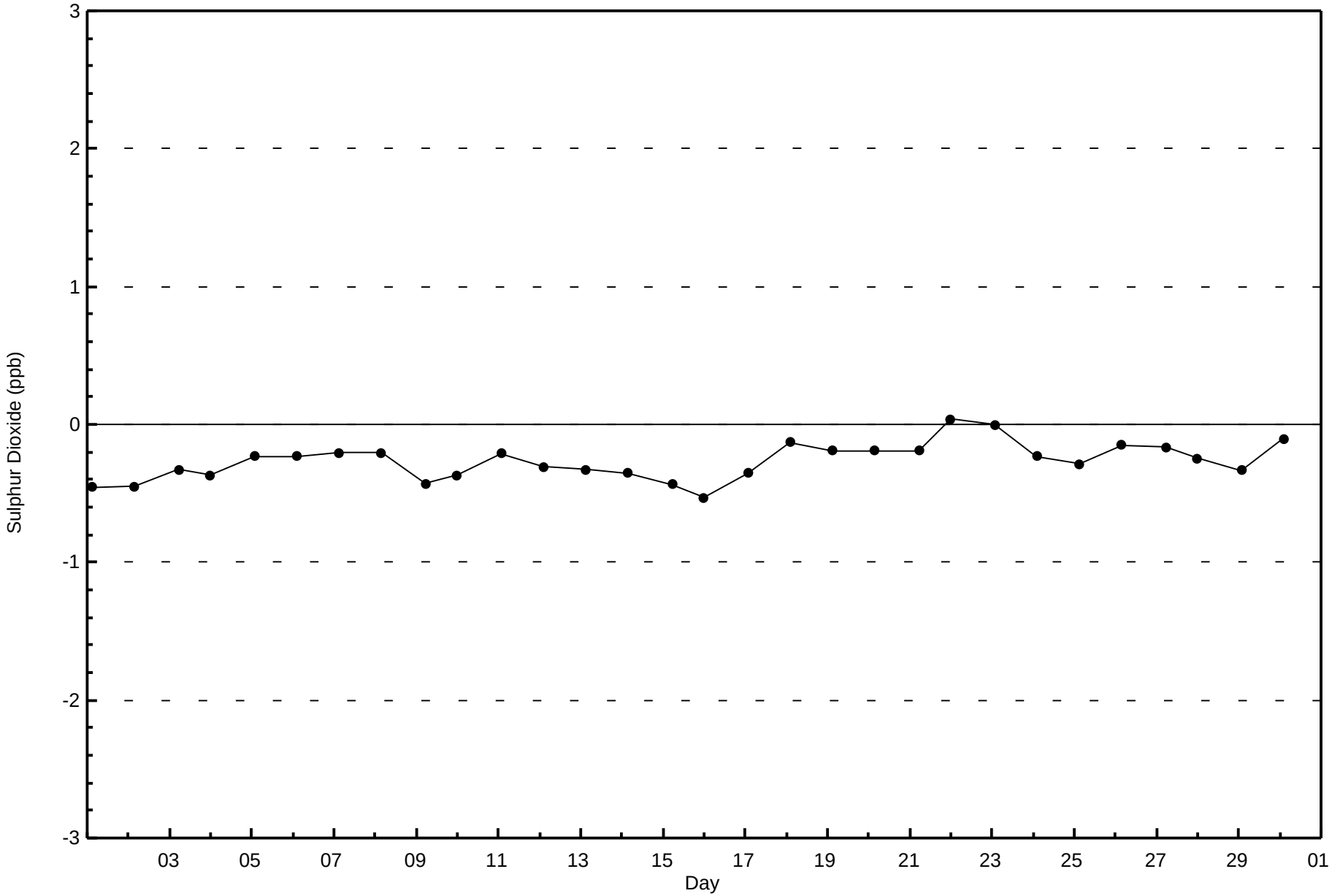
Total Number of Valid Hours: 682

Wood Buffalo Environmental Association

Zero Responses

Sulphur Dioxide (SO_2) - ppb

Cenovus - Christina Lake - April 2016



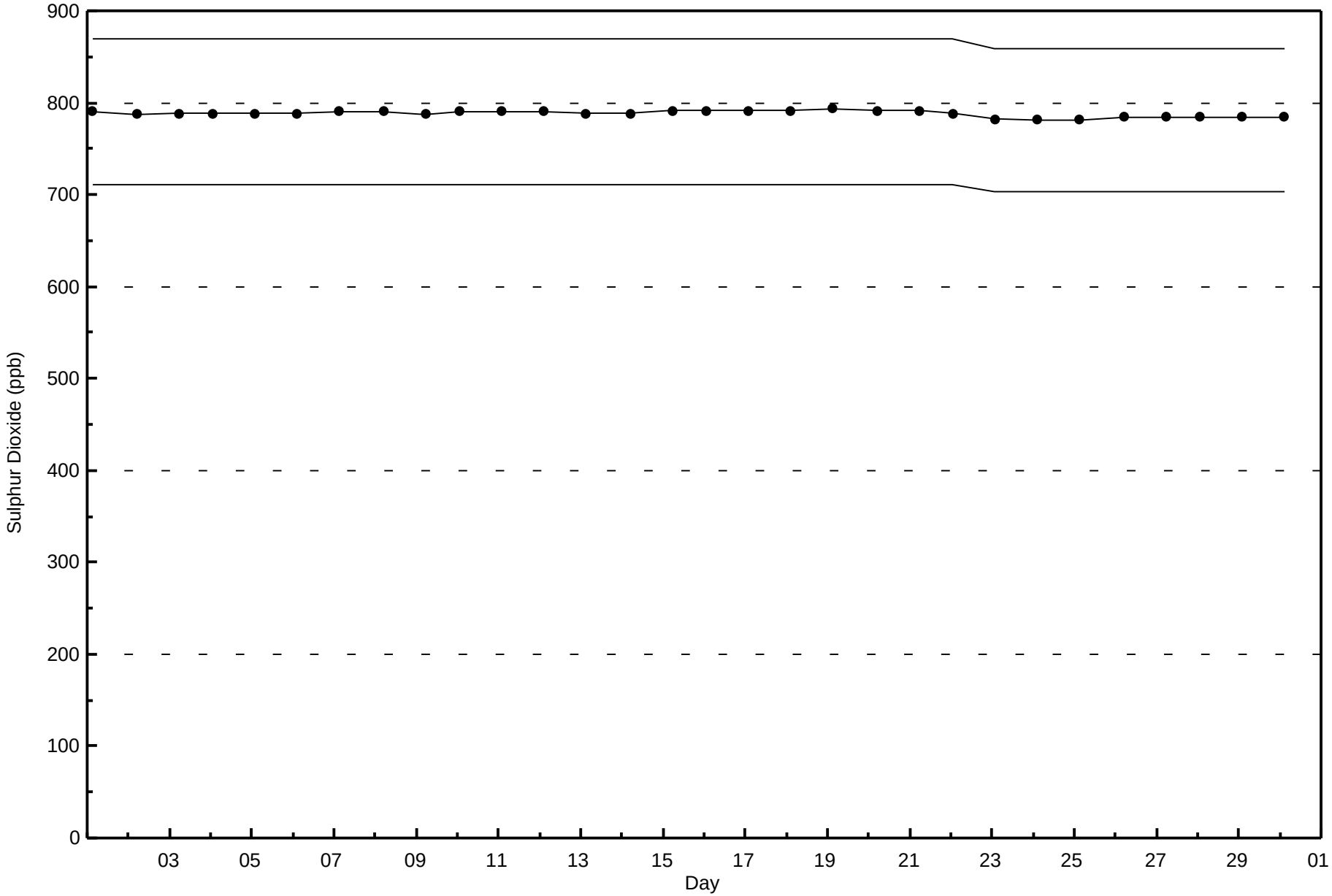
500-11

Wood Buffalo Environmental Association

Span Responses

Sulphur Dioxide (SO_2) - ppb

Cenovus - Christina Lake - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Hydrogen Sulphide (H_2S) - ppb

Cenovus - Christina Lake - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 1 ppb on Apr 19 22:00 Maximum Daily Average: 0.2 ppb on Apr 14

Minimum Value: 0 ppb on Apr 20 20:00
Maximum Diurnal Average: 0.1 ppb at hour 7
Monthly Average: 0.1 ppb

Minimum Daily Average: 0.0 ppb on Apr 21
Minimum Diurnal Average: 0.1 ppb at hour 17
Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 0$ $P_{99} = 0$

Hours in Service:	720
Hours of Data:	687
Hours of Missing Data:	33
Hours of Calibration:	33
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-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
2-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
3-Apr	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
4-Apr	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
5-Apr	0	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-Apr	0	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-Apr	0	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-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
9-Apr	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
10-Apr	0	Z	0	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-Apr	0	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-Apr	0	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-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
14-Apr	0	0	0	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
15-Apr	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
16-Apr	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
17-Apr	0	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-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
19-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.2	1
20-Apr	1	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
21-Apr	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
22-Apr	0	Z	0	0	0	0	0	0	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
23-Apr	0	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-Apr	0	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-Apr	0	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-Apr	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
27-Apr	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
28-Apr	0	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-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
30-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Diurnal Average	
	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	Diurnal Maximum	

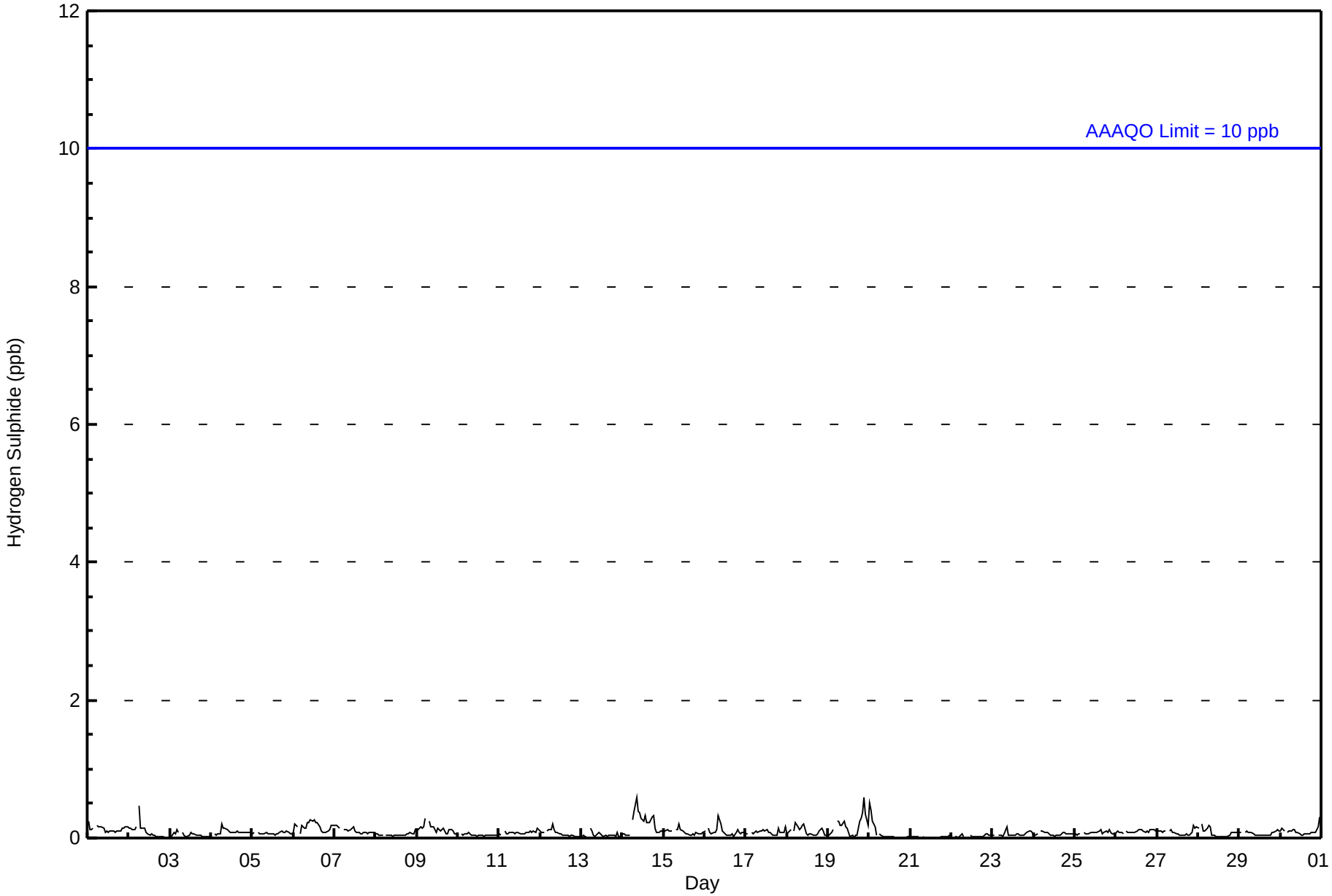
Z - zerospan C - Calibration
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb

Wood Buffalo Environmental Association

Hourly Averages

Hydrogen Sulphide (H_2S) - ppb

Cenovus - Christina Lake - April 2016



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Hydrogen Sulphide (H_2S) - ppb

Cenovus - Christina Lake - April 2016

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

Total Number of Valid Hours: 687

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Hydrogen Sulphide (H_2S) - ppb

Cenovus - Christina Lake - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 2	35	53	33	32	46	48	62	84	109	43	20	16	16	17	43	30	687
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	35	53	33	32	46	48	62	84	109	43	20	16	16	17	43	30	687

Total Number of Valid Hours: 687

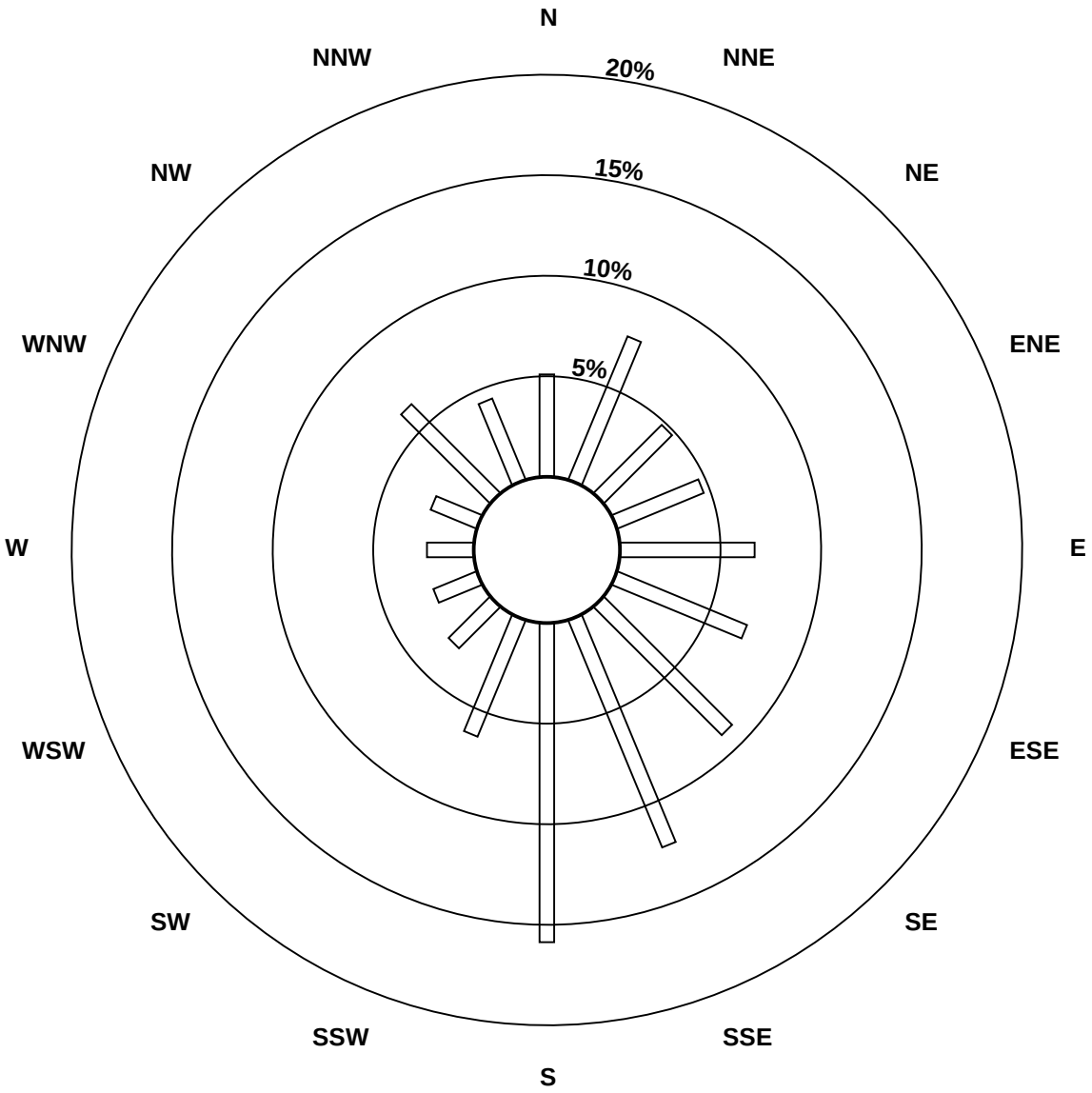
Total Number of Hours: 720

Wood Buffalo Environmental Association

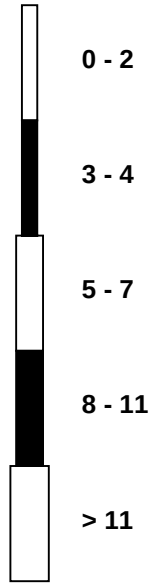
Wind Rose Apr 2016

Hydrogen Sulphide (H_2S) - ppb

Cenovus - Christina Lake (AMS500)



Classes (ppb)



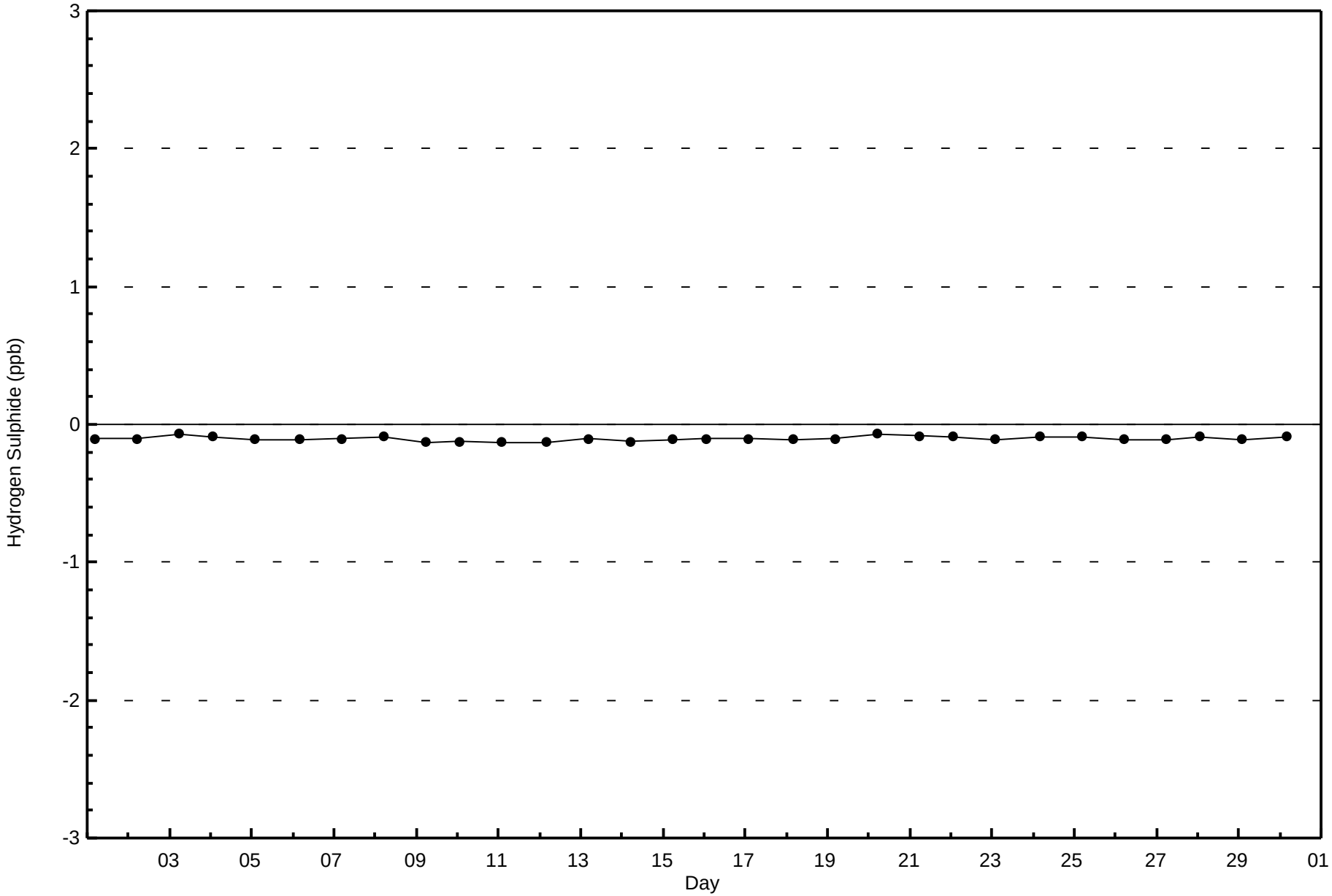
Total Number of Valid Hours: 687

Wood Buffalo Environmental Association

Zero Responses

Hydrogen Sulphide (H_2S) - ppb

Cenovus - Christina Lake - April 2016

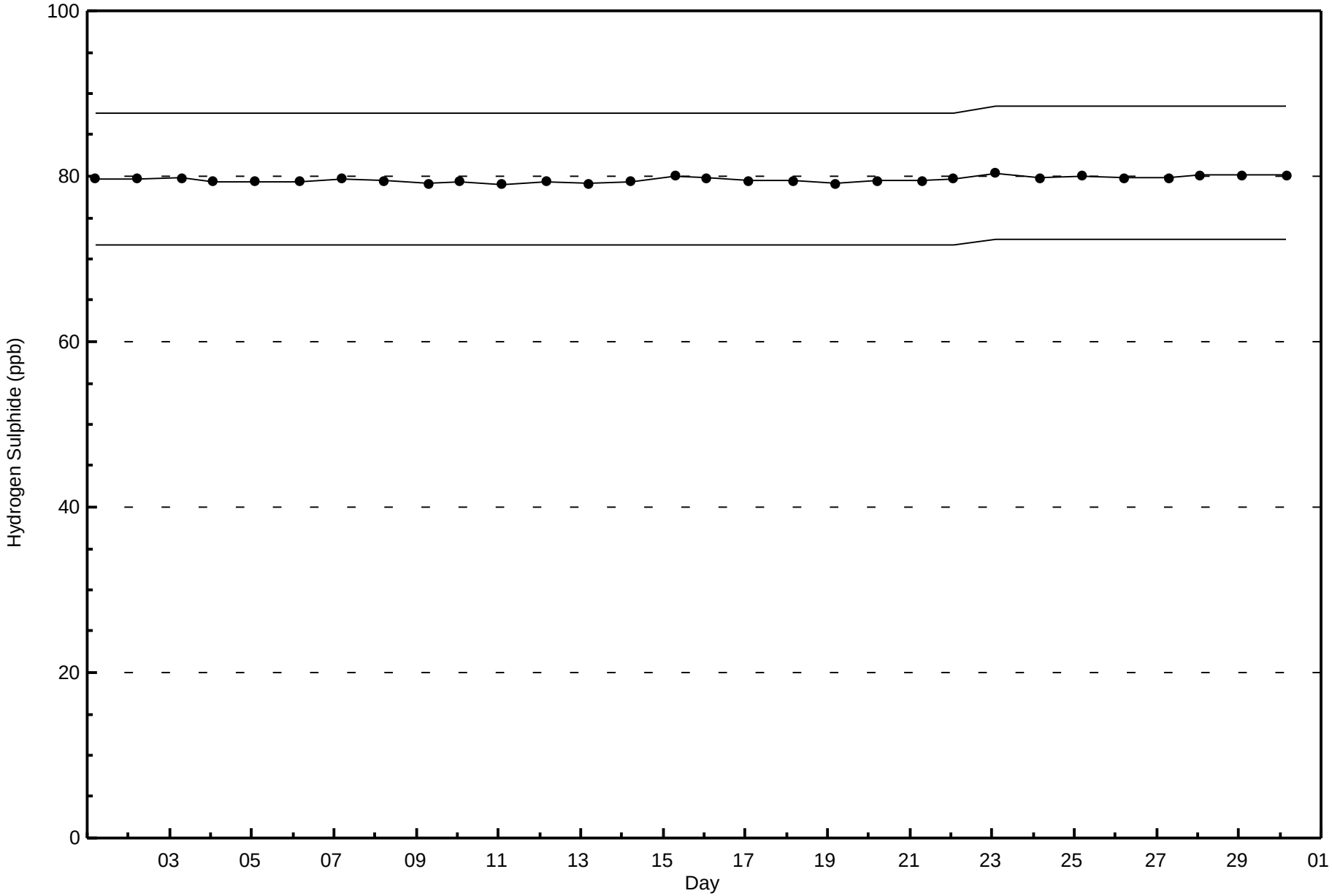


Wood Buffalo Environmental Association

Span Responses

Hydrogen Sulphide (H_2S) - ppb

Cenovus - Christina Lake - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxide (NO) - ppb

Cenovus - Christina Lake - April 2016

Maximum Value: 14 ppb on Apr 6 09:00

Maximum Daily Average: 3.5 ppb on Apr 14

Minimum Value: 0 ppb on Apr 1 02:00

Minimum Daily Average: 0.2 ppb on Apr 8

Maximum Diurnal Average: 1.6 ppb at hour 9

Minimum Diurnal Average: 0.4 ppb at hour 21

Monthly Average: 0.8 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 1 $Q_3 = 1$ $P_{90} = 1$ $P_{99} = 7$

Hours in Service:	720
Hours of Data:	626
Hours of Missing Data:	94
Hours of Calibration:	43
Percent Operational Time:	92.9

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-Apr	1	0	0	Z	0	1	1	2	2	1	1	0	1	1	1	1	0	1	0	0	1	0	0	0	0.7	2
2-Apr	0	0	1	1	Z	1	1	2	1	2	1	1	1	2	1	1	0	1	1	1	1	1	1	1	1.0	2
3-Apr	1	1	1	1	1	Z	1	1	2	1	2	1	1	2	1	2	2	2	1	1	1	1	1	1	1.3	2
4-Apr	Z	2	1	1	1	2	3	4	3	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1.5	4
5-Apr	1	Z	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	0	1	1	1	1	1	0.8	1
6-Apr	1	1	Z	1	1	1	3	5	14	9	10	7	7	7	6	3	1	0	1	0	0	0	1	1	3.4	14
7-Apr	1	0	0	Z	0	0	0	0	1	1	2	3	1	0	0	0	0	0	0	0	0	0	0	0	0.4	3
8-Apr	0	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-Apr	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-Apr	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.2	1
11-Apr	0	Z	0	0	0	1	1	1	1	0	1	1	0	1	1	1	1	0	1	0	0	1	1	1	0.6	1
12-Apr	1	1	Z	1	0	3	5	2	1	1	1	0	0	1	1	1	1	0	0	0	0	0	0	0	0.9	5
13-Apr	0	0	0	Z	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	1	0	0.3	1
14-Apr	0	1	1	1	Z	1	2	5	7	9	6	7	8	7	7	5	4	3	3	1	0	1	1	1	3.5	9
15-Apr	1	0	1	1	1	Z	1	1	1	2	2	1	1	1	1	1	1	1	1	0	1	0	0	0	0.8	2
16-Apr	Z	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0.4	1
17-Apr	0	Z	0	0	0	0	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1
18-Apr	0	0	Z	1	0	1	2	1	1	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0.4	2
19-Apr	0	0	0	Z	0	0	0	0	0	5	4	4	2	0	0	0	1	1	7	1	0	3	1	0	1.3	7
20-Apr	2	4	4	2	Z	0	0	PF	0	0	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0.8	4
21-Apr	0	0	1	1	1	Z	1	0	0	0	0	C	C	C	C	C	C	C	C	1	1	1	1	1	--	1
22-Apr	Z	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.8	1
23-Apr	1	Z	1	0	1	1	1	1	1	1	2	1	1	1	1	0	1	0	0	0	0	1	0	1	0.7	2
24-Apr	1	0	Z	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	1
25-Apr	UO	UO	UO	UO	UO	UO	UO	UO	UO	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	--	--
26-Apr	M	M	M	M	M	C	C	C	C	C	C	C	0	0	0	1	0	0	0	0	0	0	0	0	--	1
27-Apr	0	0	0	0	1	Z	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2
28-Apr	Z	0	0	0	0	3	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	3
29-Apr	0	Z	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1	0.5	1
30-Apr	0	0	Z	1	0	1	0	1	1	1	0	0	1	0	0	1	0	0	0	1	0	0	0	0	0.5	1
	0.4	0.6	0.5	0.6	0.5	0.9	1.1	1.4	1.6	1.5	1.5	1.4	1.2	1.2	1.0	0.8	0.7	0.5	0.7	0.4	0.4	0.5	0.5	0.4	Diurnal Average	
	2	4	4	2	1	3	5	5	14	9	10	7	8	7	7	5	4	3	7	1	1	3	1	1	Diurnal Maximum	

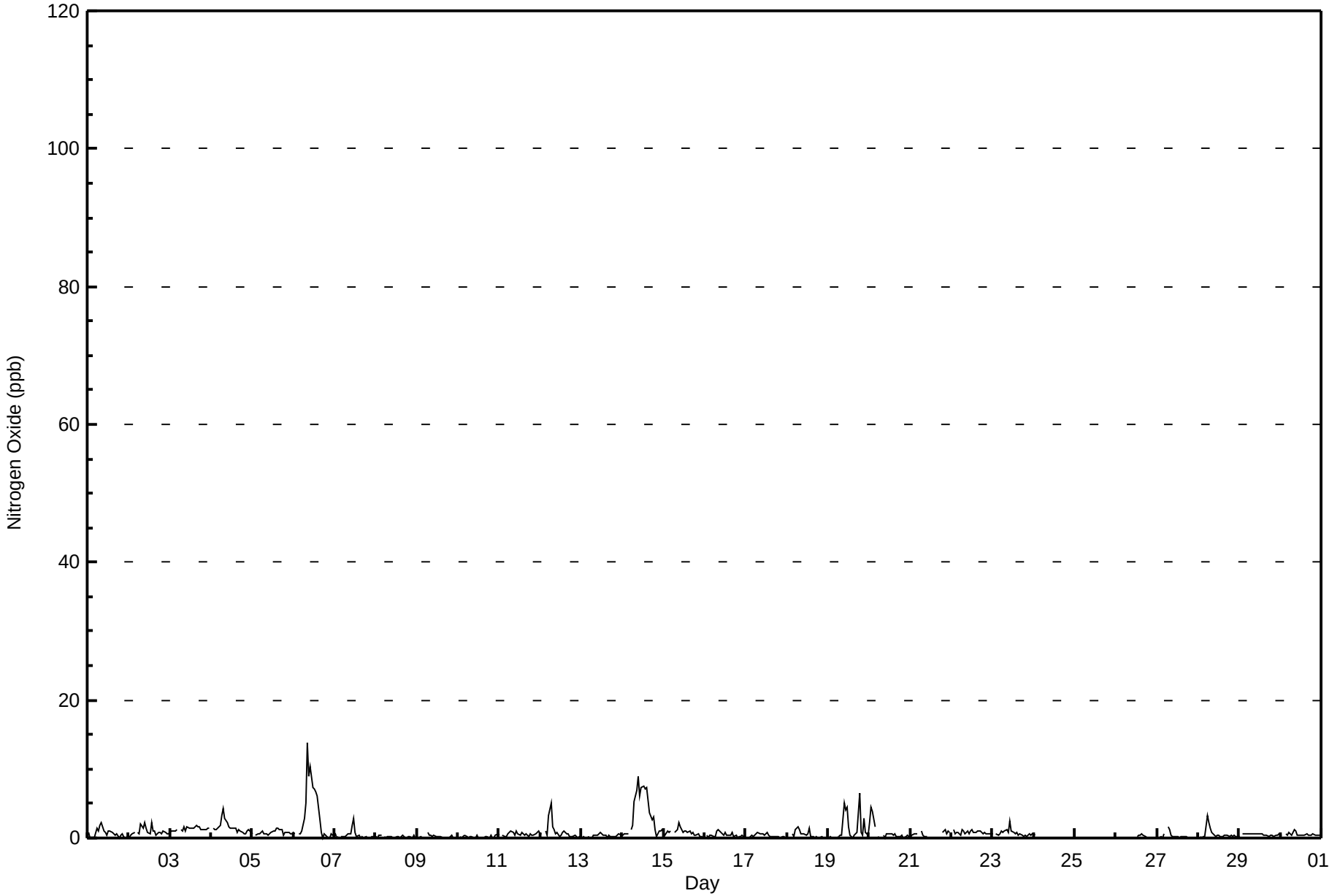
Z - zerospan C - Calibration M - Maintenance UO - Unstable Operation PF - Power Failure

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Oxide (NO) - ppb

Cenovus - Christina Lake - April 2016



500-21

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	626	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: 626

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Oxide (NO) - ppb

Cenovus - Christina Lake - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	32	57	27	34	45	42	46	72	92	39	18	16	16	18	43	29	626
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	32	57	27	34	45	42	46	72	92	39	18	16	16	18	43	29	626

Total Number of Valid Hours: 626

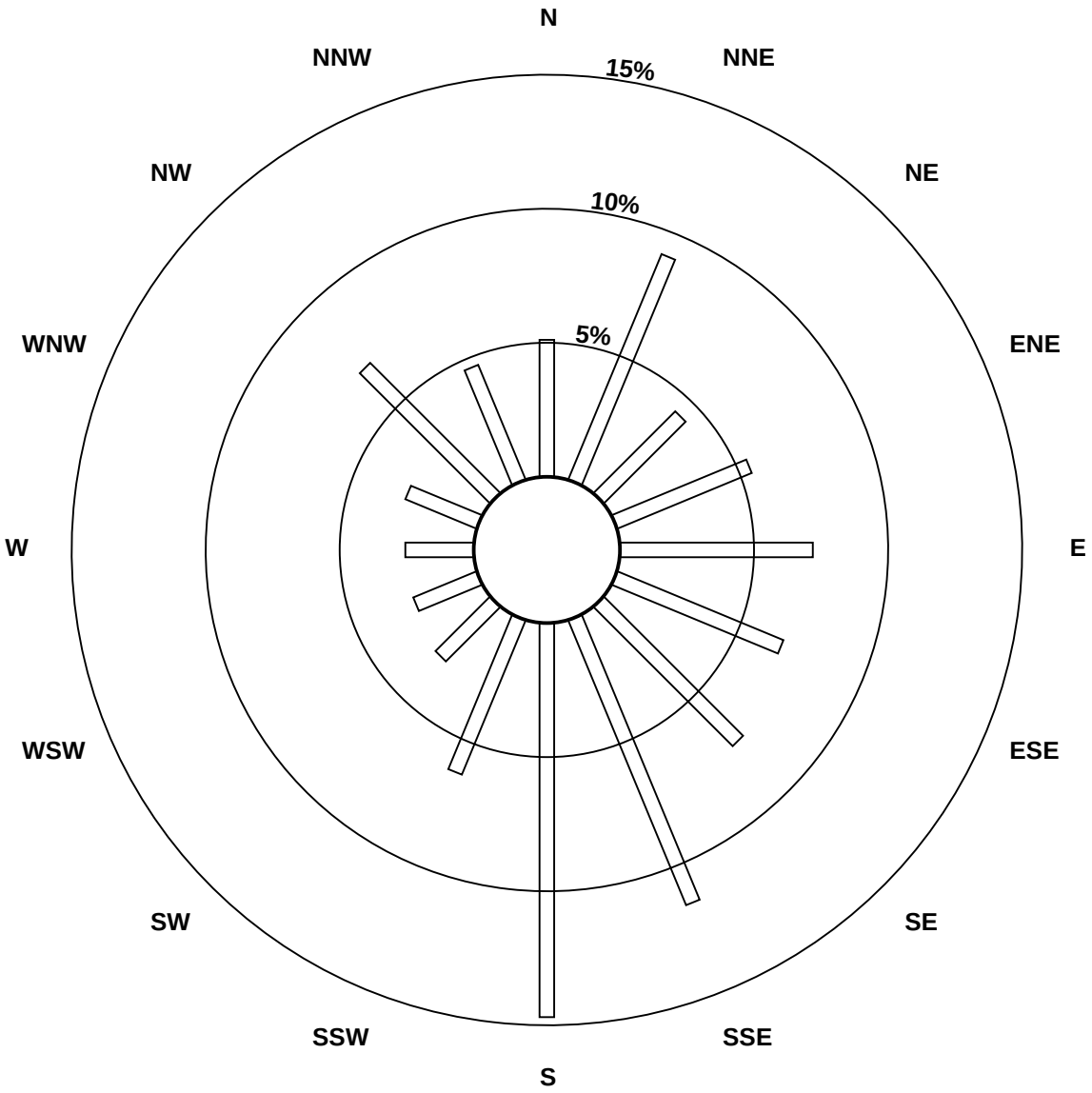
Total Number of Hours: 720

Wood Buffalo Environmental Association

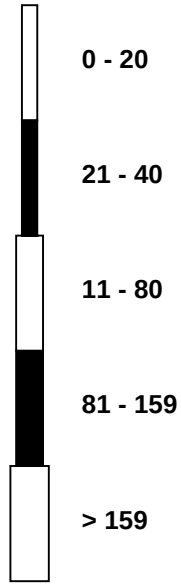
Wind Rose Apr 2016

Nitrogen Oxide (NO) - ppb

Cenovus - Christina Lake (AMS500)



Classes (ppb)



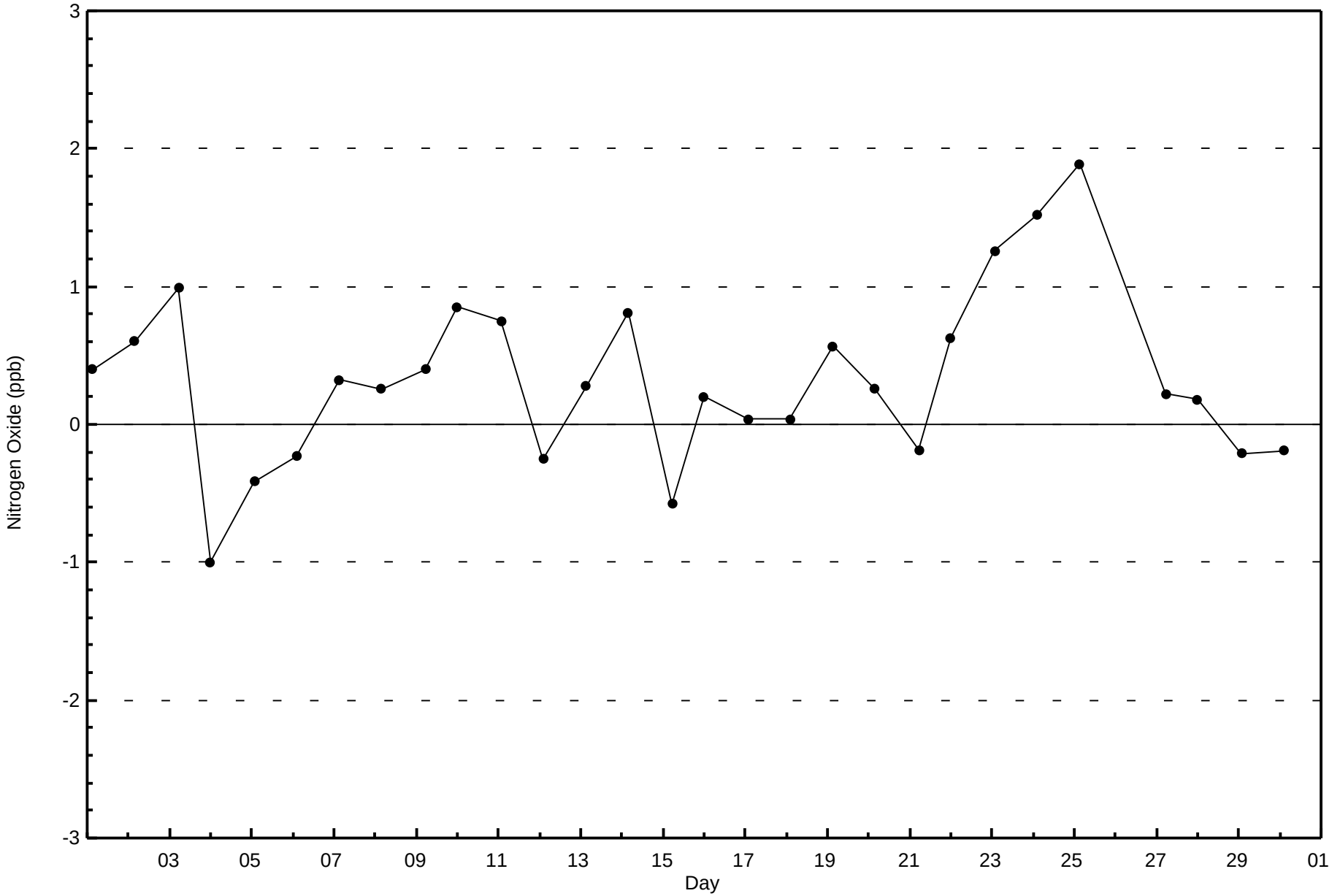
Total Number of Valid Hours: 626

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Oxide (NO) - ppb

Cenovus - Christina Lake - April 2016



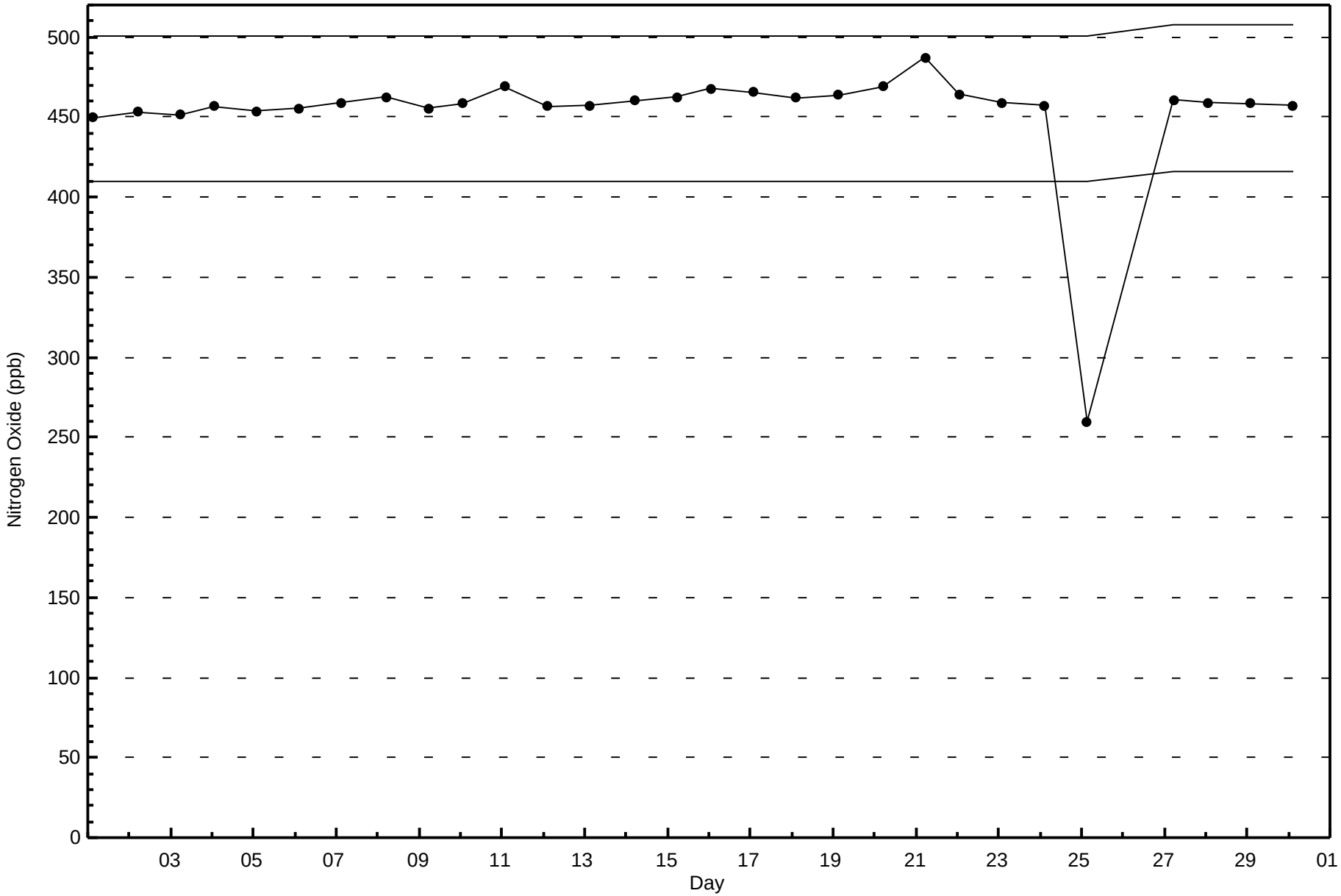
500-25

Wood Buffalo Environmental Association

Span Responses

Nitrogen Oxide (NO) - ppb

Cenovus - Christina Lake - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO_2) - ppb

Cenovus - Christina Lake - April 2016

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

Maximum Value: 18 ppb on Apr 19 19:00 Maximum Daily Average: 5.1 ppb on Apr 19

Minimum Value: 0 ppb on Apr 2 18:00 Minimum Daily Average: 0.6 ppb on Apr 8

Maximum Diurnal Average: 3.2 ppb at hour 6 Minimum Diurnal Average: 1.1 ppb at hour 17

Monthly Average: 1.9 ppb Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 1$ Median = 1 $Q_3 = 2$ $P_{90} = 4$ $P_{99} = 10$

Hours in Service:	720
Hours of Data:	626
Hours of Missing Data:	94
Hours of Calibration:	43
Percent Operational Time:	92.9

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-Apr	1	1	1	Z	1	7	4	7	7	2	1	2	2	2	2	1	1	1	1	1	1	0	0	1	2.0	7
2-Apr	2	1	1	1	Z	2	2	3	2	3	1	1	1	3	1	1	0	0	0	0	0	0	0	0	1.1	3
3-Apr	0	0	0	1	4	Z	1	1	2	1	1	2	2	2	1	1	1	1	1	1	1	0	0	0	0.9	4
4-Apr	Z	0	2	1	4	5	9	7	3	2	2	1	1	1	1	1	1	1	0	0	1	1	1	1	2.0	9
5-Apr	1	Z	1	1	1	2	2	1	0	0	1	1	1	1	1	2	3	2	1	1	1	3	0	0	1.1	3
6-Apr	1	1	Z	0	0	2	4	7	11	8	8	5	6	6	7	3	1	0	0	0	0	0	3	2	3.3	11
7-Apr	1	1	1	Z	1	1	1	2	1	1	4	4	1	1	1	0	0	0	0	0	0	0	0	0	0.9	4
8-Apr	0	0	0	0	Z	0	0	0	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0.6	1
9-Apr	2	3	4	2	2	Z	3	3	2	2	2	1	1	1	1	0	0	0	0	2	2	1	1	0	1.4	4
10-Apr	Z	0	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	3	1	0.6	3
11-Apr	3	Z	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	3	2	4	2	3	1	1.7	4
12-Apr	2	2	Z	2	3	9	8	4	3	2	2	1	1	1	1	1	1	1	1	0	0	0	1	0	2.0	9
13-Apr	0	0	0	Z	1	1	2	1	1	2	2	2	2	1	0	1	0	0	0	0	0	0	0	0	0.7	2
14-Apr	1	0	0	0	Z	2	4	7	8	10	6	6	7	9	8	6	5	5	5	1	0	0	0	0	3.8	10
15-Apr	0	0	1	0	0	Z	0	1	2	4	2	1	1	1	1	1	0	1	1	3	2	2	2	2	1.1	4
16-Apr	Z	10	8	3	1	2	2	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1	2.1	10
17-Apr	1	Z	1	2	2	3	3	4	4	3	2	3	2	1	1	1	1	1	1	1	1	1	1	1	1.7	4
18-Apr	1	1	Z	10	2	12	8	6	4	3	2	1	1	2	2	1	2	2	3	4	9	4	1	1	3.5	12
19-Apr	1	1	1	Z	2	3	3	3	3	10	8	7	5	2	1	1	3	3	18	11	5	15	7	4	5.1	18
20-Apr	13	14	9	4	Z	1	1	PF	2	1	1	1	1	1	1	1	0	0	1	0	0	1	1	0	2.5	14
21-Apr	0	0	1	1	2	Z	1	0	0	0	0	C	C	C	C	C	C	C	C	1	1	1	1	1	--	2
22-Apr	Z	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.1	2
23-Apr	1	Z	1	2	2	2	2	2	2	2	3	2	2	2	2	1	2	2	2	2	2	2	2	2	1.8	3
24-Apr	2	2	Z	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	2
25-Apr	UO	UO	UO	UO	UO	UO	UO	UO	UO	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	--	--
26-Apr	M	M	M	M	M	C	C	C	C	C	C	C	1	2	2	2	2	1	1	2	4	3	3	3	--	4
27-Apr	2	1	2	2	5	Z	3	3	2	1	2	2	2	1	2	2	2	2	1	2	6	2	5	3	2.3	6
28-Apr	Z	3	3	4	4	8	5	5	3	2	1	1	1	1	1	1	1	1	1	1	1	6	1	1	2.3	8
29-Apr	2	Z	1	3	7	3	3	1	1	1	1	1	0	0	0	0	1	0	0	3	2	3	1	1	1.4	7
30-Apr	2	9	Z	2	2	4	2	3	5	2	0	0	0	1	1	1	0	1	1	1	1	3	2	1	1.9	9
	1.6	2.2	1.8	1.9	2.1	3.2	2.8	3.0	2.7	2.4	2.0	1.9	1.6	1.6	1.5	1.3	1.1	1.1	1.7	1.5	1.6	1.9	1.5	1.1	Diurnal Average	
	13	14	9	10	7	12	9	7	11	10	8	7	7	9	8	6	5	5	18	11	9	15	7	4	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance UO - Unstable Operation PF - Power Failure

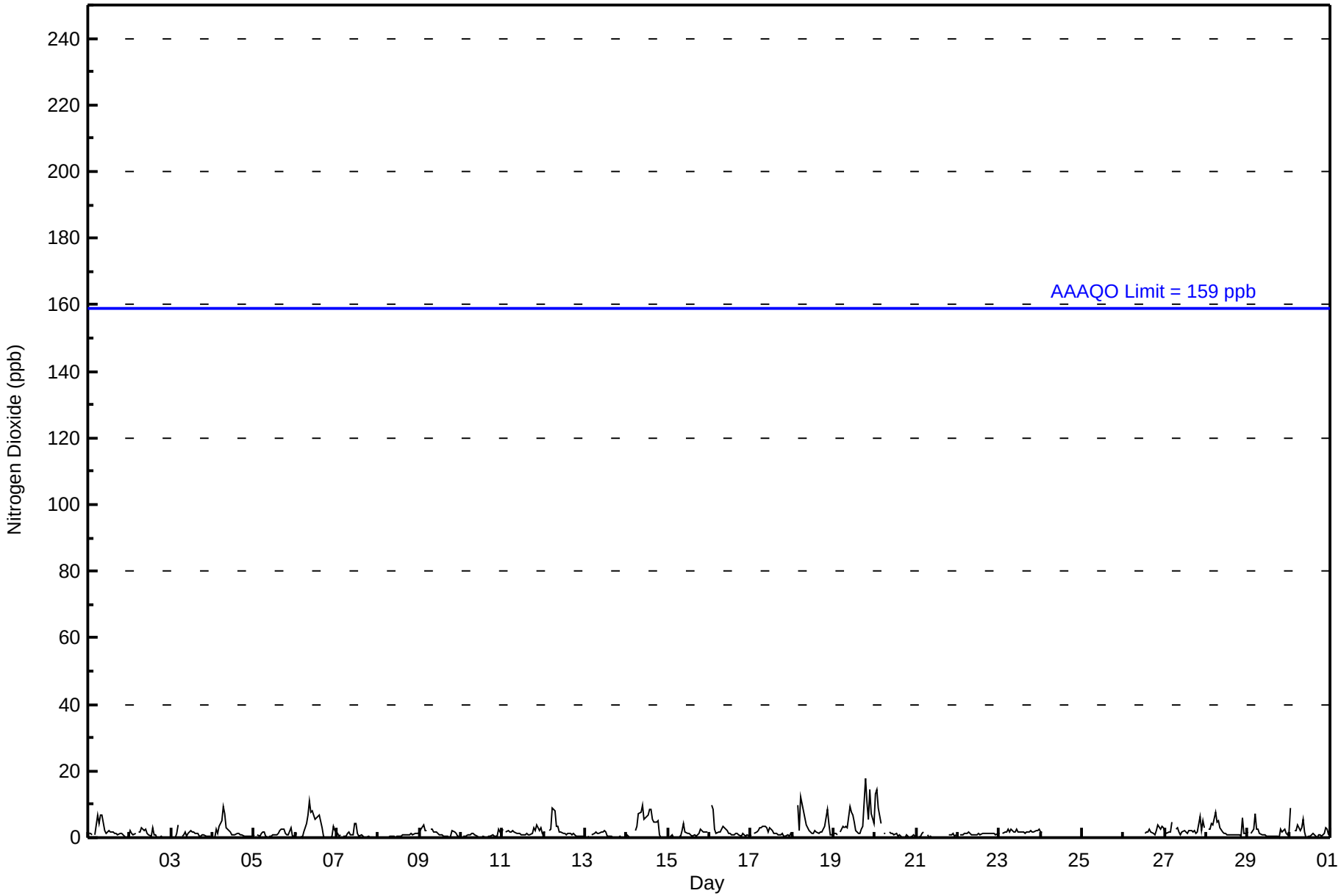
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Dioxide (NO_2) - ppb

Cenovus - Christina Lake - April 2016



Nitrogen Dioxide (NO_2) - ppb

Cenovus - Christina Lake - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	626	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: 626

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Dioxide (NO_2) - ppb

Cenovus - Christina Lake - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	32	57	27	34	45	42	46	72	92	39	18	16	16	18	43	29	626
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	32	57	27	34	45	42	46	72	92	39	18	16	16	18	43	29	626

Total Number of Valid Hours: 626

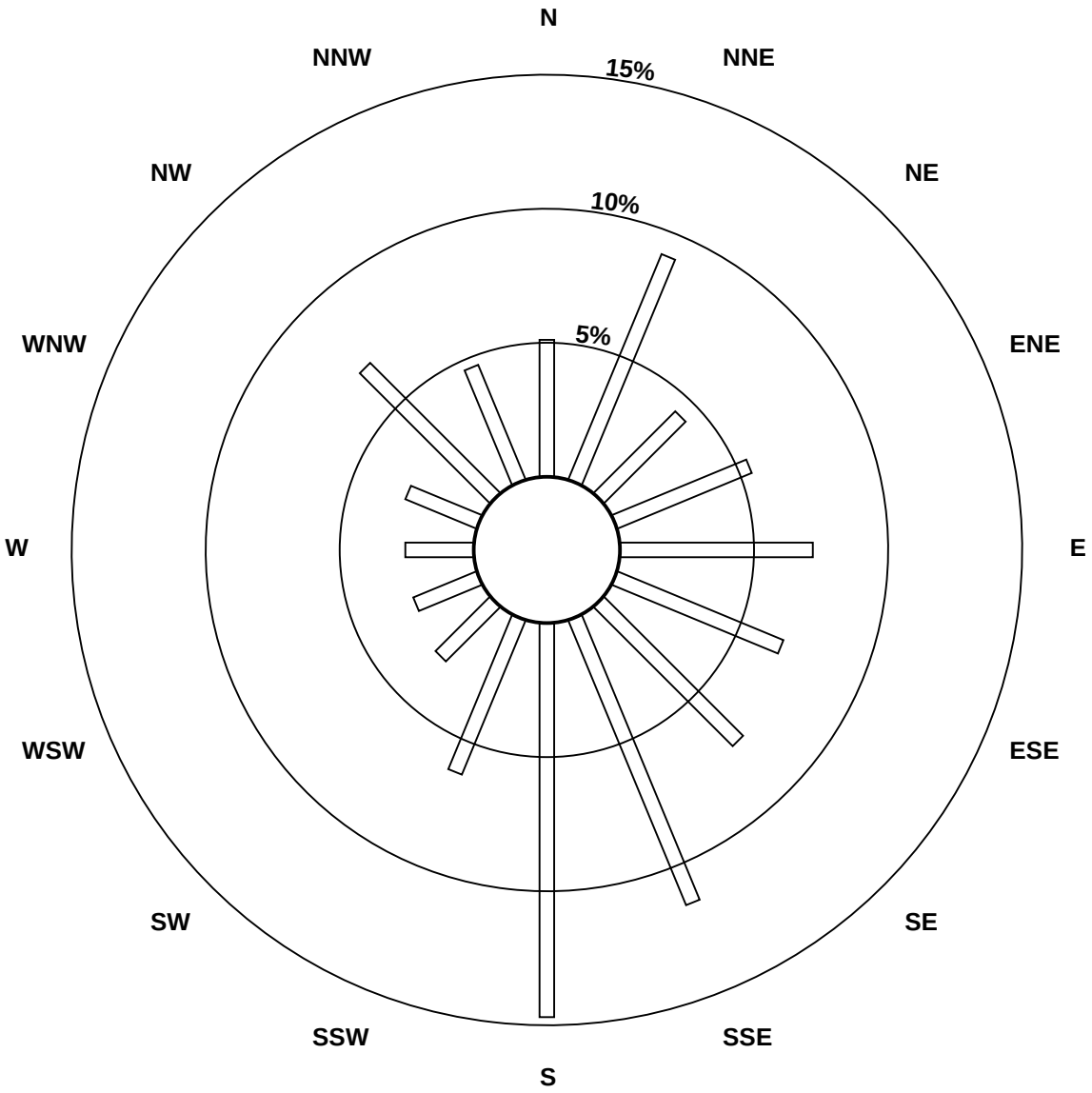
Total Number of Hours: 720

Wood Buffalo Environmental Association

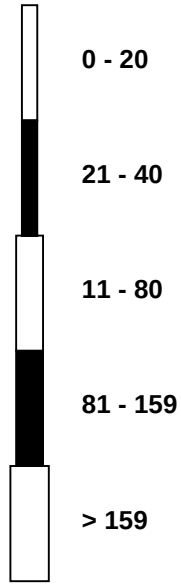
Wind Rose Apr 2016

Nitrogen Dioxide (NO_2) - ppb

Cenovus - Christina Lake (AMS500)



Classes (ppb)



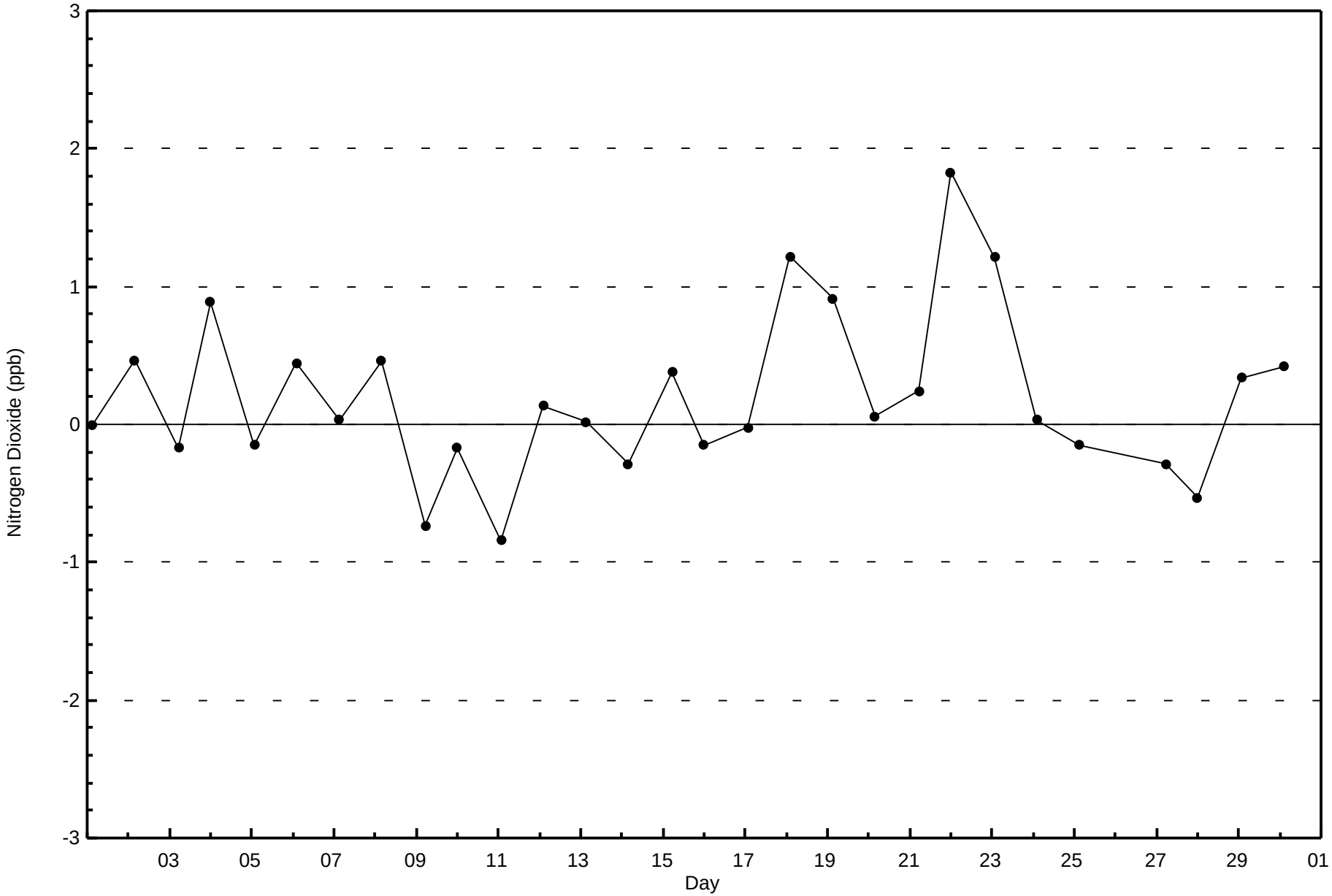
Total Number of Valid Hours: 626

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Dioxide (NO_2) - ppb

Cenovus - Christina Lake - April 2016

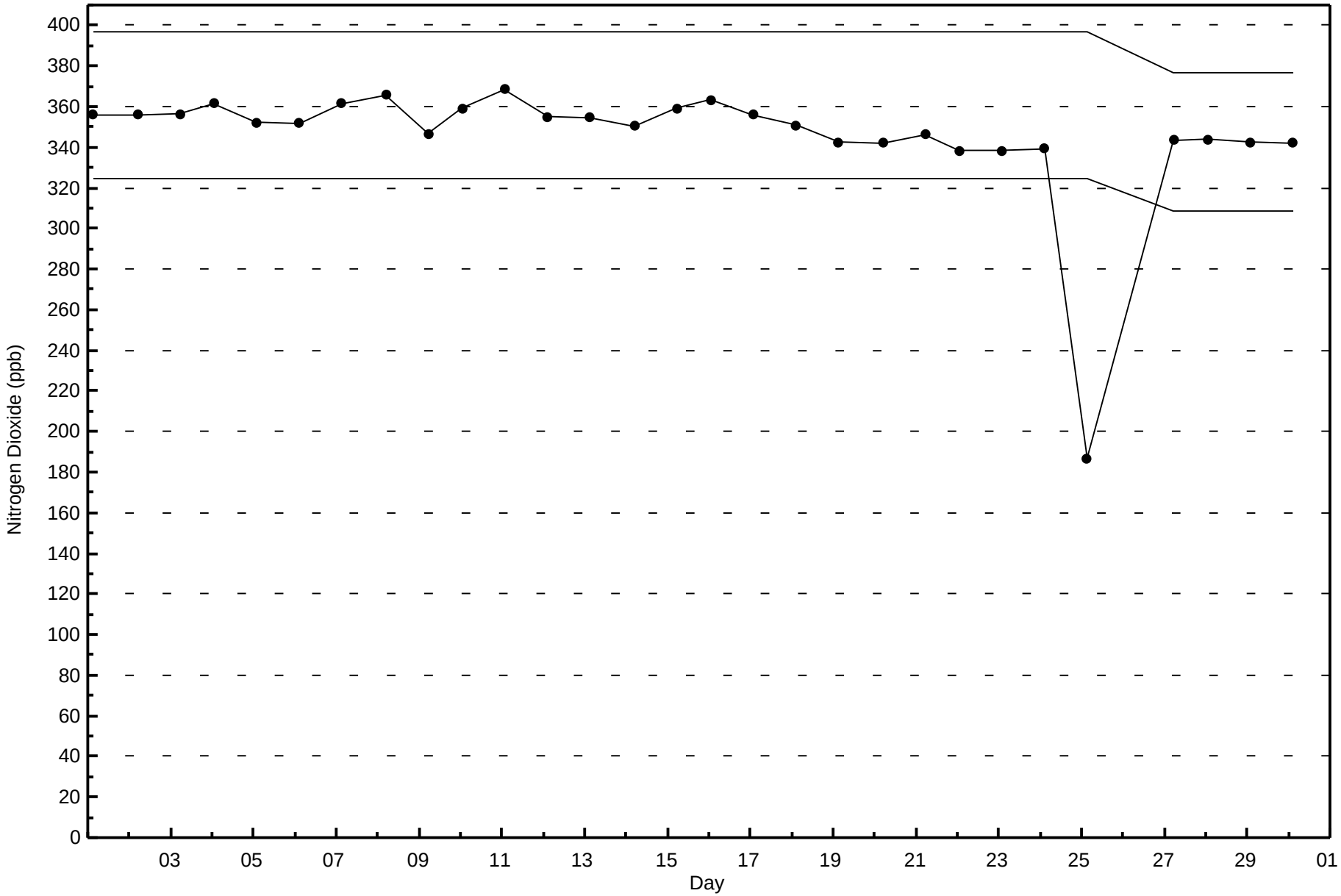


Wood Buffalo Environmental Association

Span Responses

Nitrogen Dioxide (NO_2) - ppb

Cenovus - Christina Lake - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_X) - ppb

Cenovus - Christina Lake - April 2016

Maximum Value: 25 ppb on Apr 6 09:00

Maximum Daily Average: 7.3 ppb on Apr 14

Minimum Value: 0 ppb on Apr 6 18:00

Minimum Daily Average: 0.7 ppb on Apr 8

Maximum Diurnal Average: 4.3 ppb at hour 9

Minimum Diurnal Average: 1.5 ppb at hour 24

Monthly Average: 2.7 ppb

Percentiles: $P_1 = 0$ $P_{10} = 1$ $Q_1 = 1$ Median = 2 $Q_3 = 3$ $P_{90} = 5$ $P_{99} = 17$

Hours in Service:	720
Hours of Data:	626
Hours of Missing Data:	94
Hours of Calibration:	43
Percent Operational Time:	92.9

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-Apr	2	1	1	Z	1	8	5	9	9	3	2	2	3	3	2	2	2	1	1	2	1	1	0	1	2.7	9
2-Apr	2	2	1	2	Z	2	3	5	3	5	3	2	1	5	2	2	0	1	1	1	1	1	1	1	2.0	5
3-Apr	1	1	1	2	5	Z	2	2	3	2	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2.2	5
4-Apr	Z	2	4	3	5	7	13	11	6	5	3	2	2	2	2	2	2	2	1	1	1	2	2	1	3.5	13
5-Apr	1	Z	1	1	2	3	3	1	1	1	1	2	2	2	3	3	4	4	2	1	2	4	1	1	1.9	4
6-Apr	1	2	Z	1	1	2	7	12	25	16	18	13	13	13	13	6	1	0	1	0	0	0	4	3	6.7	25
7-Apr	2	1	1	Z	1	1	2	2	2	2	6	7	2	1	1	1	1	0	0	0	0	0	0	0	1.4	7
8-Apr	0	0	0	0	Z	0	0	0	1	1	0	0	0	1	1	1	1	1	1	1	1	1	2	1	0.7	2
9-Apr	2	3	4	2	2	Z	3	3	2	2	2	1	1	1	1	1	0	0	0	2	2	1	1	0	1.6	4
10-Apr	Z	0	1	1	1	1	1	2	1	1	0	0	0	0	0	0	1	1	1	1	1	1	3	1	0.7	3
11-Apr	3	Z	2	3	2	2	3	3	2	1	2	1	1	2	2	1	1	2	4	3	4	3	4	2	2.3	4
12-Apr	2	2	Z	3	3	12	13	5	5	3	2	1	1	2	2	2	1	1	1	1	1	1	1	1	2.9	13
13-Apr	0	0	1	Z	1	1	2	2	2	2	2	3	2	1	1	1	1	0	0	0	0	0	1	0	1.0	3
14-Apr	1	1	1	1	Z	3	5	12	15	19	12	13	14	16	15	11	8	7	8	2	0	1	1	1	7.3	19
15-Apr	1	0	2	1	1	Z	1	2	3	6	3	2	2	2	1	2	1	2	2	3	2	2	2	2	1.9	6
16-Apr	Z	10	8	3	2	2	2	3	5	3	3	2	2	1	1	1	2	1	1	1	1	1	1	1	2.5	10
17-Apr	1	Z	1	2	2	3	4	4	4	4	3	3	3	2	2	1	1	1	2	1	0	1	1	1	2.1	4
18-Apr	1	1	Z	10	3	13	10	7	5	3	3	2	2	3	2	1	2	2	3	4	9	4	1	1	3.9	13
19-Apr	2	1	1	Z	2	3	3	4	4	15	12	11	6	2	1	1	3	4	24	11	6	18	8	5	6.4	24
20-Apr	15	19	13	6	Z	1	1	PF	2	1	2	2	2	1	1	1	0	0	1	1	0	1	1	1	3.3	19
21-Apr	1	1	1	2	2	Z	2	0	1	0	0	C	C	C	C	C	C	C	C	2	2	2	2	2	--	2
22-Apr	Z	2	2	2	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1.9	3
23-Apr	2	Z	2	2	2	3	2	3	3	2	5	3	3	2	2	2	2	2	2	2	2	3	3	3	2.5	5
24-Apr	2	2	Z	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	2
25-Apr	UO	UO	UO	UO	UO	UO	UO	UO	UO	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	--	--
26-Apr	M	M	M	M	M	C	C	C	C	C	C	C	1	2	2	3	2	2	1	2	4	3	3	3	--	4
27-Apr	2	1	2	2	5	Z	4	4	2	1	2	2	2	1	2	2	2	2	1	2	6	2	5	3	2.5	6
28-Apr	Z	3	3	4	4	11	7	6	4	2	1	2	1	1	1	1	1	1	1	1	1	6	1	2	2.8	11
29-Apr	2	Z	2	3	8	3	3	2	2	1	1	1	1	1	1	1	1	1	1	3	2	3	2	1	1.9	8
30-Apr	2	9	Z	2	3	5	2	4	7	3	1	1	1	1	2	1	1	1	1	1	2	3	3	1	2.5	9
	2.0	2.8	2.3	2.5	2.6	4.1	3.9	4.3	4.3	3.9	3.5	3.2	2.8	2.7	2.5	2.1	1.7	1.6	2.4	1.9	2.0	2.4	1.9	1.5	Diurnal Average	
	15	19	13	10	8	13	13	12	25	19	18	13	14	16	15	11	8	7	24	11	9	18	8	5	Diurnal Maximum	

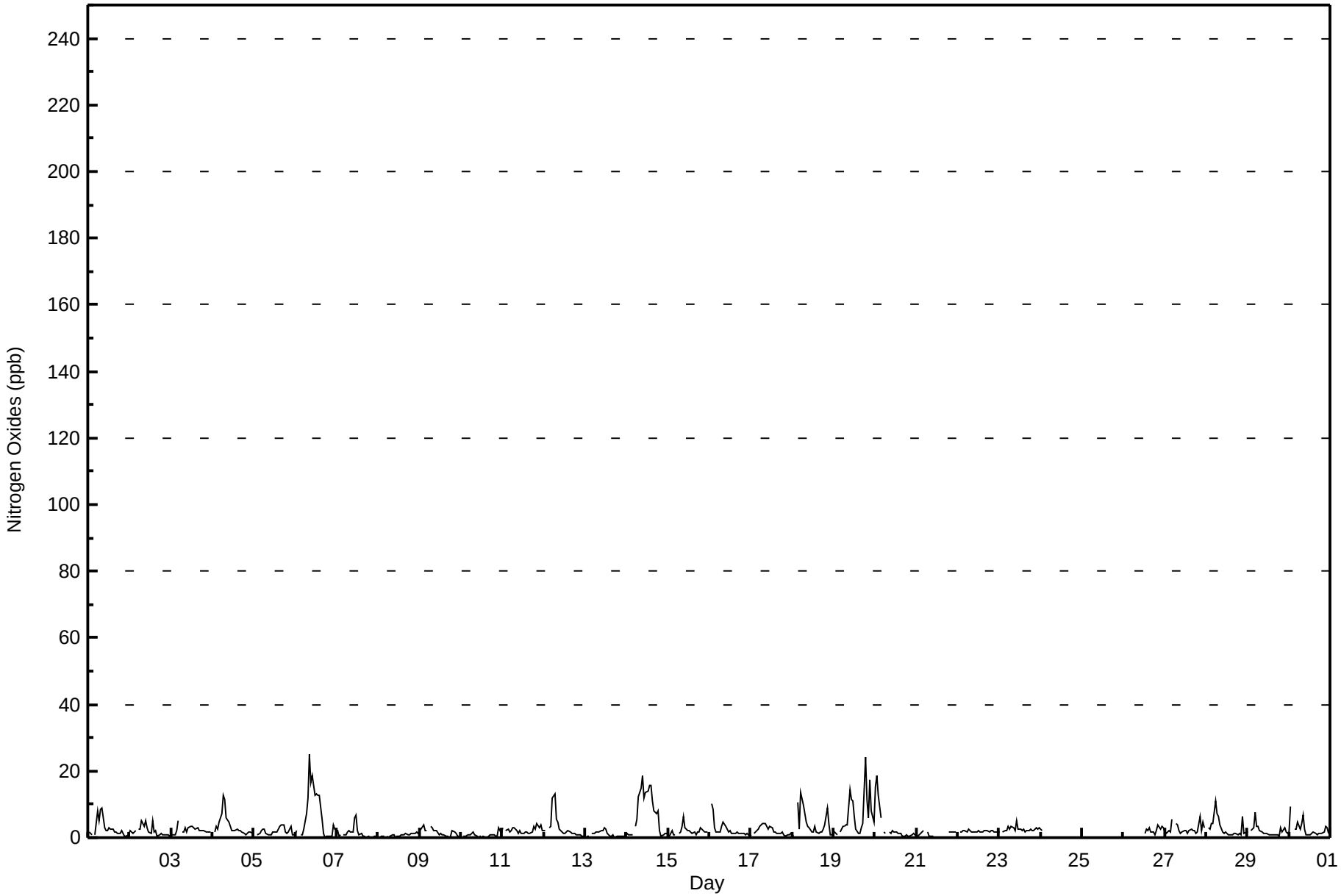
Z - zerospan C - Calibration M - Maintenance UO - Unstable Operation PF - Power Failure

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Oxides (NO_X) - ppb

Cenovus - Christina Lake - April 2016



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Nitrogen Oxides (NO_X) - ppb

Cenovus - Christina Lake - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	624	99.68	99.68
21 - 40	2	0.32	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: 626

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Oxides (NO_X) - ppb

Cenovus - Christina Lake - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	32	57	27	34	45	42	46	72	92	39	18	16	16	16	43	29	624
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	32	57	27	34	45	42	46	72	92	39	18	16	16	18	43	29	626

Total Number of Valid Hours: 626

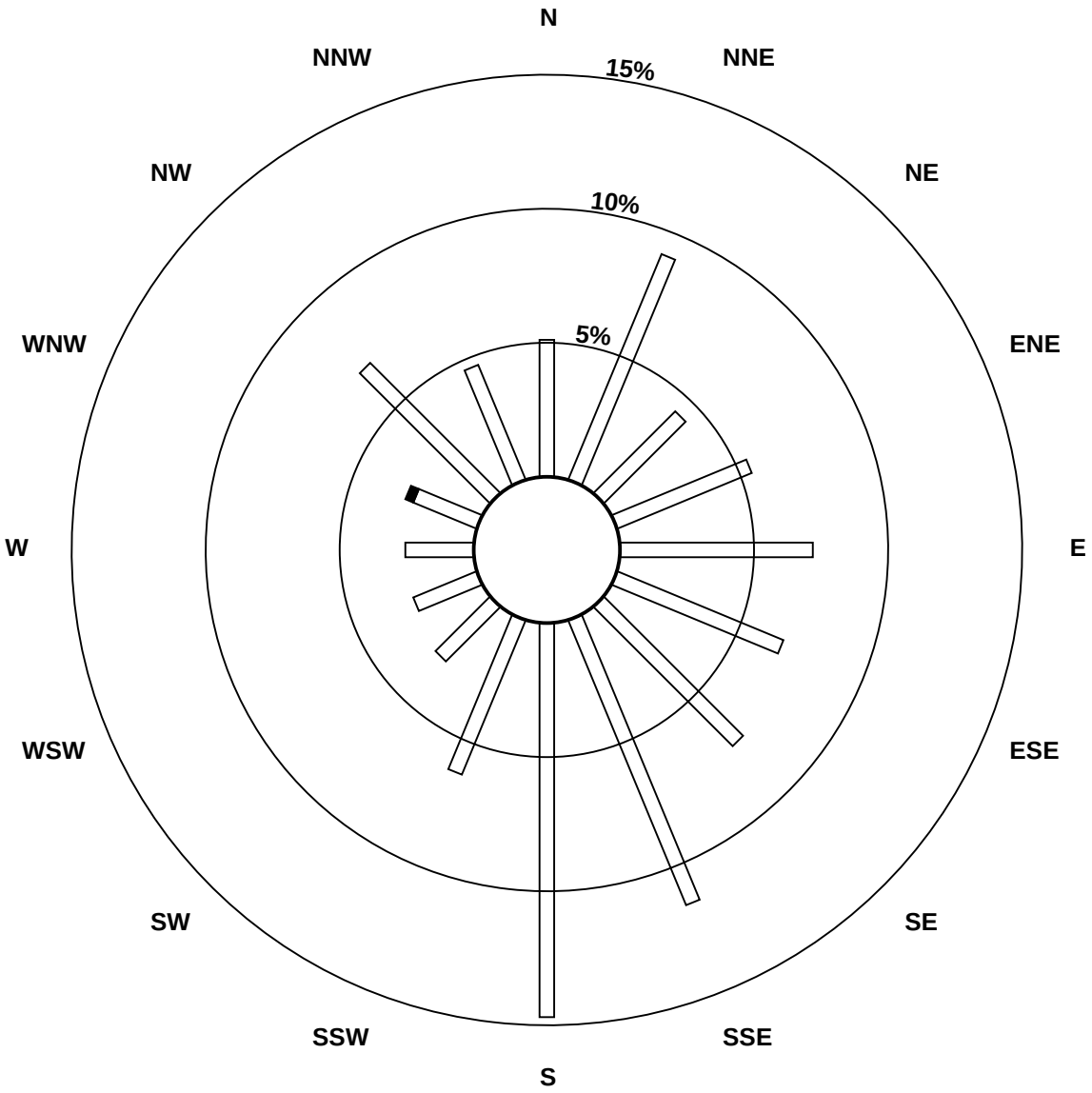
Total Number of Hours: 720

Wood Buffalo Environmental Association

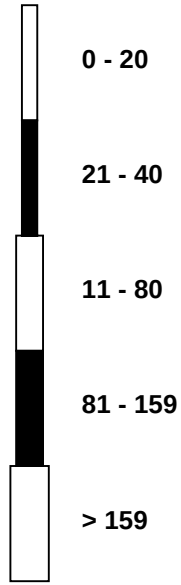
Wind Rose Apr 2016

Nitrogen Oxides (NO_X) - ppb

Cenovus - Christina Lake (AMS500)



Classes (ppb)



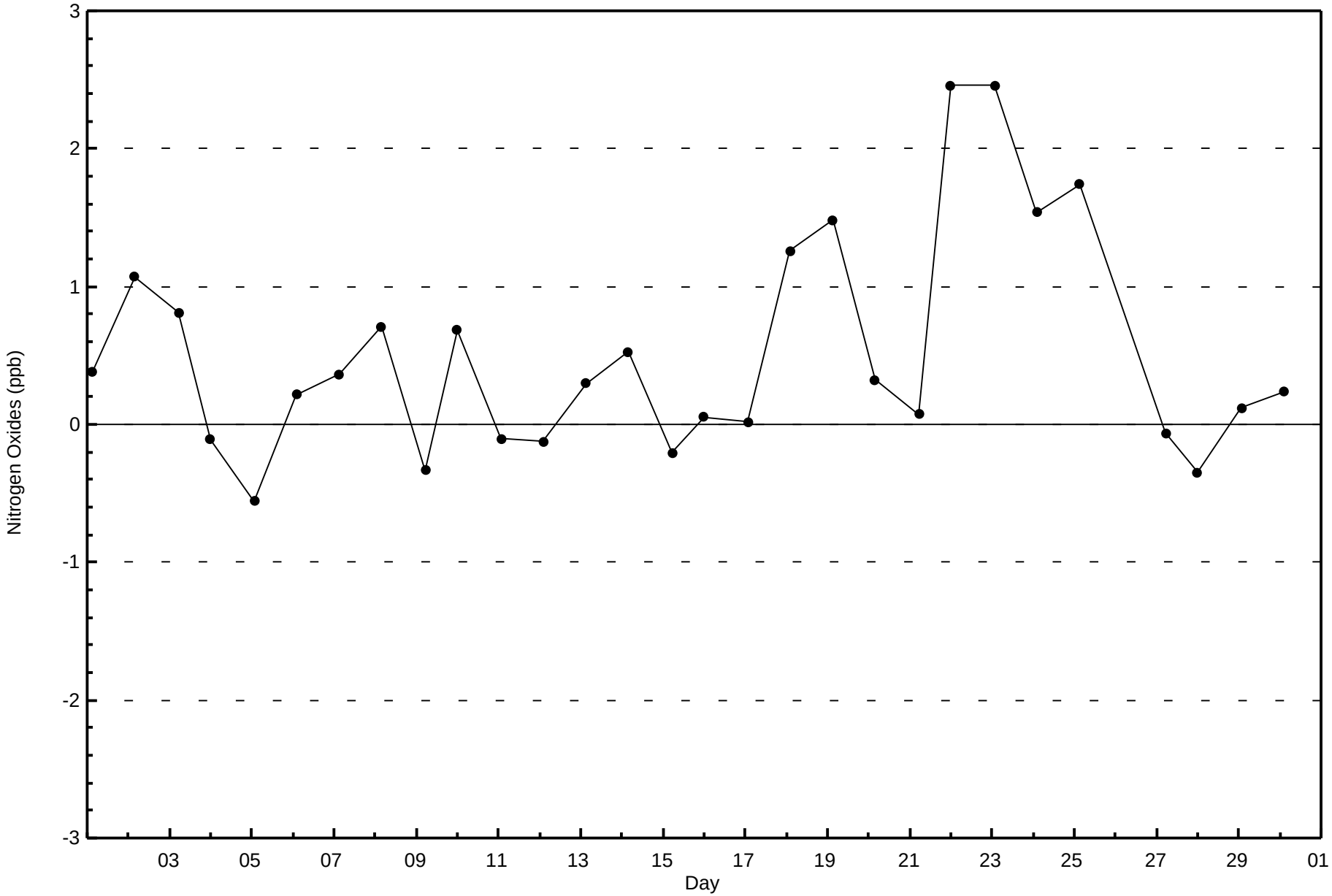
Total Number of Valid Hours: 626

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Oxides (NO_X) - ppb

Cenovus - Christina Lake - April 2016

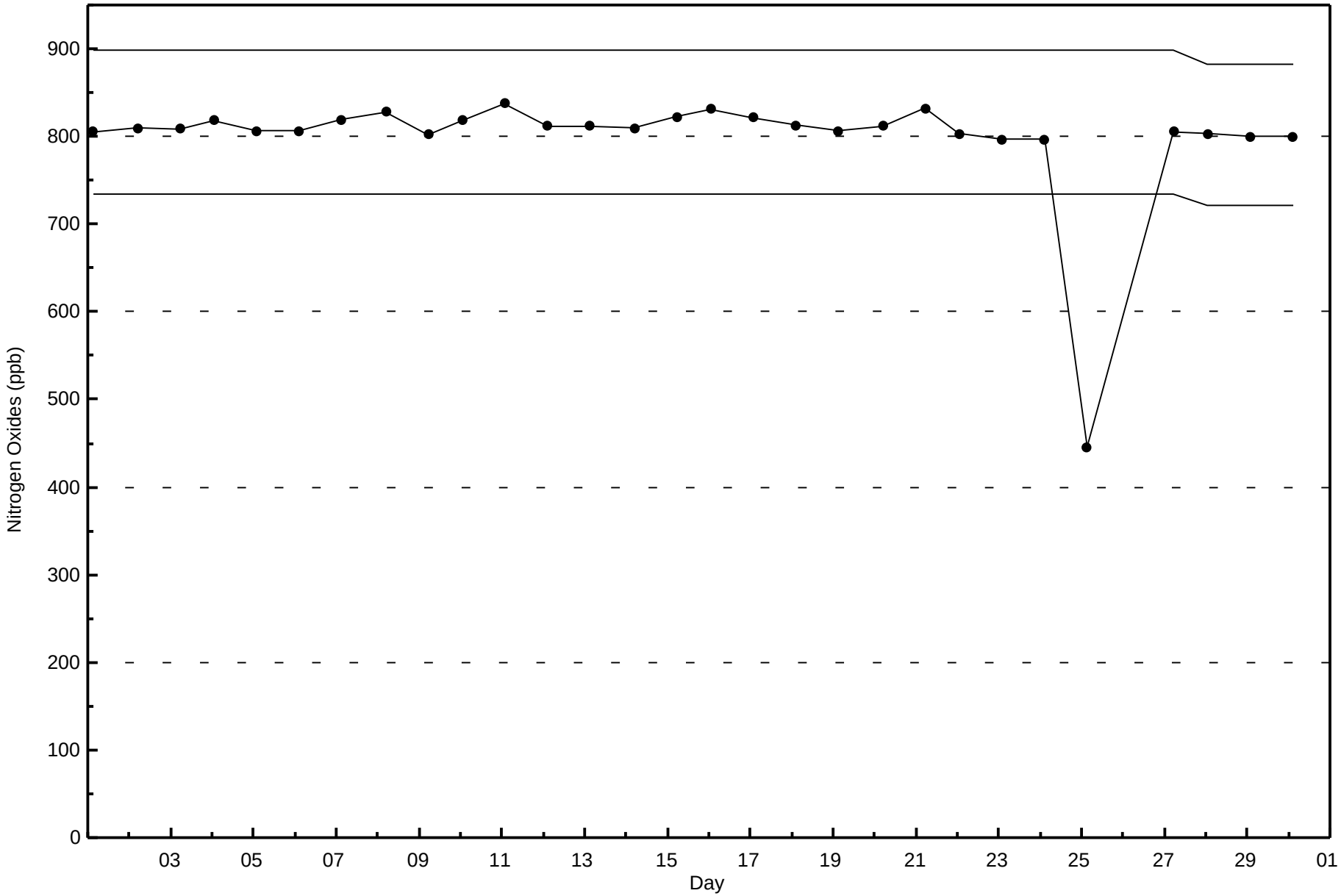


Wood Buffalo Environmental Association

Span Responses

Nitrogen Oxides (NO_X) - ppb

Cenovus - Christina Lake - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

Cenovus - Christina Lake - April 2016

Maximum Value: 23.6 C on Apr 18 15:00

Maximum Daily Average: 16.8 C on Apr 18

Minimum Value: -7.5 C on Apr 4 04:00

Minimum Daily Average: -4.3 C on Apr 10

Maximum Diurnal Average: 9.3 C at hour 16

Minimum Diurnal Average: 0.3 C at hour 6

Monthly Average: 4.71 C

Percentiles: P_1 = -7.0 P_{10} = -3.2 Q_1 = 0.1 Median = 3.6 Q_3 = 8.6 P_{90} = 15.6 P_{99} = 22.7

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

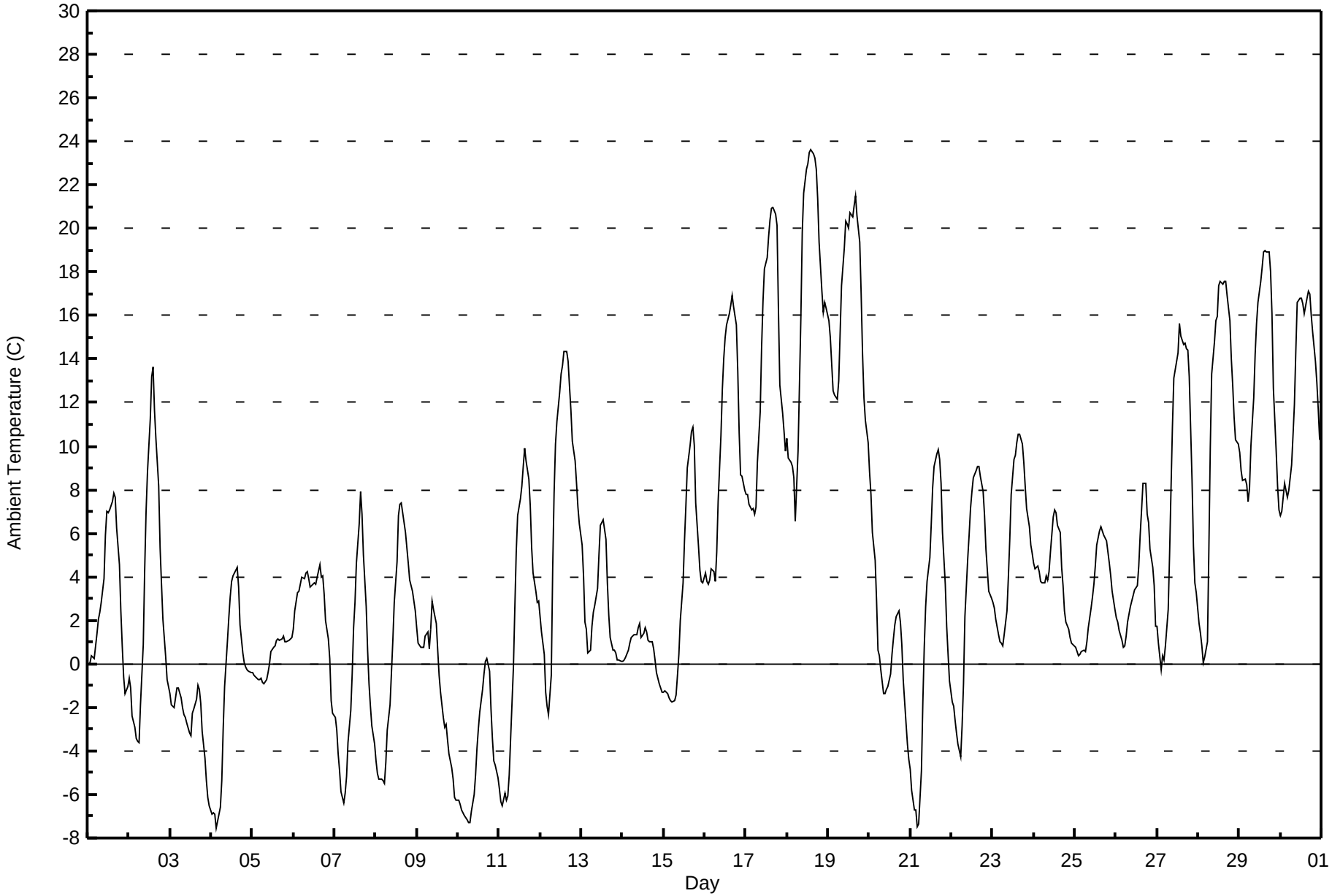
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	0.0	0.1	0.4	0.3	0.2	1.4	2.0	2.4	2.8	3.9	5.9	7.0	6.9	7.1	7.5	7.8	7.6	6.3	4.5	2.4	0.8	-0.6	-1.4	-1.1	3.1	7.8
2-Apr	-0.6	-1.1	-2.4	-2.9	-3.4	-3.6	-3.6	-1.9	0.9	4.3	7.0	8.8	11.2	13.2	13.7	11.6	10.4	8.2	5.4	3.7	2.1	0.3	-0.7	-1.0	3.3	13.7
3-Apr	-1.4	-1.9	-2.0	-1.6	-1.1	-1.1	-1.6	-2.0	-2.3	-2.5	-2.7	-3.2	-3.3	-2.3	-2.1	-1.6	-1.0	-1.2	-1.8	-3.1	-4.3	-5.3	-6.1	-6.5	-2.6	-1.0
4-Apr	-6.9	-6.9	-6.9	-7.5	-7.3	-6.6	-5.4	-3.0	-1.1	1.0	2.1	3.1	3.8	4.1	4.3	4.4	3.5	1.8	0.5	0.1	-0.1	-0.3	-0.3	-0.4	-1.0	4.4
5-Apr	-0.4	-0.5	-0.6	-0.7	-0.7	-0.7	-0.8	-0.9	-0.7	-0.4	0.0	0.6	0.7	0.8	1.1	1.1	1.1	1.2	1.2	1.0	1.0	1.1	1.1	1.2	0.3	1.2
6-Apr	1.6	2.4	3.3	3.3	3.7	4.0	3.9	4.2	4.2	3.9	3.5	3.6	3.7	3.7	4.0	4.5	4.0	4.1	3.2	2.0	1.1	0.3	-1.7	-2.3	2.8	4.5
7-Apr	-2.5	-3.0	-4.1	-4.9	-5.8	-6.4	-5.9	-5.2	-3.6	-2.1	-0.5	1.7	2.8	4.6	6.4	7.9	6.9	5.0	2.6	0.6	-0.9	-1.9	-2.8	-3.7	-0.6	7.9
8-Apr	-4.5	-5.0	-5.3	-5.3	-5.3	-5.5	-4.5	-3.0	-1.9	-0.4	1.1	2.8	4.7	6.8	7.3	7.4	7.0	6.0	5.3	4.6	3.8	3.3	2.9	2.4	1.0	7.4
9-Apr	1.7	0.9	0.7	0.8	0.8	1.3	1.5	0.7	1.6	2.9	2.5	1.8	0.6	-0.6	-1.3	-2.5	-2.9	-2.8	-3.5	-4.2	-4.8	-5.3	-6.2	-6.3	-0.9	2.9
10-Apr	-6.2	-6.5	-6.7	-6.9	-7.0	-7.2	-7.3	-7.3	-6.8	-6.0	-5.1	-3.9	-3.0	-2.2	-1.2	-0.4	0.1	0.2	-0.4	-2.1	-3.4	-4.5	-4.7	-5.3	-4.3	0.2
11-Apr	-5.7	-6.4	-6.5	-5.9	-6.2	-6.0	-5.1	-3.4	-0.2	2.5	5.2	6.8	7.6	8.1	9.1	9.9	9.3	8.5	7.2	5.3	4.2	3.4	2.8	2.9	2.0	9.9
12-Apr	2.1	1.5	0.4	-1.3	-2.0	-2.3	-0.6	4.4	7.8	10.1	11.2	12.5	13.3	13.7	14.3	14.4	13.9	12.8	11.7	10.2	9.3	8.3	7.2	6.5	7.5	14.4
13-Apr	5.5	4.0	1.9	1.6	0.5	0.6	1.7	2.3	2.7	3.5	5.0	6.4	6.5	6.6	5.7	3.7	2.3	1.2	0.6	0.6	0.5	0.2	0.2	0.1	2.7	6.6
14-Apr	0.1	0.2	0.3	0.7	1.0	1.2	1.2	1.4	1.4	1.6	1.8	1.2	1.4	1.7	1.5	1.1	1.0	1.0	0.7	0.2	-0.4	-0.9	-1.1	-1.3	0.7	1.8
15-Apr	-1.3	-1.2	-1.4	-1.5	-1.7	-1.7	-1.7	-1.4	-0.5	0.5	2.0	3.7	5.6	7.3	9.0	10.0	10.7	10.8	10.0	7.4	5.4	4.3	3.8	3.7	3.4	10.8
16-Apr	4.2	3.8	3.7	3.9	4.4	4.2	3.8	5.1	7.5	10.5	12.6	14.0	15.0	15.6	16.1	16.5	16.9	16.4	15.6	13.4	10.6	8.7	8.6	8.0	10.0	16.9
17-Apr	7.8	7.8	7.3	7.1	7.1	6.9	7.2	9.2	11.6	14.6	16.7	18.2	18.6	19.6	20.4	20.9	21.0	20.7	20.2	16.3	12.8	11.5	10.7	9.8	13.5	21.0
18-Apr	10.4	9.4	9.3	9.1	8.5	6.6	9.8	12.8	15.9	19.8	21.6	22.7	23.0	23.5	23.6	23.4	23.2	22.7	21.3	19.4	17.1	16.1	16.6	16.4	16.8	23.6
19-Apr	15.8	15.0	13.8	12.6	12.4	12.2	13.0	15.2	17.4	19.1	20.3	20.2	20.0	20.7	20.5	21.1	21.5	20.6	19.4	17.0	14.2	12.2	11.2	10.2	16.5	21.5
20-Apr	8.8	7.8	6.0	4.8	2.9	0.6	0.4	-0.3	-1.3	-1.4	-1.2	-1.1	-0.4	0.4	1.2	1.8	2.2	2.4	1.9	0.9	-0.8	-2.8	-3.7	-4.4	1.0	8.8
21-Apr	-4.9	-5.8	-6.7	-6.7	-7.5	-7.4	-4.9	-1.8	0.8	2.6	3.8	4.9	6.4	8.1	9.1	9.6	9.8	9.4	8.3	6.0	3.6	1.8	0.5	-0.8	1.6	9.8
22-Apr	-1.8	-2.0	-2.6	-3.2	-3.7	-4.2	-2.8	-0.9	2.2	4.8	5.9	7.2	7.9	8.5	8.9	9.1	9.1	8.6	7.9	6.8	5.3	4.3	3.3	3.0	3.4	9.1
23-Apr	2.8	2.6	2.0	1.4	1.0	0.9	0.8	1.3	2.5	4.0	5.7	7.8	9.4	9.6	10.2	10.6	10.5	10.1	9.2	8.1	7.1	6.3	5.5	5.1	5.6	10.6
24-Apr	4.7	4.3	4.5	4.2	3.8	3.7	3.7	4.1	3.9	4.3	5.2	6.8	7.1	7.0	6.4	6.0	4.4	3.6	2.4	1.9	1.6	1.2	0.9	0.9	4.0	7.1
25-Apr	0.8	0.6	0.4	0.4	0.6	0.6	0.6	1.0	1.6	2.6	3.1	3.7	4.5	5.4	6.1	6.3	6.1	5.9	5.7	5.2	4.6	4.1	3.4	2.5	3.2	6.3
26-Apr	2.1	1.9	1.5	1.1	0.8	0.8	1.3	2.0	2.6	2.9	3.1	3.4	3.6	4.5	5.9	7.1	8.3	8.3	6.9	6.5	5.3	4.4	3.6	1.7	3.7	8.3
27-Apr	1.7	1.0	-0.3	0.4	0.2	0.8	2.5	5.0	8.0	10.8	13.1	13.9	14.3	15.6	15.1	14.7	14.7	14.5	14.4	13.2	8.4	5.4	3.7	3.3	8.1	15.6
28-Apr	1.9	1.4	0.8	0.1	0.3	1.0	5.3	9.9	13.3	14.8	15.8	15.9	17.4	17.6	17.5	17.5	17.5	16.9	15.8	14.0	12.8	11.3	10.3	10.1	10.8	17.6
29-Apr	9.7	8.9	8.5	8.5	8.2	7.4	8.1	10.0	12.3	14.2	15.6	16.6	17.6	18.2	18.9	19.0	18.9	18.9	18.0	16.1	12.7	9.8	8.2	7.1	13.0	19.0
30-Apr	6.8	7.0	8.3	8.0	7.6	8.0	9.1	10.5	11.9	14.3	16.6	16.8	16.8	16.6	16.1	16.8	17.1	17.0	16.0	15.2	13.9	12.9	11.7	10.3	12.7	17.1
	1.7	1.3	0.9	0.6	0.4	0.3	1.1	2.4	3.8	5.4	6.6	7.5	8.1	8.8	9.2	9.3	9.2	8.6	7.7	6.3	4.8	3.7	2.9	2.4	Diurnal Average	
	15.8	15.0	13.8	12.6	12.4	12.2	13.0	15.2	17.4	19.8	21.6	22.7	23.0	23.5	23.6	23.4	23.2	22.7	21.3	19.4	17.1	16.1	16.6	16.4	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature (AT) - C

Cenovus - Christina Lake - April 2016



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	176	24.44	24.44
0 - 10	393	54.58	79.03
10 - 20	129	17.92	96.94
> 20	22	3.06	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Cenovus - Christina Lake - April 2016

Maximum Value: 98 % on Apr 14 01:00

Maximum Daily Average: 93.8 % on Apr 5

Minimum Value: 12 % on Apr 19 20:00

Minimum Daily Average: 22.5 % on Apr 19

Maximum Diurnal Average: 72.7 % at hour 6

Minimum Diurnal Average: 43.7 % at hour 15

Monthly Average: 58.0 %

Percentiles: $P_1 = 17$ $P_{10} = 27$ $Q_1 = 40$ Median = 55 $Q_3 = 77$ $P_{90} = 91$ $P_{99} = 97$

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

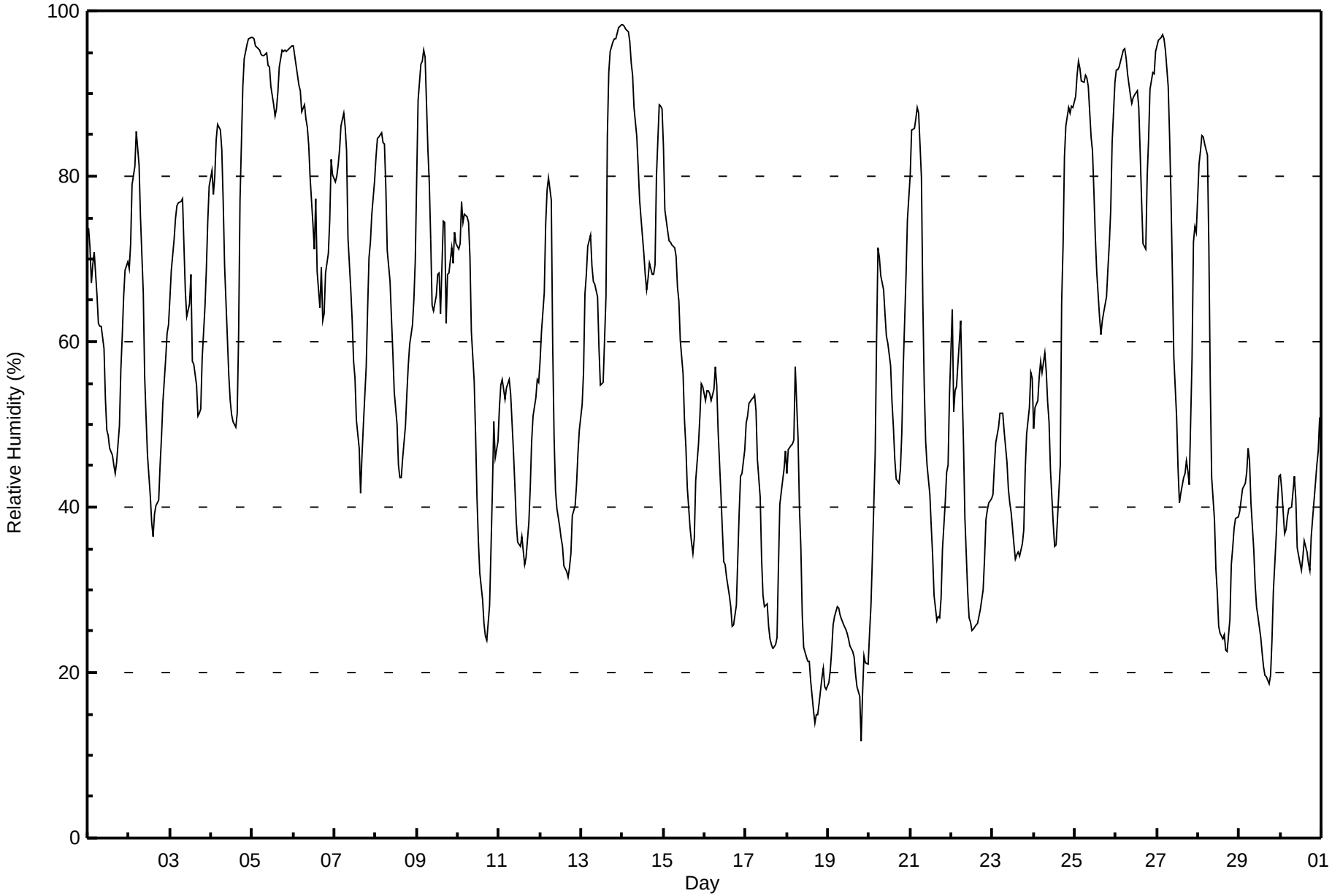
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	74	71	67	69	71	66	62	62	62	59	53	49	49	47	46	45	44	45	50	57	61	65	69	70	58.9	74
2-Apr	69	72	79	81	85	83	81	75	66	56	51	46	41	38	37	39	40	41	45	49	53	58	61	62	58.7	85
3-Apr	65	69	72	75	77	77	77	77	72	66	63	65	68	58	57	55	51	51	52	58	64	69	75	79	66.3	79
4-Apr	81	78	80	84	86	86	83	77	69	60	56	53	51	50	50	51	61	77	91	94	95	96	97	97	75.1	97
5-Apr	97	97	96	95	95	95	95	95	95	93	93	91	89	87	88	90	93	95	95	95	95	95	96	96	93.8	97
6-Apr	96	95	92	91	90	88	89	87	86	84	80	74	71	77	69	64	69	63	63	68	71	75	82	80	79.3	96
7-Apr	79	80	81	83	86	88	86	83	72	66	63	58	56	50	47	42	46	50	57	64	70	72	75	80	68.1	88
8-Apr	82	85	85	85	84	84	79	71	67	63	59	54	50	45	44	44	46	50	54	57	60	62	65	70	64.3	85
9-Apr	80	89	94	94	95	94	83	79	72	64	64	66	68	68	63	75	74	62	68	68	71	70	73	72	75.3	95
10-Apr	71	72	77	74	75	75	74	70	61	55	49	41	36	32	29	26	24	24	28	35	42	50	46	48	50.7	77
11-Apr	52	55	56	53	54	55	55	54	47	43	38	36	35	36	35	33	34	38	42	48	51	53	55	55	46.4	56
12-Apr	58	61	66	74	78	80	77	60	48	42	40	38	36	35	33	32	32	33	34	39	40	43	46	49	48.9	80
13-Apr	52	56	66	68	72	73	69	67	67	65	59	55	55	55	66	85	92	95	96	97	97	97	98	98	75.1	98
14-Apr	98	98	98	97	96	94	92	88	85	81	77	75	71	68	66	68	69	68	68	69	80	89	89	88	82.2	98
15-Apr	84	76	73	72	72	72	71	70	67	65	60	56	50	47	42	38	36	34	36	43	48	51	55	55	57.3	84
16-Apr	53	54	54	54	53	54	57	55	49	42	37	33	33	32	29	28	26	26	28	34	39	44	44	47	41.8	57
17-Apr	50	51	53	53	53	54	52	46	41	34	29	28	28	26	24	23	23	23	24	33	40	43	45	47	38.5	54
18-Apr	44	47	47	48	48	57	48	40	35	27	23	22	21	21	19	15	14	15	15	16	19	21	18	18	29.1	57
19-Apr	19	20	23	26	27	28	28	27	26	26	25	25	24	23	23	22	20	18	17	12	17	22	21	21	22.5	28
20-Apr	25	28	34	46	60	71	70	68	66	63	61	60	57	53	50	46	43	43	44	49	57	68	75	77	54.8	77
21-Apr	80	86	86	87	88	88	80	65	55	48	45	42	38	34	29	26	27	27	29	35	41	44	45	53	53.2	88
22-Apr	64	52	54	55	57	62	54	48	39	30	27	26	25	25	26	26	27	28	30	34	39	40	40	41	39.4	64
23-Apr	42	45	48	50	51	51	51	49	45	42	40	39	35	34	34	35	34	36	37	44	49	52	56	56	44.0	56
24-Apr	49	52	53	56	58	56	59	56	53	50	45	38	35	35	38	45	65	72	82	86	88	88	88	88	59.8	88
25-Apr	90	92	94	93	92	91	92	92	91	85	83	78	73	68	63	61	62	64	65	69	72	76	84	91	80.0	94
26-Apr	93	93	93	95	95	95	94	92	90	89	90	90	90	88	83	77	72	71	80	84	91	93	92	95	88.6	95
27-Apr	96	96	97	97	97	95	91	85	77	68	58	51	45	40	42	44	44	46	44	43	58	72	74	73	68.0	97
28-Apr	81	83	85	85	84	83	71	55	44	38	33	30	26	25	24	25	23	23	27	33	35	37	39	39	46.9	85
29-Apr	39	41	42	43	44	47	46	40	35	31	28	27	24	22	21	20	20	19	20	24	30	36	41	44	32.6	47
30-Apr	44	42	37	37	39	40	40	42	44	41	35	33	32	34	36	35	33	32	36	39	43	45	47	51	39.0	51
	66.9	67.8	69.3	70.7	72.1	72.7	70.2	65.8	60.9	55.9	52.1	49.2	47.1	45.2	43.7	43.8	44.8	45.6	48.7	52.5	57.2	60.9	63.0	64.6	Diurnal Average	
	98	98	98	97	97	95	95	95	95	93	93	91	90	88	88	90	93	95	96	97	97	97	98	98	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity (RH) - %

Cenovus - Christina Lake - April 2016



Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	19	2.64	2.64
20 - 40	159	22.08	24.72
40 - 60	218	30.28	55.00
60 - 80	172	23.89	78.89
80 - 100	152	21.11	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Cenovus - Christina Lake - April 2016

Maximum Speed: 30 km/h on Apr 6 11:00

Maximum Daily Speed Average: 16.7 km/h on Apr 9

Minimum Speed Value: 1 km/h on Apr 2 05:00

Minimum Daily Speed Average: 3.1 km/h on Apr 27

Maximum Diurnal Speed Average: 3.8 km/h at hour 23

Minimum Diurnal Speed Average: 0.8 km/h at hour 6

Monthly Average Velocity: 1.8 km/h 164.8 deg

Percentiles: $P_1 = 2$ $P_{10} = 5$ $Q_1 = 7$ Median = 10 $Q_3 = 14$ $P_{90} = 19$ $P_{99} = 27$

Hours in Service: 720

Hours of Data: 720

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-Apr	SSW8	SW10	WSW8	WSW8	SW8	WNW7	NW14	NW13	NW12	NW15	NW15	NNW15	N17	N16	N14	N11	N11	NNE15	NE12	ENE8	E7	E5	ESE6	SE8	NNW5.4	N17
2-Apr	SE9	E6	ENE5	E5	S1	NW4	NW4	NW3	NNW2	NNE3	N6	NNE9	NNE7	NNW8	NW14	N14	NNE14	NNE15	N11	N12	NNE11	NNE9	NNE8	NE8	NNE6.1	NNE15
3-Apr	N7	NNW9	W4	WSW8	WNW10	NW14	NW15	NW14	NNW17	NW18	NNW17	NNW15	NNE11	NNW9	NNE11	NNE12	NNE10	NE10	NE11	ENE8	ENE9	ESE6	ESE4	ESE4	N7.1	NW18
4-Apr	SSE4	SE5	ESE4	ESE5	ESE4	SSE5	SSE7	S12	S15	S12	SSE11	SE11	SSE13	SSE11	SE11	SE9	ESE6	E10	ESE6	ESE5	ENE5	ENE4	NNE5	NE5	SE6.2	S15
5-Apr	NE6	E5	ESE4	E3	ENE3	N3	E5	E6	E8	E8	ESE10	SE10	SE10	SE9	SE9	SE7	SSE6	SSE5	SSE6	S8	S10	S11	S13	S13	SE5.7	S13
6-Apr	S11	SSW13	SW15	WSW15	WSW15	W20	W20	W21	WNW24	NW26	NW30	NW30	NW27	W21	WNW23	NW22	NW20	NW18	NNW18	NW14	NW16	NNW16	NNE15	N13	WNW15.6	NW30
7-Apr	N10	NNE12	NNE9	N8	NNE9	NNE6	E4	SE6	ENE3	NNE4	ENE4	NE5	ENE6	NNE2	N3	NNW11	NE15	NNE19	NE15	NE12	ENE12	ENE10	ENE8	E6	NE7.2	NNE19
8-Apr	E5	ESE6	ESE7	ESE7	ESE7	ESE7	ESE11	SE13	SE11	SE16	SE17	SE19	SE21	SE22	SE27	SE26	SSE25	SSE23	SE18	SSE17	SE17	SE18	SSE18	SSE12	SE15.0	SE27
9-Apr	S6	SE6	SSE7	SSE5	SSE2	NW13	NW26	NW22	NW22	NW22	NW27	NW23	NW27	NW26	NW25	NW25	NW23	NNW26	NNW23	NNW23	NNW21	NNW22	NNW20	NNW16	NW16.7	NW27
10-Apr	NNW14	NNW16	NNW14	NNW13	N12	N12	N12	N15	N16	N13	NNE13	NNE11	NNE12	NNE12	NNE9	NNE9	NE6	NE5	E7	ESE7	ESE5	ESE6	SE7	SSE9	NNE7.6	N16
11-Apr	SE7	SSE9	SE8	S11	S12	S14	S13	S13	S16	S15	SSW14	SSW14	SSW14	S14	SSW12	S14	SSW13	S17	S13	SSE8	ESE5	SE6	SSE9	S10	S11.2	S17
12-Apr	S5	SSE4	S3	SSE4	S4	SSE3	SE2	SSW5	NW7	NNE6	NE9	NNE10	NNE8	NNE10	NNE7	NNE12	NNE15	NE14	NE12	ENE12	ENE14	E14	E10	E12	NE5.4	NNE15
13-Apr	E8	E7	E2	N6	ENE4	NNW6	N7	NNE9	NNE8	N6	NNE10	NNE9	NNE10	NE8	ENE12	NE12	N9	NNE7	NNW6	N6	NW8	NW9	NNW7	NW7	NNE6.0	NE12
14-Apr	WSW3	E2	ESE1	NNW6	NW12	NW16	NW18	WNW15	WNW16	WNW17	WNW19	WNW21	WNW18	WNW18	W17	WNW16	W14	W14	WNW13	NW12	NNE8	NE7	NE7	NE5	NW10.5	WNW21
15-Apr	NNE6	NNW7	NNW4	NNW7	N4	NNW4	WNW2	NNE3	S3	SSE7	SSE6	E6	SE7	ESE9	SE10	SSE10	SE13	S13	SSE12	SSE8	SSE9	SSE10	SSE12	SSE11	SE4.5	SE13
16-Apr	S15	S16	S17	S12	S15	SSW14	S17	S15	SSW13	SSW13	SW10	SSW9	SSW11	WSW13	SW13	SW13	SW13	SW13	SW10	SSW7	SSW7	S8	S8	S8	SSW11.3	S17
17-Apr	S11	S10	S10	S11	S12	S14	S14	S11	S9	SW8	SSW11	SW14	SW12	SW13	WSW12	SW13	WSW12	WSW12	WSW7	S7	S7	S7	S7	S6	SSW9.4	S14
18-Apr	S8	S7	S7	S6	S5	SSE3	SE1	S8	S9	SSW12	SSW17	S23	S26	S23	S23	S24	S24	S22	S20	S18	SSE16	SSE19	S24	S24	S15.2	S26
19-Apr	S26	S24	S22	S17	SSW13	SSW9	SW11	WSW10	WSW13	WNW17	W22	W23	W21	WSW19	W22	WSW24	W28	W27	WNW23	W17	NW20	NW17	W12	W14	WSW14.9	W28
20-Apr	WNW13	WNW14	NW20	NW20	NW16	NNE15	N13	N15	NNE16	N16	NNW16	N16	N16	N15	NNE15	NNE12	NNE13	NNE12	NNE13	NNE8	ENE5	ESE4	ESE4	E5	N10.6	NW20
21-Apr	E4	ESE4	SSE2	E2	SE2	ESE3	E5	ESE6	ESE7	ENE5	ENE11	E8	E8	E7	NE13	NE17	NE16	NE16	NE18	NE14	ENE8	ENE7	E5	ENE4	ENE7.4	NE18
22-Apr	NE4	NNE6	NE3	NNE9	NE7	NNE8	NE7	ENE11	ENE10	ENE17	E17	ENE15	E14	E13	E14	ESE13	E14	E13	ENE11	ENE12	E8	E7	E8	ENE9.7	E17
23-Apr	E8	ENE6	NNE7	NE8	NE8	NE7	NE8	ENE9	ENE9	ENE8	E10	E14	ESE16	ESE16	ESE14	SE14	SE13	SE10	SSE11	S6	S8	ESE5	SE6	ESE6	E7.4	ESE16
24-Apr	ESE8	SE7	SSE9	SSE13	SE6	SSE10	SSE10	SSE12	SE15	ESE13	SE13	SE20	SE18	SE15	SE15	SE14	SSE14	SSE15	SE12	SE9	ESE5	SE8	SE6	SE6	SE11.0	SE20
25-Apr	SE7	ESE7	ESE7	SE7	SE7	ESE4	ESE6	SE7	SE9	S10	S11	S12	SSE8	S11	SSW11	SSW10	SSW8	SSW7	SW8	SW7	SSW6	S8	S13	S11	S7.1	S13
26-Apr	S9	S10	SSE10	SSE7	SSE8	SSE7	SSE9	S11	S12	S12	S12	S12	S13	SSW11	SSW10	SSW11	S11	SSE8	S13	S9	SSE7	SE4	ESE4	E5	S8.9	S13
27-Apr	ENE3	ESE3	SSE6	SSE7	ESE4	S5	S6	SSW6	SSW7	SW7	SSW8	SSW7	SSW8	SW10	N3	N7	ENE8	E8	E7	SE6	SSE4	S3	SSE6	SSE3	SSE3.1	WSW10
28-Apr	SE2	E1	E2	ESE3	SE2	E3	ESE2	SSE5	SE6	SSE12	SSE13	SSE13	SSE15	SSE19	SSE18	SSE17	SSE19	SSE16	SSE14	SSE9	SE9	SE7	SSE7	SSE8	SSE9.0	SSE19
29-Apr	SE10	SSE10	SSE11	SSE11	SSE11	SSE9	SE10	SSE13	SSE16	S18	S24	SSE21	S21	SSE23	SSE20	SSE23	SSE19	S17	S15	S12	S7	SSE9	S7	SSE9	SSE14.2	S24
30-Apr	S9	S11	S14	S10	S6	S6	S8	S9	S8	SSW11	SSW17	SSW17	SSW18	SW14	SW14	SSW15	SSW16	SSW16	SSW11	SSW10	S9	SSW9	SW8	SSW8	SSW11.0	SSW18
	SSE3.3	SSE3.1	S3.3	S2.3	S1.6	WSW0.8	WSW1.1	SSW1.8	SSW1.2	WSW1.4	SW1.9	SSW1.4	S2.2	S2.7	S2.1	S1.8	SSE1.9	SSE1.6	ESE1.7	SE2.1	ESE2.4	ESE3.0	SE3.8	SSE3.7	Diurnal Average	
	S26	S24	S22	NW20	NW16	W20	NW26	NW22	WNW24	NW26	NW30	NW30	NW27	NW26	SE27	SE26	W28	W27	WNW23	NNW23	NNW21	NNW22	S24	S24	Diurnal Maximum	

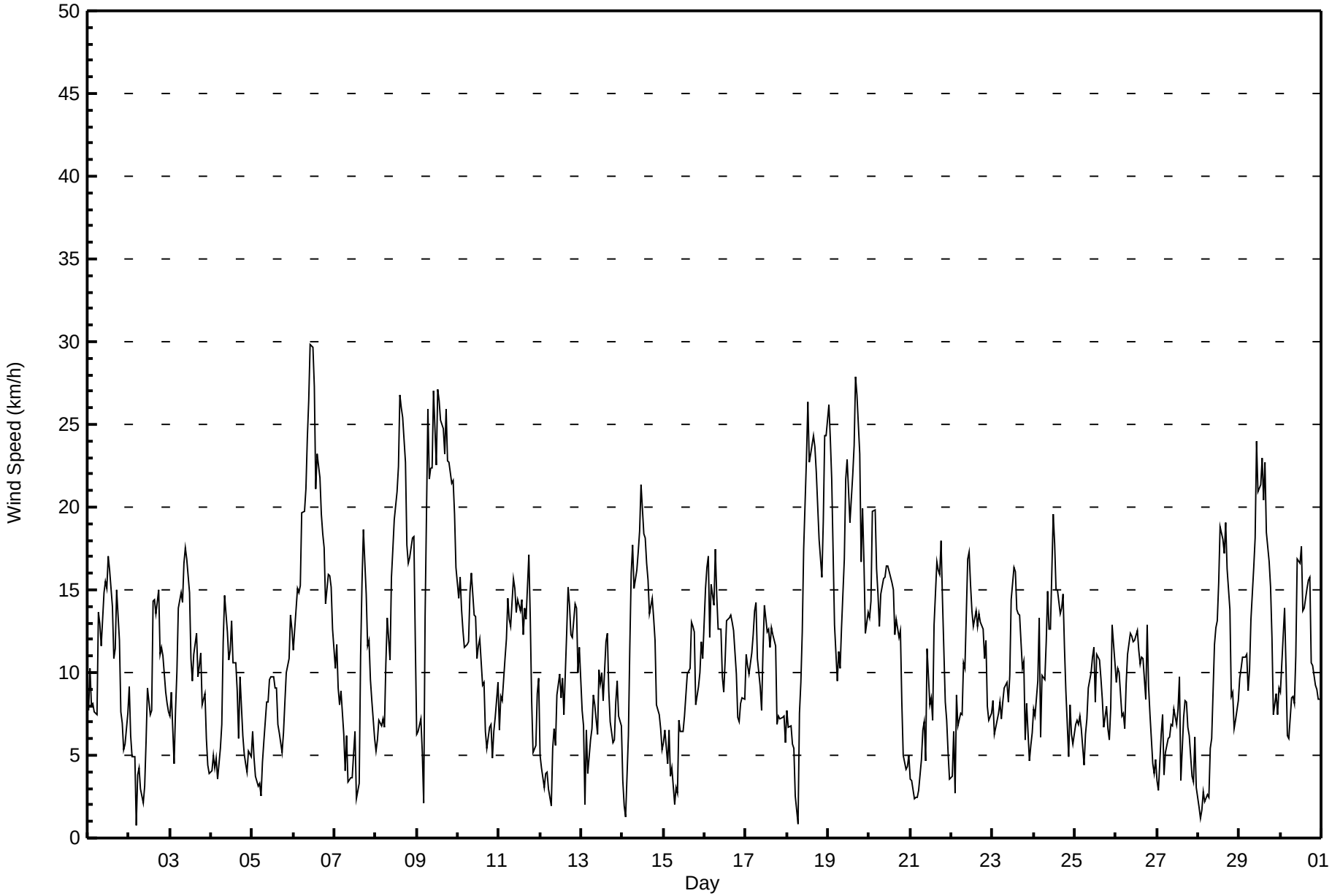
All monthly, daily, and diurnal averages have been calculated using vector methods

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed (WS) - km/h

Cenovus - Christina Lake - April 2016



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	104	14.44	14.44
6 - 11	308	42.78	57.22
12 - 19	241	33.47	90.69
20 - 28	65	9.03	99.72
29 - 38	2	0.28	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Wind Speed (WS) - km/h

Cenovus - Christina Lake - April 2016

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	4	5	6	11	18	22	7	13	8	1	0	1	1	1	3	3	104
6 - 11	13	32	15	17	21	23	37	42	51	25	10	6	0	2	4	10	308
12 - 19	18	20	12	7	10	5	16	27	40	18	11	8	6	11	20	12	241
20 - 28	0	0	0	0	0	0	5	6	15	0	0	2	9	4	18	6	65
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	35	57	33	35	49	50	65	88	114	44	21	17	16	18	47	31	720

Total Number of Valid Hours: 720

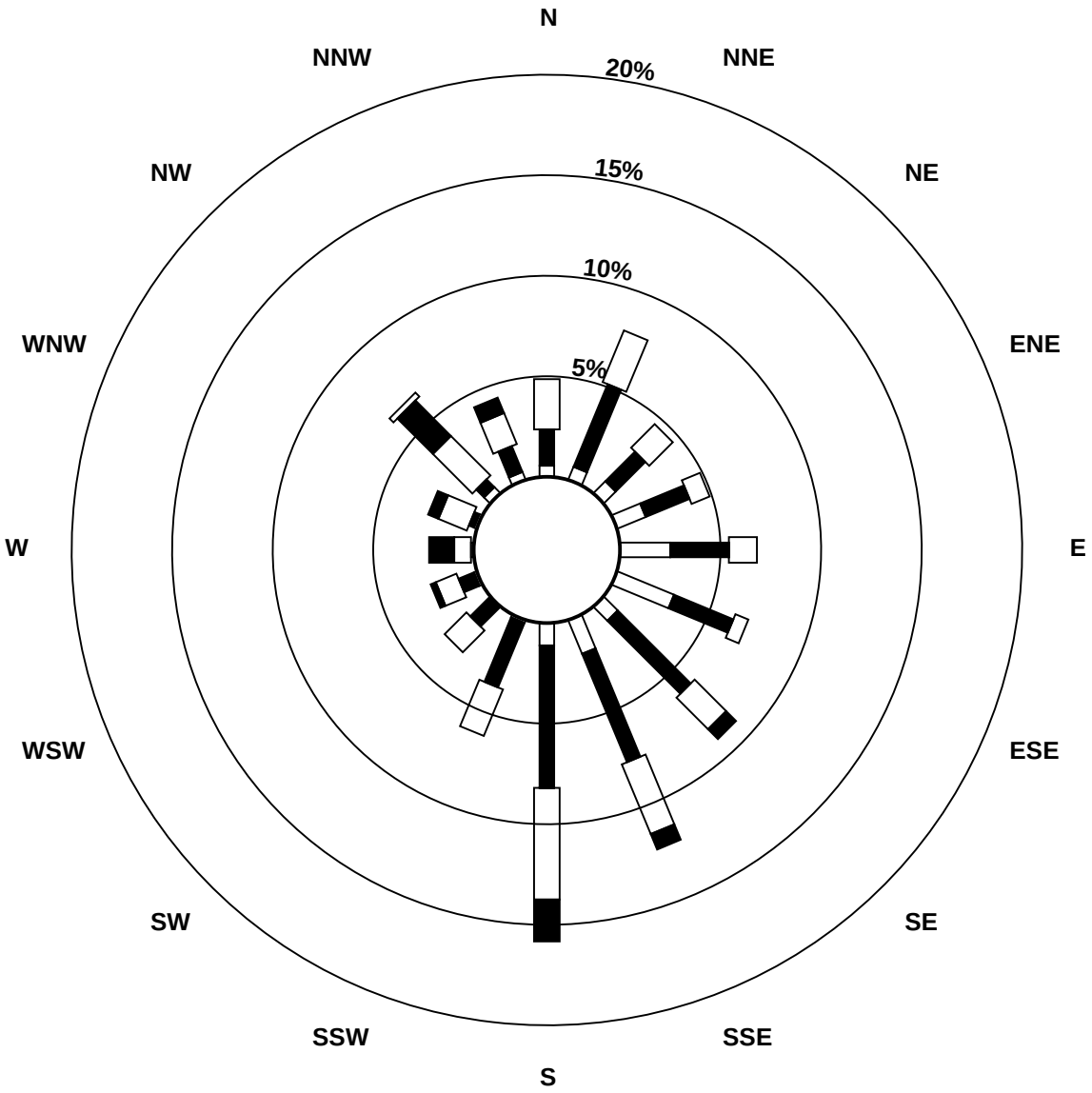
Total Number of Hours: 720

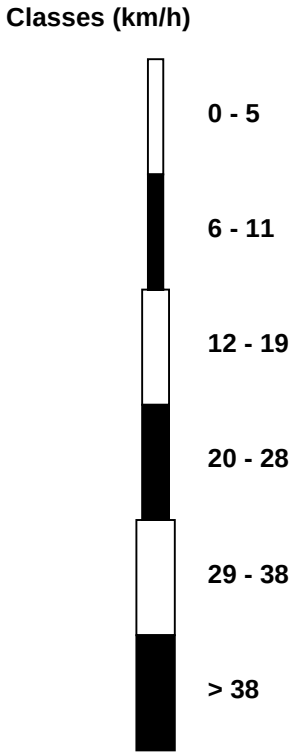
Wood Buffalo Environmental Association

Wind Rose Apr 2016

Wind Speed (WS) - km/h

Cenovus - Christina Lake (AMS500)





Total Number of Valid Hours: 720

Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Speed (WS) - km/h

Cenovus - Christina Lake - April 2016

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

Minimum Value: 0 km/h on Apr 20 22:00

Percentiles: P_1 = 1 P_{10} = 1 Q_1 = 2 Median = 3 Q_3 = 4 P_{90} = 5 P_{99} = 6

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

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

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Cenovus - Christina Lake - April 2016

Direction of Maximum Speed: 305 deg on Apr 6 11:00
Direction of Maximum Daily Speed Average: 319.5 deg on Apr 9

Direction of Minimum Speed: 177 deg on Apr 2 05:00

Direction of Minimum Daily Speed Average: 3.1 deg on Apr 27

Monthly Average Direction: 201.6 deg

Hours in Service:	720
Hours of Data:	720
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-Apr	209	219	251	238	217	293	311	310	317	314	326	331	358	359	1	354	8	30	52	67	80	93	118	137	339.9
2-Apr	125	99	75	91	177	326	305	325	348	32	10	19	21	334	326	6	16	16	357	356	23	19	33	45	14.8
3-Apr	4	328	262	245	300	317	320	319	330	325	328	337	27	348	32	27	22	44	43	62	75	110	106	123	351.9
4-Apr	149	137	119	104	122	154	156	177	171	176	167	135	147	152	137	146	109	95	103	113	70	77	30	35	137.9
5-Apr	51	82	110	91	68	6	98	87	93	101	120	124	128	126	135	133	165	167	155	180	178	176	183	183	136.6
6-Apr	189	209	231	244	255	264	269	279	297	306	305	304	306	279	303	313	322	322	331	326	316	330	12	10	297.9
7-Apr	358	28	26	8	22	23	95	143	76	31	62	41	60	20	3	334	34	24	45	42	63	59	71	81	37.3
8-Apr	98	105	104	112	106	116	117	142	133	137	134	137	135	140	140	145	155	149	144	147	146	145	153	163	139.4
9-Apr	170	140	167	162	163	317	309	309	314	309	309	315	316	320	320	315	320	327	328	334	335	339	335	334	319.5
10-Apr	338	336	332	347	349	351	355	8	10	4	22	12	12	32	27	24	49	49	90	118	116	122	140	148	14.1
11-Apr	139	151	144	174	177	178	182	182	186	183	197	198	203	185	192	181	195	175	170	155	123	146	161	175	177.9
12-Apr	179	159	178	160	177	153	140	206	313	17	36	32	26	20	16	14	24	36	51	68	77	87	92	95	55.8
13-Apr	88	100	100	9	66	344	11	30	30	7	23	22	13	46	72	51	7	20	346	1	325	311	336	319	19.8
14-Apr	244	80	103	330	324	317	313	301	285	302	291	297	298	289	281	297	276	278	297	322	14	35	44	36	303.9
15-Apr	15	345	345	331	352	348	298	23	183	162	147	97	131	109	130	150	141	169	168	160	168	150	158	159	143.7
16-Apr	177	173	173	177	184	192	184	189	199	209	222	198	206	238	233	227	226	234	221	195	193	186	185	183	199.2
17-Apr	176	181	180	179	180	179	177	185	182	219	208	231	228	235	240	234	244	238	237	183	185	179	181	182	203.2
18-Apr	184	175	172	170	173	157	141	179	178	204	206	188	180	183	177	177	177	181	176	174	167	166	179	185	179.9
19-Apr	186	189	187	191	204	209	214	237	256	296	274	275	268	253	259	249	263	268	289	272	307	308	264	259	251.7
20-Apr	293	301	312	313	325	16	353	358	17	10	338	357	356	9	29	14	19	12	24	25	57	114	111	94	356.3
21-Apr	84	103	152	85	140	108	79	112	106	65	60	99	82	85	53	43	54	56	43	54	73	75	86	65	68.2
22-Apr	39	26	52	27	36	14	35	57	62	77	87	73	94	84	94	103	93	91	80	77	68	81	94	87	74.2
23-Apr	87	69	30	34	35	41	36	66	68	72	80	90	109	102	122	143	131	134	151	175	177	110	124	112	99.1
24-Apr	118	139	154	158	129	148	157	150	133	121	131	128	131	142	139	144	162	159	146	139	108	128	132	125	139.8
25-Apr	128	123	118	127	138	113	106	131	146	175	174	169	166	188	203	204	193	197	225	222	192	173	178	178	169.4
26-Apr	169	171	168	148	148	156	168	181	184	184	177	176	182	196	198	201	181	167	184	179	161	125	115	82	174.0
27-Apr	68	102	159	152	120	170	185	208	210	218	207	200	198	236	1	2	68	79	86	132	168	180	154	163	164.0
28-Apr	125	87	96	110	146	89	104	157	138	159	161	160	157	166	165	153	155	168	163	157	145	146	157	149	155.2
29-Apr	146	147	147	147	149	152	145	159	156	170	174	167	172	163	162	162	163	188	183	170	171	158	176	163	163.7
30-Apr	172	176	180	187	184	178	181	190	188	196	202	210	208	222	224	210	208	207	200	192	187	199	221	212	199.6
	152.6	155.1	170.9	172.3	177.2	254.1	243.8	206.7	203.4	236.4	226.8	195.3	172.6	190.7	175.0	177.6	156.7	148.1	123.4	125.9	111.6	122.8	143.5	147.9	
	Diurnal Average																								

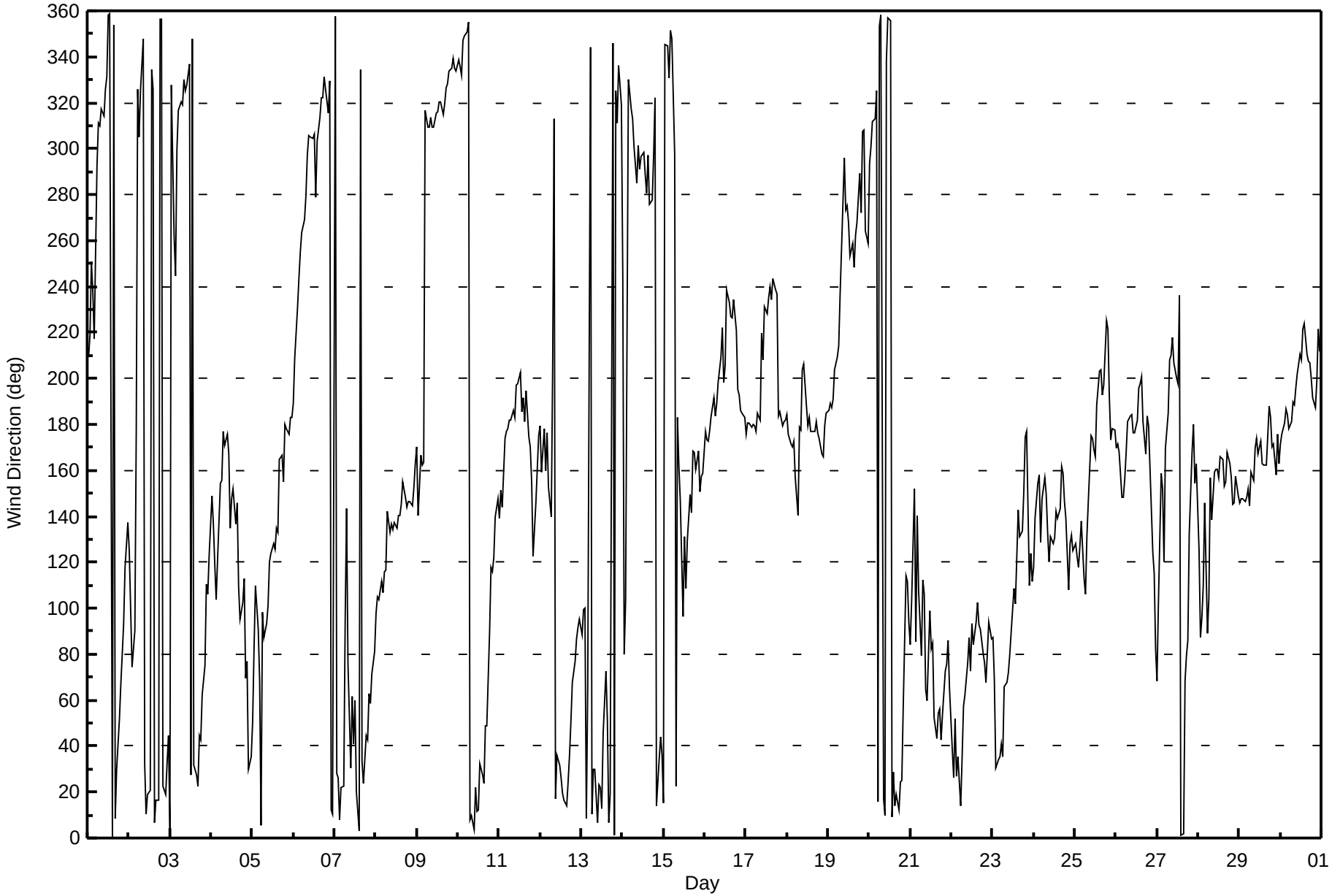
All monthly, daily, and diurnal averages have been calculated using vector methods

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction (WD) - deg

Cenovus - Christina Lake - April 2016



Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg

Cenovus - Christina Lake - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 92 deg on Apr 7 14:00

Minimum Value: 5 deg on Apr 17 21:00

Percentiles: $P_1 = 7$ $P_{10} = 11$ $Q_1 = 13$ Median = 18 $Q_3 = 24$ $P_{90} = 37$ $P_{99} = 72$

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily
	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-Apr	22	18	25	25	40	43	13	12	14	16	23	24	19	20	30	35	31	10	11	9	18	17	19	15	43
2-Apr	12	25	25	22	82	17	20	37	75	51	58	27	27	71	21	22	15	13	17	17	15	14	14	22	82
3-Apr	18	15	40	29	21	14	14	14	16	15	17	29	20	30	19	20	24	17	11	18	11	17	16	22	40
4-Apr	23	21	28	12	29	33	28	13	15	20	26	25	20	20	24	34	47	16	18	21	26	35	16	17	47
5-Apr	16	13	26	29	19	24	34	14	14	17	11	14	13	12	15	17	12	19	8	13	13	12	12	12	34
6-Apr	14	17	19	16	16	15	17	15	17	12	13	13	12	20	17	14	16	15	15	12	12	18	17	16	20
7-Apr	21	11	11	17	13	13	33	21	56	62	54	46	39	92	74	27	19	11	15	11	9	10	10	12	92
8-Apr	13	14	12	16	12	14	15	15	16	16	17	15	15	16	13	15	13	12	13	14	14	13	20	46	46
9-Apr	28	29	14	20	69	17	11	11	12	12	12	13	14	14	13	12	14	13	15	15	14	16	14	15	69
10-Apr	15	19	16	18	16	15	19	20	23	28	27	32	38	26	40	39	56	43	23	10	14	9	15	11	56
11-Apr	16	10	13	14	13	13	16	15	15	17	20	21	25	28	25	21	20	13	11	9	21	31	15	17	31
12-Apr	48	22	18	18	21	30	62	33	32	36	19	23	38	37	52	26	16	12	12	10	17	11	12	13	62
13-Apr	13	19	56	32	57	49	34	15	20	20	20	24	23	24	19	13	19	13	22	19	14	17	12	19	57
14-Apr	68	60	73	63	12	11	12	15	20	17	19	20	20	19	20	23	23	18	22	15	20	13	18	21	73
15-Apr	19	26	42	19	34	28	80	60	89	24	55	56	52	40	37	40	24	20	12	12	15	10	9	9	89
16-Apr	12	12	11	17	14	20	13	16	18	18	30	37	36	26	29	24	24	18	19	11	7	7	10	9	37
17-Apr	8	11	12	10	11	11	11	15	17	34	27	26	31	26	37	31	24	23	21	10	5	8	5	15	37
18-Apr	10	13	14	20	19	41	92	18	16	20	21	17	15	20	20	15	16	15	13	11	12	12	14	14	92
19-Apr	13	14	14	17	17	34	20	21	22	23	22	21	18	20	19	19	18	17	16	17	17	11	20	19	34
20-Apr	19	25	10	11	26	14	18	20	15	18	25	25	22	30	22	32	23	25	13	9	32	10	12	8	32
21-Apr	15	29	45	41	19	20	19	20	32	70	20	41	42	52	28	18	16	15	12	17	10	12	14	23	70
22-Apr	21	10	51	9	10	12	20	17	16	19	18	22	24	25	23	20	18	16	11	12	8	9	10	12	51
23-Apr	13	20	13	13	13	20	15	10	15	21	24	20	26	17	24	25	26	21	12	13	22	16	19	27	27
24-Apr	14	23	13	20	11	23	16	17	18	21	16	19	20	21	31	25	23	12	14	14	20	17	12	11	31
25-Apr	13	14	10	11	13	21	12	17	15	20	18	19	29	22	23	20	18	21	16	17	16	9	10	11	29
26-Apr	12	12	11	11	10	12	15	16	15	13	14	14	14	17	18	18	21	20	37	19	10	25	40	29	40
27-Apr	48	55	16	14	48	44	18	21	28	30	46	47	25	33	79	25	21	10	14	17	48	33	14	26	79
28-Apr	39	46	73	29	48	31	39	14	51	20	26	22	30	26	27	18	17	21	15	8	6	9	6	7	73
29-Apr	8	9	10	11	11	11	16	14	16	16	16	23	20	17	27	20	20	18	15	9	6	8	8	5	27
30-Apr	7	7	11	14	14	14	14	14	15	20	21	22	20	22	21	23	20	21	17	14	11	14	26	12	26
	68	60	73	63	82	49	92	60	89	70	58	56	52	92	79	40	56	43	37	21	48	35	40	46	
	Diurnal Maximum																								

Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

Calibration Date	April 21, 2016	Last Calibration	March 23, 2016
Station Name	Cenovus - Christina Lake	Station Number	AMS 500
Reason:	Routine		
Start Time (MST)	11:00	End Time (MST)	18:20
Gas Cert Reference	LL107928	Station temp.	22 Deg C
Cal Gas Concentration	50 ppm	Cal Gas Exp Date	Sep-8-2018
Calibrator Make/Model	API T700	Serial Number	451
ZAG Make/Model	API 701	Serial Number	404
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2575

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range	0 - 1000 ppb		PMT voltage	-698	-697
Analyzer IP address	192.168.1.43		Lamp voltage	839	841
Calculated slope	0.995625	0.998080	Chamber temp	45.1	44.8
Calculated intercept	0.886051	0.835819	Pressure	679.4	684.1
Analyzer Background	13.2	12.8	Flow	0.587	0.590
Analyzer Coefficient	1.027	1.017	Intensity	90	91

Analyzer make	Thermo 43i	Analyzer serial #	118148497

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.4	----
as found span	5000	79.3	793.0	796.8	0.995
calibrator zero	5000	0.0	0.0	-0.1	----
high point	5000	79.3	793.0	794.2	0.999
second point	5000	39.7	397.0	396.2	1.002
third point	5000	19.8	198.0	197.0	1.005
as left zero	5000	0.0	0.0	0.1	----
as left span	5000	79.3	793.0	789.8	1.004
				Average Correction Factor	1.002

Corrected As found	797.2	Previous response	795.6	% change	-0.2%

Notes:

Changed inlet filter after as founds. Adjusted zero and span.

Calibration Performed By: Evan Magill

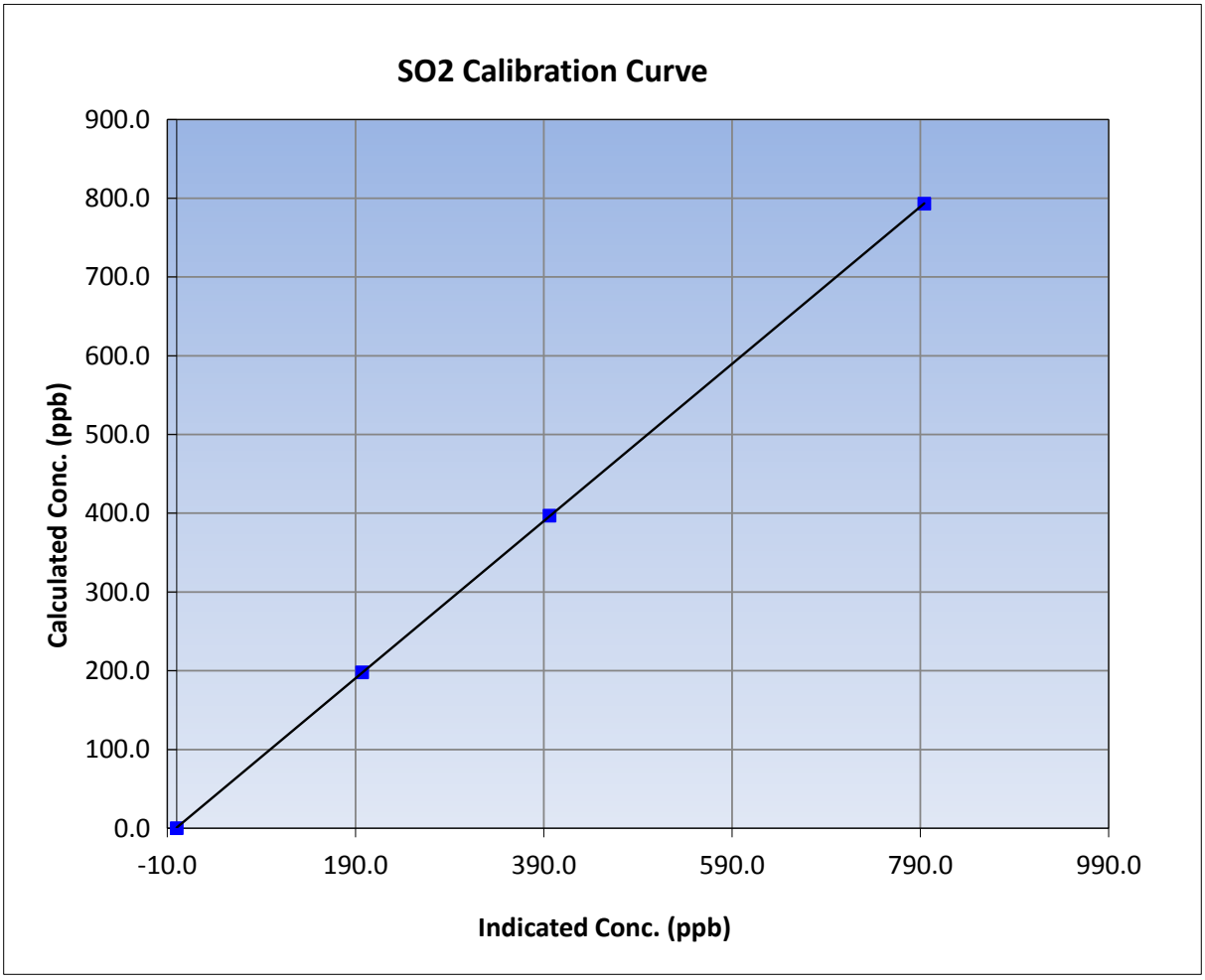
Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

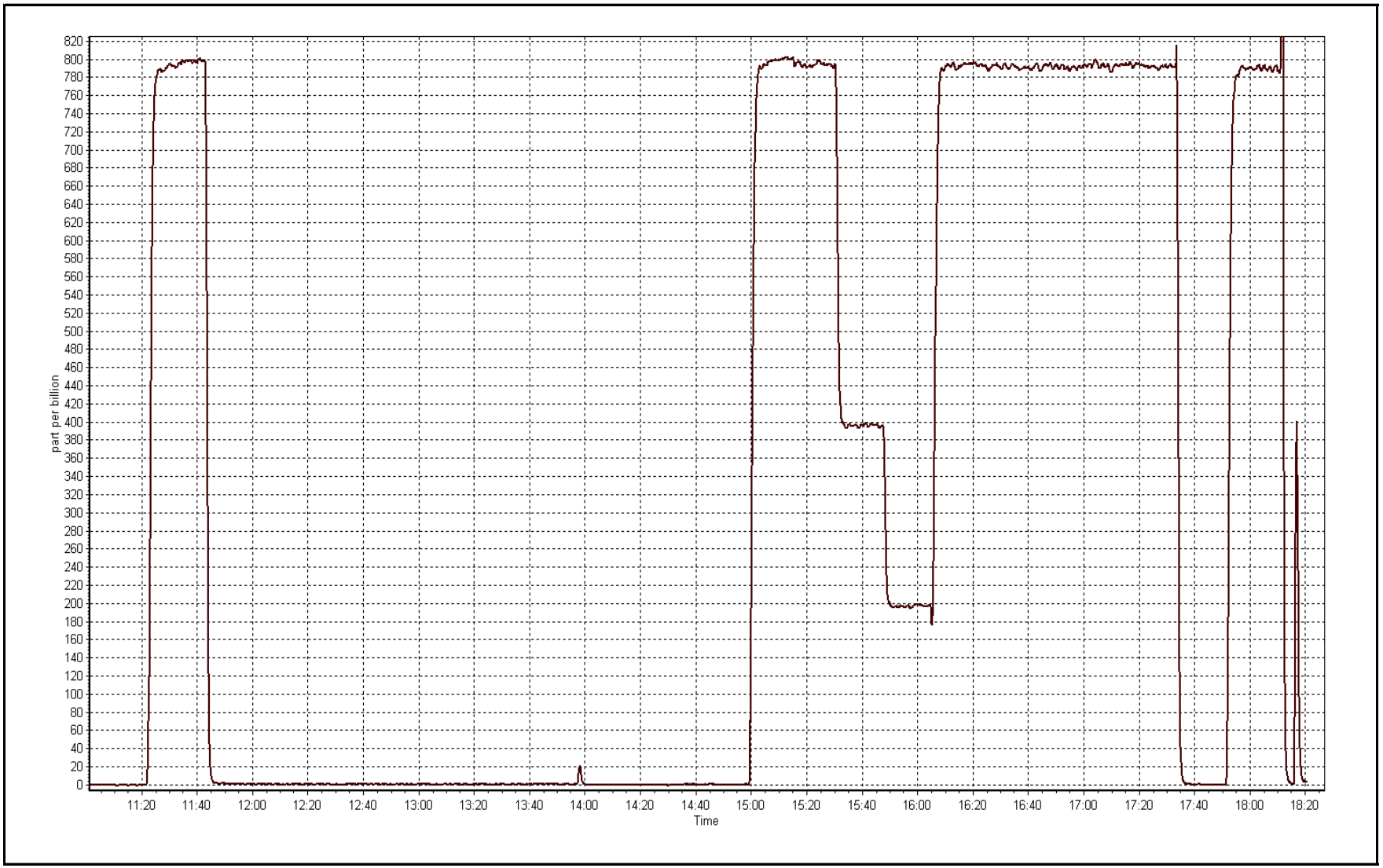
Calibration Date	April 21, 2016	Previous Calibration	March 23, 2016
Station Name	Cenovus - Christina Lake	Station Number	AMS 500
Start Time (MST)	11:00	End Time (MST)	18:20
Analyzer make	Thermo 43i	Analyzer serial #	118148497

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999995
793.0	794.2	0.9985		
397.0	396.2	1.0020	Slope	0.998080
198.0	197.0	1.0051		
			Intercept	0.835819



SO2 Calibration Plot Date: April 21, 2016



Wood Buffalo Environmental Association
H2S Calibration Report

Station Information

Calibration Date	April 22, 2016	Last Calibration	March 24, 2016
Station Name	Cenovus	Station Number	AMS 500
Reason:	Routine		
Start Time (MST)	8:10	End Time (MST)	10:45
Gas Cert Reference	LL23598	Station temp.	22 Deg C
Cal Gas Concentration	10.2 ppm	Cal Gas Exp Date	5/30/2016
Calibrator Make/Model	API 700	Serial Number	451
ZAG air Make/Model	API 701	Serial Number	404
DACS make/model	Campbell Scientific CR3000	Serial Number	2575
SO2 gas concentration	50 ppm	SO2 gas cert/exp	LL107928 09-Aug-18

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-680	-680
Analyzer IP address	192.168.1.42		Lamp voltage	981	984
Calculated slope	0.998541	0.992376	Chamber temp	45	45
Calculated intercept	0.121173	0.109198	Pressure	659.3	666.5
Analyzer Background	1.72	1.72	Flow	0.433	0.430
Analyzer Coefficient	0.882	0.882	Intensity	90	91
			Converter temp.	310	310

Analyzer make/model	Thermo 43i-TLE	Analyzer serial #	1008841400
Converter make/model	Thermo 340	Converter serial #	328702539

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.1	----
as found span	5000	39.3	80.2	80.7	0.994
SO2 scrubber check	5000	20.0	200.0	1.6	----
calibrator zero	5000	0.0	0.0	-0.1	----
high point	5000	39.3	80.2	80.7	0.994
second point	5000	19.7	40.2	40.5	0.993
third point	6000	11.9	20.2	20.2	1.001
as left zero	5000	0.0	0.0	0.0	----
as left span	5000	39.3	80.2	81.3	0.986
				Average Correction Factor	0.996

Corrected As found	80.8	Previous response	80.2	% change	-0.7%

Notes:

Changed inlet filter and scrubber check done after as founds. No adjustments.

Calibration Performed By: Evan Magill

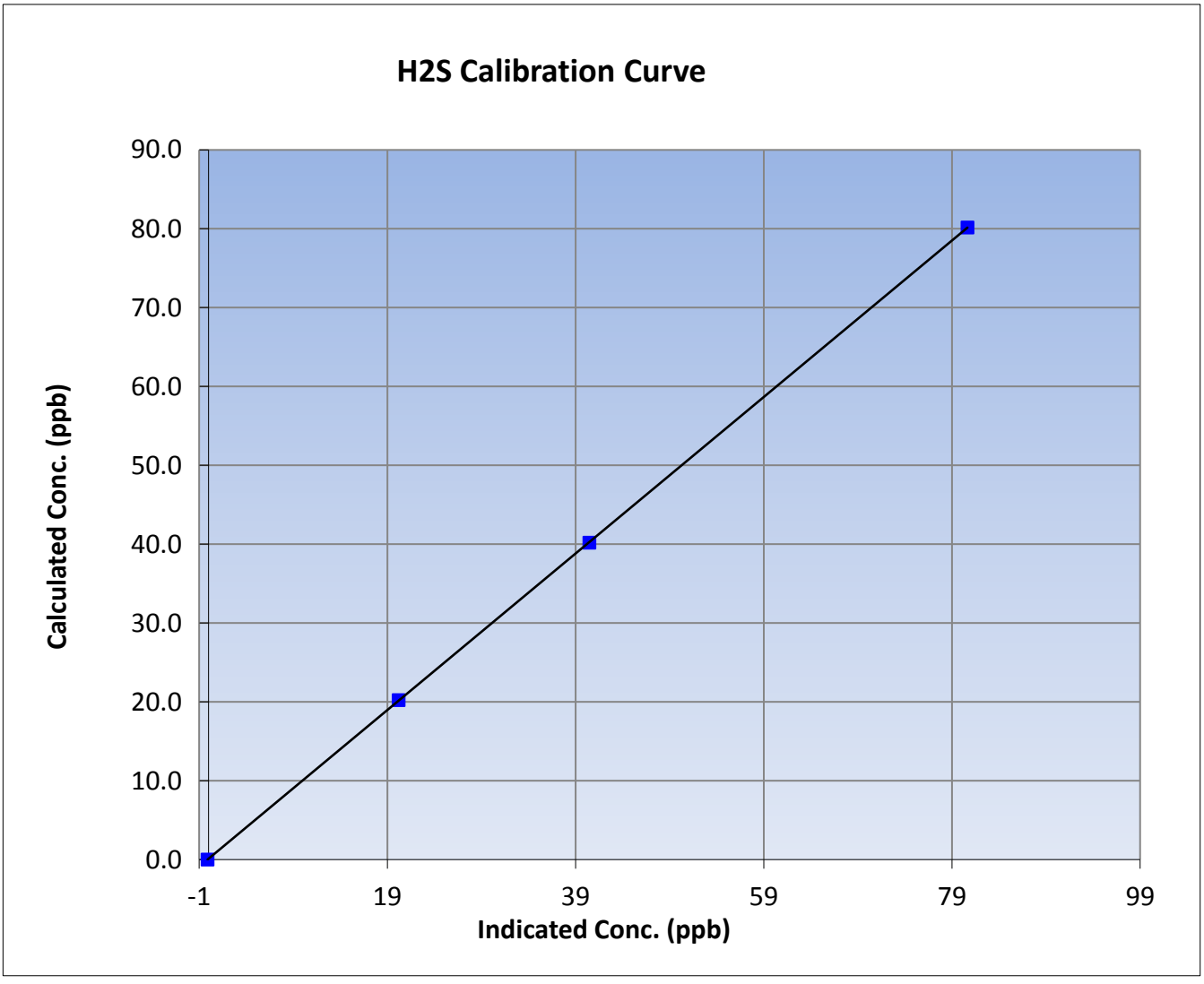
Wood Buffalo Environmental Association
H2S Calibration Report

Station Information

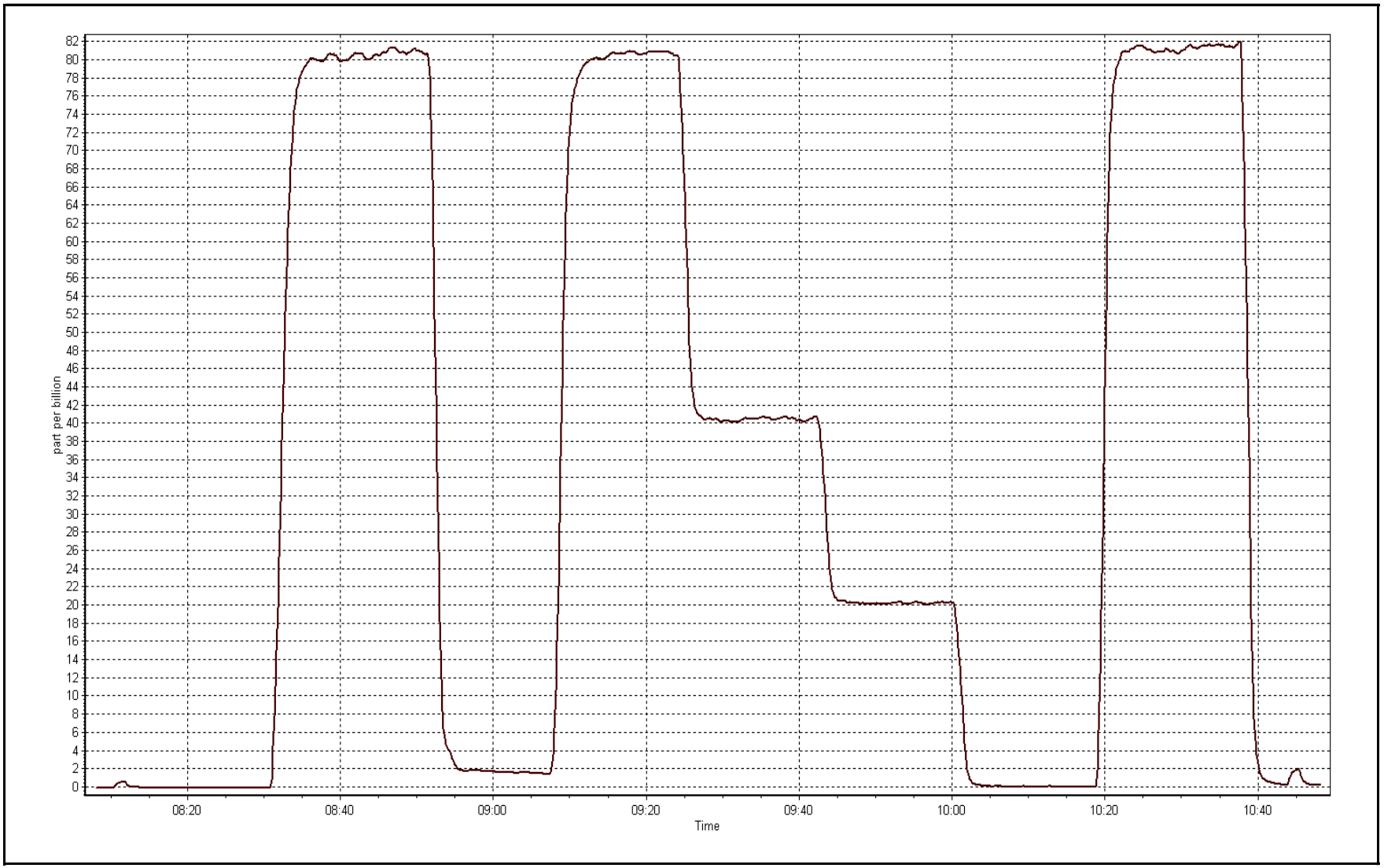
Calibration Date	April 22, 2016	Previous Calibration	March 24, 2016
Station Name	Cenovus	Station Number	AMS 500
Start Time (MST)	8:10	End Time (MST)	10:45
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1008841400

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999996
80.2	80.7	0.9941		
40.2	40.5	0.9928	Slope	0.992376
20.2	20.2	1.0015		
			Intercept	0.109198



H2S Calibration Plot Date: April 22, 2016



Wood Buffalo Environmental Association
NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	April 21, 2016	Previous Calibration	March 23, 2016
Station Name	Cenovus	Station Number	AMS 500
Reason:	Routine		
Start Time (MST)	11:00	End Time (MST)	18:20
NO Cal Gas Conc	50.5 ppm	Gas Cert Reference	LL107928
NOx Cal Gas Conc	50.8 ppm	Cal Gas Expiry Date	Sep-8-2018
Calibrator	API T700	Serial Number	451
Zero air Generator	Teledyne API T701	Serial Number	4604

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	2575

Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.996723	0.995802	0.995782
	Data Offset	1.199856	1.276187	-1.149607
Current Calibration	Data Slope	1.003957	0.999351	1.002328
	Data Offset	-0.083444	0.729504	1.294174

Analyzer Information

Analyzer make/model	API T200	Analyzer serial #	723

Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
Analyzer IP	192.168.1.72		192.168.1.72	
NO coefficient	1.045		0.819	
NOX coefficient	1.050		0.821	
NO2 coefficient	1.000		1.000	
NO bkgrnd	-0.3		-4.9	
NOX bkgrnd	0.6		-3.6	
Chamber Temp	50	Deg C	50	Deg C
Moly Temp	316.3	Deg C	315	Deg C
PMT voltage	826	V	826	V
PMT Temp	6.9	Deg C	6.9	Deg C
O3 flow	85	ccm	86	ccm
R Cell press NO	264.16	mmHg	284.48	mmHg
R Cell Press Nox	266.7	mmHg	287.02	mmHg
NO sample flow	0.488	lpm	0.488	lpm
Nox sample Flow	0.486	lpm	0.483	lpm

Notes:

Changed inlet filter after as founds. Changed the o-rings, scintered filters and cleaned the reaction chamber after as founds for annual preventative maintenance. Allowed time for analyzer to settle after PM. Adjusted zero and span.

Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: April 21, 2016 Station Number: AMS 500

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1	----	----
as found span	5000	79.3	805.7	800.9	4.8	820.7	813.5	7.1	0.9817	0.9845
calibrator zero	5000	0.0	0.0	0.0	0.0	0.6	0.4	0.3	----	----
high point	5000	79.3	805.7	800.9	4.8	803.0	801.4	1.5	1.0034	0.9994
second point	5000	39.6	402.3	400.0	2.4	400.3	398.4	1.9	1.0052	1.0039
third point	5000	19.8	201.2	200.0	1.2	200.1	198.7	1.4	1.0053	1.0065
as left zero	5000	0.0	0.0	0.0	0.0	0.9	1.3	-0.4	----	----
as left span	5000	79.3	805.7	465.0	340.7	797.2	466.3	331.0	1.0106	0.9972
								Average Correction Factor	1.0046	1.0033

Corrcted As found NO_X= 820.8 NO= 813.5 Percent Change NO_X= -1.7% NO= -1.3%

Previous Response NO_X= 807.1 NO= 803.0

GPT Calibration Data

Dilution Flow (total) 5000 ccm Source Gas Flow 79.30 ccm NOX ref calc conc = 805.7 ppb NO ref calc conc = 800.9 ppb

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
1st NO ref point		4.8	801.5	794.9	0.3	1.0052	1.0076	----	----
1st NO2 (300)	465.0	334.7	799.0	465.0	334.0	1.0084	----	1.0020	99.8%
2nd NO2 (200)	588.4	211.3	796.5	588.4	208.1	1.0116	----	1.0154	98.5%
3rd NO2 (100)	687.1	112.5	796.5	687.1	109.4	1.0115	----	1.0284	97.2%
2nd NO ref point		4.8	799.5	794.5	5.0	1.0078	1.0081	----	----
				Average Correction Factor		1.0098		1.0153	98.5%

Calibration Performed By: Evan Magill

Wood Buffalo Environmental Association

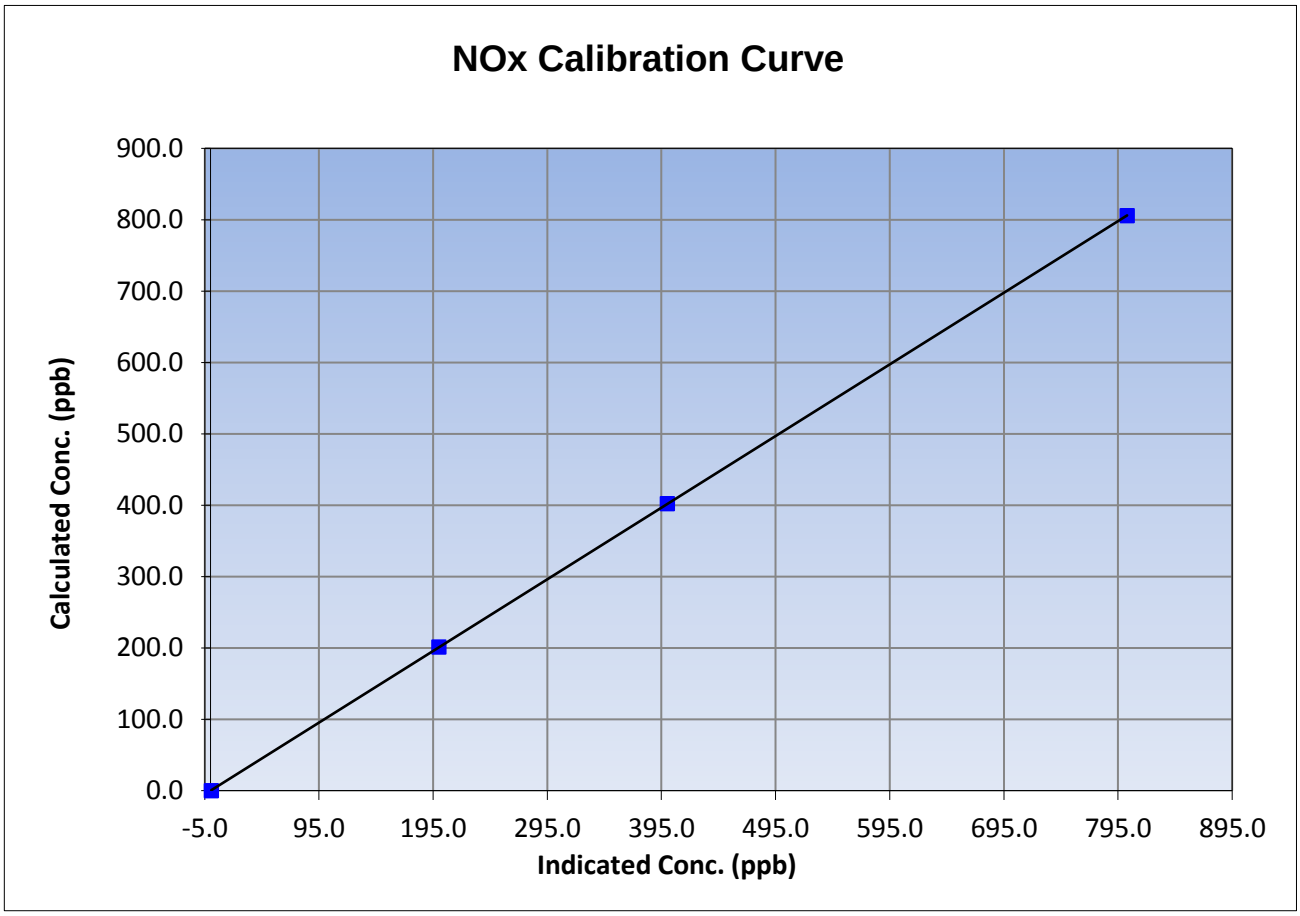
NO_X Calibration Summary

Station Information

Calibration Date	April 21, 2016	Previous Calibration	March 23, 2016
Station Name	Cenovus	Station Number	AMS 500
Start Time (MST)	11:00	End Time (MST)	18:20
Analyzer make	API T200	Analyzer serial #	723

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.6	----	Correlation Coefficient	0.999997
805.7	803.0	1.0034		
402.3	400.3	1.0052	Slope	1.003957
201.2	200.1	1.0053		
			Intercept	-0.083444



Wood Buffalo Environmental Association

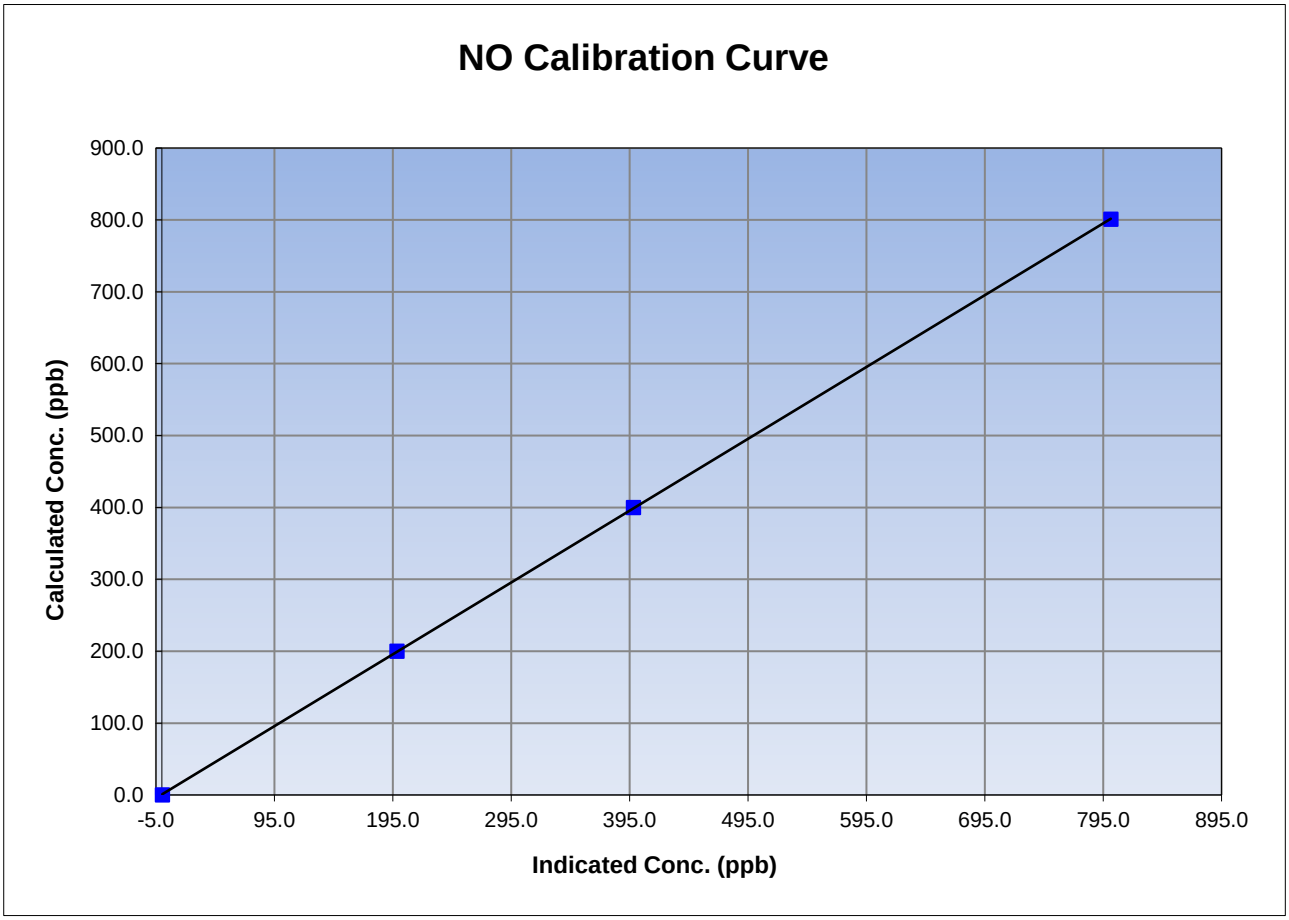
NO Calibration Summary

Station Information

Calibration Date	April 21, 2016	Previous Calibration	March 23, 2016
Station Name	Cenovus	Station Number	AMS 500
Start Time (MST)	11:00	End Time (MST)	18:20
Analyzer make	API T200	Analyzer serial #	723

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.4	N/A	Correlation Coefficient	0.999990
800.9	801.4	0.9994		
400.0	398.4	1.0039	Slope	0.999351
200.0	198.7	1.0065		
			Intercept	0.729504



Wood Buffalo Environmental Association

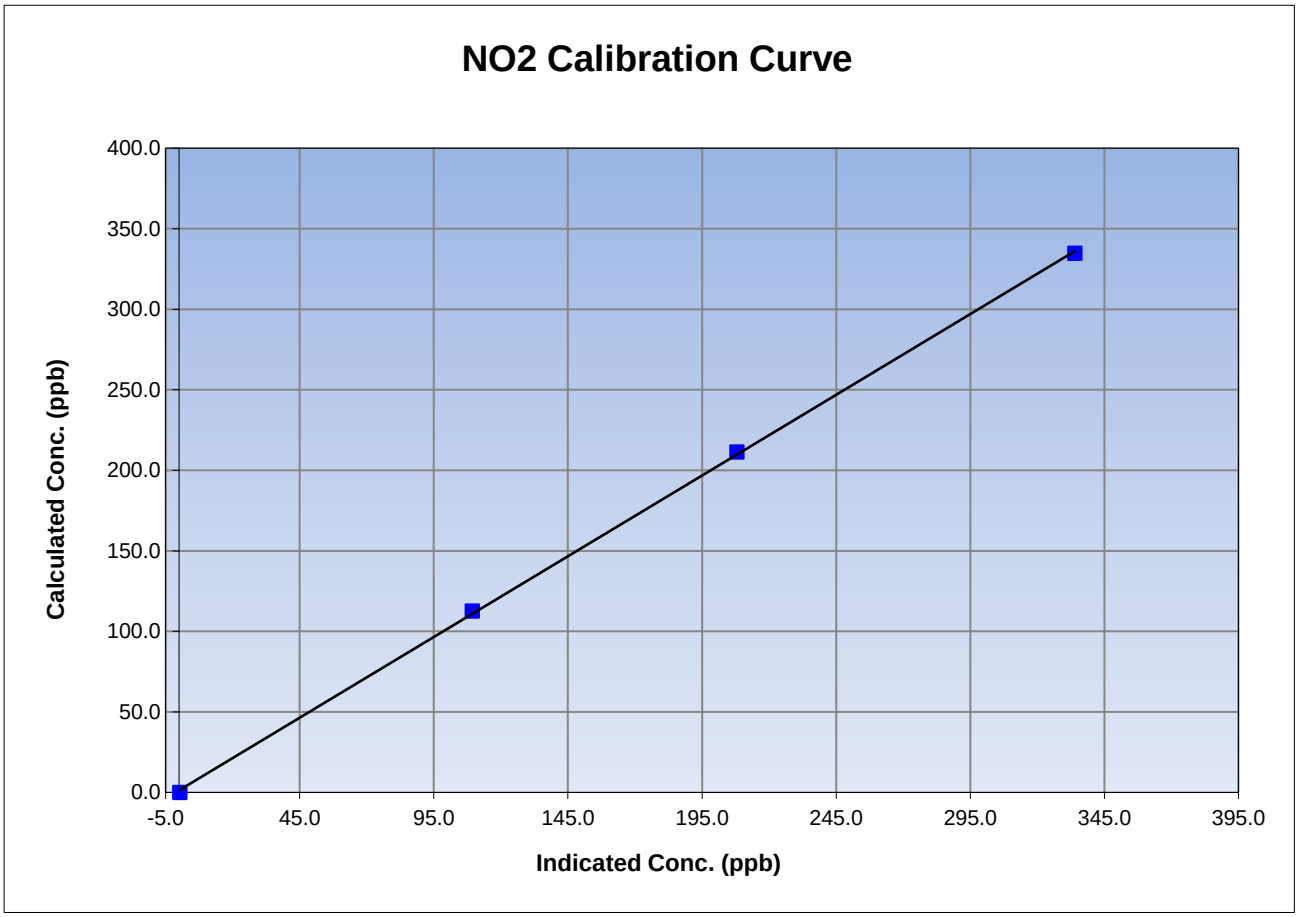
NO_2 Calibration Summary

Station Information

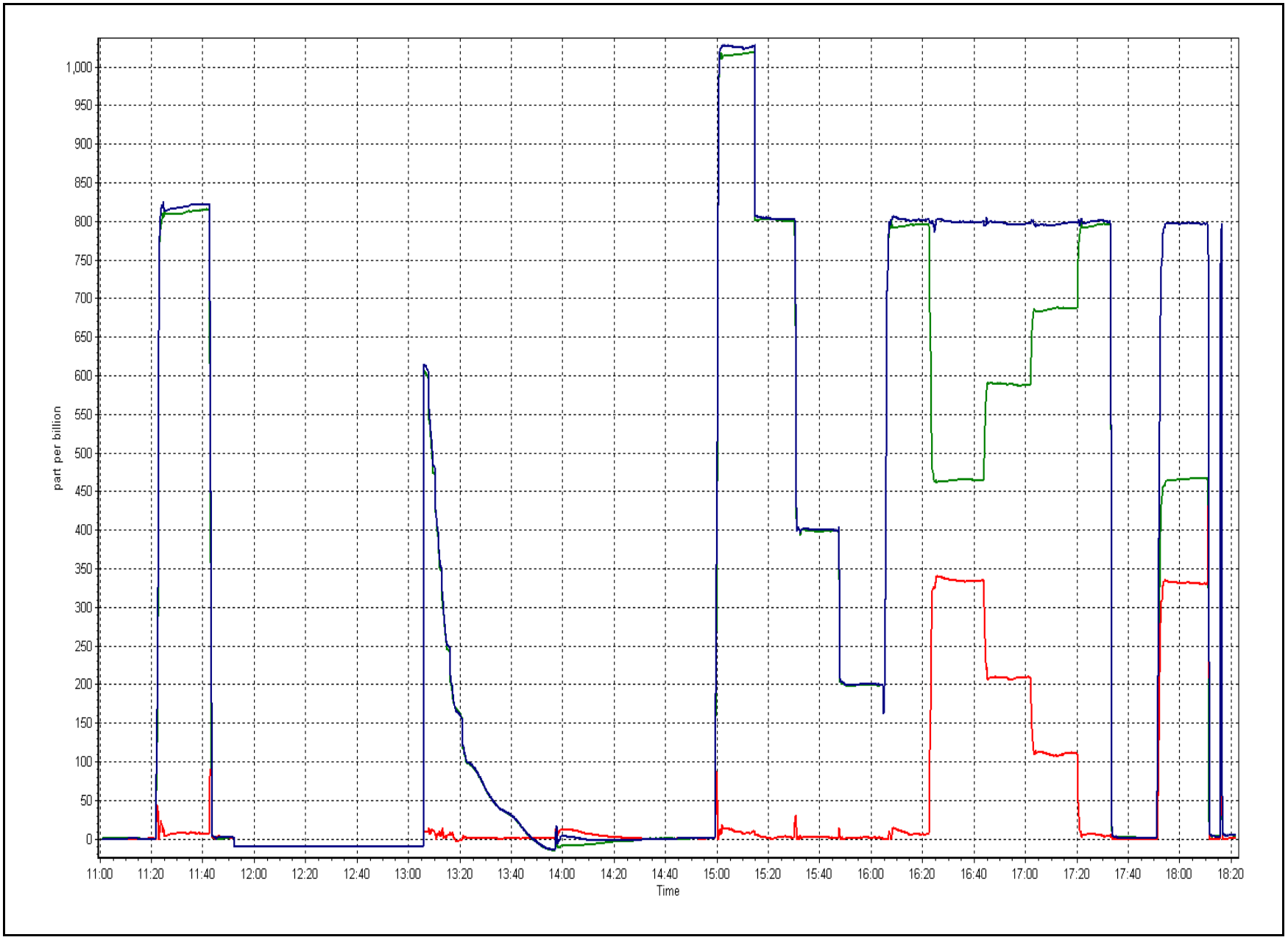
Calibration Date	April 21, 2016	Previous Calibration	March 23, 2016
Station Number	Cenovus	Station Number	AMS 500
Start Time (MST)	11:00	End Time (MST)	18:20
Analyzer make	API T200	Analyzer serial #	723

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.3	N/A	Correlation Coefficient	0.999854
334.7	334.0	1.0020		
211.3	208.1	1.0154	Slope	1.002328
112.5	109.4	1.0284		
			Intercept	1.294174



NOX Calibration Plot Date: April 21, 2016



Wood Buffalo Environmental Association
NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	April 25, 2016	Previous Calibration	April 21, 2016
Station Name	Cenovus	Station Number	AMS 500
Reason:	As Found		
Start Time (MST)	13:25	End Time (MST)	14:40
NO Cal Gas Conc	50.5 ppm	Gas Cert Reference	LL107928
NOx Cal Gas Conc	50.8 ppm	Cal Gas Expiry Date	Sep-8-2018
Calibrator	API T700	Serial Number	451
Zero air Generator	Teledyne API T701	Serial Number	4604

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	2575

Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	1.003957	0.999351	1.002328
	Data Offset	-0.083444	0.729504	1.294174
Current Calibration	Data Slope	1.004209	1.002998	
	Data Offset	0.651737	0.522258	

Analyzer Information

Analyzer make/model	API T200	Analyzer serial #	723

Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
Analyzer IP	192.168.1.72		192.168.1.72	
NO coefficient	0.819		0.819	
NOX coefficient	0.821		0.821	
NO2 coefficient	1.000		1.000	
NO bkgrnd	-4.9		-4.9	
NOX bkgrnd	-3.6		-3.6	
Chamber Temp	50	Deg C	50	Deg C
Moly Temp	315	Deg C	315	Deg C
PMT voltage	826	V	826	V
PMT Temp	6.9	Deg C	6.9	Deg C
O3 flow	86	ccm	85	ccm
R Cell press NO	284.48	mmHg	299.72	mmHg
R Cell Press Nox	287.02	mmHg	299.72	mmHg
NO sample flow	0.488	lpm	0.482	lpm
Nox sample Flow	0.483	lpm	0.480	lpm

Notes:

As Found calibration. Investigating poor/irregular span response from daily z/s. Poor response not found during this As Found calibration.

Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: April 25, 2016 Station Number: AMS 500

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	1.8	1.6	0.2	----	----
as found span	5000	79.3	805.7	800.9	4.8	802.8	798.8	4.0	1.0036	1.0026
calibrator zero	5000	0.0	0.0	0.0	0.0	1.8	1.6	0.2	----	----
high point	5000	79.3	805.7	800.9	4.8	802.8	798.8	4.0	1.0036	1.0026
second point	5000	39.6	402.3	400.0	2.4	398.9	397.8	1.1	1.0087	1.0055
third point	5000	19.8	201.2	200.0	1.2	197.3	196.4	0.9	1.0198	1.0182
as left zero										
as left span										
								Average Correction Factor	1.0107	1.0087

Corrcted As found NO_X= 801.1 NO= 797.3 Percent Change NO_X= 0.2% NO= 0.4%

Previous Response NO_X= 802.6 NO= 800.7

GPT Calibration Data

Dilution Flow (total) 5000 ccm Source Gas Flow 79.30 ccm NOX ref calc conc = 805.7 ppb NO ref calc conc = 800.9 ppb

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
1st NO ref point		4.8			0.2			----	
1st NO2 (300)									
2nd NO2 (200)									
3rd NO2 (100)									
2nd NO ref point		4.8							
				Average Correction Factor					

Calibration Performed By: Evan Magill

Wood Buffalo Environmental Association

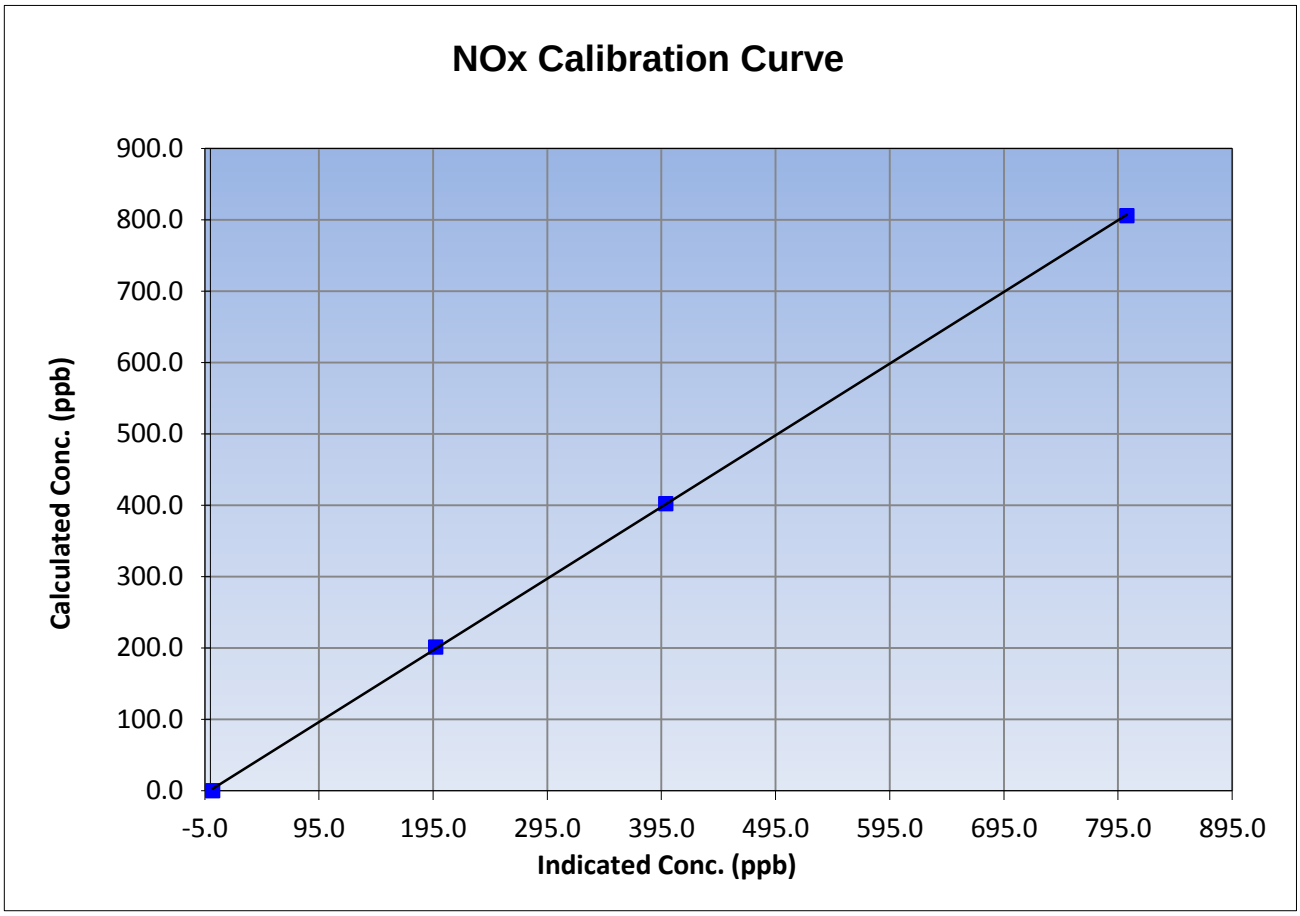
NO_X Calibration Summary

Station Information

Calibration Date	April 25, 2016	Previous Calibration	April 21, 2016
Station Name	Cenovus	Station Number	AMS 500
Start Time (MST)	13:25	End Time (MST)	14:40
Analyzer make	API T200	Analyzer serial #	723

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	1.8	----	Correlation Coefficient	0.999960
805.7	802.8	1.0036		
402.3	398.9	1.0087	Slope	1.004209
201.2	197.3	1.0198		
			Intercept	0.651737



Wood Buffalo Environmental Association

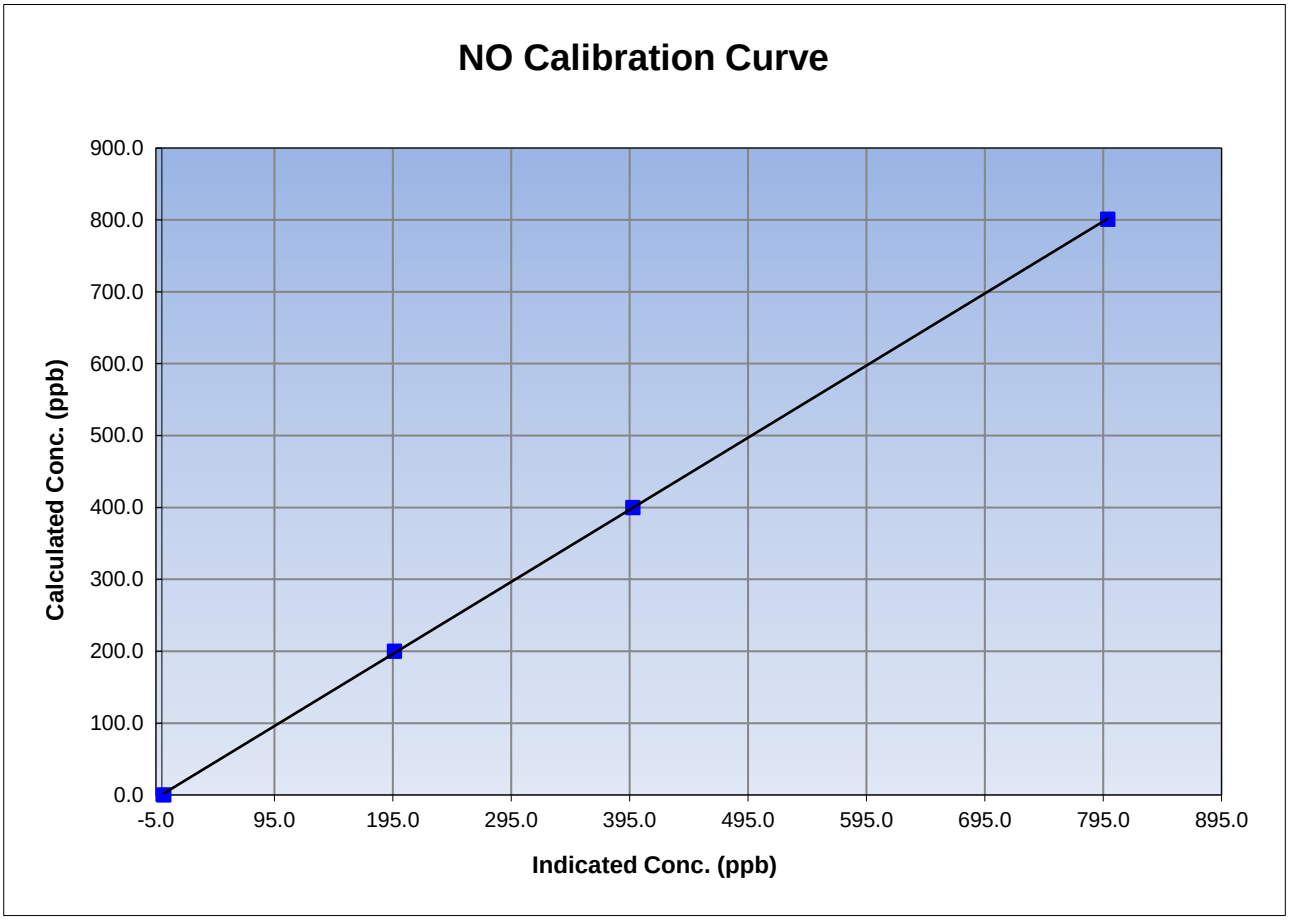
NO Calibration Summary

Station Information

Calibration Date	April 25, 2016	Previous Calibration	April 21, 2016
Station Name	Cenovus	Station Number	AMS 500
Start Time (MST)	13:25	End Time (MST)	14:40
Analyzer make	API T200	Analyzer serial #	723

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	1.6	N/A	Correlation Coefficient	0.999968
800.9	798.8	1.0026		
400.0	397.8	1.0055	Slope	1.002998
200.0	196.4	1.0182		
			Intercept	0.522258



Wood Buffalo Environmental Association

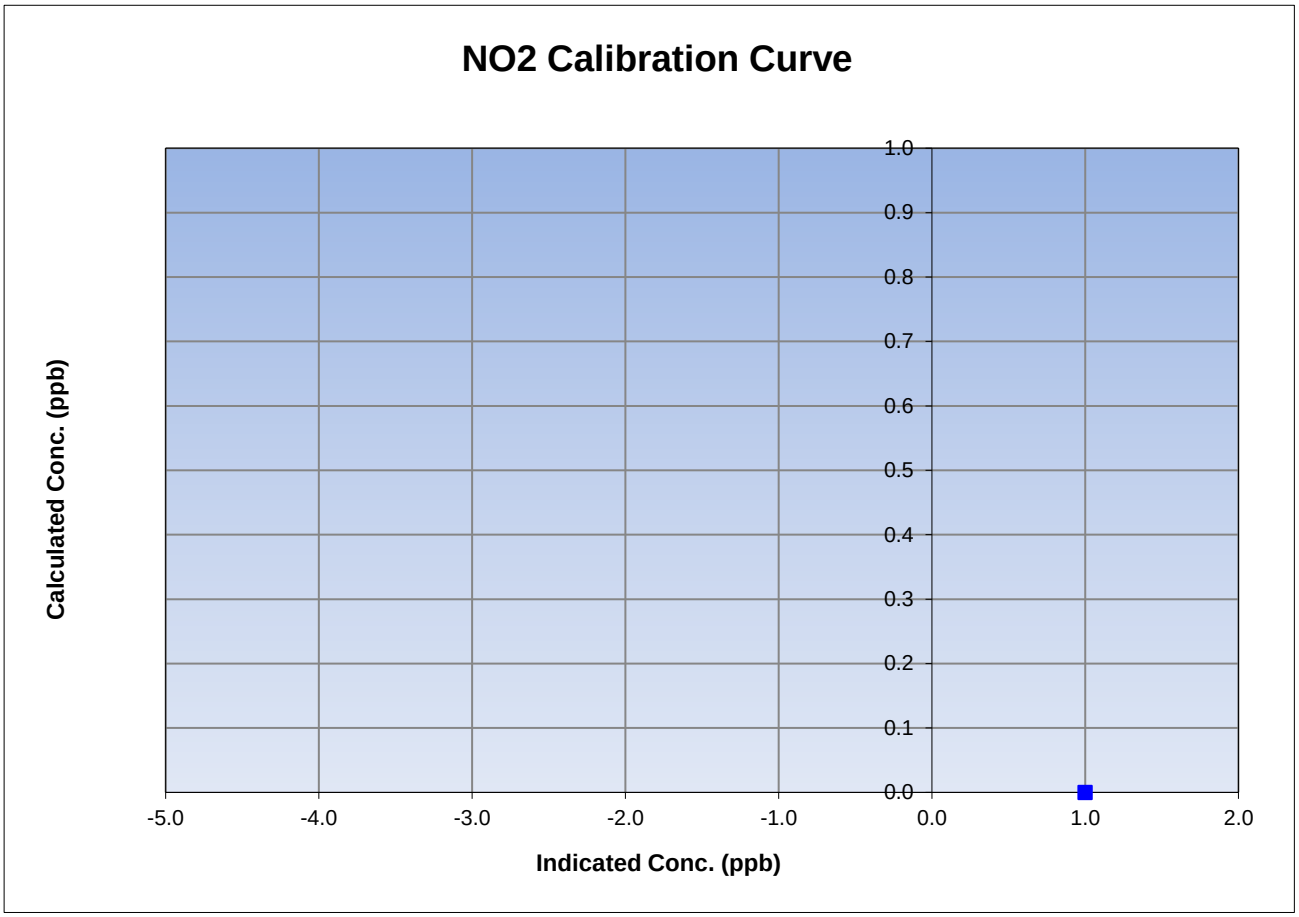
NO_2 Calibration Summary

Station Information

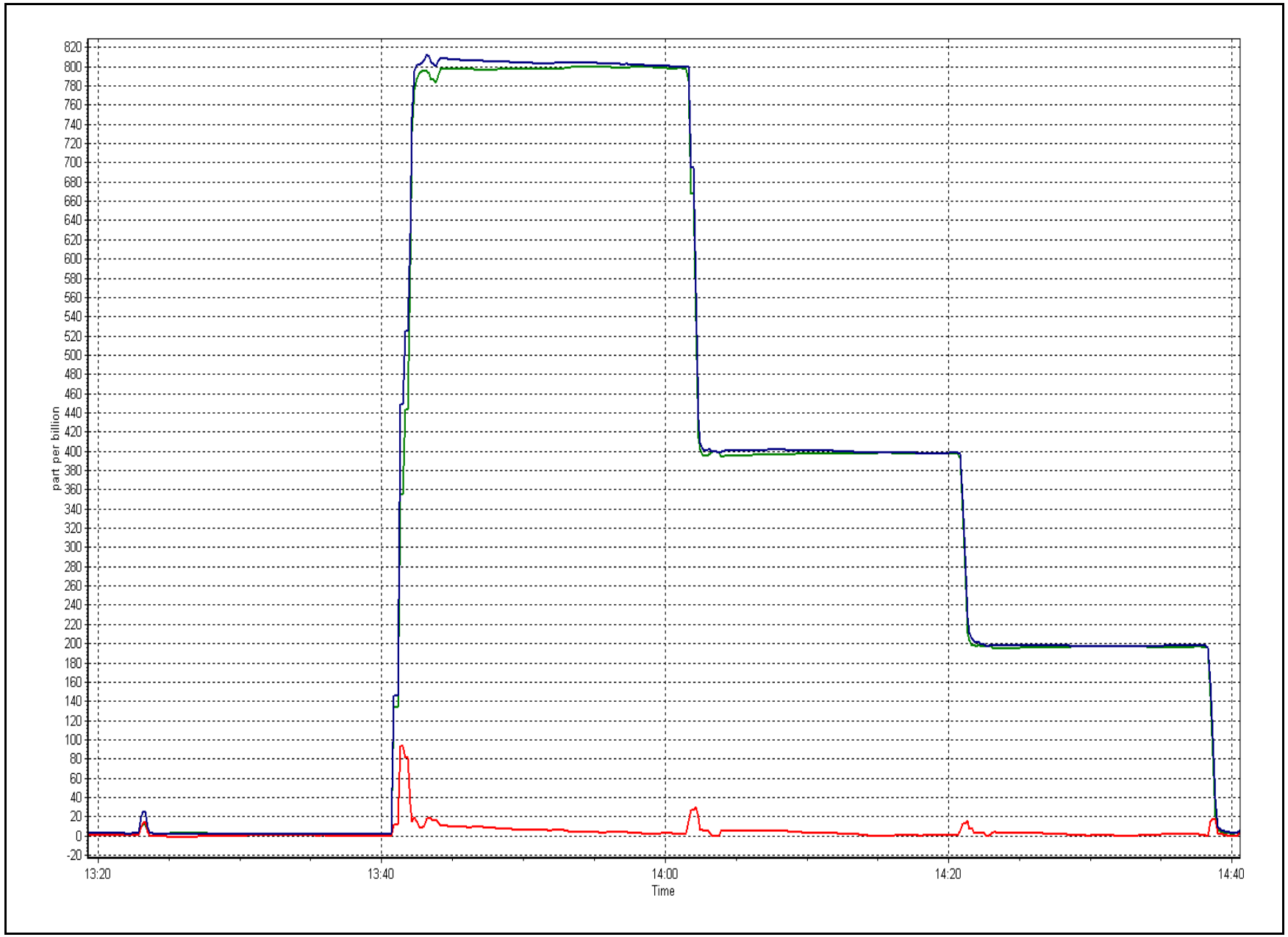
Calibration Date	April 25, 2016	Previous Calibration	April 21, 2016
Station Number	Cenovus	Station Number	AMS 500
Start Time (MST)	13:25	End Time (MST)	14:40
Analyzer make	API T200	Analyzer serial #	723

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	N/A	Correlation Coefficient	
			Slope	
			Intercept	



NOX Calibration Plot Date: April 25, 2016



Wood Buffalo Environmental Association
NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	April 26, 2016	Previous Calibration	April 25, 2016
Station Name	Cenovus	Station Number	AMS 500
Reason:	Other: Replaced pump after As Found calibration		
Start Time (MST)	7:40	End Time (MST)	11:25
NO Cal Gas Conc	50.5 ppm	Gas Cert Reference	LL107928
NOx Cal Gas Conc	50.8 ppm	Cal Gas Expiry Date	Sep-8-2018
Calibrator	API T700	Serial Number	451
Zero air Generator	Teledyne API T701	Serial Number	4604

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	2575

Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	1.004209	1.002998	
	Data Offset	0.651737	0.522258	
Current Calibration	Data Slope	0.997822	0.999615	0.997417
	Data Offset	2.007545	1.549150	-0.681966

Analyzer Information

Analyzer make/model	API T200	Analyzer serial #	723

Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
Analyzer IP	192.168.1.72		192.168.1.72	
NO coefficient	0.819		0.876	
NOX coefficient	0.821		0.879	
NO2 coefficient	1.000		1.000	
NO bkgrnd	-4.9		-0.1	
NOX bkgrnd	-3.6		2.4	
Chamber Temp	50	Deg C	50	Deg C
Moly Temp	315	Deg C	314.4	Deg C
PMT voltage	826	V	826	V
PMT Temp	6.9	Deg C	6.9	Deg C
O3 flow	85	ccm	86	ccm
R Cell press NO	299.72	mmHg	106.7	mmHg
R Cell Press Nox	299.72	mmHg	104.1	mmHg
NO sample flow	0.482	lpm	0.49	lpm
Nox sample Flow	0.480	lpm	0.485	lpm

Notes:

Changed pump after As Found calibration yesterday, allowed analyzer to settle overnight. Adjusted zero and span.

Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: April 26, 2016 Station Number: AMS 500

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero										
as found span										
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.4	-0.1	-0.3	----	----
high point	5000	79.3	805.7	800.9	4.8	806.0	800.3	5.7	0.9996	1.0008
second point	5000	39.6	402.3	400.0	2.4	401.0	398.2	2.9	1.0033	1.0045
third point	5000	19.8	201.2	200.0	1.2	197.6	196.9	0.7	1.0182	1.0157
as left zero	5000	0.0	0.0	0.0	0.0	-0.5	0.5	-1.1	----	----
as left span	5000	79.3	805.7	460.8	344.9	801.5	463.1	338.4	1.0053	0.9950
							Average Correction Factor		1.0070	1.0070

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 (total) 5000 ccm Source Gas Flow 79.30 ccm NOX ref calc conc = 805.7 ppb NO ref calc conc = 800.9 ppb

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
1st NO ref point		4.8	804.7	797.1	-0.3	1.0013	1.0048	----	----
1st NO2 (300)	460.8	341.1	802.9	460.8	342.2	1.0035	----	0.9970	100.3%
2nd NO2 (200)	590.0	211.9	803.2	590.0	213.2	1.0031	----	0.9937	100.6%
3rd NO2 (100)	690.2	111.7	804.2	690.2	114.0	1.0018	----	0.9794	102.1%
2nd NO ref point		4.8	804.8	797.4	7.4	1.0011	1.0044	----	----
				Average Correction Factor		1.0024		0.9900	101.0%

Calibration Performed By: Evan Magill

Wood Buffalo Environmental Association

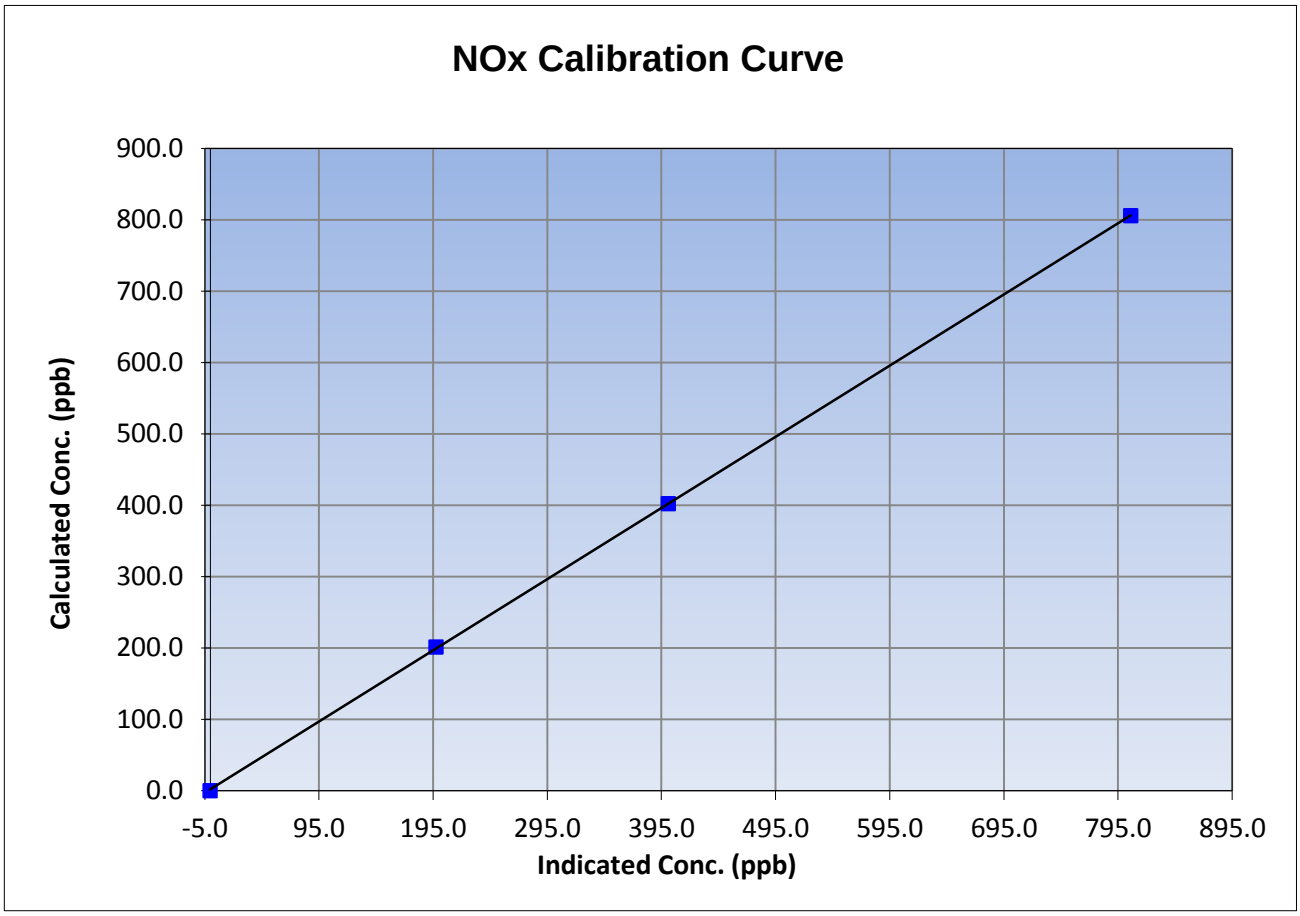
NO_X Calibration Summary

Station Information

Calibration Date	April 26, 2016	Previous Calibration	April 25, 2016
Station Name	Cenovus	Station Number	AMS 500
Start Time (MST)	7:40	End Time (MST)	11:25
Analyzer make	API T200	Analyzer serial #	723

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.4	----	Correlation Coefficient	0.999980
805.7	806.0	0.9996		
402.3	401.0	1.0033	Slope	0.997822
201.2	197.6	1.0182		
			Intercept	2.007545



Wood Buffalo Environmental Association

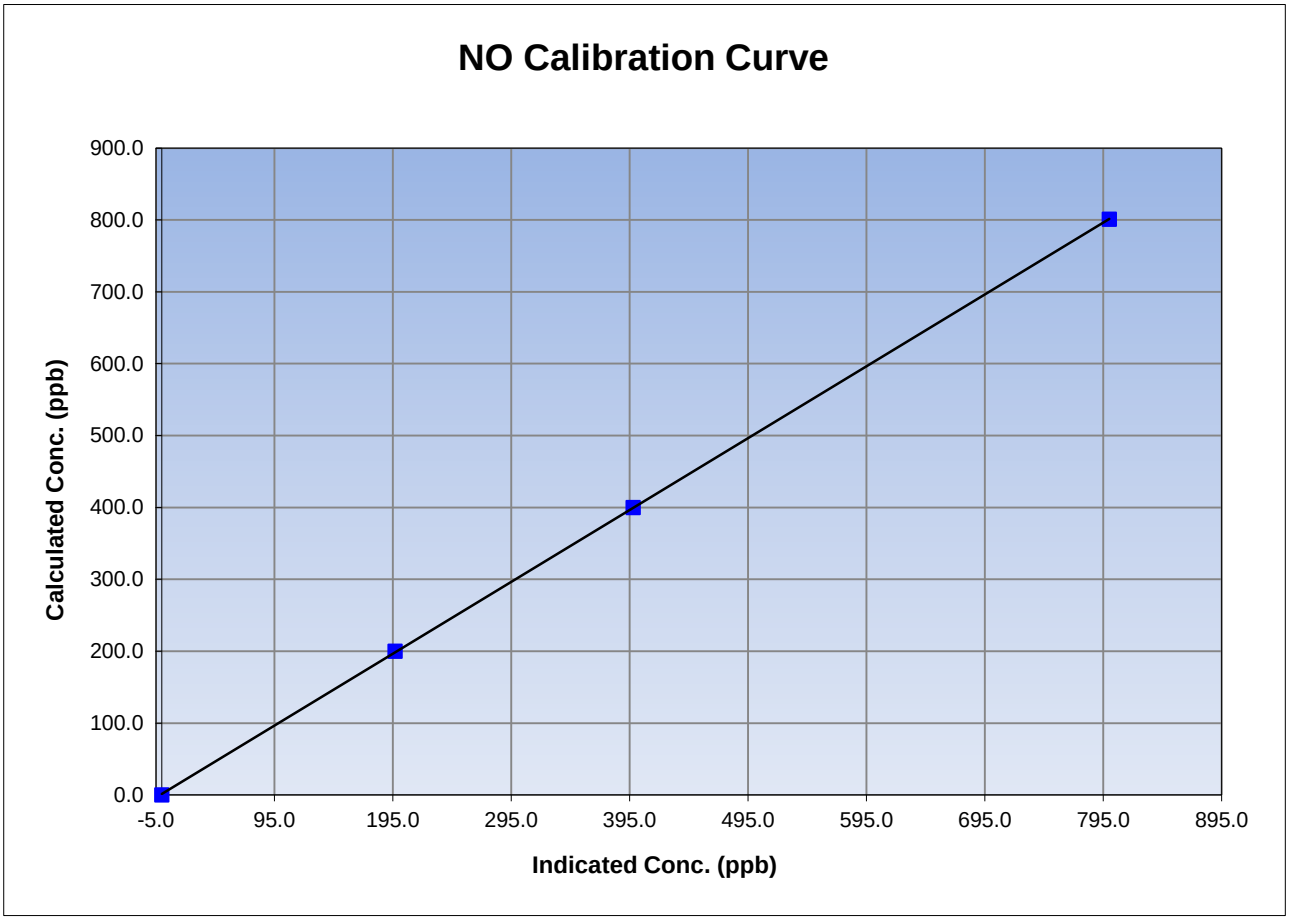
NO Calibration Summary

Station Information

Calibration Date	April 26, 2016	Previous Calibration	April 25, 2016
Station Name	Cenovus	Station Number	AMS 500
Start Time (MST)	7:40	End Time (MST)	11:25
Analyzer make	API T200	Analyzer serial #	723

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999985
800.9	800.3	1.0008		
400.0	398.2	1.0045	Slope	0.999615
200.0	196.9	1.0157		
			Intercept	1.549150



Wood Buffalo Environmental Association

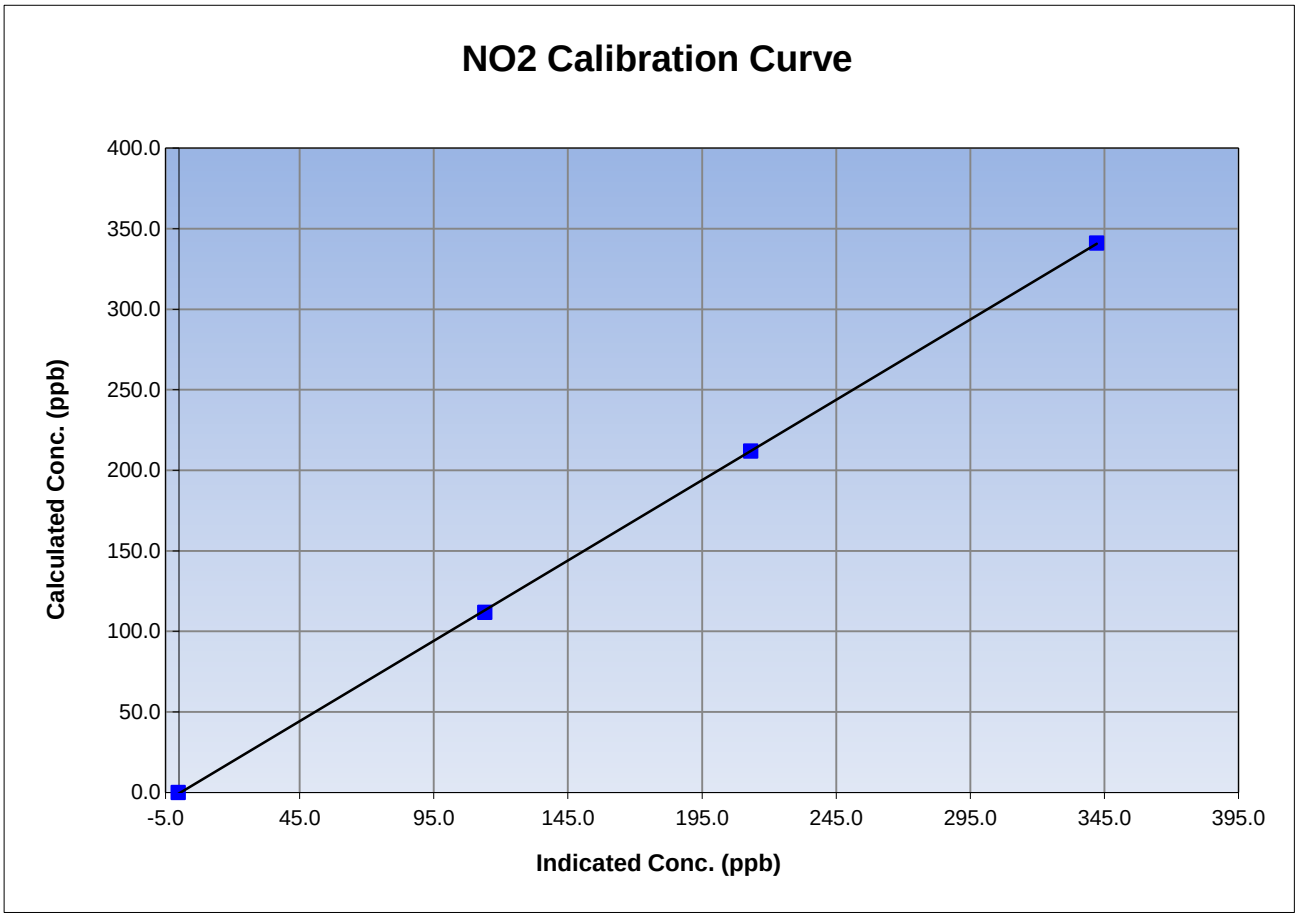
NO_2 Calibration Summary

Station Information

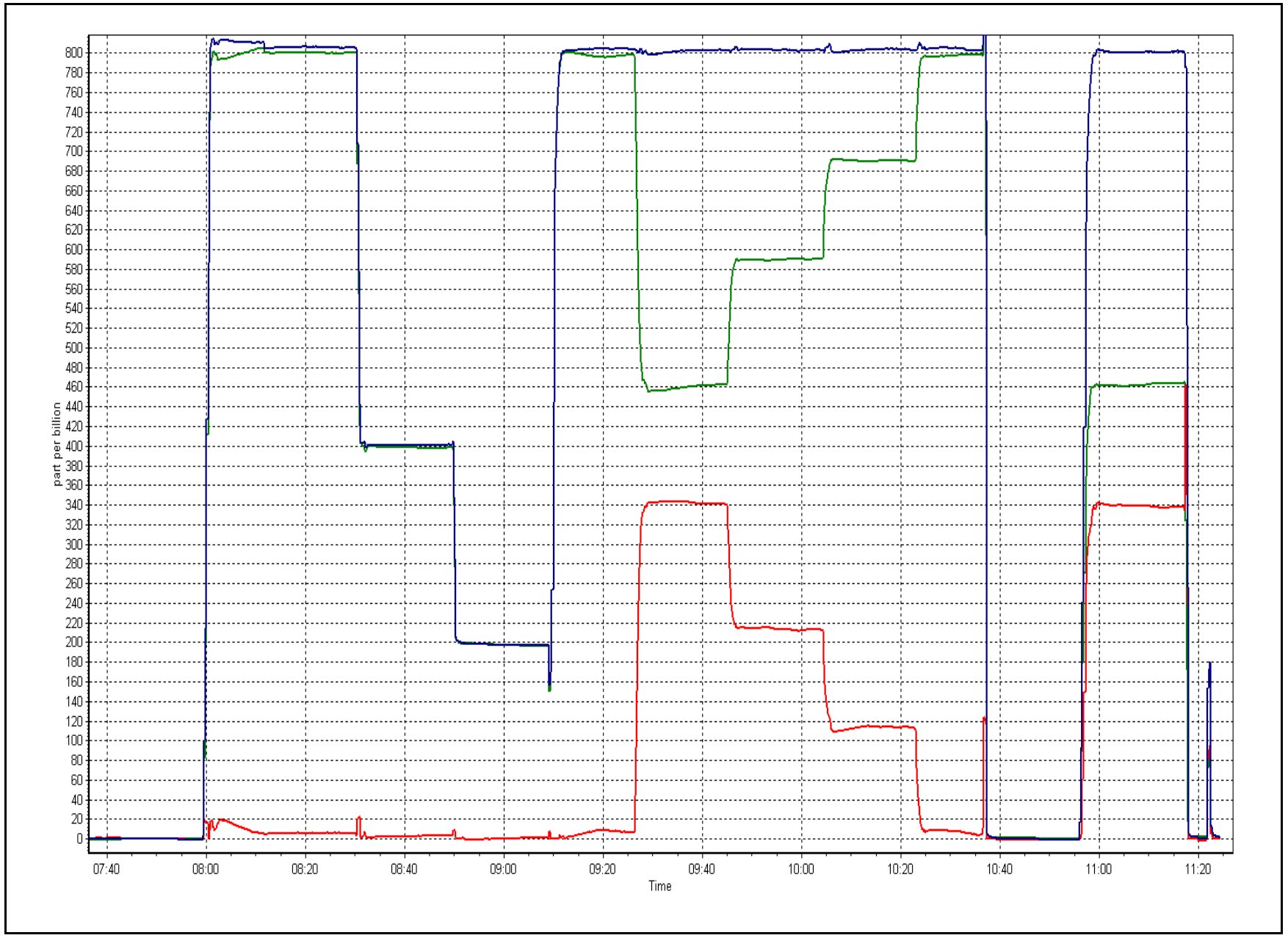
Calibration Date	April 26, 2016	Previous Calibration	April 25, 2016
Station Number	Cenovus	Station Number	AMS 500
Start Time (MST)	7:40	End Time (MST)	11:25
Analyzer make	API T200	Analyzer serial #	723

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.3	N/A	Correlation Coefficient	0.999951
341.1	342.2	0.9970		
211.9	213.2	0.9937	Slope	0.997417
111.7	114.0	0.9794		
			Intercept	-0.681966



NOX Calibration Plot Date: April 26, 2016



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 502
CONOCOPHILLIPS
SURMONT
APRIL 2016

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

May 27, 2016

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONOCOPHILLIPS SURMONT (AMS 502)
APRIL 2016

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	683	35	37	99.72	34	0	8	0
H2S (ppb) Average	682	33	38	99.31	1	0	1	0
NO2 (ppb) Average	661	36	59	96.81	13	0	5	-
NO (ppb) Average	661	36	59	96.81	27	-	7	-
NOX (ppb) Average	661	36	59	96.81	39	-	11	-
Temperature 2 m (C) Average	720	0	0	100.00	24	-	18.6	-
Relative Humidity (%) Average	720	0	0	100.00	100	-	93	-
Wind Speed 10 m (km/h) Average	720	0	0	100.00	42	-	28	-
Wind Direction 10 m (deg) Average	720	0	0	100.00	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONOCOPHILLIPS SURMONT (AMS 502)
APRIL 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

					Percentile						
Parameter	Number	Mean	StnDev	Total	Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	683	1.2	3	-	0	0	0	1	1	2	34
H2S (ppb) Average	682	0.2	0	-	0	0	0	0	0	0	1
NO2 (ppb) Average	661	1.9	2	-	0	1	1	1	2	4	13
NO (ppb) Average	661	1.2	3	-	0	0	0	0	1	2	27
NOX (ppb) Average	661	3	4	-	0	1	1	2	3	6	39
Temperature 2 m (C) Average	720	4.03	7.3	-	-9.5	-4.9	-1.2	2.8	9	15.2	24
Relative Humidity (%) Average	720	57.2	24	-	12	27	36	55	77	91	100
Wind Speed 10 m (km/h) Average	720	13.6	6	-	1	7	9	12	17	22	42
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONOCOPHILLIPS SURMONT (AMS 502)
APRIL 2016

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2, H2S	19 Apr 2016 12:00	19 Apr 2016 13:00	2	Maintenance - sample manifold cleaned
H2S	17 Apr 2016 03:00	17 Apr 2016 04:00	2	Unstable operation - excessive baseline drift
H2S	18 Apr 2016 12:00	18 Apr 2016 12:00	1	Unstable operation - excessive baseline drift
NO2, NO, NOX	18 Apr 2016 11:00	18 Apr 2016 14:00	4	Maintenance - calibration did not meet criteria
NO2, NO, NOX	18 Apr 2016 15:00	19 Apr 2016 07:00	17	Unstable operation - excessive baseline drift

Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO_2) - ppb

ConocoPhillips - Surmont - April 2016

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

Maximum Value: 34 ppb on Apr 9 07:00

Maximum Daily Average: 7.9 ppb on Apr 9

Minimum Value: 0 ppb on Apr 8 07:00

Minimum Daily Average: 0.2 ppb on Apr 26

Maximum Diurnal Average: 2.7 ppb at hour 14

Minimum Diurnal Average: 0.5 ppb at hour 3

Monthly Average: 1.2 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 1 $Q_3 = 1$ $P_{90} = 2$ $P_{99} = 15$

Hours in Service:	720
Hours of Data:	683
Hours of Missing Data:	37
Hours of Calibration:	35
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-Apr	0	Z	1	1	5	4	6	5	4	4	3	5	3	9	1	3	4	1	0	0	0	0	0	0	2.6	9
2-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0.3	1
3-Apr	0	0	0	Z	2	1	1	2	1	1	1	1	3	3	1	1	1	2	1	1	1	0	0	0	1.0	3
4-Apr	0	0	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
5-Apr	1	1	1	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
6-Apr	Z	0	0	0	0	0	2	13	6	2	2	6	15	13	15	11	15	16	1	1	2	1	1	1	5.4	16
7-Apr	0	Z	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	0.4	1
8-Apr	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
9-Apr	1	1	0	Z	1	12	34	22	15	15	12	15	8	29	8	1	2	3	1	1	0	0	1	1	7.9	34
10-Apr	0	0	0	1	Z	1	1	0	1	1	1	1	2	6	6	1	1	1	1	1	1	1	1	1	1.3	6
11-Apr	1	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1.0	2
12-Apr	Z	1	1	1	1	1	1	3	1	1	1	0	2	1	1	1	1	1	1	0	0	0	0	0	0.8	3
13-Apr	0	Z	0	1	1	0	1	1	1	1	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0.5	2
14-Apr	0	0	Z	3	3	5	3	1	2	2	4	10	6	1	1	1	1	0	0	0	0	1	1	1	2.1	10
15-Apr	1	1	1	Z	1	1	1	1	1	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0.7	1
16-Apr	1	1	1	1	Z	0	0	0	0	1	1	0	0	1	1	1	1	1	1	1	1	0	0	0	0.6	1
17-Apr	0	0	0	0	0	Z	1	1	1	1	1	2	1	3	3	4	1	1	1	1	1	1	1	1	1.1	4
18-Apr	Z	0	0	0	1	1	1	1	1	1	C	C	C	C	C	0	0	0	1	1	1	1	1	1	0.7	1
19-Apr	1	Z	1	1	1	1	0	0	0	0	0	M	M	1	1	1	1	1	6	5	1	1	0	0	1.1	6
20-Apr	6	22	Z	1	2	1	0	0	1	2	1	2	4	5	0	0	0	0	0	0	1	1	0	0	2.2	22
21-Apr	0	0	0	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.5	1
22-Apr	1	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.4	1
23-Apr	1	1	1	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
24-Apr	Z	0	0	0	0	1	1	0	0	1	1	0	1	0	0	0	0	1	1	1	1	1	1	0	0.6	1
25-Apr	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
26-Apr	0	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
27-Apr	0	0	0	Z	0	1	0	0	2	1	1	3	2	1	1	1	1	1	1	1	0	0	0	1	0.8	3
28-Apr	1	1	0	0	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0.7	1
29-Apr	1	1	1	1	1	Z	2	1	1	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1.1	2
30-Apr	Z	1	0	0	0	1	1	0	1	1	0	0	0	0	0	1	1	1	0	0	0	0	0	1	0.5	1
	0.8	1.4	0.5	0.7	0.9	1.3	1.9	2.0	1.5	1.4	1.2	2.0	1.9	2.7	1.6	1.2	1.2	1.2	0.7	0.7	0.6	0.5	0.6	0.5	Diurnal Average	
	6	22	1	3	5	12	34	22	15	15	12	15	15	29	15	11	15	16	6	5	2	1	2	1	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance

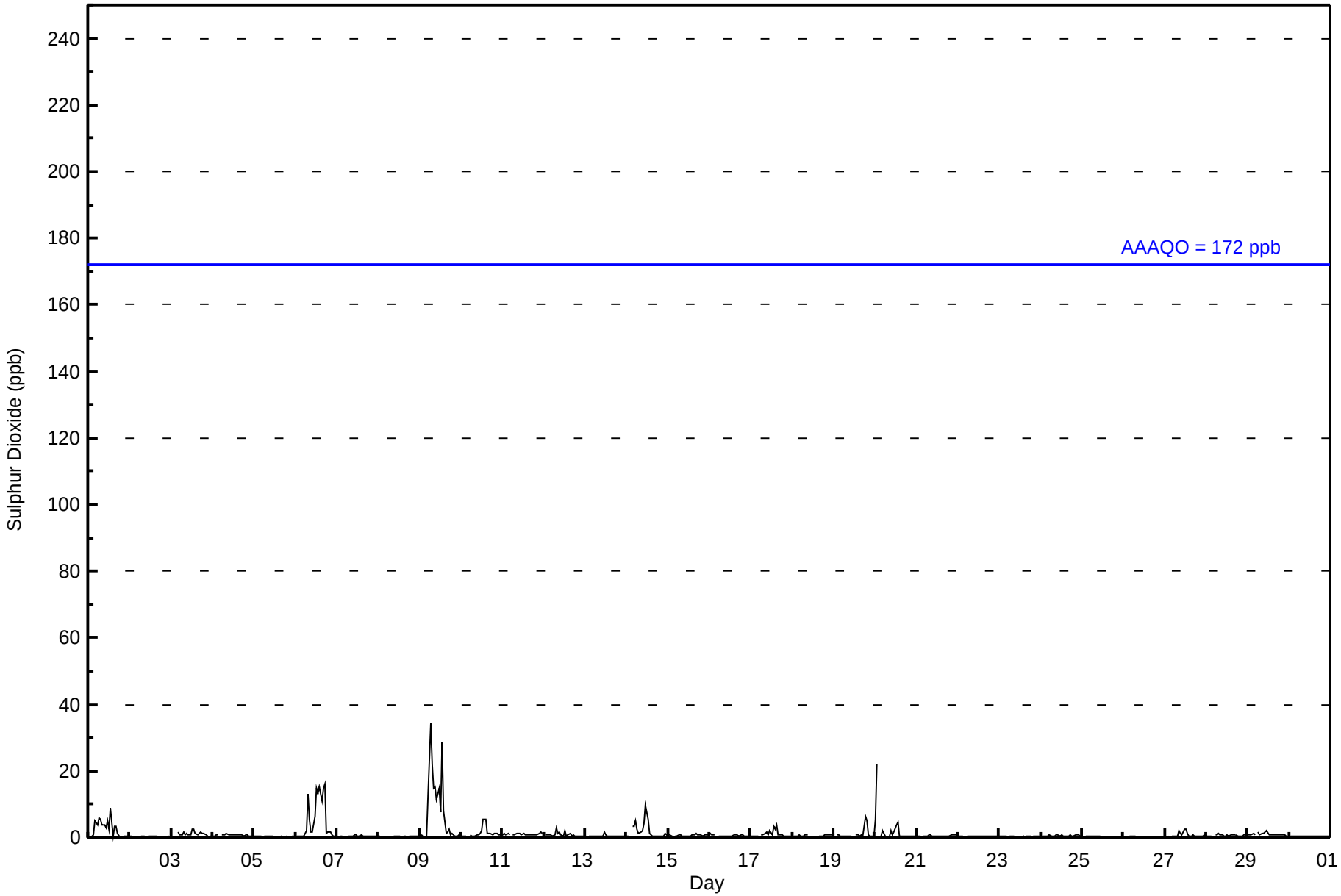
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb

Wood Buffalo Environmental Association

Hourly Averages

Sulphur Dioxide (SO_2) - ppb

ConocoPhillips - Surmont - April 2016



Sulphur Dioxide (SO_2) - ppb

ConocoPhillips - Surmont - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	667	97.66	97.66
11 - 20	12	1.76	99.41
21 - 60	4	0.59	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 683

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Sulphur Dioxide (SO_2) - ppb

ConocoPhillips - Surmont - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 10	40	19	24	32	53	38	89	38	75	61	52	32	28	18	6	62	667
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	4	12
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	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	40	19	24	32	53	38	89	38	75	61	52	32	28	18	17	67	683

Total Number of Valid Hours: 683

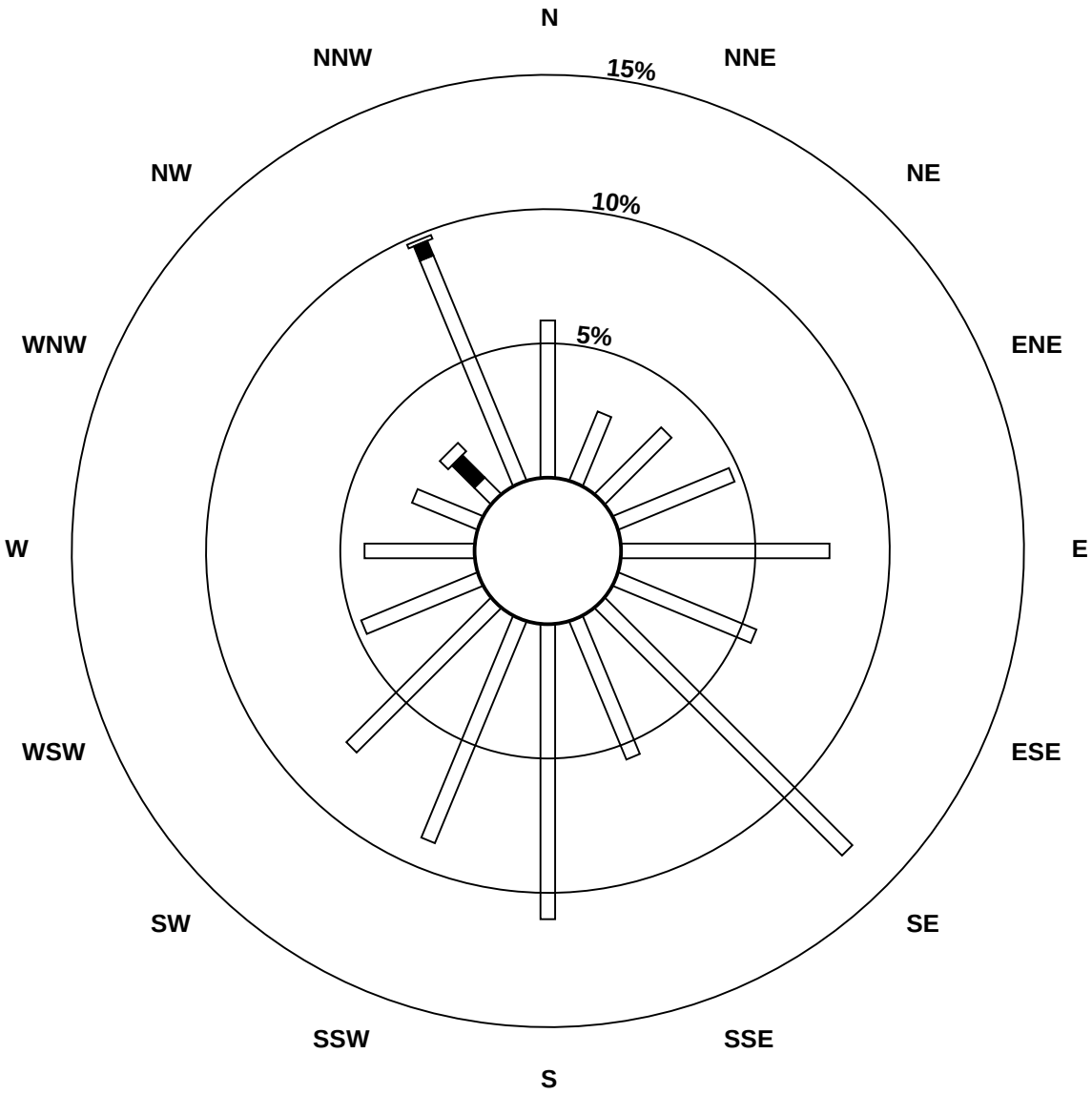
Total Number of Hours: 720

Wood Buffalo Environmental Association

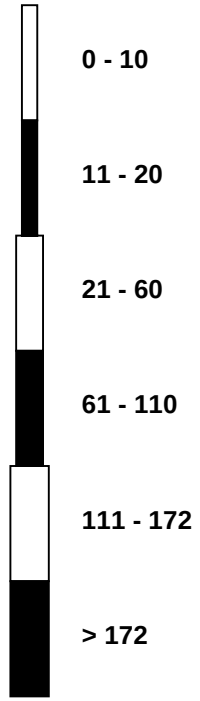
Wind Rose Apr 2016

Sulphur Dioxide (SO_2) - ppb

ConocoPhillips - Surmont (AMS502)



Classes (ppb)



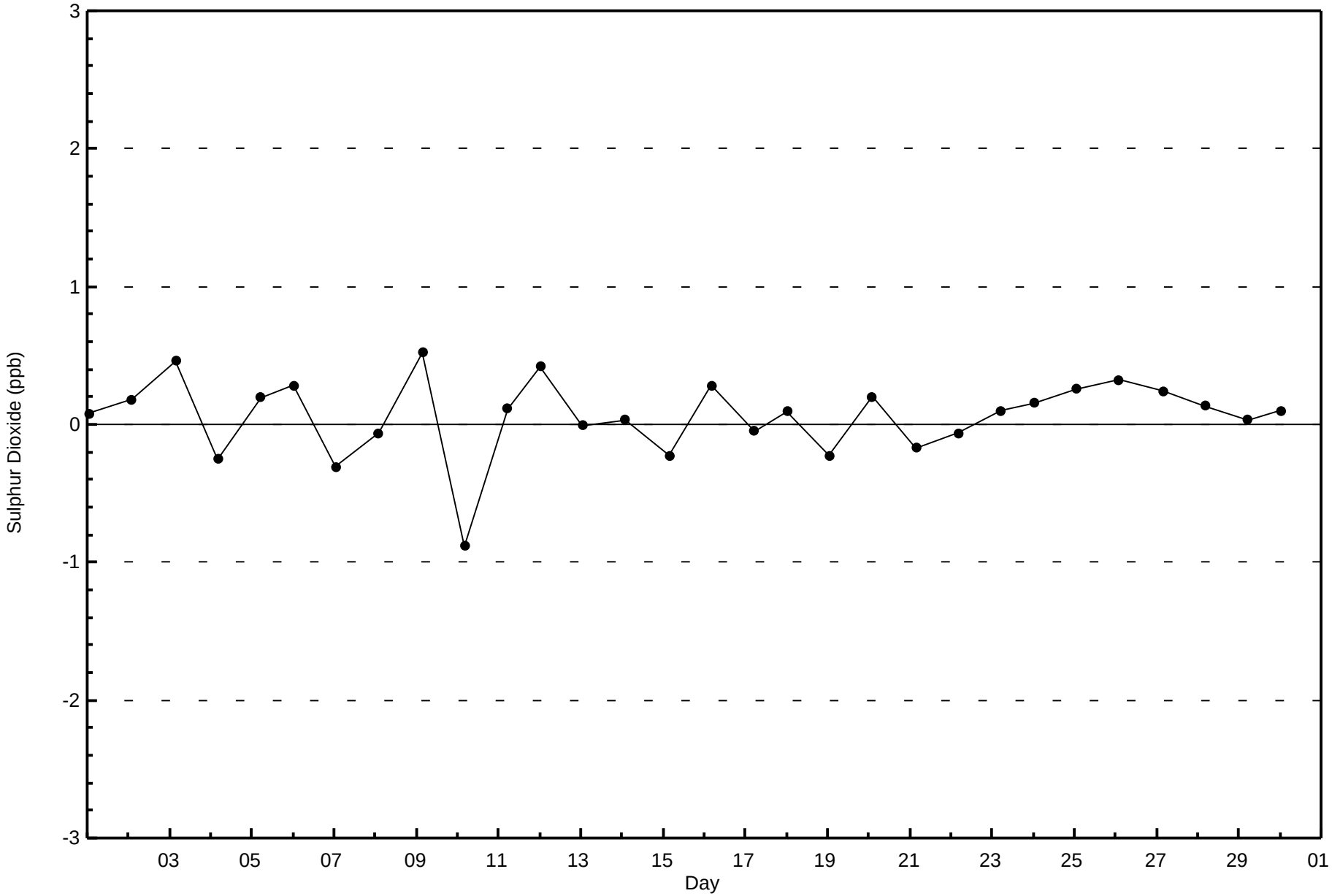
Total Number of Valid Hours: 683

Wood Buffalo Environmental Association

Zero Responses

Sulphur Dioxide (SO_2) - ppb

ConocoPhillips - Surmont - April 2016



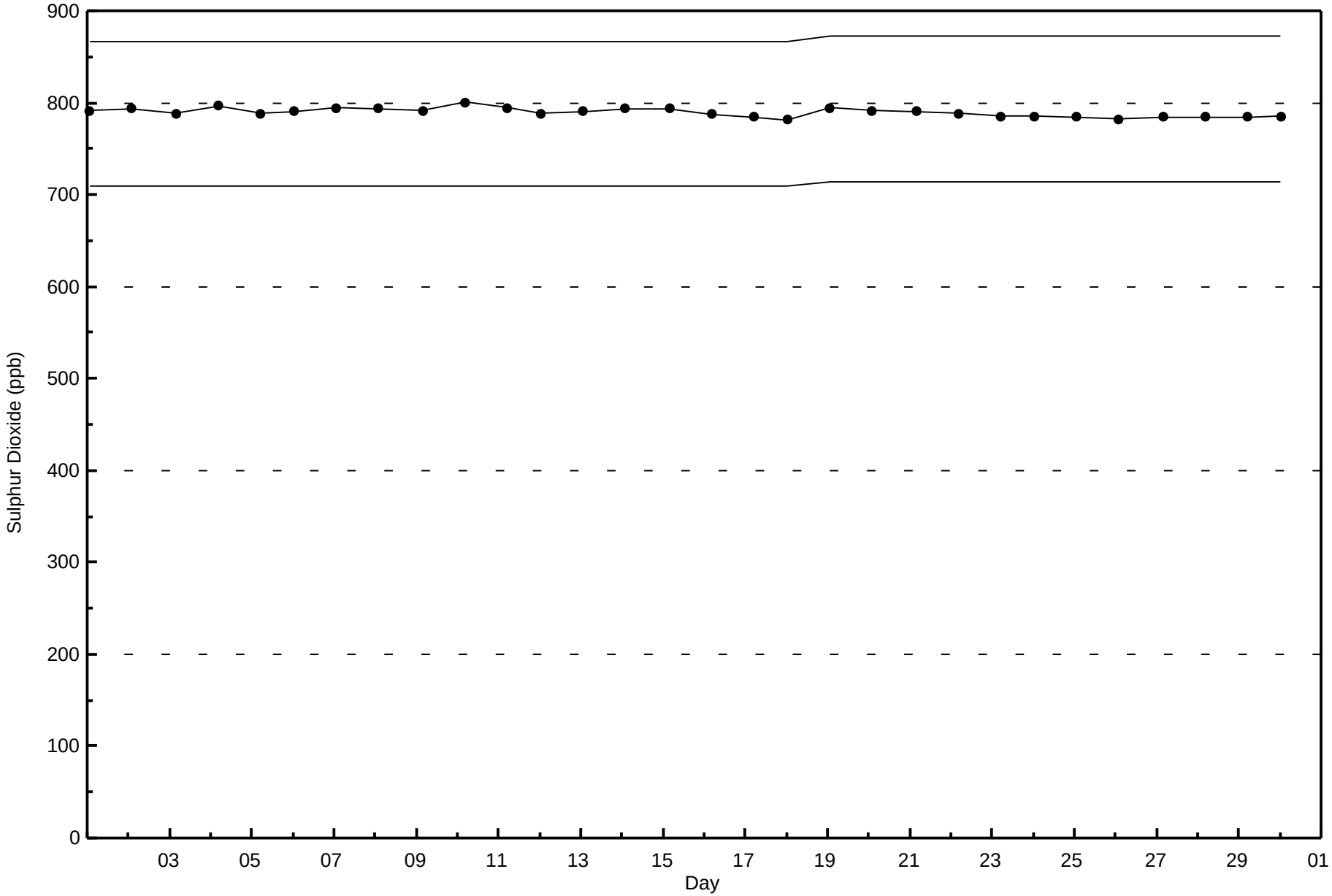
502-11

Wood Buffalo Environmental Association

Span Responses

Sulphur Dioxide (SO_2) - ppb

ConocoPhillips - Surmont - April 2016



502-12

Wood Buffalo Environmental Association

Summary of Hour Averages

Hydrogen Sulphide (H_2S) - ppb

ConocoPhillips - Surmont - April 2016

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

Maximum Value: 1 ppb on Apr 14 01:00 Maximum Daily Average: 0.6 ppb on Apr 6

Minimum Value: 0 ppb on Apr 10 22:00 Minimum Daily Average: 0.1 ppb on Apr 21

Maximum Diurnal Average: 0.3 ppb at hour 9 Minimum Diurnal Average: 0.2 ppb at hour 19

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:	720
Hours of Data:	682
Hours of Missing Data:	38
Hours of Calibration:	33
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-Apr	0	0	Z	0	0	0	0	1	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.4	1
2-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
3-Apr	0	0	0	0	Z	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
4-Apr	0	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-Apr	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
6-Apr	0	Z	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0.6	1
7-Apr	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
8-Apr	0	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
9-Apr	0	0	0	0	Z	1	1	1	1	1	0	1	1	1	0	1	0	0	0	0	1	1	1	1	0.5	1
10-Apr	0	1	1	1	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
11-Apr	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
12-Apr	0	Z	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
13-Apr	0	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-Apr	1	1	1	Z	1	1	1	1	1	1	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0.6	1
15-Apr	0	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
16-Apr	0	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
17-Apr	0	0	UO	UO	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.2	1
18-Apr	0	Z	0	0	0	0	0	0	0	0	0	UO	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
19-Apr	0	0	Z	0	0	0	0	0	0	0	0	M	M	0	0	0	0	0	0	0	0	0	0	0	0.2	0
20-Apr	0	0	1	Z	1	0	0	C	C	C	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
21-Apr	0	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
22-Apr	0	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
23-Apr	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
24-Apr	0	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
25-Apr	0	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
26-Apr	0	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
27-Apr	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
28-Apr	0	1	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
29-Apr	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
30-Apr	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
	0.2	0.2	0.2	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.2	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	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Diurnal Maximum	

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

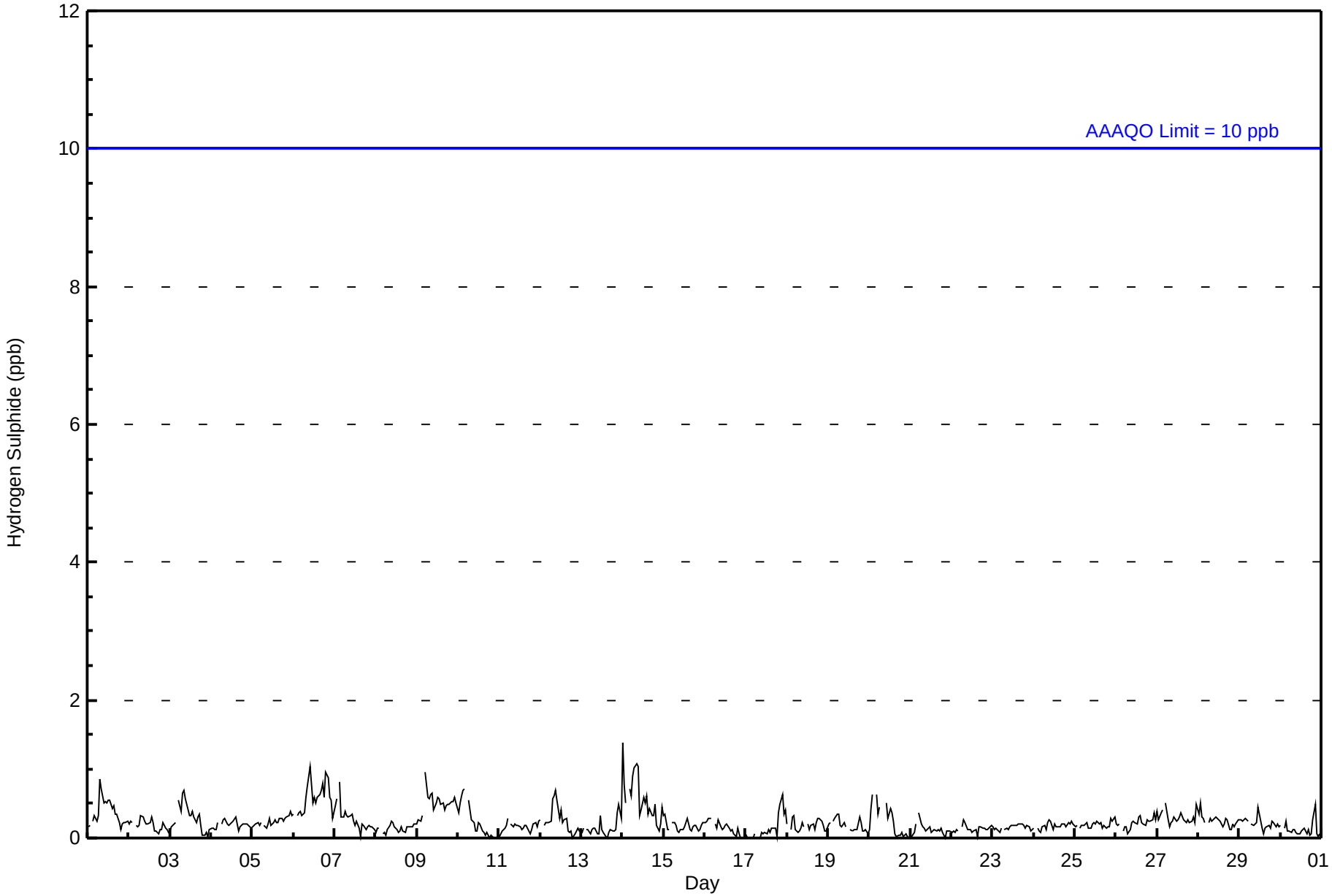
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb

Wood Buffalo Environmental Association

Hourly Averages

Hydrogen Sulphide (H_2S) - ppb

ConocoPhillips - Surmont - April 2016



Hydrogen Sulphide (H_2S) - ppb

ConocoPhillips - Surmont - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	682	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Hydrogen Sulphide (H_2S) - ppb

ConocoPhillips - Surmont - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 2	37	19	25	31	54	38	87	37	80	66	49	31	28	19	16	65	682
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	37	19	25	31	54	38	87	37	80	66	49	31	28	19	16	65	682

Total Number of Valid Hours: 682

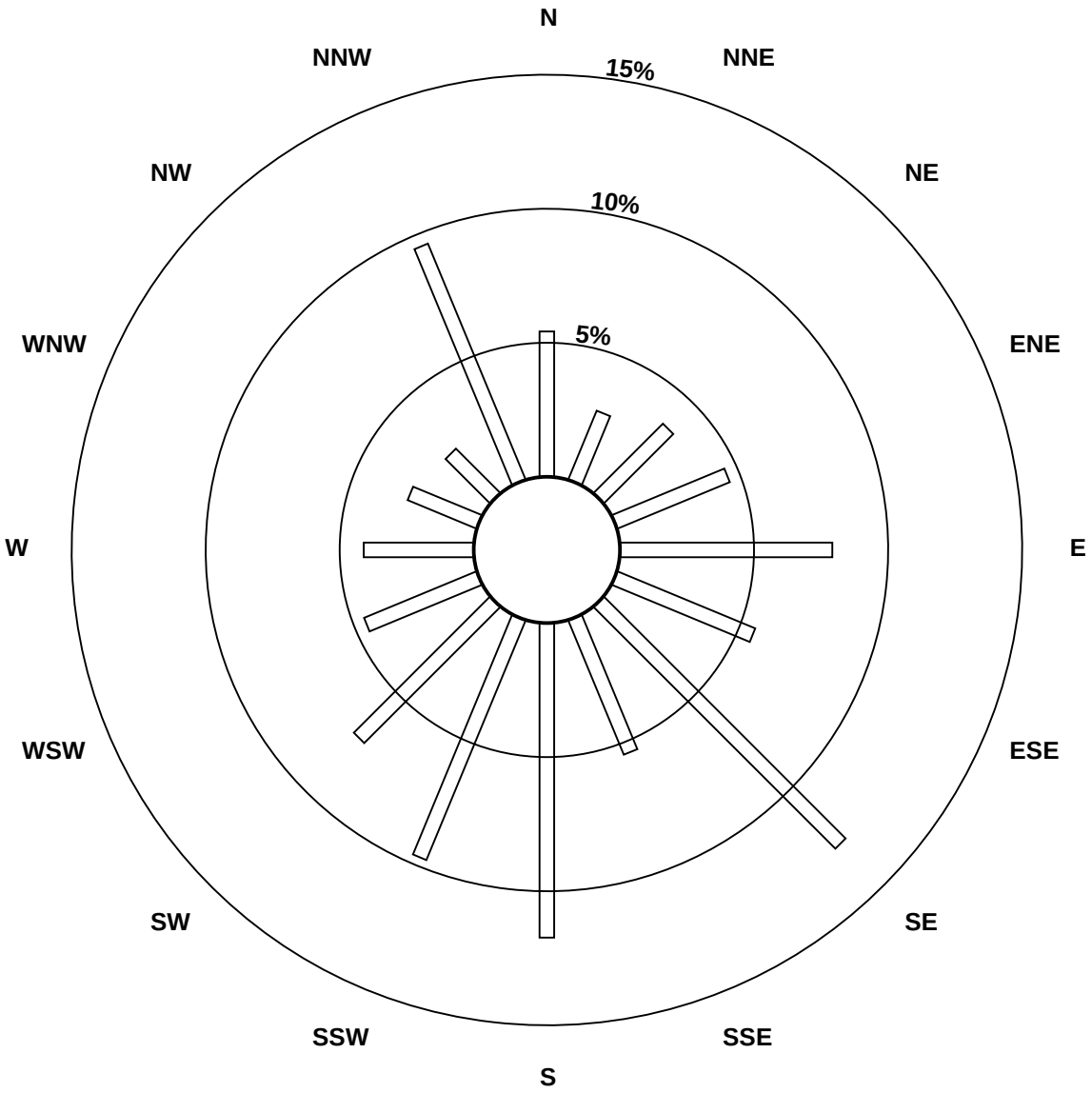
Total Number of Hours: 720

Wood Buffalo Environmental Association

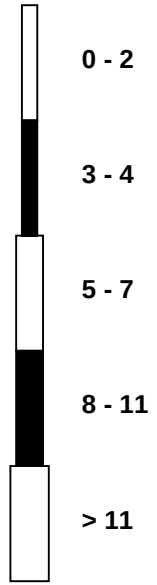
Wind Rose Apr 2016

Hydrogen Sulphide (H_2S) - ppb

ConocoPhillips - Surmont (AMS502)



Classes (ppb)



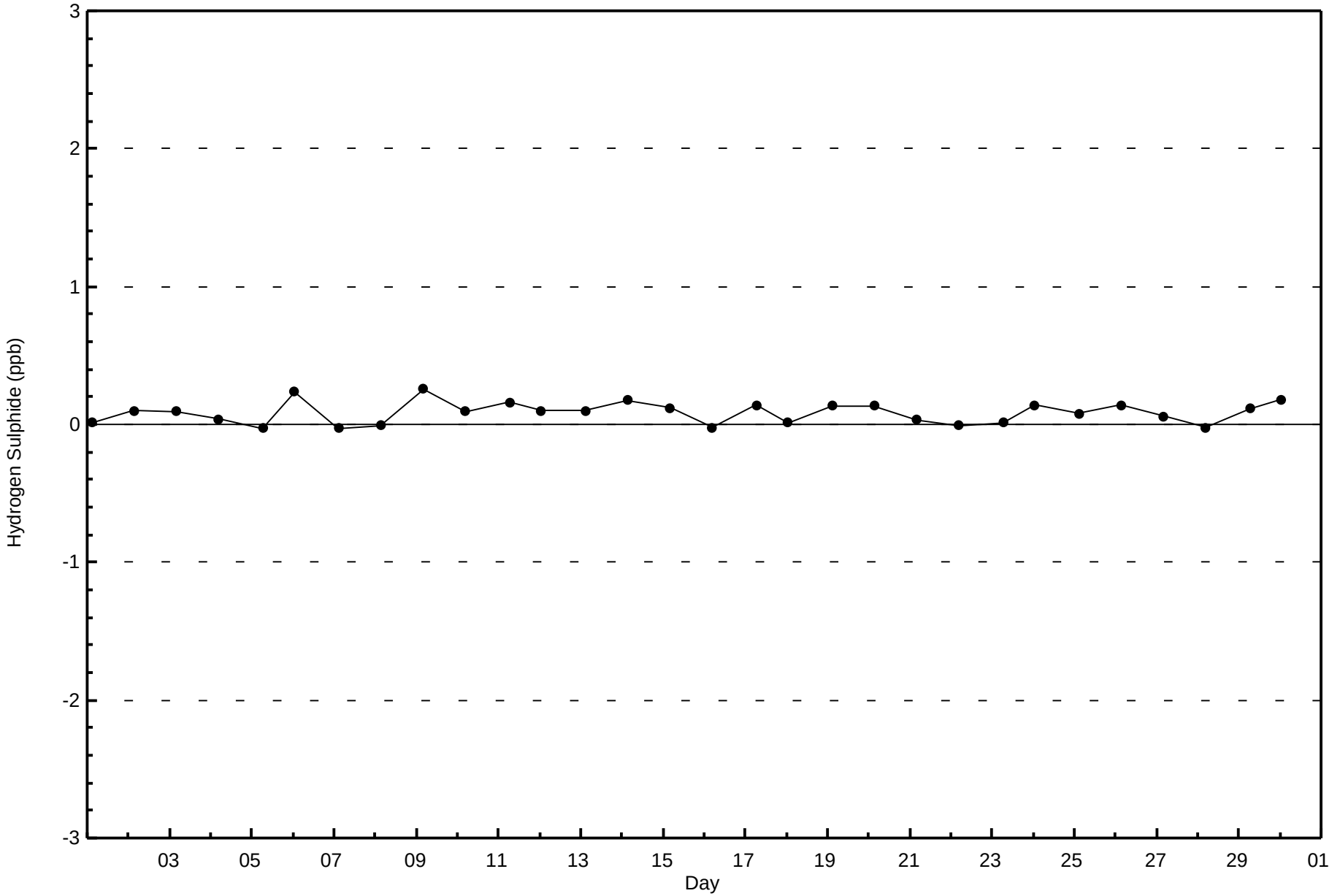
Total Number of Valid Hours: 682

Wood Buffalo Environmental Association

Zero Responses

Hydrogen Sulphide (H_2S) - ppb

ConocoPhillips - Surmont - April 2016

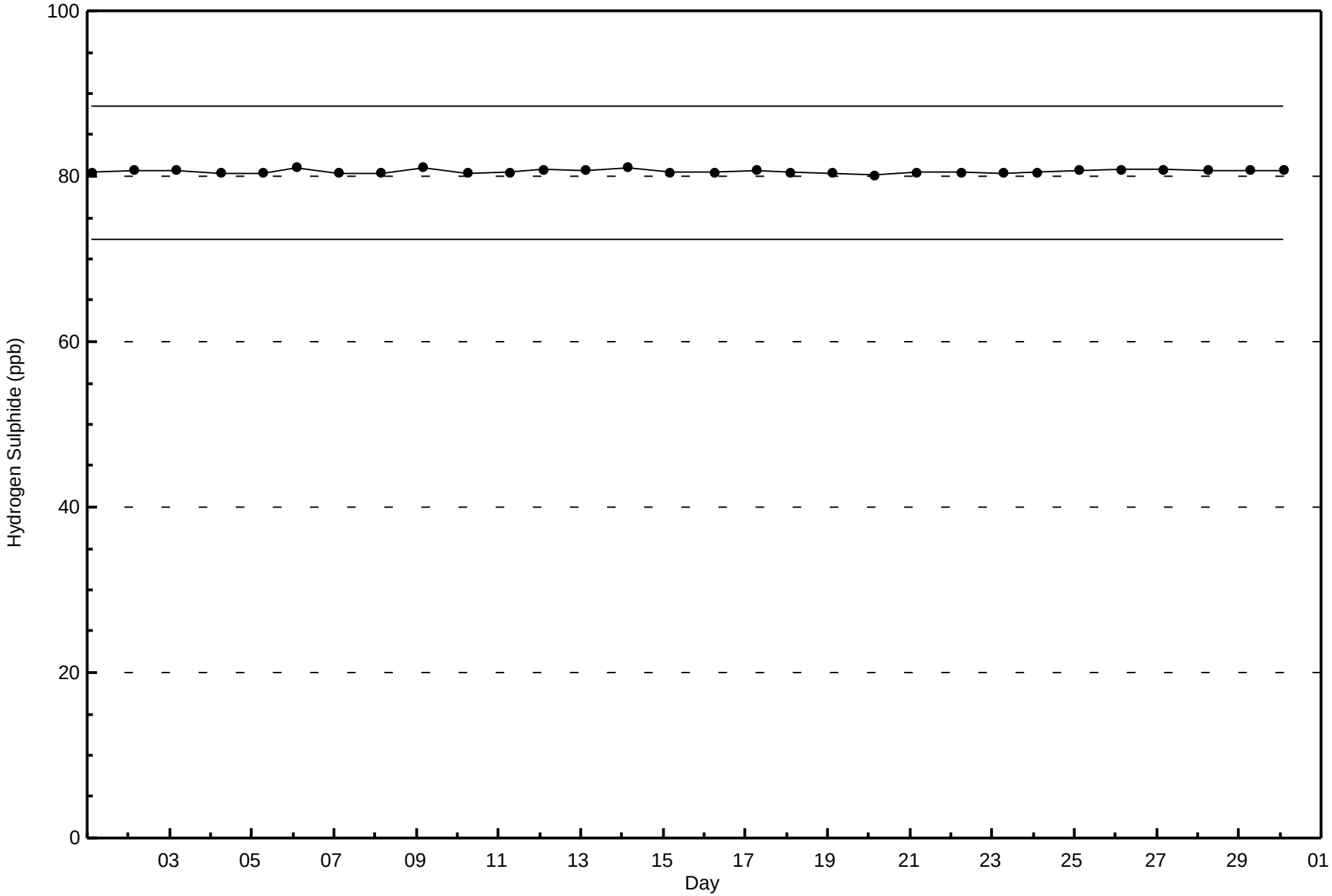


Wood Buffalo Environmental Association

Span Responses

Hydrogen Sulphide (H_2S) - ppb

ConocoPhillips - Surmont - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxide (NO) - ppb

ConocoPhillips - Surmont - April 2016

Maximum Value: 27 ppb on Apr 9 07:00

Maximum Daily Average: 6.6 ppb on Apr 9

Minimum Value: 0 ppb on Apr 2 05:00

Minimum Daily Average: 0.1 ppb on Apr 22

Maximum Diurnal Average: 2.6 ppb at hour 12

Minimum Diurnal Average: 0.3 ppb at hour 22

Monthly Average: 1.2 ppb

Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 1$ $P_{90} = 2$ $P_{99} = 16$

Hours in Service:	720
Hours of Data:	661
Hours of Missing Data:	59
Hours of Calibration:	36
Percent Operational Time:	96.8

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-Apr	0	Z	0	1	5	3	5	3	2	3	2	3	2	4	1	1	0	1	0	0	0	0	1	2	1.8	5
2-Apr	0	0	Z	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0.2	1
3-Apr	0	0	0	Z	1	1	1	2	1	2	2	1	2	2	1	1	1	1	1	1	1	0	0	0	0.9	2
4-Apr	0	0	0	0	Z	1	0	1	1	1	2	1	1	1	4	1	1	1	0	1	0	0	0	0	0.8	4
5-Apr	0	0	0	0	0	Z	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0.3	1
6-Apr	Z	0	0	0	1	1	5	19	7	3	3	8	17	13	15	12	16	17	1	1	1	0	1	1	6.1	19
7-Apr	0	Z	0	0	0	0	0	1	1	3	2	3	1	1	1	1	1	1	1	0	0	0	0	0	0.8	3
8-Apr	0	0	Z	1	1	2	0	1	2	3	1	2	1	1	1	1	1	1	1	0	1	1	2	2	1.2	3
9-Apr	2	2	0	Z	1	12	27	18	11	12	11	12	7	20	7	1	2	3	1	1	1	1	1	1	6.6	27
10-Apr	1	1	1	0	Z	0	1	1	1	1	1	1	2	3	2	0	0	0	0	0	0	0	0	1	0.7	3
11-Apr	1	2	0	0	1	Z	0	0	1	1	0	1	2	1	0	0	0	1	1	0	0	0	0	0	0.6	2
12-Apr	Z	0	1	0	0	0	0	2	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0.6	2
13-Apr	1	Z	1	0	0	0	1	0	0	0	1	1	0	0	0	0	1	1	1	1	0	0	1	0	0.5	1
14-Apr	0	0	Z	5	5	7	2	1	3	4	6	13	7	1	1	0	0	0	0	0	0	0	0	0	2.4	13
15-Apr	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	3	0	1	2	0	0	0	0	1	0	0.4	3
16-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0.2	1
17-Apr	0	0	0	0	0	Z	0	0	1	1	2	1	1	2	2	2	0	1	1	1	1	1	1	1	0.8	2
18-Apr	Z	1	1	1	1	1	1	1	2	2	M	M	M	M	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	2
19-Apr	UO	UO	UO	UO	UO	UO	UO	UO	UO	C	C	C	C	C	C	C	0	0	4	2	0	0	0	0	--	4
20-Apr	3	14	Z	0	1	0	0	0	1	2	0	2	4	4	1	0	0	0	0	0	0	0	0	0	1.5	14
21-Apr	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.1	1
22-Apr	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
23-Apr	0	0	0	0	0	Z	0	0	1	1	0	1	0	1	2	1	1	2	1	0	0	1	1	0	0.6	2
24-Apr	Z	0	0	1	0	1	1	2	1	3	3	2	2	1	1	1	1	3	1	1	1	1	1	0	1.2	3
25-Apr	1	Z	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
26-Apr	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.2	1
27-Apr	0	0	0	Z	0	0	1	1	3	1	1	2	2	1	0	0	1	0	0	0	0	0	0	0	0.6	3
28-Apr	0	0	0	0	Z	0	0	0	0	1	0	0	1	1	1	1	1	1	0	0	0	0	0	1	0.4	1
29-Apr	1	0	1	1	1	Z	2	1	3	3	4	14	2	2	1	1	2	1	0	0	2	1	1	0	2.0	14
30-Apr	Z	0	1	1	1	2	1	1	1	1	0	1	0	1	0	1	0	0	0	0	0	1	0	1	0.7	2
	0.5	0.9	0.3	0.5	0.8	1.4	1.7	1.9	1.6	1.8	1.6	2.6	2.1	2.3	1.7	1.0	1.1	1.3	0.5	0.4	0.3	0.3	0.4	0.4	Diurnal Average	
	3	14	1	5	5	12	27	19	11	12	11	14	17	20	15	12	16	17	4	2	2	1	2	2	Diurnal Maximum	

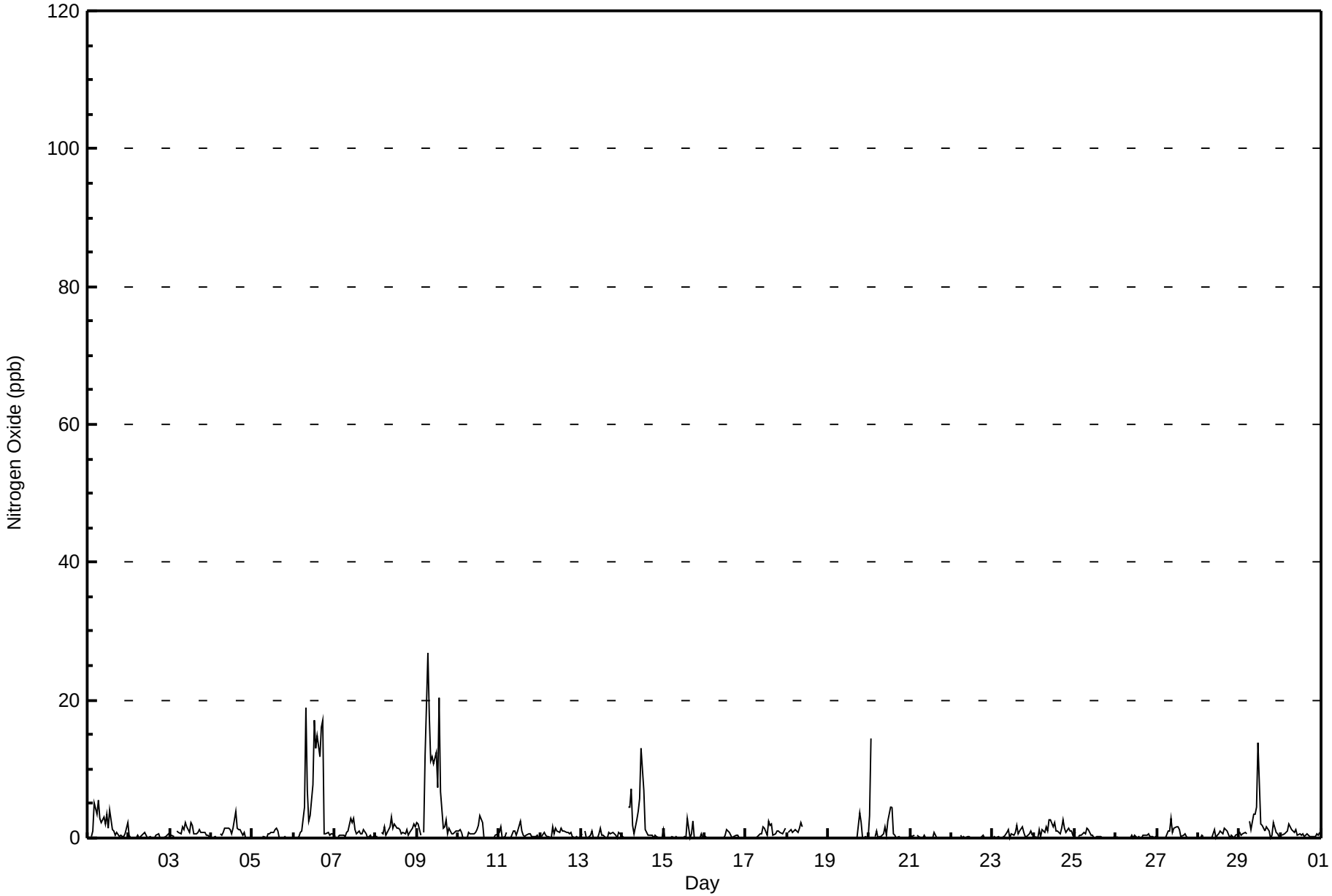
Z - zerospan C - Calibration M - Maintenance UO - Unstable Operation

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Oxide (NO) - ppb

ConocoPhillips - Surmont - April 2016



Wood Buffalo Environmental Association

Cumulative Frequency Distribution

Nitrogen Oxide (NO) - ppb

ConocoPhillips - Surmont - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	660	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: 661

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Oxide (NO) - ppb

ConocoPhillips - Surmont - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	40	19	24	32	53	38	89	38	70	56	50	30	20	18	16	67	660
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	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	40	19	24	32	53	38	89	38	70	56	50	30	20	18	17	67	661

Total Number of Valid Hours: 661

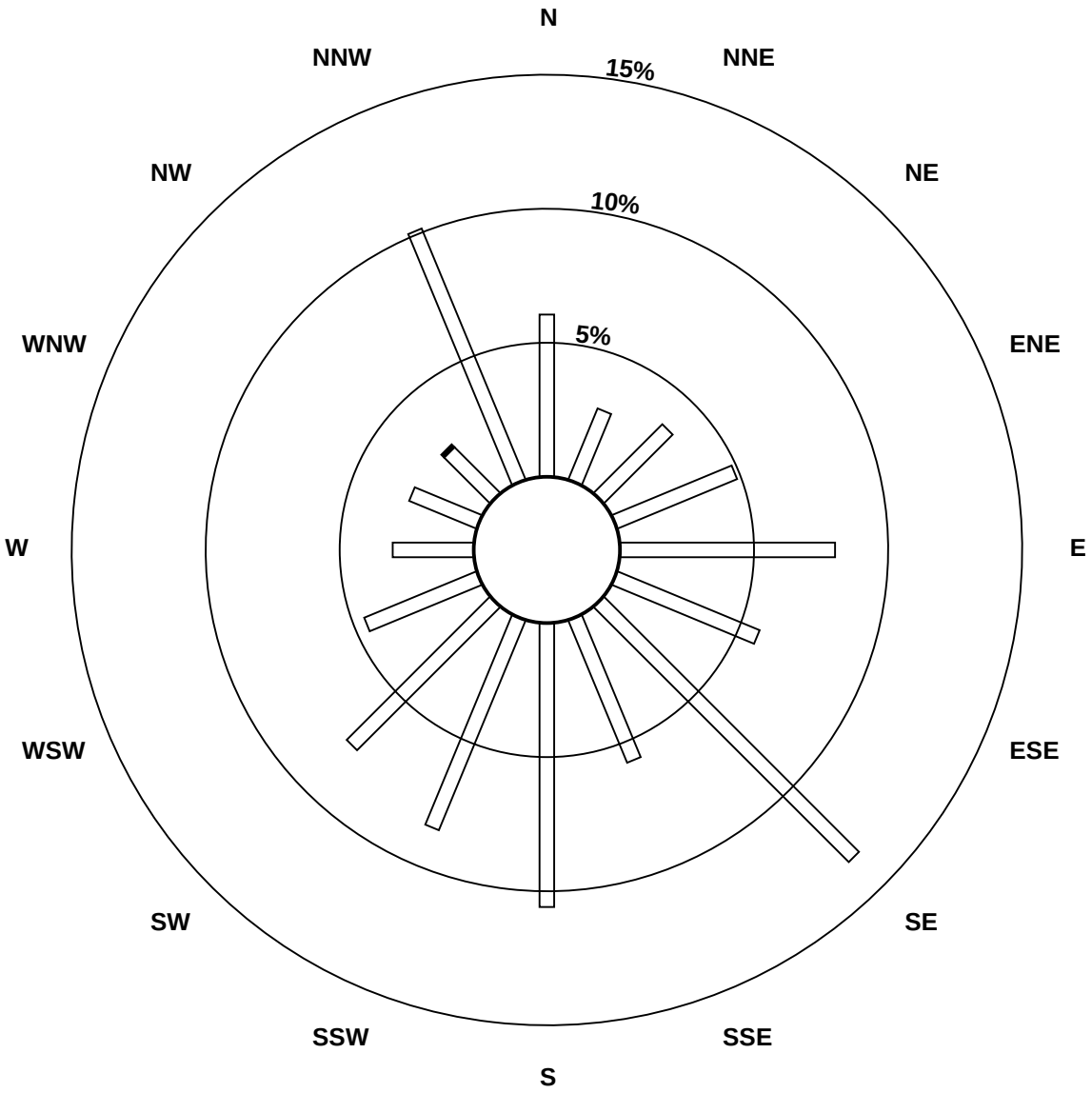
Total Number of Hours: 720

Wood Buffalo Environmental Association

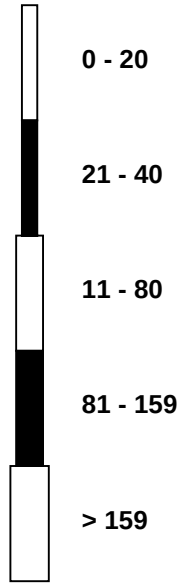
Wind Rose Apr 2016

Nitrogen Oxide (NO) - ppb

ConocoPhillips - Surmont (AMS502)



Classes (ppb)



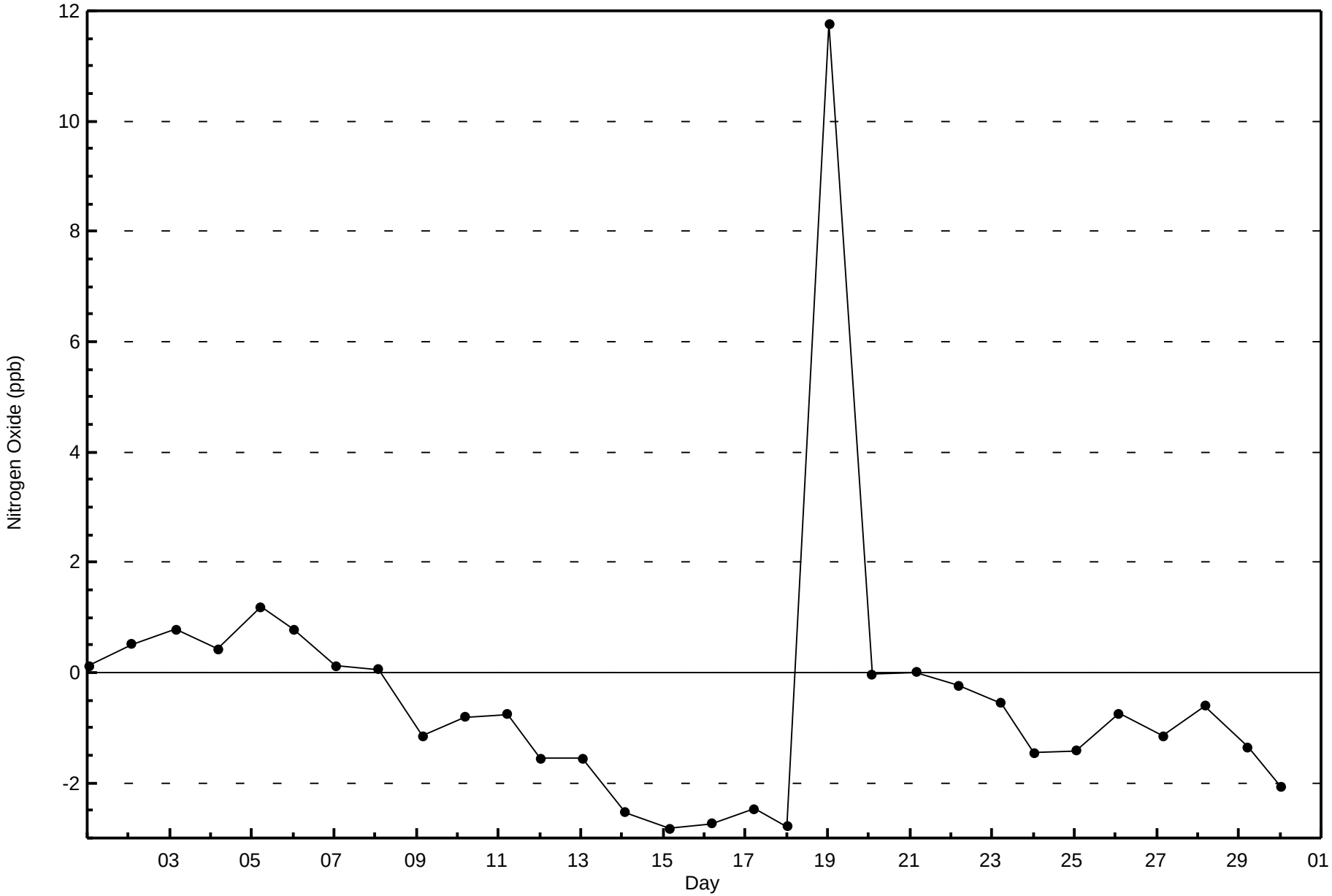
Total Number of Valid Hours: 661

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Oxide (NO) - ppb

ConocoPhillips - Surmont - April 2016



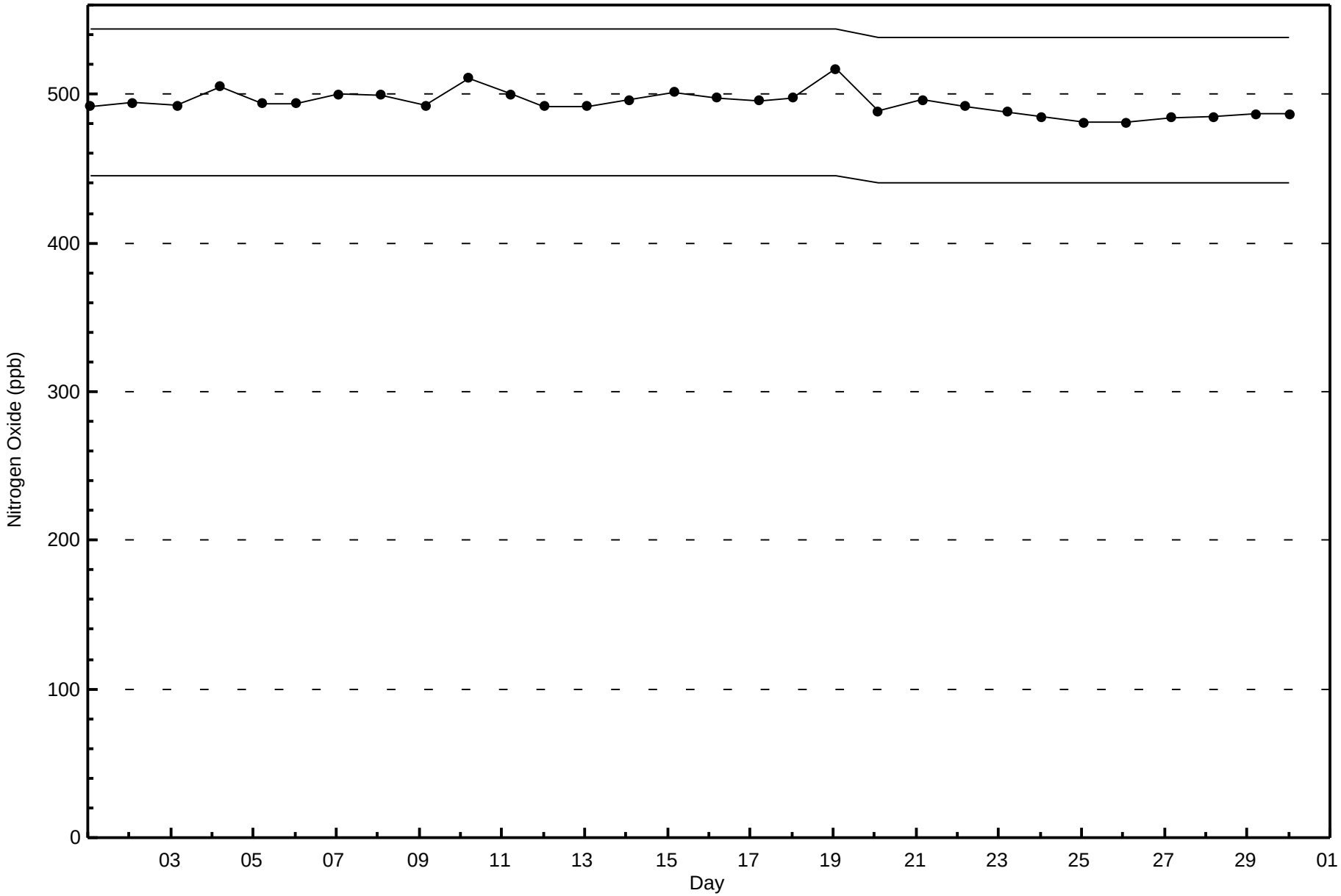
502-25

Wood Buffalo Environmental Association

Span Responses

Nitrogen Oxide (NO) - ppb

ConocoPhillips - Surmont - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO_2) - ppb

ConocoPhillips - Surmont - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 13 ppb on Apr 9 07:00 Maximum Daily Average: 4.7 ppb on Apr 9

Minimum Value: 0 ppb on Apr 2 00:00 Minimum Daily Average: 0.5 ppb on Apr 21
Maximum Diurnal Average: 2.6 ppb at hour 10 Minimum Diurnal Average: 1.2 ppb at hour 3
Monthly Average: 1.9 ppb Percentiles: $P_1 = 0$ $P_{10} = 1$ $Q_1 = 1$ Median = 1 $Q_3 = 2$ $P_{90} = 4$ $P_{99} = 8$

Hours in Service:	720
Hours of Data:	661
Hours of Missing Data:	59
Hours of Calibration:	36
Percent Operational Time:	96.8

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-Apr	1	Z	1	1	6	5	8	6	4	5	3	4	3	5	3	2	2	5	3	2	1	1	1	0	3.1	8
2-Apr	1	1	Z	1	0	2	1	2	2	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1.1	2
3-Apr	1	1	1	Z	2	6	9	9	6	6	5	3	3	3	2	2	3	3	3	4	4	2	2	2	3.3	9
4-Apr	1	1	2	2	Z	1	1	2	2	3	3	2	2	3	1	2	2	2	2	2	2	2	2	2	1.8	3
5-Apr	1	2	1	1	1	Z	1	1	1	1	1	1	1	2	2	1	1	1	2	2	1	2	1	1	1.3	2
6-Apr	Z	1	1	1	1	1	2	7	4	4	5	4	7	7	8	7	8	7	4	6	5	2	1	2	4.0	8
7-Apr	1	Z	2	2	2	2	2	2	2	3	2	2	1	1	2	1	1	2	1	1	1	1	1	1	1.5	3
8-Apr	1	1	Z	1	1	2	1	2	1	2	2	2	1	1	1	1	1	1	2	1	1	2	2	3	1.3	3
9-Apr	4	5	2	Z	2	7	13	9	7	6	6	7	5	10	4	3	4	4	2	3	2	2	2	2	4.7	13
10-Apr	2	2	2	3	Z	3	3	2	2	2	2	2	3	4	3	1	2	1	1	2	0	1	2	1	2.0	4
11-Apr	3	4	1	2	3	Z	1	2	2	2	2	3	4	2	2	2	1	1	1	2	2	2	2	2	2.0	4
12-Apr	Z	2	2	2	2	2	2	3	3	5	3	2	3	2	2	2	2	2	1	1	1	1	1	1	2.0	5
13-Apr	1	Z	1	1	1	3	2	1	1	1	1	3	1	1	1	1	2	1	2	1	1	1	1	1	1.3	3
14-Apr	1	0	Z	7	5	8	5	4	4	6	3	5	5	3	3	1	1	1	1	1	2	3	4	4	3.3	8
15-Apr	4	2	1	Z	1	1	1	1	0	0	1	0	1	1	0	1	2	2	1	1	1	4	3	2	1.4	4
16-Apr	3	2	2	2	Z	1	1	1	1	0	1	1	2	1	1	1	1	1	1	1	0	1	1	1	1.1	3
17-Apr	1	1	1	1	1	Z	2	2	2	4	3	4	1	2	2	3	1	1	1	1	1	1	5	4	1.8	5
18-Apr	Z	1	1	1	2	2	2	2	3	3	M	M	M	M	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	3
19-Apr	UO	UO	UO	UO	UO	UO	UO	UO	UO	C	C	C	C	C	C	C	1	0	5	3	1	1	1	0	--	5
20-Apr	4	9	Z	1	2	2	1	1	1	2	1	2	2	2	1	1	0	1	0	1	1	1	1	1	1.6	9
21-Apr	0	1	1	Z	1	1	2	0	1	0	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0.5	2
22-Apr	0	0	0	1	Z	4	0	0	0	1	1	0	0	0	1	0	1	1	0	1	1	0	1	0	0.5	4
23-Apr	1	1	1	1	1	Z	1	1	1	0	0	1	1	0	0	1	1	1	1	0	0	0	0	0	0.6	1
24-Apr	Z	0	0	1	1	4	2	1	2	3	3	2	2	1	1	2	2	3	2	2	4	3	4	2	2.0	4
25-Apr	2	Z	1	1	1	1	2	3	2	2	2	1	1	1	1	1	1	1	1	0	1	1	1	3	1.3	3
26-Apr	1	1	Z	0	0	0	0	1	1	1	1	1	1	1	1	1	2	1	1	2	2	2	1	1	1.0	2
27-Apr	3	1	1	Z	2	2	3	2	4	2	3	4	3	3	2	1	2	3	1	1	1	1	1	2	2.0	4
28-Apr	1	2	1	1	Z	1	1	2	1	3	1	2	2	2	2	2	3	3	1	2	1	2	2	4	1.8	4
29-Apr	3	2	3	6	3	Z	7	3	5	6	6	11	2	2	2	2	2	2	1	1	7	1	1	1	3.3	11
30-Apr	Z	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0.9	2
	1.7	1.7	1.2	1.7	1.7	2.6	2.6	2.3	2.2	2.6	2.2	2.4	2.1	2.2	1.8	1.5	1.7	1.8	1.4	1.6	1.6	1.4	1.5	1.4	Diurnal Average	
	4	9	3	7	6	8	13	9	7	6	6	11	7	10	8	7	8	7	5	6	7	4	5	4	Diurnal Maximum	

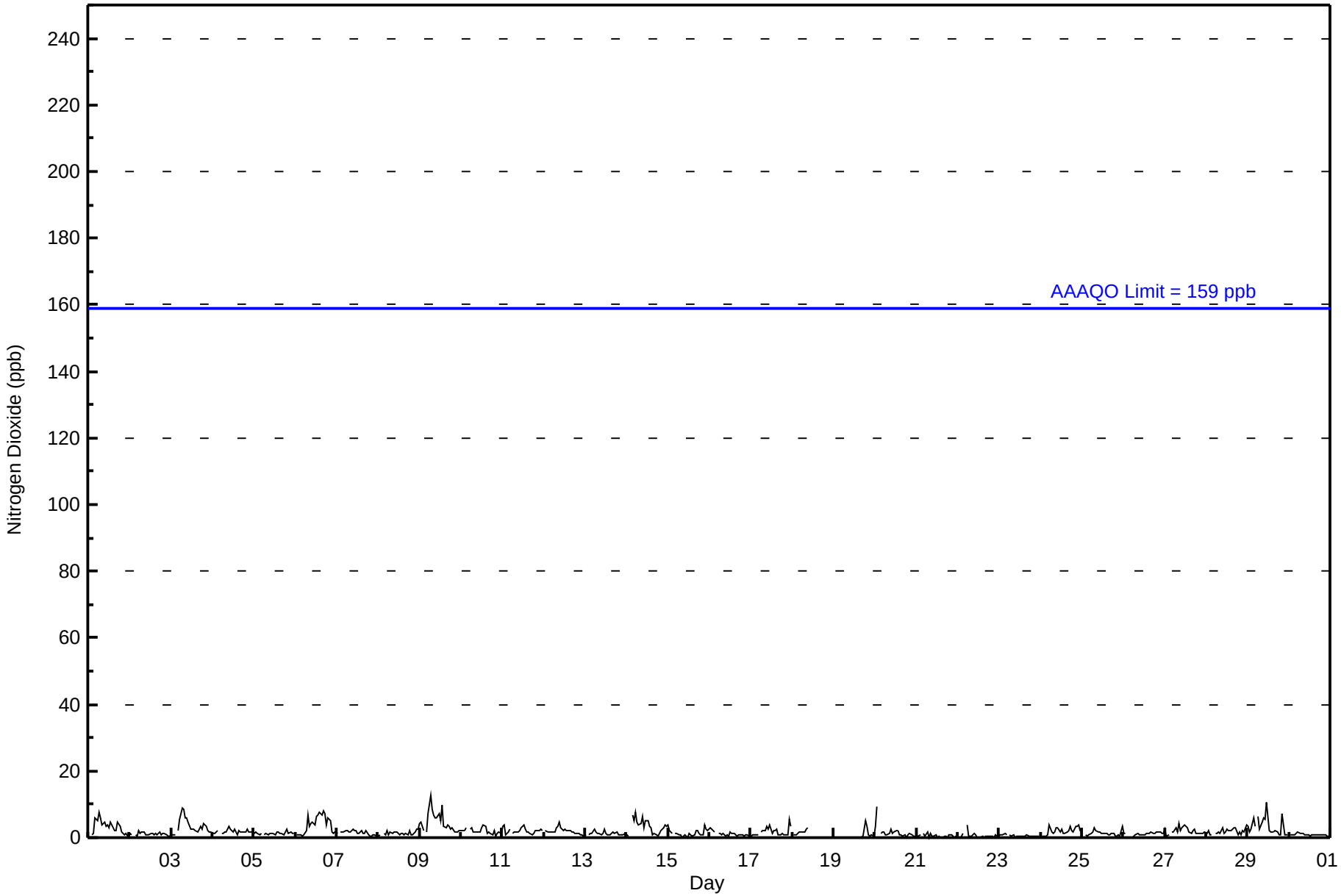
Z - zerospan C - Calibration M - Maintenance UO - Unstable Operation
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Dioxide (NO_2) - ppb

ConocoPhillips - Surmont - April 2016



Nitrogen Dioxide (NO_2) - ppb

ConocoPhillips - Surmont - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	661	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: 661

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Dioxide (NO_2) - ppb

ConocoPhillips - Surmont - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	40	19	24	32	53	38	89	38	70	56	50	30	20	18	17	67	661
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	40	19	24	32	53	38	89	38	70	56	50	30	20	18	17	67	661

Total Number of Valid Hours: 661

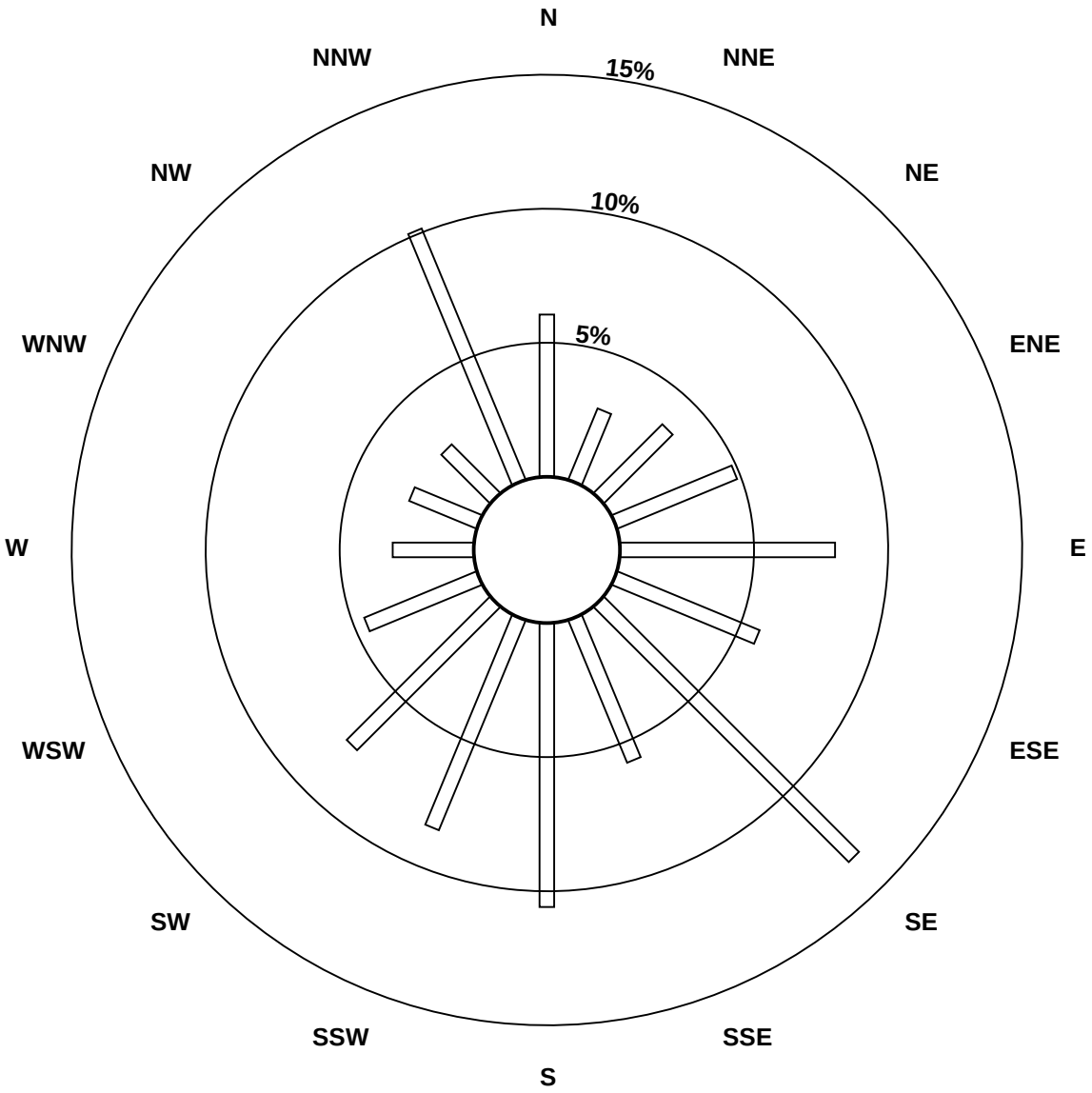
Total Number of Hours: 720

Wood Buffalo Environmental Association

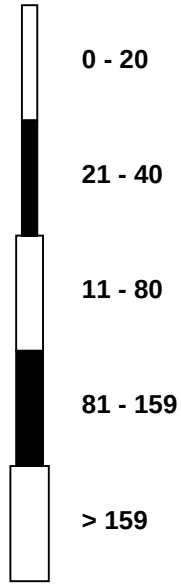
Wind Rose Apr 2016

Nitrogen Dioxide (NO_2) - ppb

ConocoPhillips - Surmont (AMS502)



Classes (ppb)



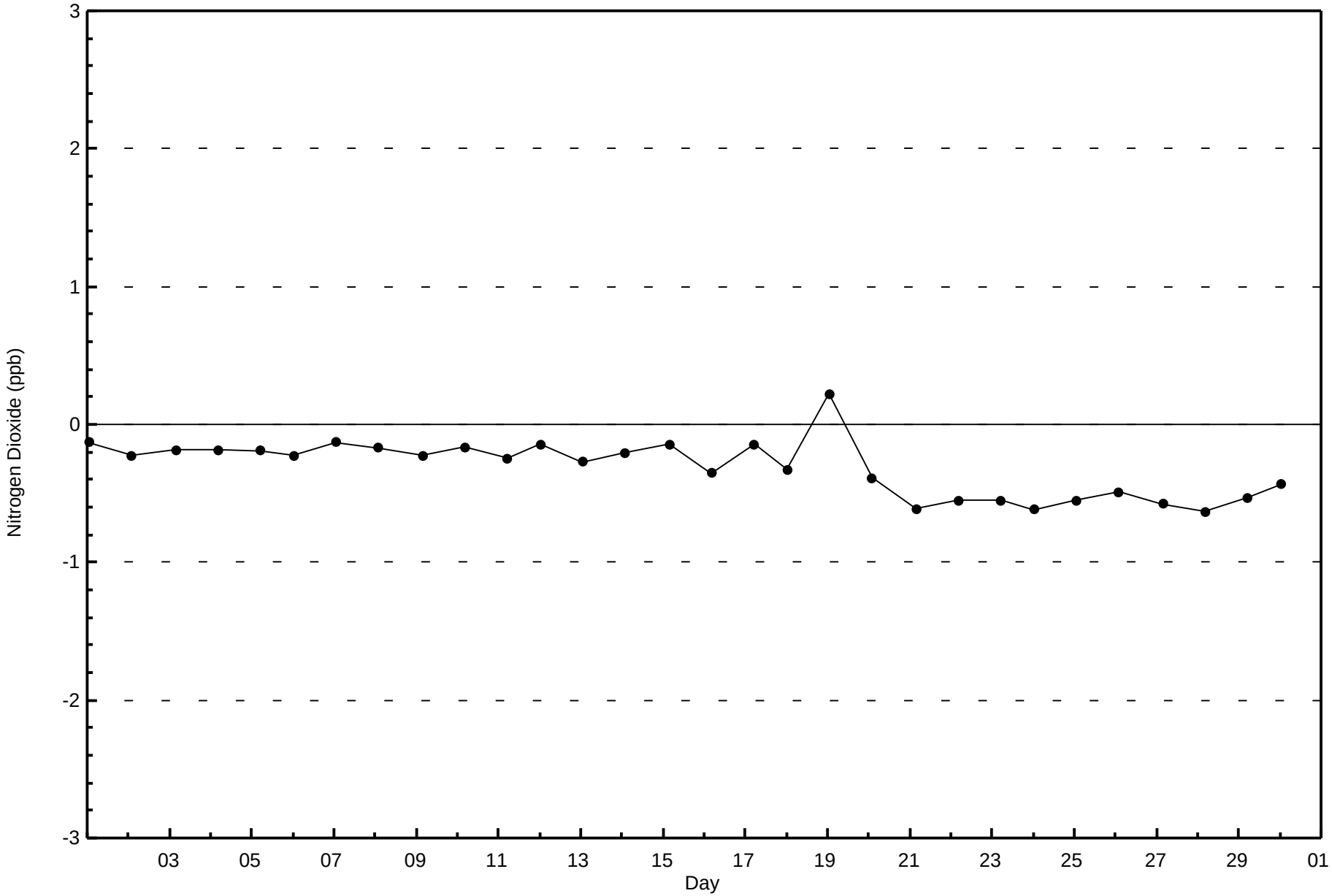
Total Number of Valid Hours: 661

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Dioxide (NO_2) - ppb

ConocoPhillips - Surmont - April 2016

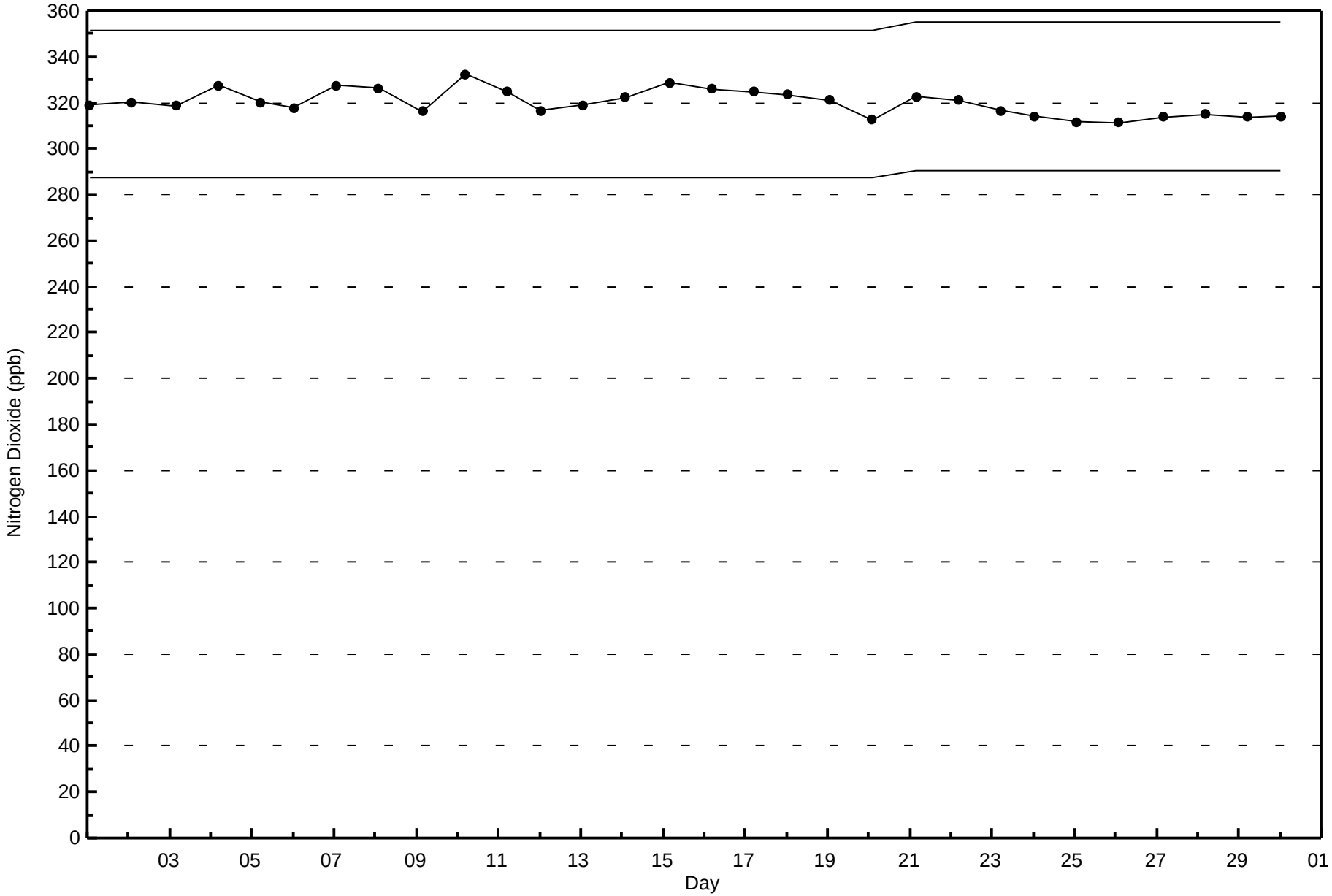


Wood Buffalo Environmental Association

Span Responses

Nitrogen Dioxide (NO_2) - ppb

ConocoPhillips - Surmont - April 2016



Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_X) - ppb

ConocoPhillips - Surmont - April 2016

Maximum Value: 39 ppb on Apr 9 07:00

Maximum Daily Average: 11.3 ppb on Apr 9

Minimum Value: 0 ppb on Apr 15 09:00

Minimum Daily Average: 0.6 ppb on Apr 22

Maximum Diurnal Average: 5.0 ppb at hour 12

Minimum Diurnal Average: 1.5 ppb at hour 3

Monthly Average: 3.0 ppb

Percentiles: $P_1 = 0$ $P_{10} = 1$ $Q_1 = 1$ Median = 2 $Q_3 = 3$ $P_{90} = 6$ $P_{99} = 24$

Hours in Service:	720
Hours of Data:	661
Hours of Missing Data:	59
Hours of Calibration:	36
Percent Operational Time:	96.8

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-Apr	1	Z	1	2	11	9	13	9	6	8	5	7	4	9	4	3	2	6	4	2	2	1	2	2	4.9	13
2-Apr	2	1	Z	1	0	2	1	2	2	2	1	1	2	1	1	1	1	2	1	1	1	1	1	1	1.4	2
3-Apr	1	1	1	Z	3	6	9	10	7	8	6	4	5	5	3	2	3	5	3	5	4	3	2	2	4.3	10
4-Apr	1	1	2	2	Z	2	2	2	3	5	4	3	3	4	5	4	3	3	2	2	2	2	2	2	2.6	5
5-Apr	1	2	1	1	1	Z	1	1	1	2	2	2	2	3	3	2	1	1	1	3	1	2	1	1	1.6	3
6-Apr	Z	1	1	1	1	2	7	26	10	7	8	12	24	20	22	19	24	24	4	6	6	2	2	2	10.0	26
7-Apr	2	Z	2	2	2	3	2	3	3	5	4	5	2	2	3	2	2	3	2	1	1	1	1	1	2.3	5
8-Apr	1	1	Z	2	2	4	1	2	3	5	3	4	2	3	2	1	2	2	3	1	2	3	4	4	2.5	5
9-Apr	6	7	3	Z	2	19	39	26	18	18	17	19	13	30	10	4	5	6	3	4	2	2	3	3	11.3	39
10-Apr	3	3	3	3	Z	3	4	3	2	2	2	3	5	7	6	1	1	1	1	2	0	1	2	2	2.7	7
11-Apr	4	5	1	2	4	Z	1	1	3	3	2	4	6	4	2	2	2	2	2	2	2	2	3	2	2.6	6
12-Apr	Z	3	2	2	2	2	2	5	4	6	4	3	4	3	3	3	3	2	2	2	1	1	1	1	2.6	6
13-Apr	1	Z	2	1	1	3	3	1	1	1	2	4	2	2	1	1	2	2	2	2	1	1	2	1	1.7	4
14-Apr	1	0	Z	11	9	15	7	4	7	10	9	18	12	4	4	1	2	1	1	2	3	3	4	3	5.7	18
15-Apr	5	2	1	Z	1	1	1	1	0	0	1	0	1	1	3	1	3	5	1	1	1	4	3	2	1.8	5
16-Apr	3	2	2	2	Z	1	1	1	1	0	1	1	2	3	2	1	1	1	1	1	0	1	1	0	1.3	3
17-Apr	1	1	1	1	1	Z	1	2	3	4	4	5	2	5	4	4	1	1	2	2	2	1	6	5	2.6	6
18-Apr	Z	2	2	2	3	3	3	3	5	5	M	M	M	M	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	5
19-Apr	UO	UO	UO	UO	UO	UO	UO	UO	UO	C	C	C	C	C	C	C	1	0	9	6	1	1	1	0	--	9
20-Apr	7	24	Z	1	3	2	1	1	2	4	2	4	7	7	2	1	1	1	0	1	1	1	1	1	3.1	24
21-Apr	1	1	1	Z	2	1	2	0	2	0	0	1	0	0	1	0	0	0	0	1	1	0	0	0	0.6	2
22-Apr	0	0	0	1	Z	4	0	0	0	2	1	0	0	0	1	0	1	1	1	1	1	0	1	0	0.6	4
23-Apr	1	1	1	2	1	Z	1	1	2	1	0	1	1	1	2	1	2	2	1	1	1	1	1	1	1.2	2
24-Apr	Z	1	0	2	1	5	2	3	3	6	6	4	5	2	2	2	4	6	3	2	5	4	5	2	3.3	6
25-Apr	3	Z	1	1	1	2	2	5	3	2	2	1	1	1	1	1	1	1	1	0	1	1	1	4	1.7	5
26-Apr	1	1	Z	0	0	0	0	1	1	1	1	2	1	1	1	1	2	2	2	2	2	2	1	1	1.2	2
27-Apr	3	0	1	Z	2	2	4	3	7	3	4	5	5	4	2	2	3	3	1	1	1	1	1	2	2.6	7
28-Apr	1	2	1	1	Z	1	1	2	1	4	1	2	3	3	3	4	4	4	1	2	1	2	2	4	2.3	4
29-Apr	4	2	3	7	4	Z	9	4	8	9	10	24	4	4	3	3	4	3	1	1	10	2	1	1	5.3	24
30-Apr	Z	1	2	2	2	4	3	2	2	2	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1.6	4
	2.2	2.6	1.5	2.2	2.5	4.0	4.3	4.3	3.8	4.3	3.7	5.0	4.2	4.6	3.5	2.5	2.8	3.1	1.9	2.0	1.9	1.6	1.9	1.8	Diurnal Average	
	7	24	3	11	11	19	39	26	18	18	17	24	24	30	22	19	24	24	9	6	10	4	6	5	Diurnal Maximum	

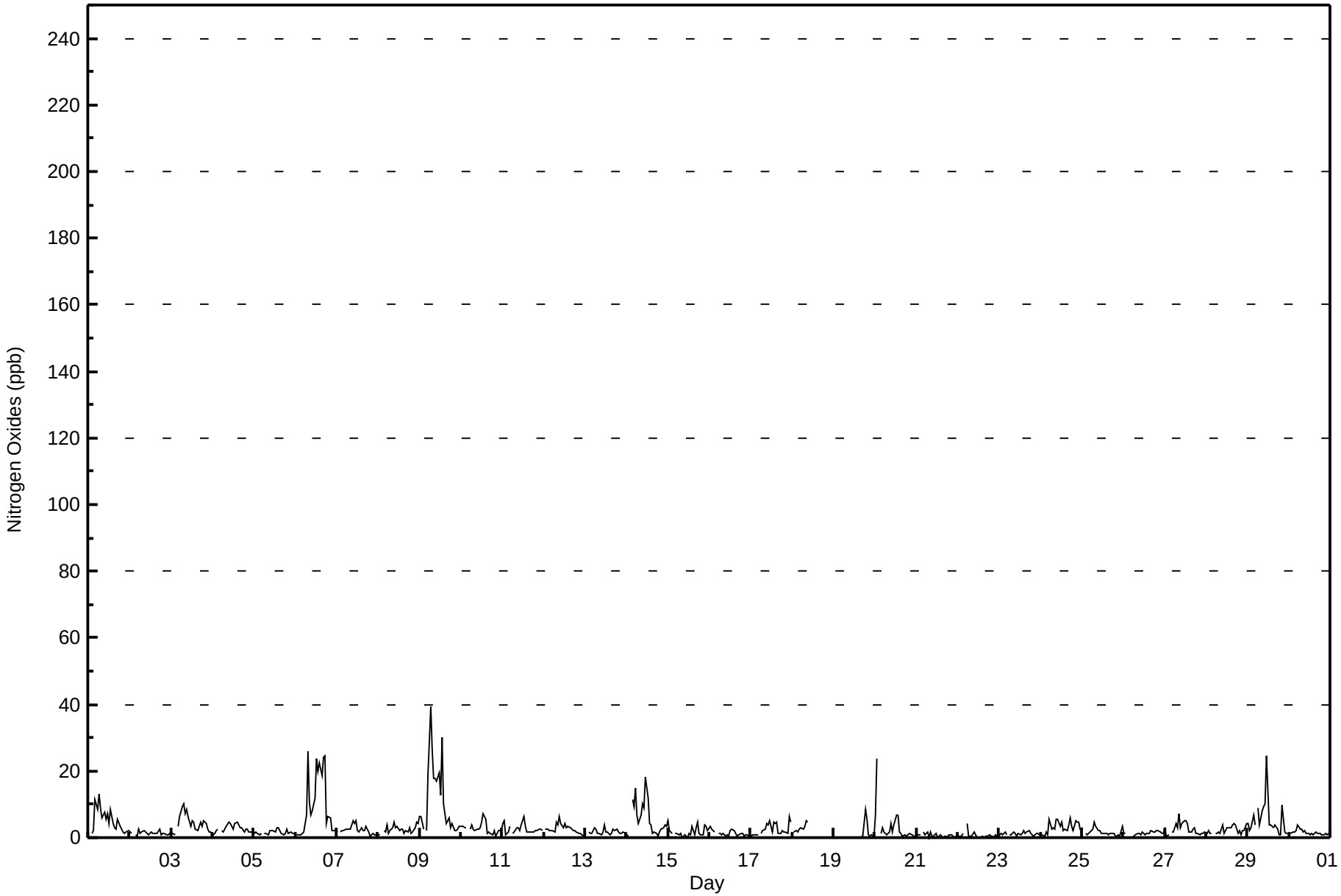
Z - zerospan C - Calibration M - Maintenance UO - Unstable Operation

Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Oxides (NO_X) - ppb

ConocoPhillips - Surmont - April 2016



Nitrogen Oxides (NO_X) - ppb

ConocoPhillips - Surmont - April 2016

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	651	98.49	98.49
21 - 40	10	1.51	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: 661

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Nitrogen Oxides (NO_X) - ppb

ConocoPhillips - Surmont - April 2016

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	**Totals**
0 - 20	40	19	24	32	53	38	89	38	69	56	50	30	20	18	9	66	651
21 - 40	0	0	0	0	0	0	0	0	1	0	0	0	0	0	8	1	10
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	40	19	24	32	53	38	89	38	70	56	50	30	20	18	17	67	661

Total Number of Valid Hours: 661

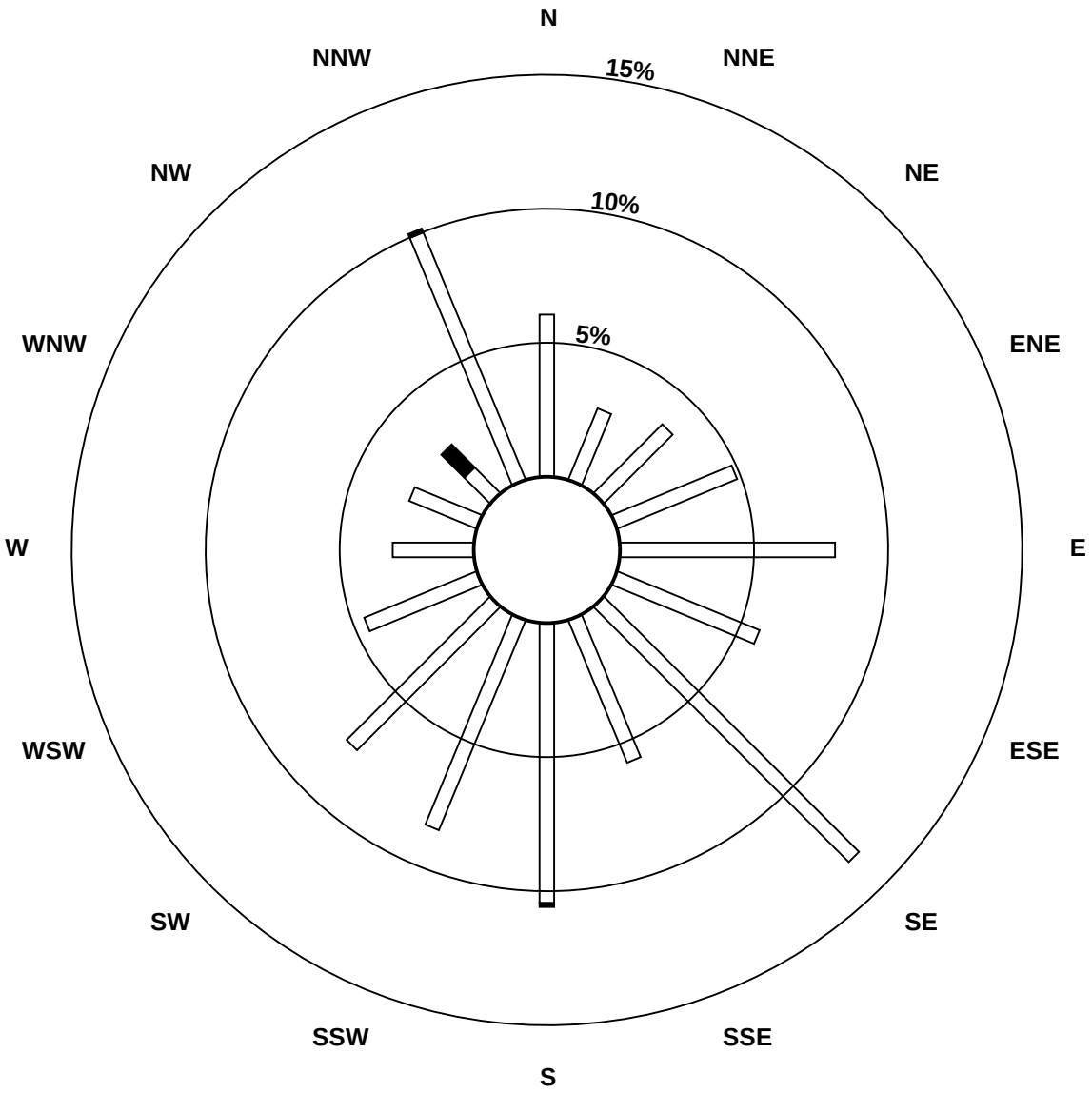
Total Number of Hours: 720

Wood Buffalo Environmental Association

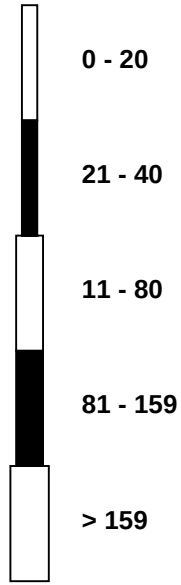
Wind Rose Apr 2016

Nitrogen Oxides (NO_X) - ppb

ConocoPhillips - Surmont (AMS502)



Classes (ppb)



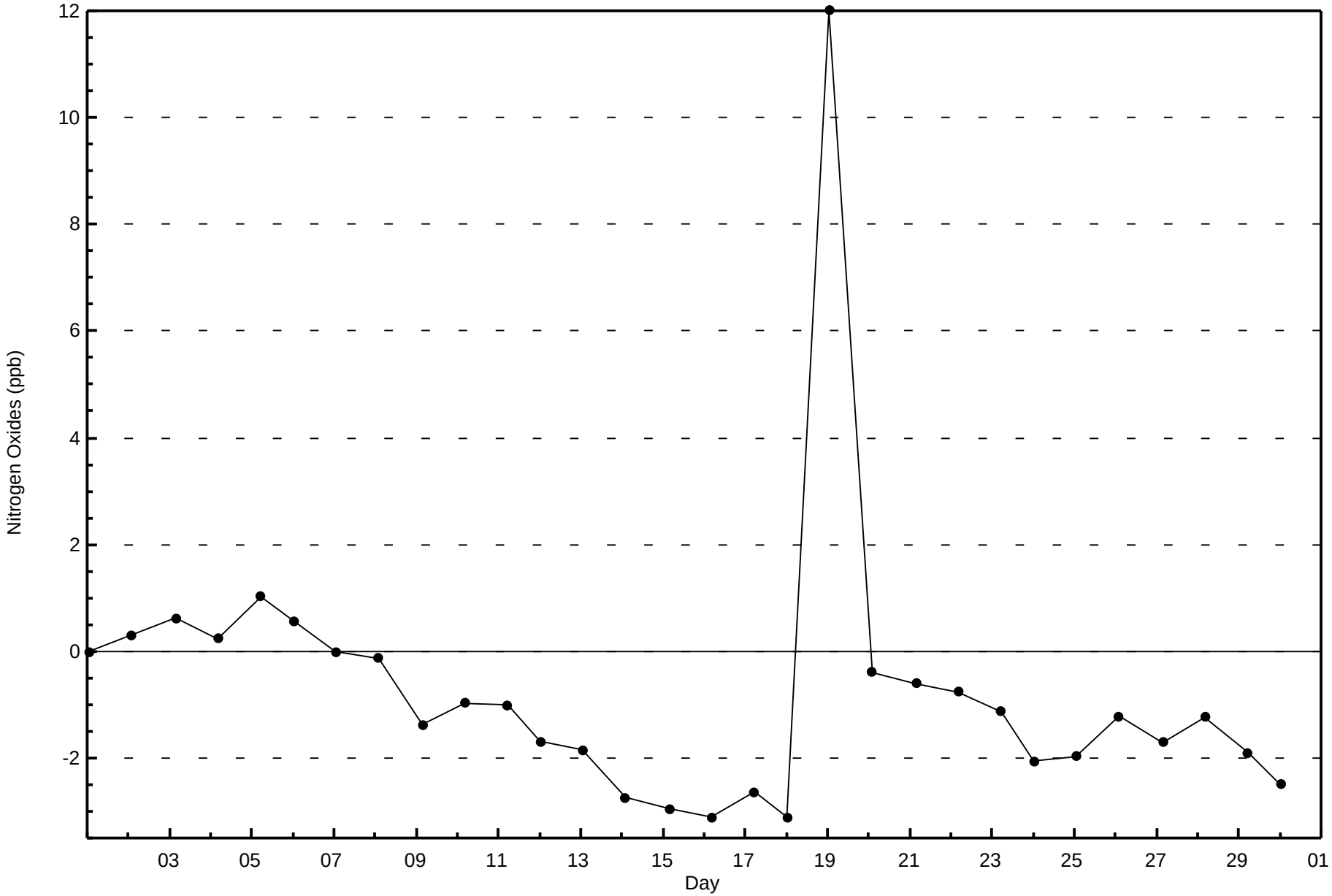
Total Number of Valid Hours: 661

Wood Buffalo Environmental Association

Zero Responses

Nitrogen Oxides (NO_X) - ppb

ConocoPhillips - Surmont - April 2016

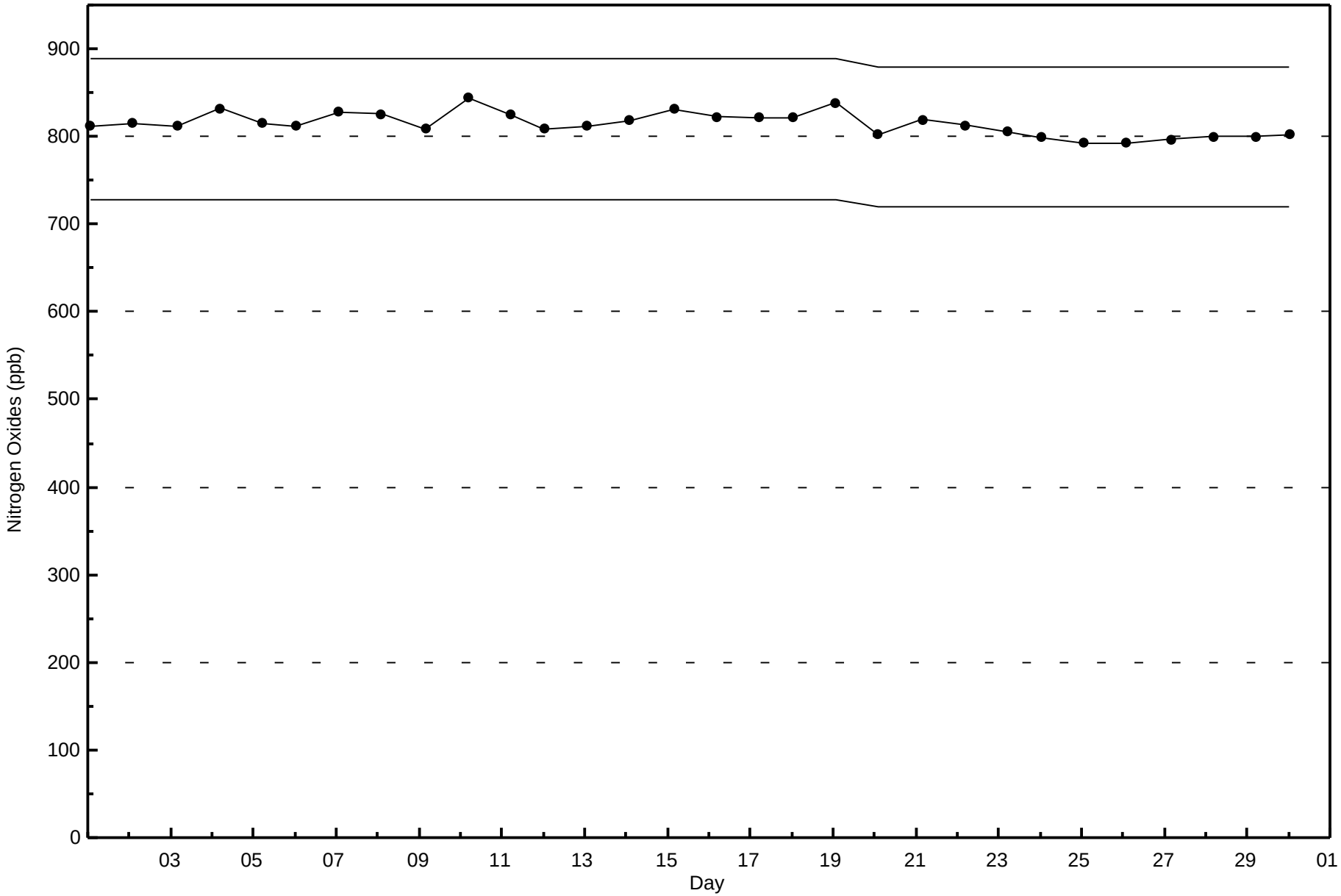


Wood Buffalo Environmental Association

Span Responses

Nitrogen Oxides (NO_X) - ppb

ConocoPhillips - Surmont - April 2016



Maximum Value: 24.0 C on Apr 18 14:00

Maximum Daily Average: 18.6 C on Apr 18

Minimum Value: -9.5 C on Apr 10 07:00

Minimum Daily Average: -5.8 C on Apr 10

Maximum Diurnal Average: 7.7 C at hour 16

Minimum Diurnal Average: 0.8 C at hour 6

Monthly Average: 4.03 C

Percentiles: P_1 = -8.1 P_{10} = -4.9 Q_1 = -1.2 Median = 2.8 Q_3 = 9.0 P_{90} = 15.2 P_{99} = 22.3

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

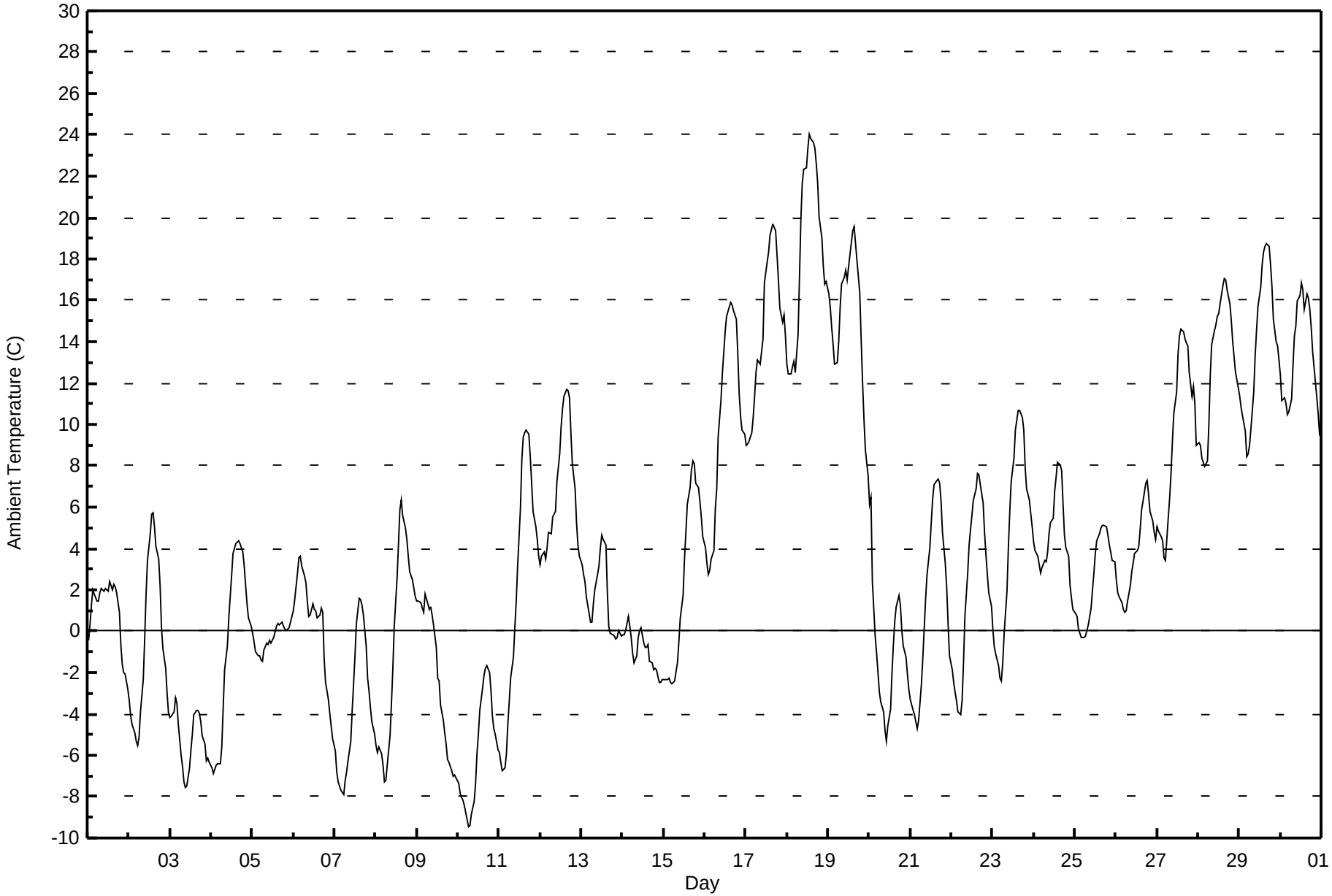
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	-0.4	0.3	1.2	2.0	1.8	1.5	1.4	1.9	2.1	1.9	2.1	2.0	1.9	2.4	2.0	2.3	2.1	1.8	0.9	-0.6	-1.6	-2.0	-2.1	-2.8	0.9	2.4
2-Apr	-3.3	-4.1	-4.5	-4.9	-5.3	-5.5	-5.1	-3.9	-2.4	-0.4	1.8	3.4	4.7	5.7	5.7	5.1	4.1	3.5	2.2	0.1	-0.9	-1.8	-3.0	-4.0	-0.5	5.7
3-Apr	-4.2	-4.1	-3.9	-3.2	-3.5	-4.5	-6.0	-6.6	-7.3	-7.6	-7.5	-6.6	-5.7	-5.0	-4.1	-3.8	-3.8	-4.0	-4.3	-5.1	-5.5	-6.3	-6.1	-6.3	-5.2	-3.2
4-Apr	-6.6	-6.9	-6.7	-6.4	-6.4	-6.4	-5.6	-3.7	-1.8	-0.7	0.7	1.7	2.7	3.8	4.2	4.3	4.4	4.2	3.8	3.2	2.2	1.3	0.7	0.2	-0.6	4.4
5-Apr	-0.1	-0.5	-1.0	-1.2	-1.2	-1.4	-1.4	-0.9	-0.6	-0.7	-0.4	-0.5	-0.3	0.0	0.2	0.4	0.3	0.4	0.2	0.1	0.0	0.2	0.4	0.7	-0.3	0.7
6-Apr	1.0	1.5	2.8	3.6	3.6	3.2	2.7	2.4	1.5	0.7	0.8	1.3	1.0	1.0	0.6	0.8	1.1	0.9	-1.3	-2.5	-3.3	-3.9	-4.6	-5.2	0.4	3.6
7-Apr	-5.8	-6.8	-7.3	-7.5	-7.7	-7.9	-7.2	-6.8	-6.3	-5.3	-3.8	-2.6	-1.2	0.4	1.6	1.5	1.3	0.8	-0.7	-2.3	-2.9	-3.7	-4.4	-5.0	-3.7	1.6
8-Apr	-5.5	-5.9	-5.6	-5.9	-6.5	-7.3	-7.2	-6.4	-5.1	-3.5	-1.8	0.3	2.5	4.1	5.8	6.4	5.6	5.0	4.4	3.6	2.9	2.5	2.1	1.7	-0.6	6.4
9-Apr	1.5	1.5	1.4	1.1	0.9	1.8	1.3	1.1	1.2	0.8	0.3	-0.8	-2.3	-2.4	-3.6	-4.3	-4.9	-5.4	-6.2	-6.3	-6.7	-7.0	-7.0	-7.1	-2.1	1.8
10-Apr	-7.3	-7.9	-8.0	-8.1	-8.4	-9.1	-9.5	-9.4	-8.9	-8.2	-7.3	-5.9	-5.0	-3.9	-2.8	-2.1	-1.8	-1.6	-2.0	-2.9	-4.1	-4.7	-5.0	-5.7	-5.8	-1.6
11-Apr	-5.9	-6.3	-6.7	-6.6	-5.9	-4.5	-3.4	-2.2	-1.3	0.2	1.5	3.2	5.9	8.3	9.4	9.6	9.7	9.5	8.5	7.1	5.8	5.1	4.4	3.6	2.0	9.7
12-Apr	3.2	3.6	3.8	3.5	4.0	4.8	4.7	5.5	5.7	5.8	7.2	8.5	9.8	10.8	11.4	11.7	11.6	11.3	9.6	8.1	6.9	5.3	4.2	3.6	6.9	11.7
13-Apr	3.2	2.8	2.4	1.7	1.3	0.4	0.5	1.3	2.0	2.7	3.1	4.0	4.6	4.4	4.2	1.9	0.2	-0.1	-0.2	-0.3	-0.3	-0.3	0.0	-0.3	1.6	4.6
14-Apr	-0.2	-0.2	0.0	0.7	0.2	-0.3	-1.1	-1.5	-1.2	-0.3	0.0	0.1	-0.6	-0.8	-0.8	-0.6	-1.4	-1.6	-1.9	-1.8	-1.9	-2.5	-2.5	-2.3	-0.9	0.7
15-Apr	-2.3	-2.3	-2.3	-2.3	-2.5	-2.5	-2.4	-1.9	-1.6	-0.5	0.7	1.7	3.5	4.8	6.1	7.0	7.8	8.2	8.1	7.1	7.0	6.3	5.5	4.6	2.4	8.2
16-Apr	4.0	3.3	2.8	2.9	3.5	3.9	5.9	6.9	9.4	11.2	12.4	13.5	14.5	15.2	15.7	15.9	15.7	15.5	15.1	13.5	11.5	10.4	9.7	9.5	10.1	15.9
17-Apr	9.0	9.0	9.2	9.6	10.3	11.4	12.5	13.1	12.9	13.5	14.2	16.9	17.9	18.4	19.1	19.4	19.7	19.3	18.2	17.0	15.6	15.0	15.3	14.3	14.6	19.7
18-Apr	12.9	12.4	12.5	12.8	13.0	12.5	14.3	17.0	19.9	21.7	22.3	22.4	23.4	24.0	23.9	23.6	23.3	22.6	21.6	20.0	19.0	17.7	16.8	16.9	18.6	24.0
19-Apr	16.3	15.7	14.7	13.8	12.9	13.0	14.0	15.6	16.8	17.1	17.5	17.0	17.6	18.2	19.4	19.6	18.8	17.9	16.3	14.1	12.0	10.3	8.8	7.5	15.2	19.6
20-Apr	6.2	6.5	2.4	-0.2	-1.0	-2.0	-2.9	-3.4	-3.9	-4.8	-5.3	-4.6	-3.7	-2.0	-0.6	0.5	1.2	1.7	1.2	0.1	-0.7	-1.2	-2.1	-2.8	-0.9	6.5
21-Apr	-3.3	-3.6	-4.0	-4.4	-4.7	-4.3	-2.5	-1.2	0.1	1.6	2.7	4.0	5.3	6.4	7.1	7.3	7.4	7.2	6.3	4.8	3.3	2.2	0.4	-1.2	1.5	7.4
22-Apr	-1.8	-2.5	-3.0	-3.4	-3.9	-4.1	-3.3	-1.5	0.7	2.8	4.1	4.9	5.6	6.4	6.9	7.6	7.6	7.1	6.2	4.8	3.7	2.7	1.9	1.2	2.1	7.6
23-Apr	0.1	-0.7	-1.1	-1.6	-2.3	-2.4	-1.5	-0.1	1.9	4.0	5.8	7.2	8.4	9.7	10.2	10.7	10.7	10.3	9.7	7.9	6.9	6.3	5.6	5.0	4.6	10.7
24-Apr	4.3	3.9	3.6	3.2	2.8	3.1	3.4	3.4	3.8	4.7	5.3	5.4	6.8	7.4	8.1	8.0	7.8	6.1	4.7	4.0	3.6	2.2	1.6	1.1	4.5	8.1
25-Apr	0.8	0.7	0.1	-0.1	-0.3	-0.3	-0.2	0.0	0.3	1.1	2.0	2.8	3.7	4.4	4.7	5.0	5.1	5.1	5.1	4.7	4.2	3.8	3.5	3.3	2.5	5.1
26-Apr	2.5	1.9	1.6	1.4	1.1	0.9	1.0	1.5	2.2	2.9	3.3	3.7	3.9	4.1	4.9	5.8	6.3	7.1	7.3	6.6	5.8	5.3	4.8	4.5	3.8	7.3
27-Apr	5.0	4.8	4.6	4.4	3.6	3.4	5.4	6.4	7.6	9.2	10.6	11.6	13.4	14.3	14.6	14.5	14.1	13.9	13.8	12.5	11.4	11.8	11.0	9.0	9.6	14.6
28-Apr	9.1	9.0	8.4	8.1	8.0	8.2	10.0	12.3	13.9	14.5	14.8	15.2	15.4	15.9	16.7	17.1	17.0	16.5	15.8	15.0	14.0	13.2	12.5	11.7	13.0	17.1
29-Apr	11.3	10.8	10.4	9.6	8.4	8.6	9.0	9.8	11.6	13.3	14.5	15.7	16.7	17.7	18.3	18.6	18.7	18.6	17.8	16.6	15.1	14.0	13.8	13.1	13.8	18.7
30-Apr	12.4	11.2	11.3	11.0	10.5	10.6	11.2	12.9	14.3	14.8	15.9	16.3	16.9	16.5	15.6	16.3	16.1	15.5	14.7	13.5	12.1	11.3	10.5	9.4	13.4	16.9
	1.9	1.6	1.3	1.1	0.9	0.8	1.3	2.0	2.9	3.8	4.6	5.4	6.2	7.0	7.5	7.7	7.5	7.3	6.5	5.4	4.5	3.8	3.2	2.6	Diurnal Average	
	16.3	15.7	14.7	13.8	13.0	13.0	14.3	17.0	19.9	21.7	22.3	22.4	23.4	24.0	23.9	23.6	23.3	22.6	21.6	20.0	19.0	17.7	16.8	16.9	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Ambient Temperature (AT) - C

ConocoPhillips - Surmont - April 2016



Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	229	31.81	31.81
0 - 10	331	45.97	77.78
10 - 20	149	20.69	98.47
> 20	11	1.53	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

ConocoPhillips - Surmont - April 2016

Maximum Value: 100 % on Apr 14 04:00

Maximum Daily Average: 93.1 % on Apr 14

Minimum Value: 12 % on Apr 19 18:00

Minimum Daily Average: 22.2 % on Apr 19

Maximum Diurnal Average: 68.2 % at hour 6

Minimum Diurnal Average: 46.4 % at hour 16

Monthly Average: 57.2 %

Percentiles: P_1 = 15 P_{10} = 27 Q_1 = 36 Median = 55 Q_3 = 77 P_{90} = 91 P_{99} = 99

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

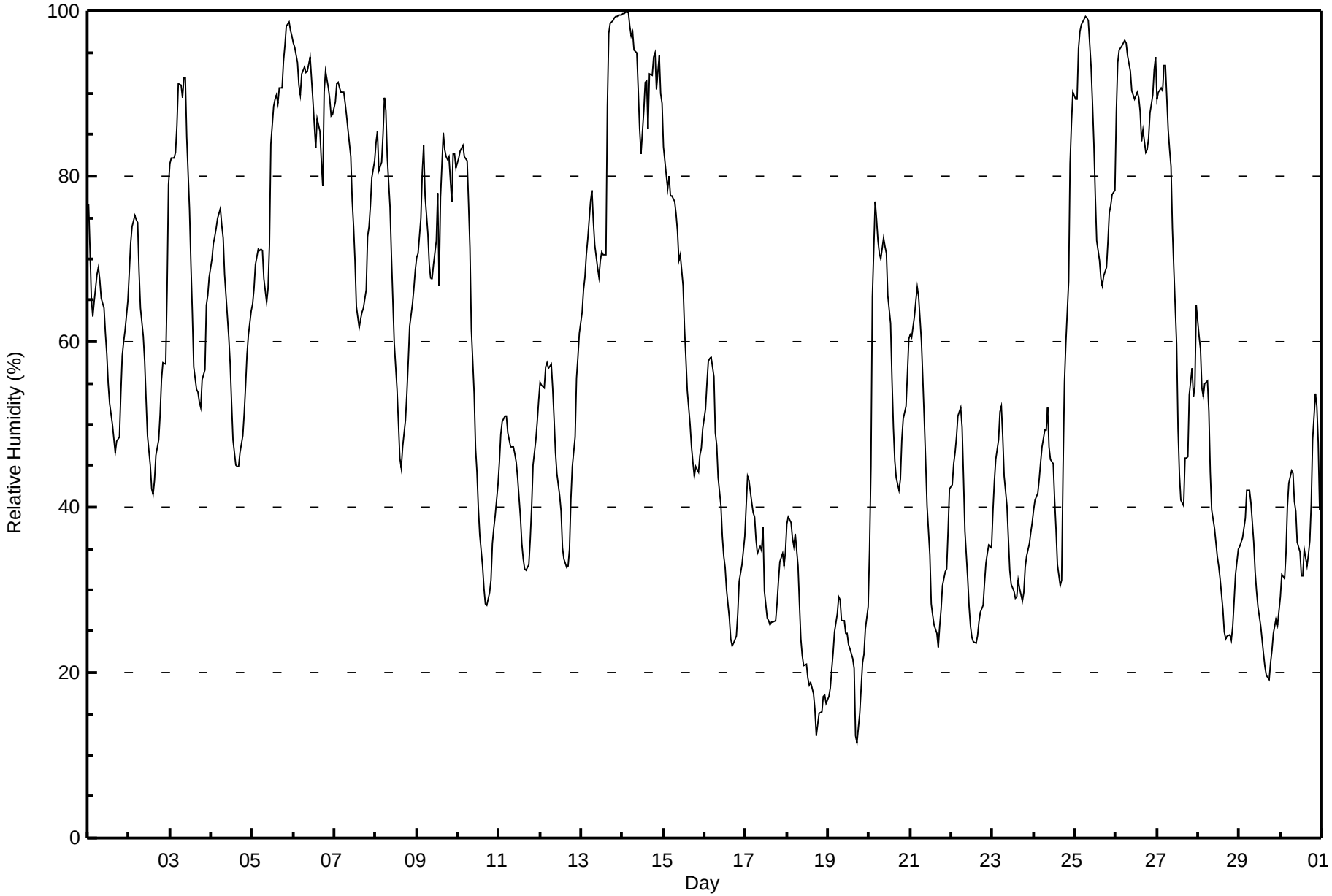
Day	Hourly Period Ending At (MST)																								Daily	Daily
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Average	Maximum
1-Apr	77	71	65	63	65	68	69	67	65	64	61	58	55	53	50	48	47	48	48	54	58	60	61	65	60.0	77
2-Apr	68	72	74	75	75	74	69	64	61	58	53	49	45	42	42	43	46	48	51	55	57	57	66	79	59.3	79
3-Apr	82	82	82	83	86	91	91	89	92	92	85	76	69	63	57	54	54	53	52	55	57	64	66	68	72.7	92
4-Apr	70	72	73	74	75	76	74	73	68	63	60	57	53	48	45	45	45	47	49	51	55	59	61	64	60.6	76
5-Apr	65	66	69	71	71	71	71	68	65	66	72	84	88	89	90	89	91	91	94	96	98	99	98	97	81.6	99
6-Apr	96	96	94	91	90	92	93	93	93	93	94	89	86	83	87	85	82	79	90	93	91	89	87	87	89.8	96
7-Apr	89	91	91	91	90	90	89	87	86	82	77	74	70	64	62	63	64	64	66	73	74	76	80	82	78.1	91
8-Apr	84	85	81	82	85	89	88	82	76	70	65	60	54	50	46	45	47	50	54	58	62	65	67	69	67.3	89
9-Apr	70	71	75	81	84	78	73	69	68	68	69	72	78	67	77	85	83	82	82	82	77	83	83	81	76.6	85
10-Apr	82	83	83	84	82	82	77	71	62	54	47	44	40	37	33	30	28	28	30	31	36	37	39	43	52.6	84
11-Apr	45	49	50	51	51	49	48	47	47	46	45	44	39	36	34	33	32	33	36	40	45	48	50	53	43.9	53
12-Apr	55	55	54	57	57	57	57	54	51	47	44	41	39	35	34	33	33	35	41	45	48	56	58	61	47.8	61
13-Apr	64	66	68	71	72	77	78	75	72	69	68	70	71	71	70	88	97	99	99	99	99	99	99	100	80.9	100
14-Apr	100	100	100	100	98	97	97	95	95	91	86	83	88	91	91	86	92	92	94	95	91	95	90	89	93.1	100
15-Apr	84	82	78	80	78	78	77	75	73	70	70	67	62	58	54	50	47	46	44	45	44	46	47	49	62.7	84
16-Apr	52	55	58	58	58	56	49	47	44	40	36	34	33	30	27	24	23	24	24	27	31	32	33	36	38.8	58
17-Apr	40	44	43	40	39	39	36	34	35	35	38	30	27	26	26	26	26	26	28	31	33	34	33	35	33.6	44
18-Apr	38	39	38	36	35	37	33	28	24	22	21	21	19	18	19	17	16	12	14	15	15	17	17	16	23.7	39
19-Apr	17	18	20	22	25	27	29	29	26	26	25	25	23	23	22	21	12	12	15	18	21	22	25	28	22.2	29
20-Apr	35	45	65	77	75	72	71	70	73	72	71	66	62	55	50	46	44	42	43	48	51	52	56	60	58.3	77
21-Apr	61	61	63	65	67	65	60	55	51	46	40	34	28	27	26	25	23	26	28	31	32	33	37	42	42.7	67
22-Apr	43	45	47	49	51	52	50	44	37	31	28	26	24	24	24	24	26	27	28	31	33	34	35	35	35.3	52
23-Apr	40	43	46	48	51	52	48	44	40	36	32	31	30	29	29	31	30	29	30	33	34	36	37	38	37.4	52
24-Apr	40	41	42	43	45	47	49	49	52	47	46	45	41	37	33	31	31	45	55	60	67	81	86	90	50.2	90
25-Apr	89	89	95	97	98	99	99	99	99	93	89	84	78	72	70	68	67	68	69	72	76	76	78	78	83.5	99
26-Apr	88	94	95	96	96	96	96	95	93	90	90	89	90	89	88	84	86	83	83	85	88	90	93	94	90.5	96
27-Apr	89	90	91	90	93	93	86	83	81	74	69	60	50	44	41	40	46	46	46	54	57	53	55	64	66.4	93
28-Apr	61	59	54	53	55	55	52	44	40	37	36	34	33	31	28	25	24	24	25	24	26	29	32	35	38.1	61
29-Apr	35	36	36	39	42	42	42	41	36	32	30	28	26	24	22	21	20	19	21	23	25	27	26	28	29.9	42
30-Apr	29	32	31	34	40	43	44	44	41	39	36	35	32	32	35	33	34	36	40	48	54	52	48	40	38.8	54
	62.9	64.4	65.4	66.7	67.7	68.2	66.5	63.9	61.4	58.5	56.1	53.6	51.1	48.3	47.0	46.4	46.5	47.1	49.3	52.3	54.5	56.7	58.1	60.2	Diurnal Average	
	100	100	100	100	98	99	99	99	99	93	94	89	90	91	91	89	97	99	99	99	99	99	99	100	Diurnal Maximum	

Wood Buffalo Environmental Association

Hourly Averages

Relative Humidity (RH) - %

ConocoPhillips - Surmont - April 2016



Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	20	2.78	2.78
20 - 40	188	26.11	28.89
40 - 60	192	26.67	55.56
60 - 80	154	21.39	76.94
80 - 100	166	23.06	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

ConocoPhillips - Surmont - April 2016

Maximum Speed: 42 km/h on Apr 19 15:00

Maximum Daily Speed Average: 26.7 km/h on Apr 19

Minimum Speed Value: 1 km/h on Apr 27 11:00

Minimum Daily Speed Average: 2.3 km/h on Apr 27

Maximum Diurnal Speed Average: 5.8 km/h at hour 2

Minimum Diurnal Speed Average: 0.5 km/h at hour 10

Monthly Average Velocity: 2.4 km/h 202.3 deg

Percentiles: $P_1 = 3$ $P_{10} = 7$ $Q_1 = 9$ Median = 12 $Q_3 = 17$ $P_{90} = 22$ $P_{99} = 32$

Hours in Service:	720
Hours of Data:	720
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-Apr	WSW19	W20	WNW21	WNW21	WNW19	WNW16	WNW14	NNW15	NNW22	NNW22	NNW21	NNW19	NNW18	NNW16	N16	N14	N13	NNE11	NE9	E7	ESE8	SE10	SE12	SE14	NNW9.1	NNW22
2-Apr	SE13	SE14	SE16	SE12	SE9	E5	ESE6	SE10	ESE7	E8	E9	ENE10	ENE8	NE9	NE9	NNE11	NNE13	NNE11	NNE14	NE10	NE9	ENE10	ENE10	ENE8	E7.2	SE16
3-Apr	ENE5	E4	SSE2	WNW7	N10	N15	N14	NNW17	NNW19	NNW19	N17	N16	NNW15	N16	N16	N16	N16	N13	N10	NE6	E5	SE9	SE13	S12	N8.4	NNW19
4-Apr	SSW14	SSW13	SSW14	SSW12	SW12	SW11	SSW9	SSW11	S11	SE10	SE13	SE13	SE13	SSE10	SE10	SE11	SE11	SE8	ESE5	ESE7	E7	E6	E6	E6	SSE7.8	SSW14
5-Apr	ENE5	NE5	E5	E5	E6	ESE7	ESE6	ESE7	ESE8	SE12	SSE13	SSE16	SE14	SE13	SSE11	SSE11	S12	S14	SSW15	S12	S14	S14	S12	S12	SSE8.3	SSE16
6-Apr	SW14	WSW18	W19	W22	WNW27	WNW26	WNW24	NW21	NNW20	NNW22	NNW18	WNW25	NW25	NW25	NW21	NW19	NW23	NW21	N19	NNW19	NNW21	N18	NNW18	N15	NW18.0	WNW27
7-Apr	N14	NNW15	NNW16	NNW13	NNE8	NE4	S2	ESE6	ESE7	SE6	ESE6	ESE7	ENE8	ENE7	NE8	NE13	NE13	NE12	NE11	ENE10	ENE11	E8	ESE9	ESE10	NE6.5	NNW16
8-Apr	ESE8	SE12	SE18	SE19	SE16	SE17	SE17	SE17	SE19	SE21	SE23	SSE23	SE21	SE21	SE25	SE28	SSE31	SE27	SE25	SE22	SSE26	SSE28	SSE25	SSE17	SE21.0	SSE31
9-Apr	S13	S15	S12	S5	NW4	NNW20	NW25	NNW27	NW21	NNW23	NNW24	NNW29	NNW26	NW32	NNW28	NNW29	NNW30	NNW30	NNW29	NNW30	NNW29	NNW26	NNW25	NNW22	NNW19.3	NW32
10-Apr	N19	NNW21	NNW24	NNW22	NNW22	NNW21	NNW21	NNW20	N18	N16	NNE13	NNE12	NNW9	NNW9	N7	NNE9	NNE5	NE5	ENE7	E7	ESE8	SE10	SE14	SE15	N9.7	NNW24
11-Apr	SSE15	S18	S15	SSW14	SSW14	SSW14	SW16	SSW14	SSW13	S12	S15	S13	S13	S13	S14	SSW13	S14	SSW13	SW12	SSW10	SSW12	SSW16	SSW14	SSW12	SSW13.3	S18
12-Apr	SSW12	SW16	WSW23	WSW21	W16	W15	WNW13	NW15	NNW18	NNW20	N15	N13	N12	NNE12	NNE11	N11	NE11	NE10	NE10	ENE8	E13	ESE11	ESE10	SE13	NNW4.4	WSW23
13-Apr	SE9	E6	ESE7	ESE9	E5	E6	SE7	ESE8	ESE11	ESE10	SE11	N4	E10	ENE8	NE9	ENE9	NE7	NE6	NE6	NNE7	NNE5	N5	NW8	N9	ENE5.2	SE11
14-Apr	NNW10	NW8	NW8	NW15	NNW20	NNW22	NNW19	NNW19	NNW15	NNW17	WNW23	NW22	NNW16	N14	N16	N16	N15	N13	N9	NNW8	N4	NNE9	N7	NNW5	NNW13.0	WNW23
15-Apr	N5	WNW5	W7	WNW8	W7	WSW7	W7	WSW7	SW7	SE7	SE12	SE14	SE13	SE14	SE15	SE17	SE16	SE14	SE12	SE11	S13	S11	S14	S16	SSE6.9	SE17
16-Apr	S18	S18	S15	S13	S12	SSW13	SW17	WSW20	WSW18	WSW13	WSW13	WSW15	SW18	WSW20	WSW19	WSW20	WSW17	SW13	WSW9	SW8	SW9	WSW10	WSW11	WSW13	SW13.4	WSW20
17-Apr	WSW12	SW11	SW11	SW12	SW13	SW14	SW14	SW13	WSW16	SW9	SE6	W6	W14	WNW18	W15	W13	W16	W15	WSW8	SW7	SW8	SW9	SSW12	SSW10	WSW10.3	WNW18
18-Apr	SW10	SW11	SW11	SW11	SW11	SW12	SW14	SW13	SW12	SSW14	S18	S21	SSW21	SSW21	S25	SSW24	SSW23	SSW23	S19	S18	S20	S22	S22	SSW25	SSW16.8	SSW25
19-Apr	SSW24	SW26	SW25	SW25	WSW32	WSW29	W24	W26	W31	W33	W31	W33	W36	W37	W42	W41	W42	W32	WNW27	WNW24	WNW17	W18	W16	W13	W26.7	W42
20-Apr	W14	NW20	NNW23	NNW22	NNW22	NNW22	NNW21	N20	NNW25	NNW22	NNW22	NNW21	NNW20	N15	N15	NNE12	NNE11	NE9	ENE10	E7	E6	E6	ESE8	SE9	N12.6	NNW25
21-Apr	SE8	SE7	SE5	SSW2	SSE2	SW8	SSW8	SSW10	SSE8	E8	E7	ENE7	ENE9	ENE10	ENE11	ENE12	NE13	ENE13	E12	E11	E9	E10	ENE11	E9	E6.4	ENE13
22-Apr	E9	ENE6	E7	NE5	NE6	ENE6	ENE7	ENE7	ENE10	E12	E14	E12	E12	ENE12	E12	ENE13	E11	E12	E14	E11	E8	ESE9	ESE9	ESE8	E9.3	E14
23-Apr	ESE9	ESE8	E8	E7	E6	E6	E9	ESE9	E9	E11	E13	ESE13	ESE11	ESE14	SE12	SE14	SE15	ESE13	SE13	E14	ESE14	ESE14	SE12	SE12	ESE10.8	SE15
24-Apr	ESE10	SE10	SE10	SE11	SE11	SSE10	S10	SE15	SE15	SSE18	SSE23	SE21	SSE17	SE18	SSE21	SE19	SSE20	S20	S16	SSE16	S19	S17	S15	SSE12	SSE14.9	SSE23
25-Apr	S13	S13	SE13	SSE12	SE12	SE12	SSE10	SSE9	SSE11	S11	S10	SSW11	SSW10	S10	SSW12	SSW10	S10	SSW9	SSW7	WSW6	WSW5	SW6	SW6	SSW8	S8.9	S13
26-Apr	SSW11	SSW10	S12	S13	S12	S12	S11	S11	SSW9	S9	S11	S12	S11	SSW10	SSW9	S9	S10	S10	SE10	SE8	SSE4	SSE5	W7	SW7	S8.8	S13
27-Apr	SSW10	SW13	SW10	SSW9	N3	WNW3	ENE2	E4	E4	ENE6	NNE1	NNE4	E4	E5	N9	E9	S9	SE6	SE4	SE8	SE5	SE7	SE3	WNW4	SSE2.3	SW13
28-Apr	SW7	SSW9	SW9	SW10	SW12	SW11	SW9	SW9	SSW11	S14	SSW14	S11	S14	SSE13	SSE13	SSE20	SSE18	SSE17	SE18	SE18	SE17	S12	SSW13	S11	S11.1	SSE20
29-Apr	SSW11	S13	S14	S12	SSE14	S14	S18	S18	S18	SSE19	SSE24	S25	S21	S18	S18	S18	S19	SSW17	S15	SSW11	SSW10	SSW12	SSW12	S12	S15.5	S25
30-Apr	SSW11	SSW12	SSW10	SW10	SW9	SW10	SW9	SW9	SSW12	SSW16	SSW19	SSW19	SSW20	SW21	SW18	WSW21	SW17	WSW15	WSW9	WSW8	SW8	SW10	WSW13	WSW18	SW12.8	WSW21
	SSW5.4	SSW5.8	SSW5.1	SW4.7	WSW3.7	W4.4	WSW4.1	W3.1	W1.9	SSW0.5	S1.9	SSW1.9	SSW2.1	SW1.6	SSW1.1	S1.2	S2.0	S1.5	ESE2.1	ESE2.9	SE3.7	SSE4.8	S4.6	S4.9	Diurnal Average	
	SSW24	SW26	SW25	SW25	WSW32	WSW29	NW25	NNW27	W31	W33	W31	W33	W36	W37	W42	W41	W42	W32	NNW29	NNW30	NNW29	SSE28	SSE25	SSW25	Diurnal Maximum	

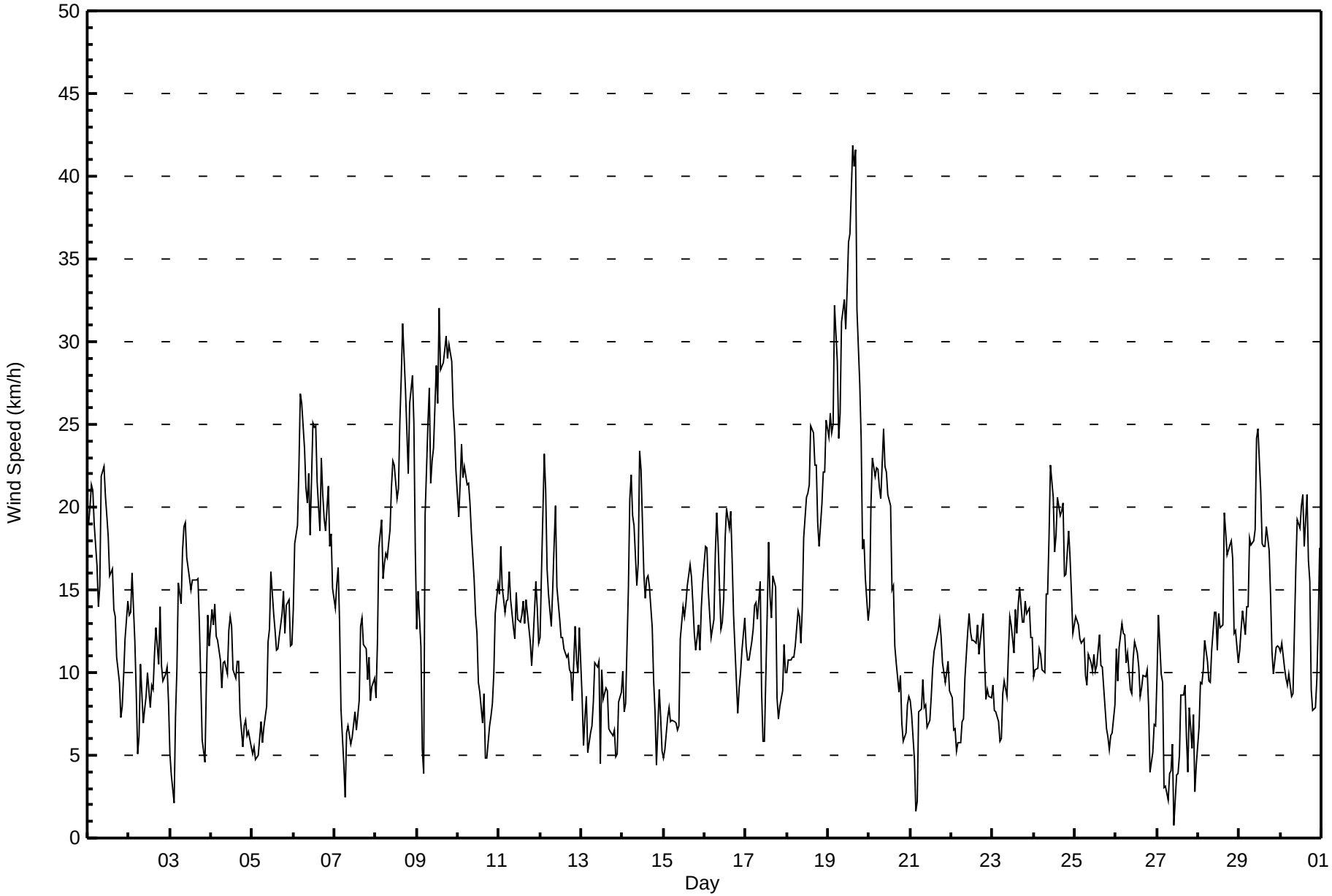
All monthly, daily, and diurnal averages have been calculated using vector methods

Wood Buffalo Environmental Association

Hourly Averages

Wind Speed (WS) - km/h

ConocoPhillips - Surmont - April 2016



Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	44	6.11	6.11
6 - 11	263	36.53	42.64
12 - 19	288	40.00	82.64
20 - 28	104	14.44	97.08
29 - 38	18	2.50	99.58
> 38	3	0.42	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

Wood Buffalo Environmental Association

Frequency Distribution

Wind Speed (WS) - km/h

ConocoPhillips - Surmont - April 2016

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	4	3	10	1	4	4	2	1	0	1	0	3	1	1	44
6 - 11	8	9	17	25	34	34	28	9	16	27	33	9	5	2	3	4	263
12 - 19	26	6	4	4	11	5	49	15	57	32	21	14	12	6	3	23	288
20 - 28	1	0	0	0	0	0	10	9	8	8	4	6	4	9	10	35	104
29 - 38	0	0	0	0	0	0	0	1	0	0	0	2	7	0	1	7	18
> 38	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	3
Totals	40	19	25	32	55	40	91	38	83	68	58	32	31	20	18	70	720

Total Number of Valid Hours: 720

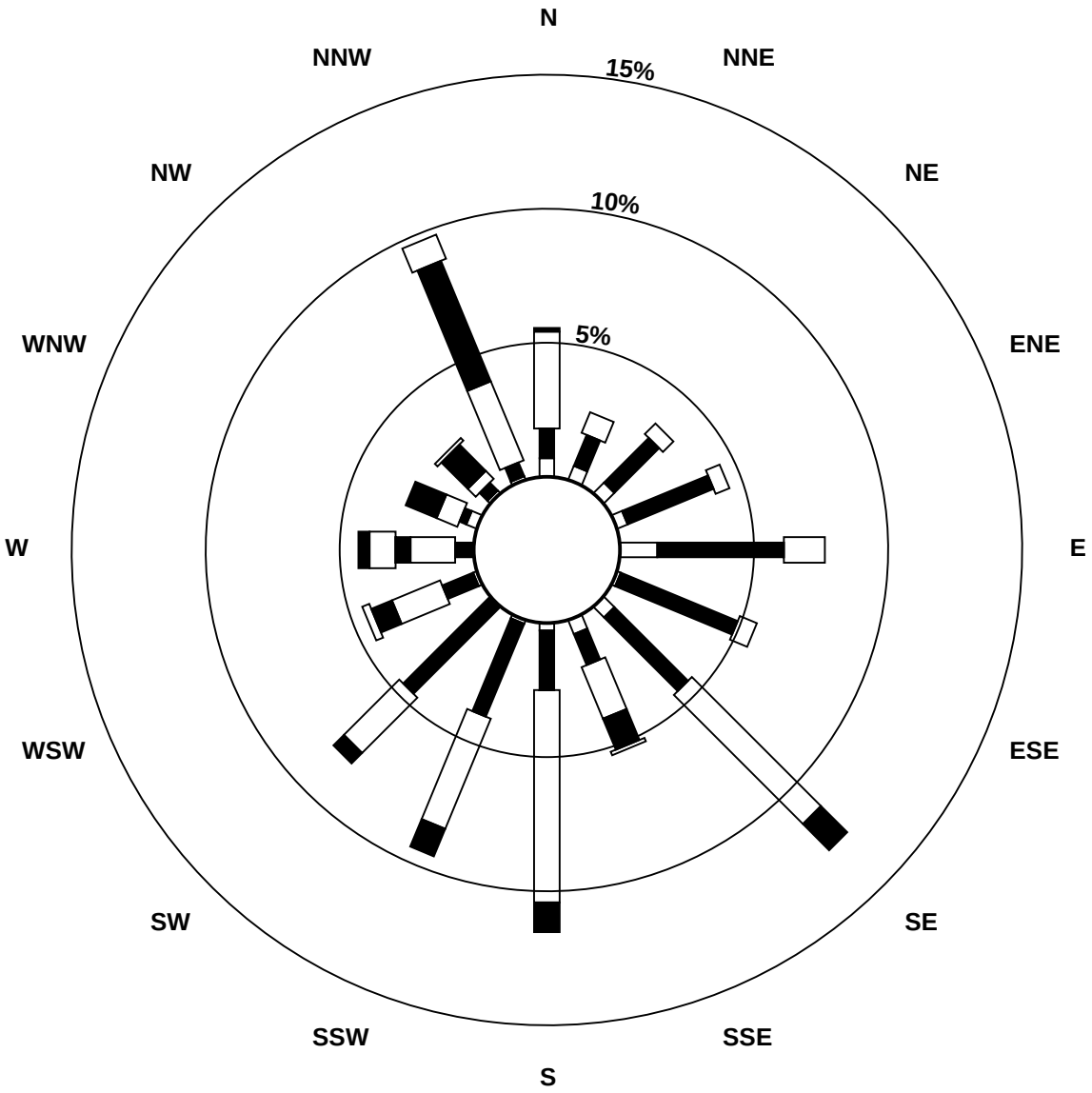
Total Number of Hours: 720

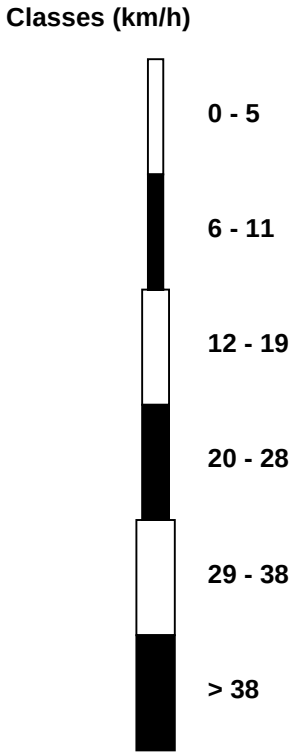
Wood Buffalo Environmental Association

Wind Rose Apr 2016

Wind Speed (WS) - km/h

ConocoPhillips - Surmont (AMS502)





Total Number of Valid Hours: 720

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

Maximum Value: 10 km/h on Apr 19 17:00

Minimum Value: 0 km/h on Apr 17 22:00

Percentiles: $P_1 = 1$ $P_{10} = 1$ $Q_1 = 2$ Median = 3 $Q_3 = 4$ $P_{90} = 5$ $P_{99} = 8$

Hours in Service:	720
Hours of Data:	720
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-Apr	4	4	4	3	3	2	2	3	6	6	4	4	4	3	3	3	3	3	2	1	1	2	2	3	6
2-Apr	2	3	3	4	2	1	2	2	1	2	2	2	3	3	3	3	2	2	3	2	2	2	2	2	4
3-Apr	1	1	1	5	3	3	3	4	3	3	4	3	3	4	4	3	4	3	2	2	1	2	3	4	5
4-Apr	3	3	3	2	2	2	2	2	3	3	3	3	3	3	3	2	2	2	1	1	2	1	1	1	3
5-Apr	1	1	1	1	1	1	1	1	2	2	4	4	3	2	3	3	3	3	3	3	3	3	2	2	4
6-Apr	3	4	4	4	5	4	5	5	6	4	4	5	5	5	5	4	5	6	4	4	4	4	4	3	6
7-Apr	3	3	3	3	1	2	1	2	2	1	1	2	2	3	3	3	3	2	2	2	3	2	2	2	3
8-Apr	1	3	3	3	3	3	3	3	4	4	3	4	5	5	5	5	6	5	4	4	4	5	4	5	6
9-Apr	4	3	4	2	4	6	6	6	5	5	5	6	6	7	6	6	5	6	5	6	5	6	4	5	7
10-Apr	5	5	4	4	4	4	4	4	4	4	4	4	5	4	3	3	3	2	1	2	1	2	2	3	5
11-Apr	3	3	3	3	3	3	4	3	3	3	3	3	4	4	5	4	5	3	3	3	2	3	3	2	5
12-Apr	2	3	4	3	3	3	3	3	3	3	3	3	4	4	4	3	3	3	2	2	3	2	3	2	4
13-Apr	3	1	1	2	1	1	2	2	2	2	2	4	2	2	2	2	1	1	1	1	1	1	2	1	4
14-Apr	2	1	2	5	4	4	3	4	3	4	5	4	4	3	3	3	3	3	2	2	3	2	1	1	5
15-Apr	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	2	2	3	3	3	3	3
16-Apr	4	3	3	3	2	3	4	4	5	4	4	4	6	7	5	5	5	4	3	1	1	1	2	1	7
17-Apr	3	2	2	2	3	3	3	4	3	3	2	4	4	5	5	6	5	4	1	1	0	0	2	2	6
18-Apr	1	1	1	2	2	2	3	3	3	4	5	6	6	6	7	6	6	7	5	4	5	5	5	7	7
19-Apr	7	6	6	5	6	5	4	5	7	8	8	7	8	8	9	9	10	8	7	5	3	3	3	2	10
20-Apr	3	4	6	5	5	5	4	5	5	5	4	5	5	5	5	4	4	3	2	2	1	1	1	1	6
21-Apr	1	1	2	1	2	1	2	2	2	3	3	3	4	4	4	4	4	3	3	2	2	2	2	2	4
22-Apr	2	1	1	1	1	1	1	2	2	3	3	3	3	4	3	3	4	3	3	2	2	2	1	1	4
23-Apr	2	1	1	1	1	1	2	2	2	3	4	4	5	4	5	5	4	3	4	3	3	3	2	2	5
24-Apr	2	2	2	2	2	3	3	3	3	5	5	5	5	4	5	5	5	5	5	5	5	4	4	3	5
25-Apr	3	3	2	3	3	2	2	2	2	3	3	3	3	3	3	3	3	2	2	1	1	1	1	2	3
26-Apr	2	2	3	2	2	2	2	3	2	2	3	2	3	3	2	2	2	2	2	2	2	4	4	3	4
27-Apr	2	3	2	2	2	1	1	1	2	2	2	2	3	3	6	2	3	2	2	3	2	1	2	2	6
28-Apr	1	2	1	2	2	1	2	2	3	4	4	4	4	5	6	6	5	5	4	4	3	4	2	2	6
29-Apr	3	3	3	3	3	3	4	4	5	6	7	7	6	6	6	5	5	5	4	3	2	2	2	3	7
30-Apr	2	2	2	2	2	2	2	2	3	5	5	6	6	6	5	6	5	4	2	2	1	1	3	2	6
	7	6	6	5	6	6	6	6	7	8	8	7	8	8	9	9	10	8	7	6	5	6	5	7	
	Diurnal Maximum																								

Direction of Maximum Speed: 264 deg on Apr 19 15:00
Direction of Maximum Daily Speed Average: 264.0 deg on Apr 19

Direction of Minimum Speed: 22 deg on Apr 27 11:00

Direction of Minimum Daily Speed Average: 2.3 deg on Apr 27

Monthly Average Direction: 235.5 deg

Hours in Service:	720
Hours of Data:	720
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-Apr	245	266	284	293	302	300	303	337	341	338	344	345	346	328	358	1	2	32	41	88	110	129	135	138	329.0
2-Apr	139	139	145	137	129	99	121	139	118	95	88	72	72	49	35	30	29	27	23	39	48	62	66	64	81.5
3-Apr	64	95	162	290	353	349	357	345	343	341	349	356	348	349	359	2	357	357	9	50	80	133	143	183	358.3
4-Apr	196	200	203	205	215	217	197	193	181	141	139	132	135	155	137	131	134	124	111	113	98	92	96	90	159.3
5-Apr	67	54	83	86	100	108	103	111	111	140	154	148	139	133	151	162	188	189	195	189	184	182	185	189	154.8
6-Apr	220	242	265	279	286	290	298	311	332	342	337	300	306	305	309	314	311	323	349	346	344	353	346	350	311.7
7-Apr	353	348	346	347	29	56	176	111	111	132	120	108	75	72	43	40	47	46	51	61	64	83	104	121	51.3
8-Apr	123	137	144	143	141	141	143	144	141	145	145	147	139	137	144	145	147	146	146	146	147	148	147	147	144.0
9-Apr	174	180	180	174	318	329	320	327	325	327	328	331	335	325	336	342	340	338	342	339	342	344	340	345	332.6
10-Apr	350	345	342	343	342	342	346	347	356	9	12	27	348	345	8	12	31	41	77	100	122	130	141	137	3.6
11-Apr	155	187	187	192	201	212	215	209	193	182	176	182	180	186	189	199	189	213	223	198	193	200	199	202	194.0
12-Apr	202	232	243	248	265	278	292	319	345	345	353	3	1	14	13	6	34	43	53	71	91	110	116	131	335.7
13-Apr	125	90	107	117	93	93	124	122	121	113	126	4	79	66	47	71	53	46	48	19	14	1	304	3	78.3
14-Apr	348	313	322	320	335	329	339	344	341	334	299	305	329	357	352	358	354	354	6	343	354	23	11	337	337.7
15-Apr	351	291	279	285	277	254	262	243	227	133	133	135	135	133	132	140	142	134	133	138	169	181	183	186	162.6
16-Apr	183	186	188	189	190	204	227	237	243	237	253	245	220	239	253	250	250	236	240	223	225	239	237	246	227.6
17-Apr	241	226	232	235	225	223	217	225	241	223	144	277	279	287	273	275	268	270	257	218	220	217	206	211	242.0
18-Apr	222	225	225	217	215	229	236	231	218	195	187	187	200	201	182	192	195	196	188	183	183	180	188	200	198.7
19-Apr	212	217	222	234	244	255	266	280	279	274	270	265	264	266	264	268	267	279	292	295	289	274	277	272	264.0
20-Apr	277	311	344	346	342	347	346	349	342	344	343	345	340	356	6	21	16	41	63	83	95	99	119	125	352.5
21-Apr	127	130	128	202	153	214	203	197	153	98	93	78	70	58	69	67	50	68	85	94	92	91	65	80	93.6
22-Apr	90	77	85	38	50	58	68	74	73	88	83	101	95	75	79	67	83	85	85	86	95	109	117	111	84.0
23-Apr	106	106	101	90	98	93	96	108	88	84	99	118	112	111	135	129	124	112	126	98	108	123	125	129	111.4
24-Apr	119	124	130	132	129	162	169	132	139	148	150	144	162	143	148	143	147	174	169	154	178	184	177	159	152.1
25-Apr	183	178	145	150	145	141	153	168	153	184	184	196	194	191	193	193	189	204	204	239	240	220	223	201	181.1
26-Apr	198	198	184	184	183	182	180	185	197	186	190	183	189	196	210	178	175	181	126	127	153	150	271	229	184.6
27-Apr	204	230	214	210	355	302	70	100	95	67	22	24	96	99	6	90	169	137	144	124	131	137	134	291	147.0
28-Apr	233	203	224	230	235	224	228	222	194	176	194	171	175	157	148	152	164	155	143	145	138	172	196	189	178.7
29-Apr	192	190	187	174	156	177	178	189	179	164	168	171	189	183	177	189	182	192	191	195	194	195	210	191	182.5
30-Apr	194	195	200	217	226	235	227	218	205	199	210	210	201	221	226	244	236	246	255	242	223	228	243	248	222.5
	191.9	209.4	213.7	230.3	249.5	260.4	257.0	259.9	267.6	201.8	183.2	201.5	210.3	230.3	211.9	173.3	189.6	179.7	116.3	124.1	142.7	156.8	172.1	176.8	
	Diurnal Average																								

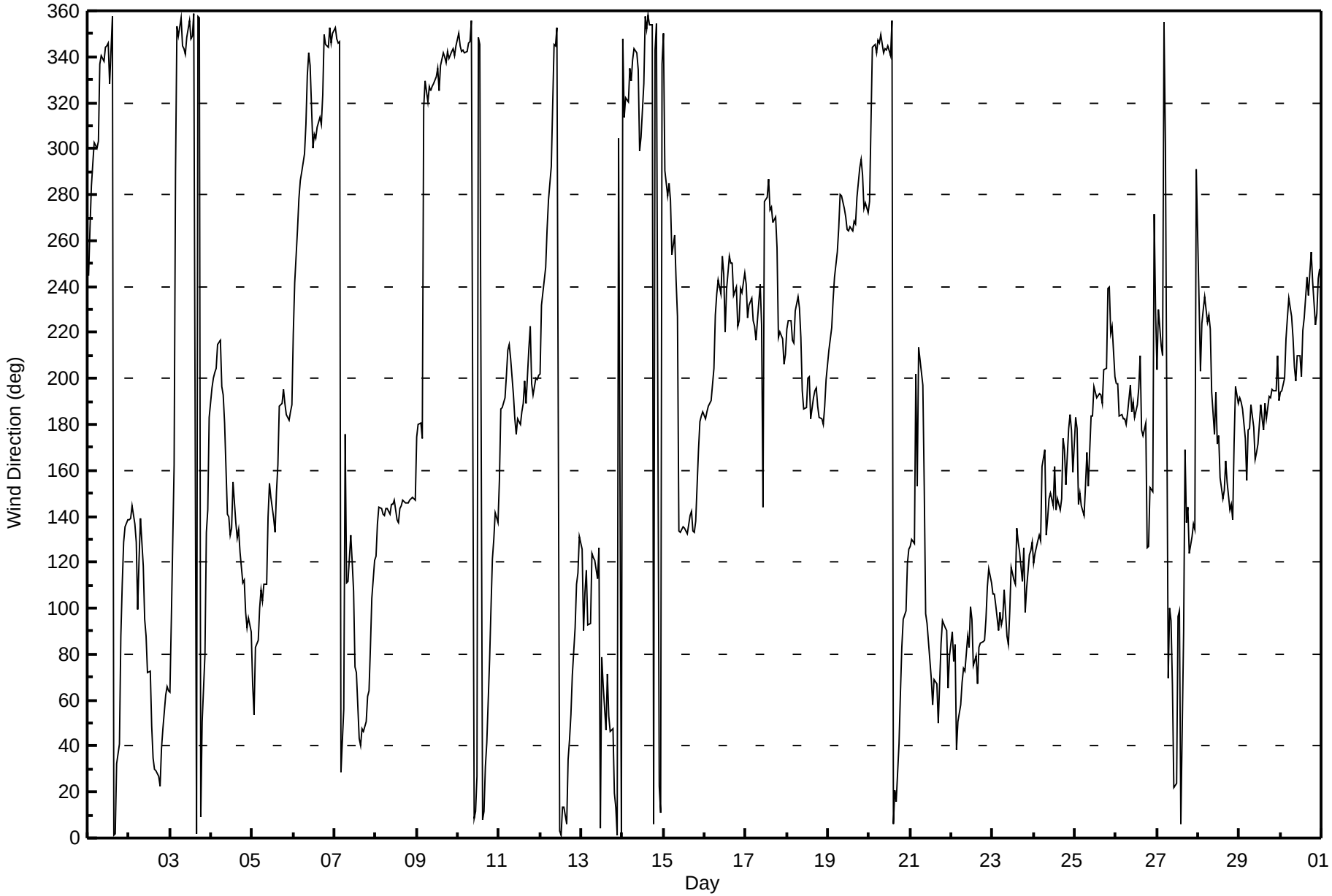
All monthly, daily, and diurnal averages have been calculated using vector methods

Wood Buffalo Environmental Association

Hourly Averages

Wind Direction (WD) - deg

ConocoPhillips - Surmont - April 2016



Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg

ConocoPhillips - Surmont - April 2016

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0
Maximum Value: 97 deg on Apr 27 11:00

Minimum Value: 5 deg on Apr 17 22:00

Percentiles: $P_1 = 7$ $P_{10} = 10$ $Q_1 = 13$ Median = 16 $Q_3 = 21$ $P_{90} = 30$ $P_{99} = 73$

Hours in Service:	720
Hours of Data:	720
Hours of Missing Data:	0
Hours of Calibration:	0
Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily
	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-Apr	12	10	10	9	8	8	12	18	14	15	16	22	18	26	18	21	19	22	15	15	12	11	12	11	26
2-Apr	11	11	10	12	13	17	24	13	22	20	26	23	42	27	26	16	17	20	17	13	17	19	17	17	42
3-Apr	28	26	59	44	27	16	16	15	12	15	16	18	23	21	22	20	19	18	21	20	19	13	9	23	59
4-Apr	14	13	12	12	12	12	17	16	17	26	17	16	18	31	25	16	16	16	11	16	11	12	10	18	31
5-Apr	14	16	20	13	17	12	12	13	17	13	21	15	14	13	22	25	17	15	13	18	13	12	15	15	25
6-Apr	17	13	10	10	10	11	9	13	17	12	18	11	12	13	14	14	15	17	15	13	13	16	14	15	18
7-Apr	16	18	13	14	16	27	66	21	20	28	22	29	27	39	33	18	20	17	17	14	14	16	12	11	66
8-Apr	10	12	10	10	10	9	10	11	11	11	11	11	14	14	12	12	11	11	11	10	10	10	10	15	15
9-Apr	21	18	19	26	93	15	13	14	18	17	15	15	17	16	14	12	13	12	12	12	12	13	11	14	93
10-Apr	16	13	11	11	11	10	13	15	19	23	26	25	38	55	63	34	75	54	17	12	9	10	9	10	75
11-Apr	15	13	13	13	15	14	13	14	19	17	13	17	21	26	27	23	20	23	15	14	14	14	14	12	27
12-Apr	12	14	8	7	15	10	10	22	14	13	19	22	31	29	30	30	22	31	13	15	12	13	15	12	31
13-Apr	24	30	13	10	24	13	20	12	13	12	17	69	17	18	22	12	14	18	17	18	14	21	30	14	69
14-Apr	12	32	30	17	14	14	13	11	14	19	12	13	27	17	15	16	16	16	15	36	55	17	15	35	55
15-Apr	47	36	14	11	15	32	22	24	32	45	23	17	18	18	17	15	14	15	11	9	27	20	16	13	47
16-Apr	12	12	14	13	13	14	14	13	13	19	20	22	24	22	22	18	26	26	13	7	7	7	9	6	26
17-Apr	12	11	13	12	13	14	14	16	12	31	52	78	20	23	29	30	21	15	11	8	7	5	9	13	78
18-Apr	7	10	10	11	10	12	12	14	21	27	22	21	20	24	19	20	20	17	15	15	14	15	16	17	27
19-Apr	17	14	14	13	9	9	9	11	14	14	16	14	14	14	12	13	13	13	14	10	9	8	8	9	17
20-Apr	26	15	14	14	15	17	15	17	14	17	15	19	19	32	26	32	32	32	20	10	9	9	9	9	32
21-Apr	11	9	34	80	65	10	15	17	32	35	58	50	46	43	33	22	22	23	19	11	11	15	12	13	80
22-Apr	13	14	12	20	9	12	15	23	21	23	16	24	29	28	30	24	20	15	14	12	12	13	11	12	30
23-Apr	11	10	11	12	10	11	16	18	22	23	21	29	32	28	29	23	19	18	17	12	12	12	12	11	32
24-Apr	10	11	11	10	10	22	35	12	13	16	16	17	29	21	14	15	17	21	22	21	21	16	20	17	35
25-Apr	19	20	14	15	13	11	19	18	16	18	19	20	22	22	19	18	17	17	18	11	10	13	12	16	22
26-Apr	15	16	15	13	13	13	15	19	21	19	17	15	17	18	24	19	15	18	17	14	42	47	41	35	47
27-Apr	13	14	18	17	59	36	37	35	54	36	97	62	80	82	51	21	30	43	48	13	25	8	70	40	97
28-Apr	21	20	7	10	10	9	13	18	26	22	29	31	25	30	40	21	23	21	12	12	10	24	14	23	40
29-Apr	15	14	14	18	23	19	20	15	17	19	22	19	23	27	27	26	25	22	16	15	13	14	13	17	27
30-Apr	19	13	14	13	14	12	13	20	20	20	21	22	25	24	18	25	20	14	12	21	8	8	7	6	25
	47	36	59	80	93	36	66	35	54	45	97	78	80	82	63	34	75	54	48	36	55	47	70	40	
	Diurnal Maximum																								

Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

Calibration Date	April 18, 2016	Last Calibration	March 21, 2016
Station Name	ConocoPhillips - Surmont	Station Number	AMS 502
Reason:	Routine		
Start Time (MST)	10:22	End Time (MST)	14:35
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	622
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	518	518
Analyzer IP address	192.168.1.43		Lamp voltage	1937	1886
Calculated slope	0.995648	1.004425	Chamber temp	50.0	50.0
Calculated intercept	1.170679	-0.190777	Pressure	21.6	22.1
Analyzer Background	21.1	21.1	Flow	0.540	0.549
Analyzer Coefficient	1.020	1.020	Intensity	48	47

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	0.3	----
as found span	5000	83.2	803.7	800.0	1.005
calibrator zero	5000	0.0	0.0	0.3	----
high point	5000	83.2	803.7	800.0	1.005
second point	5000	41.6	401.9	401.4	1.001
third point	5000	20.8	200.9	199.4	1.008
as left zero	5000	0.0	0.0	0.3	----
as left span	5000	83.2	803.7	798.6	1.006
				Average Correction Factor	1.004

Corrected As found	799.8	Previous response	806.1	% change	0.8%

Notes:

Sample inlet filter replaced after as founds. No adjustments.

Calibration Performed By: Asad Hidayat

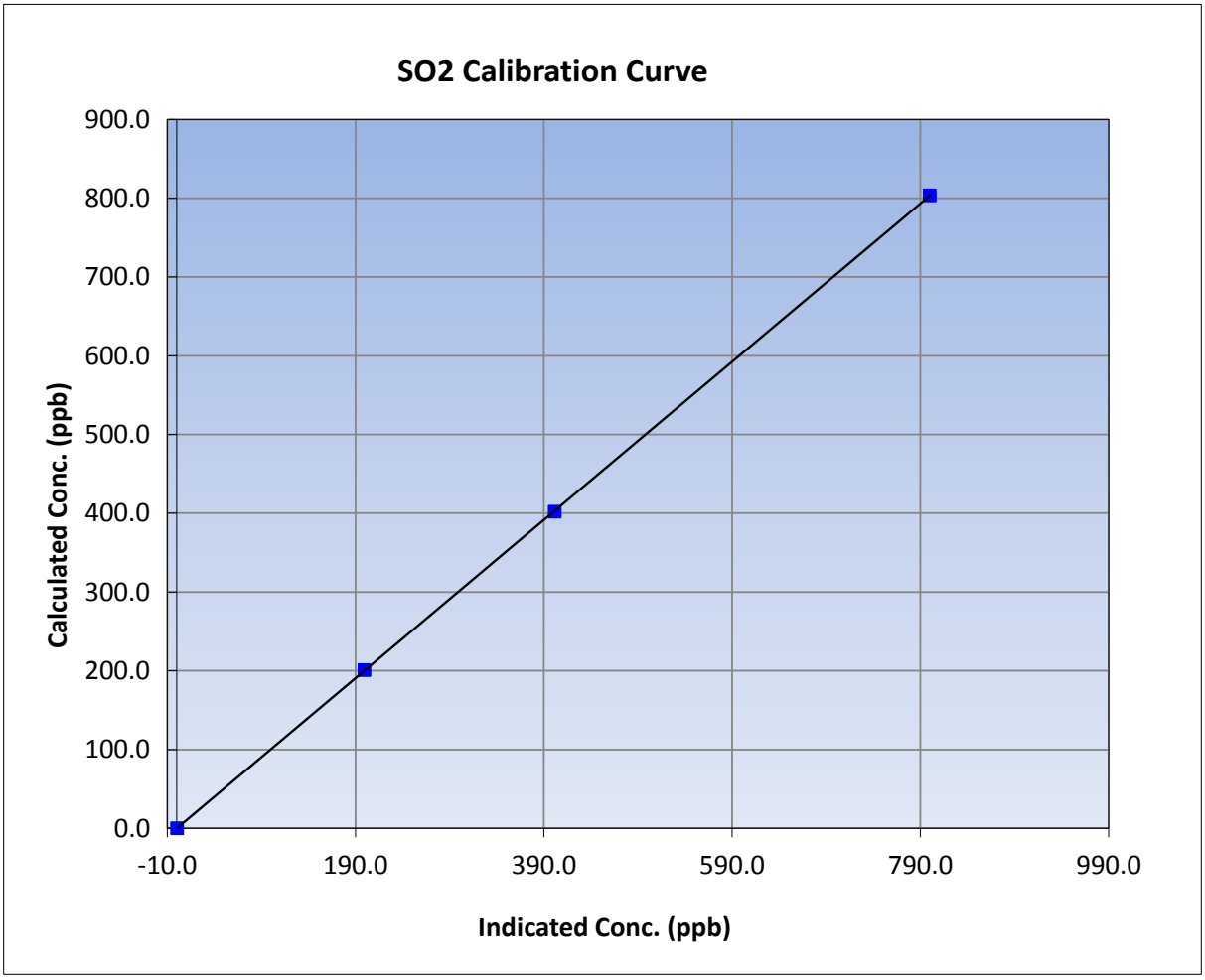
Wood Buffalo Environmental Association
SO2 Calibration Report

Station Information

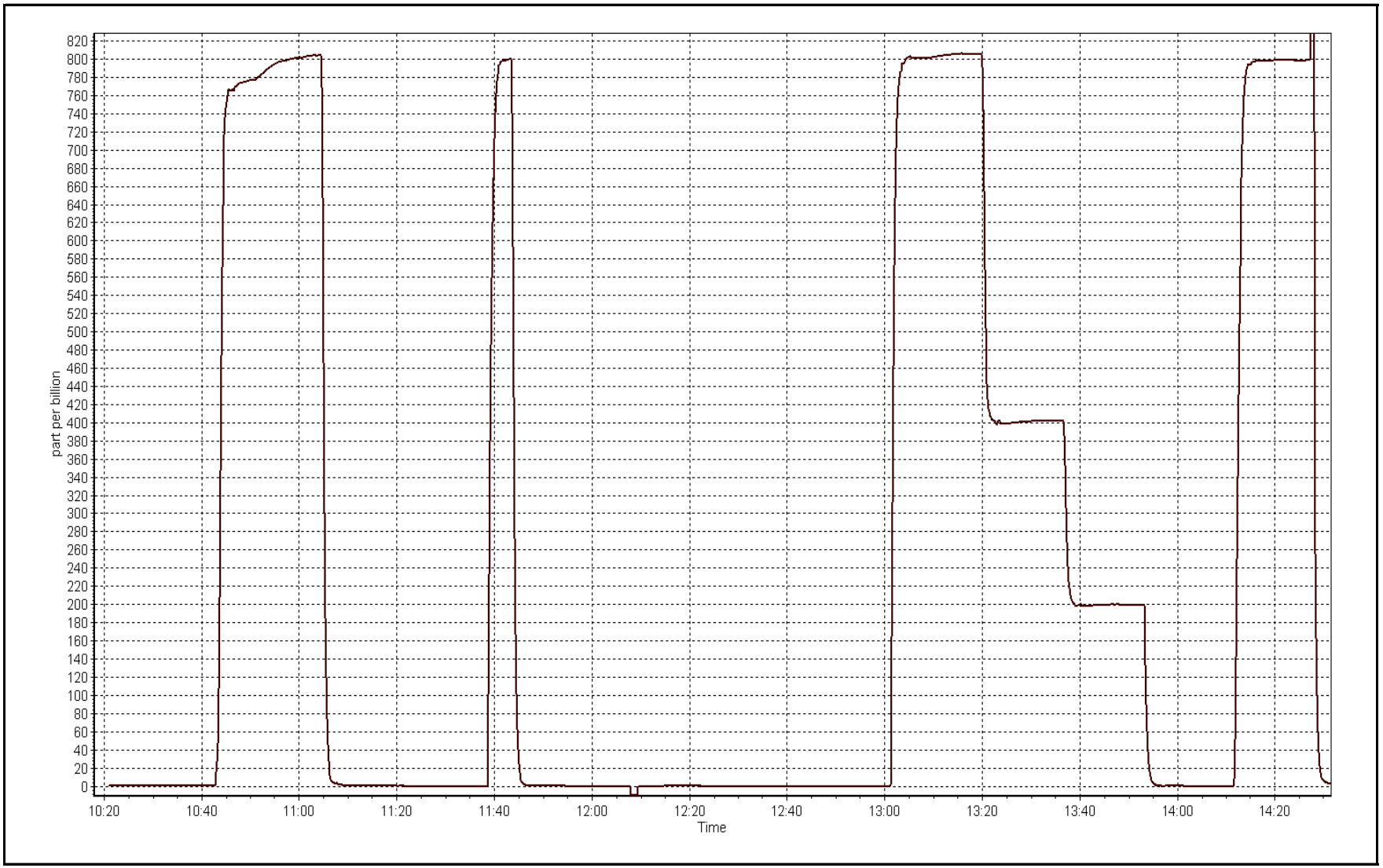
Calibration Date	April 18, 2016	Previous Calibration	March 21, 2016
Station Name	ConocoPhillips - Surmont	Station Number	AMS 502
Start Time (MST)	10:22	End Time (MST)	14:35
Analyzer make	API T100	Analyzer serial #	598

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.3	----	Correlation Coefficient	0.999994
803.7	800.0	1.0046		
401.9	401.4	1.0012	Slope	1.004425
200.9	199.4	1.0077		
			Intercept	-0.190777



SO2 Calibration Plot Date: April 18, 2016



Wood Buffalo Environmental Association
H2S Calibration Report

Station Information

Calibration Date	April 20, 2016	Last Calibration	March 24, 2016
Station Name	ConocoPhillips	Station Number	AMS 502
Reason:	Routine		
Start Time (MST)	7:33	End Time (MST)	10:00
Gas Cert Reference	LL34303	Station temp.	21 Deg C
Cal Gas Concentration	10.4 ppm	Cal Gas Exp Date	30/05/2016
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	48.3 ppm	SO2 gas cert/exp	LL104215 12-Feb-18

Analyzer Information

	Before	*After*		*Before*	*After*
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	497	497
Analyzer IP address	192.168.1.75		Lamp voltage	2537	2537
Calculated slope	0.995783	0.991615	Chamber temp	50	50
Calculated intercept	0.123892	0.166433	Pressure	23.4	23.7
Analyzer Background	18.1	18.1	Flow	0.631	0.640
Analyzer Coefficient	1.003	1.003	Intensity	56	56
			Converter temp.	314	314

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	0.0	----
as found span	5000	38.5	80.1	80.7	0.992
SO2 scrubber check	5000	20.7	200.0	3.5	----
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	38.5	80.1	80.7	0.992
second point	5000	19.3	40.1	40.2	0.999
third point	5000	12.1	25.2	25.1	1.003
as left zero	5000	0.0	0.0	0.1	----
as left span	5000	38.5	80.1	80.8	0.991
				Average Correction Factor	0.998

Corrected As found	80.7	Previous response	80.3	% change	-0.5%

Notes:

Sample inlet filter replaced after as founds. Scrubber check done after as founds. No adjustments.

Calibration Performed By: Asad Hidayat

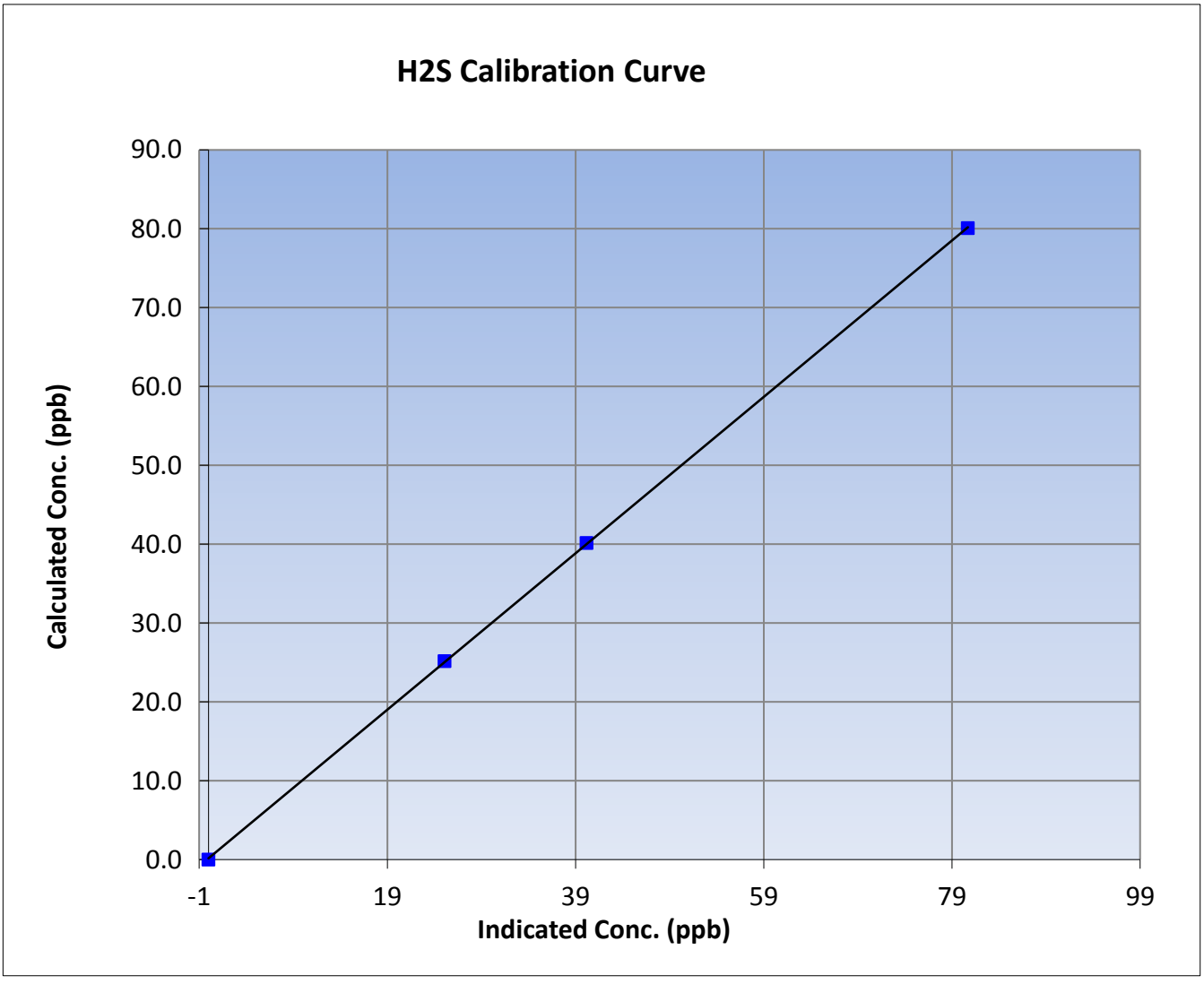
Wood Buffalo Environmental Association
H2S Calibration Report

Station Information

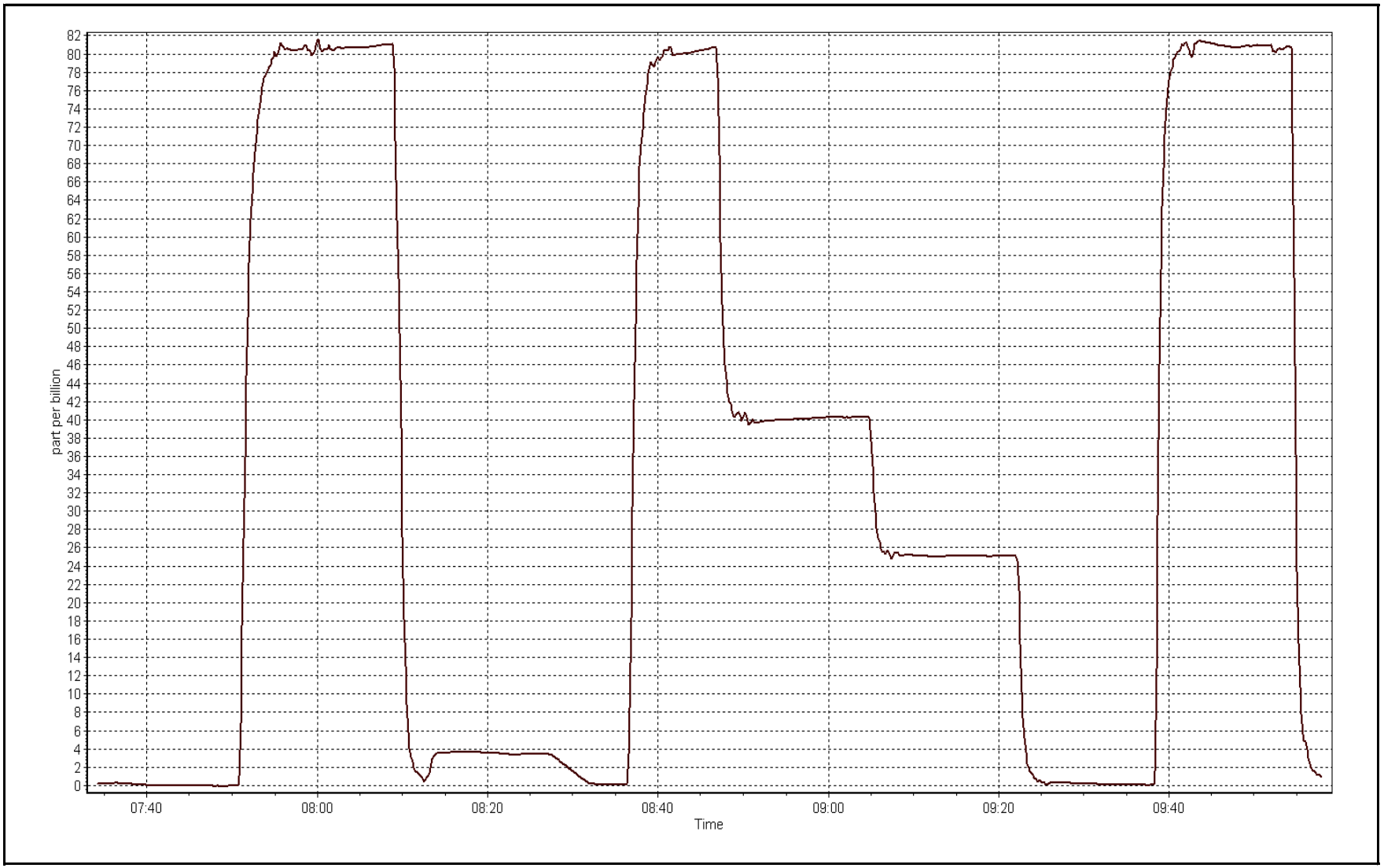
Calibration Date	April 20, 2016	Previous Calibration	March 24, 2016
Station Name	ConocoPhillips	Station Number	AMS 502
Start Time (MST)	7:33	End Time (MST)	10:00
Analyzer make	API T101	Analyzer serial #	197

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999979
80.1	80.7	0.9923		
40.1	40.2	0.9994	Slope	0.991615
25.2	25.1	1.0031		
			Intercept	0.166433



H2S Calibration Plot Date: April 20, 2016



Wood Buffalo Environmental Association
NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	April 19, 2016	Previous Calibration	March 21, 2016
Station Name	ConocoPhillips	Station Number	AMS 502
Reason:	Routine		
Start Time (MST)	9:00	End Time (MST)	15:40
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	0.998748	0.997961	0.998376
	Data Offset	1.287808	1.295706	-0.414179
Current Calibration	Data Slope	1.001777	1.001944	0.997466
	Data Offset	1.652240	1.428812	-0.700943

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1218153356

Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
Analyzer IP	192.168.1.42		192.168.1.42	
NO coefficient	0.970		0.949	
NOX coefficient	1.000		1.000	
NO2 coefficient	1.000		1.000	
NO bkgrnd	10.1		8.5	
NOX bkgrnd	10.4		9.2	
Chamber Temp	50.4	Deg C	50.5	Deg C
Moly Temp	322.4	Deg C	328.1	Deg C
PMT voltage	-866.2	V	-866.5	V
PMT Temp	-2.7	Deg C	-2.7	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	160.6	mmHg	162.9	mmHg
R Cell Press Nox	160.9	mmHg	162.7	mmHg
NO sample flow	0.657	lpm	0.661	lpm
Nox sample Flow	0.655	lpm	0.663	lpm

Notes:

Sample inlet filter replaced after as founds yesterday (April 18, 2016). O rings around the capillaries were replaced due to unstable zero and span response during cal yesterday, which was aborted. Adjusted both zero and span.

Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: April 19, 2016 Station Number: AMS 502

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	13.3	12.7	0.6	----	----
as found span	5000	83.2	800.4	800.4	0.0	827.4	826.3	1.1	0.9674	0.9686
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.2	0.0	----	----
high point	5000	83.2	800.4	800.4	0.0	798.0	798.0	0.0	1.0031	1.0030
second point	5000	41.6	400.2	400.2	0.0	397.4	397.5	-0.2	1.0072	1.0067
third point	5000	20.8	200.1	200.1	0.0	196.5	196.9	-0.4	1.0184	1.0162
as left zero	5000	0.0	0.0	0.0	0.0	-0.4	0.0	-0.3	----	----
as left span	5000	83.2	800.4	488.0	312.4	801.5	490.4	311.1	0.9986	0.9951
								Average Correction Factor	1.0095	1.0086

Corrcted As found NO_X= 814.1 NO= 813.7 Percent Change NO_X= -1.7% NO= -1.6%

Previous Response NO_X= 800.1 NO= 800.7

GPT Calibration Data

Dilution Flow (total) 5000 ccm Source Gas Flow 83.20 ccm NOX ref calc conc = 800.4 ppb NO ref calc conc = 800.4 ppb

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
1st NO ref point		0.0	795.9	795.2	0.0	1.0056	1.0065	----	----
1st NO2 (300)	488.0	307.2	796.2	488.0	308.1	1.0053	----	0.9969	100.3%
2nd NO2 (200)	584.0	211.2	796.7	584.0	212.7	1.0047	----	0.9931	100.7%
3rd NO2 (100)	684.2	111.0	797.3	684.2	113.1	1.0039	----	0.9819	101.8%
2nd NO ref point		0.0	798.4	798.7	-0.2	1.0025	1.0021	----	----
				Average Correction Factor		1.0041		0.9907	100.9%

Calibration Performed By: Asad Hidayat

Wood Buffalo Environmental Association

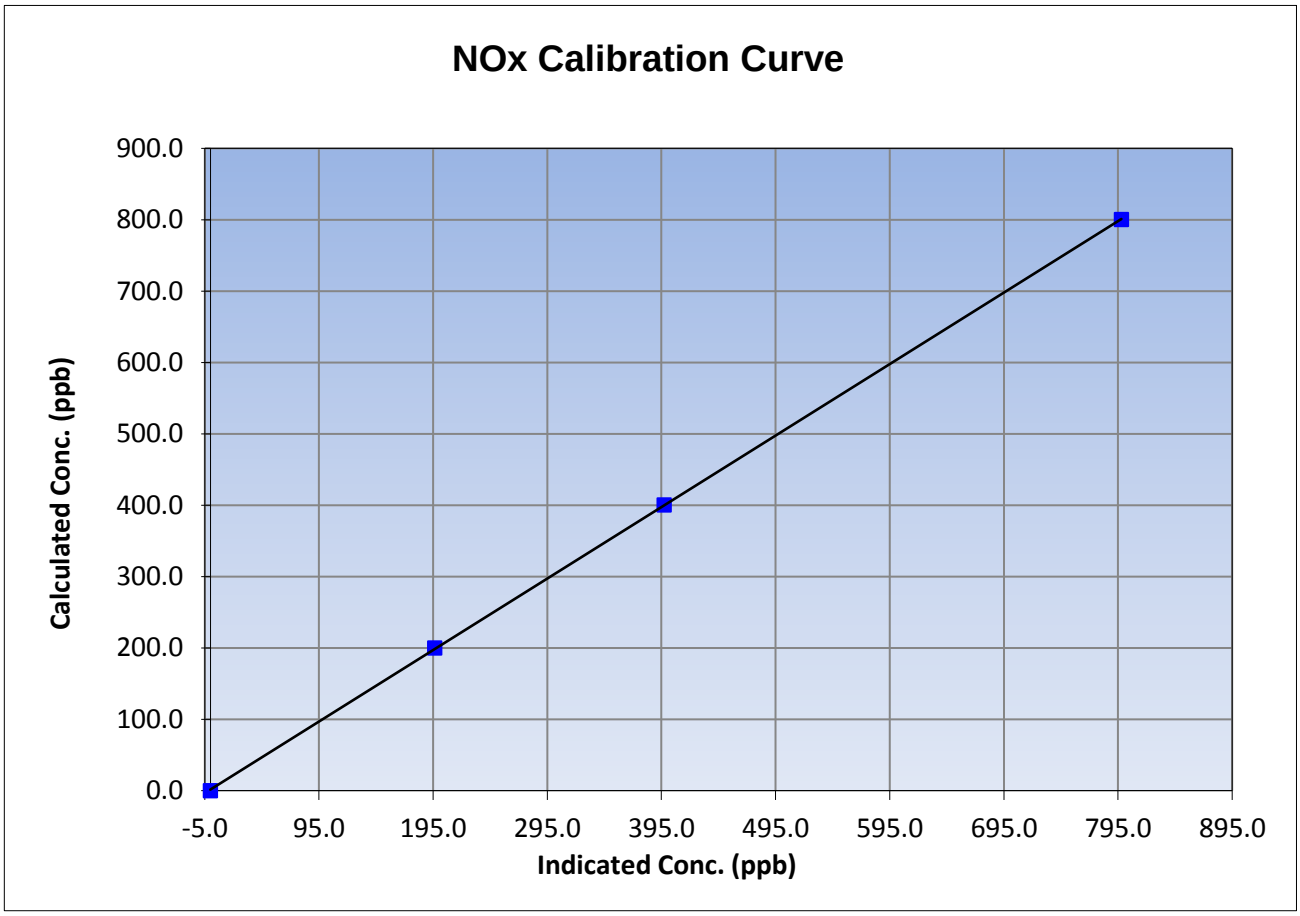
NO_X Calibration Summary

Station Information

Calibration Date	April 19, 2016	Previous Calibration	March 21, 2016
Station Name	ConocoPhillips	Station Number	AMS 502
Start Time (MST)	9:00	End Time (MST)	15:40
Analyzer make	Thermo 42i	Analyzer serial #	1218153356

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	----	Correlation Coefficient	0.999985
800.4	798.0	1.0031		
400.2	397.4	1.0072	Slope	1.001777
200.1	196.5	1.0184		
			Intercept	1.652240



Wood Buffalo Environmental Association

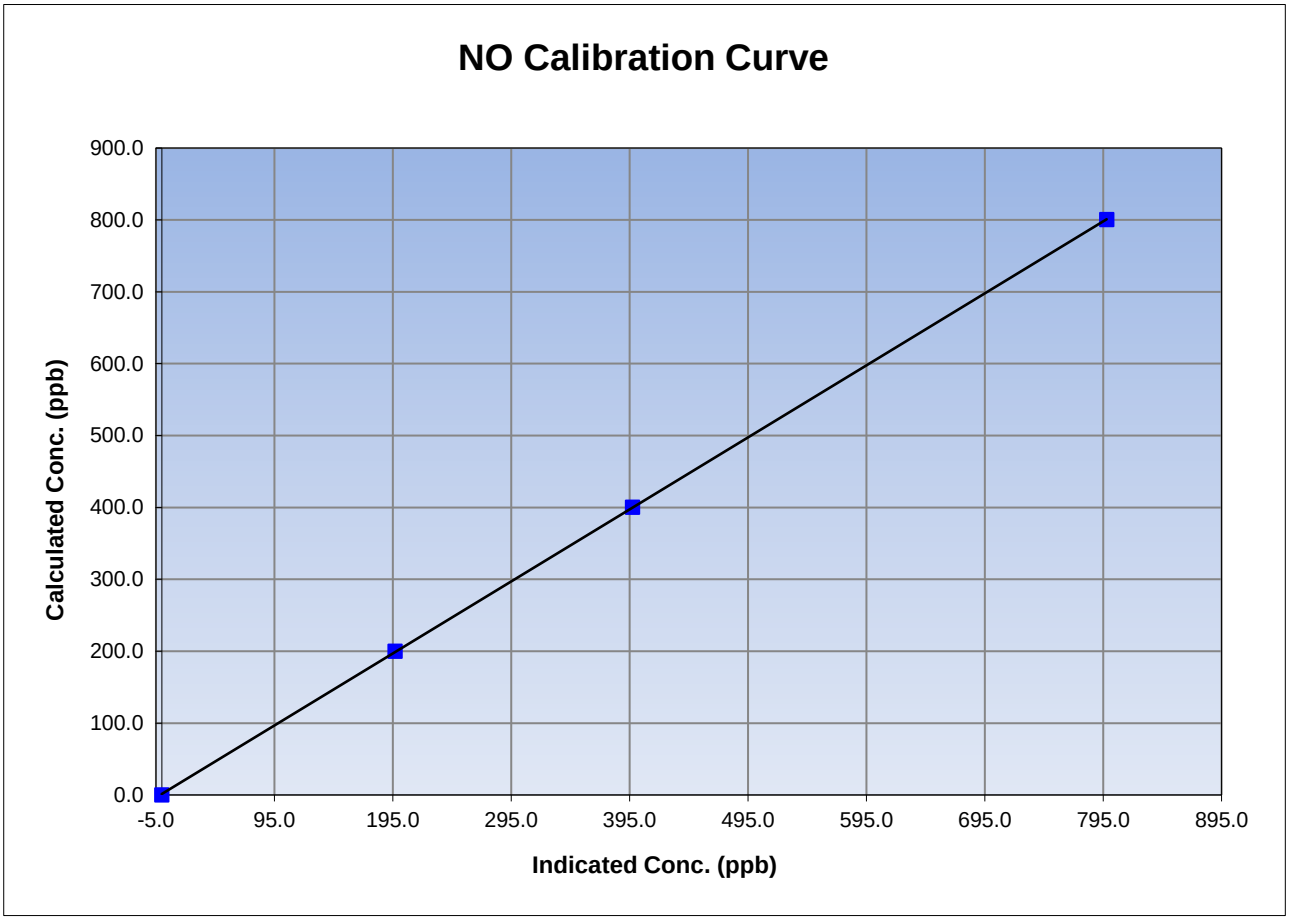
NO Calibration Summary

Station Information

Calibration Date	April 19, 2016	Previous Calibration	March 21, 2016
Station Name	ConocoPhillips	Station Number	AMS 502
Start Time (MST)	9:00	End Time (MST)	15:40
Analyzer make	Thermo 42i	Analyzer serial #	1218153356

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	N/A	Correlation Coefficient	0.999988
800.4	798.0	1.0030		
400.2	397.5	1.0067	Slope	1.001944
200.1	196.9	1.0162		
			Intercept	1.428812



Wood Buffalo Environmental Association

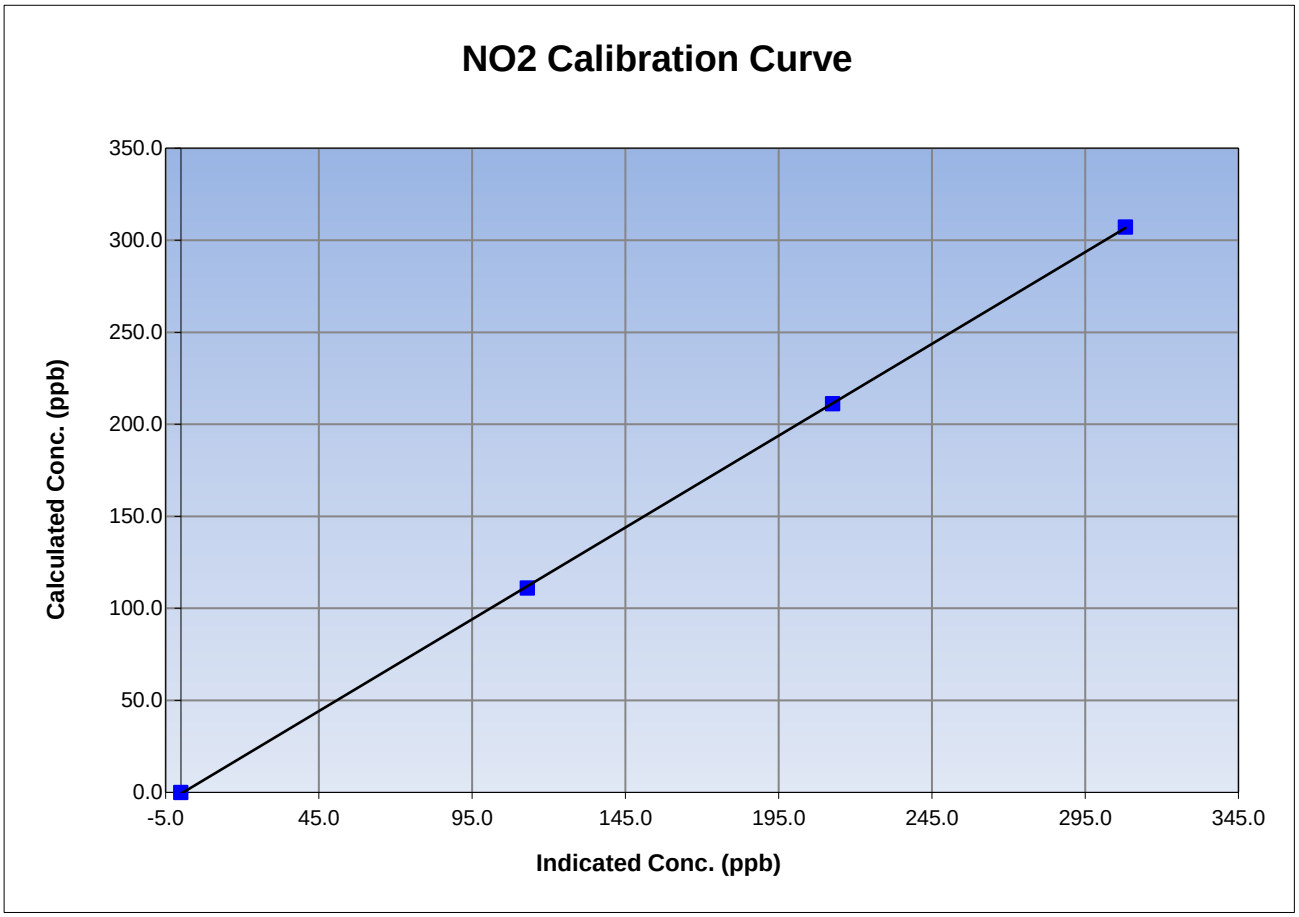
NO_2 Calibration Summary

Station Information

Calibration Date	April 19, 2016	Previous Calibration	March 21, 2016
Station Number	ConocoPhillips	Station Number	AMS 502
Start Time (MST)	9:00	End Time (MST)	15:40
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	0.0	N/A	Correlation Coefficient	0.999961
307.2	308.1	0.9969		
211.2	212.7	0.9931	Slope	0.997466
111.0	113.1	0.9819		
			Intercept	-0.700943



NOX Calibration Plot Date: April 19, 2016