



Wood Buffalo Environmental Association

JUNE 2015 MONTHLY REPORT

CONTINUOUS MONITORING
INTEGRATED MONITORING
July 30, 2015

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



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July 30, 2015

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

www.wbea.org

Enclosed is the June 2015 ambient air quality monitoring report for the continuous ambient air quality monitoring stations of the Wood Buffalo Environmental Association regional air quality monitoring network.

The continuous ambient air quality monitoring network stations are:

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

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

Member	EPEA Approval No.
Athabasca Oil Corporation	289664-00-00
Brion Energy	254465-00-00
Canadian Natural Resources Ltd.	149968-00-01
Cenovus Energy	48522-01-00
Connacher Oil and Gas Ltd.	240008-00-03



ConocoPhillips Canada 48263-00-00

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

Aboriginal Communities

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

Government and Non-Industrial Organizations

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

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

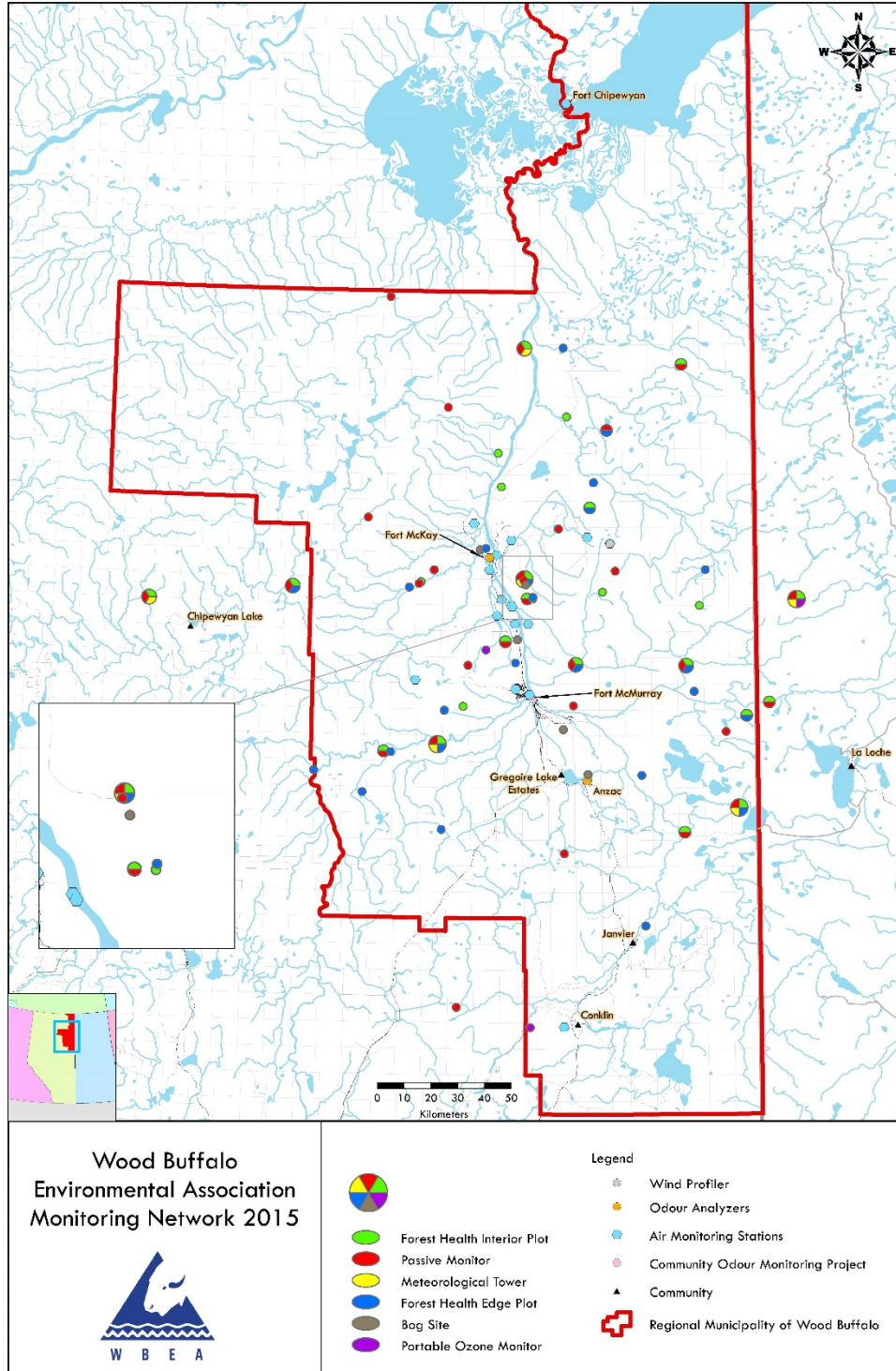


Figure 1 Map of WBEA Air Monitoring Network.

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

1.0 Concentrations in Excess of Alberta Ambient Air Quality Objectives

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

There were 37 ambient ground level concentrations of Particulate Matter (PM_{2.5}) in excess of the PM_{2.5} 24-hour air quality objective reported to the Energy and Environmental Response Centre in real time. After data processing to account for valid analyzer response and correction, there were 35 concentrations in excess of the PM_{2.5} air quality objective. There were 2 24-hour objective exceedances reported in real-time that were found not to be in exceedance due to excessive loading and foreign material in the sample chamber from wild fires.

There was 1 H₂S ambient ground level concentration in excess of the 1-hour H₂S air quality objective reported to the Energy and Environmental Response Centre in real time.

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

Site	Parameter	Date / Time	Reference	Period	Concentration ppb or ug/m ³		Status
					Reported	Final	
AMS 5 Mannix	H ₂ S	20Jun15:02:00	299712	1-hour	11.0	11.0	exc
AMS 1 Fort McKay	PM _{2.5}	28Jun15:24:00	300052	24-hour	33.0	33	exc
AMS 1 Fort McKay	PM _{2.5}	29Jun15:24:00	300121	24-hour	81.0	82	exc
AMS 1 Fort McKay	PM _{2.5}	30Jun15:24:00	300193	24-hour	138.0	138	exc
AMS 6 Patricia McInnes	PM _{2.5}	29Jun15:24:00	300122	24-hour	221.0	221	exc
AMS 6 Patricia McInnes	PM _{2.5}	30Jun15:24:00	300194	24-hour	115.0	115	exc
AMS 7 Athabasca Valley	PM _{2.5}	29Jun15:24:00	300123	24-hour	130.0	131	exc
AMS 7 Athabasca Valley	PM _{2.5}	30Jun15:24:00	300195	24-hour	118.0	119	exc
AMS 8 Fort Chipewyan	PM _{2.5}	06Jun15:24:00	299282	24-hour	60.0	60	exc
AMS 8 Fort Chipewyan	PM _{2.5}	07Jun15:24:00	299297	24-hour	78.0	-	nae
AMS 8 Fort Chipewyan	PM _{2.5}	27Jun15:24:00	300016	24-hour	70.0	69	exc
AMS 8 Fort Chipewyan	PM _{2.5}	28Jun15:24:00	300052	24-hour	196.0	196	exc
AMS 8 Fort Chipewyan	PM _{2.5}	29Jun15:24:00	300124	24-hour	397.0	397	exc
AMS 8 Fort Chipewyan	PM _{2.5}	30Jun15:24:00	300196	24-hour	72.0	72	exc

<u>Site</u>	<u>Parameter</u>	<u>Date / Time</u>	<u>Reference</u>	<u>Period</u>	<u>Concentration ppb or ug/m³</u>		<u>Status</u>
					<u>Reported</u>	<u>Final</u>	
AMS 12 Millennium Mine	PM2.5	04Jun15:24:00	299218	24-hour	31.0	32	exc
AMS 12 Millennium Mine	PM2.5	25Jun15:24:00	299955	24-hour	36.0	37	exc
AMS 12 Millennium Mine	PM2.5	28Jun15:24:00	300052	24-hour	35.0	36	exc
AMS 12 Millennium Mine	PM2.5	29Jun15:24:00	300125	24-hour	68.0	69	exc
AMS 12 Millennium Mine	PM2.5	30Jun15:24:00	300197	24-hour	156	157	exc
AMS 13 Fort McKay - South	PM2.5	29Jun15:24:00	300126	24-hour	72.0	72	exc
AMS 13 Fort McKay - South	PM2.5	30Jun15:24:00	300198	24-hour	124	124	exc
AMS 14 Anzac	PM2.5	29Jun15:24:00	300127	24-hour	79.0	78	exc
AMS 14 Anzac	PM2.5	30Jun15:24:00	300199	24-hour	81.0	81	exc
AMS 15 CNRL Horizon	PM2.5	07Jun15:24:00	299298	24-hour	35.0	35	exc
AMS 15 CNRL Horizon	PM2.5	25Jun15:24:00	299955	24-hour	34.0	35	exc
AMS 15 CNRL Horizon	PM2.5	28Jun15:24:00	300052	24-hour	47.0	48	exc
AMS 15 CNRL Horizon	PM2.5	29Jun15:24:00	300128	24-hour	148.0	149	exc
AMS 15 CNRL Horizon	PM2.5	30Jun15:24:00	300200	24-hour	163.0	164	exc
AMS 16 Shell Muskeg River	PM2.5	07Jun15:24:00	299299	24-hour	31.0	31	exc
AMS 16 Shell Muskeg River	PM2.5	21Jun15:00:00	299745	24-hour	30.0	30	nae
AMS 16 Shell Muskeg River	PM2.5	25Jun15:24:00	299955	24-hour	34.0	34	exc
AMS 16 Shell Muskeg River	PM2.5	28Jun15:24:00	300052	24-hour	57.0	57	exc
AMS 16 Shell Muskeg River	PM2.5	29Jun15:24:00	300129	24-hour	89.0	89	exc
AMS 16 Shell Muskeg River	PM2.5	30Jun15:24:00	300201	24-hour	152.0	152	exc
AMS 17 Wapasu	PM2.5	07Jun15:24:00	299300	24-hour	46.0	46	exc
AMS 17 Wapasu	PM2.5	28Jun15:24:00	300052	24-hour	121.0	121	exc
AMS 17 Wapasu	PM2.5	29Jun15:24:00	300130	24-hour	108.0	107	exc
AMS 17 Wapasu	PM2.5	30Jun15:24:00	300202	24-hour	200.0	200	exc

*status legend:

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

1.1 Data Processing and Validation

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

After data processing and validation, NO₂ concentrations were re-calculated from baseline-corrected NO_x and NO concentrations. Specifically, the NO concentration was subtracted from the NO_x concentration to determine the NO₂ concentration. In cases where the NO_x and/or NO values exceeded the operating range of the analyzer, values reported for NO₂ were determined as the largest of either the difference between baseline-corrected NO_x and NO values, or the NO₂ value reported by the data acquisition system with baseline correction applied.

1.2 Revisions to CASA Data Warehouse

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

2.0 Operational Status

2.1 Continuous Monitoring

In June 2015, there were no incidents resulting in compliance monitoring instruments operating less than 90 % of the time.

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

The normal operation of solar radiation sensor at the Fort Chipewyan air monitoring station (AMS 8) was interrupted for 720 hours due to wiring issues. The sensor was removed for servicing during this reporting period.

A power spike at AMS 3, Lower Camp Meteorological Tower, on June 11 interrupted the normal operations of the 167 meter elevation wind sensors for 148 hours.

2.2 Intermittent Monitoring

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

3.0 Monitoring Notes

General Network Notes

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

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

Station 1, Fort McKay- Bertha Ganter

The NH₃ analyzer required additional time to stabilize to levels below ambient concentrations following the automated daily spans and routine monthly multipoint calibrations. Additional time for stabilization after exposure to high concentrations of NH₃ gas is an inherent behavior in the NH₃ analyzer operations resulting from the properties of the NH₃ gas. Data for 1 to 4 hours following the daily spans have been reported as invalid for a total of 53 hours this month.

Maintenance to the sample inlet, flow audits and zero reference checks on June 18 interrupted the normal operations of the PM_{2.5} analyzer for 1 hour.

Maintenance and recalibration of the O₃ analyzer on June 5 interrupted the normal operations of the analyzer for 13 hours. Manual re-initiation of the daily QA check on June 8 interrupted the normal operation of O₃ analyzer for 1 hour.

Maintenance and cleaning of the sample manifold on June 16 interrupted the normal operations of SO₂, TRS, and O₃ for 1 hour.

Flat-lines in the output signals of the surface leaf wetness sensor resulted in 2 hours of invalid data this reporting period.

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

Station 2, Mildred Lake

Maintenance and cleaning of the sample manifold on June 22 interrupted the normal operations of the H₂S for 2 hours.

Station 3, Lower Camp B - Meteorology

Flat-lines in the output signal of the 167 m elevation wind sensors resulted in 148 hours of downtime this month.

Station 4, Buffalo Viewpoint

Maintenance on the daily zero and span systems and confirmation of analyzers responses on 4 instances from June 8 to 12 interrupted the normal operations of the H₂S analyzer for 12 hours this reporting period. The normal operations of the SO₂ and THC analyzer were also interrupted on June 12 for 1 hour.

A power spike at the station on June 9 interrupted the normal operations of the THC analyzer for 1 hour.

Station 5, Mannix

Maintenance and cleaning of the sample manifold on June 11 affected the normal operations of the H₂S analyzer for 1 hour.

Station 6, Patricia McInnes

Maintenance and replacement of the TRS converter, hydrocarbon kicker, and subsequent re-calibration between June 9 and 10 interrupted the normal operations of the TRS analyzer for 26 hours.

Maintenance to the sample inlet, flow audits and zero reference checks on June 12 interrupted the normal operations of the PM_{2.5} analyzer for 2 hours.

The NH₃ analyzer required additional time to stabilize to levels below ambient concentrations following the automated daily span and routine monthly multipoint calibration periods. Additional time for stabilization after exposure to high concentrations of the NH₃ gas is an inherent behavior in the NH₃ analyzer operations resulting from the properties of the NH₃ gas. Data for 1 to 2 hours following the daily spans have been reported as invalid for 40 hours this month.

Station 7, Athabasca Valley

Maintenance and cleaning of the sample manifold on June 3 affected the normal operations of all air quality analyzers for 1 to 2 hours.

Maintenance on the daily zero and span systems and confirmation of CO analyzer responses on June 2 and 5 interrupted the normal operations of the analyzer for 6 hours.

Maintenance to the sample inlet, flow audits and zero reference checks on June 8 interrupted the normal operations of the PM_{2.5} analyzer for 1 hour.

Depletion and replacement of the carrier gas cylinder at the station on June 18 affected the normal operations of the THC analyzer for 1 hour.

Station 8, Fort Chipewyan

Maintenance to the sample inlet, flow audits and zero reference checks on June 3 interrupted the normal operations of the PM_{2.5} analyzer for 2 hours. An analyzer failure due to the filter tape failing to advance on June 7 interrupted the normal operations of the PM_{2.5} analyzer for 27 hours.

Maintenance of the wind speed and wind direction sensors on June 3 interrupted the normal operations for 2 hours. A flat-line in the output signals of the wind sensor on June 29 resulted in 1 hour of invalid data.

The NO₂ analyzer experienced a single episode of baseline drift on June 8, resulting in 1 hour of invalid data.

A power outage at the station on June 22 affected the normal operations of all air quality analyzers for 7 hours. The NO₂ analyzer required an additional 2 hours to stabilize to ambient conditions following the power outage.

Intermittent unstable operation from the effects of forest fire smoke from June 29 to 30, affected the normal operation of the O₃ analyzer for 4 hours.

The solar radiation sensor was removed for repairs since experiencing sensor issues last month. Data for these periods were flagged, resulting in 720 hours of invalid data.

Station 9, Barge Landing

A flat-line in the output signal of the wind sensor resulted in 1 hour of invalid data this reporting period.

Station 11, Lower Camp

The H₂S analyzer experienced a single episode of baseline drift on June 24, resulting in 2 hours of invalid data.

Maintenance and cleaning of the sample manifold on June 17 affected the normal operations of the SO₂ and THC analyzers for 1 hour.

Station 12, Millennium Mine

The continuous PM_{2.5} analyzer measured higher than normal particulate matter in the region as a result of the wild fires, which interrupted the normal operations of PM_{2.5} analyzer on June 1 for 15 hours.

Maintenance and cleaning of the sample manifold on June 15 interrupted the normal operations of the SO₂, NO₂ and THC analyzers for 1 hour.

Maintenance to the sample inlet, flow audits and zero reference checks on June 24 interrupted the normal operations of the PM_{2.5} analyzer for 6 hours.

Flat-lines in the output signals of the wind sensor resulted in 2 hours of invalid data this reporting period.

Station 13, Fort McKay South

Maintenance and cleaning of the sample manifold on June 12 interrupted the normal operations of the SO₂, THC and NO₂ analyzers for 1 hour.

Maintenance to the sample inlet, flow audits and zero reference checks on June 16 interrupted the normal operations of the PM_{2.5} analyzer for 2 hours.

The PM_{2.5} analyzer experienced two instances of baseline drift between June 16 and 17, resulting in 3 hours of invalid data.

Station 14, Anzac

Maintenance to the automated daily zero and span system on June 8 interrupted the normal operations of all air quality analyzers for 2 hours.

Depletion and replacement of the fuel cylinder at the station on June 5 affected the normal operations of the THC analyzer for 3 hours.

Maintenance and cleaning of the sample manifold on June 16 interrupted the normal operations of the SO₂, TRS, THC and NO₂ analyzers for 1 hour.

An analyzer failure due to the filter tape failing to advance on June 2 interrupted the normal operations of the PM_{2.5} analyzer for 25 hours.

Maintenance to the sample inlet, flow audits and zero reference checks on June 17 interrupted the normal operations of the PM_{2.5} analyzer for 2 hours.

A power outage at the station on June 29 interrupted the normal operations of all air quality analyzers for 4 hours. The THC analyzer failed to re-light after a power interruption on June 29 resulting in an additional 19 hours of downtime.

Station 15, CNRL Horizon

Maintenance and cleaning of the sample manifold on June 18 interrupted the normal operations of TRS analyzer for 2 hours.

Maintenance to the sample inlet, flow audits, zero reference checks and sample pump repair on June 22 interrupted the normal operations of the PM_{2.5} analyzer for 2 hours.

A power interruption at the station on June 19 affected the normal operations of the THC and NO₂ analyzers for 1 hour.

Station 16, Shell Muskeg River

Maintenance to the sample inlet, flow audits and zero reference checks on June 17 and 22 interrupted the normal operations of the PM_{2.5} analyzer for 3 hours.

Flat-lines in the output signals of the wind sensor resulted in 2 hours of invalid data this reporting period.

Station 17, Wapasu

Maintenance to the sample inlet, flow audits and zero reference checks on June 10 interrupted the normal operations of the PM_{2.5} analyzer for 2 hours.

Maintenance and cleaning of the sample manifold on June 10 interrupted the normal operations of the SO₂, NO₂ and THC analyzers for 1 hour.

Station 19, Firebag

Flat-lines in the output signals of the wind sensor resulted in 11 hours of invalid data this reporting period.

Station 502, ConocoPhillips Surmont

The H₂S and SO₂ analyzer experienced several episodes of excessive baseline drifts resulting in 3 and 12 hours of invalid data, respectively.

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

Yours sincerely,

Wood Buffalo Environmental Association

Sanjay Prasad
Air Quality Scientist



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

JUNE 2015
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APPROVAL NUMBERS	REPORT DATE						
	MONTH	YEAR					
289664-00-00	6	2015					
254465-00-00							
149968-00-01							
48522-01-00							
240008-00-03	CONTINUOUS AMBIENT MONITORING						
48263-00-00							
224816-00-03				ONE-HOUR AVERAGE		24-HOUR AVERAGE	
189942-00-02	PARAMETER	STN. NO.	% TIME OPERATIONAL	MAXIMUM CONCENTRATION	NO. READINGS > REGULATION	MAXIMUM CONCENTRATION	NO. READINGS > REGULATION
206355-00-00							
46586-00-00							
216466-00-04	SO2(ppm)	1	99.86	0.037	0	0.006	0
137467-00-00	SO2(ppm)	2	100.00	0.038	0	0.009	0
20809-01-00	SO2(ppm)	4	99.86	0.030	0	0.005	0
241311-00-00	SO2(ppm)	5	100.00	0.062	0	0.009	0
094-02-00	SO2(ppm)	6	100.00	0.021	0	0.004	0
305529-00-00	SO2(ppm)	7	99.86	0.021	0	0.004	0
026-02-00	SO2(ppm)	8	99.03	0.005	0	0.001	0
228044-00-00	SO2(ppm)	11	99.86	0.066	0	0.011	0
73203-01-00	SO2(ppm)	12	99.86	0.038	0	0.006	0
	SO2(ppm)	13	99.86	0.030	0	0.008	0
	SO2(ppm)	14	99.03	0.011	0	0.002	0
	SO2(ppm)	15	100.00	0.072	0	0.009	0
	SO2(ppm)	16	100.00	0.016	0	0.004	0
	SO2(ppm)	17	99.86	0.011	0	0.003	0
	SO2(ppm)	19	100.00	0.014	0	0.003	0
	SO2(ppm)	502	98.33	0.010	0	0.003	0
	H2S(ppm)	2	99.72	0.003	0	0.001	0
	H2S(ppm)	4	98.33	0.003	0	0.001	0
	H2S(ppm)	5	99.86	0.011	1	0.002	0
	H2S(ppm)	11	99.72	0.007	0	0.002	0
	H2S(ppm)	17	100.00	0.002	0	0.001	0
	H2S(ppm)	19	100.00	0.002	0	0.001	0
	H2S(ppm)	502	99.58	0.002	0	0.001	0
	TRS(ppm)	1	99.72	0.002	0	0.001	0
	TRS(ppm)	6	96.39	0.003	0	0.001	0
	TRS(ppm)	7	100.00	0.002	0	0.001	0
	TRS(ppm)	9	100.00	0.002	0	0.001	0
	TRS(ppm)	12	100.00	0.002	0	0.001	0
	TRS(ppm)	13	100.00	0.001	0	0.000	0
	TRS(ppm)	14	99.03	0.004	0	0.000	0
	TRS(ppm)	15	99.72	0.001	0	0.001	0
	THC(ppm)	1	99.86	2.5	-	2.1	-
	THC(ppm)	2	100.00	4.9	-	3.0	-
	THC(ppm)	4	99.72	4.0	-	2.9	-
	THC(ppm)	5	100.00	6.0	-	3.2	-
	THC(ppm)	6	100.00	3.3	-	2.2	-
	THC(ppm)	7	99.72	4.1	-	2.4	-
	THC(ppm)	9	100.00	3.4	-	2.6	-
	THC(ppm)	11	99.86	4.1	-	3.0	-
	THC(ppm)	12	99.86	5.3	-	3.6	-
	THC(ppm)	13	99.86	3.3	-	2.6	-
	THC(ppm)	14	95.97	3.7	-	2.2	-
	THC(ppm)	15	99.86	6.1	-	2.9	-
	THC(ppm)	16	100.00	4.9	-	2.9	-
	THC(ppm)	17	99.86	3.8	-	2.8	-
	THC(ppm)	19	100.00	3.0	-	2.6	-
	O3(ppm)	1	97.78	0.078	0	0.046	-
	O3(ppm)	6	100.00	0.061	0	0.041	-

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

JUNE 2015
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APPROVAL NUMBERS	REPORT DATE						
	MONTH	YEAR					
289664-00-00	6	2015					
254465-00-00							
149968-00-01							
48522-01-00							
24008-00-03	CONTINUOUS AMBIENT MONITORING						
48263-00-00							
224816-00-03							
189942-00-02			ONE-HOUR AVERAGE		24-HOUR AVERAGE		
206355-00-00	PARAMETER	STN. NO.	% TIME OPERATIONAL	MAXIMUM CONCENTRATION	NO. READINGS > REGULATION	MAXIMUM CONCENTRATION	NO. READINGS > REGULATION
46586-00-00	O3(ppm)	7	100.00	0.059	0	0.038	-
216466-00-04	O3(ppm)	8	98.47	0.069	0	0.055	-
137467-00-00	O3(ppm)	13	100.00	0.062	0	0.038	-
20809-01-00	O3(ppm)	14	99.17	0.061	0	0.045	-
241311-00-02	O3(ppm)	17	100.00	0.064	0	0.049	-
094-02-00	O3(ppm)	1	99.86	0.026	0	0.006	-
305529-00-00	NO2(ppm)	6	100.00	0.048	0	0.013	-
026-02-00	NO2(ppm)	7	99.72	0.049	0	0.014	-
228044-00-00	NO2(ppm)	8	98.61	0.016	0	0.006	-
73203-01-00	NO2(ppm)	12	99.86	0.048	0	0.027	-
	NO2(ppm)	13	99.86	0.024	0	0.005	-
	NO2(ppm)	14	99.03	0.014	0	0.003	-
	NO2(ppm)	15	99.86	0.036	0	0.011	-
	NO2(ppm)	16	100.00	0.032	0	0.020	-
	NO2(ppm)	17	99.86	0.027	0	0.010	-
	NO2(ppm)	19	100.00	0.026	0	0.007	-
	NO2(ppm)	502	100.00	0.022	0	0.004	-
	CO(ppm)	7	98.89	2.6	-	0.8	0
	NH3(ppm)	1	92.50	12	-	5	0
	NH3(ppm)	6	94.44	68	-	14	0
	PM2.5(ug/m ³)	1	99.72	194.3	-	137.8	3
	PM2.5(ug/m ³)	6	99.72	1331.6	-	221.2	2
	PM2.5(ug/m ³)	7	99.86	434.7	-	130.7	2
	PM2.5(ug/m ³)	8	95.00	1507.5	-	397.3	5
	PM2.5(ug/m ³)	12	97.08	222.7	-	157.1	5
	PM2.5(ug/m ³)	13	99.31	155	-	123.6	2
	PM2.5(ug/m ³)	14	95.69	257.2	-	80.8	2
	PM2.5(ug/m ³)	15	99.72	352.2	-	163.7	5
	PM2.5(ug/m ³)	16	99.58	192.7	-	152.3	5
	PM2.5(ug/m ³)	17	99.72	285	-	200.1	4
	WIND	1	99.86	-	-	-	-
	WIND	2	100.00	-	-	-	-
	WIND	4	100.00	-	-	-	-
	WIND	5	100.00	-	-	-	-
	WIND	6	100.00	-	-	-	-
	WIND	7	100.00	-	-	-	-
	WIND	8	99.58	-	-	-	-
	WIND	9	99.86	-	-	-	-
	WIND	11	100.00	-	-	-	-
	WIND	12	99.72	-	-	-	-
	WIND	13	100.00	-	-	-	-
	WIND	14	100.00	-	-	-	-
	WIND	15	100.00	-	-	-	-
	WIND	16	99.72	-	-	-	-
	WIND	17	100.00	-	-	-	-
	WIND	19	98.47	-	-	-	-
	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
JUNE 2015

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

July 30, 2015



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

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	683	36	37	99.86	37	0	6	0
TRS(ppb) Average	684	34	36	99.72	2	0	1	0
THC(ppm) Average	685	34	35	99.86	2.5	-	2.1	-
NMHC(ppm) Average	685	34	35	99.86	0.306	-	0.041	-
CH4(ppm) Average	685	34	35	99.86	2.4	-	2	-
O3 (ppb) Average	672	32	48	97.78	78	0	46	-
NO2 (ppb) Average	685	34	35	99.86	26	0	6	-
NO (ppb) Average	685	34	35	99.86	17	-	2	-
NOX (ppb) Average	685	34	35	99.86	40	-	8	-
NH3 (ppb) Average	626	40	94	92.50	12	0	5	-
PM2.5 (ug/m3) Average	718	1	2	99.86	194.3	-	137.8	3
Wind Speed 10 m (km/h) Average	719	0	1	99.86	19	-	11	-
Wind Direction 10 m (deg) Average	719	0	1	99.86	-	-	-	-
Temperature 2 m (C) Average	719	0	1	99.86	32.8	-	23.5	-
Temperature 10 m (C) Average	719	0	1	99.86	31.9	-	24.3	-
Relative Humidity (%) Average	719	0	1	99.86	99	-	75	-
Precipitation (mm) Total	719	0	1	99.86	8.4	-	8.6	-
Surface Wetness (% of range) Average	717	0	3	99.58	59	-	12	-
Global Solar Radiation (W/m2) Average	719	0	1	99.86	905	-	355	-

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

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

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	683	1.1	3	-	0	0	0	0	1	3	37
TRS (ppb) Average	684	0.5	0	-	0	0	0	0	1	1	2
THC (ppm) Average	685	1.87	0.1	-	1.8	1.8	1.8	1.8	1.9	2	2.5
NMHC(ppm) Average	685	0.003	0.024	-	0	0	0	0	0	0	0.306
CH4(ppm) Average	685	1.87	0.1	-	1.8	1.8	1.8	1.8	1.9	2	2.4
O3 (ppb) Average	672	32.7	13	-	5	15	22	33	42	50	78
NO2 (ppb) Average	685	2.7	3	-	0	0	1	2	4	7	26
NO (ppb) Average	685	0.6	2	-	0	0	0	0	0	1	17
NOX (ppb) Average	685	3.3	4	-	0	0	1	2	4	8	40
NH3 (ppb) Average	626	0.2	2	-	0	0	0	0	0	0	12
PM2.5 (ug/m3) Average	718	18.09	29.7	-	0	2.6	4.5	8.6	16.6	34.8	194.3
Wind Speed 10 m (km/h) Average	719	6.5	4	-	0	2	4	6	9	12	19
Wind Direction 10 m (deg) Average	719	-	-	-	-	-	-	-	-	-	-
Temperature 2 m (C) Average	719	17.02	6.5	-	-1.3	9.4	12	16.7	21.3	25.9	32.8
Temperature 10 m (C) Average	719	17.35	5.9	-	0.1	10.2	13.2	17	21	25.6	31.9
Relative Humidity (%) Average	719	57.7	23	-	18	27	38	57	78	90	99
Precipitation (mm) Total	719	-	-	31.24	-	-	-	-	-	-	-
Surface Wetness (% of range) Average	717	2.3	8	-	0	0	0	0	0	8	59
Global Solar Radiation (W/m2) Average	719	269.1	291	-	0	0	3	143	521	730	905

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

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
ALL PARAMETERS	17 Jun 2015 11:00	17 Jun 2015 11:00	1	Maintenance - Data collection program upload
SO2, TRS, O3	16 Jun 2015 13:00	16 Jun 2015 13:00	1	Maintenance - manifold cleaning
O3	05 Jun 2015 23:00	06 Jun 2015 11:00	13	Analyzer Failure - sample pump failed
O3	08 Jun 2015 15:00	08 Jun 2015 15:00	1	Maintenance - reinitiated daily QA check
NH3	01 Jun 2015 07:00	30 Jun 2015 07:00	53	Stabilization after daily span
PM2.5	18 Jun 2015 11:00	18 Jun 2015 11:00	1	Maintenance - Flow and zero check, sample head cleaning
Surface Leaf Wetness	30 Jun 2015 05:00	30 Jun 2015 06:00	2	Unstable Operation



Summary of Hour Averages

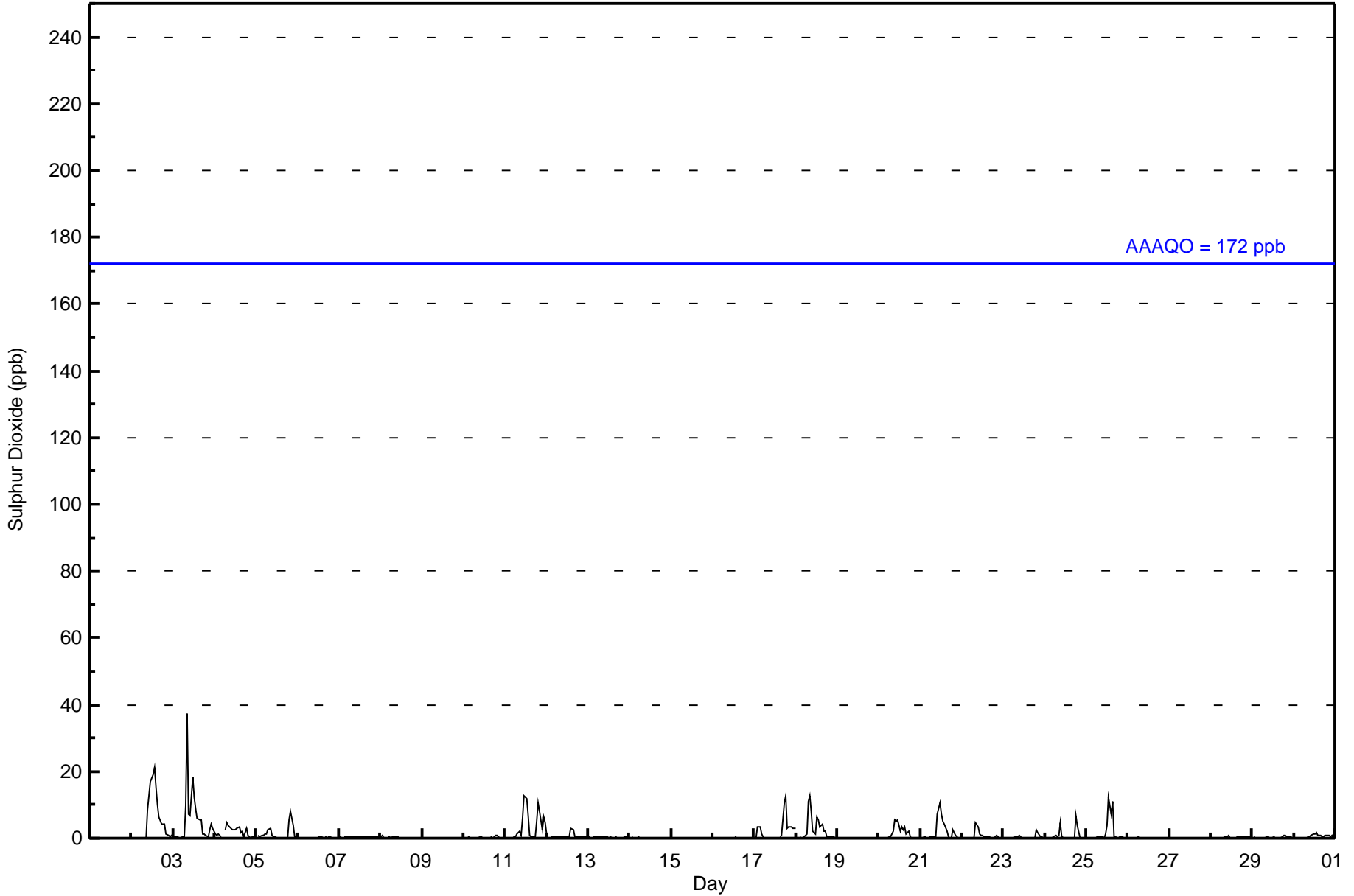
Fort McKay - Bertha Ganter - June 2015

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 37 ppb on Jun 3 09:00	Maximum Daily Average: 5.8 ppb on Jun 3		Hours of Data:	683
Minimum Value: 0 ppb on Jun 1 07:00	Minimum Daily Average: 0.0 ppb on Jun 15		Hours of Missing Data:	37
Maximum Diurnal Average: 2.5 ppb at hour 12	Minimum Diurnal Average: 0.2 ppb at hour 2		Hours of Calibration:	36
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 = 12		Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	0	Z	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-Jun	0	0	0	Z	0	0	0	0	0	8	13	17	19	21	15	10	7	4	4	4	1	1	1	1	5.5	21
3-Jun	0	0	0	0	Z	0	0	10	37	7	7	18	12	9	6	5	6	1	1	1	0	3	4	3	5.8	37
4-Jun	1	1	1	1	1	Z	3	5	4	3	3	3	3	3	3	2	2	1	3	1	0	0	0	0	1.8	5
5-Jun	Z	1	1	1	1	1	1	2	3	1	0	0	0	0	0	0	0	0	0	5	8	4	0	0	1.3	8
6-Jun	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
7-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0.4	1
8-Jun	1	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
9-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
10-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0.2	1
11-Jun	Z	0	0	0	0	0	0	1	2	1	6	13	12	7	1	0	0	0	5	11	8	3	6	5	3.6	13
12-Jun	1	Z	1	1	0	0	1	1	1	1	1	1	1	1	3	3	0	0	0	0	0	0	0	0	0.7	3
13-Jun	0	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
14-Jun	0	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-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
16-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	M	0	0	0	0	0	0	0	0	0	0	0	0.0	0
17-Jun	Z	0	3	3	1	0	0	0	0	C	C	C	C	C	C	1	1	10	13	3	4	3	3	3	--	13
18-Jun	3	Z	0	0	0	0	1	11	13	8	2	1	6	5	3	4	2	2	0	0	0	0	0	0	2.9	13
19-Jun	0	0	Z	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-Jun	0	0	0	Z	0	0	0	0	2	6	5	6	2	4	2	3	1	2	0	0	0	0	0	0	1.5	6
21-Jun	0	0	0	0	Z	1	0	0	0	0	7	10	7	5	4	2	0	0	0	3	1	0	0	0	1.9	10
22-Jun	0	0	0	0	0	Z	0	0	5	3	1	1	1	0	0	1	0	0	0	0	1	0	0	0	0.6	5
23-Jun	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	3	2	1	0	0	0.4	3
24-Jun	0	Z	0	0	0	0	1	0	1	5	0	0	0	0	0	0	0	0	7	4	0	0	0	0	0.8	7
25-Jun	0	0	Z	0	0	0	0	0	0	0	0	1	4	12	7	11	1	1	0	0	1	0	0	0	1.8	12
26-Jun	0	0	0	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-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
28-Jun	0	0	0	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0.3	1
29-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0.3	1
30-Jun	0	Z	0	0	0	0	0	0	0	0	1	1	1	2	1	1	1	1	1	1	1	0	1	0	0.6	2

0.3	0.2	0.3	0.3	0.2	0.3	0.4	1.1	2.4	1.6	1.7	2.5	2.5	2.4	1.7	1.5	0.8	0.8	1.3	1.3	1.0	0.6	0.6	0.5	Diurnal Average	
3	1	3	3	1	1	3	11	37	8	13	18	19	21	15	11	7	10	13	11	8	4	6	5	Diurnal Maximum	

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Fort McKay - Bertha Ganter - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	667	97.66	97.66
11 - 20	14	2.05	99.71
21 - 60	2	0.29	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 683

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Fort McKay - Bertha Ganter - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	51	60	17	13	14	11	9	45	86	71	37	26	27	42	92	66	667
11 - 20	1	0	0	0	0	0	1	6	5	1	0	0	0	0	0	0	14
21 - 60	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	52	60	17	13	14	11	10	51	93	72	37	26	27	42	92	66	683

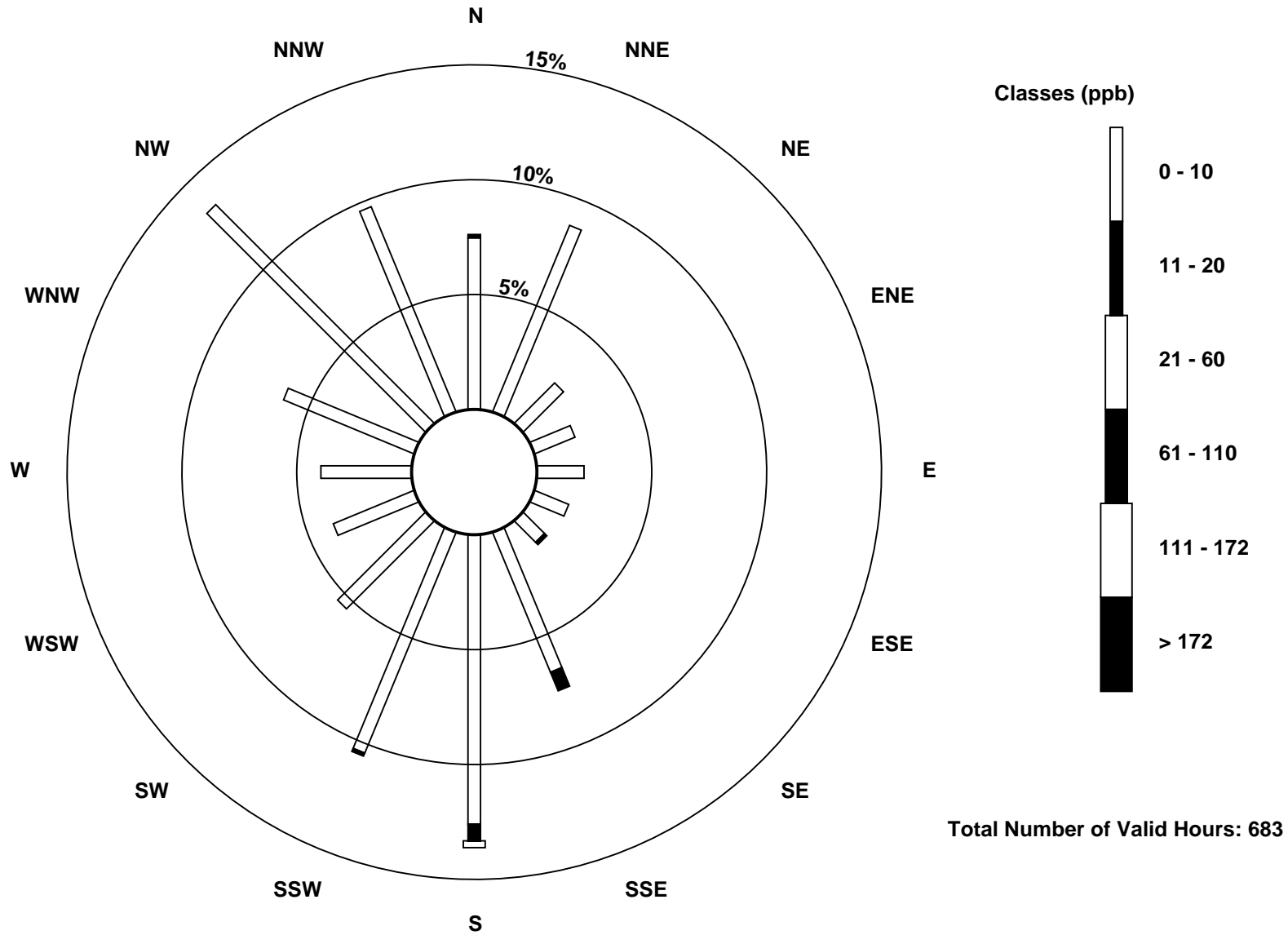
Total Number of Valid Hours: 683

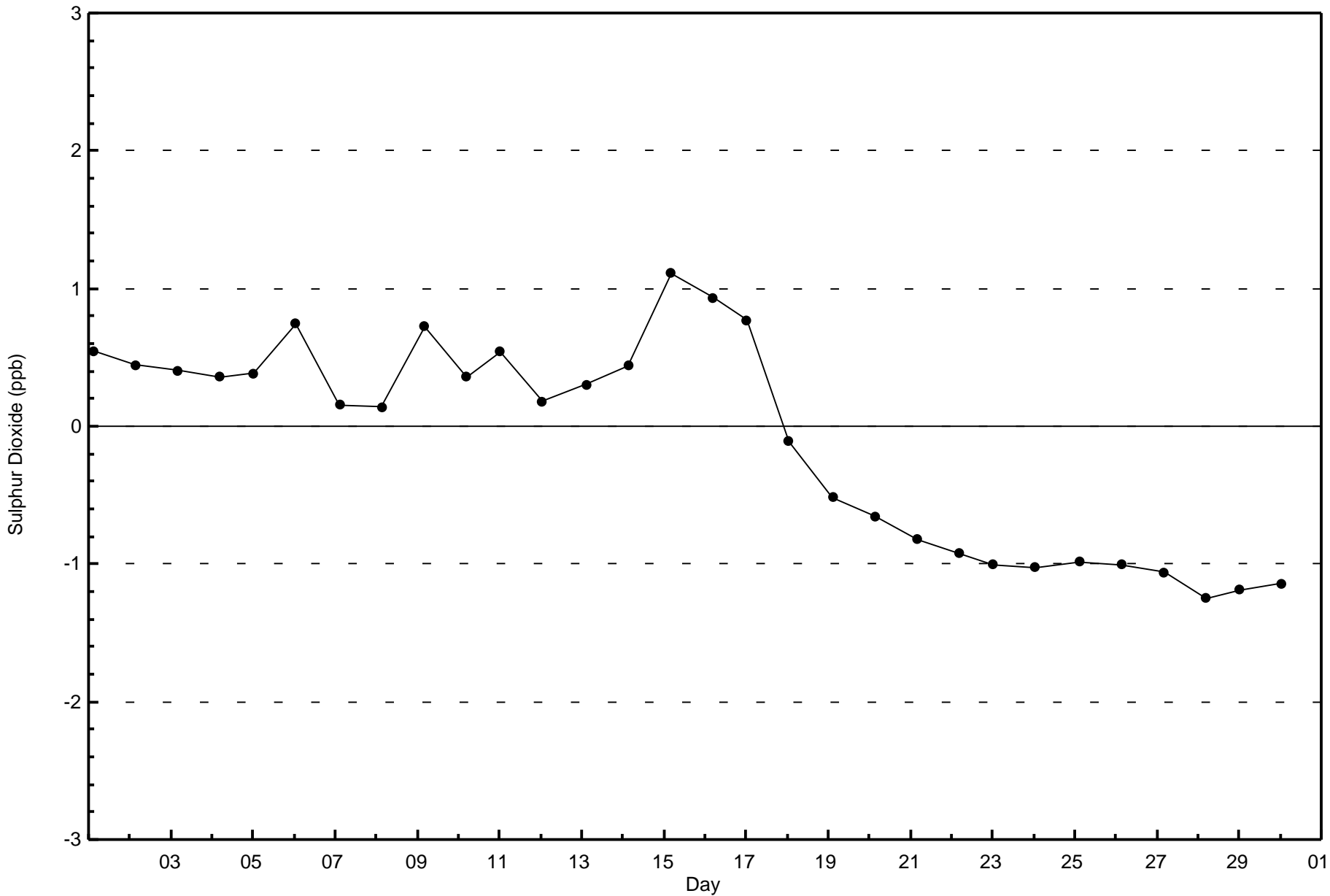
Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

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





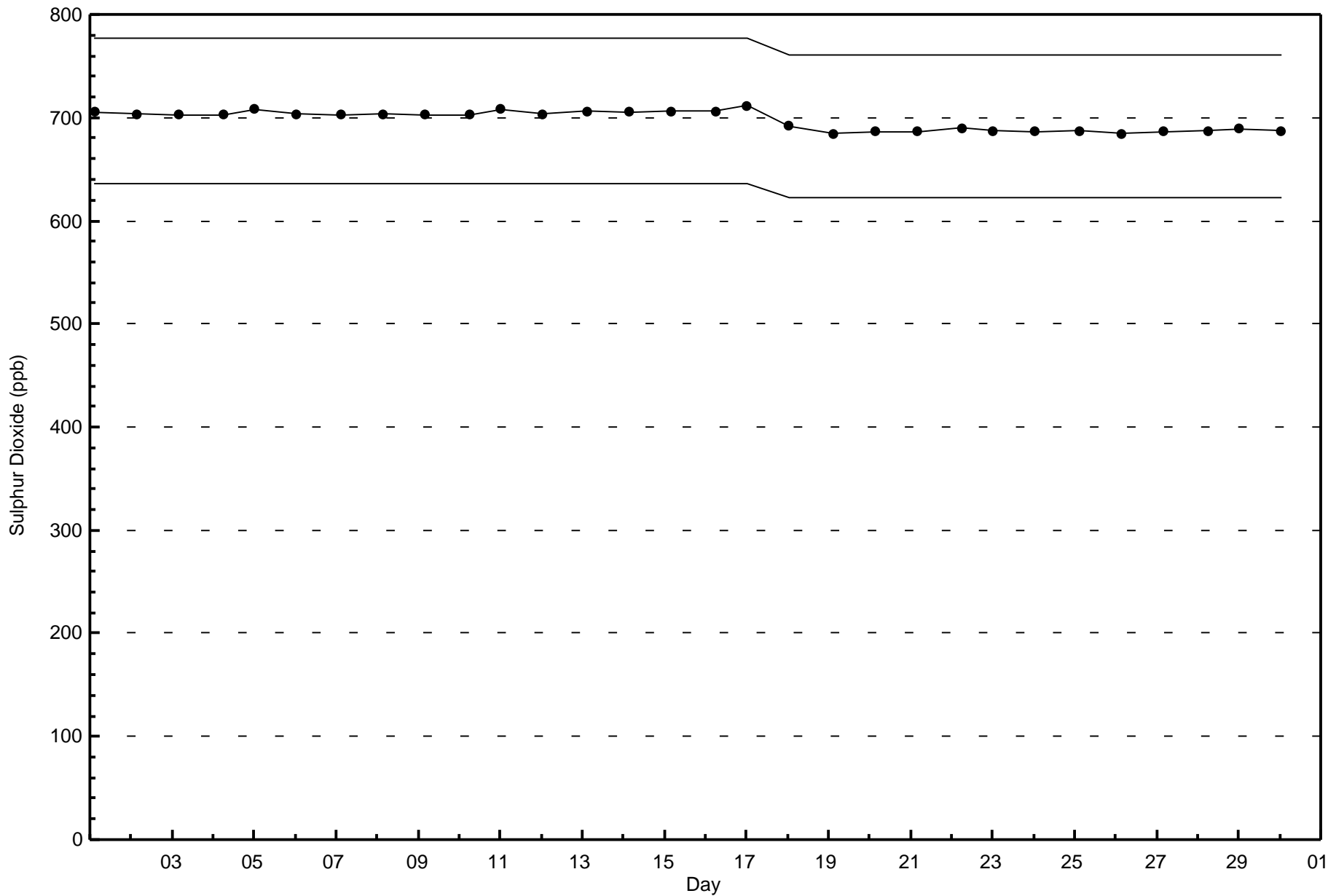


Wood Buffalo Environmental Association

Span Responses

Sulphur Dioxide (SO₂) - ppb

Fort McKay - Bertha Ganter - June 2015



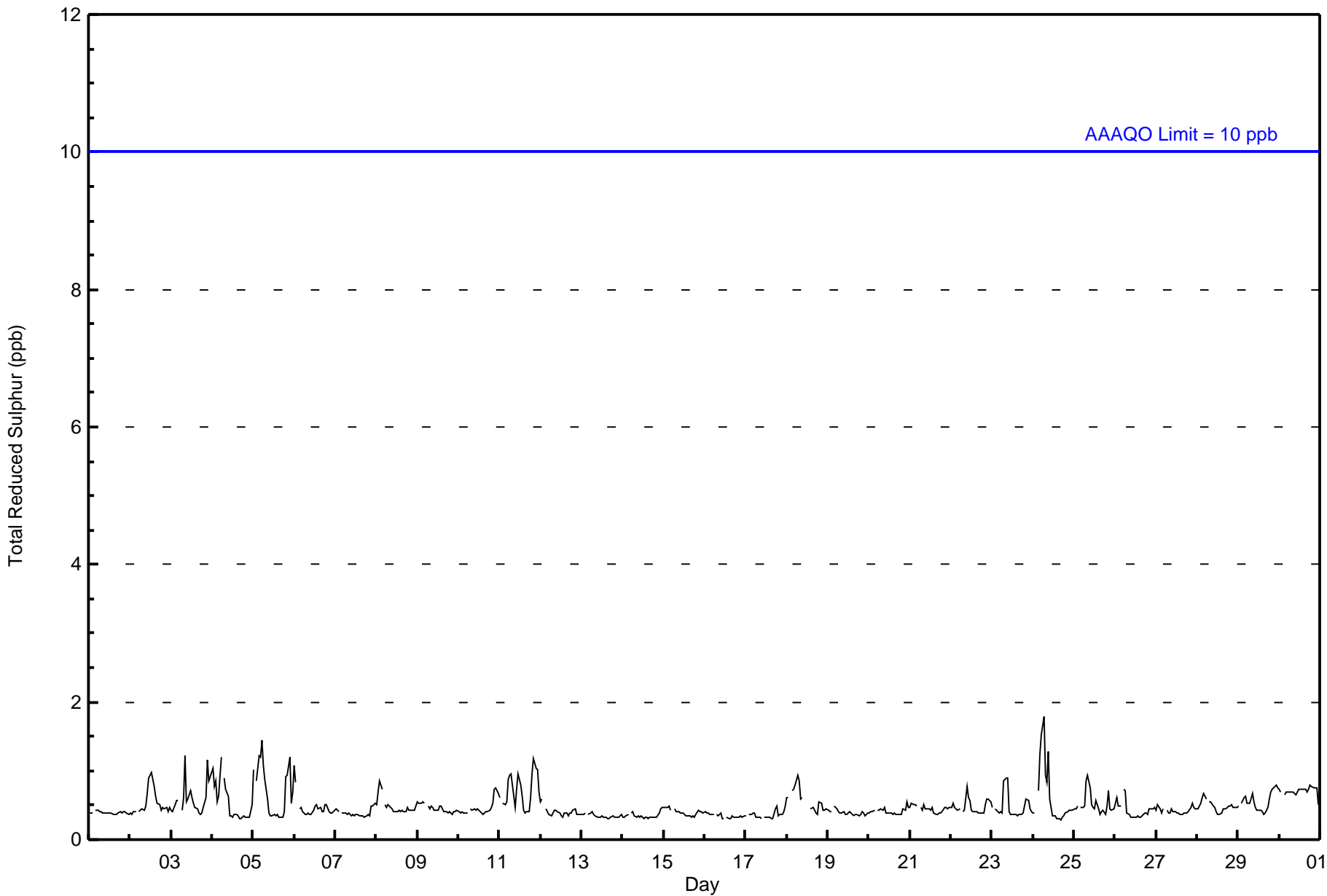


Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 2 ppb on Jun 24 07:00	Maximum Daily Average: 0.7 ppb on Jun 11		Hours of Data:	684
Minimum Value: 0 ppb on Jun 24 17:00	Minimum Daily Average: 0.3 ppb on Jun 16		Hours of Missing Data:	36
Maximum Diurnal Average: 0.6 ppb at hour 6	Minimum Diurnal Average: 0.4 ppb at hour 17		Hours of Calibration:	34
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 = 1		Percent Operational Time:	99.7

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

0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	Diurnal Average
1	1	1	1	1	2	2	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
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Fort McKay - Bertha Ganter - June 2015

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



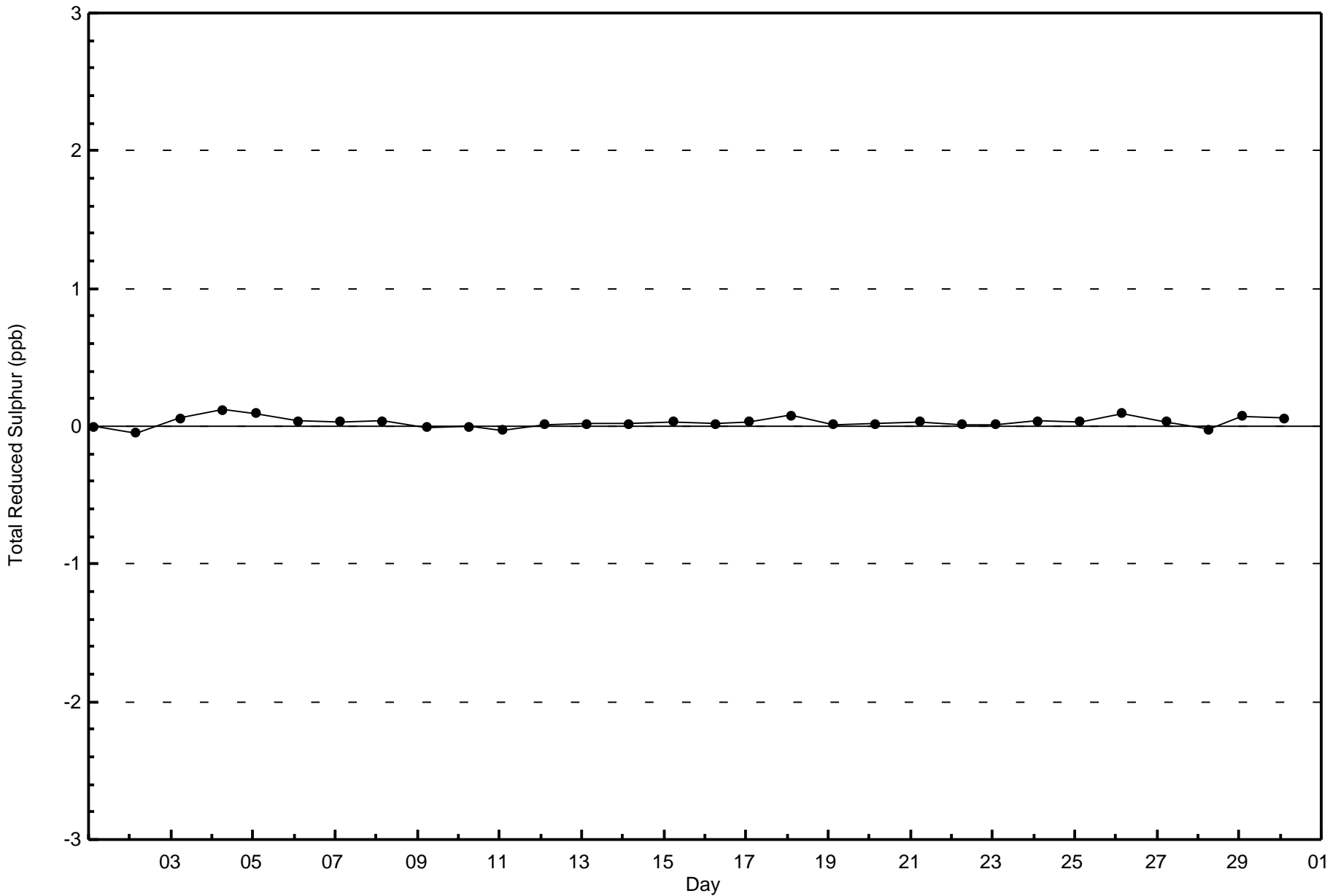
Wood Buffalo Environmental Association
Frequency Distribution

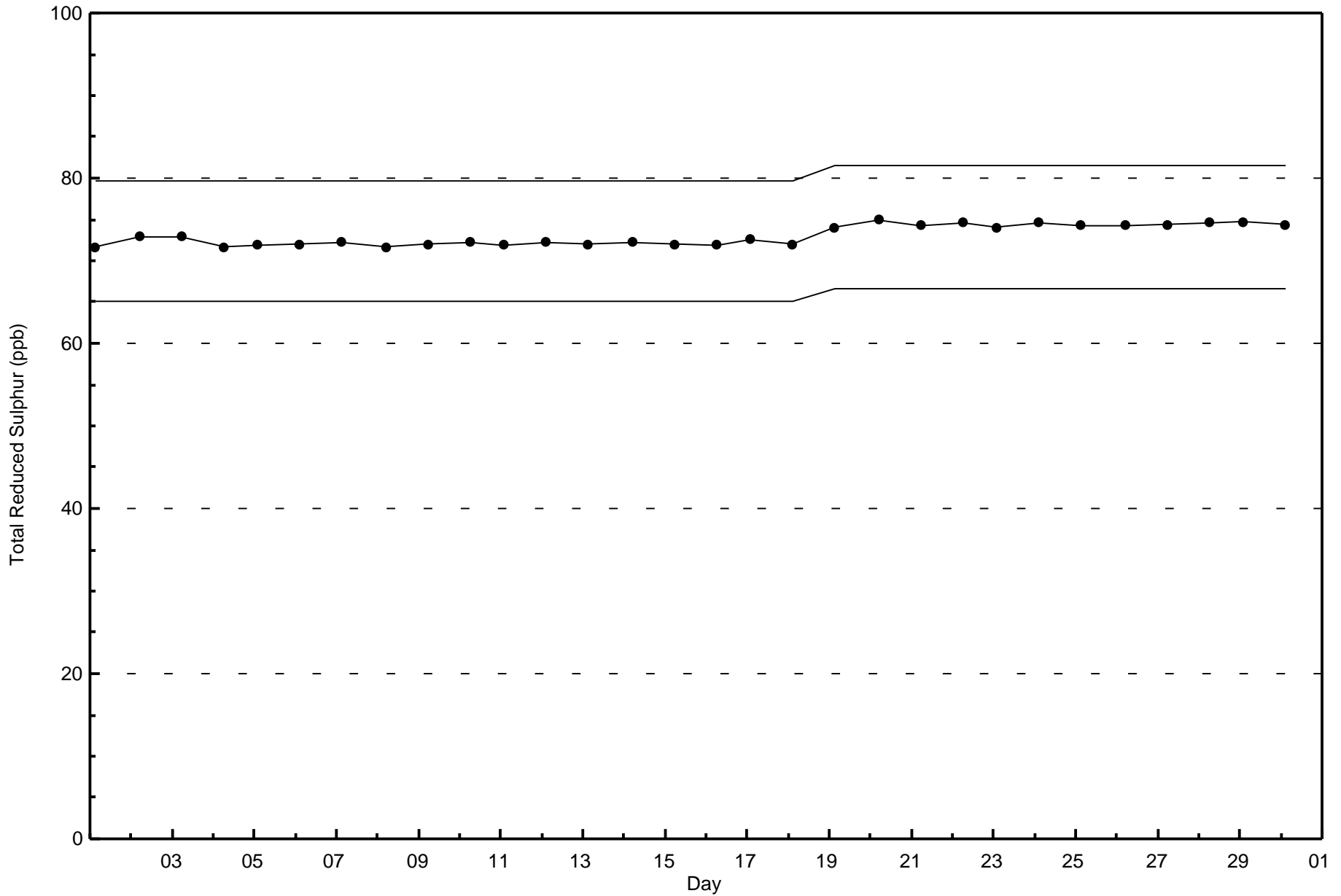
Total Reduced Sulphur (TRS) - ppb
Fort McKay - Bertha Ganter - June 2015

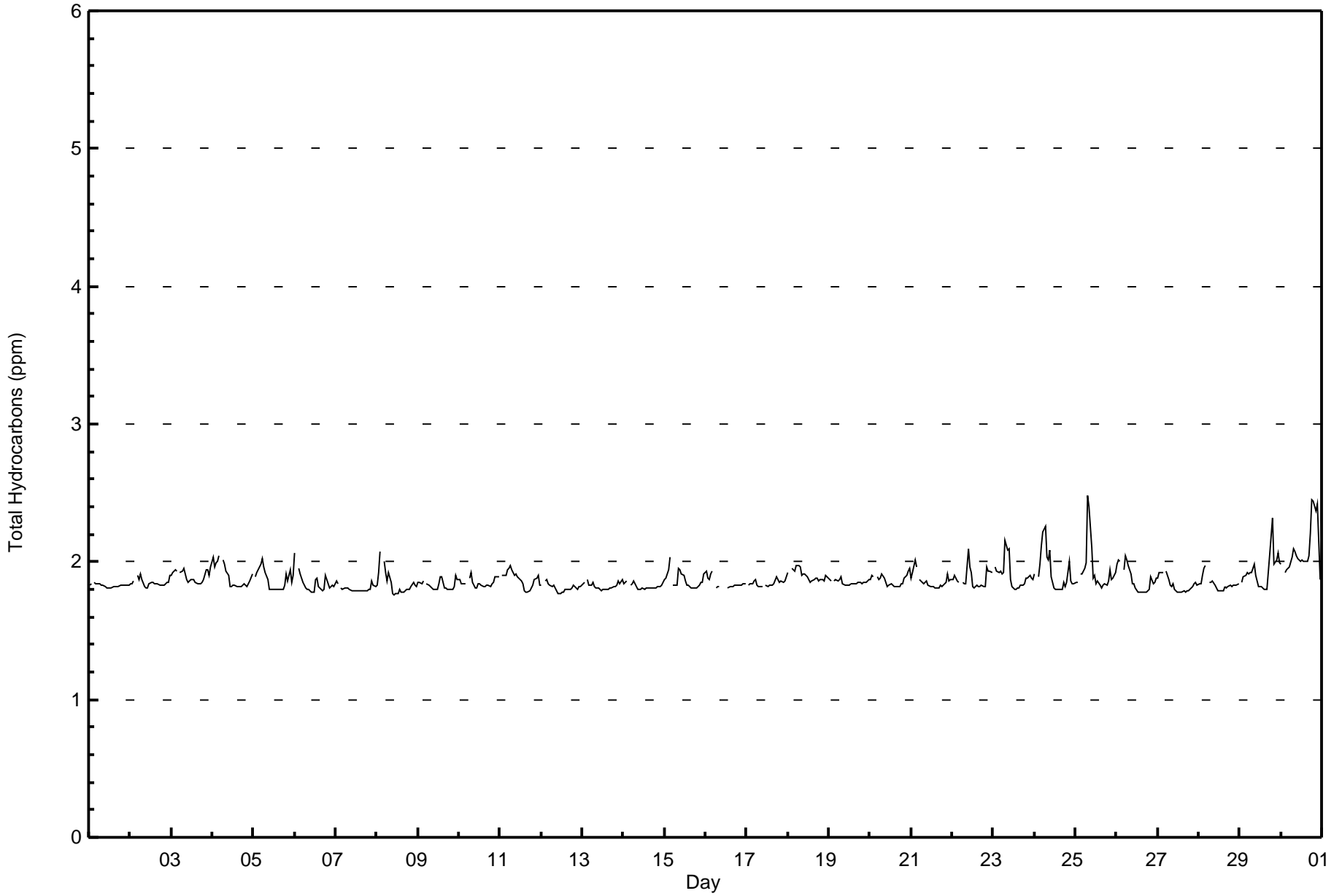
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	53	63	16	14	14	11	11	48	90	74	37	26	28	43	93	63	684
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	53	63	16	14	14	11	11	48	90	74	37	26	28	43	93	63	684

Total Number of Valid Hours: 684

Total Number of Hours: 720









Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Fort McKay - Bertha Ganter - June 2015

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	660	96.35	96.35
2.1 - 3.0	25	3.65	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
Fort McKay - Bertha Ganter - June 2015

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	50	59	16	12	12	11	11	47	90	69	34	25	26	42	90	66	660
2.1 - 3.0	0	2	1	2	2	0	0	4	3	3	3	1	1	1	2	0	25
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	50	61	17	14	14	11	11	51	93	72	37	26	27	43	92	66	685

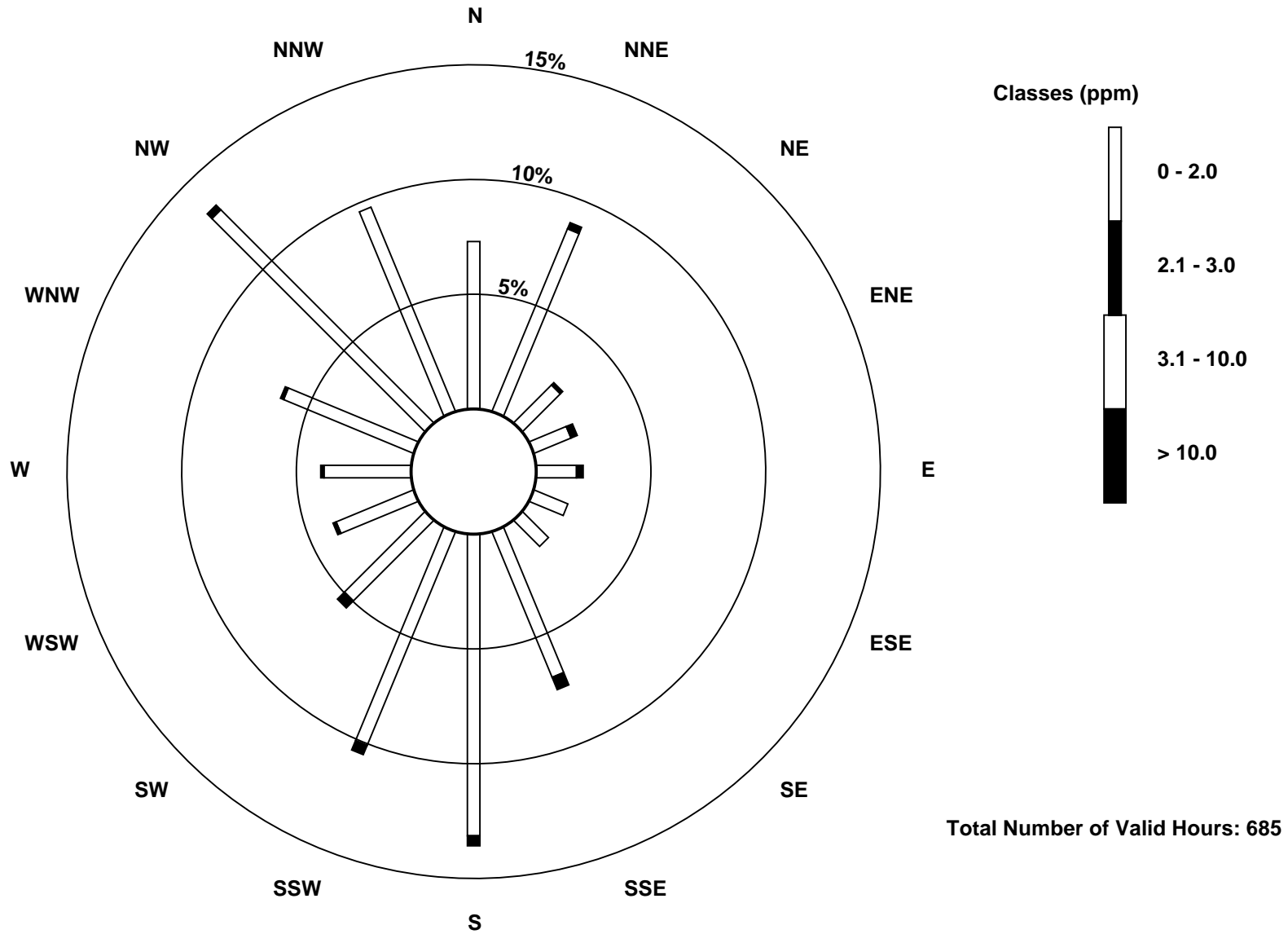
Total Number of Valid Hours: 685

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

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



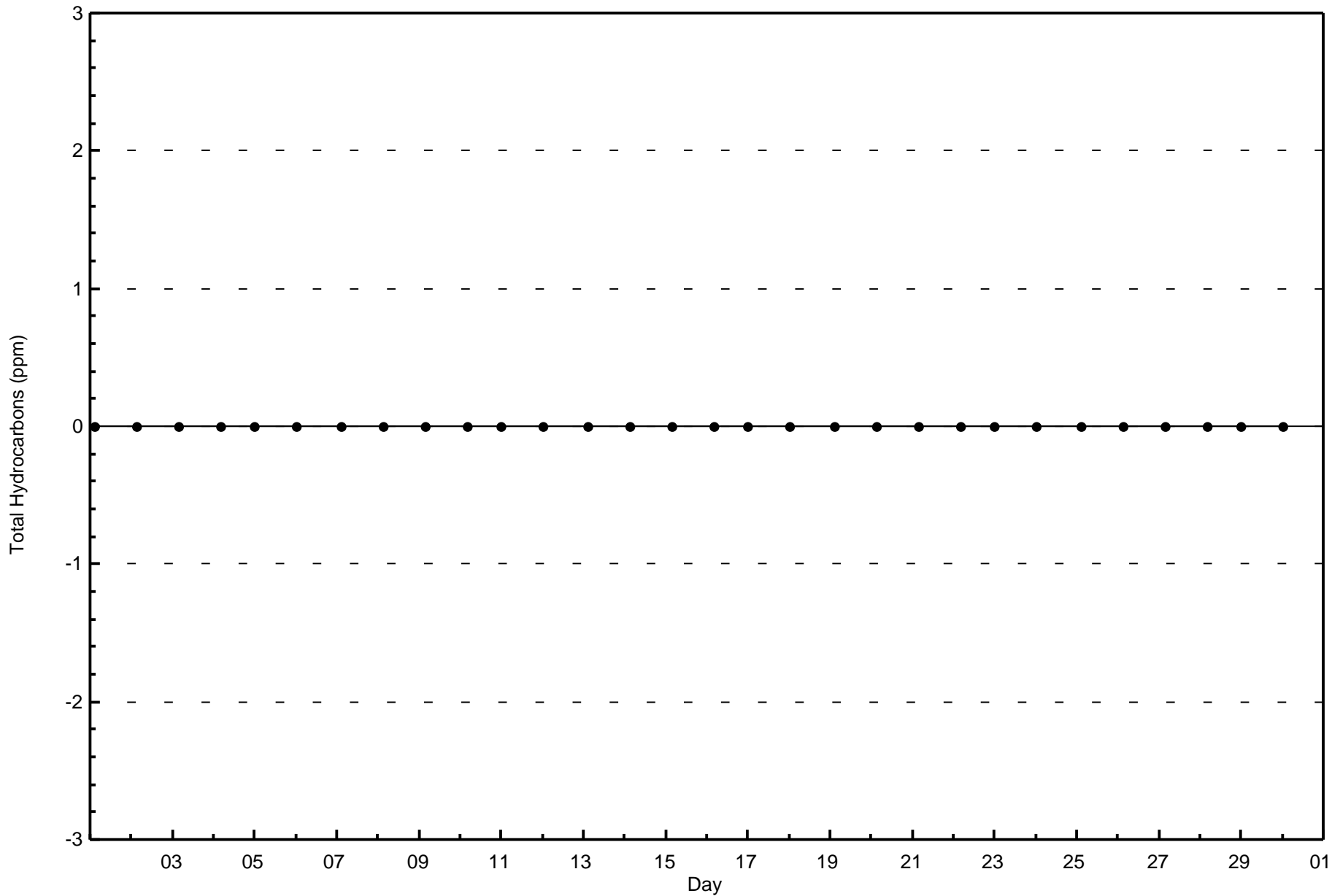


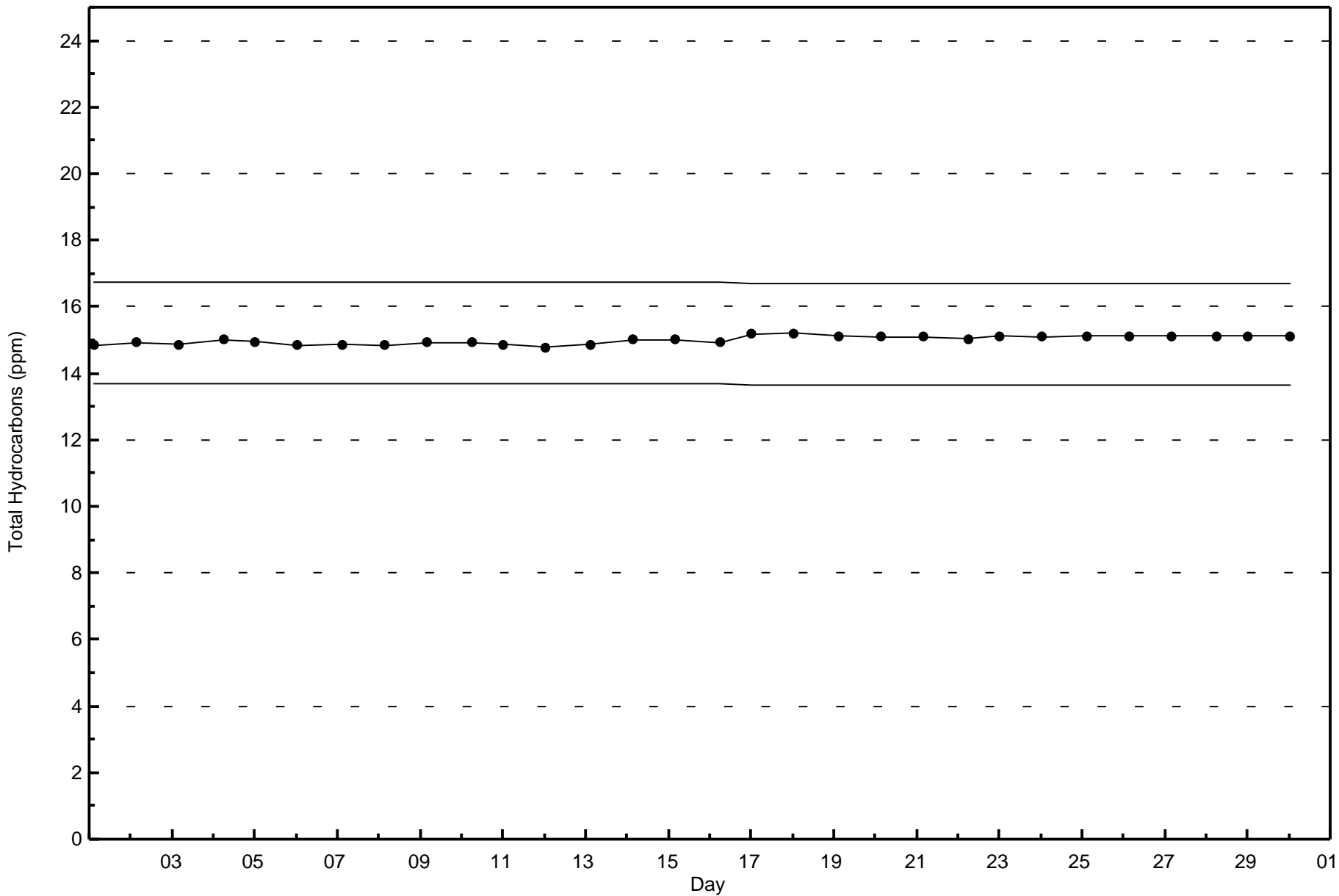
Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Fort McKay - Bertha Ganter - June 2015





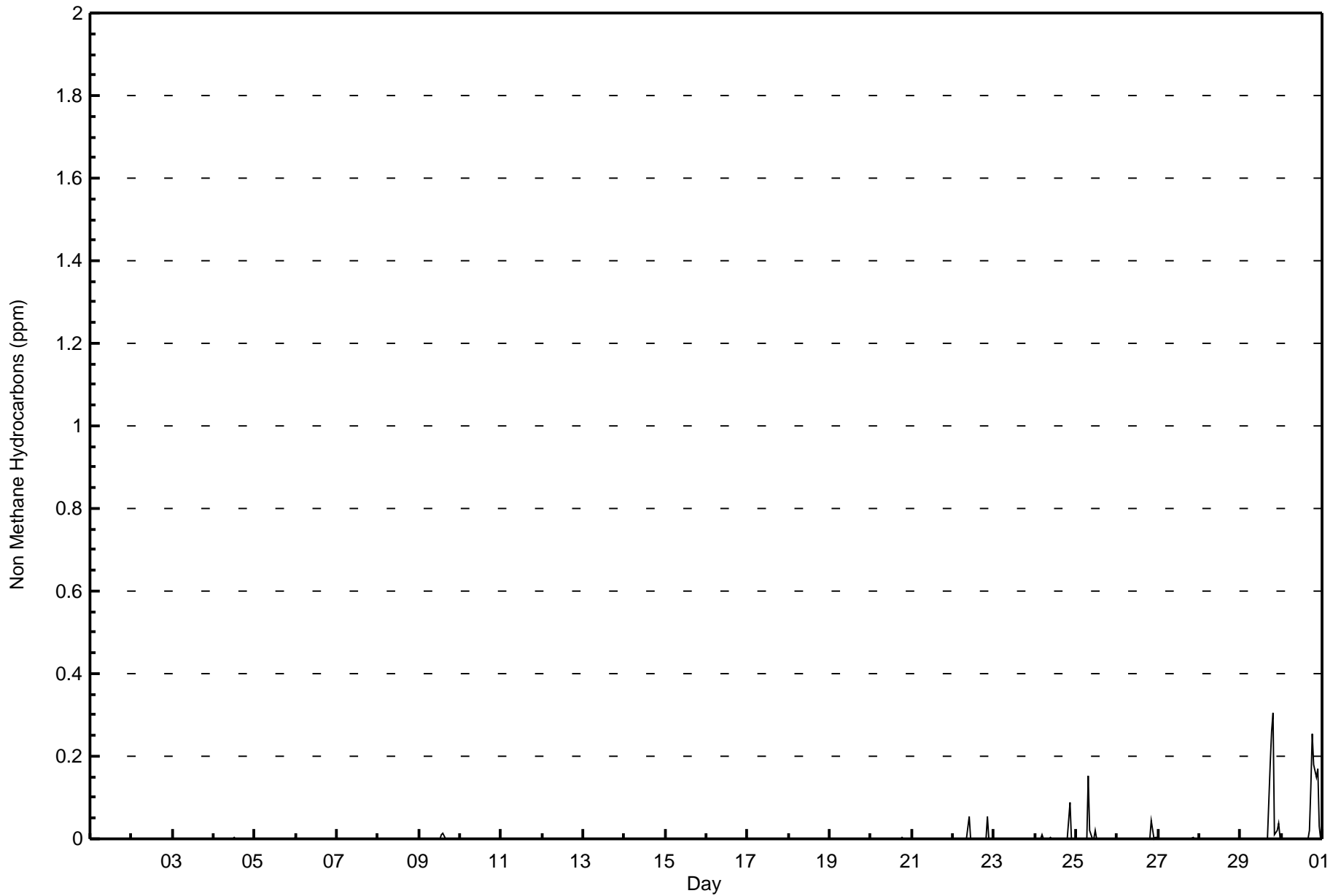


Maximum Value: 0.306 ppm on Jun 29 20:00		Maximum Daily Average: 0.041 ppm on Jun 30		Hours in Service:	720																											
Minimum Value: 0.000 ppm on Jun 1 01:00		Minimum Daily Average: 0.000 ppm on Jun 1		Hours of Data:	685																											
Maximum Diurnal Average: 0.017 ppm at hour 19		Minimum Diurnal Average: 0.000 ppm at hour 2		Hours of Missing Data:	35																											
Monthly Average: 0.003 ppm		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 O ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 0.1		Hours of Calibration:	34																											
				Percent Operational Time:	99.9																											
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24								
1-Jun	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Jun	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	0.000
3-Jun	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4-Jun	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004
5-Jun	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Jun	0.008	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.008
7-Jun	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Jun	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	0.000
9-Jun	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10-Jun	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11-Jun	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Jun	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Jun	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Jun	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	0.000
15-Jun	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
16-Jun	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	C	C	C	C	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
17-Jun	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	M	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Jun	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
19-Jun	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Jun	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	0.000
21-Jun	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
22-Jun	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.056	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Jun	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Jun	0.000	Z	0.000	0.000	0.010	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
25-Jun	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.151	0.020	0.000	0.000	0.019	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
26-Jun	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	0.000
27-Jun	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
28-Jun	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
29-Jun	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Jun	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
																								Diurnal Average								
																								Diurnal Maximum								
																								0.000 0.000								
																								0.008 0.000								
																								Z - zerospan C - Calibration M - Maintenance								



Wood Buffalo Environmental Association
Hourly Averages

Non Methane Hydrocarbons (NMHC) - ppm
Fort McKay - Bertha Ganter - June 2015





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm
Fort McKay - Bertha Ganter - June 2015

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	661	96.50	96.50
0.006 - 0.05	12	1.75	98.25
0.06 - 0.1	5	0.73	98.98
> 0.1	7	1.02	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



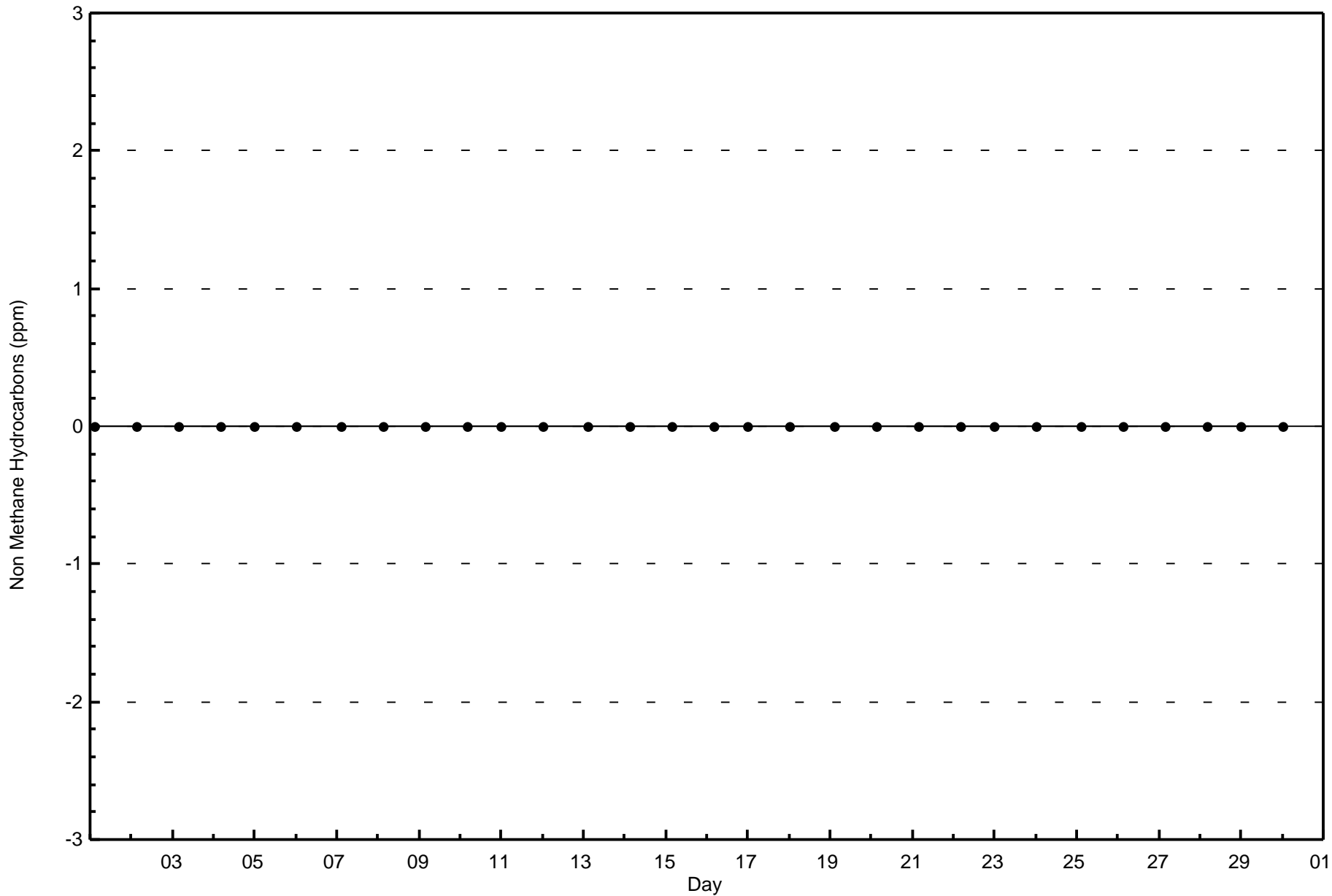
Wood Buffalo Environmental Association
Frequency Distribution

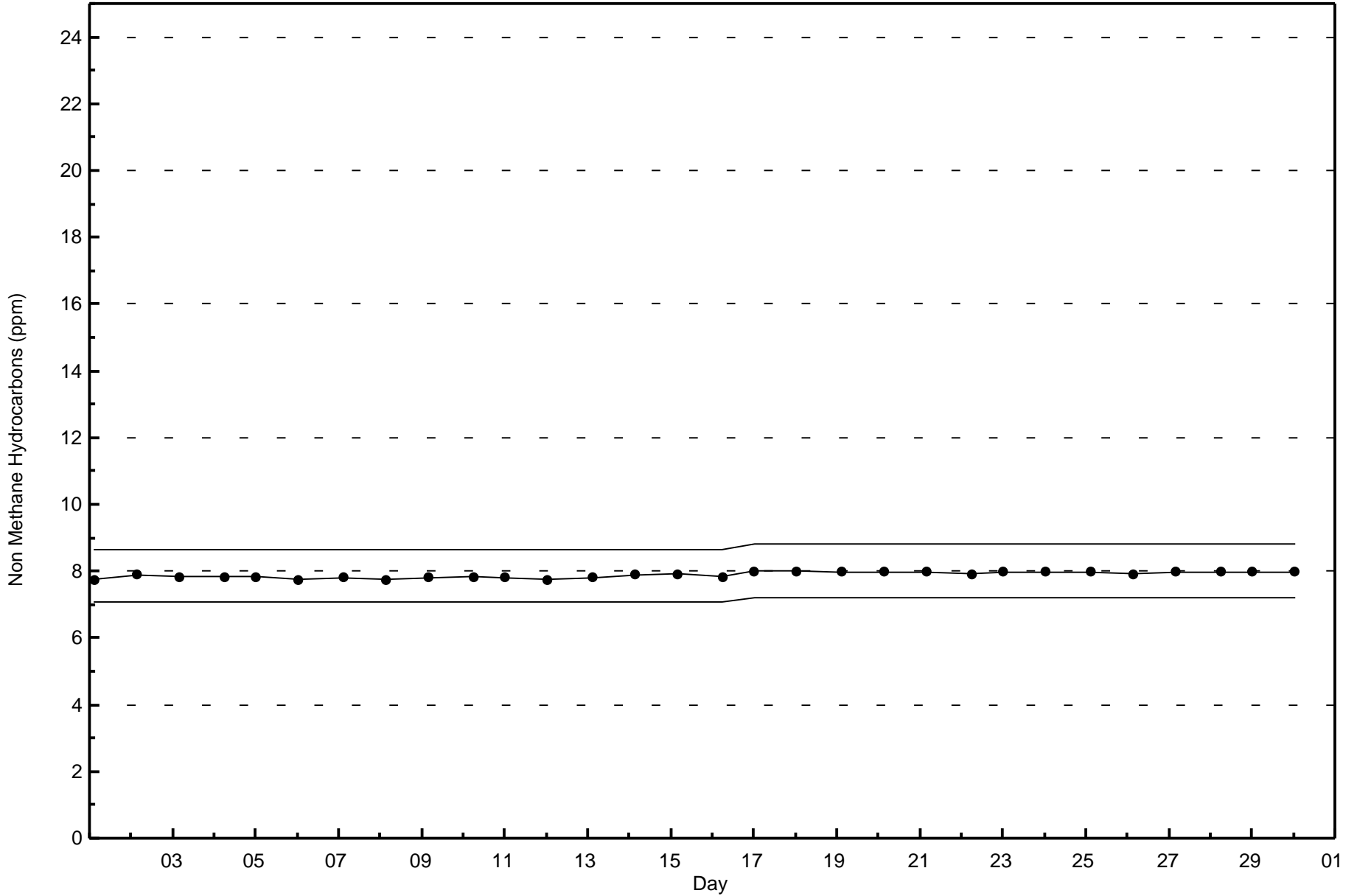
Non Methane Hydrocarbons (NMHC) - ppm
Fort McKay - Bertha Ganter - June 2015

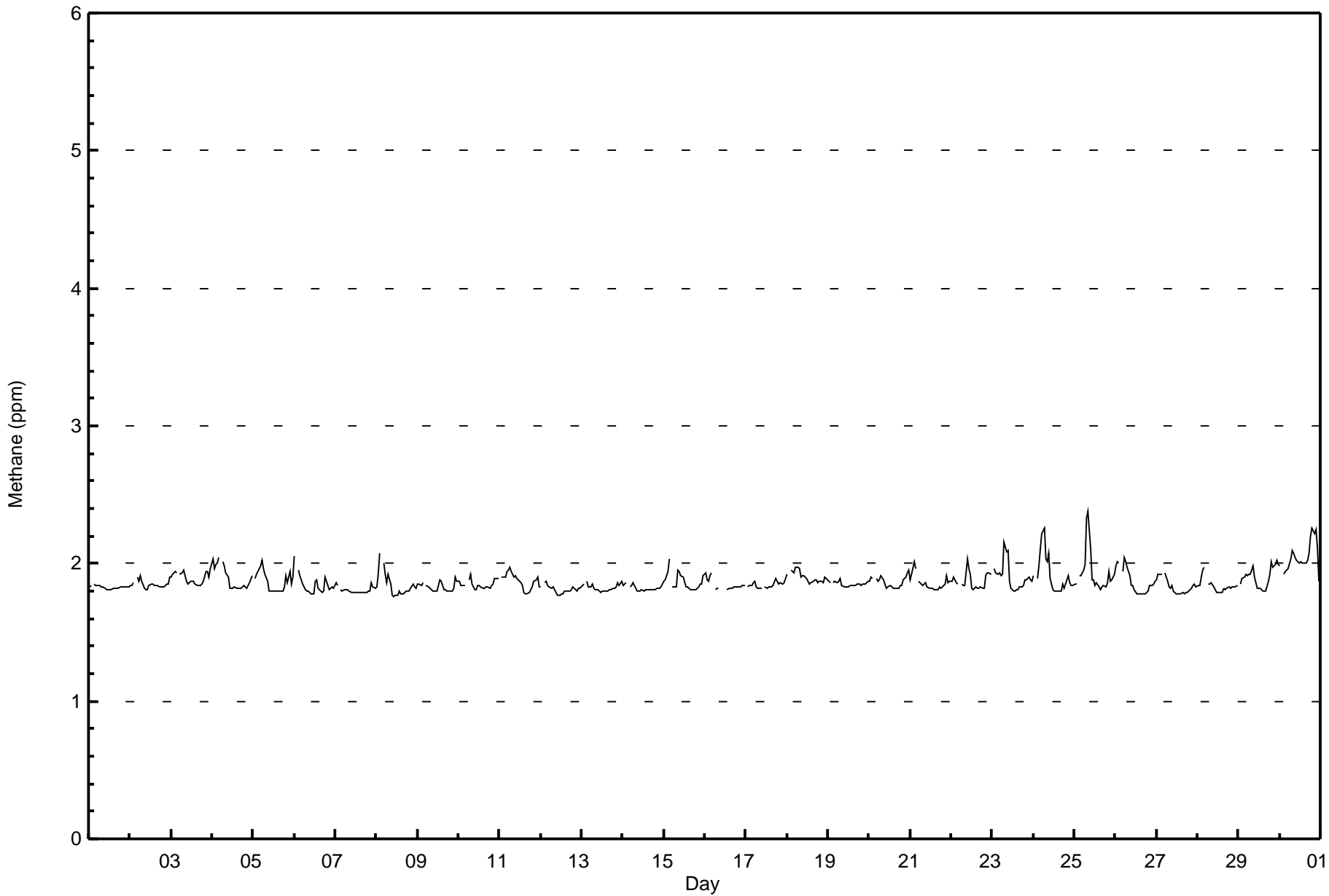
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	49	57	14	10	13	10	11	51	93	70	35	25	26	42	90	65	661
0.006 - 0.05	1	1	1	3	0	1	0	0	0	1	1	0	1	0	1	1	12
0.06 - 0.1	0	1	1	0	1	0	0	0	0	1	0	0	0	0	1	0	5
> 0.1	0	2	1	1	0	0	0	0	0	0	1	1	0	1	0	0	7
Totals	50	61	17	14	14	11	11	51	93	72	37	26	27	43	92	66	685

Total Number of Valid Hours: 685

Total Number of Hours: 720









Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Fort McKay - Bertha Ganter - June 2015

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	665	97.08	97.08
2.1 - 3.0	20	2.92	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



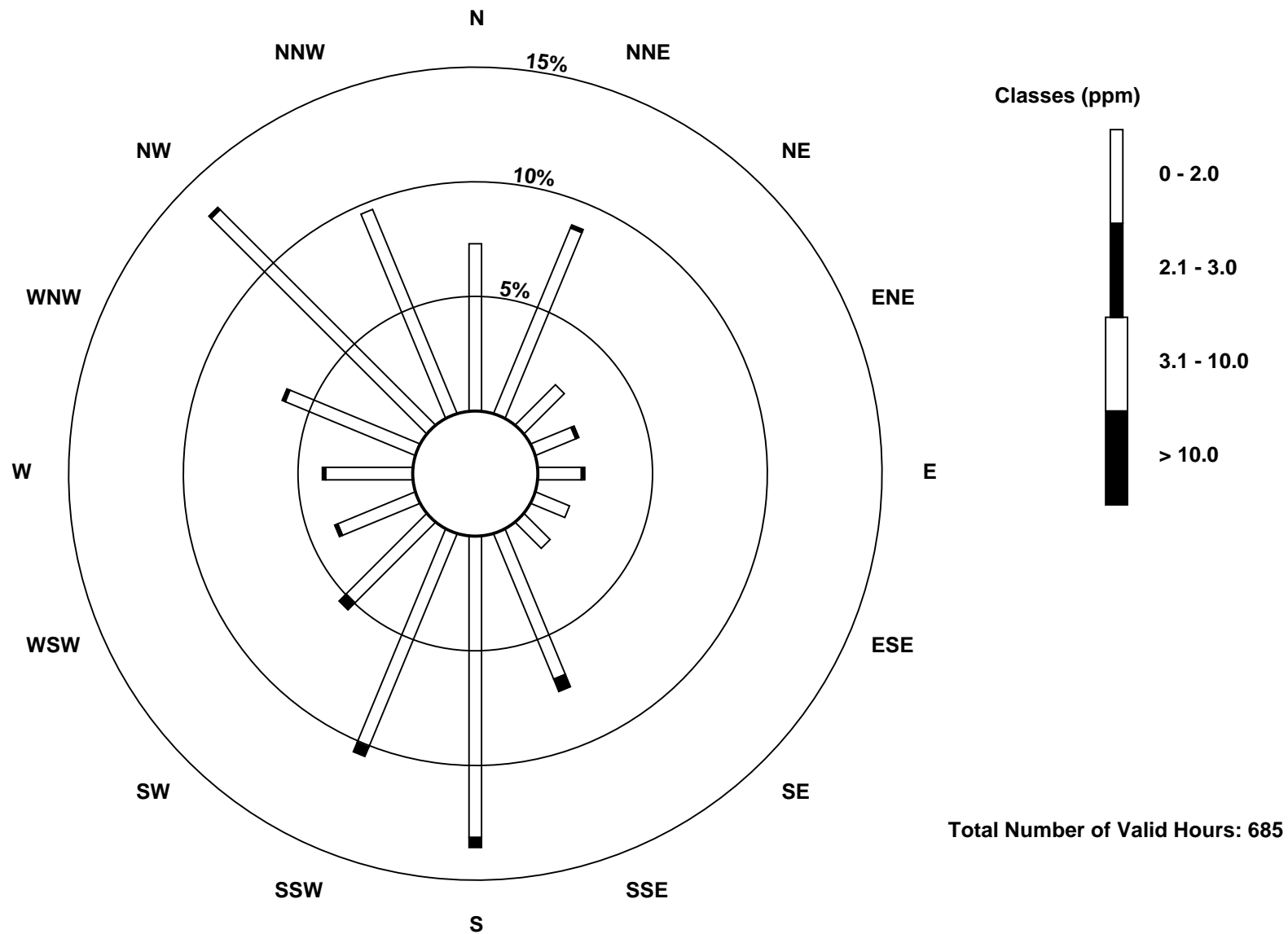
Wood Buffalo Environmental Association
Frequency Distribution

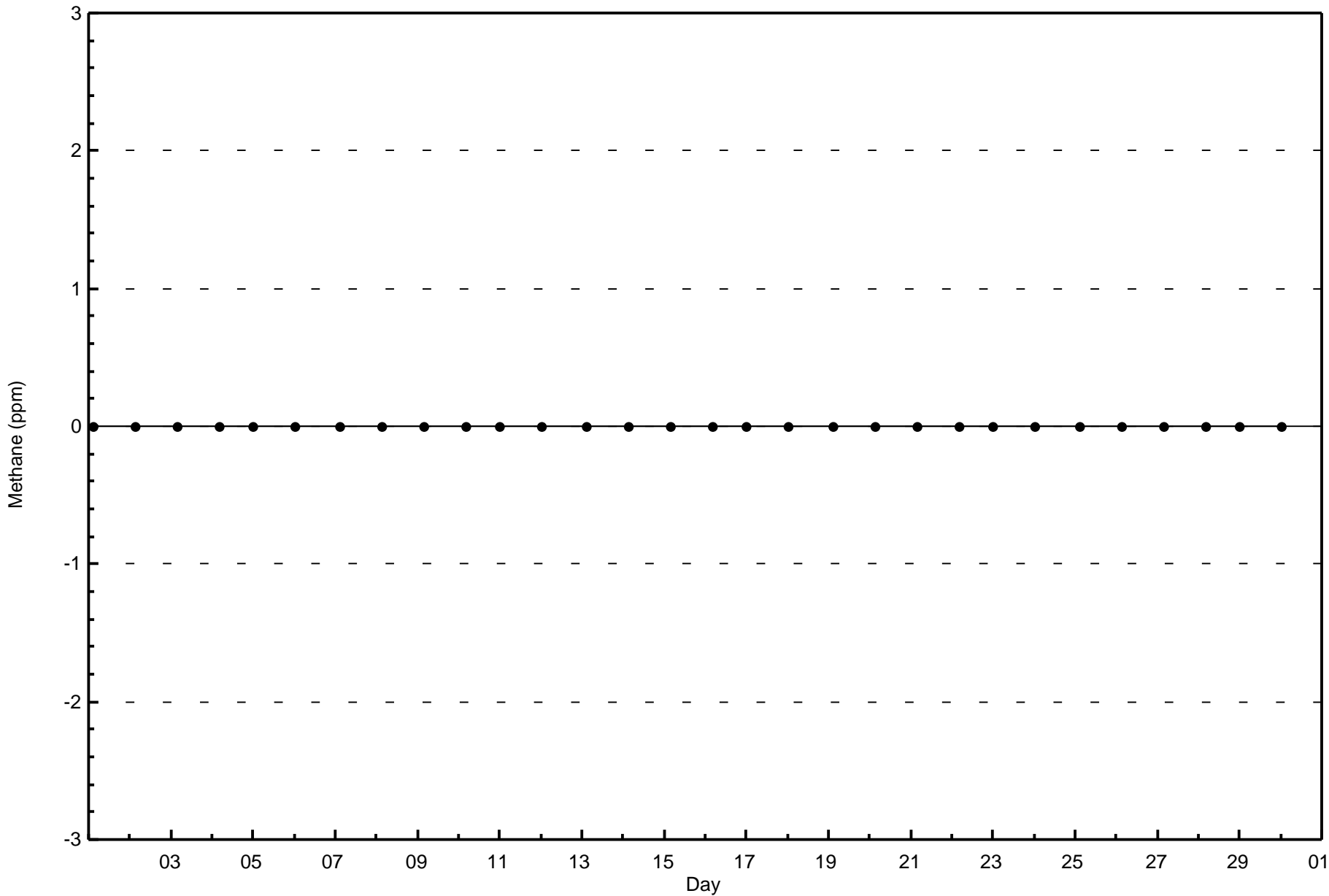
Methane (CH₄) - ppm
Fort McKay - Bertha Ganter - June 2015

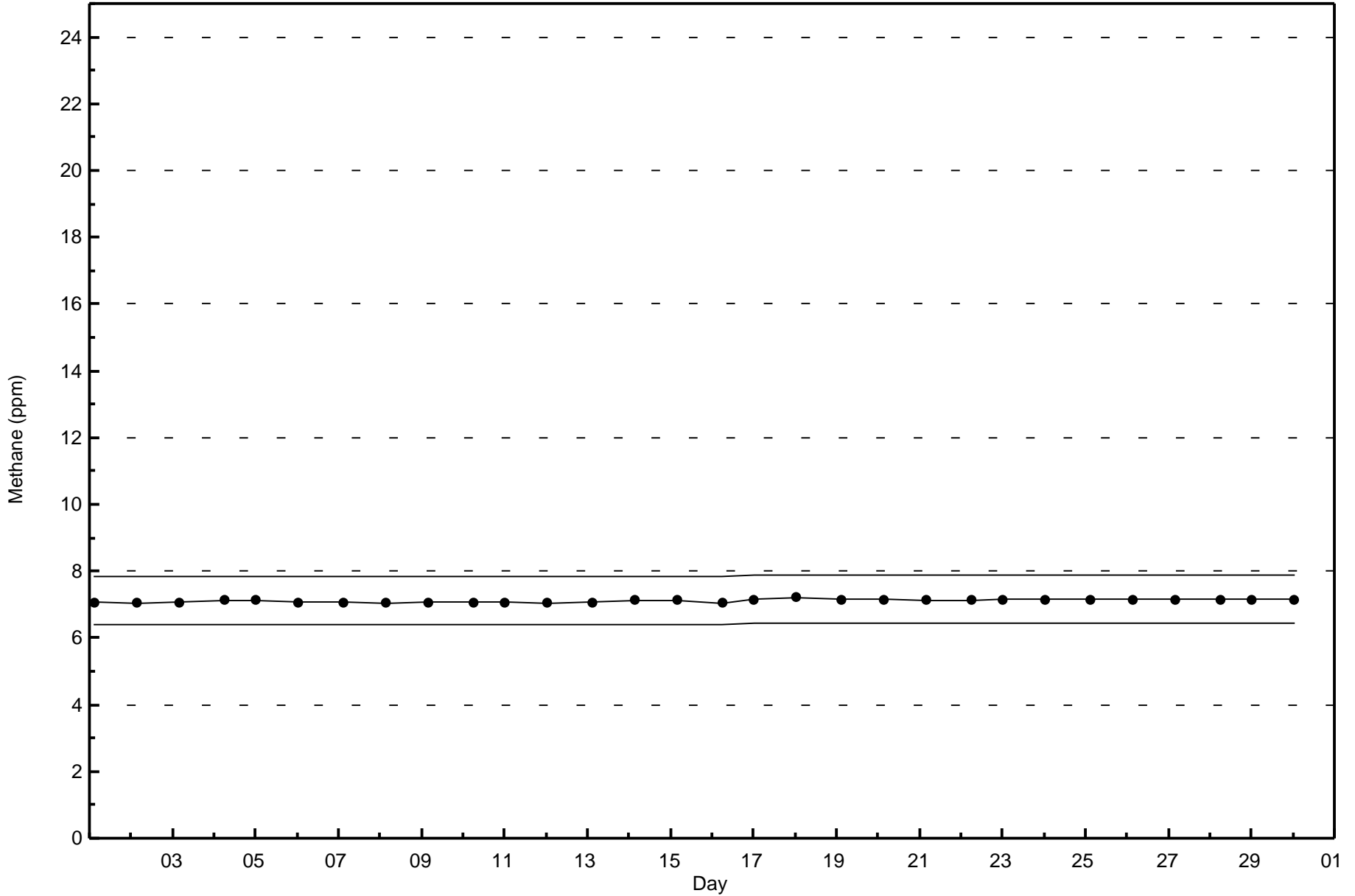
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	50	60	17	13	13	11	11	47	90	69	34	25	26	42	91	66	665
2.1 - 3.0	0	1	0	1	1	0	0	4	3	3	3	1	1	1	1	0	20
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	50	61	17	14	14	11	11	51	93	72	37	26	27	43	92	66	685

Total Number of Valid Hours: 685

Total Number of Hours: 720







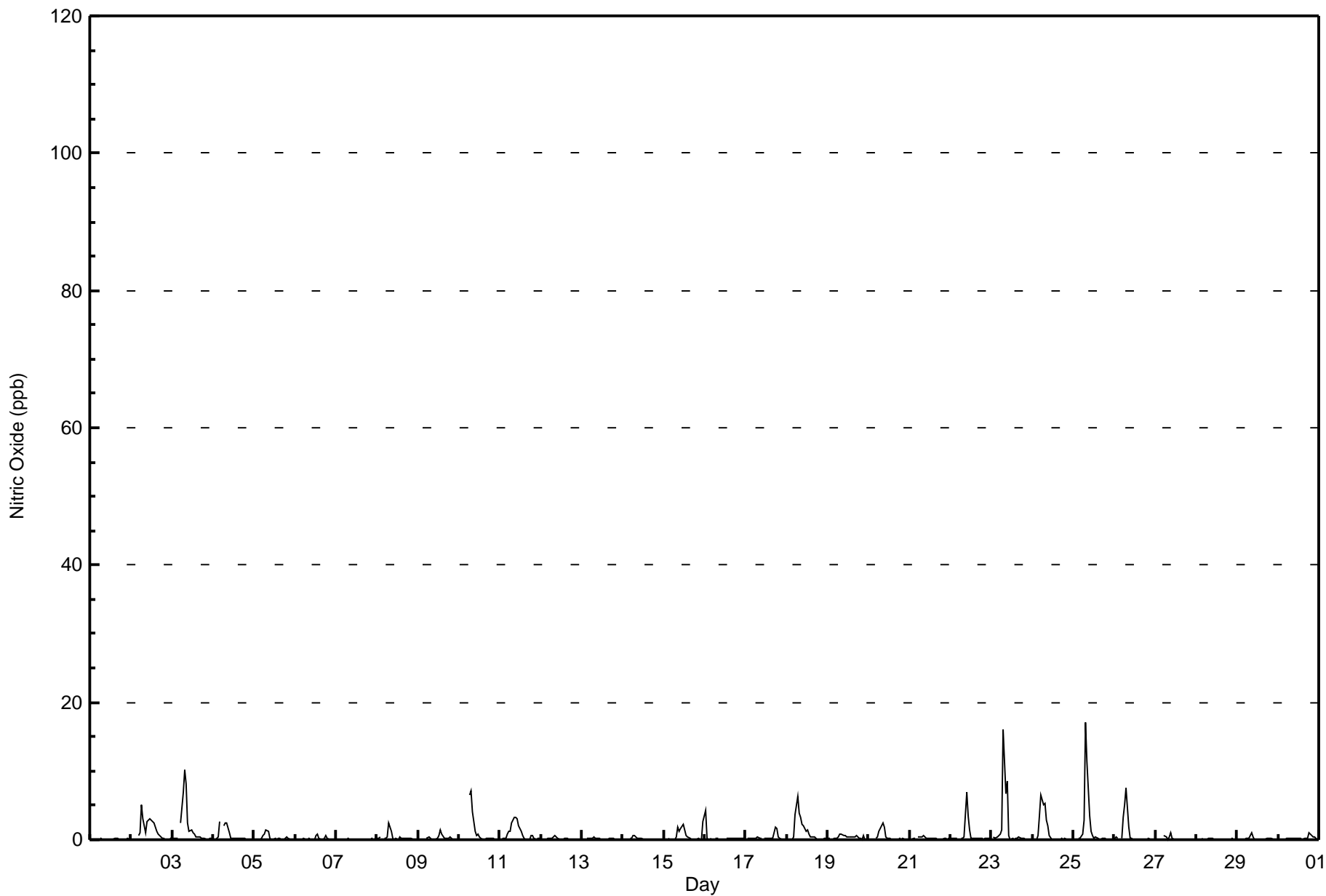


Maximum Value: 17 ppb on Jun 25 08:00	Maximum Daily Average: 1.7 ppb on Jun 25	Hours in Service: 720
Minimum Value: 0 ppb on Jun 25 17:00	Minimum Daily Average: 0.1 ppb on Jun 1	Hours of Data: 685
Maximum Diurnal Average: 2.8 ppb at hour 8	Minimum Diurnal Average: 0.1 ppb at hour 23	Hours of Missing Data: 35
Monthly Average: 0.6 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 7	Hours of Calibration: 34
		Percent Operational Time: 99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	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-Jun	0	0	0	Z	1	1	5	3	1	3	3	3	3	2	2	1	1	0	0	0	0	0	0	0	1.3	5
3-Jun	0	0	0	0	Z	2	7	10	8	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1.6	10
4-Jun	0	0	0	0	3	Z	2	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	3
5-Jun	Z	0	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
6-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	0.2	1
7-Jun	0	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-Jun	0	0	0	Z	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2
9-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0.2	1
10-Jun	0	0	0	0	0	Z	7	7	4	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1.0	7
11-Jun	Z	0	0	0	1	1	1	2	3	3	3	2	1	1	0	0	0	0	1	1	0	0	0	0	0.9	3
12-Jun	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
13-Jun	0	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-Jun	0	0	0	Z	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
15-Jun	0	0	0	0	Z	0	0	0	2	1	2	2	1	1	0	0	0	0	0	0	0	0	0	3	0.6	3
16-Jun	4	0	0	0	0	Z	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.4	4
17-Jun	Z	0	0	0	0	0	0	0	0	0	M	0	0	0	0	0	0	0	2	2	0	0	0	0	0.3	2
18-Jun	0	Z	0	0	0	4	6	4	3	2	2	1	1	1	0	0	0	0	0	0	0	0	0	0	1.2	6
19-Jun	0	0	Z	0	0	0	0	1	1	1	1	1	0	0	0	0	0	1	0	0	0	1	0	0	0.4	1
20-Jun	0	0	0	Z	0	0	1	2	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	3
21-Jun	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-Jun	0	0	0	0	0	Z	0	0	1	7	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0.7	7
23-Jun	Z	0	0	0	1	1	1	16	7	9	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.6	16
24-Jun	0	Z	0	1	3	7	5	5	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.2	7
25-Jun	0	0	Z	0	0	1	3	17	11	4	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1.7	17
26-Jun	0	0	0	Z	0	3	5	8	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	8
27-Jun	0	0	0	0	Z	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
28-Jun	0	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-Jun	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
30-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0.2	1

0.2	0.1	0.1	0.1	0.5	1.0	1.6	2.8	1.9	1.4	0.7	0.5	0.4	0.4	0.2	0.2	0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.2	Diurnal Average
4	0	0	1	3	7	7	17	11	9	4	3	3	2	2	1	1	2	2	1	0	1	0	3	2	2	1	0	3	Diurnal Maximum	

Z - zerspan C - Calibration M - Maintenance





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Fort McKay - Bertha Ganter - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	685	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



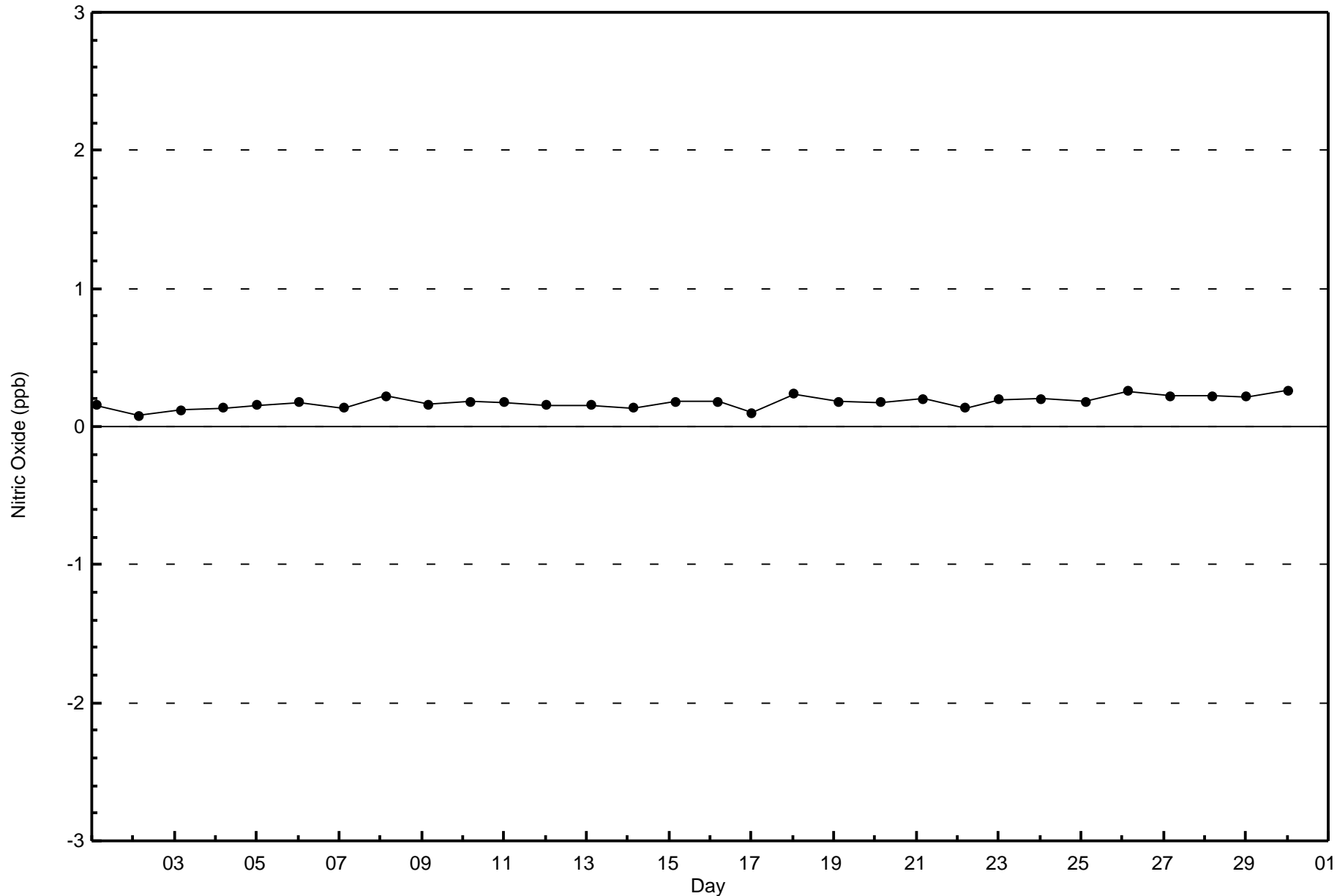
Wood Buffalo Environmental Association
Frequency Distribution

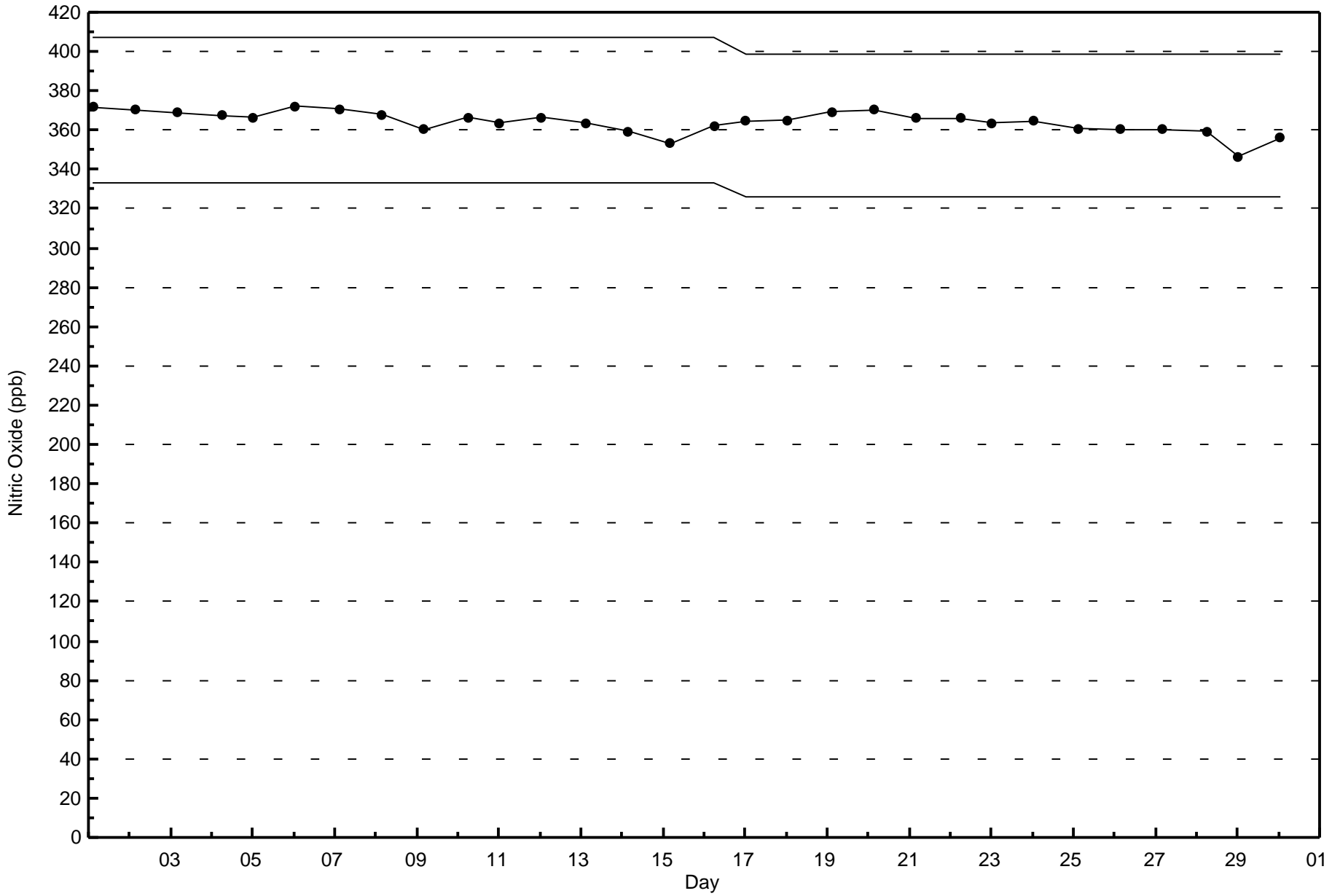
Nitric Oxide (NO) - ppb
Fort McKay - Bertha Ganter - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	50	61	17	14	14	11	11	51	93	72	37	26	27	43	92	66	685
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	50	61	17	14	14	11	11	51	93	72	37	26	27	43	92	66	685

Total Number of Valid Hours: 685

Total Number of Hours: 720





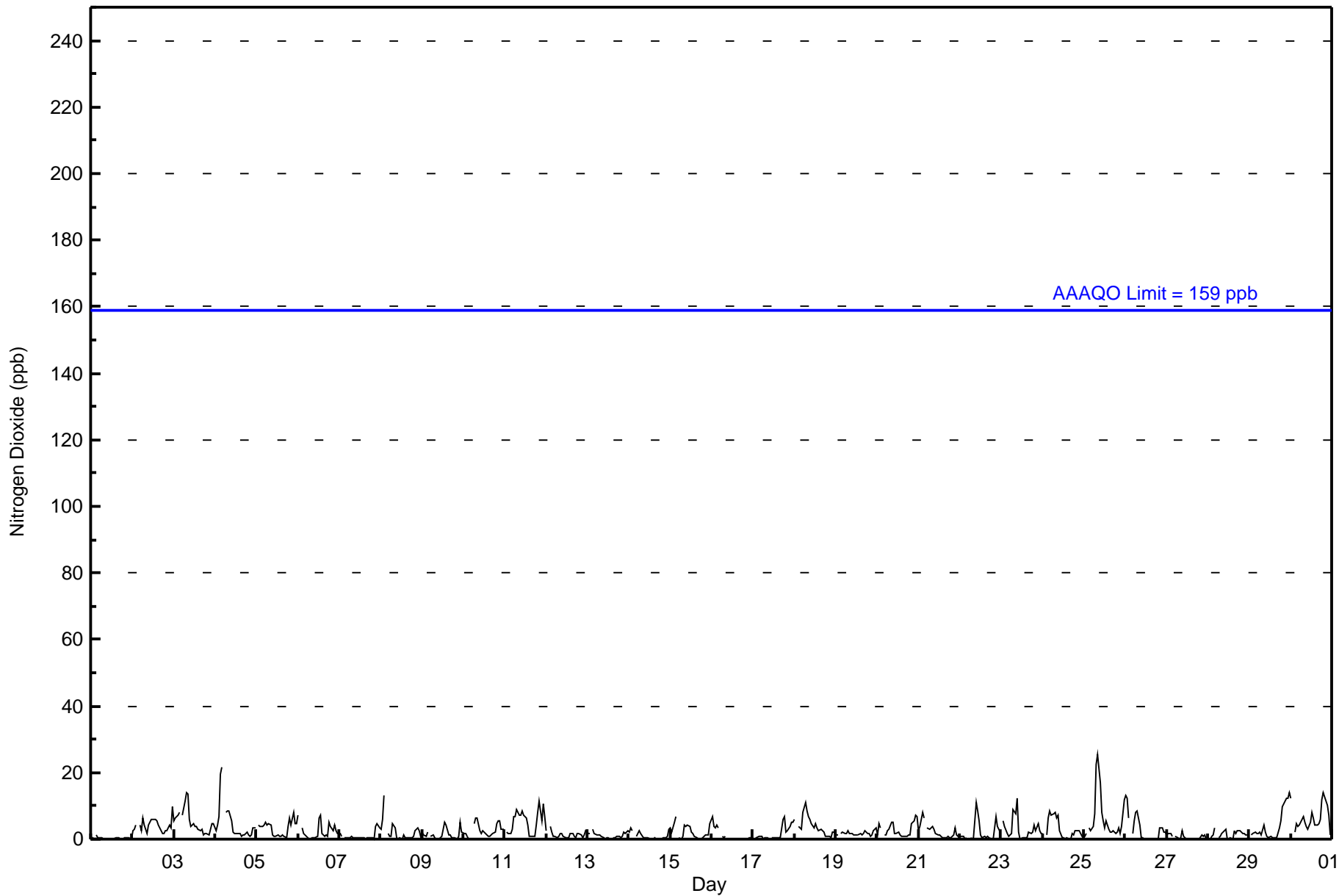


Number of Exceedences (AAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 26 ppb on Jun 25 09:00	Maximum Daily Average: 6.3 ppb on Jun 30		Hours of Data:	685
Minimum Value: 0 ppb on Jun 1 09:00	Minimum Daily Average: 0.3 ppb on Jun 1		Hours of Missing Data:	35
Maximum Diurnal Average: 4.4 ppb at hour 8	Minimum Diurnal Average: 1.1 ppb at hour 17		Hours of Calibration:	34
Monthly Average: 2.7 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 2 Q ₃ = 4 P ₉₀ = 7 P ₉₉ = 14		Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	1	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0.3	1
2-Jun	2	3	4	Z	4	3	6	4	2	4	5	6	6	6	5	4	4	2	2	3	3	4	4	10	4.1	10
3-Jun	5	6	7	8	Z	7	12	14	13	6	4	5	4	4	3	3	3	1	2	2	1	3	5	5	5.3	14
4-Jun	3	4	7	19	22	Z	8	8	8	5	2	2	2	2	1	1	1	1	2	1	1	1	3	4	4.8	22
5-Jun	Z	4	4	4	4	5	4	5	4	1	1	1	1	1	1	1	1	0	4	6	4	8	5	5	3.2	8
6-Jun	7	Z	3	2	1	1	0	0	1	0	0	1	6	7	2	1	1	1	5	4	3	4	3	2	2.4	7
7-Jun	2	1	Z	0	0	1	1	1	0	0	0	1	0	0	0	0	1	0	0	0	4	5	3	0.9	5	
8-Jun	3	6	13	Z	2	1	1	5	3	0	0	1	0	1	1	1	0	1	1	1	3	4	3	1	2.1	13
9-Jun	2	1	1	2	Z	1	1	0	0	0	0	1	3	5	4	1	1	0	1	0	0	1	5	2	1.5	5
10-Jun	2	2	1	0	0	Z	5	7	6	2	2	2	2	2	1	1	1	2	2	5	6	5	3	3	2.6	7
11-Jun	Z	2	2	2	3	7	7	9	7	7	8	7	7	4	1	1	1	1	4	8	12	6	10	7	5.3	12
12-Jun	3	Z	4	2	1	1	1	1	2	2	1	1	0	0	2	2	1	1	2	2	1	0	1	3	1.3	4
13-Jun	2	2	Z	3	2	1	1	1	1	0	0	0	0	0	0	0	1	1	1	0	1	2	2	3	1.1	3
14-Jun	2	3	3	Z	1	2	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	3	1.0	3
15-Jun	3	2	5	7	Z	0	0	1	4	4	4	4	2	2	1	0	0	0	0	0	1	1	1	5	2.1	7
16-Jun	7	4	4	4	3	Z	1	1	1	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	1.3	7
17-Jun	Z	0	1	1	1	1	0	1	0	0	M	0	0	0	1	1	1	6	7	2	3	4	5	5	1.7	7
18-Jun	6	Z	4	3	3	8	11	8	7	6	5	3	5	4	3	3	2	2	1	1	1	1	2	2	3.9	11
19-Jun	1	1	Z	2	2	2	2	2	2	2	1	1	1	1	2	1	2	2	2	2	1	1	3	3	1.7	3
20-Jun	1	5	3	Z	1	1	3	3	5	5	2	2	2	1	1	1	1	1	1	1	5	5	7	7	2.8	7
21-Jun	3	4	8	7	Z	3	3	4	4	3	2	1	1	1	1	0	1	0	0	1	3	1	1	1	2.3	8
22-Jun	1	1	1	0	1	Z	0	0	1	11	9	5	1	1	1	1	1	0	0	0	4	7	4	2	2.2	11
23-Jun	Z	6	4	2	1	1	2	9	8	12	2	0	1	1	0	1	2	2	2	4	3	5	3	2	3.0	12
24-Jun	2	Z	1	6	8	7	8	8	6	7	3	0	0	0	0	0	0	2	1	2	3	3	2	1	3.1	8
25-Jun	1	2	Z	3	2	4	8	23	26	17	8	6	4	6	3	2	2	3	2	2	3	2	4	12	6.2	26
26-Jun	13	12	6	Z	2	6	8	9	4	1	1	0	0	0	0	0	0	0	0	4	4	2	2	2	3.1	13
27-Jun	1	2	2	1	Z	1	1	0	1	3	1	0	0	0	0	0	0	0	0	0	1	1	1	0	0.6	3
28-Jun	0	0	1	1	3	Z	0	1	2	2	3	0	0	0	0	3	2	2	3	2	2	2	1	1	1.4	3
29-Jun	Z	1	2	2	2	2	2	1	4	2	1	1	1	1	0	0	0	4	6	10	11	12	12	14	3.9	14
30-Jun	12	Z	2	5	4	4	6	7	5	4	3	5	8	6	4	4	5	6	12	14	11	10	7	1	6.3	14

3.4	3.0	3.7	3.5	2.9	2.7	3.4	4.4	4.3	3.8	2.4	1.9	2.0	1.9	1.3	1.1	1.1	1.4	2.0	2.5	2.9	3.4	3.5	3.6	Diurnal Average	
13	12	13	19	22	8	12	23	26	17	9	7	8	7	5	4	5	6	12	14	12	12	12	14	Diurnal Maximum	

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Fort McKay - Bertha Ganter - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	682	99.56	99.56
21 - 40	3	0.44	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



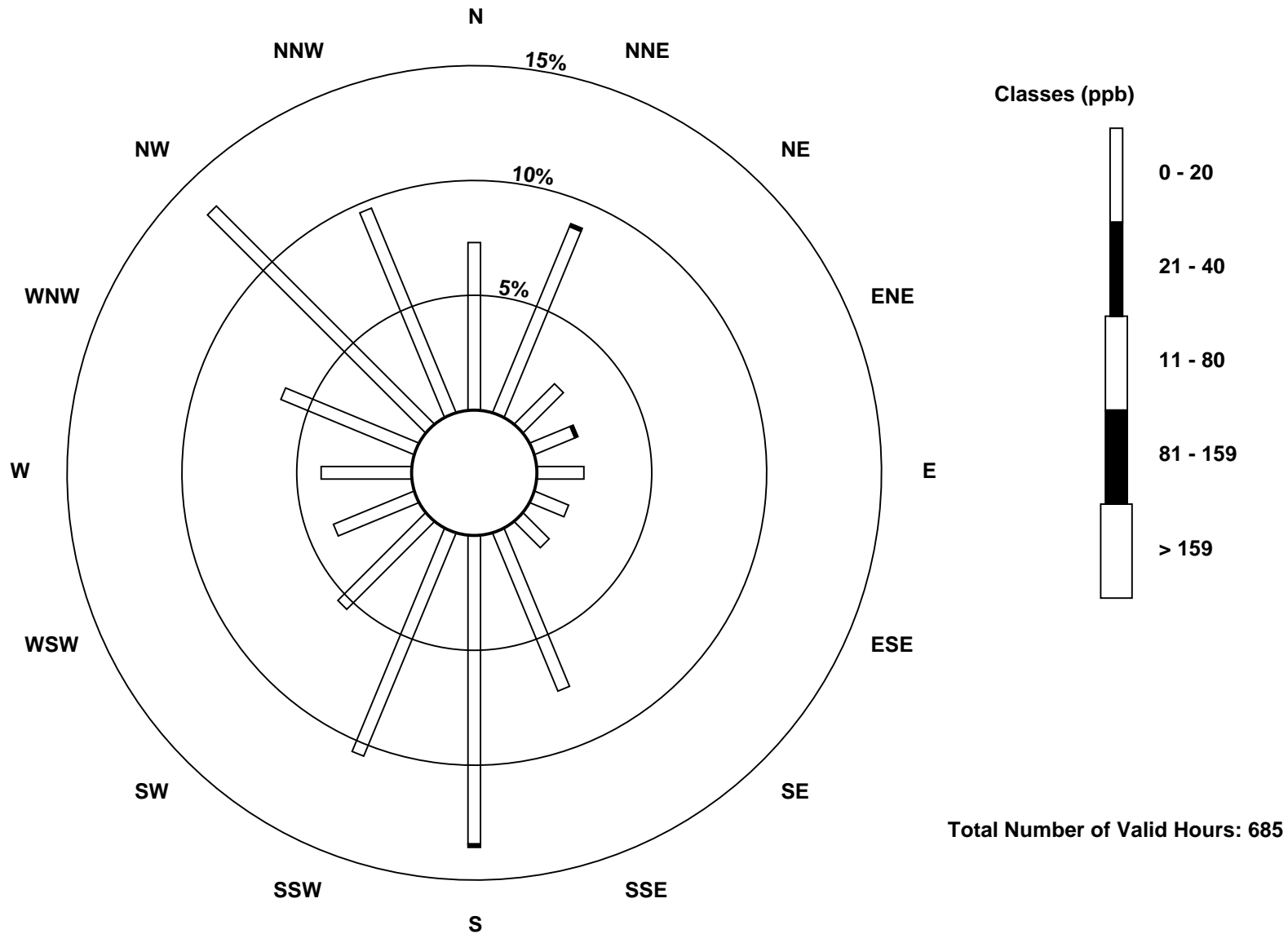
Wood Buffalo Environmental Association
Frequency Distribution

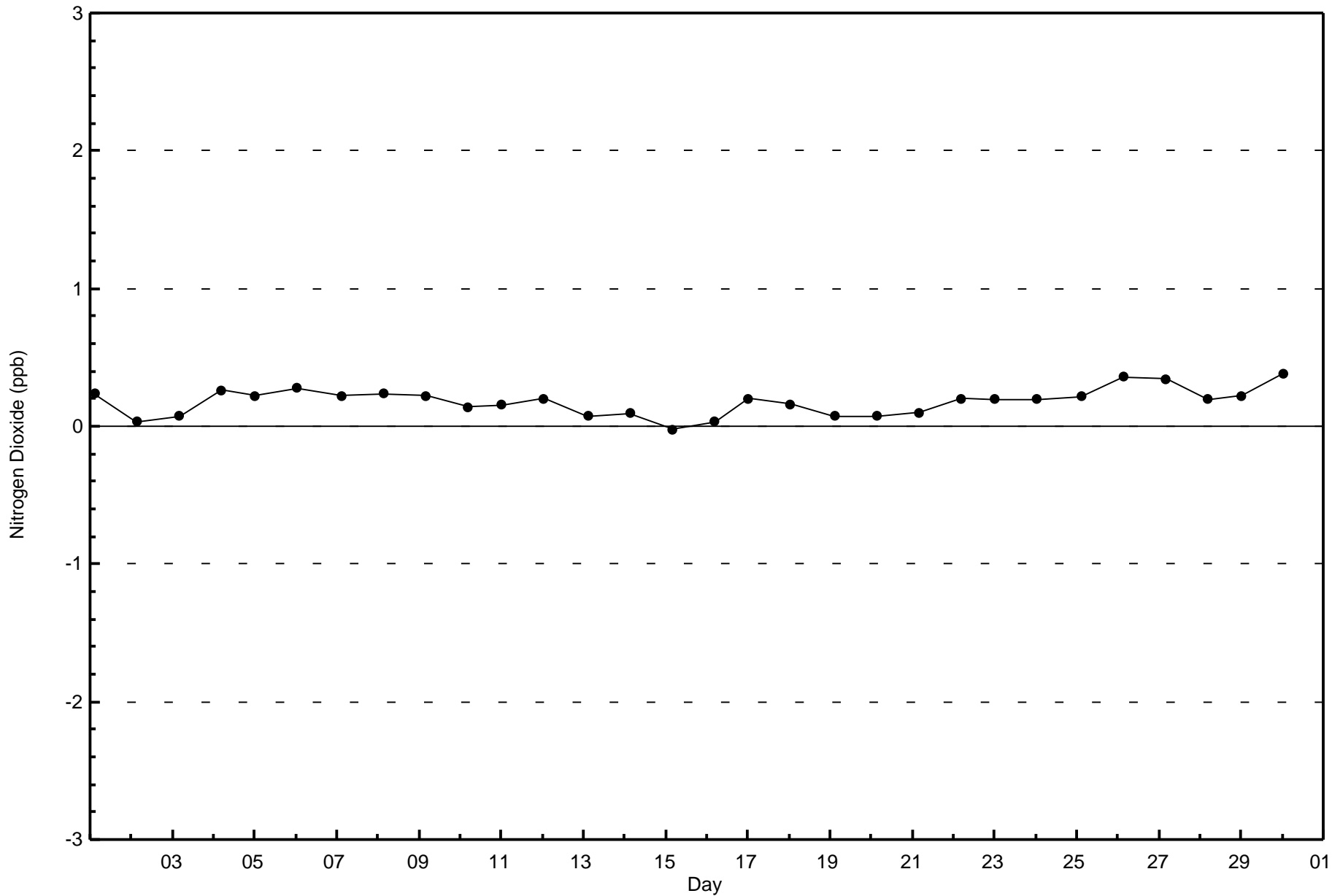
Nitrogen Dioxide (NO₂) - ppb
Fort McKay - Bertha Ganter - June 2015

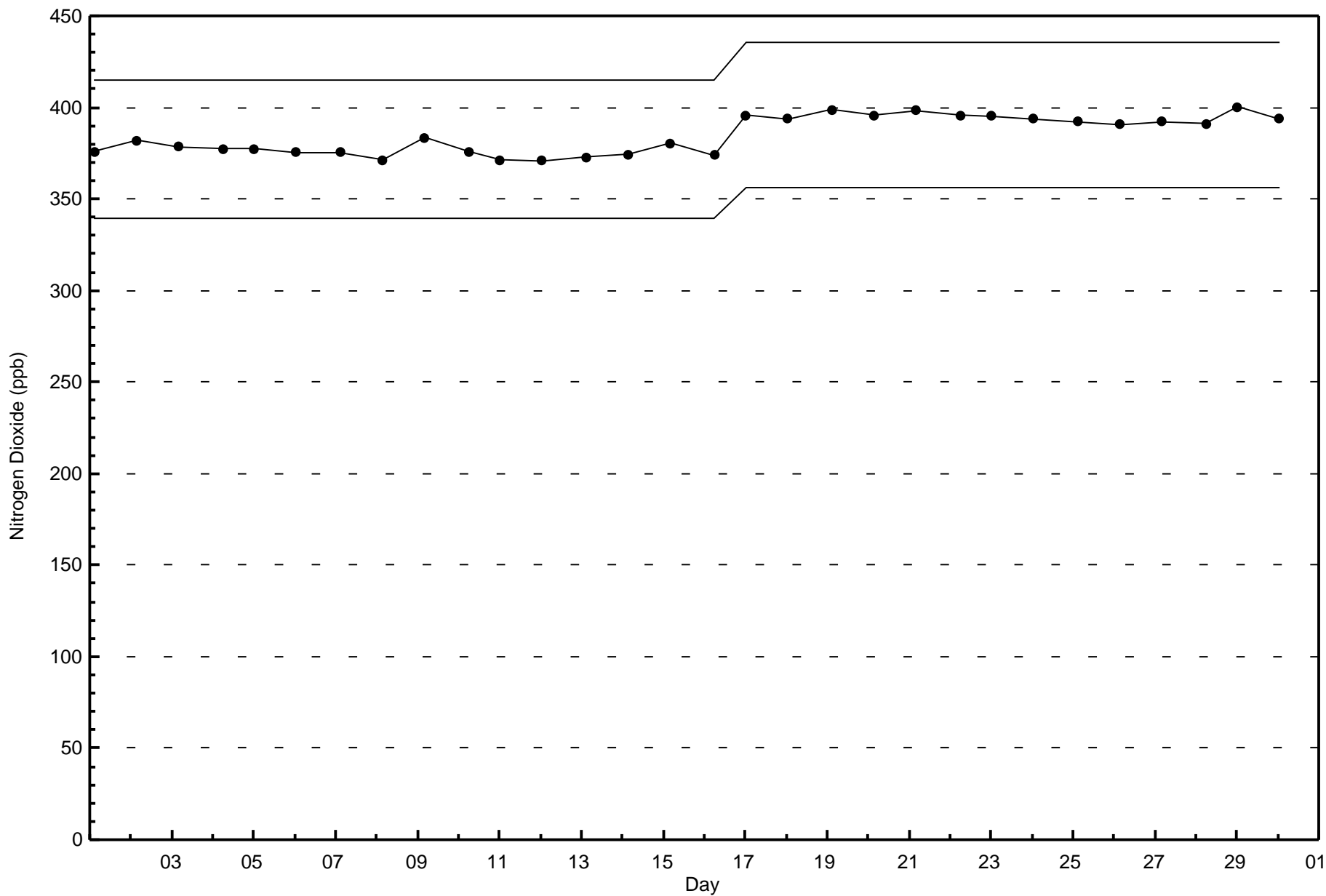
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	50	60	17	13	14	11	11	51	92	72	37	26	27	43	92	66	682
21 - 40	0	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	3
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	50	61	17	14	14	11	11	51	93	72	37	26	27	43	92	66	685

Total Number of Valid Hours: 685

Total Number of Hours: 720









Maximum Value: 40 ppb on Jun 25 08:00																		Maximum Daily Average: 7.8 ppb on Jun 25						Hours in Service: 720		
Minimum Value: 0 ppb on Jun 26 14:00																		Minimum Daily Average: 0.4 ppb on Jun 1						Hours of Data: 685		
Maximum Diurnal Average: 7.3 ppb at hour 8																		Minimum Diurnal Average: 1.2 ppb at hour 17						Hours of Missing Data: 35		
Monthly Average: 3.3 ppb																		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 2 Q ₃ = 4 P ₉₀ = 8 P ₉₉ = 20						Hours of Calibration: 34		
																		Percent Operational Time: 99.9								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	1	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	1	1	0	0.4	1
2-Jun	2	3	5	Z	5	4	11	7	3	7	8	9	9	9	7	5	4	2	2	3	3	4	4	10	5.4	11
3-Jun	5	6	7	8	Z	9	18	24	22	8	5	6	5	4	3	3	3	1	2	2	1	3	5	5	6.9	24
4-Jun	3	5	7	20	24	Z	10	11	11	7	2	2	2	2	2	1	1	1	2	1	1	1	3	4	5.3	24
5-Jun	Z	4	4	4	4	5	5	6	5	2	1	1	2	1	1	1	1	0	4	7	4	8	5	5	3.5	8
6-Jun	7	Z	3	2	1	1	0	0	1	0	0	1	7	8	2	1	1	1	6	4	3	4	3	2	2.6	8
7-Jun	2	1	Z	0	1	1	1	1	0	0	0	0	1	1	0	0	0	1	0	0	0	4	5	3	1.0	5
8-Jun	3	6	13	Z	2	1	1	7	4	1	0	1	0	1	1	1	1	1	1	1	3	4	3	1	2.5	13
9-Jun	2	1	1	2	Z	1	2	0	0	0	0	1	4	7	5	1	1	1	1	1	0	1	5	2	1.7	7
10-Jun	2	2	1	0	0	Z	11	14	10	4	2	3	3	2	1	1	1	2	2	5	6	5	3	3	3.6	14
11-Jun	Z	2	2	2	4	8	8	11	10	10	11	9	8	5	1	1	1	1	5	9	12	6	11	7	6.3	12
12-Jun	3	Z	4	2	1	1	1	1	2	2	1	1	0	0	2	2	1	1	2	2	1	0	1	3	1.5	4
13-Jun	2	2	Z	3	2	2	2	2	1	0	0	0	0	0	0	0	1	1	1	1	1	2	2	3	1.2	3
14-Jun	2	3	3	Z	1	2	3	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	3	1.1	3
15-Jun	3	2	5	7	Z	1	0	2	6	5	6	6	4	2	1	1	0	0	0	0	1	1	1	7	2.7	7
16-Jun	11	4	4	5	4	Z	1	1	1	C	C	C	C	0	0	0	0	0	0	0	0	0	1	0	1.6	11
17-Jun	Z	0	1	1	1	1	0	1	1	0	M	1	0	1	1	1	1	8	8	2	3	4	5	5	2.0	8
18-Jun	6	Z	4	3	3	12	17	12	10	8	7	5	6	4	3	4	3	2	1	1	1	1	2	2	5.1	17
19-Jun	1	1	Z	2	2	2	2	3	3	2	2	2	2	2	2	2	2	3	2	2	1	2	3	3	2.1	3
20-Jun	1	5	4	Z	1	2	4	4	7	7	2	2	2	1	1	1	1	1	1	1	5	5	8	7	3.2	8
21-Jun	3	4	8	7	Z	4	3	4	5	3	2	1	1	1	1	0	1	0	0	1	4	1	1	2.5	8	
22-Jun	1	1	1	0	1	Z	1	0	1	18	12	7	2	1	1	1	1	1	0	0	4	7	4	2	2.9	18
23-Jun	Z	6	4	2	1	2	3	25	14	21	3	0	1	0	1	1	2	2	2	4	3	5	3	2	4.6	25
24-Jun	2	Z	2	7	12	14	13	13	9	9	3	0	0	0	0	0	0	2	1	3	3	3	2	1	4.3	14
25-Jun	1	2	Z	4	3	5	10	40	37	21	9	6	4	6	3	2	2	3	2	2	3	2	4	12	7.8	40
26-Jun	13	12	7	Z	2	9	13	16	6	1	1	0	0	0	0	0	0	0	0	0	4	4	2	2	4.0	16
27-Jun	1	2	2	1	Z	1	1	0	1	3	1	0	0	0	0	0	0	0	0	0	1	1	1	0	0.8	3
28-Jun	0	0	1	2	4	Z	1	1	2	3	3	0	0	0	0	3	2	2	3	2	1	2	1	1	1.5	4
29-Jun	Z	1	2	2	2	2	2	1	5	3	1	1	1	1	0	0	0	4	6	10	11	12	12	14	4.1	14
30-Jun	12	Z	2	5	4	4	6	7	5	4	3	5	8	6	4	4	5	6	13	15	12	10	7	1	6.5	15
																		Diurnal Average								
																		Diurnal Maximum								
Z - zerospan																		C - Calibration						M - Maintenance		

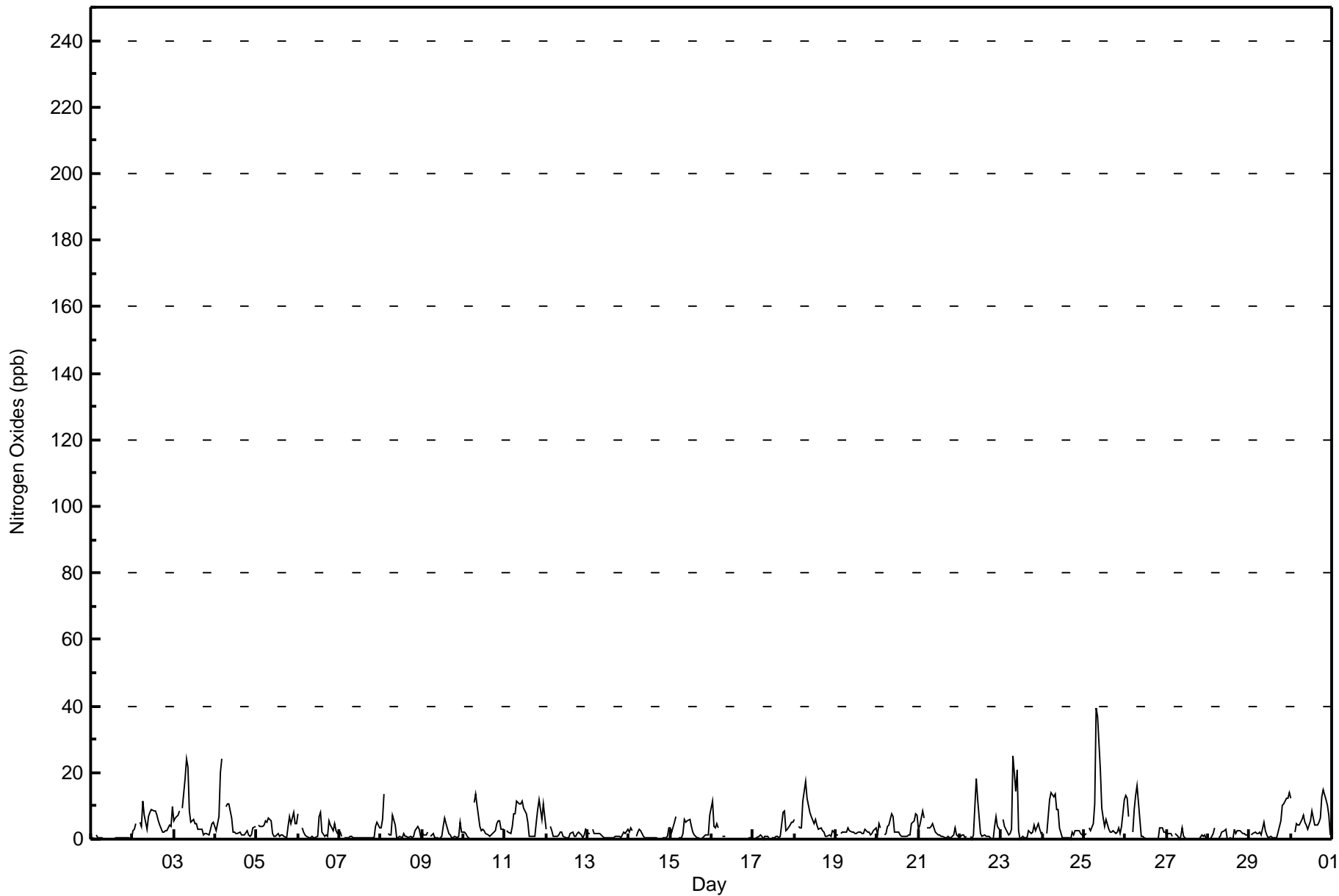


Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Oxides (NO_x) - ppb

Fort McKay - Bertha Ganter - June 2015





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Fort McKay - Bertha Ganter - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	677	98.83	98.83
21 - 40	8	1.17	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



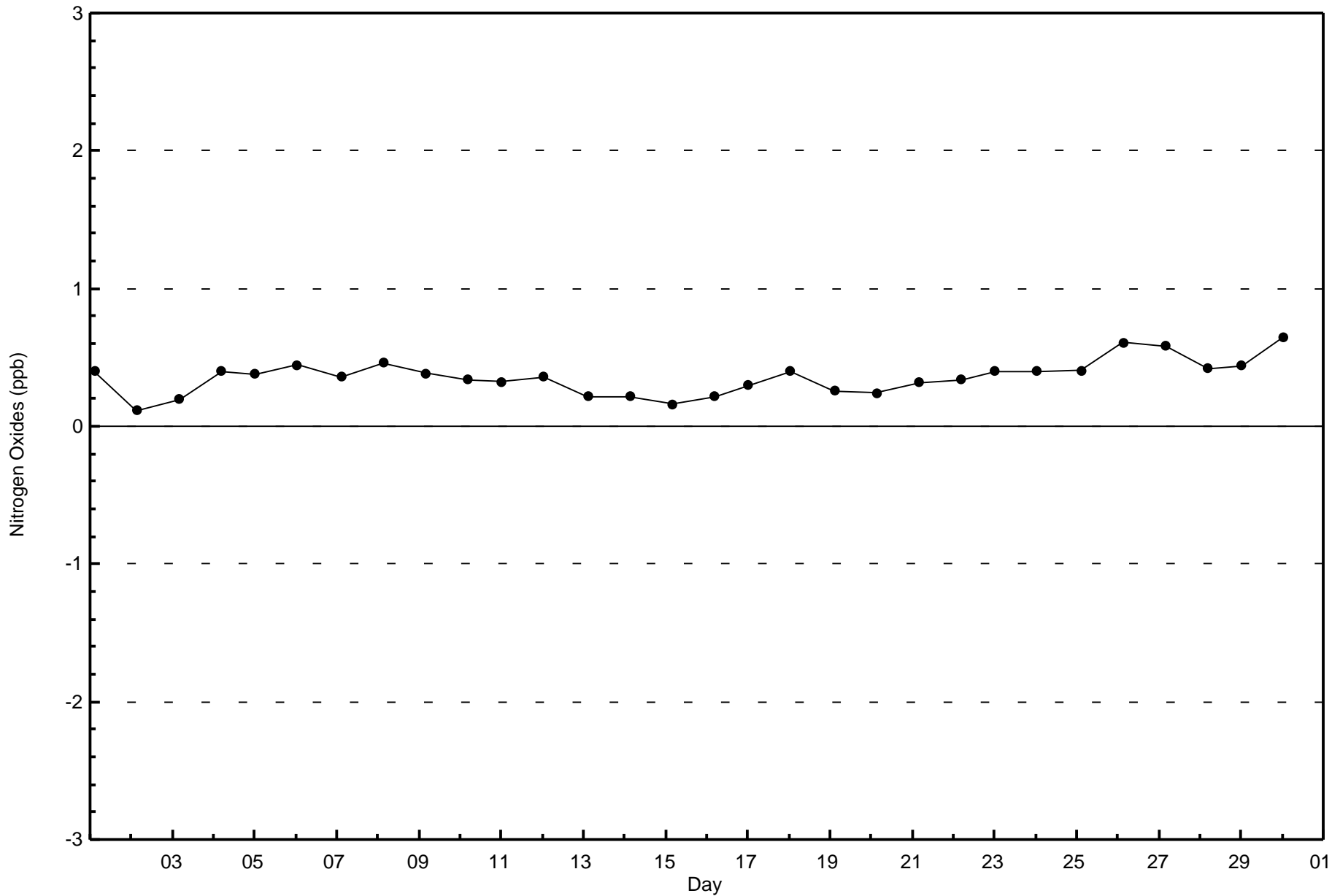
**Wood Buffalo Environmental Association
Frequency Distribution**

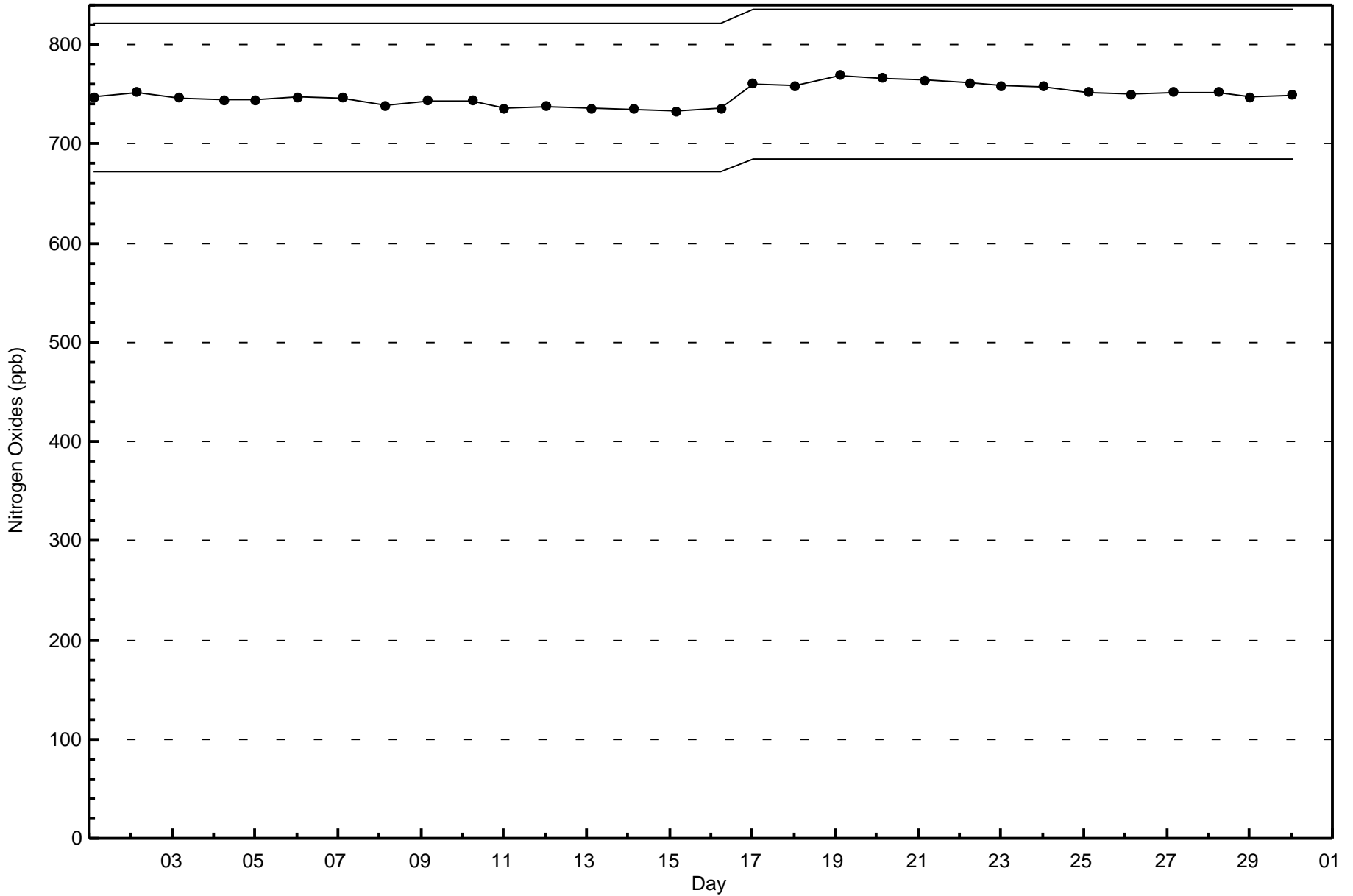
**Nitrogen Oxides (NO_x) - ppb
Fort McKay - Bertha Ganter - June 2015**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	50	60	17	13	13	11	11	49	90	72	37	26	27	43	92	66	677
21 - 40	0	1	0	1	1	0	0	2	3	0	0	0	0	0	0	0	8
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	50	61	17	14	14	11	11	51	93	72	37	26	27	43	92	66	685

Total Number of Valid Hours: 685

Total Number of Hours: 720







Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

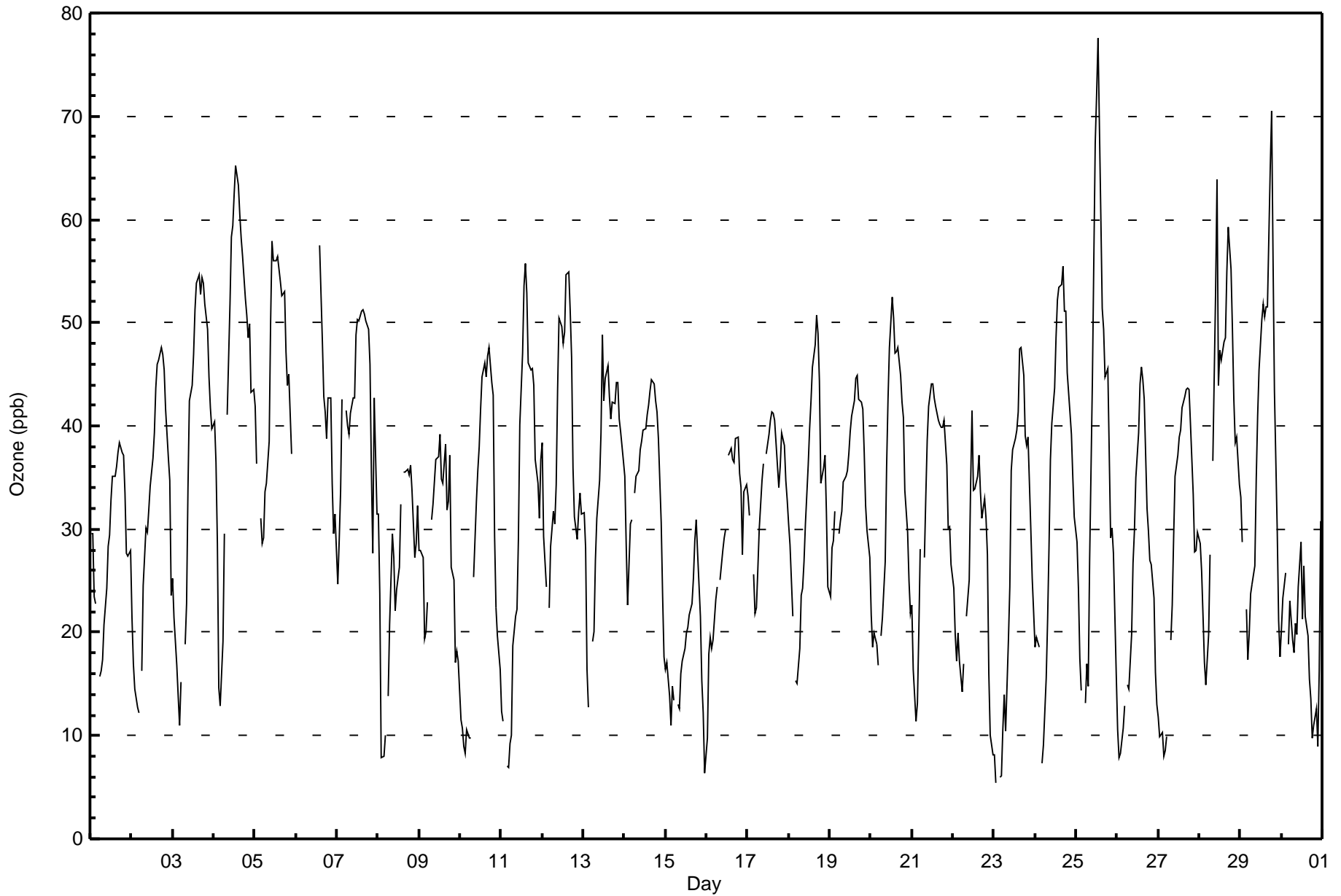
Fort McKay - Bertha Ganter - June 2015

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 78 ppb on Jun 25 14:00	Maximum Daily Average: 45.5 ppb on Jun 4		Hours of Data:	672
Minimum Value: 5 ppb on Jun 23 02:00	Minimum Daily Average: 18.1 ppb on Jun 15		Hours of Missing Data:	48
Maximum Diurnal Average: 45.3 ppb at hour 15	Minimum Diurnal Average: 15.7 ppb at hour 5		Hours of Calibration:	32
Monthly Average: 32.7 ppb	Percentiles: P ₁ = 8 P ₁₀ = 15 Q ₁ = 22 Median = 33 Q ₃ = 42 P ₉₀ = 50 P ₉₉ = 64		Percent Operational Time:	97.8

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	30	30	23	23	Z	16	16	17	21	24	28	29	33	35	35	36	37	38	37	37	34	28	27	28	28.8	38
2-Jun	21	17	14	13	12	Z	16	25	30	30	32	34	37	39	44	46	46	48	47	45	42	37	35	24	31.9	48
3-Jun	25	21	17	14	11	15	Z	19	23	34	42	44	47	51	54	55	53	54	54	52	49	45	42	40	37.4	55
4-Jun	40	36	29	15	13	19	29	Z	41	52	58	59	63	65	63	60	58	56	52	51	49	50	43	44	45.5	65
5-Jun	42	36	Z	31	29	29	34	34	38	50	58	56	56	55	54	53	53	47	44	45	37	AF	AF	44.7	58	
6-Jun	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	C	C	C	58	48	43	41	39	43	43	34	30	31	--	58
7-Jun	25	29	34	43	Z	41	40	39	41	43	43	49	50	50	51	51	51	50	49	46	36	28	43	31	41.8	51
8-Jun	31	24	8	8	10	Z	14	21	30	27	22	24	26	32	M	36	36	36	35	36	34	27	29	32	26.3	36
9-Jun	28	28	27	19	20	23	Z	31	32	35	37	37	39	35	34	38	32	33	37	26	25	17	18	17	29.1	39
10-Jun	11	11	9	8	11	10	10	Z	25	33	36	38	42	45	46	45	47	48	44	43	29	22	20	16	28.2	48
11-Jun	12	11	Z	7	7	9	10	19	21	22	29	40	47	54	56	53	46	45	46	44	37	34	31	37	31.2	56
12-Jun	38	29	24	Z	22	28	32	31	34	44	50	50	48	49	55	55	51	47	36	31	29	32	33	31	38.3	55
13-Jun	32	28	16	13	Z	19	20	27	31	35	39	49	42	45	46	43	41	42	42	44	44	41	39	37	35.4	49
14-Jun	35	29	23	30	31	Z	33	35	36	38	39	40	40	41	42	43	44	44	42	41	39	31	24	18	35.5	44
15-Jun	16	17	14	11	15	13	Z	13	13	16	17	18	20	21	22	23	25	29	31	28	22	15	12	6	18.1	31
16-Jun	10	18	20	18	19	23	24	Z	25	28	29	30	M	37	38	37	36	39	39	35	34	28	34	34	28.9	39
17-Jun	33	31	Z	26	22	22	26	30	35	36	M	37	39	41	41	41	41	36	34	36	39	38	35	33	34.2	41
18-Jun	30	28	22	Z	15	15	19	24	24	27	30	36	40	42	46	48	51	49	44	34	36	37	32	24	32.8	51
19-Jun	24	28	29	32	Z	30	31	32	35	35	36	37	39	41	42	45	45	43	42	42	37	32	30	27	35.3	45
20-Jun	22	19	20	19	17	Z	20	21	27	36	43	48	52	50	47	47	48	45	42	41	34	30	25	22	33.6	52
21-Jun	23	16	11	13	20	28	Z	27	33	39	42	44	44	43	42	41	40	40	40	40	36	30	30	27	32.6	44
22-Jun	24	20	17	20	17	14	17	Z	22	25	34	41	34	34	35	37	34	31	33	31	28	16	10	8	25.3	41
23-Jun	8	5	Z	6	6	11	14	10	19	24	36	38	39	40	41	47	48	45	39	38	39	30	25	22	27.4	48
24-Jun	19	20	19	Z	7	9	16	21	28	37	40	44	49	52	53	54	55	51	51	45	41	39	35	31	35.5	55
25-Jun	29	24	17	14	Z	13	17	15	27	45	56	67	72	78	60	51	49	45	46	37	29	30	28	16	37.7	78
26-Jun	11	8	8	11	13	Z	15	15	20	27	30	35	39	44	46	44	43	32	30	27	27	23	16	13	25.0	46
27-Jun	12	10	10	8	9	10	Z	19	23	29	35	37	39	40	42	43	43	44	44	40	33	28	28	30	28.5	44
28-Jun	29	26	22	17	15	20	27	Z	37	53	64	44	47	46	48	49	55	59	55	49	43	38	39	34	39.8	64
29-Jun	33	29	Z	22	17	20	24	25	26	35	41	45	50	52	51	51	52	65	70	56	43	30	21	18	38.1	70
30-Jun	20	23	26	Z	19	23	19	18	21	20	24	29	21	26	22	20	15	14	10	11	13	9	16	31	19.6	31

24.6	22.5	19.1	17.6	15.7	19.2	21.8	23.6	28.2	33.7	38.2	40.7	42.7	44.3	45.3	44.7	43.9	43.4	42.0	39.2	35.6	30.6	28.6	26.3	Diurnal Average	
42	36	34	43	31	41	40	39	41	53	64	67	72	78	63	60	58	65	70	56	49	50	43	44	Diurnal Maximum	

Z - zerspan C - Calibration M - Maintenance AF - Analyzer Failure
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Fort McKay - Bertha Ganter - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	143	21.28	21.28
21 - 50	467	69.49	90.77
51 - 82	62	9.23	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 672

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Ozone (O₃) - ppb
Fort McKay - Bertha Ganter - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	9	15	1	0	1	0	0	7	15	22	7	6	11	15	19	15	143
21 - 50	41	48	15	11	12	7	10	37	59	37	23	15	12	29	70	41	467
51 - 82	2	1	1	2	0	4	0	4	14	11	5	3	3	1	3	8	62
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	52	64	17	13	13	11	10	48	88	70	35	24	26	45	92	64	672

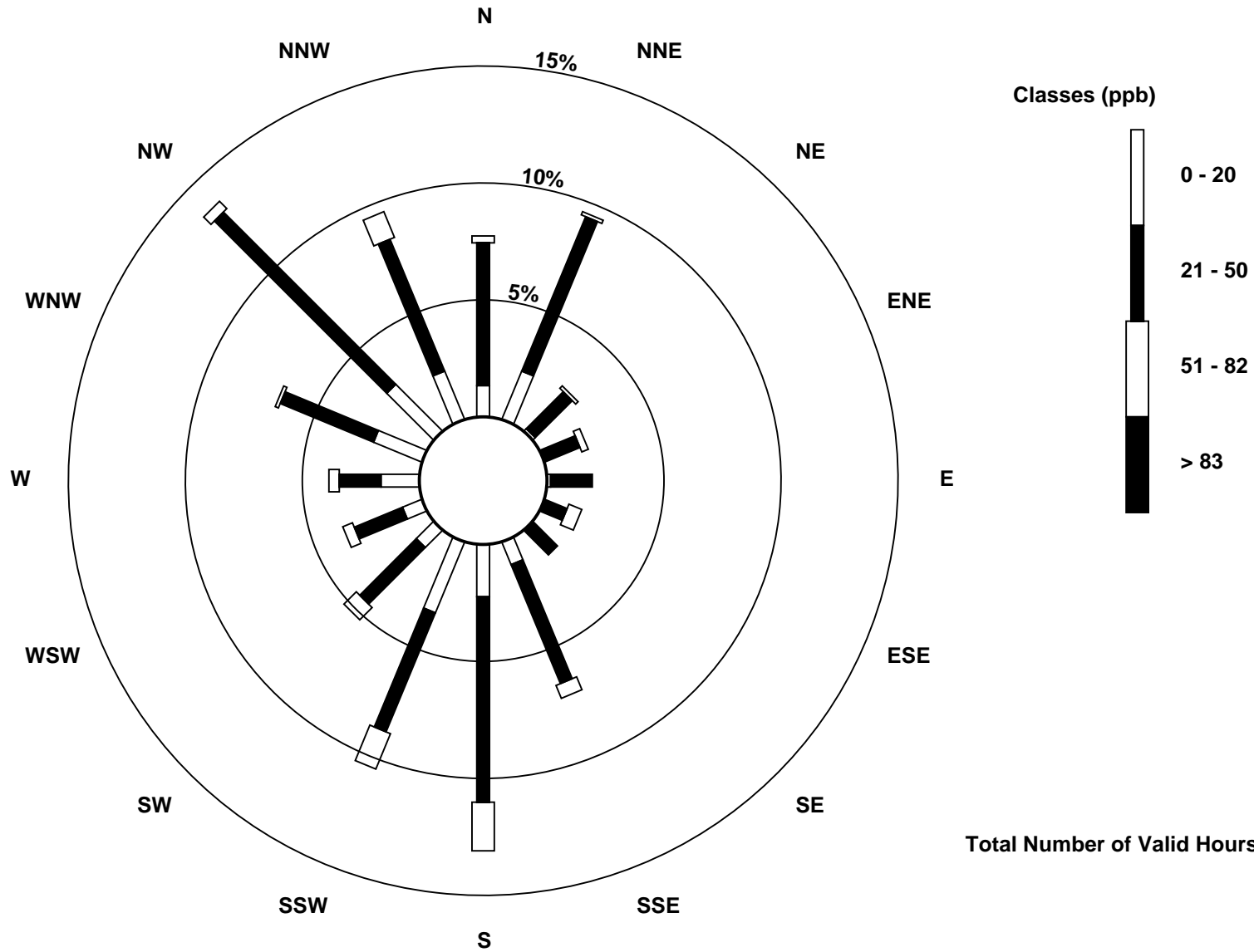
Total Number of Valid Hours: 672

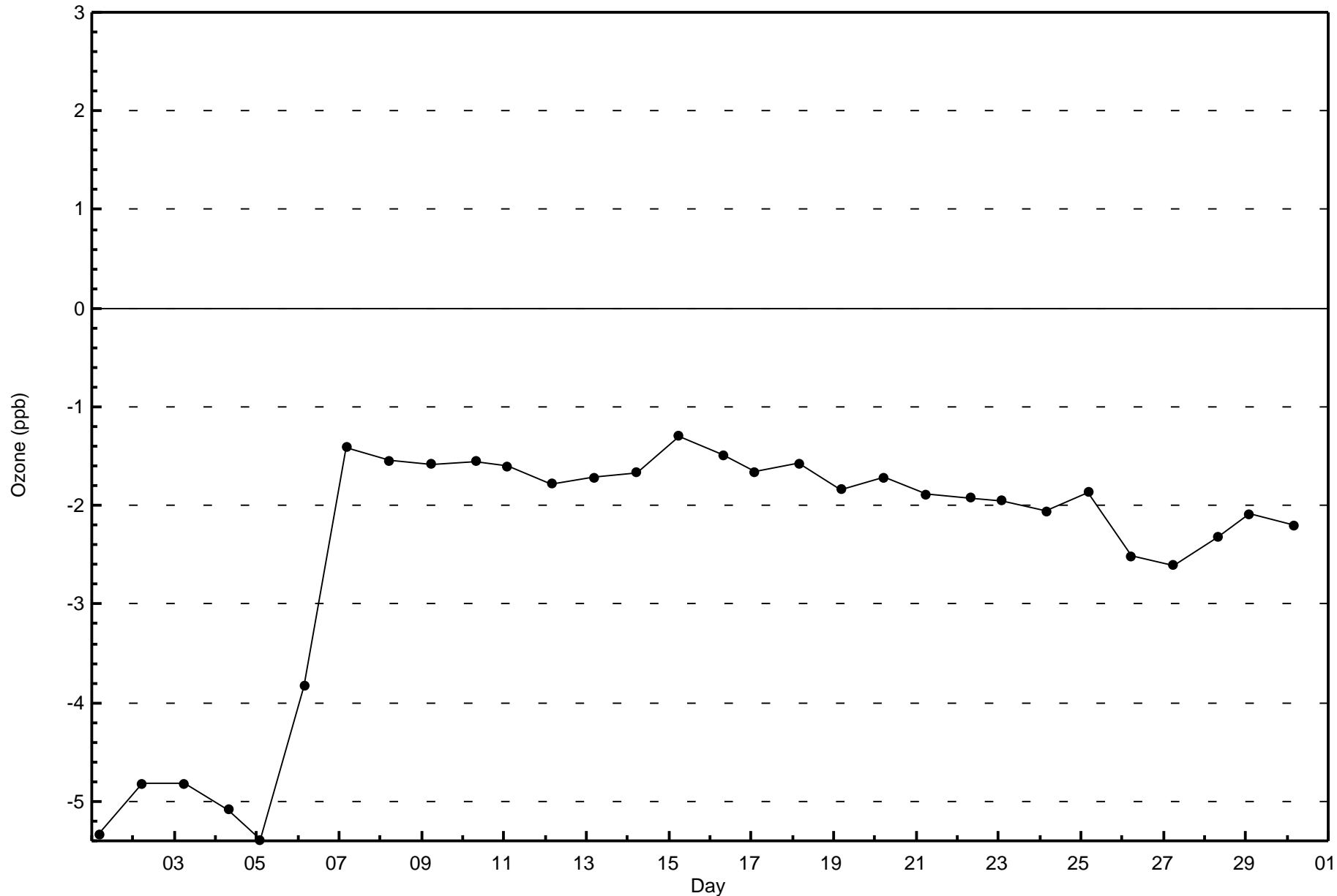
Total Number of Hours: 720

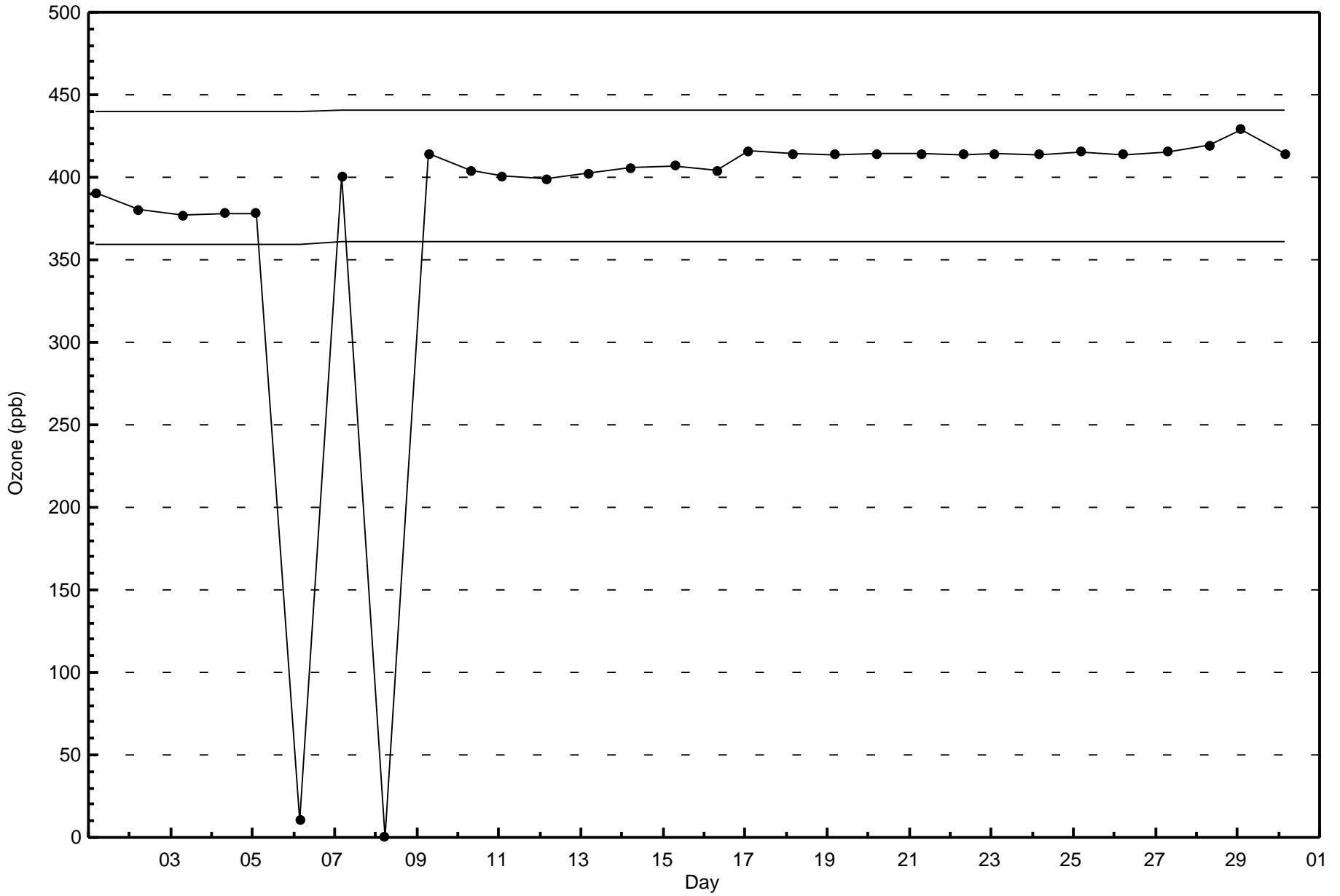


Wood Buffalo Environmental Association
Wind Rose Jun 2015

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









Wood Buffalo Environmental Association

Summary of Hour Averages

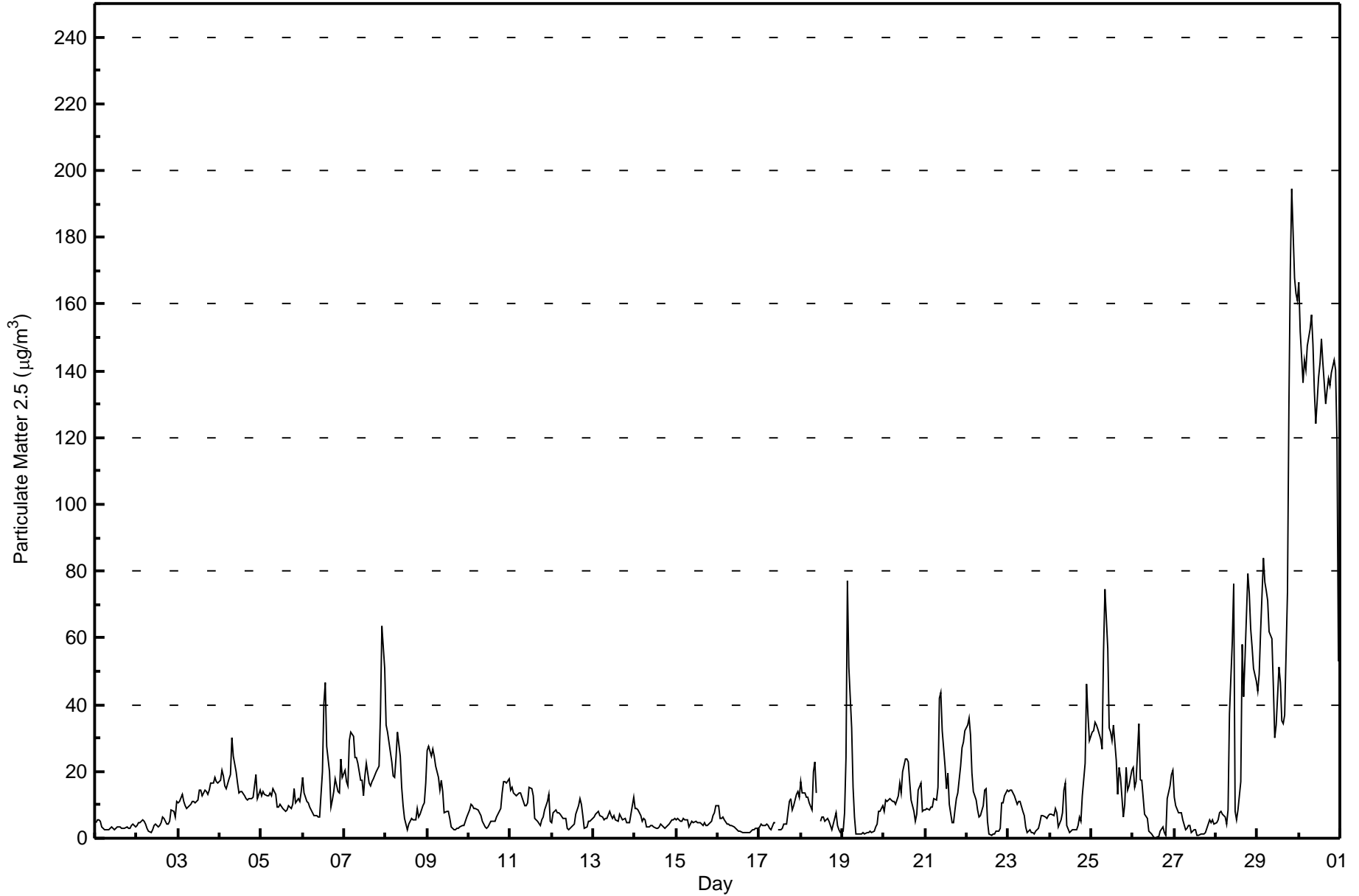
Particulate Matter 2.5 (PM_{2.5}) - µg/m³

Fort McKay - Bertha Ganter - June 2015

Number of Exceedences (AAAQO): 24-hr: 3	Hours in Service: 720
Maximum Value: 194.3 µg/m ³ on Jun 29 21:00	Maximum Daily Average: 137.8 µg/m ³ on Jun 30
Minimum Value: 0.0 µg/m ³ on Jun 26 13:00	Hours of Data: 718
Maximum Diurnal Average: 23.7 µg/m ³ at hour 22	Hours of Missing Data: 2
Monthly Average: 18.09 µg/m ³	Hours of Calibration: 0
Minimum Daily Average: 3.4 µg/m ³ on Jun 1	Percent Operational Time: 99.7
Minimum Diurnal Average: 13.1 µg/m ³ at hour 17	
Percentiles: P ₁ = 1.0 P ₁₀ = 2.6 Q ₁ = 4.5 Median = 8.6 Q ₃ = 16.6 P ₉₀ = 34.8 P ₉₉ = 153.8	

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	4.8	5.3	5.6	5.2	3.3	2.7	2.5	2.4	2.7	3.2	3.1	2.7	2.8	3.6	3.4	2.9	3.1	2.8	3.5	3.0	2.9	3.6	4.0	3.4	3.4	5.6
2-Jun	4.0	4.5	4.7	5.5	4.9	4.1	3.0	2.2	1.8	2.6	3.8	4.4	3.5	3.8	4.8	6.5	6.0	4.4	4.3	5.2	8.6	8.1	6.5	10.9	4.9	10.9
3-Jun	10.7	10.8	13.0	11.2	9.8	8.9	9.8	10.0	11.2	11.1	10.7	11.5	14.3	14.4	12.6	14.3	14.2	13.2	14.3	16.3	16.7	18.1	16.9	16.4	12.9	18.1
4-Jun	17.2	20.4	18.8	15.7	14.9	17.7	19.3	30.1	24.4	19.8	16.6	13.7	13.9	14.0	12.9	11.9	11.5	12.0	11.8	12.1	15.9	19.2	11.8	14.4	16.3	30.1
5-Jun	12.9	13.9	13.0	12.5	12.5	13.6	12.7	15.0	13.0	9.5	9.1	10.3	9.1	8.7	8.1	8.3	9.7	8.7	10.0	14.9	10.7	11.9	10.8	14.0	11.4	15.0
6-Jun	18.2	13.5	11.2	10.8	9.3	8.3	6.9	6.8	6.8	6.3	6.3	19.9	40.2	46.5	27.3	19.9	9.4	11.4	14.0	17.8	14.1	13.7	23.5	18.3	15.9	46.5
7-Jun	20.4	16.9	15.8	29.1	31.9	30.3	24.3	24.2	22.3	17.3	17.6	12.8	18.5	22.3	16.4	15.7	16.8	17.8	19.7	20.7	21.7	37.2	63.6	50.6	24.3	63.6
8-Jun	34.0	31.6	28.7	22.9	18.6	18.1	24.0	31.7	24.7	15.3	9.8	5.7	2.7	4.1	5.0	6.0	5.4	5.7	8.8	6.2	7.2	9.8	10.6	16.5	14.7	34.0
9-Jun	26.2	27.5	24.8	26.8	24.5	21.5	18.2	14.6	17.5	13.9	7.6	8.1	8.2	6.0	3.6	2.4	2.6	3.0	3.0	3.2	3.9	3.7	5.2	6.4	11.8	27.5
10-Jun	8.3	10.0	9.7	8.9	8.7	8.4	7.8	6.7	5.1	3.4	2.8	3.5	4.4	4.9	4.9	5.0	6.5	7.0	9.0	13.7	17.1	16.9	16.7	17.9	8.6	17.9
11-Jun	14.2	15.4	13.7	12.6	13.1	13.6	13.5	12.2	9.8	9.9	10.6	15.3	14.8	12.8	6.1	5.6	5.1	4.0	5.4	6.6	8.3	11.0	13.1	5.3	10.5	15.4
12-Jun	4.7	7.5	8.3	7.8	7.6	7.3	5.9	5.9	6.0	3.0	2.6	3.2	3.7	4.1	7.2	9.6	11.8	10.1	6.8	3.0	3.3	5.0	5.0	5.7	6.0	11.8
13-Jun	6.3	7.2	7.8	7.9	6.8	6.3	5.7	6.0	5.7	8.2	6.6	5.9	6.9	5.5	5.2	7.1	6.5	5.7	6.1	4.7	4.5	4.9	7.2	12.2	6.5	12.2
14-Jun	8.7	8.8	8.3	6.6	4.9	5.8	5.5	3.6	3.3	3.7	3.7	3.6	3.0	3.0	3.3	4.2	3.6	3.1	3.2	3.6	4.1	5.6	5.5	5.8	4.8	8.8
15-Jun	5.6	6.0	4.9	4.9	5.9	5.5	5.4	3.2	4.2	4.9	4.8	5.0	4.8	4.5	4.7	3.7	4.5	3.7	3.8	4.1	5.2	6.7	7.4	9.8	5.1	9.8
16-Jun	9.7	5.8	6.1	6.3	5.3	4.3	4.3	3.9	3.8	3.2	2.8	2.7	2.2	2.1	1.9	1.9	1.8	1.8	1.9	2.0	2.4	2.5	2.9	2.8	3.5	9.7
17-Jun	3.4	4.1	4.0	4.0	4.2	3.9	3.0	2.6	4.8	4.7	M	2.7	2.5	3.1	4.4	4.3	4.3	11.2	12.0	8.3	9.9	13.2	14.1	12.4	6.1	14.1
18-Jun	16.9	13.4	13.5	12.2	12.3	10.7	8.4	20.0	23.0	13.4	M	5.1	6.5	6.3	5.2	5.9	5.3	3.8	2.6	4.3	7.8	3.9	2.4	1.7	8.9	23.0
19-Jun	2.2	7.7	24.0	77.0	51.1	32.9	15.0	6.2	1.3	1.1	1.3	1.4	1.6	1.4	1.9	1.8	2.1	1.7	2.2	3.3	4.1	8.1	7.8	9.7	11.1	77.0
20-Jun	8.3	11.5	11.1	12.0	11.5	10.9	11.2	10.1	12.8	16.3	13.4	19.9	23.9	23.8	22.9	17.2	11.7	8.0	5.2	7.2	14.3	16.7	8.0	8.4	13.2	23.9
21-Jun	8.4	9.1	8.7	9.2	9.4	12.0	11.6	15.1	42.1	43.9	32.3	21.5	15.0	19.4	10.3	4.6	4.5	8.4	11.9	13.5	21.4	27.1	28.7	32.1	17.5	43.9
22-Jun	33.7	36.0	31.0	19.4	14.1	11.3	8.3	6.5	6.6	9.5	14.3	14.9	5.2	1.4	0.9	1.2	1.2	2.3	2.0	2.9	10.6	10.7	12.6	14.5	11.3	36.0
23-Jun	14.0	14.4	14.4	12.7	11.4	10.1	10.9	11.1	7.9	6.8	3.4	1.8	2.3	1.9	1.6	1.1	2.2	3.0	4.6	6.9	6.7	6.3	6.0	6.6	7.0	14.4
24-Jun	7.3	7.1	6.7	8.7	7.5	3.3	5.6	7.6	14.4	16.4	3.7	1.6	2.3	2.4	2.7	2.6	3.8	6.4	5.3	12.7	22.4	46.1	37.0	29.4	11.0	46.1
25-Jun	31.9	32.4	34.6	34.0	32.4	29.5	26.9	56.0	74.4	56.8	32.9	31.8	29.4	33.8	23.4	13.3	21.1	18.2	6.4	10.1	21.0	14.5	15.5	20.3	29.2	74.4
26-Jun	21.3	15.2	16.8	34.3	17.2	17.5	12.5	7.4	5.9	2.0	1.9	1.1	0.0	0.0	0.3	0.6	1.9	3.4	1.6	0.7	11.7	15.8	19.2	20.2	9.5	34.3
27-Jun	12.3	9.8	7.8	7.6	7.5	5.4	2.7	2.8	4.0	4.0	1.6	2.6	2.5	1.0	0.7	1.3	1.4	1.3	1.9	2.8	5.5	4.5	5.4	4.0	4.2	12.3
28-Jun	4.5	5.6	7.7	8.0	7.2	6.3	4.0	8.6	37.5	59.0	76.4	8.2	5.3	8.4	17.0	57.8	42.4	54.1	79.1	73.2	62.6	57.1	51.0	46.9	32.8	79.1
29-Jun	43.9	49.0	61.8	84.0	76.6	74.1	71.3	62.0	59.7	45.8	30.2	33.9	51.3	46.6	35.1	34.4	36.9	73.7	128.7	170.3	194.3	167.6	163.3	161.0	81.5	194.3
30-Jun	166.6	151.6	136.6	143.4	140.2	147.6	152.5	156.7	147.9	133.9	124.3	138.2	142.2	149.7	142.5	130.0	134.2	137.6	135.5	139.4	143.1	140.3	118.7	53.2	137.8	166.6
																								Diurnal Average		
																								Diurnal Maximum		

M - Maintenance
 Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m³





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort McKay - Bertha Ganter - June 2015

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	227	31.62	31.62
6 - 15	293	40.81	72.42
16 - 25	84	11.70	84.12
26 - 80	77	10.72	94.85
> 81.0	30	4.18	99.03

Total Number of Valid Hours: 718

Total Number of Hours: 720



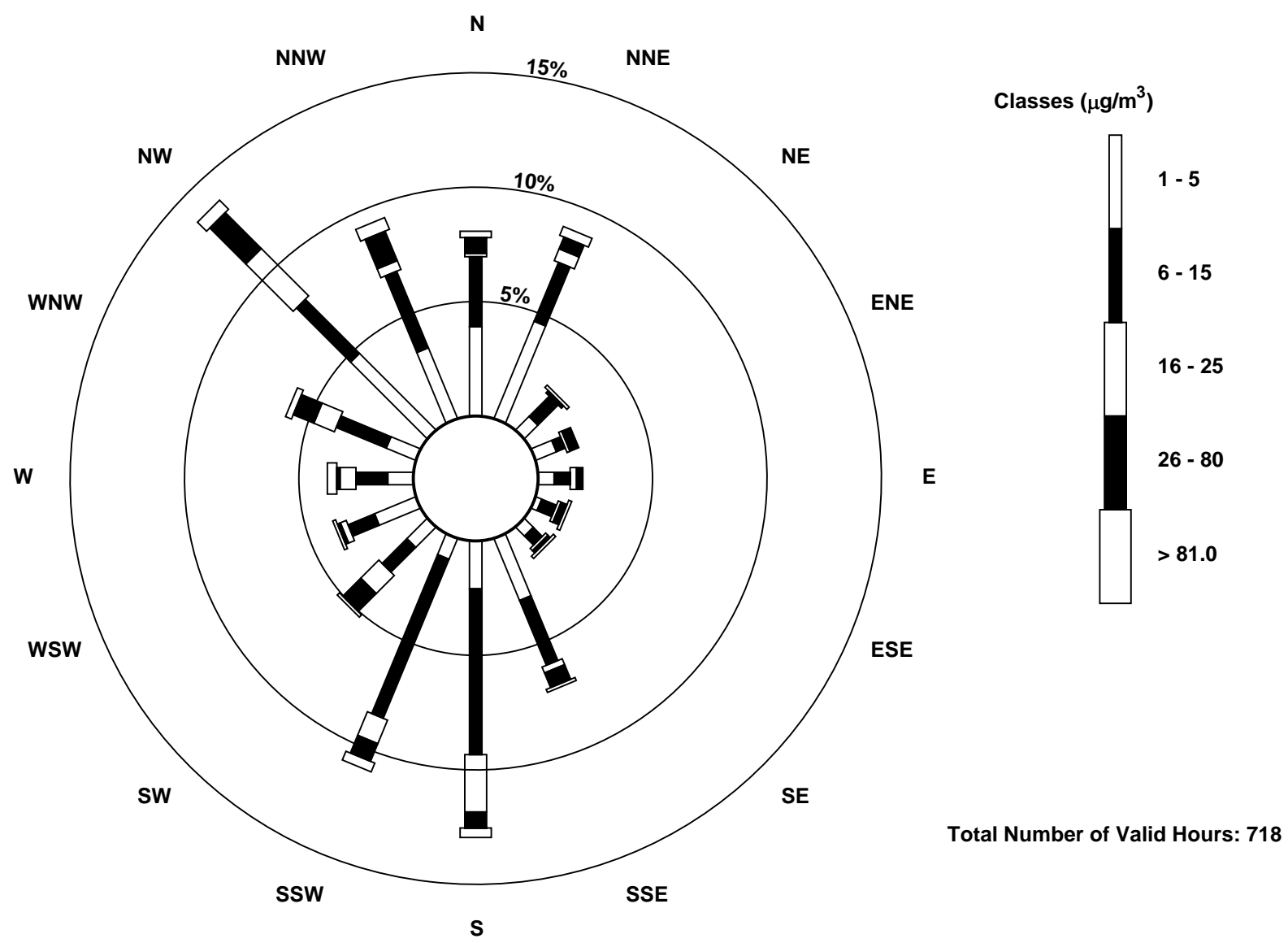
Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Fort McKay - Bertha Ganter - June 2015

Concentration Ranges (μg/m ³)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	28	33	6	7	5	2	4	21	15	7	9	14	8	10	34	24	227
6 - 15	22	20	9	3	5	5	4	22	52	54	11	9	10	17	24	26	293
16 - 25	1	4	0	1	2	1	1	2	18	8	8	2	5	7	21	3	84
26 - 80	5	4	1	3	2	2	1	5	5	6	8	1	1	7	16	10	77
> 81.0	2	3	1	0	0	1	1	1	3	3	1	1	3	2	4	4	30
Totals	58	64	17	14	14	11	11	51	93	78	37	27	27	43	99	67	711

Total Number of Valid Hours: 718

Total Number of Hours: 720





Number of Exceedences (AAAQO): 1-hr: 0	Maximum Value: 12 ppb on Jun 29 21:00	Maximum Daily Average: 5.0 ppb on Jun 30	Hours in Service: 720	Hours of Data: 626	Hours of Missing Data: 94	Hours of Calibration: 40	Percent Operational Time: 92.5
Minimum Value: 0 ppb on Jun 1 01:00	Maximum Diurnal Average: 0.7 ppb at hour 21	Monthly Average: 0.2 ppb	Minimum Daily Average: 0.0 ppb on Jun 1	Minimum Diurnal Average: 0.0 ppb at hour 2	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 11		

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
1-Jun	0	0	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
2-Jun	0	0	0	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
3-Jun	0	0	0	0	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
4-Jun	0	0	0	0	0	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
5-Jun	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
6-Jun	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
7-Jun	0	0	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
8-Jun	0	0	0	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
9-Jun	0	0	0	0	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
10-Jun	0	0	0	0	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
11-Jun	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
12-Jun	0	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
13-Jun	0	0	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
14-Jun	0	0	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
15-Jun	0	0	0	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
16-Jun	0	0	0	0	0	0	0	0	Z	C	C	C	C	C	C	C	C	C	C	C	0	0	0	0	0	--	0	
17-Jun	0	0	0	Z	RE	RE	0	0	0	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
18-Jun	0	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
19-Jun	0	0	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
20-Jun	0	0	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
21-Jun	0	0	0	0	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
22-Jun	0	0	0	0	0	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
23-Jun	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
24-Jun	0	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
25-Jun	0	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
26-Jun	0	0	0	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
27-Jun	0	0	0	0	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
28-Jun	0	0	0	0	0	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
29-Jun	0	0	0	Z	RE	RE	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	12	12	12	11	2.5	12
30-Jun	11	0	0	0	Z	RE	RE	RE	10	0	0	0	10	0	11	11	11	10	10	0	10	10	0	0	0	5.0	11	

0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.3	0.0	0.4	0.4	0.4	0.4	0.4	0.0	0.3	0.7	0.4	0.4	0.4	Diurnal Average	
11	0	0	0	0	0	0	0	10	0	0	0	10	0	11	11	11	10	10	0	10	12	12	12	11	Diurnal Maximum	

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

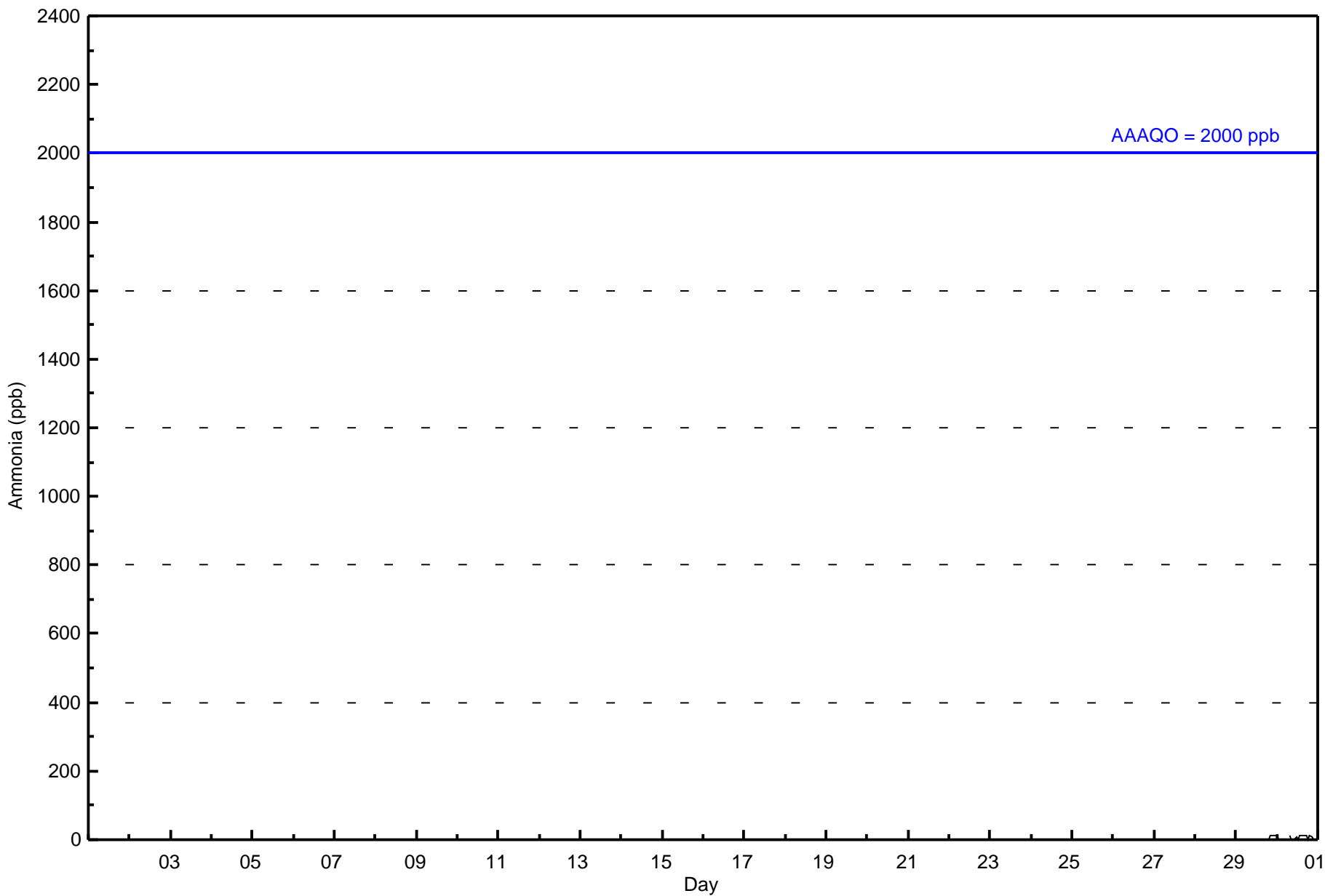


Wood Buffalo Environmental Association

Hourly Averages

Ammonia (NH_3) - ppb

Fort McKay - Bertha Ganter - June 2015





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ammonia (NH₃) - ppb
Fort McKay - Bertha Ganter - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 5	612	97.76	97.76
6 - 10	6	0.96	98.72
11 - 15	8	1.28	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: 626

Total Number of Hours: 720



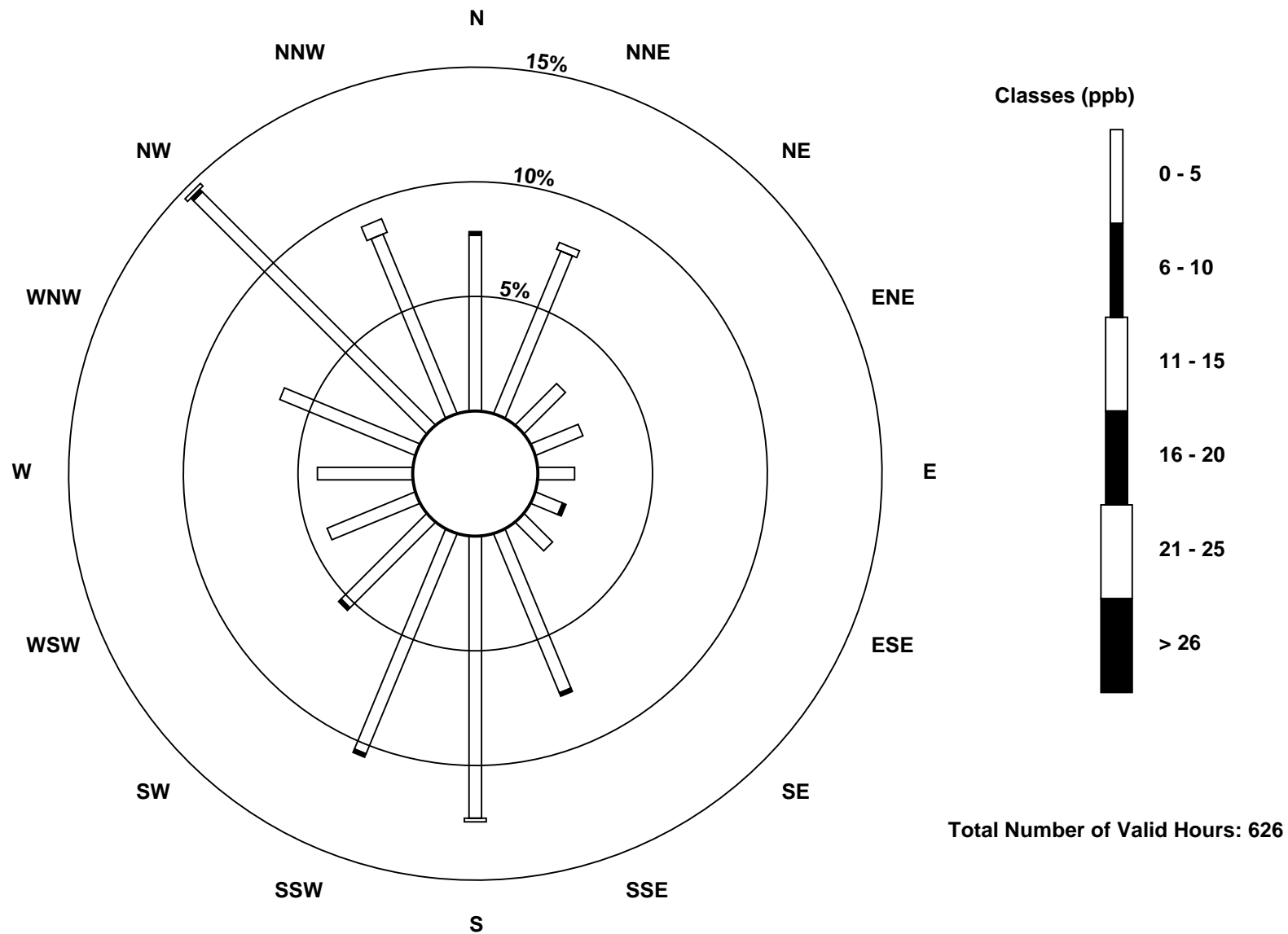
Wood Buffalo Environmental Association
Frequency Distribution

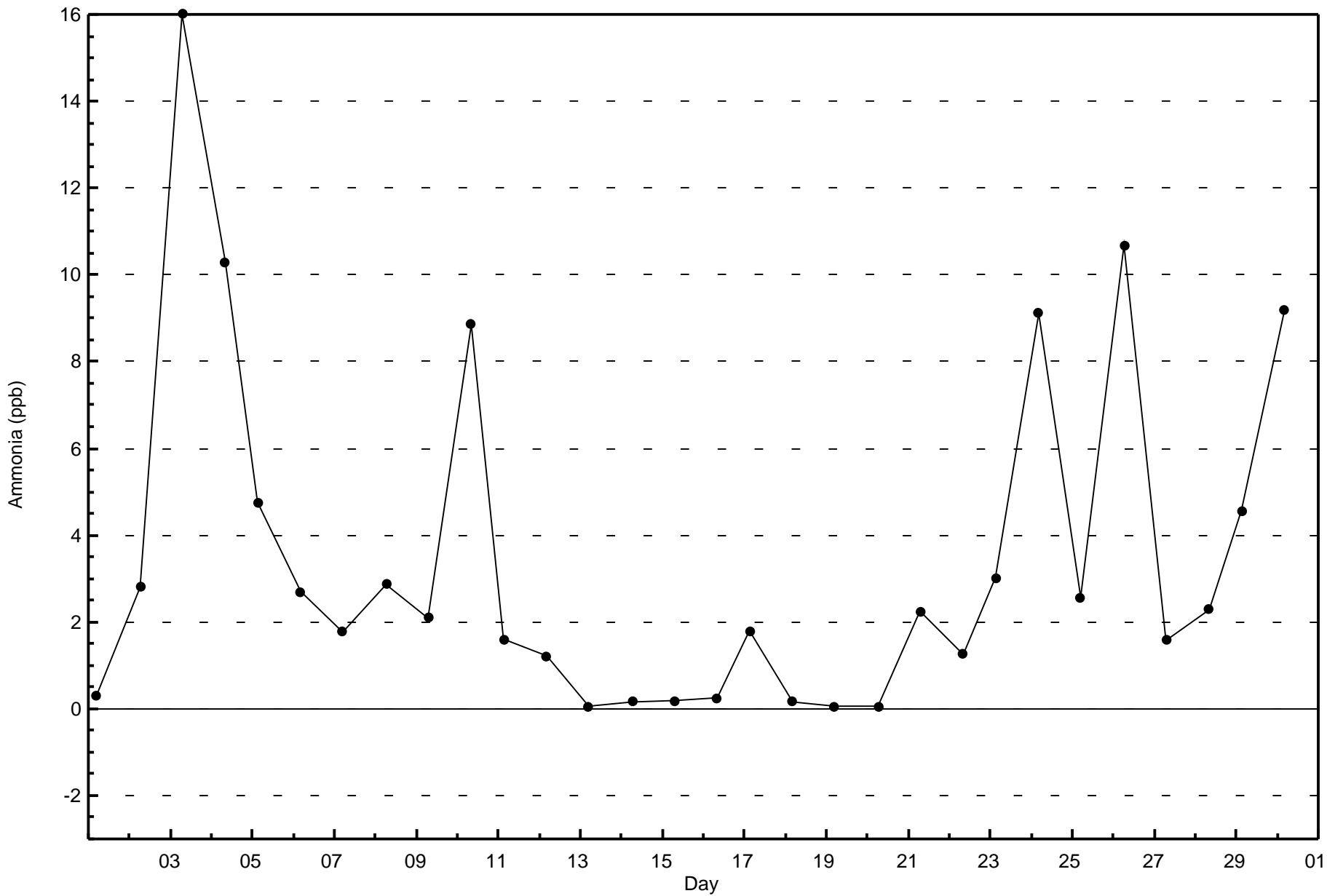
Ammonia (NH₃) - ppb
Fort McKay - Bertha Ganter - June 2015

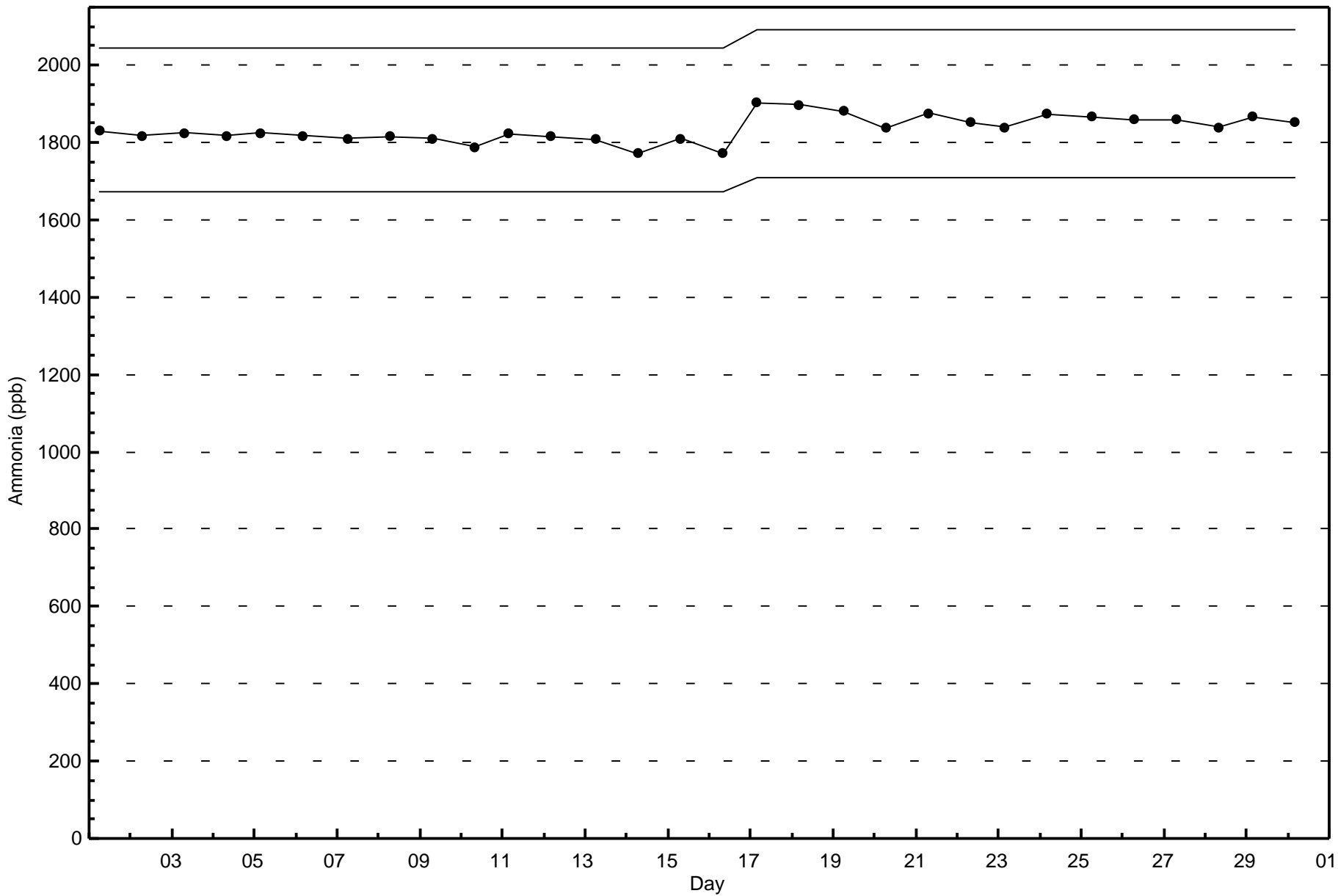
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	48	48	16	14	10	8	11	47	77	65	33	26	26	40	90	53	612
6 - 10	1	0	0	0	0	1	0	1	0	1	1	0	0	0	1	0	6
11 - 15	0	2	0	0	0	0	0	0	1	0	0	0	0	0	1	4	8
16 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 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	49	50	16	14	10	9	11	48	78	66	34	26	26	40	92	57	626

Total Number of Valid Hours: 626

Total Number of Hours: 720







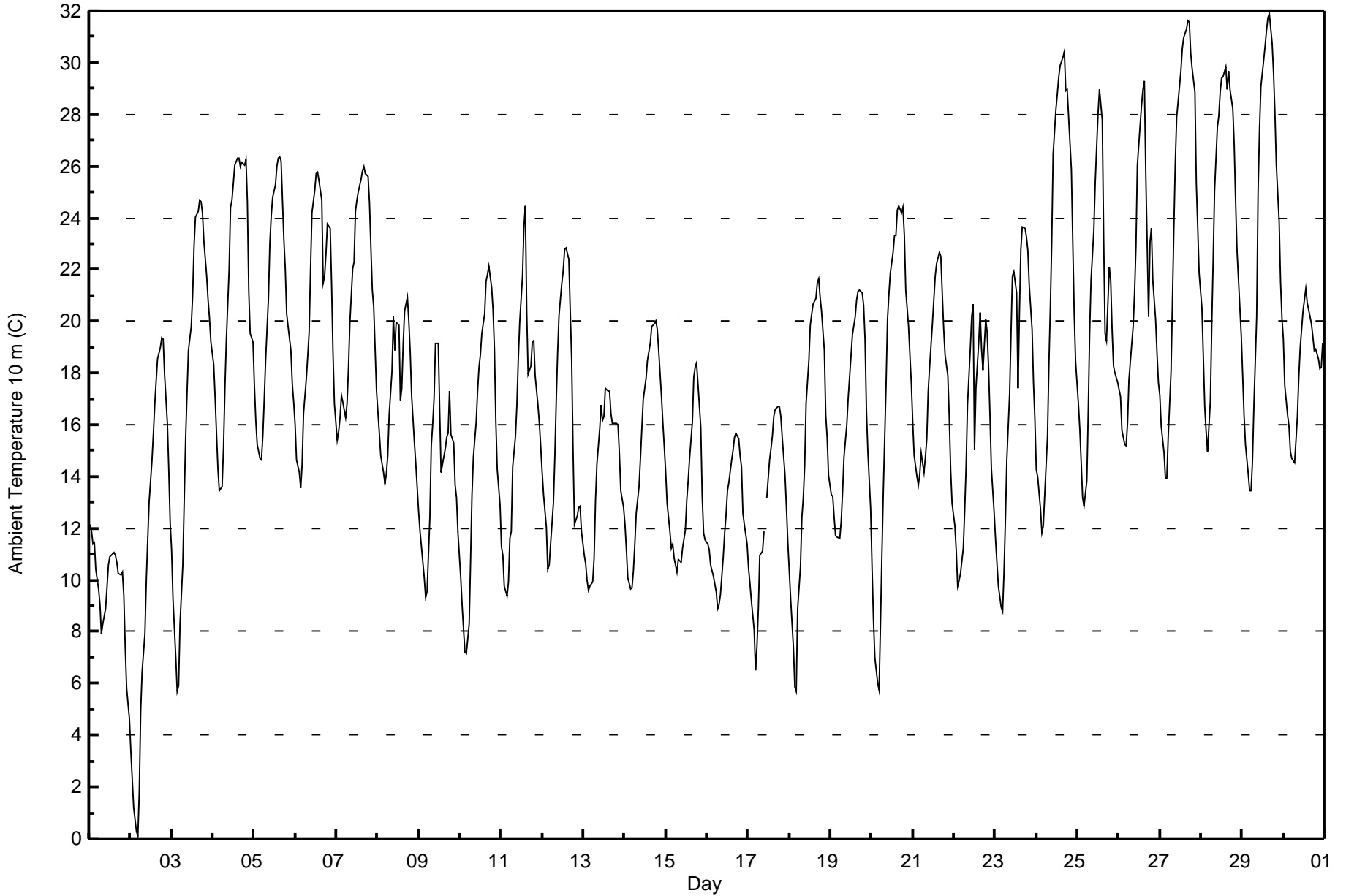


Maximum Value: 31.9 C on Jun 29 17:00		Maximum Daily Average: 24.3 C on Jun 27		Hours in Service: 720																						
Minimum Value: 0.1 C on Jun 2 05:00		Minimum Daily Average: 9.7 C on Jun 1		Hours of Data: 719																						
Maximum Diurnal Average: 22.2 C at hour 16		Minimum Diurnal Average: 10.9 C at hour 5		Hours of Missing Data: 1																						
Monthly Average: 17.35 C		Percentiles: P ₁ = 4.7 P ₁₀ = 10.2 Q ₁ = 13.2 Median = 17.0 Q ₃ = 21.0 P ₉₀ = 25.6 P ₉₉ = 30.8		Hours of Calibration: 0																						
				Percent Operational Time: 99.9																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	12.1	11.9	11.4	11.4	10.4	9.7	9.1	7.9	8.3	8.9	9.7	10.5	10.9	10.9	11.1	11.0	10.7	10.2	10.2	10.3	9.4	7.3	5.8	4.6	9.7	12.1
2-Jun	3.4	2.3	1.2	0.3	0.1	1.8	4.9	6.5	7.9	10.0	11.6	13.0	14.6	15.6	16.8	17.7	18.5	19.0	19.4	19.3	17.9	16.1	14.3	12.2	11.0	19.4
3-Jun	11.2	9.3	7.0	5.7	5.9	8.3	10.6	13.0	15.5	17.2	18.9	19.8	21.0	22.9	24.0	24.2	24.7	24.6	24.2	23.1	21.8	20.9	20.1	19.2	17.2	24.7
4-Jun	18.4	17.1	15.7	14.3	13.4	13.6	15.1	17.4	19.3	22.0	24.4	24.7	25.3	26.0	26.3	26.3	26.0	26.2	26.1	26.2	24.6	21.1	19.5	19.2	21.2	26.3
5-Jun	17.5	16.2	15.2	14.7	14.7	15.5	17.0	18.5	20.9	23.0	24.1	24.8	25.3	26.0	26.3	26.4	26.2	23.2	22.0	20.3	19.8	18.9	17.6	16.9	20.5	26.4
6-Jun	16.0	14.6	14.2	13.6	14.5	16.5	17.8	18.6	19.6	22.0	24.2	25.1	25.7	25.8	25.4	24.7	21.5	21.8	22.6	23.7	23.6	21.4	18.8	16.8	20.3	25.8
7-Jun	15.4	15.7	16.3	17.1	16.9	16.3	16.8	18.1	19.9	22.0	22.3	24.2	24.7	25.0	25.5	25.8	26.0	25.7	25.6	24.6	22.8	21.2	20.5	17.3	21.1	26.0
8-Jun	16.5	15.7	14.8	14.2	13.7	14.1	14.8	16.4	18.1	20.2	18.9	19.9	19.9	16.9	17.4	19.2	20.4	20.9	20.0	18.8	17.1	15.3	14.5	13.6	17.1	20.9
9-Jun	12.7	11.9	10.7	10.1	9.3	9.6	12.4	15.2	16.0	17.0	19.2	19.1	16.5	14.1	14.5	15.1	15.5	15.7	17.3	15.6	15.3	13.7	13.2	11.8	14.2	19.2
10-Jun	10.1	9.0	8.1	7.2	7.2	8.3	10.7	13.3	14.7	16.1	17.3	18.2	18.7	19.5	20.3	21.5	21.8	22.1	21.3	20.4	18.9	16.1	14.3	12.9	15.3	22.1
11-Jun	11.3	11.0	9.8	9.4	9.9	11.6	11.9	14.4	15.6	16.7	18.6	20.0	21.8	23.6	24.4	20.4	17.9	18.3	19.2	19.2	17.9	16.7	16.0	15.1	16.3	24.4
12-Jun	14.2	13.3	12.0	10.4	10.6	11.4	13.0	14.7	16.8	18.8	20.3	21.5	22.0	22.8	22.8	22.4	20.4	18.6	15.0	12.1	12.5	12.8	12.9	11.9	16.0	22.8
13-Jun	11.0	10.6	10.0	9.6	9.8	9.9	10.8	13.0	14.5	15.8	16.8	16.2	16.3	17.4	17.3	17.3	16.4	16.1	16.1	16.1	16.0	14.9	13.5	12.8	14.1	17.4
14-Jun	12.1	11.2	10.1	9.7	9.7	10.4	11.4	12.6	13.6	14.7	15.8	17.0	17.8	18.5	18.8	19.2	19.8	19.9	20.0	19.7	18.9	17.1	16.0	15.1	15.4	20.0
15-Jun	14.2	13.0	11.9	11.2	11.4	10.9	10.3	10.8	10.7	10.7	11.2	11.9	13.1	13.8	14.7	16.1	17.8	18.2	18.4	17.6	15.9	13.2	11.8	11.5	13.3	18.4
16-Jun	11.4	11.1	10.6	10.4	10.1	9.5	8.9	9.0	9.4	10.9	11.8	12.5	13.4	13.8	14.6	15.0	15.5	15.7	15.5	14.8	14.4	12.6	12.2	11.4	12.3	15.7
17-Jun	10.5	9.9	9.2	8.1	6.5	7.5	8.9	10.9	11.1	11.9	M	13.2	14.6	15.1	15.6	16.3	16.6	16.7	16.7	16.3	15.5	14.1	12.8	11.4	12.6	16.7
18-Jun	10.4	9.2	7.4	5.8	5.7	8.9	10.5	12.4	13.2	14.4	16.8	18.5	19.8	20.3	20.7	20.9	21.5	21.6	20.9	20.4	18.9	16.4	15.5	14.1	15.2	21.6
19-Jun	13.3	13.3	12.4	11.7	11.6	11.6	12.2	13.4	14.8	16.0	17.0	17.8	18.7	19.5	20.2	20.8	21.2	21.2	21.1	20.6	19.3	16.6	15.0	12.8	16.3	21.2
20-Jun	10.5	8.5	7.0	6.0	5.8	8.3	11.0	13.4	17.6	20.1	21.0	21.8	22.7	23.3	23.3	24.3	24.5	24.2	24.4	23.3	21.2	19.8	18.7	17.5	17.4	24.5
21-Jun	16.0	14.8	14.0	13.6	14.1	14.9	14.2	14.8	15.5	17.3	18.2	19.9	20.8	21.7	22.3	22.7	22.5	21.1	19.8	18.7	17.9	16.3	14.3	13.0	17.4	22.7
22-Jun	12.1	11.1	9.8	10.0	10.3	11.2	12.7	14.4	16.8	18.9	20.2	20.7	15.0	17.4	19.2	20.4	18.9	18.1	20.1	19.6	18.2	16.4	14.3	12.6	15.8	20.7
23-Jun	11.6	10.6	9.7	9.0	8.8	10.3	12.3	14.6	17.2	19.5	21.7	21.9	21.1	17.4	20.3	22.8	23.7	23.6	23.3	22.7	21.4	19.7	17.6	16.2	17.4	23.7
24-Jun	14.3	14.0	12.7	11.8	12.1	13.3	15.6	18.3	20.5	23.0	26.5	28.2	28.8	29.5	29.9	30.2	30.4	28.9	29.0	27.9	25.9	23.0	20.4	18.4	22.2	30.4
25-Jun	16.8	15.8	14.6	13.2	12.8	13.8	16.5	19.5	21.6	23.5	25.4	26.7	28.0	29.0	27.8	23.2	19.5	19.3	22.1	21.6	19.7	18.3	18.0	17.6	20.2	29.0
26-Jun	17.4	17.1	15.8	15.2	15.2	16.1	17.7	18.4	19.8	21.1	22.9	26.0	27.6	28.4	29.0	29.3	25.7	20.2	23.1	23.6	21.6	20.0	18.8	17.6	21.1	29.3
27-Jun	17.1	16.0	14.9	13.9	13.9	15.6	18.0	20.8	23.6	26.1	27.9	29.1	29.7	30.6	31.0	31.3	31.6	31.6	30.4	29.8	28.8	25.3	23.6	21.8	24.3	31.6
28-Jun	20.5	18.6	16.7	15.7	15.0	16.9	19.9	22.4	25.1	27.5	27.9	28.8	29.4	29.4	29.8	29.0	29.7	29.0	28.2	26.8	24.6	22.7	21.6	19.4	23.9	29.8
29-Jun	18.0	16.4	15.2	14.1	13.5	13.4	14.6	16.7	20.2	25.0	27.4	29.1	30.1	30.6	31.2	31.7	31.9	30.8	29.6	28.1	26.0	23.9	21.5	20.1	23.3	31.9
30-Jun	19.3	17.5	16.4	16.0	15.0	14.7	14.6	15.4	16.4	17.9	19.0	20.4	20.8	21.2	20.7	20.2	19.9	19.4	18.9	18.9	18.5	18.2	18.2	19.1	18.2	21.2
																								Diurnal Average		
																								Diurnal Maximum		
M - Maintenance																										



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature 10 m (AT 10m) - C
Fort McKay - Bertha Ganter - June 2015





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ambient Temperature 10 m (AT 10m) - C
Fort McKay - Bertha Ganter - June 2015

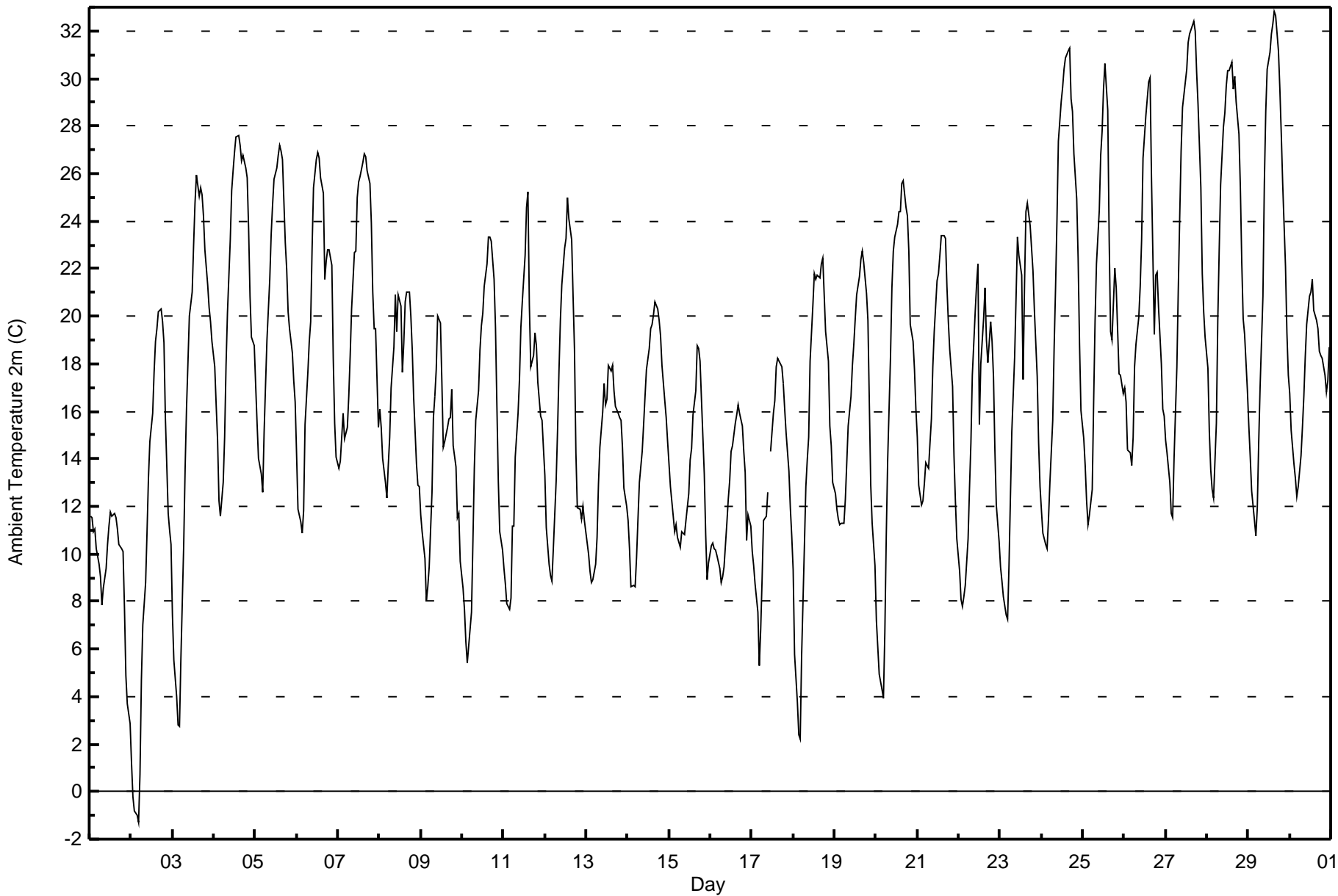
Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	65	9.04	9.04
10 - 20	433	60.22	69.26
> 20	221	30.74	100.00

Total Number of Valid Hours: 719

Total Number of Hours: 720



Maximum Value: 32.8 C on Jun 29 16:00 Maximum Daily Average: 23.5 C on Jun 27																						Hours in Service: 720 Hours of Data: 719																										
Minimum Value: -1.3 C on Jun 2 05:00 Minimum Daily Average: 9.5 C on Jun 1 Maximum Diurnal Average: 23.1 C at hour 15 Minimum Diurnal Average: 9.4 C at hour 5 Monthly Average: 17.02 C Percentiles: P ₁ = 2.3 P ₁₀ = 9.4 Q ₁ = 12.0 Median = 16.7 Q ₃ = 21.3 P ₉₀ = 25.9 P ₉₉ = 31.8																						Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jun	11.6	11.5	10.9	11.1	10.2	9.6	9.0	7.9	8.6	9.4	10.4	11.2	11.8	11.6	11.7	11.5	11.1	10.4	10.2	10.1	7.7	4.9	3.7	2.9	9.5	11.8																						
2-Jun	1.2	-0.2	-0.8	-1.0	-1.3	0.7	4.7	7.0	8.8	10.9	13.2	14.7	15.9	17.6	18.9	19.5	20.2	20.3	19.8	18.9	15.7	11.7	11.0	10.4	10.7	20.3																						
3-Jun	7.4	5.5	4.0	2.8	2.8	5.6	10.4	13.6	16.2	18.0	20.0	21.0	23.0	24.7	25.9	25.0	25.4	25.1	24.2	22.8	21.3	20.3	19.8	18.9	16.8	25.9																						
4-Jun	17.9	16.3	14.8	12.2	11.6	13.0	14.9	17.9	20.1	23.2	25.3	26.1	26.9	27.5	27.6	27.2	26.5	26.8	26.2	25.8	23.7	20.8	19.1	18.8	21.3	27.6																						
5-Jun	17.1	15.5	14.0	13.4	12.6	15.2	17.1	19.0	21.6	23.4	24.7	25.7	26.2	26.8	27.2	27.0	26.6	23.1	22.0	20.2	19.5	18.5	17.3	16.4	20.4	27.2																						
6-Jun	14.2	11.9	11.4	10.9	11.8	15.5	17.6	18.9	19.8	22.8	25.4	26.6	26.9	26.6	25.8	25.2	21.5	22.3	22.8	22.8	22.1	18.2	15.5	14.1	19.6	26.9																						
7-Jun	13.6	13.9	14.9	15.9	14.8	15.3	16.6	18.4	20.3	22.7	22.8	25.0	25.6	25.9	26.4	26.8	26.7	26.1	25.6	23.9	21.0	19.5	19.5	15.3	20.7	26.8																						
8-Jun	16.1	15.3	14.0	13.0	12.4	13.7	14.9	17.0	18.7	20.9	19.4	20.9	20.4	17.6	18.9	20.6	21.0	21.0	20.0	18.6	16.6	13.8	12.9	12.8	17.1	21.0																						
9-Jun	11.6	10.9	9.8	8.0	8.6	9.4	12.6	15.7	16.7	17.8	20.0	19.7	17.2	14.5	14.8	15.3	15.7	15.8	17.0	14.5	13.7	11.5	11.7	9.7	13.8	20.0																						
10-Jun	8.6	7.7	6.3	5.4	6.1	7.5	10.5	13.6	15.6	16.9	18.6	19.6	20.1	21.3	22.2	23.3	23.3	23.1	21.5	19.6	16.2	13.1	11.0	10.1	15.1	23.3																						
11-Jun	9.4	8.8	7.9	7.7	8.2	11.2	11.1	14.1	15.9	17.4	19.6	20.6	22.6	24.6	25.2	20.5	17.9	18.3	19.3	18.7	17.2	15.8	15.6	14.4	15.9	25.2																						
12-Jun	13.3	11.1	9.5	9.1	8.8	10.2	13.1	15.2	17.7	19.8	21.3	22.8	23.3	25.0	24.1	23.2	20.8	18.6	14.3	11.9	11.9	11.5	12.0	11.4	15.8	25.0																						
13-Jun	10.4	10.0	9.3	8.8	8.9	9.6	10.7	13.0	14.5	16.0	17.1	16.3	16.5	17.9	17.7	17.9	16.9	16.2	15.9	15.7	15.6	14.5	12.8	12.0	13.9	17.9																						
14-Jun	11.4	10.2	8.6	8.7	8.6	9.9	11.4	13.0	14.3	15.4	16.6	17.8	18.6	19.4	19.7	20.1	20.6	20.3	19.8	19.2	18.0	16.4	15.7	14.7	15.4	20.6																						
15-Jun	13.8	12.8	11.6	11.0	11.2	10.7	10.3	10.9	10.9	10.8	11.4	12.5	14.0	14.4	15.9	16.9	18.8	18.6	18.1	16.5	13.3	10.8	8.9	9.6	13.1	18.8																						
16-Jun	10.3	10.4	10.2	10.1	10.0	9.4	8.8	9.0	9.5	11.3	12.3	13.1	14.3	14.6	15.5	15.9	16.3	15.9	15.4	14.3	13.4	10.6	11.7	11.2	12.2	16.3																						
17-Jun	10.1	9.5	8.8	7.6	5.3	6.8	8.9	11.4	11.6	12.6	M	14.3	15.9	16.5	17.9	18.3	18.1	17.9	17.1	16.1	15.1	13.5	11.9	10.7	12.9	18.3																						
18-Jun	9.4	5.8	3.7	2.4	2.2	5.7	10.4	12.8	14.0	14.9	18.1	20.5	21.8	21.6	21.7	21.6	22.2	22.4	20.9	19.4	18.1	15.4	14.5	13.0	14.7	22.4																						
19-Jun	12.5	11.9	11.4	11.2	11.3	11.3	12.3	13.8	15.4	16.6	18.0	18.8	19.9	20.9	21.7	22.4	22.7	22.3	21.0	19.8	16.4	12.9	11.3	9.5	16.1	22.7																						
20-Jun	7.2	6.1	4.9	4.3	3.9	6.7	10.8	13.9	18.3	21.2	22.7	23.3	23.8	24.4	24.4	25.6	25.7	24.6	24.2	22.7	19.6	18.9	17.8	16.1	17.1	25.7																						
21-Jun	14.9	12.9	12.1	12.2	12.9	13.9	13.6	14.7	15.7	17.9	19.4	21.5	21.8	22.6	23.4	23.4	23.2	21.2	19.8	18.6	17.0	14.2	12.3	10.6	17.1	23.4																						
22-Jun	9.3	8.1	7.8	8.2	8.7	10.7	12.8	14.7	17.5	20.1	21.3	22.2	15.4	18.0	19.9	21.2	19.0	18.0	19.8	18.9	17.5	14.4	12.0	10.5	15.2	22.2																						
23-Jun	9.4	8.8	8.2	7.4	7.2	9.5	12.4	15.1	18.3	20.8	23.3	22.6	21.7	17.3	21.3	24.4	24.8	23.8	22.9	21.9	20.3	17.4	14.7	12.8	16.9	24.8																						
24-Jun	11.8	10.9	10.4	10.2	11.5	13.0	15.6	18.7	21.2	24.0	27.4	29.0	29.6	30.4	30.9	31.1	31.3	29.2	28.6	26.8	25.0	22.4	18.8	16.0	21.8	31.3																						
25-Jun	14.8	13.7	12.2	11.2	11.7	12.7	16.4	19.7	22.2	24.4	26.8	27.8	29.5	30.6	28.7	23.3	19.4	19.0	22.0	21.2	19.4	17.6	17.5	16.8	19.9	30.6																						
26-Jun	17.0	16.4	14.4	14.3	13.7	14.9	17.9	18.8	20.0	21.3	23.2	26.7	28.4	29.1	29.8	30.1	25.8	19.2	21.7	21.8	20.4	18.0	16.1	15.8	20.6	30.1																						
27-Jun	14.8	14.2	13.0	11.7	11.5	14.0	17.8	21.1	24.2	26.9	28.8	29.8	30.4	31.5	31.9	32.2	32.4	32.0	30.3	28.9	25.4	21.8	20.2	19.1	23.5	32.4																						
28-Jun	17.8	15.2	13.5	12.7	12.3	15.5	19.8	22.8	25.5	27.9	28.5	29.7	30.3	30.4	30.7	29.5	30.1	29.0	27.7	25.4	22.2	19.9	19.2	16.8	23.0	30.7																						
29-Jun	15.4	14.1	12.6	11.4	10.8	11.9	14.7	17.0	20.8	25.6	28.6	30.4	31.1	31.9	32.3	32.8	32.6	31.2	29.6	27.7	25.6	22.1	19.3	17.5	22.8	32.8																						
30-Jun	16.7	15.2	13.8	13.2	12.4	12.8	14.1	15.3	16.6	18.3	19.7	20.9	21.0	21.6	20.2	19.8	19.5	18.5	18.3	18.2	17.5	16.8	17.3	18.7	17.4	21.6																						
																								12.3	11.2	10.1	9.5	9.4	10.9	13.0	15.1	17.0	19.0	20.8	21.7	22.1	22.6	23.1	23.0	22.5	21.7	21.2	20.0	18.2	15.9	14.7	13.6	Diurnal Average
																								17.9	16.4	14.9	15.9	14.8	15.5	19.8	22.8	25.5	27.9	28.8	30.4	31.1	31.9	32.3	32.8	32.6	32.0	30.3	28.9	25.6	22.4	20.2	19.1	Diurnal Maximum
M - Maintenance																																																





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature 2m (AT 2m) - C
Fort McKay - Bertha Ganter - June 2015**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	4	0.56	0.56
0 - 10	85	11.82	12.38
10 - 20	407	56.61	68.98
> 20	223	31.02	100.00

Total Number of Valid Hours: 719

Total Number of Hours: 720

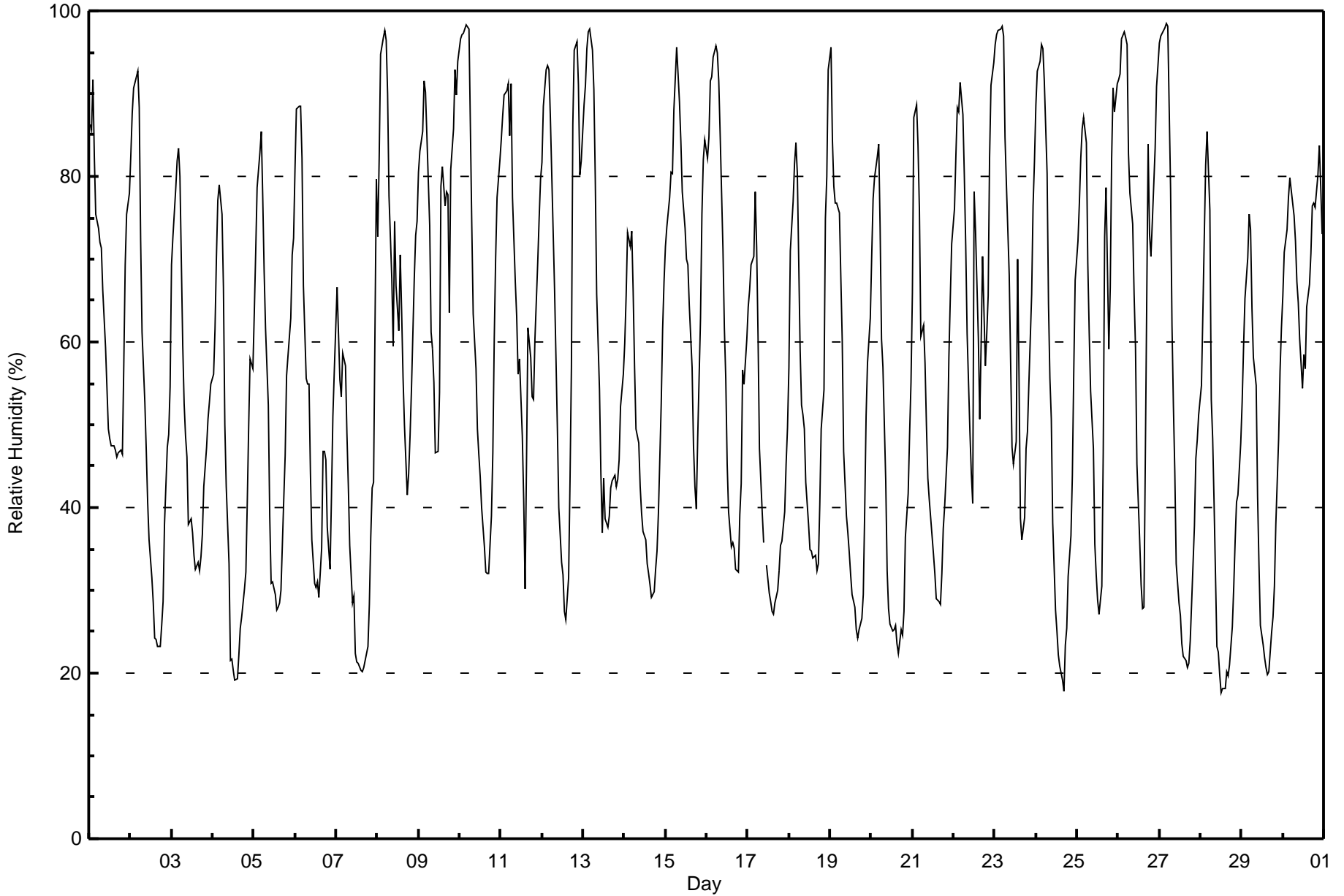


Maximum Value: 99 % on Jun 27 05:00	Maximum Daily Average: 75.5 % on Jun 9	Hours in Service: 720
Minimum Value: 18 % on Jun 28 13:00	Minimum Daily Average: 39.1 % on Jun 7	Hours of Data: 719
Maximum Diurnal Average: 86.0 % at hour 5	Minimum Diurnal Average: 35.5 % at hour 16	Hours of Missing Data: 1
Monthly Average: 57.7 %	Percentiles: P ₁ = 20 P ₁₀ = 27 Q ₁ = 38 Median = 57 Q ₃ = 78 P ₉₀ = 90 P ₉₉ = 98	Hours of Calibration: 0
		Percent Operational Time: 99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	86	86	92	82	75	74	72	71	66	59	54	50	48	47	47	47	46	47	47	47	57	69	75	78	63.5	92
2-Jun	83	88	91	92	93	88	72	61	53	47	41	36	31	28	24	24	23	23	26	29	38	47	49	55	51.7	93
3-Jun	69	73	78	82	83	80	60	52	49	46	38	39	37	34	33	33	32	34	37	43	47	51	53	55	51.6	83
4-Jun	56	62	70	77	79	75	67	50	43	33	22	22	20	19	19	22	25	27	30	32	41	50	58	57	44.0	79
5-Jun	64	71	79	83	85	78	69	62	52	39	31	31	29	28	28	29	30	41	46	56	58	63	71	72	53.9	85
6-Jun	81	88	88	88	82	67	56	55	55	44	36	31	30	31	29	35	47	47	46	38	33	41	51	56	52.3	88
7-Jun	67	61	55	53	59	57	49	43	35	28	29	22	21	21	20	20	21	22	23	28	36	42	43	80	39.1	80
8-Jun	73	82	95	97	98	96	90	78	68	60	75	67	61	70	64	56	50	42	44	49	54	68	73	75	70.1	98
9-Jun	80	83	85	91	90	85	74	61	59	55	47	47	54	79	81	76	78	78	64	81	86	93	90	94	75.5	94
10-Jun	97	97	97	98	98	98	86	74	63	57	49	46	44	40	35	32	32	32	39	47	60	70	78	82	64.6	98
11-Jun	84	87	90	90	91	85	91	77	67	63	56	58	49	41	30	46	62	58	53	53	60	70	75	80	67.4	91
12-Jun	82	89	93	93	93	87	73	66	58	49	40	33	32	27	27	32	43	57	86	95	96	91	80	82	66.9	96
13-Jun	89	91	95	97	98	95	91	80	66	54	44	37	44	39	38	39	42	43	44	42	43	46	52	56	61.1	98
14-Jun	60	66	73	71	73	66	57	49	48	43	39	37	36	33	32	31	29	30	33	35	39	53	61	67	48.4	73
15-Jun	72	74	77	81	80	88	96	92	89	84	78	74	70	69	64	57	47	43	40	48	63	75	82	84	72.0	96
16-Jun	82	85	91	92	94	96	95	92	85	71	62	56	45	39	35	36	35	33	32	39	43	57	55	60	62.9	96
17-Jun	64	66	69	70	78	72	61	47	39	36	M	33	30	29	28	27	28	30	32	35	36	39	45	50	45.4	78
18-Jun	57	71	77	81	84	80	59	52	51	50	43	38	35	35	34	34	32	33	40	49	54	75	80	93	55.8	93
19-Jun	96	84	79	77	77	76	68	60	47	39	37	35	32	30	28	25	24	25	27	30	40	51	58	63	50.2	96
20-Jun	70	77	80	82	84	74	60	57	43	32	28	26	25	25	26	23	22	25	25	28	36	42	49	55	45.6	84
21-Jun	66	87	89	84	76	61	62	57	50	44	41	37	34	32	29	29	28	32	37	40	47	58	65	72	52.4	89
22-Jun	76	83	88	88	91	87	80	72	61	49	44	41	78	73	61	51	60	70	57	61	66	82	91	94	71.0	94
23-Jun	96	97	98	98	98	97	85	79	68	58	47	45	48	70	56	39	36	39	47	49	55	66	76	82	67.8	98
24-Jun	89	93	94	96	95	91	80	65	56	51	38	28	25	22	21	19	18	23	25	32	37	44	56	67	52.7	96
25-Jun	72	77	82	86	87	84	69	61	54	47	36	32	29	27	30	47	73	79	59	67	82	91	88	91	64.6	91
26-Jun	92	92	97	97	97	96	83	78	74	66	59	45	36	31	28	28	46	84	73	70	75	83	91	93	71.4	97
27-Jun	96	97	98	98	99	98	78	62	52	44	33	28	27	24	22	22	21	21	24	29	38	46	48	51	52.3	99
28-Jun	55	63	73	81	85	76	53	48	41	23	23	20	18	18	18	20	20	21	26	30	36	41	42	48	40.7	85
29-Jun	53	59	65	70	75	74	64	58	55	41	33	26	23	22	21	20	20	25	27	31	38	48	56	62	44.4	75
30-Jun	66	71	74	77	80	78	75	72	67	65	60	54	58	57	64	67	71	76	77	76	80	84	79	73	70.9	84

75.7	80.0	83.7	85.2	86.0	82.0	72.5	64.4	57.1	49.3	43.6	39.1	38.3	38.0	35.7	35.5	38.1	41.3	42.2	46.3	52.5	61.2	65.7	70.9	Diurnal Average	
97	97	98	98	99	98	96	92	89	84	78	74	78	79	81	76	78	84	86	95	96	93	91	94	Diurnal Maximum	

M - Maintenance

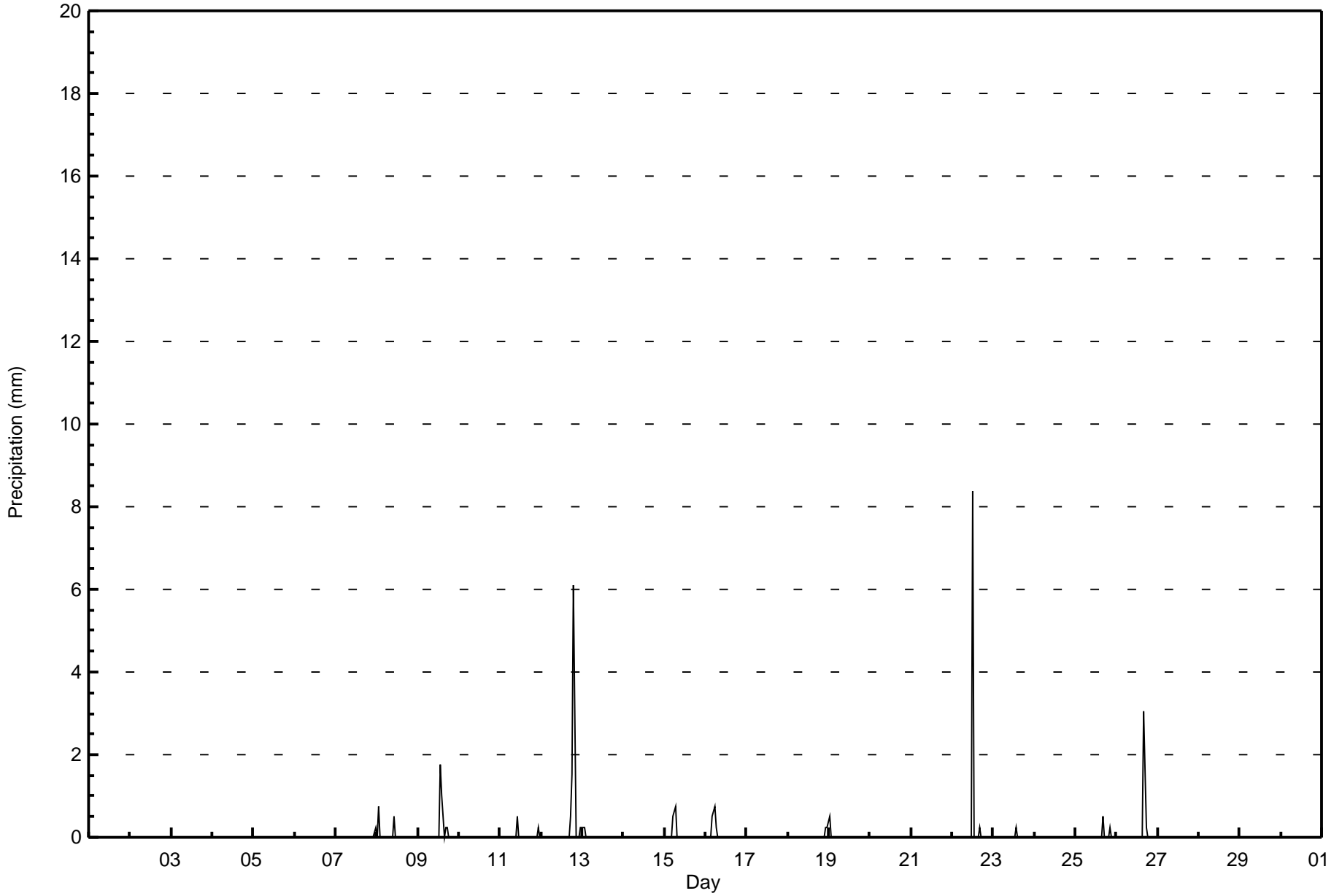




Maximum Value: 8.4 mm on Jun 22 13:00	Maximum Daily Total: 8.6 mm on Jun 22	Hours in Service: 720
Minimum Value: 0.0 mm on Jun 1 01:00	Minimum Daily Total: 0.0 mm on Jun 1	Hours of Data: 719
Maximum Diurnal Total: 8.4 mm at hour 13	Minimum Diurnal Total: 0.0 mm at hour 3	Hours of Missing Data: 1
Monthly Total: 31.24 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 = 0.6	Hours of Calibration: 0
		Percent Operational Time: 99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3														
8-Jun	0.0	0.8	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	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.8	1.3														
9-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	1.0	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3	1.8	3.3														
10-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.8	0.5	0.8														
12-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.5	6.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	8.4	6.1	8.4															
13-Jun	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.3	0.5															
14-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.8	1.3															
16-Jun	0.0	0.0	0.0	0.0	0.5	0.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.8	1.5															
17-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0														
18-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.5	0.3	0.5	0.3															
19-Jun	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.5															
20-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.4	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	8.6	8.4	8.6															
23-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3															
24-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.5	0.8	0.5															
26-Jun	0.0	0.0	0.0	0.0	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	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3	3.0	3.3	3.0															
27-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0														
																								0.8	1.0	0.0	0.0	0.5	1.3	1.0	0.0	0.0	0.0	1.0	0.0	8.4	2.0	1.0	0.0	4.1	1.0	1.5	6.1	0.3	0.0	0.5	0.8	Diurnal Average	
																								0.5	0.8	0.0	0.0	0.5	0.8	0.8	0.0	0.0	0.0	0.5	0.0	8.4	1.8	1.0	0.0	3.0	0.5	1.5	6.1	0.3	0.0	0.3	0.3	Diurnal Maximum	

M - Maintenance





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Precipitation (PC) - mm
Fort McKay - Bertha Ganter - June 2015

Concentration Ranges (mm)	Number of Hours	%	Cumulative %
0 - 0.3	703	97.77	97.77
0.4 - 0.5	7	0.97	98.75
0.6 - 0.7	0	0.00	98.75
0.8 - 1.4	4	0.56	99.30
1.5 - 10	5	0.70	100.00
> 10	0	0.00	100.00

Total Number of Valid Hours: 719

Total Number of Hours: 720

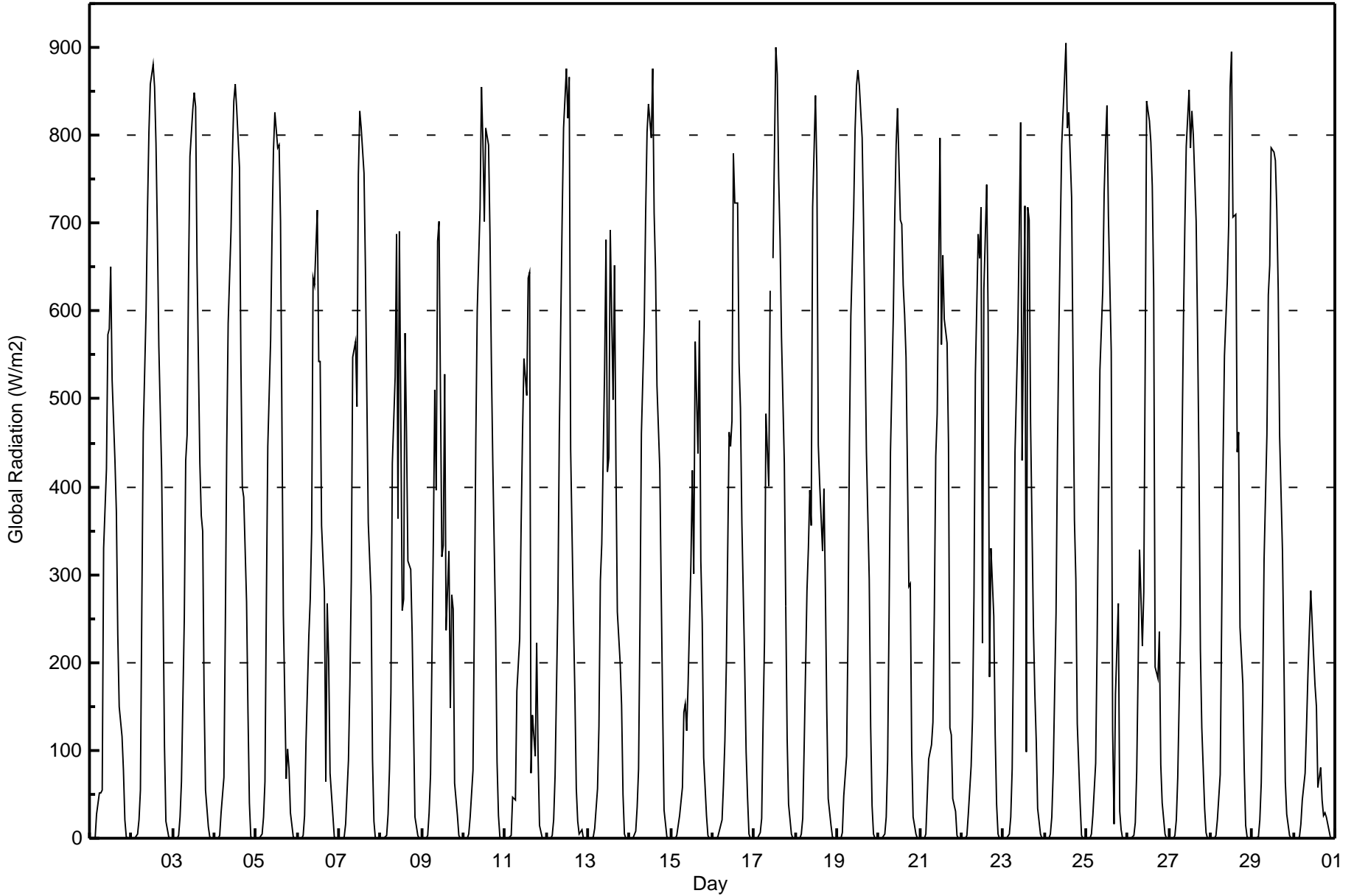


Maximum Value: 905 W/m2 on Jun 24 13:00	Maximum Daily Average: 354.6 W/m2 on Jun 19	Hours in Service: 720
Minimum Value: 0 W/m2 on Jun 1 01:00	Minimum Daily Average: 73.7 W/m2 on Jun 30	Hours of Data: 719
Maximum Diurnal Average: 700.1 W/m2 at hour 12	Minimum Diurnal Average: 0.0 W/m2 at hour 2	Hours of Missing Data: 1
Monthly Average: 269.1 W/m2	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 3 Median = 143 Q ₃ = 521 P ₉₀ = 730 P ₉₉ = 874	Hours of Calibration: 0
		Percent Operational Time: 99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	0	0	0	28	52	52	55	329	420	573	580	650	521	429	373	232	150	115	77	20	2	0	0	194.1	650
2-Jun	0	0	0	4	22	55	266	462	600	715	803	858	881	854	790	687	560	417	271	105	19	2	0	0	348.8	881
3-Jun	0	0	0	4	24	65	250	430	460	640	776	829	849	833	654	427	367	349	161	55	12	1	0	0	299.4	849
4-Jun	0	0	0	3	29	69	242	447	586	691	778	839	857	831	764	542	400	388	270	143	41	2	0	0	330.0	857
5-Jun	0	0	0	4	25	64	269	446	566	689	783	826	786	789	702	471	254	68	102	80	29	2	0	0	289.8	826
6-Jun	0	0	0	3	26	110	231	272	349	638	629	714	543	543	356	280	65	267	204	74	26	2	0	0	222.2	714
7-Jun	0	0	0	1	15	88	174	294	547	565	491	755	828	808	756	648	503	360	276	91	20	1	0	0	300.8	828
8-Jun	0	0	0	3	28	79	166	426	525	688	363	690	260	272	575	462	316	307	234	128	25	3	0	0	231.3	690
9-Jun	0	0	0	4	29	72	341	510	397	679	703	321	333	528	237	326	149	277	262	63	27	3	0	0	219.1	703
10-Jun	0	0	0	4	23	78	256	454	601	717	855	794	702	808	788	688	540	426	238	87	26	2	0	0	337.1	855
11-Jun	0	0	0	3	47	45	44	168	227	354	461	545	504	638	645	74	140	93	222	93	14	0	0	0	179.9	645
12-Jun	0	0	0	3	21	70	269	460	585	705	808	877	820	866	443	250	165	57	19	5	9	1	0	0	268.0	877
13-Jun	0	0	0	2	11	56	127	293	334	534	681	416	433	693	498	652	425	258	200	151	49	5	0	0	242.4	693
14-Jun	0	0	0	7	35	79	246	461	584	711	803	836	797	876	712	646	516	420	282	152	33	1	0	0	341.4	876
15-Jun	0	0	0	3	14	25	58	144	152	122	175	314	418	301	565	438	589	316	244	91	26	4	0	0	166.6	589
16-Jun	0	0	0	1	9	21	62	112	196	463	445	475	779	723	723	541	490	359	195	98	46	4	0	0	239.3	779
17-Jun	0	0	0	6	22	133	225	483	402	624	M	661	900	870	752	681	570	426	263	112	38	5	0	0	311.9	900
18-Jun	0	0	0	5	22	102	282	330	395	355	719	845	759	447	402	327	398	284	145	45	15	2	0	0	245.0	845
19-Jun	0	0	0	6	48	94	236	449	593	715	807	856	875	857	797	700	572	440	294	127	37	5	0	0	354.6	875
20-Jun	0	0	0	5	25	88	250	440	595	705	789	832	703	699	630	596	548	287	290	99	24	5	0	0	317.0	832
21-Jun	0	0	0	5	48	91	106	132	260	435	483	797	562	664	591	564	450	125	118	45	31	4	0	0	229.7	797
22-Jun	0	0	0	4	27	82	138	275	528	688	660	718	223	625	743	594	183	330	253	118	39	4	0	0	259.6	743
23-Jun	0	0	0	5	24	79	232	439	577	692	814	430	720	98	719	704	473	242	166	111	34	5	0	0	273.5	814
24-Jun	0	0	0	4	24	76	256	440	575	688	789	864	905	809	826	729	544	362	295	130	40	3	0	0	348.3	905
25-Jun	0	0	0	4	25	85	217	392	532	623	734	792	834	708	554	122	16	164	267	31	9	0	0	0	254.6	834
26-Jun	0	0	0	3	18	75	194	328	219	281	542	840	816	792	743	624	195	182	234	84	40	4	0	0	258.9	840
27-Jun	0	0	0	3	22	69	242	441	585	696	787	852	786	827	801	701	579	427	214	126	34	6	0	0	341.6	852
28-Jun	0	0	0	4	21	73	242	428	549	633	699	856	895	707	711	440	463	239	175	77	15	2	0	0	301.2	895
29-Jun	0	0	0	2	21	62	161	318	459	618	652	785	781	771	714	624	457	327	206	65	28	3	0	0	293.9	785
30-Jun	0	0	0	1	16	44	75	127	187	236	281	208	173	150	57	81	44	26	30	25	8	0	0	0	73.7	281

0.0	0.0	0.0	3.6	24.9	72.7	197.0	348.6	449.8	577.3	651.1	700.1	679.1	663.7	622.6	499.7	373.3	279.0	208.2	89.6	27.1	2.8	0.0	0.0		Diurnal Average
0	0	0	7	48	133	341	510	601	717	855	877	905	876	826	729	589	440	295	152	49	6	0	0		Diurnal Maximum

M - Maintenance





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Global Radiation (GR) - W/m2
Fort McKay - Bertha Ganter - June 2015

Concentration Ranges (W/m2)	Number of Hours	%	Cumulative %
0 - 20	229	31.85	31.85
21 - 100	106	14.74	46.59
101 - 300	114	15.86	62.45
301 - 600	133	18.50	80.95
601 - 900	136	18.92	99.86
> 900	1	0.14	100.00

Total Number of Valid Hours: 719

Total Number of Hours: 720

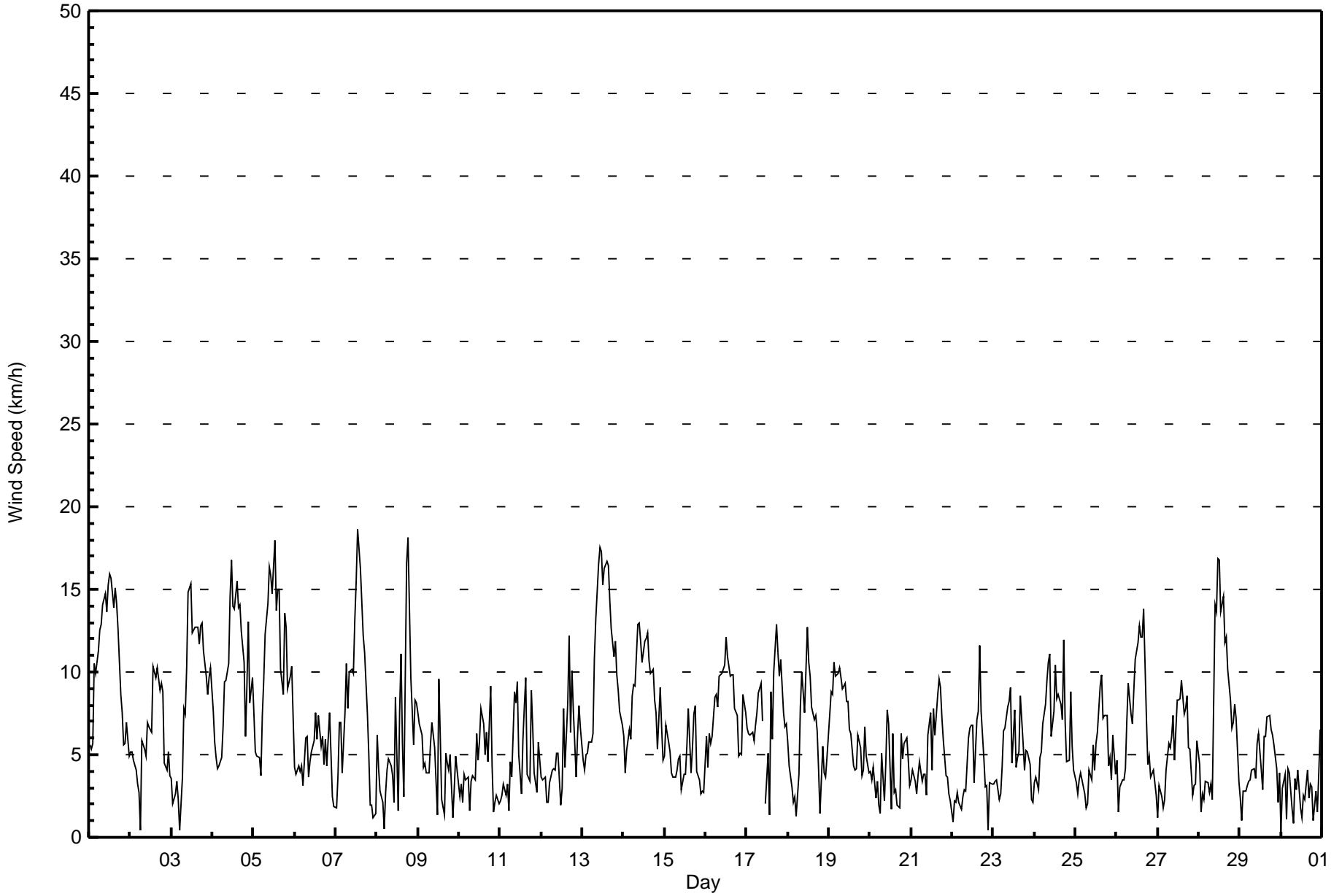


Maximum Speed: 19 km/h on Jun 7 14:00	Maximum Daily Speed Average: 10.7 km/h on Jun 1	Hours in Service: 720
Minimum Speed Value: 0 km/h on Jun 30 01:00	Minimum Daily Speed Average: 0.5 km/h on Jun 17	Hours of Data: 719
Maximum Diurnal Speed Average: 2.3 km/h at hour 3	Minimum Diurnal Speed Average: 0.4 km/h at hour 9	Hours of Missing Data: 1
Monthly Average Velocity: 1.1 km/h 288.4 deg	Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 4 Median = 6 Q ₃ = 9 P ₉₀ = 12 P ₉₉ = 17	Percent Operational Time: 99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	NW6	NW5	NW6	NNW10	NNW10	NW11	NW13	NW13	NW14	NW15	NW14	NNW15	NW16	NNW16	NNW14	NNW15	NNW14	NNW13	NNW9	NW8	NW6	NW6	NW7	NW5	NNW10.7	NW16
2-Jun	NW5	NW5	NW5	WNW4	NNW3	NW3	N0	SSE6	SSE5	S5	SSE7	SSE7	SSW6	S10	SSE10	S10	S10	SSE9	SSE9	SSE9	SSE4	SSW4	SSW5	SSW4	S4.1	S10
3-Jun	SSW4	WSW2	W3	NNW3	NW2	NE0	S4	S8	S7	S10	S15	S15	SSE12	S13	SSE13	S13	S12	S13	S13	S11	S10	S9	S10	S10	S8.1	S15
4-Jun	S8	S6	S5	SSE4	S4	SSW5	S7	S9	S10	S11	SSW15	S17	S14	S14	S16	SSW14	SSW14	SSW12	S11	SSW6	SSW9	SW13	S8	SSW10	S9.8	SSE17
5-Jun	SSW7	SSW5	SSW5	SSW5	SW4	S7	S9	S12	S14	SSW16	SW16	SSW15	SSW18	SSW14	SSW15	SSW15	SW10	WSW9	SSW14	S13	S9	SSW10	SSW10	SSW7	SSW10.4	SSW18
6-Jun	SW4	WSW4	SSW4	SSW4	SSW4	SSW3	W6	WNW6	WSW4	S5	SE5	SE6	E8	ENE6	N7	SW6	SW6	SSE4	S6	NNW4	NNW8	NW5	W2	NW2	SW1.4	E8
7-Jun	S2	WNW4	NW7	NW7	NW4	NW8	NW11	NW8	NW10	NW10	NW10	NW13	WNW16	NW19	NW16	NW14	NW12	NW11	NW7	NW5	NW2	SSW2	SE1	WNW1	NW7.9	NW19
8-Jun	SSW6	SSW4	SW3	W2	W1	SW3	WNW4	NW5	WNW4	W4	SSE2	S8	WSW2	E8	SSE11	SE6	NW2	NNW17	NNW18	NNW14	NNW10	NNW6	NW8	NW8	NW2.5	NNW18
9-Jun	NW8	NW7	NW6	NNW4	NW4	WNW4	WSW4	WSW6	WNW7	WNW6	WNW5	NNW1	NE10	ENE6	NE2	SSW1	NW5	WNW5	WNW4	NNW5	NW1	N3	N5	NNW4	NW3.4	NE10
10-Jun	WNW2	NNW3	W2	WNW4	NW4	NW4	WSW2	S3	ESE4	E3	E6	E5	SE6	SSE8	SSE7	SE5	E6	SE5	SSW9	SSW4	SW2	W2	NW3	WNW2	SSE1.4	SSW9
11-Jun	NW2	NW3	WNW3	NW3	W3	S2	NNW5	SSW4	S9	SSE8	SSE9	SSE5	SE3	S6	SSW8	WNW10	NNW4	NW3	S9	S7	WSW4	W3	S6	S5	SSW2.6	WNW10
12-Jun	NW4	NW3	NW4	W2	SSW2	SW3	S4	SSE4	SSE4	SSE5	SSW5	SW2	SW3	SSE8	SSE4	ESE8	ESE12	SE6	NNW10	N8	NNE4	SE6	ESE8	E7	SE1.8	ESE12
13-Jun	ENE5	NNE4	N5	NNW5	N6	NNW6	NNW6	N11	N13	NNE17	NNE18	NNE17	NNE15	NNE16	NNE17	NNE16	NE14	NE13	NE11	NNE12	NNE10	NNE9	N8	N7	NNE10.4	NNE18
14-Jun	N6	N4	NNW5	N7	N6	N9	NNE9	NNE9	N13	NNE13	NNE12	NNE11	NNE12	NNE12	NNE12	NNE11	N10	N10	N8	N8	N5	N9	N7	NNE5	N8.6	NNE13
15-Jun	NNE5	NNE7	NNE6	NNE5	NNE4	N4	NNW4	NNE4	NNE5	NNE3	SSE4	SSE4	S5	S8	WSW4	WNW5	NW7	NNW8	NW4	W3	WSW3	WSW3	W3	W3	NNW1.7	NNW8
16-Jun	NNW6	NNE4	NNE6	N6	N6	N8	N9	N8	N10	NNE10	N10	N10	N12	NNE11	NNE10	N10	N10	NNE8	NNE7	N5	N5	NNW5	N9	N8	N7.9	N12
17-Jun	N7	NNW6	NNW6	NNW6	NNW6	NNW7	N8	N9	NNE9	NNE7	M	NNE2	WNW5	ENE1	SE9	SSE6	SSE10	S13	S11	S10	SSW11	SSW8	SSW7	SSW7	S0.5	S13
18-Jun	SSW6	SW4	WNW3	NW2	NNW2	E1	SSE4	S8	S10	S9	S8	SSE13	SSE11	SSE10	S8	S7	S7	S6	WSW4	NW1	NW6	NNW4	NW4	NW5	S3.8	SSE13
19-Jun	NW7	N9	N9	NNE11	N10	N10	NNE10	NNE10	NNE9	ENE9	ENE8	NE8	ENE7	ENE6	ENE4	NE4	NE4	E6	ENE5	NE4	NNW4	N7	NNW5	NW4	NNE5.9	NNE11
20-Jun	NW4	WNW3	WNW4	W2	WNW3	NW2	S1	SSE5	SSE2	ESE5	ESE8	E7	ENE2	N6	S3	E3	N2	NE2	NE6	NNE5	N6	NNE6	NNE5	WNW3	NNE1.3	ESE8
21-Jun	NW3	NNW4	NW3	NNW3	N4	N5	NW3	NNW4	N4	NE3	SSE6	SSE8	NE4	NNE8	NE6	NNE9	N10	NNE9	N7	NNW6	NW4	WNW4	WNW3	WNW2	N3.3	N10
22-Jun	NW1	WSW2	SSW2	W3	SSW2	SSW2	S2	NW3	ESE3	E6	E7	ESE7	NNE7	WSW3	W7	W8	NW12	NW8	NW5	NNE3	NE3	WNW0	W3	NW3	NW1.3	NW12
23-Jun	WNW3	NW3	W3	SSW2	SW3	S4	S6	SSE7	SSE8	SSE9	W5	W8	WSW4	SSE5	SSE5	S9	SSW6	S4	S5	SSW5	SSW4	SSW2	SW2	SW2	SSW3.8	SSE9
24-Jun	SSW3	SSW4	SSW3	SSW5	SSW5	S7	S8	S10	S11	S11	SSW6	WSW8	WSW10	W8	W9	WSW8	WSW7	NNW12	NNW7	N5	NNE5	NNE9	NNW6	NW4	WSW3.2	NNW12
25-Jun	NW3	NNW3	WNW3	NW4	NW4	WNW3	NNE2	NNE2	ENE4	E3	ESE6	ESE4	S6	SSE6	NNW9	N10	SW7	SSW7	SW7	NW4	SW5	WNW3	SSW6	SSW4	WSW1.0	N10
26-Jun	S5	WNW2	NW3	SSW4	SSW4	S4	S7	S9	SSW7	SW7	SW9	W11	WNW12	W13	WNW12	WNW12	NW14	WNW7	WNW4	WNW5	ENE4	S4	WSW3	SW3	WSW4.6	NW14
27-Jun	SW1	SSW3	SSW2	SW2	S2	S4	S6	SSW5	SSW6	S7	SW5	SW8	SW8	WNW8	SW10	WSW7	WSW8	WSW9	SW5	SW5	WSW3	WSW3	W3	NW6	SW4.5	SW10
28-Jun	NW4	N2	SSW3	S2	SSW3	SSW3	WNW3	SSE3	NNW2	NNW14	NNW14	NW17	NW17	NNW14	NNW15	N12	NNW12	NNW10	NNW8	NW7	NW7	NW8	NW7	NNW3	NW6.7	NW17
29-Jun	WNW2	SW1	SW3	SSW3	SW3	SSW3	S3	S4	SSE4	S4	SSE6	SSE6	SW4	W3	SW6	SW6	SW7	NE7	NE7	NNE6	NNE6	NNW4	NW2	NNW4	SSW1.1	ENE7
30-Jun	NNE0	NW3	NW4	N1	W4	WNW4	W2	SSE1	SSW4	S3	S4	ESE2	SE1	S3	NNW2	NNW4	N2	NW3	WNW3	SW1	SSW3	WSW2	W4	NW6	W1.3	NW6

WNW1.9	NW2.0	NW2.3	NW2.1	NW1.9	NNW1.4	NNW1.1	SSW0.8	S0.4	SSE0.6	S1.5	S1.1	W1.2	WNW0.6	WSW1.1	NNW1.4	NNW1.8	NW1.7	NNW1.4	NW1.5	NW1.4	NNW1.7	W1.4	NNW1.9	Diurnal Average
S8	N9	NNE9	NNE11	NNW10	NW11	NW13	NW13	S14	NNE17	NNE18	NNE17	SSW18	NW19	NNE17	NNE16	NE14	NNW17	NNW18	NNW14	SSW11	SW13	SSW10	S10	Diurnal Maximum

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Fort McKay - Bertha Ganter - June 2015

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	342	47.57	47.57
6 - 11	291	40.47	88.04
12 - 19	86	11.96	100.00
20 - 28	0	0.00	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 719

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Fort McKay - Bertha Ganter - June 2015**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	16	20	9	7	5	5	5	21	28	45	23	18	21	37	54	28	342
6 - 11	38	31	6	7	9	5	6	26	52	22	13	9	7	6	30	24	291
12 - 19	4	13	2	0	0	1	0	4	14	11	2	0	1	4	15	15	86
20 - 28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	58	64	17	14	14	11	11	51	94	78	38	27	29	47	99	67	719

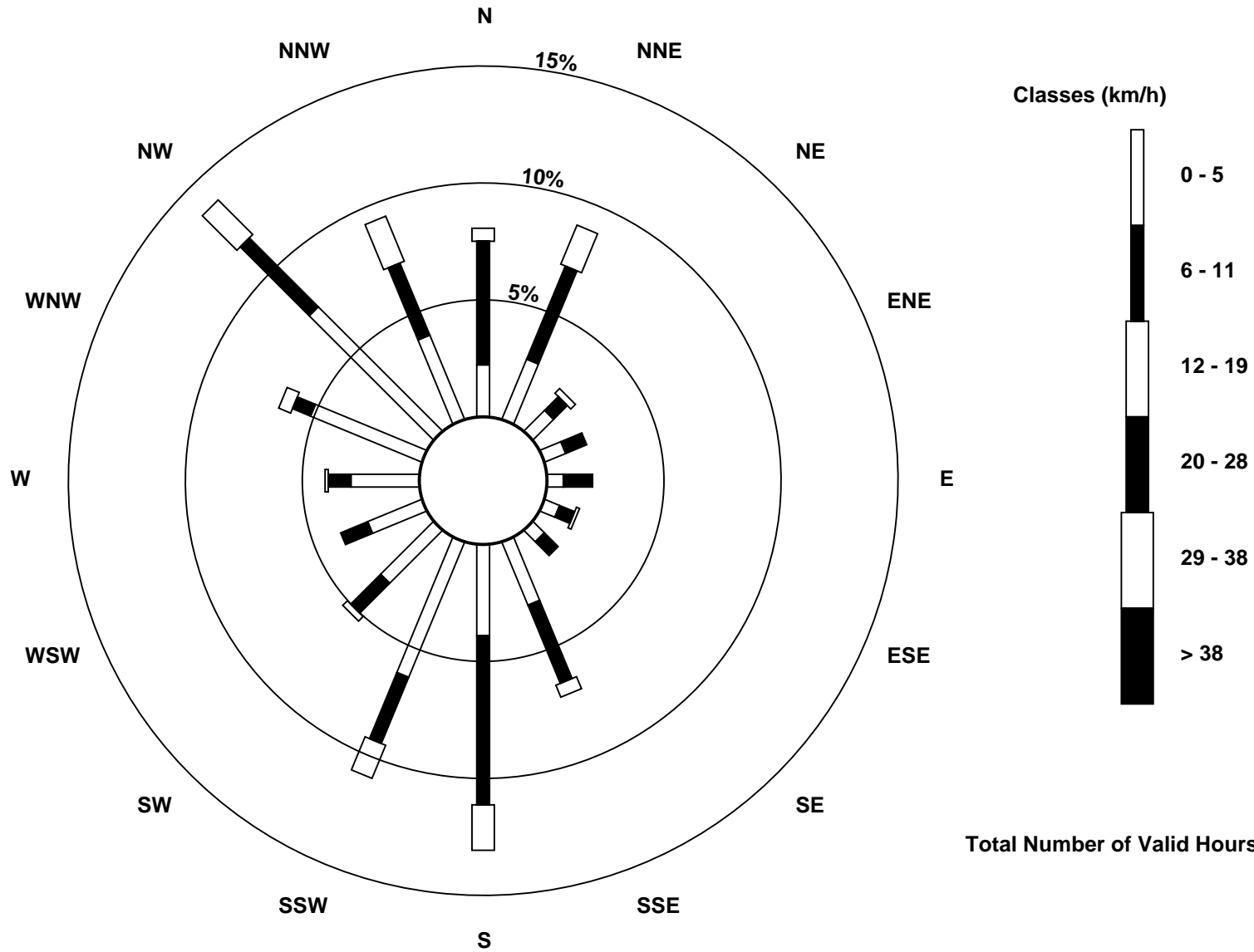
Total Number of Valid Hours: 719

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

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





Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 9 km/h on Jun 4 21:00	Hours of Data: 719
Minimum Value: 0 km/h on Jun 18 03:00	Hours of Missing Data: 1
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 3 P ₉₀ = 5 P ₉₉ = 7	Hours of Calibration: 0
	Percent Operational Time: 99.9

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

3	3	3	3	4	3	4	4	4	5	7	8	7	7	7	8	7	8	6	6	5	9	5	4	3	
Diurnal Maximum																									

M - Maintenance



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Fort McKay - Bertha Ganter - June 2015

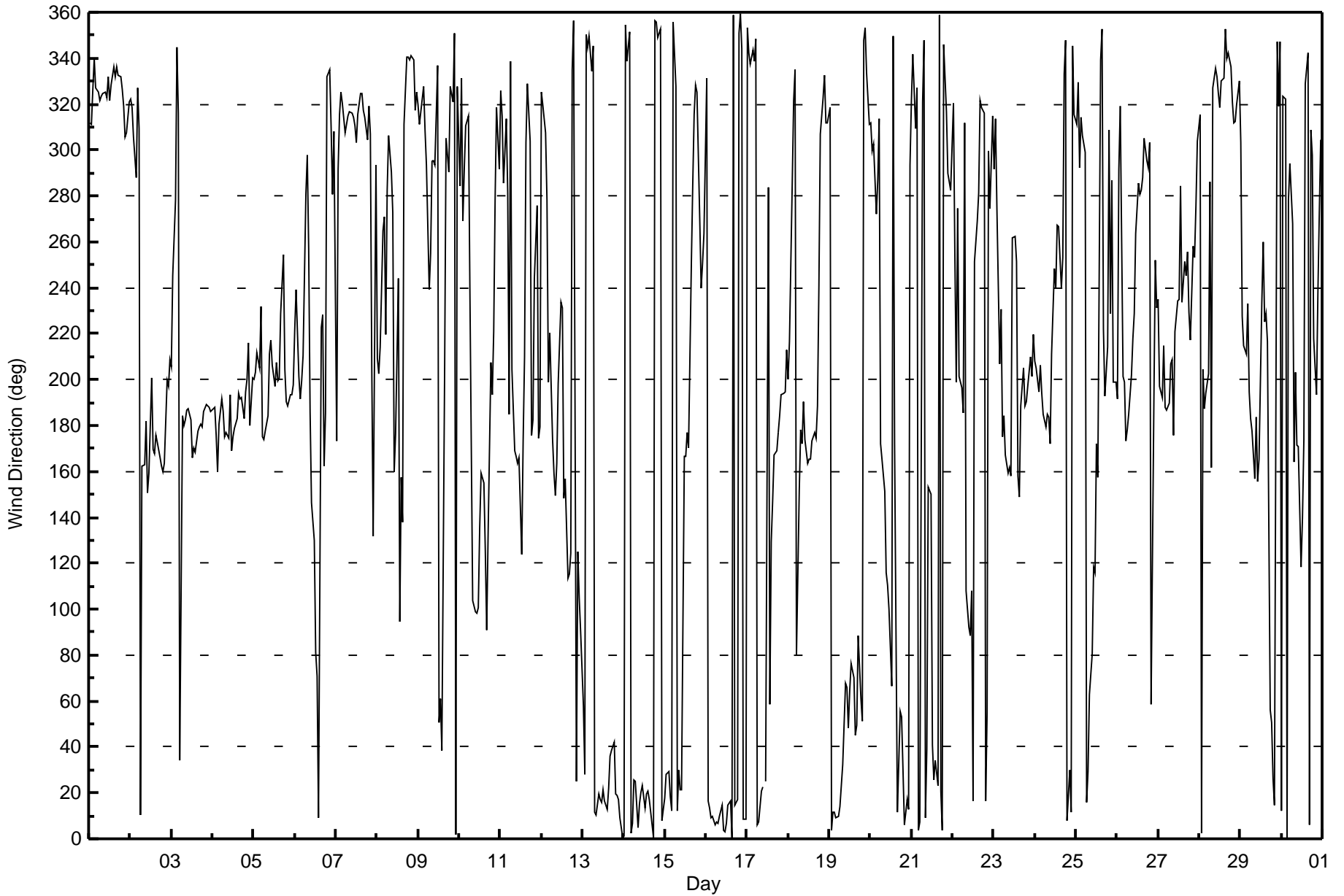
Direction of Maximum Speed: 316 deg on Jun 7 14:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 326.3 deg on Jun 1	Hours of Data: 719
Direction of Minimum Speed: 12 deg on Jun 30 01:00	Hours of Missing Data: 1
Direction of Minimum Daily Speed Average: 0.5 deg on Jun 17	Percent Operational Time: 99.9
Monthly Average Direction: 277.9 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	312	311	326	340	327	325	322	323	325	325	323	332	321	328	336	332	336	332	332	326	319	306	308	321	326.3
2-Jun	322	318	306	288	327	309	11	162	163	182	151	159	201	170	168	176	172	166	162	160	164	200	197	209	180.4
3-Jun	205	245	278	345	316	34	185	180	182	187	188	183	166	170	168	178	180	180	179	186	189	189	188	186	183.2
4-Jun	187	188	176	160	180	192	186	175	177	174	194	169	175	179	183	194	192	193	183	195	200	216	180	201	185.9
5-Jun	200	203	212	205	232	175	174	178	184	211	217	206	197	207	200	201	229	254	205	190	189	194	193	198	201.1
6-Jun	221	239	201	192	199	210	281	298	257	186	146	130	81	71	9	223	228	162	185	332	335	310	281	308	229.9
7-Jun	173	291	316	325	320	308	311	315	317	316	314	311	303	316	325	325	317	315	304	319	307	206	132	294	313.7
8-Jun	209	202	214	265	271	219	283	306	291	273	160	176	244	95	157	138	311	341	340	339	341	339	317	325	312.1
9-Jun	320	311	322	328	309	294	239	255	296	295	293	337	51	61	39	205	305	298	290	327	321	351	2	328	318.8
10-Jun	285	332	269	292	311	315	240	172	103	99	98	101	136	159	155	126	91	133	208	194	221	278	319	292	156.8
11-Jun	326	315	286	314	281	185	339	205	169	166	164	166	124	173	210	303	329	304	176	182	244	276	174	180	205.4
12-Jun	325	320	307	278	199	220	174	159	150	164	199	234	231	149	157	113	116	124	335	356	25	125	105	90	130.7
13-Jun	58	28	350	345	350	334	346	11	10	19	17	16	21	16	13	22	36	39	42	19	19	17	9	0	16.9
14-Jun	1	355	339	351	3	7	25	25	5	15	20	23	14	20	21	17	11	1	356	356	349	353	8	13	9.5
15-Jun	18	28	29	18	12	356	328	12	30	22	22	167	167	177	170	250	285	316	328	325	270	240	251	263	339.5
16-Jun	331	16	14	9	10	6	7	6	10	14	4	3	7	15	16	0	359	14	17	351	360	344	9	8	6.4
17-Jun	353	342	337	343	338	348	6	8	20	22	M	25	284	59	129	147	167	169	177	184	194	194	195	213	182.8
18-Jun	200	216	286	322	335	80	152	178	172	191	174	164	165	165	173	177	174	188	241	307	323	333	312	312	187.8
19-Jun	319	4	11	12	9	10	14	23	32	67	66	48	65	76	70	45	49	89	61	51	348	354	334	311	27.5
20-Jun	312	300	303	272	287	313	172	165	152	116	110	100	67	349	172	91	11	56	53	30	6	17	13	294	32.6
21-Jun	321	341	310	327	4	7	321	348	9	39	153	150	41	26	34	23	359	21	4	346	317	290	286	282	2.5
22-Jun	320	254	199	275	201	196	185	312	108	92	88	108	17	252	269	281	322	319	316	17	55	299	274	315	317.5
23-Jun	292	314	275	207	231	175	185	167	159	162	158	262	263	251	158	149	188	205	189	190	197	210	201	220	195.6
24-Jun	208	205	195	206	194	185	180	185	184	172	211	248	240	267	266	240	253	333	348	8	30	12	345	315	236.9
25-Jun	311	330	292	314	306	299	16	29	63	80	118	116	172	158	339	353	222	193	214	309	229	287	199	199	252.6
26-Jun	191	292	319	201	199	173	178	185	202	218	229	264	286	281	283	288	305	295	292	303	59	191	252	231	256.7
27-Jun	235	197	192	215	188	186	190	207	208	176	221	234	235	285	233	251	246	256	230	217	258	253	276	304	231.9
28-Jun	315	2	205	187	194	203	286	162	327	335	332	324	319	330	331	353	340	342	336	321	312	313	320	330	325.9
29-Jun	303	228	215	211	233	194	183	177	157	183	156	165	234	260	225	229	216	56	51	26	14	347	319	347	204.7
30-Jun	12	323	322	0	278	294	268	164	203	171	171	118	140	174	329	342	6	309	297	218	193	237	272	304	279.0
	292.7	310.5	306.5	316.7	307.8	303.2	283.5	212.7	181.9	161.8	170.9	187.1	277.9	287.6	246.1	287.6	284.0	314.5	290.2	317.4	304.8	290.6	280.7	284.9	

Diurnal Average

M - Maintenance

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





Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg

Fort McKay - Bertha Ganter - June 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 106 deg on Jun 17 14:00	Hours of Data: 719
Minimum Value: 9 deg on Jun 3 03:00	Hours of Missing Data: 1
Percentiles: P ₁ = 12 P ₁₀ = 17 Q ₁ = 23 Median = 33 Q ₃ = 48 P ₉₀ = 68 P ₉₉ = 96	Hours of Calibration: 0
	Percent Operational Time: 99.9

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	20	25	22	22	24	21	23	22	24	26	31	26	27	30	27	29	26	25	28	22	19	12	14	33	33
2-Jun	19	12	19	21	39	25	97	26	40	57	35	61	58	28	24	27	23	23	25	16	21	14	18	45	97
3-Jun	32	31	9	31	31	88	34	24	28	23	19	20	21	20	21	18	20	19	17	15	15	14	15	15	88
4-Jun	13	14	14	15	15	15	20	20	18	19	25	21	24	26	23	26	21	22	19	36	22	31	23	16	36
5-Jun	14	19	16	24	30	16	16	15	18	26	32	31	21	30	24	28	50	46	22	16	16	14	15	18	50
6-Jun	13	19	14	23	25	66	44	45	53	37	54	48	48	61	53	86	42	35	35	75	19	11	61	47	86
7-Jun	36	33	24	25	28	20	21	27	25	40	34	39	36	29	30	29	34	36	38	23	30	72	91	78	91
8-Jun	23	48	27	31	92	39	47	42	62	72	88	23	86	48	21	46	88	25	26	27	23	17	17	18	92
9-Jun	17	16	29	29	28	54	63	51	42	53	69	95	47	55	98	90	40	49	49	18	69	49	23	25	98
10-Jun	53	30	26	16	22	25	81	40	64	73	50	78	45	32	40	70	43	56	34	22	56	25	29	35	81
11-Jun	42	35	13	39	37	88	68	58	18	26	23	34	80	33	75	51	63	94	29	20	50	66	35	47	94
12-Jun	91	72	49	88	65	51	33	33	53	44	58	88	80	47	78	42	28	77	24	28	61	18	36	48	91
13-Jun	54	42	17	12	17	19	26	31	34	36	37	36	39	39	37	42	42	47	47	41	39	35	31	26	54
14-Jun	26	35	11	17	23	30	40	38	32	39	43	46	41	40	42	43	39	35	35	29	22	28	31	34	46
15-Jun	34	42	43	40	31	35	23	54	48	40	74	64	57	48	26	71	60	38	24	21	14	31	25	22	74
16-Jun	40	46	31	30	33	28	27	31	31	35	34	33	35	38	44	36	38	41	34	21	25	19	29	31	46
17-Jun	26	22	21	19	14	22	32	40	36	52	M	90	78	106	35	51	37	18	19	17	15	14	12	16	106
18-Jun	16	17	13	40	24	59	38	23	19	24	47	22	24	20	25	25	25	44	54	48	54	66	51	28	66
19-Jun	20	25	28	29	28	28	32	37	45	45	54	55	65	66	73	79	75	51	47	44	15	18	16	16	79
20-Jun	16	32	18	46	30	62	94	29	82	67	38	54	98	65	97	83	92	96	54	42	28	38	32	30	98
21-Jun	28	19	27	28	31	26	19	35	49	88	24	42	88	50	62	45	34	34	35	27	21	15	61	52	88
22-Jun	66	48	50	47	43	58	55	53	71	48	47	39	62	67	50	48	29	29	33	49	47	84	42	40	84
23-Jun	19	21	25	33	24	21	17	22	19	22	26	66	50	69	52	47	29	30	15	13	12	16	34	30	69
24-Jun	19	19	23	13	18	19	17	17	17	16	62	56	51	54	52	55	48	37	36	50	49	31	21	25	62
25-Jun	38	45	23	23	17	21	79	81	64	76	46	69	47	47	79	57	59	28	21	41	63	63	25	38	81
26-Jun	25	72	40	25	28	25	21	16	28	30	42	50	46	48	51	47	38	40	42	42	56	40	44	24	72
27-Jun	79	33	24	25	27	14	20	29	38	45	67	48	52	54	49	58	53	54	41	21	23	19	29	18	79
28-Jun	34	70	24	46	19	27	63	54	97	27	28	25	31	33	30	30	27	26	24	19	12	12	32	33	97
29-Jun	46	85	21	40	20	31	19	26	17	53	30	50	90	91	64	61	46	47	44	38	30	27	49	39	91
30-Jun	97	46	33	81	14	29	55	81	34	29	23	68	71	38	62	20	35	55	38	74	48	68	42	34	97

97	85	50	88	92	88	97	81	97	88	88	88	95	98	106	98	90	92	96	54	75	69	84	91	78	
Diurnal Maximum																									

M - Maintenance



Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

Calibration Date	June 17, 2015	Last Calibration	May 12, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	Removal		
Start Time (MST)	9:15	End Time (MST)	10:30
Gas Cert Reference	SA140071A	Station temp.	21 Deg C
Cal Gas Concentration	50 ppm	Cal Gas Exp Date	26-Sep-17
Calibrator Make/Model	Sabio 4010	Serial Number	1730512
ZAG Make/Model	API 701	Serial Number	587
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2582

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		PMT voltage	-689	-689
Analyzer IP address	192.168.1.43		Lamp voltage	731	731
Calculated slope	0.992526	0.992698	Chamber temp	43.2	43.2
Calculated intercept	2.061264	0.999710	Pressure	725.2	725.2
Analyzer Background	42.8	42.8	Flow	0.504	0.504
Analyzer Coefficient	0.802	0.802	Intensity	35700	35700
Analyzer make	Thermo 43C		Analyzer serial #	509110888	

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	0.6	----
as found span	5500	78.1	710.0	715.3	0.993
calibrator zero	5500	0.0	0.0	0.6	----
high point	5500	78.1	710.0	715.3	0.993
second point	5500	43.8	398.2	398.9	0.998
third point	5500	21.9	199.1	198.1	1.005
as left zero					
as left span					
Average Correction Factor					0.999

Corrected As found	714.7	Previous response	713.3	% change	-0.2%
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Notes:

Removal cal to replace with new i-series analyzer.

Calibration Performed By:

Michael Martineau



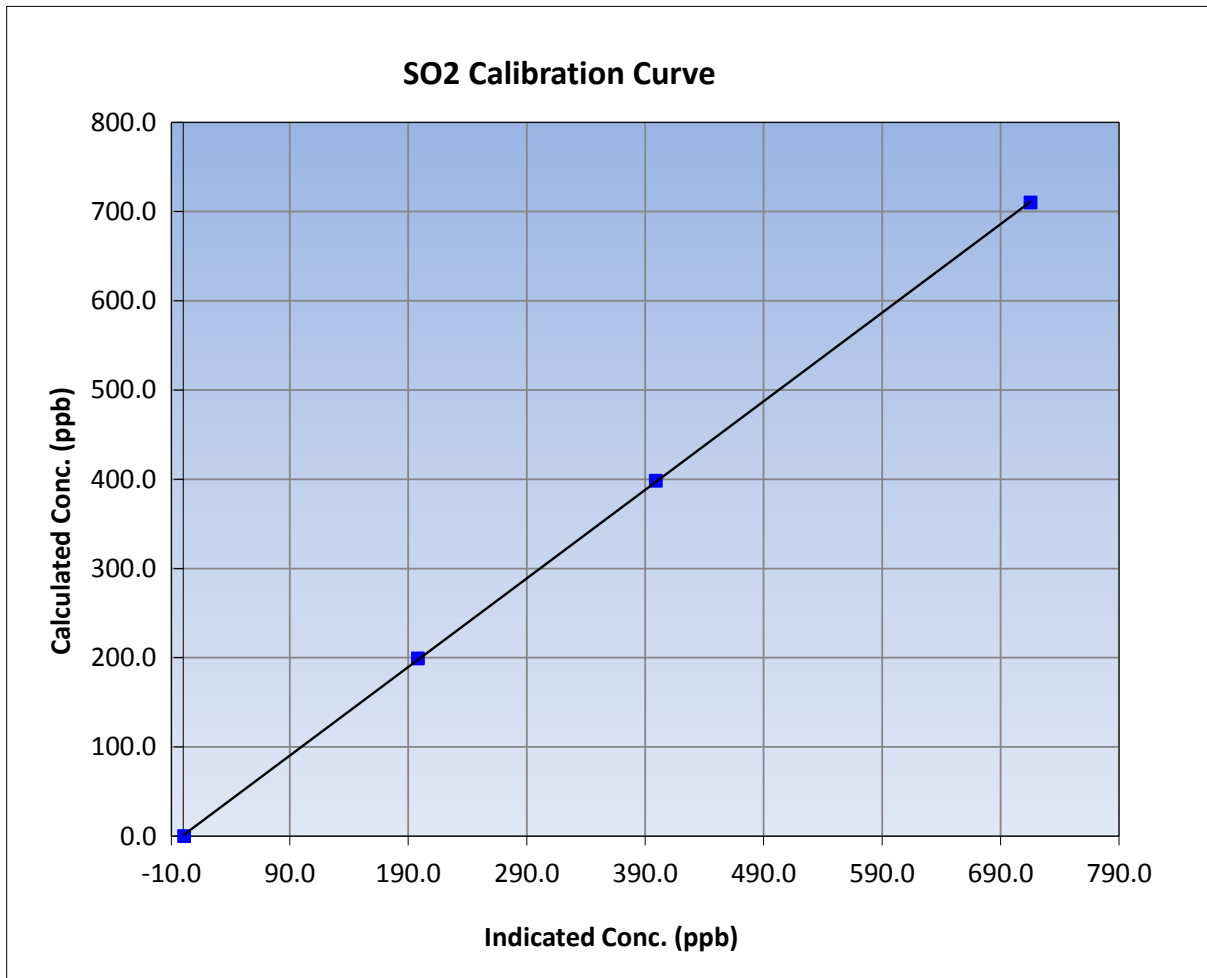
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	June 17, 2015	Previous Calibration	May 12, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:15	End Time (MST)	10:30
Analyzer make	Thermo 43C	Analyzer serial #	509110888

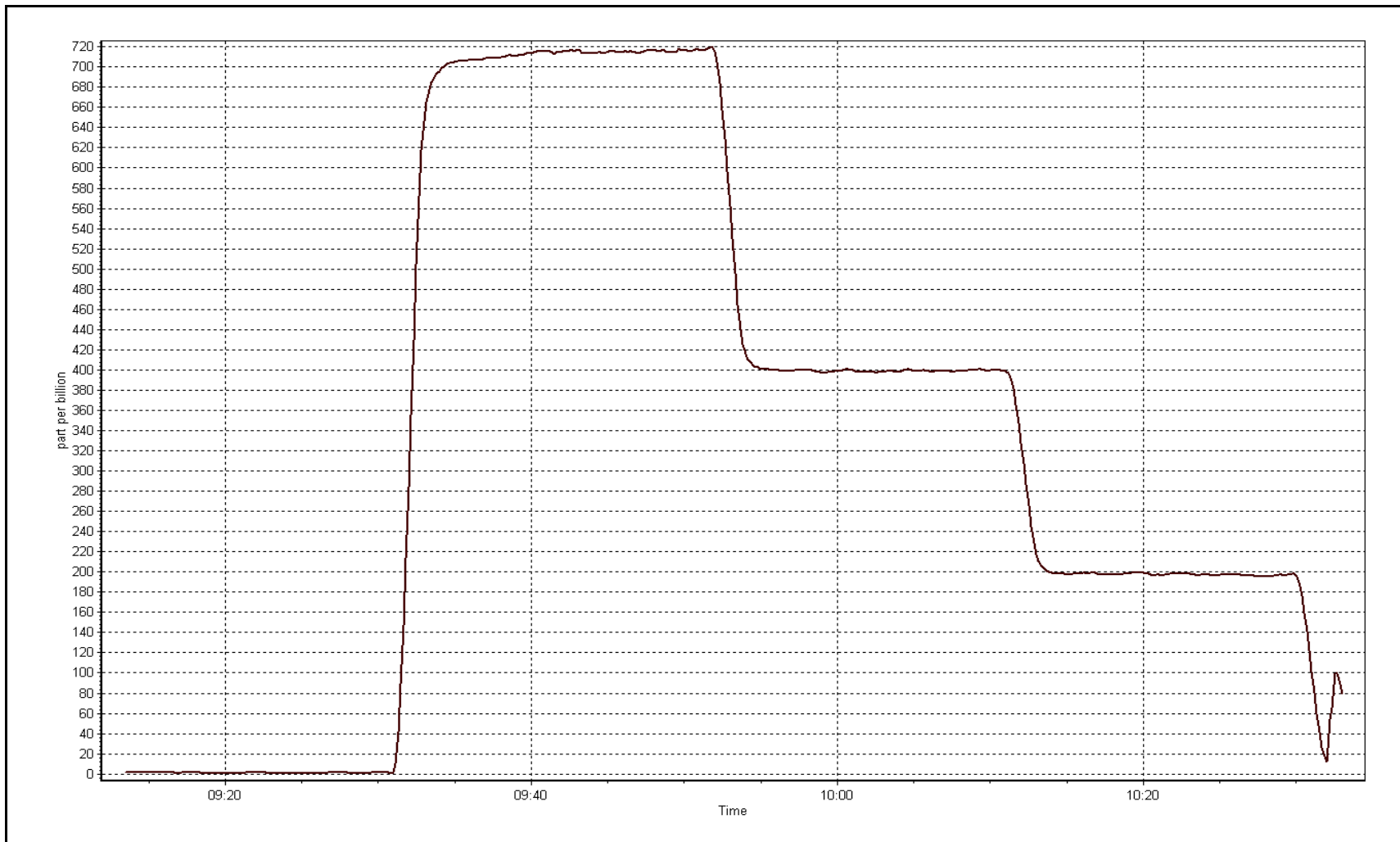
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.6	----	Correlation Coefficient	0.999973
710.0	715.3	0.9926		
398.2	398.9	0.9982	Slope	0.992698
199.1	198.1	1.0052		
			Intercept	0.999710



SO2 Calibration Plot

Date: June 17, 2015





Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

Calibration Date	June 17, 2015	Last Calibration	NA
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	Install		
Start Time (MST)	12:00	End Time (MST)	14:05
Gas Cert Reference	SA140071A	Station temp.	21 Deg C
Cal Gas Concentration	50 ppm	Cal Gas Exp Date	26-Sep-17
Calibrator Make/Model	Sabio 4010	Serial Number	1730512
ZAG Make/Model	API 701	Serial Number	587
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2582

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		PMT voltage	n/a	-614
Analyzer IP address	192.168.1.43		Lamp voltage	n/a	818
Calculated slope	n/a	0.997312	Chamber temp	n/a	45.3
Calculated intercept	n/a	1.769132	Pressure	n/a	726.4
Analyzer Background	n/a	12.7	Flow	n/a	0.524
Analyzer Coefficient	n/a	0.985	Intensity	n/a	91

Analyzer make Thermo 43i Analyzer serial # JC1501301448

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero					
as found span					
calibrator zero	5500	0.0	0.0	0.1	----
high point	5500	78.1	710.0	711.3	0.998
second point	5500	43.8	398.2	396.3	1.005
third point	5500	21.9	199.1	196.1	1.015
as left zero	5500	0.0	0.0	0.3	----
as left span	5500	78.1	710.0	711.0	0.999
Average Correction Factor					1.006

Corrected As found NA Previous response NA % change NA

Notes:

Installed new i-series 43 to replace c-series analyzer. Adjusted zero and span.

Calibration Performed By: Michael Martineau



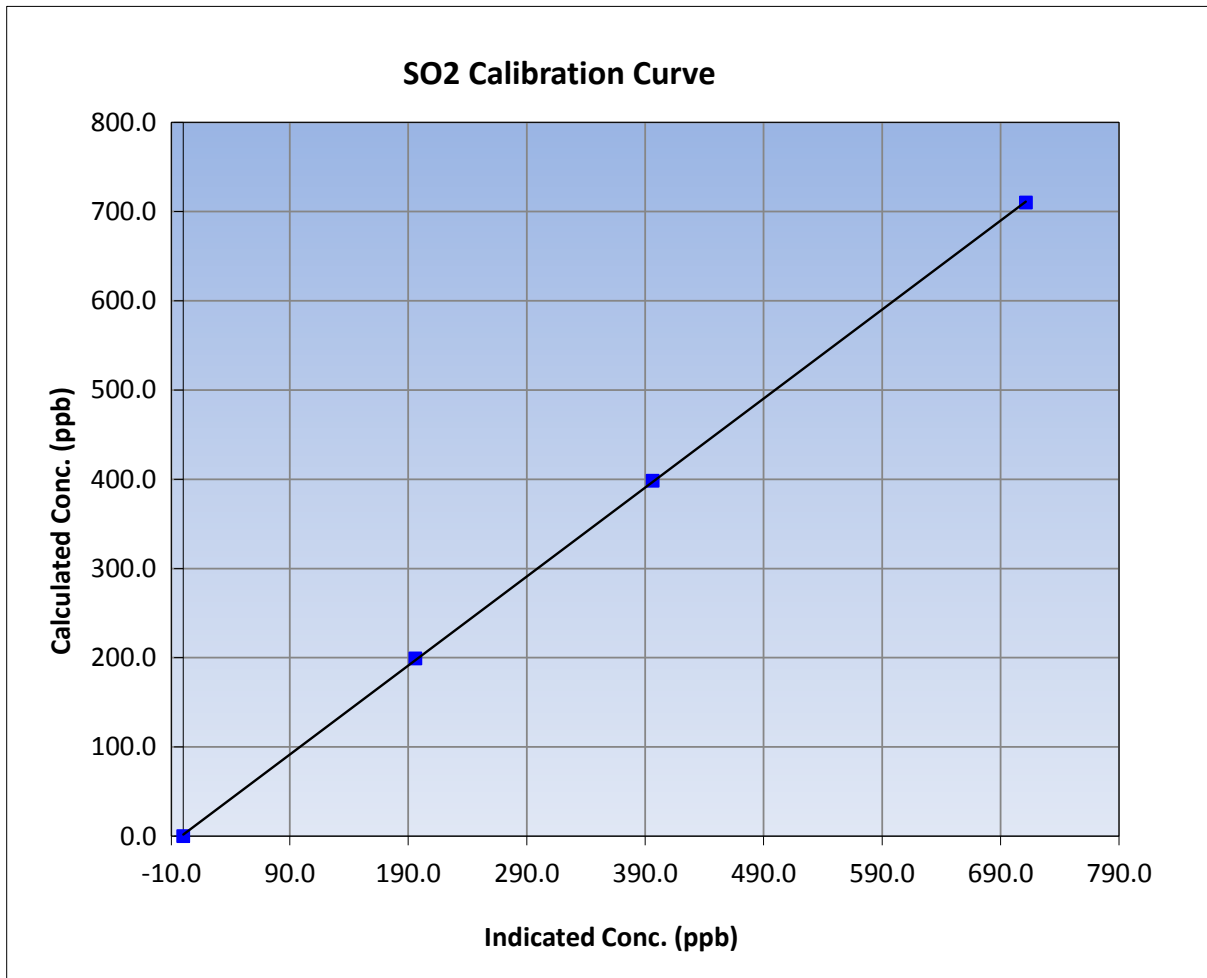
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	June 17, 2015	Previous Calibration	NA
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	12:00	End Time (MST)	14:05
Analyzer make	Thermo 43i	Analyzer serial #	JC1501301448

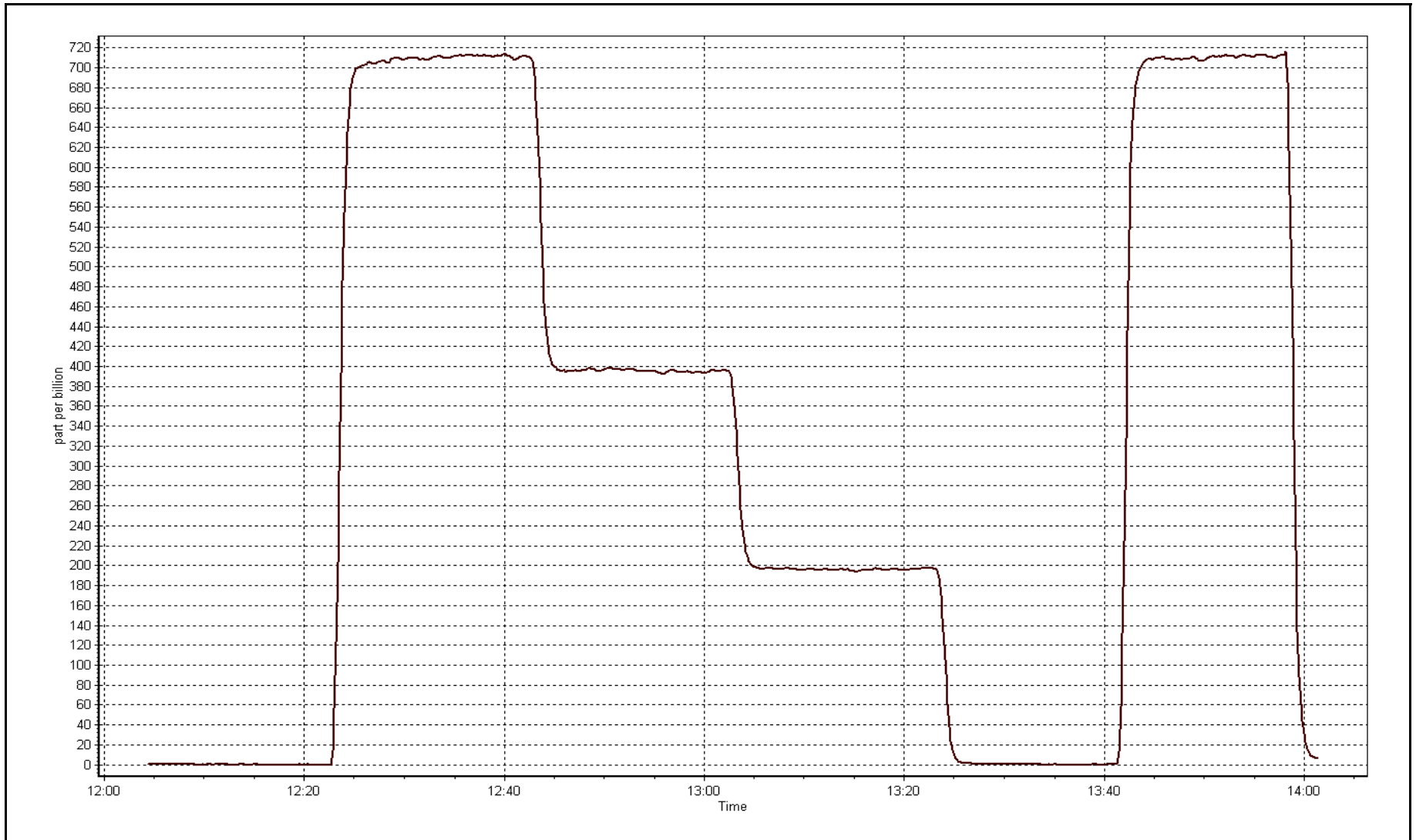
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	0.999966
710.0	711.3	0.9982		
398.2	396.3	1.0048	Slope	0.997312
199.1	196.1	1.0154		
			Intercept	1.769132



SO2 Calibration Plot

Date: June 17, 2015





Wood Buffalo Environmental Association TRS Calibration Report

Station Information

Calibration Date	June 18, 2015	Last Calibration	May 19, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	Routine		
Start Time (MST)	10:05	End Time (MST)	13:00
Gas Cert Reference	LL27480	Station temp.	21 Deg C
Cal Gas Concentration	10.6 ppm	Cal Gas Exp Date	41264
Calibrator Make/Model	SABIO 4010	Serial Number	1730512
Dil air Make/Model	API 701	Serial Number	587
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2582
SO2 gas concentration	50 ppm	SO2 gas cert/exp	SA140071A Sep-17

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-859	-860
Analyzer IP address	192.168.1.42		Lamp voltage	1164	1152
Calculated slope	1.014866	0.991793	Chamber temp	45	45
Calculated intercept	0.208176	0.153607	Pressure	674.8	667.2
Analyzer Background	1.63	1.7	Flow	0.415	0.410
Analyzer Coefficient	0.976	1.006	Intensity	80	80
			Converter temp.	800	800
Analyzer make/model	Thermo 43i-TLE		Analyzer serial #	1218153461	
Converter make/model	CDN-101		Converter serial #	470	

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6500	0.0	0.0	0.0	----
as found span	6500	46.0	75.0	72.8	1.030
SO2 scrubber check	5500	21.9	199.1	0.4	----
calibrator zero	6500	0.0	0.0	0.0	----
high point	6500	46.0	75.0	75.6	0.992
second point	6500	24.6	40.1	40.1	1.000
third point	6500	12.3	20.1	20.0	1.002
as left zero	6500	0.0	0.0	0.2	----
as left span	6500	46.0	75.0	76.4	0.981
Average Correction Factor					0.998

Corrected As found	72.8	Previous response	73.7	% change	1.2%
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Notes:

inlet filter changed after as founds. Adjusted span.

Calibration Performed By:

Michael Martineau



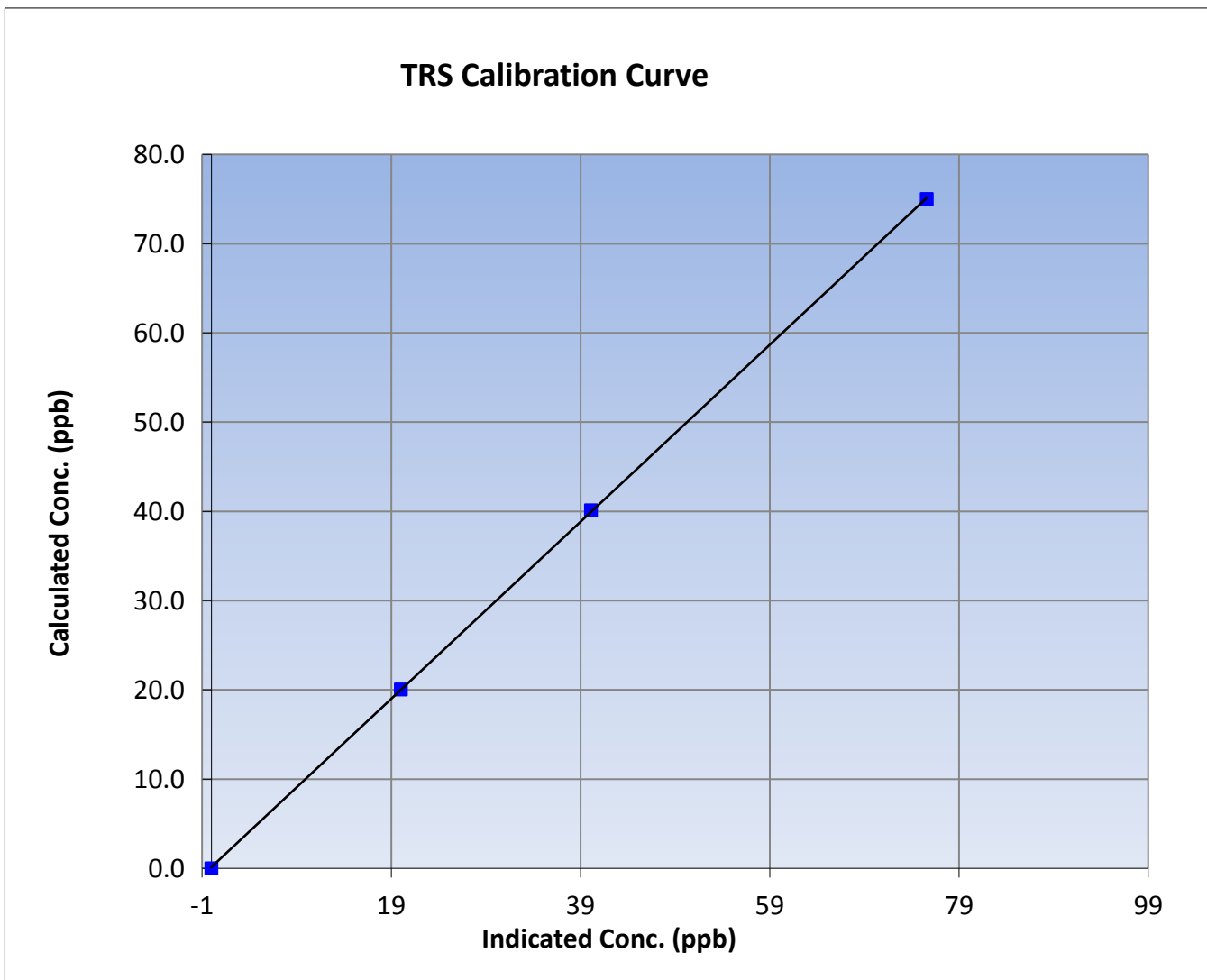
Wood Buffalo Environmental Association TRS Calibration Report

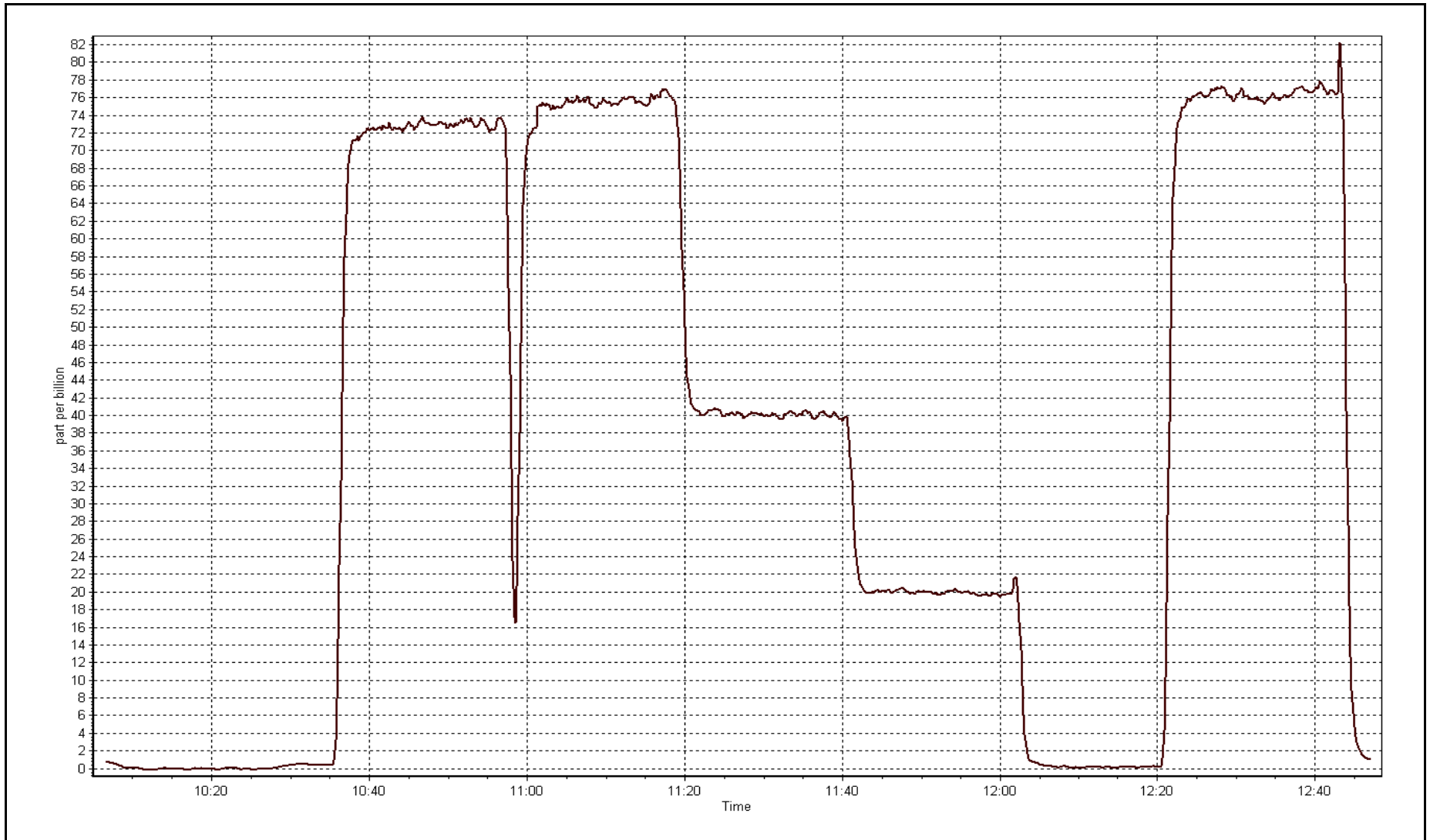
Station Information

Calibration Date	June 18, 2015	Previous Calibration	May 19, 2015
Station Name	AMS 1	Station Number	AMS 1
Start Time (MST)	10:05	End Time (MST)	13:00
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1218153461

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999976
75.0	75.6	0.9923		
40.1	40.1	1.0004	Slope	0.991793
20.1	20.0	1.0024		
			Intercept	0.153607







Wood Buffalo Environmental Association THC / NMHC Calibration Report

Station Information

Calibration Date	June-16-15	Last Calibration	May-18-15
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	Routine		
Start Time (MST)	9:00	End Time (MST)	12:50
Gas Cert Reference	SA140071A	Cal Gas Expiry Date	September-26-17
CH4 Cal Gas Conc.	499.0 ppm	CH4 Equiv Conc.	1054.5 ppm
C3H8 Cal Gas Conc.	202.0 ppm	Station temp.	20 Deg C
Calibrator Model	Sabio 4010	Serial Number	1730512
ZAG make/model	Teledyne API 701	Serial Number	587
DACS make/model	Campbell Scientific CR3000	Serial Number	2582

Analyzer Information

	Before	After		Before	After
THC Range (ppm)	0 - 50 ppm		Column Temp	75.2	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	0.997990	1.001668	Carrier Pressure	40.4	40.4
THC Calc intercept	0.053869	0.056213	Fuel Pressure	42.2	42.2
NMHC Calc slope	0.999405	1.002999	Air Pressure	32.3	32.3
NMHC Calc intercept	0.020598	0.020152			

Analyzer make Thermo 55i Analyzer serial # 1331259520

THC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5500	0.0	0.00	0.00	----
as found span	5500	78.1	14.97	14.92	1.004
calibrator zero	5500	0.0	0.00	0.00	----
high point	5500	78.1	14.97	14.94	1.002
second point	5500	43.8	8.40	8.26	1.017
third point	5500	21.9	4.20	4.10	1.024
as left zero					
as left span					
Average Correction Factor					1.014

Corrected As found 14.92 Previous response 14.95 % change 0.2%

Notes:

Changed hydrogen cylinder after as founds. Adjusted span.

Calibration Performed By: Michael Martineau



Wood Buffalo Environmental Association

THC / NMHC Calibration Report

NMHC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5500	0	0.00	0.00	----
as found span	5500	78.1	7.89	7.87	1.002
calibrator zero	5500	0.0	0.00	0.00	----
high point	5500	78.1	7.89	7.86	1.004
second point	5500	43.8	4.42	4.37	1.012
third point	5500	21.9	2.21	2.17	1.019
as left zero					
as left span					
Average Correction Factor					1.012

Corrected As found 7.87 Previous response 7.87 % 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	5500	0	0.00	0.00	----
as found span	5500	78.1	7.09	7.04	1.007
calibrator zero	5500	0.0	0.00	0.00	----
high point	5500	78.1	7.09	7.08	1.001
second point	5500	43.8	3.97	3.90	1.019
third point	5500	21.9	1.99	1.93	1.029
as left zero					
as left span					
Average Correction Factor					1.016

Corrected As found 7.04 Previous response 7.08 % change 0.5%



Wood Buffalo Environmental Association

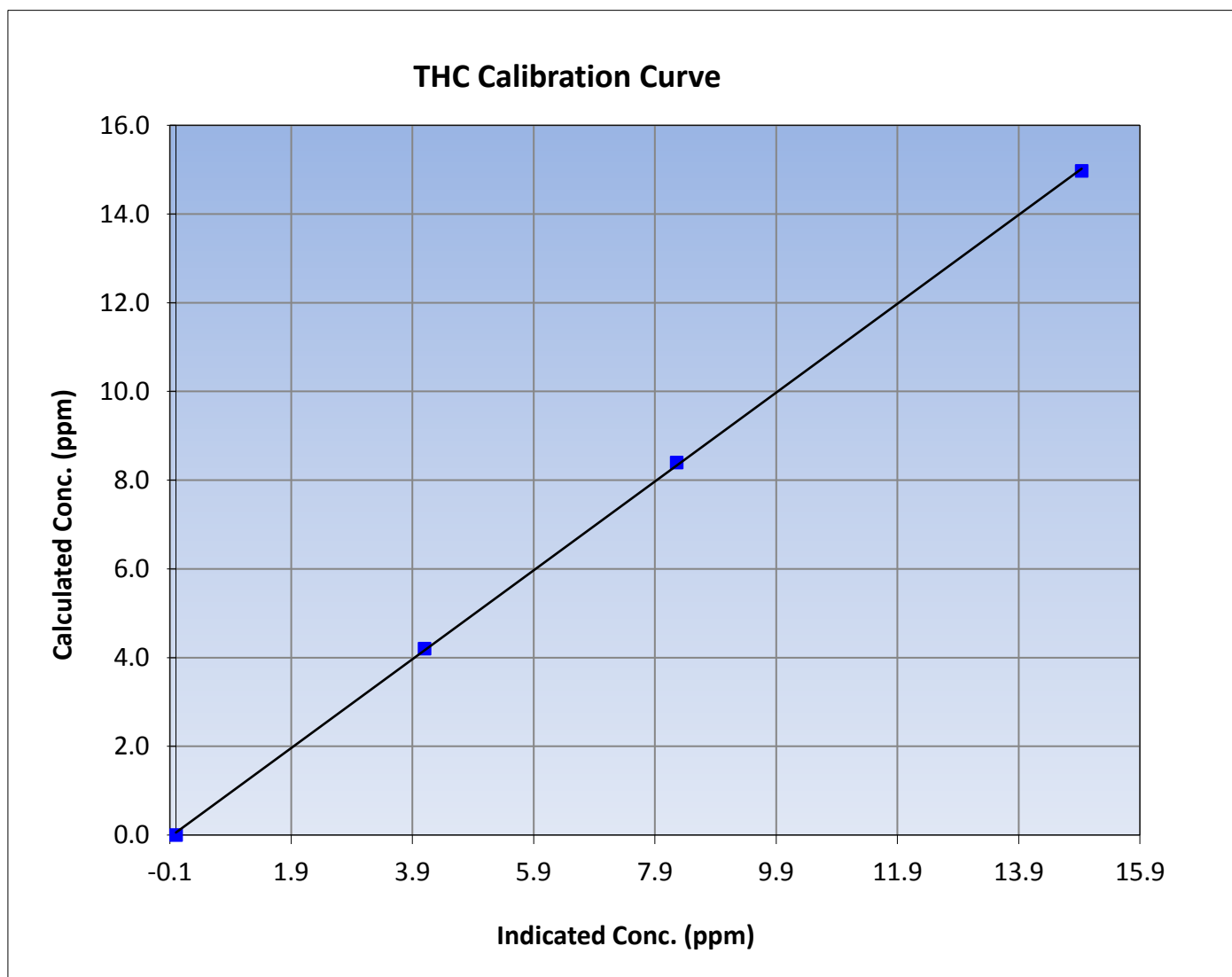
THC Calibration Summary

Station Information

Calibration Date	June 16, 2015	Previous Calibration	May 18, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:00	End Time (MST)	12:50
Analyzer make	Thermo 55i	Analyzer serial #	1331259520

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999908
14.97	14.94	1.0023		
8.40	8.26	1.0167	Slope	1.001668
4.20	4.10	1.0241		
			Intercept	0.056213





Wood Buffalo Environmental Association

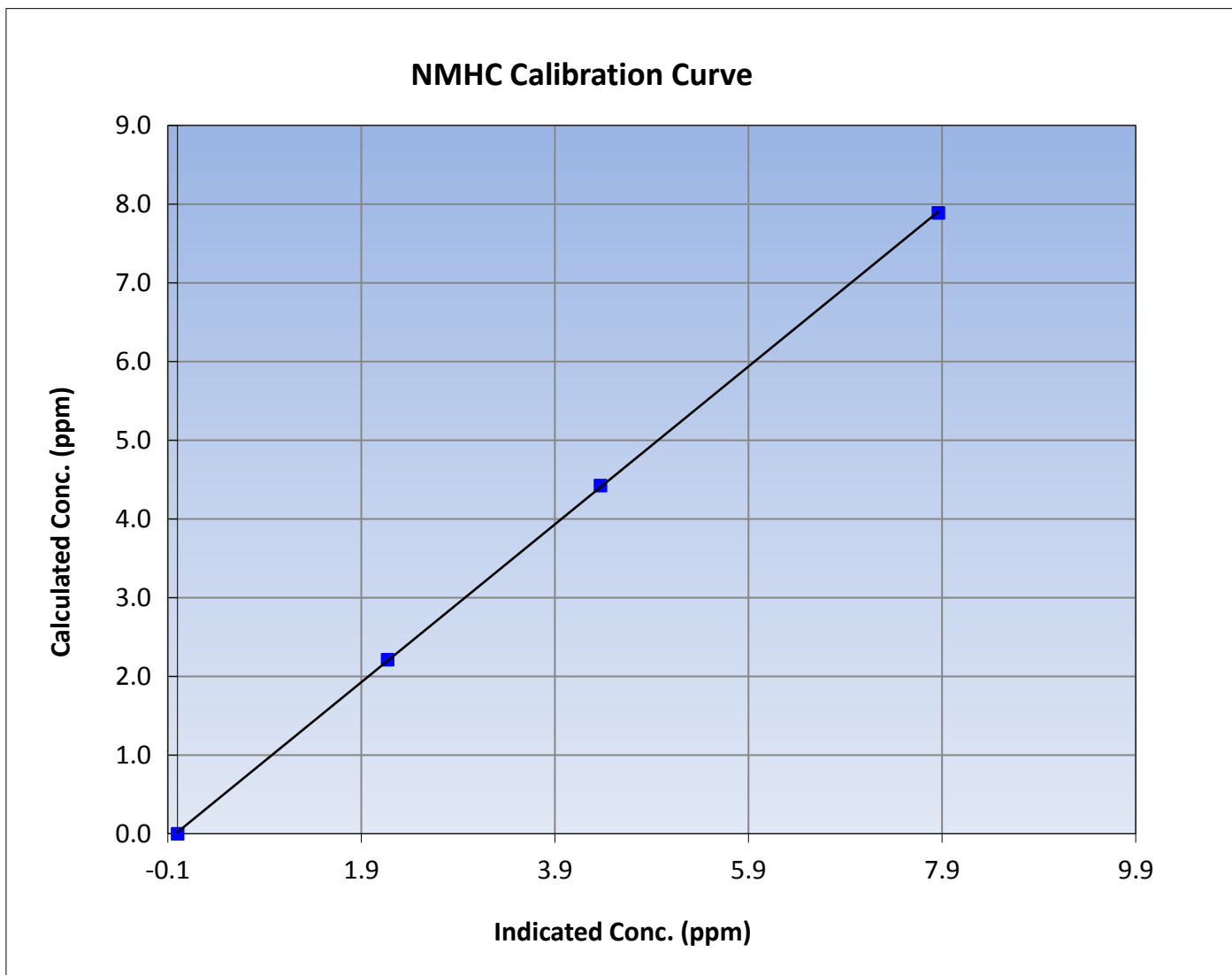
NMHC Calibration Summary

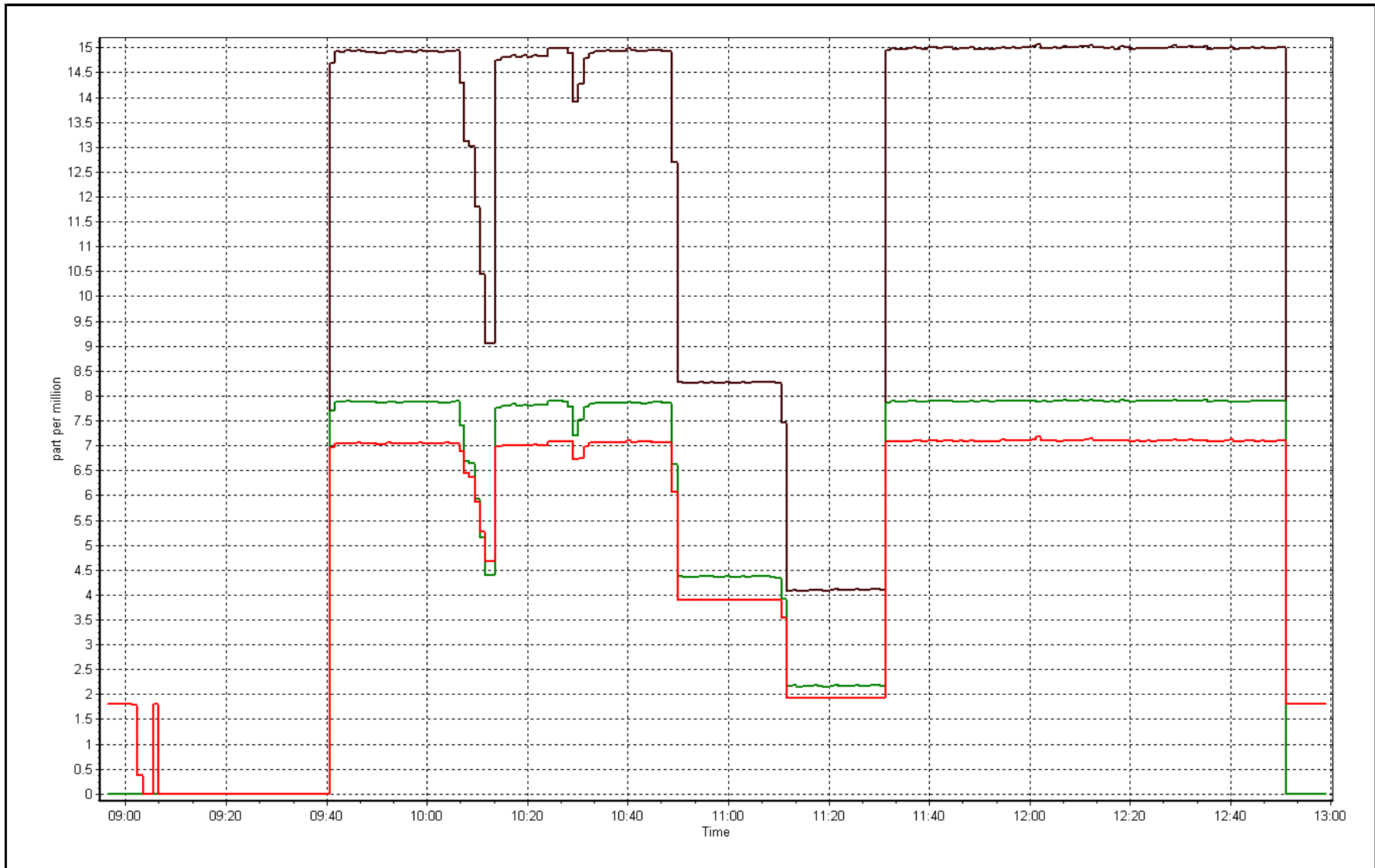
Station Information

Calibration Date	June 16, 2015	Previous Calibration	May 18, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:00	End Time (MST)	12:50
Analyzer make	Thermo 55i	Analyzer serial #	1331259520

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999962
7.89	7.86	1.0036		
4.42	4.37	1.0123	Slope	1.002999
2.21	2.17	1.0193		
			Intercept	0.020152







Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

Calibration Date	June 6, 2015	Previous Calibration	May 12, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	Other: repair		
Start Time (MST)	10:50	End Time (MST)	13:10
NO2 GPT Ref date	May-12-15	Transfer Standard	N/A
		Station temp.	21 Deg C
Calibrator Make/Model	SABIO 4010	Serial Number	1730512
ZAG make/model	Teledyne API 701	Serial Number	587
DACS make/model	Campbell Scientific CR3000	Serial Number	2582

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 500 ppb		Bench temp.	27.9	26.5
Analyzer IP address	192.168.1.48		Lamp temp.	53.5	53.5
Calculated slope	0.993217	0.998152	Pressure	702.9	681.5
Calculated intercept	2.253988	-2.108262	Flow cell A	0.596	0.736
Analyzer Background	-0.3	-2.0	Flow cell B	0.591	0.739
Analyzer Coefficient	1.001	1.050	Cell A Intensity	78500	78050
			Cell B Intensity	73200	72920

Analyzer make	Thermo 49i	Analyzer serial #	1300156233
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Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator Lamp Intensity (mA)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero					
as found span					
calibrator zero	5500	0.00	0.0	0.5	----
high point	5000	0.98	398.8	400.1	0.997
second point	5000	0.56	204.4	209.6	0.975
third point	5000	0.34	105.1	107.9	0.974
as left zero	5500	0.00	0.0	0.7	----
as left span	5000	0.98	398.8	403.3	0.989
Average Correction Factor					0.982

Corrected As found	NA	Previous response	NA	% change	NA
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Notes:

Failed pump only producing 60 ccm flow. Replaced pump and inlet filter. Adjusted zero and span.

Calibration Performed By:

Michael Martineau



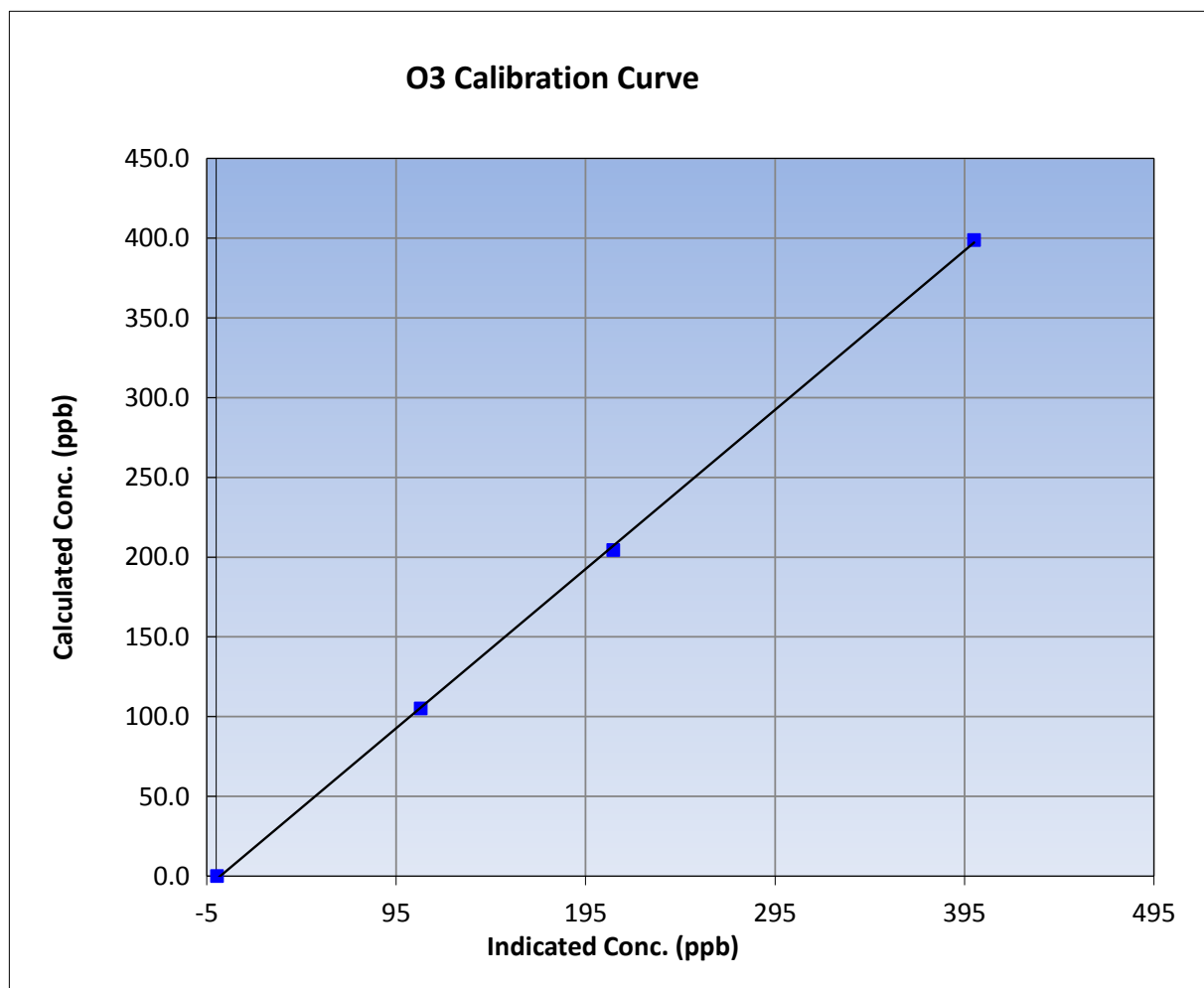
Wood Buffalo Environmental Association O3 Calibration Report

Station Information

Calibration Date	June-06-15	Previous Calibration	May 12, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	10:50	End Time (MST)	13:10
Analyzer make	Thermo 49i	Analyzer serial #	1300156233

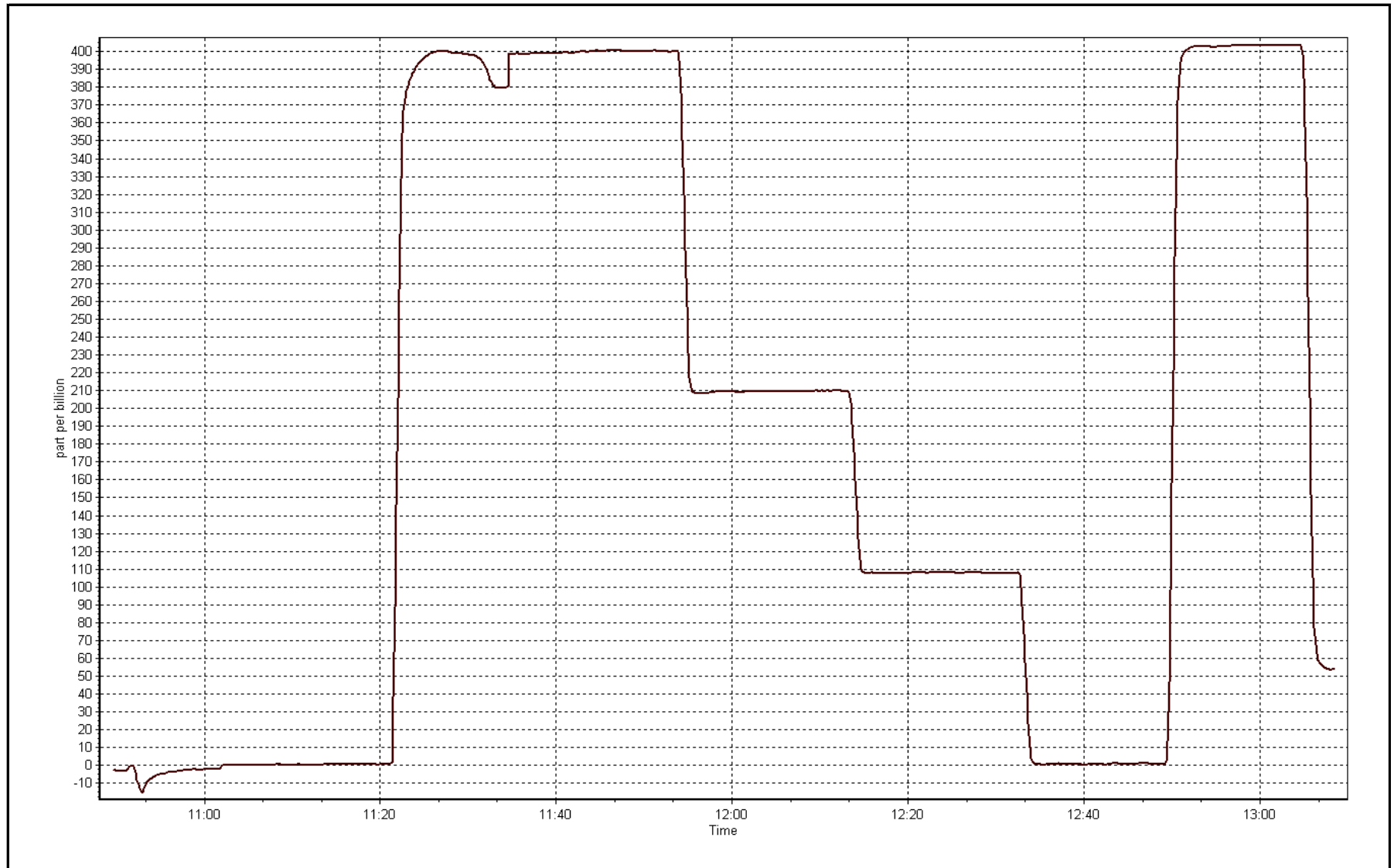
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.5	----	Correlation Coefficient	0.999853
398.8	400.1	0.9968		
204.4	209.6	0.9752	Slope	0.998152
105.1	107.9	0.9741		
			Intercept	-2.108262



O3 Calibration Plot

Date: June 6, 2015





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	June 16, 2015	Previous Calibration	May 12, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	Routine		
Start Time (MST)	9:00	End Time (MST)	13:00
NO Cal Gas Conc	52.8 ppm	Gas Cert Reference	SA140071A
NOx Cal Gas Conc	52.8 ppm	Cal Gas Expiry Date	September 26, 2017
Calibrator	Sabio 4010	Serial Number	1730512
Zero air Generator	Teledyne API T701	Serial Number	587

DACS Information

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

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.999935	0.997718	1.006465
	Data Offset	2.327244	2.393719	1.401515
Current Calibration	Data Slope	0.999528	0.998203	1.003421
	Data Offset	2.239287	2.179978	0.150510

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1218153357
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Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
NO coefficient	0.857		0.882	
NOx coefficient	0.996		0.997	
NO2 coefficient	1.000		1.000	
NO bkgrnd	6.1		6.2	
NOx bkgrnd	6.2		6.3	
Chamber Temp	50.2	Deg C	50.3	Deg C
Moly Temp	324.5	Deg C	322	Deg C
PMT voltage	-850.3	V	-850	V
PMT Temp	-3	Deg C	-3	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	208.4	mmHg	210.5	mmHg
R Cell Press Nox	208.7	mmHg	210.8	mmHg
NO sample flow	0.464	lpm	0.448	lpm
Nox sample Flow	0.465	lpm	0.449	lpm

Notes:

Adjusted span after as founds.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date:

June 16, 2015

Station Number:

AMS 1

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5500	0.0	0.0	0.0	0.0	0.2	0.2	0.0	----	----
as found span	5500	78.1	749.8	749.8	0.0	727.6	729.0	-1.5	1.0305	1.0285
calibrator zero	5500	0.0	0.0	0.0	0.0	0.2	0.2	0.0	----	----
high point	5500	78.1	749.8	749.8	0.0	749.4	750.4	-1.0	1.0004	0.9991
second point	5500	43.8	420.5	420.5	0.0	416.8	417.5	-0.8	1.0089	1.0071
third point	5500	21.9	210.2	210.2	0.0	205.8	206.1	-0.4	1.0216	1.0199
as left zero										
as left span										
Average Correction Factor									1.0103	1.0087

Corrccted As found NO_x= 727.4 NO= 728.8 Percent Change NO_x= 2.8% NO= 2.8%
 Previous Response NO_x= 747.5 NO= 749.1

GPT Calibration Data

Dilution Flow 5500 ccm Source Gas Flow 78.10 ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
Cal zero			0.0			0.0			N/A	
1st NO2 (300)	----	368.4	381.8	748.9	368.4	380.4	0.9872	1.0000	1.0035	99.7%
2nd NO2 (200)	----	551.6	198.6	749.2	551.6	197.6	0.9868	1.0000	1.0053	99.5%
3rd NO2 (100)	----	647.1	103.1	749.6	647.1	102.5	0.9862	1.0000	1.0055	99.5%
4th NO2 (0)	750.2	----	-1.2	749.0	750.2	-1.2	0.9870	1.0000	N/A	----
Average Correction Factor							0.9868	1.0000	1.0047	99.5%

Calibration Performed By: Michael Martineau



Wood Buffalo Environmental Association

NO_x Calibration Summary

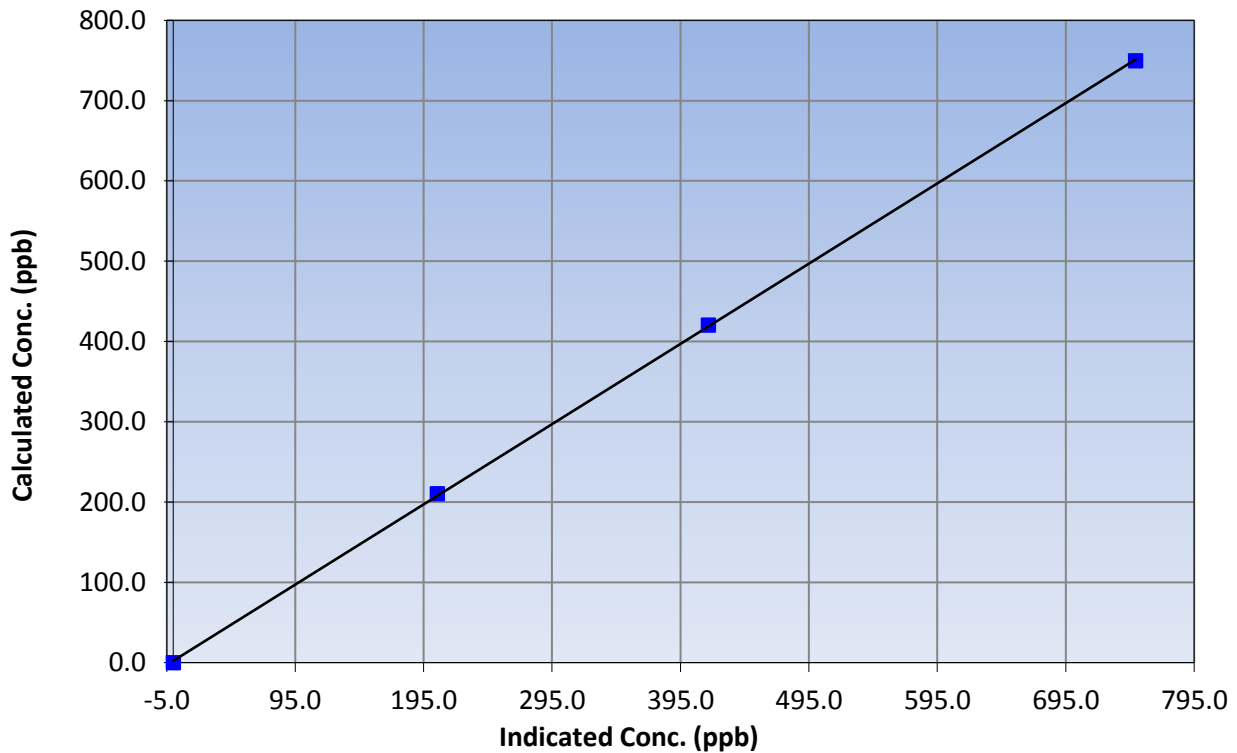
Station Information

Calibration Date	June 16, 2015	Previous Calibration	May 12, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:00	End Time (MST)	13:00
Analyzer make	Thermo 42i	Analyzer serial #	1218153357

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	----	Correlation Coefficient	0.999946
749.8	749.4	1.0004		
420.5	416.8	1.0089	Slope	0.999528
210.2	205.8	1.0216		
			Intercept	2.239287

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

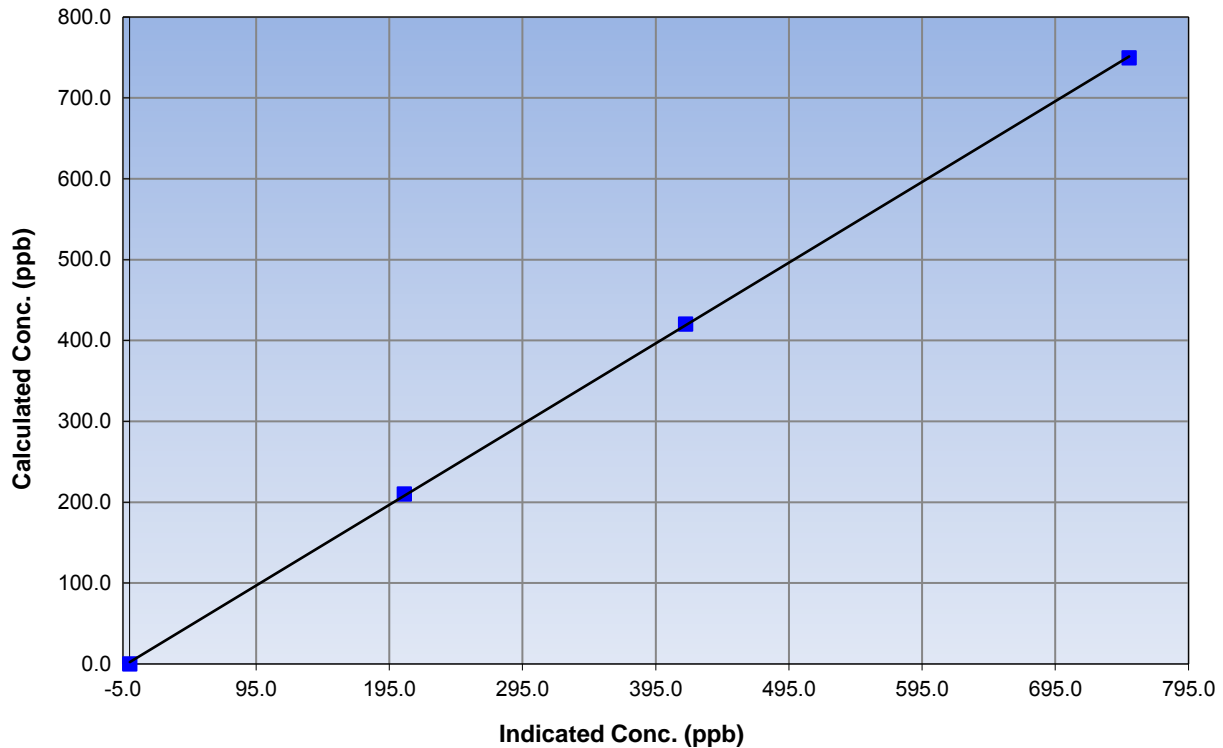
Station Information

Calibration Date	June 16, 2015	Previous Calibration	May 12, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:00	End Time (MST)	13:00
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	0.999950
749.8	750.4	0.9991		
420.5	417.5	1.0071	Slope	0.998203
210.2	206.1	1.0199		
			Intercept	2.179978

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

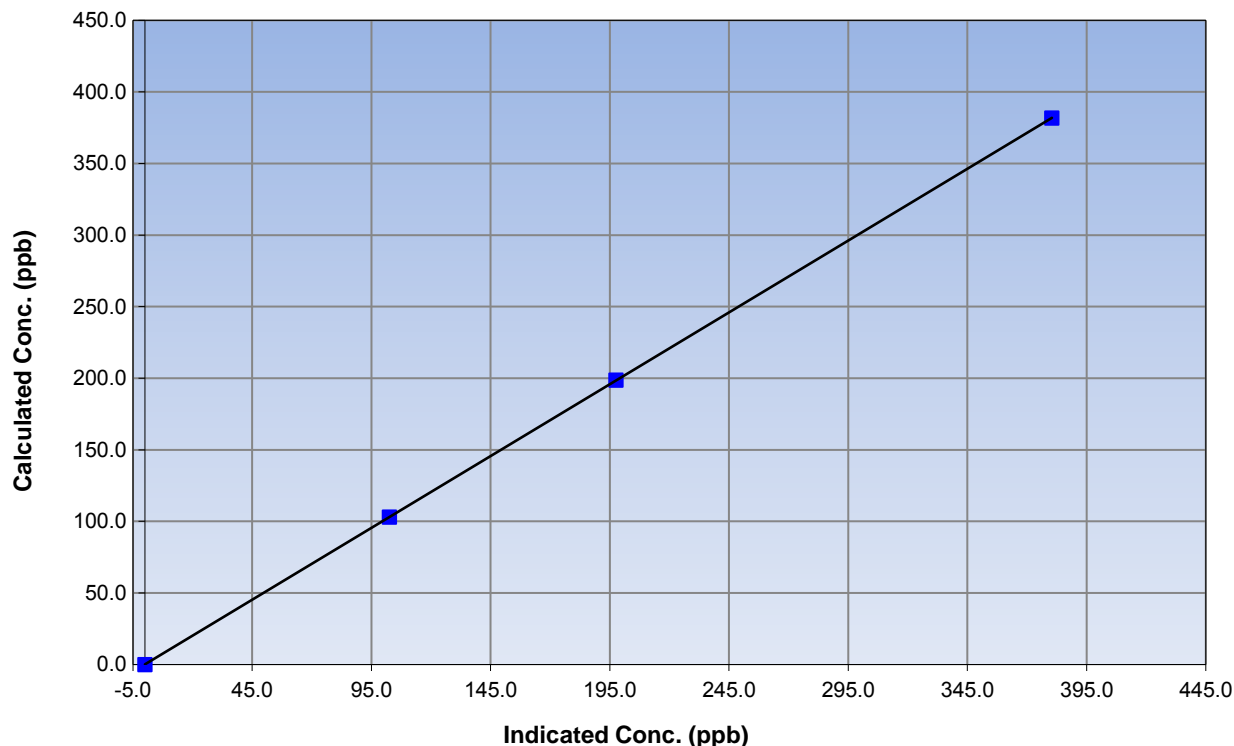
Station Information

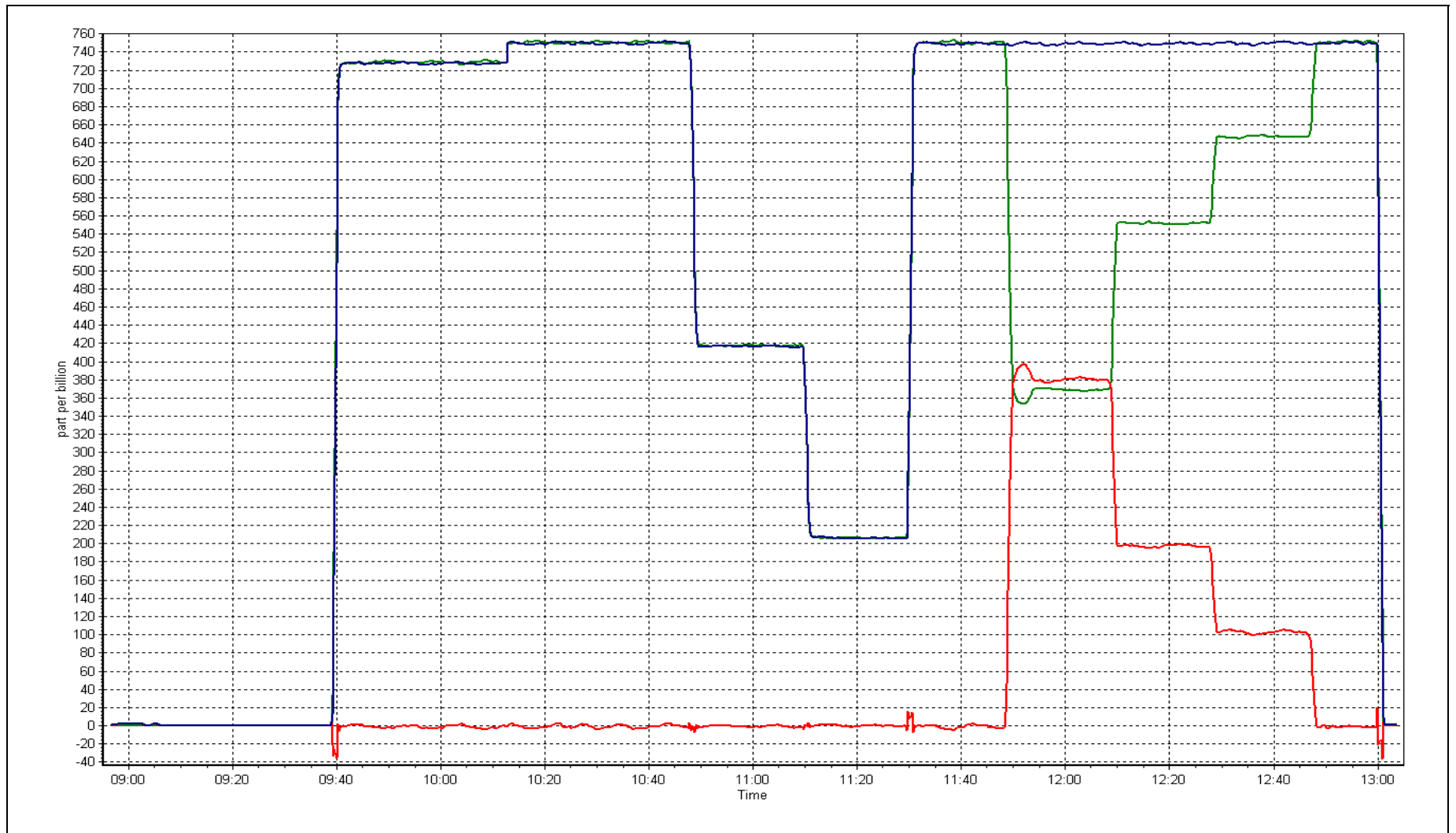
Calibration Date	June 16, 2015	Previous Calibration	May 12, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:00	End Time (MST)	13:00
Analyzer make	Thermo 42i	Analyzer serial #	1218153357

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999999
381.8	380.4	1.0035		
198.6	197.6	1.0053	Slope	1.003421
103.1	102.5	1.0055		
			Intercept	0.150510

NO₂ Calibration Curve







Wood Buffalo Environmental Association

N_t-NO_x-NH₃ Calibration Report

Station Information

Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
NOX Calibration Date	June 16, 2015	NOX Previous Cal Date	May 12, 2015
NH3 Calibration Date	June 16, 2015	NH3 Previous Cal Date	May 15, 2015
Reason:	Routine		
Start Time (MST)	9:00	End Time (MST)	16:00
Barometric Pressure	n/a mmHg	Station Temperature	21.0 Deg C
Calibrator	Sabio 4010	Serial Number	14300410
NH3 Cal Gas Conc	192 ppm	NH3 Expiry Date / SN	March 3, 2012 LL156612
NOx Cal Gas Conc	52.8 ppm	NO Expiry Date / SN	September 26, 2017 SA140071A
NO Cal Gas Conc	52.8 ppm		

DACs Information

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

Parameter		NH3	Nt	NOx	NO	NO2
Cal Stats As Found	Data Slope	1.005172	0.996862	0.998279	0.998976	1.002395
	Data Offset	-2.481245	-3.369441	2.009014	2.256454	-2.656652
Cal Stats After	Data Slope	1.005983	0.997481	0.999658	1.001176	1.001735
	Data Offset	-4.379433	-5.633379	2.117238	1.879381	-2.831741
IP address		192.168.1.17				

Analyzer Information

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

Test Point	before		after	
NH3 Conc range	2500	ppb	2500	ppb
NOX Conc range	1000	ppb	1000	ppb
NO BKG	-0.1	ppb	-0.1	ppb
NOx BKG	0.0	ppb	0.0	ppb
Nt BKG	0.1		0.1	
NO coefficient	1.124		1.126	
NO2 coefficient	1.000	ppb	1.000	ppb
NOx coefficient	1.210		1.217	
NH3 coefficient	0.895		0.895	
Nt coefficient	1.220		1.253	
NH3 conv temp	825	DegC	825	Deg C
Chamber Temp	50.0	Deg C	50.0	Deg C
Moly Temp	315.9	Deg C	315.4	Deg C
PMT Temp	7.0	Deg C	7.0	Deg C
O3 flow	84.0	ccm	84.0	ccm
R Cell Press	4.6	mmHg	4.6	mmHg
PMT Voltage	644.0	v	645.0	v
Sample Flow 1 NO	518.0	ccm	513.0	ccm
Sample Flow 2 Nox	523.0	ccm	518.0	ccm
Sample Flow 3 Nt	553.0	ccm	548.0	ccm

Notes:

Adjusted NO/Nox/Nt span after as founds.



Wood Buffalo Environmental Association

Nt-NO_x-NH₃ Calibration Report

Station Information

Calibration Date:

June 16, 2015

Station Number:

AMS 1

NH₃ Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated Nt conc (ppb)	Calculated NO _x conc (ppb)	Calculated NH ₃ conc (ppb)	Indicated Nt conc (ppb)	Indicated NO _x conc (ppb)	Indicated NH ₃ conc (ppb)	Nt Correction factor	NH ₃ Correction factor
as found zero	5500	0.0	0.0	0.0	0.0	1.5	0.6	0.9	----	----
as found NO	5500	78.1	749.8	749.8	----	725.8	745.2	1987.0	1.033	----
calibrator zero	5500	0.0	0.0	0.0	0.0	1.5	0.6	0.9	----	----
high NO point	5500	78.1	749.8	749.8	----	754.4	750.2	4.2	0.994	----
NO/O ₃ point	5500	78.1	749.8	749.8	----	765.8	752.3	13.5	0.979	----
as found NH ₃	6500	67.7	1999.8	NA	1999.8	2004.5	17.5	1987.0	0.998	1.006
first NH ₃	6500	67.7	1999.8	NA	1999.8	2004.5	17.5	1987.0	0.998	1.006
second NH ₃	6500	33.9	1001.4	NA	1001.4	1022.8	11.2	1011.6	0.979	0.990
third NH ₃	6500	17.0	502.2	NA	502.2	505.9	6.0	500.3	0.993	1.004
Average Correction Factor									0.9865	1.0000

NH₃ Corrected As Found
 Nt Corrected As Found
 NO_x Corrected As Found

NH₃ = 1986.1 ppb
 Nt = 724.2 ppb
 NO_x = 744.6 ppb

Previous Response
 Previous Response
 Previous Response

NH₃ = 1991.9 ppb
 Nt = 755.5 ppb
 NO_x = 749.0 ppb

NH₃ percent change 0.3%
 Nt percent change 4.3%
 NO_x percent change 0.6%



Wood Buffalo Environmental Association

NO_x(NH₃) Calibration Report

Station Information

Calibration Date: June 16, 2015 Station Number: AMS 1

NO_x / NO / Nt Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NO _x conc (ppb)	Calculated NO conc (ppb)	Calculated Nt conc (ppb)	Indicated NO _x conc (ppb)	Indicated NO conc (ppb)	Indicated Nt conc (ppb)	NO _x Correction factor	NO Correction factor
as found zero	5500	0.0	0.0	0.0	0.0	0.6	0.8	1.5	----	----
as found span	5500	78.1	749.8	749.8	749.8	745.2	750.1	725.8	1.0061	0.9995
calibrator zero	5500	0.0	0.0	0.0	0.0	0.6	0.8	1.5	----	----
high point	5500	78.1	749.8	749.8	749.8	750.2	749.0	754.4	0.9995	1.0010
second point	5500	43.8	420.5	420.5	420.5	415.3	415.4	419.7	1.0125	1.0122
third point	5500	21.9	210.2	210.2	210.2	206.4	206.1	207.0	1.0184	1.0201
as left zero										
as left span										
Average Correction Factor									1.0101	1.0111

	<u>Nt</u>	<u>NOx</u>	<u>NO</u>	<u>NO2</u>
Corrected As found	724.2	744.6	749.4	380.7
Previous Response	755.5	749.0	748.6	383.4
Percent Change	4.3%	0.6%	-0.1%	0.7%

GPT Calibration Data

Dilution Flow 5000 ccm Source Gas Flow 78.10 ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO ₂ conc (ppb)	Indicated NO _x conc (ppb)	Indicated NO conc (ppb)	Indicated NO ₂ conc (ppb)	NO _x Correction factor	NO Correction factor	NO ₂ Correction factor	Converter Efficiency
Cal zero			0.0			3.6			----	
1st NO ₂ (300)	----	367.1	381.6	751.4	367.1	384.3	1.0976	1.0000	0.9930	100.7%
2nd NO ₂ (200)	----	551.6	197.2	750.5	551.6	199.0	1.0989	1.0000	0.9910	100.9%
3rd NO ₂ (100)	----	647.7	101.0	750.8	647.7	103.0	1.0985	1.0000	0.9803	102.0%
4th NO ₂ (0)	748.7	----	3.6	752.3	748.7	3.6	1.0962	1.0000	----	----
Average Correction Factor							1.0978	1.0000	0.9881	101.2%

Calibration Performed By: Michael Martineau



Wood Buffalo Environmental Association

NH3 Calibration Summary

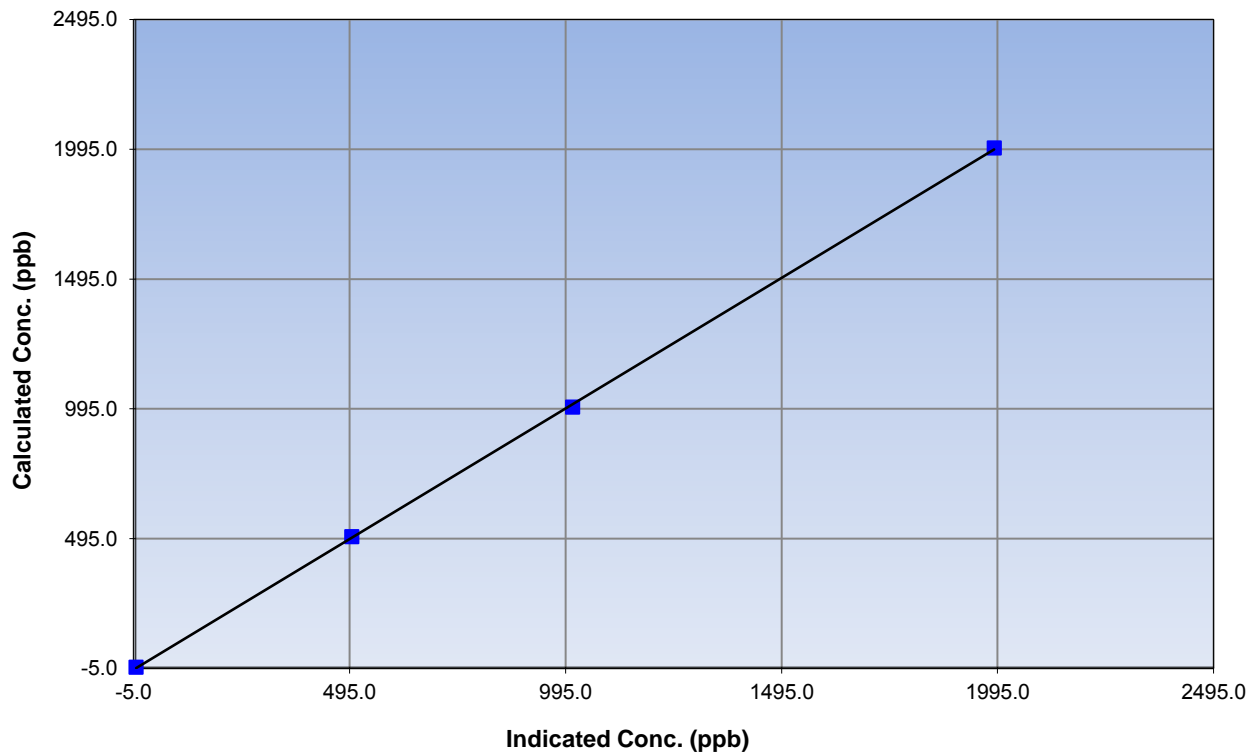
Station Information

Calibration Date	June 16, 2015	Previous Calibration	May 12, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:00	End Time (MST)	16:00
Analyzer make	API T201	Analyzer serial #	152

NH3 Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.9	----	Correlation Coefficient	0.999913
1999.8	1987.0	1.0064		
1001.4	1011.6	0.9899	Slope	1.005983
502.2	500.3	1.0036		
			Intercept	-4.379433

NH3 Calibration Curve





Wood Buffalo Environmental Association

Nt Calibration Summary

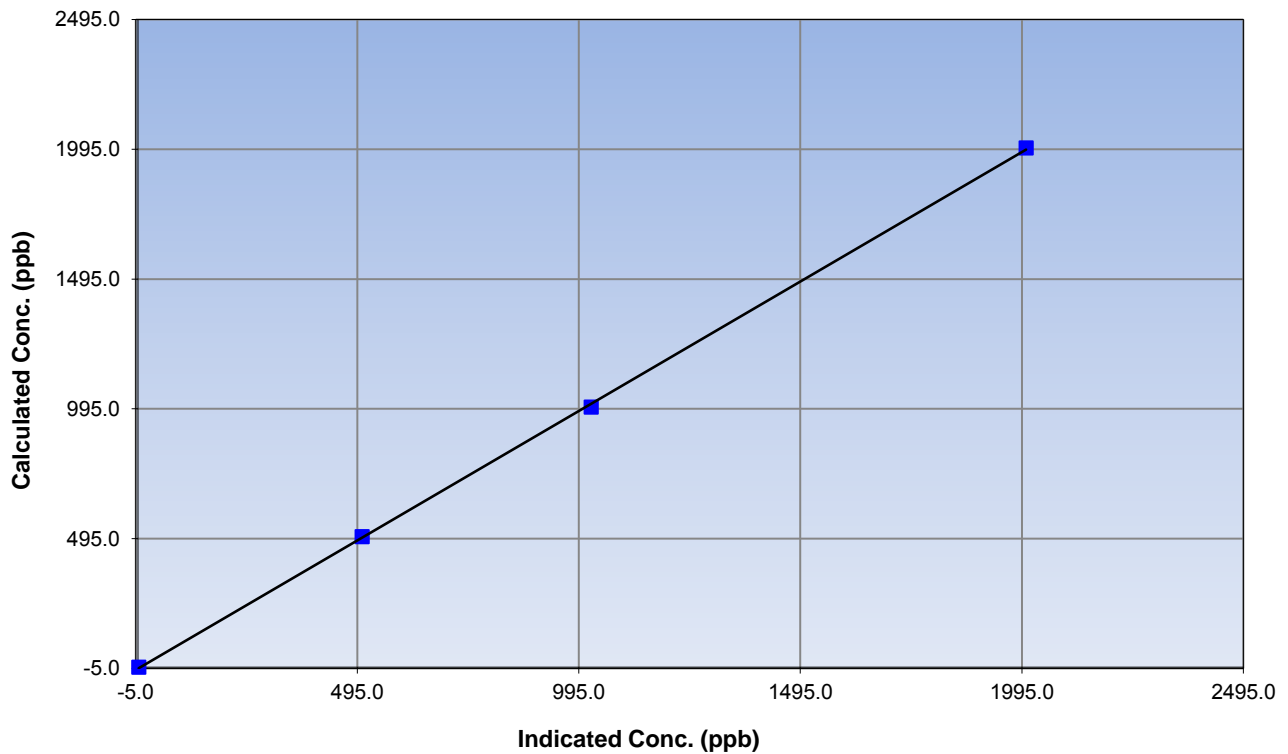
Station Information

Calibration Date	June 16, 2015	Previous Calibration	May 12, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:00	End Time (MST)	16:00
Analyzer make	API T201	Analyzer serial #	152

Nt (NH₃) Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	1.5	----	Correlation Coefficient	0.999892
1999.8	2004.5	0.9976		
1001.4	1022.8	0.9791	Slope	0.997481
502.2	505.9	0.9926		
			Intercept	-5.633379

Nt Calibration Curve





Wood Buffalo Environmental Association

NOx Calibration Summary

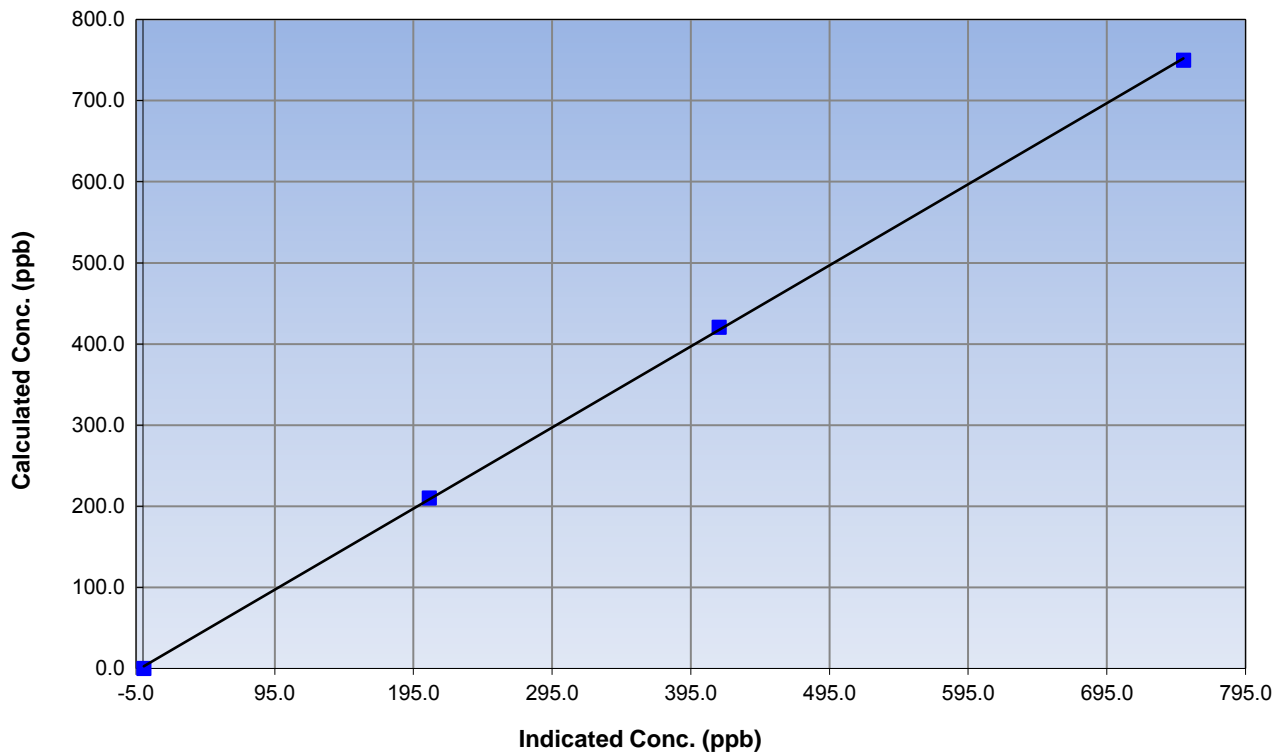
Station Information

Calibration Date	June 16, 2015	Previous Calibration	May 12, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:00	End Time (MST)	16:00
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	0.6	----	Correlation Coefficient	0.999915
749.8	750.2	0.9995		
420.5	415.3	1.0125	Slope	0.999658
210.2	206.4	1.0184		
			Intercept	2.117238

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

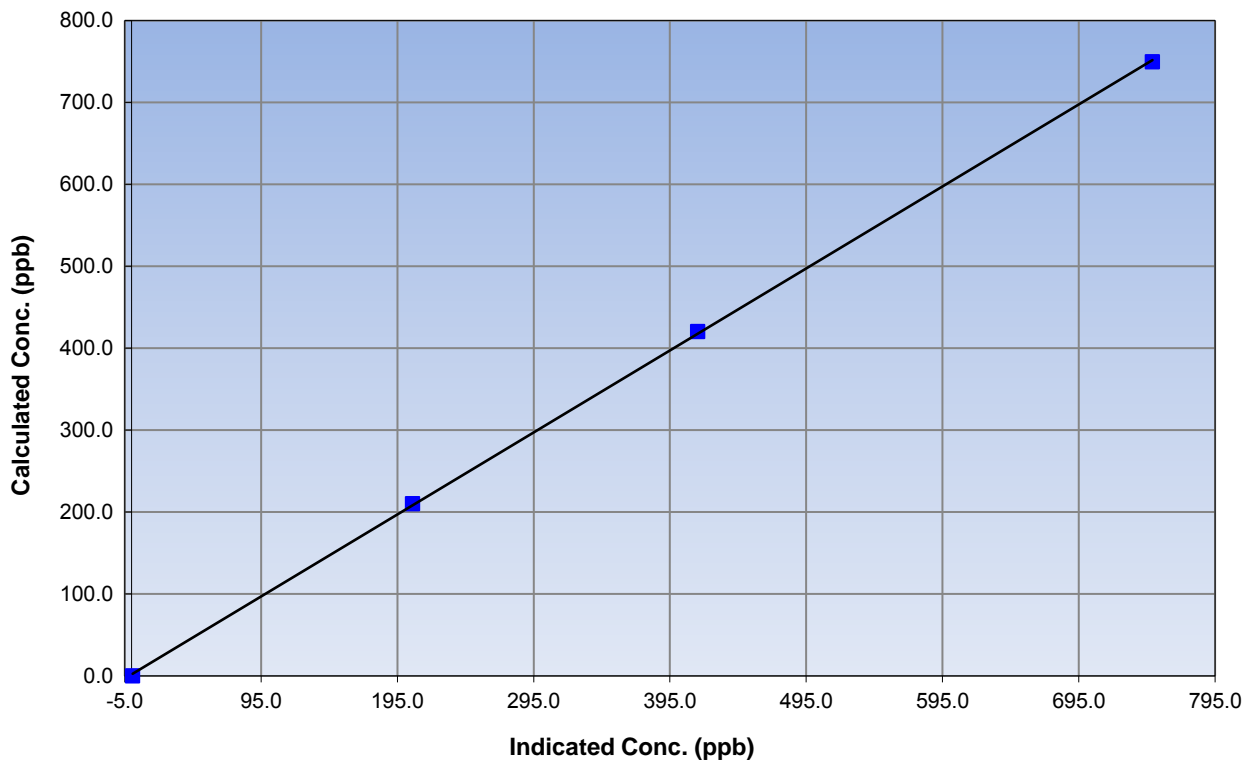
Station Information

Calibration Date	June 16, 2015	Previous Calibration	May 12, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:00	End Time (MST)	16:00
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	0.8	----	Correlation Coefficient	0.999927
749.8	749.0	1.0010		
420.5	415.4	1.0122	Slope	1.001176
210.2	206.1	1.0201		
			Intercept	1.879381

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

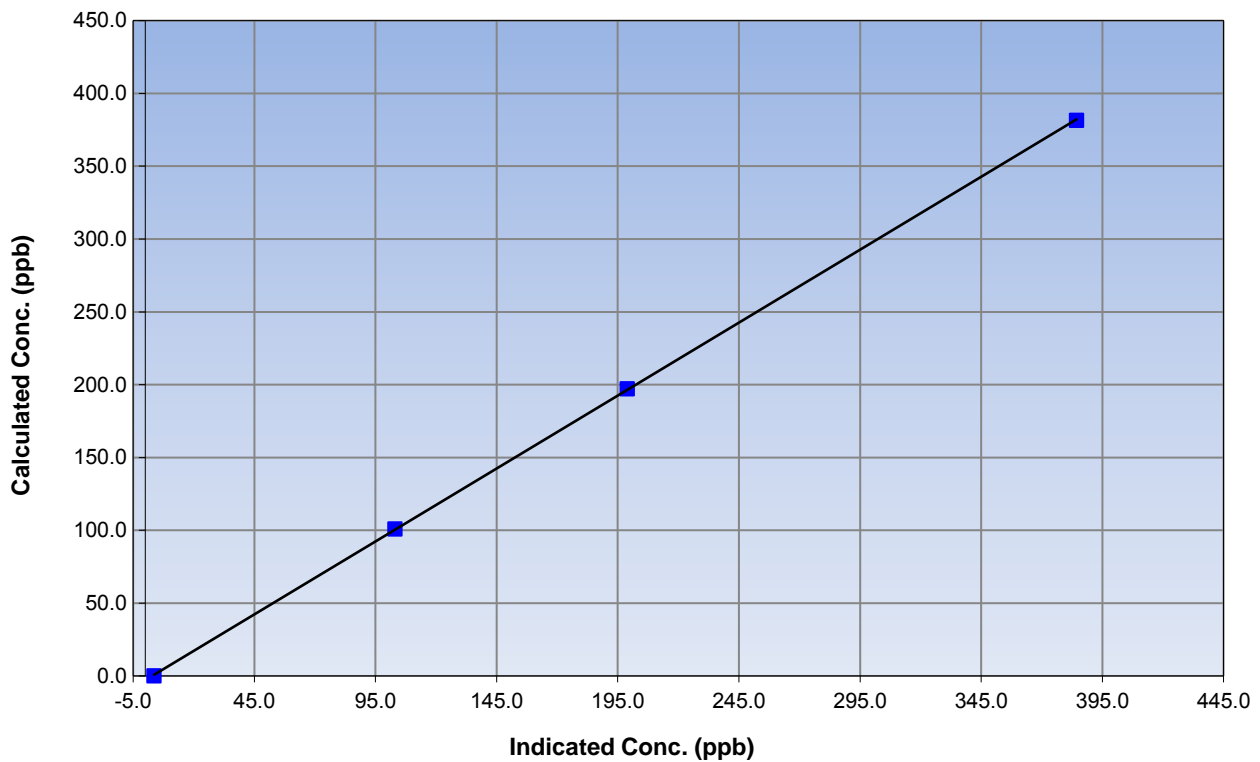
Station Information

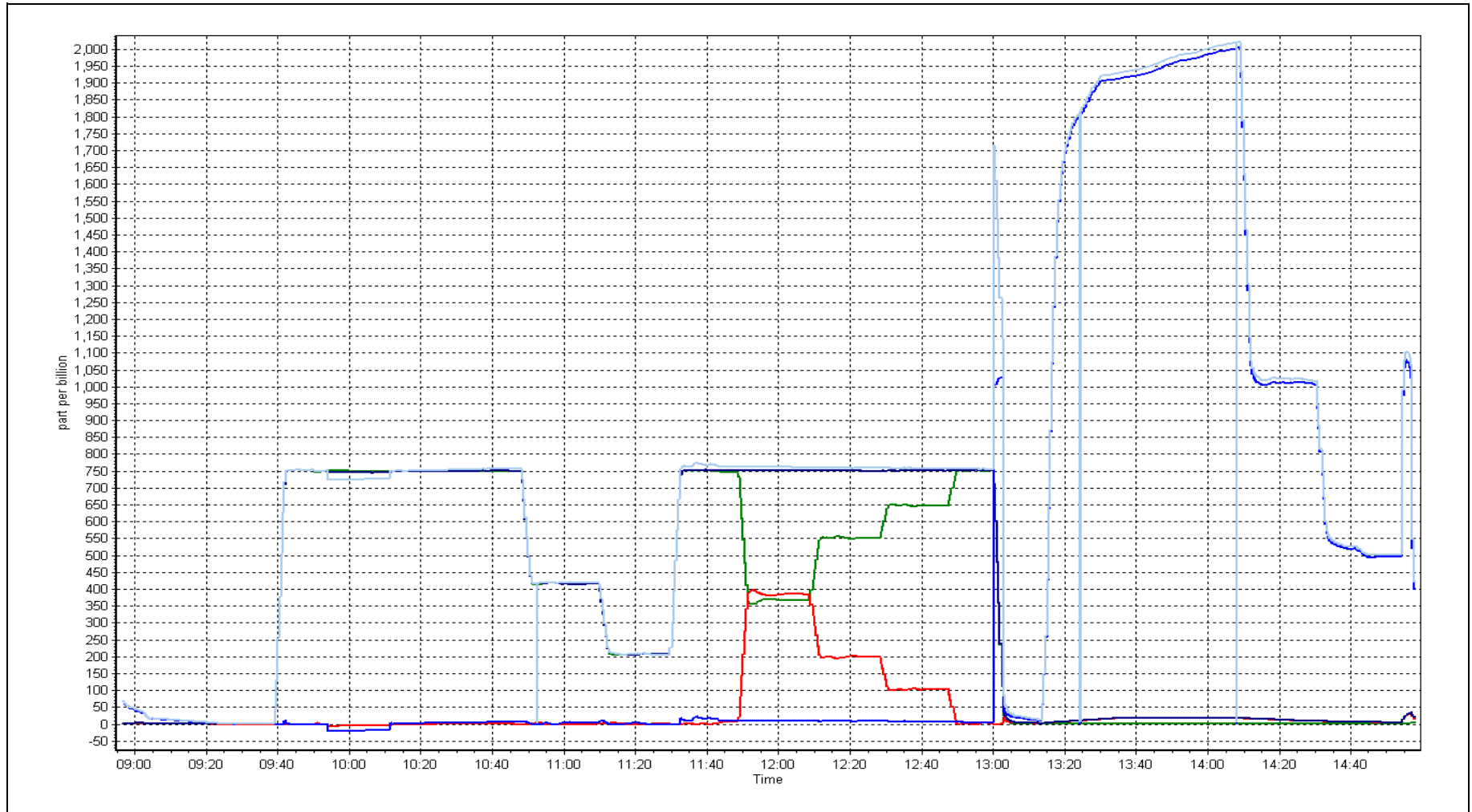
Calibration Date	June 16, 2015	Previous Calibration	May 12, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:00	End Time (MST)	16:00
Analyzer make	API T201	Analyzer serial #	152

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	3.6	----	Correlation Coefficient	0.999978
381.6	384.3	0.9930		
197.2	199.0	0.9910	Slope	1.001735
101.0	103.0	0.9803		
			Intercept	-2.831741

NO₂ Calibration Curve







Wood Buffalo Environmental Association

SHARP CALIBRATION

STATION INFORMATION

Calibration Date:	<u>June 18, 2015</u>	Previous Calibration:	<u>May 19, 2015</u>
Station Name:	<u>Bertha Ganter</u>	Station Number:	<u>AMS 1</u>
Start Time (MST):	<u>10:15</u>	End Time (MST):	<u>10:30</u>
Calibrator Make/Model:	<u>Delta Cal</u>	Calibrator Serial Number:	<u>1019</u>

SHARP INFORMATION

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

CALIBRATION DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	15.3	15.1	-0.2	15.3
T2	23.0	na	na	
T3	23.0	na	na	
T4	21.0	na	na	
RH (%)	29.0	na	na	

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	980	981.9	1.9	980

Main Flow (Lph)

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

Nephelometer Calibration

Parameter	As Found	Zeroed (Limit +/- 2.0ug/m3)	As Left
Analog	220		218
Neph	2.5		-0.7
C14	5.2		7
Indicated Concentration (ug/m3)	1.7	YES	-0.6
Offset 1	215.7		219.5
Offset 2	34.2		34.6

Leak Check (Quarterly)

Leak Check Date:	not performed	Previous Leak Check Date:	April 20, 2015
------------------	---------------	---------------------------	----------------

Measured

Difference LPM (Limit +/- 0.42 LPM)

Flow without adaptor (LPM):	16.89	
Flow with adaptor [turn off pump first](LPM):	16.80	0.09

Mass Foil Calibration (Annually)

Foil Calibration Date:	not performed	Previous Foil Calibration:	n/a
Zeroed?:			
Foil Mass:			
Previous Correction Factor:			<u>Mass foil set S/N:</u>
New Correction Factor:			

INSPECTION DATA

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

NOTES:

adjusted nephelometer zero; changed out cyclone head.

Calibration Performed By:

Michael Martineau



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

**CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT**

**AMS 2
MILDRED LAKE
JUNE 2015**

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

July 30, 2015



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

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	685	35	35	100.00	38	0	9	0
H2S (ppb) Average	685	33	35	99.72	3	0	1	0
THC (ppm) Average	685	35	35	100.00	4.9	-	3	-
Temperature (C) Average	720	0	0	100.00	32.2	-	24.7	-
Relative Humidity (%) Average	720	0	0	100.00	98	-	76	-
Wind Speed 10 m (km/h) Average	720	0	0	100.00	27	-	16	-
Wind Direction 10 m (deg) Average	720	0	0	100.00	-	-	-	-

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

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

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	685	2	4	-	0	0	0	1	2	5	38
H2S (ppb) Average	685	0.5	0	-	0	0	0	0	1	1	3
THC (ppm) Average	685	2.31	0.4	-	2	2.1	2.1	2.2	2.4	2.7	4.9
Temperature 2 m (C) Average	720	17.59	5.9	-	0.6	10.3	13.6	17.2	21.1	25.8	32.2
Relative Humidity (%) Average	720	55.1	20	-	19	28	37	54	71	84	98
Wind Speed 10 m (km/h) Average	720	9	5	-	0	3	5	8	12	15	27
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-

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

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
H2S	22 Jun 2015 12:00	22 Jun 2015 13:00	2	Maintenance - sample manifold cleaning



Summary of Hour Averages

Mildred Lake - June 2015

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 38 ppb on Jun 2 13:00	Maximum Daily Average: 8.9 ppb on Jun 2		Hours of Data:	685
Minimum Value: 0 ppb on Jun 13 14:00	Minimum Daily Average: 0.3 ppb on Jun 16		Hours of Missing Data:	35
Maximum Diurnal Average: 4.4 ppb at hour 13	Minimum Diurnal Average: 0.9 ppb at hour 1		Hours of Calibration:	35
Monthly Average: 2.0 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 2 P ₉₀ = 5 P ₉₉ = 19		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	1	1	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.4	1	
2-Jun	0	0	0	Z	0	0	0	19	28	19	24	26	38	16	1	1	1	2	4	5	7	5	6	1	8.9	38	
3-Jun	4	8	8	2	Z	4	13	3	9	2	1	3	1	1	1	0	0	0	0	0	1	1	1	1	2.8	13	
4-Jun	0	3	4	12	7	Z	1	1	3	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1.7	12	
5-Jun	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	5	10	1	1	1	1.4	10	
6-Jun	1	Z	4	2	1	4	2	3	2	5	8	4	1	2	1	1	1	1	3	5	2	1	1	1	2.6	8	
7-Jun	1	1	Z	2	1	1	1	1	1	1	0	1	2	3	1	4	1	0	1	1	3	2	1	1	1.3	4	
8-Jun	0	1	1	Z	0	0	3	1	1	1	4	1	1	1	1	1	1	0	0	0	0	0	0	1	0.9	4	
9-Jun	1	1	1	1	Z	1	1	2	1	1	1	7	3	1	1	1	1	1	0	1	1	1	0	1	1.1	7	
10-Jun	1	1	1	1	1	Z	1	1	1	1	1	2	9	17	5	1	1	1	2	1	2	1	1	6	2.4	17	
11-Jun	Z	3	7	7	4	3	3	4	8	5	2	4	2	1	1	1	5	1	3	4	4	2	1	2	3.3	8	
12-Jun	1	Z	1	1	1	1	5	1	1	2	2	19	26	14	6	2	1	1	1	1	1	0	0	0	3.8	26	
13-Jun	0	0	Z	0	1	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
14-Jun	0	0	0	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.4	1	
15-Jun	1	0	1	1	Z	1	1	0	0	0	1	1	3	2	2	17	15	7	3	1	1	1	1	0	2.5	17	
16-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.3	1	
17-Jun	Z	0	1	2	2	1	1	1	0	0	1	1	1	1	2	11	15	10	1	3	5	4	4	2	3.0	15	
18-Jun	1	Z	1	2	2	3	2	1	1	1	1	2	1	1	1	1	1	1	0	1	1	1	2	1	1.2	3	
19-Jun	2	2	Z	1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0.7	2	
20-Jun	0	0	0	Z	0	1	3	3	2	7	5	2	4	2	3	3	2	1	1	1	0	0	1	1	1.9	7	
21-Jun	1	1	1	1	Z	1	1	1	0	0	1	5	3	3	3	2	2	1	0	0	5	2	1	0	1.5	5	
22-Jun	0	0	1	0	1	Z	1	1	1	C	C	C	C	C	2	7	9	1	1	1	1	1	1	1	1.6	9	
23-Jun	Z	1	0	1	0	0	1	3	3	1	2	4	2	2	1	4	5	1	1	1	0	0	0	0	1.5	5	
24-Jun	1	Z	1	1	1	0	0	0	0	0	0	1	1	1	0	0	1	6	0	0	0	0	0	0	0.7	6	
25-Jun	0	0	Z	1	1	1	1	1	1	1	1	5	4	2	2	4	3	1	1	3	4	2	1	1	1.7	5	
26-Jun	1	1	1	Z	1	0	0	0	0	0	1	2	11	14	11	18	11	8	2	11	9	6	1	1	0	4.8	18
27-Jun	0	0	0	1	Z	0	0	0	0	0	1	0	2	7	8	6	4	1	3	2	1	1	0	1	1.7	8	
28-Jun	5	7	3	1	1	Z	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1.3	7	
29-Jun	Z	1	1	0	0	1	0	0	2	7	3	3	3	4	1	1	2	5	1	0	0	1	1	1	1.6	7	
30-Jun	0	Z	0	0	0	0	0	1	1	2	1	2	2	6	4	7	1	1	1	3	2	6	4	5	2.3	7	

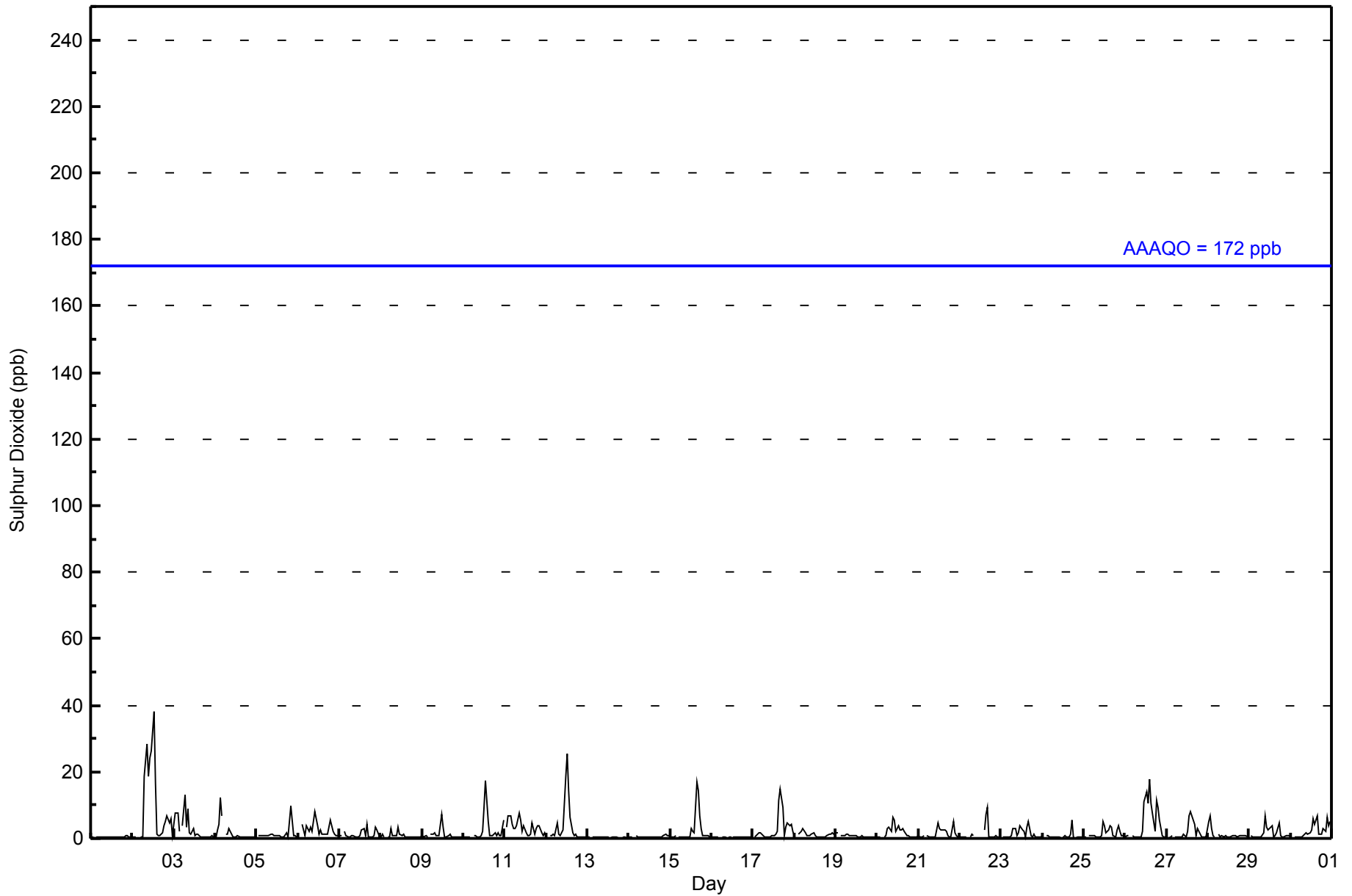
0.9	1.3	1.5	1.6	1.1	1.0	1.5	1.8	2.3	2.1	2.3	3.6	4.4	3.5	2.3	2.8	2.9	1.6	1.4	1.7	1.9	1.3	1.1	1.0	Diurnal Average	
5	8	8	12	7	4	13	19	28	19	24	26	38	17	18	17	15	10	11	9	10	6	6	6	Diurnal Maximum	

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



WBEA
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Mildred Lake - June 2015





WBEA
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Mildred Lake - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	662	96.64	96.64
11 - 20	18	2.63	99.27
21 - 60	5	0.73	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



WBEA
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Mildred Lake - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	82	102	12	9	9	12	20	53	72	55	39	38	22	32	50	55	662
11 - 20	0	0	0	0	0	0	1	1	1	6	2	0	5	2	0	0	18
21 - 60	0	0	0	0	0	0	0	0	2	2	1	0	0	0	0	0	5
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	82	102	12	9	9	12	21	54	75	63	42	38	27	34	50	55	685

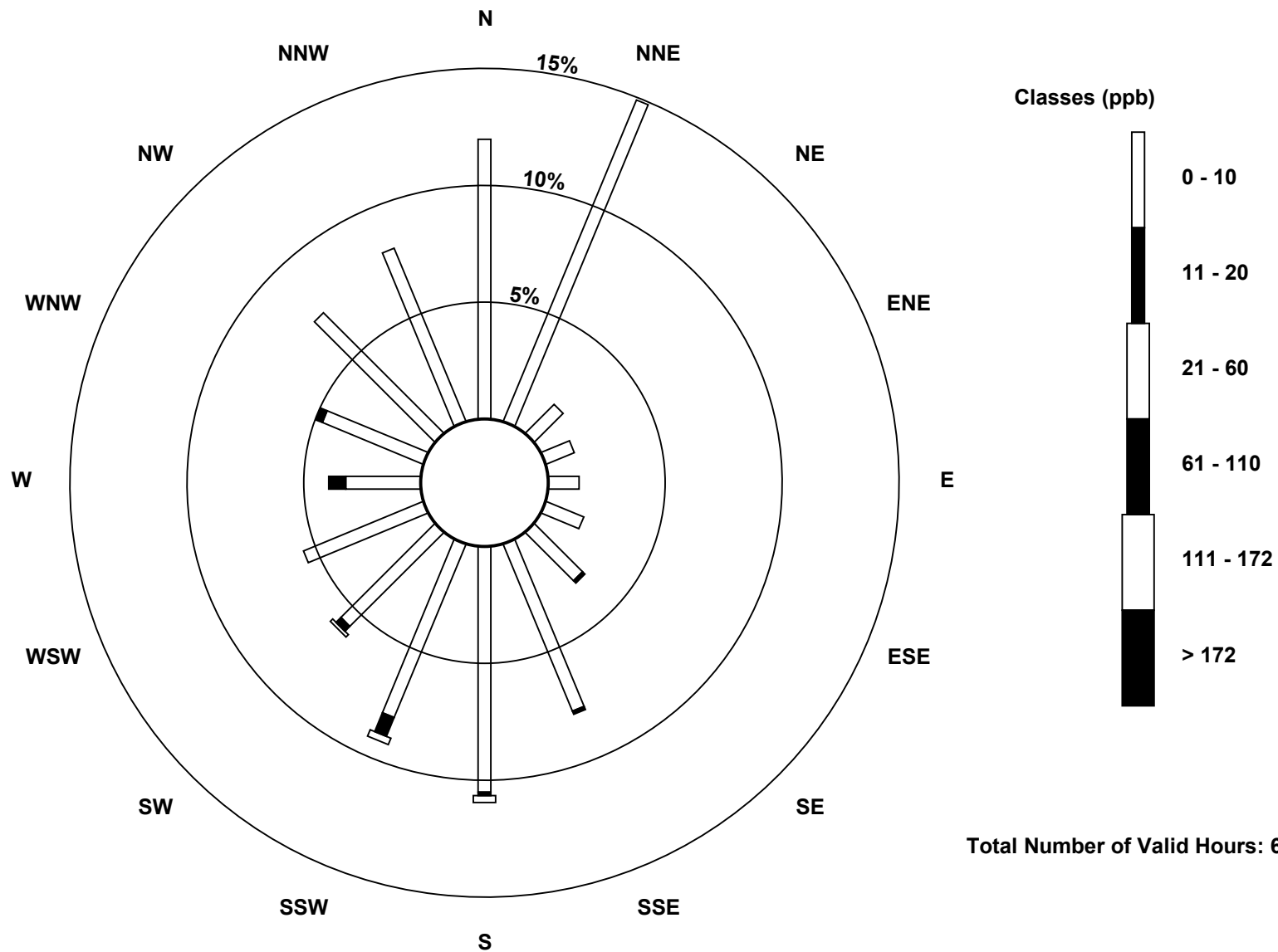
Total Number of Valid Hours: 685

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

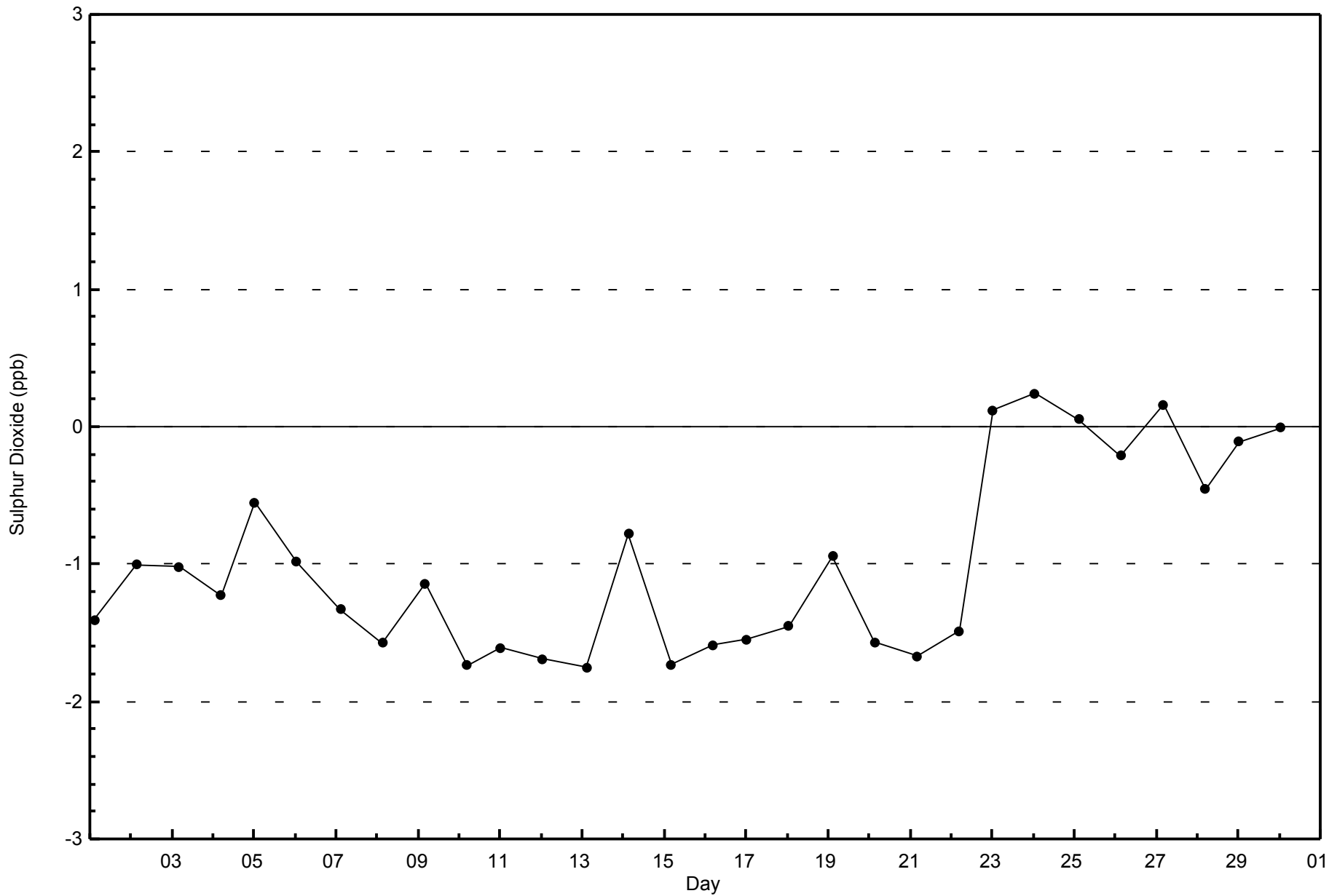
Sulphur Dioxide (SO₂) - ppb
Mildred Lake (AMS 2)





WBEA
Zero Responses

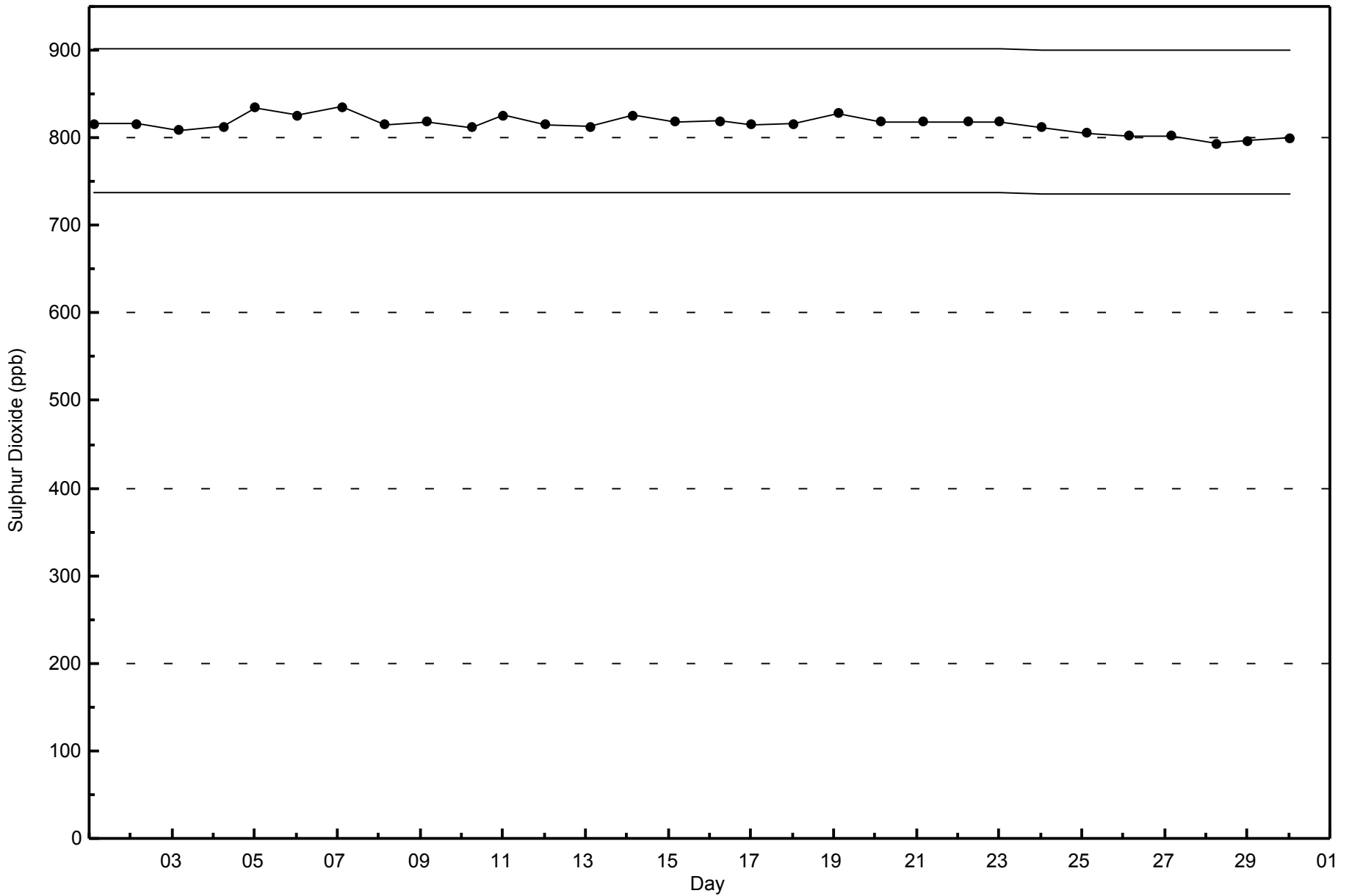
Sulphur Dioxide (SO₂) - ppb
Mildred Lake - June 2015





WBEA
Span Responses

Sulphur Dioxide (SO₂) - ppb
Mildred Lake - June 2015





Summary of Hour Averages

Mildred Lake - June 2015

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 3 ppb on Jun 29 06:00	Maximum Daily Average: 1.2 ppb on Jun 11		Hours of Data:	685
Minimum Value: 0 ppb on Jun 28 11:00	Minimum Daily Average: 0.2 ppb on Jun 13		Hours of Missing Data:	35
Maximum Diurnal Average: 0.9 ppb at hour 4	Minimum Diurnal Average: 0.3 ppb at hour 15		Hours of Calibration:	33
Monthly Average: 0.5 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 1 P ₉₉ = 3		Percent Operational Time:	99.7

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

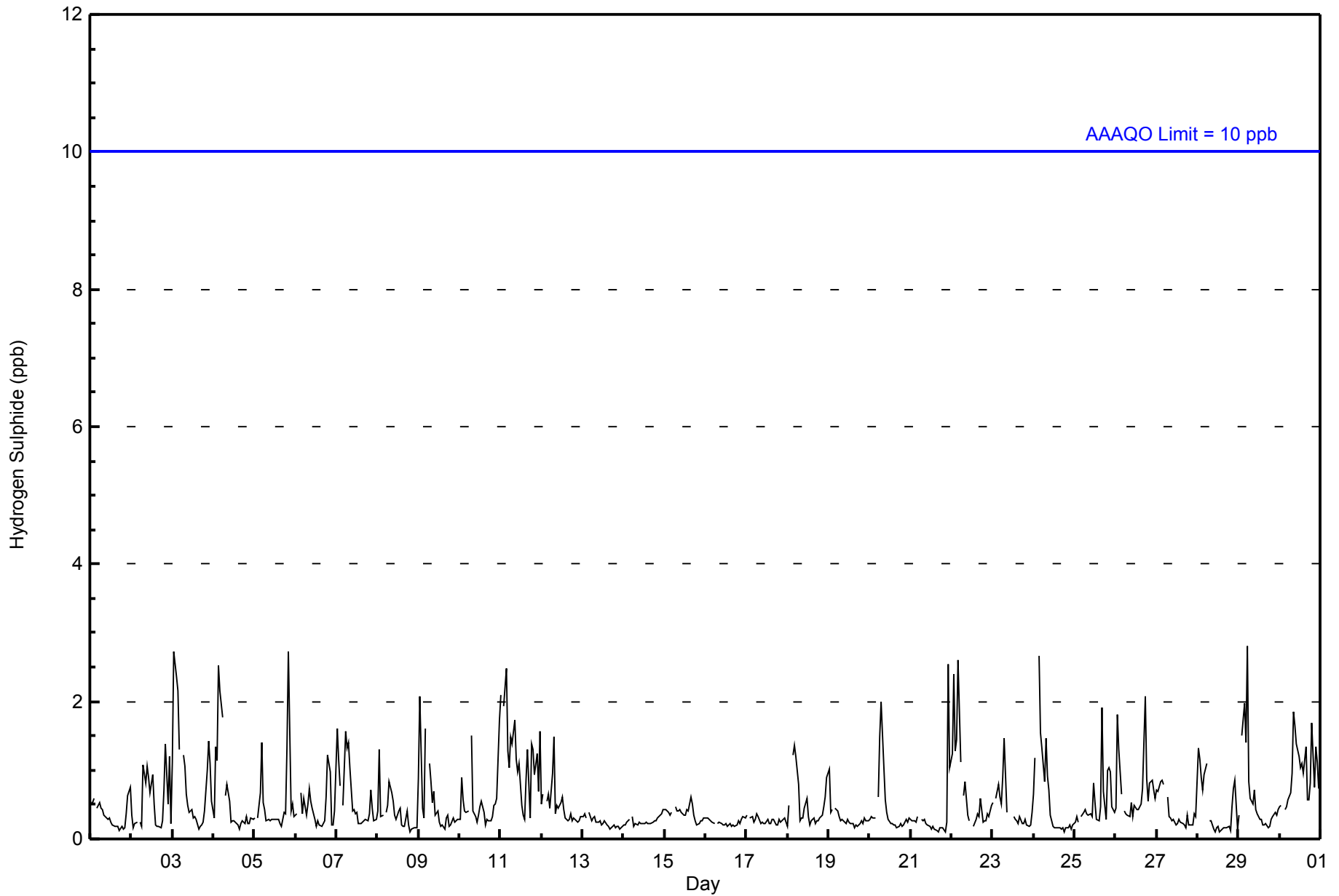
0.6	0.9	0.7	0.9	0.9	0.8	0.7	0.7	0.6	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.5	0.5	0.5	0.5	0.5	Diurnal Average
2	3	2	3	3	3	1	2	2	2	1	1	1	1	1	1	1	2	2	1	2	3	1	3	2	Diurnal Maximum	

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



WBEA
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
Mildred Lake - June 2015





WBEA
Cumulative Frequency Distribution

Hydrogen Sulphide (H₂S) - ppb
Mildred Lake - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	678	98.98	98.98
3 - 4	7	1.02	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



WBEA
Frequency Distribution

Hydrogen Sulphide (H₂S) - ppb
Mildred Lake - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	82	101	14	9	9	11	19	53	75	60	39	37	29	32	52	56	678
3 - 4	0	0	0	0	0	0	2	2	0	0	1	0	0	1	1	0	7
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	82	101	14	9	9	11	21	55	75	60	40	37	29	33	53	56	685

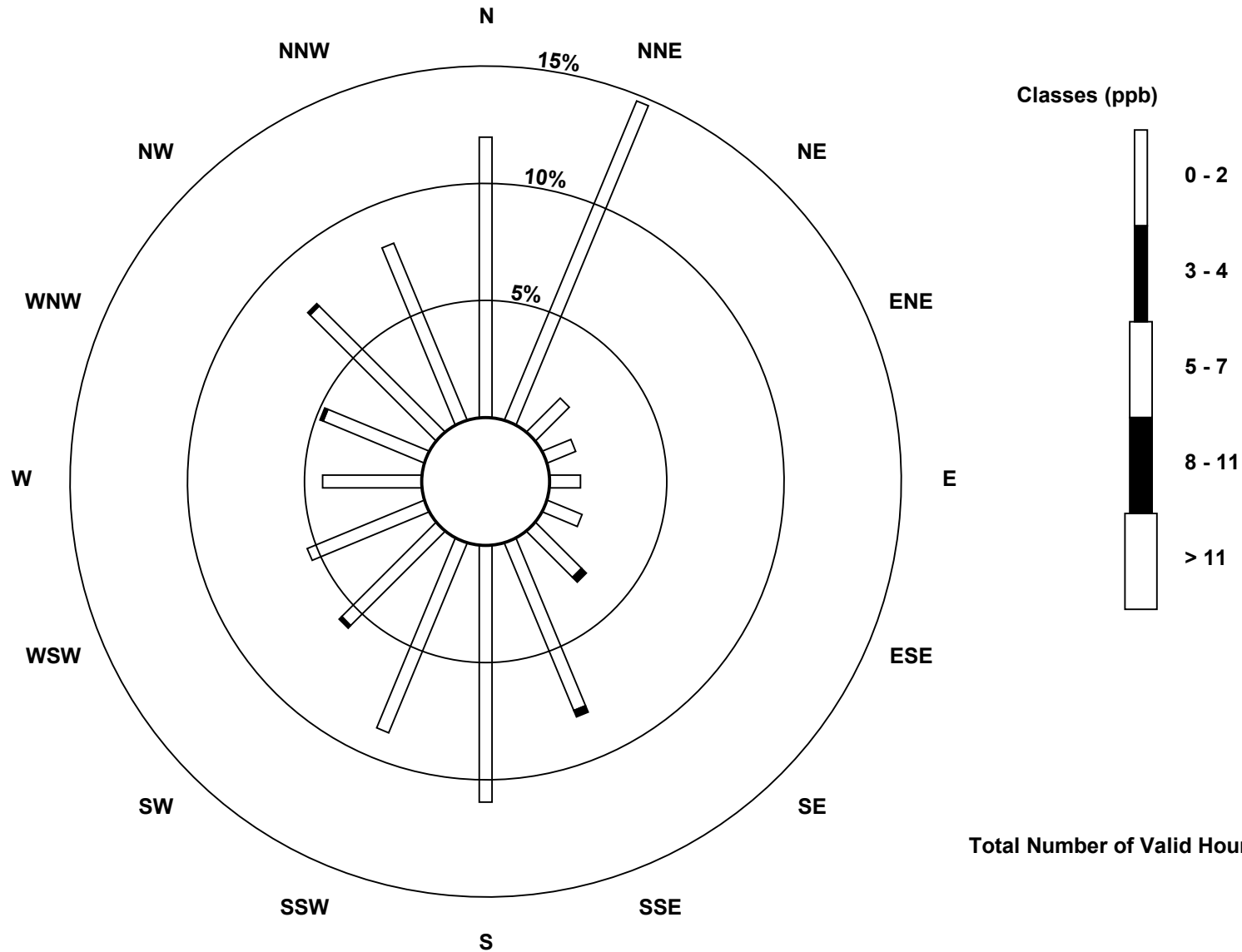
Total Number of Valid Hours: 685

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

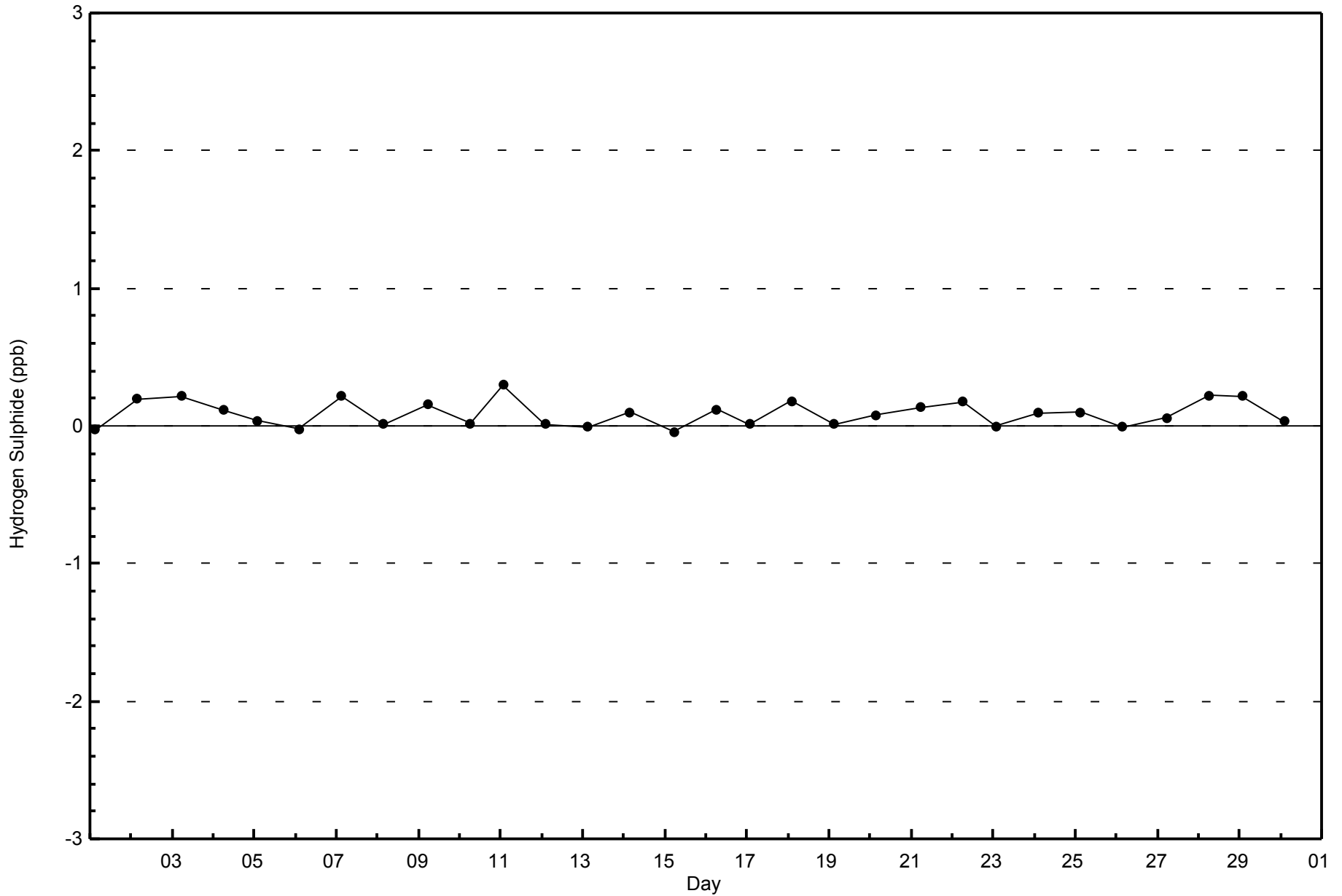
Hydrogen Sulphide (H₂S) - ppb
Mildred Lake (AMS 2)





WBEA
Zero Responses

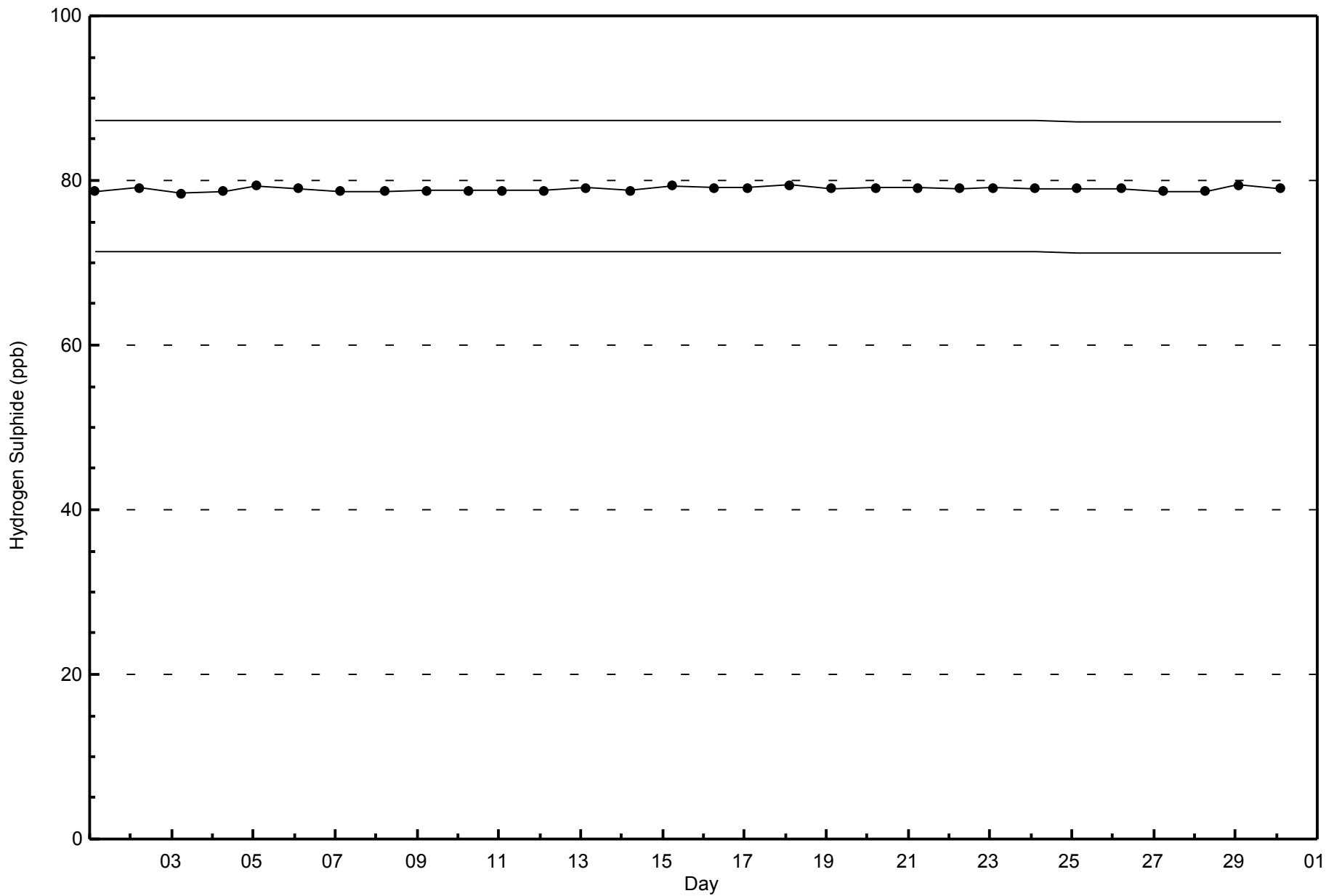
Hydrogen Sulphide (H₂S) - ppb
Mildred Lake - June 2015





WBEA
Span Responses

Hydrogen Sulphide (H₂S) - ppb
Mildred Lake - June 2015





Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

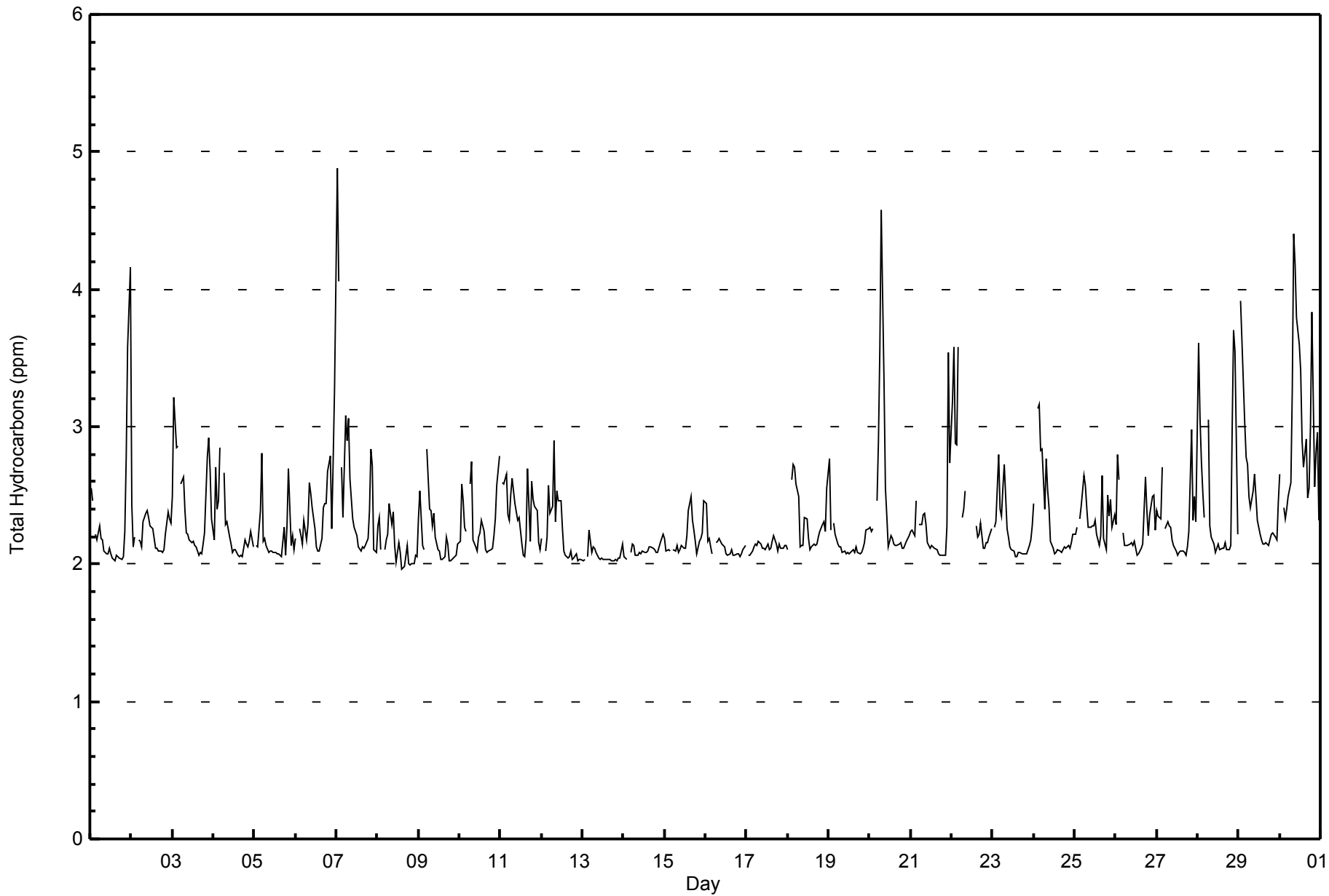
Mildred Lake - June 2015

Maximum Value: 4.9 ppm on Jun 7 01:00																	Maximum Daily Average: 3.0 ppm on Jun 30																	Hours in Service: 720	
Minimum Value: 2.0 ppm on Jun 8 15:00																	Minimum Daily Average: 2.1 ppm on Jun 13																	Hours of Data: 685	
Maximum Diurnal Average: 2.6 ppm at hour 2																	Minimum Diurnal Average: 2.1 ppm at hour 15																	Hours of Missing Data: 35	
Monthly Average: 2.31 ppm																	Percentiles: P ₁ = 2.0 P ₁₀ = 2.1 Q ₁ = 2.1 Median = 2.2 Q ₃ = 2.4 P ₉₀ = 2.7 P ₉₉ = 3.9																	Hours of Calibration: 35	
																																		Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24											
1-Jun	2.6	2.5	Z	2.2	2.2	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.2	2.8	3.6	4.2	2.3	4.2									
2-Jun	2.4	2.1	2.2	Z	2.2	2.2	2.1	2.3	2.4	2.4	2.3	2.3	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.4	2.3	2.3	2.2	2.4									
3-Jun	2.5	3.2	2.8	2.9	Z	2.6	2.6	2.4	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.8	2.9	2.7	2.3	2.4	3.2									
4-Jun	2.2	2.7	2.4	2.5	2.8	Z	2.7	2.3	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.2	2.1	2.1	2.2	2.2	2.1	2.2	2.8									
5-Jun	Z	2.1	2.1	2.4	2.8	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	2.3	2.1	2.2	2.1	2.2	2.2	2.8									
6-Jun	2.2	Z	2.3	2.2	2.1	2.3	2.2	2.3	2.6	2.5	2.4	2.3	2.1	2.1	2.1	2.2	2.4	2.4	2.4	2.7	2.8	2.3	2.7	3.3	2.4	3.3									
7-Jun	4.9	4.1	Z	2.7	2.3	3.1	2.9	3.1	2.6	2.3	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.4	2.8	2.7	2.1	2.1	2.6	4.9									
8-Jun	2.3	2.3	2.1	Z	2.1	2.2	2.2	2.4	2.3	2.4	2.1	2.0	2.2	2.1	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.4									
9-Jun	2.3	2.5	2.1	2.1	Z	2.8	2.4	2.4	2.3	2.4	2.2	2.1	2.1	2.0	2.0	2.1	2.2	2.1	2.0	2.0	2.0	2.1	2.1	2.2	2.2	2.8									
10-Jun	2.2	2.6	2.5	2.3	2.2	Z	2.6	2.7	2.2	2.1	2.1	2.2	2.2	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.6	2.8	2.3	2.8									
11-Jun	Z	2.6	2.6	2.7	2.4	2.3	2.5	2.6	2.4	2.4	2.3	2.3	2.1	2.1	2.1	2.2	2.7	2.2	2.6	2.5	2.4	2.4	2.2	2.1	2.4	2.7									
12-Jun	2.2	Z	2.1	2.2	2.6	2.4	2.4	2.9	2.3	2.5	2.5	2.5	2.3	2.1	2.1	2.0	2.1	2.1	2.0	2.0	2.1	2.0	2.0	2.0	2.2	2.9									
13-Jun	2.0	2.0	Z	2.1	2.2	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.2									
14-Jun	2.1	2.0	2.0	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.2									
15-Jun	2.2	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.4	2.5	2.3	2.3	2.2	2.1	2.2	2.2	2.2	2.5	2.2	2.5									
16-Jun	2.4	2.2	2.2	2.1	2.1	Z	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.4									
17-Jun	Z	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	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2									
18-Jun	2.1	Z	2.6	2.7	2.7	2.6	2.5	2.1	2.1	2.1	2.3	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.3	2.3	2.2	2.5	2.7									
19-Jun	2.8	2.2	Z	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.3	2.2	2.8									
20-Jun	2.3	2.2	2.3	Z	2.5	2.9	3.6	4.6	3.3	2.6	2.3	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.2	2.2	2.2	2.5	4.6									
21-Jun	2.2	2.2	2.2	2.5	Z	2.3	2.3	2.4	2.4	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	3.5	2.7	2.3	3.5									
22-Jun	3.2	3.6	2.9	2.9	3.6	Z	2.3	2.4	2.5	C	C	C	C	C	2.3	2.2	2.2	2.3	2.1	2.1	2.2	2.2	2.2	2.3	2.5	3.6									
23-Jun	Z	2.3	2.3	2.8	2.4	2.3	2.6	2.7	2.3	2.2	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.2	2.8									
24-Jun	2.4	Z	3.1	3.2	2.8	2.8	2.4	2.8	2.5	2.4	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.4	3.2									
25-Jun	2.2	2.3	Z	2.3	2.4	2.6	2.6	2.4	2.3	2.3	2.3	2.3	2.3	2.2	2.1	2.2	2.6	2.2	2.1	2.5	2.3	2.5	2.3	2.4	2.3	2.6									
26-Jun	2.3	2.8	2.6	Z	2.2	2.1	2.1	2.1	2.2	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.6	2.4	2.2	2.4	2.5	2.5	2.2	2.3	2.8								
27-Jun	2.4	2.3	2.3	2.7	Z	2.3	2.3	2.3	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	3.0	2.3	2.5	2.3	2.3	3.0									
28-Jun	3.6	3.1	2.7	2.5	2.3	Z	3.1	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	3.0	3.7	3.5	2.2	2.5	3.7									
29-Jun	Z	3.9	3.6	3.0	2.8	2.7	2.5	2.4	2.5	2.7	2.5	2.3	2.2	2.2	2.1	2.1	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.4	2.5	3.9								
30-Jun	2.7	Z	2.4	2.3	2.4	2.5	2.6	3.3	4.4	4.2	3.8	3.6	3.4	2.9	2.7	2.9	2.5	2.5	3.0	3.8	2.6	2.8	3.0	2.3	3.0	4.4									
																								Diurnal Average											
																								Diurnal Maximum											
2.5 2.6 2.4 2.5 2.4 2.4 2.4 2.5 2.4 2.3 2.3 2.2 2.2 2.1 2.1 2.1 2.2 2.2 2.2 2.2 2.3 2.3 2.4 2.4																																			
4.9 4.1 3.6 3.2 3.6 3.1 3.6 4.6 4.4 4.2 3.8 3.6 3.4 2.9 2.7 2.9 2.7 2.6 3.0 3.8 3.0 3.7 3.6 4.2																																			
Z - zerspan C - Calibration																																			



WBEA
Hourly Averages

Total Hydrocarbons (THC) - ppm
Mildred Lake - June 2015





WBEA
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Mildred Lake - June 2015

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	44	6.42	6.42
2.1 - 3.0	610	89.05	95.47
3.1 - 10.0	31	4.53	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



WBEA
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Mildred Lake - June 2015

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	2	19	2	1	2	4	1	0	0	2	0	0	0	0	1	10	44
2.1 - 3.0	79	83	10	8	7	4	18	53	75	58	41	35	26	29	42	42	610
3.1 - 10.0	1	0	0	0	0	4	2	1	0	3	1	3	1	5	7	3	31
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	82	102	12	9	9	12	21	54	75	63	42	38	27	34	50	55	685

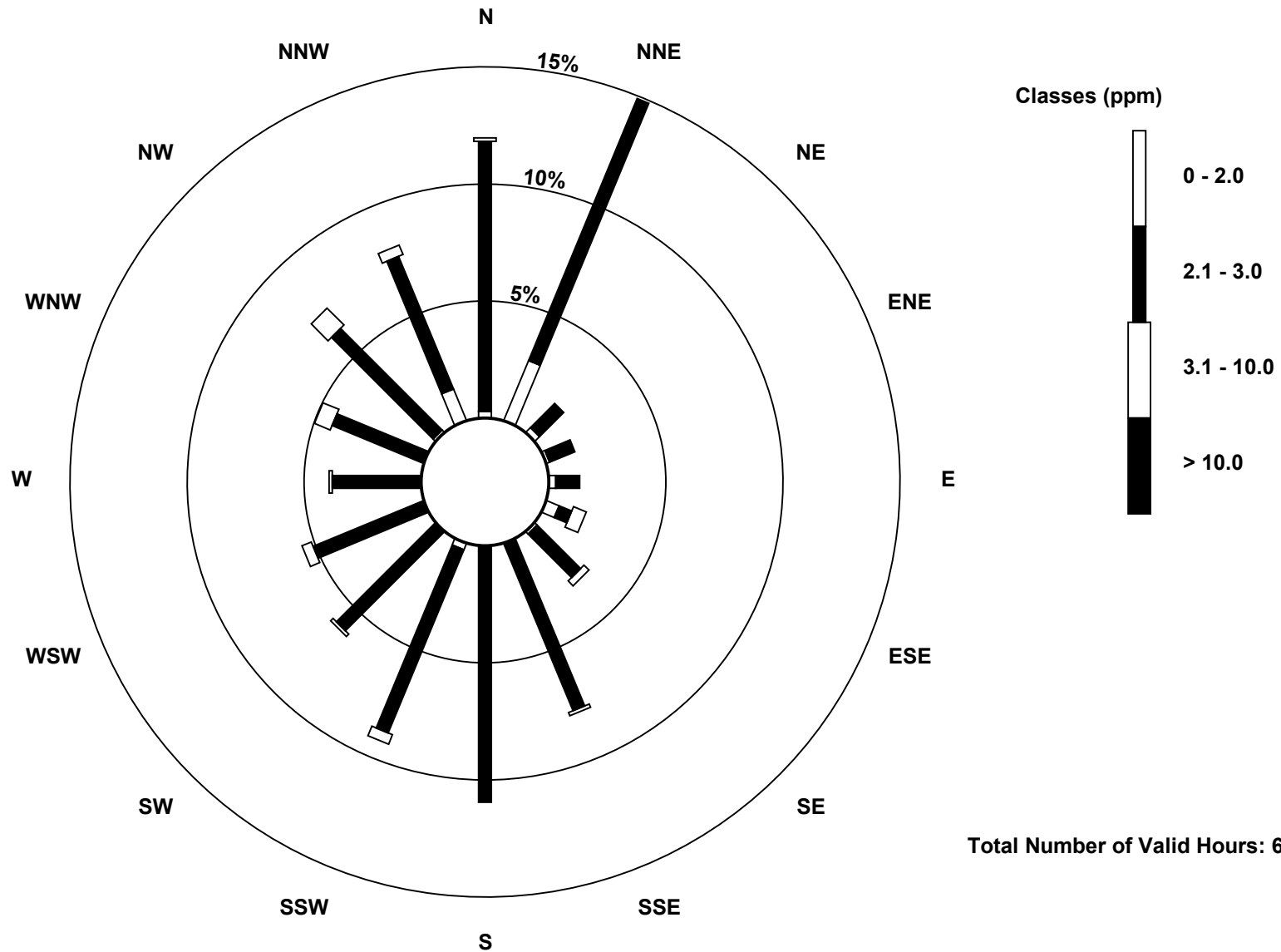
Total Number of Valid Hours: 685

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

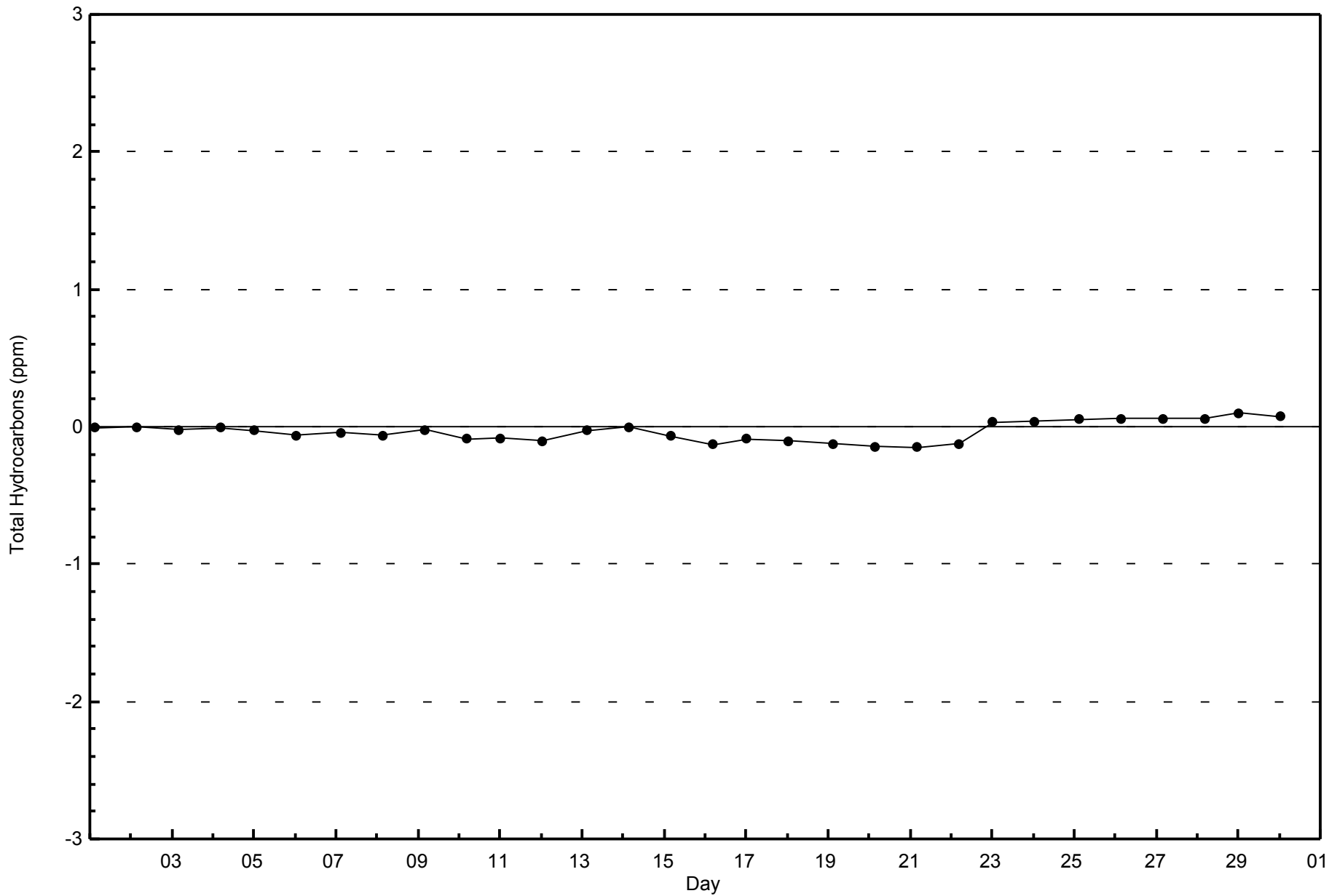
Total Hydrocarbons (THC) - ppm
Mildred Lake (AMS 2)





WBEA
Zero Responses

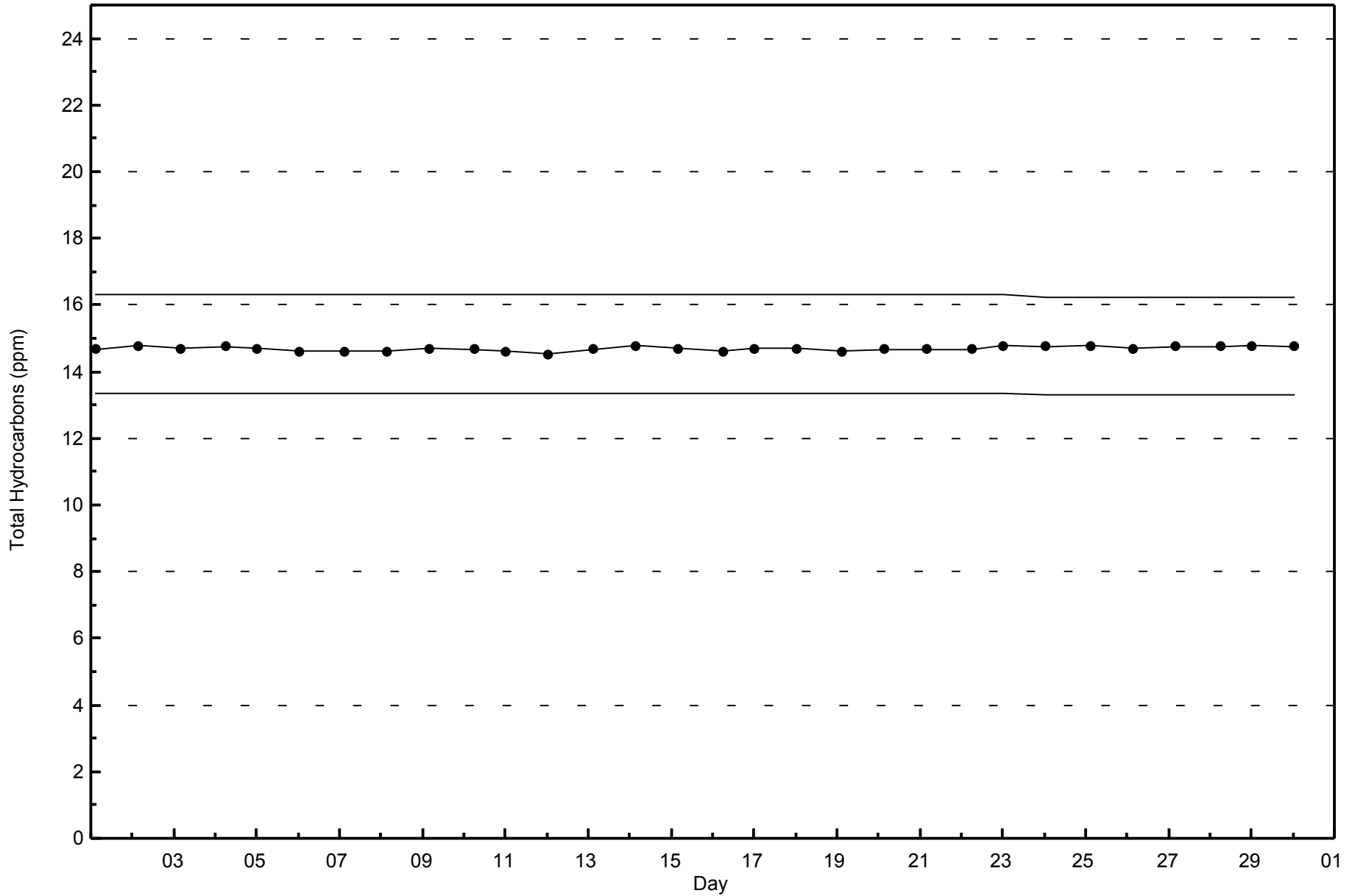
Total Hydrocarbons (THC) - ppm
Mildred Lake - June 2015





WBEA
Span Responses

Total Hydrocarbons (THC) - ppm
Mildred Lake - June 2015



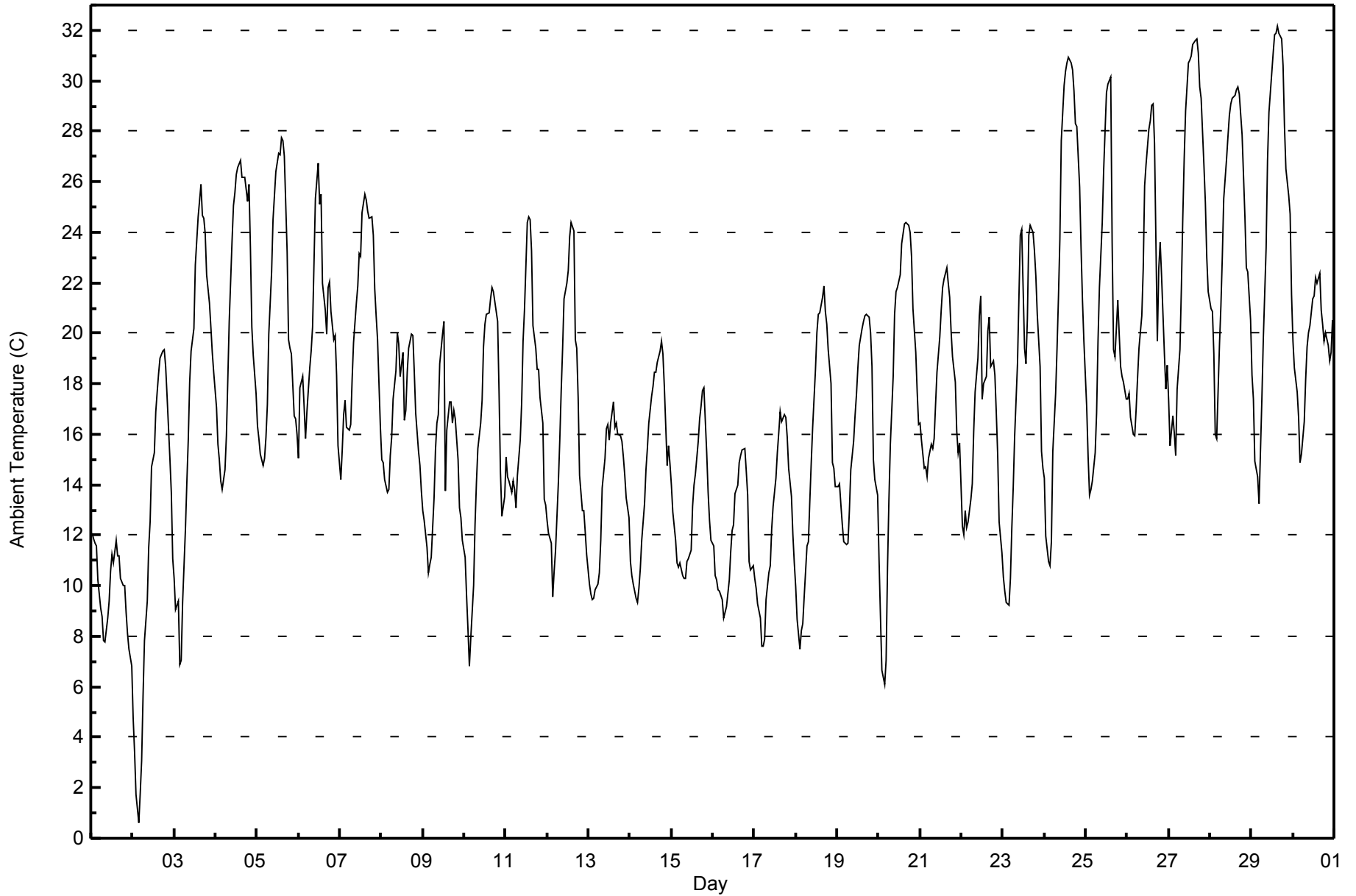


Maximum Value: 32.2 C on Jun 29 16:00																						Maximum Daily Average: 24.7 C on Jun 27																						Hours in Service: 720			
Minimum Value: 0.6 C on Jun 2 04:00																						Minimum Daily Average: 9.9 C on Jun 1																						Hours of Data: 720			
Maximum Diurnal Average: 22.5 C at hour 16																						Minimum Diurnal Average: 11.7 C at hour 5																						Hours of Missing Data: 0			
Monthly Average: 17.59 C																						Percentiles: P ₁ = 5.9 P ₁₀ = 10.3 Q ₁ = 13.6 Median = 17.2 Q ₃ = 21.1 P ₉₀ = 25.8 P ₉₉ = 31.6																						Hours of Calibration: 0			
																																												Percent Operational Time: 100.0			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																							
1-Jun	12.1	11.9	11.7	11.6	10.2	9.1	8.8	7.8	7.8	8.7	9.4	10.6	11.2	10.9	11.8	11.2	11.2	10.3	10.0	10.0	8.9	8.1	7.5	6.8	9.9	12.1																					
2-Jun	4.7	3.4	1.7	0.6	1.8	3.1	5.7	7.9	9.4	11.5	12.5	14.7	15.3	16.9	17.7	18.4	19.0	19.3	19.4	18.7	17.5	15.0	13.7	11.1	11.6	19.4																					
3-Jun	10.3	9.1	9.4	6.9	7.1	9.3	12.2	14.1	15.8	18.1	19.3	20.2	22.7	23.6	24.6	25.9	24.7	24.5	23.9	22.3	21.2	20.2	19.3	18.4	17.6	25.9																					
4-Jun	17.1	15.6	15.0	14.1	13.8	14.6	16.0	18.2	20.5	23.7	25.0	25.6	26.3	26.6	26.8	26.2	26.2	26.2	25.2	25.9	23.4	20.2	19.1	17.6	21.2	26.8																					
5-Jun	16.3	15.8	15.2	14.8	15.0	15.9	17.2	19.9	22.4	24.5	25.4	26.4	27.1	27.1	27.8	27.7	27.0	23.2	19.8	19.4	19.2	16.7	16.6	16.0	20.7	27.8																					
6-Jun	15.1	17.8	18.3	17.1	15.8	16.9	18.6	19.3	20.3	22.8	25.3	26.7	25.1	25.5	22.0	20.9	19.9	21.8	22.0	20.9	19.8	19.9	18.3	15.6	20.2	26.7																					
7-Jun	14.2	15.4	16.8	17.3	16.3	16.1	16.4	18.2	19.7	21.2	21.9	23.2	23.0	24.8	25.5	25.3	24.8	24.6	24.6	23.9	21.8	20.7	19.7	16.3	20.5	25.5																					
8-Jun	15.0	14.9	14.2	13.7	13.8	15.2	15.9	17.4	18.5	20.0	19.6	18.3	19.2	16.6	16.9	18.5	19.4	19.9	19.9	18.4	16.8	15.3	14.8	13.8	16.9	20.0																					
9-Jun	13.0	12.6	11.5	10.5	10.8	11.1	13.5	15.4	16.5	16.8	18.8	20.0	20.5	13.8	16.1	17.3	17.3	16.4	17.0	16.6	15.0	13.1	12.7	11.8	14.9	20.5																					
10-Jun	11.1	9.6	8.3	6.8	7.9	10.0	12.4	14.1	15.5	16.4	17.3	19.5	20.4	20.7	20.8	21.4	21.8	21.6	20.8	20.5	17.7	14.5	12.7	13.5	15.6	21.8																					
11-Jun	15.1	14.3	14.2	13.7	14.1	13.8	13.1	14.4	15.8	17.2	19.7	20.9	24.4	24.6	24.5	23.3	20.3	19.4	18.6	18.6	17.5	16.4	13.4	13.2	17.5	24.6																					
12-Jun	12.6	12.1	11.7	9.6	10.6	11.4	14.1	15.8	17.7	19.4	21.4	22.0	22.5	23.8	24.4	24.1	19.8	19.4	17.5	14.4	13.0	13.0	12.2	11.3	16.4	24.4																					
13-Jun	10.1	9.7	9.5	9.5	9.8	10.1	10.5	11.8	13.9	15.0	16.2	16.4	15.8	16.5	17.3	16.3	16.4	16.0	15.9	15.7	15.1	14.4	13.5	12.7	13.7	17.3																					
14-Jun	11.0	10.4	10.1	9.5	9.3	9.9	10.7	11.8	13.3	14.6	15.5	16.4	17.5	17.9	18.5	18.5	18.8	19.3	19.7	19.2	17.9	14.8	15.5	14.8	14.8	19.7																					
15-Jun	14.0	12.9	11.8	10.9	10.8	10.9	10.4	10.3	10.3	11.0	11.1	11.4	13.2	14.0	14.4	15.7	16.6	17.1	17.7	17.8	15.3	13.7	12.6	11.8	13.2	17.8																					
16-Jun	11.6	10.4	10.2	9.9	9.8	9.4	8.7	8.9	9.2	10.2	11.4	12.2	12.4	13.7	14.0	14.9	15.1	15.4	15.4	14.6	13.6	11.0	10.6	10.8	11.8	15.4																					
17-Jun	10.3	9.9	9.3	8.7	7.6	7.6	7.9	9.4	10.5	10.8	12.2	13.1	14.2	15.3	16.1	16.9	16.5	16.8	16.7	15.9	14.7	13.5	12.0	10.9	12.4	16.9																					
18-Jun	10.0	8.6	7.5	8.2	8.5	9.6	11.6	11.7	13.4	14.9	16.3	18.5	20.0	20.7	20.8	21.4	21.8	20.9	20.4	19.3	18.0	14.9	14.7	13.9	15.2	21.8																					
19-Jun	13.9	14.0	13.2	12.4	11.8	11.7	11.7	13.0	14.6	15.7	16.8	17.5	18.6	19.5	20.2	20.5	20.7	20.8	20.7	20.0	18.7	15.0	14.2	13.6	16.2	20.8																					
20-Jun	11.0	8.8	6.6	6.1	7.1	10.7	13.4	15.6	18.3	20.8	21.7	21.8	22.3	23.5	23.9	24.3	24.4	24.3	24.0	23.1	21.0	19.2	17.7	16.4	17.7	24.4																					
21-Jun	16.5	15.8	14.6	14.7	14.3	15.1	15.6	15.5	15.8	17.2	18.4	19.8	20.9	21.8	22.1	22.6	22.0	21.4	20.1	19.1	18.1	16.1	15.3	15.7	17.9	22.6																					
22-Jun	12.4	12.1	13.0	12.3	12.5	13.4	14.1	16.1	17.7	19.0	20.7	21.5	17.4	18.0	18.3	20.1	20.6	18.7	18.9	18.4	16.8	15.2	12.5	11.3	16.3	21.5																					
23-Jun	10.3	9.8	9.3	9.2	10.3	12.3	13.9	15.9	18.8	21.3	23.9	24.1	19.4	18.8	20.6	23.9	24.3	24.0	23.3	22.2	20.7	18.7	15.3	14.7	17.7	24.3																					
24-Jun	14.3	11.9	10.9	10.8	11.8	15.3	17.6	19.4	21.4	23.7	27.6	29.8	30.4	30.7	31.0	30.7	30.4	29.6	28.3	28.2	25.8	23.4	21.3	19.7	22.7	31.0																					
25-Jun	17.0	15.1	13.6	13.8	14.1	15.3	16.8	19.7	21.8	24.4	26.5	28.0	29.6	29.9	30.2	23.6	19.4	19.1	21.3	20.0	18.7	18.3	18.1	17.4	20.5	30.2																					
26-Jun	17.4	17.6	16.7	16.0	16.0	17.0	18.3	19.4	20.7	22.5	25.9	26.7	28.1	28.4	29.0	29.1	27.5	19.7	22.5	23.6	22.3	19.2	17.8	18.7	21.7	29.1																					
27-Jun	17.4	15.6	16.7	16.1	15.1	17.8	19.4	21.8	24.6	26.9	28.8	30.7	30.8	31.0	31.4	31.6	31.6	31.1	29.8	29.3	26.6	25.2	23.0	21.7	24.7	31.6																					
28-Jun	20.9	20.9	19.2	16.0	15.8	19.6	21.1	23.0	25.3	26.9	27.8	28.7	29.1	29.3	29.4	29.6	29.8	29.5	27.9	26.2	24.6	22.6	22.5	20.5	24.4	29.8																					
29-Jun	18.3	17.4	14.9	14.3	13.3	15.3	17.4	19.7	23.4	26.8	28.8	29.5	31.1	31.8	31.9	32.2	31.9	31.6	30.6	28.2	26.5	25.4	24.7	21.6	24.4	32.2																					
30-Jun	19.7	18.6	17.7	16.7	14.9	15.2	16.5	18.2	19.4	20.0	20.3	21.4	21.5	22.2	22.0	22.4	20.9	20.4	19.7	20.0	19.5	18.9	19.2	20.5	19.4	22.4																					
																						13.8	13.1	12.4	11.7	11.7	12.8	14.0	15.5	17.1	18.7	20.2	21.2	21.7	21.9	22.3	22.5	22.0	21.4	21.0	20.3	18.9	17.1	16.0	15.1	Diurnal Average	
																						20.9	20.9	19.2	17.3	16.3	19.6	21.1	23.0	25.3	26.9	28.8	30.7	31.1	31.8	31.9	32.2	31.9	31.6	30.6	29.3	26.6	25.4	24.7	21.7	Diurnal Maximum	



WBEA
Hourly Averages

Ambient Temperature (AT) - C
Mildred Lake - June 2015





WBEA
Cumulative Frequency Distribution

Ambient Temperature (AT) - C
Mildred Lake - June 2015

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	63	8.75	8.75
10 - 20	430	59.72	68.47
> 20	227	31.53	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

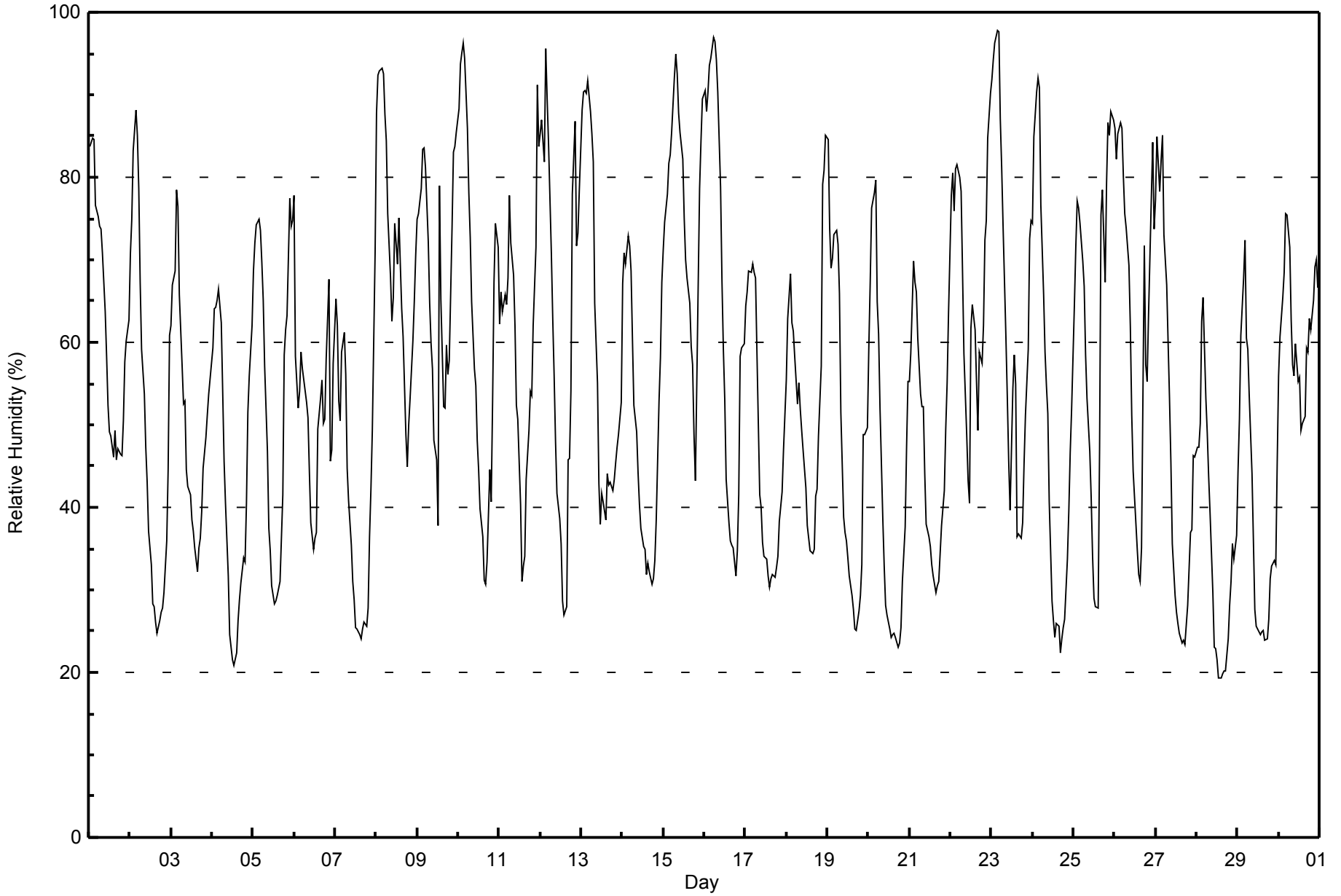
Mildred Lake - June 2015

Maximum Value: 98 % on Jun 23 04:00																		Maximum Daily Average: 75.6 % on Jun 15																		Hours in Service: 720													
Minimum Value: 19 % on Jun 28 14:00																		Minimum Daily Average: 35.1 % on Jun 28																		Hours of Data: 720													
Maximum Diurnal Average: 78.0 % at hour 5																		Minimum Diurnal Average: 36.4 % at hour 16																		Hours of Missing Data: 0													
Monthly Average: 55.1 %																		Percentiles: P ₁ = 21 P ₁₀ = 28 Q ₁ = 37 Median = 54 Q ₃ = 71 P ₉₀ = 84 P ₉₉ = 95																		Hours of Calibration: 0													
																																				Percent Operational Time: 100.0													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jun	84	84	85	85	77	75	74	74	71	64	58	52	49	49	46	49	46	47	46	46	50	58	60	63	62.2	85																							
2-Jun	71	75	83	88	85	79	67	59	54	47	43	37	33	28	28	26	25	26	27	28	30	36	45	61	49.2	88																							
3-Jun	62	67	69	78	76	66	57	52	53	45	43	42	38	37	35	32	35	36	39	45	49	51	54	56	50.7	78																							
4-Jun	59	64	64	65	66	62	54	46	41	32	25	23	21	21	22	26	29	31	34	33	40	52	56	62	42.9	66																							
5-Jun	69	72	74	75	73	70	65	57	47	37	35	30	28	29	29	30	31	42	59	62	63	77	74	75	54.3	77																							
6-Jun	78	58	52	54	59	57	54	53	51	44	38	35	36	37	50	53	55	50	51	58	68	46	47	57	51.7	78																							
7-Jun	65	62	53	51	59	61	56	45	41	35	31	29	25	25	25	24	25	26	26	28	36	42	49	71	41.3	71																							
8-Jun	88	92	93	93	93	88	84	76	68	63	65	74	69	75	70	64	61	49	45	50	53	60	65	71	71.2	93																							
9-Jun	75	76	79	83	84	81	72	65	60	57	48	46	38	79	65	52	52	60	56	58	74	83	84	85	67.1	85																							
10-Jun	88	94	95	96	94	86	78	73	65	57	55	48	45	40	36	31	31	33	45	41	53	67	74	72	62.3	96																							
11-Jun	62	66	64	66	65	68	78	72	68	62	52	51	40	31	33	34	43	49	54	54	62	72	91	84	59.2	91																							
12-Jun	85	87	82	96	90	84	71	63	56	48	42	39	36	29	27	28	46	46	54	78	87	72	73	78	62.3	96																							
13-Jun	88	90	91	90	92	88	85	82	65	55	43	38	42	41	38	44	43	43	42	43	45	47	49	53	59.9	92																							
14-Jun	67	71	70	73	72	69	60	52	49	44	40	37	35	32	33	32	31	31	34	39	53	58	67	49.4	73																								
15-Jun	71	75	78	82	83	85	92	95	93	88	85	82	75	70	68	65	59	57	49	43	67	79	84	89	75.6	95																							
16-Jun	90	88	90	94	94	97	97	94	90	79	68	59	53	43	38	36	36	35	32	35	41	58	59	60	65.3	97																							
17-Jun	64	66	69	69	69	69	68	59	41	40	36	34	34	32	30	31	32	32	33	34	38	42	47	51	46.6	69																							
18-Jun	56	63	68	62	61	58	53	55	52	49	47	42	38	36	35	34	35	41	42	49	57	79	81	85	53.3	85																							
19-Jun	85	74	69	70	73	74	72	66	52	39	37	36	34	32	29	28	25	25	27	29	33	49	49	50	48.1	85																							
20-Jun	59	67	76	78	80	65	61	52	39	33	28	27	25	24	25	25	24	23	24	25	31	38	47	55	43.0	80																							
21-Jun	55	59	70	67	66	60	54	52	52	44	38	37	35	33	32	30	30	31	34	38	42	50	55	64	47.0	70																							
22-Jun	78	81	76	81	82	80	78	69	59	49	43	40	62	65	62	55	49	59	57	62	72	75	85	90	67.0	90																							
23-Jun	92	94	96	98	98	87	81	74	61	53	46	40	54	58	55	36	37	36	38	45	51	59	73	75	64.1	98																							
24-Jun	74	85	90	92	91	77	66	59	55	51	41	29	26	24	26	26	22	24	25	27	34	40	47	52	49.2	92																							
25-Jun	65	72	77	76	74	70	67	58	53	47	41	34	29	28	28	47	75	79	67	79	87	85	88	87	63.0	88																							
26-Jun	86	82	85	87	86	80	76	74	69	62	51	44	38	35	32	31	35	72	57	55	63	78	84	74	64.0	87																							
27-Jun	77	85	78	82	85	73	67	60	53	46	36	29	27	26	25	24	24	23	26	28	37	37	46	46	47.5	85																							
28-Jun	47	47	50	63	65	53	49	44	39	30	23	23	22	19	19	20	20	20	24	28	31	36	34	37	35.1	65																							
29-Jun	44	51	61	68	72	60	59	54	44	36	28	26	25	25	25	25	24	24	26	31	33	34	33	45	39.7	72																							
30-Jun	56	61	65	68	76	75	71	63	57	56	60	55	56	49	50	51	59	59	63	61	65	69	70	67	61.8	76																							
																								71.4	73.6	75.1	77.7	78.0	73.2	68.9	63.2	56.5	49.7	44.2	40.6	39.0	38.5	37.1	36.4	38.0	40.3	41.1	44.2	51.1	57.4	62.0	66.0	Diurnal Average	
																								92	94	96	98	98	97	97	95	93	88	85	82	75	79	70	65	75	79	67	79	87	85	91	90	Diurnal Maximum	



WBEA
Hourly Averages

Relative Humidity (RH) - %
Mildred Lake - June 2015





Maximum Speed: 27 km/h on Jun 8 19:00	Maximum Daily Speed Average: 16.1 km/h on Jun 1	Hours in Service: 720
Minimum Speed Value: 0 km/h on Jun 23 01:00	Minimum Daily Speed Average: 0.3 km/h on Jun 10	Hours of Data: 720
Maximum Diurnal Speed Average: 4.2 km/h at hour 16	Minimum Diurnal Speed Average: 0.4 km/h at hour 21	Hours of Missing Data: 0
Monthly Average Velocity: 1.9 km/h 318.0 deg	Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 5 Median = 8 Q ₃ = 12 P ₉₀ = 15 P ₉₉ = 22	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	NW10	WNW9	NW12	NNW14	NW17	NW18	NW19	NW19	NW19	NW22	NW22	NW19	NW21	NNW22	NW22	NNW21	NNW22	NNW21	NNW18	NNW12	NW8	NW8	NW9	NW9	NW16.1	NNW22
2-Jun	N7	N9	NW2	N4	N6	NNE4	E4	SSW4	S5	SSW6	SSW6	SSW7	S7	S10	S10	SSE10	S10	SSE10	SSE10	SSE13	SSE14	SE8	S8	S3	SSE4.2	SSE14
3-Jun	SSE6	SE4	S6	SE3	NE3	ESE4	SE8	SSE13	SSE11	S14	S13	SSE15	S13	S13	SSE14	S11	S15	S15	S16	S17	S16	SSE15	SSE15	S11	SSE10.9	S17
4-Jun	SSE10	SSE9	SE10	SSE10	SSE11	SSE13	S13	S10	SSE10	S8	S15	S16	S14	S17	S16	S17	SSW15	SSW12	S10	SSW9	SSW22	SW11	SSW9	S11	S11.8	SSW22
5-Jun	S10	S10	S10	SSE9	SSE12	SSE11	S13	SSW13	SW16	SW14	SSW16	SSW18	SSW15	SSW15	SW12	SW13	SSW13	WNW15	SSW21	SSE13	SSE9	S7	SSE9	SSW8	SSW11.2	SSW21
6-Jun	SW8	WSW10	WSW12	WSW12	SW9	WSW8	WSW7	W9	WNW7	WNW5	SW6	SW7	SW9	SW7	SW10	WSW11	WSW9	S4	SSE5	SSE1	NNE1	NNW7	NNW7	NW5	WSW5.7	WSW12
7-Jun	WNW3	WSW4	WNW6	NW14	NNW6	NW7	WNW13	NW12	NW12	NW14	NW15	NW14	NW18	WNW19	WNW14	NW15	WNW14	WNW12	NW12	NW7	NW3	WSW4	N7	SSE2	NW9.6	WNW19
8-Jun	SSE6	SSW7	SSW9	SSW6	SSW5	WSW5	WNW6	WNW9	NW9	NNW10	NNE3	SE6	WSW7	NNE10	E14	ESE6	ESE2	NNW16	NNW27	NNW21	NNW18	NNW12	NNW14	NNW15	NNW5.0	NNW27
9-Jun	NNW12	NW12	NNW13	NW7	WNW4	WNW8	W5	W6	NW8	NW9	NW7	WSW6	NW12	NE12	NNE10	NNE9	NW11	NNW10	N7	NNW6	N5	NNE5	NNE8	N8	NNW6.9	NNW13
10-Jun	N6	NNW4	N4	N4	NNE5	NE2	SSW2	SW2	NE4	NNE4	W3	WSW4	WSW6	W4	E3	N5	NNE4	ESE1	WSW11	S6	SE5	SE5	S4	SE6	NW0.3	WSW11
11-Jun	SE9	SE9	SSE9	SSE10	SSE13	SSW5	SE12	SSE12	SE10	SSE13	S12	SSE9	S10	SW13	SW15	W13	WNW8	SSW8	SSE11	SSE9	SSE8	SSW6	SE10	ESE10	S7.7	SW15
12-Jun	N6	N7	N6	SSW1	SW3	WSW6	NW4	NNW6	NNW4	S1	WSW4	SW4	SW4	SSW7	SW7	SSW6	SE21	SE16	ESE15	NNE8	N10	E11	E9	ENE8	E1.3	SE21
13-Jun	NNE8	NNE8	N8	N8	N8	NNW12	NNW13	N14	NNE18	NNE22	NNE24	NNE25	NNE23	NNE23	NNE24	NNE21	NNE24	NNE21	NNE20	NNE17	NNE13	NNE11	NNE11	NNE8	NNE15.5	NNE25
14-Jun	ESE5	NE4	NNE5	N5	N9	N11	NNE14	NNE14	NNE17	NNE19	NNE18	NNE17	NNE18	NNE19	NNE19	N18	NNE15	NNE12	N14	N13	N6	N5	NNE10	NNE11	NNE11.9	NNE19
15-Jun	NNE10	NNE11	NNE9	NNE8	NNE7	NNE6	NNE6	NNE8	NNE9	NE8	NE5	SSE2	NW1	SSE1	SSW6	SSW4	S5	N2	N5	S6	S6	S5	S4	NNE2.7	NNE11	
16-Jun	NNW3	N12	NNE9	NNE12	NNE9	NNE10	NNE12	NNE13	NNE13	NNE13	N15	N16	N14	N15	N16	N15	N15	N11	N9	NNW7	N4	N8	NNE11	N11.3	N16	
17-Jun	NNE10	N9	NNW8	NNW11	NNW10	NNW12	N11	N11	N14	N12	NNE7	NNW8	NW6	WNW8	WNW6	SW8	SSW9	S7	SSW10	S12	S11	S10	S8	S9	NW2.5	N14
18-Jun	SSE8	SE6	SE6	SSE14	SSE13	SSE14	S11	S11	S11	S10	SSE8	SE7	S1	S6	SSE8	S6	S6	SW9	SSW5	E1	SE2	WNW10	W7	W8	S6.2	SSE14
19-Jun	WNW7	N13	N15	NNE16	NNE17	NNE15	NNE12	NNE12	NE14	NE16	NNE14	NE13	NNE8	N10	N13	N11	N12	N12	NNE8	NE7	NE5	NNE5	N9	NNE7	NNE10.7	NNE17
20-Jun	NNE6	N5	NNE3	NW1	SSE0	N2	S4	SSW3	SW4	SW5	NW6	N10	N10	NNW4	NNW5	NNW5	NNW8	NNE8	NNE9	NNE7	NNE7	N10	NNE5	ENE2	N3.8	N10
21-Jun	N6	N8	N5	N8	N7	NNE7	NNE7	NNE6	NNE5	NNW7	N8	NNE8	N9	N9	N12	N13	N12	NNE10	NNE11	NNE9	N9	NNW6	NW6	WNW6	N7.7	N13
22-Jun	N2	WNW5	WNW6	WNW6	WNW7	W4	WSW5	W4	NNW6	NNW6	NW4	N9	N15	NNW1	WSW11	W11	WNW14	NNW14	N5	ENE4	ENE4	E3	SE1	ENE2	NW4.1	N15
23-Jun	S0	NNE1	SSE1	S2	SSW6	SSW7	SSE5	S7	SSW4	SSW6	SW9	SSW5	N7	NNW12	SSE2	SSW5	SW8	SSW7	S5	S9	SSW9	SSW5	SSE2	SSE6	SSW3.8	NNW12
24-Jun	SSE2	SSE3	SSW3	SE2	SSW5	SSW9	SSW9	S8	S9	S9	SSW10	SW11	SW11	WSW11	SW12	SW13	WSW9	W8	N10	NNE4	ENE5	NNE11	NNE9	NNE8	SW3.5	SW13
25-Jun	N2	NNE2	NNE5	N3	NNE7	NNE7	N5	NNE6	N6	NNW4	NW3	S5	SSW3	S5	WSW1	NNW14	NNE3	ENE7	W3	S3	W6	WSW2	S7	S6	N1.5	NNW14
26-Jun	S7	S8	SSW5	SW3	SW7	S7	SSW9	SSW7	SSW8	WSW8	WSW8	WNW14	W14	W16	W16	W18	WNW19	NW16	NNW10	W8	NNW4	SSE3	SW3	SW4	W6.9	WNW19
27-Jun	SW3	SSW3	WSW4	WSW4	SSW3	SW5	SSW6	SW9	SSW8	SSW9	SSW8	SW10	WSW12	W11	W10	W9	WSW10	WSW11	W7	WSW6	W5	W4	WSW4	W6	WSW6.3	WSW12
28-Jun	WSW5	W6	W3	SSW3	SW3	W5	WNW7	NNW7	N8	NNW14	NNW19	NW20	NNW21	NW24	NW21	NW19	NW15	NW15	N13	NNW11	NW9	NNW7	NNW10	N9	NW10.4	NW24
29-Jun	NW6	WNW6	SSE2	SW4	S2	SW4	SSW5	SSW5	SSW4	SW3	WSW6	WNW6	SW8	WSW9	SSW12	SW12	WSW5	WNW4	N1	NNE8	NNE9	ENE10	ENE9	NNE7	WSW1.9	SSW12
30-Jun	N7	N9	N9	N8	E1	NE2	SSE2	WSW3	NNW2	E3	ESE5	ESE3	ESE5	E4	E4	N7	NNE9	NE5	NW6	NW5	S3	SE7	WSW7	WNW11	NNE2.1	WNW11

NNW1.0	NNW2.1	NNW1.6	NNW1.8	NW1.0	NW1.8	NNW1.0	NNW1.6	NNW2.1	NNW2.6	NW2.4	NW2.2	NNW3.7	NW3.9	NNW3.0	NNW4.2	NNW3.7	NW3.4	NNW2.4	N1.6	NNW0.4	NNE0.7	NNW0.8	N0.9	Diurnal Average	
NNW12	N13	N15	NNE16	NNE17	NW18	NW19	NW19	NW19	NNE22	NNE24	NNE25	NNE23	NW24	NNE24	NNW21	NNE24	NNW21	NNW27	NNW21	SSW22	SSE15	SSE15	NNW15	Diurnal Maximum	

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

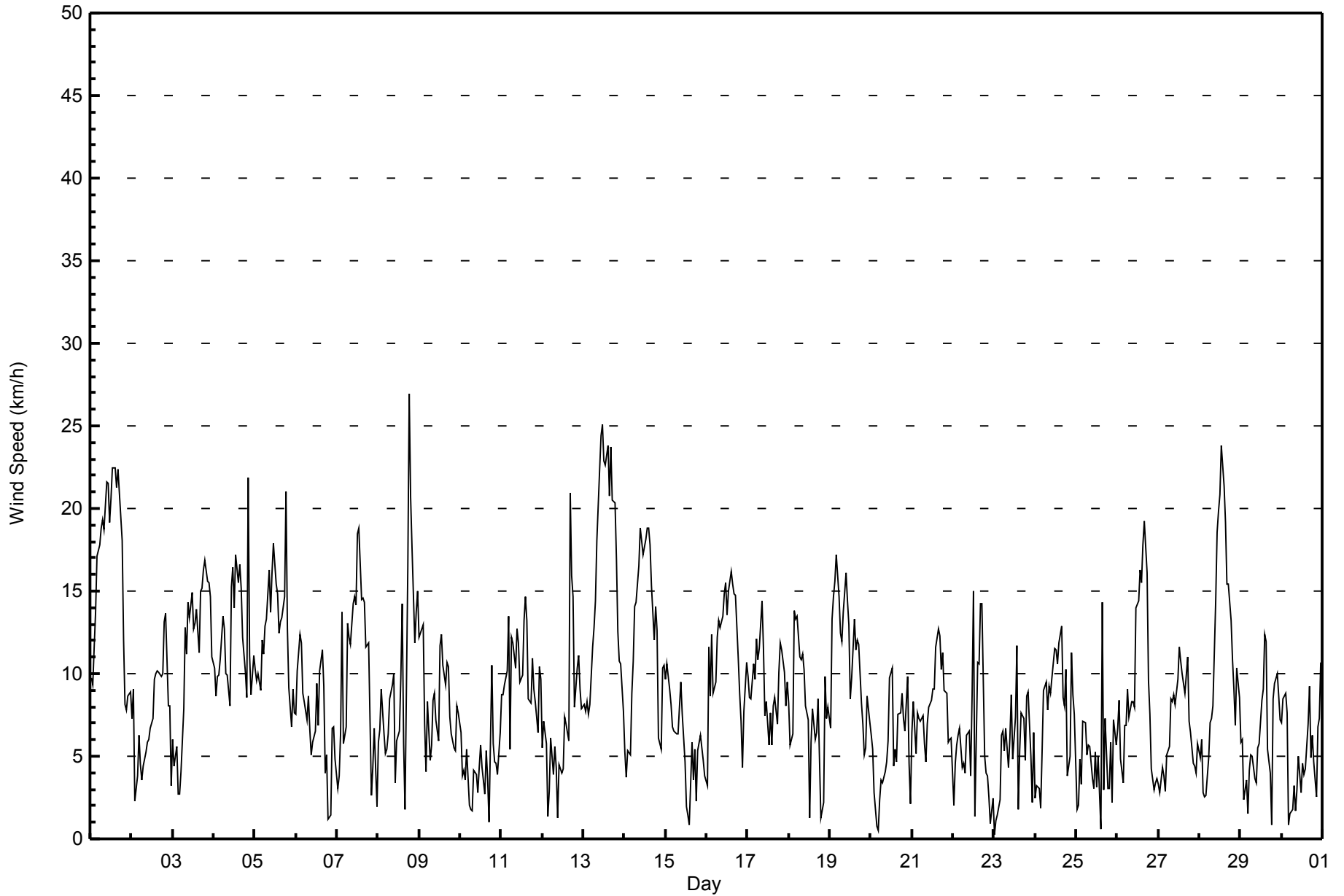
Wind Speed (WS) - km/h
Mildred Lake - June 2015

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



WBEA
Hourly Averages

Wind Speed (WS) - km/h
Mildred Lake - June 2015





WBEA
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Mildred Lake - June 2015

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	189	26.25	26.25
6 - 11	336	46.67	72.92
12 - 19	168	23.33	96.25
20 - 28	27	3.75	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



WBEA
Frequency Distribution

Wind Speed (WS) - km/h
Mildred Lake - June 2015

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	19	17	8	5	7	8	7	15	17	23	15	14	10	5	8	11	189
6 - 11	47	54	2	4	2	2	13	25	41	31	20	21	14	21	18	21	336
12 - 19	25	25	4	0	0	2	2	16	19	9	8	4	5	9	21	19	168
20 - 28	0	10	0	0	0	0	1	0	0	2	0	0	0	1	7	6	27
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	91	106	14	9	9	12	23	56	77	65	43	39	29	36	54	57	720

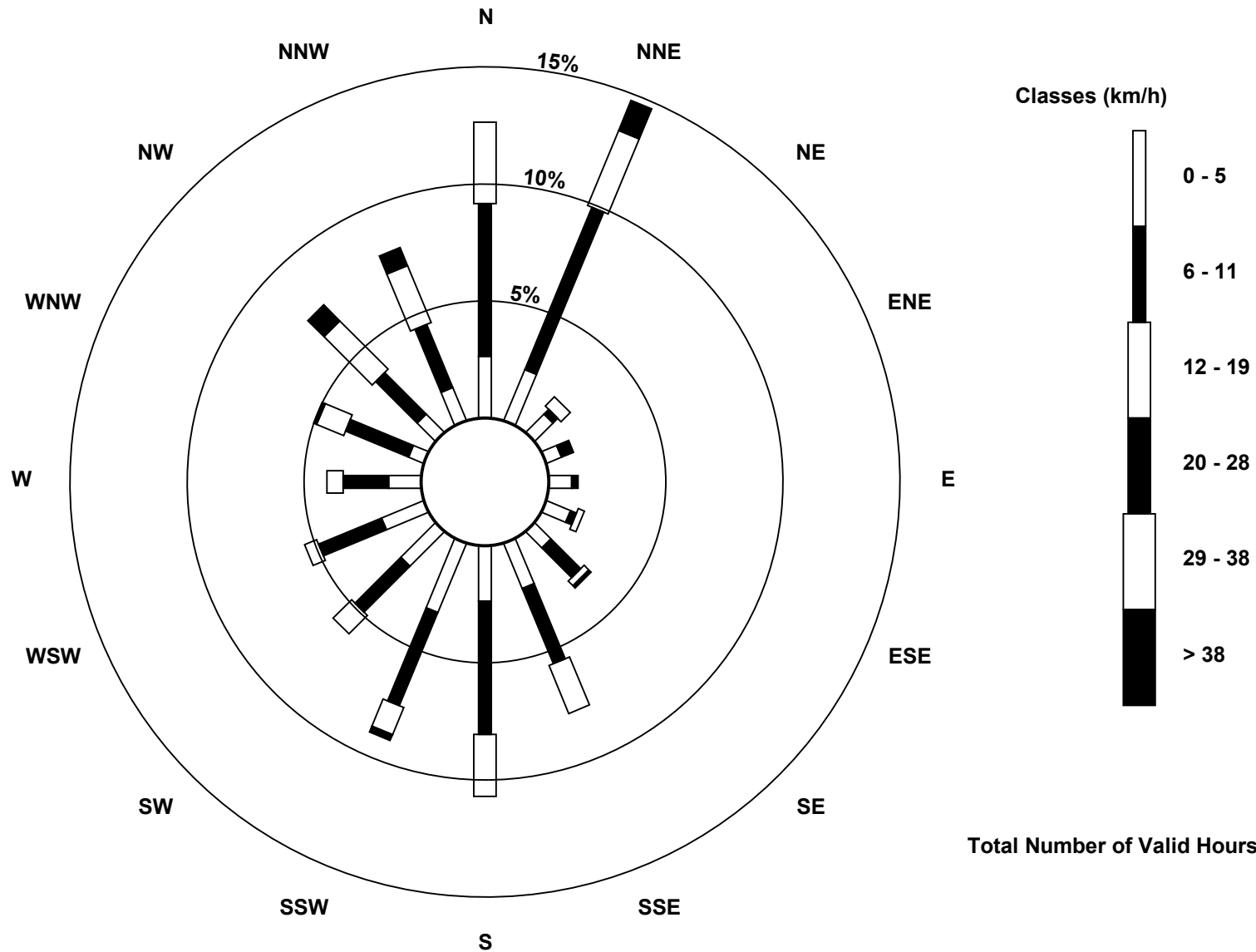
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

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





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Mildred Lake - June 2015

Direction of Maximum Speed: 338 deg on Jun 8 19:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 322.2 deg on Jun 1	Hours of Data: 720
Direction of Minimum Speed: 180 deg on Jun 23 01:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 0.3 deg on Jun 10	Percent Operational Time: 100.0
Monthly Average Direction: 275.5 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	304	300	313	330	322	318	316	316	323	324	321	312	312	328	323	334	332	340	340	333	319	307	305	317	322.2
2-Jun	358	2	319	9	7	18	81	200	177	206	205	205	184	187	173	168	173	166	152	156	159	124	191	170	167.6
3-Jun	167	138	175	143	41	108	145	165	147	175	175	160	173	172	167	190	178	177	173	171	170	168	168	175	167.9
4-Jun	164	147	141	159	168	162	174	172	159	175	174	178	174	172	179	189	197	200	180	194	209	223	195	172	179.0
5-Jun	182	170	170	161	168	164	169	194	214	228	211	204	211	205	221	219	212	282	202	159	158	190	168	202	197.0
6-Jun	216	240	254	252	231	246	251	270	296	294	233	232	217	214	230	247	240	169	157	147	16	339	335	322	247.4
7-Jun	282	253	288	312	346	308	300	311	321	314	321	312	316	296	289	313	296	294	324	317	326	246	355	157	308.0
8-Jun	166	198	200	210	208	250	285	298	307	329	12	126	253	30	101	109	107	331	338	343	338	338	332	332	327.4
9-Jun	329	326	343	323	294	297	263	262	310	325	312	255	324	41	27	15	321	336	354	345	6	13	17	5	337.0
10-Jun	3	333	358	8	14	46	209	220	55	27	269	254	241	262	89	350	15	115	240	176	135	128	178	144	311.0
11-Jun	141	137	163	160	162	197	124	167	140	159	171	147	191	236	222	279	290	199	157	158	154	201	138	122	171.0
12-Jun	349	352	351	193	233	253	322	339	330	174	255	228	234	210	235	197	128	132	106	20	355	79	80	58	90.2
13-Jun	33	13	7	8	353	344	340	2	16	20	29	15	31	27	24	32	26	26	30	26	33	20	15	29	20.1
14-Jun	107	56	29	5	351	358	21	31	12	22	18	20	26	14	15	6	14	18	350	350	358	8	13	28	14.8
15-Jun	24	21	31	16	29	32	22	28	26	24	35	37	151	317	155	205	200	188	351	10	187	182	182	187	33.3
16-Jun	330	11	33	15	17	16	18	12	13	14	0	7	359	6	356	3	353	351	11	357	345	2	10	21	6.4
17-Jun	15	358	337	348	346	347	1	355	359	5	17	346	313	302	298	215	195	182	192	178	189	184	184	183	323.5
18-Jun	164	134	141	162	166	164	171	177	183	184	155	144	186	180	167	181	183	217	209	81	145	284	275	279	179.4
19-Jun	300	358	8	18	25	23	20	24	37	41	33	55	28	6	352	10	5	7	23	56	39	28	1	21	19.5
20-Jun	19	1	13	324	156	10	191	198	219	226	315	8	356	329	344	343	343	20	18	21	26	10	29	58	0.6
21-Jun	2	360	353	356	4	22	23	15	30	337	358	17	6	355	9	10	356	21	32	12	357	343	322	300	3.7
22-Jun	356	300	285	285	297	260	247	279	330	345	318	355	358	328	246	272	296	336	6	66	73	88	135	77	315.6
23-Jun	180	23	151	189	208	200	166	180	205	202	218	196	349	335	160	210	215	208	188	188	203	209	164	166	203.4
24-Jun	160	164	198	138	196	198	200	184	180	182	211	227	231	241	226	215	252	273	1	15	58	20	28	26	218.8
25-Jun	353	30	13	5	12	12	10	15	4	341	309	189	196	181	246	344	18	72	266	180	271	241	185	187	350.3
26-Jun	180	174	193	233	215	185	196	210	213	245	251	301	271	279	281	281	286	305	290	279	335	153	225	236	259.4
27-Jun	226	207	239	257	209	236	225	220	212	210	212	225	250	276	270	279	250	252	274	243	266	264	241	264	244.3
28-Jun	256	276	280	206	216	261	300	334	358	344	335	320	303	320	319	320	326	322	353	338	320	337	332	1	322.7
29-Jun	319	288	168	220	179	232	196	196	210	230	258	284	219	239	208	214	241	283	2	28	29	59	68	13	244.2
30-Jun	5	6	8	4	81	44	153	247	334	101	102	107	102	86	94	5	13	54	316	317	182	127	253	288	14.1

342.0 345.8 336.6 332.2 325.6 305.1 296.9 289.8 336.9 332.7 315.0 311.1 299.2 304.6 291.7 299.8 301.7 319.4 342.4 5.1 329.9 12.6 348.2 352.2

Diurnal Average

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



Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg

Mildred Lake - June 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 103 deg on Jun 8 11:00	Hours of Data: 720
Minimum Value: 8 deg on Jun 30 03:00	Hours of Missing Data: 0
Percentiles: P ₁ = 10 P ₁₀ = 14 Q ₁ = 18 Median = 24 Q ₃ = 38 P ₉₀ = 62 P ₉₉ = 94	Hours of Calibration: 0
	Percent Operational Time: 100.0

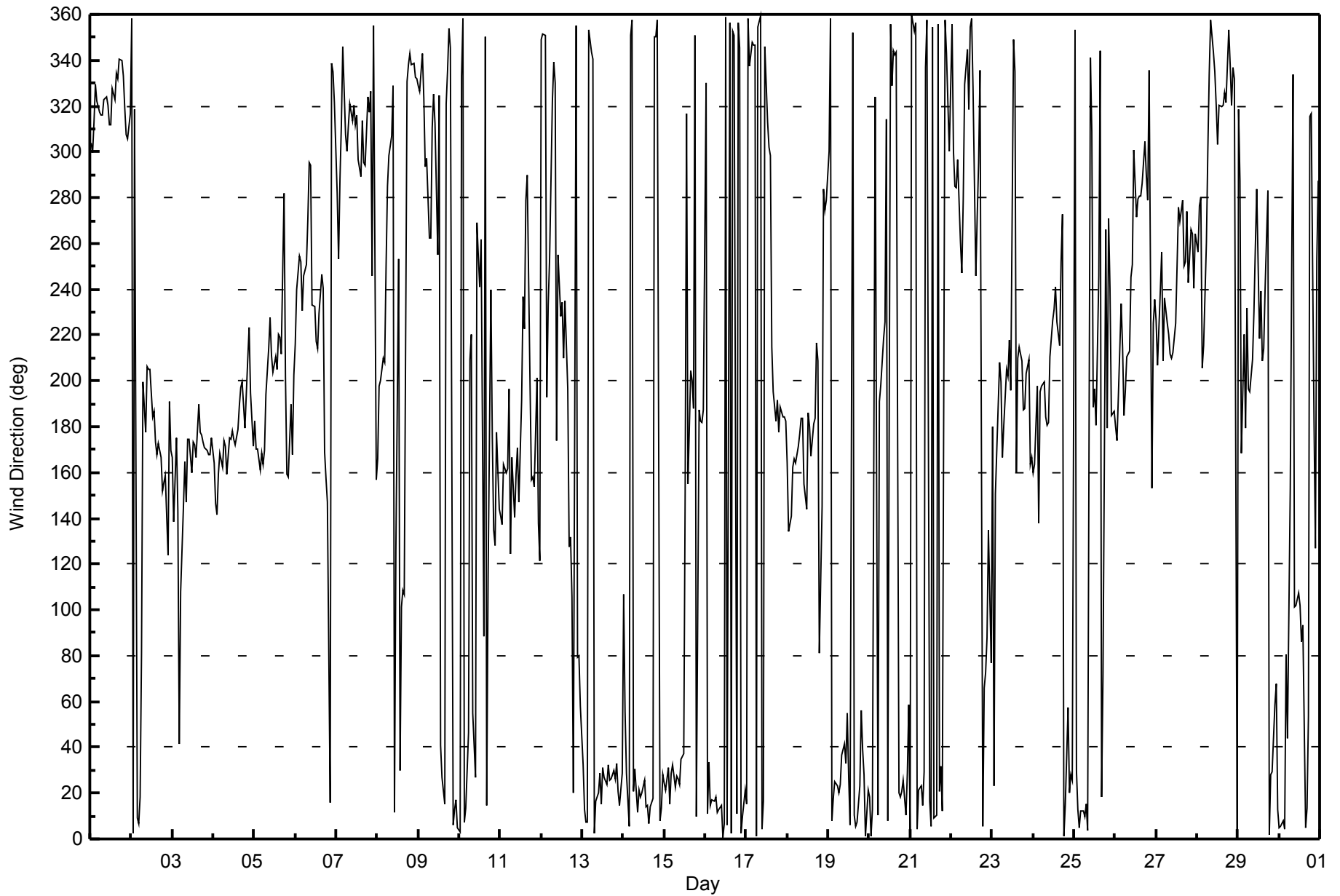
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	18	19	19	15	15	16	16	17	17	18	18	21	21	18	18	19	14	16	14	17	16	13	14	15	21
2-Jun	18	10	62	26	14	14	56	51	51	51	53	50	51	34	34	28	28	31	26	16	13	13	41	56	62
3-Jun	14	21	31	48	22	55	22	15	28	18	22	20	26	28	29	38	20	20	17	14	11	11	12	16	55
4-Jun	13	17	16	13	11	12	14	20	20	36	23	24	22	21	29	21	22	24	20	29	20	24	24	14	36
5-Jun	16	14	13	12	13	13	14	18	20	26	25	18	22	21	28	24	22	33	22	24	24	25	13	27	33
6-Jun	27	27	26	29	26	27	27	29	34	42	43	44	26	53	29	27	37	64	33	83	61	9	10	10	83
7-Jun	36	28	46	28	47	36	18	19	20	19	18	25	18	24	23	24	21	21	15	15	61	43	53	79	79
8-Jun	15	19	16	26	33	26	32	27	26	26	103	35	64	57	16	37	79	21	13	12	11	11	12	11	103
9-Jun	11	13	12	21	29	16	40	37	41	23	58	60	41	31	40	31	26	24	20	21	13	11	14	11	60
10-Jun	14	28	11	16	11	61	82	89	63	68	80	64	49	68	96	51	77	96	26	24	32	11	18	14	96
11-Jun	11	12	14	13	12	65	55	21	18	17	21	27	39	29	25	46	37	34	19	24	21	66	24	19	66
12-Jun	45	26	76	78	70	21	53	35	45	92	64	74	64	39	38	47	17	20	14	48	19	19	15	21	92
13-Jun	18	18	13	12	14	10	12	16	19	21	23	20	22	21	21	21	22	22	22	22	21	16	16	23	23
14-Jun	18	30	17	36	12	15	19	22	20	21	25	27	26	21	24	23	25	26	23	19	13	27	15	16	36
15-Jun	20	17	18	16	18	18	17	22	18	20	24	35	84	87	93	31	65	33	90	28	35	16	18	22	93
16-Jun	77	21	19	15	18	17	17	15	17	19	19	20	21	27	25	27	22	20	25	14	9	14	19	15	77
17-Jun	16	17	14	14	13	11	14	20	17	27	53	51	66	49	62	39	31	38	21	18	18	17	17	18	66
18-Jun	19	49	54	10	12	12	20	18	21	22	37	45	92	53	27	38	36	28	20	69	58	29	33	28	92
19-Jun	25	14	14	16	16	19	20	21	27	25	26	29	49	37	23	33	24	23	41	20	15	18	15	12	49
20-Jun	13	21	57	78	89	37	62	45	47	41	55	44	57	87	73	84	49	41	24	17	14	14	67	54	89
21-Jun	15	11	25	11	11	15	18	23	36	27	34	40	38	41	29	33	20	24	20	19	14	16	15	21	41
22-Jun	55	31	31	31	24	32	30	51	41	33	87	46	33	94	25	30	22	21	44	19	15	60	60	45	94
23-Jun	92	68	74	45	19	17	24	27	52	48	28	68	71	46	71	52	33	22	28	16	14	20	47	25	92
24-Jun	87	43	62	73	23	13	17	24	23	22	26	28	27	35	27	21	36	47	21	37	27	19	16	16	87
25-Jun	94	66	16	31	12	12	19	21	28	70	67	51	81	61	100	52	72	34	60	79	45	75	20	22	100
26-Jun	19	16	52	52	19	29	22	22	23	29	33	28	29	27	26	25	24	20	25	27	74	32	30	61	74
27-Jun	32	43	30	41	45	27	26	23	20	21	27	27	32	32	35	36	36	26	27	33	46	28	27	24	46
28-Jun	24	31	79	59	75	31	25	21	24	22	17	21	22	21	23	20	26	25	14	11	13	11	18	13	79
29-Jun	24	21	62	25	53	18	13	17	38	63	47	49	41	37	21	22	50	62	99	17	14	18	22	14	99
30-Jun	11	12	8	13	73	48	69	43	73	19	16	42	19	23	26	15	17	35	40	44	77	27	43	27	77

94	68	79	78	89	65	82	89	73	92	103	74	92	94	100	84	79	96	99	83	77	75	67	79	
Diurnal Maximum																								



WBEA
Hourly Averages

Wind Direction (WD) - deg
Mildred Lake - June 2015





Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

Calibration Date	June 22, 2015	Last Calibration	May 12, 2015
Station Name	Mildred Lake	Station Number	AMS 2
Reason:	Routine		
Start Time (MST)	9:13	End Time (MST)	13:40
Gas Cert Reference	CC307191	Station temp.	22 Deg C
Cal Gas Concentration	59.4 ppm	Cal Gas Exp Date	26/03/2012
Calibrator Make/Model	Sabio 4010	Serial Number	11541008
ZAG Make/Model	API 701	Serial Number	825
DACS make/model	Campbell Scientific CR3000	DACS serial No.	8346

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		PMT voltage	-652	-654
Analyzer IP address	192.168.1.43		Lamp voltage	782	809
Calculated slope	0.995872	1.002731	Chamber temp	45.1	45.1
Calculated intercept	2.772657	0.734685	Pressure	696.5	692.6
Analyzer Background	25.4	22.4	Flow	0.492	0.489
Analyzer Coefficient	1.119	1.022	Intensity	91	89
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	-1.7	----
as found span	5000	69.9	830.4	817.1	1.016
calibrator zero	5000	0.0	0.0	0.5	----
high point	5000	69.9	830.4	828.2	1.003
second point	5000	35.4	420.6	417.6	1.007
third point	5000	17.7	210.3	208.0	1.011
as left zero	5000	0.0	0.0	0.6	----
as left span	5000	69.9	830.4	823.9	1.008
Average Correction Factor					1.007

Corrected As found 818.8 Previous response 831.1 % change 1.5%

Notes:

Sample inlet filter changed after as founds. Replaced flash lamp. Performed 'pre-calibration' test. Adjusted zero and span.

Calibration Performed By:

_____ Asad Hidayat



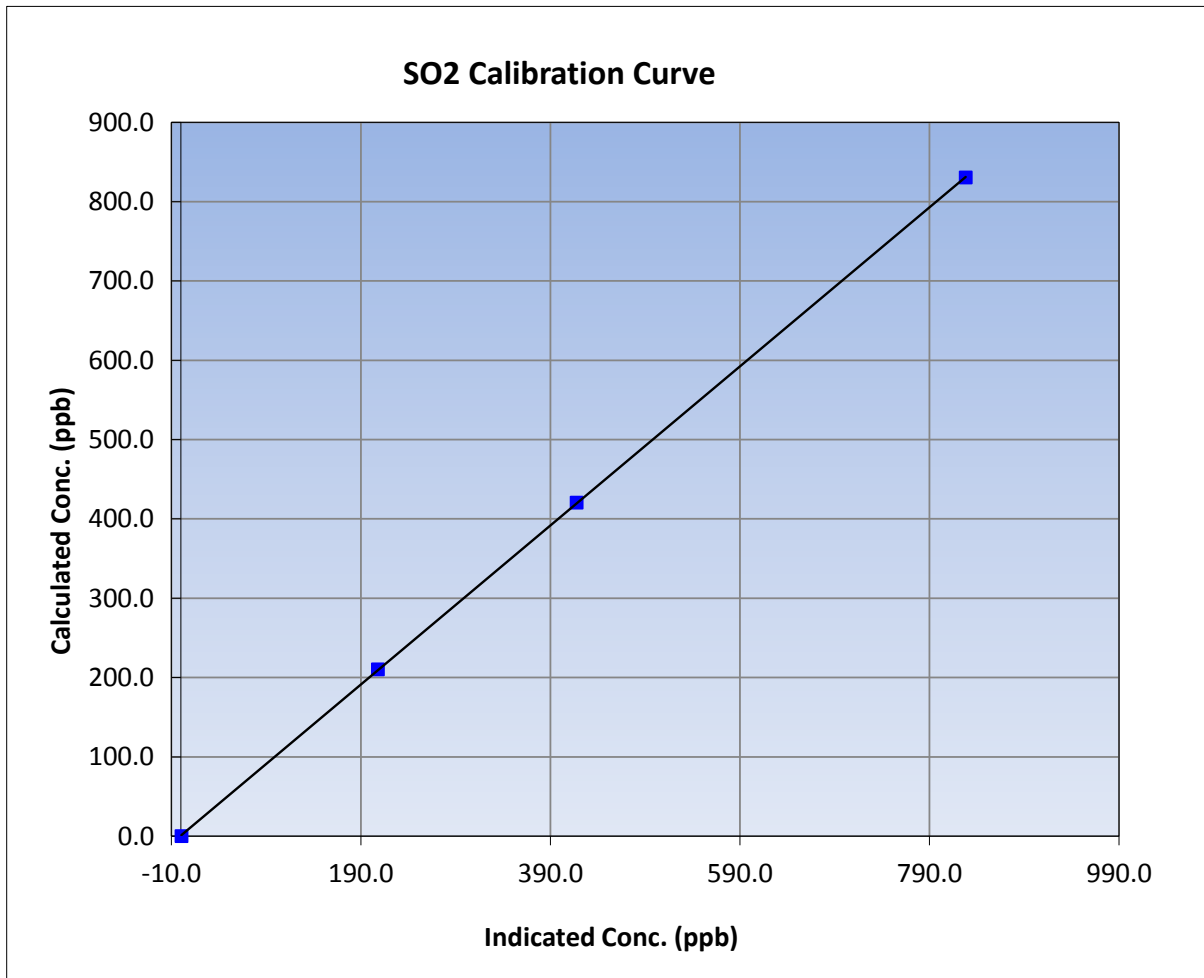
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	June 22, 2015	Previous Calibration	May 12, 2015
Station Name	Mildred Lake	Station Number	AMS 2
Start Time (MST)	9:13	End Time (MST)	13:40
Analyzer make	TEI 43i	Analyzer serial #	JC1404901075

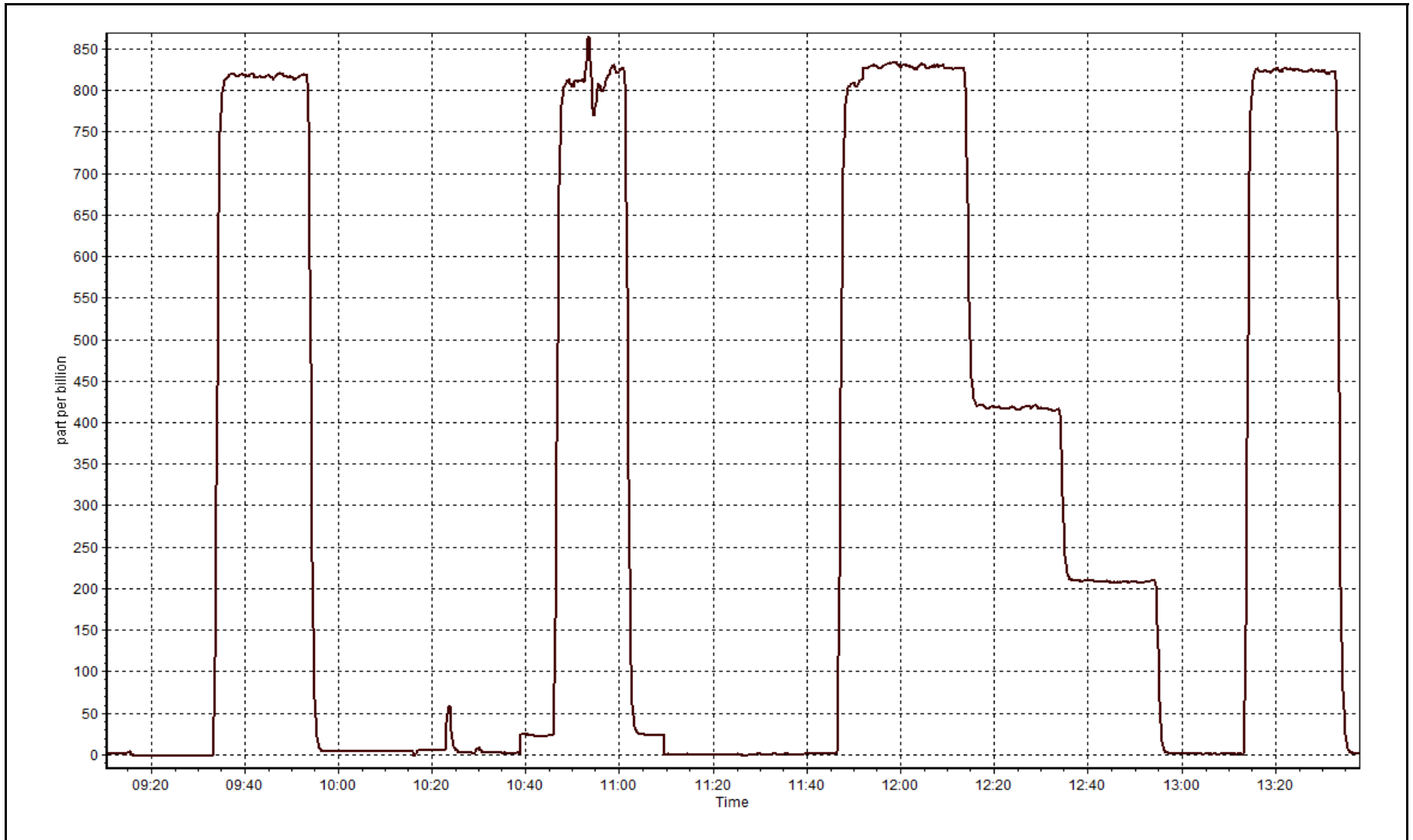
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.5	----	Correlation Coefficient	0.999989
830.4	828.2	1.0027		
420.6	417.6	1.0071	Slope	1.002731
210.3	208.0	1.0109		
			Intercept	0.734685



SO2 Calibration Plot

Date: June 22, 2015





Wood Buffalo Environmental Association H2S Calibration Report

Station Information

Calibration Date	June 23, 2015	Last Calibration	May 19, 2015
Station Name	Mildred Lake	Station Number	AMS 2
Reason:	Routine		
Start Time (MST)	8:51	End Time (MST)	11:25
Gas Cert Reference	ALM028262	Station temp.	22 Deg C
Cal Gas Concentration	5.04 ppm	Cal Gas Exp Date	09/09/2017
Calibrator Make/Model	Sabio 4010	Serial Number	11541008
ZAG air Make/Model	API 701	Serial Number	825
DACS make/model	Campbell Scientific CR3000	Serial Number	8346
SO2 gas concentration	59.4 ppm	SO2 gas cert/exp	CC307191 26/03/2012

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	777	774
Calculated slope	0.999615	1.007763	Chamber temp	45	45
Calculated intercept	-0.248405	-0.173163	Pressure	561.2	558.2
Analyzer Background	13.9	13.9	Flow	0.977	0.951
Analyzer Coefficient	0.908	0.908	Intensity	87	88
			Converter temp.	324	325
Analyzer make/model	TEI 450i		Analyzer serial #	815129107	
Converter make/model	n/a		Converter serial #	n/a	

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	4000	0.0	0.0	0.1	----
as found span	4000	63.5	80.0	79.4	1.007
SO2 scrubber check	5000	17.7	210.3	0.2	----
calibrator zero	4000	0.0	0.0	0.1	----
high point	4000	63.5	80.0	79.4	1.007
second point	4000	31.8	40.1	40.2	0.997
third point	4000	15.9	20.0	20.0	1.001
as left zero	5000	0.0	0.0	0.0	----
as left span	4000	63.5	80.0	79.7	1.004
Average Correction Factor					1.002

Corrected As found	79.4	Previous response	80.3	% change	1.2%
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Notes:

Changed inlter filter and scrubber check done after as founds. No adjustments.

Calibration Performed By:

Asad Hidayat



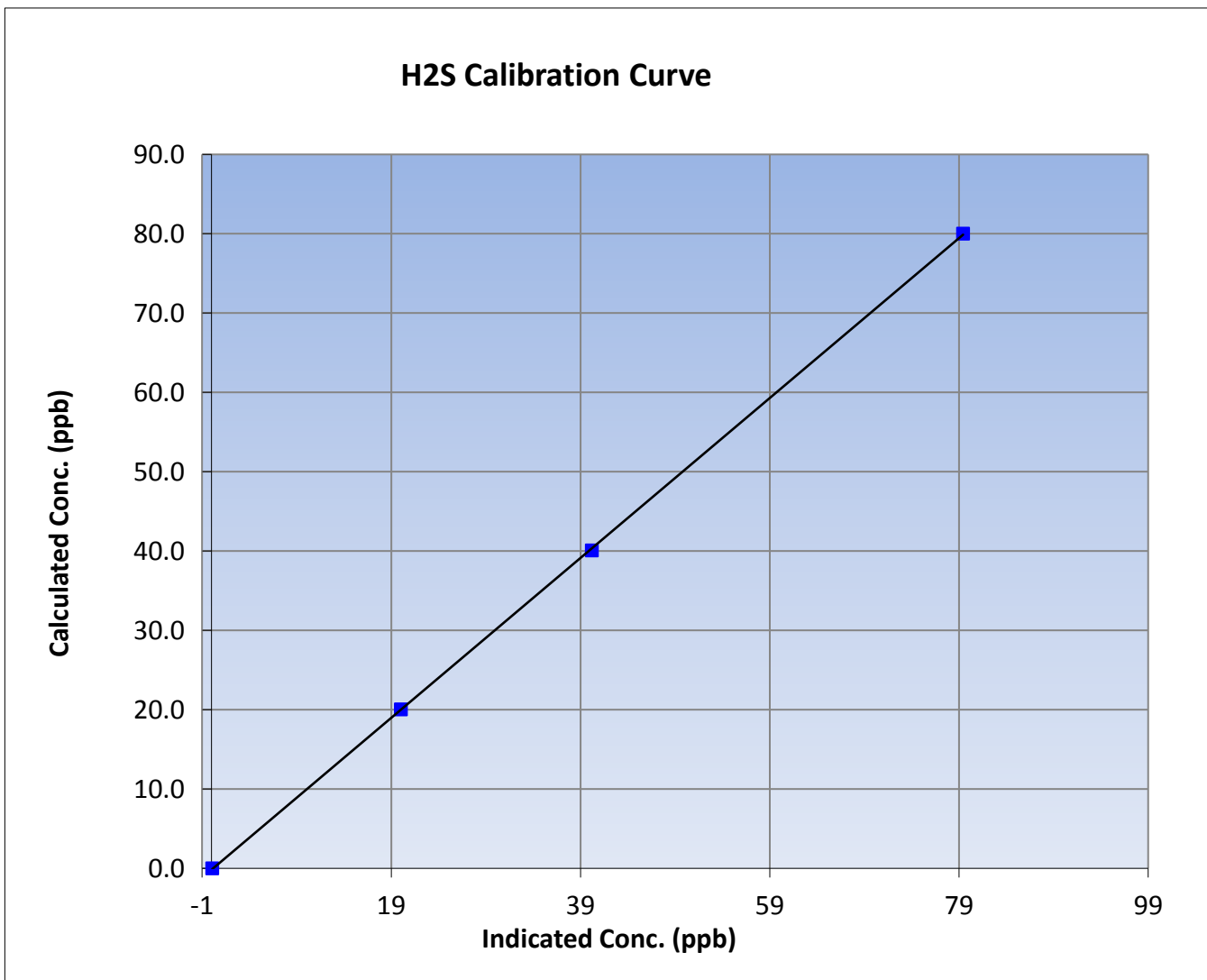
Wood Buffalo Environmental Association H2S Calibration Report

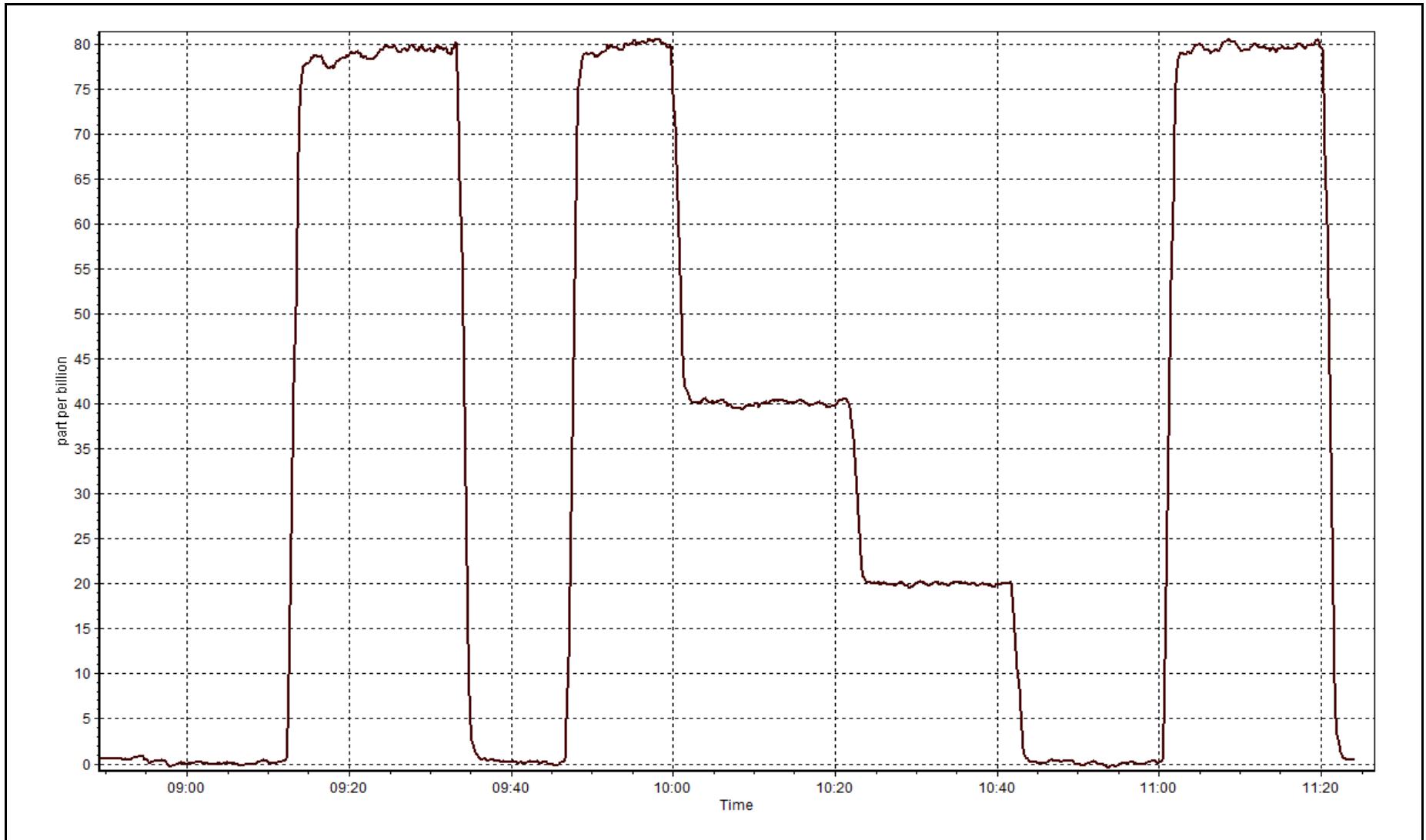
Station Information

Calibration Date	June 23, 2015	Previous Calibration	May 19, 2015
Station Name	Mildred Lake	Station Number	AMS 2
Start Time (MST)	8:51	End Time (MST)	11:25
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	0.1	----	Correlation Coefficient	0.999971
80.0	79.4	1.0072		
40.1	40.2	0.9967	Slope	1.007763
20.0	20.0	1.0012		
			Intercept	-0.173163







Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	June-22-15	Last Calibration	May-12-15
Station Name	Mildred Lake	Station Number	AMS 2
Reason:	Routine		
Start Time (MST)	9:13	End Time (MST)	13:40
Gas Cert Reference	CC307191	Cal Gas Expiry Date	26/03/2012
CH4 Cal Gas Conc.	505 ppm	CH4 Equiv Conc.	1060.5 ppm
C3H8 Cal Gas Conc.	202 ppm	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11541008
ZAG make/model	Teledyne API 701	Serial Number	825
DACS make/model	Campbell Scientific CR3000	Serial Number	8346

Analyzer Information

	<i>Before</i>	<i>After</i>		<i>Before</i>	<i>After</i>
Analyzer Range	0 - 50 ppm		Sample Pressure	8.2	8.2
Analyzer IP address	192.168.1.51		Air or Bypass Press	39.8	39.8
Calculated slope	0.997760	1.003694	Fuel Pressure	25.7	25.7
Calculated intercept	0.034144	-0.022007	Analyzer Coeff	4.6	4.6
			Analyzer BKG	2.540	2.380
Analyzer make	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	-0.16	----
as found span	5000	69.9	14.83	14.74	1.006
calibrator zero	5000	0.0	0.00	0.02	----
high point	5000	69.9	14.83	14.79	1.002
second point	5000	35.4	7.51	7.51	1.000
third point	5000	17.7	3.75	3.76	0.998
as left zero	5000	0.0	0.00	0.02	----
as left span	5000	69.9	14.83	14.74	1.006
Average Correction Factor					1.000

Corrected As found	14.90	Previous response	14.82	% change	-0.5%
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Notes:

Sample inlet filter changed after as founds. Adjusted zero and span. Analyzer pulling ambient air from 9:52-10:28 MST while doing maintenance on SO2.

Calibration Performed By:

Asad Hidayat



Wood Buffalo Environmental Association THC Calibration Report

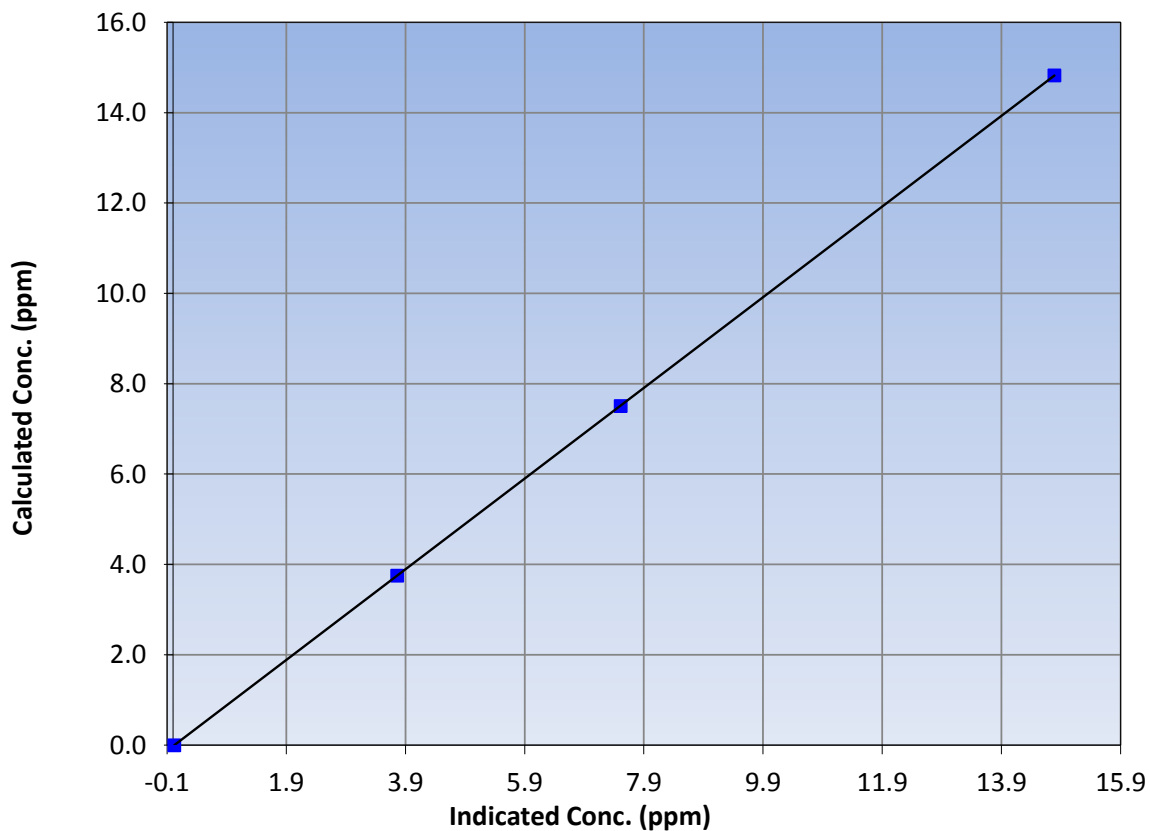
Station Information

Calibration Date	June 22, 2015	Previous Calibration	May 12, 2015
Station Name	Mildred Lake	Station Number	AMS 2
Start Time (MST)	9:13	End Time (MST)	13:40
Analyzer make	51i-LT	Analyzer serial #	1300156231

Calibration Data

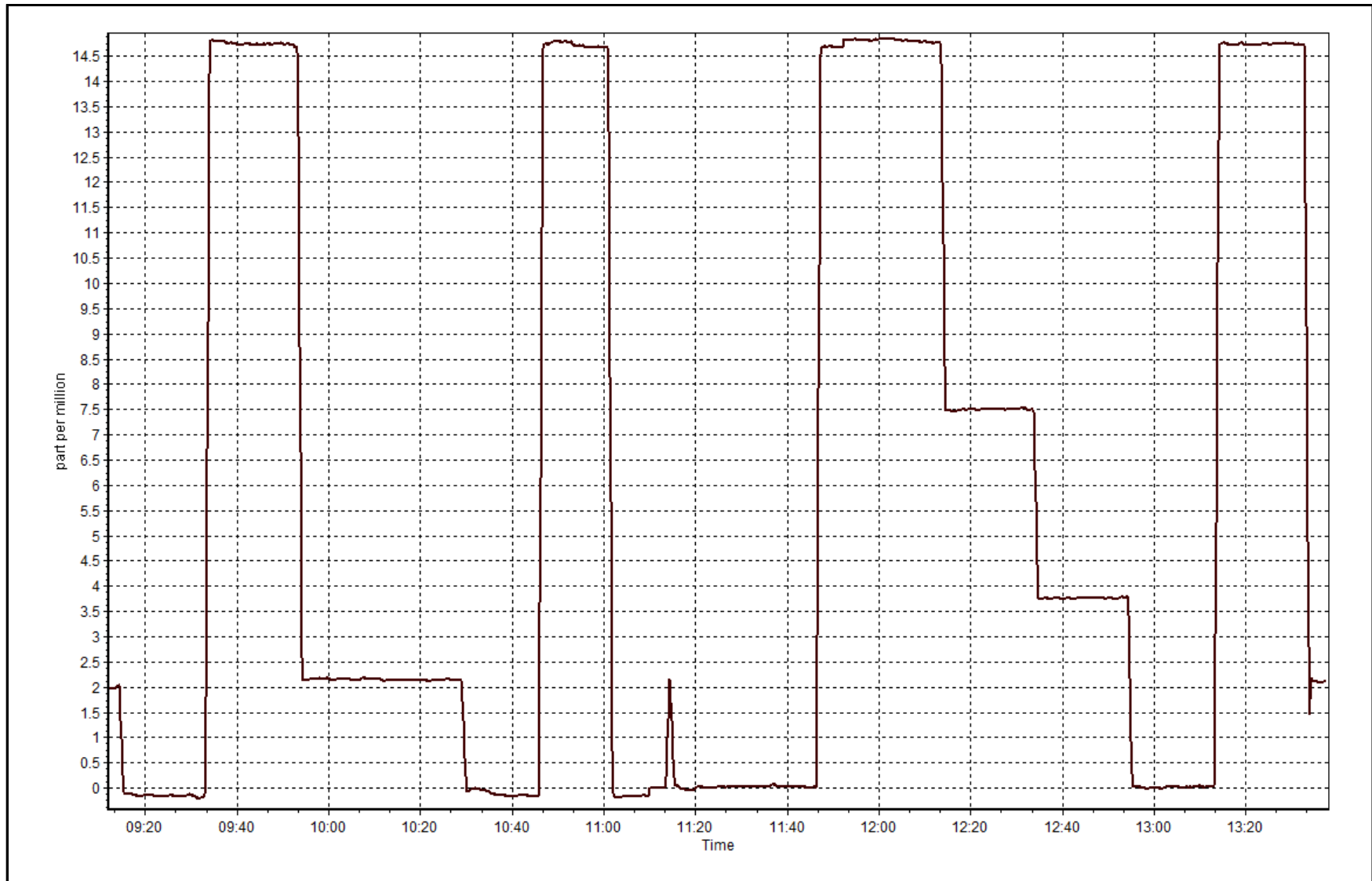
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.02	----	Correlation Coefficient	0.999999
14.83	14.79	1.0024		
7.51	7.51	0.9998	Slope	1.003694
3.75	3.76	0.9984		
			Intercept	-0.022007

THC Calibration Curve



THC Calibration Plot

Date: June 22, 2015





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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 3 LOWER CAMP METEOROLOGY JUNE 2015

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

July 30, 2015



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

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
Temperature 20 m (C) Average	720	0	0	100.00	31.6	-	24.6	-
Temperature 45 m (C) Average	720	0	0	100.00	31.4	-	24.7	-
Temperature 100 m (C) Average	720	0	0	100.00	30.8	-	24.7	-
Temperature 167 m (C) Average	720	0	0	100.00	30.2	-	24.5	-
Relative Humidity 20 m (%) Average	720	0	0	100.00	99	-	73.0	-
Relative Humidity 45 m (%) Average	720	0	0	100.00	98	-	72.0	-
Relative Humidity 100 m (%) Average	720	0	0	100.00	97	-	73.0	-
Relative Humidity 167 m (%) Average	720	0	0	100.00	95	-	75.0	-
Wind Speed 20 m (km/h) Average	720	0	0	100.00	25	-	13.0	-
Wind Speed 45 m (km/h) Average	720	0	0	100.00	31	-	18.0	-
Wind Speed 100 m (km/h) Average	720	0	0	100.00	44	-	27.0	-
Wind Speed 167 m (km/h) Average	572	0	148	79.44	41	-	28.0	-
Wind Direction 20 m (deg) Average	720	0	0	100.00	-	-	-	-
Wind Direction 45 m (deg) Average	720	0	0	100.00	-	-	-	-
Wind Direction 100 m (deg) Average	720	0	0	100.00	-	-	-	-
Wind Direction 167 m (deg) Average	572	0	148	79.44	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	720	0	0	100.00	1	-	0.4	-
Vertical Wind Speed 45 m (km/h) Average	720	0	0	100.00	1.6	-	0.7	-
Vertical Wind Speed 100 m (km/h) Average	720	0	0	100.00	2.5	-	0.9	-
Vertical Wind Speed 167 m (km/h) Average	572	0	148	79.44	2.9	-	1.6	-

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

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

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
Temperature 20 m (C) Average	720	17.71	5.5	-	1.9	10.8	13.9	17.3	21.2	25.1	31.6
Temperature 45 m (C) Average	720	17.66	5.4	-	2.2	10.8	13.9	17.4	21	24.9	31.4
Temperature 100 m (C) Average	720	17.5	5.3	-	2.5	10.4	13.8	17.4	20.9	24.6	30.8
Temperature 167 m (C) Average	720	17.34	5.3	-	3.4	10.1	13.8	17.3	20.8	24.3	30.2
Relative Humidity 20 m (%) Average	720	56.1	21	-	19	29	37	57	72	84	99
Relative Humidity 45 m (%) Average	720	54.4	20	-	18	28	37	55	70	81	98
Relative Humidity 100 m (%) Average	720	51.5	18	-	18	27	36	51	66	77	97
Relative Humidity 167 m (%) Average	720	49.8	18	-	18	26	35	49	63	75	95
Wind Speed 20 m (km/h) Average	720	7.1	5	-	0	2	3	6	10	14	25
Wind Speed 45 m (km/h) Average	720	9.6	6	-	0	2	5	8	13	19	31
Wind Speed 100 m (km/h) Average	720	13.8	8	-	0	4	8	13	19	25	44
Wind Speed 167 m (km/h) Average	572	15.7	9	-	0	5	9	15	22	29	41
Wind Direction 20 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-
Wind Direction 45 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-
Wind Direction 100 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-
Wind Direction 167 m (deg) Average	572	-	-	-	-	-	-	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	720	-0.1	0.3	-	-1.4	-0.5	-0.3	-0.1	0.1	0.3	1
Vertical Wind Speed 45 m (km/h) Average	720	-0.07	0.5	-	-1.6	-0.8	-0.4	-0.1	0.3	0.6	1.6
Vertical Wind Speed 100 m (km/h) Average	720	0.16	0.6	-	-1.5	-0.5	-0.2	0.1	0.4	0.9	2.5
Vertical Wind Speed 167 m (km/h) Average	572	0.42	0.8	-	-1.6	-0.4	0	0.3	0.8	1.5	2.9

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

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
Wind Speed, Wind Direction, Vertical Wind Speed 167 m	11 Jun 2015 07:00	17 Jun 2015 10:00	148	Flat line in sensor output signal

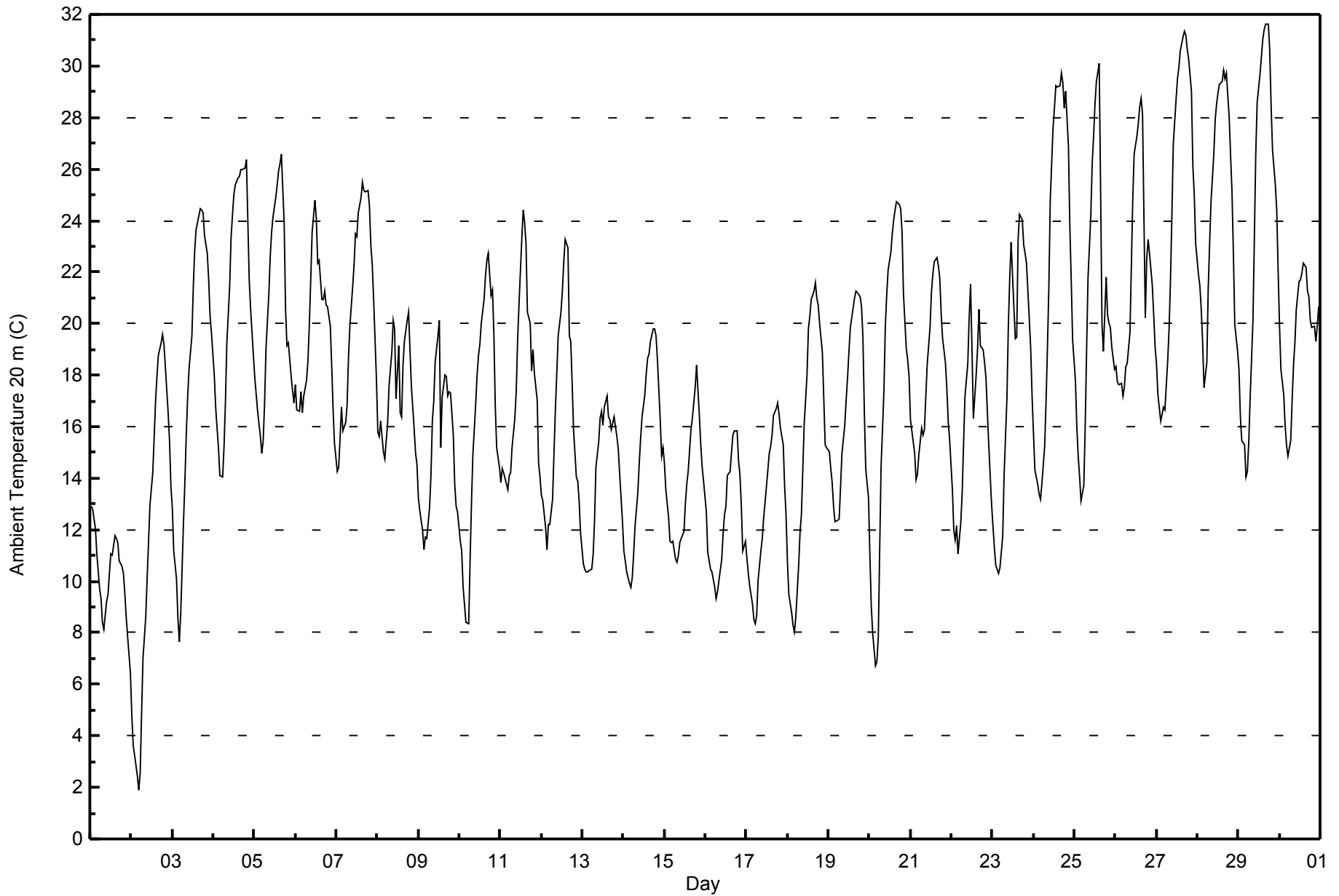


Maximum Value: 31.6 C on Jun 29 18:00 Maximum Daily Average: 24.6 C on Jun 27																						Hours in Service:	720			
Minimum Value: 1.9 C on Jun 2 05:00 Minimum Daily Average: 10.3 C on Jun 1																						Hours of Data:	720			
Maximum Diurnal Average: 22.3 C at hour 16 Minimum Diurnal Average: 12.1 C at hour 5																						Hours of Missing Data:	0			
Monthly Average: 17.71 C Percentiles: P ₁ = 6.4 P ₁₀ = 10.8 Q ₁ = 13.9 Median = 17.3 Q ₃ = 21.2 P ₉₀ = 25.1 P ₉₉ = 31.0																						Hours of Calibration:	0			
																						Percent Operational Time:	100.0			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	12.9	12.8	12.4	12.1	11.0	9.7	9.3	8.4	8.1	9.2	9.5	10.3	11.0	11.0	11.8	11.7	11.5	10.8	10.6	10.3	9.5	8.6	7.9	6.5	10.3	12.9
2-Jun	4.8	3.6	3.2	2.4	1.9	2.5	4.9	7.0	8.6	10.1	11.6	13.0	14.2	15.6	17.0	18.0	18.7	19.2	19.6	19.2	18.3	16.5	15.5	13.7	11.6	19.6
3-Jun	12.8	11.1	10.1	8.6	7.7	8.7	12.3	13.9	15.8	17.2	18.3	19.5	21.4	22.8	23.7	24.2	24.5	24.4	24.3	23.5	22.7	21.7	20.3	19.6	17.9	24.5
4-Jun	18.0	16.8	16.0	15.2	14.1	14.0	15.2	17.0	19.2	21.4	23.3	24.2	25.0	25.4	25.7	25.7	26.0	26.0	26.0	26.4	24.0	21.7	20.6	18.7	21.1	26.4
5-Jun	17.9	17.2	16.6	15.6	14.9	15.5	16.9	19.0	21.1	22.6	23.5	24.1	24.9	25.4	25.9	26.2	26.6	23.9	20.6	19.2	19.3	17.9	17.4	16.9	20.4	26.6
6-Jun	17.6	16.6	16.6	17.4	16.5	17.2	17.8	18.5	20.0	21.7	23.5	24.8	24.1	22.3	22.5	21.0	20.9	21.3	20.7	20.6	19.9	18.4	16.7	15.3	19.7	24.8
7-Jun	14.3	14.4	15.6	16.8	15.9	16.2	16.8	18.7	19.9	21.4	22.3	23.5	23.4	24.3	24.9	25.5	25.2	25.1	25.2	24.6	23.0	22.3	20.9	17.9	20.7	25.5
8-Jun	15.8	15.6	16.2	15.0	14.8	15.4	16.1	17.6	18.9	20.1	19.8	17.1	19.1	16.6	16.4	18.4	19.3	20.1	20.5	19.0	17.6	15.9	15.0	14.5	17.3	20.5
9-Jun	13.3	12.7	12.0	11.2	11.7	11.7	12.9	14.1	16.2	17.0	18.5	19.5	20.1	15.2	17.2	18.0	17.9	17.2	17.4	17.3	15.7	13.8	12.9	12.7	15.3	20.1
10-Jun	11.6	11.2	9.8	9.1	8.4	8.4	10.8	13.1	14.9	16.9	18.0	18.8	19.2	20.0	20.9	21.9	22.5	22.7	21.1	21.3	19.7	16.8	15.2	14.4	16.1	22.7
11-Jun	13.8	14.4	14.2	13.8	13.6	14.1	14.2	15.2	16.3	17.4	19.4	20.8	23.3	24.4	23.9	23.1	20.4	20.0	18.2	19.0	18.1	17.0	14.6	14.0	17.6	24.4
12-Jun	13.3	13.1	12.1	11.2	12.2	12.2	13.2	15.0	16.7	18.1	19.5	20.4	21.2	22.4	23.2	23.0	19.5	19.3	17.7	15.9	14.0	13.9	13.1	11.9	16.3	23.2
13-Jun	10.7	10.4	10.4	10.3	10.4	10.5	11.0	12.3	14.4	15.4	16.3	16.6	16.1	16.7	17.2	16.4	16.3	15.9	16.4	16.0	15.6	15.1	14.2	12.3	14.0	17.2
14-Jun	11.1	10.8	10.3	9.9	9.7	10.1	11.1	12.1	13.5	14.6	15.6	16.4	17.3	18.1	18.6	18.8	19.3	19.8	19.8	19.5	18.6	16.2	14.9	15.2	15.1	19.8
15-Jun	14.6	13.6	12.5	11.5	11.5	11.6	10.9	10.7	11.0	11.5	11.6	12.0	13.0	13.8	14.3	15.9	16.3	16.9	17.5	18.4	16.4	15.3	14.4	13.9	13.7	18.4
16-Jun	12.7	11.1	10.8	10.5	10.3	9.8	9.3	9.6	10.0	10.8	11.9	12.6	12.9	14.1	14.3	15.0	15.7	15.9	15.9	14.7	14.1	13.0	11.2	11.5	12.4	15.9
17-Jun	10.9	10.3	9.8	9.1	8.5	8.3	8.7	10.0	11.2	11.7	12.5	13.0	14.3	15.0	15.3	15.7	16.4	16.7	16.9	16.5	15.9	15.3	13.6	12.6	12.8	16.9
18-Jun	10.7	9.5	8.8	8.3	8.0	8.6	10.6	11.9	12.6	14.4	16.1	18.0	19.8	20.3	20.9	21.2	21.6	21.0	20.7	20.0	18.9	17.1	15.3	15.2	15.4	21.6
19-Jun	15.0	14.4	13.9	12.9	12.3	12.3	12.4	13.6	14.9	16.1	17.1	17.9	18.9	19.8	20.6	21.0	21.3	21.2	21.0	20.6	19.4	16.6	14.4	13.2	16.7	21.3
20-Jun	10.9	9.0	8.0	6.7	6.9	7.9	11.3	14.5	17.4	19.8	21.1	22.1	22.8	23.5	24.0	24.4	24.7	24.6	24.5	23.5	21.2	19.0	18.6	18.0	17.7	24.7
21-Jun	16.3	15.9	15.0	14.0	14.2	14.9	15.9	15.7	15.9	17.2	18.4	19.8	21.2	21.9	22.4	22.6	22.2	21.8	20.3	19.4	18.5	17.5	16.2	15.5	18.0	22.6
22-Jun	13.6	12.0	11.6	12.1	11.1	12.2	13.5	15.4	17.2	18.4	20.2	21.5	19.1	16.3	18.0	19.0	20.6	19.1	19.0	18.5	17.9	16.6	15.3	13.0	16.3	21.5
23-Jun	12.2	11.3	10.6	10.3	10.5	11.1	11.8	14.1	17.1	19.8	21.7	23.2	20.6	19.4	19.5	23.3	24.2	24.0	23.1	22.7	22.3	20.2	19.1	17.2	17.9	24.2
24-Jun	15.7	14.3	13.8	13.4	13.2	13.7	15.2	17.0	19.1	21.4	24.8	27.6	28.3	29.2	29.2	29.3	29.7	29.3	28.4	29.0	26.9	23.8	21.7	19.4	22.2	29.7
25-Jun	17.8	16.0	14.9	14.0	13.1	13.7	16.0	19.0	21.7	24.2	26.2	27.3	28.5	29.4	30.1	25.3	20.0	18.9	21.8	20.4	20.0	19.8	19.1	18.2	20.6	30.1
26-Jun	18.3	17.7	17.7	17.7	17.2	17.5	18.3	18.4	19.6	22.2	24.8	26.6	27.3	27.7	28.4	28.7	28.2	20.2	22.5	23.3	22.7	21.5	20.4	19.1	21.9	28.7
27-Jun	18.4	17.2	16.2	16.5	16.7	16.6	18.6	19.8	21.7	24.2	27.0	28.7	29.5	29.9	30.6	31.1	31.4	31.2	30.6	30.3	29.0	26.1	25.0	23.1	24.6	31.4
28-Jun	21.9	21.5	20.6	19.2	17.5	18.5	21.4	23.1	24.7	26.6	27.9	28.5	29.0	29.3	29.4	29.8	29.5	29.7	28.0	26.5	25.1	22.7	19.9	18.9	24.6	29.8
29-Jun	18.2	16.4	15.5	15.3	14.1	14.2	15.4	17.1	20.1	23.3	26.6	28.6	29.7	30.3	31.0	31.4	31.6	31.6	30.6	28.4	26.8	25.4	24.4	22.1	23.7	31.6
30-Jun	19.9	18.2	17.3	16.1	15.3	14.9	15.5	17.0	18.4	19.2	20.5	21.7	21.7	22.0	22.3	22.2	21.3	21.0	20.1	19.8	19.9	19.3	19.9	20.7	19.3	22.3
																								Diurnal Average		
																								Diurnal Maximum		



WBEA
Hourly Averages

Ambient Temperature 20 m (AT20m) - C
Lower Camp Met Tower - June 2015





WBEA
Cumulative Frequency Distribution

Ambient Temperature 20 m (AT20m) - C
Lower Camp Met Tower - June 2015

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	46	6.39	6.39
10 - 20	447	62.08	68.47
> 20	227	31.53	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

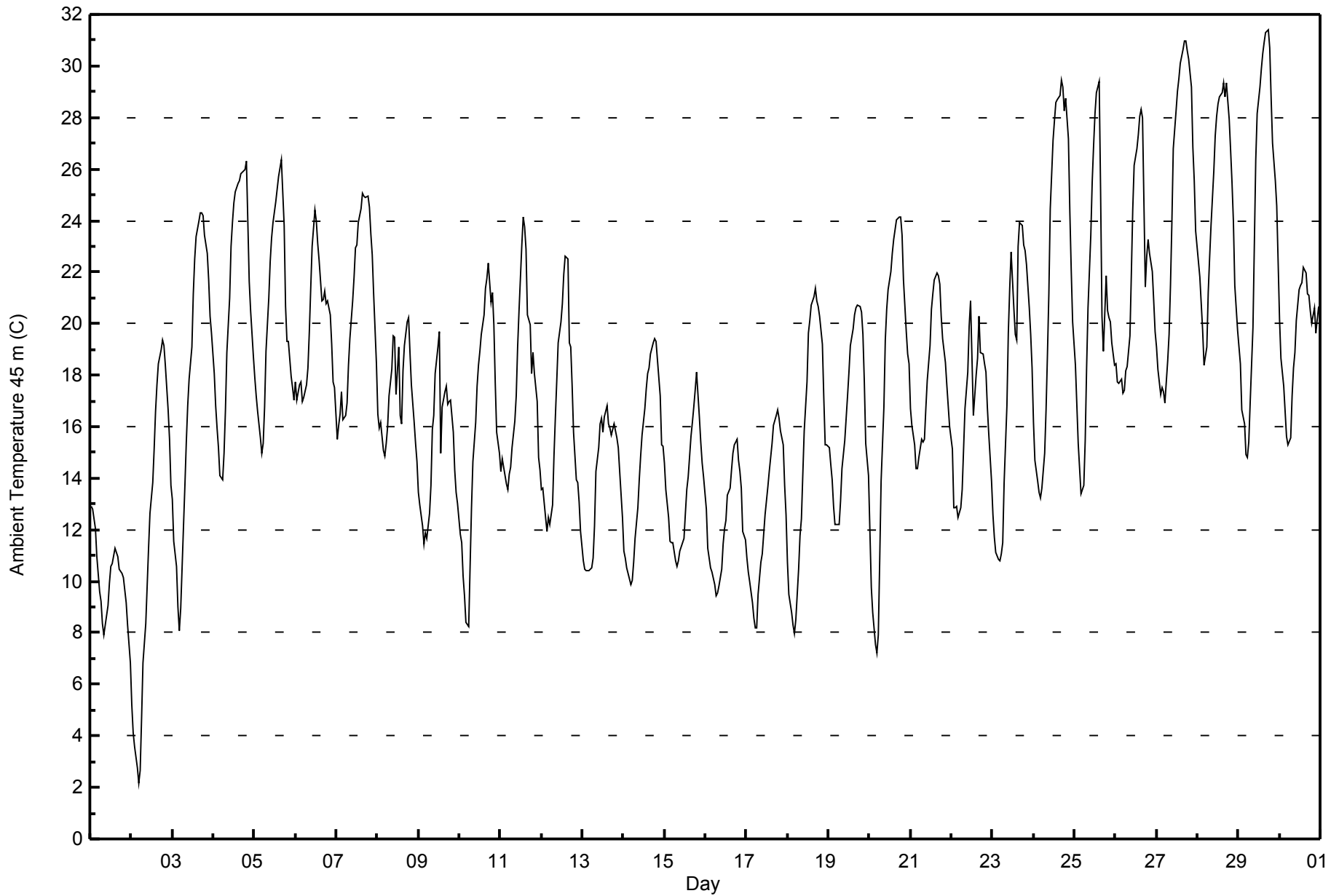


Maximum Value: 31.4 C on Jun 29 18:00		Maximum Daily Average: 24.7 C on Jun 27		Hours in Service: 720																																													
Minimum Value: 2.2 C on Jun 2 05:00		Minimum Daily Average: 10.1 C on Jun 1		Hours of Data: 720																																													
Maximum Diurnal Average: 21.9 C at hour 16		Minimum Diurnal Average: 12.4 C at hour 5		Hours of Missing Data: 0																																													
Monthly Average: 17.66 C		Percentiles: P ₁ = 6.8 P ₁₀ = 10.8 Q ₁ = 13.9 Median = 17.4 Q ₃ = 21.0 P ₉₀ = 24.9 P ₉₉ = 30.6		Hours of Calibration: 0																																													
				Percent Operational Time: 100.0																																													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jun	12.9	12.8	12.4	12.0	11.0	9.6	9.2	8.3	7.9	8.7	9.1	9.9	10.6	10.7	11.3	11.1	11.0	10.5	10.3	10.1	9.6	9.2	8.3	6.8	10.1	12.9																							
2-Jun	5.2	4.1	3.6	2.8	2.2	2.7	4.7	6.9	8.3	9.8	11.3	12.6	13.8	15.1	16.6	17.6	18.4	19.0	19.4	19.1	18.4	16.7	15.5	13.7	11.6	19.4																							
3-Jun	13.2	11.5	10.6	9.0	8.1	9.0	12.1	13.7	15.4	16.8	17.9	19.1	21.2	22.5	23.4	24.0	24.3	24.3	24.2	23.4	22.7	21.7	20.3	19.6	17.8	24.3																							
4-Jun	18.1	16.8	16.0	15.2	14.1	14.0	15.0	16.7	18.9	21.0	23.0	23.9	24.7	25.1	25.4	25.5	25.8	25.9	26.0	26.3	23.9	21.7	20.5	18.7	20.9	26.3																							
5-Jun	17.9	17.2	16.6	15.6	15.0	15.4	16.8	18.9	21.0	22.4	23.3	23.9	24.7	25.2	25.7	26.0	26.4	23.8	20.7	19.3	19.3	18.0	17.5	17.0	20.3	26.4																							
6-Jun	17.7	17.1	17.6	17.7	17.0	17.1	17.6	18.3	19.7	21.4	23.0	24.4	24.0	23.1	22.5	20.9	20.9	21.3	20.8	20.9	20.4	19.2	17.7	17.5	19.9	24.4																							
7-Jun	15.5	16.1	16.5	17.4	16.3	16.4	16.9	18.4	19.4	20.9	21.8	23.0	23.1	23.9	24.5	25.0	24.9	24.9	24.9	24.5	23.5	22.7	21.2	18.4	20.8	25.0																							
8-Jun	16.5	16.0	16.2	15.1	14.9	15.4	16.0	17.2	18.2	19.5	19.5	17.3	19.1	16.5	16.1	18.2	19.2	20.0	20.2	18.9	17.6	16.2	15.4	14.6	17.2	20.2																							
9-Jun	13.4	12.9	12.1	11.5	11.9	11.7	12.6	13.7	15.9	16.5	18.1	19.1	19.7	15.0	16.7	17.4	17.6	16.9	17.0	17.0	15.8	14.3	13.5	13.0	15.1	19.7																							
10-Jun	11.8	11.5	10.2	9.4	8.4	8.2	10.6	12.8	14.6	16.2	17.6	18.4	18.9	19.6	20.3	21.4	21.7	22.4	20.8	21.2	19.9	17.7	15.8	15.0	16.0	22.4																							
11-Jun	14.3	14.7	14.4	13.8	13.6	14.2	14.4	15.2	16.2	17.2	19.1	20.5	23.1	24.1	23.7	22.9	20.3	19.9	18.0	18.9	18.1	17.0	14.8	14.3	17.6	24.1																							
12-Jun	13.6	13.6	12.5	11.9	12.5	12.2	13.0	14.9	16.4	17.8	19.3	20.1	20.8	21.9	22.6	22.5	19.3	19.1	17.5	15.8	14.0	13.9	13.1	11.9	16.2	22.6																							
13-Jun	10.8	10.5	10.4	10.4	10.4	10.5	10.9	12.1	14.2	15.2	16.1	16.3	15.8	16.4	16.8	16.1	15.9	15.7	16.1	15.9	15.6	15.2	14.3	12.5	13.9	16.8																							
14-Jun	11.2	10.9	10.5	10.1	9.9	10.0	10.8	11.7	12.9	14.0	14.9	15.7	16.7	17.5	18.1	18.3	18.8	19.3	19.4	19.3	18.6	17.2	15.3	15.3	14.8	19.4																							
15-Jun	14.6	13.6	12.5	11.6	11.5	11.5	10.8	10.6	10.8	11.2	11.4	11.7	12.6	13.6	14.1	15.6	16.1	16.8	17.4	18.1	16.4	15.4	14.6	14.0	13.6	18.1																							
16-Jun	12.8	11.3	10.9	10.5	10.4	9.9	9.4	9.5	9.8	10.5	11.4	12.1	12.4	13.4	13.6	14.3	15.0	15.3	15.5	14.7	14.2	13.6	12.0	11.6	12.3	15.5																							
17-Jun	10.9	10.4	10.0	9.2	8.6	8.2	8.2	9.5	10.8	11.1	11.8	12.6	13.7	14.3	14.8	15.3	16.0	16.4	16.7	16.3	15.8	15.3	13.7	12.6	12.6	16.7																							
18-Jun	10.7	9.5	8.8	8.3	8.0	8.5	10.5	11.7	12.4	14.1	15.8	17.7	19.6	20.1	20.7	21.1	21.4	20.9	20.7	20.3	19.2	17.2	15.3	15.3	15.3	21.4																							
19-Jun	15.2	14.5	13.9	12.9	12.2	12.2	12.2	13.1	14.4	15.5	16.4	17.2	18.1	19.1	19.8	20.3	20.6	20.7	20.7	20.5	19.6	17.8	15.4	14.1	16.5	20.7																							
20-Jun	11.9	9.7	8.8	7.6	7.2	7.9	10.8	13.9	16.7	19.3	20.5	21.3	22.0	22.7	23.3	23.6	24.0	24.1	24.1	23.4	21.7	19.7	18.8	18.5	17.6	24.1																							
21-Jun	16.7	16.1	15.3	14.4	14.4	14.8	15.5	15.4	15.5	16.7	17.8	19.2	20.6	21.1	21.7	22.0	21.9	21.5	20.3	19.4	18.5	17.7	16.8	16.0	17.9	22.0																							
22-Jun	15.1	12.9	12.8	12.9	12.5	12.8	13.6	15.1	16.7	18.1	19.9	20.9	18.7	16.4	18.0	18.6	20.3	18.9	18.8	18.4	18.1	16.8	15.7	13.9	16.5	20.9																							
23-Jun	12.6	11.7	11.1	10.8	10.8	11.1	11.5	13.9	16.8	19.6	21.4	22.8	20.5	19.6	19.4	23.0	23.9	23.8	23.1	22.8	22.3	20.6	19.6	18.3	18.0	23.9																							
24-Jun	16.1	14.7	13.9	13.5	13.2	13.6	15.0	16.7	18.8	21.1	24.4	27.1	27.9	28.6	28.7	28.9	29.4	29.2	28.2	28.8	27.2	24.4	22.1	20.1	22.1	29.4																							
25-Jun	18.4	16.9	15.3	14.4	13.4	13.7	15.5	18.3	20.6	23.4	25.5	26.9	28.1	28.9	29.4	25.1	20.3	18.9	21.8	20.5	20.2	20.1	19.2	18.4	20.6	29.4																							
26-Jun	18.4	17.7	17.7	17.9	17.3	17.4	18.2	18.3	19.5	21.9	24.4	26.1	26.8	27.3	28.0	28.3	28.0	21.4	22.6	23.3	22.8	22.0	20.9	19.7	21.9	28.3																							
27-Jun	19.1	18.2	17.3	17.5	17.4	16.9	18.5	19.6	21.5	23.9	26.8	28.3	29.0	29.5	30.1	30.7	30.9	30.9	30.6	30.2	29.2	26.9	25.6	23.6	24.7	30.9																							
28-Jun	22.4	21.8	20.8	19.8	18.4	19.1	21.2	22.6	23.8	25.9	27.3	28.0	28.6	28.8	29.0	29.3	28.8	29.4	27.9	26.7	25.5	24.0	21.5	19.7	24.6	29.4																							
29-Jun	19.1	18.5	16.6	16.1	14.9	14.8	15.4	16.9	19.8	23.1	26.4	28.2	29.2	29.9	30.5	30.9	31.3	31.4	30.7	28.7	27.0	25.5	24.6	22.4	23.8	31.4																							
30-Jun	20.2	18.6	17.6	16.6	15.6	15.3	15.6	17.2	18.3	18.9	20.1	21.3	21.5	21.6	22.2	21.9	21.2	21.1	20.5	20.0	20.6	19.6	20.2	20.7	19.4	22.2																							
																								14.9	14.1	13.4	12.9	12.4	12.5	13.4	14.7	16.2	17.7	19.2	20.2	20.8	21.0	21.6	21.9	21.8	21.5	21.2	20.8	19.9	18.6	17.3	16.2	Diurnal Average	
																								22.4	21.8	20.8	19.8	18.4	19.1	21.2	22.6	23.8	25.9	27.3	28.3	29.2	29.9	30.5	30.9	31.3	31.4	30.7	30.2	29.2	26.9	25.6	23.6	Diurnal Maximum	



WBEA
Hourly Averages

Ambient Temperature 45 m (AT45m) - C
Lower Camp Met Tower - June 2015





WBEA
Cumulative Frequency Distribution

Ambient Temperature 45 m (AT45m) - C
Lower Camp Met Tower - June 2015

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	48	6.67	6.67
10 - 20	442	61.39	68.06
> 20	230	31.94	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

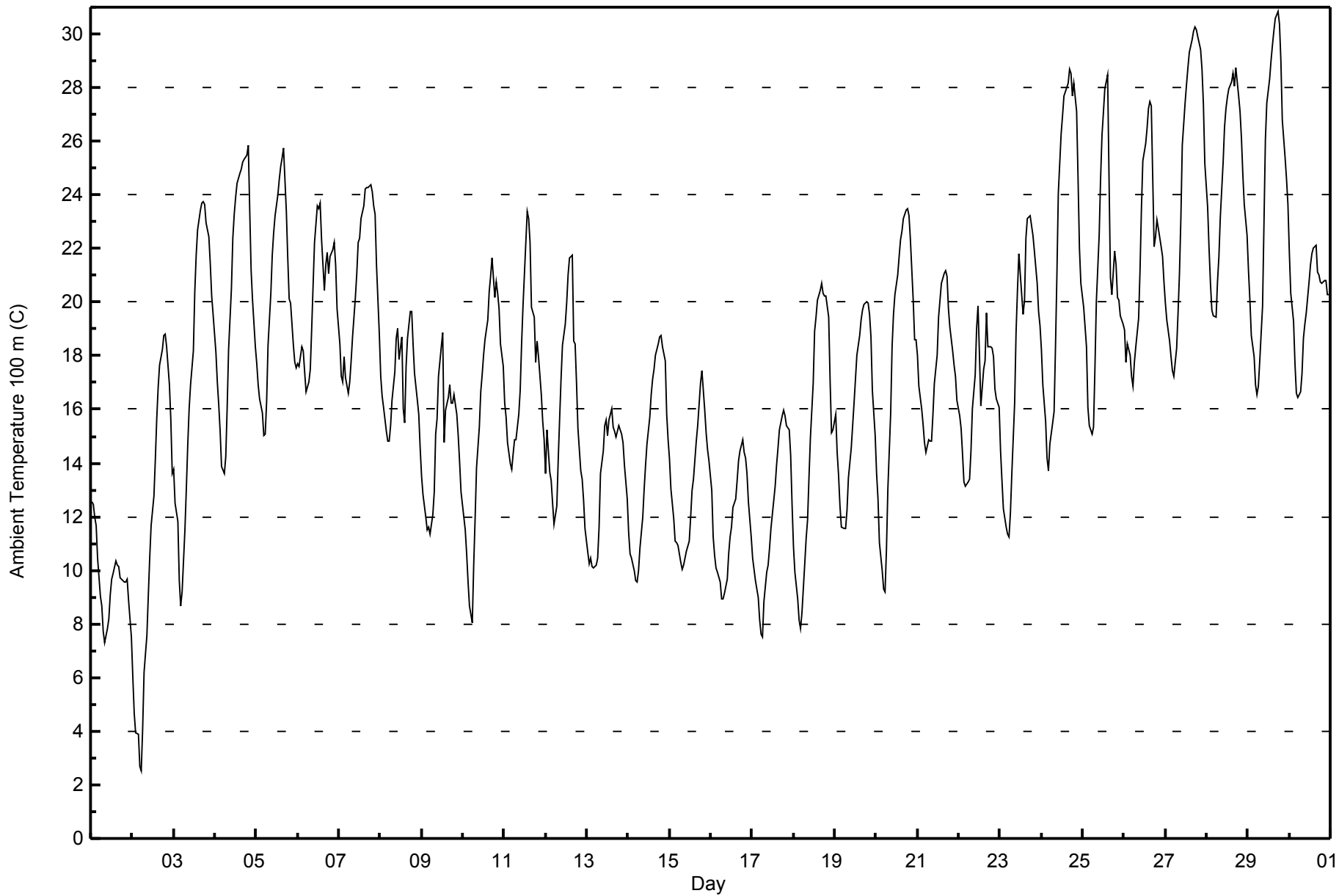


Maximum Value: 30.8 C on Jun 29 18:00 Maximum Daily Average: 24.7 C on Jun 27																						Hours in Service: 720 Hours of Data: 720																										
Minimum Value: 2.5 C on Jun 2 06:00 Minimum Daily Average: 9.6 C on Jun 1 Maximum Diurnal Average: 21.2 C at hour 17 Minimum Diurnal Average: 12.5 C at hour 6 Monthly Average: 17.50 C Percentiles: P ₁ = 5.9 P ₁₀ = 10.4 Q ₁ = 13.8 Median = 17.4 Q ₃ = 20.9 P ₉₀ = 24.6 P ₉₉ = 30.1																						Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jun	12.5	12.4	12.0	11.7	10.4	9.0	8.7	7.7	7.3	7.8	8.2	9.1	9.6	9.9	10.4	10.2	10.1	9.7	9.6	9.6	9.6	9.7	8.9	7.5	9.6	12.5																						
2-Jun	6.0	4.7	3.9	3.9	2.7	2.5	4.1	6.2	7.6	9.0	10.5	11.6	12.8	14.1	15.7	16.8	17.6	18.3	18.8	18.8	18.3	16.9	15.6	13.6	11.3	18.8																						
3-Jun	13.7	12.5	11.8	9.6	8.7	9.2	11.5	13.0	14.6	16.0	16.9	18.2	20.4	21.8	22.7	23.4	23.7	23.7	23.7	22.9	22.4	21.4	20.3	19.5	17.6	23.7																						
4-Jun	18.1	17.0	16.2	15.2	13.9	13.6	14.3	16.1	18.2	20.5	22.4	23.3	23.9	24.4	24.8	25.0	25.2	25.3	25.5	25.8	23.4	21.2	20.1	18.3	20.5	25.8																						
5-Jun	17.7	16.9	16.4	15.9	15.0	15.1	16.3	18.4	20.3	21.7	22.6	23.2	24.0	24.6	25.1	25.4	25.8	23.4	21.7	20.1	19.9	18.4	17.8	17.6	20.1	25.8																						
6-Jun	17.7	17.6	18.3	18.2	17.4	16.7	17.0	17.5	19.0	20.7	22.2	23.6	23.5	23.7	22.3	20.4	21.4	21.8	21.1	21.7	22.0	22.3	21.4	19.7	20.3	23.7																						
7-Jun	18.4	17.3	17.0	17.9	17.2	16.6	17.0	17.8	18.7	20.2	21.1	22.2	22.4	23.1	23.6	24.2	24.3	24.3	24.4	24.1	23.6	23.3	21.4	18.8	20.8	24.4																						
8-Jun	17.3	16.5	16.1	15.2	14.8	14.8	15.4	16.3	17.4	18.6	19.0	17.9	18.7	16.0	15.5	17.6	18.6	19.7	19.7	18.4	17.3	16.3	15.8	14.6	17.0	19.7																						
9-Jun	13.5	12.8	12.0	11.5	11.6	11.3	12.1	12.9	15.1	15.7	17.2	18.3	18.8	14.8	16.0	16.4	16.9	16.2	16.2	16.6	15.8	15.0	14.0	12.9	14.7	18.8																						
10-Jun	12.0	11.5	10.6	9.5	8.6	8.0	10.2	11.9	13.8	15.3	16.6	17.3	18.0	18.6	19.3	20.4	21.0	21.6	20.2	20.8	20.3	19.7	18.4	17.6	15.9	21.6																						
11-Jun	16.3	15.7	14.7	14.0	13.8	14.3	14.9	14.9	15.8	16.7	18.5	19.8	22.2	23.4	23.1	22.2	19.8	19.4	17.8	18.6	18.0	16.5	15.5	14.8	17.5	23.4																						
12-Jun	13.6	15.2	13.7	13.4	12.5	11.7	12.4	14.1	15.6	17.1	18.4	19.2	19.9	21.0	21.6	21.7	18.5	18.4	17.0	15.3	13.7	13.4	12.6	11.6	15.9	21.7																						
13-Jun	10.7	10.3	10.4	10.1	10.1	10.2	10.4	11.6	13.6	14.5	15.4	15.6	15.0	15.6	16.0	15.3	15.2	15.0	15.4	15.3	15.1	14.8	13.9	12.7	13.4	16.0																						
14-Jun	11.4	10.6	10.4	10.0	9.6	9.6	10.0	10.8	12.0	13.0	13.9	14.7	15.7	16.5	17.1	17.5	18.0	18.5	18.7	18.8	18.3	17.8	15.8	14.9	14.3	18.8																						
15-Jun	14.1	13.0	11.9	11.1	11.0	10.9	10.3	10.0	10.2	10.5	10.7	11.1	12.0	13.0	13.4	14.8	15.4	16.2	17.0	17.4	16.0	15.1	14.5	14.1	13.1	17.4																						
16-Jun	13.0	11.3	10.6	10.1	9.9	9.6	8.9	8.9	9.1	9.7	10.6	11.3	11.6	12.3	12.6	13.3	14.1	14.5	14.8	14.4	14.2	13.6	12.6	11.2	11.8	14.8																						
17-Jun	10.5	10.0	9.6	9.0	8.2	7.6	7.5	8.8	10.0	10.2	10.8	11.6	12.6	13.1	13.9	14.6	15.2	15.7	16.0	15.7	15.4	15.3	14.3	12.4	12.0	16.0																						
18-Jun	10.9	9.9	8.9	8.1	7.8	8.4	10.2	11.2	11.9	13.5	14.9	17.0	18.9	19.4	20.1	20.5	20.7	20.3	20.3	20.2	19.5	17.1	15.1	15.3	15.0	20.7																						
19-Jun	15.8	14.4	13.6	12.4	11.6	11.5	11.5	12.3	13.5	14.5	15.4	16.3	17.1	18.0	18.8	19.4	19.7	19.9	20.0	20.0	19.6	18.7	16.7	15.0	16.1	20.0																						
20-Jun	13.6	12.6	11.1	10.0	9.3	9.2	10.8	13.0	15.8	18.3	19.5	20.3	21.0	21.7	22.3	22.6	23.1	23.4	23.5	23.2	22.3	20.1	18.6	18.6	17.7	23.5																						
21-Jun	18.0	16.8	16.0	15.5	14.8	14.4	14.9	14.8	14.8	15.8	17.0	18.0	19.5	20.1	20.7	21.1	21.2	21.0	19.8	19.1	18.2	17.7	17.3	16.4	17.6	21.2																						
22-Jun	15.8	15.3	14.3	13.3	13.1	13.3	13.4	14.4	16.0	17.3	19.0	19.9	18.1	16.1	17.5	17.8	19.6	18.3	18.4	18.3	18.0	16.8	16.4	16.1	16.5	19.9																						
23-Jun	14.5	13.3	12.3	11.6	11.4	11.2	12.1	13.6	16.3	18.9	20.4	21.8	20.3	19.5	20.1	22.4	23.1	23.2	22.9	22.5	21.9	20.7	19.6	19.1	18.0	23.2																						
24-Jun	18.2	16.9	15.6	14.2	13.7	14.7	15.5	15.9	18.3	21.0	24.1	26.3	26.9	27.7	27.9	28.2	28.7	28.5	27.7	28.2	27.1	24.7	22.0	20.7	22.2	28.7																						
25-Jun	19.8	19.0	18.3	16.1	15.4	15.1	15.4	17.5	20.0	22.5	24.6	26.2	27.0	28.0	28.5	24.7	20.9	20.3	21.9	21.4	20.2	20.1	19.5	19.2	20.9	28.5																						
26-Jun	19.0	17.7	18.5	18.0	17.2	16.9	17.7	18.3	19.4	21.2	23.5	25.3	25.9	26.5	27.2	27.5	27.3	22.0	22.4	23.1	22.7	22.1	21.7	20.7	21.7	27.5																						
27-Jun	19.9	19.3	18.5	17.9	17.4	17.2	18.3	19.6	21.1	23.1	25.8	27.4	28.1	28.7	29.3	29.8	30.1	30.3	30.2	29.9	29.4	28.7	27.4	25.2	24.7	30.3																						
28-Jun	23.5	22.0	20.7	19.7	19.5	19.4	20.7	21.7	23.2	25.2	26.5	27.2	27.7	27.9	28.2	28.5	28.1	28.7	27.7	27.1	26.1	24.8	23.7	22.5	24.6	28.7																						
29-Jun	21.2	20.1	18.8	18.0	16.9	16.5	16.9	17.8	19.9	23.0	26.1	27.4	28.3	29.0	29.6	30.1	30.6	30.8	30.4	29.0	26.8	25.4	24.6	23.6	24.2	30.8																						
30-Jun	21.8	20.3	19.3	17.7	16.6	16.4	16.6	17.4	18.7	19.2	19.6	20.7	21.4	21.8	22.0	22.1	21.1	21.0	20.7	20.7	20.8	20.8	20.3	20.3	19.9	22.1																						
																								15.6	14.8	14.1	13.3	12.7	12.5	13.2	14.2	15.6	17.0	18.4	19.4	20.0	20.3	20.8	21.1	21.2	21.0	20.8	20.6	19.9	18.9	17.9	16.8	Diurnal Average
																								23.5	22.0	20.7	19.7	19.5	19.4	20.7	21.7	23.2	25.2	26.5	27.4	28.3	29.0	29.6	30.1	30.6	30.8	30.4	29.9	29.4	28.7	27.4	25.2	Diurnal Maximum



WBEA
Hourly Averages

Ambient Temperature 100 m (AT100m) - C
Lower Camp Met Tower - June 2015





WBEA
Cumulative Frequency Distribution

Ambient Temperature 100 m (AT100m) - C
Lower Camp Met Tower - June 2015

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	57	7.92	7.92
10 - 20	438	60.83	68.75
> 20	225	31.25	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

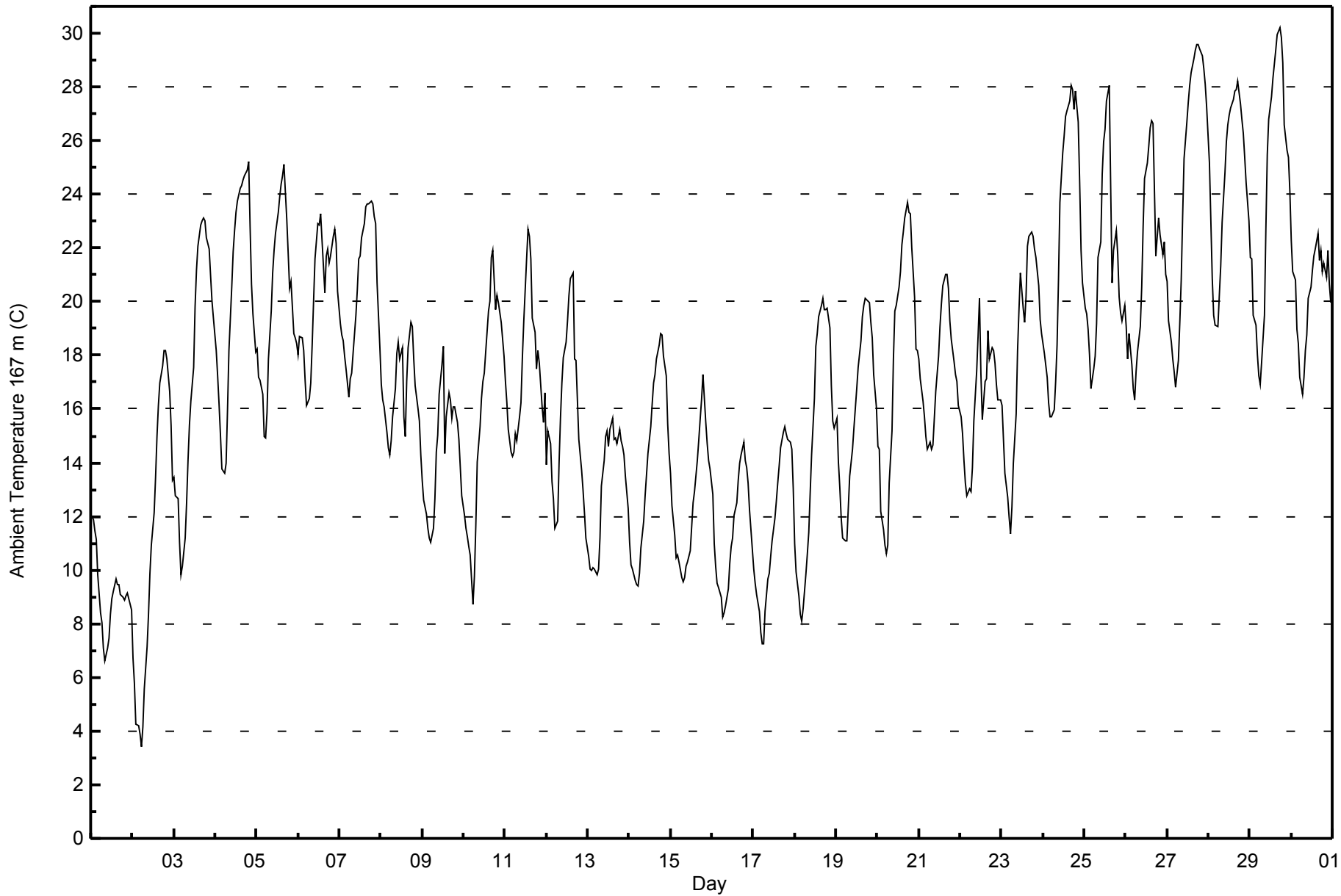


Maximum Value: 30.2 C on Jun 29 18:00																				Maximum Daily Average: 24.5 C on Jun 27					Hours in Service: 720																							
Minimum Value: 3.4 C on Jun 2 06:00																				Minimum Daily Average: 9.1 C on Jun 1					Hours of Data: 720																							
Maximum Diurnal Average: 20.8 C at hour 17																				Minimum Diurnal Average: 12.6 C at hour 6					Hours of Missing Data: 0																							
Monthly Average: 17.34 C																				Percentiles: P ₁ = 6.6 P ₁₀ = 10.1 Q ₁ = 13.8 Median = 17.3 Q ₃ = 20.8 P ₉₀ = 24.3 P ₉₉ = 29.4					Hours of Calibration: 0																							
																									Percent Operational Time: 100.0																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jun	12.0	11.9	11.5	11.2	9.9	8.4	8.0	7.1	6.6	7.1	7.5	8.4	8.9	9.2	9.7	9.5	9.5	9.1	9.0	8.9	9.0	9.1	8.9	8.5	9.1	12.0																						
2-Jun	6.7	5.8	4.3	4.2	3.9	3.4	4.1	5.6	7.2	8.3	9.9	10.9	12.2	13.5	15.0	16.2	17.0	17.6	18.2	18.2	17.9	16.7	15.4	13.3	11.1	18.2																						
3-Jun	13.5	12.7	12.7	11.0	9.8	10.1	11.2	12.5	14.1	15.4	16.3	17.6	19.8	21.2	22.1	22.9	23.0	23.1	23.0	22.4	21.9	21.0	20.0	19.4	17.4	23.1																						
4-Jun	18.2	17.2	16.2	15.1	13.8	13.6	14.0	16.0	18.2	20.6	21.9	22.6	23.3	23.8	24.2	24.3	24.5	24.7	24.9	25.2	22.8	20.6	19.6	18.2	20.1	25.2																						
5-Jun	18.3	17.2	17.1	16.5	15.0	14.9	15.8	17.9	19.7	21.1	21.9	22.6	23.3	23.9	24.4	24.7	25.1	23.0	21.8	20.5	20.8	18.8	18.7	18.4	20.1	25.1																						
6-Jun	18.0	18.7	18.7	18.2	17.1	16.1	16.4	16.9	18.4	20.0	21.6	22.9	22.9	23.3	22.3	20.3	21.7	22.0	21.5	21.7	22.4	22.7	22.2	20.4	20.3	23.3																						
7-Jun	19.2	18.7	18.6	17.9	17.5	16.4	17.1	17.3	18.1	19.5	20.5	21.6	21.7	22.4	22.9	23.5	23.6	23.7	23.7	23.6	23.2	22.9	20.7	18.3	20.5	23.7																						
8-Jun	16.9	16.3	16.1	15.1	14.6	14.3	14.8	15.7	16.7	18.1	18.5	17.9	18.3	15.7	15.0	17.0	18.3	19.2	19.1	17.9	16.9	16.0	15.6	14.3	16.6	19.2																						
9-Jun	13.4	12.6	12.1	11.5	11.2	11.0	11.6	12.7	14.4	15.1	16.6	17.7	18.3	14.3	15.7	16.6	16.3	15.7	16.1	16.1	15.5	14.9	13.8	12.7	14.4	18.3																						
10-Jun	12.0	11.5	11.3	10.9	10.5	8.7	9.8	11.7	14.0	15.4	16.4	17.0	17.3	18.1	19.7	20.0	21.6	21.9	19.7	20.3	20.0	19.6	19.2	18.0	16.0	21.9																						
11-Jun	17.0	16.2	15.2	14.4	14.2	14.4	15.1	14.8	15.7	16.2	17.9	19.3	21.6	22.7	22.4	21.6	19.4	18.9	17.5	18.2	17.7	16.1	15.5	16.6	17.4	22.7																						
12-Jun	13.9	15.2	14.7	13.3	12.6	11.6	11.8	14.0	15.7	17.0	17.9	18.5	19.3	20.2	20.9	21.1	17.8	17.8	16.4	14.9	13.7	13.0	12.1	11.2	15.6	21.1																						
13-Jun	10.5	10.0	10.0	10.1	10.0	9.8	10.0	11.2	13.2	14.1	15.0	15.2	14.6	15.2	15.7	14.9	14.9	14.7	15.2	14.8	14.6	14.3	13.5	12.3	13.1	15.7																						
14-Jun	11.0	10.2	10.0	9.6	9.5	9.4	9.9	10.8	11.8	12.8	13.6	14.4	15.4	16.2	16.9	17.3	17.9	18.4	18.8	18.8	18.0	17.2	15.4	14.3	14.1	18.8																						
15-Jun	13.6	12.4	11.3	10.5	10.6	10.3	9.7	9.6	9.7	10.1	10.3	10.7	11.6	12.5	12.9	14.1	14.8	15.6	16.4	17.3	15.5	14.7	14.1	13.8	12.6	17.3																						
16-Jun	12.8	11.0	10.1	9.5	9.3	9.0	8.3	8.4	8.7	9.3	10.3	10.9	11.2	12.0	12.5	13.3	14.0	14.3	14.8	14.1	13.8	13.2	12.3	10.8	11.4	14.8																						
17-Jun	10.0	9.5	9.1	8.5	7.7	7.3	7.2	8.4	9.7	9.9	10.5	11.1	11.9	12.6	13.2	13.9	14.5	15.1	15.4	15.1	14.9	14.8	14.5	13.0	11.6	15.4																						
18-Jun	11.0	9.9	9.1	8.4	8.1	8.6	9.9	10.6	11.4	12.9	14.3	16.4	18.3	18.8	19.4	19.9	20.1	19.7	19.7	19.8	19.0	16.9	15.6	15.3	14.7	20.1																						
19-Jun	15.7	14.1	13.1	11.9	11.2	11.1	11.1	12.3	13.5	14.5	15.3	16.0	16.8	17.6	18.6	19.5	19.8	20.1	20.0	20.0	19.2	18.7	17.3	16.0	16.0	20.1																						
20-Jun	14.6	14.5	12.2	11.5	10.9	10.6	10.9	13.2	15.2	17.9	19.6	19.9	20.6	21.1	22.1	22.6	23.1	23.7	23.3	23.3	22.0	20.2	18.2	18.2	17.9	23.7																						
21-Jun	17.8	17.1	16.3	15.7	15.0	14.5	14.8	14.5	14.6	15.6	16.7	18.0	19.1	19.9	20.6	21.0	21.0	20.5	19.3	18.6	17.8	17.3	17.0	16.1	17.4	21.0																						
22-Jun	15.7	15.1	14.1	13.2	12.8	13.0	12.9	13.8	15.6	17.4	18.7	20.1	17.4	15.6	17.0	17.1	18.9	17.9	18.3	18.2	17.7	16.9	16.4	16.3	16.3	20.1																						
23-Jun	16.1	14.9	13.6	12.7	12.0	11.3	12.3	14.0	15.8	18.2	19.7	21.1	19.8	19.2	20.2	22.1	22.5	22.6	22.4	21.9	21.6	20.6	19.3	18.8	18.0	22.6																						
24-Jun	18.4	18.1	17.2	16.2	15.7	15.7	16.0	17.0	18.4	20.8	23.7	25.5	26.2	26.9	27.1	27.5	28.0	27.9	27.2	27.8	26.7	24.5	21.9	20.7	22.3	28.0																						
25-Jun	19.8	19.5	18.9	18.0	16.8	17.5	18.0	19.2	21.6	22.2	24.7	26.0	26.4	27.5	28.1	24.3	20.7	21.9	22.6	21.8	20.2	19.6	19.3	19.9	21.4	28.1																						
26-Jun	19.1	17.9	18.8	17.6	16.7	16.4	17.4	18.1	19.1	20.6	22.8	24.6	25.2	25.8	26.5	26.8	26.7	21.7	22.4	23.1	22.5	21.7	22.2	21.0	21.4	26.8																						
27-Jun	20.8	19.3	18.5	17.9	17.4	16.8	17.8	19.2	20.8	23.1	25.3	26.7	27.4	28.0	28.6	29.1	29.4	29.6	29.6	29.4	29.1	28.7	28.1	27.3	24.5	29.6																						
28-Jun	25.2	23.0	20.8	19.5	19.1	19.1	20.2	21.3	23.0	24.8	25.9	26.6	26.9	27.2	27.5	27.8	27.9	28.2	27.4	26.8	26.2	25.4	24.4	23.0	24.5	28.2																						
29-Jun	21.7	21.6	19.5	19.1	18.0	17.2	16.9	17.7	19.5	22.7	25.5	26.8	27.6	28.3	28.9	29.4	30.0	30.2	29.8	28.9	26.6	25.6	25.4	24.1	24.2	30.2																						
30-Jun	22.3	21.1	20.8	19.0	18.4	17.2	16.6	17.2	18.2	18.8	20.1	20.6	21.2	21.7	21.9	22.6	21.6	21.9	21.1	21.4	20.9	21.9	20.6	20.0	20.3	22.6																						
																								15.8	15.1	14.4	13.6	13.0	12.6	13.0	14.0	15.3	16.6	18.0	18.9	19.5	19.8	20.4	20.7	20.8	20.7	20.5	20.3	19.6	18.8	17.9	17.0	Diurnal Average
																								25.2	23.0	20.8	19.5	19.1	19.1	20.2	21.3	23.0	24.8	25.9	26.8	27.6	28.3	28.9	29.4	30.0	30.2	29.8	29.4	29.1	28.7	28.1	27.3	Diurnal Maximum



WBEA
Hourly Averages

Ambient Temperature 167 m (AT167m) - C
Lower Camp Met Tower - June 2015





WBEA
Cumulative Frequency Distribution

Ambient Temperature 167 m (AT167m) - C
Lower Camp Met Tower - June 2015

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	65	9.03	9.03
10 - 20	440	61.11	70.14
> 20	215	29.86	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

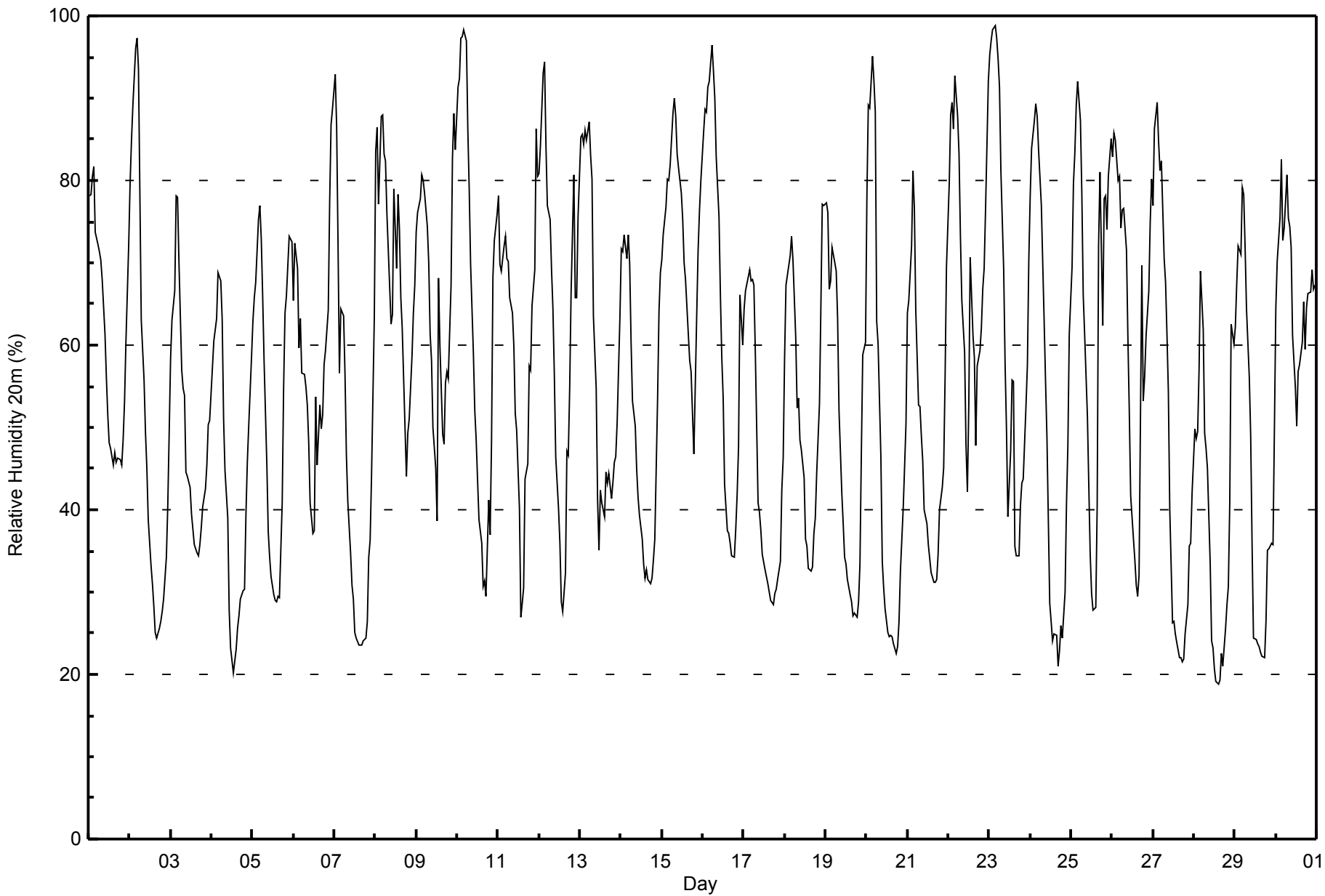


Maximum Value: 99 % on Jun 23 04:00																			Maximum Daily Average: 73.0 % on Jun 15						Hours in Service: 720																			
Minimum Value: 19 % on Jun 28 15:00																			Minimum Daily Average: 38.7 % on Jun 28						Hours of Data: 720																			
Maximum Diurnal Average: 80.4 % at hour 5																			Minimum Diurnal Average: 36.1 % at hour 16						Hours of Missing Data: 0																			
Monthly Average: 56.1 %																			Percentiles: P ₁ = 21 P ₁₀ = 29 Q ₁ = 37 Median = 57 Q ₃ = 72 P ₉₀ = 84 P ₉₉ = 97						Hours of Calibration: 0																			
																									Percent Operational Time: 100.0																			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																				
1-Jun	78	78	80	82	74	72	71	70	68	61	56	52	48	47	45	47	46	46	46	45	49	53	60	72	60.4	82																		
2-Jun	80	85	89	96	97	94	78	63	56	49	45	39	33	31	28	25	24	26	26	28	29	34	41	49	51.9	97																		
3-Jun	58	63	67	78	78	70	57	55	54	45	44	43	39	38	36	35	34	36	38	40	43	46	50	51	49.8	78																		
4-Jun	57	61	62	63	69	68	63	51	45	39	28	23	22	20	23	26	27	29	30	30	39	46	50	58	42.9	69																		
5-Jun	63	66	68	75	77	73	66	58	45	37	34	32	30	29	29	29	29	41	55	64	66	73	73	73	53.5	77																		
6-Jun	65	72	69	60	63	57	56	55	53	48	41	37	38	54	45	53	50	52	58	59	64	77	87	89	58.4	89																		
7-Jun	93	87	72	57	64	64	56	47	41	35	31	29	25	24	24	24	24	24	24	26	34	36	44	63	43.7	93																		
8-Jun	84	86	77	88	88	83	82	76	67	63	64	79	69	78	74	66	62	50	44	49	51	59	64	67	69.6	88																		
9-Jun	74	76	78	81	80	79	74	70	61	58	50	45	39	68	60	49	48	55	57	56	67	83	88	84	65.8	88																		
10-Jun	91	92	97	98	98	97	86	79	70	59	52	48	44	39	36	31	31	29	41	37	48	68	73	76	63.4	98																		
11-Jun	78	70	69	72	73	70	70	66	64	60	52	50	40	27	29	31	44	46	58	57	65	69	86	80	59.4	86																		
12-Jun	81	84	93	94	84	77	75	69	64	57	47	40	36	29	28	32	47	47	55	66	81	66	66	76	62.2	94																		
13-Jun	85	86	84	86	85	87	83	80	63	55	41	35	42	41	39	45	43	44	41	43	46	47	50	63	59.0	87																		
14-Jun	72	71	73	71	73	70	60	53	50	45	41	39	36	33	32	33	32	31	32	34	36	54	64	69	50.2	73																		
15-Jun	70	73	77	80	80	82	88	90	88	83	82	78	75	70	68	61	58	57	52	47	63	71	76	80	73.0	90																		
16-Jun	86	89	88	91	92	96	93	90	83	76	66	59	54	43	37	37	36	34	34	38	42	48	66	60	64.1	96																		
17-Jun	64	67	67	69	68	68	67	59	41	40	37	35	33	32	31	30	29	28	30	30	32	34	42	46	45.0	69																		
18-Jun	58	67	70	71	73	70	61	52	54	48	47	44	36	36	33	32	33	37	39	44	53	65	77	77	53.3	77																		
19-Jun	77	76	67	68	72	70	69	63	52	42	38	34	33	31	30	29	27	27	27	29	33	47	59	60	48.4	77																		
20-Jun	78	89	89	95	92	88	63	60	46	34	31	28	25	25	25	25	24	23	23	26	32	40	45	51	48.2	95																		
21-Jun	64	65	72	81	77	64	53	53	49	46	40	38	36	34	32	31	31	32	35	40	43	45	56	70	49.4	81																		
22-Jun	80	88	89	86	93	88	83	73	65	59	48	42	53	71	61	58	48	57	59	62	67	69	76	92	69.5	93																		
23-Jun	95	97	98	99	97	95	91	81	69	58	50	39	47	56	56	36	34	34	41	43	44	53	58	70	64.2	99																		
24-Jun	78	84	87	89	88	84	77	70	63	56	49	29	26	24	25	25	21	23	26	24	30	41	48	61	51.1	89																		
25-Jun	69	80	83	89	92	87	79	66	61	51	43	35	30	28	28	41	72	81	62	78	78	74	80	85	65.5	92																		
26-Jun	83	86	85	80	80	74	77	77	72	61	52	42	36	34	31	30	32	70	53	56	61	67	75	80	62.2	86																		
27-Jun	77	86	89	85	81	82	71	68	61	54	40	26	26	25	24	22	22	21	22	25	29	36	36	42	48.0	89																		
28-Jun	50	49	50	57	69	62	49	47	45	33	24	23	21	19	19	19	23	21	26	29	31	41	63	60	38.7	69																		
29-Jun	62	67	72	71	79	78	72	64	56	49	36	24	24	24	23	23	22	22	27	35	35	36	36	50	45.3	79																		
30-Jun	64	70	75	83	73	74	81	76	74	72	61	55	50	57	58	60	65	59	64	66	66	69	67	67	67.0	83																		
																			73.9	77.0	78.0	79.8	80.4	77.5	71.8	66.1	59.4	52.4	45.6	40.7	38.2	38.9	36.9	36.1	37.3	39.4	40.8	43.6	48.6	54.8	61.9	67.4	Diurnal Average	
																			95	97	98	99	98	97	93	90	88	83	82	79	75	78	74	66	72	81	64	78	81	83	88	92	Diurnal Maximum	



WBEA
Hourly Averages

Relative Humidity 20m (RH20m) - %
Lower Camp Met Tower - June 2015





WBEA
Cumulative Frequency Distribution

Relative Humidity 20m (RH20m) - %
Lower Camp Met Tower - June 2015

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	3	0.42	0.42
20 - 40	194	26.94	27.36
40 - 60	195	27.08	54.44
60 - 80	221	30.69	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

Relative Humidity 45m (RH45m) - %

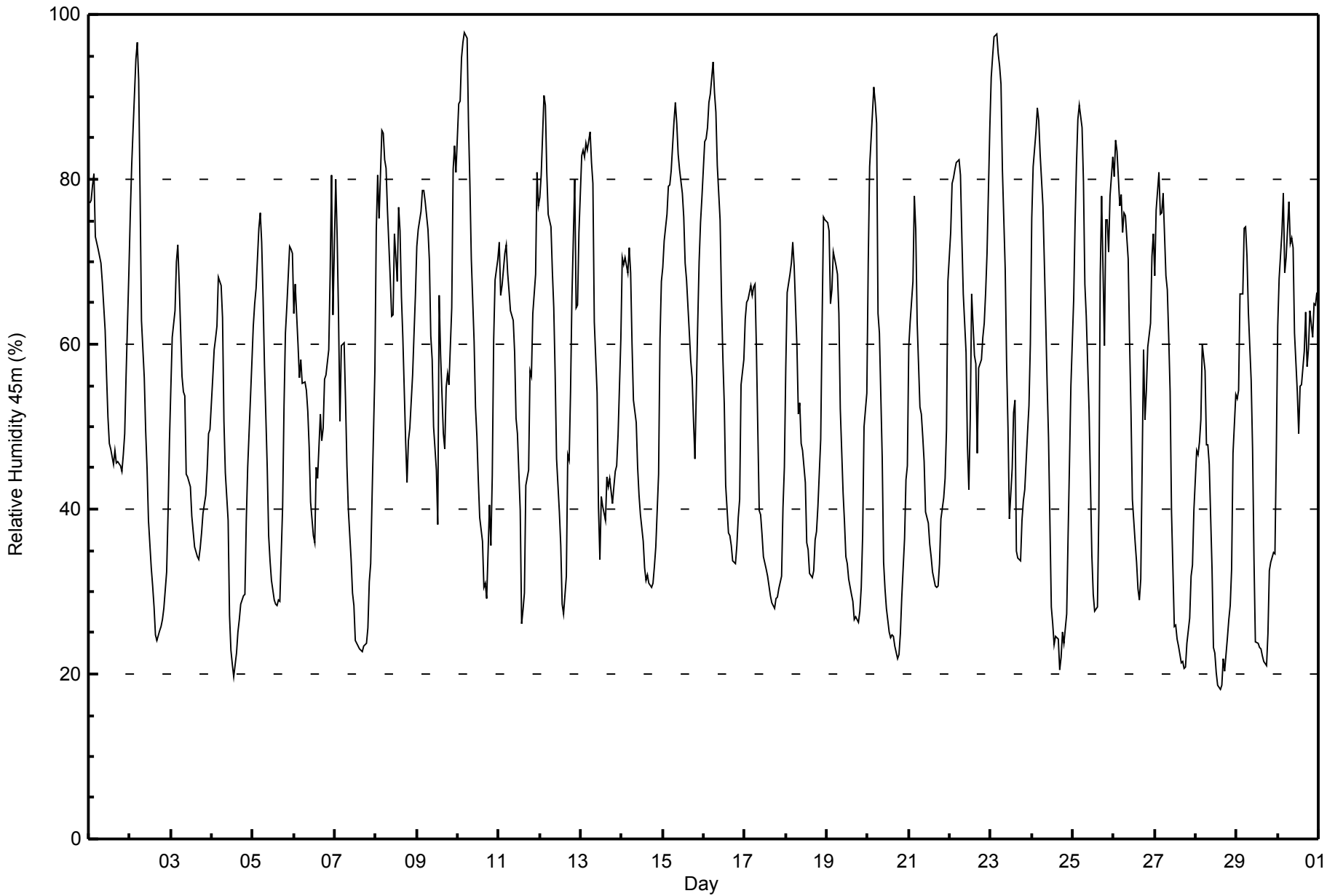
Lower Camp Met Tower - June 2015

Maximum Value: 98 % on Jun 10 05:00																			Maximum Daily Average: 72.2 % on Jun 15																			Hours in Service: 720	
Minimum Value: 18 % on Jun 28 15:00																			Minimum Daily Average: 35.8 % on Jun 28																			Hours of Data: 720	
Maximum Diurnal Average: 77.5 % at hour 5																			Minimum Diurnal Average: 35.6 % at hour 16																			Hours of Missing Data: 0	
Monthly Average: 54.4 %																			Percentiles: P ₁ = 21 P ₁₀ = 28 Q ₁ = 37 Median = 55 Q ₃ = 70 P ₉₀ = 81 P ₉₉ = 94																			Hours of Calibration: 0	
																																						Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24															
1-Jun	77	77	79	81	73	72	71	70	68	62	56	51	48	47	45	47	46	46	45	45	47	49	56	69	59.4	81													
2-Jun	76	82	86	95	97	92	78	63	56	49	45	39	33	31	28	25	24	25	26	27	28	32	39	48	50.9	97													
3-Jun	55	61	64	70	72	67	56	54	54	44	44	43	39	37	35	34	34	35	37	40	42	45	49	50	48.4	72													
4-Jun	56	59	61	62	68	67	63	51	44	39	27	23	21	20	23	25	27	29	29	30	39	45	49	58	42.2	68													
5-Jun	62	65	67	74	76	72	66	57	45	37	34	31	29	28	28	29	29	40	53	61	65	72	72	71	52.6	76													
6-Jun	64	67	60	56	58	55	55	54	52	47	41	37	36	45	44	52	48	50	56	56	59	68	81	64	54.4	81													
7-Jun	80	73	63	51	60	60	53	45	40	34	30	28	24	24	23	23	23	23	24	26	31	33	42	57	40.4	80													
8-Jun	74	80	75	86	86	82	81	76	68	63	64	73	68	77	74	66	61	48	43	48	50	56	61	66	67.8	86													
9-Jun	72	74	76	79	79	77	74	70	61	58	50	45	38	66	59	49	47	55	57	55	64	81	84	81	64.6	84													
10-Jun	89	89	95	97	98	97	87	79	70	60	52	49	44	39	36	30	31	29	41	36	44	61	68	70	62.1	98													
11-Jun	72	66	67	71	72	69	67	64	63	59	51	49	40	26	28	30	43	45	57	56	64	68	81	77	57.6	81													
12-Jun	78	80	90	89	81	76	74	69	64	56	46	40	36	29	27	32	47	46	54	66	80	64	65	74	60.9	90													
13-Jun	83	84	83	84	84	86	82	79	63	54	40	34	42	40	39	44	43	44	41	43	45	45	49	61	57.9	86													
14-Jun	70	70	70	69	72	69	60	53	50	45	42	39	36	33	31	32	31	31	31	33	35	44	61	68	49.0	72													
15-Jun	69	72	76	79	79	81	87	89	87	83	81	78	75	70	68	61	58	56	51	46	63	70	75	78	72.2	89													
16-Jun	85	85	86	89	90	94	91	88	82	75	66	58	53	43	37	37	36	34	33	36	39	41	55	58	62.1	94													
17-Jun	63	65	65	67	66	67	67	59	40	39	37	34	33	32	31	30	29	28	29	29	30	32	40	45	44.1	67													
18-Jun	57	66	69	70	72	70	60	52	53	48	47	43	36	35	32	32	32	36	37	40	48	63	75	75	52.0	75													
19-Jun	75	74	65	67	71	70	69	64	52	42	38	34	33	32	30	29	27	27	26	28	31	37	50	54	46.8	75													
20-Jun	70	81	85	91	89	87	64	61	46	34	30	28	25	24	25	25	23	22	22	25	29	36	44	45	46.4	91													
21-Jun	60	63	68	78	74	63	52	51	49	46	40	38	36	34	32	31	31	31	33	39	41	44	50	68	47.9	78													
22-Jun	73	80	80	81	82	82	81	73	66	59	48	42	51	66	59	58	47	57	58	61	62	66	71	86	66.2	86													
23-Jun	92	95	97	98	95	94	91	81	69	58	50	39	45	52	53	35	34	34	39	41	42	49	53	60	62.3	98													
24-Jun	75	81	86	89	87	83	77	70	63	55	49	28	26	24	25	24	20	22	25	24	27	37	46	55	49.9	89													
25-Jun	65	75	82	87	89	86	80	67	63	52	43	34	30	28	28	40	68	78	60	75	75	71	78	83	64.1	89													
26-Jun	80	85	83	77	78	74	76	76	70	60	52	41	36	33	30	29	32	59	51	54	60	63	71	73	60.2	85													
27-Jun	68	76	81	76	76	78	68	67	61	54	40	26	26	24	23	21	21	21	21	24	27	32	33	40	45.2	81													
28-Jun	47	47	48	51	60	57	48	48	46	33	23	23	20	19	18	19	22	20	24	27	28	33	47	54	35.8	60													
29-Jun	53	54	66	66	74	74	71	64	56	47	34	24	24	23	23	22	22	21	25	33	34	35	35	47	42.7	74													
30-Jun	62	68	74	78	69	70	77	72	73	72	61	54	49	55	55	59	64	57	59	64	61	65	65	66	64.6	78													
	70.1	73.2	74.9	76.9	77.5	75.7	70.8	65.6	59.1	52.2	45.3	40.2	37.7	37.8	36.3	35.6	36.6	38.3	39.6	42.2	46.3	51.3	58.1	63.3	Diurnal Average														
	92	95	97	98	98	97	91	89	87	83	81	78	75	77	74	66	68	78	60	75	80	81	84	86	Diurnal Maximum														



WBEA
Hourly Averages

Relative Humidity 45m (RH45m) - %
Lower Camp Met Tower - June 2015





WBEA
Cumulative Frequency Distribution

Relative Humidity 45m (RH45m) - %
Lower Camp Met Tower - June 2015

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	4	0.56	0.56
20 - 40	208	28.89	29.44
40 - 60	202	28.06	57.50
60 - 80	222	30.83	88.33
80 - 100	84	11.67	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity 100m (RH100m) - %

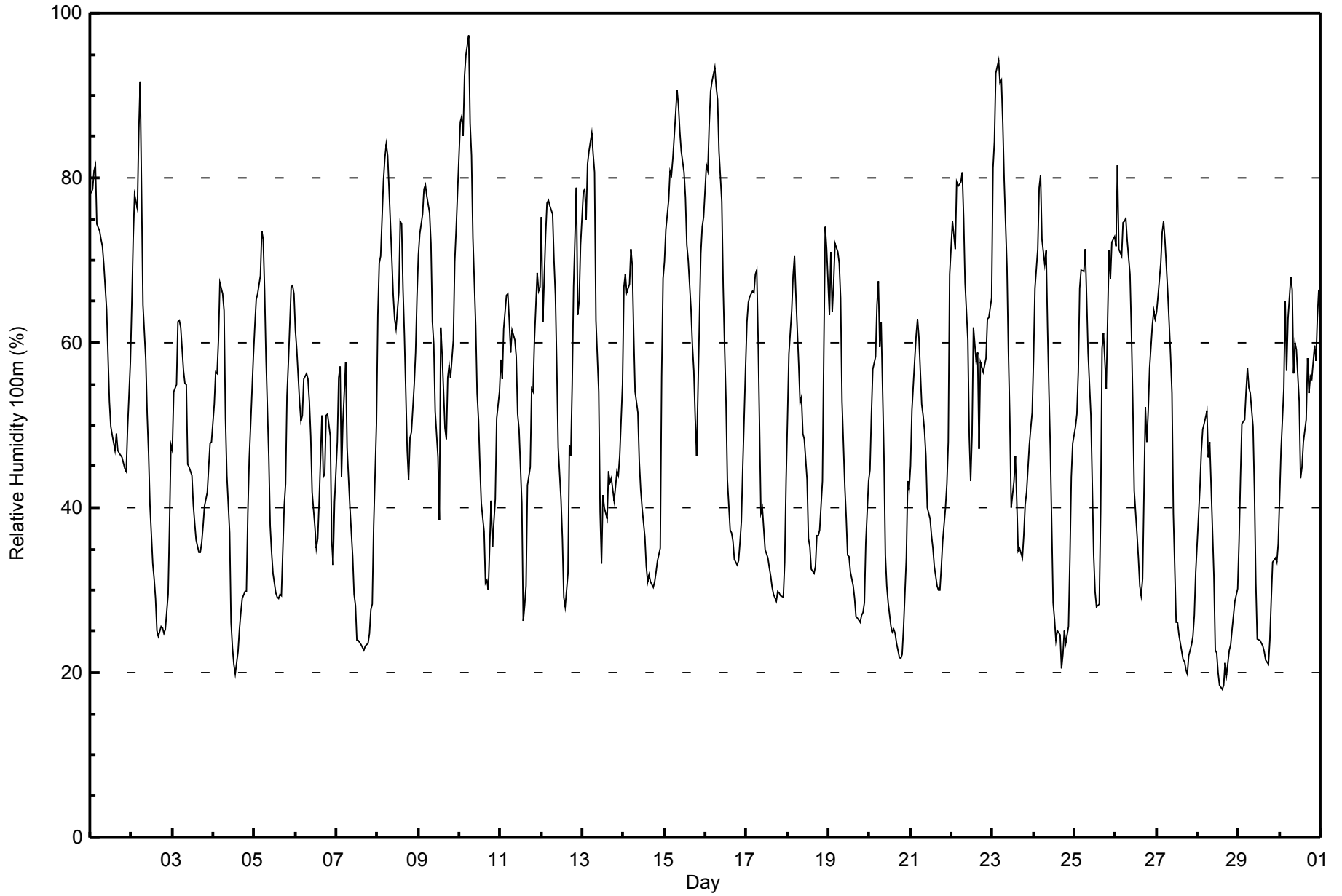
Lower Camp Met Tower - June 2015

Maximum Value: 97 % on Jun 10 06:00																			Maximum Daily Average: 73.4 % on Jun 15						Hours in Service: 720																								
Minimum Value: 18 % on Jun 28 15:00																			Minimum Daily Average: 31.9 % on Jun 28						Hours of Data: 720																								
Maximum Diurnal Average: 72.4 % at hour 6																			Minimum Diurnal Average: 35.7 % at hour 16						Hours of Missing Data: 0																								
Monthly Average: 51.5 %																			Percentiles: P ₁ = 20 P ₁₀ = 27 Q ₁ = 36 Median = 51 Q ₃ = 66 P ₉₀ = 77 P ₉₉ = 92						Hours of Calibration: 0																								
																			Percent Operational Time: 100.0																														
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jun	78	79	81	81	74	73	73	72	69	64	58	53	50	49	47	49	47	47	46	45	45	44	50	58	59.7	81																							
2-Jun	65	73	78	76	86	92	78	65	58	51	47	40	33	31	29	25	24	26	25	25	25	29	38	48	48.6	92																							
3-Jun	47	54	55	63	63	62	57	55	55	45	45	44	40	38	36	35	35	36	38	40	42	45	48	48	46.8	63																							
4-Jun	52	56	56	60	67	66	64	51	44	37	26	23	21	20	23	25	27	29	30	30	39	46	50	58	41.7	67																							
5-Jun	62	65	66	68	74	72	66	58	46	38	35	32	30	29	29	30	29	40	43	53	58	67	67	66	51.0	74																							
6-Jun	62	59	53	51	51	56	56	56	53	49	42	38	35	36	41	51	44	44	51	51	49	36	33	41	47.3	62																							
7-Jun	48	56	57	44	50	58	47	44	40	34	30	28	24	24	23	23	23	23	24	25	28	28	38	50	36.2	58																							
8-Jun	63	70	71	80	82	84	83	79	70	66	63	62	66	75	74	66	61	47	43	48	49	55	59	66	65.9	84																							
9-Jun	71	73	76	79	79	78	76	72	62	60	52	46	38	62	58	50	48	56	57	56	60	70	74	78	63.8	79																							
10-Jun	87	87	85	92	95	97	87	83	73	62	54	51	45	40	37	31	31	30	41	35	38	41	51	54	59.5	97																							
11-Jun	58	56	62	66	66	63	59	61	60	58	51	49	40	26	28	30	43	45	54	54	60	68	66	67	53.9	68																							
12-Jun	75	63	73	77	77	77	76	70	66	57	47	41	36	29	28	32	48	46	55	67	79	63	65	72	59.1	79																							
13-Jun	78	79	75	82	83	85	83	81	63	54	40	33	41	40	39	44	43	44	41	43	44	44	46	55	56.6	85																							
14-Jun	67	68	66	67	71	69	61	54	52	46	42	40	36	33	31	32	31	30	31	32	34	35	56	68	48.0	71																							
15-Jun	70	74	77	81	80	82	88	91	89	86	83	81	78	72	70	64	60	57	51	46	63	71	74	75	73.4	91																							
16-Jun	82	81	86	91	92	93	91	90	83	77	67	59	53	43	37	37	36	34	33	33	36	38	45	57	61.4	93																							
17-Jun	62	65	66	66	66	68	69	60	39	40	37	35	34	33	32	30	29	29	30	30	29	29	33	43	44.0	69																							
18-Jun	51	59	64	68	70	66	57	53	53	49	48	43	36	35	33	32	33	37	37	37	43	60	74	71	50.4	74																							
19-Jun	63	71	64	67	72	71	70	65	53	42	39	34	34	32	30	29	27	27	26	27	27	29	36	43	45.0	72																							
20-Jun	45	51	57	58	65	67	59	63	46	34	30	28	26	25	25	25	24	22	22	25	34	43	42	39.1	67																								
21-Jun	45	52	58	61	63	61	53	51	49	46	40	39	37	35	33	31	30	30	33	36	40	43	48	68	45.0	68																							
22-Jun	75	73	71	80	79	79	81	75	67	60	49	43	49	62	58	59	47	58	56	57	58	63	63	66	63.6	81																							
23-Jun	81	84	93	94	92	92	87	80	69	59	51	40	43	46	41	35	35	34	37	40	42	48	50	52	59.3	94																							
24-Jun	58	67	71	79	80	73	70	71	62	54	47	29	26	24	25	25	21	22	25	24	26	34	44	48	45.9	80																							
25-Jun	50	51	57	67	69	69	71	65	59	51	43	34	30	28	28	39	59	61	54	63	71	68	72	73	55.5	73																							
26-Jun	72	82	71	70	75	75	75	72	68	61	53	42	37	34	31	29	31	52	48	52	57	62	64	63	57.3	82																							
27-Jun	64	66	70	73	75	72	66	62	58	54	39	26	26	25	24	22	21	20	20	22	23	24	27	32	42.2	75																							
28-Jun	39	42	47	49	50	52	46	48	43	32	23	22	20	18	18	18	21	20	23	23	25	27	29	30	31.9	52																							
29-Jun	36	44	50	51	54	57	55	54	50	42	31	24	24	24	23	23	22	21	24	29	33	34	33	36	36.3	57																							
30-Jun	41	47	54	65	57	63	68	67	56	60	59	53	44	45	48	51	58	54	56	56	60	58	63	66	56.1	68																							
																								61.5	64.8	67.0	70.2	71.9	72.4	69.0	65.5	58.6	52.3	45.7	40.4	37.8	37.1	36.0	35.7	36.3	37.3	38.4	40.1	43.6	46.4	51.3	56.4	Diurnal Average	
																								87	87	93	94	95	97	91	91	89	86	83	81	78	75	74	66	61	61	57	67	79	71	74	78	Diurnal Maximum	



WBEA
Hourly Averages

Relative Humidity 100m (RH100m) - %
Lower Camp Met Tower - June 2015





WBEA
Cumulative Frequency Distribution

Relative Humidity 100m (RH100m) - %
Lower Camp Met Tower - June 2015

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	6	0.83	0.83
20 - 40	216	30.00	30.83
40 - 60	249	34.58	65.42
60 - 80	201	27.92	93.33
80 - 100	48	6.67	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) - %

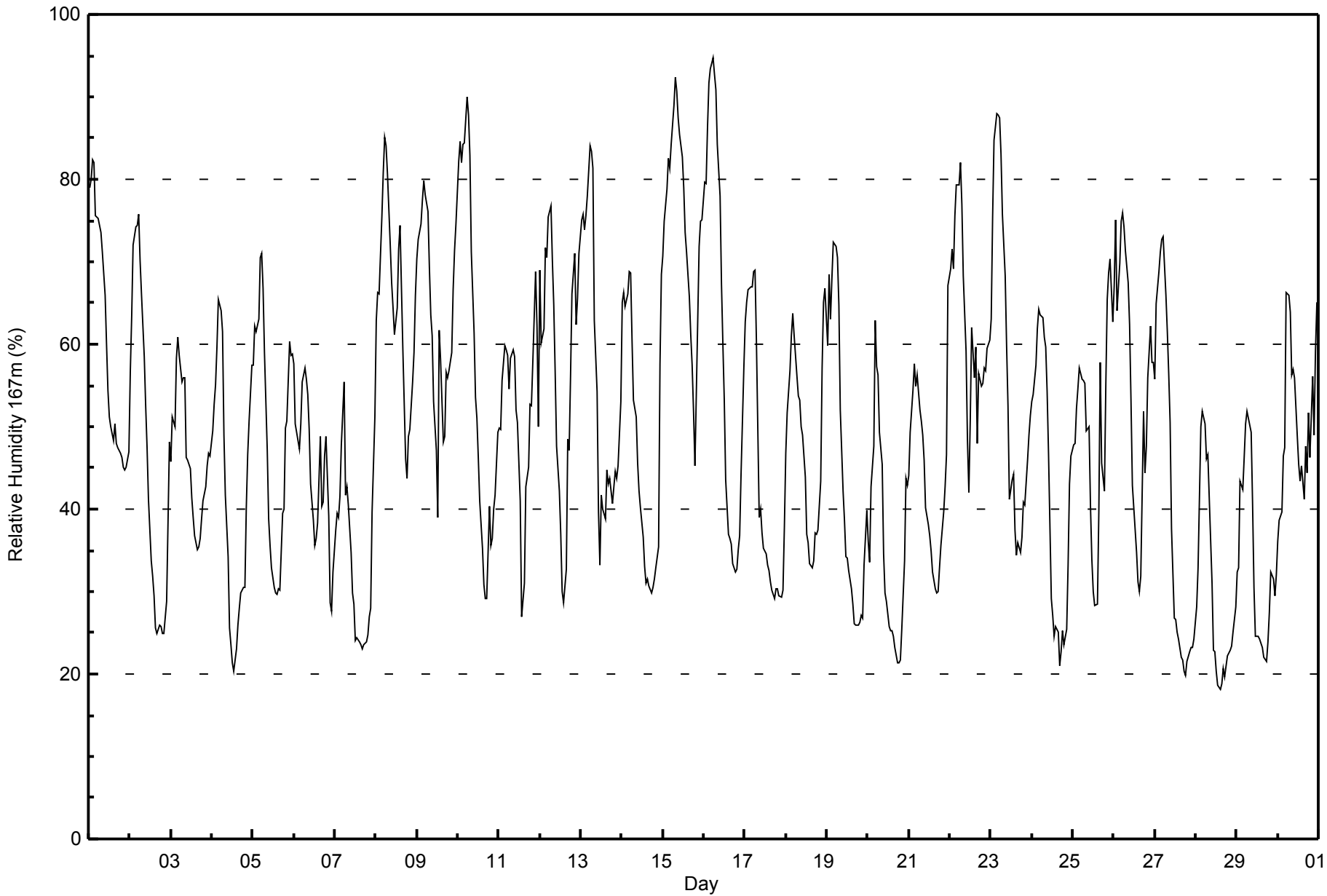
Lower Camp Met Tower - June 2015

Maximum Value: 95 % on Jun 16 06:00																		Maximum Daily Average: 74.6 % on Jun 15						Hours in Service: 720																									
Minimum Value: 18 % on Jun 28 15:00																		Minimum Daily Average: 30.2 % on Jun 28						Hours of Data: 720																									
Maximum Diurnal Average: 69.7 % at hour 6																		Minimum Diurnal Average: 35.6 % at hour 16						Hours of Missing Data: 0																									
Monthly Average: 49.8 %																		Percentiles: P ₁ = 20 P ₁₀ = 26 Q ₁ = 35 Median = 49 Q ₃ = 63 P ₉₀ = 75 P ₉₉ = 91						Hours of Calibration: 0																									
																		Percent Operational Time: 100.0																															
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jun	79	80	82	82	76	75	74	73	71	66	60	54	51	50	48	50	48	48	47	46	45	45	45	47	60.2	82																							
2-Jun	57	63	72	74	74	76	70	66	59	53	47	41	34	32	29	26	25	26	26	25	25	29	39	48	46.5	76																							
3-Jun	46	51	50	58	61	59	55	56	56	46	46	45	41	39	37	35	35	37	39	41	43	45	47	46	46.4	61																							
4-Jun	49	53	55	60	65	64	62	49	42	34	26	24	21	20	23	26	28	30	30	30	40	47	51	58	41.1	65																							
5-Jun	58	62	61	63	71	71	67	59	47	39	36	33	31	30	30	30	30	40	40	50	51	60	59	59	48.9	71																							
6-Jun	58	50	48	47	50	55	57	56	54	50	43	39	36	36	38	49	40	41	46	49	39	29	28	32	44.6	58																							
7-Jun	38	39	39	42	48	55	42	43	41	35	30	29	24	24	24	24	23	24	24	25	27	28	40	51	34.0	55																							
8-Jun	63	66	66	75	81	85	84	81	72	67	64	61	64	72	74	67	60	46	44	49	50	55	59	66	65.5	85																							
9-Jun	70	73	75	77	80	78	76	69	64	61	53	47	39	62	58	48	49	57	56	57	59	67	71	75	63.3	80																							
10-Jun	82	85	82	84	84	90	88	83	71	61	54	51	46	41	35	31	29	29	40	36	36	40	42	49	57.1	90																							
11-Jun	50	50	56	60	59	59	55	58	59	58	52	51	41	27	29	31	43	45	53	53	58	69	62	50	51.1	69																							
12-Jun	69	60	62	72	71	75	77	70	65	57	48	42	37	30	29	33	49	47	56	66	71	62	66	71	57.6	77																							
13-Jun	75	76	74	76	78	84	83	81	63	54	40	33	42	40	39	45	43	44	41	43	45	44	45	53	55.8	84																							
14-Jun	65	66	65	66	69	69	60	53	51	46	42	40	37	33	31	30	30	30	30	32	33	35	58	69	47.6	69																							
15-Jun	71	75	79	83	81	84	89	92	91	87	85	83	79	74	71	66	61	57	52	45	63	72	75	75	74.6	92																							
16-Jun	80	80	86	92	93	95	93	91	84	78	67	60	53	44	37	36	36	33	32	33	35	37	44	57	61.5	95																							
17-Jun	63	65	67	67	67	69	69	60	39	40	37	35	35	33	33	31	30	29	30	30	30	29	30	38	44.0	69																							
18-Jun	47	52	57	61	64	61	56	54	53	50	49	44	37	36	33	33	34	37	37	37	43	57	65	67	48.5	67																							
19-Jun	60	69	63	68	72	72	70	65	52	42	39	34	34	33	30	28	26	26	26	26	27	27	33	40	44.3	72																							
20-Jun	36	34	43	48	63	57	56	49	45	35	30	29	26	25	25	25	23	21	21	22	26	34	44	43	35.8	63																							
21-Jun	44	49	54	58	55	56	52	51	49	46	40	38	37	35	32	30	30	30	33	36	40	43	47	67	43.8	67																							
22-Jun	69	72	69	76	79	79	82	77	68	59	48	42	51	62	56	60	48	56	55	55	57	57	60	60	62.4	82																							
23-Jun	63	75	85	88	88	87	83	76	68	60	52	41	44	44	38	34	36	35	37	41	40	46	49	51	56.7	88																							
24-Jun	53	54	58	62	64	64	63	61	60	54	47	29	27	25	26	25	21	23	25	24	25	33	43	46	42.1	64																							
25-Jun	48	48	52	55	57	56	55	49	50	41	34	30	28	28	40	58	46	42	55	65	69	70	63	63	49.8	70																							
26-Jun	67	75	64	70	75	76	74	71	68	62	53	43	38	35	31	30	32	52	44	48	56	62	58	58	55.9	76																							
27-Jun	56	65	69	71	73	73	66	62	56	51	38	27	27	25	24	22	22	20	20	21	23	23	23	24	40.8	73																							
28-Jun	28	33	42	50	52	50	46	47	41	31	23	23	20	19	18	19	21	20	22	23	23	23	25	28	30.2	52																							
29-Jun	32	33	43	42	46	50	52	51	49	41	31	25	25	24	24	23	22	21	24	27	32	31	29	32	33.8	52																							
30-Jun	36	39	40	47	47	66	66	64	56	57	56	49	45	43	45	41	48	44	52	46	56	49	59	65	50.7	66																							
																								57.0	59.7	61.9	65.7	68.1	69.7	67.5	64.1	58.1	52.3	45.9	40.8	38.3	37.3	35.9	35.6	35.9	36.4	37.5	39.0	42.1	44.9	48.8	52.9	Diurnal Average	
																								82	85	86	92	93	95	93	92	91	87	85	83	79	74	74	67	61	57	56	66	71	72	75	75	Diurnal Maximum	



WBEA
Hourly Averages

Relative Humidity 167m (RH167m) - %
Lower Camp Met Tower - June 2015





WBEA
Cumulative Frequency Distribution

Relative Humidity 167m (RH167m) - %
Lower Camp Met Tower - June 2015

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	5	0.69	0.69
20 - 40	233	32.36	33.06
40 - 60	273	37.92	70.97
60 - 80	169	23.47	94.44
80 - 100	40	5.56	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Maximum Speed: 25 km/h on Jun 5 19:00	Maximum Daily Speed Average: 12.2 km/h on Jun 1	Hours in Service: 720
Minimum Speed Value: 0 km/h on Jun 7 00:00	Minimum Daily Speed Average: 0.8 km/h on Jun 10	Hours of Data: 720
Maximum Diurnal Speed Average: 4.2 km/h at hour 16	Minimum Diurnal Speed Average: 0.2 km/h at hour 4	Hours of Missing Data: 0
Monthly Average Velocity: 1.2 km/h 281.9 deg	Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 3 Median = 6 Q ₃ = 10 P ₉₀ = 14 P ₉₉ = 19	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	WNW11	WNW11	NW11	NW11	NW15	NW14	NW16	NW17	NW15	NW15	NW17	NW15	NW18	NW17	NW15	NNW16	NNW14	NNW13	NNW11	NW9	NW6	NW6	NNW4	N3	NW12.2	NW18	
2-Jun	NNE2	NNW2	WSW1	N2	NW2	NW3	WSW1	S2	SSE3	SSE4	SSE4	SSE6	SSE9	SSE10	SSE9	S8	SSE9	SSE7	SSE9	SSE12	SE10	SSE7	SSW10	SSE3	SSE4.4	SSE12	
3-Jun	SSE4	ESE5	ESE3	NNE2	N3	NNW1	SE2	SSE8	SE10	SSE13	SSE13	SSE13	SSE12	SSE15	SSE14	SSE15	S15	S16	S17	S18	S18	S19	SSE18	SSE17	SSE10.6	S19	
4-Jun	SSE11	SSE8	SSE8	SSE8	SSE5	SE6	SE3	SE9	SE8	SSE11	SSE15	S14	SSE15	SSE16	S16	S16	S14	SSW11	S12	S13	SSW23	SSW15	S11	SSE13	S11.1	SSW23	
5-Jun	SSE18	SSE13	SSE16	SSE12	E3	ESE5	SSE11	S13	SSW17	SSW18	SW19	SW17	SSW14	SSW16	SSW14	SSW13	SSW12	W17	SSW25	SSE14	SSE8	ESE4	SSE7	E5	S10.5	SSW25	
6-Jun	SSE6	SSE7	SE6	SSW5	SSE5	WSW7	WSW9	W10	W7	WSW9	WSW11	W6	WSW11	S4	SW17	W9	WSW17	SE6	SSE8	SE5	SE2	SSW0	SSE2	W0	SW5.0	WSW17	
7-Jun	SE1	SE4	SSE1	NW4	NNW3	W2	NW4	NW4	NW8	NW12	NW11	NW11	NW14	WNW18	NNW16	NW11	WNW13	WNW11	NW8	WNW4	W2	WSW5	NNW6	W4	NW6.4	WNW18	
8-Jun	SE7	SSE4	SSW7	SE3	SE4	SW6	W8	W5	NW8	NNW5	NNW3	SE2	WSW9	NNW3	SE6	S2	SSE2	NNW10	NNW16	NNW13	NNW13	NNW8	NW9	NW11	NW3.2	NNW16	
9-Jun	NNW8	NNW6	NNW7	WNW4	NW3	WNW5	WNW6	W8	W8	NW5	WSW6	WSW8	WNW8	NNE9	N6	N7	NW8	NNW8	N4	NW5	NNW5	NNW4	NNW4	N3	NW4.9	NNE9	
10-Jun	SSW1	NW3	NNW3	NNW2	NE1	ESE1	ESE0	SSW1	SSW2	NNW2	SE1	NNW1	SW5	WNW2	N4	WNW3	N3	E1	WSW13	SSW3	SE4	N0	SE1	ENE1	W0.8	WSW13	
11-Jun	E2	SE3	SE1	SE4	SSE4	SE3	SE6	SSE7	SSE11	SSE11	SSE12	SE6	SSW7	WSW18	SW18	W14	NW6	SSW10	SSE10	SSE7	SSE5	SSW5	SE3	SE8	S5.3	SW18	
12-Jun	NW4	NW3	ESE3	ESE2	SW2	SW5	WSW5	SW1	E4	SE3	SW4	WSW6	WSW8	W6	WNW7	SSW0	SE17	SE13	ESE10	ENE4	N5	ENE7	E7	NE6	SE1.3	SE17	
13-Jun	NNE7	NNE7	NNE7	N6	N5	NW6	NW8	NNW8	N14	N18	NNE21	NNE18	NNE18	NNE18	NNE19	NNE17	NNE18	NNE16	NNE18	NNE14	NNE10	NNE9	NNE6	E3	NNE11.8	NNE21	
14-Jun	E4	N1	NNE3	N3	NNW5	NNW7	N11	N12	N12	N15	N14	N14	NNE14	N14	N13	N12	N12	N9	N9	NNE5	NNE2	NNW1	N6	N8	N8.3	N15	
15-Jun	NNE7	N7	N7	N5	NNE6	NNE6	NNE5	NNE6	NNW5	N6	N6	NNW3	NNE1	SE2	SSE2	SSW3	SW3	E1	SW1	W1	S7	SSE5	SSE3	SSE4	NNE1.8	N7	
16-Jun	ENE2	NNW8	N4	N7	NNW6	N6	N11	N10	N9	N8	N8	N11	N8	N11	N12	N10	NNW10	N10	NNE6	NNW4	NNW3	N3	N4	N8	N7.3	N12	
17-Jun	NNE6	N3	NNW5	NW8	NNW7	NNW7	NNW7	NNW7	NNE10	N9	N5	NW6	NW5	NW5	SW6	WSW7	W6	WSW2	S5	S12	S13	S14	SSE12	SSE16	W1.4	SSE16	
18-Jun	SSE11	SSE7	SE5	SE5	SSE5	SSE7	S9	S12	S9	S10	SE7	ESE5	S9	SSE6	S8	S6	SSE8	SW12	WSW4	NNE2	S3	W11	W12	W8	S5.5	S12	
19-Jun	NW6	NNW6	N8	N9	N11	N11	N9	N9	NNE10	N12	N12	N12	N8	N6	N7	N7	N9	N9	NE6	NNE5	NNE3	NNW3	N4	NW2	N7.4	N12	
20-Jun	N2	NNW1	N1	N2	N1	NNW1	NNE1	N1	NW2	W3	NNE4	NNW7	NNW7	NW6	NNW5	NNW6	NNW5	NNE4	NNE5	N6	N3	NNW4	W2	NNE2	NNW3.1	NNW7	
21-Jun	N5	N5	NNW1	NNW4	NNW5	NNW4	N6	N5	N5	NNE4	N6	NNE7	N6	N7	N8	N8	NNE7	NNE7	NNE8	N5	NNW5	WNW4	SE0	W1	N4.9	N8	
22-Jun	N3	N2	N2	N3	NNE2	SE2	S3	WSW6	WNW3	NE4	S1	NNE6	NNW12	WNW3	WSW14	W15	W13	NNW11	NE3	SE2	NNE1	W1	N1	N1	NW2.6	W15	
23-Jun	WNW1	NNW1	N1	SE3	SE6	SE6	SE7	SSE8	SE5	SSE3	SW5	WSW6	WNW4	NW9	E3	SSE2	SW4	S4	SSE6	S8	SSW8	SE6	SSE5	SSE7	S3.0	NW9	
24-Jun	SE4	SE4	SE7	SSE6	SE7	SE10	SE9	SE8	SSE9	SSE11	SE5	W11	W11	W11	W11	WSW13	WSW11	WSW10	WSW15	WNW4	W3	NE2	N6	N5	N5	SSW3.2	WSW15
25-Jun	NNW1	NNW3	NW2	NW1	N1	NW2	NNW2	NNW2	N3	NNW3	NNE3	E3	SE4	E1	NNW5	NNW13	NW4	ENE1	W3	SSE5	W6	WSW2	S4	SE1	NNW1.3	NNW13	
26-Jun	SSE4	ESE6	SSE9	S6	S5	SSW5	SSE6	SSE9	SSE8	WSW4	W6	W14	W16	W18	W17	W20	W19	WNW15	W12	W11	W5	SE5	S2	S2	WSW5.8	W20	
27-Jun	SSE5	SSE4	SE6	SE5	SSE5	SSE6	SW5	SSE6	SE6	SE5	SSW2	W7	W12	WSW13	W11	W9	W10	W12	W10	W8	WSW9	W7	W9	W11	WSW5.0	WSW13	
28-Jun	W6	W6	W1	SSE7	SE9	SSE5	W3	NNE2	N4	N8	NNW12	NW15	WNW20	NW17	NW17	NW15	NNW9	NW10	NNW7	NNW7	NNW4	NNW2	NNE1	WNW3	NW5.6	WNW20	
29-Jun	SSE1	SE4	SE4	SE5	SE3	SE8	SE9	SE6	SE4	SE5	S4	WSW9	WSW7	WSW9	WSW9	W8	WSW8	WSW8	ESE5	N4	NNW5	NW2	E2	N4	SSW2.1	WSW9	
30-Jun	N4	NNW3	W1	NNW1	ENE2	NNW1	E1	ESE2	NNW1	N2	N2	NE2	NE1	N2	NE1	N5	N4	N2	NW5	NNW3	SE4	SE5	W7	W9	NNW1.3	W9	

SE0.5 NE0.5 ESE0.7 ENE0.2 NNE0.6 W0.2 NW0.6 SW0.4 N0.7 NNW1.0 NW1.0 NNW3.1 NNW4.1 NNW3.7 W4.0 NNW4.2 NNW3.5 NNW3.1 W1.0 SW0.8 SSW1.6 SW1.3 SSW1.1 S0.7	Diurnal Average
SSE18 SSE13 SSE16 SSE12 NW15 NW14 NW16 NW17 SSW17 SSW18 NNE21 NNE18 NNW20 NNW18 NNE19 W20 W19 W17 SSW25 S18 SSW23 S19 SSE18 SSE17	Diurnal Maximum

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



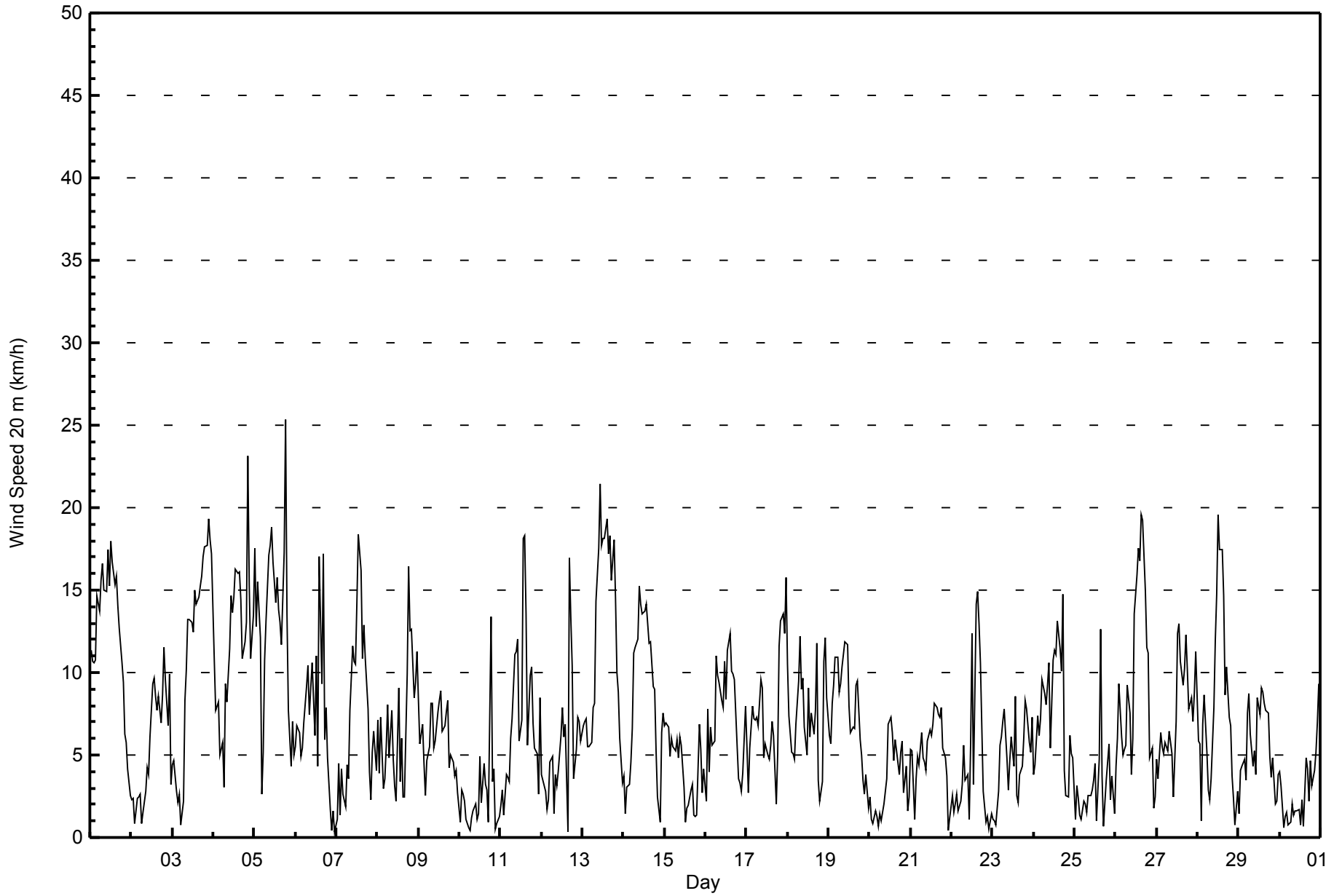
Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 10 km/h on Jun 5 18:00			Hours of Data:	720
Minimum Value: 0 km/h on Jun 6 22:00			Hours of Missing Data:	0
			Hours of Calibration:	0
			Percent Operational Time:	100.0
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 6 P ₉₉ = 8				

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



WBEA
Hourly Averages

Wind Speed 20 m (WS20m) - km/h
Lower Camp Met Tower - June 2015





WBEA
Cumulative Frequency Distribution

Wind Speed 20 m (WS20m) - km/h
Lower Camp Met Tower - June 2015

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	316	43.89	43.89
6 - 11	271	37.64	81.53
12 - 19	128	17.78	99.31
20 - 28	5	0.69	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

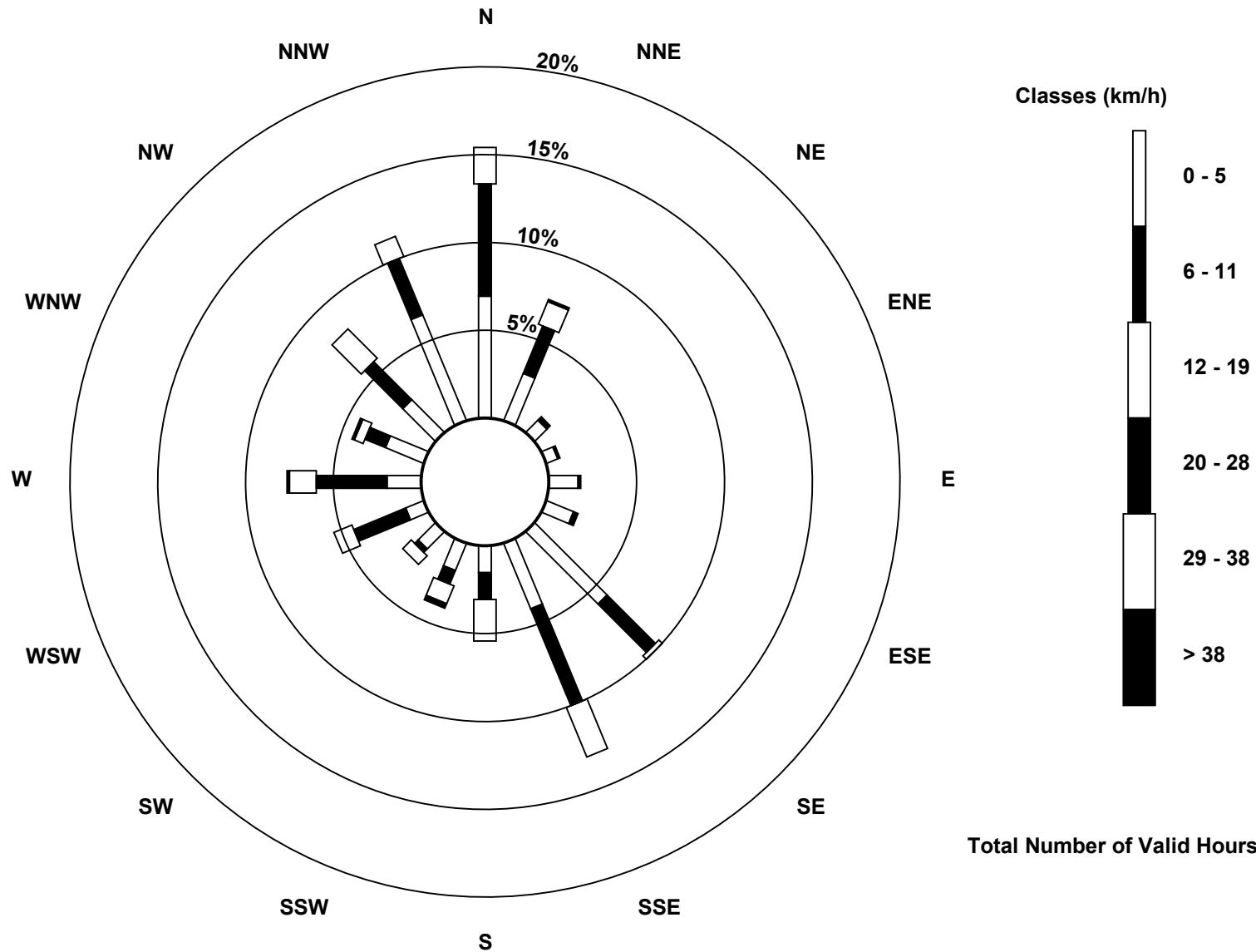
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

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





Maximum Speed: 31 km/h on Jun 13 11:00	Maximum Daily Speed Average: 17.1 km/h on Jun 13	Hours in Service: 720
Minimum Speed Value: 0 km/h on Jun 10 07:00	Minimum Daily Speed Average: 0.9 km/h on Jun 10	Hours of Data: 720
Maximum Diurnal Speed Average: 5.9 km/h at hour 16	Minimum Diurnal Speed Average: 0.4 km/h at hour 1	Hours of Missing Data: 0
Monthly Average Velocity: 1.9 km/h 297.1 deg	Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 5 Median = 8 Q ₃ = 13 P ₉₀ = 19 P ₉₉ = 26	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	WNW16	WNW16	NW15	NW15	NW20	NW18	NW20	NW22	NW20	NW20	NW23	NW21	NW25	NW22	NW20	NNW21	NNW19	NNW18	NNW15	NW13	NW9	NW10	NNW7	N4	NW16.7	NW25
2-Jun	NNE4	NNW4	WSW2	N3	NW2	NW3	WSW1	S1	SSE3	SSE5	SSE4	SSE7	SSE11	SSE11	SSE10	S9	SSE10	SSE8	SSE10	SSE15	SE14	SSE10	SSW12	SSE4	SSE5.3	SSE15
3-Jun	SSE7	ESE7	ESE4	NNE2	N3	NNW1	SE4	SSE10	SE13	SSE16	SSE17	SSE16	SSE14	SSE18	SSE16	SSE17	S17	S18	S19	S19	S19	S21	SSE20	SSE19	SSE12.3	S21
4-Jun	SSE13	SSE11	SSE11	SSE11	SSE8	SE9	SE5	SE12	SE10	SSE14	SSE17	S16	SSE18	SSE19	S19	S18	S17	SSW13	S13	S15	SSW27	SSW21	S13	SSE16	S13.5	SSW27
5-Jun	SSE20	SSE15	SSE19	SSE15	E4	ESE7	SSE13	S15	SSW21	SSW23	SW23	SW21	SSW18	SSW19	SSW17	SSW16	SSW15	W24	SSW29	SSE17	SSE12	ESE6	SSE10	E7	S13.0	SSW29
6-Jun	SSE7	SSE8	SE7	SSW7	SSE6	WSW10	WSW13	W15	W10	WSW12	WSW13	W8	WSW15	S6	SW21	W14	WSW22	SE7	SSE10	SE7	SE3	SSW0	SSE1	W4	SW6.8	WSW22
7-Jun	SE1	SE5	SSE2	NW8	NNW4	W4	NW7	NW6	NW11	NW16	NW15	NW14	NW19	NNW25	NNW22	NW15	WSW18	NNW15	NW10	WNW5	W5	WSW9	NNW9	W5	NW9.1	NNW25
8-Jun	SE8	SSE5	SSW10	SE5	SE5	SW7	W11	W7	NW10	NNW7	NNW4	SE2	WSW11	NNW5	SE8	S3	SSE2	NNW14	NNW24	NNW18	NNW18	NNW13	NW14	NW16	NW4.8	NNW24
9-Jun	NNW12	NNW9	NNW10	WNW6	NW4	WNW7	WNW8	W11	W10	NW7	WSW7	WSW10	NNW10	NNE13	N9	N9	NW11	NNW12	N6	NW7	NNW8	NNW6	NNW7	N5	NW7.1	NNE13
10-Jun	SSW1	NW4	NNW5	NNW2	NE2	ESE1	ESE0	SSW1	SSW2	NNW3	SE1	NNW2	SW6	WNW3	N5	WNW4	N4	E1	WSW18	SSW4	SE6	N1	SE3	ENE3	W0.9	WSW18
11-Jun	E4	SE6	SE3	SE6	SSE6	SE5	SE9	SSE10	SSE15	SSE14	SSE14	SE8	SSW9	WSW24	SW23	W18	NW7	SSW12	SSE12	SSE9	SSE7	SSW6	SE3	SE11	S6.9	WSW24
12-Jun	NW4	NW6	ESE3	ESE3	SW4	SW6	WSW6	SW2	E4	SE3	SW4	WSW7	WSW9	W8	WNW9	SSW1	SE22	SE17	ESE15	ENE5	N8	ENE12	E11	NE9	SE1.8	SE22
13-Jun	NNE11	NNE11	NNE11	N8	N8	NW9	NNW11	NNW12	N20	N25	NNE31	NNE26	NNE26	NNE26	NNE28	NNE25	NNE27	NNE22	NNE26	NNE21	NNE15	NNE13	NNE9	E6	NNE17.1	NNE31
14-Jun	E6	N2	NNE6	N5	NNW8	NNW10	N15	N16	N16	N21	N19	N19	NNE19	N20	N18	N16	N17	N13	N13	NNE8	NNE4	NNW2	N11	N11	N11.9	N21
15-Jun	NNE11	N10	N10	N7	NNE9	NNE8	NNE7	NNE8	NNW7	N8	N7	NNW4	NNE2	SE2	SSE2	SSW3	SW4	E1	SW2	W1	S8	SSE7	SSE4	SSE5	NNE2.8	NNE11
16-Jun	ENE2	NNW12	N6	N10	NNW8	N9	N15	N14	N13	N12	N11	N15	N12	N15	N17	N14	NNW13	N13	NNE8	NNW5	NNW6	N5	N7	N12	N10.4	N17
17-Jun	NNE9	N5	NNW8	NW12	NNW11	NNW11	NNW11	NNW9	NNE14	N12	N6	NW8	NW6	NW6	SW7	WSW8	W8	WSW2	S6	S12	S14	S15	SSE15	SSE19	WNW2.2	SSE19
18-Jun	SSE13	SSE10	SE8	SE7	SSE7	SSE9	S11	S13	S10	S11	SE7	ESE6	S10	SSE7	S9	S7	SSE9	SW15	WSW5	NNE2	S4	W16	W19	W14	S6.7	WSW19
19-Jun	NW10	NNW9	N12	N14	N15	N15	N12	N13	NNE14	N16	N16	N15	N11	N8	N9	N9	N13	N13	NE9	NNE8	NNE7	NNW5	N7	NW4	N10.5	N16
20-Jun	N4	NNW2	N1	N2	N2	NNW1	NNE2	N1	NW3	W3	NNE5	NNW9	NNW9	NW8	NNW7	NNW8	NNW7	NNE5	NNE8	N9	N6	NNW6	W1	NNE3	NNW4.3	NNW9
21-Jun	N8	N9	NNW2	NNW6	NNW8	NNW6	N9	N7	N6	NNE5	N8	NNE9	N8	N9	N10	N11	NNE10	NNE10	NNE12	N8	NNW8	WNW5	SE1	W4	N7.0	NNE12
22-Jun	N2	N3	N3	N4	NNE4	SE2	S4	WSW7	WNW4	NE4	S1	NNE7	NNW18	WNW4	WSW20	W20	W18	NNW15	NE5	SE2	NNE2	W0	N0	N1	NW3.6	W20
23-Jun	WNW2	NNW1	N1	SE4	SE7	SE8	SE9	SSE9	SE5	SSE3	SW6	WSW8	WNW6	NW13	E4	SSE2	SW4	S5	SSE8	S10	SSW10	SE7	SSE6	SSE10	S3.6	NW13
24-Jun	SE6	SE8	SE10	SSE8	SE9	SE13	SE12	SE10	SSE11	SSE13	SE7	W14	W15	W15	WSW17	WSW15	WSW13	WSW20	WNW6	W3	NE5	N9	N8	N8	SSW3.9	WSW20
25-Jun	NNW3	NNW4	NW3	NW2	N3	NW2	NNW3	NNW2	N3	NNW3	NNE3	E4	SE5	E2	NNW6	NNW18	NW5	ENE3	W4	SSE6	W9	WSW4	S5	SE3	NNW1.9	NNW18
26-Jun	SSE5	ESE8	SSE12	S7	S6	SSW7	SSE7	SSE11	SSE9	WSW5	W7	W19	W23	W24	W23	W28	W27	NNW22	W17	W17	W7	SE6	S3	S3	WSW8.2	W28
27-Jun	SSE4	SSE6	SE9	SE4	SSE4	SSE6	SW7	SSE7	SE6	SE5	SSW2	W9	W17	WSW17	W15	W13	W14	W17	W14	W11	WSW12	W12	W14	W17	WSW7.1	W17
28-Jun	W12	W10	W3	SSE7	SE9	SSE4	W5	NNE3	N5	N11	NNW17	NW20	NNW26	NW23	NW23	NW20	NNW12	NW14	NNW12	NNW11	NNW6	NNW6	NNE5	WNW4	NW8.5	NNW26
29-Jun	SSE1	SE6	SE9	SE7	SE7	SE10	SE11	SE8	SE5	SE6	S4	WSW11	WSW10	WSW12	WSW12	W11	WSW10	WSW11	ESE6	N6	NNW7	NW3	E3	N5	SSW2.8	WSW12
30-Jun	N7	NNW6	W1	NNW2	ENE1	NNW1	E1	ESE2	NNW1	N2	N2	NE2	NE1	N3	NE1	N7	N7	N3	NW6	NNW5	SE4	SE8	W11	W14	NNW2.1	W14

ENE0.4	NNE0.9	E0.8	N0.5	NNE1.2	NW0.7	NW1.1	NNW0.7	N1.3	NNW1.9	NW2.5	NW4.3	NNW5.6	NNW5.3	W5.3	NNW5.9	NNW5.0	NNW4.4	NNW1.6	W0.8	SW1.6	WSW1.5	SW0.9	SW0.6	Diurnal Average	
SSE20	WNW16	SSE19	SSE15	NW20	NW18	NW20	NW22	SSW21	N25	NNE31	NNE26	WNW26	NNE26	NNE28	W28	W27	W24	SSW29	NNE21	SSW27	S21	SSE20	SSE19	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 45 m (WS45m) - km/h

Lower Camp Met Tower - June 2015

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 12 km/h on Jun 5 18:00			Hours of Data:	720
Minimum Value: 1 km/h on Jun 6 22:00			Hours of Missing Data:	0
			Hours of Calibration:	0
			Percent Operational Time:	100.0
Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 2 Median = 3 Q ₃ = 5 P ₉₀ = 6 P ₉₉ = 9				

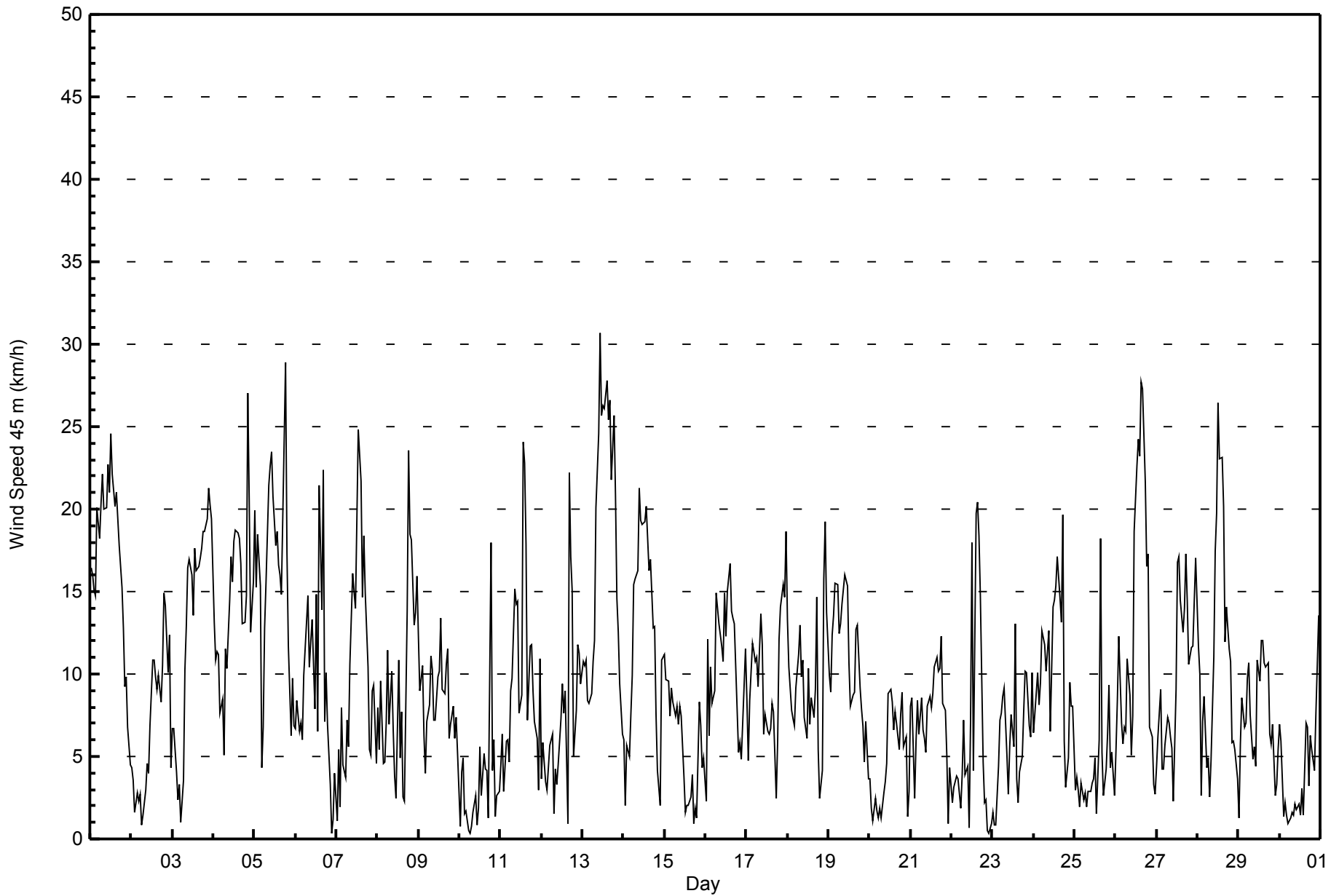
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	4	5	6	4	6	6	6	7	6	7	7	7	7	7	7	6	6	6	5	4	2	2	3	3	7
2-Jun	3	1	1	2	1	1	2	2	2	2	2	3	4	4	5	4	4	4	5	4	5	3	4	3	5
3-Jun	2	1	2	1	1	2	3	4	5	5	5	5	5	5	6	6	6	5	5	4	4	5	5	5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

Diurnal Maximum



WBEA
Hourly Averages

Wind Speed 45 m (WS45m) - km/h
Lower Camp Met Tower - June 2015





WBEA
Cumulative Frequency Distribution

Wind Speed 45 m (WS45m) - km/h
Lower Camp Met Tower - June 2015

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	208	28.89	28.89
6 - 11	278	38.61	67.50
12 - 19	176	24.44	91.94
20 - 28	56	7.78	99.72
29 - 38	2	0.28	100.00
> 38	0	0.00	100.00

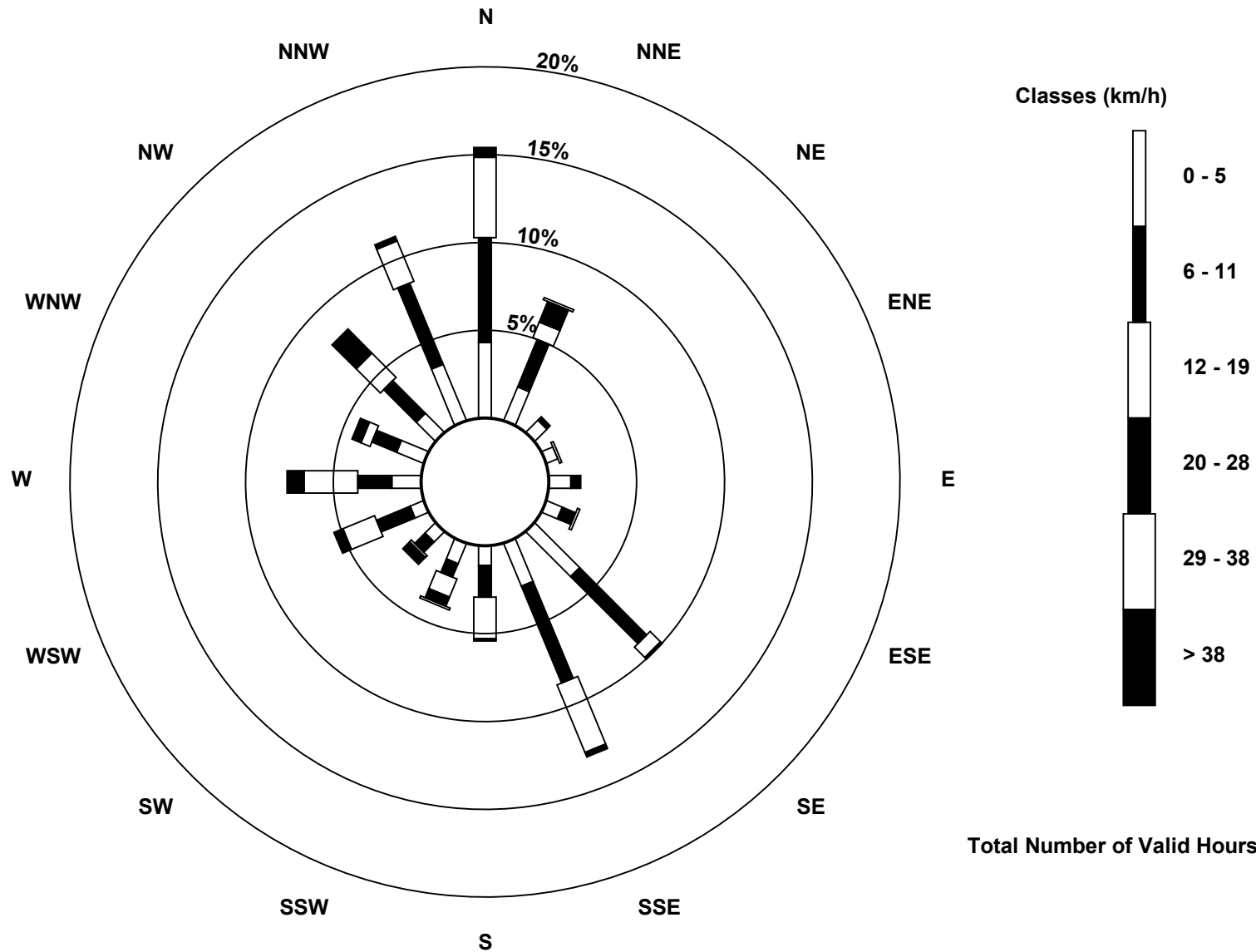
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

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





Maximum Speed: 44 km/h on Jun 13 11:00	Maximum Daily Speed Average: 25.9 km/h on Jun 13	Hours in Service: 720
Minimum Speed Value: 0 km/h on Jun 10 11:00	Minimum Daily Speed Average: 0.4 km/h on Jun 10	Hours of Data: 720
Maximum Diurnal Speed Average: 6.7 km/h at hour 16	Minimum Diurnal Speed Average: 0.5 km/h at hour 22	Hours of Missing Data: 0
Monthly Average Velocity: 2.8 km/h 301.3 deg	Percentiles: P ₁ = 1 P ₁₀ = 4 Q ₁ = 8 Median = 13 Q ₃ = 19 P ₉₀ = 25 P ₉₉ = 37	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	WNW24	WNW23	WNW22	NW25	NW29	WNW26	NW28	WNW31	NW29	NW28	NW30	WNW27	WNW32	NW28	NW27	NW29	NW27	NNW26	NNW22	NW17	NW16	WNW19	WNW18	NW13	NW24.5	WNW32
2-Jun	N12	N11	WNW4	NNW4	N7	NNE4	NNE1	SSW1	SE3	SE5	SSE5	SE8	SE13	SE14	SSE12	SSE11	SSE13	SE11	SE15	SE25	SE26	SE21	SSW20	S8	SE6.9	SE26
3-Jun	SSE12	SE16	SE17	SE9	ESE3	SE9	SE11	SE17	SE18	SE23	SE24	SE21	SSE17	SSE22	SSE21	SSE19	SSE19	SSE21	SSE22	S24	SSE27	SSE30	SSE27	SSE26	SSE18.5	SSE30
4-Jun	SSE19	SE18	SE25	SE23	SE17	SE19	SE12	SE14	SE14	SE19	SSE21	SSE18	SE25	SSE23	SSE22	S20	S18	S15	S16	S17	SSW31	SSW28	S15	SSW16	SSE17.9	SSW31
5-Jun	S23	SSE17	S18	SSE21	SSE13	SE12	SSE16	S16	SSW22	SSW25	SW26	SW24	SSW20	SSW20	SSW18	SSW18	SSW17	W31	SSW34	SE25	SE22	SSE14	SSE17	SSE12	S17.3	SSW34
6-Jun	SSW10	SSW8	WSW10	WSW18	SW13	WSW14	WSW14	WSW19	W13	WSW12	WSW14	WSW8	SW16	S7	SW28	WSW18	SW29	SSE6	SE10	S4	WSW3	NW11	NW11	WNW6	WSW10.4	SW29
7-Jun	WNW6	WSW8	W11	WNW18	NNW9	W8	WNW19	NW10	NW14	NW20	NW20	NW18	NW27	WNW33	W27	WNW19	WNW25	WNW20	NW14	WNW8	W6	SW15	NNW14	NW5	WNW14.6	WNW33
8-Jun	SSE6	S9	S14	S6	SSW4	SW9	W16	W8	NW13	WNW8	NW6	S2	WSW15	NNE9	ESE12	ESE4	ESE1	NW21	NNW35	NNW29	NW29	NW24	NW25	NW28	NNW8.3	NNW35
9-Jun	NW23	NW17	NNW17	NW11	W8	W13	W11	W14	W12	NW9	WSW8	WSW10	WNW11	NNE21	N13	N12	WNW13	NW15	NNW9	NW8	NNW11	NNW12	N13	N11	NW9.8	NW23
10-Jun	N8	NW7	NNW11	NNW7	N6	NW0	NW1	WSW1	NW1	N3	NE0	NNW3	SW5	WNW4	N5	WNW4	N5	NE2	SW20	S5	SE9	SE9	SE14	SE17	W0.4	SW20
11-Jun	SE16	SE21	SE13	SE16	SE16	SSE7	ESE17	SE20	SE27	SE22	SE19	SE11	S11	WSW26	SW26	W22	WNW11	S15	SSE15	SE15	SE16	SSE11	S5	ESE18	SSE12.1	SE27
12-Jun	ENE3	NNW14	NW5	S5	WSW8	SW8	WSW8	SW2	ENE4	ESE4	WSW4	WSW8	WSW10	W8	W10	ESE2	SE31	SE25	ESE22	ENE8	N11	ENE19	E18	ENE15	ESE2.9	ESE31
13-Jun	NE18	NE16	NNE19	N17	N14	NNW15	NNW18	N20	N30	N36	NNE44	NNE38	NNE38	NNE38	NNE40	NNE36	NNE37	NNE32	NNE36	NNE31	NNE22	NNE21	NNE18	ENE9	NNE25.9	NNE44
14-Jun	E12	NE5	NE13	NNE10	NNW12	N15	N21	NNE22	N23	N30	N27	N26	NNE27	N28	N25	N23	N23	N18	N18	NNE12	NE9	N5	N21	N18	N17.5	N30
15-Jun	NNE19	N16	N15	N12	NNE17	NNE13	NNE11	NNE11	N9	N10	N8	N4	N2	SE2	SSE2	S2	SW5	SW2	WSW4	NW2	S9	SE7	SE9	SSE7	NNE4.4	NNE19
16-Jun	S2	N21	NNE11	N18	N13	N15	N22	N19	N19	N16	N15	N19	NNW17	N21	N22	N20	NNW18	NNW18	NNE11	N10	N10	N8	N14	N20	N15.4	N22
17-Jun	N16	N10	NNW14	NNW19	NNW19	NNW15	NNW16	NNW13	NNE19	N15	N9	NW9	NW8	WNW7	WSW8	WSW9	W8	WSW4	S7	S13	S18	SSE22	SSE21	SSE20	NW3.3	SSE22
18-Jun	SSE21	SSE20	SSE14	SE12	SE14	SE16	SSE15	SSE15	SSE12	SSE13	SE9	SE8	S12	SSE8	SSE10	SSE9	SSE11	SW17	SW8	SW1	SSE7	W22	WSW25	W20	S9.6	WSW25
19-Jun	WNW19	NNW16	N20	N21	N22	N22	N18	N19	NNE21	NNE23	N22	N20	NNE14	N11	N11	N12	N17	N18	NE13	NNE11	NE14	NE16	N14	NNE10	N15.6	NNE23
20-Jun	NNE5	N8	N4	N4	NNW3	N4	W1	WNW1	WNW3	W4	N5	NNW11	NNW11	NW10	NNW8	NNW10	NNW9	NNE8	NNE11	NNE14	NNE17	NNE14	NE5	E5	N6.3	NNE17
21-Jun	N11	N16	NNE7	NNW13	N15	N10	N11	N10	N8	N6	NNW10	N12	N11	N11	N15	N15	N14	NNE15	NNE18	N15	NNW15	NW11	W6	WSW13	N10.8	NNE18
22-Jun	W9	W8	W13	W13	W10	WSW7	SW5	WSW8	WNW4	N5	W0	NNE9	NNW26	NW5	WSW21	WSW23	W24	NNW21	NNE7	ENE7	ENE8	E7	SSE2	ESE3	WNW5.9	NNW26
23-Jun	SE2	NNW1	SE3	SSW4	S6	SSE6	SE8	SE11	SE4	S2	WSW7	WSW9	NW8	NW20	N3	ESE2	SW4	S5	SSE9	S11	SSW13	S6	SSW5	S6	SSW3.5	NW20
24-Jun	SSE9	SSE12	SSE13	SSE10	SSE12	SSE14	SSE13	SE15	SSE14	SSE11	SSE6	WSW16	W17	WSW17	WSW19	SW17	WSW15	SW21	NW7	NW4	ENE10	NNE16	NNE14	NNE11	SSW5.1	SW21
25-Jun	NNE6	ESE1	NNW7	NNW10	N11	N7	NNW5	NW3	NW4	NW4	N3	E2	SE6	E2	NNW7	NNW24	NNW9	ENE16	WSW3	SSE9	WSW14	W7	S9	SSE9	NNW2.8	NNW24
26-Jun	S7	SE14	SSE13	SSW6	SSW9	SSW9	SSE7	SSE9	S8	WSW6	WSW9	W23	W28	W31	W30	W36	W37	WNW34	W24	WSW23	W10	S4	WSW12	WSW11	WSW13.3	W37
27-Jun	WSW10	SW3	SW8	WSW9	WSW9	SW9	SW11	S5	SSE5	SE7	SW2	WSW10	WSW18	WSW19	WSW16	WSW16	W18	WSW22	W20	WSW14	SW18	WSW20	WSW22	WSW25	WSW12.4	WSW25
28-Jun	WSW22	WSW20	WSW10	SSW6	SW10	WSW10	W8	NW3	NNW9	NNW16	NNW23	NW25	WNW35	NW31	NW30	NW27	NNW17	NW20	NNW19	NNW21	NW16	NW15	NW17	NNW16	NW15.0	WNW35
29-Jun	WNW6	W6	SSW4	SW7	SW5	SW8	SSW6	S4	SE3	SSW4	SW7	WSW12	WSW11	WSW14	WSW14	WSW12	WSW12	WSW11	ESE7	NE9	NNE9	NE9	E9	NE6	WSW3.8	WSW14
30-Jun	N8	N12	N8	NNW10	NNW1	SE0	SSW2	SW7	W2	NE1	ENE3	NNE2	NE3	E3	E5	N9	N13	ENE9	NW6	WNW11	SW5	SE13	SW15	W21	NNW2.5	W21

W1.2 NW1.5 NW0.9 NW2.6 NW2.8	NNW1.9 NW2.2	NNW1.3 N2.4	NNW2.9 NW3.5	NW5.0	NNW6.5	NNW6.0 W5.9	NNW6.7	NNW6.0	NNW5.6	NW2.2	NNW1.0	SSW0.5	SW0.5	W2.0	WSW0.9	Diurnal Average								
WNW24	WNW23	SE25	NW25	NW29	WNW26	NW28	WNW31	N30	N36	NNE44	NNE38	NNE38	NNE38	NNE40	NNE36	W37	WNW34	NNE36	NNE31	SSW31	SSE30	SSE27	NW28	Diurnal Maximum

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



Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Speed 100 m (WS100m) - km/h

Lower Camp Met Tower - June 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 14 km/h on Jun 22 13:00	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0
Minimum Value: 1 km/h on Jun 20 07:00	
Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 2 Median = 3 Q ₃ = 5 P ₉₀ = 7 P ₉₉ = 11	

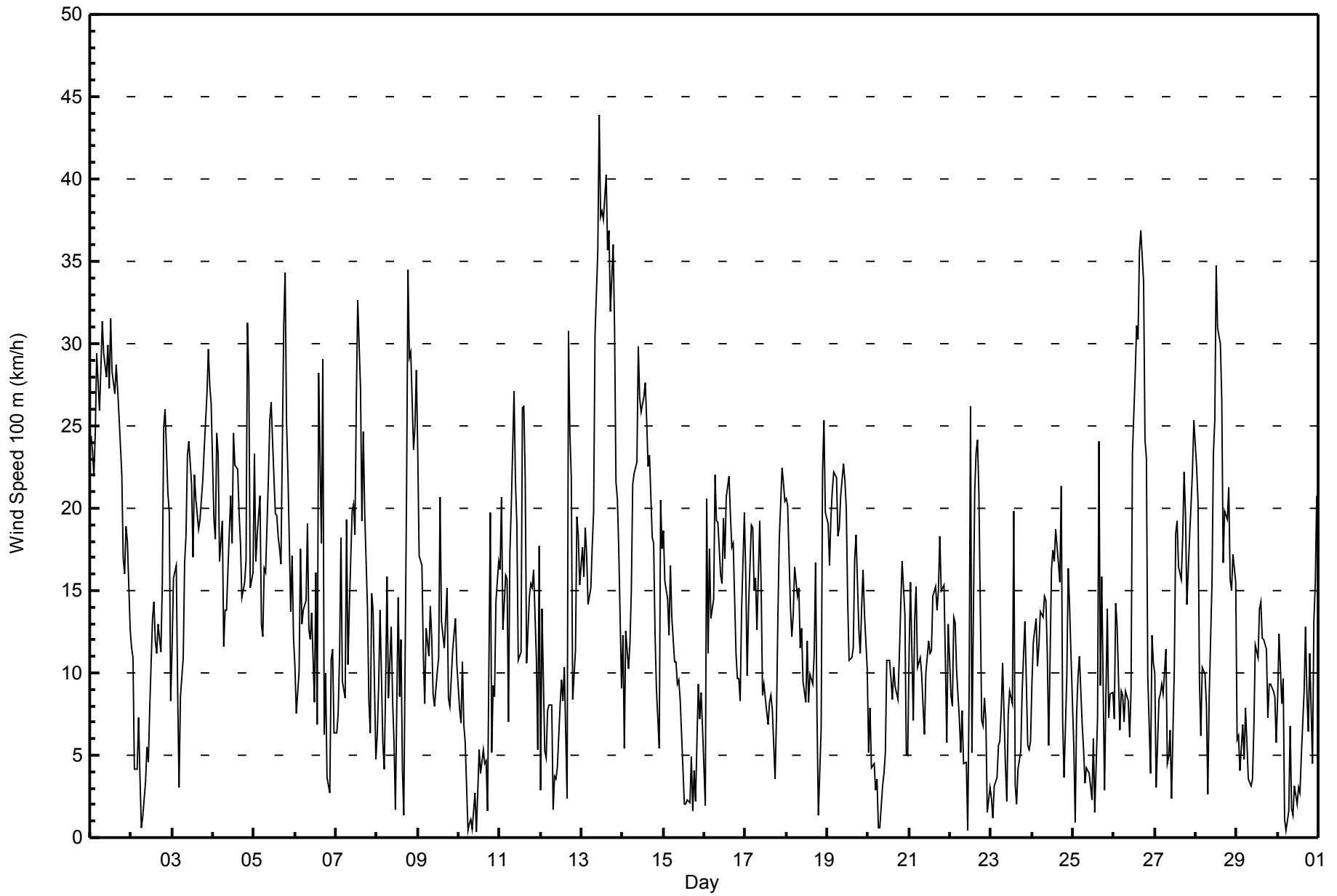
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	3	5	6	4	6	6	6	6	5	7	6	6	7	7	7	5	5	6	5	3	2	2	4	3	7
2-Jun	4	1	2	2	2	1	2	2	3	2	2	3	3	3	5	4	4	4	6	4	4	2	4	4	6
3-Jun	2	2	2	2	2	3	4	3	4	3	4	4	5	5	5	6	6	6	5	5	5	5	7	5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

Diurnal Maximum



WBEA
Hourly Averages

Wind Speed 100 m (WS100m) - km/h
Lower Camp Met Tower - June 2015





WBEA
Cumulative Frequency Distribution

Wind Speed 100 m (WS100m) - km/h
Lower Camp Met Tower - June 2015

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	115	15.97	15.97
6 - 11	213	29.58	45.56
12 - 19	225	31.25	76.81
20 - 28	130	18.06	94.86
29 - 38	35	4.86	99.72
> 38	2	0.28	100.00

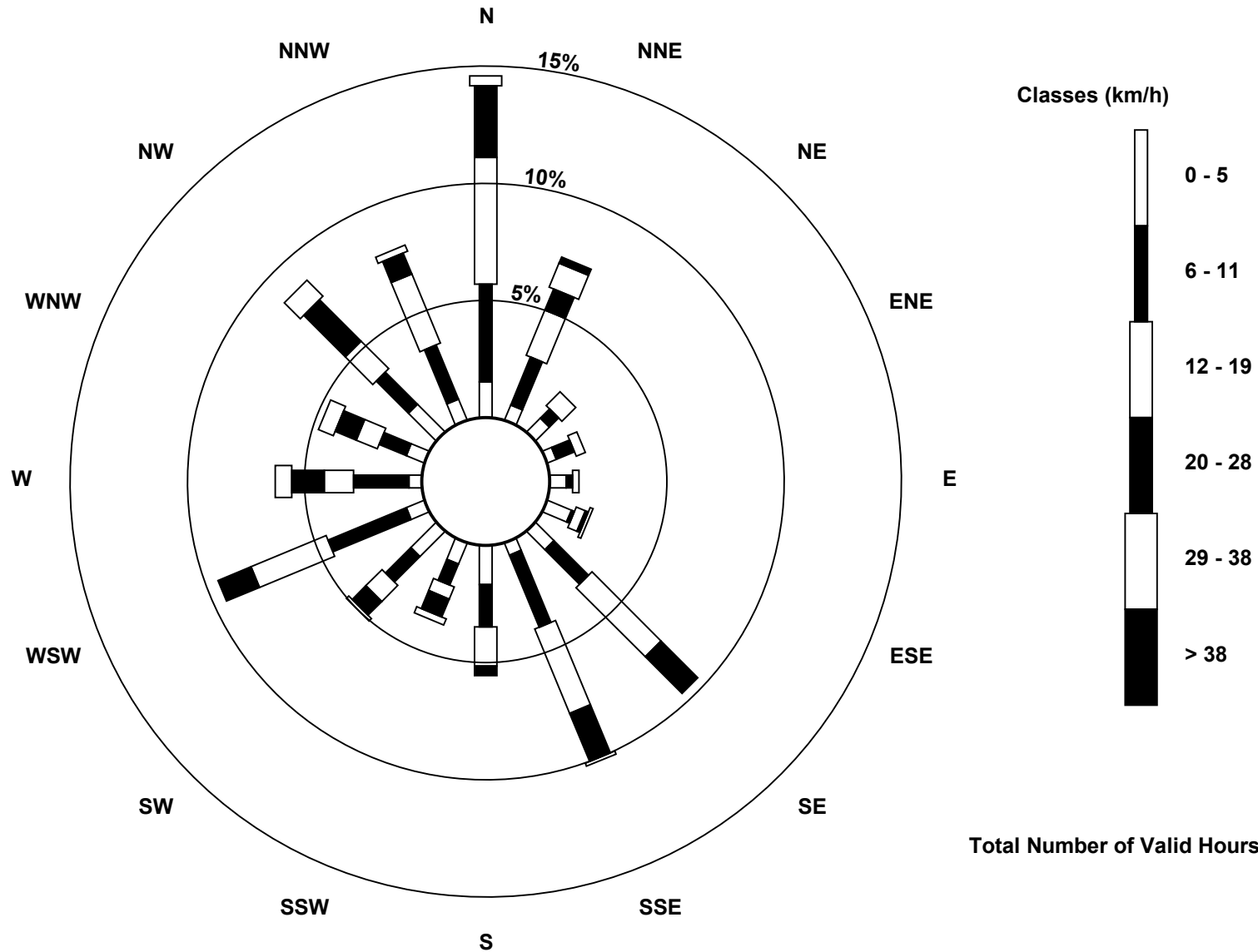
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

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





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed 167 m (WS167m) - km/h

Lower Camp Met Tower - June 2015

Maximum Speed: 41 km/h on Jun 26 17:00	Maximum Daily Speed Average: 27.8 km/h on Jun 1	Hours in Service: 720
Minimum Speed Value: 0 km/h on Jun 30 11:00	Minimum Daily Speed Average: 1.0 km/h on Jun 10	Hours of Data: 572
Maximum Diurnal Speed Average: 9.1 km/h at hour 13	Minimum Diurnal Speed Average: 2.0 km/h at hour 22	Hours of Missing Data: 148
Monthly Average Velocity: 5.3 km/h 265.1 deg	Percentiles: P ₁ = 1 P ₁₀ = 5 Q ₁ = 9 Median = 15 Q ₃ = 22 P ₉₀ = 29 P ₉₉ = 38	Percent Operational Time: 79.4

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-Jun	WNW27	WNW26	WNW26	NW30	NW33	NW30	NW32	WNW35	NW32	NW31	NW32	WNW30	WNW34	NW31	NW30	NW31	NW29	NNW29	NNW25	NW19	NW18	WNW20	WNW24	NW23	NW27.8	WNW35	
2-Jun	NNW18	NNE17	NNW5	N5	NE8	ENE6	E3	SW2	SE3	SE5	SSE4	SE7	SE12	SE14	SSE12	SSE12	SSE13	SE12	SE16	SE25	SE29	SE25	SSW25	SSW12	SE7.2	SE29	
3-Jun	S12	SSE16	SSE16	SSE15	SE13	SE17	SE18	SE18	SE20	SE23	SE24	SE22	SSE18	SSE22	SSE21	SSE18	SSE20	SSE22	SSE24	S29	SSE29	SSE31	SSE31	S33	SSE20.8	S33	
4-Jun	S25	SSE20	SSE26	SSE21	SSE15	SSE17	SSE13	SSE12	SSE12	SSE15	SSE21	S19	SE24	SSE24	SSE22	S22	S20	S18	S18	S20	SSW40	SSW35	SSW20	S22	S19.7	SSW40	
5-Jun	SSW29	SSW21	SSW24	SSW23	S18	SSE14	S17	S19	SSW26	SSW30	SW28	SW26	SSW22	SSW22	SSW21	SSW19	W35	SSW33	SSE25	SSE23	S20	S26	S18	SSW21.3	W35		
6-Jun	SW19	WSW20	WSW26	WSW32	WSW21	WSW20	WSW17	W21	W14	WSW13	WSW14	WSW8	WSW17	SSW5	SW31	WSW25	WSW34	SW6	S5	SW8	NW10	NNW20	NW21	NW13	WSW15.2	WSW34	
7-Jun	NW12	WNW11	WNW18	WNW27	NNW14	WNW12	WNW30	NW15	NW16	NW21	NW22	NW21	NW30	WNW36	W29	WNW21	WNW27	WNW23	WNW16	WNW11	W6	WSW14	NNW14	NW5	WNW18.1	WNW36	
8-Jun	S7	S11	SSW19	SSW12	SW11	WSW13	W19	WNW10	WNW14	WNW9	NW8	W2	WSW18	NNE13	E14	E5	NNW1	NW26	NNW38	NNW34	NNW34	NNW29	NW31	NW36	NW10.6	NNW38	
9-Jun	NNW30	NW25	NNW24	NNW17	WNW10	W13	W13	W16	W14	WNW10	W9	WSW12	WNW12	NNE24	N15	N13	WNW15	NW17	NNW9	NW8	NNW11	NNW14	NNE16	N17	NW12.0	NNW30	
10-Jun	N18	NNW12	N9	N7	N7	NNW7	W5	WNW2	NNW2	NNW3	NW1	NW3	WSW6	WNW5	N5	WNW5	N5	NNE2	SW22	S5	SE9	SE11	SE18	SSE18	NW1.0	SW22	
11-Jun	SE20	SE27	SE20	SE21	SE22	S9	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	----	SE27	
12-Jun	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	----	----	
13-Jun	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	----	----	
14-Jun	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-Jun	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	----	----	
16-Jun	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	----	----	
17-Jun	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	N10	NW10	NW9	WNW8	WSW9	WSW10	W7	WSW4	S7	S16	S24	S27	S31	S26	----	S31
18-Jun	S22	S24	SSE20	SSE17	SSE16	SSE18	SSE16	SSE16	SSE14	S13	SE9	SSE10	S14	SSE8	SSE10	S10	SSE12	SW18	SW9	SSW4	SSE8	W24	W29	W22	S11.2	W29	
19-Jun	WNW18	N21	NNE24	N23	NNE24	NNE23	NNE18	NNE19	NNE21	NNE23	NNE22	NNE20	NNE15	N12	N12	N13	N18	N19	NE13	NE13	NE15	NE20	NNE21	NE21	NNE17.5	NNE24	
20-Jun	ENE11	ENE8	NE2	WNW3	WNW5	NW5	W4	WSW3	W5	WNW4	N5	NNW12	NNW11	NW10	NNW9	NNW11	N10	NNE9	NNE12	NNE15	NNE21	NNE24	NE12	E8	N6.7	NNE24	
21-Jun	NNE8	N17	NE10	N12	NNE18	NNE13	N11	N11	N8	NNW6	NNW10	N13	NNW12	N12	N16	N16	N15	NNE17	NNE21	N17	NNW18	NW13	W10	WSW16	N11.7	NNE21	
22-Jun	W11	W10	W17	W18	W11	W11	WSW8	W9	WNW6	NNW4	WNW1	NNE9	NNW29	NNW6	WSW25	WSW26	W26	NW24	N7	NE7	ENE10	ENE15	E5	SE7	WNW7.4	NNW29	
23-Jun	S4	S3	WSW3	WSW7	SW8	SW9	SSW5	S7	SW4	SSW3	WSW9	WSW10	NW10	NW22	NNW6	SE1	SW5	SSW6	S8	S13	SSW21	SW14	SW11	SW10	SW6.1	NW22	
24-Jun	SSW5	S7	S8	SSW7	SSW8	SSW9	SSW11	S10	S10	S9	S5	WSW19	W20	WSW19	WSW21	SW18	WSW18	SW23	NW9	NW5	ENE13	NE22	NE22	NE16	SW5.3	SW23	
25-Jun	ENE10	SE6	NW3	N6	NNE6	NE8	NE13	NE7	N4	NW4	NNW3	ESE2	SE5	ESE2	NW8	NNW25	NNW11	ENE23	S2	S8	WSW17	WNW8	S10	S13	NNE1.9	NNW25	
26-Jun	S12	S13	S15	SW9	SW14	SW11	S7	SSW8	SW10	SW8	WSW12	W26	W31	W34	W34	W40	W41	WNW40	W28	W25	W12	SW5	WSW15	WSW18	WSW17.1	W41	
27-Jun	W20	WSW10	WSW17	W16	WSW15	WSW14	WSW15	SW8	SW6	S3	WSW4	WSW12	WSW21	WSW22	WSW19	WSW18	W20	WSW26	W23	WSW18	WSW23	WSW25	W25	W33	WSW16.9	W33	
28-Jun	W29	W27	W18	WSW13	WSW14	WSW16	W12	NW8	NNW11	NNW19	NNW25	NW28	WNW38	NW34	NW32	NW29	NNW19	NW22	NNW23	NNW27	NW24	NW26	NW31	NNW23	NW20.2	WNW38	
29-Jun	NW11	WNW12	W9	W12	W11	WSW17	WSW11	SW9	SW7	WSW10	WSW9	WSW12	WSW12	WSW16	WSW16	WSW14	WSW13	WSW13	ESE7	ENE12	NE19	ENE22	E24	E11	WSW4.6	ENE24	
30-Jun	ENE5	NE5	E7	NNE1	W2	SW4	WSW4	WSW11	W5	WSW3	W0	N2	N1	NE2	ESE3	N6	N16	NE11	N5	WNW17	W9	SE9	SW20	W29	WNW2.6	W29	

WSW5.3	WSW3.8	WSW5.2	WSW5.8	WSW3.7	WSW4.8	WSW5.3	WSW5.1	W4.0	W4.0	W4.4	W6.5	W9.1	WNW6.8	W8.1	W8.9	W8.9	WNW8.5	WNW4.6	W2.9	WSW2.4	W2.0	WSW4.6	WSW5.4	Diurnal Average
NNW30	W27	WNW26	WSW32	NW33	WNW30	NW32	WNW35	NW32	NW31	NW32	WNW30	WNW38	WNW36	W34	W40	W41	WNW40	NNW38	NNW34	SSW40	SSW35	S31	NW36	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 - June 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 18 km/h on Jun 22 13:00	Hours of Data: 572
Minimum Value: 1 km/h on Jun 23 00:00	Hours of Missing Data: 148
Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 2 Median = 3 Q ₃ = 5 P ₉₀ = 6 P ₉₉ = 12	Hours of Calibration: 0
	Percent Operational Time: 79.4

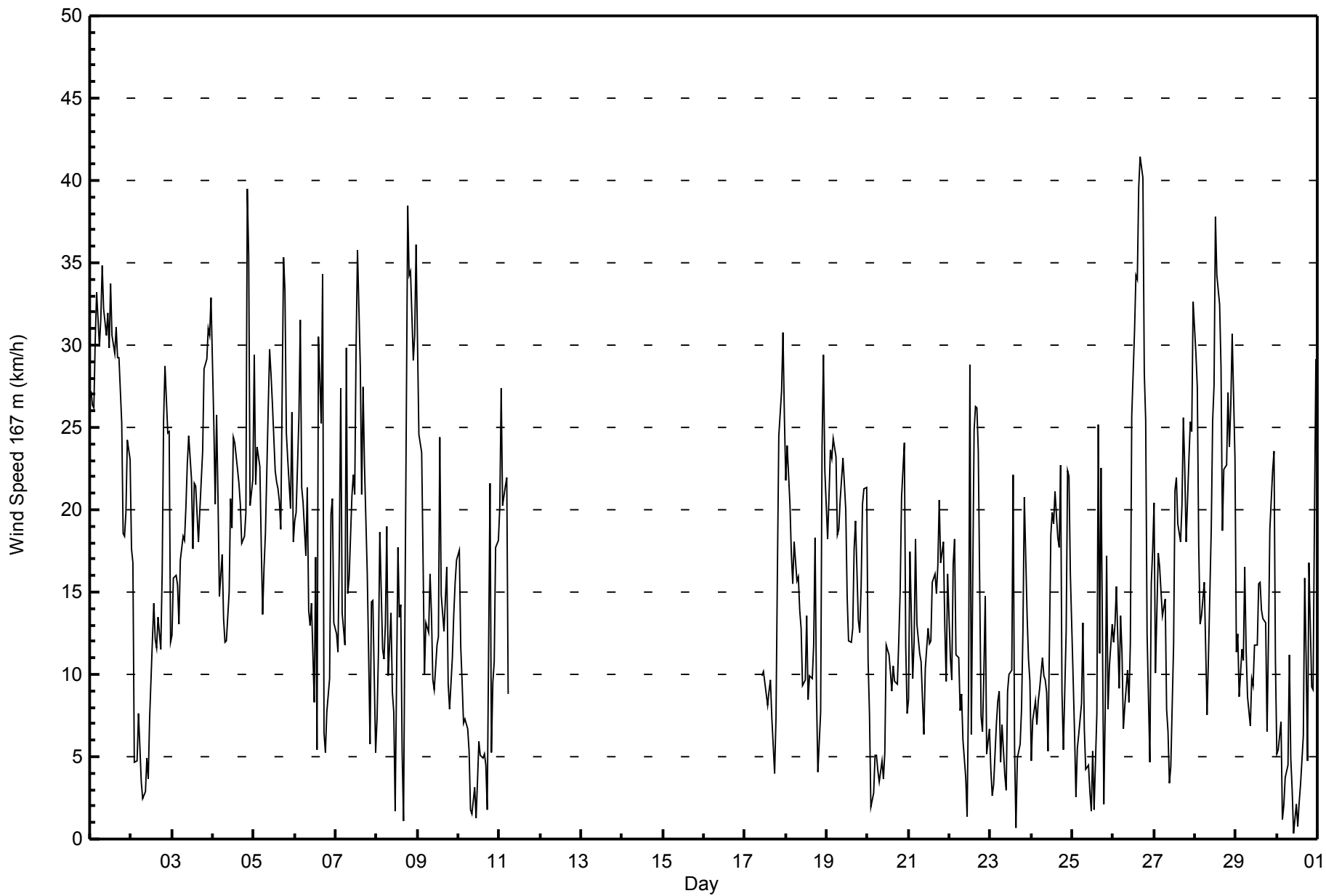
Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	2	5	5	4	6	6	5	6	5	5	5	5	6	6	6	4	5	6	4	3	2	2	2	2	6	
2-Jun	3	2	2	1	2	1	2	2	2	2	2	2	3	3	5	4	3	4	5	4	3	3	4	7	7	
3-Jun	2	2	2	2	2	4	3	4	4	3	3	4	5	5	5	6	6	5	5	4	4	4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

AF - Analyzer Failure



WBEA
Hourly Averages

Wind Speed 167 m (WS167m) - km/h
Lower Camp Met Tower - June 2015





WBEA
Cumulative Frequency Distribution

Wind Speed 167 m (WS167m) - km/h
Lower Camp Met Tower - June 2015

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	75	13.11	13.11
6 - 11	135	23.60	36.71
12 - 19	173	30.24	66.96
20 - 28	131	22.90	89.86
29 - 38	54	9.44	99.30
> 38	4	0.70	100.00

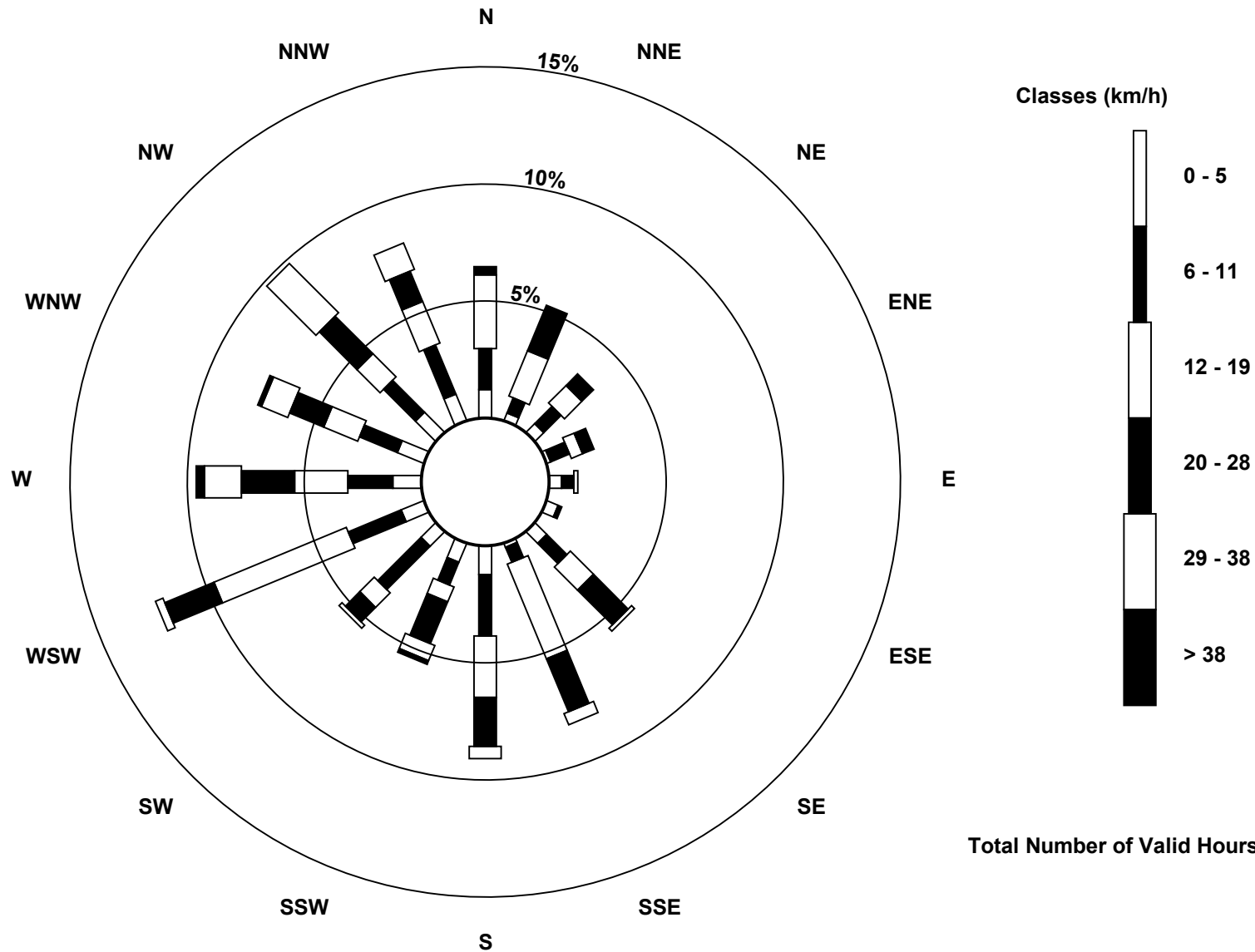
Total Number of Valid Hours: 572

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

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



Total Number of Valid Hours: 572



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction 20 m (WD20m) - deg

Lower Camp Met Tower - June 2015

Direction of Maximum Speed: 201 deg on Jun 5 19:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 320.0 deg on Jun 1	Hours of Data: 720
Direction of Minimum Speed: 260 deg on Jun 7 00:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 0.8 deg on Jun 10	Percent Operational Time: 100.0
Monthly Average Direction: 300.4 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	297	303	311	320	319	314	317	312	324	325	317	313	307	322	326	330	335	336	339	323	312	315	344	11	320.0
2-Jun	12	336	248	7	319	316	257	190	149	168	164	155	155	147	163	173	163	167	161	157	146	149	194	166	162.4
3-Jun	149	116	104	26	360	340	136	159	146	151	147	157	168	158	164	167	169	171	174	179	176	174	167	164	163.2
4-Jun	159	153	156	156	159	146	127	146	139	147	160	176	156	164	171	184	189	193	183	182	200	213	178	163	171.7
5-Jun	165	162	161	158	94	110	156	180	202	213	224	225	203	202	210	213	213	267	201	153	152	123	148	94	190.7
6-Jun	165	154	137	198	168	243	254	271	267	252	249	259	241	184	231	271	238	140	149	139	141	206	157	260	223.9
7-Jun	128	138	147	308	336	276	324	324	321	317	325	321	318	298	286	304	301	302	310	288	262	248	345	261	305.6
8-Jun	144	160	199	141	144	229	274	276	320	301	293	137	241	348	131	169	165	327	335	336	329	328	323	325	304.3
9-Jun	329	347	346	296	316	297	285	276	281	307	256	251	298	19	9	351	307	330	355	317	334	341	346	357	318.2
10-Jun	207	318	347	327	44	122	110	198	199	340	144	342	225	284	3	283	10	91	247	195	136	355	145	74	268.5
11-Jun	86	143	136	145	165	129	129	158	149	156	160	131	197	247	224	263	312	194	160	155	162	192	142	143	180.5
12-Jun	324	323	119	110	215	218	244	218	89	138	233	244	256	270	291	195	131	138	109	69	355	75	83	47	139.7
13-Jun	22	19	17	359	353	325	323	347	5	8	14	17	16	13	15	27	13	18	16	15	18	13	19	85	12.2
14-Jun	96	352	29	360	334	339	8	10	4	2	1	3	15	9	360	358	358	358	9	13	14	333	351	4	3.8
15-Jun	20	7	2	351	27	17	17	16	345	352	351	345	20	124	150	199	235	88	229	279	185	149	153	151	14.0
16-Jun	78	347	0	351	346	350	2	359	5	357	357	355	352	357	0	357	348	358	21	330	330	350	356	10	357.0
17-Jun	15	359	327	325	336	340	347	336	15	359	355	313	313	311	234	244	265	237	181	178	180	175	162	159	272.5
18-Jun	155	148	144	146	159	157	170	179	170	172	142	121	176	155	170	170	165	231	241	19	180	271	259	266	181.4
19-Jun	304	343	352	351	359	11	9	9	12	6	5	6	5	3	358	11	359	1	39	31	22	344	349	314	2.5
20-Jun	355	332	355	349	5	331	26	354	322	281	12	336	345	325	347	347	341	26	15	2	0	332	272	26	347.6
21-Jun	350	351	339	345	347	344	356	358	4	16	353	23	2	9	2	10	12	12	19	351	339	292	125	268	359.6
22-Jun	357	2	357	356	23	138	174	255	303	43	183	26	336	301	251	266	280	342	39	135	20	268	359	359	305.0
23-Jun	292	336	358	144	144	141	141	147	144	166	234	258	291	315	101	160	222	191	162	173	199	130	155	153	172.2
24-Jun	139	137	139	149	138	143	144	140	151	155	144	260	275	260	253	238	248	241	301	281	41	4	359	1	207.0
25-Jun	339	340	316	323	355	304	329	345	356	343	23	80	126	87	347	337	324	72	281	148	265	245	176	131	333.7
26-Jun	163	122	158	169	185	207	151	153	166	245	267	281	276	274	275	270	276	302	275	261	276	141	191	178	250.8
27-Jun	157	155	142	141	161	152	215	147	145	138	198	281	261	248	261	266	280	269	275	263	242	267	259	261	239.5
28-Jun	268	280	274	158	141	148	263	27	6	355	342	314	302	321	318	316	348	325	342	330	343	327	17	283	319.9
29-Jun	160	131	142	136	146	139	135	131	136	137	188	250	254	247	254	259	253	250	120	358	330	319	101	3	201.2
30-Jun	360	347	275	331	62	332	97	103	330	3	4	34	51	4	49	353	350	1	326	339	132	134	266	271	339.9

133.4	52.8	115.1	56.9	29.5	277.1	311.9	228.4	359.7	338.7	310.5	302.7	284.8	292.2	275.2	286.0	283.3	292.3	267.0	224.0	211.9	213.8	204.0	182.6	
Diurnal Average																								

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



Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction 20 m (WD20m) - deg

Lower Camp Met Tower - June 2015

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 102 deg on Jun 10 07:00			Hours of Data:	720
Minimum Value: 9 deg on Jun 5 01:00			Hours of Missing Data:	0
			Hours of Calibration:	0
Percentiles: P ₁ = 10 P ₁₀ = 17 Q ₁ = 22 Median = 29 Q ₃ = 48 P ₉₀ = 75 P ₉₉ = 95			Percent Operational Time:	100.0

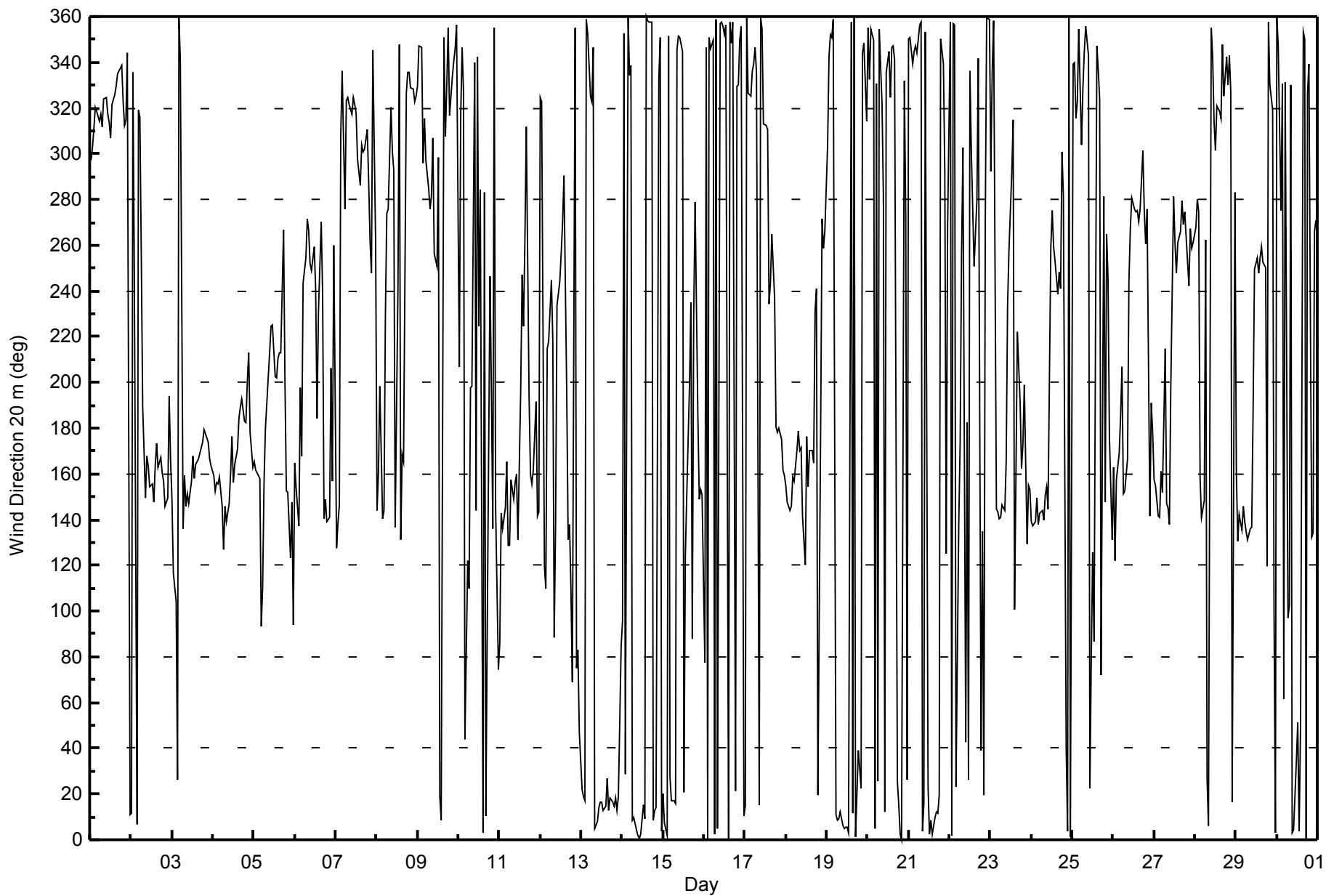
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	19	20	21	20	21	20	19	21	21	24	23	25	24	24	25	23	23	23	24	22	14	15	35	51	51
2-Jun	65	48	83	49	38	30	88	79	64	42	53	43	24	21	32	37	27	36	23	19	20	24	30	47	88
3-Jun	23	18	41	51	39	102	84	23	22	21	22	22	21	18	19	18	15	14	12	10	10	10	9	102	
4-Jun	10	17	22	26	32	40	84	20	22	18	17	22	22	19	20	20	19	15	19	19	12	19	10	84	
5-Jun	9	11	10	17	75	35	22	20	13	14	15	17	18	22	22	21	23	36	23	17	19	47	32	45	75
6-Jun	36	17	22	37	28	21	21	27	34	22	20	32	30	76	11	47	13	44	14	45	60	86	22	83	86
7-Jun	72	12	92	57	63	50	52	88	25	27	26	35	24	26	26	32	26	20	24	17	52	67	40	58	92
8-Jun	13	29	14	73	37	20	26	67	32	74	75	58	57	81	33	70	53	43	21	21	17	14	14	17	81
9-Jun	17	19	21	19	47	31	33	28	30	42	45	46	65	45	67	36	30	28	30	22	20	15	24	32	67
10-Jun	66	38	24	40	64	80	102	84	83	80	84	88	44	93	44	65	55	87	52	75	29	95	66	58	102
11-Jun	51	68	88	47	46	64	52	35	22	19	21	33	49	21	14	44	76	28	16	29	29	78	88	21	88
12-Jun	62	67	77	95	77	25	38	79	35	47	43	38	29	43	38	95	22	27	28	65	36	35	32	33	95
13-Jun	23	22	23	28	32	19	19	24	24	25	24	29	28	27	26	31	27	28	26	26	27	22	44	32	44
14-Jun	36	54	38	40	17	24	24	26	28	27	25	29	30	31	29	27	28	26	33	38	56	90	20	21	90
15-Jun	33	25	29	37	32	31	29	29	32	24	27	33	90	75	66	63	46	85	90	75	26	14	44	21	90
16-Jun	62	24	54	27	33	31	21	26	30	30	30	25	27	27	26	30	29	27	45	35	15	18	25	23	62
17-Jun	33	49	27	16	21	23	22	26	29	33	52	63	67	61	71	35	38	77	68	18	11	10	16	13	77
18-Jun	19	22	38	33	29	24	13	13	17	18	28	33	33	39	27	31	32	32	55	50	80	33	19	21	80
19-Jun	39	21	20	21	21	24	27	25	30	26	27	28	41	52	47	45	30	27	44	31	23	26	20	66	66
20-Jun	46	55	79	82	70	90	64	63	78	68	57	43	42	64	73	45	45	59	47	21	20	21	93	65	93
21-Jun	22	20	81	23	18	28	21	25	37	39	32	37	52	38	34	38	28	32	30	23	21	21	84	79	84
22-Jun	45	91	51	34	65	43	37	33	64	45	90	41	30	64	17	21	23	23	58	32	83	83	94	51	94
23-Jun	84	61	63	50	20	18	17	17	25	49	50	43	84	42	69	57	52	33	26	24	12	26	17	12	84
24-Jun	23	18	12	16	16	17	19	22	19	13	66	25	28	25	26	22	29	20	57	29	68	30	16	16	68
25-Jun	84	42	42	66	84	27	42	75	31	58	45	44	40	100	51	35	75	100	46	75	75	80	40	79	100
26-Jun	36	24	14	17	20	20	24	17	38	39	37	25	23	22	25	22	22	24	20	19	85	22	64	30	85
27-Jun	17	24	20	14	22	19	47	17	20	23	55	35	25	21	38	31	26	20	19	14	17	16	13	11	55
28-Jun	42	51	96	18	12	33	71	43	28	29	24	28	23	25	22	25	27	26	19	12	23	63	83	32	96
29-Jun	84	26	22	17	21	14	13	16	22	19	59	25	31	28	31	26	29	20	39	43	16	69	76	42	84
30-Jun	27	23	90	63	72	74	66	64	47	39	60	59	66	26	88	23	24	48	44	56	46	24	83	25	90

	84	91	96	95	84	102	102	88	83	80	90	88	90	100	88	95	76	100	90	75	85	95	94	83	
	Diurnal Maximum																								



WBEA
Hourly Averages

Wind Direction 20 m (WD20m) - deg
Lower Camp Met Tower - June 2015





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction 45 m (WD45m) - deg

Lower Camp Met Tower - June 2015

Direction of Maximum Speed: 12 deg on Jun 13 11:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 10.2 deg on Jun 13	Hours of Data: 720
Direction of Minimum Speed: 51 deg on Jun 10 07:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 0.8 deg on Jun 10	Percent Operational Time: 100.0
Monthly Average Direction: 299.3 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	288	293	300	312	311	304	309	302	317	317	308	304	298	313	316	320	326	327	330	314	302	297	319	356	310.5
2-Jun	6	354	271	1	338	327	310	167	142	150	153	143	143	135	153	164	152	153	148	143	135	134	187	167	147.6
3-Jun	146	127	125	79	19	79	119	144	135	140	138	144	156	146	152	157	159	162	164	170	166	164	158	157	152.1
4-Jun	149	140	140	142	139	137	124	134	131	139	149	166	143	153	160	173	179	182	173	192	204	171	155	160.6	
5-Jun	158	154	153	147	102	108	146	170	192	203	216	216	193	193	202	204	204	258	194	143	138	127	141	98	181.7
6-Jun	162	151	149	207	182	239	246	260	260	244	243	255	234	174	223	258	230	135	137	127	137	103	157	255	220.3
7-Jun	247	147	245	303	345	264	309	322	314	308	315	312	309	289	277	296	291	293	301	282	251	239	337	269	296.3
8-Jun	147	163	185	136	140	223	263	273	309	298	296	126	235	350	114	150	149	319	328	329	323	322	314	317	300.9
9-Jun	321	336	341	303	292	281	273	266	273	302	252	245	292	15	5	348	298	321	345	311	333	344	347	354	313.8
10-Jun	207	321	351	347	42	125	51	203	205	335	116	332	229	276	354	280	4	67	239	190	126	91	141	122	264.6
11-Jun	112	129	134	129	140	123	115	144	139	144	147	124	193	240	216	256	304	185	149	142	148	179	155	132	167.9
12-Jun	321	325	100	146	217	208	238	223	76	126	232	240	252	265	282	155	122	127	101	64	350	69	75	44	116.6
13-Jun	22	16	17	2	351	325	320	340	1	6	12	15	13	10	12	25	11	14	13	13	16	11	19	74	10.2
14-Jun	93	16	26	1	334	336	8	8	358	359	355	356	13	3	357	355	352	351	4	10	25	327	346	360	0.2
15-Jun	18	4	356	347	25	13	16	14	343	349	346	341	8	110	132	192	232	94	243	289	180	144	143	150	10.2
16-Jun	69	343	1	347	343	349	360	353	359	351	353	350	345	350	352	353	344	349	13	342	329	341	348	8	351.7
17-Jun	14	354	327	322	332	333	339	329	10	354	347	308	309	300	231	240	256	237	171	171	170	166	155	152	297.3
18-Jun	144	137	129	129	141	143	158	167	159	162	131	117	168	146	162	161	157	224	236	9	160	262	248	254	174.0
19-Jun	288	337	347	345	354	7	5	7	10	5	3	4	1	355	353	8	353	357	35	29	26	9	347	350	359.4
20-Jun	346	316	286	324	3	1	31	348	305	276	359	326	338	319	338	340	336	15	11	2	17	338	298	20	343.4
21-Jun	349	344	347	351	345	345	351	355	358	9	343	10	355	1	356	3	6	9	18	352	337	298	306	247	353.6
22-Jun	322	348	308	306	314	169	171	248	293	31	174	15	330	298	242	257	271	332	29	112	51	190	325	308	293.3
23-Jun	327	331	260	144	142	134	133	136	131	147	230	252	289	304	80	141	217	185	152	168	187	130	150	146	165.4
24-Jun	139	136	135	142	135	136	135	131	139	143	137	253	266	252	247	231	241	234	297	279	47	0	0	349	198.7
25-Jun	351	333	329	328	360	327	330	333	338	335	8	68	116	79	339	326	323	69	266	137	251	248	178	142	326.4
26-Jun	154	119	147	166	181	198	142	144	161	238	260	270	266	263	265	261	266	292	265	250	262	140	220	195	244.6
27-Jun	174	148	145	161	182	163	218	138	134	129	198	268	253	241	253	259	268	259	265	254	231	248	245	251	235.5
28-Jun	257	265	267	163	149	172	263	17	4	346	332	306	293	312	310	307	342	318	338	326	328	331	2	334	311.3
29-Jun	158	144	144	140	145	141	134	123	125	131	193	243	249	241	248	251	246	243	110	359	333	350	86	356	196.4
30-Jun	356	353	11	323	39	267	114	148	345	8	2	26	42	3	74	347	347	22	318	339	136	127	249	261	334.0

96.6 35.2 93.9 3.8 7.4 295.9 317.3 292.0 359.5 344.7 317.1 300.3 283.9 289.9 273.0 283.6 282.7 290.8 297.8 281.0 204.0 214.7 226.4 198.9

Diurnal Average

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



Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction 45 m (WD45m) - deg

Lower Camp Met Tower - June 2015

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 110 deg on Jun 10 07:00			Hours of Data:	720
Minimum Value: 5 deg on Jun 28 00:00			Hours of Missing Data:	0
Percentiles: P ₁ = 7 P ₁₀ = 12 Q ₁ = 16 Median = 22 Q ₃ = 39 P ₉₀ = 64 P ₉₉ = 96			Hours of Calibration:	0
			Percent Operational Time:	100.0

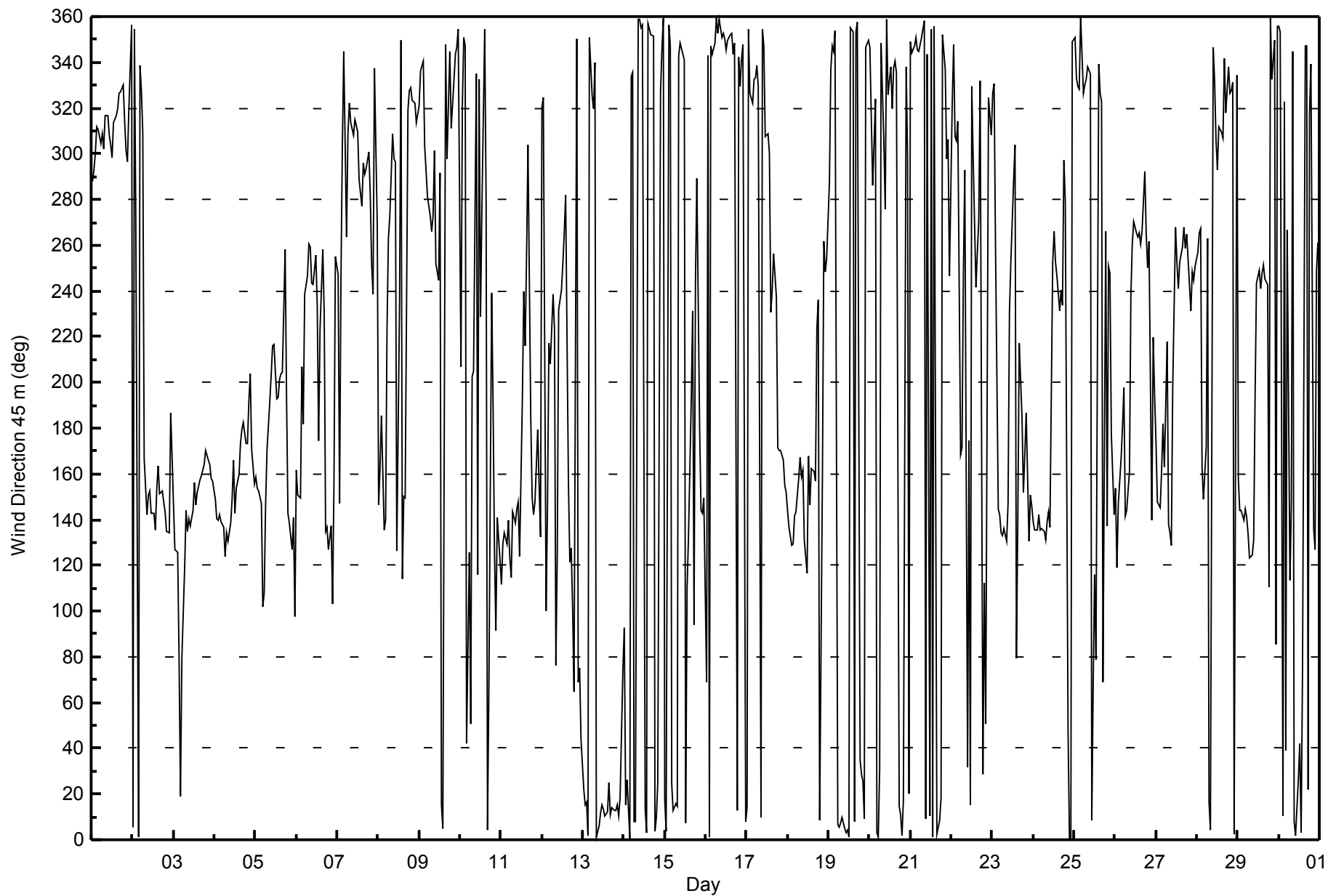
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	11	12	14	14	16	15	14	16	15	17	18	20	18	18	20	17	17	16	18	17	10	10	31	31	31
2-Jun	36	24	67	54	37	28	98	71	62	39	49	43	19	18	29	34	25	30	20	15	13	15	32	47	98
3-Jun	14	12	29	47	23	97	52	20	17	17	16	17	19	17	17	15	15	12	10	8	8	7	9	8	97
4-Jun	9	12	15	19	25	26	54	13	16	13	14	20	19	19	17	19	17	12	16	19	12	16	7	54	
5-Jun	7	8	7	11	60	28	19	17	13	14	14	17	18	21	23	20	23	33	23	16	14	26	23	41	60
6-Jun	36	18	34	32	29	14	13	17	27	13	13	26	25	54	8	40	9	45	10	18	21	78	35	18	78
7-Jun	74	14	71	43	64	32	31	80	19	22	19	27	18	20	18	26	19	13	19	15	35	36	40	61	80
8-Jun	19	19	12	57	32	19	19	40	25	51	75	58	58	77	28	77	72	31	15	15	12	9	11	12	77
9-Jun	12	14	14	18	37	23	24	19	27	36	38	41	67	40	54	27	26	24	22	18	14	9	16	20	67
10-Jun	83	34	16	58	43	85	110	90	84	74	88	86	41	89	35	56	41	84	48	67	15	67	28	27	110
11-Jun	21	31	64	32	33	47	39	27	17	15	17	25	48	15	13	43	91	28	14	19	28	80	84	18	91
12-Jun	72	51	60	65	38	23	34	67	28	50	39	30	21	34	28	89	17	22	21	63	24	24	19	20	89
13-Jun	14	15	15	21	26	12	14	18	19	19	18	22	20	20	18	21	20	21	18	18	18	16	36	23	36
14-Jun	20	41	24	36	10	18	18	20	21	21	21	22	23	22	24	20	22	21	26	32	45	94	13	17	94
15-Jun	19	20	22	25	21	21	18	22	24	18	19	29	83	72	60	74	37	97	89	74	24	13	24	16	97
16-Jun	64	19	32	18	24	23	17	18	21	23	22	20	20	23	21	22	24	23	37	29	11	11	18	17	64
17-Jun	19	35	18	11	13	15	14	19	23	29	42	58	62	53	67	36	28	76	61	14	7	7	13	10	76
18-Jun	15	15	24	21	21	18	10	10	15	15	24	25	29	38	25	25	26	31	29	39	55	27	10	12	55
19-Jun	30	14	14	15	15	18	20	18	22	20	21	23	34	47	43	37	22	22	32	20	12	24	12	29	47
20-Jun	26	42	58	32	61	76	45	54	61	53	49	39	33	62	69	34	40	54	40	17	13	15	93	60	93
21-Jun	13	12	79	11	11	18	16	21	31	25	23	27	43	29	28	29	22	30	20	17	13	17	95	44	95
22-Jun	49	57	36	34	19	54	36	29	66	40	98	35	26	55	10	12	16	19	47	32	55	97	85	67	98
23-Jun	50	74	61	36	16	14	12	12	23	53	49	35	87	38	62	56	56	32	23	16	12	23	14	9	87
24-Jun	11	9	7	11	12	12	13	15	14	9	57	19	20	18	20	20	25	16	48	27	58	28	13	9	58
25-Jun	64	55	28	74	32	23	33	61	26	52	42	40	35	96	44	32	69	86	50	74	58	59	34	63	96
26-Jun	39	16	10	15	16	19	21	13	38	36	26	18	16	14	17	15	15	21	12	10	92	23	30	29	92
27-Jun	13	15	11	19	28	25	43	12	14	21	55	29	15	15	28	22	18	13	11	10	11	8	6	5	55
28-Jun	17	40	85	15	16	34	48	42	24	25	15	22	17	20	17	19	20	22	13	8	18	16	15	33	85
29-Jun	91	19	11	11	10	9	9	10	17	17	57	18	23	22	21	19	21	14	39	42	14	87	72	37	91
30-Jun	11	12	71	68	95	55	70	73	52	30	57	56	58	25	74	22	18	42	50	44	53	17	74	16	95

91	74	85	74	95	97	110	90	84	74	98	86	87	96	74	89	91	97	89	74	92	97	95	67	
Diurnal Maximum																								



WBEA
Hourly Averages

Wind Direction 45 m (WD45m) - deg
Lower Camp Met Tower - June 2015





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction 100 m (WD100m) - deg

Lower Camp Met Tower - June 2015

Direction of Maximum Speed: 12 deg on Jun 13 11:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 13.7 deg on Jun 13	Hours of Data: 720
Direction of Minimum Speed: 48 deg on Jun 10 11:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 0.4 deg on Jun 10	Percent Operational Time: 100.0
Monthly Average Direction: 283.5 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	288	290	297	312	309	303	305	301	313	314	306	302	299	312	314	320	325	327	330	316	304	295	296	312	308.1
2-Jun	349	351	289	329	355	23	19	192	135	140	152	139	138	135	154	161	148	141	142	141	137	134	197	186	143.9
3-Jun	160	140	143	135	123	125	132	140	133	139	135	141	155	148	150	158	158	162	163	169	162	159	159	160	150.8
4-Jun	157	145	141	141	139	137	132	142	135	143	153	166	142	154	158	171	181	185	173	177	198	209	182	168	160.8
5-Jun	170	168	171	162	151	138	155	176	197	207	215	217	195	195	202	206	205	259	199	145	139	157	158	153	184.8
6-Jun	209	205	237	239	236	243	247	258	262	244	243	253	234	176	225	249	236	155	137	185	257	323	318	295	239.9
7-Jun	283	246	266	298	348	271	300	312	309	306	313	309	307	288	275	296	290	293	304	292	259	236	335	307	294.9
8-Jun	168	170	189	183	192	231	263	278	305	300	310	179	241	16	106	110	121	317	327	330	323	325	315	316	305.1
9-Jun	318	321	335	324	273	265	260	261	274	304	256	250	290	25	11	356	300	323	346	315	339	348	2	0	318.4
10-Jun	354	326	335	345	354	312	325	243	309	349	48	334	236	296	1	286	8	41	234	183	128	134	136	142	275.6
11-Jun	137	137	139	142	140	151	119	138	139	143	144	133	190	237	216	259	298	187	147	139	139	166	186	109	157.6
12-Jun	65	327	326	179	247	226	242	232	66	112	247	242	251	271	278	117	124	125	105	76	8	77	82	62	105.1
13-Jun	43	37	24	10	2	336	329	351	7	10	12	17	15	12	14	26	14	17	16	15	17	13	17	64	13.7
14-Jun	100	40	38	28	338	351	11	12	2	3	359	0	14	6	3	360	356	354	8	15	36	349	359	6	6.8
15-Jun	17	11	7	4	22	14	20	15	356	355	353	353	7	135	150	191	234	232	254	315	191	165	151	168	11.9
16-Jun	186	354	23	360	359	2	5	2	2	354	355	351	348	352	353	356	345	348	12	4	349	1	359	11	357.8
17-Jun	9	355	339	333	341	341	347	338	12	359	356	318	315	303	245	243	260	242	174	173	171	164	165	164	321.8
18-Jun	157	155	148	142	141	140	155	162	159	163	137	135	171	149	162	164	155	221	228	231	153	266	250	259	175.7
19-Jun	282	342	1	356	4	11	9	10	13	12	11	9	12	6	358	10	358	3	36	32	34	44	11	29	7.7
20-Jun	13	354	11	353	335	358	270	302	292	278	354	333	341	322	341	343	345	14	16	14	30	26	48	82	0.0
21-Jun	360	356	17	339	355	360	357	2	4	358	339	3	349	2	356	4	7	12	23	4	342	317	272	249	354.2
22-Jun	260	266	265	264	267	250	216	254	286	11	259	14	333	321	239	255	268	327	17	67	66	86	148	110	285.9
23-Jun	140	335	140	197	178	164	135	136	136	170	238	250	310	304	9	122	219	185	159	179	196	182	192	176	193.3
24-Jun	150	157	160	160	153	155	155	138	147	153	156	250	262	250	244	231	238	233	313	307	57	23	23	15	196.2
25-Jun	16	105	336	337	351	3	346	313	315	322	356	83	124	92	336	329	330	70	245	151	250	268	170	153	338.4
26-Jun	169	142	164	204	208	207	150	162	187	237	256	268	263	262	262	259	264	288	265	251	265	172	248	244	248.6
27-Jun	256	218	226	245	237	226	232	188	150	129	216	258	248	239	251	256	263	255	259	251	236	250	253	253	245.5
28-Jun	254	256	258	210	221	238	272	315	343	340	331	307	293	310	308	306	345	319	342	327	311	322	322	347	306.6
29-Jun	290	262	212	236	221	224	208	180	143	210	225	244	247	239	246	247	241	240	118	45	22	54	80	34	237.1
30-Jun	7	353	0	346	338	143	209	234	281	42	64	25	44	89	90	357	5	62	318	300	233	133	232	261	331.0

270.7 326.2 314.2 312.9 321.7 290.0 305.6 301.0 352.4 346.2 326.1 305.5 291.4 298.5 279.3 291.7 291.0 302.7 318.8 346.7 200.8 232.2 264.8 249.2

Diurnal Average

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



Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction 100 m (WD100m) - deg

Lower Camp Met Tower - June 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 112 deg on Jun 10 09:00	Hours of Data: 720
Minimum Value: 3 deg on Jun 28 00:00	Hours of Missing Data: 0
Percentiles: P ₁ = 4 P ₁₀ = 7 Q ₁ = 10 Median = 15 Q ₃ = 27 P ₉₀ = 51 P ₉₉ = 92	Hours of Calibration: 0
	Percent Operational Time: 100.0

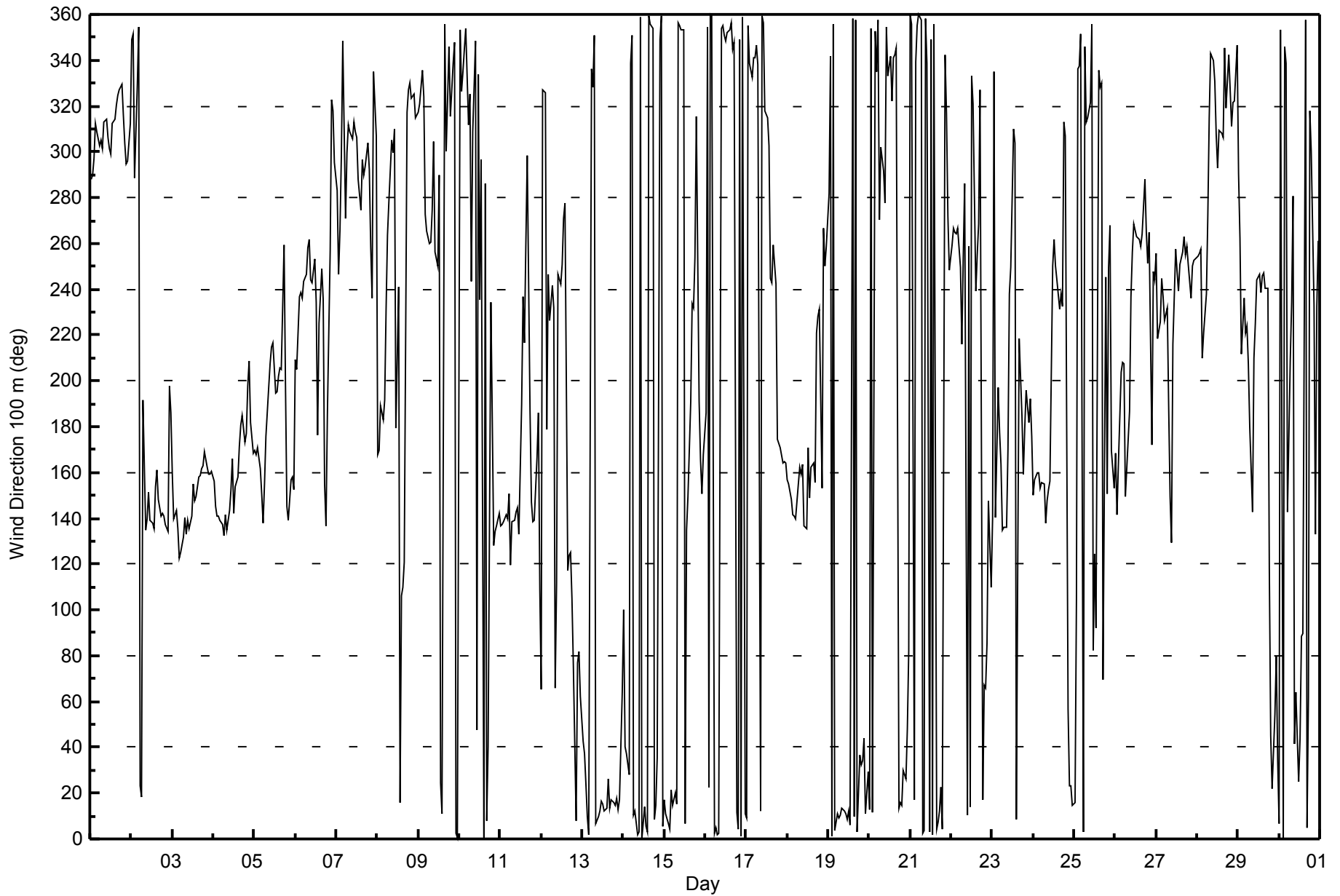
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	5	7	10	10	10	9	8	10	8	13	12	15	13	13	15	12	12	12	13	13	6	4	9	12	15
2-Jun	16	6	40	41	9	20	97	94	63	25	38	26	8	10	23	30	20	24	15	6	6	6	37	44	97
3-Jun	11	6	5	8	24	14	14	8	9	8	5	11	15	12	15	15	14	11	9	7	6	6	6	5	24
4-Jun	9	8	3	3	5	4	12	7	8	8	11	17	13	15	17	20	18	16	12	18	20	8	15	9	20
5-Jun	10	9	9	9	19	18	16	15	12	11	12	15	18	19	19	18	21	29	23	14	5	13	12	23	29
6-Jun	28	22	24	10	12	10	9	12	18	11	10	20	22	46	6	34	5	52	16	27	48	7	5	15	52
7-Jun	24	15	22	31	46	17	13	44	15	16	14	22	14	18	15	20	16	10	15	17	19	19	37	67	67
8-Jun	34	15	10	62	32	13	14	29	17	42	67	73	54	75	19	45	99	19	11	10	7	4	7	6	99
9-Jun	6	8	9	18	14	9	14	10	22	30	34	47	69	28	38	16	23	21	14	12	12	4	9	11	69
10-Jun	13	17	5	9	12	88	83	89	112	71	97	80	43	66	24	51	30	68	45	46	10	7	3	4	112
11-Jun	5	5	7	7	6	38	24	10	4	8	10	18	46	12	9	38	64	32	12	8	7	71	57	13	71
12-Jun	85	10	84	46	26	16	26	63	29	46	42	20	17	24	21	87	11	14	14	58	13	14	10	12	87
13-Jun	9	12	6	8	14	7	8	11	9	9	9	13	12	11	11	13	12	12	11	9	10	8	25	32	32
14-Jun	13	29	17	24	6	11	8	11	15	14	14	17	15	14	15	15	17	18	18	20	22	20	8	8	29
15-Jun	9	12	13	13	8	10	11	14	15	12	14	26	75	71	60	85	23	67	92	67	22	19	11	16	92
16-Jun	70	18	18	9	14	12	7	10	13	13	15	14	14	16	13	13	19	18	33	18	11	9	9	8	70
17-Jun	8	15	17	8	6	8	8	14	16	25	28	40	57	60	47	29	25	63	39	12	5	4	6	7	63
18-Jun	9	8	15	15	6	6	12	8	14	13	13	19	21	31	23	21	22	25	12	76	52	25	5	6	76
19-Jun	11	15	8	9	7	10	9	8	11	11	14	14	24	37	35	24	18	17	22	12	4	4	18	12	37
20-Jun	20	6	22	22	32	33	87	94	47	48	38	36	29	54	53	26	33	31	34	12	6	11	83	28	94
21-Jun	23	4	22	5	5	9	11	11	20	17	17	15	30	22	20	21	18	27	11	6	6	20	26	7	30
22-Jun	11	14	11	9	8	15	22	22	67	35	101	30	22	48	5	8	11	17	32	9	16	26	55	20	101
23-Jun	34	70	14	27	23	15	9	29	53	41	23	90	36	86	65	61	35	24	12	12	30	26	19	90	
24-Jun	11	6	5	7	11	10	11	6	10	10	63	11	14	12	15	15	17	12	43	37	51	31	9	16	63
25-Jun	46	86	11	7	8	8	17	27	14	34	46	67	16	88	36	33	56	20	81	68	35	45	26	16	88
26-Jun	38	9	13	16	13	15	27	20	33	28	24	13	11	10	12	10	11	18	7	6	85	42	7	7	85
27-Jun	9	45	20	10	13	12	11	24	39	9	64	21	11	12	23	16	12	8	8	9	4	5	3	3	64
28-Jun	5	10	33	20	10	17	28	36	18	15	10	19	13	16	13	15	18	20	9	6	8	5	8	9	36
29-Jun	39	18	21	9	12	9	13	26	31	32	42	14	18	14	12	15	14	11	36	34	18	32	30	42	42
30-Jun	13	10	9	9	64	95	90	14	59	75	21	57	45	38	18	31	10	16	64	27	47	9	48	9	95

85	86	84	62	64	95	97	94	112	75	101	80	90	88	86	87	99	68	92	76	85	71	83	67	
Diurnal Maximum																								



WBEA
Hourly Averages

Wind Direction 100 m (WD100m) - deg
Lower Camp Met Tower - June 2015





Maximum Value: 1.0 km/h on Jun 3 22:00		Maximum Daily Average: 0.4 km/h on Jun 3		Hours in Service: 720																						
Minimum Value: -1.4 km/h on Jun 13 11:00		Minimum Daily Average: -0.7 km/h on Jun 13		Hours of Data: 720																						
Maximum Diurnal Average: 0.0 km/h at hour 8		Minimum Diurnal Average: -0.2 km/h at hour 14		Hours of Missing Data: 0																						
Monthly Average: -0.10 km/h		Percentiles: P ₁ = -1.0 P ₁₀ = -0.5 Q ₁ = -0.3 Median = -0.1 Q ₃ = 0.1 P ₉₀ = 0.3 P ₉₉ = 0.7		Hours of Calibration: 0																						
				Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	-0.3	-0.3	-0.3	-0.5	-0.6	-0.6	-0.7	-0.7	-0.8	-0.7	-1.0	-0.5	-0.7	-0.7	-0.7	-0.7	-0.6	-0.4	-0.3	-0.5	-0.4	-0.3	-0.3	-0.1	-0.5	-0.1
2-Jun	-0.1	-0.1	0.1	-0.1	-0.2	-0.2	0.3	0.3	0.1	0.3	0.0	0.2	0.3	0.0	0.3	0.4	0.3	0.2	0.2	0.4	0.1	0.1	0.3	0.0	0.1	0.4
3-Jun	0.3	0.0	0.0	0.0	-0.1	-0.1	-0.1	0.2	0.3	0.3	0.5	0.6	0.4	0.2	0.4	0.4	0.5	0.5	0.8	0.8	0.9	1.0	0.6	0.6	0.4	1.0
4-Jun	0.3	0.1	0.1	0.3	0.1	0.0	-0.2	0.1	0.3	0.3	0.5	0.5	0.3	0.3	0.6	0.5	0.4	0.4	0.6	0.7	0.3	0.2	0.6	0.7	0.3	0.7
5-Jun	0.9	0.6	0.7	0.3	0.0	-0.2	0.4	0.7	0.2	0.1	-0.1	0.0	0.4	0.5	0.3	0.3	0.2	-0.3	0.7	0.3	0.1	-0.3	0.3	-0.4	0.2	0.9
6-Jun	0.1	0.2	0.1	0.2	0.6	-0.1	-0.2	-0.3	-0.2	-0.1	-0.1	0.0	0.0	0.0	-0.1	-0.2	-0.2	0.0	0.0	0.2	0.1	0.1	0.1	0.1	0.0	0.6
7-Jun	0.1	0.0	0.1	-0.1	-0.2	0.0	-0.1	0.0	-0.3	-0.4	-0.3	-0.5	-0.6	-0.6	-0.7	-0.4	-0.3	-0.4	-0.5	-0.2	-0.1	0.0	-0.5	-0.2	-0.3	0.1
8-Jun	0.1	0.2	0.4	0.2	0.3	0.1	-0.2	0.1	-0.2	-0.3	-0.1	0.2	0.0	-0.1	-0.2	0.2	0.3	-0.4	-0.7	-0.2	-0.5	-0.5	-0.6	-0.5	-0.1	0.4
9-Jun	-0.5	-0.3	-0.3	-0.2	-0.1	-0.2	-0.2	-0.2	-0.5	-0.2	-0.1	-0.1	-0.6	-0.6	-0.3	-0.1	-0.3	-0.3	-0.1	-0.4	-0.3	-0.3	-0.3	-0.1	-0.3	-0.1
10-Jun	0.1	-0.1	-0.1	0.0	0.1	0.0	0.1	0.4	0.2	-0.1	0.3	0.2	0.2	-0.3	-0.1	0.4	0.0	-0.2	-0.3	0.0	0.1	0.0	0.1	0.0	0.0	0.4
11-Jun	0.0	0.1	0.0	-0.1	0.1	0.0	-0.1	0.4	0.4	0.3	0.4	0.0	0.3	-0.5	-0.1	-0.3	-0.4	0.3	0.4	0.3	0.2	0.0	-0.1	0.1	0.1	0.4
12-Jun	-0.3	-0.1	0.0	0.0	0.1	0.1	-0.1	0.1	0.0	0.2	0.1	0.0	-0.2	-0.2	0.0	-0.2	-0.3	-0.1	-0.5	-0.3	-0.2	-0.4	-0.6	-0.5	-0.1	0.2
13-Jun	-0.3	-0.4	-0.4	-0.3	-0.3	-0.2	-0.2	-0.3	-0.7	-1.0	-1.4	-0.9	-0.9	-0.9	-1.0	-1.2	-0.7	-0.8	-1.2	-0.8	-0.8	-0.6	-0.4	-0.2	-0.7	-0.2
14-Jun	-0.2	0.0	-0.2	-0.2	-0.3	-0.3	-0.7	-0.8	-0.7	-0.9	-0.9	-0.7	-1.0	-0.8	-0.5	-0.7	-0.8	-0.6	-0.4	-0.2	-0.2	0.0	-0.3	-0.3	-0.5	0.0
15-Jun	-0.4	-0.3	-0.4	-0.2	-0.4	-0.3	-0.4	-0.5	-0.1	-0.4	-0.4	-0.2	0.2	0.0	0.2	0.2	0.0	0.0	-0.1	0.0	0.3	0.2	0.0	0.2	-0.1	0.3
16-Jun	0.0	-0.3	-0.2	-0.2	-0.2	-0.3	-0.6	-0.5	-0.4	-0.4	-0.3	-0.6	-0.3	-0.7	-0.9	-0.6	-0.7	-0.5	-0.5	-0.2	-0.2	-0.1	-0.2	-0.5	-0.4	0.0
17-Jun	-0.2	-0.2	-0.2	-0.4	-0.2	-0.3	-0.1	-0.3	-0.4	-0.7	0.0	0.0	0.0	0.1	0.1	-0.1	-0.3	0.0	0.2	0.6	0.7	0.8	0.7	0.5	0.0	0.8
18-Jun	0.3	0.0	-0.1	0.0	0.0	0.0	0.2	0.6	0.2	0.5	0.2	0.0	0.4	0.3	0.3	0.3	0.3	0.0	0.1	0.0	0.1	-0.4	-0.2	-0.1	0.1	0.6
19-Jun	-0.2	-0.2	-0.3	-0.3	-0.5	-0.7	-0.5	-0.4	-0.5	-0.6	-0.8	-1.0	-0.4	-0.5	-0.5	-0.5	-0.5	-0.6	-0.4	-0.4	-0.2	-0.1	-0.1	0.0	-0.4	0.0
20-Jun	-0.1	0.0	0.1	0.0	0.0	-0.1	-0.2	0.4	0.4	0.2	-0.1	-0.3	-0.5	-0.1	-0.2	0.0	-0.2	-0.3	-0.4	-0.3	-0.1	-0.3	-0.2	-0.2	-0.1	0.4
21-Jun	-0.3	-0.2	-0.1	-0.1	-0.2	-0.3	-0.5	-0.3	-0.5	-0.2	-0.2	-0.1	-0.2	-0.5	-0.5	-0.3	-0.6	-0.5	-0.4	-0.2	-0.3	-0.1	0.1	0.1	-0.3	0.1
22-Jun	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.0	-0.4	-0.1	0.2	-0.4	-0.4	0.1	-0.3	-0.7	-0.3	-0.5	-0.3	0.0	-0.1	0.2	0.1	0.0	-0.1	0.2
23-Jun	0.0	0.0	0.1	0.1	0.2	0.3	0.4	0.5	0.1	0.2	0.1	0.1	-0.3	-0.2	0.0	0.0	0.1	0.3	0.2	0.3	0.3	0.1	0.2	0.3	0.1	0.5
24-Jun	0.0	0.2	0.1	0.2	0.0	0.2	0.2	0.3	0.4	0.2	0.2	-0.2	-0.4	0.0	-0.3	-0.1	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.3	-0.3	0.0	0.4
25-Jun	0.0	-0.2	0.0	0.0	0.0	-0.1	0.0	0.1	-0.2	0.3	0.1	0.0	0.4	0.3	-0.1	-0.6	-0.4	0.0	-0.3	-0.1	-0.2	0.0	0.1	-0.1	0.0	0.4
26-Jun	0.1	-0.3	0.3	0.5	0.3	0.1	0.2	0.3	0.2	0.2	0.0	-0.5	-0.5	-0.7	-0.5	-0.5	-0.7	-0.7	-0.5	-0.3	-0.2	0.1	0.1	0.1	-0.1	0.5
27-Jun	0.2	0.1	0.0	0.2	0.2	0.3	0.1	0.1	0.4	0.3	0.2	-0.2	-0.3	-0.2	-0.1	-0.1	-0.2	-0.5	-0.4	-0.3	-0.1	-0.3	-0.2	-0.3	-0.1	0.4
28-Jun	0.0	-0.1	0.0	0.3	0.1	0.1	0.0	-0.3	0.0	-0.4	-0.5	-0.7	-0.7	-0.9	-0.9	-0.7	-0.5	-0.5	-0.4	-0.5	-0.2	-0.1	0.0	0.0	-0.3	0.3
29-Jun	0.1	0.1	0.1	0.0	0.1	-0.1	0.2	0.2	0.4	0.4	0.1	-0.1	-0.1	0.0	0.1	-0.2	0.0	-0.1	0.0	-0.3	-0.6	-0.2	0.1	-0.3	0.0	0.4
30-Jun	-0.1	-0.1	0.1	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1	-0.2	-0.1	0.0	0.0	-0.3	-0.2	-0.1	-0.3	-0.2	0.0	0.0	-0.2	-0.2	-0.1	0.1
																								Diurnal Average		
																								Diurnal Maximum		



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 5.4 km/h on Jun 13 11:00	Hours of Data: 720
Minimum Value: 0.1 km/h on Jun 20 02:00	Hours of Missing Data: 0
Percentiles: P ₁ = 0.2 P ₁₀ = 0.5 Q ₁ = 0.9 Median = 1.6 Q ₃ = 2.2 P ₉₀ = 2.9 P ₉₉ = 4.8	Hours of Calibration: 0
	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	2.4	2.4	2.4	2.3	3.3	3.0	3.3	3.6	3.2	3.4	3.7	3.5	3.9	3.7	3.4	3.6	3.2	3.2	2.5	2.1	1.0	0.9	0.9	0.6	3.9
2-Jun	0.7	0.5	0.3	0.3	0.3	0.5	1.0	1.2	1.6	1.6	1.9	1.9	2.3	2.3	2.1	2.0	1.9	1.6	1.8	2.4	2.2	1.3	1.5	0.8	2.4
3-Jun	0.7	0.6	0.5	0.4	0.3	0.5	1.3	2.0	2.5	2.8	3.2	2.8	2.3	2.6	2.4	2.2	2.2	2.1	2.1	1.9	2.0	2.0	2.1	2.0	3.2
4-Jun	1.4	1.5	1.9	2.2	1.5	1.9	1.5	2.0	2.1	2.6	2.5	2.2	3.0	2.7	2.5	2.3	2.0	1.7	1.4	1.7	2.7	2.2	1.4	1.7	3.0
5-Jun	2.0	1.7	1.9	2.2	1.3	1.4	2.1	2.1	2.1	2.3	2.2	2.3	2.2	2.1	2.1	2.1	2.0	3.5	2.8	2.3	1.8	1.2	1.7	1.5	3.5
6-Jun	1.3	1.0	0.9	1.3	1.2	1.2	1.8	2.5	1.8	1.8	2.1	1.7	1.9	0.9	1.9	2.4	2.2	1.3	1.1	0.8	0.3	0.1	0.2	0.2	2.5
7-Jun	0.2	0.6	0.9	1.6	0.9	0.6	1.6	1.6	1.9	2.8	2.7	2.6	3.1	4.1	3.4	2.7	3.0	2.4	1.7	0.6	0.5	1.3	1.5	0.9	4.1
8-Jun	0.7	0.5	1.3	1.0	0.8	1.0	1.9	1.6	2.0	1.9	2.2	0.9	2.2	2.4	1.8	1.1	0.9	2.5	3.8	2.9	2.7	1.6	1.6	2.4	3.8
9-Jun	1.5	1.1	1.4	0.6	0.6	1.2	1.5	2.1	1.9	1.7	1.8	1.9	3.0	2.9	2.3	2.0	1.9	1.9	1.1	0.8	0.7	0.3	0.6	0.6	3.0
10-Jun	0.4	0.3	0.4	0.3	0.4	0.5	0.9	1.1	1.2	1.5	1.7	1.9	1.9	1.9	1.8	1.7	1.4	1.0	2.3	0.8	0.5	0.3	0.3	0.3	2.3
11-Jun	0.5	0.9	0.5	1.2	1.2	0.8	1.4	1.8	2.9	2.3	2.3	1.7	2.0	2.9	2.2	3.0	1.9	1.6	1.6	1.4	1.1	2.3	1.0	1.5	3.0
12-Jun	0.9	0.8	0.5	0.5	0.7	1.0	1.2	0.9	1.5	1.6	1.5	1.8	1.9	1.8	2.0	2.2	4.0	3.1	2.8	1.8	1.2	2.3	2.0	1.6	4.0
13-Jun	1.7	1.7	1.9	1.4	1.4	1.3	1.8	2.1	3.5	4.5	5.4	4.8	4.8	4.8	5.0	4.8	4.9	4.3	4.8	3.8	2.6	2.2	1.7	0.9	5.4
14-Jun	0.9	0.4	0.9	0.9	0.8	1.6	2.9	2.9	3.0	3.8	3.5	3.4	3.5	3.6	3.4	2.9	3.1	2.3	2.5	1.6	0.9	0.3	1.3	1.7	3.8
15-Jun	1.9	1.8	1.8	1.4	1.7	1.5	1.3	1.5	1.4	1.4	1.4	0.8	1.2	1.2	1.0	1.5	1.1	0.8	0.7	0.9	1.1	0.7	0.7	0.6	1.9
16-Jun	1.2	1.9	1.2	1.7	1.4	1.7	2.6	2.3	2.4	2.3	2.2	2.6	2.2	2.9	3.0	2.6	2.5	2.4	1.8	0.9	0.4	0.3	0.9	2.0	3.0
17-Jun	1.5	0.9	1.3	1.5	1.6	1.8	1.8	1.7	2.7	2.3	1.8	2.2	2.2	2.3	1.9	1.8	1.8	1.4	1.3	1.5	1.6	1.5	1.6	2.2	2.7
18-Jun	2.2	1.7	1.6	1.5	1.4	1.6	1.4	1.4	1.3	1.7	1.8	1.5	1.8	1.3	1.6	1.3	1.5	1.8	0.7	0.3	0.9	2.4	2.3	1.8	2.4
19-Jun	1.6	1.2	1.7	2.2	2.5	2.8	2.2	2.5	2.9	3.1	2.9	2.9	2.4	2.4	2.2	2.2	2.4	2.4	1.9	1.4	0.8	0.3	0.4	0.3	3.1
20-Jun	0.2	0.1	0.2	0.1	0.2	0.4	0.6	0.8	1.2	1.5	1.8	2.2	2.3	2.3	2.1	1.8	1.8	1.5	1.6	1.3	0.4	0.6	0.9	0.6	2.3
21-Jun	0.6	0.9	0.4	0.5	0.9	1.0	1.4	1.1	1.4	1.4	1.6	2.2	2.2	2.2	2.3	2.3	1.9	2.0	2.3	1.2	1.0	0.4	0.4	0.6	2.3
22-Jun	0.3	0.2	0.4	0.6	0.3	0.4	0.7	1.5	1.5	1.5	1.5	2.0	3.3	1.6	2.3	3.1	2.9	2.5	1.1	0.3	0.5	0.6	0.2	0.1	3.3
23-Jun	0.1	0.1	0.2	0.4	0.7	1.2	1.6	1.8	1.5	1.4	1.7	1.8	2.1	2.4	1.2	1.2	1.3	1.1	1.0	1.2	1.4	0.6	0.6	0.8	2.4
24-Jun	0.4	0.6	1.0	1.0	1.3	2.1	2.1	2.1	2.2	1.9	1.9	2.5	2.6	2.5	2.5	2.0	2.1	2.2	1.3	0.5	0.8	1.4	0.8	0.6	2.6
25-Jun	0.4	0.4	0.2	0.2	0.3	0.3	0.7	0.8	0.9	1.2	1.4	1.5	1.7	1.7	1.6	3.2	1.6	1.0	0.7	1.1	1.5	0.8	0.9	0.4	3.2
26-Jun	0.8	1.3	1.5	0.8	0.8	1.1	1.1	1.4	1.4	1.2	1.9	3.0	3.5	3.5	3.6	4.0	3.9	3.0	2.3	2.2	1.6	0.5	0.5	0.5	4.0
27-Jun	0.5	0.5	0.8	0.7	0.8	1.0	1.3	1.2	1.4	1.6	1.5	1.9	2.7	2.5	2.4	2.1	2.4	2.4	2.0	1.1	0.8	0.9	1.3	1.5	2.7
28-Jun	1.4	1.7	0.9	0.8	1.2	1.1	1.1	0.8	1.1	2.1	2.8	3.2	4.2	4.0	3.7	3.4	2.2	2.4	1.5	1.1	0.5	0.3	0.3	0.4	4.2
29-Jun	0.3	0.4	0.6	0.6	0.5	0.9	1.3	1.2	1.3	1.3	1.6	1.8	1.9	2.1	2.2	1.9	1.7	1.4	0.7	0.8	0.8	0.9	0.8	0.7	2.2
30-Jun	0.6	0.5	0.2	0.2	0.3	0.2	0.3	0.5	0.4	0.6	0.6	0.7	0.3	0.6	0.3	1.0	0.9	0.5	0.8	0.7	0.5	0.7	2.0	2.1	2.1

2.4	2.4	2.4	2.3	3.3	3.0	3.3	3.6	3.5	4.5	5.4	4.8	4.8	4.8	5.0	4.8	4.9	4.3	4.8	3.8	2.7	2.4	2.3	2.4	
Diurnal Maximum																								



Maximum Value: 1.6 km/h on Jun 5 03:00		Maximum Daily Average: 0.7 km/h on Jun 3		Hours in Service: 720																							
Minimum Value: -1.6 km/h on Jun 28 13:00		Minimum Daily Average: -1.0 km/h on Jun 1		Hours of Data: 720																							
Maximum Diurnal Average: 0.1 km/h at hour 8		Minimum Diurnal Average: -0.3 km/h at hour 17		Hours of Missing Data: 0																							
Monthly Average: -0.07 km/h		Percentiles: $P_1 = -1.3$ $P_{10} = -0.8$ $Q_1 = -0.4$ Median = -0.1 $Q_3 = 0.3$ $P_{90} = 0.6$ $P_{99} = 1.2$		Hours of Calibration: 0																							
				Percent Operational Time: 100.0																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	-0.8	-0.9	-0.8	-0.9	-1.2	-0.9	-1.4	-1.2	-1.3	-1.0	-1.4	-0.9	-1.2	-1.3	-1.0	-1.4	-1.1	-1.0	-0.5	-0.9	-0.7	-0.6	-0.4	-0.2	-1.0	-0.2	
2-Jun	-0.2	-0.1	0.0	-0.1	-0.1	-0.2	0.4	0.3	0.2	0.2	0.0	0.5	0.8	0.6	0.6	0.4	0.5	0.1	0.6	0.7	0.8	0.8	0.6	0.0	0.3	0.8	
3-Jun	0.7	0.4	0.2	0.2	-0.1	0.1	0.0	0.5	0.8	1.3	1.1	0.8	0.7	0.8	0.8	0.8	0.8	0.7	1.1	0.5	1.1	1.3	1.1	1.1	0.7	1.3	
4-Jun	0.8	0.6	0.6	0.7	0.4	0.5	-0.1	0.3	0.7	0.7	0.9	0.7	0.7	1.0	0.9	0.6	0.4	0.5	0.4	0.6	0.2	-0.3	0.7	1.2	0.6	1.2	
5-Jun	1.3	1.2	1.6	0.7	0.2	0.0	1.0	1.0	-0.1	-0.2	-0.2	0.0	0.2	0.2	0.4	0.3	0.0	-0.6	0.5	0.8	0.5	0.1	0.8	-0.2	0.4	1.6	
6-Jun	0.2	0.8	0.6	0.2	0.6	0.0	-0.1	-0.2	-0.2	-0.1	-0.1	-0.1	0.1	0.2	0.4	-0.2	0.1	0.3	0.6	0.5	0.3	0.1	0.1	-0.1	0.2	0.8	
7-Jun	0.0	0.3	0.0	-0.4	-0.3	0.0	-0.1	0.2	-0.4	-0.9	-1.0	-0.7	-1.2	-1.2	-1.1	-0.7	-1.0	-0.9	-0.8	-0.3	-0.1	-0.1	-0.6	-0.3	-0.5	0.3	
8-Jun	0.5	0.4	0.4	0.5	0.5	-0.1	-0.3	0.2	-0.4	-0.1	-0.3	0.2	-0.1	0.0	0.1	0.3	0.3	-0.9	-1.3	-0.6	-1.2	-1.0	-0.9	-0.9	-0.2	0.5	
9-Jun	-1.1	-0.5	-0.7	-0.4	-0.1	-0.4	-0.4	-0.1	-0.6	-0.2	-0.3	-0.1	-0.8	-0.6	-0.3	-0.4	-0.6	-0.7	-0.2	-0.5	-0.4	-0.3	-0.4	-0.3	-0.4	-0.1	
10-Jun	0.1	-0.2	-0.1	0.0	0.1	-0.1	0.0	0.5	0.4	-0.2	0.7	0.5	0.3	-0.2	0.2	0.3	0.0	-0.2	0.0	0.1	0.3	0.2	0.2	0.2	0.1	0.7	
11-Jun	0.3	0.3	0.1	0.0	0.0	0.3	0.2	0.9	0.9	0.7	0.9	0.4	0.7	-0.3	-0.1	-0.6	-0.5	0.4	0.7	0.6	0.5	0.2	0.1	0.6	0.3	0.9	
12-Jun	-0.4	-0.3	0.2	0.3	0.1	0.1	-0.1	0.1	0.2	0.3	0.0	-0.1	-0.3	-0.3	-0.1	0.0	0.8	0.7	0.0	-0.1	-0.3	0.0	-0.2	-0.3	0.0	0.8	
13-Jun	-0.2	-0.5	-0.4	-0.2	-0.4	-0.4	-0.6	-0.4	-0.8	-1.0	-1.3	-0.8	-1.0	-0.9	-1.0	-0.8	-0.9	-0.9	-0.7	-0.9	-0.7	-0.5	-0.5	-0.3	-0.1	-0.6	-0.1
14-Jun	0.0	0.1	-0.1	-0.2	-0.5	-0.5	-0.9	-0.8	-0.7	-1.1	-1.0	-0.9	-1.1	-0.8	-0.7	-0.9	-0.9	-0.6	-0.5	-0.2	-0.2	0.0	-0.4	-0.5	-0.5	0.1	
15-Jun	-0.5	-0.3	-0.4	-0.2	-0.2	-0.4	-0.4	-0.5	-0.2	-0.6	-0.5	-0.4	0.3	0.1	0.3	0.4	-0.1	0.2	-0.2	0.0	0.4	0.5	0.0	0.3	-0.1	0.5	
16-Jun	0.2	-0.5	-0.3	-0.4	-0.3	-0.4	-0.6	-0.5	-0.5	-0.5	-0.5	-0.9	-0.6	-0.8	-1.2	-0.7	-0.8	-0.7	-0.2	-0.3	-0.3	-0.2	-0.3	-0.3	-0.5	0.2	
17-Jun	-0.4	-0.2	-0.3	-0.8	-0.5	-0.5	-0.4	-0.5	-0.5	-0.8	0.0	-0.1	0.3	0.3	0.2	-0.1	-0.6	-0.1	0.3	0.5	0.6	0.8	1.3	1.2	0.0	1.3	
18-Jun	0.9	0.4	0.0	0.2	0.2	0.0	0.4	0.6	0.4	0.8	0.7	0.3	0.6	0.6	0.4	0.6	0.3	0.2	0.2	0.0	0.4	-0.5	0.1	0.0	0.3	0.9	
19-Jun	-0.5	-0.4	-0.5	-0.6	-0.8	-0.8	-0.5	-0.6	-0.7	-0.8	-0.7	-0.9	-0.4	-0.3	-0.6	-0.3	-0.7	-0.7	-0.4	-0.2	-0.1	-0.1	-0.3	0.0	-0.5	0.0	
20-Jun	-0.1	0.0	0.0	-0.1	0.0	-0.1	-0.2	0.6	0.6	0.3	0.1	-0.3	-0.5	-0.2	-0.5	-0.1	-0.3	-0.2	-0.3	-0.4	-0.1	-0.5	-0.3	-0.2	-0.1	0.6	
21-Jun	-0.5	-0.4	-0.2	-0.2	-0.4	-0.4	-0.6	-0.2	-0.5	-0.1	-0.5	-0.1	-0.1	-0.5	-0.3	-0.5	-0.6	-0.4	-0.4	-0.3	-0.2	-0.3	0.0	0.1	-0.3	0.1	
22-Jun	0.0	0.1	-0.2	-0.4	-0.1	0.1	0.2	0.1	-0.3	0.2	0.4	-0.4	-0.7	0.0	0.0	-0.8	-0.8	-0.8	-0.3	0.1	0.0	0.3	0.1	0.1	-0.1	0.4	
23-Jun	0.1	0.0	0.1	0.3	0.6	0.6	0.7	0.8	0.3	0.6	0.1	0.1	-0.3	-0.5	-0.1	0.2	0.3	0.4	0.4	0.6	0.3	0.5	0.5	1.2	0.3	1.2	
24-Jun	0.5	0.8	0.8	0.5	0.5	0.6	0.5	0.6	0.7	0.7	0.6	-0.2	-0.7	0.0	-0.2	0.0	-0.2	-0.1	-0.2	-0.3	0.0	-0.2	-0.5	-0.4	0.2	0.8	
25-Jun	-0.1	-0.2	-0.1	-0.1	0.0	-0.1	0.0	0.1	-0.1	0.2	0.2	0.2	0.8	0.6	0.1	-1.1	-0.6	0.2	-0.3	0.1	-0.2	0.0	0.2	0.1	0.0	0.8	
26-Jun	0.3	0.1	0.8	0.7	0.4	0.0	0.4	0.8	0.6	0.1	-0.1	-1.1	-1.2	-0.8	-0.6	-1.1	-1.0	-1.5	-0.7	-0.2	-0.3	0.4	-0.1	-0.1	-0.2	0.8	
27-Jun	0.1	0.5	0.5	0.3	0.1	0.5	0.2	0.5	0.7	0.5	0.3	-0.3	-0.6	-0.2	-0.2	-0.3	-0.7	-0.5	-0.7	-0.4	0.0	-0.2	-0.2	-0.4	0.0	0.7	
28-Jun	0.2	-0.2	0.0	0.6	0.7	0.1	0.1	-0.2	0.0	-0.5	-1.1	-1.3	-1.6	-1.4	-1.4	-1.2	-0.7	-0.8	-0.6	-0.7	-0.4	-0.2	0.0	-0.1	-0.4	0.7	
29-Jun	0.2	0.5	0.6	0.5	0.5	0.7	0.8	0.7	0.5	0.8	0.3	-0.1	0.0	0.1	0.0	-0.4	0.1	-0.2	0.3	-0.4	-0.8	-0.3	0.1	-0.3	0.2	0.8	
30-Jun	-0.2	-0.2	0.1	-0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.1	-0.1	0.0	-0.2	0.1	-0.4	-0.2	-0.1	-0.5	-0.3	0.3	0.4	-0.2	-0.2	-0.1	0.4	
																								Diurnal Average			
																								Diurnal Maximum			



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 5.6 km/h on Jun 13 11:00	Hours of Data: 720
Minimum Value: 0.1 km/h on Jun 20 02:00	Hours of Missing Data: 0
	Hours of Calibration: 0
	Percent Operational Time: 100.0
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 = 4.8	

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	2.3	2.4	2.5	2.5	3.5	3.2	3.4	3.8	3.5	3.8	3.9	3.7	4.0	4.0	3.9	3.8	3.5	3.5	2.8	2.1	1.0	1.0	1.1	0.7	4.0
2-Jun	0.8	0.5	0.5	0.3	0.4	0.6	1.1	1.4	1.7	1.9	2.0	2.1	2.5	2.3	2.3	2.3	2.2	1.9	2.0	2.6	2.2	1.5	1.7	1.1	2.6
3-Jun	0.9	0.7	0.7	0.6	0.3	0.6	1.4	2.1	2.3	2.8	3.2	3.0	2.5	2.8	2.5	2.5	2.5	2.3	2.3	2.2	2.1	2.3	2.2	2.1	3.2
4-Jun	1.5	1.5	2.1	2.5	1.9	2.1	1.6	1.8	2.0	2.4	2.7	2.4	3.0	3.0	2.8	2.8	2.4	2.0	1.6	2.1	3.5	2.7	1.8	1.7	3.5
5-Jun	2.0	1.7	1.8	2.2	1.7	1.7	2.4	2.5	2.6	2.7	2.8	2.7	2.6	2.7	2.7	2.5	2.2	3.5	3.2	2.2	2.0	1.4	2.1	1.8	3.5
6-Jun	1.5	1.2	1.3	1.7	1.5	1.5	1.8	2.7	1.9	1.9	2.1	1.8	2.0	1.0	2.2	2.3	2.2	1.3	0.9	0.6	0.4	0.2	0.2	0.3	2.7
7-Jun	0.3	0.7	1.1	1.9	1.0	0.7	2.0	2.0	2.1	2.9	2.8	2.8	3.3	4.1	3.4	2.9	3.2	2.3	1.8	0.8	0.5	1.4	1.5	1.1	4.1
8-Jun	0.7	0.7	1.4	1.1	1.0	1.2	2.1	1.8	2.3	2.2	2.6	1.0	2.6	2.5	2.0	1.2	1.0	2.7	4.1	3.5	3.0	1.5	1.8	2.5	4.1
9-Jun	1.8	1.3	1.5	0.6	0.8	1.4	1.5	2.3	2.0	1.8	2.1	1.9	3.2	3.0	2.4	2.1	1.9	2.0	1.2	0.8	0.8	0.3	0.6	0.8	3.2
10-Jun	0.5	0.3	0.5	0.4	0.4	0.4	0.9	1.2	1.4	1.6	2.0	2.1	2.2	2.1	2.1	1.9	1.6	1.2	2.3	0.9	0.7	0.4	0.4	0.5	2.3
11-Jun	0.8	1.2	0.8	1.3	1.4	0.9	1.6	2.1	3.0	2.4	2.3	1.8	2.3	2.8	2.7	3.3	2.2	1.9	1.6	1.5	1.3	2.4	1.1	1.6	3.3
12-Jun	1.1	0.9	0.6	0.7	0.8	1.2	1.3	1.0	1.6	1.8	1.6	1.9	2.0	2.1	2.3	2.4	3.9	3.2	2.8	1.9	1.3	2.4	2.1	1.7	3.9
13-Jun	1.7	1.6	1.8	1.8	1.6	1.4	1.8	2.3	3.9	4.7	5.6	5.0	4.9	5.0	5.3	4.9	5.0	4.3	4.7	4.0	2.6	2.2	1.8	0.9	5.6
14-Jun	1.0	0.6	0.9	0.9	0.9	1.8	3.0	2.9	3.2	3.9	3.6	3.4	3.7	3.9	3.5	3.0	3.2	2.6	2.7	1.7	1.0	0.4	1.6	1.7	3.9
15-Jun	1.9	2.1	2.0	1.6	1.8	1.6	1.4	1.5	1.5	1.5	1.4	1.0	1.4	1.3	1.2	1.8	1.2	0.8	0.9	0.9	1.2	0.9	1.0	0.8	2.1
16-Jun	1.2	2.1	1.4	2.0	1.7	1.9	2.6	2.7	2.5	2.5	2.3	2.8	2.4	3.1	3.1	2.7	2.7	2.6	2.0	1.0	0.5	0.4	1.1	2.1	3.1
17-Jun	1.6	1.1	1.4	1.5	1.9	2.0	1.9	1.9	2.9	2.4	2.2	2.4	2.5	2.4	2.1	2.0	1.9	1.7	1.5	1.7	1.8	1.5	1.7	2.2	2.9
18-Jun	2.5	2.0	1.8	1.7	1.6	1.7	1.6	1.6	1.5	1.9	1.9	1.7	2.1	1.5	1.9	1.5	1.5	1.9	0.7	0.4	1.0	2.4	2.1	1.7	2.5
19-Jun	1.7	1.4	2.0	2.4	2.6	2.8	2.5	2.5	2.9	3.3	3.0	3.0	2.5	2.5	2.3	2.3	2.6	2.6	1.9	1.4	0.8	0.4	0.5	0.5	3.3
20-Jun	0.3	0.1	0.2	0.1	0.2	0.4	0.7	0.9	1.4	1.8	2.1	2.5	2.4	2.5	2.1	2.1	2.0	1.6	1.7	1.5	0.5	0.8	1.2	0.7	2.5
21-Jun	0.6	0.9	0.5	0.5	1.0	1.2	1.4	1.3	1.3	1.6	1.6	2.4	2.4	2.3	2.5	2.5	2.1	2.2	2.3	1.5	1.3	0.6	0.5	1.0	2.5
22-Jun	0.5	0.4	0.7	0.9	0.5	0.5	0.8	1.6	1.6	1.6	1.7	2.0	3.8	1.7	1.9	2.8	3.1	2.5	1.2	0.5	0.5	0.8	0.2	0.1	3.8
23-Jun	0.2	0.1	0.2	0.6	0.8	1.2	1.5	1.6	1.6	1.5	1.9	2.1	2.4	2.6	1.2	1.4	1.5	1.2	1.0	1.4	1.6	0.9	0.8	0.9	2.6
24-Jun	0.6	0.6	0.9	1.1	1.4	2.1	2.2	2.1	2.1	1.7	1.9	2.5	2.7	2.5	2.6	2.3	2.0	2.0	1.4	0.6	0.9	1.5	0.9	0.6	2.7
25-Jun	0.6	0.4	0.2	0.3	0.5	0.3	0.8	0.9	0.9	1.3	1.6	1.6	1.9	1.9	1.8	3.5	1.6	1.3	0.7	1.2	1.5	0.9	1.0	0.6	3.5
26-Jun	0.9	1.3	1.5	1.0	0.9	1.2	1.2	1.4	1.5	1.4	2.1	3.2	3.5	3.7	3.7	4.2	4.0	3.1	2.3	2.1	1.7	0.7	0.7	0.6	4.2
27-Jun	0.6	0.7	1.1	0.7	0.9	1.1	1.3	1.1	1.5	1.7	1.6	2.1	2.7	2.6	2.5	2.4	2.5	2.4	2.0	1.1	0.9	0.8	0.9	0.9	2.7
28-Jun	1.7	2.1	1.1	1.0	1.0	1.3	1.3	0.9	1.3	2.2	3.1	3.4	4.4	4.3	3.9	3.6	2.4	2.6	1.7	1.3	0.6	0.4	0.4	0.6	4.4
29-Jun	0.5	0.6	0.6	0.7	0.6	0.9	1.2	1.1	1.2	1.3	1.6	1.9	2.1	2.3	2.3	1.9	1.8	1.4	0.7	1.0	1.0	1.1	1.1	0.9	2.3
30-Jun	0.7	0.5	0.3	0.3	0.3	0.2	0.3	0.6	0.4	0.6	0.6	0.7	0.4	0.4	0.4	0.9	1.1	0.6	0.8	0.8	0.6	0.7	2.2	2.3	2.3

2.5	2.4	2.5	2.5	3.5	3.2	3.4	3.8	3.9	4.7	5.6	5.0	4.9	5.0	5.3	4.9	5.0	4.3	4.7	4.0	3.5	2.7	2.2	2.5	
Diurnal Maximum																								



Maximum Value: 2.5 km/h on Jun 5 23:00		Maximum Daily Average: 0.9 km/h on Jun 11		Hours in Service: 720																						
Minimum Value: -1.5 km/h on Jun 1 16:00		Minimum Daily Average: -0.7 km/h on Jun 1		Hours of Data: 720																						
Maximum Diurnal Average: 0.3 km/h at hour 8		Minimum Diurnal Average: 0.0 km/h at hour 17		Hours of Missing Data: 0																						
Monthly Average: 0.16 km/h		Percentiles: P ₁ = -1.3 P ₁₀ = -0.5 Q ₁ = -0.2 Median = 0.1 Q ₃ = 0.4 P ₉₀ = 0.9 P ₉₉ = 2.1		Hours of Calibration: 0																						
				Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	-0.7	-0.6	-0.7	-0.4	-0.7	-0.3	-1.1	-0.9	-1.3	-0.3	-1.0	-0.6	-0.8	-1.1	-0.4	-1.5	-1.4	-0.4	-0.4	-0.8	-0.7	-0.5	-0.4	-0.6	-0.7	-0.3
2-Jun	-0.2	-0.2	0.0	-0.1	-0.2	0.1	0.0	0.4	0.8	-0.1	-0.5	0.5	0.3	0.5	0.9	0.3	0.9	0.8	1.1	2.1	1.8	1.4	1.5	0.5	0.5	2.1
3-Jun	0.8	1.0	0.9	0.5	0.1	0.4	0.6	1.8	1.0	1.5	1.6	1.6	1.0	0.9	1.2	1.0	0.8	0.7	1.0	-0.2	0.5	1.3	1.4	0.9	0.9	1.8
4-Jun	1.2	1.3	2.3	2.3	1.7	1.8	0.5	-0.1	0.2	0.5	0.9	0.5	1.5	0.8	1.9	1.2	0.4	-0.1	-0.1	0.2	0.6	-0.2	0.1	0.5	0.8	2.3
5-Jun	0.5	0.8	0.7	1.8	2.0	1.1	1.2	1.0	-0.2	-0.3	0.3	0.6	0.0	-0.1	0.6	0.5	-0.1	0.2	0.8	0.8	1.5	1.6	2.5	1.1	0.8	2.5
6-Jun	-0.2	0.0	0.1	1.3	0.8	0.7	0.6	0.8	0.4	0.3	-0.1	0.0	0.5	0.3	1.7	0.9	1.7	0.2	0.3	0.1	-0.1	-0.3	-0.2	-0.2	0.4	1.7
7-Jun	-0.2	0.1	-0.3	-0.3	-0.3	0.2	0.9	1.2	0.6	-0.6	-0.9	0.0	-1.2	-1.4	-0.4	0.0	-0.6	-0.6	-0.4	0.0	0.1	0.4	-0.2	0.2	-0.2	1.2
8-Jun	0.1	0.5	0.5	0.4	0.1	0.1	0.2	0.6	-0.2	1.1	0.1	-0.1	0.4	0.5	-0.3	0.7	0.2	-0.8	-1.4	-0.9	-1.0	-0.9	-0.6	-0.6	-0.1	1.1
9-Jun	-0.9	-0.7	-0.5	-0.3	0.1	0.1	0.1	0.5	-0.2	0.1	-0.4	0.1	-0.7	-0.5	0.6	-0.3	-0.3	-0.4	-0.2	0.0	-0.2	-0.3	-0.4	-0.1	-0.2	0.6
10-Jun	-0.1	-0.3	-0.3	0.0	0.2	-0.1	-0.1	0.7	1.2	0.0	1.4	1.5	0.9	0.3	-0.2	0.3	-0.4	-0.3	1.1	0.3	0.3	0.3	1.2	1.3	0.4	1.5
11-Jun	1.2	1.9	0.7	0.6	1.3	0.2	0.8	1.9	2.2	1.6	1.8	0.5	0.8	0.4	0.5	0.2	-0.2	0.7	0.7	1.3	1.6	1.3	0.1	0.4	0.9	2.2
12-Jun	-0.4	-0.2	0.0	0.3	-0.1	0.2	-0.2	0.2	-0.1	-0.2	-0.1	-0.2	-0.7	-0.1	0.1	0.2	1.5	1.2	0.3	0.1	0.1	0.0	-0.1	-0.2	0.1	1.5
13-Jun	-0.2	-0.1	0.3	0.7	0.5	-0.4	-0.6	-0.1	0.3	-0.1	-0.2	0.3	0.3	0.2	-0.2	-0.1	-0.3	0.6	-0.3	0.2	-0.2	-0.1	0.1	0.1	0.0	0.7
14-Jun	0.3	0.0	0.1	0.0	-0.3	-0.1	-0.4	-0.2	0.3	-0.6	-0.3	-0.1	-0.5	0.3	-0.2	-0.3	-0.8	-0.1	-0.4	0.4	0.2	0.0	-0.3	0.0	-0.1	0.4
15-Jun	0.3	0.0	0.6	0.4	0.4	0.0	0.0	-0.5	0.4	-0.3	-0.1	-0.6	0.4	-0.1	0.4	0.9	-0.5	0.2	-0.5	0.0	0.4	0.5	-0.5	-0.3	0.1	0.9
16-Jun	0.2	0.0	0.0	0.2	0.4	0.3	0.0	0.4	0.3	0.0	0.2	-0.3	-0.5	-0.3	-1.0	-0.5	-0.3	-0.5	0.4	0.4	0.1	-0.2	0.0	0.3	0.0	0.4
17-Jun	0.2	0.2	-0.1	-0.5	-0.6	-0.4	-0.4	-0.5	-0.1	-0.1	0.1	-0.3	1.1	0.6	0.7	0.6	-0.5	-0.1	0.4	-0.2	0.1	-0.2	1.2	1.0	0.1	1.2
18-Jun	2.1	2.2	1.4	0.8	0.7	0.3	0.0	0.2	0.4	0.5	0.7	0.4	0.2	0.4	0.2	0.4	0.3	0.8	0.5	0.3	0.6	0.5	1.3	0.9	0.7	2.2
19-Jun	-0.5	-0.1	0.2	0.0	0.1	0.1	0.0	-0.4	0.0	-0.1	-0.4	-0.5	0.0	0.3	-0.3	-0.1	-0.7	0.0	-0.5	0.2	0.1	0.1	-0.2	0.1	-0.1	0.3
20-Jun	0.0	0.1	0.1	0.0	0.1	-0.1	0.0	0.2	1.1	1.2	0.0	0.6	-0.1	0.4	-0.2	-0.1	-0.5	-0.1	0.2	0.2	0.3	0.2	-0.2	0.1	0.1	1.2
21-Jun	-0.3	-0.2	-0.2	-0.3	-0.1	-0.1	-0.4	0.2	-0.3	-0.3	-1.0	-0.8	0.3	-0.5	0.1	-0.3	-0.3	0.2	-0.2	0.3	-0.1	-0.1	-0.2	0.9	-0.2	0.9
22-Jun	-0.3	0.1	-0.3	-0.7	-0.2	-0.1	0.2	0.5	-0.3	0.2	0.9	-0.3	-0.8	0.3	0.5	0.5	0.0	-0.7	-0.2	0.1	0.3	0.3	0.1	0.1	0.0	0.9
23-Jun	0.1	0.1	0.2	0.0	0.3	0.1	0.3	0.0	0.3	0.9	0.4	0.3	0.1	-0.2	-0.2	0.6	1.2	0.7	0.3	0.3	0.6	0.2	-0.1	0.0	0.3	1.2
24-Jun	0.9	0.8	0.4	0.1	0.4	1.0	0.8	0.8	0.7	0.2	0.2	0.0	-0.5	0.6	0.1	0.0	0.1	0.8	0.0	-0.1	0.1	0.1	0.0	-0.2	0.3	1.0
25-Jun	0.0	0.2	-0.1	-0.1	0.0	0.1	0.0	-0.1	-0.2	-0.2	-0.2	0.6	0.1	0.5	0.7	-0.1	-0.6	0.7	0.0	0.0	0.2	-0.1	0.4	0.6	0.1	0.7
26-Jun	0.3	0.4	0.2	0.4	0.3	-0.1	0.1	0.5	0.3	0.4	-0.1	-1.1	-0.3	-0.7	0.1	-0.1	-0.4	-1.4	-0.1	0.8	0.2	0.2	0.1	0.2	0.0	0.8
27-Jun	0.2	0.2	0.1	0.1	-0.1	0.2	0.6	0.1	0.0	0.2	0.1	-0.4	-0.7	0.2	0.5	-0.1	-0.4	0.1	-0.1	0.0	0.7	0.7	0.8	0.3	0.1	0.8
28-Jun	2.4	1.8	0.2	0.1	0.2	-0.3	0.2	-0.2	-0.4	-0.6	-1.3	-0.9	-1.0	-1.2	-1.3	-1.3	-0.3	-0.3	-0.3	-0.5	-0.3	-0.4	-0.3	-0.1	-0.3	2.4
29-Jun	0.0	0.0	0.0	0.0	0.0	-0.1	-0.3	0.0	0.1	0.3	-0.2	-0.1	0.2	0.7	0.1	-0.5	0.7	0.0	0.1	0.2	-0.5	-0.1	-0.3	0.0	0.0	0.7
30-Jun	-0.1	-0.1	0.2	0.0	0.0	0.1	0.0	0.1	0.0	0.1	0.1	-0.2	0.2	0.0	0.1	-0.1	-0.1	0.1	-0.2	-0.4	0.0	0.5	0.9	0.4	0.0	0.9
																								Diurnal Average		
																								Diurnal Maximum		



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 4.8 km/h on Jun 13 12:00 Minimum Value: 0.2 km/h on Jun 20 02:00 Percentiles: P ₁ = 0.3 P ₁₀ = 0.6 Q ₁ = 1.1 Median = 1.8 Q ₃ = 2.6 P ₉₀ = 3.3 P ₉₉ = 4.5																				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 Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	1.6	1.9	2.4	2.3	3.0	3.2	3.2	3.6	3.2	4.2	4.2	3.9	4.3	4.3	4.3	3.8	3.4	3.6	3.1	2.3	0.7	0.5	1.2	1.2	4.3
2-Jun	0.8	0.6	0.8	0.4	0.8	0.9	1.3	1.8	2.2	2.1	2.3	2.4	1.9	2.3	2.6	2.9	2.6	2.5	2.1	2.0	1.3	1.3	1.8	1.5	2.9
3-Jun	1.4	1.0	1.1	0.8	0.4	0.8	1.8	1.9	2.2	2.5	2.5	2.9	3.0	3.2	3.0	2.9	3.3	2.8	2.7	2.1	2.2	2.6	2.5	2.2	3.3
4-Jun	1.8	1.3	1.4	1.5	1.3	1.5	1.9	1.5	1.5	1.6	2.8	3.0	3.2	3.3	3.4	3.2	3.1	2.3	1.7	2.2	3.6	2.8	1.7	1.7	3.6
5-Jun	1.9	1.6	1.7	2.1	2.4	2.2	2.5	2.7	2.9	3.3	3.7	3.8	3.4	3.8	3.6	3.3	3.0	3.1	2.4	1.8	0.9	2.0	2.5	2.7	3.8
6-Jun	2.0	1.2	2.0	2.4	2.2	2.1	2.1	2.5	2.0	2.3	2.7	2.3	2.3	1.3	1.9	2.5	1.9	1.6	0.7	0.7	0.7	0.6	0.5	0.4	2.7
7-Jun	0.4	0.9	1.5	2.7	1.3	1.2	2.5	2.5	2.6	3.2	3.2	3.4	3.6	4.1	3.8	3.4	3.3	2.3	1.9	1.0	0.6	1.9	2.0	1.6	4.1
8-Jun	0.6	1.0	1.3	1.1	1.1	1.4	1.9	2.2	2.4	3.1	2.9	1.0	2.8	3.1	2.2	1.7	1.3	3.0	3.9	3.4	2.5	1.3	1.5	2.2	3.9
9-Jun	1.5	1.5	1.2	0.5	1.3	1.3	1.6	2.1	2.4	2.3	2.5	2.8	3.6	2.8	2.8	2.2	2.2	2.0	1.1	1.0	0.3	0.2	0.7	1.1	3.6
10-Jun	0.9	0.5	0.3	0.5	0.7	0.5	0.8	1.7	1.5	1.9	2.2	2.4	3.2	2.7	2.5	2.4	1.7	1.3	2.3	1.0	0.6	0.7	0.5	0.8	3.2
11-Jun	0.7	1.6	1.4	1.5	1.3	1.3	1.8	1.6	1.4	1.8	2.2	1.7	3.1	3.5	3.4	3.8	2.3	2.1	1.4	1.3	1.2	2.2	1.2	1.7	3.8
12-Jun	1.8	0.9	0.6	0.7	1.3	1.5	1.7	1.2	1.5	1.6	2.0	2.6	2.3	2.9	3.2	2.8	3.7	3.1	2.3	2.4	1.4	2.4	2.1	1.6	3.7
13-Jun	1.6	1.0	0.8	1.4	1.5	1.5	1.8	2.3	3.7	4.0	4.7	4.8	4.6	4.6	4.5	4.6	4.3	4.3	4.7	3.7	2.8	2.2	1.8	0.9	4.8
14-Jun	1.0	1.0	1.1	0.8	0.6	1.7	2.4	2.8	3.3	3.6	3.5	3.5	3.6	3.8	3.5	3.1	3.2	2.7	2.7	2.0	1.0	0.9	1.5	1.6	3.8
15-Jun	2.0	2.2	2.0	1.9	1.6	1.6	1.5	1.7	1.8	1.5	1.4	1.0	1.7	1.4	1.3	2.5	1.7	1.2	1.3	1.3	1.5	1.2	1.4	1.1	2.5
16-Jun	1.1	1.9	2.2	2.0	1.9	2.1	2.2	2.6	2.8	2.5	2.7	2.8	2.5	3.3	3.1	2.8	3.0	2.9	2.5	1.4	0.6	0.8	1.1	1.9	3.3
17-Jun	1.3	1.2	1.6	1.2	1.6	2.0	1.8	1.9	2.9	2.8	2.6	2.6	3.2	3.2	3.2	2.9	2.6	2.1	1.9	1.5	1.3	1.1	1.6	1.6	3.2
18-Jun	2.6	2.1	2.1	1.9	1.4	1.5	2.0	2.1	1.8	2.2	1.8	1.9	2.4	2.0	2.1	2.2	2.0	2.0	1.2	0.6	1.2	1.9	1.6	1.3	2.6
19-Jun	1.0	1.2	1.8	2.1	2.1	2.9	2.0	2.1	2.6	2.9	3.2	2.8	3.3	3.3	3.1	2.8	2.7	2.6	2.2	1.6	0.6	0.4	1.1	1.2	3.3
20-Jun	0.4	0.2	0.2	0.2	0.3	0.4	0.3	0.9	1.6	2.1	2.3	3.6	3.3	3.2	2.6	2.5	2.5	2.1	2.1	1.3	0.6	1.3	2.1	1.0	3.6
21-Jun	0.4	0.4	0.6	0.3	0.7	1.0	1.3	1.2	1.4	1.4	1.8	1.8	2.9	2.7	3.0	2.8	2.2	2.4	2.2	1.1	1.2	0.5	0.9	1.2	3.0
22-Jun	0.7	0.7	1.0	1.4	0.8	1.0	1.0	2.2	1.8	1.3	2.0	2.0	3.7	2.0	1.9	3.0	2.8	2.5	1.2	0.5	0.7	1.5	0.5	0.3	3.7
23-Jun	0.3	0.3	0.3	0.6	0.9	1.0	0.7	0.7	1.3	1.4	2.4	2.8	2.9	2.5	0.8	1.6	1.9	1.6	1.0	1.3	1.3	1.4	1.2	1.0	2.9
24-Jun	1.1	0.9	0.8	0.8	1.0	1.1	1.2	1.3	1.3	1.3	1.7	3.1	3.2	3.5	3.5	3.5	2.8	2.7	2.2	1.0	1.1	1.8	1.2	1.2	3.5
25-Jun	1.0	0.6	0.2	0.4	0.3	0.3	0.5	0.6	0.6	1.2	1.7	1.6	1.7	2.1	2.3	3.3	1.7	1.7	1.0	1.1	2.0	1.2	1.2	1.2	3.3
26-Jun	1.1	1.4	1.4	0.9	1.2	1.5	1.3	1.5	1.7	1.5	2.6	3.1	3.5	3.5	3.6	3.5	3.6	3.0	1.9	1.5	1.4	0.9	0.9	0.7	3.6
27-Jun	0.8	0.8	1.3	1.2	1.4	1.5	1.5	1.1	1.1	1.1	1.8	2.7	3.0	3.7	3.1	3.0	2.6	2.2	1.6	0.9	0.9	0.6	0.6	0.7	3.7
28-Jun	1.6	1.9	1.6	1.3	1.1	1.9	1.7	0.8	0.9	2.7	2.8	3.9	4.5	4.5	4.1	3.8	2.4	3.1	1.6	1.1	1.0	0.8	1.0	0.5	4.5
29-Jun	0.4	0.7	0.6	0.6	0.5	0.9	0.7	0.7	0.7	1.1	1.8	2.6	2.8	3.3	3.3	2.5	2.7	2.1	1.1	1.3	1.8	2.1	2.3	1.4	3.3
30-Jun	0.8	0.4	0.4	0.4	0.3	0.2	0.4	1.1	0.3	0.3	0.4	0.8	0.4	0.3	0.3	0.3	0.6	0.7	0.8	0.8	0.8	0.6	1.9	2.1	2.1
Diurnal Maximum																									



Maximum Value: 2.9 km/h on Jun 28 02:00 Maximum Daily Average: 1.6 km/h on Jun 5																								Hours in Service: 720 Hours of Data: 572					
Minimum Value: -1.6 km/h on Jun 1 17:00 Minimum Daily Average: -0.5 km/h on Jun 1 Maximum Diurnal Average: 0.7 km/h at hour 23 Minimum Diurnal Average: 0.0 km/h at hour 11 Monthly Average: 0.42 km/h Percentiles: P ₁ = -1.2 P ₁₀ = -0.4 Q ₁ = 0.0 Median = 0.3 Q ₃ = 0.8 P ₉₀ = 1.5 P ₉₉ = 2.7																								Hours of Missing Data: 148 Hours of Calibration: 0 Percent Operational Time: 79.4					
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-Jun	-0.2	0.0	-0.3	-0.4	-0.5	0.0	-0.6	-0.5	-1.1	0.2	-0.8	-0.1	-0.2	-1.2	-0.2	-1.5	-1.6	-0.4	-0.5	-0.8	-0.4	-0.3	0.0	-0.5	-0.5	0.2			
2-Jun	-0.2	0.2	0.1	0.1	0.0	0.0	-0.1	0.0	0.4	-0.2	-0.7	0.4	-0.4	0.0	0.9	0.8	1.3	1.4	1.2	2.2	1.9	1.5	2.7	1.5	0.6	2.7			
3-Jun	0.5	0.9	0.5	0.9	1.0	1.2	1.1	2.5	0.9	1.4	1.5	1.8	1.1	0.8	1.3	0.9	0.7	0.5	0.4	-0.2	0.7	1.1	1.4	1.0	1.0	2.5			
4-Jun	1.0	1.2	2.4	1.7	1.2	1.6	0.5	-0.6	0.2	0.3	0.6	0.7	1.8	0.4	2.0	1.7	1.2	0.4	0.1	0.6	2.0	2.4	1.2	0.9	1.1	2.4			
5-Jun	2.3	2.1	2.8	2.3	2.4	1.4	0.8	1.4	1.4	1.5	1.4	1.7	1.0	1.0	1.4	1.2	0.7	1.5	1.6	0.7	1.5	1.8	2.5	1.7	1.6	2.8			
6-Jun	0.7	1.0	1.0	2.7	1.5	1.2	0.8	1.8	1.0	0.8	0.0	0.0	0.7	0.6	2.5	1.9	2.3	0.2	0.4	0.4	-0.2	-0.4	-0.3	-0.2	0.8	2.7			
7-Jun	-0.1	0.0	-0.5	0.2	-0.3	0.4	2.6	1.9	1.1	-0.3	-0.8	0.2	-1.0	-1.2	0.4	0.8	-0.4	0.1	0.1	0.3	0.2	1.0	0.2	0.4	0.2	2.6			
8-Jun	0.3	0.6	1.5	1.3	0.6	0.5	0.9	1.0	0.1	1.5	0.0	0.0	1.0	1.2	0.1	0.6	-0.3	-0.6	-1.2	-0.9	-0.9	-0.8	-0.4	-0.6	0.2	1.5			
9-Jun	-0.7	-0.4	-0.3	-0.2	0.2	0.4	0.4	0.9	0.0	0.1	-0.5	0.1	-0.4	0.2	0.8	-0.3	-0.1	-0.4	-0.2	0.2	-0.1	-0.4	-0.1	0.2	0.0	0.9			
10-Jun	0.1	-0.2	-0.1	0.2	0.3	0.1	0.1	0.5	1.3	0.1	1.5	2.2	1.1	0.3	-1.2	0.2	-0.8	-0.8	2.0	0.4	0.5	0.3	1.5	1.3	0.5	2.2			
11-Jun	1.5	2.7	1.3	0.9	2.0	0.3	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	2.7		
12-Jun	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--	
13-Jun	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--
14-Jun	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--
15-Jun	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--
16-Jun	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--
17-Jun	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	-0.3	-0.8	1.2	0.4	1.0	0.8	-0.4	-0.2	0.8	-0.1	0.1	0.3	1.1	0.6	--	1.2		
18-Jun	1.2	1.5	1.7	1.5	0.9	0.6	0.0	0.0	0.1	0.7	0.5	0.4	0.8	0.6	0.5	0.5	0.4	1.3	0.7	0.6	0.9	1.1	1.5	1.2	0.8	1.7			
19-Jun	-0.1	0.0	0.5	0.3	0.4	0.4	0.3	-0.4	0.1	-0.1	-0.5	-0.5	0.0	0.3	-0.4	-0.1	-0.5	0.0	-0.4	0.2	0.2	0.5	0.1	0.4	0.0	0.5			
20-Jun	0.2	0.1	0.1	0.0	0.1	0.0	0.0	0.2	0.7	1.8	-0.2	0.8	0.0	-0.2	-0.7	-0.4	-0.7	0.0	0.7	0.4	0.6	0.7	-0.1	0.1	0.2	1.8			
21-Jun	0.0	0.0	0.0	0.1	0.3	0.2	-0.4	0.4	-0.3	-0.7	-1.2	-1.3	0.2	-0.5	0.2	0.0	-0.4	0.7	0.2	0.5	0.2	0.1	0.1	1.1	0.0	1.1			
22-Jun	-0.3	0.2	0.2	-0.2	-0.2	0.0	0.6	0.6	-0.4	-0.1	0.6	-0.4	1.4	0.3	1.4	1.1	0.8	-0.4	0.0	0.2	0.5	0.6	0.2	0.5	0.3	1.4			
23-Jun	0.3	0.2	0.1	0.4	0.6	0.2	0.3	0.1	0.4	1.1	0.6	0.3	0.7	0.0	-0.2	0.3	1.1	1.2	0.5	0.8	2.8	1.7	0.7	0.3	0.6	2.8			
24-Jun	0.4	0.4	0.3	0.3	0.7	0.9	0.9	0.6	0.4	0.1	0.3	0.1	-0.5	0.5	0.5	0.6	0.4	1.2	0.1	-0.2	0.7	0.8	0.5	0.2	0.4	1.2			
25-Jun	0.4	0.4	0.1	0.1	0.1	0.2	0.0	0.1	0.0	-0.3	-0.4	0.7	-0.4	0.5	0.7	0.3	1.4	1.6	0.3	0.1	0.9	0.0	0.7	0.6	0.3	1.6			
26-Jun	0.7	0.4	0.5	0.9	1.4	0.5	0.5	0.5	0.8	0.8	0.1	-0.7	0.4	-0.1	1.0	0.4	0.2	-0.6	0.2	0.9	0.5	0.3	0.6	0.9	0.5	1.4			
27-Jun	0.9	0.5	1.1	0.5	0.0	0.6	1.2	0.5	0.2	0.3	0.2	-0.3	-0.5	0.4	0.7	0.2	0.3	0.5	0.2	0.4	1.3	1.2	0.6	0.5	0.5	1.3			
28-Jun	2.8	2.9	1.0	1.0	0.6	0.2	0.1	-0.6	-0.6	-0.7	-1.3	-0.7	-0.6	-1.1	-1.4	-1.1	0.2	0.4	0.0	-0.4	-0.1	-0.3	-0.4	-0.1	0.0	2.9			
29-Jun	0.1	-0.1	0.2	0.2	0.2	0.3	0.0	0.2	0.3	0.6	0.0	0.2	0.6	0.7	0.2	-0.7	1.4	0.2	0.3	0.8	-0.8	0.9	-0.5	0.3	0.2	1.4			
30-Jun	0.2	0.2	0.3	0.1	0.2	0.3	0.2	0.3	0.2	0.1	0.1	-0.3	0.2	0.0	0.2	0.0	-0.1	0.3	0.2	-0.3	-0.1	0.4	1.8	0.8	0.2	1.8			
																								Diurnal Average					
																								Diurnal Maximum					
																								0.5 0.6 0.6 0.6 0.6 0.5 0.4 0.5 0.3 0.4 0.0 0.2 0.3 0.2 0.5 0.3 0.3 0.3 0.3 0.3 0.3 0.5 0.6 0.7 0.6					
																								2.8 2.9 2.8 2.7 2.4 1.6 2.6 2.5 1.4 1.8 1.5 2.2 1.8 1.2 2.5 1.9 2.3 1.6 2.0 2.2 2.8 2.4 2.7 1.7					
AF - Analyzer Failure																													



Number of Exceedences (AAAQO): 1-hr: 1 24-hr: 0	Hours in Service: 720
Maximum Value: 11.3 km/h on Jun 22 13:00	Hours of Data: 572
Minimum Value: 0.2 km/h on Jun 20 06:00	Hours of Missing Data: 148
Percentiles: P ₁ = 0.2 P ₁₀ = 0.5 Q ₁ = 1.0 Median = 1.6 Q ₃ = 2.6 P ₉₀ = 3.4 P ₉₉ = 4.8	Hours of Calibration: 0
	Percent Operational Time: 79.4

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	1.3	2.1	2.6	2.1	2.6	3.5	3.3	3.7	3.1	4.2	4.6	4.8	5.1	4.4	4.9	4.1	3.3	3.4	2.9	2.2	0.8	0.5	0.9	0.8	5.1
2-Jun	1.0	0.5	0.7	0.5	0.4	0.5	1.0	1.9	2.2	1.9	1.6	2.2	2.0	2.5	2.6	2.8	2.8	2.9	2.2	2.3	1.4	1.8	1.6	2.1	2.9
3-Jun	0.8	1.1	1.2	1.0	0.8	0.9	2.1	2.1	2.3	3.0	2.6	3.1	3.1	3.2	3.5	2.6	3.1	2.6	2.3	1.3	2.0	2.3	1.9	1.1	3.5
4-Jun	1.1	1.2	1.7	1.8	1.9	1.8	2.4	1.4	1.6	1.5	3.1	3.0	3.7	3.4	3.3	2.9	2.6	1.7	1.8	2.0	3.1	2.6	1.5	1.4	3.7
5-Jun	1.6	1.0	1.1	1.2	2.2	2.1	1.7	2.0	2.5	3.7	3.7	4.1	3.0	3.6	3.5	3.3	2.8	2.8	2.4	1.7	1.4	1.3	1.6	2.0	4.1
6-Jun	2.0	1.0	1.8	1.8	2.3	1.7	1.6	1.9	2.0	2.3	2.5	2.3	2.0	1.6	1.7	2.6	1.4	2.3	0.9	0.7	1.2	0.4	0.5	0.4	2.6
7-Jun	0.3	0.4	1.4	3.3	1.6	1.9	2.6	2.9	2.6	3.6	3.5	3.9	3.6	4.2	4.3	4.0	3.4	2.6	2.1	1.2	0.7	2.1	2.2	1.8	4.3
8-Jun	0.7	0.9	0.8	1.2	1.4	1.0	1.9	2.5	2.7	3.4	3.3	1.2	3.4	3.4	2.4	1.7	1.6	2.8	3.4	2.9	2.0	1.0	1.3	1.5	3.4
9-Jun	1.0	1.4	1.2	0.5	1.3	1.1	1.5	1.6	2.2	2.4	2.8	2.9	3.7	4.5	2.7	2.4	2.3	1.9	0.9	1.0	0.4	0.3	0.7	1.0	4.5
10-Jun	0.7	0.5	0.2	0.3	0.6	0.6	0.5	1.7	1.8	2.3	2.2	2.6	3.4	3.1	1.8	2.4	1.4	1.3	2.0	1.1	0.6	0.6	0.6	1.3	3.4
11-Jun	1.2	2.0	1.6	1.8	1.7	1.5	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	2.0
12-Jun	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--
13-Jun	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--
14-Jun	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-Jun	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--
16-Jun	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--
17-Jun	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	2.6	2.8	3.8	3.8	3.3	3.2	3.0	2.0	2.0	1.2	0.5	0.4	0.7	1.0	3.8
18-Jun	1.4	1.3	1.9	2.1	2.0	2.2	1.7	1.6	1.4	1.9	2.0	2.0	2.2	2.2	2.2	2.2	2.0	1.8	1.0	0.6	1.4	1.8	1.3	1.3	2.2
19-Jun	0.9	1.3	2.3	2.3	2.5	3.0	2.2	2.1	2.8	3.2	3.6	3.4	3.7	3.8	3.5	3.3	3.2	3.2	2.6	1.8	0.5	0.3	1.0	1.0	3.8
20-Jun	0.5	0.3	0.2	0.2	0.3	0.2	0.3	0.8	1.6	2.2	2.5	4.1	3.8	3.6	3.2	2.8	2.6	2.7	2.3	1.4	0.5	1.4	2.7	1.2	4.1
21-Jun	0.4	0.4	0.6	0.4	0.5	1.0	1.3	1.2	1.4	1.3	2.0	2.0	3.4	3.1	3.6	3.5	2.4	2.6	2.0	1.2	0.8	0.4	1.3	1.1	3.6
22-Jun	0.7	0.8	0.9	0.9	0.7	0.9	1.0	2.2	1.8	1.2	2.1	2.2	11.3	2.9	1.4	2.3	2.6	2.3	1.3	0.4	0.7	1.5	0.9	0.3	11.3
23-Jun	0.3	0.2	0.2	0.5	0.8	1.2	0.4	0.6	0.8	1.3	2.8	3.1	4.1	2.5	0.7	1.4	1.9	1.6	1.1	1.0	0.9	1.8	1.1	1.2	4.1
24-Jun	0.8	0.7	0.7	0.5	0.7	0.9	1.1	0.9	1.0	1.0	1.8	3.2	2.8	3.5	3.8	3.9	3.0	2.8	2.5	1.1	1.3	1.6	1.1	1.2	3.9
25-Jun	1.4	1.0	0.4	0.4	0.2	0.2	0.4	0.3	0.3	1.2	1.4	1.7	1.4	2.4	2.6	3.7	9.1	1.7	1.1	1.2	2.1	1.2	1.1	0.9	9.1
26-Jun	1.2	1.2	1.2	1.1	1.3	1.4	1.3	1.4	1.9	1.5	2.5	3.0	3.5	3.2	3.5	3.1	3.4	5.2	1.6	1.1	1.9	0.7	0.6	0.7	5.2
27-Jun	0.8	1.1	1.1	1.0	0.8	1.4	1.4	1.4	1.3	0.7	1.8	3.0	3.1	3.9	3.2	3.2	2.6	1.8	1.3	0.7	0.6	0.5	0.6	0.7	3.9
28-Jun	1.4	1.3	1.4	1.3	1.2	1.5	1.7	1.0	1.1	2.8	3.1	4.6	4.6	4.7	4.6	4.1	2.7	3.2	1.8	1.0	0.9	0.8	1.2	0.5	4.7
29-Jun	0.5	0.6	0.4	0.5	0.3	0.6	0.7	0.7	1.0	1.4	2.1	2.8	3.2	3.7	3.1	2.5	3.0	2.1	1.6	1.4	1.8	1.9	2.2	2.2	3.7
30-Jun	1.1	0.4	0.4	0.5	0.5	0.3	0.4	0.8	0.4	0.3	0.2	0.5	0.4	0.4	0.4	0.4	0.5	0.5	1.1	0.8	0.7	0.5	1.5	1.8	1.8
Diurnal Maximum																									
2.0 2.1 2.6 3.3 2.6 3.5 3.3 3.7 3.1 4.2 4.6 4.8 11.3 4.7 4.9 4.1 9.1 5.2 3.4 2.9 3.1 2.6 2.7 2.2																									

AF - Analyzer Failure



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 4
BUFFALO VIEWPOINT
JUNE 2015**

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

July 30, 2015



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

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	680	39	40	99.86	30	0	5	0
H2S (ppb) Average	678	30	42	98.33	3	0	1	0
THC (ppm) Average	679	39	41	99.72	4	-	2.9	-
Temperature (C) Average	720	0	0	100.00	32.4	-	24.9	-
Relative Humidity (%) Average	720	0	0	100.00	99	-	78	-
Wind Speed 10 m (km/h) Average	720	0	0	100.00	37	-	24	-
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 - BUFFALO VIEWPOINT (AMS 4)
 JUNE 2015

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	680	1	3	-	0	0	0	0	1	2	30
H2S (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
Temperature 2 m (C) Average	720	17.33	5.9	-	1.4	10	12.8	17	21.1	25.4	32.4
Relative Humidity (%) Average	720	56.8	21	-	18	29	38	57	74	87	99
Wind Speed 10 m (km/h) Average	720	10.5	6	-	1	4	6	9	13	19	37
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-

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

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2	12 Jun 2015 09:00	12 Jun 2015 09:00	1	Maintenance on daily zero and span system
H2S	08 Jun 2015 14:00	08 Jun 2015 14:00	1	Maintenance - Station operator on site
H2S	08 Jun 2015 16:00	08 Jun 2015 17:00	2	Maintenance - verify daily QA response
H2S	09 Jun 2015 08:00	09 Jun 2015 09:00	2	Maintenance - verify daily QA response
H2S	10 Jun 2015 11:00	10 Jun 2015 14:00	4	Maintenance on daily zero and span system
H2S	11 Jun 2015 10:00	11 Jun 2015 10:00	1	Maintenance - verify daily QA response
H2S	12 Jun 2015 09:00	12 Jun 2015 10:00	2	Maintenance on daily zero and span system
THC	09 Jun 2015 14:00	09 Jun 2015 14:00	1	Power spike
THC	12 Jun 2015 09:00	12 Jun 2015 09:00	1	Maintenance on daily zero and span system



Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 30 ppb on Jun 10 15:00	Maximum Daily Average: 5.3 ppb on Jun 10		Hours of Data:	680
Minimum Value: 0 ppb on Jun 5 00:00	Minimum Daily Average: 0.2 ppb on Jun 4		Hours of Missing Data:	40
Maximum Diurnal Average: 2.4 ppb at hour 15	Minimum Diurnal Average: 0.3 ppb at hour 3		Hours of Calibration:	39
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 = 13		Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0.4	1
2-Jun	0	0	0	Z	0	0	3	4	1	2	1	1	1	0	0	0	0	1	1	1	1	0	0	0	0.8	4
3-Jun	0	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-Jun	0	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-Jun	Z	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
6-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0.3	1
7-Jun	0	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-Jun	0	0	0	Z	0	0	0	0	0	C	C	C	C	C	C	C	C	C	1	1	0	1	0	0	--	1
9-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	3	2	1	0	0	0	0	0	0	0.5	3
10-Jun	0	0	0	0	0	Z	0	0	0	0	7	13	19	19	30	15	8	4	1	0	1	1	1	1	5.3	30
11-Jun	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
12-Jun	1	Z	0	0	0	0	0	0	M	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.4	1
13-Jun	0	0	Z	0	0	1	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.4	3
14-Jun	7	2	0	Z	0	0	0	0	0	0	0	0	0	0	1	2	0	8	5	1	1	0	0	0	1.3	8
15-Jun	0	0	0	0	Z	0	0	0	0	0	1	2	2	1	4	0	0	0	0	0	0	0	0	0	0.5	4
16-Jun	0	0	0	0	0	Z	0	0	0	0	0	1	0	2	1	1	6	10	0	0	0	0	0	0	1.0	10
17-Jun	Z	0	1	7	8	11	1	0	0	0	3	2	4	14	8	8	1	0	0	4	4	3	2	1	3.6	14
18-Jun	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
19-Jun	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0.2	1
20-Jun	0	0	0	Z	0	0	0	1	1	13	17	5	3	3	3	4	3	1	0	0	0	0	0	3	2.6	17
21-Jun	1	0	0	0	Z	0	0	0	0	1	12	8	7	5	4	7	3	1	0	0	2	2	0	0	2.5	12
22-Jun	0	0	0	0	0	Z	0	0	0	2	17	14	4	2	1	0	0	0	0	1	4	3	1	0	2.2	17
23-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	1	2	4	11	3	0	1	1	0	0	0	0	1.0	11
24-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	3	1	0	0	0.4	3
25-Jun	0	0	Z	0	2	1	1	0	0	1	3	4	1	1	1	2	0	2	2	1	2	1	0	0	1.1	4
26-Jun	0	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-Jun	0	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-Jun	0	0	0	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	4	1	1	1	1	0	0.5	4
29-Jun	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	9	5	1.0	9
30-Jun	1	Z	0	0	0	0	0	1	1	1	1	2	2	6	9	13	4	1	2	3	2	2	1	1	2.3	13

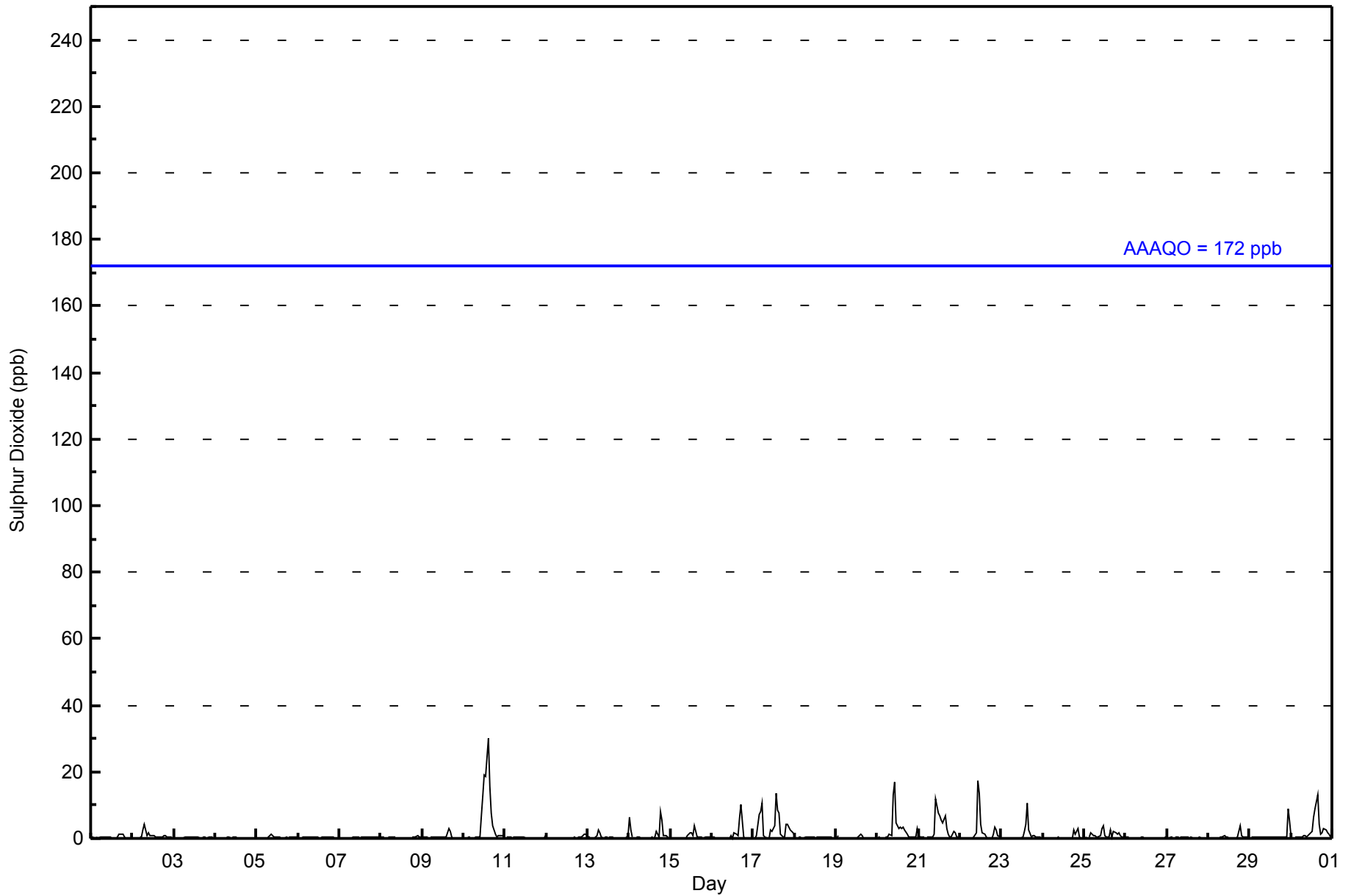
0.6	0.3	0.3	0.5	0.6	0.7	0.4	0.5	0.4	0.9	2.3	1.9	1.6	2.0	2.4	2.4	1.3	0.9	0.9	0.8	0.8	0.6	0.7	0.6	Diurnal Average	
7	2	1	7	8	11	3	4	1	13	17	14	19	19	30	15	8	10	8	5	4	3	9	5	Diurnal Maximum	

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



WBEA
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Buffalo Viewpoint - June 2015





WBEA
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Buffalo Viewpoint - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	666	97.94	97.94
11 - 20	13	1.91	99.85
21 - 60	1	0.15	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 680

Total Number of Hours: 720



WBEA
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Buffalo Viewpoint - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	100	50	10	5	3	8	50	97	41	38	35	40	59	60	44	26	666
11 - 20	2	2	0	0	0	0	0	0	1	0	0	0	1	2	2	3	13
21 - 60	1	0	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	103	52	10	5	3	8	50	97	42	38	35	40	60	62	46	29	680

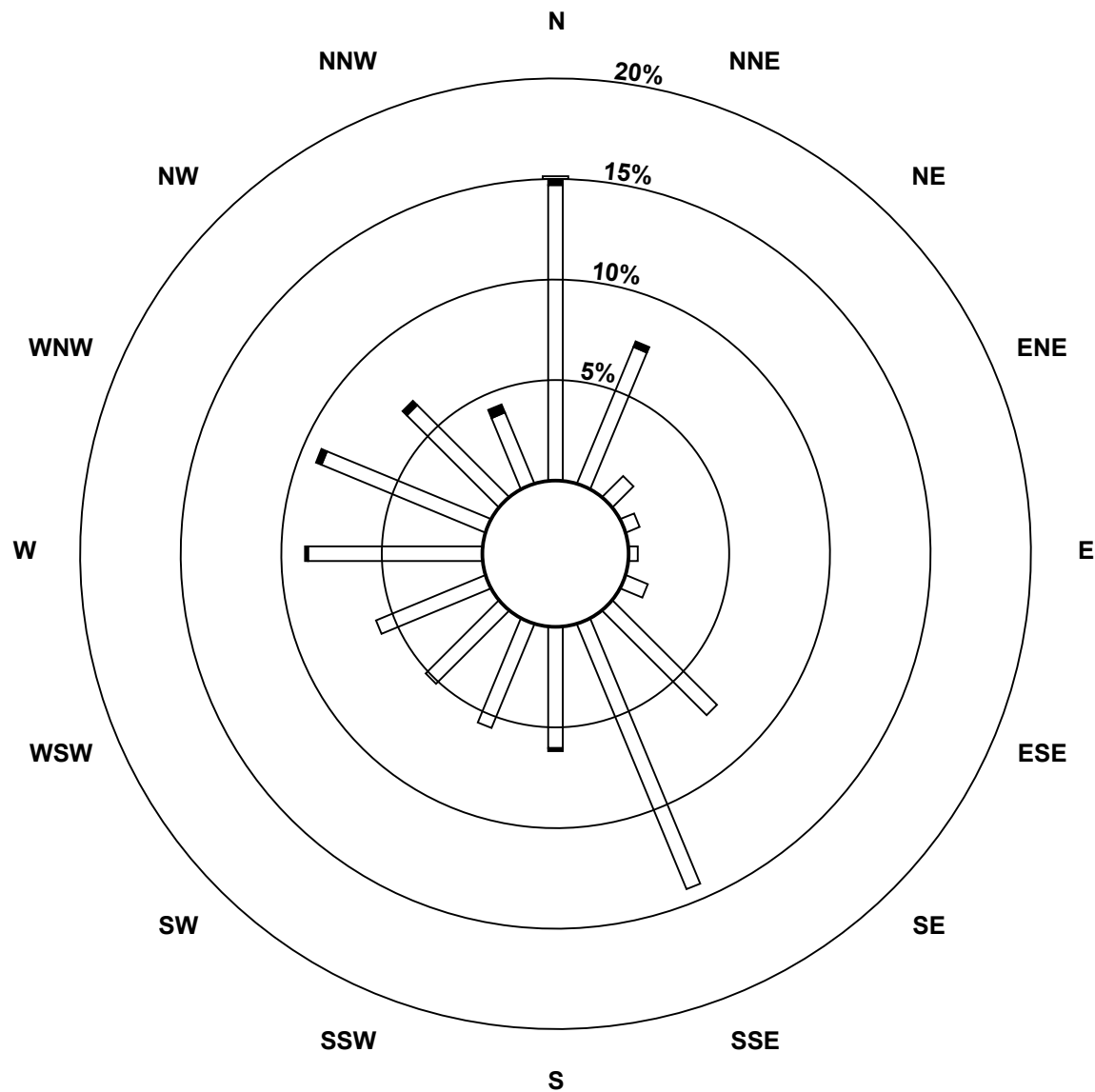
Total Number of Valid Hours: 680

Total Number of Hours: 720

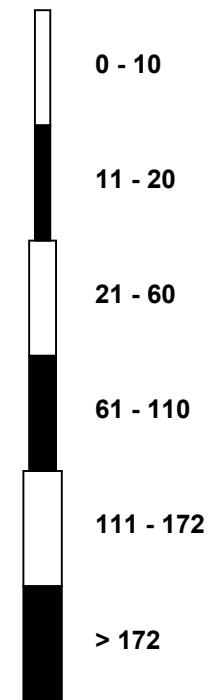


Wood Buffalo Environmental Association
Wind Rose Jun 2015

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



Classes (ppb)

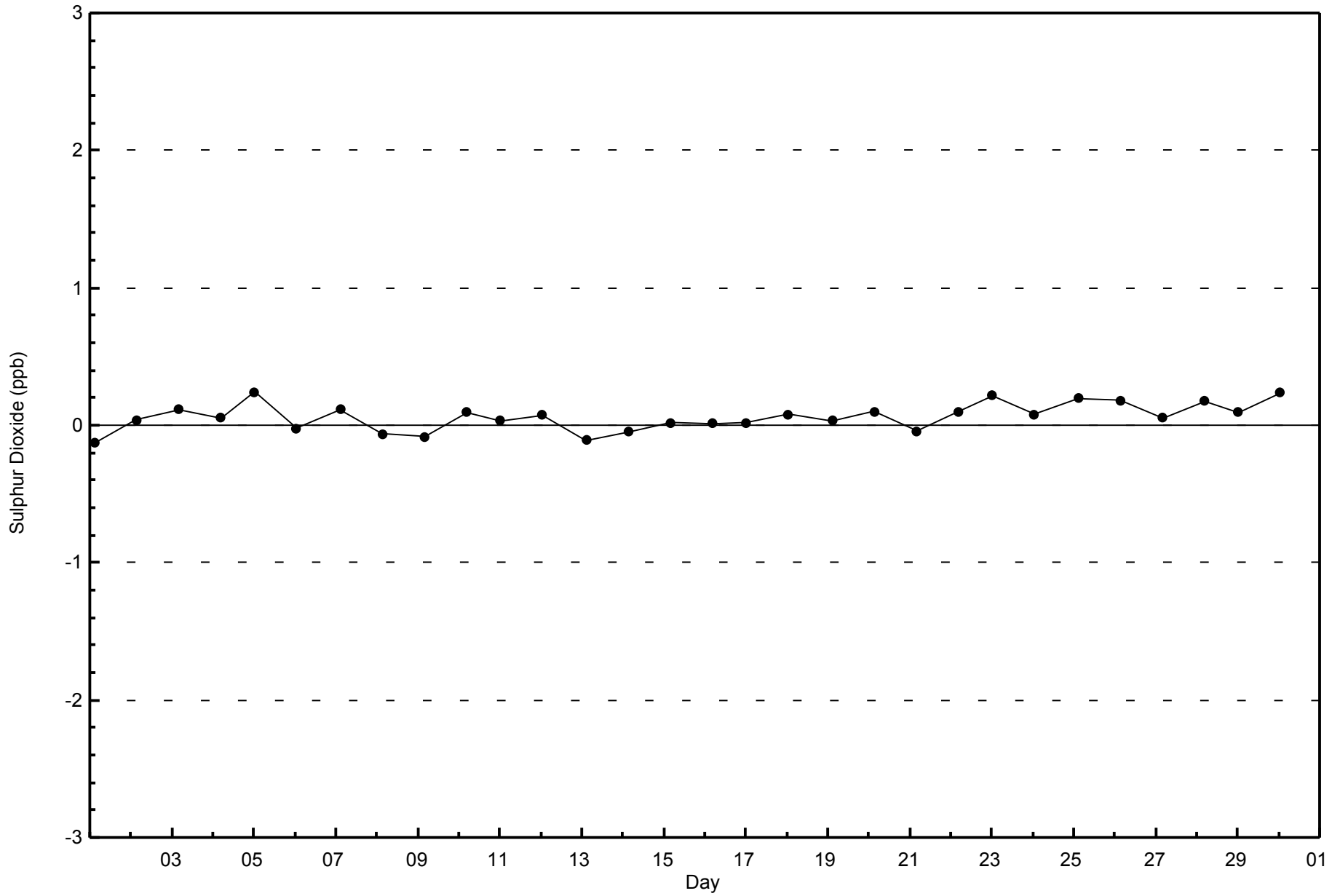


Total Number of Valid Hours: 680



WBEA
Zero Responses

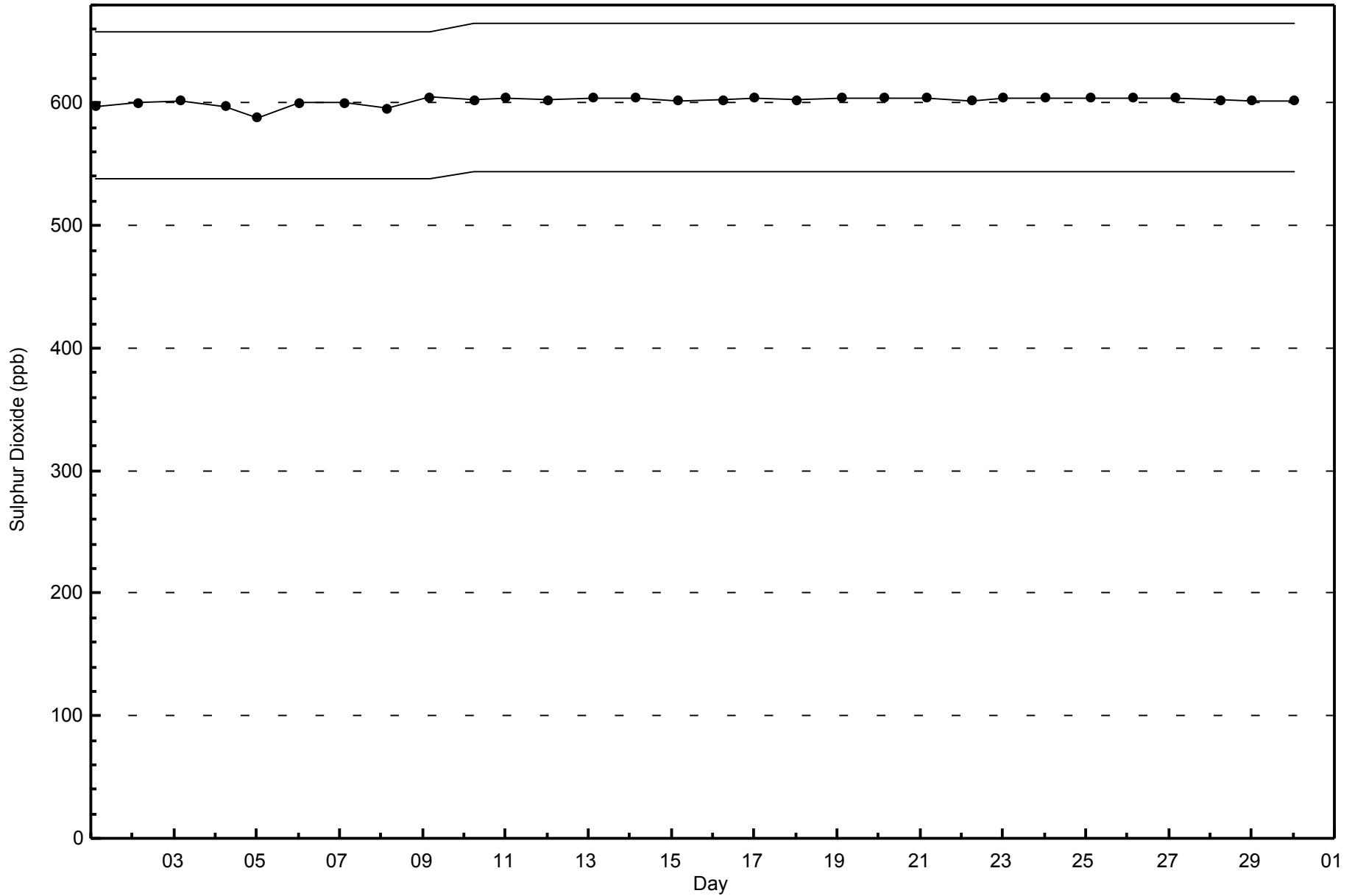
Sulphur Dioxide (SO₂) - ppb
Buffalo Viewpoint - June 2015





WBEA
Span Responses

Sulphur Dioxide (SO₂) - ppb
Buffalo Viewpoint - June 2015





Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 3 ppb on Jun 30 16:00	Maximum Daily Average: 1.0 ppb on Jun 30
Minimum Value: 0 ppb on Jun 4 13:00	Hours of Data: 678
Maximum Diurnal Average: 0.6 ppb at hour 5	Hours of Missing Data: 42
Monthly Average: 0.3 ppb	Hours of Calibration: 30
Minimum Daily Average: 0.1 ppb on Jun 5	Percent Operational Time: 98.3
Minimum Diurnal Average: 0.2 ppb at hour 13	
Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 2	

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

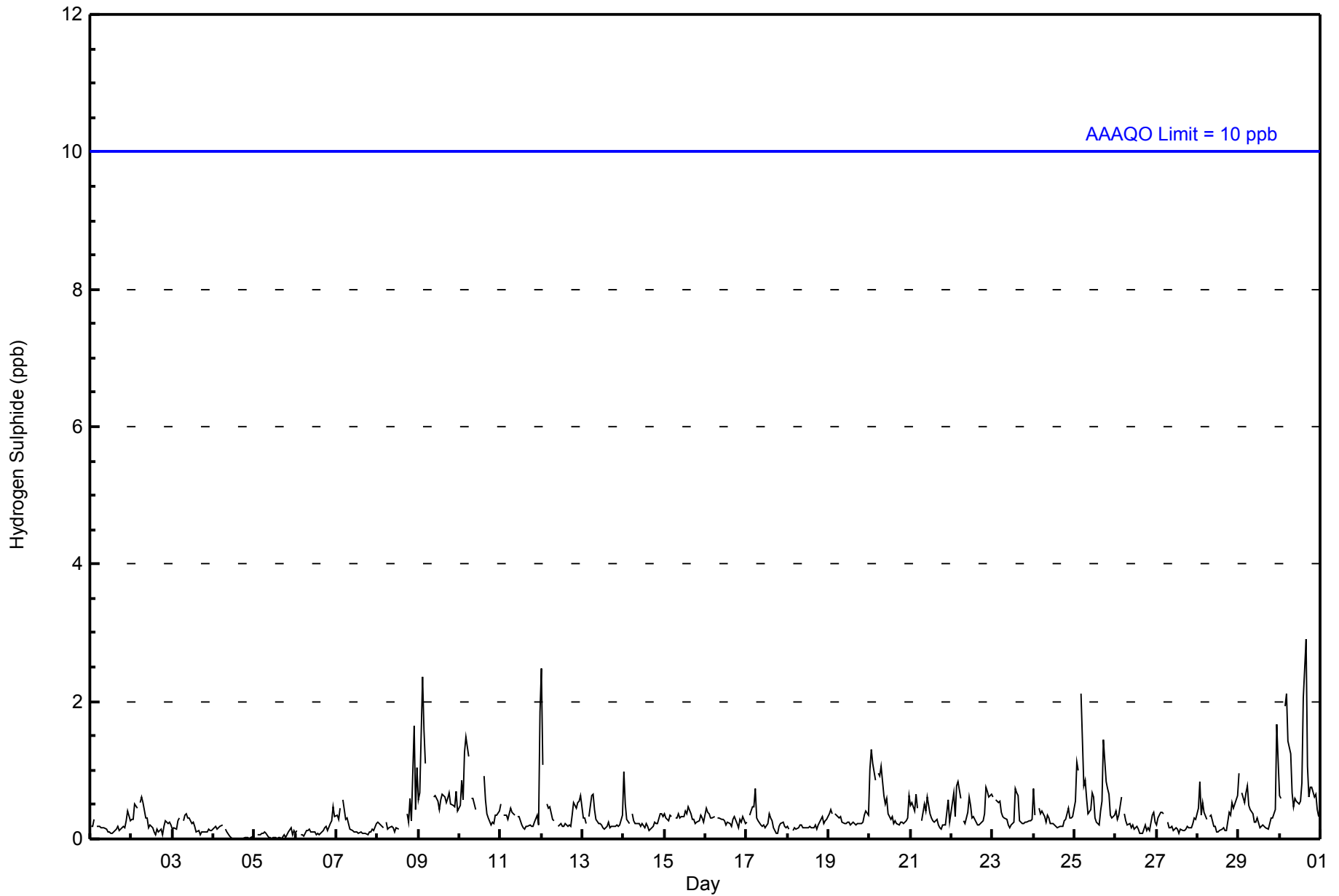
0.5	0.5	0.5	0.5	0.6	0.5	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.3	0.3	0.4	0.4	0.4	Diurnal Average	
2	1	2	2	2	1	1	1	1	1	1	1	1	1	1	2	3	1	1	1	1	1	2	2	2	Diurnal Maximum	

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



WBEA
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
Buffalo Viewpoint - June 2015





WBEA
Cumulative Frequency Distribution

Hydrogen Sulphide (H₂S) - ppb
Buffalo Viewpoint - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	677	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: 678

Total Number of Hours: 720



WBEA
Frequency Distribution

Hydrogen Sulphide (H₂S) - ppb
Buffalo Viewpoint - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	102	53	10	5	3	8	48	96	42	40	38	40	58	61	46	27	677
3 - 4	1	0	0	0	0	0	0	0	0	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	103	53	10	5	3	8	48	96	42	40	38	40	58	61	46	27	678

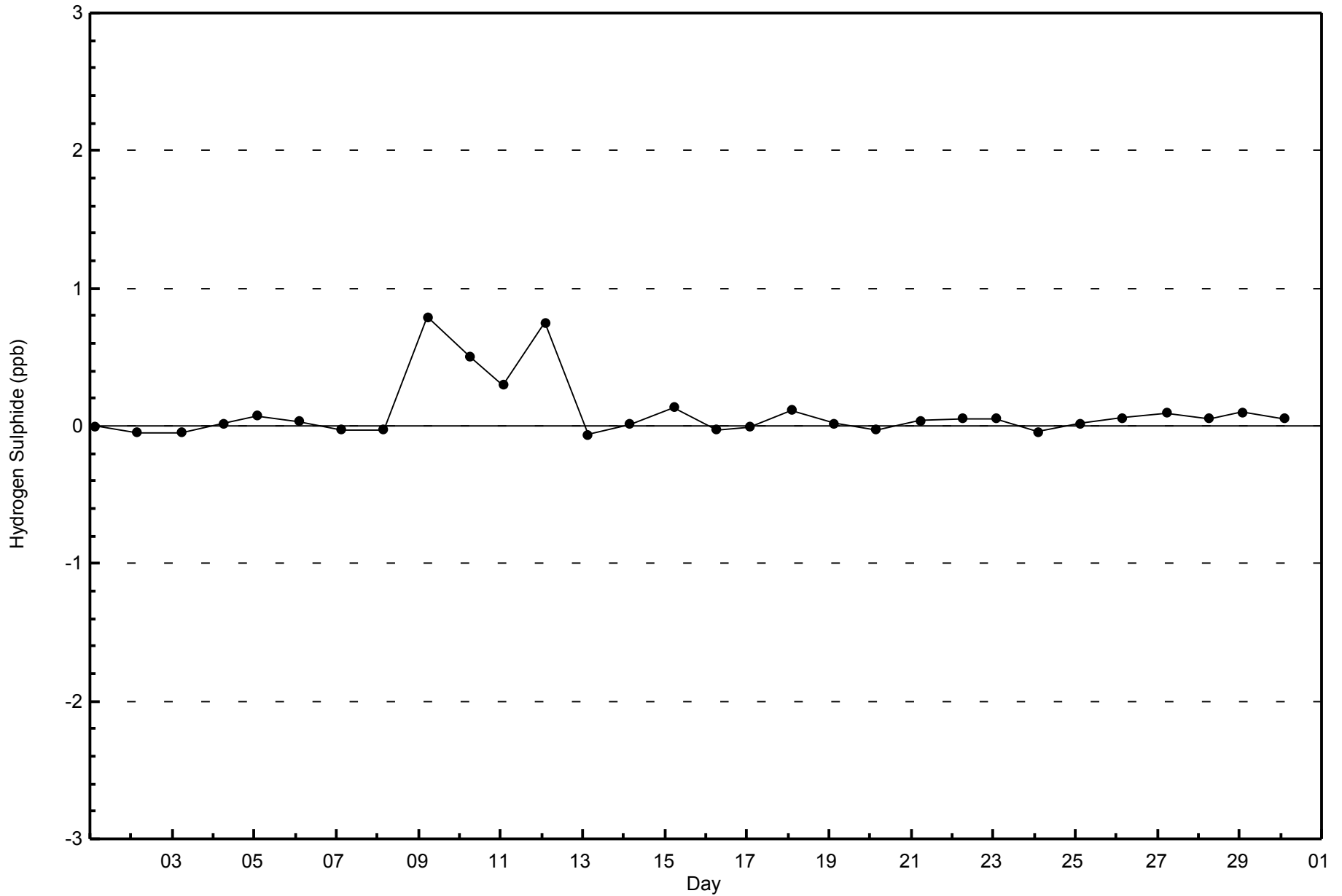
Total Number of Valid Hours: 678

Total Number of Hours: 720



WBEA
Zero Responses

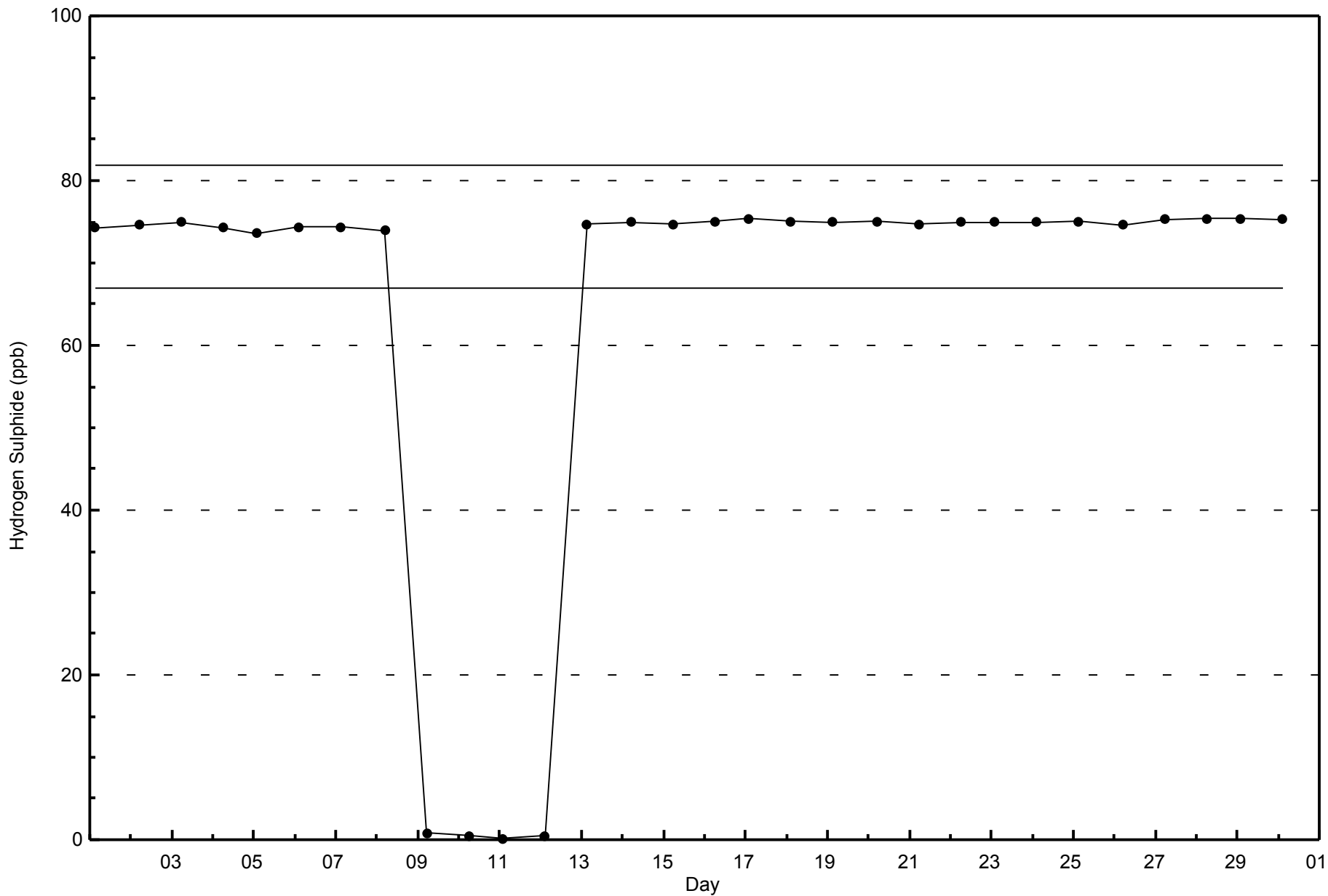
Hydrogen Sulphide (H₂S) - ppb
Buffalo Viewpoint - June 2015





WBEA
Span Responses

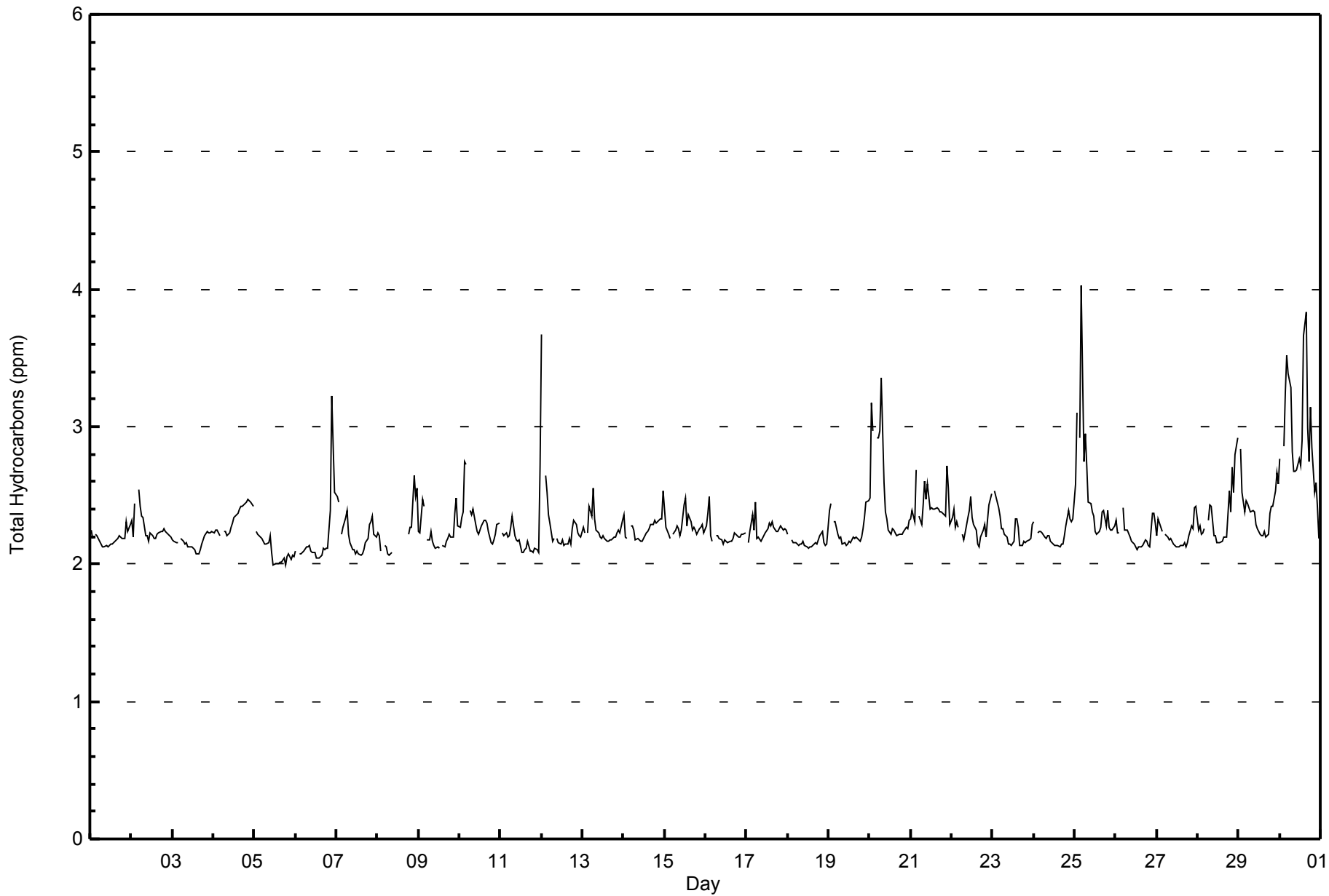
Hydrogen Sulphide (H₂S) - ppb
Buffalo Viewpoint - June 2015





WBEA
Hourly Averages

Total Hydrocarbons (THC) - ppm
Buffalo Viewpoint - June 2015





WBEA
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Buffalo Viewpoint - June 2015

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	13	1.91	1.91
2.1 - 3.0	653	96.17	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



WBEA
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Buffalo Viewpoint - June 2015

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	0	0	0	0	0	0	0	3	1	8	0	0	1	0	0	0	13
2.1 - 3.0	102	51	10	5	2	8	50	94	40	29	33	40	59	58	45	27	653
3.1 - 10.0	1	0	0	0	1	0	0	0	1	1	2	0	0	4	1	2	13
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	103	51	10	5	3	8	50	97	42	38	35	40	60	62	46	29	679

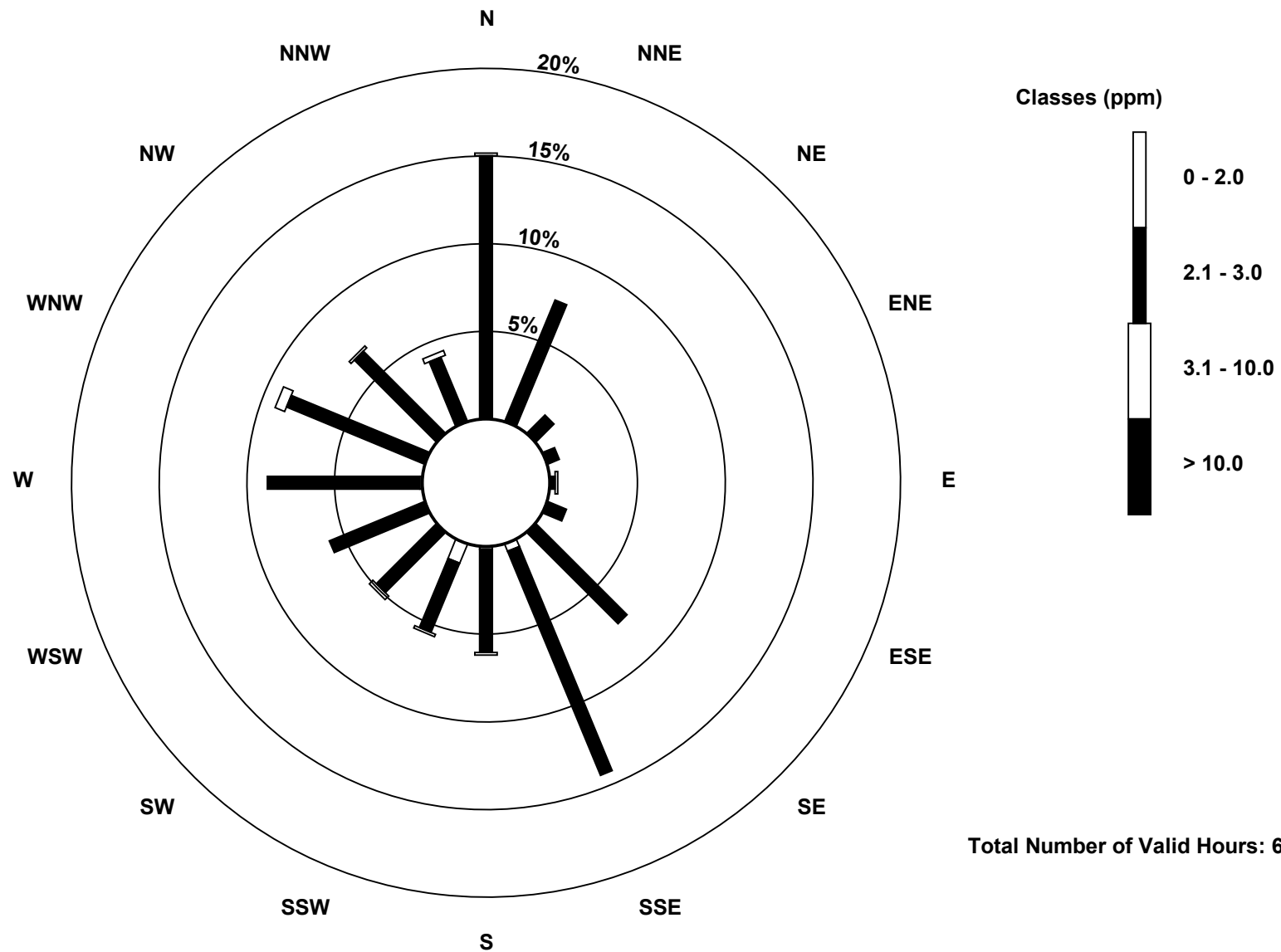
Total Number of Valid Hours: 679

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

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



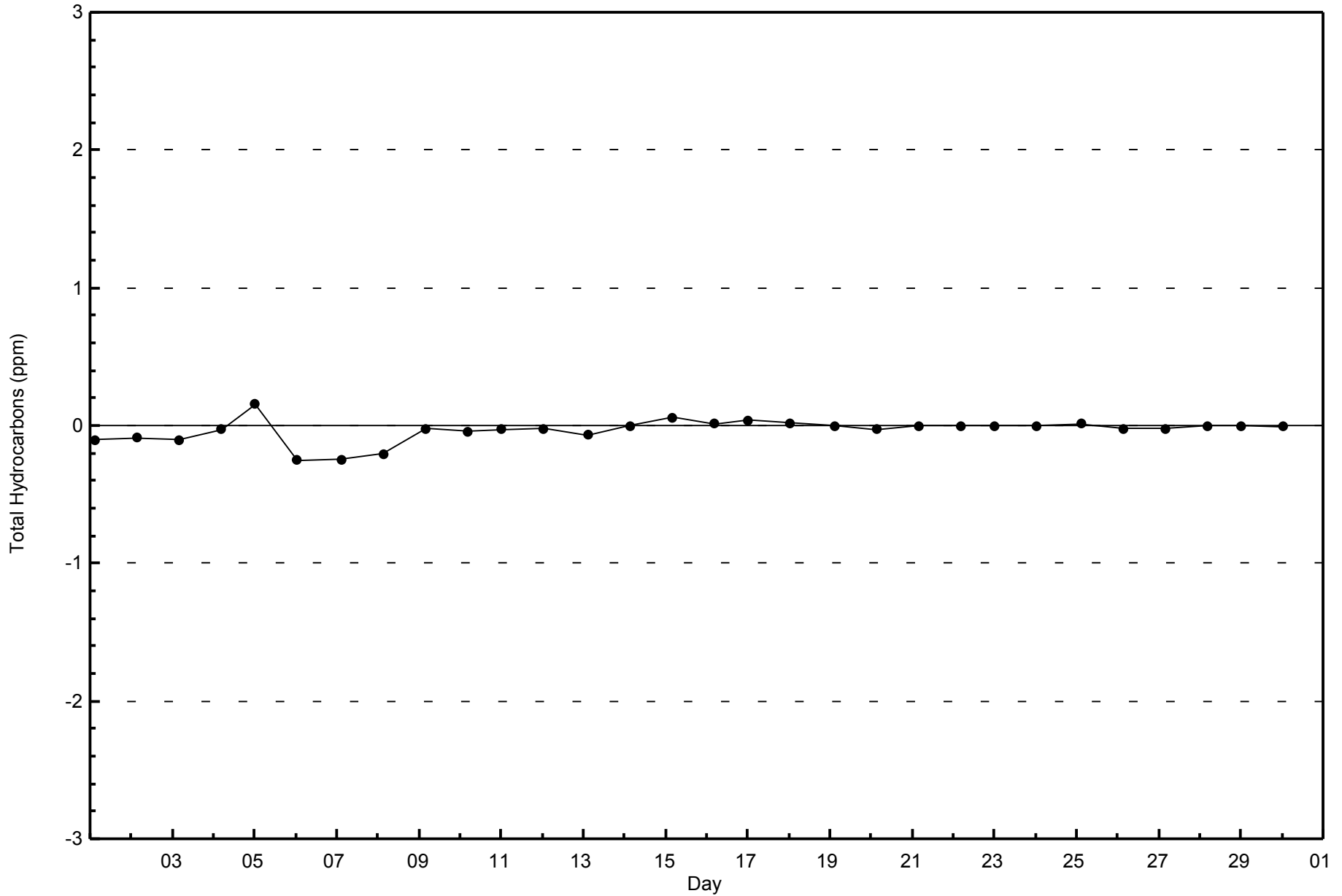


WBEA

Zero Responses

Total Hydrocarbons (THC) - ppm

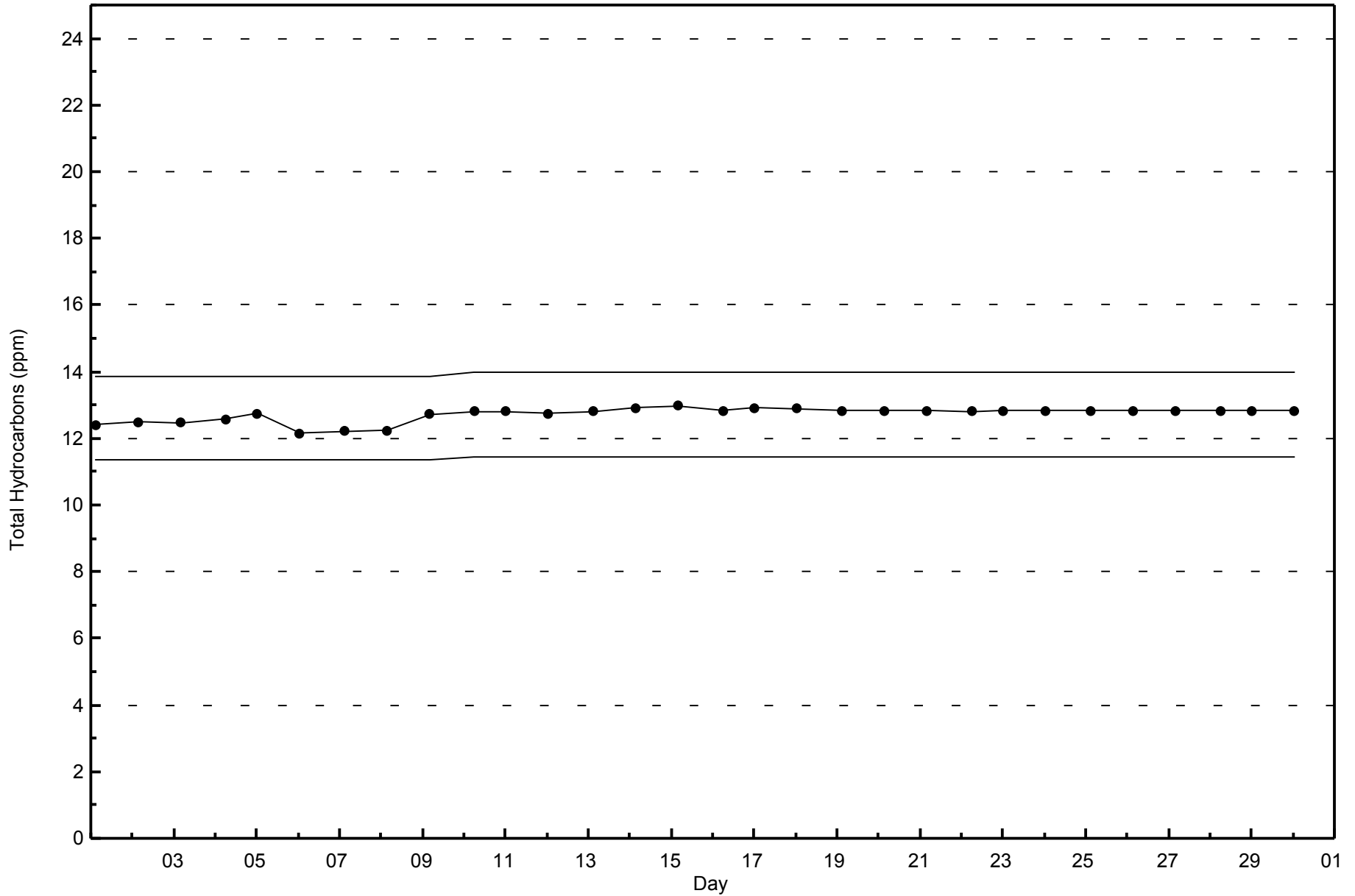
Buffalo Viewpoint - June 2015





WBEA
Span Responses

Total Hydrocarbons (THC) - ppm
Buffalo Viewpoint - June 2015





Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

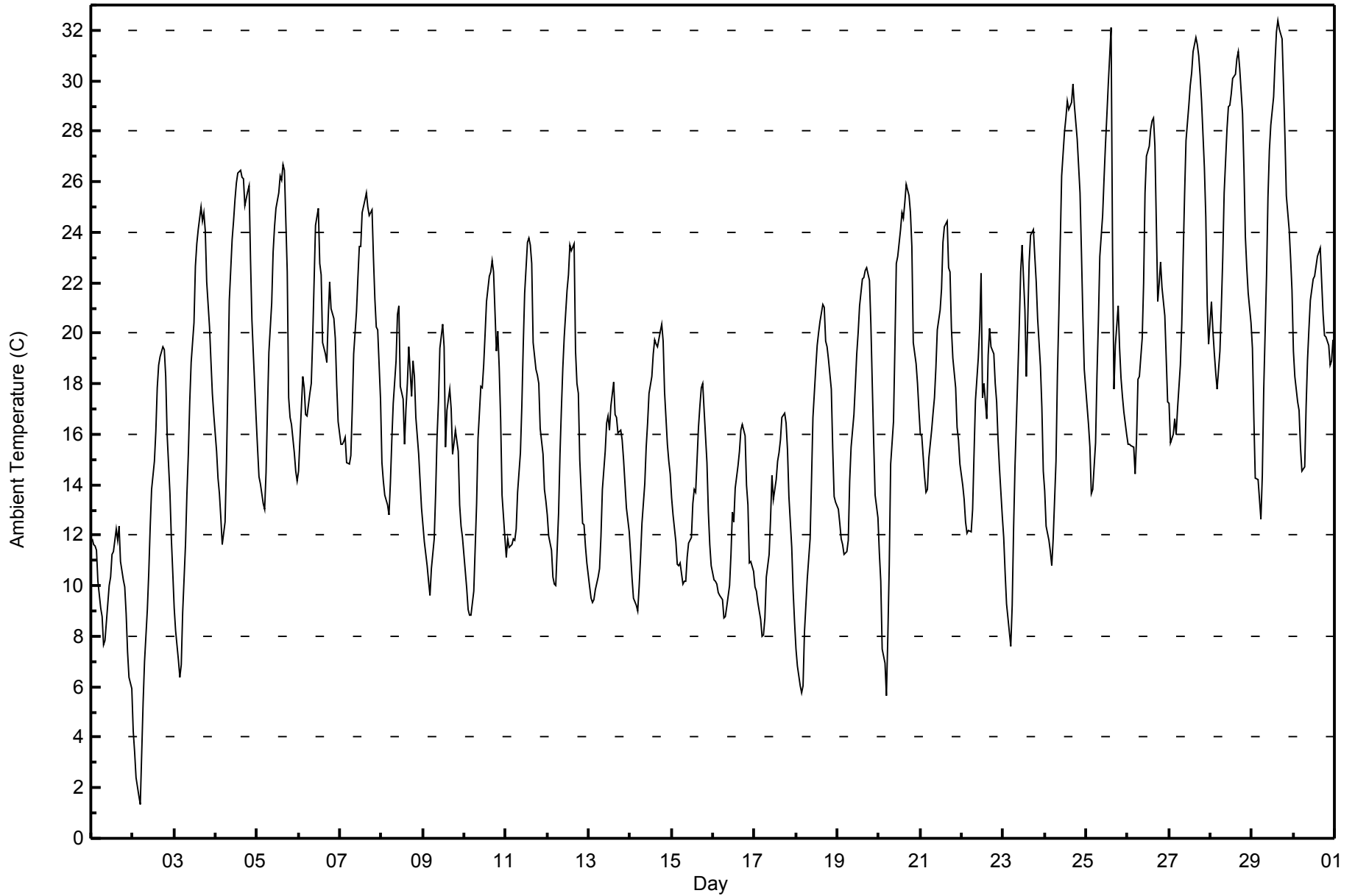
Buffalo Viewpoint - June 2015

Maximum Value: 32.4 C on Jun 29 16:00																				Maximum Daily Average: 24.9 C on Jun 28					Hours in Service: 720																							
Minimum Value: 1.4 C on Jun 2 05:00																				Minimum Daily Average: 9.9 C on Jun 1					Hours of Data: 720																							
Maximum Diurnal Average: 22.5 C at hour 16																				Minimum Diurnal Average: 11.1 C at hour 5					Hours of Missing Data: 0																							
Monthly Average: 17.33 C																				Percentiles: P ₁ = 5.6 P ₁₀ = 10.0 Q ₁ = 12.8 Median = 17.0 Q ₃ = 21.1 P ₉₀ = 25.4 P ₉₉ = 31.3					Hours of Calibration: 0																							
																									Percent Operational Time: 100.0																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jun	11.9	11.6	11.6	11.4	10.2	9.1	8.8	7.7	7.8	9.3	10.0	10.3	11.2	11.4	12.3	11.8	12.4	11.0	10.2	10.0	8.9	7.4	6.4	5.9	9.9	12.4																						
2-Jun	4.3	3.4	2.4	1.7	1.4	3.4	5.3	7.0	9.1	10.5	12.3	13.8	14.9	16.1	17.9	18.7	19.1	19.4	19.3	18.3	16.0	13.7	11.9	10.5	11.3	19.4																						
3-Jun	9.1	8.2	7.0	6.4	6.9	8.9	11.7	13.6	15.2	17.3	18.9	20.4	22.7	23.5	24.1	25.0	24.4	24.8	24.1	22.1	20.2	18.9	17.6	16.8	17.0	25.0																						
4-Jun	15.3	14.3	13.6	12.7	11.6	12.5	14.9	18.0	21.3	23.7	24.5	25.3	26.0	26.3	26.4	26.2	26.1	25.1	25.6	25.8	22.9	20.5	19.2	16.6	20.6	26.4																						
5-Jun	15.4	14.3	14.1	13.3	13.0	14.5	16.9	19.2	21.2	23.2	24.2	24.9	25.6	26.2	26.1	26.7	26.4	22.4	17.4	16.7	16.4	15.3	14.5	14.1	19.3	26.7																						
6-Jun	14.5	15.8	18.3	17.8	16.8	16.8	17.6	18.0	19.8	22.1	24.3	24.9	22.8	22.3	19.6	19.2	18.8	20.6	22.0	21.0	20.6	19.8	17.9	16.5	19.5	24.9																						
7-Jun	15.6	15.6	15.7	15.9	14.9	14.8	15.2	17.0	19.2	20.9	22.2	23.4	23.4	24.8	25.3	25.6	25.0	24.7	24.9	23.0	21.4	20.3	20.2	17.4	20.3	25.6																						
8-Jun	14.9	14.1	13.6	13.2	12.8	14.1	15.8	17.2	18.9	20.8	21.1	17.9	17.4	15.6	17.0	18.0	19.5	17.5	18.9	18.3	16.7	15.2	14.1	13.1	16.5	21.1																						
9-Jun	12.4	11.8	10.8	10.2	9.6	10.7	11.8	13.7	15.9	17.3	19.4	20.4	19.4	15.5	16.9	17.8	17.0	15.2	15.7	16.2	15.3	13.2	12.4	11.9	14.6	20.4																						
10-Jun	10.6	9.9	9.0	8.8	8.9	9.8	11.5	13.3	15.8	17.9	17.8	18.7	20.0	21.3	22.3	22.5	22.9	22.5	19.3	20.1	18.6	16.6	13.6	11.9	16.0	22.9																						
11-Jun	11.1	11.9	11.5	11.6	11.8	11.8	12.3	13.7	15.2	17.1	19.5	21.6	23.6	23.7	23.5	22.8	19.6	18.6	18.3	18.0	16.2	15.2	13.8	13.3	16.5	23.7																						
12-Jun	12.8	12.0	11.4	10.3	10.1	10.0	12.9	15.2	17.0	18.6	19.8	21.7	22.3	23.5	23.3	23.5	19.3	18.0	17.6	15.0	12.5	12.4	11.6	10.9	15.9	23.5																						
13-Jun	9.9	9.5	9.3	9.5	9.9	10.4	10.7	12.0	13.8	15.3	16.4	16.7	16.2	17.1	18.1	16.8	16.7	16.1	16.1	15.8	15.0	14.1	13.1	12.1	13.8	18.1																						
14-Jun	11.2	10.3	9.5	9.2	9.0	10.0	11.1	12.5	14.0	15.5	16.4	17.6	18.3	19.2	19.8	19.6	19.5	20.1	20.3	19.7	17.7	15.6	14.9	14.4	15.2	20.3																						
15-Jun	13.5	12.8	11.7	10.9	10.8	10.9	10.1	10.2	10.2	11.1	11.7	11.9	13.3	13.8	13.7	16.3	17.1	17.8	18.0	17.0	14.9	12.9	11.6	10.8	13.0	18.0																						
16-Jun	10.2	10.2	10.1	9.7	9.6	9.4	8.7	8.8	9.2	10.0	11.3	12.9	12.5	13.9	14.7	15.3	16.2	16.4	15.9	14.0	13.2	10.9	10.9	10.6	11.9	16.4																						
17-Jun	10.0	9.8	9.4	8.7	8.0	8.1	8.7	10.4	11.2	12.6	14.4	13.4	14.2	14.9	15.3	15.8	16.6	16.8	16.4	15.4	13.5	11.5	9.8	8.6	12.2	16.8																						
18-Jun	7.5	6.8	6.0	5.7	6.0	8.2	10.3	11.1	11.9	14.2	16.7	18.6	19.5	20.0	20.5	21.1	21.0	19.7	19.5	19.0	17.8	15.4	13.6	13.3	14.3	21.1																						
19-Jun	13.0	12.5	11.9	11.6	11.2	11.3	11.8	14.1	15.5	16.8	17.9	19.2	20.0	21.1	22.1	22.2	22.5	22.6	22.1	20.3	18.0	15.7	13.6	12.7	16.7	22.6																						
20-Jun	11.3	10.2	7.5	6.9	5.7	8.0	10.8	14.8	16.5	19.5	22.8	23.0	24.1	24.8	24.6	25.2	25.9	25.4	24.8	23.4	19.6	18.8	18.0	16.9	17.9	25.9																						
21-Jun	16.0	15.9	14.3	13.7	13.8	15.0	16.2	16.9	17.5	18.6	20.2	20.9	21.7	23.6	24.2	24.4	22.6	22.4	20.2	19.0	17.8	16.3	15.8	14.8	18.4	24.4																						
22-Jun	14.0	13.4	12.5	12.1	12.2	12.1	13.0	15.2	17.3	19.0	20.3	22.4	17.4	18.0	16.6	19.2	20.2	19.5	19.2	18.0	17.3	15.8	14.7	12.8	16.3	22.4																						
23-Jun	11.9	10.5	9.3	8.2	7.6	9.2	12.3	14.8	18.4	20.3	22.4	23.5	20.9	18.3	20.5	22.8	23.9	24.1	23.1	22.0	20.6	18.7	17.1	14.5	17.3	24.1																						
24-Jun	13.8	12.4	11.8	11.4	10.8	11.9	14.9	18.3	20.7	23.6	26.2	27.9	28.5	29.2	28.8	29.1	29.9	29.0	28.4	27.7	25.6	23.2	20.7	18.6	21.8	29.9																						
25-Jun	17.1	16.4	15.5	13.7	13.8	15.7	18.3	20.5	23.0	24.7	26.1	27.4	28.6	29.8	32.1	23.4	17.8	19.5	21.1	19.4	18.2	17.5	16.9	16.0	20.5	32.1																						
26-Jun	15.6	15.6	15.5	15.5	14.4	15.8	18.2	18.3	19.8	22.0	25.6	27.0	27.4	28.1	28.4	28.5	27.4	21.3	22.0	22.8	21.8	20.7	19.0	17.3	21.2	28.5																						
27-Jun	17.2	15.7	16.0	16.6	16.0	17.0	18.8	20.4	23.0	25.5	27.6	29.0	29.8	30.3	31.2	31.7	31.5	31.0	30.2	29.2	26.6	24.6	21.1	19.6	24.1	31.7																						
28-Jun	21.3	20.2	19.3	18.5	17.8	19.3	21.0	23.0	25.5	28.1	29.0	29.0	29.5	30.1	30.2	30.9	31.1	30.5	28.7	26.5	23.8	22.6	21.6	20.4	24.9	31.1																						
29-Jun	19.4	16.7	14.3	14.2	13.4	12.6	14.4	17.8	22.3	25.4	27.2	28.3	29.4	30.8	31.9	32.4	32.0	31.7	29.8	27.8	25.4	24.1	23.0	21.7	23.6	32.4																						
30-Jun	19.3	18.3	17.3	17.0	15.5	14.6	14.7	17.1	19.0	20.2	21.3	22.1	22.3	22.7	23.0	23.4	22.0	20.7	19.9	19.9	19.5	18.7	18.9	19.8	19.5	23.4																						
																								13.3	12.7	12.0	11.5	11.1	11.9	13.3	15.0	16.8	18.7	20.2	21.2	21.4	21.9	22.3	22.5	22.1	21.5	21.0	20.0	18.4	16.9	15.6	14.5	Diurnal Average
																								21.3	20.2	19.3	18.5	17.8	19.3	21.0	23.0	25.5	28.1	29.0	29.0	29.8	30.8	32.1	32.4	32.0	31.7	30.2	29.2	26.6	24.6	23.0	21.7	Diurnal Maximum



WBEA
Hourly Averages

Ambient Temperature (AT) - C
Buffalo Viewpoint - June 2015





WBEA
Cumulative Frequency Distribution

Ambient Temperature (AT) - C
Buffalo Viewpoint - June 2015

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	71	9.86	9.86
10 - 20	427	59.31	69.17
> 20	222	30.83	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

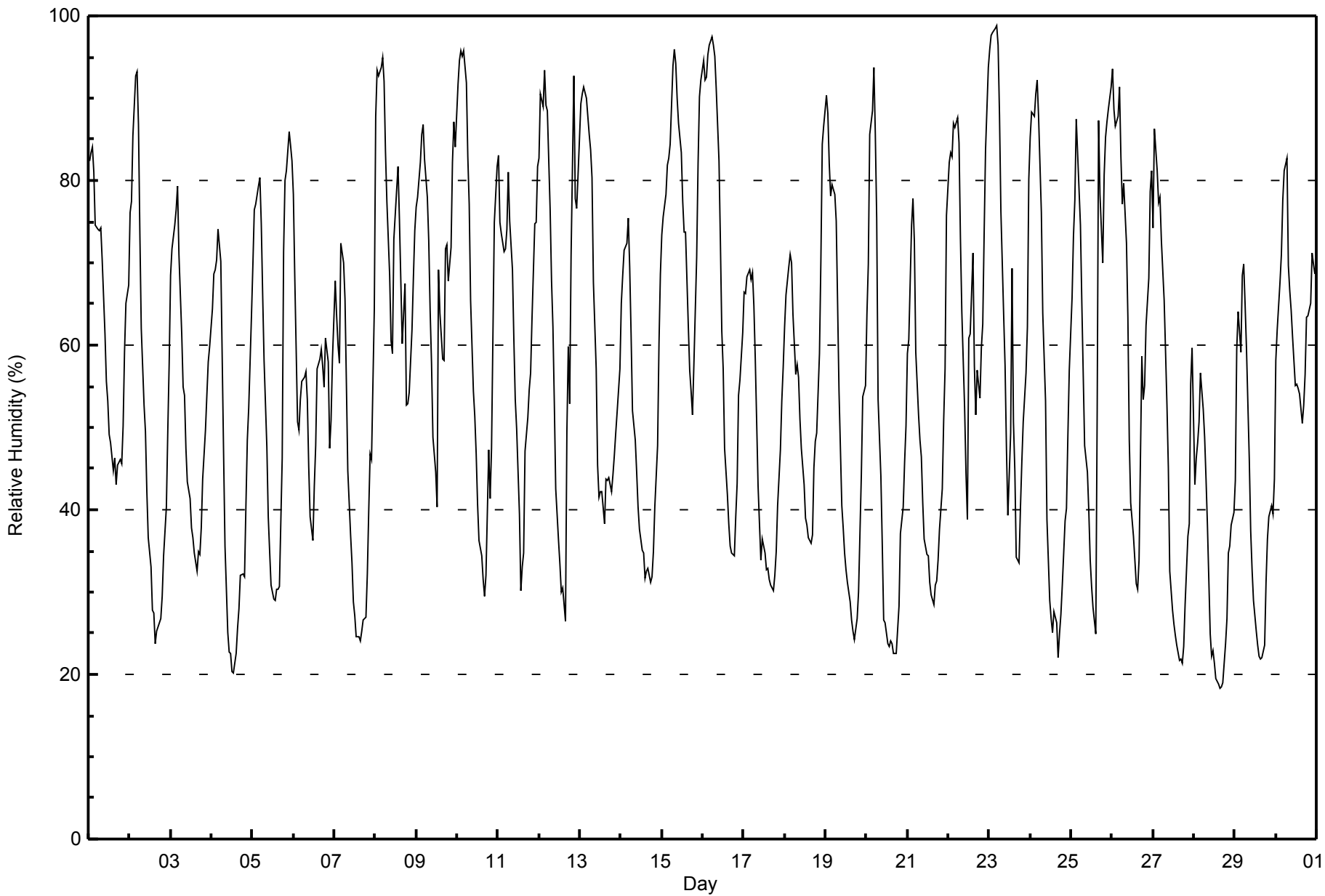
**Relative Humidity (RH) - %
Buffalo Viewpoint - June 2015**

Maximum Value: 99 % on Jun 23 05:00																		Maximum Daily Average: 77.6 % on Jun 15																		Hours in Service: 720													
Minimum Value: 18 % on Jun 28 16:00																		Minimum Daily Average: 33.8 % on Jun 28																		Hours of Data: 720													
Maximum Diurnal Average: 80.9 % at hour 5																		Minimum Diurnal Average: 36.9 % at hour 16																		Hours of Missing Data: 0													
Monthly Average: 56.8 %																		Percentiles: P ₁ = 21 P ₁₀ = 29 Q ₁ = 38 Median = 57 Q ₃ = 74 P ₉₀ = 87 P ₉₉ = 96																		Hours of Calibration: 0													
																																				Percent Operational Time: 100.0													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jun	82	83	84	81	75	74	74	74	70	61	56	53	49	48	45	46	43	45	46	46	50	59	65	67	61.6	84																							
2-Jun	76	77	85	93	93	87	74	62	53	50	42	37	33	28	27	24	25	26	27	29	34	40	49	58	51.2	93																							
3-Jun	68	72	75	77	79	71	61	55	54	47	43	41	38	37	35	33	35	35	38	44	50	54	58	60	52.4	79																							
4-Jun	64	69	69	70	74	70	59	47	36	25	23	20	20	23	26	28	32	32	32	40	49	52	64	43.6	74																								
5-Jun	70	76	77	79	80	75	66	58	48	39	35	31	29	29	30	30	31	46	71	80	81	86	84	82	59.0	86																							
6-Jun	78	68	51	50	53	56	56	57	53	45	39	36	43	48	57	58	59	57	55	61	58	47	51	58	54.0	78																							
7-Jun	68	63	60	58	72	70	66	55	45	37	34	29	27	25	24	24	25	27	27	32	40	47	46	64	44.4	72																							
8-Jun	88	93	93	94	95	92	84	77	69	61	59	73	79	82	75	68	60	68	53	53	54	62	68	74	73.8	95																							
9-Jun	77	78	82	86	87	83	78	73	64	58	49	45	40	69	64	58	58	72	72	68	72	82	87	84	70.2	87																							
10-Jun	92	95	96	95	96	92	83	77	65	54	51	47	41	36	34	31	29	32	47	41	48	61	75	82	62.5	96																							
11-Jun	83	75	74	71	72	74	81	75	69	61	53	50	39	30	33	35	47	51	55	57	63	75	75	82	61.6	83																							
12-Jun	83	90	89	93	89	88	76	68	62	53	43	36	33	30	30	26	50	60	53	71	93	78	77	81	64.7	93																							
13-Jun	89	91	91	91	90	86	84	80	68	57	45	42	42	42	38	44	44	44	42	44	47	49	52	57	60.8	91																							
14-Jun	65	69	71	72	75	70	61	52	48	45	40	38	35	35	32	32	33	31	32	35	40	48	60	69	49.5	75																							
15-Jun	73	76	78	82	83	84	94	96	94	90	87	83	78	74	74	62	57	54	52	58	71	82	90	92	77.6	96																							
16-Jun	95	92	93	95	96	97	97	95	91	82	72	62	57	47	42	38	36	35	34	39	43	54	56	61	67.1	97																							
17-Jun	66	66	68	69	68	69	65	58	43	38	34	36	35	33	33	31	31	30	32	35	41	47	53	57	47.5	69																							
18-Jun	62	66	69	71	70	64	56	58	56	51	48	43	39	38	37	36	37	45	48	49	59	70	84	87	56.0	87																							
19-Jun	90	88	82	78	79	78	75	65	54	40	38	35	33	31	29	27	25	24	27	30	37	44	54	55	50.8	90																							
20-Jun	64	70	86	88	94	86	75	53	44	36	27	26	24	23	24	24	23	23	25	28	37	40	46	50	46.5	94																							
21-Jun	59	61	75	78	73	59	51	48	46	41	36	35	34	31	30	28	31	31	34	38	43	51	57	76	47.7	78																							
22-Jun	82	83	83	87	87	88	85	73	64	52	44	39	61	61	71	57	52	57	54	60	63	74	84	94	68.9	94																							
23-Jun	96	98	98	98	99	96	88	76	64	57	47	39	49	69	51	45	34	34	40	46	51	57	62	80	65.6	99																							
24-Jun	85	88	88	91	92	88	76	64	58	53	39	29	27	25	28	26	22	25	27	31	39	40	49	57	51.9	92																							
25-Jun	66	73	78	87	83	75	65	57	48	45	40	34	31	28	25	52	87	78	70	81	85	87	89	91	64.7	91																							
26-Jun	94	89	87	88	91	83	77	80	72	63	48	41	37	34	31	30	34	59	53	55	62	68	79	81	64.0	94																							
27-Jun	74	86	81	77	78	73	65	59	53	45	33	28	26	25	24	22	22	21	23	28	37	38	55	60	47.2	86																							
28-Jun	43	46	48	51	57	52	49	44	38	25	22	23	21	20	19	18	18	19	24	27	35	36	38	40	33.8	57																							
29-Jun	43	59	64	59	68	70	65	60	46	37	33	29	25	24	22	22	22	24	31	36	39	40	40	44	41.8	70																							
30-Jun	58	62	68	71	78	81	83	70	67	64	61	55	55	55	54	51	53	56	63	64	65	71	70	69	64.3	83																							
																								74.5	76.8	78.1	79.4	80.9	77.7	72.3	65.5	58.1	50.5	44.0	40.5	39.4	39.2	38.0	36.9	38.3	41.4	42.9	46.6	52.5	57.9	63.5	69.2	Diurnal Average	
																								96	98	98	98	99	97	97	96	94	90	87	83	79	82	75	68	87	78	72	81	93	87	90	94	Diurnal Maximum	



WBEA
Hourly Averages

Relative Humidity (RH) - %
Buffalo Viewpoint - June 2015





Maximum Speed: 37 km/h on Jun 13 12:00	Maximum Daily Speed Average: 23.6 km/h on Jun 13	Hours in Service: 720
Minimum Speed Value: 1 km/h on Jun 2 05:00	Minimum Daily Speed Average: 1.1 km/h on Jun 12	Hours of Data: 720
Maximum Diurnal Speed Average: 5.8 km/h at hour 16	Minimum Diurnal Speed Average: 0.6 km/h at hour 23	Hours of Missing Data: 0
Monthly Average Velocity: 2.8 km/h 313.1 deg	Percentiles: P ₁ = 1 P ₁₀ = 4 Q ₁ = 6 Median = 9 Q ₃ = 13 P ₉₀ = 19 P ₉₉ = 31	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	W11	W12WNW13	NW21	NW27WNW26WNW25WNW25	NW25	NW26WNW26WNW21WNW25WNW23	NW24	NW25	NW24	NW23	NNW20	NW16WNW11	W8	W8	W10											NW19.2	NW27
2-Jun	NW3	N5	SW3	NW4	ENE1	NNE4	SW3	SSE4	ESE6	SSE5	SE5	ESE8	ESE9	ESE11	SE9	S9	SE9	SE10	SE11	SE11	SE9	SE8	S7	SSE8	SE4.9	SE11	
3-Jun	SE6	SSE7	SSE6	SSE7	SSE5	SE5	SSE7	SE9	SE10	SE10	SE13	SE13	SSE13	SE12	SSE12	S13	SSE13	SSE12	SSE14	SSE15	SSE11	SSE11	SSE10	SSE10	SSE10.0	SSE15	
4-Jun	SSE10	SE10	SE11	SSE10	SSE10	SSE10	SSE11	SSE9	S8	S11	S14	S12	SSE14	SSE13	S14	S14	S14	S10	SSE9	SSW9	SSW21	SSW16	SSE8	SSE11	S11.1	SSW21	
5-Jun	SSE11	SE10	SSE11	SE10	SSE9	SE9	SSE11	S12	S16	SSW15	S16	S17	SSW16	SSW14	SSW14	SSW13	SSW12	W19	SSE14	SSE10	SSE8	SSE11	SSE11	SSE10	S10.9	W19	
6-Jun	SSE12	S8WSW15WSW17	SW12	WSW9	W11	W13	W12	W10WNW11	W9	SSW7	SSW9	SSW11	SW14	SSW11	S7	SSE5	S4	WSW4	WNW9	W9	SW4				SW7.9	WSW17	
7-Jun	SW5	WSW6	W8	NW17	W9	W9	W11WNW13WNW13WNW15WNW14WNW20	NW21WNW19WNW19	W17WNW17WNW12WNW11	WSW5	SW6	SSW6	WNW8	WSW4	WNW11.1	NW21									WNW11.1	NW21	
8-Jun	SE5	S6	S8	S7	SSE7	S4	W11WNW11WNW11	NW9	WNW9	SSW1	SW12	N9	ENE10	SE5	ENE2	NW18	NW28	NNW24	NW23	NW16	NW13	NW15			NW6.2	NW28	
9-Jun	NW14	NW16	NW15	WNW8	SW5	W9	WSW6	W8WNW10	WNW7	NW6	NW6	W8	NNE20	NNE13	N11	WNW8	NW14	W6	W7	NW3	N6	N10	NNE7	NW7.1	NNE20		
10-Jun	N8	NW8	NW7	WNW4	WNW4	WNW4	WNW4	NNW3	NNE5	N6	NW6	WNW7	NW6	NNW8	N9	NNE6	NE6	SW3	SW11	SSE5	SE5	SSE5	SSE7	SSE6	NW2.1	SW11	
11-Jun	SSE7	SSE8	SSE7	SSE11	SSE8	SSE5	SE8	SSE9	SE11	SSE11	SE9	SE6	SW11	SW17	SSW15	W13	W7	S7	SE9	SE8	SSE8	SSW6	E6	SE10	SSE6.7	SW17	
12-Jun	NNW5	NNW10	WNW5	SSW5	S6	SSE5	WSW10	W5	WNW8	W6	W5	NW7	WNW7	NW10	WSW6	WNW7	SE16	SE14	SE8	ENE10	N12	ENE14	ENE14	NE12	NNW1.1	SE16	
13-Jun	NE13	NE10	NNE14	N13	N15	NNW17	NW16	N25	N28	N32	N36	N37	N34	N31	N36	NNE31	N33	NNE32	NNE29	N28	NNE20	N18	N19	NNE12	N23.6	N37	
14-Jun	ENE8	NE8	NNE8	NNE9	N9	N18	N21	N20	N21	N23	N25	N23	N22	N24	N26	N23	N20	N17	NNW16	N14	N12	NNW4	N16	NNE15	N16.1	N26	
15-Jun	NNE12	NNE16	NNE17	NNE15	N12	NNE11	NNE10	NNE7	NNE8	NNE8	NNE6	NNE5	NE3	NNW3	WSW2	WNW5	W6	SW5	SW6	S7	SSE5	SE8	SSE8	SSE8	NNE3.9	NNE17	
16-Jun	WSW1	N13	NNE12	N16	N11	N13	N19	N18	N17	N19	N18	N20	N19	N18	N21	N20	NNW19	N18	N16	N14	N13	N10	N9	N15	N15.2	N21	
17-Jun	N13	N17	NNW13	NNW15	NNW16	NNW12	N19	N18	N19	N18	N11	WNW9	WNW7	NW4	SW4	SE5	SSW4	SSW4	SSE7	SSE10	SSE10	SSE10	SSE10	SSE10	N4.6	N19	
18-Jun	SSE11	SE12	SE12	SE13	SE11	SSE11	SSE12	SSE10	SSE10	SSE9	SE7	ESE6	SSW6	SE4	SSE6	SSE4	SSE6	SSW6	SE3	ESE4	SSW6	WSW15	SW7	WSW8	SSE6.9	WSW15	
19-Jun	WNW10	NNW14	N21	N21	N19	N19	N16	N17	N17	N19	N20	N16	NNE10	N11	N10	NNW12	N15	N14	N10	NNE9	NNE10	NNE7	NNE10	NNE9	N13.5	N21	
20-Jun	N5	NW6	S4	WSW3	S3	SW2	WSW1	WNW2	SW5	W3	N6	N8	N12	N9	NW7	NNE9	N10	NNE6	N7	N10	NNE12	NNE12	NNW3	NNE7	N4.5	N12	
21-Jun	N8	N13	NNE8	N7	N13	NNE13	N11	N9	NNE8	N7	NNW9	NW8	NNW7	N11	N13	NNW13	N11	N14	NNE15	N12	N12	WNW7	WSW7	WSW8	N8.9	NNE15	
22-Jun	WSW5	WSW6	WSW7	W8	W7	SSW5	SW5	WSW8	WNW8	WNW6	WNW7	N5	NNW11	WSW1	SW11	W14	W16	NW18	NW6	NE4	E4	SE3	S3	S6	W5.0	NW18	
23-Jun	SSW3	SSE6	SSE6	SSE7	SSE8	SE7	SE5	S6	SSW3	SW4	W5	WSW6	NNW19	NNW12	NE2	S8	S4	SSW4	SSE5	SSE7	SSE6	S7	S7	SE8	S3.3	NNW19	
24-Jun	SSE4	S6	S6	SSE7	SSE10	SSE9	SSE7	SSE6	SE7	SSE7	SW8	W12	WSW12	W13	SW12	SW9	WSW9	SW11	N8	SSW3	WSW1	NNE14	NNE14	NNE9	SSW3.1	NNE14	
25-Jun	NW5	SW3	SSW3	W2	NNW7	NNE2	N4	NNW5	N4	NW5	WNW4	ESE6	SSW4	W2	N10	NW12	NNW5	NE9	W1	S6	SW6	S4	S6	SSE5	NW1.4	NW12	
26-Jun	SE5	SSE8	SSE7	SW3	S7	SSE5	SSE5	SE6	SSW4	SW3	W11	W16	W19	W19	W21	W23	W21	W19	W12	WSW12	WSW10	W7	SW6	S5	WSW8.1	W23	
27-Jun	S4	SSE5	SSW4	W9	SW6	SSW6	SSW6	SW6	SSW6	SSW6	SW7	SW7	W14	W14	W13	WNW13	WSW12	WSW15	W9	SW7	SSW8	SW9	S8	S6	SW6.9	WSW15	
28-Jun	W7	W10	W9	WSW5	SSW4	W8	WNW7	WNW9	NW13	NW23	NW19	WNW22	WNW25	WNW24	WNW23	NW23	NW22	NW20	NNW19	NW16	WNW10	WNW11	WNW12	NW8	NW13.7	WNW25	
29-Jun	WNW6	SSW5	SSE8	SSE7	SSE6	SSE7	SSE7	SSE5	WSW5	WSW7	WSW7	SW8	SW8	W7	WNW7	WNW7	W5	WSW4	SE5	NNE5	NNE12	NE13	NE10	NNE7	SW1.3	NE13	
30-Jun	N6	NNE7	NNW5	WNW4	SW4	SSW4	S6	WSW5	W7	WNW5	WNW2	WSW2	S4	SW2	E2	N6	NNE12	NNE9	WNW9	W5	SE5	SE8	WSW12	WSW12	WNW2.1	WSW12	

NNW0.7	NW1.5	NNW1.0	NNW2.3	NNW1.2	NW1.6	NW2.2	NW3.2	NW3.8	NW4.6	NW4.9	NW4.8	NNW5.5	NW5.5	NW4.8	NW5.8	NW4.7	NW4.9	NNW3.2	N1.6	NNW1.0	NNW0.6	NW0.6	ESE0.7			Diurnal Average
NW14	N17	N21	WNW21	NW27	WNW26	WNW25	WNW25	N28	N32	N36	N37	N34	N31	N36	NNE31	N33	NNE32	NNE29	N28	NW23	N18	N19	NNE15			Diurnal Maximum

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



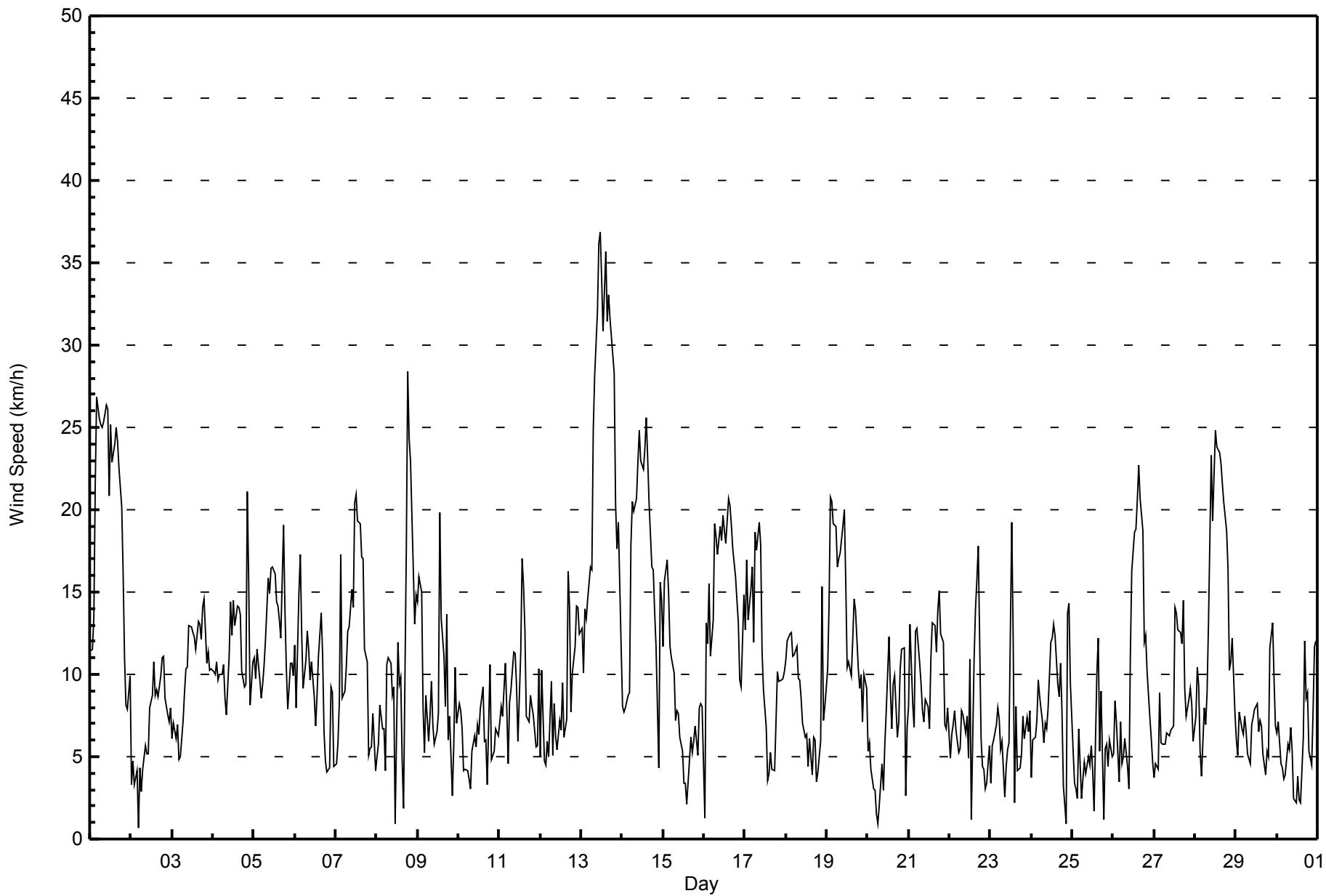
Summary of Hour Standard Deviations

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 10 km/h on Jun 9 14:00 Minimum Value: 0 km/h on Jun 18 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: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	3	3	5	4	5	6	5	6	5	6	6	5	6	6	5	6	5	5	5	4	2	1	1	1	6
2-Jun	3	3	1	2	2	2	2	2	2	2	2	3	4	3	4	3	4	3	3	3	2	1	1	1	4
3-Jun	1	1	1	1	2	1	2	3	3	3	4	4	4	4	4	4	4	4	4	4	2	2	2	2	4
4-Jun	2	2	2	2	2	2	3	2	2	4	5	4	5	5	5	5	5	4	3	3	8	5	3	3	8
5-Jun	2	2	2	2	3	2	3	3	4	4	5	5	5	5	4	4	3	7	5	4	2	2	2	2	7
6-Jun	2	2	5	4	3	4	3	3	3	3	3	5	5	3	3	6	5	1	1	1	2	2	1	1	6
7-Jun	1	1	3	7	2	1	2	3	3	3	4	7	5	5	5	5	5	3	3	1	1	3	4	3	7
8-Jun	1	2	2	1	1	2	4	3	3	3	3	4	3	7	5	2	2	7	6	5	7	3	3	3	7
9-Jun	2	3	3	2	2	3	3	2	3	2	3	3	5	10	4	4	3	5	3	1	1	2	2	2	10
10-Jun	2	2	1	2	1	1	1	1	2	2	2	2	2	3	3	2	3	3	5	1	1	1	1	1	5
11-Jun	1	2	2	2	2	4	3	2	3	3	3	2	4	5	4	7	3	4	3	2	2	4	4	3	7
12-Jun	4	2	3	2	1	2	4	3	2	2	2	3	2	3	3	4	7	4	4	4	3	4	4	4	7
13-Jun	3	2	3	3	3	4	3	6	7	7	7	8	8	7	7	7	7	7	7	6	4	3	3	4	8
14-Jun	2	2	2	2	5	3	4	4	5	5	6	6	6	6	6	6	5	4	4	3	4	2	3	4	6
15-Jun	4	3	4	3	3	2	2	2	2	2	2	2	1	1	2	2	2	2	2	2	1	1	1	1	4
16-Jun	6	3	3	3	3	3	4	3	4	4	3	4	4	5	5	6	4	4	5	3	2	2	6	3	6
17-Jun	3	3	3	4	4	3	3	3	4	4	4	4	3	3	3	2	2	2	2	3	2	2	2	2	4
18-Jun	2	2	2	2	2	3	3	3	3	3	2	2	3	2	2	2	3	3	1	0	5	4	5	2	5
19-Jun	2	3	4	4	4	4	3	3	4	5	5	4	4	4	5	4	4	3	3	3	2	2	4	1	5
20-Jun	3	2	2	2	2	2	2	1	1	2	2	4	4	4	3	4	3	3	2	3	2	6	3	1	6
21-Jun	3	2	3	2	2	2	2	2	2	3	2	3	3	4	5	5	4	4	3	2	2	1	1	2	5
22-Jun	1	2	2	2	2	1	2	2	2	2	2	3	8	2	2	4	4	7	3	2	1	1	1	1	8
23-Jun	1	1	1	1	1	1	2	2	2	2	3	3	9	9	3	2	2	2	2	1	1	1	1	2	9
24-Jun	2	2	1	1	2	1	2	2	2	2	3	4	4	4	4	3	3	3	5	2	1	7	3	2	7
25-Jun	2	1	2	2	1	2	1	2	2	2	2	3	2	2	3	7	4	5	2	3	4	2	2	1	7
26-Jun	2	2	3	2	3	2	2	2	2	1	4	5	5	5	6	6	8	6	3	3	3	1	1	2	8
27-Jun	2	2	2	3	2	1	2	2	1	2	2	4	5	4	4	4	4	4	3	2	1	1	1	3	5
28-Jun	3	4	2	2	2	2	2	2	3	4	5	5	6	6	6	5	5	5	4	4	1	2	2	3	6
29-Jun	2	1	2	1	1	1	1	1	2	2	2	2	3	3	3	3	2	1	1	3	2	2	2	4	4
30-Jun	2	2	2	1	1	1	1	2	2	1	1	1	1	1	1	3	2	3	5	2	2	2	5	3	5
																	Diurnal Maximum								



WBEA
Hourly Averages

Wind Speed (WS) - km/h
Buffalo Viewpoint - June 2015





WBEA
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Buffalo Viewpoint - June 2015

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	140	19.44	19.44
6 - 11	336	46.67	66.11
12 - 19	179	24.86	90.97
20 - 28	55	7.64	98.61
29 - 38	10	1.39	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



WBEA
Frequency Distribution

Wind Speed (WS) - km/h
Buffalo Viewpoint - June 2015

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	5	5	3	2	2	1	13	18	9	17	16	15	9	11	6	8	140
6 - 11	30	27	4	3	1	7	31	72	26	16	18	17	32	33	14	5	336
12 - 19	47	18	3	2	0	0	8	11	10	8	5	9	18	11	15	14	179
20 - 28	20	2	0	0	0	0	0	0	0	1	0	0	3	13	14	2	55
29 - 38	7	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	109	55	10	7	3	8	52	101	45	42	39	41	62	68	49	29	720

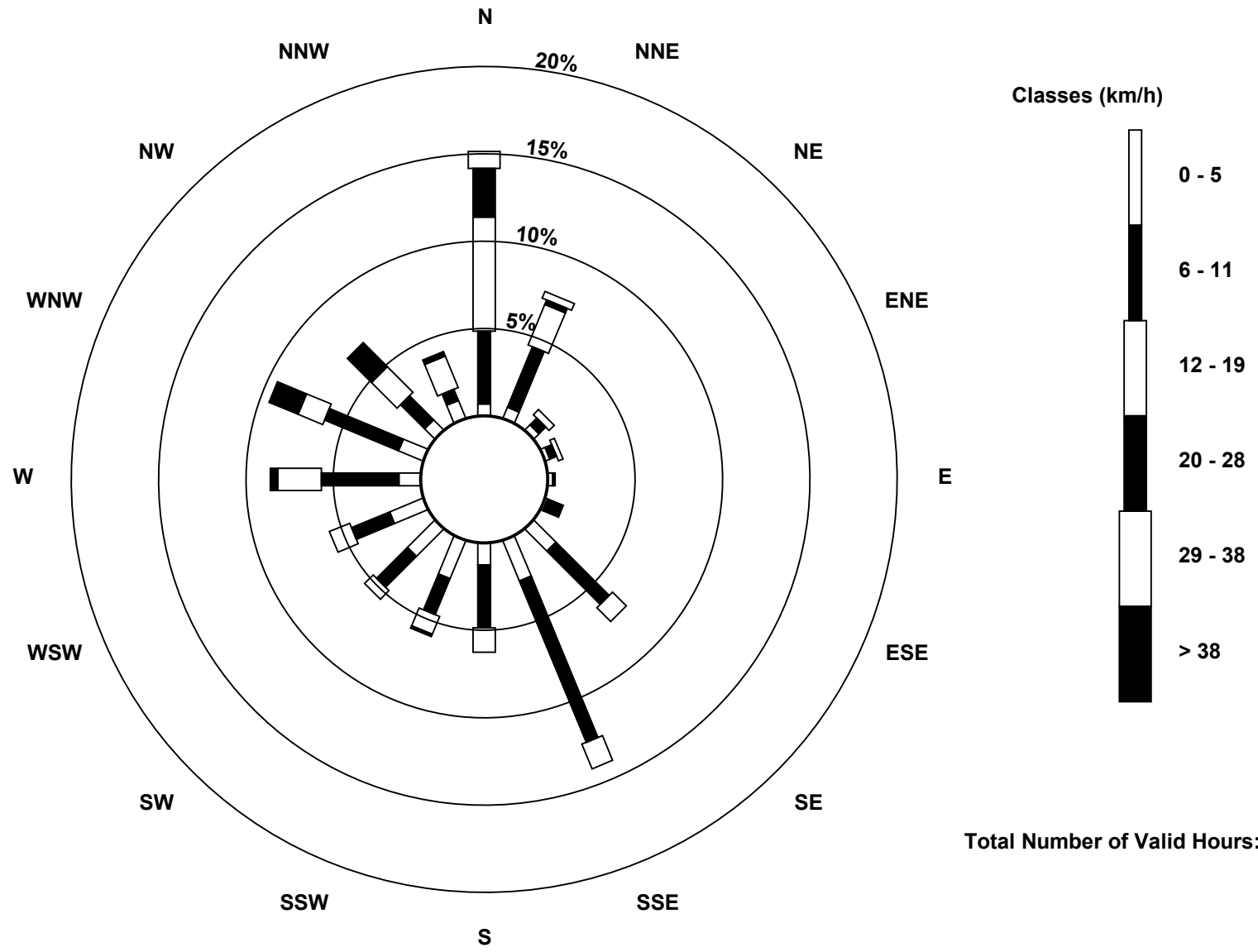
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

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





Wood Buffalo Environmental Association

Summary of Hour Averages

**Wind Direction (WD) - deg
Buffalo Viewpoint - June 2015**

Direction of Maximum Speed: 358 deg on Jun 13 12:00 Direction of Maximum Daily Speed Average: 6.3 deg on Jun 13	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0
Direction of Minimum Speed: 72 deg on Jun 2 05:00 Direction of Minimum Daily Speed Average: 1.1 deg on Jun 12	Percent Operational Time: 100.0
Monthly Average Direction: 269.7 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	279	270	292	304	307	303	299	298	305	308	302	294	295	298	315	326	319	322	327	323	298	270	275	275	303.9
2-Jun	317	5	231	316	72	14	222	167	115	153	128	118	114	107	142	174	141	124	132	130	136	144	170	154	135.5
3-Jun	144	151	166	148	151	145	152	143	133	133	133	134	154	142	165	169	156	166	161	150	148	152	147	158	150.3
4-Jun	154	146	145	160	159	154	154	155	174	189	177	170	164	152	175	176	182	174	151	192	192	203	163	152	169.3
5-Jun	153	145	147	146	147	145	155	171	189	193	188	185	193	195	200	208	204	260	167	147	162	161	156	159	177.9
6-Jun	163	186	238	240	223	249	259	263	262	270	287	275	205	196	207	232	209	190	166	169	258	285	269	227	235.0
7-Jun	222	249	267	310	279	270	274	284	282	285	290	300	305	283	284	281	290	287	296	246	214	212	289	251	283.0
8-Jun	141	186	171	182	150	183	262	292	300	305	287	203	216	350	71	126	61	316	324	328	323	326	315	312	306.7
9-Jun	305	308	315	282	225	264	241	272	294	293	308	313	265	21	14	2	298	322	280	273	310	354	358	16	315.2
10-Jun	7	316	313	291	302	284	282	330	33	9	310	293	304	344	0	19	35	230	217	153	143	162	151	160	321.1
11-Jun	150	155	158	153	157	149	128	162	140	149	140	136	225	225	203	261	264	172	127	125	158	212	94	127	167.4
12-Jun	339	300	291	195	180	168	253	277	288	279	278	314	296	312	257	289	126	139	133	66	0	58	63	56	342.8
13-Jun	40	34	12	5	0	344	320	350	1	3	9	358	10	11	6	14	10	12	12	8	15	8	3	19	6.3
14-Jun	69	55	23	31	0	355	2	5	358	3	355	0	4	358	0	359	356	358	345	350	358	333	7	15	2.3
15-Jun	12	12	13	14	9	17	19	13	19	15	21	23	40	329	257	282	271	231	233	190	166	138	147	152	14.9
16-Jun	256	350	29	359	360	1	9	357	2	2	2	359	358	355	359	354	346	353	350	358	4	10	358	11	359.3
17-Jun	7	354	344	334	340	328	357	358	3	1	10	293	290	323	231	126	208	195	159	158	155	157	153	155	351.5
18-Jun	150	145	144	145	144	147	154	155	159	151	137	118	195	138	147	165	157	203	144	119	198	249	223	238	162.3
19-Jun	299	334	6	8	358	2	0	359	5	11	4	9	19	360	354	346	353	353	4	28	21	27	14	29	2.4
20-Jun	352	313	169	251	170	226	238	289	219	275	11	354	10	7	319	23	355	18	1	11	16	15	338	31	359.2
21-Jun	4	1	14	2	4	15	7	9	21	0	331	305	338	2	349	347	359	356	20	8	8	300	255	248	355.2
22-Jun	257	251	248	271	274	203	215	257	284	294	302	359	282	242	225	265	269	312	321	47	95	132	181	171	269.0
23-Jun	203	168	166	161	149	145	145	178	197	214	267	247	328	335	50	190	183	194	168	165	159	169	186	144	183.2
24-Jun	163	174	171	159	168	163	156	150	136	148	214	260	251	265	227	227	243	220	351	212	242	16	19	16	212.3
25-Jun	326	229	197	279	347	21	359	346	3	325	295	115	192	273	358	317	348	56	281	185	232	170	179	151	321.9
26-Jun	139	152	163	232	182	163	150	139	193	234	269	275	260	264	267	262	266	273	268	247	253	272	217	189	248.0
27-Jun	189	155	199	271	220	197	209	218	198	193	218	227	260	259	276	282	256	257	262	227	209	218	175	175	234.5
28-Jun	272	280	276	240	200	264	286	297	310	326	311	298	297	303	301	314	320	316	337	321	300	292	298	324	304.6
29-Jun	285	207	156	164	161	157	149	157	254	250	246	215	221	276	293	289	273	242	146	33	14	35	53	18	227.1
30-Jun	349	21	334	286	231	198	178	237	281	284	289	238	184	229	98	5	23	23	302	271	136	146	243	257	284.4

329.7 318.5 303.2 300.6 296.0 311.8 304.6 312.3 323.7 325.3 318.3 311.5 294.1 316.3 307.1 305.3 309.3 311.1 329.0 350.5 330.9 290.3 325.6 105.8

Diurnal Average

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



Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

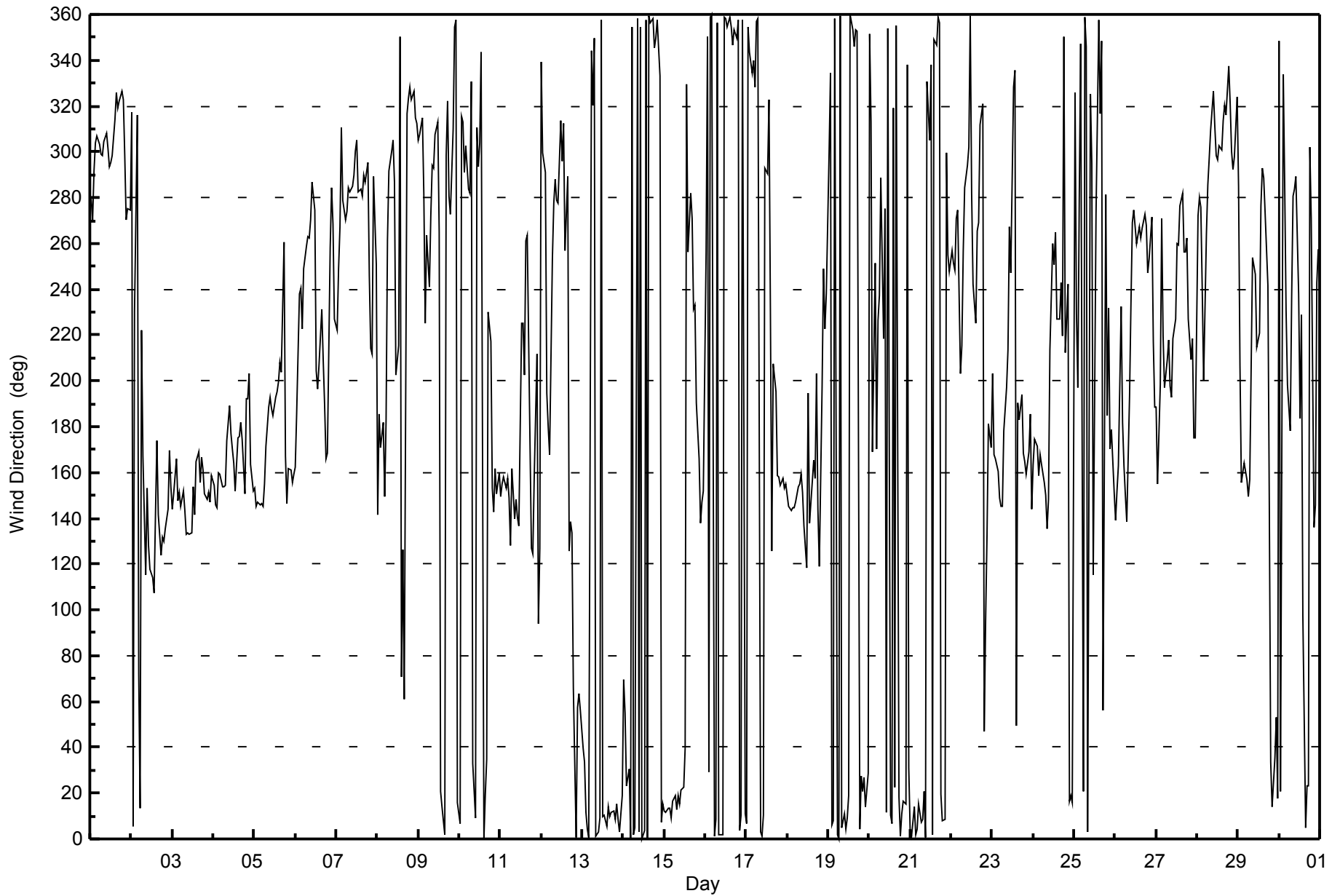
Wind Direction (WD) - deg
Buffalo Viewpoint - June 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0																			Hours in Service: 720						
Maximum Value: 97 deg on Jun 25 14:00																			Hours of Data: 720						
Minimum Value: 6 deg on Jun 15 22:00																			Hours of Missing Data: 0						
Percentiles: P ₁ = 9 P ₁₀ = 14 Q ₁ = 17 Median = 23 Q ₃ = 34 P ₉₀ = 53 P ₉₉ = 85																			Hours of Calibration: 0						
Percent Operational Time: 100.0																									
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	17	16	18	13	13	14	14	15	14	15	17	18	16	17	17	16	19	18	15	15	18	12	10	10	19
2-Jun	81	37	55	47	90	18	70	62	54	57	63	46	38	26	43	37	47	27	26	18	17	14	20	12	90
3-Jun	17	15	17	15	24	22	25	26	25	31	25	27	31	29	38	29	30	27	24	20	18	19	18	19	38
4-Jun	17	15	17	19	18	19	21	24	30	29	28	32	31	34	28	28	29	22	24	25	22	19	24	18	34
5-Jun	19	15	16	18	20	18	20	24	21	23	26	23	28	28	28	23	25	25	30	26	23	17	18	16	30
6-Jun	14	29	18	17	17	28	18	16	20	24	28	29	42	21	19	26	26	20	35	39	53	9	8	37	53
7-Jun	30	14	23	15	18	10	13	16	19	16	23	18	16	20	21	21	17	20	16	32	28	55	56	58	58
8-Jun	34	26	19	18	16	43	26	19	20	33	34	96	28	60	34	43	75	17	13	13	11	11	11	14	96
9-Jun	11	11	12	18	29	20	29	28	21	37	51	52	49	51	29	24	20	15	35	17	60	30	21	17	60
10-Jun	20	19	14	29	29	24	33	55	41	35	49	37	39	38	33	54	46	85	36	27	12	9	14	13	85
11-Jun	11	18	22	20	23	68	43	26	22	21	27	47	30	21	19	46	41	47	22	20	17	63	69	15	69
12-Jun	69	9	83	53	21	38	19	48	24	33	56	35	50	36	60	34	44	23	51	30	18	23	18	19	83
13-Jun	16	20	14	16	14	19	15	17	18	19	17	20	19	17	19	16	20	18	18	19	14	15	16	21	21
14-Jun	21	19	16	18	29	17	18	17	17	20	18	19	21	20	21	22	20	22	21	18	17	41	14	14	41
15-Jun	14	15	13	14	15	14	16	26	16	21	25	28	64	56	70	58	42	51	41	30	26	6	7	7	70
16-Jun	77	31	18	15	16	15	17	16	16	17	16	17	17	23	20	20	20	20	16	16	14	12	23	13	77
17-Jun	15	17	23	18	19	20	16	17	18	18	30	37	52	79	74	59	67	53	35	20	17	16	15	16	79
18-Jun	13	13	14	15	16	21	21	20	22	27	34	41	54	43	34	53	41	32	18	6	46	17	45	29	54
19-Jun	23	18	16	16	16	18	15	17	19	17	19	21	37	27	34	27	18	18	24	17	11	9	19	9	37
20-Jun	34	25	44	49	69	65	73	71	34	68	44	54	26	32	53	35	26	48	24	16	11	52	84	10	84
21-Jun	15	14	17	20	14	12	16	17	28	26	29	38	48	30	29	30	31	17	17	16	15	29	19	18	48
22-Jun	27	25	25	18	17	30	24	25	35	32	28	73	50	95	14	25	19	20	28	41	17	39	35	11	95
23-Jun	31	13	15	22	13	9	29	23	88	53	65	58	33	70	76	32	64	35	19	19	15	18	19	22	88
24-Jun	57	31	18	15	19	13	19	27	25	34	46	29	34	29	27	27	34	25	62	85	85	23	14	12	85
25-Jun	35	39	51	58	27	27	32	34	52	43	64	58	71	97	22	56	63	52	86	52	73	65	20	29	97
26-Jun	28	17	29	49	25	36	32	22	42	66	28	29	23	25	20	19	21	29	22	15	19	21	25	40	66
27-Jun	34	35	40	28	33	21	27	23	25	30	43	52	25	26	27	24	26	21	21	15	8	12	21	36	52
28-Jun	20	16	17	35	46	18	20	18	18	16	17	19	17	19	21	16	17	16	15	10	9	14	16	25	46
29-Jun	30	35	20	15	17	23	14	20	48	32	35	33	30	49	49	49	46	40	23	55	11	13	24	51	55
30-Jun	16	12	24	23	40	33	21	26	22	23	68	80	28	37	57	46	14	19	37	38	40	32	30	20	80
																			81 39 83 58 90 68 73 71 88 68 68 96 71 97 76 59 75 85 86 85 85 65 84 58						
Diurnal Maximum																									



WBEA
Hourly Averages

Wind Direction (WD) - deg
Buffalo Viewpoint - June 2015





Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	June 8, 2015	Last Calibration	May 20, 2015
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Reason:	Routine		
Start Time (MST)	9:45	End Time (MST)	17:10
Gas Cert Reference	LL107926	Station temp.	22 Deg C
Cal Gas Concentration	51 ppm	Cal Gas Exp Date	5/29/2014
Calibrator Make/Model	Sabio 4010	Serial Number	11551008
ZAG Make/Model	API 701	Serial Number	4297
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2636

Analyzer Information

	<i>Before</i>	<i>After</i>		<i>Before</i>	<i>After</i>
Analyzer Range	0 - 1000 ppb		PMT voltage	-592	-592
Analyzer IP address	192.168.1.43		Lamp voltage	836	830
Calculated slope	0.995749	1.005683	Chamber temp	45.0	45.0
Calculated intercept	-0.027297	-2.441654	Pressure	701.2	692.6
Analyzer Background	10.0	10.1	Flow	0.492	0.449
Analyzer Coefficient	0.867	0.867	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	0.1	----
as found span	5000	58.8	599.8	596.3	1.006
calibrator zero	5000	0.0	0.0	0.1	----
high point	5000	58.8	599.8	596.3	1.006
second point	5000	29.4	299.9	305.5	0.982
third point	5000	14.7	149.9	151.4	0.990
as left zero	5000	0.0	0.0	0.3	----
as left span	5000	58.8	599.8	607.7	0.987
Average Correction Factor					0.992

Corrected As found 596.2 Previous response 602.3 % change 1.0%

Notes:

Sample inlet filter changed after as founds. Power outage from 12:45 - 13:45 MST. No adjustments.

Calibration Performed By: Asad Hidayat



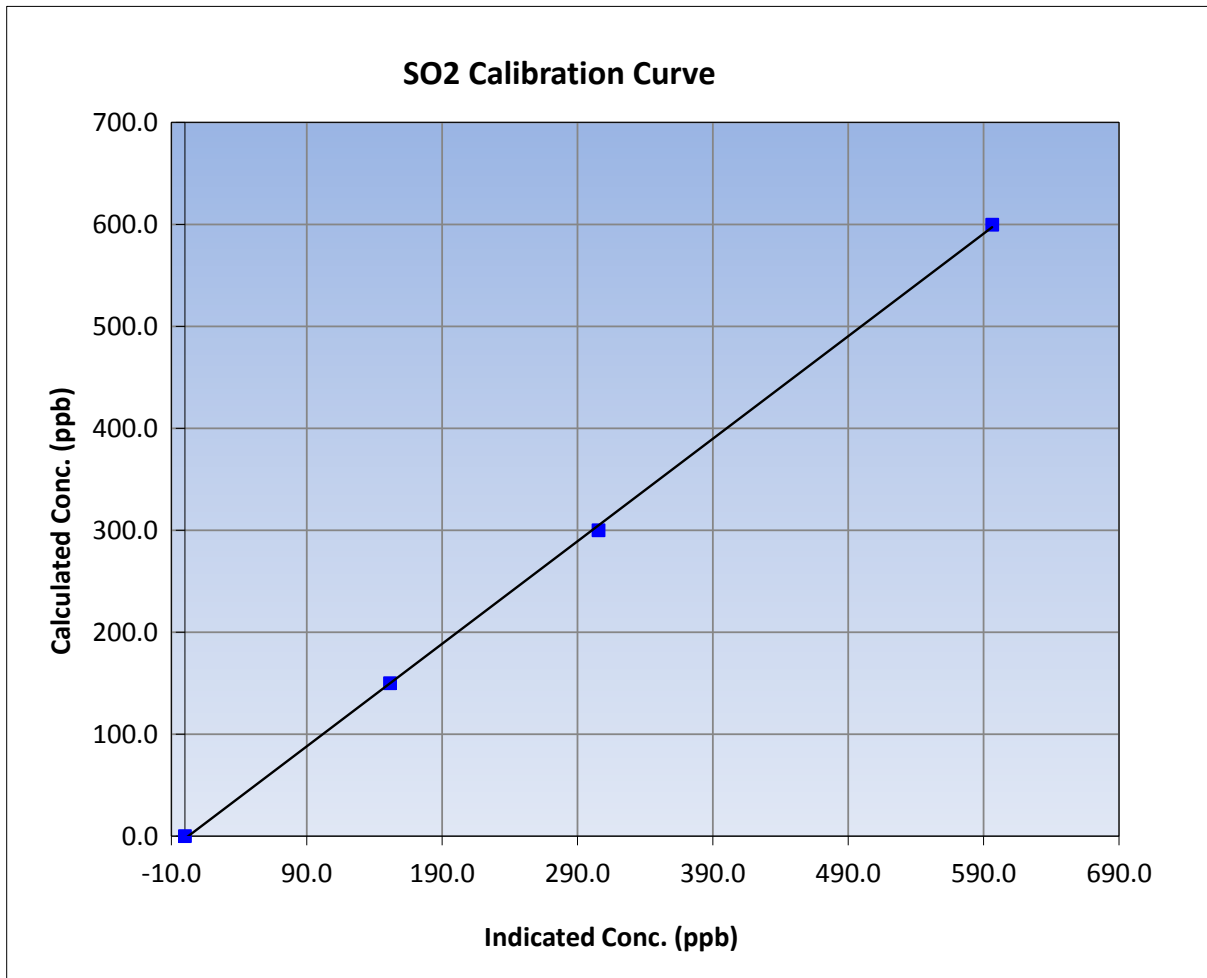
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	June 8, 2015	Previous Calibration	May 20, 2015
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Start Time (MST)	9:45	End Time (MST)	17:10
Analyzer make	TEI 43i	Analyzer serial #	JC1327300932

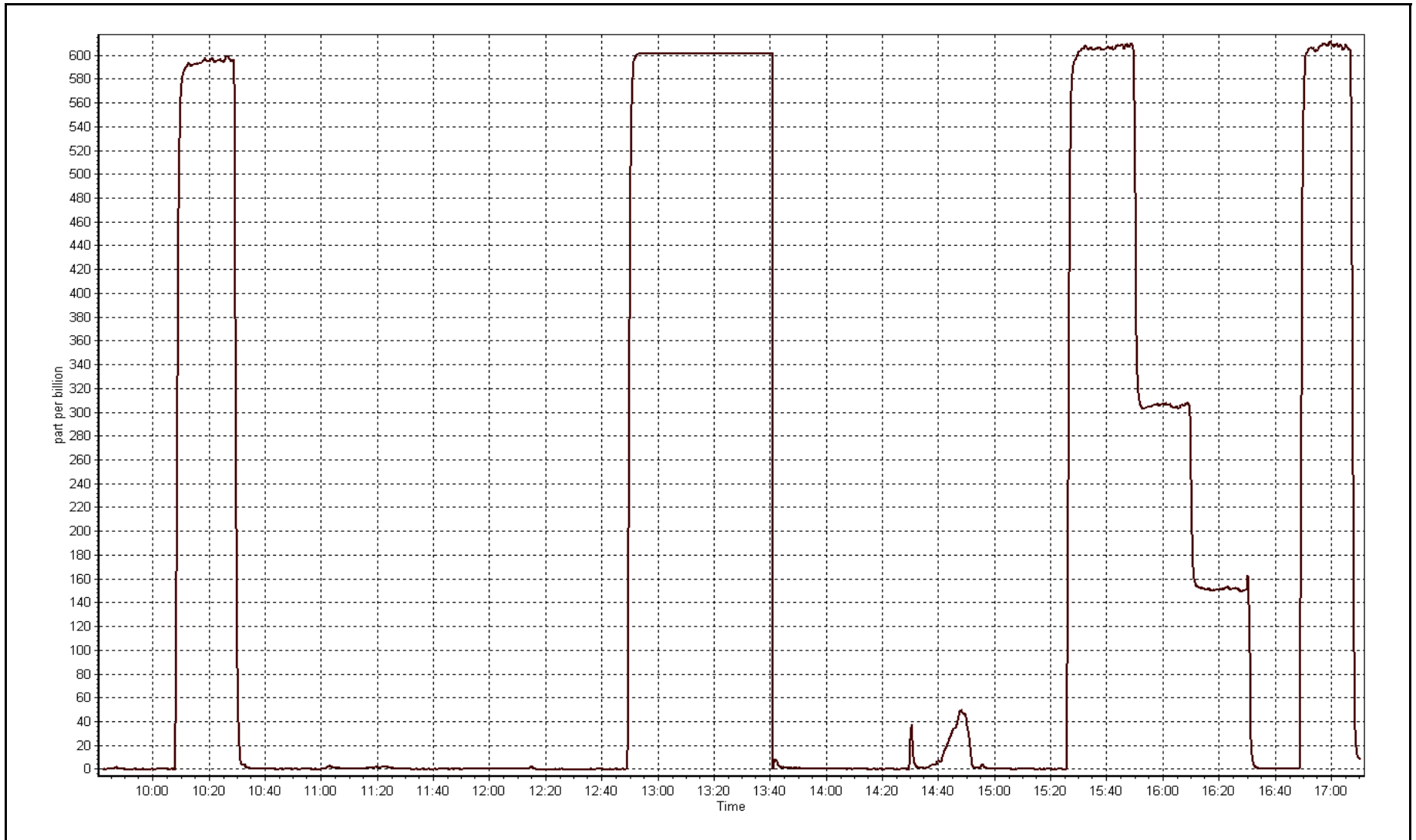
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	0.999815
599.8	596.3	1.0058		
299.9	305.5	0.9815	Slope	1.005683
149.9	151.4	0.9901		
			Intercept	-2.441654



SO2 Calibration Plot

Date: June 8, 2015





Wood Buffalo Environmental Association H2S Calibration Report

Station Information

Calibration Date	June 10, 2015	Last Calibration	May 11, 2015
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Reason:	Routine		
Start Time (MST)	10:30	End Time (MST)	13:05
Gas Cert Reference	LL10590	Station temp.	21 Deg C
Cal Gas Concentration	9.75 ppm	Cal Gas Exp Date	21/12/2012
Calibrator Make/Model	Sabio 4010	Serial Number	11551008
ZAG air Make/Model	API 701	Serial Number	4297
DACS make/model	Campbell Scientific CR3000	Serial Number	2635
SO2 gas concentration	51 ppm	SO2 gas cert/exp	LL107926 5/29/2014

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-616	-617
Analyzer IP address	192.168.1.42		Lamp voltage	871	868
Calculated slope	0.994664	0.987114	Chamber temp	45	45
Calculated intercept	-0.082000	-0.081677	Pressure	556.2	550.5
Analyzer Background	14.1	14.3	Flow	1.057	1.045
Analyzer Coefficient	0.852	0.852	Intensity	94	94
			Converter temp.	332	332
Analyzer make/model	TEI 450i		Analyzer serial #	1336160094	
Converter make/model	NA		Converter serial #	NA	

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6000	0.0	0.0	0.0	----
as found span	6000	46.2	75.1	75.2	0.998
SO2 scrubber check	5000	14.7	149.9	2.0	----
calibrator zero	6000	0.0	0.0	0.0	----
high point	6000	46.2	75.1	76.0	0.988
second point	6000	25.8	41.9	42.8	0.979
third point	6000	15.4	25.0	25.4	0.985
as left zero	6000	0.0	0.0	0.2	----
as left span	6000	46.1	74.9	76.3	0.981
Average Correction Factor					0.984

Corrected As found	75.2	Previous response	75.6	% change	0.5%
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Notes:

Inlet filter changed after as founds. Scrubber check done after as founds. No adjustments.

Calibration Performed By:

Asad Hidayat



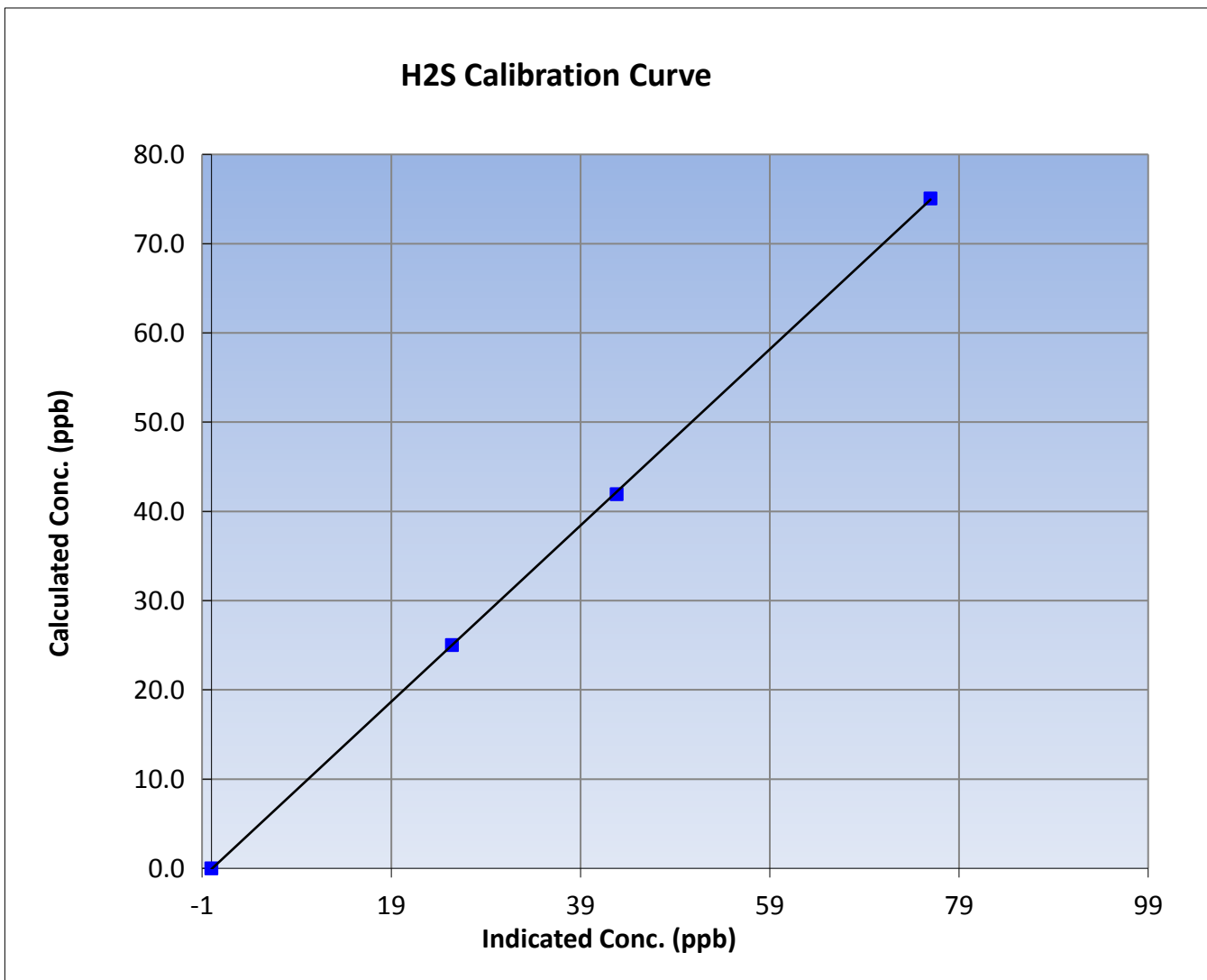
Wood Buffalo Environmental Association H2S Calibration Report

Station Information

Calibration Date	June 10, 2015	Previous Calibration	May 11, 2015
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Start Time (MST)	10:30	End Time (MST)	13:05
Analyzer make	TEI 450i	Analyzer serial #	1336160094

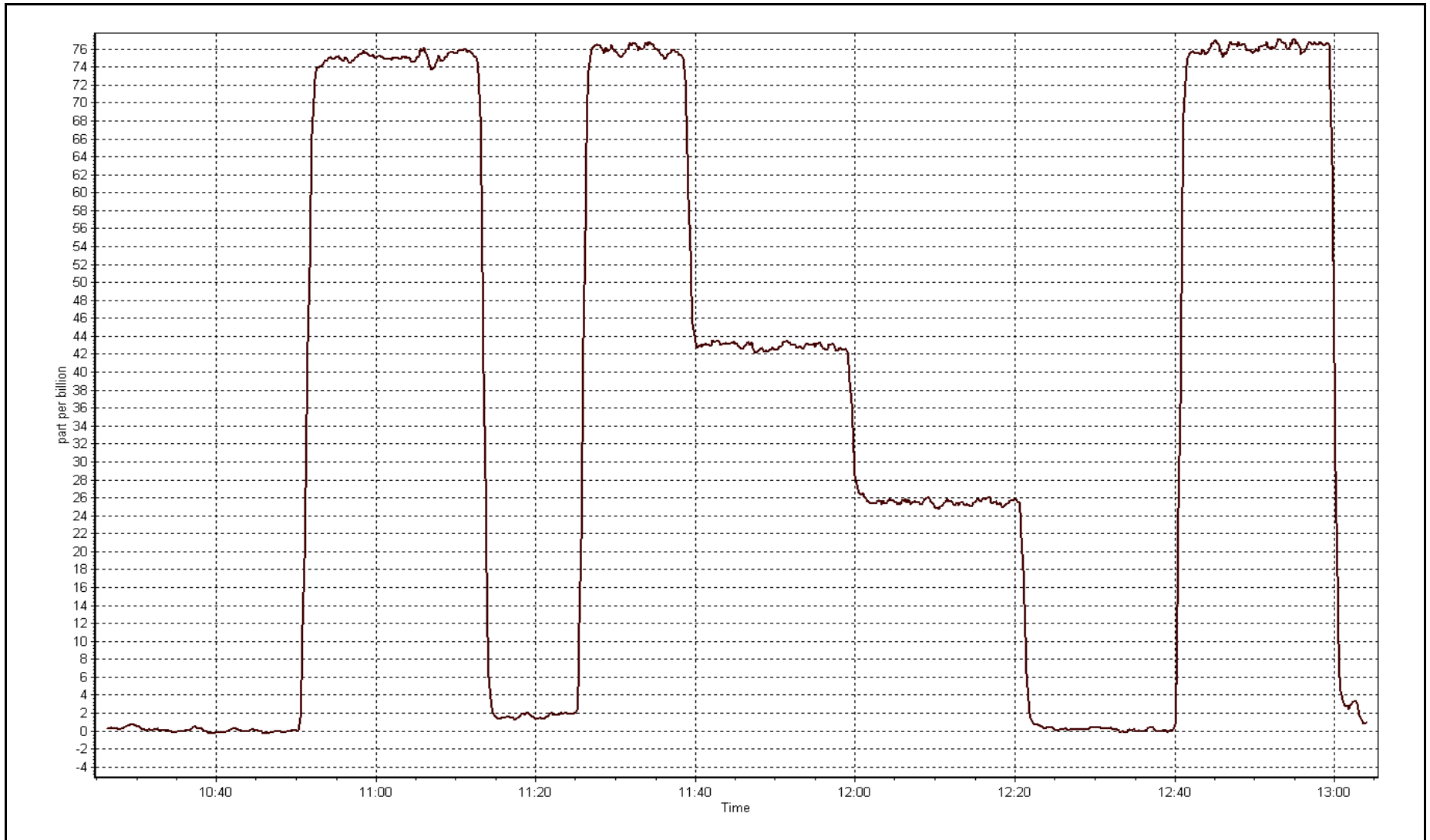
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999968
75.1	76.0	0.9878		
41.9	42.8	0.9791	Slope	0.987114
25.0	25.4	0.9852		
			Intercept	-0.081677



H2S Calibration Plot

Date: June 10, 2015





Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	June-08-15	Last Calibration	May-20-15
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Reason:	Routine		
Start Time (MST)	9:45	End Time (MST)	17:10
Gas Cert Reference	LL107926	Cal Gas Expiry Date	5/29/2014
CH4 Cal Gas Conc.	515 ppm	CH4 Equiv Conc.	1067.8 ppm
C3H8 Cal Gas Conc.	201 ppm	Station temp.	21 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11551008
ZAG make/model	Teledyne API 701	Serial Number	4297
DACS make/model	Campbell Scientific CR3000	Serial Number	2635

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 50 ppm		Sample Pressure	8.5	8.5
Analyzer IP address	192.168.1.51		Air or Bypass Press	30.4	30.4
Calculated slope	1.002631	1.002997	Fuel Pressure	19.8	19.9
Calculated intercept	-0.025910	-0.017895	Analyzer Coeff	4.1	4.2
			Analyzer BKG	1.160	0.970

Analyzer make	TEI 51i-LT	Analyzer serial #	1201650671
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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	-0.12	----
as found span	5000	58.8	12.56	12.32	1.019
calibrator zero	5000	0.0	0.00	0.01	----
high point	5000	58.8	12.56	12.52	1.003
second point	5000	29.4	6.28	6.32	0.993
third point	5000	14.7	3.14	3.13	1.003
as left zero	5000	0.0	0.00	-0.04	----
as left span	5000	58.8	12.56	12.60	0.997
Average Correction Factor					1.000

Corrected As found	12.44	Previous response	12.55	% change	0.9%
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Notes:

THC pump and inlet filter replaced after as founds. Power outage from 12:45-13:45 MST. Adjusted zero and span.

Calibration Performed By:

Asad Hidayat



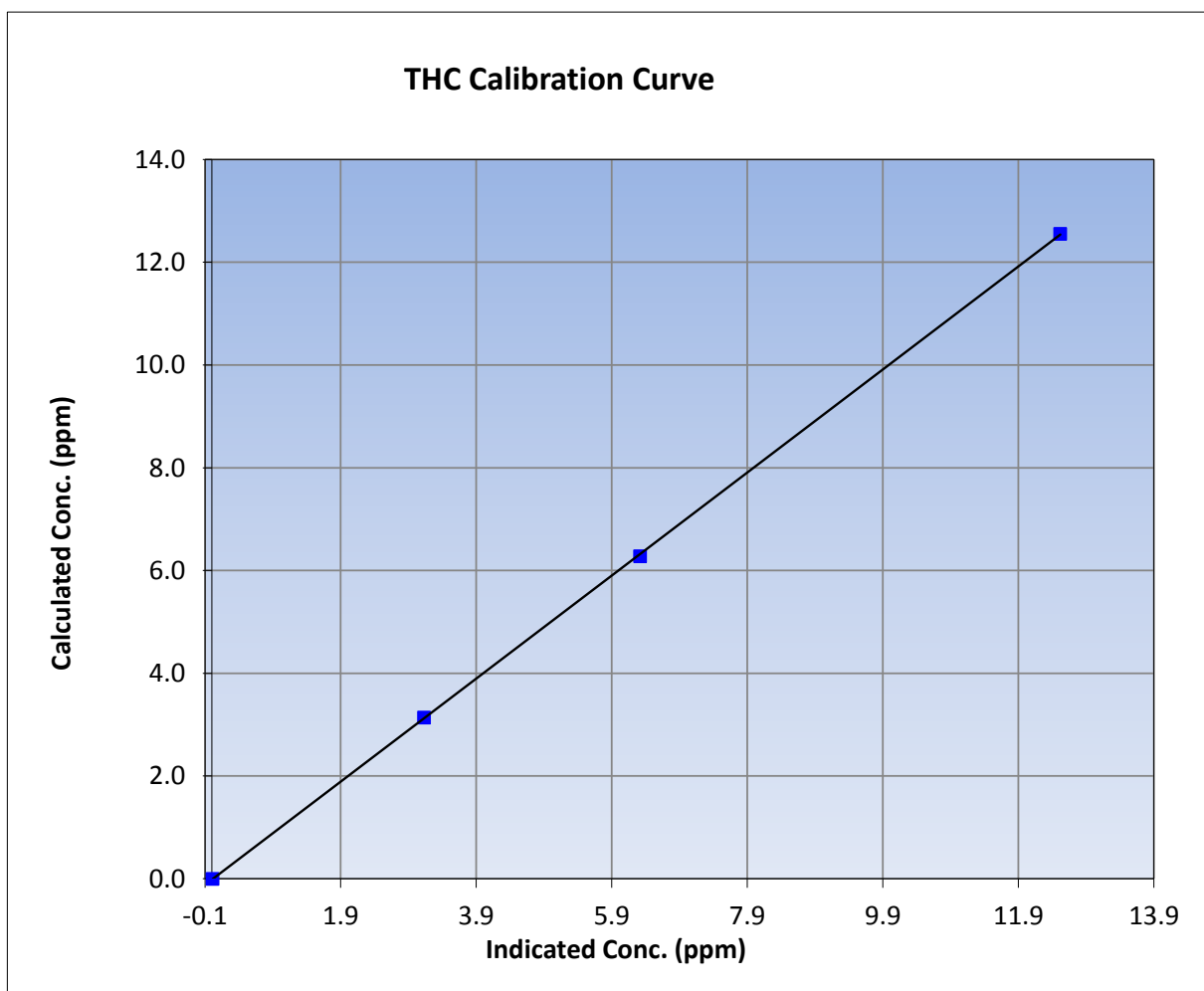
Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	June 8, 2015	Previous Calibration	May 20, 2015
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Start Time (MST)	9:45	End Time (MST)	17:10
Analyzer make	TEI 51i-LT	Analyzer serial #	1201650671

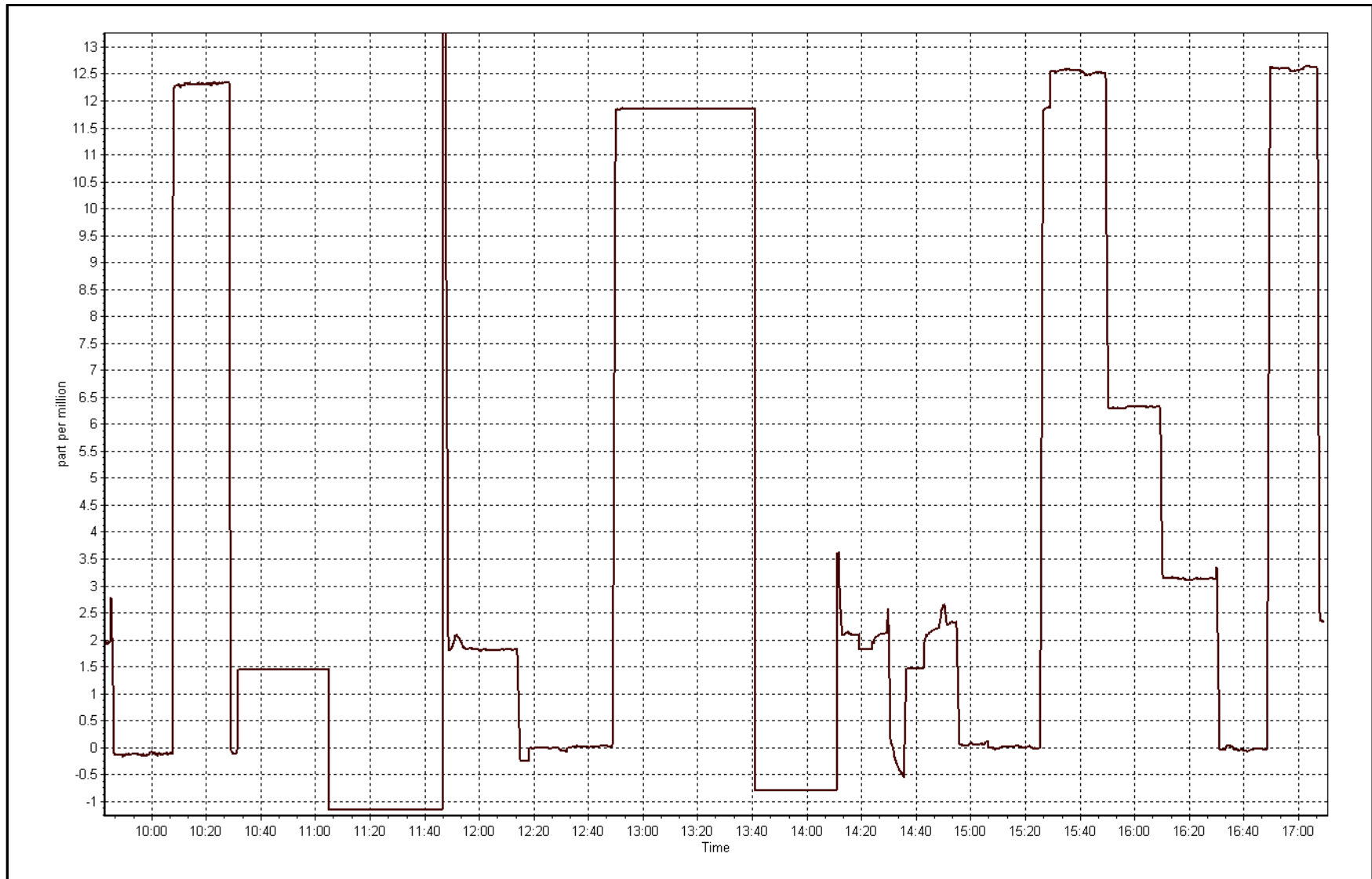
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.01	----	Correlation Coefficient	0.999971
12.56	12.52	1.0029		
6.28	6.32	0.9934	Slope	1.002997
3.14	3.13	1.0029		
			Intercept	-0.017895



THC Calibration Plot

Date: June 8, 2015





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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT

AMS 5 MANNIX JUNE 2015

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

July 30, 2015



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MANNIX (AMS 5)

JUNE 2015

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	684	36	36	100.00	62	0	9	0
H2S (ppb) Average	686	33	34	99.86	11	1	2	0
THC (ppm) Average	684	36	36	100.00	6	-	3.2	-
Temperature 2 m (C) Average	720	0	0	100.00	31.1	-	23.9	-
Temperature 20 m (C) Average	720	0	0	100.00	30.9	-	24.5	-
Temperature 45 m (C) Average	720	0	0	100.00	30.5	-	24.6	-
Temperature 75 m (C) Average	720	0	0	100.00	30.2	-	24.6	-
Temperature 90 m (C) Average	720	0	0	100.00	30.1	-	24.6	-
Relative Humidity 2 m (%) Average	720	0	0	100.00	96	-	77	-
Relative Humidity 20 m (%) Average	720	0	0	100.00	96	-	74	-
Relative Humidity 45 m (%) Average	720	0	0	100.00	96	-	74	-
Relative Humidity 75 m (%) Average	720	0	0	100.00	93	-	75	-
Relative Humidity 90 m (%) Average	720	0	0	100.00	94	-	76	-
Wind Speed 20 m (km/h) Average	720	0	0	100.00	29	-	19	-
Wind Speed 45 m (km/h) Average	720	0	0	100.00	39	-	26	-
Wind Speed 75 m (km/h) Average	720	0	0	100.00	43	-	30	-
Wind Speed 90 m (km/h) Average	720	0	0	100.00	45	-	31	-
Wind Direction 20 m (deg) Average	720	0	0	100.00	-	-	-	-
Wind Direction 45 m (deg) Average	720	0	0	100.00	-	-	-	-
Wind Direction 75 m (deg) Average	720	0	0	100.00	-	-	-	-
Wind Direction 90 m (deg) Average	720	0	0	100.00	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	720	0	0	100.00	1.3	-	0.3	-
Vertical Wind Speed 45 m (km/h) Average	720	0	0	100.00	1.3	-	0.8	-
Vertical Wind Speed 75 m (km/h) Average	720	0	0	100.00	1.3	-	0.3	-
Vertical Wind Speed 90 m (km/h) Average	720	0	0	100.00	4.3	-	3	-

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

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

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile							
					Min	P10	Q1	Median	Q3	P90	Max	
SO2 (ppb) Average	684	2.2	5	-	0	0	0	1	2	6	62	
H2S (ppb) Average	686	0.7	1	-	0	0	0	0	1	2	11	
THC (ppm) Average	684	2.32	0.3	-	1.8	2.1	2.1	2.2	2.4	2.6	6	
Temperature 2 m (C) Average	720	17.24	5.7	-	0.9	10.3	13	16.8	21	25.1	31.1	
Temperature 20 m (C) Average	720	17.38	5.4	-	3.2	10.4	13.5	17	20.9	24.4	30.9	
Temperature 45 m (C) Average	720	17.28	5.3	-	3.9	10.3	13.5	17.2	20.7	24.3	30.5	
Temperature 75 m (C) Average	720	17.23	5.3	-	3.9	10.1	13.7	17.2	20.7	24.3	30.2	
Temperature 90 m (C) Average	720	17.19	5.3	-	3.8	10.1	13.6	17.2	20.6	24.2	30.1	
Relative Humidity 2 m (%) Average	720	57	19	-	21	31	40	57	72	85	96	
Relative Humidity 20 m (%) Average	720	52.7	18	-	18	28	36	53	67	78	96	
Relative Humidity 45 m (%) Average	720	51.3	18	-	18	28	36	51	65	76	96	
Relative Humidity 75 m (%) Average	720	50.6	17	-	18	28	35	50	63	74	93	
Relative Humidity 90 m (%) Average	720	50.6	17	-	19	28	36	50	63	74	94	
Wind Speed 20 m (km/h) Average	720	10.1	6	-	0	4	6	9	13	17	29	
Wind Speed 45 m (km/h) Average	720	14.4	8	-	0	5	9	14	19	24	39	
Wind Speed 75 m (km/h) Average	720	16.3	9	-	0	5	10	16	22	28	43	
Wind Speed 90 m (km/h) Average	720	17.2	9	-	0	6	10	16	24	30	45	
Wind Direction 20 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-	
Wind Direction 45 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-	
Wind Direction 75 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-	
Wind Direction 90 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-	
Vertical Wind Speed 20 m (km/h) Average	720	-0.02	0.3	-	-1	-0.4	-0.2	0	0.2	0.3	1.3	
Vertical Wind Speed 45 m (km/h) Average	720	0.15	0.4	-	-0.9	-0.3	-0.1	0.1	0.5	0.7	1.3	
Vertical Wind Speed 75 m (km/h) Average	720	0.14	0.3	-	-1	-0.3	-0.1	0.1	0.3	0.6	1.3	
Vertical Wind Speed 90 m (km/h) Average	720	0.9	1	-	-1.4	-0.1	0.2	0.7	1.4	2.2	4.3	

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

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
H2S	11 Jun 2015 13:00	11 Jun 2015 13:00	1	Maintenance - sample manifold cleaned



Summary of Hour Averages

Mannix - June 2015

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 62 ppb on Jun 30 15:00	Maximum Daily Average: 9.3 ppb on Jun 30		Hours of Data:	684
Minimum Value: 0 ppb on Jun 1 01:00	Minimum Daily Average: 0.1 ppb on Jun 27		Hours of Missing Data:	36
Maximum Diurnal Average: 4.4 ppb at hour 15	Minimum Diurnal Average: 0.5 ppb at hour 1		Hours of Calibration:	36
Monthly Average: 2.2 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 2 P ₉₀ = 6 P ₉₉ = 19		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	0	Z	0	1	0	0	0	0	0	0	0	0	0	6	17	12	2	0	2	4	0	0	0	2.0	17
2-Jun	0	8	1	Z	2	1	1	0	0	2	1	1	1	0	1	0	1	1	1	1	1	0	0	0	1.1	8
3-Jun	0	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-Jun	0	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-Jun	Z	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
6-Jun	0	Z	0	0	0	0	0	0	0	6	17	6	7	6	0	0	1	1	1	0	0	0	0	0	2.0	17
7-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0.2	2
8-Jun	0	0	0	Z	0	0	0	0	0	0	8	0	0	0	0	0	7	8	4	1	0	0	3	1	1.4	8
9-Jun	1	1	1	0	Z	0	0	0	0	0	0	0	3	1	2	3	2	7	1	0	1	2	1	1.1	7	
10-Jun	2	3	1	1	1	Z	1	4	18	4	5	11	10	6	13	19	17	13	4	1	2	2	2	1	6.1	19
11-Jun	Z	0	0	0	0	0	0	0	0	0	C	C	C	C	C	C	0	0	0	0	0	0	0	1	--	1
12-Jun	0	Z	0	0	0	6	0	1	7	9	17	5	0	0	0	0	0	0	0	0	0	0	0	0	2.1	17
13-Jun	0	0	Z	0	1	2	0	2	9	11	5	9	8	7	2	1	2	4	4	5	0	0	0	0	3.2	11
14-Jun	0	0	0	Z	4	44	12	4	7	4	2	3	3	2	2	2	4	1	1	2	0	0	2	9	4.7	44
15-Jun	1	1	3	3	Z	0	0	0	0	1	1	2	3	3	11	3	1	0	0	1	1	0	0	1.6	11	
16-Jun	0	3	1	5	6	Z	3	2	10	1	2	1	1	1	0	0	0	0	1	0	2	1	2	1	1.9	10
17-Jun	Z	1	2	1	4	2	3	16	2	2	2	4	5	7	6	8	13	5	4	7	5	6	5	2	4.8	16
18-Jun	1	Z	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
19-Jun	0	1	Z	61	38	18	10	8	4	0	0	3	4	4	7	2	3	1	0	0	1	0	1	1	7.3	61
20-Jun	0	2	1	0	0	Z	6	9	3	3	8	8	4	4	3	2	2	2	2	0	0	1	2	0	2.7	9
21-Jun	1	2	2	2	Z	1	1	5	5	9	2	3	5	6	4	3	2	1	0	1	4	12	2	1	3.2	12
22-Jun	1	0	0	0	0	Z	0	0	0	9	10	17	5	10	6	1	0	2	4	1	1	1	1	1	3.0	17
23-Jun	Z	0	0	0	0	0	0	0	0	1	0	0	1	0	3	7	4	2	1	1	0	0	0	0	1.1	7
24-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	1	0	0	0.4	2
25-Jun	1	2	Z	1	2	4	1	1	1	1	2	1	1	1	1	1	1	2	3	5	2	1	1	1	1.6	5
26-Jun	1	1	1	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.3	1
27-Jun	0	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-Jun	0	0	0	0	0	Z	0	3	4	2	4	1	0	0	0	1	1	1	3	3	3	1	2	6	1.6	6
29-Jun	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	1.3	2
30-Jun	2	Z	3	2	2	2	3	3	3	2	4	13	20	21	62	35	11	5	4	4	4	4	4	2	9.3	62

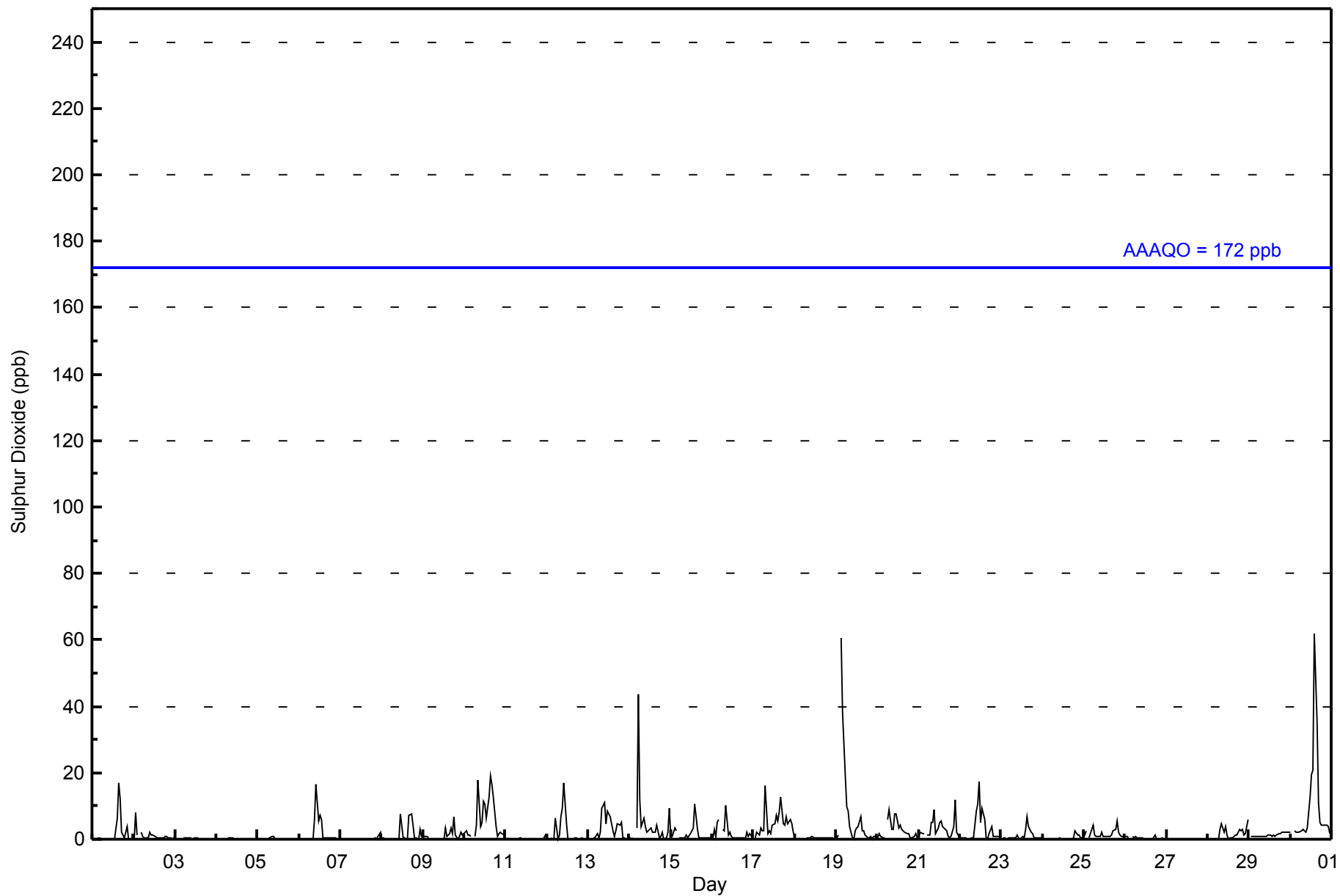
0.5	1.1	0.7	3.0	2.5	3.5	1.5	2.1	2.6	2.4	2.9	3.3	2.7	2.9	4.4	3.7	2.9	1.9	1.6	1.4	1.1	1.3	1.1	1.2	Diurnal Average	
2	8	3	61	38	44	12	16	18	11	17	17	20	21	62	35	17	13	7	7	5	12	5	9	Diurnal Maximum	

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



WBEA
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Mannix - June 2015





WBEA
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Mannix - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	657	96.05	96.05
11 - 20	21	3.07	99.12
21 - 60	4	0.58	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: 684

Total Number of Hours: 720



WBEA
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Mannix - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	49	60	21	12	8	11	55	90	32	23	32	54	92	50	28	40	657
11 - 20	2	3	0	0	1	1	1	0	0	0	1	0	2	6	4	0	21
21 - 60	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	1	4
61 - 110	1	0	0	1	0	0	0	0	0	0	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	53	64	21	13	9	13	56	90	32	23	33	54	94	56	32	41	684

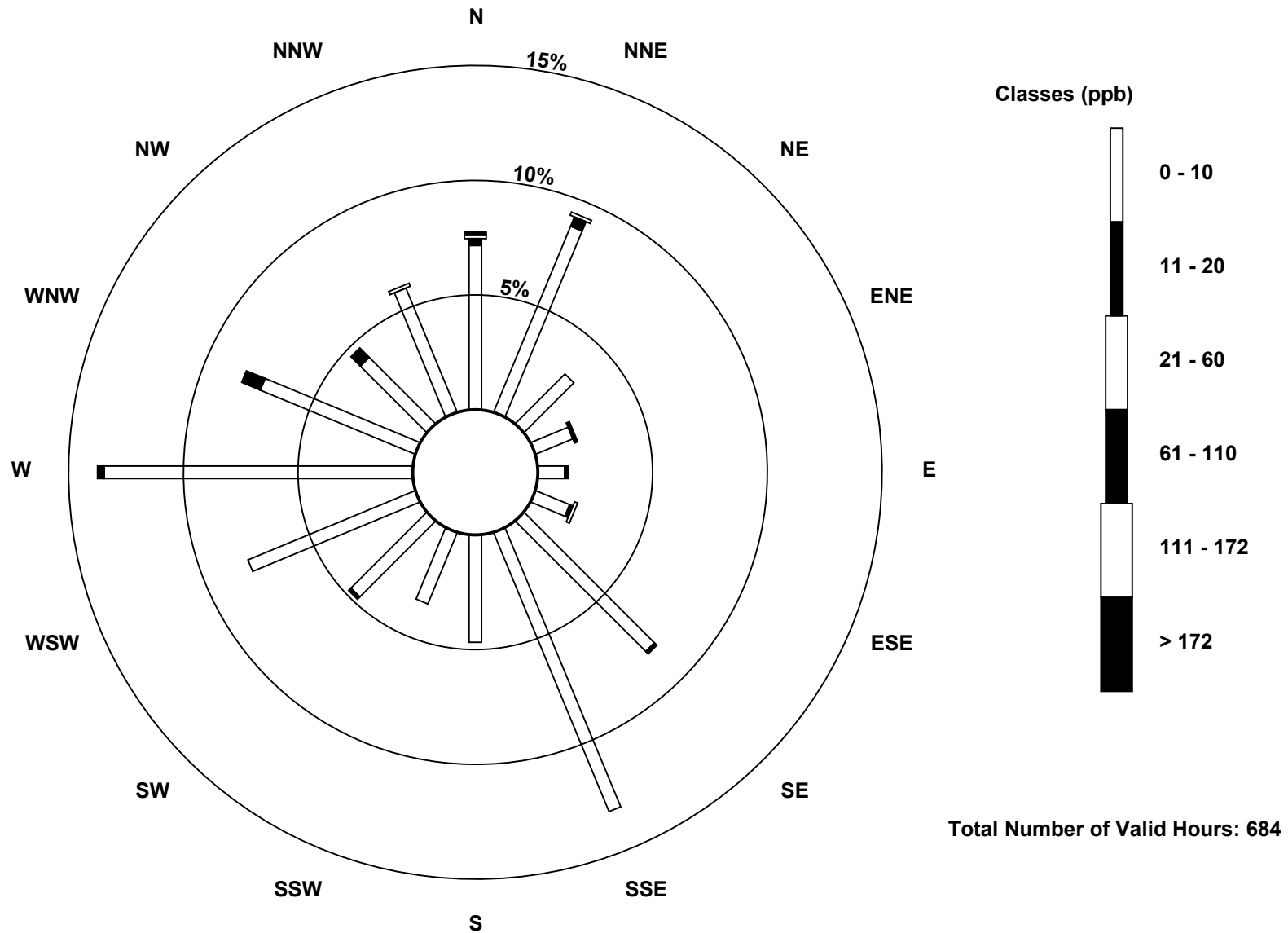
Total Number of Valid Hours: 684

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

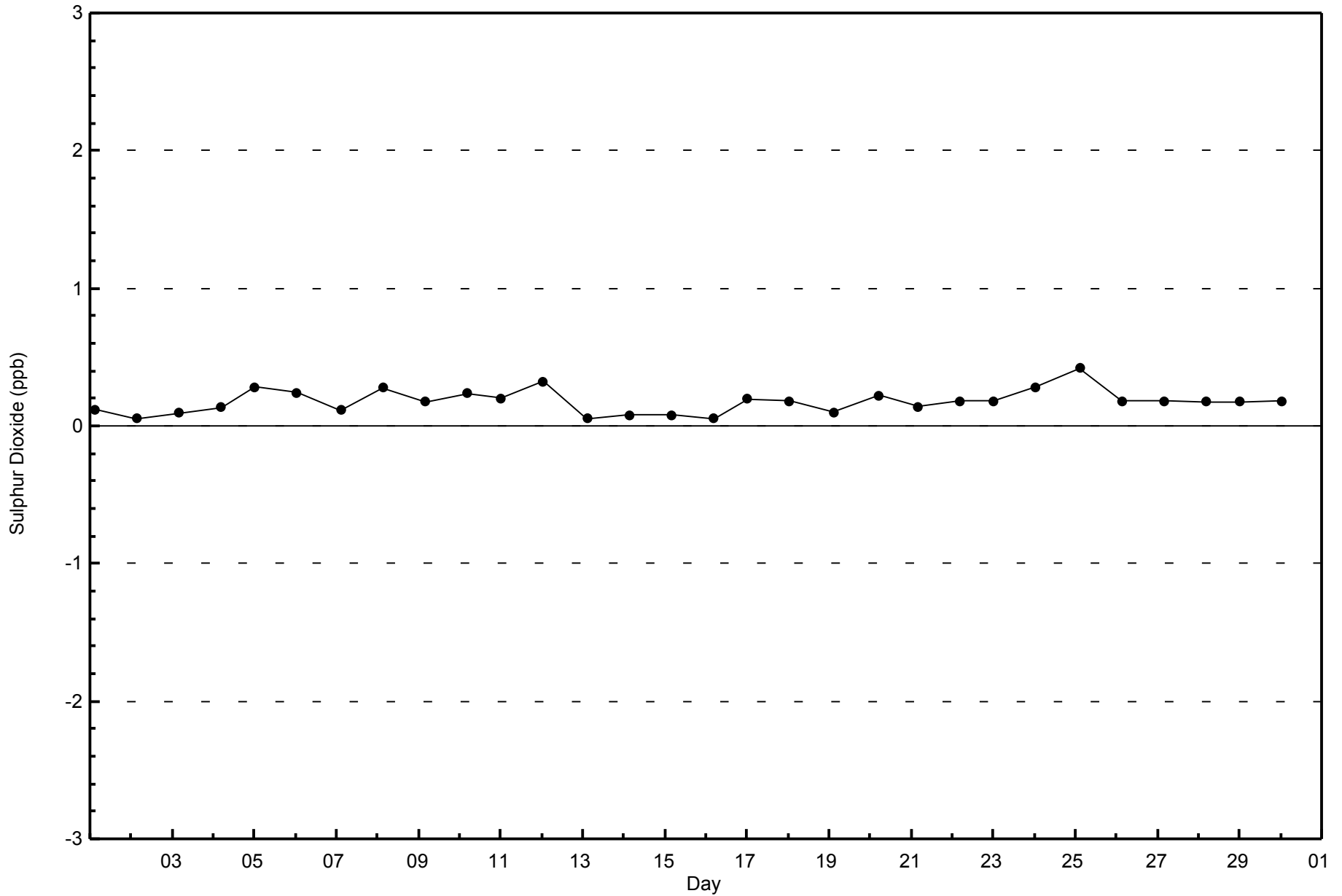
Sulphur Dioxide (SO₂) - ppb
Mannix (AMS 5)





WBEA
Zero Responses

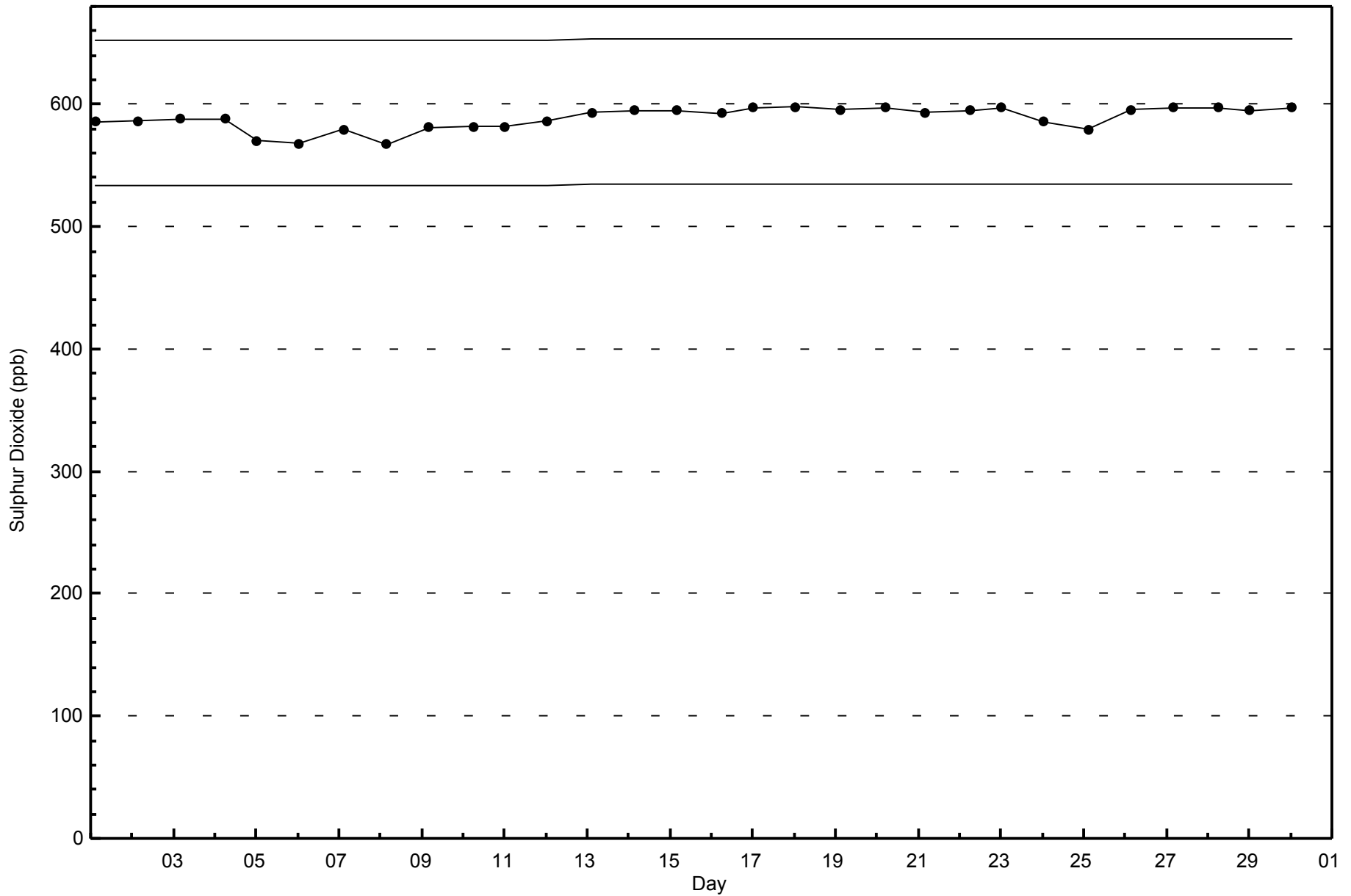
Sulphur Dioxide (SO₂) - ppb
Mannix - June 2015





WBEA
Span Responses

Sulphur Dioxide (SO₂) - ppb
Mannix - June 2015





Summary of Hour Averages

Mannix - June 2015

Number of Exceedences (AAAQO):	1-hr: 1	24-hr: 0	Hours in Service:	720
Maximum Value: 11 ppb on Jun 20 02:00	Maximum Daily Average: 2.0 ppb on Jun 30		Hours of Data:	686
Minimum Value: 0 ppb on Jun 9 21:00	Minimum Daily Average: 0.2 ppb on Jun 3		Hours of Missing Data:	34
Maximum Diurnal Average: 1.5 ppb at hour 2	Minimum Diurnal Average: 0.4 ppb at hour 16		Hours of Calibration:	33
Monthly Average: 0.7 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 2 P ₉₉ = 4		Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0.4	1	
2-Jun	0	3	1	0	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	3	
3-Jun	0	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-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.4	1	
5-Jun	0	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	
6-Jun	0	0	Z	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0.3	1	
7-Jun	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.3	1	
8-Jun	0	0	0	0	Z	0	0	0	0	0	0	1	1	1	1	0	0	1	2	2	2	2	2	1	0.7	2	
9-Jun	1	1	3	2	1	Z	0	0	0	0	0	0	0	1	1	0	0	1	1	0	0	1	2	1	0.7	3	
10-Jun	2	2	1	3	2	1	Z	2	2	1	1	1	1	0	1	1	1	1	0	0	0	0	1	0	1.0	3	
11-Jun	0	Z	0	0	0	0	1	0	0	0	0	0	M	0	0	0	0	0	0	0	0	0	2	1	0.4	2	
12-Jun	1	2	Z	0	0	0	0	1	0	0	C	C	C	0	0	0	0	0	0	0	1	1	1	1	0.5	2	
13-Jun	1	1	1	Z	1	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1.0	2	
14-Jun	0	1	1	1	Z	7	1	1	1	1	1	1	0	1	0	0	1	0	0	1	1	1	1	2	0.9	7	
15-Jun	1	1	1	1	1	Z	1	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0.7	1	
16-Jun	0	2	1	3	2	1	Z	1	1	0	1	0	0	0	0	0	0	0	1	1	1	2	2	2	1.0	3	
17-Jun	1	Z	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.6	1	
18-Jun	0	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	
19-Jun	1	2	3	Z	3	3	2	1	1	1	1	0	1	1	1	0	0	0	1	1	1	1	1	2	3	1.4	3
20-Jun	5	11	1	1	1	1	Z	4	2	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1.5	11	
21-Jun	2	3	3	6	3	2	Z	1	1	1	1	1	1	0	0	1	0	1	1	1	1	1	1	0	1.4	6	
22-Jun	0	0	0	0	0	1	Z	1	0	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0.7	1	
23-Jun	1	Z	0	0	0	1	0	0	0	0	0	0	1	1	2	1	0	0	0	0	0	0	1	0	0.5	2	
24-Jun	1	0	Z	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	2	2	3	0.7	3	
25-Jun	2	2	1	Z	5	5	2	2	1	1	1	0	0	0	0	1	2	2	2	2	1	0	0	0	1.5	5	
26-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0.4	1	
27-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
28-Jun	0	0	1	0	0	0	Z	1	1	1	1	0	0	0	0	0	1	0	1	3	2	0	1	4	0.8	4	
29-Jun	3	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	4	2	2	0.7	4	
30-Jun	3	4	Z	1	1	1	1	1	0	0	2	3	4	3	5	3	5	3	3	1	1	1	1	0	2.0	5	

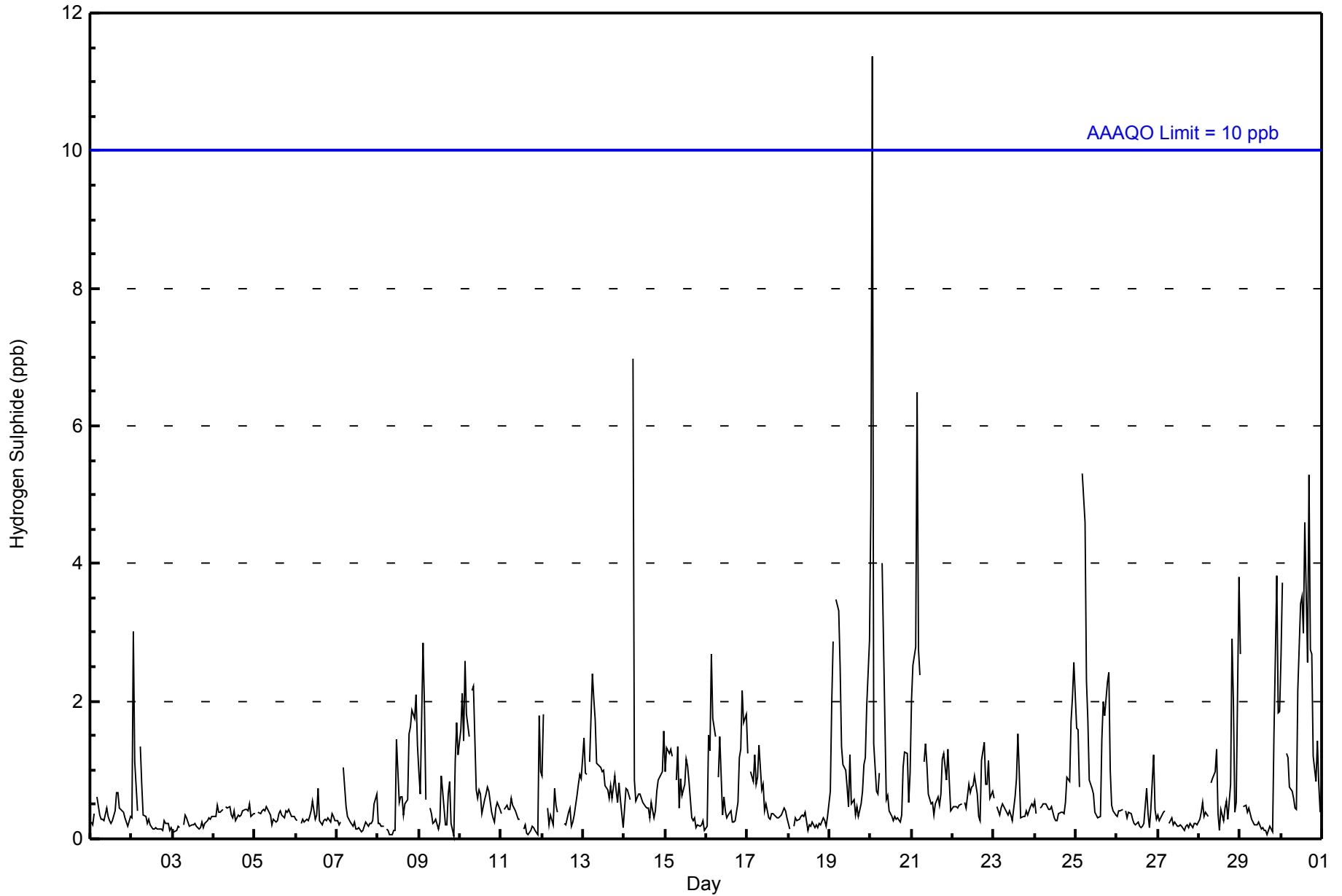
0.9	1.5	0.9	1.0	1.1	1.2	0.7	0.8	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.4	0.6	0.5	0.6	0.7	0.7	0.9	0.8	0.9	Diurnal Average	
5	11	3	6	5	7	2	4	2	1	2	3	4	3	5	3	5	3	3	3	3	2	4	2	4	Diurnal Maximum	

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



WBEA
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
Mannix - June 2015





WBEA
Cumulative Frequency Distribution

Hydrogen Sulphide (H₂S) - ppb
Mannix - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	653	95.19	95.19
3 - 4	25	3.64	98.83
5 - 7	7	1.02	99.85
8 - 11	0	0.00	99.85
> 11	1	0.15	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



WBEA
Frequency Distribution

Hydrogen Sulphide (H₂S) - ppb
Mannix - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	42	59	20	11	9	11	54	93	33	26	33	54	90	51	31	36	653
3 - 4	8	5	0	2	0	2	1	0	0	0	0	0	2	2	1	2	25
5 - 7	2	1	1	1	0	0	0	0	0	0	0	0	0	0	1	1	7
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Totals	53	65	21	14	9	13	55	93	33	26	33	54	92	53	33	39	686

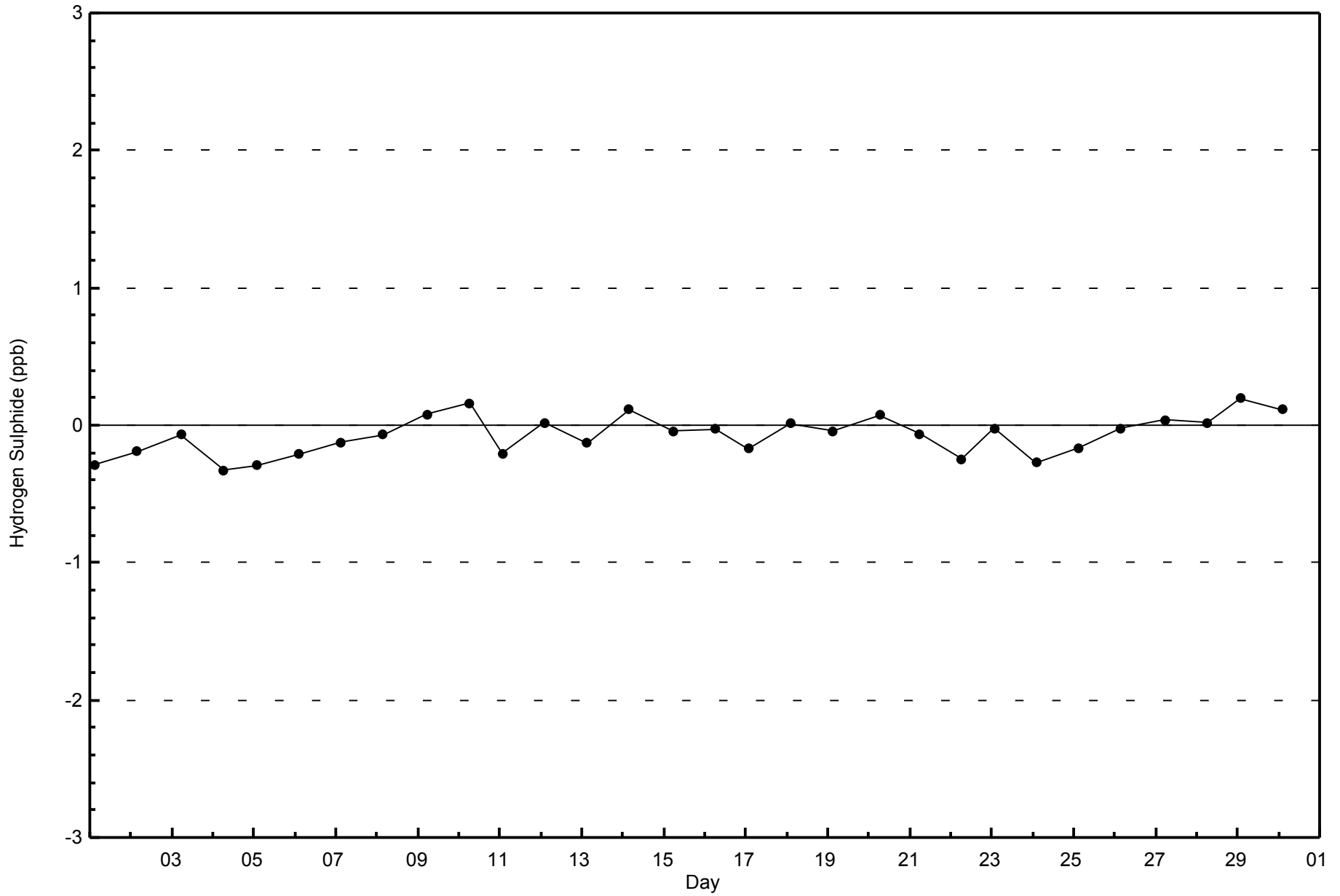
Total Number of Valid Hours: 686

Total Number of Hours: 720



WBEA
Zero Responses

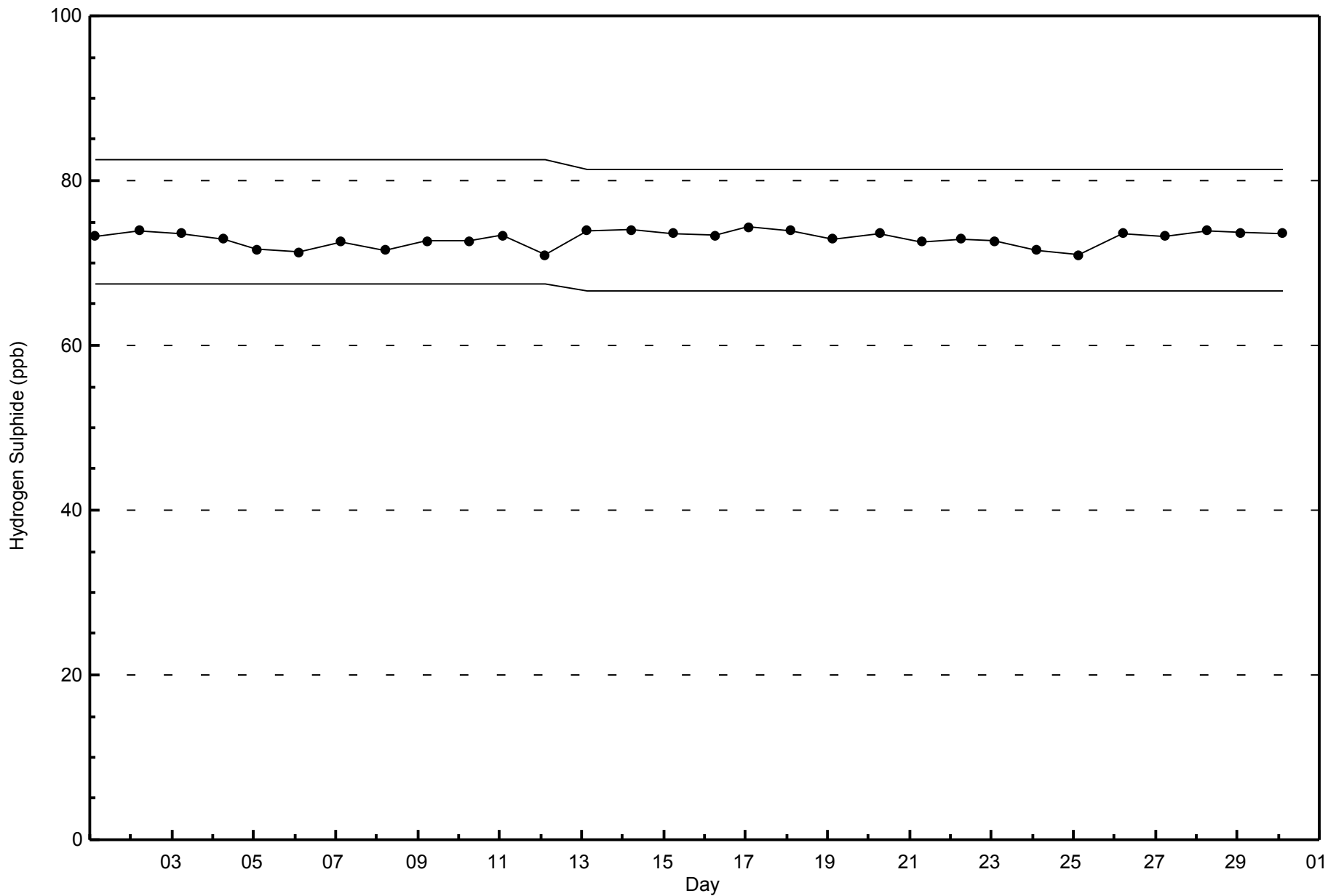
Hydrogen Sulphide (H₂S) - ppb
Mannix - June 2015





WBEA
Span Responses

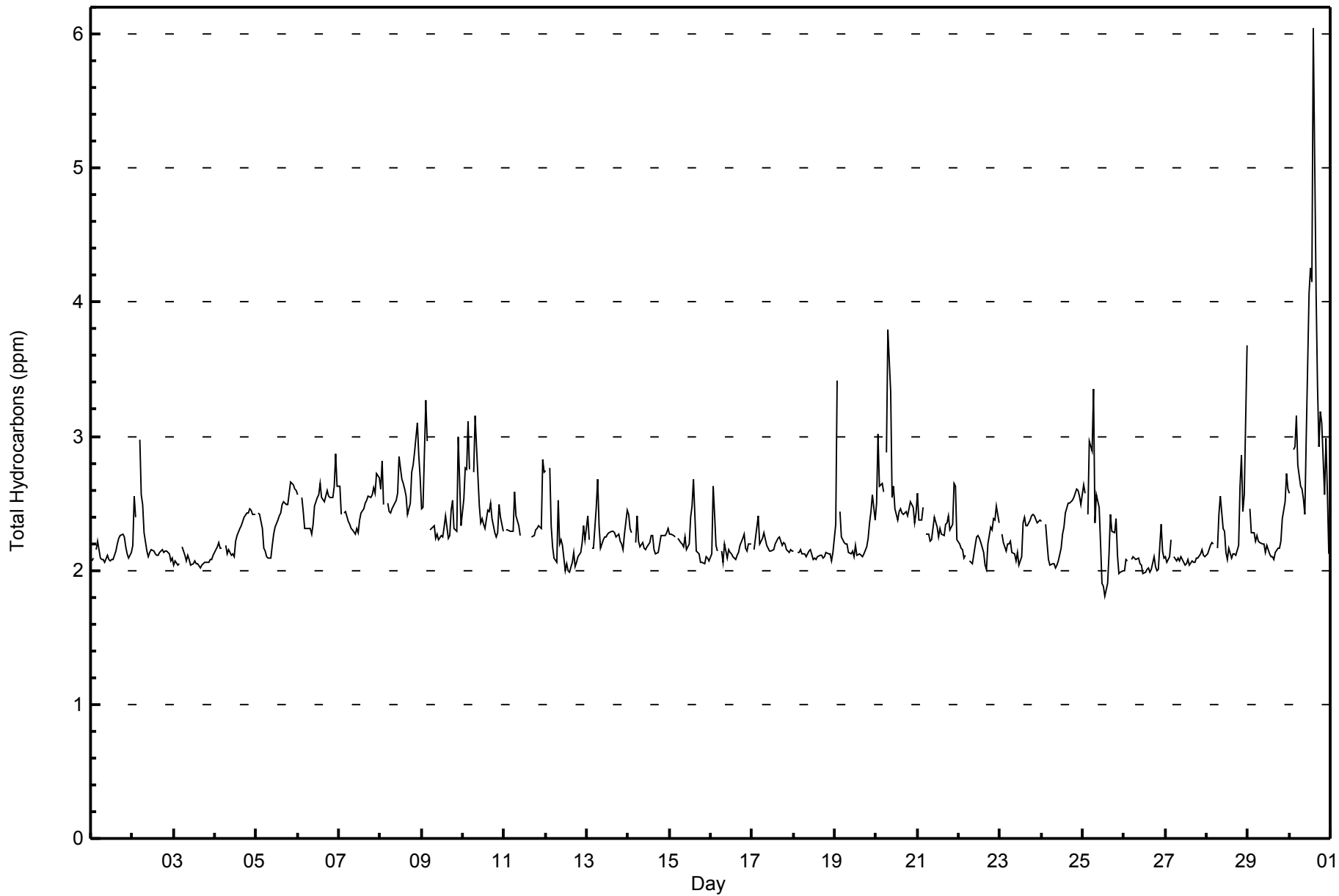
Hydrogen Sulphide (H₂S) - ppb
Mannix - June 2015





WBEA
Hourly Averages

Total Hydrocarbons (THC) - ppm
Mannix - June 2015





WBEA
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Mannix - June 2015

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	42	6.14	6.14
2.1 - 3.0	624	91.23	97.37
3.1 - 10.0	18	2.63	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



WBEA
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Mannix - June 2015

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	0	0	0	1	0	1	4	14	2	1	0	5	11	3	0	0	42
2.1 - 3.0	53	62	20	11	9	10	51	76	30	22	32	47	81	51	30	39	624
3.1 - 10.0	0	2	1	1	0	2	1	0	0	0	1	2	2	2	2	2	18
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	53	64	21	13	9	13	56	90	32	23	33	54	94	56	32	41	684

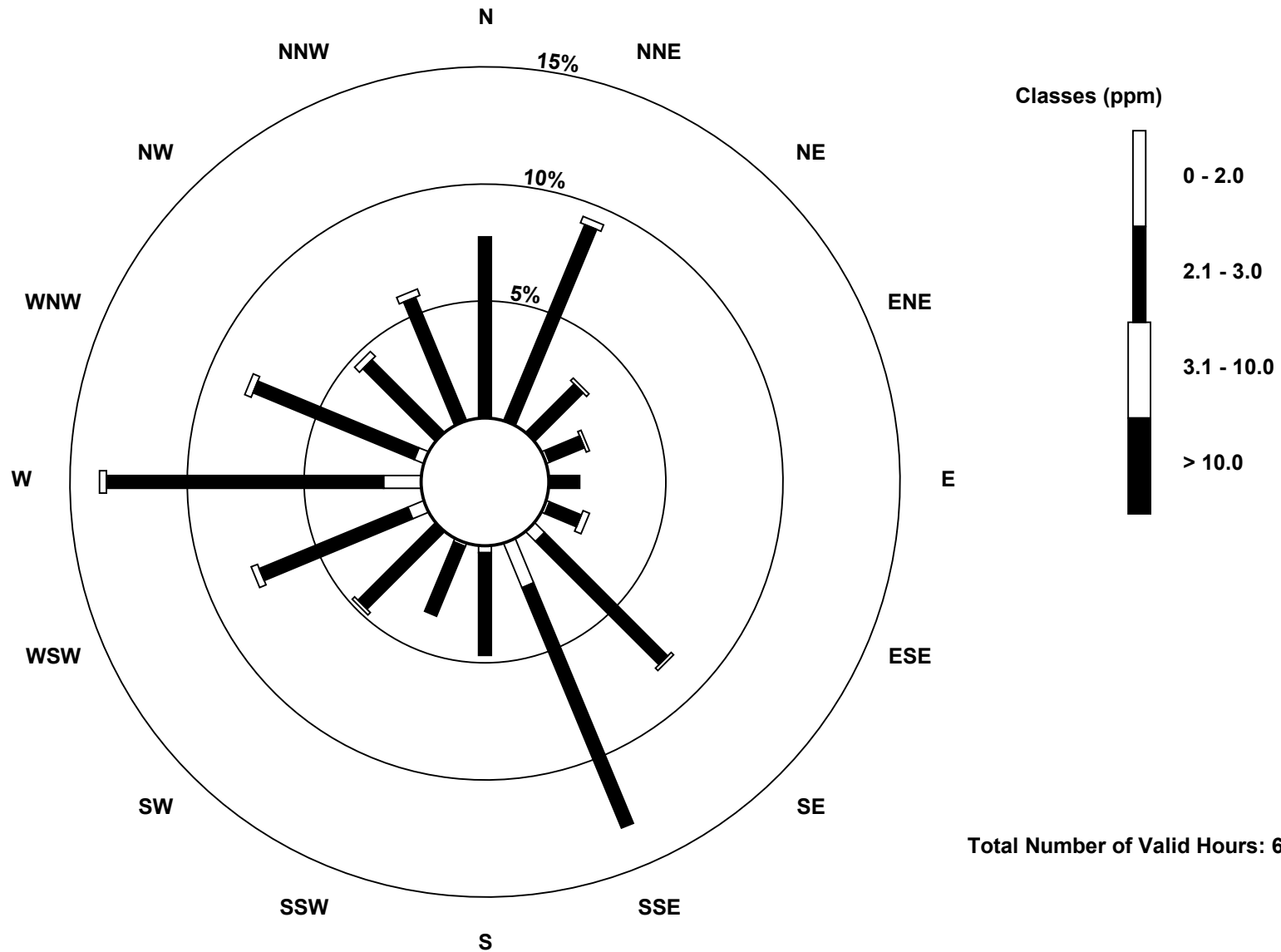
Total Number of Valid Hours: 684

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

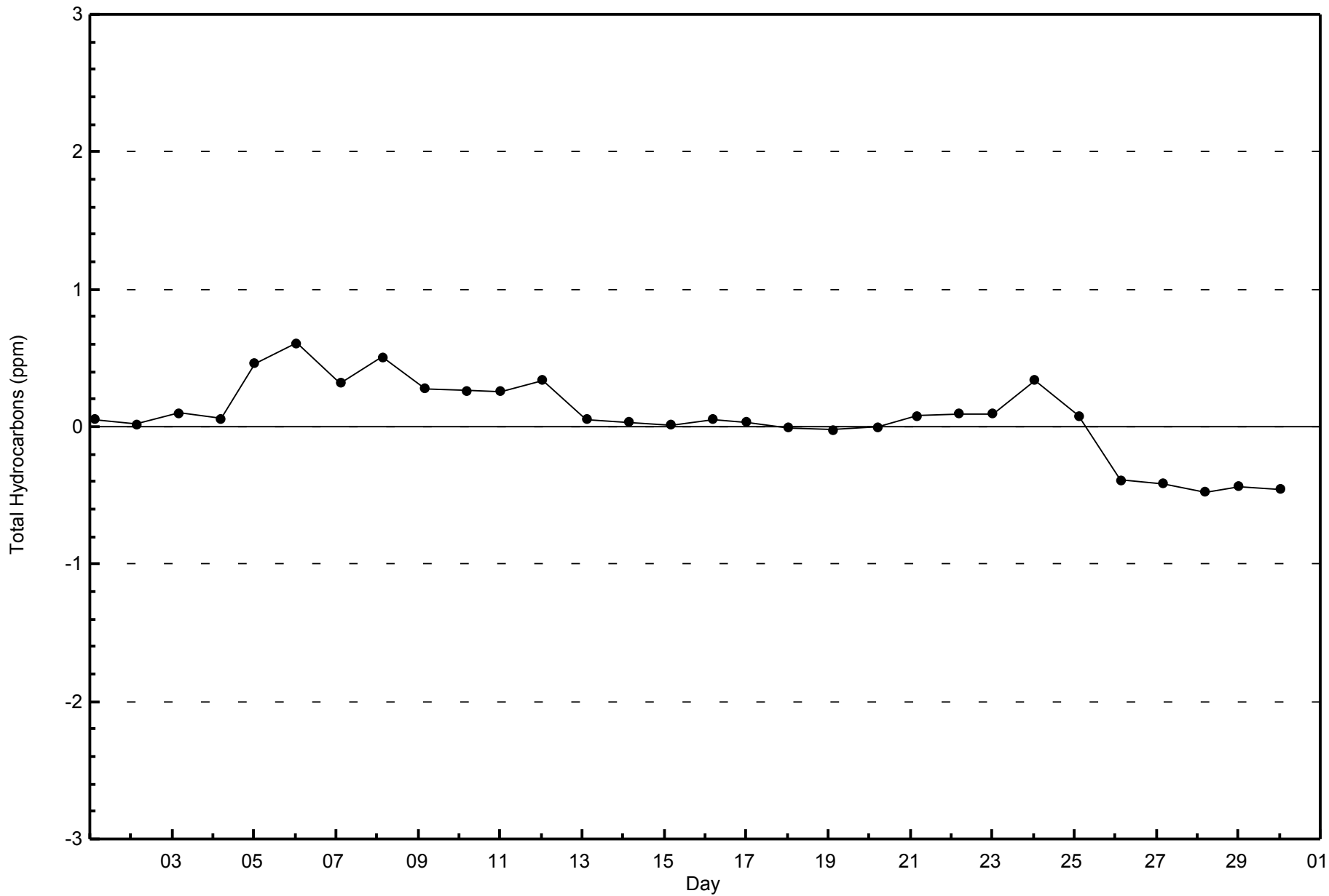
Total Hydrocarbons (THC) - ppm
Mannix (AMS 5)





WBEA
Zero Responses

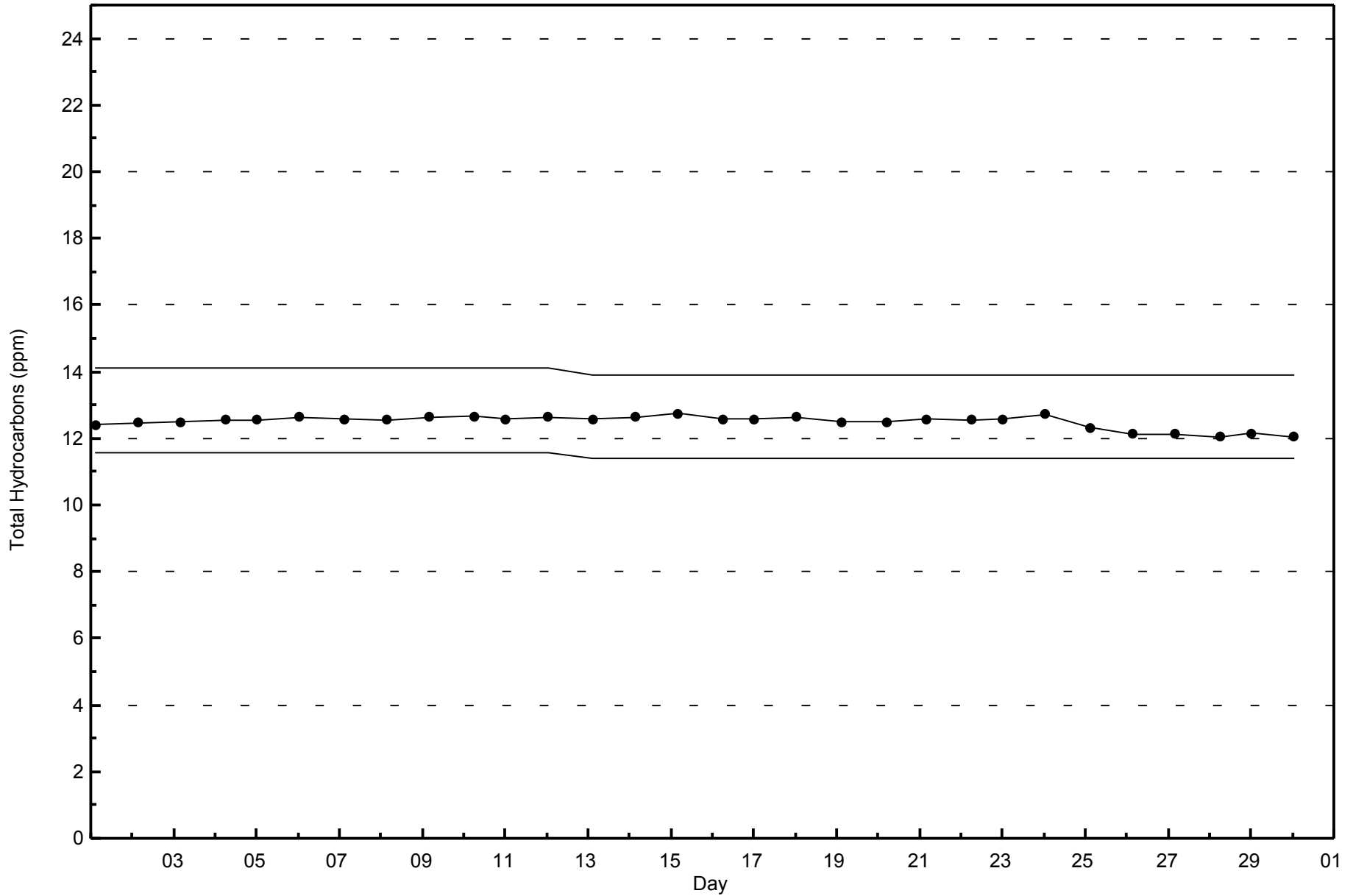
Total Hydrocarbons (THC) - ppm
Mannix - June 2015





WBEA
Span Responses

Total Hydrocarbons (THC) - ppm
Mannix - June 2015



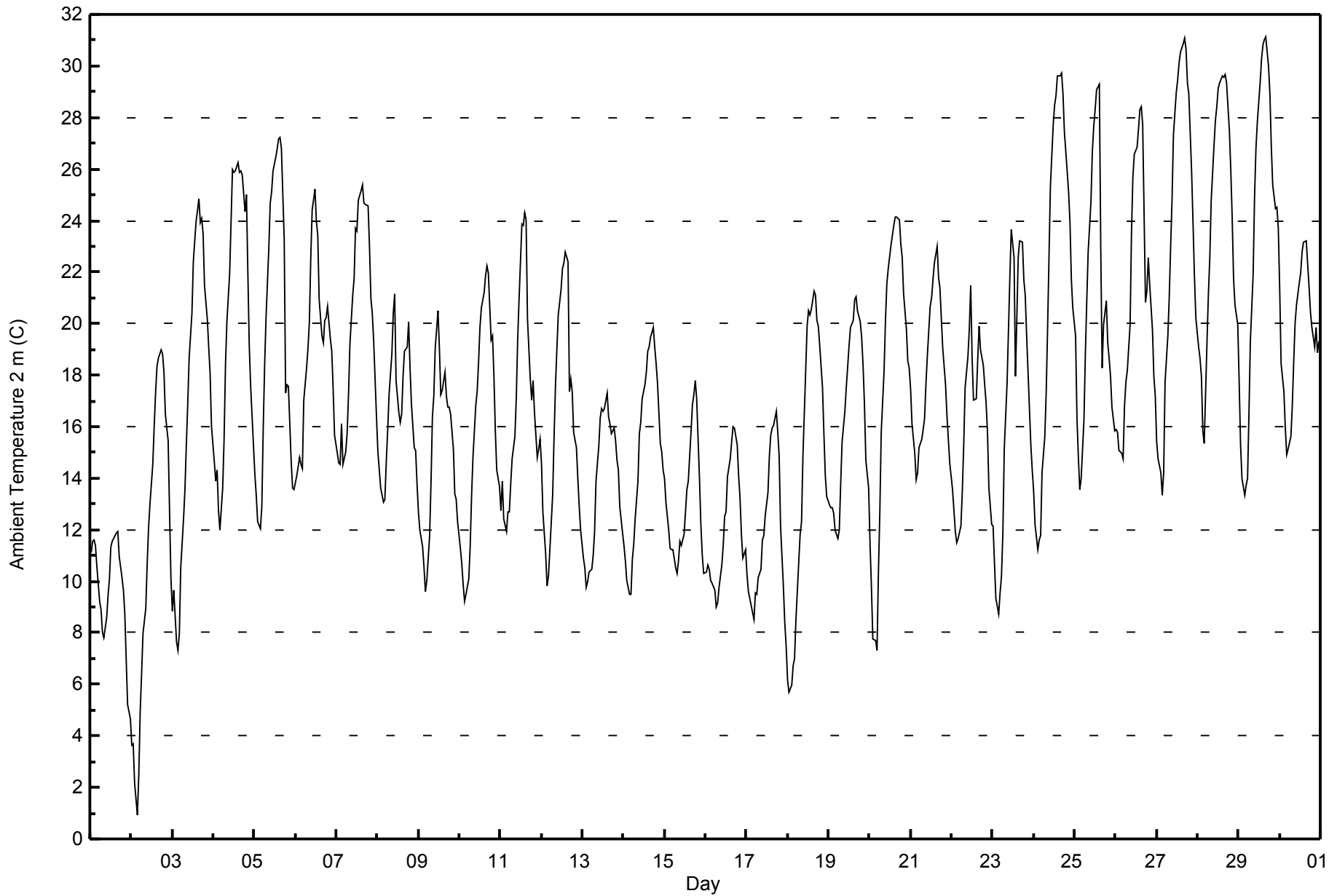


Maximum Value: 31.1 C on Jun 29 17:00																				Maximum Daily Average: 23.9 C on Jun 28					Hours in Service: 720	
Minimum Value: 0.9 C on Jun 2 04:00																				Minimum Daily Average: 9.7 C on Jun 1					Hours of Data: 720	
Maximum Diurnal Average: 22.2 C at hour 16																				Minimum Diurnal Average: 11.3 C at hour 4					Hours of Missing Data: 0	
Monthly Average: 17.24 C																				Percentiles: P ₁ = 5.1 P ₁₀ = 10.3 Q ₁ = 13.0 Median = 16.8 Q ₃ = 21.0 P ₉₀ = 25.1 P ₉₉ = 30.5					Hours of Calibration: 0	
																									Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	11.1	11.5	11.6	11.4	10.6	9.2	8.9	8.0	7.8	8.6	9.4	10.1	11.3	11.5	11.8	11.9	11.9	11.0	10.1	9.7	8.7	7.0	5.2	4.7	9.7	11.9
2-Jun	3.6	3.7	2.2	0.9	2.5	4.9	6.4	8.0	9.0	10.7	12.1	13.0	14.5	16.0	17.3	18.4	18.7	19.0	18.8	18.1	16.5	15.4	12.7	10.1	11.4	19.0
3-Jun	8.8	9.6	7.7	7.3	8.0	10.5	12.4	13.6	15.3	16.9	18.7	20.4	22.4	23.2	24.0	24.9	23.9	24.1	23.5	21.5	20.2	19.1	18.1	16.0	17.1	24.9
4-Jun	14.6	13.9	14.3	12.8	12.0	13.6	15.5	18.4	20.0	21.9	24.0	26.0	25.8	25.9	26.2	25.9	25.9	25.8	24.3	25.0	22.0	19.1	17.6	15.3	20.2	26.2
5-Jun	14.1	13.4	12.3	12.0	12.9	15.9	18.4	20.2	22.9	24.7	25.1	25.9	26.5	26.8	27.2	27.2	26.8	23.3	17.3	17.6	17.6	14.6	13.6	13.6	19.6	27.2
6-Jun	13.8	14.1	14.8	14.5	14.4	17.0	18.3	19.1	20.1	22.5	24.4	25.2	24.0	23.4	20.9	19.5	19.2	20.1	20.2	20.7	19.4	18.9	17.5	15.7	19.1	25.2
7-Jun	15.0	14.6	14.5	16.1	14.5	15.0	15.7	17.3	19.2	21.1	21.7	23.7	23.6	24.8	25.2	25.4	24.7	24.6	24.5	23.0	21.0	20.4	19.3	16.4	20.1	25.4
8-Jun	15.0	14.3	13.6	13.0	13.2	14.7	15.8	17.3	18.8	20.4	21.1	17.8	16.5	16.1	16.5	17.9	18.9	19.1	20.0	18.3	16.9	15.2	15.1	13.8	16.6	21.1
9-Jun	12.7	12.0	11.3	10.5	9.6	10.0	11.8	13.8	16.4	17.2	19.0	20.5	19.0	17.3	17.4	18.1	17.2	16.8	16.8	16.5	15.1	13.4	13.2	12.3	14.9	20.5
10-Jun	11.3	10.7	9.9	9.2	9.5	10.1	11.3	13.3	14.8	16.8	17.4	18.5	19.9	20.6	21.2	21.9	22.2	22.0	19.4	19.5	18.0	15.9	14.3	13.6	15.9	22.2
11-Jun	12.8	13.9	12.4	11.9	12.7	12.7	13.8	14.8	15.6	17.2	19.4	21.0	23.9	23.8	24.3	24.0	20.2	17.9	17.0	17.8	16.5	14.8	15.1	15.5	17.0	24.3
12-Jun	14.6	12.7	11.1	9.8	10.2	11.2	13.4	15.6	17.6	19.0	20.4	21.3	22.1	22.3	22.8	22.4	17.4	17.8	17.4	15.8	15.2	14.0	12.9	12.0	16.2	22.8
13-Jun	10.9	10.5	9.8	10.0	10.3	10.5	11.0	11.9	13.9	15.2	16.3	16.7	16.6	16.7	17.3	16.4	16.1	15.7	16.0	15.5	14.7	14.3	12.9	11.9	13.8	17.3
14-Jun	11.4	10.8	10.1	9.5	9.5	10.8	11.4	12.4	13.9	15.7	16.1	17.1	17.6	18.1	18.9	19.1	19.5	19.9	19.1	18.4	17.7	15.3	15.0	14.3	15.1	19.9
15-Jun	14.0	13.1	12.0	11.3	11.2	11.2	10.5	10.3	10.8	11.5	11.4	11.8	12.7	13.6	13.9	15.8	16.9	17.2	17.8	17.1	14.0	12.2	11.0	10.3	13.0	17.8
16-Jun	10.4	10.6	10.5	10.0	9.9	9.6	9.0	9.2	9.7	10.7	11.4	12.5	12.7	14.0	14.7	15.4	16.0	15.9	15.3	14.1	13.2	11.8	10.9	11.2	12.0	16.0
17-Jun	10.3	9.6	9.3	8.8	8.5	9.5	9.5	10.1	10.5	11.6	11.8	12.5	13.5	14.8	15.7	16.0	16.1	16.6	15.8	14.9	12.1	9.8	8.4	7.5	11.8	16.6
18-Jun	6.2	5.7	6.0	6.7	7.0	8.5	10.8	11.8	12.3	14.9	16.6	19.9	20.5	20.3	20.6	21.3	21.1	20.1	19.9	19.1	17.5	15.7	14.1	13.3	14.6	21.3
19-Jun	13.0	12.8	12.9	12.7	12.0	11.6	12.0	13.8	15.4	16.6	17.5	18.3	19.2	19.8	20.1	20.9	21.1	20.5	20.1	19.4	18.4	16.8	14.7	13.6	16.4	21.1
20-Jun	11.4	9.8	7.7	7.7	7.3	10.4	12.7	15.8	18.1	20.1	21.5	22.2	23.1	23.5	23.8	24.1	24.1	24.0	23.1	22.5	21.2	19.8	18.6	18.3	17.9	24.1
21-Jun	17.5	16.1	14.9	13.9	14.2	15.2	15.5	15.9	16.3	17.7	18.8	20.7	21.0	21.7	22.4	23.0	21.8	21.4	20.2	19.0	17.6	16.4	15.5	14.6	18.0	23.0
22-Jun	13.5	12.7	11.9	11.5	11.6	12.1	13.5	15.3	17.5	18.7	19.8	21.5	18.7	17.0	17.1	18.6	19.9	19.0	18.4	17.7	16.9	15.8	13.6	12.2	16.0	21.5
23-Jun	12.1	10.7	9.3	8.8	9.5	10.2	11.9	15.1	17.7	19.7	21.8	23.6	22.5	18.0	20.2	22.6	23.2	23.2	21.7	21.1	19.5	16.7	15.3	14.3	17.0	23.6
24-Jun	13.5	12.2	11.2	11.6	11.8	14.2	15.6	17.4	19.8	22.6	25.3	27.7	28.5	28.9	29.6	29.6	29.7	28.9	27.4	26.7	25.1	23.9	21.7	20.6	21.8	29.7
25-Jun	19.5	16.3	14.8	13.6	14.0	16.3	18.8	20.9	22.8	24.7	26.7	27.7	28.3	29.1	29.3	23.0	18.3	19.9	20.9	19.3	18.7	17.9	16.8	15.8	20.6	29.3
26-Jun	15.9	15.8	15.1	15.0	14.7	16.8	17.7	18.2	20.0	23.5	25.7	26.6	26.9	27.5	28.3	28.4	27.7	20.8	21.3	22.5	21.6	19.7	18.0	17.2	21.0	28.4
27-Jun	15.4	14.8	14.2	13.4	14.2	17.7	19.5	21.1	23.0	24.8	27.3	29.0	29.4	30.1	30.5	30.9	31.1	30.7	29.4	28.9	25.9	23.9	21.8	20.2	23.6	31.1
28-Jun	19.1	18.6	18.0	15.8	15.3	19.3	21.2	22.6	24.8	26.9	27.9	28.4	29.1	29.4	29.6	29.6	29.7	29.4	27.5	26.0	24.2	21.7	20.7	19.9	23.9	29.7
29-Jun	17.7	15.3	14.0	13.3	13.7	14.0	16.5	19.3	21.9	24.9	26.8	27.8	29.3	30.2	30.8	31.0	31.1	30.0	28.9	26.9	25.4	24.5	24.5	23.7	23.4	31.1
30-Jun	21.3	18.4	17.4	16.0	14.9	15.1	15.6	16.8	18.5	20.0	20.7	21.6	22.0	22.8	23.2	23.2	22.3	21.4	20.5	19.8	19.1	19.8	18.9	19.3	19.5	23.2
																								Diurnal Average		
																								Diurnal Maximum		



WBEA
Hourly Averages

Ambient Temperature 2 m (AT2m) - C
Mannix - June 2015





WBEA
Cumulative Frequency Distribution

Ambient Temperature 2 m (AT2m) - C
Mannix - June 2015

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	61	8.47	8.47
10 - 20	442	61.39	69.86
> 20	217	30.14	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Summary of Hour Averages

Mannix - June 2015

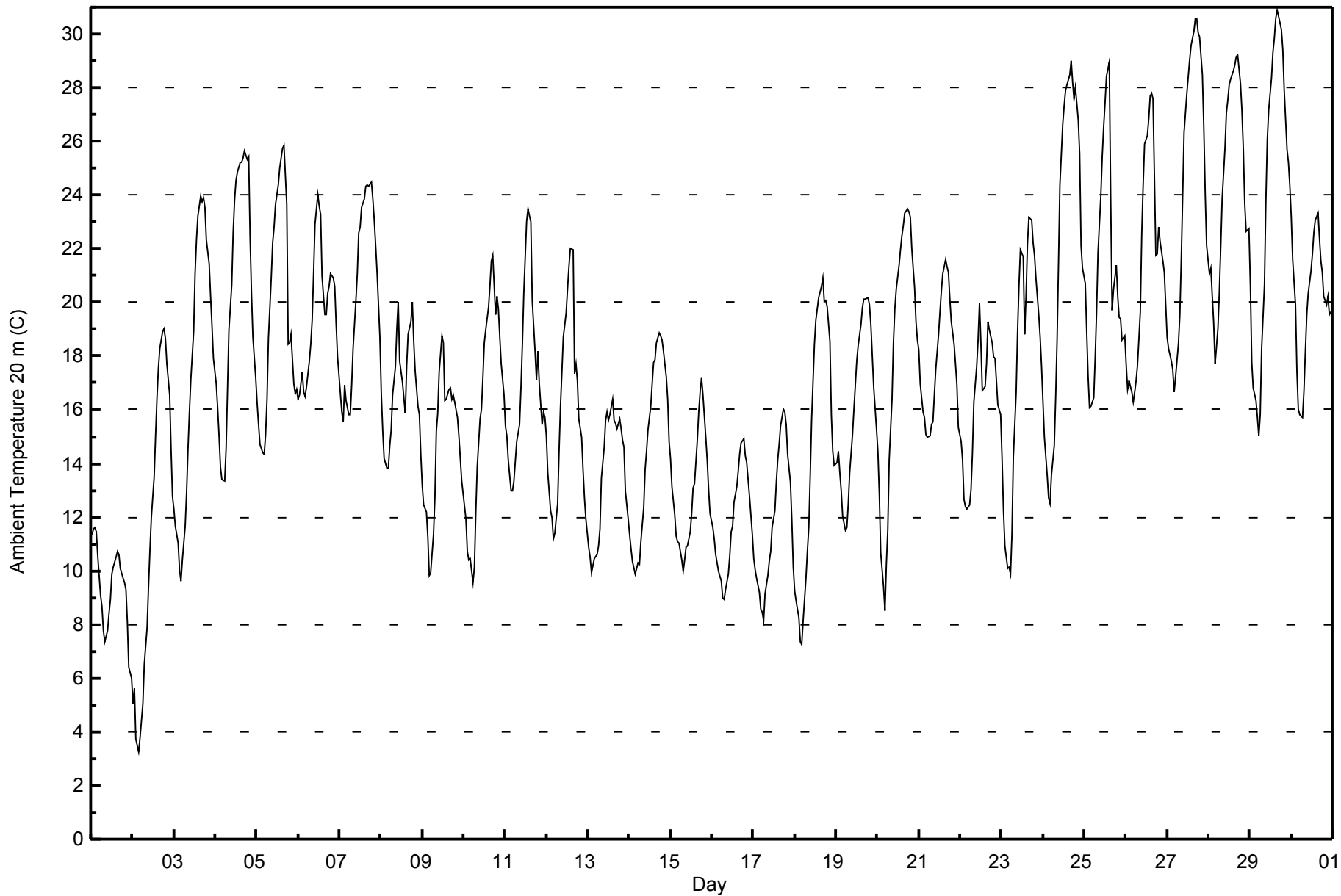
Maximum Value: 30.9 C on Jun 29 17:00		Maximum Daily Average: 24.5 C on Jun 28		Hours in Service: 720																							
Minimum Value: 3.2 C on Jun 2 04:00		Minimum Daily Average: 9.4 C on Jun 1		Hours of Data: 720																							
Maximum Diurnal Average: 21.4 C at hour 16		Minimum Diurnal Average: 12.3 C at hour 5		Hours of Missing Data: 0																							
Monthly Average: 17.38 C		Percentiles: P ₁ = 5.9 P ₁₀ = 10.4 Q ₁ = 13.5 Median = 17.0 Q ₃ = 20.9 P ₉₀ = 24.4 P ₉₉ = 30.1		Hours of Calibration: 0																							
				Percent Operational Time: 100.0																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	11.3	11.5	11.6	11.5	10.5	9.1	8.7	7.8	7.3	7.8	8.4	8.9	9.9	10.2	10.5	10.7	10.6	10.1	9.7	9.6	9.3	8.1	6.4	6.0	9.4	11.6	
2-Jun	5.1	5.6	3.8	3.2	3.8	4.4	5.0	6.5	7.9	9.4	10.8	12.0	13.5	15.0	16.5	17.5	18.3	18.9	19.0	18.6	17.7	16.6	14.5	12.7	11.5	19.0	
3-Jun	12.3	11.7	11.0	10.0	9.6	10.4	11.7	12.9	14.6	15.9	17.1	18.9	21.1	22.3	23.2	23.9	23.7	23.9	23.5	22.3	21.4	20.2	19.1	17.9	17.5	23.9	
4-Jun	17.0	16.1	15.0	13.9	13.4	13.3	14.6	16.8	19.0	20.7	22.6	23.8	24.5	24.8	25.2	25.2	25.4	25.6	25.3	25.4	22.4	20.4	18.7	17.2	20.3	25.6	
5-Jun	16.2	15.4	14.7	14.4	14.3	15.1	16.4	18.7	20.9	22.2	22.8	23.7	24.4	25.0	25.4	25.8	25.9	23.6	18.4	18.5	18.8	16.9	16.6	16.8	19.6	25.9	
6-Jun	16.4	16.5	17.4	16.6	16.5	16.9	17.8	18.4	19.3	21.1	22.9	24.0	23.6	23.3	21.0	19.5	19.5	20.3	20.6	21.1	20.9	20.6	19.2	17.9	19.6	24.0	
7-Jun	16.6	15.9	15.5	16.9	16.4	15.8	15.8	16.9	18.3	20.1	21.1	22.6	22.8	23.5	23.9	24.3	24.4	24.3	24.5	23.9	23.1	22.1	21.1	18.7	20.4	24.5	
8-Jun	16.6	15.2	14.2	13.8	13.8	14.6	15.2	16.6	17.6	19.0	20.0	17.8	17.0	16.5	15.9	17.6	18.8	19.3	20.0	18.5	17.5	16.2	15.8	14.3	16.7	20.0	
9-Jun	13.2	12.5	12.2	11.2	9.8	9.9	11.3	12.7	15.2	15.9	17.4	18.7	18.5	16.4	16.4	16.8	16.8	16.4	16.5	16.3	15.7	15.0	14.2	13.4	14.7	18.7	
10-Jun	12.4	11.9	10.7	10.4	10.4	9.6	10.2	12.2	13.9	15.7	16.0	17.2	18.5	19.0	19.8	20.6	21.5	21.8	19.5	20.2	19.7	18.7	17.7	16.6	16.0	21.8	
11-Jun	15.4	15.0	14.1	13.0	13.0	13.3	14.1	14.8	15.4	16.8	18.5	20.4	23.0	23.5	23.2	23.0	20.1	18.2	17.1	18.2	17.0	15.4	15.9	15.7	17.3	23.5	
12-Jun	15.0	13.6	12.2	12.0	11.2	11.4	12.5	14.4	16.1	17.4	18.7	19.6	20.5	21.3	22.0	22.0	17.3	17.7	17.1	15.6	15.0	13.8	12.7	11.9	15.9	22.0	
13-Jun	10.9	10.5	9.9	10.2	10.5	10.6	10.9	11.6	13.5	14.6	15.6	15.9	15.6	15.8	16.4	15.6	15.5	15.3	15.6	15.3	14.9	14.6	13.0	11.9	13.5	16.4	
14-Jun	11.3	10.8	10.4	9.9	10.1	10.3	10.2	11.1	12.3	13.8	14.4	15.2	16.1	17.0	17.8	17.9	18.5	18.9	18.8	18.6	18.2	17.2	16.4	14.8	14.6	18.9	
15-Jun	14.2	13.1	12.1	11.3	11.1	11.1	10.4	10.0	10.4	10.9	10.9	11.4	12.1	13.1	13.3	14.9	15.9	16.6	17.2	16.5	15.0	14.1	13.1	12.1	13.0	17.2	
16-Jun	11.6	11.2	10.6	10.3	10.0	9.6	9.0	8.9	9.3	9.9	10.6	11.4	11.7	12.6	13.2	13.7	14.4	14.7	14.9	14.3	14.0	13.4	12.8	11.4	11.8	14.9	
17-Jun	10.4	10.1	9.7	9.2	8.6	8.5	8.1	9.1	9.8	10.4	10.7	11.6	12.2	13.3	14.1	14.7	15.4	16.0	15.9	15.5	14.4	13.3	11.9	10.1	11.8	16.0	
18-Jun	9.2	8.9	8.3	7.4	7.3	8.2	9.7	10.7	11.6	13.5	15.6	18.4	19.3	19.7	20.2	20.6	20.9	20.0	20.1	19.9	18.5	15.8	14.4	13.9	14.7	20.9	
19-Jun	14.0	14.5	13.7	13.0	12.0	11.5	11.6	12.5	13.7	15.1	16.0	16.9	17.8	18.4	19.2	19.8	20.1	20.1	20.2	19.9	19.2	18.0	16.9	15.3	16.2	20.2	
20-Jun	14.4	12.9	10.7	9.4	8.5	10.2	11.5	14.1	16.4	18.5	19.8	20.5	21.4	22.0	22.5	22.8	23.3	23.5	23.4	23.2	22.0	20.6	19.3	18.6	17.9	23.5	
21-Jun	18.2	17.0	15.9	15.7	15.1	15.0	15.0	15.4	15.6	16.6	17.5	18.8	19.7	20.4	21.1	21.6	21.3	21.1	20.1	19.3	18.4	17.7	16.9	15.4	17.9	21.6	
22-Jun	14.8	14.1	12.7	12.4	12.3	12.5	13.0	14.4	16.3	17.6	18.6	20.0	18.5	16.7	16.9	17.7	19.3	19.0	18.5	18.0	17.9	17.1	16.2	15.8	16.3	20.0	
23-Jun	14.2	12.2	11.0	10.1	10.1	9.9	11.3	14.2	16.7	18.9	20.6	21.9	21.7	18.8	20.2	22.1	23.2	23.1	22.2	21.8	20.9	19.5	18.7	17.6	17.5	23.2	
24-Jun	16.3	15.0	13.5	12.7	12.5	13.5	14.7	16.4	18.6	21.4	24.4	26.7	27.3	27.9	28.1	28.5	29.0	28.2	27.6	28.0	26.8	25.5	22.1	21.3	21.9	29.0	
25-Jun	20.7	18.9	17.2	16.1	16.1	16.4	17.9	19.7	21.9	24.0	25.4	26.5	27.4	28.4	29.0	23.9	19.7	20.5	21.4	20.2	19.5	19.4	18.6	18.8	21.2	29.0	
26-Jun	17.6	16.8	17.1	16.6	16.3	16.6	17.1	17.6	19.6	22.5	24.4	25.9	26.2	26.8	27.7	27.8	27.6	21.8	21.8	22.8	22.3	21.5	21.1	19.9	21.5	27.8	
27-Jun	18.7	18.3	17.8	17.5	16.7	17.2	18.5	19.5	21.6	23.9	26.3	27.8	28.5	29.1	29.6	30.1	30.6	30.6	30.0	29.9	28.5	26.6	24.1	22.1	24.3	30.6	
28-Jun	21.1	21.3	20.2	19.2	17.7	19.0	20.4	22.1	23.9	25.8	27.0	27.5	28.1	28.3	28.7	28.8	29.1	29.2	28.1	27.2	25.7	23.7	22.6	22.8	24.5	29.2	
29-Jun	20.6	17.8	16.8	16.4	15.7	15.0	15.8	18.3	20.6	23.8	26.1	27.2	28.4	29.3	29.9	30.6	30.9	30.4	30.1	29.4	27.9	25.7	25.2	24.3	24.0	30.9	
30-Jun	23.2	21.6	19.9	17.5	16.0	15.8	15.7	16.7	18.2	19.5	20.3	21.2	21.8	22.6	23.1	23.3	22.4	21.6	21.1	20.2	19.9	20.2	19.6	19.7	20.0	23.3	
		15.0	14.2	13.3	12.7	12.3	12.5	13.1	14.4	15.8	17.4	18.7	19.8	20.4	20.7	21.1	21.4	21.3	21.0	20.6	20.3	19.4	18.3	17.2	16.2	Diurnal Average	
		23.2	21.6	20.2	19.2	17.7	19.0	20.4	22.1	23.9	25.8	27.0	27.8	28.5	29.3	29.9	30.6	30.9	30.6	30.1	29.9	28.5	26.6	25.2	24.3	Diurnal Maximum	



WBEA
Hourly Averages

Ambient Temperature 20 m (AT20m) - C

Mannix - June 2015





WBEA
Cumulative Frequency Distribution

Ambient Temperature 20 m (AT20m) - C
Mannix - June 2015

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	53	7.36	7.36
10 - 20	450	62.50	69.86
> 20	217	30.14	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Summary of Hour Averages

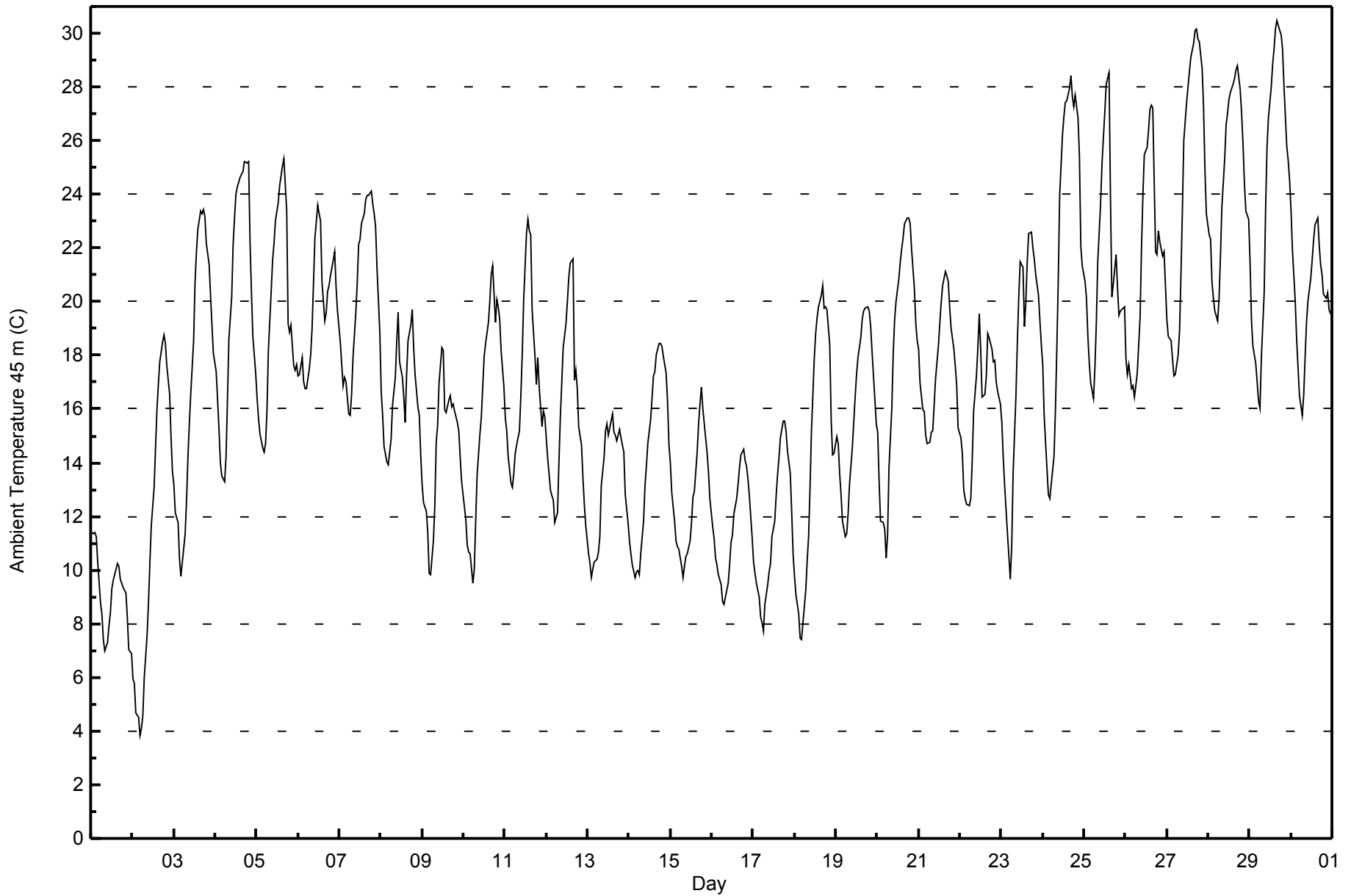
Mannix - June 2015

Maximum Value: 30.5 C on Jun 29 17:00		Maximum Daily Average: 24.6 C on Jun 28		Hours in Service: 720																							
Minimum Value: 3.9 C on Jun 2 05:00		Minimum Daily Average: 9.2 C on Jun 1		Hours of Data: 720																							
Maximum Diurnal Average: 20.9 C at hour 17		Minimum Diurnal Average: 12.4 C at hour 6		Hours of Missing Data: 0																							
Monthly Average: 17.28 C		Percentiles: P ₁ = 5.7 P ₁₀ = 10.3 Q ₁ = 13.5 Median = 17.2 Q ₃ = 20.7 P ₉₀ = 24.3 P ₉₉ = 29.7		Hours of Calibration: 0																							
				Percent Operational Time: 100.0																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	11.4	11.4	11.4	11.3	10.3	8.8	8.4	7.4	7.0	7.3	7.9	8.4	9.3	9.6	10.0	10.3	10.1	9.7	9.4	9.3	9.1	8.3	7.0	6.9	9.2	11.4	
2-Jun	5.9	5.8	4.7	4.5	3.9	4.1	4.6	6.0	7.6	8.8	10.3	11.6	13.1	14.5	16.0	16.9	17.8	18.5	18.7	18.4	17.6	16.5	14.9	13.7	11.4	18.7	
3-Jun	13.2	12.2	11.8	10.4	9.8	10.3	11.4	12.6	14.2	15.5	16.6	18.5	20.7	21.9	22.7	23.4	23.3	23.4	23.2	22.2	21.4	20.2	19.1	18.1	17.3	23.4	
4-Jun	17.4	16.4	15.2	14.0	13.5	13.3	14.2	16.3	18.6	20.2	22.1	23.1	24.0	24.3	24.6	24.7	24.9	25.2	25.2	25.2	22.2	20.3	18.7	17.4	20.0	25.2	
5-Jun	16.4	15.7	15.1	14.6	14.4	14.7	15.9	18.2	20.4	21.6	22.2	23.0	23.7	24.3	24.7	25.1	25.4	23.4	19.2	18.9	19.1	17.6	17.5	17.7	19.5	25.4	
6-Jun	17.2	17.3	17.9	17.0	16.8	16.7	17.5	18.0	19.0	20.7	22.4	23.6	23.3	23.0	20.7	19.3	19.6	20.4	20.6	21.0	21.5	21.8	20.6	19.7	19.8	23.6	
7-Jun	18.5	17.7	16.9	17.2	17.0	15.8	15.8	16.6	17.9	19.6	20.7	22.1	22.3	22.9	23.3	23.8	24.0	24.0	24.1	23.6	23.3	22.8	21.3	18.9	20.4	24.1	
8-Jun	16.6	15.8	14.6	14.0	13.9	14.4	14.9	16.1	17.2	18.5	19.6	17.8	17.2	16.4	15.5	17.3	18.5	19.1	19.7	18.3	17.3	16.1	15.8	14.3	16.6	19.7	
9-Jun	13.2	12.5	12.2	11.4	9.9	9.8	11.1	12.4	14.8	15.4	17.0	18.3	18.2	16.0	15.9	16.3	16.5	16.1	16.2	15.9	15.5	15.2	14.2	13.3	14.5	18.3	
10-Jun	12.4	11.9	10.9	10.7	10.6	9.5	10.0	11.9	13.6	15.1	15.7	16.8	18.0	18.5	19.2	20.0	21.0	21.3	19.2	20.1	19.8	19.4	18.2	16.8	15.9	21.3	
11-Jun	15.7	15.2	14.3	13.2	13.1	13.6	14.3	14.6	15.2	16.5	18.1	20.1	22.5	23.1	22.7	22.5	19.7	17.9	16.9	17.9	16.8	15.4	15.9	15.7	17.1	23.1	
12-Jun	14.9	14.2	13.0	12.8	12.6	11.7	12.1	14.0	15.7	17.0	18.3	19.2	20.0	20.9	21.4	21.6	17.1	17.5	16.7	15.3	14.7	13.5	12.4	11.7	15.8	21.6	
13-Jun	10.6	10.3	9.7	10.1	10.3	10.4	10.7	11.3	13.2	14.2	15.2	15.5	15.0	15.3	15.8	15.1	15.0	14.8	15.2	14.9	14.6	14.4	12.8	11.7	13.2	15.8	
14-Jun	11.1	10.6	10.2	9.7	9.9	10.0	9.8	10.6	11.8	13.1	13.9	14.7	15.6	16.4	17.2	17.4	18.0	18.4	18.4	18.3	18.0	17.3	16.3	14.7	14.2	18.4	
15-Jun	14.0	12.9	11.8	11.1	10.9	10.8	10.1	9.7	10.1	10.5	10.6	11.1	11.8	12.7	12.9	14.4	15.5	16.2	16.8	16.0	14.9	14.4	13.7	12.7	12.7	16.8	
16-Jun	11.6	11.2	10.4	10.2	9.8	9.5	8.8	8.7	9.0	9.5	10.2	11.0	11.3	12.1	12.6	13.2	13.8	14.3	14.5	14.1	13.9	13.4	12.8	11.2	11.5	14.5	
17-Jun	10.3	9.9	9.5	9.0	8.3	8.0	7.7	8.7	9.5	9.9	10.3	11.2	11.8	12.8	13.6	14.2	14.9	15.6	15.6	15.2	14.5	13.6	12.2	10.6	11.5	15.6	
18-Jun	9.8	9.1	8.3	7.5	7.4	8.0	9.2	10.3	11.3	13.0	15.1	17.9	18.8	19.4	19.8	20.2	20.6	19.7	19.8	19.7	18.4	15.6	14.3	14.4	14.5	20.6	
19-Jun	15.0	14.7	13.6	12.8	11.8	11.2	11.3	12.1	13.2	14.6	15.5	16.5	17.3	17.9	18.7	19.3	19.7	19.8	19.8	19.6	19.1	18.1	17.2	15.5	16.0	19.8	
20-Jun	15.2	13.3	11.8	11.8	11.5	10.5	11.3	13.8	16.0	18.1	19.3	20.0	20.9	21.5	22.0	22.4	22.9	23.1	23.1	22.9	22.0	20.5	19.2	18.5	18.0	23.1	
21-Jun	18.2	17.0	16.0	15.9	15.0	14.7	14.8	15.1	15.2	16.2	17.1	18.3	19.2	20.0	20.6	21.1	21.0	20.8	19.8	19.0	18.2	17.6	16.8	15.3	17.6	21.1	
22-Jun	14.9	14.4	13.0	12.7	12.4	12.4	12.7	14.1	15.9	17.2	18.3	19.5	18.2	16.5	16.5	17.3	18.8	18.6	18.2	17.8	17.8	17.0	16.7	16.2	16.1	19.5	
23-Jun	15.5	14.2	13.1	11.3	10.5	9.7	10.9	13.6	16.5	18.5	20.2	21.5	21.3	19.1	20.0	21.5	22.6	22.6	22.0	21.6	21.0	20.2	19.3	18.4	17.7	22.6	
24-Jun	17.6	15.8	13.8	12.8	12.6	13.2	14.2	16.0	18.3	20.8	24.0	26.2	26.9	27.4	27.5	27.9	28.4	27.7	27.3	27.7	26.8	25.4	22.1	21.3	21.7	28.4	
25-Jun	20.8	20.1	18.7	17.7	16.9	16.4	17.6	19.2	21.5	23.6	25.1	26.1	27.1	28.1	28.5	24.0	20.2	20.6	21.8	20.5	19.5	19.6	19.7	19.8	21.4	28.5	
26-Jun	17.9	17.3	17.6	16.8	16.9	16.4	16.8	17.3	19.4	21.9	24.0	25.5	25.7	26.4	27.2	27.3	27.2	21.8	21.7	22.6	22.2	21.7	21.9	20.6	21.4	27.3	
27-Jun	19.3	18.7	18.6	17.8	17.2	17.3	18.0	18.9	21.0	23.4	26.0	27.4	28.0	28.6	29.1	29.6	30.1	30.2	29.8	29.7	28.7	27.3	24.9	23.3	24.3	30.2	
28-Jun	22.5	22.3	20.7	20.1	19.6	19.3	20.1	21.7	23.5	25.3	26.6	27.0	27.5	27.8	28.1	28.3	28.7	28.8	27.9	27.0	25.8	24.4	23.4	23.1	24.6	28.8	
29-Jun	21.4	19.3	18.3	17.7	17.0	16.3	16.0	17.9	20.3	23.4	25.7	26.9	28.0	28.8	29.4	30.1	30.5	30.1	30.0	29.4	28.0	25.8	25.3	24.5	24.2	30.5	
30-Jun	23.4	22.0	20.0	18.6	17.6	16.5	15.8	16.5	17.9	19.3	20.0	20.9	21.6	22.3	22.8	23.1	22.1	21.4	21.0	20.3	20.1	20.3	19.7	19.6	20.1	23.4	
		15.4	14.6	13.8	13.2	12.7	12.4	12.9	14.0	15.5	17.0	18.3	19.3	19.9	20.3	20.6	20.9	20.9	20.7	20.4	20.1	19.4	18.5	17.5	16.5	Diurnal Average	
		23.4	22.3	20.7	20.1	19.6	19.3	20.1	21.7	23.5	25.3	26.6	27.4	28.0	28.8	29.4	30.1	30.5	30.2	30.0	29.7	28.7	27.3	25.3	24.5	Diurnal Maximum	



WBEA
Hourly Averages

Ambient Temperature 45 m (AT45m) - C
Mannix - June 2015





WBEA
Cumulative Frequency Distribution

Ambient Temperature 45 m (AT45m) - C
Mannix - June 2015

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	59	8.19	8.19
10 - 20	450	62.50	70.69
> 20	211	29.31	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Summary of Hour Averages

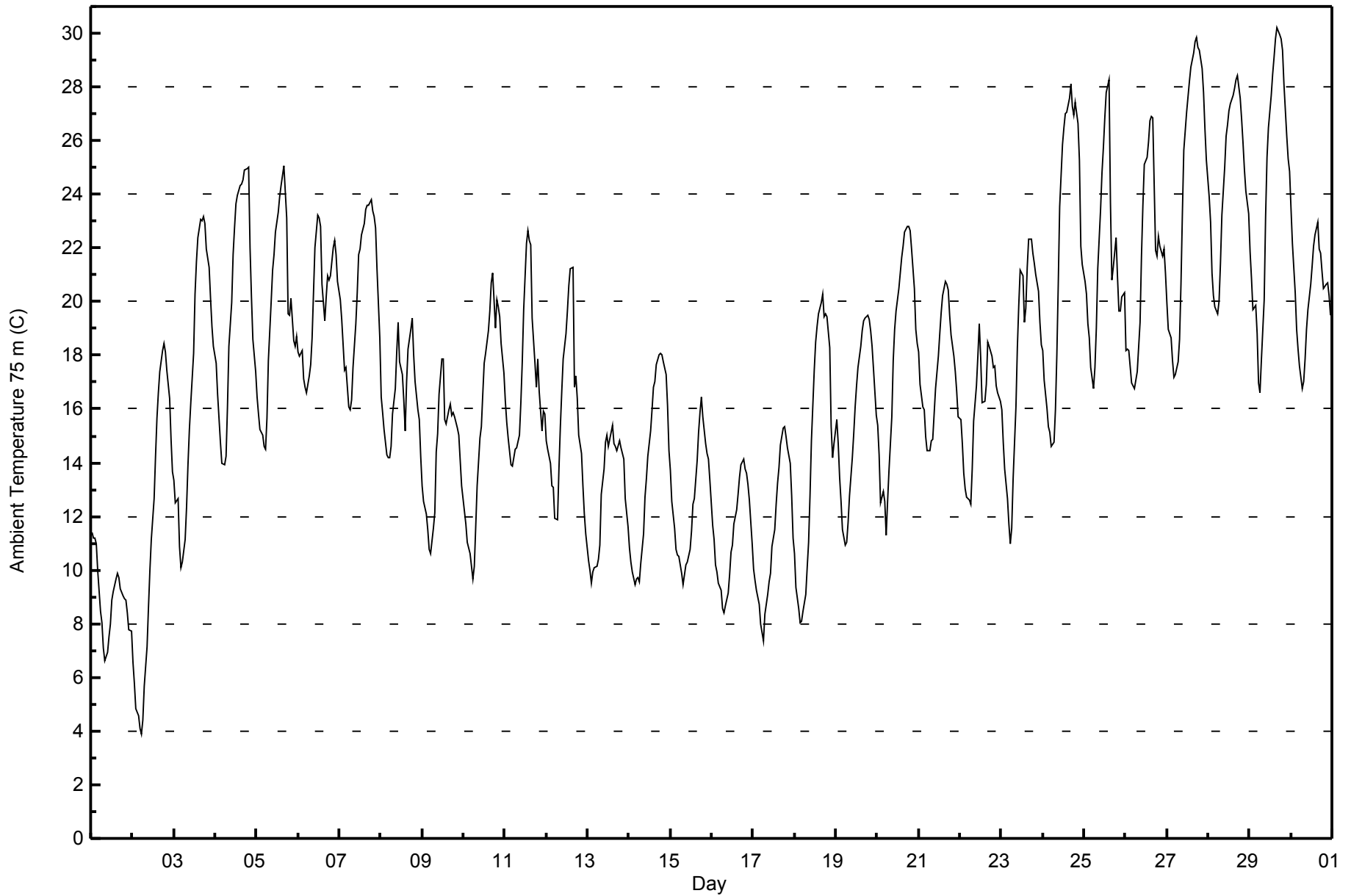
Mannix - June 2015

Maximum Value: 30.2 C on Jun 29 17:00																				Maximum Daily Average: 24.6 C on Jun 28					Hours in Service: 720																							
Minimum Value: 3.9 C on Jun 2 06:00																				Minimum Daily Average: 9.0 C on Jun 1					Hours of Data: 720																							
Maximum Diurnal Average: 20.7 C at hour 17																				Minimum Diurnal Average: 12.7 C at hour 6					Hours of Missing Data: 0																							
Monthly Average: 17.23 C																				Percentiles: P ₁ = 6.6 P ₁₀ = 10.1 Q ₁ = 13.7 Median = 17.2 Q ₃ = 20.7 P ₉₀ = 24.3 P ₉₉ = 29.4					Hours of Calibration: 0																							
																									Percent Operational Time: 100.0																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jun	11.4	11.2	11.2	11.0	10.0	8.5	8.1	7.1	6.6	6.9	7.5	8.0	8.9	9.2	9.7	9.9	9.7	9.3	9.0	9.0	8.9	8.4	7.8	7.7	9.0	11.4																						
2-Jun	6.6	5.8	4.8	4.6	4.1	3.9	4.4	5.7	7.1	8.6	10.0	11.1	12.7	14.2	15.6	16.6	17.4	18.2	18.5	18.1	17.4	16.4	14.9	13.7	11.3	18.5																						
3-Jun	13.4	12.5	12.7	10.9	10.1	10.3	11.2	12.3	13.9	15.2	16.3	18.1	20.3	21.5	22.4	23.1	23.0	23.2	22.9	22.0	21.3	20.1	19.1	18.3	17.2	23.2																						
4-Jun	17.7	16.6	15.7	14.8	14.0	13.9	14.2	16.1	18.3	20.0	21.7	22.7	23.6	23.9	24.3	24.4	24.5	24.9	24.9	25.0	22.0	20.2	18.6	17.4	20.0	25.0																						
5-Jun	16.5	15.8	15.2	15.0	14.6	14.5	15.7	17.8	20.0	21.2	21.8	22.6	23.3	23.9	24.3	24.7	25.0	23.1	19.6	19.5	20.1	18.5	18.3	18.7	19.6	25.0																						
6-Jun	18.2	18.0	18.2	17.1	16.8	16.6	17.3	17.7	18.6	20.3	22.0	23.2	23.1	22.8	20.6	19.3	20.2	21.0	20.8	21.0	22.0	22.3	21.8	20.8	20.0	23.2																						
7-Jun	20.1	19.3	18.4	17.4	17.6	16.1	16.0	16.3	17.5	19.2	20.3	21.7	22.0	22.5	22.9	23.4	23.6	23.6	23.8	23.4	23.2	22.7	21.2	18.7	20.5	23.8																						
8-Jun	16.4	15.9	15.2	14.3	14.2	14.2	14.6	15.8	16.8	18.1	19.3	17.7	17.3	16.4	15.2	17.0	18.2	19.0	19.4	18.0	17.0	16.0	15.6	14.2	16.5	19.4																						
9-Jun	13.1	12.6	12.1	11.5	10.8	10.6	11.6	12.2	14.4	15.1	16.6	17.9	17.8	15.6	15.4	16.0	16.2	15.8	15.9	15.7	15.3	15.0	14.1	13.1	14.3	17.9																						
10-Jun	12.2	11.7	11.0	10.8	10.6	9.7	10.1	11.6	13.1	14.9	15.3	16.5	17.7	18.1	18.9	19.7	20.7	21.1	19.0	20.1	19.8	19.5	18.5	17.3	15.7	21.1																						
11-Jun	16.3	15.5	14.9	13.9	13.9	14.2	14.5	14.5	15.0	16.2	17.8	19.7	22.2	22.7	22.3	22.1	19.4	17.7	16.8	17.9	16.7	15.2	15.9	15.8	17.1	22.7																						
12-Jun	14.8	14.5	14.0	13.1	13.1	11.9	11.9	13.8	15.4	16.6	17.9	18.8	19.7	20.6	21.2	21.3	16.8	17.2	16.4	15.0	14.3	13.2	12.1	11.4	15.6	21.3																						
13-Jun	10.4	10.0	9.5	9.9	10.1	10.2	10.4	10.9	12.8	13.8	14.8	15.0	14.6	14.9	15.4	14.7	14.6	14.4	14.8	14.6	14.4	14.1	12.7	11.6	12.9	15.4																						
14-Jun	10.8	10.3	9.9	9.5	9.7	9.7	9.6	10.2	11.4	12.7	13.4	14.2	15.2	16.0	16.8	17.0	17.7	18.0	18.1	18.0	17.8	17.3	16.1	14.5	13.9	18.1																						
15-Jun	13.7	12.6	11.6	10.8	10.5	10.5	9.9	9.4	9.8	10.2	10.3	10.8	11.4	12.4	12.6	14.1	15.1	15.9	16.4	15.7	14.7	14.3	14.2	13.3	12.5	16.4																						
16-Jun	11.7	11.1	10.2	9.9	9.5	9.2	8.6	8.4	8.6	9.2	9.8	10.7	10.9	11.7	12.2	12.8	13.5	13.9	14.2	13.7	13.6	13.2	12.6	11.0	11.3	14.2																						
17-Jun	10.0	9.6	9.2	8.7	8.0	7.7	7.4	8.3	9.1	9.6	9.9	10.9	11.5	12.4	13.2	13.8	14.7	15.3	15.3	15.0	14.5	14.0	12.7	11.2	11.3	15.3																						
18-Jun	10.6	9.3	8.6	8.1	8.1	8.4	9.1	10.1	11.0	12.8	14.8	17.5	18.5	19.1	19.6	20.0	20.3	19.4	19.6	19.5	18.3	15.3	14.2	14.7	14.4	20.3																						
19-Jun	15.6	14.7	13.4	12.5	11.5	10.9	11.0	11.8	12.8	14.2	15.1	16.1	16.9	17.5	18.3	18.9	19.3	19.4	19.5	19.3	18.9	18.3	17.5	15.8	15.8	19.5																						
20-Jun	15.4	14.3	12.5	12.9	12.6	11.3	12.6	13.7	15.7	17.8	19.0	19.7	20.5	21.1	21.6	22.1	22.6	22.8	22.8	22.6	21.9	20.5	19.0	18.4	18.1	22.8																						
21-Jun	18.1	16.9	16.1	16.0	15.0	14.5	14.5	14.8	14.8	15.8	16.7	18.0	18.8	19.6	20.2	20.8	20.7	20.4	19.5	18.7	18.0	17.4	16.7	15.7	17.4	20.8																						
22-Jun	15.6	14.7	13.6	13.0	12.7	12.6	12.4	13.8	15.5	16.9	17.9	19.2	17.9	16.3	16.3	16.9	18.5	18.3	18.0	17.5	17.6	16.8	16.6	16.3	16.0	19.2																						
23-Jun	16.0	14.8	13.8	12.6	11.7	11.0	11.6	13.4	16.1	18.3	19.9	21.1	20.9	19.2	19.7	21.3	22.3	22.3	21.8	21.4	21.0	20.4	19.3	18.4	17.9	22.3																						
24-Jun	18.2	17.1	16.1	15.3	15.1	14.6	14.7	16.0	18.0	20.6	23.6	25.8	26.5	27.0	27.1	27.6	28.1	27.3	26.9	27.4	26.7	25.3	22.1	21.4	22.0	28.1																						
25-Jun	20.8	20.3	19.2	18.7	17.5	16.8	17.6	19.0	21.2	23.4	24.8	25.7	26.9	27.8	28.2	23.7	20.8	21.3	22.4	20.9	19.7	19.7	20.2	20.3	21.5	28.2																						
26-Jun	18.2	18.2	18.2	17.0	16.9	16.8	17.1	17.4	19.2	21.7	23.6	25.1	25.4	26.0	26.7	26.9	26.9	21.9	21.7	22.4	22.0	21.7	22.0	21.1	21.4	26.9																						
27-Jun	20.0	18.9	18.6	17.8	17.2	17.3	17.8	18.6	20.7	23.3	25.6	27.1	27.6	28.2	28.7	29.3	29.7	29.8	29.5	29.4	28.7	27.8	26.5	25.3	24.3	29.8																						
28-Jun	23.9	23.0	21.1	20.2	19.8	19.5	20.0	21.5	23.2	25.0	26.2	26.6	27.1	27.4	27.7	28.0	28.3	28.4	27.6	26.8	25.9	24.9	24.1	23.3	24.6	28.4																						
29-Jun	21.9	20.8	19.7	19.9	18.8	17.0	16.6	17.8	20.1	23.1	25.4	26.5	27.7	28.5	29.1	29.8	30.2	29.9	29.8	29.4	28.1	26.2	25.3	24.8	24.4	30.2																						
30-Jun	23.5	22.2	20.3	19.0	18.2	17.6	16.7	17.0	17.8	19.0	19.7	20.6	21.3	22.1	22.5	23.0	21.9	21.8	21.1	20.5	20.7	20.7	20.2	19.5	20.3	23.5																						
																								15.7	14.9	14.2	13.5	13.1	12.7	12.9	13.8	15.2	16.7	17.9	19.0	19.6	19.9	20.3	20.6	20.7	20.5	20.2	19.9	19.4	18.5	17.7	16.8	Diurnal Average
																								23.9	23.0	21.1	20.2	19.8	19.5	20.0	21.5	23.2	25.0	26.2	27.1	27.7	28.5	29.1	29.8	30.2	29.9	29.8	29.4	28.7	27.8	26.5	25.3	Diurnal Maximum



WBEA
Hourly Averages

Ambient Temperature 75 m (AT75m) - C
Mannix - June 2015





WBEA
Cumulative Frequency Distribution

Ambient Temperature 75 m (AT75m) - C
Mannix - June 2015

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	67	9.31	9.31
10 - 20	442	61.39	70.69
> 20	211	29.31	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Summary of Hour Averages

Mannix - June 2015

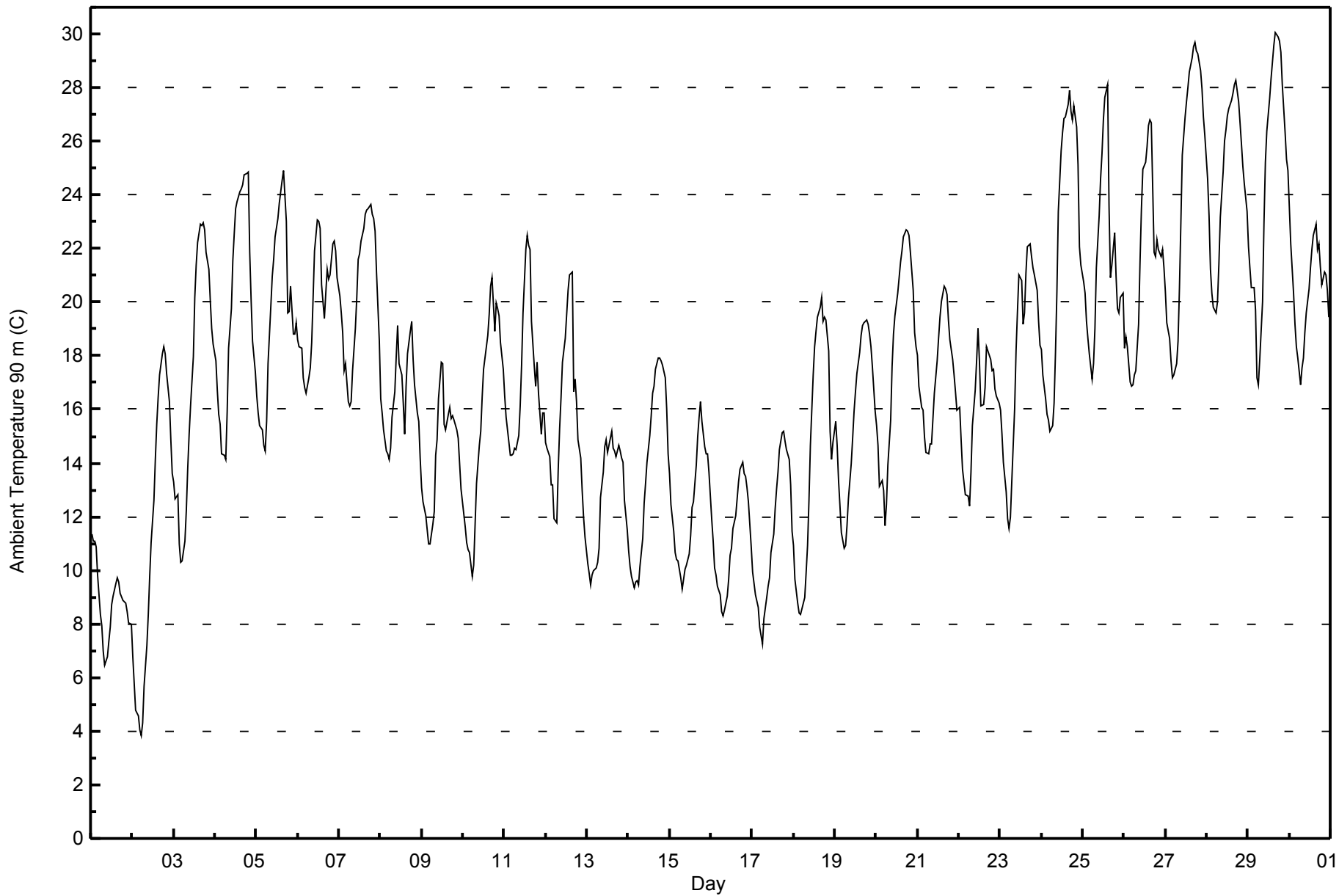
Maximum Value: 30.1 C on Jun 29 17:00		Maximum Daily Average: 24.6 C on Jun 28		Hours in Service: 720																																												
Minimum Value: 3.8 C on Jun 2 06:00		Minimum Daily Average: 8.9 C on Jun 1		Hours of Data: 720																																												
Maximum Diurnal Average: 20.5 C at hour 17		Minimum Diurnal Average: 12.8 C at hour 6		Hours of Missing Data: 0																																												
Monthly Average: 17.19 C		Percentiles: P ₁ = 6.4 P ₁₀ = 10.1 Q ₁ = 13.6 Median = 17.2 Q ₃ = 20.6 P ₉₀ = 24.2 P ₉₉ = 29.2		Hours of Calibration: 0																																												
				Percent Operational Time: 100.0																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jun	11.4	11.1	11.1	10.9	9.8	8.3	7.9	7.0	6.5	6.8	7.4	7.9	8.7	9.0	9.5	9.7	9.6	9.1	8.9	8.8	8.8	8.4	8.0	8.0	8.9	11.4																						
2-Jun	6.8	5.8	4.8	4.6	4.1	3.8	4.3	5.7	7.2	8.4	9.8	11.0	12.6	14.1	15.5	16.4	17.3	18.1	18.3	18.1	17.4	16.3	14.8	13.6	11.2	18.3																						
3-Jun	13.3	12.6	12.8	11.0	10.3	10.3	11.1	12.2	13.8	15.1	16.1	18.0	20.2	21.4	22.2	22.9	22.8	23.0	22.7	21.9	21.2	20.1	19.0	18.4	17.2	23.0																						
4-Jun	17.8	16.7	15.8	15.4	14.4	14.3	14.1	15.9	18.3	19.8	21.6	22.6	23.5	23.8	24.1	24.2	24.4	24.7	24.8	24.8	21.9	20.1	18.6	17.4	20.0	24.8																						
5-Jun	16.5	15.8	15.4	15.2	14.7	14.5	15.6	17.7	19.9	21.0	21.6	22.4	23.1	23.7	24.1	24.5	24.9	23.0	19.6	19.7	20.6	18.8	18.8	19.2	19.6	24.9																						
6-Jun	18.6	18.3	18.3	17.2	16.8	16.6	17.2	17.6	18.5	20.2	21.9	23.1	23.0	22.7	20.7	19.4	20.3	21.2	20.9	21.0	22.1	22.3	21.9	20.9	20.0	23.1																						
7-Jun	20.3	19.6	18.9	17.5	17.7	16.3	16.1	16.3	17.4	19.0	20.2	21.6	21.8	22.3	22.7	23.3	23.5	23.5	23.6	23.3	23.1	22.6	21.1	18.6	20.4	23.6																						
8-Jun	16.4	15.8	15.3	14.5	14.3	14.1	14.5	15.7	16.7	18.0	19.1	17.7	17.3	16.2	15.1	16.9	18.1	18.9	19.3	17.9	16.9	15.9	15.5	14.2	16.4	19.3																						
9-Jun	13.1	12.6	12.1	11.5	11.0	11.0	11.7	12.2	14.3	14.9	16.4	17.7	17.7	15.5	15.3	15.8	16.1	15.6	15.8	15.6	15.2	14.9	14.0	13.0	14.3	17.7																						
10-Jun	12.1	11.6	11.0	10.8	10.7	9.8	10.2	11.7	13.2	14.7	15.2	16.4	17.5	17.9	18.7	19.5	20.6	20.9	18.9	20.0	19.8	19.5	18.5	17.5	15.7	20.9																						
11-Jun	16.5	15.7	15.3	14.3	14.3	14.4	14.5	14.5	15.0	16.1	17.7	19.6	22.0	22.5	22.1	21.9	19.3	17.6	16.9	17.8	16.6	15.1	15.9	15.9	17.1	22.5																						
12-Jun	14.8	14.6	14.2	13.2	13.2	11.9	11.8	13.7	15.3	16.5	17.7	18.6	19.5	20.4	21.0	21.1	16.6	17.1	16.3	14.9	14.2	13.0	12.0	11.2	15.5	21.1																						
13-Jun	10.3	9.9	9.5	9.8	10.0	10.1	10.3	10.8	12.7	13.6	14.6	14.9	14.4	14.7	15.2	14.5	14.4	14.3	14.7	14.4	14.2	14.0	12.6	11.5	12.7	15.2																						
14-Jun	10.7	10.2	9.8	9.4	9.6	9.6	9.5	10.1	11.2	12.5	13.2	14.0	15.0	15.8	16.6	16.9	17.5	17.9	17.9	17.8	17.7	17.2	16.0	14.3	13.8	17.9																						
15-Jun	13.6	12.5	11.4	10.7	10.4	10.4	9.7	9.3	9.7	10.0	10.2	10.6	11.3	12.3	12.5	13.9	15.0	15.7	16.3	15.6	14.6	14.3	14.3	13.6	12.4	16.3																						
16-Jun	11.9	11.1	10.1	9.8	9.4	9.1	8.5	8.3	8.5	9.0	9.7	10.5	10.8	11.5	12.1	12.6	13.3	13.8	14.0	13.6	13.5	13.1	12.6	10.9	11.2	14.0																						
17-Jun	9.9	9.5	9.1	8.6	7.9	7.6	7.2	8.2	9.0	9.4	9.7	10.7	11.3	12.3	13.0	13.7	14.5	15.1	15.2	14.8	14.5	14.1	13.2	11.4	11.2	15.2																						
18-Jun	10.9	9.6	8.8	8.4	8.4	8.6	9.0	9.9	10.9	12.6	14.7	17.3	18.3	18.9	19.4	19.8	20.2	19.3	19.4	19.3	18.2	15.2	14.1	14.7	14.4	20.2																						
19-Jun	15.6	14.7	13.3	12.4	11.4	10.8	10.9	11.7	12.7	14.0	14.9	15.9	16.7	17.4	18.1	18.8	19.1	19.2	19.3	19.2	18.8	18.4	17.6	15.9	15.7	19.3																						
20-Jun	15.4	14.7	13.1	13.4	13.0	11.7	12.5	13.9	15.6	17.6	18.8	19.5	20.3	20.9	21.5	21.9	22.4	22.7	22.6	22.5	21.9	20.4	18.9	18.3	18.1	22.7																						
21-Jun	18.0	16.9	16.1	16.0	15.0	14.4	14.4	14.7	14.7	15.7	16.6	17.8	18.6	19.5	20.0	20.6	20.5	20.3	19.3	18.6	17.9	17.3	16.6	16.0	17.3	20.6																						
22-Jun	16.1	14.9	13.8	13.3	12.8	12.8	12.4	13.7	15.4	16.7	17.8	19.0	17.8	16.1	16.2	16.8	18.3	18.2	17.9	17.4	17.5	16.7	16.5	16.3	16.0	19.0																						
23-Jun	16.0	15.1	14.0	12.9	11.9	11.6	12.0	13.4	16.0	18.2	19.6	21.0	20.8	19.2	19.6	21.1	22.1	22.2	21.7	21.3	21.0	20.4	19.3	18.4	17.9	22.2																						
24-Jun	18.2	17.3	16.4	15.8	15.6	15.2	15.4	16.2	18.1	20.4	23.4	25.7	26.3	26.8	26.9	27.4	27.9	27.1	26.8	27.3	26.5	25.1	22.0	21.4	22.1	27.9																						
25-Jun	20.8	20.3	19.3	18.6	18.1	17.1	17.7	19.0	21.3	23.2	24.6	25.5	26.8	27.6	28.1	23.6	20.9	21.4	22.6	20.9	19.7	19.6	20.2	20.3	21.6	28.1																						
26-Jun	18.3	18.7	18.4	17.0	16.8	16.9	17.3	17.4	19.2	21.5	23.5	24.9	25.2	25.8	26.6	26.8	26.7	21.9	21.7	22.4	22.0	21.7	22.0	21.3	21.4	26.8																						
27-Jun	20.4	19.2	18.6	17.8	17.2	17.3	17.7	18.5	20.6	23.0	25.5	26.9	27.5	28.0	28.6	29.1	29.5	29.7	29.3	29.3	28.6	27.9	26.9	26.2	24.3	29.7																						
28-Jun	24.6	23.2	21.2	20.3	19.8	19.6	20.0	21.4	23.2	24.8	26.0	26.4	26.9	27.2	27.5	27.8	28.1	28.3	27.5	26.7	25.9	25.0	24.4	23.4	24.6	28.3																						
29-Jun	22.1	21.3	20.6	20.5	19.7	17.2	16.9	17.8	20.0	23.0	25.2	26.4	27.6	28.3	28.9	29.6	30.1	29.9	29.7	29.3	28.1	26.3	25.3	24.9	24.5	30.1																						
30-Jun	23.5	22.2	20.3	19.2	18.4	17.9	16.9	17.6	17.9	18.9	19.6	20.5	21.3	22.0	22.5	22.9	22.0	22.2	21.3	20.6	21.1	21.0	20.4	19.4	20.4	23.5																						
																								15.8	15.0	14.3	13.7	13.2	12.8	12.9	13.7	15.1	16.5	17.7	18.8	19.5	19.8	20.1	20.5	20.5	20.4	20.1	19.8	19.3	18.5	17.7	16.9	Diurnal Average
																								24.6	23.2	21.2	20.5	19.8	19.6	20.0	21.4	23.2	24.8	26.0	26.9	27.6	28.3	28.9	29.6	30.1	29.9	29.7	29.3	28.6	27.9	26.9	26.2	Diurnal Maximum



WBEA
Hourly Averages

Ambient Temperature 90 m (AT90m) - C

Mannix - June 2015





WBEA
Cumulative Frequency Distribution

Ambient Temperature 90 m (AT90m) - C
Mannix - June 2015

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	70	9.72	9.72
10 - 20	437	60.69	70.42
> 20	213	29.58	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

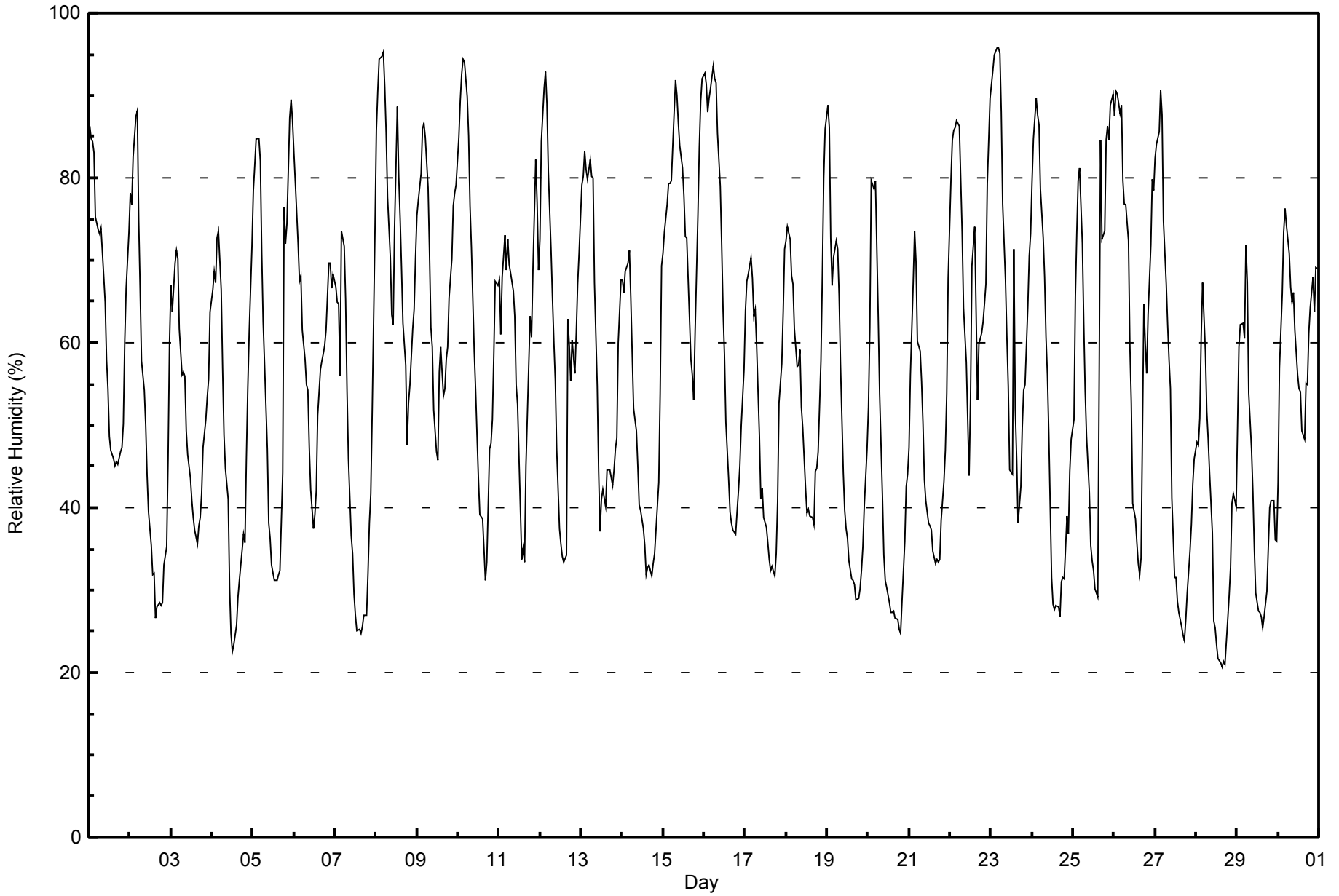


Maximum Value: 96 % on Jun 23 05:00																			Maximum Daily Average: 76.5 % on Jun 15						Hours in Service: 720	
Minimum Value: 21 % on Jun 28 16:00																			Minimum Daily Average: 37.8 % on Jun 28						Hours of Data: 720	
Maximum Diurnal Average: 79.1 % at hour 5																			Minimum Diurnal Average: 38.7 % at hour 16						Hours of Missing Data: 0	
Monthly Average: 57.0 %																			Percentiles: P ₁ = 23 P ₁₀ = 31 Q ₁ = 40 Median = 57 Q ₃ = 72 P ₉₀ = 85 P ₉₉ = 94						Hours of Calibration: 0	
																			Percent Operational Time: 100.0							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	86	85	84	83	75	74	73	74	71	65	58	54	49	47	46	45	46	45	47	47	50	60	67	73	62.7	86
2-Jun	78	77	82	87	88	75	67	58	54	50	44	40	35	32	32	27	28	28	28	28	33	35	46	60	50.5	88
3-Jun	67	64	70	71	70	62	56	56	56	49	46	44	41	39	37	36	38	39	42	47	51	53	56	64	52.2	71
4-Jun	66	69	67	73	74	66	57	49	45	41	30	25	23	23	26	29	31	33	37	36	46	54	61	72	47.2	74
5-Jun	78	81	85	85	82	71	62	58	47	38	36	33	31	31	31	32	32	44	77	72	74	87	89	87	60.2	89
6-Jun	83	79	72	67	68	62	58	55	54	47	42	37	39	42	51	57	58	59	60	62	70	70	67	68	59.5	83
7-Jun	67	65	65	56	74	72	65	54	46	37	34	29	27	25	25	25	26	27	27	32	38	42	52	74	45.1	74
8-Jun	86	91	94	95	95	91	85	78	70	63	62	74	89	80	75	69	62	57	48	53	55	62	64	70	73.7	95
9-Jun	75	77	80	86	87	85	79	71	62	60	52	47	46	56	60	53	54	58	59	65	70	77	78	79	67.4	87
10-Jun	85	89	93	94	94	90	85	77	71	59	54	49	44	39	39	35	31	33	47	48	51	58	68	67	62.5	94
11-Jun	68	61	68	73	69	72	69	68	66	63	55	53	40	34	35	33	45	57	63	61	69	82	77	69	60.5	82
12-Jun	72	84	91	93	89	81	71	65	60	55	47	38	36	34	33	34	63	60	55	60	56	61	67	71	61.6	93
13-Jun	79	80	83	81	80	82	80	80	67	55	44	37	41	42	40	45	45	45	43	45	47	48	60	68	59.0	83
14-Jun	68	66	69	70	71	65	59	52	49	45	40	40	37	35	32	33	33	32	33	34	37	43	54	69	48.6	71
15-Jun	71	73	77	79	79	80	88	92	90	87	84	81	78	73	73	63	58	56	53	61	75	84	89	92	76.5	92
16-Jun	93	91	88	90	91	94	92	91	85	79	72	64	58	50	43	39	38	37	37	39	42	45	50	57	65.3	94
17-Jun	64	68	68	70	68	63	64	60	49	41	42	39	38	36	34	32	33	32	34	41	53	57	64	71	50.8	71
18-Jun	72	74	73	68	67	62	57	57	59	52	50	42	39	40	39	39	38	44	45	47	58	68	80	86	56.5	86
19-Jun	89	86	73	67	70	72	71	66	57	44	40	38	36	33	31	31	31	29	29	30	32	35	40	47	49.1	89
20-Jun	52	62	80	79	80	71	63	54	41	34	31	30	29	27	27	27	27	26	25	25	29	36	43	44	43.4	80
21-Jun	47	56	67	73	70	60	59	55	50	43	41	38	38	37	35	33	34	33	34	38	43	47	54	68	48.2	73
22-Jun	80	85	86	86	87	86	80	73	64	58	51	44	53	69	74	64	53	60	61	63	65	67	79	90	69.9	90
23-Jun	91	93	95	96	96	95	88	77	68	61	55	45	44	71	52	46	38	42	50	54	55	64	70	73	67.5	96
24-Jun	79	85	90	88	86	79	73	68	61	56	49	31	28	28	28	27	31	31	31	39	37	44	48	48	51.9	90
25-Jun	51	66	73	80	81	72	62	54	49	42	35	34	32	30	29	55	85	73	74	85	86	85	89	90	62.9	90
26-Jun	88	90	90	88	89	80	77	77	72	60	53	40	39	36	33	32	34	65	60	56	63	72	80	79	64.6	90
27-Jun	82	84	86	91	88	75	67	62	58	54	41	31	31	29	27	26	25	24	26	30	35	38	43	46	49.9	91
28-Jun	48	48	51	61	67	59	52	48	44	37	26	25	23	22	21	21	21	21	26	29	33	41	42	40	37.8	67
29-Jun	50	59	62	62	61	72	67	54	47	42	35	30	27	27	27	25	27	30	35	40	41	41	36	36	43.0	72
30-Jun	43	57	66	73	76	74	71	67	65	66	62	56	54	54	49	48	55	55	61	64	68	64	69	69	62.0	76
	72.0	74.9	77.6	78.8	79.1	74.7	69.9	65.0	59.3	52.8	47.1	42.3	40.9	40.8	39.5	38.7	40.5	42.5	44.9	47.5	52.1	57.1	62.6	67.5	Diurnal Average	
	93	93	95	96	96	95	92	92	90	87	84	81	89	80	75	69	85	73	77	85	86	87	89	92	Diurnal Maximum	



WBEA
Hourly Averages

Relative Humidity (RH) - %
Mannix - June 2015





WBEA
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Mannix - June 2015

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	181	25.14	25.14
40 - 60	212	29.44	54.58
60 - 80	225	31.25	85.83
80 - 100	102	14.17	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

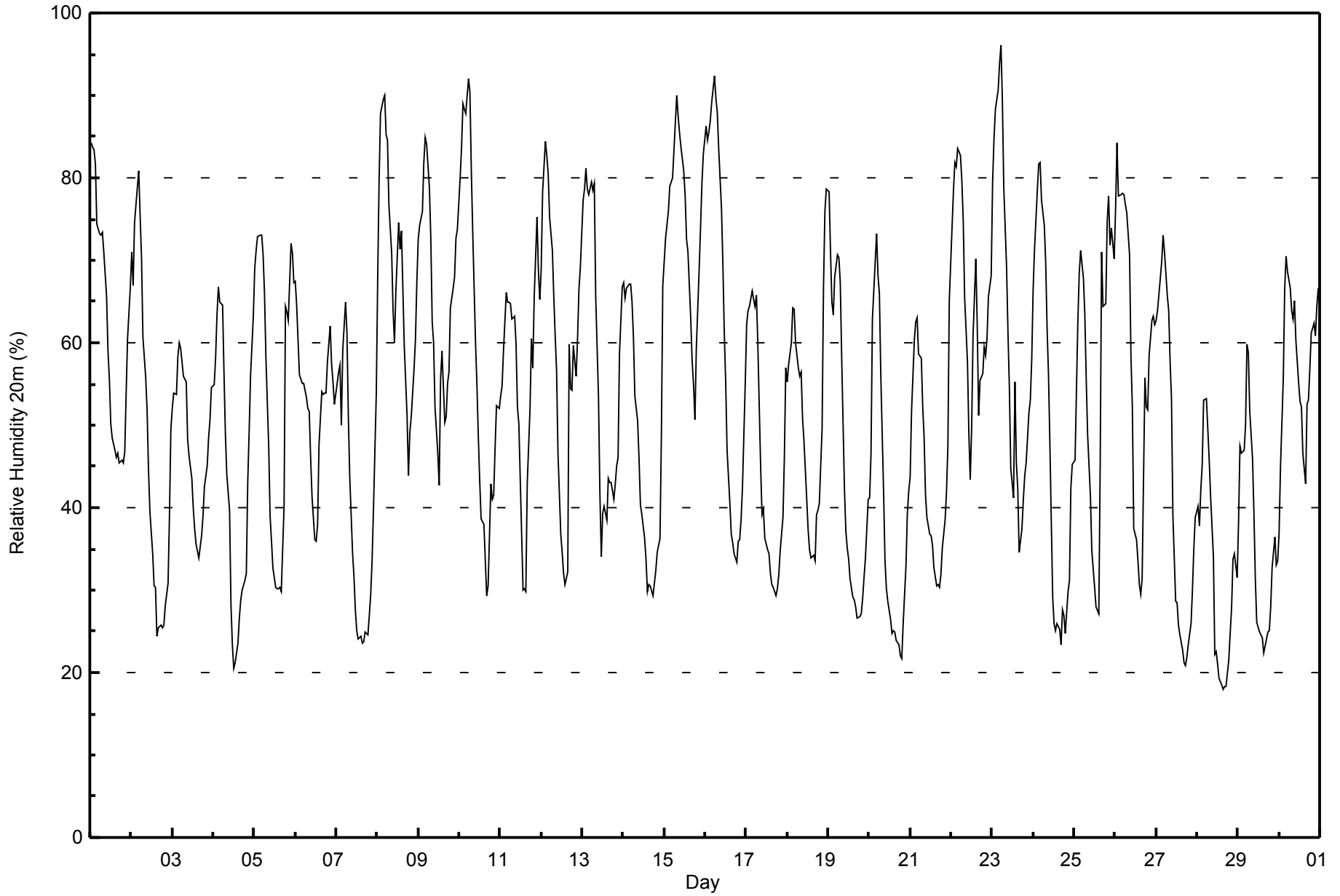


Maximum Value: 96 % on Jun 23 06:00																			Maximum Daily Average: 74.3 % on Jun 15						Hours in Service: 720	
Minimum Value: 18 % on Jun 28 16:00																			Minimum Daily Average: 32.3 % on Jun 28						Hours of Data: 720	
Maximum Diurnal Average: 72.6 % at hour 5																			Minimum Diurnal Average: 36.2 % at hour 16						Hours of Missing Data: 0	
Monthly Average: 52.7 %																			Percentiles: P ₁ = 21 P ₁₀ = 28 Q ₁ = 36 Median = 53 Q ₃ = 67 P ₉₀ = 78 P ₉₉ = 90						Hours of Calibration: 0	
																			Percent Operational Time: 100.0							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	84	84	83	82	74	73	73	73	71	66	59	56	50	48	47	46	47	45	46	45	47	54	61	67	61.7	84
2-Jun	71	67	75	79	81	75	70	61	56	52	45	39	34	31	30	24	25	26	25	26	28	31	39	50	47.5	81
3-Jun	52	54	54	58	60	59	56	56	55	48	46	43	40	38	36	34	35	37	39	43	45	48	51	55	47.6	60
4-Jun	55	58	63	67	65	65	56	49	44	40	28	23	21	21	24	27	29	30	31	32	43	49	56	63	43.3	67
5-Jun	69	71	73	73	73	71	66	58	48	39	36	33	30	30	30	30	30	40	64	64	63	72	71	67	54.2	73
6-Jun	67	65	56	56	55	55	53	52	52	46	41	36	36	38	48	54	54	54	54	58	62	57	55	53	52.4	67
7-Jun	55	56	57	50	59	65	61	51	44	35	32	28	25	24	24	24	25	24	27	30	34	40	54	39.5	65	
8-Jun	68	80	88	89	90	85	85	77	71	64	60	66	75	71	73	67	60	51	44	49	51	57	60	67	68.7	90
9-Jun	73	74	76	82	85	84	79	73	63	60	52	47	43	56	59	50	51	55	56	64	67	68	73	74	65.1	85
10-Jun	80	84	89	88	88	92	90	81	73	60	55	49	43	39	38	34	29	30	43	41	42	47	52	52	59.1	92
11-Jun	54	55	59	66	65	65	65	63	63	60	52	50	37	30	30	30	43	52	61	57	66	75	69	65	55.4	75
12-Jun	69	78	84	83	81	75	71	66	61	57	47	37	35	32	31	32	60	54	54	60	56	61	66	69	59.1	84
13-Jun	77	79	81	79	78	80	79	79	66	53	42	34	39	40	38	44	43	43	41	43	45	46	59	67	57.3	81
14-Jun	67	65	67	67	67	65	61	54	51	46	40	39	36	34	30	31	30	29	31	32	35	36	49	67	47.0	67
15-Jun	70	73	76	79	80	80	87	90	88	85	84	81	78	72	71	63	58	55	51	59	69	74	79	83	74.3	90
16-Jun	86	85	86	87	89	92	90	88	84	76	70	61	55	47	40	37	36	34	33	36	36	38	42	55	61.8	92
17-Jun	62	64	64	66	65	64	66	60	45	39	40	36	35	34	32	31	30	29	30	32	35	39	46	57	46.0	66
18-Jun	55	57	60	64	64	60	57	56	56	51	48	41	37	35	34	34	34	39	40	41	50	67	76	79	51.4	79
19-Jun	78	71	65	63	68	71	70	67	58	42	37	35	34	31	29	29	28	27	27	27	29	32	34	41	45.6	78
20-Jun	41	47	63	70	73	68	66	56	42	34	30	29	26	25	25	25	24	23	22	22	26	33	39	42	39.6	73
21-Jun	44	52	60	63	63	59	58	52	48	41	39	37	37	35	33	31	31	30	32	35	38	42	48	65	44.6	65
22-Jun	74	78	82	81	84	83	80	75	65	58	49	43	50	61	70	62	51	56	56	60	59	61	66	68	65.4	84
23-Jun	79	85	88	91	94	96	89	79	69	61	55	45	41	55	45	42	35	38	41	44	45	52	53	58	61.7	96
24-Jun	66	71	79	82	82	77	74	70	62	56	48	29	26	25	26	25	23	28	27	25	30	31	42	45	47.9	82
25-Jun	46	54	63	68	71	68	63	56	49	41	35	33	30	28	27	46	71	64	65	75	78	72	74	70	56.1	78
26-Jun	76	84	78	78	78	78	77	76	71	58	52	37	36	34	31	30	31	56	52	52	59	63	63	62	58.8	84
27-Jun	63	64	68	70	73	71	66	64	58	53	39	29	29	26	24	23	21	21	22	23	26	30	35	39	43.1	73
28-Jun	40	38	42	45	53	53	49	46	41	34	22	23	21	19	18	18	18	18	21	25	28	34	34	32	32.3	53
29-Jun	38	47	47	47	50	60	59	52	46	39	31	26	25	25	24	22	23	25	25	28	33	36	33	33	36.5	60
30-Jun	37	45	56	66	70	69	67	64	63	65	60	55	53	52	47	43	53	53	57	61	62	61	64	67	57.9	70
	63.3	66.2	69.4	71.3	72.6	71.9	69.4	64.7	58.7	52.0	45.8	40.7	38.6	37.9	37.2	36.2	37.6	38.9	40.5	42.8	46.0	50.0	54.3	58.8	Diurnal Average	
	86	85	89	91	94	96	90	90	88	85	84	81	78	72	73	67	71	64	65	75	78	75	79	83	Diurnal Maximum	



WBEA
Hourly Averages

Relative Humidity 20m (RH20m) - %
Mannix - June 2015





WBEA
Cumulative Frequency Distribution

Relative Humidity 20m (RH20m) - %
Mannix - June 2015

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	5	0.69	0.69
20 - 40	212	29.44	30.14
40 - 60	236	32.78	62.92
60 - 80	213	29.58	92.50
80 - 100	54	7.50	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

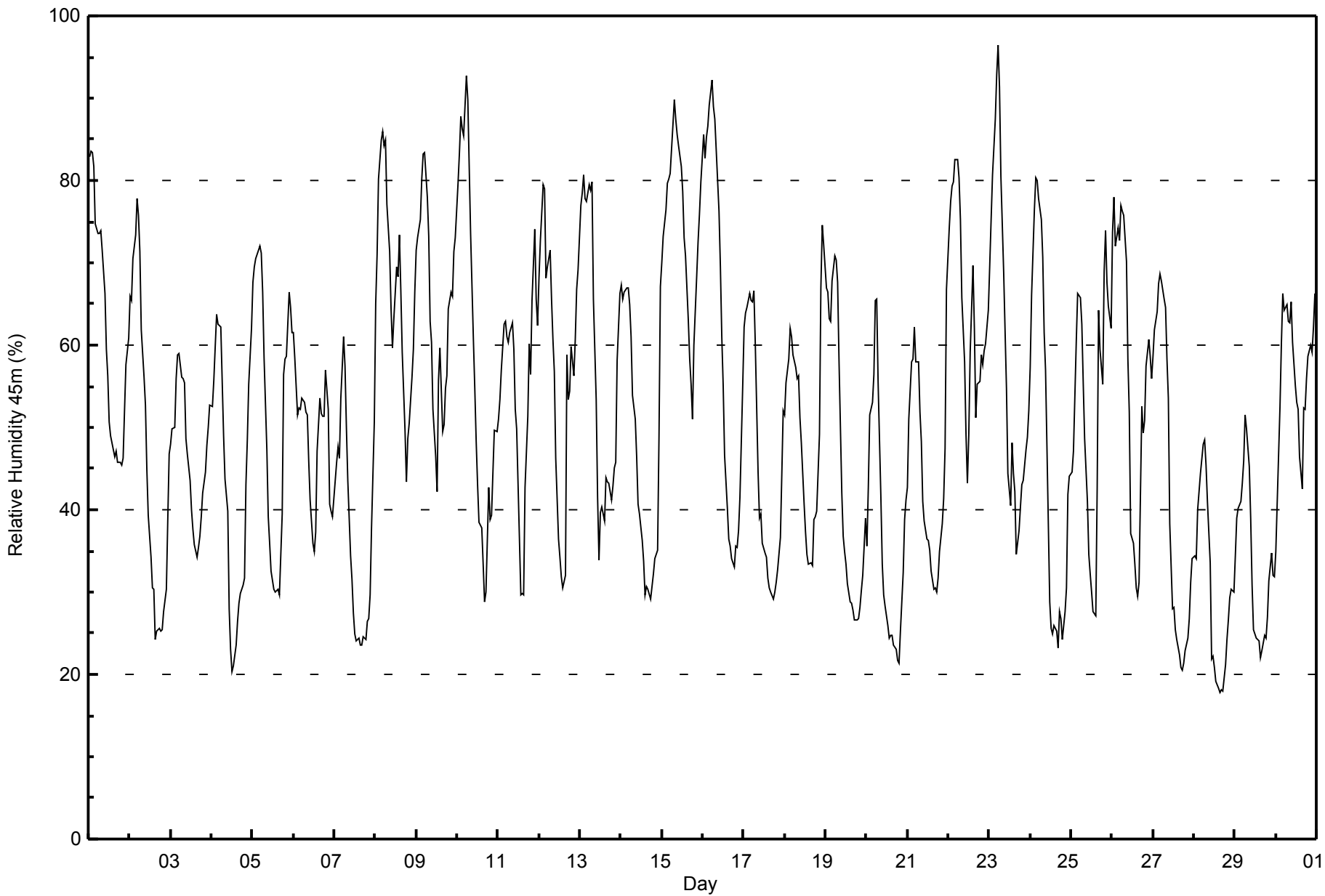


Maximum Value: 96 % on Jun 23 06:00																		Maximum Daily Average: 74.3 % on Jun 15																		Hours in Service: 720													
Minimum Value: 18 % on Jun 28 16:00																		Minimum Daily Average: 30.4 % on Jun 28																		Hours of Data: 720													
Maximum Diurnal Average: 70.3 % at hour 6																		Minimum Diurnal Average: 35.9 % at hour 16																		Hours of Missing Data: 0													
Monthly Average: 51.3 %																		Percentiles: P ₁ = 21 P ₁₀ = 28 Q ₁ = 36 Median = 51 Q ₃ = 65 P ₉₀ = 76 P ₉₉ = 90																		Hours of Calibration: 0													
																																				Percent Operational Time: 100.0													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jun	83	84	83	82	75	74	74	74	72	66	60	56	51	49	47	46	47	46	46	45	46	52	58	61	61.5	84																							
2-Jun	66	65	71	73	78	76	71	62	56	53	45	39	34	30	30	24	25	26	25	25	28	30	39	47	46.6	78																							
3-Jun	48	50	50	56	59	59	56	56	55	49	47	44	40	38	36	34	35	37	39	42	45	48	50	53	46.8	59																							
4-Jun	53	56	60	64	62	62	56	49	44	40	28	23	20	21	23	29	30	31	32	43	49	55	62	62	42.4	64																							
5-Jun	68	69	71	72	72	71	67	58	47	39	36	32	30	30	30	27	30	40	57	58	59	66	65	62	52.4	72																							
6-Jun	61	58	52	52	52	54	53	52	52	46	41	36	35	37	47	54	52	51	51	57	52	41	40	39	48.6	61																							
7-Jun	44	46	48	46	54	61	57	50	43	34	32	27	25	24	24	24	25	24	26	27	30	38	51	51	36.8	61																							
8-Jun	65	71	80	85	86	84	85	77	71	64	60	63	69	68	73	67	59	50	43	49	50	56	59	66	66.8	86																							
9-Jun	72	73	75	80	83	83	78	73	63	60	52	46	42	56	60	49	50	55	56	64	66	66	71	73	64.5	83																							
10-Jun	80	83	88	86	85	93	90	82	74	61	55	48	43	38	38	33	29	30	43	39	39	45	50	50	58.3	93																							
11-Jun	51	53	57	63	63	61	60	62	63	59	52	50	37	30	30	30	43	51	60	56	65	74	66	62	54.1	74																							
12-Jun	68	73	79	79	68	69	71	66	61	57	46	36	34	32	30	32	59	53	54	60	56	61	67	69	57.6	79																							
13-Jun	77	79	81	78	78	79	79	80	66	53	41	34	40	40	39	44	43	43	41	43	45	46	58	66	57.2	81																							
14-Jun	67	66	66	67	67	65	61	54	51	46	41	39	36	34	30	31	30	29	31	32	34	35	49	67	47.0	67																							
15-Jun	70	73	76	80	80	81	87	90	88	86	84	82	79	73	71	63	58	55	51	60	68	73	76	80	74.3	90																							
16-Jun	86	83	85	87	89	92	89	88	84	76	70	61	55	47	40	36	36	34	33	36	35	37	42	55	61.4	92																							
17-Jun	62	64	64	66	65	65	67	60	45	39	39	36	35	34	32	30	30	29	30	31	33	37	44	52	45.4	67																							
18-Jun	52	55	58	62	61	59	57	56	56	51	48	41	37	35	33	34	33	39	39	40	49	67	75	72	50.4	75																							
19-Jun	67	66	63	63	68	71	70	68	58	42	37	35	33	31	29	29	28	27	27	27	28	30	32	39	44.5	71																							
20-Jun	36	43	52	53	56	65	66	56	42	33	30	28	26	24	25	25	24	23	22	21	25	32	39	41	36.9	66																							
21-Jun	43	51	58	58	62	58	58	52	48	41	39	36	36	35	33	30	30	30	32	35	38	41	47	67	44.2	67																							
22-Jun	74	78	79	80	83	83	80	75	66	58	49	43	49	59	70	62	51	55	56	59	58	59	60	64	64.6	83																							
23-Jun	70	75	81	88	93	96	91	80	69	62	55	44	41	48	44	42	35	37	40	43	44	47	49	52	59.4	96																							
24-Jun	57	66	76	80	80	78	75	71	62	57	48	29	26	25	26	25	23	28	27	24	28	31	42	44	46.9	80																							
25-Jun	45	47	54	60	66	66	63	55	49	41	35	32	30	28	27	43	64	59	55	69	74	68	65	62	52.3	74																							
26-Jun	74	78	72	74	73	77	76	76	70	58	52	37	36	33	31	29	31	53	49	51	57	61	59	56	56.8	78																							
27-Jun	59	62	64	67	69	68	66	65	58	54	38	28	28	25	24	22	21	21	21	23	24	27	31	34	41.6	69																							
28-Jun	34	34	40	42	44	48	49	45	41	34	22	22	21	19	18	18	18	18	21	24	27	29	30	30	30.4	49																							
29-Jun	34	39	40	41	43	46	51	50	45	39	31	25	24	24	24	22	23	25	24	27	31	35	32	32	33.7	51																							
30-Jun	35	41	53	60	66	64	65	63	63	65	60	55	53	52	46	42	52	52	56	59	60	59	62	66	56.3	66																							
																								59.9	62.7	65.9	68.2	69.4	70.3	68.9	64.8	58.6	52.1	45.7	40.4	38.2	37.4	37.0	35.9	37.1	38.3	39.5	41.9	44.5	47.7	51.6	55.8	Diurnal Average	
																								86	84	88	88	93	96	91	90	88	86	84	82	79	73	73	67	64	59	60	69	74	74	76	80	Diurnal Maximum	



WBEA
Hourly Averages

Relative Humidity 45m (RH45m) - %
Mannix - June 2015





WBEA
Cumulative Frequency Distribution

Relative Humidity 45m (RH45m) - %
Mannix - June 2015

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	5	0.69	0.69
20 - 40	225	31.25	31.94
40 - 60	246	34.17	66.11
60 - 80	197	27.36	93.47
80 - 100	47	6.53	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

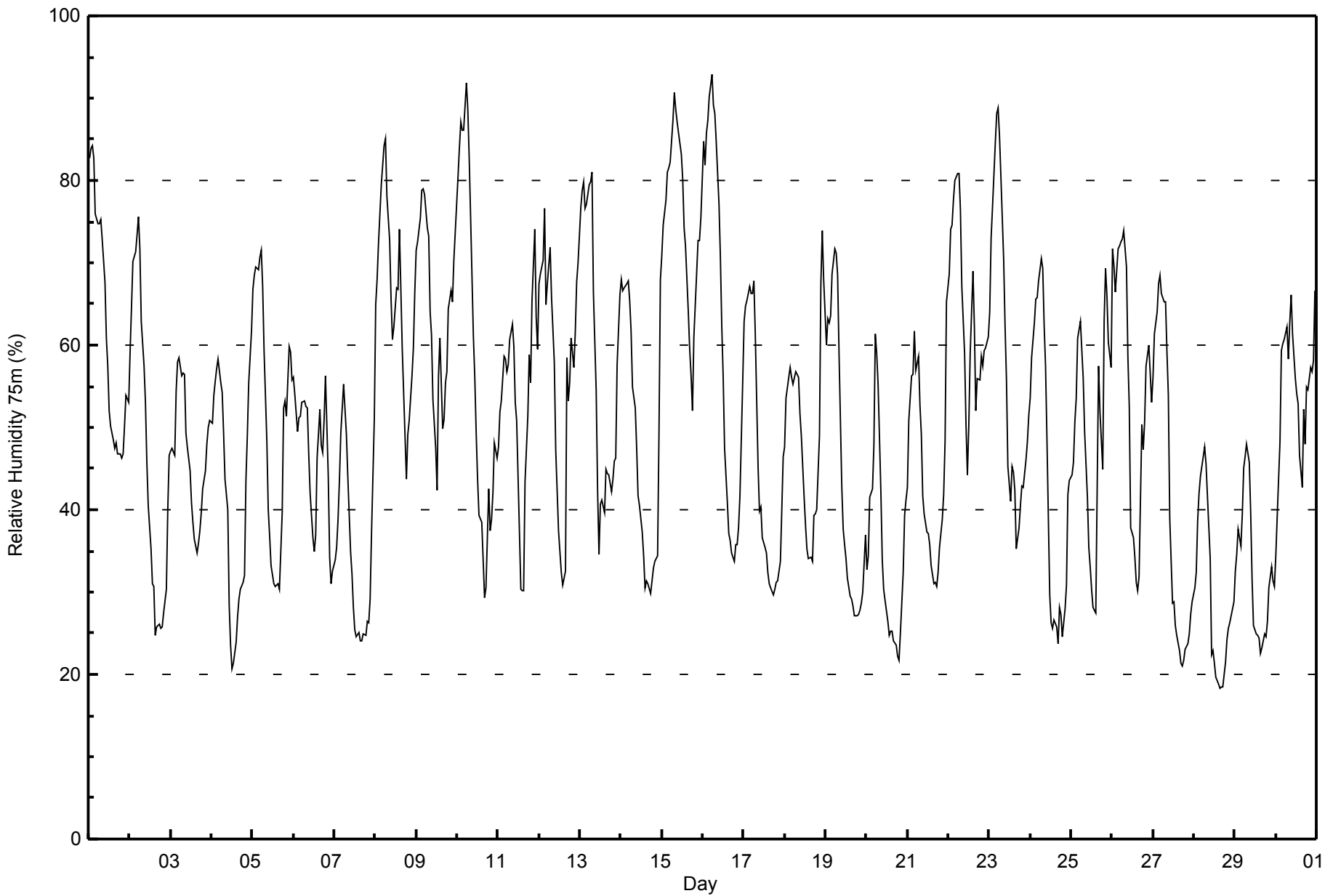


Maximum Value: 93 % on Jun 16 06:00																			Maximum Daily Average: 75.0 % on Jun 15						Hours in Service: 720																								
Minimum Value: 18 % on Jun 28 16:00																			Minimum Daily Average: 29.9 % on Jun 28						Hours of Data: 720																								
Maximum Diurnal Average: 68.2 % at hour 6																			Minimum Diurnal Average: 36.4 % at hour 16						Hours of Missing Data: 0																								
Monthly Average: 50.6 %																			Percentiles: P ₁ = 21 P ₁₀ = 28 Q ₁ = 35 Median = 50 Q ₃ = 63 P ₉₀ = 74 P ₉₉ = 89						Hours of Calibration: 0																								
																			Percent Operational Time: 100.0																														
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jun	83	84	84	83	76	75	75	75	73	68	61	58	52	50	48	48	48	47	47	46	47	50	54	53	61.8	84																							
2-Jun	59	65	70	71	73	76	72	63	57	53	46	41	35	31	31	25	26	26	26	26	28	30	40	47	46.5	76																							
3-Jun	47	47	47	54	58	59	56	57	56	49	48	45	41	39	36	35	36	37	40	42	45	48	50	51	46.8	59																							
4-Jun	51	54	56	57	58	55	54	49	44	40	29	24	21	21	24	27	29	30	31	32	44	49	55	62	41.5	62																							
5-Jun	67	69	69	69	71	71	67	59	48	40	37	33	31	31	31	31	30	40	52	53	51	60	59	56	51.1	71																							
6-Jun	56	54	49	51	51	53	53	53	52	47	42	37	35	37	46	52	48	47	51	56	44	34	31	32	46.4	56																							
7-Jun	34	35	39	44	49	55	52	49	44	35	32	28	25	25	24	24	25	25	26	26	29	37	51	35.0	55																								
8-Jun	65	68	72	79	82	84	85	78	73	66	61	62	67	67	74	67	60	49	44	49	51	56	60	66	66.0	85																							
9-Jun	71	73	75	79	79	78	74	73	64	61	53	47	42	56	61	50	51	55	57	64	67	65	70	74	64.3	79																							
10-Jun	81	84	87	86	86	92	89	83	76	61	56	49	44	39	38	34	29	30	43	37	39	42	48	46	58.3	92																							
11-Jun	48	52	53	59	58	57	58	61	63	60	53	51	37	30	30	30	43	51	59	55	65	74	63	59	52.9	74																							
12-Jun	67	69	70	77	65	67	72	66	62	58	47	37	35	32	31	33	59	53	55	61	57	61	68	70	57.2	77																							
13-Jun	77	79	80	77	77	80	80	81	66	54	42	35	41	41	40	45	44	44	42	44	46	46	58	66	57.7	81																							
14-Jun	68	67	67	67	68	65	62	55	52	47	42	41	37	34	30	31	31	30	31	33	34	34	50	68	47.7	68																							
15-Jun	71	75	78	81	82	82	87	91	89	87	86	83	80	74	72	64	59	56	52	61	69	73	73	75	75.0	91																							
16-Jun	85	82	86	87	90	93	89	88	85	77	71	62	56	47	41	37	36	35	34	36	36	38	42	56	62.0	93																							
17-Jun	63	65	65	67	66	66	68	61	45	40	40	37	35	35	32	31	31	30	30	31	31	34	40	46	45.4	68																							
18-Jun	48	54	56	57	56	55	57	56	56	52	49	42	38	35	34	34	34	39	40	40	49	67	74	68	49.6	74																							
19-Jun	60	63	63	63	69	72	71	68	59	43	38	36	34	32	29	29	28	27	27	27	28	29	30	37	44.3	72																							
20-Jun	33	34	41	42	48	61	59	55	42	34	30	29	26	25	25	25	24	24	22	22	25	32	39	41	35.0	61																							
21-Jun	43	51	56	56	62	57	59	53	49	42	39	37	37	36	33	31	31	31	32	35	39	42	48	65	44.4	65																							
22-Jun	69	74	75	78	80	81	81	77	67	59	50	44	50	59	69	62	52	56	56	59	57	59	60	61	63.9	81																							
23-Jun	64	73	77	85	88	89	85	81	70	62	56	45	41	45	45	42	35	38	40	43	43	46	48	52	58.0	89																							
24-Jun	54	59	63	66	66	68	71	69	62	57	49	30	26	26	27	26	24	28	27	25	28	31	42	44	44.3	71																							
25-Jun	44	46	51	54	61	63	59	56	49	42	35	33	30	28	28	43	57	52	45	63	69	66	60	57	49.6	69																							
26-Jun	72	70	66	72	72	73	73	74	69	59	53	38	37	34	31	30	32	50	47	51	57	60	57	53	55.4	74																							
27-Jun	56	61	64	67	68	66	65	65	59	54	39	29	29	26	25	23	21	21	22	23	24	25	27	29	41.2	68																							
28-Jun	30	32	39	42	44	47	48	46	42	34	22	23	21	20	19	18	19	18	22	24	26	26	27	29	29.9	48																							
29-Jun	32	35	38	36	40	45	46	48	46	40	32	26	25	25	24	23	23	25	25	27	30	33	31	31	32.7	48																							
30-Jun	34	39	48	59	60	61	62	58	63	66	61	56	54	53	47	43	52	48	55	55	57	57	58	67	54.7	67																							
																								57.7	60.3	62.8	65.5	66.8	68.2	67.6	64.9	59.5	52.9	46.6	41.2	38.8	37.8	37.6	36.4	37.3	38.1	39.3	41.6	43.7	46.6	50.0	53.7	Diurnal Average	
																								85	84	87	87	90	93	89	91	89	87	86	83	80	74	74	67	60	56	59	64	69	74	74	75	Diurnal Maximum	



WBEA
Hourly Averages

Relative Humidity 75m (RH75m) - %
Mannix - June 2015





WBEA
Cumulative Frequency Distribution

Relative Humidity 75m (RH75m) - %
Mannix - June 2015

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	5	0.69	0.69
20 - 40	228	31.67	32.36
40 - 60	268	37.22	69.58
60 - 80	176	24.44	94.03
80 - 100	43	5.97	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

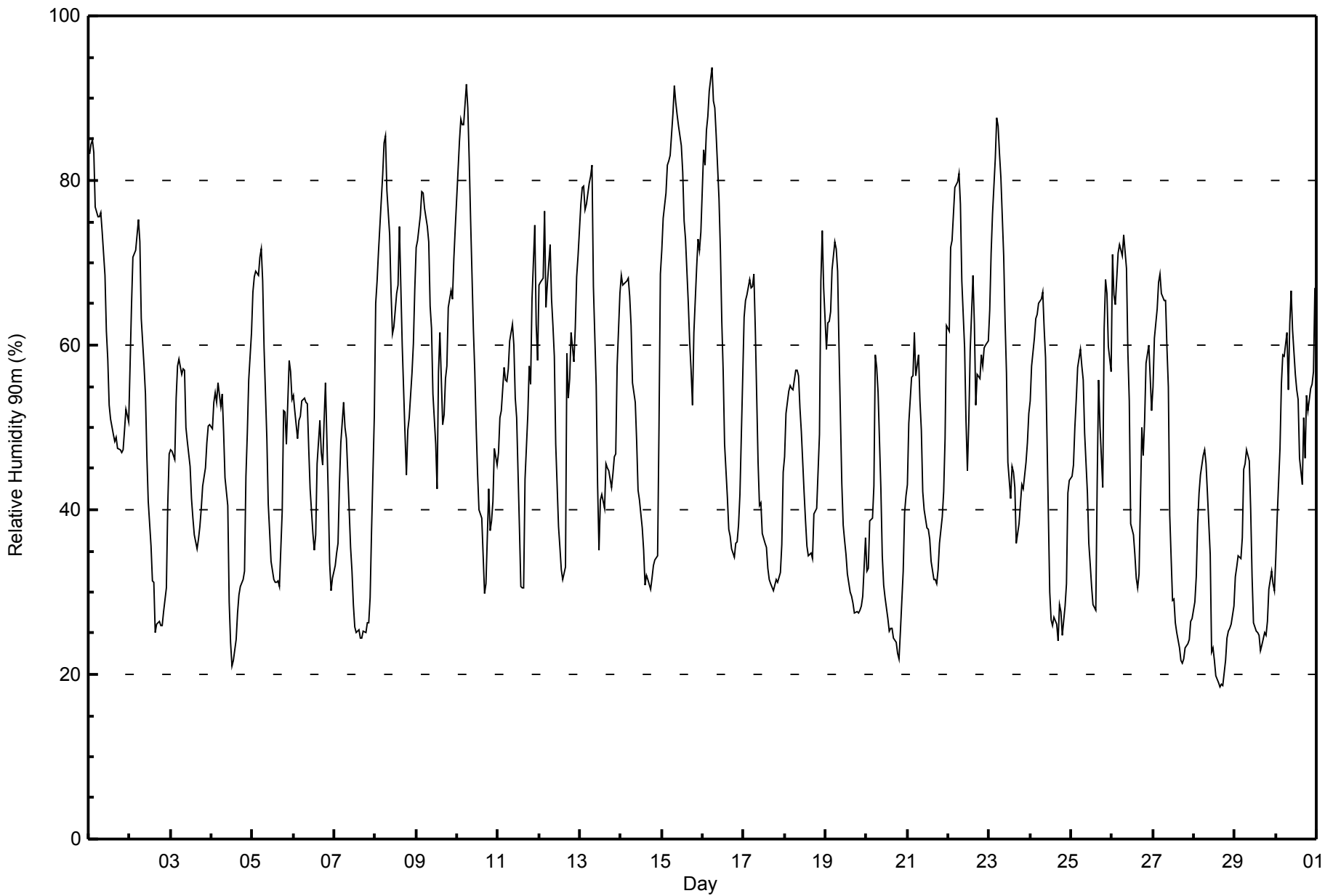


Maximum Value: 94 % on Jun 16 06:00																			Maximum Daily Average: 75.6 % on Jun 15						Hours in Service: 720																								
Minimum Value: 19 % on Jun 28 16:00																			Minimum Daily Average: 29.8 % on Jun 28						Hours of Data: 720																								
Maximum Diurnal Average: 67.5 % at hour 6																			Minimum Diurnal Average: 36.8 % at hour 16						Hours of Missing Data: 0																								
Monthly Average: 50.6 %																			Percentiles: P ₁ = 22 P ₁₀ = 28 Q ₁ = 36 Median = 50 Q ₃ = 63 P ₉₀ = 74 P ₉₉ = 88						Hours of Calibration: 0																								
																									Percent Operational Time: 100.0																								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jun	83	84	85	83	77	76	76	76	74	69	62	58	53	51	49	48	49	47	47	47	50	52	51	62.2	85																								
2-Jun	58	65	71	72	73	75	73	63	57	54	47	41	36	31	31	25	26	26	26	26	28	31	41	47	46.7	75																							
3-Jun	47	47	46	54	58	58	56	57	57	50	48	45	41	39	37	35	36	38	40	43	45	48	50	50	47.0	58																							
4-Jun	50	53	54	53	55	52	54	50	44	41	29	24	21	22	24	27	30	31	32	32	44	49	56	62	41.2	62																							
5-Jun	67	68	69	68	71	72	68	60	49	41	37	34	32	31	31	31	31	40	52	52	48	58	57	53	50.8	72																							
6-Jun	54	52	49	51	51	53	53	53	53	48	43	37	35	37	46	51	47	45	51	55	42	33	30	32	45.9	55																							
7-Jun	33	35	36	43	48	53	50	49	44	35	33	28	26	25	24	24	25	25	25	26	26	29	37	51	34.7	53																							
8-Jun	65	68	71	78	81	85	85	79	73	66	61	62	66	67	74	67	60	49	44	50	51	57	60	67	66.1	85																							
9-Jun	72	73	76	79	78	77	74	72	65	62	54	48	42	57	62	50	52	56	57	65	67	66	70	74	64.5	79																							
10-Jun	81	85	88	87	87	92	89	83	75	62	57	50	44	40	39	34	30	31	42	38	39	41	47	45	58.6	92																							
11-Jun	47	51	52	57	56	56	57	61	63	60	54	51	38	31	31	31	44	52	58	55	66	75	63	58	52.6	75																							
12-Jun	67	68	68	76	65	68	72	66	62	59	48	38	35	33	31	33	59	54	56	61	58	62	68	71	57.4	76																							
13-Jun	77	79	79	76	77	80	80	82	67	55	43	35	41	42	40	46	45	45	43	44	46	47	57	66	58.1	82																							
14-Jun	69	67	67	68	68	66	62	55	53	48	42	41	38	35	31	32	32	30	32	33	34	34	50	69	48.2	69																							
15-Jun	71	75	79	82	82	83	88	92	90	88	87	84	81	75	73	65	60	57	53	61	69	73	72	74	75.6	92																							
16-Jun	84	82	86	88	91	94	90	89	85	78	72	63	57	48	42	38	37	35	34	36	36	38	42	56	62.5	94																							
17-Jun	63	65	66	68	67	67	69	62	46	40	41	37	36	35	33	32	31	30	31	32	31	32	36	45	45.6	69																							
18-Jun	46	52	54	55	55	54	57	57	56	52	49	42	39	36	34	35	34	40	40	40	49	68	74	67	49.4	74																							
19-Jun	60	63	63	64	69	72	72	69	60	43	38	36	35	32	30	30	29	28	28	28	28	28	29	37	44.5	72																							
20-Jun	33	33	39	39	43	59	57	54	43	34	31	29	27	25	26	26	24	24	22	22	25	33	40	42	34.5	59																							
21-Jun	43	51	56	56	62	56	59	53	50	42	40	38	38	36	34	31	32	31	33	36	39	42	49	62	44.5	62																							
22-Jun	62	72	73	76	79	80	81	77	68	60	51	45	51	59	68	62	53	56	56	59	57	60	60	61	63.5	81																							
23-Jun	64	71	76	83	88	87	83	80	71	63	57	46	41	45	45	43	36	38	41	43	43	46	48	52	57.8	88																							
24-Jun	53	57	61	63	64	65	66	66	62	58	49	30	27	26	27	26	24	28	28	25	28	31	42	44	43.8	66																							
25-Jun	44	45	50	53	57	60	58	56	49	42	36	33	31	29	28	43	56	50	43	62	68	66	60	57	49.0	68																							
26-Jun	71	66	65	71	72	72	71	73	69	59	53	38	37	35	32	31	32	50	47	51	58	60	56	52	55.0	73																							
27-Jun	55	61	64	68	69	66	65	65	60	55	39	29	29	26	25	23	22	21	22	23	24	24	26	27	41.2	69																							
28-Jun	29	32	38	42	44	47	47	46	42	35	23	23	22	20	19	19	19	19	22	24	25	26	26	28	29.8	47																							
29-Jun	32	33	34	34	37	45	46	47	46	40	32	26	25	25	25	23	24	25	25	26	30	33	31	30	32.2	47																							
30-Jun	34	39	47	55	59	59	61	55	62	67	62	56	55	53	46	43	51	46	54	52	55	55	57	67	53.8	67																							
																								57.1	59.7	62.1	64.7	66.1	67.5	67.3	64.9	59.8	53.5	47.2	41.7	39.2	38.2	37.9	36.8	37.5	38.3	39.4	41.6	43.5	46.5	49.5	53.2	Diurnal Average	
																								84	85	88	88	91	94	90	92	90	88	87	84	81	75	74	67	60	57	58	65	69	75	74	74	Diurnal Maximum	



WBEA
Hourly Averages

Relative Humidity 90m (RH90m) - %
Mannix - June 2015





WBEA
Cumulative Frequency Distribution

Relative Humidity 90m (RH90m) - %
Mannix - June 2015

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	5	0.69	0.69
20 - 40	224	31.11	31.81
40 - 60	275	38.19	70.00
60 - 80	174	24.17	94.17
80 - 100	42	5.83	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Maximum Speed: 29 km/h on Jun 13 16:00	Maximum Daily Speed Average: 18.6 km/h on Jun 1	Hours in Service: 720
Minimum Speed Value: 0 km/h on Jun 10 08:00	Minimum Daily Speed Average: 0.7 km/h on Jun 25	Hours of Data: 720
Maximum Diurnal Speed Average: 6.2 km/h at hour 13	Minimum Diurnal Speed Average: 0.3 km/h at hour 20	Hours of Missing Data: 0
Monthly Average Velocity: 2.5 km/h 288.0 deg	Percentiles: P ₁ = 1 P ₁₀ = 4 Q ₁ = 6 Median = 9 Q ₃ = 13 P ₉₀ = 17 P ₉₉ = 27	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	W11	W16	WNW17	WNW20	WNW23	WNW25	WNW23	WNW25	WNW24	WNW24	WNW25	W24	WNW28	WNW26	NW23	NW23	NW21	NW21	NNW17	NW12	WNW10	W9	WSW10	W11	WNW18.6	WNW28
2-Jun	W6	N6	SW5	NW3	NNE4	NE5	SSE1	SSE3	ESE5	SSE4	ESE4	ESE6	ESE7	SE7	SE8	SSE9	SSE8	SSE8	SE11	SE13	SE11	SE12	S9	S7	SE4.6	SE13
3-Jun	SSE7	SE7	SSE8	SSE8	SE6	SE6	SE10	SE9	SE9	SE11	SE14	SE12	SE11	SE15	SSE16	SSE14	SSE15	SSE16	SSE16	SSE15	SSE13	SSE14	SSE13	SSE12	SSE11.4	SSE16
4-Jun	SSE11	SSE8	SE10	SE12	SSE9	SSE12	SSE11	SSE9	SE7	SE11	SE13	S13	SE13	SSE17	SSE17	SSE15	S14	SSE12	SSE11	SSE14	S22	SSW13	S14	SSE12	SSE12.1	S22
5-Jun	SSE12	SSE8	SSE8	SSE9	SSE11	SSE9	S11	S10	SSW17	S17	SSW17	SSW15	S15	S14	S14	S14	SSW13	WSW20	SSW12	ESE10	SSE10	SSE10	SSE11	S10	S11.1	WSW20
6-Jun	SSW7	SSW6	SW12	SSW7	SW9	SW5	WSW7	W16	W12	W8	WNW7	W8	W9	NNW1	SW15	WSW14	SW16	SE4	SE4	SSW4	WSW6	W8	W9	W9	WSW7.3	W16
7-Jun	W9	WSW8	WSW10	WNW13	WSW6	W7	W15	W18	W16	W19	WNW19	W21	WNW22	W25	WNW26	W23	W21	WNW16	W13	W7	SW6	WSW9	NW6	SW5	W13.7	WNW26
8-Jun	SE2	S6	SSW6	SSE5	SSE4	SW5	WSW9	W15	W15	WNW12	WNW11	NNW6	SW13	NW11	ENE13	E5	NE3	WNW14	NW22	NNW18	NW17	NW12	WNW15	WNW15	WNW6.6	NW22
9-Jun	WNW13	WNW11	NW9	W10	WSW10	WSW11	W10	W13	W12	W12	W9	W8	W15	NNE13	NE9	NNW12	W10	NW12	NW6	W9	W9	NW6	N9	N10	WNW8.0	W15
10-Jun	N5	N7	WNW3	WNW2	NNW3	SSW4	W2	SW0	E5	NE1	W5	WNW3	W4	WNW10	WNW7	WNW7	NW4	WNW1	SW10	S2	ESE4	SSE5	SE7	SSE8	W1.6	SW10
11-Jun	SSE9	SE9	SE7	SE10	SE10	SSE5	E9	SE9	SE9	SE9	SE12	SE4	SW13	SW18	SSW17	SW14	W14	SSE11	SE7	SE8	SE11	SSE6	NE3	E12	SSE6.6	SW18
12-Jun	NE5	WNW9	WSW7	SW4	WSW9	SW5	WSW7	WNW6	W7	WSW5	W6	W7	WNW8	WSW4	S4	ENE7	ESE14	SSE13	E15	E15	E15	ENE17	ENE17	ENE15	ESE1.7	ENE17
13-Jun	NE14	NE9	NNE12	N12	N14	NNW12	NW12	NNW14	N19	NNE26	N25	NNE28	NNE29	NNE28	NNE29	NNE29	NNE25	NNE25	NNE24	NNE25	NNE17	NNE14	ENE7	E7	NNE18.1	NNE29
14-Jun	E8	NE8	NNE8	NNE9	NNW8	NNW10	N17	NNE17	NNE15	N16	NNE21	N17	N18	N18	NNE19	N18	N13	NNW14	N12	NE10	NE8	N5	N12	NNE17	N12.7	NNE21
15-Jun	NNE15	NNE14	NNE16	NNE16	NNE15	NNE12	NNE11	NNE9	N6	NNW5	NE7	NE5	NE4	NW2	WNW4	W7	W9	W6	WSW10	SSW8	S6	S5	SSE5	S5	N4.1	NNE16
16-Jun	SE3	NNW12	NNE10	N15	N11	N9	N18	N12	N12	NNW12	NNW10	NNW12	NNW14	NNW13	NNW15	NNW14	NNW13	NNW13	N10	NNE8	N6	N8	N10	NNE20	N10.9	NNE20
17-Jun	NNE12	N7	NNW11	NNW11	NNW11	NNW11	NNW11	NNE12	N12	NNE13	NNW7	N6	WNW9	W8	W5	W6	SW5	WSW4	SSE7	SSE10	SSE9	SSE9	SSE10	SSE8	NNW2.9	NNE13
18-Jun	SSE9	SSE9	SE9	SE9	SE11	SE12	SSE10	SSE10	SSE9	SSE9	SE6	SSE8	SSE10	SSE9	SSE8	S6	SSE8	SW9	WSW4	SSE3	S9	WSW18	WSW14	WNW15	S6.6	WSW18
19-Jun	WNW11	NNW12	N20	N22	N19	N17	NNE14	NNE13	N13	NNE16	NNE16	NNE13	NNE11	N10	NNE10	N8	N10	NNE12	NNE10	NNE9	NNE11	NNE9	NNE8	NNE8	N11.9	N22
20-Jun	N7	N3	WSW5	W5	WSW4	S1	WNW1	W3	WSW3	W4	W5	NW9	NW8	NW9	WNW9	WNW9	NNW7	NW7	NNE7	NE8	NNE10	N5	N10	NE9	NNW4.0	NNE10
21-Jun	NNE8	N10	N8	N8	N9	NNE12	NNE6	N5	N8	NNW6	NW8	NNW9	N9	NW7	N13	N14	N7	N9	NNE14	N10	NNW8	NW7	W6	WSW9	N7.5	NNE14
22-Jun	WSW8	WSW9	WSW11	W10	W7	SW7	SW7	W8	W9	W9	WSW9	W7	WNW15	NW5	WSW14	WSW19	W20	NW14	N5	ENE6	NNE4	ENE6	SSW2	SSE2	W6.8	W20
23-Jun	W3	WSW6	SW6	SSW6	S5	SSE3	SE3	SSE5	ESE4	ESE4	SE1	WNW5	NW12	NW10	NNW3	S5	S4	SSE7	SSE8	S8	S8	S6	SSW5	SE6	SSW2.9	NW12
24-Jun	SSE7	SSE8	SSE8	SE7	SSE6	SSE7	SSE7	SE6	SE7	SE6	SE4	WSW13	WSW13	WSW15	SW17	SW12	SSW8	SW15	W6	W1	SW3	NNE11	NNE14	NNE14	SSW3.7	SW17
25-Jun	NE4	SW4	WSW5	WNW3	NE1	NW2	NE2	NNE4	NNE3	NE3	NNW0	SSE4	SSE4	ESE2	ENE3	W12	NNW10	NNE10	W5	SSE6	W11	WSW6	SSE8	SSE8	W0.7	W12
26-Jun	SSE5	SSE8	SSE7	SSE2	SSW7	SE6	SE8	SSE7	SE4	SSW3	WNW2	W24	W25	W27	W24	W29	W25	W23	W14	WSW15	W12	WSW4	SW10	SW7	WSW9.6	W29
27-Jun	SW6	SSE4	S4	SW5	SSW5	S4	SSW4	S4	SSE5	SE5	SSW1	W4	W14	W14	W13	W14	W13	W19	W13	WSW10	SW8	WSW11	WSW10	WSW11	WSW6.9	W19
28-Jun	WSW11	WSW12	WSW4	SSE6	SSE6	S2	W6	W10	WNW8	NW10	NW18	WNW23	WNW26	WNW26	WNW24	WNW23	NW20	WNW19	NNW13	NNW12	WNW8	W9	WNW9	NNW8	WNW11.3	WNW26
29-Jun	W6	SW6	SW5	WSW8	SSW4	S6	S4	SSW2	W4	W7	WSW8	WSW8	W7	WNW7	WNW7	W12	SW4	SSE7	SE8	SSE7	NNE2	NNE10	ENE10	ENE10	SW2.5	W12
30-Jun	ENE3	ENE3	SE2	WSW4	WSW5	SW6	SW7	WSW7	W6	W6	NE3	SE1	ESE4	ESE1	ENE3	NNE2	N10	NNE9	WNW6	W11	WSW2	ESE6	SW9	WSW12	W1.8	WSW12
WSW0.6 W1.2 W1.6WNW1.6WNW1.2 W1.0WNW1.6WNW3.0 NW2.6 NW2.8 NW3.2WNW4.8WNW6.2WNW5.8WNW4.0 W6.1WNW5.0WNW4.4 NW2.0 NE0.3 SW1.2WSW0.8WSW0.7 N0.3																								Diurnal Average		
NNE15 W16 N20 N22WNW23WNW25WNW23WNW25WNW24 NNE26 N25 NNE28 NNE29 NNE28 NNE29 NNE29 W25 NNE25 NNE24 NNE25 S22 WSW18 ENE17 NNE20																								Diurnal Maximum		

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



Summary of Hour Standard Deviations

Mannix - June 2015

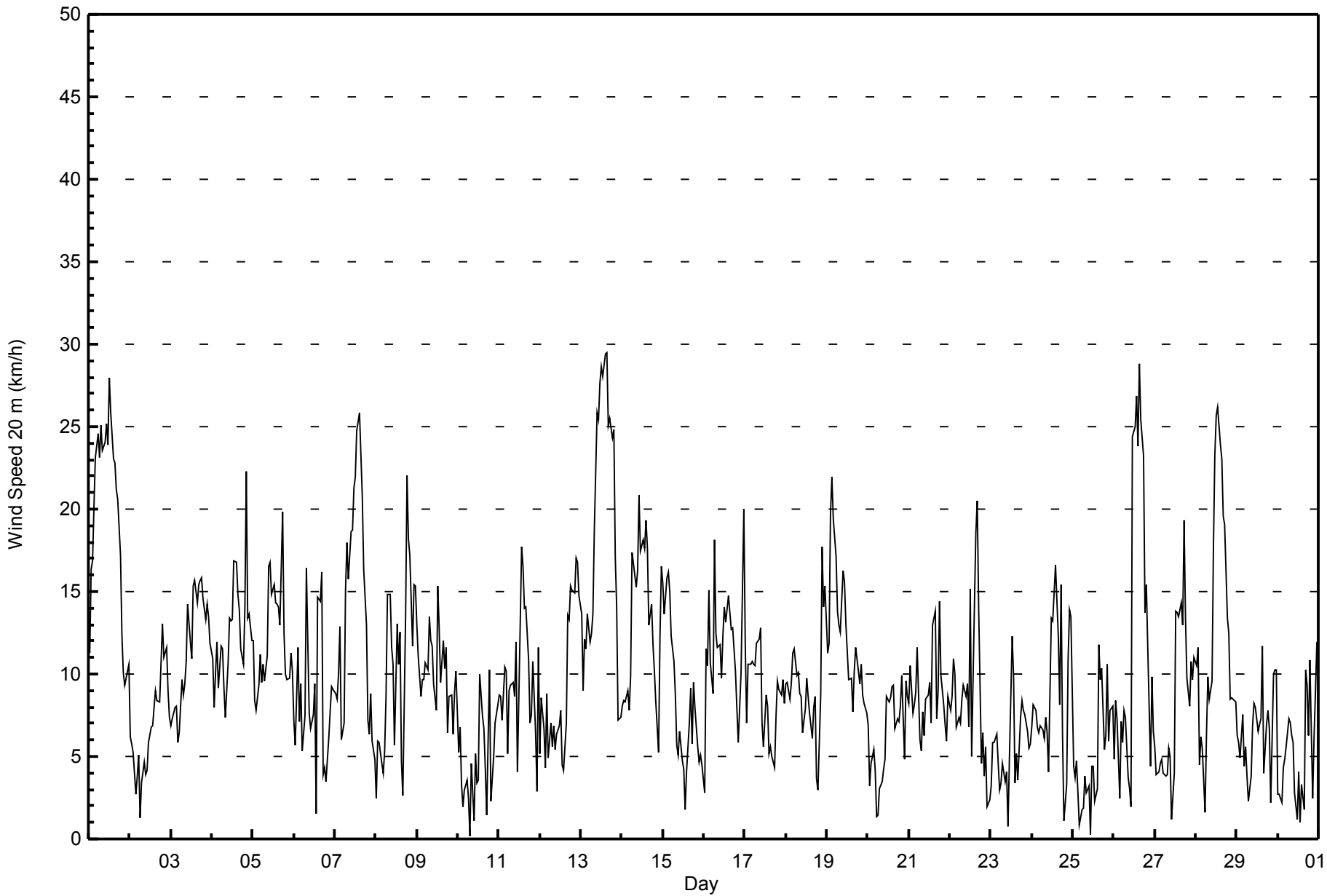
Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 12 km/h on Jun 22 13:00																		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0							
Minimum Value: 1 km/h on Jun 7 00:00																									
Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 2 Median = 3 Q ₃ = 5 P ₉₀ = 7 P ₉₉ = 9																									
Day	Hourly Period Ending At (MST)																							Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23		24
1-Jun	3	3	4	6	7	7	7	7	6	7	7	6	7	7	7	7	7	7	6	5	3	1	2	2	7
2-Jun	3	3	2	1	2	2	2	2	3	2	3	3	4	4	4	5	4	4	4	5	3	4	3	2	5
3-Jun	1	2	2	2	2	3	4	3	4	4	5	5	6	6	6	5	6	7	5	4	4	4	3	7	
4-Jun	3	3	3	4	4	4	4	4	3	4	5	7	7	8	7	7	6	6	5	6	10	6	5	4	10
5-Jun	4	3	2	3	3	4	4	5	6	8	7	7	7	8	7	7	6	9	8	4	3	3	3	9	
6-Jun	2	2	3	3	3	2	3	4	3	3	4	4	7	6	6	5	8	3	2	1	1	1	1	8	
7-Jun	1	1	3	5	3	4	3	3	4	5	5	8	7	7	7	5	6	5	4	3	1	6	3	8	
8-Jun	2	2	3	1	1	2	4	4	4	4	4	5	7	7	4	3	2	6	8	7	6	4	5	8	
9-Jun	4	3	3	2	3	2	3	4	3	3	4	4	6	8	5	5	4	6	3	3	2	2	3	8	
10-Jun	3	2	3	2	2	2	1	2	2	2	3	2	3	4	4	4	3	3	5	2	2	1	3	5	
11-Jun	3	3	2	3	3	3	3	3	3	4	5	3	6	7	7	8	5	6	3	3	4	5	5	8	
12-Jun	5	3	3	4	2	3	3	4	3	3	3	4	4	4	4	8	7	6	5	4	4	5	6	8	
13-Jun	4	3	3	4	5	5	5	5	9	9	9	9	9	8	9	8	7	8	8	7	5	4	5	9	
14-Jun	3	3	3	3	3	5	5	5	6	7	7	6	6	8	8	7	6	6	5	3	2	1	6	8	
15-Jun	5	5	6	5	4	4	4	3	3	3	2	2	2	2	2	3	4	3	3	4	2	1	1	6	
16-Jun	2	5	3	6	6	4	6	5	4	5	4	5	5	6	6	6	5	5	4	3	2	2	6	6	
17-Jun	6	3	4	4	4	4	4	5	6	5	4	4	4	4	4	4	3	3	4	3	3	2	3	6	
18-Jun	3	3	3	3	3	3	4	4	3	3	3	5	4	4	4	3	4	5	2	2	7	5	3	7	
19-Jun	5	5	7	7	6	6	5	5	5	5	5	5	5	5	4	4	5	4	4	3	3	2	3	7	
20-Jun	2	3	2	1	2	1	1	1	2	2	3	5	5	4	5	4	4	4	4	3	3	4	4	5	
21-Jun	3	3	3	2	3	3	3	3	4	3	4	4	5	4	5	6	4	4	4	4	3	3	2	6	
22-Jun	1	2	2	2	2	2	2	2	3	3	3	4	12	6	5	5	5	7	2	2	2	2	1	12	
23-Jun	2	1	2	2	2	1	1	2	2	2	2	3	9	9	5	4	3	4	3	3	3	2	1	9	
24-Jun	2	2	2	2	2	2	3	2	3	3	3	5	6	5	7	6	5	8	5	2	2	6	4	8	
25-Jun	4	2	1	1	1	1	1	2	2	2	2	3	3	3	3	8	4	5	3	3	6	4	2	8	
26-Jun	2	3	3	2	3	3	3	2	2	2	3	7	6	7	7	6	6	9	4	4	5	3	1	9	
27-Jun	2	1	1	2	1	2	2	2	3	2	2	4	6	6	6	6	5	6	5	3	2	1	1	6	
28-Jun	1	2	4	1	1	1	3	2	4	5	7	8	8	9	8	7	7	7	5	5	2	2	3	9	
29-Jun	2	2	2	2	1	1	2	1	2	2	3	3	4	4	4	5	3	3	2	2	2	3	3	5	
30-Jun	3	2	1	1	1	1	2	2	2	2	2	2	2	2	2	3	3	3	7	3	3	2	5	7	
																		Diurnal Maximum							



WBEA
Hourly Averages

Wind Speed 20 m (WS20m) - km/h

Mannix - June 2015





WBEA
Cumulative Frequency Distribution

Wind Speed 20 m (WS20m) - km/h
Mannix - June 2015

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	149	20.69	20.69
6 - 11	331	45.97	66.67
12 - 19	187	25.97	92.64
20 - 28	49	6.81	99.44
29 - 38	4	0.56	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



WBEA
Frequency Distribution

Wind Speed 20 m (WS20m) - km/h
Mannix - June 2015

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	6	6	12	4	2	8	12	18	12	11	13	14	12	9	5	5	149
6 - 11	26	23	8	6	3	4	37	60	13	9	15	31	45	20	14	17	331
12 - 19	21	27	1	4	4	1	10	19	8	7	9	11	26	12	8	19	187
20 - 28	3	9	0	0	0	0	0	0	1	0	0	1	12	17	6	0	49
29 - 38	0	3	0	0	0	0	0	0	0	0	0	0	1	0	0	0	4
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	56	68	21	14	9	13	59	97	34	27	37	57	96	58	33	41	720

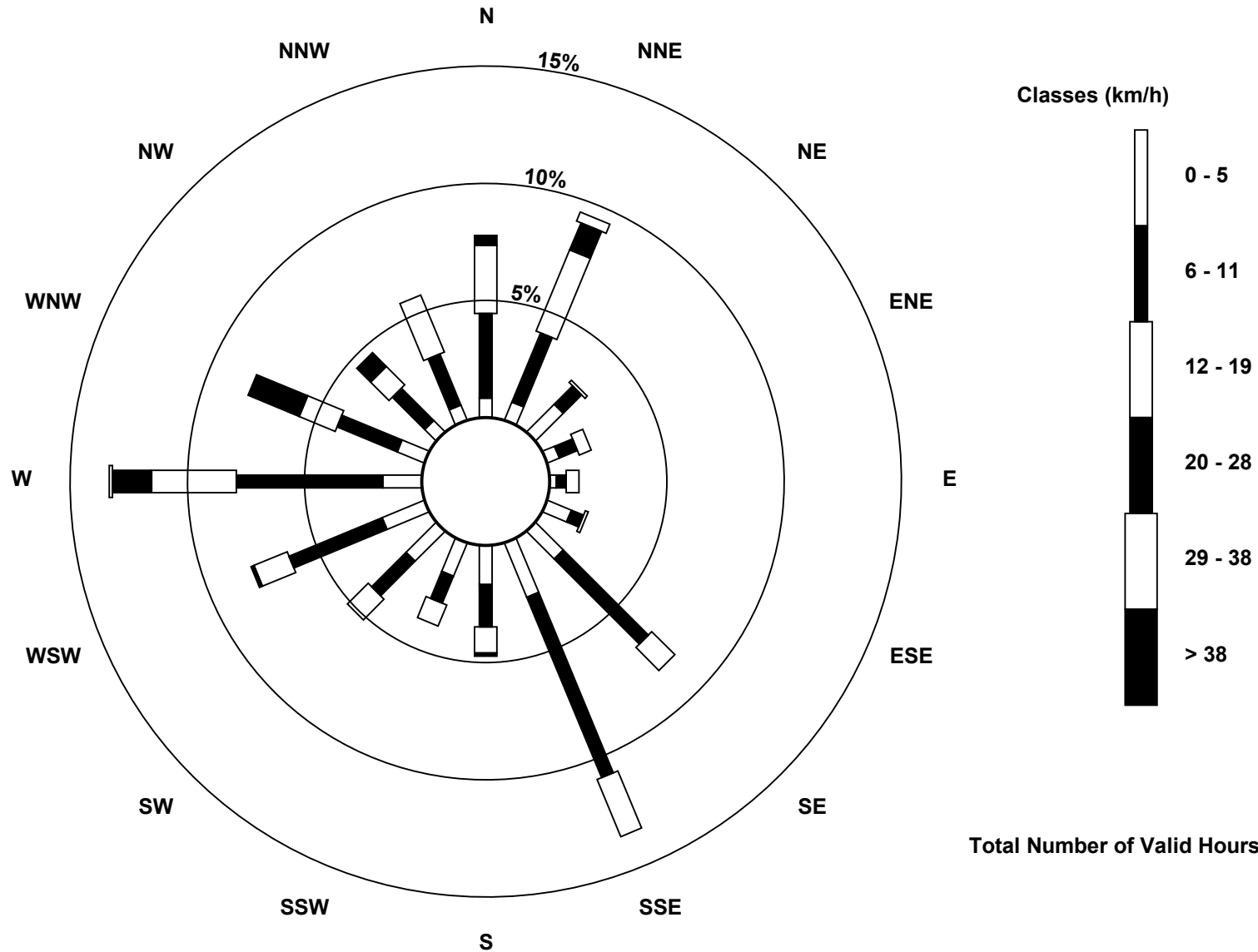
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

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





Maximum Speed: 39 km/h on Jun 4 21:00	Maximum Daily Speed Average: 25.1 km/h on Jun 13	Hours in Service: 720
Minimum Speed Value: 0 km/h on Jun 10 08:00	Minimum Daily Speed Average: 0.2 km/h on Jun 25	Hours of Data: 720
Maximum Diurnal Speed Average: 7.7 km/h at hour 13	Minimum Diurnal Speed Average: 0.4 km/h at hour 20	Hours of Missing Data: 0
Monthly Average Velocity: 3.1 km/h 288.7 deg	Percentiles: P ₁ = 1 P ₁₀ = 5 Q ₁ = 9 Median = 14 Q ₃ = 19 P ₉₀ = 24 P ₉₉ = 34	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	W16	W20	WNW22	WNW28	WNW32	WNW34	WNW31	WNW33	WNW32	WNW32	WNW28	WNW34	WNW32	NW31	NW30	NW29	NNW28	NNW24	NW18	WNW14	W12	W14	WNW16	WNW25.0	WNW34	
2-Jun	NW10	N10	WSW3	N5	NNE7	NE6	SSE3	SSE5	ESE6	SSE5	ESE5	ESE7	ESE8	SE9	SE10	SSE13	SSE12	SSE11	SE14	SE18	SE16	SE18	S18	S16	SE6.4	S18
3-Jun	S15	SE15	SSE17	SE15	SE10	SE8	SE13	SE12	SE13	SE14	SE19	SE15	SE14	SE20	SE22	SSE19	SSE22	SSE22	SSE24	SSE23	SSE20	SSE22	SSE22	SSE22	SSE17.2	SSE24
4-Jun	SSE22	SSE16	SE17	SE19	SSE15	SSE19	SSE16	SSE13	SE10	SE14	SSE18	S21	SE18	SSE23	SSE23	SSE23	S23	S19	SSE16	SSE23	S39	S27	S24	SSE23	SSE19.2	S39
5-Jun	SSE23	S17	S16	SSE17	SSE20	SSE16	S17	S18	SSW19	S29	SSW29	SSW25	S26	S24	S23	S25	SSW21	WSW26	SSW17	ESE14	SE17	S21	SSE24	S23	S19.7	S29
6-Jun	SSW18	SW14	WSW19	SW14	SW17	WSW10	WSW9	W18	W13	W9	WNW8	W8	W11	NW2	SW21	WSW19	SW24	SSE5	SSE6	SSW5	W8	WNW13	WNW14	WNW13	WSW10.7	SW24
7-Jun	WNW14	W13	W16	WNW22	W11	WNW11	W20	W21	WNW18	WNW23	WNW22	WNW25	WNW30	WNW29	WNW31	W26	WNW24	WNW20	WNW16	W9	WSW9	WSW14	NW11	SW6	WNW17.8	WNW31
8-Jun	ESE3	SSE12	SSW14	S9	S8	SW8	WSW11	W18	WNW18	WNW14	WNW13	NNW9	SW21	NW14	ENE14	E5	NE3	NW21	NW33	NNW27	NW26	NNW19	NW24	NW24	WNW9.3	NW33
9-Jun	WNW21	WNW19	NW16	WNW14	W13	W14	W12	W14	W14	W13	WNW11	W10	W18	NNE17	NE12	N18	WNW12	NW17	NW9	W10	WNW11	NW12	N14	N16	WNW11.1	WNW21
10-Jun	N10	N10	NW6	NNW3	N5	SSW4	W2	WSW0	ENE5	ENE1	W5	WNW4	W4	WNW13	NW10	WNW9	NW6	W2	SW14	SSW4	ESE5	SE9	SE14	SSE15	WNW1.5	SSE15
11-Jun	SE16	SE15	SSE13	SE17	SE16	SSE10	ESE13	SE13	SE14	SE12	SE16	SE5	SW18	SW24	SSW27	SW22	W17	S17	SE9	SE11	SE15	SSE10	NNW5	ENE16	SSE10.2	SSW27
12-Jun	ENE7	NW14	WNW9	S4	W15	SW9	WSW8	WNW7	WNW8	WSW6	W7	WNW8	WNW9	WSW5	S6	ENE8	ESE18	SSE18	E19	E18	E18	ENE22	ENE21	ENE18	E2.1	ENE22
13-Jun	NE19	NE12	NNE17	N18	N21	NNW19	NNW20	NNW21	N26	NNE35	N35	NNE37	NNE39	NNE37	NNE39	NNE38	NNE34	NNE34	NNE33	NNE35	NNE23	NNE20	ENE10	E9	NNE25.1	NNE39
14-Jun	E10	NE11	NNE11	NNE13	NNW12	N16	NNE24	NNE22	NNE21	N22	NNE26	N23	N23	N24	NNE26	N24	N18	NNW20	N16	NNE13	NE12	N9	N19	NNE23	N17.5	NNE26
15-Jun	NNE23	NNE18	NNE22	NNE22	NNE21	NNE17	NNE15	NNE12	N9	NNW7	NE8	NE6	NE5	NW3	WNW5	W8	W11	W7	WSW12	SSW15	S12	S10	S13	S12	N4.8	NNE23
16-Jun	SSE7	NNW19	NNE15	N22	N15	N13	NNE26	N21	N17	NNW18	N15	NNW18	NNW20	NNW19	NNW20	NNW20	NNW18	NNW18	N14	NNE10	N9	N12	N16	NNE29	N16.0	NNE29
17-Jun	NNE18	N11	NNW16	NNW17	NNW17	N16	NNW15	NNE16	N18	NNE16	NNW11	N7	WNW11	W9	W7	W7	SW6	WSW5	SSE11	SSE15	SSE18	SSE17	SSE19	SSE18	NNW3.4	SSE19
18-Jun	S21	SSE18	SSE15	SE16	SE19	SE18	SSE14	SSE15	SSE13	SSE12	SE9	SSE12	SSE13	SSE13	SSE10	S9	SSE12	SW12	SW5	SSE5	S14	WSW23	WSW18	WNW24	S10.5	WNW24
19-Jun	WNW20	NNW21	N29	N32	N28	N24	NNE20	NNE18	N17	NNE21	NNE20	NNE16	NNE15	N12	NNE13	N10	N14	NNE14	NNE13	NNE13	NNE15	NNE15	NNE14	NNE13	N16.9	N32
20-Jun	NNE10	NNE8	N1	NNW4	NNW2	ENE2	WNW1	W3	SW4	W5	WSW6	NW12	NNW11	NW12	WNW11	NW12	NNW10	NW10	NNE9	NE11	NNE16	N9	NNE14	NE14	NNW5.9	NNE16
21-Jun	NNE12	N17	NNE11	N12	N14	NNE16	NNE8	N7	N11	NNW9	NW12	NNW12	N13	NW9	N17	N19	N11	N13	NNE19	N14	NNW14	NW12	W9	WSW13	N10.8	NNE19
22-Jun	W11	W12	WSW16	W15	W11	WSW11	SW10	W9	W11	W10	W10	W8	WNW20	NW7	SW18	WSW21	W24	NW20	N7	ENE8	NE6	ENE8	SE4	SE6	W8.4	W24
23-Jun	SE2	SW4	WSW5	SW8	S8	SSE5	SSE4	SSE6	SE4	SE5	SE1	WNW6	NW17	NW16	NNW6	S8	S5	SSE11	SSE13	S16	S17	SSW14	SSW11	SSE9	SSW4.7	NW17
24-Jun	SSE12	SSE15	SSE14	SE13	SSE13	SSE10	SSE9	SE8	SE9	SE8	SSE5	WSW15	WSW16	WSW18	SW24	SW18	SSW12	SSW25	WNW8	WSW1	SW6	NNE14	NNE21	NNE19	S5.9	SSW25
25-Jun	NE7	SSE4	SSW4	N4	N5	N4	NE3	NNE5	NNE3	NE3	S0	SSE6	SSE6	ESE2	ENE4	WNW16	NNW17	NNE16	WNW7	SSE11	WSW13	WSW9	SSE16	SSE17	WSW0.2	NNW17
26-Jun	S12	SSE18	S17	S4	SW12	SE8	SE10	SSE10	SSE5	SSW5	WNW3	W28	W29	W31	W28	W33	W30	W33	W18	WSW20	W15	W9	WSW12	SW12	WSW12.5	W33
27-Jun	WSW11	SSW5	SW7	WSW10	SW9	SSW7	SSW6	S7	S7	SE6	SW1	WSW5	W15	W17	W17	WNW17	W16	W22	W16	WSW12	SW15	WSW18	WSW17	WSW20	WSW10.5	W22
28-Jun	WSW19	W19	W10	SSW7	S8	SW5	W8	WNW11	WNW10	NW14	NW25	WNW29	WNW32	WNW33	WNW30	WNW31	NW27	WNW26	NNW20	NNW19	WNW14	WNW16	NW18	NNW16	WNW16.6	WNW33
29-Jun	WNW8	W10	WSW11	W13	WSW7	SW10	SSW8	SW4	W5	W8	WSW9	WSW9	W8	WNW9	WNW9	W14	SW5	SE10	SSE11	SSE11	ENE4	NNE15	ENE14	ENE13	WSW3.5	NNE15
30-Jun	E5	E4	E1	SW4	WNW5	WSW8	WSW12	WSW10	WNW8	W7	NE3	SE2	ESE4	ESE1	ENE4	N2	NNE14	NNE13	WNW8	WNW16	W5	ESE10	SW12	WSW17	W2.6	WSW17

SW1.2	NNW1.6	W2.1	NW2.2	NNW2.2	NNW2.0	NNW2.2	NNW3.4	NW3.2	NW3.4	NW4.0	WNW5.8	WNW7.7	NNW7.2	NNW4.9	W7.3	WNW6.2	NNW5.7	NW2.8	ESE0.4	SSW2.0	SW1.1	SW1.2	SSW0.6	Diurnal Average	
SSE23	NNW21	N29	N32	WNW32	WNW34	WNW31	WNW33	WNW32	NNE35	N35	NNE37	NNE39	NNE37	NNE39	NNE38	NNE34	NNE34	NNE33	NNE35	S39	SSW27	S24	NNE29	Diurnal Maximum	

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



Summary of Hour Standard Deviations

Mannix - June 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 14 km/h on Jun 22 13:00	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0
Minimum Value: 1 km/h on Jun 7 02:00	
Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 2 Median = 3 Q ₃ = 5 P ₉₀ = 6 P ₉₉ = 9	

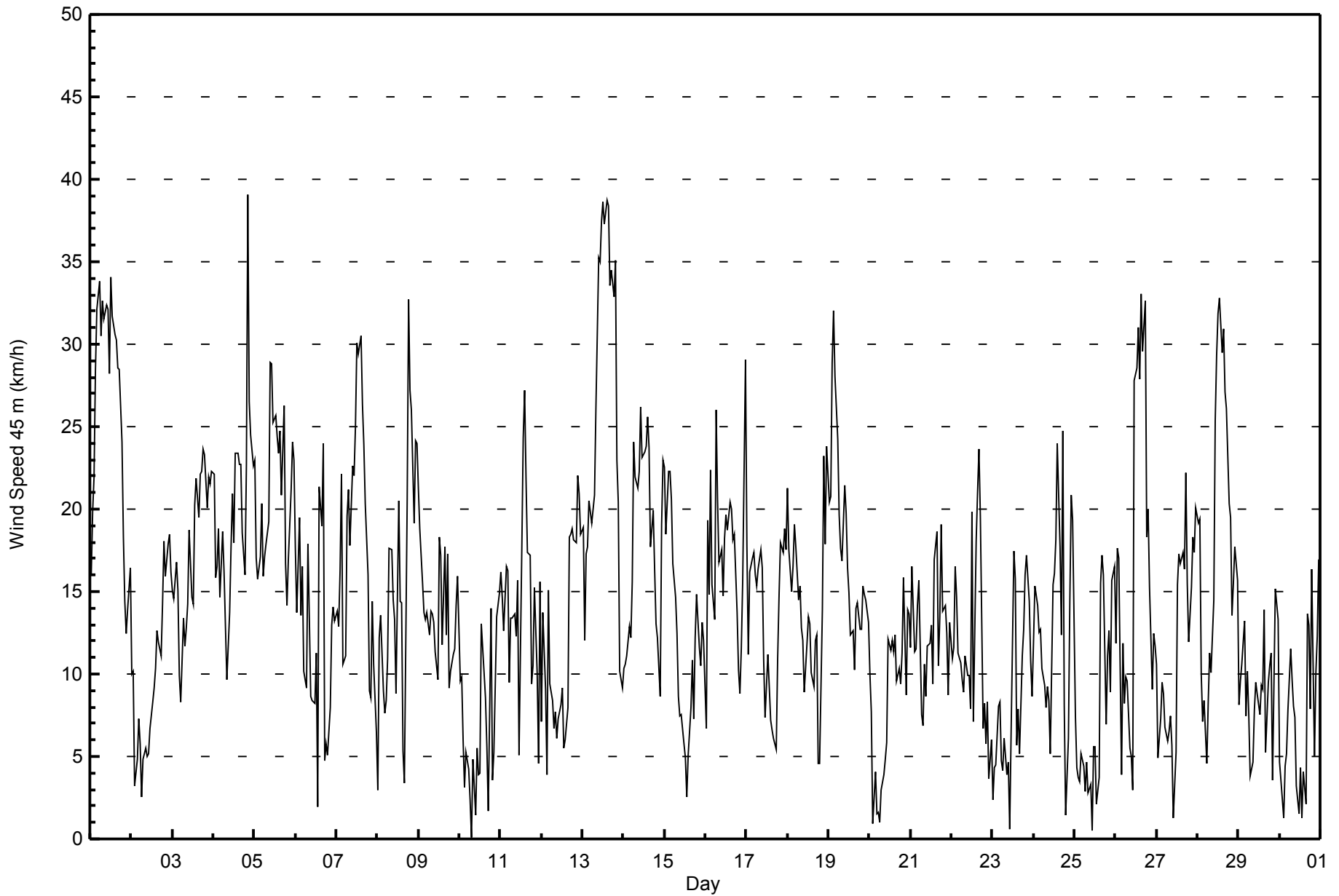
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	3	2	4	5	5	5	5	5	5	5	6	5	6	6	6	5	5	5	5	5	3	2	3	2	6
2-Jun	3	4	3	2	2	2	3	2	3	3	3	3	4	4	4	5	5	5	4	4	3	4	3	2	5
3-Jun	1	2	3	2	3	4	4	3	3	4	4	5	6	5	5	7	5	5	7	4	4	4	4	3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

Diurnal Maximum



WBEA
Hourly Averages

Wind Speed 45 m (WS45m) - km/h
Mannix - June 2015





WBEA
Cumulative Frequency Distribution

Wind Speed 45 m (WS45m) - km/h
Mannix - June 2015

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	91	12.64	12.64
6 - 11	185	25.69	38.33
12 - 19	286	39.72	78.06
20 - 28	115	15.97	94.03
29 - 38	40	5.56	99.58
> 38	3	0.42	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



WBEA
Frequency Distribution

Wind Speed 45 m (WS45m) - km/h
Mannix - June 2015

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	7	2	5	6	4	6	7	10	4	6	8	7	8	5	2	4	91
6 - 11	12	9	7	5	2	4	17	18	10	5	10	17	30	22	9	8	185
12 - 19	27	35	5	5	3	3	32	41	16	7	12	18	29	20	15	18	286
20 - 28	11	17	0	2	0	0	2	17	10	5	6	5	8	14	7	11	115
29 - 38	3	9	0	0	0	0	0	0	1	1	0	0	5	17	4	0	40
> 38	0	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	3
Totals	60	74	17	18	9	13	58	86	42	24	36	47	80	78	37	41	720

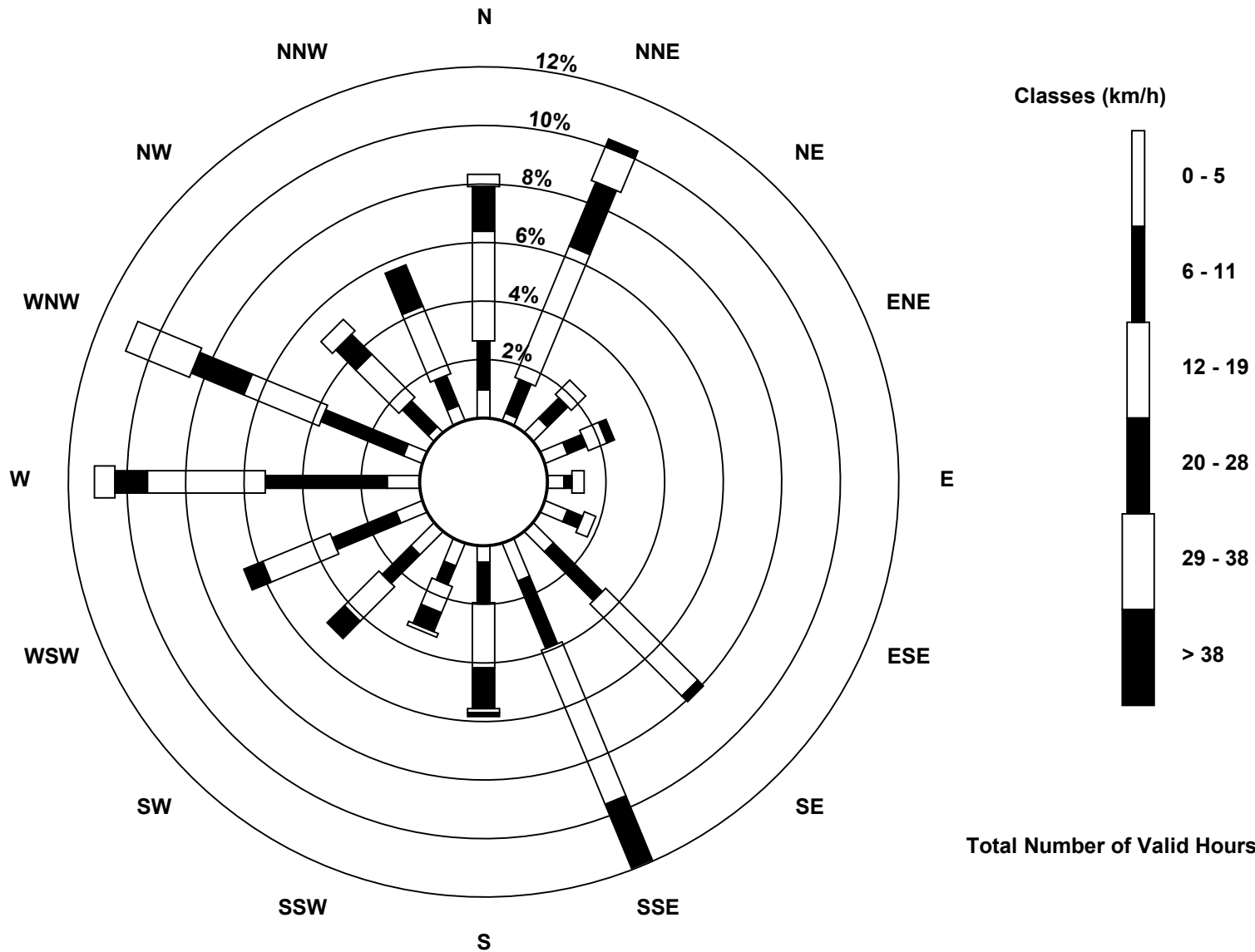
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

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





Maximum Speed: 43 km/h on Jun 4 21:00	Maximum Daily Speed Average: 28.6 km/h on Jun 13	Hours in Service: 720
Minimum Speed Value: 0 km/h on Jun 23 11:00	Minimum Daily Speed Average: 0.6 km/h on Jun 25	Hours of Data: 720
Maximum Diurnal Speed Average: 8.1 km/h at hour 13	Minimum Diurnal Speed Average: 0.2 km/h at hour 20	Hours of Missing Data: 0
Monthly Average Velocity: 3.4 km/h 290.8 deg	Percentiles: P ₁ = 1 P ₁₀ = 5 Q ₁ = 10 Median = 16 Q ₃ = 22 P ₉₀ = 28 P ₉₉ = 40	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	W19	W22WNW25WNW31WNW34WNW36WNW33WNW34WNW33WNW34WNW33WNW29WNW35WNW33	NW32	NW31	NW30	NNW31	NNW26	NW19WNW16	W16WNW19WNW21	WNW27.0	WNW36															
2-Jun	NW14	NNE14	N2	NNE7	NE11	NE7	SSE3	SSE5	ESE6	SSE5	ESE5	ESE7	ESE8	SE9	SE10	SSE13	SSE13	SE11	SE14	SE17	SE19	SE18	SSW22	SSW19	SE6.3	SSW22
3-Jun	S18	SE18	SSE23	SE20	SE11	SE9	SE14	SE12	SE11	SE14	SE18	SE14	SE14	SE19	SE22	SSE21	SSE23	SSE24	SSE26	SSE27	SSE26	SSE28	SSE28	SSE29	SSE19.3	SSE29
4-Jun	SSE29	SSE21	SE18	SE25	SSE21	SSE25	SSE19	SSE14	SSE11	SE13	SSE18	S23	SE18	SSE25	SSE25	SSE24	S25	SSE20	SSE18	SSE26	S43	S31	S30	S28	SSE22.2	S43
5-Jun	SSE29	S22	S20	SSE23	SSE26	S20	S19	S21	SSW21	S31	SSW31	SSW27	S28	S26	S25	S27	SSW22WSW29	SSW17	ESE10	SE20	SSE30	SSE33	S32	S23.0	SSE33	
6-Jun	SW26	SW22WSW26	SW18WSW20WSW14WSW10	W18	W14	W9	WNW8	W8	W12	NNW2	SW25WSW24WSW30	SSW4	SSE5	SW7WNW11	NW16	NW18	NW14	WSW12.9	WSW30							
7-Jun	NW14WNW16WNW20WNW28WNW13WNW16WNW24	W23WNW18WNW23WNW22WNW26WNW31WNW31WNW31	W27WNW25WNW21WNW16	W10	WSW9WSW16	NW11	SW7	WNW19.5	WNW31																	
8-Jun	ESE2	SSE13	S19	S12	SSW10	SW10WSW12	W18WNW18WNW15WNW13	NNW10	SW24	NW16	ENE15	E6	NE4	NW23	NW36	NNW31	NW30	NNW23	NW27	NW27	WNW10.4	NW36				
9-Jun	NW24	NW23	NW19WNW16	W16	W18	W14	W14	W13	W13WNW12	W10	W20	NNE20	NE13	N19WNW12	NW18	NW10	W10WNW11	NW13	N17	N18	NW12.4	NW24				
10-Jun	N12	N11	NNW8	N5	N6	SSW2	WNW2	E0	ENE5	E2	W5	W4	WSW4WNW13	NW11	WNW9	NW6	W1	SW16	SSW4	ESE5	SE8	SE12	SSE21	WNW1.4	SSE21	
11-Jun	SE23	SE19	SE19	SE15	SE21	SSE14	ESE11	SE13	SE13	SE13	SE16	SSE5	SW19	SW27	SSW29	SW23	W19	S19	SE11	SE11	SE15	SSE10	NNW7	ENE18	SSE11.4	SSW29
12-Jun	ENE9	NW16	NW11	SSE4	W17WSW12WSW10	WNW7	W7	W6	W8	WNW8	WNW9	SW6	SSW6	ENE7	ESE16	SE18	E16	E17	E19	ENE25	ENE24	ENE20	ENE2.2	ENE25		
13-Jun	NE23	NE14	NNE21	NNE21	N25	NNW23	NNW23	NNW24	N30	NNE40	NNE40	NNE42	NNE43	NNE42	NNE42	NNE42	NNE37	NNE39	NNE37	NNE39	NNE26	NNE24	ENE12	E8	NNE28.6	NNE43
14-Jun	ENE11	NE12	NNE14	NNE15	NNW13	N18	NNE26	NNE24	NNE24	N24	NNE28	N25	N26	NNE26	NNE28	N26	N19	N21	N18	NNE16	NNE16	NNE12	N22	NNE26	NNE19.6	NNE28
15-Jun	NNE27	NNE21	NNE25	NNE25	NNE24	NNE19	NNE17	NNE14	N9	NNW8	NNE8	NE6	NNE5	NW2	WNW5	W8	W11	W7WSW13	SSW16	S14	S14	S19	S20	N4.8	NNE27	
16-Jun	SSE11	N24	NNE19	N26	NNE18	N16	NNE30	N24	NNE19	N20	N16	NNW19	NNW21	NNW21	NNW21	NNW21	NNW19	NNW20	N14	NNE12	N10	N13	N18	NNE35	N17.8	NNE35
17-Jun	NNE22	N13	NNW18	NNW20	NNW20	N18	N16	NNE18	N19	NNE18	NNW11	N8WNW12	W9	W7	W7	SW7	WSW5	SSE11	SSE17	SSE23	SSE24	SSE26	S25	NNW3.1	SSE26	
18-Jun	S31	SSE26	SSE22	SSE23	SSE25	SE24	SSE18	SSE17	SSE15	SSE12	SE9	SSE13	SSE14	SSE14	SSE10	S10	SSE12	SW14	SW5	SSE5	S17WSW27WSW21WNW25	S13.1	S31			
19-Jun	NW20	NNW24	N33	N36	N33	N27	NNE22	NNE19	NNE19	NNE23	NNE21	NNE18	NNE16	N13	NNE14	N12	N15	NNE16	NNE14	NNE14	NNE20	NE22	NNE20	NNE19	NNE19.5	N36
20-Jun	NE10	NNE11	NE2	N3	NNE1	NNE3	NNW1	W2	SW4	W5	W6	NW12	NNW12	NW12	WNW11	NW12	NNW10	NW11	NNE11	NE14	NNE20	NNE13	NNE16	ENE16	N6.6	NNE20
21-Jun	NE15	N18	NNE14	N12	N17	NNE19	NNE8	N7	N11	NNW9	NW11	NNW12	N13	NW9	N18	N20	N11	N15	NNE21	N15	NNW16	NW14	W11WSW19	N11.8	NNE21	
22-Jun	W16	W16	W21	W20WNW17	W13WSW12WSW10	W11	W10	W10	WSW8WNW20	NW7	SW19WSW22	W24	NW21	NNW7	NE9	NE8	ENE10	ESE3	SE7	W9.7	W24					
23-Jun	SE3	SSE4	S4	SW5	S7	SSW5	S4	S6	SE4	SE4	SSW0	WNW6	NW19	NW17	N7	S8	S6	S12	SSE14	S19	S22	SSW17	SW14	S8	SSW5.1	S22
24-Jun	S11	SSE14	S15	SSE12	SSE12	SSE14	SSE11	SSE9	SE9	SSE8	SSE6WSW16WSW17WSW19	SW25	SW18	SSW13	SSW27	WNW8	W1	SW6	NE16	NE27	NE23	S6.6	SSW27			
25-Jun	ENE10	SE7	SE7	W2	N7	NNE8	NNE6	NNE5	NNE3	NE3	S1	SSE6	SSE5	E2	ENE4WNW16	NW20	NE20	WNW6	SSE13WSW15	WSW9	SSE16	SSE18	E0.6	NE20		
26-Jun	SSE17	S24	S23	SW6	SW15	SE7	SSE10	SSE10	S6	SSW6	WNW3	W29	W30	W33	W30	W34	W31	W37	W22WSW23	W18	W12	W13WSW16	WSW14.7	W37		
27-Jun	WSW16	WSW9WSW11	W13WSW11	SW9	SW7	SSW7	S8	SSE6	SW2	WSW7	W15	W18	W17	W17	W23	W16WSW13	SW20WSW23WSW26WSW29	WSW13.1	WSW29							
28-Jun	WSW28	W27	W16	SW10	SW8	W9	W11WNW11	NW10	NW15	NW27WNW30WNW33WNW34WNW30	NW32	NW28WNW27	NNW22	NNW23	NW17	NW21	NW25	NNW21	WNW19.3	WNW34						
29-Jun	NW10	W14	W12	W15	W14WSW11	WSW9	WSW6	W5	W8	WSW9	WSW9	W7WNW10	W9	W15	SW5	SE9	SE11	SE13	E5	NE17	ENE17	E15	W3.9	NE17		
30-Jun	E6	E4	E3	S4	NW4	WNW7	W12	W13WNW11	W8	NE4	SE1	ESE3	SE2	ENE4	NNE2	NNE15	NE17	NW7WNW20	W10	ESE8	SW14WSW21	WNW3.2	WSW21			

SW1.6	W2.1	W2.1	NW2.7	NNW3.1	NNW2.9	NNW3.1	NNW3.7	NW3.4	NW3.6	NW4.3	WNW5.9	WNW8.1	WNW7.4	NNW5.1	W7.4	NNW6.8	NNW6.0	NW3.2	NE0.2	SSW1.8	WSW0.9	WSW1.4	SSW1.1	Diurnal Average	
S31	W27	N33	N36	WNW34	WNW36	WNW33	WNW34	WNW33	NNE40	NNE40	NNE42	NNE43	NNE42	NNE42	NNE42	NNE42	NNE37	NNE39	NNE37	NNE39	S43	SSW31	SSE33	NNE35	Diurnal Maximum

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



Summary of Hour Standard Deviations

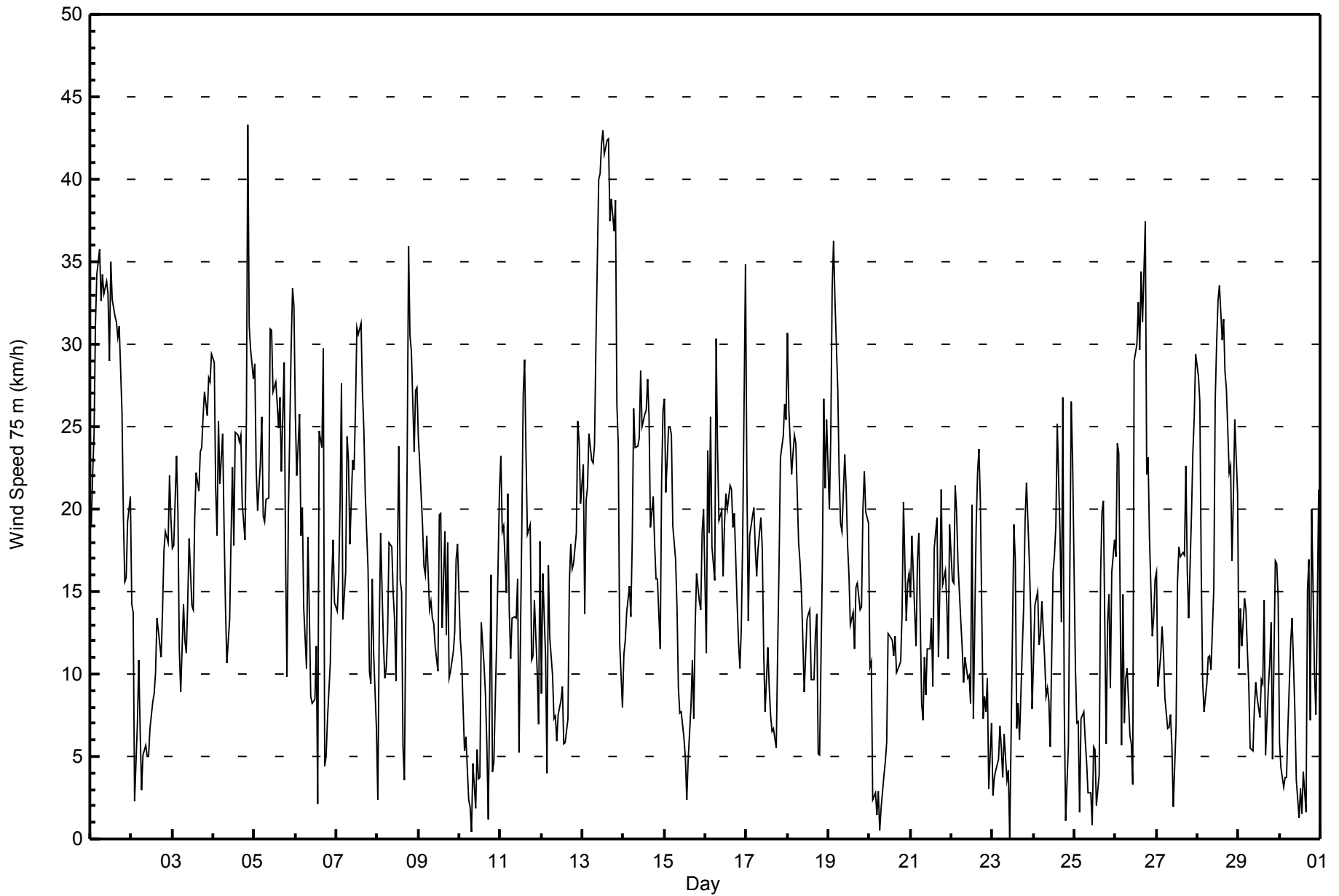
Mannix - June 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0														Hours in Service: 720											
Maximum Value: 15 km/h on Jun 22 13:00														Hours of Data: 720											
Minimum Value: 1 km/h on Jun 7 00:00														Hours of Missing Data: 0											
Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 2 Median = 4 Q ₃ = 5 P ₉₀ = 6 P ₉₉ = 10														Hours of Calibration: 0											
														Percent Operational Time: 100.0											
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	2	2	4	4	4	5	5	5	4	5	5	5	5	5	6	5	5	4	5	5	2	3	2	1	6
2-Jun	3	4	1	2	2	2	3	2	3	3	3	3	4	4	4	6	5	5	5	5	3	6	3	3	6
3-Jun	2	2	2	2	4	4	5	3	4	4	5	5	6	6	6	7	5	5	7	4	3	4	4	3	7
4-Jun	3	3	4	3	4	3	3	3	3	3	6	7	7	8	6	6	5	5	4	5	10	5	3	3	10
5-Jun	3	4	2	2	3	3	3	6	5	7	5	5	6	8	5	5	4	10	11	4	4	3	2	3	11
6-Jun	2	2	2	5	3	3	2	4	3	3	3	4	8	6	6	5	7	4	2	1	1	2	2	1	8
7-Jun	1	2	5	6	4	6	3	3	3	3	4	8	5	6	5	5	4	4	3	3	1	7	3	4	8
8-Jun	2	3	3	1	1	2	3	3	3	3	5	5	8	8	4	3	4	8	9	6	5	3	4	4	9
9-Jun	2	2	4	2	2	2	2	3	3	3	4	3	6	11	6	5	3	6	3	3	1	2	3	2	11
10-Jun	3	3	2	2	3	1	1	2	2	2	2	2	3	4	4	3	3	4	6	3	2	3	5	1	6
11-Jun	2	6	2	4	3	6	4	4	4	4	5	4	8	6	5	5	4	6	4	4	4	6	6	3	8
12-Jun	5	5	3	4	2	2	4	2	2	2	3	3	4	5	4	9	7	5	6	6	4	5	6	5	9
13-Jun	3	4	3	4	5	4	4	4	9	10	8	8	7	7	8	8	7	7	8	6	5	4	7	2	10
14-Jun	4	4	5	3	3	4	3	4	5	6	6	6	6	8	7	7	5	6	5	4	2	3	8	6	8
15-Jun	4	5	6	3	4	4	4	3	3	2	2	2	3	2	3	2	3	3	3	2	2	2	2	2	6
16-Jun	4	4	3	5	8	5	6	5	4	5	4	4	4	5	5	5	5	5	4	5	3	2	9	4	9
17-Jun	8	3	3	3	4	3	3	5	5	5	4	4	4	4	4	4	3	3	4	3	1	2	2	3	8
18-Jun	2	3	3	2	1	2	3	3	3	3	3	6	5	4	3	4	5	5	2	3	8	4	3	5	8
19-Jun	2	5	6	5	4	6	4	4	3	5	4	5	5	5	4	5	5	5	4	3	2	2	1	4	6
20-Jun	2	3	2	2	1	2	1	1	2	2	3	6	5	5	5	4	4	4	4	4	2	6	6	2	6
21-Jun	3	3	4	2	2	4	4	3	4	3	4	4	5	4	6	6	4	4	4	3	3	2	2	3	6
22-Jun	1	2	2	2	2	2	2	2	2	3	3	3	15	7	5	3	4	6	3	2	2	3	1	2	15
23-Jun	1	1	1	2	3	1	2	2	2	2	2	3	12	11	8	5	4	3	2	3	2	3	2	2	12
24-Jun	2	3	3	3	2	1	2	2	2	3	4	5	5	7	5	4	8	5	3	2	10	4	3	10	10
25-Jun	5	3	2	1	3	2	2	2	2	2	3	4	3	3	4	9	3	7	2	5	8	6	2	2	9
26-Jun	4	5	5	3	6	3	2	2	2	2	5	7	5	6	7	5	6	7	4	4	6	3	2	2	7
27-Jun	2	1	2	2	3	2	2	2	2	2	3	5	6	6	5	5	5	5	6	3	2	2	2	1	6
28-Jun	2	2	7	2	1	3	3	2	3	4	5	5	6	7	7	5	5	5	4	4	2	3	2	3	7
29-Jun	4	2	2	2	3	2	1	2	3	2	2	2	4	4	5	5	4	3	2	2	4	3	3	2	5
30-Jun	4	3	2	2	1	2	2	2	2	2	2	1	2	2	2	3	3	3	9	3	5	3	8	4	9
														Diurnal Maximum											
														8 6 7 6 8 6 6 6 9 10 8 8 15 11 8 9 7 10 11 6 10 10 9 6											



WBEA
Hourly Averages

Wind Speed 75 m (WS75m) - km/h
Mannix - June 2015





WBEA
Cumulative Frequency Distribution

Wind Speed 75 m (WS75m) - km/h
Mannix - June 2015

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	72	10.00	10.00
6 - 11	167	23.19	33.19
12 - 19	243	33.75	66.94
20 - 28	172	23.89	90.83
29 - 38	56	7.78	98.61
> 38	10	1.39	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



WBEA
Frequency Distribution

Wind Speed 75 m (WS75m) - km/h
Mannix - June 2015

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	3	6	3	4	6	5	5	9	4	5	5	2	8	3	2	2	72
6 - 11	10	7	6	5	3	6	16	15	8	4	11	15	26	15	12	8	167
12 - 19	26	29	8	5	4	1	26	26	12	5	9	14	35	18	16	9	243
20 - 28	11	26	5	3	0	0	7	27	16	6	7	11	10	14	12	17	172
29 - 38	4	4	0	0	0	0	0	5	4	3	0	3	7	19	5	2	56
> 38	0	9	0	0	0	0	0	0	1	0	0	0	0	0	0	0	10
Totals	54	81	22	17	13	12	54	82	45	23	32	45	86	69	47	38	720

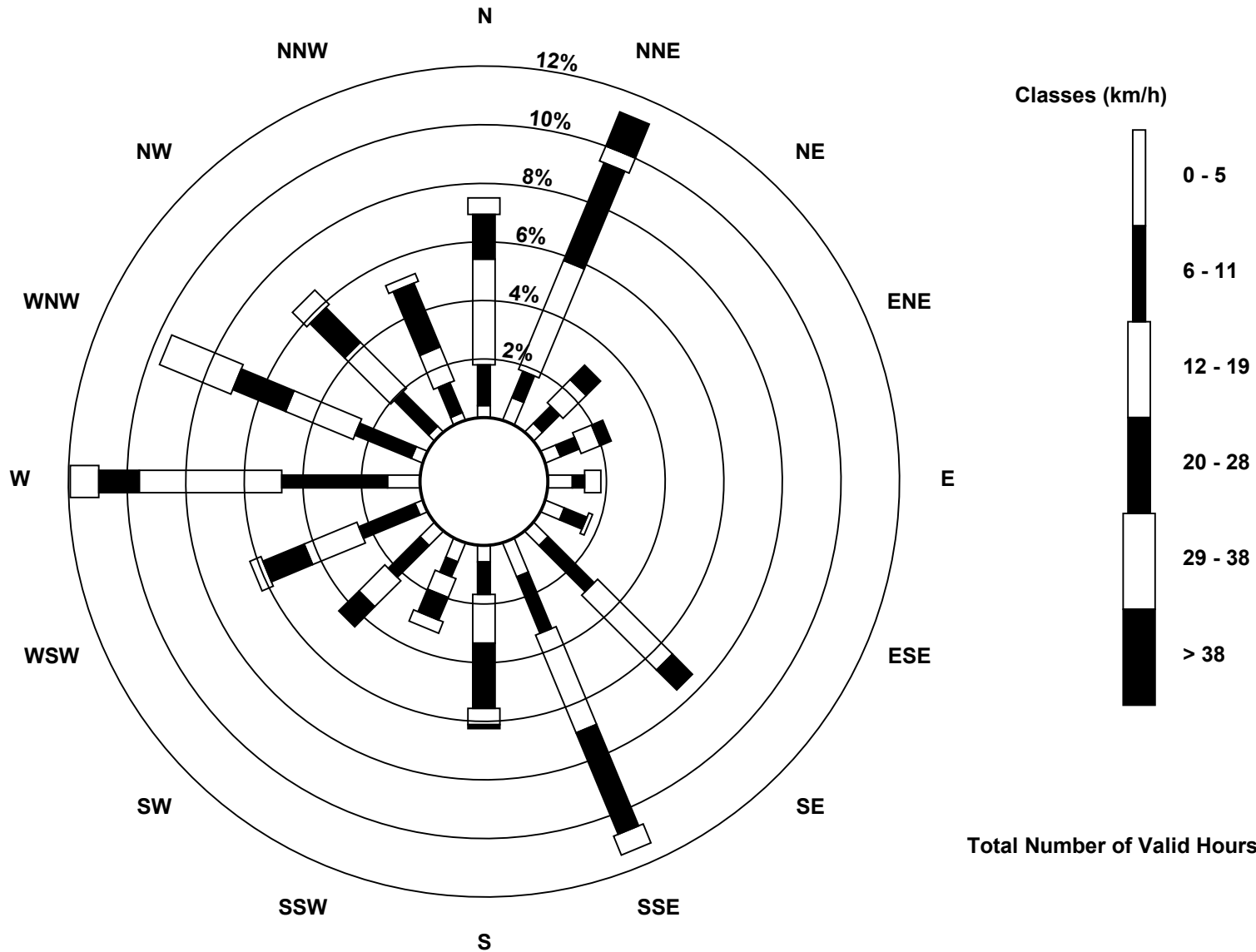
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

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





Maximum Speed: 45 km/h on Jun 4 21:00	Maximum Daily Speed Average: 30.0 km/h on Jun 13	Hours in Service: 720
Minimum Speed Value: 0 km/h on Jun 20 07:00	Minimum Daily Speed Average: 0.9 km/h on Jun 25	Hours of Data: 720
Maximum Diurnal Speed Average: 8.1 km/h at hour 13	Minimum Diurnal Speed Average: 0.4 km/h at hour 20	Hours of Missing Data: 0
Monthly Average Velocity: 3.5 km/h 284.6 deg	Percentiles: P ₁ = 1 P ₁₀ = 6 Q ₁ = 10 Median = 16 Q ₃ = 24 P ₉₀ = 30 P ₉₉ = 42	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
1-Jun	W20	W23WNW25WNW32WNW34WNW36WNW32WNW34WNW33WNW34WNW33	W29WNW35WNW32WNW32WNW31	NW31	NW32	NW27	NW20WNW16	W17	W21WNW22	WNW27.3	WNW36	2-Jun	NW16	N15	N4	NNE8	NNE12	NE7	SE3	SSE5	ESE6	SE5	ESE5	E8	ESE9	SE10	SE11	SSE14	SSE14	SE12	SE16	SE20	SE21	SE21	S24	SSW21	SE6.8	S24	3-Jun	S18	SE21	SE25	SE23	SE15	ESE13	SE17	SE13	ESE14	SE15	SE19	SE16	SE16	SE22	SE24	SSE22	SSE24	SSE25	SSE27	SSE29	SE28	SE31	SSE31	SSE33	SE21.5	SSE33	4-Jun	SSE32	SSE24	SE21	SE30	SSE26	SE28	SSE21	SSE15	SSE12	SE14	SE20	S23	SE20	SE26	SE26	SSE25	SSE21	SSE19	SSE27	S45	S33	S32	SSE30	SSE24.1	S45	5-Jun	SSE31	S25	S22	S25	SSE27	SSE22	S21	S22	S21	S32	S32	S28	S28	S27	S26	S28	S23WSW30	SSW18	ESE17	SE22	SSE32	SSE38	S36	S24.6	SSE38	6-Jun	SW30	SW26WSW29	SW21WSW22WSW15WSW11	W18	W14	W9	W8	W9	W12	NNW3	SW26	SW26	SW31	SW5	S5	SW8WNW12	NW17	NW20	NW15	WSW14.1	SW31	7-Jun	NW13WNW14WNW21WNW29WNW15WNW18WNW26	W24	W18	W23	W22	W26WNW31	W30	W31	W27	W25	W21	W16	W11WSW10WSW16	NW11	SW7	W19.6	W31	8-Jun	ESE4	SSE13	S20	S14	SSW12	SW12WSW14	W18	W17	W15	W13	NW10	SW25	NW17	ENE16	E6	NNE4WNW24	NW37	NW32	NW31	NW25	NW28WNW28	WNW11.0	NW37	9-Jun	WNW25	NW24	NW21WNW17WNW16	W19	W13	W15	W13	W13	W12	W11WSW20	NNE21	NNE13	NNW19WNW12	NW19	NW10	W10WNW11	NW13	N18	N19	NW12.9	WNW25	10-Jun	NNW13	NNW12	NNW9	N6	N7	SSW2	WNW2	ENE1	ENE4	E2	W6	W4	WSW4WNW13	NW11	WNW9	NW6	W1	SW17	SSW4	ESE8	ESE9	SE14	SE24	WNW1.2	SE24	11-Jun	SE26	SE22	SE21	SE19	SE26	SSE16	ESE19	SE15	ESE16	SE15	SE17	SE6	SW19	SW27	SSW30	SSW24	W19	SSE20	SE13	SE13	SE15	SE12	NW9	ENE20	SSE12.9	SSW30	12-Jun	ENE10	NW17	NW12	SE5WSW17WSW14WSW11	WNW8	W7	WSW6	W8	W8	W9	SW6	SSW6	ENE8	ESE25	SE19	E22	E21	ENE21	ENE27	ENE26	ENE22	ENE3.3	ENE27	13-Jun	NE25	NE14	NNE22	N23	N26	NNW25	NW24	NNW25	N31	N41	N43	N44	N45	N43	N44	NNE44	NNE39	N40	N38	N40	NNE28	N25	NE13	ENE9	N30.0	N45	14-Jun	ENE13	NE13	NNE15	NNE16	NNW14	NNW19	N27	N24	N25	N25	N29	N26	N26	N27	N29	N26	N19	NNW21	N19	NNE17	NNE13	N22	N27	N20.4	N29	15-Jun	N28	N22	N26	N26	NNE20	NNE18	N15	N9	NNW8	NNE8	NNE6	NNE5	NW2	WNW5	W8	W11	W8	SW13	SSW17	S16	S16	SSE20	SSE23	N4.8	N28	16-Jun	SSE13	NNW26	NNE20	N27	N19	N17	N32	N25	N20	NNW21	NNW17	NNW19	NNW21	NNW21	NNW22	NNW22	NNW19	NNW20	N15	NNE13	N11	N13	N19	N37	N18.6	N37	17-Jun	N23	NNW14	NNW19	NW20	NNW21	NNW18	NNW16	N18	N20	N18	NNW12	N8WNW12	W9	W8	W7	SW7	WSW6	SSE12	SSE18	SSE25	SSE28	SSE31	SSE29	NNW2.9	SSE31	18-Jun	SSE34	SSE30	SSE26	SSE28	SSE27	SE26	SSE20	SSE18	SE17	SSE13	SE10	SSE14	SE15	SSE14	SSE10	S10	SE13	SW14	SSW6	SSE5	S17WSW28WSW23WNW26	S14.4	SSE34	19-Jun	WNW20	NNW25	N35	N37	N34	N28	N23	N20	N19	NNE24	N22	NNE18	N16	N13	NNE14	N12	N15	NNE16	NNE15	NNE15	NNE21	NNE25	NNE22	NNE22	N20.4	N37	20-Jun	NE11	NNE9	NE3	ENE1	ENE1	N3	WNW0	W1	SW4	W5	WSW6	NW12	NNW12	NW12	WNW11	NW12	NNW10	NW11	NNE11	NNE14	NNE22	N15	NNE16	NE17	N6.7	NNE22	21-Jun	NNE16	N19	NNE15	N12	N18	NNE20	NNE9	NNW7	N11	NNW9	NW12	NNW12	N14	NW9	N18	NNW20	N11	N16	NNE22	N16	NNW17	NW15	W12WSW20	N12.3	NNE22	22-Jun	W16	W16	W22	W22	W19	W15WSW13WSW10	W11	W10	W10	WSW8WNW20	NW8	SW20WSW22	W23	NW21	NNW8	NE9	NE9	ENE11	ESE4	SE7	W10.1	W23	23-Jun	SE5	SSE5	S6	SSW6	S5	SSW5	S4	S6	SE3	ESE4	SSW0	WNW7	NW19	NW18	N7	S8	S6	SSE12	SSE15	S21	S24	SSW18	SW16	SSW9	SSW5.7	S24	24-Jun	S11	S13	S13	S8	S9	SSE12	SSE11	SSE10	SE10	SE9	SSE6WSW16WSW18WSW19	SSW26	SW19	SSW14	SSW28	W9	W1	SW6	NNE17	NNE29	NE25	SSW6.3	NNE29	25-Jun	ENE12	ESE8	SE9	SW2	N7	NNE9	NNE8	NNE5	NNE3	NE2	SSW1	SSE6	SE6	E3	NE5	W17	NW20	NNE21	WNW5	SSE13	SW15	WSW9	SE16	SSE18	E0.9	NNE21	26-Jun	SSE19	S28	S26	SW7	SW16	SE7	SE9	SSE10	S7	SSW6	W3WSW29	W30WSW32WSW30WSW34WSW31	W39	W24WSW24	W19	W13	W14WSW18	WSW15.5	W39	27-Jun	WSW20WSW12WSW13WSW14WSW13	SW10	SW7	SSW7	S7	SSE6	SW2	SW7WSW15	W18	W17	W17WSW17WSW22	W16WSW14	SW21WSW26WSW27WSW32	WSW14.2	WSW32	28-Jun	WSW31WSW29WSW19WSW11	SW8	W11	W13WNW11	NW10	NW15	NW27WNW30WNW32WNW33WNW30WNW31WNW28WNW27	NNW23	NW24WNW18WNW23	NW28	NNW23	WNW20.4	WNW33	29-Jun	NW12WNW15	W11	W13	W14WSW14WSW12	WSW7	WSW6	W8	WSW9	WSW9	W8WNW10	W10WSW15	SW5	SE10	SE11	SE14	ESE6	NE17	ENE19	ENE17	W3.9	ENE19	30-Jun	E8	E6	E4	S2	WNW4	W5	W11	W15	W12	W8	NNE3	SE1	ESE4	SE1	ENE4	NE1	N15	NE17	NW6WNW21	W13	E10	SW13WSW23	WNW3.1	WSW23

SW1.7	W2.4	W2.3	NNW2.8	NNW3.5	NNW3.4	NNW3.3	NNW4.0	NW3.4	NW3.6	NW4.3	NNW5.9	NNW8.1	NNW7.5	W5.1	W7.5	W6.4	NNW6.2	NW3.1	ENE0.4	SSW1.7	WSW0.8	WSW1.4	SSW1.2	Diurnal Average
SSE34	SSE30	N35	N37	WNW34	WNW36	WNW32	WNW34	WNW33	N41	N43	N44	N45	N43	N44	NNE44	NNE39	N40	N38	N40	S45	S33	SSE38	N37	Diurnal Maximum

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



Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 15 km/h on Jun 22 13:00			Hours of Data:	720
Minimum Value: 1 km/h on Jun 23 03:00			Hours of Missing Data:	0
			Hours of Calibration:	0
			Percent Operational Time:	100.0
Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 2 Median = 4 Q ₃ = 5 P ₉₀ = 6 P ₉₉ = 11				

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

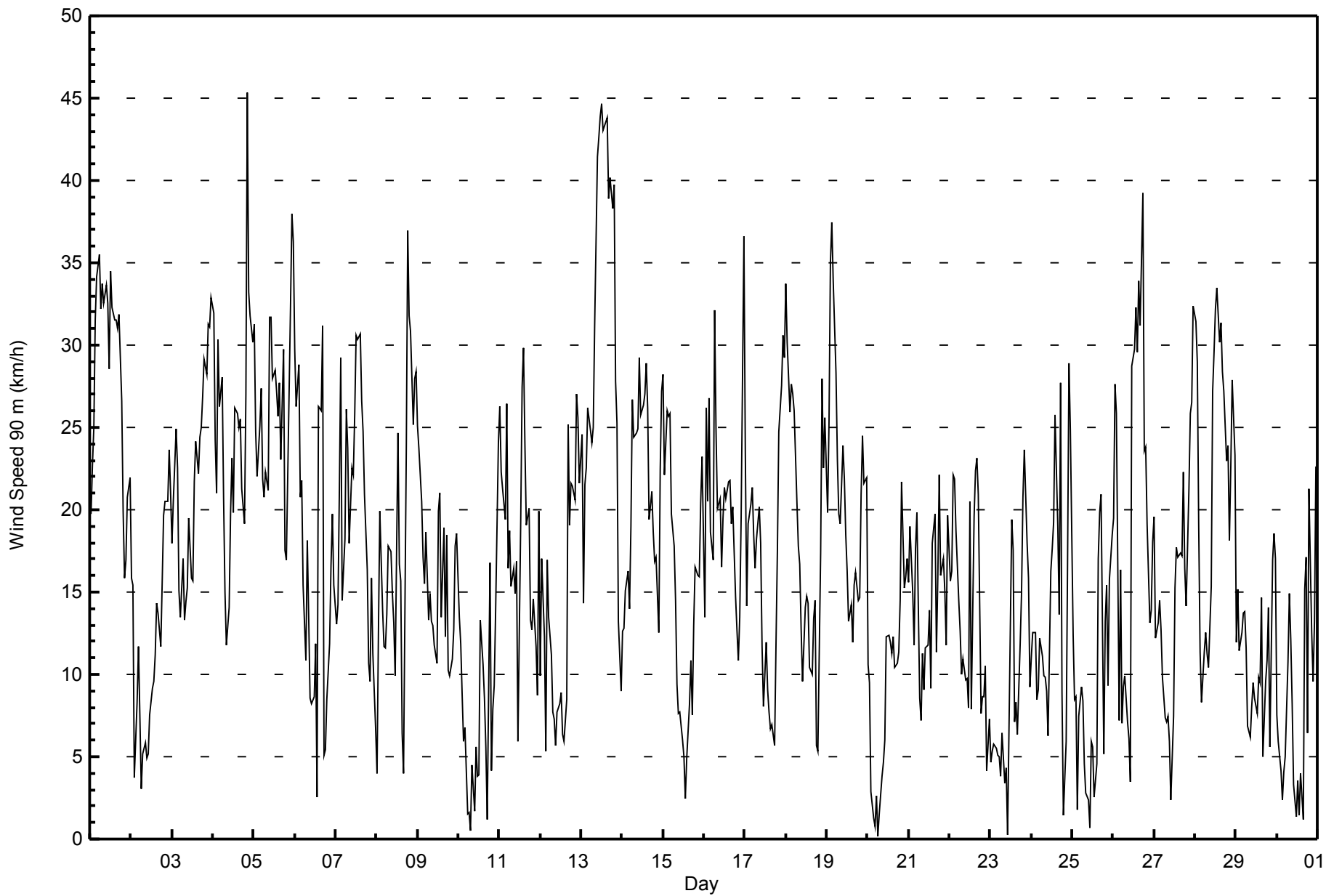
	8	9	6	6	8	7	6	6	9	10	8	8	15	12	8	13	10	10	12	6	9	10	9	6	
	Diurnal Maximum																								



WBEA
Hourly Averages

Wind Speed 90 m (WS90m) - km/h

Mannix - June 2015





WBEA
Cumulative Frequency Distribution

Wind Speed 90 m (WS90m) - km/h
Mannix - June 2015

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	63	8.75	8.75
6 - 11	148	20.56	29.31
12 - 19	232	32.22	61.53
20 - 28	195	27.08	88.61
29 - 38	70	9.72	98.33
> 38	12	1.67	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



WBEA
Frequency Distribution

Wind Speed 90 m (WS90m) - km/h
Mannix - June 2015

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	2	5	4	5	3	5	5	5	4	5	5	1	5	7	1	1	63
6 - 11	9	8	4	4	5	7	12	7	10	6	10	14	28	7	11	6	148
12 - 19	27	19	6	5	0	5	24	22	6	6	9	22	35	12	18	16	232
20 - 28	27	14	2	5	2	1	21	23	19	4	8	12	14	14	14	15	195
29 - 38	9	1	0	0	0	0	2	12	5	1	2	10	4	19	5	0	70
> 38	8	2	0	0	0	0	0	0	1	0	0	0	1	0	0	0	12
Totals	82	49	16	19	10	18	64	69	45	22	34	59	87	59	49	38	720

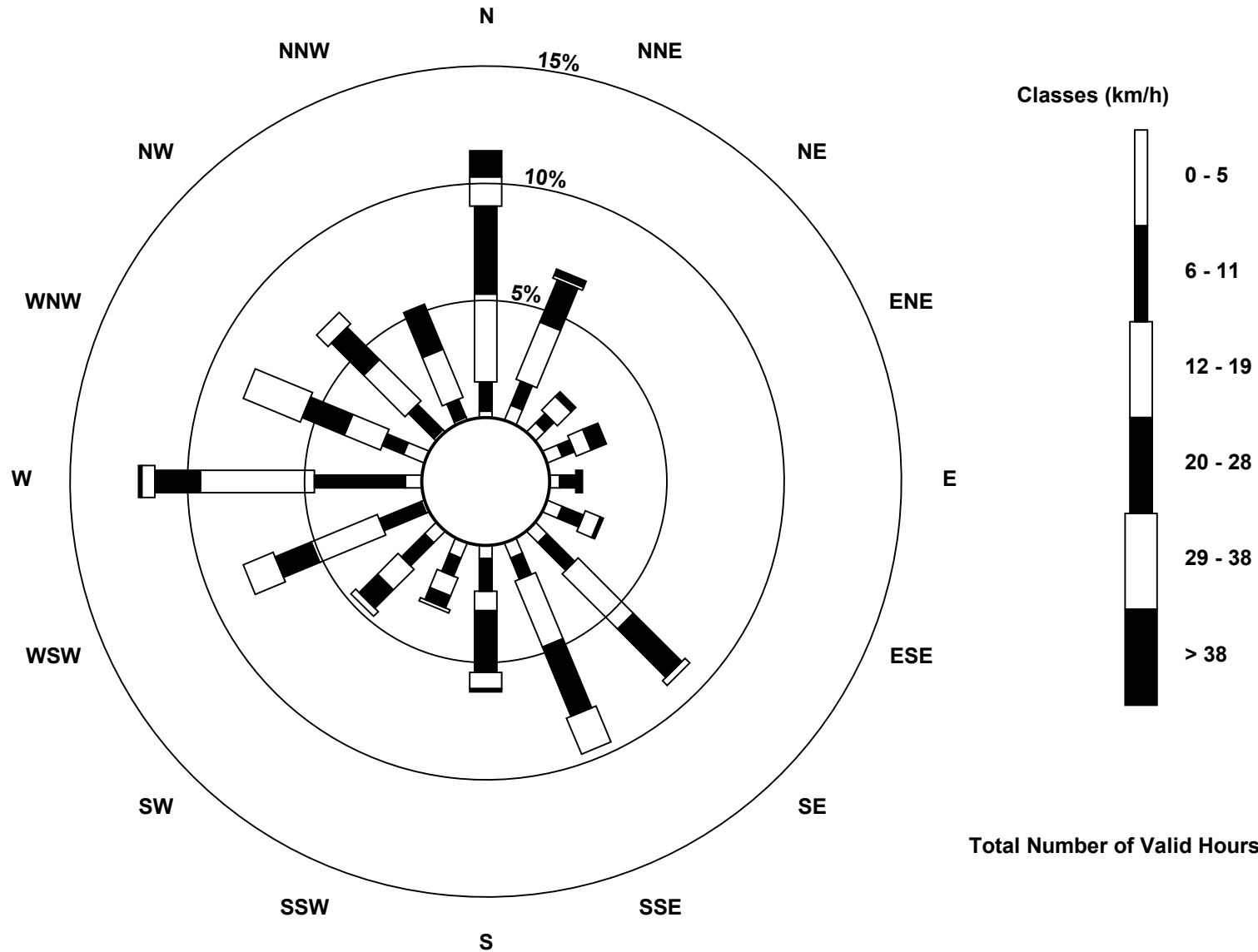
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

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





Direction of Maximum Speed: 20 deg on Jun 13 16:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 292.5 deg on Jun 1	Hours of Data: 720
Direction of Minimum Speed: 233 deg on Jun 10 08:00	Direction of Minimum Daily Speed Average: 0.7 deg on Jun 25
Direction of Minimum Speed: 233 deg on Jun 10 08:00	Hours of Missing Data: 0
Monthly Average Direction: 262.7 deg	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	259	267	283	289	298	291	288	285	290	294	290	279	287	289	308	305	318	324	328	323	289	264	256	271	292.5
2-Jun	278	5	235	319	18	39	154	163	114	151	116	105	111	131	136	153	152	147	140	135	142	137	180	176	140.5
3-Jun	158	132	152	148	142	133	139	137	132	140	144	141	143	139	147	158	155	155	159	159	150	151	151	160	148.2
4-Jun	162	147	136	145	153	149	152	158	140	141	145	177	144	149	153	166	173	166	158	162	191	192	170	165	159.9
5-Jun	161	165	164	153	163	164	170	183	192	190	198	199	185	186	188	188	195	245	196	122	151	167	162	172	181.4
6-Jun	203	211	235	204	220	227	249	265	267	271	286	274	272	331	225	241	236	131	143	195	245	273	266	262	244.4
7-Jun	260	252	257	295	256	272	273	276	279	281	282	281	297	279	282	274	279	283	281	276	232	247	317	227	276.8
8-Jun	124	176	197	166	160	217	250	276	281	285	284	335	227	313	67	89	53	301	316	327	316	325	303	297	295.5
9-Jun	290	293	311	271	253	258	262	267	272	276	278	275	260	16	47	346	279	311	314	261	279	315	4	356	293.4
10-Jun	350	355	291	294	341	202	259	233	81	47	265	285	273	293	302	293	309	285	232	181	121	153	141	147	272.0
11-Jun	148	137	144	145	142	157	100	141	136	140	144	139	230	231	206	221	268	168	133	142	144	160	41	79	163.6
12-Jun	52	284	250	227	256	215	249	288	277	249	266	274	282	243	190	76	119	149	97	92	86	68	63	61	102.6
13-Jun	42	43	16	9	5	331	326	333	7	13	9	12	13	14	17	20	20	14	14	13	20	15	70	92	13.7
14-Jun	86	54	26	14	343	347	11	14	14	4	17	7	10	11	14	359	354	347	1	35	38	353	355	13	10.5
15-Jun	15	18	17	16	19	18	17	15	351	340	44	49	40	325	293	274	277	276	237	212	185	183	165	171	1.1
16-Jun	133	346	29	5	6	354	11	349	10	345	347	337	335	338	342	339	332	334	4	27	360	6	8	18	355.4
17-Jun	16	349	330	328	338	347	343	16	0	18	340	5	293	264	270	274	214	251	150	160	160	156	156	158	337.3
18-Jun	164	156	144	138	140	145	149	165	155	157	144	156	151	164	154	177	150	224	240	153	189	243	257	289	174.5
19-Jun	298	333	1	9	8	9	12	14	10	14	16	23	15	4	27	359	1	25	31	21	25	31	19	25	10.4
20-Jun	3	11	245	278	252	184	284	261	251	260	260	307	324	320	293	300	340	310	33	37	31	352	11	48	328.7
21-Jun	26	356	8	0	356	21	24	3	5	333	311	328	4	306	0	354	354	8	24	7	339	316	263	251	352.6
22-Jun	255	252	256	260	272	234	229	260	276	272	258	260	294	309	237	258	272	306	356	62	30	59	210	149	268.6
23-Jun	263	238	232	206	173	153	142	148	121	122	141	299	309	310	343	179	172	167	157	178	190	182	195	144	195.2
24-Jun	147	149	149	140	151	155	148	143	140	144	143	257	246	243	218	221	212	214	273	263	228	31	30	26	193.4
25-Jun	45	218	258	300	51	324	45	12	33	55	335	157	149	116	73	276	331	26	273	163	262	239	163	162	262.7
26-Jun	165	156	160	148	196	140	146	147	137	201	283	261	266	261	263	262	262	280	271	257	271	256	234	229	249.6
27-Jun	226	154	181	234	197	176	197	191	166	137	201	259	265	271	278	280	262	263	265	253	225	240	243	244	246.5
28-Jun	251	255	254	161	149	170	260	279	293	319	314	289	288	293	289	299	305	295	336	329	283	278	293	333	292.6
29-Jun	262	226	221	243	196	191	178	203	268	262	257	254	261	285	285	261	224	147	146	149	31	20	70	65	235.5
30-Jun	63	64	128	241	243	229	235	245	275	279	54	140	108	117	69	12	11	33	292	274	254	123	235	251	266.1
256.5	276.4	273.9	299.9	287.5	277.9	285.2	284.5	307.8	308.2	304.5	290.3	286.9	289.5	285.3	281.2	283.3	290.6	314.3	49.2	218.7	240.3	245.8	2.3		
Diurnal Average																									

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



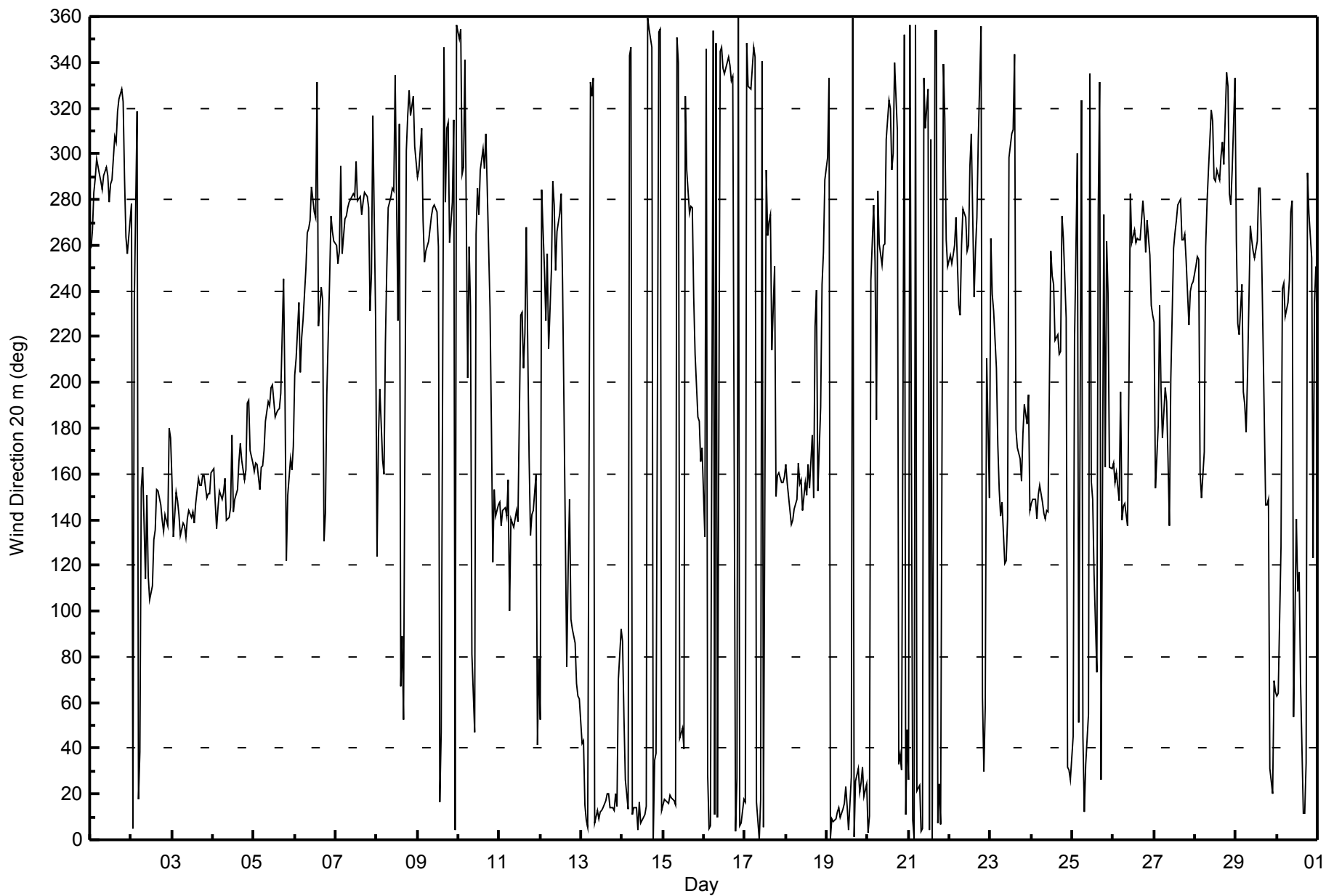
Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 101 deg on Jun 25 11:00		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																							
Minimum Value: 4 deg on Jun 7 00:00																									
Percentiles: P ₁ = 7 P ₁₀ = 12 Q ₁ = 14 Median = 20 Q ₃ = 34 P ₉₀ = 54 P ₉₉ = 96																									
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	10	8	11	11	12	11	12	11	11	13	13	13	15	15	14	14	19	16	17	21	18	7	13	10	21
2-Jun	45	36	32	50	26	18	80	51	40	53	54	39	41	41	34	37	35	33	18	13	11	12	26	20	80
3-Jun	10	12	12	13	18	21	16	17	24	20	19	25	24	20	19	29	17	21	16	14	12	13	13	13	29
4-Jun	14	20	10	11	16	12	14	21	23	15	19	31	28	20	23	28	26	28	20	22	21	20	16	14	31
5-Jun	14	14	13	13	13	16	20	25	29	24	20	23	25	27	28	27	26	25	48	16	17	13	12	17	48
6-Jun	23	17	10	33	13	24	17	10	16	28	34	34	33	97	17	16	14	64	18	33	9	13	5	4	97
7-Jun	5	5	12	19	43	17	6	8	12	11	12	15	13	14	14	13	12	12	13	12	12	35	59	45	59
8-Jun	78	28	32	21	19	24	23	14	15	17	24	54	21	60	19	39	62	24	17	15	14	16	15	14	78
9-Jun	12	13	17	20	13	10	15	9	13	14	33	41	22	57	42	19	27	21	29	19	12	21	18	14	57
10-Jun	30	14	50	65	48	47	36	99	34	97	31	69	77	26	39	41	48	81	31	58	22	17	14	11	99
11-Jun	13	13	11	10	12	54	22	15	19	19	18	63	38	20	19	40	25	34	19	16	16	62	82	17	82
12-Jun	55	15	40	47	12	34	25	44	27	54	43	42	41	97	69	62	36	22	19	16	12	13	13	16	97
13-Jun	13	22	12	17	19	16	17	17	21	16	18	16	18	16	15	16	16	16	17	14	13	13	33	13	33
14-Jun	20	23	13	12	19	18	13	16	22	23	25	23	27	25	23	27	29	28	33	15	14	21	15	13	33
15-Jun	14	16	16	13	14	13	15	22	25	32	23	35	36	83	35	28	21	36	20	25	15	13	14	16	83
16-Jun	59	30	16	15	22	22	14	19	21	22	29	21	19	24	26	23	25	25	35	23	15	11	16	13	59
17-Jun	20	25	15	18	18	19	18	23	29	26	42	62	39	42	67	62	51	69	28	16	14	11	12	13	69
18-Jun	14	13	15	11	10	12	16	18	16	21	26	42	27	31	31	37	35	22	38	31	37	12	9	20	42
19-Jun	16	16	16	14	15	14	14	19	21	17	18	23	29	39	31	46	34	23	19	16	13	12	22	19	46
20-Jun	14	55	28	17	38	76	59	29	41	48	43	40	48	39	42	28	42	35	45	16	11	60	34	11	76
21-Jun	14	13	18	11	16	13	30	34	28	37	35	38	40	41	30	24	49	39	15	18	18	24	22	13	49
22-Jun	9	10	9	8	12	12	15	15	19	21	23	47	45	58	12	13	13	32	49	16	41	25	56	43	58
23-Jun	63	18	15	27	22	32	24	22	38	42	98	60	51	54	99	39	70	27	15	21	17	14	19	10	99
24-Jun	11	10	11	12	14	14	17	17	20	22	58	20	27	18	22	27	36	20	54	71	59	32	11	11	71
25-Jun	82	70	22	46	76	56	53	38	56	43	101	54	69	93	96	64	36	46	28	23	19	40	13	13	101
26-Jun	32	15	20	35	26	19	17	15	63	55	89	14	12	16	16	15	13	24	16	11	39	47	11	11	89
27-Jun	10	16	26	23	22	24	27	36	31	29	86	66	22	25	18	21	24	14	13	16	12	9	7	7	86
28-Jun	7	7	80	13	13	51	27	13	37	28	21	15	17	17	20	15	16	15	24	15	17	16	15	17	80
29-Jun	19	12	27	11	26	14	20	39	32	26	22	24	43	61	48	21	53	23	13	12	82	15	13	10	82
30-Jun	72	46	40	43	24	14	14	15	19	21	64	79	45	87	58	90	14	12	64	22	89	24	50	13	90
	82	70	80	65	76	76	80	99	63	97	101	79	77	97	99	90	70	81	64	71	89	62	82	45	
	Diurnal Maximum																								



WBEA
Hourly Averages

Wind Direction 20 m (WD20m) - deg

Mannix - June 2015





Summary of Hour Averages

Mannix - June 2015

Direction of Maximum Speed: 191 deg on Jun 4 21:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 14.0 deg on Jun 13	Hours of Data: 720
Direction of Minimum Speed: 246 deg on Jun 10 08:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 0.2 deg on Jun 25	Percent Operational Time: 100.0
Monthly Average Direction: 268.1 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	268	271	287	293	300	294	291	288	294	297	292	282	289	291	310	307	322	327	329	326	297	275	273	287	296.7
2-Jun	308	9	251	2	29	44	162	161	116	152	120	110	116	132	139	155	155	147	139	134	140	135	188	191	141.3
3-Jun	169	138	151	145	135	127	137	139	131	141	143	140	141	139	146	157	157	156	160	160	150	151	152	161	148.9
4-Jun	165	153	135	144	152	150	155	160	146	142	148	179	144	149	154	167	174	169	160	164	191	191	172	168	162.5
5-Jun	163	169	172	159	164	167	174	185	192	189	198	198	184	187	187	186	195	243	202	120	146	170	164	174	181.0
6-Jun	210	230	242	222	230	238	250	265	268	269	289	276	272	313	223	242	235	152	147	211	273	299	289	282	247.8
7-Jun	283	276	270	301	275	284	279	279	282	285	285	284	299	283	284	276	283	285	287	279	244	247	316	225	282.0
8-Jun	119	161	197	170	176	225	251	278	285	288	286	333	228	313	68	91	52	306	319	330	320	327	308	304	296.5
9-Jun	299	303	318	288	264	268	267	267	275	280	282	277	262	17	41	350	284	317	321	267	287	320	6	1	303.0
10-Jun	350	354	318	329	356	207	275	246	77	70	268	285	268	298	310	300	321	273	231	196	118	139	136	147	282.2
11-Jun	145	136	147	141	140	158	105	138	134	141	144	139	228	230	204	214	270	171	135	143	139	155	348	78	162.3
12-Jun	57	305	283	183	261	228	252	294	282	251	272	283	289	237	191	76	119	147	97	94	85	67	62	63	90.3
13-Jun	42	43	17	11	6	335	329	340	7	14	11	14	14	14	17	20	20	16	14	13	20	16	68	91	14.0
14-Jun	84	54	30	18	346	350	12	15	15	7	15	7	10	10	15	1	356	348	0	30	34	11	358	13	11.1
15-Jun	15	17	16	15	19	20	20	15	354	342	39	45	34	321	302	278	281	280	237	203	184	179	172	173	3.5
16-Jun	151	347	29	7	9	358	12	353	11	346	349	340	339	340	344	342	337	337	5	26	3	7	5	16	357.1
17-Jun	15	351	334	331	343	351	348	16	360	18	344	1	296	266	270	273	218	249	152	159	161	157	159	167	342.1
18-Jun	170	157	149	144	143	143	152	164	154	156	143	160	151	166	154	177	153	223	228	157	186	243	257	293	173.1
19-Jun	302	336	4	10	9	9	12	14	11	16	17	23	14	1	23	0	0	25	30	23	25	32	24	27	10.3
20-Jun	21	18	359	331	335	70	295	265	236	259	258	316	329	319	299	305	345	317	29	35	29	7	16	51	347.8
21-Jun	31	359	15	3	0	21	22	360	4	333	317	334	0	314	360	354	354	7	23	8	342	322	268	252	353.3
22-Jun	265	267	257	265	280	249	231	259	279	274	262	262	298	318	236	257	274	310	349	59	37	61	134	138	272.8
23-Jun	143	235	241	220	182	165	150	158	128	129	139	300	315	317	346	183	175	168	159	177	187	194	213	159	195.2
24-Jun	156	151	152	146	152	154	156	145	140	145	150	257	245	241	216	219	210	213	283	257	219	33	31	33	186.5
25-Jun	53	156	205	351	0	5	34	17	26	53	180	156	155	108	60	282	328	30	290	164	255	246	155	160	255.3
26-Jun	169	164	169	178	216	138	142	149	147	198	284	261	267	262	262	263	262	281	272	257	272	265	256	236	246.3
27-Jun	242	213	230	251	236	204	203	189	174	143	224	246	264	273	280	283	264	262	266	250	229	241	240	241	247.6
28-Jun	253	260	265	203	187	229	267	288	302	324	319	292	291	296	293	303	307	299	338	332	296	299	304	337	296.7
29-Jun	298	262	250	260	254	220	201	218	263	267	256	254	265	288	287	260	224	144	147	148	65	26	71	70	247.7
30-Jun	81	80	97	220	289	256	245	250	282	279	47	146	111	122	69	7	14	32	302	284	269	119	225	252	277.5

226.6 283.1 273.4 310.4 298.0 287.3 291.8 289.7 315.3 312.6 308.7 293.0 289.0 292.2 282.9 280.9 284.6 292.0 319.1 104.8 208.7 231.7 232.3 198.3

Diurnal Average

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



Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 107 deg on Jun 10 08:00			Hours of Data:	720
Minimum Value: 2 deg on Jun 7 01:00			Hours of Missing Data:	0
			Hours of Calibration:	0
			Percent Operational Time:	100.0
Percentiles: P ₁ = 4 P ₁₀ = 7 Q ₁ = 10 Median = 15 Q ₃ = 27 P ₉₀ = 48 P ₉₉ = 91				

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	7	6	8	7	8	7	8	8	7	9	11	11	12	12	11	10	16	12	12	17	15	6	6	6	17
2-Jun	37	16	87	34	15	19	67	40	34	42	47	26	31	35	27	28	29	26	13	8	7	8	25	16	87
3-Jun	9	7	8	7	10	14	11	13	19	14	15	21	19	16	25	12	15	11	7	7	7	7	7	5	25
4-Jun	4	13	5	6	8	6	9	13	21	10	16	22	24	15	17	22	20	21	14	17	15	9	7	5	24
5-Jun	5	6	6	8	6	8	11	14	19	15	10	13	16	15	18	16	17	23	50	12	12	4	4	8	50
6-Jun	17	5	5	19	7	15	13	9	14	23	23	32	38	93	12	15	9	48	17	27	18	10	6	5	93
7-Jun	2	6	10	13	30	12	5	7	9	8	9	13	8	12	12	12	10	10	10	11	9	25	54	48	54
8-Jun	72	17	19	13	15	15	19	11	12	14	22	50	17	59	18	37	57	19	12	10	9	10	9	9	72
9-Jun	6	7	10	17	14	7	16	7	12	13	21	36	21	54	37	10	25	16	24	17	11	16	13	8	54
10-Jun	18	13	28	37	21	45	40	107	31	91	34	64	76	22	33	36	51	79	29	41	19	10	4	6	107
11-Jun	8	8	7	7	7	37	16	11	14	14	13	55	28	16	10	39	24	32	17	13	11	60	87	13	87
12-Jun	52	13	24	57	13	12	21	35	23	35	39	29	34	79	50	64	33	18	16	14	10	10	9	14	79
13-Jun	9	20	7	10	14	9	10	11	15	10	15	12	14	10	11	12	13	11	13	9	9	8	30	12	30
14-Jun	20	19	11	9	15	12	7	10	17	15	20	18	21	18	18	20	22	22	26	10	8	16	10	8	26
15-Jun	8	10	12	8	10	8	10	15	20	26	20	25	31	82	32	23	19	31	15	20	7	4	4	7	82
16-Jun	50	25	12	9	16	14	9	12	14	16	23	14	14	16	19	16	17	19	32	18	12	7	13	8	50
17-Jun	15	19	8	12	10	10	10	17	24	19	34	50	35	41	60	57	48	60	19	10	5	4	5	7	60
18-Jun	5	7	9	6	5	6	10	10	9	16	19	30	22	24	27	27	27	16	37	28	35	9	8	17	37
19-Jun	11	12	10	8	8	7	8	11	13	12	12	19	20	33	24	40	28	17	13	11	8	8	18	13	40
20-Jun	16	14	78	33	84	64	70	31	36	39	40	30	37	30	38	23	34	24	37	12	7	60	31	6	84
21-Jun	11	5	15	9	9	9	24	23	20	31	28	30	30	36	24	17	40	32	10	12	10	18	16	11	40
22-Jun	9	8	4	4	8	13	11	15	16	18	24	42	45	50	8	12	11	29	43	12	27	21	20	8	50
23-Jun	26	25	30	36	18	20	20	16	35	35	95	57	47	29	83	28	65	19	11	11	6	11	8	11	95
24-Jun	8	5	5	6	6	7	10	11	12	17	54	16	22	15	18	19	26	12	56	72	53	32	7	8	72
25-Jun	57	54	30	63	31	24	41	27	54	52	98	49	64	94	78	65	33	29	30	31	26	38	6	5	98
26-Jun	21	10	11	34	18	14	12	10	43	42	90	13	11	14	15	14	12	23	16	7	37	25	13	6	90
27-Jun	5	14	16	8	11	12	19	22	19	26	85	60	22	22	17	19	21	12	11	14	7	3	4	4	85
28-Jun	7	5	45	20	12	38	17	11	33	19	15	12	13	15	18	11	11	10	19	9	13	12	8	11	45
29-Jun	15	9	7	9	16	10	11	29	29	20	19	25	36	41	44	22	52	16	9	9	68	13	11	8	68
30-Jun	36	30	58	49	20	12	11	9	16	17	60	72	44	73	31	91	9	8	65	21	80	22	52	10	91
	72	54	87	63	84	64	70	107	54	91	98	72	76	94	83	91	65	79	65	72	80	60	87	48	

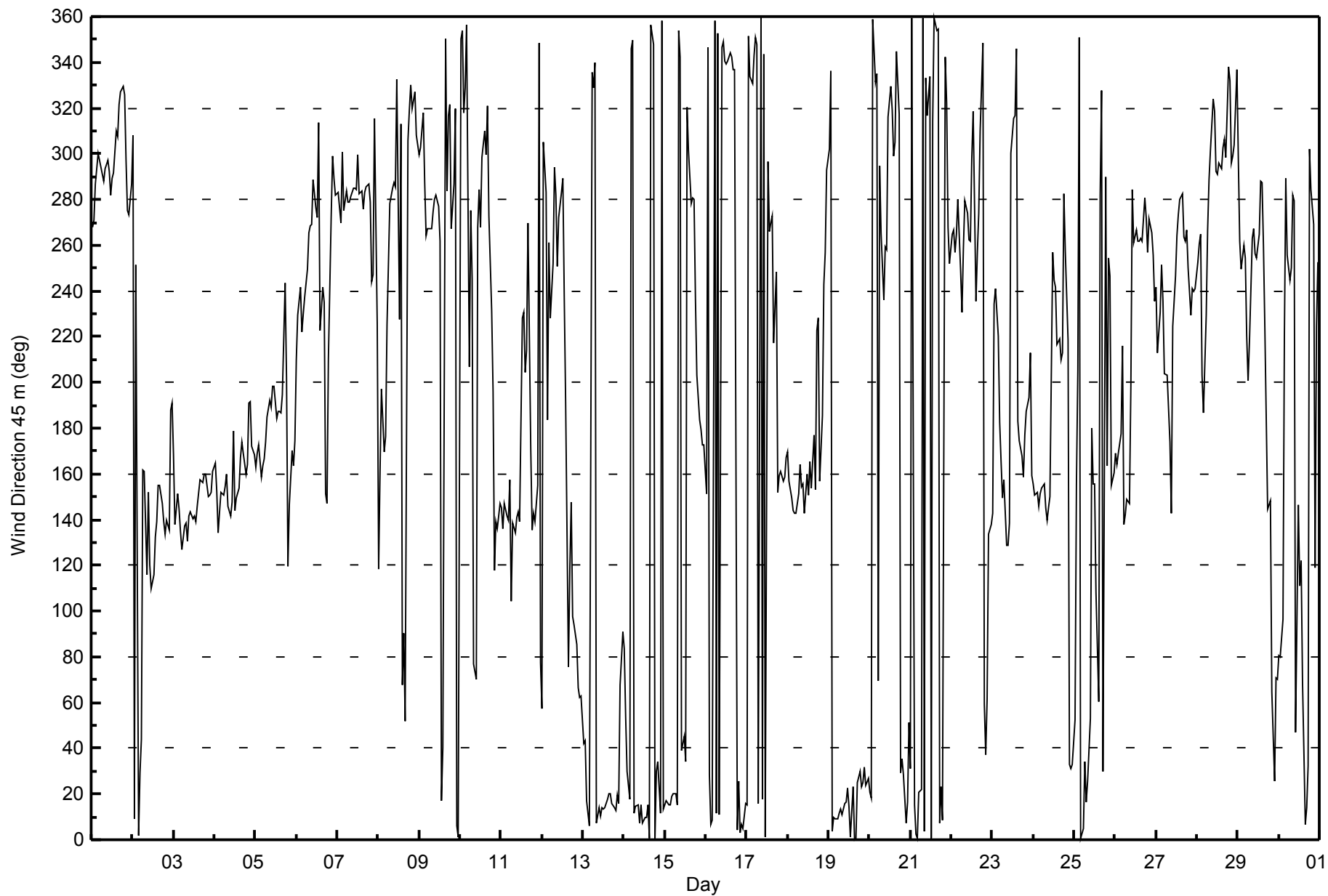
Diurnal Maximum



WBEA
Hourly Averages

Wind Direction 45 m (WD45m) - deg

Mannix - June 2015





Direction of Maximum Speed: 190 deg on Jun 4 21:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 15.1 deg on Jun 13	Hours of Data: 720
Direction of Minimum Speed: 213 deg on Jun 23 11:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 0.6 deg on Jun 25	Percent Operational Time: 100.0
Monthly Average Direction: 270.4 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	275	273	288	294	301	295	291	288	294	298	293	282	290	291	309	308	323	329	330	326	299	281	282	298	297.9
2-Jun	319	13	0	25	37	52	158	161	115	147	123	110	117	131	140	154	156	145	140	135	139	136	193	199	138.0
3-Jun	173	145	152	141	134	129	139	141	133	142	144	141	142	141	146	155	156	156	159	159	150	152	152	159	149.7
4-Jun	165	156	139	143	152	151	158	162	156	145	149	176	145	150	153	166	173	168	159	164	190	191	174	171	163.2
5-Jun	166	173	177	168	168	170	177	184	192	189	196	197	183	188	187	185	194	243	210	118	140	167	164	178	181.4
6-Jun	221	235	245	232	237	247	251	265	268	267	287	277	269	337	223	240	237	210	164	225	300	313	310	312	252.3
7-Jun	310	293	285	303	286	288	286	281	282	284	285	285	299	283	284	276	283	286	287	280	258	253	314	228	285.3
8-Jun	117	155	191	182	203	233	253	277	283	286	286	327	232	314	67	91	39	307	321	332	323	329	311	308	296.8
9-Jun	305	309	323	299	281	278	276	267	272	280	284	274	262	19	38	353	287	319	325	275	294	322	8	4	308.1
10-Jun	350	354	333	360	8	210	296	90	73	96	269	279	258	299	313	301	318	266	231	201	116	133	135	147	297.4
11-Jun	143	138	145	135	139	157	106	137	134	143	143	150	227	230	203	214	268	173	142	143	137	155	329	78	162.4
12-Jun	63	315	319	149	260	239	251	299	281	260	276	285	287	230	198	75	119	145	96	93	84	67	64	65	72.6
13-Jun	46	48	21	13	8	339	332	345	10	15	12	15	15	18	22	21	17	15	14	21	17	59	81	15.1	
14-Jun	78	56	33	24	348	352	13	16	16	8	17	9	11	12	16	2	357	351	2	29	31	24	0	14	13.0
15-Jun	16	16	16	16	19	21	22	17	357	343	32	44	26	314	302	279	280	273	237	199	183	179	172	170	8.8
16-Jun	165	349	31	10	12	0	13	356	13	349	352	341	342	342	345	345	340	339	6	28	5	9	5	16	359.6
17-Jun	15	355	337	332	345	353	353	15	2	19	347	2	297	267	270	272	225	256	152	157	161	159	162	169	348.4
18-Jun	172	161	158	157	153	146	152	162	153	155	142	162	152	163	154	179	154	219	219	162	184	244	256	295	174.4
19-Jun	307	341	7	11	11	11	13	16	13	19	18	24	17	0	25	2	2	26	30	25	27	35	30	33	13.3
20-Jun	35	21	43	349	30	20	340	274	225	267	261	319	335	321	301	310	346	319	30	35	29	15	25	58	358.3
21-Jun	38	3	24	7	6	23	22	357	5	336	319	338	359	314	0	355	359	11	24	11	344	326	270	257	355.5
22-Jun	273	277	261	269	282	267	239	256	278	274	266	258	299	319	235	255	274	311	345	55	43	64	119	139	275.6
23-Jun	130	153	179	221	186	193	170	170	142	130	213	296	318	319	354	182	178	169	162	178	188	206	221	183	197.5
24-Jun	177	166	170	165	165	160	158	151	143	149	165	256	245	241	215	218	209	212	282	272	223	36	37	44	190.5
25-Jun	64	136	151	279	359	28	30	23	32	56	174	153	152	97	60	283	326	36	298	160	245	257	150	160	91.1
26-Jun	166	174	176	223	225	142	147	154	169	195	282	260	265	261	261	262	261	279	268	257	270	269	262	242	245.0
27-Jun	245	238	252	261	247	228	216	196	177	151	230	238	262	273	281	281	263	260	267	248	233	241	245	248	249.8
28-Jun	256	261	261	232	220	260	274	300	310	326	319	292	291	296	294	304	306	300	341	332	304	308	310	337	297.6
29-Jun	317	280	269	274	271	252	240	240	262	267	254	253	264	288	279	260	221	143	145	143	97	41	75	81	259.8
30-Jun	86	93	85	185	314	283	261	261	284	275	40	138	119	136	65	16	16	37	317	290	280	106	226	254	291.1

223.8 280.1 273.4 309.1 301.1 294.9 298.5 293.1 317.4 316.4 312.4 293.4 289.9 293.6 283.7 280.6 285.3 295.4 320.5 47.7 210.5 245.2 242.6 200.8

Diurnal Average

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



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 111 deg on Jun 10 08:00	Hours of Data: 720
Minimum Value: 2 deg on Jun 4 01:00	Hours of Missing Data: 0
Percentiles: P ₁ = 3 P ₁₀ = 6 Q ₁ = 8 Median = 14 Q ₃ = 24 P ₉₀ = 45 P ₉₉ = 89	Hours of Calibration: 0
	Percent Operational Time: 100.0

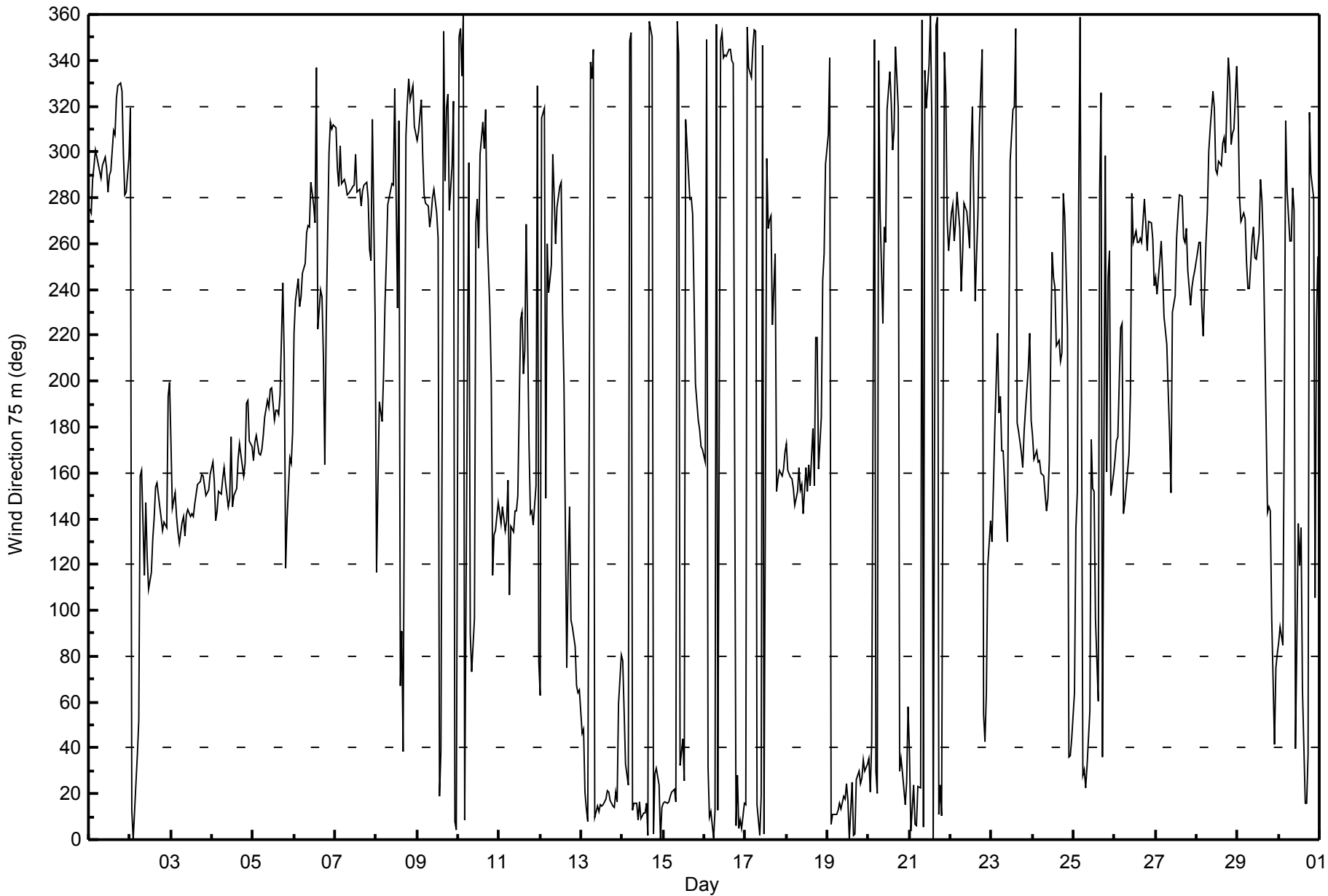
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	6	6	8	6	7	6	7	8	6	8	10	11	12	11	10	10	15	10	11	16	14	4	4	6	16
2-Jun	30	8	59	14	8	23	60	34	32	41	49	24	26	26	27	24	25	22	12	7	5	8	25	14	60
3-Jun	7	8	7	4	8	12	11	12	18	10	12	18	18	14	14	20	11	13	8	6	5	5	5	3	20
4-Jun	2	9	5	3	5	6	8	12	18	10	14	18	21	12	15	22	19	19	12	16	14	9	6	4	22
5-Jun	6	6	6	8	6	6	9	12	18	13	9	12	14	14	18	15	17	22	51	14	8	4	3	8	51
6-Jun	13	4	5	11	6	11	11	9	12	22	22	28	40	89	10	14	8	56	25	19	16	7	5	6	89
7-Jun	5	8	5	10	24	10	5	6	8	7	8	12	7	11	12	10	9	9	8	9	7	20	52	48	52
8-Jun	74	16	8	11	15	11	18	10	11	13	24	48	18	59	18	31	58	17	12	9	8	9	7	8	74
9-Jun	5	7	8	15	13	9	20	6	12	12	20	33	20	53	33	9	23	16	23	17	11	12	13	6	53
10-Jun	15	16	18	10	15	65	61	111	34	83	28	69	79	22	28	33	50	82	27	40	17	9	7	4	111
11-Jun	5	6	4	5	5	28	16	10	11	12	11	50	26	15	9	40	24	30	15	13	9	59	83	11	83
12-Jun	51	12	28	51	13	7	19	26	24	32	34	28	37	82	49	79	30	16	16	15	9	8	8	12	82
13-Jun	8	19	5	7	11	8	9	10	14	9	12	11	13	9	10	10	11	10	12	7	8	7	27	21	27
14-Jun	18	14	9	8	14	10	5	8	15	15	17	17	18	16	18	19	21	22	24	9	5	8	8	7	24
15-Jun	6	9	9	6	7	7	8	13	19	26	18	28	27	82	37	22	21	29	15	20	5	5	2	4	82
16-Jun	36	24	10	7	13	13	7	10	13	13	20	13	12	15	17	13	16	18	31	14	13	7	12	5	36
17-Jun	13	19	8	10	9	8	9	16	23	16	33	48	30	41	57	57	42	64	21	8	3	3	3	4	64
18-Jun	3	4	6	5	3	4	8	8	8	14	17	24	19	22	25	27	23	16	31	25	34	8	6	18	34
19-Jun	13	12	8	6	6	5	7	8	10	11	10	16	16	32	20	35	26	14	11	10	5	3	17	13	35
20-Jun	18	9	49	67	65	58	102	56	33	45	41	33	31	30	38	21	31	23	37	9	4	60	29	4	102
21-Jun	10	4	16	10	7	7	24	20	16	29	29	29	27	40	21	15	40	29	8	12	8	17	14	10	40
22-Jun	7	5	6	4	4	7	9	15	15	16	22	36	47	58	7	12	10	29	41	11	15	17	19	8	58
23-Jun	15	17	24	35	22	16	32	15	39	38	101	46	41	28	68	27	45	18	11	9	5	11	6	16	101
24-Jun	13	6	6	6	5	3	8	12	12	15	51	15	21	14	17	18	24	10	59	78	51	32	5	7	78
25-Jun	25	31	21	58	14	17	26	27	58	61	95	45	56	88	77	65	33	11	31	37	30	39	7	6	95
26-Jun	13	7	10	34	10	24	17	9	38	37	90	13	11	13	15	13	12	23	15	6	35	13	11	6	90
27-Jun	3	6	10	7	9	8	23	19	15	25	80	52	22	22	18	19	21	12	10	13	6	2	3	4	80
28-Jun	3	4	13	12	15	14	13	13	29	17	14	11	13	14	17	11	11	9	18	8	9	7	7	11	29
29-Jun	13	5	8	7	3	7	13	21	27	19	19	22	36	32	41	22	54	12	8	7	60	11	10	7	60
30-Jun	17	23	28	37	23	15	8	6	9	17	52	76	49	69	29	96	7	9	66	18	45	28	55	8	96

74	31	59	67	65	65	102	111	58	83	101	76	79	89	77	96	58	82	66	78	60	60	83	48	
Diurnal Maximum																								



WBEA
Hourly Averages

Wind Direction 75 m (WD75m) - deg
Mannix - June 2015





Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 110 deg on Jun 10 08:00	Hours of Data: 720
Minimum Value: 2 deg on Jun 4 01:00	Hours of Missing Data: 0
	Hours of Calibration: 0
	Percent Operational Time: 100.0
Percentiles: P ₁ = 3 P ₁₀ = 5 Q ₁ = 8 Median = 13 Q ₃ = 24 P ₉₀ = 42 P ₉₉ = 87	

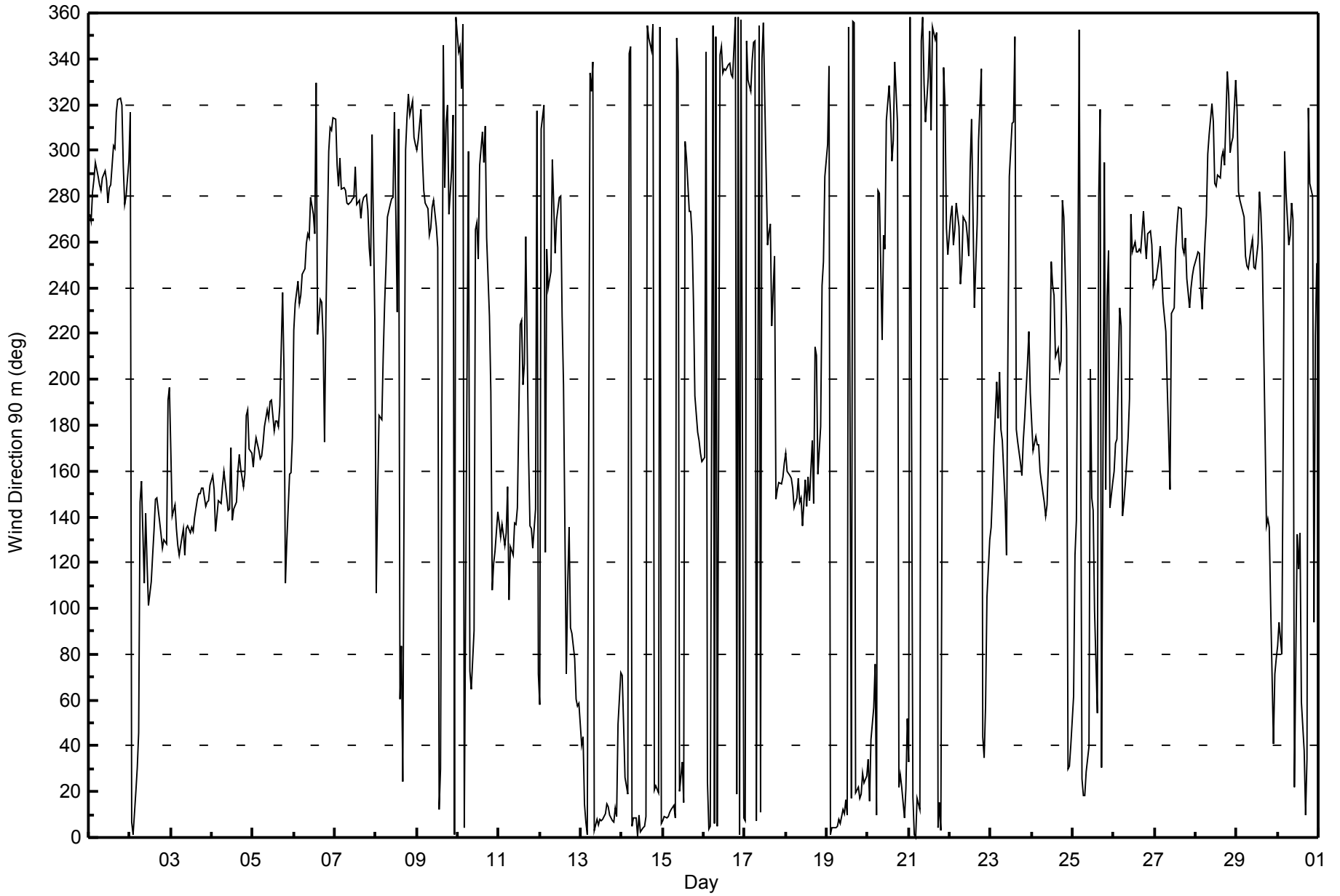
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	6	5	8	6	7	5	7	7	6	7	9	11	11	10	9	9	15	10	10	15	13	4	4	6	15
2-Jun	27	7	48	10	7	21	61	34	36	42	56	25	28	29	28	25	25	24	13	6	5	8	26	13	61
3-Jun	7	9	8	4	5	8	11	14	17	11	13	18	18	15	14	21	10	13	8	5	4	4	4	3	21
4-Jun	2	8	7	2	4	5	8	11	18	12	14	19	21	12	14	22	19	18	11	16	14	9	6	4	22
5-Jun	6	5	6	8	6	6	9	11	17	13	9	12	15	14	18	14	17	22	56	11	6	4	3	9	56
6-Jun	12	4	4	9	6	10	10	9	11	20	21	25	40	88	9	14	8	60	30	19	14	6	5	5	88
7-Jun	6	9	3	9	19	8	5	6	7	6	8	12	7	10	11	10	8	8	8	7	7	18	52	46	52
8-Jun	86	17	6	11	15	10	16	9	9	12	20	46	19	58	19	35	62	16	12	8	7	8	6	7	86
9-Jun	5	6	8	13	13	9	19	6	11	11	19	31	19	50	32	9	21	15	21	15	11	11	14	5	50
10-Jun	14	17	17	9	12	68	68	110	41	83	25	56	78	21	26	31	48	82	26	40	12	7	8	4	110
11-Jun	6	6	3	4	4	27	12	9	10	12	12	43	25	15	10	39	22	31	15	15	10	59	72	10	72
12-Jun	51	12	24	52	10	6	15	24	22	29	33	25	39	70	49	84	28	17	15	15	9	7	7	12	84
13-Jun	7	19	5	7	10	7	9	10	12	8	12	10	12	9	9	10	10	9	11	7	7	6	26	25	26
14-Jun	19	14	8	8	14	9	5	8	14	15	16	17	17	15	17	18	21	22	24	8	4	5	8	6	24
15-Jun	5	8	9	6	6	7	8	11	18	25	17	28	26	84	37	20	20	26	14	21	6	4	3	4	84
16-Jun	34	25	9	6	12	13	6	9	12	13	19	13	12	14	16	12	16	18	30	13	13	6	12	4	34
17-Jun	13	18	7	10	8	8	9	15	22	17	32	46	26	42	55	53	42	59	24	8	3	3	2	3	59
18-Jun	2	3	5	4	3	5	7	8	7	13	17	24	20	21	25	28	24	15	29	26	35	7	5	18	35
19-Jun	19	13	7	5	6	5	6	8	10	11	10	15	15	31	20	34	25	14	11	9	4	3	17	12	34
20-Jun	19	14	49	51	80	57	91	65	34	43	40	33	29	31	35	21	30	22	35	9	4	58	29	5	91
21-Jun	11	4	15	8	6	6	25	20	15	26	29	28	24	41	20	15	39	27	7	11	8	17	13	8	41
22-Jun	6	5	6	4	3	6	8	14	13	15	21	33	46	58	7	11	10	27	38	12	11	17	17	8	58
23-Jun	15	12	17	30	18	18	35	15	49	42	103	39	39	26	62	30	40	17	11	8	5	11	6	16	103
24-Jun	14	7	9	18	12	6	7	14	11	16	49	14	20	13	15	18	24	10	57	74	48	33	5	7	74
25-Jun	23	23	16	56	21	14	20	30	58	75	101	46	54	89	73	67	32	9	39	40	31	39	10	5	101
26-Jun	11	7	10	30	9	27	20	11	36	36	86	12	10	13	14	12	11	22	14	5	32	10	10	6	86
27-Jun	2	6	8	6	8	7	24	20	17	29	77	49	21	21	17	16	20	12	9	12	6	3	3	4	77
28-Jun	2	3	8	9	13	10	9	13	26	17	14	10	12	13	16	10	10	9	18	8	7	6	6	11	26
29-Jun	10	6	12	6	4	6	10	19	24	17	15	19	34	28	41	21	55	13	9	7	61	12	10	7	61
30-Jun	15	18	16	40	15	18	9	7	7	14	50	75	55	81	33	92	6	11	67	16	34	32	59	6	92

86	25	49	56	80	68	91	110	58	83	103	75	78	89	73	92	62	82	67	74	61	59	72	46	
Diurnal Maximum																								



WBEA
Hourly Averages

Wind Direction 90 m (WD90m) - deg
Mannix - June 2015





Summary of Hour Averages

Mannix - June 2015

Maximum Value: 1.3 km/h on Jun 12 22:00		Maximum Daily Average: 0.3 km/h on Jun 3		Hours in Service: 720																																												
Minimum Value: -1.0 km/h on Jun 1 15:00		Minimum Daily Average: -0.4 km/h on Jun 1		Hours of Data: 720																																												
Maximum Diurnal Average: 0.1 km/h at hour 9		Minimum Diurnal Average: -0.1 km/h at hour 5		Hours of Missing Data: 0																																												
Monthly Average: -0.02 km/h		Percentiles: P ₁ = -0.8 P ₁₀ = -0.4 Q ₁ = -0.2 Median = 0.0 Q ₃ = 0.2 P ₉₀ = 0.3 P ₉₉ = 0.7		Hours of Calibration: 0																																												
				Percent Operational Time: 100.0																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jun	0.0	0.5	-0.3	-0.4	-0.9	-0.6	-0.5	0.0	-0.5	-0.4	-0.3	0.1	-0.3	-0.4	-1.0	-0.9	-0.8	-1.0	-0.7	-0.5	-0.3	0.3	0.1	0.2	-0.4	0.5																						
2-Jun	-0.1	-0.2	-0.3	-0.2	-0.1	0.0	0.2	0.0	0.4	0.0	0.2	0.2	0.3	0.2	0.4	0.1	0.0	0.3	0.1	0.1	0.2	0.3	0.1	0.0	0.1	0.4																						
3-Jun	0.2	0.3	0.3	0.3	0.3	0.2	0.3	0.0	0.2	0.0	0.3	0.0	0.2	0.3	0.5	0.3	0.5	0.5	0.6	0.7	0.5	0.5	0.5	0.5	0.3	0.7																						
4-Jun	0.6	0.4	0.2	0.4	0.3	0.3	0.3	0.2	0.2	0.1	0.2	0.1	0.5	0.5	0.2	0.4	0.3	0.3	0.4	-0.1	-0.1	0.4	0.4	0.4	0.3	0.6																						
5-Jun	0.6	0.4	0.3	0.4	0.4	0.4	0.3	0.2	0.3	0.0	0.0	-0.1	0.2	0.2	0.0	0.2	0.0	-0.2	-0.2	0.2	0.3	0.3	0.4	0.2	0.2	0.6																						
6-Jun	-0.1	-0.3	-0.5	-0.2	-0.3	0.0	-0.1	0.3	0.3	0.0	-0.1	-0.1	0.0	0.0	-0.2	-0.1	-0.2	0.2	0.2	-0.2	-0.1	0.0	0.1	0.1	-0.1	0.3																						
7-Jun	0.1	0.0	-0.1	-0.3	-0.1	0.1	0.5	0.3	0.1	0.0	-0.3	0.0	-0.7	0.4	-0.3	0.1	0.0	-0.1	0.0	0.3	-0.2	-0.1	-0.2	0.0	0.0	0.5																						
8-Jun	0.0	0.1	0.0	0.1	0.0	-0.2	-0.1	0.1	0.1	-0.1	-0.1	-0.2	-0.2	0.0	0.9	0.4	0.3	-0.5	-0.8	-0.6	-0.9	-0.5	-0.8	-0.8	-0.2	0.9																						
9-Jun	-0.5	-0.5	-0.4	0.0	-0.2	-0.2	0.2	0.0	0.1	-0.1	-0.1	-0.3	0.0	0.1	0.5	-0.4	-0.2	-0.4	-0.1	0.2	0.1	-0.2	-0.2	-0.4	-0.1	0.5																						
10-Jun	-0.3	-0.3	-0.1	-0.2	-0.2	-0.1	-0.1	-0.4	0.4	0.1	-0.1	-0.2	0.4	0.0	0.1	0.0	0.1	0.1	0.0	0.1	0.2	0.1	0.3	0.3	0.0	0.4																						
11-Jun	0.2	0.1	0.3	0.2	0.2	0.1	0.3	0.1	0.2	0.2	0.2	0.2	-0.1	-0.1	-0.1	-0.1	0.0	0.3	0.2	0.2	0.2	0.3	0.1	0.7	0.2	0.7																						
12-Jun	0.6	-0.1	-0.1	-0.2	-0.2	-0.2	-0.2	0.0	-0.1	-0.2	0.0	-0.2	-0.1	0.0	0.1	0.4	0.2	0.1	0.7	0.5	0.8	1.3	1.2	1.0	0.2	1.3																						
13-Jun	0.5	0.5	-0.2	-0.3	-0.4	-0.5	-0.4	-0.4	-0.4	-0.4	-0.5	-0.1	-0.1	-0.5	-0.5	-0.4	0.0	-0.4	-0.4	-0.5	-0.2	-0.2	0.3	0.3	-0.2	0.5																						
14-Jun	0.6	0.3	0.0	-0.2	-0.4	-0.2	-0.3	-0.3	0.4	-0.1	-0.2	-0.4	-0.5	-0.3	0.1	-0.4	-0.2	-0.6	0.0	0.2	0.3	-0.3	-0.5	-0.3	-0.1	0.6																						
15-Jun	-0.1	-0.2	-0.2	-0.2	-0.1	-0.1	-0.2	0.0	-0.1	0.0	0.3	0.3	0.3	0.1	-0.1	-0.2	-0.2	0.0	-0.2	0.2	-0.1	-0.2	0.1	-0.1	-0.1	0.3																						
16-Jun	0.2	-0.3	0.0	-0.4	-0.2	-0.3	-0.5	0.0	0.0	-0.3	-0.1	-0.3	-0.7	-0.4	-0.5	-0.4	-0.4	-0.5	0.0	0.0	-0.2	-0.3	-0.3	-0.2	-0.3	0.2																						
17-Jun	-0.1	-0.2	-0.5	-0.4	-0.1	-0.3	-0.3	0.1	-0.2	0.1	0.1	0.0	-0.4	0.0	-0.1	-0.1	0.0	0.3	0.4	0.5	0.5	0.5	0.5	0.5	0.0	0.5																						
18-Jun	0.4	0.4	0.4	0.3	0.2	0.2	0.4	0.2	0.3	0.1	0.3	0.4	0.2	0.3	0.0	-0.1	0.2	-0.2	0.0	0.0	0.2	-0.2	0.1	-0.5	0.2	0.4																						
19-Jun	-0.5	-0.5	-0.6	-0.3	-0.5	-0.5	-0.2	-0.1	-0.1	-0.3	-0.1	0.0	0.2	-0.3	0.1	0.3	0.0	0.0	0.1	0.0	0.0	0.2	-0.2	0.0	-0.1	0.3																						
20-Jun	-0.2	-0.1	-0.3	-0.4	-0.4	0.2	-0.1	-0.1	0.2	-0.1	-0.1	-0.3	0.0	0.0	-0.2	-0.5	0.0	-0.4	0.2	0.3	0.0	0.0	-0.2	0.3	-0.1	0.3																						
21-Jun	-0.2	-0.4	-0.2	-0.3	-0.3	-0.2	0.0	-0.1	0.1	-0.1	-0.4	-0.2	0.1	-0.3	-0.4	-0.6	0.0	0.0	-0.1	-0.2	0.0	-0.2	-0.1	-0.1	-0.2	0.1																						
22-Jun	-0.1	-0.1	-0.1	-0.1	0.0	-0.3	-0.2	-0.3	-0.2	-0.1	-0.3	0.1	-0.3	-0.1	-0.1	0.0	0.2	-0.3	0.1	0.5	0.1	0.3	-0.1	-0.1	-0.1	0.5																						
23-Jun	-0.1	-0.4	-0.3	-0.3	0.0	0.2	0.2	0.1	0.3	0.3	0.0	-0.1	-0.4	-0.1	-0.2	0.2	0.1	0.3	0.3	0.1	-0.1	-0.2	-0.3	0.2	0.0	0.3																						
24-Jun	0.2	0.3	0.2	0.1	0.1	0.2	0.2	0.2	0.1	0.3	0.2	0.0	-0.3	-0.1	-0.3	-0.2	-0.2	-0.2	-0.1	-0.1	0.1	0.0	-0.3	0.0	0.0	0.3																						
25-Jun	0.0	-0.3	-0.2	-0.2	0.0	-0.1	0.2	0.3	0.3	0.1	0.1	0.3	-0.2	0.2	0.2	-0.2	-0.4	0.0	0.0	0.2	0.2	-0.1	0.3	0.3	0.0	0.3																						
26-Jun	0.2	0.4	0.3	0.0	-0.3	0.2	0.0	0.1	0.1	0.1	0.1	-0.1	0.2	0.1	0.2	0.1	0.2	-0.6	0.2	0.1	0.1	-0.1	-0.4	-0.2	0.0	0.4																						
27-Jun	-0.2	-0.2	-0.3	0.0	-0.3	0.0	0.0	0.3	0.3	0.3	0.0	0.1	0.0	0.1	0.2	0.0	0.2	0.3	0.4	0.1	-0.2	-0.3	-0.2	-0.2	0.0	0.4																						
28-Jun	-0.2	-0.2	0.0	-0.3	-0.1	0.1	0.0	0.2	0.0	-0.3	-0.7	-0.3	-0.2	-0.7	-0.4	-0.7	-0.6	-0.5	-0.5	-0.5	-0.1	-0.1	-0.4	-0.4	-0.3	0.2																						
29-Jun	0.1	-0.3	-0.3	-0.1	-0.4	-0.2	0.0	0.1	-0.2	-0.1	0.0	-0.1	-0.2	0.0	-0.2	0.3	-0.1	0.2	0.2	0.3	0.0	-0.2	0.7	0.8	0.0	0.8																						
30-Jun	0.1	0.1	-0.1	-0.3	-0.3	-0.3	-0.2	-0.2	-0.1	-0.1	0.4	0.1	0.0	0.1	0.4	-0.1	-0.3	0.1	-0.1	-0.3	0.1	0.2	0.2	-0.1	0.0	0.4																						
																								0.1	0.0	-0.1	-0.1	-0.1	-0.1	0.0	0.0	0.1	0.0	0.0	0.0	-0.1	0.0	0.0	-0.1	0.0	-0.1	0.0	0.1	0.0	0.0	0.1	0.1	Diurnal Average
																								0.6	0.5	0.4	0.4	0.4	0.4	0.5	0.3	0.4	0.3	0.4	0.4	0.5	0.5	0.9	0.4	0.5	0.5	0.7	0.7	0.8	1.3	1.2	1.0	Diurnal Maximum



Summary of Hour Standard Deviations

Mannix - June 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 4.4 km/h on Jun 13 13:00		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																							
Minimum Value: 0.2 km/h on Jun 23 01:00																									
Percentiles: P ₁ = 0.3 P ₁₀ = 0.7 Q ₁ = 1.1 Median = 1.6 Q ₃ = 2.2 P ₉₀ = 2.8 P ₉₉ = 3.9																									
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	1.1	1.4	2.1	2.6	2.8	2.9	2.8	2.9	2.8	3.1	2.9	2.6	3.1	2.9	2.9	2.8	2.9	2.9	2.7	2.2	1.3	0.7	0.6	0.6	3.1
2-Jun	0.7	1.0	0.5	0.3	0.5	0.8	1.2	1.4	1.6	1.7	1.8	1.9	2.0	2.0	2.1	2.1	2.0	1.9	1.8	2.1	1.6	1.8	1.6	1.1	2.1
3-Jun	0.7	1.1	1.0	1.1	0.9	1.3	1.9	1.5	1.9	1.9	2.5	2.4	2.3	2.9	2.9	2.7	2.6	2.7	2.7	2.6	2.0	2.3	2.2	1.9	2.9
4-Jun	1.9	1.3	1.3	1.6	1.5	1.7	1.8	1.8	1.7	1.9	2.4	2.8	2.6	2.9	3.0	3.0	2.9	2.3	1.9	2.6	4.3	2.8	2.5	2.1	4.3
5-Jun	2.1	1.5	1.2	1.4	1.9	1.8	2.2	2.3	2.7	3.6	3.3	3.1	3.2	3.1	3.0	3.1	2.7	2.7	2.1	1.6	1.5	1.5	1.7	1.7	3.6
6-Jun	1.2	0.7	1.2	1.3	1.3	1.1	1.1	1.7	1.6	1.5	1.7	1.8	1.8	1.7	2.3	2.0	2.2	1.0	0.7	0.5	0.3	0.6	0.4	0.3	2.3
7-Jun	0.3	0.4	0.8	2.1	0.9	1.0	1.3	1.8	1.9	2.3	2.2	2.5	2.8	2.9	2.8	2.3	2.2	2.0	1.7	0.9	0.5	1.4	1.2	0.7	2.9
8-Jun	0.4	0.9	1.0	0.7	0.6	1.0	1.3	1.9	2.1	2.0	2.0	1.4	2.1	2.6	1.9	1.3	1.1	2.3	3.2	2.9	2.6	2.0	2.2	2.1	3.2
9-Jun	1.9	1.6	1.5	1.0	1.0	1.1	1.3	1.3	1.7	1.8	1.9	1.9	2.1	2.7	2.3	2.4	1.6	2.0	1.4	1.2	1.0	1.0	1.3	1.6	2.7
10-Jun	1.0	0.9	0.7	0.5	0.5	0.8	0.9	1.1	1.5	1.6	1.4	1.5	1.8	2.2	2.0	1.8	1.6	1.5	1.6	0.7	0.5	0.5	0.9	1.0	2.2
11-Jun	1.2	1.3	0.9	1.3	1.4	1.2	1.3	1.5	1.8	1.7	2.0	1.5	2.4	2.8	3.1	2.9	1.9	2.3	1.4	1.3	1.6	1.9	1.6	1.3	3.1
12-Jun	1.2	1.1	0.6	0.6	0.7	0.9	1.3	1.3	1.5	1.5	1.7	1.9	2.0	1.7	1.7	2.2	3.2	2.3	2.2	2.1	1.9	2.4	2.4	2.1	3.2
13-Jun	1.9	1.5	1.7	1.9	2.2	2.4	2.4	2.6	3.2	3.9	4.1	4.3	4.4	4.1	4.3	4.0	3.8	3.9	3.7	3.6	2.5	2.2	1.4	0.9	4.4
14-Jun	1.4	1.4	1.2	1.2	1.3	2.0	2.7	2.5	2.9	3.1	3.3	3.0	3.0	3.1	3.4	3.0	2.7	2.7	2.3	1.6	1.2	0.6	2.2	2.3	3.4
15-Jun	2.5	2.2	2.5	2.2	2.2	1.9	1.7	1.5	1.3	1.3	1.3	1.2	1.3	1.2	1.2	1.7	1.8	1.4	1.5	1.7	1.1	0.6	0.7	0.5	2.5
16-Jun	0.7	2.3	1.7	2.5	2.1	1.7	2.9	2.7	2.2	2.4	2.2	2.5	2.5	2.6	2.7	2.8	2.6	2.4	2.2	1.4	1.0	0.9	1.6	2.9	2.9
17-Jun	2.1	1.5	1.9	2.1	2.2	2.3	2.2	2.3	2.4	2.3	2.0	1.9	1.9	2.2	2.0	1.8	1.7	1.5	1.5	1.7	1.6	1.4	1.6	1.5	2.4
18-Jun	1.7	1.6	1.4	1.4	1.6	1.7	1.9	2.0	1.7	1.8	1.7	2.2	2.3	2.0	1.6	1.5	1.8	1.5	0.8	0.5	1.8	2.1	1.5	2.0	2.3
19-Jun	1.5	2.1	3.3	3.4	3.1	2.8	2.2	2.2	2.3	2.7	2.5	2.6	2.4	2.4	2.3	2.2	2.4	2.0	1.9	1.4	1.5	1.3	1.1	1.1	3.4
20-Jun	0.6	0.6	0.3	0.4	0.5	0.6	0.7	0.9	1.3	1.4	1.8	2.2	2.3	2.3	2.2	2.0	2.0	1.7	1.4	1.3	1.4	1.6	1.8	1.2	2.3
21-Jun	0.9	1.7	1.1	0.9	1.5	1.7	1.1	1.2	1.7	1.8	2.0	2.3	2.2	2.1	2.5	2.6	1.9	2.0	2.2	1.7	1.7	1.4	0.7	0.9	2.6
22-Jun	0.5	0.4	0.8	0.6	0.8	0.9	1.1	1.3	1.6	1.5	1.5	1.9	2.3	2.0	1.7	2.0	2.2	2.4	1.3	0.9	0.7	0.8	0.3	0.3	2.4
23-Jun	0.2	0.4	0.4	0.8	0.8	0.8	1.0	1.2	1.3	1.6	1.7	1.9	2.7	1.9	1.5	1.6	1.3	1.6	1.5	1.7	1.4	1.0	0.6	0.6	2.7
24-Jun	0.8	0.9	1.0	1.0	0.9	1.3	1.2	1.3	1.5	1.6	1.7	2.1	2.3	2.2	3.0	2.3	1.9	2.9	1.8	0.7	0.8	1.6	1.7	1.7	3.0
25-Jun	1.1	0.4	0.4	0.4	0.3	0.5	0.8	1.3	1.2	1.6	1.8	1.6	1.6	1.7	1.4	2.5	1.7	1.5	0.9	1.1	1.1	1.0	1.1	1.1	2.5
26-Jun	1.0	1.4	1.4	0.4	1.1	1.1	1.2	1.2	1.0	1.4	1.6	2.6	2.6	3.0	2.8	3.0	2.7	3.0	1.7	1.9	1.4	0.8	0.6	0.7	3.0
27-Jun	0.3	0.3	0.6	0.6	0.5	0.8	1.0	1.3	1.5	1.4	1.5	1.7	2.0	2.3	2.2	2.2	2.1	2.2	1.4	1.2	1.1	0.7	0.5	0.7	2.3
28-Jun	0.6	0.9	0.7	0.5	0.5	0.6	1.1	1.5	1.7	2.2	2.8	2.9	3.2	3.0	3.0	2.9	2.8	2.6	2.6	2.1	1.1	0.9	1.2	1.3	3.2
29-Jun	0.7	0.4	0.5	0.4	0.5	0.7	0.8	0.8	1.1	1.4	1.5	1.6	1.7	1.9	1.8	2.0	1.5	1.3	1.1	1.0	0.8	1.1	1.2	1.0	2.0
30-Jun	0.6	0.4	0.4	0.4	0.5	0.8	1.0	0.9	1.0	1.2	1.1	0.9	0.9	0.7	0.8	0.6	1.5	1.4	1.2	1.4	0.5	1.0	1.4	1.6	1.6
Diurnal Maximum																									
2.5 2.3 3.3 3.4 3.1 2.9 2.9 2.9 3.2 3.9 4.1 4.3 4.4 4.1 4.3 4.0 3.8 3.9 3.7 3.6 4.3 2.8 2.5 2.9																									



Summary of Hour Averages

Mannix - June 2015

Maximum Value: 1.3 km/h on Jun 12 23:00																				Maximum Daily Average: 0.8 km/h on Jun 3					Hours in Service: 720				
Minimum Value: -0.9 km/h on Jun 1 17:00																				Minimum Daily Average: -0.3 km/h on Jun 1					Hours of Data: 720				
Maximum Diurnal Average: 0.3 km/h at hour 9																				Minimum Diurnal Average: 0.0 km/h at hour 5					Hours of Missing Data: 0				
Monthly Average: 0.15 km/h																				Percentiles: P ₁ = -0.6 P ₁₀ = -0.3 Q ₁ = -0.1 Median = 0.1 Q ₃ = 0.5 P ₉₀ = 0.7 P ₉₉ = 1.1					Hours of Calibration: 0				
																				Percent Operational Time: 100.0									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Jun	-0.1	0.0	-0.2	-0.4	-0.4	-0.5	-0.1	-0.2	-0.3	0.2	0.0	-0.1	-0.3	-0.5	-0.8	-0.2	-0.9	-0.8	-0.7	-0.2	-0.1	-0.1	-0.1	-0.3	-0.3	0.2			
2-Jun	-0.2	-0.2	0.0	0.0	0.1	0.2	0.6	0.4	0.8	0.4	0.8	0.2	0.7	0.7	1.0	0.7	0.8	0.9	0.5	0.5	0.6	0.7	0.1	0.1	0.4	1.0			
3-Jun	0.4	0.8	0.8	0.8	0.6	0.7	0.5	0.3	0.8	0.3	1.0	0.5	0.9	0.8	1.1	1.0	1.2	0.7	1.0	1.1	1.0	1.1	1.1	0.8	0.8	1.2			
4-Jun	0.9	0.7	0.6	0.9	0.6	0.5	0.6	0.7	0.6	0.5	0.6	0.5	1.0	1.0	1.0	0.8	1.1	1.0	0.6	0.9	0.5	0.3	0.7	0.7	0.7	1.1			
5-Jun	0.9	0.6	0.3	0.8	0.8	0.8	0.7	0.7	1.0	0.7	-0.1	0.2	0.6	1.0	0.4	0.7	-0.2	-0.1	-0.2	0.4	0.6	0.3	0.6	0.5	0.5	1.0			
6-Jun	-0.2	-0.4	-0.4	-0.2	-0.5	-0.1	0.2	-0.2	0.3	-0.2	-0.4	-0.2	-0.2	0.0	-0.3	0.0	-0.4	0.3	0.3	-0.1	-0.2	-0.2	-0.4	-0.1	-0.1	0.3			
7-Jun	-0.1	-0.1	-0.2	-0.2	0.0	0.0	0.0	-0.1	-0.1	-0.2	-0.3	-0.2	0.0	0.5	-0.4	-0.2	-0.1	-0.2	-0.2	0.1	-0.1	0.0	0.1	0.2	-0.1	0.5			
8-Jun	0.2	0.5	0.1	0.3	0.1	-0.1	0.0	-0.2	0.1	0.0	-0.2	-0.2	-0.4	-0.1	0.9	0.7	0.6	-0.3	-0.5	-0.7	-0.5	-0.5	-0.5	-0.4	0.0	0.9			
9-Jun	-0.2	-0.3	-0.3	0.0	-0.2	-0.2	0.0	-0.3	0.1	0.0	-0.1	0.0	-0.1	0.1	0.8	-0.5	0.2	-0.3	0.2	0.3	0.2	-0.2	-0.1	-0.4	-0.1	0.8			
10-Jun	-0.3	-0.3	0.2	-0.1	0.0	0.0	0.0	-0.3	0.7	0.0	0.1	-0.3	1.2	0.1	0.6	0.4	0.5	0.3	0.1	0.1	0.3	0.5	0.7	0.6	0.2	1.2			
11-Jun	0.6	0.5	0.5	0.7	0.7	0.6	0.6	0.5	0.6	0.6	0.6	0.5	-0.1	0.2	0.0	0.1	0.0	0.6	0.4	0.6	0.7	0.7	0.3	0.6	0.5	0.7			
12-Jun	0.7	-0.2	-0.1	0.1	-0.2	-0.1	-0.1	0.1	0.2	-0.1	0.2	-0.1	0.2	0.5	0.4	0.6	0.9	0.4	0.8	0.7	1.1	1.2	1.3	0.9	0.4	1.3			
13-Jun	0.5	0.7	0.0	0.1	-0.3	-0.6	-0.3	-0.2	0.0	-0.4	0.1	0.3	0.1	-0.3	-0.5	-0.1	0.2	-0.2	0.0	-0.6	-0.1	-0.1	0.6	0.5	0.0	0.7			
14-Jun	0.9	0.4	0.4	-0.1	-0.3	-0.2	-0.4	-0.2	0.8	0.5	-0.2	-0.4	-0.5	-0.4	0.4	-0.3	0.6	0.1	0.3	0.2	0.3	0.0	-0.4	-0.1	0.1	0.9			
15-Jun	0.1	0.1	0.0	-0.3	0.0	-0.1	0.0	0.1	0.2	0.2	0.4	0.4	0.3	0.2	-0.2	-0.4	0.1	0.2	-0.2	0.6	0.2	0.2	0.4	0.3	0.1	0.6			
16-Jun	0.4	-0.4	0.1	-0.2	0.0	-0.1	-0.2	0.0	0.5	-0.3	0.3	-0.3	-0.6	-0.4	0.0	-0.5	0.0	-0.4	0.1	0.1	-0.2	-0.3	-0.2	-0.4	-0.1	0.5			
17-Jun	0.2	-0.2	-0.4	-0.1	-0.2	-0.4	-0.6	0.4	-0.2	0.5	0.2	0.1	-0.3	0.2	0.4	0.0	0.2	0.1	1.1	0.9	0.8	0.8	0.7	0.7	0.2	1.1			
18-Jun	0.7	0.8	0.8	0.7	0.8	0.8	1.1	0.5	0.6	0.2	0.6	0.8	0.6	0.4	0.2	0.2	0.6	0.0	0.2	0.2	0.4	-0.3	-0.2	-0.3	0.4	1.1			
19-Jun	-0.5	-0.7	-0.4	-0.1	-0.3	-0.4	-0.1	-0.1	0.0	-0.1	0.0	-0.1	0.7	0.0	0.5	0.6	0.5	0.1	0.2	0.3	0.1	0.2	-0.1	0.1	0.0	0.7			
20-Jun	0.1	0.1	0.1	-0.1	0.0	0.3	0.0	0.5	0.9	0.0	0.3	0.0	0.6	0.1	0.0	-0.2	0.3	-0.1	0.3	0.3	0.1	0.2	0.0	0.3	0.2	0.9			
21-Jun	0.1	-0.4	0.0	-0.2	-0.3	-0.1	0.2	-0.1	0.4	0.4	-0.1	0.3	0.2	-0.2	-0.3	-0.5	0.2	0.3	0.3	0.0	-0.1	0.0	0.1	-0.3	0.0	0.4			
22-Jun	-0.2	-0.2	-0.4	-0.4	-0.3	-0.3	0.0	-0.2	0.1	-0.1	0.1	0.3	0.0	0.0	-0.1	-0.3	0.1	-0.3	0.3	0.5	0.2	0.6	0.3	0.2	0.0	0.6			
23-Jun	0.3	-0.1	0.0	0.0	0.0	0.4	0.4	0.5	0.4	0.5	0.4	0.0	-0.2	-0.3	-0.1	0.7	0.3	0.8	0.8	0.5	0.2	0.0	-0.2	0.4	0.2	0.8			
24-Jun	0.6	0.8	0.3	0.5	0.5	0.6	0.6	0.4	0.4	0.7	0.4	0.0	-0.2	-0.3	0.0	-0.1	0.6	0.1	0.0	0.1	0.1	0.3	0.1	-0.3	0.3	0.8			
25-Jun	0.0	0.1	0.0	0.0	0.0	0.1	0.2	0.5	0.5	0.3	0.5	0.8	-0.3	0.6	0.4	-0.1	-0.2	0.1	0.1	0.5	0.0	0.1	0.8	0.6	0.2	0.8			
26-Jun	0.4	0.7	0.6	0.0	-0.2	0.5	0.5	0.5	0.4	0.4	0.3	-0.5	0.1	-0.1	0.2	-0.4	0.0	-0.6	-0.1	-0.3	-0.1	0.0	-0.2	-0.2	0.1	0.7			
27-Jun	-0.2	-0.1	-0.1	0.0	-0.2	0.0	0.1	0.6	0.5	0.5	0.1	0.6	0.0	0.3	0.1	0.2	0.2	0.2	0.3	-0.1	-0.2	-0.4	-0.4	-0.6	0.1	0.6			
28-Jun	-0.6	-0.5	-0.1	-0.1	0.1	0.1	-0.1	0.0	0.1	0.0	-0.4	-0.3	0.2	-0.3	-0.4	-0.5	-0.3	0.1	-0.3	-0.6	-0.1	-0.4	-0.4	-0.5	-0.2	0.2			
29-Jun	0.0	-0.1	-0.3	0.1	-0.1	-0.2	0.0	0.2	-0.1	0.0	0.1	0.0	-0.1	0.2	0.1	0.2	0.5	0.6	0.4	0.5	0.2	-0.1	0.6	0.8	0.1	0.8			
30-Jun	0.4	0.3	0.2	-0.1	-0.1	-0.3	-0.1	-0.1	0.1	0.1	0.5	0.3	0.1	0.3	0.6	0.0	0.0	0.2	0.0	-0.2	0.1	0.5	0.1	-0.2	0.1	0.6			
																								Diurnal Average					
																								Diurnal Maximum					



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 4.5 km/h on Jun 13 13:00		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																							
Minimum Value: 0.2 km/h on Jun 7 02:00																									
Percentiles: $P_1 = 0.2$ $P_{10} = 0.6$ $Q_1 = 1.0$ Median = 1.8 $Q_3 = 2.5$ $P_{90} = 3.0$ $P_{99} = 3.9$																									
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	0.8	1.2	1.9	2.4	2.6	2.7	2.6	2.7	2.5	3.0	3.1	2.7	3.4	3.1	3.1	3.2	3.2	3.2	2.9	2.2	1.2	0.6	0.4	0.3	3.4
2-Jun	0.8	1.0	0.6	0.5	0.5	1.0	1.5	1.8	1.9	2.3	2.2	2.1	2.7	2.5	2.8	2.6	2.5	2.2	2.2	2.0	1.6	1.8	1.2	0.7	2.8
3-Jun	0.4	0.6	0.7	0.8	0.9	1.3	2.1	1.7	2.1	2.1	2.6	2.8	2.8	3.1	3.1	2.6	2.7	2.4	2.1	2.1	2.4	2.1	1.3	3.1	
4-Jun	1.1	0.8	0.8	1.3	1.3	1.6	1.7	2.0	1.9	1.9	2.7	3.0	2.9	3.2	3.1	3.1	2.9	2.7	1.8	2.4	3.5	2.4	1.7	1.3	3.5
5-Jun	1.4	1.0	0.5	1.2	1.2	1.5	2.1	2.3	2.8	3.2	2.9	3.2	3.4	3.2	3.2	3.1	2.6	2.7	1.9	1.3	1.1	0.9	1.1	1.0	3.4
6-Jun	0.7	0.7	1.1	1.2	1.2	1.4	1.4	1.9	2.0	1.9	2.2	2.3	2.0	1.5	2.0	2.3	2.1	0.9	0.7	0.4	0.4	0.6	0.3	0.2	2.3
7-Jun	0.2	0.2	0.5	2.1	0.9	0.8	1.2	1.7	2.0	2.4	2.1	2.9	3.0	3.2	2.9	2.6	2.3	1.9	1.7	0.9	0.4	1.3	1.0	1.0	3.2
8-Jun	0.5	0.5	0.6	0.5	0.5	1.0	1.6	1.8	2.2	2.4	2.3	1.5	1.7	2.7	2.3	1.6	1.5	2.4	3.7	3.2	3.0	2.1	2.1	1.8	3.7
9-Jun	1.4	1.3	1.4	0.8	0.6	0.7	1.2	1.3	2.0	2.1	2.3	2.6	2.2	2.9	2.5	2.4	1.9	2.1	1.6	1.1	0.7	0.5	1.1	1.4	2.9
10-Jun	1.1	0.9	0.7	0.5	0.5	0.5	1.1	1.3	1.7	2.0	1.8	1.9	2.5	2.9	2.7	2.5	2.0	1.9	1.8	0.9	0.6	0.4	0.6	0.8	2.9
11-Jun	1.2	1.3	0.8	1.1	1.3	1.3	1.2	1.3	1.7	1.7	2.3	1.6	3.0	3.1	2.7	3.1	1.9	2.0	1.4	1.4	1.5	1.6	1.7	1.3	3.1
12-Jun	1.3	0.7	0.5	0.5	0.4	0.9	1.6	1.5	1.8	2.0	2.3	2.5	2.6	2.5	2.2	2.6	3.4	2.1	2.2	2.2	2.0	2.5	2.4	2.2	3.4
13-Jun	1.9	1.6	1.5	1.7	2.1	2.2	2.5	2.8	3.4	3.7	4.3	4.4	4.5	4.1	3.9	4.0	3.9	3.9	4.0	3.2	2.7	2.3	1.5	0.8	4.5
14-Jun	1.7	1.8	1.4	1.1	1.1	2.1	2.1	2.6	3.4	3.5	3.5	3.5	3.4	3.4	3.7	3.4	3.1	3.1	2.6	1.9	1.2	0.6	2.0	2.2	3.7
15-Jun	2.4	2.3	2.3	2.1	2.4	1.9	1.8	1.6	1.4	1.5	1.4	1.5	1.5	1.5	1.3	2.1	2.4	2.0	1.7	1.8	1.0	0.5	0.4	0.6	2.4
16-Jun	0.7	2.2	1.9	2.3	2.2	1.9	2.6	2.7	2.4	2.6	2.6	2.8	2.7	2.9	3.2	3.1	3.1	2.8	2.3	1.6	1.2	1.0	1.4	2.8	3.2
17-Jun	2.2	1.8	1.7	2.3	2.3	2.2	2.1	2.5	2.6	2.6	2.5	2.3	2.5	2.9	2.8	2.6	2.6	2.0	1.9	1.6	1.0	0.9	0.9	1.0	2.9
18-Jun	1.1	1.7	1.6	1.3	1.2	1.6	2.0	1.8	1.7	1.9	2.2	2.9	2.9	2.2	2.0	1.8	1.9	1.6	0.9	0.6	1.7	2.1	1.4	1.3	2.9
19-Jun	0.8	1.8	3.3	3.3	3.0	2.4	2.0	2.2	2.5	2.8	2.8	3.0	3.2	3.0	3.0	2.7	2.9	2.4	2.2	1.7	1.4	1.6	1.1	1.2	3.3
20-Jun	0.3	0.5	0.2	0.2	0.3	0.6	0.6	1.2	1.5	1.9	2.5	2.7	2.9	3.1	2.8	2.6	2.4	2.3	1.7	1.4	1.3	2.0	2.2	0.9	3.1
21-Jun	0.8	1.0	1.0	0.6	1.2	1.8	1.4	1.3	1.8	2.3	2.5	2.9	2.9	2.7	2.9	3.1	2.4	2.4	2.2	1.7	1.7	1.2	0.7	0.9	3.1
22-Jun	0.4	0.3	0.6	0.5	0.6	0.6	1.2	1.8	2.0	1.9	2.2	2.6	2.7	2.1	1.8	2.2	2.2	2.3	1.3	0.9	0.9	1.0	0.5	0.3	2.7
23-Jun	0.3	0.3	0.3	0.3	0.3	0.8	1.0	1.4	1.6	1.9	2.3	2.6	2.8	2.0	1.8	2.0	1.9	1.9	1.3	1.4	0.9	0.6	0.5	0.6	2.8
24-Jun	0.8	0.6	0.9	0.9	0.8	1.1	1.1	1.4	1.6	1.8	2.1	2.6	2.9	2.6	3.0	2.7	2.6	3.0	1.9	0.8	0.8	1.4	1.7	1.5	3.0
25-Jun	1.1	0.4	0.5	0.2	0.4	0.6	0.9	1.5	1.6	1.6	2.3	2.2	1.9	2.2	1.8	2.5	1.1	1.4	0.6	0.8	0.8	0.9	0.7	0.5	2.5
26-Jun	0.8	0.7	1.1	0.4	0.8	0.9	1.2	1.1	1.1	1.9	2.1	2.8	3.0	3.3	3.3	3.3	2.9	2.9	1.6	1.6	1.4	0.9	0.2	0.4	3.3
27-Jun	0.3	0.4	1.0	0.8	0.6	0.7	1.2	1.7	1.8	1.6	2.1	2.2	2.4	2.8	2.7	2.7	2.4	2.6	1.6	1.3	0.8	0.3	0.3	0.3	2.8
28-Jun	0.2	0.9	0.7	0.5	0.4	0.7	1.2	1.5	2.1	2.8	3.1	2.9	3.3	3.6	3.4	3.1	3.0	2.7	2.5	2.1	0.9	0.7	0.9	1.2	3.6
29-Jun	0.7	0.3	0.5	0.4	0.2	0.3	0.6	1.0	1.4	1.9	1.9	2.1	2.3	2.6	2.3	2.6	2.0	1.7	1.0	0.7	0.9	0.9	1.3	0.8	2.6
30-Jun	0.6	0.4	0.3	0.3	0.4	0.3	0.8	0.9	1.1	1.4	1.3	1.2	1.0	0.7	1.0	0.5	1.2	1.2	1.0	1.0	0.5	0.8	1.3	1.5	1.5
Diurnal Maximum																									
2.4 2.3 3.3 3.3 3.0 2.7 2.6 2.8 3.4 3.7 4.3 4.4 4.5 4.1 3.9 4.0 3.9 3.9 4.0 3.2 3.5 2.5 2.4 2.8																									



Summary of Hour Averages

Mannix - June 2015

Maximum Value: 1.3 km/h on Jun 10 13:00		Maximum Daily Average: 0.3 km/h on Jun 13		Hours in Service: 720																						
Minimum Value: -1.0 km/h on Jun 25 13:00		Minimum Daily Average: -0.2 km/h on Jun 6		Hours of Data: 720																						
Maximum Diurnal Average: 0.3 km/h at hour 17		Minimum Diurnal Average: 0.0 km/h at hour 5		Hours of Missing Data: 0																						
Monthly Average: 0.14 km/h		Percentiles: P ₁ = -0.6 P ₁₀ = -0.3 Q ₁ = -0.1 Median = 0.1 Q ₃ = 0.3 P ₉₀ = 0.6 P ₉₉ = 1.1		Hours of Calibration: 0																						
				Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0.0	0.2	0.1	0.1	0.3	0.3	0.4	0.4	0.1	0.7	0.8	0.2	0.2	0.0	-0.3	0.6	-0.3	-0.6	-0.2	0.2	0.3	-0.1	0.0	0.1	0.1	0.8
2-Jun	0.2	0.0	-0.1	0.1	0.2	0.2	0.6	0.1	0.4	0.2	0.8	-0.3	0.3	0.7	1.2	0.2	0.9	0.5	-0.1	-0.5	-0.2	-0.3	-0.2	-0.2	0.2	1.2
3-Jun	0.4	0.2	0.5	0.1	0.0	0.1	-0.2	-0.3	0.4	-0.3	0.5	0.2	0.7	-0.1	0.4	0.5	0.5	0.1	0.7	0.7	0.2	0.5	0.6	0.7	0.3	0.7
4-Jun	0.8	0.5	-0.2	0.1	0.1	-0.2	0.2	0.5	0.4	-0.2	0.0	0.0	0.6	0.2	0.2	0.5	1.2	0.8	0.4	0.5	0.0	0.0	0.4	0.4	0.3	1.2
5-Jun	0.7	0.5	0.1	0.6	0.5	0.4	0.3	0.4	1.1	0.7	-1.0	-0.3	-0.1	0.7	0.1	0.2	-0.7	-0.2	-0.6	-0.4	0.0	0.3	0.6	0.4	0.2	1.1
6-Jun	-0.5	-0.5	-0.4	-0.4	-0.5	-0.1	0.1	-0.3	0.4	-0.5	-0.4	-0.1	-0.2	0.0	-0.5	-0.2	-0.5	-0.1	0.0	-0.4	-0.1	0.0	0.0	0.1	-0.2	0.4
7-Jun	0.2	0.2	-0.1	0.4	0.3	0.1	0.1	0.1	0.1	-0.1	-0.2	0.1	0.7	0.7	-0.1	0.1	0.2	0.0	-0.1	0.2	-0.2	-0.2	0.3	0.4	0.1	0.7
8-Jun	0.0	0.2	0.0	0.1	-0.2	-0.2	0.0	0.0	-0.1	-0.2	-0.2	-0.1	-0.6	0.2	0.6	0.5	0.5	0.3	0.3	0.1	0.1	-0.2	0.1	0.2	0.1	0.6
9-Jun	0.3	0.1	-0.1	0.2	0.0	-0.1	0.1	-0.2	0.1	0.0	-0.1	-0.1	0.0	0.1	0.7	-0.4	0.3	-0.1	0.3	0.5	0.3	0.0	0.3	-0.2	0.1	0.7
10-Jun	-0.2	-0.2	0.3	-0.1	0.0	-0.1	-0.1	-0.4	0.6	-0.1	0.0	-0.7	1.3	0.2	0.7	0.2	1.1	0.4	-0.1	0.0	0.4	0.0	-0.1	0.1	0.1	1.3
11-Jun	0.0	-0.1	0.0	-0.1	-0.1	0.6	0.2	-0.1	0.1	0.1	-0.1	0.3	-0.4	0.1	-0.6	0.0	0.2	0.1	-0.1	0.2	-0.1	0.3	0.5	0.4	0.1	0.6
12-Jun	0.7	0.0	0.0	0.2	-0.2	-0.2	-0.4	0.1	0.0	-0.4	0.4	-0.2	0.3	0.4	0.1	0.1	0.4	-0.5	0.1	0.4	0.8	1.1	1.0	0.9	0.2	1.1
13-Jun	0.6	0.9	0.3	0.6	0.1	-0.4	-0.1	0.0	0.7	0.2	0.8	0.9	0.2	0.2	0.3	0.5	0.8	0.0	0.9	-0.3	0.2	0.1	0.5	0.3	0.3	0.9
14-Jun	0.6	0.3	0.5	0.0	0.0	0.0	-0.1	-0.2	1.0	1.3	0.1	-0.3	-0.2	-0.3	0.8	0.3	1.2	0.6	0.6	0.3	0.4	0.2	0.0	0.4	0.3	1.3
15-Jun	0.4	0.6	0.4	0.0	0.3	0.2	0.1	0.2	0.3	0.3	0.5	0.3	0.5	0.2	-0.4	-0.6	0.3	0.1	-0.4	0.3	0.1	0.2	0.5	0.5	0.2	0.6
16-Jun	0.3	-0.2	0.3	0.3	0.4	0.4	0.3	0.6	1.2	0.0	0.6	0.1	-0.2	-0.3	0.5	-0.5	0.1	-0.3	0.5	0.0	-0.1	-0.3	0.2	0.0	0.2	1.2
17-Jun	0.6	0.1	-0.2	0.0	0.0	-0.3	-0.5	0.9	-0.1	0.7	0.2	0.2	-0.1	0.0	0.3	-0.2	-0.4	-0.2	0.8	0.5	0.7	0.7	0.6	0.5	0.2	0.9
18-Jun	0.7	0.6	0.6	0.5	0.2	0.1	0.6	0.3	0.3	0.0	0.2	0.4	0.2	0.0	-0.3	0.1	0.2	-0.2	0.2	0.0	0.1	-0.4	-0.4	0.0	0.2	0.7
19-Jun	0.0	-0.5	0.0	0.3	0.2	0.1	0.1	0.1	-0.1	0.0	0.1	-0.1	0.9	0.2	0.6	0.6	0.7	0.3	0.1	0.3	0.3	0.4	0.2	0.4	0.2	0.9
20-Jun	0.2	0.2	0.1	0.0	0.1	0.2	0.1	0.2	1.0	0.0	0.4	0.1	0.6	0.1	0.1	-0.2	0.3	0.0	0.4	0.2	0.2	0.4	0.2	0.5	0.2	1.0
21-Jun	0.3	-0.2	0.2	-0.1	0.1	0.0	0.2	-0.2	0.7	0.5	0.1	0.7	0.2	-0.4	-0.3	-0.2	0.2	0.4	0.5	0.2	0.2	0.2	0.0	-0.3	0.1	0.7
22-Jun	-0.2	-0.2	-0.4	-0.4	-0.3	-0.1	-0.1	-0.3	-0.1	-0.4	0.5	0.3	0.4	0.2	-0.1	-0.5	0.4	0.1	0.3	0.4	0.3	0.4	0.2	0.0	0.0	0.5
23-Jun	0.1	0.1	0.0	0.0	-0.1	0.1	0.2	0.2	0.2	0.0	0.3	-0.3	-0.1	-0.1	-0.2	0.6	0.3	0.6	0.3	0.2	0.1	-0.3	-0.3	0.0	0.1	0.6
24-Jun	0.1	0.3	0.0	0.4	0.3	0.4	0.4	0.0	-0.1	0.3	0.4	0.0	-0.4	-0.5	-0.4	-0.4	0.5	-0.4	0.1	0.1	-0.2	0.3	0.3	-0.5	0.0	0.5
25-Jun	0.1	0.1	0.0	0.1	0.0	0.3	0.2	0.4	0.4	0.1	0.3	0.7	-1.0	0.3	0.4	0.2	0.2	0.3	0.0	0.4	-0.1	0.1	0.3	0.5	0.2	0.7
26-Jun	0.3	0.5	0.4	-0.1	-0.3	0.2	0.1	0.2	0.2	0.2	0.3	-0.2	0.5	-0.1	0.8	-0.4	0.1	-0.1	0.0	-0.3	-0.2	0.1	-0.2	-0.3	0.1	0.8
27-Jun	-0.4	-0.2	-0.1	0.1	-0.2	-0.2	-0.1	0.1	0.2	0.2	-0.2	0.2	0.2	0.5	0.2	0.4	0.2	0.3	0.2	0.0	-0.4	-0.6	-0.6	-0.8	0.0	0.5
28-Jun	-0.7	-0.6	-0.2	-0.2	-0.1	-0.1	-0.2	0.1	0.2	0.2	0.1	0.4	0.9	0.6	0.2	0.1	0.4	0.7	0.0	-0.3	0.2	0.1	0.0	-0.4	0.1	0.9
29-Jun	0.0	-0.1	-0.1	0.4	0.1	-0.1	-0.2	0.2	-0.1	-0.2	-0.2	0.0	-0.1	0.4	0.1	-0.1	0.9	0.1	0.0	0.1	0.3	0.2	0.4	0.3	0.1	0.9
30-Jun	0.1	0.2	0.2	0.0	0.0	-0.1	0.2	0.1	0.1	0.1	0.4	0.1	-0.1	0.3	0.5	0.0	0.0	0.3	0.2	0.0	0.0	0.1	0.0	-0.2	0.1	0.5
																								Diurnal Average		
																								Diurnal Maximum		



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 4.4 km/h on Jun 13 13:00 Minimum Value: 0.2 km/h on Jun 30 06:00 Percentiles: P ₁ = 0.2 P ₁₀ = 0.5 Q ₁ = 0.9 Median = 1.8 Q ₃ = 2.7 P ₉₀ = 3.3 P ₉₉ = 3.9																								Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	0.8	1.2	1.8	2.1	2.6	2.6	2.6	2.7	2.7	3.2	3.5	3.2	3.6	3.3	3.3	3.6	3.3	3.0	3.0	2.4	1.3	0.7	0.4	0.4	3.6
2-Jun	0.9	1.1	0.8	0.5	0.5	1.0	1.7	2.0	2.1	2.7	2.8	2.6	3.2	3.0	3.2	3.0	3.0	2.5	2.4	1.8	1.5	1.8	1.2	0.8	3.2
3-Jun	0.4	0.6	0.5	0.7	1.1	1.6	2.2	1.8	2.5	2.2	3.0	3.3	3.2	3.2	3.3	3.3	2.8	2.8	2.4	1.9	1.6	2.0	1.8	1.0	3.3
4-Jun	0.7	0.7	0.7	0.7	1.3	1.3	1.7	1.9	1.9	1.8	2.8	3.2	3.3	3.2	3.5	3.4	3.2	3.1	1.9	2.3	3.6	2.5	1.5	1.1	3.6
5-Jun	1.1	0.8	0.5	0.9	0.9	1.5	2.3	2.5	3.0	3.6	2.9	3.5	3.6	3.7	3.6	3.4	2.9	2.6	1.8	1.8	0.9	0.5	0.7	0.9	3.7
6-Jun	0.6	0.8	1.4	1.4	1.4	1.5	1.5	1.9	2.1	2.0	2.4	2.6	2.1	1.6	1.7	2.0	1.8	1.0	0.6	0.5	0.5	0.9	0.4	0.3	2.6
7-Jun	0.3	0.2	0.5	2.0	1.0	0.8	1.2	1.8	2.1	2.2	2.3	3.3	3.3	3.5	3.4	3.0	2.4	2.0	1.8	0.9	0.5	1.5	1.1	1.3	3.5
8-Jun	0.8	0.4	0.4	0.4	0.7	1.0	1.6	1.9	2.3	2.6	2.4	1.6	1.6	2.7	2.4	1.7	1.6	2.7	3.7	3.1	2.6	1.9	1.9	1.9	3.7
9-Jun	1.3	1.2	1.4	0.9	0.3	0.5	0.8	1.2	2.2	2.1	2.7	2.9	2.2	2.6	2.6	2.6	2.0	2.1	1.6	1.1	0.7	0.6	1.0	1.4	2.9
10-Jun	1.1	1.0	0.8	0.4	0.5	0.4	0.9	1.4	2.0	2.3	2.0	2.1	3.0	3.1	3.1	3.0	2.4	2.2	1.6	0.9	1.1	0.9	1.0	0.4	3.1
11-Jun	0.8	1.3	0.6	1.1	0.9	1.8	2.1	1.2	1.7	1.8	2.2	1.8	3.2	3.1	2.9	3.4	1.9	1.8	1.3	1.4	1.4	1.7	2.0	1.4	3.4
12-Jun	1.4	0.8	0.6	0.8	0.5	0.8	1.4	1.5	2.0	2.3	2.7	3.0	3.0	3.0	2.7	3.1	4.0	2.3	2.8	2.7	2.1	2.4	2.3	2.5	4.0
13-Jun	1.7	1.7	1.1	1.5	1.7	2.3	2.6	2.9	3.3	3.5	4.2	4.2	4.4	3.9	4.0	4.0	3.8	3.3	4.1	2.8	2.5	2.3	1.6	1.2	4.4
14-Jun	2.1	2.0	1.3	0.8	1.1	2.2	2.0	2.5	3.4	3.7	3.5	3.6	3.7	3.5	3.9	3.9	3.4	3.4	2.7	1.8	0.9	0.6	1.8	2.0	3.9
15-Jun	2.3	2.1	2.2	2.0	2.1	1.7	1.6	1.5	1.5	1.6	1.6	1.7	1.8	1.6	1.5	2.3	2.8	2.1	2.0	1.7	1.0	0.6	0.4	0.6	2.8
16-Jun	0.6	2.0	1.8	2.1	2.3	2.1	2.2	2.6	2.5	2.6	2.7	3.1	2.9	3.2	3.6	3.3	3.8	3.0	2.5	1.6	1.6	1.1	1.3	2.3	3.8
17-Jun	2.2	1.8	1.5	2.1	2.2	2.2	2.2	2.7	2.5	2.8	2.8	2.5	2.9	3.3	3.2	3.0	2.9	2.3	2.1	1.5	0.6	0.5	0.7	0.8	3.3
18-Jun	0.6	1.3	1.4	1.2	0.8	1.0	1.9	1.7	1.6	2.0	2.4	3.4	3.2	2.5	2.1	2.2	2.2	1.5	1.0	0.5	1.5	1.9	1.3	1.4	3.4
19-Jun	0.6	1.6	3.3	2.9	2.7	2.0	1.8	2.2	2.5	2.8	3.0	3.2	3.6	3.5	3.4	3.2	3.4	2.8	2.4	1.8	0.9	0.8	0.7	0.8	3.6
20-Jun	0.5	0.5	0.3	0.3	0.2	0.4	0.5	1.1	1.7	2.1	2.9	3.3	3.6	3.5	3.3	3.0	3.0	2.6	1.8	1.2	0.6	1.8	2.7	0.7	3.6
21-Jun	0.5	0.8	1.0	0.5	1.0	1.4	1.3	1.5	2.0	2.5	2.9	3.4	3.4	2.9	3.3	3.4	2.7	2.5	2.1	1.7	1.6	1.1	0.7	0.5	3.4
22-Jun	0.2	0.2	0.3	0.4	0.5	0.4	1.0	1.8	2.1	1.9	2.6	3.1	2.9	2.2	1.6	2.2	2.5	2.5	1.5	0.9	0.8	1.0	0.6	0.5	3.1
23-Jun	0.5	0.3	0.3	0.3	0.2	0.6	0.7	1.3	1.7	2.0	2.4	3.1	3.1	1.9	1.8	2.2	2.2	2.2	1.1	1.2	0.7	0.6	0.6	0.9	3.1
24-Jun	1.0	0.6	0.6	0.6	0.6	0.7	0.9	1.1	1.4	1.9	2.4	2.9	3.4	3.0	3.3	2.9	3.0	2.9	2.2	0.8	0.9	1.5	1.3	1.5	3.4
25-Jun	1.2	0.7	0.5	0.3	0.5	0.4	1.0	1.5	1.6	1.7	2.5	2.8	2.2	2.6	2.4	2.7	1.1	1.0	0.6	0.6	0.8	1.1	0.5	0.3	2.8
26-Jun	0.8	0.7	1.0	0.5	0.8	0.9	1.0	0.8	1.4	2.0	2.4	3.2	3.4	3.5	3.7	3.6	3.0	2.9	1.7	1.4	1.4	1.0	0.3	0.5	3.7
27-Jun	0.3	0.4	1.3	0.9	0.6	0.5	1.1	1.7	1.7	1.7	2.3	2.6	3.0	3.1	3.0	3.3	2.6	2.9	1.7	1.4	0.6	0.3	0.2	0.3	3.3
28-Jun	0.3	1.1	0.8	0.7	0.4	0.7	1.1	1.4	2.3	3.2	3.5	3.3	3.8	4.0	3.9	3.5	3.3	3.0	2.6	1.9	1.0	0.7	0.8	1.0	4.0
29-Jun	0.8	0.4	0.4	0.4	0.3	0.4	0.4	1.0	1.4	2.0	2.1	2.5	2.6	3.1	2.7	3.0	2.3	2.0	1.0	0.5	0.8	0.8	1.3	1.0	3.1
30-Jun	0.8	0.7	0.4	0.4	0.3	0.2	0.5	0.8	1.1	1.5	1.3	1.2	1.1	0.9	1.1	0.7	1.0	0.8	0.8	0.8	0.4	1.1	1.1	1.4	1.5
Diurnal Maximum																									
2.3 2.1 3.3 2.9 2.7 2.6 2.6 2.9 3.4 3.7 4.2 4.2 4.4 4.0 4.0 4.0 4.0 4.0 4.0 3.4 4.1 3.1 3.6 2.5 2.7 2.5																									



Summary of Hour Averages

Mannix - June 2015

Maximum Value: 4.3 km/h on Jun 26 18:00		Maximum Daily Average: 3.0 km/h on Jun 1		Hours in Service: 720																							
Minimum Value: -1.4 km/h on Jun 25 00:00		Minimum Daily Average: 0.1 km/h on Jun 2		Hours of Data: 720																							
Maximum Diurnal Average: 1.3 km/h at hour 17		Minimum Diurnal Average: 0.6 km/h at hour 10		Hours of Missing Data: 0																							
Monthly Average: 0.90 km/h		Percentiles: P ₁ = -0.7 P ₁₀ = -0.1 Q ₁ = 0.2 Median = 0.7 Q ₃ = 1.4 P ₉₀ = 2.2 P ₉₉ = 4.0		Hours of Calibration: 0																							
				Percent Operational Time: 100.0																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	2.1	2.6	2.8	3.5	4.0	4.0	3.8	4.1	3.5	4.1	4.2	3.2	3.8	3.3	2.9	3.6	2.3	1.8	1.7	1.8	1.9	1.6	2.4	2.6	3.0	4.2	
2-Jun	1.7	0.2	-0.1	0.0	-0.1	0.0	0.6	0.1	0.0	-0.2	0.4	-0.8	-0.3	0.3	0.9	0.2	1.1	0.4	-0.5	-1.0	-0.5	-0.6	0.8	0.7	0.1	1.7	
3-Jun	0.8	0.6	1.0	0.5	-0.2	-0.2	-0.4	-0.4	0.1	-0.5	0.4	0.0	0.5	0.0	0.6	0.7	1.0	0.6	1.5	1.4	0.9	1.2	1.3	1.7	0.5	1.7	
4-Jun	2.0	1.2	-0.1	0.8	0.7	0.5	0.7	0.8	0.6	0.6	-0.1	0.1	0.8	0.7	0.5	0.6	1.3	2.2	1.5	0.9	1.3	2.2	1.5	1.6	1.5	1.0	2.2
5-Jun	1.8	1.4	0.8	1.4	1.3	1.0	1.0	1.2	2.2	2.2	0.5	1.0	1.1	1.9	1.1	1.3	0.2	2.2	1.0	-0.7	-0.2	1.7	2.0	1.9	1.2	2.2	
6-Jun	1.2	1.3	2.1	1.2	1.1	1.2	1.0	1.3	1.6	0.1	0.2	0.6	1.0	0.2	0.9	1.7	1.8	0.4	0.0	0.0	1.0	1.5	2.0	1.4	1.0	2.1	
7-Jun	1.4	1.8	2.4	3.5	2.0	2.2	3.0	2.7	1.8	2.1	2.2	2.7	4.0	3.8	3.0	2.8	2.7	2.2	1.6	1.3	0.8	1.3	1.4	1.0	2.2	4.0	
8-Jun	-0.2	0.4	1.1	0.6	0.3	0.5	1.1	1.8	1.5	1.2	1.0	0.7	1.2	1.7	-0.1	-0.1	0.3	2.7	3.7	2.4	2.8	1.8	3.0	3.1	1.3	3.7	
9-Jun	3.1	2.7	1.7	2.0	1.8	2.0	1.6	1.3	1.4	1.2	0.8	0.8	1.8	0.0	0.3	0.2	1.5	1.4	1.0	1.6	1.4	1.1	0.6	0.1	1.3	3.1	
10-Jun	0.3	0.2	1.0	0.0	0.1	0.1	0.0	-0.4	0.3	-0.3	0.4	-0.5	1.5	1.1	1.6	0.9	1.4	0.7	1.1	0.1	0.0	-0.5	-0.5	0.7	0.4	1.6	
11-Jun	0.5	0.0	0.5	-0.4	0.2	1.0	-0.5	-0.6	-0.4	0.0	-0.1	0.1	0.8	2.0	0.7	1.6	2.2	0.7	-0.1	0.1	-0.6	0.5	1.4	-0.4	0.4	2.2	
12-Jun	0.5	1.7	1.0	0.1	1.5	0.8	0.5	0.8	0.6	-0.1	1.1	0.5	1.0	0.6	0.3	-0.3	-0.7	-0.7	-0.7	-0.6	0.0	-0.1	-0.1	0.0	0.3	1.7	
13-Jun	-0.1	0.4	0.1	0.8	0.5	1.0	1.6	1.3	1.3	0.4	1.3	1.1	0.6	0.6	0.5	0.2	0.8	0.0	1.2	-0.3	0.1	0.1	0.0	-0.1	0.6	1.6	
14-Jun	0.1	-0.2	0.1	-0.2	0.6	0.8	0.0	-0.3	1.3	1.9	0.2	0.0	0.1	-0.2	0.8	1.1	2.1	1.7	1.1	-0.2	0.0	0.0	0.8	0.6	0.5	2.1	
15-Jun	0.7	0.6	0.6	0.0	0.3	0.2	0.0	0.1	0.6	0.7	0.4	0.1	0.4	0.4	-0.2	0.0	1.3	0.6	0.4	1.2	0.6	0.7	1.2	1.5	0.5	1.5	
16-Jun	0.8	1.5	-0.1	0.7	0.5	1.0	0.6	1.8	1.6	1.0	1.2	1.2	0.9	0.6	1.7	0.6	1.0	0.7	1.0	-0.3	0.2	-0.2	0.7	0.0	0.8	1.8	
17-Jun	0.8	0.7	0.9	1.5	1.0	0.3	0.1	1.2	0.5	0.9	0.5	0.3	0.8	0.6	0.8	0.1	-0.1	0.1	1.1	0.8	1.4	1.5	1.7	1.8	0.8	1.8	
18-Jun	2.0	1.8	1.6	1.3	1.1	0.8	1.0	0.8	0.5	0.1	0.1	0.5	0.1	0.3	-0.2	0.4	0.2	0.5	0.4	0.0	0.9	1.9	1.6	2.9	0.9	2.9	
19-Jun	2.6	1.0	0.5	0.6	0.6	0.3	0.2	0.0	-0.2	-0.2	0.0	-0.3	1.0	0.5	0.6	1.1	1.4	0.0	-0.2	0.1	0.0	-0.2	-0.1	0.0	0.4	2.6	
20-Jun	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.2	1.2	0.3	0.9	1.0	1.2	0.8	0.9	0.7	0.8	0.6	0.3	-0.2	-0.2	0.5	0.0	-0.3	0.4	1.2	
21-Jun	-0.1	0.2	0.1	0.0	0.3	-0.3	0.2	-0.2	1.0	0.8	1.1	1.2	0.6	0.4	0.2	0.6	0.6	0.5	0.3	0.5	1.2	1.4	1.3	1.7	0.6	1.7	
22-Jun	1.6	1.6	1.8	1.7	1.7	1.4	1.1	0.5	0.8	0.4	1.5	0.9	2.8	0.9	1.2	1.4	2.9	2.2	0.8	0.0	0.0	0.0	0.0	-0.2	1.1	2.9	
23-Jun	0.0	0.2	0.1	0.2	0.1	0.2	0.2	0.2	0.2	-0.5	0.3	0.1	1.5	1.3	0.0	0.8	0.3	1.0	0.7	1.1	1.1	0.4	0.4	0.2	0.4	1.5	
24-Jun	0.4	0.5	0.2	0.4	0.4	0.5	0.5	0.1	0.0	0.4	0.6	1.4	0.9	0.8	0.8	0.5	1.1	0.8	0.9	0.4	0.1	0.0	-0.5	-1.4	0.4	1.4	
25-Jun	-0.5	-0.1	0.1	0.3	0.2	0.1	0.1	0.3	0.1	0.0	0.3	0.2	-1.3	0.0	0.4	3.1	2.0	-0.3	0.5	0.7	1.2	1.0	0.5	0.9	0.4	3.1	
26-Jun	1.0	1.5	1.4	0.4	0.5	0.2	0.2	0.4	0.6	0.4	0.6	2.8	3.5	3.1	3.9	3.0	3.2	4.3	2.4	2.0	1.8	1.6	1.2	1.0	1.7	4.3	
27-Jun	1.2	0.7	1.1	1.6	1.0	0.4	0.3	0.4	0.4	0.1	-0.1	0.5	1.6	2.2	1.8	2.1	1.8	2.4	2.0	1.2	1.0	1.5	1.7	2.3	1.2	2.4	
28-Jun	2.4	2.3	1.7	0.7	0.4	1.0	1.2	1.2	1.0	1.2	2.3	3.4	4.3	4.1	3.4	3.2	3.2	3.4	1.5	1.3	2.2	2.5	3.3	1.1	2.2	4.3	
29-Jun	1.0	1.7	1.2	1.8	1.7	1.2	0.9	0.6	0.2	0.4	0.5	0.7	0.5	1.2	0.9	1.0	1.2	0.1	-0.1	0.1	0.3	-0.3	-0.4	-0.3	0.7	1.8	
30-Jun	-0.1	-0.1	0.0	0.1	0.4	0.5	1.3	1.7	1.4	0.8	0.2	-0.1	-0.4	0.2	0.3	0.0	-0.1	-0.2	1.1	2.5	1.3	-0.3	1.1	2.0	0.6	2.5	
																								Diurnal Average			
																								Diurnal Maximum			



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 6.6 km/h on Jun 25 16:00 Minimum Value: 0.2 km/h on Jun 23 05:00 Percentiles: $P_1 = 0.3$ $P_{10} = 0.5$ $Q_1 = 1.0$ Median = 1.8 $Q_3 = 2.8$ $P_{90} = 3.4$ $P_{99} = 4.4$																								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 Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	0.9	1.2	1.7	2.0	2.5	2.4	2.3	2.4	2.4	2.9	3.2	3.3	3.5	3.2	3.2	3.3	3.3	2.9	2.9	2.3	1.2	0.7	0.4	0.4	3.5
2-Jun	1.4	1.2	0.9	0.6	0.4	1.0	1.8	2.0	1.9	2.5	2.7	2.3	2.8	2.9	3.2	3.0	3.2	2.5	2.3	1.8	1.4	1.9	1.2	0.9	3.2
3-Jun	0.5	0.6	0.5	0.7	1.1	1.5	2.1	1.7	2.3	2.3	3.3	3.4	3.4	3.3	3.5	3.5	2.8	2.7	2.5	1.9	1.4	1.9	1.6	0.9	3.5
4-Jun	0.6	0.8	0.9	0.6	1.2	1.3	1.7	1.7	1.9	1.8	3.0	3.4	3.4	3.3	3.6	3.6	3.2	3.1	1.9	2.3	3.8	2.6	1.4	1.2	3.8
5-Jun	1.0	0.8	0.5	0.8	0.8	1.5	2.3	2.4	3.1	3.6	3.1	3.6	3.7	3.9	3.7	3.6	3.0	3.0	6.3	1.4	0.9	0.6	0.7	1.0	6.3
6-Jun	0.7	0.9	1.6	1.7	1.6	1.6	1.5	2.0	2.1	1.9	2.7	2.8	2.3	1.8	1.7	2.3	2.1	1.2	0.5	0.5	0.6	1.1	0.6	0.5	2.8
7-Jun	0.4	0.4	1.0	2.2	1.3	1.1	1.1	1.7	2.0	2.1	2.3	3.4	2.9	3.3	3.4	3.1	2.3	1.9	1.7	0.8	0.6	1.8	1.2	1.5	3.4
8-Jun	0.5	0.5	0.4	0.6	0.7	1.1	1.6	2.0	2.3	2.5	2.6	1.9	2.2	4.2	2.1	1.5	1.8	2.8	3.4	3.0	2.6	2.0	2.0	1.9	4.2
9-Jun	1.2	1.3	1.5	1.1	0.4	0.5	0.7	1.3	2.2	2.1	2.9	3.4	2.2	2.8	2.5	2.5	2.5	2.3	1.7	1.1	0.7	0.8	1.2	1.5	3.4
10-Jun	1.2	1.1	1.1	0.5	0.6	0.5	0.8	1.3	2.0	2.3	2.2	2.2	3.0	3.4	3.3	3.1	2.6	2.4	1.8	1.0	0.7	0.8	1.0	0.3	3.4
11-Jun	0.7	1.3	0.7	1.0	0.8	2.1	1.3	1.2	1.5	1.8	2.2	1.7	3.3	3.2	3.0	3.5	1.9	2.0	1.1	1.3	1.4	2.2	2.3	1.3	3.5
12-Jun	1.6	1.2	0.8	0.9	0.7	0.8	1.5	1.4	2.1	2.3	2.9	3.1	3.2	3.0	3.0	2.7	3.2	2.6	2.1	2.0	1.8	2.2	2.1	2.5	3.2
13-Jun	1.7	1.6	1.0	1.5	1.7	2.1	2.6	2.9	3.3	3.6	4.2	4.5	4.4	4.3	4.0	4.1	4.0	3.5	4.0	3.1	2.6	2.3	1.6	1.0	4.5
14-Jun	1.9	2.0	1.2	0.7	1.3	2.3	2.2	2.7	3.6	3.9	3.8	3.6	3.9	3.5	4.2	4.2	3.6	3.5	2.9	1.7	0.8	0.5	1.9	2.1	4.2
15-Jun	2.2	2.3	2.4	2.2	2.1	1.6	1.6	1.6	1.5	1.7	1.8	1.7	1.9	1.7	1.6	2.5	2.8	2.3	2.2	1.7	0.9	0.6	0.5	0.5	2.8
16-Jun	0.6	5.3	1.8	2.1	2.4	2.1	2.2	2.7	2.5	2.6	2.7	3.3	2.8	3.3	3.8	3.4	3.9	3.2	2.7	1.7	1.7	1.2	1.5	2.2	5.3
17-Jun	2.3	1.9	1.5	2.1	2.2	2.3	2.3	2.9	2.7	3.1	3.0	2.8	3.1	3.5	3.3	3.4	3.0	2.4	2.2	1.4	0.4	0.4	0.6	0.7	3.5
18-Jun	0.5	0.9	1.3	1.1	0.8	0.8	1.7	1.7	1.5	2.1	2.4	3.5	3.3	2.6	2.2	2.3	2.3	1.6	1.0	0.5	1.5	2.0	1.4	3.0	3.5
19-Jun	5.1	1.8	3.5	3.1	2.8	2.0	1.8	2.2	2.6	3.0	3.2	3.3	3.8	3.7	3.6	3.5	3.6	2.9	2.4	1.7	0.6	0.5	0.7	0.7	5.1
20-Jun	0.6	0.6	0.3	0.3	0.2	0.4	0.4	1.0	1.8	2.2	3.1	3.5	3.8	3.7	3.6	3.1	3.1	2.8	1.9	1.1	0.5	1.9	2.9	0.7	3.8
21-Jun	0.4	1.0	1.0	0.6	1.0	1.3	1.4	1.5	2.1	2.7	3.0	3.5	3.6	3.1	3.4	3.8	2.9	2.6	2.0	1.9	1.6	1.1	0.7	0.6	3.8
22-Jun	0.4	0.4	0.5	0.5	0.5	0.4	1.0	1.7	2.2	2.0	2.7	3.3	3.8	4.0	1.7	2.2	2.5	2.7	1.7	0.9	0.8	0.9	0.4	0.5	4.0
23-Jun	0.4	0.3	0.3	0.3	0.2	0.5	0.5	1.3	1.6	1.8	2.2	3.3	3.6	2.5	1.7	2.3	2.3	2.3	1.1	1.1	0.7	0.7	0.7	1.0	3.6
24-Jun	1.1	0.7	0.8	0.6	0.7	0.5	0.7	1.0	1.4	2.0	2.5	3.1	3.7	3.2	3.5	3.1	3.3	2.9	2.3	0.8	1.0	1.5	1.3	1.5	3.7
25-Jun	1.3	0.7	0.4	0.4	0.5	0.4	1.1	1.5	1.6	1.7	2.5	2.8	2.3	2.6	2.5	6.6	3.1	0.9	0.8	0.6	1.5	1.3	0.6	0.3	6.6
26-Jun	0.8	0.9	1.0	0.5	0.9	0.9	1.1	0.7	1.5	2.0	2.5	3.4	3.6	3.7	3.8	3.8	3.3	4.4	1.7	1.5	1.6	1.1	0.5	0.7	4.4
27-Jun	0.5	0.5	1.4	1.1	0.8	0.6	1.1	1.5	1.8	1.5	2.5	2.8	3.1	3.2	3.2	3.4	2.9	3.2	1.8	1.5	0.7	0.3	0.4	0.4	3.4
28-Jun	0.4	1.2	1.1	0.9	0.6	0.8	1.1	1.4	2.3	3.4	3.4	3.2	3.7	3.7	3.7	3.4	3.3	2.8	2.7	1.9	1.0	0.8	1.0	1.2	3.7
29-Jun	1.0	0.4	0.5	0.5	0.3	0.5	0.5	1.1	1.4	2.0	2.1	2.7	2.8	3.4	2.8	3.0	2.4	2.1	1.1	0.6	0.9	0.8	1.2	0.9	3.4
30-Jun	0.7	0.5	0.4	0.3	0.4	0.4	0.5	0.7	0.9	1.4	1.2	1.0	0.8	0.8	0.9	0.7	0.9	0.7	1.6	0.8	0.7	0.7	1.6	1.6	1.6
Diurnal Maximum																									



Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

Calibration Date	June 11, 2015	Last Calibration	May 21, 2015
Station Name	Mannix	Station Number	AMS 5
Reason:	Routine		
Start Time (MST)	10:15	End Time (MST)	15:15
Gas Cert Reference	S9610161A	Station temp.	22 Deg C
Cal Gas Concentration	50 ppm	Cal Gas Exp Date	26-Sep-17
Calibrator Make/Model	Sabio 4010	Serial Number	11061107
ZAG Make/Model	API 701	Serial Number	1083
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2633

Analyzer Information

	<i>Before</i>	<i>After</i>		<i>Before</i>	<i>After</i>
Analyzer Range	0 - 1000 ppb		PMT voltage	-635	-634
Analyzer IP address	192.168.1.43		Lamp voltage	873	865
Calculated slope	1.011344	0.994251	Chamber temp	45.3	45.3
Calculated intercept	-1.286369	-0.308001	Pressure	698.9	689.4
Analyzer Background	7.2	7.3	Flow	0.476	0.469
Analyzer Coefficient	1.009	1.021	Intensity	90	91

Analyzer make TEI 43i Analyzer serial # 1008841399

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.1	----
as found span	5000	60.0	600.0	588.0	1.020
calibrator zero	5000	0.0	0.0	0.1	----
high point	5000	60.0	600.0	603.3	0.994
second point	5000	30.0	300.0	303.2	0.990
third point	5000	15.0	150.0	150.7	0.995
as left zero	5000	0.0	0.0	0.3	----
as left span	5000	60.0	600.0	600.7	0.999
Average Correction Factor					0.993

Corrected As found 587.9 Previous response 594.6 % change 1.1%

Notes:

Inlet filter and zero air generator replaced after as founds. Span adjusted.

Calibration Performed By: Asad Hidayat



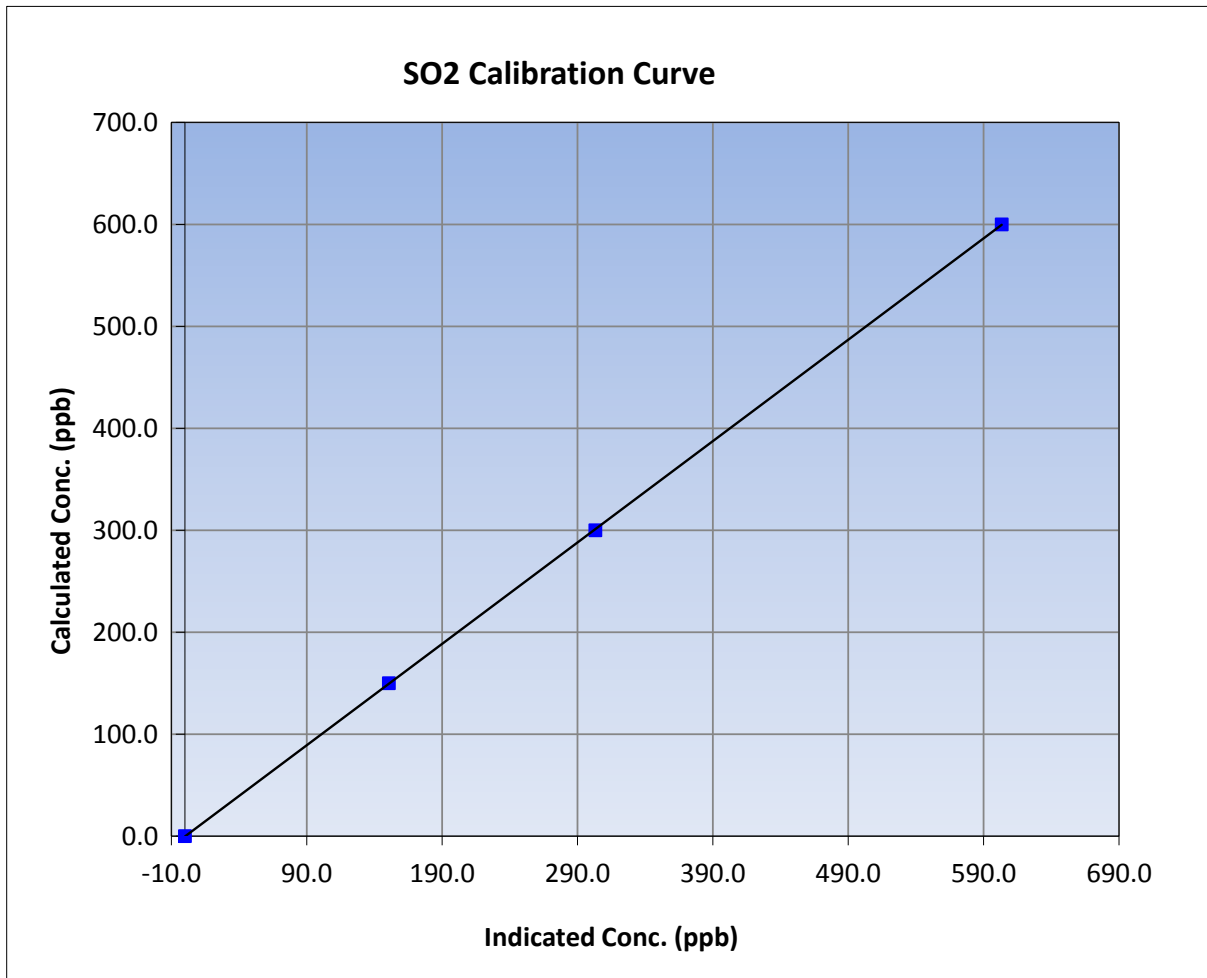
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	June 11, 2015	Previous Calibration	May 21, 2015
Station Name	Mannix	Station Number	AMS 5
Start Time (MST)	10:15	End Time (MST)	15:15
Analyzer make	TEI 43i	Analyzer serial #	1008841399

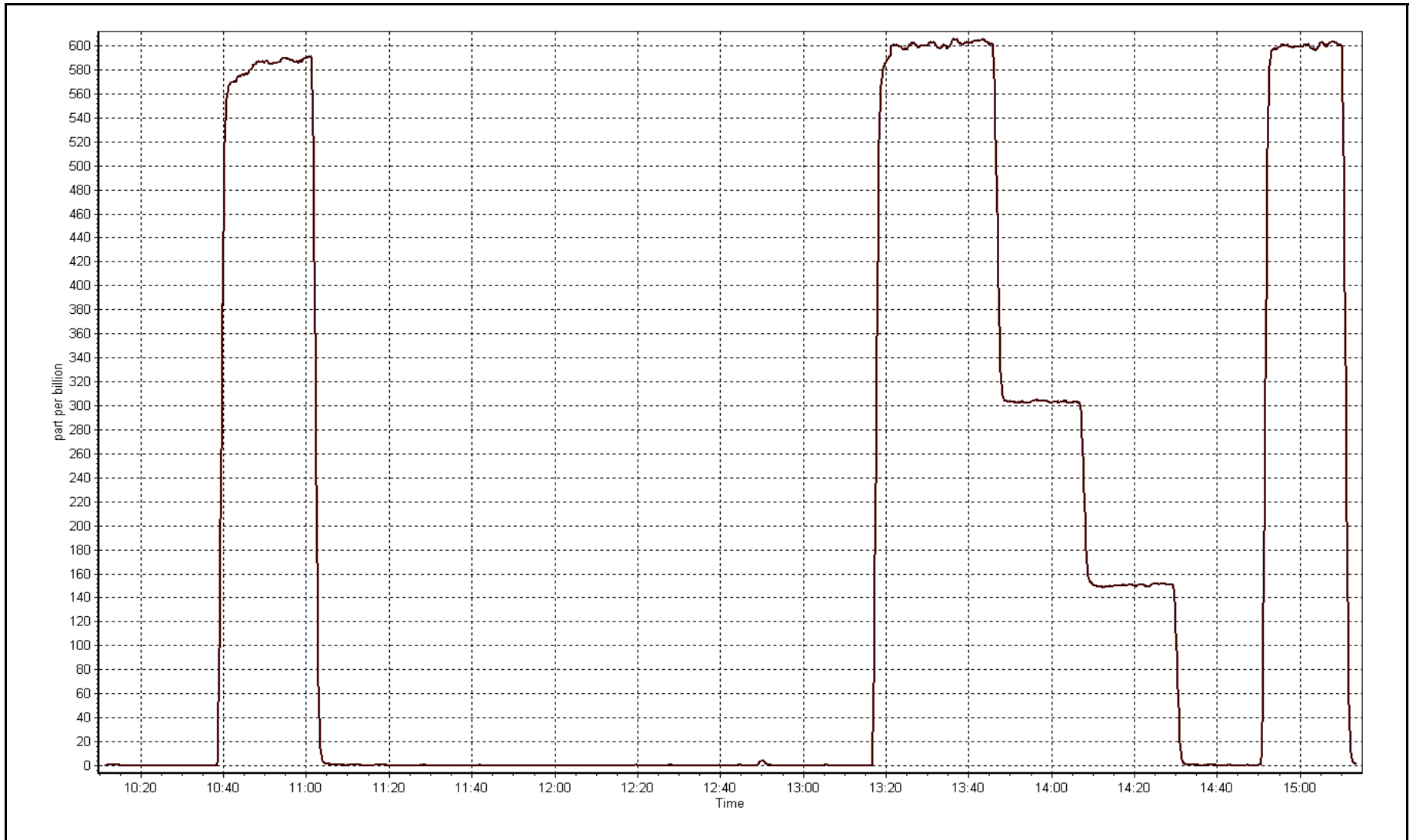
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	0.999992
600.0	603.3	0.9945		
300.0	303.2	0.9896	Slope	0.994251
150.0	150.7	0.9953		
			Intercept	-0.308001



SO2 Calibration Plot

Date: June 11, 2015





Wood Buffalo Environmental Association H2S Calibration Report

Station Information

Calibration Date	June 12, 2015	Last Calibration	May 13, 2015
Station Name	Mannix	Station Number	AMS 5
Reason:	Routine		
Start Time (MST)	9:55	End Time (MST)	12:35
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	1083
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	-624	-624
Analyzer IP address	192.168.1.42		Lamp voltage	891	883
Calculated slope	0.996021	1.005316	Chamber temp	45.2	45
Calculated intercept	-0.153255	-0.232171	Pressure	528.3	518.3
Analyzer Background	17.2	17.4	Flow	1.077	1.068
Analyzer Coefficient	1.353	1.353	Intensity	115	116
			Converter temp.	325	323

Analyzer make/model	TEI 450i	Analyzer serial #	815129108
Converter make/model	N/A	Converter serial #	N/A

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.1	----
as found span	5000	74.4	75.0	74.6	1.005
SO2 scrubber check	5000	15.0	150.0	0.8	----
calibrator zero	5000	0.0	0.0	-0.1	----
high point	5000	74.4	75.0	74.6	1.005
second point	5000	41.7	42.0	42.1	0.997
third point	5000	24.8	25.0	25.5	0.981
as left zero	5000	0.0	0.0	-0.1	----
as left span	5000	74.4	75.0	75.5	0.993
Average Correction Factor					0.994

Corrected As found	74.7	Previous response	75.4	% change	1.0%
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Notes:

Inlet filter replaced and scrubber check done after as founds. No adjustments.

Calibration Performed By:

Asad Hidayat



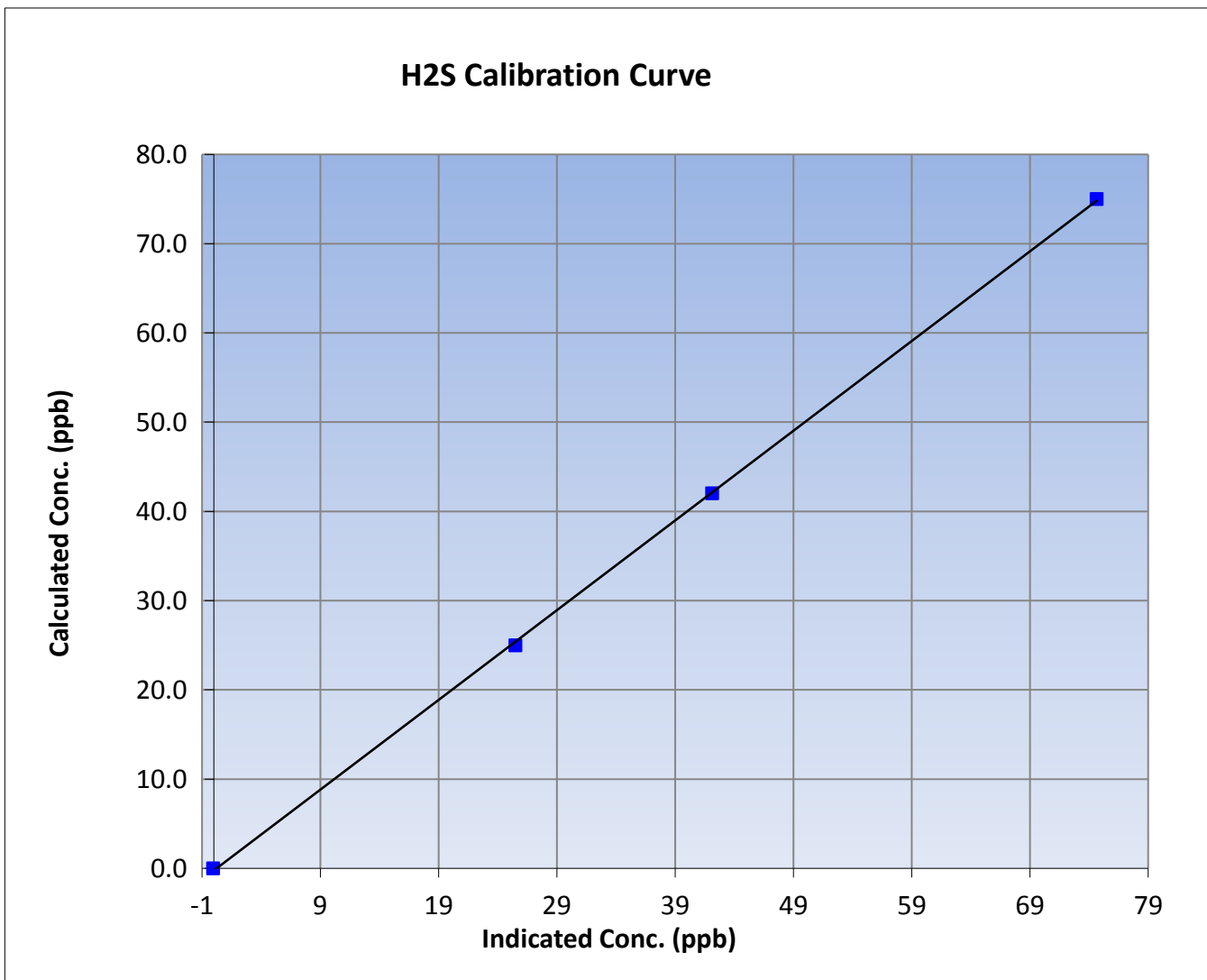
Wood Buffalo Environmental Association H2S Calibration Report

Station Information

Calibration Date	June 12, 2015	Previous Calibration	May 13, 2015
Station Name	Mannix	Station Number	AMS 5
Start Time (MST)	9:55	End Time (MST)	12:35
Analyzer make	TEI 450i	Analyzer serial #	815129108

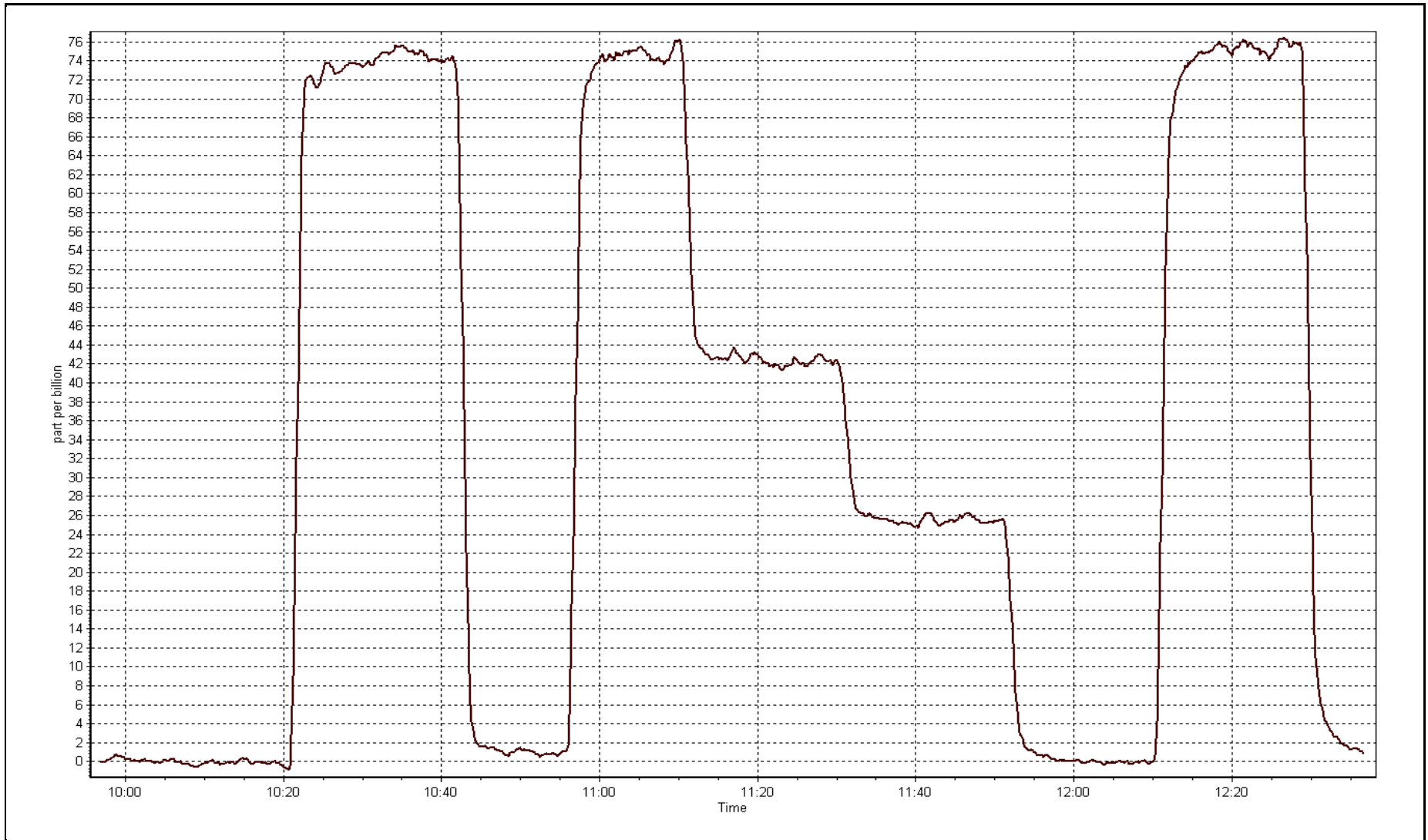
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999901
75.0	74.6	1.0048		
42.0	42.1	0.9975	Slope	1.005316
25.0	25.5	0.9807		
			Intercept	-0.232171



H2S Calibration Plot

Date: June 12, 2015





Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	June-11-15	Last Calibration	May-27-15
Station Name	Mannix	Station Number	AMS 5
Reason:	Routine		
Start Time (MST)	10:15	End Time (MST)	15:15
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	1.005531	0.996856	Fuel Pressure	20.2	20.2
Calculated intercept	-0.068351	-0.005793	Analyzer Coeff	3.822	3.801
			Analyzer BKG	3.450	3.690

Analyzer make	Thermo 51i-LT	Analyzer serial #	1317958295
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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	0.19	----
as found span	5000	60.0	12.46	12.40	1.005
calibrator zero	5000	0.0	0.00	0.04	----
high point	5000	60.0	12.46	12.52	0.995
second point	5000	30.0	6.23	6.23	1.000
third point	5000	15.0	3.11	3.10	1.005
as left zero	5000	0.0	0.00	0.02	----
as left span	5000	60.0	12.46	12.48	0.998
Average Correction Factor					1.000

Corrected As found	12.21	Previous response	12.46	% change	2.0%
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Notes:

Inlet filter and zero air generator replaced after as founds. Zero and span adjusted.

Calibration Performed By:

Asad Hidayat



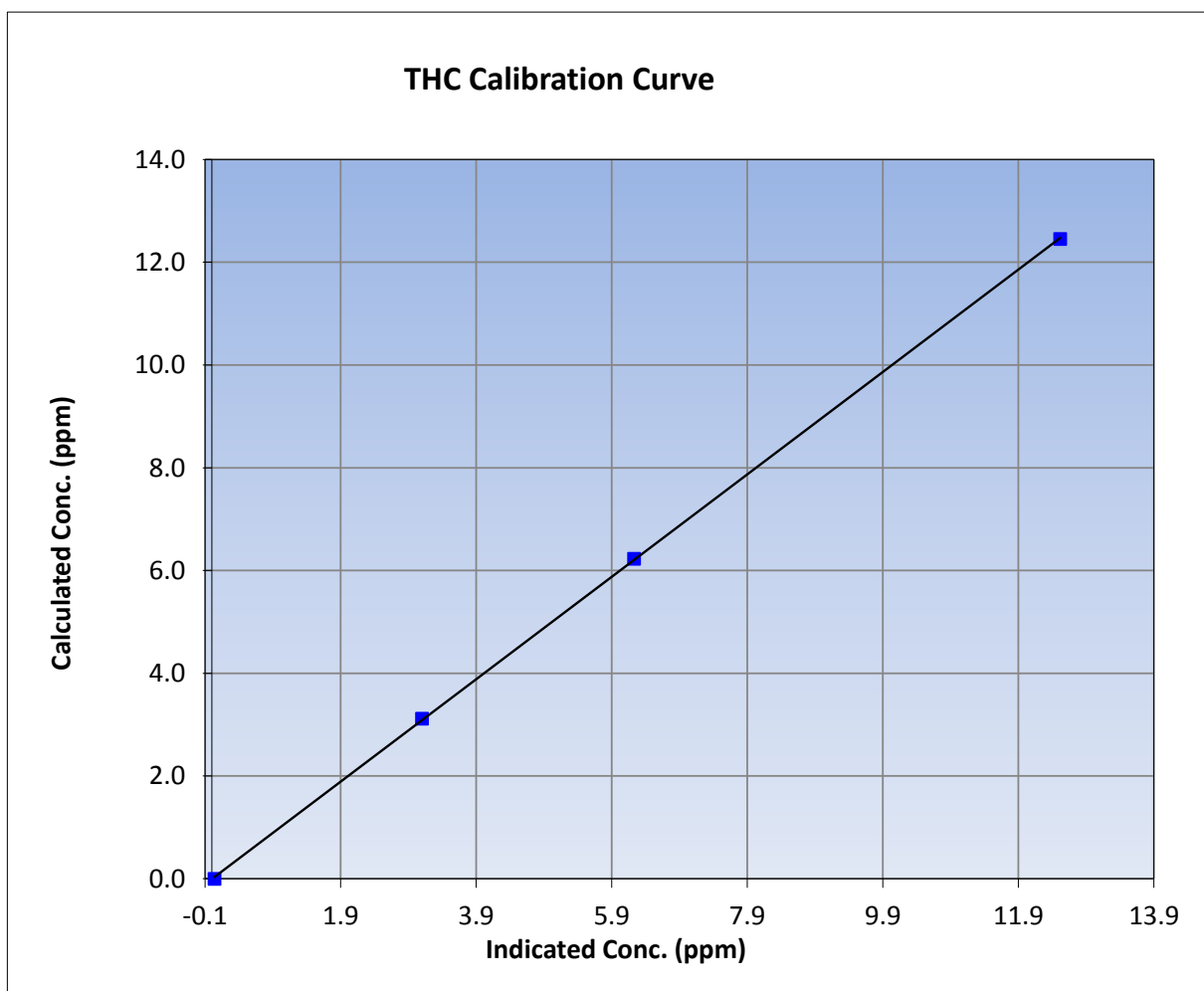
Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	June 11, 2015	Previous Calibration	May 27, 2015
Station Name	Mannix	Station Number	AMS 5
Start Time (MST)	10:15	End Time (MST)	15:15
Analyzer make	Thermo 51i-LT	Analyzer serial #	1317958295

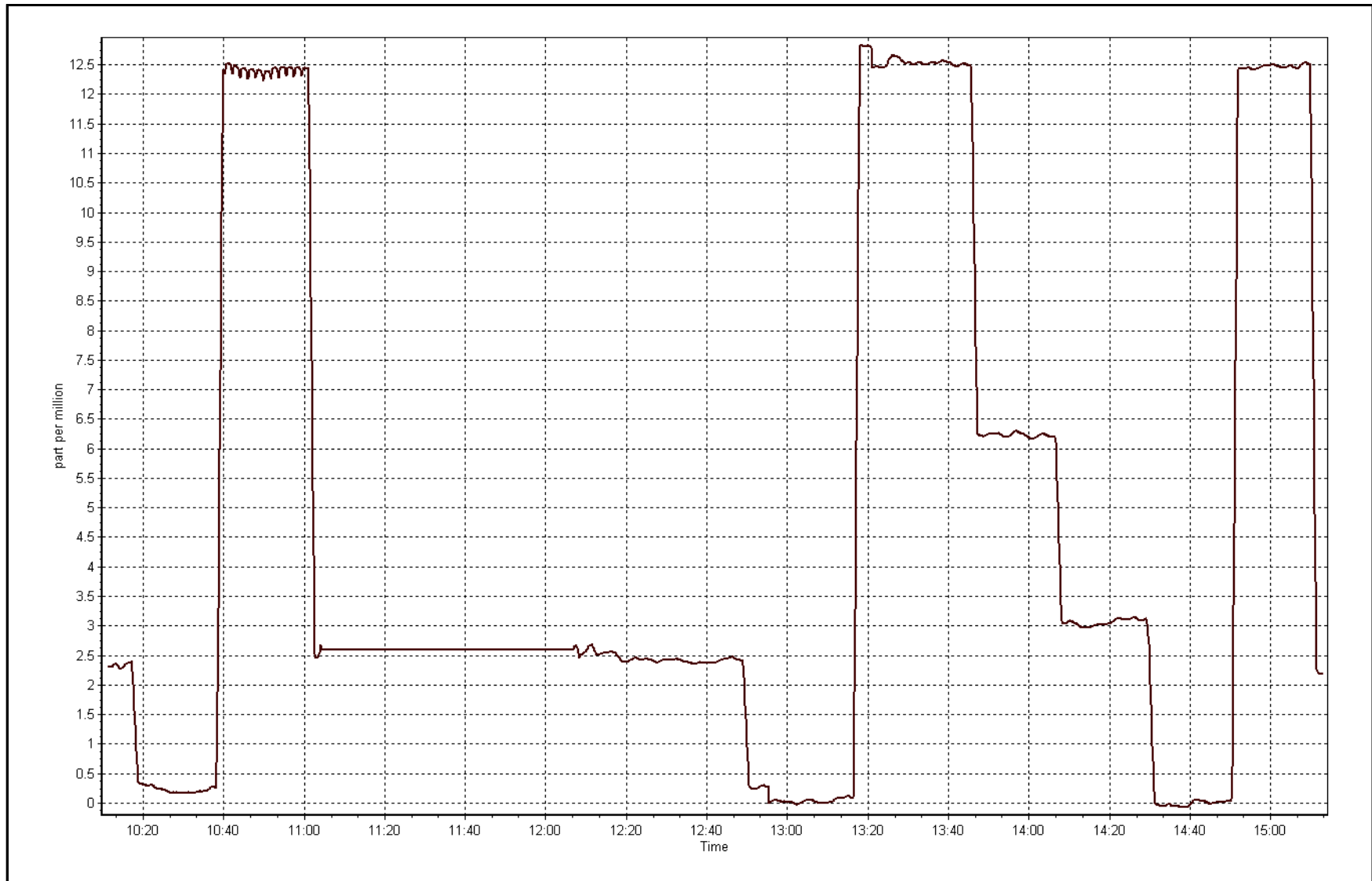
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.04	----	Correlation Coefficient	0.999965
12.46	12.52	0.9949		
6.23	6.23	0.9997	Slope	0.996856
3.11	3.10	1.0045		
			Intercept	-0.005793



THC Calibration Plot

Date: June 11, 2015





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 6
PATRICIA MCINNES
JUNE 2015

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

July 30, 2015



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - PATRICIA McINNES (AMS 6)
 JUNE 2015

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	682	38	38	100.00	21	0	4	0
TRS (ppb) Average	657	37	63	96.39	3	0	1	0
THC (ppm) Average	682	38	38	100.00	3.3	-	2.2	-
NMHC(ppm) Average	682	38	38	100.00	0.587	-	0.105	-
CH4(ppm) Average	682	38	38	100.00	2.9	-	2.1	-
O3 (ppb) Average	686	34	34	100.00	61	0	41	-
NO2 (ppb) Average	682	38	38	100.00	48	0	13	-
NO (ppb) Average	682	38	38	100.00	19	-	2	-
NOX (ppb) Average	682	38	38	100.00	67	-	15	-
NH3 (ppb) Average	632	48	88	94.44	68	0	14	-
PM2.5 (ug/m3) Average	718	0	2	99.72	1331.6	-	221.2	2
Temperature 2 m (C) Average	720	0	0	100.00	31	-	23.9	-
Relative Humidity (%) Average	720	0	0	100.00	97	-	79	-
Wind Speed 10 m (km/h) Average	720	0	0	100.00	31	-	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 - PATRICIA McINNES (AMS 6)
 JUNE 2015

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	682	0.7	2	-	0	0	0	0	1	2	21
TRS (ppb) Average	657	0.2	0	-	0	0	0	0	0	0	3
THC (ppm) Average	682	1.9	0.1	-	1.8	1.8	1.9	1.9	1.9	2	3.3
NMHC(ppm) Average	682	0.006	0.043	-	0	0	0	0	0	0	0.587
CH4(ppm) Average	682	1.89	0.1	-	1.8	1.8	1.9	1.9	1.9	2	2.9
O3 (ppb) Average	686	30.9	11	-	5	17	23	32	39	44	61
NO2 (ppb) Average	682	2.5	4	-	0	0	1	2	3	6	48
NO (ppb) Average	682	0.7	1	-	0	0	0	0	1	2	19
NOX (ppb) Average	682	3.3	5	-	0	0	1	2	4	7	67
NH3 (ppb) Average	632	0.6	5	-	0	0	0	0	0	0	68
PM2.5 (ug/m3) Average	718	19.6	74.4	-	0.8	2.3	3.9	7.4	12.4	25.5	1331.6
Temperature 2 m (C) Average	720	16.9	6	-	-0.4	9.5	12.4	16.6	20.9	24.9	31
Relative Humidity (%) Average	720	56.1	21	-	18	29	38	57	72	84	97
Wind Speed 10 m (km/h) Average	720	9.9	6	-	1	4	6	9	13	18	31
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - PATRICIA McINNES (AMS 6)
JUNE 2015

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
TRS	09 Jun 2015 09:00	10 Jun 2015 10:00	26	Maintenance - replaced converter and hydrocarbon kicker
NH3	01 Jun 2015 07:00	30 Jun 2015 06:00	40	Stabilization after daily span
PM2.5	12 Jun 2015 14:00	12 Jun 2015 15:00	2	Maintenance - Flow and zero check, sample head cleaning

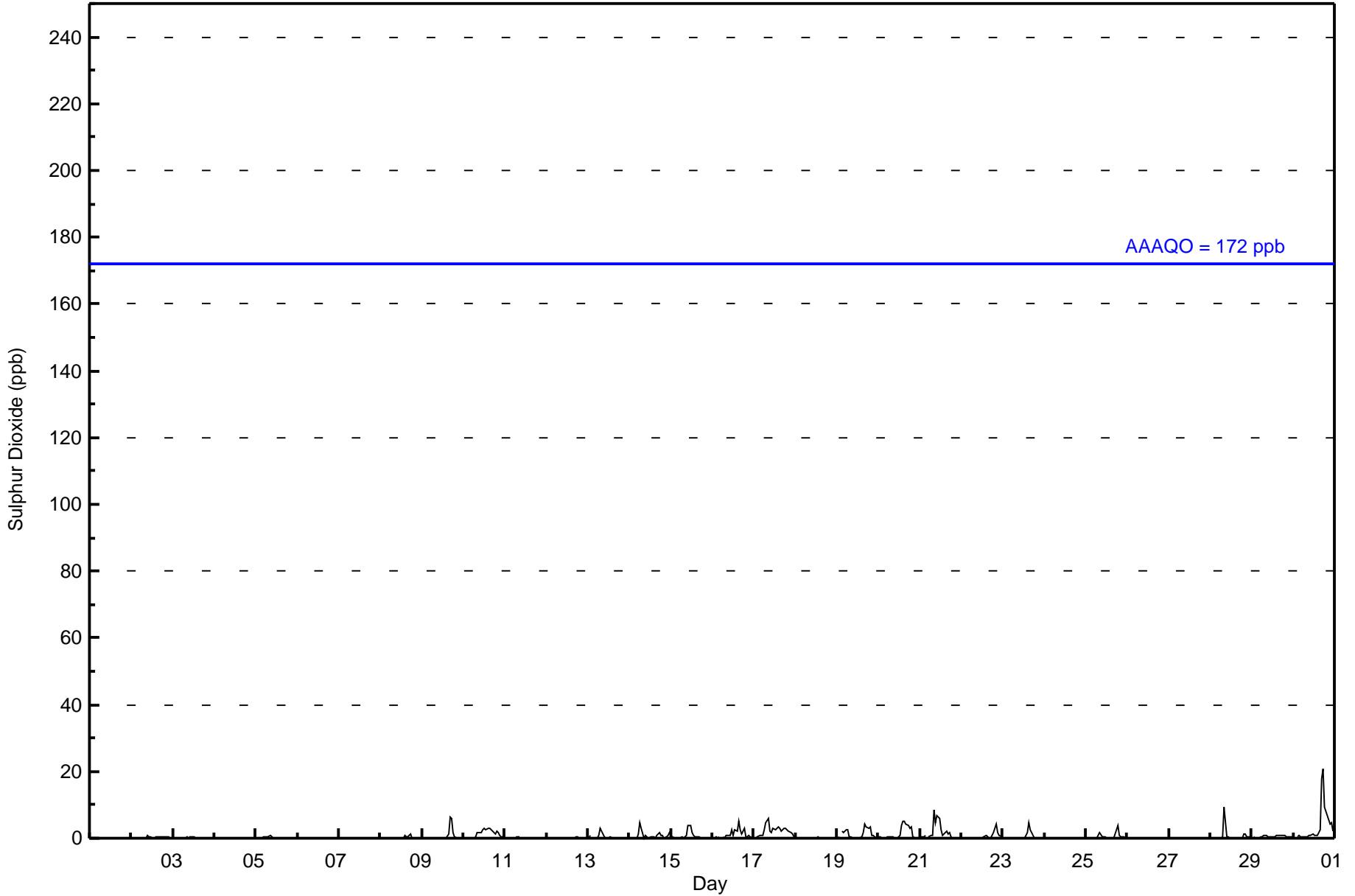


Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 21 ppb on Jun 30 18:00	Maximum Daily Average: 3.7 ppb on Jun 30		Hours of Data:	682
Minimum Value: 0 ppb on Jun 1 06:00	Minimum Daily Average: 0.0 ppb on Jun 1		Hours of Missing Data:	38
Maximum Diurnal Average: 1.6 ppb at hour 18	Minimum Diurnal Average: 0.1 ppb at hour 1		Hours of Calibration:	38
Monthly Average: 0.7 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 2 P ₉₉ = 6		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	0	0	Z	0	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-Jun	0	0	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0.3	1
3-Jun	0	0	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-Jun	0	0	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-Jun	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	0.2	1
6-Jun	0	Z	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-Jun	0	0	Z	0	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-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	0	1	1	1	0	0	0	0	0	0	0	0.2	1
9-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	6	6	2	0	0	0	0	0	0	0	0.7	6
10-Jun	0	0	0	0	0	Z	0	0	2	2	2	3	3	2	3	3	2	2	1	2	2	1	1	0	0	1.4	3
11-Jun	Z	0	0	0	0	0	0	0	0	C	C	C	C	C	C	C	C	0	0	0	0	0	0	0	0	--	0
12-Jun	0	Z	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-Jun	0	1	Z	0	0	0	1	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	3
14-Jun	0	0	0	Z	0	1	4	3	0	1	0	0	0	0	0	0	1	2	1	1	0	0	1	2	0.8	4	
15-Jun	1	0	0	0	Z	0	0	0	0	1	4	4	2	1	1	0	0	0	0	0	0	0	0	0	0	0.7	4
16-Jun	0	0	0	0	0	Z	0	0	1	1	1	2	1	3	2	5	2	1	3	0	0	1	0	0	0	1.1	5
17-Jun	Z	0	0	1	1	1	3	5	6	2	2	3	3	3	3	3	2	3	3	3	2	2	1	0	2.2	6	
18-Jun	0	Z	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-Jun	0	0	Z	2	2	3	3	1	1	0	0	0	0	0	0	2	4	3	3	4	1	1	0	0	0	1.3	4
20-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	1	4	5	5	4	4	3	3	0	0	0	0	0	1.4	5
21-Jun	0	0	0	1	Z	0	1	1	9	5	7	6	3	1	1	2	1	2	0	0	0	0	0	0	0	1.8	9
22-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	1	0	0	0	0	2	3	4	2	1	0	0	0.6	4
23-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	2	5	2	1	0	0	0	0	0	0	0	0.5	5
24-Jun	0	Z	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-Jun	0	0	Z	0	0	0	0	1	2	1	0	0	0	0	0	0	0	1	4	1	0	1	0	0	0	0.5	4
26-Jun	0	0	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-Jun	0	0	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-Jun	0	0	0	0	0	Z	0	1	9	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0.6	9
29-Jun	Z	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0.5	1
30-Jun	0	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	3	18	21	9	8	5	4	5	2	0	3.7	21

0.1	0.2	0.1	0.3	0.2	0.3	0.5	0.6	1.2	0.5	0.7	0.7	0.5	0.6	0.8	1.1	1.6	1.6	1.1	0.9	0.7	0.5	0.4	0.3	Diurnal Average	
1	1	1	2	2	3	4	5	9	5	7	6	3	4	5	5	18	21	9	8	5	4	5	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
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Patricia McInnes - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	680	99.71	99.71
11 - 20	1	0.15	99.85
21 - 60	1	0.15	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 720



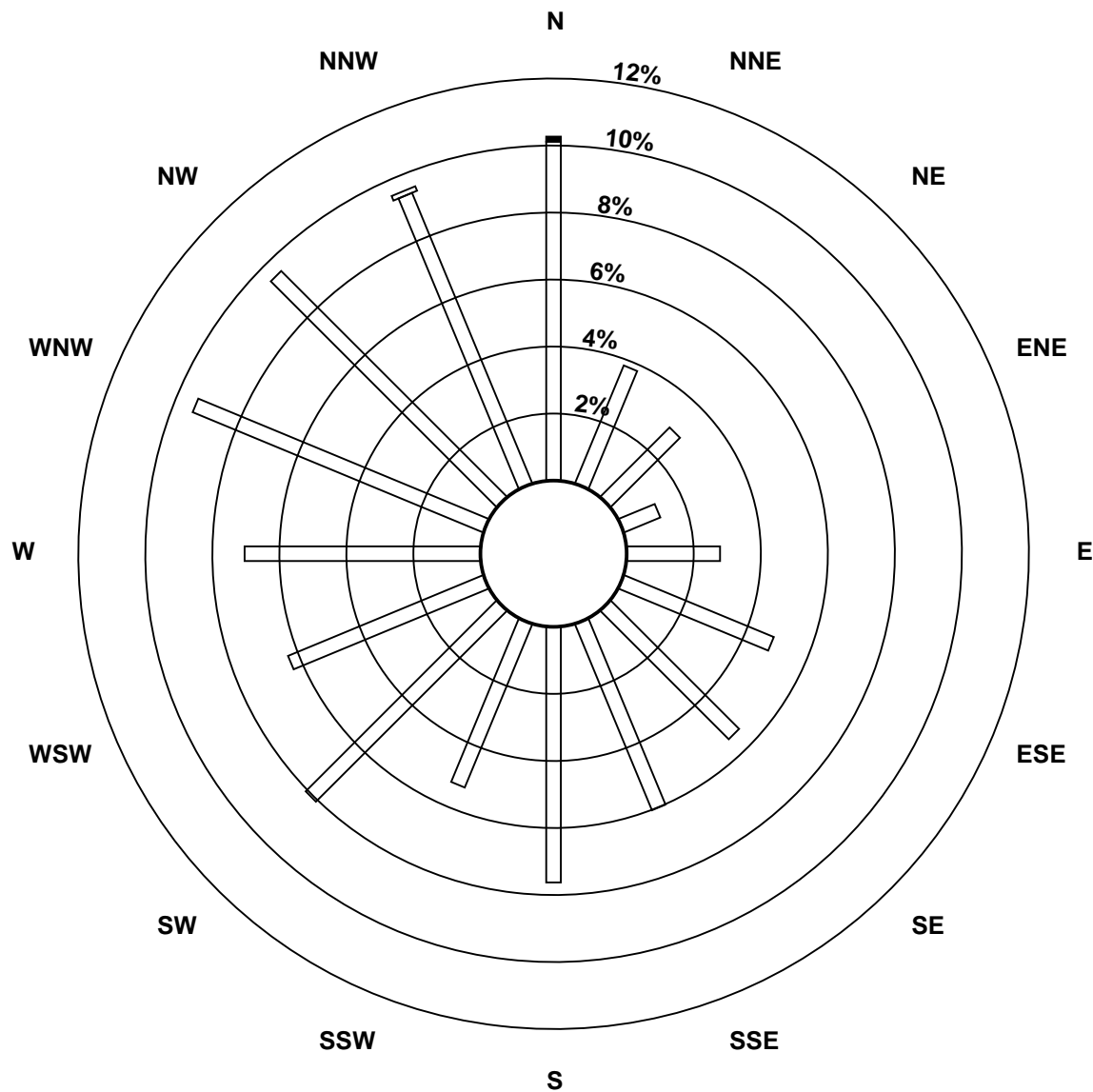
Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Patricia McInnes - June 2015

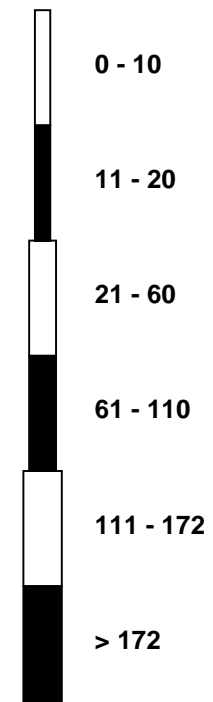
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	69	26	20	8	19	33	37	41	52	36	55	43	48	64	65	64	680
11 - 20	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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	70	26	20	8	19	33	37	41	52	36	55	43	48	64	65	65	682

Total Number of Valid Hours: 682

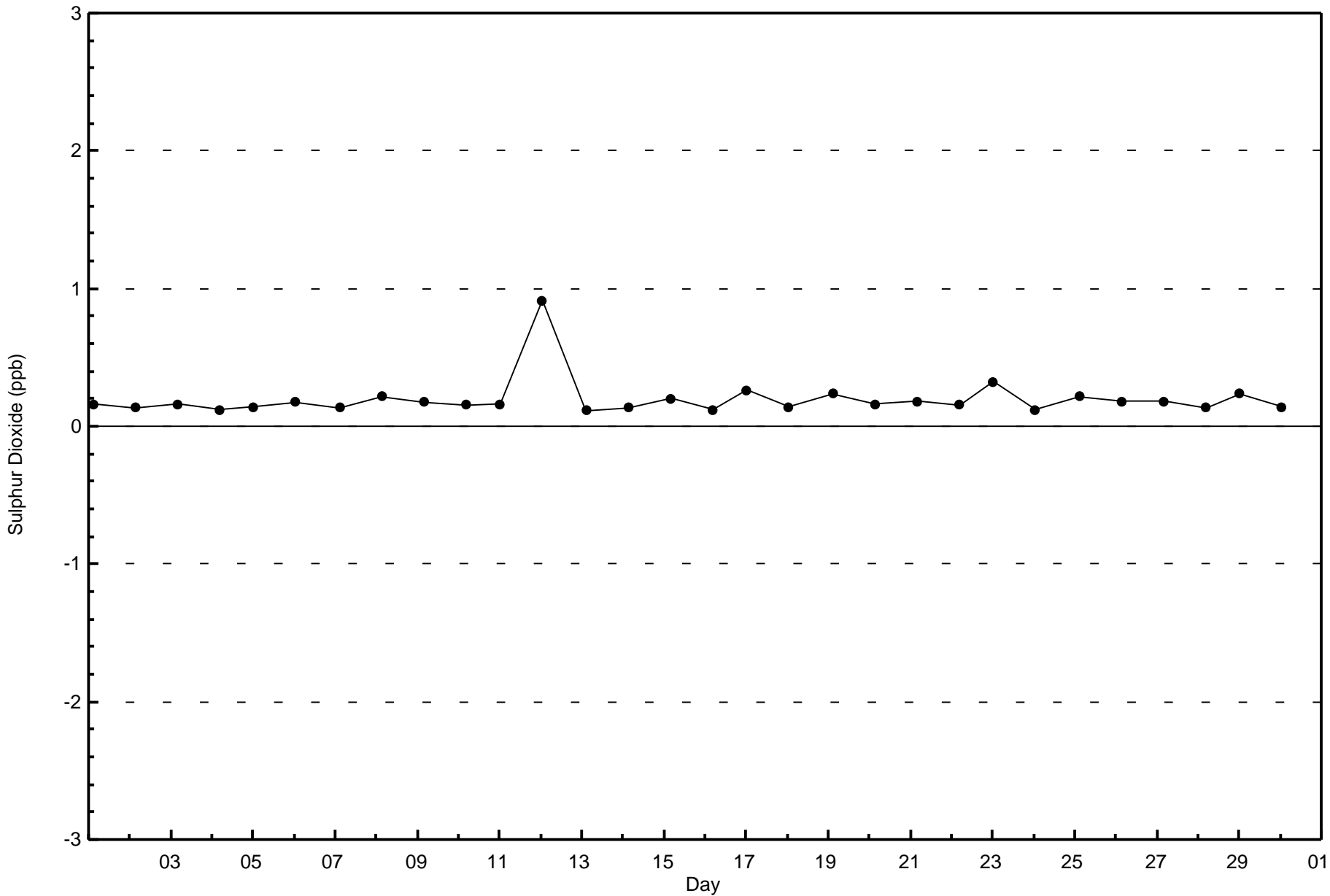
Total Number of Hours: 720

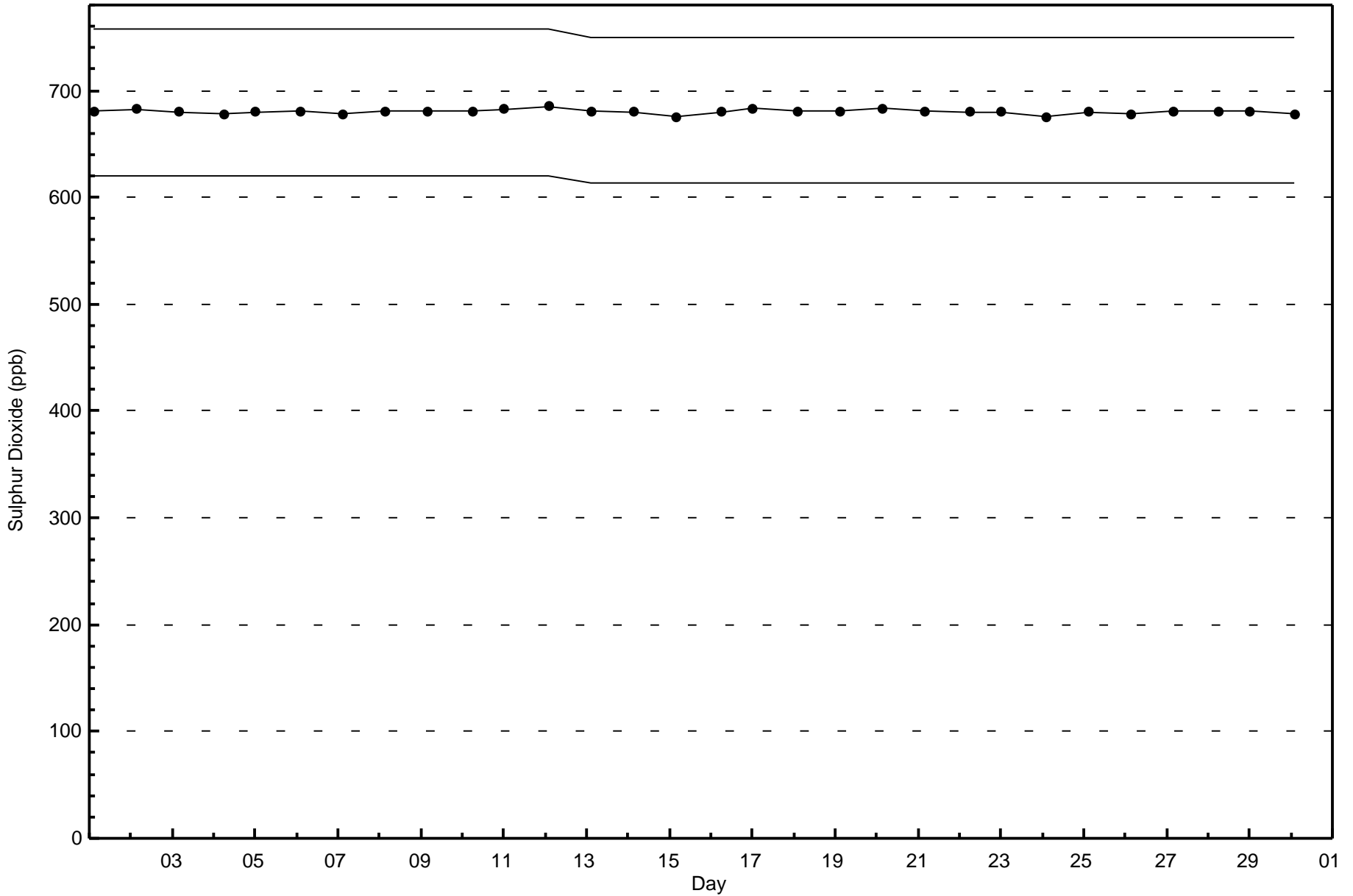


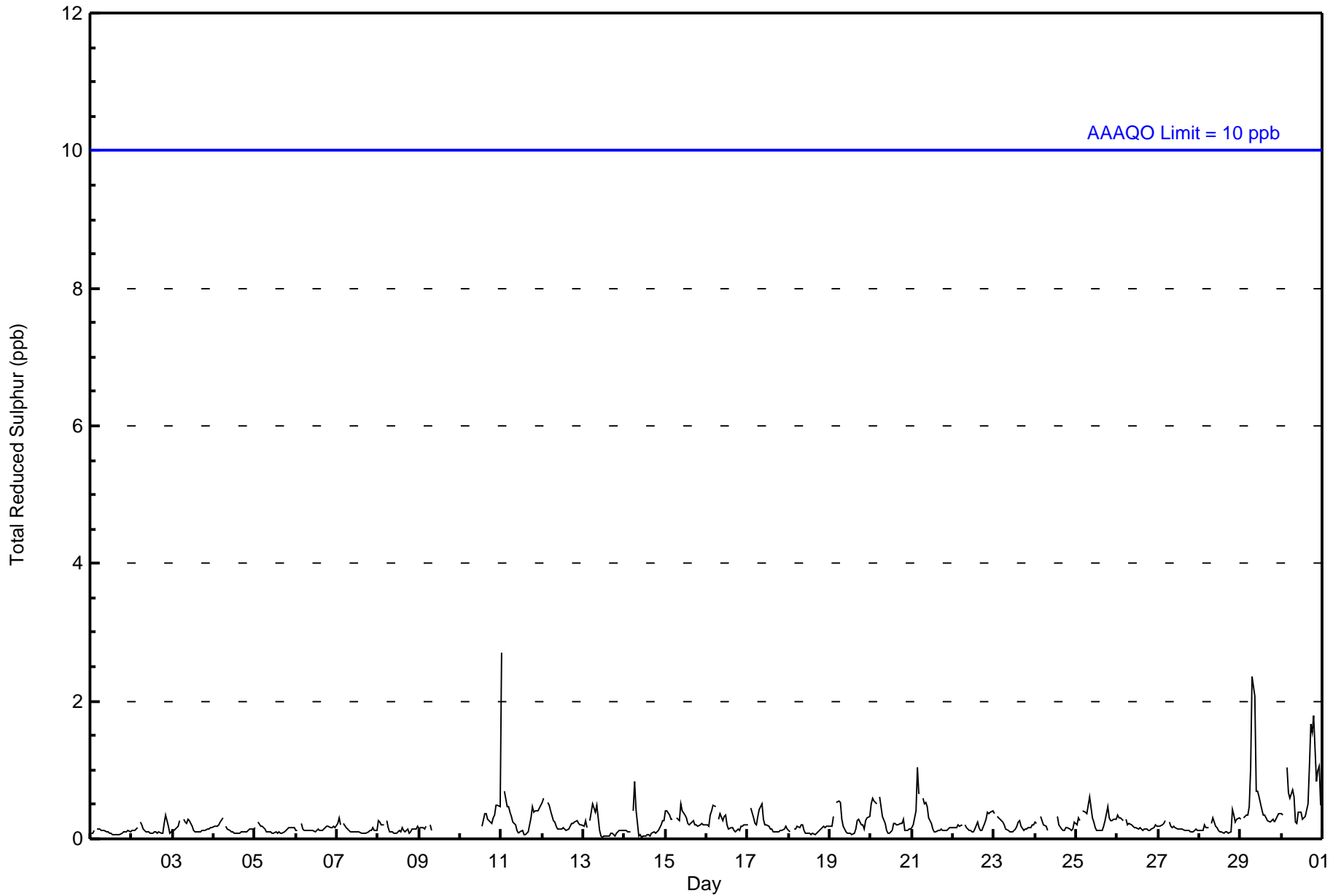
Classes (ppb)



Total Number of Valid Hours: 682









Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Patricia McInnes - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	656	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: 657

Total Number of Hours: 720



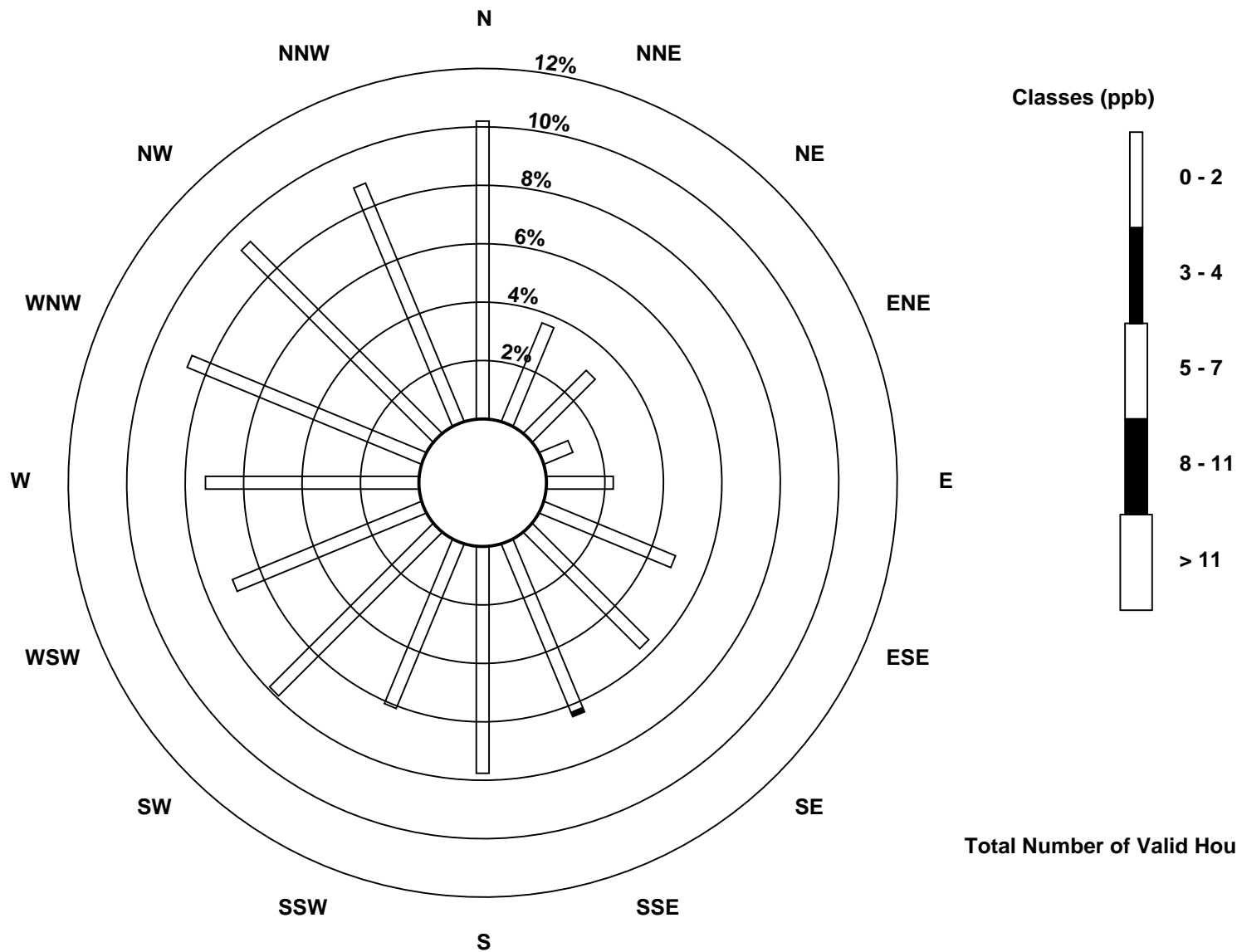
Wood Buffalo Environmental Association
Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Patricia McInnes - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	67	24	20	7	15	32	37	41	51	40	52	46	48	57	61	58	656
3 - 4	0	0	0	0	0	0	0	1	0	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	67	24	20	7	15	32	37	42	51	40	52	46	48	57	61	58	657

Total Number of Valid Hours: 657

Total Number of Hours: 720



Total Number of Valid Hours: 657

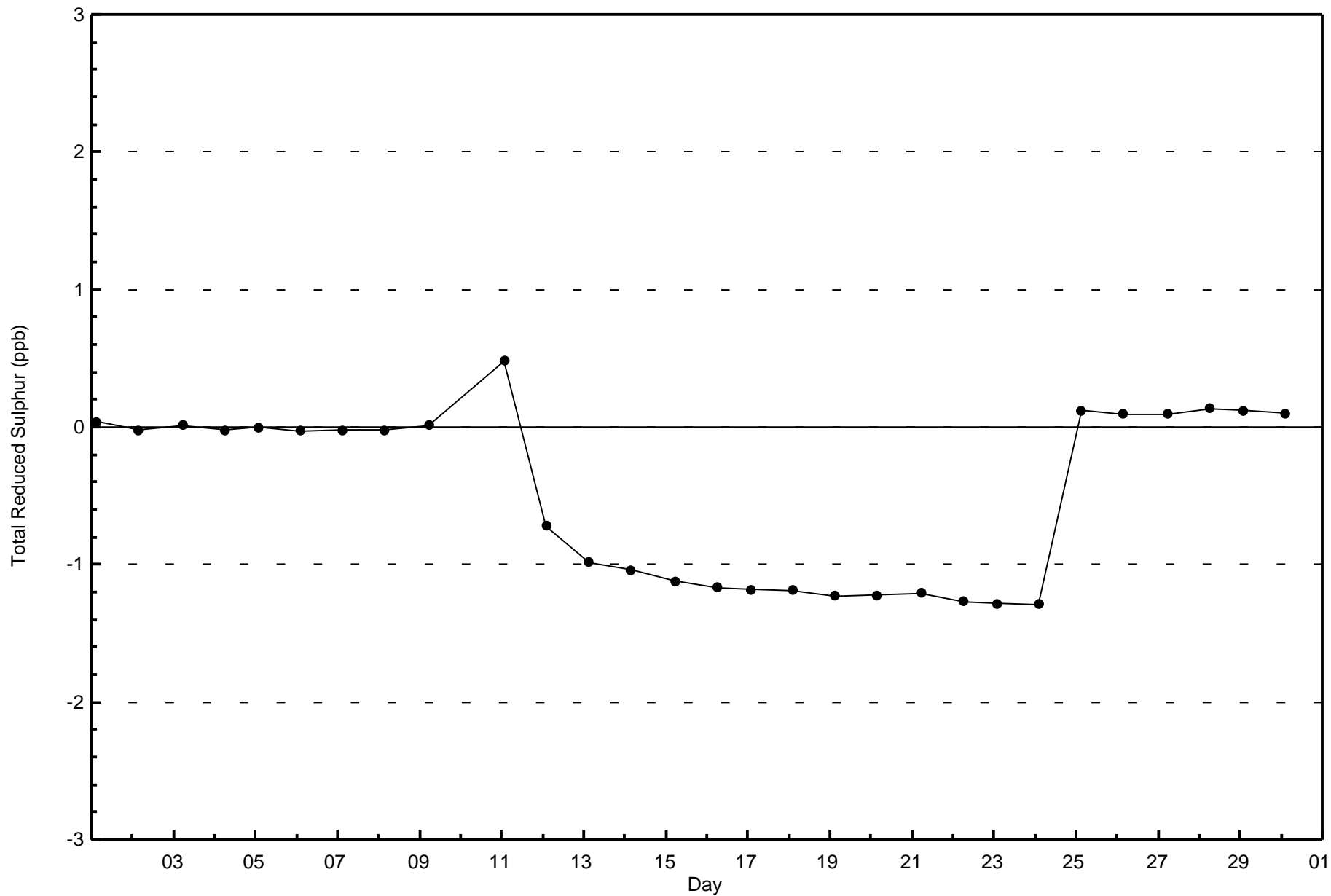


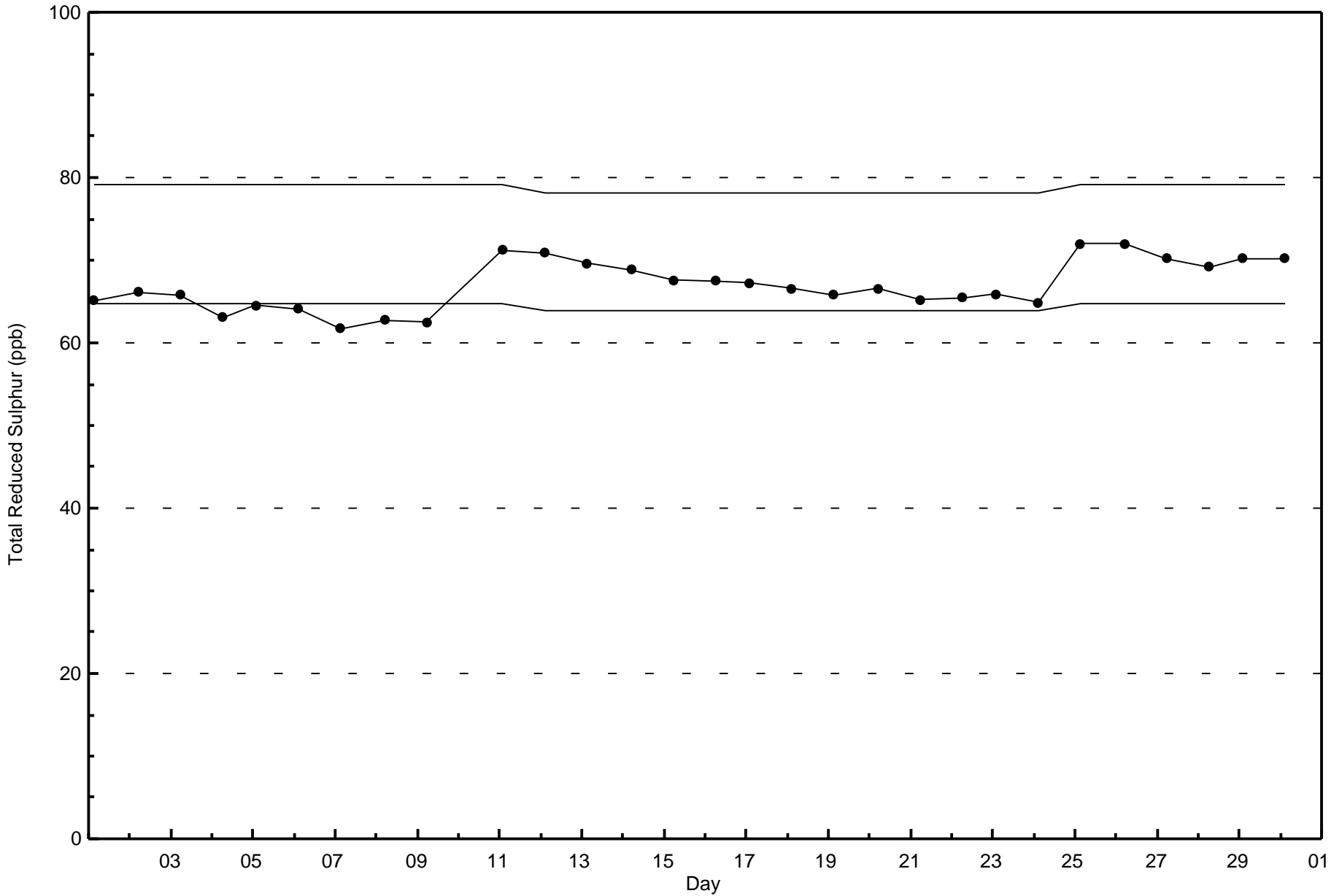
Wood Buffalo Environmental Association

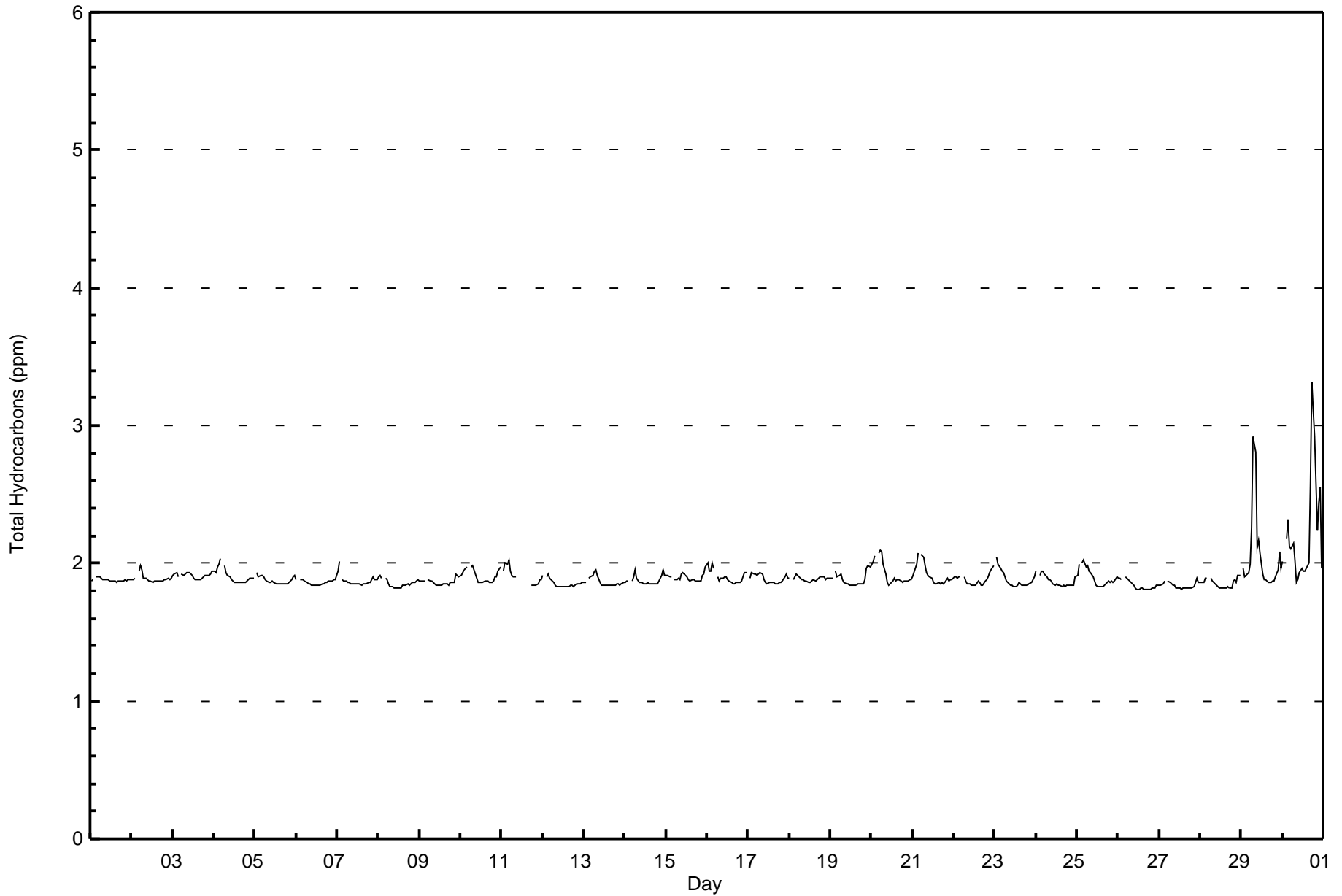
Zero Responses

Total Reduced Sulphur (TRS) - ppb

Patricia McInnes - June 2015









Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Patricia McInnes - June 2015

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	657	96.33	96.33
2.1 - 3.0	23	3.37	99.71
3.1 - 10.0	2	0.29	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 720



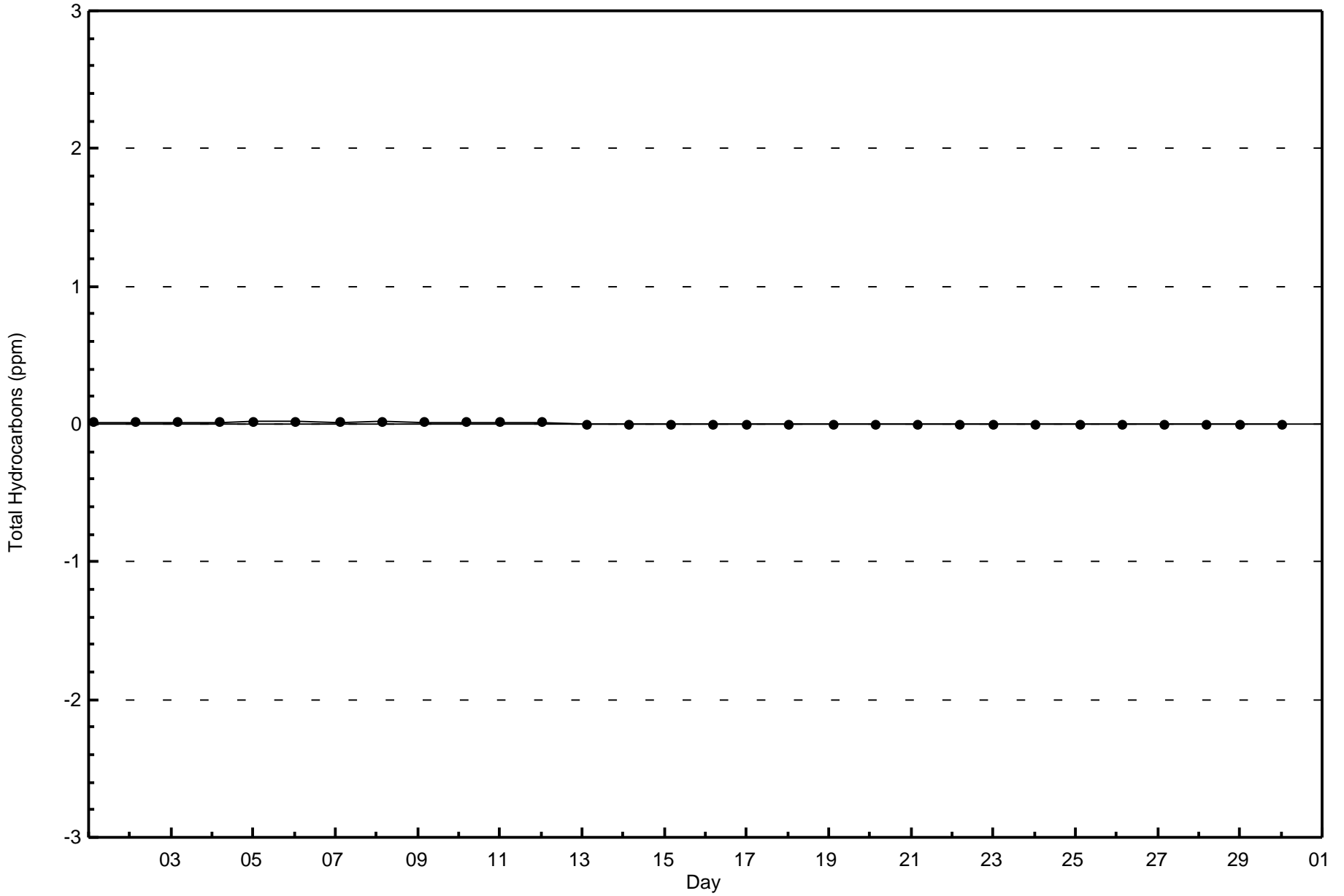
Wood Buffalo Environmental Association
Frequency Distribution

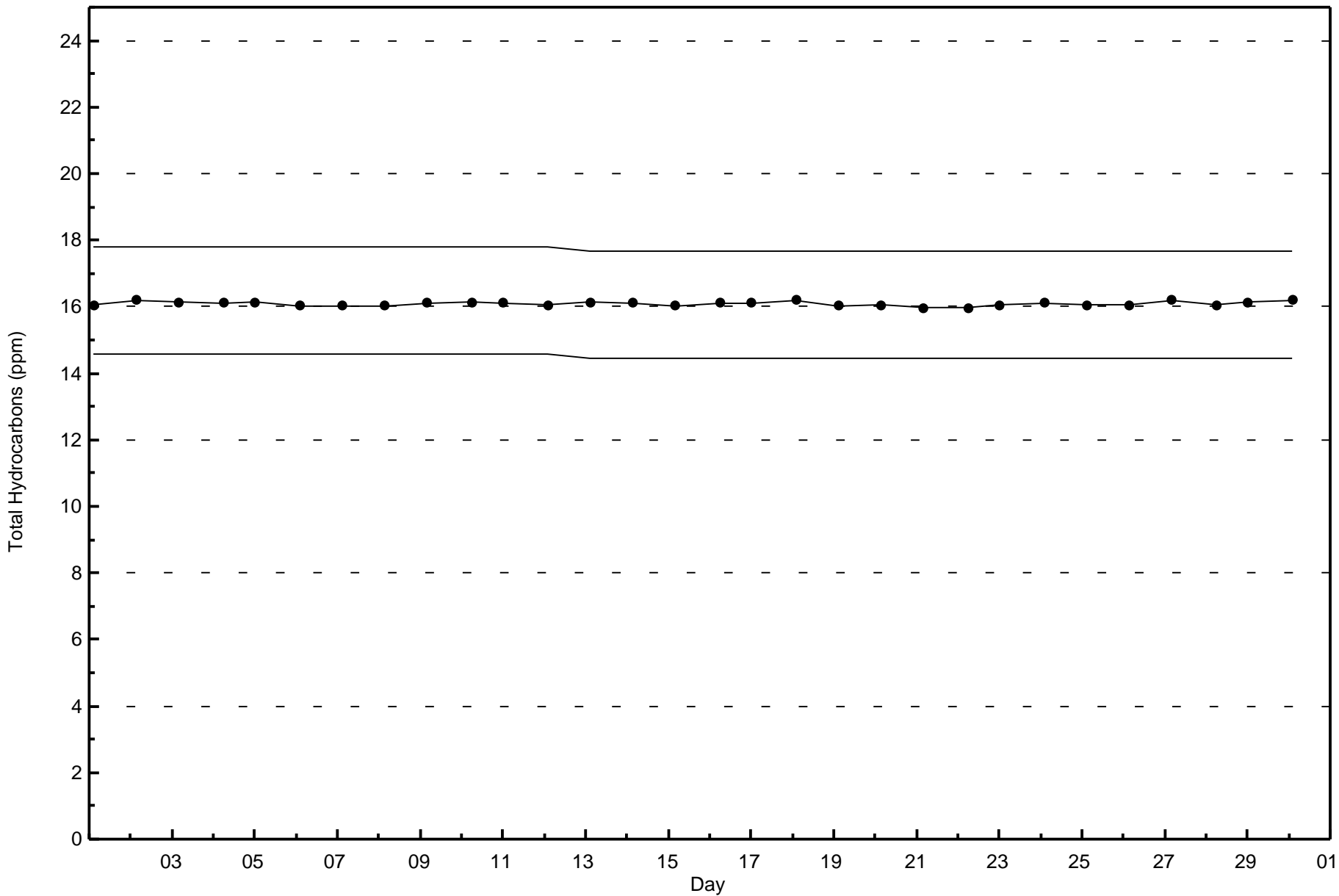
Total Hydrocarbons (THC) - ppm
Patricia McInnes - June 2015

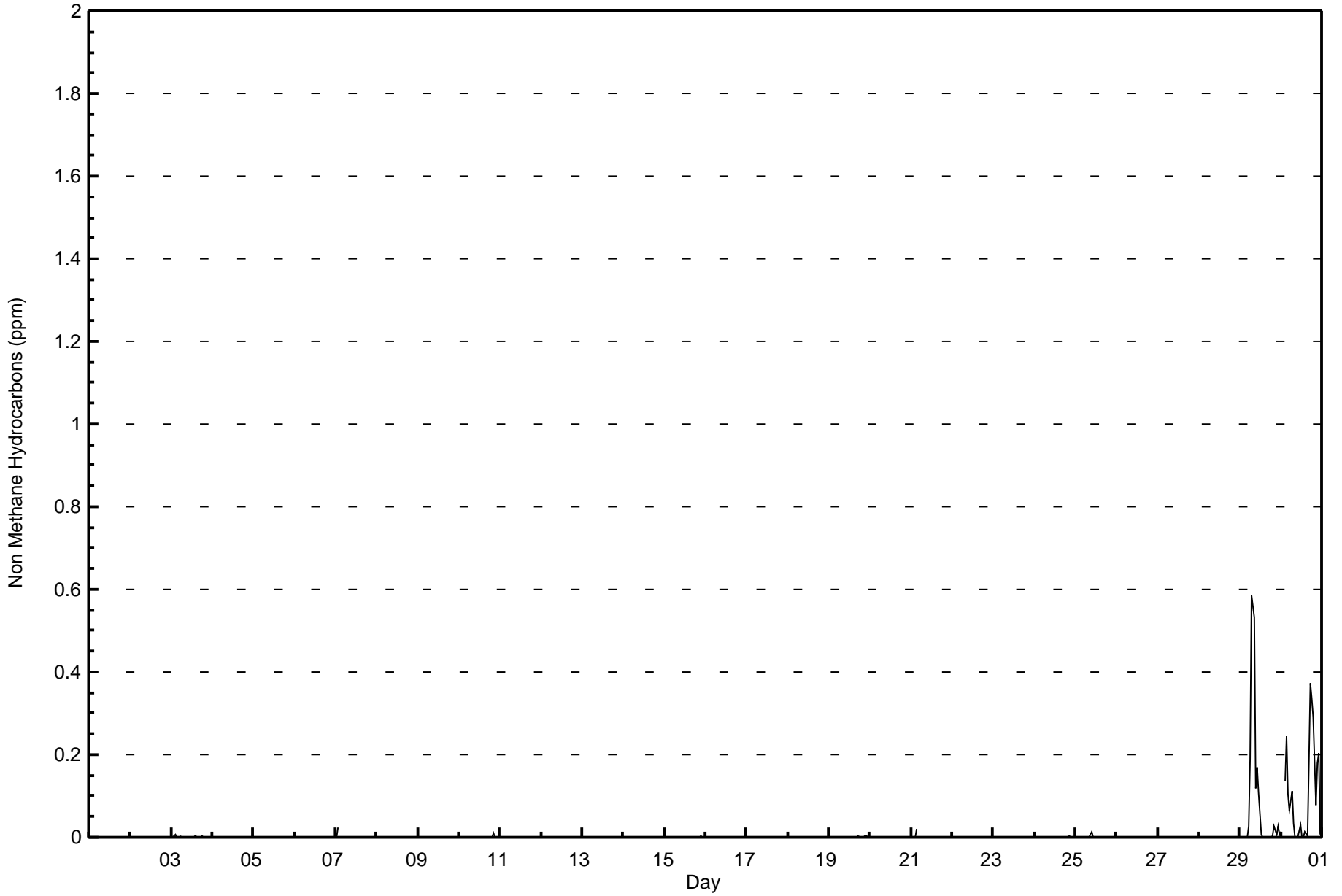
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	69	26	20	8	17	33	34	39	52	35	51	41	48	60	62	62	657
2.1 - 3.0	1	0	0	0	2	0	3	2	0	1	4	2	0	4	2	2	23
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	70	26	20	8	19	33	37	41	52	36	55	43	48	64	65	65	682

Total Number of Valid Hours: 682

Total Number of Hours: 720









Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm
Patricia McInnes - June 2015

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	648	95.01	95.01
0.006 - 0.05	16	2.35	97.36
0.06 - 0.1	7	1.03	98.39
> 0.1	11	1.61	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 720



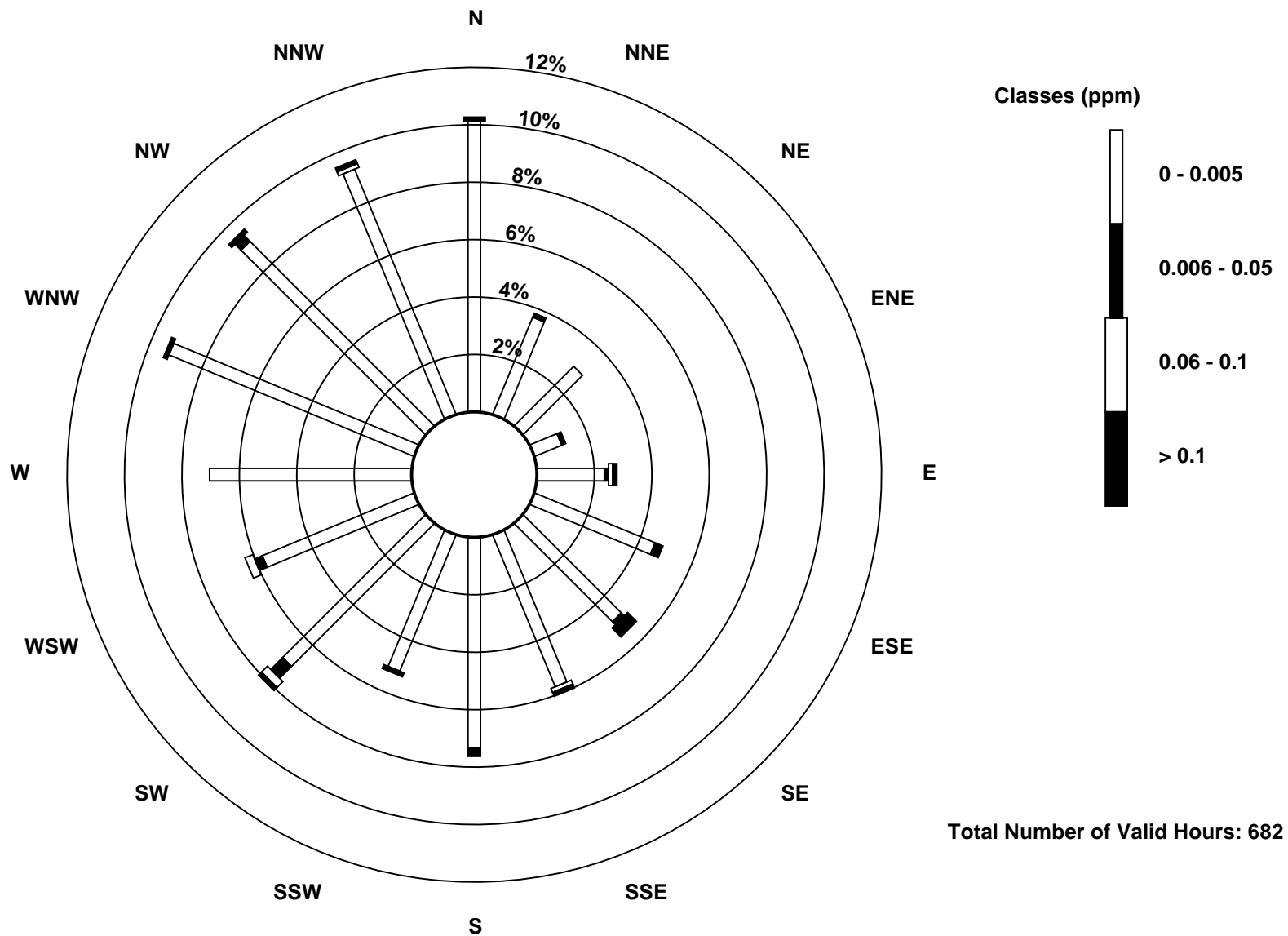
Wood Buffalo Environmental Association
Frequency Distribution

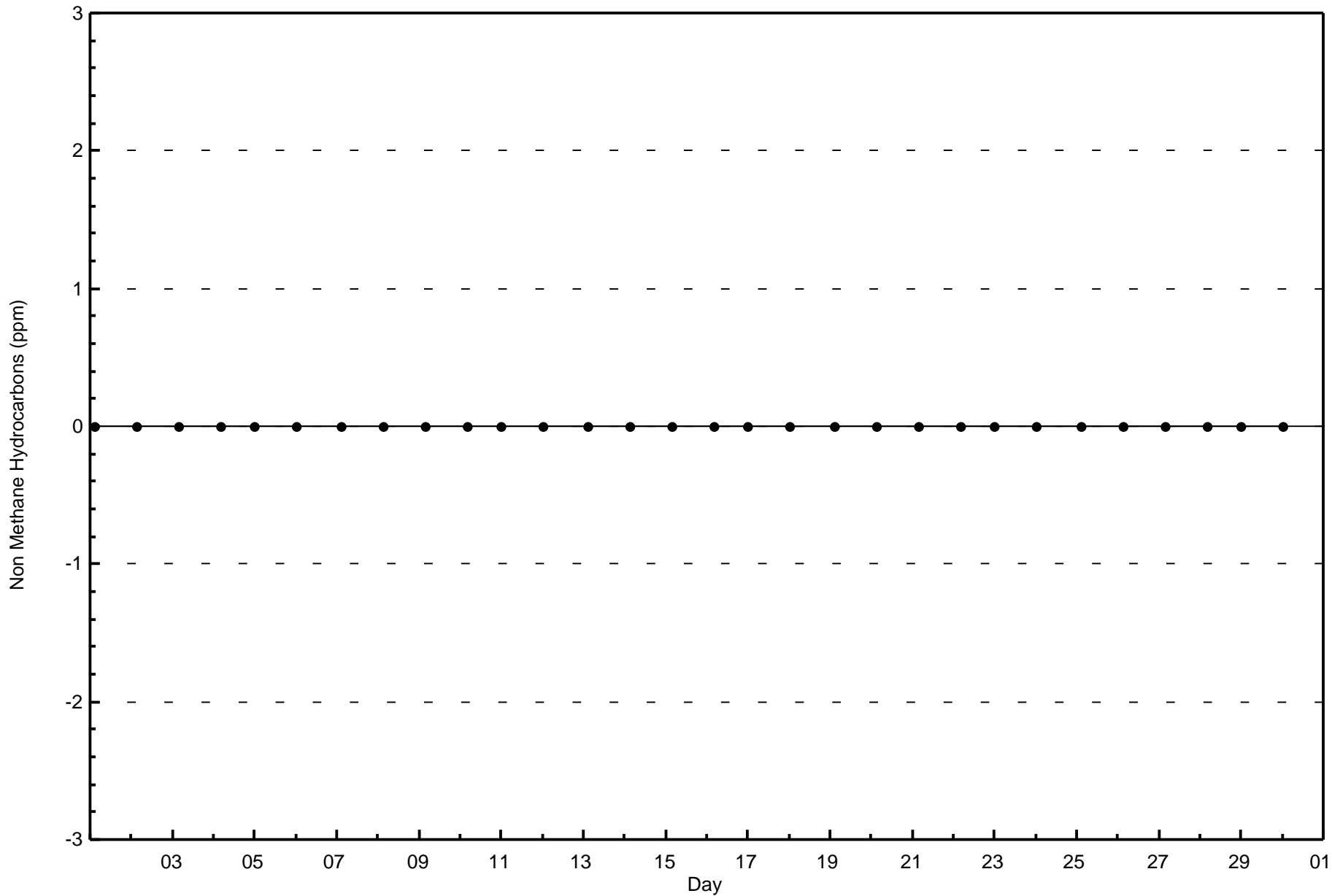
Non Methane Hydrocarbons (NMHC) - ppm
Patricia McInnes - June 2015

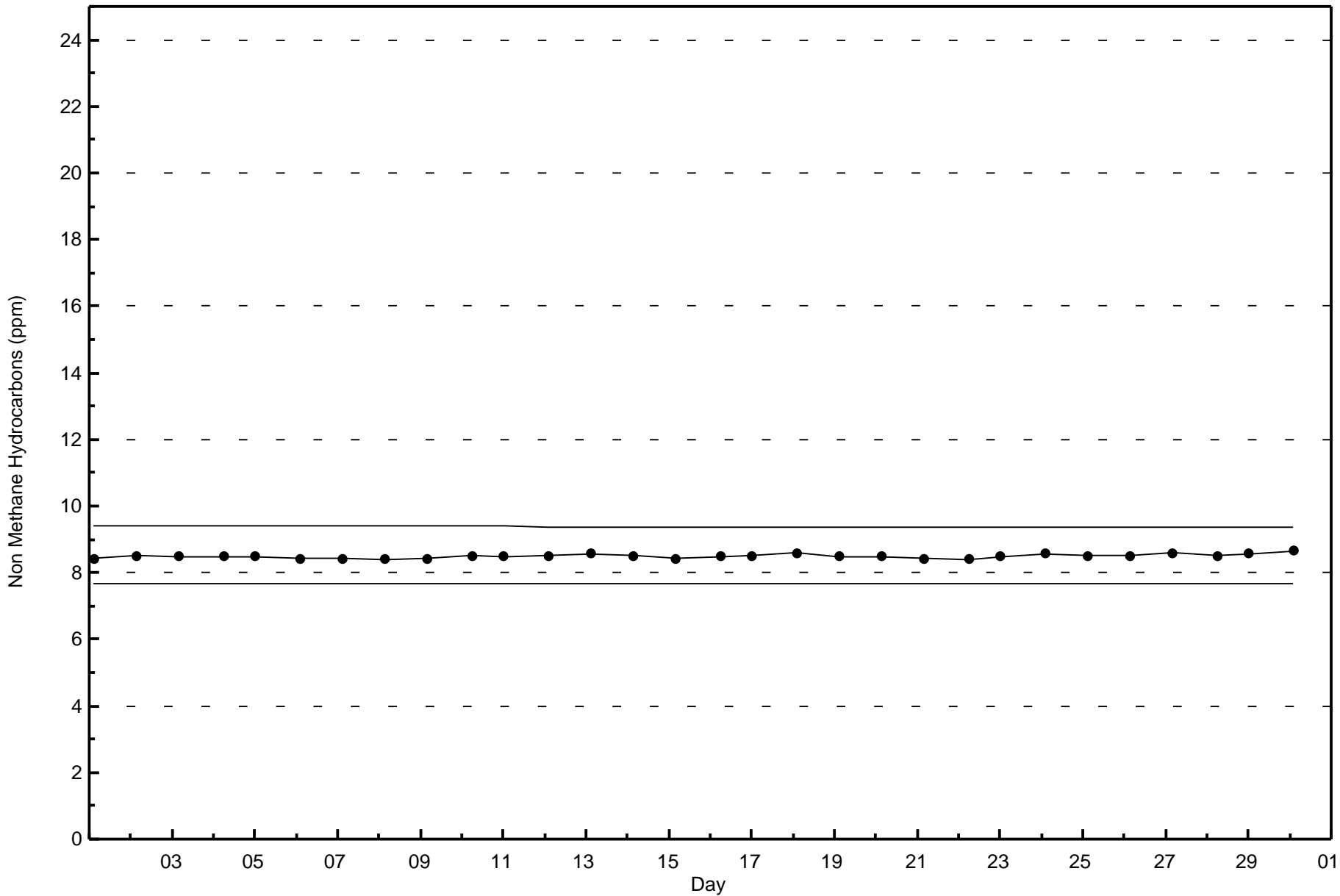
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	69	25	20	7	16	31	33	39	50	35	48	39	48	63	62	63	648
0.006 - 0.05	0	1	0	1	1	2	1	0	2	0	4	2	0	0	2	0	16
0.06 - 0.1	0	0	0	0	1	0	0	1	0	0	2	2	0	0	0	1	7
> 0.1	1	0	0	0	1	0	3	1	0	1	1	0	0	1	1	1	11
Totals	70	26	20	8	19	33	37	41	52	36	55	43	48	64	65	65	682

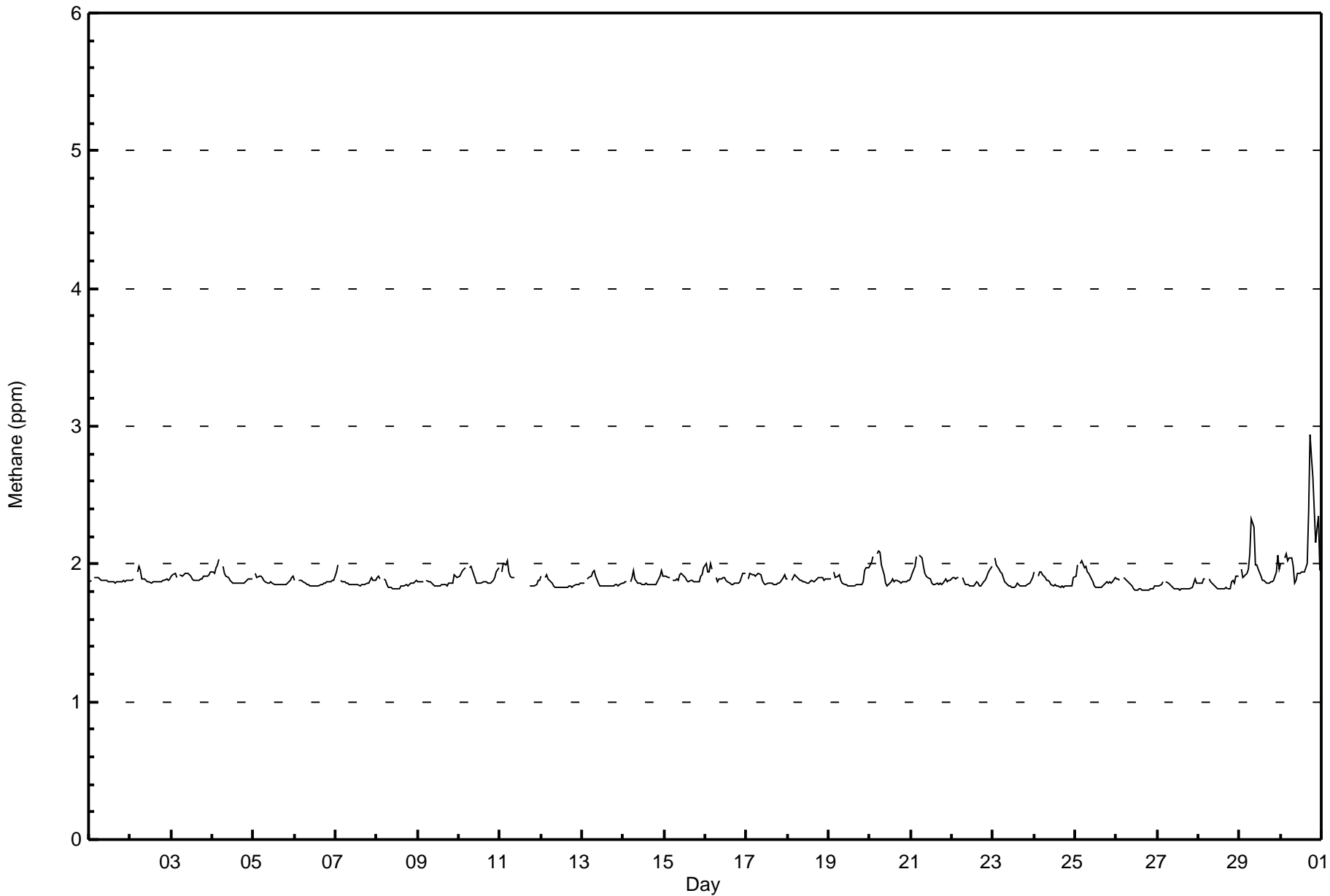
Total Number of Valid Hours: 682

Total Number of Hours: 720











Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Patricia McInnes - June 2015

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	664	97.36	97.36
2.1 - 3.0	18	2.64	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 720



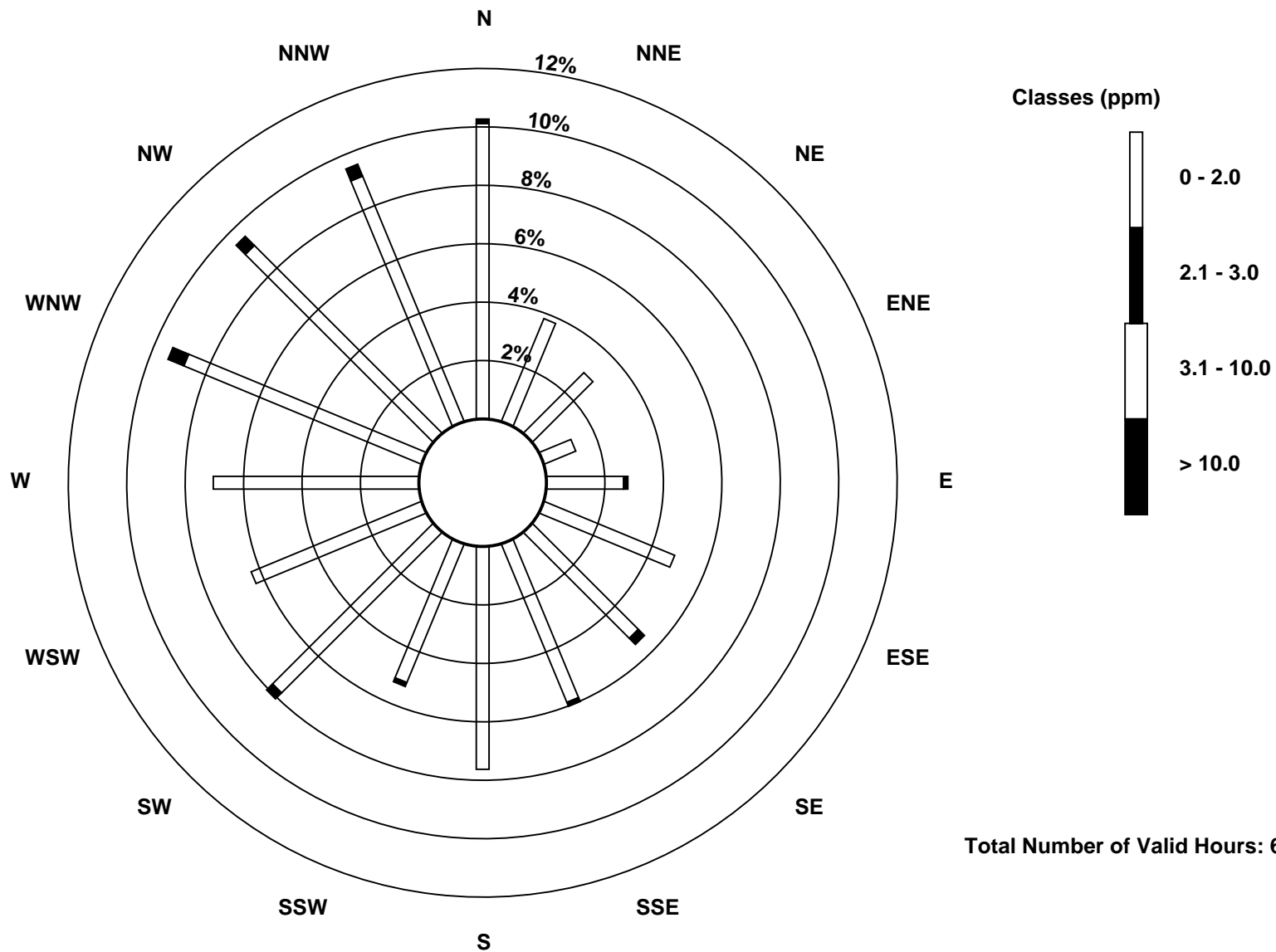
Wood Buffalo Environmental Association
Frequency Distribution

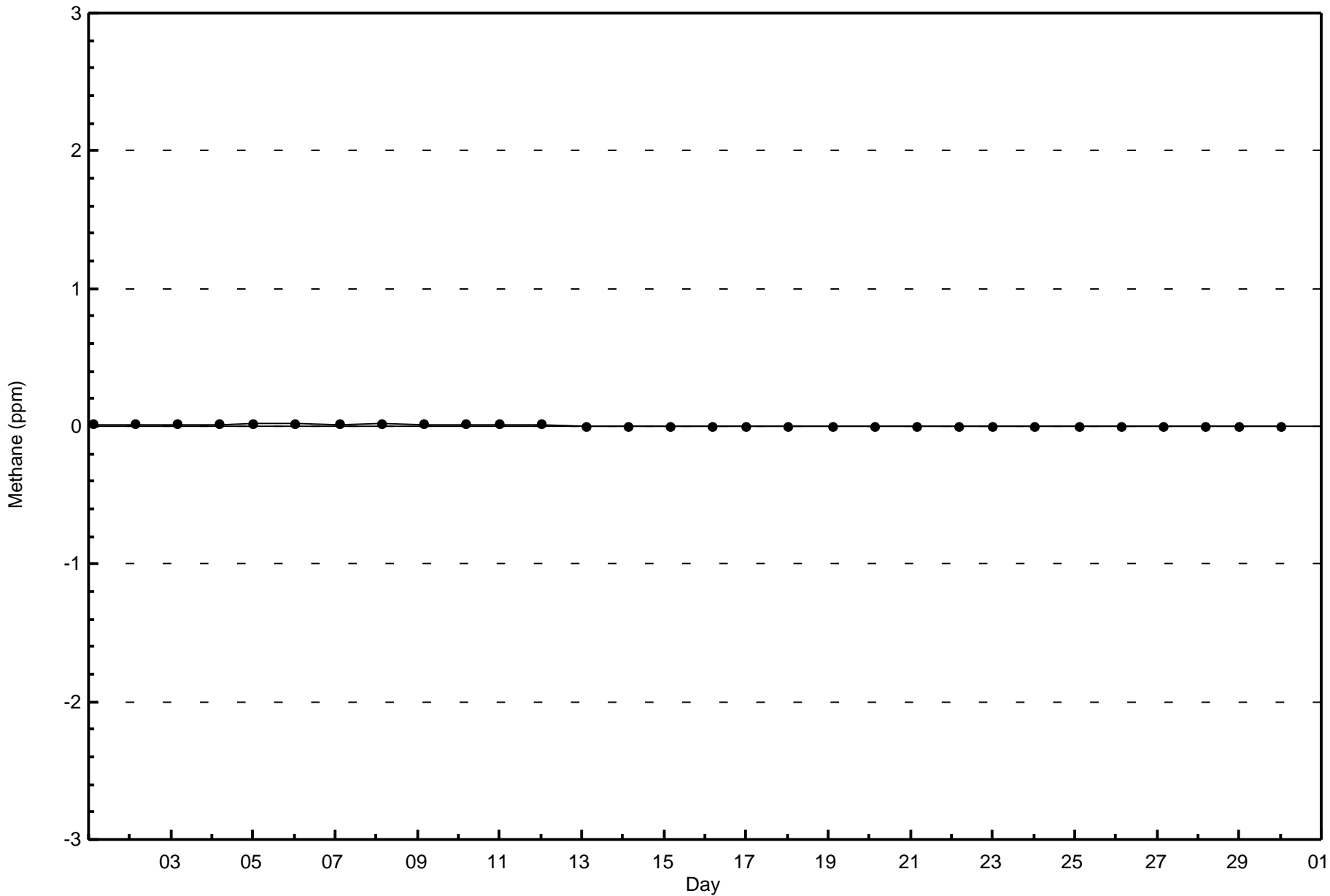
Methane (CH₄) - ppm
Patricia McInnes - June 2015

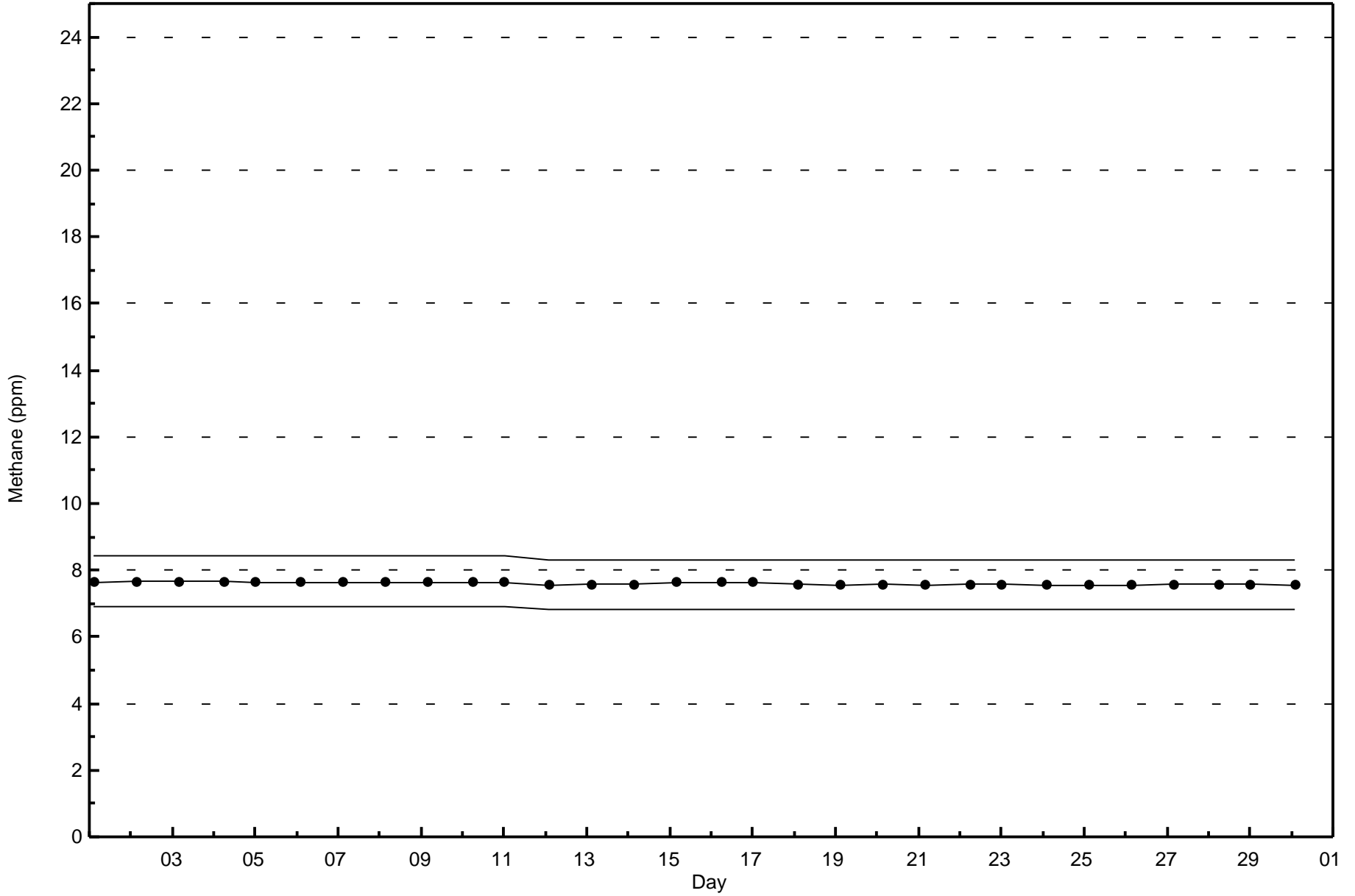
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	69	26	20	8	18	33	35	40	52	35	53	43	48	60	62	62	664
2.1 - 3.0	1	0	0	0	1	0	2	1	0	1	2	0	0	4	3	3	18
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	70	26	20	8	19	33	37	41	52	36	55	43	48	64	65	65	682

Total Number of Valid Hours: 682

Total Number of Hours: 720







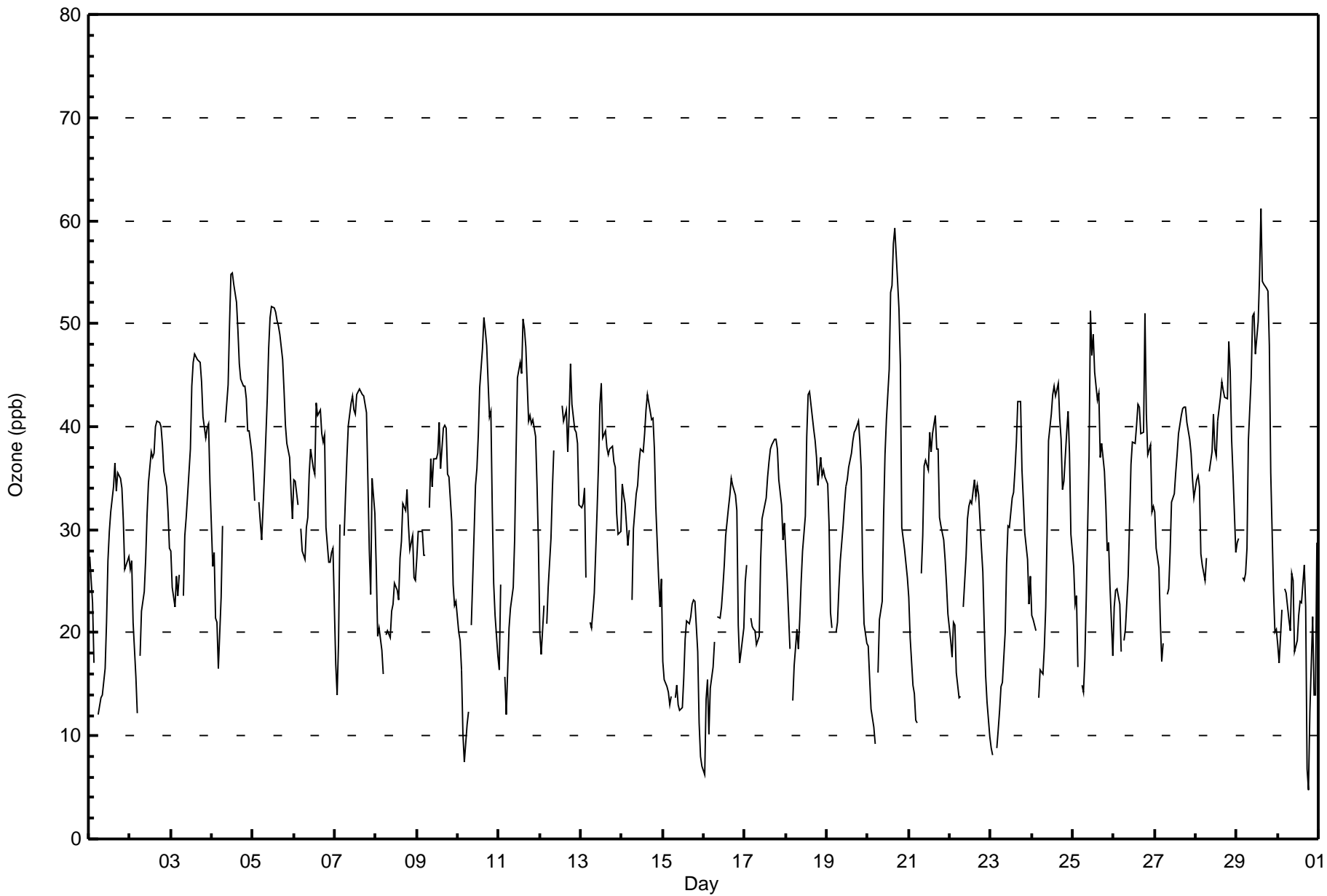


Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 61 ppb on Jun 29 15:00	Maximum Daily Average: 41.0 ppb on Jun 5		Hours of Data:	686
Minimum Value: 5 ppb on Jun 30 19:00	Minimum Daily Average: 16.0 ppb on Jun 15		Hours of Missing Data:	34
Maximum Diurnal Average: 41.2 ppb at hour 16	Minimum Diurnal Average: 18.5 ppb at hour 5		Hours of Calibration:	34
Monthly Average: 30.9 ppb	Percentiles: P ₁ = 9 P ₁₀ = 17 Q ₁ = 23 Median = 32 Q ₃ = 39 P ₉₀ = 44 P ₉₉ = 54		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	27	25	23	17	Z	12	13	14	14	17	21	27	30	32	34	36	34	36	35	34	31	26	27	27	25.7	36
2-Jun	26	27	21	16	12	Z	18	22	24	27	31	35	38	37	37	40	41	40	40	38	36	34	32	28	30.4	41
3-Jun	28	24	23	26	24	26	Z	24	29	31	33	38	44	46	47	46	46	44	41	39	40	40	35	35.6	47	
4-Jun	26	28	21	21	17	23	30	Z	40	44	50	55	55	54	52	49	46	45	44	44	43	40	40	37	39.3	55
5-Jun	35	33	Z	33	31	29	32	35	43	48	51	52	52	51	50	50	49	46	44	40	38	37	34	31	41.0	52
6-Jun	35	35	32	Z	30	28	27	30	31	35	38	36	35	42	41	42	39	38	39	30	27	27	28	28	33.7	42
7-Jun	17	14	19	31	Z	29	33	37	40	42	43	42	41	43	44	43	43	43	41	35	28	24	35	32	34.7	44
8-Jun	26	20	20	18	16	Z	20	20	19	22	23	25	24	23	27	29	33	32	34	30	28	29	25	25	24.8	34
9-Jun	27	30	30	30	28	27	Z	32	37	34	37	37	37	40	36	40	40	40	35	35	31	25	23	23	32.8	40
10-Jun	20	19	16	10	7	11	12	Z	21	30	34	36	39	44	48	51	49	48	41	42	32	25	22	18	29.3	51
11-Jun	16	25	Z	16	12	16	20	22	24	29	37	45	46	45	50	49	48	41	41	40	41	39	34	29	33.4	50
12-Jun	20	18	23	Z	21	24	29	34	38	C	C	C	C	42	41	42	38	41	46	42	40	39	38	32	34.1	46
13-Jun	32	33	34	25	Z	21	20	22	24	32	36	42	44	39	40	38	37	38	38	37	36	32	30	30	33.0	44
14-Jun	34	33	33	28	30	Z	23	30	34	34	36	38	38	39	42	43	42	41	41	38	32	25	23	25	34.0	43
15-Jun	17	15	15	14	13	14	Z	14	15	13	12	13	16	19	21	21	22	23	23	23	18	11	8	7	16.0	23
16-Jun	6	14	15	10	15	17	19	Z	22	21	23	24	27	29	32	33	35	34	33	32	21	17	18	21	22.5	35
17-Jun	25	27	Z	21	21	20	20	19	20	27	31	32	33	35	37	38	38	39	39	38	35	32	29	31	29.8	39
18-Jun	28	25	18	Z	13	17	20	18	21	25	28	31	39	43	43	41	40	39	37	34	37	35	36	35	30.7	43
19-Jun	34	30	22	20	Z	20	21	24	27	30	32	34	35	36	37	39	40	40	40	39	36	26	21	19	30.6	40
20-Jun	19	16	13	11	9	Z	16	21	23	31	37	41	46	53	54	58	59	54	51	46	30	28	27	25	33.4	59
21-Jun	23	20	15	14	12	11	Z	26	29	36	37	36	40	38	39	41	38	38	31	30	29	27	25	22	28.5	41
22-Jun	19	18	21	21	16	14	14	Z	22	27	31	32	33	33	35	33	34	33	28	26	21	16	13	10	23.9	35
23-Jun	9	8	Z	9	11	12	15	15	20	27	30	30	33	34	36	38	42	42	36	33	30	27	23	25	25.5	42
24-Jun	22	21	20	Z	14	16	16	19	23	30	39	41	43	44	43	44	41	39	34	35	39	42	37	30	31.8	44
25-Jun	26	23	24	17	Z	15	14	17	23	37	51	47	49	45	43	43	37	38	36	32	28	29	24	18	31.2	51
26-Jun	22	24	24	23	18	Z	19	20	26	31	36	39	38	40	42	42	39	40	51	41	37	38	32	32	32.9	51
27-Jun	32	28	26	21	17	19	Z	24	24	28	33	33	36	37	39	41	42	42	42	40	39	37	35	33	32.6	42
28-Jun	35	35	34	28	27	25	27	Z	36	38	41	38	37	41	43	44	44	43	43	48	45	39	35	28	37.1	48
29-Jun	29	29	Z	25	25	26	28	39	45	51	51	47	50	55	61	54	54	53	53	48	36	24	20	20	40.1	61
30-Jun	19	17	22	Z	24	24	21	20	26	25	18	19	22	23	23	27	23	7	5	12	22	14	14	29	19.8	29

24.6	23.8	22.6	20.2	18.5	19.9	21.2	24.0	27.3	31.1	34.6	36.0	37.9	39.4	40.6	41.2	40.4	39.3	38.2	36.2	32.8	29.5	27.6	26.2	Diurnal Average	
35	35	34	33	31	29	33	39	45	51	51	55	55	55	61	58	59	54	53	48	45	42	40	37	Diurnal Maximum	

Z - zerospan C - Calibration
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Patricia McInnes - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	128	18.66	18.66
21 - 50	533	77.70	96.36
51 - 82	25	3.64	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



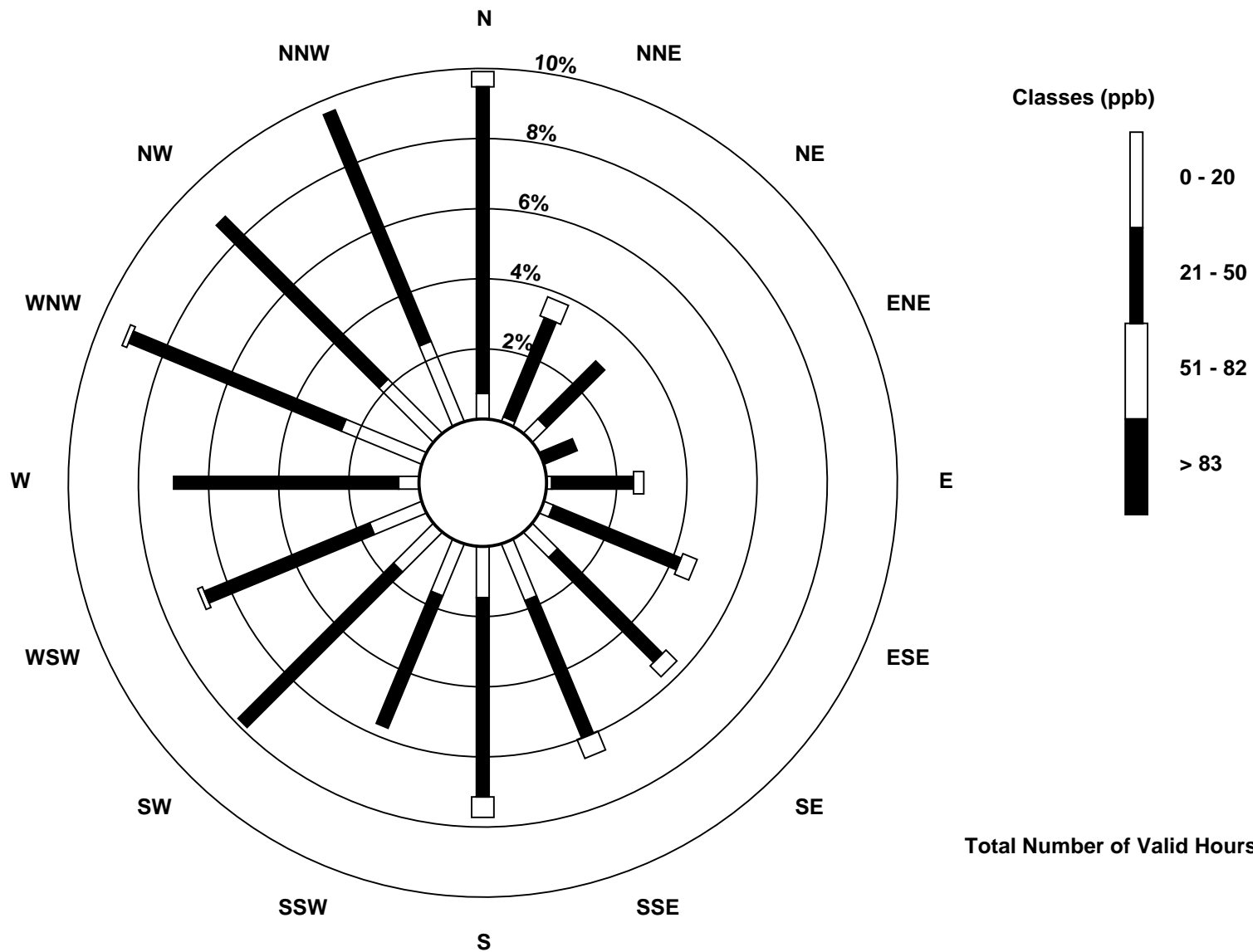
Wood Buffalo Environmental Association
Frequency Distribution

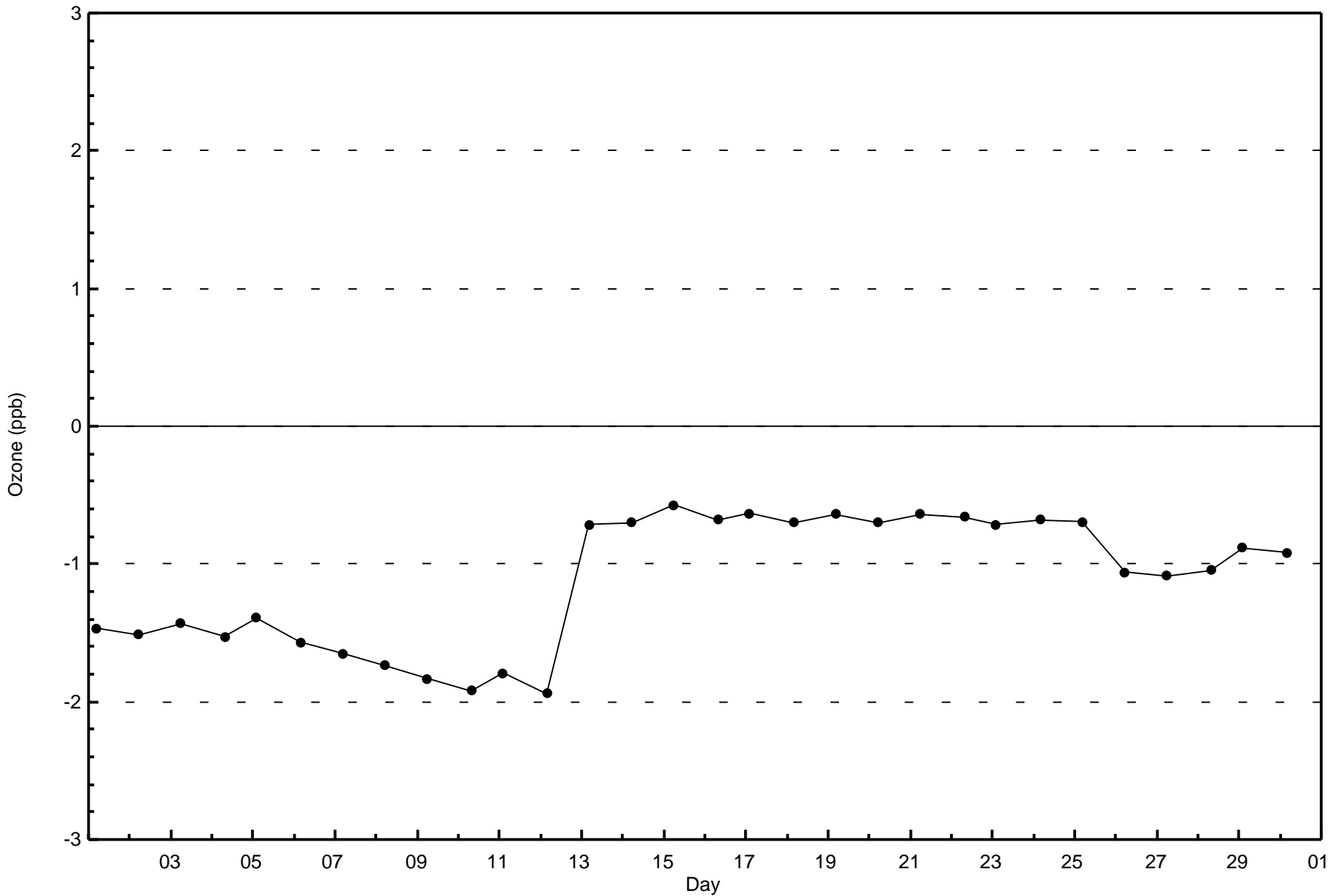
Ozone (O₃) - ppb
Patricia McInnes - June 2015

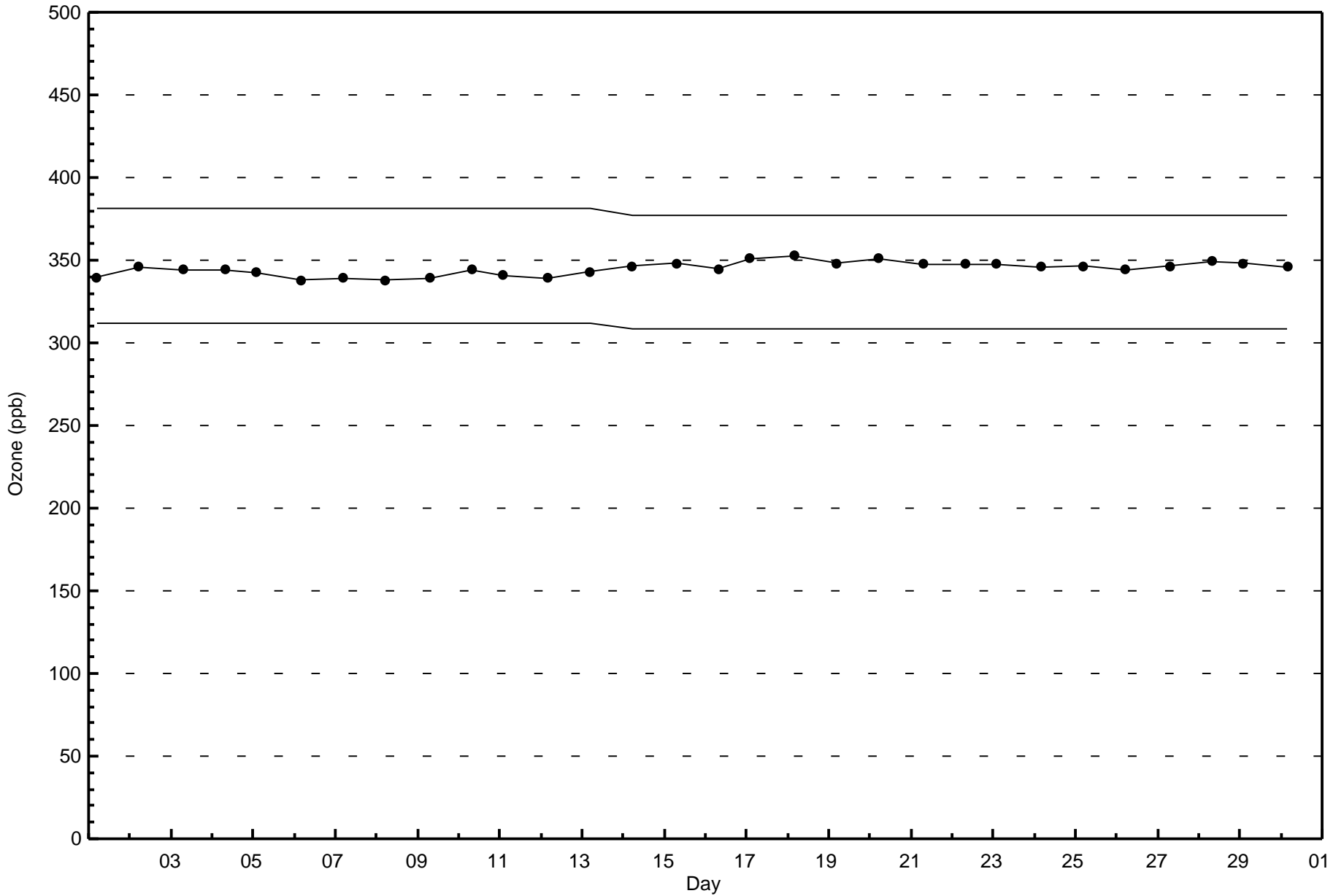
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	5	1	4	0	1	2	7	12	10	11	11	11	4	17	15	17	128
21 - 50	60	21	16	7	16	27	29	29	39	28	43	35	44	45	45	49	533
51 - 82	3	4	0	0	2	3	3	4	4	0	0	1	0	1	0	0	25
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	68	26	20	7	19	32	39	45	53	39	54	47	48	63	60	66	686

Total Number of Valid Hours: 686

Total Number of Hours: 720

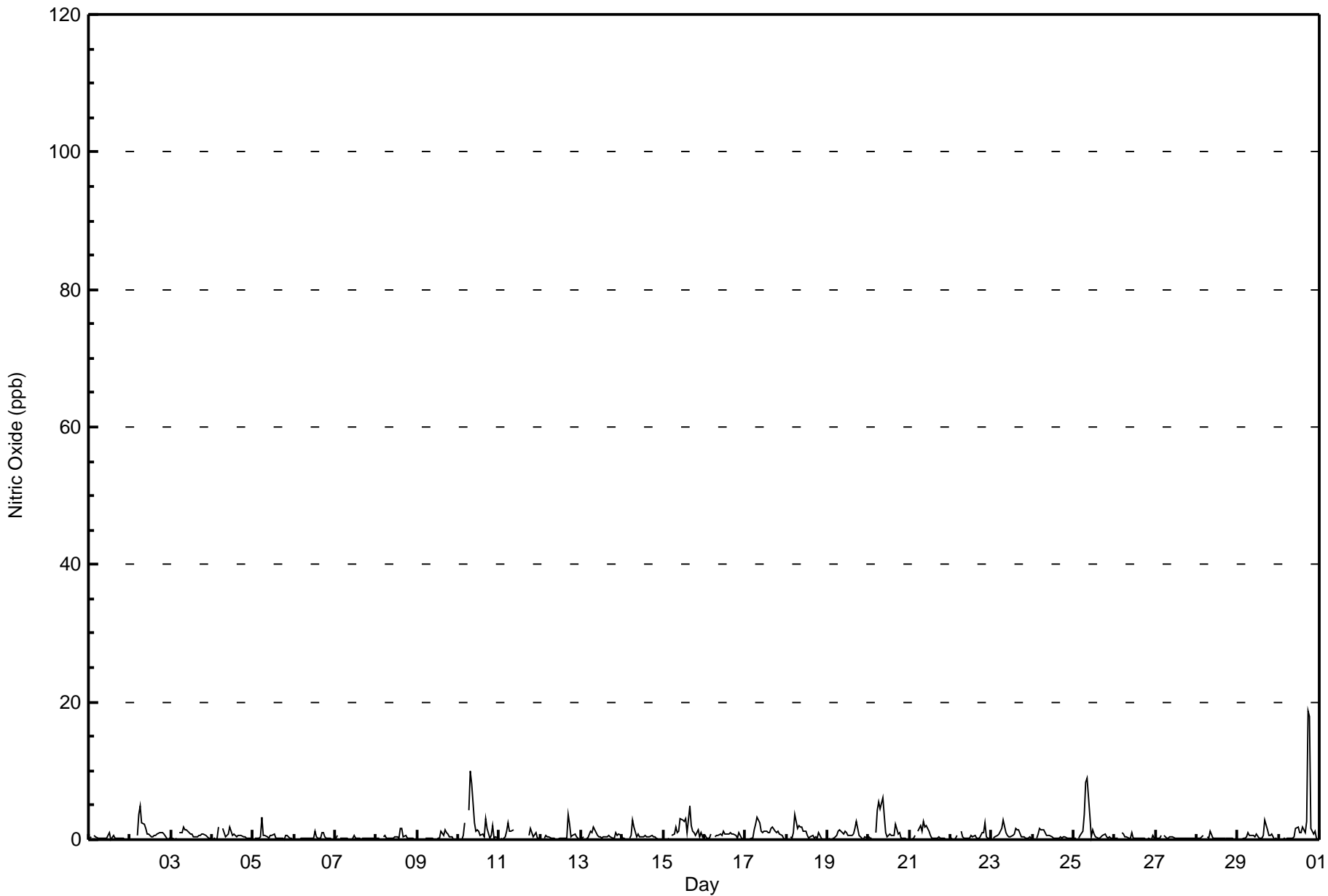








Maximum Value: 19 ppb on Jun 30 18:00																		Maximum Daily Average: 2.3 ppb on Jun 30						Hours in Service: 720			
Minimum Value: 0 ppb on Jul 1 00:00																		Minimum Daily Average: 0.2 ppb on Jun 7						Hours of Data: 682			
Maximum Diurnal Average: 1.7 ppb at hour 8																		Minimum Diurnal Average: 0.1 ppb at hour 3						Hours of Missing Data: 38			
Monthly Average: 0.7 ppb																		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 2 P ₉₉ = 6						Hours of Calibration: 38			
																		Percent Operational Time: 100.0									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	0	0	Z	1	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0.3	1	
2-Jun	0	0	0	Z	1	4	5	2	2	2	1	1	0	0	1	1	1	1	1	1	1	0	0	0	1.1	5	
3-Jun	0	0	0	0	Z	1	1	2	1	1	1	1	1	0	0	0	1	1	1	1	1	0	0	0	0.7	2	
4-Jun	0	0	0	0	2	Z	2	1	0	1	2	1	1	1	1	1	1	1	0	0	0	0	0	0	0.6	2	
5-Jun	Z	0	0	0	0	3	1	1	0	0	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0.5	3	
6-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0.3	1	
7-Jun	0	1	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
8-Jun	0	0	0	Z	0	1	0	0	0	0	0	0	0	0	2	2	0	1	0	0	0	0	0	0	0.4	2	
9-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0.3	1	
10-Jun	0	0	0	1	2	Z	4	10	8	3	1	1	1	1	1	0	3	2	0	1	2	0	0	0	1.8	10	
11-Jun	Z	0	0	0	1	2	1	1	1	C	C	C	C	C	C	C	C	1	2	1	0	1	0	0	--	2	
12-Jun	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2	0	1	1	0	0	0.5	4	
13-Jun	0	0	Z	0	0	1	1	2	2	1	0	0	0	0	0	0	1	0	0	0	1	1	1	1	0.6	2	
14-Jun	0	0	0	Z	0	1	3	2	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0.5	3	
15-Jun	0	0	0	0	Z	1	1	2	1	1	3	3	3	3	1	5	2	1	1	1	1	0	1	0	1.4	5	
16-Jun	1	0	0	0	1	Z	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	0.6	1	
17-Jun	Z	0	0	0	0	1	2	3	2	1	1	1	1	1	1	2	2	1	1	1	1	1	0	0	1.1	3	
18-Jun	0	Z	0	0	1	4	2	2	2	2	1	1	1	0	0	1	0	0	0	1	0	0	0	0	0.8	4	
19-Jun	0	0	Z	0	0	1	1	1	1	1	1	1	1	1	1	1	2	3	1	0	0	0	0	0	0.7	3	
20-Jun	0	0	0	Z	1	4	5	5	6	3	1	0	1	1	1	1	2	1	1	0	0	0	0	0	1.5	6	
21-Jun	0	0	0	1	Z	1	2	1	3	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0.7	3	
22-Jun	0	0	0	0	1	Z	1	0	0	0	0	0	1	0	1	0	0	0	1	1	2	0	0	0	0.5	2	
23-Jun	Z	0	0	1	1	1	2	3	1	1	0	0	1	1	2	1	1	0	0	0	0	0	0	0	0.8	3	
24-Jun	0	Z	0	1	2	2	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2	
25-Jun	0	0	Z	0	1	1	4	8	9	3	1	1	1	0	0	0	0	1	1	0	0	0	0	0	1.4	9	
26-Jun	0	0	0	Z	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.3	1
27-Jun	0	0	0	1	Z	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
28-Jun	0	0	0	0	1	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
29-Jun	Z	0	0	0	0	0	1	1	1	1	0	1	0	0	0	1	3	1	1	1	1	0	0	0	0.6	3	
30-Jun	0	Z	0	0	0	0	0	0	0	0	2	2	1	1	2	1	3	19	18	2	1	1	0	0	2.3	19	
																								Diurnal Average			
																								Diurnal Maximum			
Z - zerospan C - Calibration																											





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Patricia McInnes - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	682	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 720



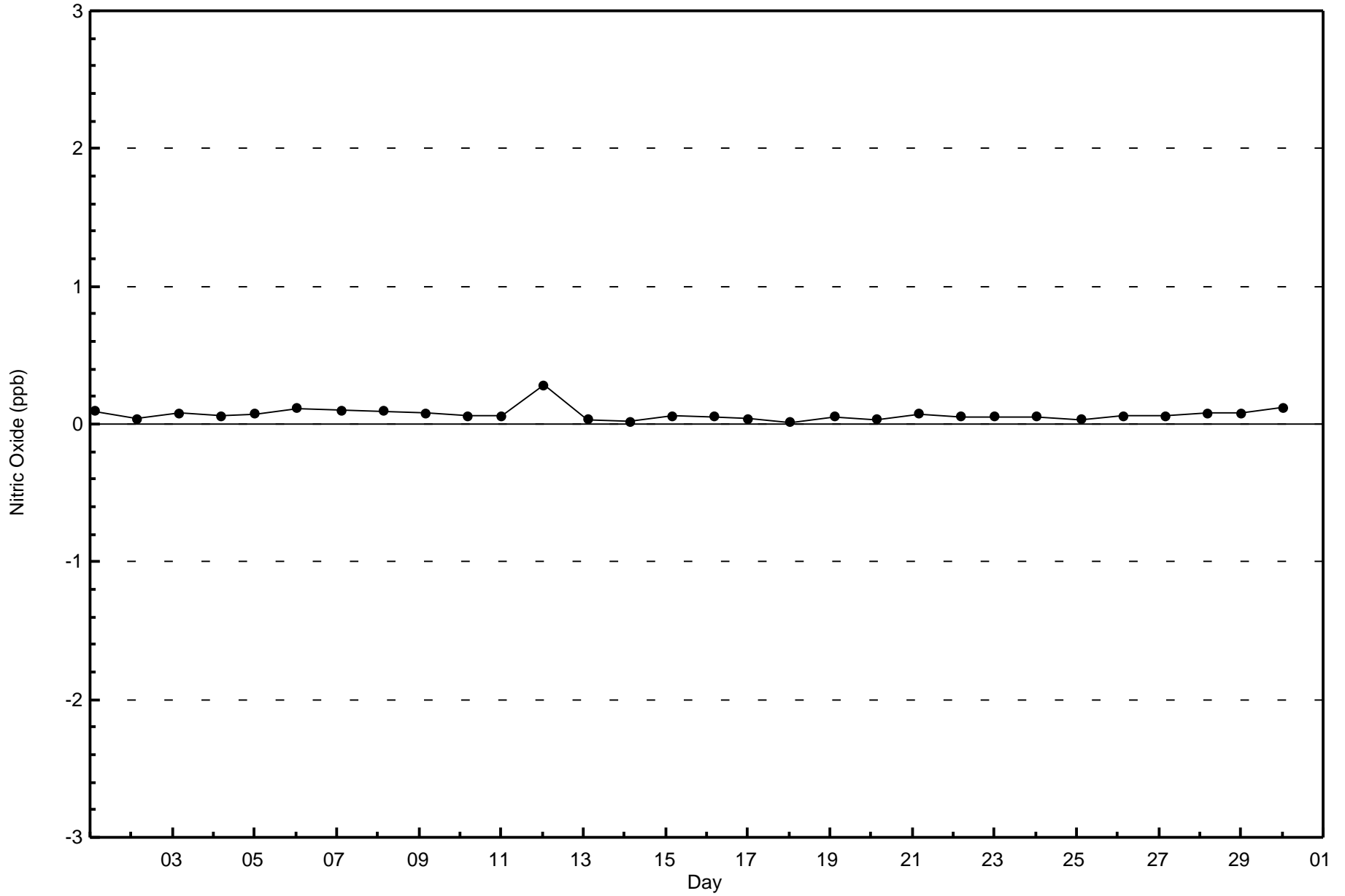
**Wood Buffalo Environmental Association
Frequency Distribution**

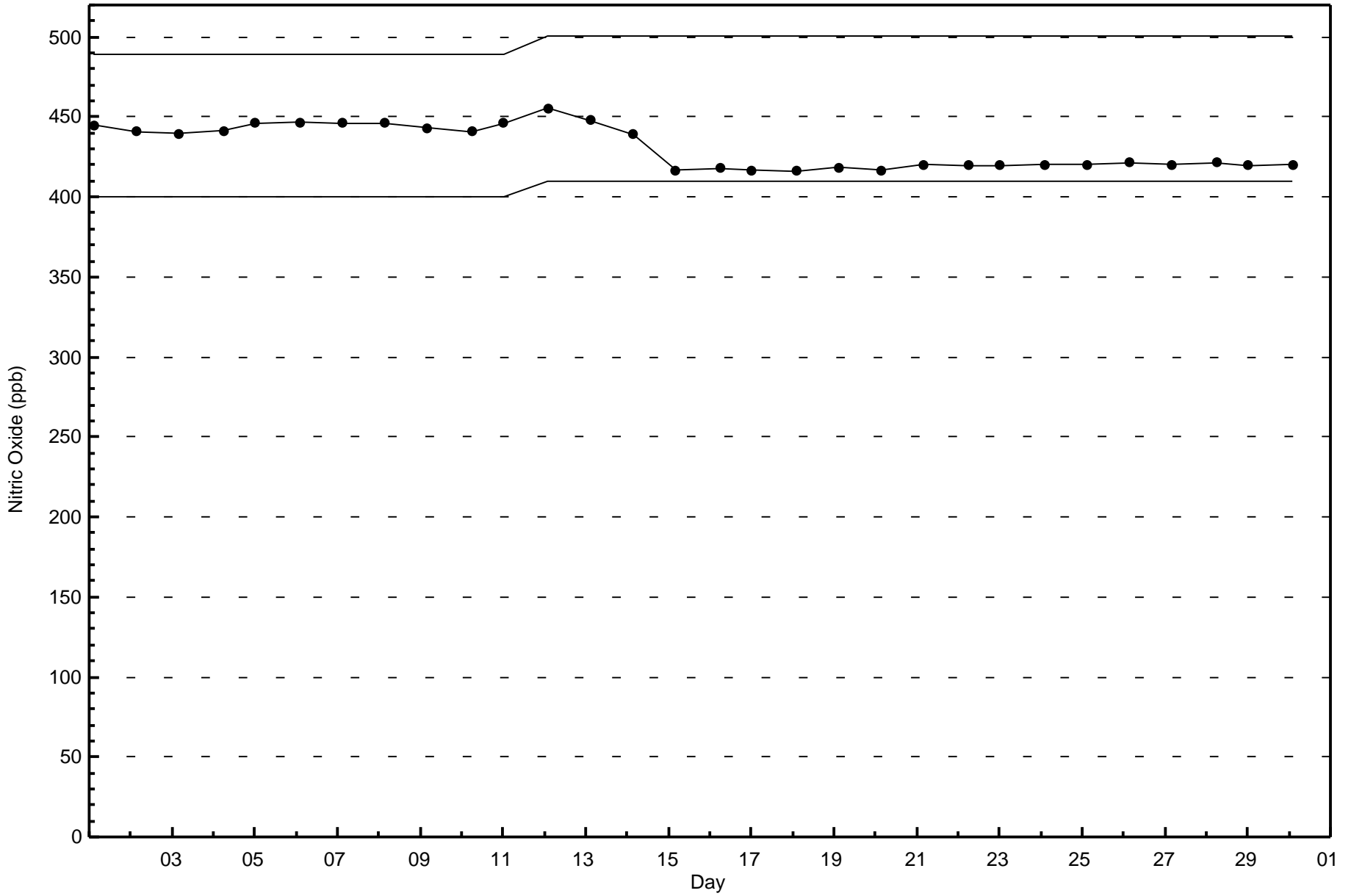
**Nitric Oxide (NO) - ppb
Patricia McInnes - June 2015**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	70	26	20	8	19	33	37	41	52	36	55	43	48	64	65	65	682
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	70	26	20	8	19	33	37	41	52	36	55	43	48	64	65	65	682

Total Number of Valid Hours: 682

Total Number of Hours: 720







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Patricia McInnes - June 2015

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 48 ppb on Jun 30 18:00	Maximum Daily Average: 12.5 ppb on Jun 30		Hours of Data:	682
Minimum Value: 0 ppb on Jun 1 06:00	Minimum Daily Average: 0.3 ppb on Jun 1		Hours of Missing Data:	38
Maximum Diurnal Average: 3.7 ppb at hour 18	Minimum Diurnal Average: 1.3 ppb at hour 14		Hours of Calibration:	38
Monthly Average: 2.5 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 2 Q ₃ = 3 P ₉₀ = 6 P ₉₉ = 18		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	1	Z	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	2	1	0	0	0.3	2
2-Jun	0	1	1	Z	3	6	8	3	2	2	1	1	1	1	1	1	1	2	2	3	4	2	1	2	2.0	8
3-Jun	2	3	2	2	Z	3	2	3	2	2	2	1	1	1	1	1	1	2	2	4	4	2	2	2	2.1	4
4-Jun	2	1	2	3	7	Z	5	2	1	1	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1.8	7
5-Jun	Z	2	1	2	2	6	1	1	1	1	1	1	1	1	0	1	1	1	0	3	5	4	5	4	1.9	6
6-Jun	0	Z	0	0	0	1	1	0	0	0	0	0	3	1	0	1	3	4	3	1	1	0	0	0	0.8	4
7-Jun	5	5	Z	0	1	1	1	0	0	0	1	1	0	0	0	0	0	0	0	2	3	2	1	0	1.1	5
8-Jun	3	3	1	Z	1	1	0	0	0	0	0	0	0	0	2	2	1	3	0	0	1	1	1	0	0.9	3
9-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	3	2	4	3	4	3	3	1	1	1	1.2	4
10-Jun	1	2	3	6	6	Z	7	9	9	4	3	3	3	3	3	3	5	5	2	4	12	8	5	4	4.8	12
11-Jun	Z	2	2	3	7	7	5	4	4	C	C	C	C	C	C	C	C	5	6	6	3	3	2	1	--	7
12-Jun	1	Z	2	4	1	1	0	0	0	0	0	0	0	0	0	0	3	3	2	2	2	1	1	1	1.0	4
13-Jun	0	0	Z	4	3	4	5	6	3	1	0	1	0	0	1	1	1	1	1	1	2	2	3	3	1.8	6
14-Jun	1	0	1	Z	3	3	7	4	1	1	1	1	1	1	1	1	1	2	2	2	2	1	1	2	1.6	7
15-Jun	3	2	2	2	Z	2	3	3	2	3	4	4	3	3	2	5	3	2	2	1	4	4	2	1	2.6	5
16-Jun	1	0	4	8	4	Z	2	2	3	2	2	3	2	2	2	2	2	2	2	2	3	4	2	2	2.4	8
17-Jun	Z	1	2	3	2	3	4	6	5	3	2	2	2	2	2	2	2	3	3	4	5	6	6	2	3.1	6
18-Jun	1	Z	2	3	4	6	3	4	3	3	2	3	2	1	1	1	1	1	1	4	1	0	0	0	2.1	6
19-Jun	0	1	Z	6	4	5	4	3	2	2	2	1	1	2	1	2	4	4	3	3	3	3	4	4	2.8	6
20-Jun	6	5	4	Z	3	6	10	8	10	7	2	1	3	4	4	4	7	5	4	4	1	1	0	0	4.3	10
21-Jun	1	5	9	7	Z	7	6	5	7	5	6	5	2	1	1	2	1	3	1	1	3	1	0	0	3.4	9
22-Jun	1	1	0	1	2	Z	2	0	0	0	0	0	1	1	2	1	0	0	3	7	12	9	7	5	2.4	12
23-Jun	Z	3	2	2	1	1	2	2	1	0	0	1	1	2	4	6	4	2	1	2	2	2	4	1	1.9	6
24-Jun	2	Z	1	4	5	3	2	1	1	1	1	0	0	1	1	1	2	0	1	2	1	1	1	3	1.4	5
25-Jun	7	5	Z	4	3	3	7	15	19	11	5	3	2	1	1	1	2	3	7	5	2	3	2	2	4.9	19
26-Jun	1	1	1	Z	4	2	1	0	0	0	1	0	0	0	0	0	1	0	0	0	1	0	3	1	0.7	4
27-Jun	1	1	1	2	Z	2	1	0	1	0	1	0	0	0	0	0	0	0	1	0	1	2	2	1	0.7	2
28-Jun	1	1	1	3	2	Z	2	1	5	1	1	0	0	0	0	0	0	0	0	3	3	3	2	6	1.4	6
29-Jun	Z	1	1	2	2	3	8	10	11	9	6	3	2	2	4	4	5	6	6	6	8	5	4	3	4.8	11
30-Jun	3	Z	3	4	3	4	3	2	1	3	12	11	8	8	10	13	30	48	41	26	15	19	18	4	12.5	48

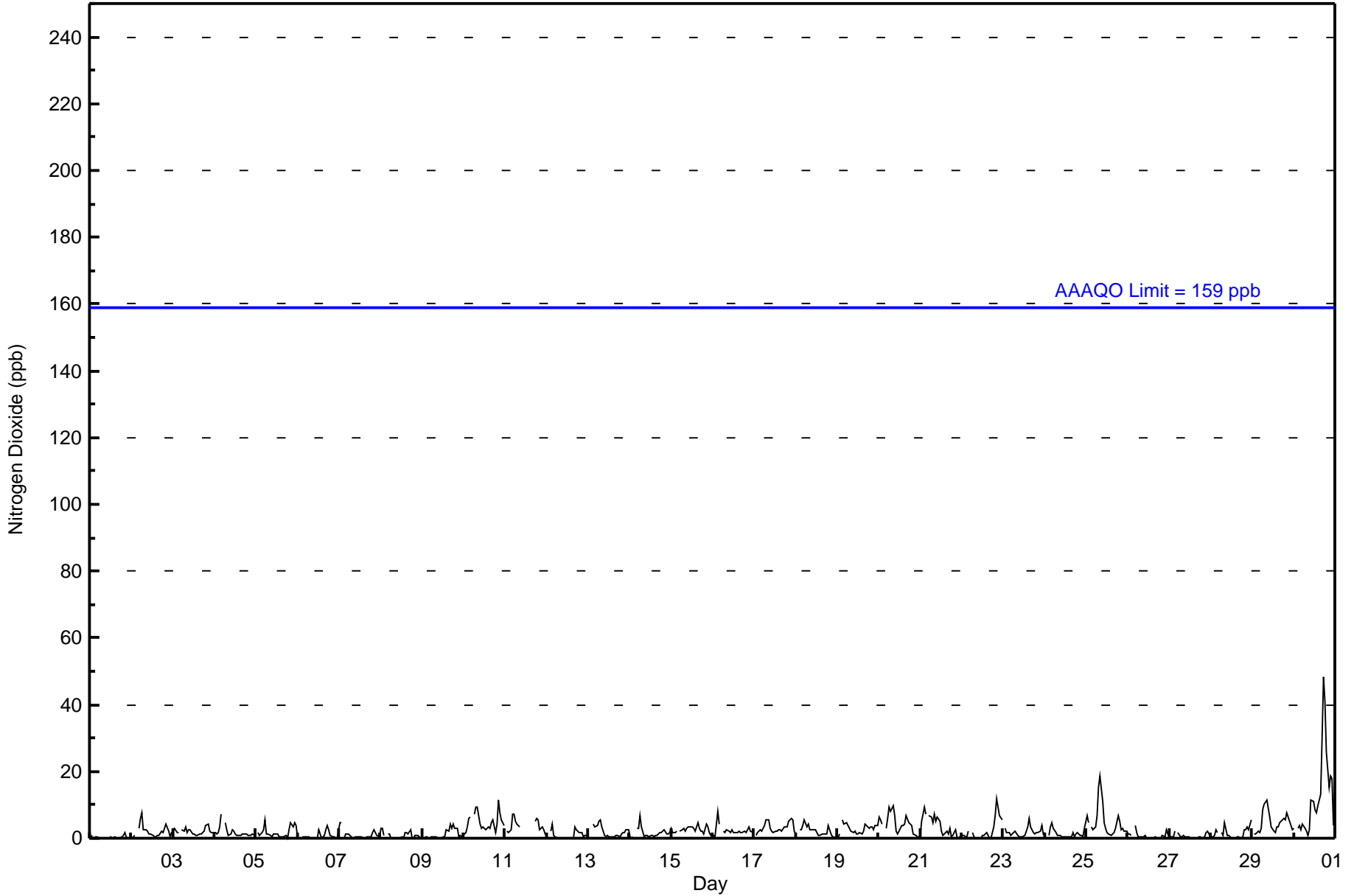
1.6	1.8	1.9	2.9	3.0	3.1	3.3	3.2	3.1	2.1	2.0	1.7	1.5	1.3	1.6	2.0	2.9	3.7	3.4	3.3	3.5	3.0	2.6	1.8	Diurnal Average	
7	5	9	8	7	7	10	15	19	11	12	11	8	8	10	13	30	48	41	26	15	19	18	6	Diurnal Maximum	

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



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Patricia McInnes - June 2015





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Patricia McInnes - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	678	99.41	99.41
21 - 40	2	0.29	99.71
41 - 80	2	0.29	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 720



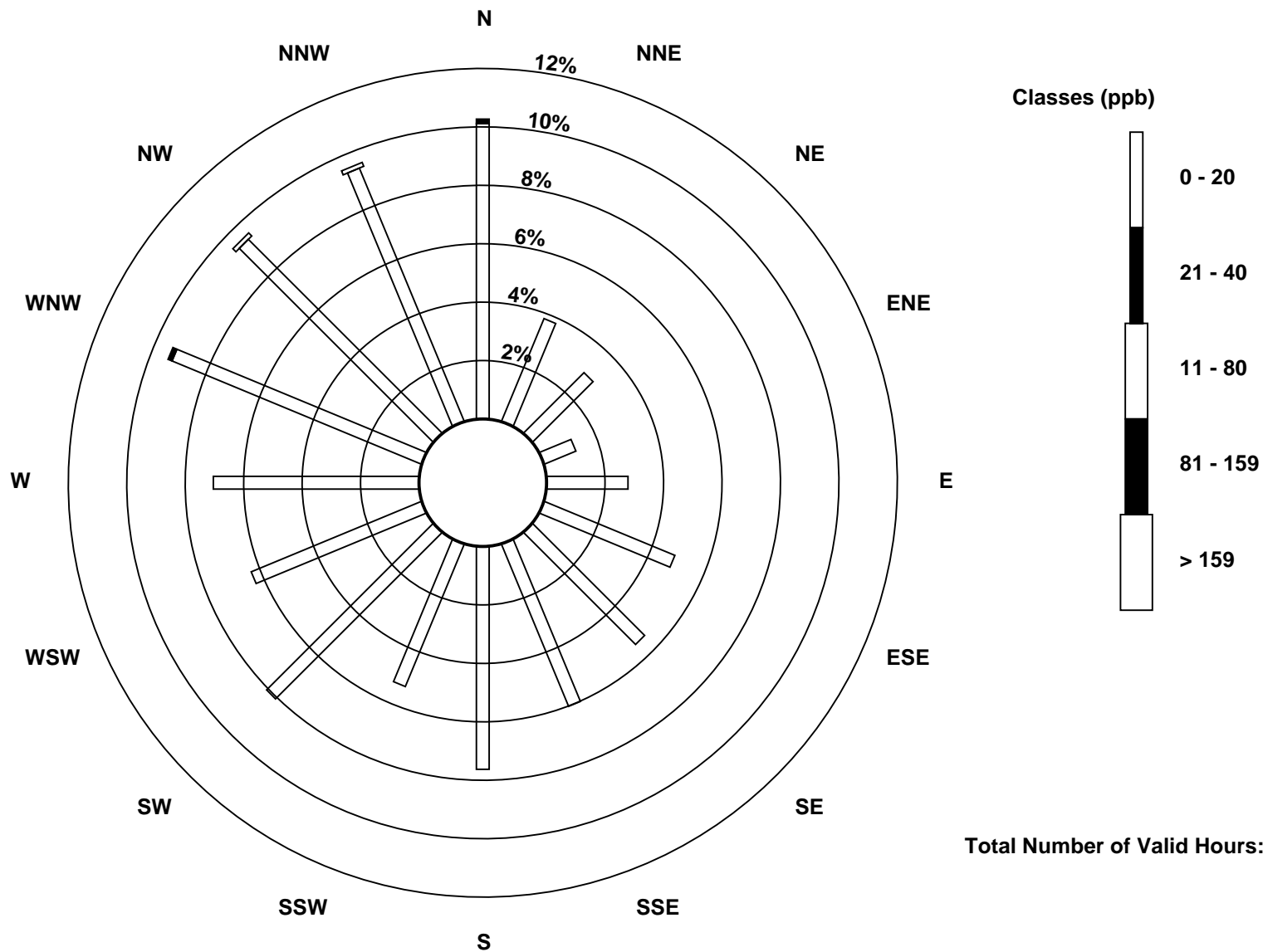
**Wood Buffalo Environmental Association
Frequency Distribution**

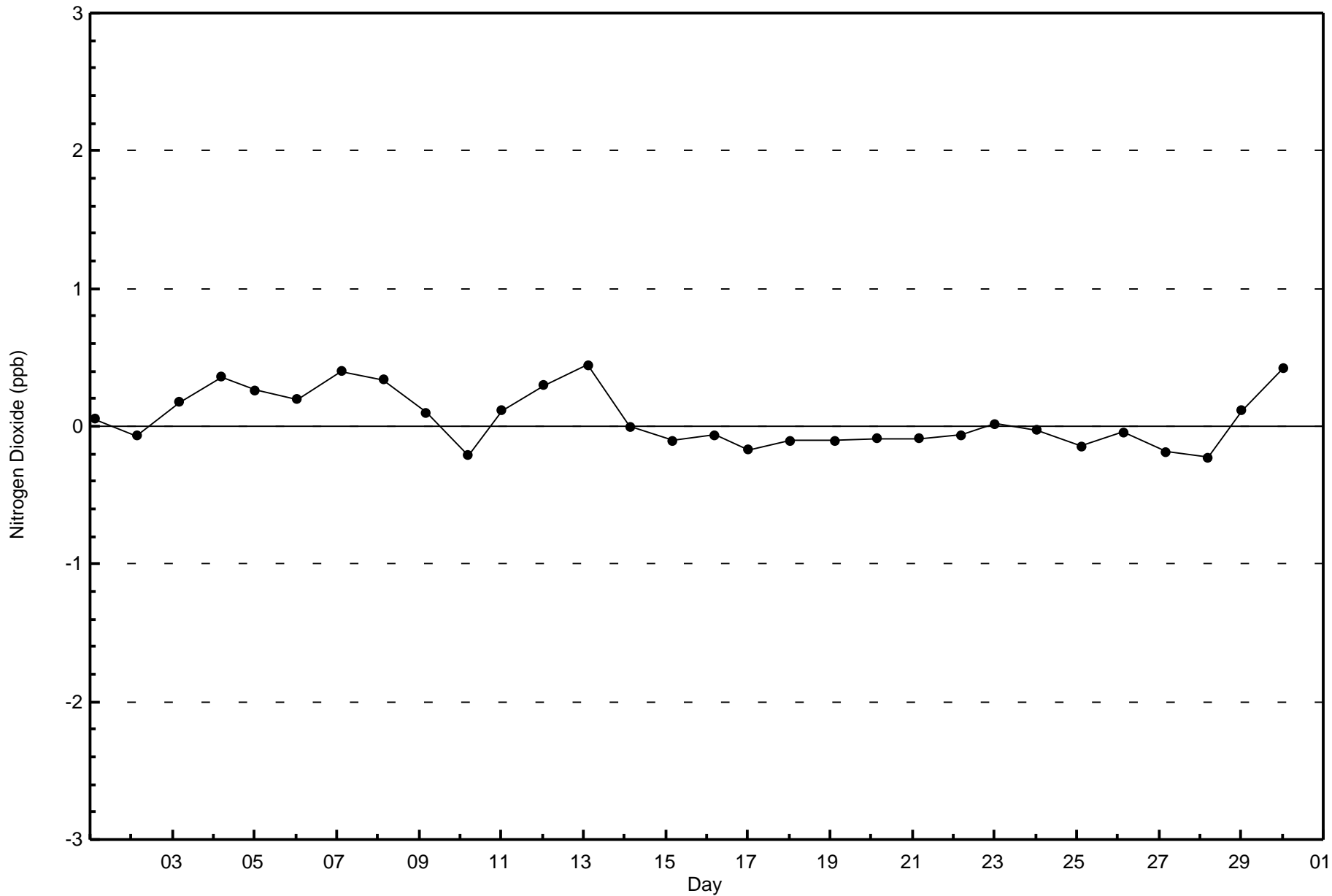
**Nitrogen Dioxide (NO₂) - ppb
Patricia McInnes - June 2015**

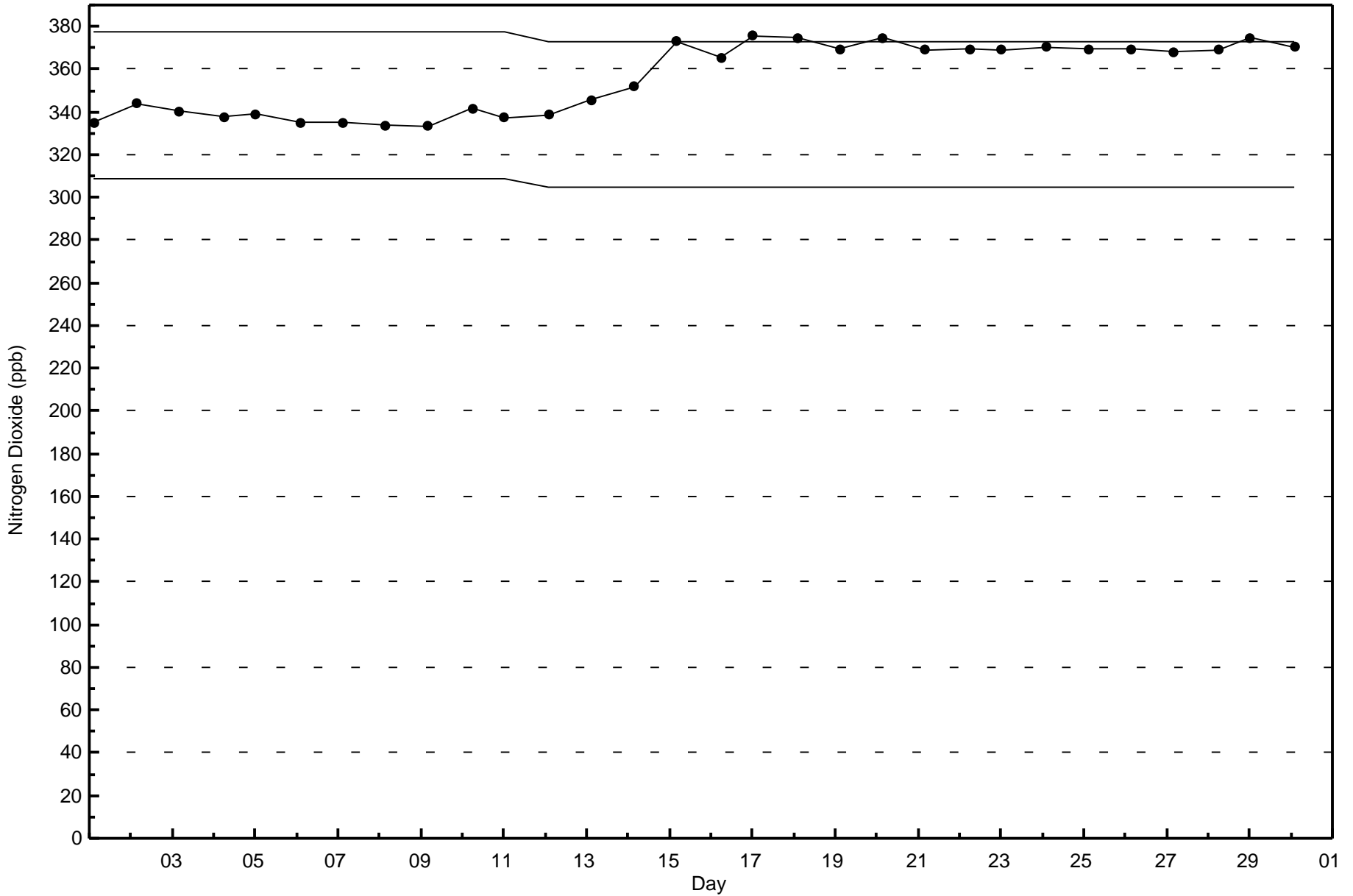
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	69	26	20	8	19	33	37	41	52	36	55	43	48	63	64	64	678
21 - 40	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	70	26	20	8	19	33	37	41	52	36	55	43	48	64	65	65	682

Total Number of Valid Hours: 682

Total Number of Hours: 720









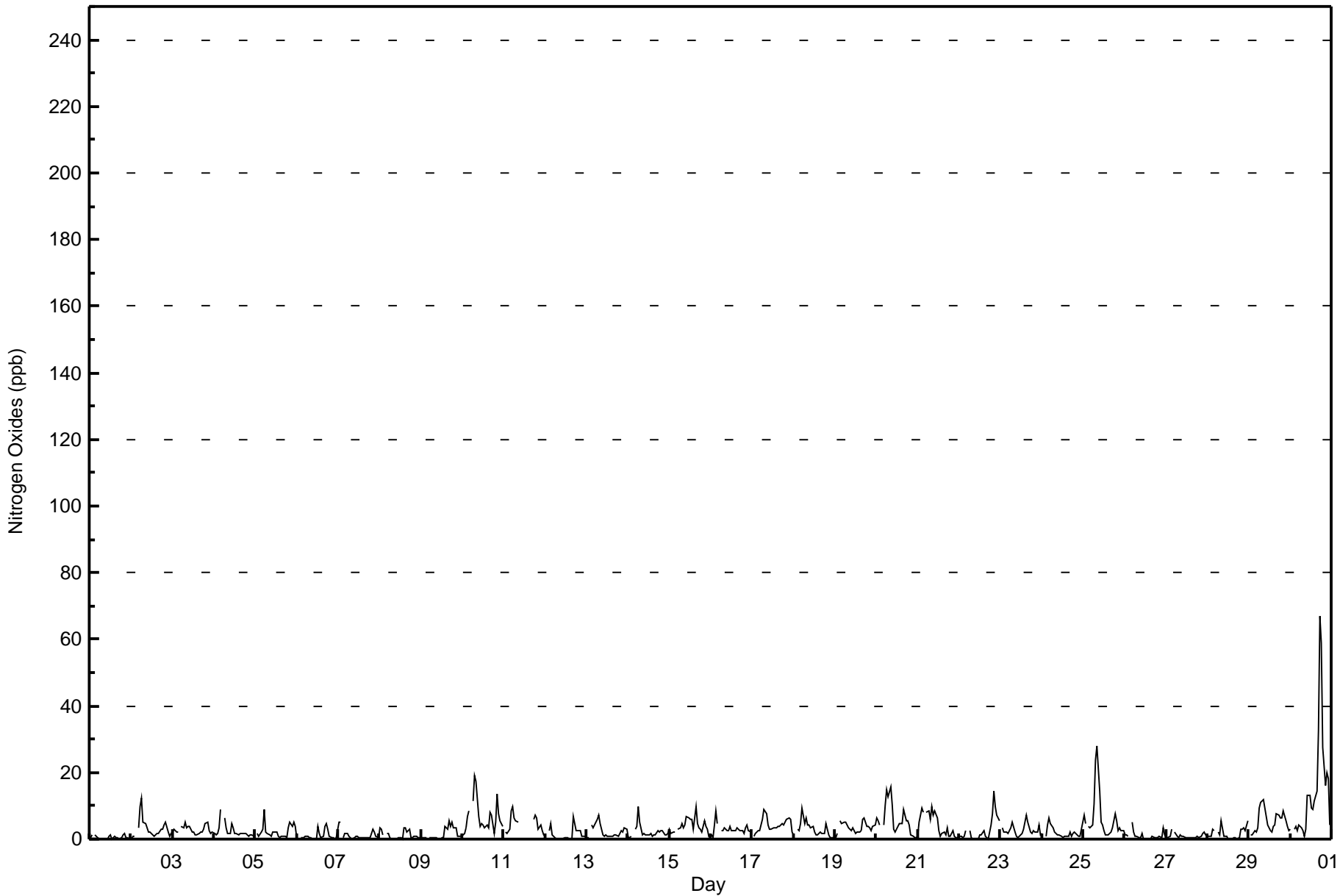
Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_x) - ppb

Patricia McInnes - June 2015

Maximum Value: 67 ppb on Jun 30 18:00																		Maximum Daily Average: 14.8 ppb on Jun 30						Hours in Service: 720			
Minimum Value: 0 ppb on Jun 2 01:00																		Minimum Daily Average: 0.5 ppb on Jun 1						Hours of Data: 682			
Maximum Diurnal Average: 5.0 ppb at hour 18																		Minimum Diurnal Average: 1.8 ppb at hour 1						Hours of Missing Data: 38			
Monthly Average: 3.3 ppb																		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 2 Q ₃ = 4 P ₉₀ = 7 P ₉₉ = 19						Hours of Calibration: 38			
																		Percent Operational Time: 100.0									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	0	1	Z	1	1	0	0	0	0	0	0	1	1	0	1	0	0	0	1	1	2	1	0	0	0.5	2	
2-Jun	0	1	1	Z	3	10	12	5	5	4	2	2	1	1	1	1	2	3	3	4	5	2	1	2	3.1	12	
3-Jun	2	3	2	2	Z	4	3	5	3	4	4	2	2	1	1	2	2	2	3	5	5	3	2	2	2.8	5	
4-Jun	2	1	2	3	9	Z	6	3	2	2	5	3	2	2	1	2	2	2	2	1	1	1	1	1	2.4	9	
5-Jun	Z	2	1	2	3	9	2	2	1	1	2	2	2	1	1	1	1	1	0	3	5	4	5	4	2.3	9	
6-Jun	0	Z	0	0	0	1	1	0	0	0	0	0	4	2	0	1	4	5	3	1	1	0	0	0	1.1	5	
7-Jun	5	5	Z	0	2	2	1	0	0	0	1	1	1	0	0	0	0	1	1	2	3	2	1	1	1.2	5	
8-Jun	3	3	1	Z	2	2	0	0	0	0	0	1	1	0	3	4	2	3	0	0	1	1	1	0	1.2	4	
9-Jun	0	0	0	0	Z	1	1	0	1	0	0	0	0	1	4	3	6	4	5	3	3	1	1	1	1.5	6	
10-Jun	1	2	3	7	9	Z	11	19	17	7	4	5	4	3	4	3	8	7	2	5	14	8	6	4	6.6	19	
11-Jun	Z	2	2	3	9	10	6	6	5	C	C	C	C	C	C	C	C	6	7	7	3	4	2	1	--	10	
12-Jun	1	Z	3	5	1	1	0	0	0	0	0	0	0	0	0	0	0	7	5	2	2	3	1	1	1	1.5	7
13-Jun	0	1	Z	4	4	5	6	7	5	1	1	1	1	1	1	1	1	1	1	2	3	2	3	3	2.4	7	
14-Jun	1	0	1	Z	3	4	10	5	1	2	1	1	1	2	1	1	1	2	2	2	3	1	1	2	2.1	10	
15-Jun	3	2	2	2	Z	3	4	5	3	4	7	7	6	6	3	10	5	4	3	2	6	4	3	1	4.0	10	
16-Jun	1	1	4	8	5	Z	3	3	3	3	2	4	3	3	3	3	3	2	3	2	4	4	2	2	3.0	8	
17-Jun	Z	1	2	3	2	4	6	9	8	4	3	3	3	3	3	4	4	5	4	5	6	7	6	2	4.2	9	
18-Jun	1	Z	3	3	5	9	5	6	4	4	4	4	2	1	1	2	1	2	2	5	1	0	0	0	2.9	9	
19-Jun	0	2	Z	6	5	5	5	4	3	3	3	3	2	2	2	3	6	6	4	4	3	3	4	4	3.5	6	
20-Jun	6	6	4	Z	4	10	15	13	16	10	3	2	4	5	4	5	9	6	5	4	1	1	0	0	5.8	16	
21-Jun	1	5	9	8	Z	8	8	6	10	7	9	6	3	1	2	2	1	3	1	1	3	1	0	0	4.1	10	
22-Jun	1	1	1	1	3	Z	3	1	0	0	0	0	1	1	2	1	0	0	4	8	14	10	7	6	2.8	14	
23-Jun	Z	3	2	2	2	3	3	5	2	1	1	1	2	3	5	7	5	2	1	2	2	2	4	1	2.7	7	
24-Jun	2	Z	1	4	6	4	3	2	2	1	1	1	1	1	1	2	1	2	1	1	2	1	1	3	1.9	6	
25-Jun	7	5	Z	4	3	4	10	24	28	15	5	4	3	1	1	2	2	4	8	5	2	4	3	2	6.4	28	
26-Jun	1	1	1	Z	5	2	1	1	0	1	2	0	0	0	0	0	1	0	0	0	1	1	3	1	1.0	5	
27-Jun	1	1	1	3	Z	2	1	1	1	1	1	0	0	0	0	0	0	1	1	0	1	2	2	1	0.9	3	
28-Jun	1	1	1	3	2	Z	2	1	6	1	1	1	0	0	0	0	1	0	1	3	3	3	3	6	1.7	6	
29-Jun	Z	1	1	2	2	3	9	11	12	9	7	4	2	2	4	4	8	7	7	6	8	5	4	3	5.4	12	
30-Jun	3	Z	3	4	3	4	3	3	1	3	13	13	9	9	11	14	33	67	59	27	16	20	18	4	14.8	67	
																		Diurnal Average									
																		Diurnal Maximum									
Z - zerospan																		C - Calibration									





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Patricia McInnes - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	676	99.12	99.12
21 - 40	4	0.59	99.71
41 - 80	2	0.29	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 720



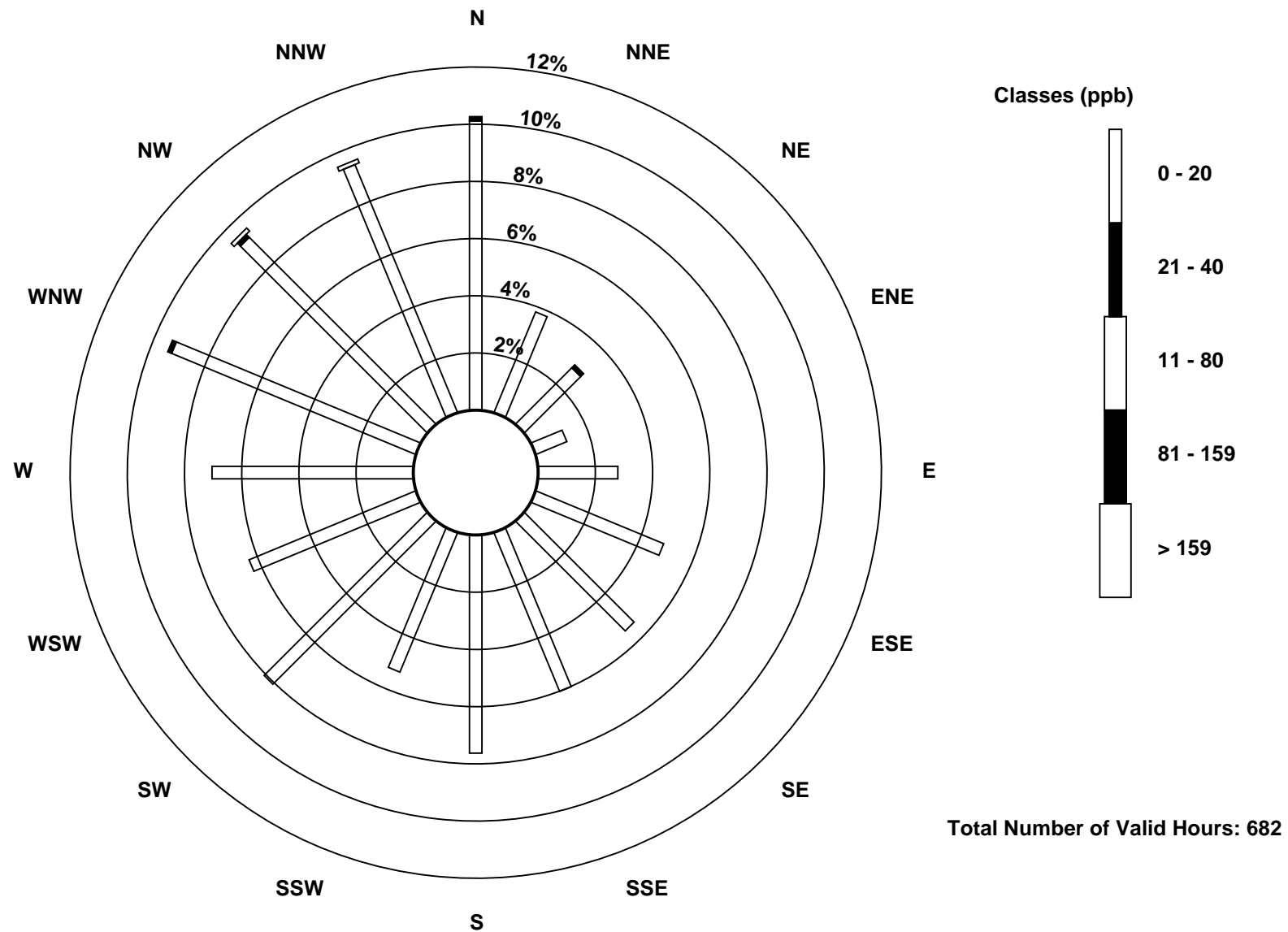
Wood Buffalo Environmental Association
Frequency Distribution

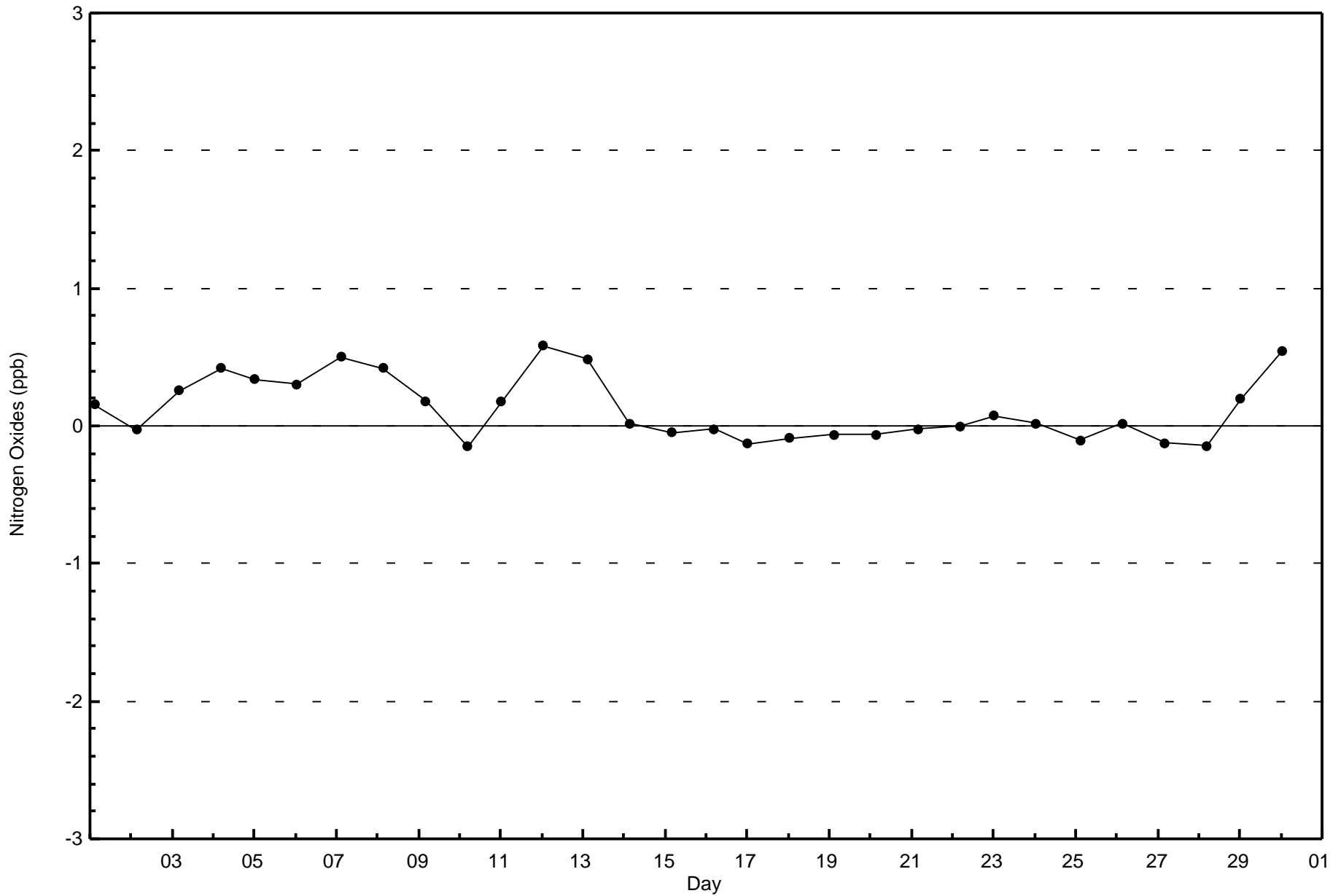
Nitrogen Oxides (NO_x) - ppb
Patricia McInnes - June 2015

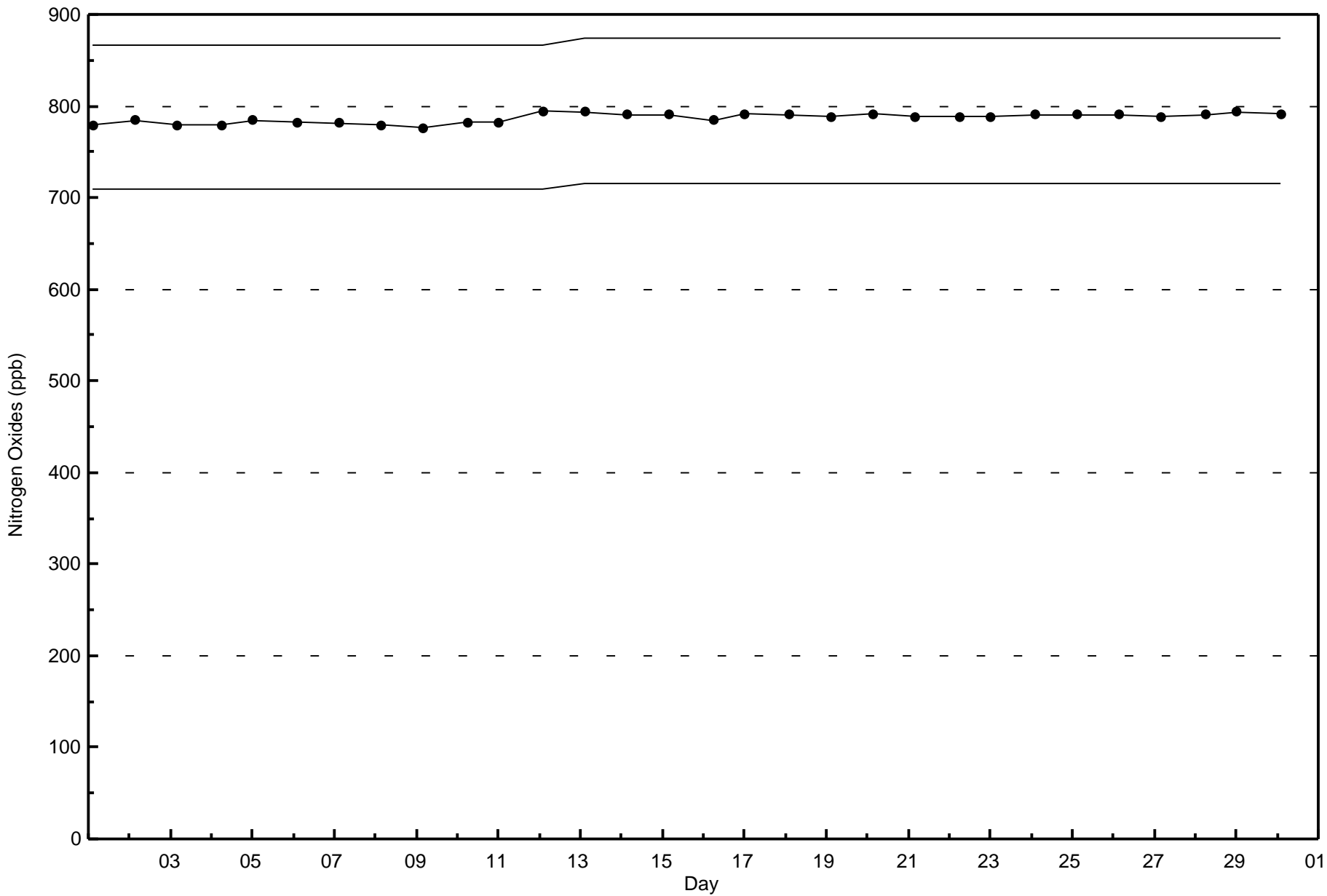
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	69	26	19	8	19	33	37	41	52	36	55	43	48	63	63	64	676
21 - 40	1	0	1	0	0	0	0	0	0	0	0	0	0	1	1	0	4
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	70	26	20	8	19	33	37	41	52	36	55	43	48	64	65	65	682

Total Number of Valid Hours: 682

Total Number of Hours: 720









Number of Exceedences (AAAQO): 1-hr: 0	Maximum Value: 68 ppb on Jun 29 09:00	Maximum Daily Average: 13.6 ppb on Jun 29	Hours in Service: 720
Minimum Value: 0 ppb on Jun 1 01:00	Maximum Diurnal Average: 4.4 ppb at hour 8	Minimum Daily Average: 0.0 ppb on Jun 1	Hours of Data: 632
Monthly Average: 0.6 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 20	Minimum Diurnal Average: 0.0 ppb at hour 1	Hours of Missing Data: 88
			Hours of Calibration: 48
			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-Jun	0	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2-Jun	0	0	0	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3-Jun	0	0	0	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
4-Jun	0	0	0	0	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
5-Jun	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
6-Jun	0	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
7-Jun	0	0	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
8-Jun	0	0	0	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
9-Jun	0	0	0	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
10-Jun	0	0	0	0	0	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
11-Jun	0	0	0	Z	RE	RE	0	0	0	C	C	C	C	C	C	C	C	C	0	0	0	0	0	0	--	0	
12-Jun	0	0	0	0	Z	RE	0	0	0	0	0	C	C	C	C	C	C	C	C	C	C	RE	RE	0	--	0	
13-Jun	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	
14-Jun	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	
15-Jun	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	
16-Jun	0	0	0	0	0	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
17-Jun	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	
18-Jun	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	
19-Jun	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	
20-Jun	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	
21-Jun	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	
22-Jun	0	0	0	0	0	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
23-Jun	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	
24-Jun	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	
25-Jun	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	
26-Jun	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	
27-Jun	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	
28-Jun	0	0	0	0	0	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
29-Jun	0	0	0	Z	RE	11	17	60	68	30	24	22	16	13	13	12	12	0	0	0	0	0	0	0	13.6	68	
30-Jun	0	0	14	29	Z	RE	22	18	0	0	0	0	0	0	0	0	0	11	0	11	0	0	0	0	4.8	29	

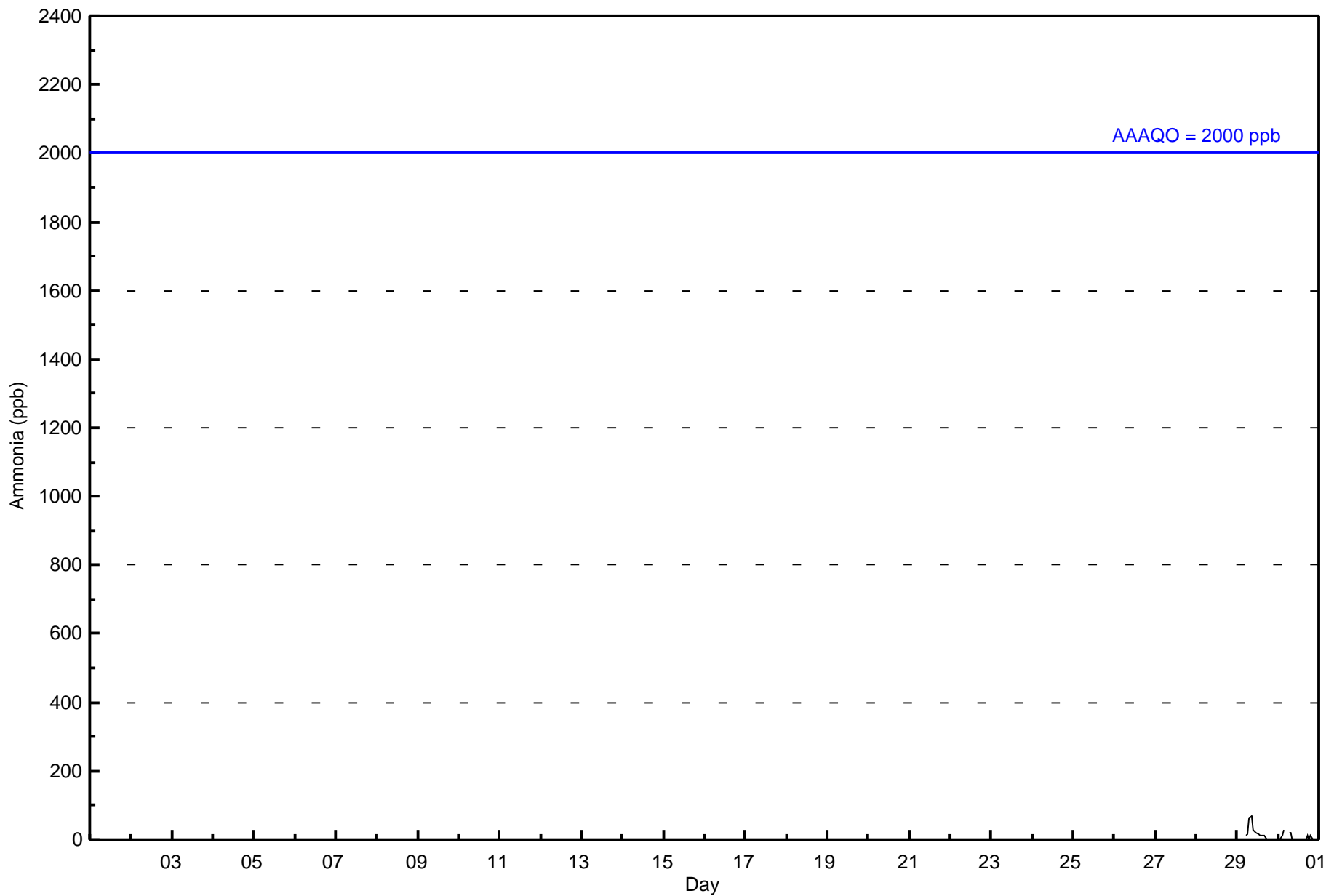
0.0	0.0	0.5	1.2	0.0	0.6	2.0	4.4	3.4	1.4	0.9	0.8	0.6	0.5	0.5	0.4	0.4	0.4	0.0	0.4	0.0	0.0	0.0	0.0	0.0	Diurnal Average
0	0	14	29	0	11	22	60	68	30	24	22	16	13	13	12	12	11	0	11	0	0	0	0	0	Diurnal Maximum

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



Wood Buffalo Environmental Association
Hourly Averages

Ammonia (NH₃) - ppb
Patricia McInnes - June 2015





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ammonia (NH₃) - ppb
Patricia McInnes - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 5	614	97.15	97.15
6 - 10	0	0.00	97.15
11 - 15	8	1.27	98.42
16 - 20	3	0.47	98.89
21 - 25	3	0.47	99.37
> 26	4	0.63	100.00

Total Number of Valid Hours: 632

Total Number of Hours: 720



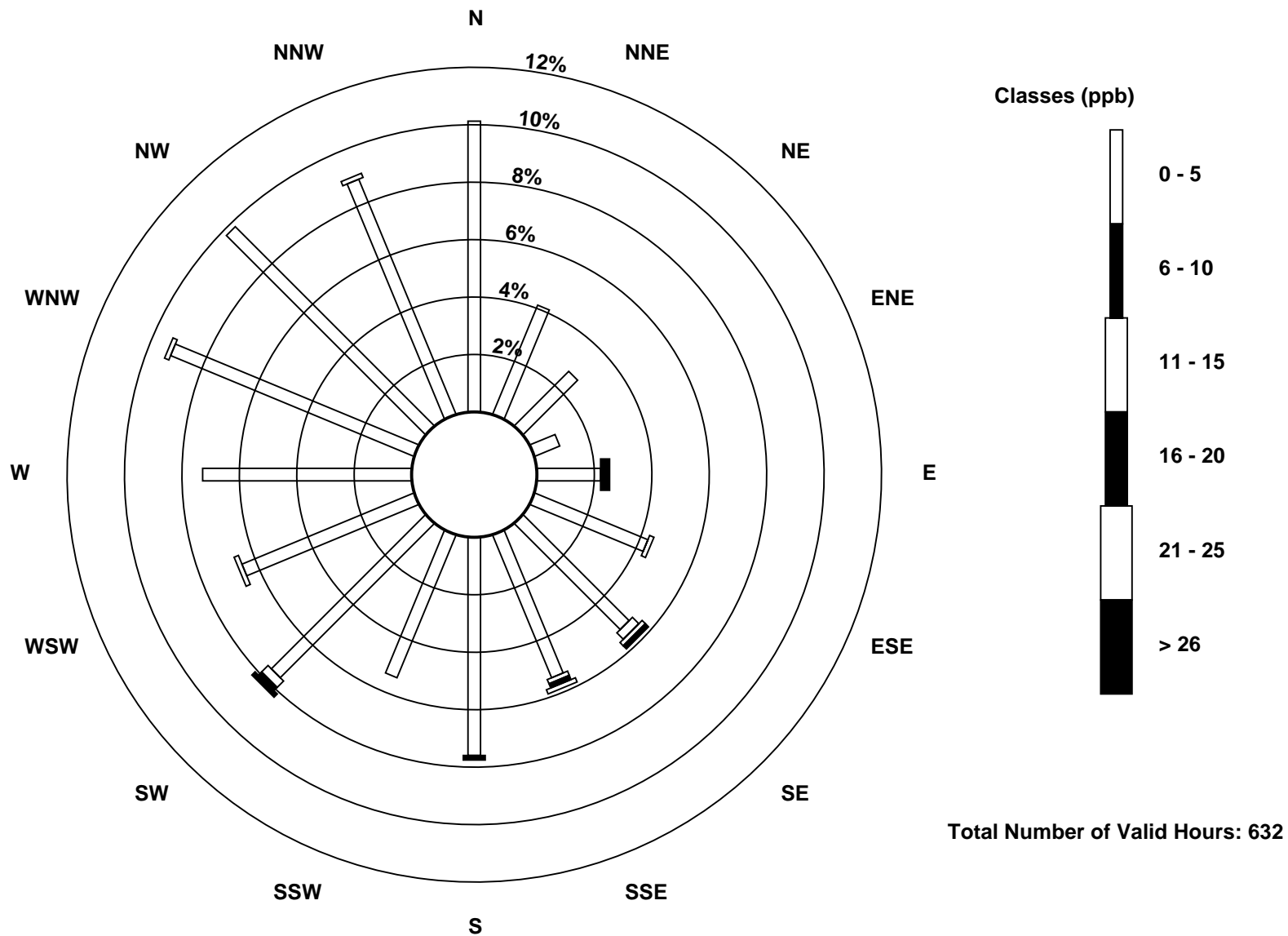
Wood Buffalo Environmental Association
Frequency Distribution

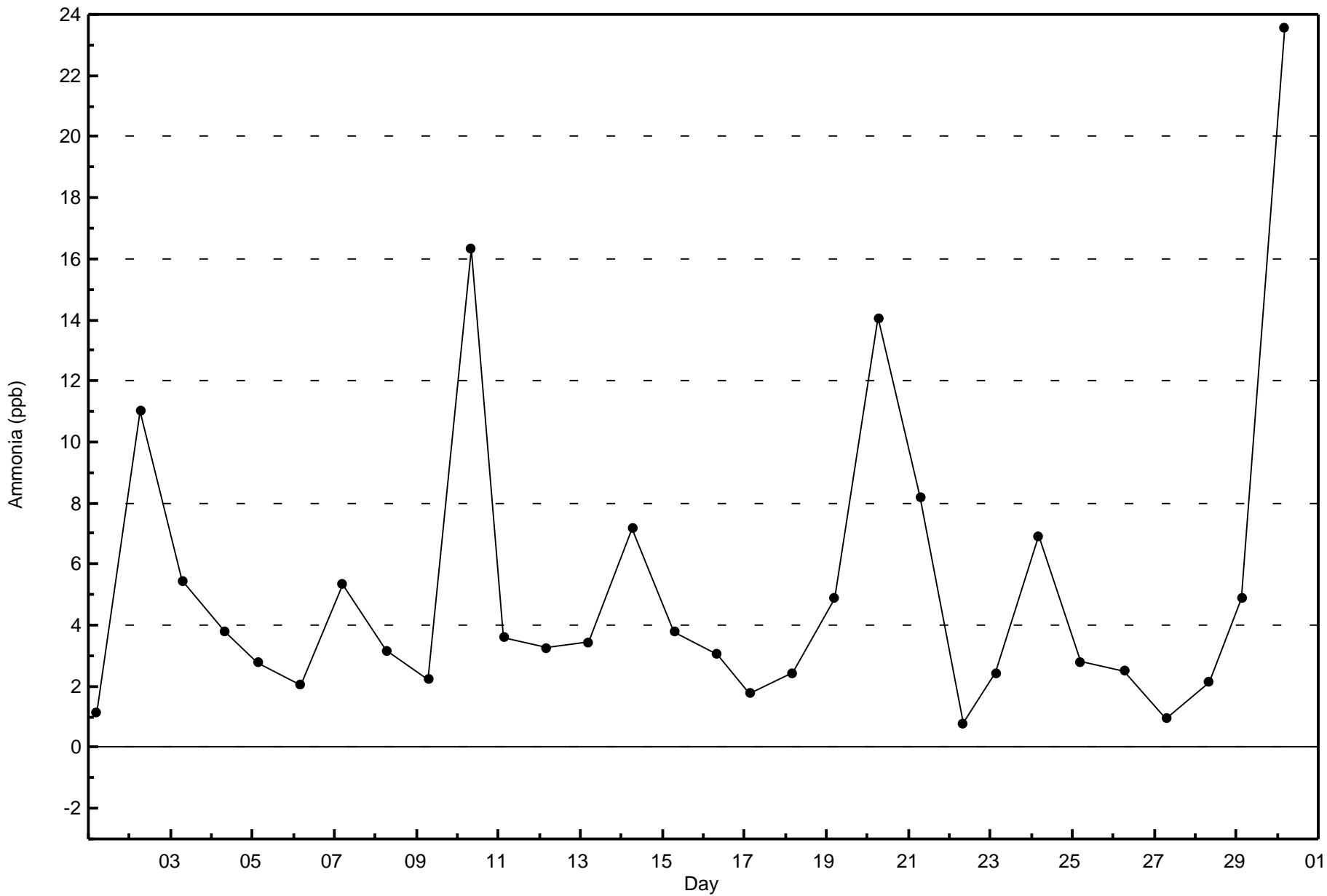
Ammonia (NH₃) - ppb
Patricia McInnes - June 2015

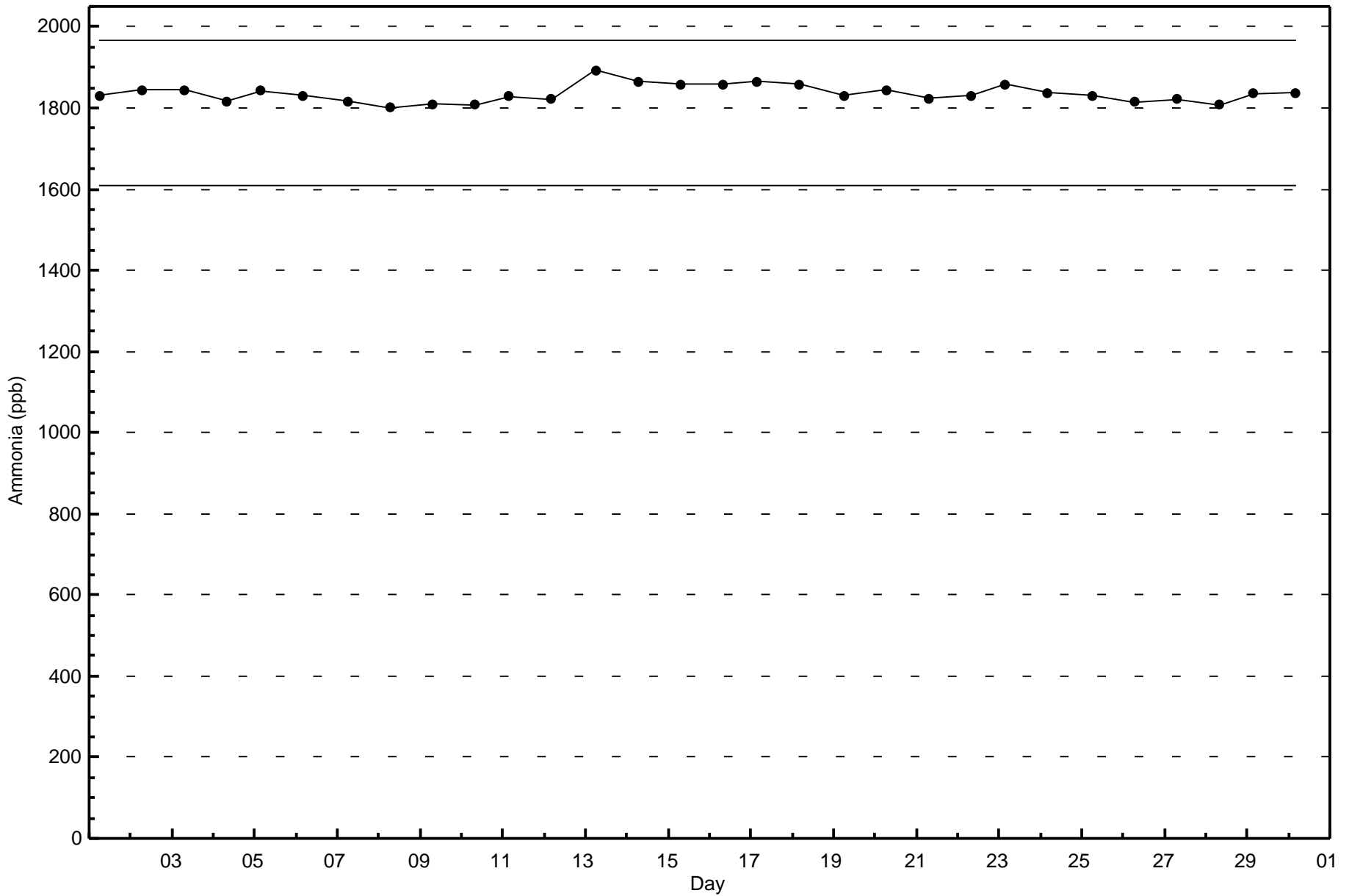
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	64	26	17	6	14	27	33	34	48	34	48	41	46	58	62	56	614
6 - 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 15	0	0	0	0	0	1	2	1	0	0	2	0	0	1	0	1	8
16 - 20	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	3
21 - 25	0	0	0	0	0	0	1	1	0	0	0	1	0	0	0	0	3
> 26	0	0	0	0	2	0	1	0	0	0	1	0	0	0	0	0	4
Totals	64	26	17	6	16	28	37	37	49	34	52	42	46	59	62	57	632

Total Number of Valid Hours: 632

Total Number of Hours: 720









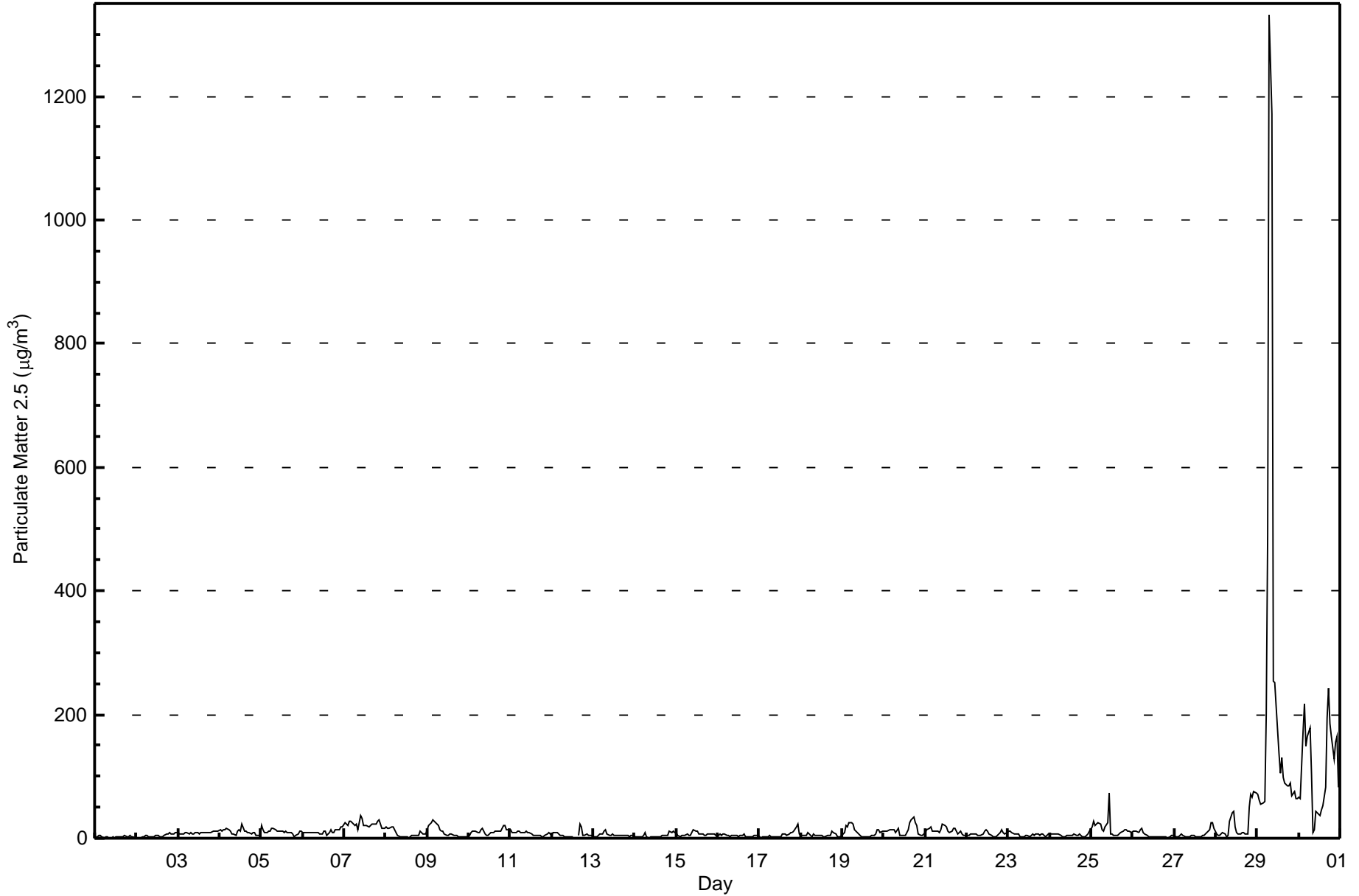
Summary of Hour Averages

Patricia McInnes - June 2015

Number of Exceedences (AAAQO):	24-hr: 2	Hours in Service:	720
Maximum Value: 1331.6 µg/m ³ on Jun 29 08:00	Maximum Daily Average: 221.2 µg/m ³ on Jun 29	Hours of Data:	718
Minimum Value: 0.8 µg/m ³ on Jun 1 12:00	Minimum Daily Average: 1.9 µg/m ³ on Jun 1	Hours of Missing Data:	2
Maximum Diurnal Average: 54.9 µg/m ³ at hour 8	Minimum Diurnal Average: 11.3 µg/m ³ at hour 14	Hours of Calibration:	0
Monthly Average: 19.60 µg/m ³	Percentiles: P ₁ = 1.1 P ₁₀ = 2.3 Q ₁ = 3.9 Median = 7.4 Q ₃ = 12.4 P ₉₀ = 25.5 P ₉₉ = 199.9	Percent Operational Time:	99.7

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jun	1.8	2.4	3.6	3.7	1.7	1.1	1.2	1.3	0.9	1.1	1.9	0.8	1.2	1.2	1.2	1.4	2.6	3.5	2.7	2.8	3.5	1.7	1.3	1.0	1.9	3.7																							
2-Jun	0.8	1.1	1.0	1.6	3.1	5.0	4.2	2.4	2.5	3.1	2.8	3.5	3.5	3.4	3.1	2.7	3.4	6.2	6.8	8.1	8.0	7.9	9.8	10.2	4.3	10.2																							
3-Jun	9.0	8.0	7.2	7.7	9.7	8.5	7.6	9.0	7.8	7.7	8.5	8.4	6.9	8.1	8.1	8.6	9.3	9.8	9.0	9.6	10.6	11.4	12.3	11.9	8.9	12.3																							
4-Jun	14.6	12.4	14.2	13.5	15.2	13.7	10.6	7.4	6.0	5.5	11.4	14.5	10.8	22.9	11.3	10.9	10.1	8.7	7.8	9.5	8.2	3.7	4.4	5.3	10.5	22.9																							
5-Jun	20.3	13.9	9.6	9.1	11.5	11.7	15.9	15.9	12.7	12.1	12.0	12.1	10.6	10.0	10.8	9.1	9.4	9.0	7.9	3.3	4.4	6.9	12.4	11.1	10.9	20.3																							
6-Jun	8.6	9.4	9.6	8.9	8.5	9.0	9.0	8.3	8.2	8.2	7.4	7.9	11.1	10.8	5.6	9.2	14.0	9.9	8.6	14.3	14.2	14.4	17.3	18.2	10.4	18.2																							
7-Jun	25.1	22.0	20.3	27.7	27.2	22.8	21.1	23.2	13.0	37.6	31.4	21.5	20.1	20.2	18.3	21.2	22.2	22.8	23.9	26.5	29.5	22.2	16.9	16.4	23.1	37.6																							
8-Jun	17.8	15.2	15.0	17.4	18.3	14.3	8.6	4.0	3.2	2.5	2.4	2.1	1.7	1.1	2.5	5.6	5.5	5.5	5.3	5.7	12.3	6.6	5.8	6.6	7.7	18.3																							
9-Jun	12.7	20.3	25.8	30.8	26.8	25.8	20.6	14.5	11.7	11.6	6.7	5.1	5.0	6.6	6.3	5.0	4.6	5.7	2.5	2.4	2.2	1.7	1.6	2.9	10.8	30.8																							
10-Jun	4.9	9.3	11.1	12.0	11.5	8.2	10.2	14.5	17.0	5.8	4.3	5.4	6.7	8.2	9.6	10.5	11.6	12.3	11.7	16.2	21.2	19.5	14.1	14.6	11.3	21.2																							
11-Jun	13.0	10.3	10.2	9.5	11.8	10.8	10.1	9.5	9.7	10.8	8.4	8.6	6.0	3.9	3.4	4.9	4.7	4.8	2.0	2.0	4.8	7.4	9.2	6.9	7.6	13.0																							
12-Jun	5.0	8.2	9.4	9.8	7.3	5.1	3.7	2.9	2.5	2.0	1.9	1.9	2.1	M	M	3.9	23.3	17.2	5.2	5.1	6.1	4.6	3.4	3.6	6.1	23.3																							
13-Jun	3.1	3.1	3.1	5.7	6.7	6.7	11.7	14.0	7.5	4.7	5.7	6.2	3.9	4.3	3.6	4.4	5.4	5.1	4.5	5.3	4.9	2.9	3.6	4.0	5.4	14.0																							
14-Jun	2.1	1.9	1.7	2.8	2.3	4.2	9.6	3.1	1.1	1.5	1.6	2.5	1.8	2.0	1.9	3.1	3.6	3.8	3.8	4.0	11.0	8.3	11.6	9.2	4.1	11.6																							
15-Jun	8.1	3.9	2.7	3.9	4.0	4.4	5.7	5.5	3.5	9.2	13.0	11.8	11.0	7.9	7.5	7.3	4.2	4.7	7.0	7.0	7.5	7.4	5.9	5.5	6.6	13.0																							
16-Jun	5.2	6.0	4.6	5.8	6.2	4.9	4.3	2.9	4.0	3.8	4.0	3.8	3.1	3.9	3.6	5.8	2.7	1.8	2.9	1.7	2.1	5.6	4.7	3.9	4.1	6.2																							
17-Jun	2.1	1.0	1.6	2.6	2.0	2.4	4.4	3.4	3.4	2.7	2.0	2.3	2.6	6.6	7.4	7.5	5.3	7.3	8.6	9.8	11.6	18.0	22.2	5.9	6.0	22.2																							
18-Jun	4.3	4.7	4.8	5.6	8.8	5.8	2.6	6.8	4.9	4.7	3.7	4.5	4.1	3.2	3.0	3.5	4.2	4.8	11.7	9.0	6.6	2.6	1.9	2.9	4.9	11.7																							
19-Jun	6.3	10.0	20.4	19.3	25.3	25.5	23.0	14.4	11.5	7.4	4.0	3.1	1.9	1.8	1.6	1.8	2.9	3.7	4.1	7.2	14.1	13.7	9.1	10.4	10.1	25.5																							
20-Jun	12.4	11.8	12.0	13.7	13.2	14.9	12.7	8.9	16.8	4.7	4.5	4.4	5.4	8.7	13.3	25.8	30.3	33.8	25.9	21.0	6.7	4.3	5.0	6.7	13.2	33.8																							
21-Jun	8.3	14.2	16.5	17.2	12.6	11.0	12.5	10.4	9.0	12.9	23.8	20.1	17.4	10.8	9.8	12.4	15.8	15.6	11.3	7.9	11.0	6.2	3.8	3.5	12.2	23.8																							
22-Jun	5.1	5.6	6.7	7.5	7.5	6.5	5.4	3.7	3.7	7.4	11.4	13.5	12.6	6.3	4.1	1.8	1.5	2.5	7.2	9.8	14.0	10.1	6.3	8.2	7.0	14.0																							
23-Jun	11.2	11.4	9.6	7.4	7.0	7.1	5.8	2.0	1.8	2.9	3.5	3.9	3.0	3.9	7.1	5.1	6.2	5.8	5.1	5.8	5.7	2.7	5.5	7.4	5.7	11.4																							
24-Jun	7.4	7.9	7.7	6.2	7.5	7.6	5.4	2.4	3.0	3.2	3.5	4.3	4.2	4.5	6.0	5.0	5.4	6.6	4.3	2.4	2.7	4.6	6.8	12.1	5.4	12.1																							
25-Jun	18.9	28.4	21.5	23.0	24.2	22.7	13.2	10.4	19.3	24.5	72.3	7.9	6.7	4.7	5.6	4.8	7.3	8.4	10.5	13.4	13.4	12.3	11.0	9.7	16.4	72.3																							
26-Jun	11.5	11.9	11.6	10.2	14.0	16.3	10.2	6.1	3.9	3.0	1.8	1.3	1.3	1.5	1.4	1.5	1.8	2.7	1.7	1.8	1.1	1.3	5.1	5.4	5.3	16.3																							
27-Jun	4.8	3.0	3.2	4.7	6.3	5.0	1.8	1.5	2.6	3.0	3.7	4.9	2.5	2.5	2.6	2.8	3.8	4.5	6.8	8.4	13.1	25.3	25.7	15.3	6.6	25.7																							
28-Jun	7.0	4.9	4.9	7.2	8.1	6.9	3.2	4.4	28.1	40.6	43.9	18.3	10.2	7.0	6.3	9.5	9.4	6.9	6.2	50.0	71.2	67.2	74.4	74.1	23.7	74.4																							
29-Jun	70.1	61.8	55.2	56.2	59.1	200.4	489.6	1331.6	1171.5	253.9	252.7	211.8	137.2	104.1	130.3	97.7	89.9	85.2	84.1	89.8	69.6	76.5	65.0	64.4	221.2	1331.6																							
30-Jun	66.8	64.1	172.0	217.2	148.6	164.2	179.4	104.0	9.5	14.2	44.5	39.1	37.7	46.2	53.3	82.7	194.7	242.7	185.5	165.6	127.4	155.2	164.8	82.2	115.1	242.7																							
																								12.9	12.9	16.6	18.9	17.2	21.8	30.8	54.9	46.7	17.1	20.0	15.2	11.7	11.3	12.0	12.5	17.2	18.7	16.2	17.5	17.3	17.7	18.0	14.7	Diurnal Average	
																								70.1	64.1	172.0	217.2	148.6	200.4	489.6	1331.6	1171.5	253.9	252.7	211.8	137.2	104.1	130.3	97.7	194.7	242.7	185.5	165.6	127.4	155.2	164.8	82.2	Diurnal Maximum	

M - Maintenance
 Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m³





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Patricia McInnes - June 2015

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	270	37.60	37.60
6 - 15	312	43.45	81.06
16 - 25	59	8.22	89.28
26 - 80	42	5.85	95.13
> 81.0	28	3.90	99.03

Total Number of Valid Hours: 718

Total Number of Hours: 720



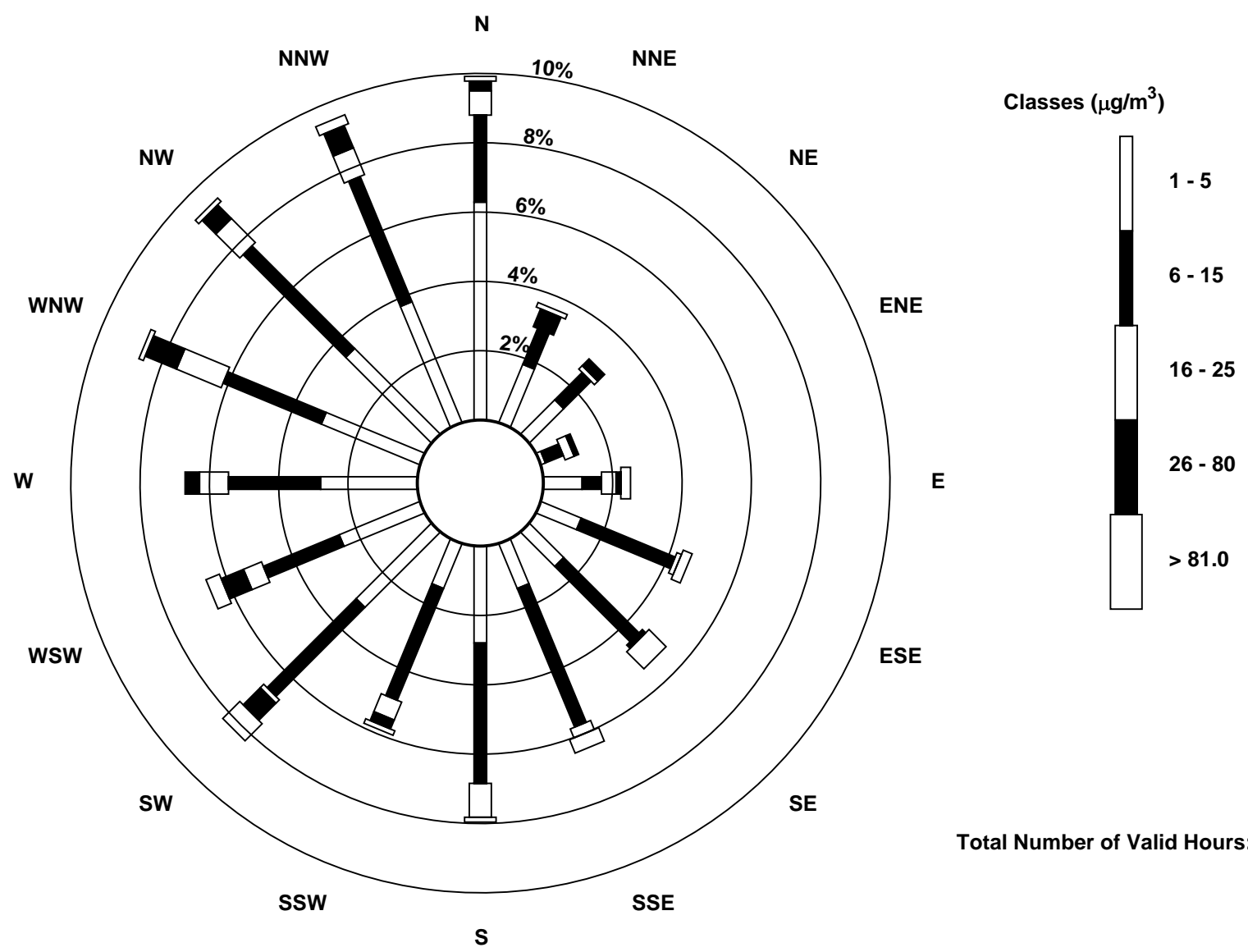
Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Patricia McInnes - June 2015

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	45	13	10	1	8	9	10	10	20	10	22	18	20	22	25	27	270
6 - 15	18	8	8	4	4	21	22	31	29	25	26	17	19	22	30	28	312
16 - 25	5	0	1	2	3	1	0	2	7	4	1	4	6	10	7	6	59
26 - 80	2	4	2	1	1	0	1	0	0	2	5	5	3	7	4	5	42
> 81.0	1	1	0	0	2	2	5	3	1	1	5	3	0	1	1	2	28
Totals	71	26	21	8	18	33	38	46	57	42	59	47	48	62	67	68	711

Total Number of Valid Hours: 718

Total Number of Hours: 720





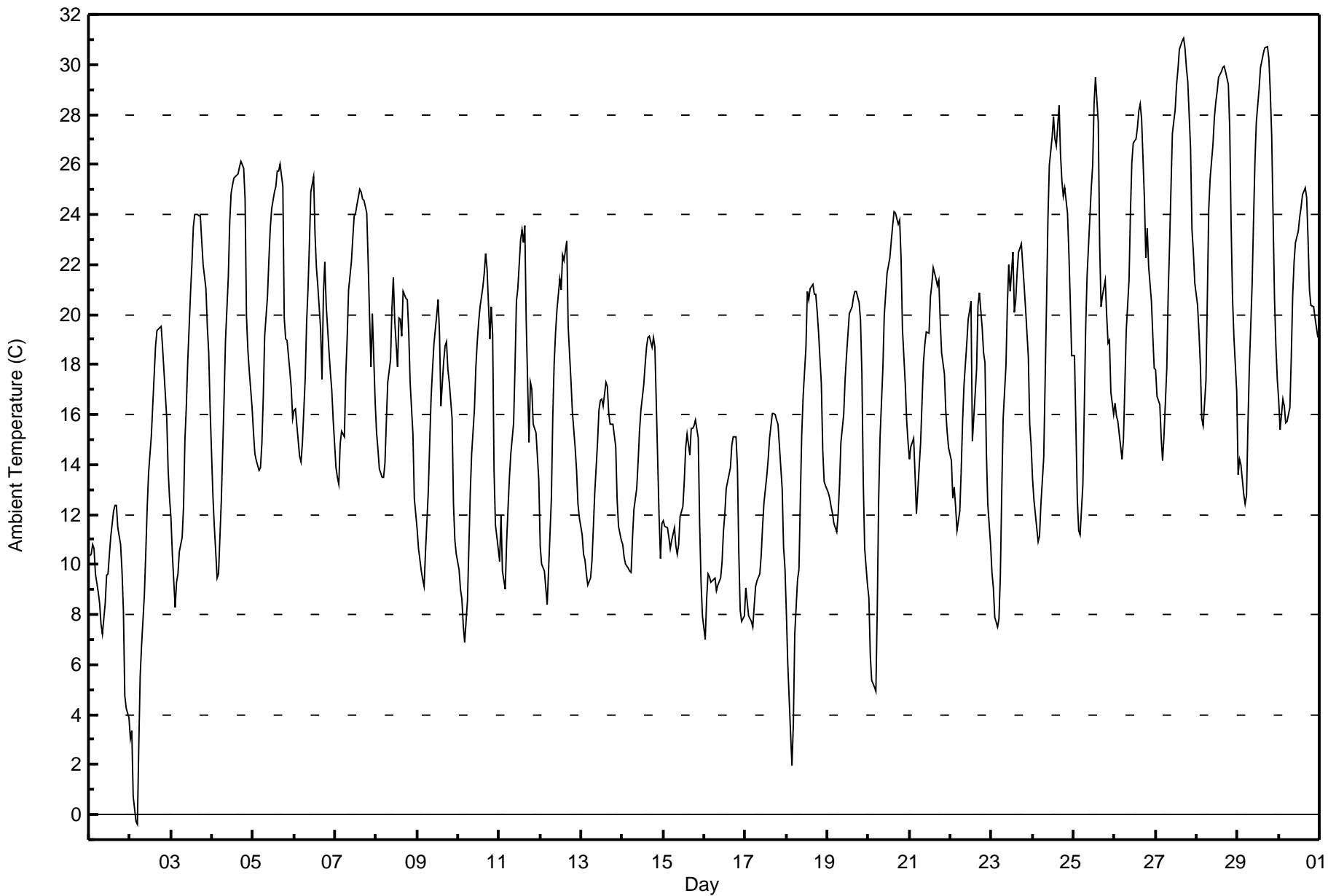
Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

Patricia McInnes - June 2015

Maximum Value: 31.0 C on Jun 27 17:00																						Maximum Daily Average: 23.9 C on Jun 28																						Hours in Service: 720					
Minimum Value: -0.4 C on Jun 2 05:00																						Minimum Daily Average: 9.3 C on Jun 1																						Hours of Data: 720					
Maximum Diurnal Average: 22.0 C at hour 16																						Minimum Diurnal Average: 10.4 C at hour 5																						Hours of Missing Data: 0					
Monthly Average: 16.90 C																						Percentiles: P₁ = 3.3 P₁₀ = 9.5 Q₁ = 12.4 Median = 16.6 Q₃ = 20.9 P₉₀ = 24.9 P₉₉ = 30.3																						Hours of Calibration: 0					
																																												Percent Operational Time: 100.0					
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jun	10.4	10.4	10.8	10.7	9.6	8.9	8.5	7.6	7.2	8.4	9.6	9.6	10.4	11.1	12.1	12.4	12.4	11.5	10.8	9.7	8.2	4.8	4.3	3.8	9.3	12.4																							
2-Jun	3.0	3.4	0.7	-0.3	-0.4	2.7	5.6	6.8	8.8	10.4	12.3	13.7	15.2	16.4	17.6	18.7	19.3	19.5	19.5	18.7	17.7	15.8	13.8	12.7	11.3	19.5																							
3-Jun	11.9	10.4	8.3	9.3	9.6	10.5	11.1	12.3	15.0	16.3	18.1	20.8	22.0	23.5	24.0	24.0	24.0	24.0	23.0	22.0	21.1	19.5	18.4	16.2	17.3	24.0																							
4-Jun	12.8	11.5	10.5	9.4	9.6	12.6	14.6	16.7	18.9	21.5	23.7	24.8	25.2	25.5	25.6	25.6	25.9	26.2	25.9	24.6	19.9	18.6	17.8	16.3	19.3	26.2																							
5-Jun	15.2	14.4	14.2	13.8	13.9	14.8	16.7	19.2	20.7	22.1	23.4	24.3	24.9	25.1	25.8	25.7	26.0	25.1	19.9	19.0	18.9	17.7	17.1	15.8	19.7	26.0																							
6-Jun	16.2	16.2	15.0	14.3	14.1	14.9	17.4	19.7	21.1	22.8	24.9	25.5	23.2	21.9	21.2	19.4	17.4	20.8	22.1	20.4	18.5	17.7	17.0	15.8	19.1	25.5																							
7-Jun	13.9	13.5	13.2	14.8	15.3	15.1	17.6	19.1	21.0	22.1	23.1	23.9	24.1	24.4	25.0	24.9	24.6	24.6	24.0	22.1	19.9	17.9	20.0	16.5	20.0	25.0																							
8-Jun	15.3	14.6	13.8	13.5	13.5	14.0	15.7	17.3	18.2	20.2	21.5	19.7	17.9	19.9	19.8	19.1	20.9	20.6	20.6	19.3	17.3	15.2	12.6	12.0	17.2	21.5																							
9-Jun	11.4	10.6	9.7	9.4	9.1	10.5	12.9	14.9	16.7	17.8	18.8	20.0	20.6	19.2	16.3	18.1	18.7	18.9	17.8	17.3	15.8	12.4	11.0	10.4	14.9	20.6																							
10-Jun	9.8	9.0	8.6	7.5	6.9	8.5	10.7	12.9	14.4	16.2	17.9	18.9	19.7	20.3	21.1	21.6	22.4	21.8	19.1	20.3	19.2	13.8	11.6	10.7	15.1	22.4																							
11-Jun	10.1	12.0	9.7	9.0	10.9	12.3	13.5	14.5	15.7	17.9	20.5	21.1	23.0	23.4	22.9	23.5	19.7	14.9	17.3	17.0	15.6	15.3	14.3	13.3	16.1	23.5																							
12-Jun	10.7	10.0	9.8	9.1	8.4	9.8	12.7	16.0	18.1	19.3	20.2	21.4	21.0	22.4	22.2	23.0	19.5	18.4	17.3	16.1	14.6	13.8	12.4	11.9	15.8	23.0																							
13-Jun	11.2	10.4	10.2	9.6	9.2	9.5	10.1	11.5	12.9	14.9	16.2	16.6	16.6	16.3	17.3	17.1	16.1	15.6	15.6	15.2	14.7	12.6	11.5	11.0	13.4	17.3																							
14-Jun	10.8	10.3	10.0	9.8	9.7	9.7	11.1	12.2	13.0	14.1	15.3	16.2	17.2	18.0	18.7	19.1	19.1	18.7	19.1	18.7	16.5	11.9	10.3	11.6	14.2	19.1																							
15-Jun	11.7	11.6	11.5	11.1	10.6	11.0	11.5	10.8	10.4	10.8	11.9	12.3	13.3	14.7	15.2	14.4	15.4	15.5	15.5	15.8	15.1	11.6	9.3	7.9	12.5	15.8																							
16-Jun	7.0	8.6	9.7	9.5	9.3	9.4	9.4	9.0	9.2	9.5	10.1	11.3	12.0	13.0	13.6	13.9	14.8	15.1	15.1	13.9	10.5	8.1	7.7	7.9	10.7	15.1																							
17-Jun	9.1	8.5	7.9	7.7	7.5	8.3	9.1	9.3	9.6	10.4	11.5	12.5	13.6	14.2	15.1	15.6	16.1	16.0	15.8	15.6	14.8	13.0	10.7	9.9	11.7	16.1																							
18-Jun	8.1	6.1	3.3	2.0	3.6	7.2	9.4	9.8	12.7	15.2	16.7	18.7	20.9	20.6	21.1	21.2	20.8	20.8	20.2	19.3	17.2	14.6	13.3	13.1	14.0	21.2																							
19-Jun	12.9	12.6	12.3	12.0	11.6	11.3	12.0	13.2	14.9	16.0	17.4	18.4	19.2	20.0	20.3	20.7	20.9	20.9	20.5	19.8	17.6	13.2	10.6	9.2	15.7	20.9																							
20-Jun	8.7	6.4	5.4	5.1	4.9	8.3	12.6	15.1	17.8	20.0	20.8	21.6	22.3	22.9	23.6	24.1	24.0	23.6	23.8	22.3	19.4	17.2	15.8	14.9	16.7	24.1																							
21-Jun	14.2	14.7	15.1	13.6	12.0	13.0	14.9	16.5	18.1	18.8	19.3	19.2	20.7	21.2	21.9	21.4	21.1	21.4	19.8	18.5	17.6	16.1	15.3	14.7	17.5	21.9																							
22-Jun	14.1	12.6	13.1	12.3	11.4	12.2	13.7	15.7	17.2	18.9	19.8	20.1	20.5	14.9	16.8	17.8	20.3	20.9	19.5	18.5	18.1	14.5	12.4	10.8	16.1	20.9																							
23-Jun	9.7	9.1	7.9	7.5	7.9	9.6	12.9	15.9	18.0	20.4	22.0	20.9	22.5	20.1	20.6	21.7	22.5	22.8	22.0	21.1	20.2	18.3	15.6	14.8	16.8	22.8																							
24-Jun	13.4	12.6	11.5	10.9	11.1	12.4	14.3	17.3	20.4	23.8	26.0	27.1	27.9	27.0	26.7	28.4	26.4	25.3	24.7	25.0	24.1	22.4	20.5	18.4	20.7	28.4																							
25-Jun	18.3	15.5	12.7	11.4	11.2	13.2	16.2	19.5	21.6	23.9	25.1	26.0	28.4	29.5	27.7	22.8	20.3	20.8	21.4	20.0	18.9	19.0	16.9	16.0	19.8	29.5																							
26-Jun	16.5	15.9	15.7	14.7	14.2	15.0	17.1	19.4	21.4	24.1	26.1	26.9	27.0	27.5	28.2	28.4	27.8	24.6	22.3	23.5	21.9	20.5	19.1	17.9	21.5	28.4																							
27-Jun	17.8	16.7	16.4	15.1	14.2	15.2	17.9	20.8	22.8	25.0	27.2	28.2	29.2	29.8	30.6	31.0	31.0	30.7	29.9	29.3	26.6	23.4	22.5	21.2	23.9	31.0																							
28-Jun	20.4	19.3	17.9	15.8	15.6	17.3	20.7	24.2	25.5	26.8	27.9	28.5	28.9	29.5	29.7	29.9	29.9	29.9	29.7	29.2	27.4	23.5	20.6	19.1	16.9	23.9	29.9																						
29-Jun	13.6	14.2	14.0	12.8	12.4	12.8	15.6	17.9	21.2	23.7	26.1	27.7	29.0	29.9	30.1	30.4	30.7	30.7	30.2	28.9	27.1	20.6	18.7	17.4	22.3	30.7																							
30-Jun	16.6	15.4	16.6	16.4	15.7	15.7	16.3	18.3	20.8	22.1	22.9	23.3	23.9	24.3	24.8	25.1	24.7	23.0	21.0	20.4	20.3	19.9	19.5	19.1	20.2	25.1																							
																								12.5	11.9	11.2	10.6	10.4	11.5	13.4	15.1	16.8	18.4	19.9	20.6	21.3	21.6	21.8	22.0	21.8	21.4	20.8	20.0	18.4	16.0	14.6	13.6	Diurnal Average	
																								20.4	19.3	17.9	16.4	15.7	17.3	20.7	24.2	25.5	26.8	27.9	28.5	29.2	29.9	30.6	31.0	31.0	30.7	30.2	29.3	27.1	23.4	22.5	21.2	Diurnal Maximum	





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ambient Temperature (AT) - C
Patricia McInnes - June 2015

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	2	0.28	0.28
0 - 10	92	12.78	13.06
10 - 20	402	55.83	68.89
> 20	224	31.11	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

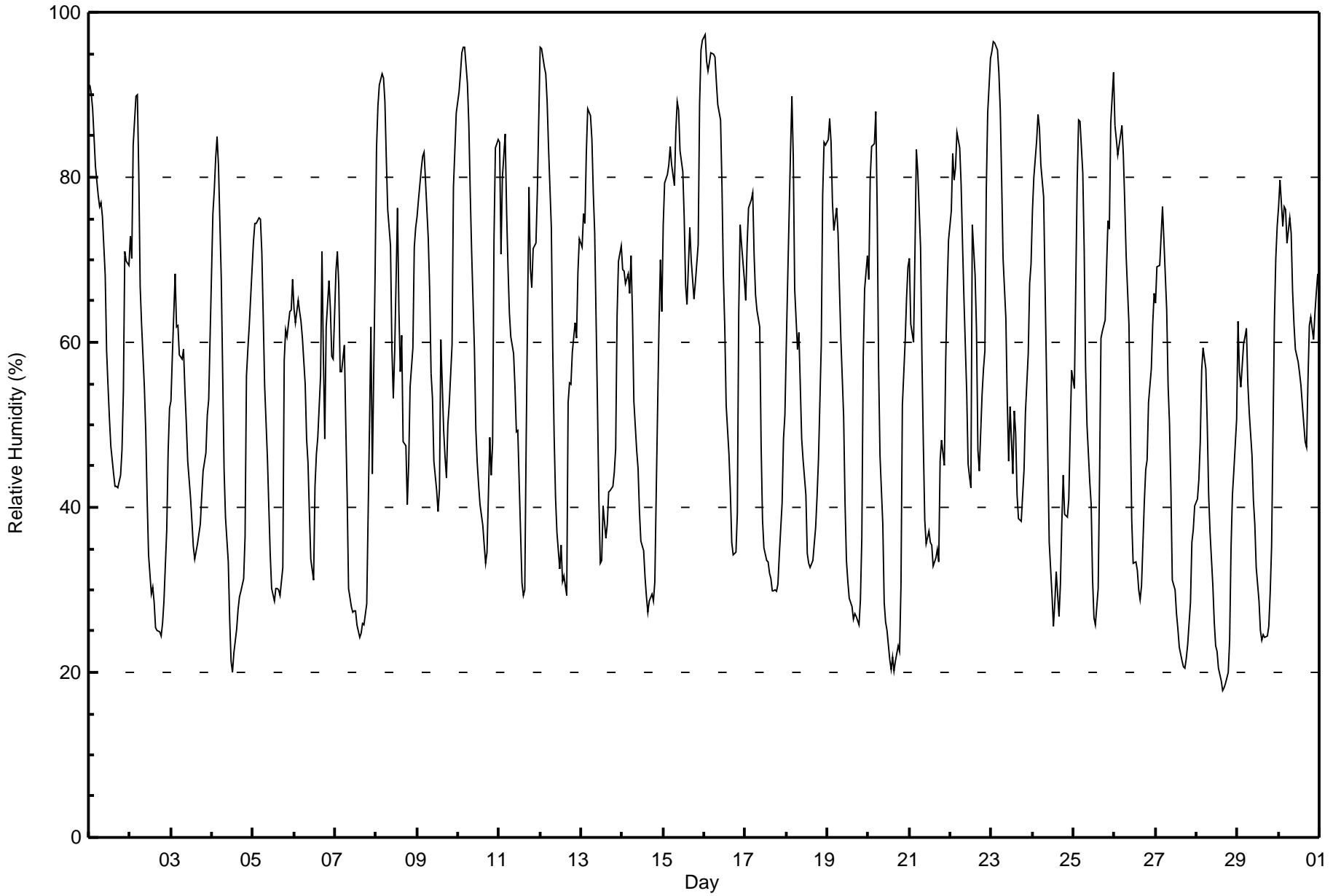
Patricia McInnes - June 2015

Maximum Value: 97 % on Jun 16 01:00																	Maximum Daily Average: 78.7 % on Jun 15																	Hours in Service: 720	
Minimum Value: 18 % on Jun 28 16:00																	Minimum Daily Average: 35.2 % on Jun 28																	Hours of Data: 720	
Maximum Diurnal Average: 79.8 % at hour 4																	Minimum Diurnal Average: 36.2 % at hour 16																	Hours of Missing Data: 0	
Monthly Average: 56.1 %																	Percentiles: P ₁ = 20 P ₁₀ = 29 Q ₁ = 38 Median = 57 Q ₃ = 72 P ₉₀ = 84 P ₉₉ = 96																	Hours of Calibration: 0	
																																		Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24											
1-Jun	91	90	88	85	81	78	77	77	75	68	59	55	51	47	44	43	43	42	44	47	54	71	70	69	64.6	91									
2-Jun	73	70	84	90	90	80	67	62	55	49	41	34	30	30	29	25	25	25	24	26	29	37	47	52	48.9	90									
3-Jun	53	58	68	62	62	59	58	59	54	50	46	41	38	35	34	36	37	38	41	44	47	51	53	61	49.4	68									
4-Jun	76	79	82	85	81	68	56	45	39	33	26	21	20	22	25	28	29	30	31	36	56	59	62	69	48.3	85									
5-Jun	72	74	74	75	75	71	63	55	46	40	34	30	29	30	30	30	29	33	58	61	61	64	64	68	52.8	75									
6-Jun	64	62	65	64	63	60	55	48	45	39	34	31	43	46	49	56	71	58	48	62	67	64	58	58	54.7	71									
7-Jun	69	71	67	57	56	60	50	41	30	28	27	27	27	26	24	25	26	26	28	39	50	62	44	69	42.9	71									
8-Jun	84	89	91	93	92	89	82	76	72	59	53	59	76	64	56	61	48	47	40	45	55	59	71	74	68.2	93									
9-Jun	75	77	81	83	83	80	73	66	56	53	46	42	40	42	60	49	46	44	50	53	60	79	83	88	62.8	88									
10-Jun	90	93	95	96	96	91	86	78	71	59	49	45	43	40	38	35	33	35	48	44	48	73	83	85	64.8	96									
11-Jun	84	71	80	85	76	69	64	61	59	55	49	49	37	31	29	30	48	79	69	67	71	72	78	87	62.5	87									
12-Jun	96	96	93	92	89	84	74	59	49	41	37	33	35	31	32	29	53	55	55	59	62	60	68	72	60.6	96									
13-Jun	72	76	74	83	88	87	85	78	73	52	41	33	34	40	36	38	42	42	43	44	47	63	70	72	58.9	88									
14-Jun	69	69	67	68	66	70	63	53	47	45	39	36	35	32	29	27	29	30	29	31	42	62	70	64	48.8	70									
15-Jun	74	79	80	81	84	82	79	86	89	88	83	81	75	67	65	74	70	68	65	67	72	89	96	97	78.7	97									
16-Jun	97	94	93	94	95	95	95	91	89	87	79	68	62	52	46	42	36	34	35	39	64	74	72	68	70.9	97									
17-Jun	65	72	76	77	78	71	66	64	62	47	38	35	33	33	32	31	30	30	30	31	34	41	48	51	49.0	78									
18-Jun	60	68	83	90	82	66	59	61	55	48	46	42	34	33	33	34	36	38	41	46	60	78	84	84	56.6	90									
19-Jun	85	87	84	77	73	76	73	67	60	51	41	34	31	29	28	26	27	27	26	29	36	58	66	71	52.6	87									
20-Jun	68	80	84	84	88	76	57	46	38	29	26	25	22	20	22	20	21	23	22	31	52	60	65	69	47.0	88									
21-Jun	70	62	60	71	83	81	71	58	48	39	36	37	36	35	33	34	35	33	46	48	45	58	66	72	52.4	83									
22-Jun	76	83	80	81	85	84	79	72	65	54	45	44	42	74	68	61	47	44	54	57	59	78	88	94	67.3	94									
23-Jun	95	96	96	95	93	88	79	70	63	53	46	52	44	52	49	42	39	38	41	45	51	59	67	70	63.5	96									
24-Jun	76	80	84	88	86	82	78	67	57	46	36	29	26	28	32	27	31	38	44	39	39	41	49	57	52.4	88									
25-Jun	54	67	79	87	87	80	71	57	50	43	40	31	27	26	30	44	60	61	63	69	75	74	87	93	60.7	93									
26-Jun	86	85	83	85	86	83	77	70	62	50	38	33	33	32	30	29	30	41	45	46	53	57	62	66	56.8	86									
27-Jun	65	69	69	73	76	72	64	55	50	42	31	30	27	25	23	21	21	20	22	23	29	36	37	40	42.6	76									
28-Jun	41	43	48	57	59	57	50	41	37	31	26	23	23	21	19	18	18	19	20	24	35	42	44	51	35.2	59									
29-Jun	63	56	55	60	61	62	55	52	46	41	38	33	29	25	24	25	24	24	26	30	35	63	70	74	44.5	74									
30-Jun	76	80	74	76	76	72	75	73	66	62	59	58	56	55	52	48	47	55	62	63	60	64	66	68	64.4	80									
73.9																	75.9																	Diurnal Average	
97																	96																	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Patricia McInnes - June 2015





Maximum Speed: 31 km/h on Jun 13 11:00	Maximum Daily Speed Average: 18.0 km/h on Jun 13	Hours in Service: 720
Minimum Speed Value: 1 km/h on Jun 18 03:00	Minimum Daily Speed Average: 1.8 km/h on Jun 10	Hours of Data: 720
Maximum Diurnal Speed Average: 5.0 km/h at hour 14	Minimum Diurnal Speed Average: 1.4 km/h at hour 21	Hours of Missing Data: 0
Monthly Average Velocity: 2.8 km/h 294.8 deg	Percentiles: P ₁ = 1 P ₁₀ = 4 Q ₁ = 6 Median = 9 O ₃ = 13 P ₉₀ = 18 P ₉₉ = 29	Percent Operational Time: 100.0

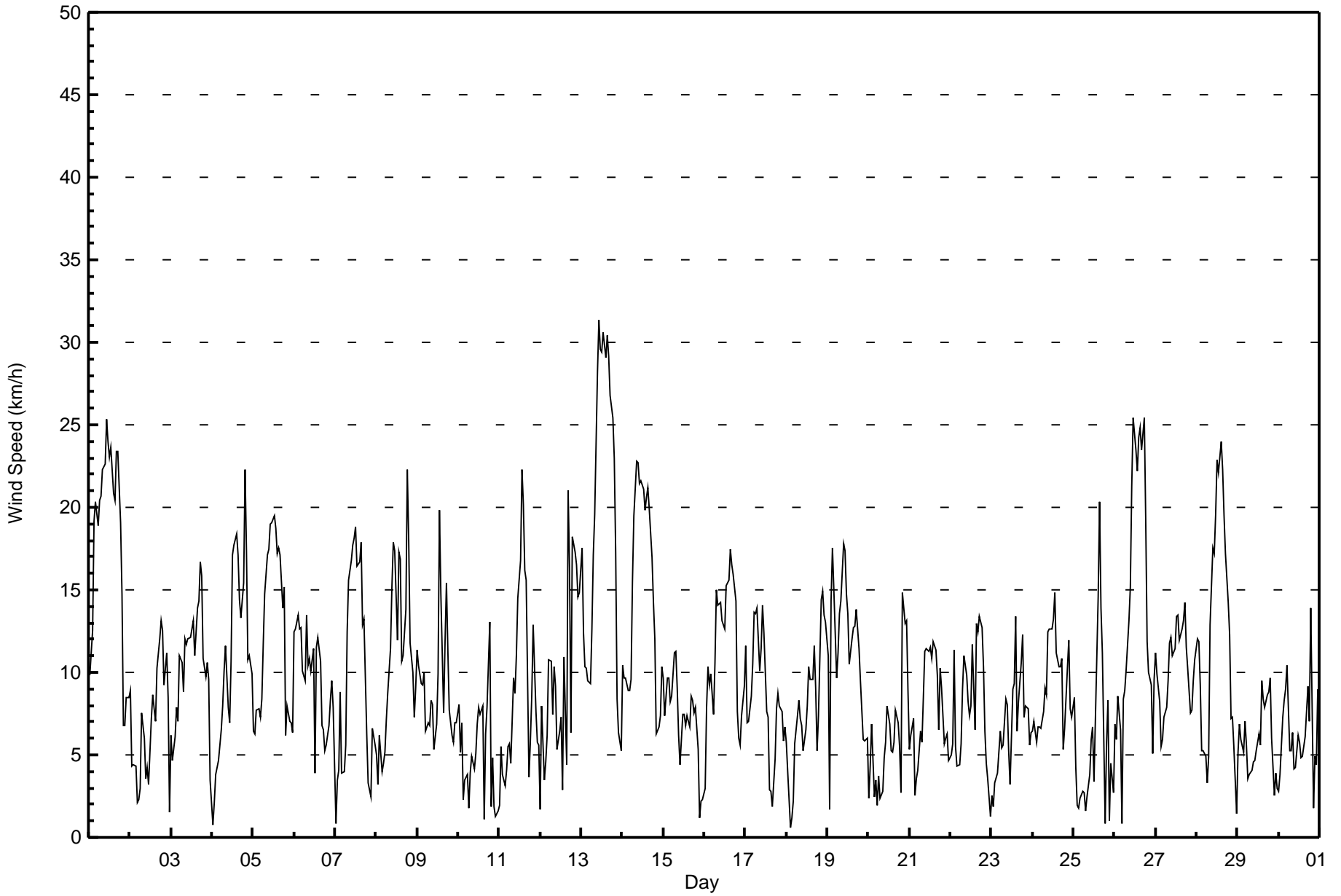
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	W10	W11	W13	WNW19	WNW20	WNW19	WNW20	WNW21	WNW22	WNW23	NW25	WNW24	WNW23	WNW24	NW21	NW20	NNW23	NNW23	NNW19	NNW15	NW7	W7	W8	W8	WNW16.7	NW25
2-Jun	WNW9	WNW4	WSW4	NW4	WNW2	N2	S3	SE8	E6	SSE4	E4	ESE3	E7	ESE9	ESE8	SE7	SE10	ESE12	ESE13	ESE13	ESE9	S11	SW8	E2	SE4.0	ESE13
3-Jun	SE6	SE5	ESE6	ESE8	SE7	ESE11	ESE11	ESE9	ESE12	ESE12	E12	SE12	SE13	SE13	SSE11	SSE14	SE14	SSE17	SE16	SE11	SE10	SE11	SE10	SE3	SE10.1	SSE17
4-Jun	W1	S2	ESE4	ESE4	SSE5	SE7	SSE8	S10	SSE12	SSE8	ESE7	ESE11	SSE17	SSE18	SSE17	S14	SSE13	SSE15	S22	SSW17	SSW11	S11	S10	SSE10.1	S22	
5-Jun	S6	S6	SSW8	S8	SSE7	SSE8	S12	S15	S17	SSW17	S19	S19	S19	S19	SSW17	SSW18	SSW17	SW14	NW15	NNE6	SSE8	S7	SSE7	SSW6	S10.6	S19
6-Jun	SW12	SW13	SW13	SW13	SW13	SW10	SW9	W13	WSW10	W11	W10	NNW11	N4	NNW11	NW12	WNW11	WNW7	S6	S5	WSW6	W7	WNW8	WNW10	WNW8	W7.6	W13
7-Jun	SSW1	S3	SSW4	WNW9	NW4	WSW4	WNW6	WNW12	NW16	WNW17	NW18	WNW18	WNW19	NW16	NW17	WNW18	W13	NNW13	NW6	WNW3	WSW3	W2	WSW7	WNW6	WNW9.0	WNW19
8-Jun	ENE5	W3	SSW6	S4	SSW5	S5	WSW7	W9	W11	W15	W18	WNW17	WNW12	W17	N17	NNE11	NNW11	NNW14	NW22	NW18	NNW12	NW10	WNW7	WNW9	WNW8.2	NW22
9-Jun	WNW11	WNW10	W9	W9	WNW10	W6	W7	W7	NW8	NNW8	WNW5	NW7	NNW10	NNW20	NNE15	N8	NNE12	NNW15	N11	N8	NNW6	NW6	WNW7	NW7	NW7.5	NNW20
10-Jun	NW8	NW5	NNW7	SW2	WSW3	SW4	SSE2	ENE4	E5	NE4	E5	E7	E8	ENE7	ENE8	N1	NE6	N8	NW13	N2	ESE5	SSW2	SW1	SW2	NNE1.8	NW13
11-Jun	SSE2	SE5	SSE4	S3	SSE4	SE5	ESE6	SSE4	ESE10	SSE9	SSE11	SSW14	SSW17	WSW22	SSW20	S16	WSW16	S4	ESE6	ESE9	ESE13	ESE8	NNE6	NNE6	S5.5	WSW22
12-Jun	NW2	NW8	WNW4	SSW5	SW6	SW11	W11	WNW7	NW10	NW9	NW5	NE6	WNW7	W3	W11	N4	E21	E16	S6	ENE18	ENE17	NE17	NE15	NNE15	NNE3.0	E21
13-Jun	NE18	NE12	NE10	N10	N9	NNW9	NW13	NNW17	NNW20	N28	N31	N30	N29	N31	N29	N30	N29	N27	N25	NNE23	NNE17	E8	E6	E5	N18.0	N31
14-Jun	NE10	NE10	NE10	N9	NNW9	NW10	NNW16	N20	N23	N23	N21	N22	N21	N20	N21	N21	NNW20	N17	N14	N12	NW6	WNW7	WNW7	NW10	N13.8	N23
15-Jun	NNW10	NNW7	N10	NNW10	NNW8	NNW9	N11	N11	N9	NW6	NNW4	NNE7	NE7	NE7	N7	NE7	SE9	SSE8	SSE8	SSE8	SE5	SE1	WSW2	SSW2	N3.5	N11
16-Jun	SSW3	NW8	NNW10	NW9	NW10	NNW7	NNW11	N15	N14	N14	N13	NNW13	NNW13	NNW15	NNW16	N17	N16	N16	NNW14	NW8	WNW6	WNW6	WNW7	NW9	NNW10.5	N17
17-Jun	NNW12	NNW7	NW7	NW9	NW11	NW14	NNW14	NNW14	NW10	N11	N14	NNE12	NNE8	N7	NNW3	WSW3	NNW2	SSE5	SE8	SE9	SE8	SSE8	S6	SSW7	NNW4.0	N14
18-Jun	S6	S4	SSE1	WSW1	S2	ESE6	SE7	SE8	SE7	ESE7	ESE5	ESE7	SE8	S10	S10	SSE10	S12	SSW9	SSW5	SSE7	SW14	W15	NW14	NW13	S3.9	W15
19-Jun	NNW11	N2	NNW14	NNW18	NNW15	NNW10	N11	N14	N14	N18	N17	N15	NNE14	NNE10	N12	NNE13	NNE13	N14	N11	NNW9	NNW8	NNW6	NW6	NW6	N11.1	N18
20-Jun	WNW2	WNW4	WNW7	WSW2	WNW3	NW2	NNW4	NE2	NE3	NNE5	N6	N8	NE7	N5	NNE5	N6	NNE8	NNE7	NNE5	W3	SW15	SW13	WSW13	WSW9	NW2.5	SW15
21-Jun	W5	N6	N7	SW3	WSW4	WNW4	NW6	NNW6	N8	NNW11	N11	NNW11	NNW12	NW11	N12	NNW11	NW10	NNW7	W10	NW9	NW6	W6	W6	WSW5	NW6.5	N12
22-Jun	WSW5	WSW6	W11	W6	SSW4	SSW4	S6	SW9	WSW11	WNW10	NW8	WSW7	WSW8	WNW12	WSW7	W13	WNW12	WNW13	N13	NNE10	NE6	WSW5	WSW4	WNW1	W5.4	WNW13
23-Jun	SW3	W2	SW3	SSW4	SSW5	S6	SSE5	SE6	SSE8	S8	WSW5	NW3	SE9	NNW9	NNE13	NNE6	ESE8	S11	S12	S7	SSW8	SW8	SSW6	SSW6	S3.4	NNE13
24-Jun	S6	S7	S6	S7	SSE7	SSE7	SSE8	SSE9	SSE9	S12	SSW13	SW13	SW13	WSW15	W11	SW10	SW10	WSW11	SW5	SW7	WSW10	SW12	W8	NW7	SSW7.4	WSW15
25-Jun	N8	N4	W2	WSW2	W2	NW3	NNW3	NE2	NW2	ENE4	WSW6	E7	ESE3	SSE7	SW15	SW20	NW14	NNW11	S1	SSW6	W8	SW1	W4	SW3	W2.4	SW20
26-Jun	SSW7	SSW6	SSW9	SSW7	S1	S8	SW9	SW10	SW13	SW15	WSW21	WSW25	WSW23	W22	WSW24	W25	W23	WNW25	WNW19	W12	W10	W9	SSW5	SW10	WSW12.6	WSW25
27-Jun	SW11	SW10	WSW8	S5	SSE6	S7	SSW8	SSW9	S12	S12	S11	SSW11	WSW13	SW13	WSW12	WSW13	SW13	SW14	SW12	W10	WSW8	WSW8	WSW10	SW11	SW9.3	SW14
28-Jun	SW12	SW12	SW9	S5	S5	SSE5	SE3	NNW5	NNW13	NNW18	NNW17	NW20	WNW23	WNW22	NW24	NW22	NW20	NW17	NNW14	NNW12	WNW7	WNW7	WNW5	SW1	NW9.6	NW24
29-Jun	WSW5	SW7	SW6	SSW5	SSW7	SW6	SSE4	SE4	E4	E5	SE5	SSE5	S6	SE6	SSE9	SE8	ESE8	E9	ESE9	SE10	SE6	NW3	NW4	WSW3	SSE3.7	SE10
30-Jun	SW3	SW4	SW7	SW8	SW9	WSW10	WSW5	SW5	W6	NW4	NE4	E6	ENE6	NE5	NNE5	NNE6	N8	NNW9	NW7	WNW14	NNW2	SE5	SSW4	WSW9	W2.3	WNW14

W2.5	W2.5	W3.0	W2.9	W2.8	WSW2.3	W2.2	NNW2.2	NW3.0	NW4.0	NW4.0	NW3.8	NNW3.3	NNW5.0	NW4.6	NW3.8	NW3.7	NNW3.8	NW3.3	N1.6	WSW1.4	WSW3.0	W3.4	W3.4	Diurnal Average
NE18	SW13	NNW14	WNW19	WNW20	WNW19	WNW20	WNW21	N23	N28	N31	N30	N29	N31	N29	N30	N29	N27	N25	NNE23	SSW17	NE17	NE15	NNE15	Diurnal Maximum

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



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 11 km/h on Jun 6 14:00 Minimum Value: 0 km/h on Jun 16 23:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 8																	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	2	2	3	6	4	5	4	5	5	5	5	6	5	5	5	4	5	4	5	1	1	1	1	6	
2-Jun	1	4	1	1	1	2	2	2	3	2	3	2	3	3	4	4	5	3	3	3	2	4	2	1	5
3-Jun	1	1	2	2	2	3	3	2	3	3	3	4	3	5	4	4	3	4	5	3	2	2	2	3	5
4-Jun	1	1	1	1	2	1	2	2	2	2	3	5	5	7	5	4	4	3	4	7	6	3	2	3	7
5-Jun	1	1	2	2	1	2	3	3	5	4	6	5	6	5	5	5	4	6	7	3	1	1	1	2	7
6-Jun	2	2	2	2	2	2	3	3	2	3	4	4	8	11	6	9	5	1	1	1	1	1	1	1	11
7-Jun	1	1	1	4	4	2	6	3	4	4	5	6	5	4	5	5	3	3	2	1	1	1	3	3	6
8-Jun	2	3	1	2	1	1	3	2	4	4	4	7	4	4	6	2	6	3	5	5	2	3	1	1	7
9-Jun	1	2	2	1	2	2	1	2	3	3	3	4	6	5	6	3	3	4	5	2	2	1	1	1	6
10-Jun	2	1	1	1	1	3	1	2	2	2	3	3	4	3	3	3	3	3	3	3	1	1	1	1	4
11-Jun	1	2	1	1	1	2	2	2	2	2	3	4	4	5	6	4	8	4	2	2	3	3	2	3	8
12-Jun	2	3	1	4	2	4	3	3	2	3	4	3	3	4	4	7	5	5	2	8	4	4	4	4	8
13-Jun	4	3	2	2	2	2	3	4	4	7	7	7	6	7	7	7	6	6	6	5	6	2	2	3	7
14-Jun	3	3	3	2	2	2	3	4	5	5	5	6	6	5	5	5	5	4	4	3	2	1	1	2	6
15-Jun	1	1	2	2	1	2	2	3	2	2	2	3	2	3	3	3	2	2	2	3	2	1	1	1	3
16-Jun	1	3	4	2	2	2	5	3	3	3	3	3	3	3	3	4	5	4	4	3	1	1	0	3	5
17-Jun	2	2	1	2	2	3	3	3	3	4	4	4	5	4	4	4	3	3	3	2	2	1	2	1	5
18-Jun	2	1	1	1	1	1	2	2	2	2	2	2	5	3	4	4	3	3	3	3	7	4	2	3	7
19-Jun	3	2	6	3	3	3	3	3	3	4	4	4	4	5	4	4	4	3	3	2	1	1	1	2	6
20-Jun	2	1	1	1	2	2	2	2	1	2	3	5	4	4	4	3	3	3	2	3	3	2	2	2	5
21-Jun	1	2	3	1	1	2	2	2	3	3	4	4	4	4	5	4	3	2	5	2	2	1	1	1	5
22-Jun	2	3	2	2	2	2	2	3	3	3	3	3	6	6	3	3	4	4	4	3	1	3	2	1	6
23-Jun	2	2	1	1	2	2	1	1	2	2	5	4	3	6	4	5	2	3	4	2	2	1	1	1	6
24-Jun	1	1	1	1	1	1	1	2	2	3	4	4	5	4	4	3	4	1	2	4	5	5	2	5	5
25-Jun	2	1	1	1	1	1	1	1	2	2	4	5	2	4	8	8	4	3	3	2	5	4	2	2	8
26-Jun	5	2	2	1	2	2	2	3	3	5	6	5	5	5	6	6	5	9	5	3	1	2	3	1	9
27-Jun	1	2	2	2	1	2	2	3	3	3	3	4	5	5	4	5	5	4	3	2	1	0	1	1	5
28-Jun	1	1	3	1	1	1	1	3	4	4	4	5	6	6	6	5	6	4	3	3	1	1	2	1	6
29-Jun	2	1	1	1	2	3	1	1	2	1	2	2	3	2	2	2	2	2	2	2	2	1	2	1	3
30-Jun	1	1	2	1	1	2	2	2	3	2	2	2	2	1	2	2	2	2	2	3	2	2	4	3	4
																	Diurnal Maximum								





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Patricia McInnes - June 2015

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	159	22.08	22.08
6 - 11	336	46.67	68.75
12 - 19	169	23.47	92.22
20 - 28	49	6.81	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
Patricia McInnes - June 2015**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	8	4	6	3	7	6	10	13	15	15	14	18	10	11	12	7	159
6 - 11	23	12	11	3	9	21	24	24	27	18	23	19	29	27	33	33	336
12 - 19	21	9	4	2	2	6	5	9	14	8	21	6	8	16	14	24	169
20 - 28	12	1	0	0	1	0	0	0	1	1	1	5	3	11	8	5	49
29 - 38	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	71	26	21	8	19	33	39	46	57	42	59	48	50	65	67	69	720

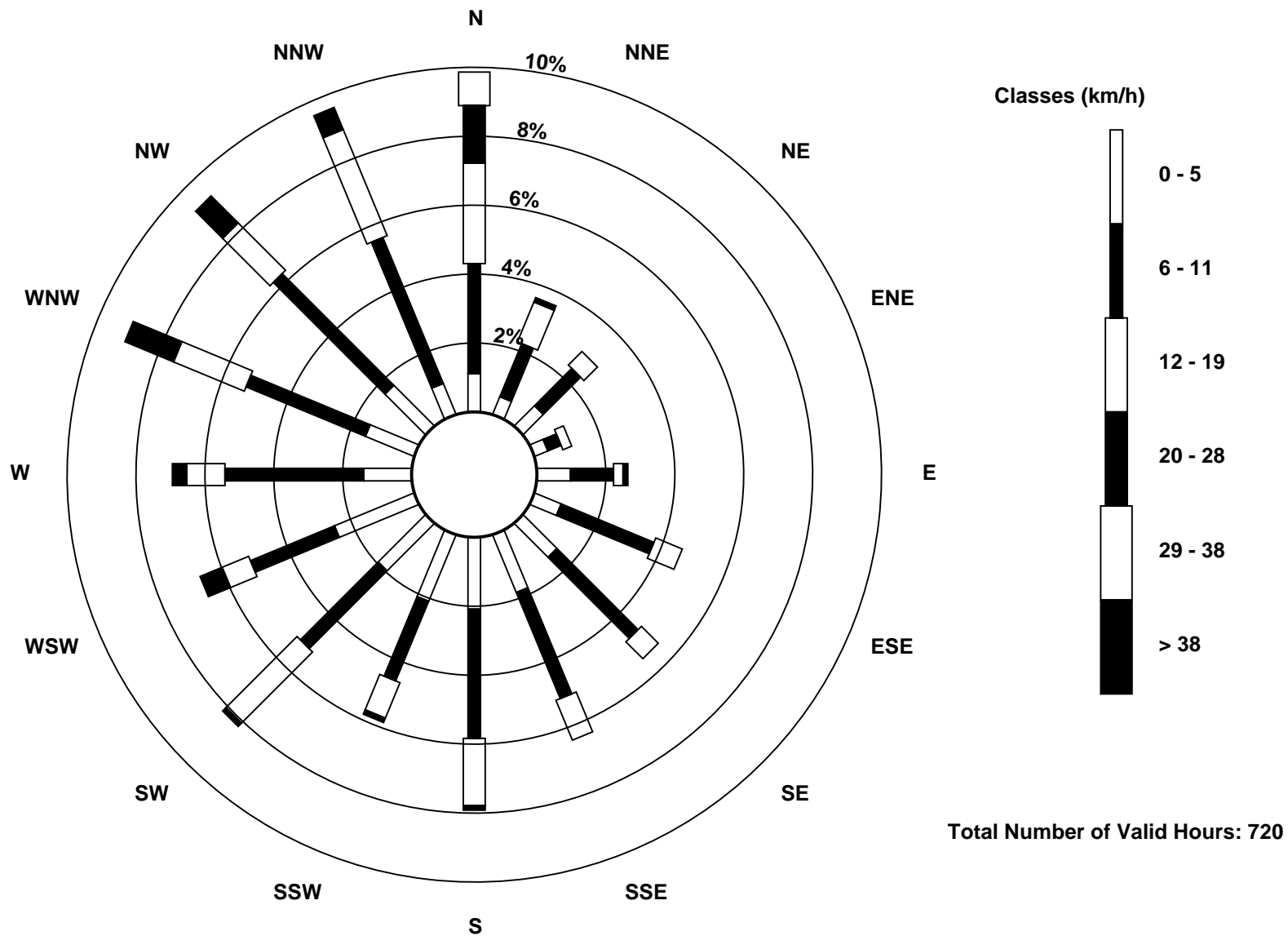
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

Wind Speed (WS) - km/h
Patricia McInnes (AMS 6)





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Patricia McInnes - June 2015

Direction of Maximum Speed: 8 deg on Jun 13 11:00 Direction of Maximum Daily Speed Average: 6.9 deg on Jun 13	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0
Direction of Minimum Speed: 164 deg on Jun 18 03:00 Direction of Minimum Daily Speed Average: 1.8 deg on Jun 10	Percent Operational Time: 100.0
Monthly Average Direction: 282.0 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	259	264	273	297	294	291	285	288	288	300	308	300	288	298	307	323	327	328	335	338	325	275	279	268	300.5
2-Jun	288	301	245	322	301	351	171	128	87	152	88	110	81	114	121	134	129	117	119	111	121	171	214	98	127.8
3-Jun	134	136	119	123	125	112	119	113	113	107	101	130	140	145	166	147	145	153	134	132	129	141	143	127	131.9
4-Jun	270	175	111	122	159	141	147	170	162	166	111	120	164	163	167	158	172	154	160	172	207	203	176	184	164.6
5-Jun	186	183	196	188	163	156	181	175	188	192	172	185	185	189	192	196	192	218	314	31	162	182	165	199	187.5
6-Jun	228	230	229	229	229	225	224	261	253	273	271	330	354	327	319	286	288	190	180	253	273	283	290	288	261.1
7-Jun	197	174	208	299	322	237	301	298	307	302	307	294	301	314	304	293	276	307	311	287	242	273	252	286	295.3
8-Jun	63	259	208	190	207	188	248	261	262	281	263	289	290	275	352	22	343	331	308	323	327	316	289	291	297.2
9-Jun	294	298	280	273	296	262	281	268	312	340	291	316	342	347	25	9	19	343	354	10	342	311	299	318	325.2
10-Jun	306	305	329	231	245	220	156	70	81	46	98	88	80	76	59	2	39	357	311	2	102	213	228	234	27.4
11-Jun	162	136	160	178	154	124	107	164	117	149	166	205	212	241	208	186	252	190	113	110	117	114	31	20	175.6
12-Jun	322	314	283	207	223	236	267	300	317	318	305	40	294	269	267	349	85	84	188	76	68	44	50	30	18.7
13-Jun	43	40	37	354	349	329	319	338	343	6	8	7	3	359	2	7	6	4	357	14	26	94	93	91	6.9
14-Jun	52	45	34	8	347	325	334	349	3	360	10	7	354	9	357	4	342	1	10	5	320	293	295	325	357.8
15-Jun	335	338	349	337	336	348	4	2	349	322	346	15	49	38	10	48	132	153	163	152	143	146	239	211	8.0
16-Jun	210	308	343	319	316	343	340	352	355	360	356	346	347	344	345	350	350	353	336	326	290	287	293	315	339.1
17-Jun	340	330	310	308	319	326	344	344	319	354	354	23	27	358	335	244	343	149	136	133	135	159	169	197	344.7
18-Jun	185	187	164	247	173	118	136	133	130	115	106	103	135	178	172	168	191	193	206	154	232	279	305	312	181.9
19-Jun	327	2	331	335	341	341	349	4	359	354	354	359	14	18	9	14	13	9	353	327	331	328	304	304	351.2
20-Jun	300	289	299	255	295	311	336	52	35	32	11	9	38	2	29	7	30	25	19	260	222	235	245	251	318.2
21-Jun	277	356	10	216	250	292	308	347	349	341	359	338	337	320	353	335	306	332	273	304	309	278	274	244	322.0
22-Jun	237	246	271	277	199	199	188	216	256	296	310	238	240	291	258	263	299	285	2	22	41	244	255	303	274.1
23-Jun	229	278	222	197	205	174	153	125	151	186	242	322	136	348	19	33	123	174	181	187	196	216	207	194	177.8
24-Jun	171	180	181	170	153	158	164	162	160	190	207	224	217	242	266	228	225	245	227	232	244	221	271	316	213.5
25-Jun	360	360	260	257	277	310	334	50	310	64	248	83	106	166	224	235	312	344	188	199	271	217	264	226	270.0
26-Jun	194	205	195	193	171	190	217	216	232	226	240	244	256	260	252	265	265	289	283	278	260	261	209	229	248.3
27-Jun	234	222	241	176	167	176	197	198	183	188	183	202	251	229	240	245	234	234	226	259	247	242	242	235	221.9
28-Jun	235	229	220	181	191	158	145	330	333	336	327	305	297	303	313	315	316	320	328	342	303	286	298	225	304.6
29-Jun	243	230	223	210	213	228	153	145	79	100	144	152	175	132	167	135	123	99	122	130	133	310	326	243	157.9
30-Jun	235	216	221	227	234	238	237	220	260	312	34	79	68	42	31	28	352	347	322	302	328	128	209	256	280.5

275.9 264.6 269.4 268.2 266.3 246.1 271.4 294.4 308.6 321.3 321.0 321.2 302.1 303.3 309.6 305.7 318.1 326.5 320.1 353.6 239.4 242.3 259.1 273.1

Diurnal Average

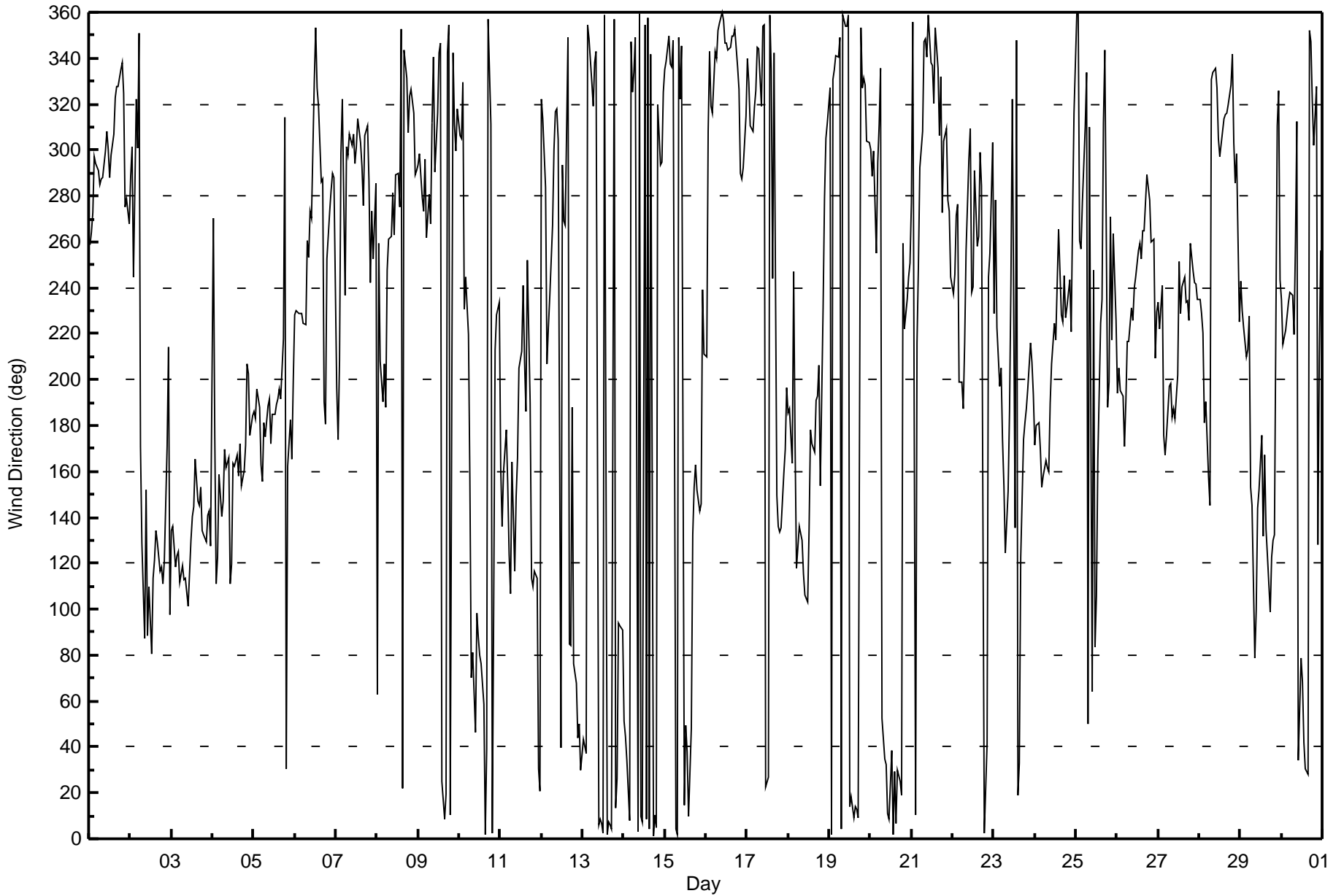
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Patricia McInnes - June 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 104 deg on Jun 10 16:00 Minimum Value: 4 deg on Jun 27 22:00 Percentiles: P ₁ = 6 P ₁₀ = 12 Q ₁ = 16 Median = 21 Q ₃ = 34 P ₉₀ = 58 P ₉₉ = 90																			Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0						
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	12	11	19	13	11	12	14	12	12	17	15	14	16	18	20	19	14	14	18	14	16	9	9	11	20
2-Jun	8	62	23	28	55	37	82	36	66	82	79	92	54	49	53	61	36	23	18	14	12	25	16	83	92
3-Jun	11	18	15	14	19	15	17	19	21	17	20	26	27	36	43	28	19	20	14	12	12	12	12	64	64
4-Jun	88	44	26	39	33	11	17	14	15	31	48	43	28	27	23	24	26	22	18	16	15	20	12	14	88
5-Jun	17	15	17	15	13	16	16	18	19	21	22	21	25	22	28	25	26	33	29	46	21	15	10	18	46
6-Jun	9	9	9	9	10	12	16	14	20	20	34	33	76	88	32	65	85	23	21	25	10	10	5	6	88
7-Jun	78	32	23	39	73	30	62	13	14	16	20	25	18	27	21	21	19	16	21	19	32	37	48	32	78
8-Jun	28	66	22	34	21	22	29	20	19	24	18	27	20	16	44	18	40	16	16	13	12	28	7	9	66
9-Jun	10	12	13	12	11	16	17	43	37	34	67	69	39	19	32	44	23	17	25	24	21	9	6	12	69
10-Jun	7	15	13	43	38	45	90	59	46	61	66	54	46	54	49	104	46	28	10	80	13	44	74	58	104
11-Jun	38	19	26	37	23	19	34	34	14	23	19	18	26	19	21	26	23	65	25	16	14	27	52	41	65
12-Jun	56	37	55	54	22	15	23	32	24	33	65	52	31	101	23	72	15	16	49	20	14	15	18	13	101
13-Jun	14	16	22	19	16	13	10	16	15	17	17	18	18	20	19	18	18	17	19	13	27	16	17	33	33
14-Jun	17	17	14	22	23	13	11	18	18	18	23	21	22	24	21	24	18	22	18	15	20	6	5	18	24
15-Jun	8	13	15	17	11	15	16	16	21	29	47	34	33	34	45	37	23	21	22	18	18	76	37	29	76
16-Jun	19	45	41	26	22	23	14	14	15	15	17	18	20	22	21	20	21	21	27	18	5	10	4	19	45
17-Jun	11	12	11	14	12	11	16	23	26	31	23	26	63	63	83	82	95	79	31	17	13	11	12	16	95
18-Jun	16	17	87	47	45	15	15	13	19	30	44	35	59	30	37	36	21	29	47	43	27	14	10	10	87
19-Jun	12	82	28	10	12	13	15	17	21	18	20	20	21	37	28	27	25	24	20	9	8	13	14	9	82
20-Jun	64	17	6	42	23	73	23	69	60	54	63	69	58	73	76	57	43	47	41	66	12	10	9	10	76
21-Jun	29	15	36	64	23	18	24	31	31	30	25	37	35	33	34	16	21	32	21	26	27	13	23	19	64
22-Jun	24	33	9	67	27	22	25	26	18	36	28	38	50	40	33	15	26	22	40	13	15	43	25	79	79
23-Jun	54	70	39	34	24	15	25	27	21	33	71	89	29	50	19	65	24	23	17	15	16	9	10	15	89
24-Jun	13	16	16	15	12	16	16	16	24	19	30	39	28	27	17	43	16	18	39	43	29	23	35	24	43
25-Jun	19	22	38	57	48	23	70	84	70	66	63	66	79	55	29	25	19	15	88	30	22	97	53	54	97
26-Jun	49	25	16	14	98	17	18	16	18	19	18	15	18	18	16	18	16	21	15	12	11	9	52	14	98
27-Jun	9	10	18	32	29	14	19	17	19	21	24	37	31	24	30	26	28	26	19	17	14	4	5	8	37
28-Jun	9	9	22	22	30	24	42	34	17	19	18	17	20	20	18	20	18	19	16	14	16	5	55	86	86
29-Jun	12	9	18	15	12	33	26	34	30	38	44	39	48	55	25	31	37	16	14	12	15	40	42	36	55
30-Jun	46	24	11	11	10	11	14	23	24	44	42	23	31	30	35	33	29	15	15	10	95	42	61	17	95
																			88 82 87 67 98 73 90 84 70 82 79 92 79 101 83 104 95 79 88 80 95 97 74 86						
Diurnal Maximum																									





Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	June 11, 2015	Last Calibration	May 19, 2015
Station Name	Patricia McInnes	Station Number	AMS 6
Reason:	Routine		
Start Time (MST)	9:00	End Time (MST)	16:47
Gas Cert Reference	SA130110A	Station temp.	22 Deg C
Cal Gas Concentration	47 ppm	Cal Gas Exp Date	12/12/2016
Calibrator Make/Model	Sabio 4010	Serial Number	14300410
ZAG Make/Model	API 701	Serial Number	60
DACS make/model	Campbell Scientific CR3000	DACS serial No.	9036

Analyzer Information

	<i>Before</i>	<i>After</i>		<i>Before</i>	<i>After</i>
Analyzer Range	0 - 1000 ppb		PMT voltage	-677	-677
Analyzer IP address	192.168.1.43		Lamp voltage	771	769
Calculated slope	0.997362	1.001268	Chamber temp	45.0	45.0
Calculated intercept	0.654623	0.862443	Pressure	701.5	689.2
Analyzer Background	5.0	5.1	Flow	0.448	0.441
Analyzer Coefficient	0.999	0.999	Intensity	90	90

Analyzer make Termo 43i Analyzer serial # 1008841397

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6000	0.0	0.0	0.1	----
as found span	6000	88.2	690.9	689.0	1.003
calibrator zero	6000	0.0	0.0	0.2	----
high point	6000	88.2	690.9	689.6	1.002
second point	6000	44.1	345.5	344.0	1.004
third point	6000	22.1	173.1	170.7	1.014
as left zero	6000	0.0	0.0	0.4	----
as left span	6000	88.2	690.9	687.3	1.005
Average Correction Factor					1.007

Corrected As found 688.8 Previous response 692.1 % change 0.5%

Notes:

No adjustments, filter changed after As Found. Work on the 55i during 10:20 to 12:20

Calibration Performed By: Ryan Power



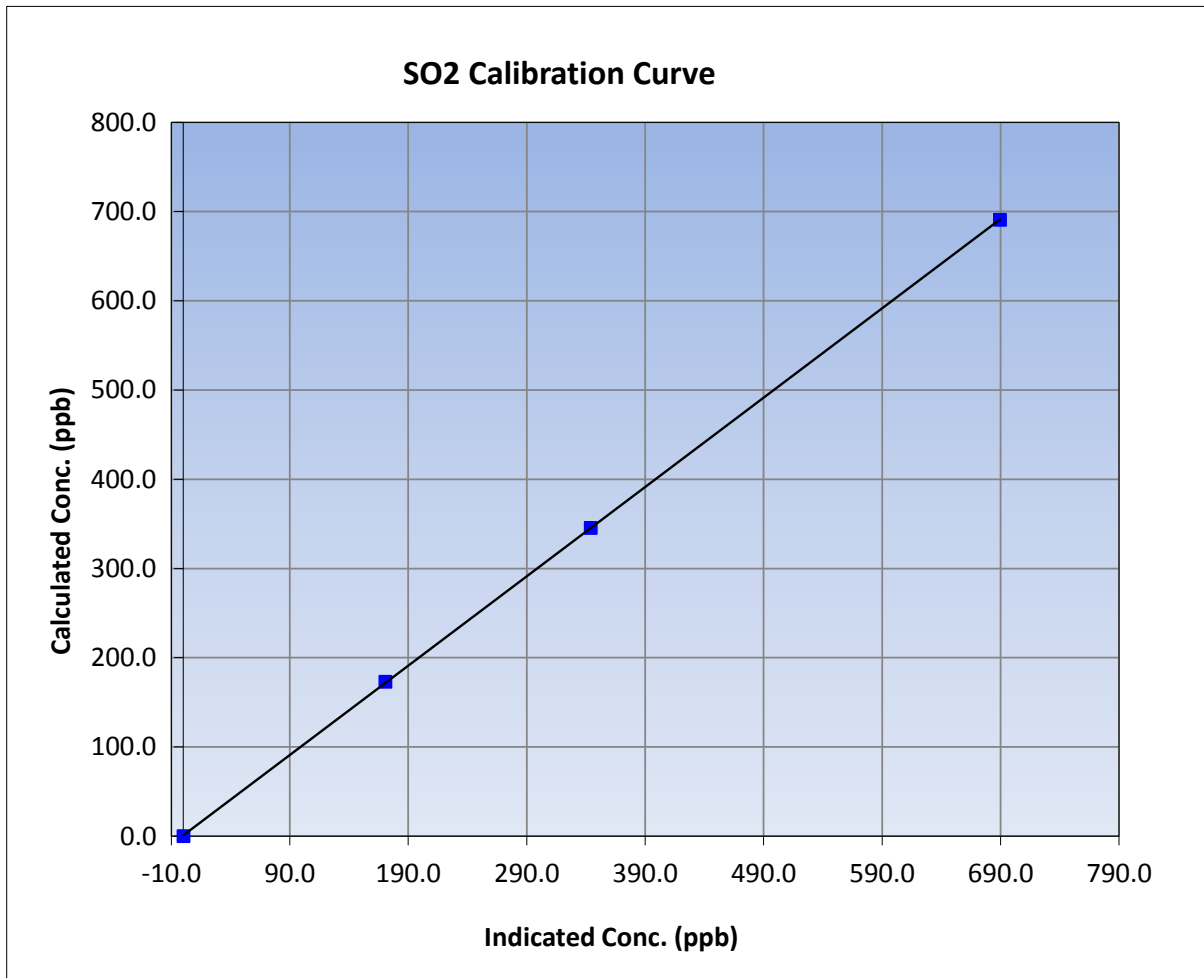
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	June 11, 2015	Previous Calibration	May 19, 2015
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	9:00	End Time (MST)	16:47
Analyzer make	Termo 43i	Analyzer serial #	1008841397

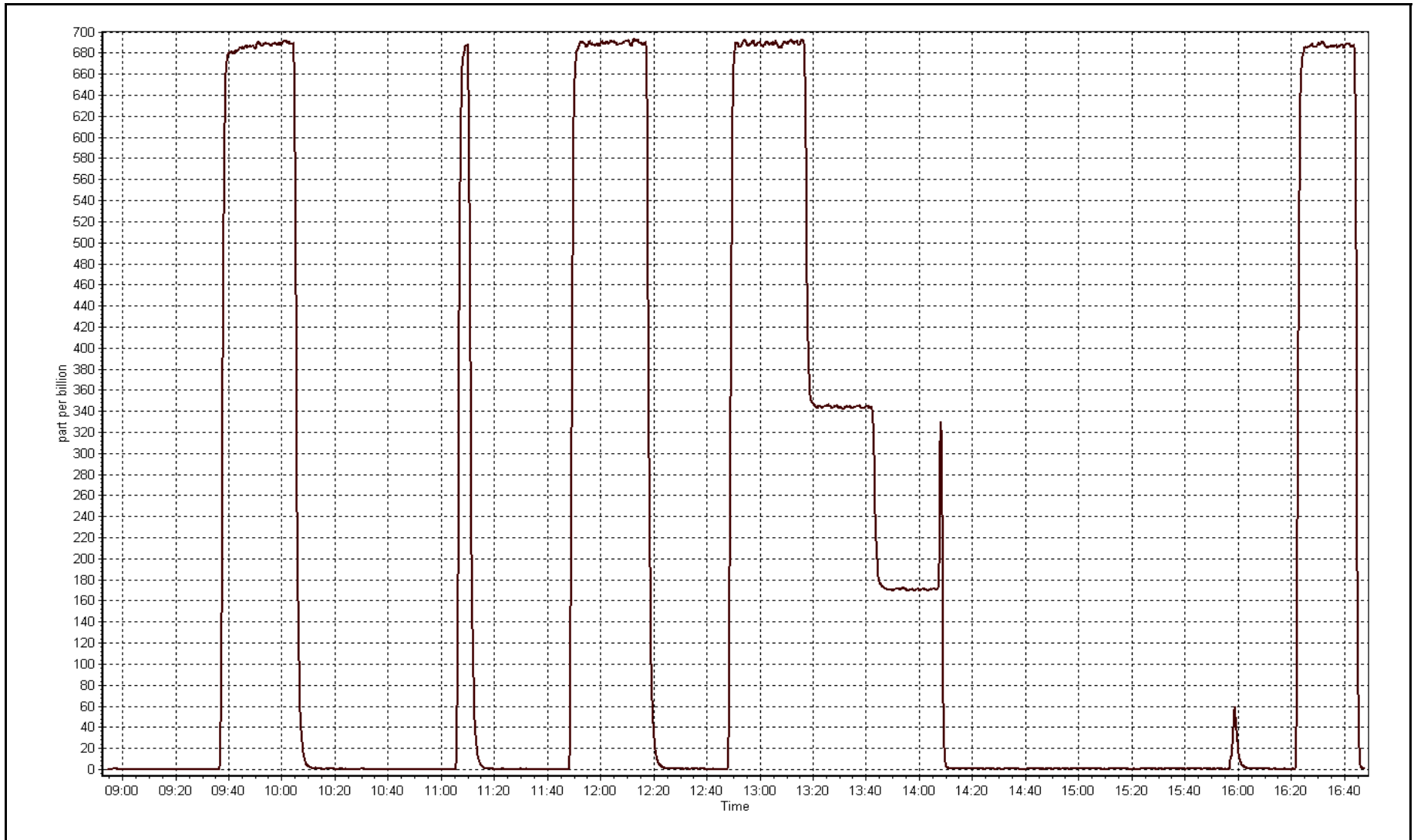
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	----	Correlation Coefficient	0.999988
690.9	689.6	1.0020		
345.5	344.0	1.0041	Slope	1.001268
173.1	170.7	1.0140		
			Intercept	0.862443



SO2 Calibration Plot

Date: June 11, 2015





Wood Buffalo Environmental Association TRS Calibration Report

Station Information

Calibration Date	June 10, 2015	Last Calibration	May 28, 2015
Station Name	Patricia McInnes	Station Number	AMS 6
Reason:	Routine		
Start Time (MST)	8:35	End Time (MST)	12:05
Gas Cert Reference	ALM009562	Station temp.	22 Deg C
Cal Gas Concentration	4.84 ppm	Cal Gas Exp Date	05/02/2017
Calibrator Make/Model	Sabio 4010	Serial Number	14300410
Dil air Make/Model	API T701	Serial Number	60
DACS make/model	Campbell Scientific CR3000	DACS serial No.	9036
SO2 gas concentration	47 ppm	SO2 gas cert/exp	SA130110A 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	1001	994
Calculated slope	0.988603	1.002256	Chamber temp	45	45
Calculated intercept	0.137117	0.014984	Pressure	711.0	694.9
Analyzer Background	2.2	3.58	Flow	0.456	0.440
Analyzer Coefficient	1.200	1.203	Intensity	90	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	6000	0.0	0.0	-0.1	----
as found span	6000	86.8	70.0	54.8	1.278
SO2 scrubber check	6000	22.1	173.1	0.5	----
calibrator zero	6000	0.0	0.0	0.2	----
high point	6000	86.8	70.0	69.9	1.001
second point	6000	43.4	35.0	34.9	1.004
third point	6000	22.3	18.0	17.7	1.015
as left zero	6000	0.0	0.0	-0.1	----
as left span	6000	86.8	70.0	68.9	1.016
Average Correction Factor					1.007

Corrected As found	54.9	Previous response	70.7	% change	28.9%
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Notes:

First graph is of As Finds and first day of work. After investigation, found issue with the hydrocarbon kicker. Analyzer was left to settle overnight before calibration. Cal finished June 10th; filter changed, scrubber check after third point.

Calibration Performed By: Ryan Power



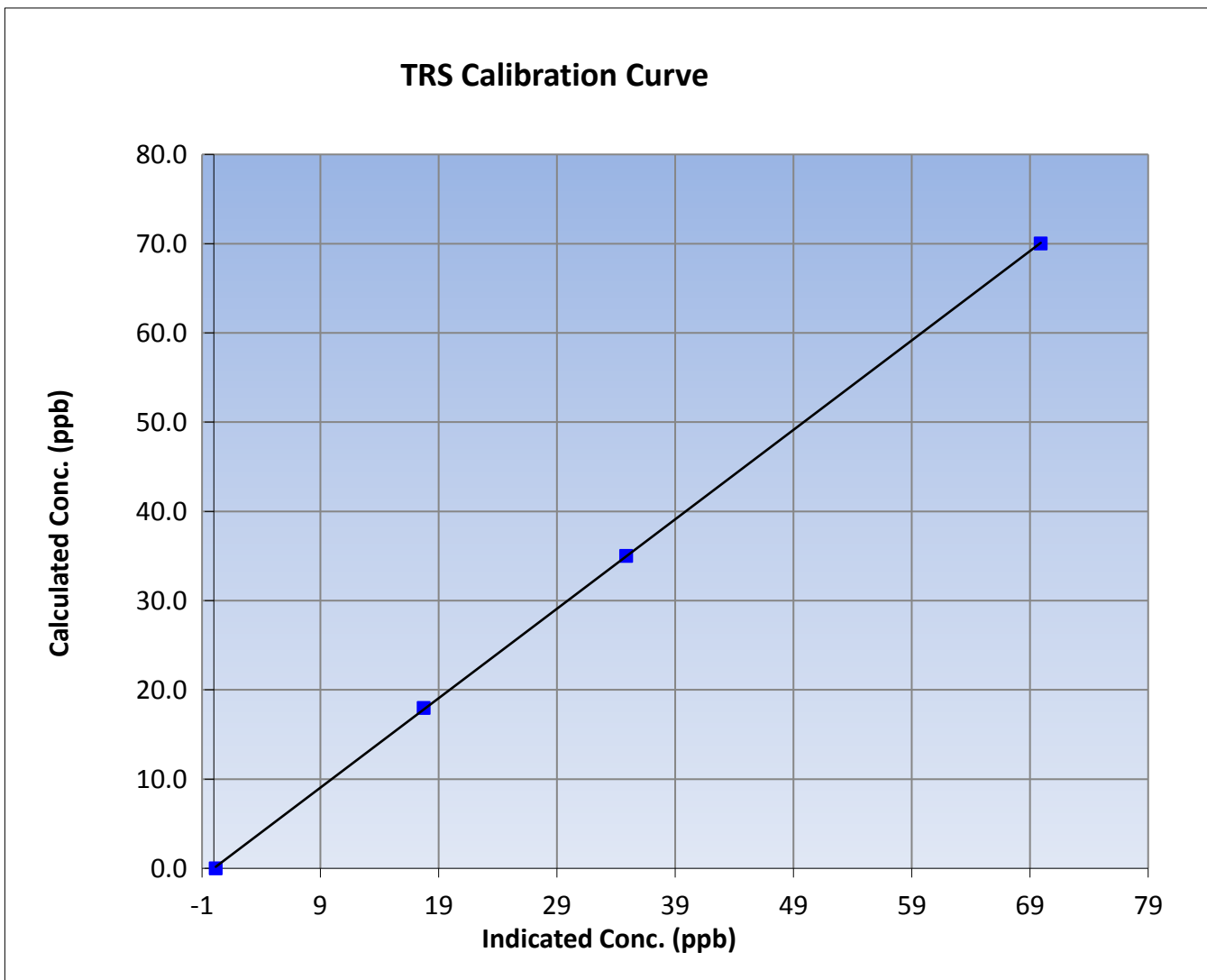
Wood Buffalo Environmental Association TRS Calibration Report

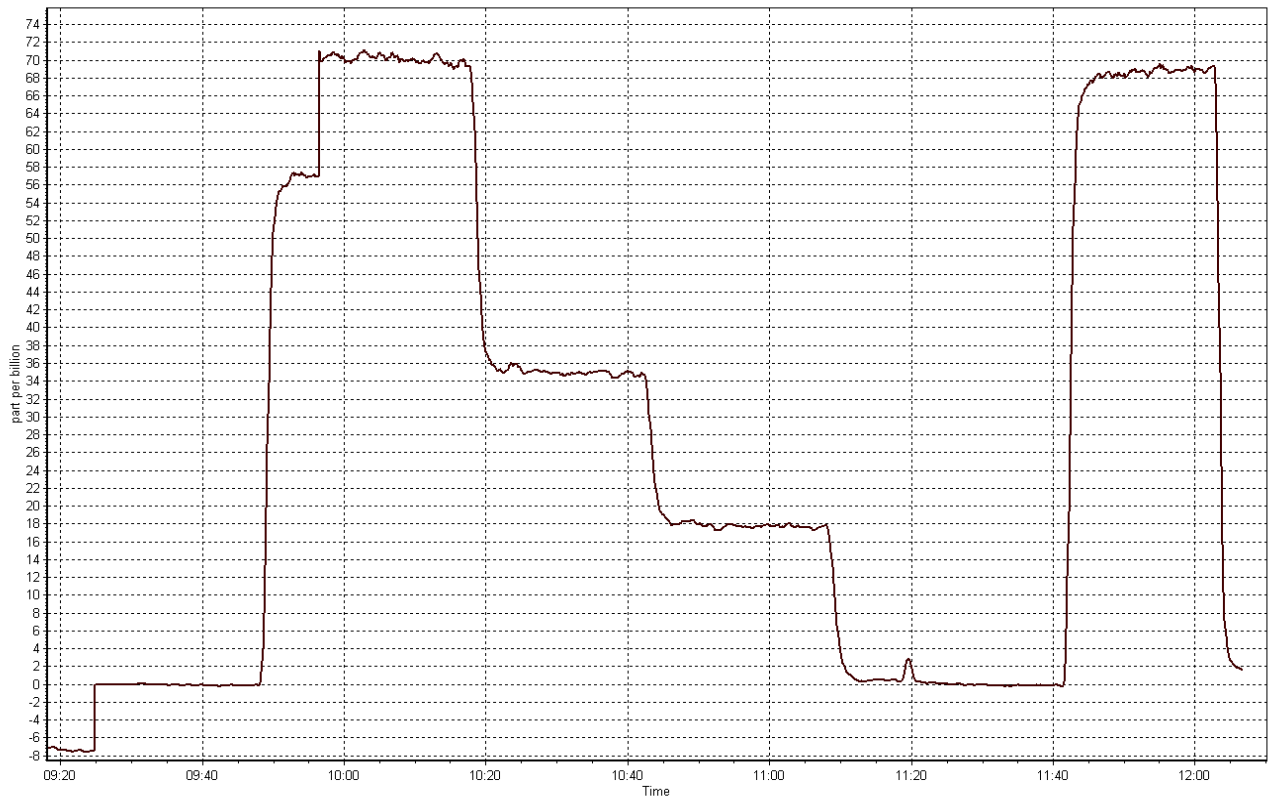
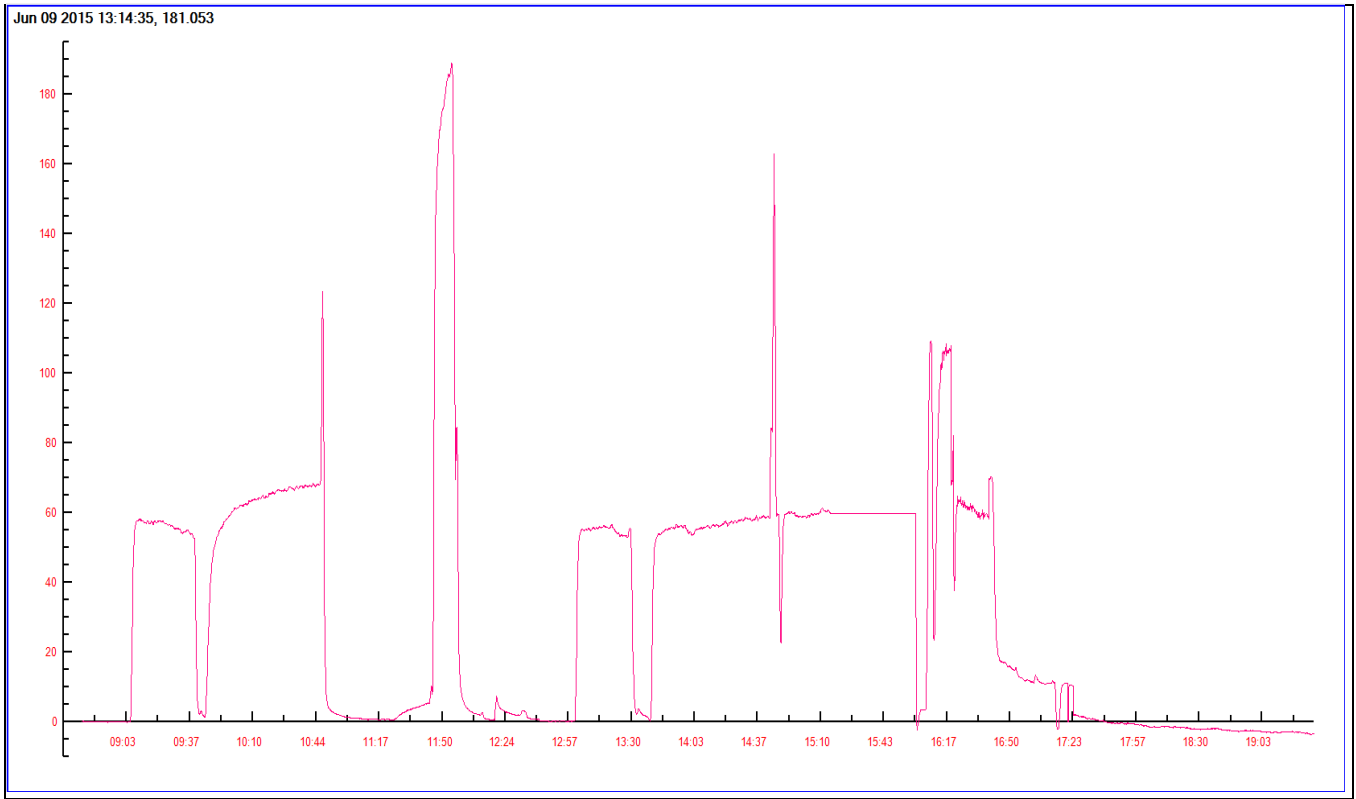
Station Information

Calibration Date	June 10, 2015	Previous Calibration	May 28, 2015
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	8:35	End Time (MST)	12:05
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1218153358

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	----	Correlation Coefficient	0.999970
70.0	69.9	1.0014		
35.0	34.9	1.0040	Slope	1.002256
18.0	17.7	1.0146		
			Intercept	0.014984







Wood Buffalo Environmental Association TRS Calibration Report

Station Information

Calibration Date	June 24, 2015	Last Calibration	June 10, 2015
Station Name	Patricia McInnes	Station Number	AMS 6
Reason:	Routine		
Start Time (MST)	8:25	End Time (MST)	12:28
Gas Cert Reference	ALM009562	Station temp.	22 Deg C
Cal Gas Concentration	4.84 ppm	Cal Gas Exp Date	05/02/2017
Calibrator Make/Model	Sabio 4010	Serial Number	14300410
Dil air Make/Model	API T701	Serial Number	60
DACS make/model	Campbell Scientific CR3000	DACS serial No.	9036
SO2 gas concentration	47 ppm	SO2 gas cert/exp	SA130110A 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	994	986
Calculated slope	1.002256	0.999319	Chamber temp	45	45
Calculated intercept	0.014984	-0.239704	Pressure	694.9	685.1
Analyzer Background	3.58	2.32	Flow	0.440	0.433
Analyzer Coefficient	1.203	1.281	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	6000	0.0	0.0	-1.4	----
as found span	6000	86.8	70.0	65.0	1.077
SO2 scrubber check	6000	22.1	173.1	0.6	----
calibrator zero	6000	0.0	0.0	0.2	----
high point	6000	86.8	70.0	70.2	0.997
second point	6000	43.4	35.0	35.5	0.986
third point	6000	22.3	18.0	18.2	0.990
as left zero	6000	0.0	0.0	0.3	----
as left span	6000	86.8	70.0	69.7	1.005
Average Correction Factor					0.991

Corrected As found	66.4	Previous response	69.8	% change	5.3%
--------------------	------	-------------------	------	----------	------

Notes:

Calibration to bump up baseline, drifted down since hydrocarbon kicker repair last calibration. Scrubber check after Calibrator Zero

Calibration Performed By: Ryan Power



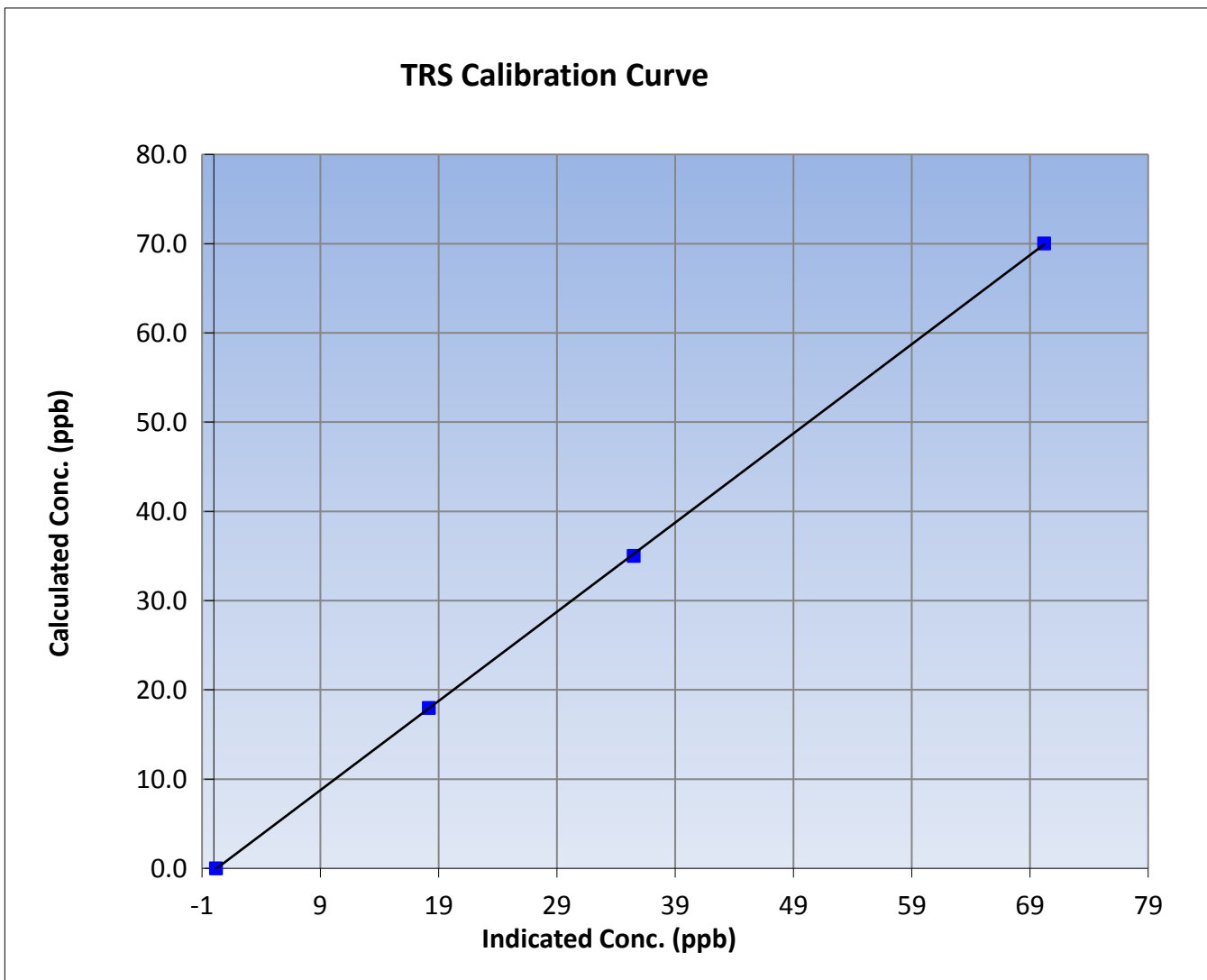
Wood Buffalo Environmental Association TRS Calibration Report

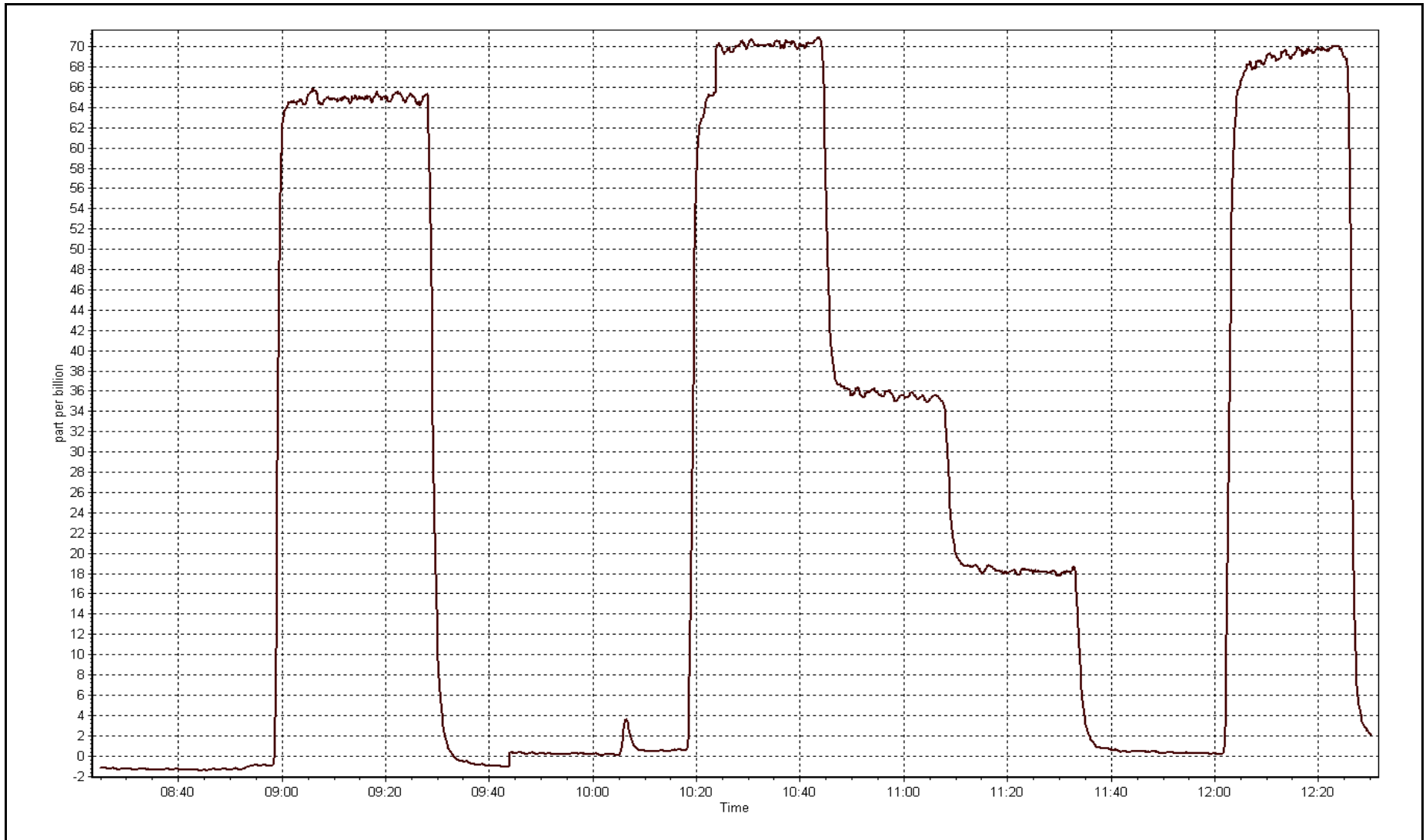
Station Information

Calibration Date	June 24, 2015	Previous Calibration	June 10, 2015
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	8:25	End Time (MST)	12:28
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	0.2	----	Correlation Coefficient	0.999974
70.0	70.2	0.9973		
35.0	35.5	0.9862	Slope	0.999319
18.0	18.2	0.9900		
			Intercept	-0.239704







Wood Buffalo Environmental Association THC / NMHC Calibration Report

Station Information

Calibration Date	June-11-15	Last Calibration	May-30-15
Station Name	Patricia McInnes	Station Number	AMS 6
Reason:	Routine		
Start Time (MST)	9:00	End Time (MST)	16:47
Gas Cert Reference	SA130110A	Cal Gas Expiry Date	December-12-16
CH4 Cal Gas Conc.	512.0 ppm	CH4 Equiv Conc.	1092.3 ppm
C3H8 Cal Gas Conc.	211.0 ppm	Station temp.	22 Deg C
Calibrator Model	Sabio 4010	Serial Number	14300410
ZAG make/model	Teledyne API 701	Serial Number	60
DACS make/model	Campbell Scientific CR3000	Serial Number	9036

Analyzer Information

	Before	After		Before	After
THC Range (ppm)	0 - 50 ppm		Column Temp	75.3	75.3
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	0.993721	0.998977	Carrier Pressure	34.5	34.5
THC Calc intercept	0.018288	0.053946	Fuel Pressure	42.3	42.3
NMHC Calc slope	0.999246	0.999536	Air Pressure	32.4	32.4
NMHC Calc intercept	-0.001929	0.032158			

Analyzer make Thermo 55i Analyzer serial # 1331259521

THC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6000	0.0	0.00	0.02	----
as found span	6000	88.2	16.06	16.01	1.003
calibrator zero	6000	0.0	0.00	0.00	----
high point	6000	88.2	16.06	16.05	1.000
second point	6000	44.1	8.03	7.94	1.011
third point	6000	22.1	4.02	3.93	1.024
as left zero	6000	0.0	0.00	0.00	----
as left span	6000	88.2	16.06	16.04	1.001
Average Correction Factor					1.012

Corrected As found 15.99 Previous response 16.14 % change 0.9%

Notes:

H2, N2, filter, and pump change after As Finds. Pump change for yearly preventative maintenance for the analyzer.

Calibration Performed By: Ryan Power



Wood Buffalo Environmental Association

THC / NMHC Calibration Report

NMHC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6000	0	0.00	0.00	----
as found span	6000	88.2	8.53	8.48	1.006
calibrator zero	6000	0.0	0.00	0.00	----
high point	6000	88.2	8.53	8.52	1.001
second point	6000	44.1	4.26	4.21	1.013
third point	6000	22.1	2.14	2.08	1.028
as left zero	6000	0.0	0.00	0.00	----
as left span	6000	88.2	8.53	8.49	1.005
Average Correction Factor					1.014

Corrected As found 8.48 Previous response 8.54 % change 0.7%

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	6000	0	0.00	0.02	----
as found span	6000	88.2	7.53	7.53	1.000
calibrator zero	6000	0.0	0.00	0.00	----
high point	6000	88.2	7.53	7.54	0.998
second point	6000	44.1	3.76	3.73	1.009
third point	6000	22.1	1.89	1.85	1.019
as left zero	6000	0.0	0.00	0.00	----
as left span	6000	88.2	7.53	7.55	0.997
Average Correction Factor					1.009

Corrected As found 7.51 Previous response 7.60 % change 1.2%



Wood Buffalo Environmental Association

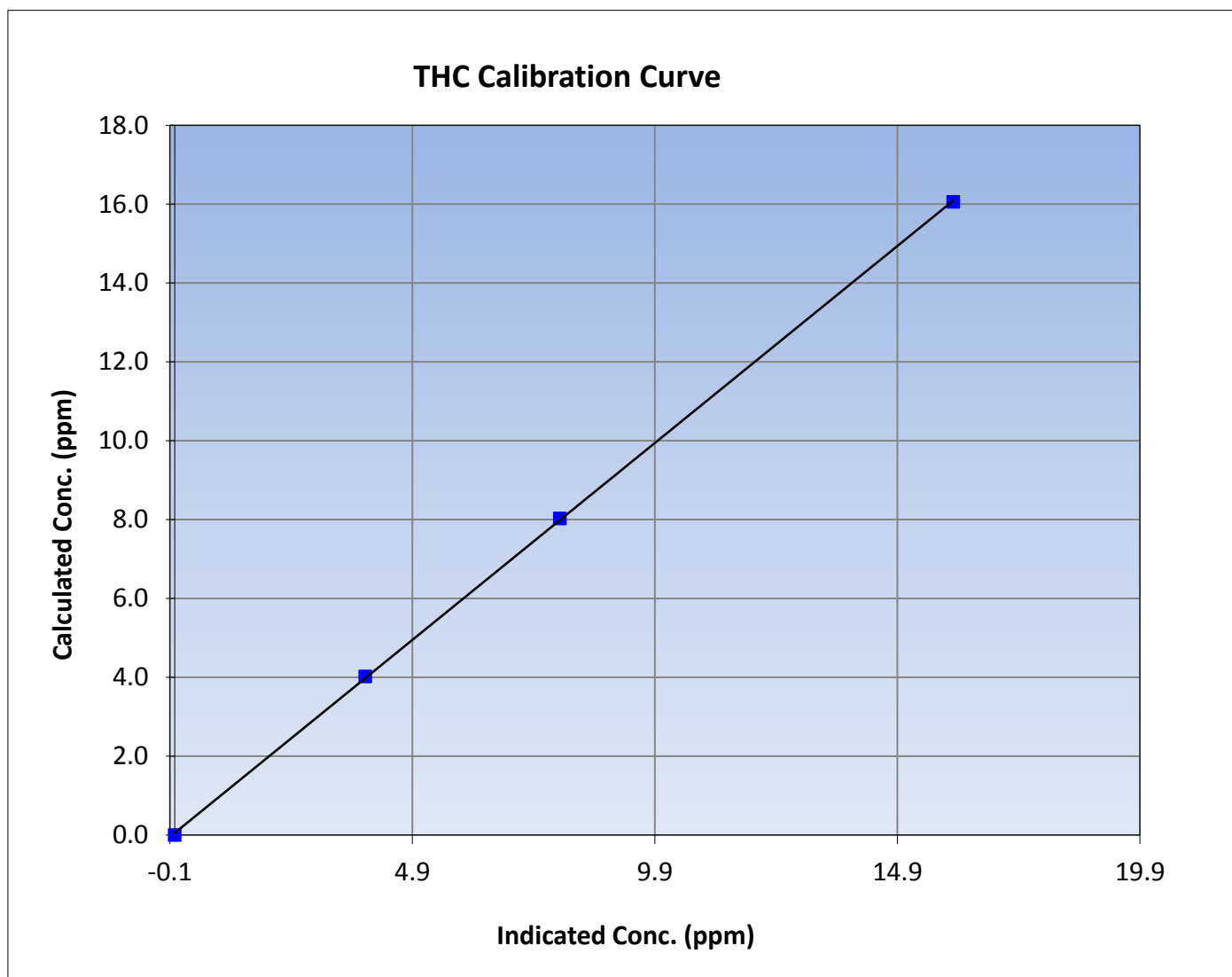
THC Calibration Summary

Station Information

Calibration Date	June 11, 2015	Previous Calibration	May 30, 2015
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	9:00	End Time (MST)	16:47
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	0.999946
16.06	16.05	1.0004		
8.03	7.94	1.0111	Slope	0.998977
4.02	3.93	1.0237		
			Intercept	0.053946





Wood Buffalo Environmental Association

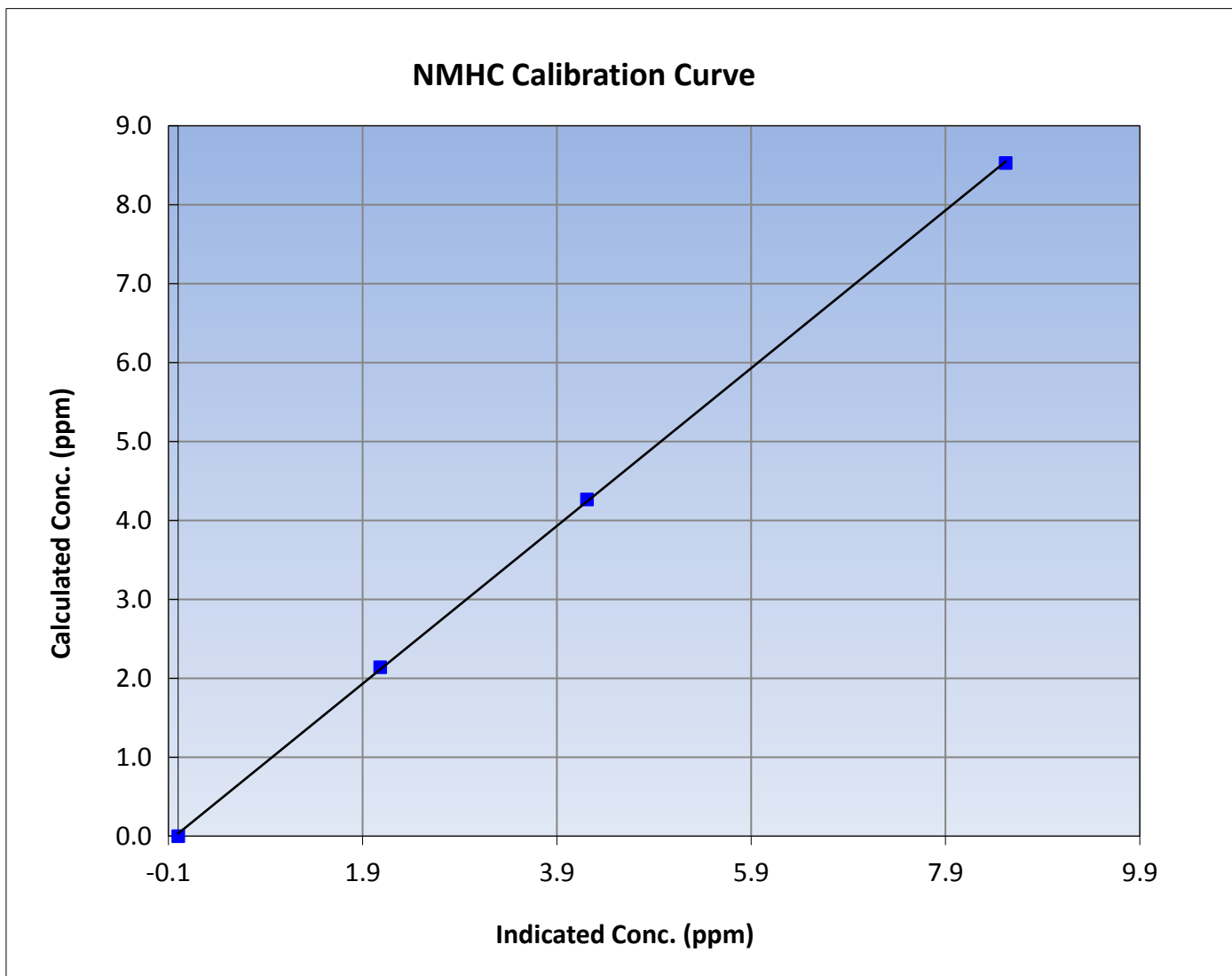
NMHC Calibration Summary

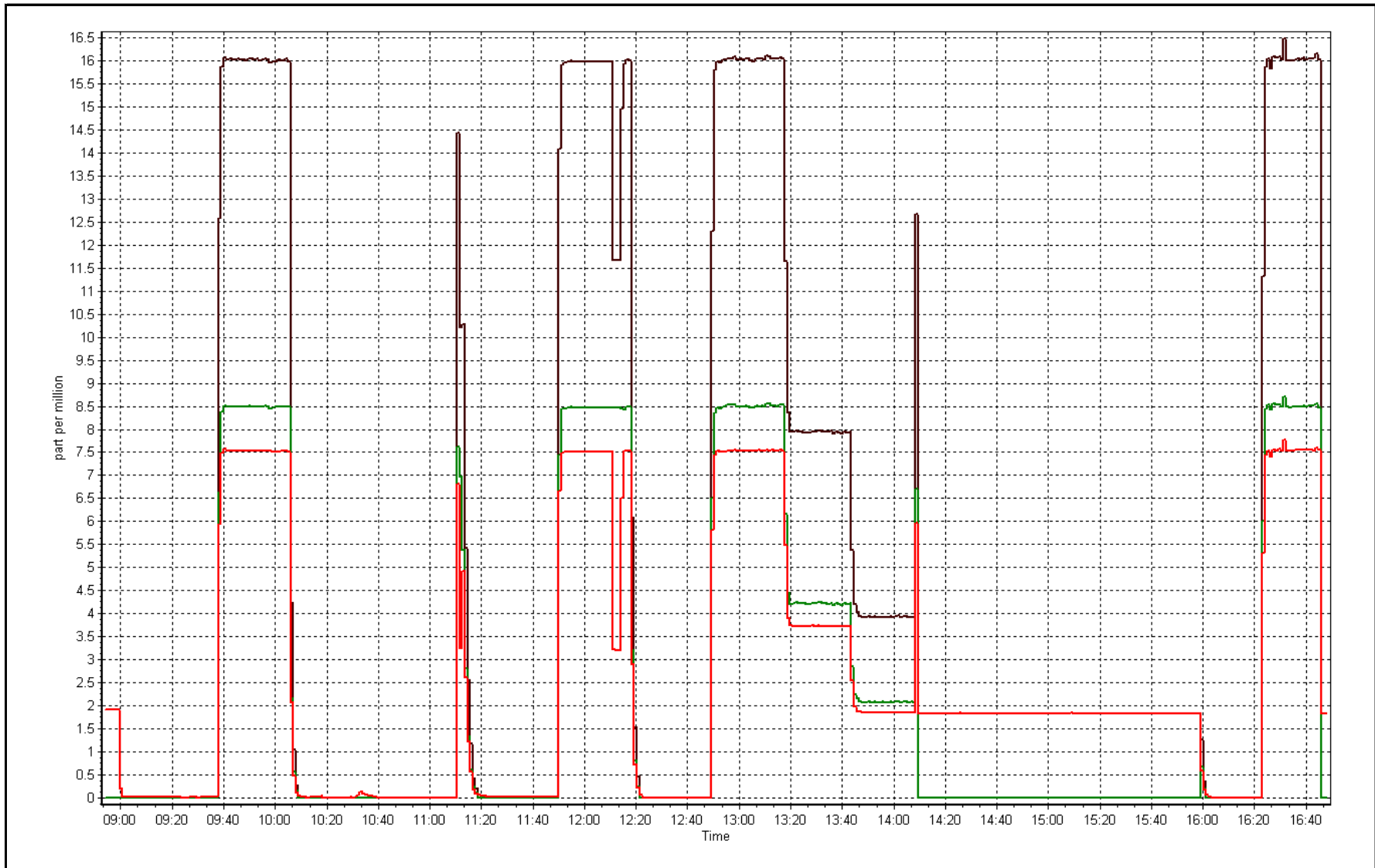
Station Information

Calibration Date	June 11, 2015	Previous Calibration	May 30, 2015
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	9:00	End Time (MST)	16:47
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	0.999933
8.53	8.52	1.0011		
4.26	4.21	1.0130	Slope	0.999536
2.14	2.08	1.0275		
			Intercept	0.032158







Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

Calibration Date	June 12, 2015	Previous Calibration	May 19, 2015
Station Name	Patricia McInnes	Station Number	AMS 6
Reason:	Routine		
Start Time (MST)	8:55	End Time (MST)	12:15
NO2 GPT Ref date	June-11-15	Transfer Standard	NO2
		Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	14300410
ZAG make/model	Teledyne API 701	Serial Number	60
DACS make/model	Campbell Scientific CR3000	Serial Number	9036

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 500 ppb		Bench temp.	26.6	26.7
Analyzer IP address	192.168.1.48		Lamp temp.	53.5	53.5
Calculated slope	1.003575	0.999637	Pressure	667.3	655.5
Calculated intercept	1.018924	-1.238425	Flow cell A	0.705	0.696
Analyzer Background	-0.4	-1.5	Flow cell B	0.729	0.721
Analyzer Coefficient	0.925	0.925	Cell A Intensity	82500	81800
			Cell B Intensity	77300	76500

Analyzer make	Thermo 49i	Analyzer serial #	1300156234
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Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator Lamp Intensity (mA)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6000	0.00	0.0	-0.8	----
as found span	6000	0.783	339.7	338.1	1.005
calibrator zero	6000	0.00	0.0	0.7	----
high point	6000	0.783	339.7	341.0	0.996
second point	6000	0.522	215.0	216.1	0.995
third point	6000	0.261	90.7	92.8	0.978
as left zero	6000	0.00	0.0	0.8	----
as left span	6000	0.783	339.7	342.1	0.993
Average Correction Factor					0.990

Corrected As found	338.9	Previous response	337.5	% change	-0.4%
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Notes:

Filter changed after As Finds. Zero adjusted.

Calibration Performed By:

Ryan Power



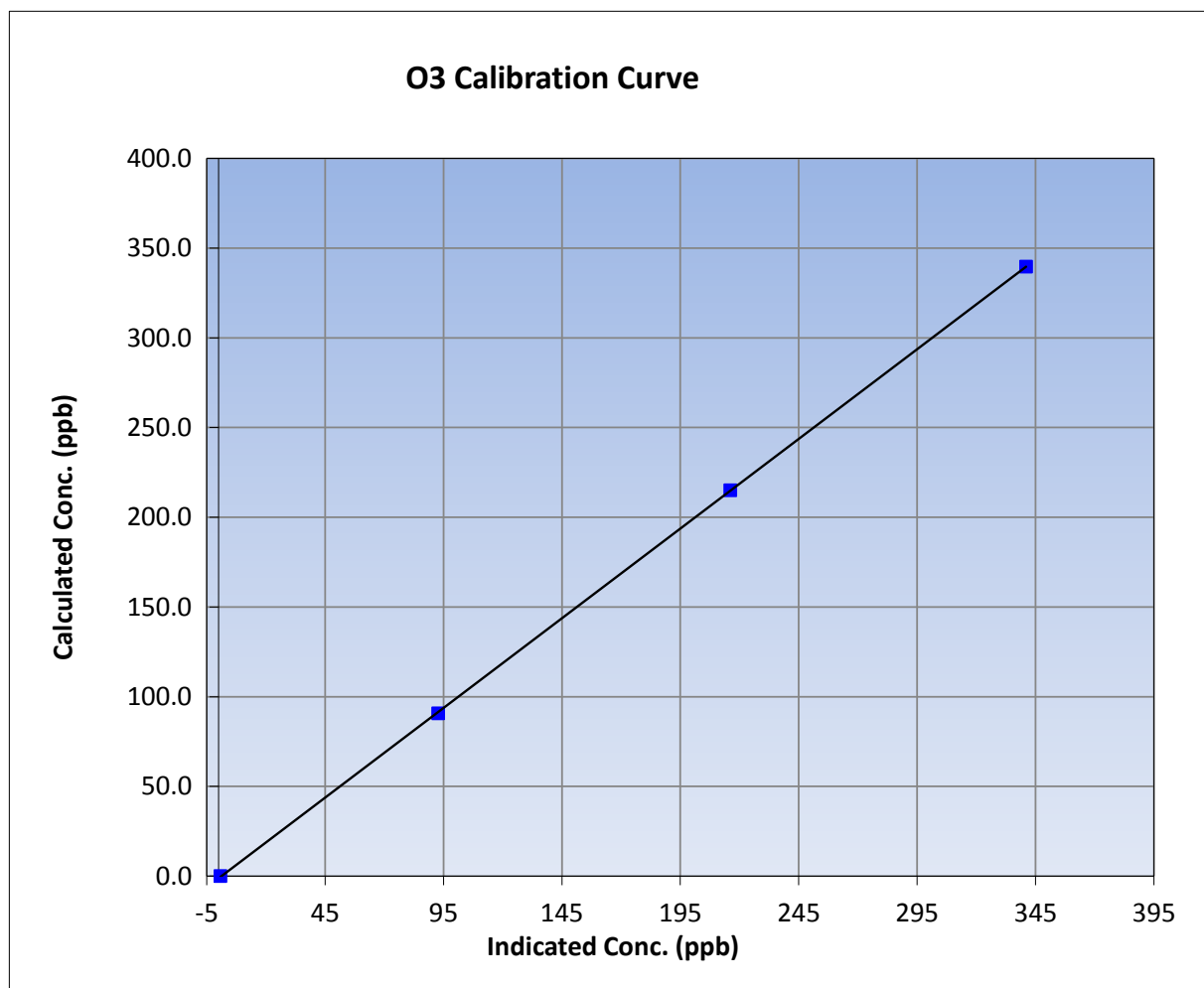
Wood Buffalo Environmental Association O3 Calibration Report

Station Information

Calibration Date	June-12-15	Previous Calibration	May 19, 2015
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	8:55	End Time (MST)	12:15
Analyzer make	Thermo 49i	Analyzer serial #	1300156234

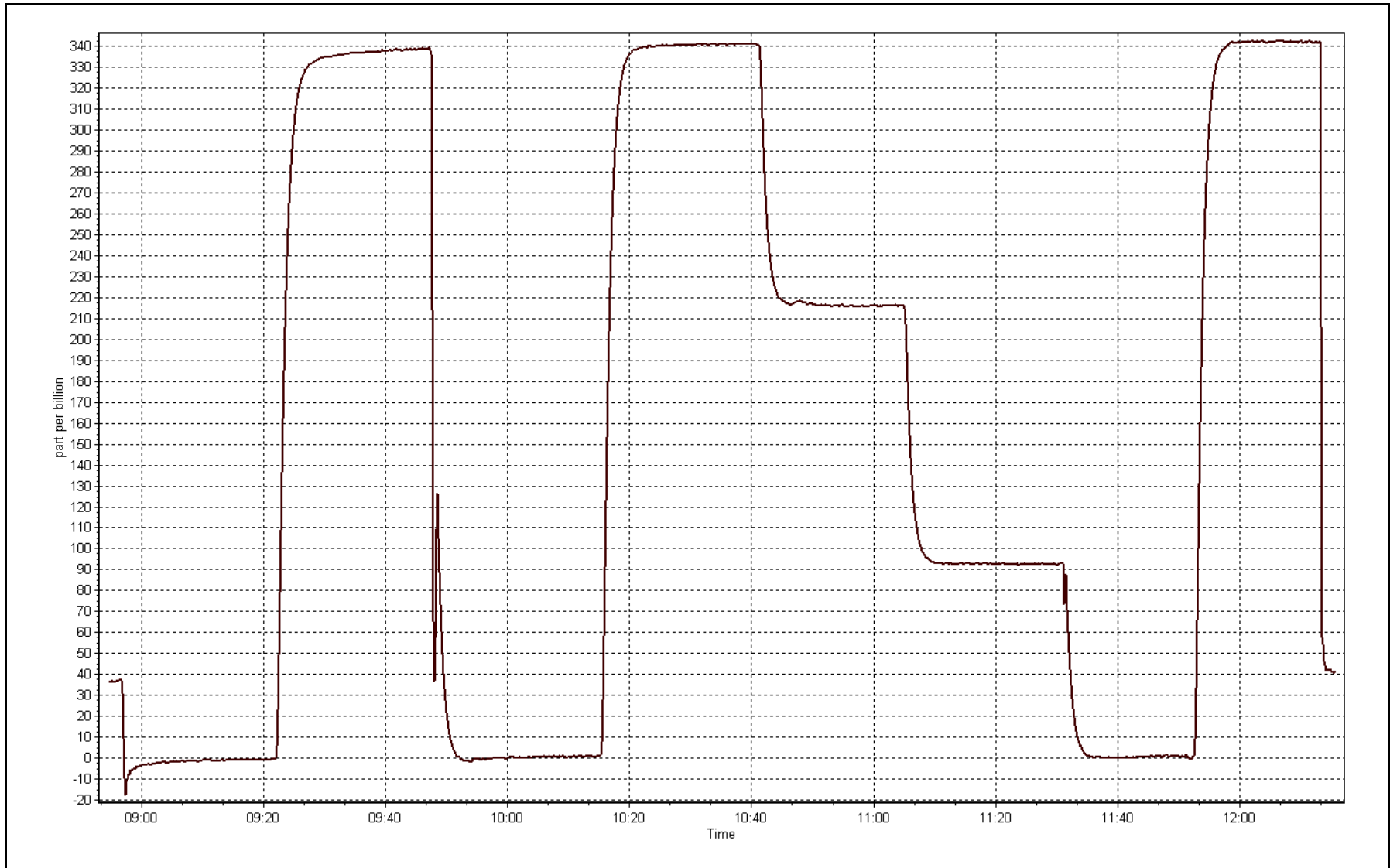
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.7	----	Correlation Coefficient	0.999985
339.7	341.0	0.9962		
215.0	216.1	0.9950	Slope	0.999637
90.7	92.8	0.9776		
			Intercept	-1.238425



O3 Calibration Plot

Date: June 12, 2015





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	June 11, 2015	Previous Calibration	May 19, 2015
Station Name	Patricia McInnes	Station Number	AMS 6
Reason:	Routine		
Start Time (MST)	9:00	End Time (MST)	16:47
NO Cal Gas Conc	54.4 ppm	Gas Cert Reference	SA130110A
NOx Cal Gas Conc	54.4 ppm	Cal Gas Expiry Date	12/12/2016
Calibrator	Sabio 4010	Serial Number	14300410
Zero air Generator	Teledyne API T701	Serial Number	60

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	9036
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Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.996118	0.998105	0.995423
	Data Offset	0.642250	1.345175	0.462732
Current Calibration	Data Slope	0.996764	0.998473	0.996382
	Data Offset	0.562597	1.087009	-0.387790

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1218153460
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Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
NO coefficient	0.927		0.938	
NOx coefficient	1.000		1.000	
NO2 coefficient	1.000		1.000	
NO bkgrnd	2.3		2.3	
NOx bkgrnd	2.8		2.9	
Chamber Temp	50.4	Deg C	50.4	Deg C
Moly Temp	324.7	Deg C	325.5	Deg C
PMT voltage	-761	V	-761	V
PMT Temp	-3	Deg C	-3	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	165.5	mmHg	162.6	mmHg
R Cell Press Nox	165.5	mmHg	162.6	mmHg
NO sample flow	0.855	lpm	0.842	lpm
Nox sample Flow	0.855	lpm	0.841	lpm

Notes:

Span adjusted, filter changed after As Finds. Work on 55i during 10:20 to 12:20



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date:

June 11, 2015

Station Number:

AMS 6

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	6000	0.0	0.0	0.0	0.0	0.1	0.0	0.1	----	----
as found span	6000	88.2	799.7	799.7	0.0	789.5	785.7	3.8	1.0129	1.0178
calibrator zero	6000	0.0	0.0	0.0	0.0	0.0	0.1	-0.1	----	----
high point	6000	88.2	799.7	799.7	0.0	801.9	800.3	1.6	0.9973	0.9993
second point	6000	44.1	399.8	399.8	0.0	400.6	399.2	1.4	0.9981	1.0016
third point	6000	22.1	200.4	200.4	0.0	199.7	198.1	1.6	1.0032	1.0113
as left zero	6000	0.0	0.0	0.0	0.0	0.1	0.1	0.0	----	----
as left span	6000	88.2	799.7	460.0	339.7	804.1	459.2	344.9	0.9945	1.0017
Average Correction Factor									0.9995	1.0041

Corrccted As found NO_x= 789.4 NO= 785.6 Percent Change NO_x= 1.6% NO= 1.8%
 Previous Response NO_x= 802.2 NO= 799.9

GPT Calibration Data

Dilution Flow 6000 ccm Source Gas Flow 88.20 ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
Cal zero			0.0			-0.1			N/A	
1st NO2 (300)	----	460.0	339.7	800.8	460.0	340.8	0.9841	1.0000	0.9965	100.3%
2nd NO2 (200)	----	584.6	215.0	801.3	584.6	216.7	0.9835	1.0000	0.9923	100.8%
3rd NO2 (100)	----	709.0	90.7	800.8	709.0	91.8	0.9841	1.0000	0.9872	101.3%
4th NO2 (0)	799.7	----	1.3	800.9	799.7	1.3	0.9840	1.0000	N/A	----
Average Correction Factor							0.9839	1.0000	0.9920	100.8%

Calibration Performed By: Ryan Power



Wood Buffalo Environmental Association

NO_x Calibration Summary

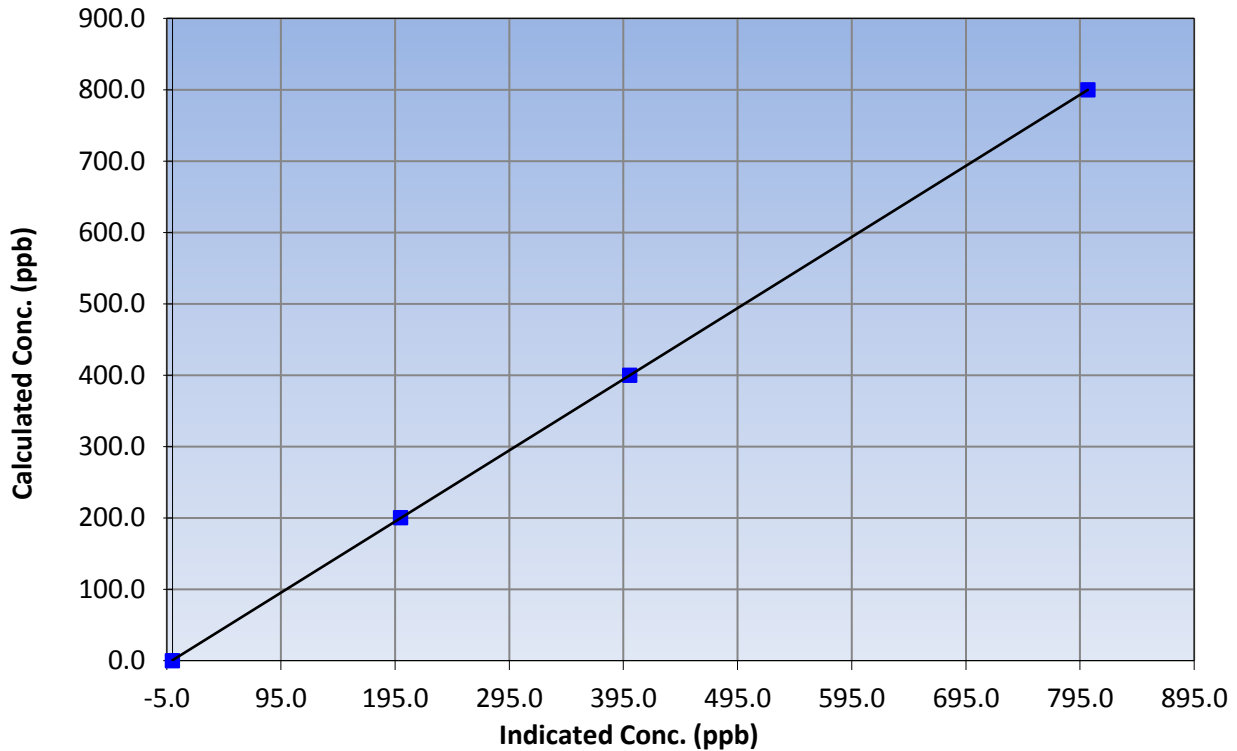
Station Information

Calibration Date	June 11, 2015	Previous Calibration	May 19, 2015
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	9:00	End Time (MST)	16:47
Analyzer make	Thermo 42i	Analyzer serial #	1218153460

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999998
799.7	801.9	0.9973		
399.8	400.6	0.9981	Slope	0.996764
200.4	199.7	1.0032		
			Intercept	0.562597

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

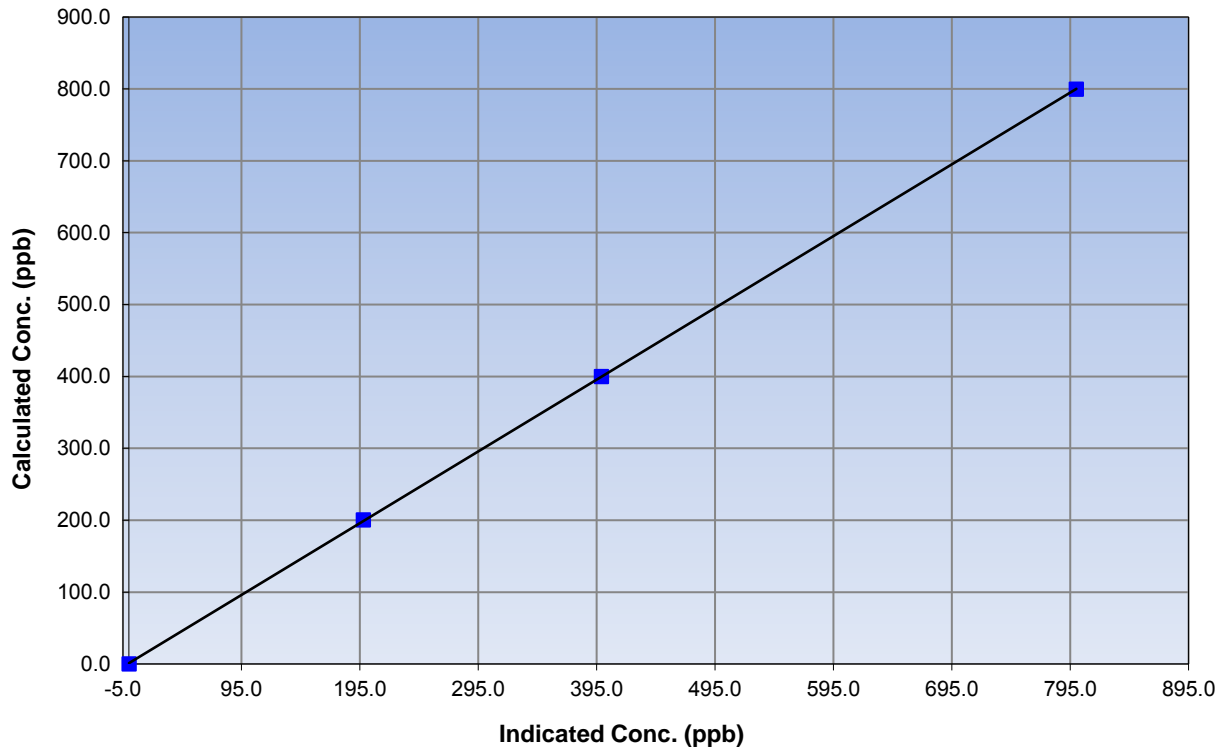
Station Information

Calibration Date	June 11, 2015	Previous Calibration	May 19, 2015
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	9:00	End Time (MST)	16:47
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	0.999989
799.7	800.3	0.9993		
399.8	399.2	1.0016	Slope	0.998473
200.4	198.1	1.0113		
			Intercept	1.087009

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

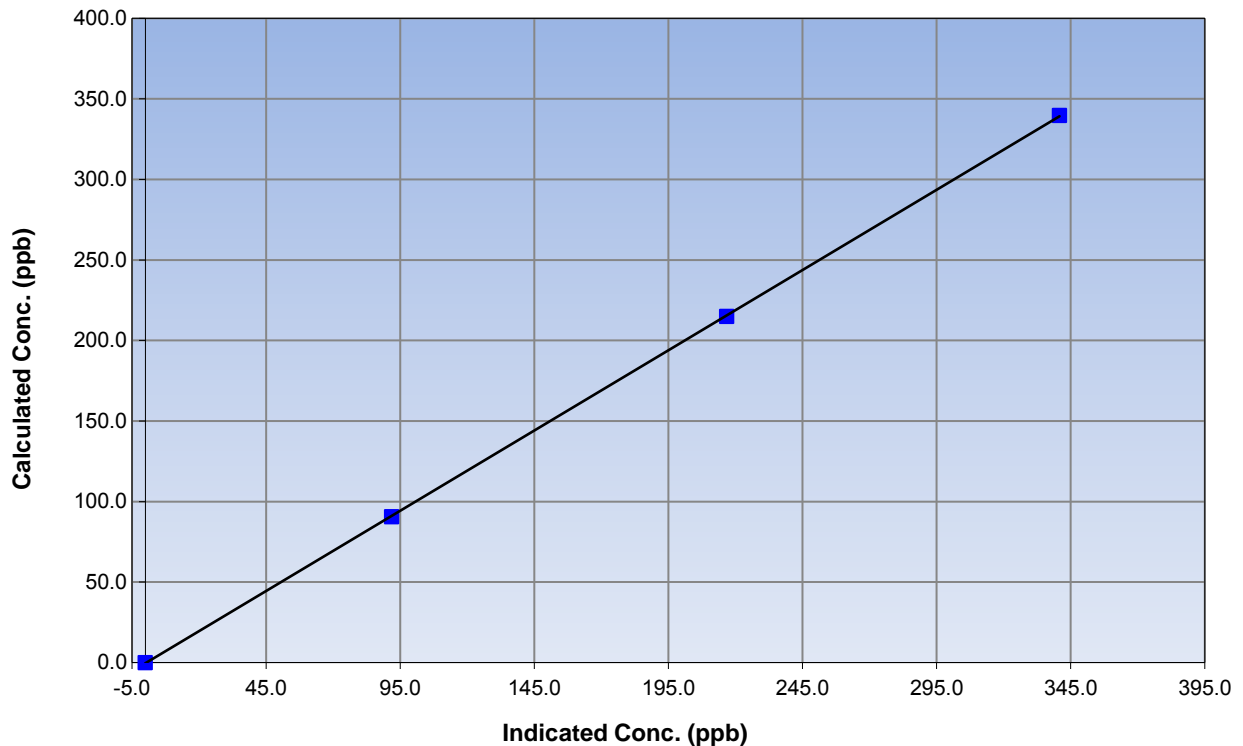
Station Information

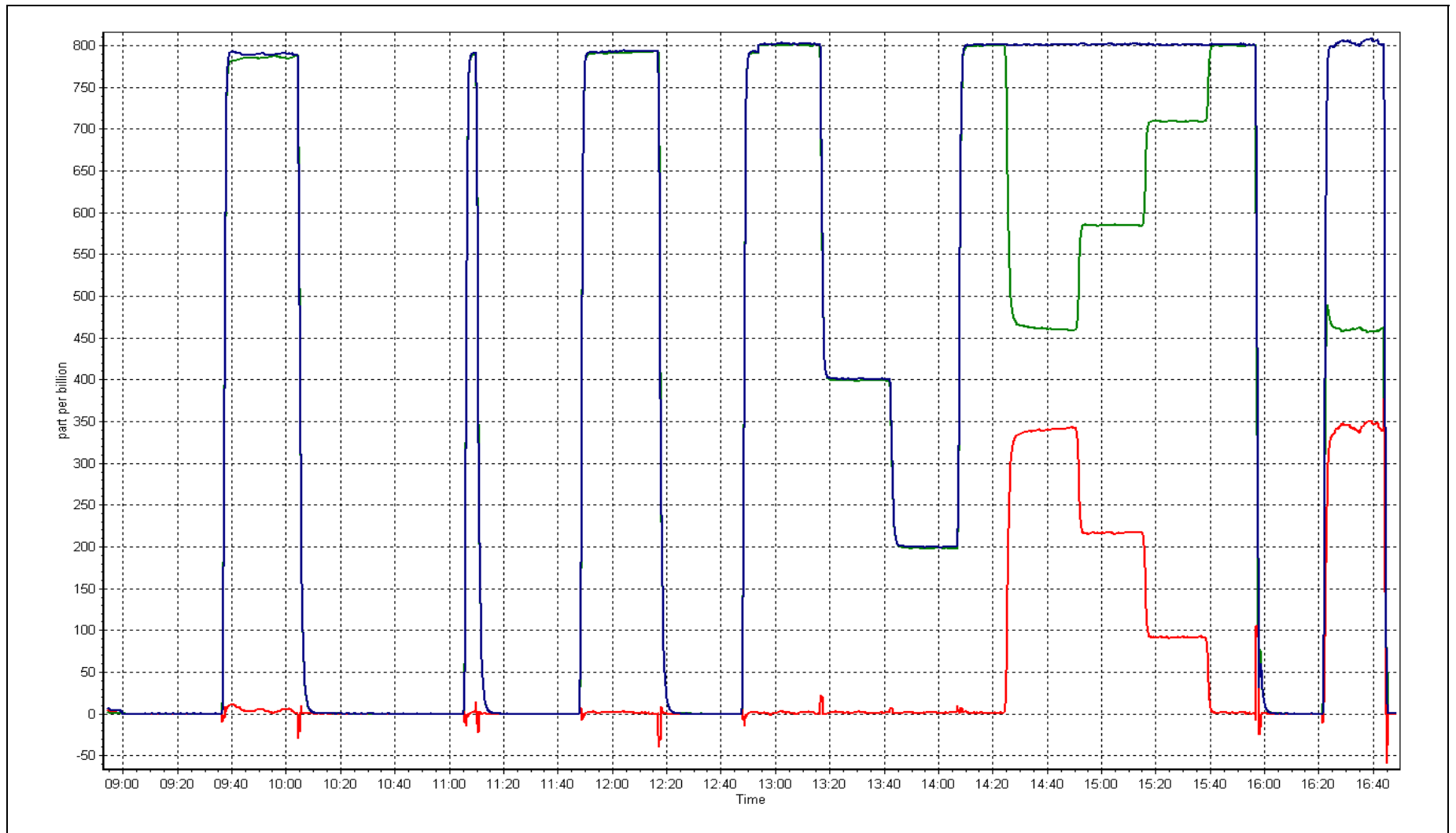
Calibration Date	June 11, 2015	Previous Calibration	May 19, 2015
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	9:00	End Time (MST)	16:47
Analyzer make	Thermo 42i	Analyzer serial #	1218153460

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999986
339.7	340.8	0.9965		
215.0	216.7	0.9923	Slope	0.996382
90.7	91.8	0.9872		
			Intercept	-0.387790

NO₂ Calibration Curve







Wood Buffalo Environmental Association

N_t-NO_x-NH₃ Calibration Report

Station Information

Station Name	Patricia McInnis	Station Number	AMS 6
NOx Calibration Date	June 11, 2015	NOx Previous Cal Date	May 19, 2015
NH3 Calibration Date	June 12, 2015	NH3 Previous Cal Date	May 20, 2015
Reason:	Routine		
Start Time (MST)	9:00	End Time (MST)	19:20
Barometric Pressure	n/a mmHg	Station Temperature	21.0 Deg C
Calibrator	Sabio 4010	Serial Number	14300410
NH3 Cal Gas Conc	190 ppm	NH3 Expiry Date / SN	April 3, 2012 LL86349
NOx Cal Gas Conc	54.4 ppm	NO Expiry Date / SN	December 12, 2016 SA130110A
NO Cal Gas Conc	54.4 ppm		

DACs Information

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

Parameter		NH3	Nt	NOx	NO	NO2
Cal Stats As Found	Data Slope	0.998793	0.980616	1.001305	0.999897	1.008542
	Data Offset	-1.686105	-1.607314	0.740784	2.134116	1.026837
Cal Stats After	Data Slope	1.020053	1.005109	0.994087	0.992297	1.013443
	Data Offset	-0.010201	0.000000	2.308877	2.984533	0.540661
IP address			192.168.1.17			

Analyzer Information

Analyzer make/model	<u>API T201</u>	Analyzer serial #	<u>215</u>
Converter	<u>API 501 NH#</u>	Converter serial #	<u>217</u>

Test Point	before		after	
NH3 Conc range	2500	ppb	2500	ppb
NOx Conc range	1000	ppb	1000	ppb
NO BKG	-0.1	ppb	-0.1	ppb
NOx BKG	0.2	ppb	0.2	ppb
Nt BKG	2.1		2.1	
NO coefficient	0.965		0.965	
NO2 coefficient	1.000	ppb	1.000	ppb
NOx coefficient	0.973		0.973	
NH3 coefficient	NA		NA	
Nt coefficient	0.960		0.960	
NH3 conv temp	825	DegC	825	Deg C
Chamber Temp	50.0	Deg C	50.0	Deg C
Moly Temp	314.6	Deg C	314.6	Deg C
PMT Temp	7.0	Deg C	7.0	Deg C
O3 flow	86.0	ccm	86.0	ccm
R Cell Press	4.6	mmHg	4.6	mmHg
HVPS	693.0	v	693.0	v
Sample Flow 1 NO	553.0	ccm	553.0	ccm
Sample Flow 2 Nox	553.0	ccm	553.0	ccm
Sample Flow 3 Nt	553.0	ccm	553.0	ccm

Notes:

Filter changed after As Finds. NH3 points reflect as found conditions of existing cal gas cylinder prior to replacement.



Wood Buffalo Environmental Association

Nt-NO_x-NH₃ Calibration Report

Station Information

Calibration Date:

June 12, 2015

Station Number:

AMS 6

NH₃ Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated Nt conc (ppb)	Calculated NO _x conc (ppb)	Calculated NH ₃ conc (ppb)	Indicated Nt conc (ppb)	Indicated NO _x conc (ppb)	Indicated NH ₃ conc (ppb)	Nt Correction factor	NH ₃ Correction factor
as found zero	6000	0.0	0.0	0.0	0.0	-0.3	0.1	-0.4	----	----
as found NO	6000	88.2	799.7	799.7	----	794.8	794.8	0.0	1.006	----
calibrator zero	6000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
high NO point	6000	88.2	799.7	799.7	----	800.5	803.3	-2.8	0.999	----
NO/O ₃ point	6000	88.2	799.7	799.7	----	801.5	801.5	0.0	0.998	----
as found NH ₃	6000	63.2	2001.3	NA	2001.3	1991.2	29.2	1962.0	1.005	1.020
first NH ₃	6000	63.2	2001.3	NA	2001.3	1991.2	29.2	1962.0	1.005	1.020
second NH ₃										
third NH ₃										
Average Correction Factor									0.9983	1.0200

NH₃ Corrected As Found
 Nt Corrected As Found
 NO_x Corrected As Found

NH₃ = 1962.4 ppb
 NH₃ = 795.1 ppb
 NH₃ = 794.7 ppb

Previous Response
 Previous Response
 Previous Response

NH₃ = 1966.5 ppb
 Nt = 812.4 ppb
 NO_x = 792.9 ppb

NH₃ percent change 0.2%
 Nt percent change 2.2%
 NO_x percent change -0.2%



Wood Buffalo Environmental Association

NO_x(NH₃) Calibration Report

Station Information

Calibration Date: June 11, 2015 Station Number: AMS 6

NO_x / NO / Nt Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NO _x conc (ppb)	Calculated NO conc (ppb)	Calculated Nt conc (ppb)	Indicated NO _x conc (ppb)	Indicated NO conc (ppb)	Indicated Nt conc (ppb)	NO _x Correction factor	NO Correction factor
as found zero	6000	0.0	0.0	0.0	0.0	0.1	0.0	-0.1	----	----
as found span	6000	88.2	799.7	799.7	799.7	797.2	795.1	797.3	1.0031	1.0058
calibrator zero	6000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
high point	6000	88.2	799.7	799.7	799.7	803.3	804.4	800.5	0.9955	0.9941
second point	6000	44.1	399.8	399.8	399.8	398.6	398.2	398.4	1.0031	1.0041
third point	6000	22.1	200.4	200.4	200.4	197.1	196.1	196.9	1.0169	1.0217
as left zero	6000	0.0	0.0	0.0	0.0	-0.9	-1.0	1.5	----	----
as left span	6000	88.2	799.7	459.6	799.7	794.5	459.1	796.5	1.0065	1.0012
Average Correction Factor									1.0052	1.0067

	<u>Nt</u>	<u>NO_x</u>	<u>NO</u>	<u>NO₂</u>
Corrected As found	797.36	794.67	795.12	336.57
Previous Response	817.1	797.9	793.0	332.9
Percent Change	2.5%	0.4%	-0.3%	-1.1%

GPT Calibration Data

Dilution Flow 6000 ccm Source Gas Flow 88.20 ccm

O ₃ Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO ₂ conc (ppb)	Indicated NO _x conc (ppb)	Indicated NO conc (ppb)	Indicated NO ₂ conc (ppb)	NO _x Correction factor	NO Correction factor	NO ₂ Correction factor	Converter Efficiency
Cal zero			0.0			0.2			----	
1st NO ₂ (300)	----	459.6	341.7	796.4	459.6	336.8	1.0041	1.0000	1.0146	98.6%
2nd NO ₂ (200)	----	584.9	216.4	798.1	584.9	213.2	1.0019	1.0000	1.0149	98.5%
3rd NO ₂ (100)	----	709.1	92.2	798.5	709.1	89.4	1.0015	1.0000	1.0322	96.9%
4th NO ₂ (0)	801.3	----	0.2	801.5	801.3	0.2	0.9977	1.0000	----	----
Average Correction Factor							1.0013	1.0000	1.0206	98.0%

Calibration Performed By: Ryan Power



Wood Buffalo Environmental Association

NH3 Calibration Summary

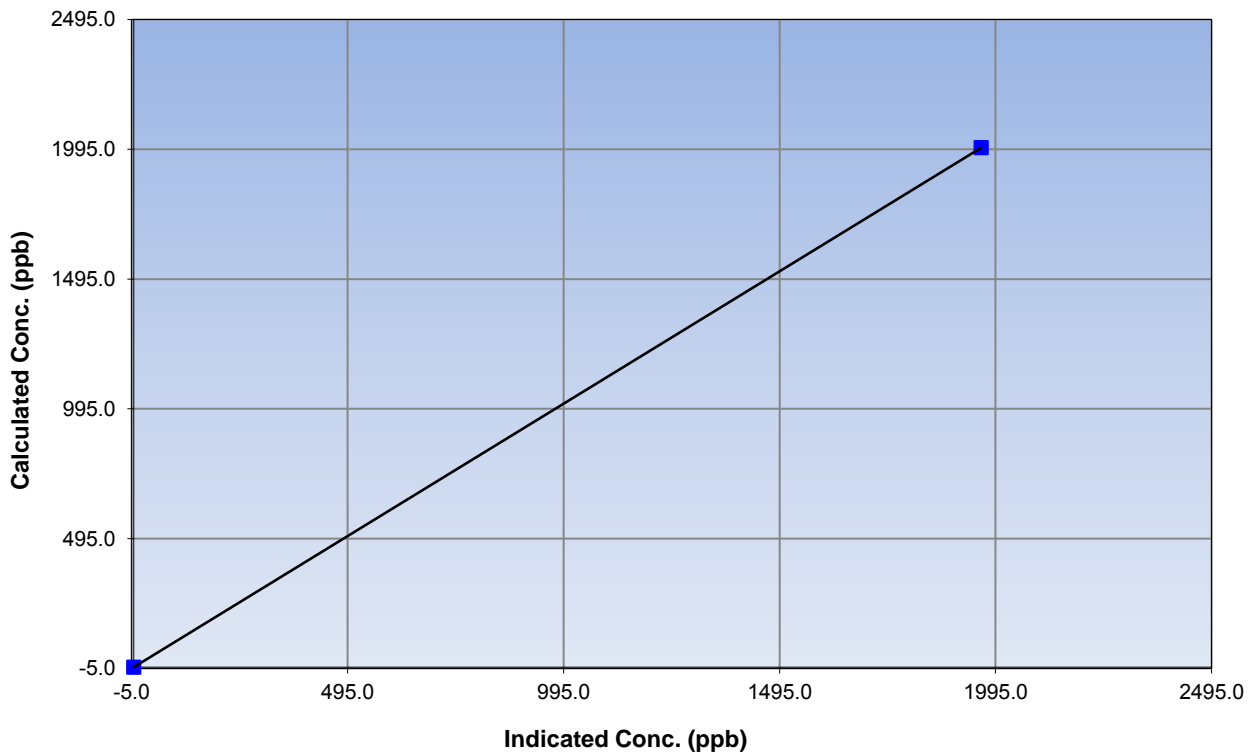
Station Information

Calibration Date	June 12, 2015	Previous Calibration	May 19, 2015
Station Name	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	9:00	End Time (MST)	19:20
Analyzer make	API T201	Analyzer serial #	215

NH3 Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	1.000000
2001.3	1962.0	1.0200		
			Slope	1.020053
			Intercept	-0.010201

NH3 Calibration Curve





Wood Buffalo Environmental Association

Nt Calibration Summary

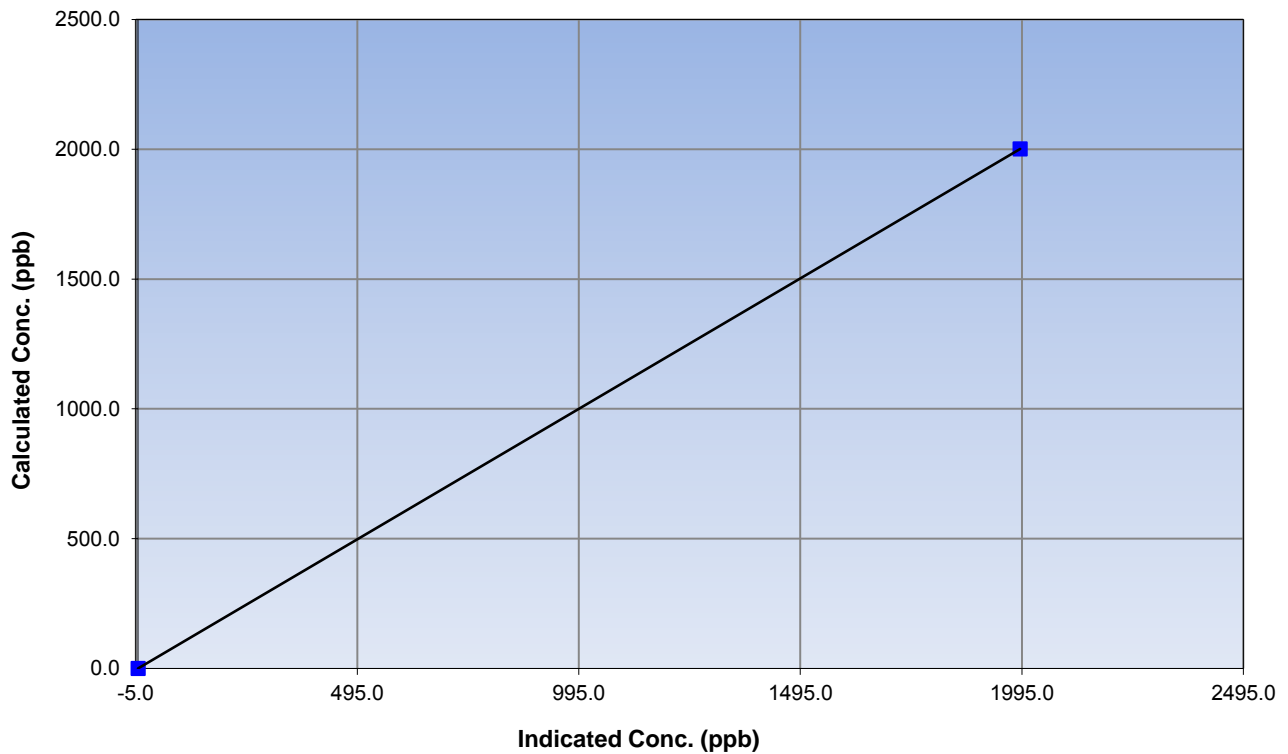
Station Information

Calibration Date	June 12, 2015	Previous Calibration	May 19, 2015
Station Name	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	9:00	End Time (MST)	19:20
Analyzer make	API T201	Analyzer serial #	215

Nt (NH₃) Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	1.000000
2001.3	1991.2	1.0051		
			Slope	1.005109
			Intercept	0.000000

Nt Calibration Curve





Wood Buffalo Environmental Association

NOx Calibration Summary

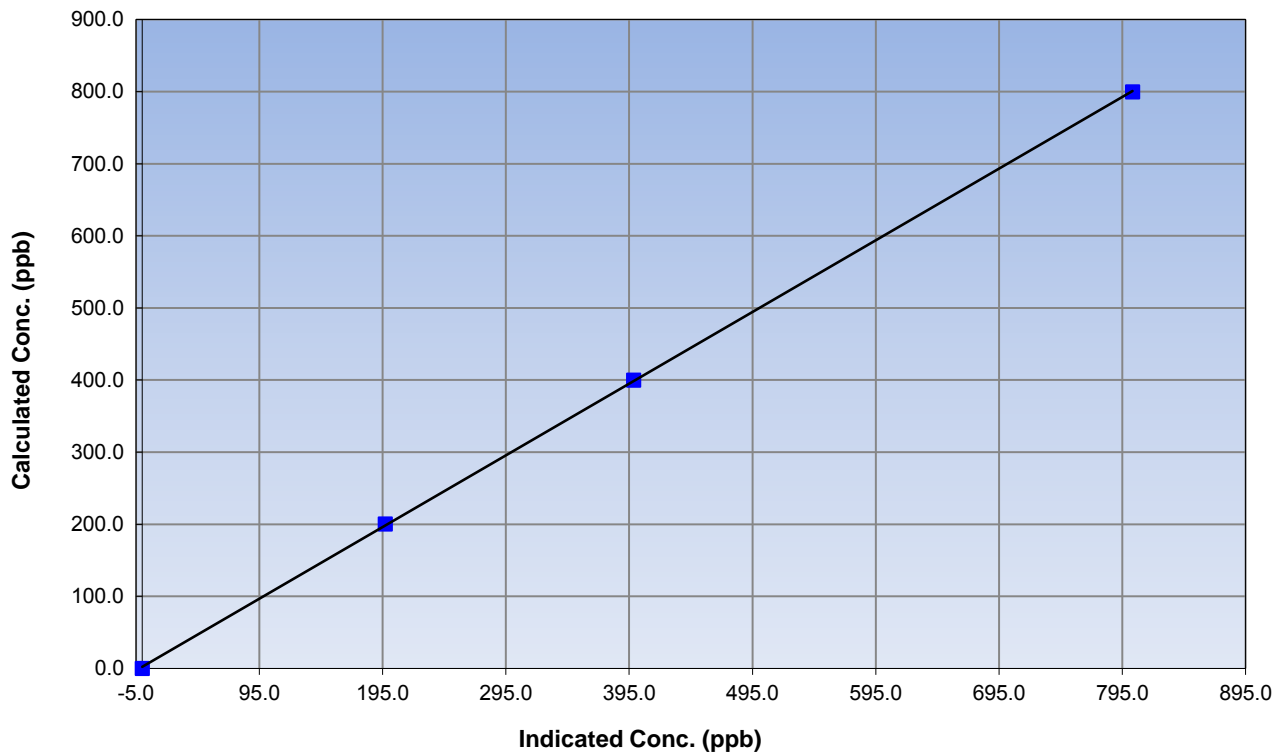
Station Information

Calibration Date	June 11, 2015	Previous Calibration	May 19, 2015
Station Name	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	9:00	End Time (MST)	19:20
Analyzer make	API T201	Analyzer serial #	215

NO_x Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999962
799.7	803.3	0.9955		
399.8	398.6	1.0031	Slope	0.994087
200.4	197.1	1.0169		
			Intercept	2.308877

NOx Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

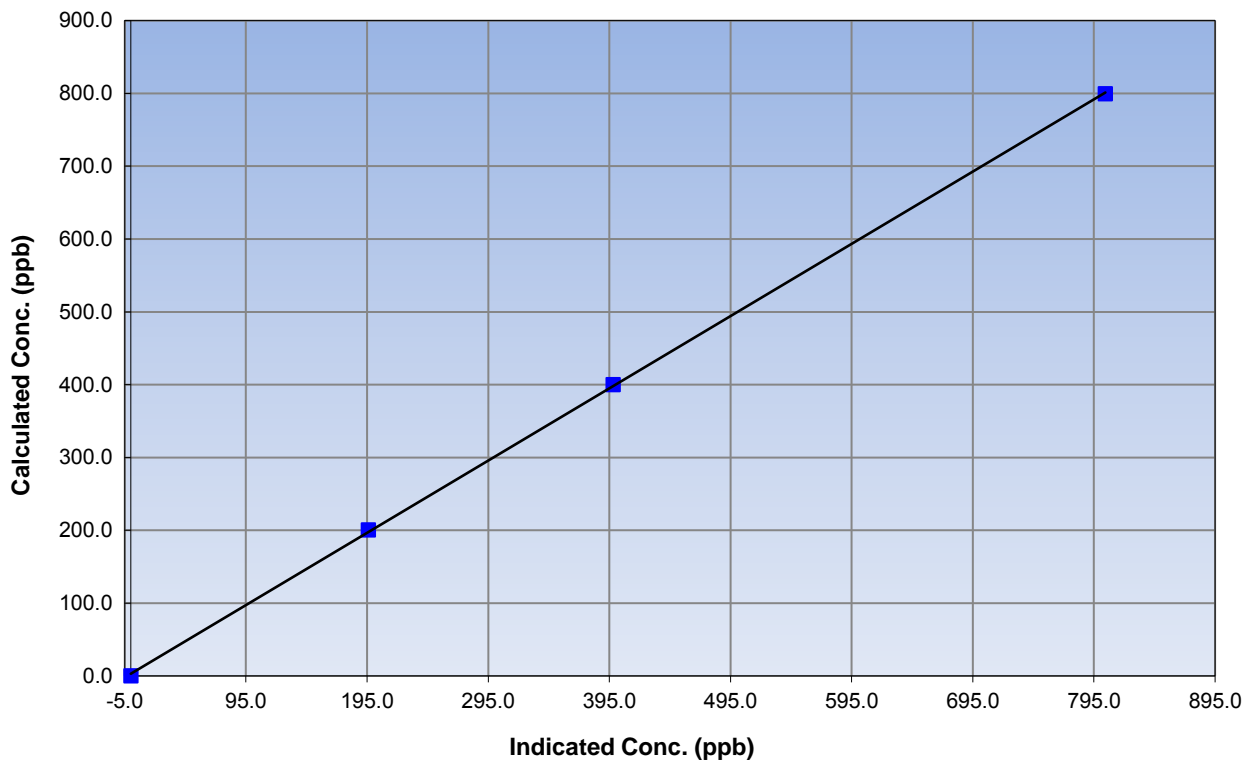
Station Information

Calibration Date	June 11, 2015	Previous Calibration	May 19, 2015
Station Name	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	9:00	End Time (MST)	19:20
Analyzer make	API T201	Analyzer serial #	215

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999937
799.7	804.4	0.9941		
399.8	398.2	1.0041	Slope	0.992297
200.4	196.1	1.0217		
			Intercept	2.984533

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

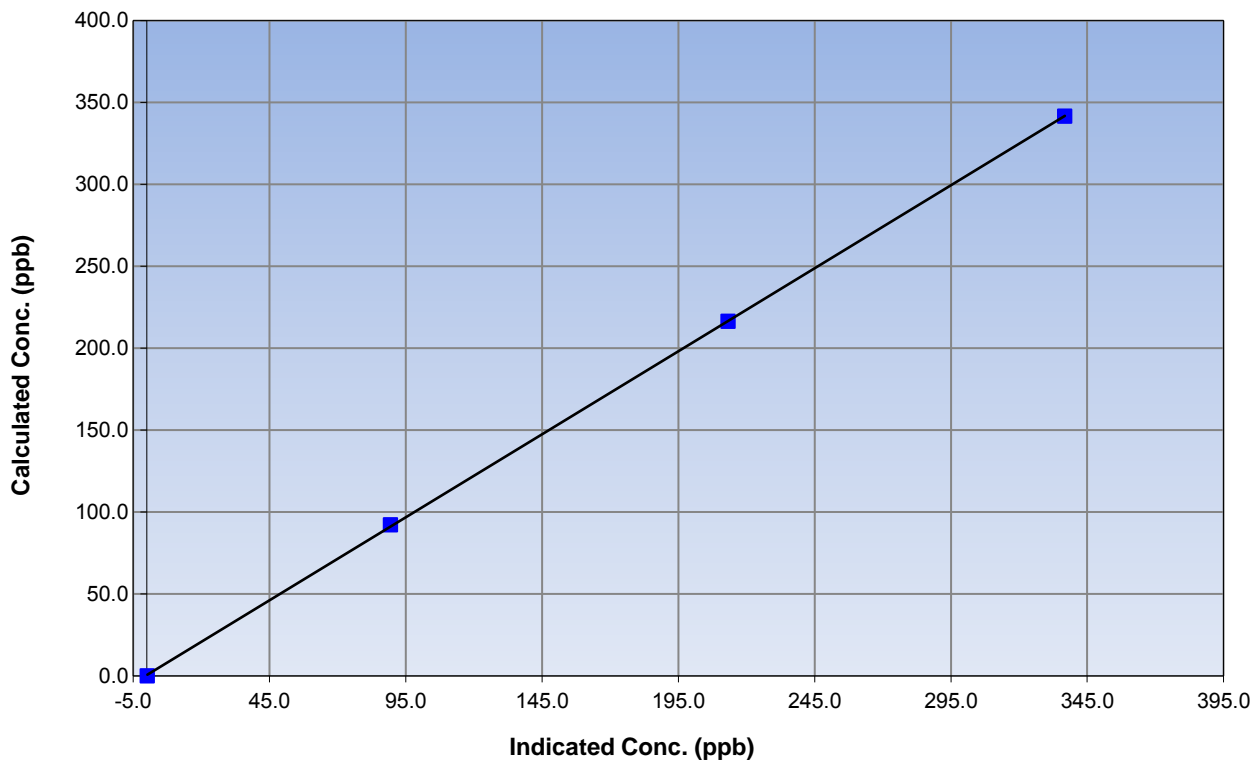
Station Information

Calibration Date	June 11, 2015	Previous Calibration	May 19, 2015
Station Name	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	9:00	End Time (MST)	19:20
Analyzer make	API T201	Analyzer serial #	215

Calibration Information

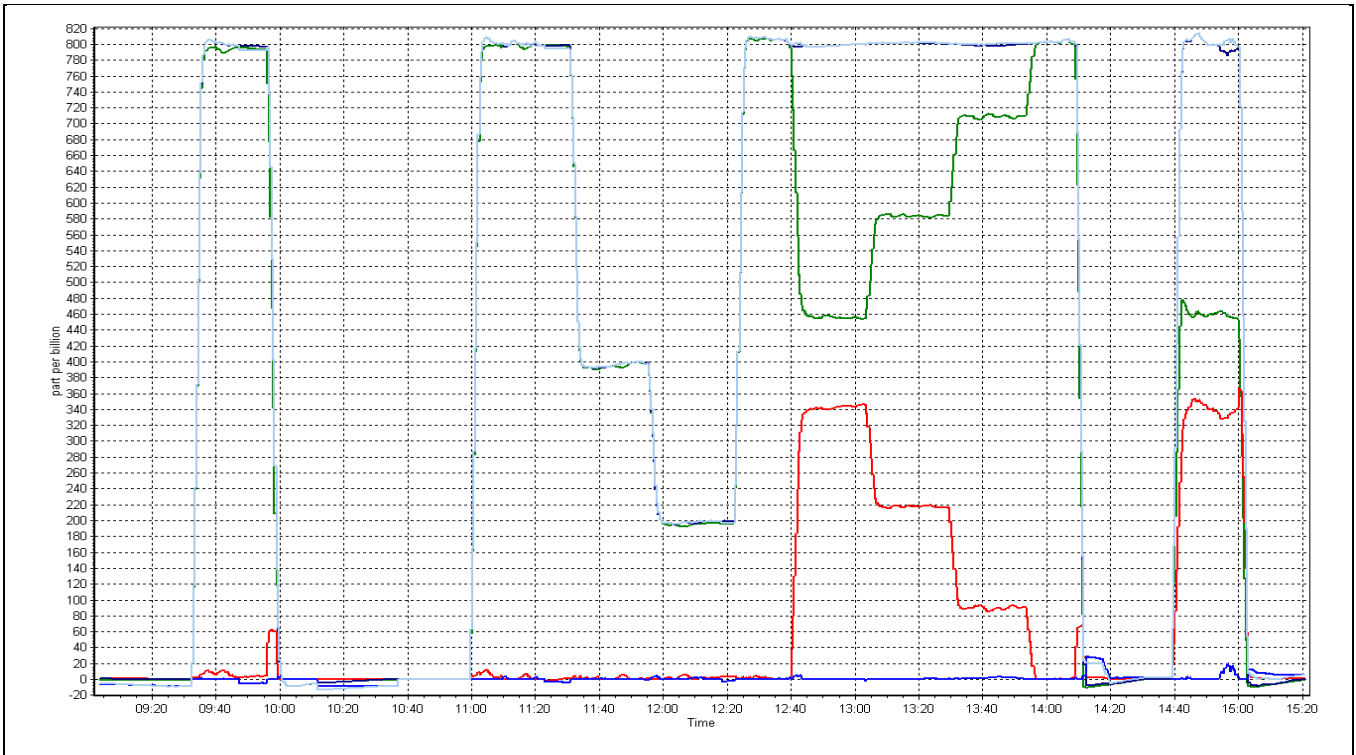
Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	----	Correlation Coefficient	0.999971
341.7	336.8	1.0146		
216.4	213.2	1.0149	Slope	1.013443
92.2	89.4	1.0322		
			Intercept	0.540661

NO₂ Calibration Curve



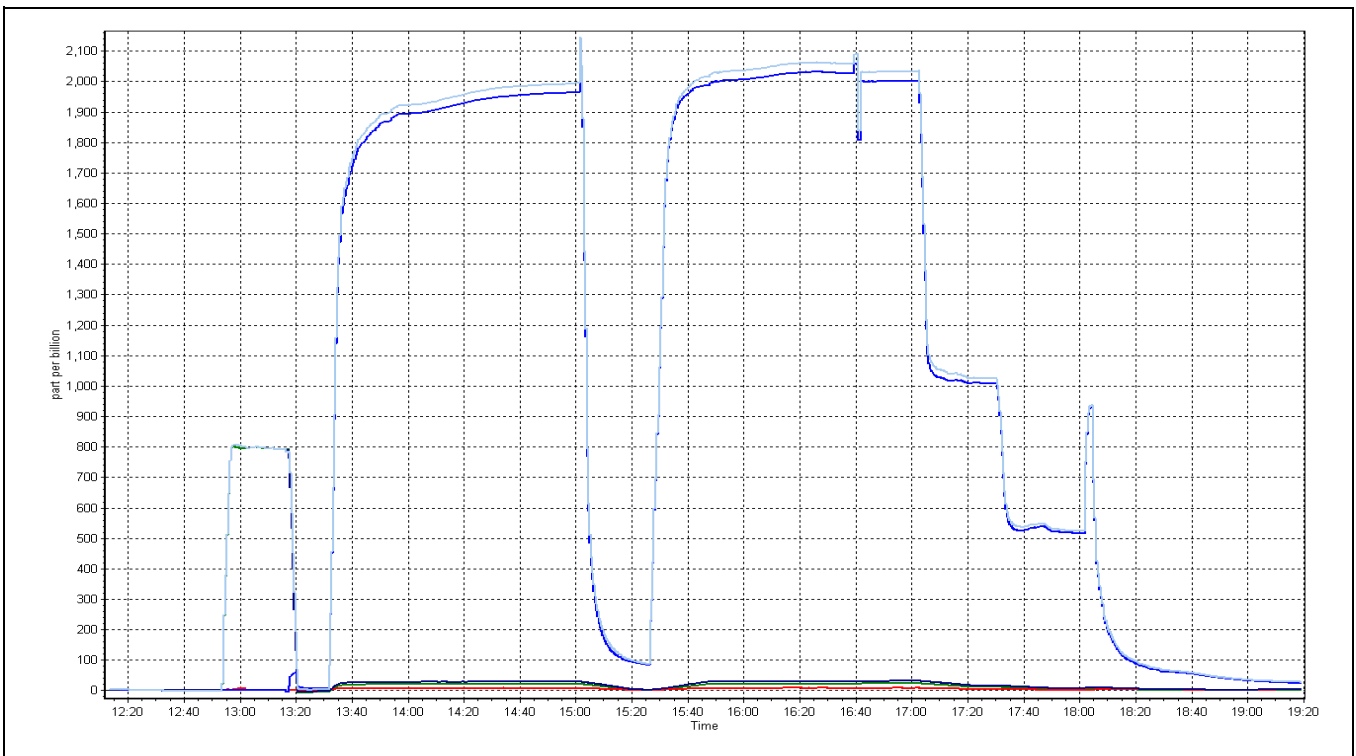
NO_x Calibration Plot

Date: June 11, 2015



NH₃ Calibration Plot

Date: June 12, 2015





Wood Buffalo Environmental Association

N_t-NO_x-NH₃ Calibration Report

Station Information

Station Name	Patricia McInnis	Station Number	AMS 6
NOX Calibration Date	June 11, 2015	NOX Previous Cal Date	May 19, 2015
NH3 Calibration Date	June 12, 2015	NH3 Previous Cal Date	May 20, 2015
Reason:	Routine		
Start Time (MST)	9:00	End Time (MST)	19:20
Barometric Pressure	720 mmHg	Station Temperature	21.0 Deg C
Calibrator	Sabio 4010	Serial Number	14300410
NH3 Cal Gas Conc	75.1 ppm	NH3 Expiry Date / SN	August 4, 2015 SGAL-3617
NOx Cal Gas Conc	54.4 ppm	NO Expiry Date / SN	December 12, 2016 SA130110A
NO Cal Gas Conc	54.4 ppm		

DACs Information

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

Parameter		NH3	Nt	NOx	NO	NO2
Cal Stats As Found	Data Slope	1.020053	1.005109	1.001305	0.999897	1.008542
	Data Offset	-0.010201	0.000000	0.740784	2.134116	1.026837
Cal Stats After	Data Slope	1.001944	0.986405			
	Data Offset	-9.238007	-9.261633			
IP address		192.168.1.17				

Analyzer Information

Analyzer make/model	<u>API T201</u>	Analyzer serial #	<u>215</u>
Converter	<u>API 501 NH#</u>	Converter serial #	<u>217</u>

Test Point	before		after	
NH3 Conc range	2500	ppb	2500	ppb
NOX Conc range	1000	ppb	1000	ppb
NO BKG	-0.1	ppb	-0.1	ppb
NOx BKG	0.2	ppb	0.2	ppb
Nt BKG	2.1		2.1	
NO coefficient	0.965		0.965	
NO2 coefficient	1.000	ppb	1.000	ppb
NOx coefficient	0.973		0.973	
NH3 coefficient	NA		NA	
Nt coefficient	0.960		0.960	
NH3 conv temp	825	DegC	825	Deg C
Chamber Temp	50.0	Deg C	50.0	Deg C
Moly Temp	314.6	Deg C	314.6	Deg C
PMT Temp	7.0	Deg C	7.0	Deg C
O3 flow	86.0	ccm	86.0	ccm
R Cell Press	4.6	mmHg	4.6	mmHg
HVPS	693.0	v	693.0	v
Sample Flow 1 NO	553.0	ccm	553.0	ccm
Sample Flow 2 Nox	553.0	ccm	553.0	ccm
Sample Flow 3 Nt	553.0	ccm	553.0	ccm

Notes:

Calibration cylinder replaced.



Wood Buffalo Environmental Association

NH₃ Calibration Report

Station Information

Calibration Date:

June 12, 2015

Station Number:

AMS 6

NH₃ Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated Nt conc (ppb)	Calculated NOx conc (ppb)	Calculated NH ₃ conc (ppb)	Indicated Nt conc (ppb)	Indicated NOx conc (ppb)	Indicated NH ₃ conc (ppb)	Nt Correction factor	NH ₃ Correction factor
as found zero	6000	0.0	0.0	0.0	0.0	-0.3	0.1	-0.4	----	----
as found NO	6000	88.2	799.7	799.7	----	794.8	794.8	0.0	1.006	----
calibrator zero	6000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
high NO point	6000	88.2	799.7	799.7	----	800.5	803.3	-2.8	0.999	----
NO/O ₃ point	6000	88.2	799.7	799.7	----	801.5	801.5	0.0	0.998	----
as found NH ₃	3500	93.2	1999.8	NA	1999.8	2060.0	30.9	2029.1	0.971	0.986
first NH ₃	3500	93.2	1999.8	NA	1999.8	2032.5	31.4	2001.1	0.984	0.999
second NH ₃	3500	46.6	999.9	NA	999.9	1026.0	16.4	1009.5	0.975	0.990
third NH ₃	3500	23.3	500.0	NA	500.0	527.0	7.9	519.1	0.949	0.963
Average Correction Factor									0.9983	0.9843

NH₃ Corrected As Found
 Nt Corrected As Found
 NOx Corrected As Found

NH₃ = 2029.6 ppb
 NH₃ = 795.1 ppb
 NH₃ = 794.7 ppb

Previous Response
 Previous Response
 Previous Response

NH₃ = 1989.7 ppb
 Nt = 791.0 ppb
 NOx = 792.9 ppb

NH₃ percent change -2.0%
 Nt percent change -0.5%
 NOx percent change -0.2%



Wood Buffalo Environmental Association

NH3 Calibration Summary

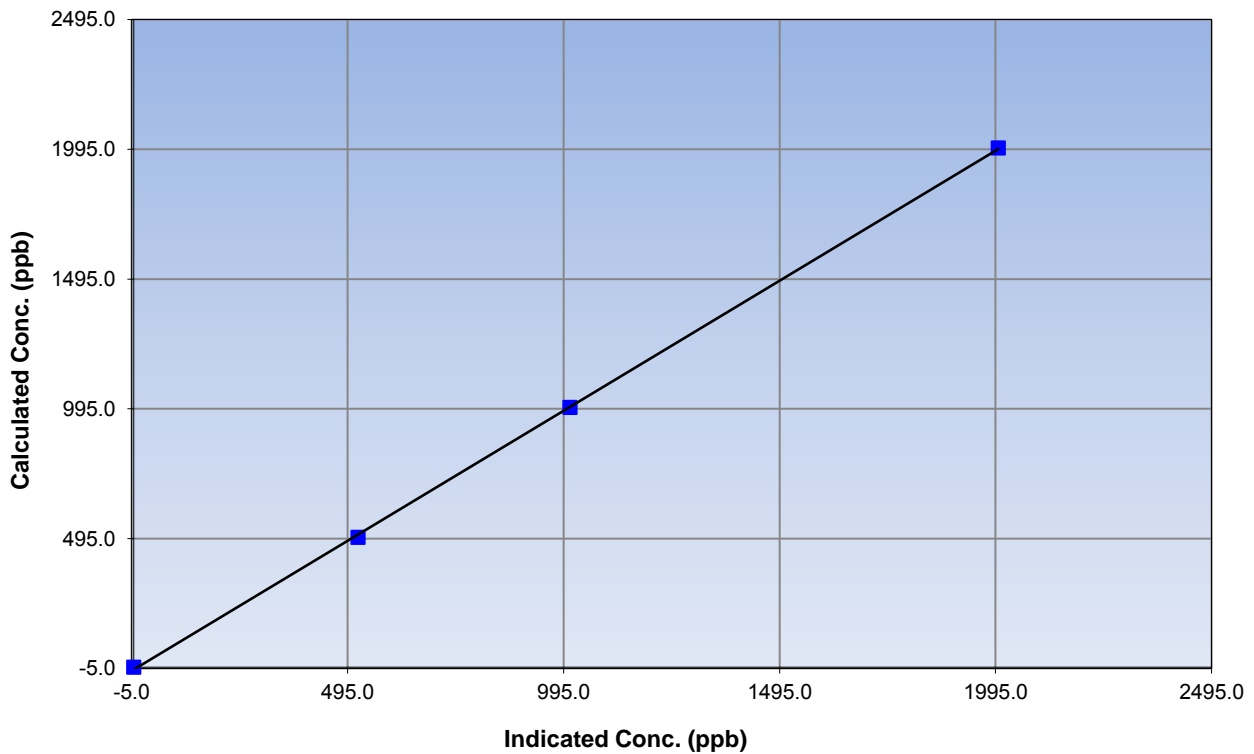
Station Information

Calibration Date	June 12, 2015	Previous Calibration	May 19, 2015
Station Number	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	9:00	End Time (MST)	19:20
Analyzer make	API T201	Analyzer serial #	215

NH3 Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999897
1999.8	2001.1	0.9993		
999.9	1009.5	0.9905	Slope	1.001944
500.0	519.1	0.9632		
			Intercept	-9.238007

NH3 Calibration Curve





Wood Buffalo Environmental Association

Nt Calibration Summary

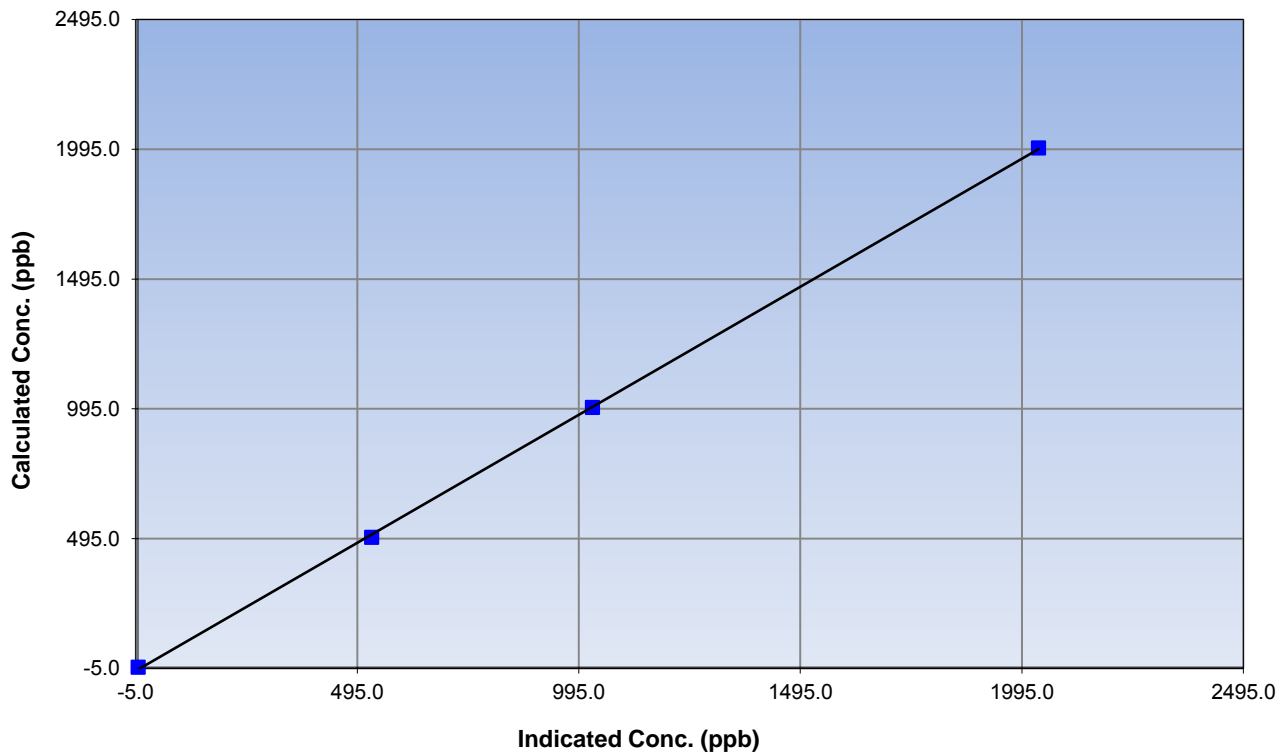
Station Information

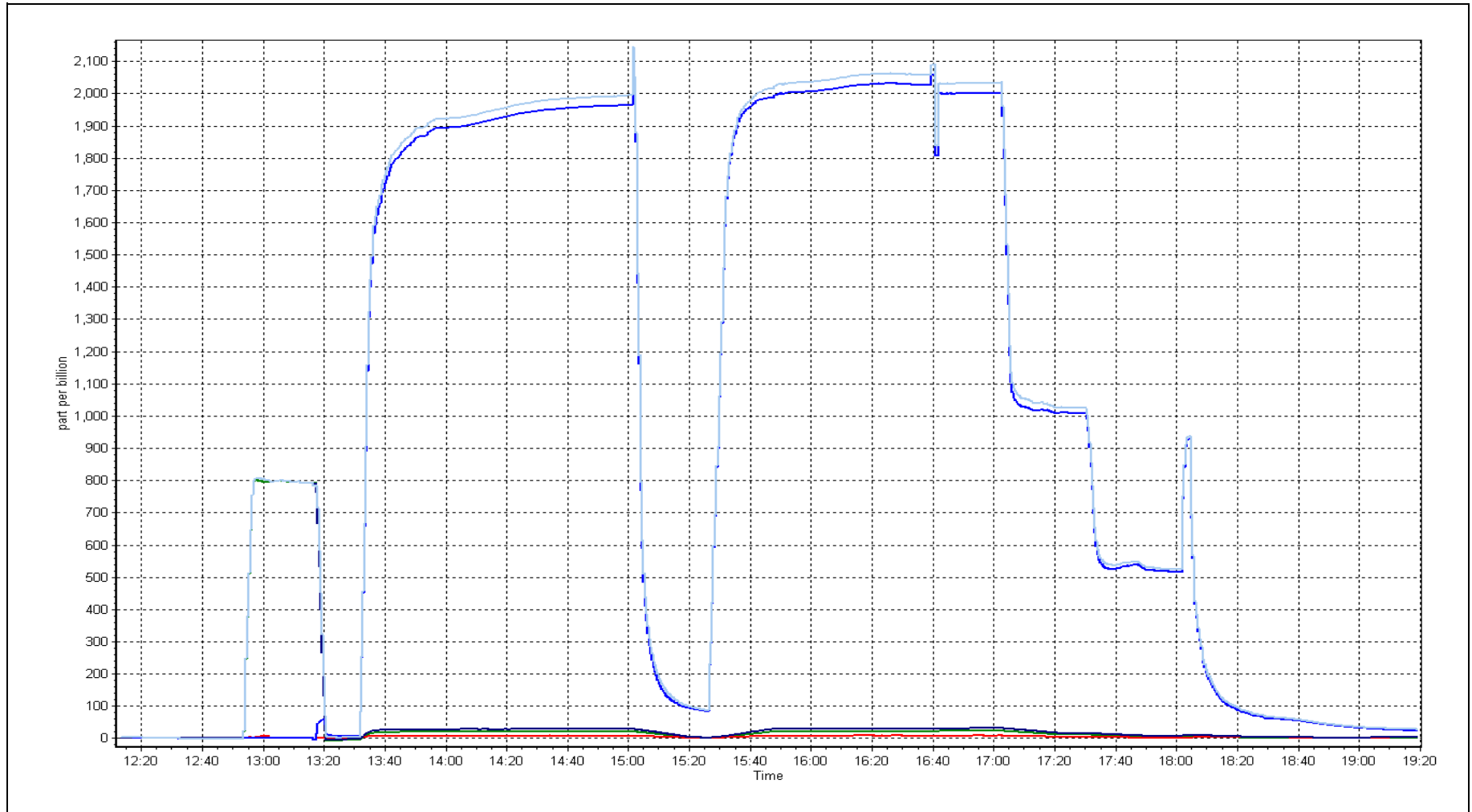
Calibration Date	June 12, 2015	Previous Calibration	May 19, 2015
Station Number	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	9:00	End Time (MST)	19:20
Analyzer make	API T201	Analyzer serial #	215

Nt (NH₃) Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999898
1999.8	2032.5	0.9839		
999.9	1026.0	0.9746	Slope	0.986405
500.0	527.0	0.9487		
			Intercept	-9.261633

Nt Calibration Curve







Wood Buffalo Environmental Association

SHARP CALIBRATION

STATION INFORMATION

Calibration Date:	<u>June 12, 2015</u>	Previous Calibration:	<u>May 20, 2015</u>
Station Name:	<u>Patricia McInnis</u>	Station Number:	<u>AMS 6</u>
Start Time (MST):	<u>13:42</u>	End Time (MST):	<u>14:25</u>
Calibrator Make/Model:	<u>Delta Cal</u>	Calibrator Serial Number:	<u>1212</u>

SHARP INFORMATION

Particulate Fraction:	<u>PM2.5</u>
Make/Model:	<u>Thermo / SHARP 5030</u>
Serial Number:	<u>E-1475</u>
Source SN:	<u>5680</u>
HEPA PN:	<u>12144</u>
Time Correct (MST):	<u>Yes</u>
Parameters Checked:	<u>T1, T2, T2,T4, P3, Main Flow, Beta, Neph</u>

CALIBRATION DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	22.0	21.6	-0.4	22.0
T2	24.0	na	na	23.0
T3	23.0	na	na	23.0
T4	19.0	na	na	19.0
RH (%)	29.0	na	na	18.0

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	961	960.0	-1.0	961

Main Flow (Lph)

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

Nephelometer Calibration

Parameter	As Found	Zeroed (Limit +/- 2.0ug/m3)	As Left
Analog	201		201
Neph	-0.9		0.1
C14	4.3		10.2
Indicated Concentration (ug/m3)	-0.9	yes	0.1
Offset 1	201.8		200.8
Offset 2	32.2		32.1

Leak Check (Quarterly)

Leak Check Date:	<u>May 20, 2015</u>	Previous Leak Check Date:	NA
	Measured	Difference LPM (Limit +/- 0.42 LPM)	
Flow without adaptor (LPM):	16.73		
Flow with adaptor [turn off pump first](LPM):	16.54	0.19	

Mass Foil Calibration (Annualy)

Foil Calibration Date:	<u>May 20, 2015</u>	Previous Foil Calibration:	NA
Zeroed?:	<u>Yes</u>		
Foil Mass:	<u>1167</u>		
Previous Correction Factor:	<u>7038</u>	Mass foil set S/N:	2597
New Correction Factor:	<u>6978</u>		

INSPECTION DATA

Item	Condition	Date of install or rebuild
Cyclone	Good / cleaned	12/06/2015
Pump	Good	NA
Filter Tape	Good	NA
Mass Foil Cal Set	Good	NA
HEPA filter	Good	NA

NOTES:

Nephelometer zeroed, Cyclone head changed

Calibration Performed By: Ryan Power



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 7
ATHABASCA VALLEY
JUNE 2015**

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

July 30, 2015



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ATHABASCA VALLEY (AMS 7)
 JUNE 2015

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	682	37	38	99.86	21	0	4	0
TRS (ppb) Average	682	38	38	100.00	2	0	1	0
THC (ppm) Average	681	37	39	99.72	4.1	-	2.4	-
NMHC (ppm) Average	681	37	39	99.72	0.981	-	0.29	-
CH4(ppm) Average	681	37	39	99.72	3.1	-	2.1	-
O3 (ppb) Average	686	34	34	100.00	59	0	38	-
NO2 (ppb) Average	681	37	39	99.72	49	0	14	-
NO (ppb) Average	681	37	39	99.72	41	-	6	-
NOX (ppb) Average	681	37	39	99.72	83	-	20	-
PM2.5 (ug/m3) Average	719	0	1	99.86	434.7	-	130.7	2
CO(ppm) Average	680	32	40	98.89	2.6	0	0.8	-
Temperature 2 m (C) Average	720	0	0	100.00	32	-	24.3	-
Barometric Pressure (inHg) Average	720	0	0	100.00	29.2	-	29.2	-
Relative Humidity (%) Average	720	0	0	100.00	94	-	76	-
Wind Speed 10 m (km/h) Average	720	0	0	100.00	34	-	18	-
Wind Direction 10 m (deg) Average	720	0	0	100.00	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ATHABASCA VALLEY (AMS 7)
 JUNE 2015

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	682	1.2	2	-	0	1	1	1	1	2	21
TRS (ppb) Average	682	0.3	0	-	0	0	0	0	0	0	2
THC (ppm) Average	681	1.87	0.2	-	1.8	1.8	1.8	1.8	1.9	1.9	4.1
NMHC (ppm) Average	681	0.023	0.082	-	0	0	0	0	0	0.1	0.981
CH4(ppm) Average	681	1.84	0.1	-	1.8	1.8	1.8	1.8	1.9	1.9	3.1
O3 (ppb) Average	686	26.9	12	-	2	10	17	27	37	42	59
NO2 (ppb) Average	681	4.4	4	-	0	1	2	4	6	8	49
NO (ppb) Average	681	1.3	3	-	0	0	0	0	1	3	41
NOX (ppb) Average	681	5.7	6	-	0	1	3	4	7	10	83
PM2.5 (ug/m3) Average	719	18.45	36.8	-	1	4.5	6.4	9	14	26.9	434.7
CO(ppm) Average	680	0.11	0.2	-	0	0	0	0	0.1	0.2	2.6
Temperature 2 m (C) Average	720	17.65	5.7	-	0.4	10.8	13.4	17.2	21.5	25	32
Barometric Pressure (inHg) Average	720	28.91	0.1	-	28.6	28.7	28.8	28.9	29	29.1	29.2
Relative Humidity (%) Average	720	57.2	20	-	19	29	39	59	73	83	94
Wind Speed 10 m (km/h) Average	720	8.9	6	-	0	3	5	7	12	18	34
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ATHABASCA VALLEY (AMS 7)
JUNE 2015

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2	03 Jun 2015 08:00	03 Jun 2015 08:00	1	Maintenance - sample manifold cleaned
NMHC, CH4, THC	03 Jun 2015 08:00	03 Jun 2015 08:00	1	Maintenance - sample manifold cleaned
NMHC, CH4, THC	18 Jun 2015 07:00	18 Jun 2015 07:00	1	Maintenance - replaced fuel cylinder
NO2, NO, NOX	03 Jun 2015 08:00	03 Jun 2015 09:00	2	Maintenance - sample manifold cleaned
PM2.5	08 Jun 2015 12:00	08 Jun 2015 12:00	1	Maintenance - Flow and zero check, sample head cleaning
CO	02 Jun 2015 08:00	02 Jun 2015 12:00	5	Maintenance - verify daily QA response, out of span gas
CO	03 Jun 2015 08:00	03 Jun 2015 09:00	2	Maintenance - sample manifold cleaned
CO	05 Jun 2015 13:00	05 Jun 2015 13:00	1	Maintenance - replace span gas



Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 21 ppb on Jun 30 18:00	Maximum Daily Average: 4.2 ppb on Jun 30		Hours of Data:	682
Minimum Value: 0 ppb on Jun 9 04:00	Minimum Daily Average: 0.5 ppb on Jun 7		Hours of Missing Data:	38
Maximum Diurnal Average: 2.2 ppb at hour 18	Minimum Diurnal Average: 0.6 ppb at hour 2		Hours of Calibration:	37
Monthly Average: 1.2 ppb	Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 1 Median = 1 Q ₃ = 1 P ₉₀ = 2 P ₉₉ = 7		Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	1	1	Z	0	1	1	0	1	1	1	0	1	0	1	0	0	1	1	2	2	2	1	1	1	0.8	2
2-Jun	1	0	1	Z	1	1	1	C	C	C	C	C	C	C	1	1	1	1	1	1	1	1	1	1	--	1
3-Jun	1	1	1	1	Z	1	1	M	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.8	1
4-Jun	1	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1
5-Jun	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1
6-Jun	1	Z	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	0	1	0.6	1
7-Jun	0	0	Z	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	0.5	1
8-Jun	1	1	0	Z	0	0	0	1	1	1	0	1	1	1	1	1	1	2	1	1	1	1	2	1	0.8	2
9-Jun	1	0	0	0	Z	1	1	1	1	1	1	1	1	0	1	1	4	6	8	3	1	1	1	1	1.4	8
10-Jun	1	1	1	1	0	Z	1	1	1	1	1	2	3	3	3	3	2	2	2	3	2	1	1	1	1.5	3
11-Jun	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1
12-Jun	1	Z	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1
13-Jun	1	0	Z	1	0	1	1	2	2	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	0.7	2
14-Jun	1	1	1	Z	1	1	2	1	1	1	1	1	1	1	1	0	1	1	1	1	0	1	1	1	0.7	2
15-Jun	1	1	1	1	Z	1	1	1	1	2	2	4	2	2	1	1	1	1	1	1	1	1	1	1	1.1	4
16-Jun	1	1	2	1	1	Z	1	1	1	1	0	1	4	4	4	4	2	2	2	1	1	1	1	1	1.5	4
17-Jun	Z	1	1	1	2	2	1	1	1	1	1	2	3	4	4	5	5	5	7	7	5	3	2	1	2.8	7
18-Jun	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.8	1
19-Jun	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	2	4	2	1	1	1	1	1	1.0	4
20-Jun	1	1	1	Z	1	1	1	1	3	1	1	1	2	5	6	4	5	4	5	3	1	1	1	1	2.0	6
21-Jun	1	1	1	1	Z	1	1	1	3	18	7	4	5	5	3	5	5	3	2	1	1	1	1	1	3.0	18
22-Jun	1	1	1	0	1	Z	1	0	1	1	1	1	1	1	2	1	1	1	2	3	3	1	1	1	1.1	3
23-Jun	Z	1	1	1	1	1	1	1	1	1	1	0	1	1	1	2	2	1	1	1	1	1	1	1	0.8	2
24-Jun	1	Z	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.6	1
25-Jun	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	3	1	1	1	1.0	3
26-Jun	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0.6	1
27-Jun	1	1	1	1	Z	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.6	1
28-Jun	1	1	1	1	1	Z	1	1	1	12	5	1	1	1	1	1	1	1	1	2	3	1	1	1	1.6	12
29-Jun	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1.0	2
30-Jun	1	Z	1	1	1	1	1	1	1	1	2	1	1	1	1	4	18	21	11	7	7	5	4	4	4.2	21

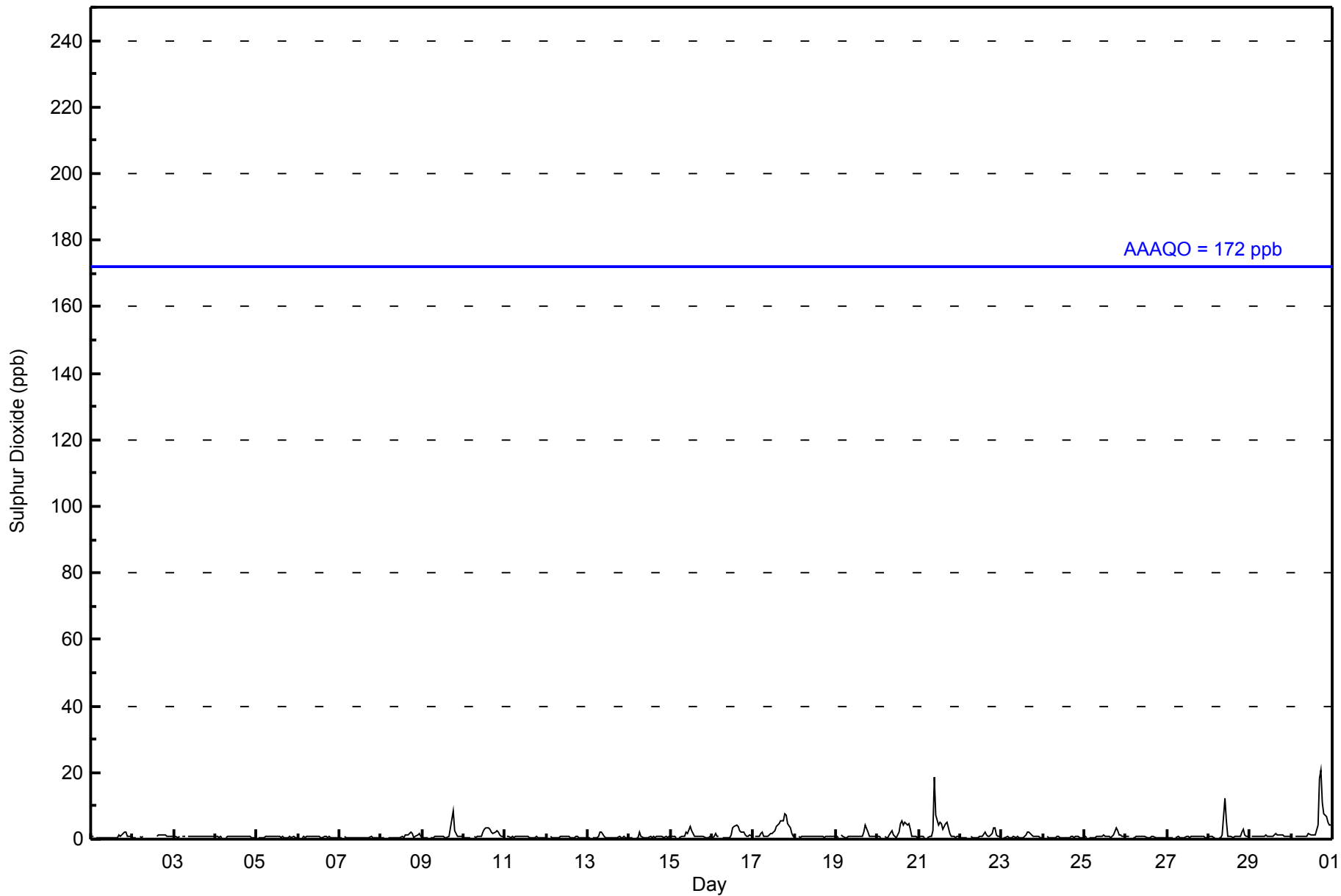
0.7	0.6	0.7	0.6	0.6	0.7	0.7	0.8	0.9	1.8	1.2	1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.0	1.6	1.3	1.0	0.9	0.8	Diurnal Average		
1	1	2	1	2	2	2	2	2	3	18	7	4	5	5	6	5	18	21	11	7	7	5	4	4	Diurnal Maximum	

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



WBEA
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Athabasca Valley - June 2015





WBEA
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Athabasca Valley - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	677	99.27	99.27
11 - 20	4	0.59	99.85
21 - 60	1	0.15	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 720



WBEA
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Athabasca Valley - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	55	14	10	14	27	44	101	39	35	30	74	26	26	38	49	95	677
11 - 20	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	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	58	14	10	14	27	44	101	39	35	30	74	26	26	38	49	97	682

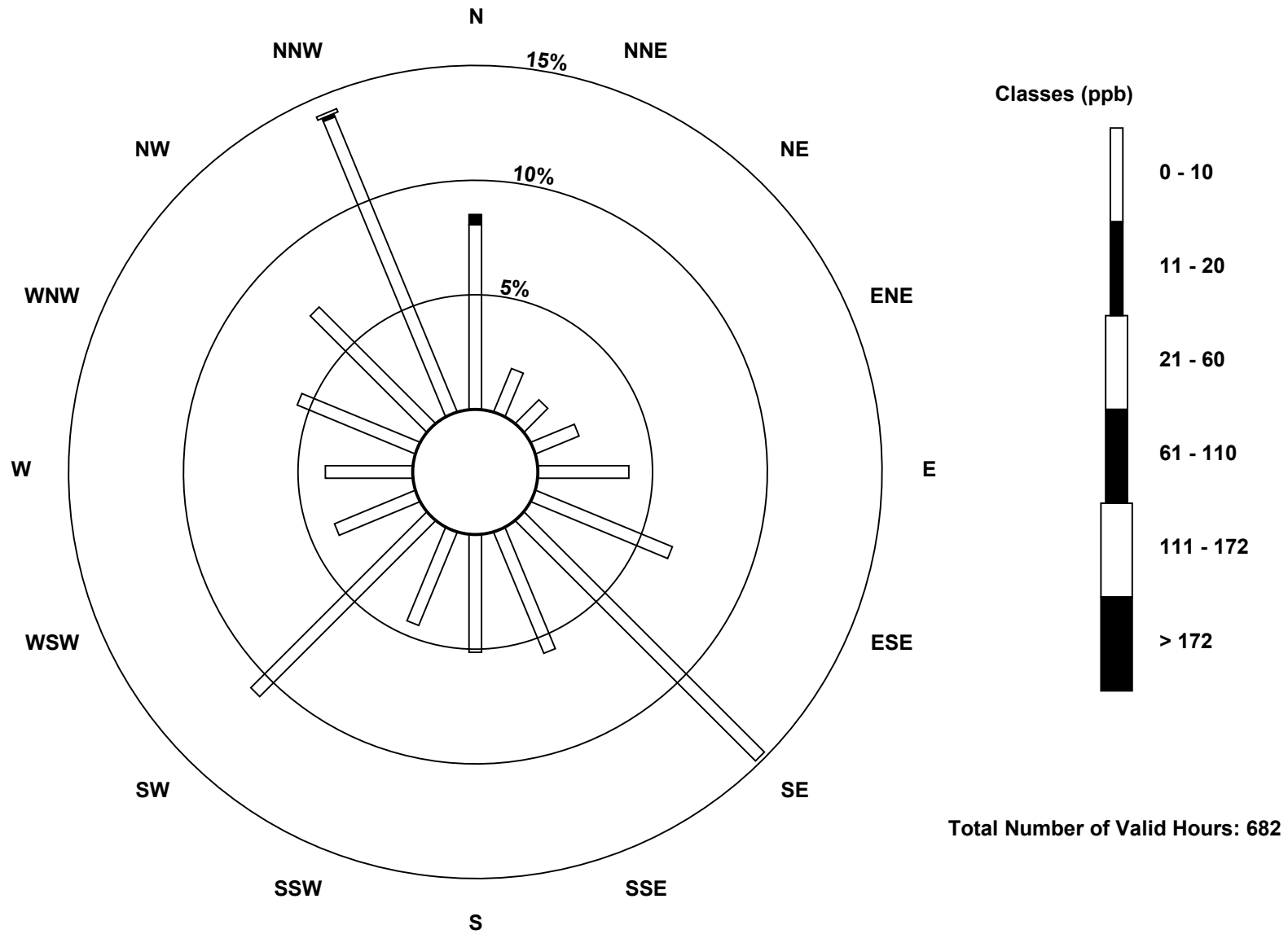
Total Number of Valid Hours: 682

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

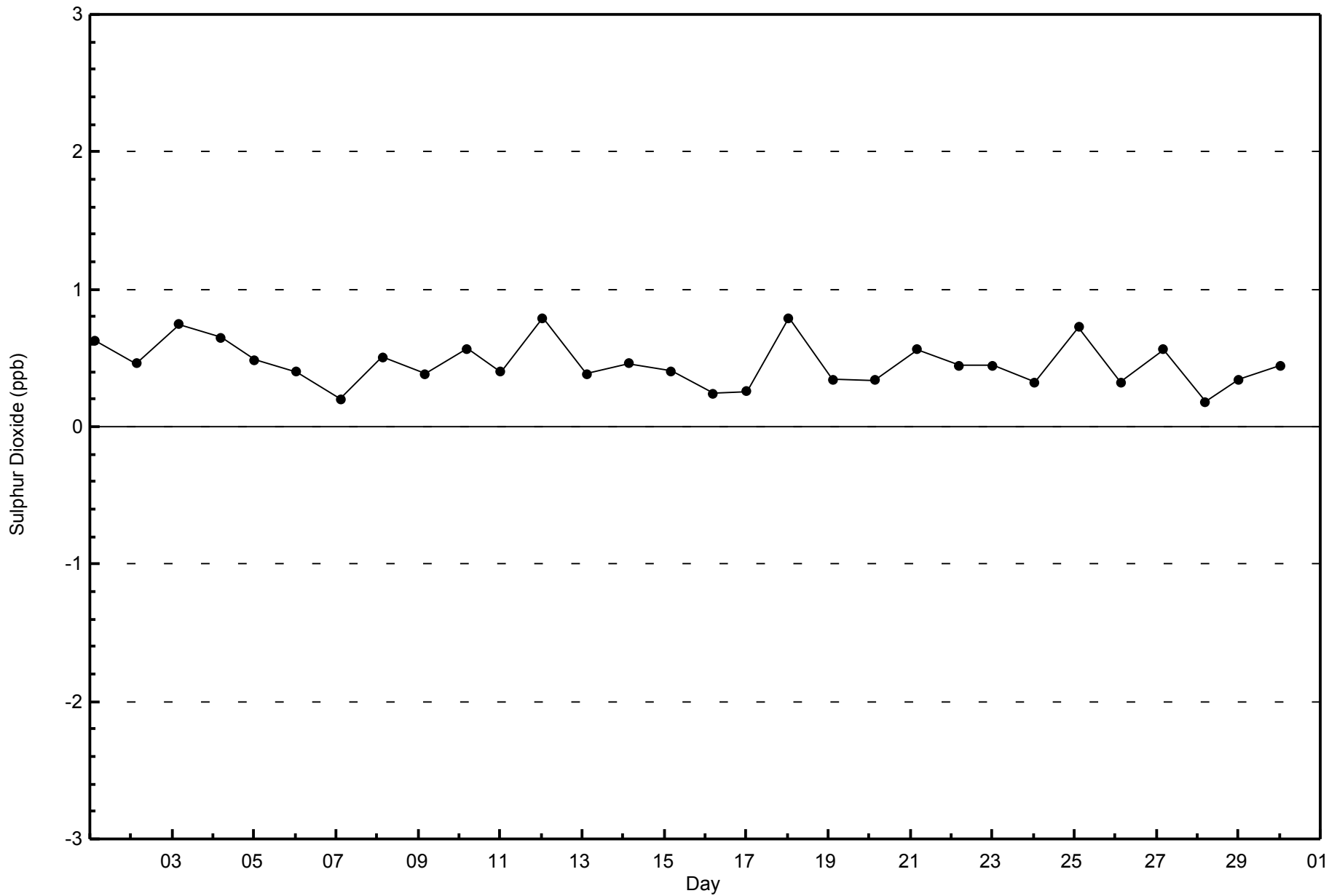
Sulphur Dioxide (SO₂) - ppb
Athabasca Valley (AMS 7)





WBEA
Zero Responses

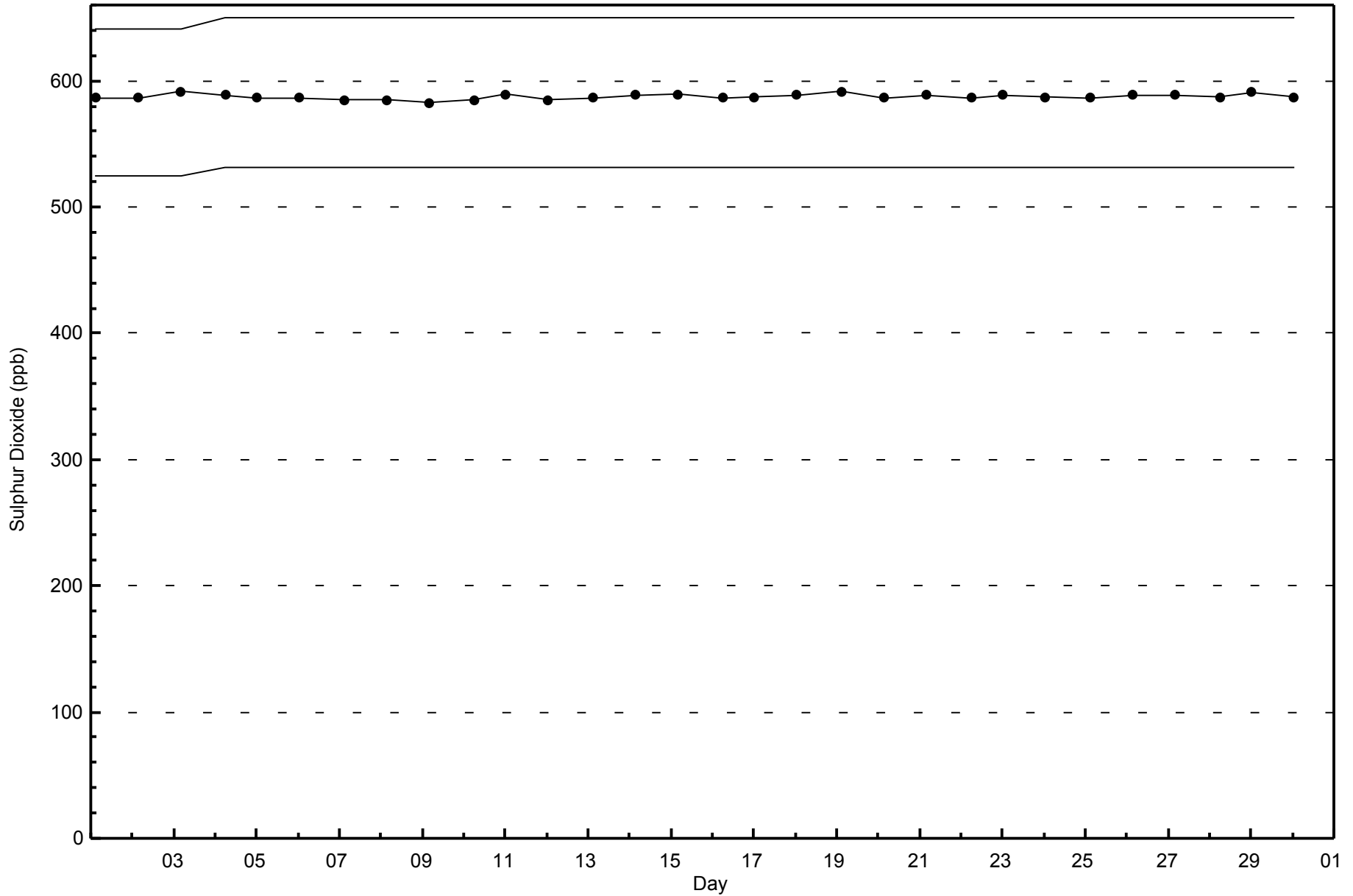
Sulphur Dioxide (SO₂) - ppb
Athabasca Valley - June 2015





WBEA
Span Responses

Sulphur Dioxide (SO₂) - ppb
Athabasca Valley - June 2015





Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 2 ppb on Jun 30 18:00	Maximum Daily Average: 0.8 ppb on Jun 30		Hours of Data:	682
Minimum Value: 0 ppb on Jun 13 00:00	Minimum Daily Average: 0.2 ppb on Jun 12		Hours of Missing Data:	38
Maximum Diurnal Average: 0.3 ppb at hour 7	Minimum Diurnal Average: 0.2 ppb at hour 14		Hours of Calibration:	38
Monthly Average: 0.3 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	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-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.3	1
3-Jun	0	0	0	0	0	Z	0	C	C	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	--	0
4-Jun	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-Jun	0	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-Jun	0	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-Jun	0	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-Jun	0	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-Jun	0	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
10-Jun	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-Jun	0	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-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
13-Jun	0	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
14-Jun	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
15-Jun	0	0	0	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
16-Jun	0	0	1	0	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
17-Jun	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
18-Jun	0	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-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.3	1
20-Jun	0	0	1	0	Z	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
21-Jun	0	0	0	0	0	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
22-Jun	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-Jun	0	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-Jun	0	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-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0.3	1
26-Jun	0	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-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
28-Jun	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-Jun	0	Z	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
30-Jun	0	0	Z	0	0	1	1	1	0	0	1	0	0	0	0	1	1	2	2	2	1	1	1	1	0.8	2

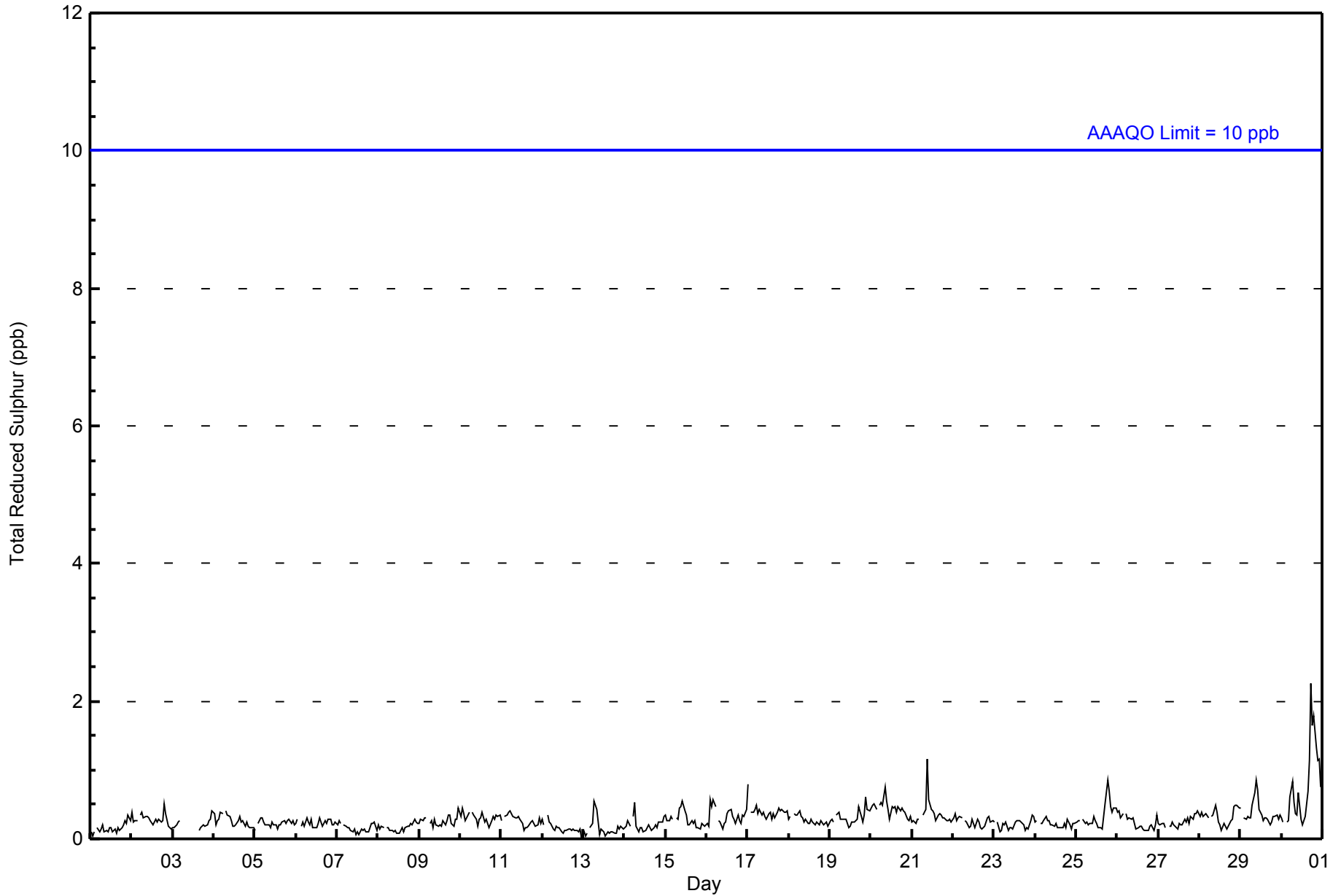
0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	Diurnal Average
1	0	1	0	1	1	1	1	1	1	1	1	0	0	0	0	1	1	2	2	2	1	1	1	1	1	1	Diurnal Maximum

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



WBEA
Hourly Averages

Total Reduced Sulphur (TRS) - ppb
Athabasca Valley - June 2015





WBEA
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Athabasca Valley - June 2015

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



WBEA
Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Athabasca Valley - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	57	13	12	15	27	38	101	41	34	32	71	27	28	40	48	98	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	57	13	12	15	27	38	101	41	34	32	71	27	28	40	48	98	682

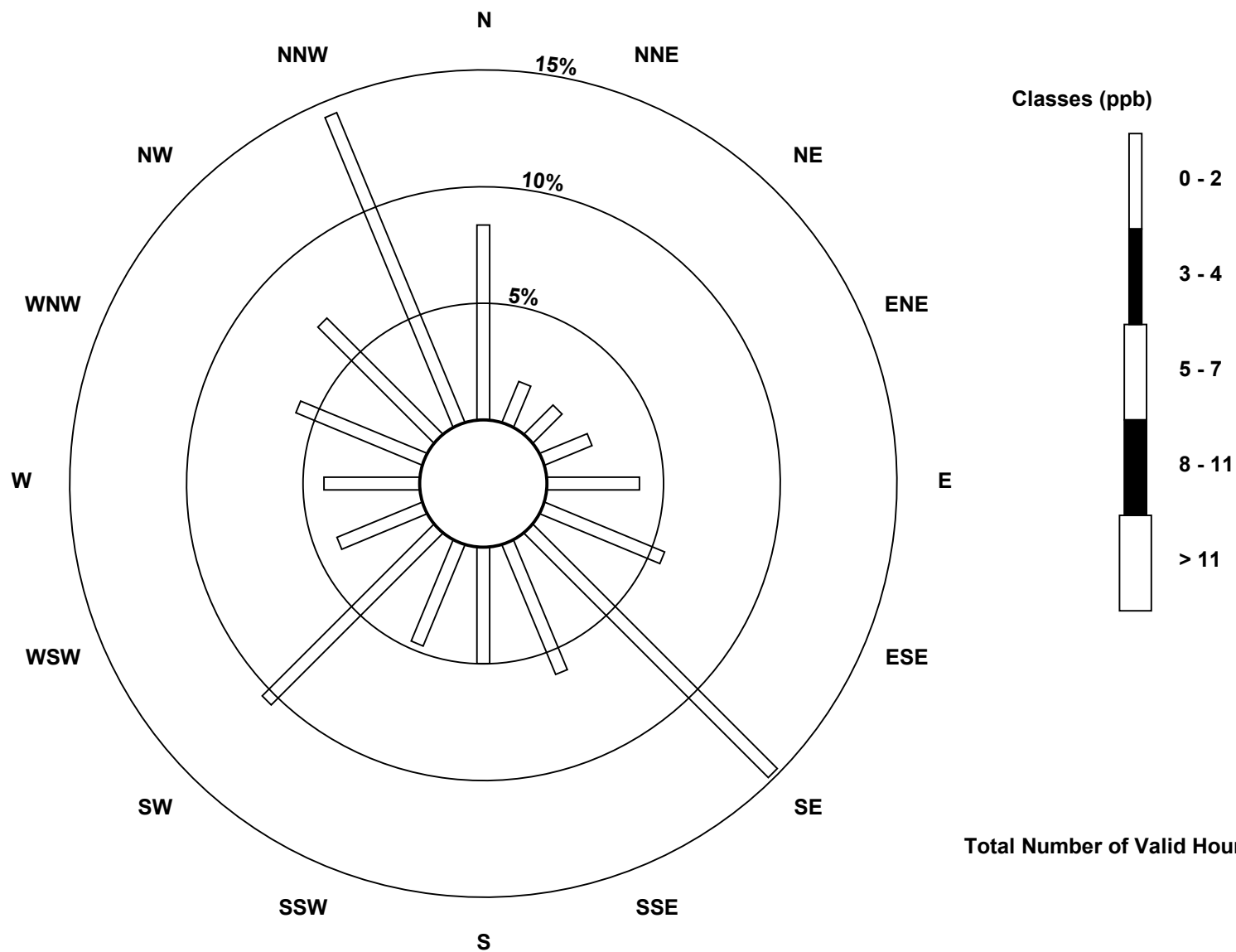
Total Number of Valid Hours: 682

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

Total Reduced Sulphur (TRS) - ppb
Athabasca Valley (AMS 7)

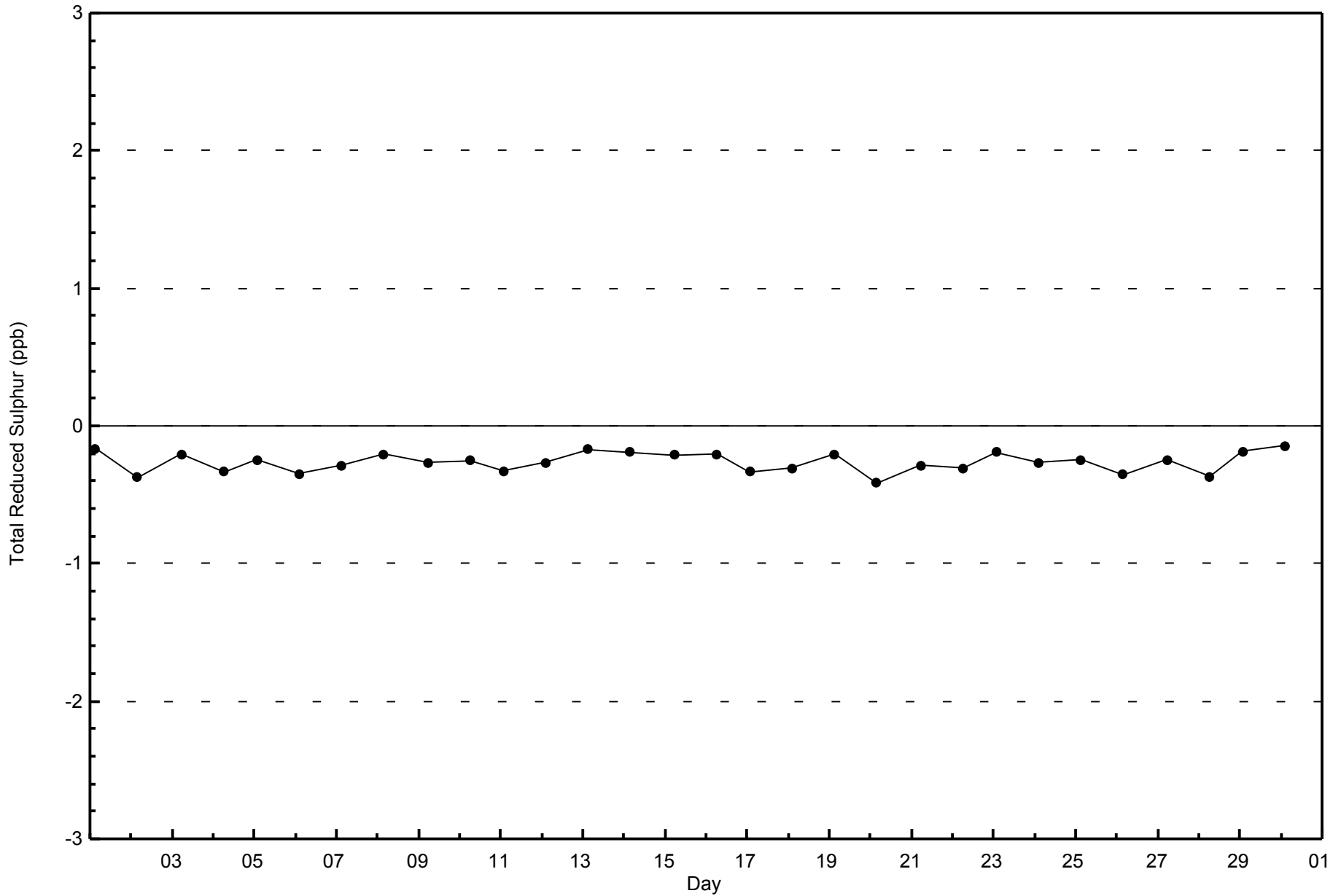


Total Number of Valid Hours: 682



WBEA
Zero Responses

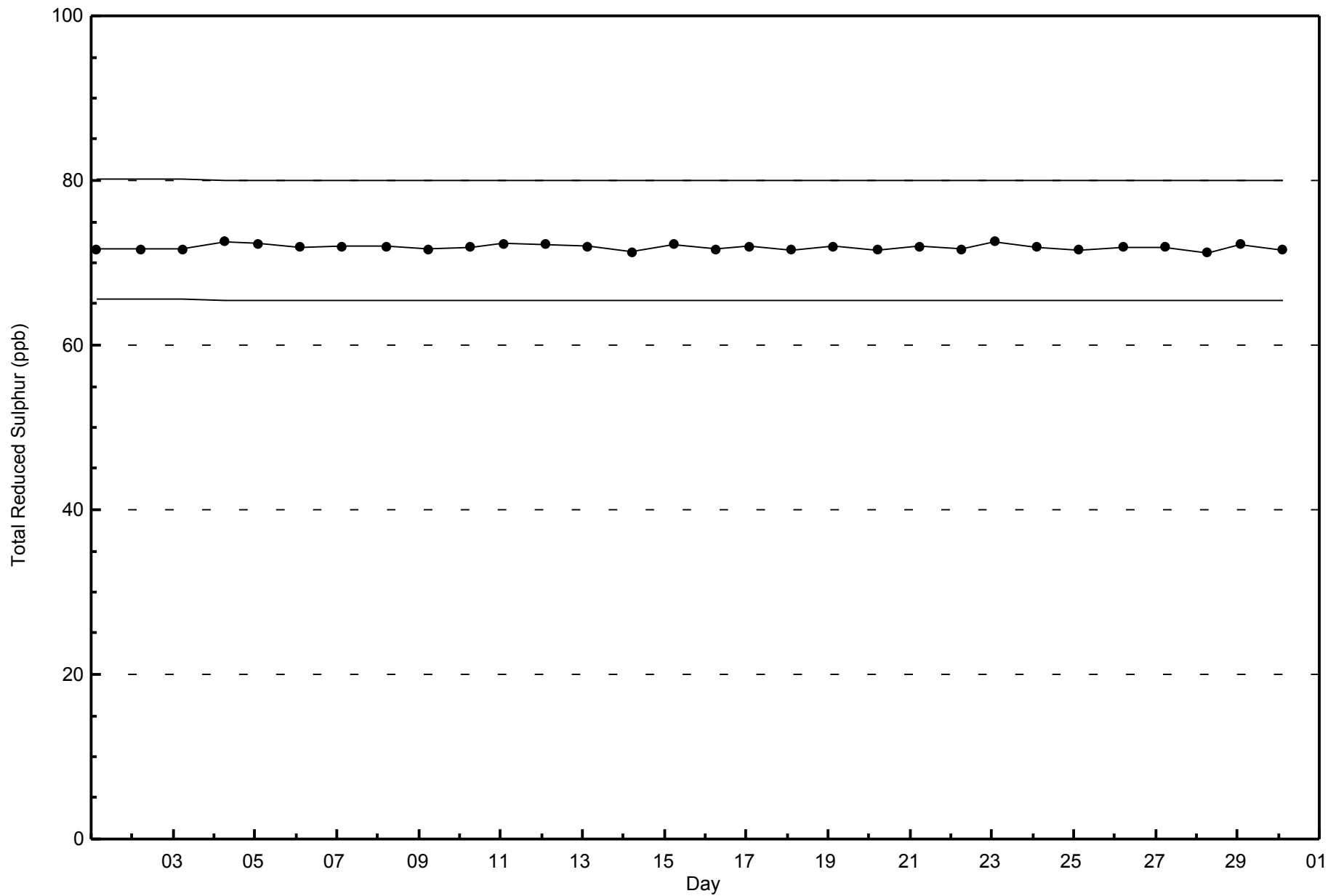
Total Reduced Sulphur (TRS) - ppb
Athabasca Valley - June 2015





WBEA
Span Responses

Total Reduced Sulphur (TRS) - ppb
Athabasca Valley - June 2015





Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

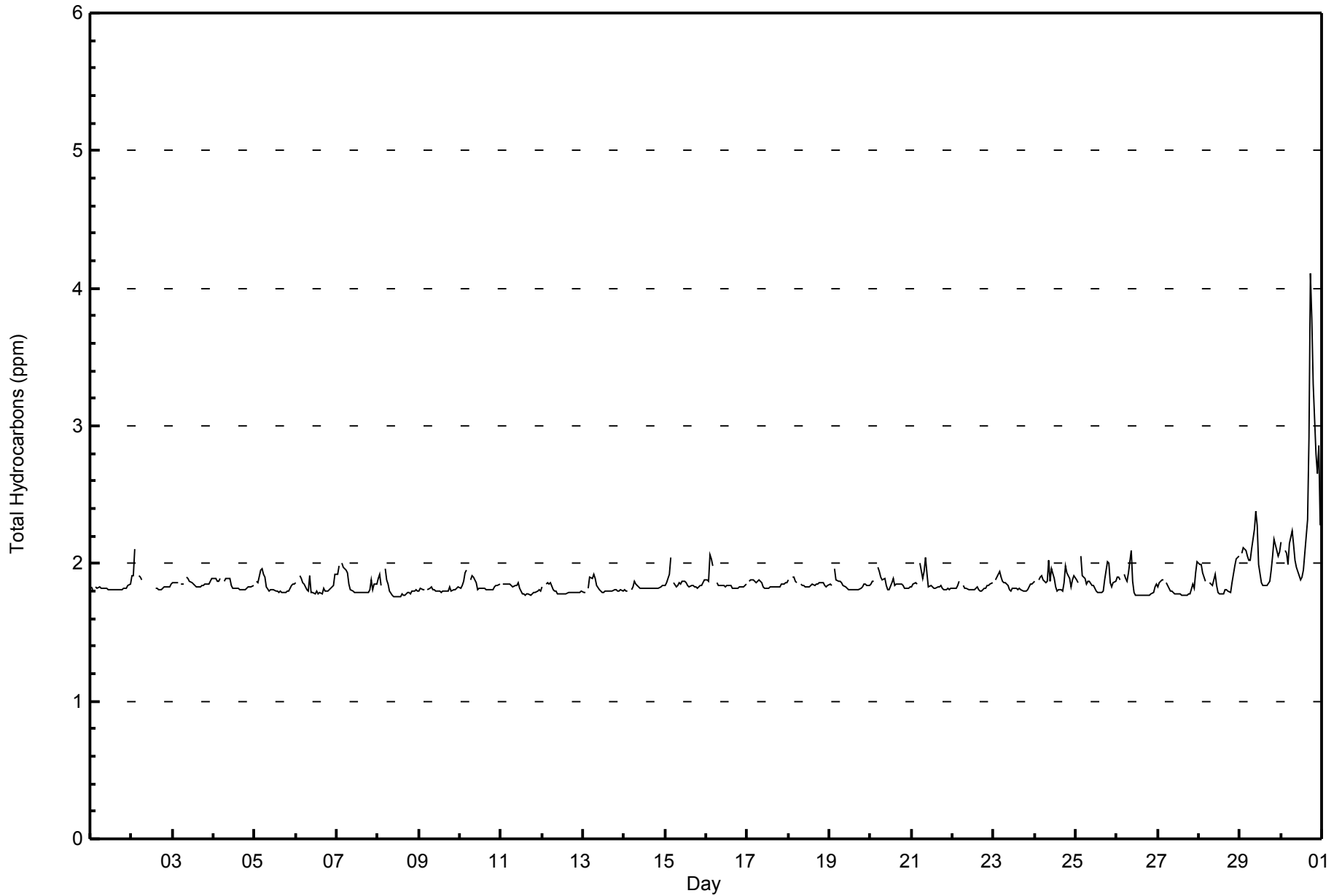
Athabasca Valley - June 2015

Maximum Value: 4.1 ppm on Jun 30 18:00		Maximum Daily Average: 2.4 ppm on Jun 30		Hours in Service: 720																							
Minimum Value: 1.8 ppm on Jun 8 13:00		Minimum Daily Average: 1.8 ppm on Jun 12		Hours of Data: 681																							
Maximum Diurnal Average: 1.9 ppm at hour 4		Minimum Diurnal Average: 1.8 ppm at hour 14		Hours of Missing Data: 39																							
Monthly Average: 1.87 ppm		Percentiles: P ₁ = 1.8 P ₁₀ = 1.8 Q ₁ = 1.8 Median = 1.8 Q ₃ = 1.9 P ₉₀ = 1.9 P ₉₉ = 2.6		Hours of Calibration: 37																							
				Percent Operational Time: 99.7																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	1.8	1.8	Z	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
2-Jun	1.9	1.9	2.1	Z	1.9	1.9	1.9	C	C	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	1.9	--	2.1
3-Jun	1.9	1.9	1.9	1.9	Z	1.9	1.9	M	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
4-Jun	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	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
5-Jun	Z	1.9	1.9	1.9	2.0	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.8	1.8	1.8	2.0
6-Jun	1.9	Z	1.9	1.9	1.9	1.8	1.8	1.8	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.8	1.8	1.9
7-Jun	1.9	2.0	Z	2.0	2.0	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.8	1.9	1.8	1.8	1.8	2.0
8-Jun	1.9	1.9	1.8	Z	2.0	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.0
9-Jun	1.8	1.8	1.8	1.8	Z	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
10-Jun	1.8	1.8	1.9	1.9	2.0	Z	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.8	1.8	2.0
11-Jun	Z	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9
12-Jun	1.8	Z	1.8	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9
13-Jun	1.8	1.8	Z	1.8	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9
14-Jun	1.8	1.8	1.8	Z	1.8	1.8	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9
15-Jun	1.8	1.9	1.9	2.0	Z	1.9	1.8	1.8	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	2.0
16-Jun	1.9	1.9	2.1	2.0	2.0	Z	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.1
17-Jun	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.8	1.9	1.9	1.8	1.9
18-Jun	1.9	Z	1.9	1.9	1.9	1.9	M	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.9	
19-Jun	1.8	1.8	Z	2.0	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.0
20-Jun	1.9	1.9	1.9	Z	2.0	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.9	1.8	1.8	1.8	1.8	1.8	1.8	2.0
21-Jun	1.8	1.9	1.9	1.8	Z	2.0	1.9	1.9	2.0	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.0
22-Jun	1.8	1.8	1.8	1.8	1.9	Z	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.8	1.9
23-Jun	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.8	1.9
24-Jun	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.0	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.0	1.9	1.8	1.9	1.9	1.9	1.9	2.0
25-Jun	1.9	1.9	Z	2.1	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.0	2.0	1.9	1.8	1.9	1.9	1.9	1.9	2.1
26-Jun	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	2.1	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.1
27-Jun	1.8	1.9	1.9	1.9	Z	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.0	1.8	1.8	2.0
28-Jun	2.0	2.0	1.9	1.9	1.9	Z	1.9	1.8	1.8	1.8	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	2.0	2.0	2.1	1.9	1.9	2.1
29-Jun	Z	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.3	2.4	2.3	2.0	1.9	1.8	1.8	1.8	1.8	1.9	1.9	2.1	2.2	2.1	2.0	2.1	2.0	2.0	2.4
30-Jun	2.2	Z	2.1	2.1	2.0	2.1	2.2	2.1	2.0	2.0	1.9	1.9	1.9	2.0	2.1	2.3	2.9	4.1	3.8	3.3	2.8	2.7	2.9	2.3	2.4	4.1	
																								Diurnal Average			
																								Diurnal Maximum			
Z - zerospan C - Calibration M - Maintenance																											



WBEA
Hourly Averages

Total Hydrocarbons (THC) - ppm
Athabasca Valley - June 2015





WBEA
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Athabasca Valley - June 2015

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	648	95.15	95.15
2.1 - 3.0	30	4.41	99.56
3.1 - 10.0	3	0.44	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 681

Total Number of Hours: 720



WBEA
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Athabasca Valley - June 2015

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	54	14	8	13	23	39	94	38	34	26	73	26	25	38	48	95	648
2.1 - 3.0	3	0	2	1	4	4	7	1	1	4	1	0	1	0	1	0	30
3.1 - 10.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	58	14	10	14	27	43	101	39	35	30	74	26	26	38	49	97	681

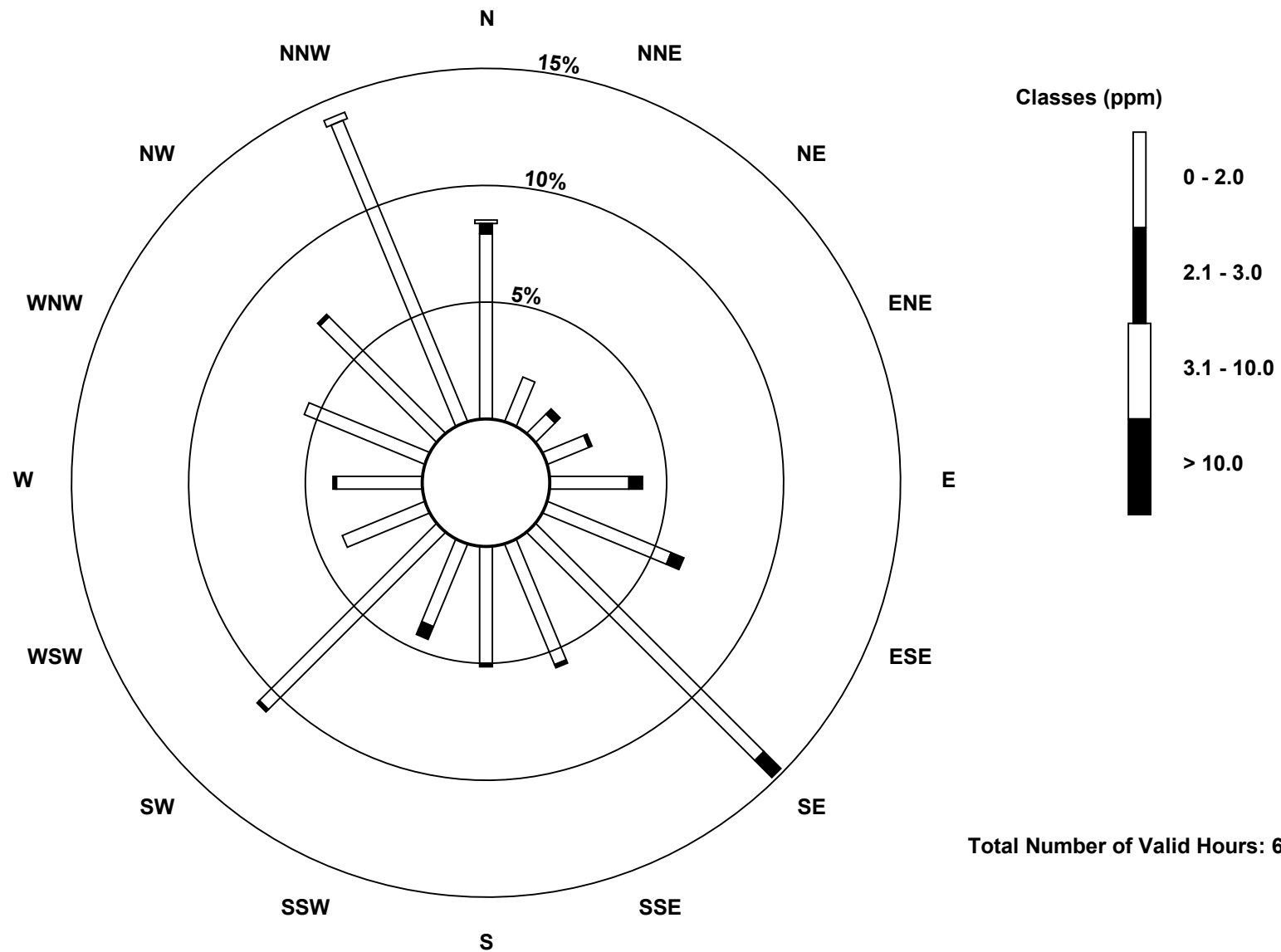
Total Number of Valid Hours: 681

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

Total Hydrocarbons (THC) - ppm
Athabasca Valley (AMS 7)

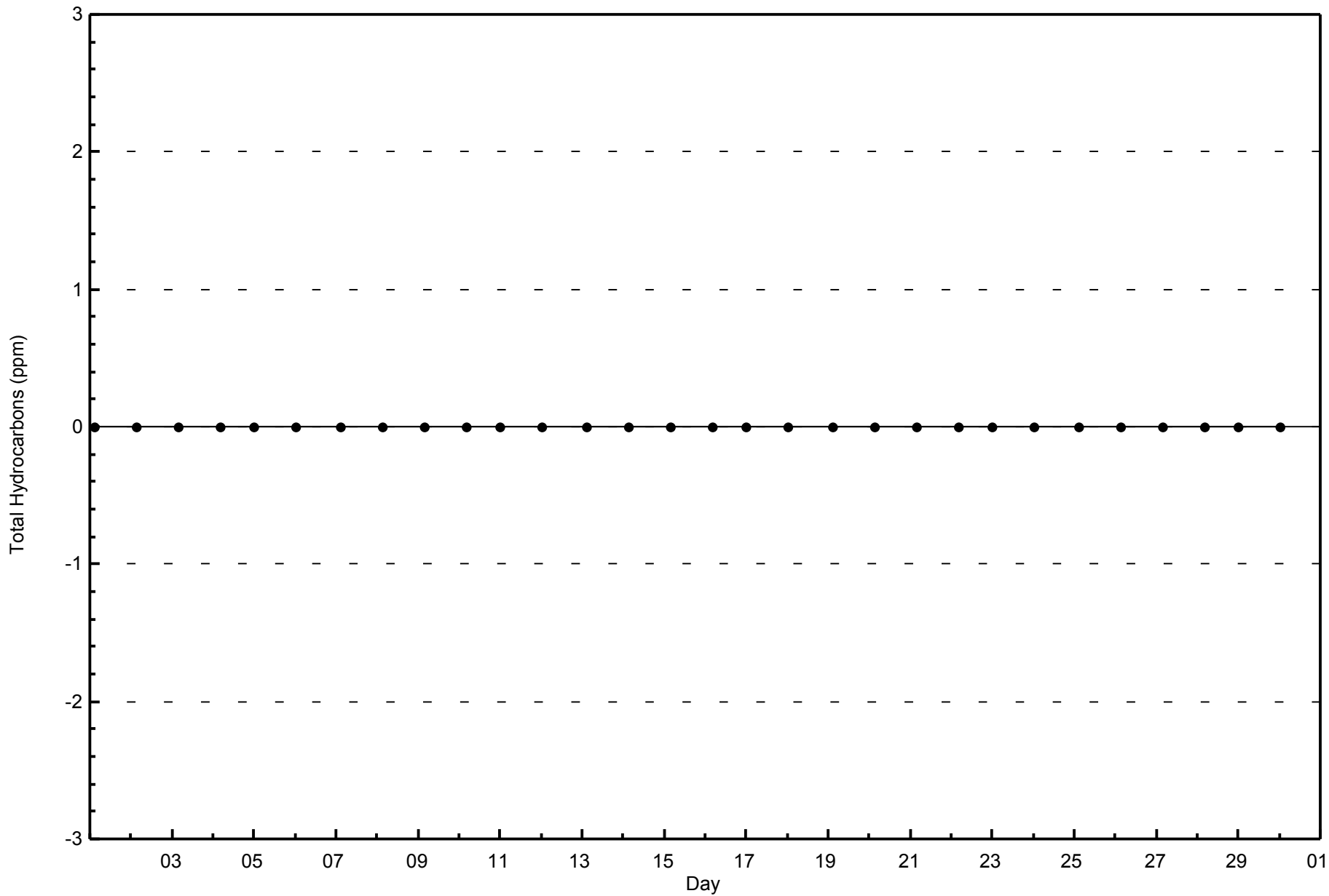


Total Number of Valid Hours: 681



WBEA
Zero Responses

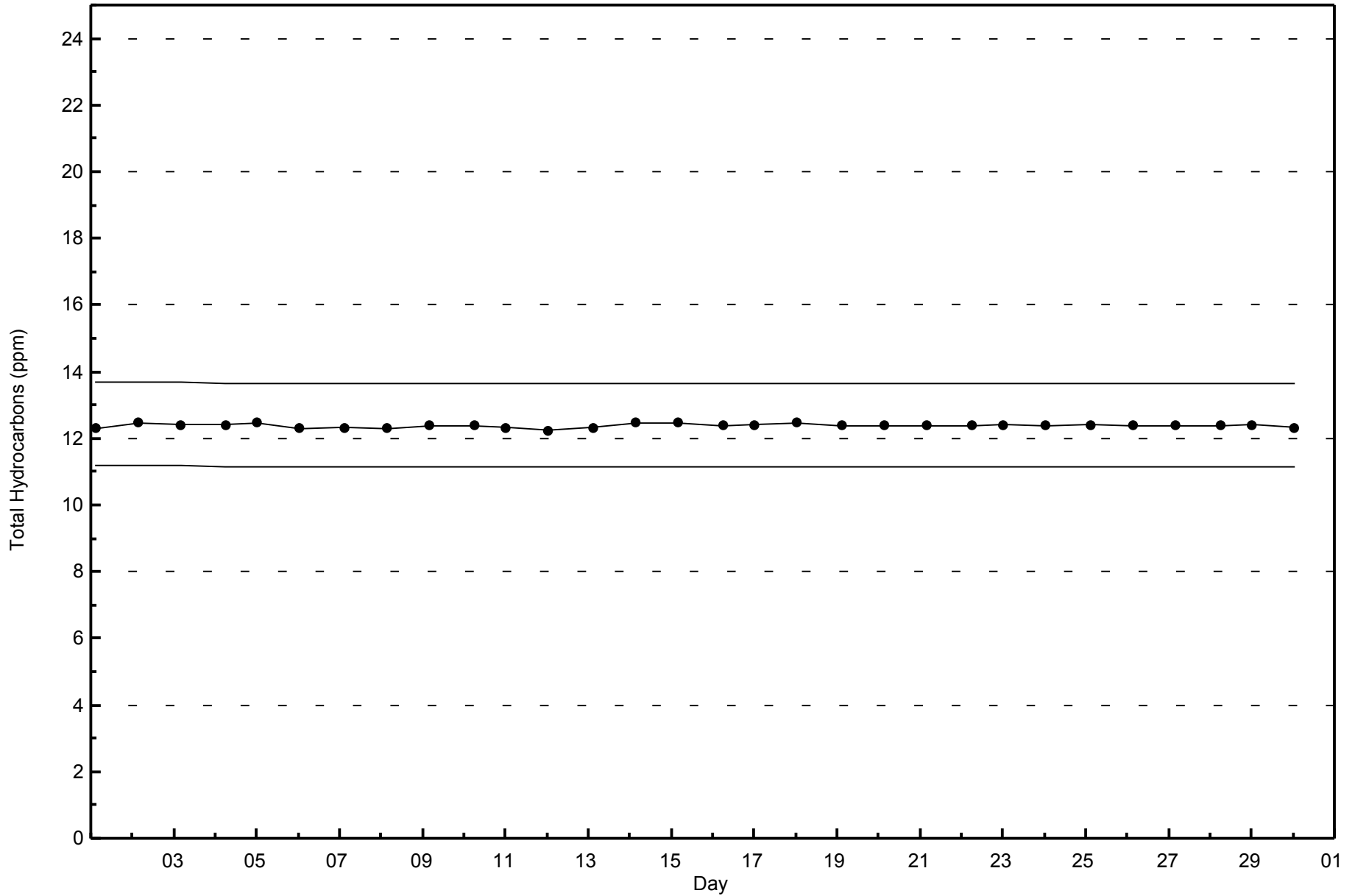
Total Hydrocarbons (THC) - ppm
Athabasca Valley - June 2015





WBEA
Span Responses

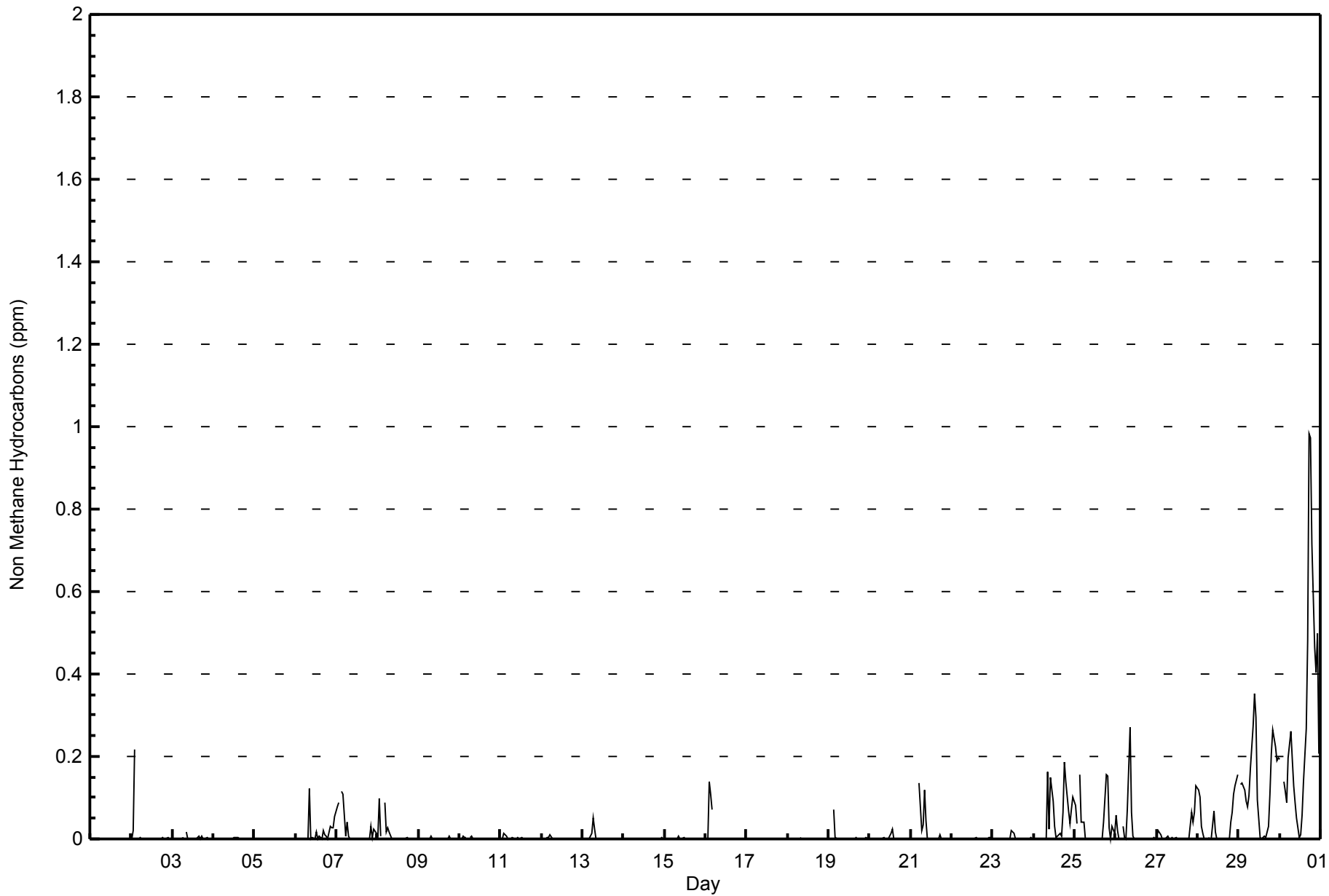
Total Hydrocarbons (THC) - ppm
Athabasca Valley - June 2015





WBEA
Hourly Averages

Non Methane Hydrocarbons (NMHC) - ppm
Athabasca Valley - June 2015





WBEA
Cumulative Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm
Athabasca Valley - June 2015

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	534	78.41	78.41
0.006 - 0.05	69	10.13	88.55
0.06 - 0.1	47	6.90	95.45
> 0.1	31	4.55	100.00

Total Number of Valid Hours: 681

Total Number of Hours: 720



WBEA
Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm
Athabasca Valley - June 2015

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	49	14	8	9	16	34	74	28	24	19	53	24	20	37	40	85	534
0.006 - 0.05	3	0	0	4	7	4	12	6	5	3	9	0	4	0	4	8	69
0.06 - 0.1	3	0	0	0	0	1	12	5	5	3	9	1	1	1	4	2	47
> 0.1	3	0	2	1	4	4	3	0	1	5	3	1	1	0	1	2	31
Totals	58	14	10	14	27	43	101	39	35	30	74	26	26	38	49	97	681

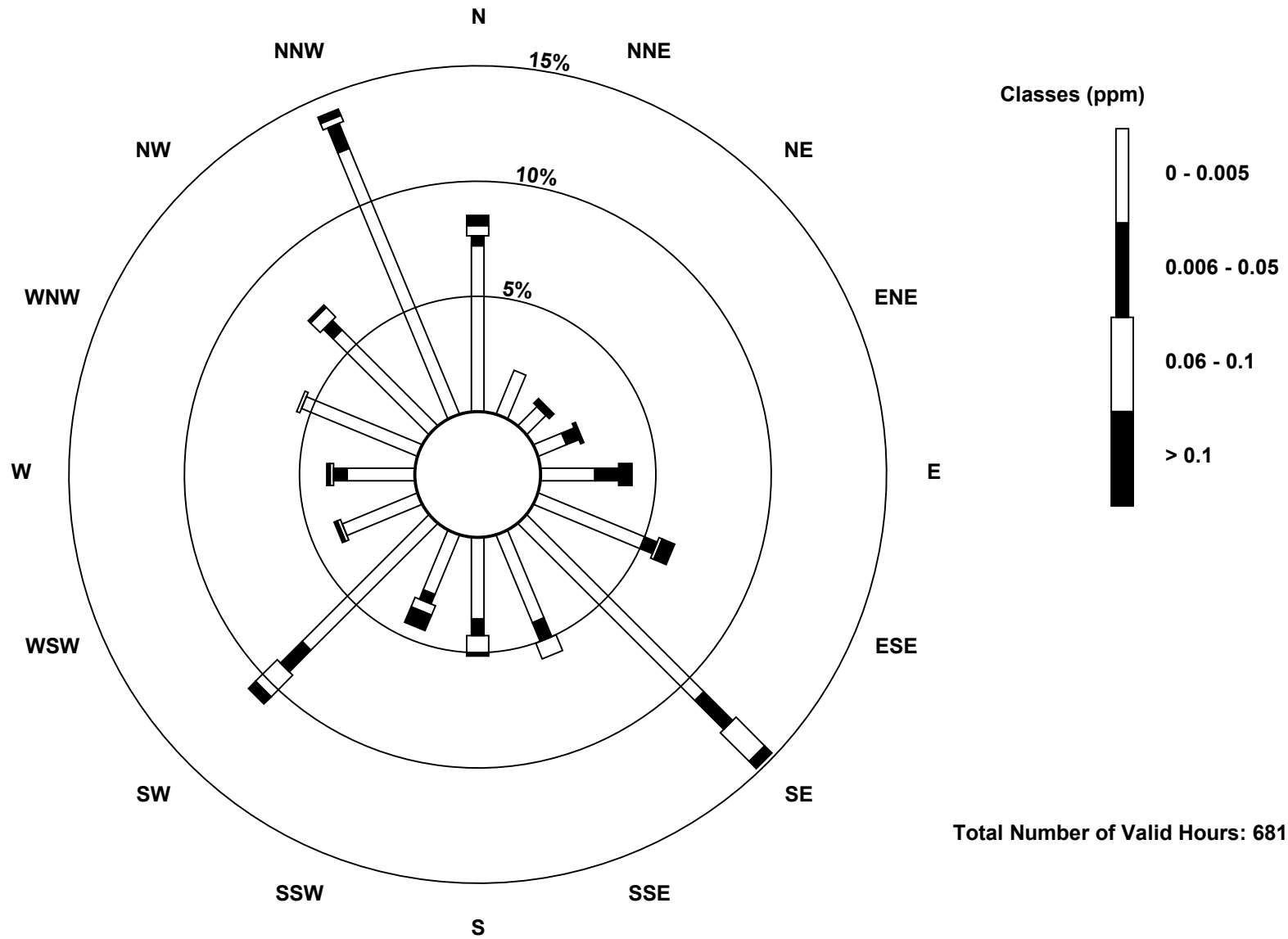
Total Number of Valid Hours: 681

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

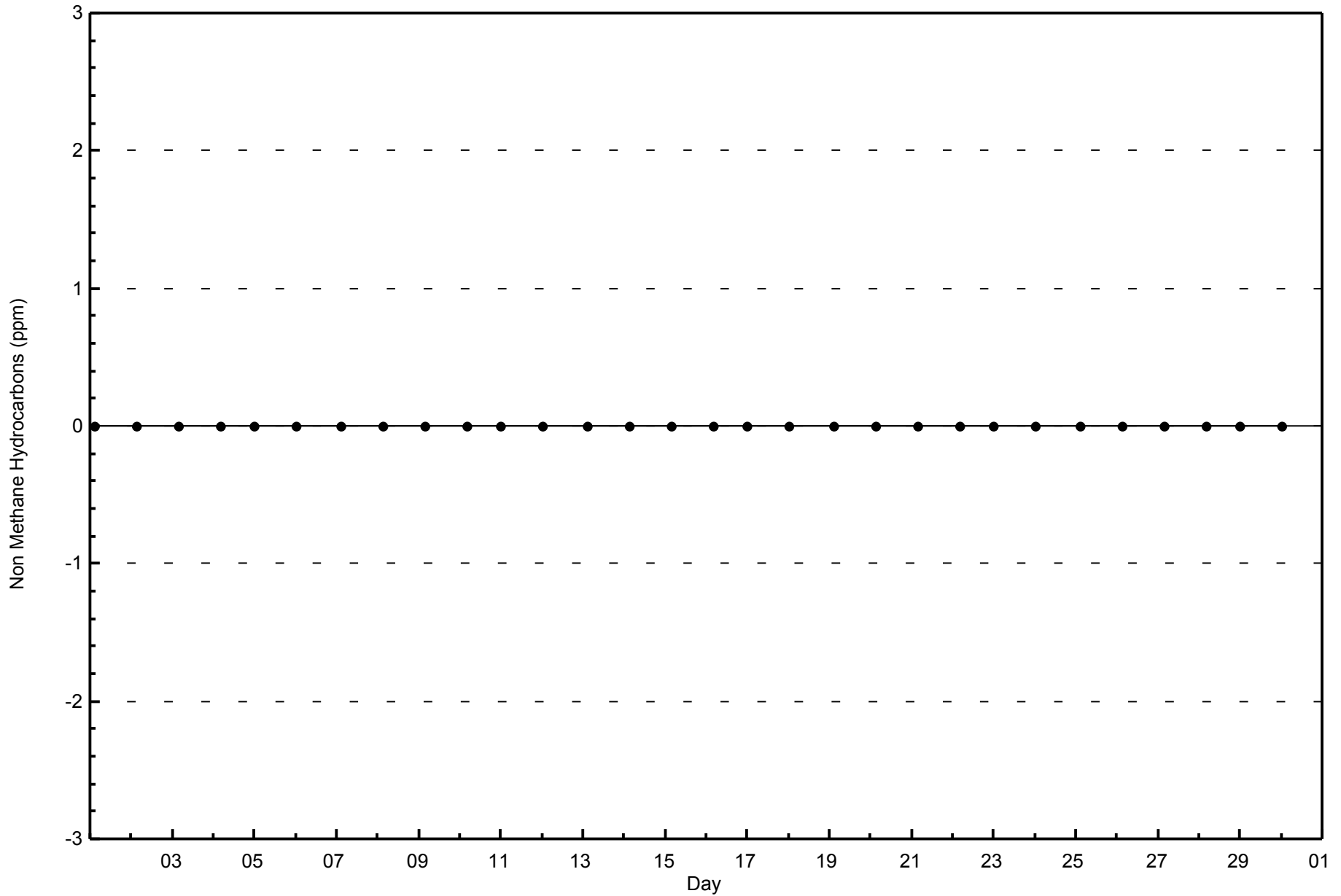
Non Methane Hydrocarbons (NMHC) - ppm
Athabasca Valley (AMS 7)





WBEA
Zero Responses

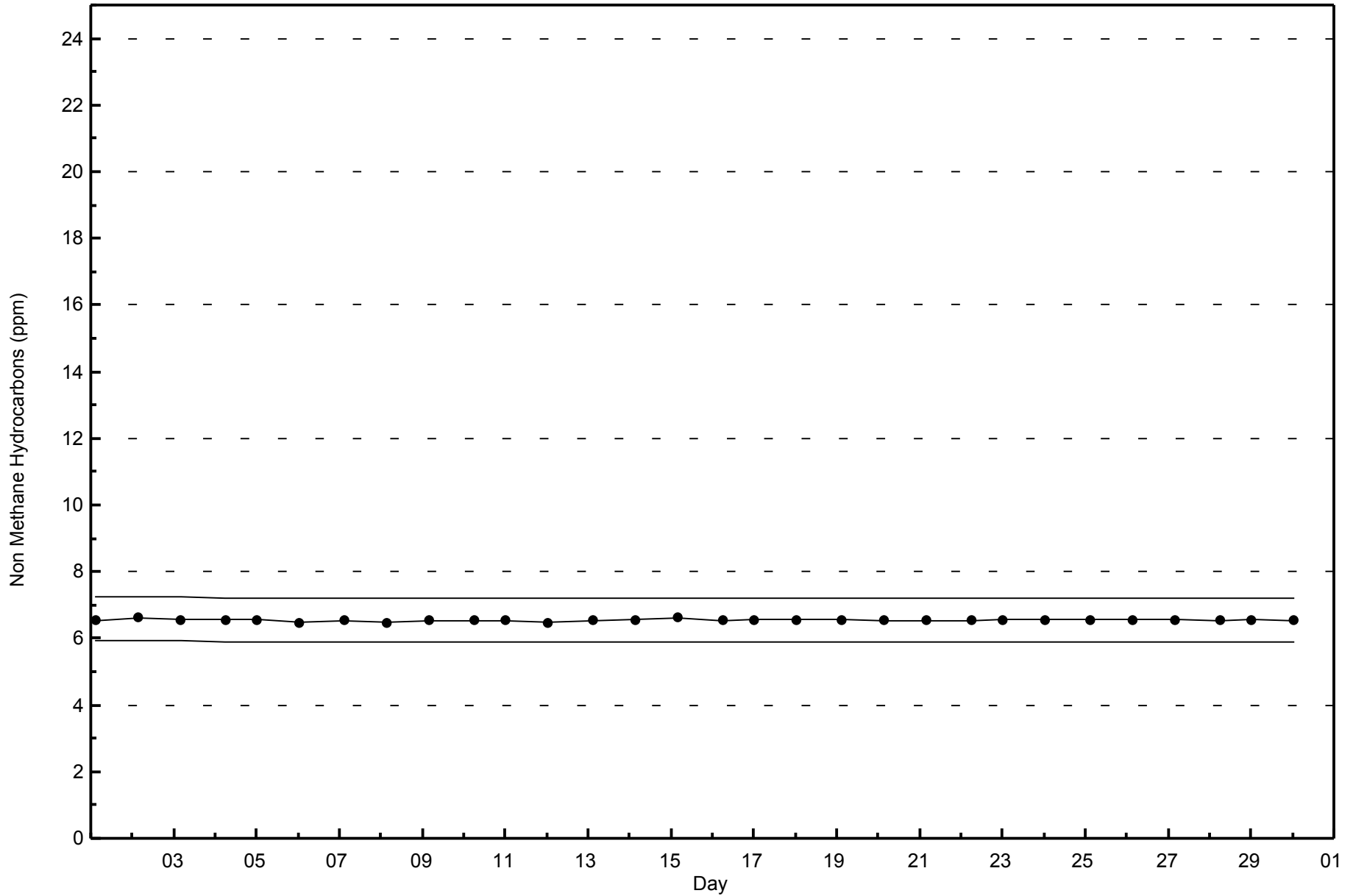
Non Methane Hydrocarbons (NMHC) - ppm
Athabasca Valley - June 2015





WBEA
Span Responses

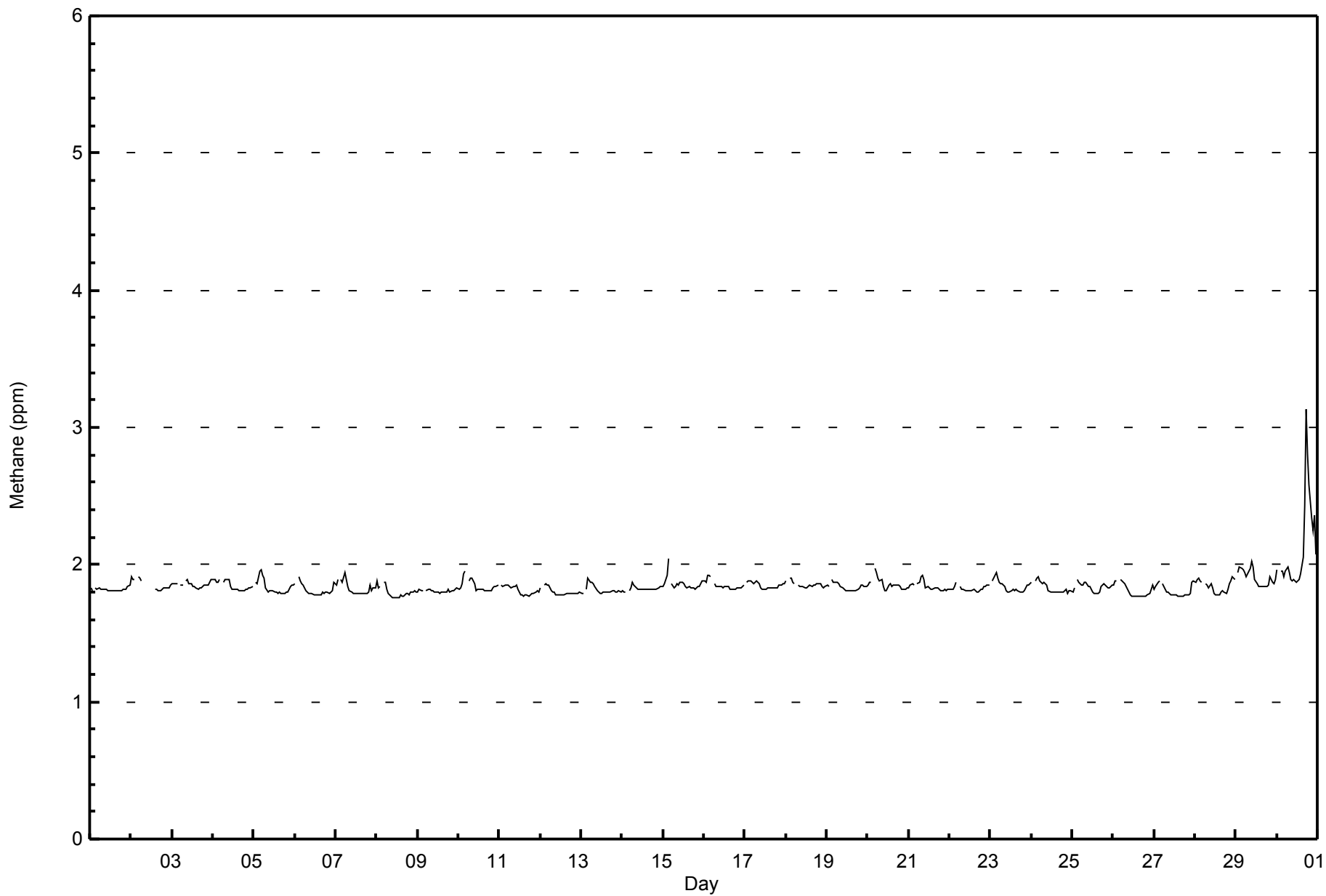
Non Methane Hydrocarbons (NMHC) - ppm
Athabasca Valley - June 2015





WBEA
Hourly Averages

Methane (CH₄) - ppm
Athabasca Valley - June 2015





WBEA
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Athabasca Valley - June 2015

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	673	98.83	98.83
2.1 - 3.0	7	1.03	99.85
3.1 - 10.0	1	0.15	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 681

Total Number of Hours: 720



WBEA
Frequency Distribution

Methane (CH₄) - ppm
Athabasca Valley - June 2015

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	56	14	9	14	27	42	101	39	34	30	74	26	25	38	49	95	673
2.1 - 3.0	2	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	7
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	58	14	10	14	27	43	101	39	35	30	74	26	26	38	49	97	681

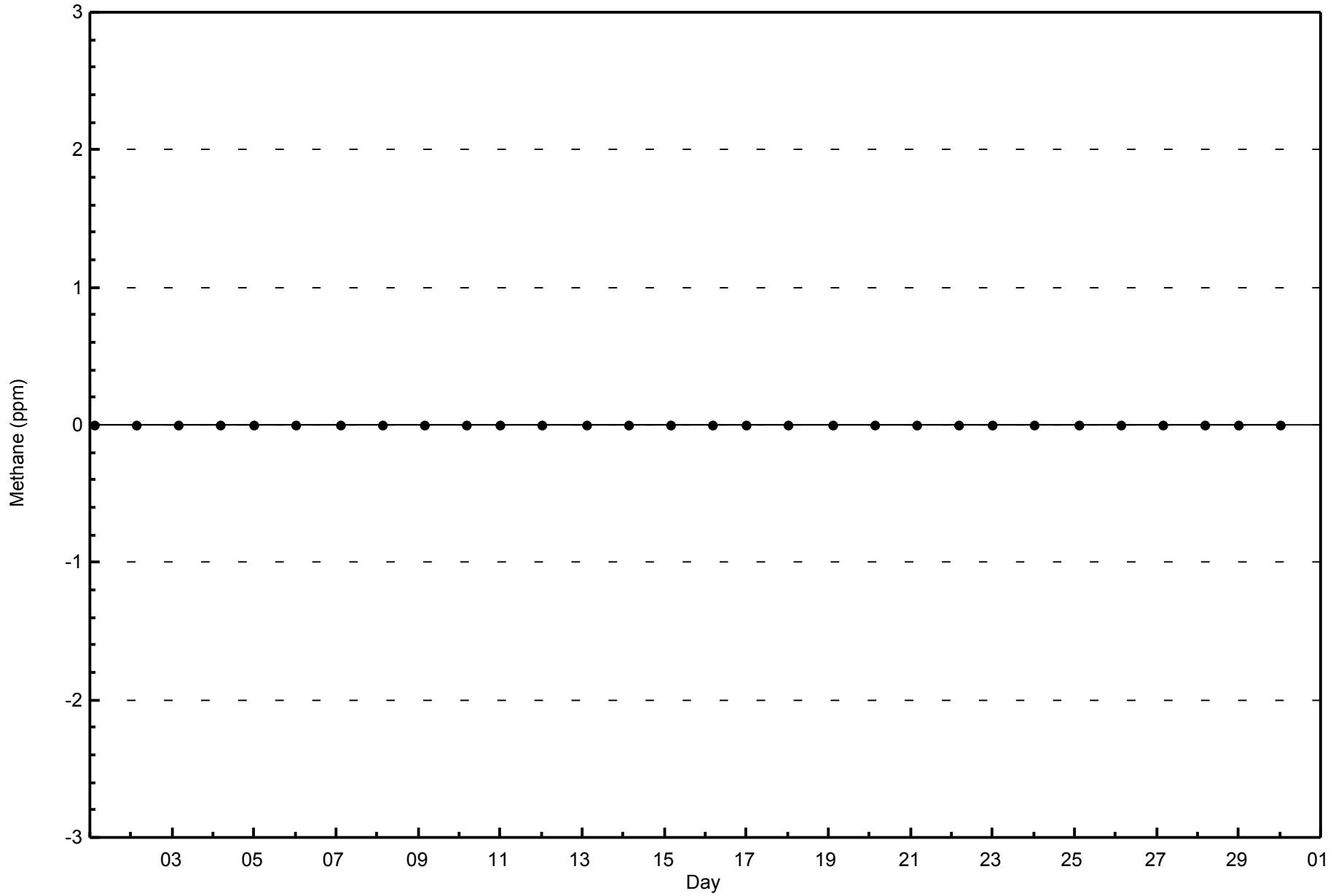
Total Number of Valid Hours: 681

Total Number of Hours: 720



WBEA
Zero Responses

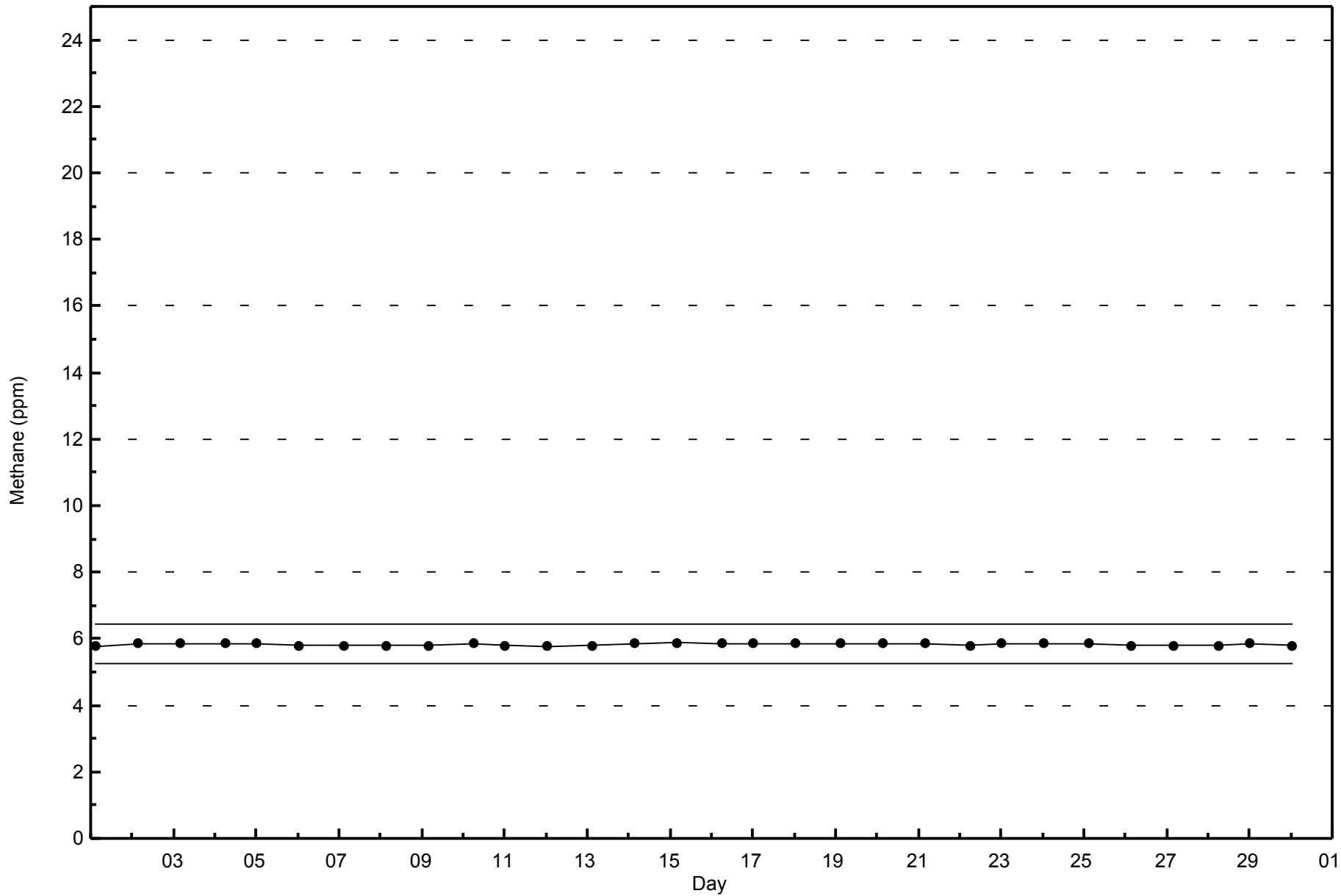
Methane (CH₄) - ppm
Athabasca Valley - June 2015





WBEA
Span Responses

Methane (CH₄) - ppm
Athabasca Valley - June 2015





Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 59 ppb on Jun 20 17:00	Maximum Daily Average: 37.5 ppb on Jun 5		Hours of Data:	686
Minimum Value: 2 ppb on Jun 10 04:00	Minimum Daily Average: 12.6 ppb on Jun 15		Hours of Missing Data:	34
Maximum Diurnal Average: 39.2 ppb at hour 16	Minimum Diurnal Average: 11.8 ppb at hour 5		Hours of Calibration:	34
Monthly Average: 26.9 ppb	Percentiles: P ₁ = 4 P ₁₀ = 10 Q ₁ = 17 Median = 27 Q ₃ = 37 P ₉₀ = 42 P ₉₉ = 52		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	15	22	22	17	Z	10	11	11	12	14	19	25	29	31	33	36	31	35	34	34	31	28	19	17	23.3	36
2-Jun	8	7	6	4	3	Z	6	11	23	27	30	34	35	35	36	39	40	39	39	38	33	32	30	28	25.3	40
3-Jun	25	22	19	17	16	18	Z	C	C	C	C	37	43	44	44	44	44	44	43	38	35	35	33	31	33.2	44
4-Jun	28	28	29	25	20	20	21	Z	28	34	49	54	55	52	48	45	44	41	41	42	42	40	39	35	37.3	55
5-Jun	31	25	Z	21	23	25	24	31	40	45	48	50	50	50	49	47	48	46	44	41	35	35	28	28	37.5	50
6-Jun	25	22	17	Z	9	21	23	26	27	30	35	37	36	36	41	40	31	35	31	20	13	10	10	6	25.3	41
7-Jun	7	6	7	8	Z	6	14	21	33	39	42	40	40	41	42	41	42	41	39	31	23	19	19	17	27.0	42
8-Jun	14	18	15	10	7	Z	14	16	18	20	21	23	24	22	25	26	30	30	31	29	27	26	23	25	21.5	31
9-Jun	26	26	26	25	24	22	Z	20	28	33	34	34	35	41	35	38	41	40	32	34	32	25	20	17	30.0	41
10-Jun	16	12	8	2	2	4	5	Z	15	23	33	35	38	42	46	47	47	46	42	40	30	23	22	19	25.9	47
11-Jun	18	21	Z	18	17	16	15	16	17	23	30	37	45	43	46	47	45	41	39	36	37	33	28	27	30.2	47
12-Jun	19	17	14	Z	13	15	23	27	30	36	40	41	43	43	37	37	37	42	43	40	39	37	36	30	32.1	43
13-Jun	29	30	31	23	Z	15	19	19	22	30	36	41	42	37	38	37	37	36	35	33	33	29	25	28	30.7	42
14-Jun	29	31	31	29	31	Z	25	27	31	32	34	36	36	37	40	42	41	40	40	38	31	24	21	18	32.3	42
15-Jun	16	13	8	4	5	9	Z	10	8	10	11	11	14	18	21	20	20	20	21	19	12	10	5	4	12.6	21
16-Jun	7	9	9	7	10	13	12	Z	18	21	19	23	23	26	29	33	34	32	30	26	20	18	17	12	19.5	34
17-Jun	10	9	Z	8	16	17	19	18	20	26	30	30	31	33	35	36	37	38	37	34	25	21	19	20	24.7	38
18-Jun	17	12	12	Z	11	13	12	10	14	20	23	28	35	40	38	38	36	35	34	31	34	35	31	31	25.7	40
19-Jun	31	27	21	16	Z	14	17	20	24	27	30	32	33	34	35	37	39	39	39	39	31	25	23	23	28.5	39
20-Jun	19	15	13	12	8	Z	13	18	19	26	36	40	43	50	52	56	59	55	51	43	29	28	26	24	32.0	59
21-Jun	22	19	20	16	12	10	Z	12	20	25	35	39	38	41	41	42	39	37	33	29	31	25	22	20	27.3	42
22-Jun	17	16	15	11	8	7	12	Z	17	20	27	30	29	29	32	30	31	33	29	27	20	14	15	7	20.7	33
23-Jun	5	6	Z	3	7	8	10	11	14	25	30	28	29	30	33	37	38	39	32	29	25	16	8	6	20.3	39
24-Jun	13	10	12	Z	7	8	9	13	18	22	31	38	40	41	42	42	37	34	33	26	27	40	35	26	26.3	42
25-Jun	22	17	14	10	Z	11	10	14	22	31	39	46	49	44	40	40	37	38	35	31	28	27	22	17	28.0	49
26-Jun	16	13	13	11	7	Z	12	15	19	26	33	36	36	38	40	40	38	37	48	42	36	32	25	20	27.4	48
27-Jun	17	14	15	13	9	12	Z	22	22	23	27	30	31	34	36	38	39	39	40	37	30	27	20	13	25.6	40
28-Jun	12	12	12	12	16	17	21	Z	31	46	48	38	35	38	41	43	42	41	41	45	44	31	24	18	30.7	48
29-Jun	17	14	Z	11	8	7	10	16	26	40	49	48	49	49	56	53	51	49	43	39	27	22	17	14	31.2	56
30-Jun	12	12	12	Z	8	16	13	15	20	21	21	24	25	24	24	24	17	3	2	6	14	13	8	21	15.3	25

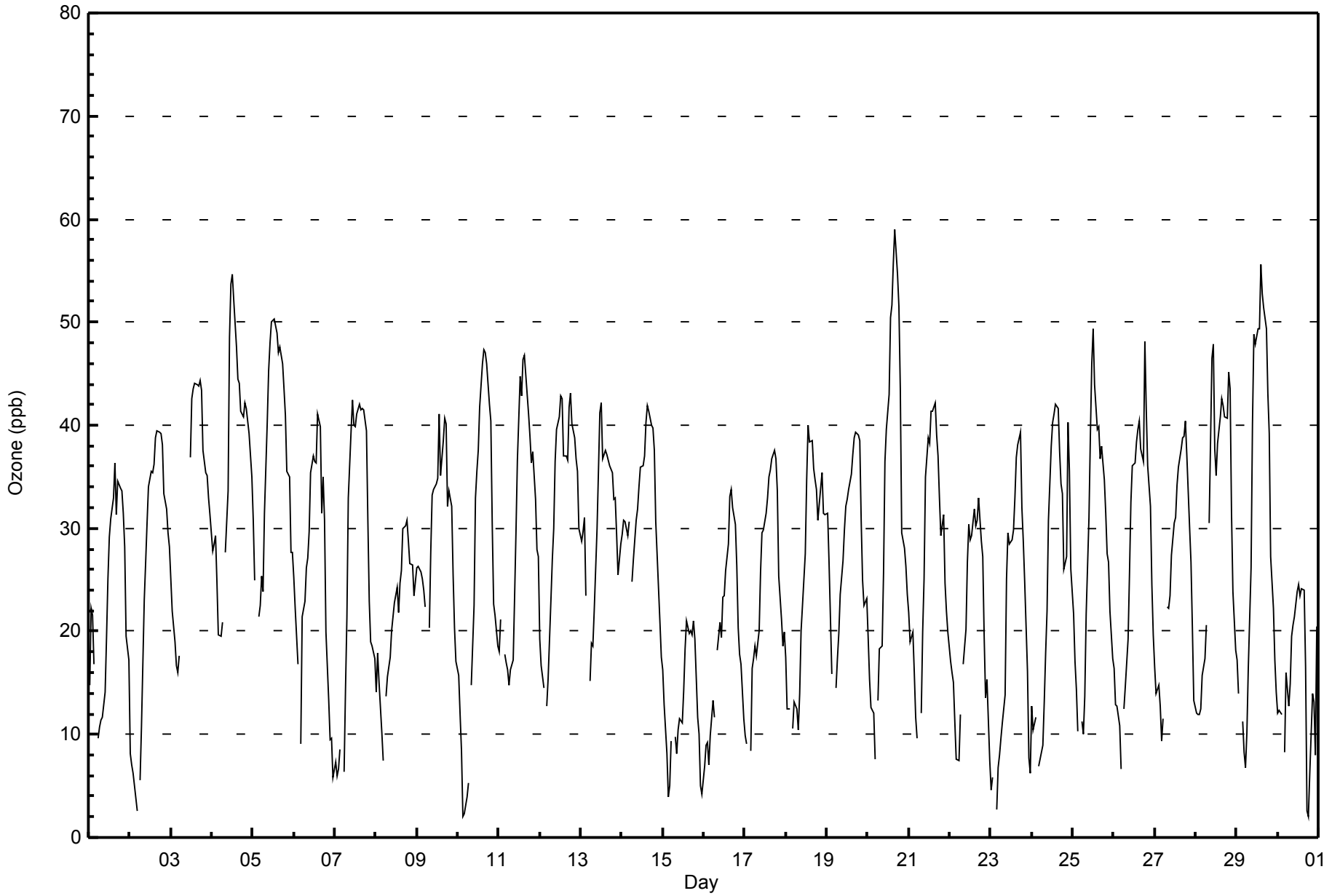
18.2	16.9	16.0	13.4	11.8	13.5	14.7	17.5	21.8	27.4	32.4	34.8	36.4	37.5	38.4	39.2	38.3	37.5	36.1	33.2	29.2	26.0	22.3	20.1	Diurnal Average	
31	31	31	29	31	25	25	31	40	46	49	54	55	52	56	56	59	55	51	45	44	40	39	35	Diurnal Maximum	

Z - zerospan C - Calibration
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb



WBEA
Hourly Averages

Ozone (O₃) - ppb
Athabasca Valley - June 2015





WBEA
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Athabasca Valley - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	236	34.40	34.40
21 - 50	439	63.99	98.40
51 - 82	11	1.60	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



WBEA
Frequency Distribution

Ozone (O₃) - ppb
Athabasca Valley - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	8	0	3	4	8	27	68	17	17	15	13	8	5	11	14	18	236
21 - 50	49	14	9	10	18	16	35	19	17	14	59	19	23	29	36	72	439
51 - 82	0	0	0	0	0	1	1	2	1	0	1	0	0	0	0	5	11
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	57	14	12	14	26	44	104	38	35	29	73	27	28	40	50	95	686

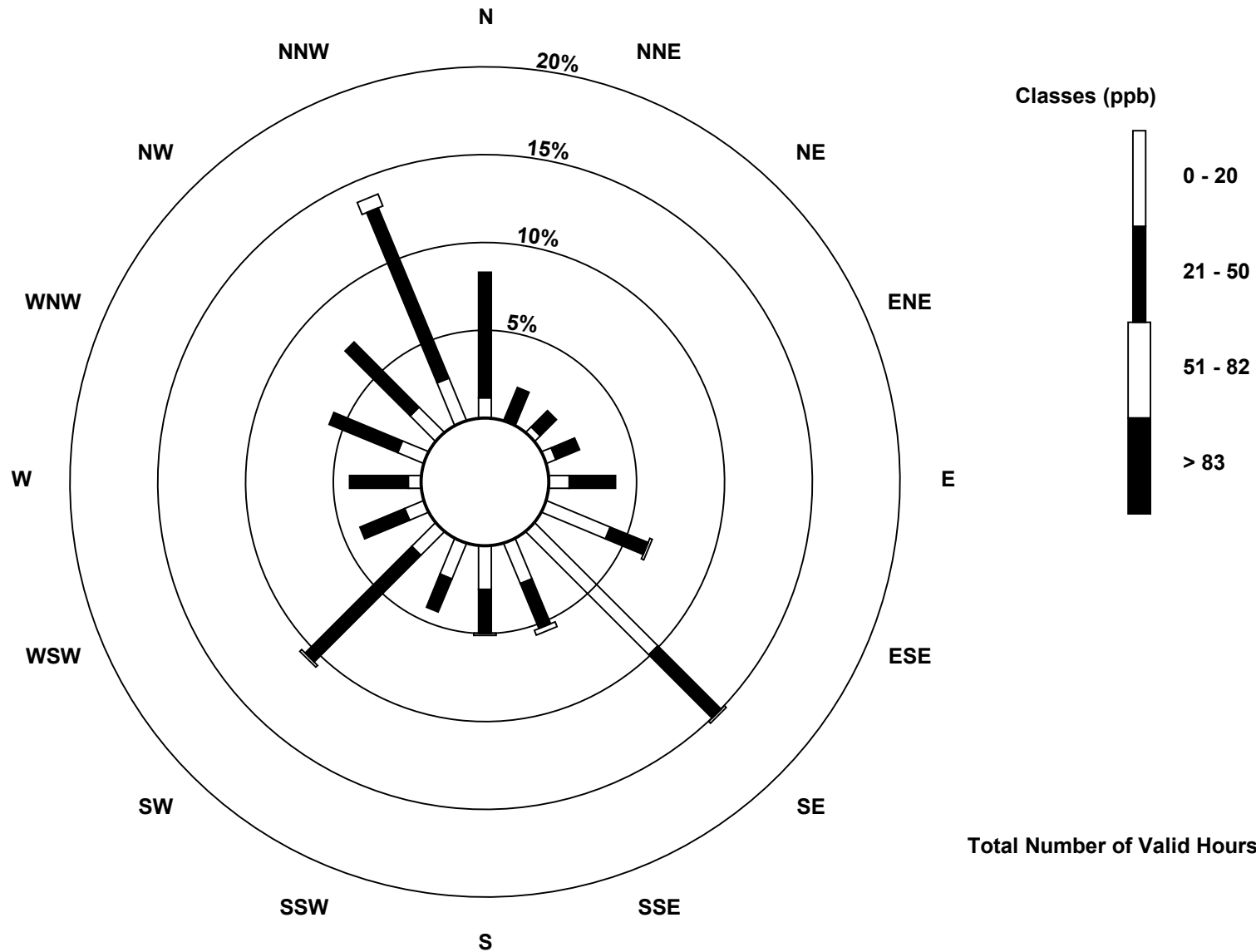
Total Number of Valid Hours: 686

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

Ozone (O₃) - ppb
Athabasca Valley (AMS 7)

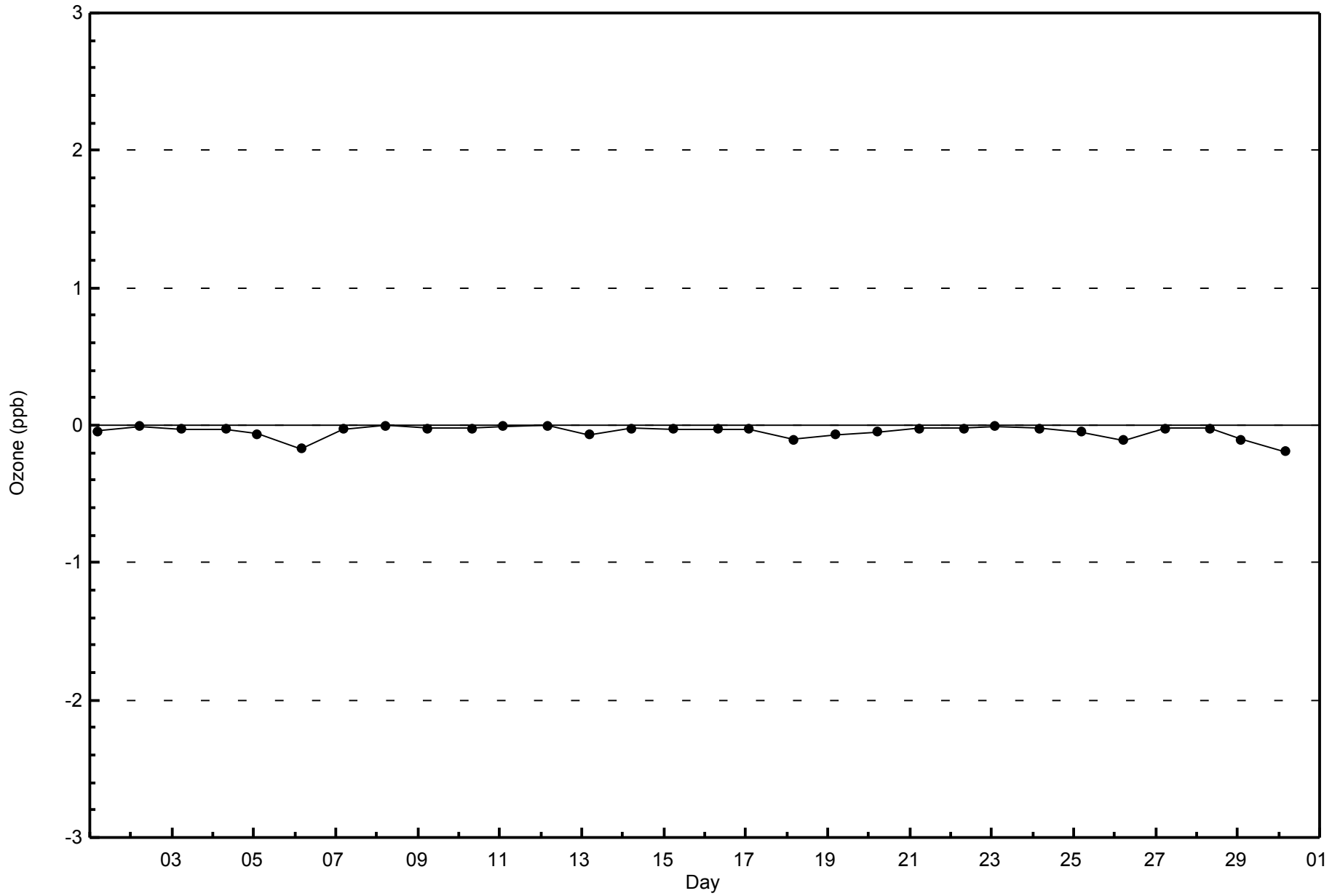


Total Number of Valid Hours: 686



WBEA
Zero Responses

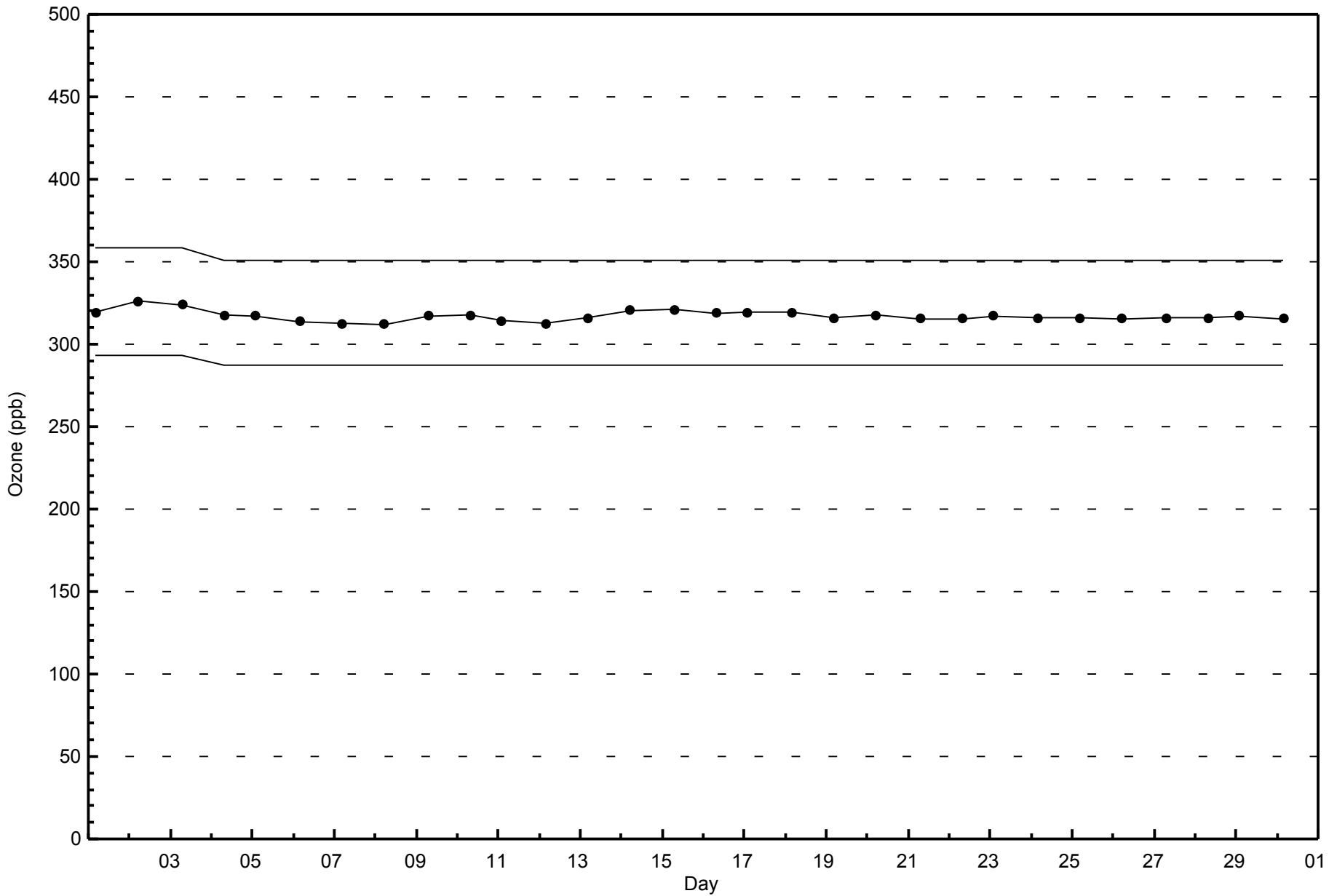
Ozone (O₃) - ppb
Athabasca Valley - June 2015





WBEA
Span Responses

Ozone (O₃) - ppb
Athabasca Valley - June 2015



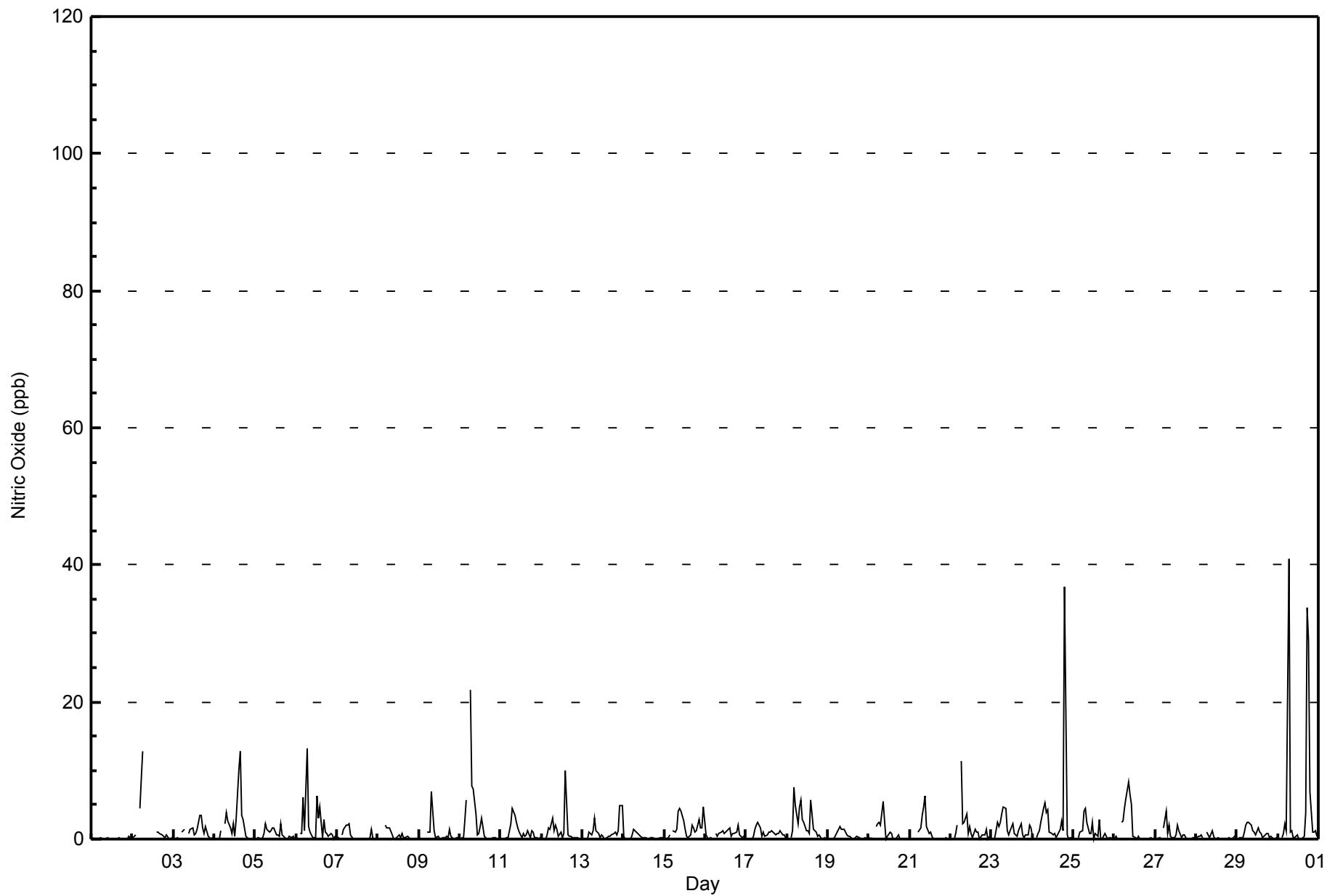


Maximum Value: 41 ppb on Jun 30 07:00														Maximum Daily Average: 5.5 ppb on Jun 30														Hours in Service: 720	
Minimum Value: 0 ppb on Jun 1 11:00														Minimum Daily Average: 0.1 ppb on Jun 1														Hours of Data: 681	
Maximum Diurnal Average: 5.1 ppb at hour 7														Minimum Diurnal Average: 0.1 ppb at hour 2														Hours of Missing Data: 39	
Monthly Average: 1.3 ppb														Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 3 P ₉₉ = 13														Hours of Calibration: 37	
																												Percent Operational Time: 99.7	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Jun	0	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-Jun	0	0	1	Z	4	9	13	C	C	C	C	C	C	1	1	1	1	0	0	1	0	0	0	--	13				
3-Jun	0	0	0	0	Z	1	1	M	M	1	1	2	1	1	1	4	3	2	1	2	0	0	0	1.0	4				
4-Jun	0	0	0	0	1	Z	2	4	3	2	1	2	0	3	10	13	3	3	0	0	0	0	0	2.1	13				
5-Jun	Z	0	0	0	0	1	2	1	1	1	2	2	1	1	0	2	1	0	0	0	0	0	0	0.7	2				
6-Jun	0	Z	1	1	6	1	13	2	1	1	0	0	6	3	5	0	3	1	1	0	1	1	0	2.1	13				
7-Jun	0	0	Z	1	1	2	2	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.5	2				
8-Jun	0	0	0	Z	2	2	2	2	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0.5	2				
9-Jun	0	0	0	0	Z	1	1	7	4	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0.8	7				
10-Jun	0	0	0	3	6	Z	22	8	7	4	1	1	2	3	0	0	0	0	0	0	0	0	0	2.5	22				
11-Jun	Z	0	0	0	0	1	2	4	3	3	2	1	0	1	0	1	1	0	1	1	0	0	0	1.0	4				
12-Jun	0	Z	0	1	2	1	3	1	2	1	0	1	0	1	10	1	0	0	0	0	0	0	0	1.1	10				
13-Jun	0	0	Z	0	1	1	1	3	1	1	0	1	0	0	0	0	0	1	1	1	1	1	5	1.0	5				
14-Jun	0	0	0	Z	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1				
15-Jun	0	0	0	1	Z	1	1	1	4	4	4	3	2	0	0	1	2	2	1	1	3	2	2	1.7	5				
16-Jun	1	0	0	0	0	Z	1	0	1	1	1	1	1	2	0	1	1	1	1	2	1	0	0	0.7	2				
17-Jun	Z	0	0	0	0	1	2	2	2	0	1	0	1	1	1	1	1	1	1	1	1	1	1	0.9	2				
18-Jun	0	Z	0	1	7	5	2	5	6	3	2	1	1	6	1	1	1	0	1	0	0	0	0	2.0	7				
19-Jun	0	0	Z	0	0	1	1	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.5	2				
20-Jun	0	0	0	Z	2	2	2	2	5	3	0	0	1	1	0	0	0	1	0	0	0	0	0	0.9	5				
21-Jun	0	0	0	0	Z	1	2	4	5	6	2	1	1	0	0	0	0	0	0	0	0	0	0	0.9	6				
22-Jun	0	0	0	1	2	Z	11	2	2	4	1	2	1	0	2	1	1	0	1	1	1	1	0	1.5	11				
23-Jun	Z	0	0	3	2	2	4	5	4	1	1	1	2	1	1	0	1	2	1	0	1	1	2	1.6	5				
24-Jun	0	Z	0	1	1	2	4	5	4	4	1	1	1	0	1	1	3	1	37	1	0	0	0	3.0	37				
25-Jun	0	0	Z	0	1	1	4	5	3	1	1	2	0	1	0	3	0	0	1	0	0	0	0	1.0	5				
26-Jun	0	0	0	Z	2	3	5	6	8	7	5	0	0	0	0	0	0	0	0	0	0	0	0	1.6	8				
27-Jun	0	0	0	0	Z	2	4	1	2	0	0	0	1	2	1	0	1	1	0	0	0	0	0	0.7	4				
28-Jun	0	0	0	1	0	Z	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1				
29-Jun	Z	0	0	0	1	2	2	2	2	1	1	1	2	1	1	0	0	1	1	0	0	0	0	0.9	2				
30-Jun	0	Z	0	1	2	1	41	1	1	0	0	1	0	0	0	0	4	34	29	7	1	1	1	5.5	41				
																												Diurnal Average	
																												Diurnal Maximum	
Z - zerspan														C - Calibration														M - Maintenance	



WBEA
Hourly Averages

Nitric Oxide (NO) - ppb
Athabasca Valley - June 2015





WBEA
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Athabasca Valley - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	676	99.27	99.27
21 - 40	4	0.59	99.85
41 - 80	1	0.15	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 681

Total Number of Hours: 720



WBEA
Frequency Distribution

Nitric Oxide (NO) - ppb
Athabasca Valley - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	57	14	10	14	27	44	100	39	34	29	73	26	26	38	49	96	676
21 - 40	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1	4
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	58	14	10	14	27	44	100	39	35	30	74	26	26	38	49	97	681

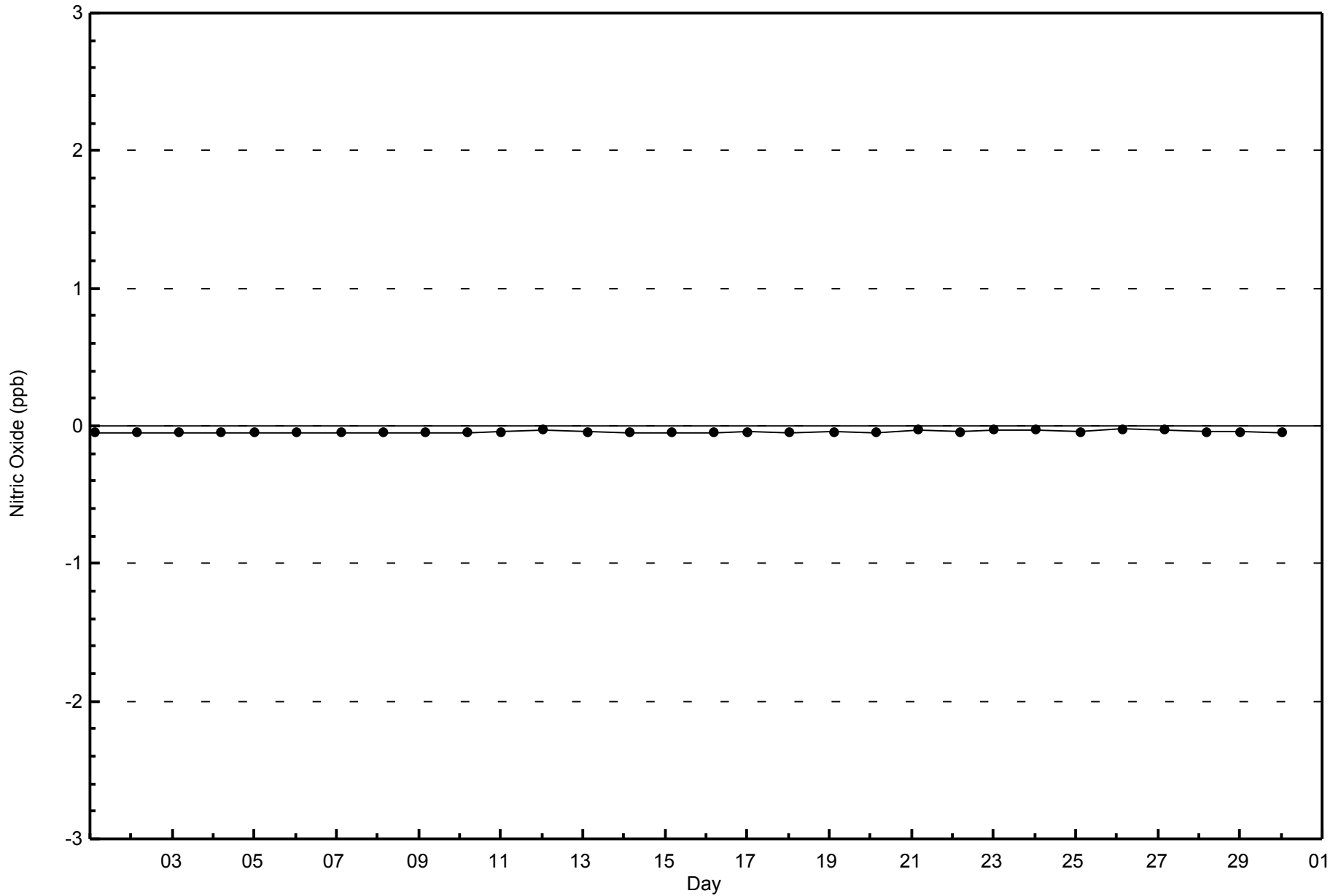
Total Number of Valid Hours: 681

Total Number of Hours: 720



WBEA
Zero Responses

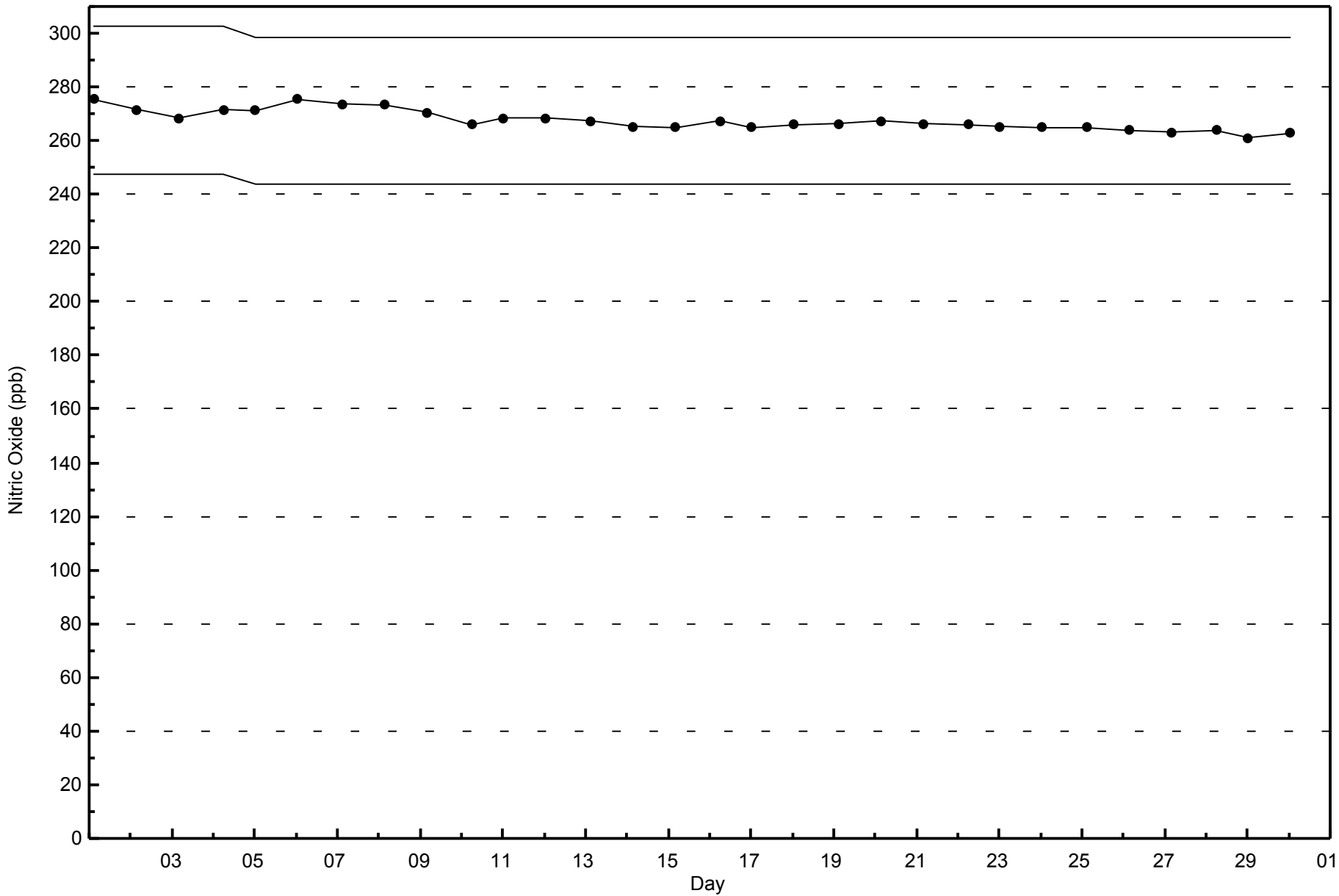
Nitric Oxide (NO) - ppb
Athabasca Valley - June 2015





WBEA
Span Responses

Nitric Oxide (NO) - ppb
Athabasca Valley - June 2015





Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 49 ppb on Jun 30 18:00	Maximum Daily Average: 14.1 ppb on Jun 30		Hours of Data:	681
Minimum Value: 0 ppb on Jun 1 13:00	Minimum Daily Average: 1.6 ppb on Jun 1		Hours of Missing Data:	39
Maximum Diurnal Average: 6.7 ppb at hour 5	Minimum Diurnal Average: 2.3 ppb at hour 13		Hours of Calibration:	37
Monthly Average: 4.4 ppb	Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 4 Q ₃ = 6 P ₉₀ = 8 P ₉₉ = 19		Percent Operational Time:	99.7

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	3	1	Z	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	2	3	3	6	5	1.6	6	
2-Jun	9	7	6	Z	7	6	7	C	C	C	C	C	C	C	2	2	3	3	3	3	6	4	3	4	--	9	
3-Jun	4	3	3	3	Z	4	4	M	M	2	4	3	3	3	3	7	6	5	5	9	8	6	6	6	4.5	9	
4-Jun	3	3	2	3	5	Z	5	6	5	5	4	3	2	4	7	8	10	7	5	3	3	3	5	5	4.5	10	
5-Jun	Z	5	4	6	6	4	6	4	3	3	4	4	2	2	2	4	2	3	1	3	7	5	9	6	4.1	9	
6-Jun	5	Z	9	12	20	6	5	3	2	2	2	1	2	4	4	3	8	4	5	6	4	4	3	6	5.3	20	
7-Jun	5	6	Z	5	6	6	5	6	3	1	1	1	1	1	1	1	1	1	2	5	7	5	6	4	3.5	7	
8-Jun	6	3	3	Z	6	4	3	2	1	1	1	1	2	1	2	1	1	4	2	1	2	3	4	3	2.4	6	
9-Jun	1	1	1	2	Z	3	3	5	5	3	1	2	1	1	2	2	2	2	7	3	4	6	6	5	2.9	7	
10-Jun	3	3	4	7	7	Z	8	9	8	6	2	2	3	5	2	2	2	2	3	3	8	9	6	5	4.7	9	
11-Jun	Z	3	3	3	3	4	7	8	8	5	5	4	2	2	2	3	4	4	5	8	4	4	5	2	4.2	8	
12-Jun	4	Z	4	5	5	4	4	3	4	3	2	1	1	3	7	2	2	2	3	1	0	2	1	1	2.8	7	
13-Jun	1	1	Z	6	15	12	9	9	4	2	1	2	2	1	1	1	1	2	3	4	2	2	6	5	3.9	15	
14-Jun	2	1	1	Z	2	4	5	3	2	1	2	1	1	1	1	1	2	2	2	1	3	5	2	6	2.2	6	
15-Jun	4	4	6	8	Z	5	3	5	7	7	5	4	2	1	1	2	4	4	3	4	10	6	9	9	4.8	10	
16-Jun	4	3	7	10	8	Z	8	4	4	3	3	2	4	4	4	2	2	2	3	6	6	4	4	6	4.4	10	
17-Jun	Z	5	5	6	6	5	4	5	4	2	2	2	2	2	2	3	3	3	4	6	13	11	10	7	4.8	13	
18-Jun	7	Z	6	8	7	5	4	9	7	4	5	3	4	3	5	4	5	4	4	6	4	1	3	2	4.8	9	
19-Jun	2	2	Z	8	10	10	7	5	4	3	3	2	2	2	2	1	2	3	3	3	7	8	7	5	4.3	10	
20-Jun	5	5	5	Z	6	5	4	4	8	5	1	1	5	4	4	4	4	4	4	5	2	1	1	2	3.8	8	
21-Jun	1	3	2	3	Z	6	4	6	9	13	6	4	3	3	2	3	4	3	3	2	2	3	2	1	3.8	13	
22-Jun	1	1	1	5	6	Z	5	2	2	3	2	2	2	3	5	3	2	1	3	4	7	7	4	7	3.4	7	
23-Jun	Z	5	4	5	4	4	4	4	5	2	2	2	4	5	2	3	5	4	3	4	5	9	12	11	4.6	12	
24-Jun	6	Z	4	4	4	3	5	5	5	7	3	2	2	2	2	3	4	4	4	15	5	2	4	5	4.3	15	
25-Jun	2	2	Z	5	6	4	6	8	6	3	5	6	2	2	3	3	4	5	8	9	7	4	6	5	4.8	9	
26-Jun	3	5	4	Z	7	5	5	7	6	4	3	2	1	1	2	1	1	2	2	1	2	4	4	3	3.2	7	
27-Jun	6	6	5	5	Z	5	4	2	1	1	1	1	2	1	1	1	2	2	2	2	3	3	4	8	2.9	8	
28-Jun	10	8	7	6	4	Z	4	3	3	9	5	1	1	1	0	1	1	1	1	6	6	6	5	8	4.1	10	
29-Jun	Z	7	7	7	9	11	10	10	10	11	13	11	7	6	4	5	6	6	8	12	8	6	5	5	5	7.7	13
30-Jun	6	Z	5	9	9	5	16	7	3	4	6	5	3	4	7	13	31	49	45	32	19	17	21	11	14.1	49	

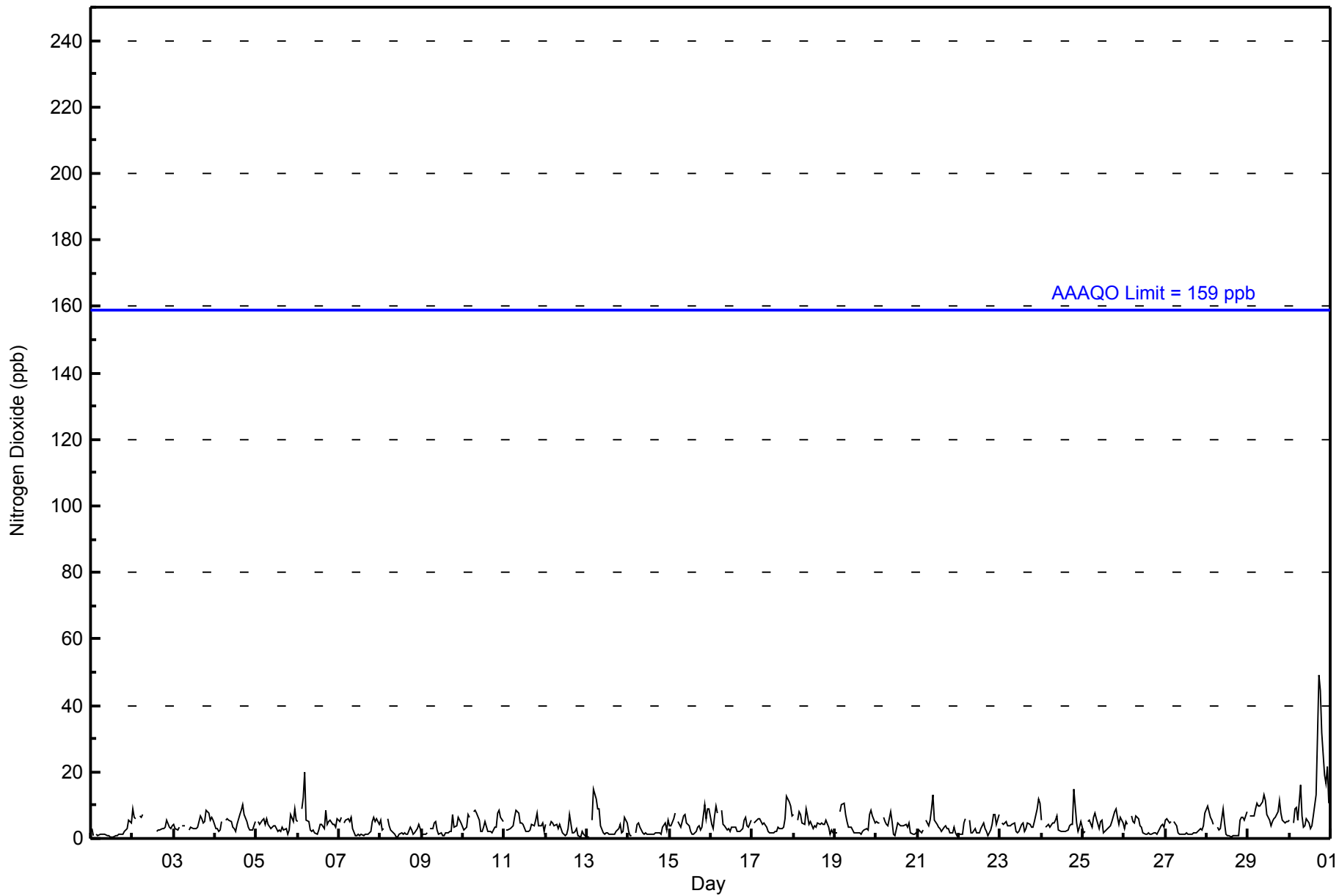
4.0	3.6	4.2	5.6	6.7	5.2	5.5	5.1	4.6	4.1	3.0	2.4	2.3	2.5	2.8	3.1	4.2	4.7	5.0	5.4	5.4	5.1	5.5	5.1	Diurnal Average	
10	8	9	12	20	12	16	10	11	13	11	7	6	5	7	13	31	49	45	32	19	17	21	11	Diurnal Maximum	

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



WBEA
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Athabasca Valley - June 2015





WBEA
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Athabasca Valley - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	676	99.27	99.27
21 - 40	3	0.44	99.71
41 - 80	2	0.29	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 681

Total Number of Hours: 720



WBEA
Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Athabasca Valley - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	56	14	10	14	27	44	100	39	34	30	74	26	26	38	49	95	676
21 - 40	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	3
11 - 80	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	58	14	10	14	27	44	100	39	35	30	74	26	26	38	49	97	681

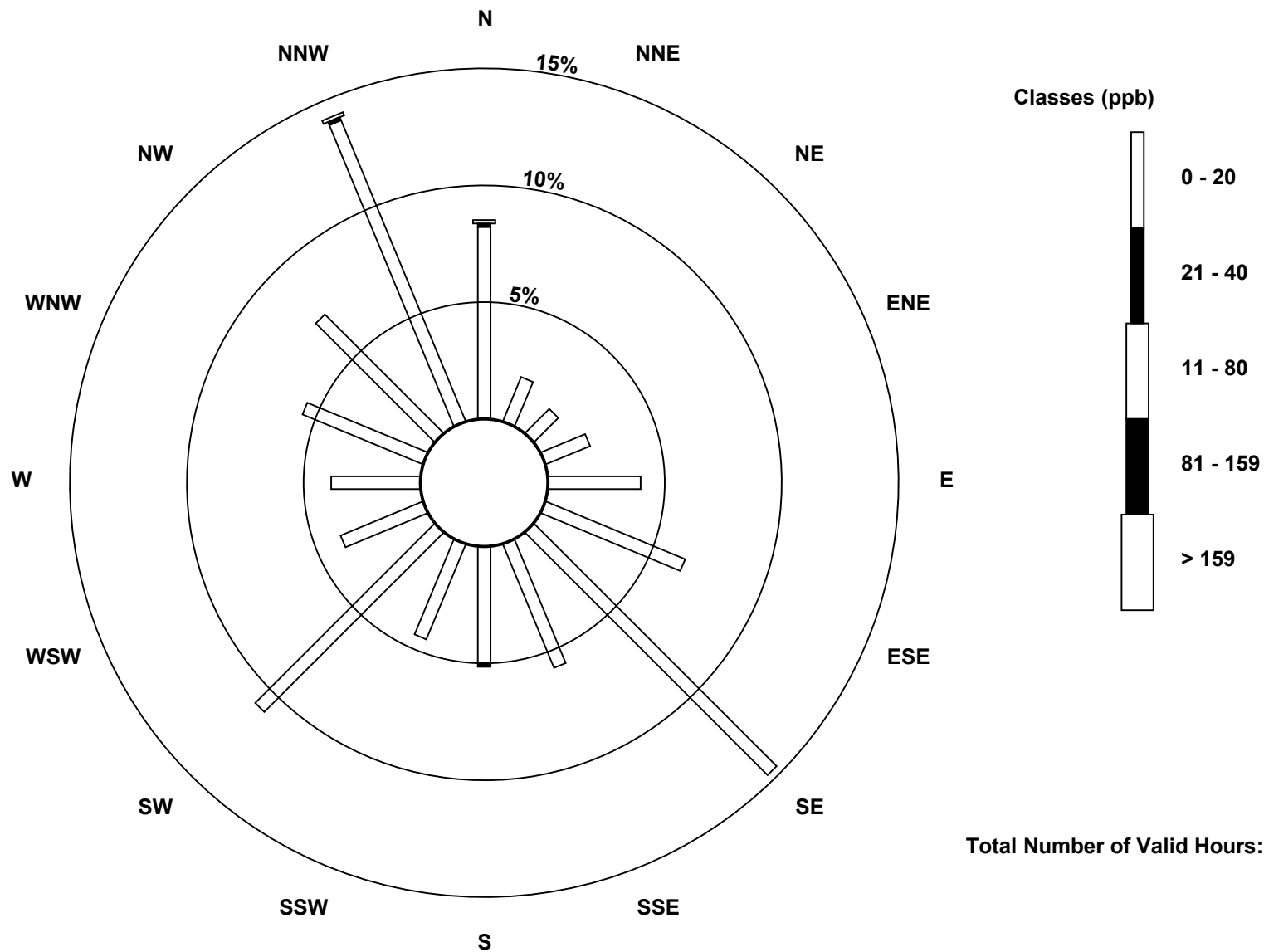
Total Number of Valid Hours: 681

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

Nitrogen Dioxide (NO₂) - ppb
Athabasca Valley (AMS 7)

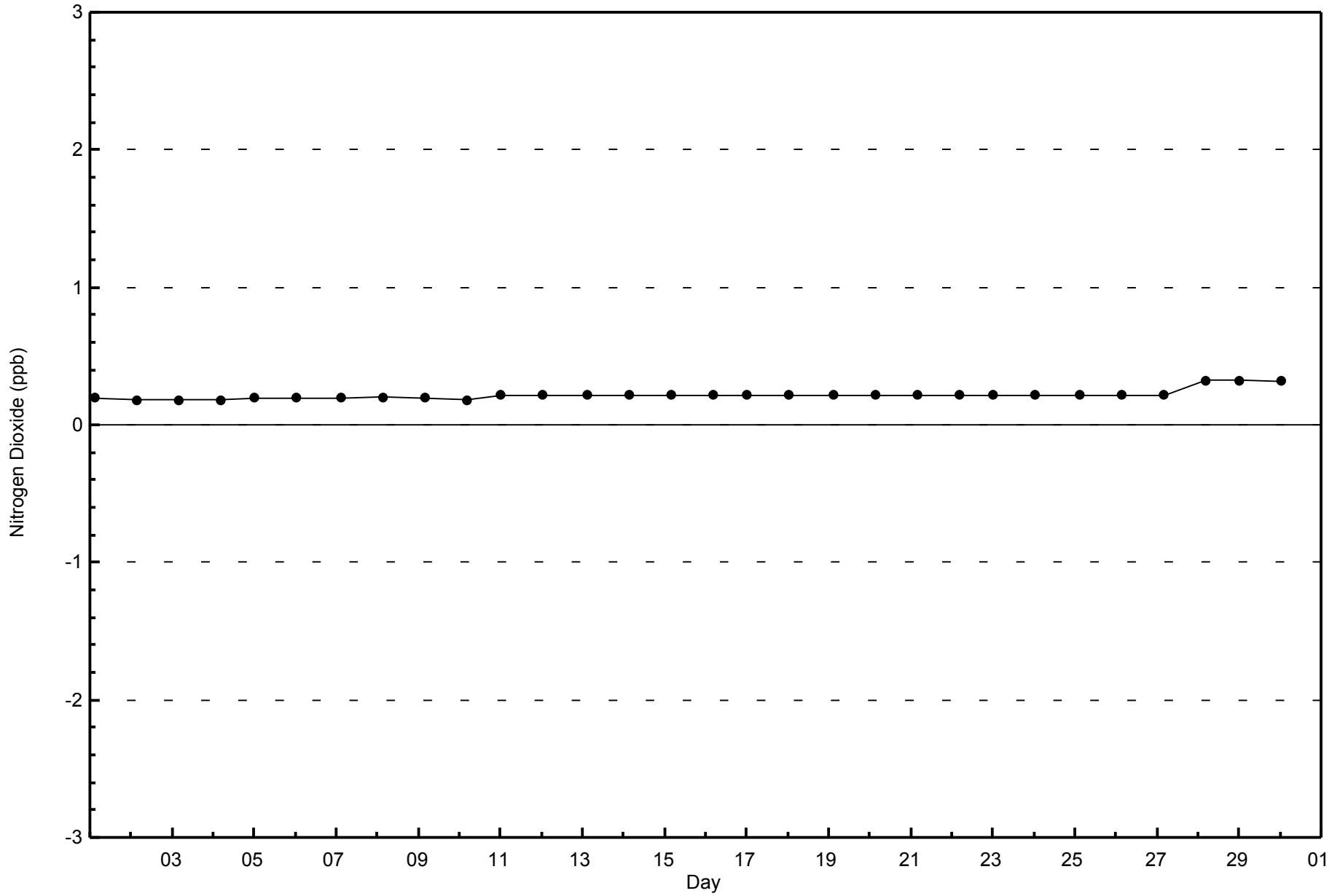


Total Number of Valid Hours: 681



WBEA
Zero Responses

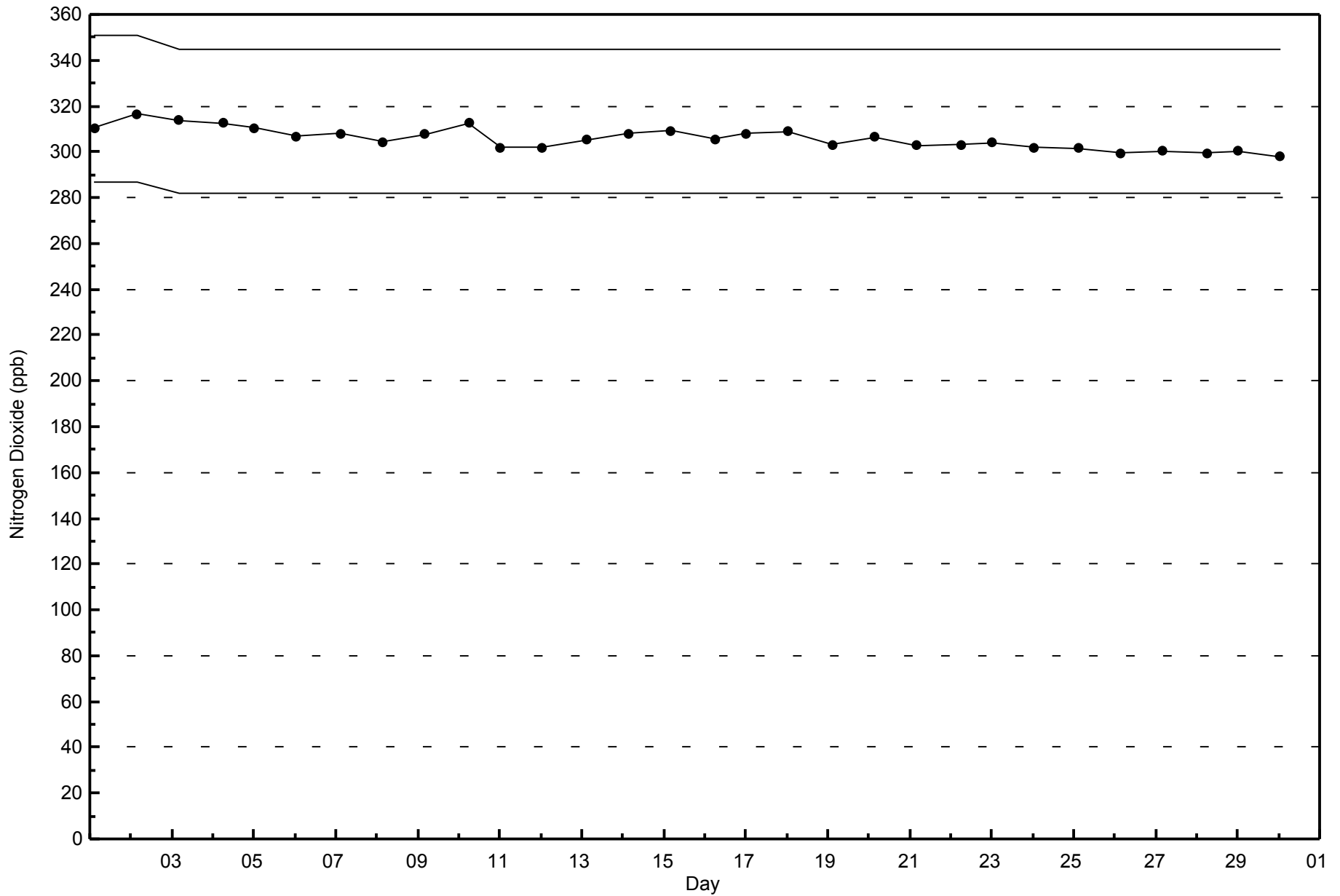
Nitrogen Dioxide (NO₂) - ppb
Athabasca Valley - June 2015





WBEA
Span Responses

Nitrogen Dioxide (NO₂) - ppb
Athabasca Valley - June 2015





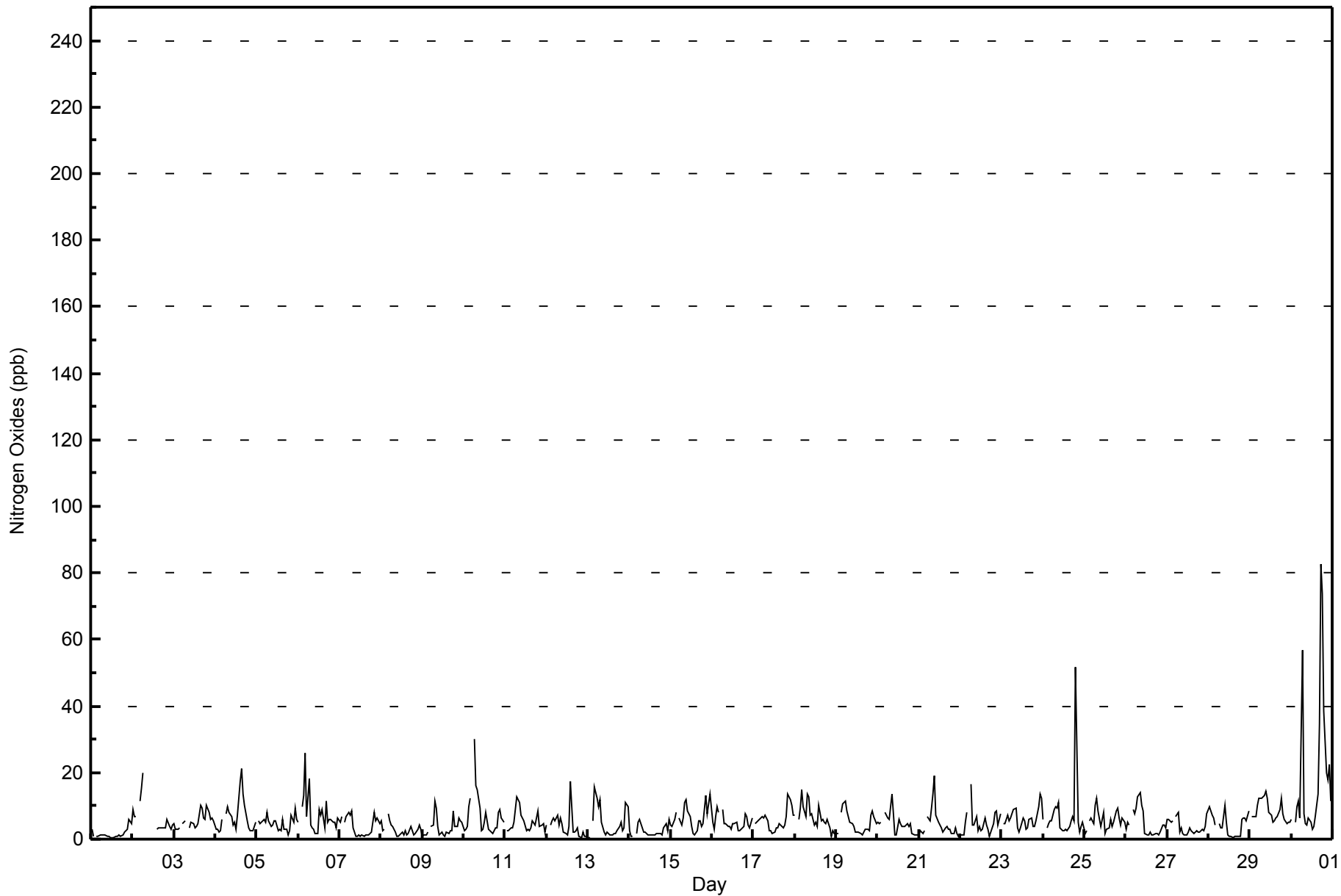
Maximum Value: 83 ppb on Jun 30 18:00																		Maximum Daily Average: 19.6 ppb on Jun 30						Hours in Service: 720		
Minimum Value: 0 ppb on Jun 1 13:00																		Minimum Daily Average: 1.7 ppb on Jun 1						Hours of Data: 681		
Maximum Diurnal Average: 10.6 ppb at hour 7																		Minimum Diurnal Average: 3.1 ppb at hour 13						Hours of Missing Data: 39		
Monthly Average: 5.7 ppb																		Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 3 Median = 4 Q ₃ = 7 P ₉₀ = 10 P ₉₉ = 29						Hours of Calibration: 37		
																		Percent Operational Time: 99.7								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	3	1	Z	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	2	3	3	6	5	1.7	6
2-Jun	9	7	7	Z	11	15	20	C	C	C	C	C	C	C	3	3	4	4	3	3	6	4	3	4	--	20
3-Jun	5	3	3	3	Z	5	5	M	M	3	5	5	4	4	5	10	9	6	6	10	8	6	6	6	5.5	10
4-Jun	3	3	2	3	6	Z	7	10	8	7	4	5	3	7	17	21	14	10	6	3	3	3	5	5	6.6	21
5-Jun	Z	5	4	6	6	5	8	6	4	4	5	5	3	7	2	6	3	3	1	3	7	5	9	6	4.8	9
6-Jun	5	Z	10	13	26	7	18	4	3	3	2	2	9	7	9	3	11	5	6	6	5	5	3	7	7.4	26
7-Jun	5	7	Z	5	7	8	7	9	3	1	1	1	1	1	1	1	1	1	2	5	8	5	6	4	4.0	9
8-Jun	6	3	3	Z	8	6	4	4	2	1	1	1	2	1	2	1	2	4	3	1	2	3	4	3	2.8	8
9-Jun	1	1	1	2	Z	4	4	11	9	4	1	2	1	1	2	2	3	3	8	4	4	6	6	5	3.7	11
10-Jun	3	3	4	10	12	Z	30	16	15	9	3	3	5	8	3	2	2	2	3	3	8	9	6	5	7.1	30
11-Jun	Z	3	3	3	3	5	9	13	11	7	6	5	2	3	2	3	6	4	6	8	4	4	5	2	5.2	13
12-Jun	4	Z	4	6	6	5	7	4	6	5	2	2	1	4	17	2	2	3	3	1	0	2	1	1	3.9	17
13-Jun	1	1	Z	6	16	12	10	12	5	2	1	2	2	1	1	2	2	3	4	5	2	3	11	10	4.9	16
14-Jun	2	1	1	Z	2	5	6	5	2	2	2	1	1	1	1	1	2	2	2	1	3	5	3	6	2.5	6
15-Jun	4	4	6	8	Z	6	4	6	11	12	9	7	4	2	1	3	6	6	4	5	13	8	11	14	6.6	14
16-Jun	5	3	7	10	8	Z	9	5	5	4	4	3	4	5	5	2	3	3	4	7	7	4	4	6	5.1	10
17-Jun	Z	4	5	6	6	7	6	7	5	3	2	2	2	3	3	4	4	3	4	7	14	12	10	7	5.6	14
18-Jun	7	Z	6	9	15	10	7	14	13	7	8	4	5	4	10	6	6	5	5	6	4	1	3	2	6.7	15
19-Jun	2	2	Z	8	10	12	8	7	5	5	4	2	2	2	2	1	2	3	3	3	7	8	7	5	4.8	12
20-Jun	5	5	5	Z	8	7	6	6	13	8	1	1	6	5	4	4	4	5	4	5	2	1	1	1	4.7	13
21-Jun	1	3	2	3	Z	7	6	9	13	19	7	5	4	3	2	3	4	3	3	2	2	3	2	1	4.7	19
22-Jun	1	1	1	5	8	Z	17	4	4	7	3	4	3	3	6	4	3	1	3	5	8	9	4	8	4.8	17
23-Jun	Z	5	5	7	6	6	7	9	9	3	2	3	6	5	3	3	6	6	4	4	6	10	14	12	6.2	14
24-Jun	6	Z	4	5	5	6	9	10	9	11	4	3	3	3	3	4	5	7	6	52	5	2	4	5	7.3	52
25-Jun	2	2	Z	5	7	5	10	12	8	4	6	8	2	3	3	6	4	5	9	9	7	4	6	5	5.8	12
26-Jun	3	5	4	Z	9	8	9	13	14	10	8	2	1	1	2	1	1	2	2	1	2	4	4	3	4.8	14
27-Jun	6	6	5	5	Z	7	8	2	4	2	1	1	2	3	3	2	2	2	2	2	3	3	4	8	3.6	8
28-Jun	10	8	7	6	4	Z	5	3	3	10	5	1	1	1	0	1	1	1	1	6	6	6	5	9	4.4	10
29-Jun	Z	7	7	7	10	12	12	12	13	14	12	8	7	5	6	6	7	9	12	8	6	5	5	5	8.5	14
30-Jun	6	Z	5	10	11	7	57	8	4	4	6	5	3	4	7	14	35	83	74	39	20	18	23	11	19.6	83
																		Diurnal Average								
																		Diurnal Maximum								
																		4.2		10						
																		3.7		8						
																		4.3		10						
																		6.1		13						
																		8.5		26						
																		7.1		15						
																		10.6		57						
																		7.9		16						
																		7.3		15						
																		5.9		19						
																		4.0		12						
																		3.3		8						
																		3.1		9						
																		3.3		8						
																		4.3		17						
																		4.2		21						
																		5.1		35						
																		6.5		83						
																		6.5		74						
																		7.2		52						
																		5.8		20						
																		5.4		18						
																		6.0		23						
																		5.7		14						

Z - zerspan C - Calibration M - Maintenance



WBEA
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Athabasca Valley - June 2015





WBEA
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Athabasca Valley - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	671	98.53	98.53
21 - 40	6	0.88	99.41
41 - 80	3	0.44	99.85
81 - 159	1	0.15	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 681

Total Number of Hours: 720



WBEA
Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Athabasca Valley - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	56	14	10	14	27	44	100	38	32	29	73	26	26	38	49	95	671
21 - 40	1	0	0	0	0	0	0	1	3	0	0	0	0	0	0	1	6
11 - 80	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	3
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	58	14	10	14	27	44	100	39	35	30	74	26	26	38	49	97	681

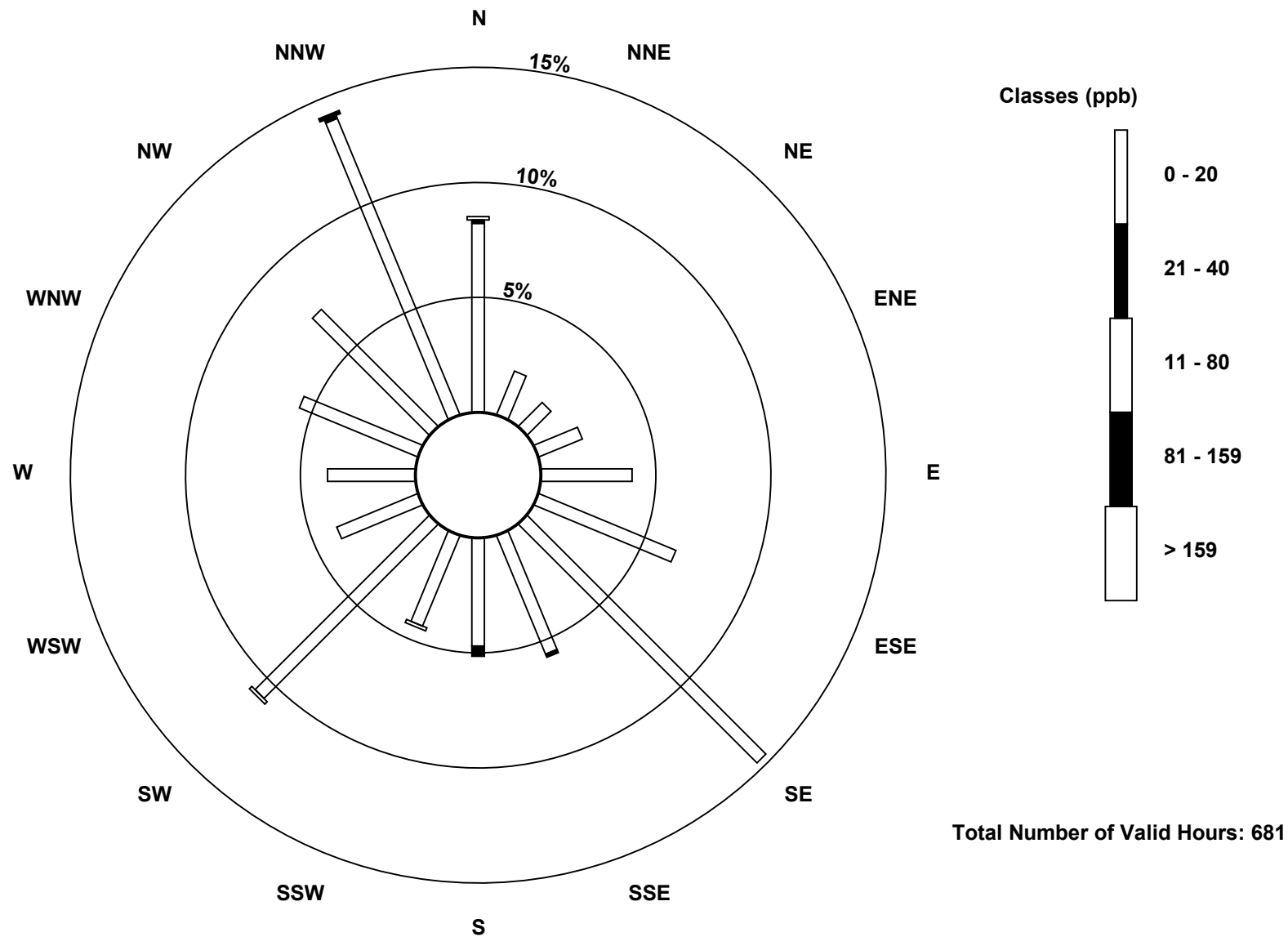
Total Number of Valid Hours: 681

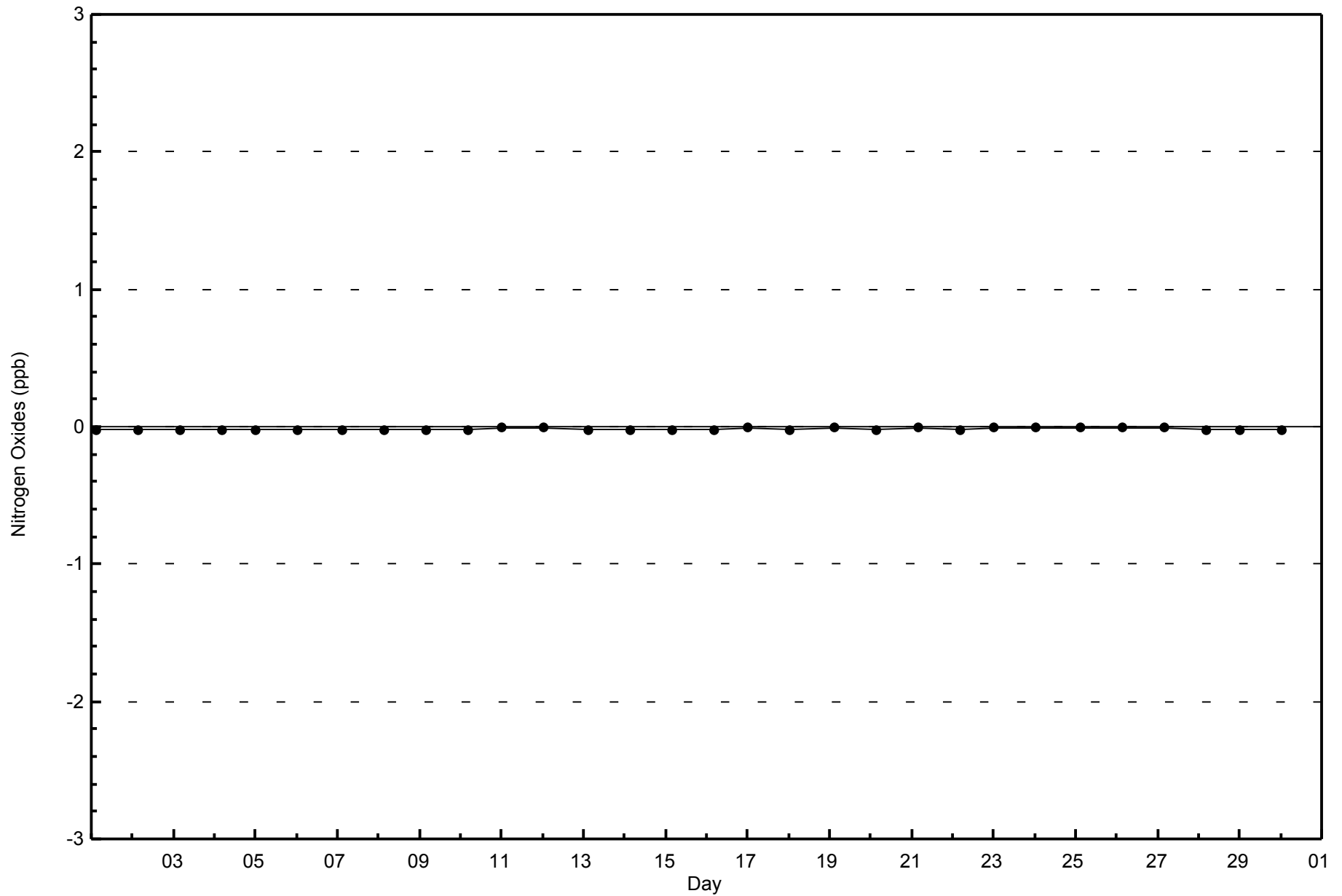
Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

Nitrogen Oxides (NO_x) - ppb
Athabasca Valley (AMS 7)

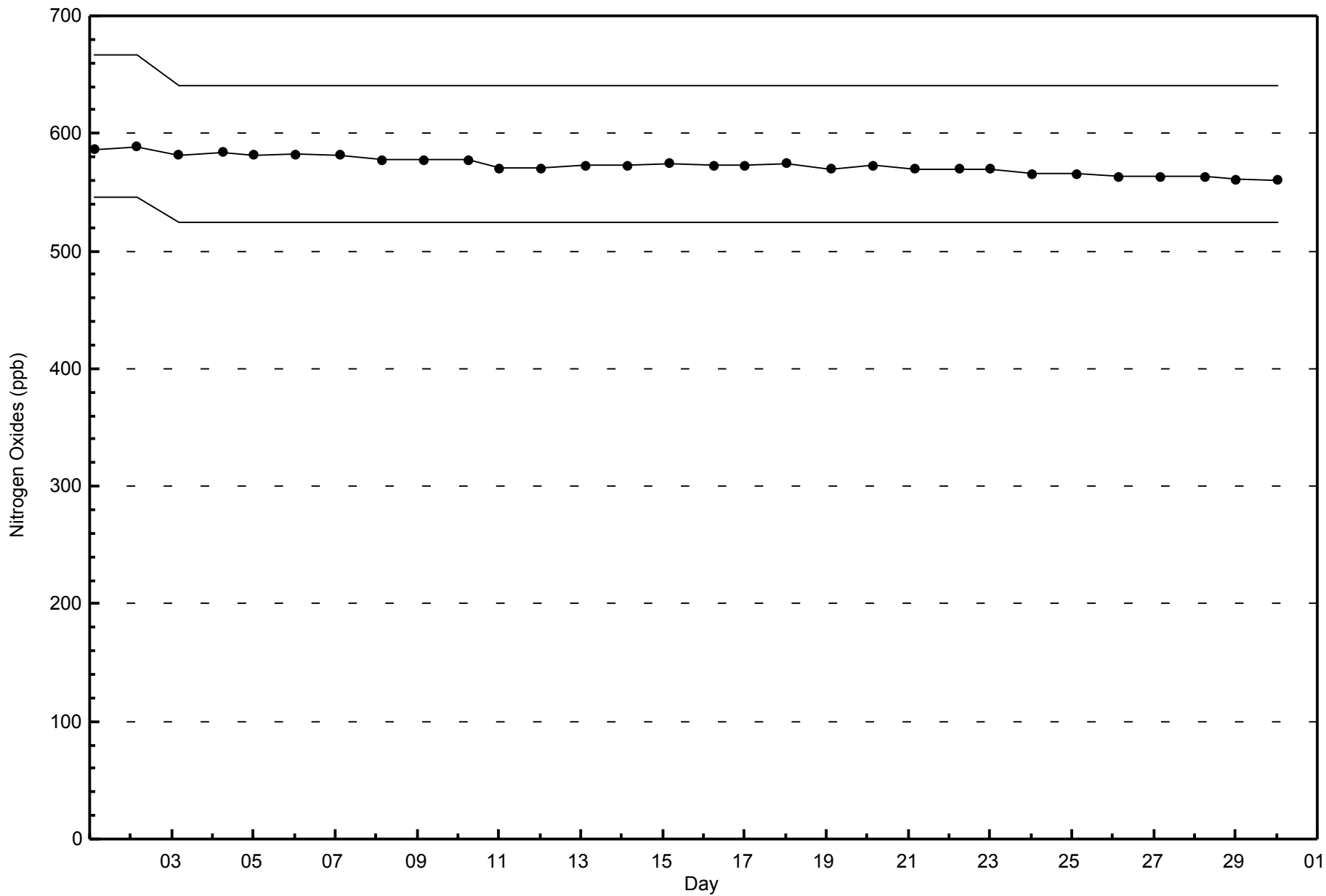






WBEA
Span Responses

Nitrogen Oxides (NO_x) - ppb
Athabasca Valley - June 2015





Summary of Hour Averages

Athabasca Valley - June 2015

Number of Exceedences (AAAQO):	24-hr: 2	Hours in Service:	720
Maximum Value: 434.7 µg/m ³ on Jun 29 10:00	Maximum Daily Average: 130.7 µg/m ³ on Jun 29	Hours of Data:	719
Minimum Value: 1.0 µg/m ³ on Jun 27 19:00	Minimum Daily Average: 3.8 µg/m ³ on Jun 1	Hours of Missing Data:	1
Maximum Diurnal Average: 25.8 µg/m ³ at hour 10	Minimum Diurnal Average: 12.6 µg/m ³ at hour 5	Hours of Calibration:	0
Monthly Average: 18.45 µg/m ³	Percentiles: P ₁ = 2.7 P ₁₀ = 4.5 Q ₁ = 6.4 Median = 9.0 Q ₃ = 14.0 P ₉₀ = 26.9 P ₉₉ = 190.5	Percent Operational Time:	99.9

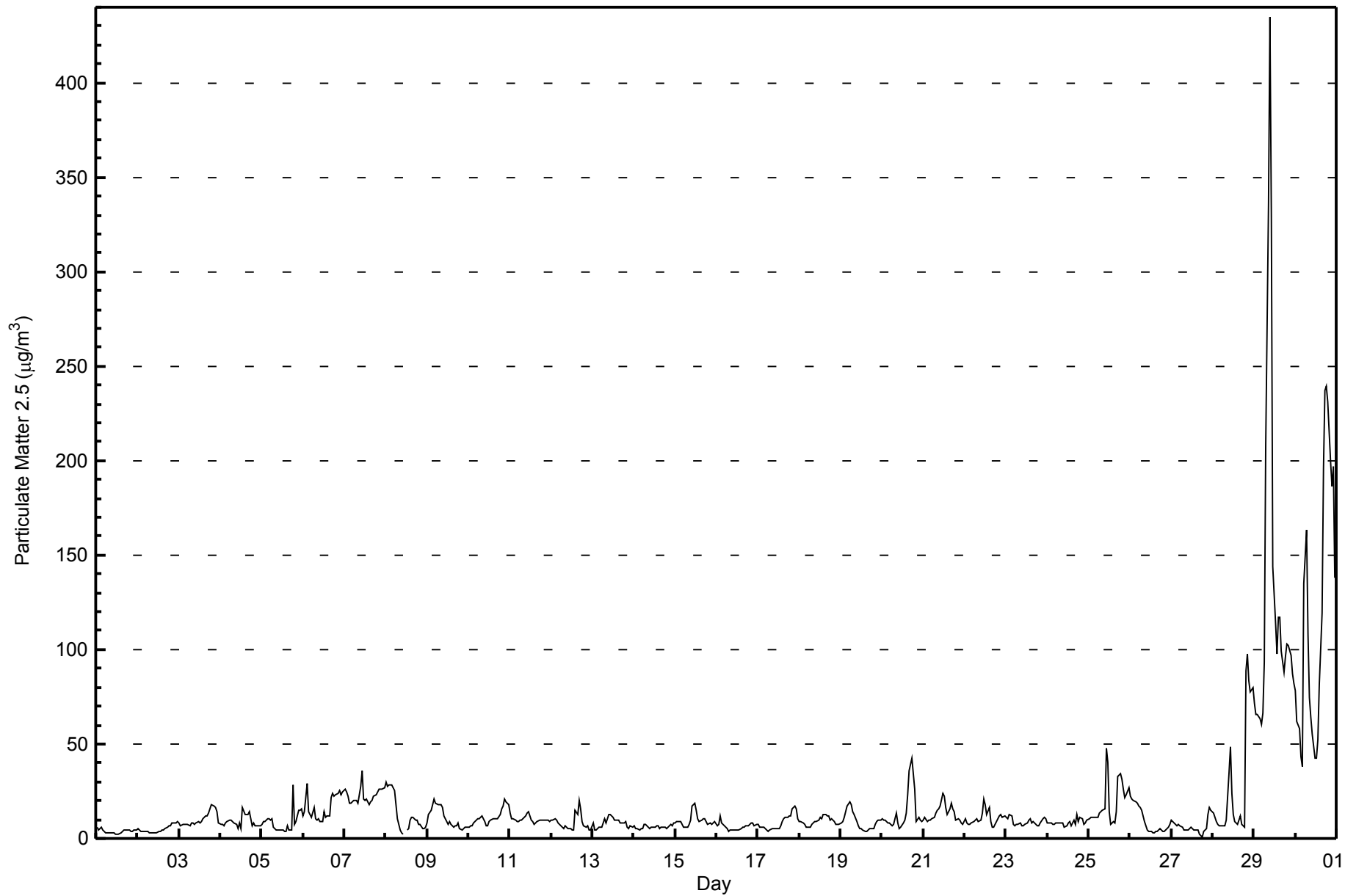
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jun	6.1	4.3	4.9	6.0	4.2	3.3	3.0	3.0	2.9	2.8	2.9	2.5	2.3	2.6	2.7	3.5	4.1	4.5	4.6	4.1	4.0	3.9	4.6	4.5	3.8	6.1																						
2-Jun	5.0	4.4	3.8	3.8	3.7	3.6	3.7	3.3	2.7	2.8	3.3	3.3	3.5	3.7	4.2	4.6	5.5	6.1	6.5	6.6	8.5	8.6	8.5	8.9	4.9	8.9																						
3-Jun	7.9	6.6	7.4	7.5	7.8	7.7	7.0	8.3	8.0	7.1	7.8	8.7	8.3	9.3	10.5	11.9	12.0	13.3	15.9	18.1	17.2	16.5	14.3	8.0	10.3	18.1																						
4-Jun	7.8	7.1	7.1	7.9	9.1	9.5	9.7	9.0	8.2	7.7	5.1	8.1	5.3	16.2	12.9	12.4	13.0	14.3	7.0	8.4	6.7	6.5	6.6	7.0	8.9	16.2																						
5-Jun	7.7	9.2	9.3	10.1	10.3	9.4	10.2	5.6	4.3	4.5	4.8	4.3	4.1	4.0	3.9	6.4	4.3	4.2	28.6	7.8	8.8	14.7	14.9	15.8	8.6	28.6																						
6-Jun	12.0	14.3	28.8	14.1	12.8	11.2	16.1	10.5	10.0	10.3	8.8	8.7	14.2	11.5	11.9	12.3	21.3	23.6	22.1	23.5	24.0	25.0	22.8	24.4	16.4	28.8																						
7-Jun	25.8	24.7	22.1	18.9	18.8	19.9	20.3	20.4	18.8	27.4	35.9	21.1	20.2	20.9	17.6	19.6	20.5	22.1	23.1	24.5	26.5	26.4	26.2	27.0	22.9	35.9																						
8-Jun	29.8	27.7	28.5	28.1	26.6	25.3	17.7	10.2	4.6	3.1	2.3	M	4.7	5.5	9.4	10.9	10.9	10.0	9.9	7.4	7.5	5.2	5.2	6.2	12.9	29.8																						
9-Jun	7.9	12.5	15.2	18.0	20.9	19.0	18.3	17.6	18.2	16.6	11.9	9.3	7.6	9.0	7.8	6.3	7.1	6.5	7.9	5.2	4.4	5.3	6.1	6.1	11.0	20.9																						
10-Jun	6.0	6.4	7.1	7.9	9.1	10.5	10.2	10.8	12.0	8.8	6.4	7.0	8.6	9.5	10.7	10.7	10.4	10.1	12.9	15.5	17.4	21.1	19.7	17.9	11.1	21.1																						
11-Jun	13.4	10.4	10.1	9.6	9.3	9.3	9.8	9.8	11.2	11.7	13.3	14.0	10.1	8.9	7.2	8.2	9.2	9.9	9.8	9.7	9.4	9.7	9.8	8.7	10.1	14.0																						
12-Jun	9.5	9.8	10.2	9.8	8.6	7.6	5.9	5.6	6.9	6.2	4.9	4.9	4.5	4.3	14.7	12.8	20.5	15.4	9.1	6.6	6.3	6.6	4.5	4.2	8.3	20.5																						
13-Jun	8.1	4.2	4.4	4.9	6.0	6.3	8.0	10.1	8.2	12.8	13.0	11.9	11.2	10.0	9.5	10.0	8.4	8.3	8.1	9.2	5.8	5.3	6.8	5.9	8.2	13.0																						
14-Jun	6.4	5.3	4.9	4.4	4.9	5.4	7.7	7.1	5.9	5.5	5.6	5.8	5.7	6.5	6.4	5.1	6.0	6.1	5.6	5.4	6.3	7.5	7.1	8.5	6.0	8.5																						
15-Jun	8.3	9.1	9.3	9.2	7.7	6.1	6.2	6.3	7.1	9.7	17.5	18.7	14.6	10.3	8.9	9.6	10.3	10.1	8.7	7.7	8.2	7.5	8.6	8.7	9.5	18.7																						
16-Jun	7.1	7.3	11.8	8.3	7.3	6.1	5.5	4.0	4.6	4.1	4.4	4.7	4.7	4.8	5.3	6.3	6.1	6.6	6.4	7.5	8.1	7.9	7.0	7.8	6.4	11.8																						
17-Jun	7.3	6.3	6.0	5.7	5.0	4.4	4.1	4.5	5.0	5.4	5.2	5.1	5.1	6.4	8.7	10.7	10.8	11.3	11.9	12.1	15.6	17.1	15.4	10.8	8.3	17.1																						
18-Jun	9.1	9.0	8.3	7.5	6.2	6.0	5.9	7.4	8.4	8.8	8.8	9.6	11.4	10.4	13.0	12.8	11.9	12.1	9.6	10.2	8.9	7.4	7.5	7.6	9.1	13.0																						
19-Jun	8.0	8.8	11.1	14.0	17.2	19.5	17.7	14.3	12.7	9.2	6.9	5.5	5.1	4.3	3.9	4.0	4.6	5.1	5.2	5.5	7.1	8.9	9.7	9.6	9.1	19.5																						
20-Jun	10.2	9.5	9.4	7.9	8.6	7.6	6.8	7.8	13.6	7.9	5.1	6.0	8.1	10.0	13.6	23.2	35.8	42.7	34.5	26.2	9.1	11.1	9.6	9.2	13.9	42.7																						
21-Jun	9.8	11.0	9.2	9.9	9.9	10.6	11.1	13.6	15.1	15.9	17.4	24.0	22.0	16.5	13.0	16.0	18.8	15.7	14.5	9.9	10.7	9.7	7.9	7.3	13.3	24.0																						
22-Jun	10.3	8.4	7.1	7.5	8.2	9.2	9.4	10.3	8.9	9.9	13.7	20.9	17.9	12.5	16.3	8.8	6.0	5.8	9.2	10.1	12.1	12.9	11.0	11.8	10.8	20.9																						
23-Jun	11.5	10.2	12.3	11.6	7.7	7.1	7.2	7.7	8.0	6.7	6.4	7.1	7.9	10.0	10.7	8.2	8.6	7.5	6.7	6.8	7.9	10.3	11.3	10.1	8.7	12.3																						
24-Jun	8.0	8.4	8.0	7.7	7.8	7.9	8.3	8.2	8.5	8.4	6.1	6.5	8.1	9.3	7.1	9.7	7.7	12.3	9.1	10.9	10.5	7.7	8.4	9.4	8.5	12.3																						
25-Jun	10.6	10.9	11.1	10.9	10.9	11.2	13.6	13.9	14.9	15.3	47.8	40.1	14.5	7.2	9.0	7.9	14.1	32.6	34.5	31.4	26.5	21.6	23.2	26.6	19.2	47.8																						
26-Jun	22.5	20.7	20.1	19.1	18.4	17.0	16.8	14.8	9.0	6.4	4.5	3.5	3.4	3.2	3.3	3.4	3.6	5.0	4.2	3.7	4.0	5.1	6.2	7.5	9.4	22.5																						
27-Jun	9.7	8.8	7.4	7.0	7.3	6.7	5.7	4.8	4.6	4.5	4.4	6.1	5.3	4.4	4.6	4.2	1.9	1.7	1.0	3.4	5.4	12.5	16.2	15.0	6.4	16.2																						
28-Jun	13.6	11.4	8.8	7.3	6.6	6.4	6.5	6.8	9.5	34.7	48.6	24.0	12.7	8.9	7.3	9.6	11.9	7.8	5.8	88.4	97.7	83.3	77.6	79.9	28.1	97.7																						
29-Jun	71.5	65.8	65.4	63.0	60.1	66.3	93.1	207.0	336.5	434.7	330.5	143.7	114.1	97.7	117.3	117.2	99.1	88.1	95.9	103.3	102.2	96.9	86.9	81.7	130.7	434.7																						
30-Jun	78.4	62.1	57.9	42.9	38.0	135.1	163.1	108.4	74.5	64.3	55.5	42.7	42.6	52.1	81.3	119.4	196.1	237.1	239.8	230.9	199.5	186.5	197.2	137.8	118.5	239.8																						
																								15.0	13.8	14.2	13.0	12.6	15.8	17.6	19.0	22.1	25.8	23.6	16.5	13.6	13.0	15.1	16.9	20.0	21.9	22.3	24.0	22.9	22.3	22.0	19.8	Diurnal Average
																								78.4	65.8	65.4	63.0	60.1	135.1	163.1	207.0	336.5	434.7	330.5	143.7	114.1	97.7	117.3	119.4	196.1	237.1	239.8	230.9	199.5	186.5	197.2	137.8	Diurnal Maximum

M - Maintenance
 Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m³



WBEA
Hourly Averages

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Athabasca Valley - June 2015





WBEA
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Athabasca Valley - June 2015

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	127	17.66	17.66
6 - 15	435	60.50	78.16
16 - 25	77	10.71	88.87
26 - 80	46	6.40	95.27
> 81.0	34	4.73	100.00

Total Number of Valid Hours: 719

Total Number of Hours: 720



WBEA
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Athabasca Valley - June 2015

Concentration Ranges (μg/m ³)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	10	4	4	2	2	7	7	0	1	5	19	3	8	12	16	27	127
6 - 15	32	11	4	9	16	32	80	31	25	18	48	22	12	21	25	49	435
16 - 25	9	0	1	2	6	2	14	7	5	4	4	1	3	4	5	10	77
26 - 80	1	0	1	1	1	4	11	3	3	3	0	1	3	2	2	10	46
> 81.0	6	0	2	1	3	3	3	1	2	3	3	0	2	1	2	2	34
Totals	58	15	12	15	28	48	115	42	36	33	74	27	28	40	50	98	719

Total Number of Valid Hours: 719

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Carbon Monoxide (CO) - ppm

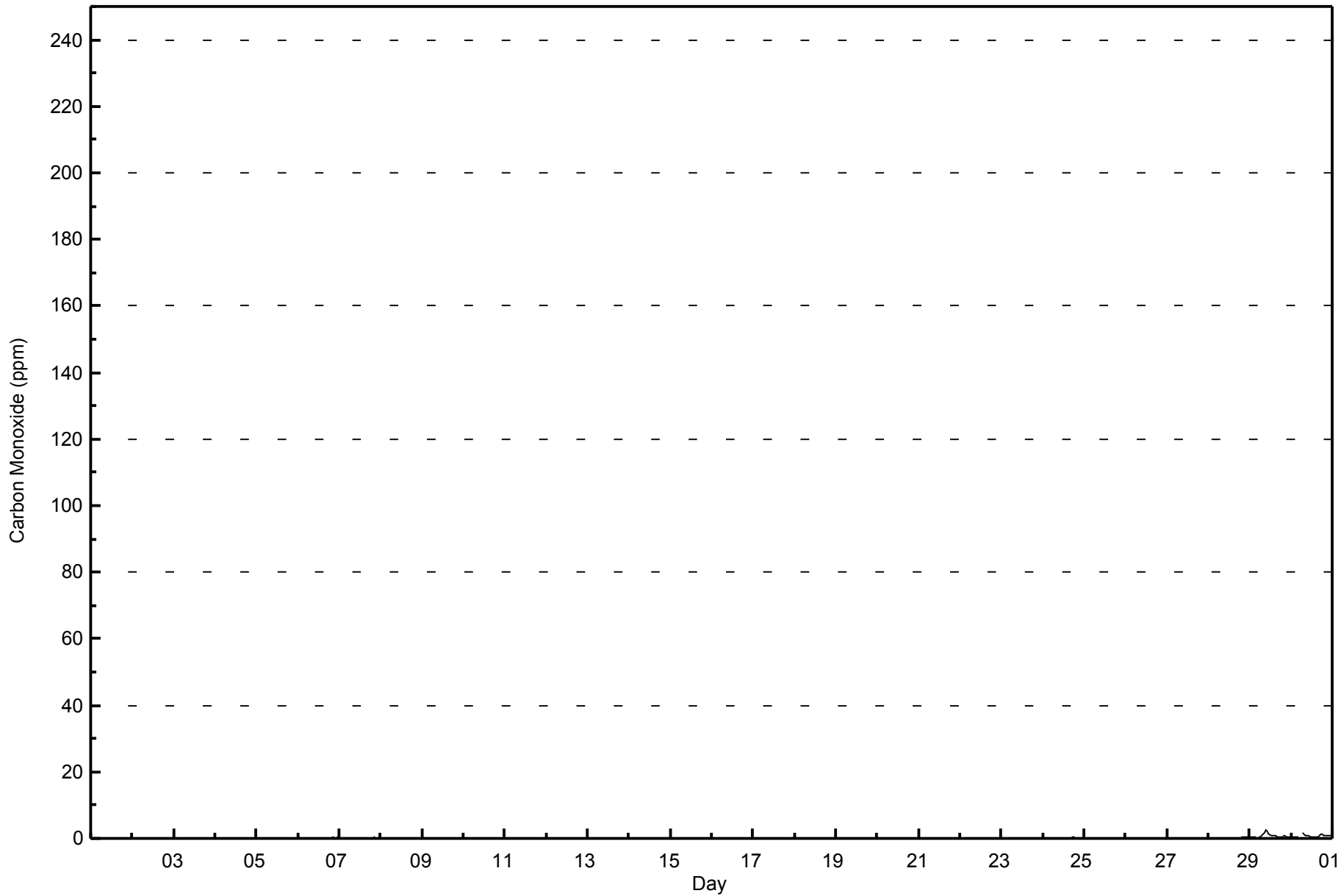
Athabasca Valley - June 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 2.6 ppm on Jun 29 10:00 Maximum Daily Average: 0.8 ppm on Jun 29																	Hours in Service: 720 Hours of Data: 680 Hours of Missing Data: 40 Hours of Calibration: 32 Percent Operational Time: 98.9										
Minimum Value: 0.0 ppm on Jun 14 14:00 Minimum Daily Average: 0.0 ppm on Jun 14 Maximum Diurnal Average: 0.2 ppm at hour 10 Minimum Diurnal Average: 0.1 ppm at hour 14 Monthly Average: 0.11 ppm Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.1 P ₉₀ = 0.2 P ₉₉ = 1.1																											
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	0.1	0.0	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	0.0	0.0	0.0	0.1	0.0	0.0	0.1	
2-Jun	0.1	0.1	0.0	0.0	0.1	0.1	0.1	M	M	M	M	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	
3-Jun	0.0	0.0	0.0	0.1	0.1	0.1	0.1	M	M	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
4-Jun	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.1	
5-Jun	0.0	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.0	0.0	0.0	0.0	M	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
6-Jun	0.1	0.1	0.1	0.1	0.1	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.1	0.2	
7-Jun	0.2	0.2	0.2	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.2	0.2	0.2	0.1	0.3	
8-Jun	0.2	0.1	0.1	0.1	0.1	0.1	0.1	Z	C	C	C	C	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2	
9-Jun	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	Z	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.2	
10-Jun	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	Z	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.2	0.1	0.1	0.1	0.2
11-Jun	0.1	0.0	0.0	0.0	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	
12-Jun	0.2	0.0	0.0	0.1	0.1	Z	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.2	
13-Jun	0.0	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
14-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.1	
15-Jun	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
16-Jun	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.1	
17-Jun	0.1	0.1	0.1	0.1	Z	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.1	
18-Jun	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	
19-Jun	0.0	0.0	0.0	0.0	0.0	0.1	Z	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	
20-Jun	0.1	0.1	0.0	0.0	0.1	0.0	0.0	Z	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	
21-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	
22-Jun	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	Z	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	
23-Jun	0.1	0.1	0.1	0.1	Z	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.1	0.1	0.2	
24-Jun	0.1	0.1	0.0	0.0	0.0	Z	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.6	0.1	0.2	0.0	0.0	0.1	0.1	0.1	0.6	
25-Jun	0.0	0.0	0.0	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.2	
26-Jun	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	
27-Jun	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.1	0.2	
28-Jun	0.2	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.1	Z	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.3	0.3	0.4	0.1	0.4	
29-Jun	0.3	0.3	0.3	0.3	Z	0.4	0.5	1.0	1.8	2.6	2.2	1.1	0.9	0.8	0.8	0.7	0.6	0.5	0.6	0.6	0.6	0.6	0.5	0.5	0.8	2.6	
30-Jun	0.4	0.4	0.3	0.3	0.2	Z	1.9	1.3	1.0	0.9	0.7	0.3	0.3	0.3	0.4	0.6	0.9	1.1	1.1	1.0	1.0	0.9	1.0	0.7	0.7	1.9	
																								Diurnal Average			
																								Diurnal Maximum			
Z - zeronspan C - Calibration M - Maintenance Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 13 ppm																											



WBEA
Hourly Averages

Carbon Monoxide (CO) - ppm
Athabasca Valley - June 2015





WBEA
Cumulative Frequency Distribution

Carbon Monoxide (CO) - ppm
Athabasca Valley - June 2015

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.3	642	94.41	94.41
0.4 - 0.5	9	1.32	95.74
0.6 - 0.7	10	1.47	97.21
0.8 - 1.4	15	2.21	99.41
1.5 - 10	4	0.59	100.00
> 10	0	0.00	100.00

Total Number of Valid Hours: 680

Total Number of Hours: 720



WBEA
Frequency Distribution

Carbon Monoxide (CO) - ppm
Athabasca Valley - June 2015

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.3	51	14	10	13	22	43	104	38	33	26	69	25	24	35	43	92	642
0.4 - 0.5	1	0	0	0	2	1	2	1	0	1	0	0	0	0	1	0	9
0.6 - 0.7	1	0	1	0	1	1	1	1	1	0	1	0	1	0	0	1	10
0.8 - 1.4	2	0	1	0	0	1	1	0	1	2	1	0	1	2	1	2	15
1.5 - 10	0	0	0	1	1	1	0	0	0	1	0	0	0	0	0	0	4
> 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	55	14	12	14	26	47	108	40	35	30	71	25	26	37	45	95	680

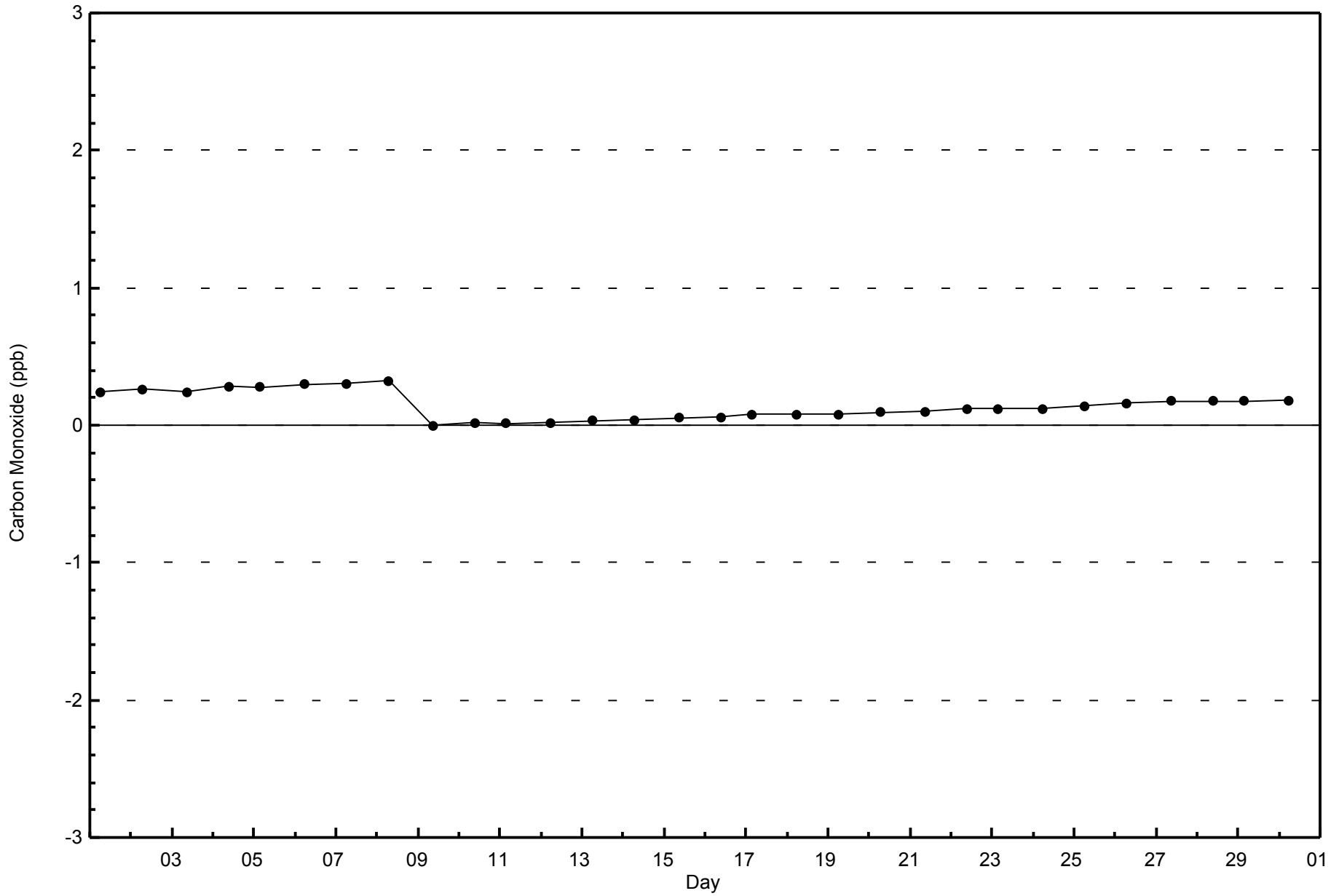
Total Number of Valid Hours: 680

Total Number of Hours: 720



WBEA
Zero Responses

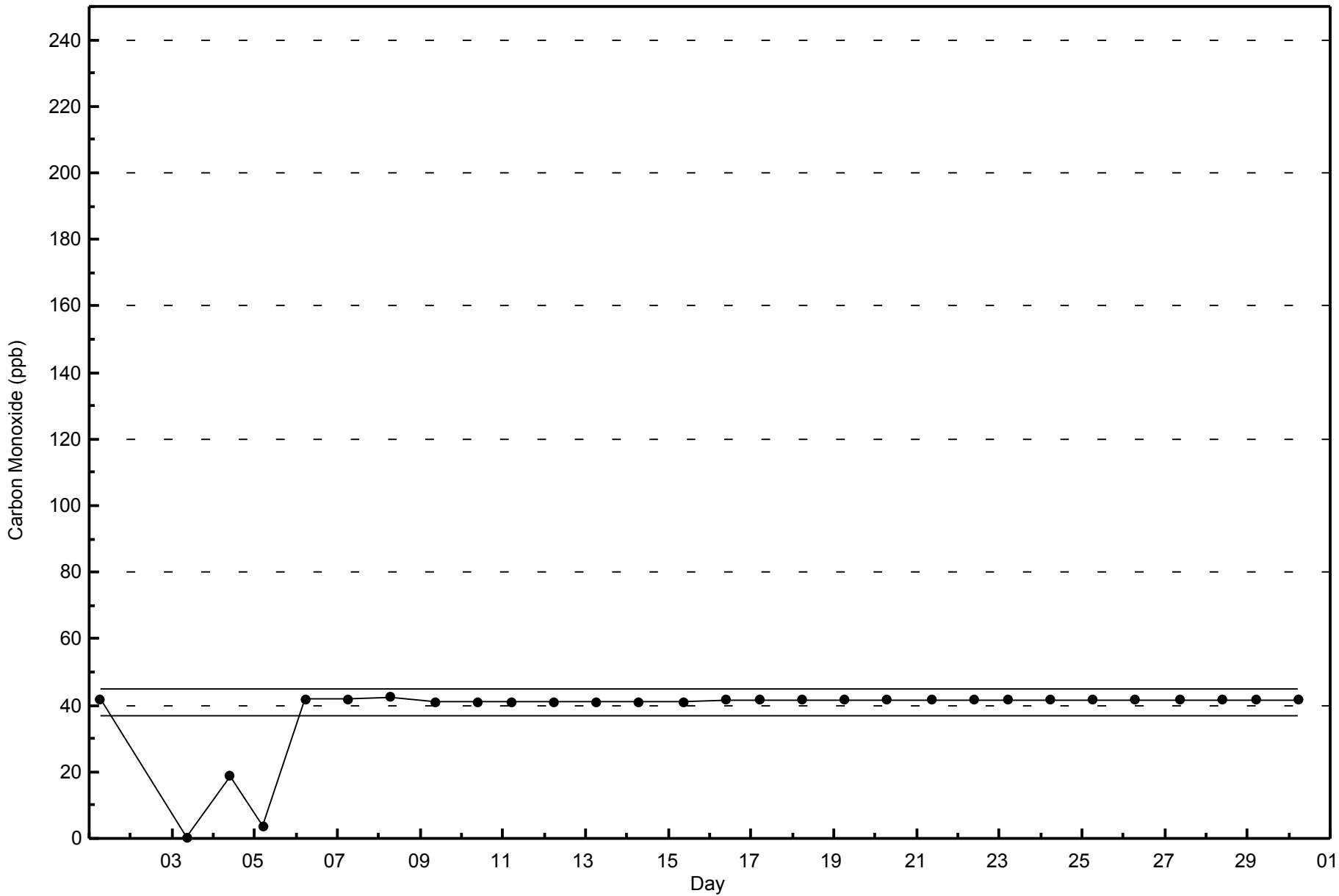
Carbon Monoxide (CO) - ppb
Athabasca Valley - June 2015





WBEA
Span Responses

Carbon Monoxide (CO) - ppb
Athabasca Valley - June 2015





Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

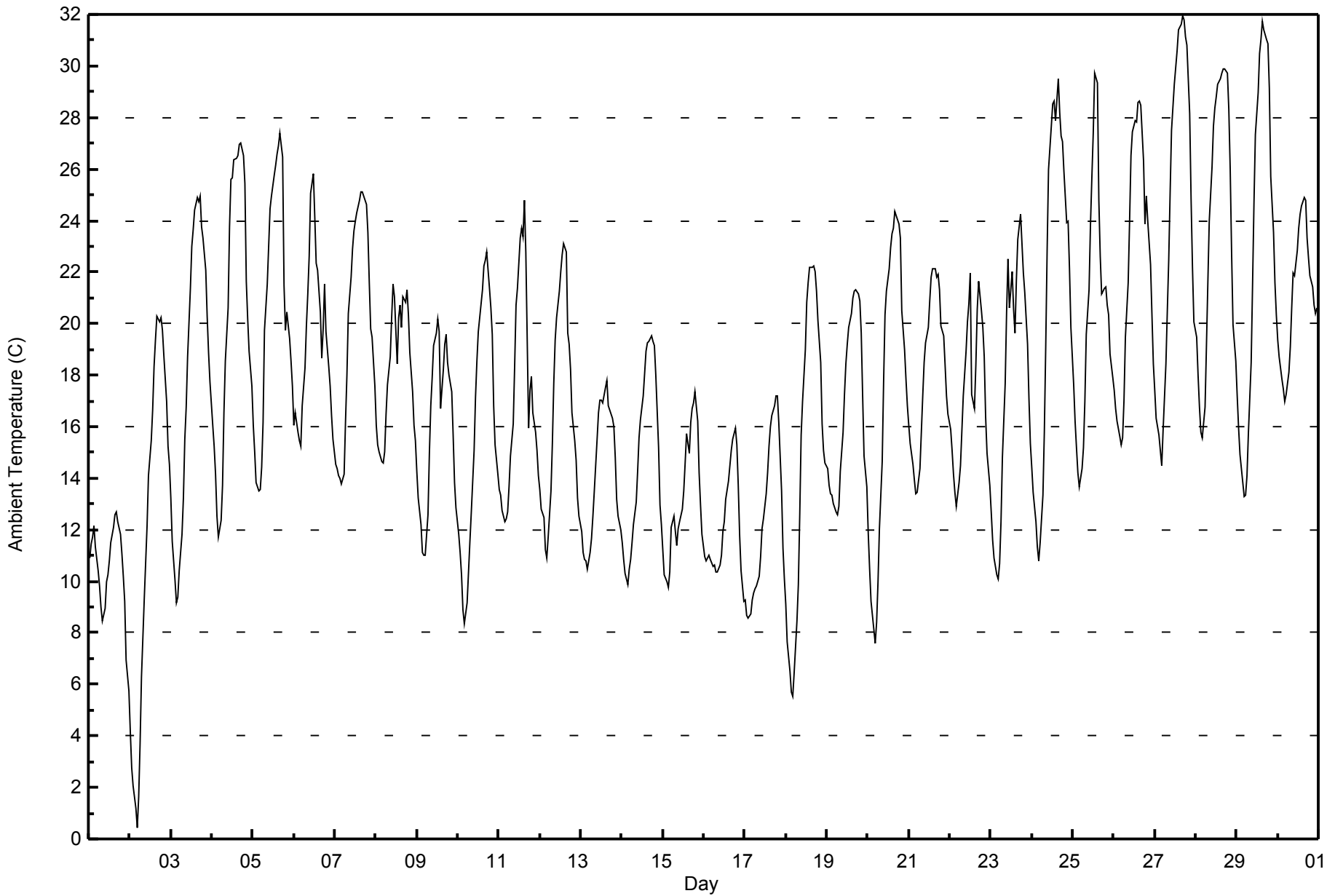
Athabasca Valley - June 2015

Maximum Value: 32.0 C on Jun 27 17:00		Maximum Daily Average: 24.3 C on Jun 27		Hours in Service: 720																																													
Minimum Value: 0.4 C on Jun 2 05:00		Minimum Daily Average: 10.5 C on Jun 1		Hours of Data: 720																																													
Maximum Diurnal Average: 22.5 C at hour 16		Minimum Diurnal Average: 11.6 C at hour 5		Hours of Missing Data: 0																																													
Monthly Average: 17.65 C		Percentiles: P ₁ = 5.5 P ₁₀ = 10.8 Q ₁ = 13.4 Median = 17.2 Q ₃ = 21.5 P ₉₀ = 25.0 P ₉₉ = 30.9		Hours of Calibration: 0																																													
				Percent Operational Time: 100.0																																													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jun	10.9	11.4	11.7	12.1	11.3	10.4	9.8	9.0	8.4	9.0	10.0	10.2	10.8	11.5	12.1	12.6	12.7	12.3	11.8	11.0	10.2	9.2	6.9	5.8	10.5	12.7																							
2-Jun	4.2	2.8	2.1	1.2	0.4	1.6	3.7	6.3	9.4	10.7	12.1	14.1	15.4	16.7	18.3	19.4	20.3	20.1	20.2	19.8	18.8	17.0	15.3	14.5	11.8	20.3																							
3-Jun	13.3	11.6	10.0	9.2	9.4	10.4	11.8	13.2	15.5	16.8	18.7	21.4	23.0	23.6	24.4	24.9	24.7	24.9	23.8	23.3	22.1	20.3	18.9	17.7	18.0	24.9																							
4-Jun	16.0	15.3	14.2	12.6	11.7	12.4	13.7	16.5	18.5	20.6	23.8	25.6	25.7	26.4	26.4	26.5	27.0	27.0	26.5	25.5	21.6	20.2	18.9	17.6	20.4	27.0																							
5-Jun	16.1	15.0	13.8	13.5	13.6	14.4	16.2	19.7	21.5	23.0	24.4	25.0	25.8	26.1	26.6	26.9	27.4	26.4	21.5	19.7	20.5	19.4	18.5	17.6	20.5	27.4																							
6-Jun	16.0	16.5	15.8	15.5	15.2	16.8	18.3	19.9	21.2	22.6	25.1	25.8	24.2	22.3	22.1	20.5	18.7	19.8	21.5	19.7	18.3	17.5	16.5	15.5	19.4	25.8																							
7-Jun	14.5	14.4	14.1	14.0	13.8	14.1	16.2	18.0	20.4	21.8	22.9	23.6	24.0	24.3	24.8	25.1	25.1	24.9	24.6	23.5	21.6	19.8	19.5	17.6	20.1	25.1																							
8-Jun	16.0	15.3	15.0	14.7	14.6	15.0	16.5	17.6	18.7	20.2	21.5	21.0	18.5	20.2	20.7	19.8	21.0	20.8	21.3	20.3	18.9	17.3	16.1	15.5	18.2	21.5																							
9-Jun	14.2	13.2	12.2	11.1	11.0	11.0	12.6	14.9	16.8	17.9	19.2	19.6	20.2	19.7	16.7	18.2	19.2	19.6	18.5	18.0	17.3	15.7	13.8	12.8	16.0	20.2																							
10-Jun	11.8	11.1	10.2	8.9	8.4	9.2	10.4	11.5	12.7	15.1	17.1	18.5	19.7	20.2	21.3	22.2	22.5	22.8	21.4	20.6	19.6	16.8	15.3	14.1	15.9	22.8																							
11-Jun	13.6	13.3	12.8	12.3	12.4	12.7	13.7	14.9	16.1	18.3	20.7	21.4	23.3	23.7	23.4	24.8	22.8	15.9	17.4	18.0	16.5	15.8	15.1	14.1	17.2	24.8																							
12-Jun	13.6	12.8	12.4	11.2	10.9	11.7	13.5	15.4	17.7	19.4	20.2	21.3	22.0	22.7	23.1	22.8	19.6	19.2	18.2	16.5	15.4	14.7	13.2	12.6	16.7	23.1																							
13-Jun	11.9	11.1	10.9	10.8	10.5	11.1	11.7	12.5	13.5	15.5	16.5	17.0	17.0	16.9	17.5	17.8	16.8	16.6	16.3	16.0	14.8	13.2	12.5	12.0	14.2	17.8																							
14-Jun	11.5	10.8	10.3	9.9	10.4	10.9	11.5	12.2	13.1	14.2	15.6	16.3	17.2	18.1	18.9	19.2	19.3	19.5	19.3	19.1	18.0	15.2	13.0	12.2	14.8	19.5																							
15-Jun	11.2	10.3	10.0	9.7	10.4	12.1	12.5	11.9	11.4	12.0	12.3	12.8	13.5	14.6	15.7	15.0	16.1	16.7	16.9	17.4	16.2	14.2	13.0	11.8	13.2	17.4																							
16-Jun	11.0	10.8	10.9	11.0	10.9	10.6	10.6	10.4	10.4	10.7	11.0	11.9	12.3	13.2	13.9	14.5	15.1	15.5	15.9	15.3	13.7	11.8	10.4	9.2	12.1	15.9																							
17-Jun	9.3	8.7	8.6	8.8	9.3	9.5	9.7	9.8	10.2	11.0	12.1	12.4	13.4	14.2	15.2	16.0	16.4	16.8	17.2	17.2	16.2	13.5	11.3	10.1	12.4	17.2																							
18-Jun	9.1	7.6	6.5	5.7	5.5	6.5	8.5	9.9	12.6	15.7	17.0	19.0	20.8	21.6	22.2	22.2	22.2	22.0	21.3	20.1	18.5	16.1	15.1	14.6	15.0	22.2																							
19-Jun	14.4	13.7	13.4	13.4	13.0	12.7	12.6	12.9	14.3	15.8	17.2	18.4	19.2	19.8	20.4	21.0	21.3	21.3	21.1	20.9	19.7	17.2	14.9	13.7	16.8	21.3																							
20-Jun	11.9	10.5	9.2	8.1	7.6	8.4	10.0	12.0	14.7	17.7	20.3	21.3	22.1	23.0	23.5	23.7	24.3	24.0	23.9	23.3	20.5	19.0	17.8	16.8	17.2	24.3																							
21-Jun	16.0	15.3	14.5	13.9	13.4	13.5	14.4	15.8	17.2	18.5	19.2	19.9	20.9	21.8	22.1	22.1	21.8	21.9	21.3	19.9	19.5	18.4	17.2	16.5	18.1	22.1																							
22-Jun	15.9	15.1	14.2	13.4	12.9	13.8	14.5	15.8	17.2	18.9	20.1	20.8	21.9	17.2	16.7	18.4	20.6	21.6	20.5	19.8	18.7	16.4	15.0	13.7	17.2	21.9																							
23-Jun	12.7	11.6	10.9	10.2	10.1	10.7	12.3	14.8	17.7	20.5	22.5	20.6	22.0	20.5	19.6	21.7	23.2	24.3	23.1	22.0	21.2	19.2	17.1	15.3	17.7	24.3																							
24-Jun	14.4	13.4	12.3	11.3	10.8	11.5	13.3	15.8	19.1	22.8	26.0	27.7	28.5	28.6	27.9	29.5	28.2	27.3	27.1	25.9	23.9	24.0	22.2	19.9	21.3	29.5																							
25-Jun	17.6	16.2	15.2	14.2	13.7	14.4	15.2	17.0	19.6	21.3	23.8	25.6	27.4	29.7	29.4	24.8	22.6	21.2	21.4	21.4	20.7	20.3	18.8	17.9	20.4	29.7																							
26-Jun	17.4	16.7	16.2	15.6	15.3	15.6	17.1	19.5	21.6	24.0	26.5	27.4	27.9	27.8	28.6	28.7	28.5	26.3	23.9	24.9	24.0	22.3	20.3	18.4	22.3	28.7																							
27-Jun	17.4	16.3	15.7	15.1	14.5	15.9	18.4	20.5	22.5	25.1	27.5	29.3	30.0	30.6	31.4	31.6	32.0	31.8	31.1	30.8	28.2	24.8	22.2	20.1	24.3	32.0																							
28-Jun	19.5	18.0	16.8	15.8	15.6	16.8	19.1	21.6	24.0	26.1	27.6	28.3	28.8	29.3	29.5	29.7	29.9	29.9	29.7	28.3	26.0	22.8	20.0	18.6	23.8	29.9																							
29-Jun	17.2	15.9	14.9	13.8	13.3	13.3	14.1	15.7	18.5	21.5	24.7	27.3	29.0	30.5	31.0	31.7	31.4	31.0	30.8	29.1	25.7	23.5	21.6	20.3	22.8	31.7																							
30-Jun	19.4	18.7	17.8	17.5	17.0	17.3	18.1	19.1	20.6	21.9	21.9	22.8	23.7	24.2	24.6	24.9	24.8	23.3	22.6	21.8	21.4	20.7	20.4	20.6	21.1	24.9																							
																								13.9	13.1	12.4	11.8	11.6	12.1	13.3	14.8	16.5	18.3	19.9	20.9	21.6	22.0	22.3	22.5	22.5	22.2	21.7	21.0	19.6	17.9	16.4	15.2	Diurnal Average	
																								19.5	18.7	17.8	17.5	17.0	17.3	19.1	21.6	24.0	26.1	27.6	29.3	30.0	30.6	31.4	31.7	32.0	31.8	31.1	30.8	28.2	24.8	22.2	20.6	Diurnal Maximum	



WBEA
Hourly Averages

Ambient Temperature (AT) - C
Athabasca Valley - June 2015





WBEA
Cumulative Frequency Distribution

Ambient Temperature (AT) - C
Athabasca Valley - June 2015

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	47	6.53	6.53
10 - 20	428	59.44	65.97
> 20	245	34.03	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Barometric Pressure (BP) - %

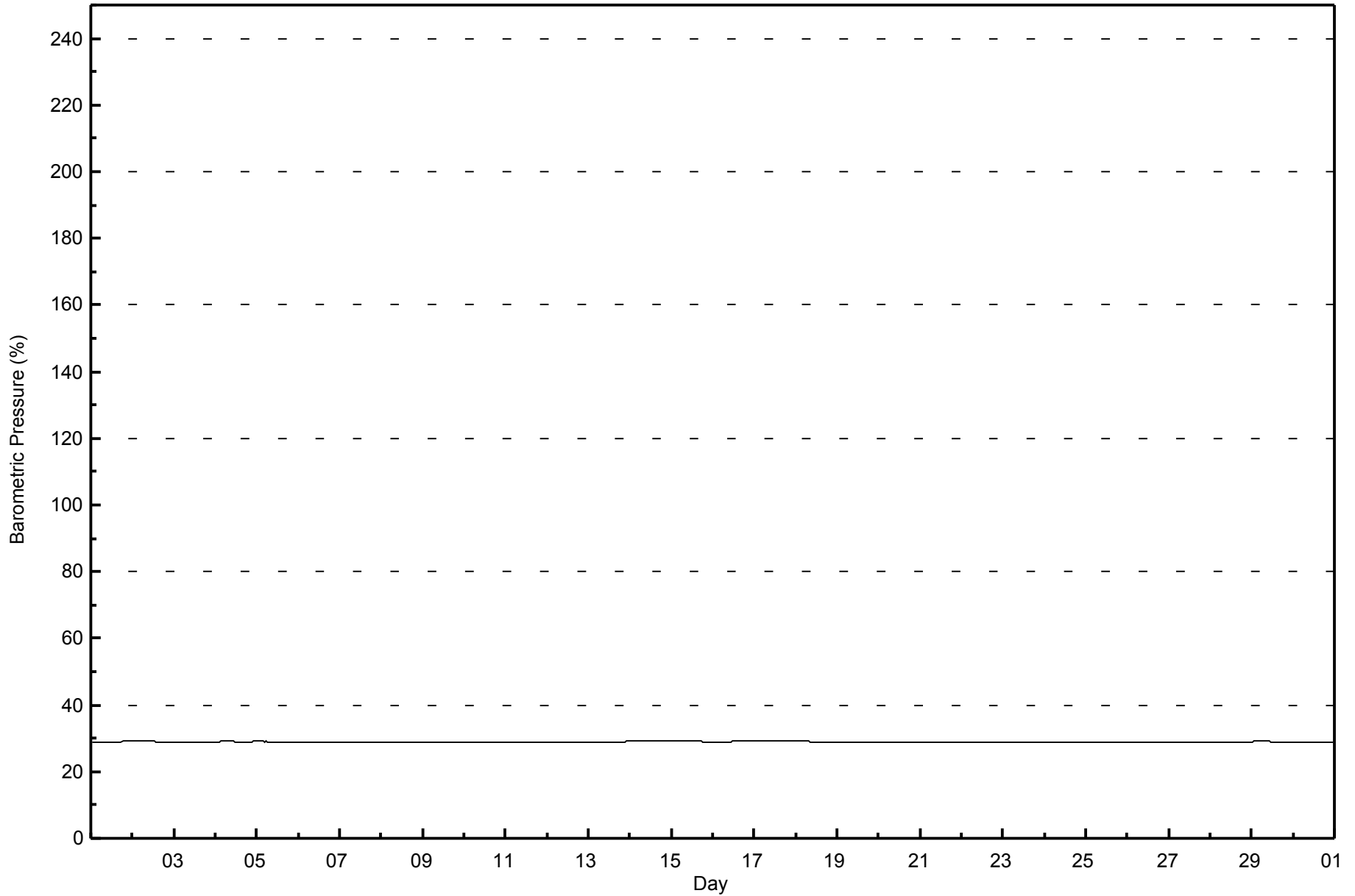
Athabasca Valley - June 2015

Maximum Value: 29.2 % on Jun 15 05:00		Maximum Daily Average: 29.2 % on Jun 14		Hours in Service: 720																						
Minimum Value: 28.6 % on Jun 12 01:00		Minimum Daily Average: 28.7 % on Jun 12		Hours of Data: 720																						
Maximum Diurnal Average: 28.9 % at hour 8		Minimum Diurnal Average: 28.9 % at hour 18		Hours of Missing Data: 0																						
Monthly Average: 28.91 %		Percentiles: P ₁ = 28.6 P ₁₀ = 28.7 Q ₁ = 28.8 Median = 28.9 Q ₃ = 29.0 P ₉₀ = 29.1 P ₉₉ = 29.2		Hours of Calibration: 0																						
				Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.1	28.9	29.1
2-Jun	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	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.1
3-Jun	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	29.0	29.0	29.0	29.0	29.0
4-Jun	29.0	29.0	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.1	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.1
5-Jun	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	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.9	29.0
6-Jun	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.8	28.7	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.7	28.8
7-Jun	28.8	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	28.7	28.7	28.7	28.7	28.7	28.7	28.8	28.8
8-Jun	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.6	28.6	28.6	28.6	28.7	28.7	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.8	28.7	28.8
9-Jun	28.8	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9
10-Jun	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	29.0
11-Jun	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.6	28.7	28.7	28.6	28.6	28.7	28.6	28.7	28.6	28.7	28.7	28.8
12-Jun	28.6	28.6	28.6	28.6	28.7	28.7	28.7	28.7	28.7	28.7	28.6	28.6	28.6	28.6	28.6	28.6	28.7	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.7	28.8
13-Jun	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	29.0	29.0	29.0	29.0	29.0	29.0	28.9	29.0
14-Jun	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2
15-Jun	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.1	29.1	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.1	29.2
16-Jun	29.0	29.0	28.9	28.9	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.1	29.1	29.1	29.0	29.1
17-Jun	29.1	29.1	29.1	29.1	29.1	29.1	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.2
18-Jun	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.9	29.0	29.1
19-Jun	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
20-Jun	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.9
21-Jun	28.8	28.8	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.8	28.9
22-Jun	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.0	28.9	29.0
23-Jun	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0
24-Jun	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	28.9
25-Jun	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.9	29.0	29.0	28.9	28.9	29.0	28.9	28.9	29.0	29.0
26-Jun	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9
27-Jun	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.9	28.9	28.9	29.0
28-Jun	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.0	29.0	28.9	29.0	29.0	29.0	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.0	28.9	29.0
29-Jun	29.0	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.1	29.1	29.0	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.1
30-Jun	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
																								Diurnal Average		
																								Diurnal Maximum		



WBEA
Hourly Averages

Barometric Pressure (BP) - %
Athabasca Valley - June 2015





Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - inHg

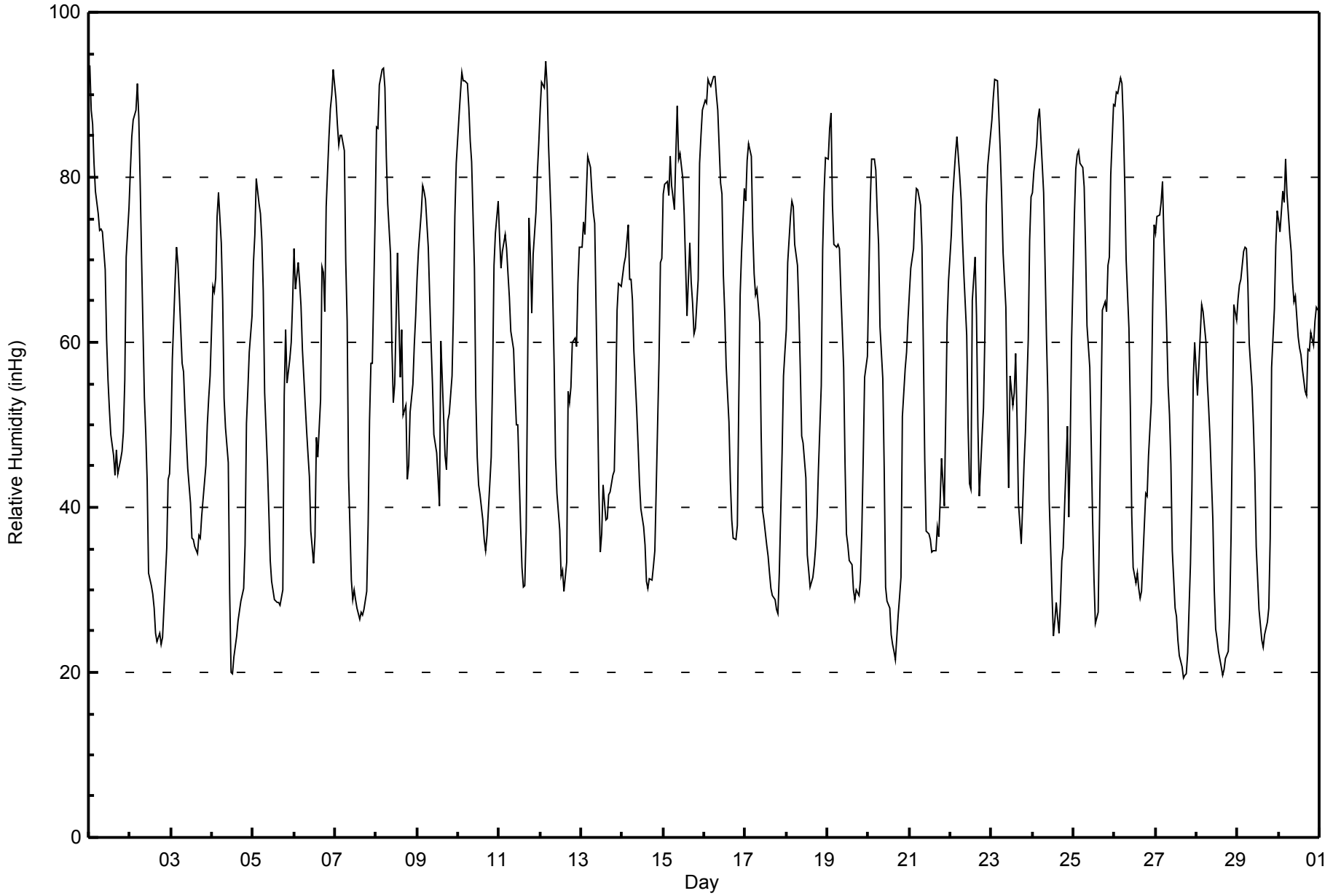
Athabasca Valley - June 2015

Maximum Value: 94 inHg on Jun 12 04:00																			Maximum Daily Average: 76.0 inHg on Jun 15																			Hours in Service: 720			
Minimum Value: 19 inHg on Jun 27 17:00																			Minimum Daily Average: 41.7 inHg on Jun 28																			Hours of Data: 720			
Maximum Diurnal Average: 80.6 inHg at hour 4																			Minimum Diurnal Average: 36.9 inHg at hour 16																			Hours of Missing Data: 0			
Monthly Average: 57.2 inHg																			Percentiles: P ₁ = 21 P ₁₀ = 29 Q ₁ = 39 Median = 59 Q ₃ = 73 P ₉₀ = 83 P ₉₉ = 92																			Hours of Calibration: 0			
																																						Percent Operational Time: 100.0			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																	
1-Jun	94	88	87	82	78	76	74	74	73	69	60	55	52	49	46	44	47	44	46	47	49	55	70	76	64.0	94															
2-Jun	81	85	87	88	91	87	79	70	53	49	43	32	30	30	28	25	24	25	23	24	28	35	43	44	50.2	91															
3-Jun	49	58	67	72	70	66	58	56	52	48	45	40	36	36	35	34	37	36	39	41	45	50	53	56	49.2	72															
4-Jun	67	66	68	75	78	72	65	53	50	45	30	20	20	22	24	26	27	29	30	35	50	54	59	63	47.1	78															
5-Jun	70	73	80	77	76	72	66	54	45	39	34	31	29	29	28	29	28	30	53	62	55	58	60	65	51.7	80															
6-Jun	71	66	70	67	64	59	52	49	46	44	37	33	37	49	46	53	69	68	64	76	85	88	90	93	61.6	93															
7-Jun	89	86	84	85	85	83	70	62	44	31	29	30	29	28	27	27	27	28	30	38	51	57	57	75	52.2	89															
8-Jun	86	86	91	93	93	91	82	77	71	60	53	55	71	63	56	62	51	52	43	45	51	55	60	63	67.1	93															
9-Jun	68	71	76	79	78	77	72	66	60	55	49	47	44	40	60	51	46	45	51	51	56	64	75	82	60.9	82															
10-Jun	87	90	93	92	92	91	89	84	82	69	53	46	43	41	38	36	35	37	43	46	56	69	73	77	65.1	93															
11-Jun	73	69	71	73	71	68	65	61	59	54	50	50	38	33	30	30	37	75	71	63	71	76	81	84	60.6	84															
12-Jun	88	92	91	94	91	84	74	66	57	46	42	37	32	32	30	33	54	53	55	60	60	59	67	71	61.2	94															
13-Jun	72	75	73	78	82	81	78	76	74	53	42	35	37	43	38	39	42	42	44	44	52	64	67	67	58.2	82															
14-Jun	68	70	70	74	68	68	65	59	52	48	43	40	38	36	31	30	31	31	33	35	42	58	70	70	51.2	74															
15-Jun	78	79	79	78	83	79	76	83	89	82	83	80	75	69	63	72	67	65	61	62	68	82	85	88	76.0	89															
16-Jun	89	89	92	91	91	92	92	90	88	79	78	68	63	57	50	43	38	36	36	38	53	66	71	79	69.6	92															
17-Jun	77	82	84	83	74	68	66	66	62	49	40	38	36	34	32	30	29	29	28	27	32	47	56	59	51.2	84															
18-Jun	62	70	75	77	76	72	69	64	57	49	48	44	34	32	30	32	33	35	39	45	55	71	78	82	55.4	82															
19-Jun	82	86	88	77	72	72	72	71	66	57	45	37	35	34	33	30	29	30	29	31	37	46	56	58	53.0	88															
20-Jun	68	77	82	82	81	76	72	62	56	45	30	29	28	25	23	23	22	27	29	31	51	57	59	63	49.8	82															
21-Jun	66	69	71	76	79	78	77	72	59	46	37	37	36	35	35	35	38	37	41	46	40	51	62	67	53.7	79															
22-Jun	73	78	80	83	85	80	77	72	68	61	50	43	42	65	70	63	50	41	49	52	61	77	81	85	66.1	85															
23-Jun	87	90	92	92	87	83	78	71	64	52	42	56	52	54	59	51	41	36	40	45	49	60	72	78	63.7	92															
24-Jun	78	81	84	87	88	85	78	70	61	54	41	29	24	26	28	25	28	34	35	40	50	39	48	60	53.0	88															
25-Jun	75	81	83	83	82	81	79	71	62	57	48	39	31	26	27	39	51	64	65	64	69	70	80	89	63.2	89															
26-Jun	89	90	90	92	91	87	79	70	62	52	39	33	31	32	30	29	30	38	42	41	46	53	65	74	57.7	92															
27-Jun	73	75	75	77	80	73	62	55	51	45	35	28	27	24	22	21	19	20	20	22	33	42	55	60	45.6	80															
28-Jun	54	57	61	65	64	60	56	52	48	39	30	25	24	22	21	20	20	22	23	27	36	50	65	63	41.7	65															
29-Jun	65	67	68	71	72	71	67	60	55	50	44	35	28	26	24	23	25	26	28	36	57	64	72	76	50.4	76															
30-Jun	75	73	78	77	82	78	73	71	67	65	66	61	59	59	57	54	54	59	59	61	60	63	64	64	65.8	82															
	75.1	77.3	79.7	80.6	80.1	77.0	72.1	66.9	61.2	53.0	45.5	41.1	38.7	38.3	37.5	36.9	37.6	39.7	41.5	44.6	51.6	59.3	66.5	71.1	Diurnal Average																
	94	92	93	94	93	92	92	90	89	82	83	80	75	69	70	72	69	75	71	76	85	88	90	93	Diurnal Maximum																



WBEA
Hourly Averages

Relative Humidity (RH) - inHg
Athabasca Valley - June 2015





Maximum Speed: 34 km/h on Jun 26 18:00	Maximum Daily Speed Average: 16.4 km/h on Jun 1	Hours in Service: 720
Minimum Speed Value: 0 km/h on Jun 6 19:00	Minimum Daily Speed Average: 1.7 km/h on Jun 15	Hours of Data: 720
Maximum Diurnal Speed Average: 8.0 km/h at hour 14	Minimum Diurnal Speed Average: 0.5 km/h at hour 7	Hours of Missing Data: 0
Monthly Average Velocity: 1.9 km/h 302.7 deg	Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 5 Median = 7 Q ₃ = 12 P ₉₀ = 18 P ₉₉ = 28	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	SSW4	WSW10	W8	WNW18	WNW20	WNW20	WNW23	WNW21	NW20	NW23	NW27	NW27	NW27	NW25	NW25	NNW24	N20	NNW28	NNW20	NNW18	NW12	W9	SE2	SSW1	NW16.4	NNW28
2-Jun	ESE3	SE6	ESE4	ESE5	ESE6	ESE5	ESE5	E7	S7	WNW2	NW3	SSW5	SE5	ESE9	SE9	SE9	SE8	ESE11	SE13	SE12	SE9	SSE8	S4	SSE6	SE5.9	SE13
3-Jun	SE9	SE10	ESE7	ESE6	ESE7	ESE6	SE13	SE11	SE13	ESE13	ESE11	ESE13	SE13	ESE15	SE11	SSE14	SSE13	SSE14	SSE15	SE10	SE9	SE9	SE10	SE7	SE10.4	SSE15
4-Jun	ESE6	ESE5	SE7	ESE7	SE5	SE8	SE9	SE7	E7	NNE4	NE2	SSE12	SE16	SSE15	SSE16	SSE14	S11	S10	SSE12	S16	SW13	S9	SSE9	SSE6	SE8.0	SSE16
5-Jun	SSW5	SE5	S3	SE7	SE9	SE10	SE9	S8	SSW12	SW13	SSW14	SW17	SSW15	SW16	SW14	SSW14	SW14	SW14	NW15	NNW4	S7	SSW8	S6	SSE3	SSW7.4	SW17
6-Jun	WSW2	SSE3	SE3	ESE3	S3	ESE2	SSW6	SW12	SW11	WNW3	NNW4	NNW5	W9	NW11	NW9	NW8	E3	SW8	E0	W2	W4	SSE1	ENE0	E2	W2.3	SW12
7-Jun	SSW1	SE2	SSE3	S2	SSE2	ESE4	E2	E6	N5	NNW17	NW20	NW19	NW23	NNW17	NW20	WNW18	WNW17	NW15	NNW8	WNW1	ENE1	WNW1	SE3	S1	NW6.5	NW23
8-Jun	SE6	S4	SE6	SE6	SSE4	SE4	SW5	SW7	W11	NW16	WNW17	WNW20	NW12	WNW18	N15	N6	NNE6	NNW11	NW21	NNW24	NW16	NW11	WNW6	WNW12	NW7.3	NNW24
9-Jun	WNW13	NW8	W5	SW7	W6	SW10	SSW5	S4	ENE3	NE5	NNE6	ENE7	N11	N16	NNE13	NNW7	NNW10	N13	N12	N7	NNW7	NW4	WSW4	WSW6	NNW4.6	N16
10-Jun	WSW7	WSW5	SW1	ESE3	SE4	SE3	S3	ENE2	WNW4	W5	WNW4	NNW6	W4	NNW8	NNW5	WNW5	NNW6	NNW9	NNW11	N4	NW1	S2	SE1	SE1	NW2.1	NNW11
11-Jun	SE5	SE7	SSE5	SSE6	SE9	SE11	SE7	S5	ESE4	SE8	ESE6	SW7	SW16	SW22	WSW19	SSW12	SW11	WNW4	E3	SE9	SE12	SE9	NE2	NNE3	S5.1	SW22
12-Jun	S2	WNW3	SW3	SSW4	S6	SSW2	SSW4	S3	E5	NNE8	N8	N8	N6	NW8	SW10	SSE2	E22	ESE14	SW8	E23	E18	NE11	ENE10	NE10	E3.5	E23
13-Jun	ENE14	NE9	NE8	NNE10	NNE9	N11	NW14	NNW18	NNW20	N20	N22	N22	N21	N21	N21	N23	N24	N20	N19	NNE15	ENE15	E8	E5	E5	N13.6	N24
14-Jun	ENE6	ENE7	NNE6	NNE6	NNE7	NNW10	NNW15	NNW17	NNW21	N18	N18	NNW19	NNW18	N18	N18	N20	NNW16	NNW16	NNW15	N9	NW1	SW3	E3	WNW3	N11.1	NNW21
15-Jun	SSW2	SE1	ESE3	ESE2	NE2	N8	N9	NNW12	NW10	NW8	NNW7	N7	N6	NNW5	NNW6	NNW8	S5	S8	S7	S8	SSE5	SE1	SE4	SE5	NNW1.7	NNW12
16-Jun	SE9	NW5	NW7	W7	NW12	NNW7	NW9	NNW14	NNW16	N13	N10	NNW12	NNW12	NNW13	NNW14	N16	N14	N10	N9	NNE6	WSW3	SW3	SW4	WNW2	NNW7.7	N16
17-Jun	WNW5	SSW1	SSW1	N0	NW10	NNW13	N13	NNW15	NNW11	NNW12	NNW14	NNW12	NNW10	NNW10	NNW7	N6	N7	WNW4	W4	S4	SSE7	SE7	SE5	SSE5	NNW5.0	NNW15
18-Jun	SE5	SE3	SE7	SE6	SE9	SE10	ESE7	SE7	S2	SE6	WNW4	E4	SE7	SSW10	SSE9	SE8	S10	S7	SE8	SSE8	WSW11	W13	W5	NW5	SSE4.1	W13
19-Jun	NNW7	W5	WSW7	NW11	NNW16	NNW12	NNW12	NNW12	NNW13	NNW18	NNW19	NNW18	NNW18	NNW17	NNW16	NNW14	NNW14	NNW14	NNW13	NNW11	NNW6	WNW4	WSW7	WSW6	NNW11.1	NNW19
20-Jun	WSW8	SSE1	SW5	ENE3	ESE3	E5	ENE4	N2	WNW3	WNW4	NNW8	NNW11	NW12	NNW12	NNW11	NNW12	NNW8	NNW7	NNW7	W6	WSW19	WSW12	WSW9	SW8	WNW4.1	WSW19
21-Jun	SW9	ESE5	ESE5	SSE5	SE5	SE5	SE2	ENE2	NNW7	NNW10	N11	N11	N11	N11	NNW11	N10	NNW6	N6	WNW11	WNW12	N5	SW7	SW8	SW7	NNW3.0	WNW12
22-Jun	SW9	SW8	SW5	S3	SE3	SE1	SW6	SW10	SW12	WSW7	N9	WNW3	SW9	NW17	SW7	WSW11	WSW6	NW13	NNE12	N6	NE2	SSW3	E2	ESE3	WSW3.4	NW17
23-Jun	SE4	ESE4	SE4	SE6	SSE7	SE9	SE7	ESE6	ESE4	SW7	SW11	ESE4	ESE8	NW8	NNE5	W2	S8	SSW8	SW11	SW6	SSE6	SE5	SSE3	SSE4	SSE3.6	SW11
24-Jun	SE8	SE8	SE13	SE12	SE10	SE9	SE11	SE8	E4	SW12	SW16	SW15	SW17	W10	SW15	SW12	SW10	SW7	SW6	WSW6	SW13	S1	SW5	SW5	SSW6.8	SW17
25-Jun	SW6	S1	SSW3	E1	SSE2	E2	WSW4	W4	WSW5	WNW3	W5	NE1	NW4	WSW7	SW11	SW20	NNW18	NNW12	WSW5	SSW6	W6	ESE1	S4	ESE3	W3.3	SW20
26-Jun	S4	SE5	SE8	SE9	SE4	SE8	SE8	SSE5	SSW9	SW13	SW20	W23	W25	W29	W28	WNW32	WNW30	WNW34	WNW23	WNW17	W14	SW5	SE2	E3	W10.1	WNW34
27-Jun	SSE4	SE3	SE6	SE8	SE5	ESE6	SSW5	SW8	SW8	SW7	SW7	SW10	SW14	WSW12	SW15	SW15	SW15	SW16	SW12	WSW9	SW8	SW9	S3	SE4	SW7.2	SW16
28-Jun	SE6	SE8	SE8	SE7	SE7	SE9	ESE6	E3	ENE3	N7	NNW12	NNW20	NW26	NW24	NW28	NW25	NW21	NNW18	NNW15	N9	N5	SW3	ESE2	ESE2	NNW6.3	NW28
29-Jun	ESE2	SE3	SE4	SE6	SE6	SE6	SE8	SE8	ESE5	E2	ENE3	NW1	WNW3	W5	SW4	S5	ESE5	E7	SSE8	SE8	E6	NE2	NW2	SSW3	SE3.2	SE8
30-Jun	E2	SSE1	SE2	SSE2	S2	SW7	SSW2	SSW3	SSW8	WNW1	NNW5	NNW6	NNW6	NNW5	N6	N7	N7	NNW10	N8	NNW12	NE3	ESE4	S3	W9	NNW2.1	NNW12

S2.1 SSE2.0 SSE2.5 SE2.3 SE1.7 ESE1.7 SE0.5 NNW0.8 NNW2.4 NNW4.4 NW5.7 NW5.8 NNW5.9 NW8.0 NW6.3 NNW5.5 NW4.3 NW5.3 NW4.4 NNW1.7 SW1.1 SSW2.5 S2.0 SSW1.4	Diurnal Average
ENE14 WSW10 SE13 WNW18 WNW20 WNW20 WNW23 WNW21 NNW21 NW23 NW27 NW27 NW27 W29 NW28 WNW32 WNW30 WNW34 WNW23 NNW24 WSW19 SW13 ENE10 WNW12	Diurnal Maximum

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

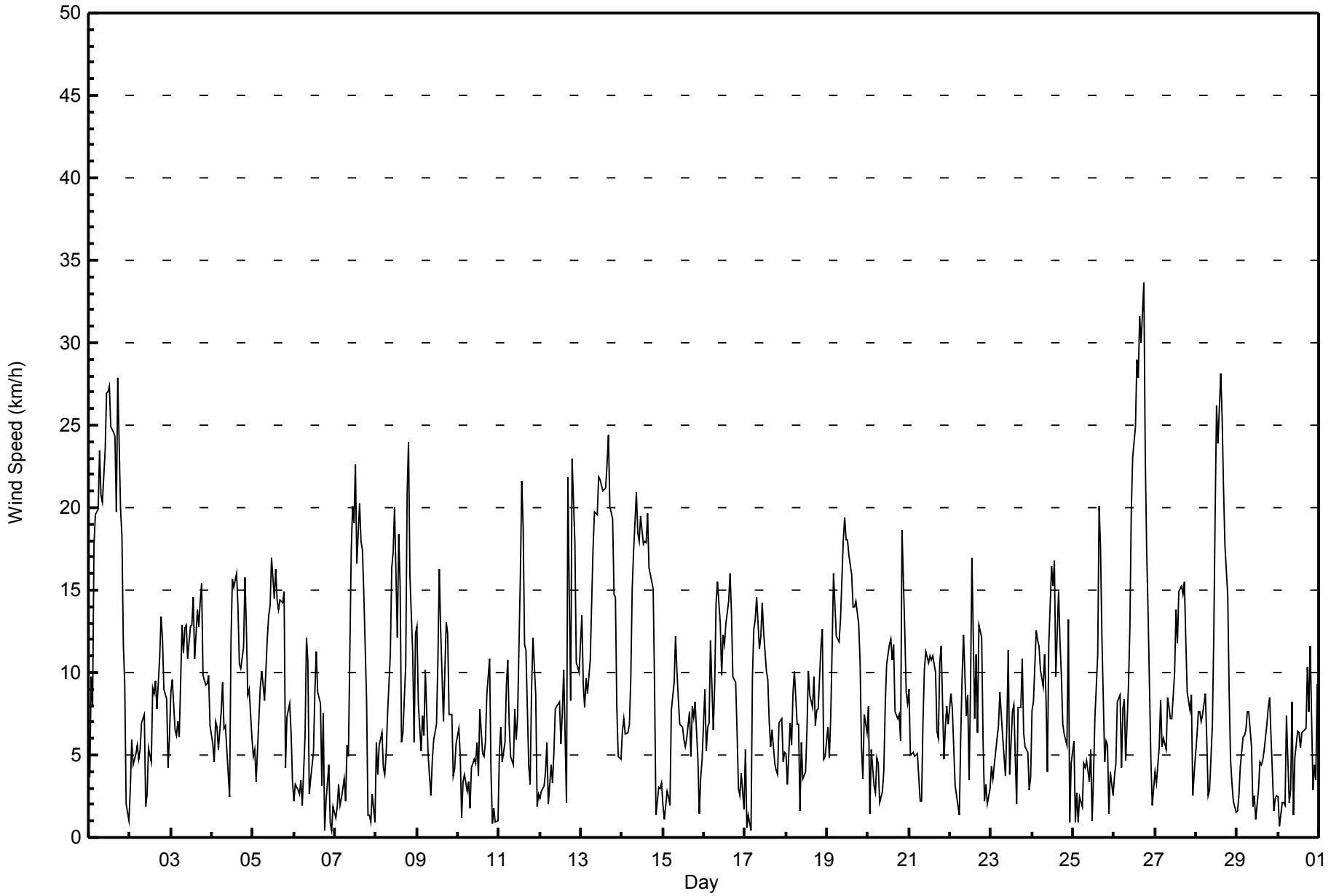
Wind Speed (WS) - km/h
Athabasca Valley - June 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 11 km/h on Jun 26 18:00 Minimum Value: 1 km/h on Jun 20 09:00 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 Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	2	2	2	7	4	3	4	5	5	5	5	5	6	5	6	5	5	5	4	3	2	1	2	7	
2-Jun	1	2	1	1	1	1	2	2	3	2	2	3	3	3	4	5	3	3	4	3	2	4	2	1	5
3-Jun	2	2	2	2	2	2	3	4	4	4	3	4	4	4	4	4	4	4	3	2	2	2	2	4	
4-Jun	2	2	2	2	2	2	2	2	2	2	3	5	5	5	5	5	3	3	3	5	5	3	2	1	5
5-Jun	1	2	2	3	2	2	2	3	4	5	4	5	5	5	4	5	5	5	10	4	2	3	2	2	10
6-Jun	2	2	2	2	2	1	2	3	4	2	2	3	8	11	7	6	5	4	1	1	2	2	2	2	11
7-Jun	2	1	2	2	2	2	2	3	5	5	5	6	5	6	5	5	5	4	4	2	1	2	2	2	6
8-Jun	2	2	2	2	1	2	2	3	4	5	5	9	4	5	9	3	3	3	6	5	3	4	2	4	9
9-Jun	4	3	3	2	2	4	2	2	2	3	3	2	3	8	6	3	5	3	5	2	2	1	2	1	8
10-Jun	2	1	2	1	1	2	1	2	1	1	1	2	2	2	3	2	2	2	3	2	1	1	2	1	3
11-Jun	2	2	2	2	2	3	2	2	2	2	3	5	5	5	6	4	9	6	2	4	4	3	4	2	9
12-Jun	1	3	2	4	3	2	3	2	2	2	2	2	3	4	4	8	6	4	3	6	6	4	3	3	8
13-Jun	3	3	2	3	2	3	3	4	4	6	7	6	7	6	6	7	6	6	6	5	4	3	2	2	7
14-Jun	2	3	2	2	2	4	3	4	5	5	6	6	5	6	5	5	5	3	4	2	3	1	2	6	
15-Jun	2	2	2	1	2	3	3	3	2	2	2	2	1	2	5	3	2	1	2	2	1	2	2	2	5
16-Jun	2	3	3	3	2	3	3	4	3	4	3	3	3	3	4	4	4	4	4	3	2	3	3	3	4
17-Jun	1	2	2	2	2	3	3	3	3	3	5	4	4	4	3	3	2	2	1	2	1	3	2	2	5
18-Jun	1	1	1	1	2	2	1	2	2	2	2	2	3	4	3	4	3	2	3	3	9	5	3	4	9
19-Jun	4	2	3	3	3	2	2	3	3	4	4	4	4	4	3	3	3	3	3	2	2	2	3	2	4
20-Jun	2	2	2	1	1	1	1	1	1	1	2	2	5	4	3	3	2	1	1	5	4	3	3	2	5
21-Jun	2	2	2	2	2	1	1	1	3	2	2	3	3	3	4	3	2	2	7	4	2	3	2	2	7
22-Jun	3	3	2	2	2	2	3	2	2	3	2	3	3	7	4	3	3	4	6	2	2	2	2	2	7
23-Jun	2	2	1	1	1	2	2	2	2	3	3	4	3	9	3	2	2	3	5	1	2	2	2	2	9
24-Jun	2	3	2	2	2	2	2	2	2	2	4	3	4	4	3	4	4	2	2	2	6	5	3	3	6
25-Jun	2	2	3	1	2	1	2	2	2	1	4	4	1	3	7	7	6	4	3	2	5	3	3	1	7
26-Jun	5	2	2	2	3	2	2	3	3	5	4	6	7	6	6	6	7	11	8	4	2	4	2	1	11
27-Jun	1	2	2	2	2	2	3	3	2	1	2	4	5	6	5	4	4	3	4	2	1	2	2	2	6
28-Jun	1	1	1	2	2	2	2	2	1	2	4	6	6	6	6	6	6	4	4	3	1	2	2	3	6
29-Jun	2	2	2	2	1	1	1	1	1	2	2	1	1	2	3	2	2	1	2	3	2	2	2	2	3
30-Jun	2	1	1	1	1	3	3	2	2	2	1	1	1	1	1	1	3	2	2	3	2	3	4	3	4
Diurnal Maximum																									



WBEA
Hourly Averages

Wind Speed (WS) - km/h
Athabasca Valley - June 2015





WBEA
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Athabasca Valley - June 2015

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	240	33.33	33.33
6 - 11	283	39.31	72.64
12 - 19	145	20.14	92.78
20 - 28	48	6.67	99.44
29 - 38	4	0.56	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



WBEA
Frequency Distribution

Wind Speed (WS) - km/h
Athabasca Valley - June 2015

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	6	3	8	9	19	28	35	22	22	20	11	7	12	21	9	8	240
6 - 11	29	9	4	4	6	16	70	11	13	8	36	16	10	2	13	36	283
12 - 19	12	3	0	2	1	4	10	9	1	5	24	4	2	9	12	47	145
20 - 28	11	0	0	0	2	0	0	0	0	0	3	0	3	6	16	7	48
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	1	3	0	0	4
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	58	15	12	15	28	48	115	42	36	33	74	27	28	41	50	98	720

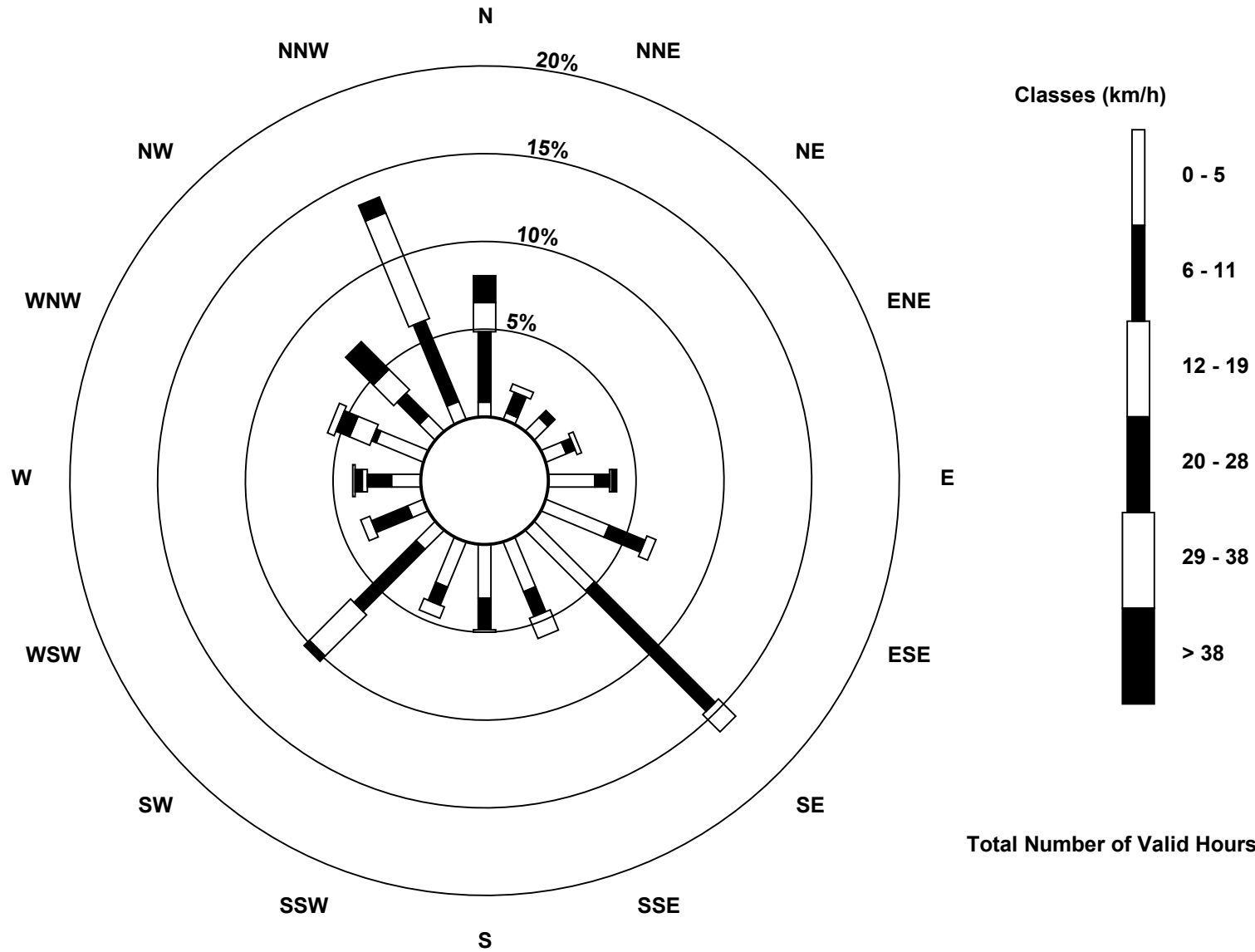
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

Wind Speed (WS) - km/h
Athabasca Valley (AMS 7)





Wood Buffalo Environmental Association

Summary of Hour Averages

**Wind Direction (WD) - deg
Athabasca Valley - June 2015**

Direction of Maximum Speed: 296 deg on Jun 26 18:00 Direction of Maximum Daily Speed Average: 310.8 deg on Jun 1	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0
Direction of Minimum Speed: 88 deg on Jun 6 19:00 Direction of Minimum Daily Speed Average: 1.7 deg on Jun 15	Percent Operational Time: 100.0
Monthly Average Direction: 290.5 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	204	245	268	297	302	290	293	301	306	308	309	304	310	309	317	333	349	334	343	340	326	274	140	197	310.8
2-Jun	117	126	122	116	115	108	105	83	170	285	308	195	141	114	125	130	138	108	128	126	126	161	172	150	129.7
3-Jun	140	132	118	116	122	105	138	145	137	120	109	121	141	118	129	155	151	155	148	144	133	131	144	146	134.9
4-Jun	109	120	125	122	133	129	131	139	91	25	52	161	140	165	161	167	179	171	163	172	215	176	160	162	154.0
5-Jun	197	144	173	136	130	131	130	177	213	220	207	225	199	223	222	210	224	234	321	346	177	200	169	155	202.5
6-Jun	249	157	133	119	169	119	210	236	229	294	341	343	270	313	315	325	84	219	88	277	264	163	64	96	262.7
7-Jun	209	132	152	171	154	112	87	81	2	328	320	320	312	332	320	303	295	315	337	299	57	291	136	174	319.8
8-Jun	132	180	135	142	157	140	214	220	274	306	284	294	320	293	353	4	12	348	323	328	321	322	303	290	308.5
9-Jun	302	326	273	236	269	229	211	190	72	50	28	72	4	352	26	334	338	349	351	1	329	322	240	256	332.4
10-Jun	246	246	224	121	135	126	179	60	296	280	286	343	259	341	346	292	335	340	338	3	320	182	143	127	312.6
11-Jun	137	137	149	148	131	143	135	179	109	128	107	218	232	229	239	208	228	295	92	135	129	138	46	26	176.4
12-Jun	176	301	232	201	185	203	208	185	81	20	10	360	349	311	235	166	93	103	214	84	84	54	67	46	79.3
13-Jun	61	39	40	16	26	349	322	338	339	10	4	10	359	360	9	2	3	6	1	25	78	98	93	99	10.3
14-Jun	61	64	29	30	27	341	342	345	347	360	356	347	348	349	354	349	348	341	337	349	315	229	87	285	352.8
15-Jun	213	160	111	110	38	349	352	339	323	325	334	1	350	330	346	339	178	185	184	181	163	166	133	137	335.4
16-Jun	139	316	308	279	317	336	319	343	339	355	355	344	343	344	342	353	351	357	10	19	254	222	217	301	340.1
17-Jun	299	200	209	349	324	344	357	342	337	345	344	336	333	342	327	11	351	300	281	174	163	142	126	148	339.1
18-Jun	135	138	133	142	138	133	105	130	169	144	286	85	144	209	163	139	191	191	144	156	252	279	262	320	166.3
19-Jun	337	265	255	323	336	334	342	345	344	339	338	339	341	339	342	345	341	341	331	332	343	292	247	250	332.5
20-Jun	237	149	235	72	122	85	78	0	287	286	337	337	317	342	336	328	336	337	338	260	238	239	237	223	298.1
21-Jun	220	123	109	156	143	138	126	72	348	348	353	358	1	357	347	356	346	355	283	283	355	227	229	228	332.5
22-Jun	225	227	220	175	138	143	222	220	216	240	360	298	236	312	229	238	254	322	16	2	53	205	87	122	256.7
23-Jun	125	116	124	138	147	127	126	110	109	217	219	123	106	309	33	274	187	196	218	219	162	138	163	153	161.3
24-Jun	143	142	141	139	138	135	129	127	129	93	216	221	222	233	262	226	229	227	230	226	242	226	183	227	193.6
25-Jun	234	191	205	92	164	79	245	260	250	303	266	44	311	249	236	235	328	343	241	206	275	103	173	105	259.9
26-Jun	175	141	144	131	134	135	134	158	208	222	222	260	260	279	277	282	282	296	291	292	259	232	144	95	261.5
27-Jun	154	143	137	138	132	120	200	222	224	222	230	220	221	249	228	230	222	231	236	238	236	223	191	144	215.3
28-Jun	143	139	140	142	134	133	118	84	69	357	343	327	309	323	320	326	325	336	340	1	352	236	115	115	334.0
29-Jun	110	129	130	126	132	127	135	129	112	79	66	309	294	260	216	180	107	91	154	130	95	40	322	195	129.8
30-Jun	97	166	126	147	177	217	201	201	211	297	334	338	345	341	354	350	7	345	352	344	39	116	170	270	330.1

168.9 148.1 150.0 136.8 126.5 117.0 143.8 303.1 301.1 327.7 321.3 315.9 303.1 306.7 309.2 300.9 313.5 320.0 319.2 338.0 225.6 206.4 171.5 193.4

Diurnal Average

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



Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

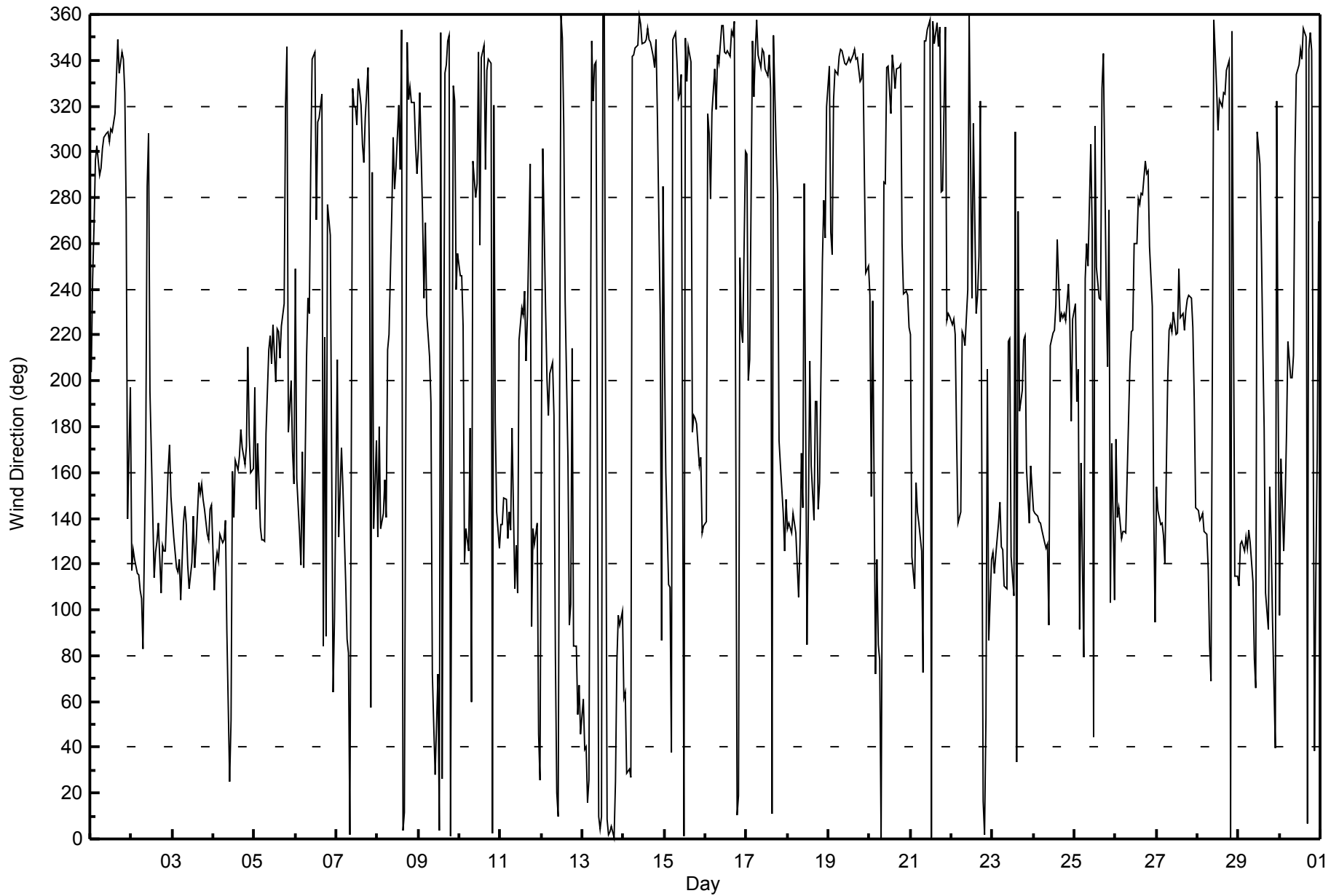
**Wind Direction (WD) - deg
Athabasca Valley - June 2015**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 103 deg on Jun 17 04:00		Hours in Service: 720 Hours of Data: 720																							
Minimum Value: 8 deg on Jun 20 19:00		Hours of Missing Data: 0 Hours of Calibration: 0																							
Percentiles: P ₁ = 11 P ₁₀ = 14 Q ₁ = 18 Median = 25 Q ₃ = 46 P ₉₀ = 72 P ₉₉ = 94		Percent Operational Time: 100.0																							
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	65	14	33	19	14	12	16	17	16	16	16	15	17	17	15	21	11	18	12	17	25	62	86	86	
2-Jun	33	28	30	19	18	26	31	23	30	99	78	58	78	42	56	48	45	26	19	18	19	34	61	17	99
3-Jun	14	13	21	23	28	29	17	18	19	21	24	24	33	26	34	25	32	23	16	17	17	15	15	22	34
4-Jun	26	43	22	17	23	18	13	29	29	52	88	46	26	27	29	26	35	26	17	23	25	36	16	18	88
5-Jun	34	34	36	18	16	14	13	46	26	25	31	20	35	28	21	30	19	23	37	84	32	20	19	72	84
6-Jun	76	54	42	46	20	74	31	23	32	77	63	58	57	70	60	43	87	33	96	34	55	79	93	44	96
7-Jun	78	35	34	72	75	54	78	48	49	16	17	23	18	26	18	24	19	14	18	68	77	79	85	95	95
8-Jun	21	51	50	25	36	51	52	20	24	24	23	31	30	17	47	49	35	17	15	14	10	15	35	18	52
9-Jun	24	29	53	19	38	15	31	57	76	66	58	38	25	21	36	35	20	18	20	27	17	38	64	22	76
10-Jun	17	22	78	43	46	58	49	79	26	15	21	53	73	46	58	32	47	22	14	51	68	70	80	74	80
11-Jun	35	23	37	41	17	19	41	45	41	26	46	42	16	15	16	35	51	83	69	21	16	31	81	46	83
12-Jun	79	80	72	61	44	73	56	65	29	33	32	33	57	48	41	81	17	22	42	13	15	24	21	22	81
13-Jun	17	23	20	20	19	24	11	17	13	23	23	22	25	22	24	24	22	22	22	26	20	23	23	46	46
14-Jun	23	28	24	20	25	31	16	17	18	22	25	20	19	21	23	22	25	20	12	20	69	72	31	59	72
15-Jun	88	78	51	29	76	25	19	15	12	21	34	23	35	24	38	31	56	25	18	16	27	73	24	32	88
16-Jun	12	80	57	36	25	37	17	16	14	19	24	18	16	17	18	20	22	27	46	24	82	89	84	101	101
17-Jun	36	93	83	103	14	17	20	17	17	17	26	19	38	36	56	50	37	40	29	63	19	29	36	39	103
18-Jun	21	37	12	20	16	12	24	25	85	45	45	74	43	42	39	53	35	32	40	35	29	23	67	47	85
19-Jun	66	49	22	16	10	10	12	16	15	14	11	16	12	15	14	16	16	12	15	13	18	45	41	63	66
20-Jun	25	78	48	32	57	23	20	64	26	25	11	13	27	20	21	14	25	13	8	33	12	11	21	17	78
21-Jun	16	40	43	47	28	24	61	78	22	18	20	22	25	25	37	22	22	23	26	37	25	31	18	14	78
22-Jun	9	16	19	50	59	72	44	12	11	45	20	61	47	30	41	24	59	32	33	30	55	63	62	50	72
23-Jun	34	21	24	21	20	12	15	32	79	58	18	89	45	92	55	70	38	31	22	14	29	26	42	32	92
24-Jun	13	16	10	11	11	12	12	11	18	57	14	13	14	17	44	17	14	15	26	87	28	96	54	96	96
25-Jun	34	70	72	63	57	66	15	17	37	16	32	91	21	27	22	23	21	18	53	24	48	94	80	44	94
26-Jun	81	41	18	18	27	18	16	54	21	18	13	27	24	16	17	14	14	18	18	13	16	70	77	45	81
27-Jun	49	51	25	12	17	20	64	22	15	16	18	29	20	40	21	16	19	13	12	12	11	16	88	28	88
28-Jun	14	11	13	18	14	11	26	81	69	30	24	18	18	21	14	15	16	18	18	21	33	75	63	67	81
29-Jun	54	24	27	20	13	12	11	16	28	84	72	66	26	38	55	53	43	17	27	21	24	72	71	58	84
30-Jun	60	86	63	48	44	26	81	53	12	80	12	11	13	14	17	16	32	13	18	16	45	54	69	22	86
	88	93	83	103	76	74	81	81	85	99	88	91	78	92	60	81	87	83	96	84	87	94	96	101	
	Diurnal Maximum																								



WBEA
Hourly Averages

Wind Direction (WD) - deg
Athabasca Valley - June 2015





Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

Calibration Date	June 2, 2015	Last Calibration	May 12, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Routine		
Start Time (MST)	7:40	End Time (MST)	13:00
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

	<i>Before</i>	<i>After</i>		<i>Before</i>	<i>After</i>
Analyzer Range	0 - 1000 ppb		PMT voltage	-681	-681
Analyzer IP address	192.168.1.103		Lamp voltage	810	812
Calculated slope	1.019380	1.009550	Chamber temp	43.6	43.5
Calculated intercept	-0.234288	0.765927	Pressure	709.7	711.9
Analyzer Background	10.5	10.5	Flow	0.552	0.554
Analyzer Coefficient	0.829	0.829	Intensity	48500	48500

Analyzer make Thermo 43C Analyzer serial # 6074175781

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.4	----
as found span	5000	60.7	607.0	594.9	1.020
calibrator zero	5000	0.0	0.0	0.4	----
high point	5000	60.7	607.0	601.5	1.009
second point	5000	30.4	304.0	298.5	1.018
third point	5000	15.2	152.0	149.5	1.017
as left zero	5000	0.0	0.0	0.7	----
as left span	5000	60.7	607.0	601.3	1.009
Average Correction Factor					1.015

Corrected As found 594.5 Previous response 595.7 % change 0.2%

Notes:

No adjustments or maintenance done, filter changed out

Calibration Performed By: Melissa Lemay



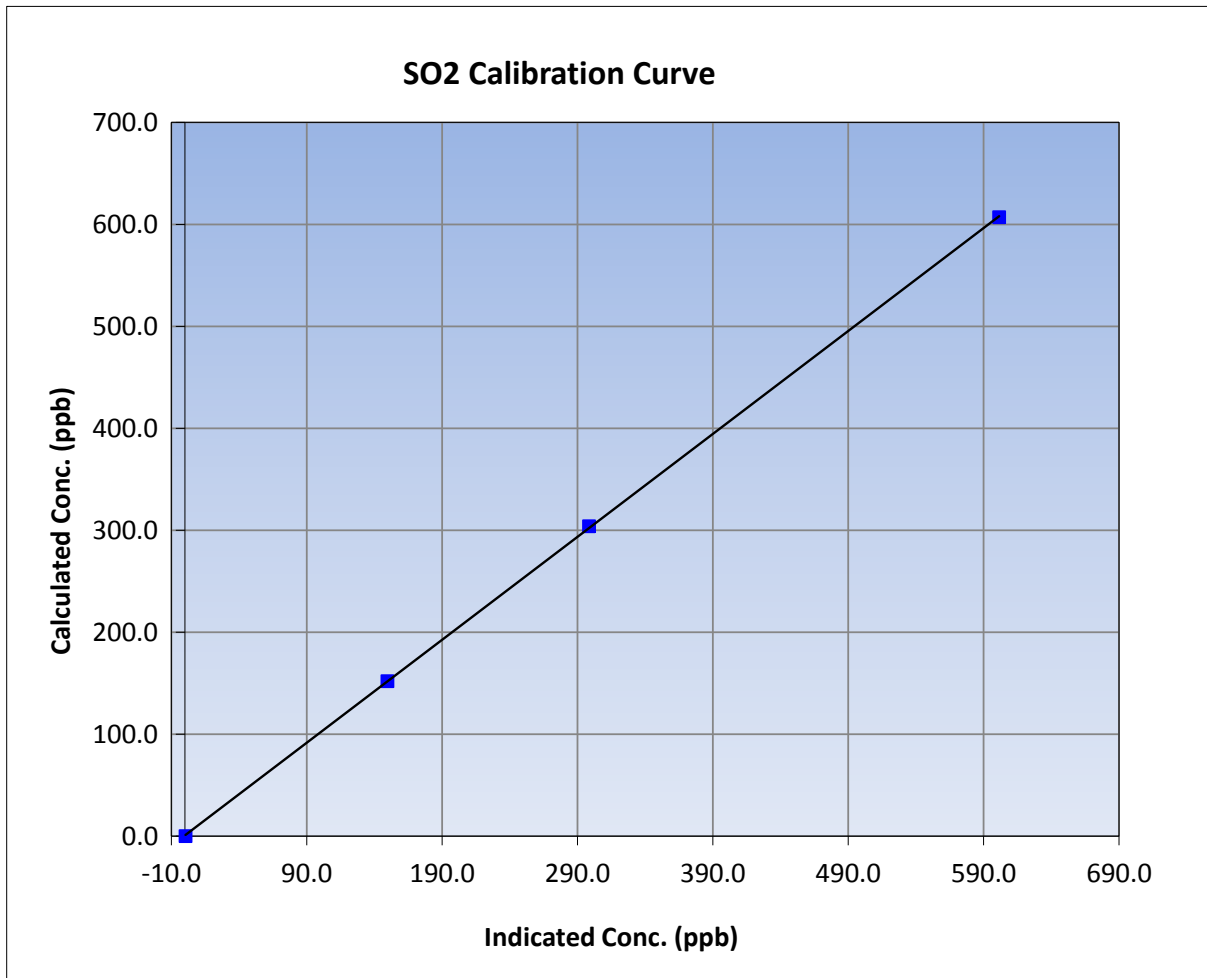
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	June 2, 2015	Previous Calibration	May 12, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	7:40	End Time (MST)	13:00
Analyzer make	Thermo 43C	Analyzer serial #	6074175781

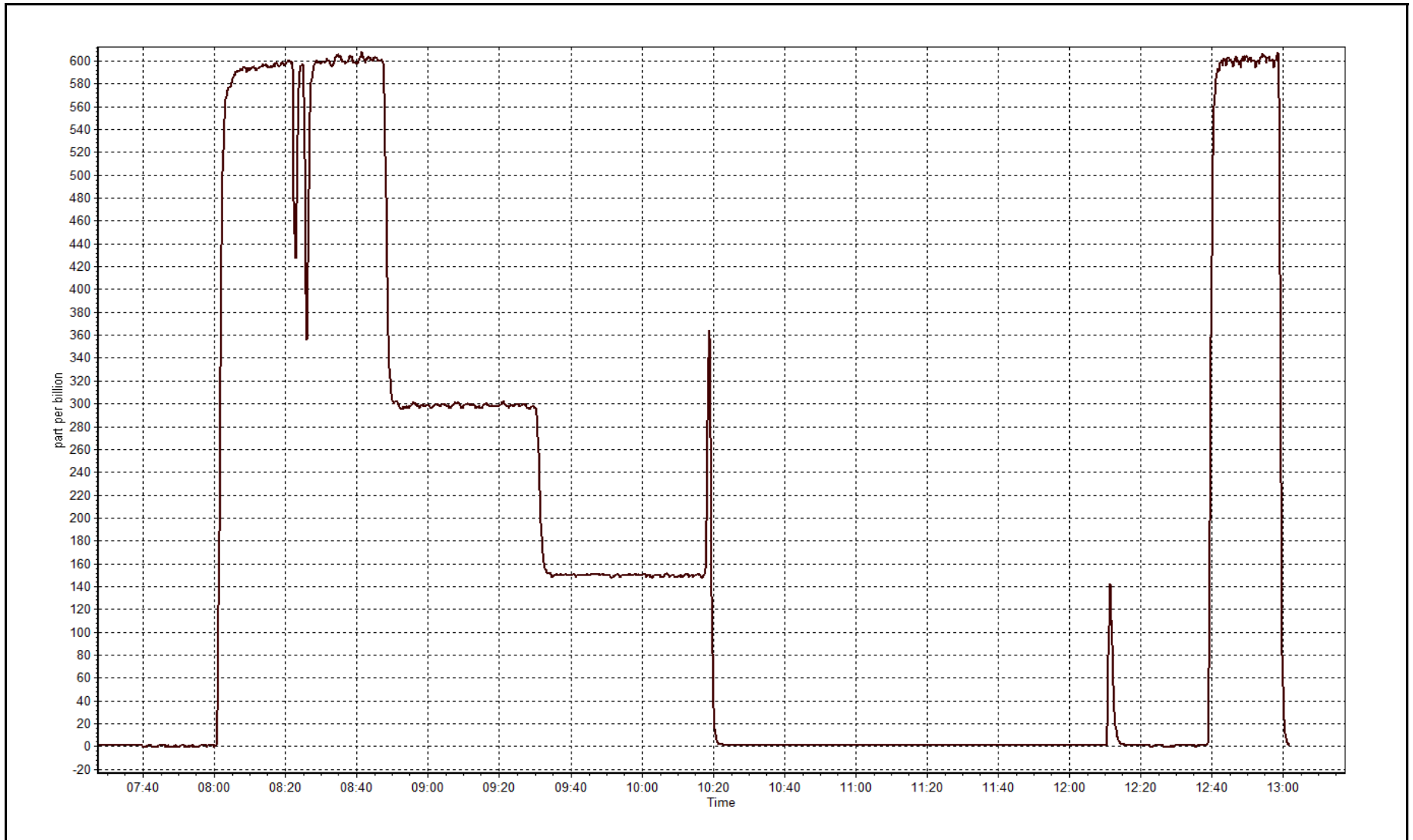
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.4	----	Correlation Coefficient	0.999970
607.0	601.5	1.0091		
304.0	298.5	1.0184	Slope	1.009550
152.0	149.5	1.0167		
			Intercept	0.765927



SO2 Calibration Plot

Date: June 2, 2015





Wood Buffalo Environmental Association TRS Calibration Report

Station Information

Calibration Date	June 3, 2015	Last Calibration	May 12, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Routine		
Start Time (MST)	10:46	End Time (MST)	13:05
Gas Cert Reference	ALMO52589	Station temp.	22 Deg C
Cal Gas Concentration	5.02 ppm	Cal Gas Exp Date	21/12/2012
Calibrator Make/Model	Sabio 4010	Serial Number	8400311
Dil air Make/Model	API 701	Serial Number	1864
DACS make/model	Campbell Scientific CR3000	DACS serial No.	5564
SO2 gas concentration	50.8 ppm	SO2 gas cert/exp	8400311 09-Sep-17

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-619	-619
Analyzer IP address	192.168.1.42		Lamp voltage	806	807
Calculated slope	1.011816	1.017807	Chamber temp	44	44
Calculated intercept	-0.153239	-0.033515	Pressure	688.4	685.1
Analyzer Background	18.6	18.6	Flow	0.476	0.474
Analyzer Coefficient	1.071	1.071	Intensity	43500	43300
			Converter temp.	800	800

Analyzer make/model	TEI 45C	Analyzer serial #	630718530
Converter make/model	Model 26 Thermal Oxidizer	Converter serial #	20101-14

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6000	0.0	0.0	-0.1	----
as found span	6000	89.6	75.0	73.6	1.019
SO2 scrubber check	5000	14.7	149.4	0.4	----
calibrator zero	6000	0.0	0.0	-0.1	----
high point	6000	89.6	75.0	73.6	1.019
second point	6000	50.2	42.0	41.4	1.015
third point	6000	29.9	25.0	24.7	1.013
as left zero	6000	0.0	0.0	-0.4	----
as left span	6000	89.6	75.0	74.1	1.012
Average Correction Factor					1.015

Corrected As found	73.7	Previous response	74.2	% change	0.8%
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Notes:

No adjustments or maintenance done, filter changed out

Calibration Performed By: Melissa Lemay



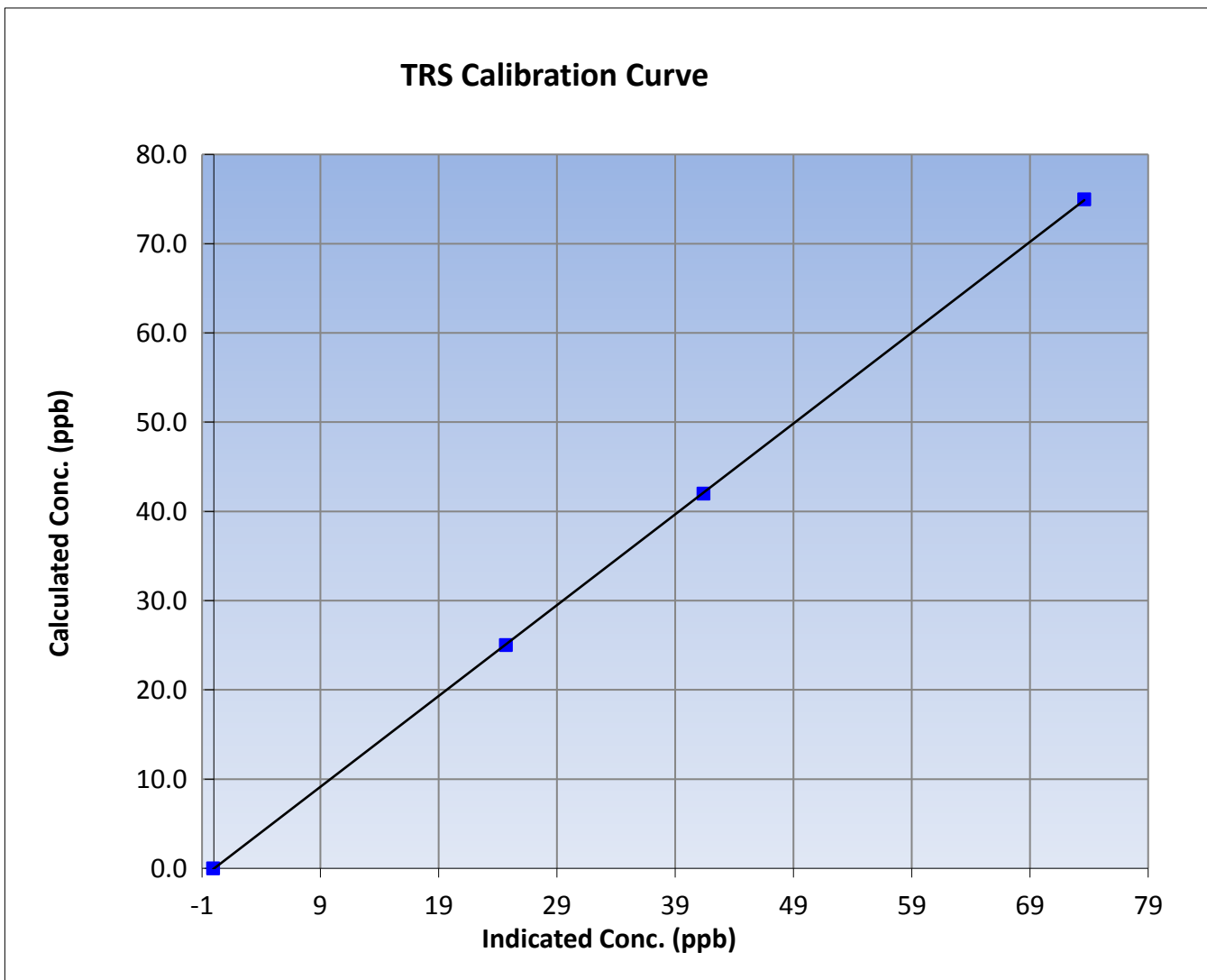
Wood Buffalo Environmental Association TRS Calibration Report

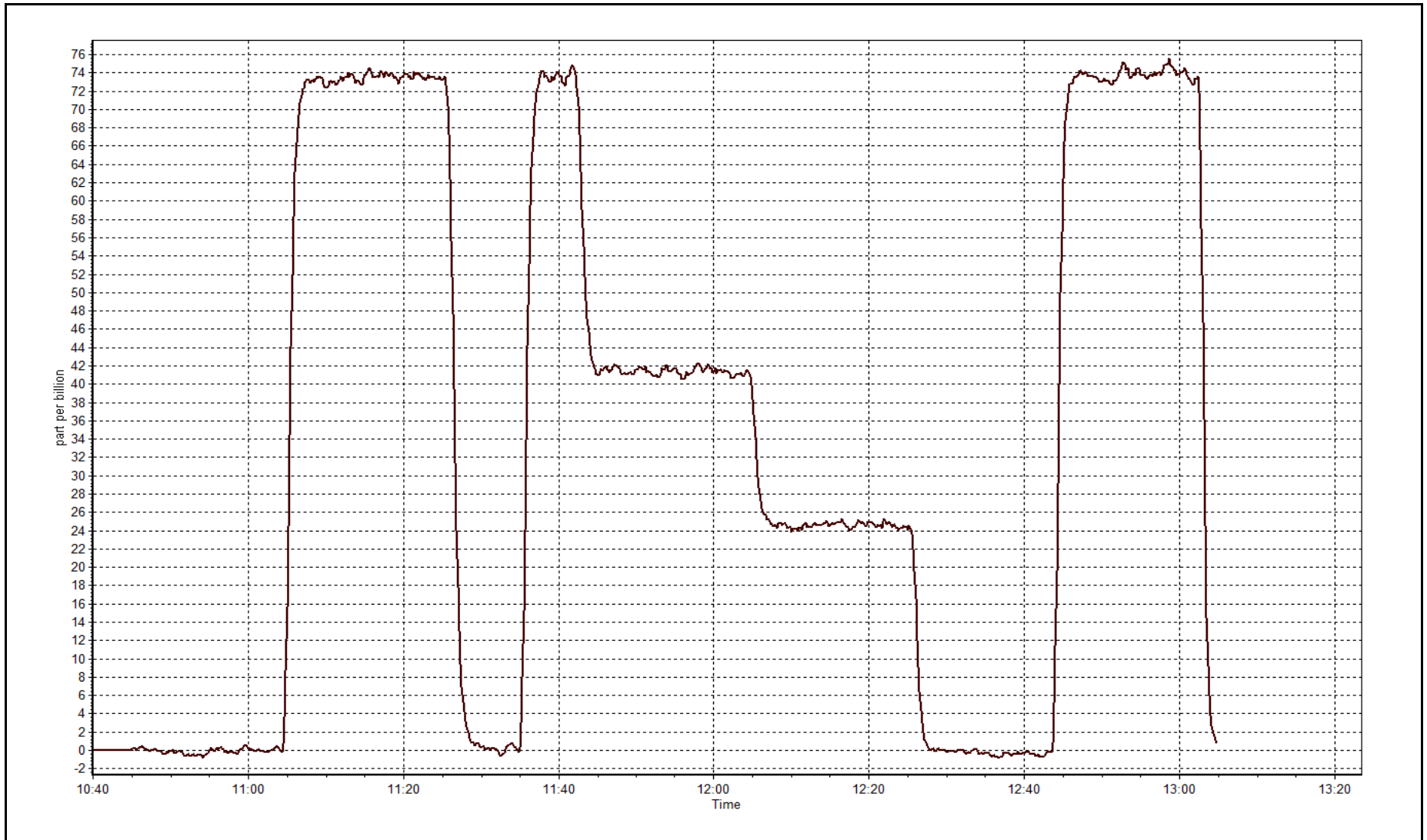
Station Information

Calibration Date	June 3, 2015	Previous Calibration	May 12, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	10:46	End Time (MST)	13:05
Analyzer make	TEI 45C	Analyzer serial #	630718530

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999987
75.0	73.6	1.0186		
42.0	41.4	1.0145	Slope	1.017807
25.0	24.7	1.0128		
			Intercept	-0.033515







Wood Buffalo Environmental Association THC / NMHC Calibration Report

Station Information

Calibration Date	June-02-15	Last Calibration	May-12-15
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Routine		
Start Time (MST)	7:41	End Time (MST)	13:01
Gas Cert Reference	S970259A	Cal Gas Expiry Date	9/26/17
CH4 Cal Gas Conc.	490.0 ppm	CH4 Equiv Conc.	1040.0 ppm
C3H8 Cal Gas Conc.	200.0 ppm	Station temp.	18 Deg C
Calibrator Model	Sabio 4010	Serial Number	11021107
ZAG make/model	Teledyne API 701	Serial Number	1864
DACS make/model	Campbell Scientific CR3000	Serial Number	5564

Analyzer Information

	Before	After		Before	After
THC Range (ppm)	0 - 50 ppm		Column Temp	75.0	75.0
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	175.0	175.1
Analyzer IP address	192.168.1.55		Flame Temp	305.0	302.0
THC Calc slope	1.012350	1.013086	Carrier Pressure	36.8	36.8
THC Calc intercept	0.000166	0.006279	Fuel Pressure	42.1	42.1
NMHC Calc slope	1.013510	1.014923	Air Pressure	32.2	32.2
NMHC Calc intercept	-0.015929	-0.009879			

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	12.47	1.012
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	60.7	12.63	12.47	1.012
second point	5000	30.4	6.32	6.20	1.020
third point	5000	15.2	3.16	3.13	1.010
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	60.7	12.63	12.48	1.012
Average Correction Factor					1.014

Corrected As found 12.47 Previous response 12.47 % change 0.0%

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	60.7	6.68	6.59	1.013
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	60.7	6.68	6.59	1.013
second point	5000	30.4	3.34	3.29	1.016
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	6.60	1.012
Average Correction Factor					1.008

Corrected As found 6.59 Previous response 6.60 % change 0.2%

CH4 Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0	0.00	0.00	----
as found span	5000	60.7	5.95	5.88	1.012
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	60.7	5.95	5.88	1.012
second point	5000	30.4	2.98	2.90	1.027
third point	5000	15.2	1.49	1.45	1.027
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	60.7	5.95	5.88	1.012
Average Correction Factor					1.022

Corrected As found 5.88 Previous response 5.87 % change -0.2%



Wood Buffalo Environmental Association

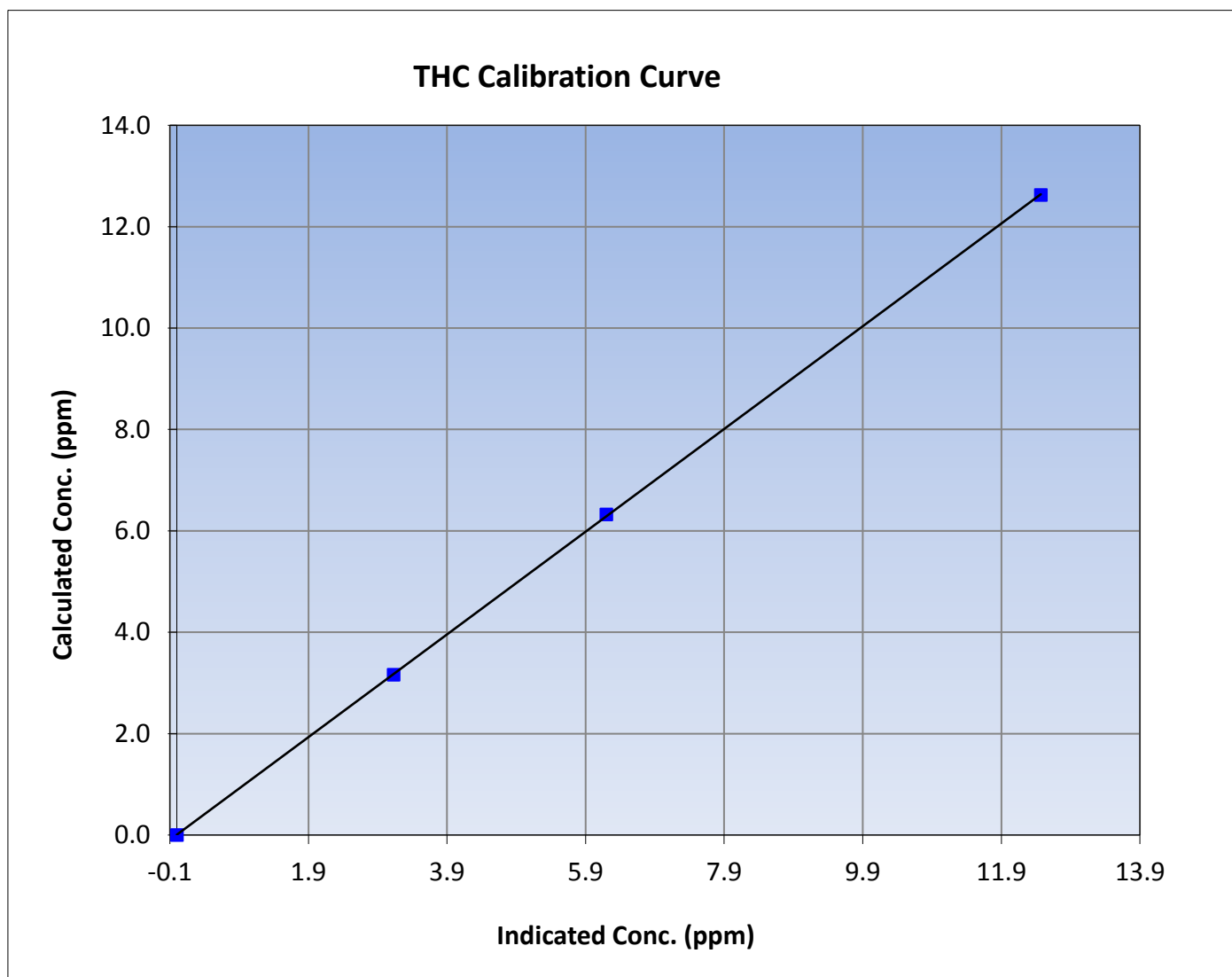
THC Calibration Summary

Station Information

Calibration Date	June 2, 2015	Previous Calibration	May 12, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	7:41	End Time (MST)	13:01
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	0.999980
12.63	12.47	1.0125		
6.32	6.20	1.0199	Slope	1.013086
3.16	3.13	1.0101		
			Intercept	0.006279





Wood Buffalo Environmental Association

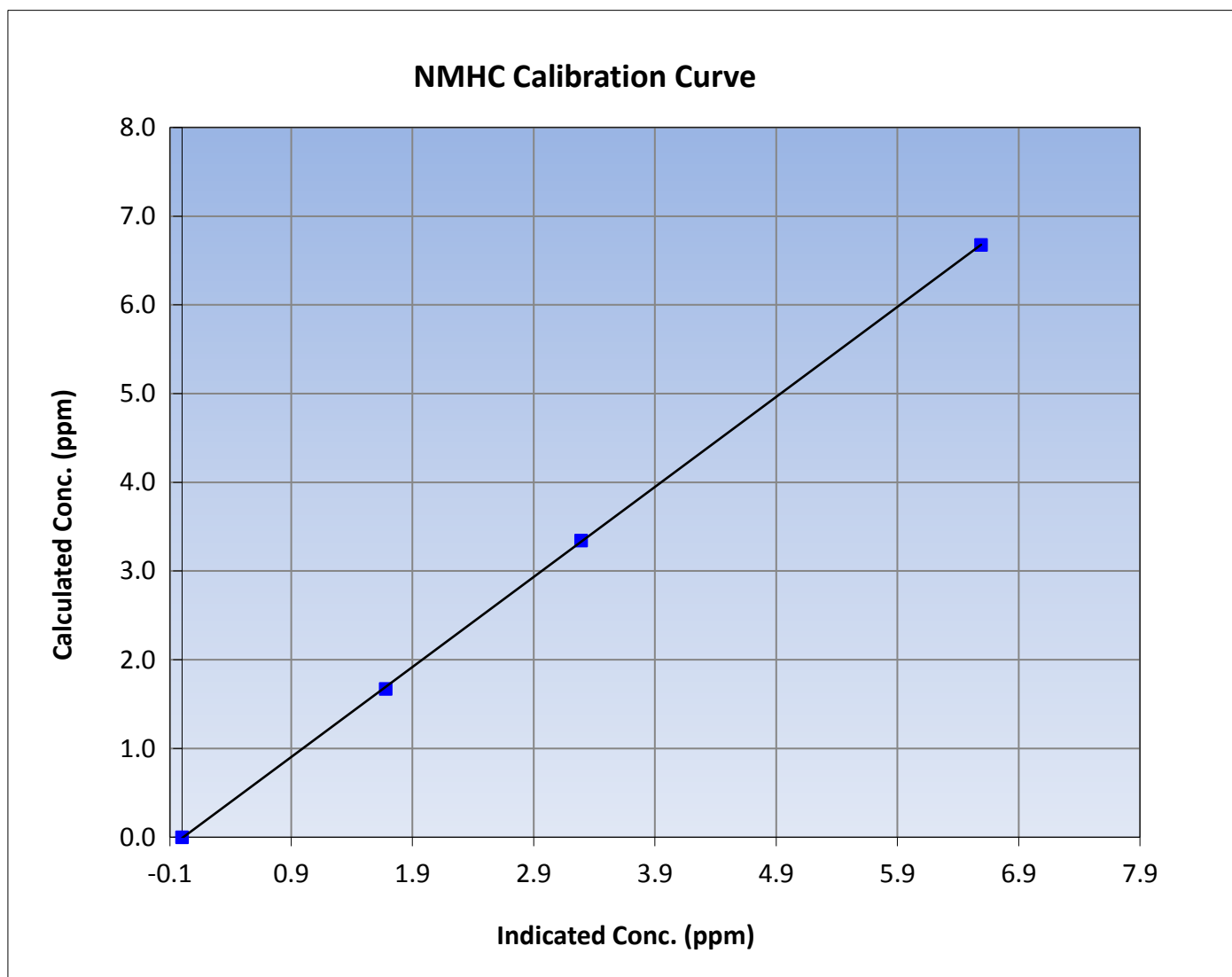
NMHC Calibration Summary

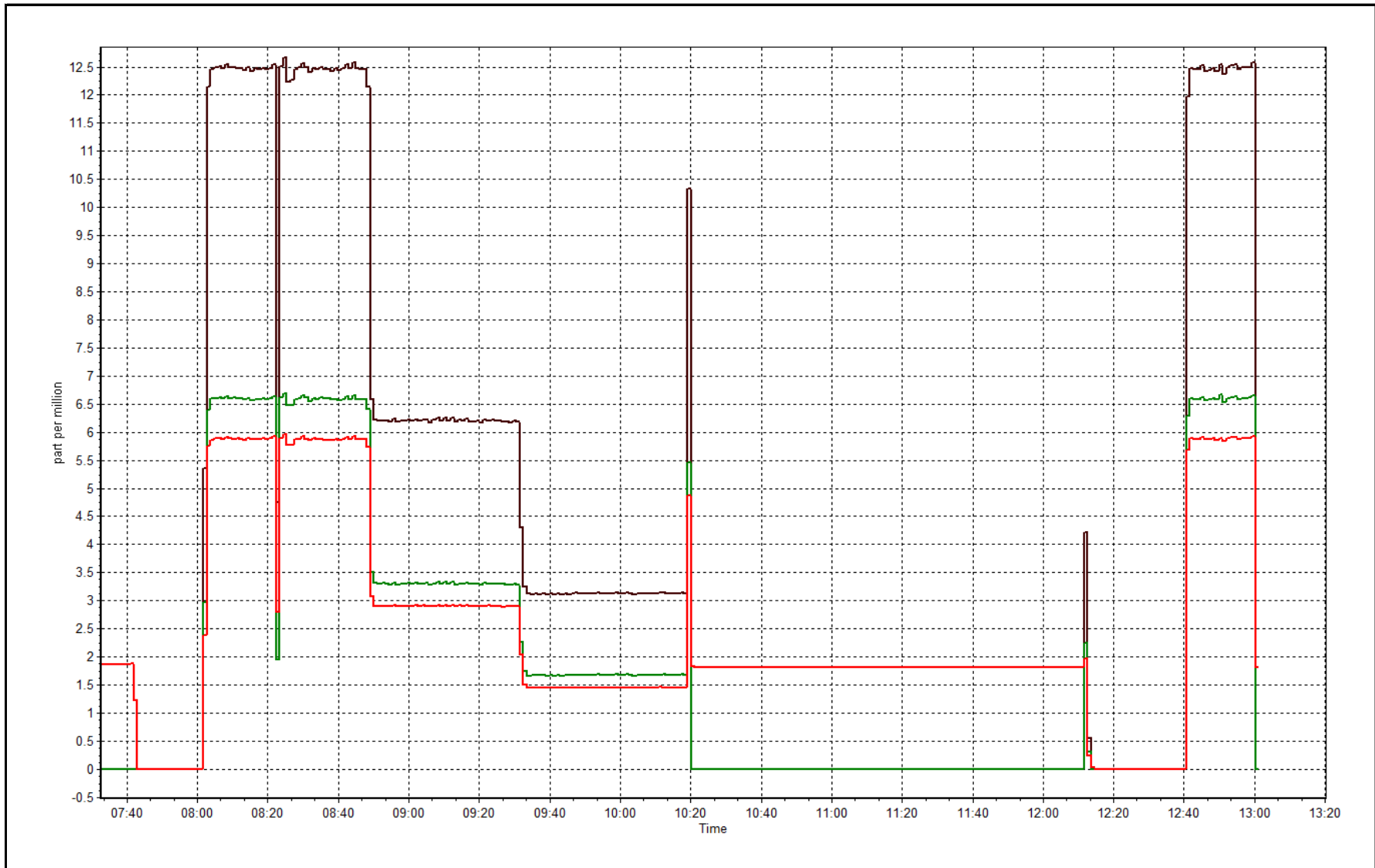
Station Information

Calibration Date	June 2, 2015	Previous Calibration	May 12, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	7:41	End Time (MST)	13:01
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	0.999965
6.68	6.59	1.0132		
3.34	3.29	1.0164	Slope	1.014923
1.67	1.68	0.9952		
			Intercept	-0.009879







Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

Calibration Date	June 3, 2015	Previous Calibration	May 15, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Routine		
Start Time (MST)	7:31	End Time (MST)	10:47
NO2 GPT Ref date	June-02-15	Transfer Standard	
		Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	5564
ZAG make/model	Teledyne API 701	Serial Number	1864
DACS make/model	Campbell Scientific CR3000	Serial Number	5564

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 500 ppb		Bench temp.	28.3	28.3
Analyzer IP address	192.168.1.103		Lamp temp.	70.8	70.8
Calculated slope	1.003209	0.997582	Pressure	720.5	720.5
Calculated intercept	-0.419472	-0.079865	Flow cell A	0.676	0.676
Analyzer Background	0.0	0.0	Flow cell B	0.740	0.740
Analyzer Coefficient	1.001	0.984	Cell A Intensity	109050	109050
			Cell B Intensity	92028	92028

Analyzer make	TEI 49C	Analyzer serial #	607415760
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Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator Lamp Intensity (mA)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.00	0.0	0.0	----
as found span	5000	1.22	324.9	330.3	0.984
calibrator zero	5000	0.00	0.0	-0.1	----
high point	5000	1.22	324.9	325.6	0.998
second point	5000	0.51	165.0	165.8	0.995
third point	5000	0.43	83.5	83.8	0.996
as left zero	5000	0.00	0.0	-0.1	----
as left span	5000	1.22	324.9	322.1	1.009
Average Correction Factor					0.996

Corrected As found	330.3	Previous response	324.3	% change	-1.8%
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Notes:

No maintenance, filter changed, span adjusted

Calibration Performed By:

Melissa Lemay



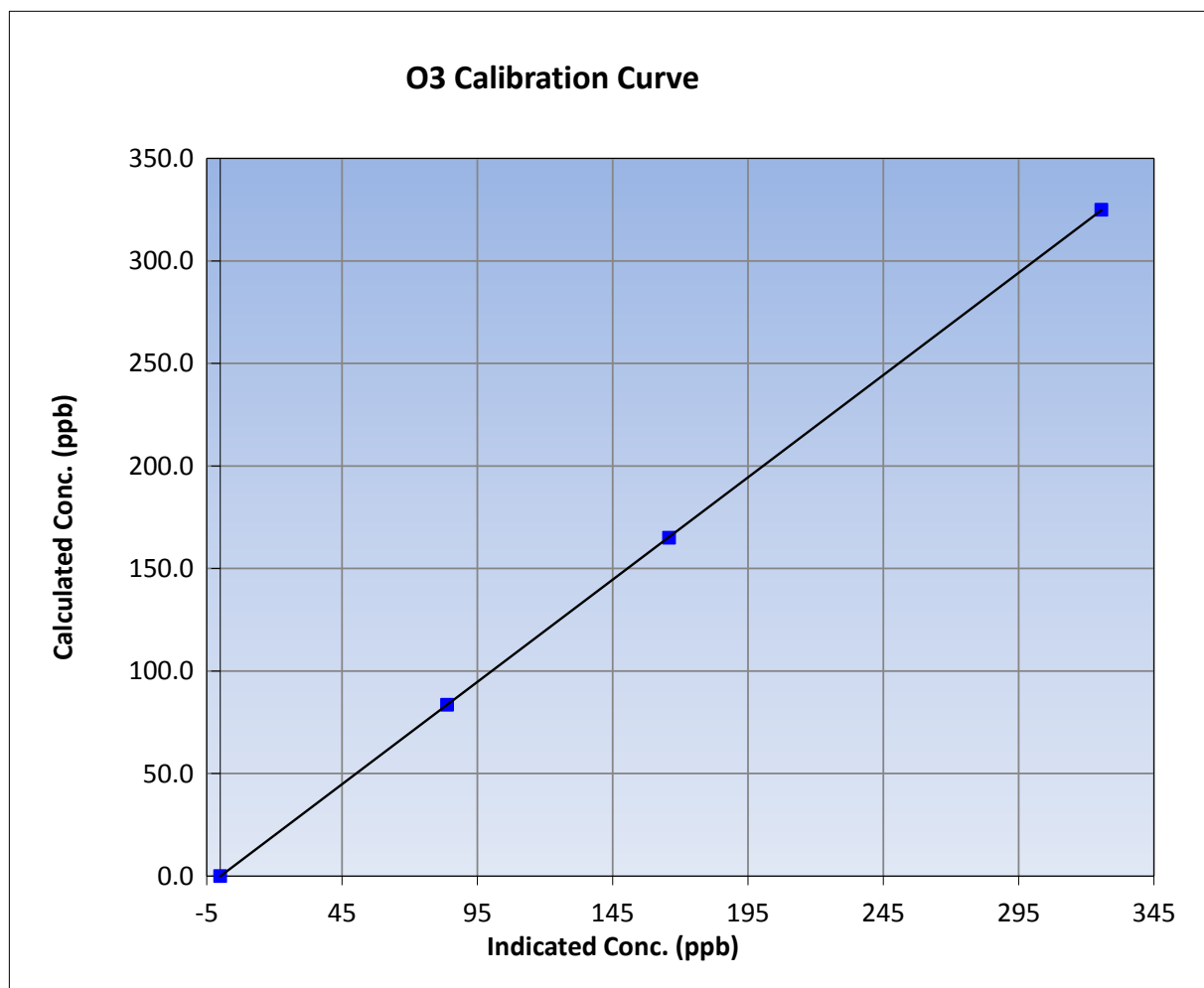
Wood Buffalo Environmental Association O3 Calibration Report

Station Information

Calibration Date	June-03-15	Previous Calibration	May 15, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	7:31	End Time (MST)	10:47
Analyzer make	TEI 49C	Analyzer serial #	607415760

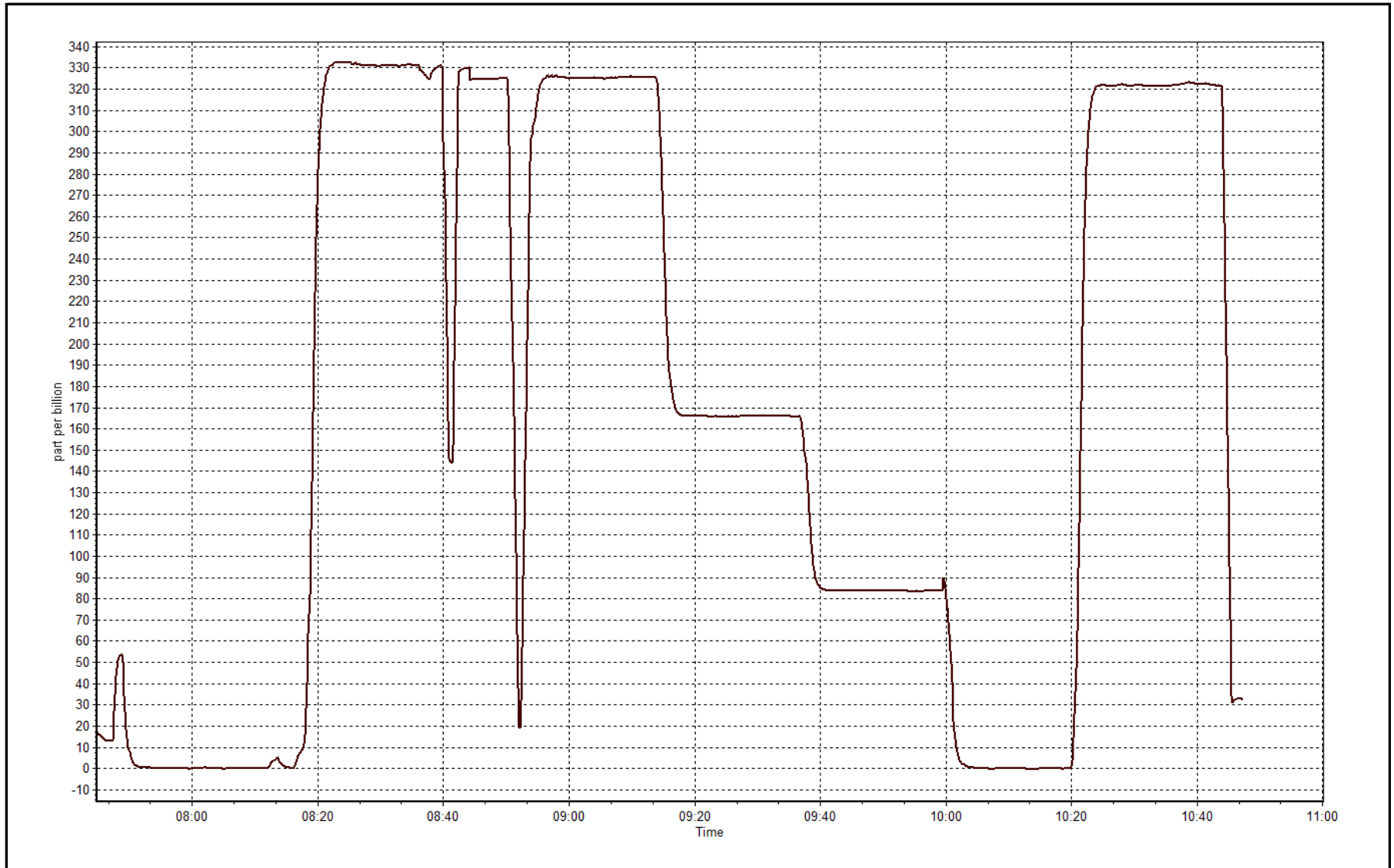
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999997
324.9	325.6	0.9979		
165.0	165.8	0.9952	Slope	0.997582
83.5	83.8	0.9964		
			Intercept	-0.079865



O3 Calibration Plot

Date: June 3, 2015





Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	June 2, 2015	Previous Calibration	May 14, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Routine		
Start Time (MST)	7:41	End Time (MST)	13:00
NO Cal Gas Conc	49.4 ppm	Gas Cert Reference	S970259A
NOx Cal Gas Conc	49.4 ppm	Cal Gas Expiry Date	9/26/2017
Calibrator	Sabio 4010	Serial Number	11021107
Zero air Generator	Teledyne API T701	Serial Number	1864

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	5564
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Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.999197	0.998448	0.996446
	Data Offset	0.878865	1.030121	0.472554
Current Calibration	Data Slope	1.013425	1.012713	1.003362
	Data Offset	0.955368	1.096117	0.225410

Analyzer Information

Analyzer make/model	Thermo 42C	Analyzer serial #	601114773
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Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
NO coefficient	0.989		0.989	
NOx coefficient	0.999		0.999	
NO2 coefficient	1.000		1.000	
NO bkgrnd	3.4		3.4	
NOx bkgrnd	3.5		3.5	
Chamber Temp	49.7	Deg C	49.7	Deg C
Moly Temp	323	Deg C	323	Deg C
PMT voltage	-806	V	-806	V
PMT Temp	-3.5	Deg C	-3.6	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	175.5	mmHg	179	mmHg
R Cell Press Nox	175.5	mmHg	179	mmHg
NO sample flow	0.778	lpm	0.774	lpm
Nox sample Flow	0.779	lpm	0.774	lpm

Notes:

No adjustments or maintenance done, filter changed out



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date:

June 2, 2015

Station Number:

AMS 7

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.2	----	----
as found span	5000	60.7	599.7	599.7	0.0	594.8	594.4	0.7	1.0083	1.0089
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	591.6	592.0	-0.3	1.0137	1.0130
second point	5000	30.4	300.4	300.4	0.0	294.0	293.8	0.3	1.0216	1.0223
third point	5000	15.2	150.2	150.2	0.0	147.0	147.0	0.0	1.0216	1.0216
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	265.7	334.0	586.8	271.7	315.2	1.0220	0.9779
Average Correction Factor									1.0190	1.0190

Corrected As found
Previous Response

NO_x= 594.8
NO_x= 599.3

NO= 594.5
NO= 599.6

Percent Change

NO_x= 0.8%

NO= 0.9%

GPT Calibration Data

Dilution Flow

5000

ccm

Source Gas Flow

60.70

ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
Cal zero			0.0			0.2			N/A	
1st NO2 (300)	----	265.7	324.9	589.3	265.7	323.8	1.0055	1.0000	1.0034	99.7%
2nd NO2 (200)	----	425.6	165.0	589.6	425.6	164.0	1.0050	1.0000	1.0061	99.4%
3rd NO2 (100)	----	507.1	83.5	589.7	507.1	82.6	1.0048	1.0000	1.0109	98.9%
4th NO2 (0)	590.6	----	-0.2	590.4	590.6	-0.2	1.0036	1.0000	N/A	----
Average Correction Factor							1.0047	1.0000	1.0068	99.3%

Calibration Performed By:

Melissa Lemay



Wood Buffalo Environmental Association

NO_x Calibration Summary

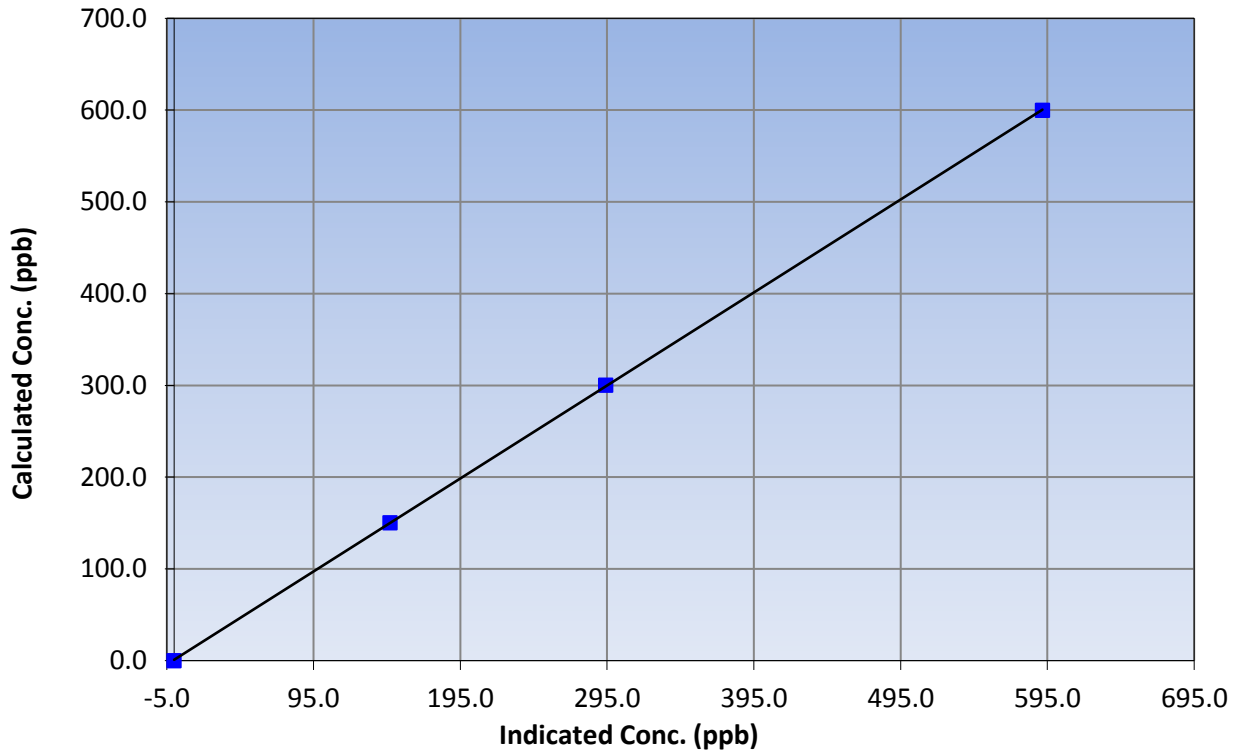
Station Information

Calibration Date	June 2, 2015	Previous Calibration	May 14, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	7:41	End Time (MST)	13:00
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	0.999982
599.7	591.6	1.0137		
300.4	294.0	1.0216	Slope	1.013425
150.2	147.0	1.0216		
			Intercept	0.955368

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

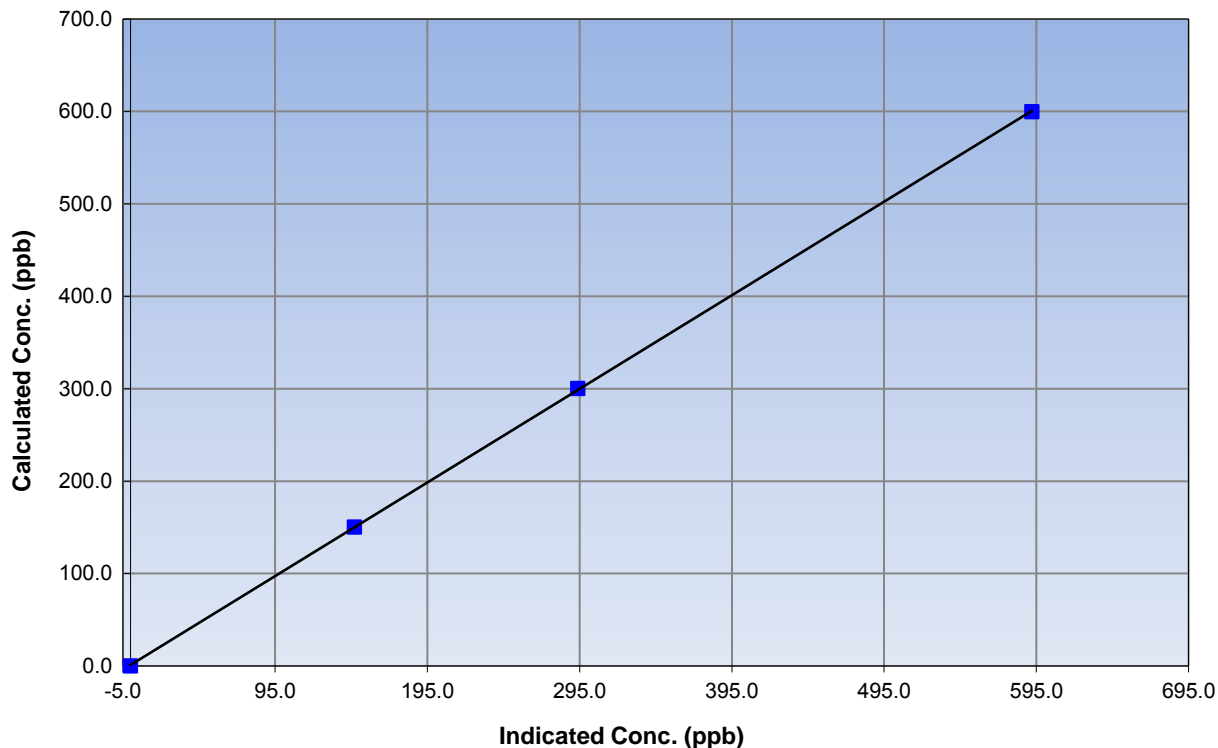
Station Information

Calibration Date	June 2, 2015	Previous Calibration	May 14, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	7:41	End Time (MST)	13:00
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	0.999975
599.7	592.0	1.0130		
300.4	293.8	1.0223	Slope	1.012713
150.2	147.0	1.0216		
			Intercept	1.096117

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

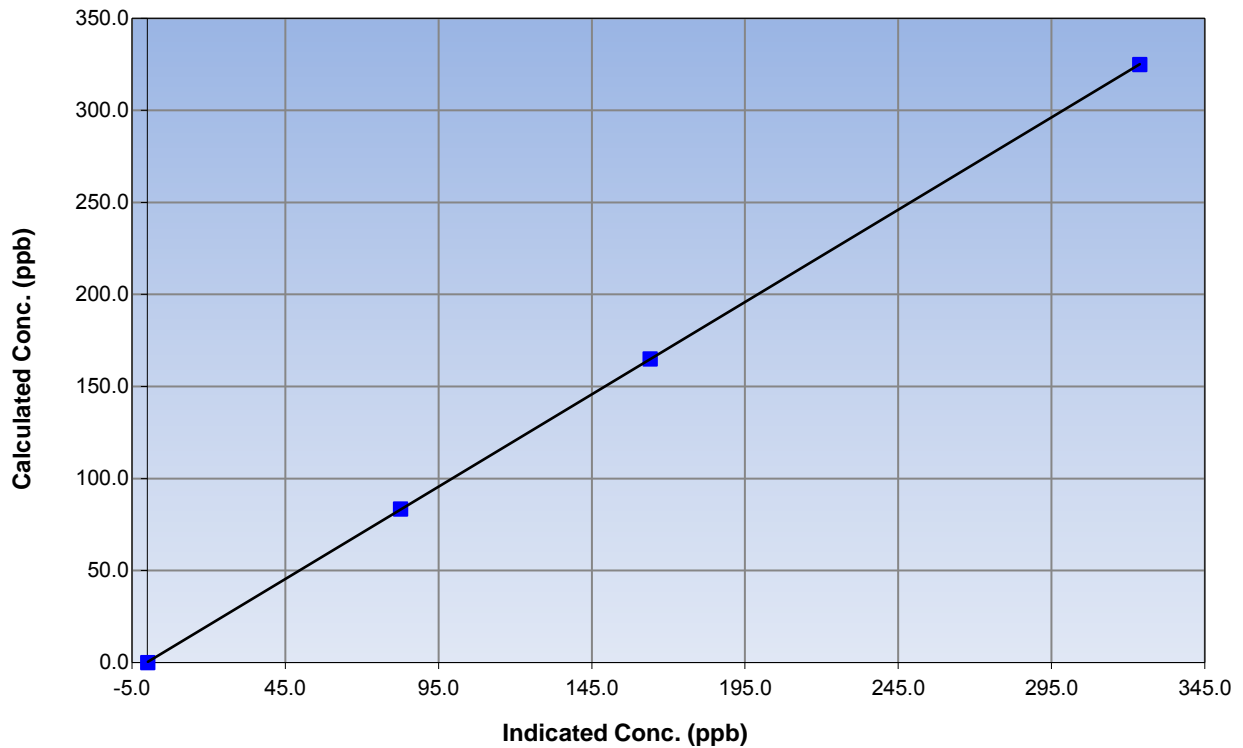
Station Information

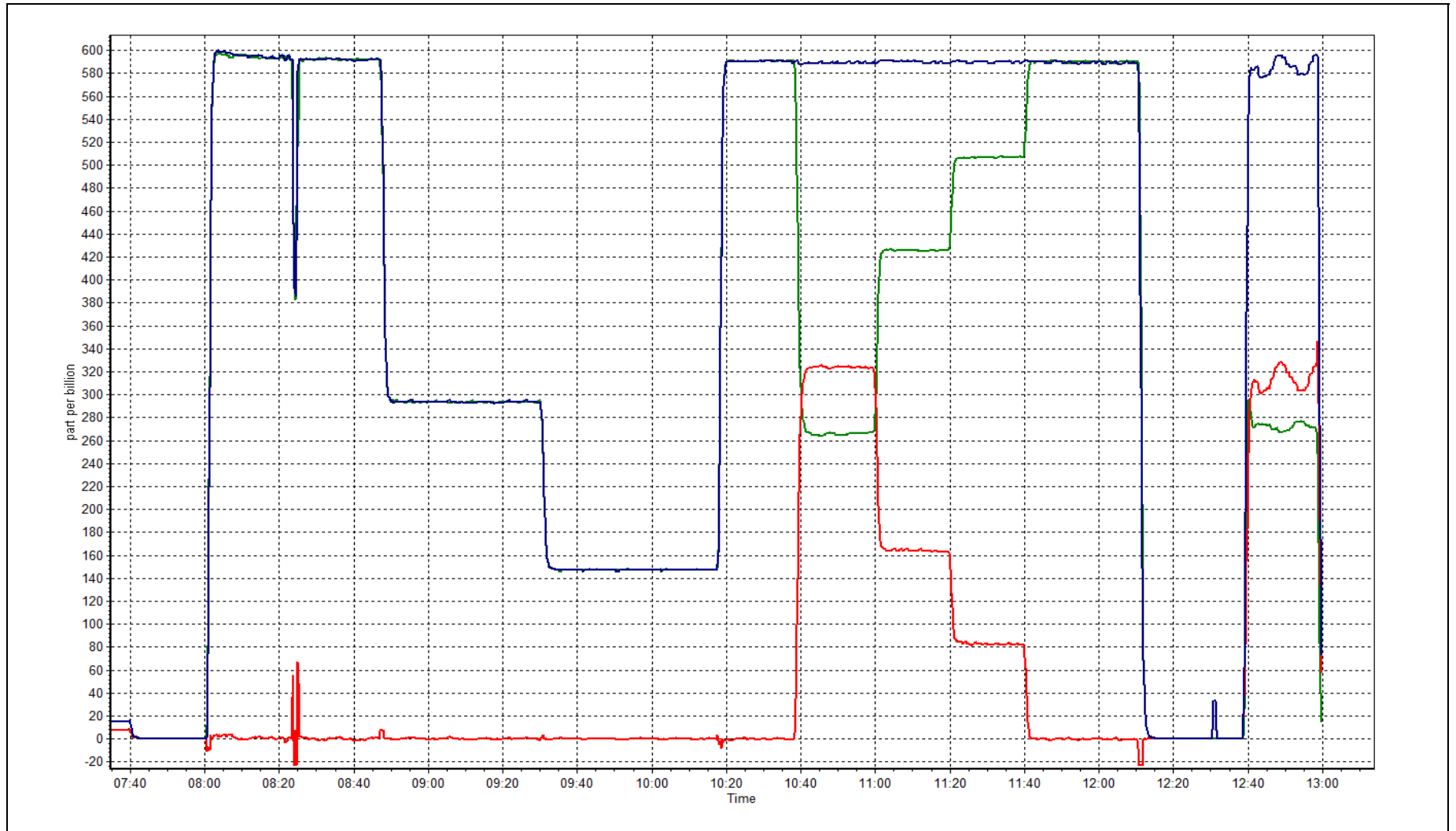
Calibration Date	June 2, 2015	Previous Calibration	May 14, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	7:41	End Time (MST)	13:00
Analyzer make	Thermo 42C	Analyzer serial #	601114773

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	N/A	Correlation Coefficient	0.999993
324.9	323.8	1.0034		
165.0	164.0	1.0061	Slope	1.003362
83.5	82.6	1.0109		
			Intercept	0.225410

NO₂ Calibration Curve







Wood Buffalo Environmental Association

SHARP CONFORMANCE TEST

STATION INFORMATION

Calibration Date:	<u>June 8, 2015</u>	Previous Calibration:	<u>May 28, 2015</u>
Station Name:	<u>Athabasca Valley</u>	Station Number:	<u>AMS 7</u>
Start Time (MST):	<u>11:23</u>	End Time (MST):	<u>12:03</u>
Calibrator Make/Model:	<u>Delta Cal</u>	Calibrator Serial Number:	<u>N/A</u>

SHARP INFORMATION

Particulate Fraction:	<u>PM2.5</u>
Make/Model:	<u>Thermo / SHARP 5030</u>
Serial Number:	<u>E-515</u>
Source SN:	
HEPA PN:	<u>12144</u>
Time Correct (MST):	<u>Yes</u>
Parameters Checked:	<u>T1, P3, Main Flow, Neph</u>

AUDIT DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	22.0	22.0	0.0	22.0
T2	18.0	na	na	18.0
T3	20.0	na	na	20.0
T4	25.0	na	na	25.0
RH (%)	41.0	na	na	41.0

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	974	971.0	-3.0	971

Main Flow (Lph)

Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
1001	1010	9	1000	1001

Nephelometer Calibration

Parameter	As Found	adjusted (Limit +/- 2.0ug/m3)	As Left
Analog	230		230
Neph	0.5		0.5
C14	6.5	no	6.5
Indicated Concentration (ug/m3)	0.2		0.2
Offset 1			
Offset 2			

Leak Check (Quarterly)

Leak Check Date:	<u>May 28, 2015</u>	Previous Leak Check Date:	
	<u>Measured</u>	<u>Difference LPM (Limit +/- 0.42 LPM)</u>	
Flow without adaptor (LPM):	16.95	0.15	
Flow with adaptor [turn off pump first](LPM):	16.80		

Mass Foil Calibration (Annualy)

Foil Calibration Date:		Previous Foil Calibration:	
Zeroed?:	<u>NO</u>		
Foil Mass:		<u>Mass foil set S/N:</u>	2518
Previous Correction Factor:			
New Correction Factor:			

INSPECTION DATA

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

NOTES:

No adjustments made, sample head cleaned

Audit Performed By: Melissa Lemay



Wood Buffalo Environmental Association CO Calibration Report

Station Information

Calibration Date	June 8, 2015	Last Calibration	May 6, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Routine		
Start Time (MST)	8:20	End Time (MST)	11:52
Gas Cert Reference	LL85940	Station temp.	18 Deg C
Cal Gas Concentration	3060 ppm	Cal Gas Exp Date	27/04/2015
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.	48.5	47.9
Analyzer IP address	192.168.1.48		Pressure	735.2	725.6
Calculated slope	0.995772	0.998107	Flow	0.485	0.481
Calculated intercept	0.134605	0.073162	Intensity	199692	199624
Analyzer Background	2.320	2.692	S/R ratio	1.177862	1.177884
Analyzer Coefficient	1.040	1.040			

Analyzer make Thermo 48i-TLE Analyzer serial # 1408761381

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.3	----
as found span	5000	67.6	41.4	42.4	0.976
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	67.6	41.4	41.4	0.999
second point	5000	34.2	20.9	20.8	1.007
third point	5000	14.7	9.0	8.9	1.006
as left zero	5000	0.0	0.0	0.0	----
as left span	5000	67.6	41.4	41.3	1.003
Average Correction Factor					1.004

Corrected As found 42.1 Previous response 41.4 % change -1.6%

Notes:

Zero and span adjusted, filter changed out, no maintenance done

Calibration Performed By: Melissa Lemay



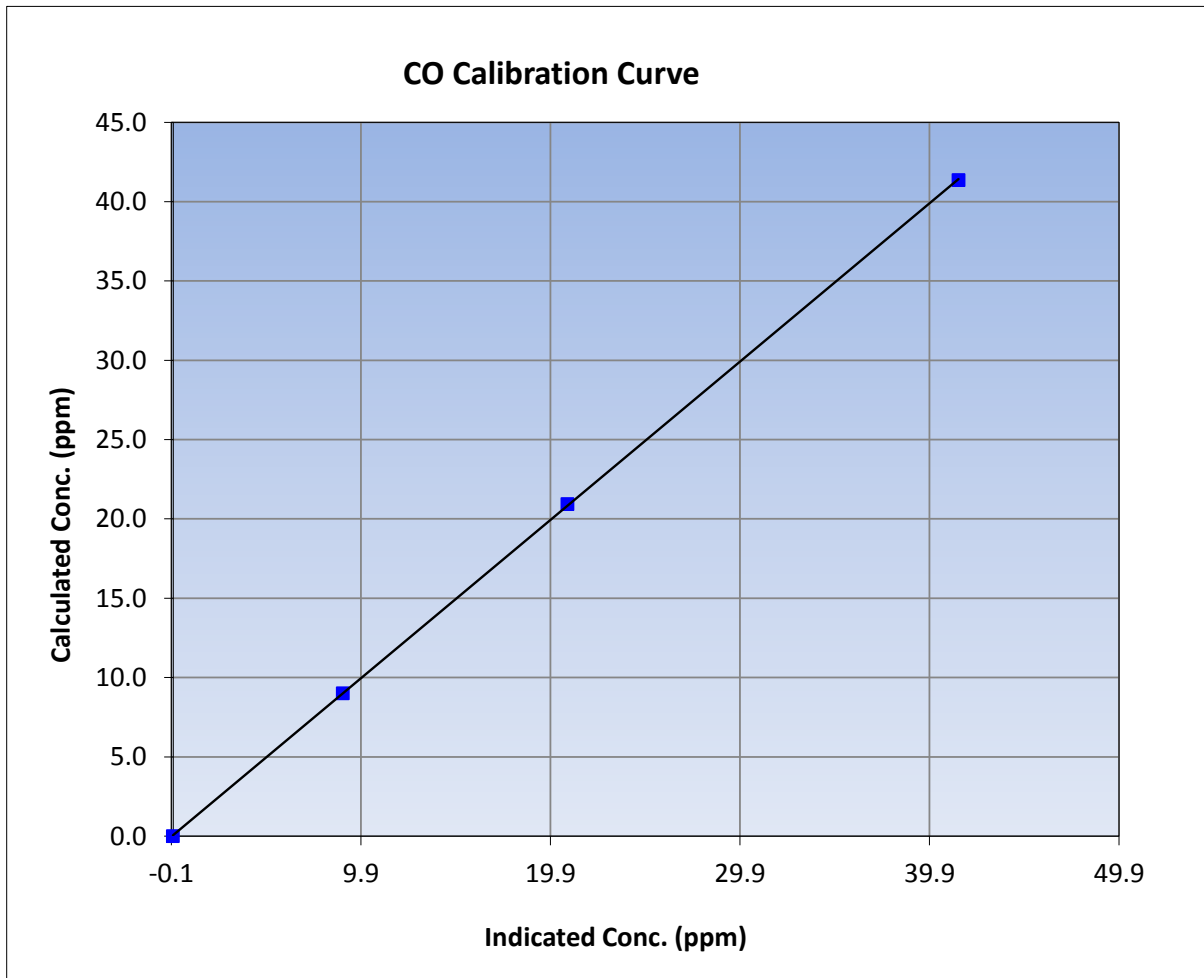
Wood Buffalo Environmental Association CO Calibration Report

Station Information

Calibration Date	June 8, 2015	Previous Calibration	May 6, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	8:20	End Time (MST)	11:52
Analyzer make	Thermo 48i-TLE	Analyzer serial #	1408761381

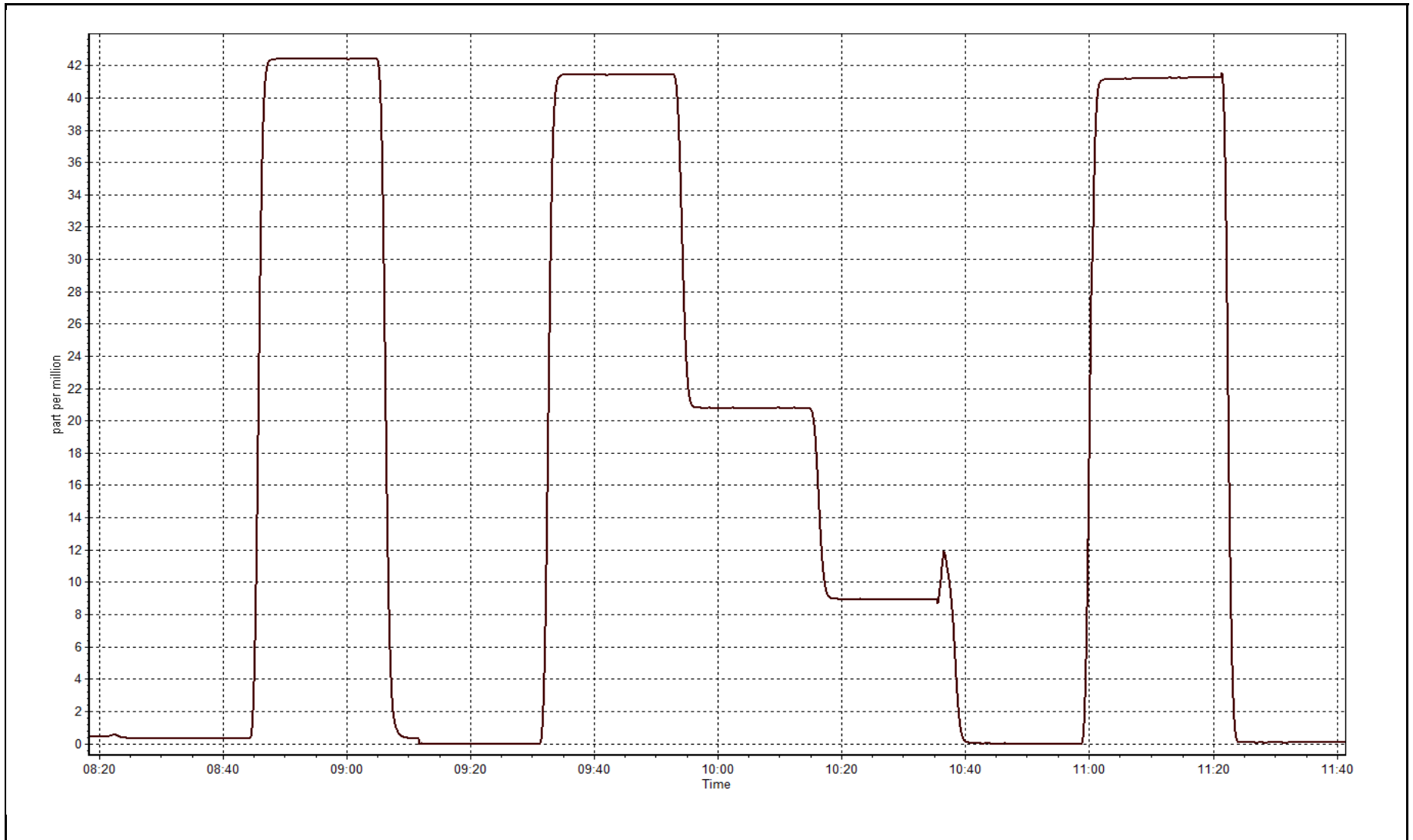
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999982
41.4	41.4	0.9986		
20.9	20.8	1.0068	Slope	0.998107
9.0	8.9	1.0063		
			Intercept	0.073162



CO Calibration Plot

Date: June 8, 2015





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 8
FORT CHIPEWYAN
JUNE 2015**

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

July 30, 2015



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS 8)
 JUNE 2015

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	678	35	42	99.03	5	0	1	0
O3(ppb) Average	675	34	45	98.47	69	0	55	-
NO2(ppb) Average	675	35	45	98.61	16	0	6	-
NO(ppb) Average	675	35	45	98.61	7	-	1	-
NOX(ppb) Average	675	35	45	98.61	19	-	7	-
PM2.5(ug/m3) Average	684	0	36	95.00	1507.5	-	397.3	5
Wind Speed 10 m (km/h) Average	717	0	3	99.58	42	-	24	-
Wind Direction 10 m (deg) Average	717	0	3	99.58	-	-	-	-
Temperature 2 m (C) Average	720	0	0	100.00	29.3	-	23.4	-
Relative Humidity (%) Average	720	0	0	100.00	97	-	84	-
Precipitation (mm) Total	720	0	0	100.00	6.1	-	13	-
Global Solar Radiation (W/m2) Average	0	0	720	0.00	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS 8)
 JUNE 2015

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile							
					Min	P10	Q1	Median	Q3	P90	Max	
SO2(ppb) Average	678	0.2	0	-	0	0	0	0	0	0	0	5
O3(ppb) Average	675	33.8	9	-	14	22	28	33	39	44	69	69
NO2(ppb) Average	675	1.2	2	-	0	0	0	1	1	3	16	16
NO(ppb) Average	675	0.2	0	-	0	0	0	0	0	0	7	7
NOX(ppb) Average	675	1.3	2	-	0	0	0	1	1	3	19	19
PM2.5(ug/m3) Average	684	38.91	126.9	-	0.4	1.9	3.3	6.6	22.6	77.3	1507.5	1507.5
Wind Speed 10 m (km/h) Average	717	13.4	7	-	2	6	9	12	18	22	42	42
Wind Direction 10 m (deg) Average	717	-	-	-	-	-	-	-	-	-	-	-
Temperature 2 m (C) Average	720	16.65	5.2	-	0.7	9.8	12.9	16.8	20.2	23.6	29.3	29.3
Relative Humidity (%) Average	720	58.8	19	-	23	33	45	59	73	85	97	97
Precipitation (mm) Total	720	-	--	28.96	0	0	0	0	0	0	6.1	6.1
Global Solar Radiation (W/m2) Average	0	-	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS 8)
JUNE 2015

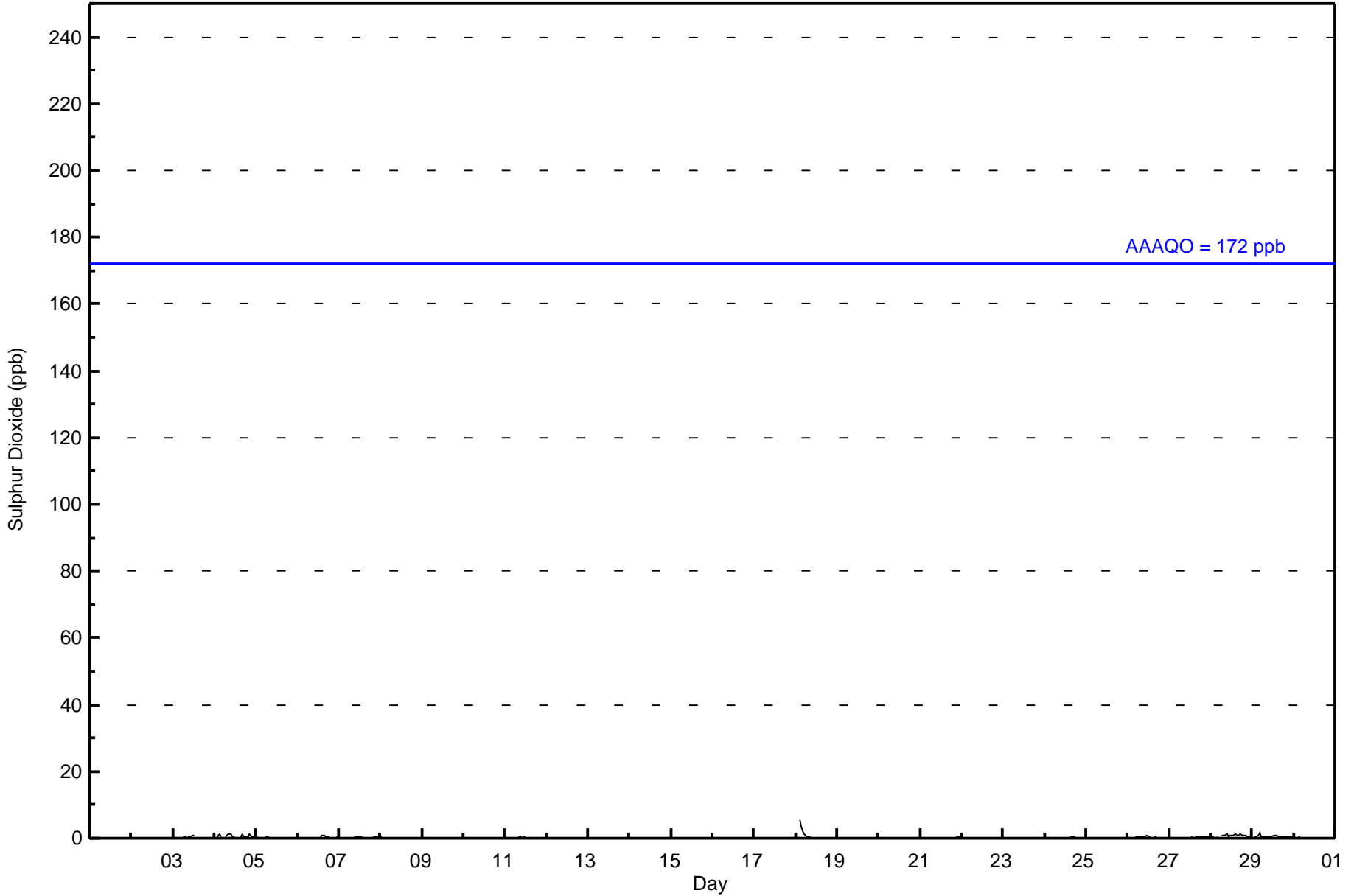
OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
AIR QUALITY ANALYZERS	22 Jun 2015 09:00	22 Jun 2015 15:00	7	Station power failure
O3	29 Jun 2015 23:00	30 Jun 2015 15:00	4	Intermittent unstable operation
NO2, NO, NOX	08 Jun 2015 17:00	08 Jun 2015 17:00	1	Unstable Operation
NO2, NO, NOX	22 Jun 2015 15:00	22 Jun 2015 17:00	2	Stabilization period following power failure
PM2.5	03 Jun 2015 19:00	03 Jun 2015 20:00	2	Maintenance - Flow and zero check, sample head cleaning
PM2.5	07 Jun 2015 15:00	08 Jun 2015 17:00	27	Analyzer Failure - filter tape failed to advance
Wind Speed, Wind Direction	03 Jun 2015 18:00	03 Jun 2015 19:00	2	Maintenance - sensor calibrations
Wind Speed, Wind Direction	29 Jun 2015 19:00	29 Jun 2015 19:00	1	Flat line in sensor output signal
Solar Global Radiation	01 Jun 2015 01:00	01 Jul 2015 00:00	720	Sensor malfunction - removed for service/repair



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Fort Chipewyan - June 2015





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Fort Chipewyan - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	678	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: 678

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Fort Chipewyan - June 2015**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	31	13	13	60	79	33	12	15	23	43	45	71	76	53	70	39	676
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	31	13	13	60	79	33	12	15	23	43	45	71	76	53	70	39	676

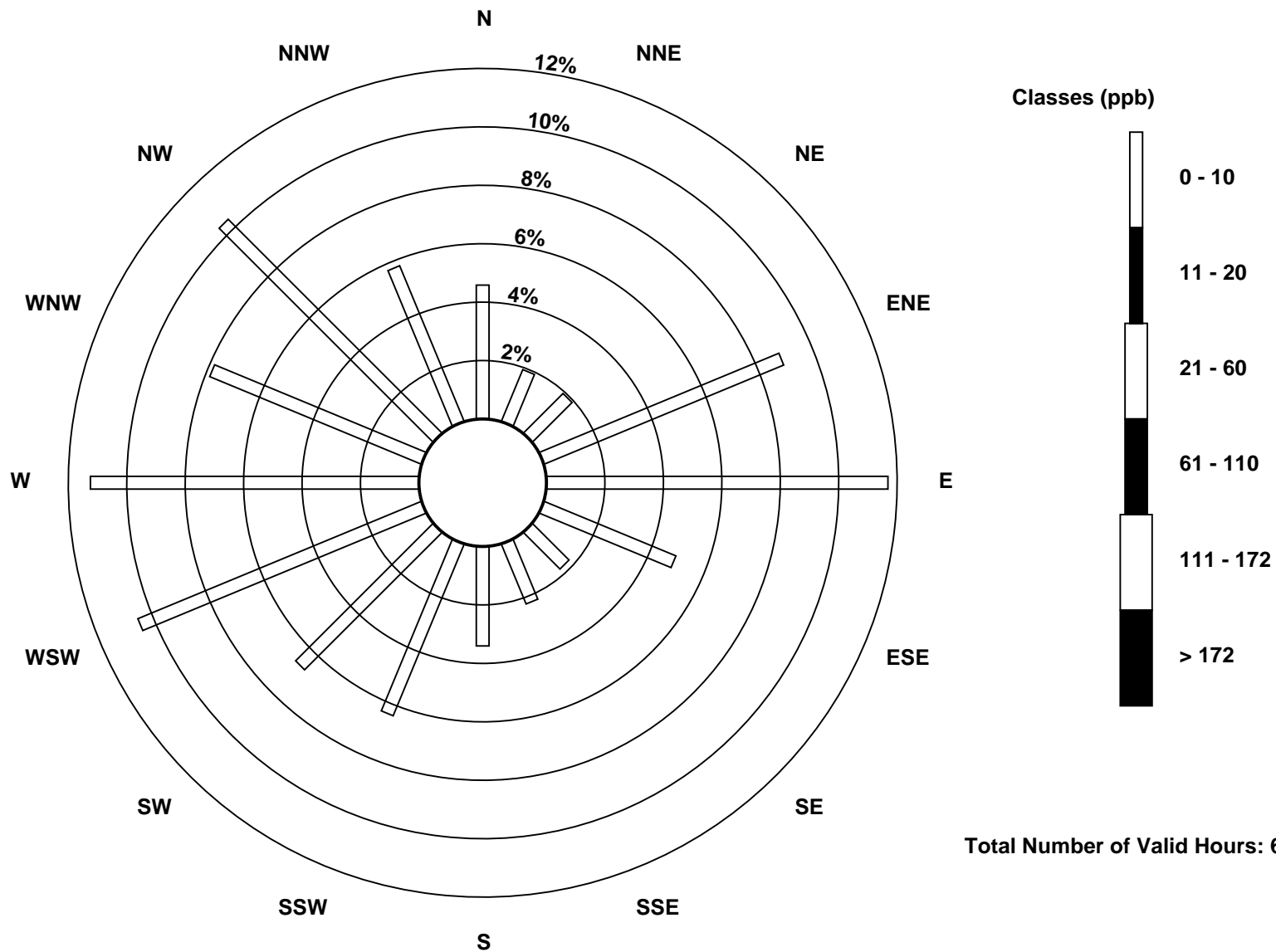
Total Number of Valid Hours: 676

Total Number of Hours: 720

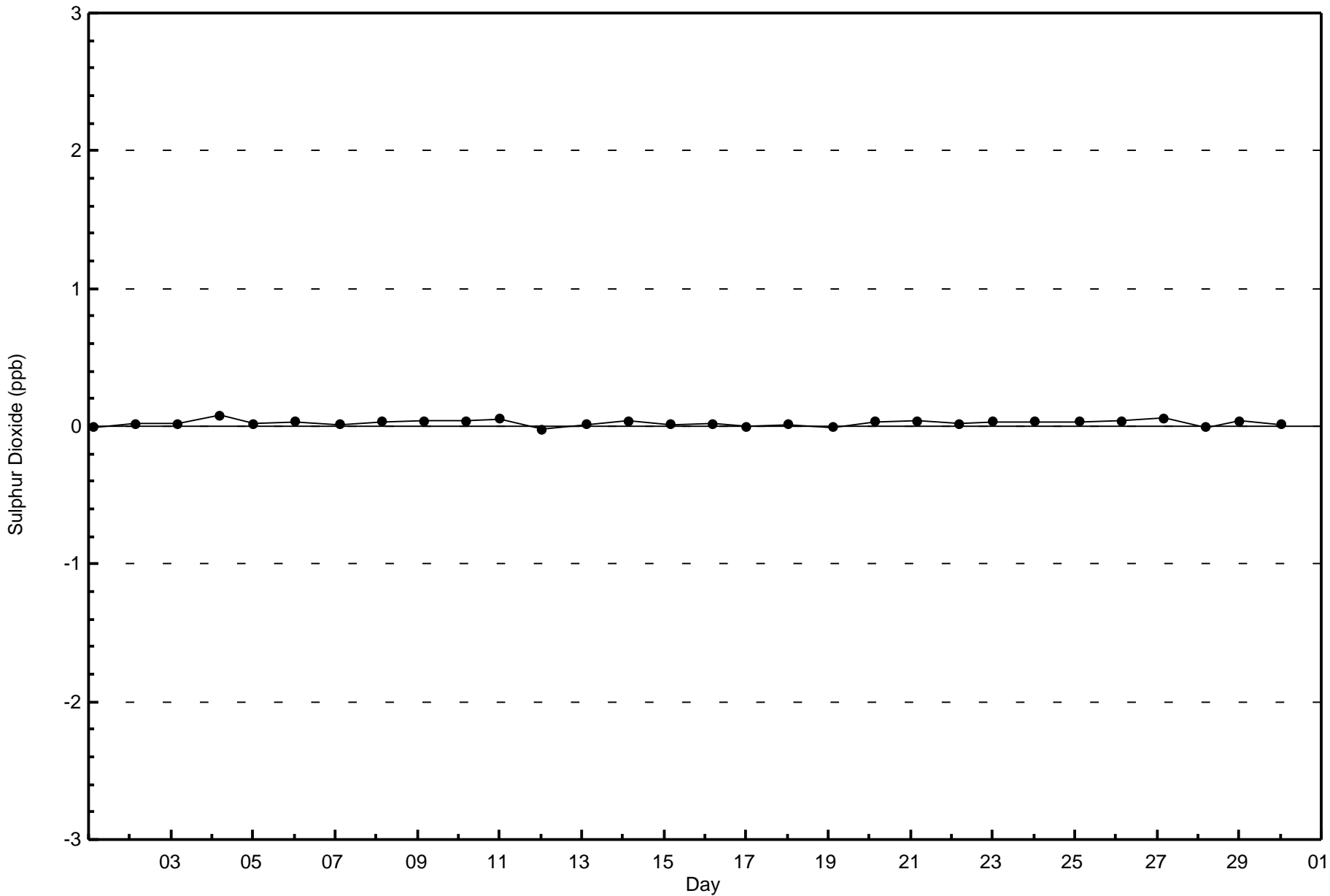


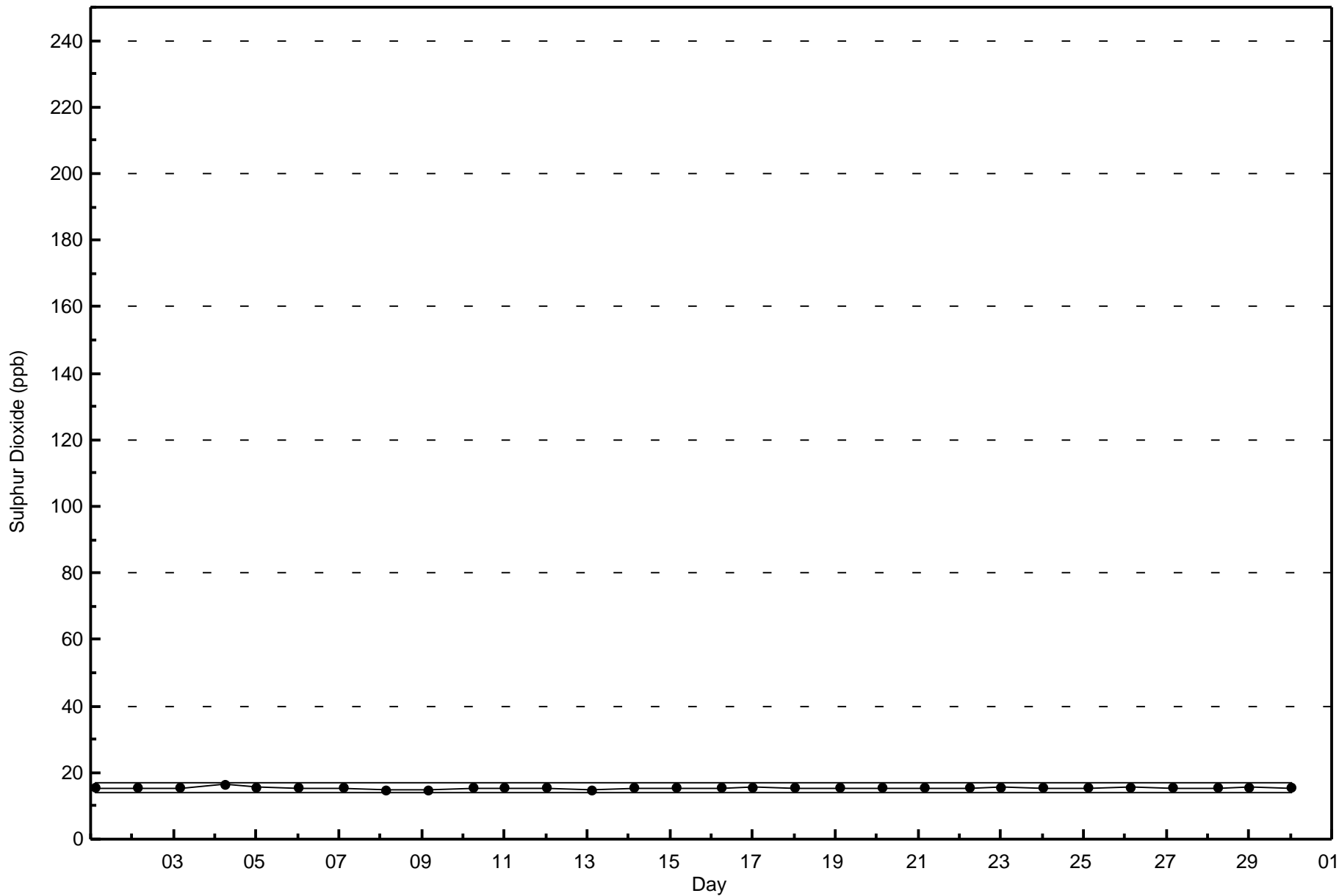
Wood Buffalo Environmental Association
Wind Rose Jun 2015

Sulphur Dioxide (SO₂) - ppb
Fort Chipewyan (AMS 8)



Total Number of Valid Hours: 676





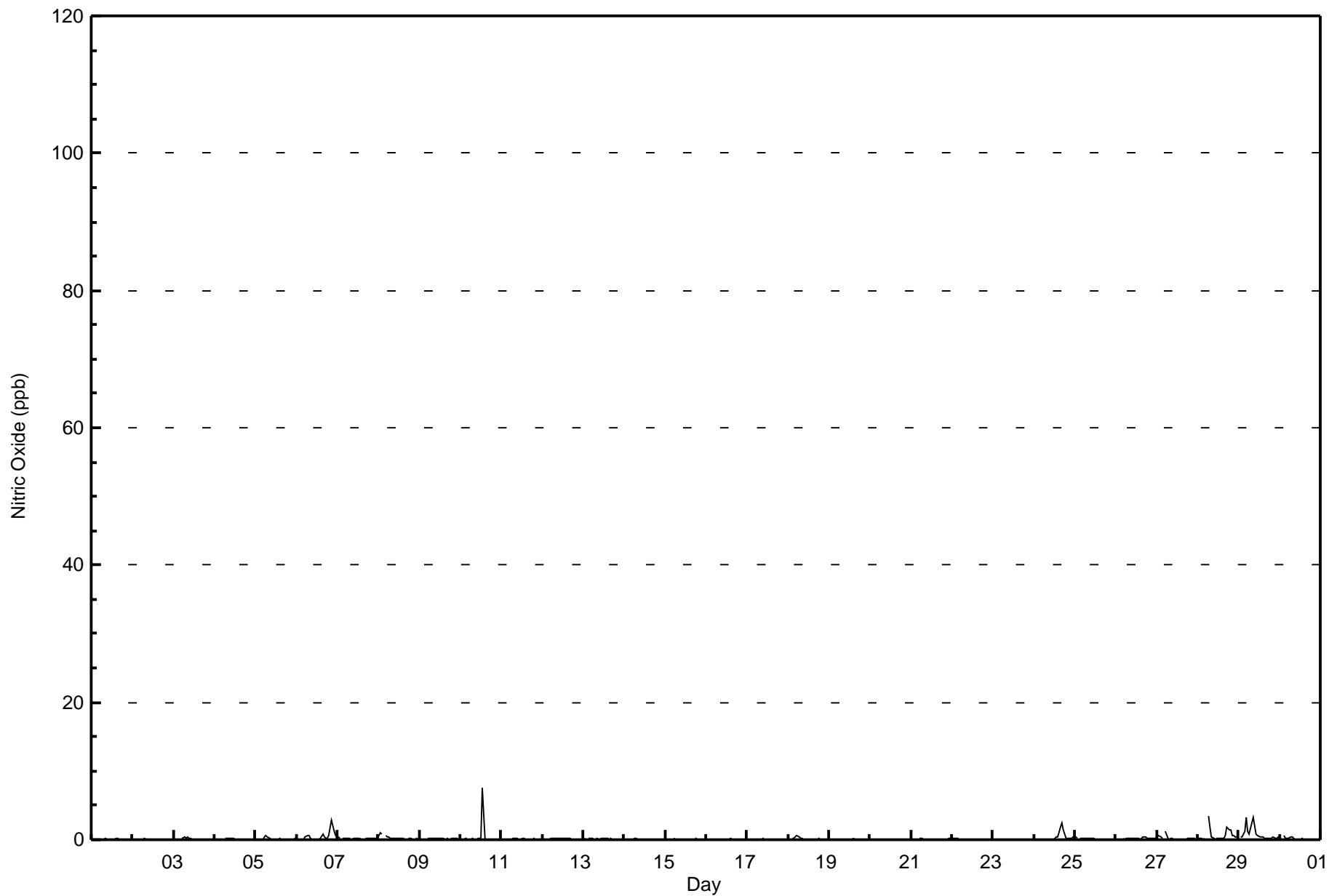


Maximum Value: 7 ppb on Jun 10 14:00														Maximum Daily Average: 0.8 ppb on Jun 29														Hours in Service: 720			
Minimum Value: 0 ppb on Jun 1 06:00														Minimum Daily Average: 0.0 ppb on Jun 23														Hours of Data: 675			
Maximum Diurnal Average: 0.4 ppb at hour 14														Minimum Diurnal Average: 0.1 ppb at hour 12														Hours of Missing Data: 45			
Monthly Average: 0.2 ppb														Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 2														Hours of Calibration: 35			
																												Percent Operational Time: 98.6			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24							
1-Jun	0	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-Jun	0	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-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	C	C	C	C	C	0	0	0	0	0	0	0.1	0					
4-Jun	0	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-Jun	Z	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1					
6-Jun	0	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0	1	3	2	1	1	0.5	3					
7-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0					
8-Jun	1	1	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	UO	0	0	0	0	0	0	0	0.3	1					
9-Jun	0	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-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0.4	7					
11-Jun	Z	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-Jun	0	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-Jun	0	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-Jun	0	0	0	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-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0					
16-Jun	0	0	0	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-Jun	Z	0	0	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-Jun	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1					
19-Jun	0	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-Jun	0	0	0	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-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0					
22-Jun	0	0	0	0	0	Z	0	0	PF	PF	PF	PF	PF	PF	PF	PF	PF	0	0	0	0	0	0	0	--	0					
23-Jun	Z	0	0	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-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	0	0	0	0	0	0.4	2					
25-Jun	0	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-Jun	0	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-Jun	0	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					
28-Jun	0	0	0	0	0	Z	3	2	0	0	0	0	0	0	0	0	1	2	1	1	1	1	0	0	0.6	3					
29-Jun	Z	0	0	1	3	1	1	2	3	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.8	3					
30-Jun	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1					
																												Diurnal Average			
																												Diurnal Maximum			
Z - zerospan														C - Calibration														UO - Unstable Operation		PF - Power Failure	



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Fort Chipewyan - June 2015





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Fort Chipewyan - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	675	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 675

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Nitric Oxide (NO) - ppb
Fort Chipewyan - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	30	13	13	60	78	32	12	15	23	43	45	71	76	53	70	39	673
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	30	13	13	60	78	32	12	15	23	43	45	71	76	53	70	39	673

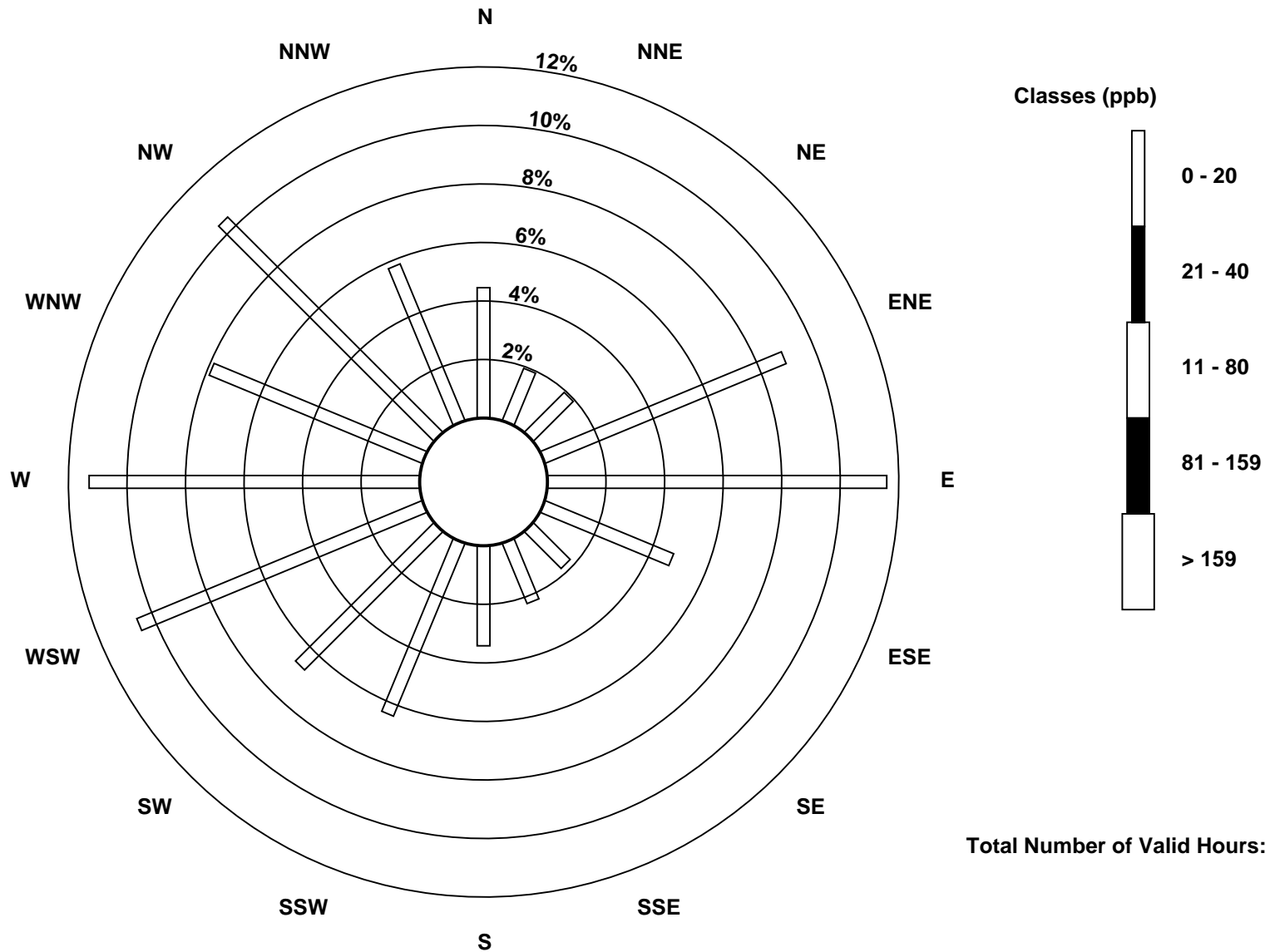
Total Number of Valid Hours: 673

Total Number of Hours: 720

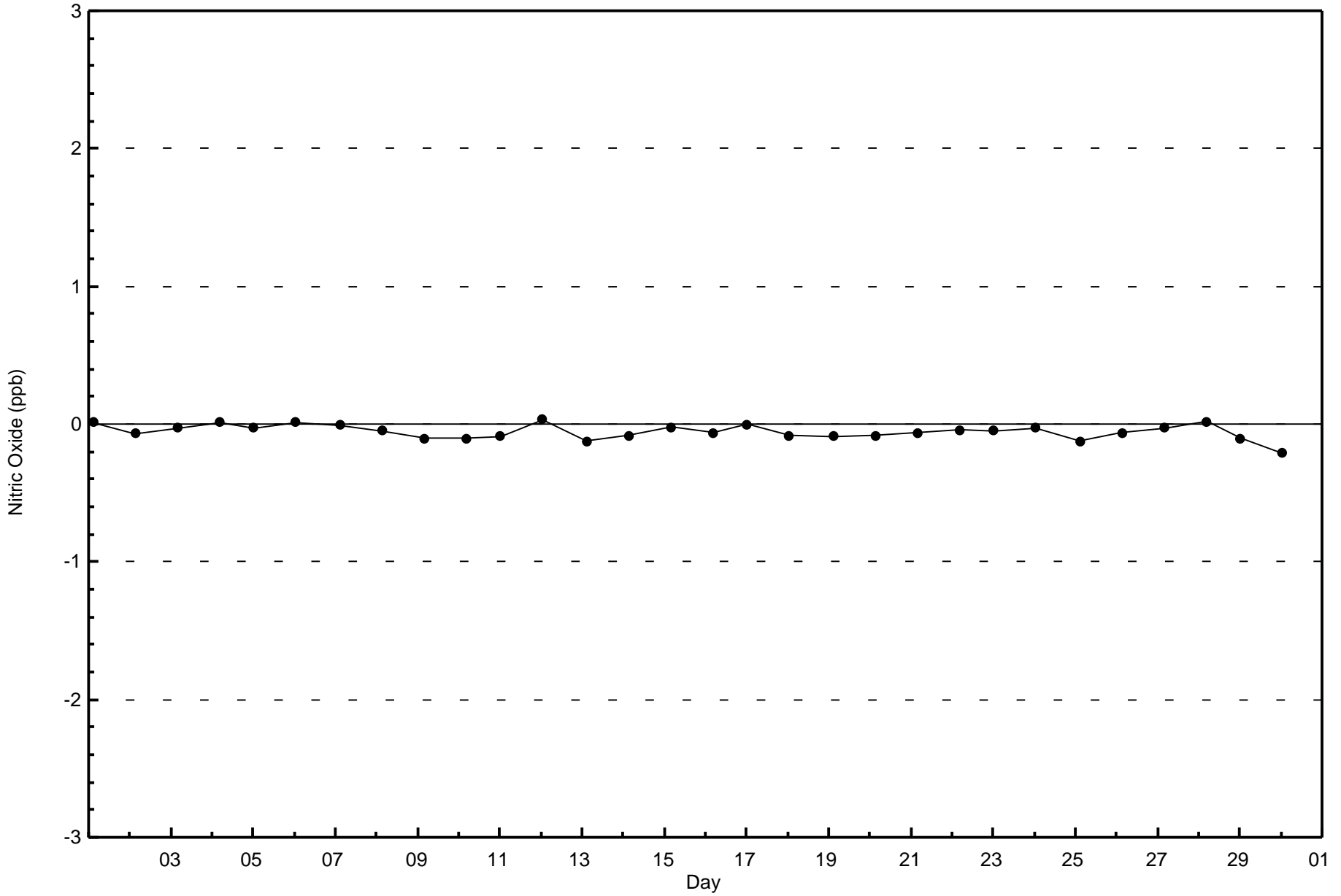


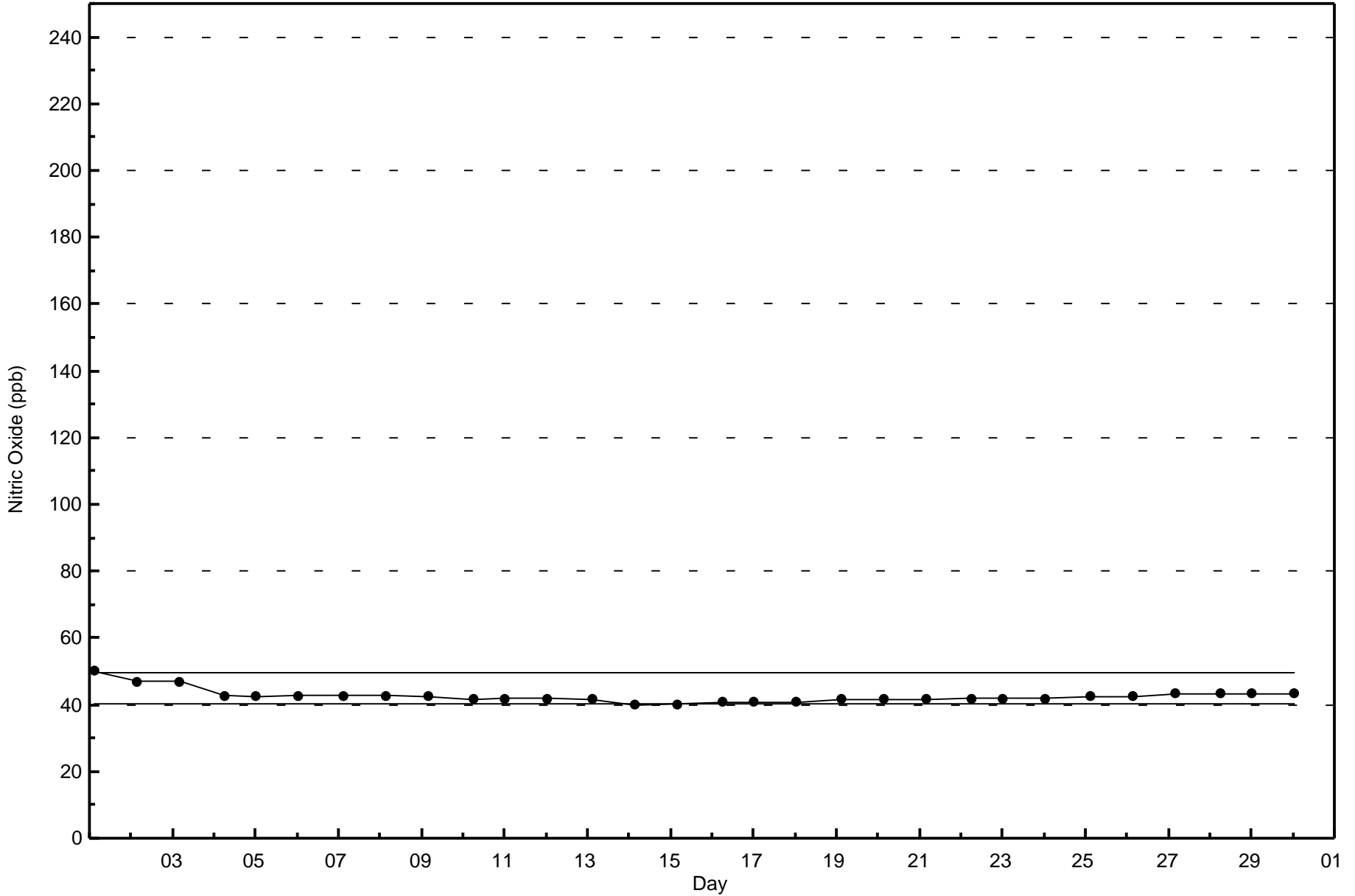
Wood Buffalo Environmental Association
Wind Rose Jun 2015

Nitric Oxide (NO) - ppb
Fort Chipewyan (AMS 8)



Total Number of Valid Hours: 673







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Fort Chipewyan - June 2015

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 16 ppb on Jun 29 10:00	Maximum Daily Average: 6.2 ppb on Jun 29		Hours of Data:	675
Minimum Value: 0 ppb on Jun 1 23:00	Minimum Daily Average: 0.1 ppb on Jun 2		Hours of Missing Data:	45
Maximum Diurnal Average: 1.4 ppb at hour 22	Minimum Diurnal Average: 0.9 ppb at hour 2		Hours of Calibration:	35
Monthly Average: 1.2 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 1 P ₉₀ = 3 P ₉₉ = 9		Percent Operational Time:	98.6

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	2	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	2
2-Jun	0	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-Jun	0	0	0	0	Z	1	1	1	1	1	1	1	C	C	C	C	C	0	0	0	0	0	0	0.5	1	
4-Jun	0	1	2	2	2	Z	1	2	2	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1.1	2
5-Jun	Z	1	1	1	2	3	3	2	1	1	1	1	1	0	0	1	0	0	1	1	1	1	1	1	1.0	3
6-Jun	1	Z	0	0	0	1	1	2	1	0	0	0	1	4	5	4	3	2	2	5	4	3	2	1.8	5	
7-Jun	2	1	Z	1	0	1	1	1	1	5	8	4	1	4	1	0	0	1	1	2	3	3	2	2	1.9	8
8-Jun	2	2	1	Z	1	1	1	1	1	1	1	1	2	2	3	UO	1	1	1	1	1	1	1	1	1.2	3
9-Jun	1	1	1	1	Z	1	1	1	0	0	1	0	0	0	1	0	1	0	1	1	1	1	1	1	0.6	1
10-Jun	1	0	0	0	0	Z	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0.6	7
11-Jun	Z	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1
12-Jun	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0.6	1
13-Jun	0	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
14-Jun	1	2	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0.4	2
15-Jun	0	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-Jun	0	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-Jun	Z	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-Jun	1	Z	8	7	5	3	1	1	1	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	1.4	8
19-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0.2	1
20-Jun	0	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
21-Jun	0	0	0	0	Z	1	1	0	0	0	0	0	0	0	0	1	1	0	1	1	1	3	3	2	0.7	3
22-Jun	2	2	1	1	1	Z	0	0	PF	PF	PF	PF	PF	PF	PF	PF	PF	0	0	0	1	1	1	1	--	2
23-Jun	Z	1	1	1	1	1	1	1	1	0	0	0	0	0	1	1	1	1	1	1	2	2	1	1	0.7	2
24-Jun	1	Z	1	0	0	0	0	0	0	0	0	0	1	1	2	4	5	4	3	1	2	2	2	2	1.4	5
25-Jun	2	1	Z	2	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0.7	2
26-Jun	1	1	1	Z	1	1	2	2	2	2	2	2	1	1	0	1	5	3	3	2	2	2	2	2	1.6	5
27-Jun	2	3	2	1	Z	5	2	1	1	1	1	1	0	1	1	2	3	3	4	4	4	5	5	3	2.4	5
28-Jun	3	3	2	2	2	Z	12	13	7	5	2	4	6	6	6	5	5	8	7	8	5	6	5	5	5.5	13
29-Jun	Z	4	3	4	7	4	4	6	15	16	10	11	9	12	8	4	3	3	3	3	5	4	3	3	6.2	16
30-Jun	3	Z	3	3	2	2	2	2	1	1	2	1	2	1	1	2	1	1	1	1	1	1	1	1	1.6	3

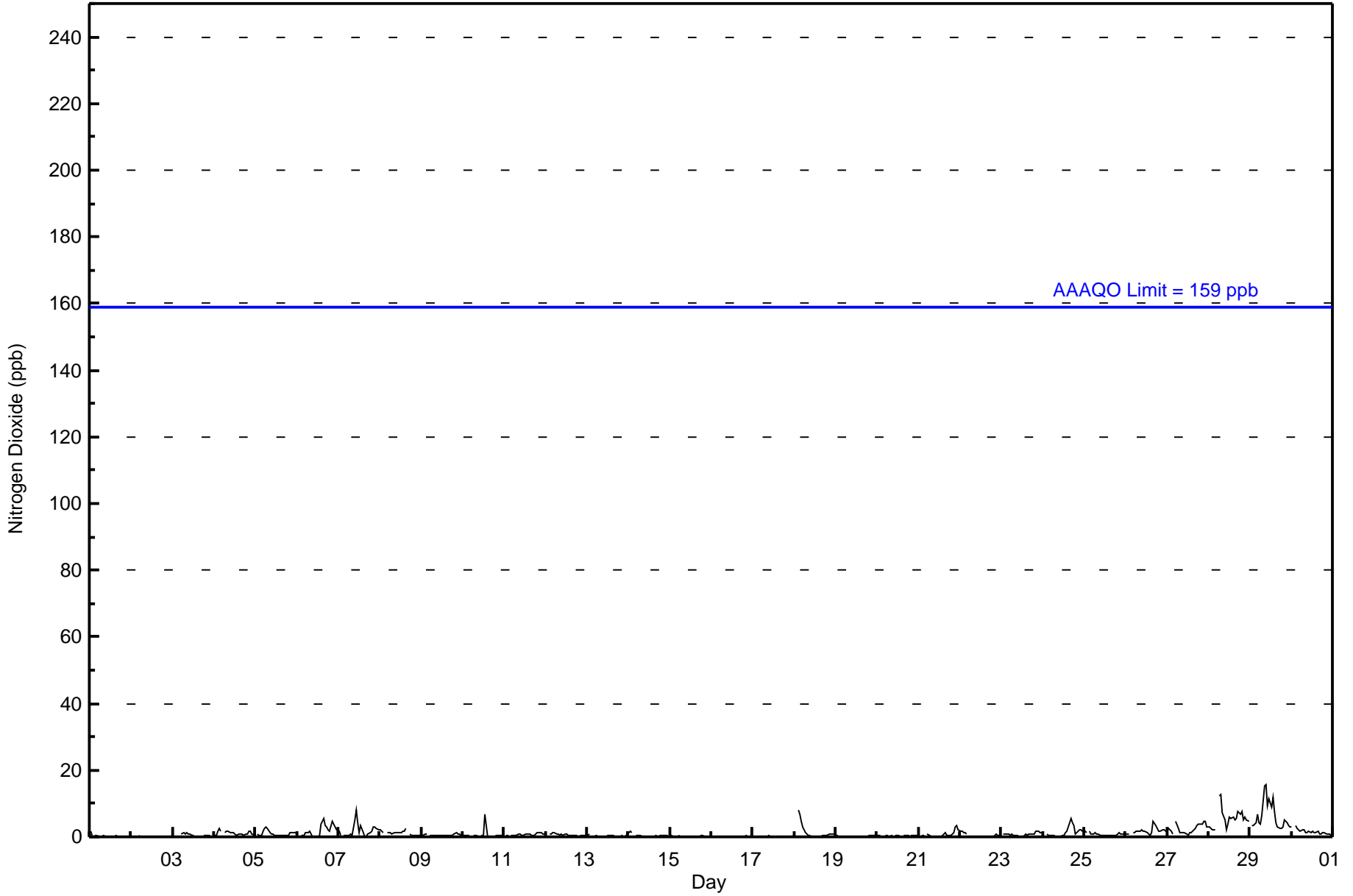
1.0	0.9	1.2	1.1	1.1	1.1	1.3	1.3	1.3	1.3	1.1	1.1	0.9	1.4	1.1	1.2	1.2	1.1	1.1	1.0	1.4	1.4	1.2	1.0	Diurnal Average	
3	4	8	7	7	5	12	13	15	16	10	11	9	12	8	5	5	8	7	8	5	6	5	5	Diurnal Maximum	

Z - zerspan C - Calibration UO - Unstable Operation PF - Power Failure
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Fort Chipewyan - June 2015





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Fort Chipewyan - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	675	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 675

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Fort Chipewyan - June 2015**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	30	13	13	60	78	32	12	15	23	43	45	71	76	53	70	39	673
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	30	13	13	60	78	32	12	15	23	43	45	71	76	53	70	39	673

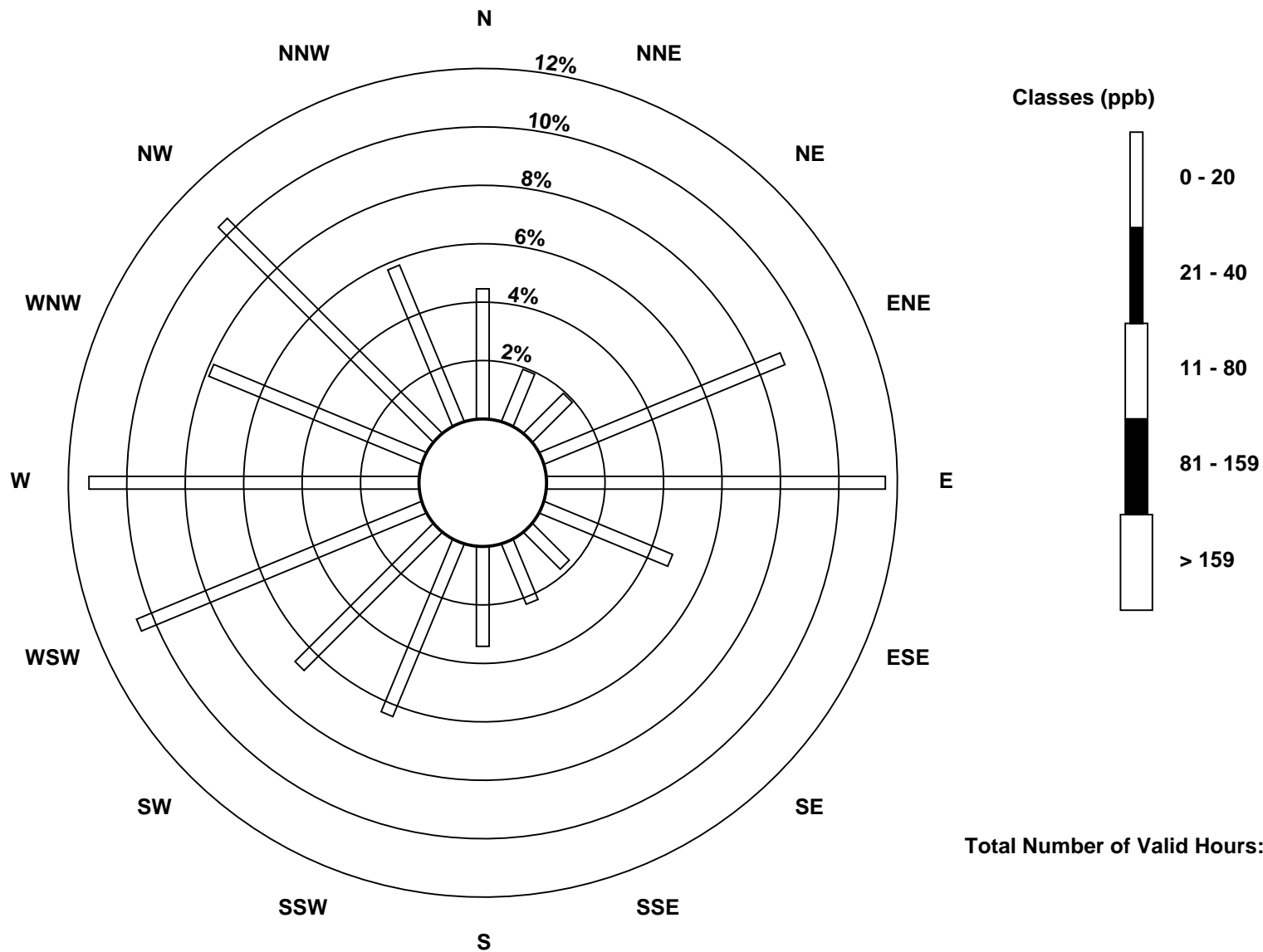
Total Number of Valid Hours: 673

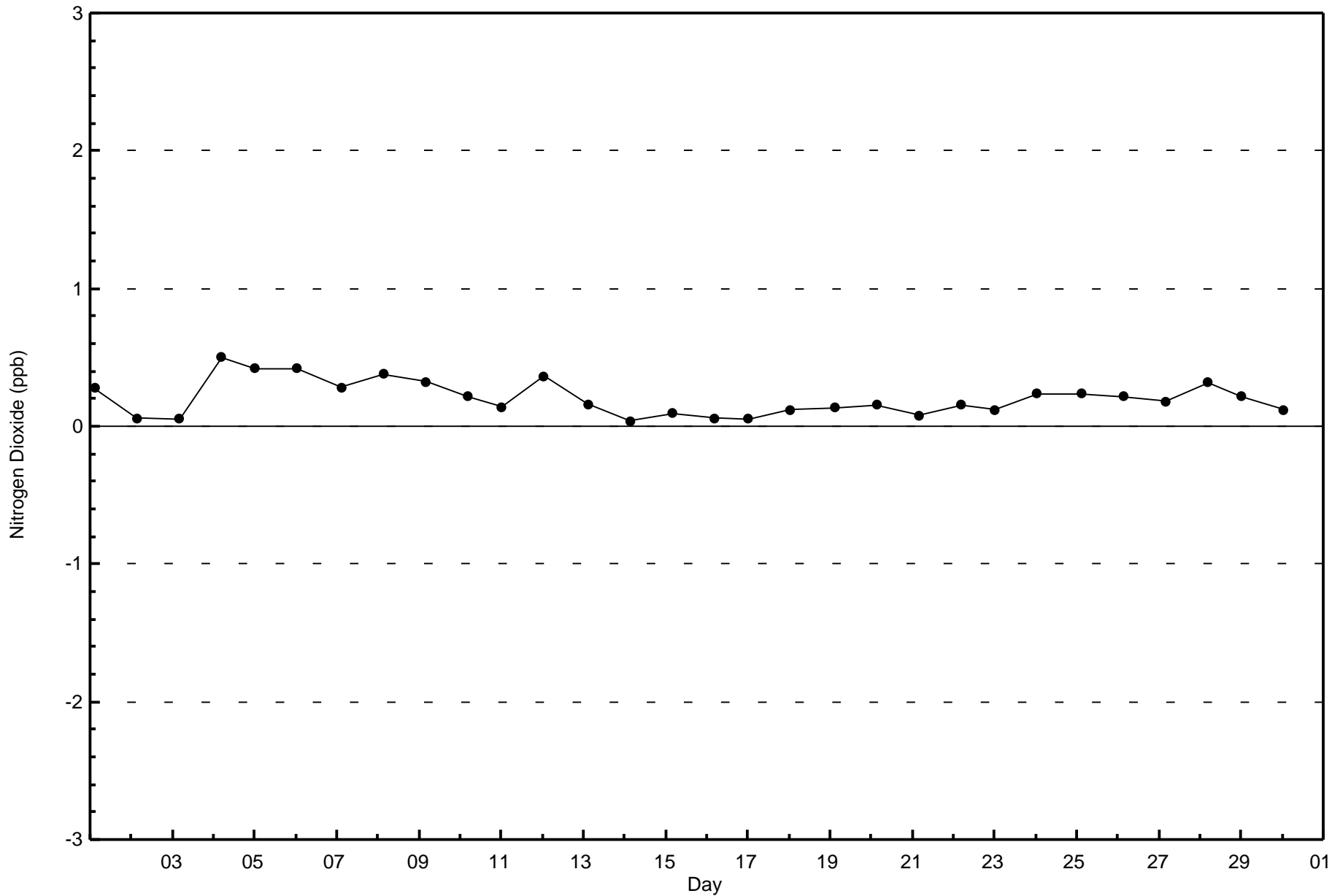
Total Number of Hours: 720

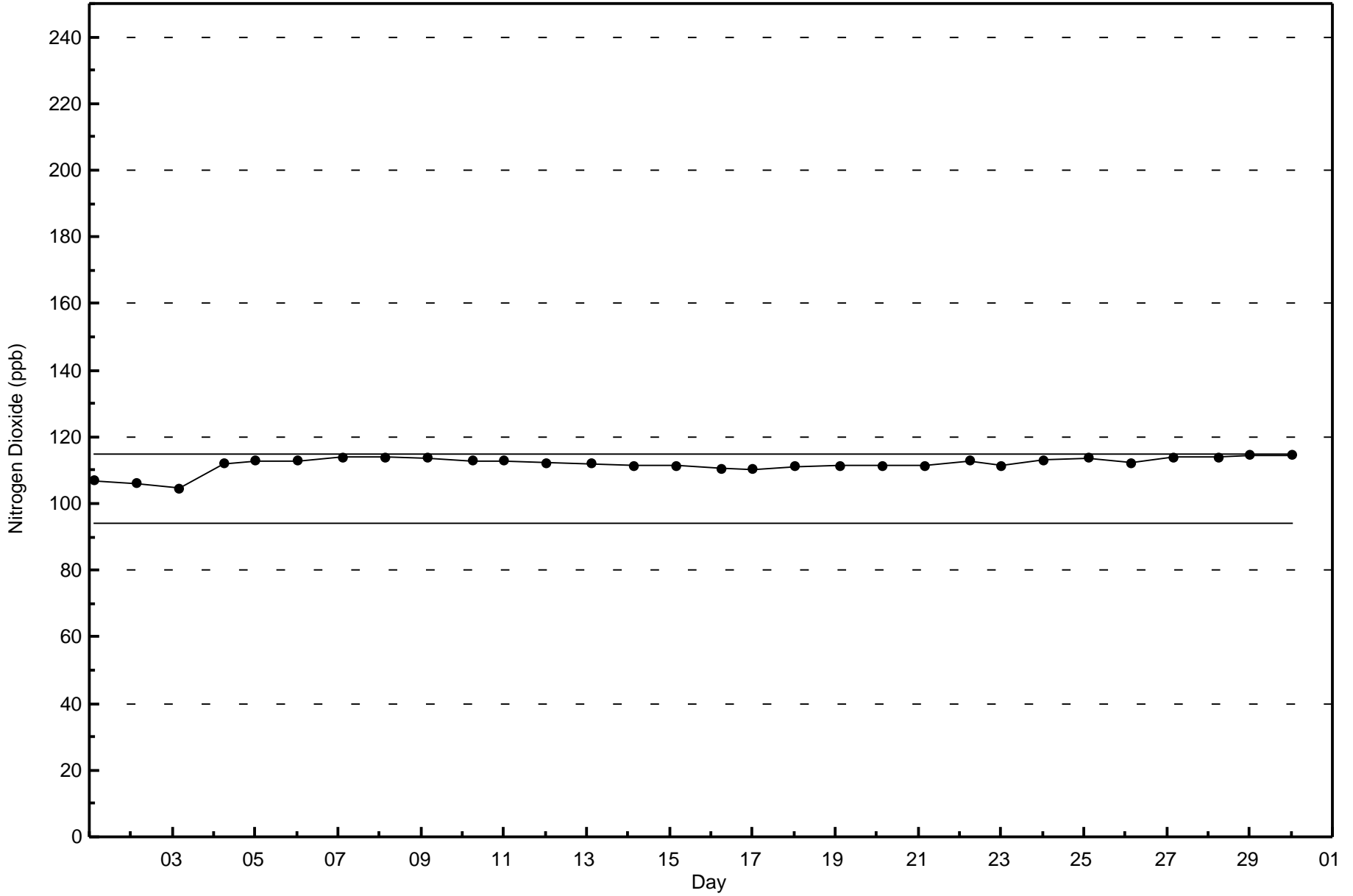


Wood Buffalo Environmental Association
Wind Rose Jun 2015

Nitrogen Dioxide (NO₂) - ppb
Fort Chipewyan (AMS 8)







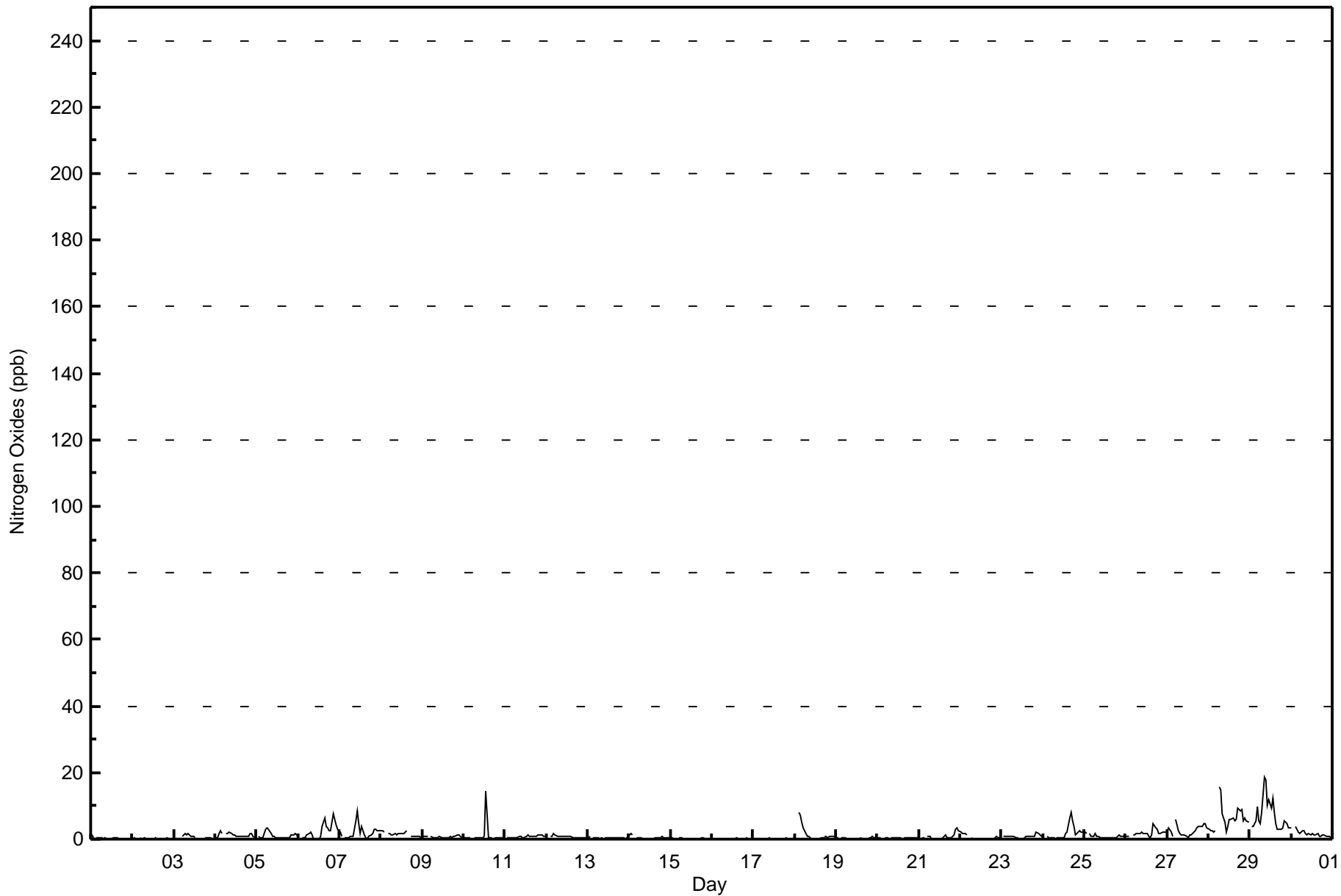


Maximum Value: 19 ppb on Jun 29 09:00														Maximum Daily Average: 7.1 ppb on Jun 29														Hours in Service: 720			
Minimum Value: 0 ppb on Jun 15 04:00														Minimum Daily Average: 0.1 ppb on Jun 17														Hours of Data: 675			
Maximum Diurnal Average: 1.8 ppb at hour 14														Minimum Diurnal Average: 1.0 ppb at hour 13														Hours of Missing Data: 45			
Monthly Average: 1.3 ppb														Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 1 P ₉₀ = 3 P ₉₉ = 12														Hours of Calibration: 35			
																												Percent Operational Time: 98.6			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24							
1-Jun	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.3	1					
2-Jun	0	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-Jun	0	0	0	0	Z	1	2	1	1	1	1	1	C	C	C	C	C	0	0	0	0	0	0	0.6	2						
4-Jun	0	1	2	2	2	Z	2	2	2	2	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1.2	2					
5-Jun	Z	1	1	1	2	3	3	3	2	1	1	1	1	0	1	1	1	1	0	1	1	1	2	1	1.1	3					
6-Jun	1	Z	0	0	0	1	2	2	1	0	0	0	1	4	6	4	3	2	2	8	6	4	3	2.3	8						
7-Jun	2	1	Z	1	1	1	1	1	1	5	8	5	2	4	1	0	0	1	1	2	3	3	3	2	2.0	8					
8-Jun	3	3	2	Z	2	2	1	1	2	1	2	2	2	2	3	UO	1	1	1	1	1	1	1	1	1.5	3					
9-Jun	1	1	1	1	Z	1	1	1	1	1	1	0	0	1	1	0	1	0	1	1	1	1	1	1	0.7	1					
10-Jun	1	0	0	1	0	Z	0	0	0	0	0	0	1	14	0	0	0	0	0	0	0	0	0	0	1.0	14					
11-Jun	Z	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.8	1					
12-Jun	1	Z	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0.7	2					
13-Jun	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.4	1					
14-Jun	1	2	1	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0.4	2					
15-Jun	0	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-Jun	0	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-Jun	Z	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-Jun	1	Z	8	7	5	4	2	1	1	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1.5	8					
19-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.2	1					
20-Jun	0	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1					
21-Jun	0	0	0	0	Z	1	1	0	0	0	0	0	0	0	0	1	1	0	0	1	1	3	3	2	0.8	3					
22-Jun	2	2	2	2	1	Z	0	0	PF	PF	PF	PF	PF	PF	PF	PF	PF	0	0	0	0	1	0	0	--	2					
23-Jun	Z	1	1	1	1	1	1	1	1	0	0	0	0	0	1	1	1	1	1	1	2	2	1	1	0.7	2					
24-Jun	1	Z	1	0	0	0	0	0	0	0	0	1	2	2	6	8	6	4	1	2	2	2	2	2	1.8	8					
25-Jun	2	2	Z	2	1	1	2	1	1	1	0	1	0	0	0	0	0	1	1	1	1	1	1	1	0.8	2					
26-Jun	1	1	1	Z	1	1	2	2	2	2	2	2	2	1	0	1	5	4	3	2	2	2	2	2	1.8	5					
27-Jun	2	3	2	1	Z	6	3	2	1	1	1	1	0	1	1	2	3	3	4	4	4	5	5	3	2.6	6					
28-Jun	3	3	3	2	2	Z	15	15	8	5	2	4	6	6	6	5	6	9	8	9	6	6	6	5	6.1	15					
29-Jun	Z	4	4	5	10	6	5	8	19	18	10	12	9	12	8	4	3	3	3	3	5	5	4	4	7.1	19					
30-Jun	3	Z	4	3	2	2	3	2	2	1	2	1	2	1	1	2	1	1	1	1	1	1	1	1	1.7	4					
																												Diurnal Average			
																												Diurnal Maximum			
Z - zerospan														C - Calibration														UO - Unstable Operation		PF - Power Failure	



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Fort Chipewyan - June 2015





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Fort Chipewyan - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	675	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 675

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Fort Chipewyan - June 2015**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	30	13	13	60	78	32	12	15	23	43	45	71	76	53	70	39	673
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	30	13	13	60	78	32	12	15	23	43	45	71	76	53	70	39	673

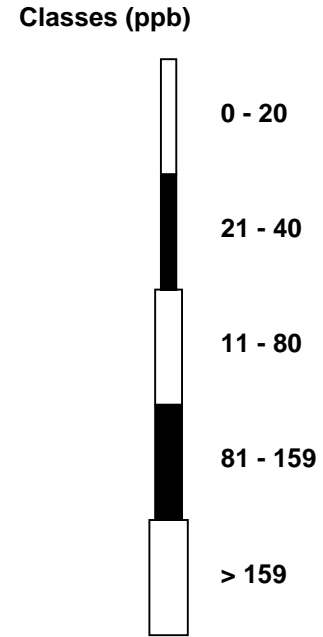
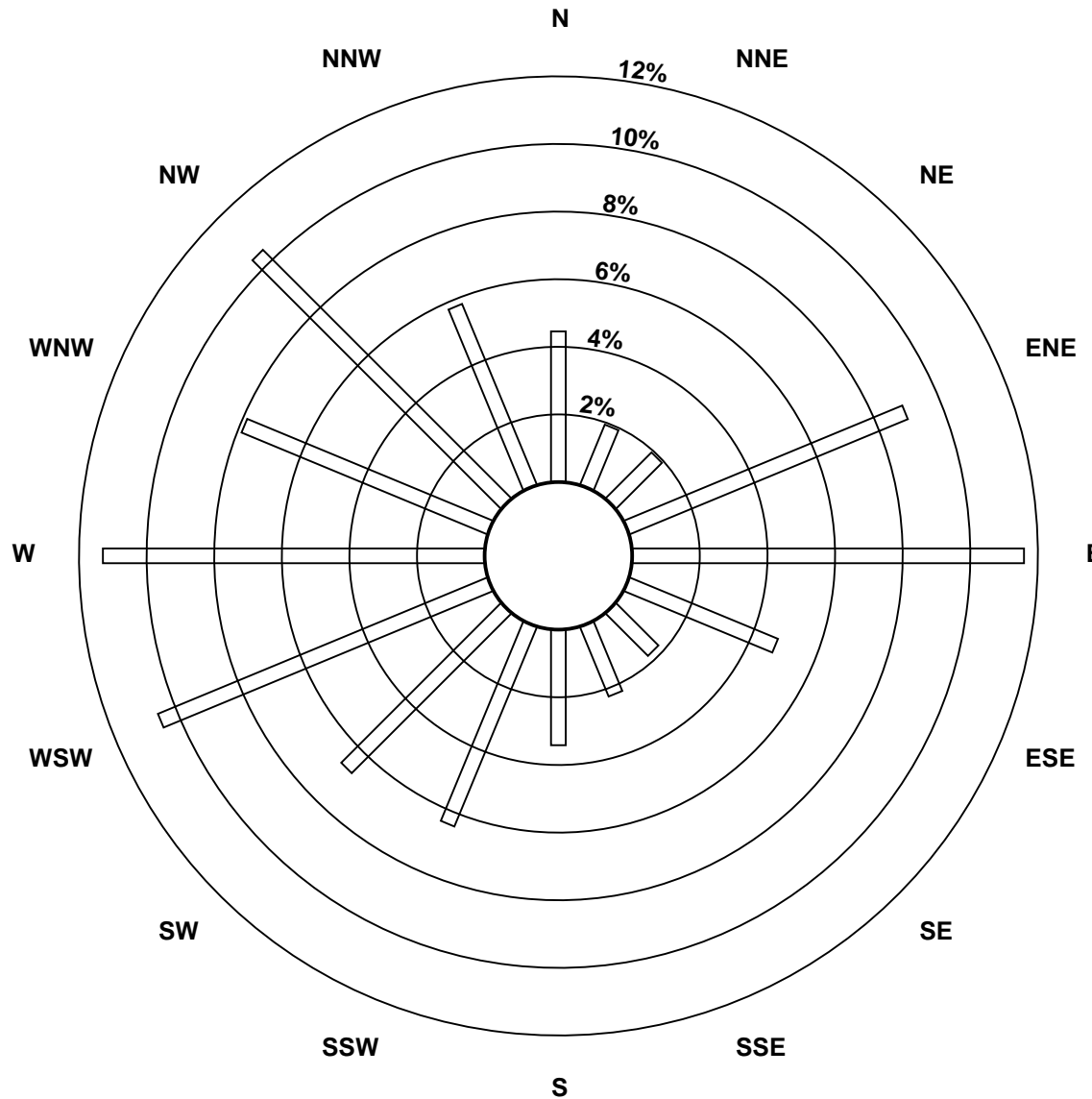
Total Number of Valid Hours: 673

Total Number of Hours: 720

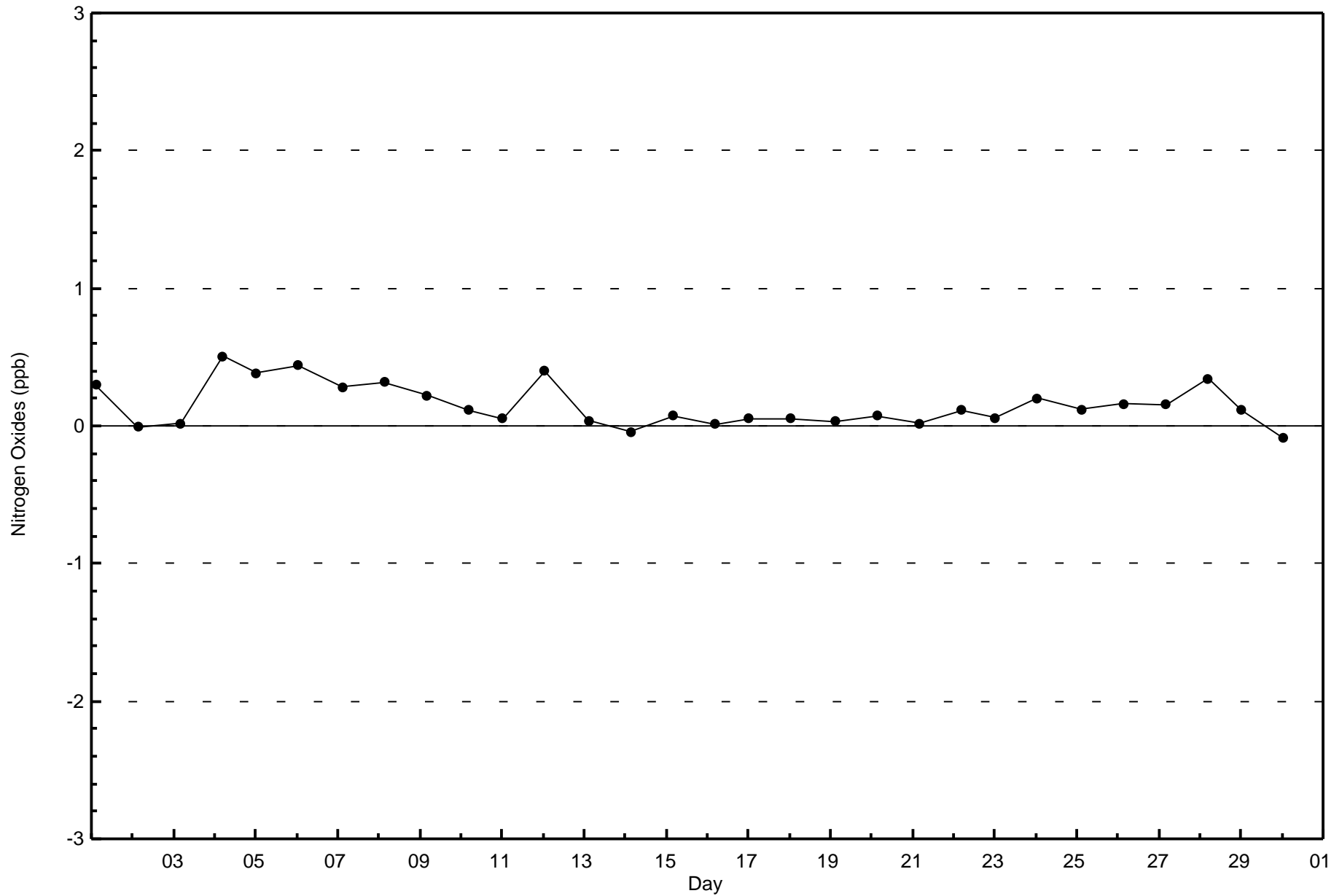


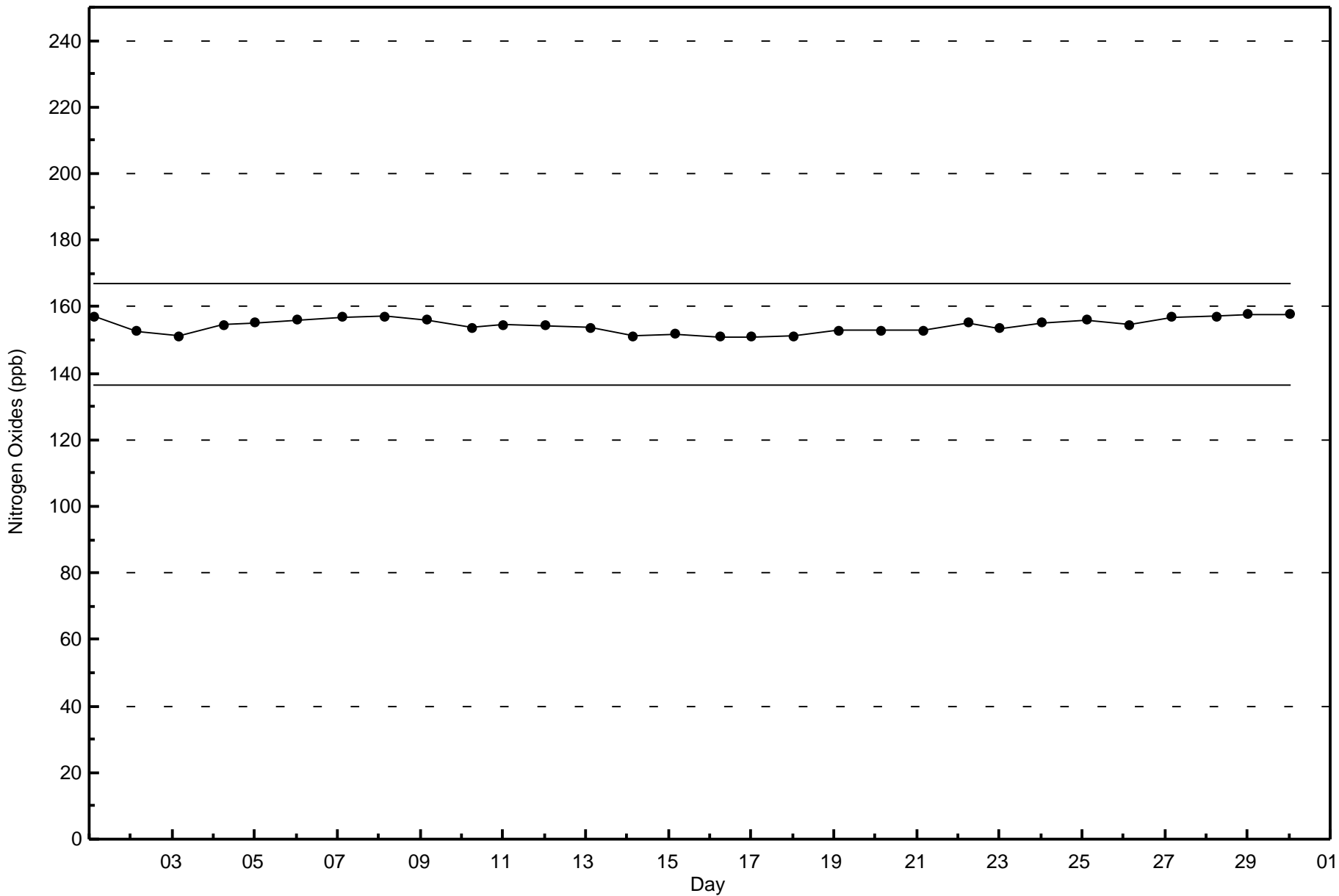
Wood Buffalo Environmental Association
Wind Rose Jun 2015

Nitrogen Oxides (NO_x) - ppb
Fort Chipewyan (AMS 8)



Total Number of Valid Hours: 673







Number of Exceedences (AAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 69 ppb on Jun 4 19:00	Maximum Daily Average: 54.6 ppb on Jun 4
Minimum Value: 14 ppb on Jun 10 03:00	Hours of Data: 675
Maximum Diurnal Average: 40.8 ppb at hour 17	Hours of Missing Data: 45
Monthly Average: 33.8 ppb	Hours of Calibration: 34
Minimum Daily Average: 22.7 ppb on Jun 9	Percent Operational Time: 98.5
Minimum Diurnal Average: 25.4 ppb at hour 6	
Percentiles: P ₁ = 16 P ₁₀ = 22 Q ₁ = 28 Median = 33 Q ₃ = 39 P ₉₀ = 44 P ₉₉ = 65	

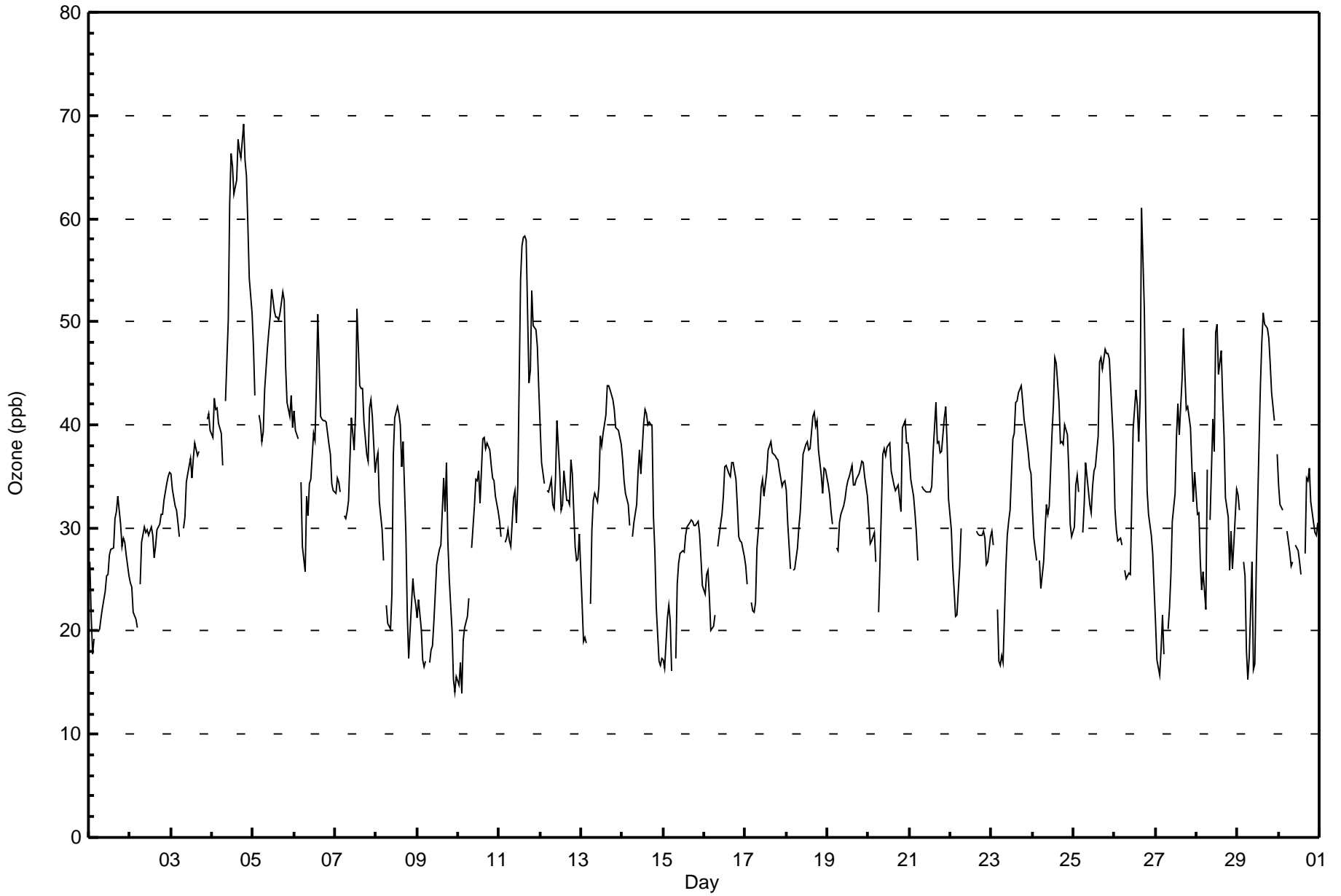
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	27	21	18	19	Z	20	20	21	22	24	25	26	27	28	28	31	32	33	30	28	29	29	27	25	25.7	33
2-Jun	25	24	22	21	20	Z	24	29	30	30	30	29	30	29	27	28	30	30	31	31	33	34	35	35	28.6	35
3-Jun	35	34	32	32	30	29	Z	30	31	34	35	37	35	37	38	37	37	C	C	C	C	41	41	39	35.0	41
4-Jun	39	43	42	42	40	39	36	Z	42	50	61	66	65	62	64	68	67	66	69	66	64	59	54	51	54.6	69
5-Jun	48	43	Z	41	40	38	39	43	48	49	51	53	51	50	50	50	51	53	52	46	42	41	43	40	46.2	53
6-Jun	41	39	39	Z	34	28	26	33	31	34	35	39	38	44	51	41	41	40	40	40	38	37	34	34	37.3	51
7-Jun	33	35	34	33	Z	31	31	32	33	41	39	38	41	51	44	43	43	40	37	37	42	42	41	35	38.1	51
8-Jun	37	37	33	30	27	Z	22	21	20	24	37	41	42	41	40	36	38	29	21	17	20	25	23	23	29.8	42
9-Jun	21	23	20	17	17	17	Z	17	18	19	21	26	27	28	28	35	32	36	29	25	20	15	14	16	22.7	36
10-Jun	15	17	14	19	20	21	23	Z	28	32	35	35	35	32	39	39	38	38	38	36	35	35	33	32	29.9	39
11-Jun	31	29	Z	29	29	30	29	28	33	34	31	34	54	57	58	58	58	44	45	53	50	49	48	43	41.5	58
12-Jun	40	36	34	Z	34	33	35	32	32	35	40	35	32	32	36	33	33	32	37	35	28	27	27	29	33.4	40
13-Jun	23	19	19	19	Z	23	30	33	33	32	34	39	38	39	41	44	44	43	42	42	40	40	39	38	34.5	44
14-Jun	37	35	33	32	30	Z	29	30	32	35	38	35	40	42	41	40	40	40	31	28	22	17	17	17	32.3	42
15-Jun	17	16	21	22	21	16	Z	17	25	27	28	28	28	29	30	30	31	31	30	30	31	29	27	24	25.6	31
16-Jun	24	25	26	23	20	21	22	Z	28	30	31	33	36	36	35	35	36	36	35	32	29	29	29	27	29.5	36
17-Jun	26	25	Z	23	22	22	23	28	31	34	35	33	35	38	38	38	37	37	37	37	36	34	34	35	32.0	38
18-Jun	34	30	26	Z	26	26	28	30	32	34	37	38	38	38	38	41	41	40	40	38	35	33	36	36	34.5	41
19-Jun	34	33	32	30	Z	28	28	31	31	32	33	34	35	35	36	34	34	35	35	36	36	36	35	33	33.3	36
20-Jun	31	28	29	30	27	Z	22	27	37	38	37	38	38	36	35	34	34	34	33	32	40	40	38	38	33.7	40
21-Jun	37	35	33	31	30	27	Z	34	34	34	33	33	33	34	37	42	38	38	37	37	41	42	38	33	35.3	42
22-Jun	30	26	24	21	22	26	30	Z	PF	PF	PF	PF	PF	PF	PF	30	29	29	29	30	29	26	27	29	--	30
23-Jun	30	28	Z	22	17	17	18	17	26	29	31	32	39	39	42	42	43	44	42	41	40	37	36	35	32.4	44
24-Jun	32	29	27	Z	27	24	27	30	32	31	32	39	42	47	46	42	38	38	38	40	39	36	30	29	34.6	47
25-Jun	30	34	35	33	Z	30	32	36	35	32	31	34	36	36	39	46	47	45	47	47	47	46	44	38	38.3	47
26-Jun	32	30	29	29	28	Z	26	25	26	26	33	40	43	42	38	43	61	51	41	34	31	29	27	24	34.2	61
27-Jun	21	17	16	18	22	18	Z	20	22	25	31	33	39	42	39	44	49	45	41	42	40	36	32	35	31.7	49
28-Jun	31	31	27	24	26	22	36	Z	31	41	37	49	50	45	47	43	39	33	31	26	30	26	28	34	34.2	50
29-Jun	33	32	Z	27	25	18	15	17	27	16	17	26	38	44	48	51	50	49	48	46	43	40	UO	37	34.0	51
30-Jun	34	32	32	Z	UO	30	28	26	27	UO	28	28	27	26	UO	28	35	35	36	33	30	30	29	31	30.1	36
30.9 29.7 27.8 26.8 26.4 25.4 27.1 27.5 30.3 32.2 34.0 36.2 38.4 39.3 40.5 40.2 40.8 39.6 38.1 36.6 35.8 34.7 33.4 32.5																								Diurnal Average		
48 43 42 42 40 39 39 43 48 50 61 66 65 62 64 68 67 66 69 66 64 59 54 51																								Diurnal Maximum		

Z - zeronspan C - Calibration UO - Unstable Operation PF - Power Failure
 Alberta Ambient Air Quality Objectives (AAQO): 1-hr 82 ppb



Wood Buffalo Environmental Association
Hourly Averages

Ozone (O₃) - ppb
Fort Chipewyan - June 2015





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Fort Chipewyan - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	49	7.26	7.26
21 - 50	595	88.15	95.41
51 - 82	31	4.59	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 675

Total Number of Hours: 720



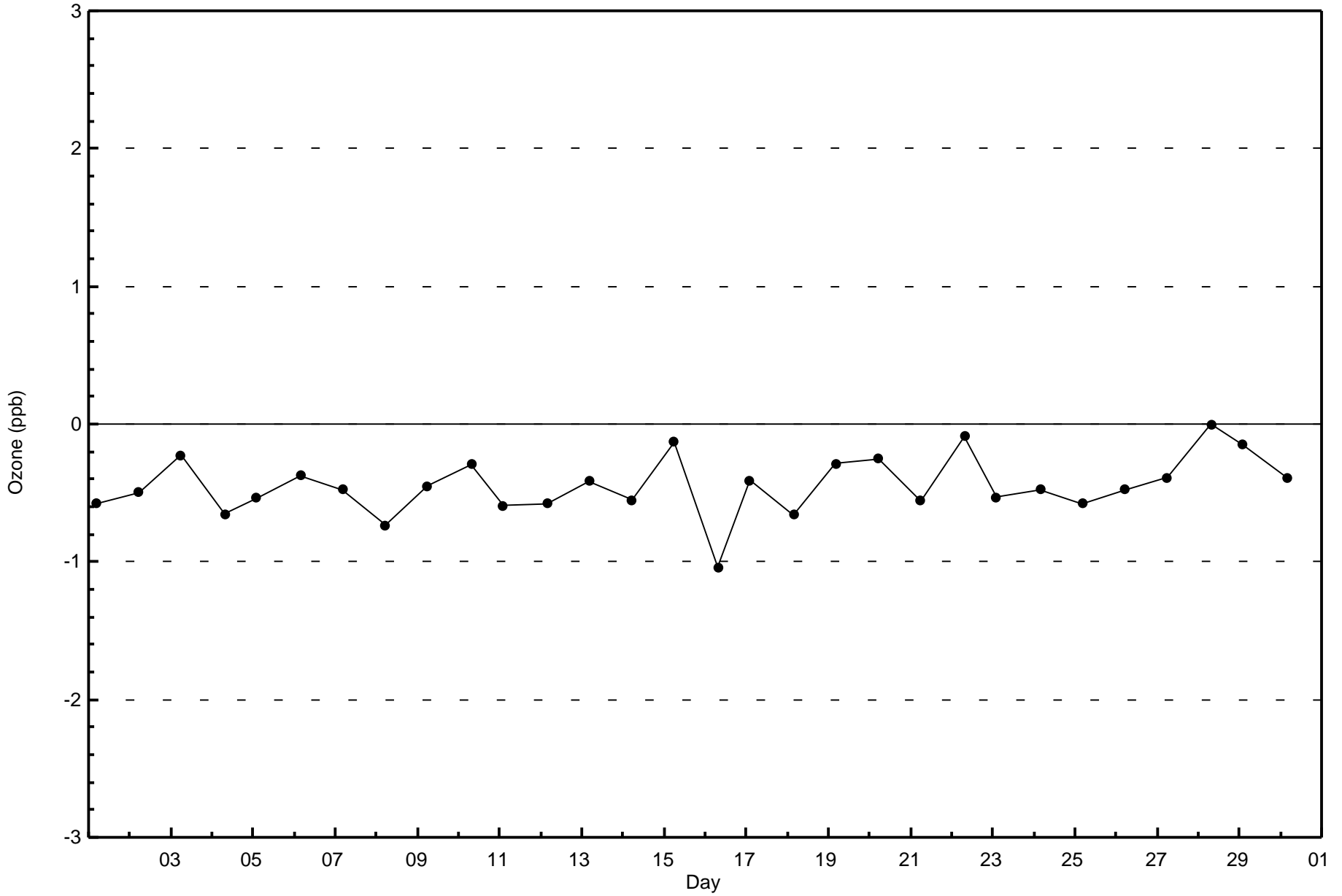
**Wood Buffalo Environmental Association
Frequency Distribution**

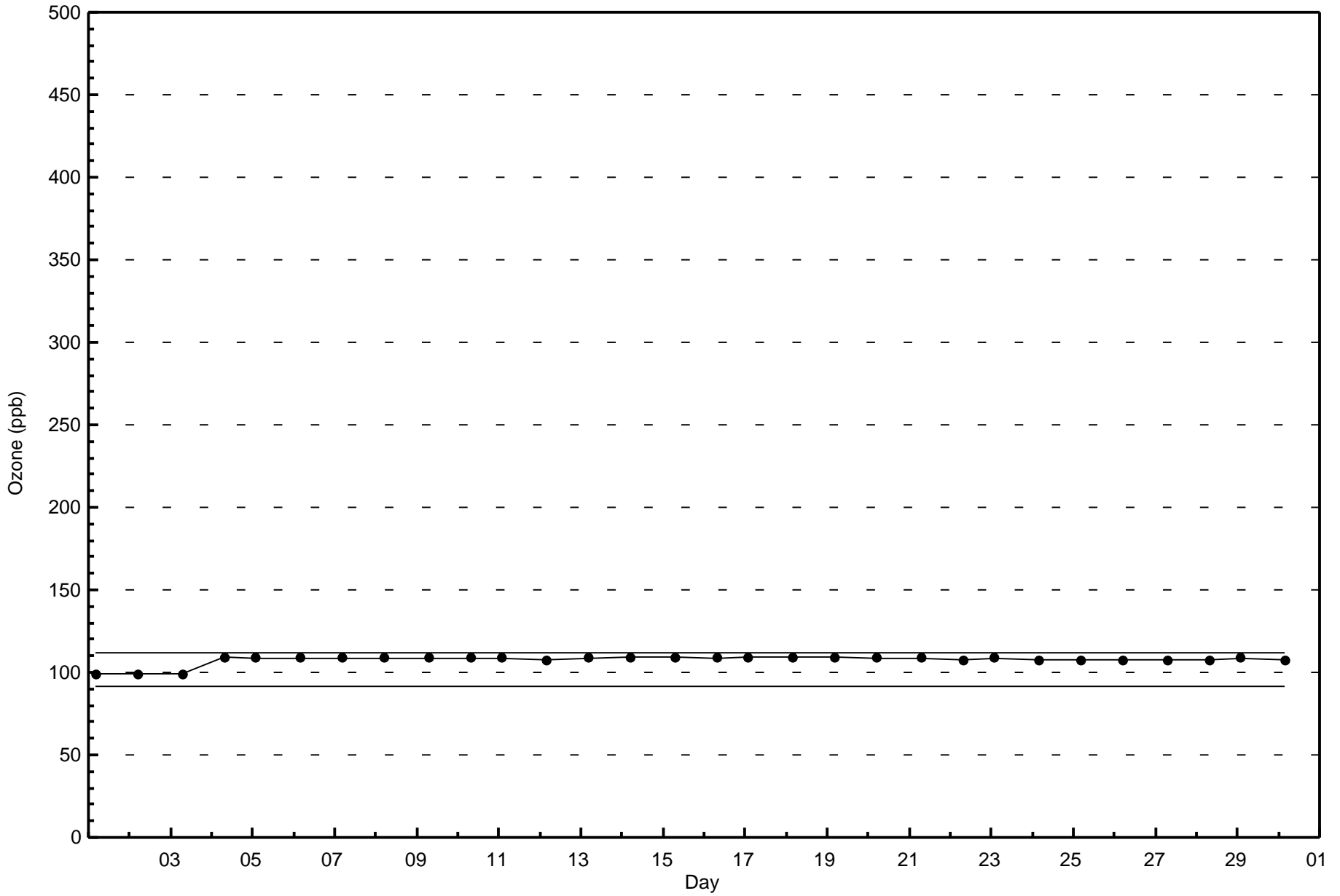
**Ozone (O₃) - ppb
Fort Chipewyan - June 2015**

Concentration Ranges (ppb)	Wind Direction																Totals	
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW		
0 - 20	2	0	0	0	0	0	0	0	0	0	0	1	8	8	9	17	4	49
21 - 50	29	13	13	55	81	32	8	12	16	33	41	61	68	42	49	41	41	594
51 - 82	0	0	0	1	0	1	3	2	7	11	2	2	0	2	0	0	0	31
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	31	13	13	56	81	33	11	14	23	44	44	71	76	53	66	45	674	

Total Number of Valid Hours: 674

Total Number of Hours: 720







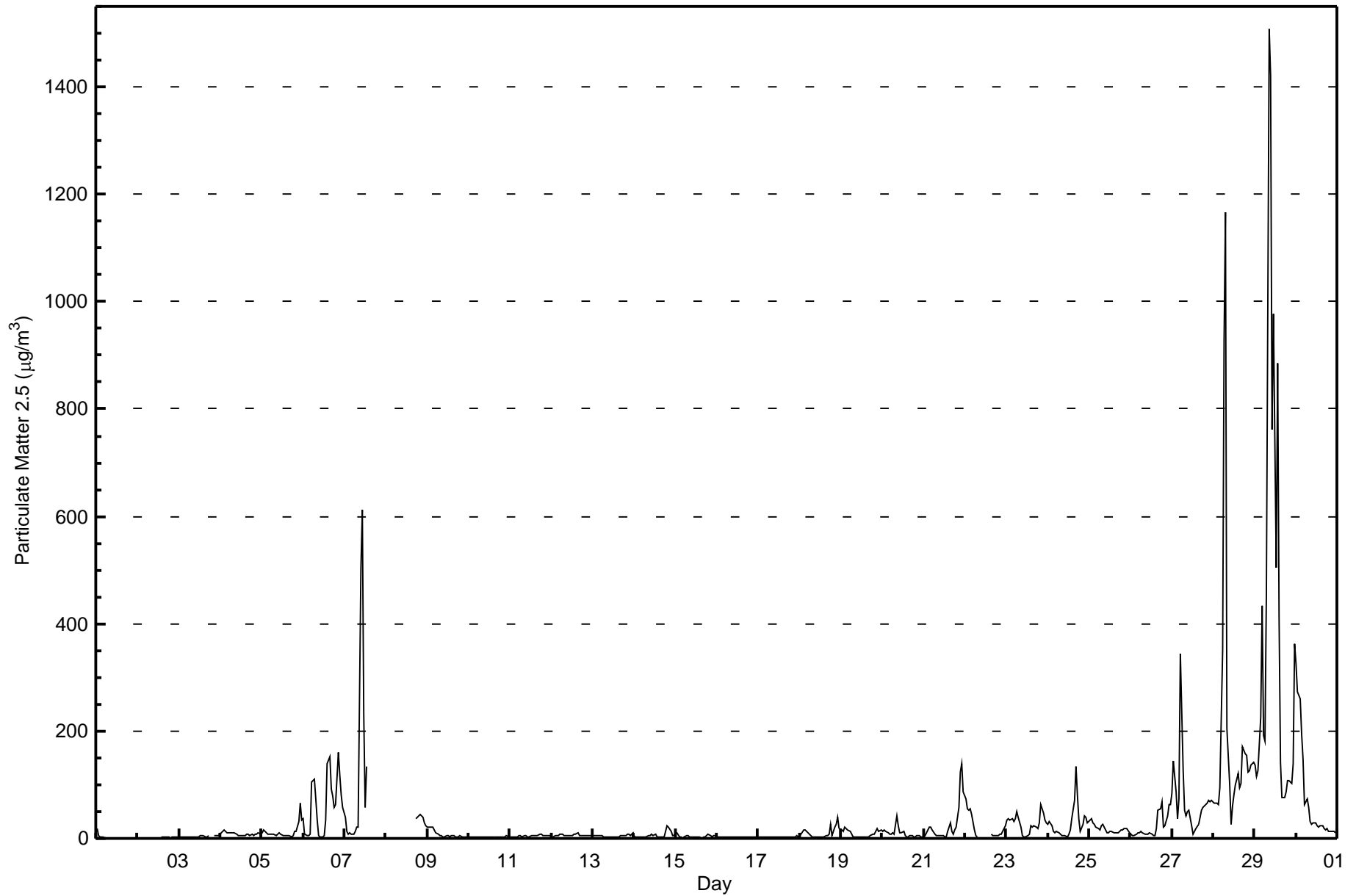
Summary of Hour Averages

Fort Chipewyan - June 2015

Number of Exceedences (AAAQO):	24-hr: 5	Hours in Service:	720
Maximum Value: 1507.5 µg/m ³ on Jun 29 09:00	Maximum Daily Average: 397.3 µg/m ³ on Jun 29	Hours of Data:	684
Minimum Value: 0.4 µg/m ³ on Jun 1 10:00	Minimum Daily Average: 1.1 µg/m ³ on Jun 2	Hours of Missing Data:	36
Maximum Diurnal Average: 79.3 µg/m ³ at hour 10	Minimum Diurnal Average: 22.4 µg/m ³ at hour 17	Hours of Calibration:	0
Monthly Average: 38.91 µg/m ³	Percentiles: P ₁ = 0.5 P ₁₀ = 1.9 Q ₁ = 3.3 Median = 6.6 Q ₃ = 22.6 P ₉₀ = 77.3 P ₉₉ = 720.1	Percent Operational Time:	95.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jun	17.7	6.0	2.8	1.7	1.9	0.6	0.7	0.4	0.5	0.4	0.4	0.5	0.4	0.5	1.0	1.2	1.2	1.3	1.2	1.2	0.6	0.6	0.6	0.6	1.8	17.7																						
2-Jun	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	1.2	1.2	1.2	1.2	1.2	1.3	1.4	1.4	1.6	1.5	1.3	1.3	1.4	1.5	1.5	1.5	1.1	1.6																						
3-Jun	1.5	1.8	1.6	1.4	1.7	2.2	3.3	2.6	2.4	3.0	3.2	3.4	4.4	4.8	4.4	3.6	3.3	4.3	M	M	5.8	5.5	5.1	5.5	3.4	5.8																						
4-Jun	9.3	13.4	15.3	13.9	11.6	10.5	10.0	10.0	9.5	7.4	5.3	5.3	4.8	5.2	6.1	7.3	6.8	6.0	6.9	6.4	8.2	9.2	9.2	8.0	8.6	15.3																						
5-Jun	10.4	14.8	13.5	8.8	8.2	8.1	7.6	6.7	6.0	7.9	9.6	7.5	5.4	4.4	5.3	5.4	4.8	3.9	4.2	12.4	13.9	32.8	65.6	34.5	12.6	65.6																						
6-Jun	36.3	7.1	4.7	4.7	8.5	104.7	109.3	73.7	34.1	6.1	3.6	3.2	4.1	34.8	140.2	152.6	91.1	79.3	56.9	62.3	159.6	119.4	82.8	57.7	59.9	159.6																						
7-Jun	38.8	13.1	8.3	10.6	7.9	8.3	12.5	20.2	20.1	504.7	611.4	232.1	58.2	132.7	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	611.4																						
8-Jun	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	44.1																						
9-Jun	21.2	19.9	20.4	21.0	15.5	10.1	7.2	5.8	4.6	3.3	3.4	4.0	4.0	3.2	4.5	4.9	3.3	2.8	3.9	4.0	3.5	2.8	2.4	2.3	7.4	21.2																						
10-Jun	3.5	3.8	3.6	3.4	3.5	2.7	2.0	1.7	2.1	2.2	2.2	2.6	2.6	2.4	2.2	2.3	2.3	2.7	2.9	3.4	3.5	3.8	4.0	3.5	2.9	4.0																						
11-Jun	3.5	3.3	2.9	2.7	3.2	4.5	4.4	3.6	4.2	4.3	3.7	3.9	4.5	6.5	5.0	5.0	5.6	8.0	7.0	4.8	5.0	4.4	4.3	4.7	4.6	8.0																						
12-Jun	3.9	3.7	4.1	4.2	6.3	8.1	7.5	6.4	4.4	5.4	4.6	6.5	6.3	6.6	7.1	9.5	5.7	4.4	4.9	5.2	5.2	5.4	5.7	5.3	5.7	9.5																						
13-Jun	5.6	5.8	5.9	5.8	5.7	4.0	2.1	1.9	2.2	2.0	2.0	2.3	2.7	2.9	3.0	3.5	4.0	4.9	5.2	5.9	7.2	6.8	4.7	10.2	4.4	10.2																						
14-Jun	3.8	3.8	3.7	3.7	2.7	2.4	2.0	1.6	4.4	4.9	8.0	4.1	6.7	3.6	2.7	2.9	3.4	13.6	23.7	21.8	13.3	6.1	4.1	6.3	23.7	6.3	23.7																					
15-Jun	9.7	11.6	3.9	1.4	1.3	1.3	4.1	4.6	3.2	2.4	2.4	1.9	2.2	1.7	1.4	1.2	2.3	3.0	5.4	7.3	5.4	3.9	4.6	5.5	3.8	11.6																						
16-Jun	3.5	3.2	3.0	2.3	2.4	2.3	2.4	1.9	1.6	2.4	2.6	2.2	1.8	1.7	1.9	3.6	2.2	2.1	2.3	2.7	3.8	3.5	3.3	2.7	2.6	3.8																						
17-Jun	2.5	2.6	2.1	1.9	2.4	2.5	2.8	1.9	2.2	2.2	2.1	2.3	2.2	1.9	2.0	2.5	2.8	2.8	2.4	2.5	2.5	3.3	4.6	3.5	2.5	4.6																						
18-Jun	5.1	9.1	16.2	14.5	12.3	9.3	5.8	3.9	3.6	3.1	2.7	2.7	2.3	2.4	2.8	4.7	4.7	8.0	25.8	6.1	22.1	25.0	38.7	18.8	10.4	38.7																						
19-Jun	16.9	12.9	21.2	19.3	15.5	12.7	8.3	3.0	2.3	1.9	1.9	2.5	1.7	1.9	1.8	3.1	2.8	4.5	6.7	7.6	13.6	17.7	14.3	14.8	8.7	21.2																						
20-Jun	14.2	15.1	13.3	10.7	9.1	8.4	11.8	7.1	41.1	22.5	11.1	11.4	12.7	4.5	2.3	2.7	6.3	4.1	2.5	3.4	5.9	5.5	3.8	2.7	9.7	41.1																						
21-Jun	2.7	6.1	16.7	20.0	20.2	15.5	8.3	4.3	4.7	5.3	6.5	5.6	3.9	3.5	12.3	29.0	12.9	8.4	15.7	22.3	57.7	124.0	140.5	86.1	26.3	140.5																						
22-Jun	73.0	56.2	51.3	56.3	44.5	16.3	4.8	2.6	PF	PF	PF	PF	PF	PF	PF	7.5	5.6	4.9	4.8	4.6	6.6	8.0	12.3	22.7	--	73.0																						
23-Jun	33.4	37.6	35.1	36.6	31.7	36.7	50.4	39.8	19.7	5.9	3.7	3.5	6.4	9.1	23.0	21.1	23.3	21.4	19.6	29.3	62.5	46.2	33.8	29.7	27.5	62.5																						
24-Jun	27.5	31.3	24.3	13.9	11.6	13.8	9.9	6.7	5.7	5.1	4.2	3.9	7.0	16.2	37.7	71.2	134.0	81.6	37.0	12.6	26.8	41.1	39.4	29.4	28.8	134.0																						
25-Jun	33.7	36.5	28.6	25.9	20.5	18.7	15.1	24.2	27.0	15.2	11.6	10.3	12.0	12.4	11.7	10.8	10.8	11.1	15.2	16.5	17.9	19.5	17.9	10.1	18.1	36.5																						
26-Jun	8.0	4.7	5.6	8.2	9.3	10.2	12.7	10.7	9.1	8.5	8.4	9.7	7.4	4.1	5.1	17.5	51.9	56.1	67.1	22.0	22.5	41.4	63.2	62.4	21.9	67.1																						
27-Jun	84.2	144.2	87.8	38.0	74.5	345.0	126.7	51.5	42.8	49.1	52.0	22.9	6.9	13.1	17.2	25.3	39.3	53.1	56.8	60.4	64.9	71.2	67.5	71.7	69.4	345.0																						
28-Jun	66.5	66.1	65.5	63.7	93.3	352.0	927.6	1165.8	205.8	98.6	27.2	59.4	82.5	98.7	121.6	94.4	101.7	169.6	156.5	154.9	122.7	127.0	137.1	142.5	195.9	1165.8																						
29-Jun	135.7	115.6	125.6	226.5	432.4	191.7	180.8	457.4	1507.5	1421.0	762.2	977.2	504.6	885.9	411.5	142.8	74.9	76.5	87.1	106.8	106.7	103.1	139.4	362.9	397.3	1507.5																						
30-Jun	326.6	272.2	260.6	193.2	147.6	63.4	73.5	56.7	32.3	25.6	30.0	30.0	22.7	21.7	22.6	24.1	18.4	16.2	17.1	13.5	12.2	12.7	12.8	10.0	71.5	326.6																						
																								34.5	31.8	29.2	28.1	34.7	43.7	55.7	68.2	71.6	79.3	56.7	50.8	27.9	46.0	31.8	23.6	22.4	23.5	23.9	23.0	28.7	30.9	32.9	35.8	Diurnal Average
																								326.6	272.2	260.6	226.5	432.4	352.0	927.6	1165.8	1507.5	1421.0	762.2	977.2	504.6	885.9	411.5	152.6	134.0	169.6	156.5	154.9	159.6	127.0	140.5	362.9	Diurnal Maximum

M - Maintenance	AF - Analyzer Failure	PF - Power Failure
Alberta Ambient Air Quality Objectives (AAAQO):		24-hr 30 µg/m ³





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort Chipewyan - June 2015

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	283	41.37	41.37
6 - 15	166	24.27	65.64
16 - 25	55	8.04	73.68
26 - 80	91	13.30	86.99
> 81.0	64	9.36	96.35

Total Number of Valid Hours: 684

Total Number of Hours: 720



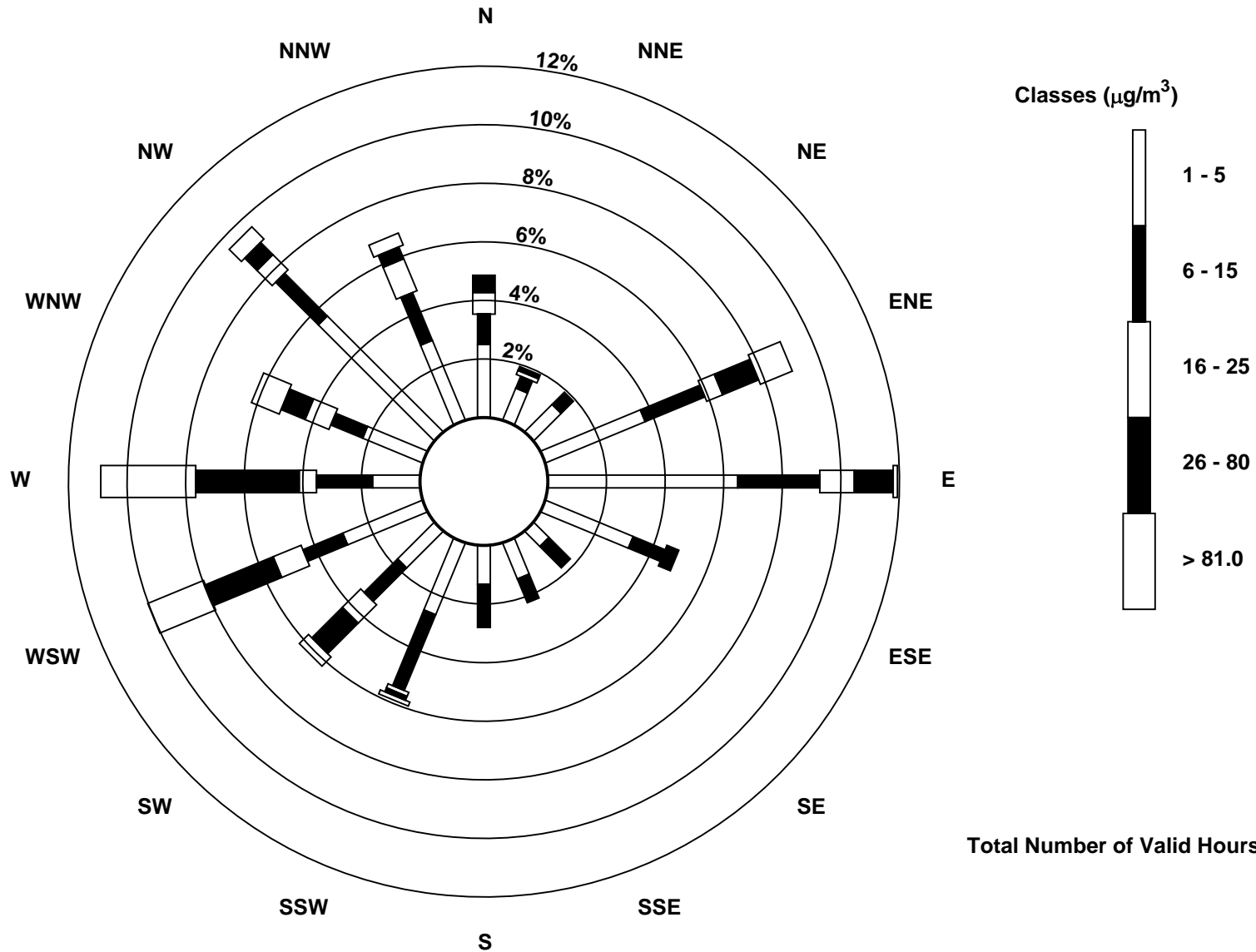
Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort Chipewyan - June 2015

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	17	8	9	25	44	22	5	9	9	18	12	20	11	15	38	20	282
6 - 15	7	3	4	15	19	8	7	6	10	19	11	10	13	8	14	12	166
16 - 25	5	1	0	4	8	0	0	0	0	1	6	7	4	6	5	8	55
26 - 80	4	1	0	9	9	3	0	0	0	1	10	17	24	6	4	3	91
> 81.0	0	0	0	8	1	0	0	0	0	1	3	14	22	7	4	3	63
Totals	33	13	13	61	81	33	12	15	19	40	42	68	74	42	65	46	657

Total Number of Valid Hours: 682

Total Number of Hours: 720



Total Number of Valid Hours: 679

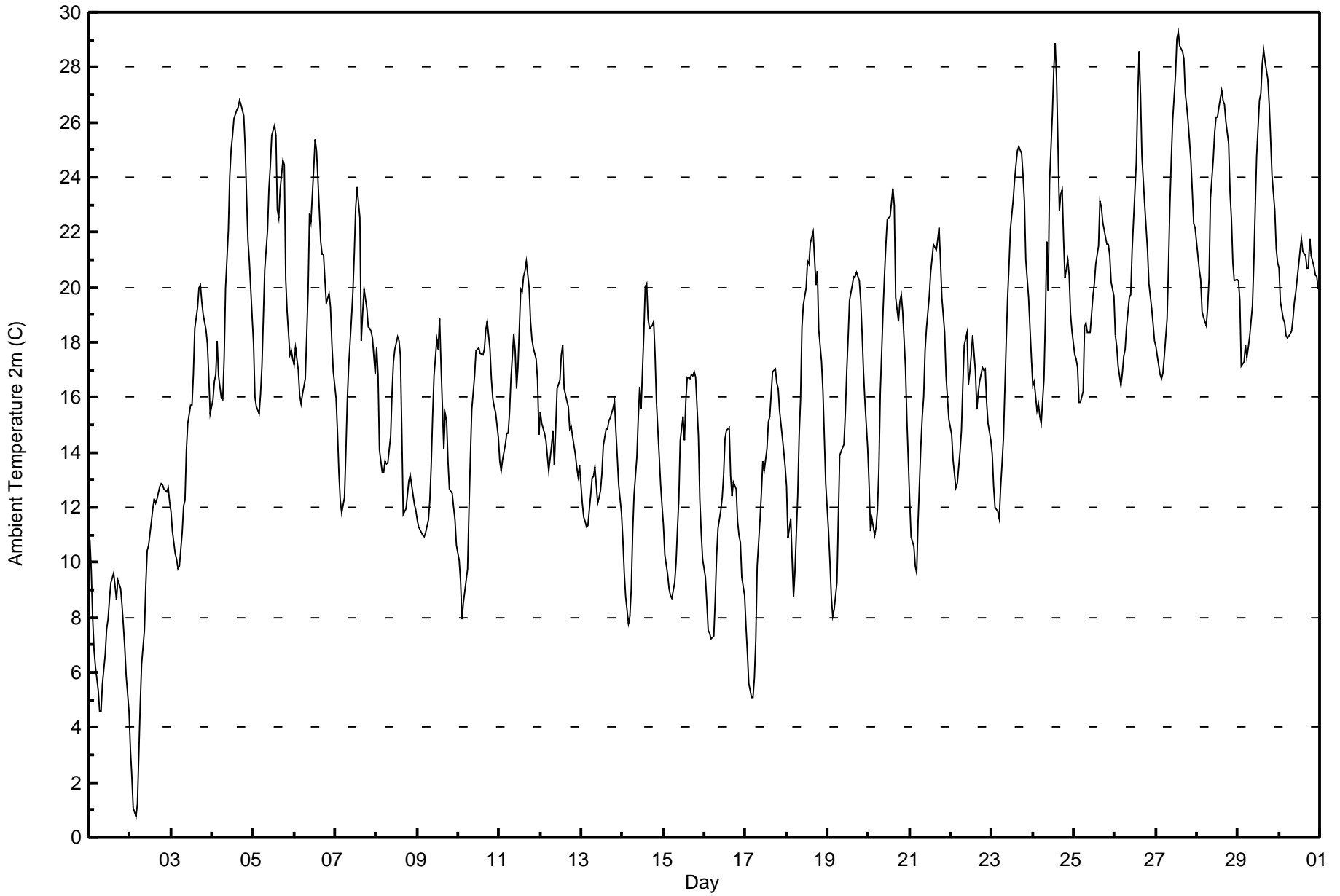


Maximum Value: 29.3 C on Jun 27 14:00 Maximum Daily Average: 23.4 C on Jun 27																						Hours in Service: 720 Hours of Data: 720																										
Minimum Value: 0.7 C on Jun 2 04:00 Minimum Daily Average: 7.5 C on Jun 1 Maximum Diurnal Average: 20.6 C at hour 14 Minimum Diurnal Average: 12.1 C at hour 5 Monthly Average: 16.65 C Percentiles: P ₁ = 4.6 P ₁₀ = 9.8 Q ₁ = 12.9 Median = 16.8 Q ₃ = 20.2 P ₉₀ = 23.6 P ₉₉ = 28.6																						Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jun	10.8	9.7	8.0	6.8	6.2	5.4	4.6	4.6	5.6	6.6	7.6	7.9	8.7	9.2	9.6	9.1	8.7	9.4	9.1	8.4	7.7	6.9	5.9	4.6	7.5	10.8																						
2-Jun	3.2	2.2	1.1	0.7	1.2	3.0	4.8	6.3	7.5	9.2	10.4	10.6	11.5	11.9	12.3	12.2	12.3	12.8	12.8	12.8	12.7	12.6	12.7	12.2	8.7	12.8																						
3-Jun	11.8	11.1	10.3	10.1	9.8	9.9	11.1	12.0	12.3	14.1	15.1	15.7	15.7	16.9	18.5	19.3	20.0	20.1	19.5	19.0	18.5	17.9	16.8	15.4	15.0	20.1																						
4-Jun	15.9	16.6	16.8	18.0	16.8	16.0	15.9	17.5	20.0	22.1	24.0	25.0	25.5	26.1	26.5	26.5	26.8	26.6	26.2	25.1	23.3	21.7	21.0	18.9	21.6	26.8																						
5-Jun	17.9	16.0	15.7	15.4	16.1	17.1	18.9	20.6	22.1	23.6	24.4	25.5	25.9	25.6	22.8	22.5	23.6	24.6	24.5	20.3	19.1	17.5	17.7	17.4	20.6	25.9																						
6-Jun	17.2	17.8	17.0	16.0	15.8	16.1	16.7	18.3	19.9	22.7	22.4	24.3	25.3	24.9	23.9	21.7	21.2	21.2	20.3	19.4	19.8	19.3	17.9	16.9	19.8	25.3																						
7-Jun	15.9	14.7	13.3	12.3	11.8	12.3	14.0	15.9	17.1	18.8	19.8	21.2	22.9	23.6	22.5	18.1	19.1	19.9	19.2	18.6	18.5	18.4	18.2	16.8	17.6	23.6																						
8-Jun	17.8	16.8	14.1	13.3	13.3	13.7	13.6	13.6	14.6	16.2	17.3	17.7	18.2	18.1	17.5	14.7	11.7	11.9	12.5	13.0	13.1	12.4	12.1	11.9	14.5	18.2																						
9-Jun	11.5	11.3	11.1	11.0	10.9	11.1	11.6	12.2	13.5	15.3	16.8	18.1	17.7	18.9	17.2	14.2	15.4	15.2	13.7	12.7	12.5	12.0	11.5	10.6	13.6	18.9																						
10-Jun	10.0	9.3	7.9	8.5	9.0	9.8	11.9	13.8	15.6	16.8	17.7	17.7	17.8	17.6	17.6	17.8	18.5	18.7	17.8	16.7	15.9	15.6	15.4	14.5	14.7	18.7																						
11-Jun	13.7	13.3	13.7	14.3	14.7	14.7	15.4	16.7	18.3	17.7	16.3	17.1	19.9	19.8	20.4	20.6	20.9	20.0	18.8	18.1	17.8	17.4	16.6	14.7	17.1	20.9																						
12-Jun	15.5	15.0	14.7	14.4	13.9	13.3	14.3	14.8	13.5	14.9	16.3	16.6	17.5	17.9	16.3	15.9	15.7	14.8	15.0	14.6	13.9	13.5	13.1	13.5	15.0	17.9																						
13-Jun	12.1	11.7	11.5	11.3	11.3	12.4	13.0	13.1	13.5	12.1	12.4	12.6	13.2	14.2	14.8	14.8	15.1	15.3	15.6	15.8	14.8	13.8	12.8	11.8	13.3	15.8																						
14-Jun	10.8	9.6	8.7	7.8	8.0	9.1	11.1	12.5	13.9	15.3	16.4	15.6	18.4	20.0	20.1	18.9	18.5	18.6	18.7	17.5	15.8	13.8	12.8	12.1	14.3	20.1																						
15-Jun	11.3	10.3	9.6	9.1	8.8	8.7	9.3	10.0	11.2	12.3	14.4	15.3	14.4	15.9	16.7	16.7	16.8	16.8	16.9	16.7	14.6	12.3	11.1	10.1	12.9	16.9																						
16-Jun	9.4	8.5	7.5	7.4	7.2	7.3	8.7	10.2	11.2	11.9	12.3	13.2	14.5	14.8	14.9	13.2	12.4	12.9	12.7	11.5	11.0	10.7	9.4	8.8	10.9	14.9																						
17-Jun	7.7	6.7	5.6	5.1	5.1	5.8	7.2	9.8	11.5	12.5	13.7	13.3	14.2	15.1	15.3	16.1	16.9	17.0	16.5	16.3	15.5	14.5	14.0	13.5	12.0	17.0																						
18-Jun	12.8	10.9	11.6	10.1	8.8	9.6	12.5	14.6	15.9	18.6	19.4	20.0	20.9	20.8	21.6	22.0	21.1	20.1	20.6	18.5	17.3	16.2	14.6	12.9	16.3	22.0																						
19-Jun	11.1	10.0	8.7	8.0	8.3	9.3	11.6	13.9	14.1	14.3	15.4	17.0	18.2	19.5	20.1	20.4	20.4	20.5	20.2	19.5	18.3	16.9	15.8	14.1	15.2	20.5																						
20-Jun	12.8	11.1	11.6	11.0	11.3	11.9	13.4	16.2	19.2	20.4	21.6	22.5	22.6	23.1	23.6	23.0	19.7	18.8	19.5	19.7	19.1	17.1	15.2	13.7	17.4	23.6																						
21-Jun	12.3	10.9	10.6	9.9	9.6	11.5	14.3	15.3	16.0	17.7	18.5	19.7	20.6	21.0	21.6	21.3	21.7	22.1	21.0	19.6	18.3	16.8	16.0	15.2	16.7	22.1																						
22-Jun	14.7	13.8	13.2	12.7	12.9	14.0	14.8	16.5	17.9	18.4	16.5	16.9	17.5	18.3	16.9	15.6	16.2	16.6	17.1	17.0	17.0	15.8	15.0	14.4	15.8	18.4																						
23-Jun	13.9	12.8	12.0	11.9	11.6	12.7	13.6	14.5	18.0	19.6	20.8	22.1	23.2	23.9	24.5	25.0	25.1	24.8	24.1	23.1	21.0	19.6	18.5	17.4	18.9	25.1																						
24-Jun	16.4	16.6	15.5	15.8	15.3	15.0	16.7	18.9	21.7	19.9	23.9	26.3	27.9	28.9	27.6	22.8	23.4	23.6	21.8	20.3	21.0	20.4	19.0	18.4	20.7	28.9																						
25-Jun	17.6	17.4	17.1	15.8	15.8	16.2	18.6	18.7	18.3	18.4	19.0	19.7	20.2	20.9	21.5	23.1	22.9	22.4	21.8	21.6	21.5	21.2	20.2	19.7	19.6	23.1																						
26-Jun	18.2	17.8	17.1	16.4	16.9	17.5	17.8	18.5	19.6	19.7	21.3	22.4	24.6	26.9	28.6	27.0	24.7	23.0	22.2	21.4	20.2	19.2	18.7	18.1	20.7	28.6																						
27-Jun	17.9	17.5	16.8	16.7	16.9	17.5	18.9	20.8	23.0	24.7	26.1	27.7	29.0	29.3	28.8	28.6	28.3	27.1	26.6	26.0	24.6	23.5	22.3	22.2	23.4	29.3																						
28-Jun	21.1	20.7	20.3	19.1	18.9	18.6	19.3	20.3	23.3	24.7	25.6	26.2	26.2	26.5	27.1	26.8	26.6	26.0	25.2	23.5	22.5	20.9	20.2	20.3	22.9	27.1																						
29-Jun	20.3	19.5	17.1	17.3	17.9	17.4	17.8	18.2	19.3	20.9	22.9	24.7	26.8	27.0	28.1	28.6	28.2	27.6	26.6	25.4	24.0	22.8	21.4	20.9	22.5	28.6																						
30-Jun	20.7	19.5	18.8	18.7	18.3	18.1	18.3	18.4	18.9	19.5	19.8	20.8	21.3	21.8	21.3	21.1	20.7	20.7	21.8	21.1	20.8	20.4	20.4	19.9	20.0	21.8																						
																								14.1	13.3	12.6	12.2	12.1	12.5	13.6	14.9	16.2	17.3	18.3	19.1	20.0	20.6	20.6	19.9	19.8	19.6	19.3	18.4	17.7	16.7	15.9	15.0	Diurnal Average
																								21.1	20.7	20.3	19.1	18.9	18.6	19.3	20.8	23.3	24.7	26.1	27.7	29.0	29.3	28.8	28.6	28.3	27.6	26.6	26.0	24.6	23.5	22.3	22.2	Diurnal Maximum



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature 2m (AT 2m) - C
Fort Chipewyan - June 2015





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ambient Temperature 2m (AT 2m) - C
Fort Chipewyan - June 2015

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	76	10.56	10.56
10 - 20	459	63.75	74.31
> 20	185	25.69	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



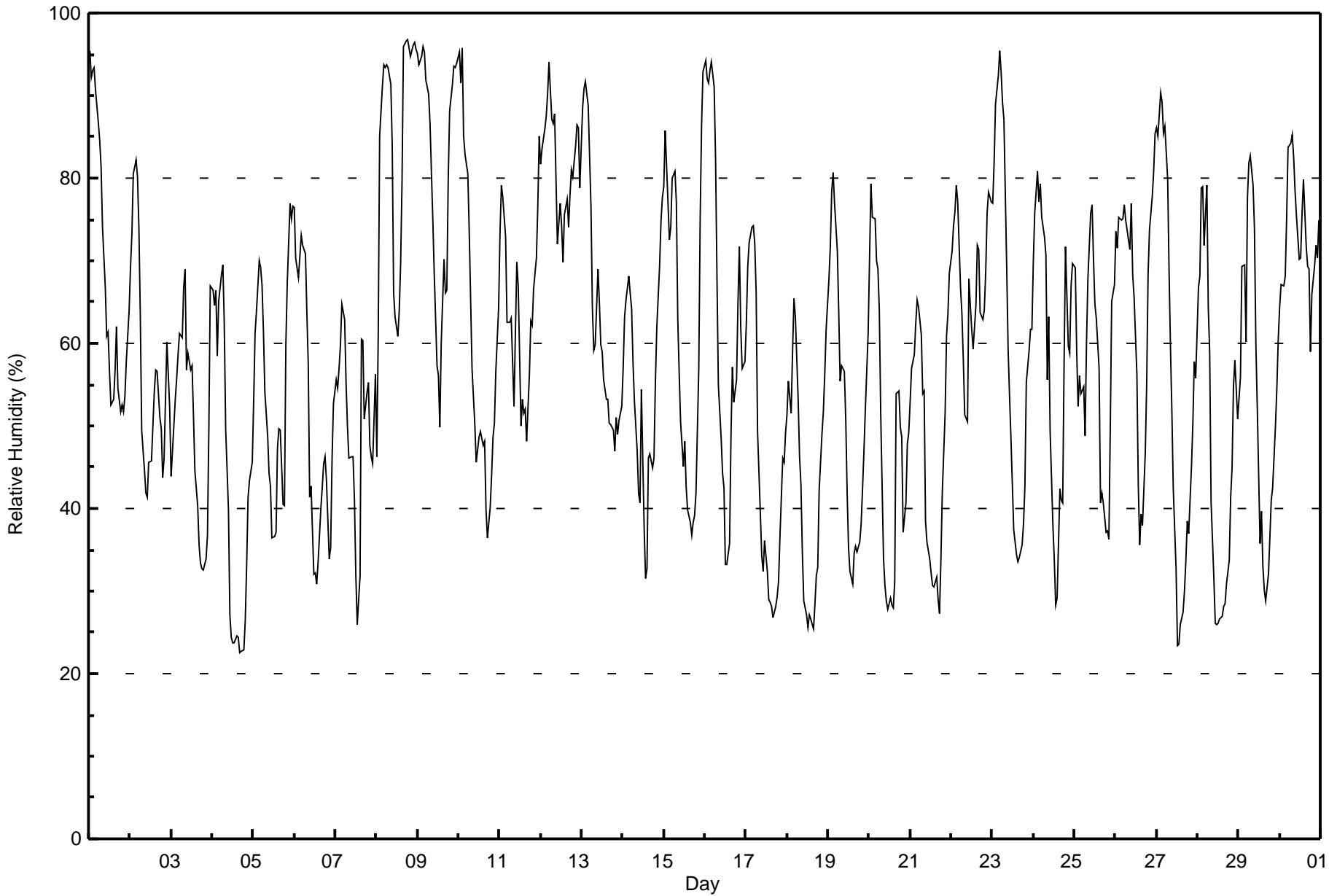
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Fort Chipewyan - June 2015

Maximum Value: 97 % on Jun 8 19:00																		Maximum Daily Average: 83.5 % on Jun 8																		Hours in Service: 720													
Minimum Value: 23 % on Jun 4 17:00																		Minimum Daily Average: 42.4 % on Jun 4																		Hours of Data: 720													
Maximum Diurnal Average: 76.1 % at hour 4																		Minimum Diurnal Average: 42.1 % at hour 14																		Hours of Missing Data: 0													
Monthly Average: 58.8 %																		Percentiles: P ₁ = 24 P ₁₀ = 33 Q ₁ = 45 Median = 59 Q ₃ = 73 P ₉₀ = 85 P ₉₉ = 96																		Hours of Calibration: 0													
																																				Percent Operational Time: 100.0													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jun	95	92	93	93	91	87	85	81	74	67	61	61	57	52	53	57	62	55	52	53	52	54	58	64	68.6	95																							
2-Jun	69	73	80	82	80	74	64	50	45	42	41	46	46	50	54	57	57	51	50	44	46	60	56	52	57.0	82																							
3-Jun	44	47	53	56	59	61	61	67	69	57	59	57	57	51	45	40	36	33	33	33	34	37	50	67	50.1	69																							
4-Jun	66	64	66	59	65	68	69	62	50	40	27	24	24	24	25	24	23	23	23	27	33	41	43	46	42.4	69																							
5-Jun	53	61	64	70	69	67	61	54	49	44	43	36	37	37	47	50	50	41	40	60	67	77	75	77	55.4	77																							
6-Jun	76	70	68	71	73	72	71	64	57	41	43	32	32	31	33	40	43	45	46	43	34	35	46	53	50.8	76																							
7-Jun	56	55	57	60	65	63	55	50	46	46	46	41	32	26	32	60	60	51	54	55	48	46	45	56	50.2	65																							
8-Jun	46	61	85	91	94	93	94	93	91	84	66	63	61	64	70	80	96	97	97	96	95	96	96	96	83.5	97																							
9-Jun	95	94	95	96	95	92	90	87	81	75	68	57	56	50	60	70	66	66	80	88	91	94	93	94	80.6	96																							
10-Jun	95	92	96	85	83	80	74	65	57	50	46	47	49	49	48	48	40	36	40	44	49	50	57	64	60.2	96																							
11-Jun	73	79	78	73	63	63	63	63	52	61	70	67	50	53	52	52	48	56	63	62	67	70	77	85	64.1	85																							
12-Jun	82	84	86	88	90	94	87	87	88	80	72	77	74	70	76	77	74	78	81	80	84	86	86	79	81.6	94																							
13-Jun	89	91	92	90	89	77	64	59	60	69	65	60	59	56	53	53	50	50	50	47	51	49	51	52	63.5	92																							
14-Jun	57	63	65	68	66	64	58	53	47	42	41	54	37	32	33	46	47	45	46	55	62	69	75	78	54.3	78																							
15-Jun	79	86	77	73	74	80	81	77	63	56	51	45	48	43	40	38	37	38	39	42	57	75	86	93	61.6	93																							
16-Jun	94	92	92	93	94	91	82	68	55	48	44	43	33	33	36	49	57	53	56	65	72	62	57	58	63.6	94																							
17-Jun	62	69	72	74	74	72	66	49	39	34	32	36	32	29	29	28	27	28	29	31	37	46	46	49	45.5	74																							
18-Jun	51	55	51	59	65	63	53	46	43	35	29	27	26	27	27	25	28	32	33	42	49	52	56	62	43.2	65																							
19-Jun	68	72	78	81	77	71	64	55	57	57	51	42	35	32	31	35	35	35	36	38	42	47	52	61	52.2	81																							
20-Jun	70	79	75	75	70	69	64	51	34	31	29	28	29	28	28	31	54	54	50	49	37	41	48	49	48.9	79																							
21-Jun	53	57	59	62	65	64	61	54	54	39	36	34	32	31	30	32	29	27	34	42	52	61	64	69	47.5	69																							
22-Jun	71	74	76	79	77	67	64	58	51	51	68	65	62	59	65	72	71	64	63	64	69	76	78	77	67.5	79																							
23-Jun	77	82	89	92	95	93	89	87	69	59	54	49	37	36	34	33	34	36	38	43	55	59	62	62	61.0	95																							
24-Jun	70	76	81	77	79	75	73	71	56	63	50	38	34	28	29	42	41	41	58	72	60	59	67	70	58.6	81																							
25-Jun	69	59	52	56	54	55	49	60	68	76	77	70	65	63	57	41	42	41	37	37	36	50	65	67	56.1	77																							
26-Jun	74	71	75	75	75	77	75	74	71	77	68	66	56	43	36	39	38	47	55	68	74	78	81	86	65.7	86																							
27-Jun	86	85	90	89	85	86	80	69	60	52	42	33	23	24	26	27	30	34	38	37	45	50	58	56	54.4	90																							
28-Jun	67	68	79	79	72	79	64	59	41	32	26	26	26	27	27	28	29	31	34	41	45	55	58	51	47.6	79																							
29-Jun	53	56	69	70	60	78	82	83	79	74	60	52	36	40	33	30	29	32	36	41	43	50	55	61	54.2	83																							
30-Jun	64	67	67	68	75	84	84	85	83	78	75	70	70	76	80	72	69	69	59	66	69	72	70	75	72.9	85																							
																								70.2	72.5	75.4	76.1	75.8	75.3	70.9	66.0	59.6	55.3	51.3	48.2	43.9	42.1	42.9	45.9	46.7	46.3	48.3	52.2	55.1	59.9	63.7	66.8	Diurnal Average	
																								95	94	96	96	95	94	94	93	91	84	77	77	74	76	80	80	96	97	97	96	95	96	96	96	Diurnal Maximum	





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Fort Chipewyan - June 2015

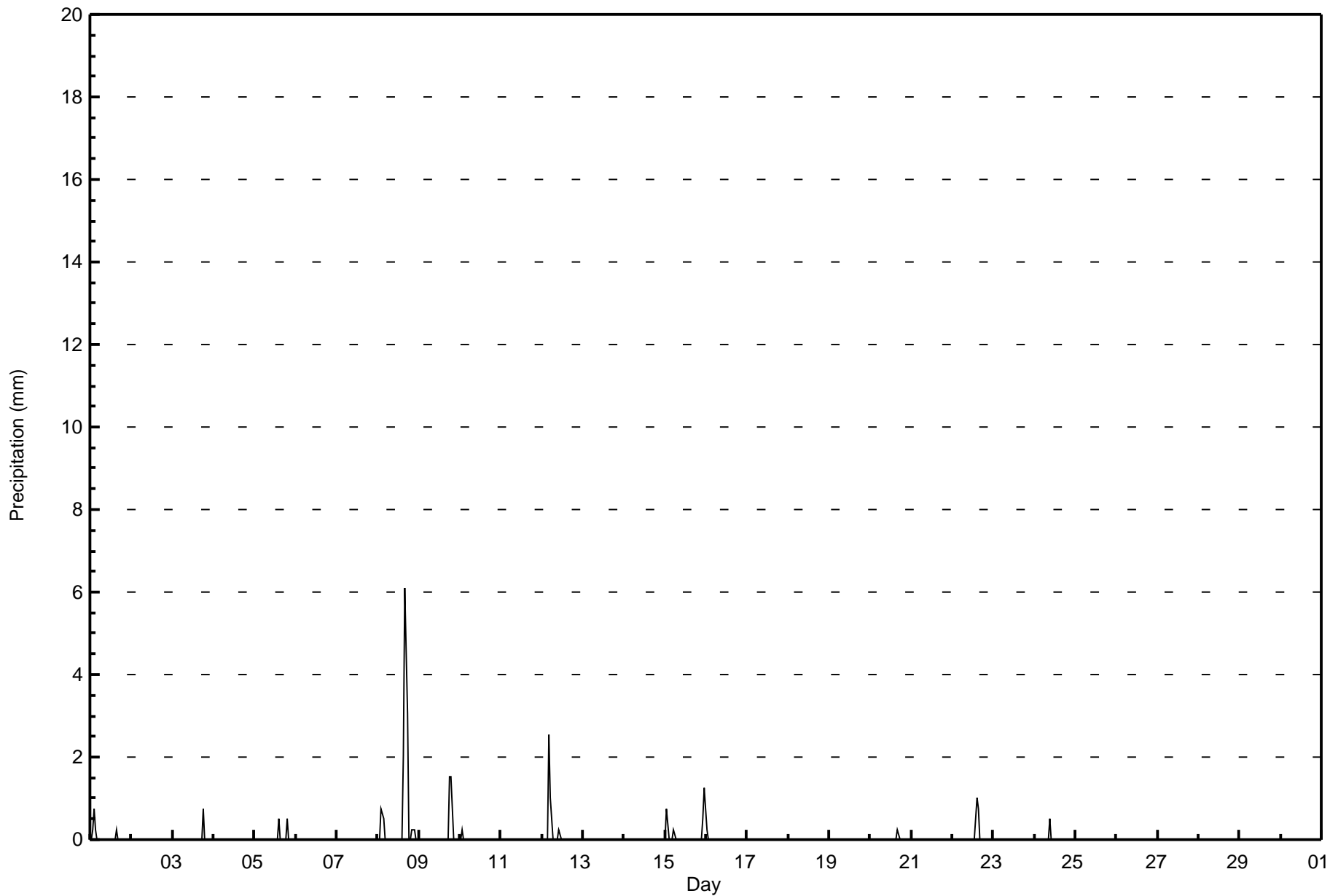
Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	137	19.03	19.03
40 - 60	243	33.75	52.78
60 - 80	238	33.06	85.83
80 - 100	102	14.17	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Maximum Value: 6.1 mm on Jun 8 17:00																			Maximum Daily Total: 13.0 mm on Jun 8						Hours in Service: 720		
Minimum Value: 0.0 mm on Jun 1 01:00																			Minimum Daily Total: 0.0 mm on Jun 2						Hours of Data: 720		
Maximum Diurnal Total: 6.4 mm at hour 17																			Minimum Diurnal Total: 0.0 mm at hour 7						Hours of Missing Data: 0		
Monthly Total: 28.96 mm																			Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 1.1						Hours of Calibration: 0		
																									Percent Operational Time: 100.0		
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	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	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.8	
2-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.8	0.8	
4-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	1.0	0.5	
6-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.8	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	6.1	3.0	0.0	0.0	0.3	0.3	0.0	0.0	13.0	6.1	
9-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	1.5	0.0	0.0	0.0	0.0	3.0	1.5	
10-Jun	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	
11-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	2.5	1.0	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	3.8	2.5	
13-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.8	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	0.5	1.3	2.8	1.3	
16-Jun	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	
17-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	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	0.3	0.3	0.3
21-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	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	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	1.0	1.8
23-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.5
25-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
																			Diurnal Average		Diurnal Maximum						
																			0.3		1.3						
																			0.3		0.8						
																			1.5		0.8						
																			2.5		1.3						
																			1.3		0.0						
																			0.0		0.0						
																			0.5		0.3						
																			0.3		0.0						
																			1.5		3.0						
																			3.0		6.4						
																			3.0		2.3						
																			2.0		0.3						
																			0.3		0.3						
																			0.5		1.3						
																			1.3		0.5						
																			1.3		0.5						





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Precipitation (PC) - mm
Fort Chipewyan - June 2015

Concentration Ranges (mm)	Number of Hours	%	Cumulative %
0 - 0.3	701	97.36	97.36
0.4 - 0.5	5	0.69	98.06
0.6 - 0.7	0	0.00	98.06
0.8 - 1.4	8	1.11	99.17
1.5 - 10	6	0.83	100.00
> 10	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

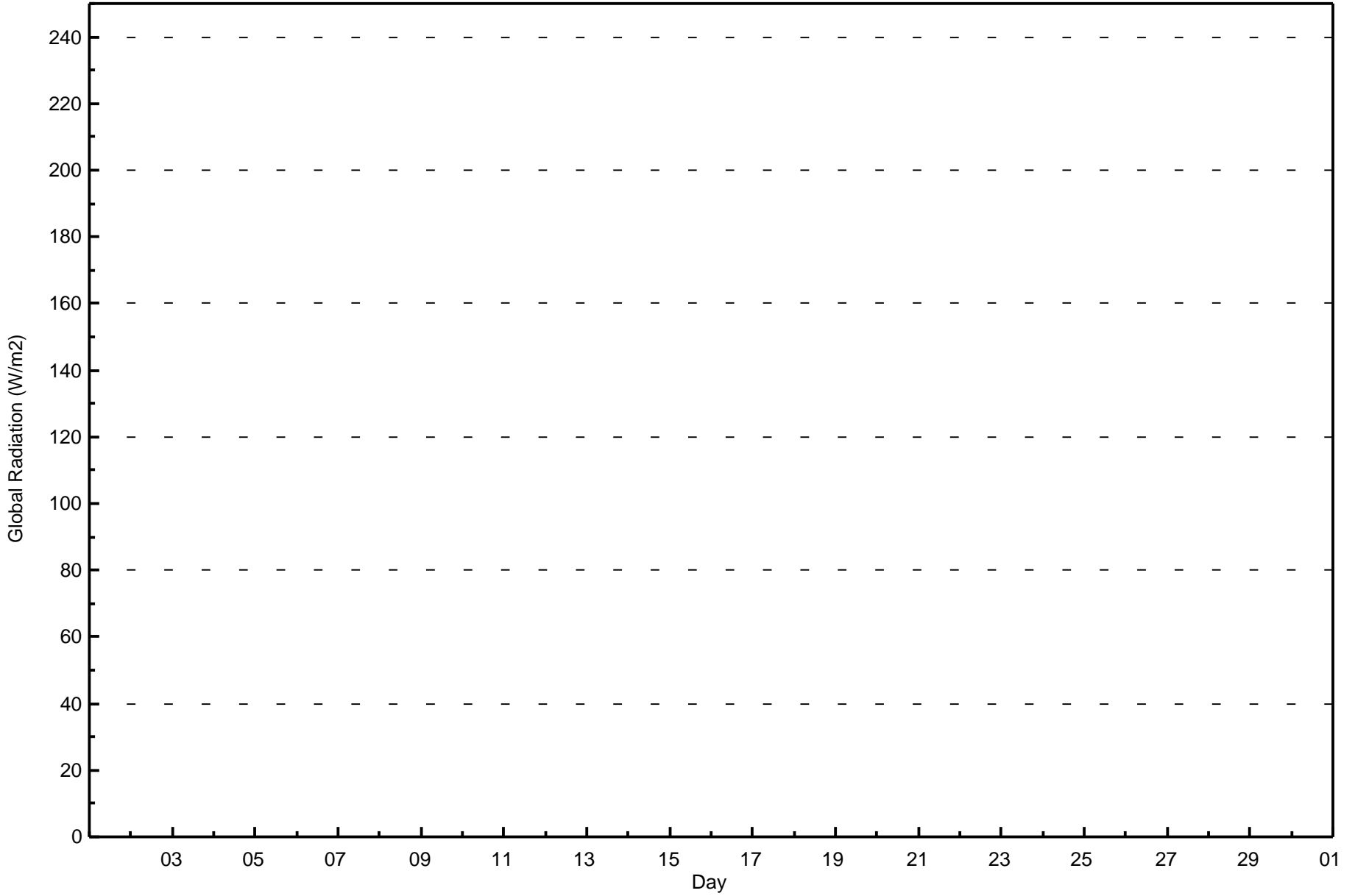


Maximum Value: -- W/m2 on Jun 1 00:00	Maximum Daily Average: -- W/m2 on May 31	Hours in Service: 720
Minimum Value: -- W/m2 on Jun 1 00:00	Minimum Daily Average: -- W/m2 on May 31	Hours of Data: 0
Maximum Diurnal Average: -- W/m2 at hour 0	Minimum Diurnal Average: -- W/m2 at hour 0	Hours of Missing Data: 720
Monthly Average: -- W/m2	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 0	Hours of Calibration: 0
		Percent Operational Time: 0.0

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

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--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Diurnal Maximum

AF - Analyzer Failure





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Global Radiation (GR) - W/m2
Fort Chipewyan - June 2015

Concentration Ranges (W/m2)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
21 - 100	0	0.00	0.00
101 - 300	0	0.00	0.00
301 - 600	0	0.00	0.00
601 - 900	0	0.00	0.00
> 900	0	0.00	0.00

Total Number of Valid Hours: 0

Total Number of Hours: 720



Maximum Speed: 42 km/h on Jun 13 13:00	Maximum Daily Speed Average: 21.9 km/h on Jun 13	Hours in Service: 720
Minimum Speed Value: 2 km/h on Jun 29 22:00	Minimum Daily Speed Average: 2.6 km/h on Jun 22	Hours of Data: 717
Maximum Diurnal Speed Average: 4.0 km/h at hour 17	Minimum Diurnal Speed Average: 0.8 km/h at hour 16	Hours of Missing Data: 3
Monthly Average Velocity: 0.5 km/h 315.1 deg	Percentiles: P ₁ = 2 P ₁₀ = 6 Q ₁ = 9 Median = 12 Q ₃ = 18 P ₉₀ = 22 P ₉₉ = 36	Percent Operational Time: 99.6

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	WNW12	NW19	NW22	NW21	NW22	NW21	WNW21	WNW23	WNW27	WNW29	WNW28	WNW29	WNW26	WNW28	NW28	WNW27	NW22	WNW21	NW20	NW17	NW15	NW15	NW13	NW11	NW21.4	WNW29	
2-Jun	NW9	WNW6	W9	W10	WNW8	W7	WNW7	WNW6	W6	SW8	SE8	ESE14	E15	E19	E23	E26	E30	E31	E30	ENE27	ENE27	E29	E30	E26	E10.8	E31	
3-Jun	ESE26	ESE24	ESE18	ESE15	ESE13	ESE13	ESE13	E18	E21	E20	E19	E22	E25	E25	E25	E25	ENE24	M	M	ENE22	ENE18	ENE14	E21	E18	E19.4	ESE26	
4-Jun	ESE16	SSE17	SSE16	S25	SE14	E13	E10	SSE10	SSE15	S21	S28	SSW31	S36	SSW29	SSW23	S22	SSW21	SSW24	SSW22	S20	S17	S20	SSW17	SW15	S18.2	S36	
5-Jun	SSW14	SW17	SW13	SSW11	SSW12	S17	S19	SSW18	SSW17	SSW18	SSW20	SSW22	SSW22	SSW21	WSW20	SSW7	SE18	SSE18	S14	NNW10	ENE7	E18	E15	ENE12	S11.1	SSW22	
6-Jun	E13	SE7	SSW7	SW8	WSW6	W10	WSW12	W10	WNW9	WNW13	WNW12	W11	WSW15	W19	WSW18	W13	W11	WSW10	W10	W11	W11	W12	W12	W12	W9.2	W19	
7-Jun	W14	W12	W11	W11	W12	W11	W14	W14	W15	WSW15	WSW19	WSW19	WSW20	WSW17	SW4	E16	E9	SSE10	S9	S12	SSW9	SSW7	SSW6	SW12	WSW8.7	WSW20	
8-Jun	WSW11	WSW18	W13	W9	WSW5	SE5	SW4	WSW5	WSW4	SSW5	SSW10	S9	S8	ESE11	E13	NNE9	N8	NNW6	W11	WNW11	NW13	NW11	NW11	NW9	W4.1	WSW18	
9-Jun	NW9	NW9	NW8	WNW9	WNW6	NW8	W7	W8	W10	WNW13	W15	W18	NW11	NE6	WSW3	WNW17	NE16	E12	NNE5	NE6	N3	NNW5	NW6	NW8	NW6.0	W18	
10-Jun	NW10	WNW5	WNW8	NW10	NNW10	NNW10	NW8	NW7	W5	SSW7	S7	SSE10	ESE14	E18	E23	E24	E23	E21	ENE21	ENE20	ENE19	ENE22	ENE23	ENE21	ENE8.5	E24	
11-Jun	E21	ENE19	E18	E18	ESE20	ESE21	ESE22	E19	SSE17	ESE17	E23	E19	SSE18	SE21	SE23	ESE22	ENE29	ENE32	E18	SSW18	SSE12	ESE21	E21	E20	ESE17.8	ENE32	
12-Jun	ESE13	SSE7	S4	SSE12	SSE19	NE4	NNW2	ESE2	E22	ENE25	E21	E24	E24	ENE28	ENE28	ENE26	ENE25	ENE27	E37	E25	ENE14	ENE14	ENE14	E10	E15.8	E37	
13-Jun	NE11	NNW7	NNW10	N11	N13	NE15	NE22	NE25	ENE22	ENE36	ENE34	ENE40	ENE42	ENE40	ENE39	ENE35	ENE31	ENE24	ENE23	NE20	NE18	NE16	NE15	NNE15	ENE21.9	ENE42	
14-Jun	NNE15	NNE15	N13	N14	NNE14	N11	NNE10	NNE8	N10	N11	NNE10	ESE10	N12	NNW13	NNE9	E13	ESE13	E8	NNW16	NNW17	NW16	NW16	NW15	NW13	N9.6	NNW17	
15-Jun	NW11	NW10	N11	N8	N5	NW4	NW6	WNW5	W7	WSW9	SSW10	SSW8	WSW8	WSW11	SW16	SW16	WSW14	WSW14	WSW14	WSW14	NW17	NW10	NW10	NW10	W6.8	NW17	
16-Jun	NW8	NNW10	NNW9	NNW8	NW10	NNW12	NNW11	N11	N12	N10	NNE8	N2	NW11	WNW14	WNW16	NW14	NNW17	NNW11	WNW9	W10	WNW10	N10	N8	NNW6	NNW9.2	NNW17	
17-Jun	NNW8	NW9	NW10	NNW10	NNW11	NW10	NNW11	NW13	NW11	WNW13	W8	WSW16	WSW19	WSW14	SW12	SW11	SW6	SSW9	SW11	SSW9	S10	SSE12	SSE15	S19	WSW6.3	S19	
18-Jun	S19	SSW18	SSW19	SSW14	SW11	SW11	SSW12	SSW12	SSW12	SSW15	SSW18	SW17	WSW16	WSW17	WSW18	WSW19	WNW16	W12	WNW13	NNW12	NNW8	N11	N10	N9	WSW9.3	WSW19	
19-Jun	N10	N9	NNW10	NNW11	NNW11	NNW12	N9	NE7	E7	ESE8	SE11	NE4	NW9	NW7	NW8	WSW12	WSW15	W13	WSW13	WSW12	WSW11	WSW11	W11	WNW10	WNW4.8	WSW15	
20-Jun	WNW9	NNW2	NNW4	NNW5	NNW5	NW6	NW7	W8	W11	WNW12	NW13	WNW12	WNW10	NW14	NW14	NNW12	N12	N8	NW9	NW10	NW9	NW8	NNW9	NNW10	NW8.4	NW14	
21-Jun	NNW10	NNW11	NNW13	NNW9	N9	N8	ENE7	ESE7	SE8	NW9	NW11	NW9	WNW8	W14	WNW14	W15	NW12	WNW14	W14	W12	WSW12	W12	W11	W11	WNW7.7	W15	
22-Jun	W10	W8	W8	W9	WNW10	NNW11	N8	NW10	NW10	N8	E21	E22	E20	E18	ENE18	ESE9	E12	E12	ESE8	E9	S8	SW7	SW10	SW11	E2.6	E22	
23-Jun	SW12	WSW6	WSW6	WSW7	WSW5	WSW4	SW7	WSW8	SW14	SW13	SW12	SSW12	WSW13	WSW14	WNW11	WNW9	SW5	SW14	SW10	WSW10	SW9	SW11	SW11	SW13	WSW9.3	SW14	
24-Jun	SW10	WSW8	WSW7	WSW10	SW10	SW8	SW10	SSW14	SSW13	WSW11	SSW14	SW26	WSW21	WSW24	W18	NNW19	NNW7	NNW8	E8	ESE10	SW4	W8	NW9	NNW10	WSW7.8	SW26	
25-Jun	N13	N14	N14	N4	NNE7	N8	ENE7	E13	E16	E18	E19	ESE19	E20	E21	E20	E20	E23	ENE19	ENE24	ENE22	ENE17	ENE14	E17	E14	SE5	ENE13.2	ENE24
26-Jun	SE4	S6	SW9	WSW7	ESE3	SE6	SE6	SSE6	S7	ESE2	E7	E11	ESE9	WSW8	WSW17	W20	WNW15	WNW12	W11	WSW11	WSW11	WSW9	W11	W11	WSW4.8	W20	
27-Jun	W12	W11	W8	W9	W11	WSW10	W12	W15	WSW13	WSW15	WSW18	WSW19	W22	W21	WSW18	SW19	SW17	WSW9	W2	ENE3	ESE3	E6	ENE6	ENE4	WSW9.6	W22	
28-Jun	ESE2	E5	ESE3	SW5	W12	W13	W11	W11	W15	W20	W22	W20	NW17	WNW17	WNW16	NW12	NNW9	WNW5	W4	WSW3	WSW5	W2	WSW5	WNW8	WNW8.6	W22	
29-Jun	NW7	NW7	WNW8	WNW8	WNW6	W7	WSW4	WSW6	SW8	W8	WSW6	SSW8	WSW8	SW14	SW11	SW10	SW12	WSW6	AF	W3	ENE3	E2	ENE9	ENE9	WSW4.6	SW14	
30-Jun	ENE8	ENE10	ENE12	ENE10	ENE15	ENE18	ENE18	ENE21	ENE17	E17	E20	E19	E11	E7	E11	ENE12	E17	E10	ENE12	E14	E13	E11	E10	E11	E13.4	ENE21	

NNW1.8	WNW2.5	WNW3.3	WNW3.4	NW2.6	NNW2.7	NW1.7	W1.3	WSW1.8	WSW1.5	S2.6	S3.7	SSW2.4	SW2.0	WSW0.8	NE0.8	ENE4.0	ENE2.3	ENE1.3	NE1.2	N1.3	NE2.2	NE2.5	NNE1.5	Diurnal Average	
ESE26	ESE24	NW22	S25	NW22	ESE21	ESE22	NE25	WNW27	ENE36	ENE34	ENE40	ENE42	ENE40	ENE39	ENE35	ENE31	ENE32	E37	ENE27	ENE27	E29	E30	E26	Diurnal Maximum	

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

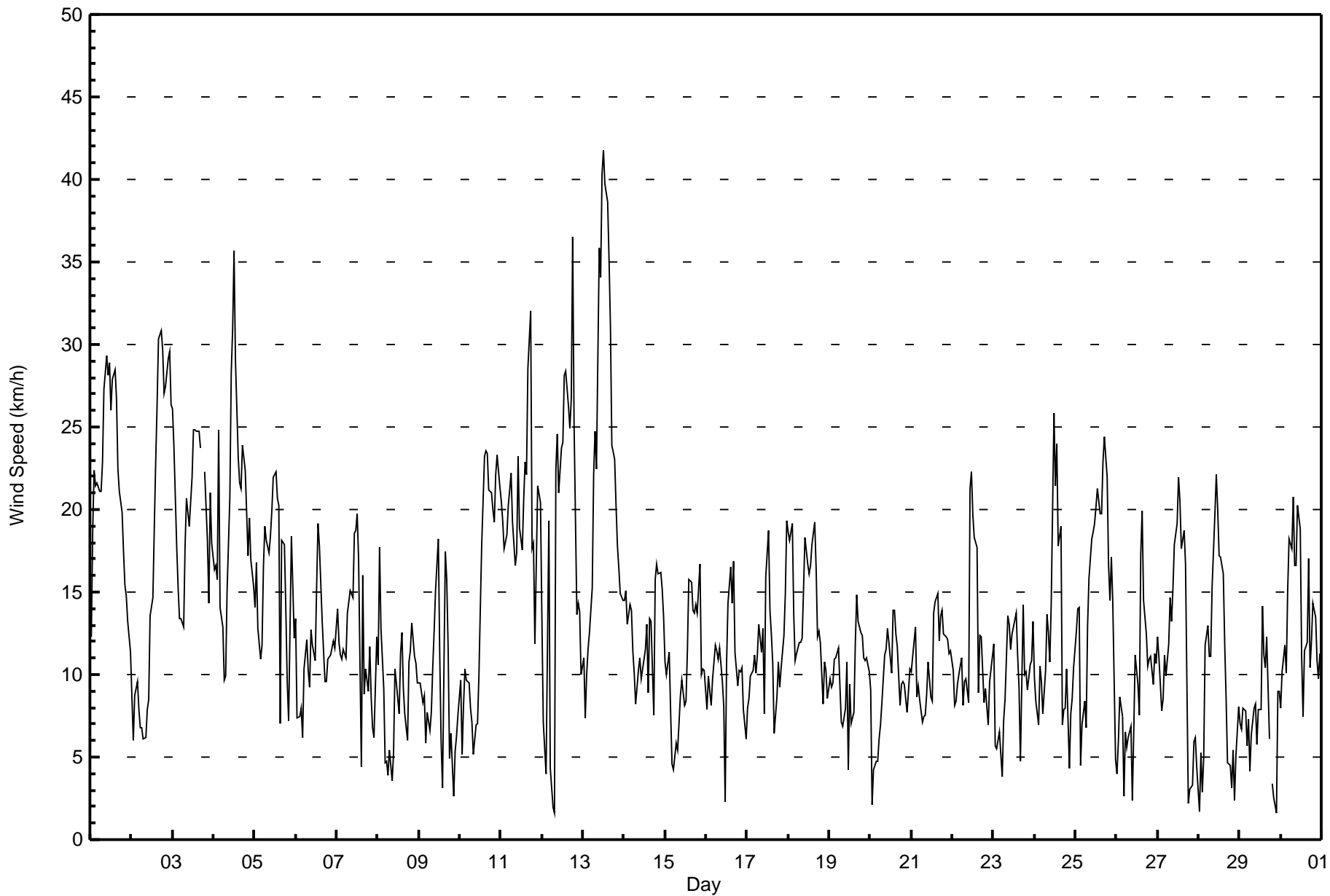
Wind Speed (WS) - km/h
Fort Chipewyan - June 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 10 km/h on Jun 5 15:00	Hours of Data: 717
Minimum Value: 1 km/h on Jun 28 19:00	Hours of Missing Data: 3
Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 8	Hours of Calibration: 0
	Percent Operational Time: 99.6

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

5	6	7	6	7	7	6	7	8	8	9	8	8	8	10	8	8	8	6	10	7	7	5	5	5	
Diurnal Maximum																									

M - Maintenance AF - Analyzer Failure





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Fort Chipewyan - June 2015

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	53	7.39	7.39
6 - 11	292	40.73	48.12
12 - 19	245	34.17	82.29
20 - 28	106	14.78	97.07
29 - 38	17	2.37	99.44
> 38	4	0.56	100.00

Total Number of Valid Hours: 717

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Fort Chipewyan - June 2015**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	4	2	1	3	2	6	3	0	1	2	4	10	5	3	1	6	53
6 - 11	23	7	4	10	16	8	6	5	8	13	24	27	43	22	46	30	292
12 - 19	8	5	5	18	32	13	2	11	7	20	17	32	27	19	19	10	245
20 - 28	0	0	3	22	32	7	2	0	6	8	1	4	6	8	7	0	106
29 - 38	0	0	0	6	6	0	0	0	1	2	0	0	0	2	0	0	17
> 38	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	4
Totals	35	14	13	63	88	34	13	16	23	45	46	73	81	54	73	46	717

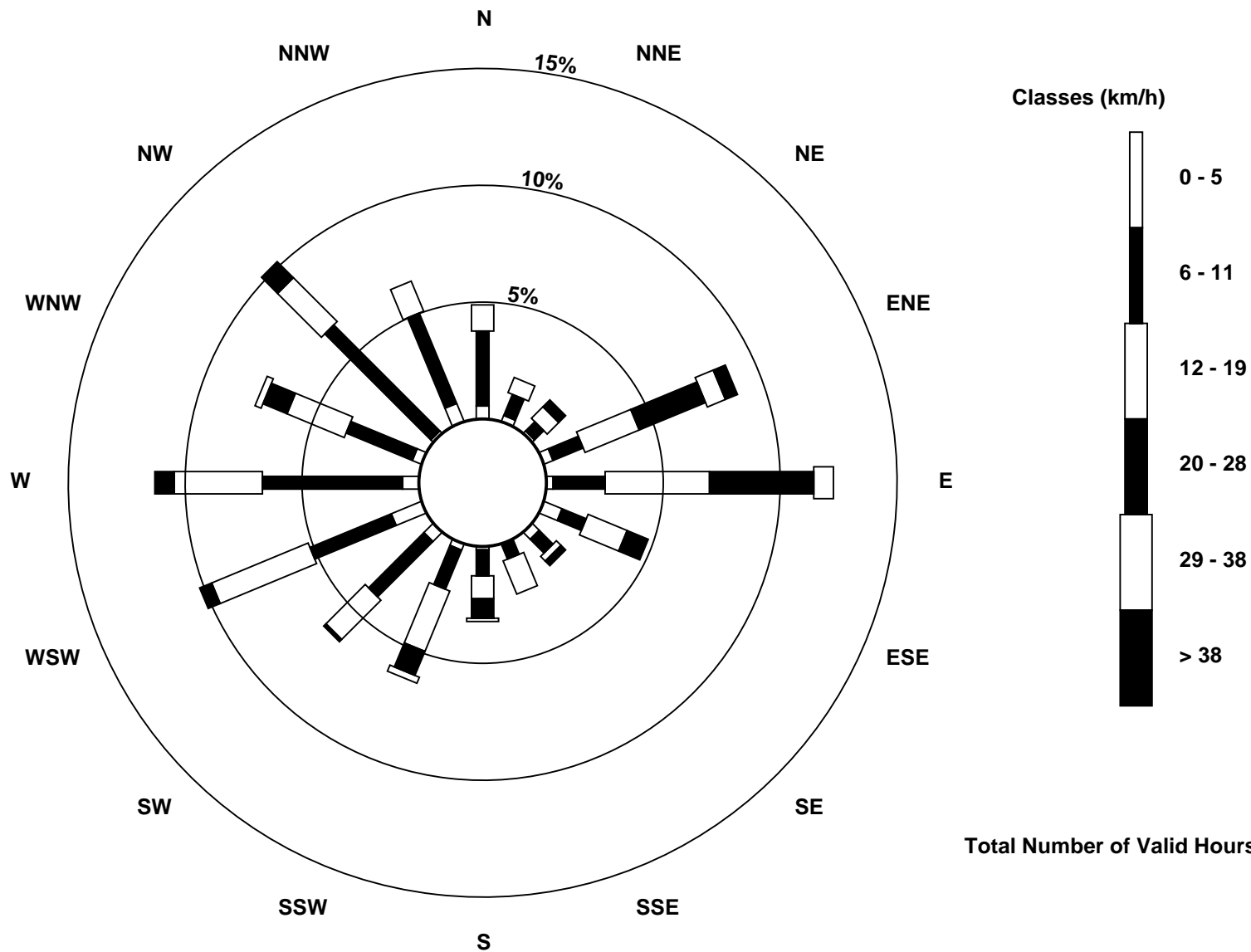
Total Number of Valid Hours: 717

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

Wind Speed (WS) - km/h
Fort Chipewyan (AMS 8)





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Fort Chipewyan - June 2015

Direction of Maximum Speed: 73 deg on Jun 13 13:00 Direction of Maximum Daily Speed Average: 58.7 deg on Jun 13	Hours in Service: 720 Hours of Data: 717 Hours of Missing Data: 3
Direction of Minimum Speed: 96 deg on Jun 29 22:00 Direction of Minimum Daily Speed Average: 2.6 deg on Jun 22	Percent Operational Time: 99.6
Monthly Average Direction: 282.0 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	303	317	314	312	314	311	297	293	296	297	298	292	298	303	308	300	305	295	306	313	320	316	316	314	304.4
2-Jun	308	292	270	272	287	281	301	303	270	230	146	107	101	95	90	88	87	84	82	75	71	84	97	97	85.6
3-Jun	102	110	111	108	115	111	105	91	89	91	93	92	92	92	88	82	75	M	M	63	65	73	87	99	91.6
4-Jun	123	157	167	176	137	100	99	150	165	177	191	194	189	195	198	185	192	198	193	186	180	186	195	217	180.4
5-Jun	209	214	216	210	198	188	184	199	206	198	194	201	197	204	246	206	142	155	173	340	68	96	80	70	187.7
6-Jun	82	137	204	224	249	276	246	264	301	302	284	272	256	265	251	259	265	258	276	271	264	262	265	264	262.6
7-Jun	267	272	276	278	276	271	275	281	275	255	242	239	237	249	218	95	100	163	177	191	201	199	206	226	243.0
8-Jun	253	258	263	260	238	135	222	247	252	197	194	190	174	106	100	22	353	332	280	289	308	314	314	309	268.3
9-Jun	312	310	306	298	299	317	272	276	277	283	275	268	319	35	241	284	50	90	22	42	4	332	322	321	308.3
10-Jun	312	302	302	324	332	329	316	311	274	206	189	148	114	93	89	89	84	80	75	64	63	67	71	71	68.6
11-Jun	79	77	83	94	107	105	103	100	147	103	87	90	158	139	129	119	77	66	89	194	161	112	98	79	103.6
12-Jun	114	156	172	154	166	34	348	117	84	75	86	90	80	63	62	65	72	68	82	83	61	57	69	81	81.2
13-Jun	38	344	340	353	359	37	51	51	66	77	70	73	73	70	72	66	66	65	64	56	53	45	43	33	58.7
14-Jun	25	21	5	359	14	7	19	23	359	357	16	110	360	339	12	100	102	85	335	326	324	325	322	4.2	
15-Jun	317	316	4	2	357	318	306	294	270	244	197	193	256	223	217	236	244	238	239	242	306	322	323	325	270.7
16-Jun	319	333	334	328	323	330	340	359	10	357	23	356	308	298	290	319	332	330	302	261	289	357	6	335	327.4
17-Jun	336	325	322	329	328	317	327	321	305	292	272	253	240	239	231	223	219	206	216	207	182	159	166	176	253.2
18-Jun	189	210	196	203	219	214	213	211	202	203	213	232	247	245	249	252	288	275	303	346	346	5	350	5	238.2
19-Jun	2	354	341	342	343	343	357	35	97	107	125	38	312	308	312	249	238	259	245	238	248	253	263	290	297.5
20-Jun	287	337	343	344	333	305	306	277	279	282	304	297	293	307	310	331	2	8	312	322	326	326	332	333	314.2
21-Jun	337	336	345	343	352	7	71	110	140	323	311	318	293	281	286	276	311	302	278	262	248	262	276	274	301.0
22-Jun	269	278	277	279	293	336	350	313	313	11	92	93	99	101	75	114	95	96	103	100	184	223	236	234	82.1
23-Jun	233	252	246	251	256	245	226	240	218	221	214	211	255	255	286	282	229	224	233	239	234	235	231	225	237.3
24-Jun	233	246	249	257	230	223	226	196	209	254	205	229	246	251	273	327	336	333	93	108	214	259	321	343	248.8
25-Jun	360	3	11	351	20	10	69	101	92	96	98	105	94	89	92	88	88	78	70	67	67	88	81	138	76.5
26-Jun	128	189	225	240	106	143	145	162	175	114	89	93	104	237	245	275	295	284	265	252	248	245	263	270	238.8
27-Jun	277	278	269	270	261	257	259	260	250	241	253	257	273	269	256	236	235	258	264	67	107	85	64	73	257.9
28-Jun	115	81	110	215	263	277	276	271	278	276	273	280	306	301	298	322	344	296	275	252	249	260	241	283	283.5
29-Jun	310	308	286	294	299	270	258	237	226	269	245	193	257	228	226	223	233	243	AF	262	64	96	64	62	252.5
30-Jun	63	71	63	61	74	74	75	78	76	80	79	83	87	101	91	78	89	90	69	79	79	79	83	92	78.8

328.6	302.2	301.1	288.5	303.9	328.0	313.7	279.9	237.4	243.5	178.1	178.5	212.1	229.3	243.4	39.3	66.2	78.0	66.1	42.2	9.8	54.2	45.2	12.6
Diurnal Average																							

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Fort Chipewyan - June 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 95 deg on Jun 19 12:00	Hours of Data: 717
Minimum Value: 3 deg on Jun 10 16:00	Hours of Missing Data: 3
Percentiles: P ₁ = 4 P ₁₀ = 8 Q ₁ = 11 Median = 16 Q ₃ = 25 P ₉₀ = 38 P ₉₉ = 80	Hours of Calibration: 0
	Percent Operational Time: 99.6

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	23	20	18	19	17	18	16	17	17	18	18	18	20	18	20	20	21	20	20	22	22	20	20	20	23
2-Jun	16	19	10	7	7	14	29	54	53	49	42	14	9	7	4	4	5	6	6	7	10	7	7	7	54
3-Jun	6	9	10	11	9	6	11	5	4	5	4	4	4	4	5	9	10	M	M	9	8	8	7	15	15
4-Jun	14	11	12	11	20	8	28	30	12	11	12	13	11	14	16	14	11	12	12	7	5	4	12	9	30
5-Jun	13	9	11	13	14	8	7	14	10	16	14	16	13	28	33	56	26	10	55	57	37	10	12	10	57
6-Jun	9	22	21	12	27	27	18	17	28	23	16	28	25	19	16	18	16	14	16	12	12	12	11	11	28
7-Jun	13	13	13	13	16	14	13	15	15	22	16	16	17	23	75	11	13	12	12	11	15	17	31	11	75
8-Jun	18	15	16	19	23	30	28	19	28	36	11	15	26	14	13	61	39	48	14	14	18	17	15	15	61
9-Jun	16	14	13	14	21	19	27	22	20	20	20	17	32	66	90	21	25	16	92	27	49	20	14	9	92
10-Jun	10	33	14	11	13	15	15	20	49	44	49	18	18	6	4	3	6	8	9	9	8	8	8	8	49
11-Jun	6	6	7	10	11	8	10	12	16	14	4	12	17	14	11	14	7	10	38	23	28	7	12	7	38
12-Jun	23	24	41	30	9	52	81	88	14	10	10	4	12	14	9	10	9	9	12	14	13	10	10	23	88
13-Jun	26	18	18	18	19	19	12	13	14	9	12	8	9	10	10	11	10	10	11	11	11	10	11	12	26
14-Jun	16	13	19	18	17	20	20	43	41	40	60	37	50	35	62	28	12	25	26	23	21	21	23	22	62
15-Jun	22	20	23	20	20	22	15	26	35	31	29	36	36	29	14	22	20	19	15	13	34	21	20	21	36
16-Jun	20	20	19	18	19	21	26	29	34	35	49	92	43	32	24	31	29	34	33	33	19	29	20	18	92
17-Jun	16	14	12	13	13	18	21	23	26	29	64	26	25	25	30	37	58	43	24	12	13	5	6	5	64
18-Jun	10	9	7	10	13	10	11	13	12	13	21	21	23	22	20	21	15	16	27	24	22	23	25	18	27
19-Jun	15	19	16	16	15	19	22	38	41	21	24	95	52	65	59	40	30	21	16	12	13	9	12	11	95
20-Jun	11	80	74	21	51	16	20	17	21	29	29	40	46	27	32	29	29	50	18	26	24	14	15	14	80
21-Jun	13	12	16	22	18	20	25	14	32	47	37	57	59	26	33	21	31	24	20	15	13	15	14	13	59
22-Jun	12	13	20	11	16	25	25	28	29	55	7	6	5	8	51	38	10	9	11	16	22	14	15	10	55
23-Jun	12	13	18	17	31	26	17	32	12	15	20	23	29	32	31	42	72	14	12	11	10	11	10	10	72
24-Jun	14	13	15	13	10	15	26	16	31	28	12	15	20	18	28	22	29	33	55	25	25	26	21	16	55
25-Jun	15	17	14	51	21	24	40	7	5	8	5	8	4	5	4	5	5	8	8	8	9	14	11	27	51
26-Jun	48	33	17	16	67	34	27	32	30	75	9	6	29	73	22	21	18	15	16	15	14	12	15	12	75
27-Jun	12	11	11	11	11	12	14	13	19	19	20	18	18	17	20	13	13	22	76	40	32	26	34	35	76
28-Jun	77	11	28	56	14	14	16	16	16	16	16	23	20	20	21	31	26	30	14	22	11	69	15	13	77
29-Jun	12	21	18	16	32	17	34	20	11	20	39	9	31	11	18	19	15	24	AF	41	58	54	10	5	58
30-Jun	14	6	5	11	10	7	7	6	8	8	7	7	7	11	6	13	8	14	9	7	5	9	8	8	14

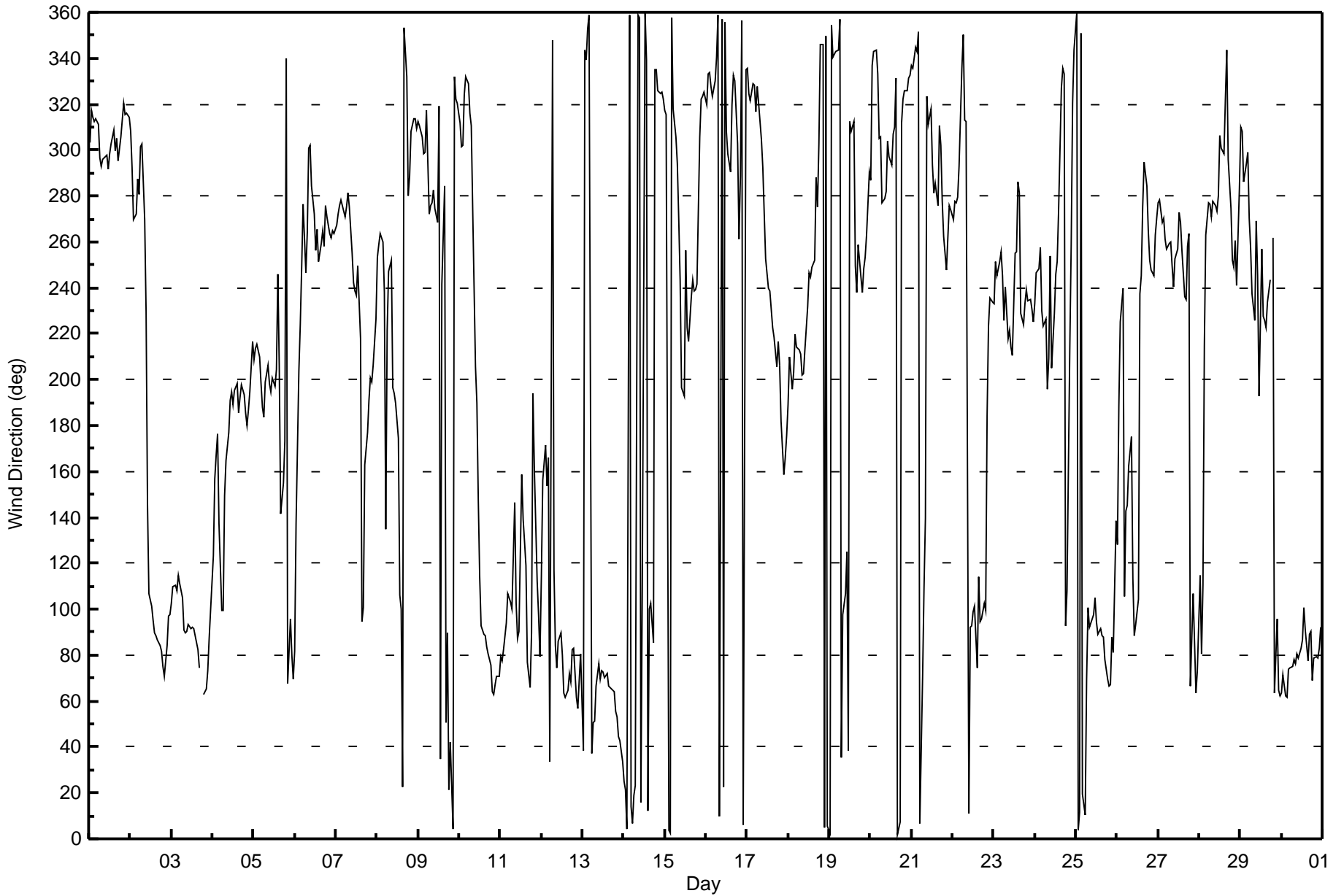
77	80	74	56	67	52	81	88	53	75	64	95	59	73	90	61	72	50	92	57	58	69	34	35	
Diurnal Maximum																								

M - Maintenance AF - Analyzer Failure



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Fort Chipewyan - June 2015





Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

Calibration Date	June 3, 2015	Last Calibration	May 6, 2015
Station Name	Fort Chipewyan	Station Number	AMS 8
Reason:	Routine		
Start Time (MST)	13:00	End Time (MST)	17:20
Gas Cert Reference	LL103809	Station temp.	22 Deg C
Cal Gas Concentration	2.45 ppm	Cal Gas Exp Date	16-Sep-16
Calibrator Make/Model	Teledyne API T700	Serial Number	747
ZAG Make/Model	Teledyne API 701	Serial Number	4698
DACS make/model	Campbell Scientific CR3000	DACS serial No.	8205

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 20 ppb		PMT voltage	-826	-826
Analyzer IP address	192.168.1.43		Lamp voltage	1004	994
Calculated slope	0.987080	0.993623	Chamber temp	45.0	45.0
Calculated intercept	-0.062865	-0.000811	Pressure	712.5	706.4
Analyzer Background	1.2	1.2	Flow	0.434	0.431
Analyzer Coefficient	1.035	1.035	Intensity	91	92

Analyzer make Thermo 43i-TLE Analyzer serial # 1136451241

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6000	0.0	0.0	0.1	----
as found span	6000	44.6	18.2	18.3	0.993
calibrator zero	6000	0.0	0.0	0.1	----
high point	6000	44.6	18.2	18.3	0.993
second point	6000	23.8	9.7	9.8	0.993
third point	6000	11.9	4.9	4.8	1.007
as left zero	6000	0.0	0.0	0.0	----
as left span	6000	44.6	18.2	18.0	1.010
Average Correction Factor					0.998

Corrected As found 18.3 Previous response 18.5 % change 1.2%

Notes:

No adjustments. As Found used as Calibrator Zero and High Point

Calibration Performed By: Ryan Power



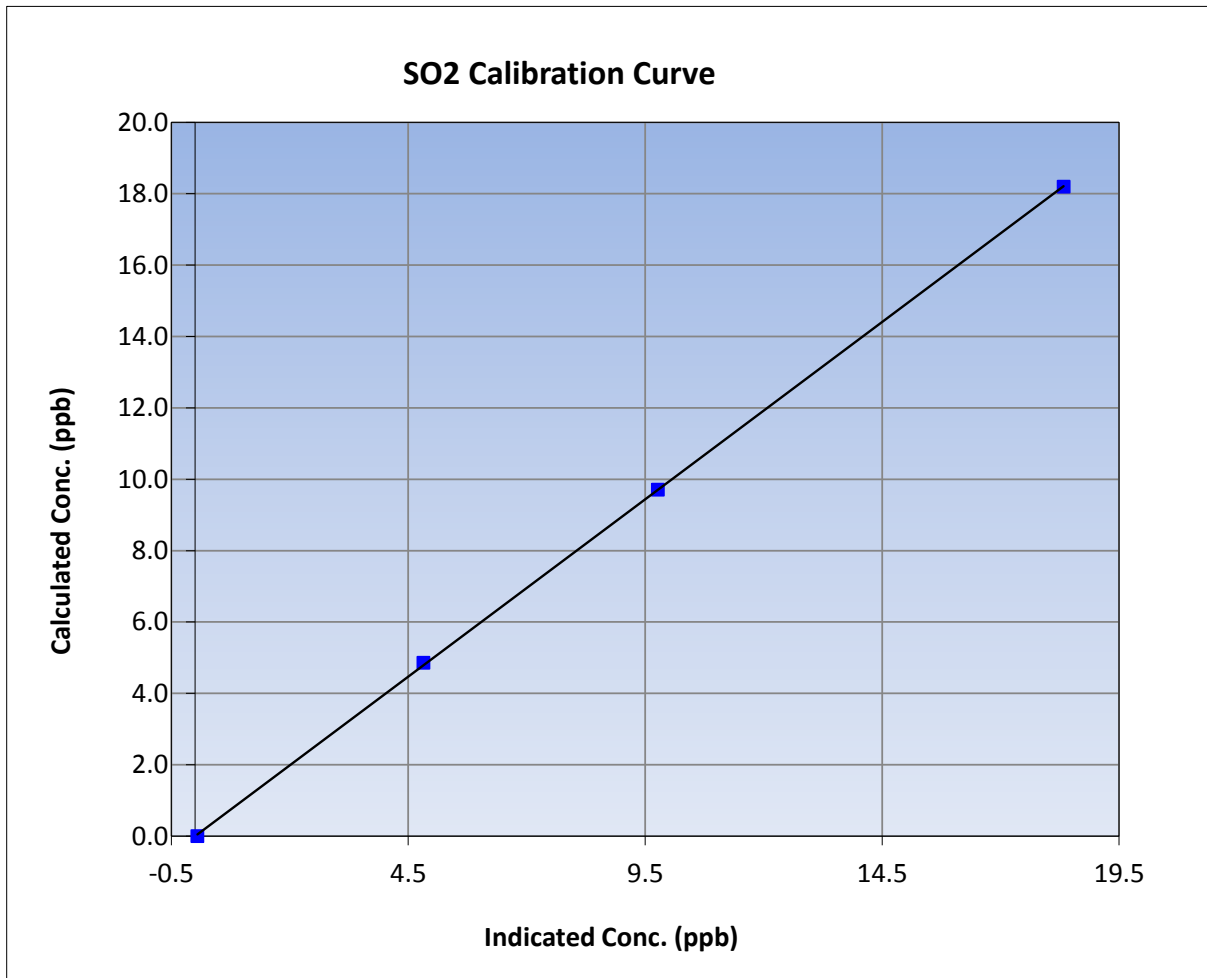
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	June 3, 2015	Previous Calibration	May 6, 2015
Station Name	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	13:00	End Time (MST)	17:20
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1136451241

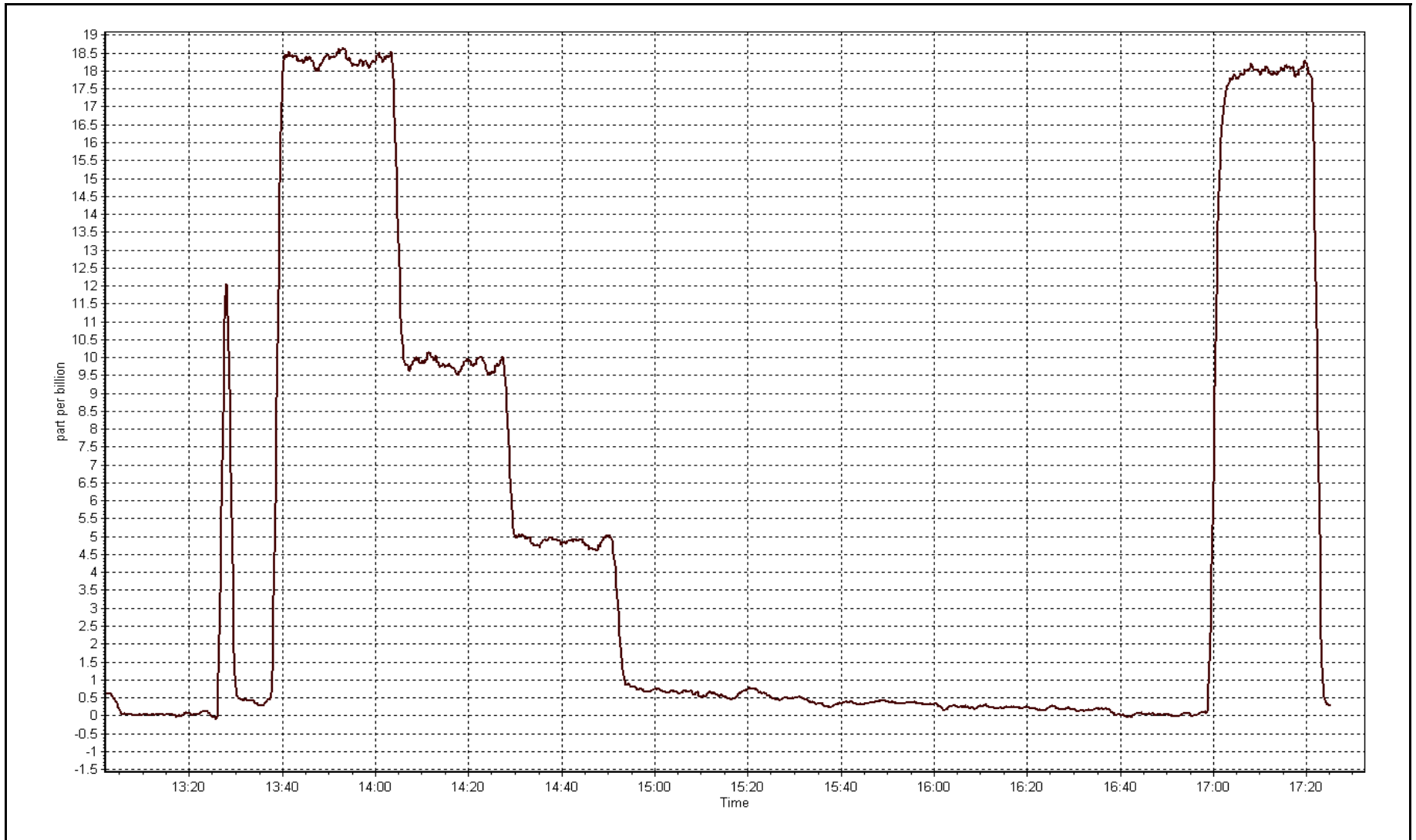
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	0.999961
18.2	18.3	0.9927		
9.7	9.8	0.9935	Slope	0.993623
4.9	4.8	1.0073		
			Intercept	-0.000811



SO2 Calibration Plot

Date: June 3, 2015





Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

Calibration Date	June 3, 2015	Previous Calibration	May 5, 2015
Station Name	Fort Chipewyan	Station Number	AMS 8
Reason:	Routine		
Start Time (MST)	17:25	End Time (MST)	20:00
NO2 GPT Ref date	June-03-15	Transfer Standard	NO2
		Station temp.	23 Deg C
Calibrator Make/Model	Teledyne API T700	Serial Number	735
ZAG make/model	Teledyne API 701	Serial Number	4698
DACS make/model	Campbell Scientific CR3000	Serial Number	8205

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 500 ppb		Bench temp.	26.5	27.5
Analyzer IP address	192.168.1.48		Lamp temp.	58.0	58.0
Calculated slope	0.994596	0.997612	Pressure	27.2	27.0
Calculated intercept	0.383582	0.549792	Flow cell A	0.773	0.757
Analyzer Background	0.0	0.0	Flow cell B	NA	NA
Analyzer Coefficient	0.987	1.026	Cell A Intensity	NA	NA
			Cell B Intensity	NA	NA

Analyzer make	Teledyne API T400	Analyzer serial #	1020
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Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator Lamp Intensity (mA) GenRef-GenDrv (mv)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6000	0.00	0.0	-0.3	----
as found span	6000	237.0 - 829.6	108.9	104.6	1.041
calibrator zero	6000	0.00	0.0	-0.3	----
high point	6000	237.0 - 829.6	108.9	108.9	1.000
second point	6000	177.9 - 789.4	83.2	82.8	1.005
third point	6000	114.1 - 732.9	56.2	55.3	1.017
as left zero	6000	0.00	0.0	0.0	----
as left span	6000	237.0 - 829.6	108.9	109.1	0.998
Average Correction Factor					1.007

Corrected As found	104.9	Previous response	109.1	% change	4.1%
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Notes:

Span adjusted. As Found Zero used as Calibrator Zero.

Calibration Performed By:

Ryan Power



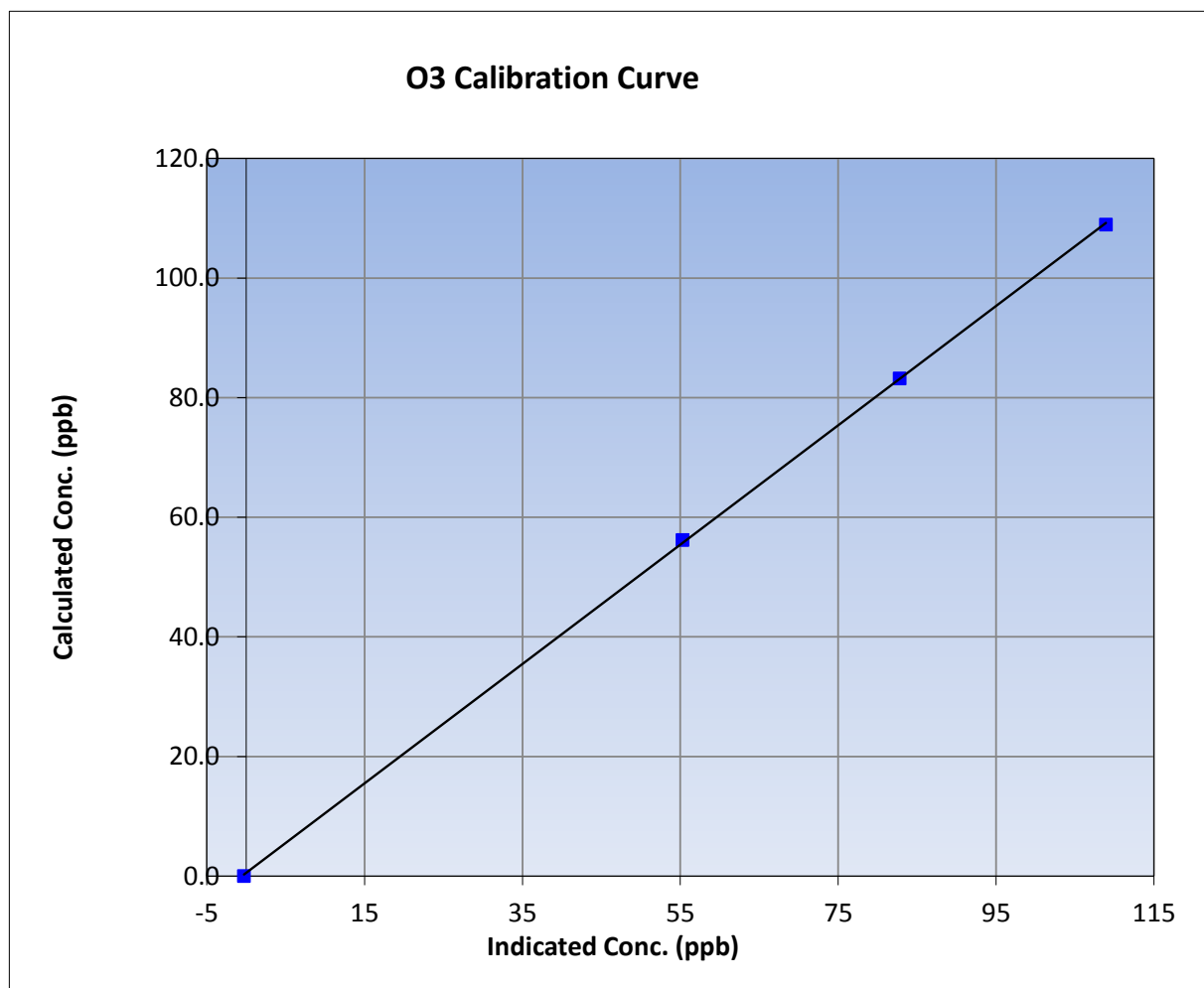
Wood Buffalo Environmental Association O3 Calibration Report

Station Information

Calibration Date	June-03-15	Previous Calibration	May 5, 2015
Station Name	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	17:25	End Time (MST)	20:00
Analyzer make	Teledyne API T400	Analyzer serial #	1020

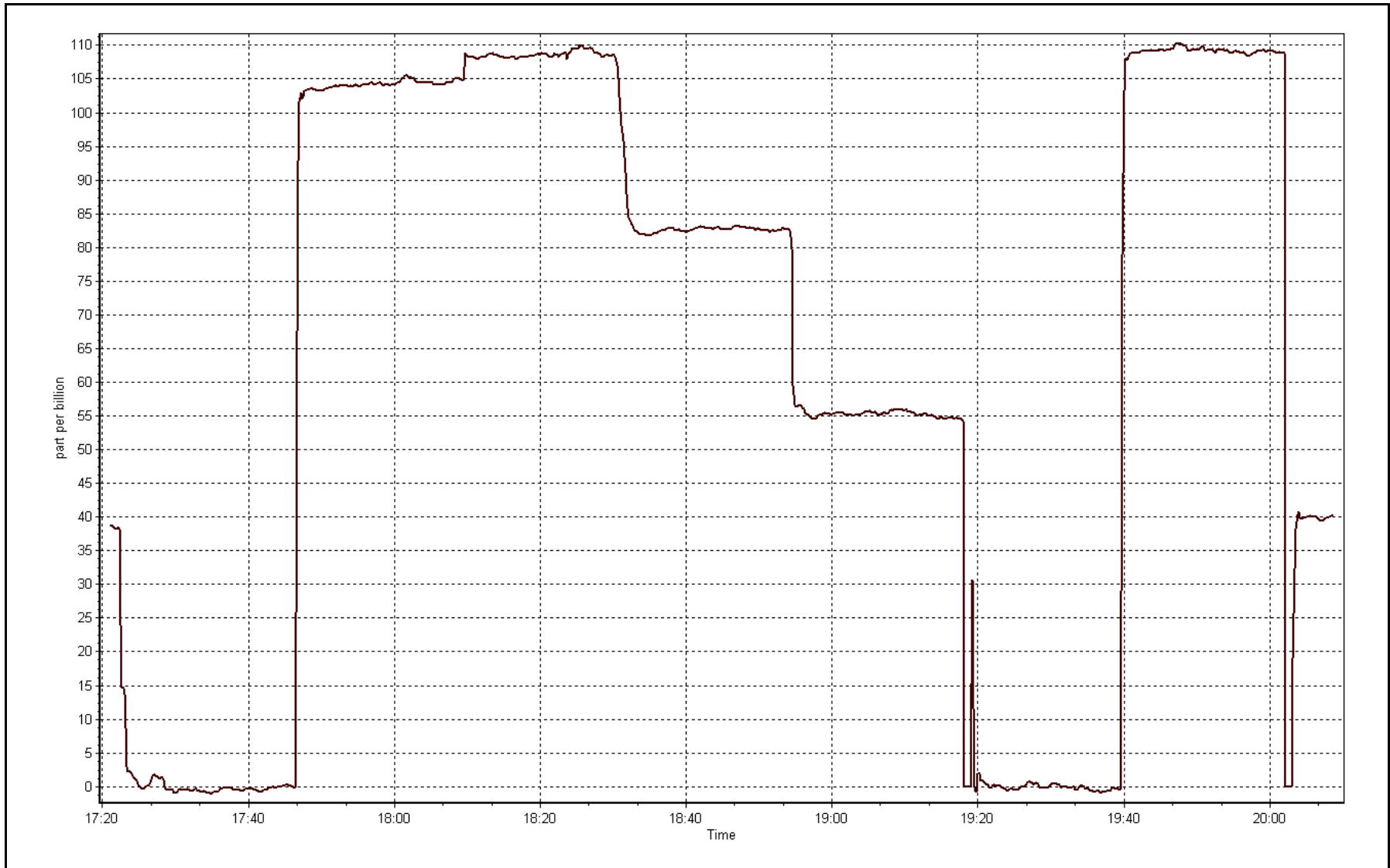
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.3	----	Correlation Coefficient	0.999932
108.9	108.9	0.9998		
83.2	82.8	1.0050	Slope	0.997612
56.2	55.3	1.0170		
			Intercept	0.549792



O3 Calibration Plot

Date: June 3, 2015





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	June 3, 2015	Previous Calibration	May 6, 2015
Station Name	Fort Chipewyan	Station Number	AMS 8
Reason:	Routine		
Start Time (MST)	13:00	End Time (MST)	17:20
NO Cal Gas Conc	20.2 ppm	Gas Cert Reference	LL103809
NOx Cal Gas Conc	20.3 ppm	Cal Gas Expiry Date	16-Sep-16
Calibrator	Teledyne API T700	Serial Number	747
Zero air Generator	Teledyne API T701	Serial Number	4698

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	8205
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Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	1.000815	1.001453	0.995513
	Data Offset	0.567981	0.699047	0.020129
Current Calibration	Data Slope	0.979151	0.979096	0.998345
	Data Offset	0.800499	1.018313	0.127628

Analyzer Information

Analyzer make/model	Teledyne API T200u	Analyzer serial #	172
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Test Point	before		after	
		ppb		ppb
Concentration range	0-200		0-200	
NO coefficient	1.177		1.177	
NOX coefficient	1.194		1.194	
NO2 coefficient	1.000		1.000	
NO bkgrnd	0.1		0.1	
NOX bkgrnd	0.2		0.2	
Chamber Temp	40	Deg C	40	Deg C
Moly Temp	316.4	Deg C	315.4	Deg C
HVPS	502	V	502	V
PMT Temp	5.1	Deg C	5.1	Deg C
O3 flow	88	ccm	89	ccm
R Cell press NO	3.8	"Hg	3.8	"Hg
R Cell Press Nox	NA	"Hg	NA	"Hg
NO sample flow	1109	ccm	1095	ccm
Nox sample Flow	1132	ccm	1118	ccm

Notes:

No adjustments. As Found used as Calibrator Zero and High Point



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date:

June 3, 2015

Station Number:

AMS 8

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	6000	0.0	0.0	0.0	0.0	0.0	-0.1	0.1	----	----
as found span	6000	44.6	150.8	150.0	0.7	153.7	152.8	0.9	0.9808	0.9815
calibrator zero	6000	0.0	0.0	0.0	0.0	0.0	-0.1	0.1	----	----
high point	6000	44.6	150.8	150.0	0.7	153.7	152.8	0.9	0.9808	0.9815
second point	6000	23.8	80.4	80.0	0.4	80.5	79.8	0.8	0.9985	1.0033
third point	6000	11.9	40.2	40.0	0.2	39.7	39.2	0.5	1.0136	1.0217
as left zero	6000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
as left span	6000	44.6	150.8	42.9	107.8	151.4	42.8	108.6	0.9957	1.0026
Average Correction Factor									0.9976	1.0022

Corrected As found

NO_x= 153.7

NO= 152.9

Percent Change

NO_x= -2.4%

NO= -2.5%

Previous Response

NO_x= 150.1

NO= 149.1

GPT Calibration Data

Dilution Flow

6000

ccm

Source Gas Flow

44.6

ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
Cal zero			0.0			0.1			N/A	
1st NO2 (100)	----	42.9	108.9	152.1	42.9	109.2	0.9840	1.0000	0.9973	100.3%
2nd NO2 (75)	----	68.6	83.2	151.7	68.6	83.1	0.9865	1.0000	1.0008	99.9%
3rd NO2 (50)	----	95.6	56.2	151.4	95.6	55.8	0.9886	1.0000	1.0072	99.3%
4th NO2 (0)	151.8	----	0.7	152.5	151.8	0.8	0.9812	1.0000	N/A	----
Average Correction Factor							0.9851	1.0000	1.0018	99.8%

Calibration Performed By:

Ryan Power



Wood Buffalo Environmental Association

NO_x Calibration Summary

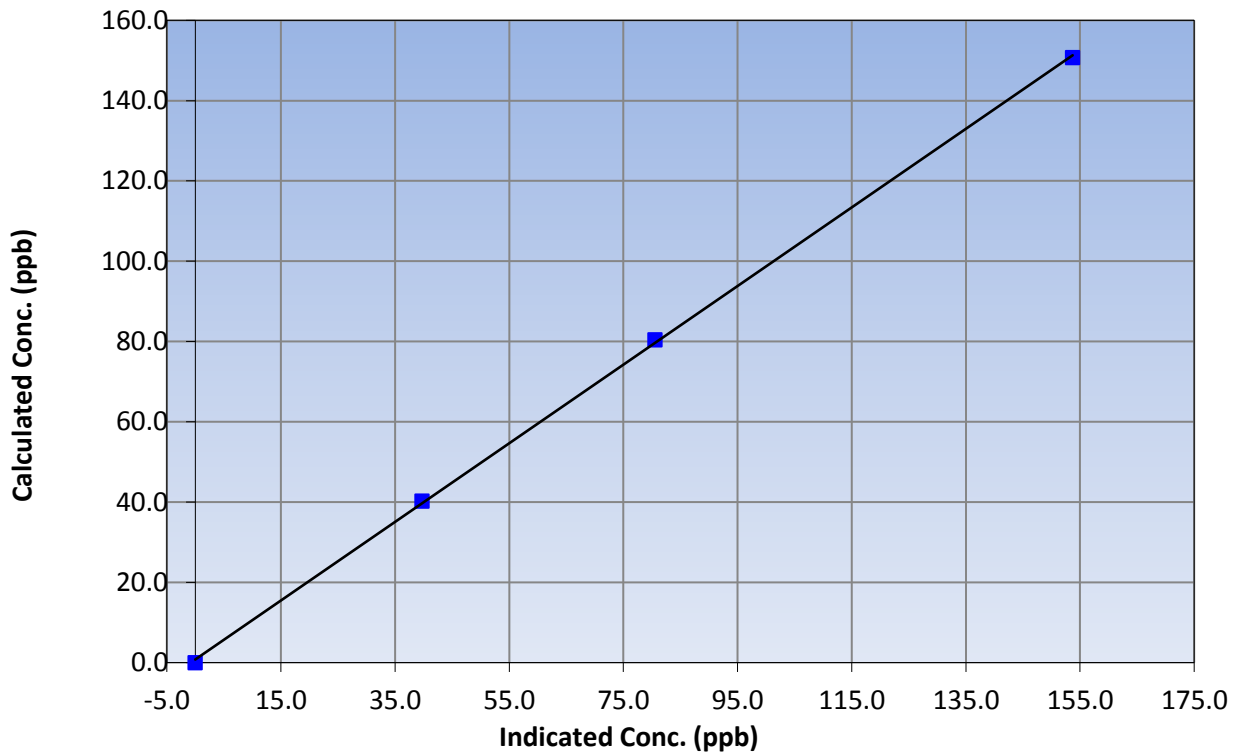
Station Information

Calibration Date	June 3, 2015	Previous Calibration	May 6, 2015
Station Name	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	13:00	End Time (MST)	17:20
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	0.999855
150.8	153.7	0.9808		
80.4	80.5	0.9985	Slope	0.979151
40.2	39.7	1.0136		
			Intercept	0.800499

NO_x Calibration Curve





Wood Buffalo Environmental Association

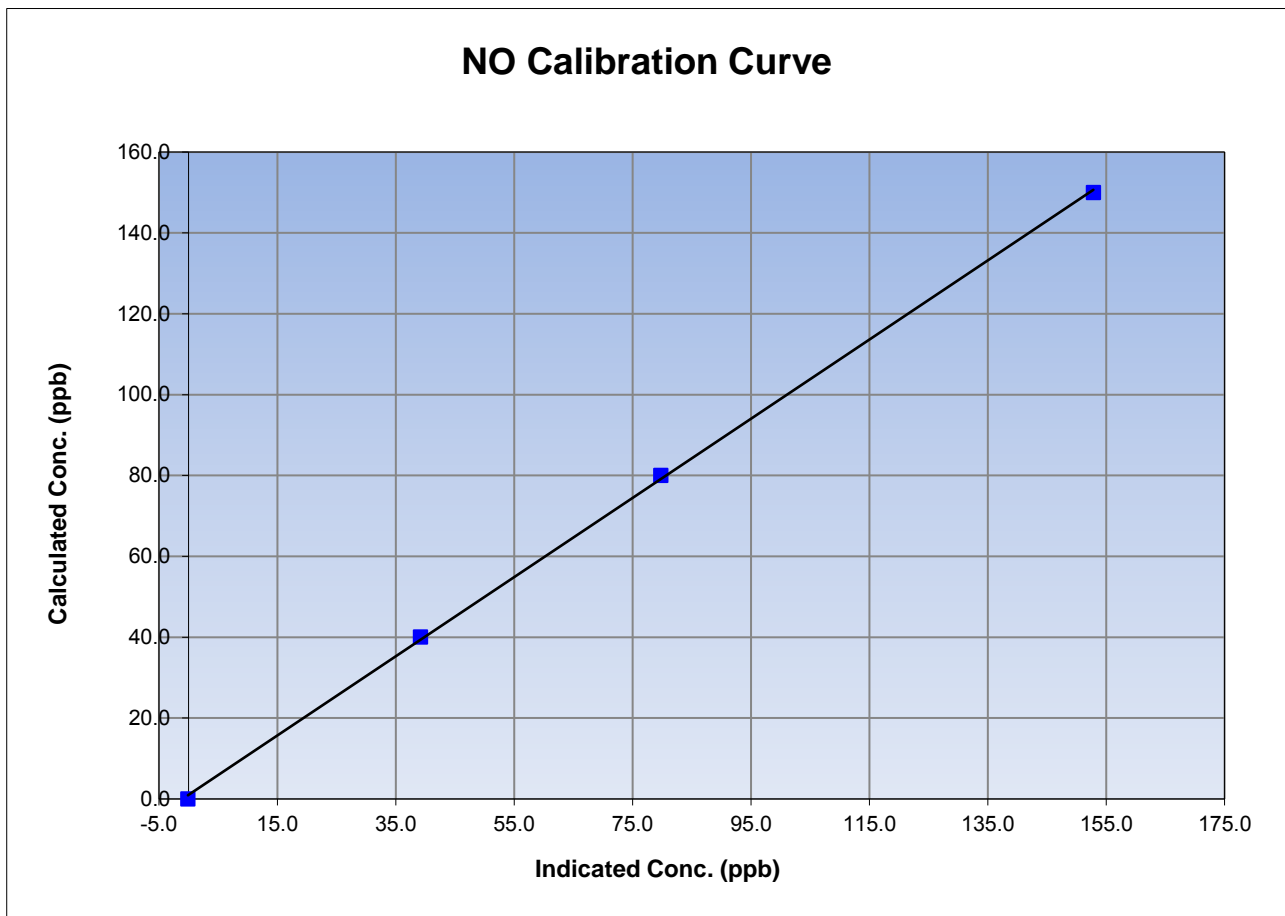
NO Calibration Summary

Station Information

Calibration Date	June 3, 2015	Previous Calibration	May 6, 2015
Station Name	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	13:00	End Time (MST)	17:20
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	0.999795
150.0	152.8	0.9815		
80.0	79.8	1.0033	Slope	0.979096
40.0	39.2	1.0217		
			Intercept	1.018313





Wood Buffalo Environmental Association

NO₂ Calibration Summary

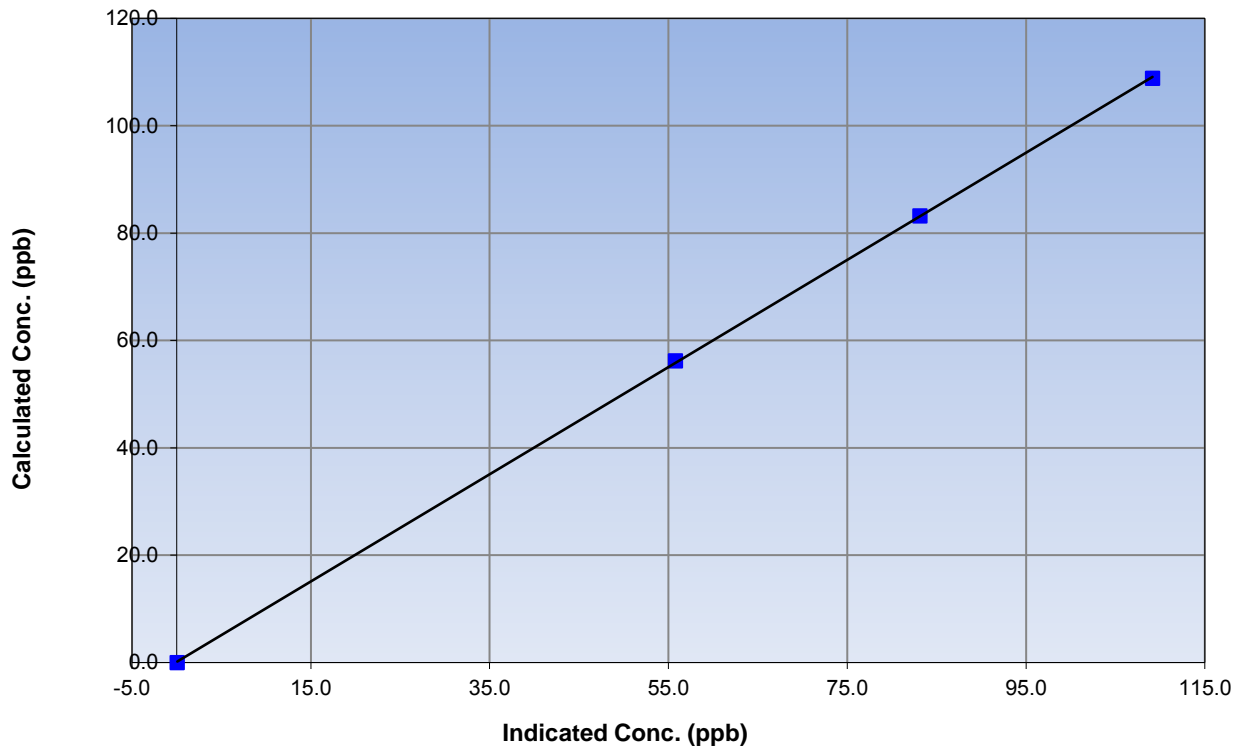
Station Information

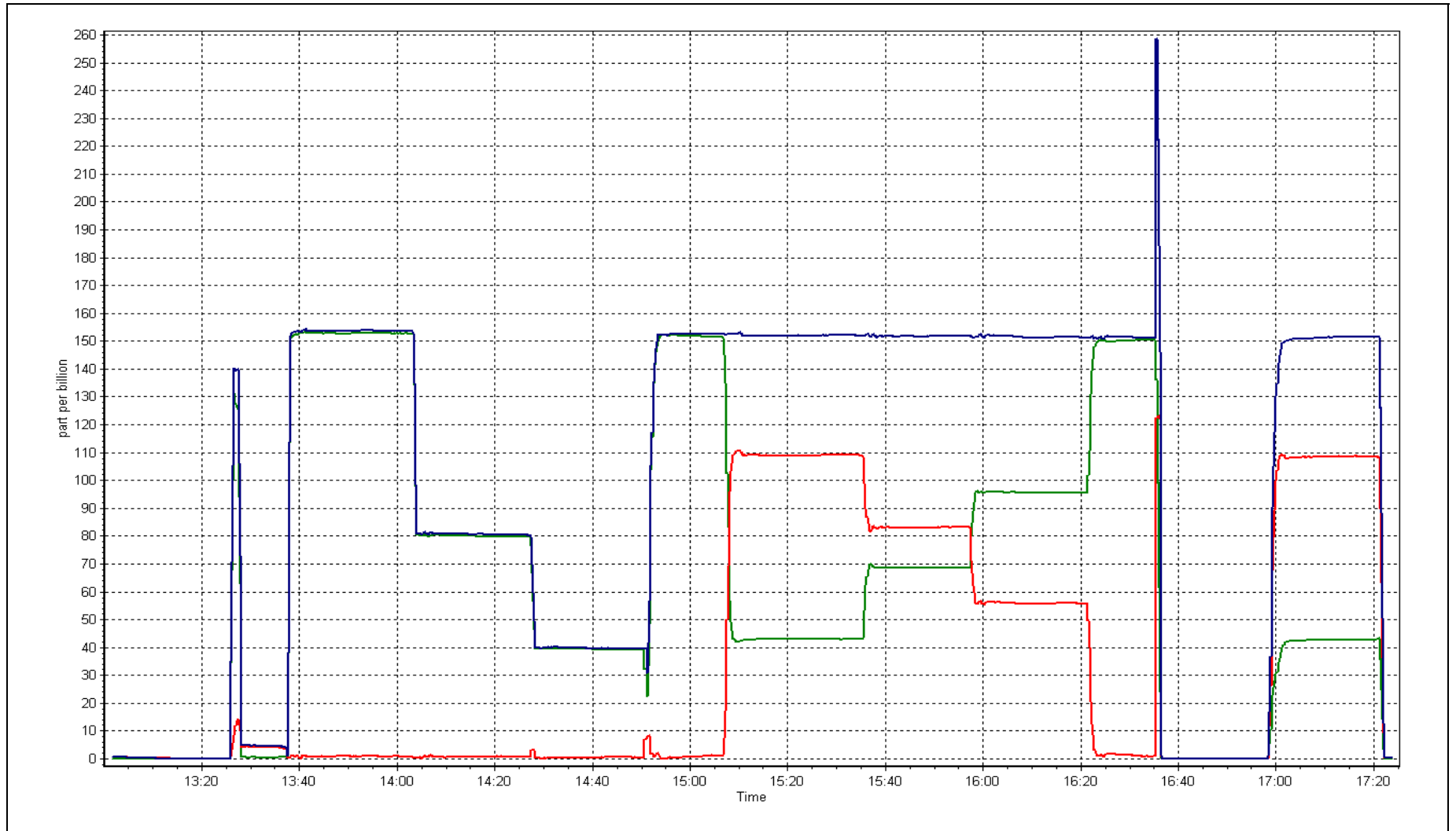
Calibration Date	June 3, 2015	Previous Calibration	May 6, 2015
Station Name	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	13:00	End Time (MST)	17:20
Analyzer make	Teledyne API T200u	Analyzer serial #	172

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	N/A	Correlation Coefficient	0.999963
108.9	109.2	0.9973		
83.2	83.1	1.0008	Slope	0.998345
56.2	55.8	1.0072		
			Intercept	0.127628

NO₂ Calibration Curve







Wood Buffalo Environmental Association

SHARP CALIBRATION

STATION INFORMATION

Calibration Date:	<u>June 3, 2015</u>	Previous Calibration:	<u>May 6, 2015</u>
Station Name:	<u>Fort Chipewyan</u>	Station Number:	<u>AMS 8</u>
Start Time (MST):	<u>18:45</u>	End Time (MST):	<u>19:30</u>
Calibrator Make/Model:	<u>Delta Cal</u>	Calibrator Serial Number:	<u>1212</u>

SHARP INFORMATION

Particulate Fraction:	<u>PM2.5</u>
Make/Model:	<u>Thermo / SHARP 5030</u>
Serial Number:	<u>E-2025</u>
Source SN:	<u>7414</u>
HEPA PN:	<u>9064</u>
Time Correct (MST):	<u>YES</u>
Parameters Checked:	<u>T1, T2, T2,T4, P3, Main Flow, Beta, Neph</u>

CALIBRATION DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	17.0	19.2	2.2	19.0
T2	24.0	na	na	24.0
T3	23.0	na	na	23.0
T4	28.0	na	na	28.0
RH (%)	28.0	na	na	28.0

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	985	985.0	0.0	985

Main Flow (Lph)

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

Nephelometer Calibration

Parameter	As Found	Zeroed (Limit +/- 2.0ug/m3)	As Left
Analog	162		162
Neph	1		1
C14	13.9		13.9
Indicated Concentration (ug/m3)	0.5	no	0.5
Offset 1	161.4		161.4
Offset 2	28.8		28.8

Leak Check (Quarterly)

Leak Check Date:	<u>May 6, 2015</u>	Previous Leak Check Date:	NA
	Measured	Difference LPM (Limit +/- 0.42 LPM)	
Flow without adaptor (LPM):	16.60		
Flow with adaptor [turn off pump first](LPM):	16.50	0.10	

Mass Foil Calibration (Annualy)

Foil Calibration Date:	<u>May 6, 2015</u>	Previous Foil Calibration:	NA
Zeroed?:			
Foil Mass:	<u>1324</u>		
Previous Correction Factor:	<u>7081</u>	Mass foil set S/N:	5868
New Correction Factor:	<u>7022</u>		

INSPECTION DATA

Item	Condition	Date of install or rebuild
Cyclone	Good / cleaned	03/06/2015
Pump	Good	NA
Filter Tape	Good	NA
Mass Foil Cal Set	Good	NA
HEPA filter	Good	NA

NOTES:

Temperature adjusted

Calibration Performed By: Ryan Power



Wood Buffalo Environmental Association

WS/WD Calibration Report

Station Information

Calibration Date	June 3, 2015	Previous Calibration	March 15, 2014
Station Number	AMS 08	Station Location	Fort Chipewyan
Reason:	Routine	Other:	
Start Time (MST)	17:30	End Time (MST)	18:30
Barometric Pressure	739 mm Hg	Station Temperature	20 Deg C
WS Calibrator	MetOne 053-120	Serial Number	P15103

WIND SPEED

Sensor make/model	Met One 010C	Sensor serial #	G3212
DACS make	Campbel Scientific CR3000	DACS serial No.	8205
	<u>Before</u>		<u>After</u>
DACS slope	0.14396	DACS slope	0.1440
DACS intercept	0.9656	DACS intercept	0.9656
Calculated slope	1.002286011	Calculated slope	0.999166
Calculated intercept	-0.036410907	Calculated intercept	-0.012612

Wind Speed Calibration Data

Shaft RPM	Actual Speed (K/hr)	Indicated Speed (K/hr)	Correction factor
0	0	0.0	n/a
100	10.564	10.6	0.9966
200	20.162	20.2	0.9981
400	39.359	39.4	0.9990
600	58.555	58.6	0.9992
800	77.752	77.8	0.9989
Average Correction Factor			0.9984

WIND DIRECTION

Sensor make/model	Met One Wind 020C	Sensor serial #	G3858
DACS make	Campbel Scientific CR3000	DACS serial No.	8205
DACS voltage range		DACS channel #	
	<u>Before</u>		<u>After</u>
DACS slope	0.072	DACS slope	0.072
DACS intercept	0	DACS intercept	0
Calculated slope	0.296436504	Calculated slope	1.027151
Calculated intercept	147.8959266	Calculated intercept	0.053937

Wind Direction Calibration Data

Physical Direction (Degrees)	Indicated Direction (Degrees)	Correction factor
0	349.0	n/a
90	86.0	1.0465
180	177.0	1.0169
270	264.0	1.0227
360	349.0	1.0315
Average Correction Factor		1.0294

Notes:

Met sensors installed at 16 degrees West of magnetic North

Calibration Performed By: Ryan Power



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 9
BARGE LANDING
JUNE 2015**

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

July 30, 2015



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BARGE LANDING (AMS 9)
 JUNE 2015

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
TRS(ppb) Average	685	35	35	100.00	2	0	1	0
THC(ppm) Average	687	33	33	100.00	3.4	-	2.6	-
Temperature (C) Average	720	0	0	100.00	32.9	-	24.6	-
Relative Humidity (%) Average	720	0	0	100.00	99	-	73	-
Wind Speed 10 m (km/h) Average	719	0	1	99.86	17	-	11	-
Wind Direction 10 m (deg) Average	719	0	1	99.86	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BARGE LANDING (AMS 9)
 JUNE 2015

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile							
					Min	P10	Q1	Median	Q3	P90	Max	
TRS(ppb) Average	685	0.2	0	-	0	0	0	0	0	0	0	2
THC(ppm) Average	687	2.19	0.2	-	2	2	2.1	2.1	2.2	2.4	2.4	3.4
Temperature (C) Average	720	17.59	6.2	-	-0.3	10.3	13	17.2	21.6	26.3	26.3	32.9
Relative Humidity (%) Average	720	55.3	22	-	18	27	36	54	73	86	86	99
Wind Speed 10 m (km/h) Average	719	5.9	3	-	0	2	3	5	8	11	11	17
Wind Direction 10 m (deg) Average	719	-	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BARGE LANDING (AMS 9)
JUNE 2015

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
Wind Speed, Wind Direction	18 Jun 2015 20:00	18 Jun 2015 20:00	1	Flat line in sensor output signal



Summary of Hour Averages

Barge Landing - June 2015

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 2 ppb on Jun 24 07:00	Maximum Daily Average: 0.6 ppb on Jun 30		Hours of Data:	685
Minimum Value: 0 ppb on Jun 5 18:00	Minimum Daily Average: 0.1 ppb on Jun 13		Hours of Missing Data:	35
Maximum Diurnal Average: 0.4 ppb at hour 7	Minimum Diurnal Average: 0.1 ppb at hour 17		Hours of Calibration:	35
Monthly Average: 0.2 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1		Percent Operational Time:	100.0

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

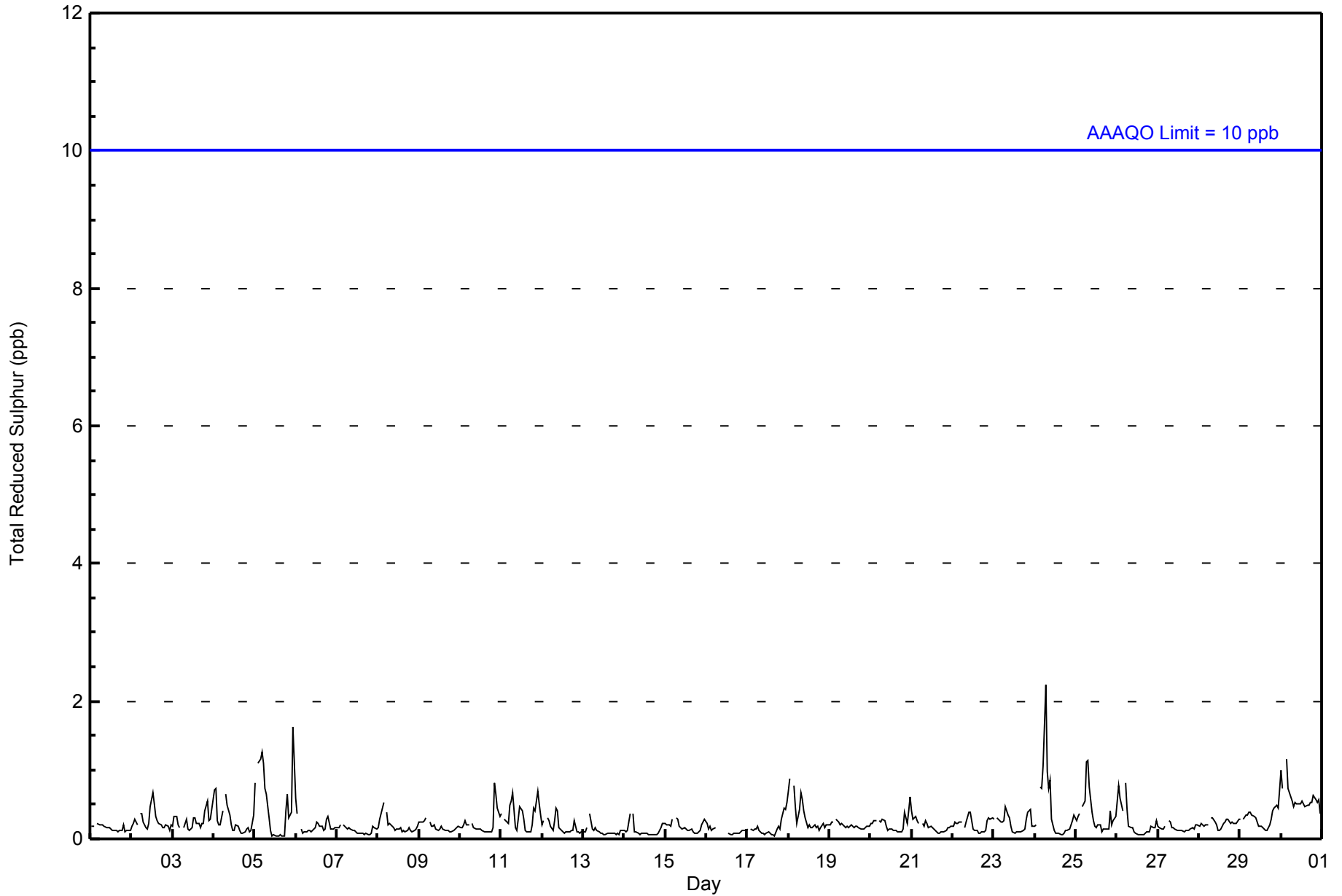
0.3	0.3	0.3	0.4	0.3	0.4	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.3	Diurnal Average	
1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	1	2	1	Diurnal Maximum

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



WBEA
Hourly Averages

Total Reduced Sulphur (TRS) - ppb
Barge Landing - June 2015





WBEA
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Barge Landing - June 2015

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



WBEA
Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Barge Landing - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	59	36	26	15	11	18	34	56	65	46	63	54	37	34	69	61	684
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	59	36	26	15	11	18	34	56	65	46	63	54	37	34	69	61	684

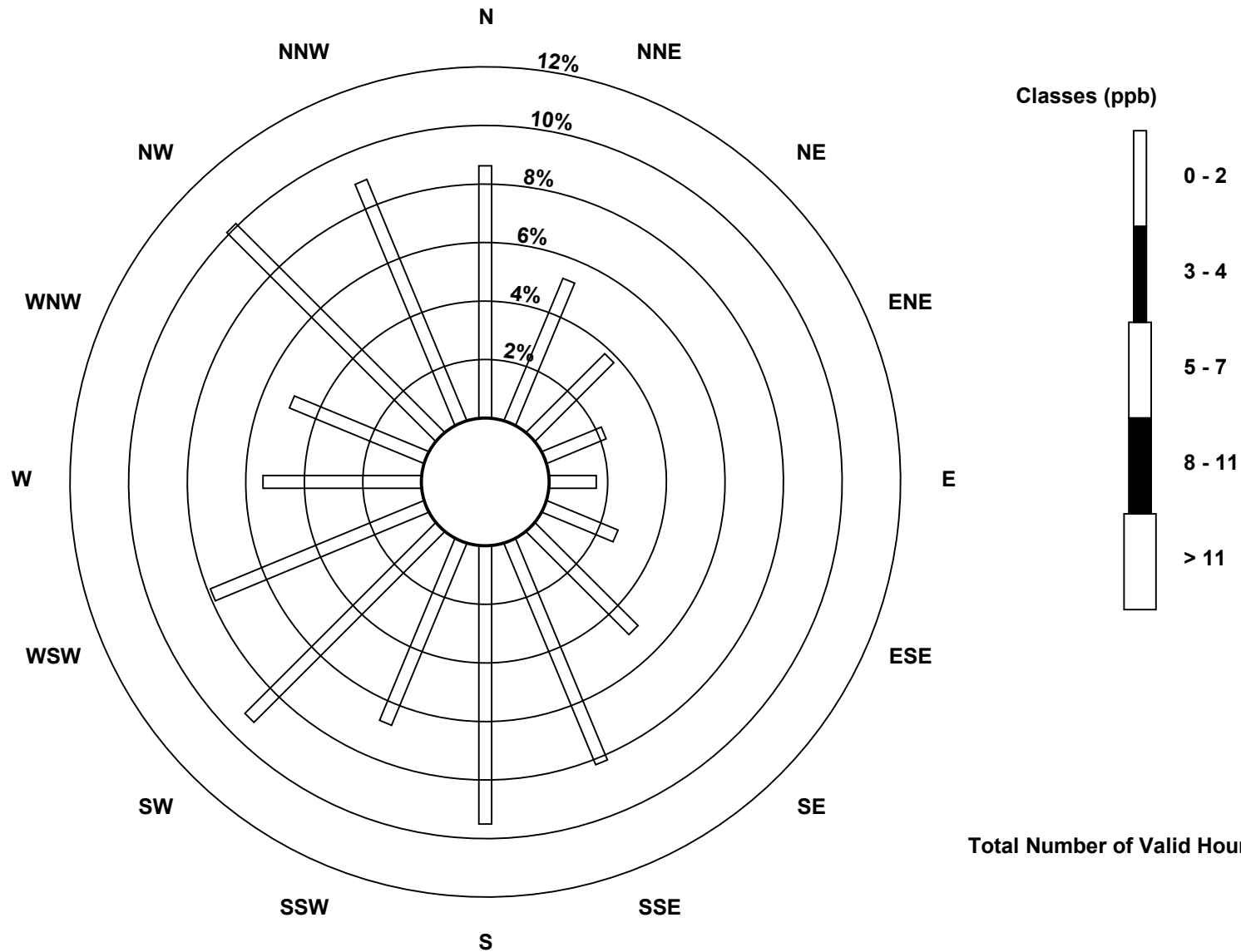
Total Number of Valid Hours: 684

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

Total Reduced Sulphur (TRS) - ppb
Barge Landing (AMS 9)

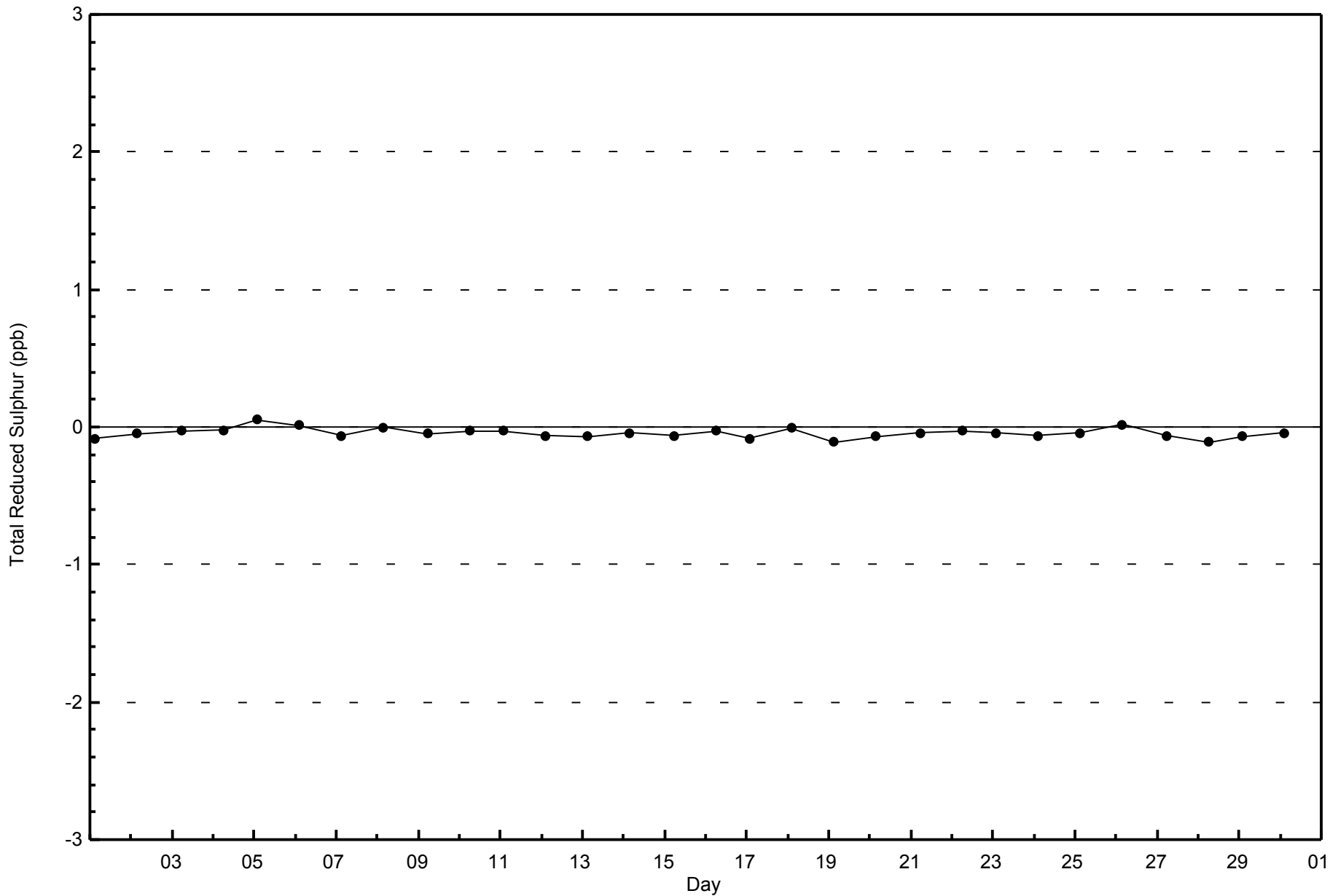


Total Number of Valid Hours: 684



WBEA
Zero Responses

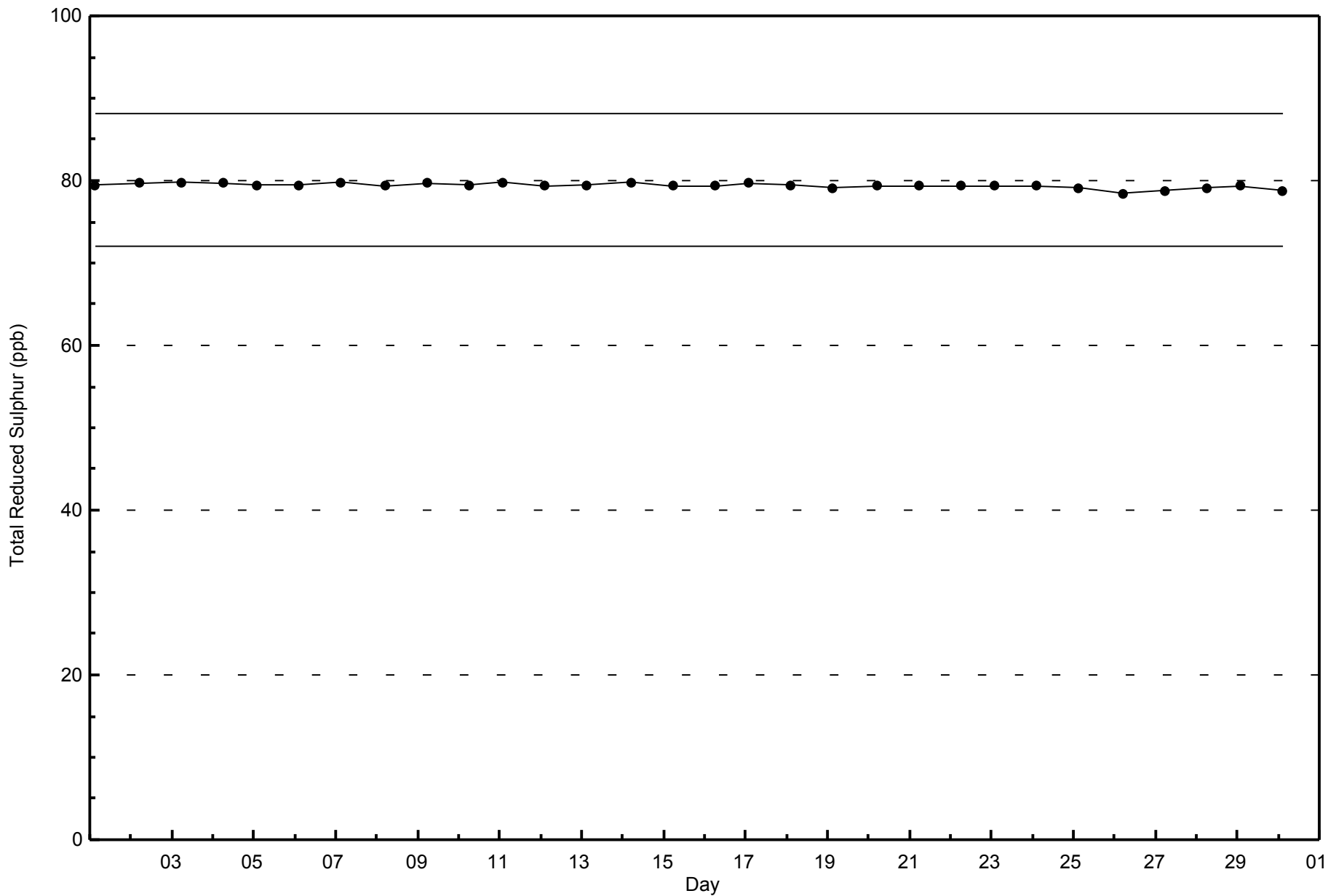
Total Reduced Sulphur (TRS) - ppb
Barge Landing - June 2015





WBEA
Span Responses

Total Reduced Sulphur (TRS) - ppb
Barge Landing - June 2015



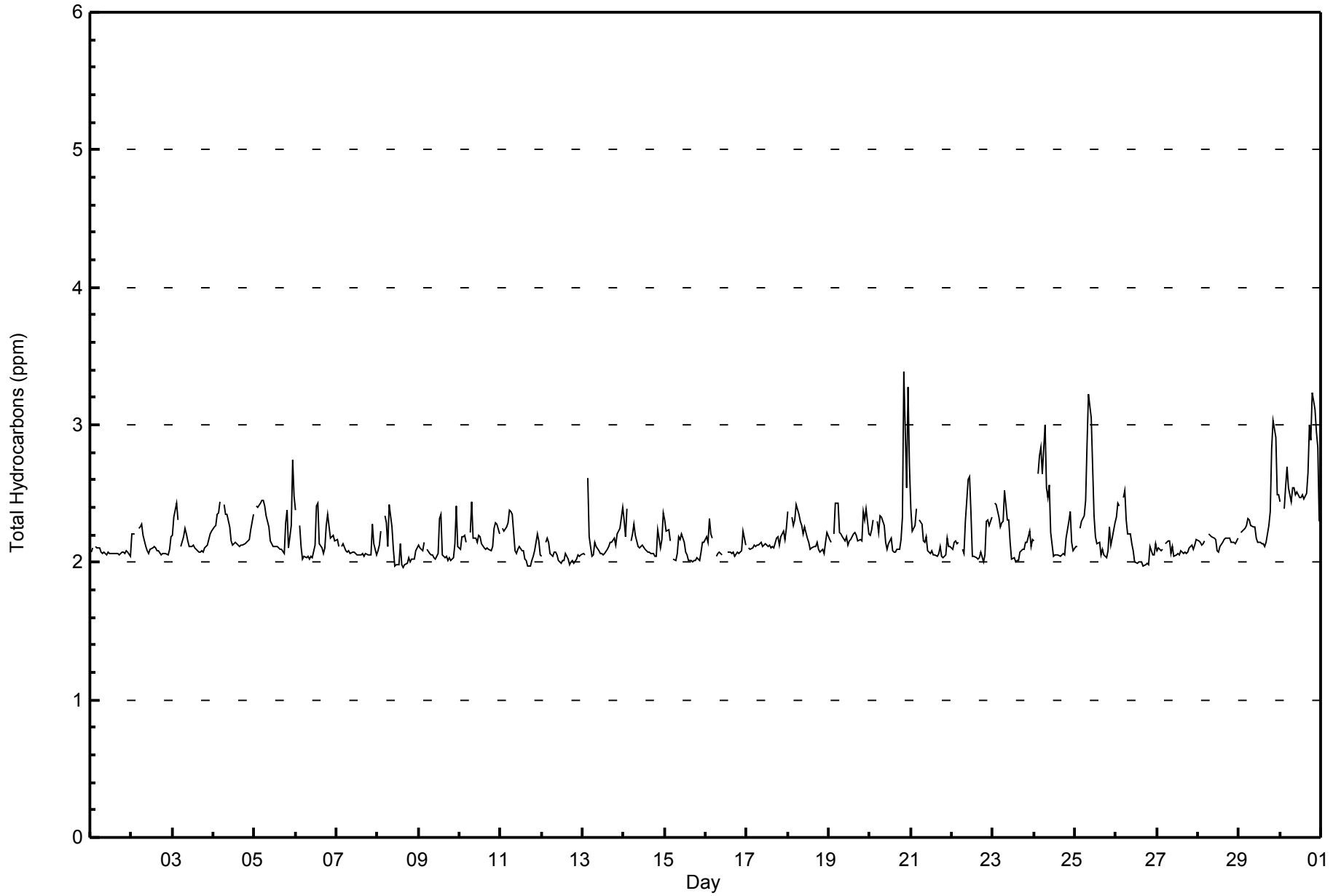


Maximum Value: 3.4 ppm on Jun 20 21:00		Maximum Daily Average: 2.6 ppm on Jun 30		Hours in Service: 720																							
Minimum Value: 2.0 ppm on Jun 8 16:00		Minimum Daily Average: 2.0 ppm on Jun 12		Hours of Data: 687																							
Maximum Diurnal Average: 2.3 ppm at hour 5		Minimum Diurnal Average: 2.1 ppm at hour 16		Hours of Missing Data: 33																							
Monthly Average: 2.19 ppm		Percentiles: P ₁ = 2.0 P ₁₀ = 2.0 Q ₁ = 2.1 Median = 2.1 Q ₃ = 2.2 P ₉₀ = 2.4 P ₉₉ = 3.0		Hours of Calibration: 33																							
				Percent Operational Time: 100.0																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	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	2.0	2.1	2.1	
2-Jun	2.2	2.2	2.2	Z	2.3	2.3	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.3	
3-Jun	2.2	2.3	2.4	2.3	Z	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	2.1	2.2	2.2	2.2	2.2	2.4	
4-Jun	2.3	2.3	2.3	2.4	2.4	Z	2.4	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	2.2	2.2	2.2	2.3	2.2	2.4	
5-Jun	Z	2.4	2.4	2.4	2.5	2.5	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	2.3	2.4	2.1	2.3	2.8	2.5	2.3	2.8
6-Jun	2.4	Z	2.3	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.4	2.4	2.1	2.1	2.1	2.1	2.3	2.4	2.2	2.2	2.2	2.2	2.2	2.4	
7-Jun	2.2	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.3	2.1	2.0	2.1	2.3	
8-Jun	2.1	2.1	2.2	Z	2.3	2.3	2.1	2.4	2.3	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	2.4	
9-Jun	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.3	2.3	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.4	2.1	2.1	2.4	
10-Jun	2.1	2.2	2.2	2.2	2.1	Z	2.2	2.4	2.2	2.2	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.3	2.2	2.2	2.4	
11-Jun	Z	2.2	2.2	2.3	2.3	2.4	2.4	2.4	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.2	2.1	2.1	2.4	
12-Jun	2.0	Z	2.2	2.2	2.1	2.1	2.0	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1	2.0	2.2	
13-Jun	2.1	2.0	Z	2.6	2.2	2.0	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.2	2.2	2.4	2.2	2.6	
14-Jun	2.3	2.2	2.4	Z	2.2	2.2	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.2	2.1	2.2	2.4	2.2	2.4	
15-Jun	2.3	2.2	2.2	2.2	Z	2.0	2.0	2.1	2.2	2.2	2.2	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.3	
16-Jun	2.2	2.2	2.3	2.2	2.2	Z	2.0	2.1	2.1	2.1	C	C	C	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.3	
17-Jun	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	
18-Jun	2.4	Z	2.3	2.3	2.3	2.4	2.3	2.3	2.3	2.2	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.4	
19-Jun	2.2	2.1	Z	2.2	2.4	2.4	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	2.4	2.3	2.4	2.2	2.2	2.4	
20-Jun	2.2	2.2	2.3	Z	2.3	2.2	2.3	2.3	2.3	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.3	3.4	2.5	3.3	2.7	2.3	3.4	
21-Jun	2.4	2.2	2.3	2.4	Z	2.3	2.3	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.0	2.0	2.1	2.2	2.1	2.1	2.2	2.4	
22-Jun	2.1	2.1	2.2	2.1	2.1	Z	2.1	2.1	2.3	2.6	2.6	2.4	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1	2.3	2.3	2.3	2.3	2.6	
23-Jun	Z	2.4	2.4	2.3	2.3	2.3	2.3	2.5	2.3	2.3	2.2	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.2	2.5	
24-Jun	2.2	Z	2.6	2.8	2.8	2.6	3.0	2.5	2.5	2.6	2.2	2.0	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.2	2.3	2.4	2.1	2.1	2.3	3.0	
25-Jun	2.1	2.1	Z	2.2	2.3	2.3	2.4	2.9	3.2	3.0	2.7	2.3	2.2	2.1	2.2	2.1	2.1	2.1	2.0	2.1	2.3	2.1	2.2	2.3	2.3	3.2	
26-Jun	2.3	2.4	2.4	Z	2.5	2.5	2.3	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	2.1	2.1	2.1	2.1	2.1	2.5	
27-Jun	2.1	2.1	2.1	2.1	Z	2.1	2.2	2.2	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	
28-Jun	2.2	2.1	2.1	2.1	2.2	Z	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	2.1	2.1	2.1	2.1	2.2	2.2	
29-Jun	Z	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.4	2.8	3.0	2.9	2.5	2.5	3.0	
30-Jun	2.4	Z	2.4	2.6	2.7	2.5	2.4	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.7	3.0	2.9	3.2	3.1	3.0	2.8	2.3	3.2	
																								Diurnal Average			
																								Diurnal Maximum			
																								Z - zerospan C - Calibration			



WBEA
Hourly Averages

Total Hydrocarbons (THC) - ppm
Barge Landing - June 2015





WBEA
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Barge Landing - June 2015

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	90	13.10	13.10
2.1 - 3.0	592	86.17	99.27
3.1 - 10.0	5	0.73	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720



WBEA
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Barge Landing - June 2015

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	4	1	1	3	3	3	2	1	3	1	13	21	7	4	18	5	90
2.1 - 3.0	55	33	25	12	8	15	31	52	62	46	48	36	29	29	54	56	591
3.1 - 10.0	0	2	0	0	0	0	1	0	1	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	0
Totals	59	36	26	15	11	18	34	53	66	47	61	57	36	33	72	62	686

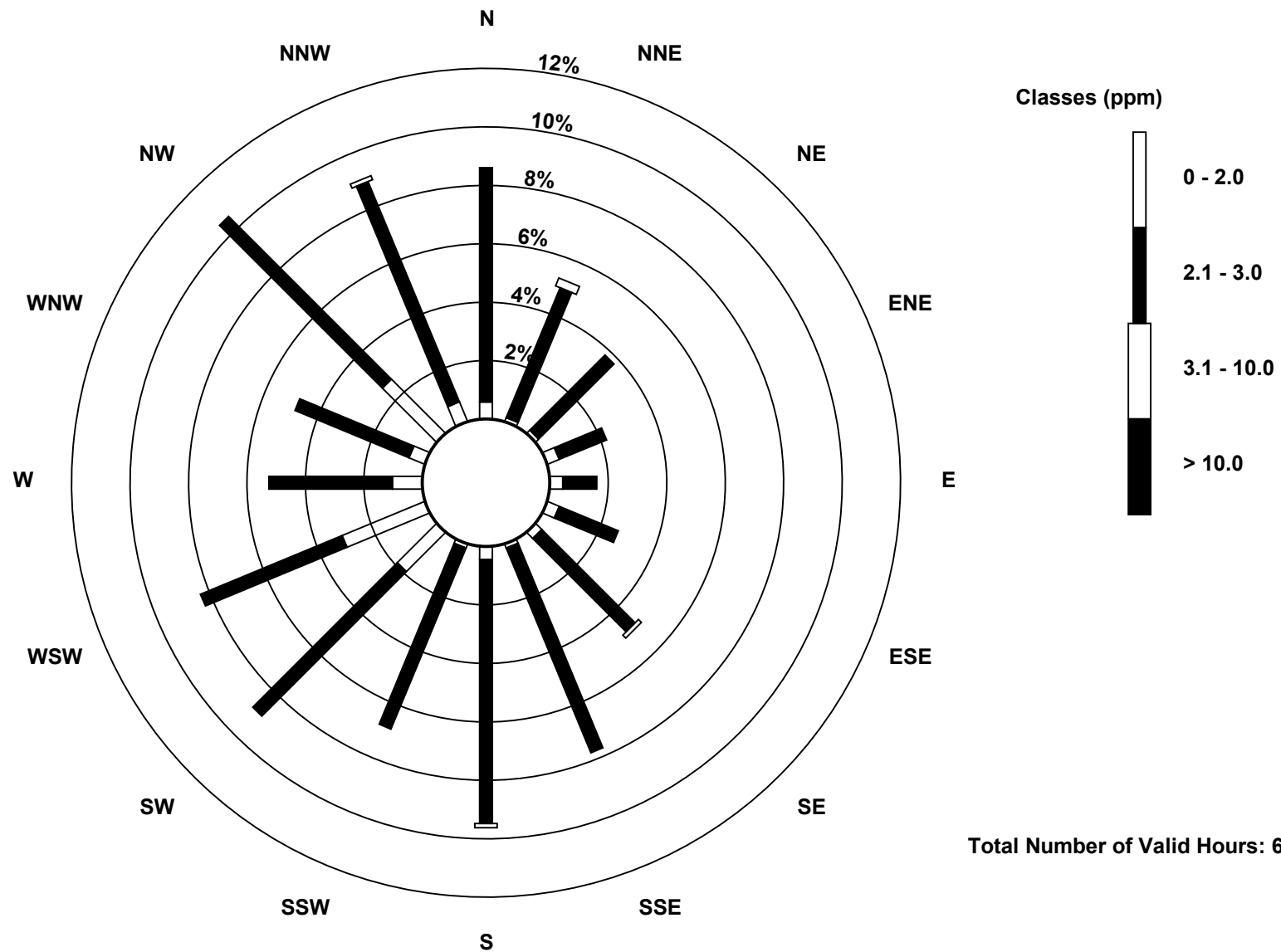
Total Number of Valid Hours: 686

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

Total Hydrocarbons (THC) - ppm
Barge Landing (AMS 9)

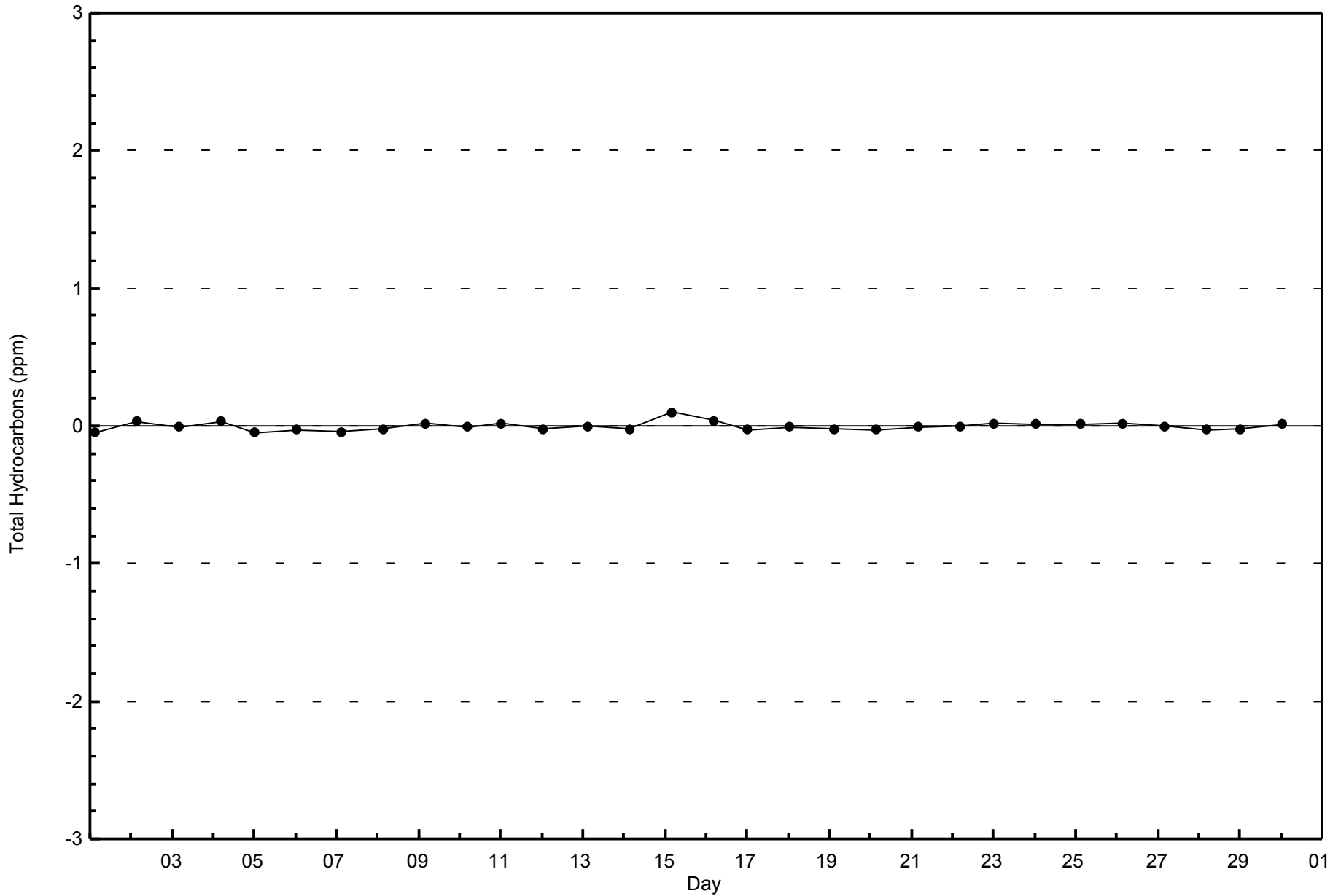


Total Number of Valid Hours: 686



WBEA
Zero Responses

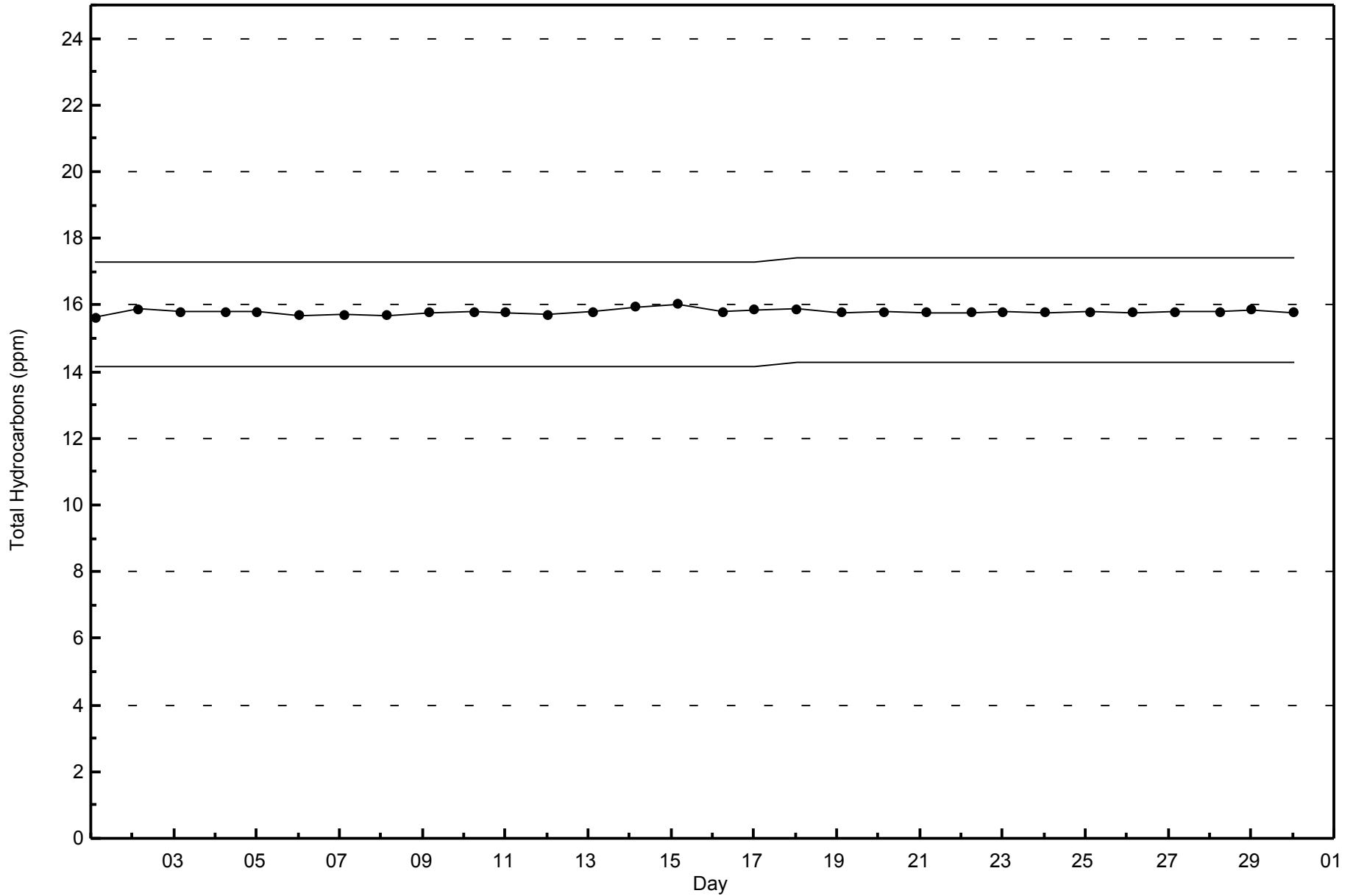
Total Hydrocarbons (THC) - ppm
Barge Landing - June 2015





WBEA
Span Responses

Total Hydrocarbons (THC) - ppm
Barge Landing - June 2015



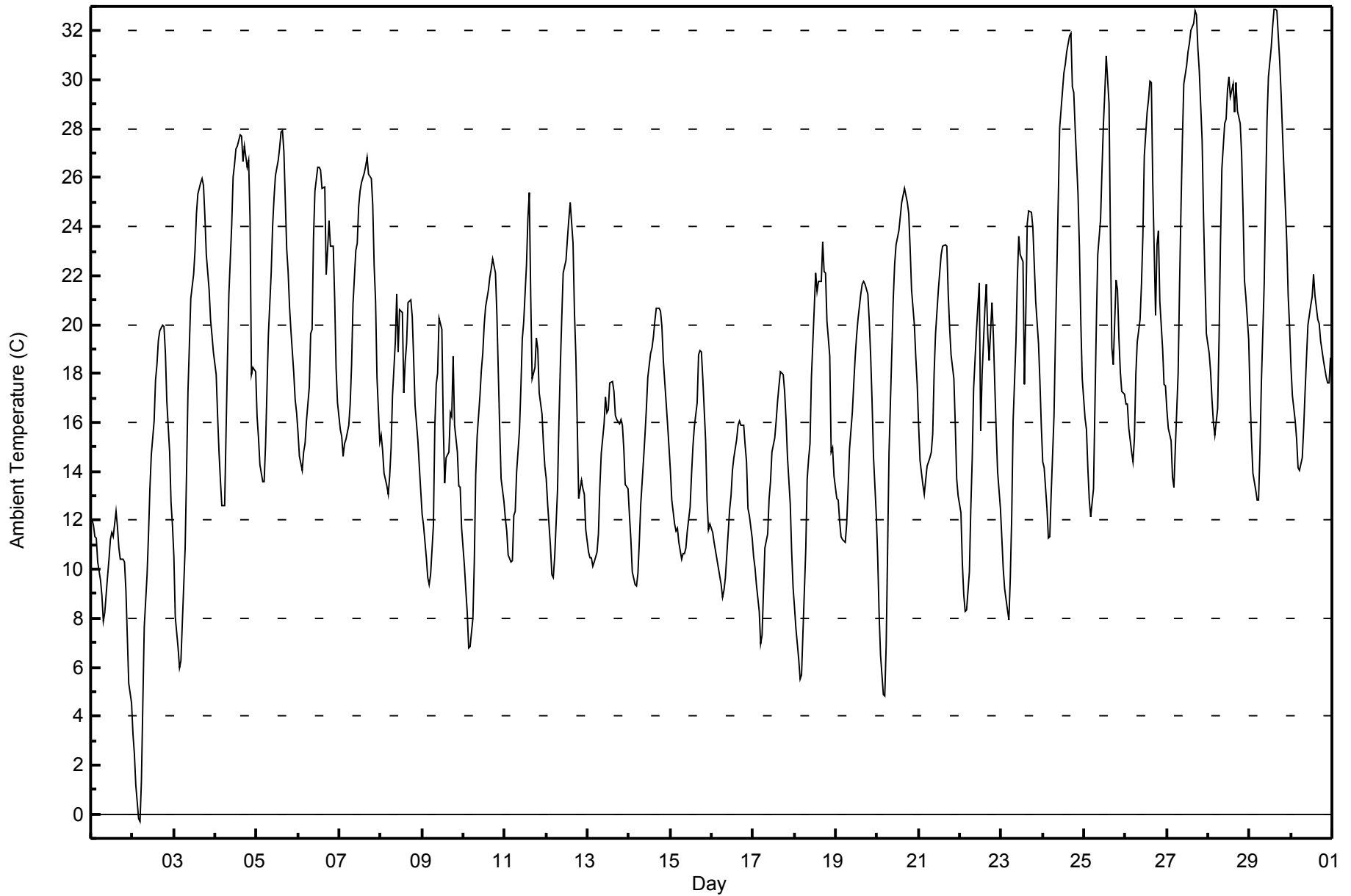


Maximum Value: 32.9 C on Jun 29 15:00																				Maximum Daily Average: 24.6 C on Jun 27					Hours in Service: 720	
Minimum Value: -0.3 C on Jun 2 05:00																				Minimum Daily Average: 9.9 C on Jun 1					Hours of Data: 720	
Maximum Diurnal Average: 23.1 C at hour 15																				Minimum Diurnal Average: 10.5 C at hour 5					Hours of Missing Data: 0	
Monthly Average: 17.59 C																				Percentiles: P ₁ = 4.4 P ₁₀ = 10.3 Q ₁ = 13.0 Median = 17.2 Q ₃ = 21.6 P ₉₀ = 26.3 P ₉₉ = 32.1					Hours of Calibration: 0	
																									Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	12.0	11.8	11.3	11.3	10.3	9.5	8.9	7.9	8.2	9.7	10.4	11.2	11.5	11.3	12.4	11.7	10.9	10.4	10.4	10.3	9.1	7.2	5.3	4.5	9.9	12.4
2-Jun	3.3	2.4	1.2	-0.2	-0.3	1.3	4.5	7.6	9.7	11.4	13.3	14.7	16.1	17.7	18.4	19.3	19.8	20.0	19.9	18.9	16.9	14.8	12.7	11.8	11.5	20.0
3-Jun	10.5	8.1	6.8	6.0	6.3	7.8	10.9	14.0	17.3	19.2	21.1	22.1	23.0	24.5	25.4	25.8	26.0	25.7	24.4	22.9	21.4	20.2	19.6	18.9	17.8	26.0
4-Jun	18.0	16.3	14.8	13.7	12.6	12.6	15.6	18.6	21.2	24.1	26.1	26.6	27.2	27.3	27.8	27.7	26.7	27.3	26.4	26.7	24.3	18.0	18.3	18.1	21.5	27.8
5-Jun	16.3	15.4	14.3	13.6	13.6	15.1	17.3	19.5	22.1	24.0	25.2	26.1	26.7	27.3	27.8	28.0	27.1	23.1	22.2	20.7	19.8	18.0	16.9	16.4	20.7	28.0
6-Jun	15.6	14.6	14.0	14.8	15.1	16.0	17.4	19.6	19.8	23.5	25.5	26.4	26.4	26.3	25.6	25.6	22.0	23.1	24.3	23.2	23.2	21.1	18.2	16.8	20.8	26.4
7-Jun	15.7	15.5	14.6	15.1	15.3	15.9	16.7	18.4	20.8	23.0	23.3	24.8	25.4	25.8	26.2	26.5	26.8	26.1	26.0	24.9	22.4	21.0	17.8	15.2	21.0	26.8
8-Jun	15.5	14.8	13.9	13.4	13.1	13.8	15.0	17.1	19.3	21.3	18.9	20.6	20.5	17.2	18.5	19.2	20.9	21.0	20.3	18.6	16.7	15.2	14.2	13.2	17.2	21.3
9-Jun	12.3	11.8	10.5	9.7	9.3	9.8	11.8	15.8	17.6	18.0	20.3	19.8	15.9	13.5	14.5	14.8	16.4	16.2	18.7	15.9	14.8	13.4	13.4	11.7	14.4	20.3
10-Jun	10.1	9.1	8.2	6.8	6.8	8.0	10.3	13.9	15.4	17.1	18.1	18.8	20.0	20.7	21.4	21.9	22.3	22.7	22.1	20.4	18.1	15.7	13.7	12.8	15.6	22.7
11-Jun	12.1	11.6	10.6	10.3	10.4	12.2	12.4	14.0	15.7	17.4	19.4	20.1	22.4	24.4	25.4	21.1	17.8	18.2	19.4	19.0	17.2	16.3	15.1	14.2	16.5	25.4
12-Jun	13.7	12.6	10.9	9.8	9.6	10.5	13.2	16.1	18.3	20.3	22.1	22.6	23.5	24.3	25.0	23.3	20.5	18.7	15.9	12.9	13.7	13.3	13.0	11.6	16.5	25.0
13-Jun	10.7	10.5	10.5	10.1	10.3	10.7	11.5	13.3	14.8	15.9	17.0	16.4	16.5	17.6	17.6	17.3	16.3	16.1	15.9	16.1	15.9	14.9	13.4	13.3	14.3	17.6
14-Jun	12.2	11.2	9.9	9.4	9.3	9.8	11.2	12.6	14.5	15.5	16.6	17.8	18.8	19.1	19.5	20.2	20.7	20.7	20.6	19.9	18.5	16.8	16.0	15.0	15.7	20.7
15-Jun	14.1	12.8	11.9	11.5	11.7	11.1	10.4	10.7	10.7	10.9	11.6	12.5	13.8	15.0	15.8	16.8	18.8	18.9	18.9	17.8	15.2	12.8	11.6	11.8	13.6	18.9
16-Jun	11.5	11.1	10.7	10.4	10.1	9.4	8.9	9.2	9.7	11.5	12.4	13.0	14.0	14.5	15.3	15.9	16.1	15.9	15.9	15.1	14.4	12.5	12.2	11.3	12.5	16.1
17-Jun	10.5	10.1	9.4	8.3	6.9	7.3	9.1	10.9	11.5	12.9	13.6	14.8	15.4	16.1	16.9	17.5	18.1	18.0	17.3	16.1	14.6	12.7	10.7	9.2	12.8	18.1
18-Jun	8.4	7.6	6.3	5.5	5.7	7.4	10.8	13.7	14.5	15.1	17.8	20.7	22.1	21.3	21.8	21.8	23.4	22.2	22.1	20.2	18.7	14.8	15.0	13.8	15.4	23.4
19-Jun	12.9	12.8	11.9	11.3	11.2	11.1	11.8	13.3	14.9	16.4	17.6	18.7	19.5	20.2	21.3	21.6	21.8	21.6	21.2	20.2	18.7	16.9	14.6	12.2	16.4	21.8
20-Jun	10.5	8.2	6.5	4.9	4.8	6.9	10.7	14.7	18.9	21.0	22.5	23.2	23.9	24.4	25.0	25.3	25.6	25.0	24.5	23.1	21.4	20.0	18.6	17.6	17.8	25.6
21-Jun	15.9	14.4	13.5	13.1	13.7	14.2	14.5	14.8	15.6	18.0	19.6	21.4	22.1	22.9	23.2	23.3	23.2	21.2	19.9	18.8	17.8	15.9	13.7	13.0	17.7	23.3
22-Jun	12.3	10.2	8.9	8.3	8.3	9.9	12.5	14.5	17.4	19.8	20.8	21.7	15.6	18.0	20.7	21.6	19.7	18.5	20.9	19.6	17.6	15.6	14.0	12.5	15.8	21.7
23-Jun	11.2	10.0	9.2	8.3	8.0	9.6	12.1	16.1	19.3	21.9	23.6	22.8	22.6	17.6	20.5	24.1	24.6	24.6	24.0	22.5	20.9	19.2	17.7	15.8	17.8	24.6
24-Jun	14.4	14.1	12.5	11.3	11.3	13.1	16.3	19.5	22.2	25.1	28.1	29.6	30.3	30.7	31.1	31.8	31.9	29.7	29.5	28.0	25.3	23.1	20.1	17.8	22.8	31.9
25-Jun	16.2	15.7	14.1	12.9	12.1	13.3	16.7	20.0	22.8	24.3	26.3	28.1	29.5	31.0	29.0	23.5	19.1	18.3	21.8	21.4	19.5	18.1	17.3	17.2	20.3	31.0
26-Jun	16.7	16.8	15.8	14.8	14.4	15.4	17.9	19.3	20.2	21.7	23.6	26.9	28.7	29.2	30.0	29.9	25.8	20.4	23.3	23.8	21.0	19.0	17.6	17.5	21.2	30.0
27-Jun	16.5	15.8	15.2	13.8	13.3	15.0	18.0	21.6	24.7	27.5	29.8	30.6	31.1	31.5	32.0	32.3	32.8	32.7	31.3	30.4	27.5	24.4	21.9	19.6	24.6	32.8
28-Jun	18.8	18.1	16.9	16.0	15.5	16.6	19.4	23.3	26.4	28.2	28.4	29.6	30.1	29.3	29.8	28.7	29.9	28.8	28.2	26.9	24.6	21.8	21.1	19.4	24.0	30.1
29-Jun	17.1	15.3	13.9	13.2	12.9	12.8	14.9	17.6	21.6	25.2	28.3	30.1	31.3	32.2	32.9	32.9	32.8	30.7	29.4	27.8	26.3	23.4	21.2	19.9	23.5	32.9
30-Jun	18.2	17.1	16.1	15.3	14.2	14.0	14.6	15.8	17.3	18.7	20.0	20.8	21.2	22.1	21.2	20.2	20.0	19.4	18.9	18.5	17.8	17.6	17.6	18.7	18.1	22.1
																								Diurnal Average		
																								Diurnal Maximum		



WBEA
Hourly Averages

Ambient Temperature (AT) - C
Barge Landing - June 2015





WBEA
Cumulative Frequency Distribution

Ambient Temperature (AT) - C
Barge Landing - June 2015

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	2	0.28	0.28
0 - 10	64	8.89	9.17
10 - 20	416	57.78	66.94
> 20	238	33.06	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

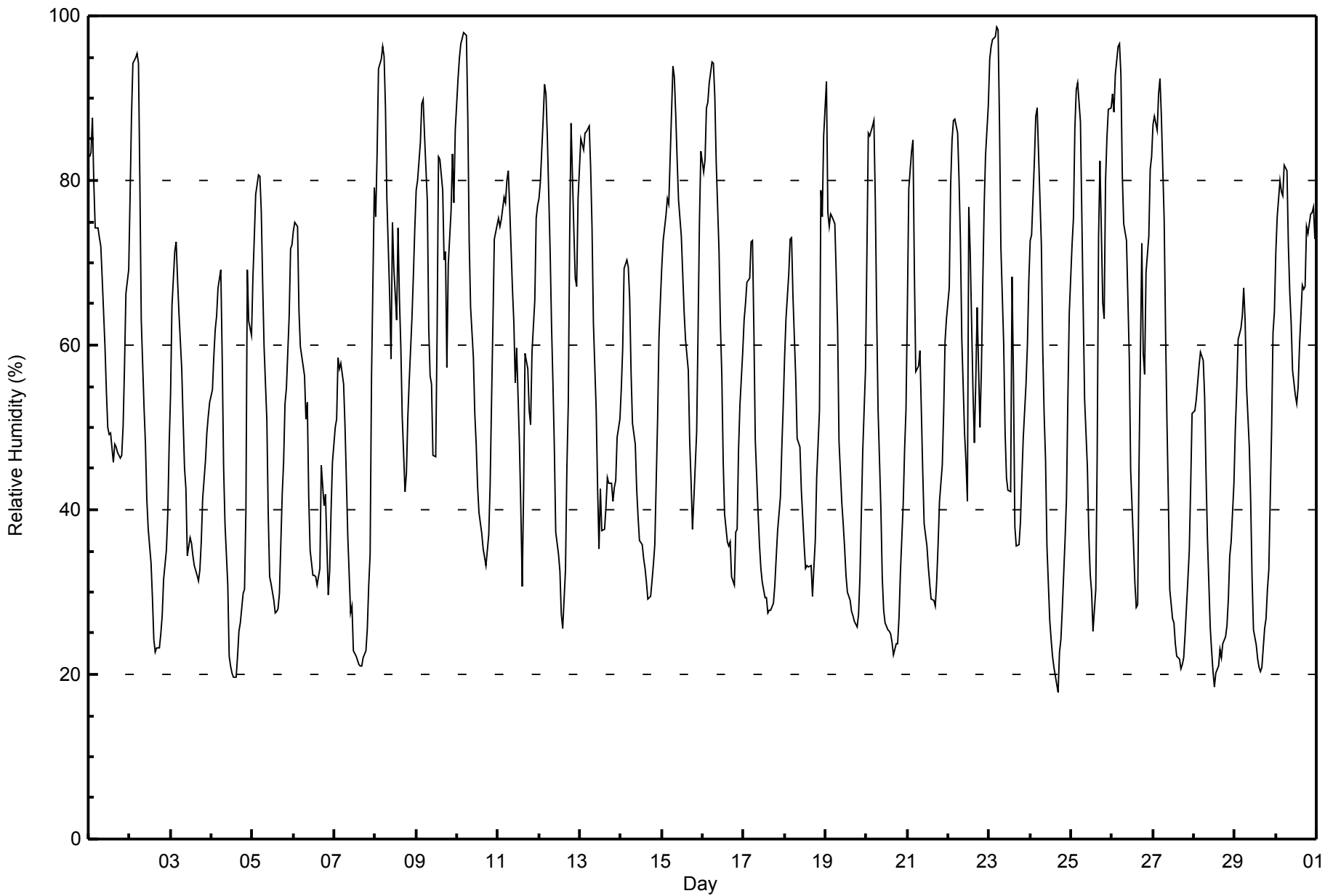
Barge Landing - June 2015

Maximum Value: 99 % on Jun 23 05:00 Maximum Daily Average: 72.9 % on Jun 9																		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Minimum Value: 18 % on Jun 24 17:00 Minimum Daily Average: 35.9 % on Jun 28 Maximum Diurnal Average: 80.8 % at hour 4 Minimum Diurnal Average: 35.6 % at hour 15 Monthly Average: 55.3 % Percentiles: P ₁ = 20 P ₁₀ = 27 Q ₁ = 36 Median = 54 Q ₃ = 73 P ₉₀ = 86 P ₉₉ = 97																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	83	83	88	80	74	74	73	72	68	60	54	50	49	49	46	48	48	47	46	47	50	57	66	69	61.7	88
2-Jun	78	88	94	95	95	94	80	63	52	48	41	38	34	29	24	23	23	25	27	32	35	40	48	51.2	95	
3-Jun	54	65	71	73	68	64	57	51	45	43	34	37	36	34	33	32	31	33	36	41	46	49	51	53	47.4	73
4-Jun	55	59	62	63	67	69	58	45	38	31	22	21	20	20	20	22	25	26	30	30	40	69	63	61	42.4	69
5-Jun	68	73	78	81	80	76	67	60	51	39	32	31	29	27	28	28	30	42	46	53	55	64	72	72	53.4	81
6-Jun	74	75	74	64	60	59	56	51	53	42	35	32	32	32	31	33	45	43	41	42	30	32	40	46	46.7	75
7-Jun	50	51	59	57	58	55	50	44	37	27	28	23	23	22	21	21	21	22	23	26	31	35	56	79	38.3	79
8-Jun	76	83	94	95	96	95	89	78	66	58	75	69	63	74	66	60	51	42	44	51	56	63	68	74	70.3	96
9-Jun	79	80	85	89	90	85	77	62	56	55	47	46	62	83	82	79	70	71	57	70	76	83	77	86	72.9	90
10-Jun	92	95	97	97	98	98	88	73	65	58	52	48	43	40	37	35	34	33	37	43	53	63	73	75	63.5	98
11-Jun	76	74	75	78	77	80	81	77	67	63	55	60	48	40	31	43	59	57	52	50	59	65	75	77	63.3	81
12-Jun	78	80	88	92	90	85	71	62	55	48	37	35	33	27	26	33	45	53	73	87	74	68	67	78	61.8	92
13-Jun	85	84	84	86	86	87	82	74	63	52	43	35	42	37	38	40	44	43	43	41	43	44	49	51	57.3	87
14-Jun	55	60	69	70	69	66	57	51	48	42	39	36	36	34	33	31	29	29	31	33	36	51	61	65	47.2	70
15-Jun	69	73	76	78	77	83	94	93	88	83	78	73	69	64	61	57	48	43	38	41	49	62	75	84	68.9	94
16-Jun	81	83	89	89	92	94	94	90	82	71	63	56	46	39	36	36	36	32	31	37	38	47	53	59	61.5	94
17-Jun	63	65	68	68	73	73	62	49	40	36	33	31	29	29	28	28	28	29	31	34	37	42	48	53	44.7	73
18-Jun	58	63	69	73	73	66	56	49	48	48	42	36	33	33	33	33	29	33	36	44	52	79	76	86	52.0	86
19-Jun	92	76	74	76	76	75	69	62	48	41	38	35	32	30	29	28	27	26	26	27	32	39	47	57	48.5	92
20-Jun	71	86	85	87	87	78	64	52	40	32	28	26	25	25	25	24	22	24	24	27	32	41	47	52	46.0	87
21-Jun	65	79	84	85	69	57	58	59	52	45	38	36	33	31	29	29	28	31	36	41	45	52	60	63	50.2	85
22-Jun	67	80	85	87	88	86	80	73	61	49	46	41	77	71	54	48	56	65	50	57	67	77	83	89	68.1	89
23-Jun	95	96	97	97	99	98	87	72	60	49	44	42	42	68	56	38	36	38	44	49	55	60	68	63.6	99	
24-Jun	73	73	82	88	89	83	72	59	52	46	36	27	24	22	21	19	18	23	24	28	36	41	54	64	48.1	89
25-Jun	72	75	86	91	92	87	76	64	53	45	37	32	30	25	30	47	73	82	65	63	80	85	89	89	65.4	92
26-Jun	91	88	93	96	97	93	81	75	73	66	58	45	36	31	28	29	46	72	59	56	69	73	81	83	67.4	97
27-Jun	87	88	86	90	92	88	75	62	51	41	30	27	26	24	22	22	21	21	22	25	31	35	43	52	48.4	92
28-Jun	52	53	55	57	59	58	54	44	37	26	23	20	19	20	21	23	22	24	25	26	29	34	36	43	35.9	59
29-Jun	50	55	61	62	64	67	63	55	48	41	32	25	24	22	21	20	21	26	27	30	33	50	61	64	42.5	67
30-Jun	71	76	80	79	78	82	81	72	66	63	57	54	53	55	60	67	67	67	74	73	76	76	77	73	69.9	82
	71.9	75.3	79.6	80.8	80.4	78.5	71.7	63.1	55.4	48.2	42.6	38.9	38.2	38.0	35.6	35.8	37.8	40.0	39.7	43.2	47.9	55.6	61.6	67.1	Diurnal Average	
	95	96	97	97	99	98	94	93	88	83	78	73	77	83	82	79	73	82	74	87	80	85	89	89	Diurnal Maximum	



WBEA
Hourly Averages

Relative Humidity (RH) - %
Barge Landing - June 2015





Maximum Speed: 17 km/h on Jun 26 14:00	Maximum Daily Speed Average: 10.6 km/h on Jun 13	Hours in Service: 720
Minimum Speed Value: 0 km/h on Jun 23 00:00	Minimum Daily Speed Average: 0.1 km/h on Jun 12	Hours of Data: 719
Maximum Diurnal Speed Average: 2.8 km/h at hour 14	Minimum Diurnal Speed Average: 0.2 km/h at hour 23	Hours of Missing Data: 1
Monthly Average Velocity: 1.2 km/h 272.5 deg	Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 3 Median = 5 Q ₃ = 8 P ₉₀ = 11 P ₉₉ = 16	Percent Operational Time: 99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	W5	WSW8	WNW4	NW10	NW10	NW9	NW11	WNW11	NW12	NW14	WNW12	NW13	WNW14	NW13	NW14	NW12	NW13	NW10	NW8	NW5	NW4	W4	W2	NW4	NW8.8	NW14
2-Jun	NW3	NW3	W3	SW3	NW2	W2	WNW1	W2	W2	NNW4	W5	W6	SSW5	SSW5	SSW8	S8	S6	SE7	SE9	SE8	ESE6	SE7	SSE6	S5	S2.4	SE9
3-Jun	SSE4	ESE4	ESE4	E3	ESE4	ESE3	SSW3	SW4	SSE6	SE9	SE11	SSE12	SSE10	SSE9	SSE10	SSE11	S9	SSE12	SSE11	SSE10	SSE9	SSE9	SSE8	SSE8	SSE7.3	SSE12
4-Jun	SSE6	SE6	SE7	SE7	SE8	SSE6	SSE6	S8	S8	S9	S10	S12	SSE11	SSE12	SSE12	S12	S11	SSW10	S8	S5	S8	S10	SSE8	S7	S8.2	S12
5-Jun	SSE5	S5	S4	SE4	S4	SSE6	SSE9	S10	S12	SSW13	SSW15	SW14	SSW14	SSW13	SSW12	S12	SSW11	SW12	S11	S10	SSE6	S7	S7	S8	S8.7	SSW15
6-Jun	S4	S4	S3	SW6	SW6	SW6	SW7	WSW6	WSW5	SW4	NW3	NE2	NE7	NNE6	NNW7	WSW4	SSW6	SSE4	S5	WNW2	NW6	NW3	NW2	WNW3	WSW2.0	SW7
7-Jun	WSW4	SW2	W2	NW1	N1	W3	NW4	WNW5	WNW5	WNW10	W9	W13	W16	W16	WNW15	WNW13	WNW11	WNW9	W9	WNW4	NNW1	ESE3	S1	S3	WNW5.9	W16
8-Jun	S6	SSE4	SSE2	SSE2	WSW1	S3	WSW6	W4	WSW6	W4	NNE1	SE5	WSW2	E8	ESE8	E4	WNW5	NW15	NW14	NW10	NW9	NW6	NW5	NW6	WNW2.0	NW15
9-Jun	NW5	NW4	NW4	NW3	WSW5	WSW5	SW5	SW6	WSW8	W4	W5	SE1	NE9	NE7	ENE2	S2	WSW6	WSW5	W4	NW4	NW3	N4	N5	NNW4	WNW2.2	NE9
10-Jun	WSW2	WNW3	W3	WSW2	W2	WSW2	WSW3	WSW2	ENE4	ENE3	ENE3	NNE5	N3	N3	NE3	ENE4	ENE5	E5	S6	S4	ESE3	ESE3	E2	ESE2	E0.7	S6
11-Jun	E2	E2	ESE2	ENE1	SE1	SE3	NW2	WSW2	SE8	SE6	SE8	SSE4	SSE5	SW4	SW7	W7	NW3	S2	SE9	SSE6	SSW3	ESE1	SE8	SE4	SSE2.5	SE9
12-Jun	WNW2	WNW2	W1	SW3	SE3	SW3	SW5	WSW4	WNW2	W5	WSW4	WSW2	NW4	W6	SSW2	ESE6	E10	E7	NW7	NNW9	ENE4	ESE6	ENE8	ENE7	NNE0.1	E10
13-Jun	NE6	NE5	N4	NNW5	NNW6	NW6	NNW8	N10	N12	NNE16	N16	NNE16	NNE15	N17	NNE15	NNE15	NNE16	NE14	NNE14	N13	NNE11	N10	N8	NNE7	NNE10.6	NNE17
14-Jun	NNE6	NE3	NNW2	NNW5	NNW6	N7	NNE9	NNE8	N9	N11	N11	N11	N10	N11	N11	N9	NNW9	NNW9	NNW8	NNW6	N4	NNW6	N8	N7	N7.5	N11
15-Jun	N6	N8	NNE7	NNE8	N5	N4	NW3	N4	N5	N4	NNW4	SE2	SW3	SW5	SW6	WSW5	WSW5	W6	NW7	NW3	WSW2	SE1	SSE3	SW3	NW2.1	N8
16-Jun	NW5	N5	NNE6	N6	N7	N8	NNW6	N7	N8	NNW9	N8	NNW9	NNW9	N9	NNW9	N8	NNW8	N7	N7	NNW4	N5	NNW4	N9	N8	N7.0	NNW9
17-Jun	NNW7	NNW6	NNW6	NNW7	NNW6	NNW6	NNW8	N8	NNE8	NNW7	NNE6	NNW4	N3	NW5	SW4	SE2	SW2	S8	SSE9	SSE8	SSE7	SSE6	SE6	SSE5	NNW1.3	SSE9
18-Jun	SSE6	SE6	SSE3	E1	ESE3	ESE4	SSE5	S7	SSE8	S9	SSW8	SSW7	SSW9	SSW8	SSE7	S6	SSW5	SSE5	SW7	AF	NW5	NW5	W4	W4	S4.0	S9
19-Jun	NW5	NNW8	NNW8	N8	N9	N9	N10	NNE9	NNE9	NE9	NE8	NNE7	NNE7	NNE6	NE5	NNE5	NNE5	NE6	NE5	NE4	NE4	N7	NNW3	NNW2	NNE5.9	N10
20-Jun	NW3	W2	W3	SSW1	WSW4	SW2	SW3	WSW5	WSW4	NW4	NNW2	N2	ENE5	NNW4	NNW3	NNW4	NNW4	N3	NE7	NE5	NNE6	NE8	NNE5	WSW3	NNW1.9	NE8
21-Jun	WNW2	NNW4	W3	WNW2	NNW3	NNW3	NW3	NW3	NNW3	WNW4	NNW3	N6	NNW6	NNW7	NNW5	N7	N7	N8	N7	NW6	WNW4	SSW3	WSW1	WSW3	NNW3.5	N8
22-Jun	WNW3	WSW3	SW3	SSW2	SSW2	SE3	SSW2	WSW3	NE3	NNE6	ENE5	NE3	NNW4	SW5	SW12	WSW11	WNW9	WNW7	NW4	NNE4	ENE5	ENE1	NW1	NNE0	W1.5	SW12
23-Jun	NNW1	WSW2	SSW1	SSE3	SSW3	SSE3	S5	S5	SSW6	SW6	SSW5	WSW6	WSW10	SW7	ESE5	ENE2	SW7	SW6	S3	SSE4	SSE5	S5	S4	SSE4	SSW3.5	WSW10
24-Jun	SSE5	S5	SE5	SE5	SE6	SE6	S6	SSW8	S8	S8	SW9	SW11	SW12	WSW12	WSW11	WSW10	WSW9	NW8	NNW6	NNE4	NE5	N8	NNW4	NNW2	SW3.7	SW12
25-Jun	WNW2	NW3	W2	WNW2	SSW1	WSW2	W1	WNW3	NNW4	N5	N5	NNE3	NW3	WSW6	NW6	NW9	SSW8	SSE6	SSW6	W3	SW6	SW2	S6	S5	W1.7	WNW9
26-Jun	SSE6	SSW2	NW2	SSE4	SE4	SE5	SSE6	S7	S7	SW7	SW10	SW16	WSW15	WSW17	WSW15	WSW15	W14	WSW10	WSW7	WSW6	E6	SE5	S3	S3	SW5.8	WSW17
27-Jun	SSW2	SSE3	S4	SSW3	SSE3	S4	SSW5	SSW6	SW7	SW7	SW7	WSW10	SW9	WSW11	SW12	SW11	WSW9	SW10	SW8	SW6	SW4	SW4	SSW4	S1	SW5.8	SW12
28-Jun	SW2	WNW3	SSW2	SSW4	S4	SW3	SW4	WSW2	NNW6	NW10	NW13	WNW15	WNW15	NW12	NNW10	NNW10	NNW9	NNW8	NW7	WNW6	NW4	NW3	NNW5	WNW4	NW5.4	WNW15
29-Jun	SW3	SSW2	S3	S3	SSW3	S3	S3	SSW4	SW4	SW2	W2	SW2	SSW5	SW5	SW6	SW7	SSW3	NE8	NE8	NE7	NE6	NNW3	NNW4	NNW5	SSW0.9	NE8
30-Jun	NNW2	NW3	NW3	NE1	SSW1	WSW2	SW2	SW2	SSW3	S2	SSE3	E1	ESE2	SSW2	NNW1	NW4	N2	NNW1	W3	S2	SE3	ESE2	WSW3	WSW7	WSW0.8	WSW7

WSW0.7	WNW0.7	W0.5	WNW0.5	WNW0.5	WSW0.7	WSW1.5	WSW2.0	W1.2	WNW1.8	WNW1.6	W2.3	W2.6	W2.8	W2.7	W2.3	W2.7	WNW1.5	W1.1	NW0.8	NE0.6	ENE0.3	SSE0.2	WSW0.6	Diurnal Average
NNW7	NNW8	NNW8	NW10	NW10	N9	NW11	WNW11	S12	NNE16	N16	SW16	W16	WSW17	WSW15	WSW15	NNE16	NW15	NW14	N13	NNE11	S10	N9	N8	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 - June 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 8 km/h on Jun 4 21:00	Hours of Data: 719
Minimum Value: 1 km/h on Jun 2 01:00	Hours of Missing Data: 1
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 6	Hours of Calibration: 0
	Percent Operational Time: 99.9

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

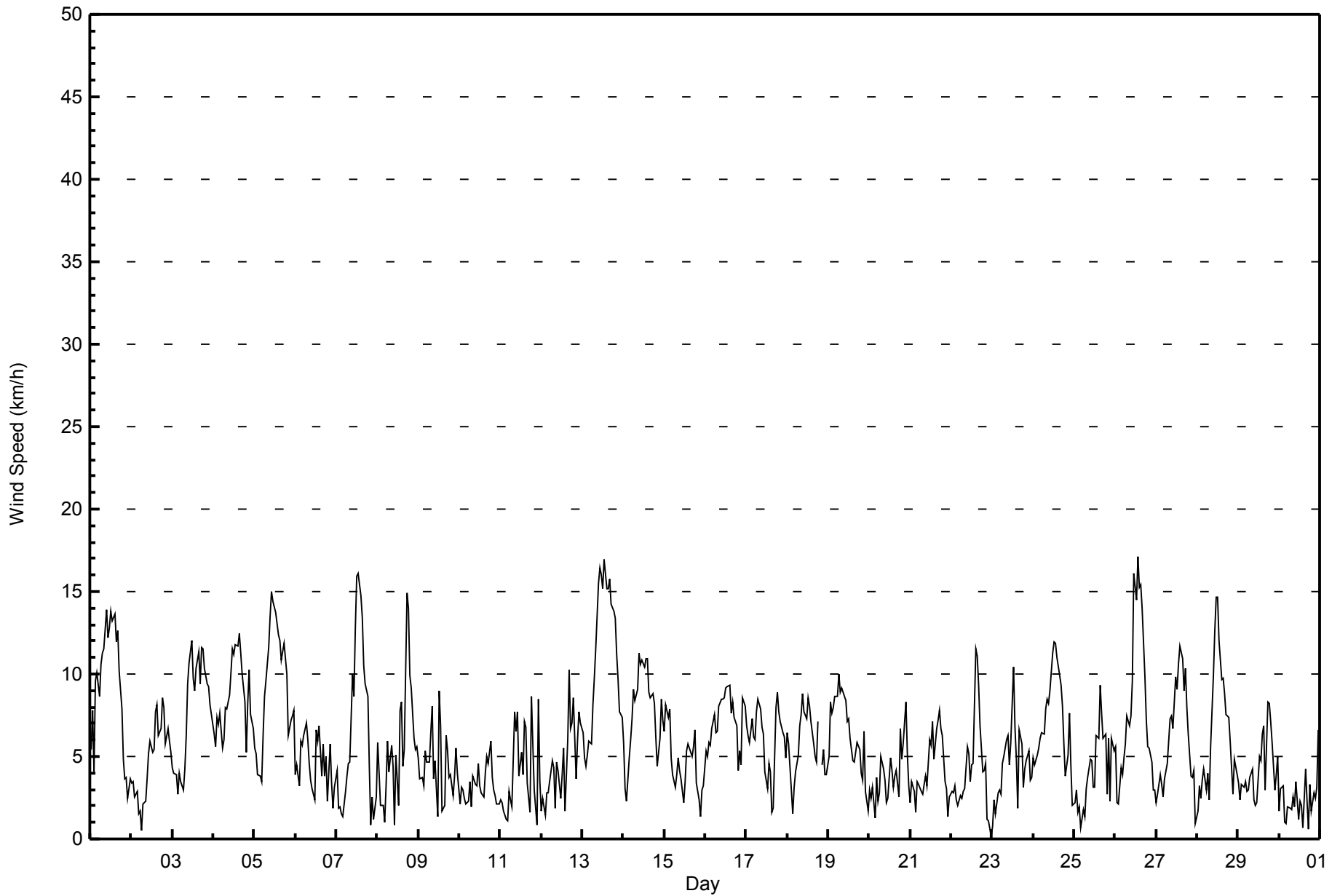
2	3	2	4	4	3	4	4	4	5	5	5	6	6	6	6	6	6	6	8	5	4	8	4	3	3
Diurnal Maximum																									

AF - Analyzer Failure



WBEA
Hourly Averages

Wind Speed (WS) - km/h
Barge Landing - June 2015





WBEA
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Barge Landing - June 2015

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	374	52.02	52.02
6 - 11	288	40.06	92.07
12 - 19	57	7.93	100.00
20 - 28	0	0.00	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 719

Total Number of Hours: 720



WBEA
Frequency Distribution

Wind Speed (WS) - km/h
Barge Landing - June 2015

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	20	10	12	13	8	15	17	23	34	30	31	33	29	22	42	35	374
6 - 11	40	18	13	2	4	4	19	31	30	13	27	21	5	7	20	34	288
12 - 19	3	8	1	0	0	0	0	4	4	5	6	5	4	6	11	0	57
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	63	36	26	15	12	19	36	58	68	48	64	59	38	35	73	69	719

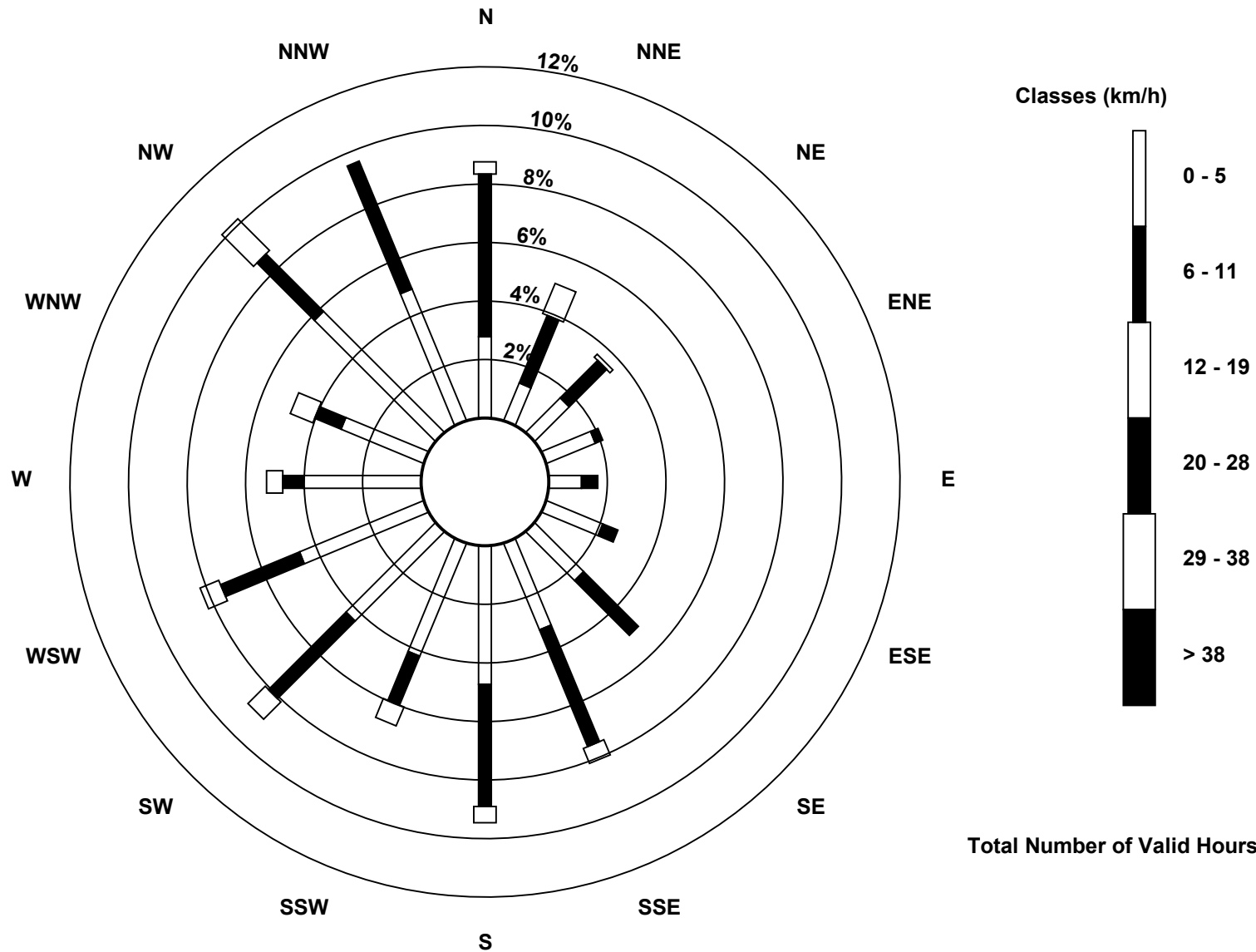
Total Number of Valid Hours: 719

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

Wind Speed (WS) - km/h
Barge Landing (AMS 9)





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Barge Landing - June 2015

Direction of Maximum Speed: 248 deg on Jun 26 14:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 11.8 deg on Jun 13	Hours of Data: 719
Direction of Minimum Speed: 24 deg on Jun 23 00:00	Hours of Missing Data: 1
Direction of Minimum Daily Speed Average: 0.1 deg on Jun 12	Percent Operational Time: 99.9
Monthly Average Direction: 277.0 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	263	255	292	320	308	306	306	300	309	309	296	312	302	309	315	316	319	316	321	318	305	265	278	312	305.8
2-Jun	325	324	270	236	315	274	295	262	268	344	273	267	205	196	203	186	173	145	133	125	121	126	150	186	186.3
3-Jun	150	116	112	98	112	122	204	228	148	146	139	163	166	153	152	157	171	159	155	157	155	147	150	156	152.9
4-Jun	154	142	138	141	138	152	153	181	187	182	174	176	162	157	171	191	196	175	187	191	180	168	176	176	169.4
5-Jun	168	173	169	141	177	153	163	177	179	200	208	215	198	199	212	187	208	233	189	172	155	180	173	173	189.8
6-Jun	177	183	171	215	221	226	235	251	238	223	307	36	37	28	335	250	204	163	174	291	317	308	306	285	243.5
7-Jun	257	214	260	314	6	263	315	286	288	294	279	279	275	279	301	290	285	292	259	284	348	121	179	175	282.0
8-Jun	185	167	162	159	253	184	238	268	241	273	23	138	247	81	109	87	294	322	323	324	323	321	304	313	299.7
9-Jun	310	309	324	308	248	251	219	224	246	268	260	141	45	54	65	184	251	245	259	320	322	350	357	338	287.1
10-Jun	239	293	259	248	276	249	244	255	64	62	70	27	2	352	41	70	78	86	182	180	115	107	91	104	80.1
11-Jun	94	96	122	74	144	143	320	253	134	130	136	164	149	222	233	275	317	189	142	152	197	110	140	132	156.6
12-Jun	299	299	273	224	142	224	226	245	282	280	244	239	312	267	199	114	100	97	324	332	71	104	78	65	23.8
13-Jun	51	41	356	346	342	325	331	358	4	12	4	12	12	11	12	19	28	36	32	8	26	9	354	12	11.8
14-Jun	21	43	329	334	344	357	21	17	353	3	5	4	358	357	351	355	346	346	333	329	8	333	358	9	356.6
15-Jun	9	4	19	14	2	349	320	358	352	359	343	136	229	227	215	239	255	276	306	311	237	145	166	219	320.7
16-Jun	306	9	12	0	0	358	346	355	358	343	356	344	347	356	340	1	330	350	353	342	356	340	354	355	350.7
17-Jun	345	344	329	332	327	327	343	2	15	346	17	329	350	307	217	129	235	177	161	162	155	148	141	155	346.2
18-Jun	147	138	147	79	108	123	152	179	165	183	206	205	205	194	162	170	203	157	233	AF	309	311	260	274	185.8
19-Jun	311	343	346	351	357	359	1	15	29	41	43	33	26	33	50	21	30	45	56	54	37	350	327	348	15.6
20-Jun	316	267	263	205	245	233	235	245	238	310	343	352	62	347	335	330	346	354	36	34	19	35	25	256	339.2
21-Jun	288	332	274	295	344	328	313	323	327	283	327	355	346	343	333	355	353	5	3	323	296	204	257	252	331.6
22-Jun	295	239	233	212	197	145	192	248	37	33	69	39	348	228	236	239	292	299	305	14	66	64	309	24	278.8
23-Jun	327	254	209	159	195	165	180	190	208	231	213	244	245	216	114	63	220	220	175	151	166	182	184	158	200.5
24-Jun	164	180	146	138	146	137	183	197	179	187	224	229	232	240	244	237	244	314	327	29	38	1	332	336	219.1
25-Jun	292	317	275	286	213	253	259	296	347	360	2	17	317	242	310	323	193	157	205	260	217	234	173	178	261.2
26-Jun	156	204	312	163	130	136	167	185	190	221	224	234	251	248	253	251	267	251	243	253	79	136	175	188	227.2
27-Jun	212	157	171	192	156	173	200	200	222	215	224	240	231	242	236	234	242	231	228	218	236	217	204	174	222.0
28-Jun	220	296	205	196	185	220	229	242	332	319	313	300	298	322	327	331	329	334	317	301	309	320	335	297	307.5
29-Jun	236	208	172	182	197	170	172	207	220	235	277	220	210	227	222	214	201	50	48	49	37	343	332	337	212.7
30-Jun	346	318	325	46	208	257	234	219	205	179	152	94	113	211	327	325	349	342	261	171	137	120	245	249	242.7
	255.4	294.4	281.1	294.6	281.4	244.3	252.7	254.9	259.6	290.5	282.3	272.4	278.0	272.8	265.2	265.6	270.2	287.1	270.1	319.4	44.5	76.2	146.4	239.1	
	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 (WD) - deg
Barge Landing - June 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 101 deg on Jun 17 16:00	Hours of Data: 719
Minimum Value: 10 deg on Jun 3 05:00	Hours of Missing Data: 1
Percentiles: P ₁ = 12 P ₁₀ = 20 Q ₁ = 25 Median = 32 Q ₃ = 45 P ₉₀ = 70 P ₉₉ = 94	Hours of Calibration: 0
	Percent Operational Time: 99.9

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	30	23	40	22	27	30	28	27	29	27	34	28	30	29	25	30	25	27	32	28	38	32	40	34	40
2-Jun	14	12	57	26	55	41	100	95	86	67	67	52	64	68	51	40	53	45	23	16	12	12	19	28	100
3-Jun	30	13	11	31	10	24	51	40	38	31	33	32	42	41	39	32	34	28	24	23	21	17	18	21	51
4-Jun	18	13	11	10	10	17	28	30	34	38	39	39	38	38	33	32	30	33	29	35	29	25	22	25	39
5-Jun	19	22	24	55	31	22	25	29	30	30	28	26	35	33	34	35	36	37	25	26	18	20	23	22	55
6-Jun	23	35	38	28	23	21	19	31	31	68	68	82	43	39	34	71	32	41	31	66	20	20	22	19	82
7-Jun	19	55	68	89	71	50	47	33	42	38	39	37	37	36	32	36	36	37	34	32	33	50	95	60	95
8-Jun	23	44	60	68	66	38	26	46	36	53	91	44	86	37	27	39	84	26	25	24	22	21	28	21	91
9-Jun	23	35	28	29	34	31	34	29	29	66	57	96	36	36	90	78	30	29	41	18	22	29	27	18	96
10-Jun	44	37	19	37	20	28	28	78	47	71	70	59	78	75	83	56	40	35	48	33	18	15	15	35	83
11-Jun	17	23	19	62	80	86	94	75	23	30	34	55	51	70	67	57	59	87	24	25	59	81	21	60	94
12-Jun	92	52	80	76	48	36	25	33	93	51	71	89	80	58	90	73	23	37	39	20	76	23	23	24	93
13-Jun	22	23	24	19	22	22	24	26	26	26	26	26	26	26	27	27	24	23	23	26	24	24	23	26	27
14-Jun	33	34	12	18	22	24	27	27	32	31	33	32	36	34	32	38	34	33	30	26	32	24	25	24	38
15-Jun	24	25	24	25	24	24	23	37	27	31	34	68	63	38	45	65	61	46	32	28	29	68	36	21	68
16-Jun	35	27	27	25	23	24	24	26	27	29	28	30	30	35	32	34	30	34	27	26	25	17	24	26	35
17-Jun	24	25	26	23	21	22	27	28	33	41	45	71	94	63	83	101	97	40	27	23	20	15	14	12	101
18-Jun	14	14	16	32	18	23	37	35	33	28	41	54	43	38	38	37	64	57	26	AF	74	36	38	24	74
19-Jun	17	22	23	23	23	23	25	25	26	27	34	39	37	52	58	55	53	40	33	26	27	21	42	17	58
20-Jun	16	43	30	62	19	21	27	25	38	60	81	96	53	62	77	64	63	81	40	30	28	26	22	43	96
21-Jun	32	22	40	56	37	35	41	49	39	59	74	43	53	43	60	36	36	31	25	20	29	29	74	30	74
22-Jun	36	36	25	38	37	30	55	56	63	39	39	71	70	73	21	27	39	28	39	32	22	54	42	89	89
23-Jun	68	21	81	42	44	38	39	40	35	38	70	48	25	51	31	86	41	24	24	16	16	22	36	16	86
24-Jun	16	28	16	11	14	16	29	29	31	36	36	32	32	37	35	33	31	39	22	49	34	23	16	54	54
25-Jun	43	20	49	47	76	24	61	42	51	35	44	72	75	53	80	41	51	42	32	65	56	70	28	17	80
26-Jun	17	65	49	22	19	18	30	28	26	27	23	22	31	26	31	29	37	29	22	66	27	34	54	24	66
27-Jun	46	52	22	18	35	21	26	29	23	30	45	33	37	30	31	37	31	26	27	23	18	16	20	88	88
28-Jun	73	51	61	28	24	51	23	55	33	29	26	31	34	30	30	24	29	24	23	29	26	34	29	32	73
29-Jun	35	57	39	32	19	26	28	30	31	82	75	98	65	75	52	52	81	28	23	23	29	56	24	19	98
30-Jun	63	33	27	69	77	44	39	51	38	57	31	76	28	48	66	17	43	79	26	75	36	52	63	22	79

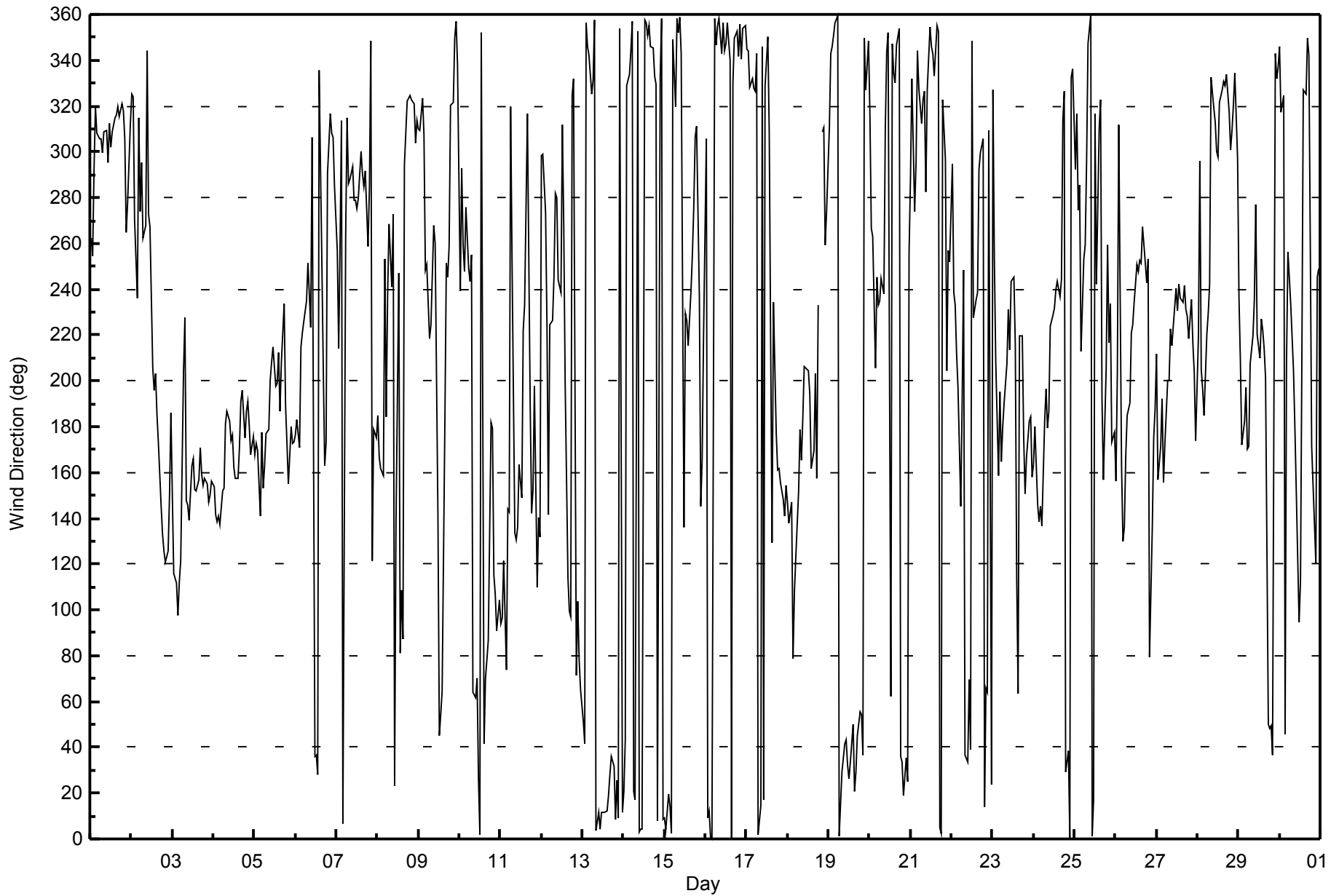
92	65	81	89	80	86	100	95	93	82	91	98	94	75	90	101	97	87	48	75	76	81	95	89	
Diurnal Maximum																								

AF - Analyzer Failure



WBEA
Hourly Averages

Wind Direction (WD) - deg
Barge Landing - June 2015





Wood Buffalo Environmental Association TRS Calibration Report

Station Information

Calibration Date	June 16, 2015	Last Calibration	May 15, 2015
Station Name	Barge Landing	Station Number	AMS 9
Reason:	Routine		
Start Time (MST)	8:20	End Time (MST)	12:40
Gas Cert Reference	CC62993	Station temp.	22 Deg C
Cal Gas Concentration	4.77 ppm	Cal Gas Exp Date	10/06/2014
Calibrator Make/Model	Sabio 4010	Serial Number	11071107
Dil air Make/Model	API 701	Serial Number	4888
DACS make/model	Campbell Scientific CR3000	DACS serial No.	6466
SO2 gas concentration	59 ppm	SO2 gas cert/exp	FF54535 7/6/14

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-689	-690
Analyzer IP address	192.168.1.42		Lamp voltage	1012	995
Calculated slope	0.991981	0.997888	Chamber temp	45	45
Calculated intercept	-0.099960	-0.106668	Pressure	686.3	692.1
Analyzer Background	1.93	1.93	Flow	0.434	0.438
Analyzer Coefficient	1.011	1.011	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	-0.1	----
as found span	5000	83.7	79.8	80.0	0.998
SO2 scrubber check	6000	12.2	120.0	0.1	----
calibrator zero	5000	0.0	0.0	-0.1	----
high point	5000	83.7	79.8	80.0	0.998
second point	5000	41.9	40.0	40.3	0.991
third point	5000	21.0	20.0	20.3	0.987
as left zero	6000	0.0	0.0	-0.1	----
as left span	5000	83.7	79.8	80.3	0.995
Average Correction Factor					0.992

Corrected As found	80.1	Previous response	80.6	% change	0.7%
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Notes:

Replaced inlet filter and scrubber check after as founds. No adjustments. As left zero was done at 11:35 - 11:55 MST, as left span done from 12:14 - 12:34 MST. Analyzer pulling room air from 10:05 - 11:35 MST due to cleaning manifold.

Calibration Performed By: Asad Hidayat



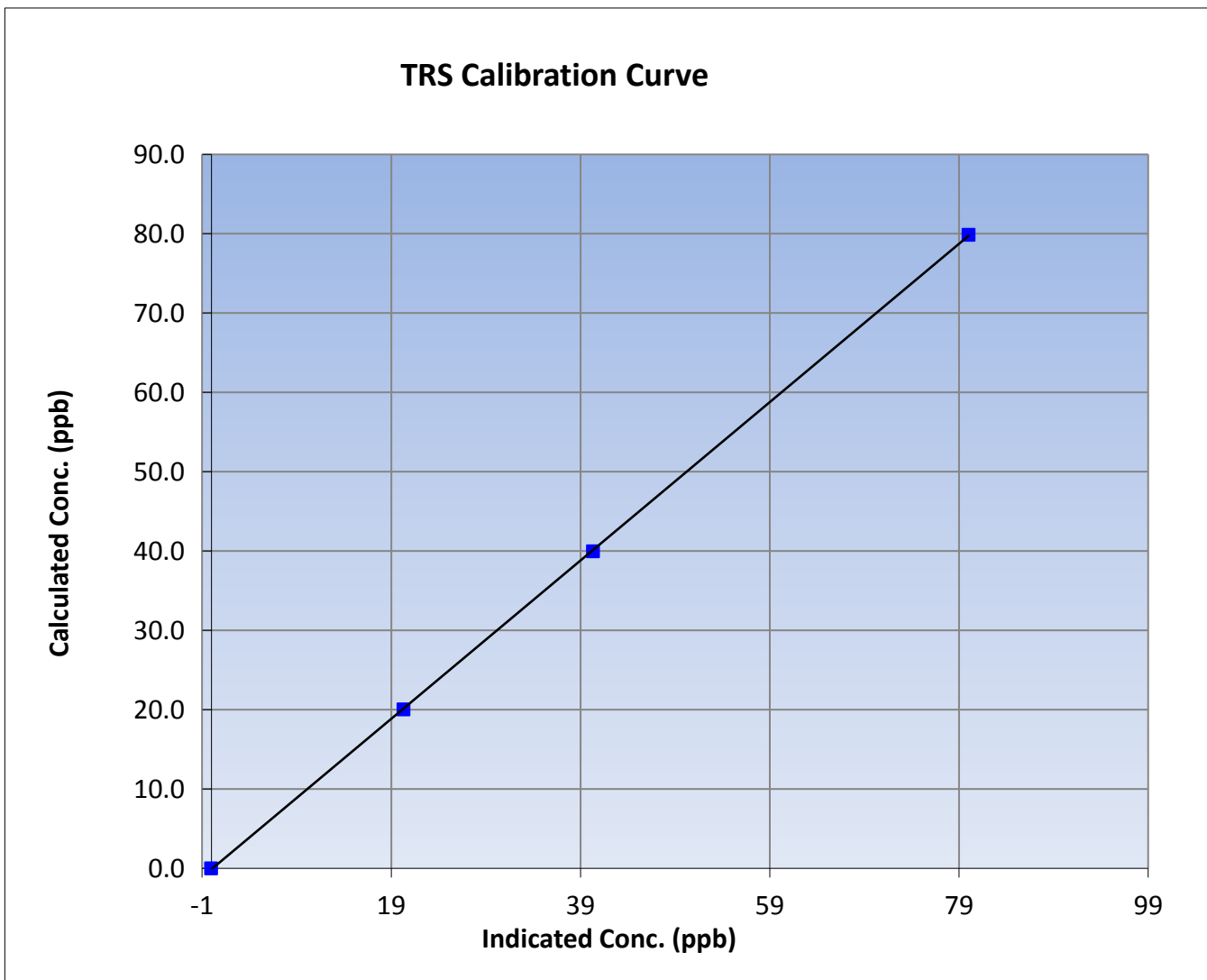
Wood Buffalo Environmental Association TRS Calibration Report

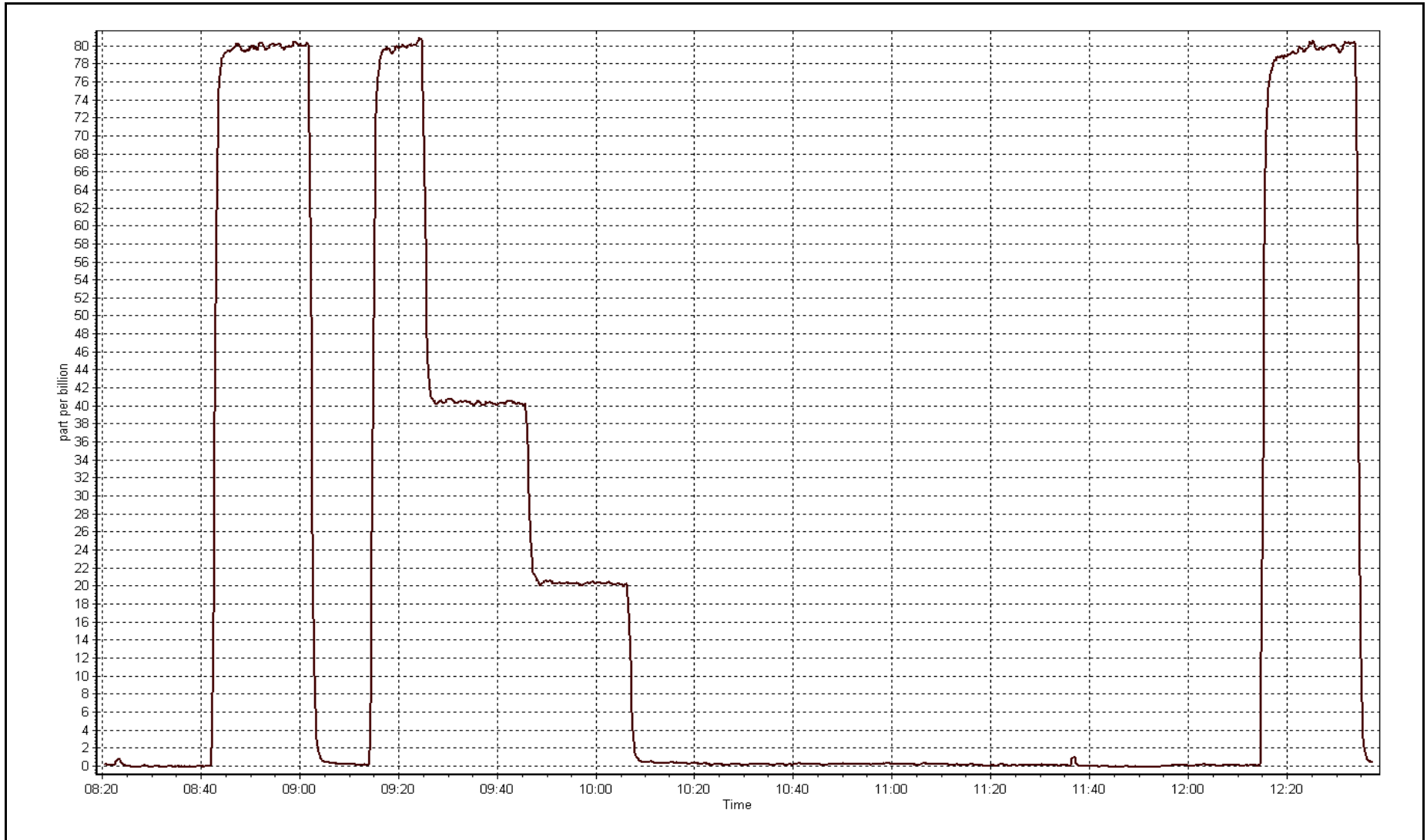
Station Information

Calibration Date	June 16, 2015	Previous Calibration	May 15, 2015
Station Name	Barge Landing	Station Number	AMS 9
Start Time (MST)	8:20	End Time (MST)	12:40
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1218153461

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999980
79.8	80.0	0.9979		
40.0	40.3	0.9914	Slope	0.997888
20.0	20.3	0.9874		
			Intercept	-0.106668







Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	June-16-15	Last Calibration	May-14-15
Station Name	Barge Landing	Station Number	AMS 9
Reason:	Routine		
Start Time (MST)	10:05	End Time (MST)	12:15
Gas Cert Reference	LL104180	Cal Gas Expiry Date	12/02/2018
CH4 Cal Gas Conc.	490 ppm	CH4 Equiv Conc.	1023.5 ppm
C3H8 Cal Gas Conc.	194 ppm	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11071107
ZAG make/model	Teledyne API 701	Serial Number	4888
DACS make/model	Campbell Scientific CR3000	Serial Number	6466

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 50 ppm		Sample Pressure	9.1	9.2
Analyzer IP address	192.168.1.51		Air or Bypass Press	34.7	34.7
Calculated slope	1.004316	0.996561	Fuel Pressure	24.1	24.1
Calculated intercept	0.011318	-0.028364	Analyzer Coeff	4.3	4.3
			Analyzer BKG	5.680	5.680
Analyzer make	Thermo 51i-LT		Analyzer serial #	1327059296	

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6000	0.0	0.00	0.05	----
as found span	6000	92.0	15.69	15.79	0.994
calibrator zero	6000	0.0	0.00	0.05	----
high point	6000	92.0	15.69	15.79	0.994
second point	6000	49.2	8.39	8.43	0.996
third point	6000	18.5	3.16	3.18	0.992
as left zero	6000	0.0	0.00	-0.04	----
as left span	6000	92.0	15.69	15.81	0.993
Average Correction Factor					0.994

Corrected As found	15.74	Previous response	15.61	% change	-0.8%
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Notes:

Changed inlet filter after as founds. No adjustments.

Calibration Performed By:

Asad Hidayat



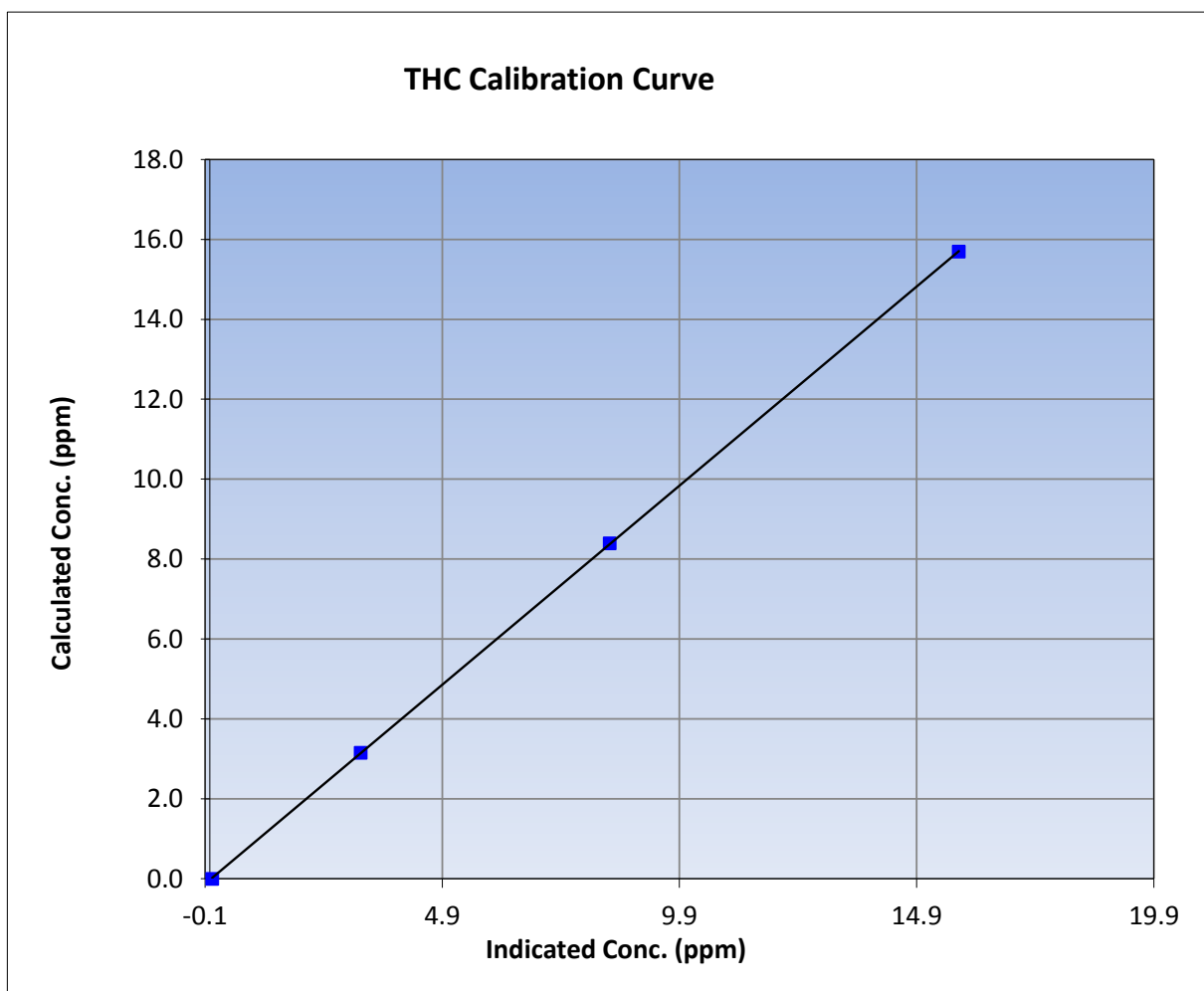
Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	June 16, 2015	Previous Calibration	May 14, 2015
Station Name	Barge Landing	Station Number	AMS 9
Start Time (MST)	10:05	End Time (MST)	12:15
Analyzer make	Thermo 51i-LT	Analyzer serial #	1327059296

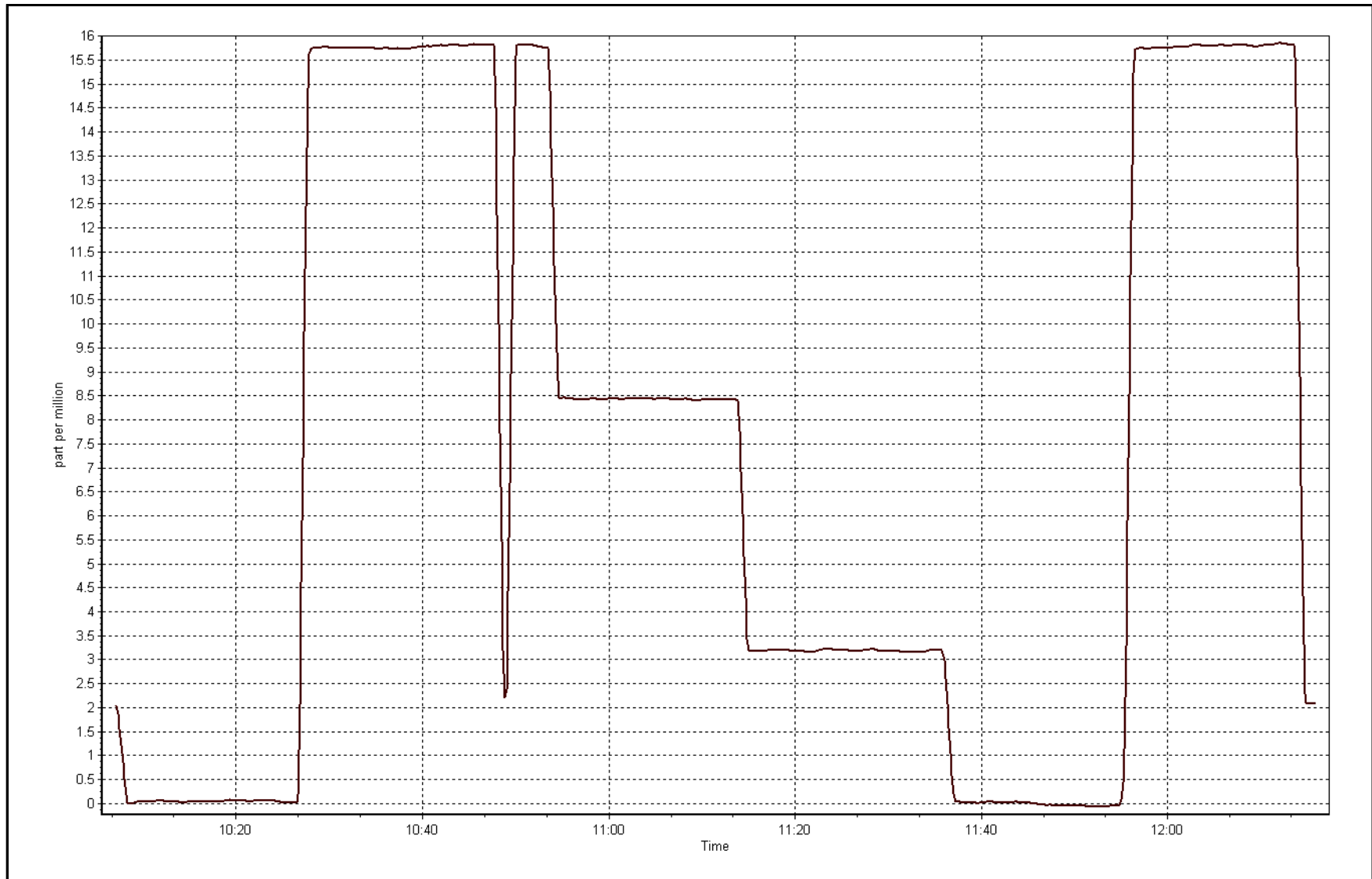
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.05	----	Correlation Coefficient	0.999991
15.69	15.79	0.9939		
8.39	8.43	0.9956	Slope	0.996561
3.16	3.18	0.9924		
			Intercept	-0.028364



THC Calibration Plot

Date: June 16, 2015





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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 11
LOWER CAMP
JUNE 2015**

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

July 30, 2015



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP (AMS 11)
 JUNE 2015

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	686	33	34	99.86	66	0	11	0
H2S (ppb) Average	684	34	36	99.72	7	0	2	0
THC (ppm) Average	686	33	34	99.86	4.1	-	3	-
Temperature (C) Average	720	0	0	100.00	32.7	-	24.5	-
Relative Humidity (%) Average	720	0	0	100.00	99	-	74	-
Wind Speed 10 m (km/h) Average	720	0	0	100.00	29	-	18	-
Wind Direction 10 m (deg) Average	720	0	0	100.00	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP (AMS 11)
 JUNE 2015

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	686	2.8	6	-	0	0	0	1	3	8	66
H2S (ppb) Average	684	0.9	1	-	0	0	0	1	1	2	7
THC (ppm) Average	686	2.32	0.3	-	2	2.1	2.1	2.2	2.4	2.7	4.1
Temperature 2 m (C) Average	720	17.76	5.7	-	1.9	10.9	13.6	17.3	21.2	25.5	32.7
Relative Humidity (%) Average	720	59	21	-	21	30	41	60	76	88	99
Wind Speed 10 m (km/h) Average	720	8.4	6	-	0	2	4	7	11	16	29
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP (AMS 11)
JUNE 2015

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2	17 Jun 2015 12:00	17 Jun 2015 12:00	1	Maintenance - sample manifold cleaned
H2S	24 Jun 2015 14:00	24 Jun 2015 15:00	2	Unstable operation - excessive baseline drift
THC	17 Jun 2015 12:00	17 Jun 2015 12:00	1	Maintenance - sample manifold cleaned



Summary of Hour Averages

Lower Camp - June 2015

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 66 ppb on Jun 2 10:00	Maximum Daily Average: 10.7 ppb on Jun 2		Hours of Data:	686
Minimum Value: 0 ppb on Jun 20 06:00	Minimum Daily Average: 0.2 ppb on Jun 16		Hours of Missing Data:	34
Maximum Diurnal Average: 6.1 ppb at hour 11	Minimum Diurnal Average: 0.9 ppb at hour 3		Hours of Calibration:	33
Monthly Average: 2.8 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 3 P ₉₀ = 8 P ₉₉ = 26		Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	9	6	Z	0	0	0	0	1	0	0	0	3	4	0	0	0	0	0	0	0	0	0	0	0	1.2	9
2-Jun	0	0	5	Z	0	0	0	9	24	66	57	17	3	3	6	7	5	4	3	2	1	1	9	23	10.7	66
3-Jun	1	1	1	1	Z	1	1	1	0	14	1	4	11	12	15	3	12	14	4	0	2	6	4	1	4.7	15
4-Jun	1	0	0	0	0	Z	2	2	1	1	5	4	9	8	18	7	3	2	1	1	7	10	1	0	3.6	18
5-Jun	Z	0	1	1	1	1	1	1	3	13	12	8	2	1	3	4	4	6	12	0	0	0	0	1	3.2	13
6-Jun	1	Z	4	3	2	7	9	6	3	10	15	14	11	5	30	5	26	4	1	1	1	3	3	2	7.2	30
7-Jun	1	1	Z	1	13	27	2	2	1	1	0	1	1	3	4	2	3	11	2	2	1	8	5	12	4.5	27
8-Jun	5	1	2	Z	1	27	3	10	16	13	12	2	10	3	0	0	1	0	0	0	0	0	0	0	4.7	27
9-Jun	0	0	0	1	Z	8	5	3	3	7	12	4	1	0	0	0	7	0	0	0	0	0	0	0	2.3	12
10-Jun	0	0	0	0	0	Z	0	1	0	0	2	3	6	11	6	5	1	2	9	12	1	1	1	0	2.7	12
11-Jun	Z	0	0	0	0	0	2	1	0	2	2	2	4	3	12	8	4	9	0	0	0	1	2	1	2.4	12
12-Jun	0	Z	1	0	10	13	11	4	2	7	6	14	19	6	0	0	0	0	0	0	0	0	0	0	4.3	19
13-Jun	0	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-Jun	0	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-Jun	0	0	0	0	Z	0	0	0	0	0	C	C	C	12	6	39	32	12	7	1	1	1	0	0	5.7	39
16-Jun	0	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-Jun	Z	0	0	1	1	1	0	0	0	0	0	M	1	1	3	4	6	6	2	4	6	8	6	3	2.4	8
18-Jun	1	Z	1	0	0	0	2	1	1	1	2	2	1	1	2	1	0	6	3	1	1	3	3	11	1.9	11
19-Jun	3	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	3
20-Jun	0	0	0	Z	0	0	0	9	6	5	5	2	3	2	1	2	1	0	0	0	0	0	13	1	2.2	13
21-Jun	0	0	0	0	Z	0	0	0	0	0	0	2	3	3	2	1	1	0	0	0	3	7	3	4	1.5	7
22-Jun	1	0	0	0	0	Z	1	2	4	1	13	4	1	0	4	1	2	1	0	0	0	1	0	0	1.7	13
23-Jun	Z	0	0	6	0	0	0	0	4	11	6	0	1	2	0	3	7	1	2	1	2	1	0	0	2.2	11
24-Jun	0	Z	0	0	0	0	0	0	0	0	2	0	0	0	2	2	9	4	0	0	0	0	0	0	1.0	9
25-Jun	0	0	Z	0	0	0	0	0	0	0	1	7	6	1	2	3	2	1	1	1	7	8	5	3	2.2	8
26-Jun	1	1	0	Z	1	6	2	1	1	3	1	4	0	0	1	0	1	1	2	4	3	2	8	2	1.9	8
27-Jun	4	1	0	0	Z	1	1	1	1	3	10	1	1	1	1	0	0	0	0	3	57	7	2	7	4.5	57
28-Jun	10	9	4	10	1	Z	3	1	0	0	1	0	2	2	0	0	0	0	1	1	0	0	0	0	2.0	10
29-Jun	Z	1	1	1	0	0	0	0	1	4	7	3	2	1	1	1	1	1	1	1	1	1	1	1	1.3	7
30-Jun	0	Z	0	0	0	0	0	2	4	2	1	2	2	2	2	2	1	1	1	2	3	3	4	2	1.7	4

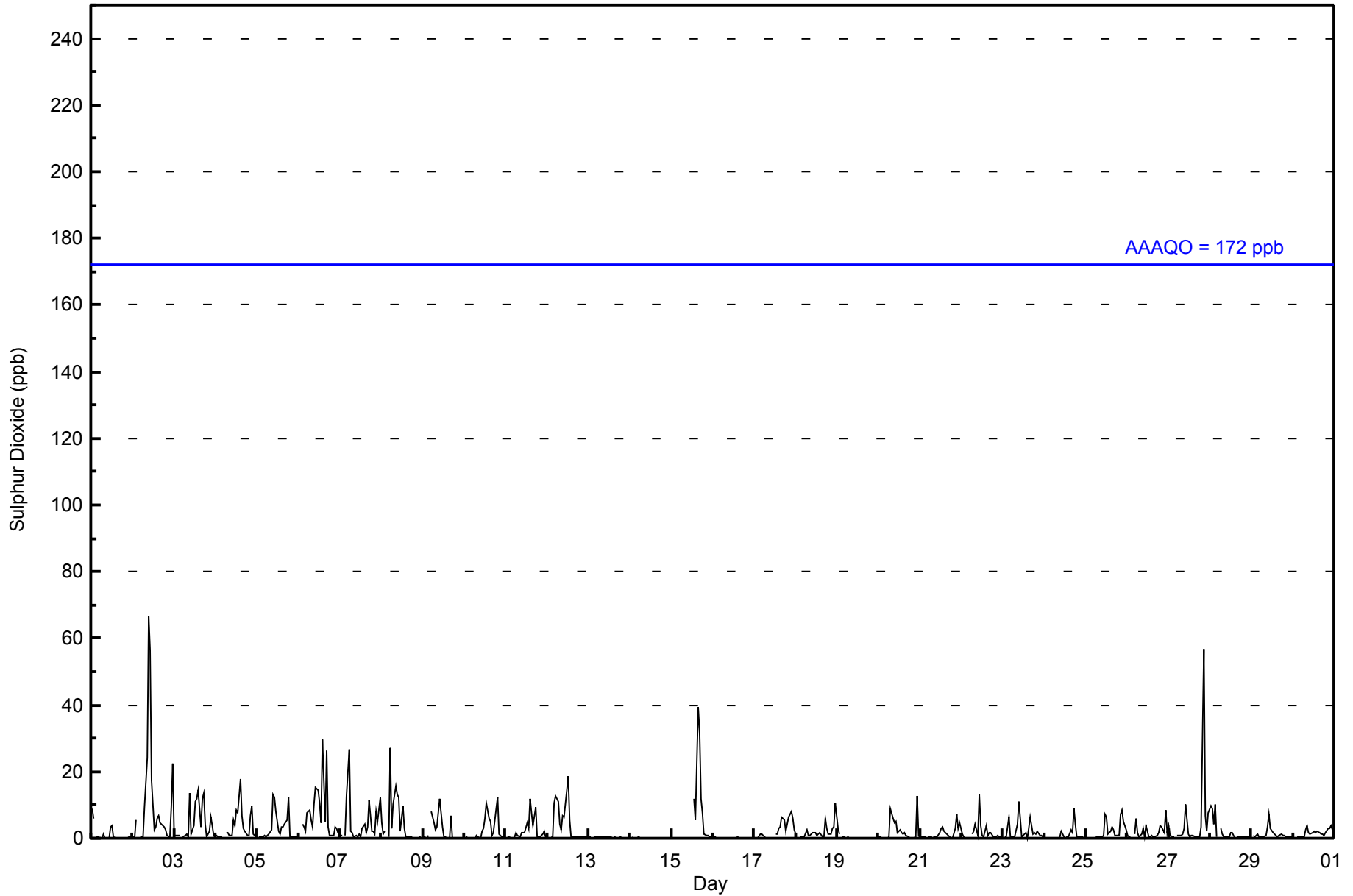
1.6	1.0	0.9	1.2	1.4	3.8	1.6	2.0	2.6	5.5	6.1	3.7	3.5	2.8	4.0	3.4	4.1	3.1	2.0	1.4	3.4	2.4	2.5	2.5	Diurnal Average	
10	9	5	10	13	27	11	10	24	66	57	17	19	12	30	39	32	14	12	12	57	10	13	23	Diurnal Maximum	

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



WBEA
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Lower Camp - June 2015





WBEA
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Lower Camp - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	641	93.44	93.44
11 - 20	34	4.96	98.40
21 - 60	10	1.46	99.85
61 - 110	1	0.15	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



WBEA
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Lower Camp - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	84	50	20	11	9	51	97	33	20	9	8	36	48	63	56	46	641
11 - 20	0	0	2	1	1	0	5	3	3	3	2	4	4	4	1	1	34
21 - 60	0	1	1	0	1	1	0	1	0	0	4	0	0	1	0	0	10
61 - 110	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
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	84	51	23	12	11	52	103	37	23	12	14	40	52	68	57	47	686

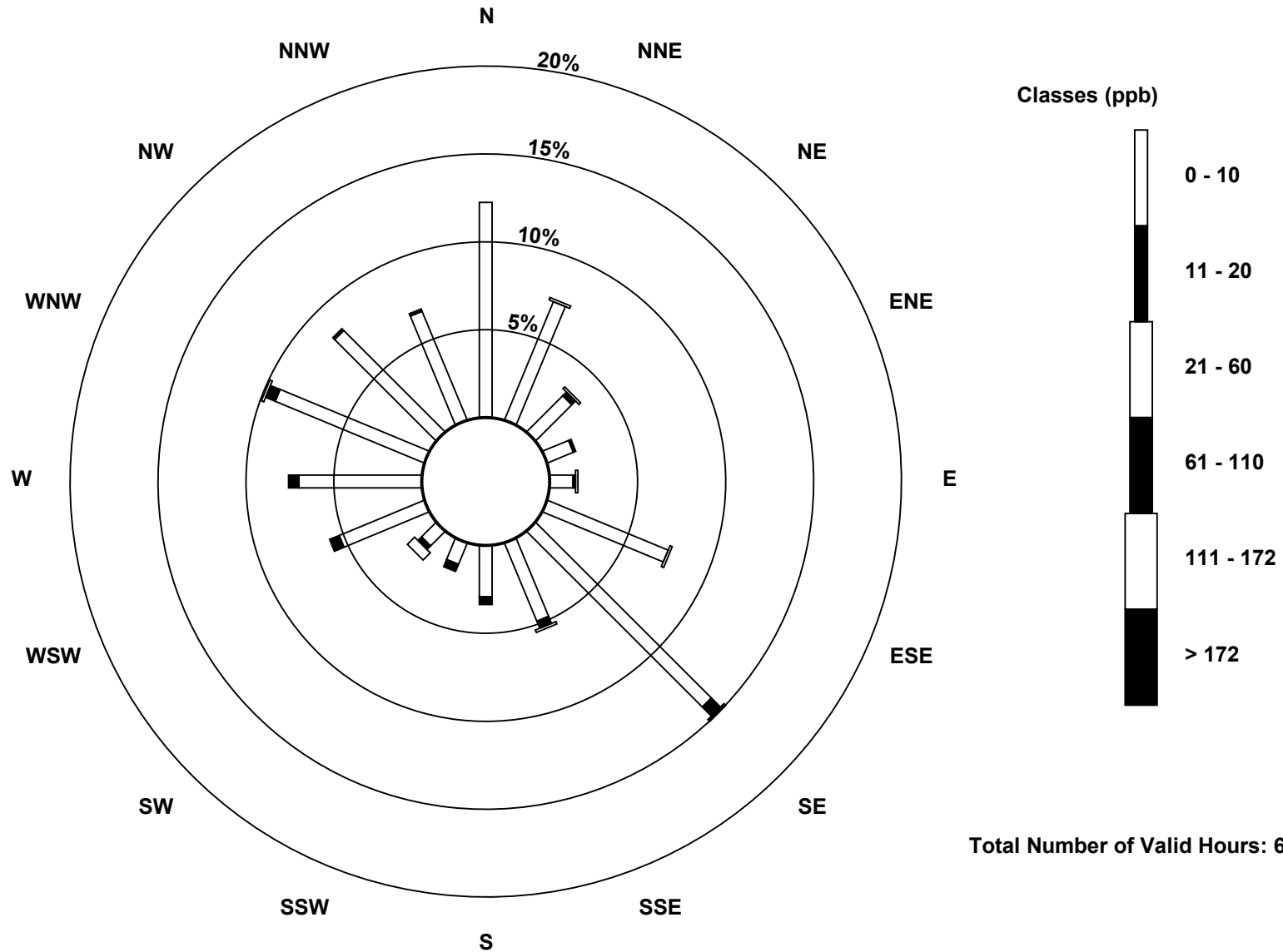
Total Number of Valid Hours: 686

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

Sulphur Dioxide (SO₂) - ppb
Lower Camp (AMS 11)

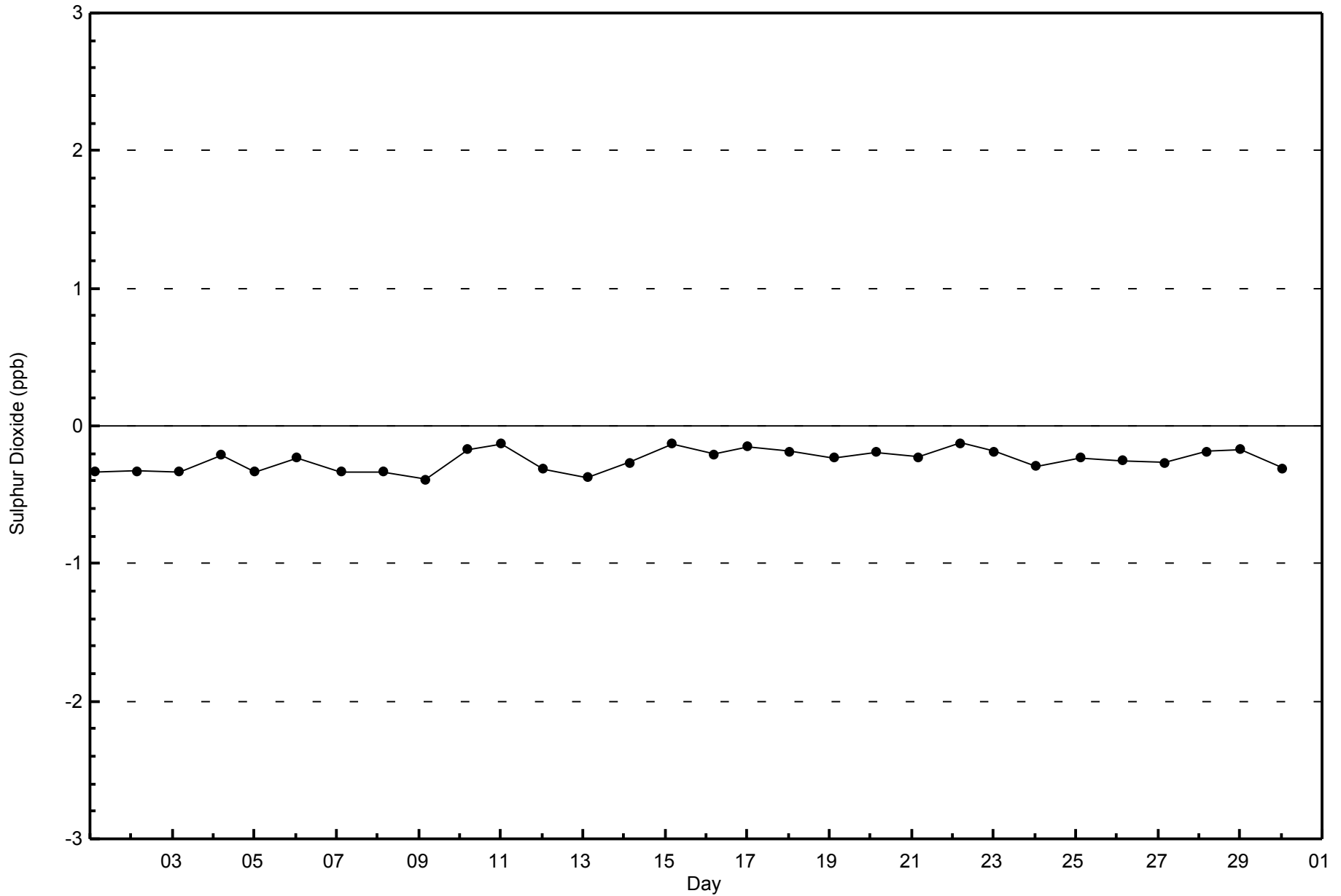


Total Number of Valid Hours: 686



WBEA
Zero Responses

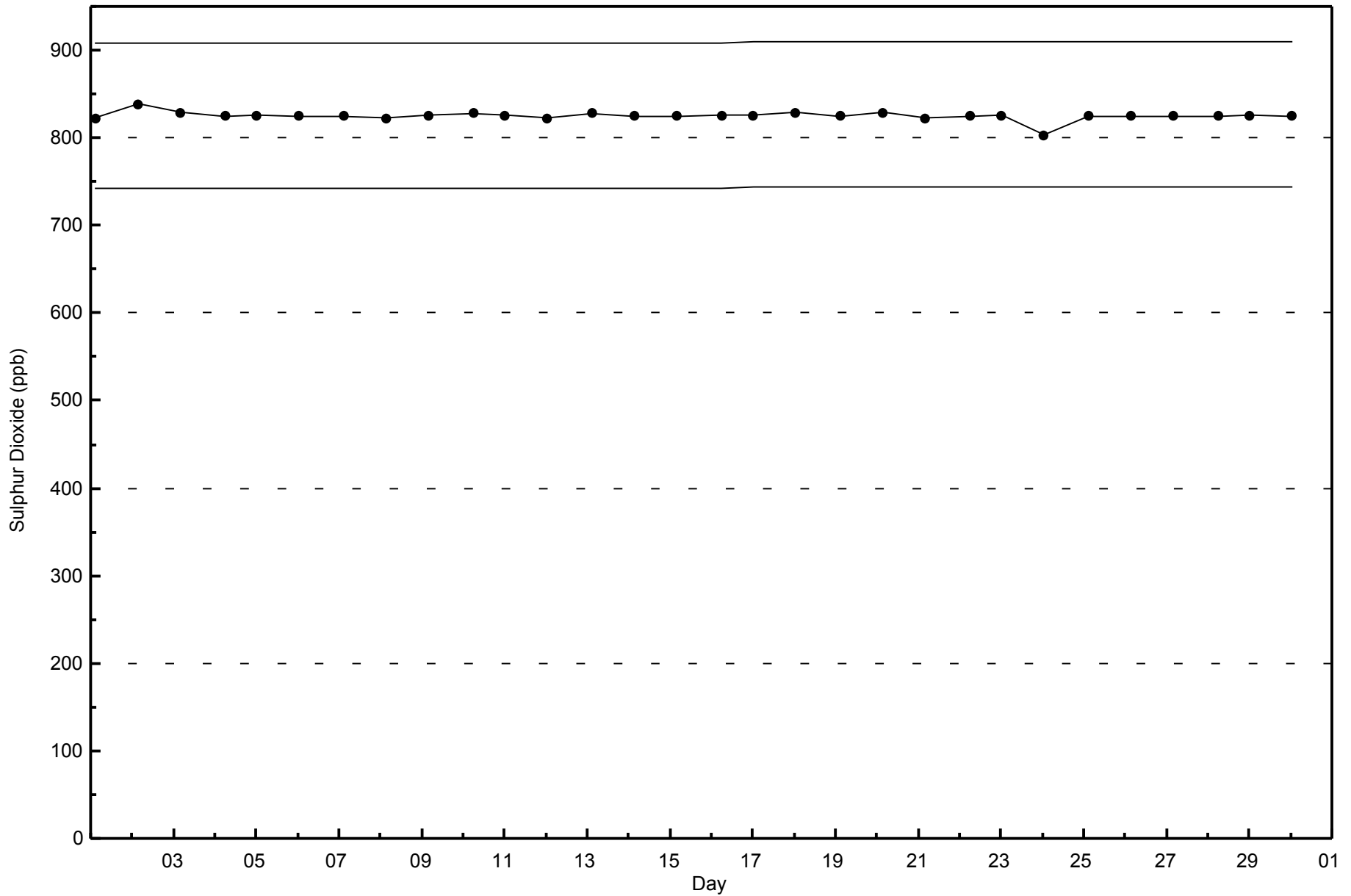
Sulphur Dioxide (SO₂) - ppb
Lower Camp - June 2015





WBEA
Span Responses

Sulphur Dioxide (SO₂) - ppb
Lower Camp - June 2015





Summary of Hour Averages

Lower Camp - June 2015

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 7 ppb on Jun 8 06:00	Maximum Daily Average: 1.6 ppb on Jun 6		Hours of Data:	684
Minimum Value: 0 ppb on Jun 24 13:00	Minimum Daily Average: 0.5 ppb on Jun 19		Hours of Missing Data:	36
Maximum Diurnal Average: 1.5 ppb at hour 6	Minimum Diurnal Average: 0.5 ppb at hour 14		Hours of Calibration:	34
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 =4		Percent Operational Time:	99.7

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	1	0	1	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	1	1	1	0.5	1
2-Jun	1	1	2	Z	Z	1	1	1	1	1	1	1	1	0	0	1	1	0	0	1	1	0	2	3	1.0	3
3-Jun	1	1	2	Z	Z	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	0.9	2
4-Jun	1	1	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	0.9	2
5-Jun	1	Z	1	2	3	1	1	1	1	2	2	1	1	1	1	1	1	1	3	1	1	1	1	1	1.1	3
6-Jun	1	1	Z	2	1	1	1	1	1	1	1	2	2	6	1	4	1	1	1	1	2	3	3	1.6	6	
7-Jun	2	2	Z	Z	2	5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	3	1.4	5
8-Jun	3	2	4	Z	Z	7	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1.4	7
9-Jun	1	1	1	1	2	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1.0	2
10-Jun	1	1	1	1	1	1	Z	1	1	1	1	1	1	1	0	0	0	0	1	2	1	2	1	1	0.8	2
11-Jun	1	Z	1	1	1	1	2	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2	1	1.0	2
12-Jun	1	1	Z	1	7	6	3	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1.4	7
13-Jun	1	1	1	Z	1	1	1	1	1	0	0	0	1	1	1	1	1	1	0	0	0	1	0	0	0.6	1
14-Jun	1	0	1	1	Z	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.5	1
15-Jun	1	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	2	1	1	0	0	1	1	1	1	0.5	2
16-Jun	1	1	1	1	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0.5	1
17-Jun	0	Z	1	1	1	1	1	1	1	1	C	C	C	C	0	0	0	0	0	1	1	1	1	1	0.6	1
18-Jun	1	2	Z	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1	1	1	1	1	2	1	0.8	2
19-Jun	1	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.5	1
20-Jun	1	1	1	2	Z	1	1	2	2	2	1	1	1	1	0	1	0	0	0	0	1	2	2	1	1.0	2
21-Jun	1	1	0	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0.5	1
22-Jun	2	1	1	1	1	1	Z	1	1	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0.6	2
23-Jun	1	Z	1	4	1	1	1	1	1	2	1	0	0	1	0	0	1	0	0	0	1	1	1	1	0.9	4
24-Jun	1	1	Z	1	1	1	0	0	0	0	0	0	0	UO	UO	0	0	1	1	0	1	1	1	1	0.6	1
25-Jun	1	1	1	Z	1	1	1	1	1	1	1	1	1	0	0	1	1	0	0	1	2	2	2	1	0.9	2
26-Jun	1	1	1	1	Z	2	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	2	1	0.8	2
27-Jun	1	1	1	1	1	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	1	6	2	1	1	0.9	6
28-Jun	1	1	1	2	1	1	Z	1	1	0	1	0	0	0	0	0	0	0	1	0	0	1	1	1	0.8	2
29-Jun	1	Z	1	1	2	1	1	1	1	2	1	1	1	1	0	0	0	0	0	1	1	0	0	1	0.9	2
30-Jun	1	1	Z	1	0	1	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.0	2

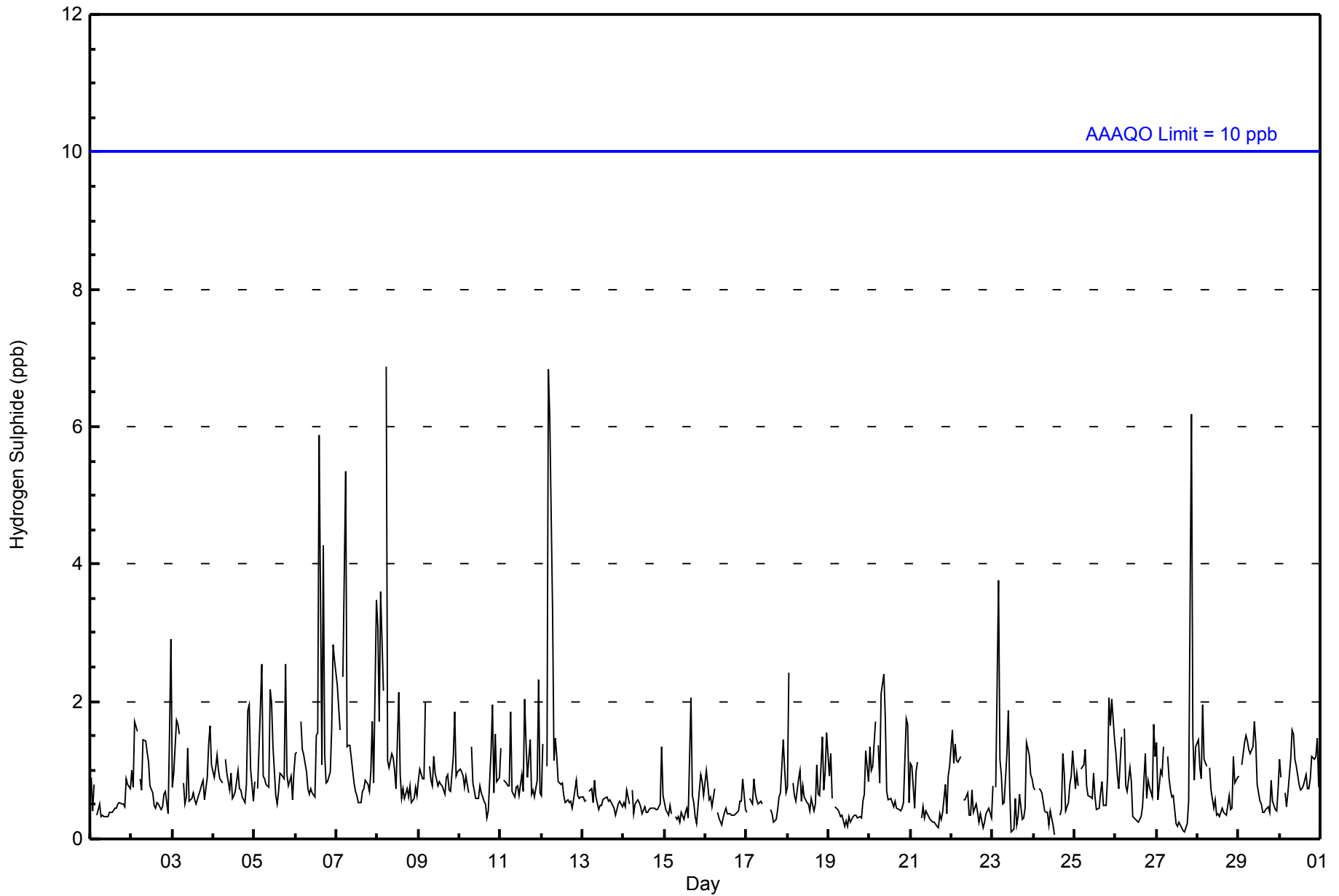
1.1	1.0	1.0	1.2	1.3	1.5	0.9	0.9	0.8	0.9	0.7	0.5	0.6	0.5	0.7	0.6	0.7	0.6	0.6	0.6	1.0	1.0	1.1	1.1	Diurnal Average	
3	2	4	4	7	7	3	2	2	2	2	1	2	2	6	2	4	1	3	2	6	2	3	3	Diurnal Maximum	

Z - zerspan C - Calibration UO - Unstable Operation
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb



WBEA
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
Lower Camp - June 2015





WBEA
Cumulative Frequency Distribution

Hydrogen Sulphide (H₂S) - ppb
Lower Camp - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	667	97.51	97.51
3 - 4	11	1.61	99.12
5 - 7	6	0.88	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



WBEA
Frequency Distribution

Hydrogen Sulphide (H₂S) - ppb
Lower Camp - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	82	51	21	12	12	48	100	36	20	12	8	38	51	69	58	49	667
3 - 4	0	0	0	0	1	2	2	1	2	0	2	1	0	0	0	0	11
5 - 7	0	1	0	0	0	0	0	0	1	0	3	1	0	0	0	0	6
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	82	52	21	12	13	50	102	37	23	12	13	40	51	69	58	49	684

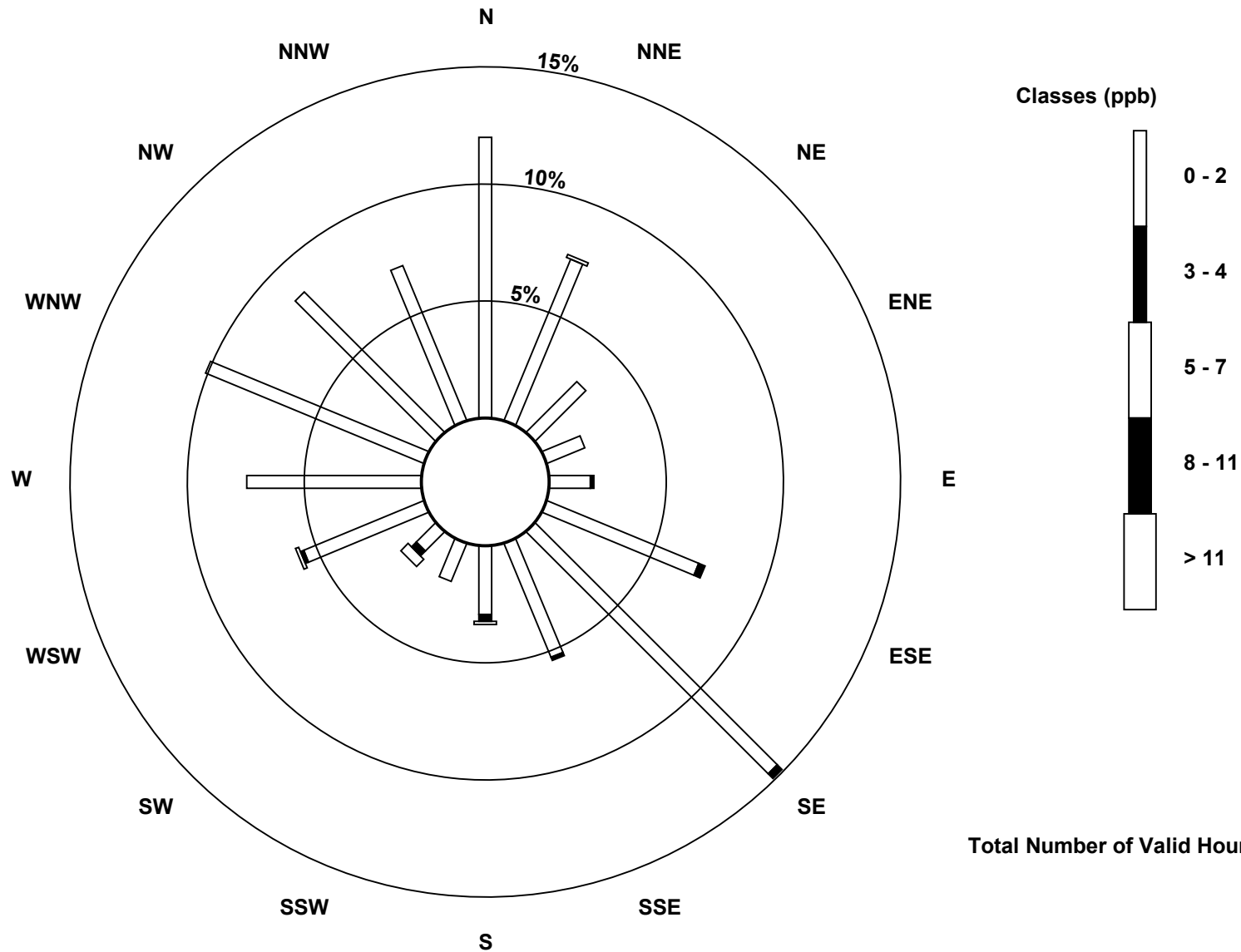
Total Number of Valid Hours: 684

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

Hydrogen Sulphide (H₂S) - ppb
Lower Camp (AMS 11)

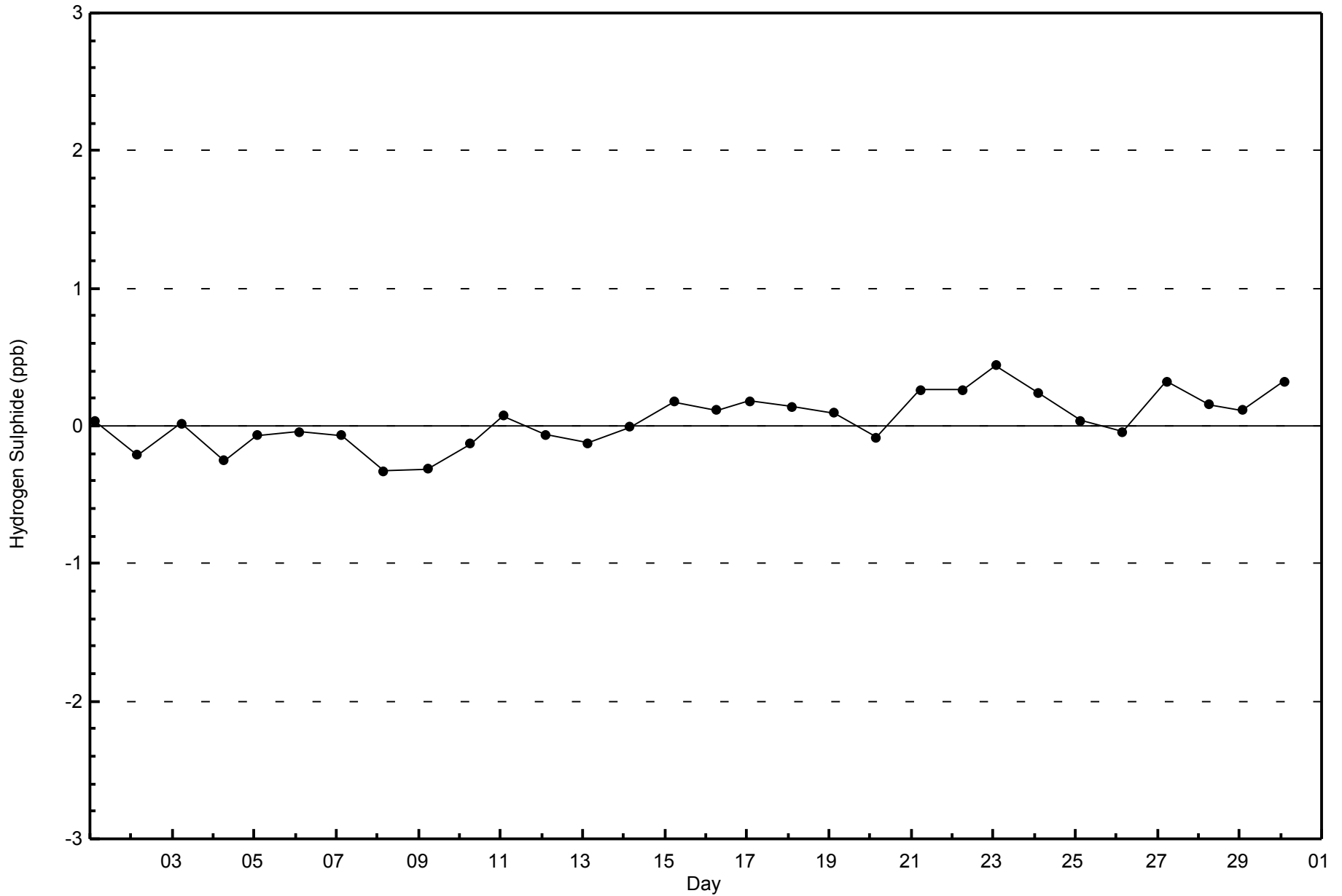


Total Number of Valid Hours: 684



WBEA
Zero Responses

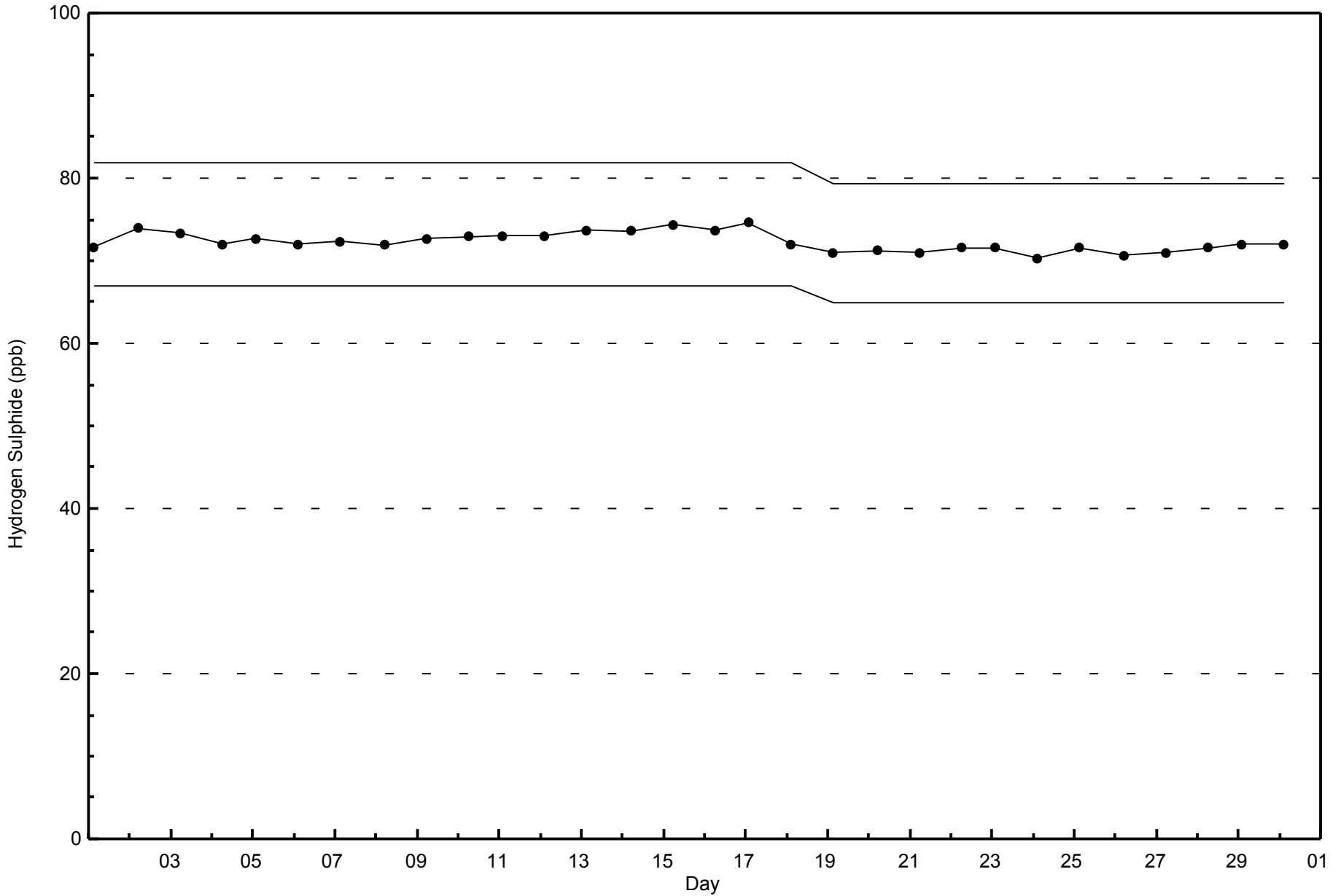
Hydrogen Sulphide (H₂S) - ppb
Lower Camp - June 2015





WBEA
Span Responses

Hydrogen Sulphide (H₂S) - ppb
Lower Camp - June 2015



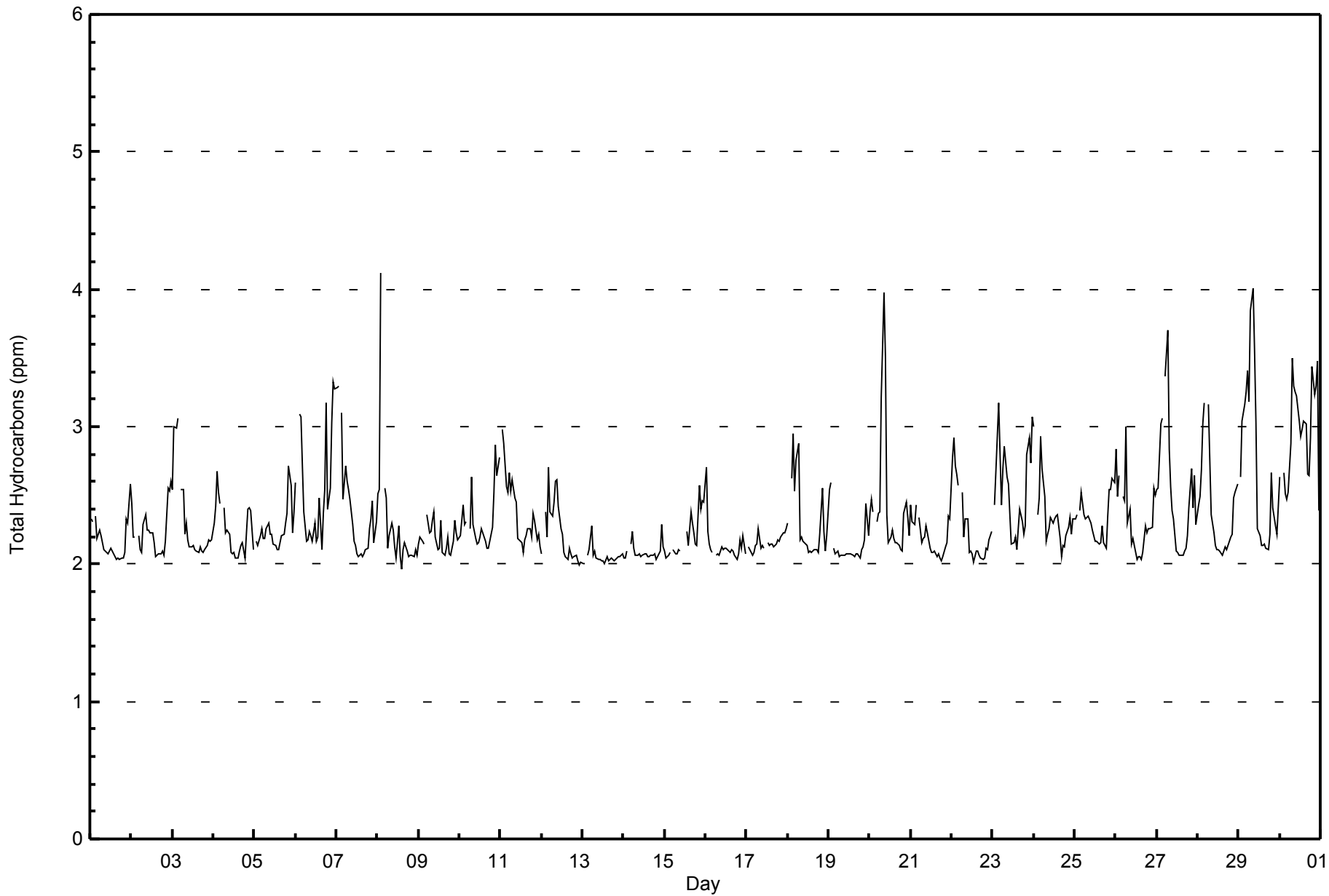


Maximum Value: 4.1 ppm on Jun 8 03:00																	Maximum Daily Average: 3.0 ppm on Jun 30																	Hours in Service: 720	
Minimum Value: 2.0 ppm on Jun 8 15:00																	Minimum Daily Average: 2.1 ppm on Jun 13																	Hours of Data: 686	
Maximum Diurnal Average: 2.6 ppm at hour 3																	Minimum Diurnal Average: 2.1 ppm at hour 16																	Hours of Missing Data: 34	
Monthly Average: 2.32 ppm																	Percentiles: P ₁ = 2.0 P ₁₀ = 2.1 Q ₁ = 2.1 Median = 2.2 Q ₃ = 2.4 P ₉₀ = 2.7 P ₉₉ = 3.5																	Hours of Calibration: 33	
																																		Percent Operational Time: 99.9	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24											
1-Jun	2.3	2.3	Z	2.3	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.3	2.3	2.6	2.2	2.6									
2-Jun	2.4	2.2	2.2	Z	2.2	2.1	2.1	2.3	2.4	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.6	2.5	2.6	2.2	2.6									
3-Jun	2.5	3.0	3.0	3.1	Z	2.5	2.5	2.2	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.3	3.1									
4-Jun	2.3	2.4	2.7	2.5	2.4	Z	2.4	2.2	2.2	2.2	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.2	2.0	2.2	2.4	2.4	2.4	2.1	2.3	2.7									
5-Jun	Z	2.2	2.1	2.2	2.3	2.2	2.2	2.3	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.3	2.4	2.7	2.6	2.2	2.4	2.2	2.7									
6-Jun	2.6	Z	3.1	3.1	2.7	2.4	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.5	2.1	2.4	2.5	3.2	2.4	2.6	3.0	3.3	3.3	2.6	3.3									
7-Jun	3.3	3.3	Z	3.1	2.5	2.7	2.6	2.5	2.5	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.3	2.5	2.2	2.3	2.4	3.3									
8-Jun	2.5	2.5	4.1	Z	2.6	2.5	2.1	2.2	2.3	2.2	2.1	2.0	2.3	2.1	2.0	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	4.1									
9-Jun	2.1	2.2	2.2	2.1	Z	2.4	2.2	2.2	2.3	2.4	2.2	2.1	2.1	2.3	2.1	2.1	2.1	2.2	2.1	2.1	2.2	2.3	2.2	2.2	2.2	2.4									
10-Jun	2.2	2.3	2.4	2.3	2.3	Z	2.3	2.6	2.3	2.2	2.1	2.2	2.2	2.3	2.2	2.2	2.1	2.1	2.2	2.3	2.5	2.9	2.6	2.8	2.3	2.9									
11-Jun	Z	3.0	2.9	2.6	2.5	2.7	2.5	2.6	2.5	2.5	2.2	2.2	2.2	2.1	2.2	2.2	2.3	2.3	2.2	2.4	2.3	2.2	2.2	2.1	2.4	3.0									
12-Jun	2.1	Z	2.4	2.2	2.7	2.4	2.3	2.4	2.6	2.6	2.4	2.3	2.2	2.1	2.1	2.0	2.1	2.1	2.0	2.0	2.1	2.0	2.0	2.0	2.2	2.7									
13-Jun	2.0	2.0	Z	2.1	2.1	2.3	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.3									
14-Jun	2.0	2.0	2.1	Z	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.3	2.1	2.1	2.3									
15-Jun	2.1	2.0	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	C	C	C	2.2	2.1	2.4	2.3	2.2	2.1	2.1	2.6	2.4	2.5	2.5	2.2	2.6								
16-Jun	2.7	2.2	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.2	2.1	2.2	2.1	2.1	2.7								
17-Jun	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.1	2.1	2.1	2.1	M	2.2	2.1	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.3	2.2	2.3									
18-Jun	2.3	Z	2.6	3.0	2.5	2.8	2.9	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	2.6	2.2	2.1	2.2	2.3	3.0									
19-Jun	2.5	2.6	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.0	2.1	2.1	2.2	2.4	2.2	2.1	2.6									
20-Jun	2.4	2.5	2.4	Z	2.3	2.4	2.4	3.2	4.0	3.5	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.4	2.4	2.3	2.2	2.4	4.0								
21-Jun	2.4	2.3	2.3	2.4	Z	2.3	2.2	2.2	2.2	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.2	2.3	2.3	2.2	2.4								
22-Jun	2.8	2.9	2.7	2.7	2.6	Z	2.5	2.2	2.3	2.3	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.2	2.2	2.2	2.3	2.9								
23-Jun	Z	2.4	2.7	3.2	2.8	2.4	2.7	2.9	2.6	2.6	2.4	2.1	2.2	2.2	2.1	2.3	2.4	2.3	2.2	2.3	2.8	2.9	2.7	3.1	2.5	3.2									
24-Jun	3.0	Z	2.4	2.5	2.9	2.7	2.5	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.2	2.1	2.1	2.1	2.2	2.3	2.2	2.3	2.4	2.4	3.0								
25-Jun	2.3	2.4	Z	2.4	2.5	2.4	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.1	2.2	2.3	2.2	2.1	2.4	2.5	2.5	2.6	2.6	2.3	2.6									
26-Jun	2.8	2.5	2.6	Z	2.5	2.5	3.0	2.3	2.4	2.2	2.2	2.1	2.0	2.1	2.1	2.0	2.1	2.3	2.2	2.3	2.3	2.3	2.5	2.5	2.3	3.0									
27-Jun	2.5	2.6	3.0	3.1	Z	3.4	3.7	2.8	2.6	2.4	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.4	2.7	2.4	2.6	2.3	2.5	3.7									
28-Jun	2.4	2.5	2.7	3.0	3.2	Z	3.2	2.8	2.4	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.5	2.5	2.6	2.4	3.2									
29-Jun	Z	2.6	3.0	3.2	3.2	3.4	3.2	3.8	4.0	3.6	3.0	2.3	2.2	2.1	2.1	2.2	2.1	2.1	2.2	2.7	2.4	2.3	2.2	2.4	2.7	4.0									
30-Jun	2.6	Z	2.7	2.5	2.5	2.5	2.9	3.5	3.3	3.3	3.2	3.0	2.9	3.0	3.0	3.0	3.0	2.7	2.6	2.9	3.4	3.2	3.3	3.5	2.4	3.0	3.5								
																								Diurnal Average											
																								Diurnal Maximum											
2.5 2.4 2.6 2.6 2.5 2.5 2.5 2.4 2.4 2.4 2.2 2.2 2.2 2.2 2.1 2.1 2.2 2.2 2.2 2.2 2.3 2.4 2.4 2.4 2.4																								3.3 3.3 4.1 3.2 3.2 3.4 3.7 3.8 4.0 3.6 3.2 3.0 2.9 3.0 3.0 3.0 2.7 2.6 3.2 3.4 3.2 3.3 3.5 3.3											
Z - zerspan C - Calibration M - Maintenance																																			



WBEA
Hourly Averages

Total Hydrocarbons (THC) - ppm
Lower Camp - June 2015





WBEA
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Lower Camp - June 2015

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	47	6.85	6.85
2.1 - 3.0	604	88.05	94.90
3.1 - 10.0	35	5.10	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



WBEA
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Lower Camp - June 2015

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	9	17	1	2	2	4	1	1	1	0	0	0	2	1	6	0	47
2.1 - 3.0	74	30	21	9	8	39	89	36	21	12	13	40	49	66	50	47	604
3.1 - 10.0	1	4	1	1	1	9	13	0	1	0	1	0	1	1	1	0	35
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	84	51	23	12	11	52	103	37	23	12	14	40	52	68	57	47	686

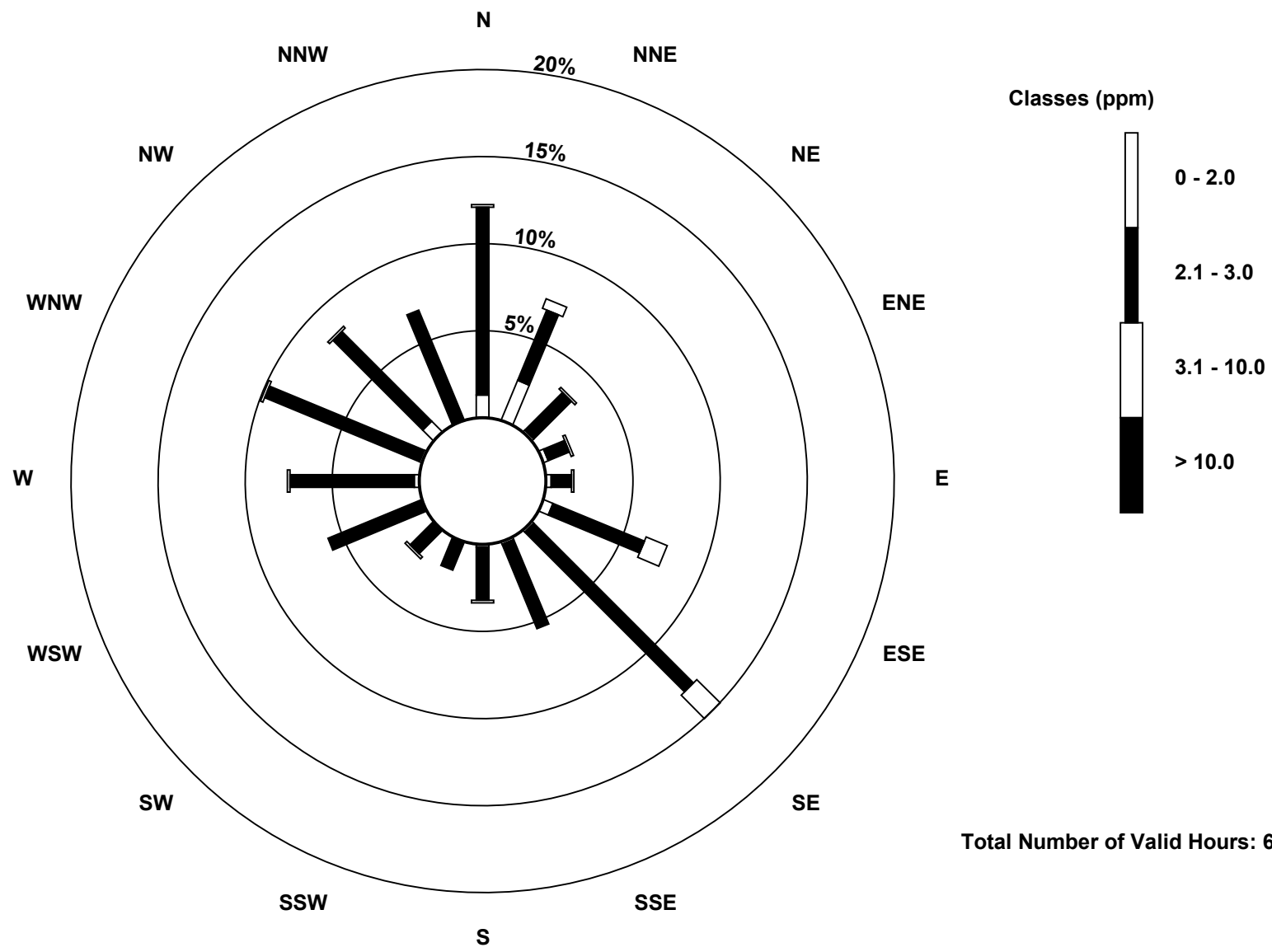
Total Number of Valid Hours: 686

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

Total Hydrocarbons (THC) - ppm
Lower Camp (AMS 11)



Total Number of Valid Hours: 686

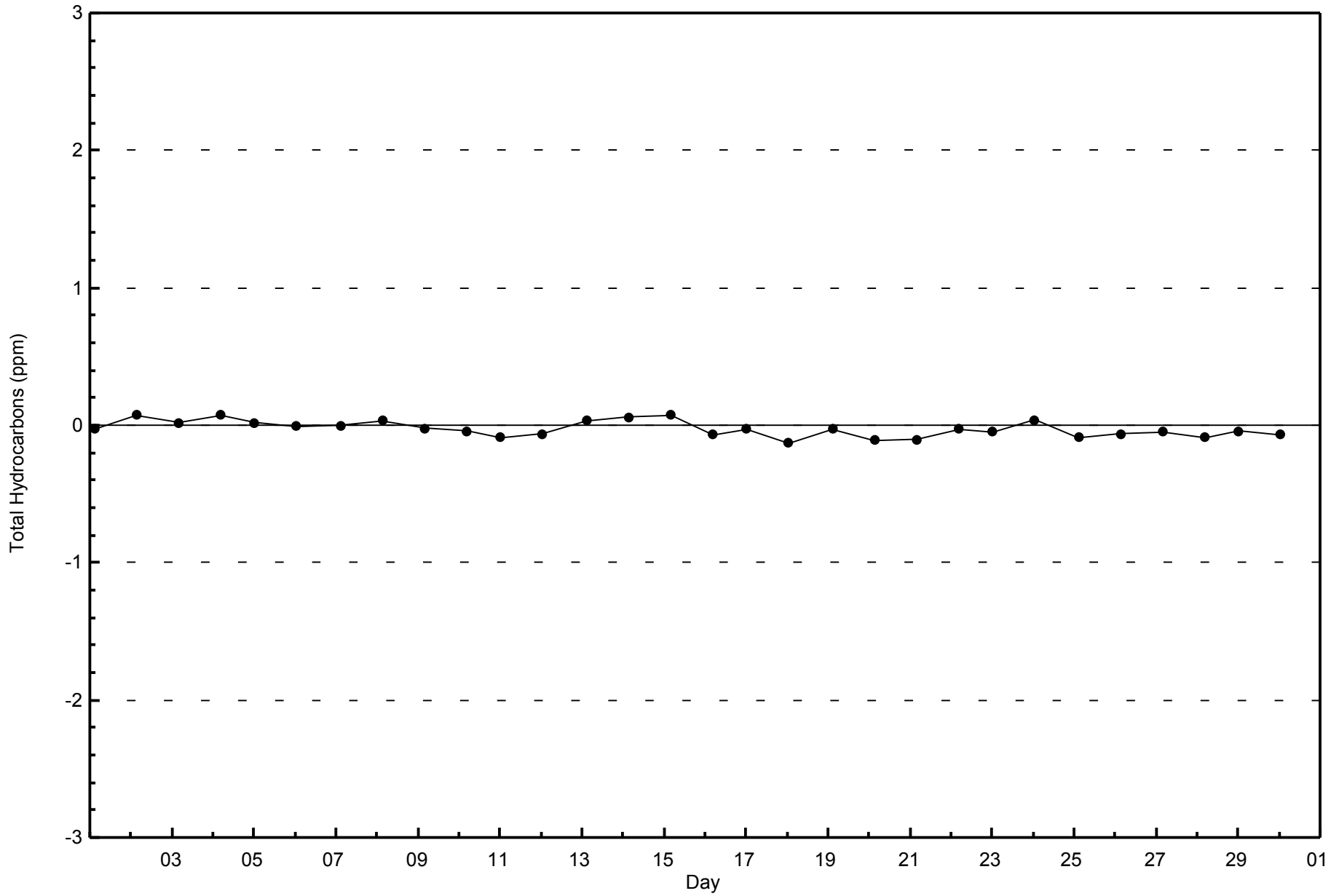


WBEA

Zero Responses

Total Hydrocarbons (THC) - ppm

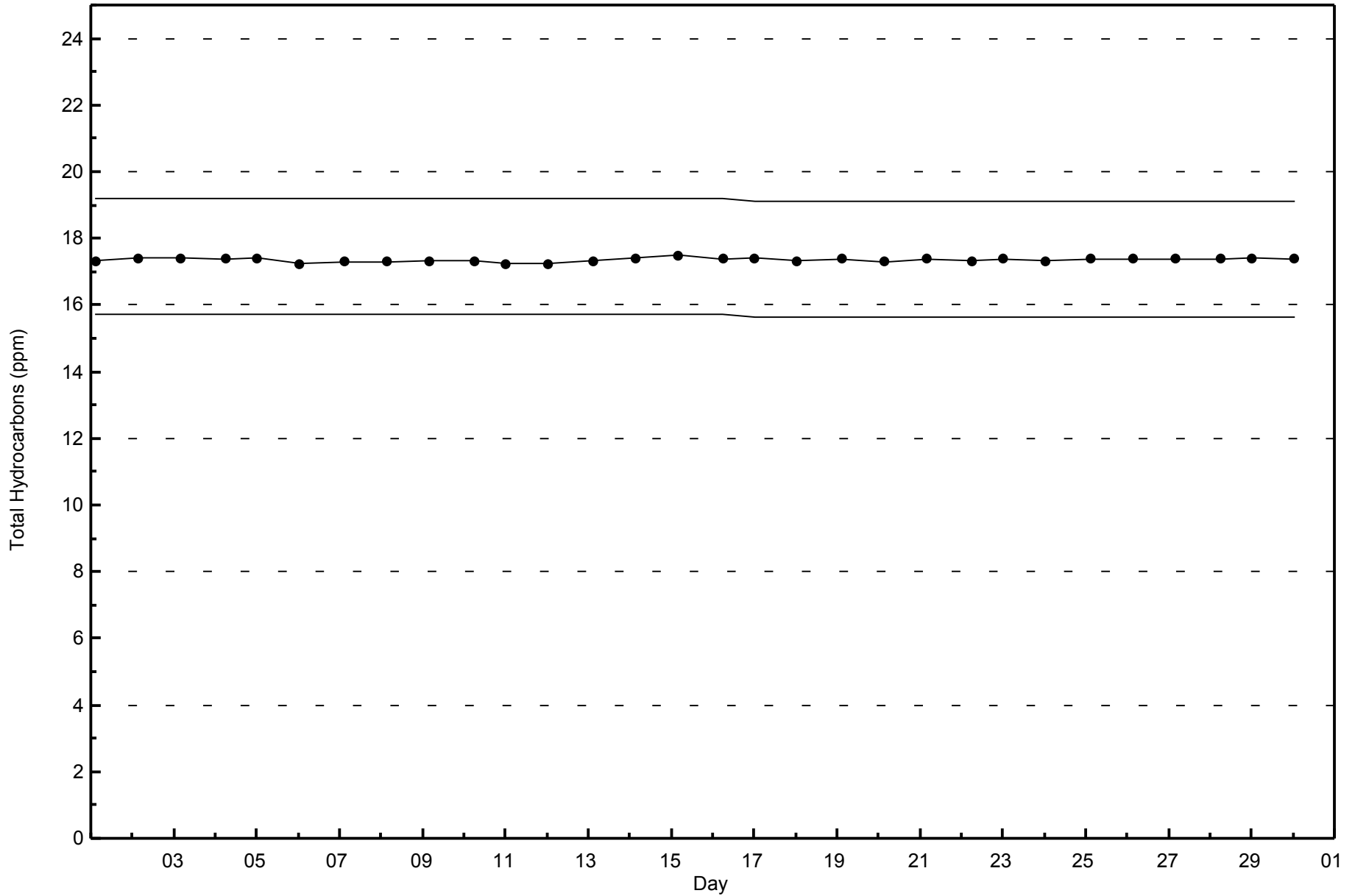
Lower Camp - June 2015





WBEA
Span Responses

Total Hydrocarbons (THC) - ppm
Lower Camp - June 2015



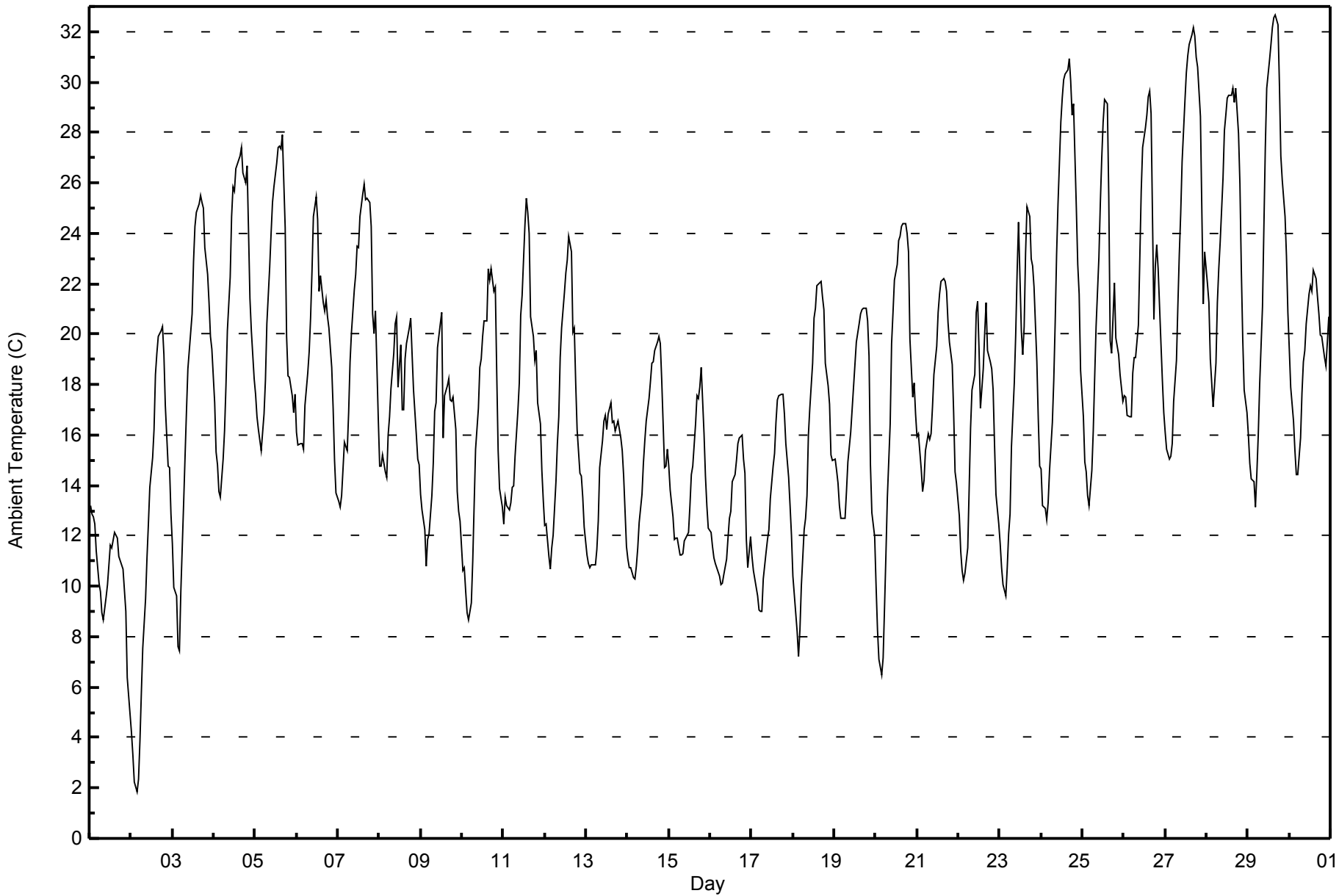


Maximum Value: 32.7 C on Jun 29 17:00 Maximum Daily Average: 24.5 C on Jun 27																						Hours in Service: 720 Hours of Data: 720																											
Minimum Value: 1.9 C on Jun 2 04:00 Minimum Daily Average: 10.5 C on Jun 1 Maximum Diurnal Average: 22.8 C at hour 16 Minimum Diurnal Average: 12.0 C at hour 4 Monthly Average: 17.76 C Percentiles: P ₁ = 5.6 P ₁₀ = 10.9 Q ₁ = 13.6 Median = 17.3 Q ₃ = 21.2 P ₉₀ = 25.5 P ₉₉ = 31.8																						Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																											
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jun	13.2	12.9	12.8	12.5	11.4	10.1	9.8	8.9	8.7	9.6	10.0	10.9	11.6	11.5	12.2	12.0	11.9	11.2	10.9	10.7	9.8	9.0	6.4	4.9	10.5	13.2																							
2-Jun	4.2	3.3	2.3	1.9	2.4	3.9	5.8	7.5	9.5	11.2	12.5	13.9	15.1	16.2	18.4	19.3	19.9	20.2	20.3	19.2	17.1	14.8	14.7	12.9	11.9	20.3																							
3-Jun	11.7	9.9	9.6	7.6	7.5	9.8	13.3	15.1	17.0	18.6	19.3	20.8	22.9	24.3	24.8	25.2	25.5	25.2	25.0	23.4	22.4	21.2	19.9	19.4	18.3	25.5																							
4-Jun	17.3	15.3	14.8	13.8	13.5	15.0	16.2	18.0	20.1	22.2	24.7	25.8	25.7	26.5	26.9	27.1	27.4	26.4	26.0	26.7	24.1	21.4	20.1	18.2	21.4	27.4																							
5-Jun	17.6	16.7	16.2	15.4	16.1	16.8	18.2	20.4	22.7	24.0	25.2	25.8	26.8	27.4	27.5	27.4	27.9	24.2	19.9	18.4	18.3	17.6	16.9	17.6	21.0	27.9																							
6-Jun	16.1	15.6	15.6	15.7	15.5	17.2	18.4	19.3	20.7	22.5	24.7	25.5	24.6	21.7	22.3	21.2	20.9	21.4	20.7	20.2	18.7	17.1	15.0	13.7	19.3	25.5																							
7-Jun	13.4	13.1	13.6	14.6	15.7	15.4	16.9	18.9	20.1	21.8	22.4	23.5	23.4	24.7	25.6	25.9	25.3	25.4	25.2	24.3	20.8	20.0	20.9	16.6	20.3	25.9																							
8-Jun	14.8	14.8	15.2	14.6	14.3	16.0	16.7	17.8	19.3	20.4	20.7	17.9	19.6	17.0	17.0	19.0	19.6	20.2	20.7	19.2	17.8	16.0	15.0	14.8	17.4	20.7																							
9-Jun	13.6	13.0	12.3	10.8	11.9	12.1	13.6	14.9	17.0	17.3	19.5	20.4	20.9	15.9	17.6	18.0	18.2	17.4	17.4	17.5	16.2	13.8	13.0	12.6	15.6	20.9																							
10-Jun	10.6	10.7	9.8	8.9	8.7	9.3	11.0	13.2	15.4	17.1	18.7	19.0	19.9	20.5	20.5	22.6	22.2	22.6	21.7	21.9	18.5	15.4	13.9	13.2	16.1	22.6																							
11-Jun	12.5	13.5	13.2	13.0	13.3	13.9	14.0	15.2	16.9	18.0	20.7	21.5	24.3	25.4	24.9	24.0	20.7	19.9	18.9	19.4	17.3	16.5	14.6	13.4	17.7	25.4																							
12-Jun	12.4	12.5	11.2	10.7	11.5	12.0	14.1	15.7	16.7	19.1	20.2	21.7	22.4	22.9	23.9	23.3	20.1	20.3	18.1	16.2	14.5	14.4	13.6	12.4	16.7	23.9																							
13-Jun	11.3	10.9	10.8	10.9	10.9	10.9	11.5	12.6	14.7	15.8	16.6	16.8	16.2	16.8	17.3	16.5	16.6	16.2	16.6	16.2	15.9	15.4	14.4	11.6	14.3	17.3																							
14-Jun	11.0	10.8	10.7	10.3	10.3	10.8	11.5	12.5	13.6	14.9	15.8	16.6	17.5	18.1	18.8	18.9	19.3	19.7	19.9	19.6	18.2	14.7	14.8	15.5	15.2	19.9																							
15-Jun	14.8	13.8	12.8	11.9	11.9	11.9	11.3	11.2	11.3	11.8	11.9	12.2	13.2	14.4	14.8	16.4	17.6	17.4	17.9	18.7	16.1	14.4	13.2	12.3	13.9	18.7																							
16-Jun	12.1	11.6	11.1	10.9	10.8	10.4	10.1	10.1	10.5	11.1	11.9	12.7	13.0	14.1	14.5	15.0	15.7	15.9	16.0	15.1	14.5	11.8	10.8	12.0	12.6	16.0																							
17-Jun	11.2	10.6	10.3	9.6	9.1	9.0	9.0	10.3	11.4	11.8	12.3	13.5	14.8	15.3	16.5	17.4	17.6	17.6	17.6	16.8	15.6	14.3	13.2	12.0	13.2	17.6																							
18-Jun	10.4	9.7	8.2	7.2	8.3	10.0	12.2	12.7	13.6	16.0	17.1	18.9	20.6	21.0	21.9	22.1	22.1	21.5	21.0	18.9	18.0	17.2	15.2	15.0	15.8	22.1																							
19-Jun	15.0	14.6	14.1	13.2	12.7	12.7	12.7	13.8	15.0	16.1	17.0	17.9	18.8	19.7	20.4	20.8	21.0	21.0	21.0	20.5	19.1	14.8	12.9	12.0	16.5	21.0																							
20-Jun	10.0	8.3	7.1	6.5	7.2	9.2	11.3	13.5	16.4	19.6	20.8	22.2	22.8	23.7	23.9	24.3	24.4	24.4	24.0	23.3	19.8	17.5	18.1	16.9	17.3	24.4																							
21-Jun	15.9	16.1	14.6	13.8	14.2	15.4	16.1	15.8	16.1	17.1	18.4	19.5	20.9	21.6	22.1	22.2	22.1	21.7	20.5	19.7	18.8	16.9	14.6	14.1	17.8	22.2																							
22-Jun	12.8	11.4	10.6	10.3	10.5	11.5	13.9	16.3	17.8	18.4	20.9	21.3	19.4	17.1	18.6	20.0	21.3	19.4	18.9	18.6	17.8	15.6	13.6	12.5	16.2	21.3																							
23-Jun	11.7	10.7	10.1	9.6	10.7	12.1	12.9	15.6	18.1	20.0	22.4	24.4	20.1	19.2	20.3	23.2	25.0	24.7	23.0	22.7	21.8	18.9	16.7	14.8	17.9	25.0																							
24-Jun	14.7	13.2	13.1	12.6	13.3	14.6	16.5	18.2	20.5	23.2	25.2	28.4	29.4	30.1	30.3	30.5	30.9	30.1	28.7	29.1	25.0	22.8	21.6	18.6	22.5	30.9																							
25-Jun	16.7	14.9	14.5	13.6	13.2	14.6	16.2	18.3	20.3	23.1	25.1	27.0	28.4	29.3	29.2	25.4	19.8	19.2	22.0	19.9	19.5	19.2	18.4	17.3	20.2	29.3																							
26-Jun	17.6	17.5	16.8	16.7	16.7	18.5	19.1	19.1	20.3	23.0	25.7	27.4	28.2	28.7	29.4	29.7	28.7	20.6	22.7	23.5	22.6	19.6	18.2	16.9	22.0	29.7																							
27-Jun	16.1	15.4	15.0	15.1	15.7	17.3	18.9	21.1	23.2	24.8	26.9	29.2	30.3	31.0	31.5	31.9	32.2	31.8	31.0	30.6	28.6	24.9	21.2	23.3	24.5	32.2																							
28-Jun	22.0	21.2	19.0	18.1	17.1	18.8	21.2	22.6	23.7	26.2	28.1	28.7	29.3	29.5	29.5	29.8	29.2	29.7	27.9	26.0	22.5	19.8	17.8	16.9	23.9	29.8																							
29-Jun	16.0	14.9	14.3	14.1	13.2	14.5	16.0	18.0	21.1	24.3	27.4	29.8	30.9	31.5	32.2	32.5	32.7	32.3	29.9	27.1	26.1	24.7	23.1	20.9	23.6	32.7																							
30-Jun	19.4	17.9	16.5	15.4	14.4	14.4	15.9	17.7	18.9	19.3	20.4	21.6	21.9	21.7	22.6	22.2	21.5	20.8	20.0	19.9	19.1	18.7	19.7	20.7	19.2	22.6																							
																								13.9	13.2	12.5	12.0	12.1	12.9	14.1	15.5	17.0	18.6	20.1	21.2	21.8	21.9	22.5	22.8	22.6	21.9	21.4	20.8	19.2	17.3	16.0	15.1	Diurnal Average	
																								22.0	21.2	19.0	18.1	17.1	18.8	21.2	22.6	23.7	26.2	28.1	29.8	30.9	31.5	32.2	32.5	32.7	32.3	31.0	30.6	28.6	24.9	23.1	23.3	Diurnal Maximum	



WBEA
Hourly Averages

Ambient Temperature (AT) - C
Lower Camp - June 2015





WBEA
Cumulative Frequency Distribution

Ambient Temperature (AT) - C
Lower Camp - June 2015

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	41	5.69	5.69
10 - 20	445	61.81	67.50
> 20	234	32.50	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

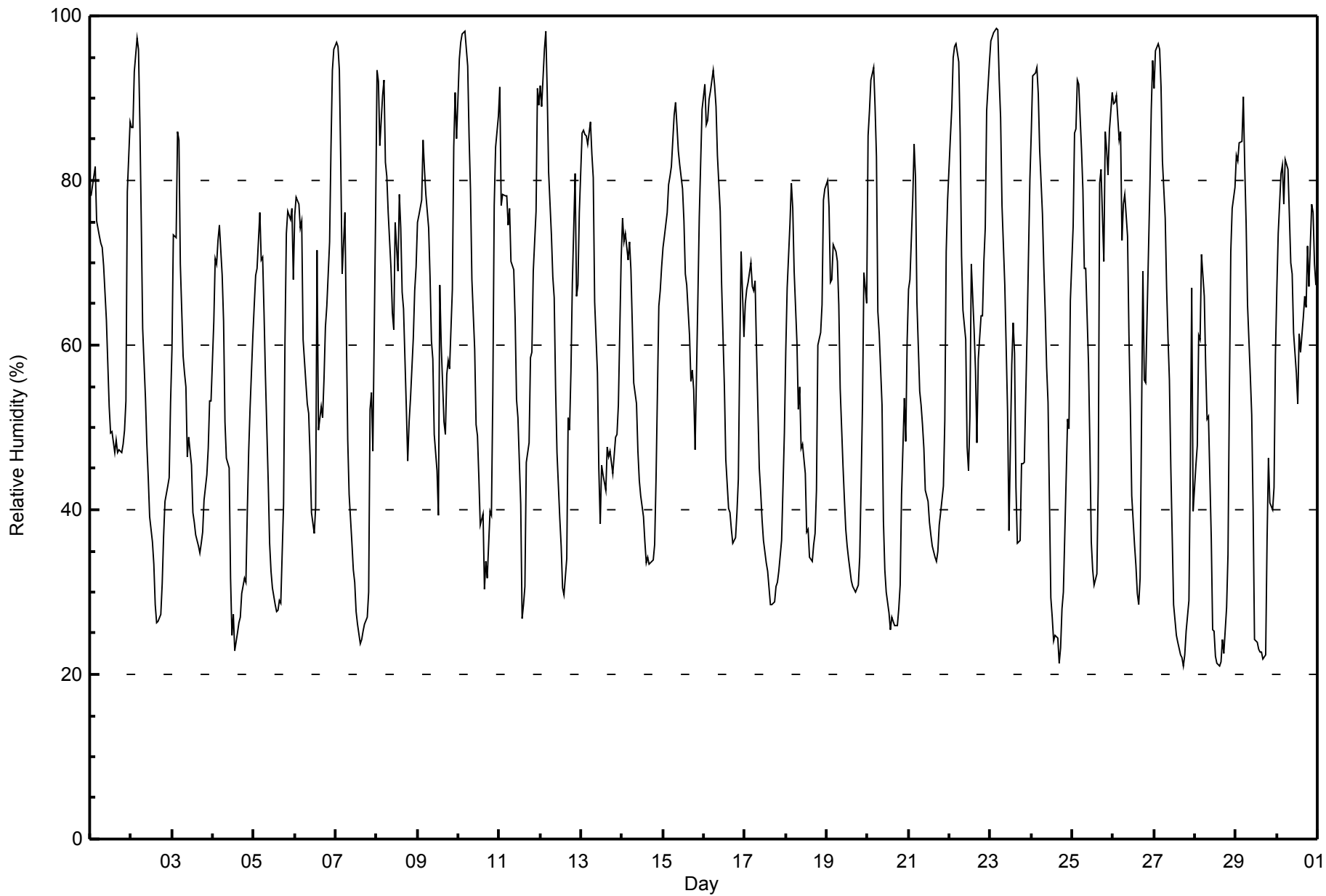


Maximum Value: 99 % on Jun 23 04:00																			Maximum Daily Average: 73.8 % on Jun 15						Hours in Service: 720	
Minimum Value: 21 % on Jun 27 18:00																			Minimum Daily Average: 44.8 % on Jun 28						Hours of Data: 720	
Maximum Diurnal Average: 84.3 % at hour 4																			Minimum Diurnal Average: 37.2 % at hour 16						Hours of Missing Data: 0	
Monthly Average: 59.0 %																			Percentiles: P ₁ = 22 P ₁₀ = 30 Q ₁ = 41 Median = 60 Q ₃ = 76 P ₉₀ = 88 P ₉₉ = 98						Hours of Calibration: 0	
																			Percent Operational Time: 100.0							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	78	79	81	82	75	73	72	72	70	63	58	53	49	49	47	48	47	47	47	48	50	53	79	87	62.8	87
2-Jun	86	86	93	97	96	87	75	62	54	48	44	39	36	33	28	26	26	27	31	37	41	43	44	53	53.9	97
3-Jun	59	73	73	86	85	70	59	57	55	47	49	45	40	38	37	36	35	36	37	41	44	48	53	53	52.3	86
4-Jun	63	71	70	73	75	69	63	51	46	45	32	25	27	23	25	26	27	30	32	31	40	47	52	61	45.9	75
5-Jun	65	68	69	76	70	71	64	56	43	36	33	30	28	28	28	29	29	41	60	74	76	75	77	68	53.9	77
6-Jun	76	78	77	74	75	61	55	53	52	47	40	37	40	71	50	53	51	56	62	65	72	84	93	96	63.2	96
7-Jun	97	96	93	82	69	76	62	48	42	36	33	31	28	26	24	24	25	26	27	30	52	54	47	76	50.2	97
8-Jun	93	92	84	90	92	82	81	76	69	64	62	75	69	78	74	66	64	52	46	51	54	61	67	69	71.4	93
9-Jun	75	76	78	85	81	78	74	68	61	58	49	45	39	67	60	51	49	56	58	57	67	84	91	85	66.4	91
10-Jun	95	97	98	98	98	94	85	79	68	59	50	49	44	38	39	30	34	32	40	39	54	77	84	88	65.4	98
11-Jun	91	77	78	78	78	75	77	70	69	63	53	51	41	27	28	31	46	48	59	59	69	76	91	89	63.5	91
12-Jun	92	89	96	98	91	81	73	68	66	55	47	39	36	30	30	34	51	50	57	68	81	66	67	76	64.1	98
13-Jun	86	86	86	85	84	87	83	80	65	57	45	38	45	44	42	48	46	47	44	47	49	49	53	70	61.2	87
14-Jun	75	73	73	70	73	69	62	55	53	47	43	42	39	36	34	34	33	34	34	36	44	65	67	69	52.5	75
15-Jun	72	73	76	79	81	82	88	89	87	84	82	79	75	69	67	61	56	57	55	47	66	76	82	89	73.8	89
16-Jun	92	87	87	90	91	93	92	89	83	76	68	61	55	46	40	40	38	36	37	40	44	59	71	61	65.6	93
17-Jun	65	67	68	70	67	67	68	60	45	42	39	36	34	33	31	29	29	29	31	31	33	36	43	49	45.8	70
18-Jun	59	67	75	80	77	69	60	52	55	47	48	44	37	38	34	34	36	37	42	60	62	65	78	79	55.6	80
19-Jun	80	77	68	68	72	71	70	65	55	45	41	38	36	34	31	31	30	30	31	34	43	53	69	65	51.6	80
20-Jun	85	88	92	94	89	83	64	61	53	39	33	30	27	25	27	26	26	26	28	31	42	54	48	61	51.3	94
21-Jun	67	68	78	84	80	65	54	53	50	47	42	41	39	37	36	34	34	35	38	40	43	51	71	78	52.7	84
22-Jun	85	89	95	96	97	94	86	71	64	61	48	45	51	70	62	57	48	58	64	64	70	74	88	94	72.1	97
23-Jun	97	98	98	99	98	92	88	77	67	60	52	37	58	63	59	43	36	36	46	46	46	62	71	80	66.9	99
24-Jun	86	93	93	94	90	84	76	69	64	57	53	29	27	24	25	24	21	23	28	30	44	51	50	65	54.2	94
25-Jun	74	86	86	92	92	84	79	69	69	58	48	36	33	31	32	43	80	81	70	86	84	81	86	91	69.6	92
26-Jun	89	89	90	85	86	73	77	78	73	61	52	42	36	33	30	29	32	69	56	55	64	79	89	95	65.1	95
27-Jun	91	96	97	96	91	82	75	67	61	56	45	28	27	25	24	22	22	21	22	25	29	45	67	40	52.3	97
28-Jun	45	48	61	61	71	66	57	51	51	37	25	25	22	21	21	22	24	23	28	35	54	71	77	79	44.8	79
29-Jun	83	82	85	85	90	82	75	65	56	52	40	24	24	23	23	23	22	22	36	46	41	40	43	59	50.8	90
30-Jun	67	74	81	82	77	82	81	76	70	69	62	57	53	61	59	63	66	65	72	67	77	76	70	67	69.7	82
	79.0	80.7	82.6	84.3	83.0	78.1	72.5	66.3	60.5	53.8	47.2	41.8	39.8	40.8	38.2	37.2	38.8	41.0	43.9	47.3	54.4	61.8	68.9	73.1	Diurnal Average	
	97	98	98	99	98	94	92	89	87	84	82	79	75	78	74	66	80	81	72	86	84	84	93	96	Diurnal Maximum	



WBEA
Hourly Averages

Relative Humidity (RH) - %
Lower Camp - June 2015





Maximum Speed: 29 km/h on Jun 13 11:00	Maximum Daily Speed Average: 17.1 km/h on Jun 13	Hours in Service: 720
Minimum Speed Value: 0 km/h on Jun 25 01:00	Minimum Daily Speed Average: 1.5 km/h on Jun 25	Hours of Data: 720
Maximum Diurnal Speed Average: 5.5 km/h at hour 16	Minimum Diurnal Speed Average: 0.2 km/h at hour 1	Hours of Missing Data: 0
Monthly Average Velocity: 2.0 km/h 313.4 deg	Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 4 Median = 7 Q ₃ = 11 P ₉₀ = 16 P ₉₉ = 26	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	W14	W13	WNW15	WNW16	WNW20	WNW22	WNW23	WNW23	NW19	WNW23	WNW23	WNW22	WNW25	NW22	WNW22	NW22	NW19	NW19	NW16	NW13	WNW9	WNW7	E2	ESE2	WNW16.5	WNW25
2-Jun	WNW3	W4	ESE2	NW2	WNW3	NNE4	NNW2	NE4	E6	SE7	ESE6	SE9	SE10	ESE10	SE8	SE8	SE9	SE8	SE8	SE10	ESE11	SSE4	S8	SSE4	SE4.4	ESE11
3-Jun	SE5	SE4	ESE2	WNW2	WNW4	NNE1	ESE6	SE10	ESE12	SE14	SE15	SE14	SE11	SE13	SE12	SE11	SSE11	SSE10	SSE11	S11	SSE10	SSE10	SSE10	SSE10	SE8.3	SE15
4-Jun	SE7	SE7	SE9	SE9	ESE9	ESE13	ESE9	ESE11	SE11	SE12	SE11	SE10	SE15	SE13	SSE12	SSE11	S10	S8	S7	SSE8	S15	SSW11	SSE7	SSE9	SSE9.4	S15
5-Jun	SSE11	SSE9	SSE11	SE9	SE8	ESE11	SE10	SSE9	SSW13	SSW17	SSW15	SW14	S11	S12	SSW11	SSW11	SSW10	WSW20	S17	SE10	SE7	SE7	SE9	SE7	S9.0	WSW20
6-Jun	ESE5	SE7	SE6	SE7	SE7	SW5	WSW10	WSW15	WSW11	WSW11	WSW11	W7	SW13	S4	SW15	WSW13	SW16	SE7	SE6	SE5	ESE2	ENE1	ESE2	E1	SW4.9	SW16
7-Jun	ESE2	ESE3	E3	SW3	WNW4	NNE1	WNW6	NW5	WNW14	WNW16	NW15	NW14	WNW21	WNW24	W21	WNW16	WNW18	WNW14	WNW10	WNW7	NNW0	WSW3	NW7	WSW6	WNW8.6	WNW24
8-Jun	SE5	SSE4	S6	SSE3	SE3	SW6	W12	W10	WNW10	WNW6	NNW7	ESE3	SW9	N4	ESE7	SE3	SE1	NW13	NW22	NW18	NW16	NW10	NW11	NW14	WNW4.9	NW22
9-Jun	NW10	NNW8	NW9	W6	W8	WSW10	WSW8	WSW13	W11	WNW9	W7	W6	WNW9	NNE12	NNE9	NNW9	WNW10	NW12	N7	WNW6	NW6	NW5	NW5	NNW3	WNW6.6	WSW13
10-Jun	W1	NNW3	W4	W4	NE4	NE2	NE4	N3	NW2	N3	ENE4	NNE4	WNW5	NW5	N7	W4	N5	N4	WSW14	S3	SE4	ENE1	ENE2	NE2	NNW1.6	WSW14
11-Jun	WSW1	ESE6	SSW2	SE6	SE6	ESE3	ESE10	SE8	SE11	SE10	SE10	ESE9	S6	WSW19	SSW14	W16	WNW7	S7	SE7	SE7	SE6	S5	SE2	SE9	SSE4.7	WSW19
12-Jun	W4	NW4	SSE2	ESE2	WSW4	S2	SW5	WNW3	NE6	ENE4	WNW3	W7	W8	WNW9	WNW10	NNE4	ESE22	ESE16	E17	E8	N8	ENE14	ENE13	NE10	ENE2.2	ESE22
13-Jun	NNE10	NNE10	NNE11	N10	N8	NW9	NNW11	NNW11	N20	N25	N29	NNE29	NNE29	N27	N28	NNE27	NNE25	NNE24	N27	N23	NNE14	N12	NNE8	E7	N17.1	N29
14-Jun	ESE7	N2	NNE6	N5	NW8	NW10	N15	N16	N17	N19	N18	N18	N18	N18	N16	NNW16	NNW16	N12	N11	NNE8	NNE4	NE2	NW7	N9	N10.7	N19
15-Jun	NNE9	N11	N9	NNW7	NNE11	NNE9	NNE7	N7	NNW7	N8	NNW6	NNW4	NNE3	NE3	ENE3	NE3	WNW1	NE3	NNE2	W2	S5	SSE5	SSE5	SE1	N3.8	NNE11
16-Jun	N2	NNW10	N6	NNW10	NNW8	NNW8	N15	N13	N13	N12	N12	NNW13	NNW12	NNW15	NNW15	N14	NNW13	NNW12	NNE8	N5	NW5	NW2	NNW4	N11	NNW9.7	N15
17-Jun	NNE8	N5	NW7	NW10	NW11	NNW10	NNW11	NW10	N14	N10	NNW7	NW7	WNW7	W9	SW6	W8	NW3	SE6	S7	S9	S8	SSE8	SSE9	SW3.4	NNE14	
18-Jun	SE9	SE8	ESE6	ESE5	SE7	ESE8	SE7	SSE8	SE6	SSE7	ESE9	ESE7	SSE7	SE5	SE6	SSE5	SE7	SW12	WSW4	N2	S3	WSW13	WSW16	WSW15	SSE4.7	WSW16
19-Jun	W9	NW7	NNW9	NNW10	N13	N16	N13	N13	NNE15	N16	N16	N15	N10	N9	N9	N9	N11	N12	NNE8	NNE9	NNE6	W3	W4	W2	N9.1	N16
20-Jun	NNW2	NW2	NE2	N1	NNE2	WNW1	NNE3	NNE5	NNE6	N4	NNE4	NNW9	NNW9	NW9	NNW6	NNW7	NNW8	NNE5	NNE9	N8	WNW3	WNW4	WSW2	N1	NNW3.9	NNW9
21-Jun	WNW5	NW6	WNW3	W4	NW5	NW5	N9	N8	N6	N6	NNW8	N9	N8	N10	N11	N11	N10	NNE11	NNE13	NNW8	NW7	W4	E2	NNW1	N6.3	NNE13
22-Jun	NW3	WNW2	NNE2	NE3	NNE2	E2	SE3	WSW7	WNW5	NNE5	ENE1	N7	NW17	NNE3	WSW15	W18	W19	NW13	NNE3	ESE3	NE1	WSW1	NE1	NE1	WNW3.1	W19
23-Jun	NW1	NE1	NE2	ESE2	SE4	SE8	SE8	SE8	SE6	E3	ESE3	W9	WNW5	WNW11	ENE5	ESE4	SSW3	SSE5	SSE5	SSE6	SSE6	ESE3	SE5	SE5	SE2.4	WNW11
24-Jun	E3	SE4	SE6	SE5	SE6	SE8	SE10	SE11	SE10	SE7	SE6	W14	W13	W15	WSW16	SW12	WSW11	SW15	WNW6	W4	NNE3	N7	NNW5	WNW4	SW3.0	WSW16
25-Jun	NW0	WNW2	WNW3	N2	WNW3	NNW2	NW4	N3	N5	N5	N5	NE4	ESE6	E4	NNW7	NW12	WNW1	S1	NNW1	SE5	WSW7	WSW4	S3	SE3	NNW1.5	NW12
26-Jun	SSE3	ESE9	SE7	SSE5	SSE4	SSW4	SE6	SE7	SE5	W5	WNW8	W17	W21	W22	W22	W25	W25	WNW19	W14	WSW15	W7	SE3	ESE3	ESE3	WSW7.1	W25
27-Jun	SE4	ESE2	SE4	ESE5	SE5	SE5	SE6	SE6	SE6	SE6	NE3	W9	W16	WSW15	WSW14	W13	W14	W17	W13	W9	SW9	WSW6	NNE2	WSW12	WSW4.9	W17
28-Jun	W9	W8	N1	SSE6	SE7	SE6	SE2	N5	N6	NNW10	NNW15	NW19	WNW26	WNW23	WNW23	WNW21	NNW11	WNW15	NW9	WNW8	NNE2	NNE1	E2	WNW1	NW7.2	WNW26
29-Jun	ESE3	ESE4	ESE4	ESE3	ESE3	SE6	SE7	SE7	SE6	SE6	S4	WSW8	WSW7	WSW11	WSW11	W9	WSW9	WSW9	ESE3	WNW4	NW6	WNW2	SE2	NW3	SSW2.3	WSW11
30-Jun	NW3	WNW3	NE2	N2	NE3	NNE1	E1	ENE2	NE2	NNE4	NNE3	NNE4	NE2	N5	ENE1	NNW6	NNW6	NNW2	WNW6	NW4	ESE3	ESE5	W9	W14	NNW1.9	W14

NW0.2	N0.9	NE0.9	N0.6	N1.0	N0.8	N1.3	NNW1.4	N2.5	NNW2.8	NNW3.4	NW4.3	NNW5.5	NW5.3	NNW4.9	NNW5.5	NNW4.4	NNW4.4	NNW2.1	NNW1.3	WSW0.8	SW0.9	S0.7	SW0.6	Diurnal Average	
W14	W13	WNW15	WNW16	WNW20	WNW22	WNW23	WNW23	N20	N25	N29	NNE29	NNE29	N27	N28	NNE27	NNE25	NNE24	N27	N23	NW16	ENE14	WSW16	WSW15	Diurnal Maximum	

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

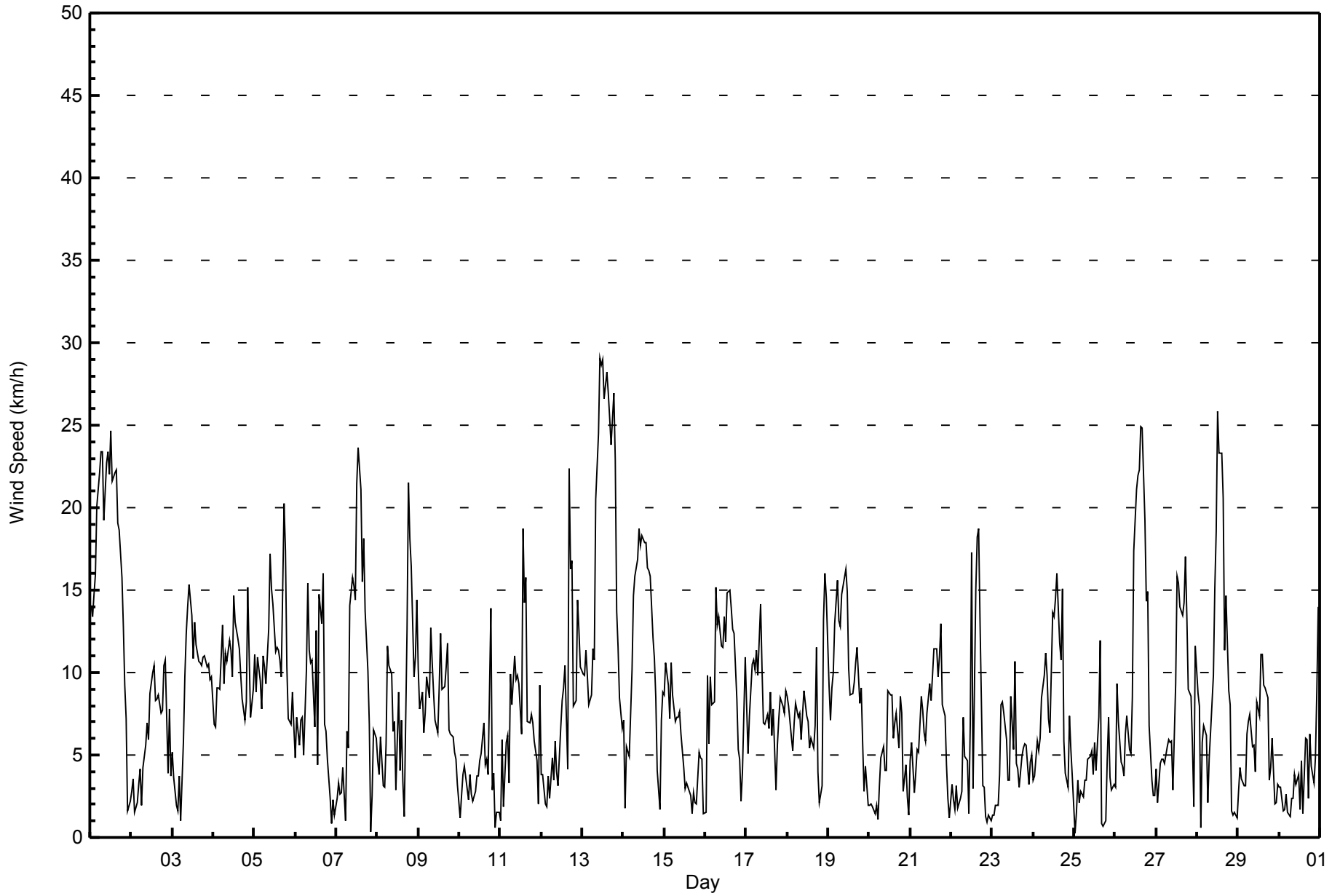
Wind Speed (WS) - km/h
Lower Camp - June 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 9 km/h on Jun 8 11:00 Minimum Value: 1 km/h on Jun 20 08:00 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 Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	3	2	3	3	5	5	5	5	5	5	5	6	6	5	5	5	5	4	3	2	3	1	1	6	
2-Jun	2	1	1	2	1	1	1	1	3	2	2	3	3	3	4	4	3	3	3	4	4	2	3	2	4
3-Jun	1	1	2	1	1	1	4	4	4	4	5	5	4	4	4	4	4	4	4	3	3	4	4	5	
4-Jun	2	2	3	3	4	4	4	3	3	3	4	4	6	5	5	4	5	3	3	3	7	6	2	3	7
5-Jun	3	2	3	3	3	4	4	4	5	6	5	5	5	5	5	6	5	9	8	4	2	2	3	3	9
6-Jun	3	2	2	3	2	2	3	4	3	3	3	3	5	4	5	7	6	3	2	2	1	1	1	1	7
7-Jun	1	2	1	7	3	2	3	5	3	4	4	6	5	6	6	5	4	4	3	1	1	6	3	3	7
8-Jun	2	1	2	2	1	2	4	3	3	2	9	2	6	7	3	2	1	8	6	5	4	2	5	3	9
9-Jun	3	2	3	1	2	3	3	3	3	3	3	4	5	8	4	3	3	4	2	2	2	1	1	2	8
10-Jun	1	2	1	1	2	2	1	1	1	2	1	2	2	2	2	2	2	2	6	4	1	1	1	1	6
11-Jun	1	2	1	3	2	2	5	3	4	3	4	3	4	6	5	9	6	4	3	3	3	4	5	3	9
12-Jun	4	3	2	2	2	1	2	2	1	1	2	2	2	3	3	6	6	5	4	4	3	4	3	2	6
13-Jun	1	2	2	2	2	2	2	3	7	7	7	6	6	6	6	6	5	5	6	5	3	3	3	2	7
14-Jun	3	1	2	2	2	2	3	4	4	5	5	5	6	6	6	5	5	3	3	3	2	2	3	2	6
15-Jun	2	3	3	2	2	2	2	3	2	2	2	1	1	1	2	1	2	2	2	2	1	2	1	1	3
16-Jun	5	4	2	3	3	4	3	3	4	3	4	3	3	5	4	4	4	4	3	3	1	1	3	3	5
17-Jun	3	2	2	2	2	3	3	2	4	3	3	4	4	3	3	3	3	2	2	3	3	3	3	3	4
18-Jun	3	3	2	2	3	3	2	3	2	3	3	3	4	3	3	2	3	5	2	1	5	4	3	2	5
19-Jun	4	2	2	3	3	4	4	3	4	4	4	4	4	4	4	4	3	4	3	2	2	1	1	1	4
20-Jun	1	1	1	1	2	1	1	1	1	1	2	3	4	4	4	3	3	2	3	2	1	2	2	1	4
21-Jun	1	2	1	1	1	2	2	3	2	2	2	3	4	4	3	4	3	4	3	2	2	1	1	2	4
22-Jun	1	1	2	1	2	2	1	2	2	1	1	2	9	4	6	4	4	4	2	1	1	1	1	1	9
23-Jun	1	2	1	2	2	3	2	2	2	1	2	3	6	6	3	1	2	2	2	2	1	1	2	6	
24-Jun	1	2	2	2	2	3	3	3	4	2	2	4	4	4	4	5	4	5	4	1	2	4	1	1	5
25-Jun	1	1	1	2	2	1	1	1	1	1	2	1	2	2	2	8	4	2	2	3	5	3	2	1	8
26-Jun	2	2	3	2	1	2	2	3	3	2	3	5	5	5	5	5	7	8	3	3	6	1	1	1	8
27-Jun	1	1	2	1	2	2	2	2	2	2	2	4	4	4	4	3	4	3	4	2	2	3	1	2	4
28-Jun	2	5	1	2	2	2	2	1	2	4	4	6	5	6	5	5	5	4	2	3	1	1	1	1	6
29-Jun	2	1	1	1	1	2	2	2	1	2	2	3	3	4	4	3	3	2	1	2	1	2	2	2	4
30-Jun	2	1	1	1	1	2	1	1	1	1	1	2	1	2	1	3	1	1	3	2	1	2	6	5	6
Diurnal Maximum																									



WBEA
Hourly Averages

Wind Speed (WS) - km/h
Lower Camp - June 2015





WBEA
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Lower Camp - June 2015

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	254	35.28	35.28
6 - 11	304	42.22	77.50
12 - 19	124	17.22	94.72
20 - 28	35	4.86	99.58
29 - 38	3	0.42	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



WBEA
Frequency Distribution

Wind Speed (WS) - km/h
Lower Camp - June 2015

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	23	26	22	10	9	31	25	14	9	3	3	7	12	28	20	12	254
6 - 11	32	19	2	0	3	19	75	25	12	4	4	19	18	20	23	29	304
12 - 19	24	5	0	2	1	3	8	1	2	5	7	15	16	9	16	10	124
20 - 28	6	3	0	0	0	1	0	0	0	0	0	1	6	15	3	0	35
29 - 38	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	86	55	24	12	13	54	108	40	23	12	14	42	52	72	62	51	720

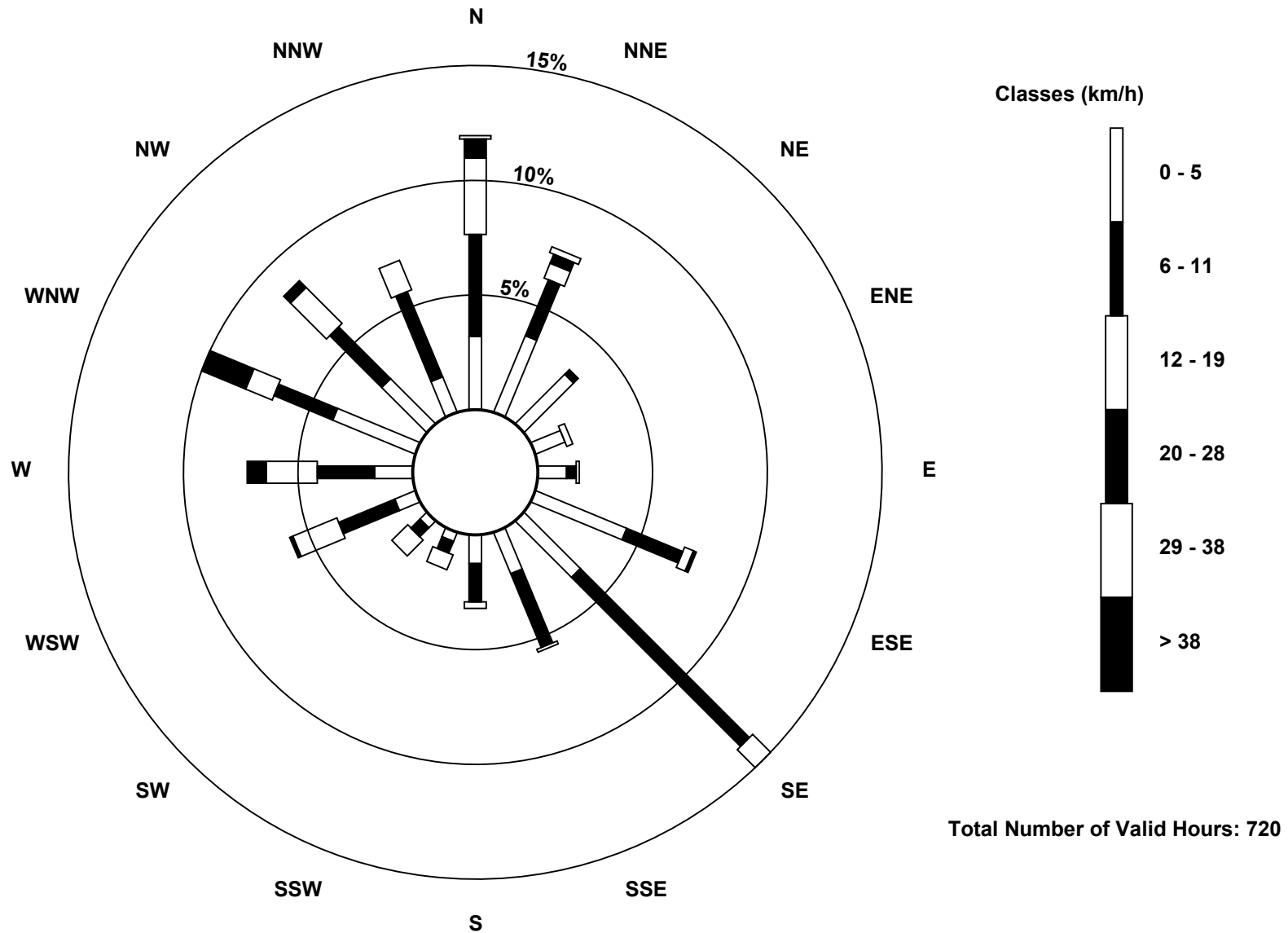
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

Wind Speed (WS) - km/h
Lower Camp (AMS 11)





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Lower Camp - June 2015

Direction of Maximum Speed: 8 deg on Jun 13 11:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 9.4 deg on Jun 13	Hours of Data: 720
Direction of Minimum Speed: 318 deg on Jun 25 01:00	Direction of Minimum Daily Speed Average: 1.5 deg on Jun 25
Direction of Minimum Speed: 318 deg on Jun 25 01:00	Hours of Missing Data: 0
Monthly Average Direction: 298.0 deg	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	281	276	291	298	302	297	298	299	309	303	303	294	294	305	303	314	322	318	321	309	290	303	92	104	302.1
2-Jun	292	280	114	313	293	12	331	42	94	127	109	126	129	121	139	142	137	138	135	130	120	158	184	157	130.1
3-Jun	143	124	113	300	290	28	113	128	123	129	126	131	140	136	143	144	148	153	154	169	164	161	154	149	142.0
4-Jun	143	133	129	127	121	123	121	114	127	131	138	150	132	141	148	165	173	180	172	167	189	199	159	150	146.6
5-Jun	152	149	148	142	144	121	136	158	192	213	209	216	187	191	195	201	196	257	191	132	133	136	137	146	177.5
6-Jun	123	139	129	141	137	229	251	252	258	248	253	270	234	182	220	254	224	137	139	132	113	73	112	92	215.2
7-Jun	113	107	96	216	299	16	303	324	298	292	306	305	303	288	269	284	287	286	291	283	346	253	317	242	291.1
8-Jun	134	163	176	155	128	227	264	265	285	282	334	121	233	352	116	134	131	310	320	319	310	308	304	304	293.4
9-Jun	311	330	326	264	259	258	257	258	268	298	268	259	293	13	14	346	291	319	352	302	323	304	313	328	301.9
10-Jun	263	330	281	281	46	55	42	350	322	356	73	25	290	315	7	281	356	350	238	182	131	69	61	49	330.2
11-Jun	251	112	195	127	126	119	112	141	130	133	134	113	189	242	212	262	299	177	138	126	140	171	137	126	159.6
12-Jun	264	311	147	117	253	184	227	291	40	59	299	259	268	298	283	24	118	122	91	80	354	73	77	44	72.2
13-Jun	28	18	15	8	358	304	305	329	0	3	8	16	17	10	11	24	12	18	11	9	14	8	21	83	9.4
14-Jun	106	1	33	7	321	325	10	11	5	352	356	356	4	8	360	348	345	349	1	17	30	46	319	358	359.3
15-Jun	20	0	349	342	27	13	22	10	338	353	337	334	15	43	65	34	296	34	26	279	171	155	149	133	9.2
16-Jun	8	332	359	342	339	341	3	357	359	349	349	348	340	348	340	349	339	346	14	353	317	308	331	8	348.4
17-Jun	12	356	317	308	323	328	343	319	11	360	348	321	305	297	265	230	266	304	145	169	174	176	153	147	314.9
18-Jun	140	134	118	120	126	123	138	165	134	149	120	106	160	129	146	162	144	227	240	1	189	251	242	249	166.5
19-Jun	276	318	335	335	352	9	7	5	15	4	2	3	7	360	349	4	2	357	29	32	14	272	273	279	357.0
20-Jun	330	318	53	359	22	286	25	25	20	351	15	328	327	309	346	332	341	14	33	360	303	294	243	357	346.7
21-Jun	302	324	285	275	305	324	351	350	357	356	348	3	2	2	355	1	3	14	19	345	322	276	96	332	349.5
22-Jun	315	291	33	44	33	92	129	250	291	23	59	7	320	19	240	259	262	322	25	121	51	252	39	38	297.1
23-Jun	320	35	51	105	125	124	128	134	134	92	113	261	291	303	74	116	205	152	148	154	166	107	140	141	139.2
24-Jun	101	135	129	140	129	130	128	127	130	138	133	263	272	262	256	234	255	236	292	280	24	350	338	294	219.4
25-Jun	318	302	299	10	283	327	322	355	8	349	355	51	122	89	346	318	290	173	343	126	253	238	171	137	336.7
26-Jun	151	107	143	155	161	195	130	135	146	265	284	274	264	265	260	261	263	284	261	249	271	137	123	107	250.8
27-Jun	130	110	126	115	139	135	139	135	140	137	43	276	262	250	257	269	265	261	264	259	229	255	25	256	242.3
28-Jun	259	272	1	153	139	128	140	10	7	346	327	304	289	303	302	303	334	303	326	303	12	12	101	296	307.7
29-Jun	108	106	109	104	106	130	128	128	140	137	176	237	258	253	249	264	241	245	111	301	305	287	132	306	211.2
30-Jun	312	299	41	351	56	31	79	66	53	26	15	18	42	2	60	335	327	336	302	320	109	119	262	260	334.4

311.2	1.9	41.5	2.1	359.4	3.8	4.0	339.8	4.4	346.1	344.6	316.8	295.9	305.7	287.8	295.2	291.4	300.0	334.2	327.9	257.7	230.6	186.7	220.0
Diurnal Average																							

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



Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg

Lower Camp - June 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 104 deg on Jun 7 22:00	Hours of Data: 720
Minimum Value: 10 deg on Jun 14 05:00	Hours of Missing Data: 0
Percentiles: P ₁ = 12 P ₁₀ = 16 Q ₁ = 21 Median = 32 Q ₃ = 46 P ₉₀ = 68 P ₉₉ = 94	Hours of Calibration: 0
	Percent Operational Time: 100.0

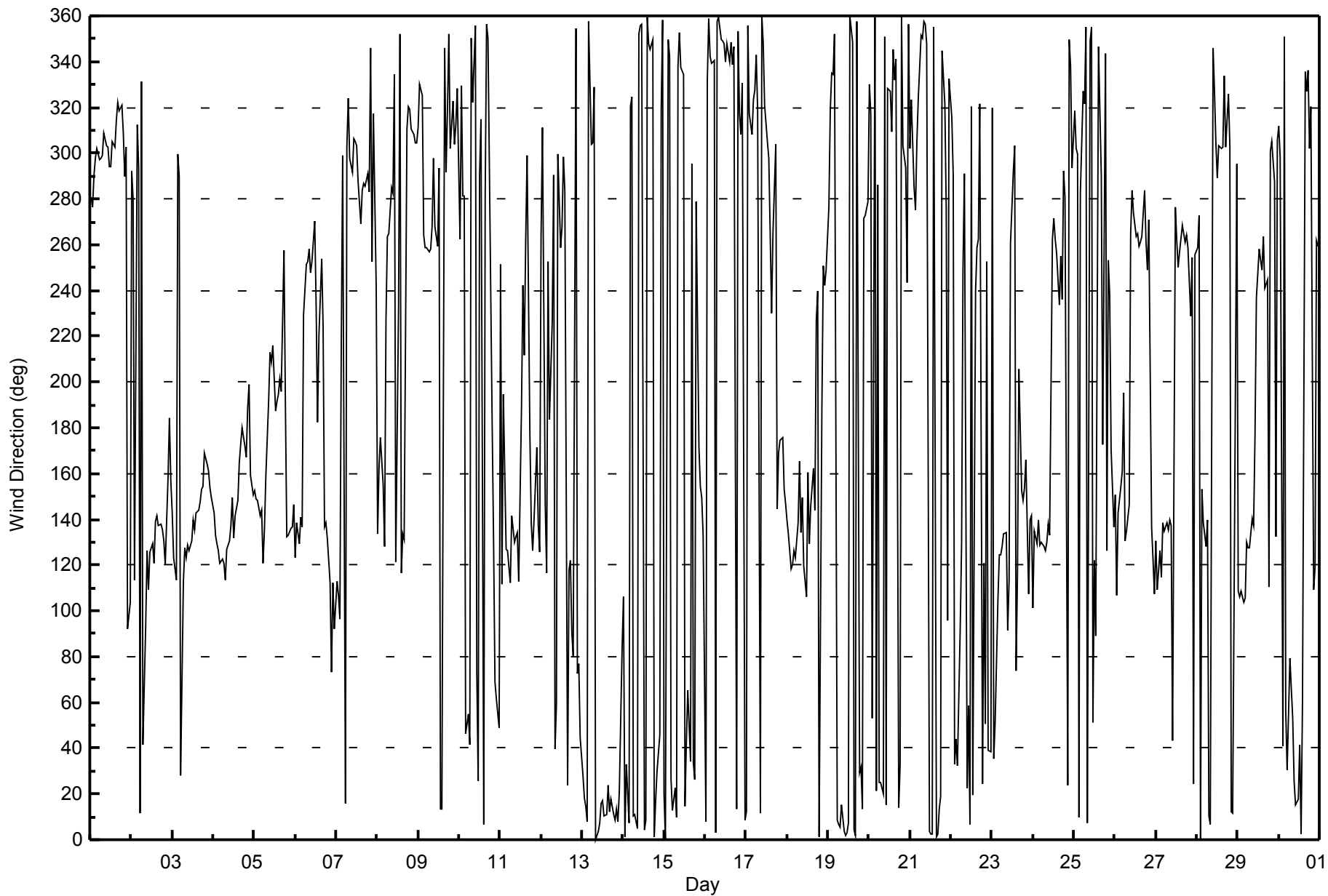
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	12	12	15	14	15	13	12	13	17	17	18	16	14	17	18	17	18	15	20	15	11	30	86	63	86
2-Jun	55	36	75	76	61	45	72	32	32	24	27	27	20	18	40	45	37	36	36	32	23	42	34	50	76
3-Jun	23	33	82	80	33	88	74	28	21	25	22	26	31	30	33	36	32	32	32	32	31	31	31	31	88
4-Jun	27	33	30	35	35	17	28	18	20	20	31	43	30	32	38	37	43	38	36	33	35	32	29	25	43
5-Jun	24	24	23	26	38	30	32	41	34	23	34	36	44	41	44	42	44	29	34	28	28	31	29	43	44
6-Jun	42	18	36	26	18	53	16	16	22	20	20	38	28	62	21	39	19	39	23	24	37	41	28	42	62
7-Jun	47	24	72	85	56	83	56	70	14	14	17	22	15	19	17	23	17	16	16	14	97	104	46	40	104
8-Jun	29	36	27	80	49	26	18	18	23	43	55	73	56	87	36	65	89	24	16	15	13	11	16	13	89
9-Jun	16	14	21	14	21	14	18	13	22	24	39	78	63	41	49	25	23	26	22	19	17	18	30	58	78
10-Jun	88	46	32	19	59	74	33	58	70	72	42	61	78	64	16	56	34	41	44	66	27	78	48	46	88
11-Jun	76	28	71	50	42	66	37	37	32	35	31	22	64	19	25	43	73	50	32	33	32	74	86	23	86
12-Jun	74	77	71	85	43	64	56	64	15	49	69	36	29	27	24	68	19	25	21	59	28	20	15	16	85
13-Jun	14	16	13	19	32	16	14	21	19	21	19	19	18	21	23	20	20	18	20	18	16	15	41	16	41
14-Jun	28	71	36	38	10	23	19	22	21	24	23	22	26	24	31	24	23	27	34	31	50	61	21	22	71
15-Jun	21	21	22	25	14	20	20	28	26	27	28	30	56	46	39	69	95	69	81	71	34	23	39	55	95
16-Jun	83	24	43	23	28	25	15	18	20	20	24	23	22	23	24	26	26	23	44	43	16	50	48	18	83
17-Jun	22	33	27	14	14	18	21	18	20	37	39	60	52	55	39	58	35	77	33	34	27	28	30	34	77
18-Jun	44	35	42	42	41	30	38	37	37	38	26	28	47	56	41	46	40	35	54	62	66	22	12	11	66
19-Jun	32	18	18	18	19	17	19	21	20	20	19	24	38	42	43	37	37	33	36	16	29	30	32	64	64
20-Jun	57	51	54	50	47	83	41	15	16	50	41	34	41	44	50	42	34	50	33	21	41	35	90	95	95
21-Jun	35	26	61	31	23	35	18	24	34	31	24	19	39	29	25	26	25	22	17	20	22	51	48	81	81
22-Jun	42	45	68	34	73	43	52	32	59	22	94	36	31	88	29	13	13	26	70	22	68	87	61	59	94
23-Jun	67	51	31	76	43	27	25	26	21	47	62	38	87	45	56	28	77	42	30	25	29	45	21	18	87
24-Jun	55	51	45	35	42	40	29	20	30	33	46	20	20	17	19	32	41	21	34	21	54	35	19	26	55
25-Jun	88	75	23	51	39	52	43	38	15	29	31	25	26	58	31	44	101	99	96	66	68	70	77	49	101
26-Jun	65	21	32	21	30	52	25	36	49	50	27	17	14	14	16	14	14	20	13	11	69	43	59	51	69
27-Jun	33	49	27	15	21	44	34	32	33	25	57	33	18	19	25	23	17	12	14	17	17	57	85	13	85
28-Jun	19	41	90	26	23	24	86	25	12	22	17	21	15	20	17	15	25	20	19	13	63	59	59	82	90
29-Jun	57	26	33	39	35	22	32	22	25	35	66	30	48	30	24	27	29	35	37	68	19	83	74	57	83
30-Jun	49	39	35	46	50	68	75	54	35	17	25	34	56	18	56	25	21	62	30	41	51	32	63	14	75

88	77	90	85	73	88	86	70	70	72	94	78	87	88	56	69	101	99	96	71	97	104	90	95	
Diurnal Maximum																								



WBEA
Hourly Averages

Wind Direction (WD) - deg
Lower Camp - June 2015





Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	June 15, 2015	Last Calibration	May 25, 2015
Station Name	Lower Camp	Station Number	AMS 11
Reason:	Routine		
Start Time (MST)	10:00	End Time (MST)	12:45
Gas Cert Reference	LL110099	Station temp.	21 Deg C
Cal Gas Concentration	51.3 ppm	Cal Gas Exp Date	25/03/2016
Calibrator Make/Model	Sabio 4010	Serial Number	11051107
ZAG Make/Model	API 701	Serial Number	3411
DACS make/model	Campbell Scientific CR3000	DACS serial No.	3492

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		PMT voltage	-675	-675
Analyzer IP address	192.168.1.43		Lamp voltage	806	803
Calculated slope	1.001723	1.001408	Chamber temp	45.1	45.2
Calculated intercept	0.661677	1.304533	Pressure	706.9	716.9
Analyzer Background	11.1	11.1	Flow	0.484	0.500
Analyzer Coefficient	1.013	1.013	Intensity	91	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	-0.2	----
as found span	5000	80.9	830.0	828.2	1.002
calibrator zero	5000	0.0	0.0	-0.2	----
high point	5000	80.9	830.0	828.2	1.002
second point	5000	40.9	419.6	416.8	1.007
third point	5000	20.4	209.3	206.9	1.012
as left zero	5000	0.0	0.0	0.0	----
as left span	5000	80.9	830.0	830.8	0.999
Average Correction Factor					1.007

Corrected As found	828.5	Previous response	827.9	% change	-0.1%
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Notes:

Inlet filter changed after as founds. No adjustments.

Calibration Performed By:

Asad Hidayat



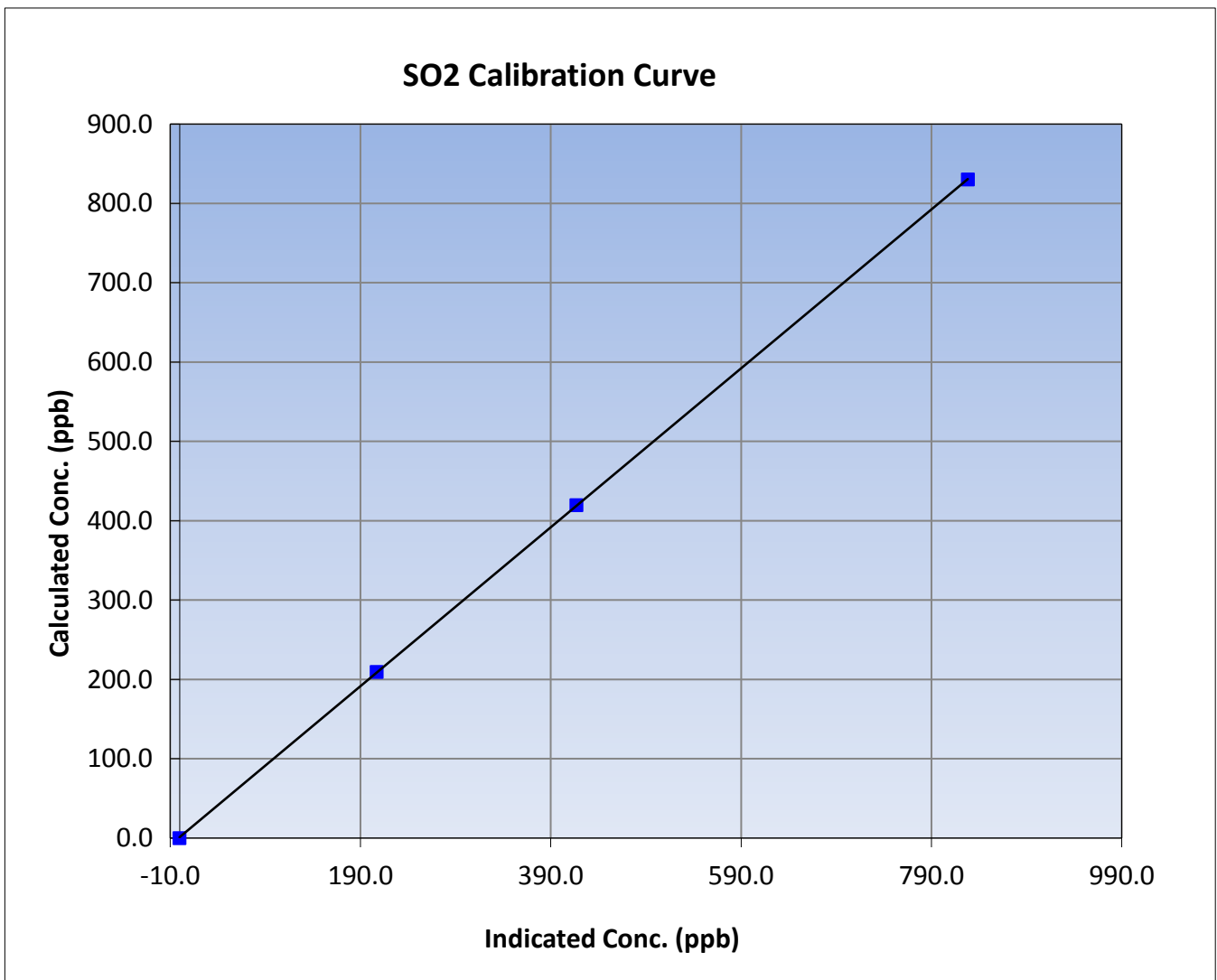
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	June 15, 2015	Previous Calibration	May 25, 2015
Station Name	Lower Camp	Station Number	AMS 11
Start Time (MST)	10:00	End Time (MST)	12:45
Analyzer make	TEI 43i	Analyzer serial #	100841398

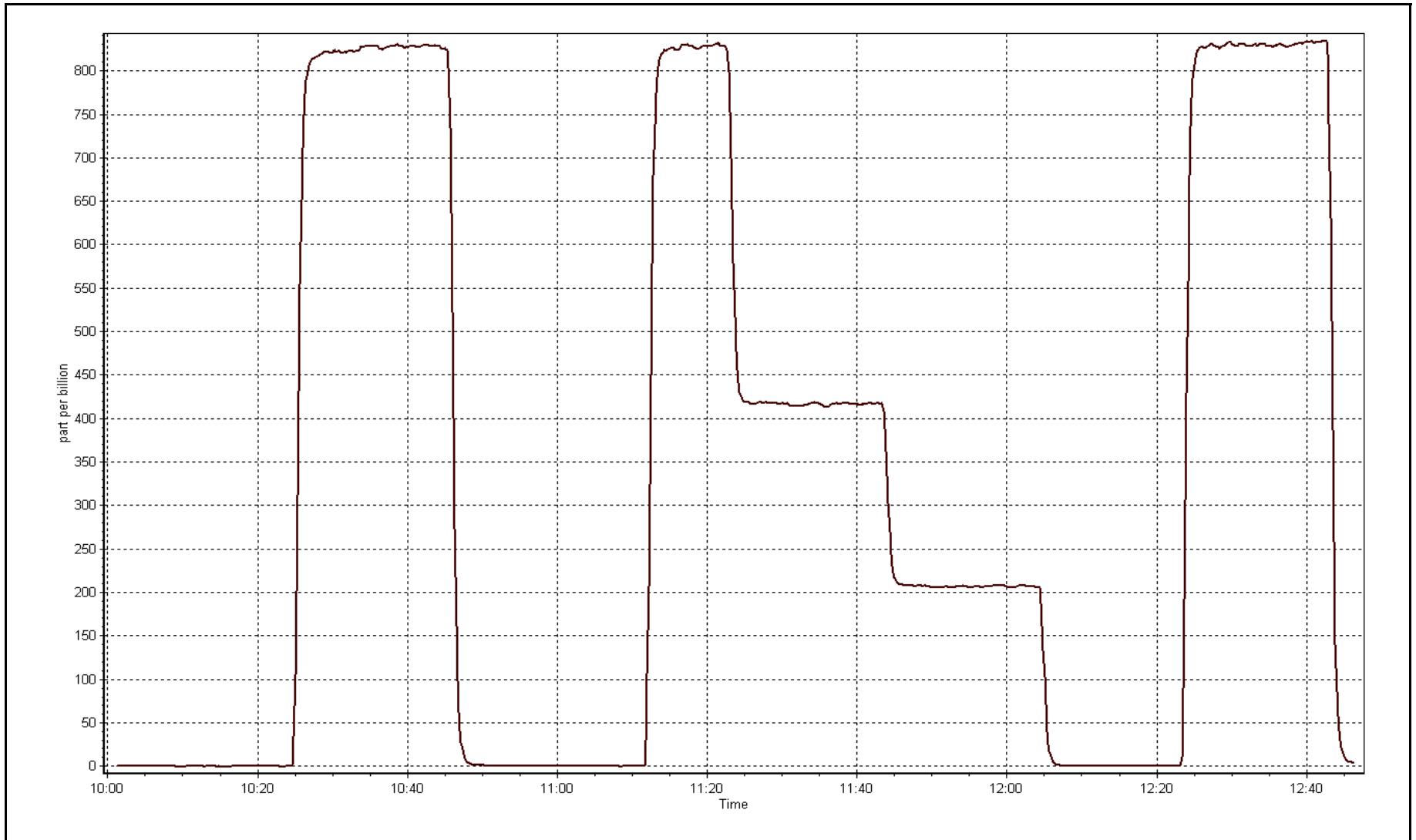
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	----	Correlation Coefficient	0.999992
830.0	828.2	1.0022		
419.6	416.8	1.0068	Slope	1.001408
209.3	206.9	1.0115		
			Intercept	1.304533



SO2 Calibration Plot

Date: June 15, 2015





Wood Buffalo Environmental Association H2S Calibration Report

Station Information

Calibration Date	June 17, 2015	Last Calibration	May 28, 2015
Station Name	Lower Camp	Station Number	AMS 11
Reason:	Routine		
Start Time (MST)	10:08	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	-634	-634
Analyzer IP address	192.168.1.45		Lamp voltage	880	881
Calculated slope	1.002897	0.996789	Chamber temp	45	45
Calculated intercept	-0.397931	-0.300357	Pressure	581.7	574.0
Analyzer Background	21.2	20.6	Flow	1.128	1.114
Analyzer Coefficient	1.297	1.249	Intensity	62	61
			Converter temp.	340	338

Analyzer make/model	Thermo 450i	Analyzer serial #	922436966
Converter make/model	NA	Converter serial #	NA

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.2	----
as found span	5000	72.8	75.0	76.7	0.977
SO2 scrubber check	5000	20.5	210.7	1.5	----
calibrator zero	5000	0.0	0.0	0.2	----
high point	5000	72.8	75.0	75.4	0.994
second point	5000	38.8	40.0	40.5	0.986
third point	5000	19.4	20.0	20.4	0.980
as left zero	5000	0.0	0.0	0.4	----
as left span	5000	72.8	75.0	75.8	0.989
Average Correction Factor					0.987

Corrected As found	76.5	Previous response	75.2	% change	-1.8%
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Notes:

Scrubber check and inlet filter replaced after as founds. Adjusted span.

Calibration Performed By: Asad Hidayat



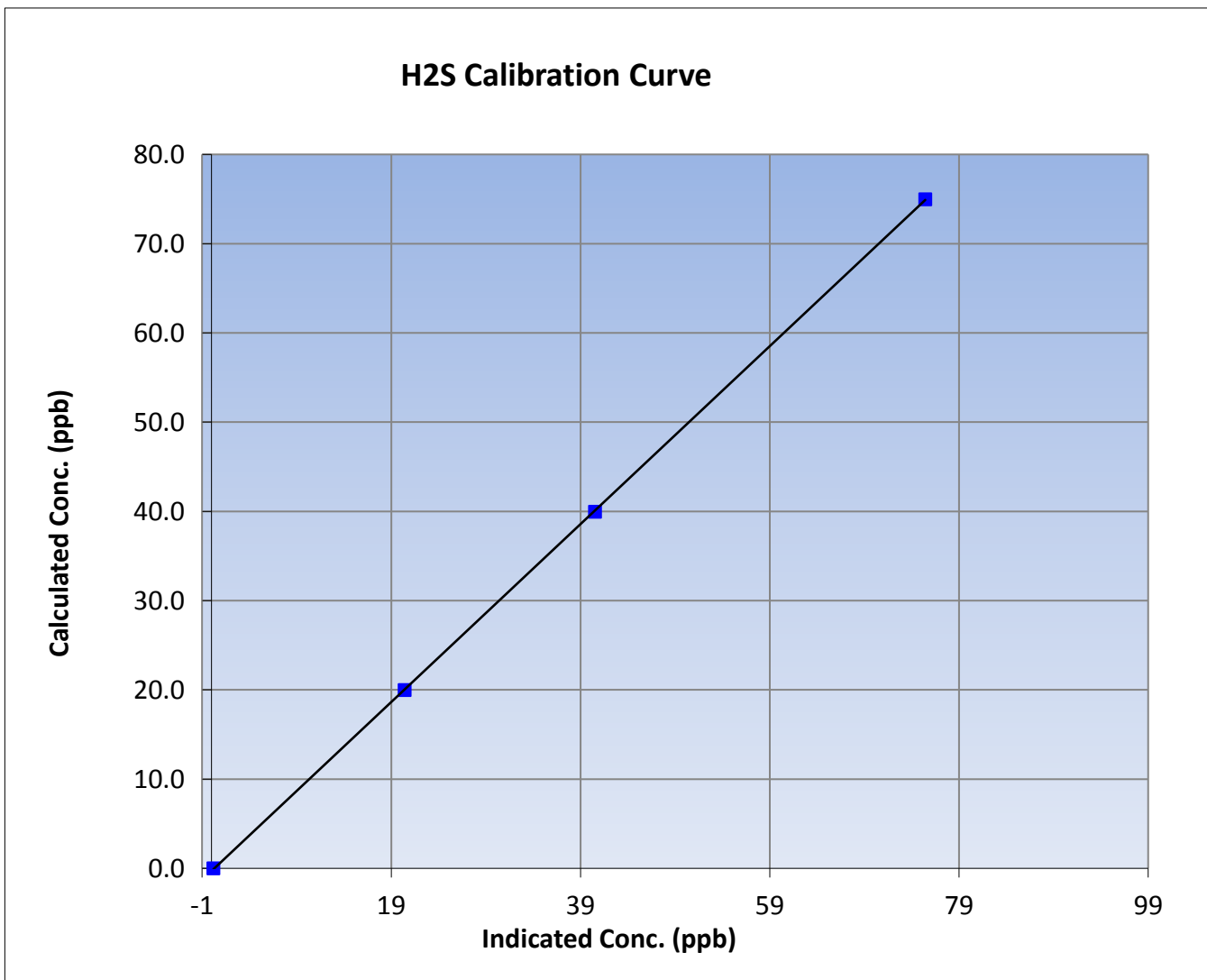
Wood Buffalo Environmental Association H2S Calibration Report

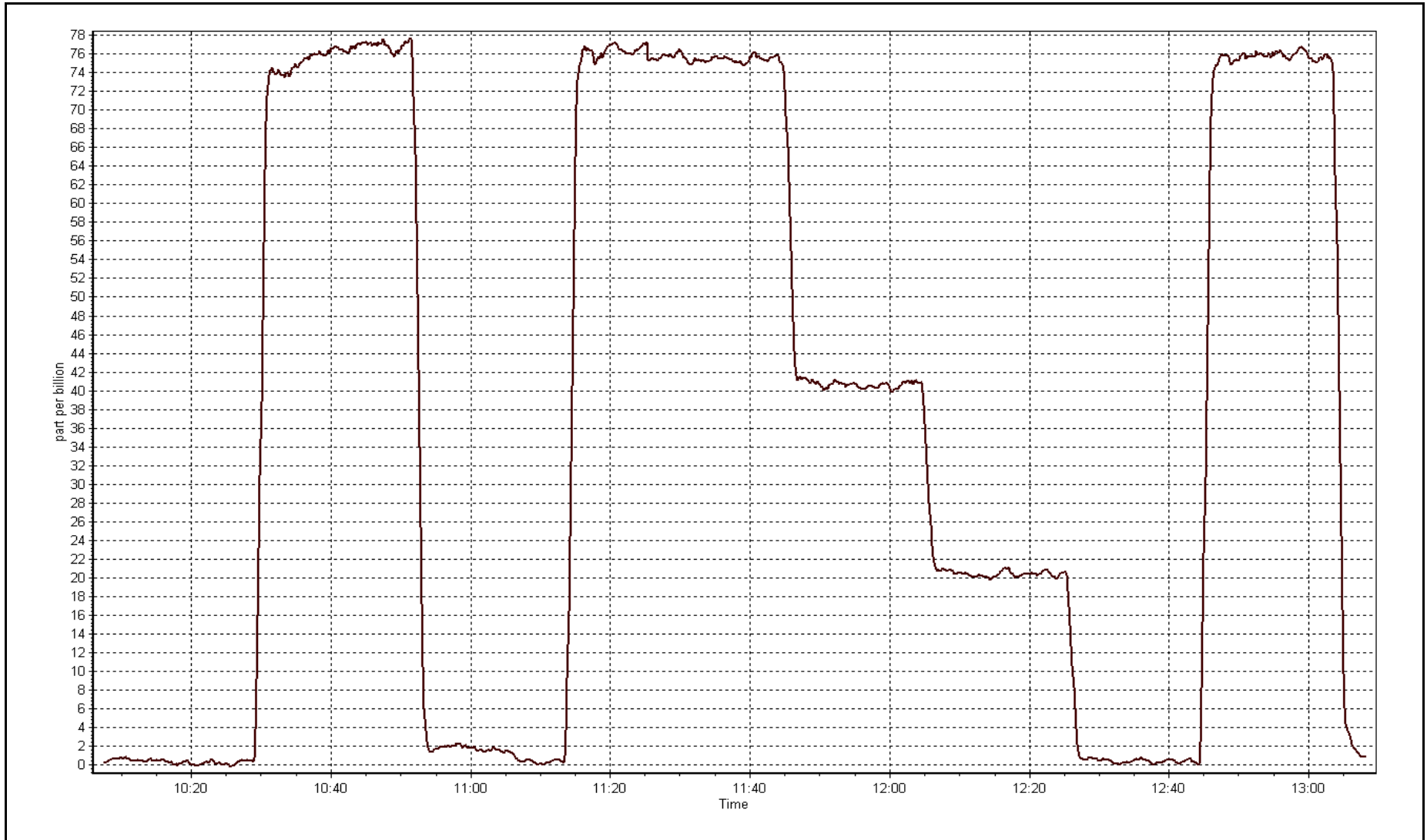
Station Information

Calibration Date	June 17, 2015	Previous Calibration	May 28, 2015
Station Name	Lower Camp	Station Number	AMS 11
Start Time (MST)	10:08	End Time (MST)	13:10
Analyzer make	Thermo 450i	Analyzer serial #	922436966

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	----	Correlation Coefficient	0.999987
75.0	75.4	0.9940		
40.0	40.5	0.9860	Slope	0.996789
20.0	20.4	0.9795		
			Intercept	-0.300357







Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	June-15-15	Last Calibration	May-25-15
Station Name	Lower Camp	Station Number	AMS 11
Reason:	Routine		
Start Time (MST)	10:00	End Time (MST)	12:45
Gas Cert Reference	LL110099	Cal Gas Expiry Date	25/03/2016
CH4 Cal Gas Conc.	515 ppm	CH4 Equiv Conc.	1070.5 ppm
C3H8 Cal Gas Conc.	202 ppm	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11051107
ZAG make/model	Teledyne API 701	Serial Number	3411
DACS make/model	Campbell Scientific CR3000	Serial Number	3492

Analyzer Information

	<i>Before</i>	<i>After</i>		<i>Before</i>	<i>After</i>
Analyzer Range	0 - 50 ppm		Sample Pressure	8.5	8.5
Analyzer IP address	192.168.1.51		Air or Bypass Press	37.3	37.3
Calculated slope	1.001783	0.995475	Fuel Pressure	24.0	24.0
Calculated intercept	0.000211	0.038181	Analyzer Coeff	4.1	4.1
			Analyzer BKG	6.050	6.220
Analyzer make	51i-LT		Analyzer serial #	1410661326	

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	0.10	----
as found span	5000	80.9	17.32	17.37	0.997
calibrator zero	5000	0.0	0.00	-0.03	----
high point	5000	80.9	17.32	17.37	0.997
second point	5000	40.9	8.76	8.74	1.002
third point	5000	20.4	4.37	4.35	1.004
as left zero	5000	0.0	0.00	-0.08	----
as left span	5000	80.9	17.32	17.40	0.995
Average Correction Factor					1.001

Corrected As found	17.27	Previous response	17.29	% change	0.1%
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Notes:

Inlet filter changed after as founds. Adjusted zero.

Calibration Performed By:

Asad Hidayat



Wood Buffalo Environmental Association THC Calibration Report

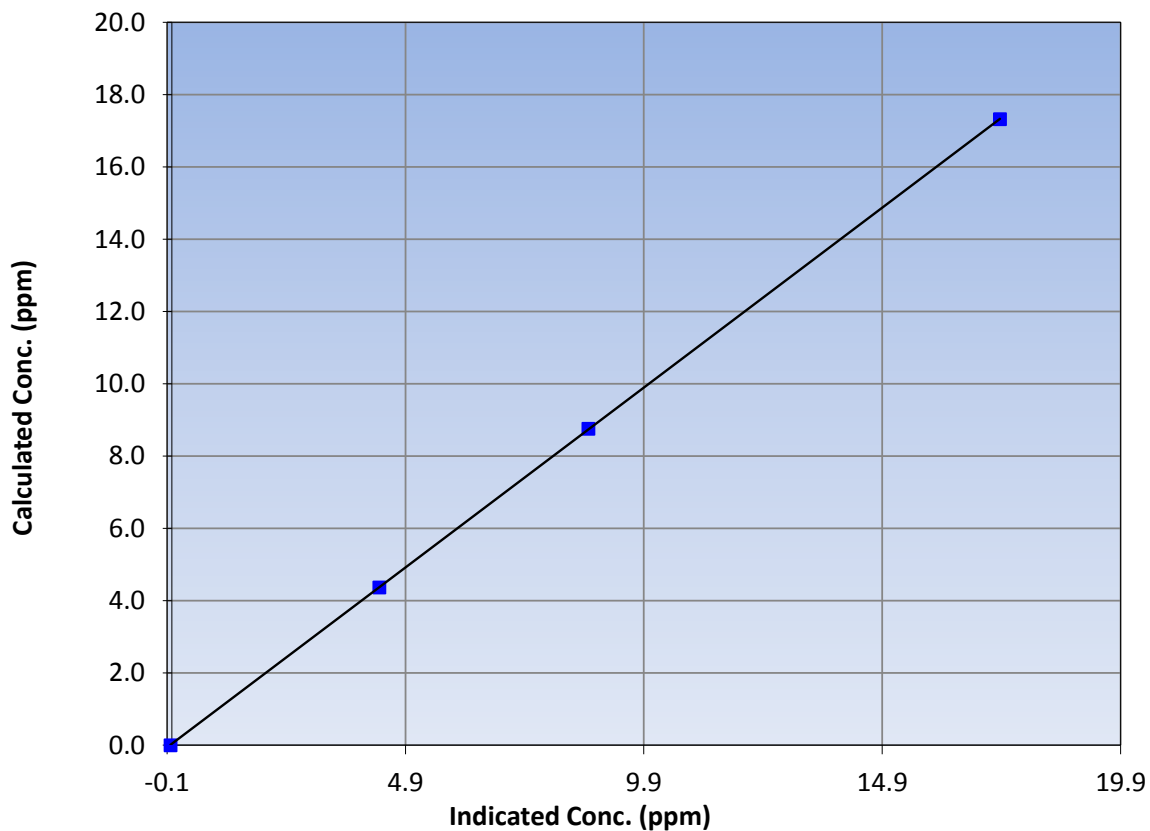
Station Information

Calibration Date	June 15, 2015	Previous Calibration	May 25, 2015
Station Name	Lower Camp	Station Number	AMS 11
Start Time (MST)	10:00	End Time (MST)	12:45
Analyzer make	51i-LT	Analyzer serial #	1410661326

Calibration Data

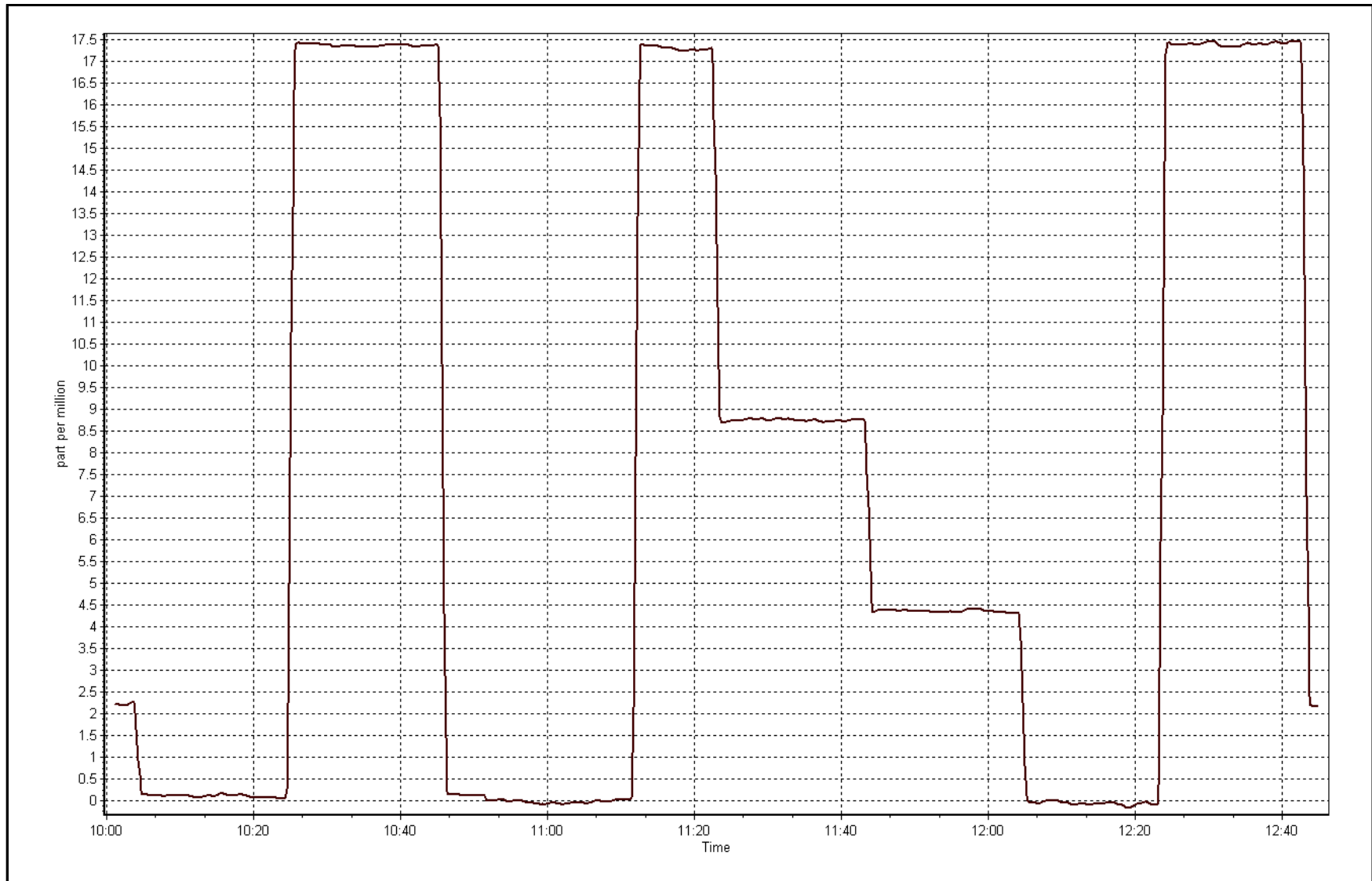
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	-0.03	----	Correlation Coefficient	0.999997
17.32	17.37	0.9972		
8.76	8.74	1.0019	Slope	0.995475
4.37	4.35	1.0041		
			Intercept	0.038181

THC Calibration Curve



THC Calibration Plot

Date: June 15, 2015





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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 12
MILLENNIUM MINE
JUNE 2015**

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

July 30, 2015



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MILLENNIUM MINE (AMS 12)
 JUNE 2015

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	682	37	38	99.86	38	0	6	0
TRS(ppb) Average	685	35	35	100.00	2	0	1	0
THC(ppm) Average	684	35	36	99.86	5.3	-	3.6	-
NO2(ppb) Average	682	37	38	99.86	48	0	27	-
NO(ppb) Average	682	37	38	99.86	85	-	14	-
NOX(ppb) Average	682	37	38	99.86	107	-	40	-
PM2.5(ug/m3) Average	699	0	21	97.08	222.7	-	157.1	5
Temperature 2 m (C) Average	720	0	0	100.00	31.6	-	23.9	-
Relative Humidity (%) Average	720	0	0	100.00	97	-	76	-
Wind Speed 10 m (km/h) Average	718	0	2	99.72	31	-	18	-
Wind Direction 10 m (deg) Average	718	0	2	99.72	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MILLENNIUM MINE (AMS 12)
 JUNE 2015

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2(ppb) Average	682	1.8	4	-	0	0	0	0	1	4	38
TRS(ppb) Average	685	0.4	0	-	0	0	0	0	0	1	2
THC(ppm) Average	684	2.35	0.4	-	1.9	2	2.1	2.2	2.4	2.8	5.3
NO2(ppb) Average	682	7.8	8	-	0	1	2	6	11	18	48
NO(ppb) Average	682	3.3	8	-	0	0	0	1	2	8	85
NOX(ppb) Average	682	11.1	14	-	0	1	3	7	13	24	107
PM2.5(ug/m3) Average	699	22.6	32.9	-	1.9	4.9	7.3	11.9	21.9	50.6	222.7
Temperature 2 m (C) Average	720	17.3	5.7	-	1.7	10.3	13.5	16.8	21	25.2	31.6
Relative Humidity (%) Average	720	56.2	20	-	19	29	39	56	73	84	97
Wind Speed 10 m (km/h) Average	718	8	5	-	0	3	5	7	10	14	31
Wind Direction 10 m (deg) Average	718	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION -MILLENNIUM MINE (AMS 12)
JUNE 2015

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2	15 Jun 2015 11:00	15 Jun 2015 11:00	1	Maintenance - manifold cleaning
THC	15 Jun 2015 11:00	15 Jun 2015 11:00	1	Maintenance - manifold cleaning
NO2, NO, NOX	15 Jun 2015 11:00	15 Jun 2015 11:00	1	Maintenance - manifold cleaning
PM2.5	01 Jun 2015 01:00	01 Jun 2015 15:00	15	Analyzer failure - sample flow shut off, wild fire materials
PM2.5	24 Jun 2015 11:00	24 Jun 2015 16:00	6	Maintenance - Flow and zero check, sample head cleaning
Wind Speed, Wind Direction	23 Jun 2015 01:00	23 Jun 2015 01:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	25 Jun 2015 06:00	25 Jun 2015 06:00	1	Flat line in sensor output signal



Summary of Hour Averages

Millennium - June 2015

Number of Exceedences (AAAO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 38 ppb on Jun 12 11:00	Maximum Daily Average: 6.2 ppb on Jun 12		Hours of Data:	682
Minimum Value: 0 ppb on Jun 25 01:00	Minimum Daily Average: 0.1 ppb on Jun 13		Hours of Missing Data:	38
Maximum Diurnal Average: 5.2 ppb at hour 11	Minimum Diurnal Average: 0.3 ppb at hour 1		Hours of Calibration:	37
Monthly Average: 1.8 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 4 P ₉₉ = 22		Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	0	Z	7	2	15	10	2	16	7	12	6	4	8	9	5	1	0	0	1	1	1	1	1	4.7	16
2-Jun	0	0	0	Z	1	1	0	0	1	3	3	2	1	1	0	0	0	1	1	1	0	0	0	0	0.8	3
3-Jun	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
4-Jun	0	0	0	0	0	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
5-Jun	Z	1	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
6-Jun	0	Z	1	0	0	0	0	1	8	19	33	37	13	3	1	1	0	1	1	0	0	1	0	0	5.3	37
7-Jun	0	0	Z	9	10	2	1	2	5	7	4	2	4	1	0	0	0	0	1	1	1	1	3	1	2.4	10
8-Jun	1	1	0	Z	1	1	0	0	7	6	2	1	1	0	0	0	2	4	1	0	0	0	0	0	1.4	7
9-Jun	0	0	0	0	Z	1	1	1	2	11	13	2	1	1	1	0	2	5	1	0	1	0	0	0	1.9	13
10-Jun	0	0	0	0	1	Z	1	4	4	2	2	2	7	9	15	15	20	22	7	2	2	2	2	1	5.3	22
11-Jun	Z	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	0	0	0	0	0	2	1	0.6	2
12-Jun	0	Z	1	1	0	0	0	10	22	32	38	24	6	3	1	1	1	1	0	0	0	0	0	0	6.2	38
13-Jun	0	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-Jun	0	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-Jun	0	0	0	0	Z	1	0	0	0	0	M	1	1	3	8	14	11	3	2	1	1	1	0	0	2.2	14
16-Jun	0	0	0	0	0	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
17-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	3	5	6	9	20	12	5	6	7	4	1	1	3.6	20
18-Jun	0	Z	0	0	0	0	0	0	0	1	1	1	1	0	1	1	0	0	0	0	0	0	0	1	0.4	1
19-Jun	1	1	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
20-Jun	0	0	0	Z	1	1	1	1	2	7	14	9	4	4	2	2	1	0	0	0	0	0	0	0	2.2	14
21-Jun	0	0	0	0	Z	0	0	0	0	0	0	1	2	2	2	1	1	0	0	0	0	0	1	1	0.7	2
22-Jun	0	0	0	0	0	Z	1	0	0	7	11	14	4	1	2	1	1	1	0	0	0	0	0	0	2.0	14
23-Jun	Z	1	0	0	0	0	0	0	0	0	0	0	1	1	0	6	3	2	1	1	0	0	0	0	0.8	6
24-Jun	0	Z	0	0	0	0	0	0	0	0	C	C	C	C	C	C	0	0	1	4	2	0	0	0	-	4
25-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	0	1	3	1	0	0	0	1	0	0	0.5	3
26-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	1	0	0.4	2
27-Jun	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
28-Jun	0	0	0	0	0	Z	1	4	3	1	1	4	4	9	16	20	3	2	1	1	2	4	3	1	3.5	20
29-Jun	Z	1	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.6	1
30-Jun	1	Z	1	1	0	1	1	1	1	1	5	9	8	14	15	15	9	2	2	3	2	2	3	1	4.2	15

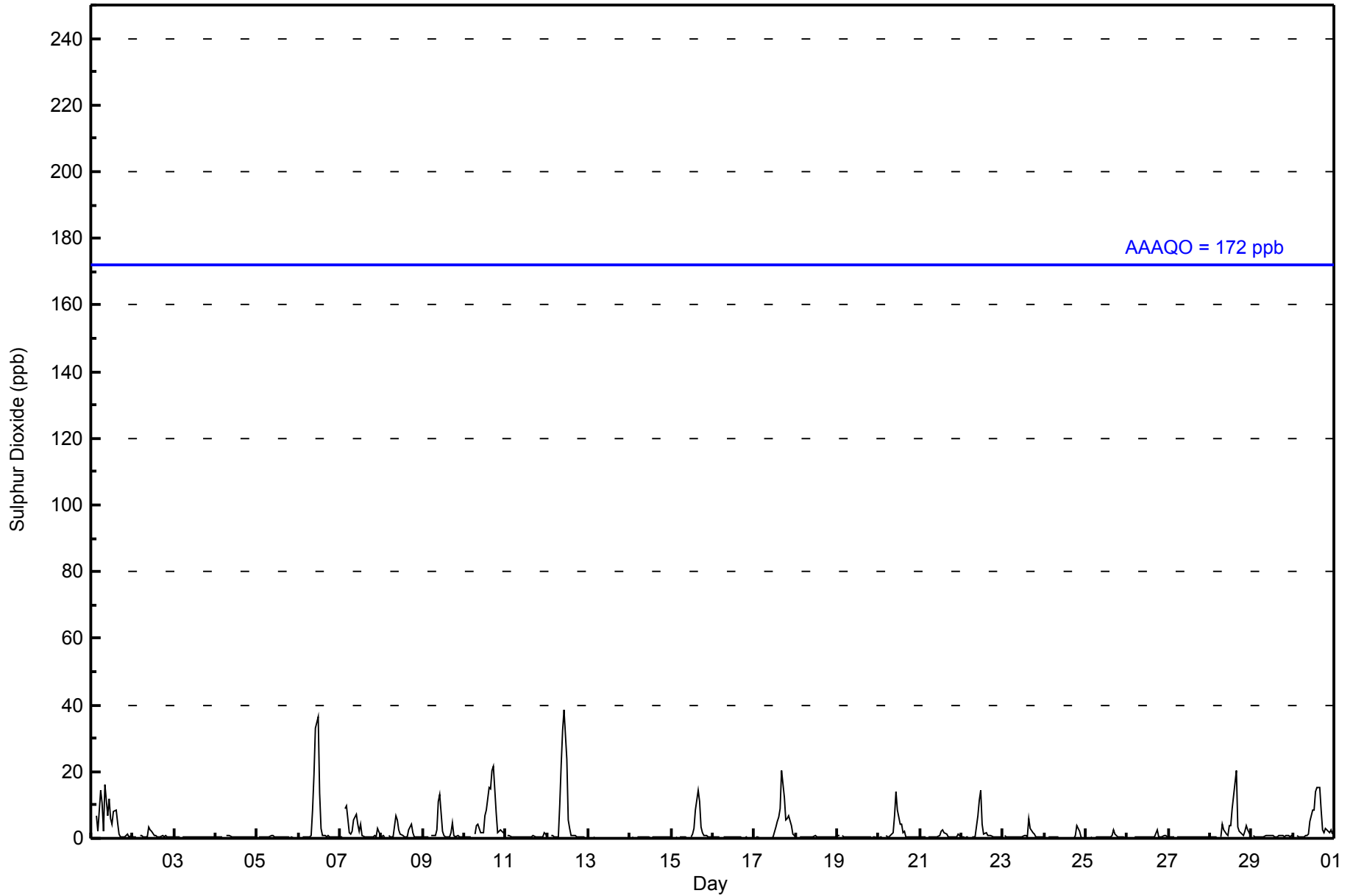
0.3	0.4	0.4	1.0	0.8	1.0	0.8	1.1	2.6	3.8	5.2	4.1	2.4	2.4	2.9	3.3	2.8	2.2	2.2	1.0	0.8	0.8	0.7	0.7	0.5	Diurnal Average	
1	1	1	9	10	15	10	10	22	32	38	37	13	14	16	20	20	22	22	7	6	7	4	3	1	Diurnal Maximum	

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



WBEA
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Millennium - June 2015





WBEA
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Millennium - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	653	95.75	95.75
11 - 20	22	3.23	98.97
21 - 60	7	1.03	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 720



WBEA
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Millennium - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	92	65	20	14	7	10	45	53	63	68	33	29	32	38	46	37	652
11 - 20	7	2	0	0	0	0	0	0	0	0	0	1	3	4	4	1	22
21 - 60	4	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	7
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	103	68	20	14	7	10	45	53	63	68	33	30	35	42	52	38	681

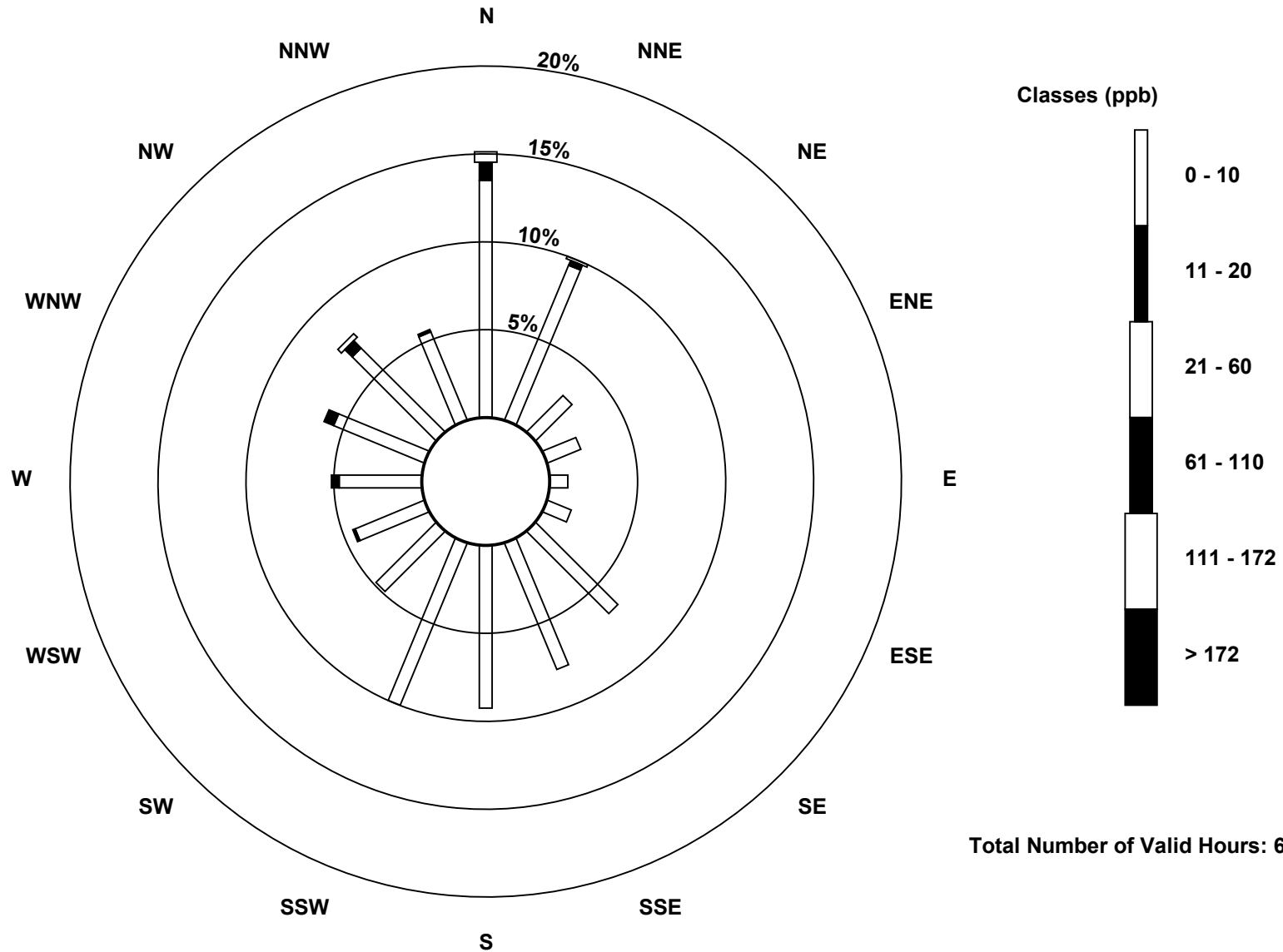
Total Number of Valid Hours: 681

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

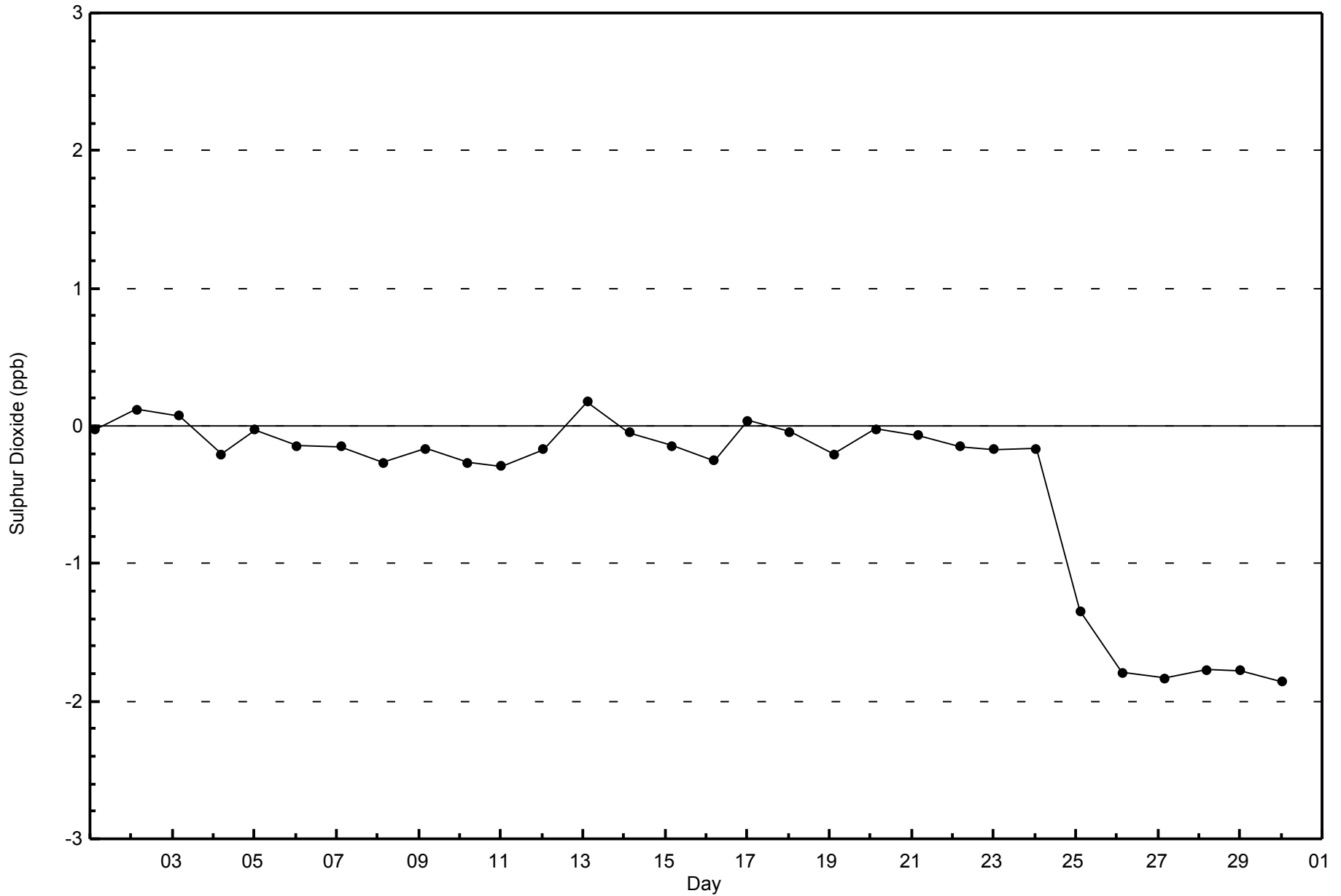
Sulphur Dioxide (SO₂) - ppb
Millennium (AMS 12)





WBEA
Zero Responses

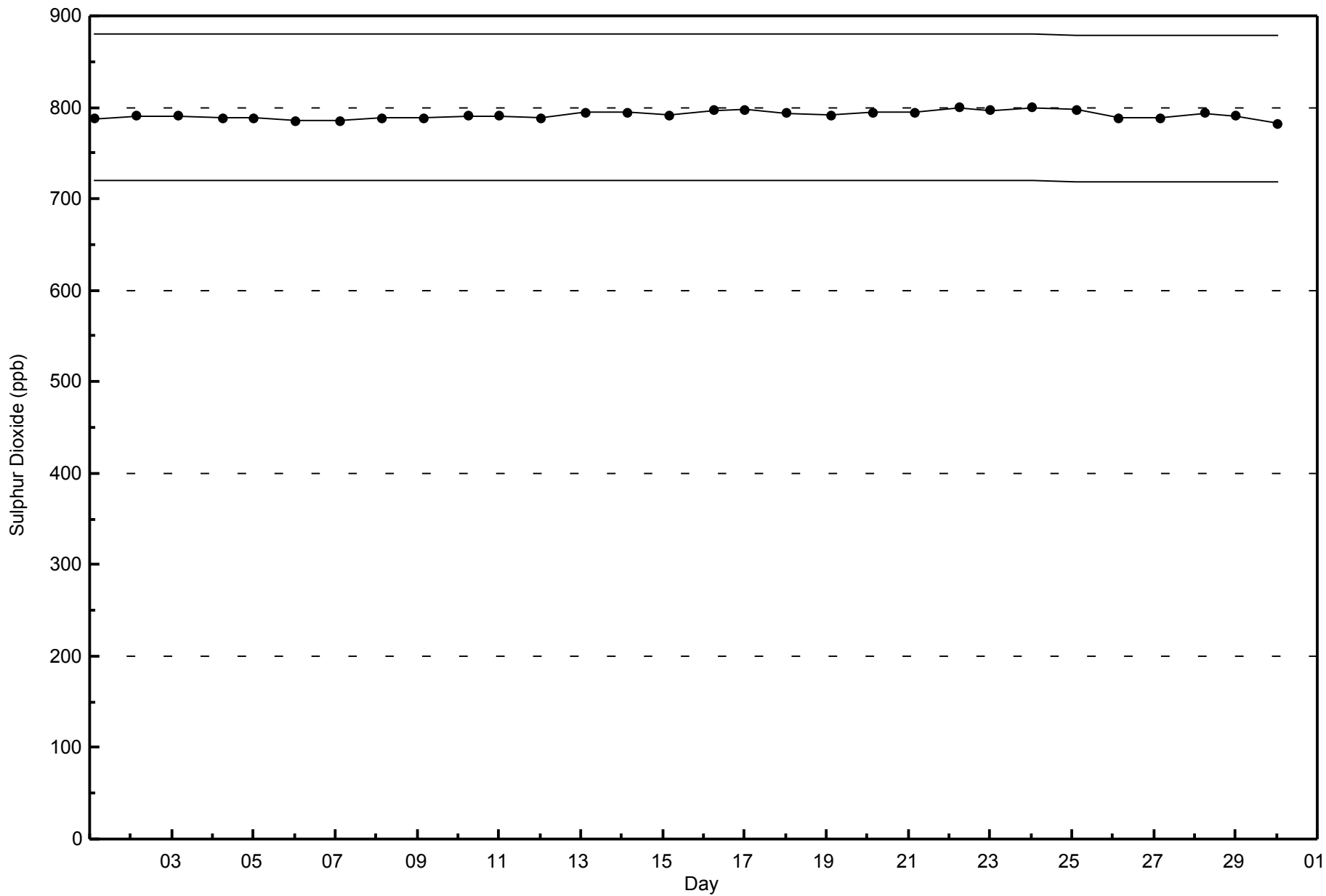
Sulphur Dioxide (SO₂) - ppb
Millennium - June 2015





WBEA
Span Responses

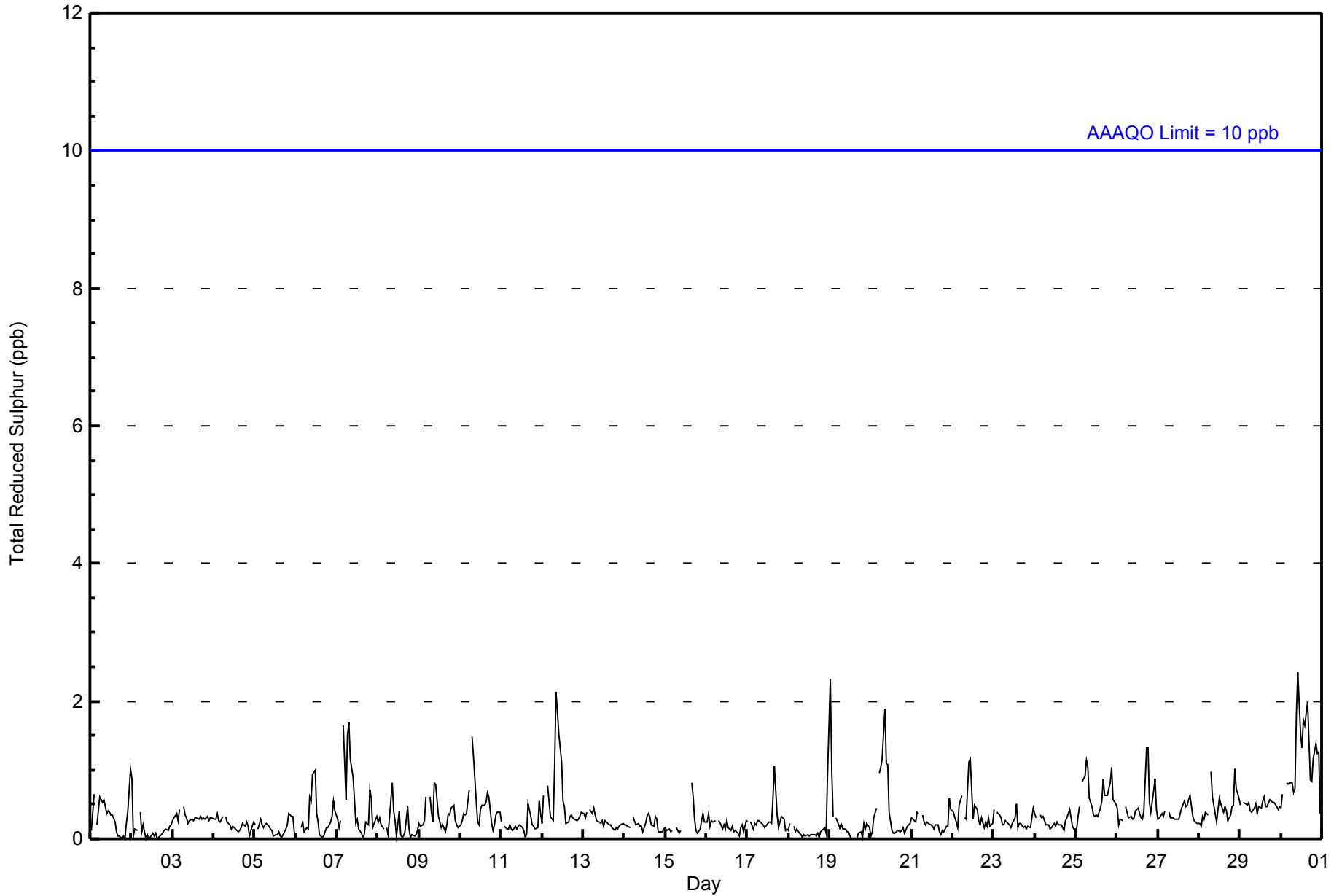
Sulphur Dioxide (SO₂) - ppb
Millennium - June 2015





WBEA
Hourly Averages

Total Reduced Sulphur (TRS) - ppb
Millennium - June 2015





WBEA
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Millennium - June 2015

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



WBEA
Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Millennium - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	102	66	20	13	7	10	44	54	66	65	37	32	36	44	49	38	683
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	102	66	20	13	7	10	44	54	66	65	37	32	36	44	49	38	683

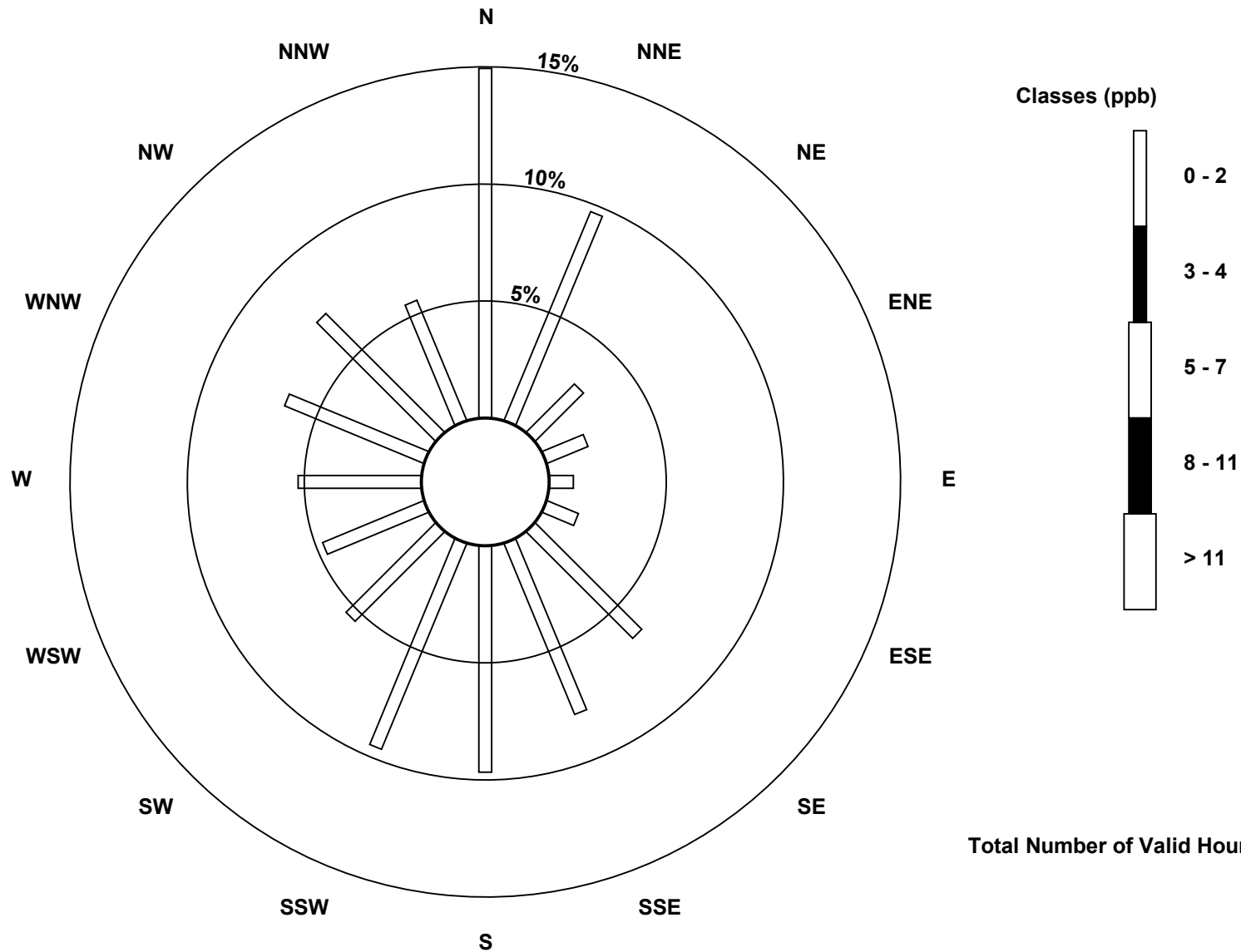
Total Number of Valid Hours: 683

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

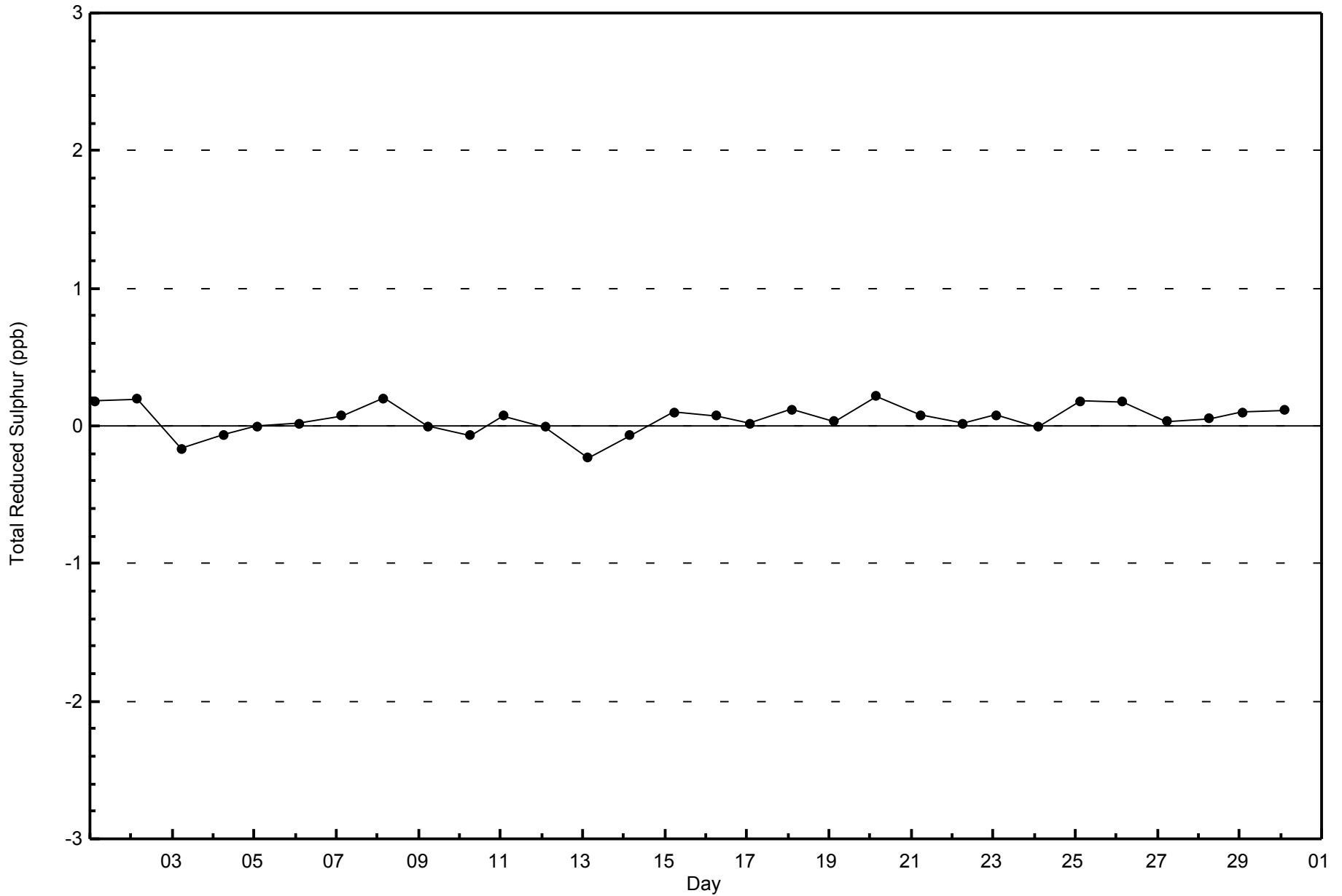
Total Reduced Sulphur (TRS) - ppb
Millennium (AMS 12)





WBEA
Zero Responses

Total Reduced Sulphur (TRS) - ppb
Millennium - June 2015

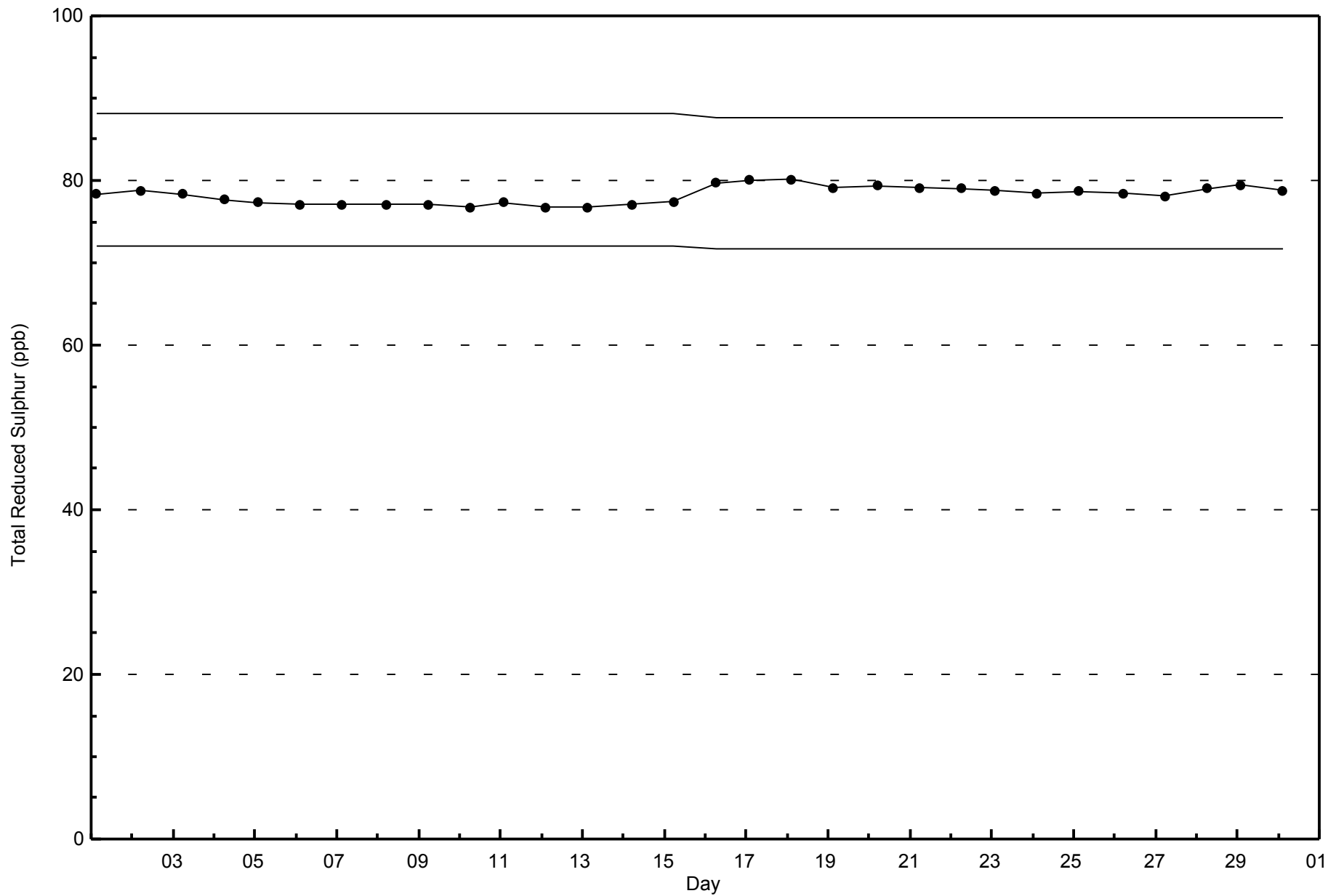




WBEA
Span Responses

Total Reduced Sulphur (TRS) - ppb

Millennium - June 2015





Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

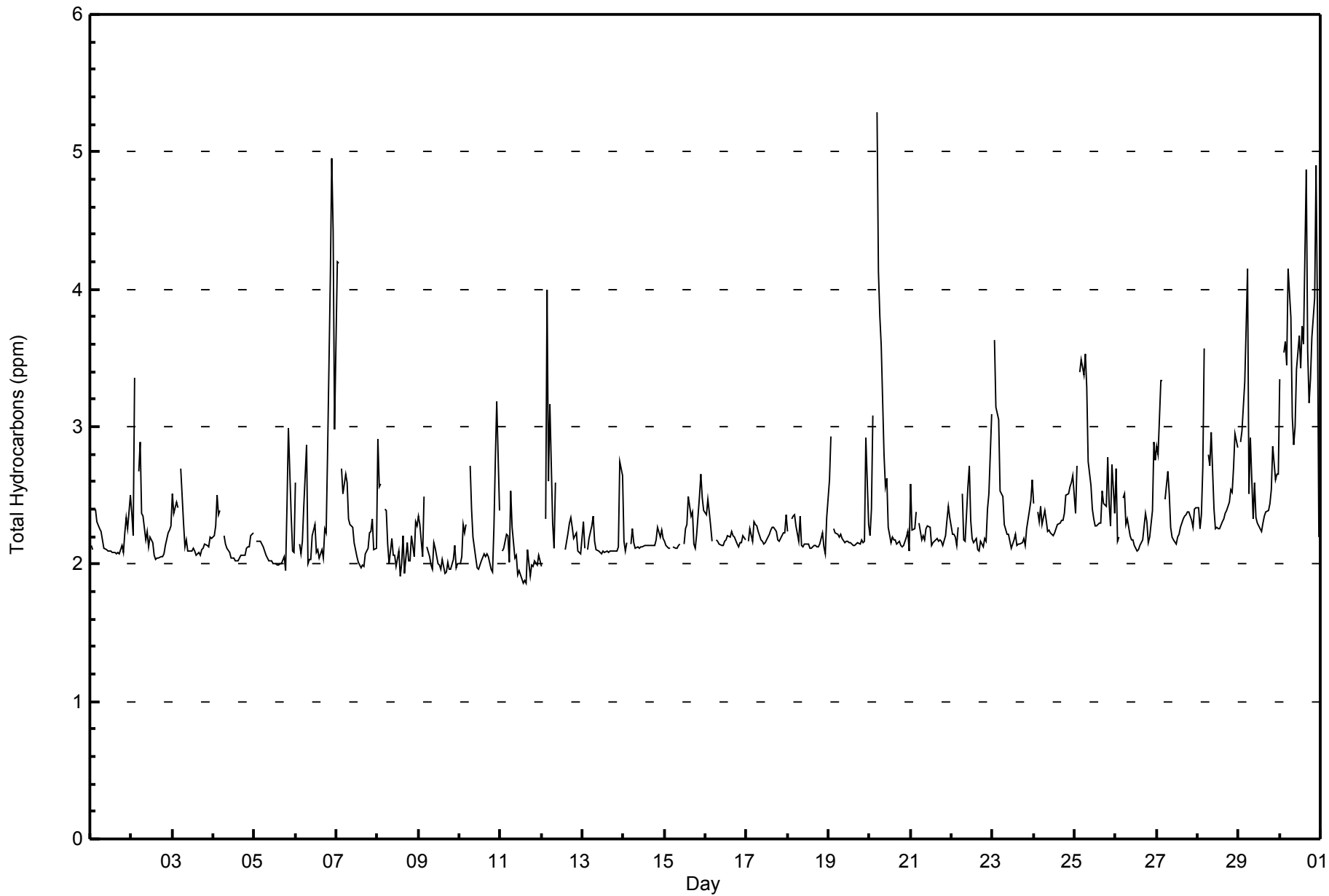
Millennium - June 2015

Maximum Value: 5.3 ppm on Jun 20 05:00																		Maximum Daily Average: 3.6 ppm on Jun 30																		Hours in Service: 720	
Minimum Value: 1.9 ppm on Jun 11 16:00																		Minimum Daily Average: 2.0 ppm on Jun 11																		Hours of Data: 684	
Maximum Diurnal Average: 2.7 ppm at hour 5																		Minimum Diurnal Average: 2.2 ppm at hour 13																		Hours of Missing Data: 36	
Monthly Average: 2.35 ppm																		Percentiles: P ₁ = 1.9 P ₁₀ = 2.0 Q ₁ = 2.1 Median = 2.2 Q ₃ = 2.4 P ₉₀ = 2.8 P ₉₉ = 4.2																		Hours of Calibration: 35	
																																				Percent Operational Time: 99.9	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24													
1-Jun	2.1	2.1	Z	2.4	2.3	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.3	2.5	2.2	2.5											
2-Jun	2.4	2.2	3.4	Z	2.7	2.9	2.4	2.3	2.2	2.2	2.1	2.2	2.2	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.2	2.3	2.3	2.3	2.3	3.4										
3-Jun	2.5	2.4	2.5	2.4	Z	2.7	2.3	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.7											
4-Jun	2.2	2.3	2.5	2.4	2.4	Z	2.2	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.5											
5-Jun	Z	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.4	3.0	2.4	2.1	2.1	3.0											
6-Jun	2.6	Z	2.1	2.1	2.2	2.4	2.9	2.0	2.0	2.0	2.2	2.3	2.1	2.1	2.0	2.1	2.0	2.3	2.2	2.8	4.1	5.0	4.4	3.0	2.6	5.0											
7-Jun	4.2	4.2	Z	2.7	2.5	2.6	2.6	2.3	2.3	2.3	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.2	2.3	2.1	2.1	2.4	4.2											
8-Jun	2.9	2.6	2.6	Z	2.4	2.4	2.1	2.0	2.2	2.1	2.1	2.0	2.1	1.9	2.0	2.2	1.9	2.2	2.0	2.0	2.2	2.1	2.3	2.3	2.2	2.9											
9-Jun	2.3	2.3	2.1	2.5	Z	2.1	2.1	2.0	2.0	2.2	2.1	2.0	2.0	2.0	2.0	1.9	1.9	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.1	2.5											
10-Jun	2.0	2.1	2.3	2.2	2.3	Z	2.7	2.4	2.2	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.0	1.9	2.3	2.8	3.2	2.4	2.2	3.2											
11-Jun	Z	2.1	2.1	2.2	2.2	2.0	2.5	2.3	2.0	2.1	1.9	2.0	1.9	1.9	1.9	1.9	2.1	1.9	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.5											
12-Jun	2.0	Z	2.3	4.0	2.6	3.2	2.3	2.1	2.6	C	C	C	C	C	2.1	2.2	2.3	2.3	2.3	2.2	2.2	2.1	2.1	2.1	2.4	4.0											
13-Jun	2.3	2.1	Z	2.1	2.2	2.3	2.4	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	2.7	2.6	2.2	2.7											
14-Jun	2.2	2.1	2.2	Z	2.1	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	2.2	2.3	2.2	2.2	2.2	2.2	2.3											
15-Jun	2.2	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	M	2.2	2.3	2.3	2.5	2.3	2.4	2.1	2.1	2.2	2.5	2.7	2.5	2.4	2.3	2.7											
16-Jun	2.4	2.5	2.4	2.3	2.2	Z	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.5											
17-Jun	Z	2.2	2.3	2.2	2.3	2.3	2.3	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.4	2.2	2.4											
18-Jun	2.2	Z	2.3	2.3	2.4	2.3	2.2	2.4	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.3	2.2	2.4											
19-Jun	2.6	2.9	Z	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.9	2.3	2.3	2.9											
20-Jun	2.2	2.4	3.1	Z	5.3	4.1	3.8	3.6	2.8	2.6	2.6	2.3	2.2	2.2	2.2	2.2	2.1	2.2	2.1	2.1	2.1	2.2	2.2	2.1	2.6	5.3											
21-Jun	2.6	2.3	2.3	2.4	Z	2.3	2.2	2.2	2.2	2.3	2.3	2.3	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.3	2.4	2.3	2.2	2.6											
22-Jun	2.2	2.2	2.2	2.1	2.3	Z	2.5	2.2	2.2	2.6	2.7	2.3	2.2	2.2	2.2	2.1	2.1	2.2	2.1	2.2	2.2	2.4	2.5	3.1	2.3	3.1											
23-Jun	Z	3.6	3.1	3.0	2.5	2.5	2.5	2.3	2.2	2.2	2.2	2.1	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.1	2.3	2.4	2.5	2.6	2.4	3.6											
24-Jun	2.4	Z	2.4	2.3	2.4	2.3	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.5	2.5	2.6	2.6	2.4	2.6											
25-Jun	2.4	2.7	Z	3.4	3.5	3.4	3.5	3.3	2.7	2.6	2.4	2.3	2.3	2.3	2.3	2.3	2.5	2.4	2.4	2.8	2.4	2.3	2.7	2.4	2.7	3.5											
26-Jun	2.7	2.2	2.2	Z	2.5	2.5	2.3	2.3	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.4	2.3	2.2	2.2	2.4	2.9	2.8	2.3	2.9											
27-Jun	2.9	2.8	3.3	3.3	Z	2.5	2.7	2.5	2.3	2.2	2.2	2.1	2.2	2.2	2.3	2.3	2.3	2.4	2.4	2.4	2.3	2.3	2.4	2.4	2.5	3.3											
28-Jun	2.4	2.3	2.4	2.7	3.6	Z	2.8	2.7	3.0	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.5	2.5	2.7	2.9	2.8	2.5	3.6											
29-Jun	Z	2.9	3.0	3.3	3.7	4.2	2.5	2.9	2.3	2.6	2.3	2.3	2.3	2.2	2.3	2.3	2.4	2.4	2.4	2.5	2.9	2.6	2.7	2.7	2.7	4.2											
30-Jun	3.3	Z	3.5	3.6	3.5	4.2	3.8	3.1	2.9	3.0	3.4	3.7	3.4	3.7	3.6	4.9	3.5	3.2	3.3	3.6	3.9	4.9	3.8	2.2	3.6	4.9											
																								Diurnal Average													
																								Diurnal Maximum													
																								Z - zerospan C - Calibration M - Maintenance													



WBEA
Hourly Averages

Total Hydrocarbons (THC) - ppm
Millennium - June 2015





WBEA
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Millennium - June 2015

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	72	10.53	10.53
2.1 - 3.0	564	82.46	92.98
3.1 - 10.0	48	7.02	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



WBEA
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Millennium - June 2015

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	7	5	1	2	1	0	6	6	14	5	5	2	6	5	2	5	72
2.1 - 3.0	90	58	17	11	5	8	37	46	50	50	24	25	30	36	47	30	564
3.1 - 10.0	2	5	2	1	1	2	2	1	0	14	6	4	1	1	3	2	47
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	99	68	20	14	7	10	45	53	64	69	35	31	37	42	52	37	683

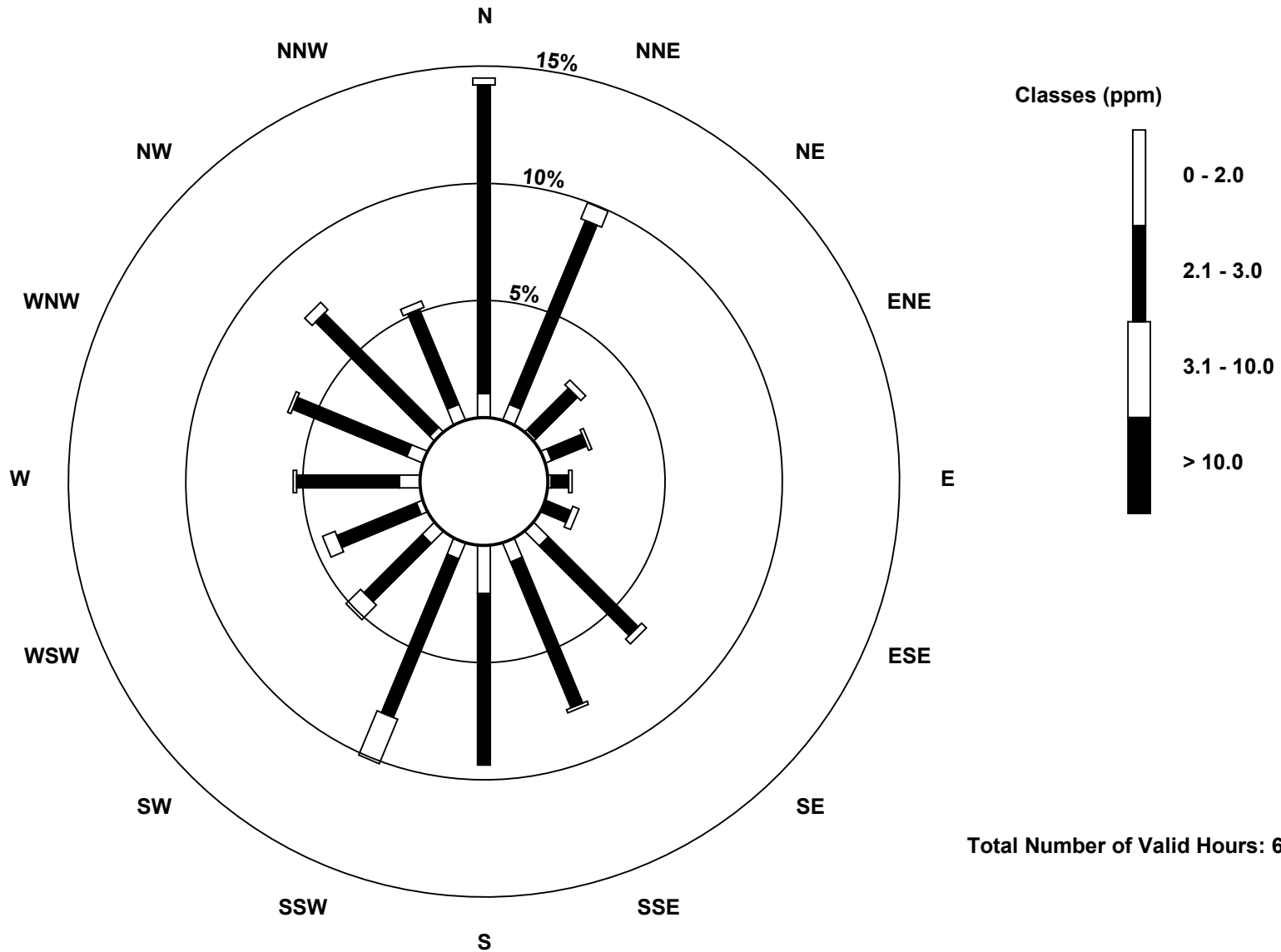
Total Number of Valid Hours: 683

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

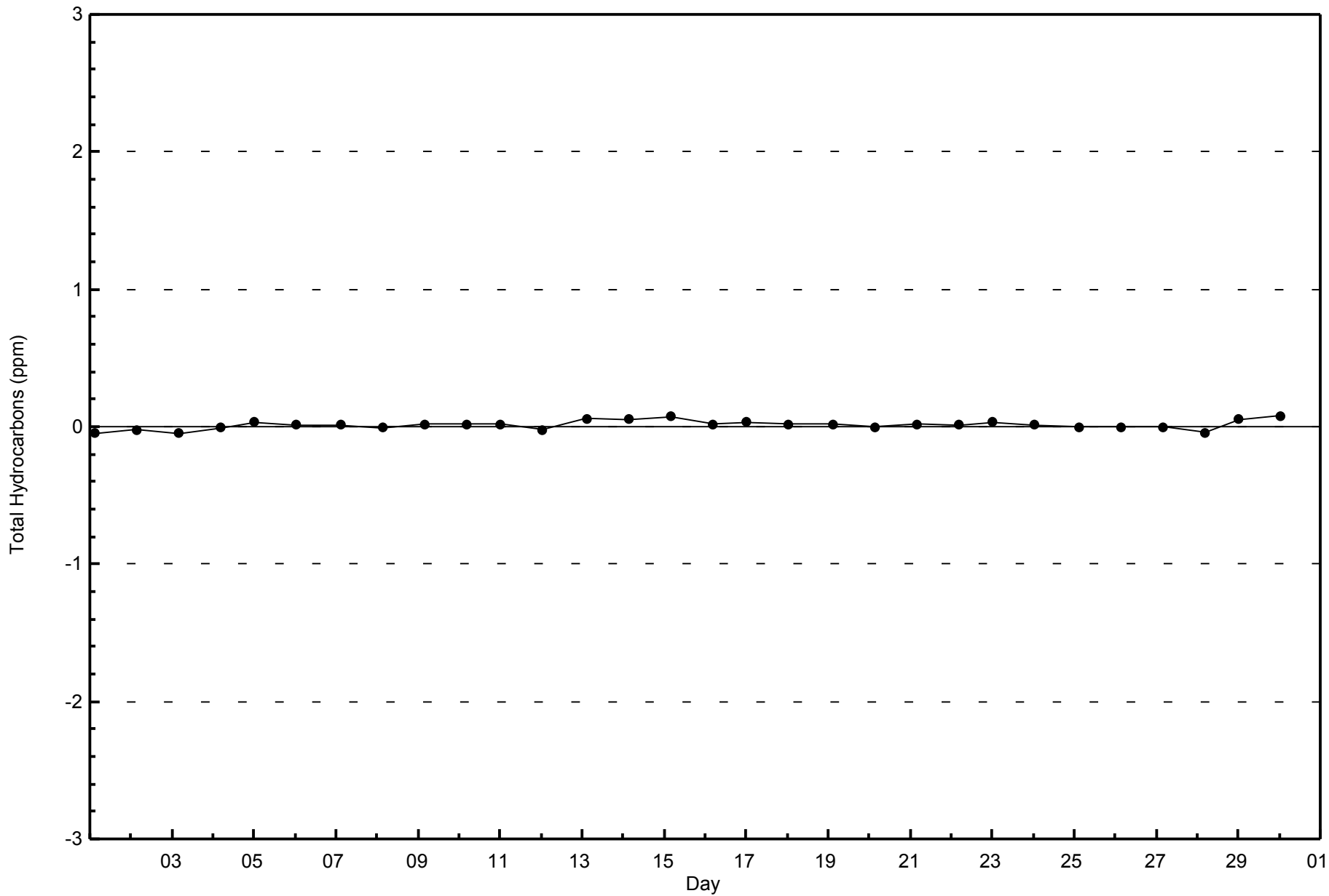
Total Hydrocarbons (THC) - ppm
Millennium (AMS 12)





WBEA
Zero Responses

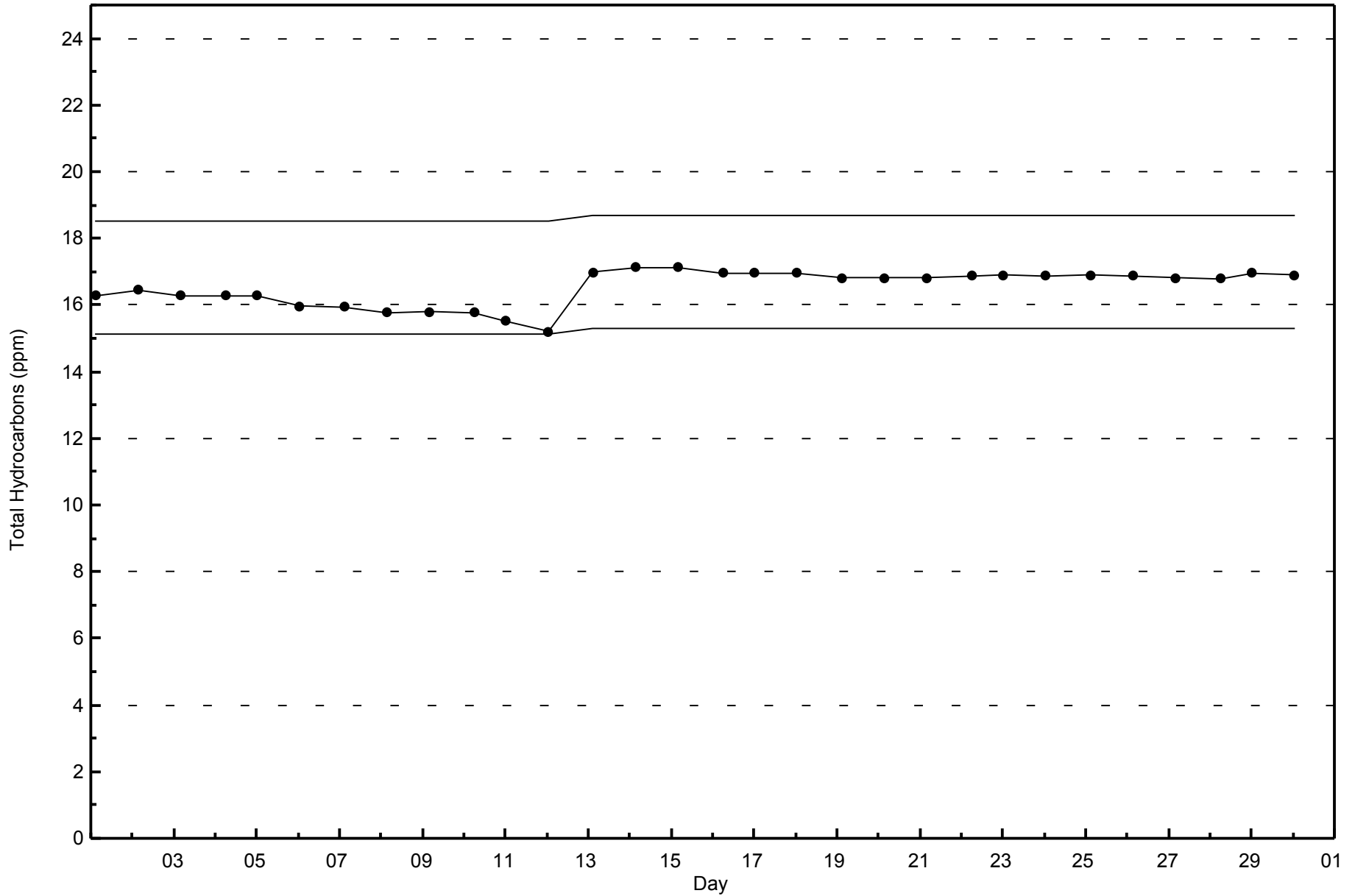
Total Hydrocarbons (THC) - ppm
Millennium - June 2015





WBEA
Span Responses

Total Hydrocarbons (THC) - ppm
Millennium - June 2015





Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

Millennium - June 2015

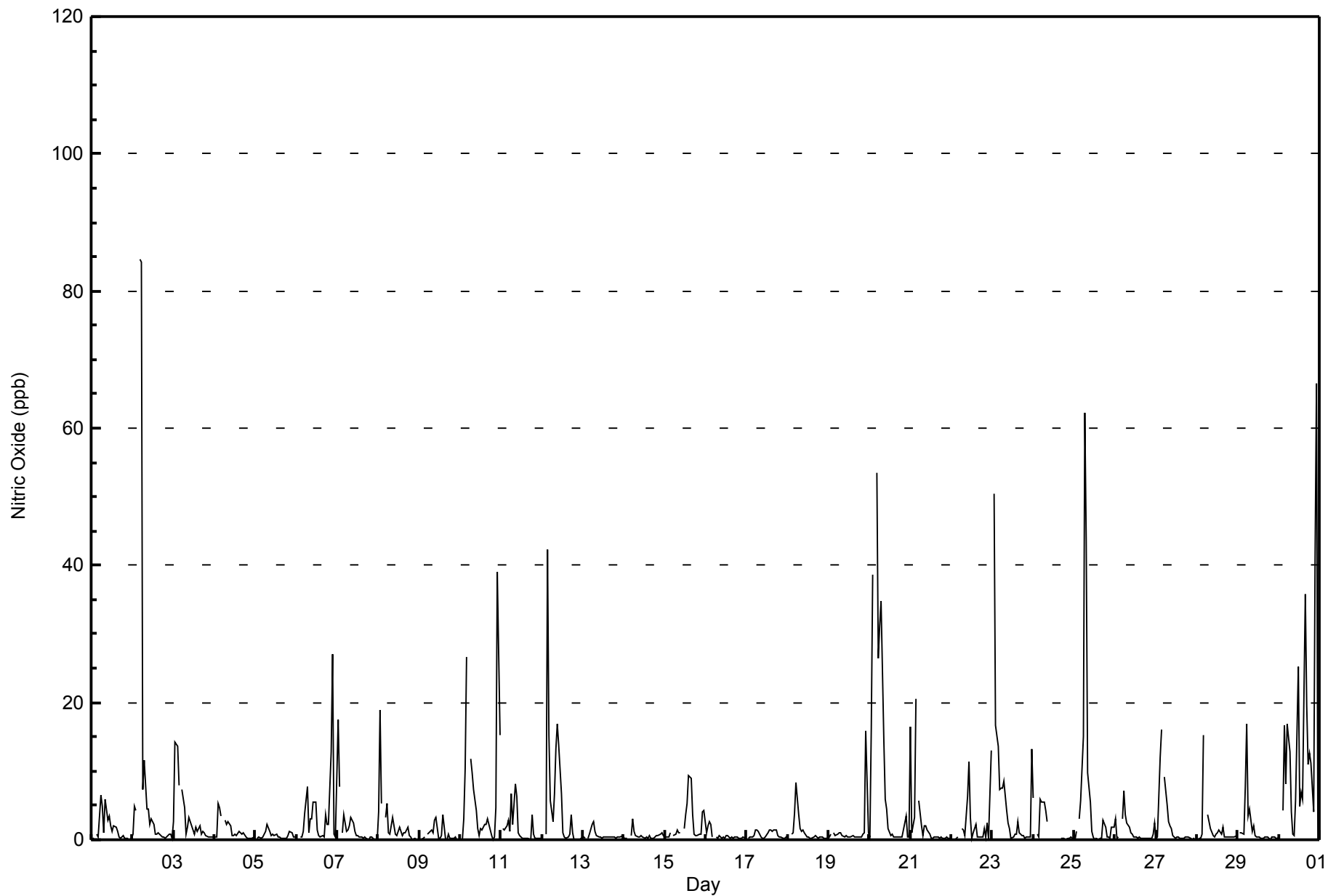
Maximum Value: 85 ppb on Jun 2 05:00																	Maximum Daily Average: 13.7 ppb on Jun 30																	Hours in Service: 720	
Minimum Value: 0 ppb on Jun 7 19:00																	Minimum Daily Average: 0.6 ppb on Jun 14																	Hours of Data: 682	
Maximum Diurnal Average: 10.2 ppb at hour 5																	Minimum Diurnal Average: 0.8 ppb at hour 20																	Hours of Missing Data: 38	
Monthly Average: 3.3 ppb																	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 2 P ₉₀ = 8 P ₉₉ = 42																	Hours of Calibration: 37	
																	Percent Operational Time: 99.9																		
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24											
1-Jun	0	0	Z	1	0	6	5	1	6	3	4	2	1	2	2	1	0	0	1	0	0	0	0	0	1.6	6									
2-Jun	1	5	4	Z	85	84	7	12	5	4	2	3	2	1	1	1	1	0	0	0	0	1	1	0	9.6	85									
3-Jun	3	14	14	8	Z	7	5	1	2	3	3	2	1	2	1	2	1	1	1	1	0	0	0	3.1	14										
4-Jun	0	0	5	5	4	Z	3	2	3	2	1	1	1	1	1	1	1	1	0	0	0	0	0	1.4	5										
5-Jun	Z	0	0	0	0	1	1	2	1	1	1	1	1	0	0	0	0	0	0	1	1	1	0	0.7	2										
6-Jun	0	Z	0	0	1	4	8	1	3	3	5	5	1	1	0	1	0	4	2	2	13	27	1	0	3.7	27									
7-Jun	17	8	Z	1	4	1	2	2	3	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	2.0	17									
8-Jun	4	19	5	Z	3	5	1	1	3	2	1	1	2	1	1	1	1	2	1	0	0	0	0	0	2.3	19									
9-Jun	0	0	0	0	Z	1	1	1	1	3	3	0	0	1	4	0	0	1	0	0	0	0	0	0	0.8	4									
10-Jun	0	0	3	10	27	Z	12	10	7	4	2	1	2	1	2	2	3	2	1	0	0	5	39	15	6.4	39									
11-Jun	Z	2	1	2	3	1	7	2	8	6	1	1	0	0	0	0	0	0	4	1	0	0	0	0	1.7	8									
12-Jun	0	Z	1	42	15	6	3	7	13	17	14	7	1	0	0	0	1	4	1	0	0	0	0	0	5.7	42									
13-Jun	0	0	Z	0	1	2	3	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0.6	3									
14-Jun	0	0	0	Z	1	3	1	1	0	0	1	0	0	0	0	1	0	0	0	1	1	1	1	1	0.6	3									
15-Jun	0	0	0	1	Z	1	1	2	1	1	M	2	4	5	9	9	4	1	1	1	1	1	4	4	2.4	9									
16-Jun	1	2	3	2	0	Z	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0.6	3									
17-Jun	Z	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1	2	1	1	0	0	0	0	0	0.8	2									
18-Jun	0	Z	1	1	4	8	4	2	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1.2	8									
19-Jun	0	1	Z	1	1	1	1	1	1	0	1	0	0	0	1	0	0	0	0	0	1	1	16	1	1.3	16									
20-Jun	0	16	39	Z	54	26	31	35	14	6	4	2	1	1	0	0	0	0	0	0	1	4	0	0	10.3	54									
21-Jun	16	1	3	21	Z	6	2	1	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	2.6	21									
22-Jun	0	0	0	0	0	Z	2	1	1	6	11	3	0	1	2	0	0	0	0	2	0	3	0	13	2.1	13									
23-Jun	Z	50	17	14	7	8	8	9	4	2	2	0	0	1	1	3	1	1	1	0	0	0	0	13	6.2	50									
24-Jun	6	Z	1	0	6	5	6	4	3	C	C	C	C	C	C	C	0	0	0	0	0	0	0	0	-	6									
25-Jun	0	1	Z	3	6	15	62	44	10	5	1	0	0	0	0	0	0	3	2	1	0	0	2	2	6.9	62									
26-Jun	3	0	0	Z	3	7	4	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	1	3	1.3	7									
27-Jun	0	0	12	16	Z	9	5	3	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2.3	16									
28-Jun	0	0	0	1	15	Z	4	3	2	1	0	1	1	1	1	2	0	0	0	0	0	0	0	1	1.5	15									
29-Jun	Z	1	1	1	8	17	3	4	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.9	17									
30-Jun	0	Z	4	17	8	17	13	4	1	1	6	25	5	7	6	36	19	11	13	11	4	41	66	0	13.7	66									
																	Diurnal Average		Diurnal Maximum																
																	2.2		17																
																	4.9		50																
																	4.7		39																
																	5.9		42																
																	10.2		85																
																	9.8		84																
																	6.8		62																
																	5.3		44																
																	3.4		14																
																	2.9		17																
																	2.4		14																
																	2.0		25																
																	1.0		5																
																	1.1		7																
																	1.3		9																
																	2.2		36																
																	1.3		19																
																	1.2		11																
																	1.1		13																
																	0.8		11																
																	0.9		13																
																	2.9		41																
																	4.5		66																
																	1.9		15																

Z - zerospan C - Calibration M - Maintenance



WBEA
Hourly Averages

Nitric Oxide (NO) - ppb
Millennium - June 2015





WBEA
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Millennium - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	663	97.21	97.21
21 - 40	10	1.47	98.68
41 - 80	7	1.03	99.71
81 - 159	2	0.29	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 720



WBEA
Frequency Distribution

Nitric Oxide (NO) - ppb
Millennium - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	101	66	18	13	7	9	43	53	63	67	31	27	34	41	52	37	662
21 - 40	2	1	2	0	0	0	1	0	0	0	1	2	0	0	0	1	10
11 - 80	0	0	0	0	0	1	1	0	0	1	1	1	1	1	0	0	7
81 - 159	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	103	68	20	14	7	10	45	53	63	68	33	30	35	42	52	38	681

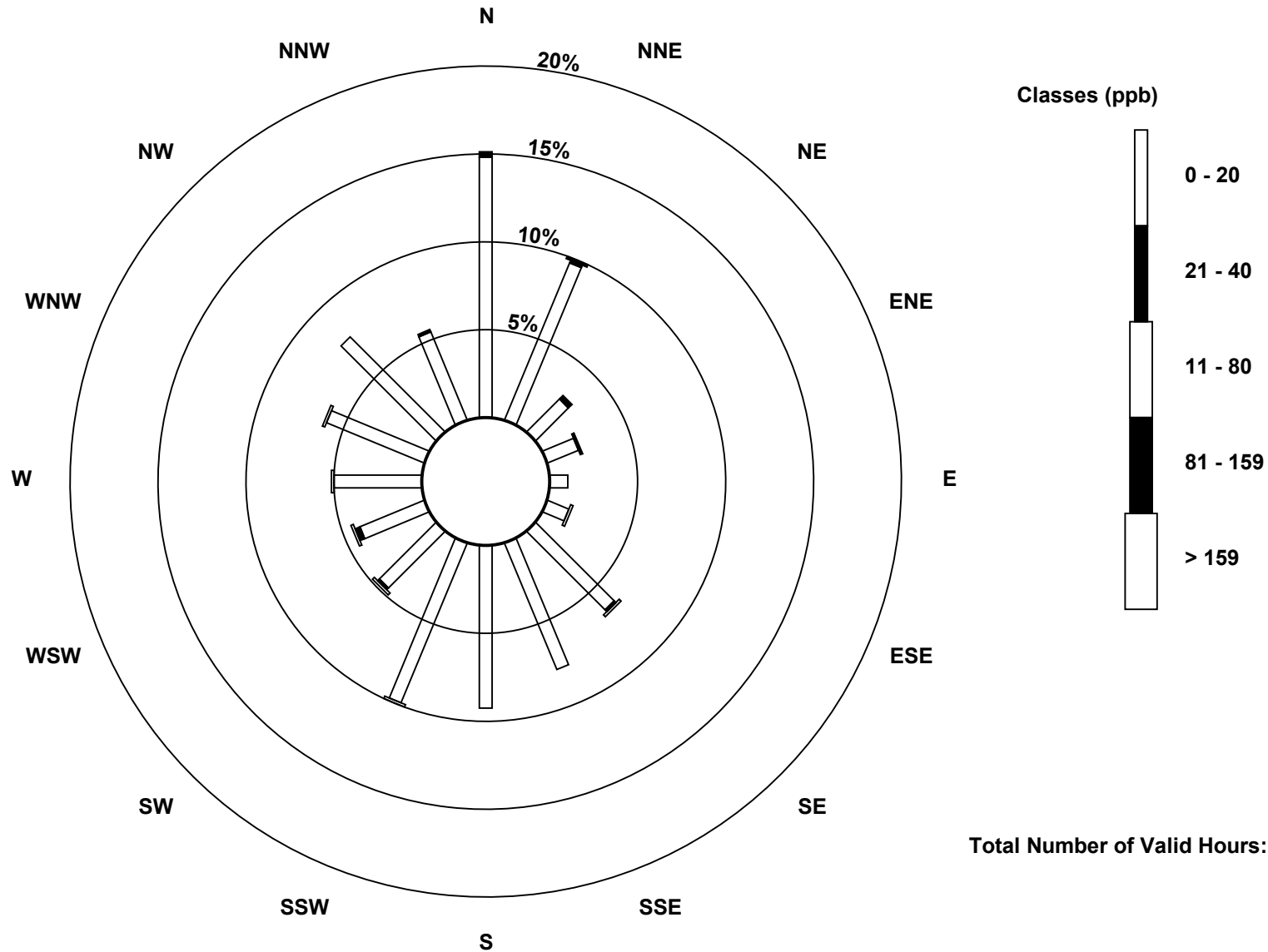
Total Number of Valid Hours: 681

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

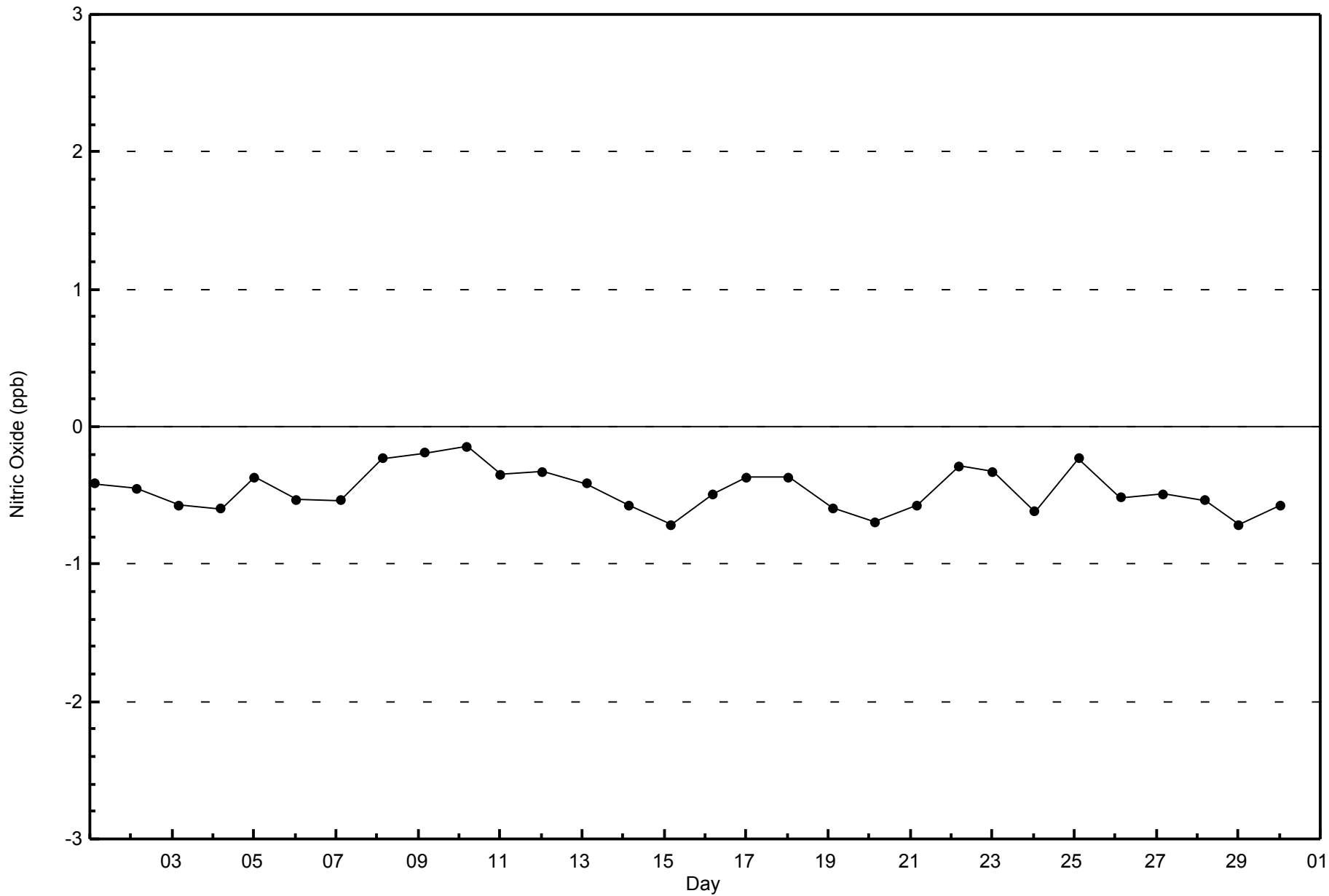
Nitric Oxide (NO) - ppb
Millennium (AMS 12)





WBEA
Zero Responses

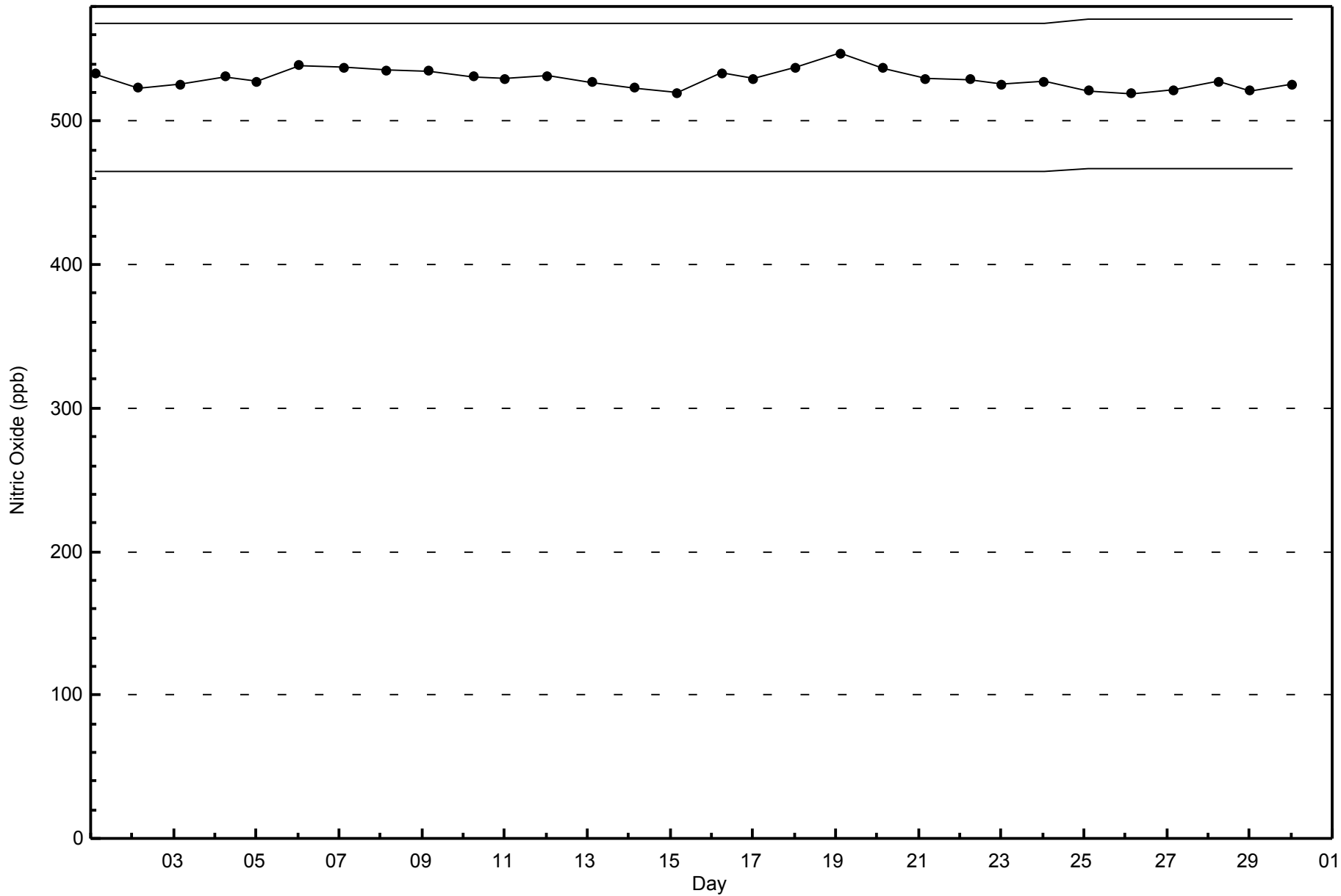
Nitric Oxide (NO) - ppb
Millennium - June 2015





WBEA
Span Responses

Nitric Oxide (NO) - ppb
Millennium - June 2015





Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 48 ppb on Jun 30 16:00	Maximum Daily Average: 26.6 ppb on Jun 30		Hours of Data:	682
Minimum Value: 0 ppb on Jun 13 14:00	Minimum Daily Average: 2.8 ppb on Jun 14		Hours of Missing Data:	38
Maximum Diurnal Average: 14.5 ppb at hour 3	Minimum Diurnal Average: 3.7 ppb at hour 13		Hours of Calibration:	37
Monthly Average: 7.8 ppb	Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 2 Median = 6 Q ₃ = 11 P ₉₀ = 18 P ₉₉ = 37		Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	5	5	Z	9	4	9	9	3	8	4	5	4	3	5	4	3	1	1	1	1	2	5	5	8	4.4	9
2-Jun	11	17	Z	Z	23	23	10	11	6	6	4	5	4	2	2	2	2	2	2	1	8	18	12	9	8.5	23
3-Jun	19	26	27	24	Z	18	12	2	5	6	5	3	2	6	4	6	3	5	5	4	8	6	8	8	9.1	27
4-Jun	10	13	31	30	22	Z	10	7	8	6	3	2	3	2	4	5	3	5	3	3	3	3	7	8	8.2	31
5-Jun	Z	8	11	9	7	7	5	6	4	2	3	2	2	2	1	1	1	2	1	10	18	17	11	11	6.0	18
6-Jun	9	Z	9	5	12	12	13	2	7	7	14	15	6	3	2	4	3	16	12	16	25	25	15	10	10.5	25
7-Jun	17	17	Z	13	18	7	8	7	9	7	5	3	3	2	1	1	2	2	2	7	7	8	3	7	6.7	18
8-Jun	17	24	16	Z	13	11	3	2	5	3	3	3	5	3	2	4	4	8	3	3	5	7	12	7	7.1	24
9-Jun	4	9	11	12	Z	6	6	4	4	8	7	2	2	3	7	1	2	4	2	4	7	15	9	10	6.0	15
10-Jun	12	11	19	17	13	Z	10	10	10	7	4	2	5	5	8	8	12	11	6	2	8	31	37	33	12.2	37
11-Jun	Z	16	22	22	18	13	18	9	15	13	4	3	2	1	1	1	2	3	15	8	9	13	9	12	9.8	22
12-Jun	3	Z	11	28	16	15	7	12	22	28	26	17	4	2	1	2	5	12	6	2	2	1	0	1	9.6	28
13-Jun	15	4	Z	6	10	13	12	4	1	0	1	0	0	0	0	1	1	1	1	1	4	10	10	12	4.6	15
14-Jun	3	2	9	Z	3	10	3	0	0	0	0	0	0	0	0	0	0	0	1	2	5	12	13	4	2.8	13
15-Jun	4	2	2	6	Z	2	2	2	1	2	M	2	5	6	12	10	7	2	1	3	7	11	14	13	5.1	14
16-Jun	10	11	14	12	5	Z	4	3	3	2	2	2	3	2	2	2	2	2	2	1	4	7	9	5	4.7	14
17-Jun	Z	5	9	7	8	9	7	4	2	2	1	1	3	4	5	6	6	7	4	4	6	7	8	13	5.5	13
18-Jun	11	Z	12	16	16	15	8	5	4	3	2	2	2	1	1	1	2	1	1	2	5	1	2	4	5.0	16
19-Jun	6	17	Z	12	6	5	4	4	3	2	2	2	1	1	1	1	1	1	1	1	9	19	31	18	6.4	31
20-Jun	6	20	26	Z	19	15	20	25	18	13	14	5	2	4	2	2	1	1	1	1	15	21	7	1	10.4	26
21-Jun	20	11	16	21	Z	15	6	3	7	7	6	5	1	2	2	2	2	2	5	3	5	9	9	8	7.2	21
22-Jun	7	4	4	6	6	Z	5	3	2	11	19	10	4	6	8	2	2	4	3	7	6	18	10	21	7.3	21
23-Jun	Z	16	12	10	8	6	6	9	7	5	4	1	2	5	3	9	4	3	4	3	8	12	11	18	7.1	18
24-Jun	17	Z	11	5	11	10	8	6	5	C	C	C	C	C	C	C	0	0	1	2	9	10	16	17	--	17
25-Jun	10	17	Z	20	16	14	27	28	21	19	9	7	4	2	1	3	12	14	10	12	11	9	9	15	12.5	28
26-Jun	15	9	10	Z	10	13	8	6	5	3	3	1	1	1	1	1	1	5	3	3	3	5	8	17	5.5	17
27-Jun	8	9	19	18	Z	12	8	4	4	4	2	0	0	0	0	0	0	1	3	4	2	1	2	2	4.4	19
28-Jun	2	1	1	7	19	Z	10	9	7	4	2	3	2	3	2	6	2	2	4	5	9	13	10	12	5.8	19
29-Jun	Z	16	14	12	17	17	11	10	5	9	4	2	2	0	0	0	2	2	2	2	12	13	8	8	7.2	17
30-Jun	18	Z	29	23	17	19	17	14	13	11	18	46	38	41	43	48	38	29	29	29	26	31	29	6	26.6	48

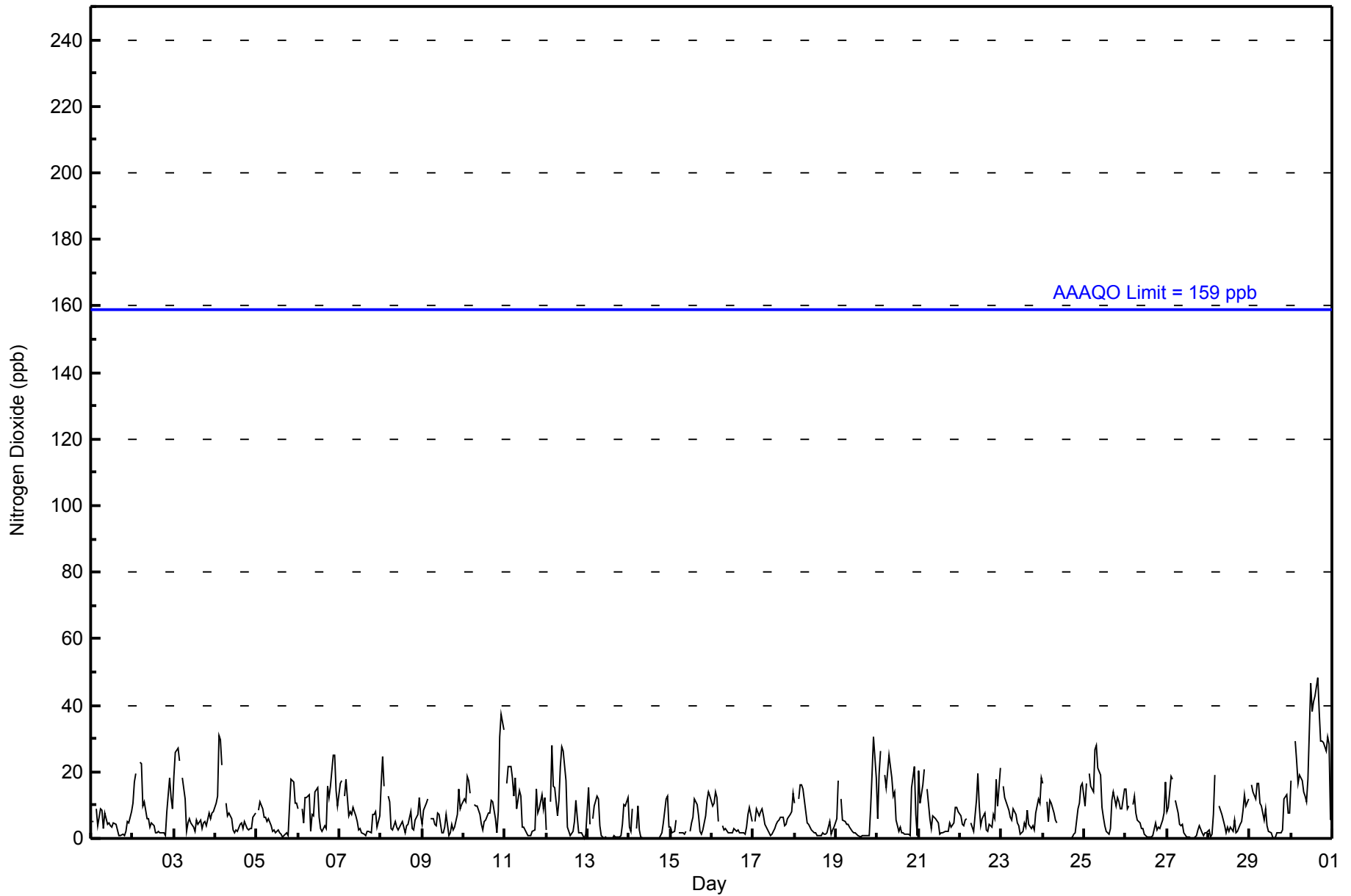
10.2	11.6	14.5	13.9	12.6	11.7	9.1	7.1	7.0	6.6	6.0	5.2	3.7	3.9	4.1	4.4	4.0	4.8	4.4	4.8	4.4	4.8	8.2	12.0	11.0	10.5	Diurnal Average	
20	26	31	30	23	23	27	28	22	28	26	46	38	41	43	48	38	29	29	29	29	26	31	37	33	Diurnal Maximum		

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



WBEA
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Millennium - June 2015





WBEA
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Millennium - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	639	93.70	93.70
21 - 40	39	5.72	99.41
41 - 80	4	0.59	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 720



WBEA
Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Millennium - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	99	60	18	12	6	8	33	53	63	66	30	29	34	41	50	36	638
21 - 40	3	7	1	2	1	2	12	0	0	2	3	1	1	1	2	1	39
11 - 80	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	4
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	103	68	20	14	7	10	45	53	63	68	33	30	35	42	52	38	681

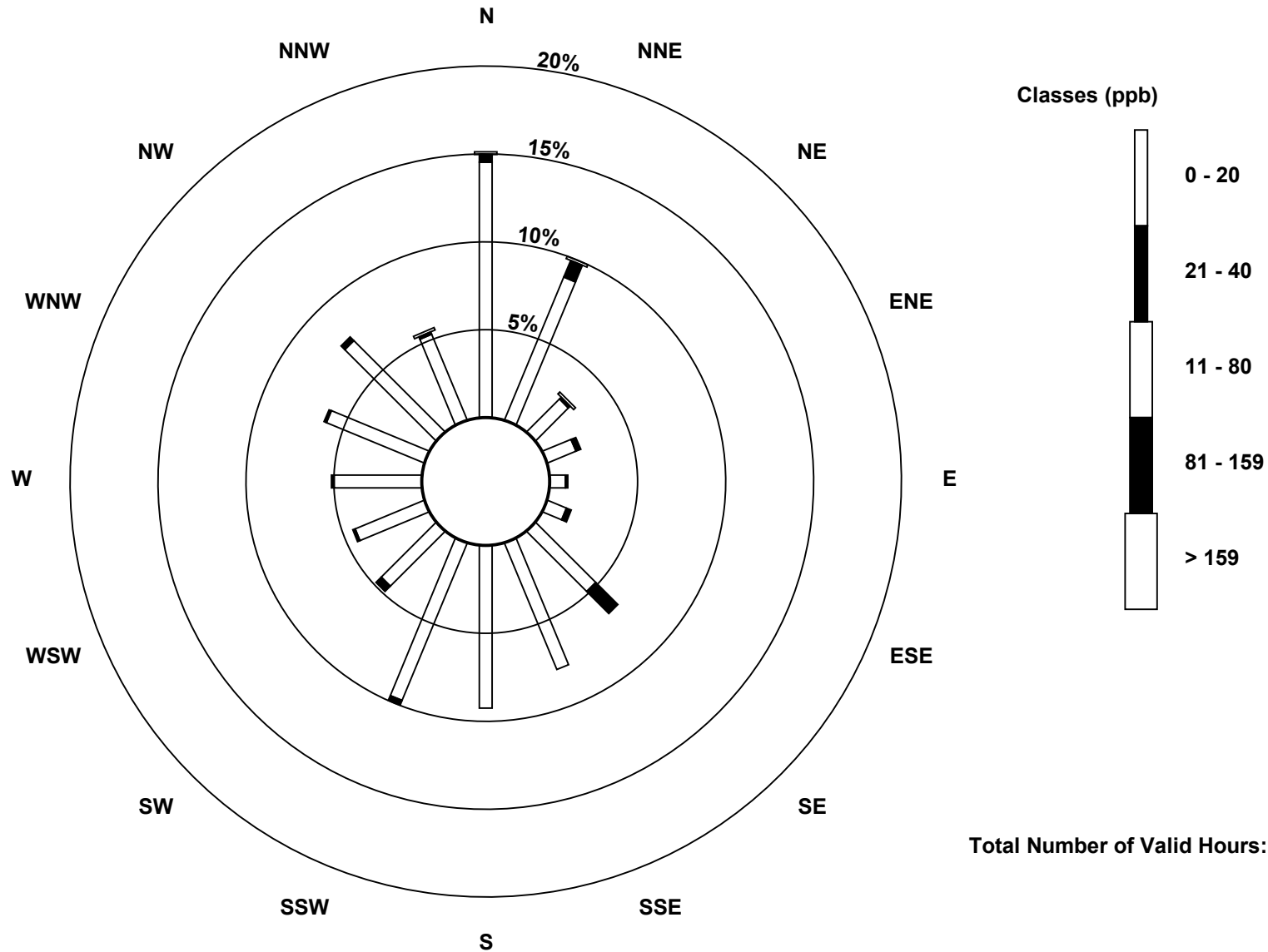
Total Number of Valid Hours: 681

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

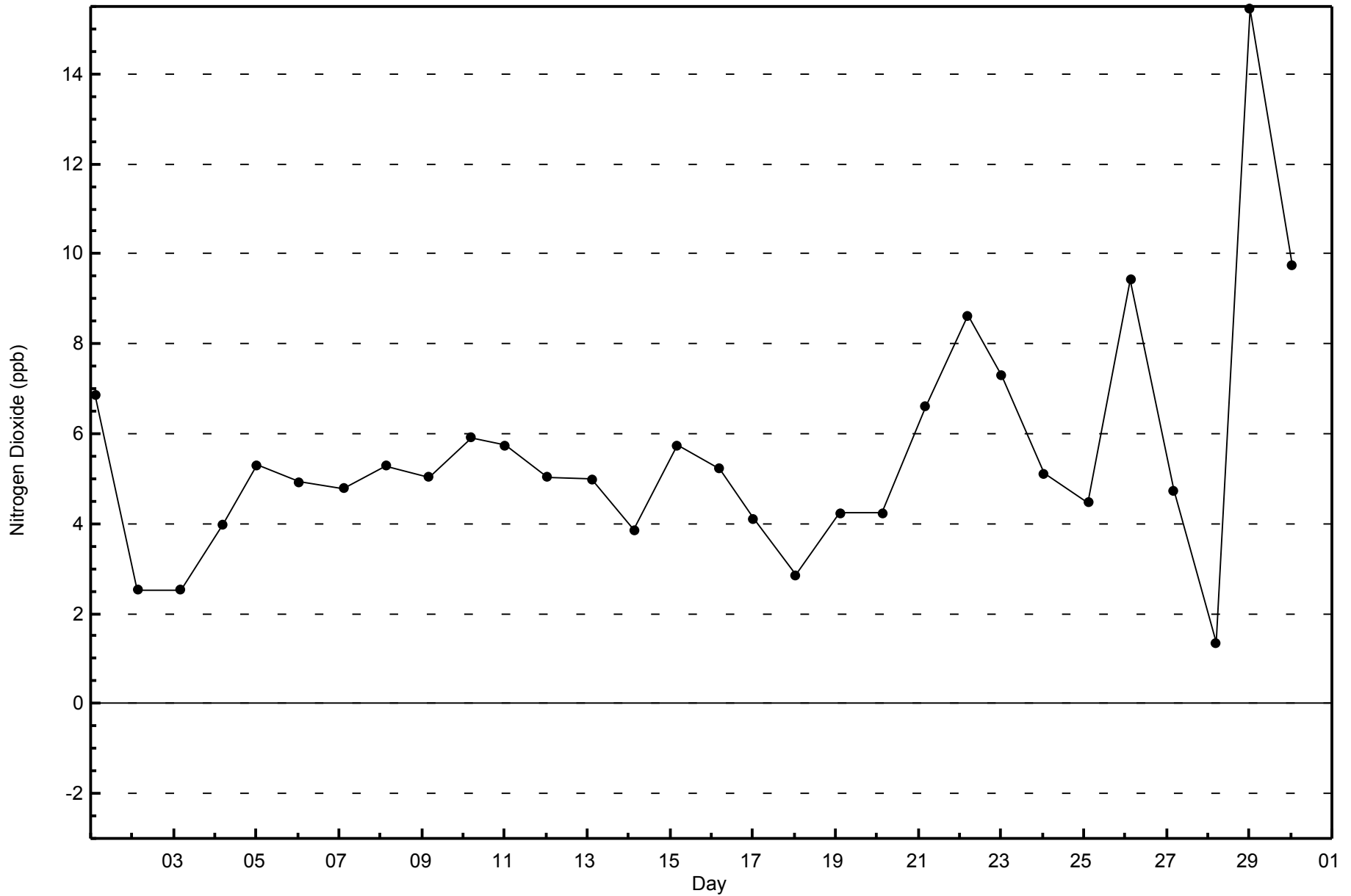
Nitrogen Dioxide (NO₂) - ppb
Millennium (AMS 12)





WBEA
Zero Responses

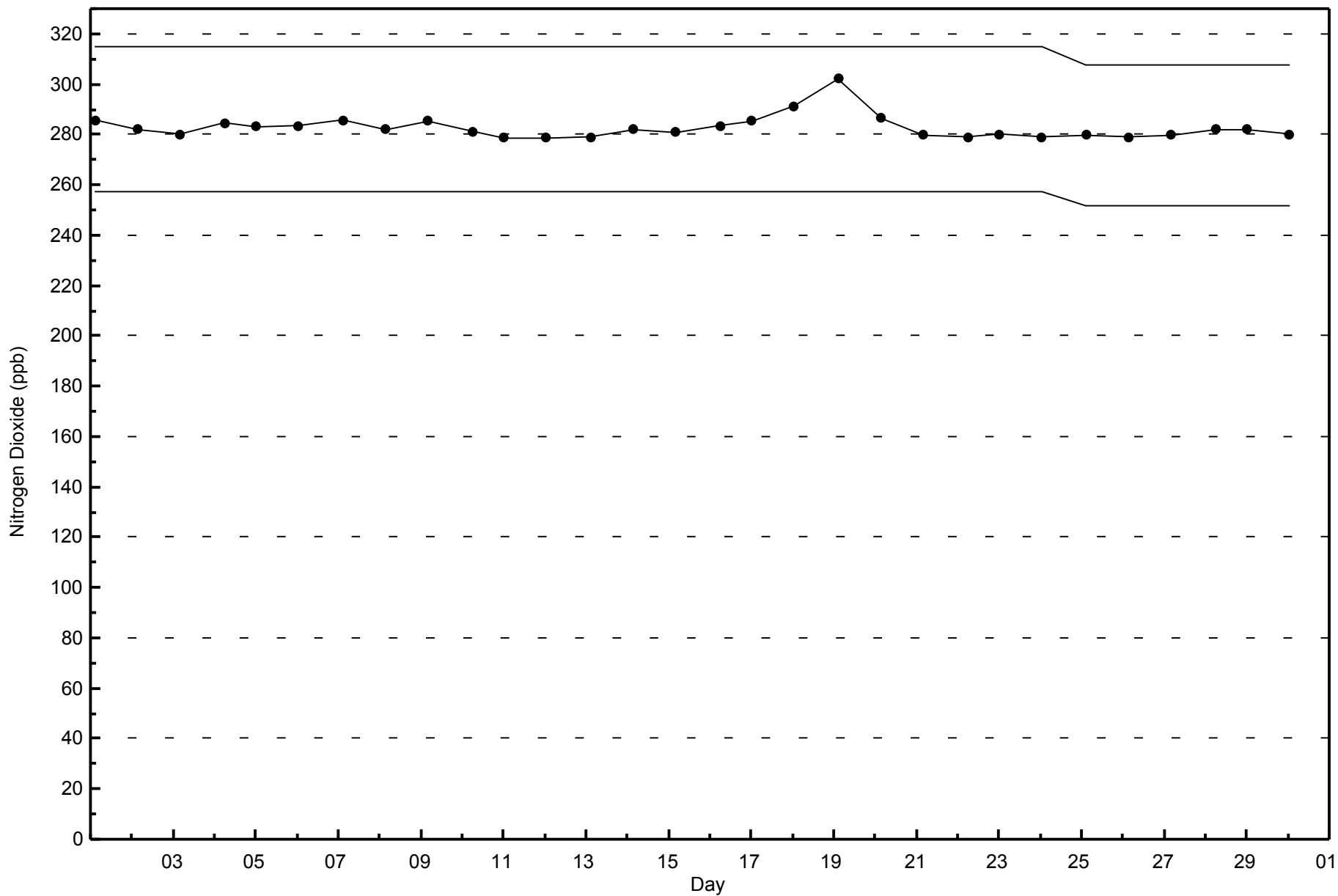
Nitrogen Dioxide (NO₂) - ppb
Millennium - June 2015





WBEA
Span Responses

Nitrogen Dioxide (NO₂) - ppb
Millennium - June 2015



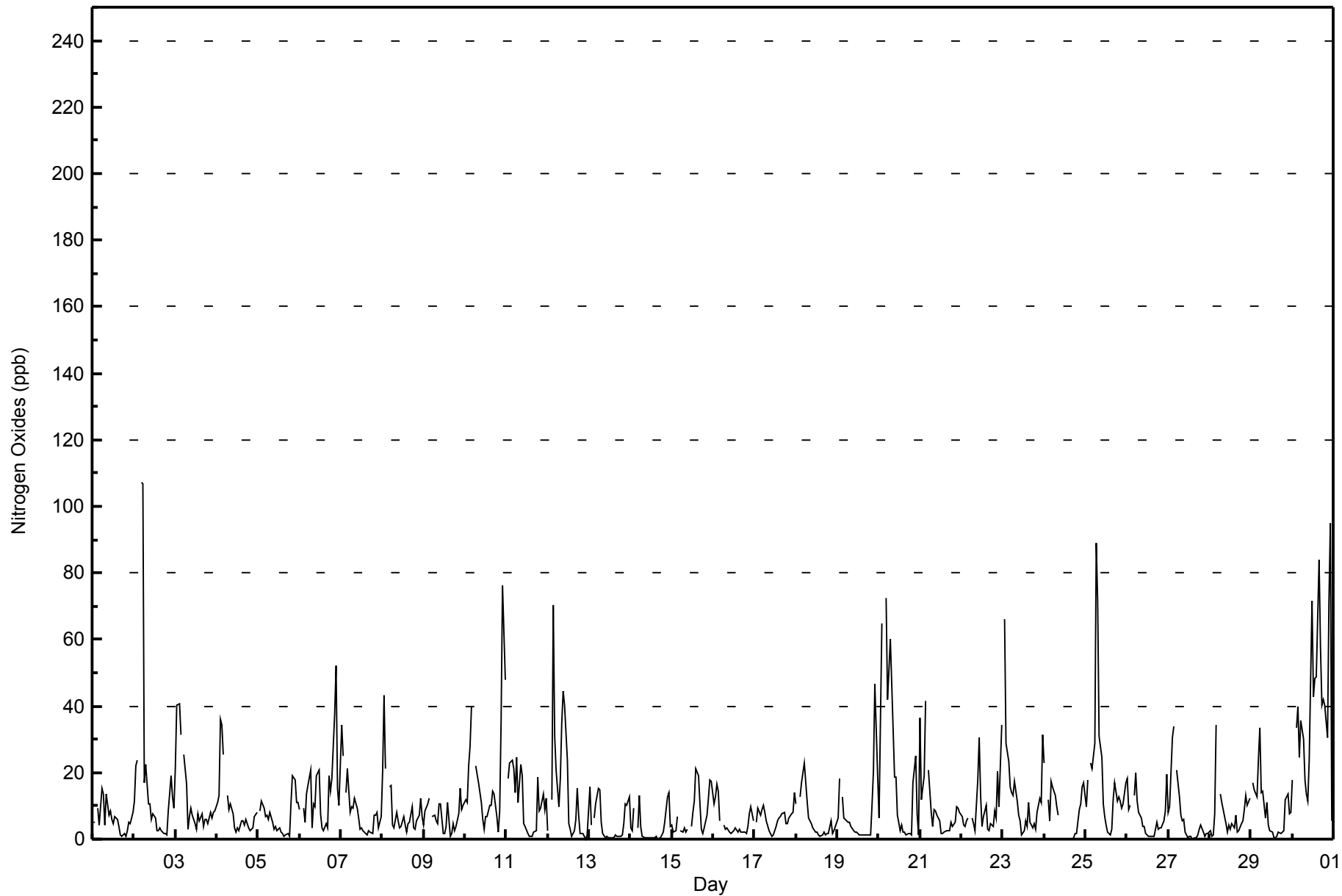


Maximum Value: 107 ppb on Jun 2 05:00																		Maximum Daily Average: 40.3 ppb on Jun 30						Hours in Service: 720		
Minimum Value: 0 ppb on Jun 24 17:00																		Minimum Daily Average: 3.4 ppb on Jun 14						Hours of Data: 682		
Maximum Diurnal Average: 22.8 ppb at hour 5																		Minimum Diurnal Average: 4.7 ppb at hour 13						Hours of Missing Data: 38		
Monthly Average: 11.1 ppb																		Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 3 Median = 7 Q ₃ = 13 P ₉₀ = 24 P ₉₉ = 71						Hours of Calibration: 37		
																								Percent Operational Time: 99.9		
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	5	5	Z	10	4	15	13	4	13	7	8	6	4	7	6	4	1	1	2	1	2	5	4	8	6.0	15
2-Jun	11	22	Z	Z	107	107	17	22	11	10	6	8	6	3	2	3	2	2	2	1	8	19	13	9	18.1	107
3-Jun	21	40	41	32	Z	25	16	3	7	9	7	5	3	7	5	7	4	6	6	4	8	7	8	8	12.2	41
4-Jun	11	13	36	34	25	Z	13	9	10	8	3	2	3	2	6	6	4	6	3	3	3	3	7	8	9.6	36
5-Jun	Z	9	12	9	7	7	6	8	5	3	4	3	3	2	2	1	1	2	1	11	19	18	11	11	6.6	19
6-Jun	9	Z	9	5	13	16	21	3	10	10	19	21	8	4	3	5	3	19	15	18	38	52	15	10	14.2	52
7-Jun	34	25	Z	14	21	8	10	9	12	9	6	3	3	2	2	1	2	2	2	7	7	8	3	7	8.7	34
8-Jun	21	43	21	Z	16	16	4	3	8	5	3	4	7	4	2	5	5	10	3	3	5	7	12	7	9.4	43
9-Jun	4	9	11	12	Z	7	7	6	5	11	11	2	2	4	11	1	2	5	3	4	8	15	9	10	6.8	15
10-Jun	12	11	22	28	40	Z	22	20	17	11	6	3	7	7	10	10	15	13	7	2	8	35	76	48	18.6	76
11-Jun	Z	18	23	24	21	14	25	11	23	19	5	4	2	1	1	1	2	3	18	8	9	13	9	12	11.6	25
12-Jun	3	Z	12	70	31	21	10	18	35	45	40	24	5	3	1	3	6	15	7	2	2	1	0	1	15.3	70
13-Jun	16	4	Z	6	10	15	15	5	2	1	1	0	1	0	0	1	1	1	1	1	5	10	10	13	5.2	16
14-Jun	4	2	9	Z	3	13	4	1	0	0	1	0	0	0	0	1	0	0	1	2	5	13	14	4	3.4	14
15-Jun	4	2	3	7	Z	2	2	3	2	3	M	4	8	12	21	19	10	3	2	3	7	12	18	17	7.5	21
16-Jun	11	13	16	14	6	Z	4	3	3	2	2	2	3	2	3	2	2	2	2	2	4	7	10	5	5.3	16
17-Jun	Z	5	9	7	9	10	8	5	3	2	1	1	4	6	6	7	8	8	5	5	6	8	8	14	6.3	14
18-Jun	11	Z	13	17	20	23	12	6	5	5	3	2	2	1	1	1	2	1	2	2	6	2	3	4	6.2	23
19-Jun	6	18	Z	13	6	6	5	5	4	2	2	2	2	1	1	1	1	1	1	1	10	20	47	19	7.7	47
20-Jun	6	36	65	Z	73	42	51	60	33	19	18	7	3	4	2	2	1	2	1	1	17	25	7	1	20.7	73
21-Jun	37	12	19	41	Z	21	8	4	9	8	7	5	2	2	2	3	3	3	5	4	5	10	9	8	9.8	41
22-Jun	7	4	4	6	6	Z	6	4	3	18	31	13	4	7	10	3	3	5	4	8	6	20	10	34	9.4	34
23-Jun	Z	66	29	23	16	14	13	17	11	7	6	1	3	5	4	11	5	3	5	3	8	12	11	31	13.3	66
24-Jun	23	Z	12	6	17	16	13	10	7	C	C	C	C	C	C	C	0	0	2	2	9	11	16	17	-	23
25-Jun	10	18	Z	23	21	29	89	72	31	24	11	7	4	2	1	3	12	17	11	13	11	9	11	17	19.4	89
26-Jun	18	9	10	Z	13	20	11	8	6	4	4	2	1	1	1	1	1	5	3	3	3	5	9	19	6.8	20
27-Jun	8	10	31	34	Z	21	13	7	6	6	2	1	1	1	0	0	0	1	3	4	2	1	2	2	6.7	34
28-Jun	3	1	1	8	34	Z	14	11	9	5	2	4	3	5	3	7	2	3	5	6	9	13	10	12	7.3	34
29-Jun	Z	17	15	13	24	33	14	14	7	11	4	3	2	1	0	1	2	2	2	3	12	14	8	8	9.1	33
30-Jun	18	Z	34	40	25	36	30	18	13	12	24	72	43	48	49	84	58	40	42	40	30	72	95	5	40.3	95
																								Diurnal Average		
																								Diurnal Maximum		
12.4 16.5 19.1 19.8 22.8 21.5 15.9 12.4 10.3 9.5 8.4 7.2 4.7 5.0 5.4 6.7 5.3 6.0 5.5 5.6 9.1 15.0 15.5 12.4 37 66 65 70 107 107 89 72 35 45 40 72 43 48 49 84 58 40 42 40 38 72 95 48																										
Z - zerospan C - Calibration M - Maintenance																										



WBEA
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Millennium - June 2015





WBEA
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Millennium - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	588	86.22	86.22
21 - 40	66	9.68	95.89
41 - 80	23	3.37	99.27
81 - 159	5	0.73	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 720



WBEA
Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Millennium - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	94	57	16	12	6	7	26	52	63	49	26	27	32	41	46	34	588
21 - 40	6	5	2	1	1	2	15	1	0	17	5	0	2	0	6	2	65
11 - 80	2	5	2	0	0	1	4	0	0	2	1	3	0	1	0	2	23
81 - 159	1	1	0	1	0	0	0	0	0	0	1	0	1	0	0	0	5
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	103	68	20	14	7	10	45	53	63	68	33	30	35	42	52	38	681

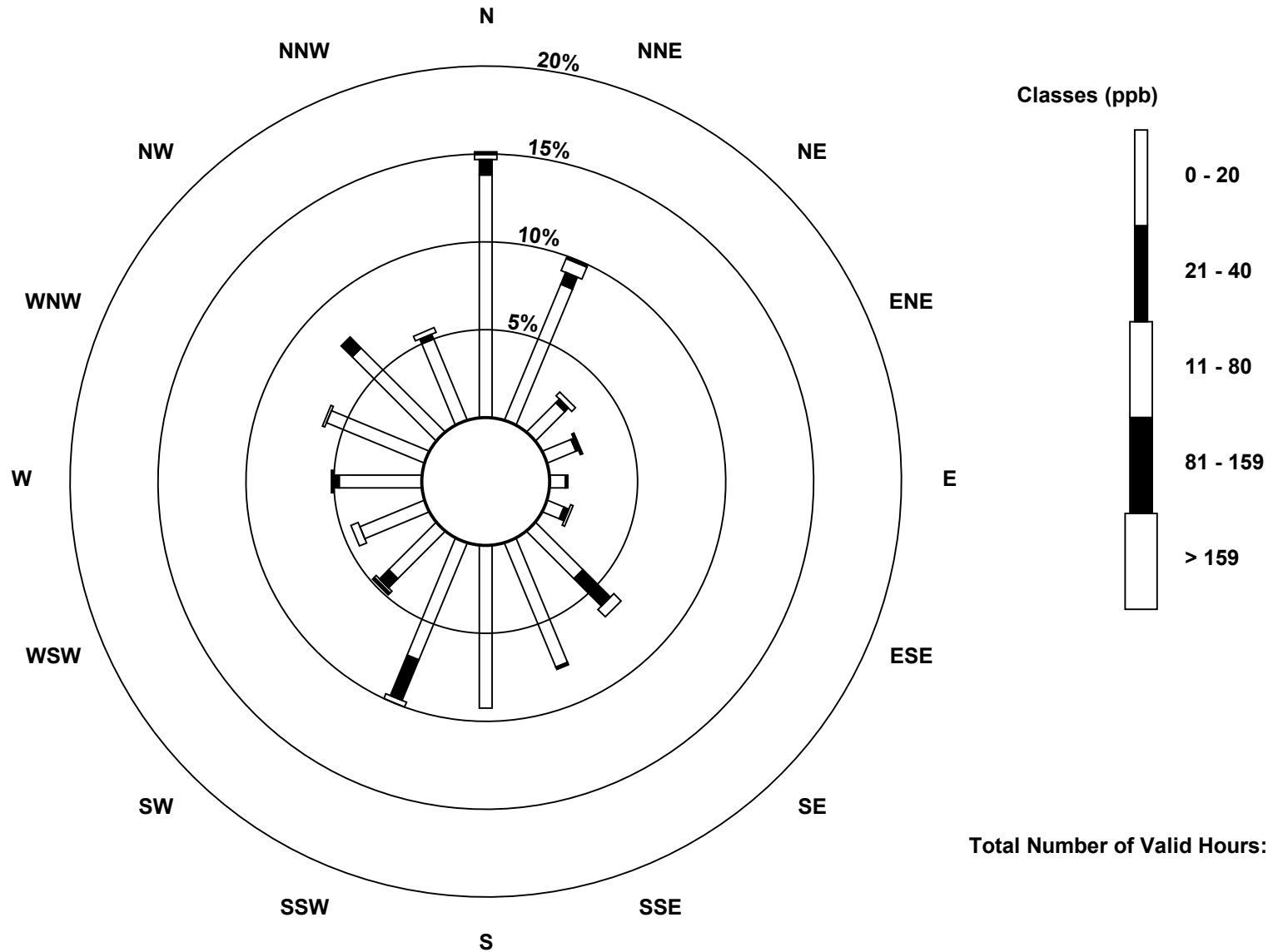
Total Number of Valid Hours: 681

Total Number of Hours: 720

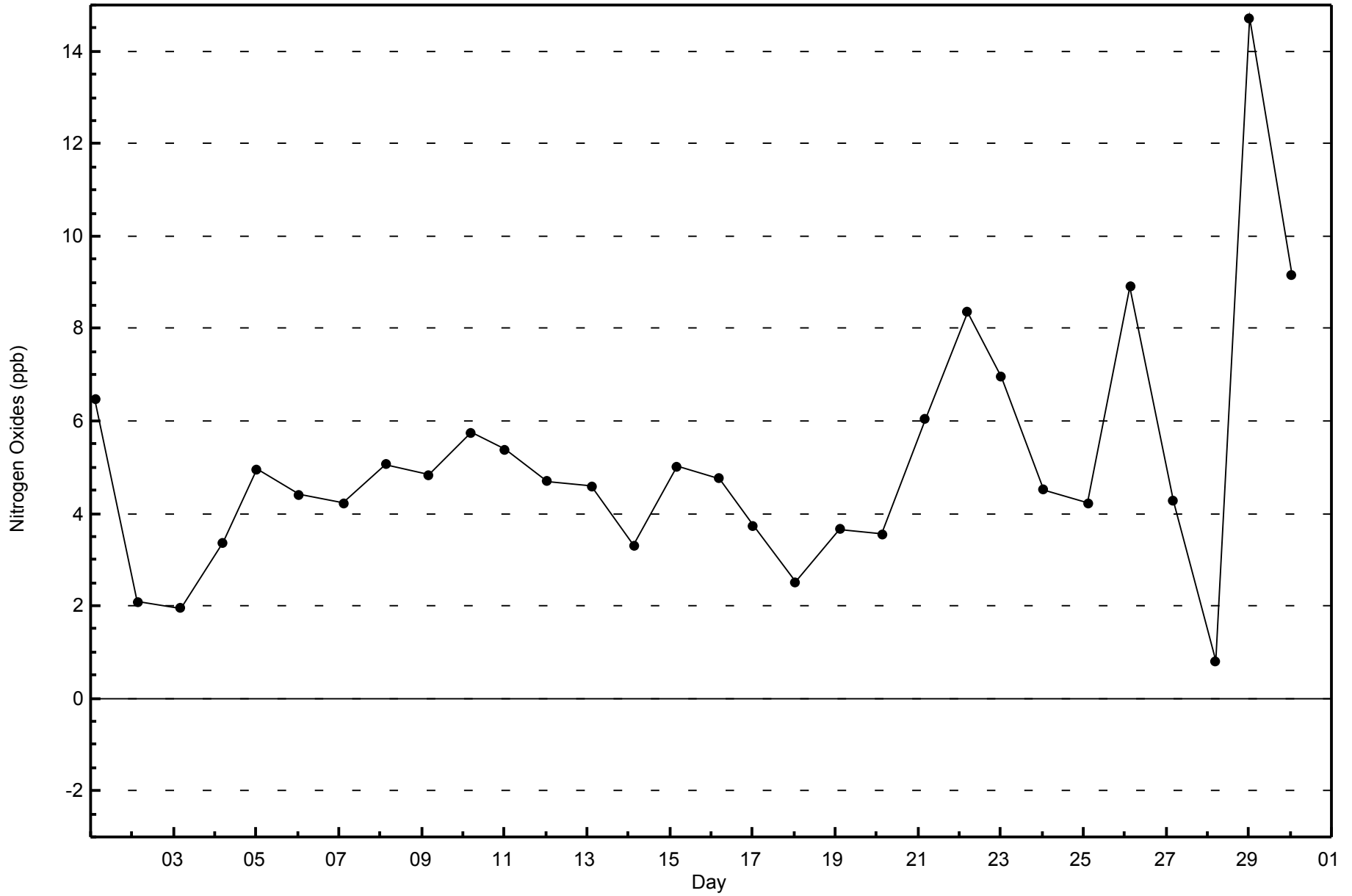


Wood Buffalo Environmental Association
Wind Rose Jun 2015

Nitrogen Oxides (NO_x) - ppb
Millennium (AMS 12)



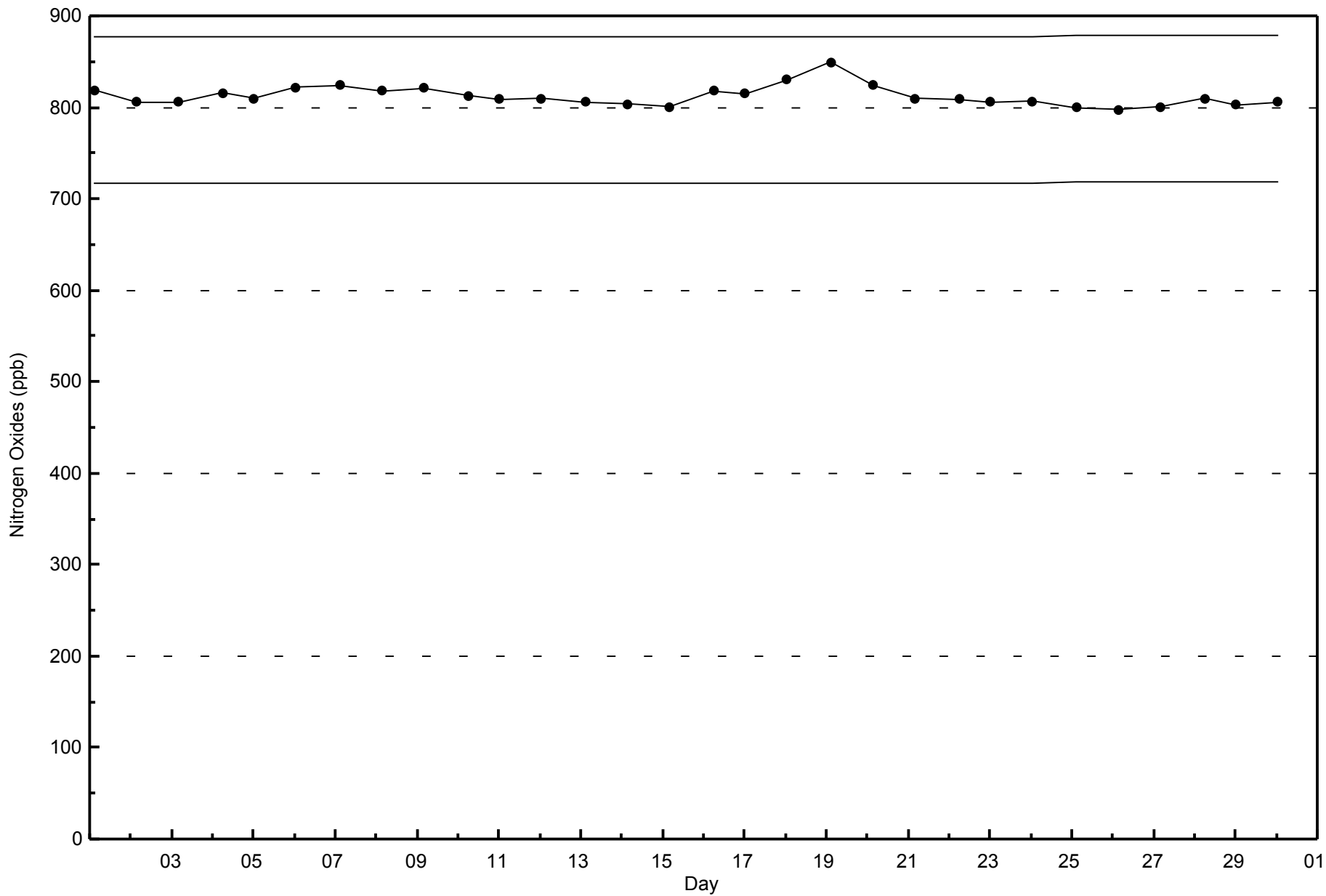
Total Number of Valid Hours: 681





WBEA
Span Responses

Nitrogen Oxides (NO_x) - ppb
Millennium - June 2015





Summary of Hour Averages

Millennium - June 2015

Number of Exceedences (AAAQO): 24-hr: 5	Hours in Service: 720
Maximum Value: 222.7 µg/m ³ on Jun 1 17:00	Maximum Daily Average: 157.1 µg/m ³ on Jun 30
Minimum Value: 1.9 µg/m ³ on Jun 2 17:00	Hours of Data: 699
Maximum Diurnal Average: 29.6 µg/m ³ at hour 17	Hours of Missing Data: 21
Monthly Average: 22.60 µg/m ³	Hours of Calibration: 0
Minimum Daily Average: 5.1 µg/m ³ on Jun 16	Percent Operational Time: 97.1
Minimum Diurnal Average: 18.3 µg/m ³ at hour 14	
Percentiles: P ₁ = 2.8 P ₁₀ = 4.9 Q ₁ = 7.3 Median = 11.9 Q ₃ = 21.9 P ₉₀ = 50.6 P ₉₉ = 186.4	

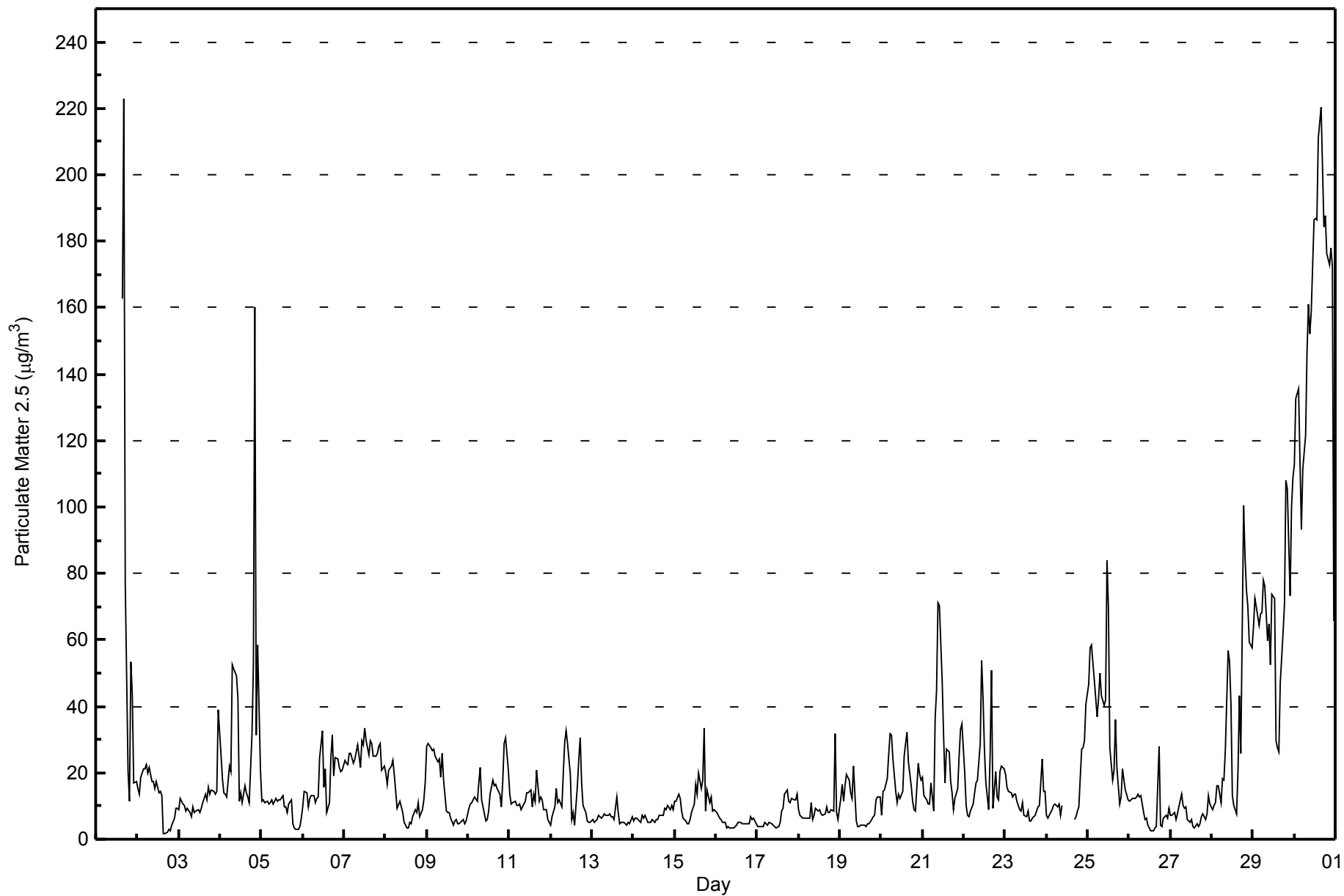
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jun	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	162.8	222.7	77.6	20.4	11.3	53.5	43.7	16.9	17.4	--	222.7																							
2-Jun	15.4	13.4	18.8	21.4	21.2	22.3	20.0	21.5	17.3	17.2	15.3	17.3	13.9	14.6	13.2	1.9	1.9	2.3	2.8	2.6	4.3	6.2	9.3	9.4	12.6	22.3																						
3-Jun	8.9	12.2	10.7	10.3	8.5	9.2	7.9	6.7	9.6	8.2	8.4	9.0	8.1	9.1	11.2	13.5	11.9	15.7	13.5	15.0	14.5	13.6	14.6	38.9	12.1	38.9																						
4-Jun	25.6	18.4	14.1	13.6	12.8	21.9	20.5	52.7	51.4	49.0	42.4	11.3	14.0	10.9	16.1	14.2	12.9	10.9	31.6	53.1	160.1	31.2	58.5	20.6	32.0	160.1																						
5-Jun	11.3	11.8	10.9	11.3	10.7	11.2	12.0	10.7	12.3	11.4	11.9	11.9	12.9	9.9	9.8	8.2	10.7	12.1	4.8	3.6	2.8	3.1	4.0	6.5	9.4	12.9																						
6-Jun	9.6	14.6	14.2	9.8	12.2	13.3	13.3	11.1	12.2	12.9	24.6	32.7	15.8	21.0	7.9	10.9	24.7	31.4	19.1	24.7	24.3	21.7	20.1	20.8	17.6	32.7																						
7-Jun	23.7	23.1	22.4	25.7	25.8	22.9	24.3	26.4	28.5	21.8	29.7	28.5	33.5	29.7	25.6	29.5	28.9	25.0	24.9	25.7	27.9	28.8	20.6	22.0	26.0	33.5																						
8-Jun	19.9	16.7	21.0	22.0	23.8	19.5	14.4	9.3	11.6	9.7	8.2	4.9	3.6	3.5	4.9	4.8	6.7	8.8	8.0	11.2	6.7	8.9	11.7	17.4	11.5	23.8																						
9-Jun	28.1	28.8	27.4	26.6	27.1	25.0	23.5	24.0	18.5	25.7	17.9	8.4	8.0	7.9	6.2	4.4	5.4	5.9	4.8	4.8	5.4	5.8	4.7	5.4	14.6	28.8																						
10-Jun	9.4	10.5	11.2	11.7	12.8	11.6	16.9	21.7	11.9	7.5	5.6	6.1	8.3	13.4	18.0	16.3	16.5	15.5	13.5	9.8	17.4	28.8	30.4	20.9	14.4	30.4																						
11-Jun	13.5	10.4	11.2	11.5	10.0	10.4	10.5	9.0	10.7	11.5	13.8	14.2	14.8	9.9	13.6	11.6	20.9	11.2	12.7	12.0	8.9	8.8	6.0	5.0	11.3	20.9																						
12-Jun	4.1	6.6	9.9	15.4	11.2	11.9	9.6	19.7	29.4	32.6	28.8	19.6	6.1	8.0	4.2	16.0	24.4	30.5	16.9	10.2	8.2	5.4	5.2	5.1	14.1	32.6																						
13-Jun	6.0	5.0	5.3	5.8	7.0	6.5	6.8	7.6	7.1	7.3	7.6	7.0	6.9	6.1	12.5	8.0	4.8	5.2	5.1	4.7	4.3	5.0	4.5	6.9	6.4	12.5																						
14-Jun	5.5	6.3	6.5	5.6	5.1	7.4	6.2	7.0	5.1	5.0	4.9	5.8	5.2	5.9	5.9	7.3	7.3	7.1	9.5	8.9	10.2	8.9	10.1	8.7	6.9	10.2																						
15-Jun	11.5	11.6	13.4	12.1	8.3	6.5	5.4	4.9	4.8	5.8	7.9	10.7	16.4	13.7	19.8	15.3	17.7	33.5	8.4	14.9	11.2	12.8	8.3	8.7	11.8	33.5																						
16-Jun	8.0	7.4	6.5	6.1	5.0	4.9	3.6	3.9	3.5	3.4	3.5	3.8	4.1	4.9	5.1	4.8	4.8	4.8	4.6	4.8	6.9	5.9	6.5	4.7	5.1	8.0																						
17-Jun	3.9	3.7	3.9	3.9	5.2	4.6	4.2	4.9	4.9	4.3	3.7	3.5	3.9	5.1	8.5	9.3	13.4	14.8	11.6	11.1	12.1	12.0	11.9	13.7	7.4	14.8																						
18-Jun	9.0	7.0	6.4	6.5	6.4	6.2	6.3	10.8	6.1	7.3	9.5	8.3	8.8	7.7	7.2	7.6	9.7	8.1	7.9	8.7	8.6	31.8	8.0	5.8	8.7	31.8																						
19-Jun	12.2	16.7	11.3	16.2	19.3	17.7	14.0	12.4	22.1	5.5	3.9	4.0	4.3	4.3	4.3	3.9	4.6	4.8	6.0	6.6	7.1	11.8	12.6	12.5	9.9	22.1																						
20-Jun	7.1	14.4	14.9	18.2	25.4	32.0	31.5	24.0	14.3	11.1	13.4	12.3	14.5	24.9	28.8	32.1	23.4	16.2	11.3	8.8	8.5	22.8	19.4	18.0	18.6	32.1																						
21-Jun	18.8	13.2	12.0	10.6	10.6	17.1	8.6	36.6	44.7	71.3	70.4	47.5	31.1	16.7	27.0	26.2	17.3	14.0	9.0	12.1	15.3	25.1	32.9	34.9	26.0	71.3																						
22-Jun	19.8	10.0	7.1	6.7	8.3	10.6	14.2	17.0	17.6	28.6	53.9	42.2	26.7	16.9	9.1	24.8	50.8	9.4	20.4	12.8	12.0	20.5	22.1	21.1	20.1	53.9																						
23-Jun	19.3	15.6	14.2	14.0	12.5	13.5	13.7	11.5	8.7	8.4	11.0	7.1	6.8	8.5	5.4	5.4	6.2	7.2	8.6	9.8	10.1	24.1	14.5	14.2	11.3	24.1																						
24-Jun	7.1	6.5	7.9	9.0	10.2	10.5	9.6	10.4	7.3	10.0	M	M	M	M	M	M	6.0	6.9	8.4	9.6	27.0	27.4	29.5	40.6	13.5	40.6																						
25-Jun	46.7	57.8	58.7	52.9	47.9	36.8	42.2	49.9	43.3	40.1	41.8	83.7	69.7	27.6	17.8	20.6	35.9	21.4	10.5	12.7	21.1	17.9	14.8	11.8	36.8	83.7																						
26-Jun	11.7	12.0	12.4	12.3	12.7	13.5	12.8	13.1	8.2	5.8	6.3	4.1	2.6	2.5	2.5	3.3	3.7	28.1	4.3	3.8	6.4	7.4	6.3	9.4	8.5	28.1																						
27-Jun	7.4	7.4	8.1	5.8	7.7	9.8	13.6	10.0	9.3	9.8	5.7	4.9	6.0	3.6	3.3	4.8	4.0	4.7	7.0	7.5	6.1	7.8	13.3	10.4	7.4	13.6																						
28-Jun	8.8	10.0	11.1	16.0	15.9	10.9	18.1	17.6	26.7	56.6	53.4	40.8	13.2	10.2	7.6	20.8	43.2	25.9	100.3	84.8	75.1	70.0	59.3	57.7	35.6	100.3																						
29-Jun	64.2	72.5	70.1	64.4	67.9	68.4	77.9	76.2	59.6	65.0	52.4	73.8	72.6	29.7	27.7	26.3	46.9	62.1	70.7	108.2	105.4	73.1	99.8	108.7	68.5	108.7																						
30-Jun	112.6	132.6	135.5	114.1	93.1	111.3	121.4	146.6	161.2	152.1	159.0	186.6	187.0	186.6	211.2	220.2	202.3	184.3	187.5	176.1	172.9	178.0	172.4	65.6	157.1	220.2																						
																								18.9	19.9	19.9	19.3	18.8	19.6	20.1	23.4	23.0	24.3	25.5	25.4	22.1	18.3	19.1	25.3	29.6	23.5	22.1	23.0	28.5	25.6	24.9	21.4	Diurnal Average
																								112.6	132.6	135.5	114.1	93.1	111.3	121.4	146.6	161.2	152.1	159.0	186.6	187.0	186.6	211.2	220.2	222.7	184.3	187.5	176.1	172.9	178.0	172.4	108.7	Diurnal Maximum

M - Maintenance AF - Analyzer Failure
 Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m³



WBEA
Hourly Averages

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Millennium - June 2015





WBEA

Cumulative Frequency Distribution

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

Millennium - June 2015

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	103	14.74	14.74
6 - 15	344	49.21	63.95
16 - 25	107	15.31	79.26
26 - 80	112	16.02	95.28
> 81.0	33	4.72	100.00

Total Number of Valid Hours: 699

Total Number of Hours: 720



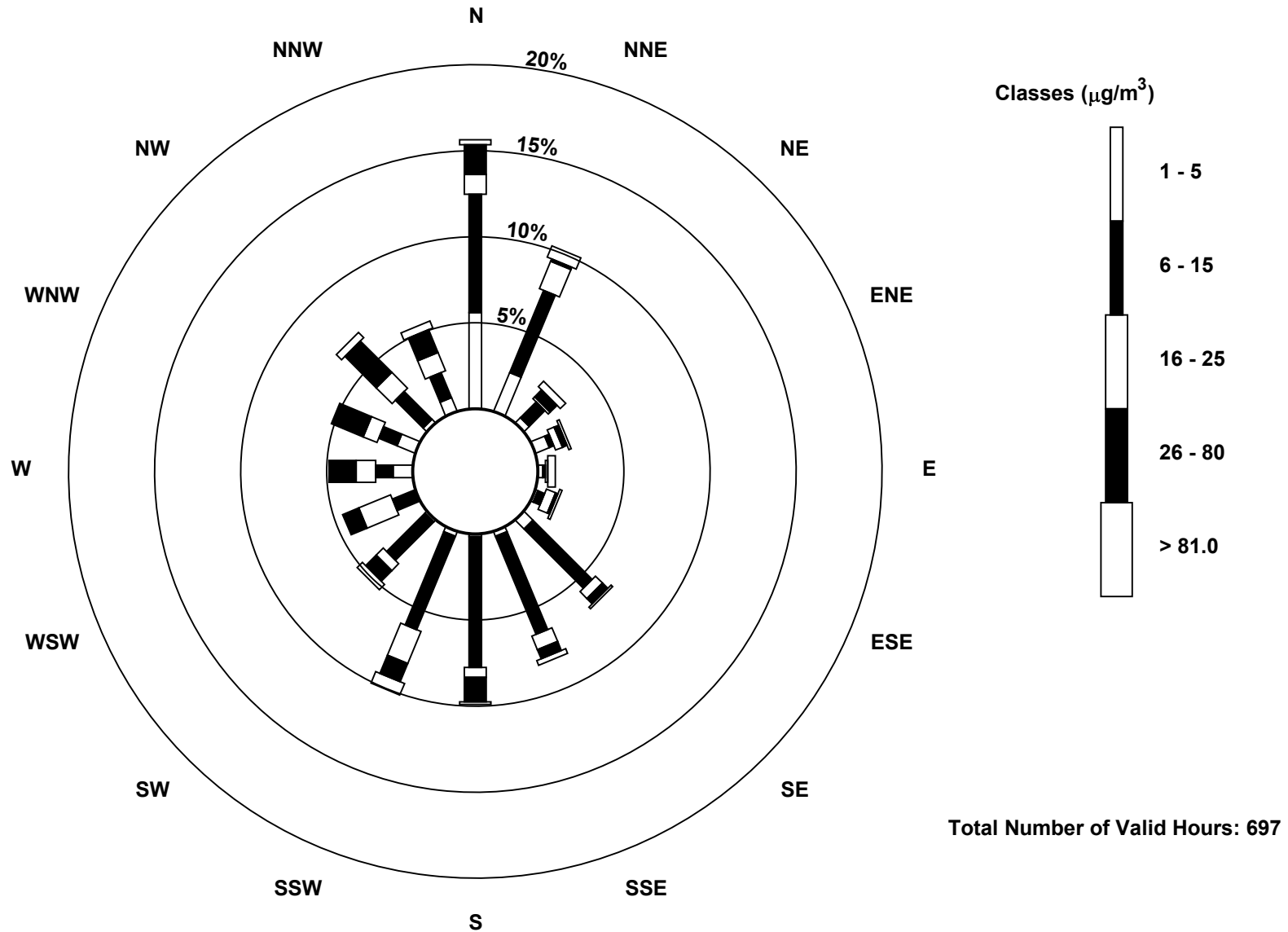
WBEA
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Millennium - June 2015

Concentration Ranges (μg/m ³)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	39	17	3	6	2	1	5	2	1	2	1	0	8	8	2	6	103
6 - 15	48	36	9	2	1	3	34	43	53	41	22	10	7	8	16	11	344
16 - 25	8	12	1	3	1	4	4	6	4	14	4	14	8	6	9	8	106
26 - 80	12	1	4	2	0	1	3	4	10	8	6	7	11	14	18	10	111
> 81.0	2	5	3	1	3	1	1	2	1	5	3	0	0	0	3	3	33
Totals	109	71	20	14	7	10	47	57	69	70	36	31	34	36	48	38	697

Total Number of Valid Hours: 697

Total Number of Hours: 720



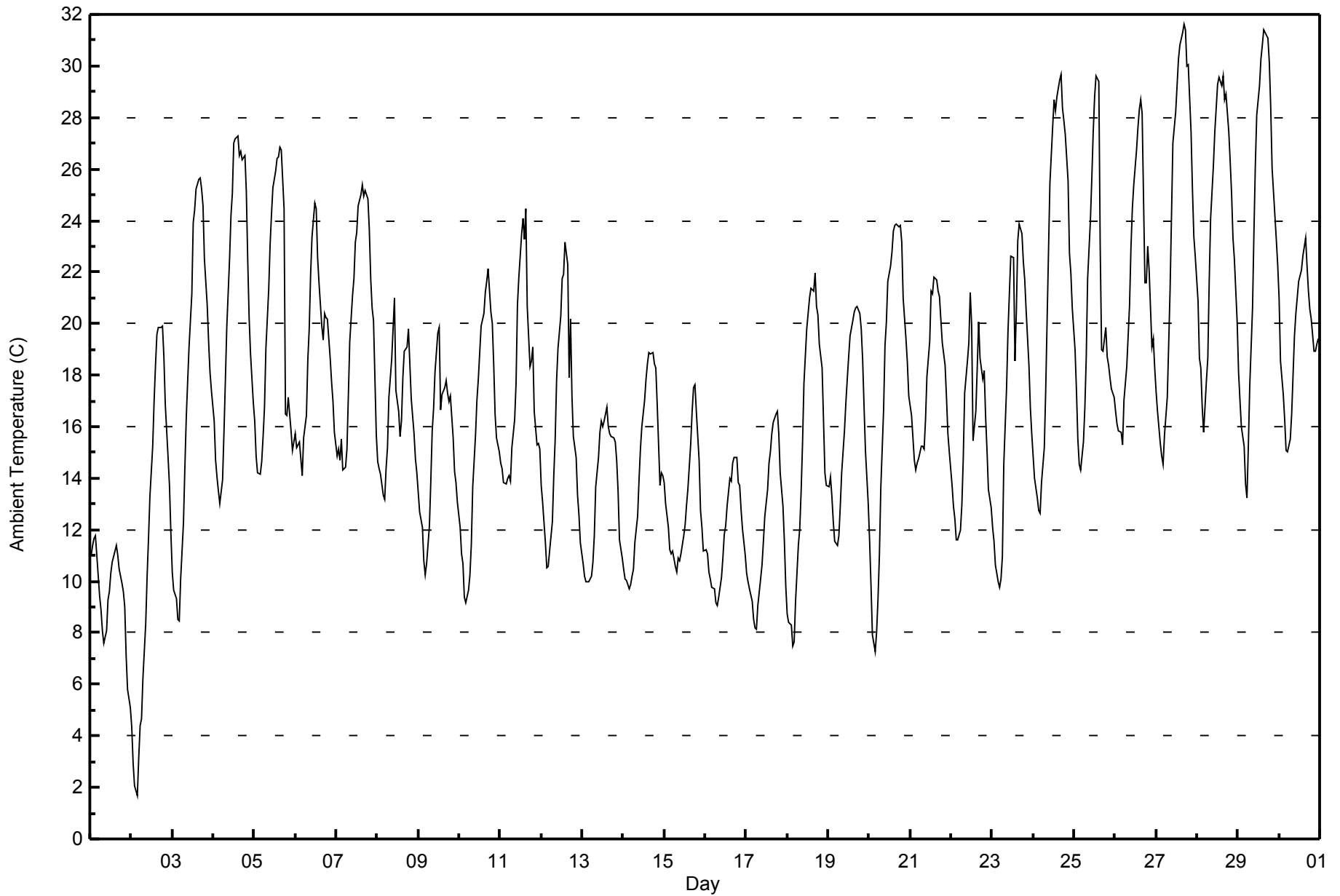


Maximum Value: 31.6 C on Jun 27 17:00																				Maximum Daily Average: 23.9 C on Jun 27					Hours in Service: 720																								
Minimum Value: 1.7 C on Jun 2 04:00																				Minimum Daily Average: 9.6 C on Jun 1					Hours of Data: 720																								
Maximum Diurnal Average: 22.1 C at hour 16																				Minimum Diurnal Average: 11.7 C at hour 5					Hours of Missing Data: 0																								
Monthly Average: 17.30 C																				Percentiles: P ₁ = 4.9 P ₁₀ = 10.3 Q ₁ = 13.5 Median = 16.8 Q ₃ = 21.0 P ₉₀ = 25.2 P ₉₉ = 30.6					Hours of Calibration: 0																								
																									Percent Operational Time: 100.0																								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jun	11.0	11.4	11.7	11.7	11.0	9.4	8.9	8.1	7.6	8.1	9.3	9.6	10.3	10.7	11.2	11.4	11.0	10.4	9.9	9.6	9.0	7.1	5.8	5.1	9.6	11.7																							
2-Jun	4.3	2.9	2.1	1.7	3.1	4.4	4.6	6.3	8.4	10.2	11.6	13.3	15.2	17.0	18.4	19.6	19.8	19.9	19.9	18.7	16.9	14.8	13.7	11.9	11.6	19.9																							
3-Jun	10.4	9.7	9.3	8.5	8.5	10.1	12.3	14.4	16.3	17.7	19.1	21.2	23.9	24.4	25.2	25.6	25.7	25.2	24.6	22.5	20.7	19.3	18.1	17.4	17.9	25.7																							
4-Jun	16.2	14.7	14.1	13.5	13.0	13.9	15.8	17.8	19.9	22.5	24.2	25.1	27.0	27.2	27.3	26.5	26.7	26.4	26.5	25.1	22.5	20.2	18.8	16.9	20.9	27.3																							
5-Jun	16.2	14.9	14.2	14.2	14.6	15.6	16.8	19.1	21.3	23.1	24.2	25.3	25.9	26.4	26.5	26.9	26.8	24.4	16.5	16.4	17.1	15.9	15.1	15.4	19.7	26.9																							
6-Jun	15.7	15.2	15.4	14.7	14.1	15.5	16.4	18.6	19.8	21.9	23.4	24.7	24.5	22.6	21.6	19.9	19.4	20.4	20.2	20.2	18.7	17.7	17.0	15.8	18.9	24.7																							
7-Jun	14.9	15.1	14.7	15.5	14.3	14.5	15.1	17.2	19.3	21.1	21.8	23.2	23.5	24.5	25.0	25.4	25.0	25.2	24.8	23.7	21.8	20.6	20.1	15.7	20.1	25.4																							
8-Jun	14.6	14.4	14.1	13.4	13.2	14.3	15.2	17.1	18.6	19.8	21.0	17.4	16.6	15.6	16.2	17.9	18.9	19.1	19.8	18.4	17.1	15.7	14.7	14.2	16.6	21.0																							
9-Jun	13.4	12.7	12.1	10.8	10.3	10.7	12.2	13.9	15.9	16.7	18.1	19.6	19.9	16.7	17.2	17.5	17.8	17.3	17.0	17.2	15.6	14.3	13.8	13.1	15.1	19.9																							
10-Jun	12.1	11.1	10.7	9.4	9.2	9.6	10.2	11.5	13.7	15.7	17.0	17.9	18.9	19.9	20.4	21.2	21.7	22.1	20.4	20.0	18.5	16.5	15.6	15.1	15.8	22.1																							
11-Jun	14.6	14.3	13.9	13.8	14.0	14.1	13.9	15.2	16.3	17.7	20.7	21.8	23.5	24.1	23.3	24.5	20.7	18.3	18.5	19.1	16.6	15.3	15.3	15.1	17.7	24.5																							
12-Jun	13.7	13.1	11.5	10.5	10.6	11.2	12.3	14.1	15.5	17.8	19.0	20.3	21.7	21.9	23.1	22.3	17.9	20.2	17.2	15.6	14.8	13.4	12.6	11.5	15.9	23.1																							
13-Jun	10.7	10.2	10.0	10.0	10.0	10.2	10.7	11.8	13.7	14.8	15.8	16.2	16.0	16.2	16.8	16.0	15.7	15.6	15.6	15.4	14.7	13.5	11.6	10.9	13.4	16.8																							
14-Jun	10.5	10.1	10.1	9.7	9.9	10.2	10.5	11.5	12.5	14.0	15.2	16.0	17.0	17.9	18.4	18.9	18.8	18.9	18.5	18.3	16.9	13.7	14.2	14.1	14.4	18.9																							
15-Jun	13.8	13.0	12.1	11.2	11.1	11.2	10.6	10.4	10.9	10.8	11.1	11.8	12.2	13.0	13.6	15.4	16.6	17.5	17.6	16.6	14.7	12.7	12.1	11.2	13.0	17.6																							
16-Jun	11.2	11.1	10.4	10.1	9.8	9.7	9.2	9.1	9.4	10.1	10.9	11.8	12.1	12.9	14.0	13.9	14.6	14.8	14.8	13.8	13.7	12.8	12.1	11.0	11.8	14.8																							
17-Jun	10.3	10.0	9.7	9.2	8.5	8.2	8.1	9.1	10.1	10.6	11.6	12.5	13.6	14.6	15.0	15.7	16.2	16.5	16.6	15.7	14.2	12.9	11.6	9.8	12.1	16.6																							
18-Jun	8.7	8.4	8.3	7.5	7.7	9.2	11.4	12.1	13.5	15.3	17.7	19.8	20.4	21.0	21.3	21.3	21.9	20.7	20.3	19.2	18.3	16.3	14.2	13.7	15.3	21.9																							
19-Jun	13.7	14.1	13.3	12.3	11.6	11.4	11.7	12.9	14.2	15.8	16.9	17.8	18.7	19.5	20.1	20.4	20.6	20.7	20.4	19.8	18.6	16.8	15.1	13.0	16.2	20.7																							
20-Jun	11.6	9.8	7.9	7.3	8.0	9.3	11.0	13.6	16.6	19.2	20.1	21.7	22.3	22.8	23.6	23.8	23.9	23.8	23.8	23.2	21.0	19.4	18.5	17.2	17.5	23.9																							
21-Jun	16.8	16.4	14.7	14.3	14.6	14.8	15.2	15.2	15.1	16.3	18.0	19.3	21.3	21.2	21.8	21.7	21.2	21.1	20.1	19.2	18.4	17.2	15.7	15.0	17.7	21.8																							
22-Jun	13.7	12.9	12.4	11.6	11.6	12.0	13.0	14.8	17.3	18.6	19.2	21.2	20.0	15.4	16.6	18.3	20.1	18.7	17.9	18.2	16.4	15.1	13.6	12.9	15.9	21.2																							
23-Jun	12.1	11.5	10.6	10.0	9.8	10.1	11.0	14.5	17.5	19.7	21.1	22.6	22.5	18.5	20.5	23.2	23.9	23.5	22.4	21.7	20.5	18.4	16.8	15.7	17.4	23.9																							
24-Jun	14.9	14.0	13.2	12.8	12.6	13.9	15.2	17.4	20.1	22.8	25.5	27.7	28.7	28.3	28.8	29.5	29.7	28.4	27.9	27.4	25.5	22.7	21.9	20.6	22.1	29.7																							
25-Jun	19.0	17.4	15.5	14.5	14.3	15.4	16.7	18.7	21.8	24.0	25.7	27.4	28.8	29.6	29.4	23.0	19.0	18.9	19.8	18.7	18.4	17.9	17.5	17.2	20.4	29.6																							
26-Jun	16.6	16.1	15.8	15.8	15.3	17.0	17.7	18.3	20.7	22.9	24.5	25.4	26.7	27.6	28.3	28.7	28.1	21.6	21.6	23.0	22.1	19.1	19.4	18.3	21.3	28.7																							
27-Jun	17.4	16.6	15.4	14.8	14.6	15.7	17.1	19.2	21.3	24.2	27.0	28.2	29.2	30.3	30.8	31.3	31.6	31.4	30.0	30.0	27.5	25.2	23.4	22.6	23.9	31.6																							
28-Jun	20.9	18.7	18.3	16.8	15.8	17.8	18.6	21.6	24.1	26.1	27.4	28.4	29.3	29.6	29.3	29.6	28.7	28.9	27.4	26.3	25.0	23.3	22.5	20.1	23.9	29.6																							
29-Jun	18.1	17.0	16.0	15.2	13.8	13.2	15.2	17.6	20.6	23.6	26.2	28.1	29.2	30.2	30.8	31.4	31.3	31.1	30.1	28.4	26.0	24.2	23.3	22.3	23.5	31.4																							
30-Jun	21.0	18.5	17.3	16.3	15.1	15.0	15.5	16.5	18.0	19.5	20.4	21.7	21.9	22.1	22.6	23.3	22.3	21.2	20.6	20.2	18.9	18.9	19.2	19.4	19.4	23.3																							
																								13.9	13.2	12.5	11.9	11.7	12.3	13.1	14.6	16.3	18.0	19.4	20.6	21.4	21.4	21.9	22.1	21.8	21.4	20.7	20.1	18.7	17.0	16.1	15.1	Diurnal Average	
																								21.0	18.7	18.3	16.8	15.8	17.8	18.6	21.6	24.1	26.1	27.4	28.4	29.3	30.3	30.8	31.4	31.6	31.4	30.1	30.0	27.5	25.2	23.4	22.6	Diurnal Maximum	



WBEA
Hourly Averages

Ambient Temperature (AT) - C
Millennium - June 2015





WBEA
Cumulative Frequency Distribution

Ambient Temperature (AT) - C
Millennium - June 2015

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	60	8.33	8.33
10 - 20	445	61.81	70.14
> 20	215	29.86	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

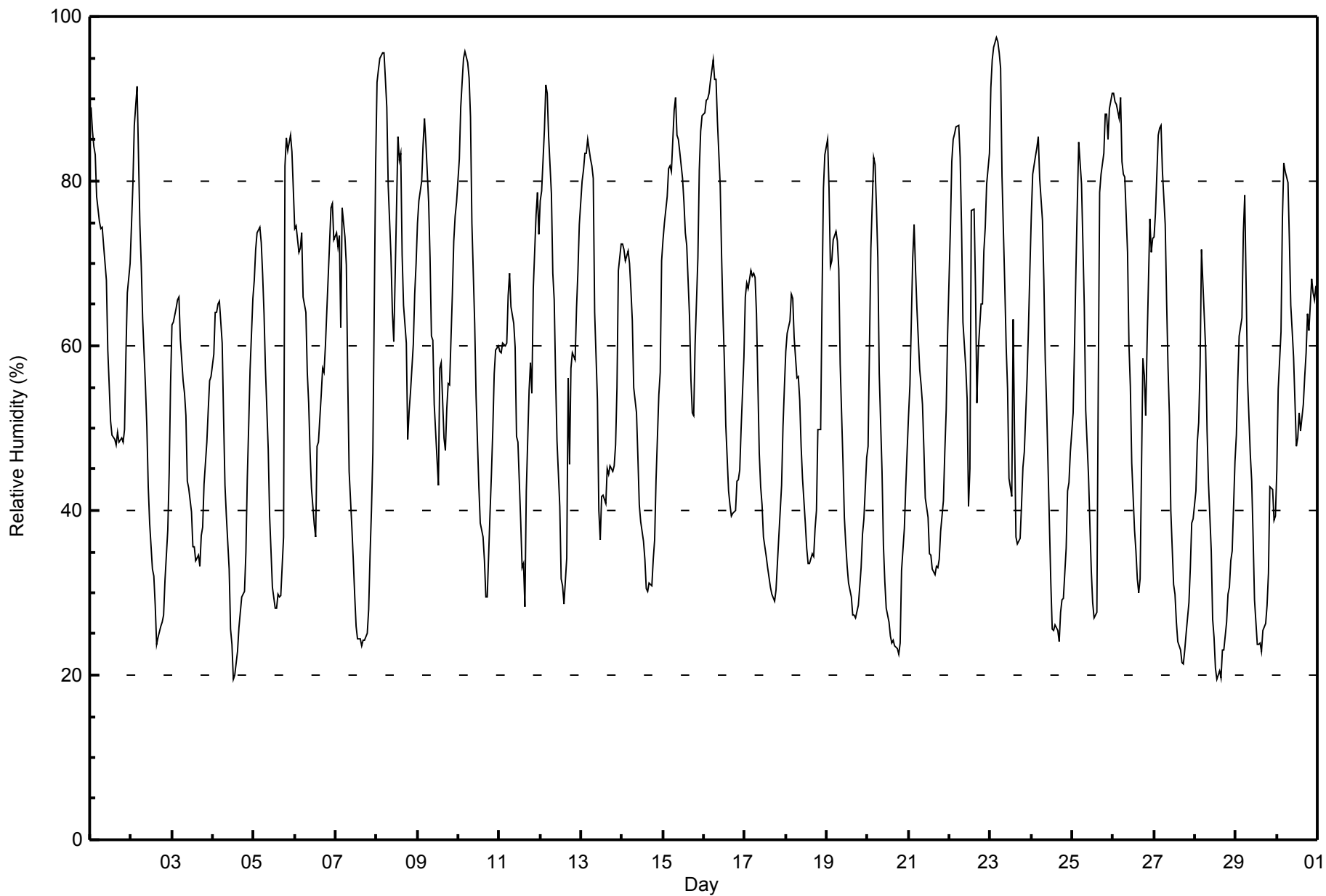
Millennium - June 2015

Maximum Value: 97 % on Jun 23 04:00														Maximum Daily Average: 75.7 % on Jun 15														Hours in Service: 720	
Minimum Value: 19 % on Jun 28 14:00														Minimum Daily Average: 37.6 % on Jun 28														Hours of Data: 720	
Maximum Diurnal Average: 79.7 % at hour 5														Minimum Diurnal Average: 37.2 % at hour 16														Hours of Missing Data: 0	
Monthly Average: 56.2 %														Percentiles: P ₁ = 21 P ₁₀ = 29 Q ₁ = 39 Median = 56 Q ₃ = 73 P ₉₀ = 84 P ₉₉ = 96														Hours of Calibration: 0	
																												Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Jun	89	86	84	83	78	75	74	74	72	68	60	55	51	49	49	48	49	48	49	48	50	59	66	70	64.0	89			
2-Jun	75	80	87	92	83	75	70	63	55	50	43	39	33	32	28	24	25	26	26	27	32	38	45	55	50.0	92			
3-Jun	63	63	65	66	66	61	56	54	52	44	43	40	36	36	34	35	33	37	38	43	48	52	56	56	48.9	66			
4-Jun	59	64	64	65	65	60	51	43	39	33	26	24	20	20	23	26	28	30	30	35	44	50	57	66	42.6	66			
5-Jun	68	72	74	74	73	69	64	57	47	39	35	31	28	28	30	29	30	37	82	85	84	86	84	79	57.7	86			
6-Jun	74	75	71	72	74	66	64	57	53	47	43	38	37	48	48	54	57	57	60	64	73	77	77	73	60.8	77			
7-Jun	74	72	73	62	77	73	70	56	45	38	34	30	26	24	24	24	24	24	25	28	35	40	47	82	46.1	82			
8-Jun	92	94	95	96	96	92	89	79	71	64	60	69	85	83	83	71	65	60	49	52	54	60	66	70	74.8	96			
9-Jun	75	78	80	84	88	85	78	71	61	61	53	46	43	57	58	49	47	52	55	55	66	73	76	77	65.4	88			
10-Jun	83	89	92	95	96	94	93	88	75	63	54	48	43	38	37	34	30	30	40	44	50	57	59	60	62.1	96			
11-Jun	59	59	60	60	60	66	69	65	63	60	49	48	39	33	34	28	42	55	58	54	67	76	79	73	56.5	79			
12-Jun	78	79	86	92	91	85	79	69	66	56	49	40	32	31	29	34	56	46	57	59	58	65	69	75	61.6	92			
13-Jun	80	81	83	83	85	83	82	80	64	53	40	36	42	42	41	45	44	45	45	45	48	55	69	72	60.3	85			
14-Jun	72	72	70	71	70	67	63	55	52	47	41	39	36	34	30	30	31	31	34	37	44	54	57	70	50.3	72			
15-Jun	73	75	78	82	82	81	89	90	86	85	84	80	77	74	72	63	56	52	52	60	71	81	86	88	75.7	90			
16-Jun	88	90	90	91	92	95	92	92	87	79	71	64	58	50	42	41	39	40	40	44	44	45	50	59	65.9	95			
17-Jun	66	68	67	69	68	69	68	64	47	43	41	37	34	33	32	31	30	29	30	34	37	43	50	55	47.7	69			
18-Jun	59	62	63	66	66	61	56	56	53	48	44	38	35	34	33	35	34	38	40	50	50	66	79	83	52.1	83			
19-Jun	85	79	70	70	73	74	73	69	58	46	39	36	33	31	29	27	27	27	28	31	33	37	39	46	48.4	85			
20-Jun	48	60	72	83	82	77	71	57	45	36	31	28	26	25	24	24	24	23	23	24	33	38	43	47	43.4	83			
21-Jun	51	55	71	75	69	65	57	55	53	47	42	39	35	35	33	32	33	33	34	37	41	47	52	61	48.1	75			
22-Jun	74	82	85	86	87	87	83	74	63	57	54	41	45	76	77	67	53	59	65	65	71	74	80	83	70.4	87			
23-Jun	91	95	96	97	97	96	94	81	67	60	55	44	42	63	49	37	36	37	41	45	47	56	62	69	64.8	97			
24-Jun	76	81	83	84	85	80	75	68	58	53	45	31	26	25	26	25	24	28	29	29	35	42	43	47	50.0	85			
25-Jun	52	60	69	77	85	80	72	65	52	44	38	33	29	27	28	55	79	81	83	88	88	85	89	91	64.6	91			
26-Jun	91	90	89	88	90	82	81	80	71	60	55	46	38	35	32	30	32	58	57	51	60	75	71	73	64.0	91			
27-Jun	73	76	86	86	87	81	75	65	57	51	40	31	30	26	24	23	22	21	23	25	29	33	39	39	47.6	87			
28-Jun	42	48	51	58	72	64	60	50	43	35	27	25	21	19	21	20	23	23	26	30	31	34	35	46	37.6	72			
29-Jun	49	56	61	63	74	78	67	56	47	44	37	29	24	24	24	23	25	26	28	32	43	43	39	39	43.0	78			
30-Jun	45	55	62	75	82	81	80	73	65	62	59	48	49	52	50	53	56	59	64	62	68	66	66	67	62.4	82			
																												Diurnal Average	
																												Diurnal Maximum	



WBEA
Hourly Averages

Relative Humidity (RH) - %
Millennium - June 2015





Maximum Speed: 31 km/h on Jun 13 11:00	Maximum Daily Speed Average: 17.8 km/h on Jun 13	Hours in Service: 720
Minimum Speed Value: 0 km/h on Jun 23 16:00	Minimum Daily Speed Average: 0.4 km/h on Jun 30	Hours of Data: 718
Maximum Diurnal Speed Average: 4.3 km/h at hour 14	Minimum Diurnal Speed Average: 0.3 km/h at hour 2	Hours of Missing Data: 2
Monthly Average Velocity: 1.6 km/h 333.2 deg	Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 5 Median = 7 Q ₃ = 10 P ₉₀ = 14 P ₉₉ = 25	Percent Operational Time: 99.7

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	WSW4	W8WNW10	NW13	NW13WNW14	WNW15	WNW15	WNW15	WNW15	WNW14	WNW16	NW15	NW15	NW15	NNW14	NNW13	NNW12	NNW11	NW7	WNW5	W5	W5	NW11.3	WNW16			
2-Jun	NW3	NNW3	SW5	NNE3	NNE4	ENE3	SSW1	SSW6	SSE3	SSE4	ESE3	ENE2	S5	SSE7	SSE9	SSE8	SSE8	SE9	SE9	SE11	SE10	SE10	S7	SSE5	SSE4.1	SE11
3-Jun	SE5	SE6	SE7	SE5	SE6	SE8	SE10	SSE8	SE12	SSE10	SSE11	SSE11	SE12	SSE9	SSE11	SSE12	SSE10	SSE11	SSE10	SSE9	SSE8	SSE9	SSE7	SSE6	SSE8.6	SSE12
4-Jun	SSE5	SE7	SE8	SE9	SE7	SSE7	SSE7	S8	S8	S8	S10	S9	SSE12	SSE10	S12	S13	S12	S9	S10	SSE10	S19	SSW16	S11	S9	S9.4	S19
5-Jun	SSE8	SSE5	SSE4	SSE6	S7	S7	S9	S10	S13	S14	S15	S14	S15	S14	S14	SSW13	S12	SW10	SSW11	ESE9	SE7	SSW6	S5	S5	S9.1	S15
6-Jun	SSW8	S5	S4	S4	SSE4	SSW5	SSW7	WSW7	WNW7	W5	NW4	NW5	WSW6	W3	SW10	SW8	SSW8	SE6	SSE3	SSW3	SSW4	WSW4	WSW3	WSW4	SW3.9	SW10
7-Jun	SSW5	SW6	SW5	WNW7	W2	WSW5	W7	W9	WNW9	WNW9	WNW9	WNW12	WNW17	WNW17	W14	W13	W13	WNW11	WNW8	W6	W1	SW3	NNW6	WSW1	W7.5	WNW17
8-Jun	SE2	SSW4	SSW6	SSW4	S3	SSW6	WSW7	W7	WNW8	NW8	NW7	NNW6	SW8	N6	ENE10	ENE1	NNE2	NW8	NNW14	NNW12	NW12	NNW8	NW7	NW12	NW3.9	NNW14
9-Jun	NW11	NW9	NNW7	WNW5	WSW4	W5	W6	WSW5	W7	NW7	NW7	NW7	WNW8	NE18	NE10	N15	NW7	NNW9	N7	WNW4	WNW4	N6	NNE9	N9	NNW5.7	NNE18
10-Jun	N9	N6	N6	NNE3	NE2	SW3	SW1	WSW2	N3	N5	NNW5	N6	NNE5	N7	N8	N6	NNE6	NNE1	SW6	SW3	ESE4	SE3	SE6	SE4	N2.3	N9
11-Jun	SE8	SE8	SE7	SE9	SE9	SE6	ESE7	SE8	SE12	SE10	SSE8	S7	SW6	SW12	SSW14	SSW13	NW7	S9	SE7	SE7	SE9	SE7	N6	ENE10	SSE5.7	SSW14
12-Jun	E6	WNW4	SSE2	SE3	SW4	SSW4	SW5	NNW4	N6	N5	N8	N6	NNW7	N9	WNW6	ENE8	SE18	ESE13	ESE11	ESE9	E9	ENE11	ENE11	NE11	ENE3.6	SE18
13-Jun	NE12	NE8	NNE12	NNE13	N13	N12	NNW10	N14	N23	NNE26	NNE31	NNE30	NNE29	N29	NNE28	NNE26	NNE26	NNE24	NNE24	NNE22	NNE15	NE5	E5	E4	NNE17.8	NNE31
14-Jun	ENE6	ENE5	NNE7	N7	N9	N13	N17	NNE18	N19	N21	NNE20	N19	N18	N18	N20	NNE18	N15	N12	N13	N8	N6	NNE5	N9	NNE13	NNE12.9	N21
15-Jun	N15	N15	NNE15	NNE13	N12	N11	NNE11	NNE12	N11	N8	N5	NNE5	N6	N6	NW2	N5	WNW6	W6	SW6	SSW9	SSW7	S3	SSE4	S4	N5.2	N15
16-Jun	S4	N9	NE14	N13	N9	N6	N18	N15	NNE14	N14	N12	N13	N13	N11	NNW12	N14	N14	NNE13	NNE11	NNE7	N8	NNE8	N11	NNE15	N11.0	N18
17-Jun	N14	N10	NNW9	NNW10	N13	N12	N11	N11	N15	N13	N6	N2	N6	NNE2	WNW4	SSW3	W3	W3	SSW4	S6	S7	SSE5	SSE5	SSW6	N4.1	N15
18-Jun	SSE5	SSE6	SE8	SE8	SE9	SE9	SSE8	S6	SSE6	S7	SSE6	S9	SSW10	SSW10	S7	SSW7	SSE7	SSW6	WSW3	S2	S6	WSW9	WSW7	NW9	S5.6	SSW10
19-Jun	NW6	NNW8	NNE19	NNE17	NNE17	N13	N12	N12	N15	NNE14	N14	N13	N12	NNW10	N10	N9	N11	N10	N11	NNE9	NNE10	NE9	NE8	NE4	N10.9	NNE19
20-Jun	NNE5	NNW1	SW2	WNW1	WSW2	WSW2	N3	NNW3	W4	WNW3	N6	NW7	N7	NW5	NW5	NNW7	NNW6	N8	NNE9	NNE8	NNE9	NNE5	NNE8	NE7	N3.9	NNE9
21-Jun	NNE6	NNE9	NNE6	NNE6	N7	NNE8	N9	N8	NNE8	N6	NNW6	NNW9	NW10	NNW10	N12	N13	NNE11	N12	NNE15	NNE11	N8	NNW4	W4	WSW4	N7.6	NNE15
22-Jun	WSW5	SW3	WSW5	WSW4	WNW4	SSW3	SSW6	WSW6	WNW7	NW5	N5	N4	NW11	NW8	SW7	WSW9	WNW11	NNW9	NNE8	NE4	NNE2	E3	ESE2	ESE2	WNW3.0	WNW11
23-Jun	AF	SSW5	SSW5	SSW7	SSW5	SSW5	SSW5	S5	S4	S3	NE2	NW4	N8	WNW7	N6	NW0	SSW7	SSW6	SSW7	SSW9	SSW8	SSW6	SSE4	SE5	SSW3.3	SSW9
24-Jun	SSE4	S4	S4	SSE4	S5	S5	S6	S6	SSE6	W7	W9	WSW7	SW14	SW9	SSW10	SW13	WSW6	NW2	SW2	NE6	NE15	NE13	NE15	NE13	SSW3.4	NE15
25-Jun	ENE7	SSW3	WSW4	NW1	NW2	AF	W2	WNW4	NW3	N4	NNW6	SSW7	S5	NE1	N8	W7	NNW8	NNE11	W1	SE6	WSW5	WSW4	SSE4	SSE5	NW0.9	NNE11
26-Jun	S4	SSE5	SSE5	S4	SSW5	SE5	SSE5	S5	S5	S4	N3	WNW9	W13	W15	W14	W15	W14	WNW15	WNW7	W5	NW3	WSW2	SW6	SSW6	WSW4.7	WNW15
27-Jun	SSW5	S3	SSW4	SSW4	S5	SSW5	SSW5	SSW6	SSW7	SSW7	SSW5	NNW2	SW6	W8	WNW8	WNW10	WNW9	W9	W8	WSW5	SW6	SW5	SW5	WSW6	WSW4.6	WNW10
28-Jun	SW4	SSW4	SW2	S3	SSW4	S3	SSW4	NW4	NW7	NW10	NNW11	NW12	NW17	NW15	NW15	NW14	N14	NNW10	N14	NNW8	NW7	WNW7	NW5	NNW4	NW6.4	NW17
29-Jun	SW3	SSW7	SW7	SW6	SSW6	SSW7	S5	SSW4	WSW2	SSW3	SSW4	SW5	W5	WNW6	NW8	WNW5	S7	SSE4	S4	SE6	NE1	ENE8	E6	E6	SSW2.6	ENE8
30-Jun	SSE2	S1	ENE1	SW5	SSW5	SSW6	SSW6	SSW5	SW2	NW1	NE3	NE3	NNE3	NNW2	NNE3	N2	NNE9	NE8	NNE3	NW7	E1	ESE6	SW4	WSW6	WNW0.4	NNE9

ENE0.7	NNW0.3	NNE0.7	N0.9	N0.8	W0.4	NNW1.0	NNW1.9	NNW2.3	NNW2.6	NNW3.3	NNW3.8	NW4.2	NW4.3	NW3.2	NW3.1	NNW2.4	NNW2.7	N2.1	NE0.9	ESE0.4	ESE0.8	NE0.9	NE1.0	Diurnal Average
N15	N15	NNE19	NNE17	NNE17	WNW14	N18	NNE18	N23	NNE26	NNE31	NNE30	NNE29	N29	NNE28	NNE26	NNE26	NNE24	NNE24	NNE22	S19	SSW16	NE15	NNE15	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
Millennium - June 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 8 km/h on Jun 23 13:00	Hours in Service: 720 Hours of Data: 718 Hours of Missing Data: 2 Hours of Calibration: 0 Percent Operational Time: 99.7
Minimum Value: 1 km/h on Jun 24 04:00	
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 2 Q ₃ = 3 P ₉₀ = 5 P ₉₉ = 7	

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

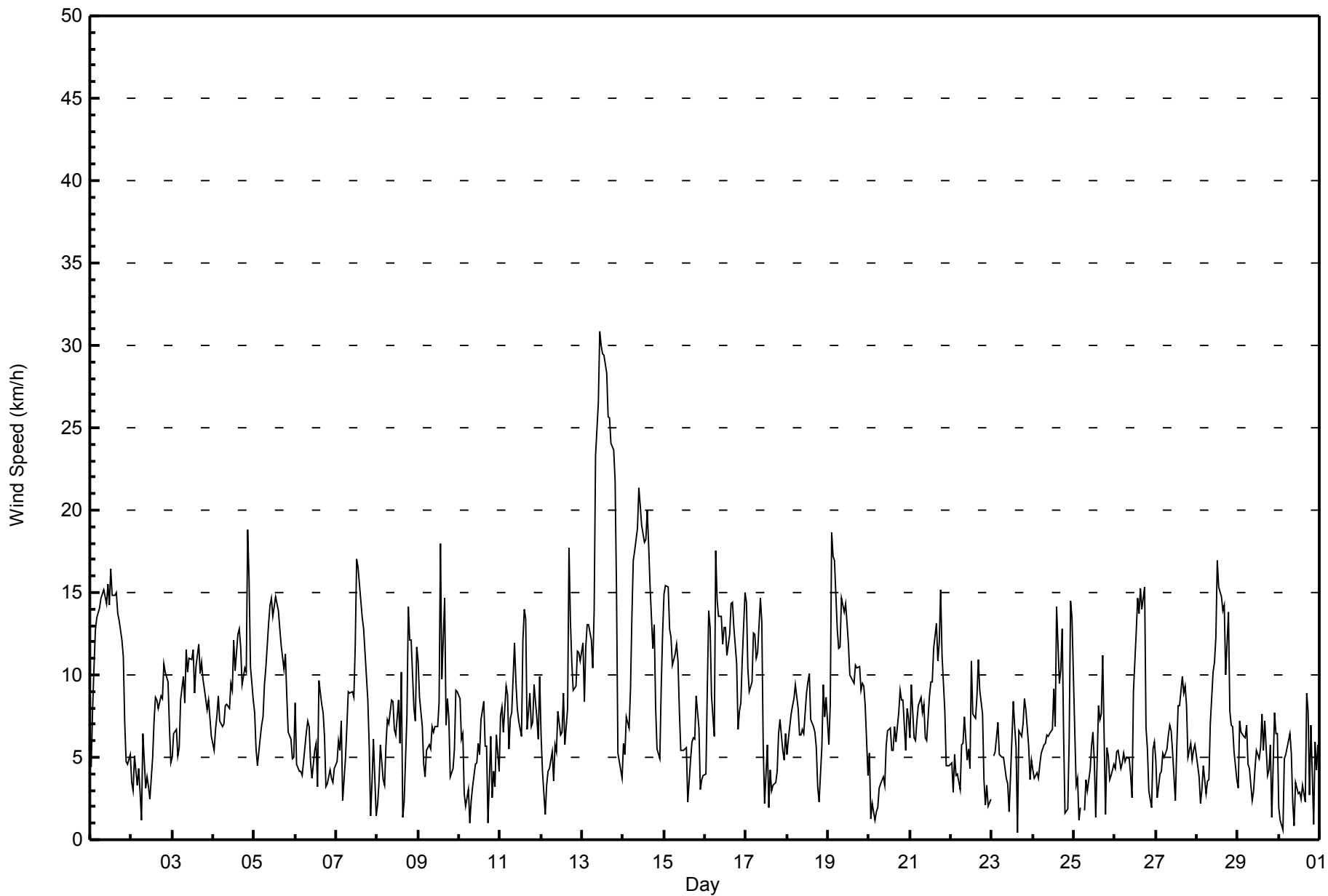
Diurnal Maximum

AF - Analyzer Failure



WBEA
Hourly Averages

Wind Speed (WS) - km/h
Millennium - June 2015





WBEA
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Millennium - June 2015

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	237	33.01	33.01
6 - 11	338	47.08	80.08
12 - 19	128	17.83	97.91
20 - 28	11	1.53	99.44
29 - 38	4	0.56	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 718

Total Number of Hours: 720



WBEA
Frequency Distribution

Wind Speed (WS) - km/h
Millennium - June 2015

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	11	16	9	5	4	4	8	24	30	32	20	22	15	11	17	9	237
6 - 11	53	25	7	9	3	5	35	31	27	35	15	11	14	22	23	23	338
12 - 19	41	19	4	0	0	1	4	2	12	4	3	0	8	12	12	6	128
20 - 28	3	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11
29 - 38	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	109	71	20	14	7	10	47	57	69	71	38	33	37	45	52	38	718

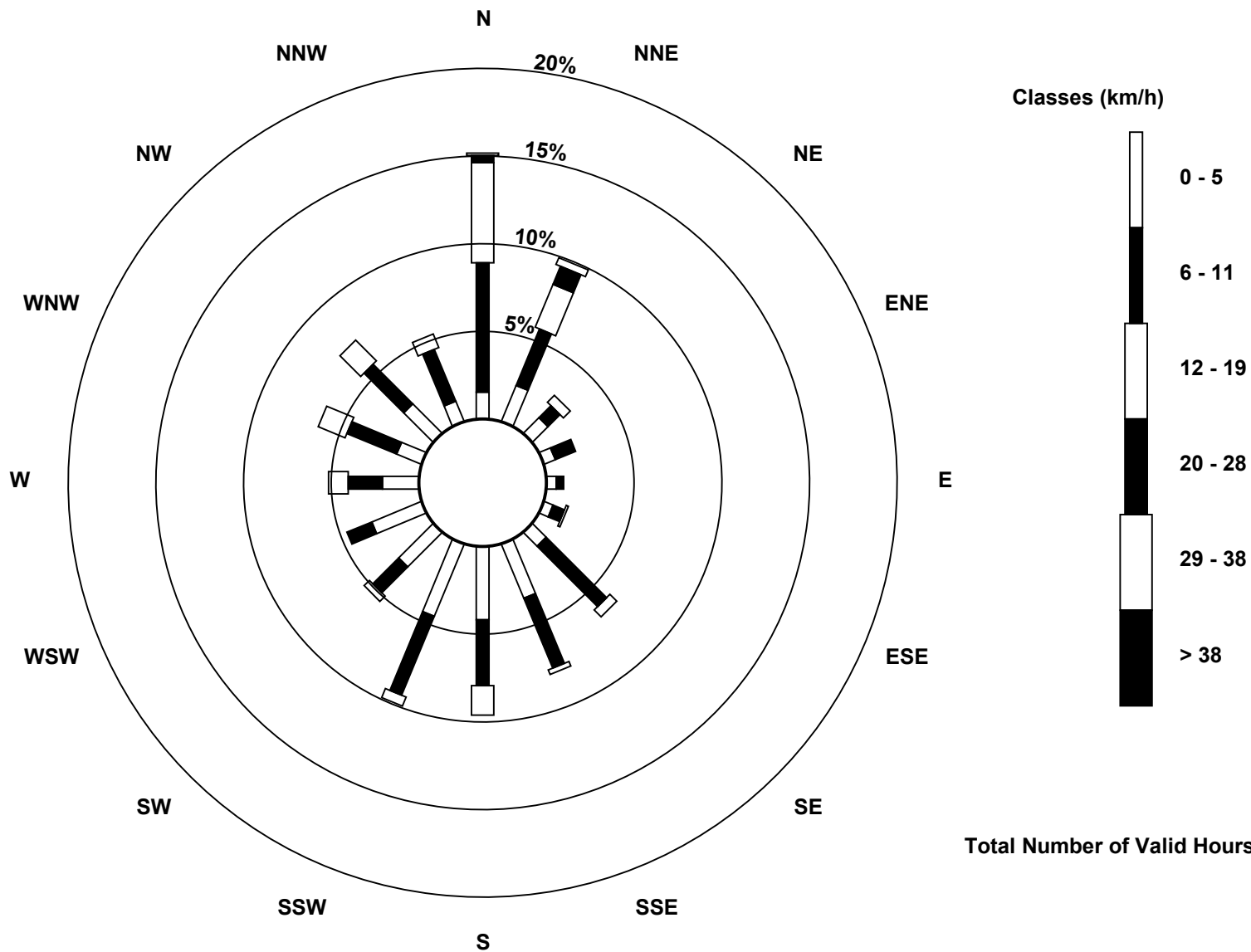
Total Number of Valid Hours: 718

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

Wind Speed (WS) - km/h
Millennium (AMS 12)





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Millennium - June 2015

Direction of Maximum Speed: 14 deg on Jun 13 11:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 16.8 deg on Jun 13	Hours of Data: 718
Direction of Minimum Speed: 311 deg on Jun 23 16:00	Hours of Missing Data: 2
Direction of Minimum Daily Speed Average: 0.4 deg on Jun 30	Percent Operational Time: 99.7
Monthly Average Direction: 263.8 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	237	267	291	312	318	297	298	296	301	303	302	291	292	305	315	321	330	336	329	338	318	288	278	277	305.9
2-Jun	311	346	222	18	31	61	192	213	158	164	109	73	175	163	165	151	154	136	138	145	138	132	175	167	150.2
3-Jun	129	137	135	140	125	133	140	147	135	166	160	149	143	157	154	150	167	157	162	165	155	152	154	164	150.1
4-Jun	168	134	139	138	144	147	155	179	178	170	184	186	148	167	173	177	181	174	180	164	190	193	173	171	170.2
5-Jun	168	153	156	151	170	175	189	180	185	189	188	191	188	185	192	187	236	209	118	135	199	171	170	182.7	
6-Jun	196	181	176	172	162	195	207	249	283	262	310	322	256	281	222	225	207	132	161	197	204	241	242	244	220.8
7-Jun	211	225	230	295	264	246	268	277	287	282	300	293	300	282	276	278	277	293	296	281	280	232	343	252	280.5
8-Jun	139	198	200	193	187	207	240	276	287	310	314	337	216	10	72	74	23	318	328	330	321	334	322	316	307.2
9-Jun	317	318	333	291	250	263	266	252	272	305	319	310	294	34	43	359	313	331	358	294	291	5	13	4	330.2
10-Jun	4	8	4	17	35	236	219	237	4	11	338	354	16	11	359	350	26	30	236	220	117	133	131	143	9.1
11-Jun	134	132	142	132	135	140	110	131	128	137	160	186	235	225	207	202	315	171	142	134	128	139	0	65	151.8
12-Jun	92	301	153	137	230	193	228	347	10	350	9	349	330	1	283	64	124	112	109	103	79	67	61	56	67.6
13-Jun	45	35	18	12	9	356	338	356	11	15	14	13	12	9	15	24	26	16	24	21	26	44	89	88	16.8
14-Jun	72	58	25	2	355	2	9	12	8	11	15	11	9	8	10	13	11	5	6	4	8	29	5	12	11.3
15-Jun	8	9	14	18	2	4	13	14	7	4	7	29	10	3	311	350	301	273	230	210	210	174	163	174	0.2
16-Jun	175	349	36	8	358	357	8	4	14	8	6	4	359	352	344	0	10	20	31	17	1	15	4	13	7.5
17-Jun	11	357	347	345	357	5	3	5	6	7	356	360	356	33	285	209	262	269	193	171	174	162	166	199	355.4
18-Jun	159	159	145	139	139	138	153	188	166	171	167	187	194	192	181	193	148	209	245	180	175	237	250	304	179.2
19-Jun	316	335	16	14	12	10	4	360	9	17	8	359	353	342	351	2	6	2	5	12	24	37	38	52	7.2
20-Jun	32	338	233	298	237	258	8	333	260	301	6	308	355	326	319	336	342	356	27	30	32	21	33	52	357.8
21-Jun	26	19	28	15	1	17	7	359	13	357	330	336	326	346	6	2	15	8	22	16	4	331	268	248	1.7
22-Jun	256	218	243	252	297	207	209	253	284	308	358	358	320	306	232	248	283	339	20	50	26	83	122	122	290.7
23-Jun	AF	210	211	207	197	198	207	176	181	186	39	309	349	289	8	311	207	209	196	193	198	193	159	143	205.8
24-Jun	153	170	169	167	175	177	176	183	165	183	192	259	260	249	217	214	208	221	251	308	227	48	41	49	200.3
25-Jun	76	208	241	317	323	AF	274	282	322	0	334	206	175	48	10	280	337	33	280	141	246	249	151	150	309.0
26-Jun	183	157	157	185	194	133	168	178	173	175	8	287	272	269	266	267	269	294	297	279	316	237	230	209	249.6
27-Jun	211	180	199	205	191	195	200	193	198	193	199	346	229	275	295	291	282	273	275	251	226	235	227	238	237.7
28-Jun	230	205	220	179	194	188	197	310	321	322	331	317	304	304	315	311	355	334	1	342	308	298	316	348	315.7
29-Jun	235	209	215	227	209	211	188	208	246	195	212	229	261	296	315	289	183	168	173	142	53	59	85	99	207.4
30-Jun	167	169	57	225	212	212	212	210	226	324	50	40	20	347	23	11	14	34	24	308	91	122	216	252	282.5
	69.8	346.7	23.2	3.2	350.7	266.1	288.6	297.6	338.2	341.7	348.2	326.8	311.2	319.9	313.6	311.7	326.3	335.7	352.7	34.9	117.1	118.3	51.8	51.6	

Diurnal Average

AF - Analyzer Failure

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



Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg

Millennium - June 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 105 deg on Jun 23 16:00	Hours of Data: 718
Minimum Value: 9 deg on Jun 29 05:00	Hours of Missing Data: 2
Percentiles: P ₁ = 12 P ₁₀ = 16 Q ₁ = 19 Median = 27 Q ₃ = 38 P ₉₀ = 62 P ₉₉ = 92	Hours of Calibration: 0
	Percent Operational Time: 99.7

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	26	28	27	29	32	29	27	29	29	31	33	31	31	34	32	32	33	32	33	31	30	31	33	20	34
2-Jun	49	39	25	75	19	34	96	24	72	64	76	96	62	47	37	34	33	30	26	19	19	17	25	31	96
3-Jun	16	14	15	32	20	17	23	23	21	24	26	26	25	28	29	24	28	28	24	21	20	18	20	22	32
4-Jun	20	17	13	16	17	18	24	22	24	26	31	37	29	31	27	24	28	25	24	22	21	22	18	18	37
5-Jun	19	19	19	15	19	21	24	23	23	24	25	26	27	25	27	26	25	42	44	36	25	19	23	19	44
6-Jun	17	24	16	21	21	17	20	35	29	51	72	55	54	80	23	26	36	25	36	16	16	19	18	16	80
7-Jun	13	9	21	30	79	26	21	26	27	36	39	37	29	31	34	35	31	32	30	25	73	82	40	76	82
8-Jun	73	57	21	28	30	21	31	34	37	34	42	56	25	76	26	88	70	38	31	34	30	33	33	30	88
9-Jun	27	29	33	37	25	24	33	49	40	41	47	48	49	20	39	20	38	37	29	40	40	26	15	14	49
10-Jun	18	19	17	58	46	62	80	67	77	53	53	37	64	47	28	60	30	92	34	58	16	19	14	22	92
11-Jun	17	18	17	17	18	36	26	28	18	24	28	34	77	28	23	34	54	29	26	23	17	38	49	22	77
12-Jun	44	42	65	62	34	18	46	46	33	38	23	49	52	35	66	59	23	30	38	30	23	22	18	18	66
13-Jun	14	19	14	15	16	21	28	21	17	17	16	18	19	19	17	17	15	17	17	16	15	34	31	29	34
14-Jun	21	23	17	19	24	19	15	16	20	16	18	20	20	20	20	18	20	26	18	18	19	19	22	15	26
15-Jun	15	16	15	16	16	17	16	16	16	21	23	25	26	28	73	71	61	44	32	22	18	19	14	16	73
16-Jun	32	41	15	17	21	24	15	17	16	16	18	17	20	28	31	21	18	17	18	16	16	13	15	16	41
17-Jun	16	19	27	30	21	17	20	19	17	20	64	89	61	95	81	88	89	76	62	23	19	18	21	19	95
18-Jun	17	17	19	16	15	17	25	25	26	26	41	31	28	28	32	36	36	40	27	63	30	27	23	26	63
19-Jun	28	31	15	15	15	15	17	20	16	20	19	21	28	30	32	24	19	21	21	17	14	11	23	72	72
20-Jun	46	70	50	57	40	34	53	51	50	66	39	57	48	58	55	38	42	36	21	17	12	68	47	10	70
21-Jun	17	16	21	16	22	17	16	24	17	31	37	34	37	38	22	21	21	23	17	16	18	38	27	24	38
22-Jun	18	38	20	28	28	55	20	36	35	54	42	73	40	50	19	29	30	51	20	29	31	27	41	37	73
23-Jun	AF	54	18	13	26	24	30	31	45	75	91	75	68	60	77	105	36	26	22	20	18	13	28	19	105
24-Jun	12	14	12	11	16	16	26	28	26	35	34	67	41	45	25	34	32	24	56	73	91	41	13	12	91
25-Jun	33	62	41	78	53	AF	60	48	63	52	43	46	58	103	29	61	40	14	77	21	42	52	23	12	103
26-Jun	29	16	21	24	25	21	22	24	30	39	92	47	34	33	35	32	33	34	33	38	71	19	18	10	92
27-Jun	13	69	13	16	16	15	21	23	26	27	46	91	55	51	48	37	40	37	29	30	16	19	16	25	91
28-Jun	32	28	67	20	21	38	58	38	31	32	33	36	34	36	33	34	26	32	19	33	28	25	40	29	67
29-Jun	55	14	14	15	9	12	15	21	61	54	48	48	67	63	49	64	28	52	31	19	83	16	26	28	83
30-Jun	68	71	73	20	19	14	18	17	44	89	32	37	31	36	32	83	15	14	61	27	87	27	56	33	89

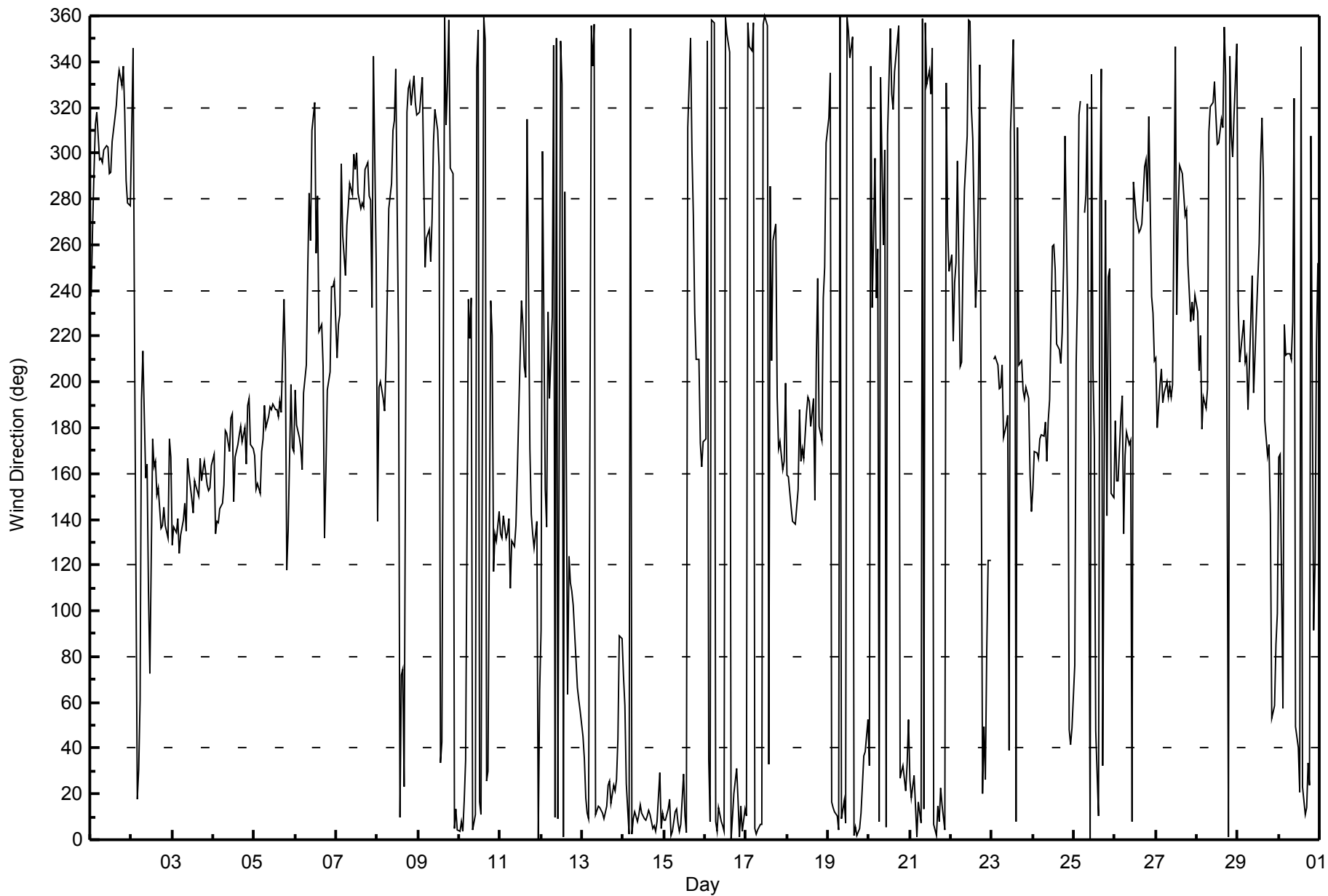
73	71	73	78	79	62	96	67	77	89	92	96	77	103	81	105	89	92	77	73	91	82	56	76	
Diurnal Maximum																								

AF - Analyzer Failure



WBEA
Hourly Averages

Wind Direction (WD) - deg
Millennium - June 2015





Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	June 24, 2015	Last Calibration	May 25, 2015
Station Name	Millennium	Station Number	AMS 12
Reason:	Routine		
Start Time (MST)	9:30	End Time (MST)	15:50
Gas Cert Reference	LL104223	Station temp.	22 Deg C
Cal Gas Concentration	48.3 ppm	Cal Gas Exp Date	12/02/2018
Calibrator Make/Model	Sabio 4010	Serial Number	11091107
ZAG Make/Model	API 701	Serial Number	4889
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2581

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		PMT voltage	-665	-665
Analyzer IP address	192.168.1.43		Lamp voltage	797	780
Calculated slope	0.999243	1.000364	Chamber temp	44.9	45.0
Calculated intercept	-0.858186	0.373952	Pressure	702.4	705.2
Analyzer Background	9.1	10.5	Flow	0.424	0.427
Analyzer Coefficient	1.254	1.239	Intensity	92	91
Analyzer make	Thermo 43i		Analyzer serial #	1118148499	

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6000	0.0	0.0	-0.1	----
as found span	5000	82.8	799.8	807.7	0.990
calibrator zero	5000	0.0	0.0	-0.6	----
high point	5000	82.8	799.8	798.7	1.001
second point	5000	41.4	399.9	400.6	0.998
third point	5000	20.7	200.0	199.0	1.005
as left zero	5000	0.0	0.0	-1.1	----
as left span	5000	82.8	799.8	793.3	1.008
Average Correction Factor					1.002

Corrected As found	807.8	Previous response	801.3	% change	-0.8%
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Notes:

Filter changed after as founds. Zero and span adjusted.

Calibration Performed By:

Devin Russell



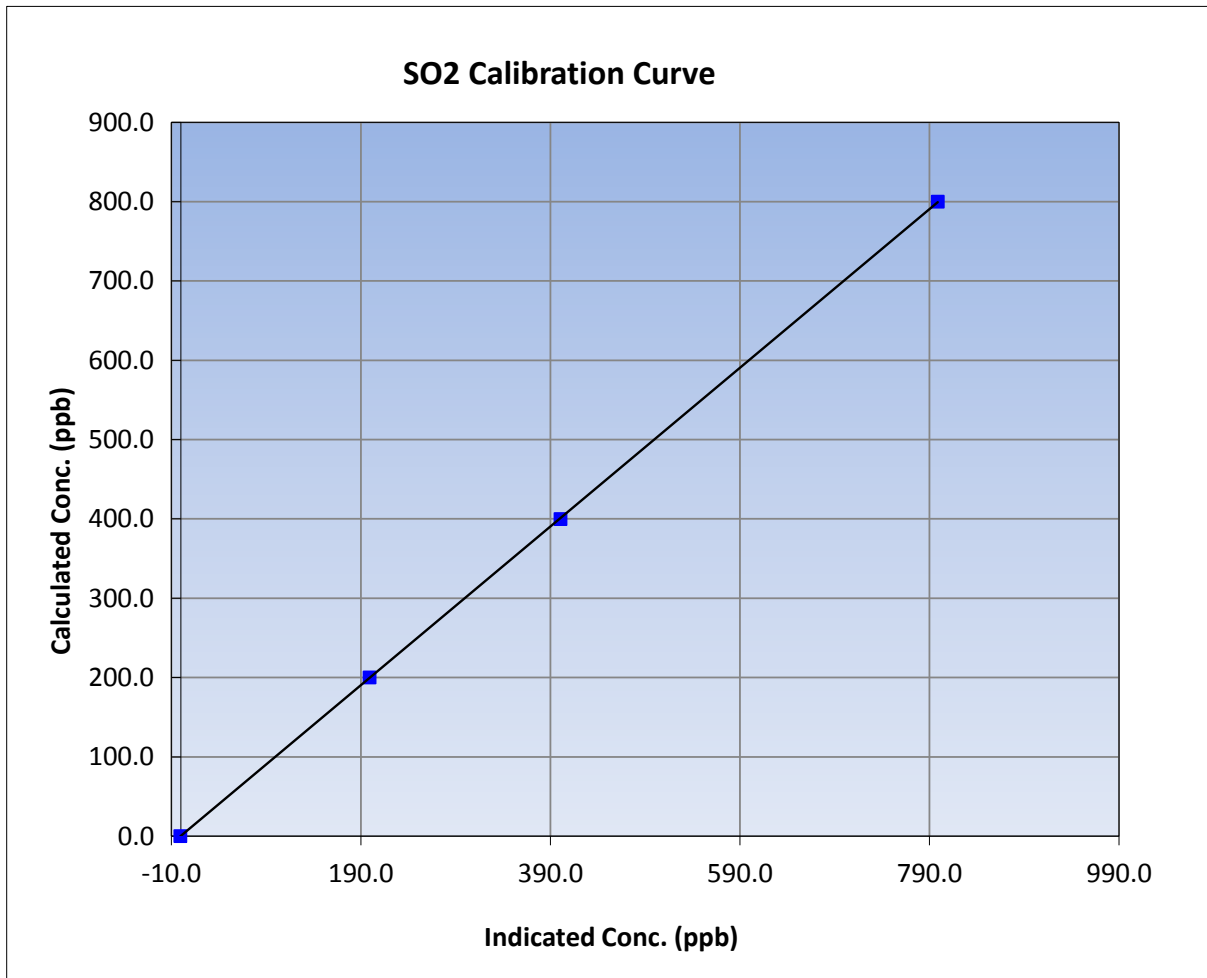
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	June 24, 2015	Previous Calibration	May 25, 2015
Station Name	Millennium	Station Number	AMS 12
Start Time (MST)	9:30	End Time (MST)	15:50
Analyzer make	Thermo 43i	Analyzer serial #	1118148499

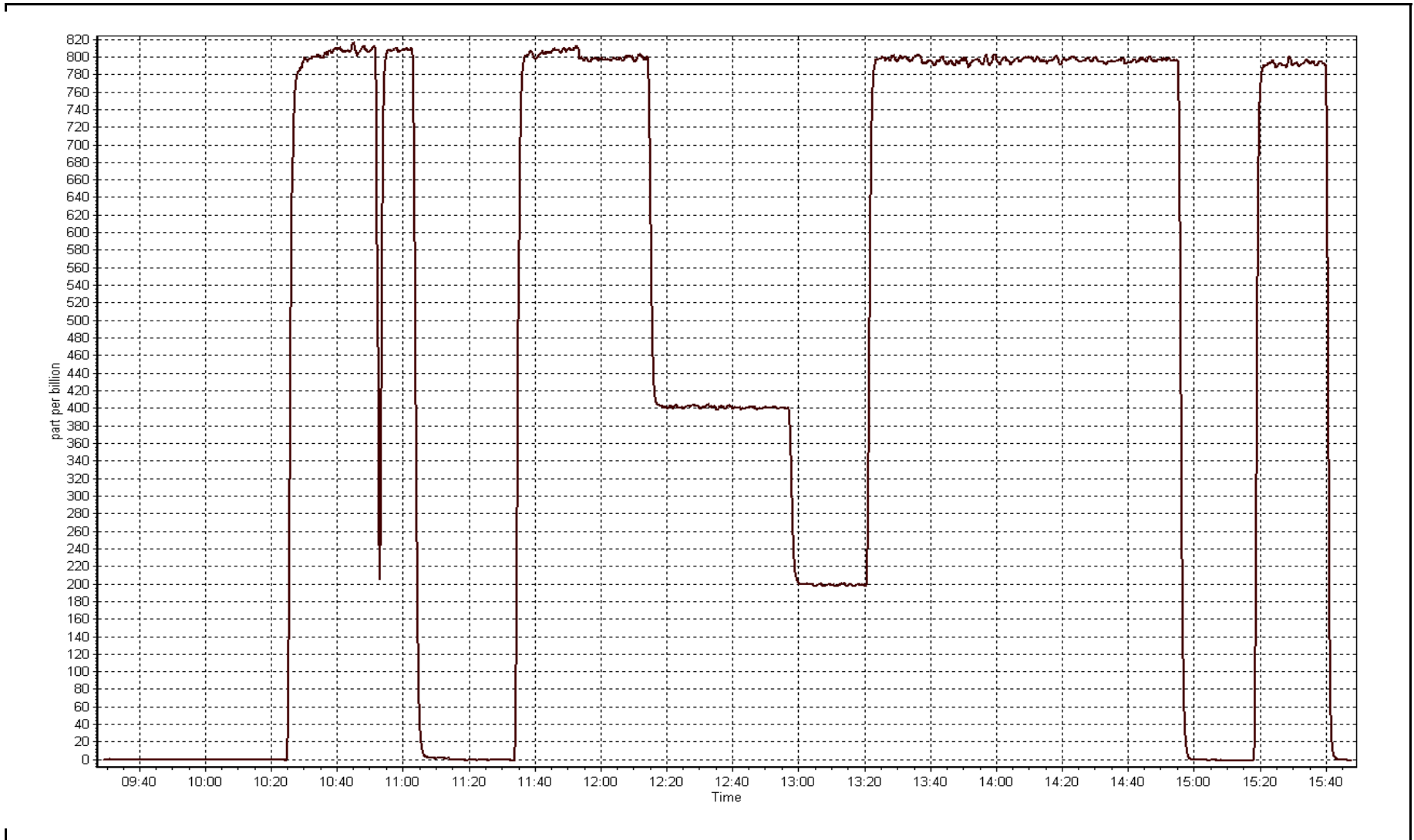
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.6	----	Correlation Coefficient	0.999995
799.8	798.7	1.0014		
399.9	400.6	0.9984	Slope	1.000364
200.0	199.0	1.0049		
			Intercept	0.373952



SO2 Calibration Plot

Date: June 24, 2015





Wood Buffalo Environmental Association TRS Calibration Report

Station Information

Calibration Date	June 15, 2015	Last Calibration	May 11, 2015
Station Name	Millenium Mine	Station Number	AMS 12
Reason:	Routine		
Start Time (MST)	10:00	End Time (MST)	14:05
Gas Cert Reference	LL84557	Station temp.	22 Deg C
Cal Gas Concentration	10.4 ppm	Cal Gas Exp Date	30/05/2013
Calibrator Make/Model	Sabio 4010	Serial Number	11091107
Dil air Make/Model	API 701	Serial Number	4889
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2581
SO2 gas concentration	48.3 ppm	SO2 gas cert/exp	LL104223 12/02/2018

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-597	-597
Analyzer IP address	192.168.1.42		Lamp voltage	887	883
Calculated slope	0.994129	0.999062	Chamber temp	44	44
Calculated intercept	0.039935	-0.053579	Pressure	685.0	689.0
Analyzer Background	19.2	19.6	Flow	0.603	0.606
Analyzer Coefficient	0.651	0.665	Intensity	47xxx	46xxx
			Converter temp.	817	817

Analyzer make/model	TEI 43C	Analyzer serial #	0509110887
Converter make/model	CDN-101	Converter serial #	375

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.1	----
as found span	5000	38.4	79.9	78.3	1.020
SO2 scrubber check	5000	20.7	200.0	0.7	----
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	38.5	80.1	80.2	0.999
second point	5000	19.2	39.9	40.0	0.997
third point	5000	9.6	20.0	20.1	0.994
as left zero	5000	0.0	0.0	0.4	----
as left span	5000	38.5	80.1	81.5	0.983
Average Correction Factor					0.997

Corrected As found	78.2	Previous response	80.3	% change	2.7%
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Notes:

Filter changed after as founds. Scrubber check completed after as founds. Span adjusted.

Calibration Performed By: Devin Russell



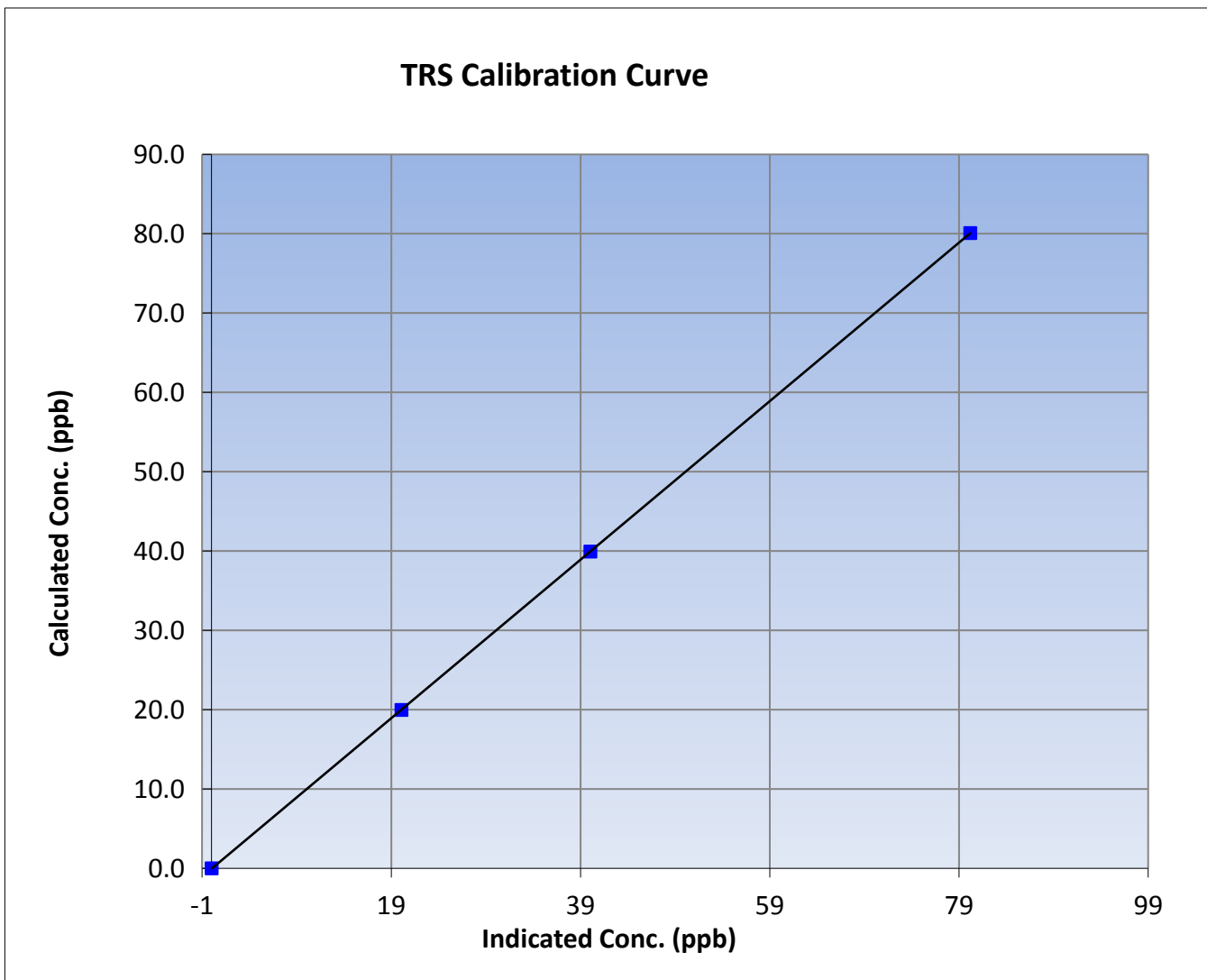
Wood Buffalo Environmental Association TRS Calibration Report

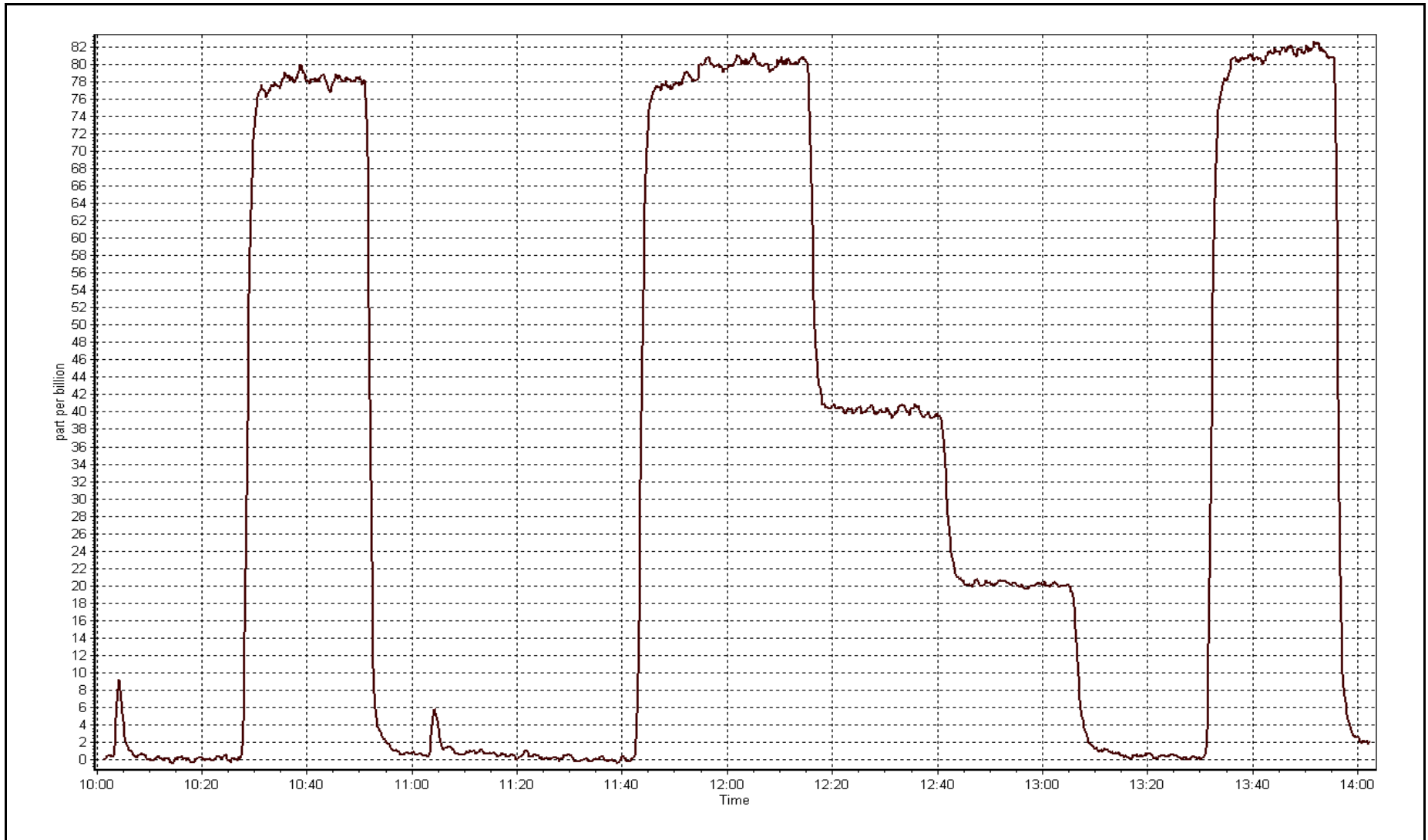
Station Information

Calibration Date	June 15, 2015	Previous Calibration	May 11, 2015
Station Name	Millenium Mine	Station Number	AMS 12
Start Time (MST)	10:00	End Time (MST)	14:05
Analyzer make	TEI 43C	Analyzer serial #	0509110887

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999999
80.1	80.2	0.9986		
39.9	40.0	0.9974	Slope	0.999062
20.0	20.1	0.9939		
			Intercept	-0.053579







Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	June-12-15	Last Calibration	May-25-15
Station Name	Millennium	Station Number	AMS 12
Reason:	Routine		
Start Time (MST)	9:05	End Time (MST)	13:00
Gas Cert Reference	LL104223	Cal Gas Expiry Date	12/02/2018
CH4 Cal Gas Conc.	489 ppm	CH4 Equiv Conc.	1017.0 ppm
C3H8 Cal Gas Conc.	192 ppm	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11091107
ZAG make/model	Teledyne API 701	Serial Number	4889
DACS make/model	Campbell Scientific CR3000	Serial Number	2581

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 50 ppm		Sample Pressure	11.8	11.8
Analyzer IP address	192.168.1.51		Air or Bypass Press	42.9	42.9
Calculated slope	0.999138	0.999138	Fuel Pressure	19.3	19.3
Calculated intercept	0.028383	0.028383	Analyzer Coeff	2.4	2.3
			Analyzer BKG	4.200	3.820
Analyzer make	Thermo 51i-LT		Analyzer serial #	1317958296	

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6000	0.0	0.00	-0.04	----
as found span	5000	82.8	16.84	15.00	1.123
calibrator zero	5000	0.0	0.00	0.06	----
high point	5000	82.8	16.84	16.88	0.998
second point	5000	41.4	8.42	8.49	0.992
third point	5000	20.7	4.21	4.27	0.986
as left zero	5000	0.0	0.00	0.05	----
as left span	5000	82.8	16.84	16.88	0.998
Average Correction Factor					0.992

Corrected As found	15.04	Previous response	16.83	% change	11.9%
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Notes:

As found span was 12.3% low. Pump was failing. Pump changed after as founds. Filter changed after as founds. H2 Cylinder changed after as founds. Zero and span adjusted.

Calibration Performed By:

Devin Russell



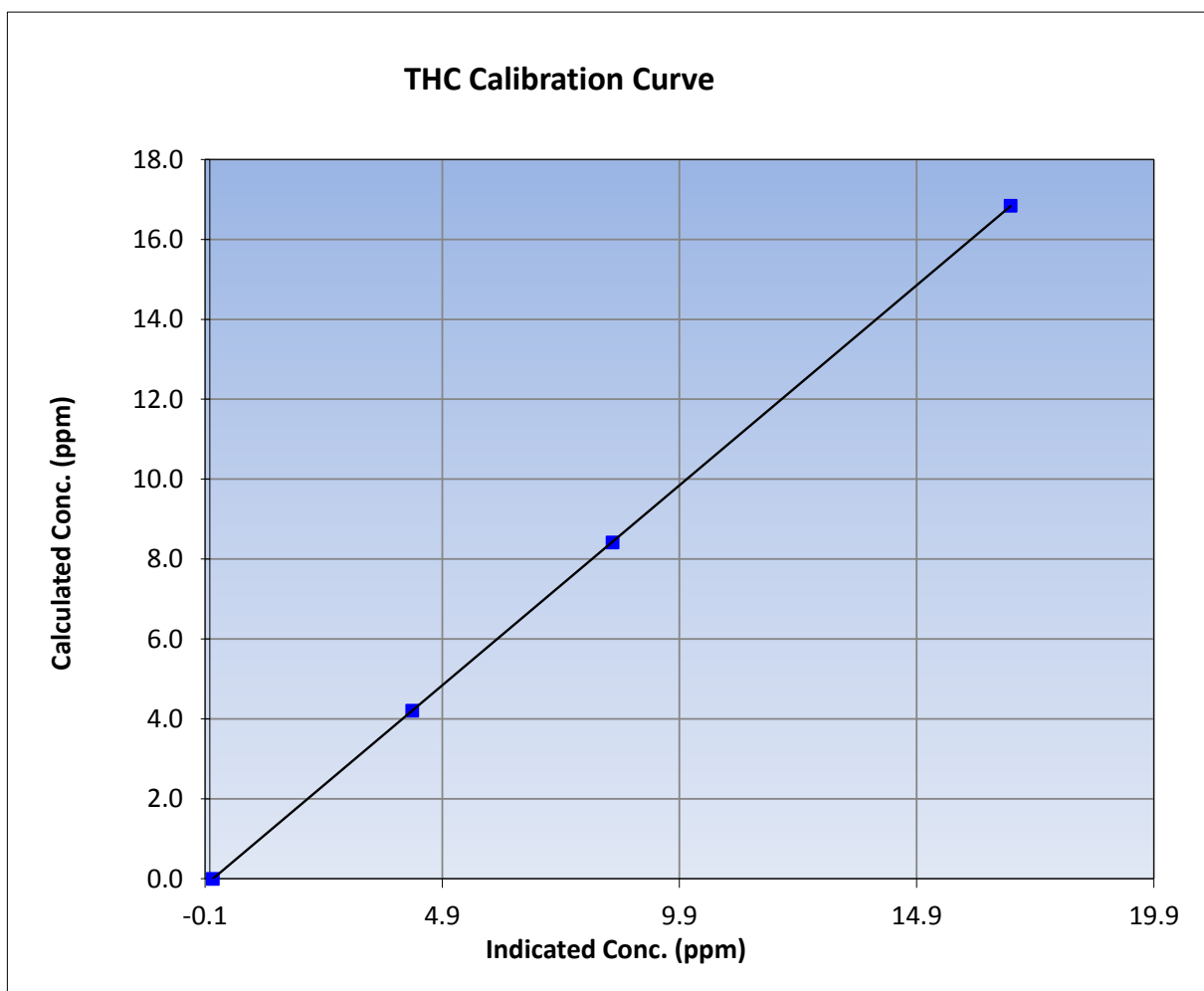
Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	June 12, 2015	Previous Calibration	May 25, 2015
Station Name	Millennium	Station Number	AMS 12
Start Time (MST)	9:05	End Time (MST)	13:00
Analyzer make	Thermo 51i-LT	Analyzer serial #	1317958296

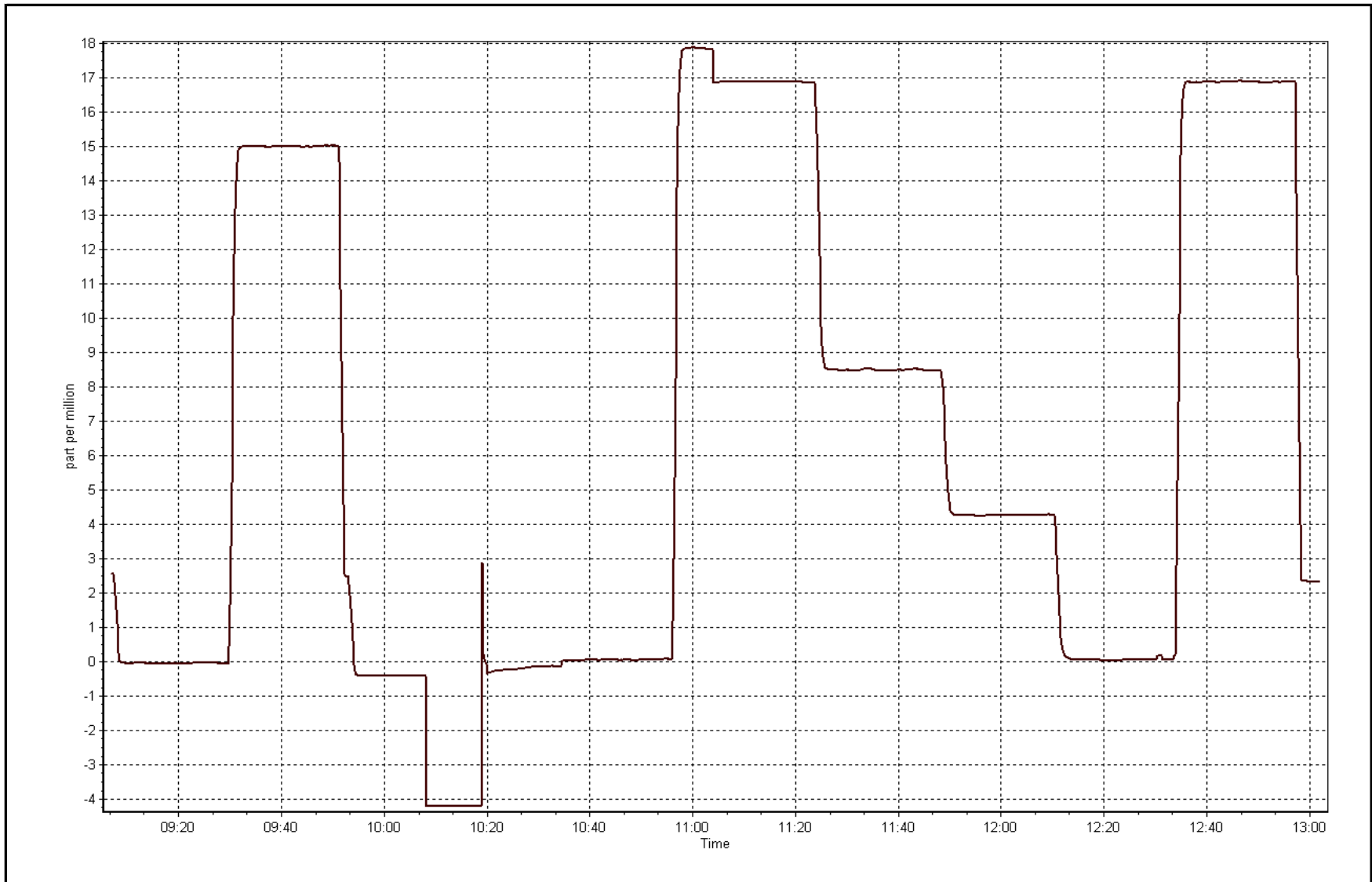
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.06	----	Correlation Coefficient	0.999998
16.84	16.88	0.9977		
8.42	8.49	0.9918	Slope	1.001244
4.21	4.27	0.9860		
			Intercept	-0.066069



THC Calibration Plot

Date: June 12, 2015





Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	June 24, 2015	Previous Calibration	May 25, 2015
Station Name	Millennium	Station Number	AMS 12
Reason:	Routine		
Start Time (MST)	9:30	End Time (MST)	15:50
NO Cal Gas Conc	48.3 ppm	Gas Cert Reference	LL104223
NOx Cal Gas Conc	48.3 ppm	Cal Gas Expiry Date	12/02/2018
Calibrator	Sabio 4010	Serial Number	11091107
Zero air Generator	Teledyne API T701	Serial Number	4889

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	2581
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Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.995964	0.999467	1.015134
	Data Offset	1.321209	0.742355	-0.753474
Current Calibration	Data Slope	0.995054	0.997129	1.001597
	Data Offset	0.694281	-0.495019	-0.552856

Analyzer Information

Analyzer make/model	API T200	Analyzer serial #	723
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Test Point	before		after	
		ppb		ppb
Concentration range	0-1000		0-1000	
NO coefficient	1.164		1.164	
NOx coefficient	1.163		1.164	
NO2 coefficient	1.000		1.000	
NO bkgrnd	0.8		0.9	
NOx bkgrnd	4.7		5.4	
Chamber Temp	50	Deg C	50	Deg C
Moly Temp	316.7	Deg C	315.6	Deg C
HVPS voltage	802	V	803	V
PMT Temp	6.9	Deg C	6.9	Deg C
O3 flow	86	ccm	86	ccm
R Cell press NO	3	mmHg	2.9	mmHg
R Cell Press Nox	2.9	mmHg	2.9	mmHg
NO sample flow	495	lpm	494	lpm
Nox sample Flow	500.000	lpm	499.000	lpm

Notes:

Filter and filter holder changed after as founds. Zero adjusted.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date:

June 24, 2015

Station Number:

AMS 12

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	6000	0.0	0.0	0.0	0.0	0.1	-0.5	0.6	----	----
as found span	5000	82.8	799.8	799.8	0.0	802.0	800.1	1.8	0.9974	0.9996
calibrator zero	5000	0.0	0.0	0.0	0.0	-1.4	-0.5	-1.0	----	----
high point	5000	82.8	799.8	799.8	0.0	801.9	801.4	0.5	0.9975	0.9980
second point	5000	41.4	399.9	399.9	0.0	404.2	404.2	0.0	0.9895	0.9894
third point	5000	20.7	200.0	200.0	0.0	199.3	200.6	-1.3	1.0035	0.9969
as left zero	5000	0.0	0.0	0.0	0.0	-1.4	0.1	-1.6	----	----
as left span	5000	82.8	799.8	465.4	334.4	807.4	524.9	282.4	0.9907	0.8866
Average Correction Factor									0.9968	0.9948

Corrcctd As found NO_x= 801.9 NO= 800.7 Percent Change NO_x= 0.0% NO= -0.1%
 Previous Response NO_x= 801.8 NO= 799.5

GPT Calibration Data

Dilution Flow 5000 ccm Source Gas Flow 82.80 ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
Cal zero			0.0			-1.0			N/A	
1st NO2 (300)	----	465.4	339.1	804.0	465.4	338.4	0.9786	1.0000	1.0020	99.8%
2nd NO2 (200)	----	615.9	188.6	805.0	615.9	189.1	0.9774	1.0000	0.9972	100.3%
3rd NO2 (100)	----	712.4	92.1	806.8	712.4	94.4	0.9752	1.0000	0.9753	102.5%
4th NO2 (0)	804.5	----	-0.1	804.4	804.5	-0.1	0.9781	1.0000	N/A	----
Average Correction Factor							0.9773	1.0000	0.9915	100.9%

Calibration Performed By: Devin Russell



Wood Buffalo Environmental Association

NO_x Calibration Summary

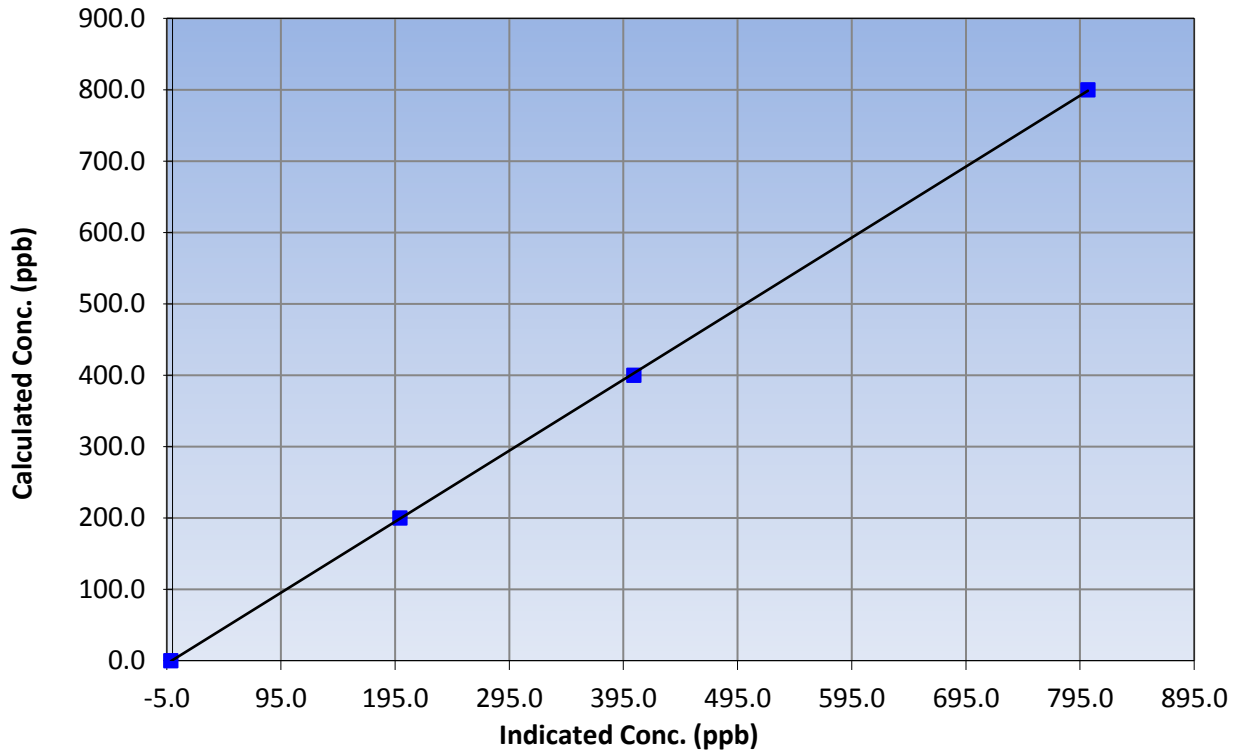
Station Information

Calibration Date	June 24, 2015	Previous Calibration	May 25, 2015
Station Name	Millennium	Station Number	AMS 12
Start Time (MST)	9:30	End Time (MST)	15:50
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	-1.4	----	Correlation Coefficient	0.999967
799.8	801.9	0.9975		
399.9	404.2	0.9895	Slope	0.995054
200.0	199.3	1.0035		
			Intercept	0.694281

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

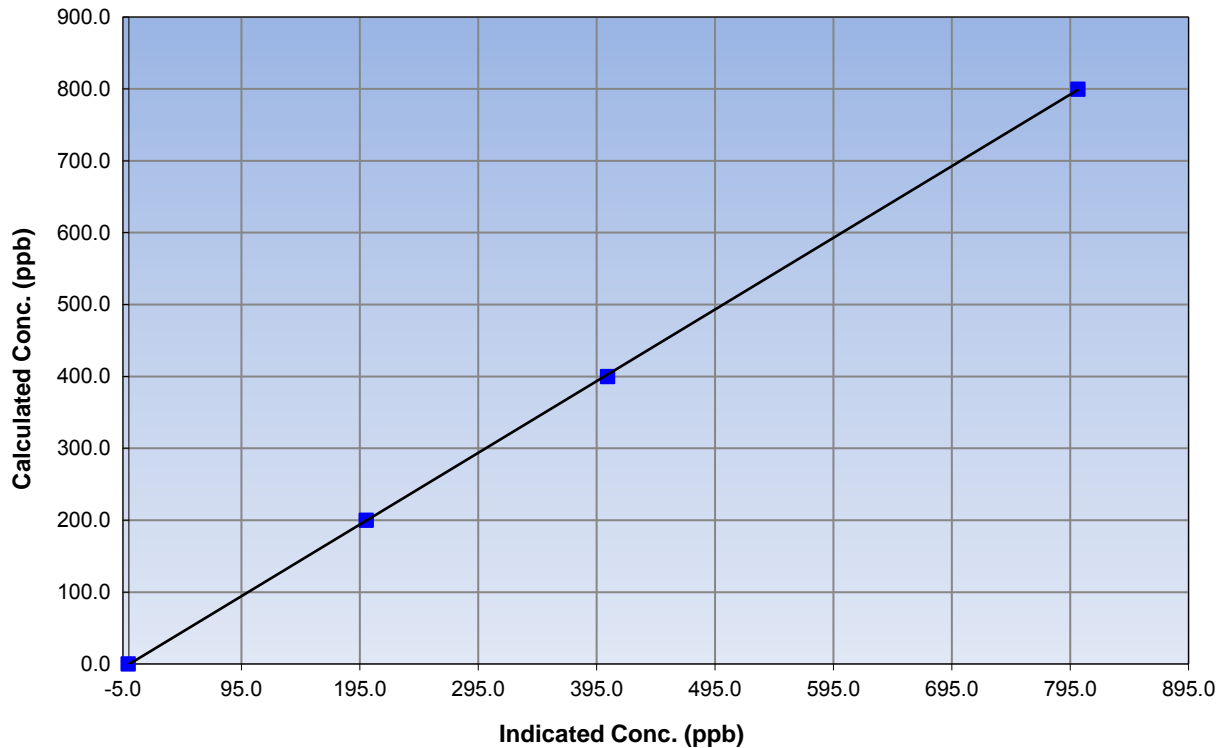
Station Information

Calibration Date	June 24, 2015	Previous Calibration	May 25, 2015
Station Name	Millennium	Station Number	AMS 12
Start Time (MST)	9:30	End Time (MST)	15:50
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	-0.5	N/A	Correlation Coefficient	0.999973
799.8	801.4	0.9980		
399.9	404.2	0.9894	Slope	0.997129
200.0	200.6	0.9969		
			Intercept	-0.495019

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

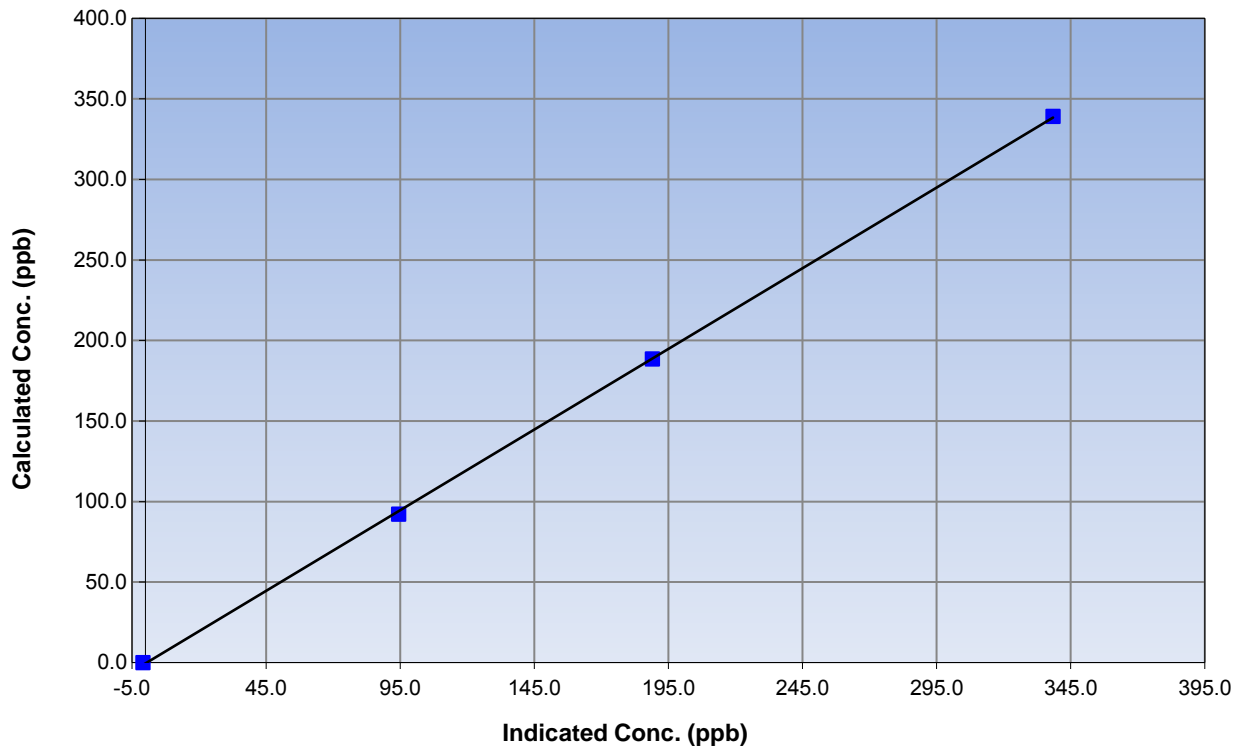
Station Information

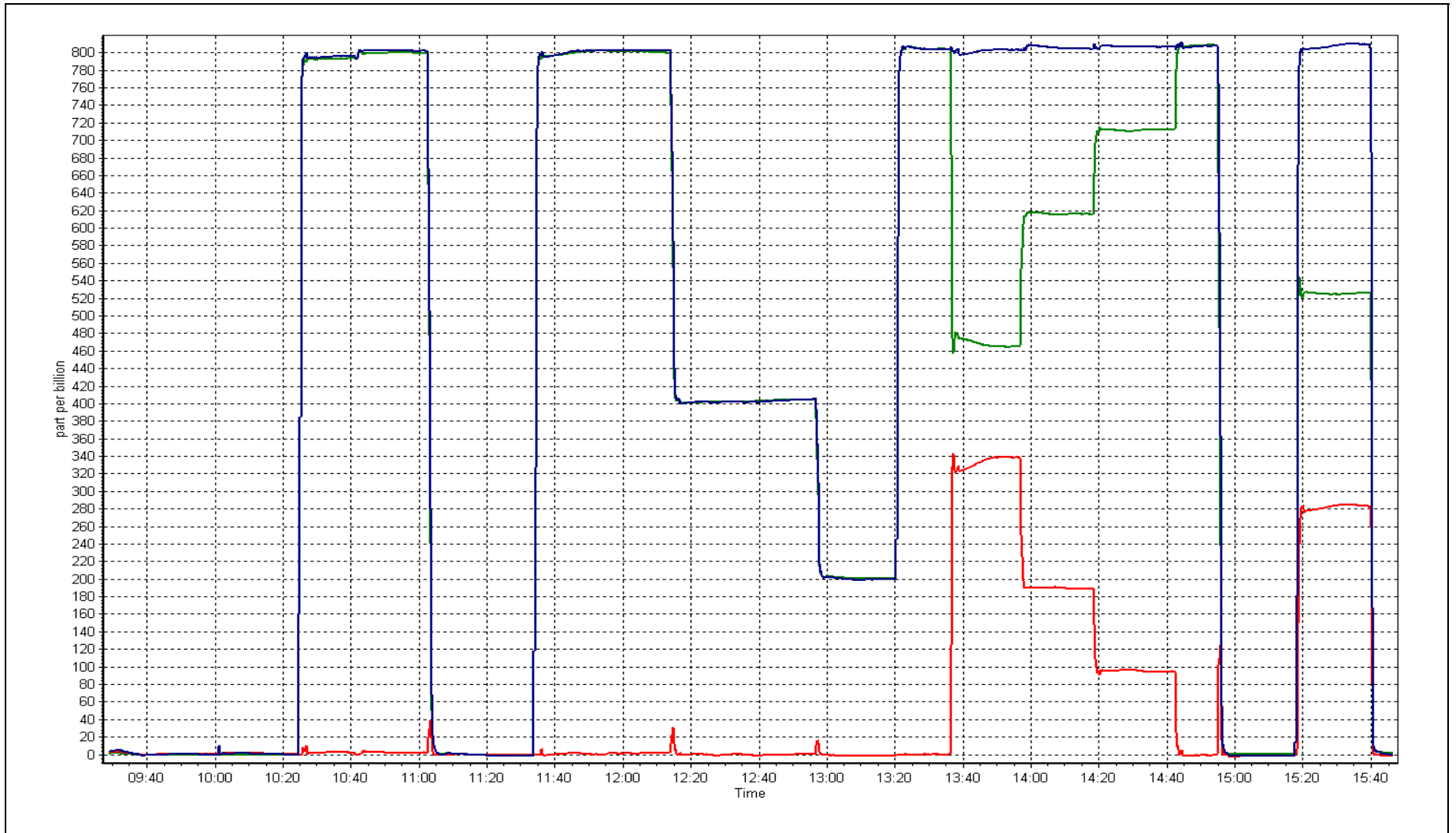
Calibration Date	June 24, 2015	Previous Calibration	May 25, 2015
Station Name	Millennium	Station Number	AMS 12
Start Time (MST)	9:30	End Time (MST)	15:50
Analyzer make	API T200	Analyzer serial #	723

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-1.0	N/A	Correlation Coefficient	0.999896
339.1	338.4	1.0020		
188.6	189.1	0.9972	Slope	1.001597
92.1	94.4	0.9753		
			Intercept	-0.552856

NO₂ Calibration Curve







Wood Buffalo Environmental Association

SHARP CONFORMANCE TEST

STATION INFORMATION

Calibration Date:	<u>June 24, 2015</u>	Previous Calibration:	<u>May 25, 2015</u>
Station Name:	<u>Millennium</u>	Station Number:	<u>AMS 12</u>
Start Time (MST):	<u>10:00</u>	End Time (MST):	
Calibrator Make/Model:	<u>Delta Cal</u>	Calibrator Serial Number:	<u>1212</u>

SHARP INFORMATION

Particulate Fraction:	<u>PM2.5</u>
Make/Model:	<u>Thermo / SHARP 5030</u>
Serial Number	<u>E-1486</u>
Source SN:	<u>5691</u>
HEPA PN:	<u>12144</u>
Time Correct (MST):	<u>Yes</u>
Parameters Checked:	<u>T1, T2, T2,T4, P3, Main Flow, Beta, Neph</u>

AUDIT DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	25.0	24.5	-0.5	25.0
T2	31.0	na	na	31.0
T3	26.0	na	na	26.0
T4	39.0	na	na	39.0
RH (%)	39.0	na	na	39.0

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	971	971.3	0.3	971

Main Flow (Lph)

Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
1000	991	-9	1000	1000

Nephelometer Calibration

Parameter	As Found	adjusted (Limit +/- 2.0ug/m3)	As Left
Analog	200		199
Neph	-0.4		-0.6
C14	41.5	NO	382
Indicated Concentration (ug/m3)	-0.2		-1.1
Offset 1	200.6		200.6
Offset 2	33.8		33.8

Leak Check (Quarterly)

Leak Check Date:	<u>April 30, 2015</u>	Previous Leak Check Date:	
	<u>Measured</u>	<u>Difference LPM (Limit +/- 0.42 LPM)</u>	
Flow without adaptor (LPM):	16.71		
Flow with adaptor [turn off pump first](LPM):	16.69	0.02	

Mass Foil Calibration (Annualy)

Foil Calibration Date:	<u>NA</u>	Previous Foil Calibration:	<u>March 27, 2015</u>
Zeroed?:	<u>No</u>		
Foil Mass:			<u>Mass foil set S/N:</u>
Previous Correction Factor:			
New Correction Factor:			

INSPECTION DATA

Item	Condition	Date of install or rebuild
Cyclone	Good / Replaced	25/05/2015
Pump	Needs Testing	NA
Filter Tape	Good	NA
Mass Foil Cal Set	Good	NA
HEPA filter	Good	NA

NOTES:

Cyclone head changed. Flow jumping back and forth between 960 and 1050 LPM.

Audit Performed By: Devin Russell/Ryan Power



Wood Buffalo Environmental Association

SHARP CONFORMANCE TEST

STATION INFORMATION

Calibration Date:	<u>June 24, 2015</u>	Previous Calibration:	<u>n/a</u>
Station Name:	<u>Millennium</u>	Station Number:	<u>AMS 12</u>
Start Time (MST):	<u>12:56</u>	End Time (MST):	<u>15:25</u>
Calibrator Make/Model:	<u>Delta Cal</u>	Calibrator Serial Number:	<u>1212</u>

SHARP INFORMATION

Particulate Fraction:	<u>PM2.5</u>
Make/Model:	<u>Thermo / SHARP 5030</u>
Serial Number:	<u>E-772</u>
Source SN:	<u>4085</u>
HEPA PN:	<u>12144</u>
Time Correct (MST):	<u>Yes</u>
Parameters Checked:	<u>T1, T2, T2,T4, P3, Main Flow, Beta, Neph</u>

AUDIT DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	31.0	29.5	-1.5	31.0
T2	27.0	na	na	27.0
T3	27.0	na	na	27.0
T4	31.0	na	na	31.0
RH (%)	25.0	na	na	25.0

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	971	969.3	-1.8	971

Main Flow (Lph)

Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
1000	1051	51	1005	1000

Nephelometer Calibration

Parameter	As Found	adjusted (Limit +/- 2.0ug/m3)	As Left
Analog	225		227
Neph	2.5		0
C14	790.7	Yes	768.7
Indicated Concentration (ug/m3)	1.9		0
Offset 1			225.8
Offset 2			34.1

Leak Check (Quarterly)

Leak Check Date:	<u>June 24, 2015</u>	Previous Leak Check Date:	
	<u>Measured</u>	<u>Difference LPM (Limit +/- 0.42 LPM)</u>	
Flow without adaptor (LPM):	16.79		
Flow with adaptor [turn off pump first](LPM):	15.80	0.99	

Mass Foil Calibration (Annualy)

Foil Calibration Date:	<u>NA</u>	Previous Foil Calibration:	<u>March 27, 2015</u>
Zeroed?:	<u>No</u>		
Foil Mass:			<u>Mass foil set S/N:</u>
Previous Correction Factor:			
New Correction Factor:			

INSPECTION DATA

Item	Condition	Date of install or rebuild
Cyclone	Good / Replaced	24/06/2015
Pump	Needs Testing	NA
Filter Tape	Good	NA
Mass Foil Cal Set	Good	NA
HEPA filter	Good	NA

NOTES:

Install conformance test. Flow adjusted to 1000 lpm. Leak check performed; failed. Inlet o-ring replaced, Tape chamber cleaned, tape moved ahead. Leak check performed again. Neph zeroed.

Audit Performed By: Devin Russell



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 13
FORT MCKAY SOUTH
JUNE 2015**

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

July 30, 2015



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT MCKAY SOUTH (AMS 13)
 JUNE 2015

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	684	35	36	99.86	30	0	8	0
TRS(ppb) Average	684	36	36	100.00	1	0	0	0
THC(ppm) Average	676	43	44	99.86	3.3	-	2.6	-
O3(ppb) Average	686	34	34	100.00	62	0	38	-
NO2(ppb) Average	684	35	36	99.86	24	0	5	-
NO(ppb) Average	684	35	36	99.86	17	-	2	-
NOX(ppb) Average	684	35	36	99.86	32	-	6	-
PM2.5(ug/m3) Average	715	0	5	99.31	155	-	123.6	2
ET(C) Average	720	0	0	100.00	32.7	-	22.8	-
RH(%) Average	720	0	0	100.00	98	-	75.0	-
WS(km/h) Average	720	0	0	100.00	20	-	12.0	-
WD(deg) Average	720	0	0	100.00	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT MCKAY SOUTH (AMS 13)
 JUNE 2015

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2(ppb) Average	684	1.7	4	-	0	0	1	1	1	4	30
TRS(ppb) Average	684	0.2	0	-	0	0	0	0	0	0	1
THC(ppm) Average	676	2.23	0.2	-	1.9	2	2.1	2.2	2.3	2.4	3.3
O3(ppb) Average	686	23.9	14	-	0	5	12	24	34	42	62
NO2(ppb) Average	684	2.4	3	-	0	0	1	1	3	6	24
NO(ppb) Average	684	0.5	2	-	0	0	0	0	0	2	17
NOX(ppb) Average	684	2.9	4	-	0	0	1	2	4	7	32
PM2.5(ug/m3) Average	715	15.53	26.2	-	0	2.5	4.2	7.6	13.5	30.9	155
Temperature 2 m (C) Average	720	16.5	6.9	-	-2.6	8.2	11.4	16.2	21.1	26	32.7
Relative Humidity (%) Average	720	58.8	23	-	19	28	38	58	79	91	98
Wind Speed 10 m (km/h) Average	720	5.5	4	-	0	2	2	5	8	11	20
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION -FORT McKAY SOUTH (AMS 13)
JUNE 2015

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2, THC, NO2, NO, NOX	12 Jun 2015 07:00	12 Jun 2015 07:00	1	Maintenance - cleaned glass manifold
PM2.5	16 Jun 2015 10:00	16 Jun 2015 11:00	2	Maintenance - Flow and zero check, sample head cleaning
PM2.5	16 Jun 2015 18:00	16 Jun 2015 19:00	2	Unstable operation - baseline drift
PM2.5	17 Jun 2015 11:00	17 Jun 2015 11:00	1	Unstable operation - baseline drift



Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 30 ppb on Jun 2 12:00	Maximum Daily Average: 8.2 ppb on Jun 2		Hours of Data:	684
Minimum Value: 0 ppb on Jun 17 02:00	Minimum Daily Average: 0.3 ppb on Jun 9		Hours of Missing Data:	36
Maximum Diurnal Average: 4.2 ppb at hour 12	Minimum Diurnal Average: 0.6 ppb at hour 2		Hours of Calibration:	35
Monthly Average: 1.7 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 1 Q ₃ = 1 P ₉₀ = 4 P ₉₉ = 22		Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	1	1	Z	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	1	0	0	0	0.6	1
2-Jun	0	0	0	Z	0	0	0	0	2	21	28	30	23	22	17	14	9	4	5	4	2	2	1	1	8.2	30
3-Jun	1	1	1	0	Z	1	1	12	27	13	18	24	10	9	4	7	6	4	2	2	1	1	1	1	6.3	27
4-Jun	1	1	1	1	1	Z	3	5	5	2	3	9	6	5	4	1	3	1	4	6	1	1	1	1	2.8	9
5-Jun	Z	1	1	1	1	1	2	2	2	2	1	1	1	1	1	1	1	1	1	8	6	2	1	1	1.6	8
6-Jun	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
7-Jun	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	1	1	1	1	0.6	1
8-Jun	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	0.6	1
9-Jun	1	1	1	1	Z	1	1	1	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.3	1
10-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0.3	1
11-Jun	Z	1	0	0	0	0	1	2	2	3	5	14	16	6	0	0	0	0	0	3	6	4	1	2	3.1	16
12-Jun	0	Z	0	0	0	0	M	0	0	0	0	0	0	2	7	9	1	0	1	1	1	1	1	1	1.2	9
13-Jun	1	1	Z	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	0.7	1
14-Jun	1	1	1	Z	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	2	1	0	0	0.6	2
15-Jun	0	0	0	0	Z	0	1	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0.5	1
16-Jun	1	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
17-Jun	Z	0	1	1	0	0	0	0	0	0	0	1	2	3	1	0	5	12	10	5	4	3	1	1	2.2	12
18-Jun	1	Z	1	1	1	1	4	20	14	8	2	6	9	7	5	2	4	2	1	1	1	1	1	1	4.0	20
19-Jun	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	0.6	1
20-Jun	1	1	1	Z	1	1	1	1	5	7	4	7	3	3	5	3	3	1	1	0	1	1	0	1	2.1	7
21-Jun	1	0	1	1	Z	1	1	1	1	1	17	12	7	6	5	4	3	1	0	2	2	1	1	1	2.8	17
22-Jun	0	0	0	1	1	Z	1	1	4	5	3	2	2	1	1	1	1	1	1	1	1	1	1	1	1.2	5
23-Jun	Z	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	4	1	1	1	1	1.0	4
24-Jun	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.8	1
25-Jun	1	1	Z	1	1	1	1	1	1	1	1	4	7	16	4	29	1	1	1	1	1	0	0	0	3.1	29
26-Jun	0	0	0	Z	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	0.5	1
27-Jun	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.6	1
28-Jun	1	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1
29-Jun	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
30-Jun	1	Z	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	0.9	2

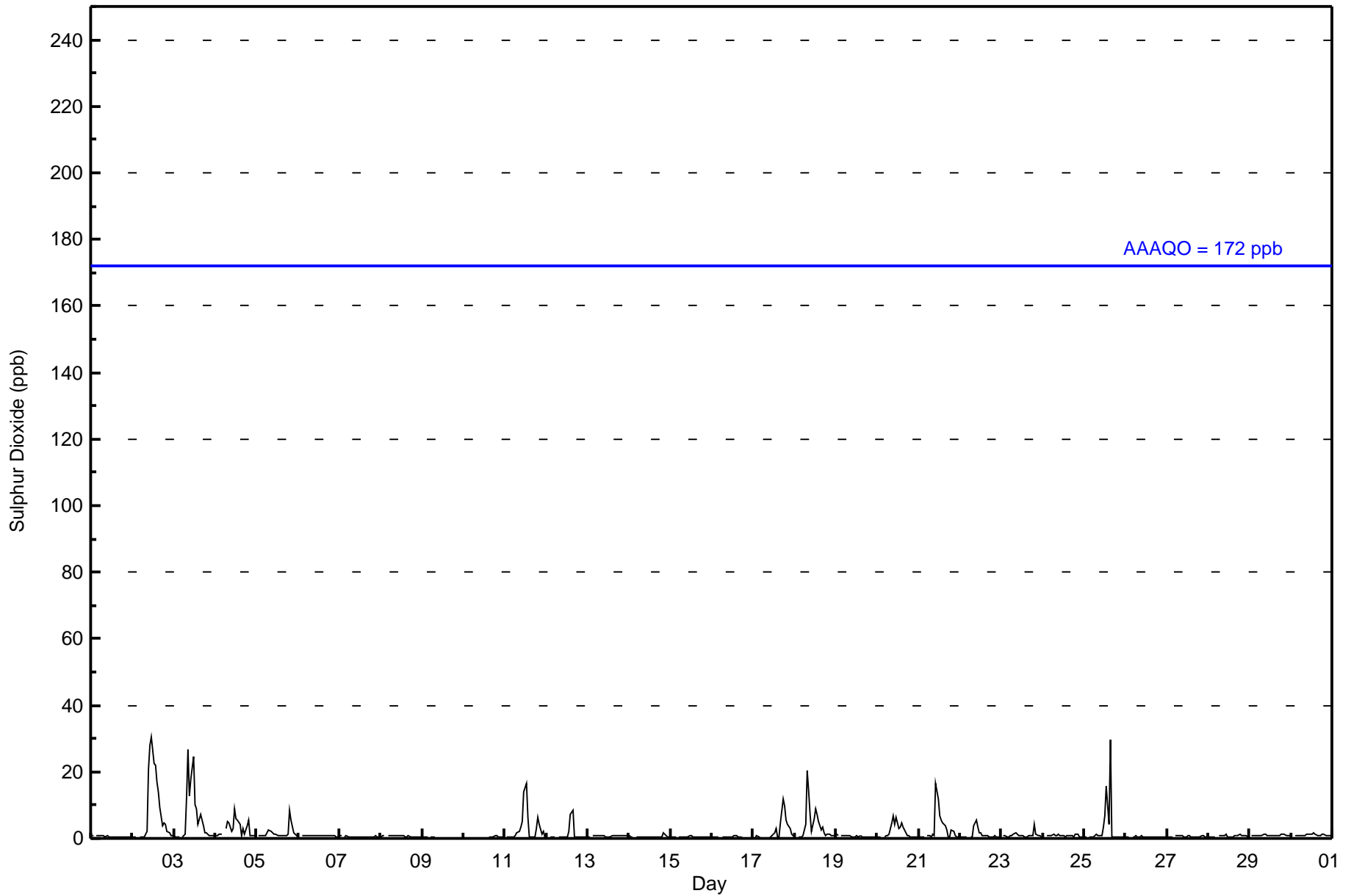
0.6	0.6	0.6	0.6	0.6	0.6	0.9	1.9	2.6	2.6	3.2	4.2	3.3	3.1	2.1	2.8	1.5	1.2	1.3	1.8	1.2	0.8	0.7	0.6	Diurnal Average	
1	1	1	1	1	1	4	20	27	21	28	30	23	22	17	29	9	12	10	8	6	3	2	1	Diurnal Maximum	

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 (SO₂) - ppb
Fort McKay South - June 2015





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Fort McKay South - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	663	96.93	96.93
11 - 20	13	1.90	98.83
21 - 60	8	1.17	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Fort McKay South - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	77	48	20	9	12	12	17	31	66	53	68	77	41	46	45	41	663
11 - 20	0	0	1	0	1	1	3	6	0	0	1	0	0	0	0	0	13
21 - 60	0	0	0	0	1	2	4	0	0	0	0	0	0	0	0	1	8
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	77	48	21	9	14	15	24	37	66	53	69	77	41	46	45	42	684

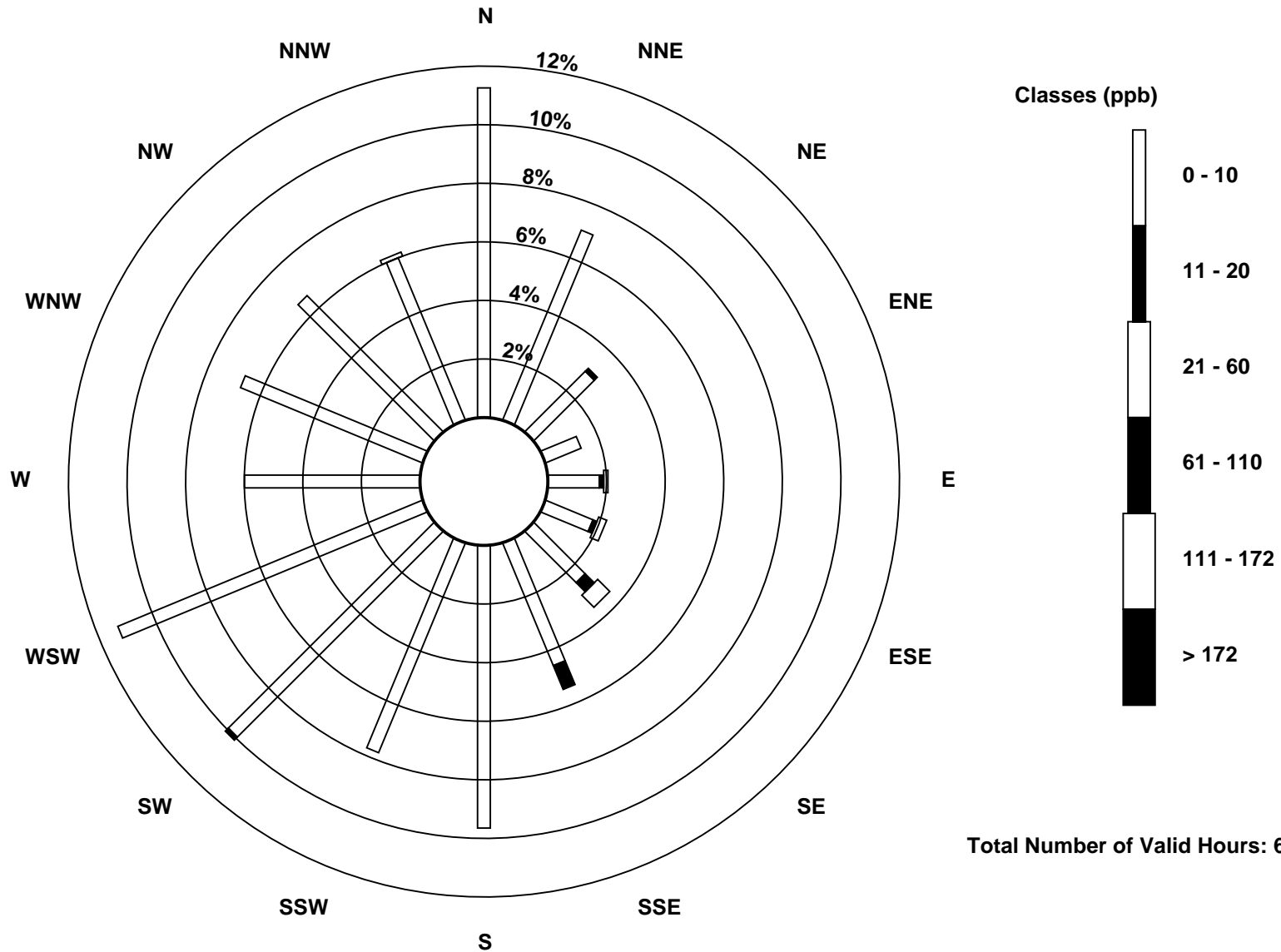
Total Number of Valid Hours: 684

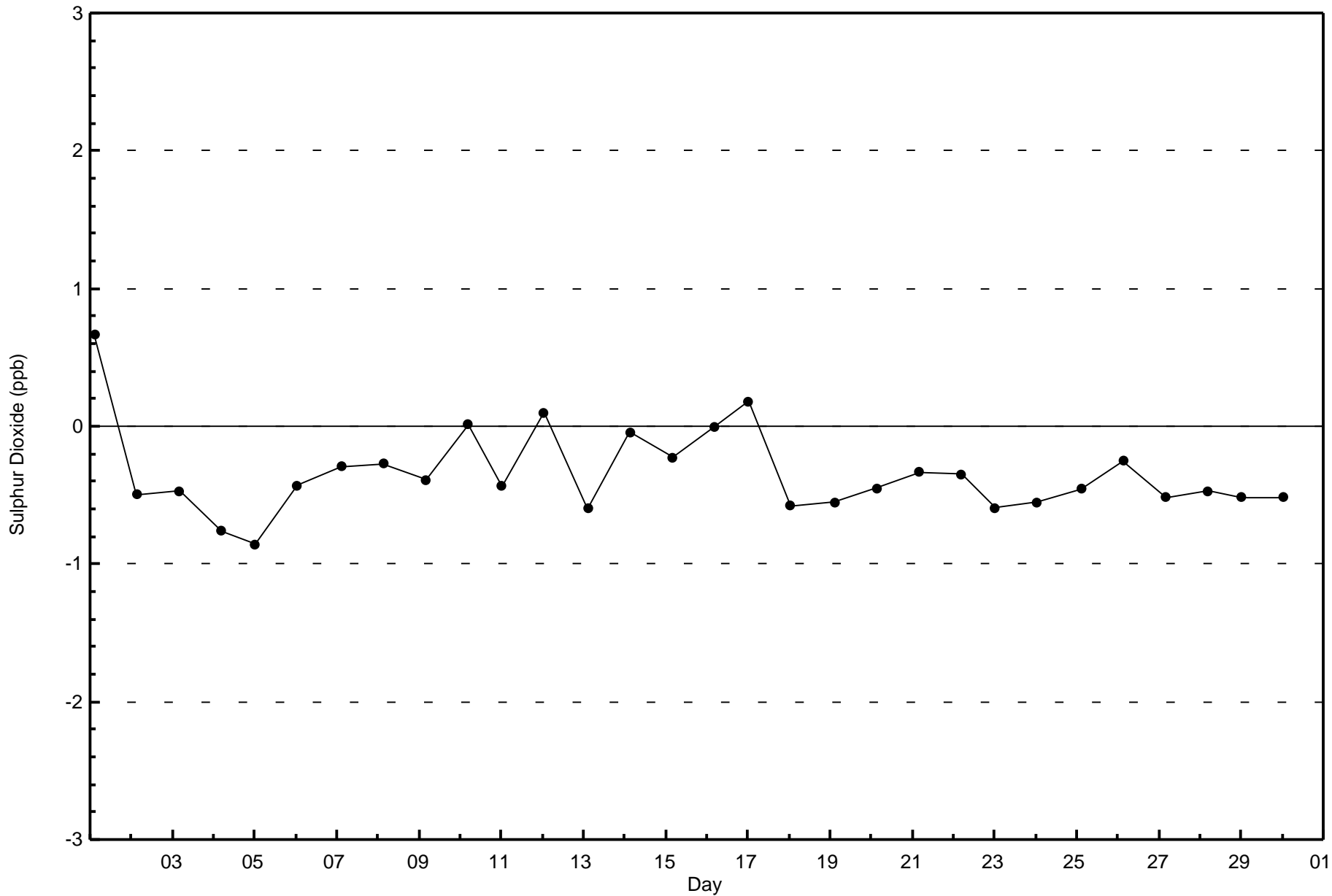
Total Number of Hours: 720

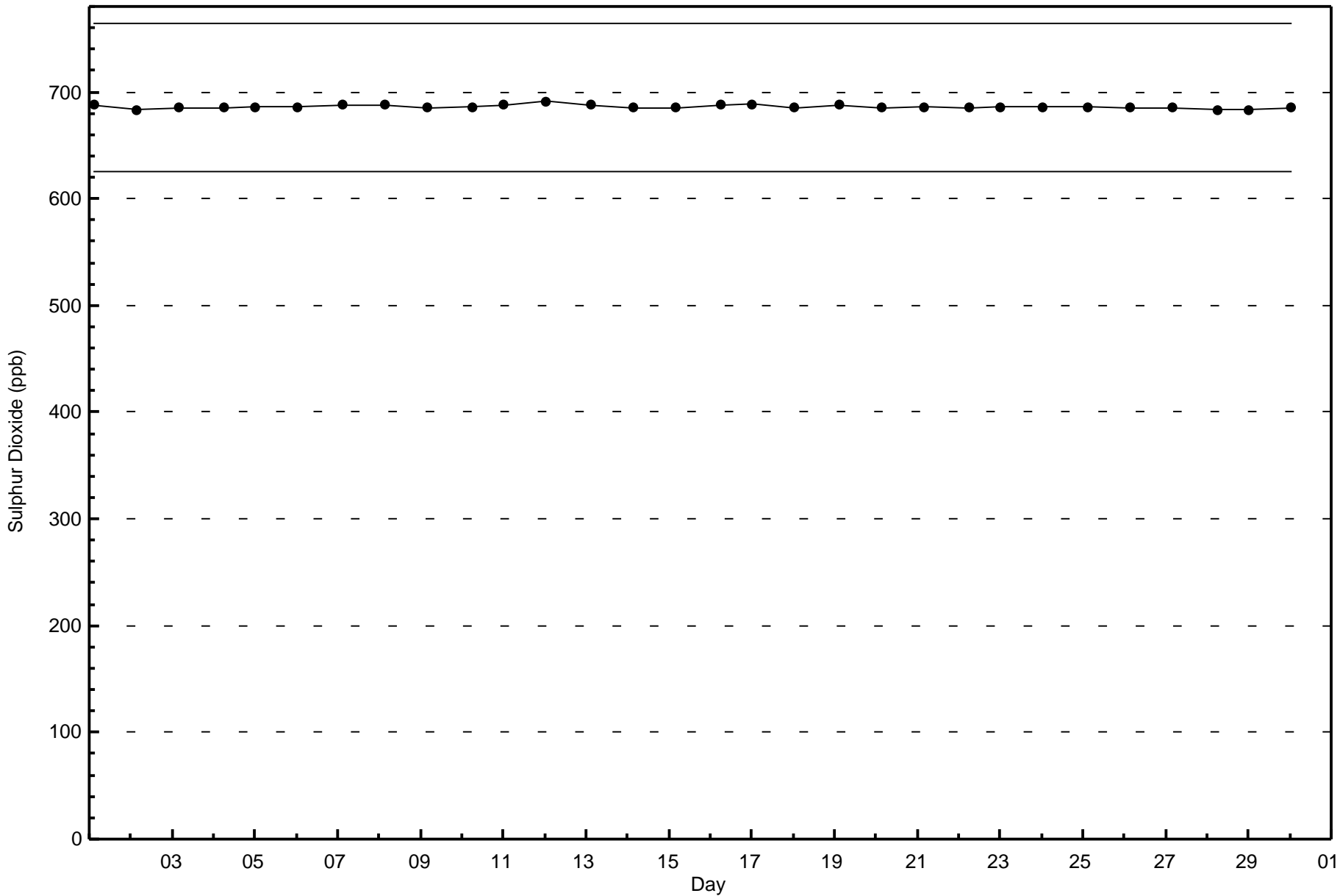


Wood Buffalo Environmental Association
Wind Rose Jun 2015

Sulphur Dioxide (SO₂) - ppb
Fort McKay South (AMS 13)







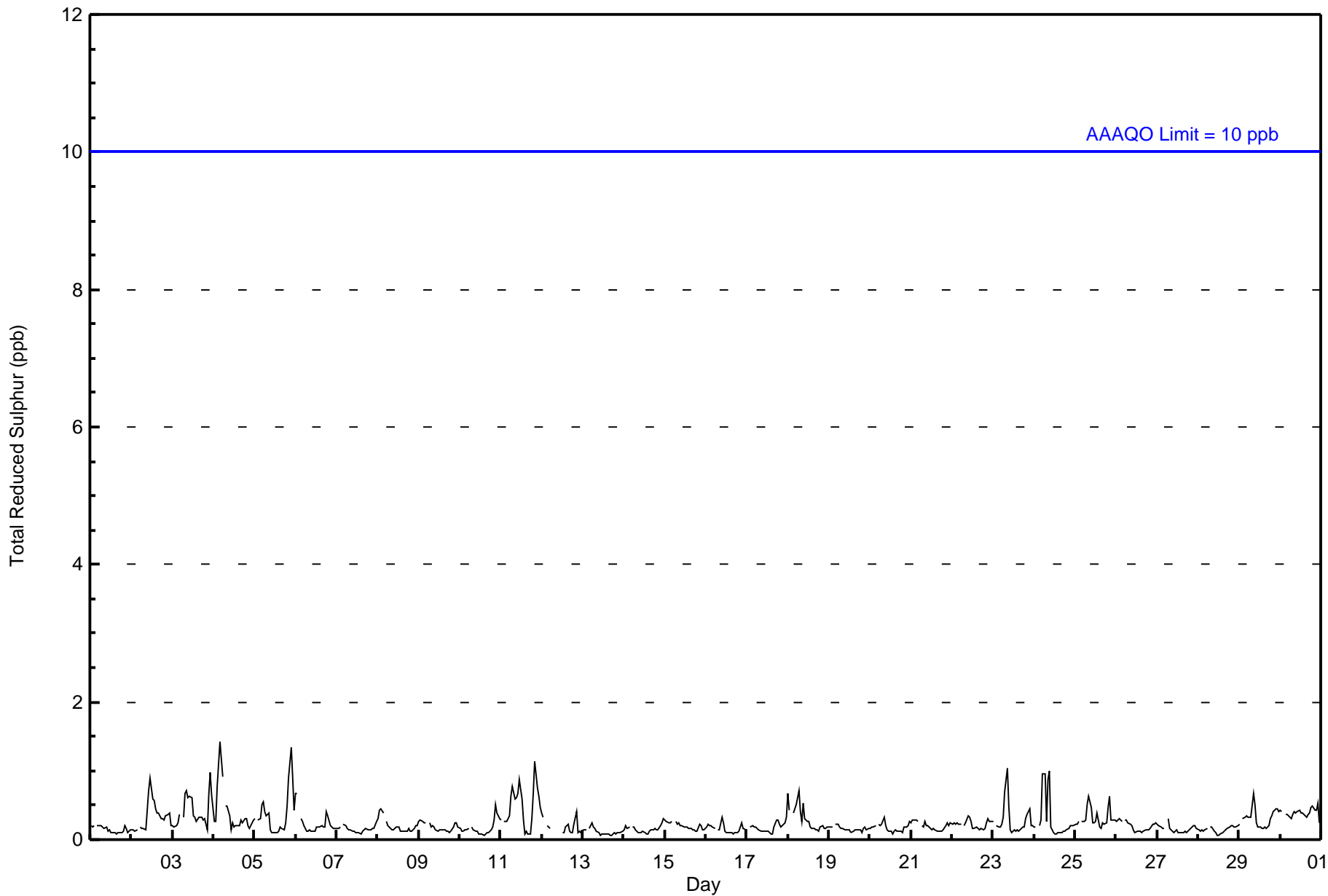


Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 1 ppb on Jun 4 05:00	Maximum Daily Average: 0.5 ppb on Jun 11		Hours of Data:	684
Minimum Value: 0 ppb on Jun 28 12:00	Minimum Daily Average: 0.1 ppb on Jun 13		Hours of Missing Data:	36
Maximum Diurnal Average: 0.3 ppb at hour 9	Minimum Diurnal Average: 0.1 ppb at hour 15		Hours of Calibration:	36
Monthly Average: 0.2 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1		Percent Operational Time:	100.0

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

0.3	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	Diurnal Average
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	Diurnal Maximum

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Fort McKay South - June 2015

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
Fort McKay South - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	78	49	21	8	12	15	24	36	69	55	69	76	40	47	44	41	684
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	78	49	21	8	12	15	24	36	69	55	69	76	40	47	44	41	684

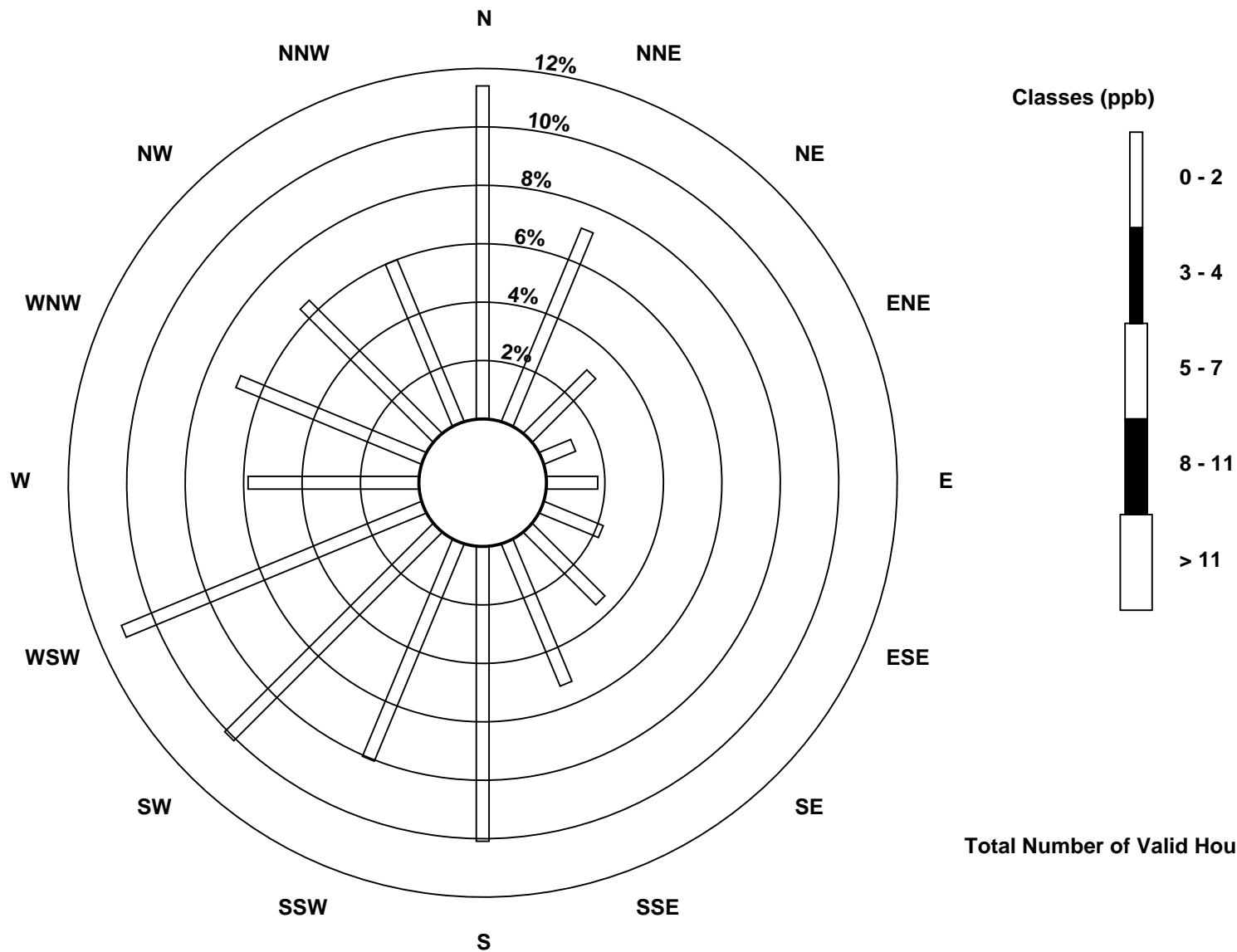
Total Number of Valid Hours: 684

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

Total Reduced Sulphur (TRS) - ppb
Fort McKay South (AMS 13)



Total Number of Valid Hours: 684

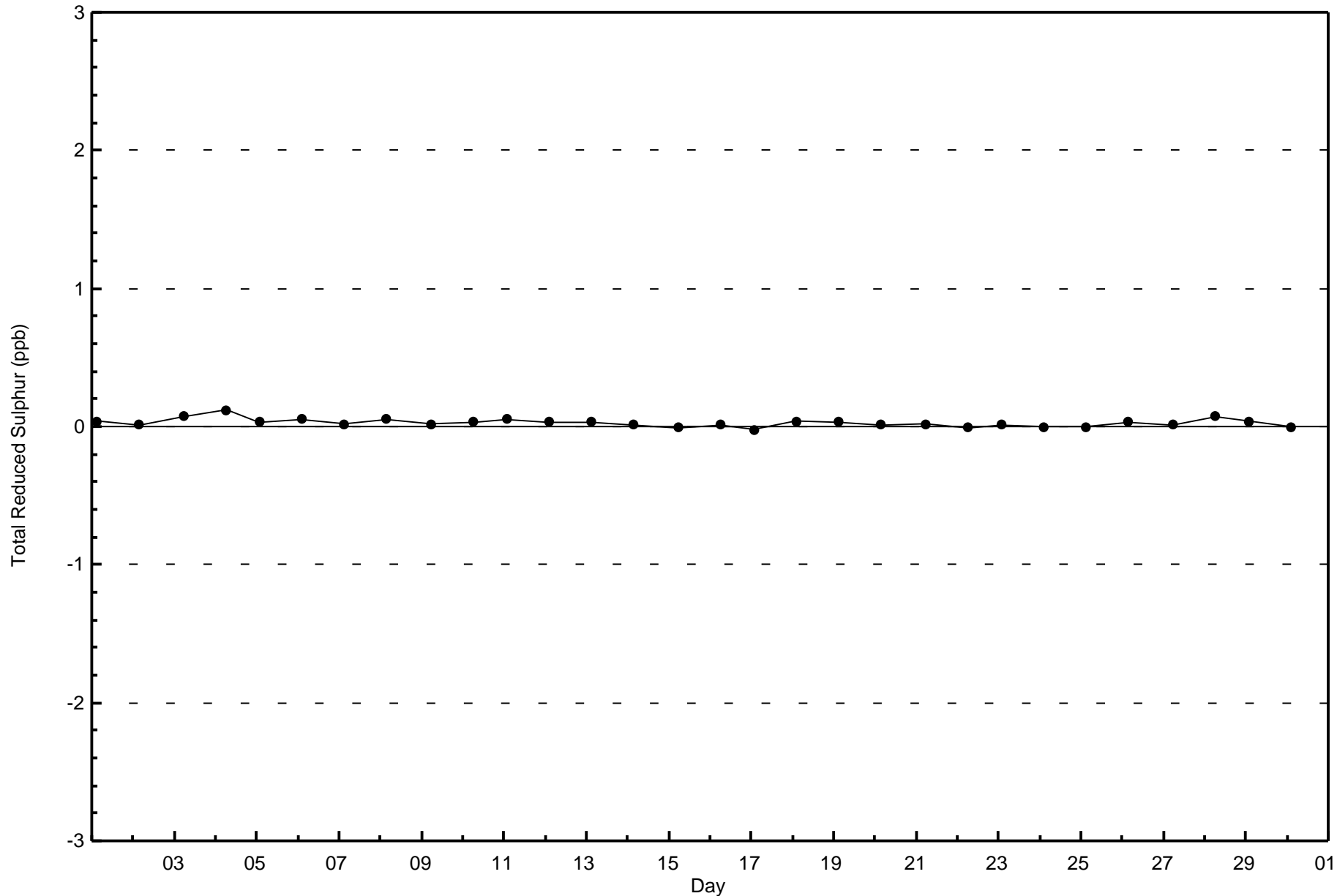


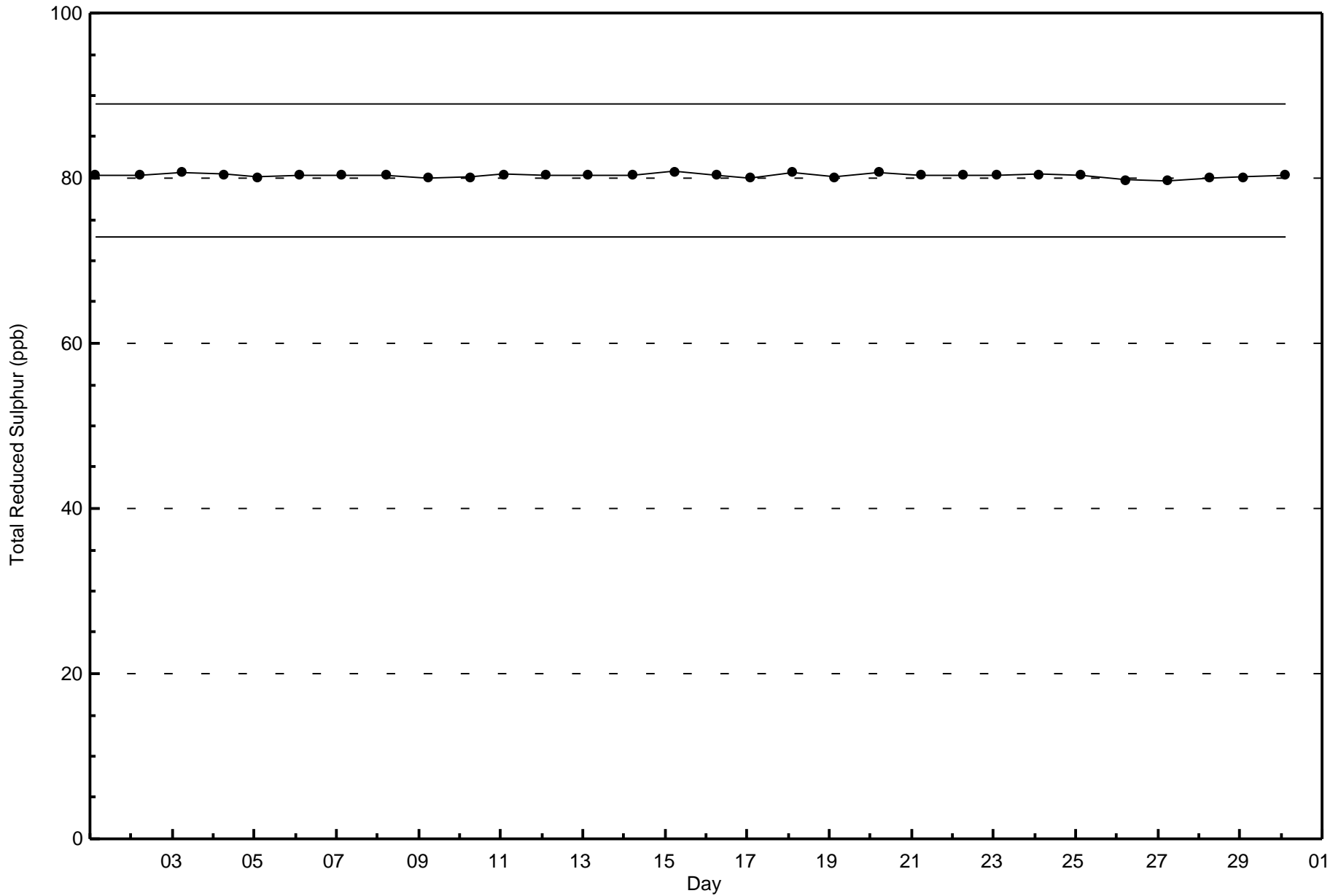
Wood Buffalo Environmental Association

Zero Responses

Total Reduced Sulphur (TRS) - ppb

Fort McKay South - June 2015







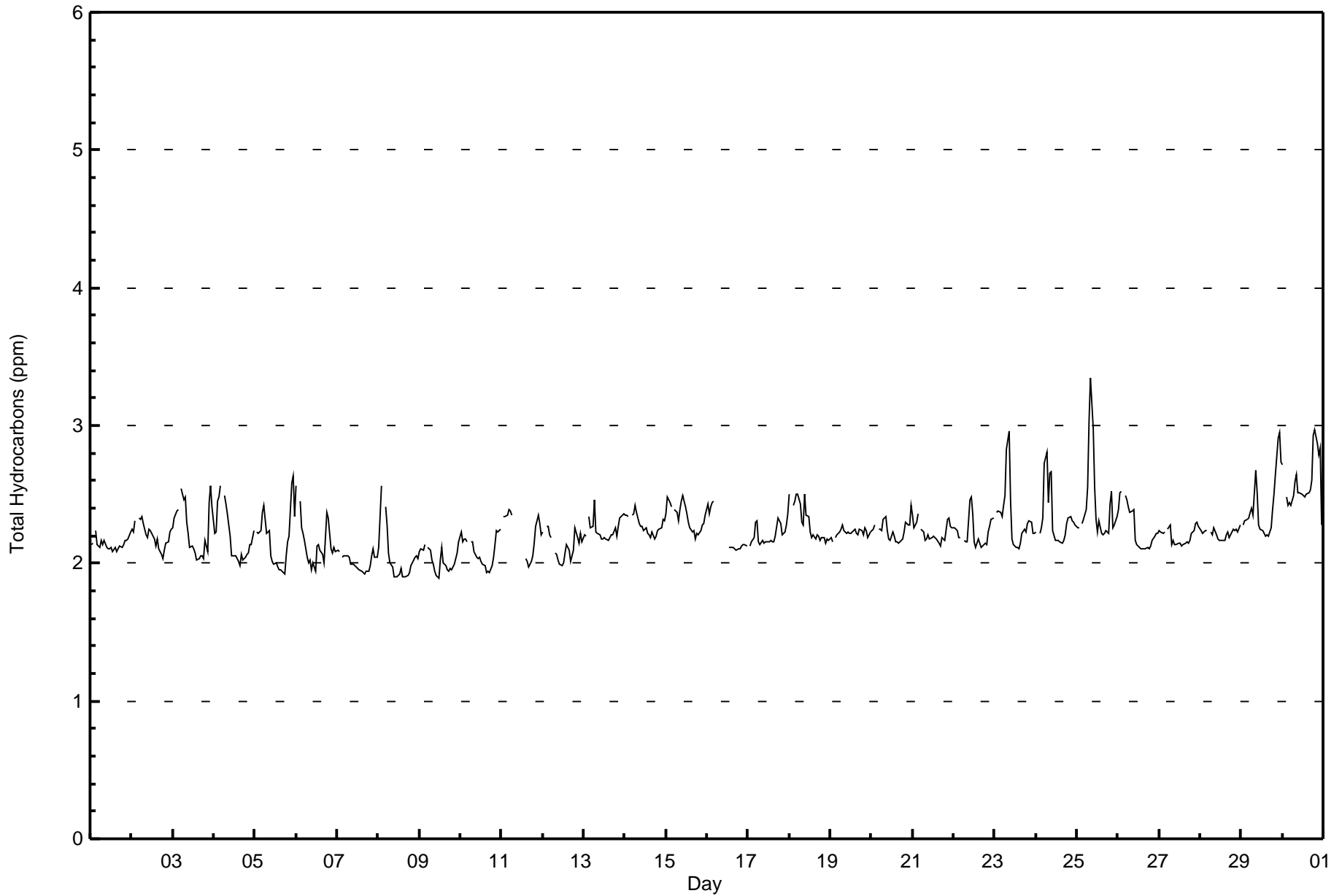
Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Fort McKay South - June 2015

Maximum Value: 3.3 ppm on Jun 25 09:00																				Maximum Daily Average: 2.6 ppm on Jun 30					Hours in Service: 720		
Minimum Value: 1.9 ppm on Jun 9 12:00																				Minimum Daily Average: 2.0 ppm on Jun 7					Hours of Data: 676		
Maximum Diurnal Average: 2.3 ppm at hour 3																				Minimum Diurnal Average: 2.1 ppm at hour 17					Hours of Missing Data: 44		
Monthly Average: 2.23 ppm																				Percentiles: P ₁ = 1.9 P ₁₀ = 2.0 Q ₁ = 2.1 Median = 2.2 Q ₃ = 2.3 P ₉₀ = 2.4 P ₉₉ = 2.9					Hours of Calibration: 43		
																									Percent Operational Time: 99.9		
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	2.1	2.1	Z	2.2	2.1	2.1	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.1	2.2	
2-Jun	2.3	2.2	2.3	Z	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.1	2.1	2.0	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2
3-Jun	2.3	2.3	2.4	2.4	Z	2.5	2.5	2.5	2.3	2.2	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.0	2.2	2.1	2.4	2.6	2.4	2.2	2.6	
4-Jun	2.2	2.2	2.5	2.5	2.6	Z	2.5	2.4	2.4	2.2	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.2	2.2	2.6	
5-Jun	Z	2.2	2.2	2.2	2.4	2.4	2.3	2.2	2.2	2.1	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	2.1	2.2	2.2	2.6	2.6	2.3	2.2	2.6	
6-Jun	2.6	Z	2.4	2.3	2.2	2.2	2.0	2.0	2.0	1.9	2.0	1.9	2.1	2.1	2.1	2.1	2.0	2.2	2.4	2.3	2.1	2.1	2.1	2.1	2.1	2.1	
7-Jun	2.1	2.1	Z	2.0	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.1	2.1	2.0	2.0	2.0	2.1	
8-Jun	2.1	2.3	2.6	Z	2.4	2.3	2.1	2.0	2.0	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.1	2.0	2.0	2.6	
9-Jun	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.0	2.0	1.9	1.9	1.9	2.0	2.1	2.0	2.0	1.9	1.9	2.0	2.0	2.0	2.0	2.1	2.2	2.0	2.2	
10-Jun	2.2	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	2.0	2.0	2.1	2.2	2.2	2.2	2.2	2.2	
11-Jun	Z	2.3	2.3	2.3	2.4	2.4	2.3	C	C	C	C	C	C	C	2.0	2.0	2.0	2.0	2.1	2.2	2.3	2.3	2.3	2.2	--	2.4	
12-Jun	2.2	Z	2.3	2.3	2.2	2.2	M	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.1	2.1	2.3	2.2	2.1	2.2	2.2	2.1	2.3	
13-Jun	2.2	2.2	Z	2.3	2.3	2.3	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	2.3	2.3	2.3	2.4	2.2	
14-Jun	2.3	2.3	2.3	Z	2.4	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	
15-Jun	2.4	2.5	2.4	2.4	Z	2.4	2.4	2.3	2.4	2.4	2.5	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	2.5	
16-Jun	2.4	2.4	2.4	2.4	2.4	Z	2.3	C	C	C	C	C	C	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	--	2.4	
17-Jun	Z	2.1	2.2	2.2	2.3	2.3	2.2	2.1	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.2	2.3	2.4	2.2	
18-Jun	2.5	Z	2.4	2.5	2.5	2.5	2.4	2.3	2.3	2.5	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.3	2.5	
19-Jun	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.3	
20-Jun	2.2	2.2	2.3	Z	2.2	2.3	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.3	2.3	2.3	2.4	2.2	2.4	
21-Jun	2.4	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	2.1	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.4	
22-Jun	2.3	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.5	2.5	2.4	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.3	2.3	2.2	2.5	
23-Jun	Z	2.4	2.4	2.4	2.3	2.4	2.5	2.8	2.8	3.0	2.5	2.2	2.1	2.1	2.1	2.1	2.2	2.3	2.2	2.3	2.3	2.3	2.2	2.2	2.3	3.0	
24-Jun	2.2	Z	2.2	2.3	2.3	2.7	2.8	2.4	2.7	2.7	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.8	
25-Jun	2.3	2.3	Z	2.3	2.3	2.4	2.5	3.0	3.3	3.0	2.6	2.3	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.4	2.5	2.3	2.3	2.3	3.3	
26-Jun	2.4	2.5	2.5	Z	2.5	2.5	2.4	2.4	2.4	2.4	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.3	2.5	
27-Jun	2.2	2.2	2.2	2.2	Z	2.2	2.3	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.3	
28-Jun	2.2	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.3	
29-Jun	Z	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.7	2.5	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.5	2.6	2.9	2.9	2.7	2.4	
30-Jun	2.7	Z	2.5	2.4	2.4	2.4	2.5	2.6	2.6	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.6	2.9	3.0	2.9	2.8	2.8	2.3	2.6	
																								Diurnal Average			
																								Diurnal Maximum			
																								Z - zerospan C - Calibration M - Maintenance			





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Fort McKay South - June 2015

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	89	13.17	13.17
2.1 - 3.0	586	86.69	99.85
3.1 - 10.0	1	0.15	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 676

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Fort McKay South - June 2015

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	0	3	7	0	5	3	2	5	5	10	4	10	15	10	6	4	89
2.1 - 3.0	70	46	14	9	8	11	20	31	60	43	65	67	28	36	40	38	586
3.1 - 10.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	71	49	21	9	13	14	22	36	65	53	69	77	43	46	46	42	676

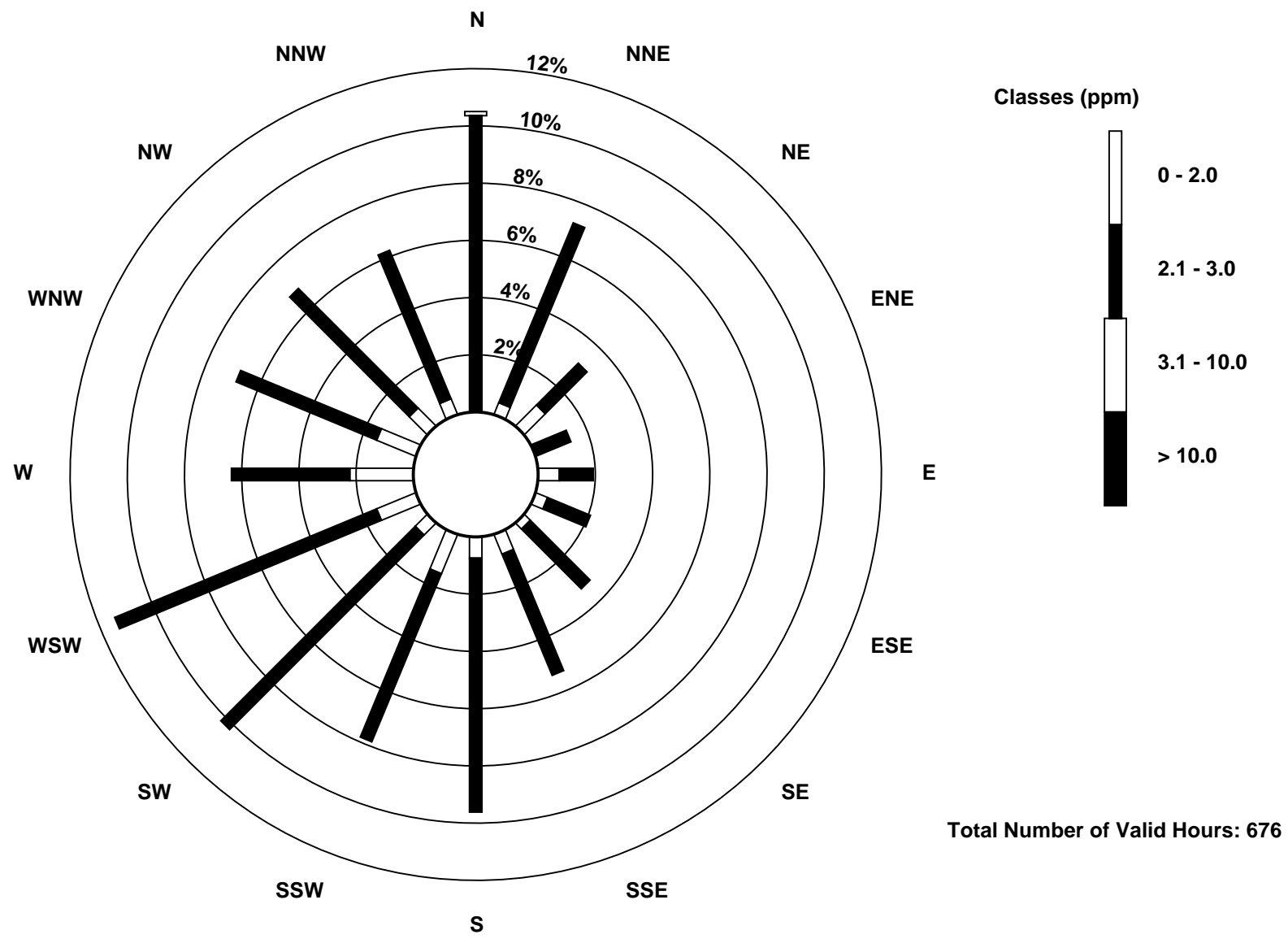
Total Number of Valid Hours: 676

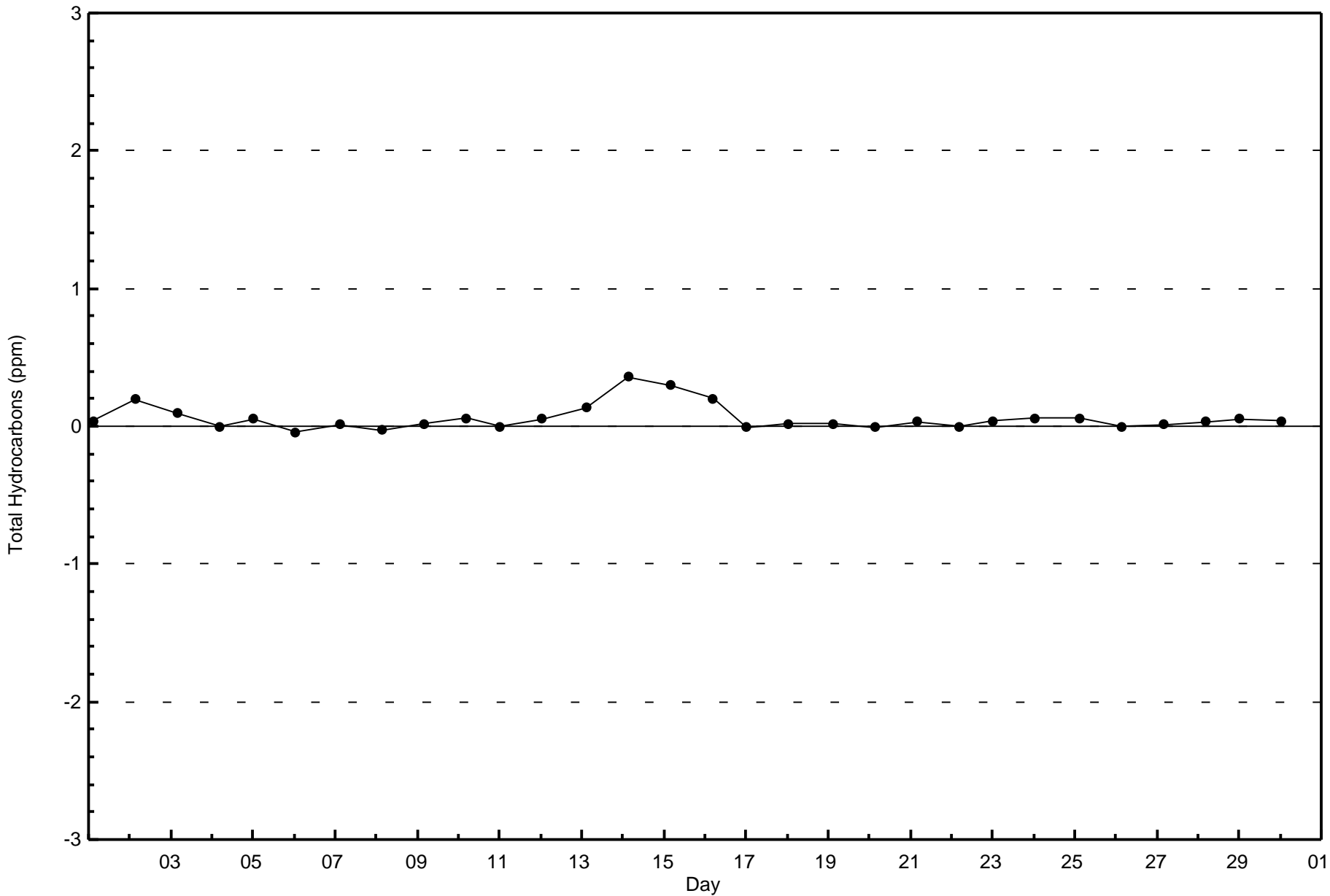
Total Number of Hours: 720

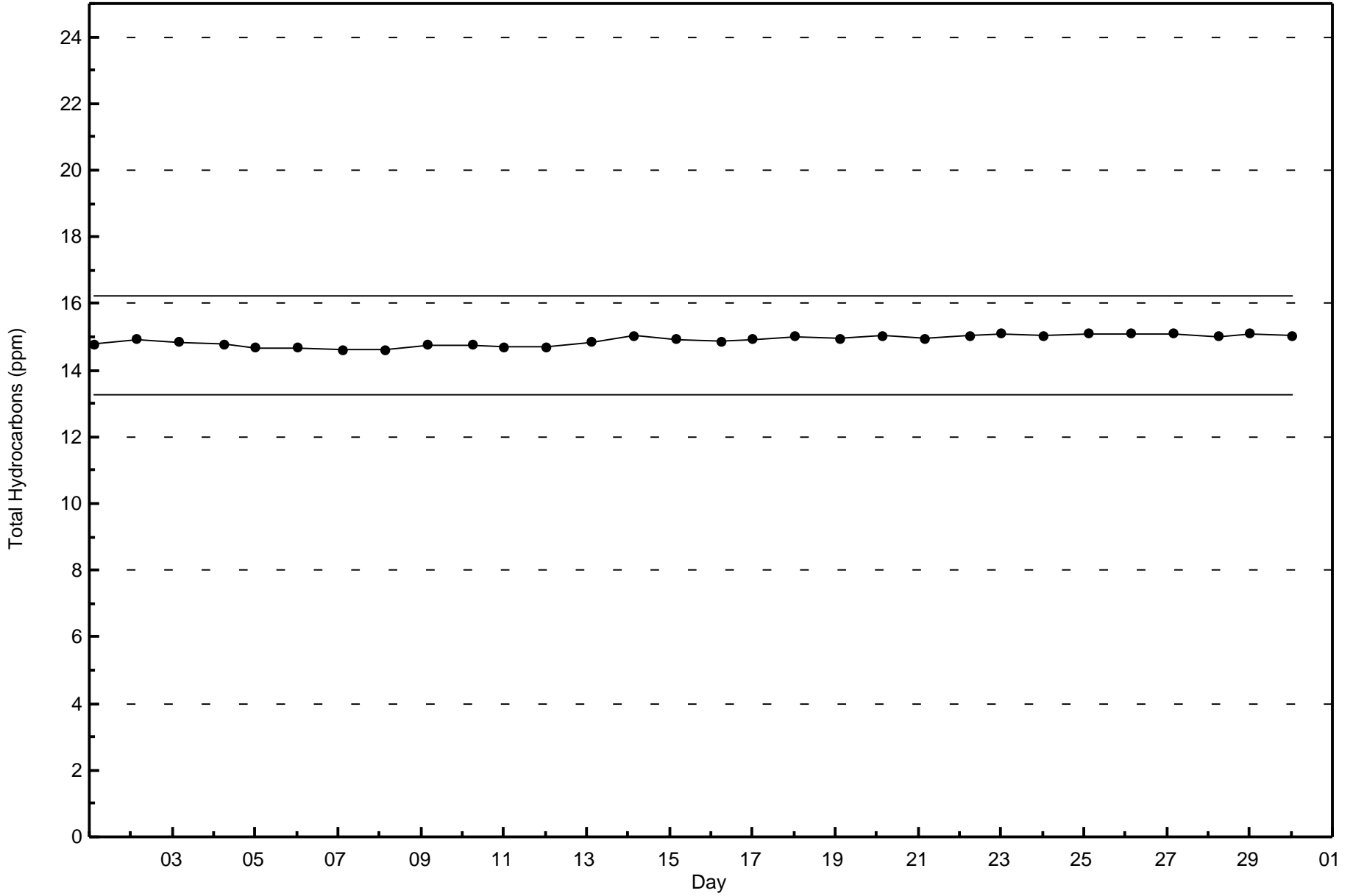


Wood Buffalo Environmental Association
Wind Rose Jun 2015

Total Hydrocarbons (THC) - ppm
Fort McKay South (AMS 13)







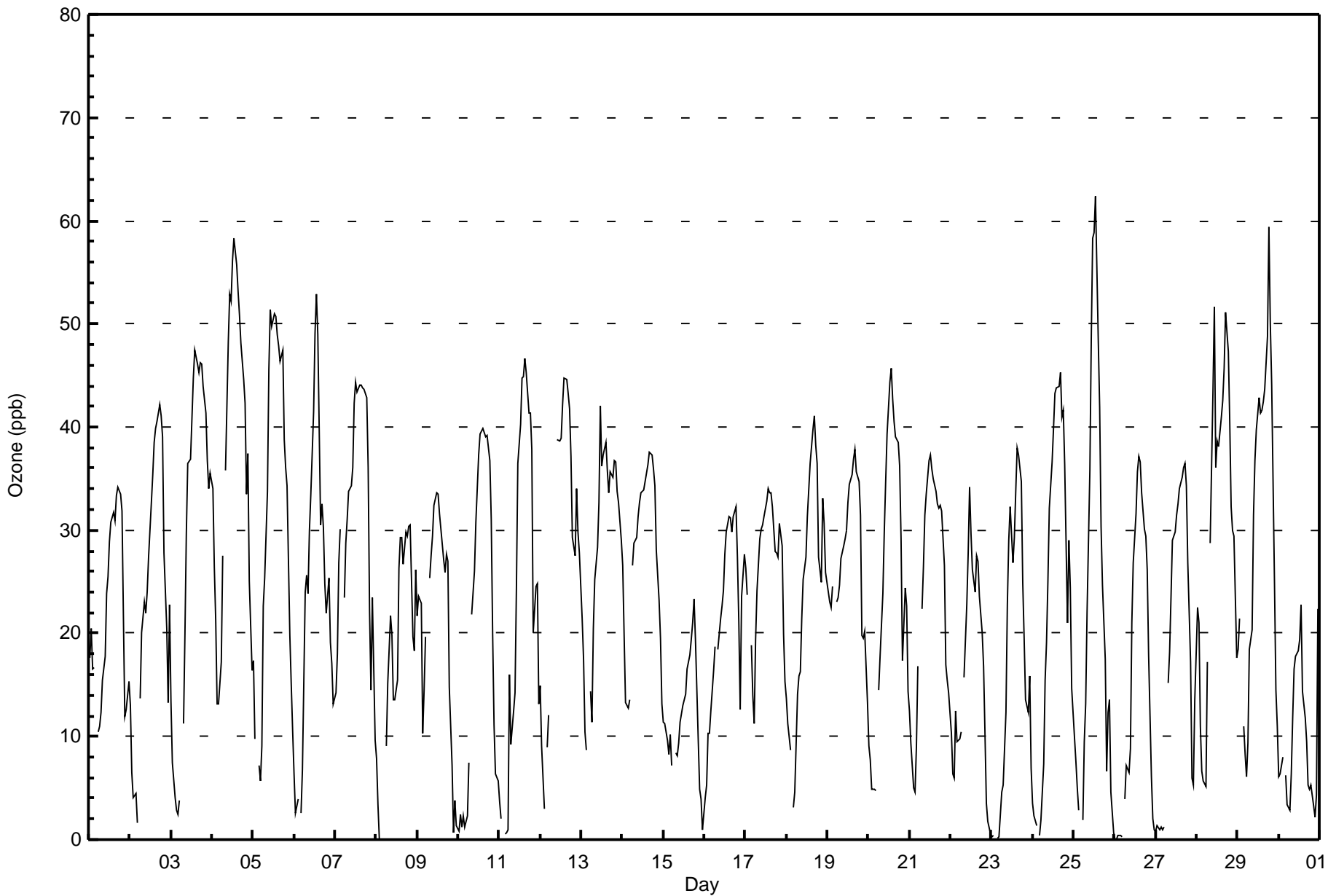


Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 62 ppb on Jun 25 14:00	Maximum Daily Average: 37.6 ppb on Jun 4		Hours of Data:	686
Minimum Value: 0 ppb on Jun 8 03:00	Minimum Daily Average: 10.0 ppb on Jun 30		Hours of Missing Data:	34
Maximum Diurnal Average: 37.7 ppb at hour 14	Minimum Diurnal Average: 6.0 ppb at hour 5		Hours of Calibration:	34
Monthly Average: 23.9 ppb	Percentiles: P ₁ = 0 P ₁₀ = 5 Q ₁ = 12 Median = 24 Q ₃ = 34 P ₉₀ = 42 P ₉₉ = 56		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	18	20	16	17	Z	10	11	12	15	18	24	25	29	31	32	31	33	34	33	32	22	12	13	15	21.9	34
2-Jun	13	7	4	4	2	Z	14	20	23	22	24	27	33	35	38	40	40	42	41	39	28	20	13	23	24.0	42
3-Jun	13	7	4	3	2	4	Z	11	20	30	36	37	41	45	47	46	45	46	46	44	41	37	34	35	29.4	47
4-Jun	34	26	21	13	13	17	27	Z	36	48	53	52	56	58	56	53	51	48	45	42	34	37	25	16	37.6	58
5-Jun	17	10	Z	7	6	9	23	25	34	45	51	50	51	51	49	48	46	47	39	36	34	20	15	11	31.5	51
6-Jun	6	3	4	Z	3	7	24	26	24	30	33	42	49	53	49	31	33	30	25	22	25	19	17	13	24.6	53
7-Jun	14	18	27	30	Z	23	29	31	34	34	36	42	44	43	44	44	44	44	43	36	22	14	24	10	31.8	44
8-Jun	8	3	0	0	0	Z	9	15	22	20	14	14	16	26	29	29	27	30	29	30	30	20	18	26	18.1	30
9-Jun	22	24	23	10	14	20	Z	25	28	29	32	34	34	32	30	27	26	28	27	15	7	1	4	1	21.4	34
10-Jun	1	2	1	2	1	2	8	Z	22	26	31	34	37	39	40	39	39	39	37	31	20	11	6	6	20.7	40
11-Jun	4	2	Z	0	1	1	16	9	12	14	24	36	40	45	45	47	45	41	41	38	20	25	25	13	23.7	47
12-Jun	15	9	3	Z	9	12	C	C	C	C	39	39	39	42	45	45	43	42	37	29	27	34	30	28	29.8	45
13-Jun	21	18	10	9	Z	14	11	20	25	28	33	42	36	37	39	36	34	36	35	37	37	34	33	29	28.4	42
14-Jun	27	20	13	13	14	Z	27	29	29	31	33	34	34	35	36	36	38	37	36	34	28	23	20	13	27.7	38
15-Jun	11	11	10	8	10	7	Z	8	8	9	11	13	14	14	17	18	19	21	23	19	10	5	4	1	11.9	23
16-Jun	4	5	10	10	13	16	19	Z	18	21	23	24	28	30	31	31	30	31	32	27	21	13	24	28	21.3	32
17-Jun	26	24	Z	19	14	11	19	24	29	30	30	31	33	34	34	34	32	28	28	27	31	28	20	15	26.2	34
18-Jun	14	11	9	Z	3	5	14	16	16	21	25	27	31	34	36	40	41	38	36	27	25	33	31	26	24.4	41
19-Jun	24	23	23	25	Z	23	23	25	27	28	29	30	33	34	35	37	38	36	35	31	20	19	20	13	27.5	38
20-Jun	9	8	5	5	5	Z	14	18	24	30	35	39	44	46	43	41	39	39	36	29	17	24	23	14	25.5	46
21-Jun	12	9	5	5	9	17	Z	22	26	31	33	37	37	36	35	34	32	32	32	32	27	17	15	14	24.0	37
22-Jun	10	6	6	13	10	10	10	Z	16	23	28	34	30	26	24	28	27	24	20	17	10	3	2	1	16.4	34
23-Jun	0	0	Z	0	0	2	5	5	12	23	29	32	27	29	34	38	37	35	25	20	14	12	16	7	17.5	38
24-Jun	4	2	1	Z	0	2	7	15	19	25	32	37	40	43	44	44	45	41	42	36	21	29	24	15	24.8	45
25-Jun	10	8	5	3	Z	2	9	13	22	36	49	58	59	62	48	42	30	25	17	7	12	14	5	1	23.3	62
26-Jun	0	0	0	0	0	Z	4	7	7	9	21	27	32	36	37	37	34	30	29	26	18	6	2	1	15.8	37
27-Jun	1	1	1	1	1	1	Z	15	18	23	29	30	32	33	34	35	36	36	34	27	17	6	5	14	18.7	36
28-Jun	22	21	11	7	6	5	17	Z	29	43	52	36	39	38	41	43	46	51	47	40	32	30	29	18	30.6	52
29-Jun	18	21	Z	11	8	6	9	18	20	31	37	40	43	41	42	42	44	49	59	50	44	25	14	11	29.8	59
30-Jun	6	6	8	Z	6	3	3	6	12	17	18	18	19	23	14	12	10	5	5	5	3	2	4	22	10.0	23

12.9	10.9	8.9	8.6	6.0	9.3	14.7	17.5	21.7	26.9	31.5	34.1	35.9	37.7	37.6	36.8	36.2	35.5	33.9	29.6	23.3	19.1	17.1	14.7	Diurnal Average	
34	26	27	30	14	23	29	31	36	48	53	58	59	62	56	53	51	51	59	50	44	37	34	35	Diurnal Maximum	

Z - zerospan C - Calibration
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Fort McKay South - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	289	42.13	42.13
21 - 50	380	55.39	97.52
51 - 82	17	2.48	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 (O₃) - ppb
Fort McKay South - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	18	8	4	3	2	3	8	11	33	30	46	45	14	24	22	18	289
21 - 50	58	39	16	4	11	11	15	22	27	22	24	33	29	23	22	24	380
51 - 82	0	2	0	1	0	1	1	2	5	3	0	0	0	0	1	1	17
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	76	49	20	8	13	15	24	35	65	55	70	78	43	47	45	43	686

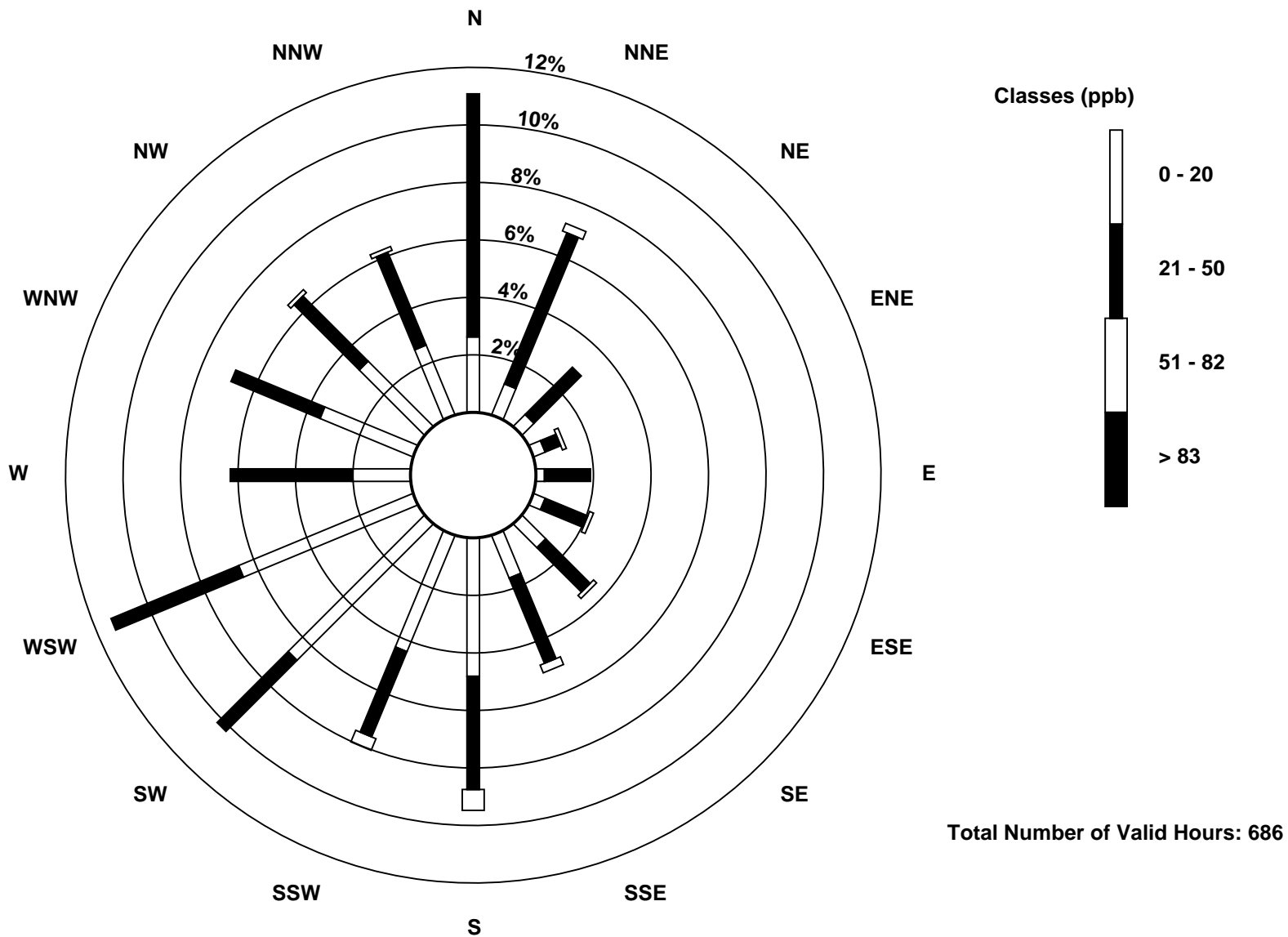
Total Number of Valid Hours: 686

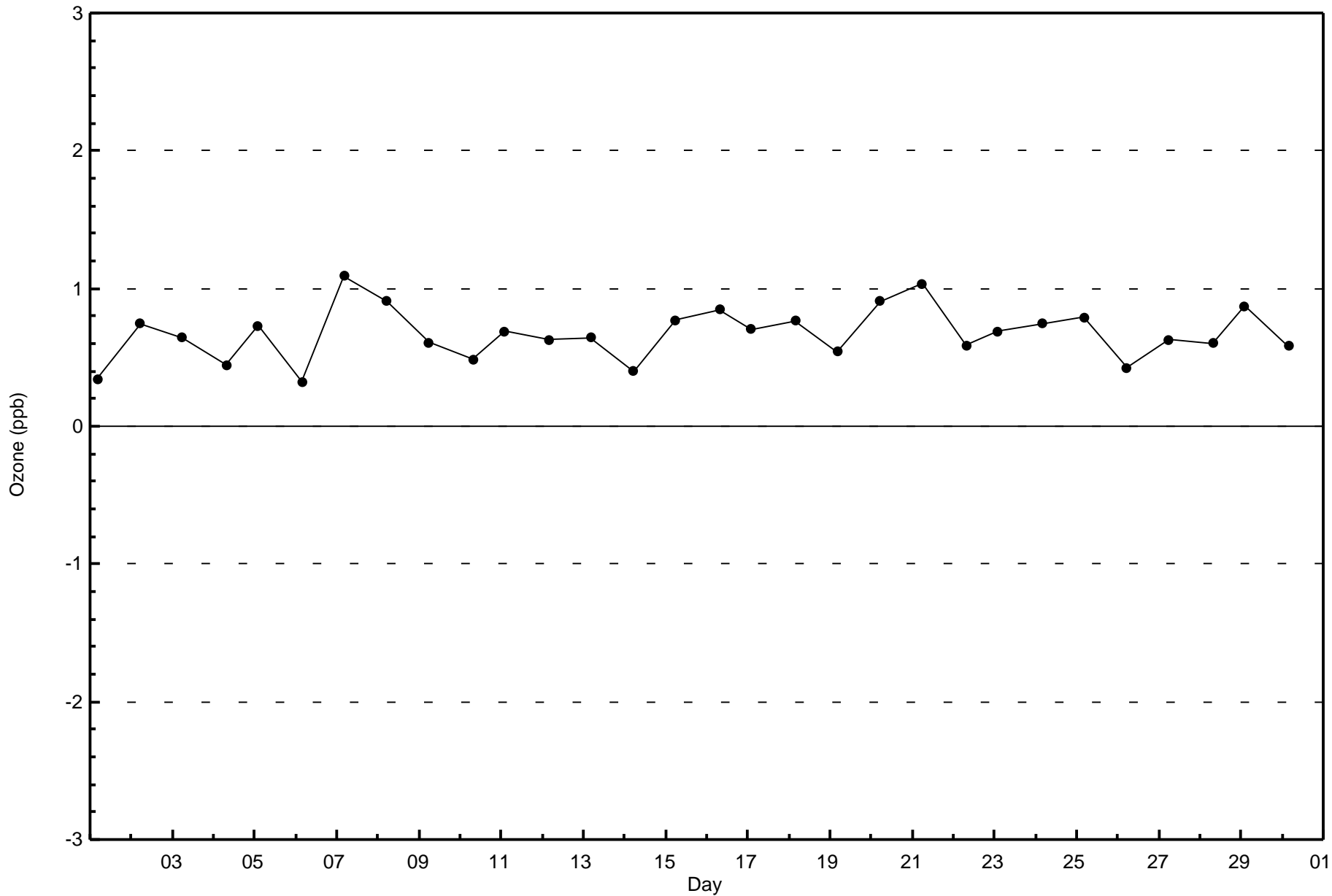
Total Number of Hours: 720

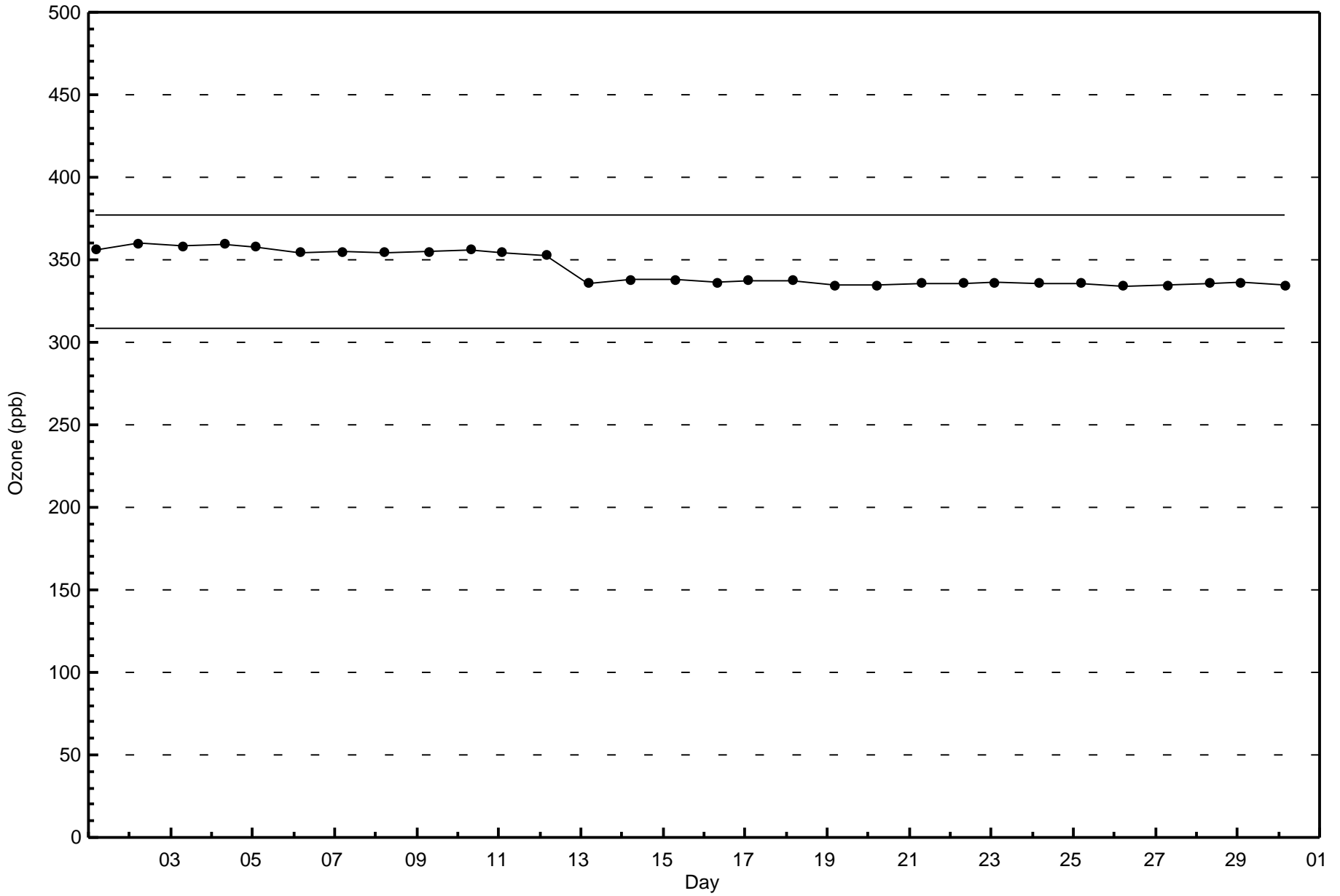


Wood Buffalo Environmental Association
Wind Rose Jun 2015

Ozone (O₃) - ppb
Fort McKay South (AMS 13)









Maximum Value: 17 ppb on Jun 23 08:00																	Maximum Daily Average: 1.7 ppb on Jun 23																	Hours in Service: 720			
Minimum Value: 0 ppb on Jun 1 02:00																	Minimum Daily Average: 0.0 ppb on Jun 1																	Hours of Data: 684			
Maximum Diurnal Average: 2.4 ppb at hour 8																	Minimum Diurnal Average: 0.0 ppb at hour 22																	Hours of Missing Data: 36			
Monthly Average: 0.5 ppb																	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 2 P ₉₉ = 8																	Hours of Calibration: 35			
																																		Percent Operational Time: 99.9			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24													
1-Jun	0	0	Z	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-Jun	0	0	0	Z	0	1	2	2	2	5	6	5	3	2	2	1	1	0	0	0	0	0	0	0	1.4	6											
3-Jun	0	0	0	0	Z	3	9	13	5	2	1	2	1	1	0	0	0	0	0	0	0	0	0	1.6	13												
4-Jun	0	0	0	0	1	Z	1	3	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0.4	3												
5-Jun	Z	0	0	0	0	1	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2												
6-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0.2	1												
7-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0												
8-Jun	0	2	11	Z	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	11												
9-Jun	0	0	0	0	Z	0	0	0	C	C	C	C	C	1	0	0	0	0	0	0	0	0	0	0.1	1												
10-Jun	0	0	0	0	0	Z	2	3	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0.5	3												
11-Jun	Z	0	0	0	1	2	0	4	4	5	3	2	2	1	0	0	0	0	0	0	0	0	0	1.0	5												
12-Jun	0	Z	0	0	0	0	M	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0.1	1												
13-Jun	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												
14-Jun	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												
15-Jun	0	0	0	0	Z	0	0	0	2	1	2	2	2	1	0	0	0	0	0	0	0	0	0	0.5	2												
16-Jun	3	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	3												
17-Jun	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	2	1	0	0	0	0	0.3	2												
18-Jun	0	Z	0	0	0	1	3	5	4	2	1	2	2	1	0	0	0	0	0	0	0	0	0	0.9	5												
19-Jun	0	0	Z	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.4	1												
20-Jun	0	0	0	Z	0	0	1	2	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	3												
21-Jun	0	0	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1												
22-Jun	0	0	0	0	0	Z	0	0	0	3	3	1	0	0	0	0	0	0	0	0	0	0	0	0.4	3												
23-Jun	Z	0	0	0	0	1	6	17	9	3	0	0	0	0	0	0	1	0	0	0	0	0	0	1.7	17												
24-Jun	0	Z	0	0	1	6	7	5	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	7												
25-Jun	0	0	Z	0	0	0	3	8	8	5	2	0	0	0	0	0	0	0	0	0	0	0	0	1.2	8												
26-Jun	1	2	1	Z	1	2	10	5	6	6	0	0	0	0	0	0	0	0	0	0	0	0	0	1.4	10												
27-Jun	0	0	0	0	Z	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	4												
28-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0												
29-Jun	Z	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	2												
30-Jun	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												
																								Diurnal Average													
																								Diurnal Maximum													
Z - zerospan C - Calibration M - Maintenance																																					

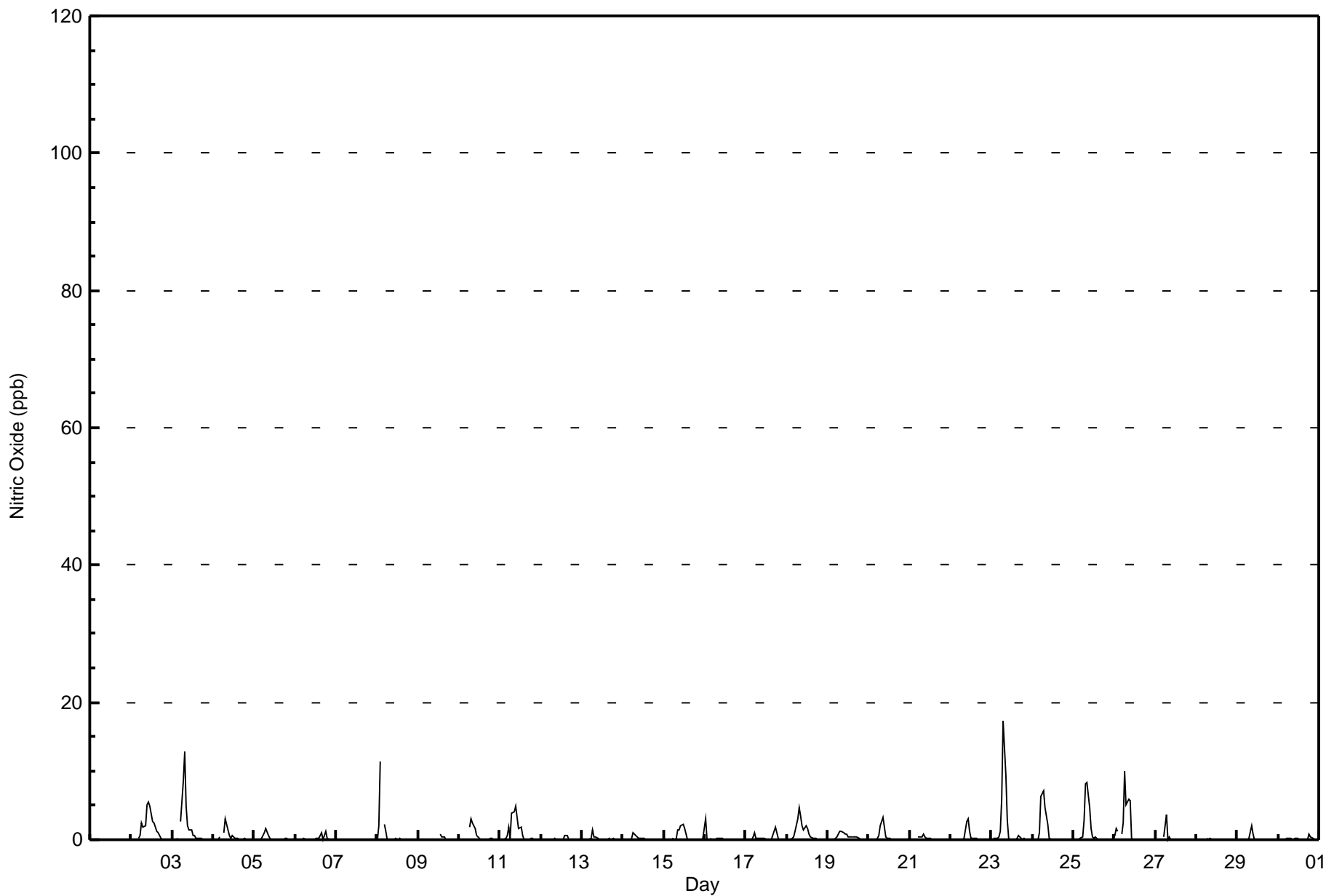


Wood Buffalo Environmental Association

Hourly Averages

Nitric Oxide (NO) - ppb

Fort McKay South - June 2015





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Fort McKay South - June 2015

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

Total Number of Valid Hours: 684

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Nitric Oxide (NO) - ppb
Fort McKay South - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	77	48	21	9	14	15	24	37	66	53	69	77	41	46	45	42	684
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	77	48	21	9	14	15	24	37	66	53	69	77	41	46	45	42	684

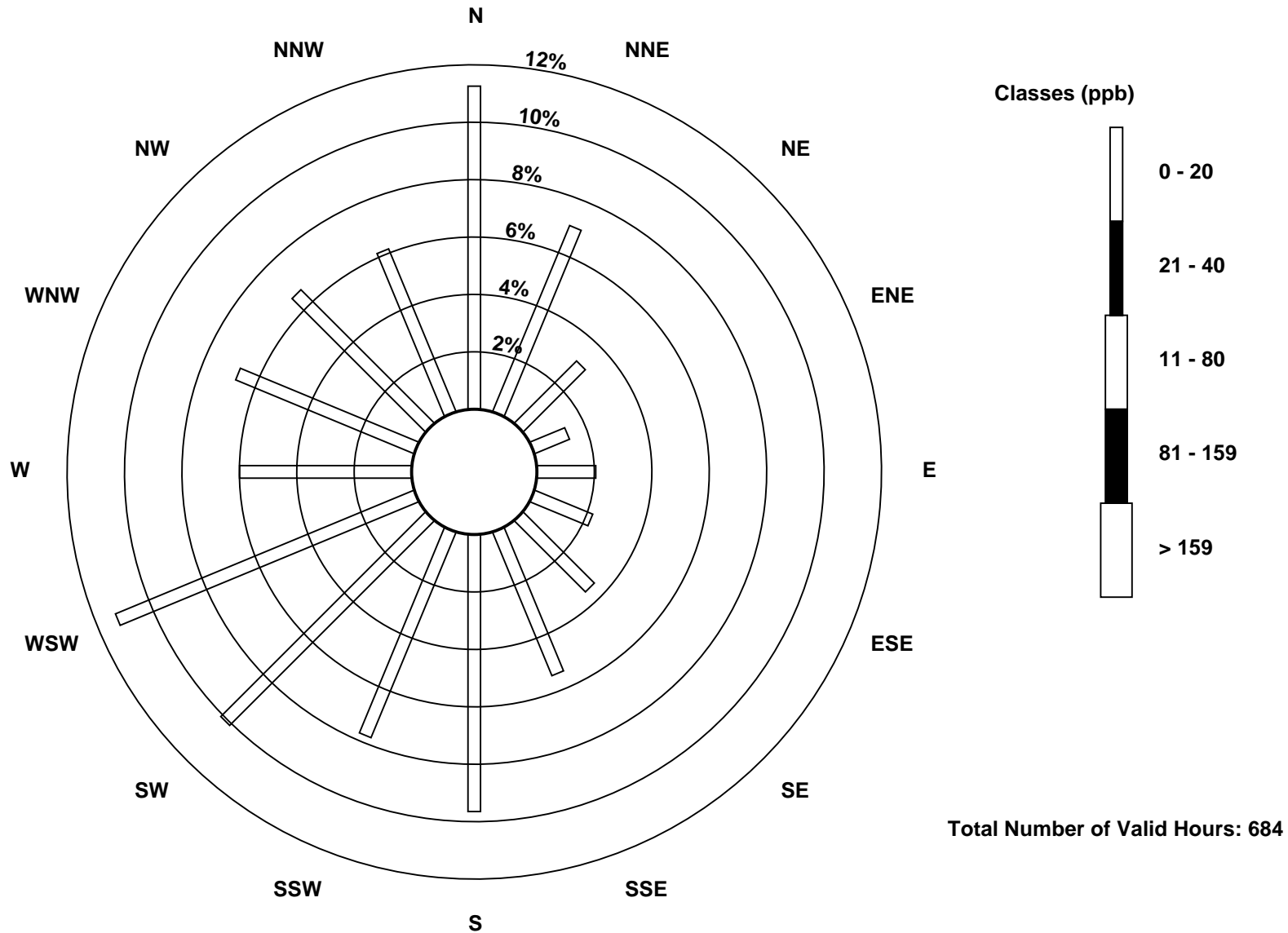
Total Number of Valid Hours: 684

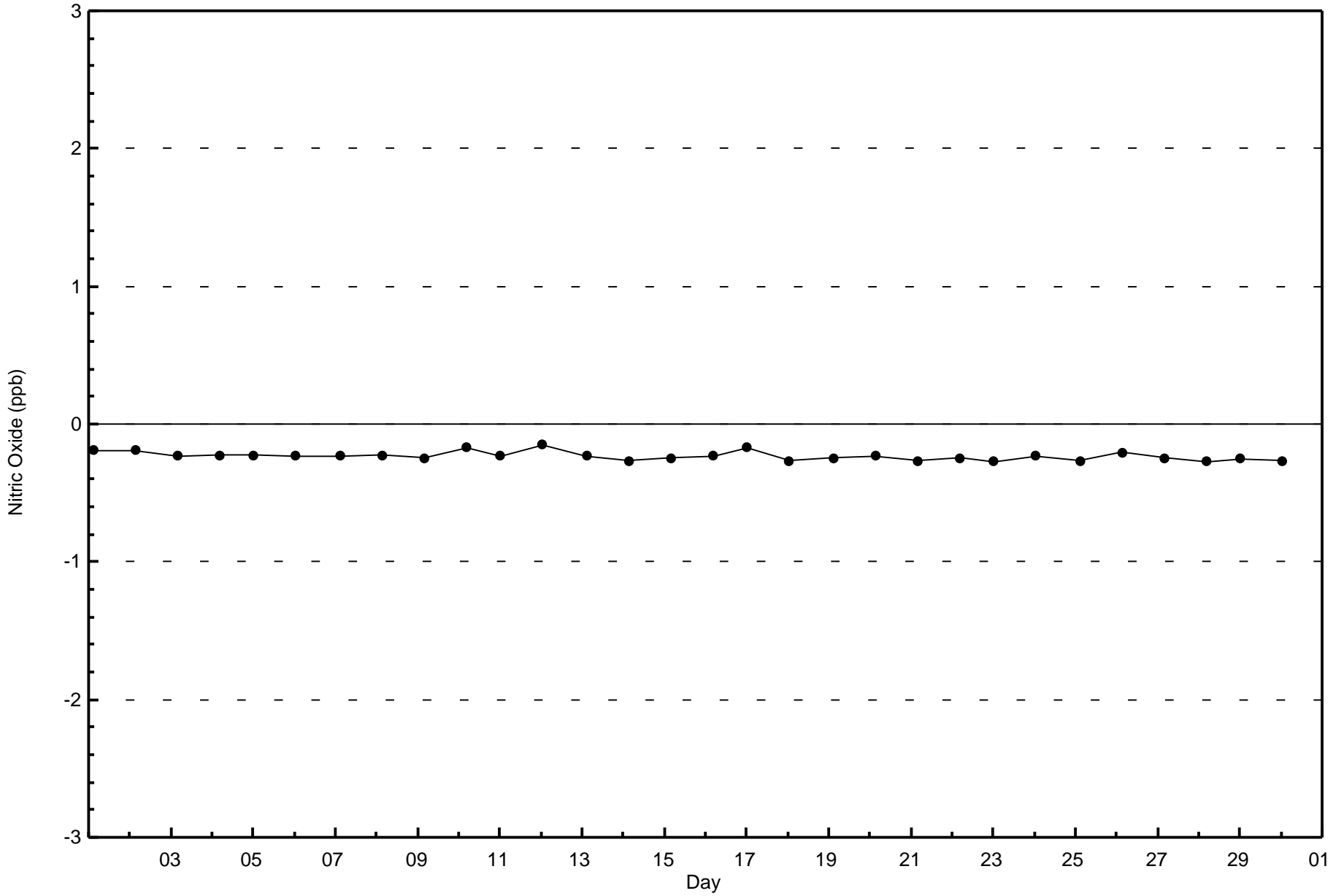
Total Number of Hours: 720

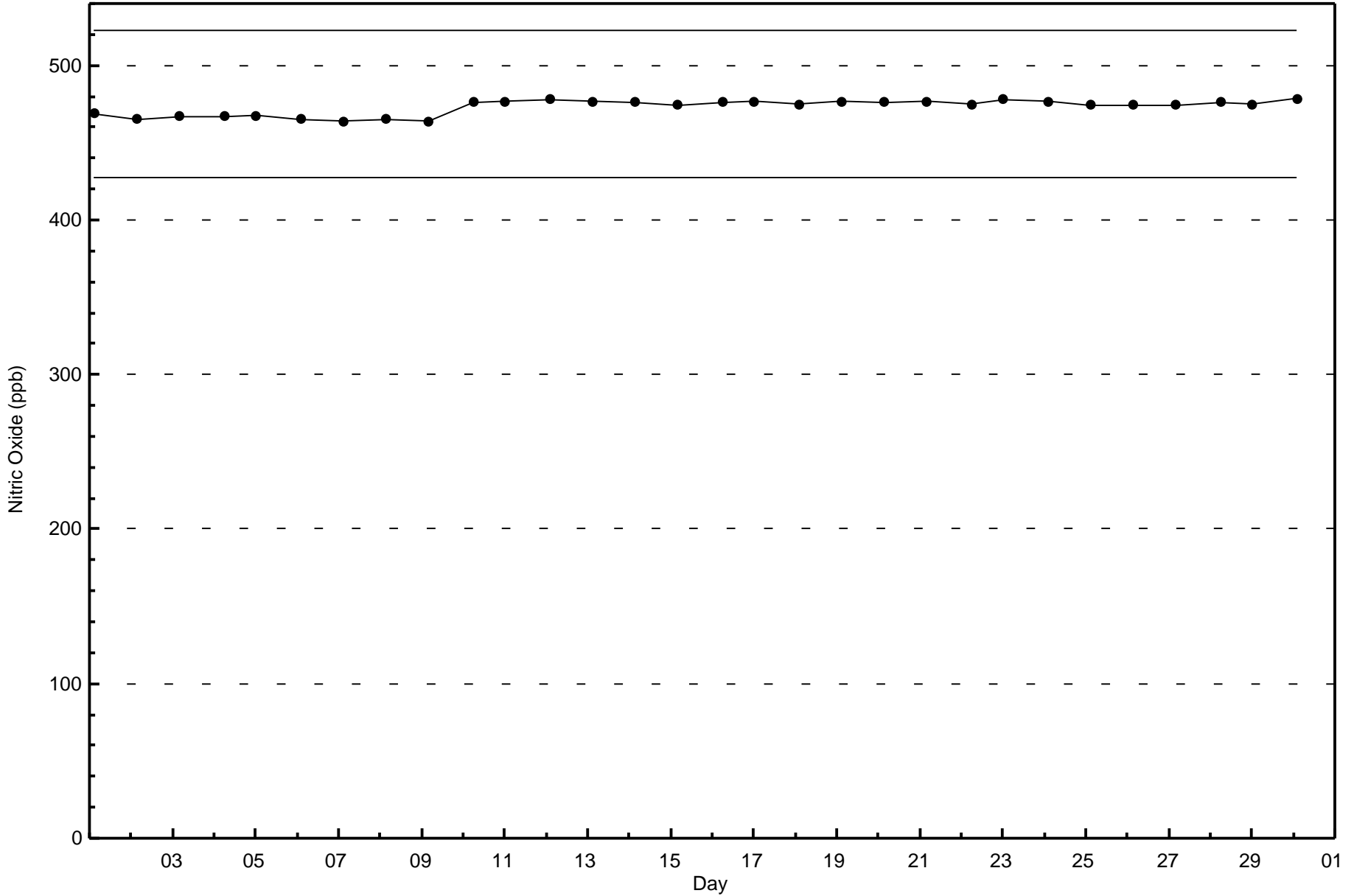


Wood Buffalo Environmental Association
Wind Rose Jun 2015

Nitric Oxide (NO) - ppb
Fort McKay South (AMS 13)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Fort McKay South - June 2015

Number of Exceedences (AAAO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 24 ppb on Jun 25 09:00	Maximum Daily Average: 5.3 ppb on Jun 25		Hours of Data:	684
Minimum Value: 0 ppb on Jun 1 12:00	Minimum Daily Average: 0.2 ppb on Jun 1		Hours of Missing Data:	36
Maximum Diurnal Average: 4.8 ppb at hour 9	Minimum Diurnal Average: 1.3 ppb at hour 17		Hours of Calibration:	35
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 = 11		Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	1	1	Z	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2
2-Jun	1	2	2	Z	1	1	4	3	3	7	9	9	6	7	6	5	4	2	2	2	2	2	3	3	3.6	9
3-Jun	3	7	7	5	Z	4	11	16	11	6	5	5	3	3	2	3	3	2	2	2	2	3	2	4.7	16	
4-Jun	3	4	5	8	9	Z	6	11	9	4	2	4	3	3	2	1	2	1	3	3	2	3	2	3	4.0	11
5-Jun	Z	4	3	3	3	3	6	6	3	2	1	1	1	1	1	1	1	1	5	7	7	8	8	4	3.4	8
6-Jun	4	Z	2	1	1	1	1	0	0	0	1	1	5	4	4	5	2	4	10	6	1	1	1	0	2.4	10
7-Jun	0	0	Z	1	1	1	1	1	1	0	1	0	0	1	1	0	0	0	0	1	1	1	1	1	0.5	1
8-Jun	3	6	12	Z	3	2	0	0	1	0	0	1	1	1	1	1	1	0	1	1	1	2	1	0	1.6	12
9-Jun	1	1	1	2	Z	0	0	0	C	C	C	C	C	4	3	2	1	0	0	0	0	0	1	2	1.0	4
10-Jun	1	1	0	0	0	Z	2	4	4	3	2	2	2	1	1	1	1	1	4	4	2	2	1	1	1.8	4
11-Jun	Z	2	2	1	2	4	5	11	10	11	9	7	9	5	1	1	1	1	3	7	9	6	9	4	5.2	11
12-Jun	2	Z	1	1	0	1	M	1	1	1	1	1	0	1	4	5	1	1	1	3	3	0	1	1	1.4	5
13-Jun	3	2	Z	3	2	2	6	1	1	1	1	1	0	1	1	1	1	1	2	1	2	3	2	5	1.7	6
14-Jun	3	2	2	Z	1	2	3	3	1	1	1	1	1	0	0	1	0	0	0	0	0	1	3	1.1	3	
15-Jun	4	4	5	6	Z	2	1	1	4	4	5	4	3	2	1	0	0	0	0	0	0	0	0	2	2.0	6
16-Jun	3	1	4	7	6	Z	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1	1	1.3	7
17-Jun	Z	0	1	1	3	5	1	1	1	1	1	1	1	1	1	3	7	5	4	3	4	5	5	2.3	7	
18-Jun	4	Z	3	2	1	2	6	10	8	6	4	5	5	4	3	2	3	2	1	1	1	1	1	1	3.2	10
19-Jun	2	2	Z	2	3	3	3	3	3	2	2	2	2	1	2	2	2	2	3	2	1	1	1	2	2.1	3
20-Jun	1	1	2	Z	1	1	2	5	7	5	2	2	2	2	1	1	1	1	1	2	2	3	4	5	2.4	7
21-Jun	3	2	2	3	Z	3	3	3	5	3	2	2	2	1	1	1	1	1	1	1	2	3	1	1	2.0	5
22-Jun	1	1	0	0	0	Z	0	0	1	6	8	6	1	1	1	1	0	0	0	1	2	2	1	1	1.5	8
23-Jun	Z	1	1	0	0	1	4	10	12	6	1	0	0	0	1	1	4	3	1	4	3	2	1	0	2.5	12
24-Jun	0	Z	0	1	1	5	10	7	8	7	2	0	0	0	0	0	0	1	2	2	2	3	3	2	2.6	10
25-Jun	1	1	Z	1	1	1	7	17	24	20	10	5	4	7	2	4	2	2	1	2	4	1	2	2	5.3	24
26-Jun	2	2	2	Z	1	2	9	6	8	9	1	0	0	0	0	0	0	0	0	0	1	1	1	0	2.0	9
27-Jun	0	0	0	0	Z	0	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	4
28-Jun	0	0	0	0	1	Z	1	1	2	2	3	0	0	0	0	2	2	2	3	2	2	2	1	1	1.1	3
29-Jun	Z	1	1	1	1	1	1	2	8	5	2	1	1	1	1	1	1	2	4	5	6	8	9	11	3.1	11
30-Jun	11	Z	3	2	3	2	2	3	3	3	4	6	4	4	3	3	4	4	10	10	5	4	7	2	4.3	11

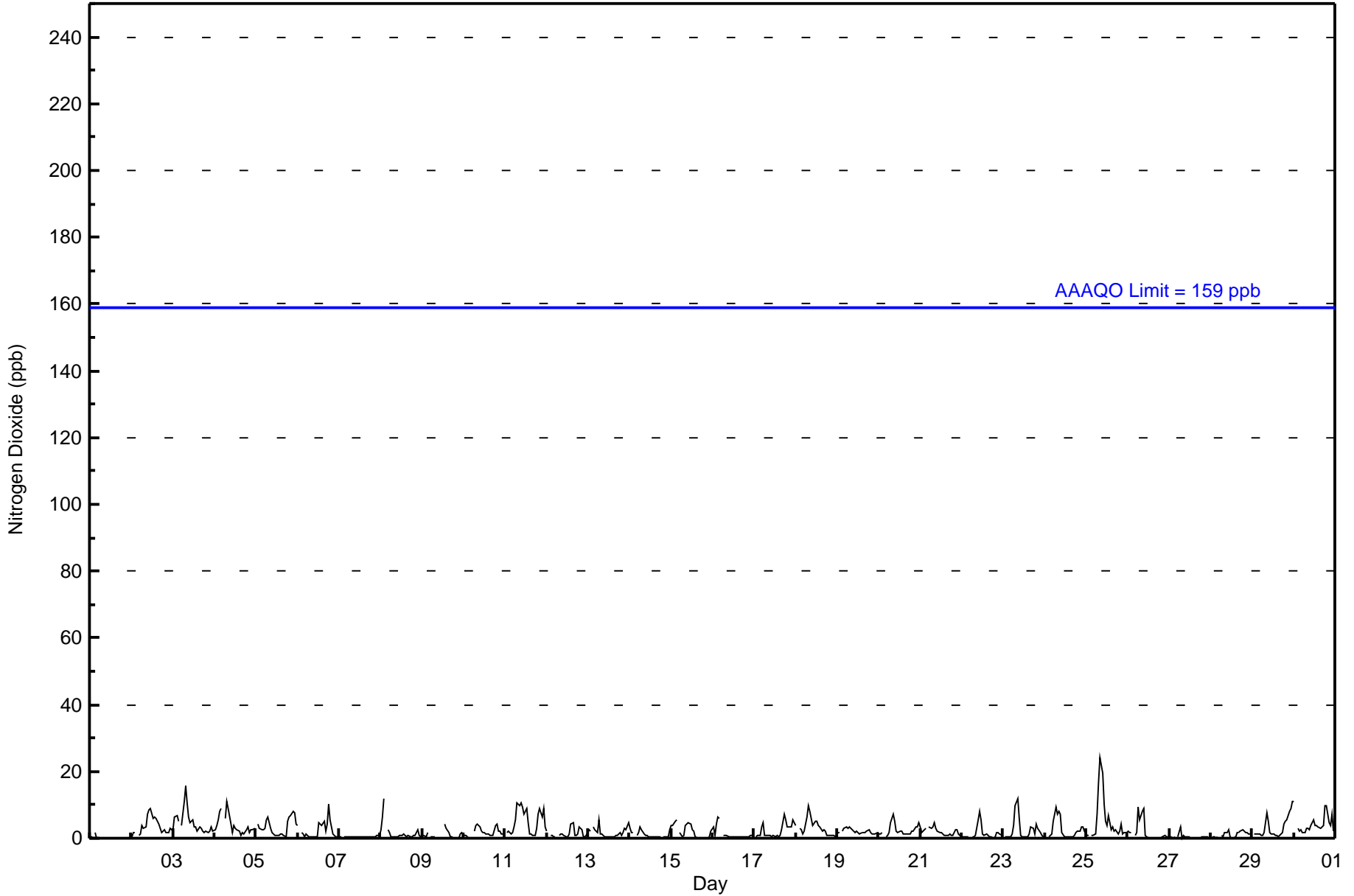
2.2	1.8	2.4	2.1	1.7	1.9	3.4	4.2	4.8	4.0	2.6	2.3	2.0	1.9	1.5	1.5	1.3	1.5	2.2	2.4	2.2	2.2	2.4	2.1	Diurnal Average	
11	7	12	8	9	5	11	17	24	20	10	9	9	7	6	5	4	7	10	10	9	8	9	11	Diurnal Maximum	

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



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Fort McKay South - June 2015





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Fort McKay South - June 2015

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 Dioxide (NO₂) - ppb
Fort McKay South - June 2015**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	76	48	21	9	14	15	24	37	66	53	69	77	41	46	45	42	683
21 - 40	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	77	48	21	9	14	15	24	37	66	53	69	77	41	46	45	42	684

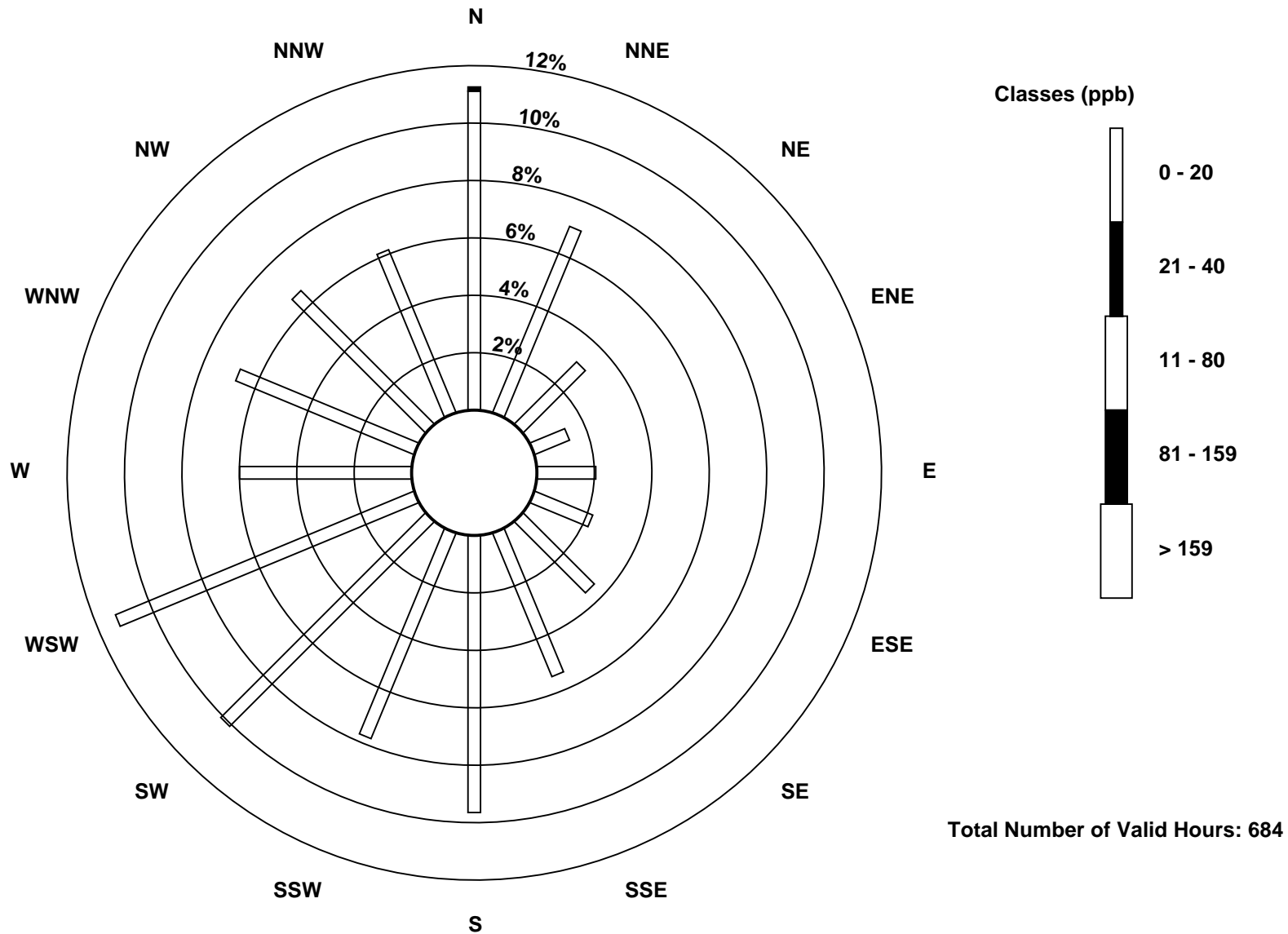
Total Number of Valid Hours: 684

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

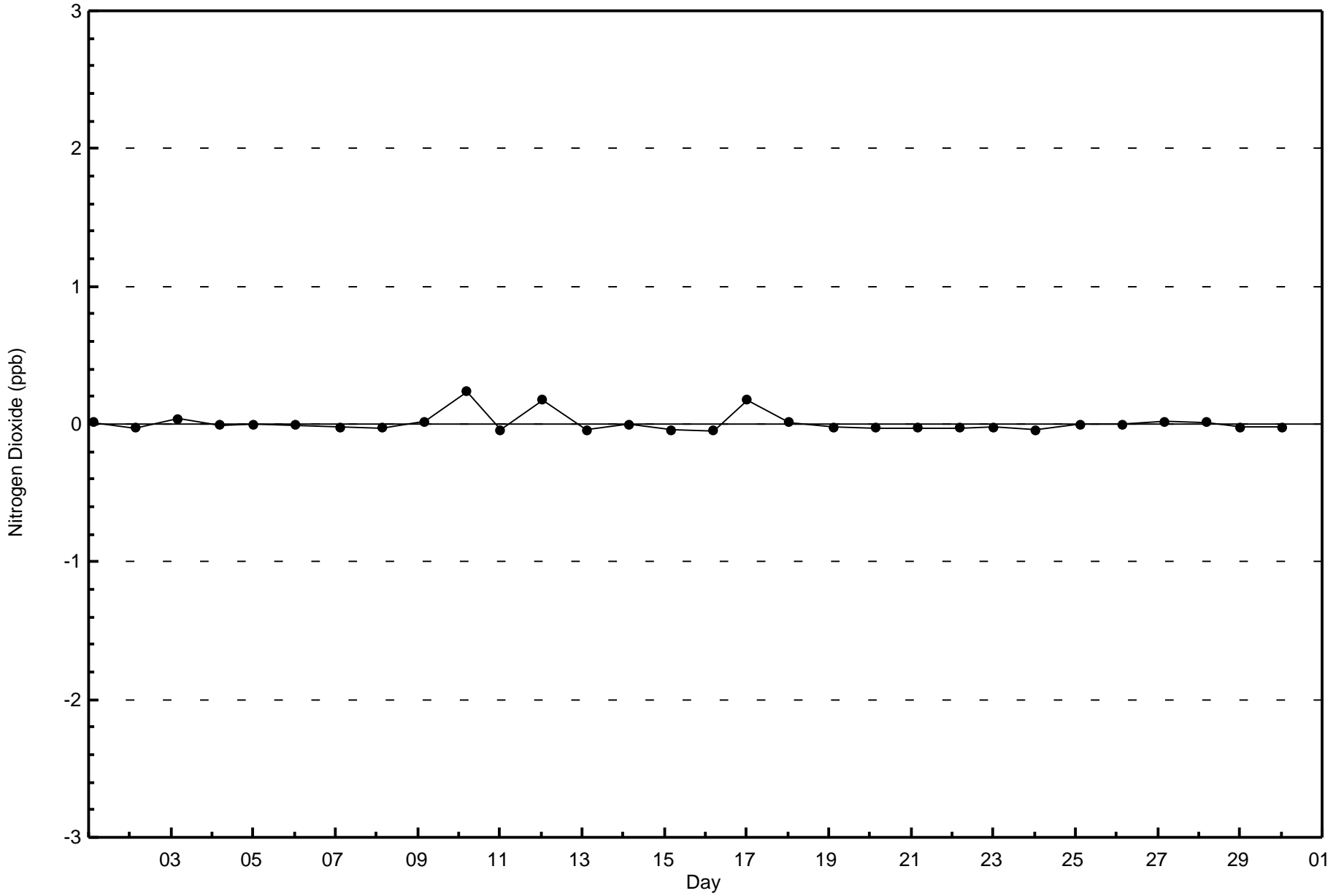
Nitrogen Dioxide (NO₂) - ppb
Fort McKay South (AMS 13)

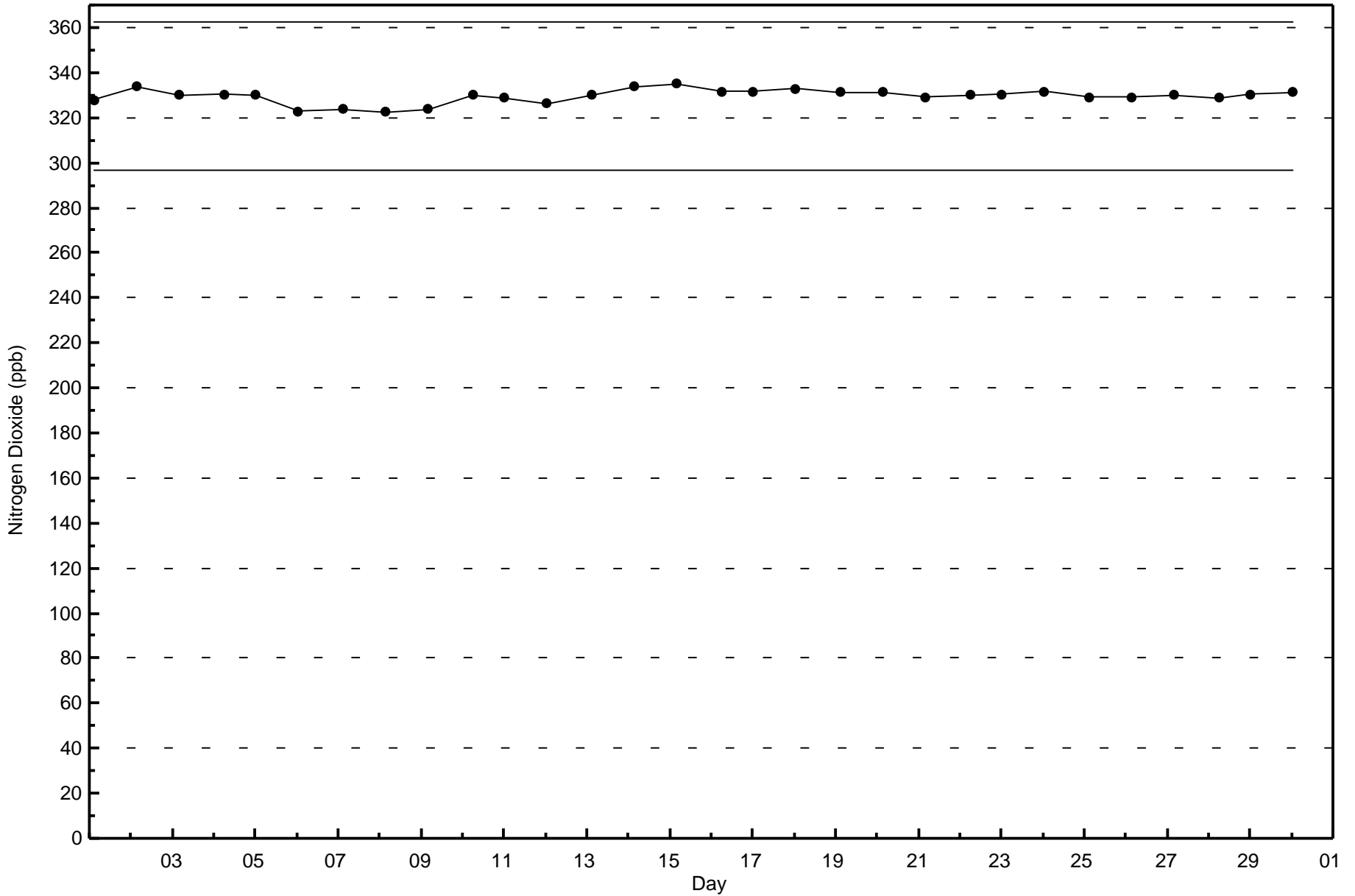




Wood Buffalo Environmental Association
Zero Responses

Nitrogen Dioxide (NO₂) - ppb
Fort McKay South - June 2015





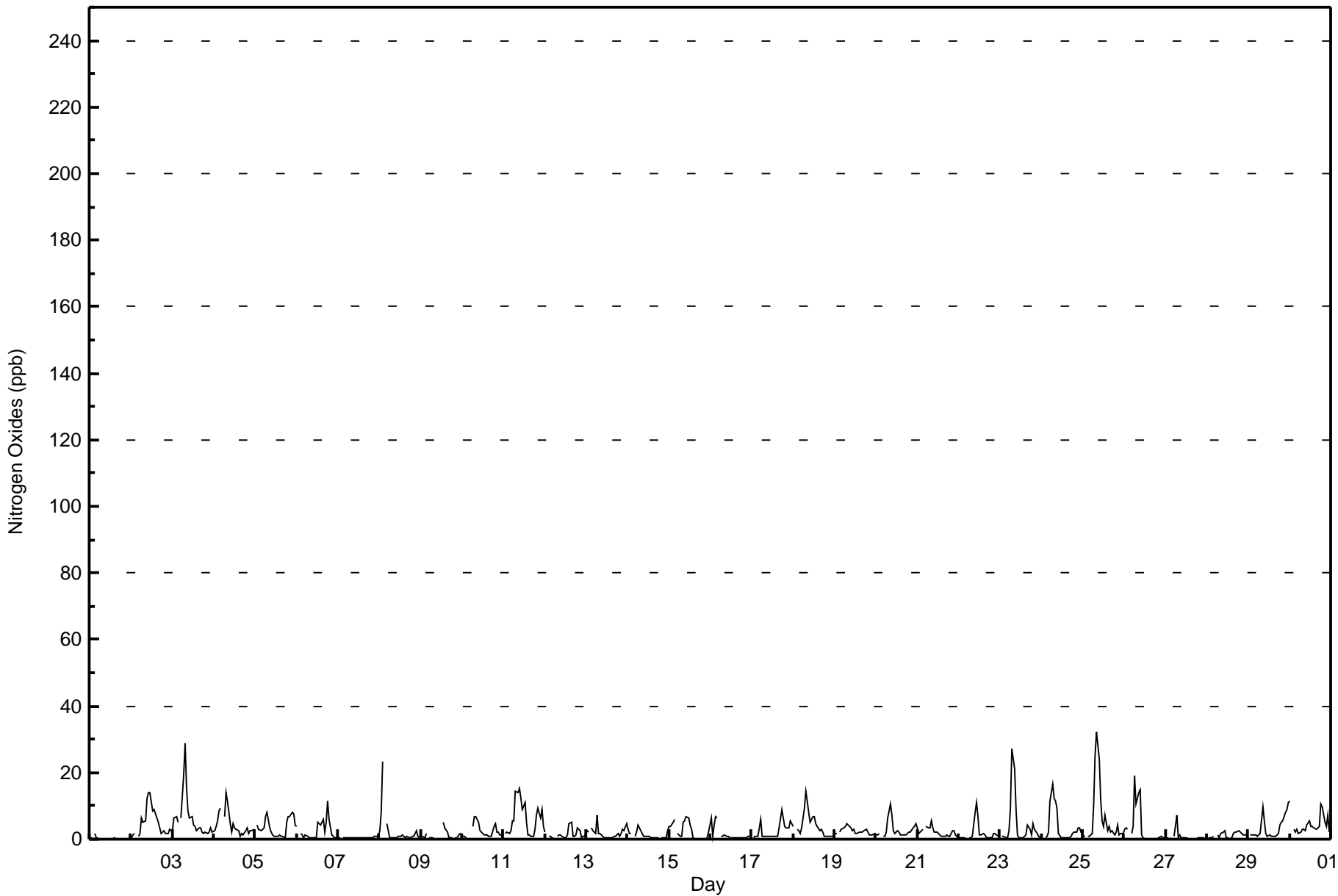


Maximum Value: 32 ppb on Jun 25 09:00																		Maximum Daily Average: 6.5 ppb on Jun 25						Hours in Service: 720		
Minimum Value: 0 ppb on Jun 1 13:00																		Minimum Daily Average: 0.2 ppb on Jun 1						Hours of Data: 684		
Maximum Diurnal Average: 6.8 ppb at hour 9																		Minimum Diurnal Average: 1.5 ppb at hour 17						Hours of Missing Data: 36		
Monthly Average: 2.9 ppb																		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 2 Q ₃ = 4 P ₉₀ = 7 P ₉₉ = 20						Hours of Calibration: 35		
																		Percent Operational Time: 99.9								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	0	Z	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2
2-Jun	1	1	2	Z	1	2	6	5	5	12	14	14	9	9	8	6	5	2	2	3	2	2	3	3	5.0	14
3-Jun	3	7	7	5	Z	6	20	29	16	8	6	7	4	4	2	3	3	2	2	2	2	3	2	6.3	29	
4-Jun	3	4	5	8	9	Z	7	14	11	5	2	5	3	3	2	1	2	1	3	3	2	3	2	3	4.4	14
5-Jun	Z	4	3	3	3	4	7	8	4	2	1	1	1	1	1	1	1	1	5	7	7	8	8	4	3.6	8
6-Jun	4	Z	2	1	1	1	1	0	0	0	0	1	5	5	4	6	2	5	12	6	1	1	0	0	2.5	12
7-Jun	0	0	Z	1	1	1	1	0	1	0	0	0	0	1	0	0	0	0	0	0	1	1	1	1	0.5	1
8-Jun	3	8	23	Z	5	3	0	0	0	0	0	1	1	1	1	1	1	0	1	1	1	2	1	0	2.4	23
9-Jun	1	1	0	2	Z	0	0	0	C	C	C	C	C	5	3	2	1	0	0	0	0	0	1	2	1.1	5
10-Jun	1	1	0	0	0	Z	4	7	7	5	3	2	2	1	1	1	1	1	4	5	2	2	1	1	2.2	7
11-Jun	Z	2	2	2	2	5	6	15	14	15	12	9	11	5	1	1	1	1	3	7	9	6	9	4	6.2	15
12-Jun	2	Z	1	1	0	0	M	1	1	1	1	1	0	1	5	5	1	1	1	3	3	0	1	1	1.4	5
13-Jun	3	2	Z	4	3	2	7	2	2	1	1	1	0	0	1	1	1	1	2	1	2	3	2	5	1.9	7
14-Jun	3	2	2	Z	1	2	4	4	2	1	1	1	1	1	1	0	1	0	0	0	0	0	1	3	1.2	4
15-Jun	4	4	5	6	Z	2	1	1	5	6	7	6	4	3	1	0	0	0	0	0	0	0	0	2	2.5	7
16-Jun	6	1	4	7	6	Z	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	1	1.5	7
17-Jun	Z	0	1	1	4	6	1	1	1	1	1	1	1	1	1	3	9	6	4	3	4	5	5	2.6	9	
18-Jun	4	Z	3	3	2	3	9	14	11	8	5	7	7	5	4	2	3	2	1	1	1	1	1	1	4.2	14
19-Jun	1	2	Z	2	3	3	4	4	4	3	3	3	2	2	2	2	2	3	3	2	1	1	1	2	2.5	4
20-Jun	1	1	2	Z	1	1	2	6	11	7	3	2	3	2	1	1	1	1	1	2	2	3	4	5	2.8	11
21-Jun	3	1	3	3	Z	4	3	4	5	3	2	2	2	1	1	1	1	1	1	1	2	2	1	1	2.2	5
22-Jun	1	1	0	0	0	Z	0	0	1	8	11	7	1	1	2	1	0	0	0	0	2	2	1	1	1.8	11
23-Jun	Z	1	1	1	1	2	10	27	21	9	1	0	0	0	1	1	4	3	1	5	3	2	1	0	4.2	27
24-Jun	0	Z	0	1	2	11	17	12	11	9	2	0	0	0	0	0	0	1	2	2	2	3	3	2	3.7	17
25-Jun	1	1	Z	1	1	2	10	25	32	24	12	5	4	7	2	4	2	2	1	2	4	1	2	2	6.5	32
26-Jun	3	3	3	Z	2	4	19	11	14	15	1	0	0	0	0	0	0	0	0	0	1	1	0	0	3.4	19
27-Jun	0	0	0	0	Z	1	7	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	7
28-Jun	0	0	0	0	1	Z	1	1	2	2	3	0	0	0	0	2	2	2	3	2	2	1	1	1	1.2	3
29-Jun	Z	1	1	1	1	1	1	2	10	6	2	1	1	1	1	1	1	2	4	5	6	8	9	11	3.3	11
30-Jun	11	Z	3	2	3	2	2	3	3	2	4	6	4	4	3	3	3	4	11	10	5	4	7	2	4.4	11
																		Diurnal Average								
																		Diurnal Maximum								
Z - zerspan																		C - Calibration						M - Maintenance		



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Fort McKay South - June 2015





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Fort McKay South - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	677	98.98	98.98
21 - 40	7	1.02	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Fort McKay South - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	75	47	21	9	14	14	22	37	65	53	69	77	41	46	45	42	677
21 - 40	2	1	0	0	0	1	2	0	1	0	0	0	0	0	0	0	7
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	77	48	21	9	14	15	24	37	66	53	69	77	41	46	45	42	684

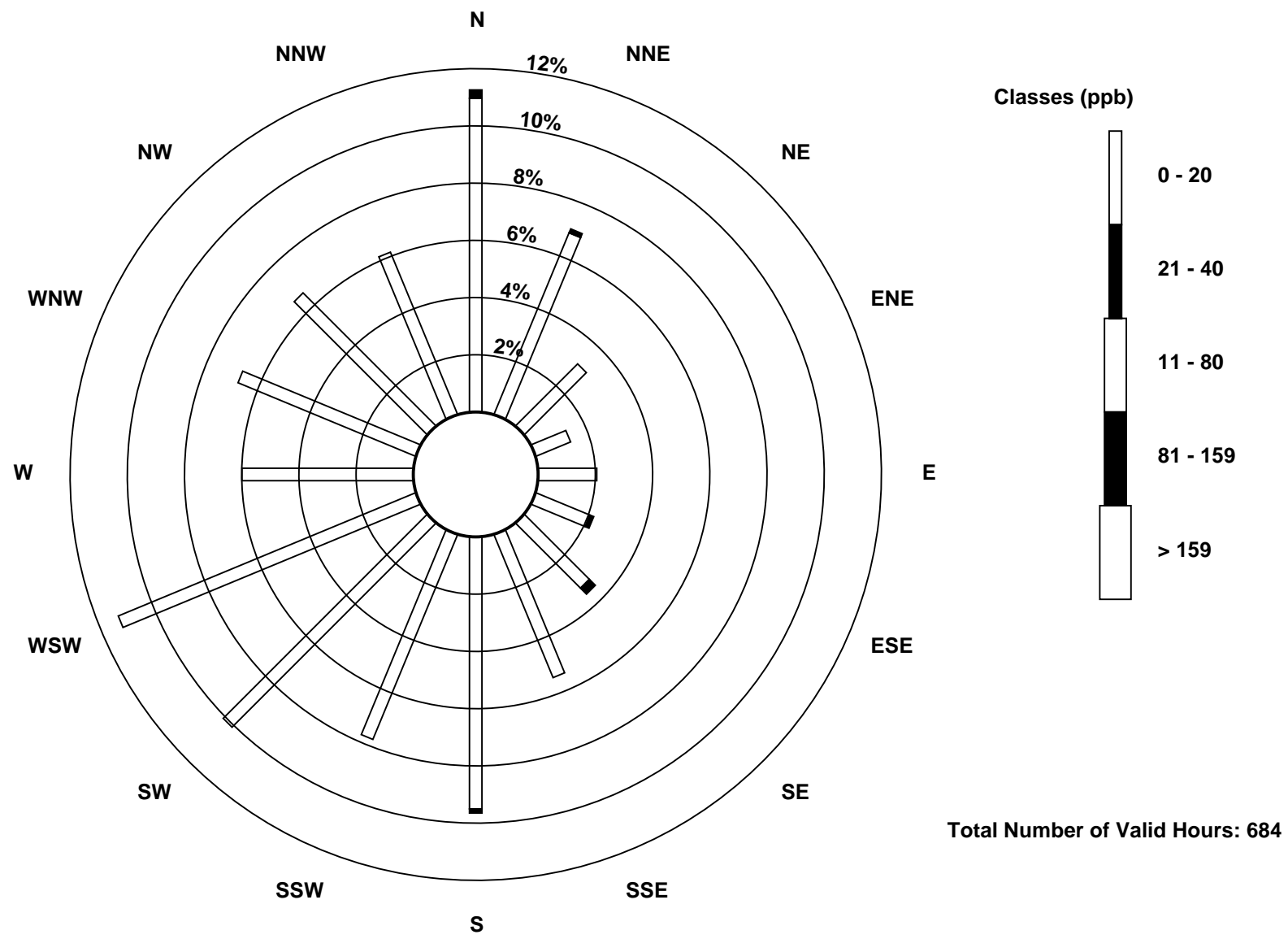
Total Number of Valid Hours: 684

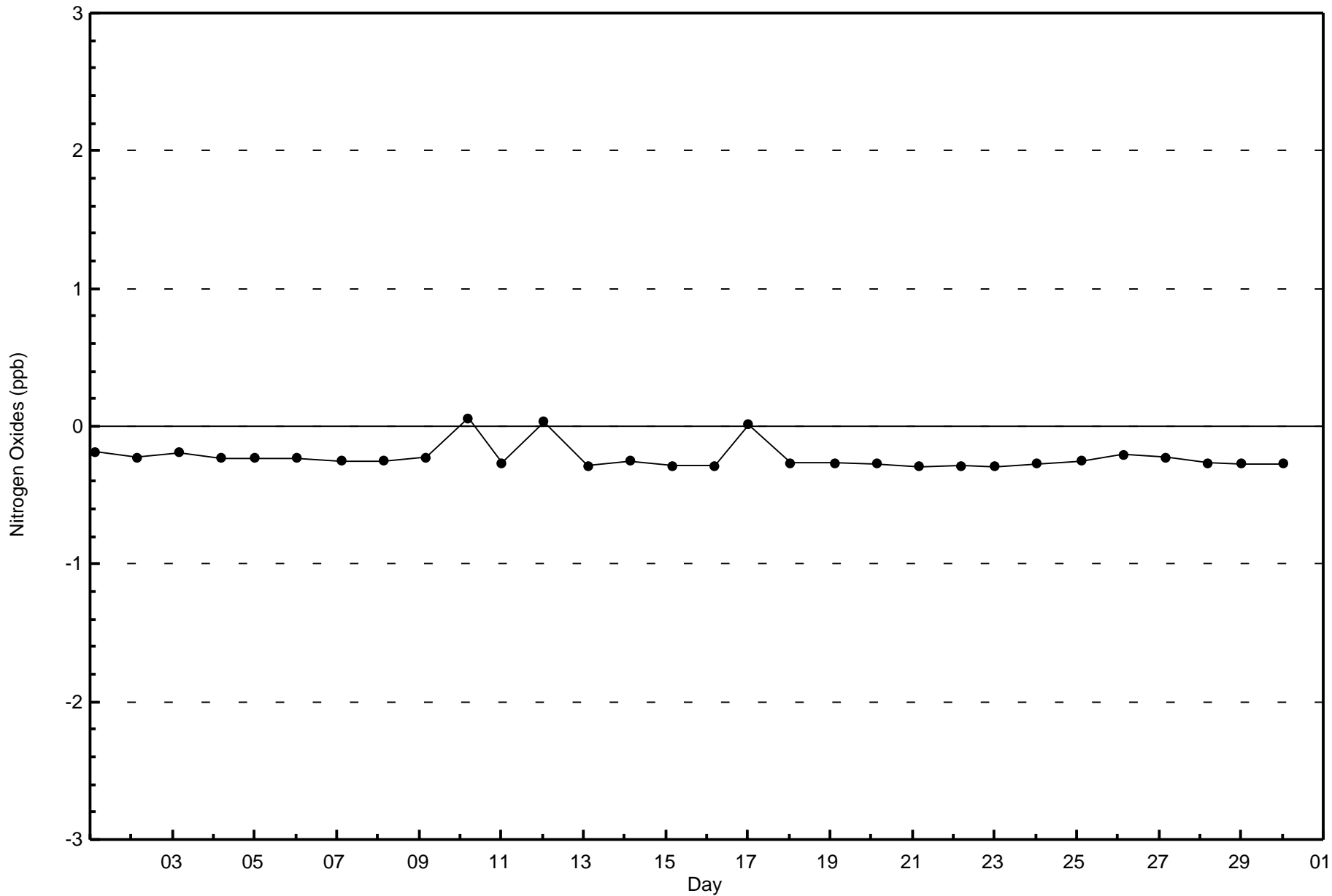
Total Number of Hours: 720

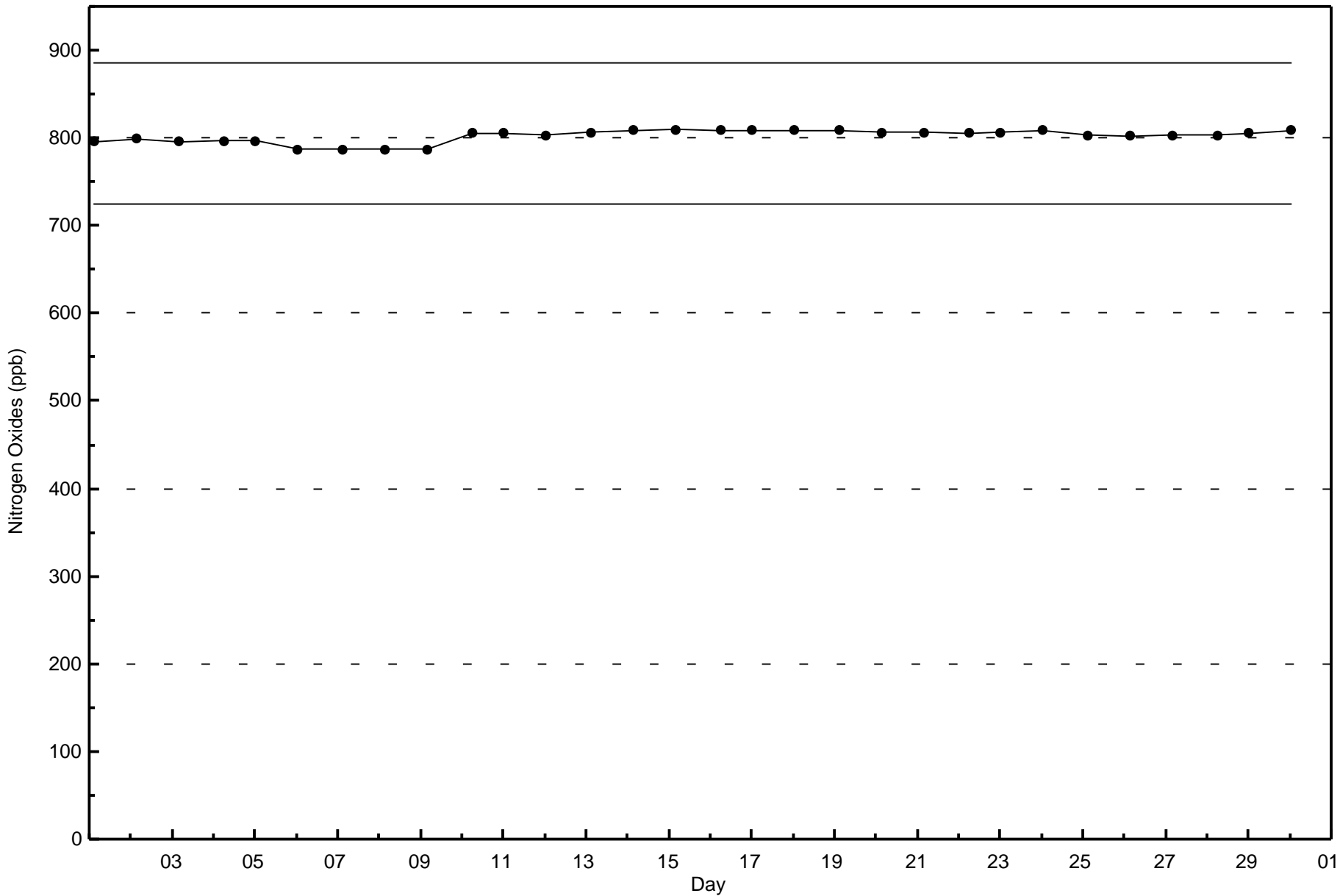


Wood Buffalo Environmental Association
Wind Rose Jun 2015

Nitrogen Oxides (NO_x) - ppb
Fort McKay South (AMS 13)









Summary of Hour Averages

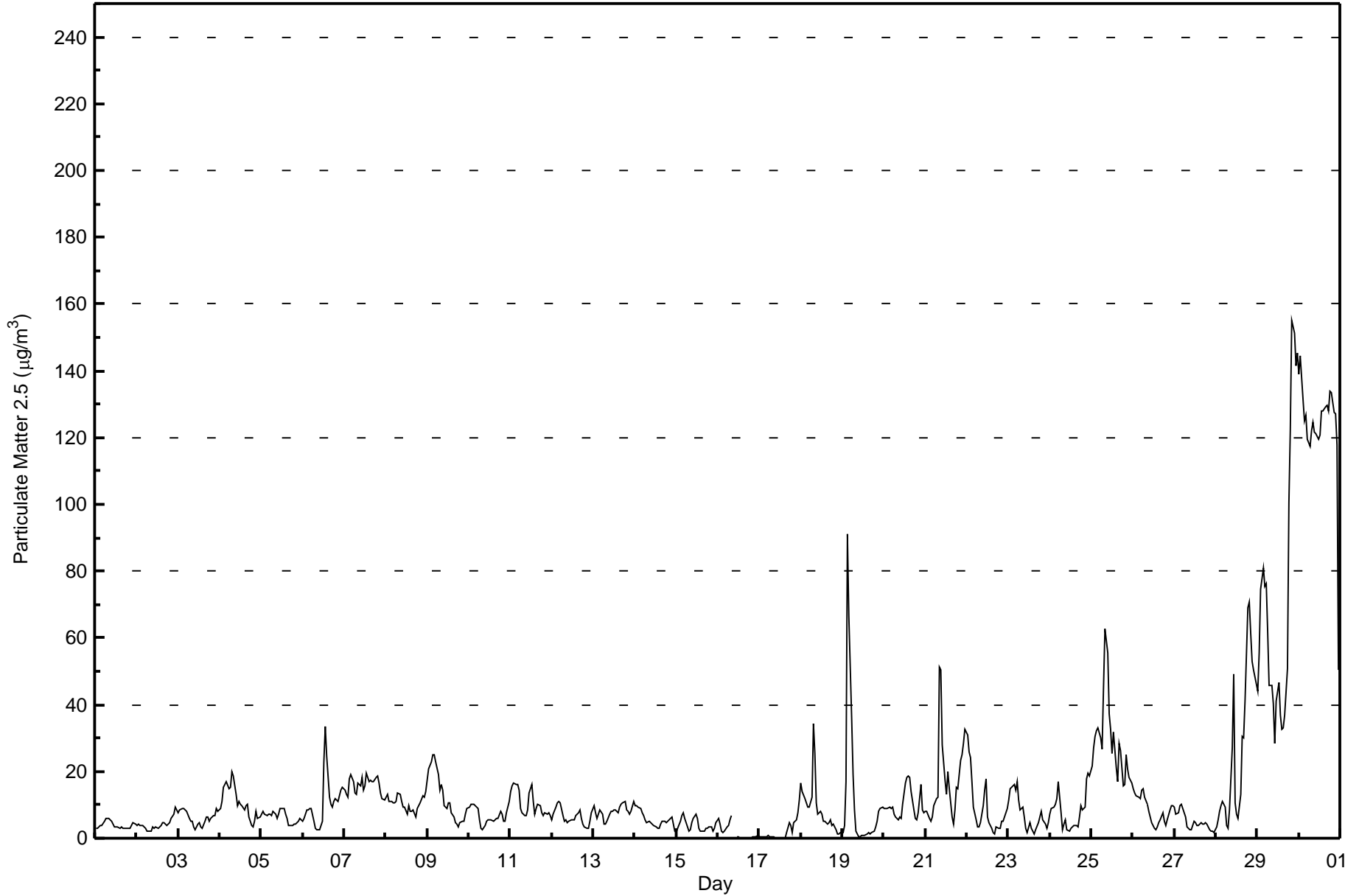
Fort McKay South - June 2015

Number of Exceedences (AAAQO): 24-hr: 2	Hours in Service: 720
Maximum Value: 155.0 µg/m ³ on Jun 29 21:00	Maximum Daily Average: 123.6 µg/m ³ on Jun 30
Minimum Value: 0.0 µg/m ³ on Jun 16 15:00	Hours of Data: 715
Maximum Diurnal Average: 19.8 µg/m ³ at hour 4	Hours of Missing Data: 5
Monthly Average: 15.53 µg/m ³	Hours of Calibration: 2
Minimum Daily Average: 2.0 µg/m ³ on Jun 17	Percent Operational Time: 99.6
Minimum Diurnal Average: 12.2 µg/m ³ at hour 16	
Percentiles: P ₁ = 0.0 P ₁₀ = 2.5 Q ₁ = 4.2 Median = 7.6 Q ₃ = 13.5 P ₉₀ = 30.9 P ₉₉ = 130.8	

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	3.2	3.2	3.5	3.7	3.8	4.9	6.0	6.0	5.9	5.2	4.2	3.6	3.4	3.4	3.1	3.2	3.1	3.0	3.0	2.8	2.8	3.8	4.6	4.1	3.9	6.0	
2-Jun	3.9	4.1	3.9	3.9	3.6	2.9	2.2	2.0	2.3	3.3	3.1	3.4	2.9	3.3	4.0	4.6	4.7	4.0	4.2	4.9	5.9	7.2	9.1	8.4	4.2	9.1	
3-Jun	7.5	8.6	8.7	8.8	8.4	7.9	5.9	5.2	5.0	3.4	2.4	4.1	4.8	3.5	2.9	4.9	6.3	6.3	5.0	5.9	6.6	6.9	8.8	7.9	6.1	8.8	
4-Jun	8.7	11.1	15.3	16.1	17.2	15.0	15.2	20.1	18.8	13.3	9.9	11.0	10.3	9.6	8.6	9.6	10.2	6.5	3.9	3.5	5.2	7.9	5.9	6.2	10.8	20.1	
5-Jun	7.2	7.9	7.0	6.8	7.4	7.3	6.6	8.1	7.1	6.0	7.2	8.8	9.1	8.8	7.4	5.8	3.6	3.7	3.8	4.3	4.2	5.0	6.1	5.4	6.4	9.1	
6-Jun	5.2	6.0	8.3	8.5	8.9	9.1	5.0	3.1	2.7	2.4	2.5	5.0	23.0	33.4	24.6	12.1	10.0	9.3	11.0	11.7	11.1	12.6	14.6	15.4	10.7	33.4	
7-Jun	14.5	13.3	12.1	17.8	19.0	17.0	13.6	13.2	16.4	15.8	18.1	14.5	15.5	19.6	17.0	17.4	16.9	17.0	18.2	18.5	16.6	13.5	11.7	11.5	15.8	19.6	
8-Jun	12.2	13.0	11.2	10.9	10.5	10.6	10.8	13.7	13.3	10.9	9.3	9.2	7.2	9.9	8.0	8.0	8.3	6.2	8.8	9.6	10.5	12.5	12.5	13.8	10.5	13.8	
9-Jun	17.3	20.9	23.1	24.9	24.9	22.9	19.0	14.4	16.0	14.4	9.9	9.0	10.6	10.4	7.5	6.2	4.7	4.2	3.6	4.8	5.3	4.9	7.4	8.9	12.3	24.9	
10-Jun	9.5	10.3	10.3	10.2	9.9	8.9	5.3	2.8	2.6	4.0	5.0	5.4	5.4	5.3	5.1	5.6	5.9	6.0	8.0	7.2	5.2	5.0	7.6	10.8	6.7	10.8	
11-Jun	14.1	15.6	16.4	16.1	16.2	14.3	9.0	7.6	6.6	6.7	8.4	13.8	16.2	11.2	7.3	8.9	10.2	9.8	7.7	6.7	7.7	7.1	7.8	6.6	10.5	16.4	
12-Jun	5.7	7.1	9.2	10.7	11.0	10.4	6.6	5.0	5.3	4.7	5.2	5.4	5.3	5.7	6.6	7.5	8.3	5.8	4.1	3.3	2.9	2.8	5.0	7.7	6.3	11.0	
13-Jun	9.9	7.4	6.1	7.2	8.4	7.1	4.3	4.1	5.1	7.3	8.1	8.1	8.5	8.4	7.5	9.5	10.3	10.4	11.1	8.3	8.2	7.2	8.1	10.9	8.0	11.1	
14-Jun	9.8	9.5	9.2	8.9	7.8	6.8	5.3	4.6	5.0	4.7	4.3	3.7	3.5	3.1	3.1	4.2	5.0	4.9	4.9	5.1	5.3	6.4	4.3	2.3	5.5	9.8	
15-Jun	1.9	2.8	5.3	6.8	7.5	6.0	3.5	2.0	2.4	4.7	6.0	7.0	5.9	2.8	2.0	2.0	2.2	2.8	2.8	3.6	3.4	2.1	3.1	4.6	3.9	7.5	
16-Jun	6.1	4.2	2.3	1.9	2.1	3.4	3.9	5.6	7.0	C	C	0.6	0.4	0.2	0.0	0.0	0.0	0.0	UO	UO	0.2	0.4	0.5	0.5	0.7	2.0	7.0
17-Jun	0.4	0.4	0.5	0.4	0.5	0.6	0.3	0.4	0.4	0.2	UO	0.0	0.1	0.0	0.0	0.0	1.7	4.6	3.7	1.7	4.6	5.4	7.5	11.4	2.0	11.4	
18-Jun	16.4	14.1	11.7	10.7	9.2	9.5	12.4	34.1	25.6	10.6	7.0	8.0	7.1	5.0	5.0	4.3	4.8	5.5	3.7	4.1	2.4	1.2	1.5	1.9	9.0	34.1	
19-Jun	1.6	3.9	16.8	91.2	66.5	36.1	19.1	8.5	2.0	0.5	0.6	0.8	0.9	1.0	1.4	1.7	1.5	1.5	2.0	3.2	5.1	8.0	9.1	9.5	12.2	91.2	
20-Jun	9.0	8.7	8.8	9.3	9.0	9.5	7.4	6.5	5.5	6.4	6.0	10.2	16.3	18.2	18.9	18.3	14.0	8.7	6.1	5.3	7.8	16.3	8.4	7.7	10.1	18.9	
21-Jun	8.0	8.1	6.1	5.2	6.3	9.7	11.9	12.4	51.2	50.6	28.1	17.2	13.1	19.8	14.7	6.1	4.4	8.7	15.4	14.9	23.5	25.0	28.4	32.6	17.5	51.2	
22-Jun	30.9	25.8	24.1	16.9	9.2	5.3	3.5	3.3	4.8	9.6	14.6	17.8	6.3	4.7	3.2	1.9	1.2	3.3	3.1	3.0	4.9	5.1	6.2	8.9	9.1	30.9	
23-Jun	11.6	14.6	15.5	16.2	14.4	16.8	11.5	8.3	9.4	6.3	2.8	1.9	4.7	3.0	2.3	1.3	2.4	4.7	6.2	7.9	5.6	4.1	3.0	4.7	7.5	16.8	
24-Jun	7.1	8.7	9.5	10.0	12.0	17.0	7.6	2.7	4.0	5.6	2.5	2.2	3.0	3.2	3.8	3.6	3.2	6.4	9.7	8.5	9.4	17.9	19.6	18.6	8.2	19.6	
25-Jun	21.8	27.2	30.5	32.1	33.0	30.0	26.5	45.3	62.7	55.3	37.5	32.7	25.2	31.6	21.0	16.9	28.4	26.1	15.6	16.2	25.0	20.8	18.3	16.4	29.0	62.7	
26-Jun	14.6	13.5	12.6	12.1	11.7	14.2	15.0	12.2	10.1	8.2	6.2	4.8	2.9	2.6	3.3	4.6	5.6	7.7	5.2	3.8	5.7	8.6	9.5	9.9	8.5	15.0	
27-Jun	9.1	7.4	7.7	9.7	10.2	9.1	6.3	3.6	2.9	2.6	2.7	4.9	4.8	3.9	3.9	4.5	4.4	4.1	4.7	4.1	2.3	2.2	1.9	1.8	5.0	10.2	
28-Jun	3.2	5.7	8.0	9.8	11.0	9.5	3.7	3.0	8.4	26.9	49.2	10.6	7.2	5.8	13.1	30.4	29.9	41.1	68.9	70.7	61.2	53.2	50.5	46.0	26.1	70.7	
29-Jun	43.9	55.4	74.6	80.9	75.4	76.2	61.9	45.8	45.8	40.4	28.2	41.0	46.5	36.7	32.8	33.0	36.7	50.7	100.3	122.3	155.0	151.4	141.6	145.4	71.7	155.0	
30-Jun	139.1	144.3	131.2	125.0	126.7	119.7	117.5	122.0	124.6	121.6	121.4	119.4	120.8	127.9	128.0	129.4	129.7	128.0	134.0	133.5	127.6	127.1	117.7	50.5	123.6	144.3	

15.1	16.1	17.0	19.8	18.7	17.3	14.2	14.2	16.0	15.6	14.7	12.8	13.0	13.4	12.2	12.2	12.6	13.8	16.5	16.7	18.0	18.4	18.0	16.4	Diurnal Average	
139.1	144.3	131.2	125.0	126.7	119.7	117.5	122.0	124.6	121.6	121.4	119.4	120.8	127.9	128.0	129.4	129.7	128.0	134.0	133.5	155.0	151.4	141.6	145.4	Diurnal Maximum	

C - Calibration UO - Unstable Operation
 Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m³





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort McKay South - June 2015

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	230	32.17	32.17
6 - 15	303	42.38	74.55
16 - 25	65	9.09	83.64
26 - 80	55	7.69	91.33
> 81.0	31	4.34	95.66

Total Number of Valid Hours: 715

Total Number of Hours: 720



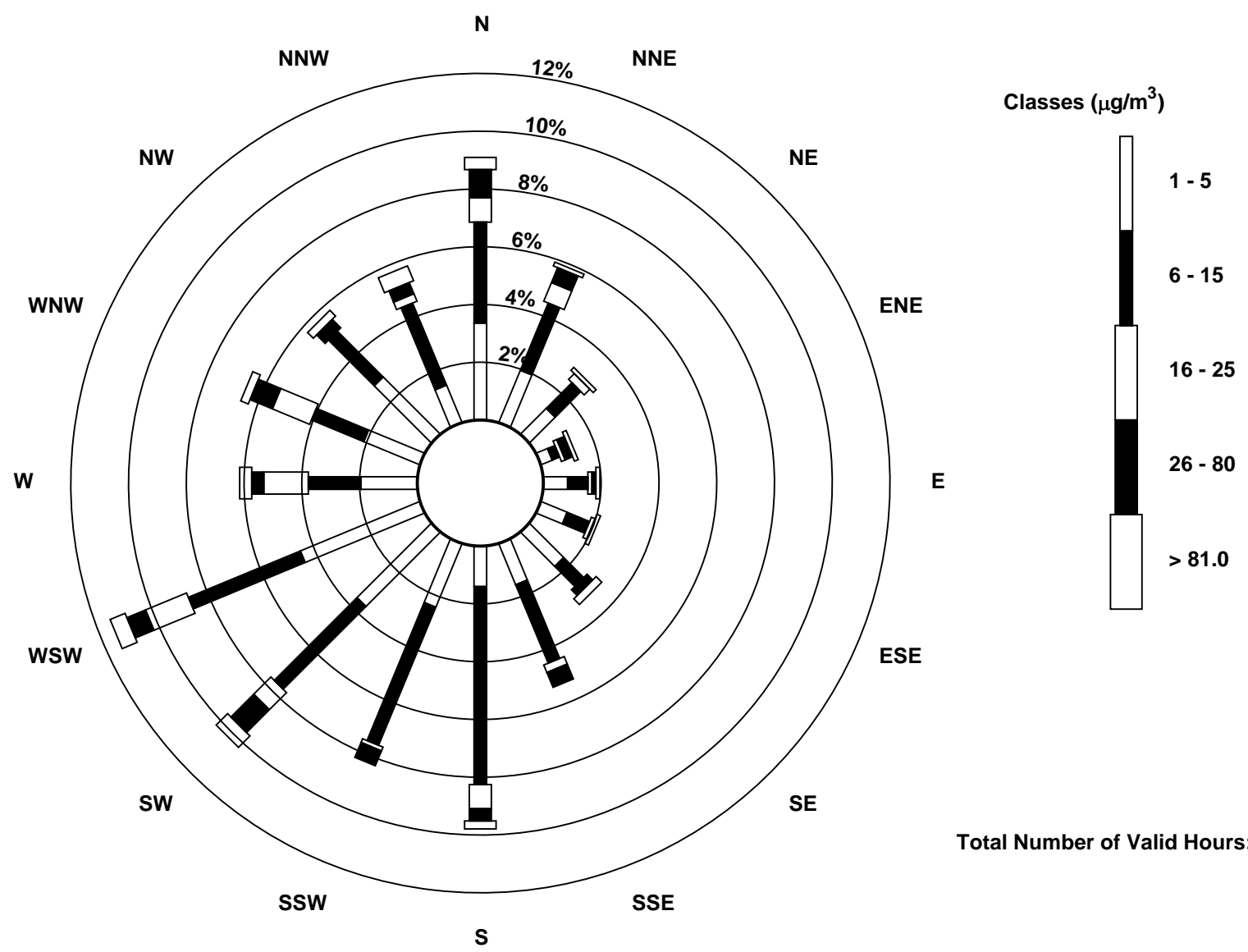
Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort McKay South - June 2015

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	24	14	9	3	6	7	12	11	10	17	26	32	14	15	20	10	230
6 - 15	25	18	9	2	5	6	7	21	49	37	29	30	13	14	16	22	303
16 - 25	6	5	2	1	1	1	0	2	6	1	6	11	11	10	0	2	65
26 - 80	7	4	0	2	1	0	2	4	3	4	8	5	3	6	3	3	55
> 81.0	3	1	1	1	1	1	2	0	2	0	4	4	3	2	2	4	31
Totals	65	42	21	9	14	15	23	38	70	59	73	82	44	47	41	41	684

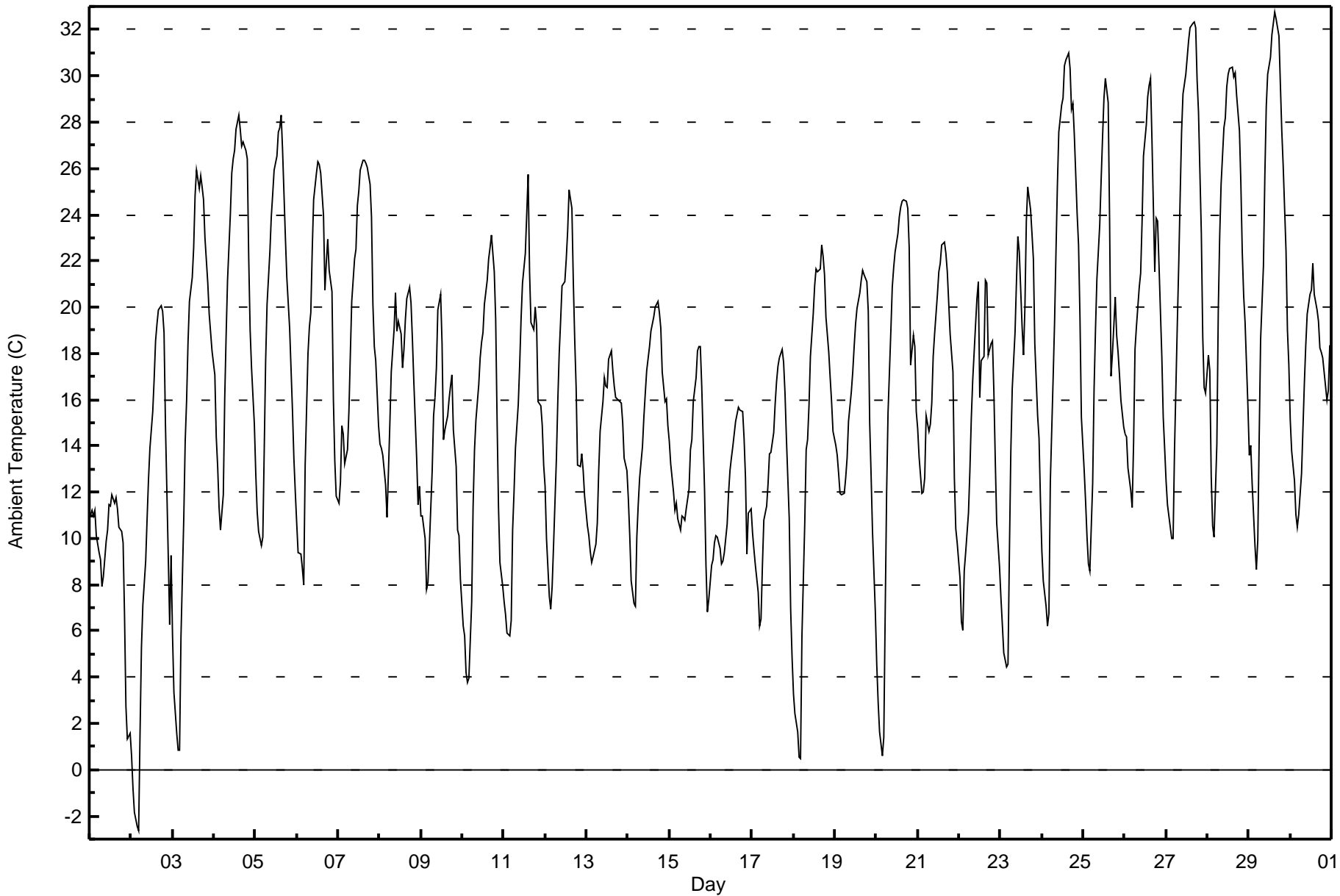
Total Number of Valid Hours: 715

Total Number of Hours: 720





Maximum Value: 32.7 C on Jun 29 16:00 Maximum Daily Average: 22.8 C on Jun 28																						Hours in Service: 720 Hours of Data: 720																										
Minimum Value: -2.6 C on Jun 2 05:00 Minimum Daily Average: 9.2 C on Jun 1 Maximum Diurnal Average: 22.9 C at hour 16 Minimum Diurnal Average: 7.9 C at hour 5 Monthly Average: 16.50 C Percentiles: P ₁ = 0.6 P ₁₀ = 8.2 Q ₁ = 11.4 Median = 16.2 Q ₃ = 21.1 P ₉₀ = 26.0 P ₉₉ = 32.1																						Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jun	11.0	11.2	11.0	11.2	10.1	9.4	9.1	7.9	8.4	9.9	10.4	11.5	11.4	11.9	11.5	11.7	11.3	10.5	10.3	9.8	6.7	2.7	1.3	1.6	9.2	11.9																						
2-Jun	0.6	-0.8	-1.8	-2.5	-2.6	1.6	5.3	7.1	9.0	10.9	12.6	13.9	15.5	16.9	18.5	19.3	19.9	20.1	19.8	18.9	14.9	9.2	6.2	9.3	10.1	20.1																						
3-Jun	5.8	3.4	1.6	0.8	0.8	5.7	10.9	14.2	16.0	18.5	20.2	21.3	22.6	24.8	25.9	25.1	25.7	25.2	24.7	23.0	21.0	19.7	18.9	18.1	16.4	25.9																						
4-Jun	17.1	14.4	13.1	11.4	10.4	11.9	16.1	18.8	21.2	24.0	25.8	26.4	26.8	27.7	28.3	27.7	27.0	27.2	26.8	26.4	22.1	19.0	17.4	14.9	20.9	28.3																						
5-Jun	12.8	11.2	10.3	9.7	10.1	13.8	17.7	20.1	22.4	23.9	24.9	25.9	26.5	27.6	27.8	28.3	26.8	23.0	21.3	20.2	19.1	15.5	13.5	12.0	19.3	28.3																						
6-Jun	10.7	9.4	9.3	8.7	8.0	13.2	18.0	19.2	19.8	22.4	24.6	25.8	26.3	26.2	25.8	24.0	20.7	22.0	22.9	21.6	20.7	16.1	13.4	11.8	18.3	26.3																						
7-Jun	11.5	12.4	14.9	14.5	13.2	13.8	15.5	17.9	20.2	22.1	22.5	24.4	25.0	25.9	26.3	26.4	26.2	26.0	25.3	23.9	20.1	18.3	17.7	14.9	20.0	26.4																						
8-Jun	14.1	13.9	13.6	12.3	10.9	12.8	14.9	17.2	19.0	20.6	19.0	19.4	18.8	17.4	18.2	19.4	20.4	20.9	20.2	18.6	16.8	13.5	11.5	12.3	16.5	20.9																						
9-Jun	11.0	11.0	10.0	7.8	8.1	9.7	12.9	15.3	16.1	17.4	19.9	20.5	18.4	14.3	14.7	15.3	16.0	16.6	17.1	14.7	13.1	10.4	10.1	8.2	13.7	20.5																						
10-Jun	6.2	5.8	4.2	3.8	4.0	7.3	11.4	13.9	15.1	16.6	17.8	18.5	18.9	20.2	21.2	22.1	22.6	23.1	21.5	19.4	15.1	11.3	9.0	7.9	14.0	23.1																						
11-Jun	7.3	6.7	5.9	5.8	6.5	10.3	12.0	13.9	15.8	17.5	19.5	21.1	22.3	24.1	25.7	21.6	19.3	19.0	20.0	19.2	15.9	15.7	14.9	13.2	15.6	25.7																						
12-Jun	12.3	10.0	7.5	6.9	7.9	9.7	13.4	15.9	18.0	19.4	20.9	21.1	22.1	23.3	25.0	24.3	21.1	18.6	16.5	13.2	13.1	13.6	12.9	11.8	15.8	25.0																						
13-Jun	10.5	10.1	9.4	9.0	9.2	9.7	10.7	12.9	14.6	15.9	17.0	16.6	16.5	17.7	18.1	17.2	16.6	16.1	16.0	15.9	15.9	15.0	13.5	12.9	14.1	18.1																						
14-Jun	11.7	10.1	8.2	7.2	7.0	10.0	11.5	12.6	14.0	15.3	16.3	17.3	18.3	19.0	19.3	19.6	20.0	20.3	19.8	19.1	17.2	15.9	16.0	14.9	15.0	20.3																						
15-Jun	14.2	13.2	12.0	11.2	11.5	10.9	10.4	10.9	10.9	10.8	11.3	12.1	13.8	14.3	15.9	16.9	18.1	18.3	18.3	16.6	12.1	8.8	6.8	7.4	12.8	18.3																						
16-Jun	8.8	9.1	9.8	10.1	10.0	9.6	8.9	9.0	9.4	10.6	12.0	12.9	13.5	14.0	15.1	15.4	15.7	15.5	15.5	14.4	12.6	9.3	11.1	11.3	11.8	15.7																						
17-Jun	10.3	9.5	8.9	7.7	6.2	6.5	8.9	10.8	11.4	12.4	13.6	13.7	14.5	15.8	16.8	17.5	17.8	18.2	17.6	16.3	14.4	10.9	7.0	4.8	12.1	18.2																						
18-Jun	3.3	2.4	1.6	0.5	0.5	5.8	10.7	13.9	14.3	15.7	17.8	19.7	20.9	21.6	21.6	21.6	22.7	22.2	21.4	19.6	18.1	16.9	15.9	14.6	14.3	22.7																						
19-Jun	14.0	13.6	12.8	11.9	11.9	11.9	12.6	13.5	15.1	16.3	17.2	18.3	19.3	20.0	20.6	21.2	21.6	21.4	21.1	19.8	15.0	12.7	10.3	6.8	15.8	21.6																						
20-Jun	4.6	2.9	1.6	0.6	1.4	6.8	11.9	15.4	18.9	20.8	21.7	22.4	23.2	23.9	24.3	24.6	24.6	24.6	24.3	22.6	17.5	18.8	18.3	15.5	16.3	24.6																						
21-Jun	14.7	13.6	12.0	12.0	12.6	15.3	14.7	14.9	15.8	17.9	18.8	20.6	21.5	21.9	22.7	22.8	22.4	21.5	20.2	18.9	17.2	12.6	10.4	9.8	16.9	22.8																						
22-Jun	8.3	6.4	6.1	8.6	9.4	11.1	13.0	15.2	16.8	19.2	20.4	21.1	16.1	17.7	17.8	21.2	21.1	17.9	18.4	18.5	16.3	13.3	10.7	8.8	14.7	21.2																						
23-Jun	7.4	6.3	5.1	4.4	4.6	9.4	13.7	16.5	18.9	21.1	23.1	22.4	19.2	17.9	20.0	23.7	25.2	24.2	23.2	22.1	18.4	15.3	14.3	11.6	16.2	25.2																						
24-Jun	9.4	8.2	7.1	6.2	6.8	12.5	16.9	19.3	22.4	25.2	27.6	28.7	29.0	30.4	30.7	31.0	30.3	28.5	28.8	27.4	24.0	22.7	19.6	15.3	21.2	31.0																						
25-Jun	12.9	11.6	10.1	8.9	8.6	12.4	16.5	19.1	21.2	23.5	25.5	27.4	29.1	29.9	28.8	23.7	17.0	18.0	20.4	18.8	18.0	17.1	16.0	14.8	18.7	29.9																						
26-Jun	14.5	14.4	13.1	12.1	11.3	14.1	18.2	19.2	20.9	21.5	23.7	26.5	27.9	29.1	29.6	29.9	27.2	21.5	23.8	23.7	21.8	17.9	15.3	13.9	20.5	29.9																						
27-Jun	12.5	11.5	10.5	10.0	10.0	13.8	19.3	21.9	24.8	27.5	29.2	30.1	30.8	31.5	32.1	32.3	32.3	32.1	29.8	28.4	23.2	18.7	16.5	16.3	22.7	32.3																						
28-Jun	17.9	17.3	12.7	10.5	10.0	14.1	19.8	23.0	25.3	27.7	28.2	29.5	30.0	30.3	30.4	29.9	30.1	29.2	27.6	25.4	22.4	20.5	19.4	15.8	22.8	30.4																						
29-Jun	13.6	14.0	12.4	9.7	8.7	9.9	14.4	18.6	21.8	25.7	28.7	30.1	30.8	31.8	32.3	32.7	32.4	31.7	29.7	27.7	26.1	22.4	19.0	17.5	22.6	32.7																						
30-Jun	15.1	13.8	12.5	11.0	10.5	11.0	12.8	14.7	16.7	18.4	19.7	20.5	20.7	21.9	20.5	19.9	19.4	18.2	18.1	17.8	16.6	16.0	16.4	18.4	16.7	21.9																						
																								10.8	9.9	8.8	8.1	7.9	10.5	13.4	15.4	17.1	19.0	20.3	21.3	21.7	22.3	22.9	22.9	22.4	21.7	21.3	20.1	17.5	15.0	13.4	12.2	Diurnal Average
																								17.9	17.3	14.9	14.5	13.2	15.3	19.8	23.0	25.3	27.7	29.2	30.1	30.8	31.8	32.3	32.7	32.4	32.1	29.8	28.4	26.1	22.7	19.6	18.4	Diurnal Maximum





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ambient Temperature (AT) - C
Fort McKay South - June 2015

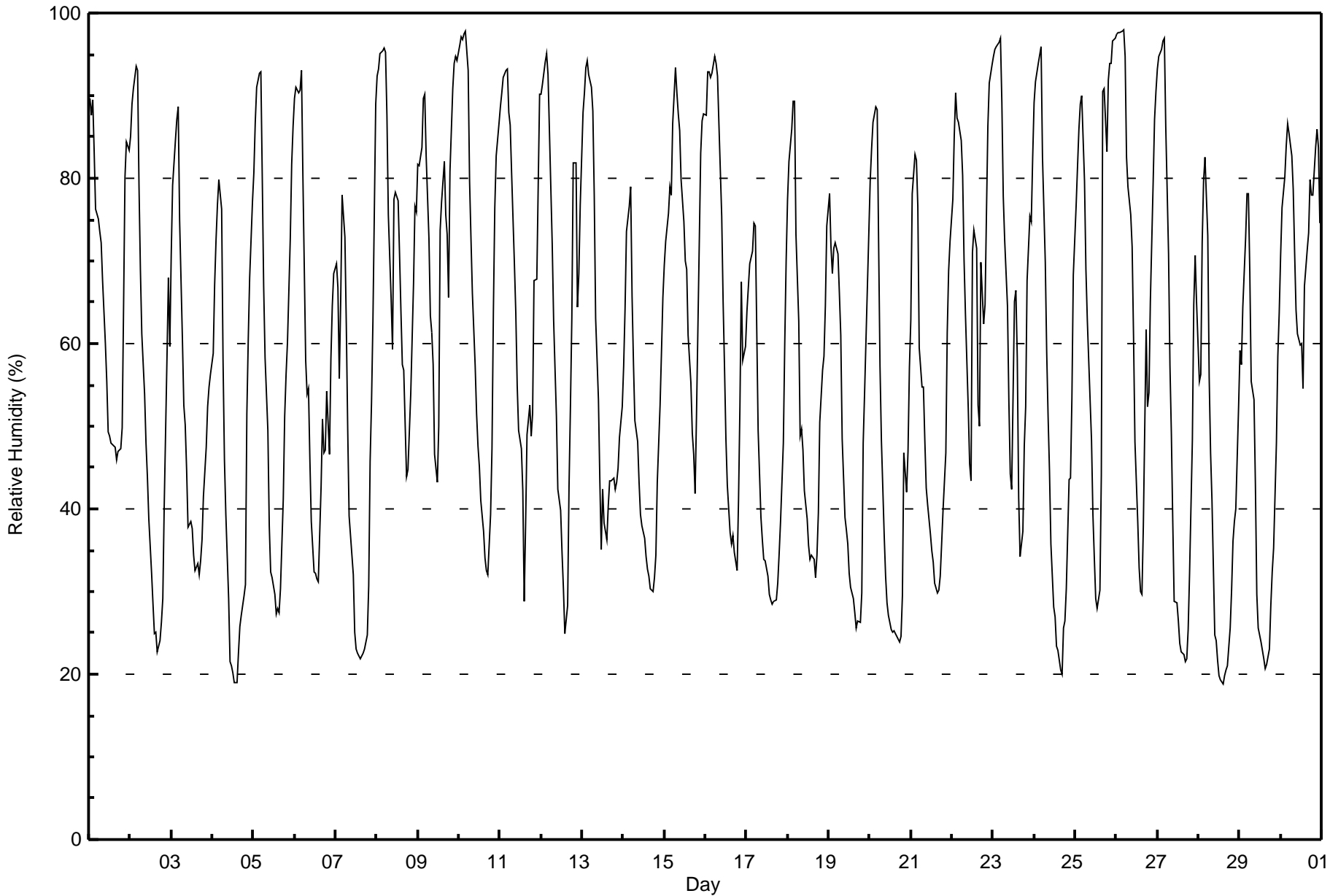
Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	4	0.56	0.56
0 - 10	115	15.97	16.53
10 - 20	386	53.61	70.14
> 20	215	29.86	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Maximum Value: 98 % on Jun 26 05:00																			Maximum Daily Average: 75.3 % on Jun 9						Hours in Service: 720			
Minimum Value: 19 % on Jun 28 15:00																			Minimum Daily Average: 40.6 % on Jun 28						Hours of Data: 720			
Maximum Diurnal Average: 87.5 % at hour 5																			Minimum Diurnal Average: 36.4 % at hour 16						Hours of Missing Data: 0			
Monthly Average: 58.8 %																			Percentiles: P ₁ = 20 P ₁₀ = 28 Q ₁ = 38 Median = 58 Q ₃ = 79 P ₉₀ = 91 P ₉₉ = 97						Hours of Calibration: 0			
																			Percent Operational Time: 100.0									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
1-Jun	90	88	89	83	76	75	74	72	68	60	55	49	49	48	48	47	46	47	47	50	65	80	84	83	65.6	90		
2-Jun	85	89	91	94	93	79	69	61	54	48	44	39	32	28	25	25	23	24	26	29	40	58	68	60	53.5	94		
3-Jun	71	79	85	87	89	75	61	53	50	45	38	38	38	34	32	33	32	34	36	41	48	52	55	56	52.6	89		
4-Jun	59	67	73	77	80	76	58	46	39	29	21	21	20	19	19	23	26	27	30	31	51	61	68	77	45.7	80		
5-Jun	81	87	91	93	93	80	67	58	49	38	32	32	30	27	28	27	30	41	51	56	60	73	82	86	58.1	93		
6-Jun	90	91	90	91	93	80	58	54	55	46	39	32	32	32	31	43	51	47	47	54	47	58	65	68	58.0	93		
7-Jun	70	67	56	65	78	73	62	50	39	34	32	25	23	23	22	22	23	23	25	31	46	53	63	89	45.5	89		
8-Jun	92	93	95	95	96	95	88	76	65	59	77	78	77	71	64	57	57	44	45	49	54	67	77	76	72.9	96		
9-Jun	82	82	84	90	90	83	73	63	61	57	47	43	50	74	77	82	76	73	66	81	91	94	95	94	75.3	95		
10-Jun	96	97	97	97	98	93	80	73	66	57	52	48	45	41	37	34	32	32	39	47	64	76	83	87	65.5	98		
11-Jun	89	90	92	93	93	88	86	81	70	64	55	50	47	42	29	38	49	53	49	52	68	68	79	90	67.2	93		
12-Jun	90	91	94	95	93	86	72	63	57	51	42	40	35	30	25	28	43	52	63	82	82	64	68	77	63.5	95		
13-Jun	88	90	93	94	93	91	88	78	63	53	43	35	42	38	36	40	43	43	44	42	43	45	49	52	59.6	94		
14-Jun	57	64	73	77	79	66	58	51	48	43	39	38	37	34	33	32	30	30	32	34	43	52	59	66	49.0	79		
15-Jun	69	72	76	79	78	87	93	90	88	86	80	75	70	69	61	55	49	47	42	51	72	83	87	88	72.8	93		
16-Jun	88	93	93	92	93	95	94	92	87	75	65	57	48	43	37	36	37	35	33	41	52	68	58	60	65.4	95		
17-Jun	64	67	70	71	75	74	62	50	39	36	34	34	32	30	29	28	29	29	31	35	38	48	60	70	47.3	75		
18-Jun	77	82	86	89	89	73	63	49	50	47	42	39	36	34	34	34	32	34	39	50	57	58	65	74	55.6	89		
19-Jun	78	72	69	72	72	71	66	61	49	39	37	36	32	30	29	28	26	26	26	30	48	54	60	73	49.3	78		
20-Jun	80	84	87	89	88	72	57	48	37	32	29	27	25	25	25	25	25	24	25	29	47	42	47	57	46.9	89		
21-Jun	63	78	83	82	77	59	55	55	48	43	41	37	35	34	31	30	30	32	36	40	47	61	69	72	51.5	83		
22-Jun	78	85	90	87	87	85	80	70	64	52	45	43	71	74	72	52	50	70	62	65	76	86	92	94	72.1	94		
23-Jun	95	96	96	97	97	89	78	73	65	53	44	42	65	67	58	41	34	37	48	52	68	75	75	83	67.8	97		
24-Jun	89	92	94	95	96	82	70	59	51	45	36	28	27	23	23	20	20	26	26	30	44	44	53	68	51.7	96		
25-Jun	77	81	86	89	90	80	69	63	58	48	39	34	29	28	30	44	90	91	83	92	94	94	97	97	70.1	97		
26-Jun	97	98	98	98	98	95	83	79	76	72	61	48	38	33	30	30	38	62	52	54	65	80	87	90	69.2	98		
27-Jun	93	95	96	97	97	86	71	57	49	38	29	29	26	24	23	22	22	22	25	32	48	65	71	65	53.4	97		
28-Jun	55	56	72	80	83	73	56	47	41	25	24	22	20	19	19	20	21	21	26	30	36	38	40	52	40.6	83		
29-Jun	59	57	64	73	78	78	69	55	53	43	30	26	24	23	22	21	21	23	28	32	35	48	58	64	45.2	78		
30-Jun	71	76	80	84	87	85	83	79	71	64	61	60	60	55	67	71	73	80	78	78	84	86	84	75	74.6	87		
																			79.0 82.0 84.7 86.8 87.5 80.8 71.3 63.5 57.0 49.4 43.8 40.1 39.9 38.4 36.5 36.4 38.5 41.0 42.0 47.4 57.1 64.4 69.8 74.8						Diurnal Average			
																			97 98 98 98 98 95 94 92 88 86 80 78 77 74 77 82 90 91 83 92 94 94 97 97						Diurnal Maximum			





Maximum Speed: 20 km/h on Jun 13 11:00	Maximum Daily Speed Average: 11.8 km/h on Jun 13	Hours in Service: 720
Minimum Speed Value: 0 km/h on Jun 10 05:00	Minimum Daily Speed Average: 0.6 km/h on Jun 12	Hours of Data: 720
Maximum Diurnal Speed Average: 2.1 km/h at hour 17	Minimum Diurnal Speed Average: 0.8 km/h at hour 8	Hours of Missing Data: 0
Monthly Average Velocity: 1.3 km/h 294.2 deg	Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 2 Median = 5 O ₃ = 8 P ₉₀ = 11 P ₉₉ = 18	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	WSW4	WSW4	WNW4	NW8	WNW7	WNW7	WNW8	WNW10	NW11	WNW12	WNW11	NW12	WNW13	NW11	NW11	NW12	NW11	NW11	NW8	WNW5	W3	W4	WSW6	W5	WNW7.8	WNW13	
2-Jun	NW3	NW4	WSW2	SW2	W1	S2	NNE1	ESE1	E5	SE5	E7	ESE7	SE6	ESE8	SSE7	SSE5	SE7	ESE7	SE6	SE6	S2	WSW3	SW3	SW5	SE2.8	ESE8	
3-Jun	SW2	WSW2	SW2	WSW1	WSW2	NNW1	SSE1	SE4	SE5	SE8	SSE11	SE10	SE8	SSE9	SSE9	SSE8	S9	SSE9	SSE9	S9	S7	S6	S6	S6	SSE5.6	SSE11	
4-Jun	S6	SSW4	S4	S3	S4	S4	SSE6	SSE6	SSE6	S8	S11	S10	SSE9	SSE10	S11	S13	S11	S10	S8	SSW6	SSW7	SSW11	S4	S4	S7.3	S13	
5-Jun	SSW3	SSW4	SSW3	SSW3	SW2	S3	SSE6	SSE7	S12	SSW15	SSW14	SSW14	SSW13	SSW13	SSW12	S13	SSW10	SSW10	SSW12	S8	S6	SSW4	SSW4	SSW4	SSW7.7	SSW15	
6-Jun	SSW1	NW1	NNW1	NNW1	W2	SSE1	WSW5	WSW7	WSW5	WSW0	NE5	NE7	NNE8	NNE7	NNE6	SSW10	SW8	E2	SSE1	NNW2	NW4	W3	W2	SSW1	WNW1.0	SSW10	
7-Jun	S1	WSW4	W5	W6	W3	W6	W7	W7	WNW6	W7	WNW7	WNW11	W12	W13	WNW12	WNW10	WNW9	W9	W6	W2	SW2	SW2	WSW3	WSW2	W6.1	W13	
8-Jun	S3	SW3	S3	SSW2	WSW1	SSW3	WSW5	WNW4	W5	NW5	SSW3	SSE4	SW4	NE8	ESE7	SE4	SSE2	NNW11	NNW13	NNW11	NW8	NW3	WNW5	WNW5	WNW1.9	NNW13	
9-Jun	WNW5	W6	WNW4	WNW1	WSW4	WSW5	WSW4	WSW7	W6	NW3	W6	W6	NNE11	NNE8	NNE5	SW3	WNW4	W4	W3	WNW3	NW1	NW1	NNW3	SW3	WNW2.8	NNE11	
10-Jun	WSW2	NE1	SW1	WSW2	N0	SSW1	ENE1	ENE2	NNE4	NE3	NE6	NE4	NE3	NE3	E6	E5	E6	ESE4	SSW10	SSW2	WSW2	SW2	SW2	SW2	E0.9	SSW10	
11-Jun	SW1	WSW2	SW2	WSW2	WSW2	S1	S4	S3	SSE5	SE6	SE7	ESE4	E3	W2	SSW15	WSW10	W6	WSW3	SSE7	SE4	WSW3	SSW2	SSE5	SSW1	S2.8	SSW15	
12-Jun	WNW3	WSW2	WSW2	WSW4	S2	SSW2	SSW2	SSE1	WSW1	E3	E2	SW3	NNW3	E3	S6	SE5	ESE8	ESE4	NNW10	NNW8	NNW3	E6	ENE5	NE5	ENE0.6	NNW10	
13-Jun	NNE5	N5	NNW3	NNW3	NNW5	NW5	NW6	N11	N15	N18	N20	N20	N19	N18	N18	NNE18	NNE18	NNE16	NNE15	N15	NNE12	N10	N9	N7	N11.8	N20	
14-Jun	N5	N1	WNW2	NNW1	NW3	N8	N11	NNE11	N12	N14	N14	N13	NNE12	N14	N14	N11	N10	NNW9	NNW8	NNW6	NW2	NNW7	N6	N5	N8.1	N14	
15-Jun	N7	N9	NNE7	N7	N6	NW3	NW3	N4	NNE5	N5	NNE4	NE2	ENE1	S2	SW4	W6	WNW6	WSW5	NW4	WNW2	SW3	SSW3	SW2	SSW1	NNW2.4	NNE9	
16-Jun	NW4	NNW3	N6	N6	N8	N8	N9	N8	N10	N11	N10	N9	N11	N11	N10	N11	NNW8	N8	N8	NNW4	NW3	WNW3	N7	N8	N7.5	N11	
17-Jun	NNW6	NNW5	NW4	NW5	NW4	NW5	NNW7	N9	NNE11	NNE9	N7	N5	NNE2	NW3	W4	SE1	SSE7	SSE8	SSE7	S7	S7	S5	SSW4	SW4	NNW1.2	NNE11	
18-Jun	SW3	S2	W2	WSW2	WSW1	NNW2	E1	SSE7	SSE7	S7	S8	SSE6	SSE7	ESE6	SE6	SE5	S6	SSW7	WSW4	W2	NW3	W3	WSW5	W4	S2.8	S8	
19-Jun	NW6	NNW8	N9	N9	N10	N10	N10	N12	NNE12	NNE12	NNE11	NNE9	N9	NNE8	NE7	NNE8	NNE7	N7	NE7	NNE3	NW3	NNW5	WNW2	WNW1	N7.2	N12	
20-Jun	SW2	SSW1	SSW1	SW2	WSW1	NE0	SE2	S2	S1	ENE2	NE5	NNE8	NE7	N4	N5	ENE4	NNE3	NE5	NE5	NNE4	NW2	NNE7	NNE6	SW3	NNE2.2	NNE8	
21-Jun	NW3	NNW2	WSW2	NW2	NNW3	NNW3	NNW4	NNW4	N5	N4	SW1	NE7	NNE9	NNE9	NNE9	NNE9	N7	NNE9	N9	NNW5	WNW3	WSW4	WSW5	WSW5	N3.7	NNE9	
22-Jun	WNW0	SW1	SW3	WSW6	WSW4	SSW1	SSW2	W2	NE3	N7	NE5	NNE5	N9	SW2	WSW8	WSW9	WNW9	WNW7	WNW2	N2	N3	W1	SW2	WSW2	WNW2.0	N9	
23-Jun	WSW2	SW2	SW2	S2	WSW2	S3	SSE4	SE4	ESE4	S4	SW5	W4	SW7	WNW4	ESE2	E5	SSW8	SSW4	SSW1	SSE3	WSW2	SW5	SW5	SW1	SSW2.3	SSW8	
24-Jun	SW3	SSW3	SW2	SSW3	SSW2	S4	S5	SSW7	S7	S8	SW9	SW10	WSW10	WSW10	WSW9	WSW6	NW8	NW6	NNW4	N4	N8	N4	NNW2	WSW3.5	WSW10		
25-Jun	WSW2	SW1	WSW2	W2	S2	WNW1	NNE1	NNE3	N5	N5	NNE3	ENE3	ESE6	SE2	NNW10	NNW9	SSW6	SSE4	SW5	WSW3	WSW4	SW2	S3	SSW2	WNW0.7	NNW10	
26-Jun	S2	NNW1	WSW2	S3	SW2	S2	SSE5	SSE6	S5	SSW6	SW7	WSW10	WSW13	WSW14	WSW12	WSW14	W10	WSW9	WSW7	WSW5	N3	SW1	SW1	SW2	SW5.0	WSW14	
27-Jun	SSW2	S2	SSW2	S2	SSE2	S2	S3	SW5	SSW6	SSW6	SW5	SW8	SW9	SW11	SW9	WSW9	WSW9	WSW9	WSW9	SW5	SW5	SW3	SW4	SW5	WSW6	SW5.1	SW11
28-Jun	WSW8	WSW2	SSW3	S1	S2	S3	W3	N2	N4	NW12	NW11	WNW13	WNW13	WNW12	NW12	NNW11	NW9	NNW10	NW8	WNW5	WNW5	W5	WNW5	WNW1	WNW5.5	WNW13	
29-Jun	SW2	SSW2	S1	S2	SSW2	S3	SSE3	SE2	E2	ENE2	SSW1	WSW4	SW6	SW8	WSW6	SW7	SW7	N4	NNE8	N6	N6	NW3	NW3	NNW2	WSW1.2	SW8	
30-Jun	W2	WNW2	WNW1	SW2	SW2	SW1	S1	WSW1	SE1	ENE1	ESE3	NE3	SE0	E2	NW1	NNW3	NNW2	W2	W3	SW1	SW1	WSW2	WSW3	W5	W0.9	W5	

W1.6	W1.4	W1.4	NNW1.5	NNW1.5	NNW1.2	W0.9	NW0.8	N1.3	N1.4	NNW1.1	NNW1.3	NNW1.7	NW1.6	NNW1.5	W1.7	W2.1	NW1.8	NW1.5	NW1.2	NNW1.4	W1.5	W1.6	W1.7	Diurnal Average	
WSW8	NNE9	N9	N9	N10	N10	N11	N12	N15	N18	N20	N20	NNE19	N18	N18	NNE18	NNE18	NNE16	NNE15	N15	NNE12	SSW11	N9	N8	Diurnal Maximum	

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

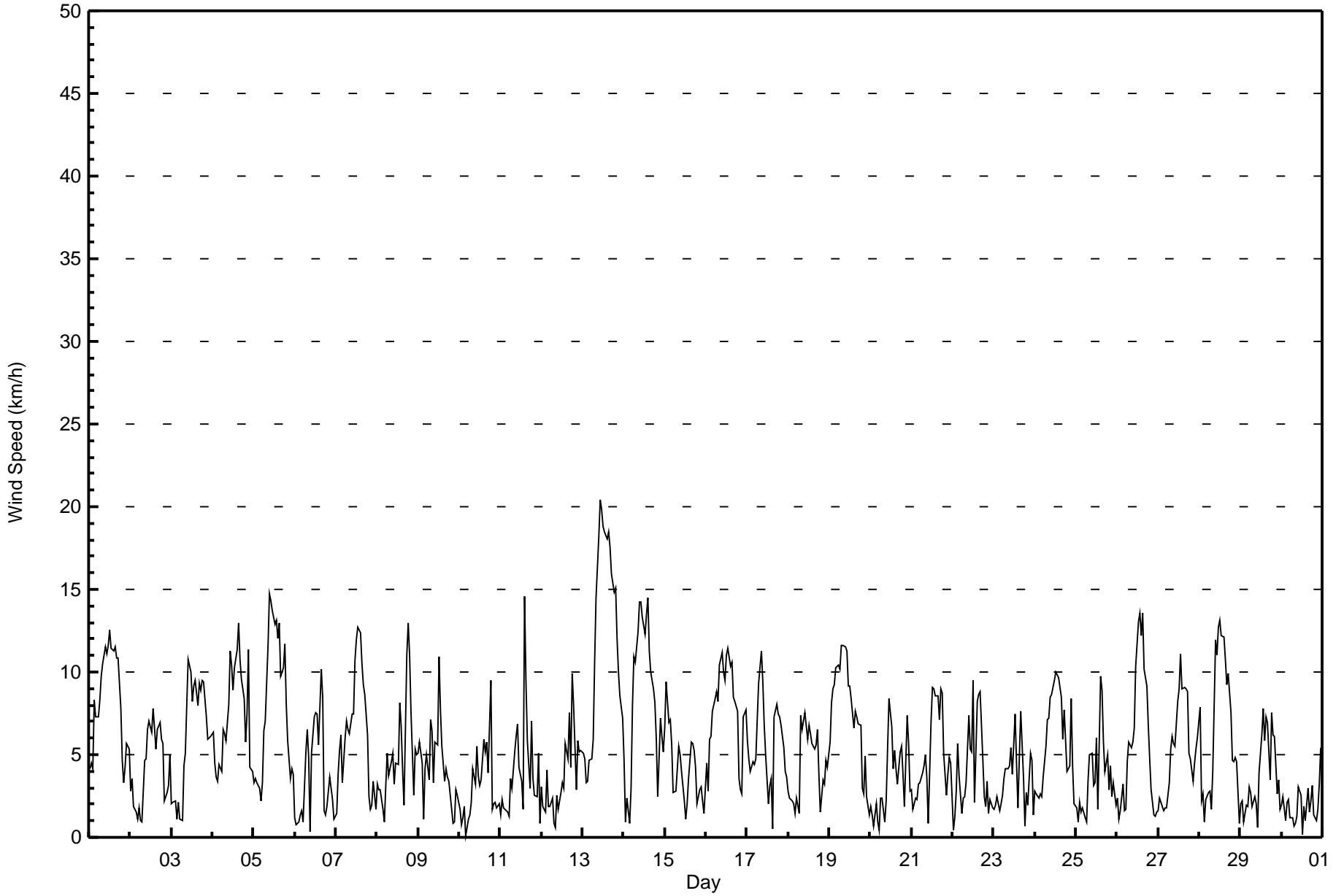


Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Fort McKay South - June 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 8 km/h on Jun 22 13:00																	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Minimum Value: 0 km/h on Jun 15 21:00																									
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 6																									
Day	Hourly Period Ending At (MST)																							Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23		24
1-Jun	1	2	2	4	4	3	3	4	4	5	5	4	5	5	5	5	5	4	4	2	1	1	1	2	5
2-Jun	2	1	1	1	1	1	1	2	2	2	3	3	3	3	3	3	3	3	2	2	1	1	1	3	3
3-Jun	1	1	1	1	1	1	1	2	2	3	4	4	3	4	4	3	4	3	3	3	3	2	2	2	4
4-Jun	2	1	1	1	1	1	2	2	2	4	4	4	4	4	4	5	4	3	3	2	6	4	2	1	6
5-Jun	1	1	1	1	1	1	2	3	4	5	5	5	5	5	4	4	4	6	4	3	2	1	1	1	6
6-Jun	1	1	1	1	1	1	3	3	2	1	2	3	3	3	4	4	3	2	1	1	1	1	1	1	4
7-Jun	1	1	2	3	1	2	2	3	3	3	4	5	5	5	5	5	4	4	3	1	1	2	2	2	5
8-Jun	1	1	1	1	1	1	2	2	2	3	2	2	4	4	3	2	3	5	6	4	3	2	3	2	6
9-Jun	2	2	2	1	2	3	3	3	3	2	3	3	5	4	3	1	1	2	1	1	1	1	2	0	5
10-Jun	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	4	2	1	1	1	1	4
11-Jun	1	1	1	1	1	2	2	2	2	3	3	2	2	3	5	6	3	3	3	2	2	2	2	1	6
12-Jun	2	1	1	3	1	1	1	1	1	2	2	2	2	2	3	4	4	3	5	4	2	3	2	2	5
13-Jun	2	1	1	1	2	2	3	4	5	7	7	6	7	6	6	6	6	6	5	5	4	3	3	3	7
14-Jun	2	2	1	1	1	3	4	4	5	5	4	5	4	5	5	4	4	4	4	3	1	4	3	2	5
15-Jun	2	3	2	2	3	1	1	1	2	2	1	1	1	1	2	2	3	2	2	1	0	1	1	1	3
16-Jun	3	1	2	2	3	3	3	3	3	4	3	3	4	4	4	4	3	4	3	1	1	1	2	3	4
17-Jun	2	2	2	2	2	2	3	4	4	3	3	3	3	3	2	2	2	3	3	3	2	1	1	1	4
18-Jun	1	1	1	1	1	1	2	2	2	2	3	3	3	3	2	2	2	3	2	1	3	2	2	2	3
19-Jun	2	3	3	3	3	3	3	3	4	4	4	4	3	3	3	4	3	3	2	2	1	2	1	1	4
20-Jun	1	1	1	1	1	1	1	1	1	2	2	3	3	3	3	2	2	2	3	3	2	3	3	1	3
21-Jun	1	1	1	1	1	2	2	2	2	2	2	3	4	3	4	3	3	3	3	2	1	1	1	1	4
22-Jun	1	1	2	2	2	1	1	1	2	3	3	3	8	2	3	4	4	3	2	1	2	1	1	1	8
23-Jun	1	1	1	1	1	1	1	2	2	2	3	5	5	4	2	2	3	2	1	2	1	2	1	1	5
24-Jun	1	1	0	1	1	1	2	2	3	3	3	4	4	4	4	4	3	4	3	2	1	3	1	1	4
25-Jun	1	1	1	1	1	1	1	2	2	2	2	2	3	3	7	6	5	2	2	2	3	2	1	1	7
26-Jun	1	2	1	1	1	1	2	2	2	2	3	5	5	6	5	5	5	4	3	2	2	1	1	1	6
27-Jun	1	1	1	1	1	1	1	2	2	3	3	4	4	5	4	4	4	4	2	2	1	1	1	2	5
28-Jun	3	2	1	1	1	1	1	1	4	5	5	6	5	5	5	5	4	4	3	2	1	1	2	1	6
29-Jun	1	1	1	1	1	1	1	1	1	1	2	2	3	4	3	3	3	3	2	2	2	2	1	1	4
30-Jun	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	2	2	2
																	Diurnal Maximum								





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Fort McKay South - June 2015

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	418	58.06	58.06
6 - 11	251	34.86	92.92
12 - 19	49	6.81	99.72
20 - 28	2	0.28	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Wind Speed (WS) - km/h
Fort McKay South - June 2015

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	21	15	14	9	10	8	14	15	43	38	59	57	29	29	29	28	418
6 - 11	45	25	7	0	4	7	10	23	24	13	14	21	14	13	14	17	251
12 - 19	12	9	0	0	0	0	0	0	3	8	0	4	2	6	4	1	49
20 - 28	2	0	0	0	0	0	0	0	0	0	0	0	0	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	80	49	21	9	14	15	24	38	70	59	73	82	45	48	47	46	720

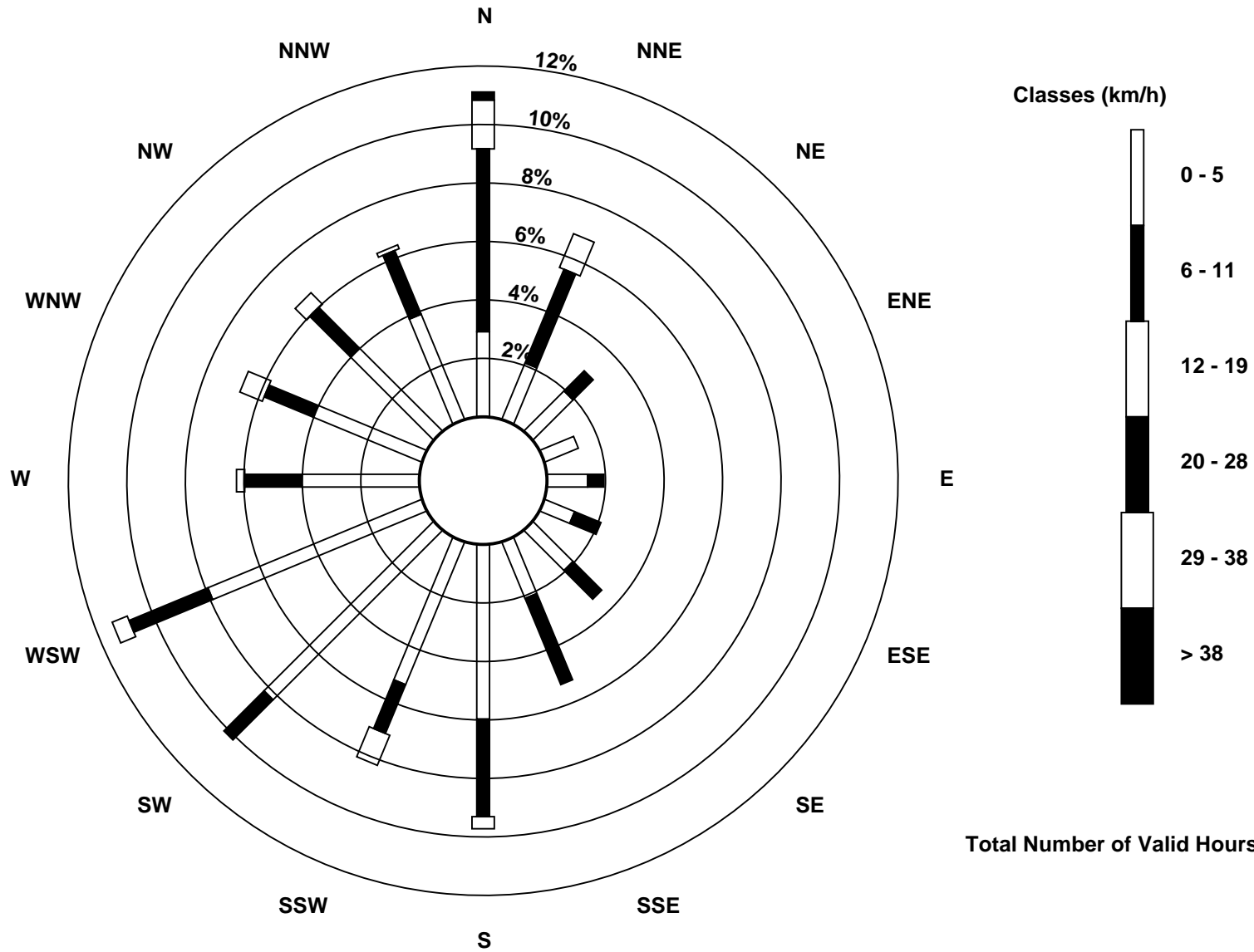
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

Wind Speed (WS) - km/h
Fort McKay South (AMS 13)





Wood Buffalo Environmental Association

Summary of Hour Averages

**Wind Direction (WD) - deg
Fort McKay South - June 2015**

Direction of Maximum Speed: 7 deg on Jun 13 11:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 7.2 deg on Jun 13	Hours of Data: 720
Direction of Minimum Speed: 356 deg on Jun 10 05:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 0.6 deg on Jun 12	Percent Operational Time: 100.0
Monthly Average Direction: 260.7 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	258	257	294	322	298	294	288	299	307	295	300	306	303	311	324	315	316	326	323	287	263	262	258	262	301.2
2-Jun	318	309	244	214	262	175	15	122	101	129	97	114	126	123	151	159	138	119	133	139	183	246	215	225	140.9
3-Jun	224	242	234	253	245	347	166	143	137	143	151	144	143	157	147	157	173	168	164	174	169	174	169	175	162.3
4-Jun	171	203	189	180	184	190	164	161	161	184	185	170	166	168	170	188	186	182	182	197	198	209	170	175	180.7
5-Jun	194	197	199	194	221	181	163	161	182	199	211	197	204	199	200	184	212	243	195	171	174	201	202	200	196.1
6-Jun	203	308	327	336	276	154	247	255	258	255	41	40	31	25	19	207	227	93	149	335	307	273	272	202	297.6
7-Jun	176	251	265	268	276	260	265	276	292	266	289	291	274	279	302	300	289	271	275	275	233	224	256	245	277.4
8-Jun	188	216	181	206	242	203	239	293	265	319	204	150	232	50	109	133	162	328	329	328	323	306	297	289	294.9
9-Jun	285	274	300	291	249	250	237	249	264	307	266	265	26	28	20	214	296	278	276	290	305	311	337	234	289.2
10-Jun	247	40	221	246	356	200	63	68	20	54	37	36	34	41	97	83	81	122	203	201	245	228	236	229	88.2
11-Jun	236	238	228	241	237	190	172	186	147	146	144	116	89	268	202	242	268	237	156	137	242	193	156	213	188.1
12-Jun	295	254	242	237	175	203	197	162	248	91	84	232	345	79	179	134	116	102	335	340	347	91	61	47	70.5
13-Jun	22	8	341	330	332	306	322	359	4	9	7	9	11	8	4	12	19	23	24	9	16	7	359	2	7.2
14-Jun	5	8	299	328	323	355	7	21	358	359	9	7	12	10	8	11	0	348	341	343	313	348	0	11	1.2
15-Jun	11	11	15	1	356	313	310	349	15	10	15	40	78	181	225	269	300	254	316	296	225	206	234	208	335.7
16-Jun	307	331	0	358	356	352	358	352	4	3	357	359	9	7	8	8	343	7	9	333	317	301	352	1	357.2
17-Jun	346	338	321	321	311	309	343	6	17	19	9	4	20	313	277	124	147	160	160	171	173	181	200	224	347.2
18-Jun	220	187	265	256	252	336	83	164	157	182	187	155	160	120	145	127	172	197	247	262	314	267	252	274	185.5
19-Jun	306	343	356	355	4	10	8	9	15	21	20	19	7	25	37	14	16	9	34	29	307	343	299	296	7.6
20-Jun	231	211	211	229	237	47	132	176	188	59	47	30	35	7	5	75	20	44	41	30	308	15	14	228	30.1
21-Jun	314	335	246	311	328	334	337	340	4	351	235	38	25	28	31	22	356	15	8	339	300	252	250	254	355.3
22-Jun	285	230	228	256	242	206	208	276	35	10	34	32	11	232	241	240	285	293	292	1	356	265	231	239	292.3
23-Jun	247	219	233	176	246	171	161	137	122	182	218	280	232	287	108	94	211	201	203	165	247	226	233	229	206.0
24-Jun	223	210	219	212	197	181	176	192	171	189	214	235	246	241	240	235	248	326	325	345	355	2	350	288	238.7
25-Jun	242	223	257	265	185	296	12	23	4	7	32	73	114	126	329	331	212	152	215	249	241	226	190	200	286.4
26-Jun	186	284	247	180	220	184	165	165	184	196	235	244	245	247	252	246	262	245	239	246	358	224	226	231	234.8
27-Jun	197	189	194	174	167	190	187	217	204	199	229	214	226	232	227	250	237	241	220	219	234	231	230	248	223.8
28-Jun	248	251	192	190	186	186	269	10	6	322	318	293	293	288	306	330	320	331	326	297	287	278	288	287	301.8
29-Jun	233	211	178	186	206	173	166	132	86	72	209	238	233	227	240	225	230	6	13	4	3	326	326	335	253.5
30-Jun	281	285	293	220	236	223	180	256	134	59	105	54	124	83	326	328	347	266	259	226	227	238	239	262	260.1

271.1 279.2 277.5 282.2 285.7 281.7 272.8 311.5 4.0 349.5 336.2 335.5 327.7 321.7 290.3 272.6 268.9 303.9 306.3 306.2 285.0 267.6 268.8 259.2

Diurnal Average

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



Wood Buffalo Environmental Association

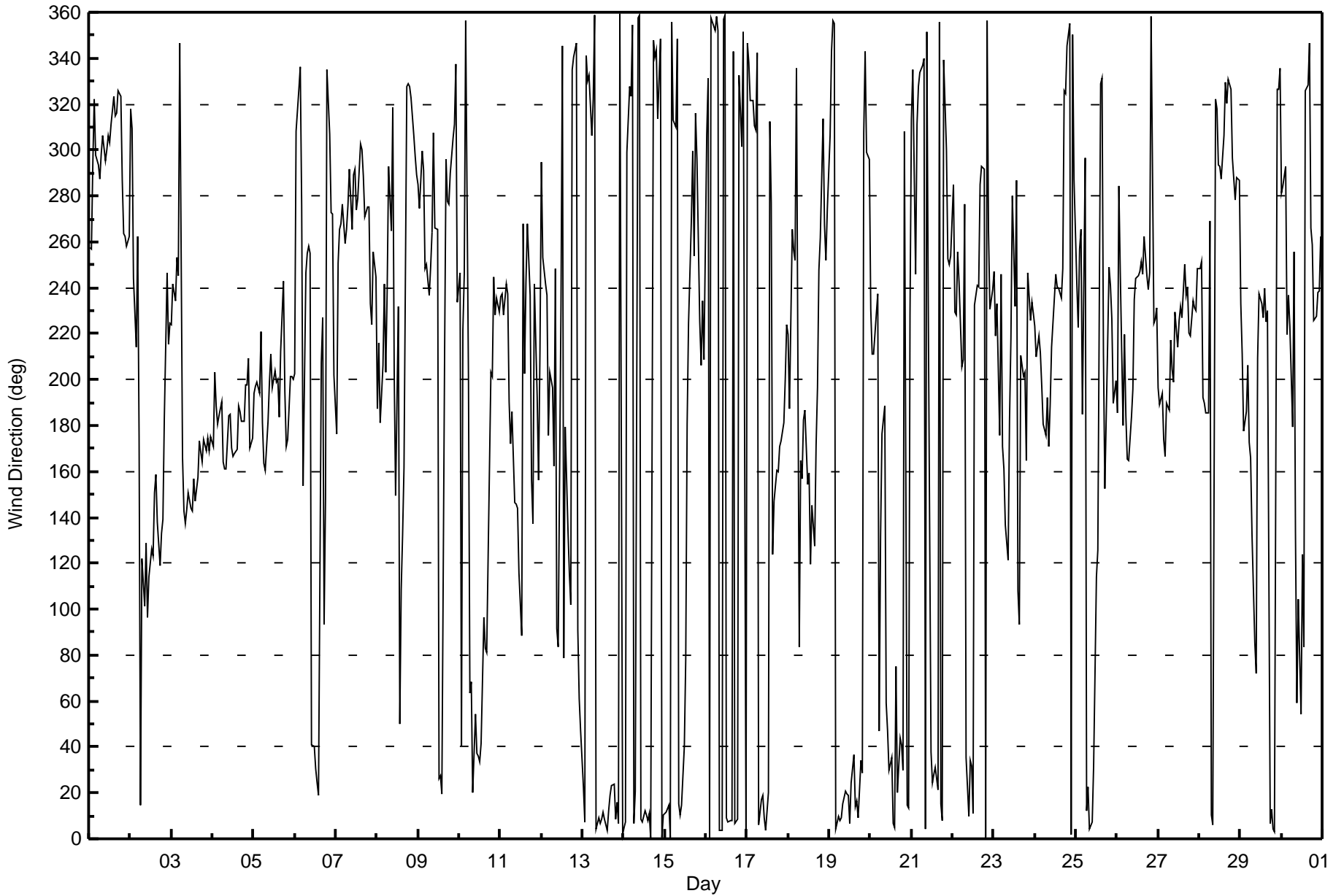
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Fort McKay South - June 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 114 deg on Jun 17 16:00	Hours of Data: 720
Minimum Value: 6 deg on Jun 27 22:00	Hours of Missing Data: 0
Percentiles: P ₁ = 12 P ₁₀ = 24 Q ₁ = 29 Median = 39 Q ₃ = 57 P ₉₀ = 76 P ₉₉ = 98	Hours of Calibration: 0
	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	27	26	45	34	47	38	37	40	39	44	42	39	39	45	44	46	41	32	40	39	19	12	13	27	47
2-Jun	46	19	45	60	63	29	92	91	54	58	51	48	53	49	57	64	49	43	37	31	52	12	27	66	92
3-Jun	63	25	29	77	34	62	92	41	42	35	34	38	45	42	40	40	27	35	27	24	23	21	24	21	92
4-Jun	24	18	22	18	17	16	26	32	41	48	34	39	46	40	34	27	25	29	26	27	33	23	33	30	48
5-Jun	23	18	27	27	39	33	25	28	30	27	29	29	31	31	34	29	40	27	24	24	23	26	18	29	40
6-Jun	37	50	78	47	53	83	56	35	47	100	69	41	49	48	65	31	22	88	83	78	26	17	69	56	100
7-Jun	54	30	38	36	34	19	28	36	50	38	47	39	39	41	44	41	43	38	37	28	26	78	63	65	78
8-Jun	23	39	19	47	60	36	35	59	64	58	69	52	72	47	42	48	81	36	37	35	34	45	29	32	81
9-Jun	29	25	40	87	42	58	70	33	42	79	60	57	41	38	55	46	38	46	35	36	62	50	40	29	87
10-Jun	43	84	51	52	95	83	74	63	53	79	70	85	75	82	55	56	48	59	29	66	12	22	34	20	95
11-Jun	27	12	27	27	58	97	78	59	32	38	40	59	78	85	30	53	39	79	33	50	60	65	36	86	97
12-Jun	67	57	68	41	62	65	61	95	109	83	94	80	80	91	69	74	53	71	33	34	74	47	42	41	109
13-Jun	27	21	29	26	27	37	37	28	27	30	29	28	29	29	31	30	29	30	29	28	29	27	25	27	37
14-Jun	25	79	21	78	28	27	28	31	35	33	30	36	37	35	31	34	35	44	38	39	61	45	27	22	79
15-Jun	23	26	26	26	30	35	36	42	31	29	46	71	107	83	68	47	53	41	45	29	17	23	19	50	107
16-Jun	54	27	21	24	26	27	25	28	26	29	33	39	34	33	33	36	36	38	30	31	24	24	25	25	54
17-Jun	28	25	32	27	29	30	33	35	30	39	59	80	96	95	89	114	39	34	32	26	22	15	16	17	114
18-Jun	17	25	23	24	37	31	76	34	34	31	41	58	50	48	47	41	41	39	40	41	39	66	23	33	76
19-Jun	30	29	25	27	25	27	28	27	32	35	33	42	45	48	60	57	46	49	44	46	15	23	31	36	60
20-Jun	39	50	62	41	67	78	46	67	106	90	62	46	58	82	65	66	76	46	38	42	26	25	49	30	106
21-Jun	31	51	27	30	20	43	32	34	34	62	102	46	43	34	51	34	40	31	29	34	36	12	12	36	102
22-Jun	85	56	52	23	51	80	46	75	65	40	60	71	60	85	24	37	41	36	42	40	33	72	27	45	85
23-Jun	43	43	20	44	47	22	27	48	53	67	66	93	46	75	87	45	34	46	79	53	21	19	15	63	93
24-Jun	26	25	24	28	22	15	25	27	33	32	38	40	41	41	43	47	46	41	36	36	23	26	25	49	49
25-Jun	45	74	29	44	62	39	81	67	37	45	85	73	54	98	57	59	55	55	27	63	69	72	42	35	98
26-Jun	32	65	55	15	70	35	23	25	26	24	44	37	30	34	32	34	45	32	31	32	54	78	74	84	84
27-Jun	57	37	71	57	50	35	36	30	37	51	64	45	48	37	48	41	41	41	30	25	13	6	9	14	71
28-Jun	19	82	29	85	25	20	60	78	82	40	41	42	43	42	41	40	40	34	33	30	23	23	39	83	85
29-Jun	74	57	95	32	42	12	21	59	59	83	111	78	60	49	67	50	42	73	27	25	25	57	36	85	111
30-Jun	53	36	75	38	32	59	64	86	70	76	34	38	97	58	57	23	65	35	51	67	77	68	63	34	97

85	84	95	87	95	97	92	95	109	100	111	93	107	98	89	114	81	88	83	78	77	78	74	86	
Diurnal Maximum																								





Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

Calibration Date	June 9, 2015	Last Calibration	May 7, 2015
Station Name	Fort McKay South	Station Number	AMS 13
Reason:	Routine		
Start Time (MST)	8:10	End Time (MST)	12:28
Gas Cert Reference	S980455A	Station temp.	22 Deg C
Cal Gas Concentration	50 ppm	Cal Gas Exp Date	26/09/2017
Calibrator Make/Model	Sabio 4010	Serial Number	11041107
ZAG Make/Model	API 701	Serial Number	3410
DACS make/model	Campbell Scientific CR3000	DACS serial No.	1850

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		HVPS voltage	512	512
Analyzer IP address	192.168.1.44		Lamp voltage	1893	1859
Calculated slope	0.989465	0.997351	Chamber temp	50.0	50.0
Calculated intercept	1.977934	0.896989	Pressure	26.4	26.2
Analyzer Background	24.2	24.2	Flow	693	688
Analyzer Coefficient	1.770	1.770	Intensity	63.9	62.8
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	-0.4	----
as found span	5000	70.3	703.0	700.0	1.004
calibrator zero	5000	0.0	0.0	-0.4	----
high point	5000	70.3	703.0	703.9	0.999
second point	5000	35.1	351.0	351.7	0.998
third point	5000	17.6	176.0	174.5	1.009
as left zero	5000	0.0	0.0	-0.4	----
as left span	5000	70.3	703.0	695.3	1.011
Average Correction Factor					1.002

Corrected As found 700.4 Previous response 708.5 % change 1.2%

Notes:

No adjustments or maintenance Done, Filter changed out

Calibration Performed By:

Melissa Lemay



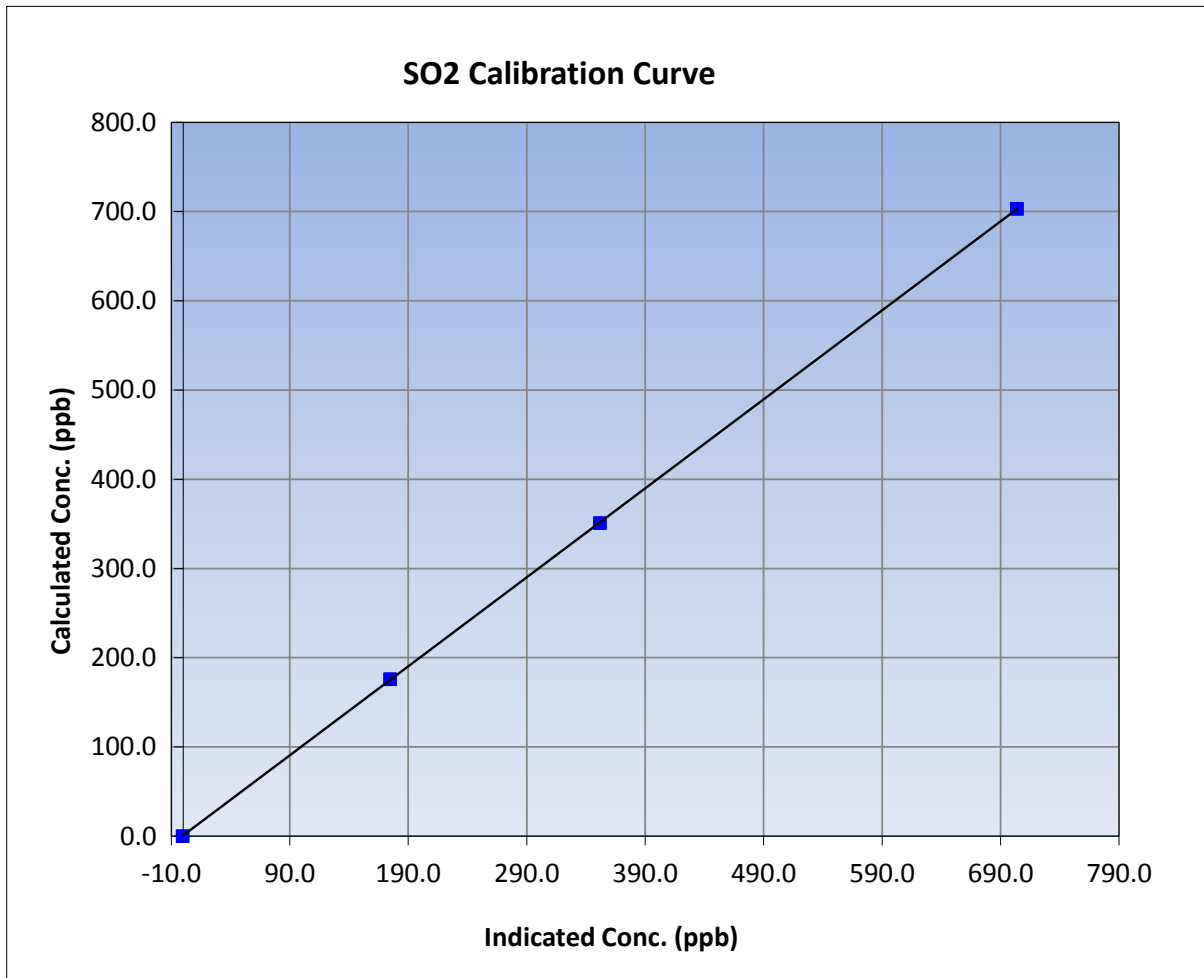
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	June 9, 2015	Previous Calibration	May 7, 2015
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	8:10	End Time (MST)	12:28
Analyzer make	API T100	Analyzer serial #	599

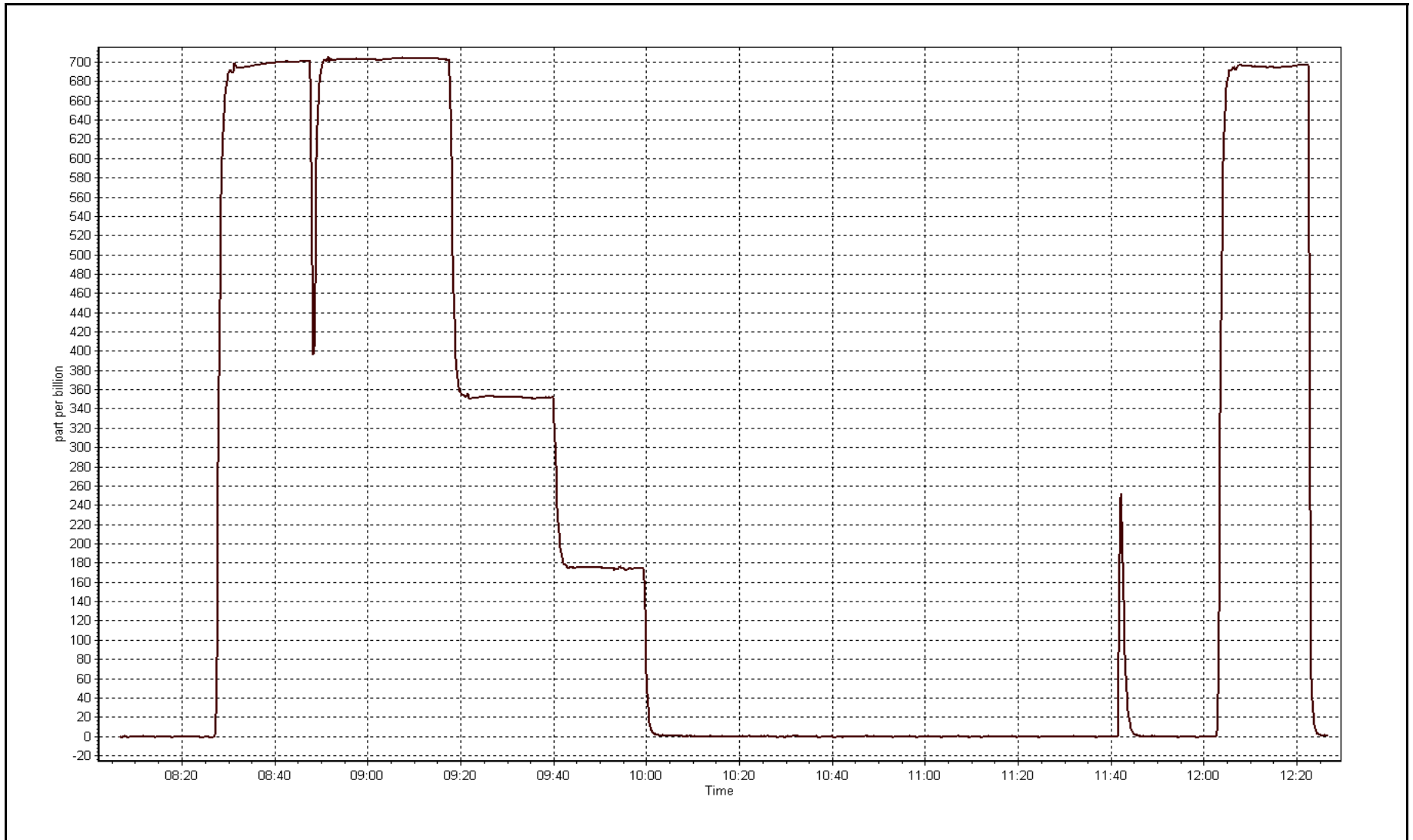
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.4	----	Correlation Coefficient	0.999993
703.0	703.9	0.9987		
351.0	351.7	0.9980	Slope	0.997351
176.0	174.5	1.0086		
			Intercept	0.896989



SO2 Calibration Plot

Date: June 9, 2015





Wood Buffalo Environmental Association TRS Calibration Report

Station Information

Calibration Date	June 12, 2015	Last Calibration	May 11, 2015
Station Name	Fort McKay South	Station Number	AMS 13
Reason:	Routine		
Start Time (MST)	8:53	End Time (MST)	11:20
Gas Cert Reference	CC178364	Station temp.	22 Deg C
Cal Gas Concentration	5.07 ppm	Cal Gas Exp Date	30/05/2013
Calibrator Make/Model	Sabio 4010	Serial Number	11041107
Dil air Make/Model	API 701	Serial Number	3410
DACS make/model	Campbell Scientific CR3000	DACS serial No.	1850
SO2 gas concentration	51.1 ppm	SO2 gas cert/exp	S980455A 26-Sep-17

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-727	-727
Analyzer IP address	192.168.1.44		Lamp voltage	1006	1002
Calculated slope	0.986401	0.990359	Chamber temp	45	45
Calculated intercept	0.096469	0.025796	Pressure	694.7	682.0
Analyzer Background	1.81	1.81	Flow	0.444	0.438
Analyzer Coefficient	1.044	1.044	Intensity	89	89
			Converter temp.	800	800
Analyzer make/model	Thermo 43i-TLE		Analyzer serial #	1218153359	
Converter make/model	CDN-101		Converter serial #	456	

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.0	----
as found span	5000	78.9	80.0	80.7	0.991
SO2 scrubber check	5000	17.6	179.9	0.3	----
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	78.9	80.0	80.7	0.991
second point	5000	39.4	40.0	40.5	0.986
third point	5000	19.7	20.0	20.0	0.999
as left zero	5000	0.0	0.0	0.1	----
as left span	5000	78.9	80.0	80.5	0.994
Average Correction Factor					0.992

Corrected As found	80.7	Previous response	81.0	% change	0.4%
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Notes:

Filter changed out after as founds, scrubber checked after as founds, no adjustments or maintenance done

Calibration Performed By:

_____ Melissa Lemay



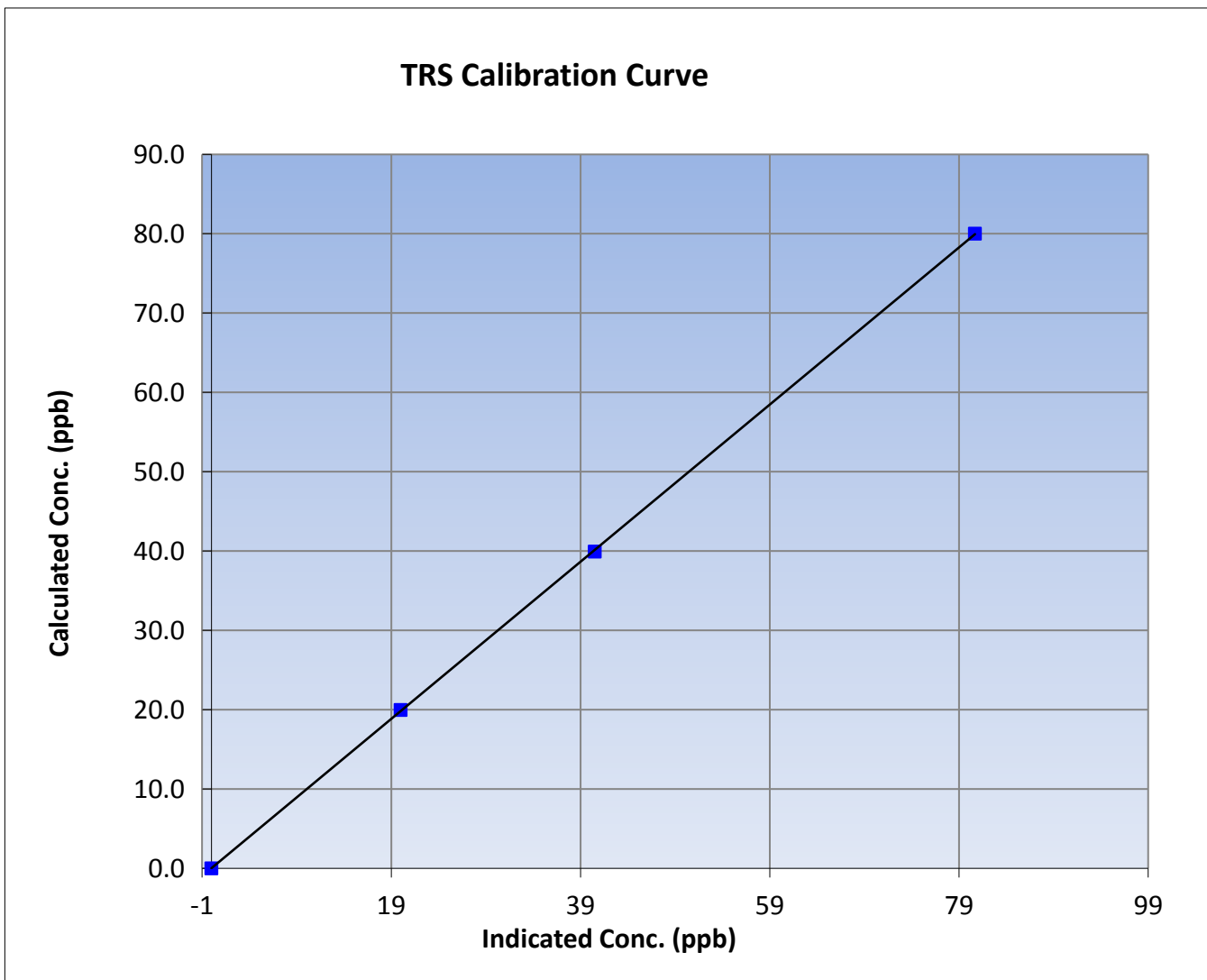
Wood Buffalo Environmental Association TRS Calibration Report

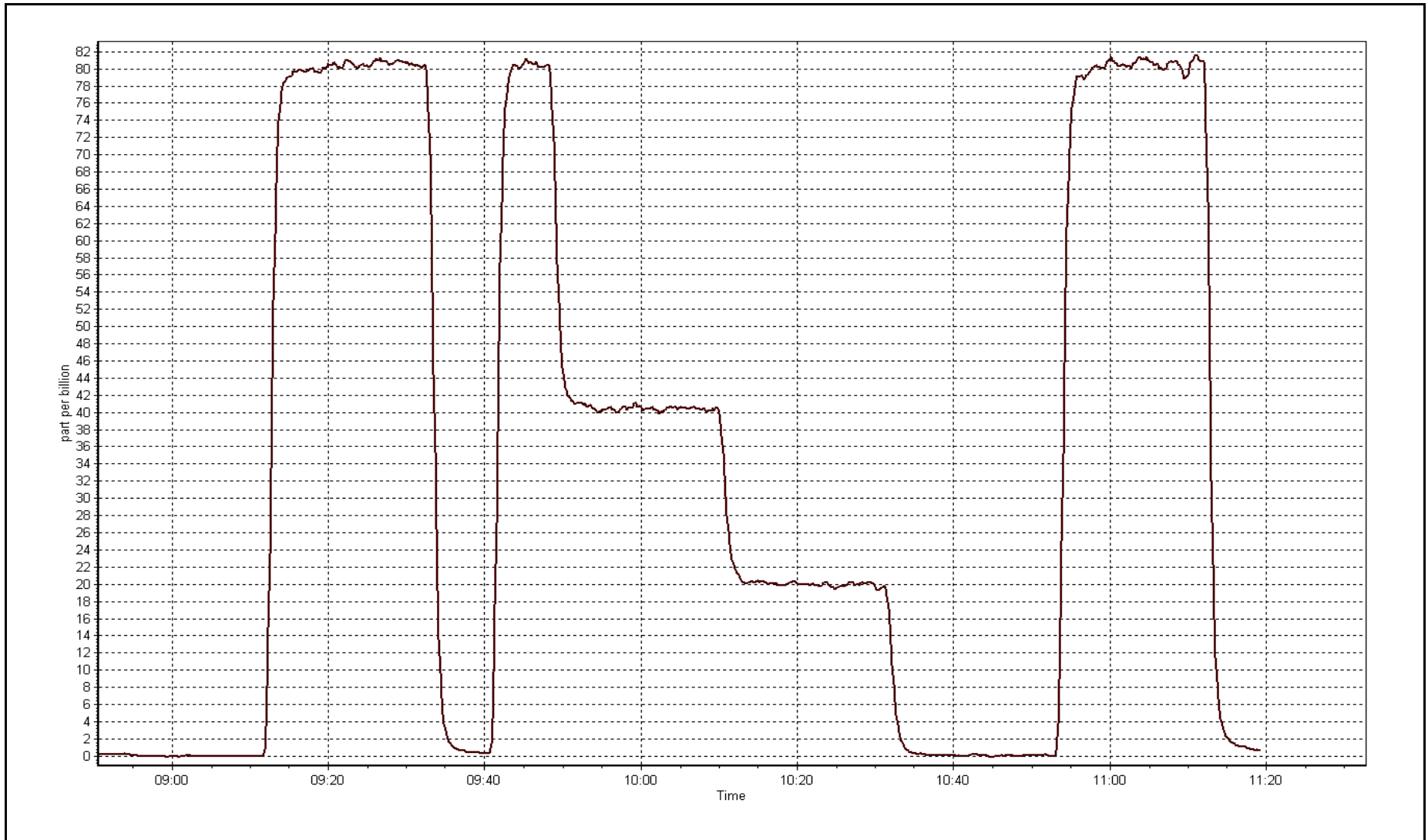
Station Information

Calibration Date	June 12, 2015	Previous Calibration	May 11, 2015
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	8:53	End Time (MST)	11:20
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1218153359

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999984
80.0	80.7	0.9914		
40.0	40.5	0.9865	Slope	0.990359
20.0	20.0	0.9988		
			Intercept	0.025796







Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	June-11-15	Last Calibration	May-29-15
Station Name	Fort McKay South	Station Number	AMS 13
Reason:	Routine		
Start Time (MST)	7:05	End Time (MST)	13:50
Gas Cert Reference	S980455A	Cal Gas Expiry Date	26/09/2017
CH4 Cal Gas Conc.	497 ppm	CH4 Equiv Conc.	1033.3 ppm
C3H8 Cal Gas Conc.	195 ppm	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11041107
ZAG make/model	Teledyne API 701	Serial Number	3410/5613
DACS make/model	Campbell Scientific CR3000	Serial Number	1850

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 50 ppm		Sample Pressure	8.0	8.0
Analyzer IP address	192.168.1.51		Air or Bypass Press	42.5	40.5
Calculated slope	0.985583	1.001653	Fuel Pressure	22.6	22.6
Calculated intercept	-0.088702	-0.036215	Analyzer Coeff	4.681	4.666
			Analyzer BKG	1.910	1.830
Analyzer make	51i-LT		Analyzer serial #	1236656114	

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	-0.02	----
as found span	5000	70.3	14.53	14.46	1.005
calibrator zero	5000	0.0	0.00	0.01	----
high point	5000	70.3	14.53	14.52	1.001
second point	5000	35.1	7.25	7.31	0.992
third point	5000	17.5	3.62	3.66	0.988
as left zero	5000	0.0	0.00	0.02	----
as left span	5000	70.3	14.53	14.52	1.001
Average Correction Factor					0.994

Corrected As found	14.48	Previous response	14.83	% change	2.4%
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Notes:

optimised the fid, adjusted the air pressure, filter changed, zero and span adjusted

Calibration Performed By:

Melissa Lemay



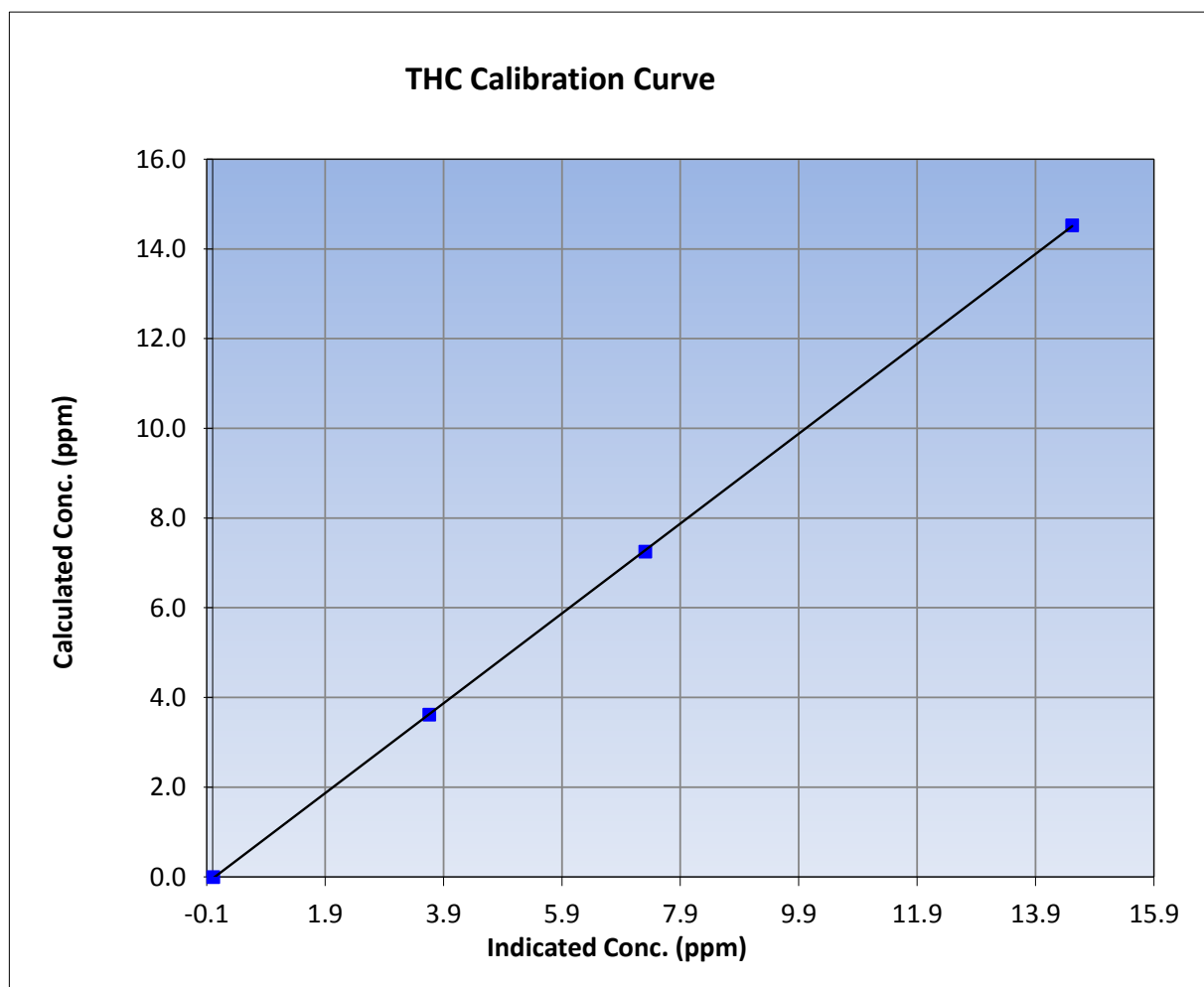
Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	June 11, 2015	Previous Calibration	May 29, 2015
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	7:05	End Time (MST)	13:50
Analyzer make	51i-LT	Analyzer serial #	1236656114

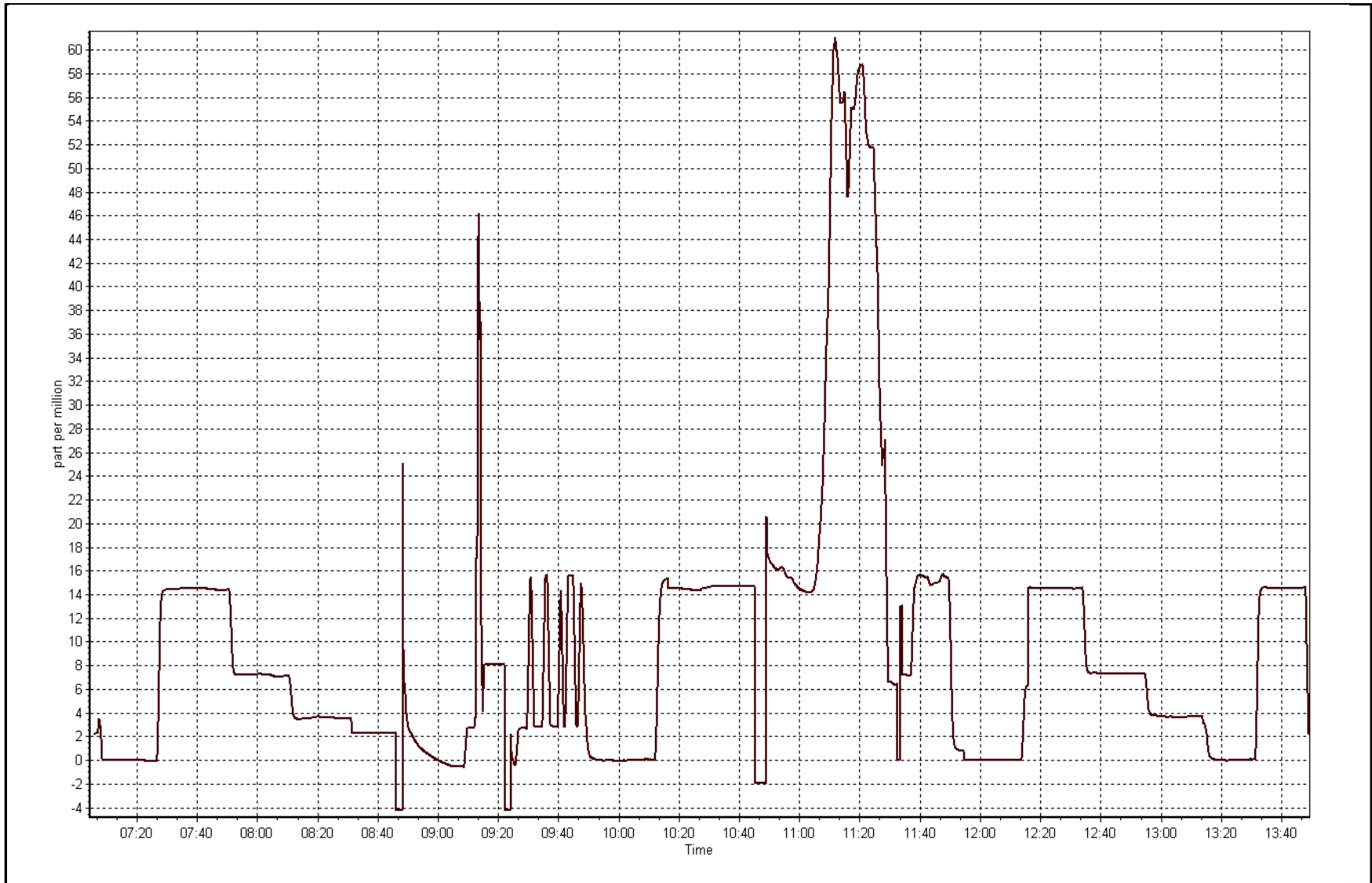
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.01	----	Correlation Coefficient	0.999980
14.53	14.52	1.0005		
7.25	7.31	0.9923	Slope	1.001653
3.62	3.66	0.9881		
			Intercept	-0.036215



THC Calibration Plot

Date: June 11, 2015





Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	June-16-15	Last Calibration	June-11-15
Station Name	Fort McKay South	Station Number	AMS 13
Reason:	Removal		
Start Time (MST)	7:44	End Time (MST)	9:20
Gas Cert Reference	S980455A	Cal Gas Expiry Date	26/09/2017
CH4 Cal Gas Conc.	497 ppm	CH4 Equiv Conc.	1033.3 ppm
C3H8 Cal Gas Conc.	195 ppm	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11041107
ZAG make/model	Teledyne API 701	Serial Number	3410/5613
DACS make/model	Campbell Scientific CR3000	Serial Number	1850

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 50 ppm		Sample Pressure	8.0	8.0
Analyzer IP address	192.168.1.51		Air or Bypass Press	40.5	40.3
Calculated slope	1.001653	1.008628	Fuel Pressure	22.6	22.6
Calculated intercept	-0.036215	-0.231974	Analyzer Coeff	4.666	4.666
			Analyzer BKG	1.830	1.830
Analyzer make	51i-LT		Analyzer serial #	1236656114	

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	0.25	----
as found span	5000	70.3	14.53	14.63	0.993
calibrator zero	5000	0.0	0.00	0.25	----
high point	5000	70.3	14.53	14.63	0.993
second point	5000	35.1	7.25	7.45	0.974
third point	5000	17.5	3.62	3.77	0.959
as left zero					
as left span					
Average Correction Factor					0.975

Corrected As found	14.38	Previous response	14.54	% change	1.1%
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Notes:

Removed due to unstable zero

Calibration Performed By:

Melissa Lemay



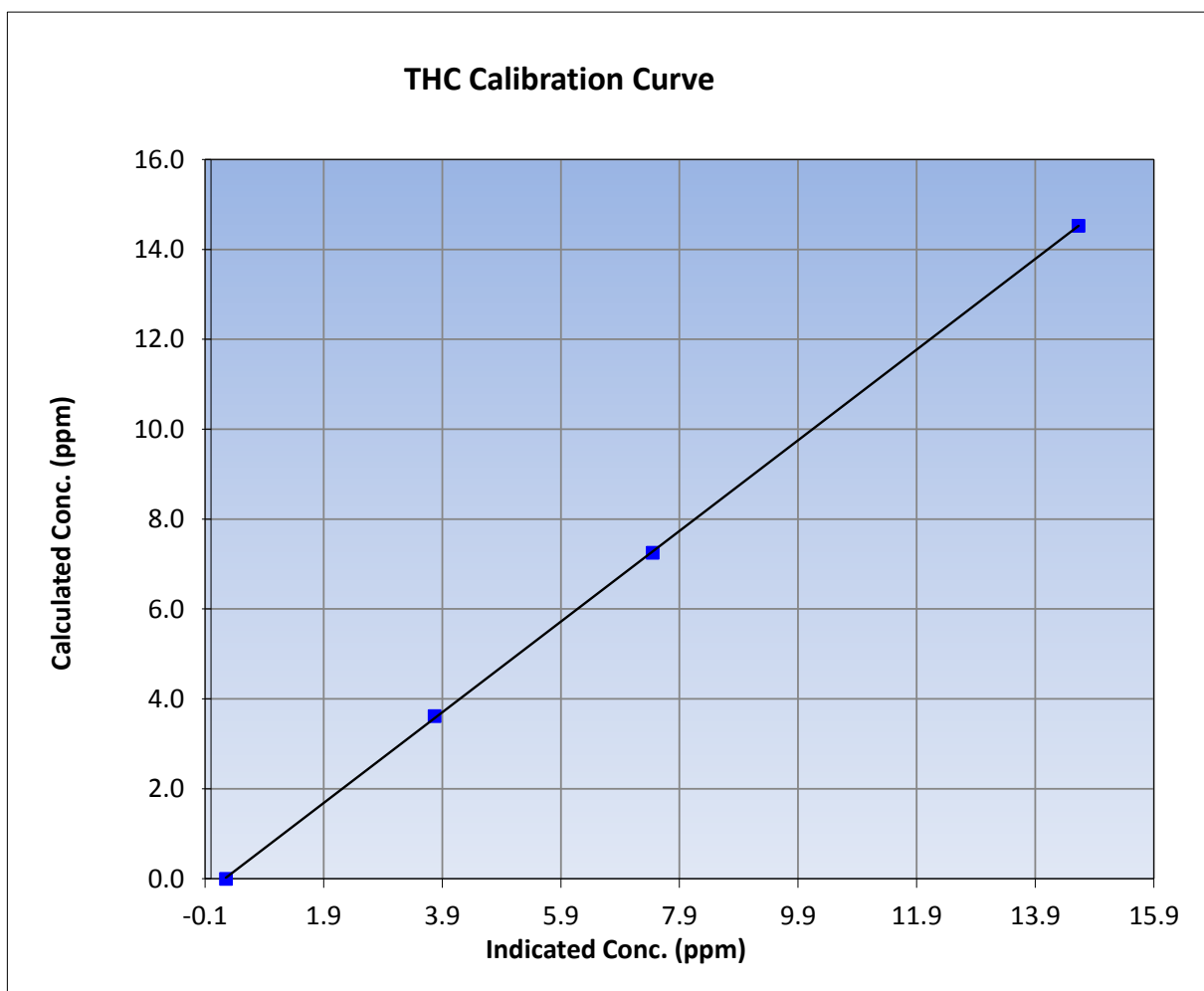
Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	June 16, 2015	Previous Calibration	June 11, 2015
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	7:44	End Time (MST)	9:20
Analyzer make	51i-LT	Analyzer serial #	1236656114

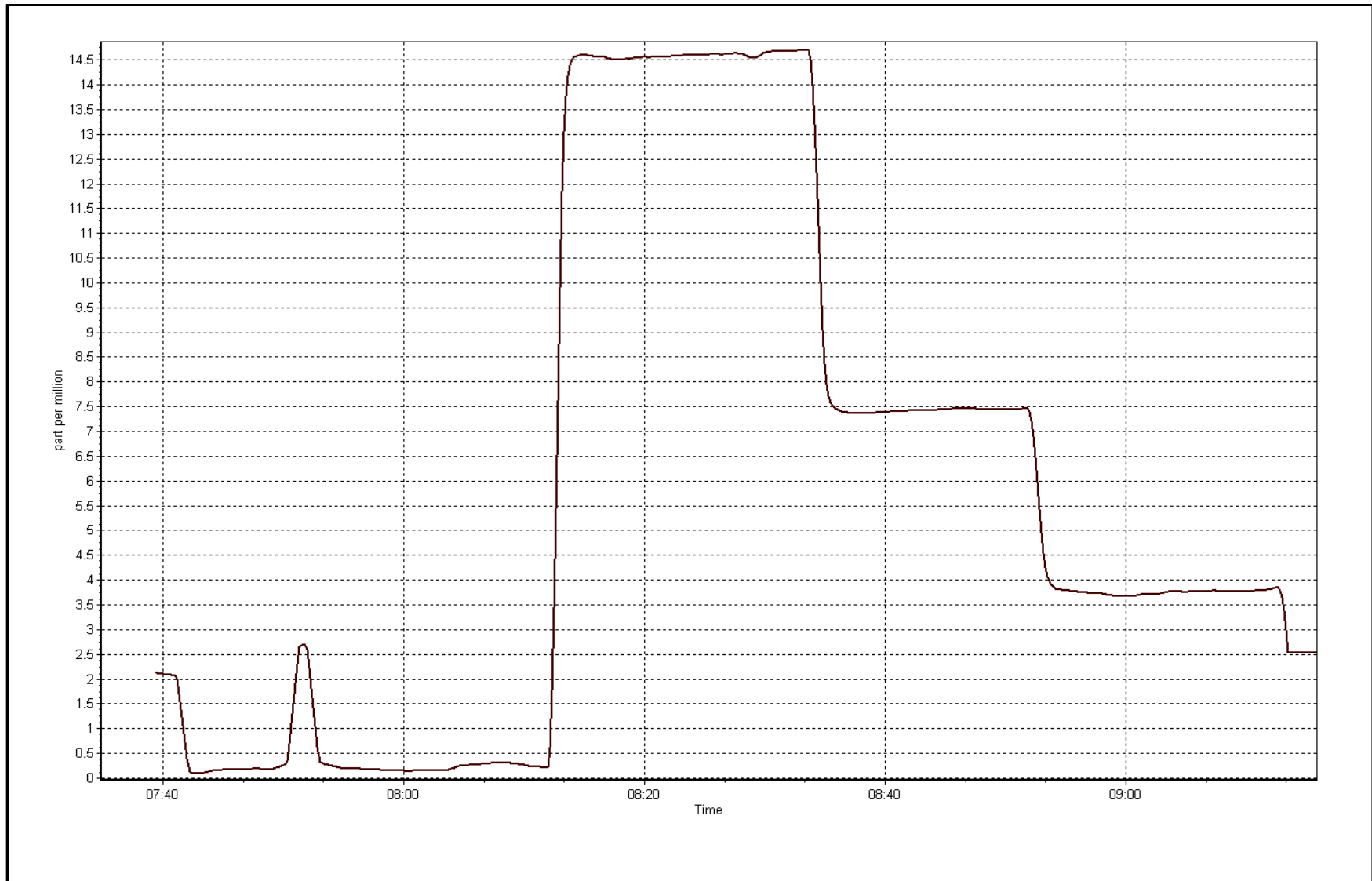
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.25	----	Correlation Coefficient	0.999971
14.53	14.63	0.9930		
7.25	7.45	0.9736	Slope	1.008628
3.62	3.77	0.9593		
			Intercept	-0.231974



THC Calibration Plot

Date: June 16, 2015





Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	June-16-15	Last Calibration	NA
Station Name	Fort McKay South	Station Number	AMS 13
Reason:	Install		
Start Time (MST)	7:44	End Time (MST)	12:47
Gas Cert Reference	S980455A	Cal Gas Expiry Date	26/09/2017
CH4 Cal Gas Conc.	497 ppm	CH4 Equiv Conc.	1033.3 ppm
C3H8 Cal Gas Conc.	195 ppm	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11041107
ZAG make/model	Teledyne API 701	Serial Number	3410/5613
DACS make/model	Campbell Scientific CR3000	Serial Number	1850

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 50 ppm		Sample Pressure	NA	9.2
Analyzer IP address	192.168.1.51		Air or Bypass Press	NA	23.1
Calculated slope	NA	1.008246	Fuel Pressure	NA	34.2
Calculated intercept	NA	-0.030356	Analyzer Coeff	NA	3.055
			Analyzer BKG	NA	1.530
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					
as found span					
calibrator zero	5000	0.0	0.00	0.01	----
high point	5000	70.3	14.53	14.42	1.007
second point	5000	35.1	7.25	7.26	0.999
third point	5000	17.5	3.62	3.62	0.999
as left zero	5000	0.0	0.00	-0.01	----
as left span	5000	70.3	14.53	14.79	0.982
Average Correction Factor					1.002

Corrected As found	NA	Previous response	NA	% change	NA
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Notes:

Installed to replace site analyzer requiring repairs

Calibration Performed By:

Melissa Lemay



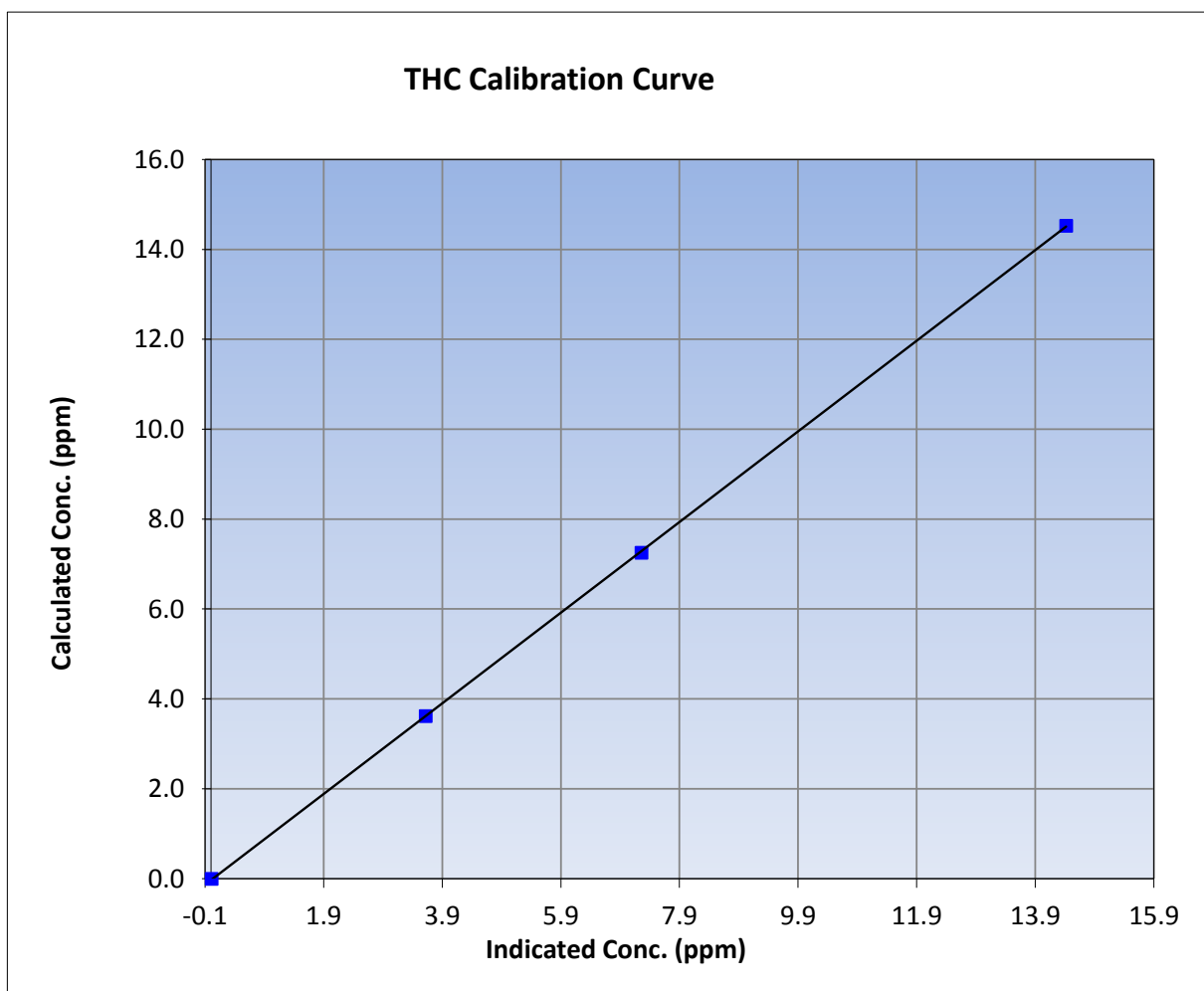
Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	June 16, 2015	Previous Calibration	NA
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	7:44	End Time (MST)	12:47
Analyzer make	51i-LT	Analyzer serial #	1505164380

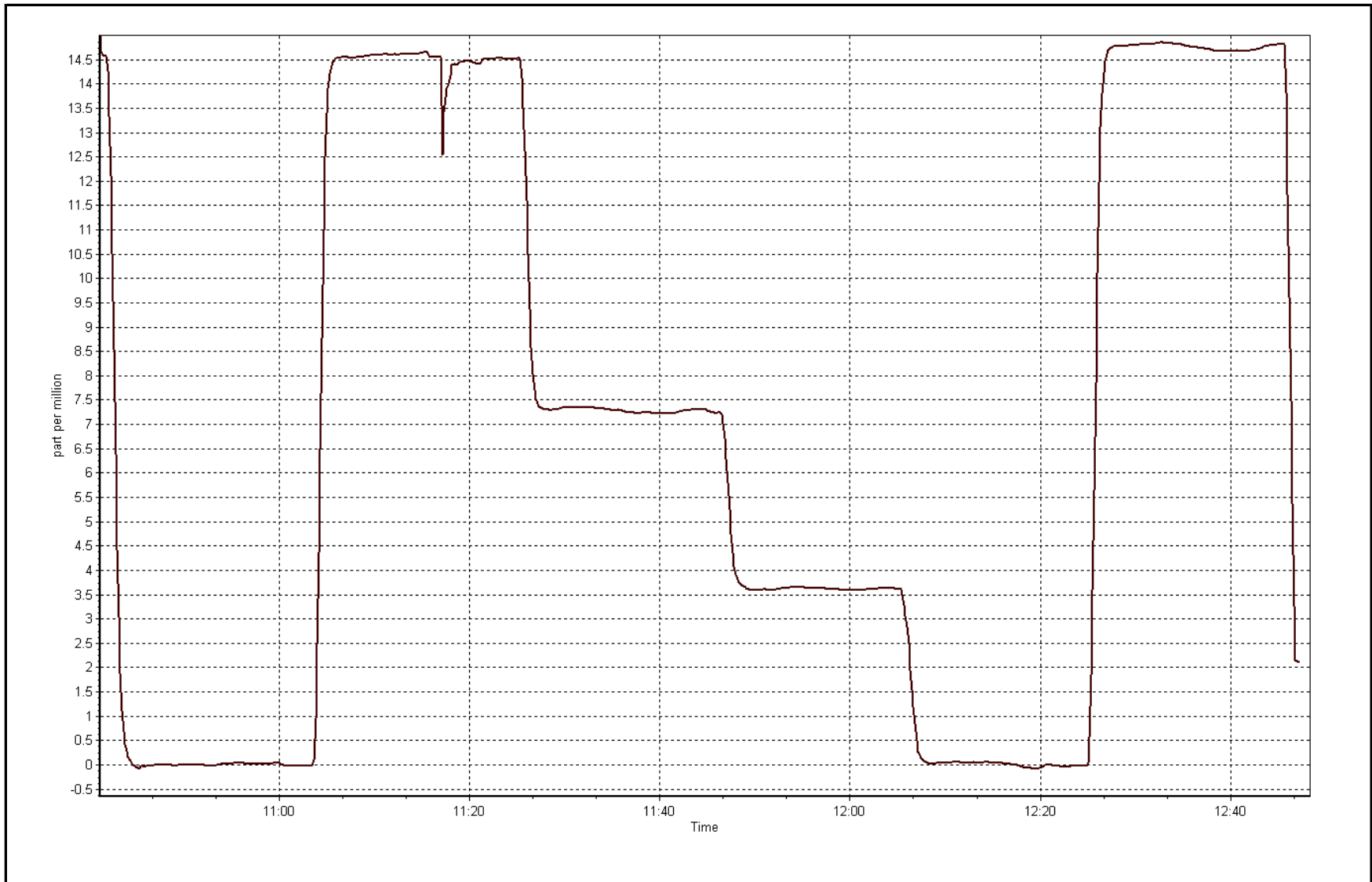
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.01	----	Correlation Coefficient	0.999982
14.53	14.42	1.0075		
7.25	7.26	0.9991	Slope	1.008246
3.62	3.62	0.9990		
			Intercept	-0.030356



THC Calibration Plot

Date: June 16, 2015





Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

Calibration Date	June 12, 2015	Previous Calibration	May 8, 2015
Station Name	Fort McKay South	Station Number	AMS 13
Reason:	Routine		
Start Time (MST)	6:20	End Time (MST)	8:56
NO2 GPT Ref date	June-09-15	Transfer Standard	Sabio 4010
Calibrator Make/Model	Sabio 4010	Station temp.	22 Deg C
ZAG make/model	Teledyne API 701	Serial Number	11041107
DACS make/model	Campbell Scientific CR3000	Serial Number	3410
		Serial Number	1850

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 500 ppb		Box temp.	24.8	25.2
Analyzer IP address	192.168.1.79		Lamp temp.	58.0	58.0
Calculated slope	1.003485	1.002426	Pressure	26.7	26.3
Calculated intercept	-1.031494	-0.567147	Flow	754	742
Analyzer Background	-0.1	-0.1	Intensity	2967.0	2897.9
Analyzer Coefficient	0.991	0.935			

Analyzer make	API T400	Analyzer serial #	825
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Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator Lamp Intensity (mA)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.00	0.0	-0.1	----
as found span	5000	0.90	326.0	344.4	0.947
calibrator zero	5000	0.00	0.0	0.4	----
high point	5000	0.90	326.0	325.6	1.001
second point	5000	0.58	193.5	193.8	0.998
third point	5000	0.36	101.5	102.0	0.995
as left zero	5000	0.00	0.0	1.0	----
as left span	5000	0.89	326.0	332.0	0.982
Average Correction Factor					0.998

Corrected As found	344.5	Previous response	325.9	% change	-5.4%
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Notes:

checked diagonstics flow and intensity changed from last month; span changed when filter changed, span adjusted

Calibration Performed By:

Melissa Lemay



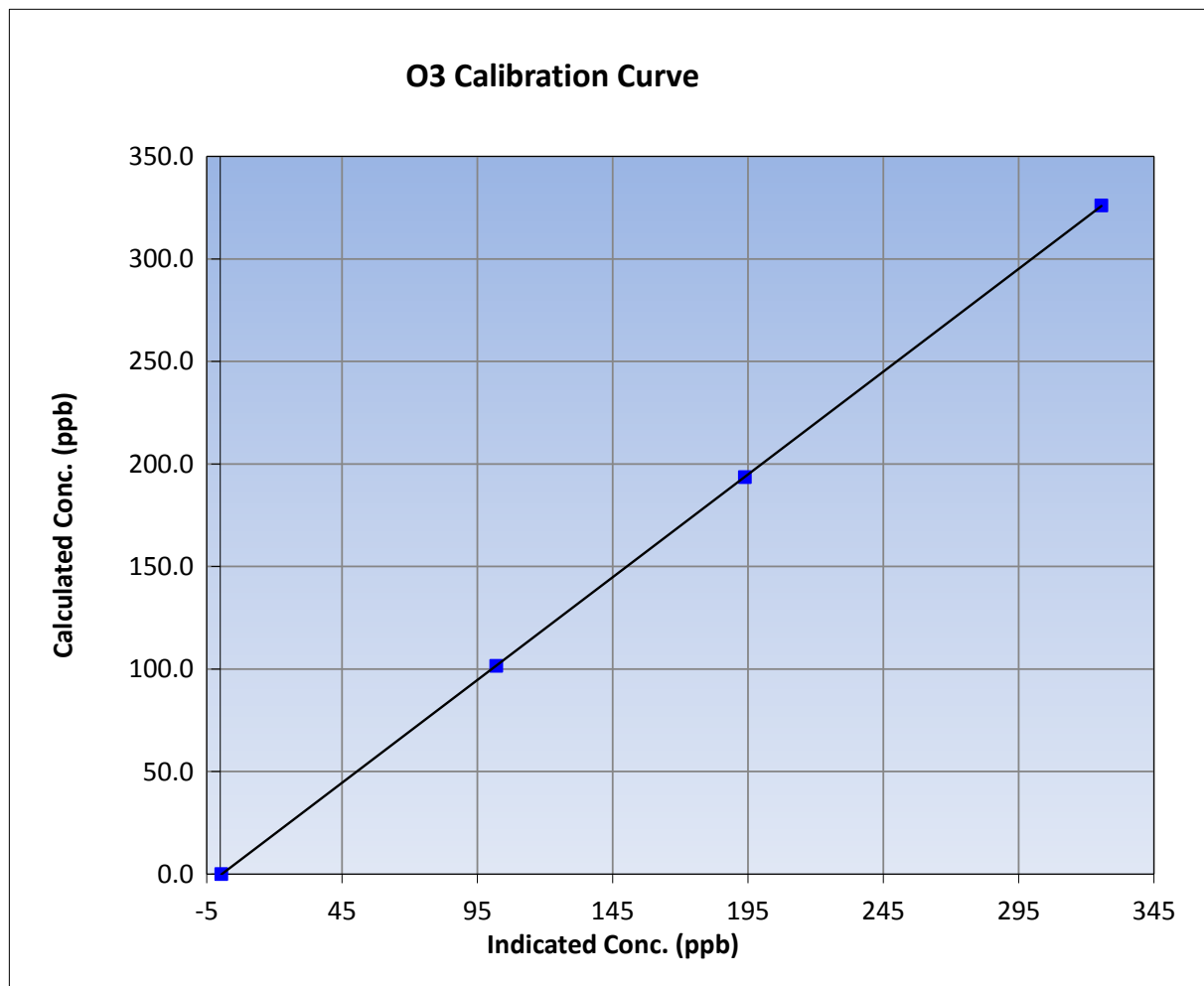
Wood Buffalo Environmental Association O3 Calibration Report

Station Information

Calibration Date	June-12-15	Previous Calibration	May 8, 2015
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	6:20	End Time (MST)	8:56
Analyzer make	API T400	Analyzer serial #	825

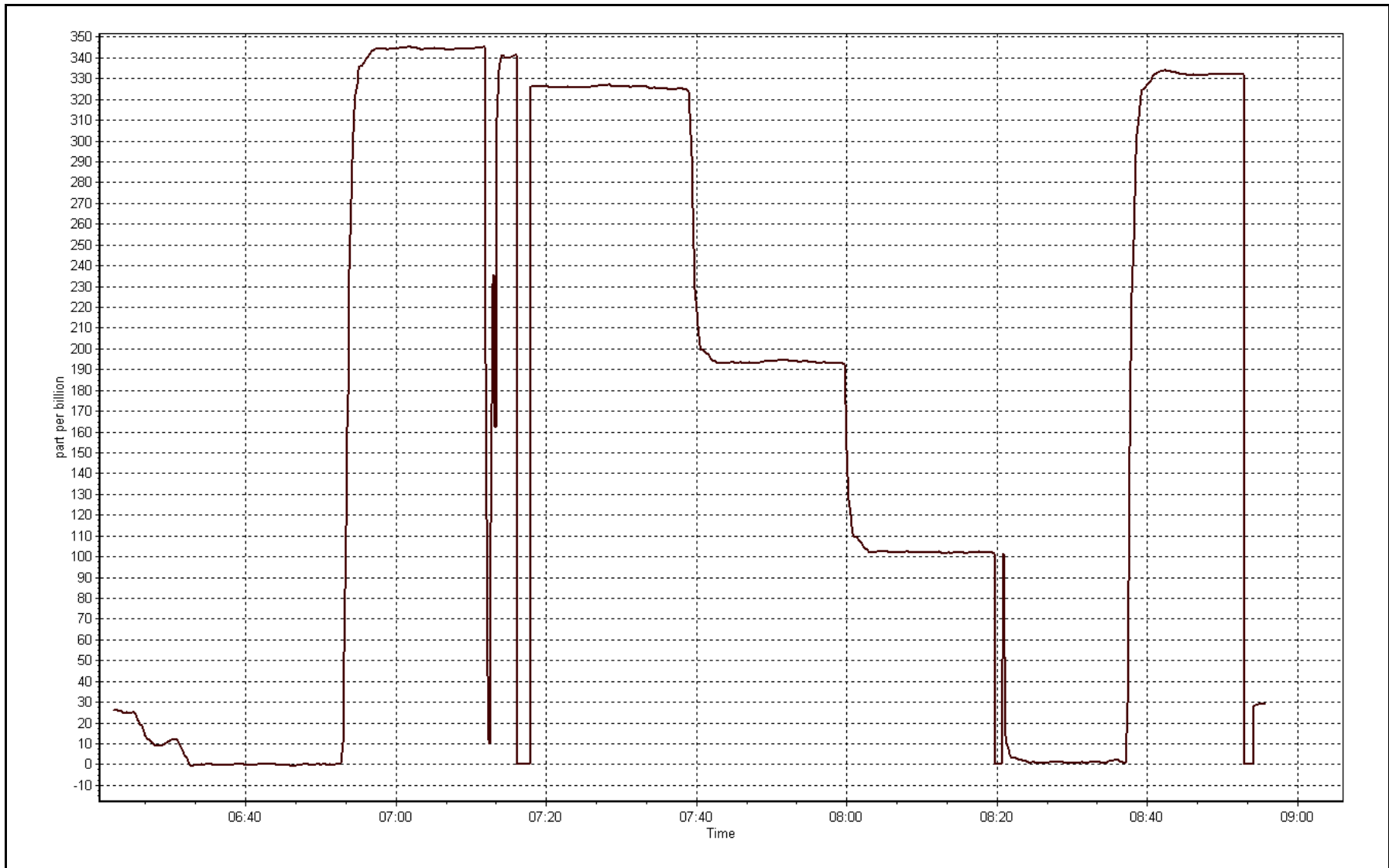
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.4	----	Correlation Coefficient	0.999997
326.0	325.6	1.0012		
193.5	193.8	0.9985	Slope	1.002426
101.5	102.0	0.9951		
			Intercept	-0.567147



O3 Calibration Plot

Date: June 12, 2015





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	June 9, 2015	Previous Calibration	May 7, 2015
Station Name	Fort McKay South	Station Number	AMS 13
Reason:	Routine		
Start Time (MST)	8:10	End Time (MST)	12:28
NO Cal Gas Conc	56.9 ppm	Gas Cert Reference	S980455A
NOx Cal Gas Conc	56.9 ppm	Cal Gas Expiry Date	26/9/2017
Calibrator	Sabio 4010	Serial Number	11041107
Zero air Generator	Teledyne API T701	Serial Number	3410

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	1850
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Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.999357	1.001596	0.994863
	Data Offset	1.399100	1.289606	-0.442808
Current Calibration	Data Slope	0.998004	0.998693	0.999529
	Data Offset	0.129613	0.157613	-0.506591

Analyzer Information

Analyzer make/model	42i	Analyzer serial #	1410661329
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Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
NO coefficient	0.708		0.726	
NOx coefficient	0.998		0.998	
NO2 coefficient	1.000		0.999	
NO bkgrnd	6.3		6.4	
NOx bkgrnd	6.4		6.5	
Chamber Temp	50.6	Deg C	50.6	Deg C
Moly Temp	324.5	Deg C	325	Deg C
PMT voltage	-846.9	V	-846.6	V
PMT Temp	-3	Deg C	-3	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	181.2	mmHg	181.2	mmHg
R Cell Press Nox	180.6	mmHg	180.6	mmHg
NO sample flow	0.904	lpm	0.888	lpm
Nox sample Flow	0.905	lpm	0.885	lpm

Notes:

No maintenance done, filter changed out, span adjusted



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date:

June 9, 2015

Station Number:

AMS 13

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.3	0.1	----	----
as found span	5000	70.3	800.0	800.0	0.0	782.4	780.3	2.1	1.0225	1.0253
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.3	0.1	----	----
high point	5000	70.3	800.0	800.0	0.0	801.0	800.4	0.6	0.9988	0.9995
second point	5000	35.1	399.4	399.4	0.0	401.5	401.2	0.3	0.9949	0.9956
third point	5000	17.6	200.3	200.3	0.0	199.7	199.6	0.0	1.0029	1.0034
as left zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.2	0.0	----	----
as left span	5000	70.3	800.0	475.8	324.2	815.5	481.4	334.0	0.9810	0.9884
Average Correction Factor									0.9989	0.9995

Corrected As found

NO_x= 782.6

NO= 780.6

Percent Change

NO_x= 2.1%

NO= 2.2%

Previous Response

NO_x= 799.1

NO= 797.4

GPT Calibration Data

Dilution Flow

5000

ccm

Source Gas Flow

70.30

ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
Cal zero			0.0			0.1			N/A	
1st NO2 (300)	----	475.8	326.0	802.0	475.8	326.3	0.9837	1.0000	0.9991	100.1%
2nd NO2 (200)	----	608.3	193.5	802.8	608.3	194.5	0.9827	1.0000	0.9949	100.5%
3rd NO2 (100)	----	700.3	101.5	802.8	700.3	102.4	0.9827	1.0000	0.9908	100.9%
4th NO2 (0)	801.8	----	0.2	802.0	801.8	0.3	0.9837	1.0000	N/A	----
Average Correction Factor							0.9832	1.0000	0.9949	100.5%

Calibration Performed By:

Melissa Lemay



Wood Buffalo Environmental Association

NO_x Calibration Summary

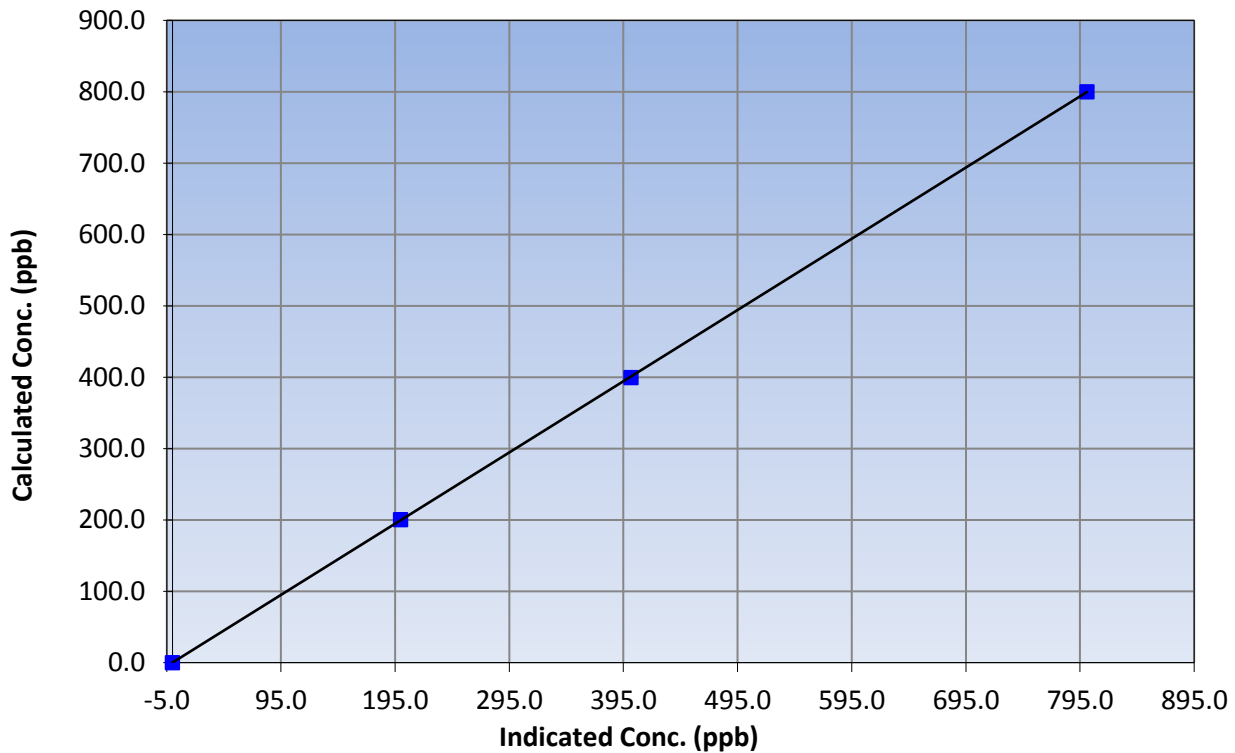
Station Information

Calibration Date	June 9, 2015	Previous Calibration	May 7, 2015
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	8:10	End Time (MST)	12:28
Analyzer make	42i	Analyzer serial #	1410661329

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	----	Correlation Coefficient	0.999992
800.0	801.0	0.9988		
399.4	401.5	0.9949	Slope	0.998004
200.3	199.7	1.0029		
			Intercept	0.129613

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

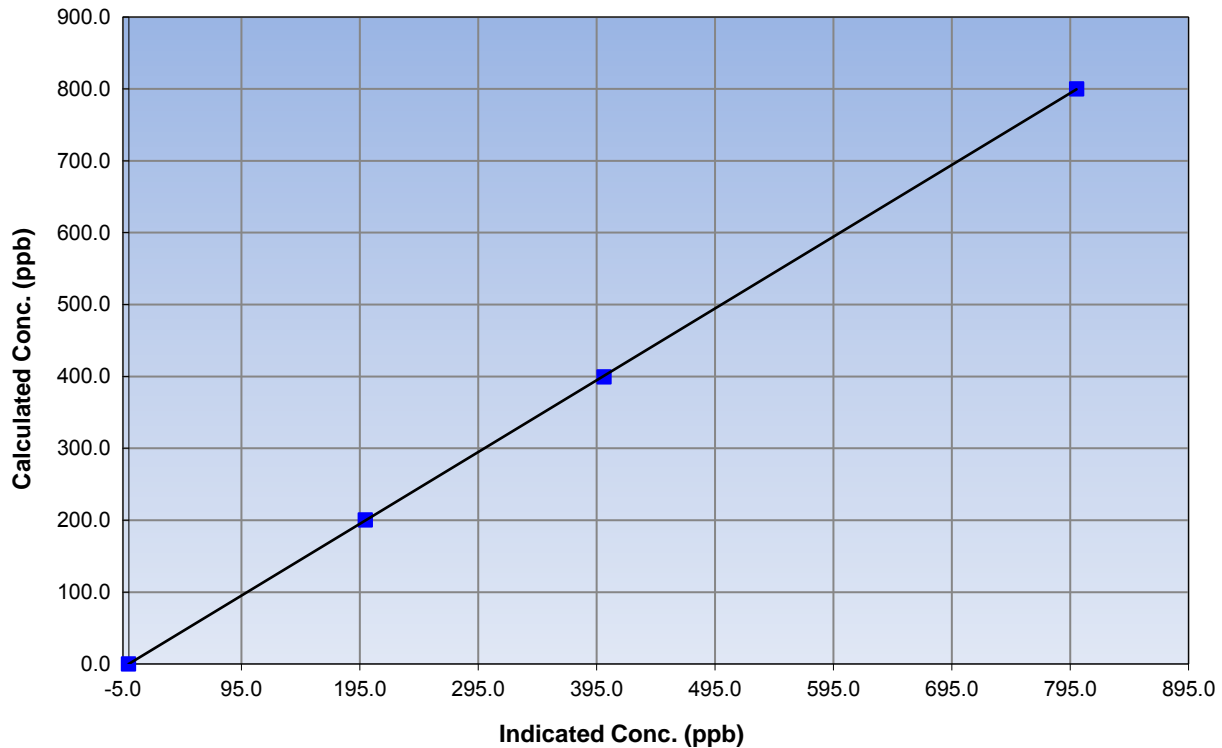
Station Information

Calibration Date	June 9, 2015	Previous Calibration	May 7, 2015
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	8:10	End Time (MST)	12:28
Analyzer make	42i	Analyzer serial #	1410661329

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.3	N/A	Correlation Coefficient	0.999992
800.0	800.4	0.9995		
399.4	401.2	0.9956	Slope	0.998693
200.3	199.6	1.0034		
			Intercept	0.157613

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

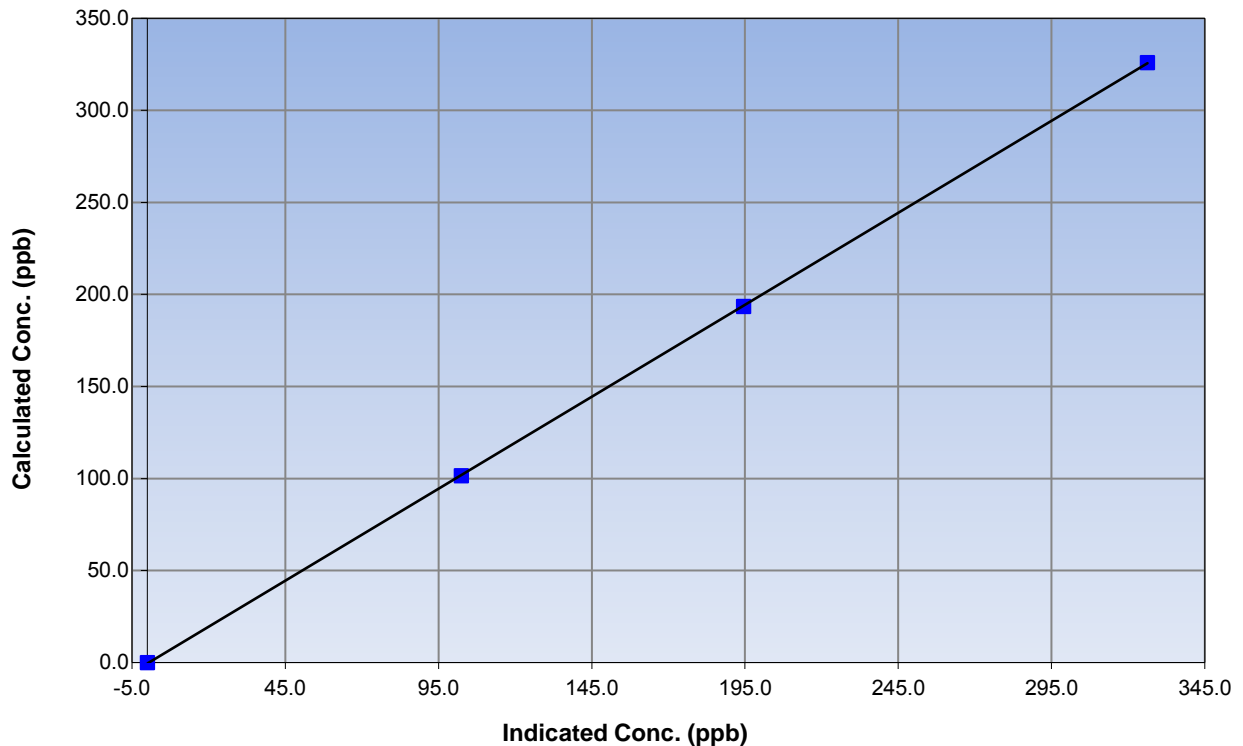
Station Information

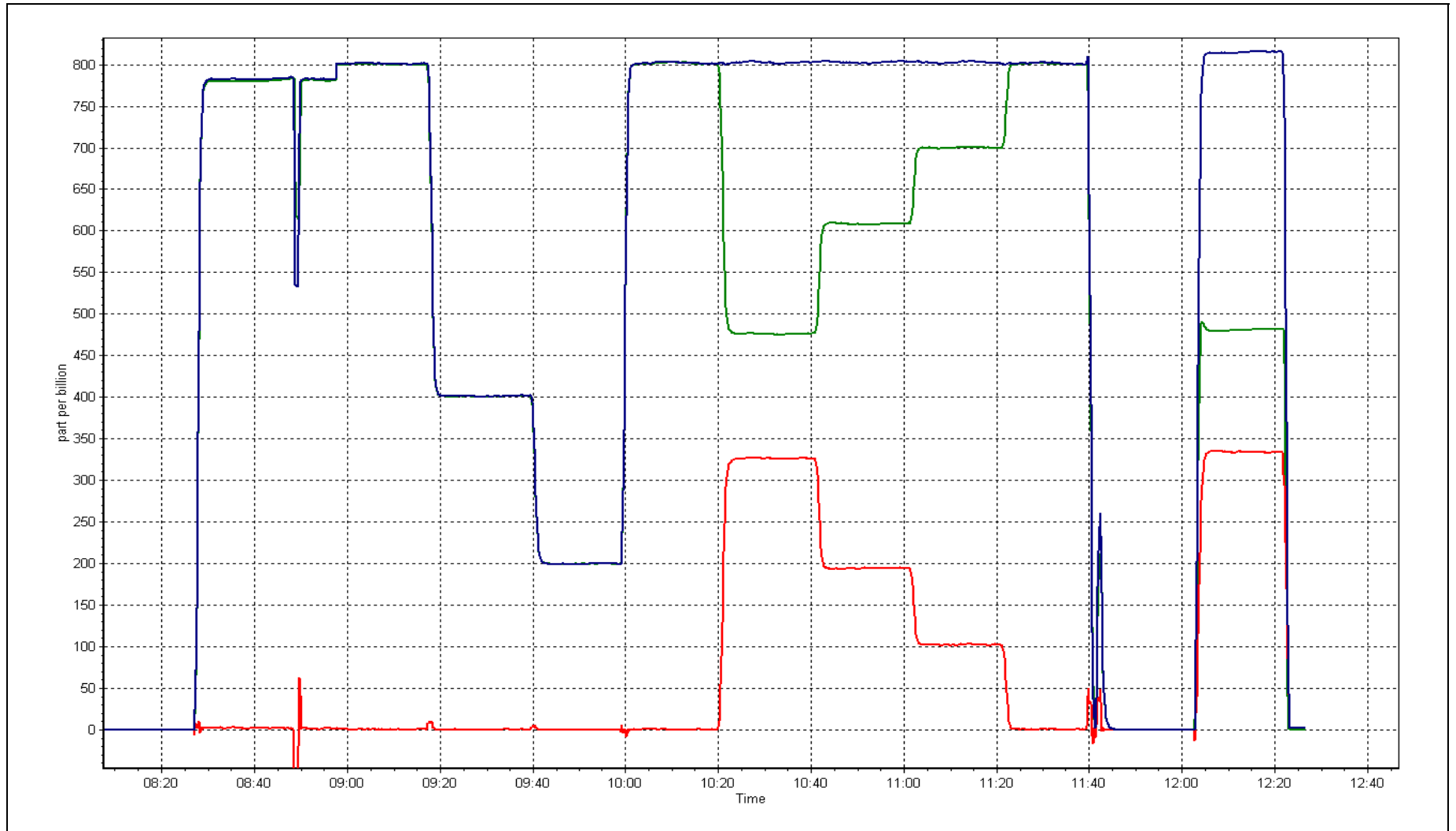
Calibration Date	June 9, 2015	Previous Calibration	May 7, 2015
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	8:10	End Time (MST)	12:28
Analyzer make	42i	Analyzer serial #	1410661329

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	N/A	Correlation Coefficient	0.999989
326.0	326.3	0.9991		
193.5	194.5	0.9949	Slope	0.999529
101.5	102.4	0.9908		
			Intercept	-0.506591

NO₂ Calibration Curve







Wood Buffalo Environmental Association

SHARP CONFORMANCE TEST

STATION INFORMATION

Calibration Date:	<u>June 16, 2015</u>	Previous Calibration:	<u>May 11, 2015</u>
Station Name:	<u>Fort McKay South</u>	Station Number:	<u>AMS 13</u>
Start Time (MST):	<u>9:32</u>	End Time (MST):	<u>10:17</u>
Calibrator Make/Model:	<u>Delta Cal</u>	Calibrator Serial Number:	<u>N/A</u>

SHARP INFORMATION

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

AUDIT DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	10.0	11.0	1.0	10.0
T2	23.0	na	na	23.0
T3	23.0	na	na	23.0
T4	26.0	na	na	26.0
RH (%)	37.0	na	na	37.0

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	980	982.0	2.0	980

Main Flow (Lph)

Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
1000	1005	5	1000	1000

Nephelometer Calibration

Parameter	As Found	adjusted (Limit +/- 2.0ug/m3)	As Left
Analog	322		326
Neph	5		-0.3
C14	9	yes	10.6
Indicated Concentration (ug/m3)	5.2		0
Offset 1	329		327.9
Offset 2	43.9		43

Leak Check (Quarterly)

Leak Check Date:	<u>June 16, 2015</u>	Previous Leak Check Date:	
	<u>Measured</u>	<u>Difference LPM (Limit +/- 0.42 LPM)</u>	
Flow without adaptor (LPM):	16.80		
Flow with adaptor [turn off pump first](LPM):	16.64	0.16	

Mass Foil Calibration (Annualy)

Foil Calibration Date:		Previous Foil Calibration:	
Zeroed?:	<u>NO</u>		
Foil Mass:	<u>1507</u>		
Previous Correction Factor:	<u>6970</u>	<u>Mass foil set S/N:</u>	
New Correction Factor:	<u>6979</u>		

INSPECTION DATA

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

NOTES:

Zero and flow adjusted, sample head cleaned, Leak check done, Heater working

Audit Performed By: Melissa Lemay



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

**CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT**

**AMS 14
ANZAC
JUNE 2015**

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

July 30, 2015



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ANZAC (AMS 14)

JUNE 2015

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	677	36	43	99.03	11	0	2	0
TRS(ppb) Average	679	34	41	99.03	4	0	0	0
THC(ppm) Average	656	35	64	95.97	3.7	-	2.2	-
NMHC(ppm) Average	656	35	64	95.97	0.341	-	0.099	-
CH4(ppm) Average	656	35	64	95.97	3.5	-	2.1	-
NO2(ppb) Average	677	36	43	99.03	14	0	3	-
NO(ppb) Average	677	36	43	99.03	17	-	1	-
NOX(ppb) Average	677	36	43	99.03	22	-	3	-
O3(ppb) Average	680	34	40	99.17	61	0	45	-
PM2.5(ug/m3) Average	689	0	31	95.69	257.2	-	80.8	2
AT 2m(C) Average	720	0	0	100.00	30.1	-	23.3	-
RH(%) Average	720	0	0	100.00	98	-	86	-
LW(% of range) Average	720	0	0	100.00	68	-	22	-
WS(km/h) Average	720	0	0	100.00	16	-	11	-
WD(deg) Average	720	0	0	100.00	-	-	-	-
PC(mm) Total	720	0	0	100.00	11.4	-	11.4	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ANZAC (AMS 14)
 JUNE 2015

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2(ppb) Average	677	0.3	1	-	0	0	0	0	0	1	11
TRS(ppb) Average	679	0.3	0	-	0	0	0	0	0	0	4
THC(ppm) Average	656	1.89	0.2	-	1.8	1.8	1.8	1.9	1.9	2	3.7
NMHC (ppm) Average	656	0.031	0.049	-	0	0	0	0	0	0.1	0.341
CH4(ppm) Average	656	1.86	0.1	-	1.7	1.8	1.8	1.8	1.9	1.9	3.5
NO2(ppb) Average	677	1.2	1	-	0	0	1	1	1	2	14
NO(ppb) Average	677	0.2	1	-	0	0	0	0	0	0	17
NOX(ppb) Average	677	1.5	2	-	0	0	1	1	2	3	22
O3(ppb) Average	680	31.6	12	-	4	14	24	33	40	45	61
PM2.5(ug/m3) Average	689	11.88	28.3	-	0.6	1.5	2.4	5.3	10	17.8	257.2
Temperature 2 m (C) Average	720	16.04	6.3	-	-2	7.9	11.4	15.9	20.6	24.5	30.1
Relative Humidity (%) Average	720	60.2	21	-	19	31	42	59	79	90	98
Surface Wetness (% of range) Average	720	3.1	9	-	0	0	0	0	0	10	68
Wind Speed 20 m (km/h) Average	720	7	3	-	0	3	5	7	9	12	16
Wind Direction 20 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-
Precipitation (mm) Total	720	-	-	27.94	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ANZAC (AMS 14)
JUNE 2015

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
AIR QUALITY ANALYZERS	08 Jun 2015 12:00	08 Jun 2015 13:00	2	Maintenance - tested daily zero and span system
AIR QUALITY ANALYZERS	29 Jun 2015 12:00	29 Jun 2015 15:00	4	Station power failure
SO2, TRS, CH4, NMHC, NO2, NO, NOX	16 Jun 2015 13:00	16 Jun 2015 13:00	1	Maintenance - cleaned glass manifold
CH4, NMHC, THC	05 Jun 2015 10:00	05 Jun 2015 12:00	3	Maintenance - replaced fuel cylinder
CH4, NMHC, THC	29 Jun 2015 16:00	30 Jun 2015 10:00	19	Analyzer Failure - required manual relight after power failure
PM2.5	01 Jun 2015 01:00	02 Jun 2015 01:00	25	Analyzer Failure - filter tape stuck
PM2.5	17 Jun 2015 12:00	17 Jun 2015 13:00	2	Maintenance - Flow and zero check, sample head cleaning



Summary of Hour Averages

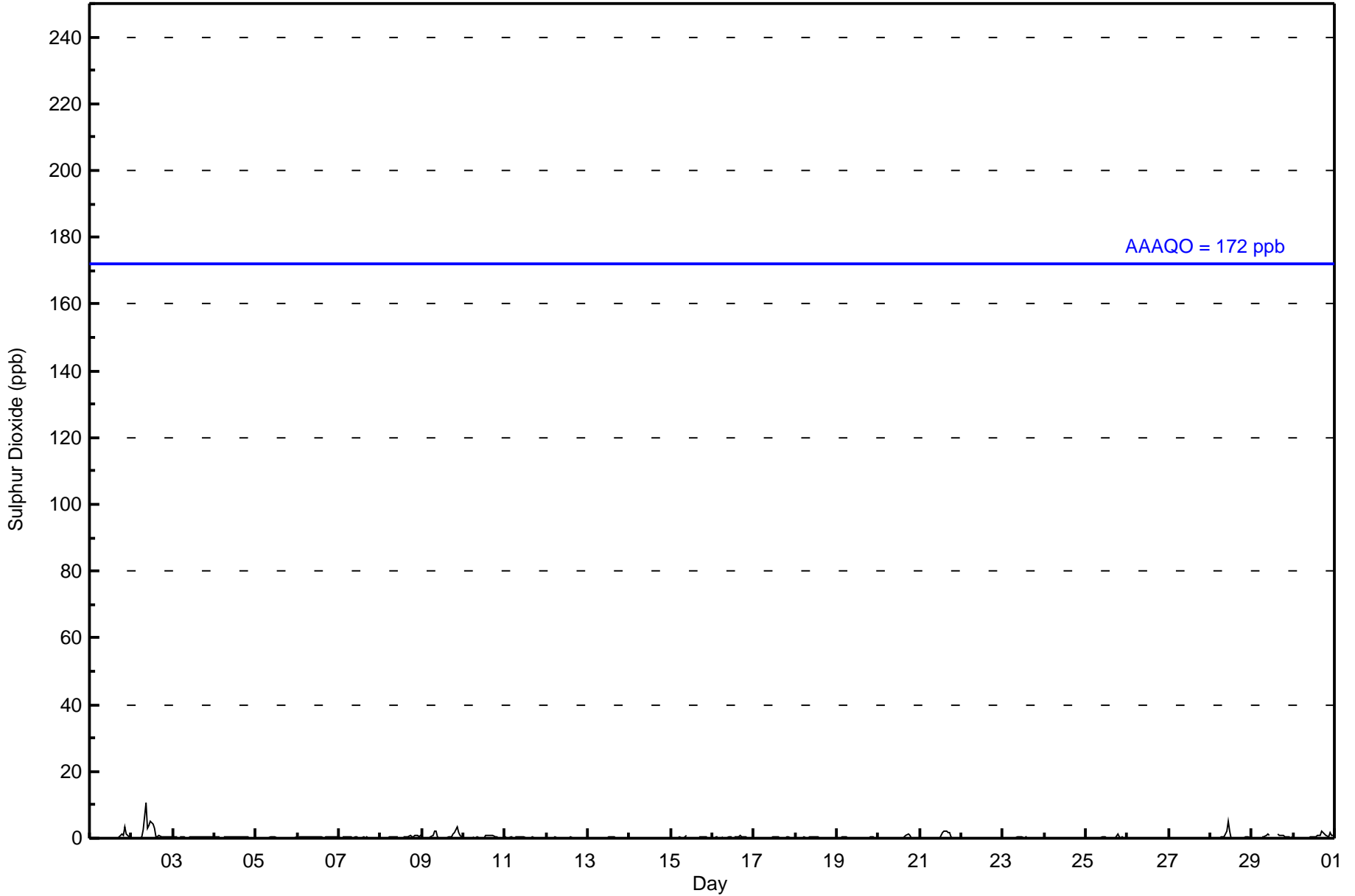
Anzac - June 2015

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 11 ppb on Jun 2 09:00	Maximum Daily Average: 1.6 ppb on Jun 2		Hours of Data:	677
Minimum Value: 0 ppb on Jun 20 04:00	Minimum Daily Average: 0.1 ppb on Jun 26		Hours of Missing Data:	43
Maximum Diurnal Average: 0.6 ppb at hour 9	Minimum Diurnal Average: 0.1 ppb at hour 2		Hours of Calibration:	36
Monthly Average: 0.3 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 3		Percent Operational Time:	99.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	4	1	1	0	0.4	4
2-Jun	0	0	Z	0	0	0	0	2	11	3	4	5	4	3	1	1	1	1	1	1	0	0	0	0	1.6	11
3-Jun	0	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
4-Jun	0	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-Jun	0	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-Jun	Z	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
7-Jun	0	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
8-Jun	0	0	Z	0	0	0	0	0	0	0	0	M	M	0	0	0	1	1	0	0	1	1	1	1	0.4	1
9-Jun	1	0	0	Z	0	0	1	2	2	0	0	0	0	0	0	0	0	0	1	2	3	2	1	0	0.8	3
10-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0.3	1
11-Jun	0	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-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
13-Jun	0	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-Jun	0	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-Jun	0	0	0	Z	0	0	0	0	1	1	C	C	C	C	C	C	0	0	0	0	0	0	0	0	--	1
16-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	M	0	0	0	1	0	0	0	0	0	0	0	0.2	1
17-Jun	0	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-Jun	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
19-Jun	0	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-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0.2	1
21-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	1	2	2	2	2	2	0	0	0	0	0	0	0.6	2
22-Jun	0	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-Jun	0	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-Jun	Z	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-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.2	1
26-Jun	0	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-Jun	0	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-Jun	0	0	0	0	Z	0	0	0	0	2	5	2	0	0	0	0	0	0	0	0	0	0	0	0	0.6	5
29-Jun	0	0	0	0	0	Z	0	1	1	1	1	PF	PF	PF	PF	1	1	1	1	1	0	0	0	0	0.5	1
30-Jun	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	2	2	1	1	0	2	1	1	0.6	2

0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.6	0.4	0.5	0.5	0.4	0.4	0.3	0.3	0.4	0.4	0.4	0.3	0.4	0.3	0.2	0.2	Diurnal Average		
1	0	0	0	0	0	0	1	2	11	3	5	5	4	3	2	2	2	2	2	1	2	4	2	1	1	Diurnal Maximum	

Z - zerspan 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
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Anzac - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	676	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: 677

Total Number of Hours: 720



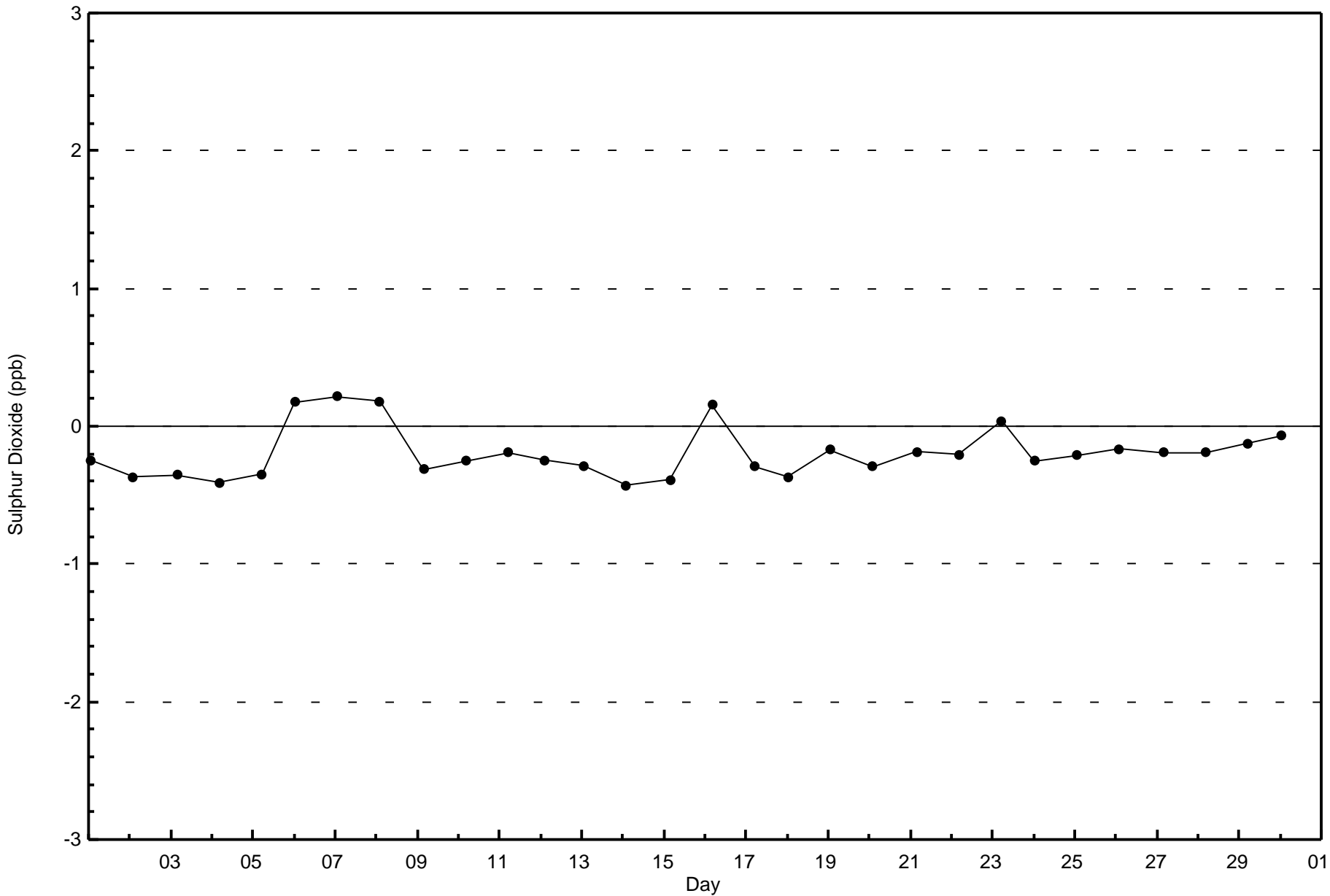
Wood Buffalo Environmental Association
Frequency Distribution

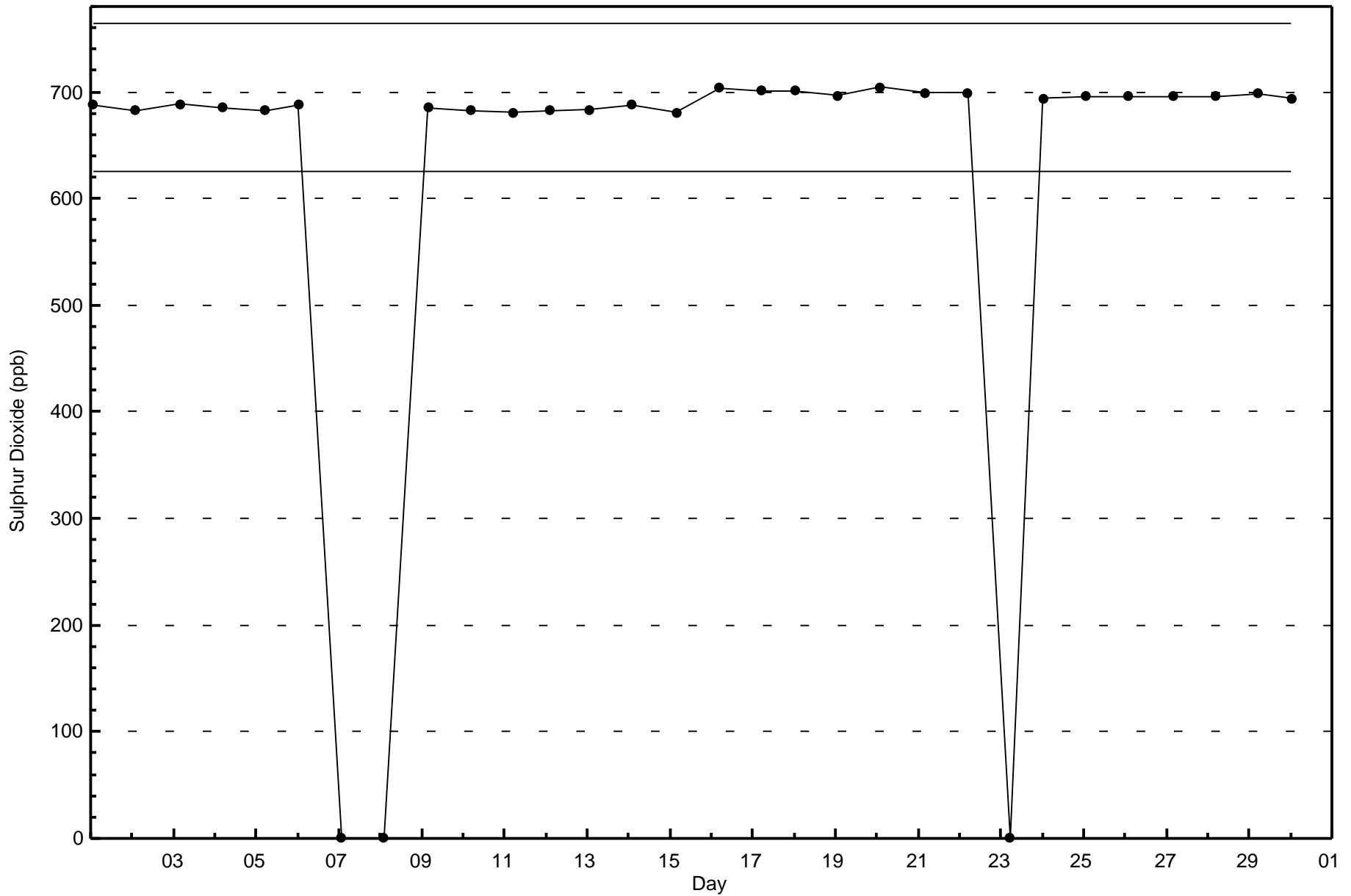
Sulphur Dioxide (SO₂) - ppb
Anzac - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	59	18	15	11	5	6	20	71	40	33	35	43	71	114	74	61	676
11 - 20	0	0	0	0	0	0	0	0	0	1	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	59	18	15	11	5	6	20	71	40	34	35	43	71	114	74	61	677

Total Number of Valid Hours: 677

Total Number of Hours: 720







Summary of Hour Averages

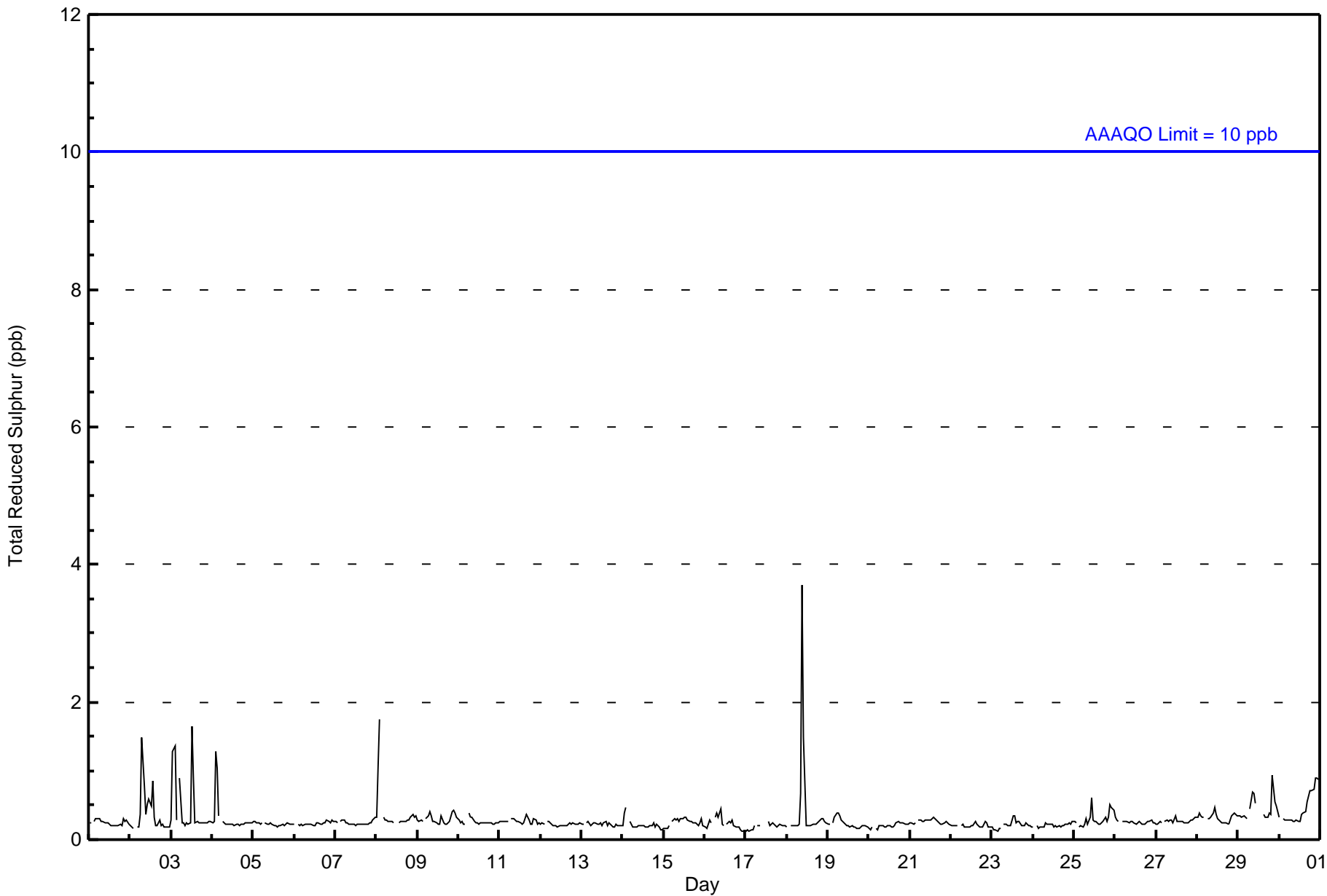
Anzac - June 2015

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 4 ppb on Jun 18 10:00	Maximum Daily Average: 0.5 ppb on Jun 3		Hours of Data:	679
Minimum Value: 0 ppb on Jun 17 00:00	Minimum Daily Average: 0.2 ppb on Jun 17		Hours of Missing Data:	41
Maximum Diurnal Average: 0.4 ppb at hour 10	Minimum Diurnal Average: 0.2 ppb at hour 16		Hours of Calibration:	34
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		Percent Operational Time:	99.0

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

0.2	0.3	0.4	0.3	0.2	0.3	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	0.3	0.3	0.3	0.3	0.3	Diurnal Average
0	1	2	1	0	1	0	1	1	1	4	1	1	2	1	0	0	1	1	1	1	1	1	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
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Anzac - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	678	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: 679

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Anzac - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	58	18	14	12	5	6	20	69	40	36	32	46	70	118	75	59	678
3 - 4	0	0	0	0	0	0	0	1	0	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	58	18	14	12	5	6	20	70	40	36	32	46	70	118	75	59	679

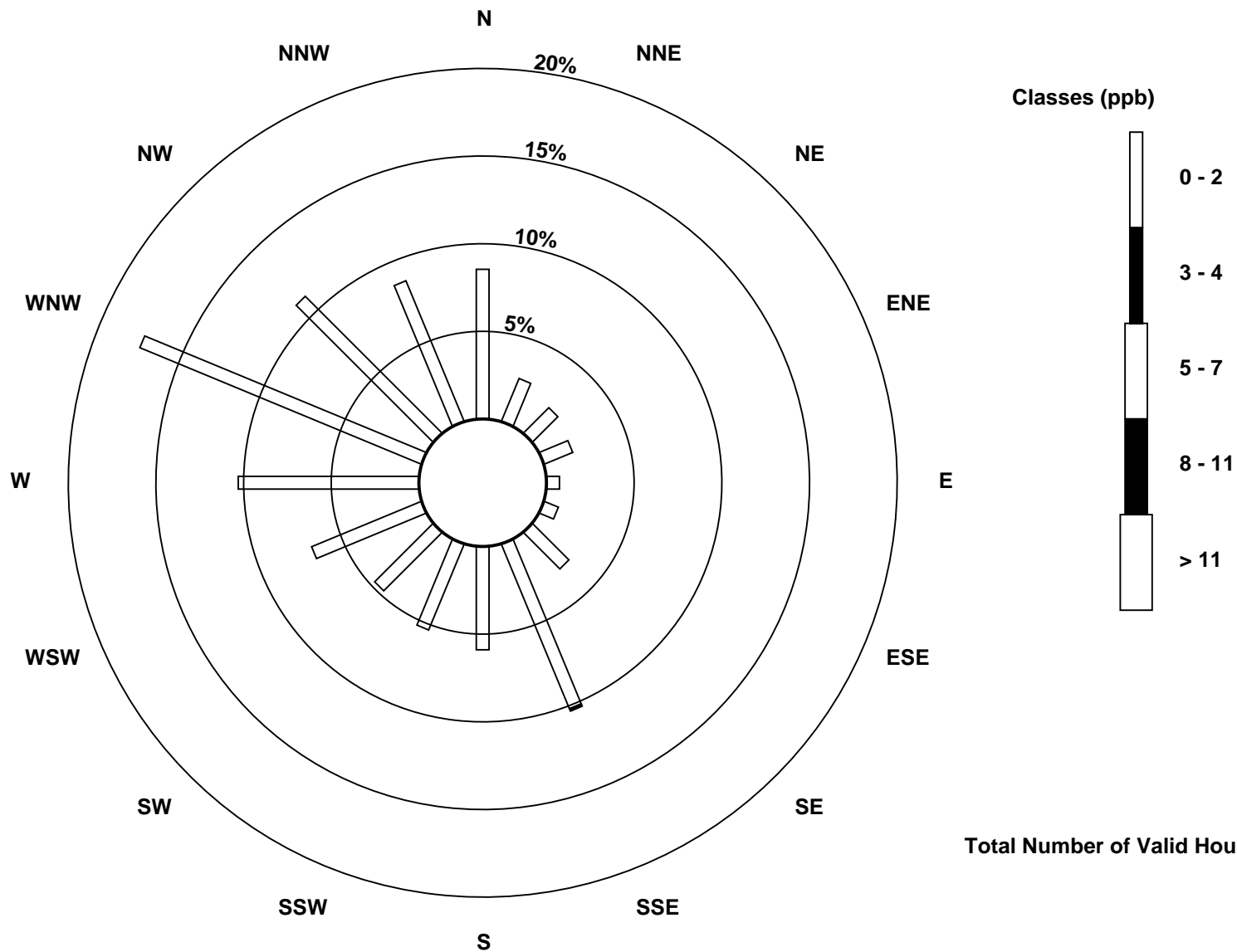
Total Number of Valid Hours: 679

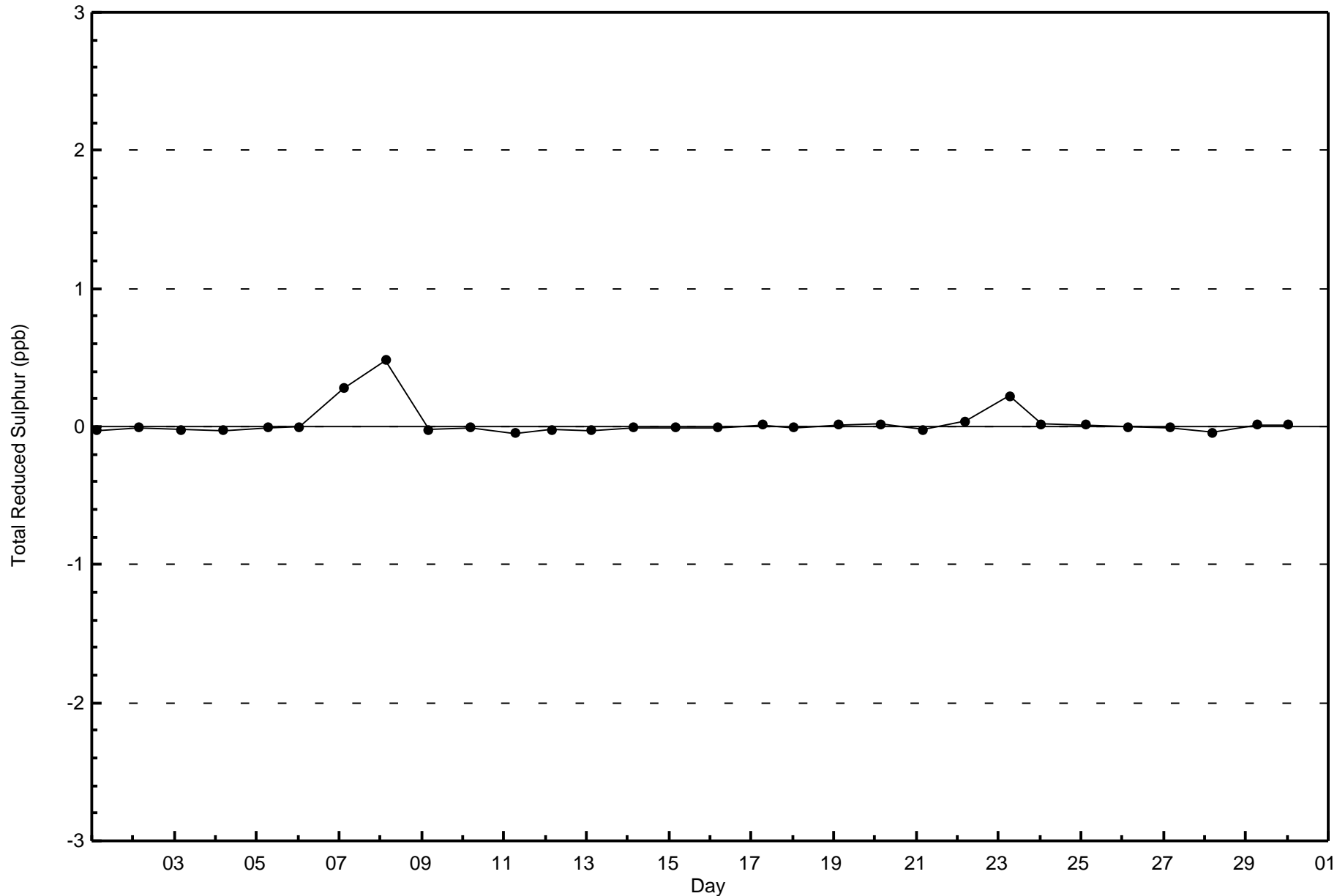
Total Number of Hours: 720

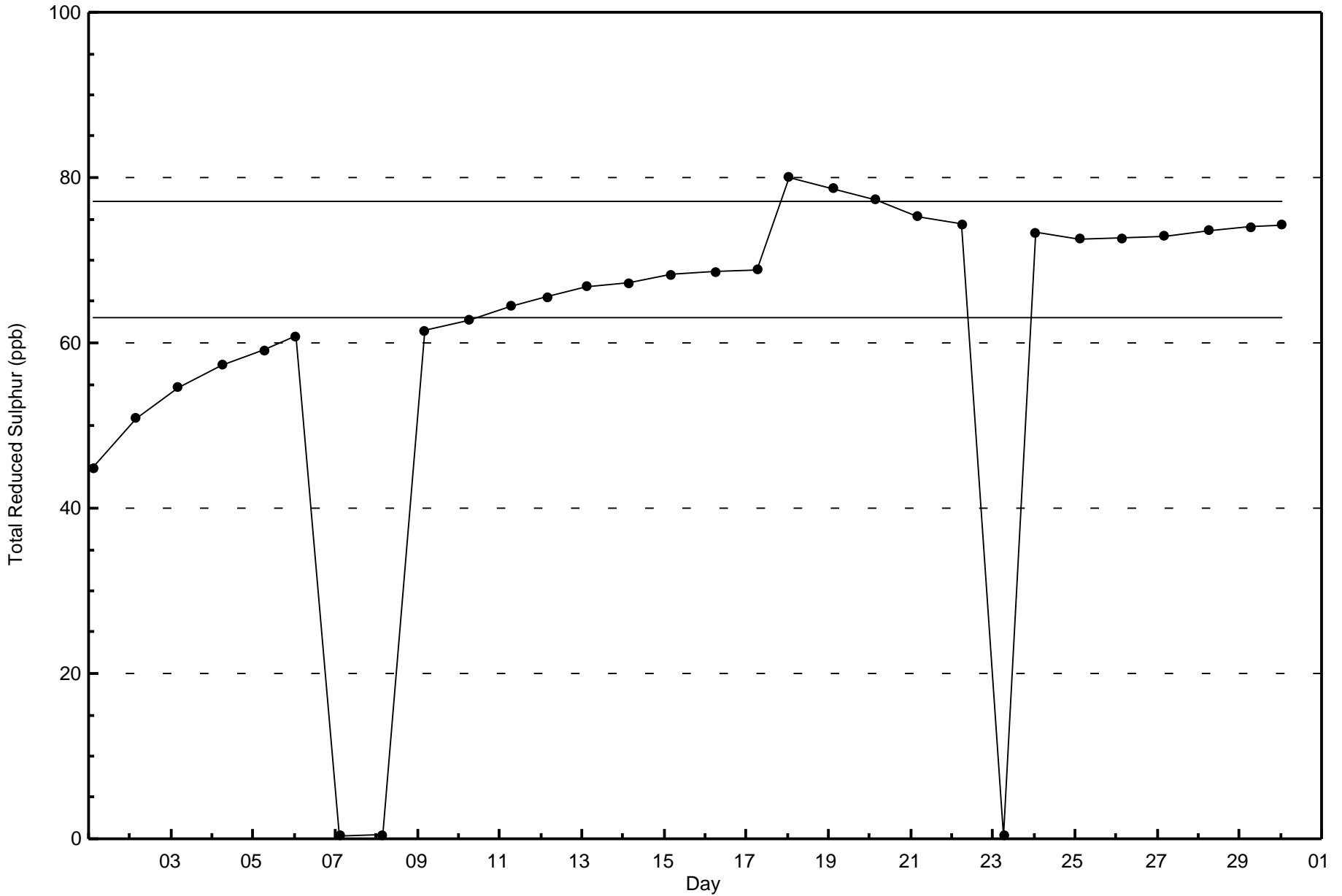


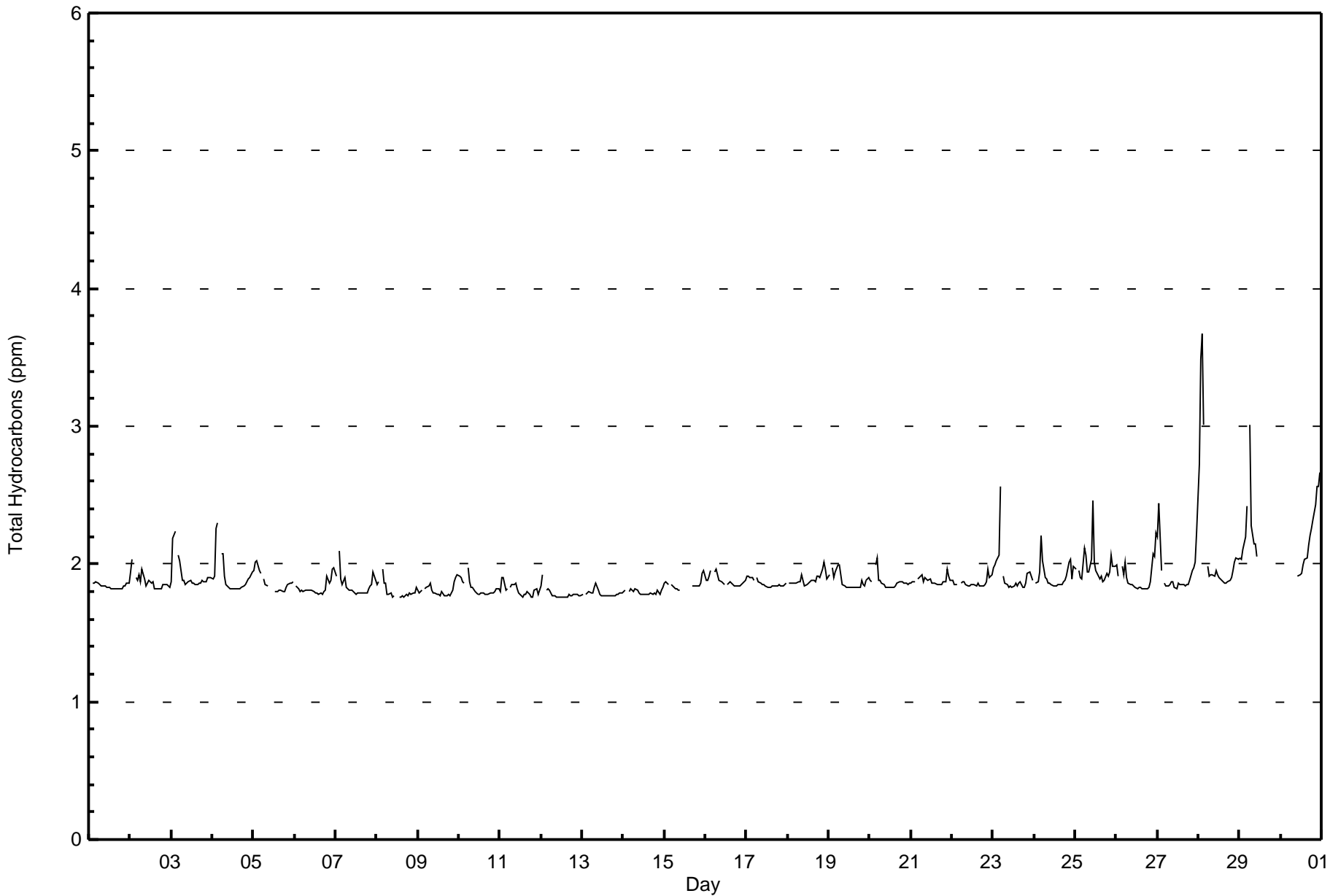
Wood Buffalo Environmental Association
Wind Rose Jun 2015

Total Reduced Sulphur (TRS) - ppb
Anzac (AMS 14)











Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Anzac - June 2015

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	615	93.75	93.75
2.1 - 3.0	39	5.95	99.70
3.1 - 10.0	2	0.30	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 656

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Anzac - June 2015

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	57	18	14	10	5	3	15	64	37	31	31	30	63	105	72	60	615
2.1 - 3.0	2	0	1	1	0	3	3	5	1	1	3	9	4	4	2	0	39
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	2
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	59	18	15	11	5	6	18	69	38	32	35	40	67	109	74	60	656

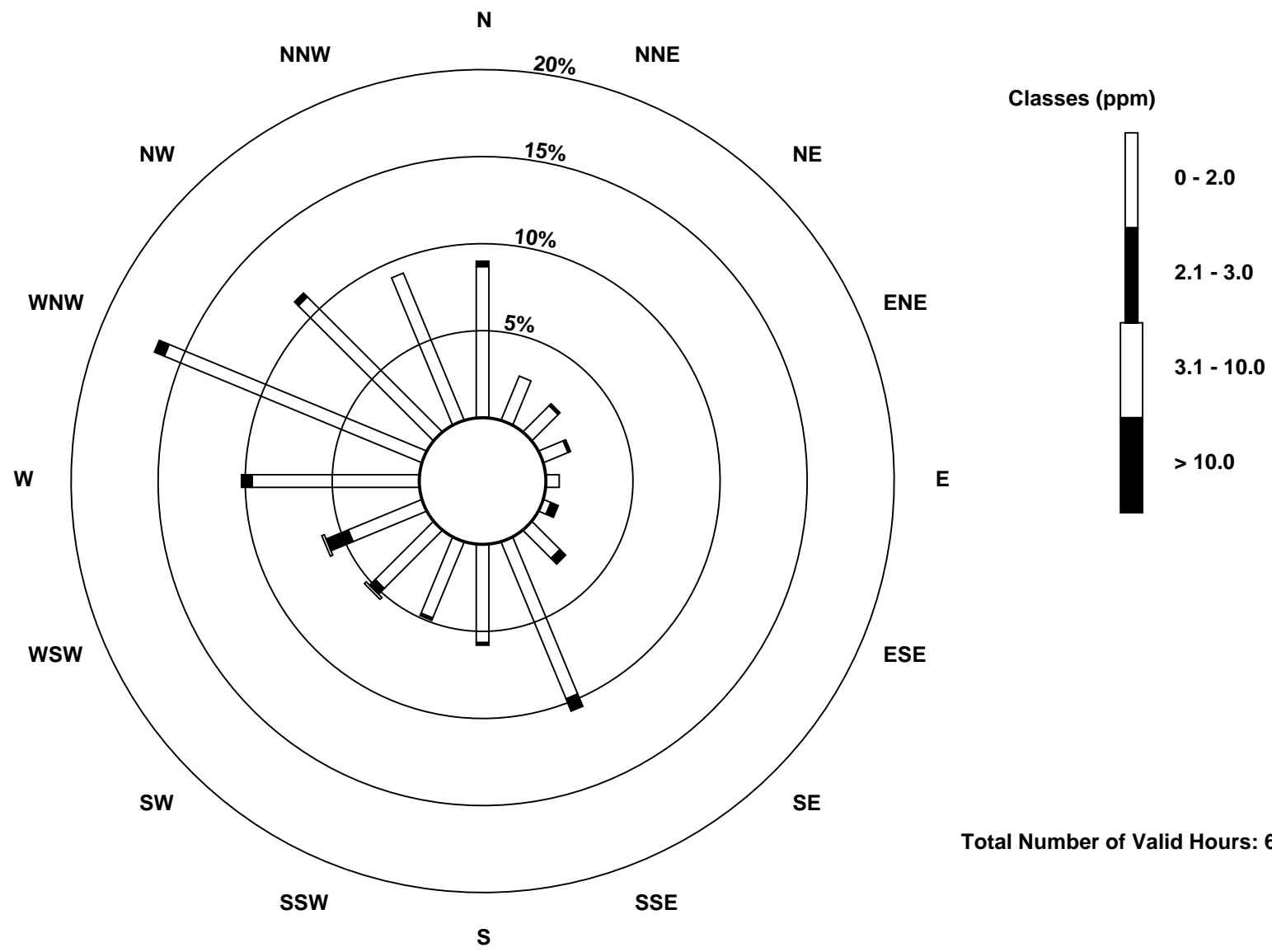
Total Number of Valid Hours: 656

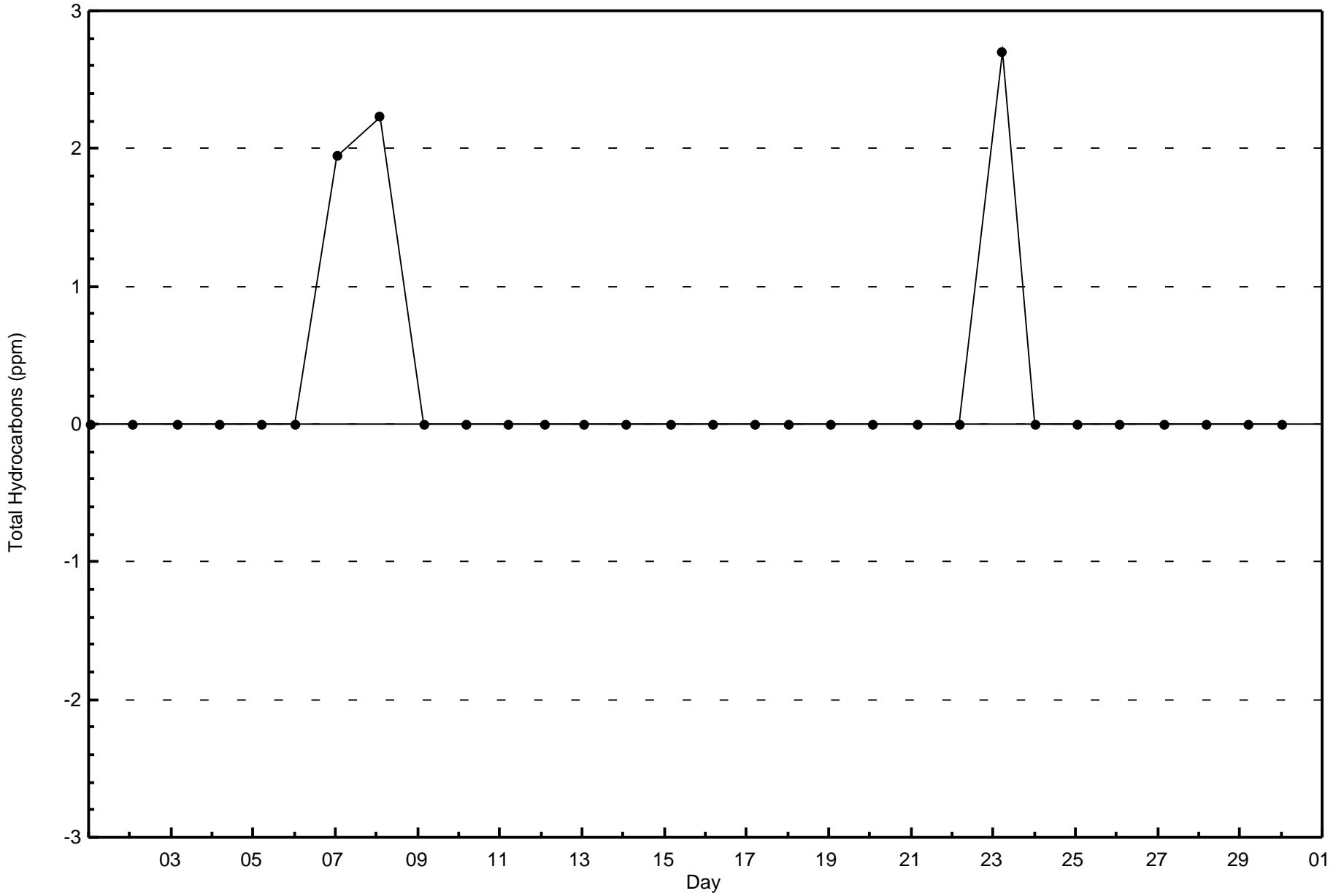
Total Number of Hours: 720

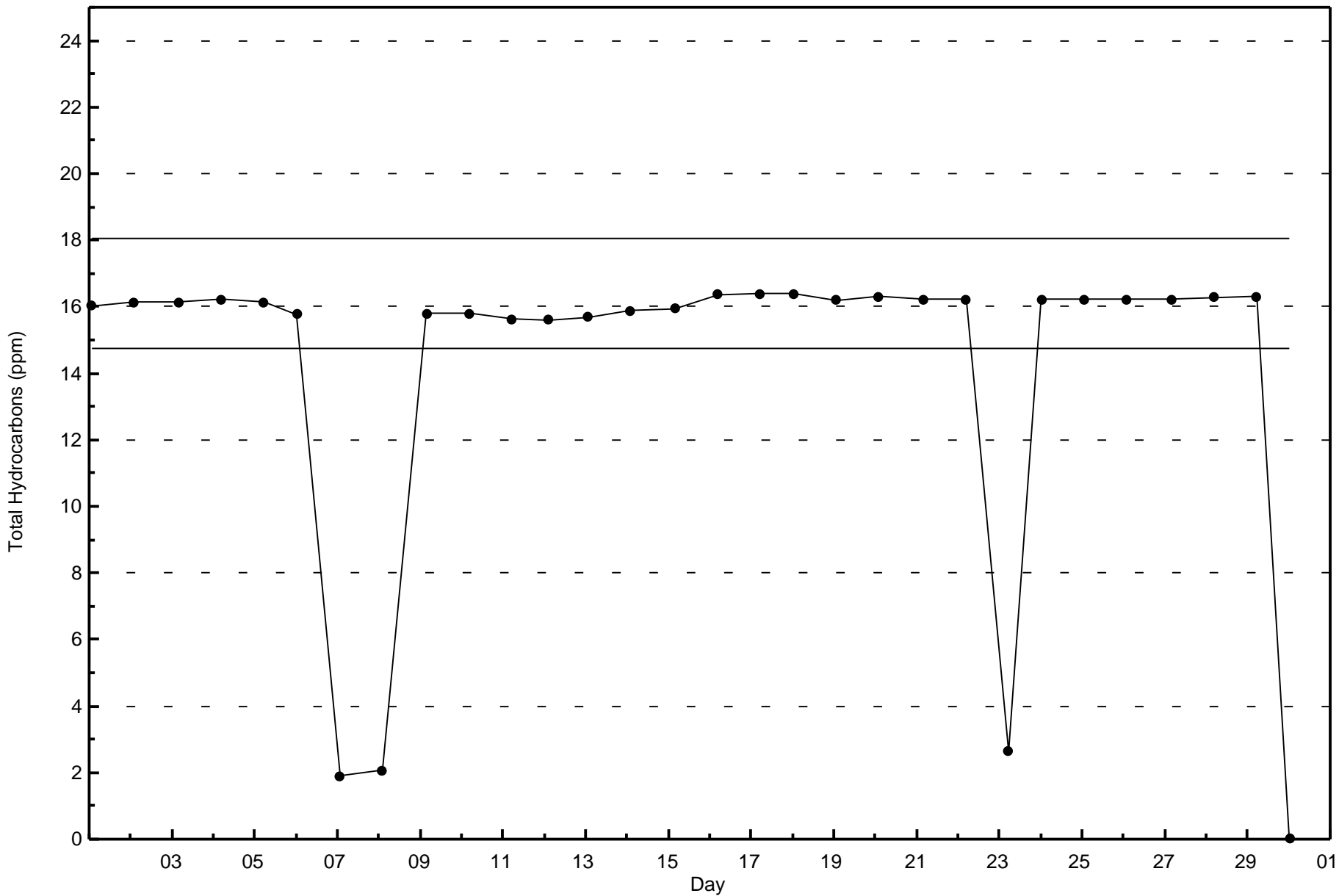


Wood Buffalo Environmental Association
Wind Rose Jun 2015

Total Hydrocarbons (THC) - ppm
Anzac (AMS 14)





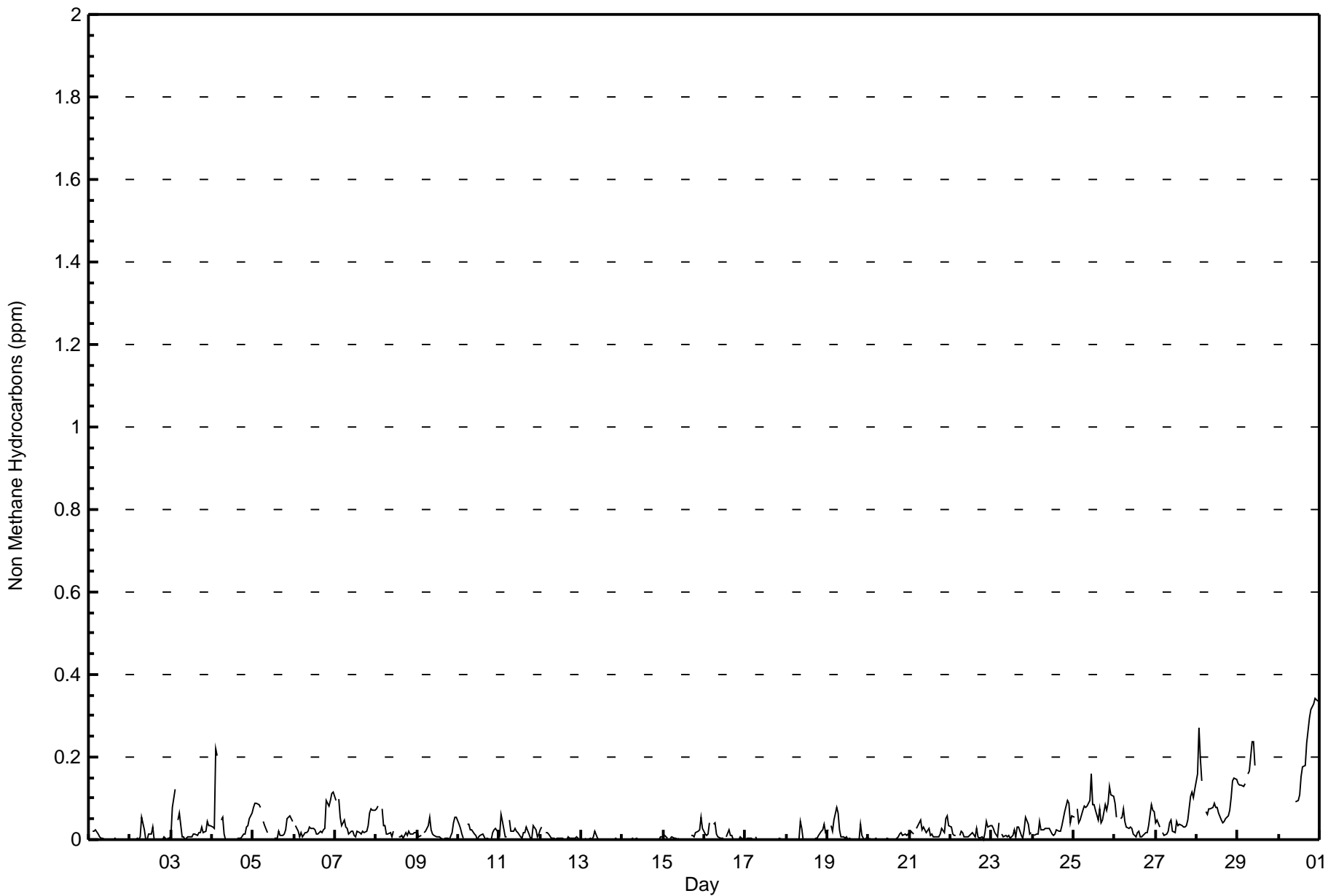




Summary of Hour Averages

Anzac - June 2015

Maximum Value: 0.341 ppm on Jun 30 22:00		Maximum Daily Average: 0.099 ppm on Jun 28		Hours in Service:	720																						
Minimum Value: 0.000 ppm on Jun 1 10:00		Minimum Daily Average: 0.001 ppm on Jun 14		Hours of Data:	656																						
Maximum Diurnal Average: 0.052 ppm at hour 22		Minimum Diurnal Average: 0.017 ppm at hour 13		Hours of Missing Data:	64																						
Monthly Average: 0.031 ppm		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.1 P ₉₉ = 0.3		Hours of Calibration:	35																						
				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-Jun	0.027	Z	0.020	0.019	0.022	0.014	0.007	0.002	0.002	0.000	0.000	0.001	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.005	0.027	
2-Jun	0.000	0.000	Z	0.000	0.002	0.000	0.005	0.053	0.025	0.000	0.000	0.015	0.013	0.032	0.001	0.000	0.000	0.000	0.000	0.000	0.007	0.001	0.003	0.002	0.007	0.053	
3-Jun	0.009	0.079	0.122	Z	0.048	0.063	0.008	0.007	0.001	0.004	0.005	0.008	0.006	0.012	0.013	0.009	0.017	0.018	0.030	0.019	0.022	0.043	0.034	0.034	0.027	0.122	
4-Jun	0.031	0.028	0.219	0.205	Z	0.047	0.055	0.014	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.004	0.005	0.013	0.013	0.029	0.036	0.051	0.063	0.036	0.219	
5-Jun	0.078	0.087	0.089	0.086	0.078	Z	0.043	0.034	0.016	M	M	M	0.004	0.005	0.004	0.019	0.011	0.010	0.015	0.023	0.050	0.058	0.052	0.044	0.040	0.089	
6-Jun	Z	0.035	0.019	0.006	0.017	0.006	0.018	0.016	0.021	0.032	0.028	0.028	0.023	0.014	0.014	0.021	0.017	0.022	0.028	0.095	0.081	0.096	0.113	0.114	0.038	0.114	
7-Jun	0.096	Z	0.099	0.054	0.035	0.047	0.031	0.028	0.015	0.019	0.019	0.009	0.007	0.020	0.018	0.015	0.019	0.017	0.021	0.036	0.065	0.076	0.072	0.070	0.039	0.099	
8-Jun	0.076	0.082	Z	0.075	0.035	0.034	0.013	0.015	0.018	0.008	0.020	M	M	0.008	0.007	0.010	0.004	0.016	0.011	0.022	0.015	0.014	0.018	0.017	0.025	0.082	
9-Jun	0.020	0.008	0.011	Z	0.016	0.019	0.033	0.054	0.024	0.012	0.011	0.007	0.008	0.005	0.004	0.001	0.002	0.003	0.002	0.001	0.017	0.042	0.055	0.054	0.018	0.055	
10-Jun	0.038	0.026	0.014	0.003	Z	0.039	0.037	0.023	0.024	0.013	0.009	0.001	0.006	0.011	0.014	0.007	0.002	0.003	0.000	0.001	0.016	0.022	0.027	0.018	0.015	0.039	
11-Jun	0.012	0.060	0.046	0.008	0.008	Z	0.046	0.020	0.022	0.026	0.019	0.017	0.008	0.003	0.016	0.018	0.031	0.014	0.002	0.003	0.032	0.022	0.007	0.013	0.020	0.060	
12-Jun	0.023	0.032	Z	0.017	0.016	0.015	0.004	0.003	0.002	0.001	0.003	0.004	0.002	0.002	0.001	0.000	0.007	0.002	0.004	0.005	0.004	0.006	0.002	0.002	0.007	0.032	
13-Jun	0.002	Z	0.003	0.001	0.000	0.002	0.001	0.008	0.021	0.004	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.004	0.000	0.002	0.000	0.002	0.021	
14-Jun	0.000	0.000	Z	0.000	0.000	0.000	0.002	0.002	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.007	0.007	0.001	0.007	
15-Jun	0.007	0.011	0.002	Z	0.002	0.007	0.003	0.003	0.000	0.003	C	C	C	C	C	C	0.011	0.010	0.007	0.017	0.020	0.024	0.054	0.026	--	0.054	
16-Jun	0.015	0.011	0.014	0.040	Z	0.037	0.040	0.012	0.008	0.004	0.004	0.004	M	0.006	0.024	0.012	0.011	0.001	0.001	0.001	0.001	0.006	0.003	0.001	0.012	0.040	
17-Jun	0.002	0.004	0.003	0.003	0.001	Z	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.001	0.000	0.000	0.001	0.006	
18-Jun	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.045	0.026	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.005	0.010	0.021	0.024	0.039	0.019	0.008	0.045	
19-Jun	0.023	Z	0.035	0.022	0.049	0.076	0.064	0.025	0.007	0.007	0.004	0.006	0.000	0.002	0.000	0.000	0.001	0.001	0.000	0.037	0.009	0.005	0.001	0.007	0.017	0.076	
20-Jun	0.002	0.002	Z	0.002	0.005	0.001	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.001	0.005	0.014	0.016	0.011	0.013	0.010	0.012	0.004	0.016	
21-Jun	0.007	0.019	0.015	Z	0.026	0.033	0.048	0.023	0.032	0.025	0.017	0.029	0.012	0.015	0.008	0.007	0.008	0.006	0.014	0.027	0.018	0.050	0.057	0.035	0.023	0.057	
22-Jun	0.029	0.013	0.010	0.011	Z	0.011	0.019	0.019	0.006	0.008	0.007	0.010	0.015	0.019	0.007	0.027	0.006	0.005	0.007	0.002	0.018	0.043	0.032	0.034	0.015	0.043	
23-Jun	0.032	0.028	0.016	0.007	0.039	Z	0.015	0.007	0.010	0.008	0.011	0.003	0.011	0.024	0.007	0.032	0.029	0.009	0.005	0.024	0.054	0.036	0.015	0.017	0.019	0.054	
24-Jun	Z	0.010	0.014	0.013	0.045	0.024	0.023	0.027	0.027	0.026	0.026	0.014	0.011	0.013	0.025	0.019	0.020	0.033	0.050	0.068	0.094	0.089	0.040	0.058	0.033	0.094	
25-Jun	0.054	Z	0.075	0.042	0.049	0.070	0.082	0.078	0.083	0.097	0.161	0.086	0.084	0.073	0.047	0.076	0.041	0.047	0.085	0.070	0.088	0.127	0.109	0.104	0.079	0.161	
26-Jun	0.090	0.055	Z	0.050	0.053	0.076	0.044	0.032	0.027	0.029	0.026	0.014	0.007	0.017	0.020	0.007	0.008	0.013	0.018	0.017	0.035	0.086	0.072	0.068	0.038	0.090	
27-Jun	0.041	0.047	0.032	Z	0.017	0.009	0.013	0.022	0.041	0.047	0.020	0.016	0.044	0.034	0.036	0.035	0.031	0.031	0.034	0.049	0.105	0.114	0.102	0.123	0.045	0.123	
28-Jun	0.160	0.270	0.196	0.142	Z	0.069	0.060	0.074	0.076	0.076	0.087	0.079	0.077	0.063	0.047	0.042	0.043	0.051	0.057	0.071	0.102	0.141	0.151	0.147	0.099	0.270	
29-Jun	0.137	0.131	0.131	0.130	0.135	Z	0.159	0.165	0.238	0.236	0.178	PF	PF	PF	PF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	0.238
30-Jun	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	0.091	0.097	0.108	0.153	0.175	0.180	0.233	0.266	0.294	0.316	0.330	0.341	0.340	0.336	--	0.341	
																								Diurnal Average			
																								Diurnal Maximum			
Z - zerspan																											
C - Calibration																											
M - Maintenance																											
AF - Analyzer Failure																											
PF - Power Failure																											





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm
Anzac - June 2015

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	209	31.86	31.86
0.006 - 0.05	342	52.13	83.99
0.06 - 0.1	82	12.50	96.49
> 0.1	23	3.51	100.00

Total Number of Valid Hours: 656

Total Number of Hours: 720



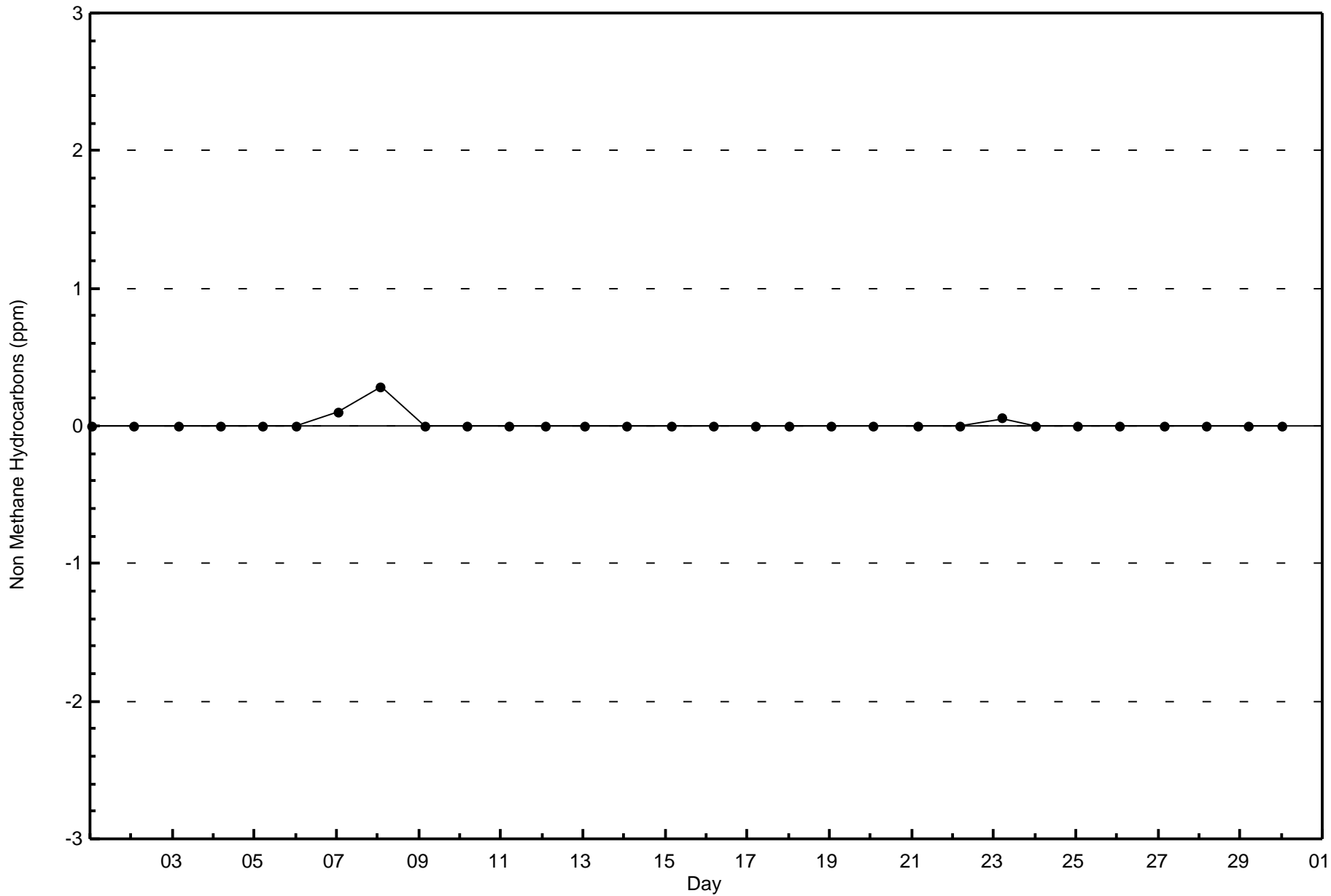
Wood Buffalo Environmental Association
Frequency Distribution

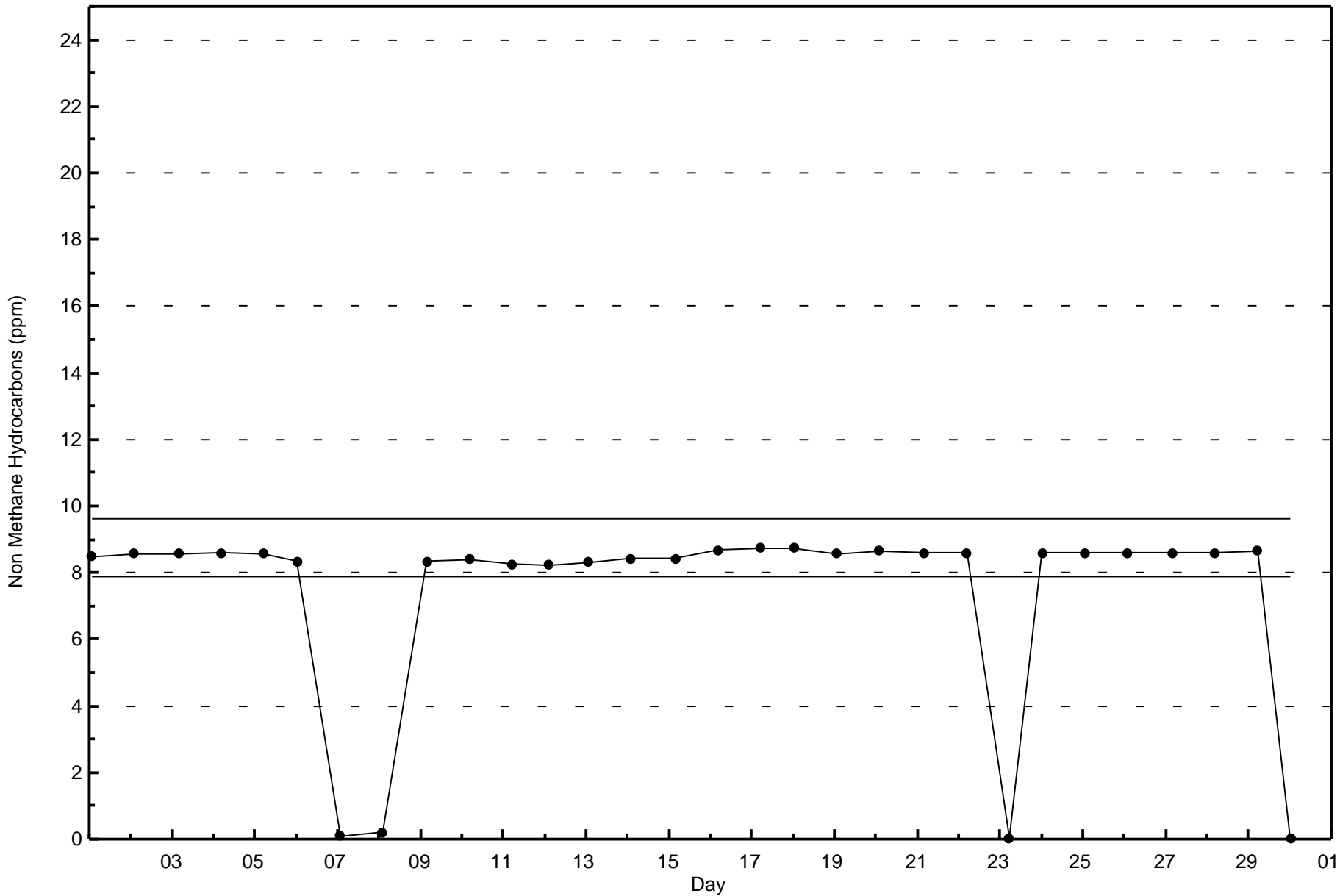
Non Methane Hydrocarbons (NMHC) - ppm
Anzac - June 2015

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	43	11	9	6	2	1	6	22	18	8	3	8	8	11	23	30	209
0.006 - 0.05	14	5	2	3	3	2	8	37	13	19	22	16	46	86	41	25	342
0.06 - 0.1	1	2	1	1	0	1	3	7	7	5	7	15	11	9	8	4	82
> 0.1	1	0	3	1	0	2	1	3	0	0	3	1	2	3	2	1	23
Totals	59	18	15	11	5	6	18	69	38	32	35	40	67	109	74	60	656

Total Number of Valid Hours: 656

Total Number of Hours: 720



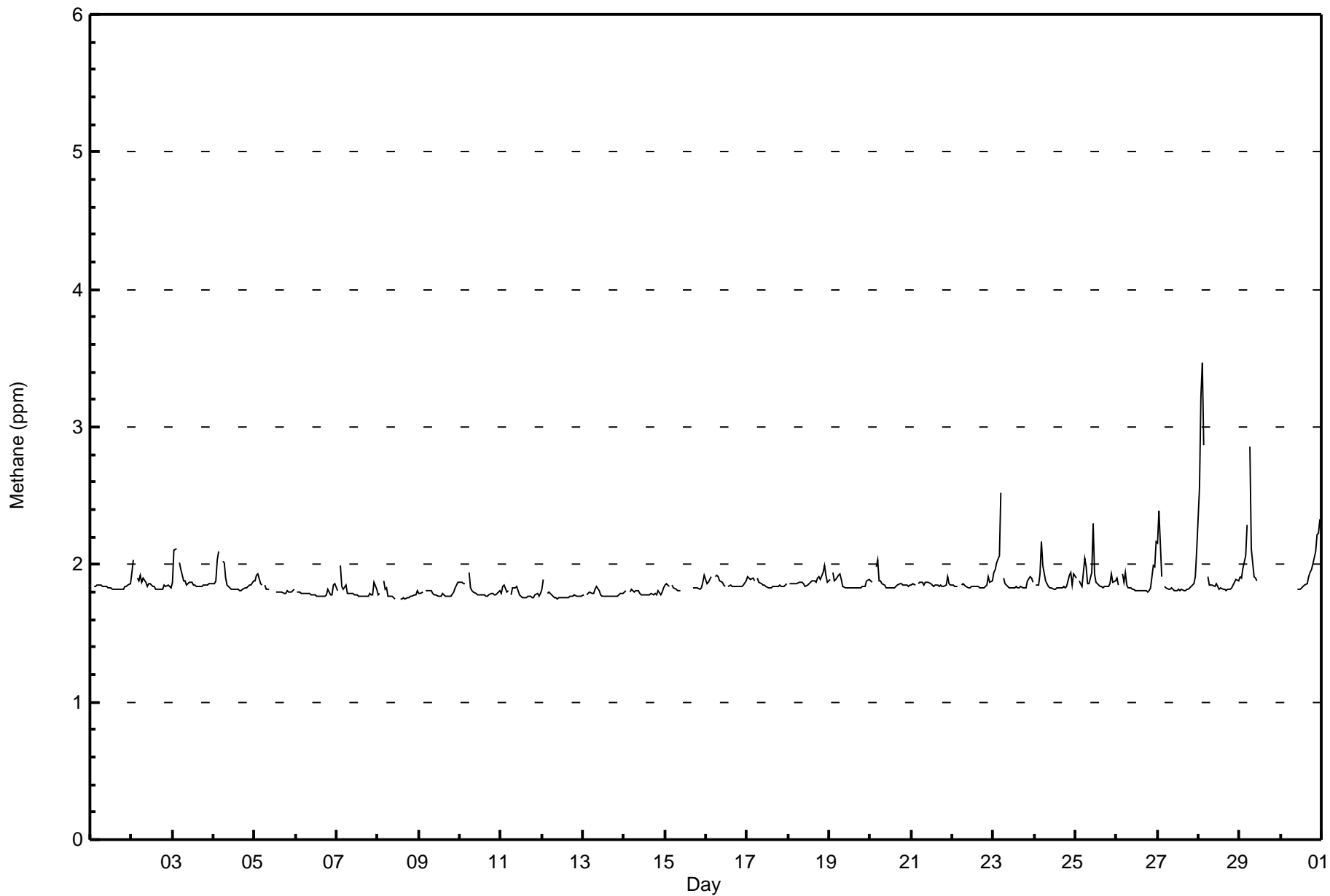




Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 3.5 ppm on Jun 28 03:00	Maximum Daily Average: 2.1 ppm on Jun 28		Hours of Data:	656
Minimum Value: 1.7 ppm on Jun 8 14:00	Minimum Daily Average: 1.8 ppm on Jun 12		Hours of Missing Data:	64
Maximum Diurnal Average: 2.0 ppm at hour 3	Minimum Diurnal Average: 1.8 ppm at hour 16		Hours of Calibration:	35
Monthly Average: 1.86 ppm	Percentiles: P ₁ = 1.8 P ₁₀ = 1.8 Q ₁ = 1.8 Median = 1.8 Q ₃ = 1.9 P ₉₀ = 1.9 P ₉₉ = 2.4		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-Jun	1.8	Z	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.8	1.9																								
2-Jun	1.9	2.0	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.8	1.9	1.8	1.8	1.9	2.0																							
3-Jun	1.9	2.1	2.1	Z	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1																							
4-Jun	1.9	1.9	2.0	2.1	Z	2.0	2.0	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	2.1																								
5-Jun	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.8	1.8	M	M	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	1.9	1.9																							
6-Jun	Z	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9																								
7-Jun	1.8	Z	2.0	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.8	2.0																								
8-Jun	1.8	1.8	Z	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	M	M	1.7	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9																							
9-Jun	1.8	1.8	1.8	Z	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9																								
10-Jun	1.9	1.9	1.9	1.9	Z	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9																							
11-Jun	1.8	1.8	1.9	1.8	1.8	Z	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9																							
12-Jun	1.8	1.9	Z	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9																							
13-Jun	1.8	Z	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8																							
14-Jun	1.8	1.8	Z	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8																							
15-Jun	1.9	1.9	1.8	Z	1.8	1.8	1.8	1.8	1.8	1.8	C	C	C	C	C	C	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9																							
16-Jun	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.8	M	1.8	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9																							
17-Jun	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	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9																							
18-Jun	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	2.0																							
19-Jun	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	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9																							
20-Jun	1.9	1.9	Z	2.0	2.0	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.9	2.0																							
21-Jun	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.9	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.8	1.9	1.9																							
22-Jun	1.8	1.8	1.8	1.8	Z	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.8	1.9																							
23-Jun	1.9	2.0	2.0	2.1	2.5	Z	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	2.5																							
24-Jun	Z	1.9	1.9	1.9	2.2	2.0	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	2.2																							
25-Jun	1.9	Z	1.9	1.9	1.8	2.0	2.0	1.9	1.9	1.9	2.3	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	2.3																							
26-Jun	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.0	2.0	2.2	1.9	2.2																							
27-Jun	2.2	2.4	1.9	Z	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	2.1	1.9	2.4																							
28-Jun	2.6	3.2	3.5	2.9	Z	1.9	1.9	1.9	1.8	1.8	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	2.1	3.5																							
29-Jun	1.9	1.9	2.0	2.1	2.3	Z	2.9	2.1	1.9	1.9	1.9	PF	PF	PF	PF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	2.9																							
30-Jun	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.1	2.2	2.2	2.3	2.3																							
																								1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	Diurnal Average	
																								2.6	3.2	3.5	2.9	2.5	2.0	2.9	2.1	1.9	1.9	2.3	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.1	2.2	2.2	2.3	Diurnal Maximum

Z - zerospan	C - Calibration	M - Maintenance	AF - Analyzer Failure	PF - Power Failure
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Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Anzac - June 2015

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	633	96.49	96.49
2.1 - 3.0	21	3.20	99.70
3.1 - 10.0	2	0.30	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 656

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Methane (CH₄) - ppm
Anzac - June 2015

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	58	18	15	11	5	5	17	66	38	31	31	33	64	107	74	60	633
2.1 - 3.0	1	0	0	0	0	1	1	3	0	1	3	6	3	2	0	0	21
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	2
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	59	18	15	11	5	6	18	69	38	32	35	40	67	109	74	60	656

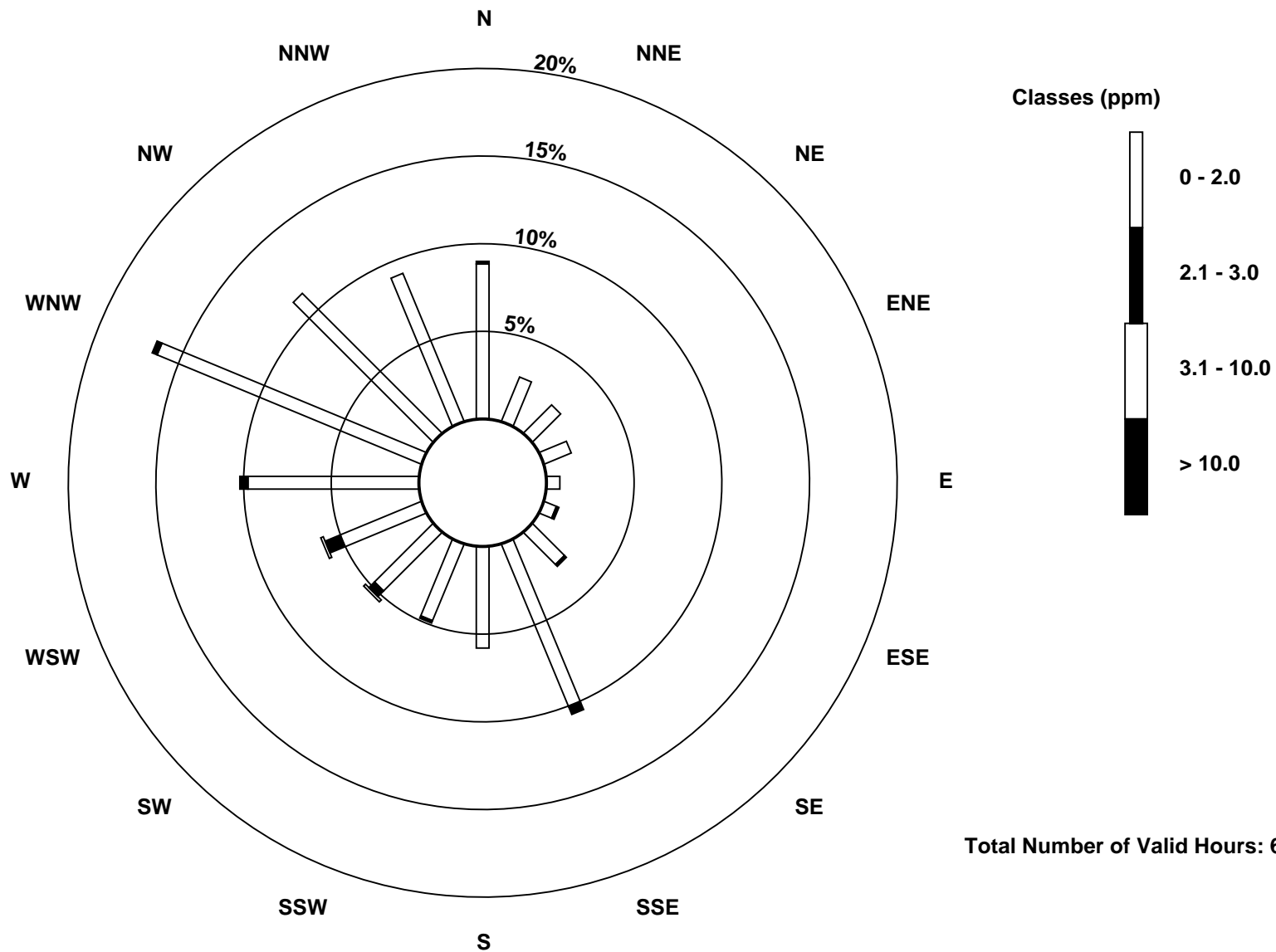
Total Number of Valid Hours: 656

Total Number of Hours: 720

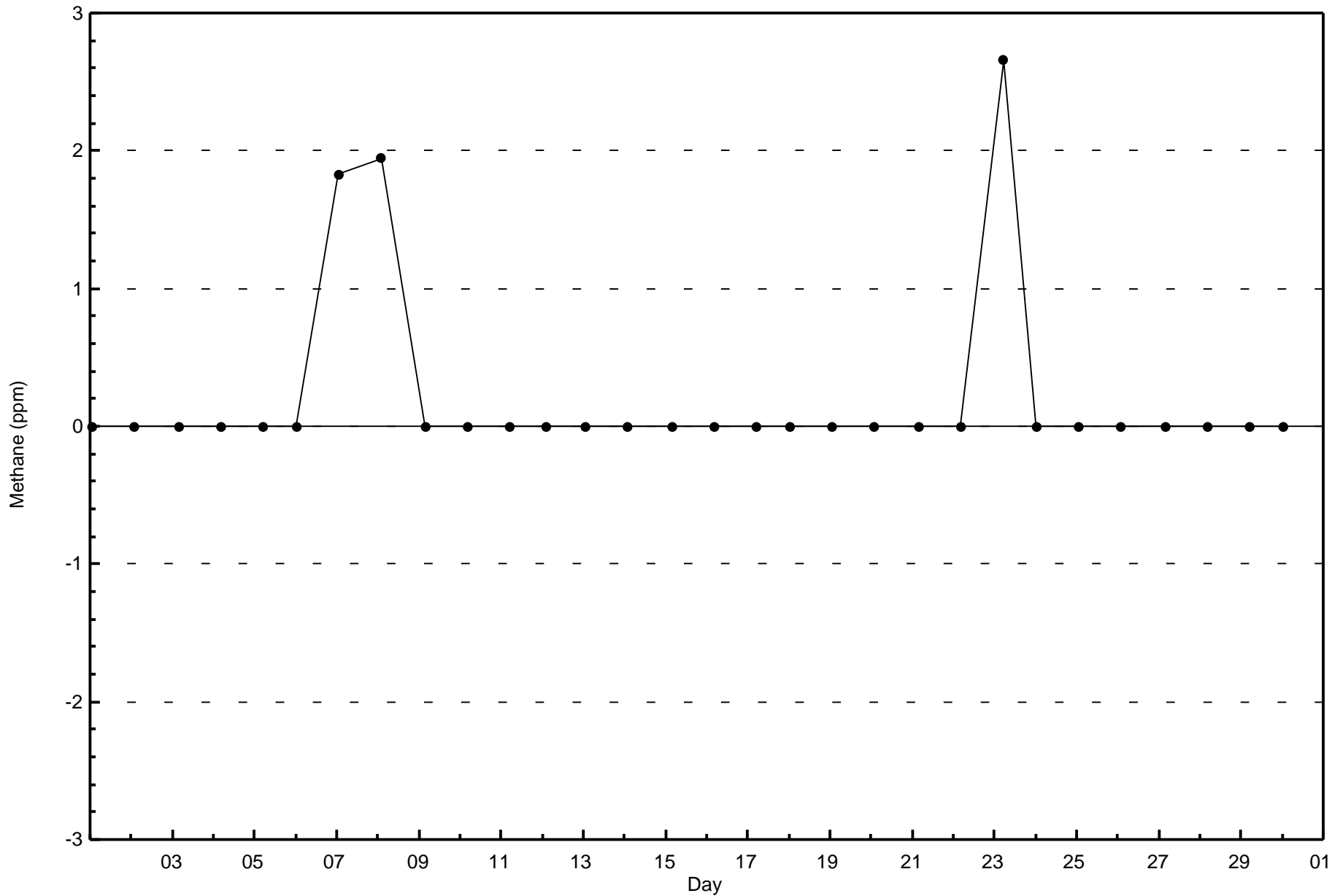


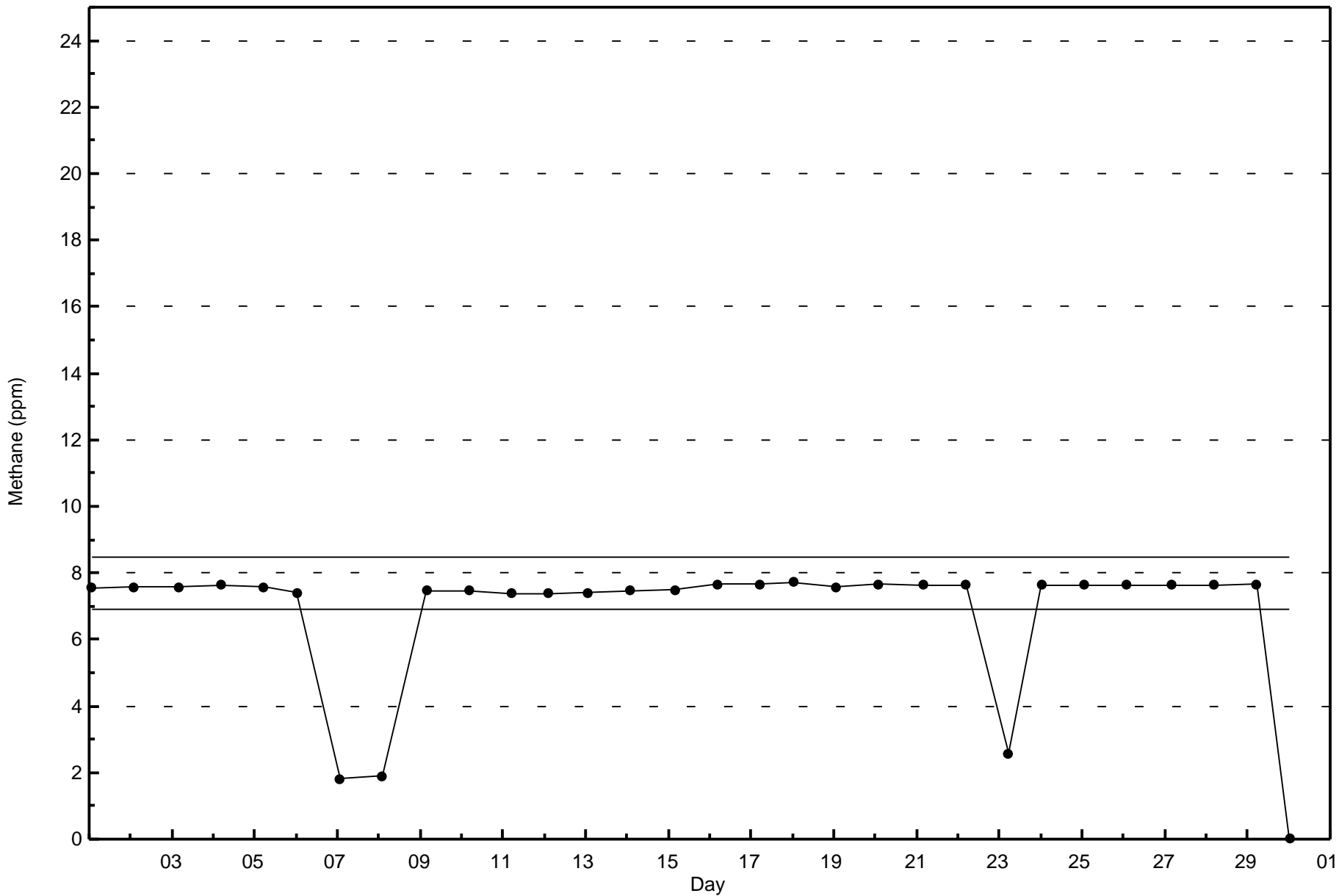
Wood Buffalo Environmental Association
Wind Rose Jun 2015

Methane (CH₄) - ppm
Anzac (AMS 14)



Total Number of Valid Hours: 656







Maximum Value: 17 ppb on Jun 18 10:00																	Maximum Daily Average: 1.1 ppb on Jun 18							Hours in Service: 720		
Minimum Value: 0 ppb on Jun 1 01:00																	Minimum Daily Average: 0.0 ppb on Jun 26							Hours of Data: 677		
Maximum Diurnal Average: 0.8 ppb at hour 10																	Minimum Diurnal Average: 0.0 ppb at hour 19							Hours of Missing Data: 43		
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 = 3							Hours of Calibration: 36		
																	Percent Operational Time: 99.0									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
2-Jun	0	0	Z	0	0	0	1	1	2	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0.3	2
3-Jun	0	0	0	Z	0	0	0	1	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0.2	2
4-Jun	0	0	0	0	Z	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2
5-Jun	0	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
6-Jun	Z	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-Jun	0	Z	1	0	0	0	0	0	0	0	5	0	0	0	2	1	1	0	0	0	0	0	0	0	0.5	5
8-Jun	0	0	Z	0	0	0	0	0	3	0	0	M	M	0	0	1	0	0	0	0	0	0	0	0	0.3	3
9-Jun	0	0	0	Z	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2
10-Jun	0	0	0	0	Z	8	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	8
11-Jun	0	0	0	2	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	2
12-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	1	0	0	0.2	3
13-Jun	0	Z	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
14-Jun	0	0	Z	0	0	0	0	1	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	4
15-Jun	0	0	0	Z	0	0	0	0	0	1	C	C	C	C	C	C	0	0	0	0	3	0	0	0	--	3
16-Jun	0	0	0	0	Z	1	0	0	0	0	0	0	M	0	1	1	0	0	0	0	1	0	0	0	0.2	1
17-Jun	0	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0.2	2
18-Jun	Z	0	0	0	0	0	1	0	1	17	5	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	17
19-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0.3	6
20-Jun	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
21-Jun	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-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0.4	7
23-Jun	1	1	0	1	2	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0.4	2
24-Jun	Z	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-Jun	0	Z	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2
26-Jun	0	0	Z	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-Jun	0	0	0	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-Jun	0	0	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.2	1
29-Jun	0	0	0	1	1	Z	1	0	0	0	0	PF	PF	PF	PF	0	0	0	0	0	0	0	0	0	0.2	1
30-Jun	Z	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
																	Diurnal Average		Diurnal Maximum							
																	0.1		1							
																	0.1		1							
																	0.2		2							
																	0.2		2							
																	0.2		2							
																	0.4		8							
																	0.3		1							
																	0.3		2							
																	0.4		3							
																	0.8		17							
																	0.4		5							
																	0.1		1							
																	0.1		2							
																	0.2		2							
																	0.3		3							
																	0.1		1							
																	0.1		1							
																	0.0		0							
																	0.0		0							
																	0.1		3							
																	0.1		2							
																	0.3		6							
																	0.1		2							
																	0.3		7							
																	Z - zerspan		C - Calibration							
																	M - Maintenance		PF - Power Failure							

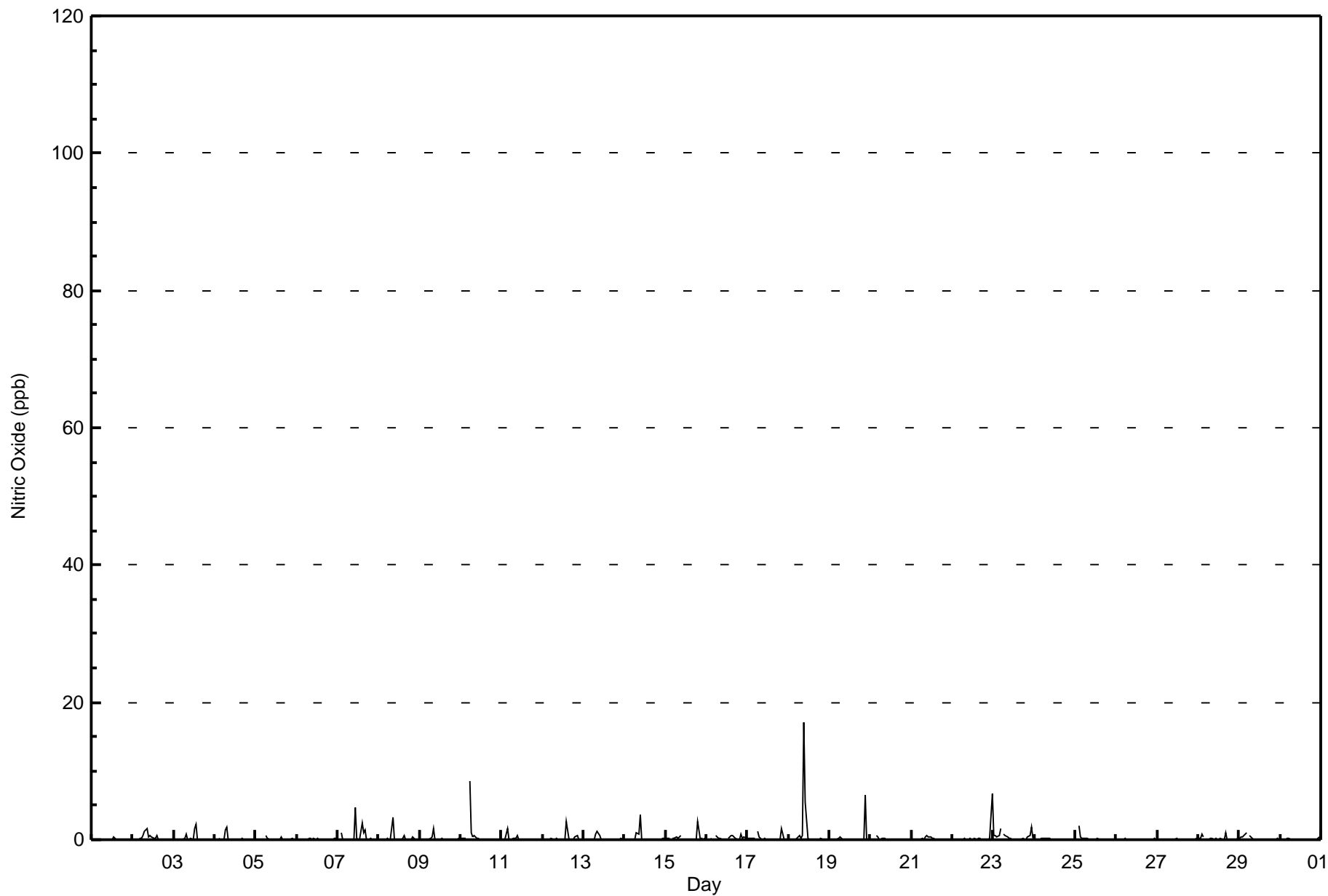


Wood Buffalo Environmental Association

Hourly Averages

Nitric Oxide (NO) - ppb

Anzac - June 2015





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Anzac - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	677	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 677

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Nitric Oxide (NO) - ppb
Anzac - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	59	18	15	11	5	6	20	71	40	34	35	43	71	114	74	61	677
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	59	18	15	11	5	6	20	71	40	34	35	43	71	114	74	61	677

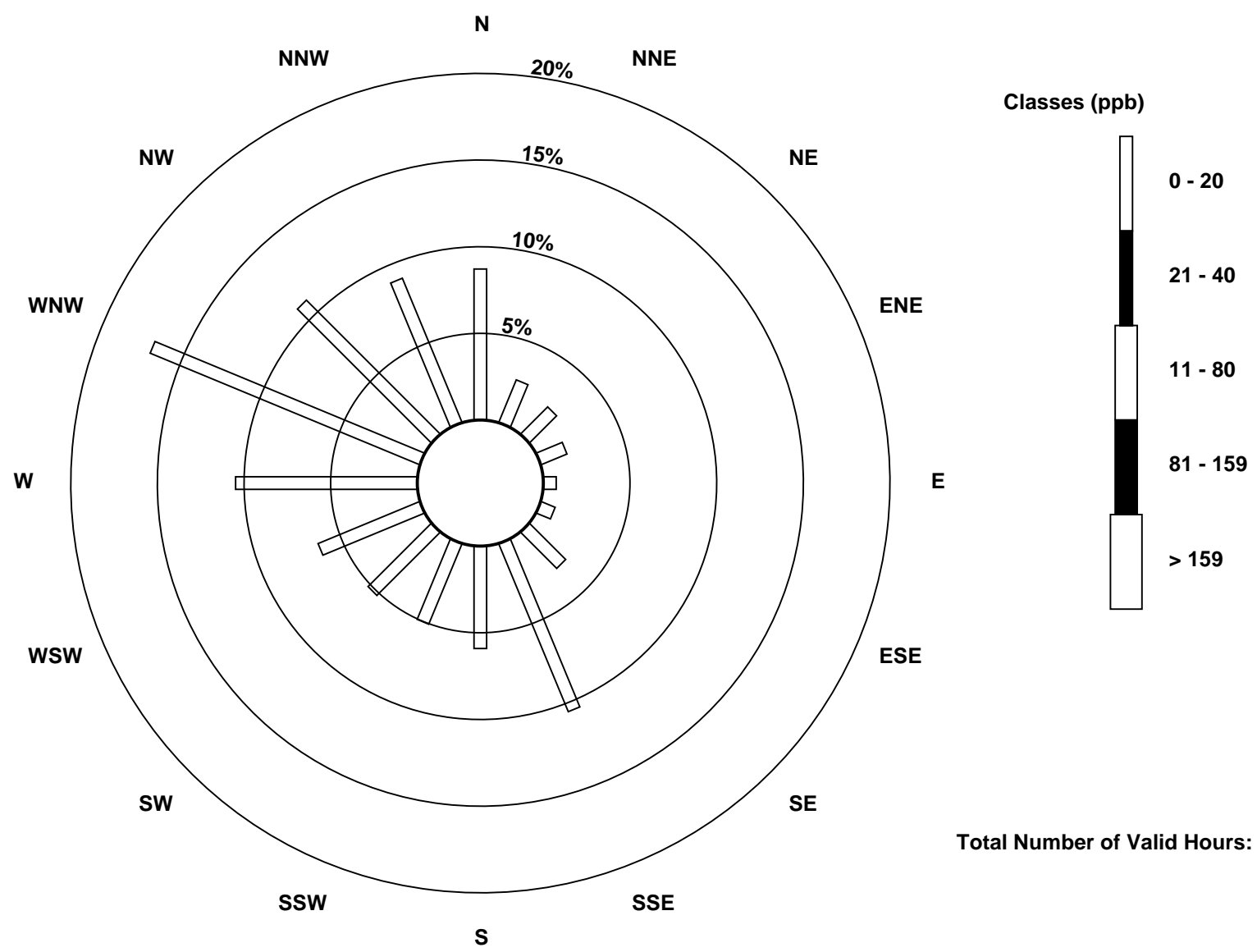
Total Number of Valid Hours: 677

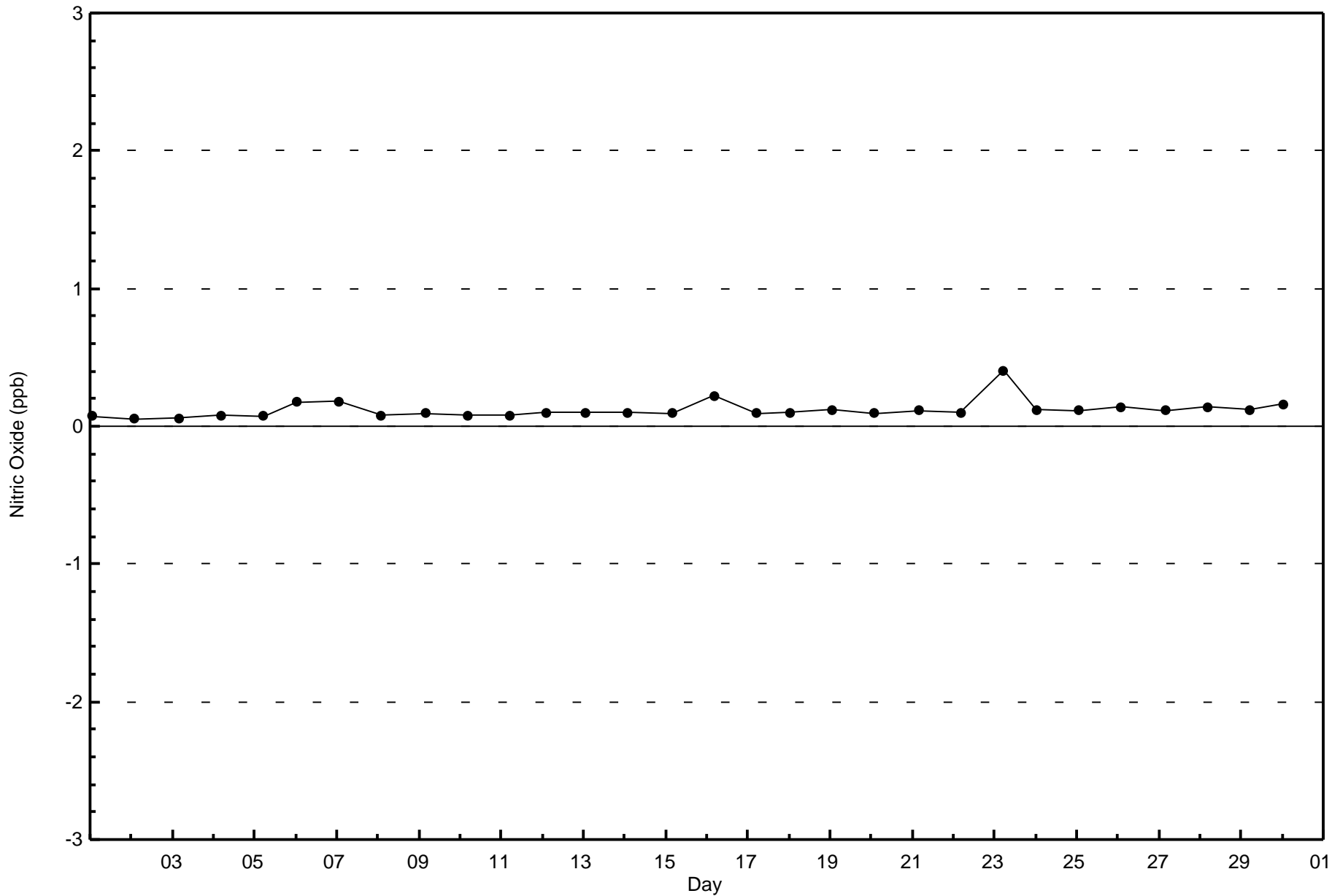
Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

Nitric Oxide (NO) - ppb
Anzac (AMS 14)

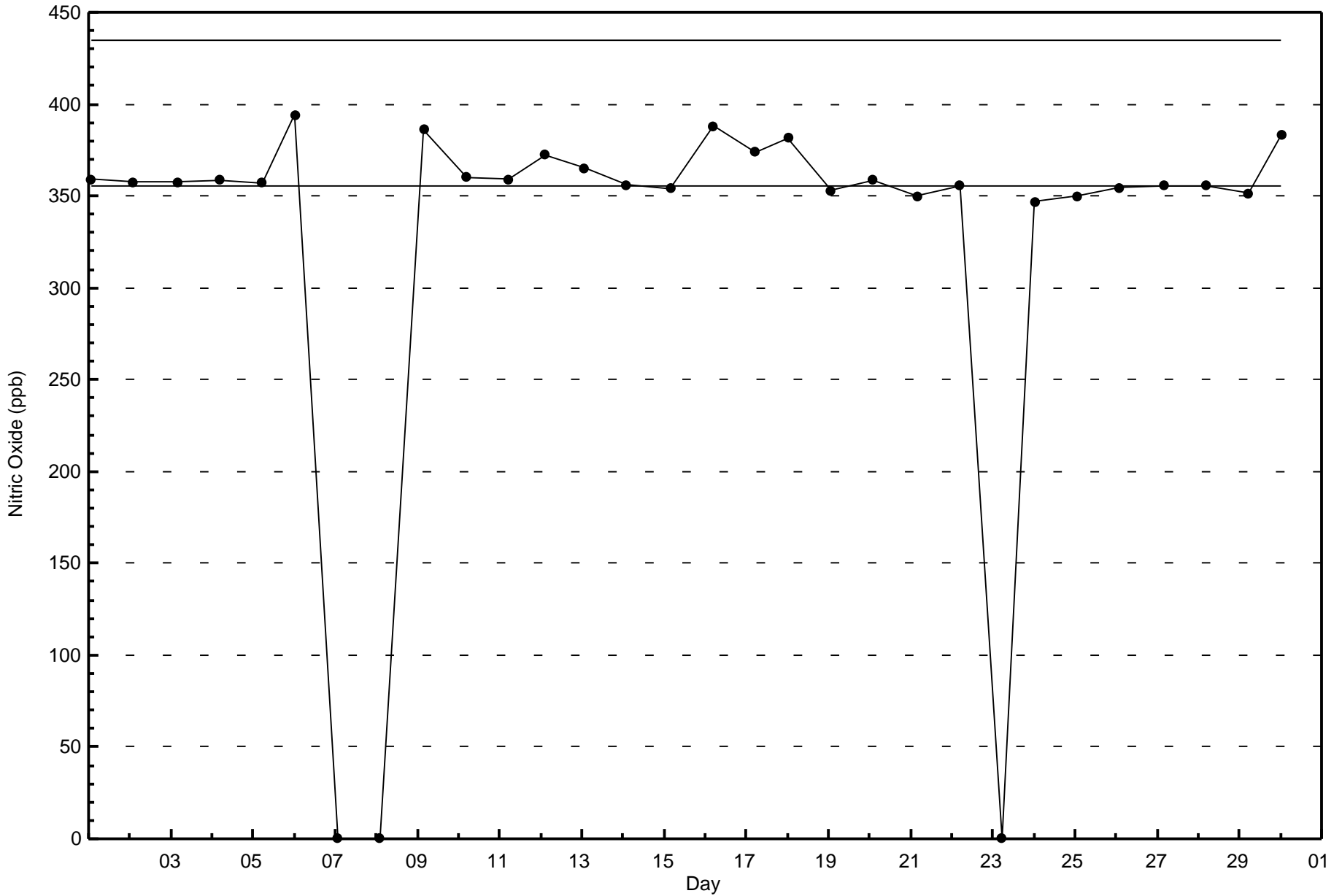






Wood Buffalo Environmental Association
Span Responses

Nitric Oxide (NO) - ppb
Anzac - June 2015





Summary of Hour Averages

Anzac - June 2015

Number of Exceedences (AAAO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 14 ppb on Jun 30 22:00	Maximum Daily Average: 3.2 ppb on Jun 30		Hours of Data:	677
Minimum Value: 0 ppb on Jun 13 06:00	Minimum Daily Average: 0.6 ppb on Jun 1		Hours of Missing Data:	43
Maximum Diurnal Average: 2.1 ppb at hour 22	Minimum Diurnal Average: 0.7 ppb at hour 13		Hours of Calibration:	36
Monthly Average: 1.2 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 1 Q ₃ = 1 P ₉₀ = 2 P ₉₉ = 7		Percent Operational Time:	99.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	1	Z	1	1	0	1	0	0	0	0	0	0	0	1	0	0	0	1	1	1	2	2	1	1	0.6	2
2-Jun	1	1	Z	1	0	1	2	3	3	1	2	2	1	1	1	1	1	1	1	1	1	2	1	1	1.1	3
3-Jun	1	1	2	Z	1	2	2	1	1	1	1	1	2	3	1	1	1	1	1	1	1	1	1	1	1.3	3
4-Jun	1	1	2	2	Z	1	5	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.2	5
5-Jun	1	1	1	1	1	Z	3	1	1	1	1	1	1	1	1	2	1	1	1	1	1	7	1	1	1.3	7
6-Jun	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	2	1	2	3	4	1.1	4
7-Jun	1	Z	3	1	1	1	1	1	1	1	3	1	1	1	3	2	3	1	1	2	1	1	1	1	1.3	3
8-Jun	1	1	Z	1	1	1	1	1	2	0	0	M	M	1	1	1	1	1	1	1	1	1	1	2	0.9	2
9-Jun	1	1	1	Z	1	1	2	3	2	1	0	1	1	1	1	1	1	1	1	1	4	3	3	2	1.3	4
10-Jun	2	1	2	1	Z	4	4	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.3	4
11-Jun	1	1	1	3	2	Z	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1.3	3
12-Jun	1	1	Z	1	2	2	1	1	1	1	1	1	1	1	2	1	0	1	1	1	2	0	0	0	0.9	2
13-Jun	0	Z	0	0	0	0	1	5	5	2	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0.8	5
14-Jun	0	0	Z	0	0	0	0	3	2	2	0	0	0	0	0	0	0	0	0	0	1	1	3	6	0.8	6
15-Jun	2	1	1	Z	2	2	2	1	2	2	C	C	C	C	C	C	1	0	0	2	0	1	1	0	--	2
16-Jun	0	0	1	2	Z	3	4	2	1	1	0	0	M	1	2	2	2	1	1	1	5	2	1	1	1.4	5
17-Jun	0	1	1	1	1	Z	3	1	0	0	1	0	0	0	0	0	0	0	0	1	4	1	1	1	0.8	4
18-Jun	Z	0	0	0	1	1	2	1	2	5	3	1	1	1	1	1	1	1	1	2	1	1	1	1	1.1	5
19-Jun	1	Z	1	1	3	4	3	1	0	0	0	0	0	0	0	0	0	0	1	2	2	9	2	1	1.4	9
20-Jun	1	0	Z	1	1	0	0	1	1	0	0	0	0	0	0	1	2	2	2	1	1	1	1	1	0.7	2
21-Jun	1	1	1	Z	1	1	1	1	2	3	3	3	2	2	2	2	2	2	2	1	1	1	1	1	1.3	3
22-Jun	1	0	1	1	Z	1	0	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	4	0.8	4
23-Jun	2	1	1	1	2	Z	2	2	1	1	1	1	1	0	0	0	1	1	0	1	2	1	8	2	1.4	8
24-Jun	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	0.8	2
25-Jun	1	Z	6	7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1.6	7
26-Jun	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	2	3	6	4	1.2	6
27-Jun	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2	2	0.9	2
28-Jun	2	2	3	2	Z	1	1	2	1	2	4	2	1	1	1	0	3	0	0	0	2	3	2	2	1.7	4
29-Jun	2	7	7	4	2	Z	3	3	3	4	3	PF	PF	PF	PF	2	1	1	2	1	2	1	2	2	2.7	7
30-Jun	Z	1	1	1	2	1	1	1	1	1	1	1	1	1	2	2	4	4	4	4	3	3	14	12	3.2	14

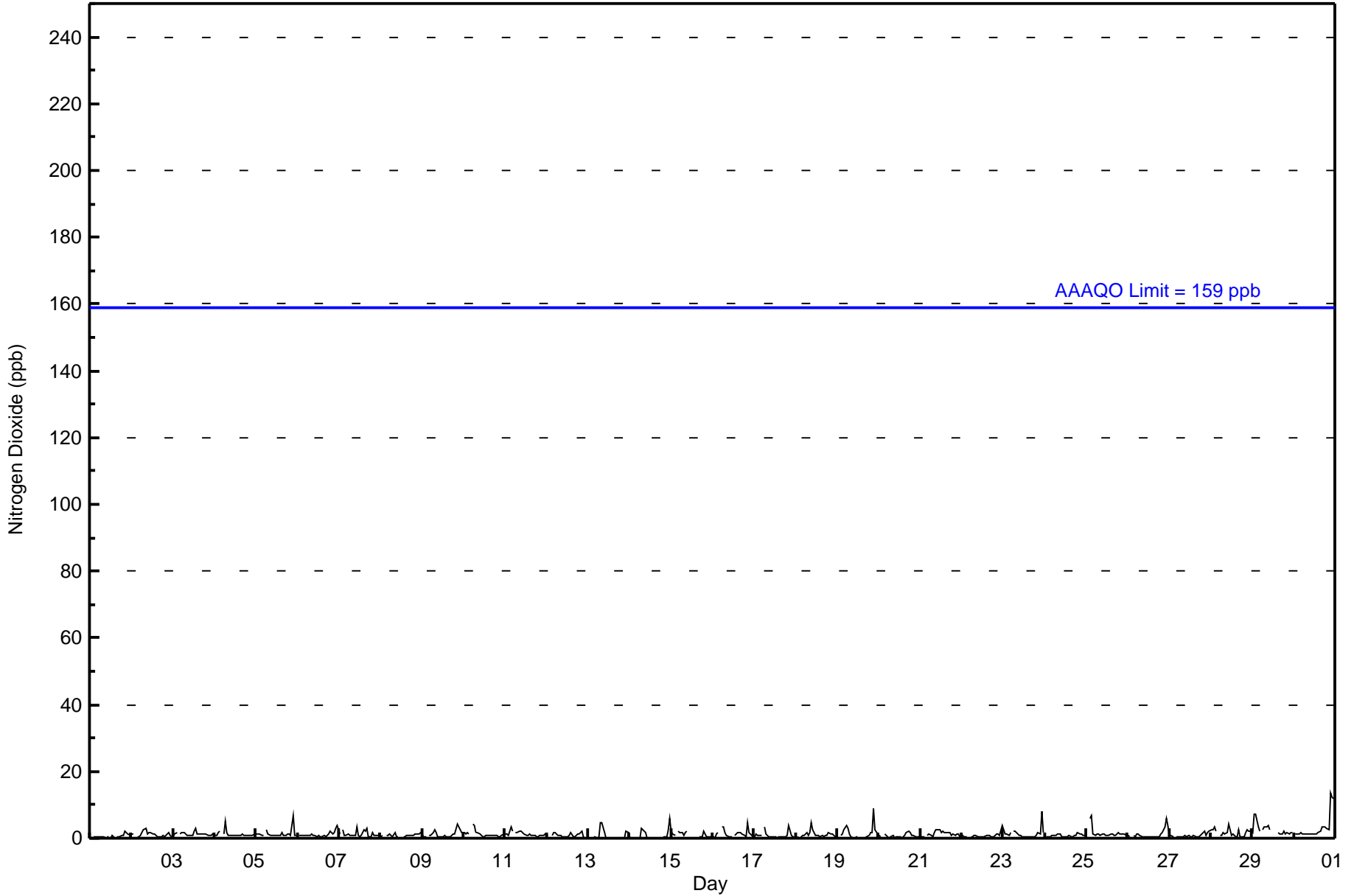
1.0	1.1	1.5	1.4	1.1	1.3	1.6	1.5	1.4	1.2	1.1	0.8	0.7	0.8	0.9	0.8	1.0	0.9	1.0	1.1	1.5	2.1	2.1	1.9	Diurnal Average		
2	7	7	7	3	4	5	5	5	5	4	3	2	3	3	2	4	4	4	4	3	5	14	12	12	Diurnal Maximum	

Z - zerspan C - Calibration M - Maintenance PF - Power Failure
 Alberta Ambient Air Quality Objectives (AAAO): 1-hr 159 ppb



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Anzac - June 2015





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Anzac - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	677	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 677

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Anzac - June 2015**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	59	18	15	11	5	6	20	71	40	34	35	43	71	114	74	61	677
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	59	18	15	11	5	6	20	71	40	34	35	43	71	114	74	61	677

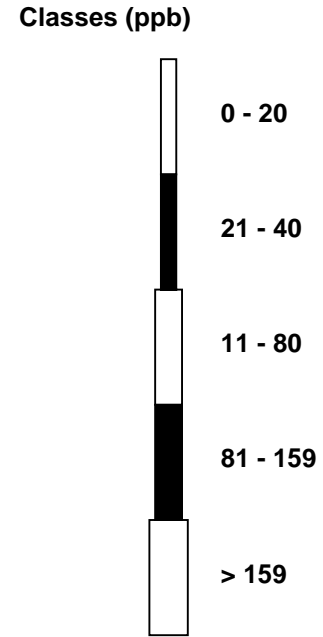
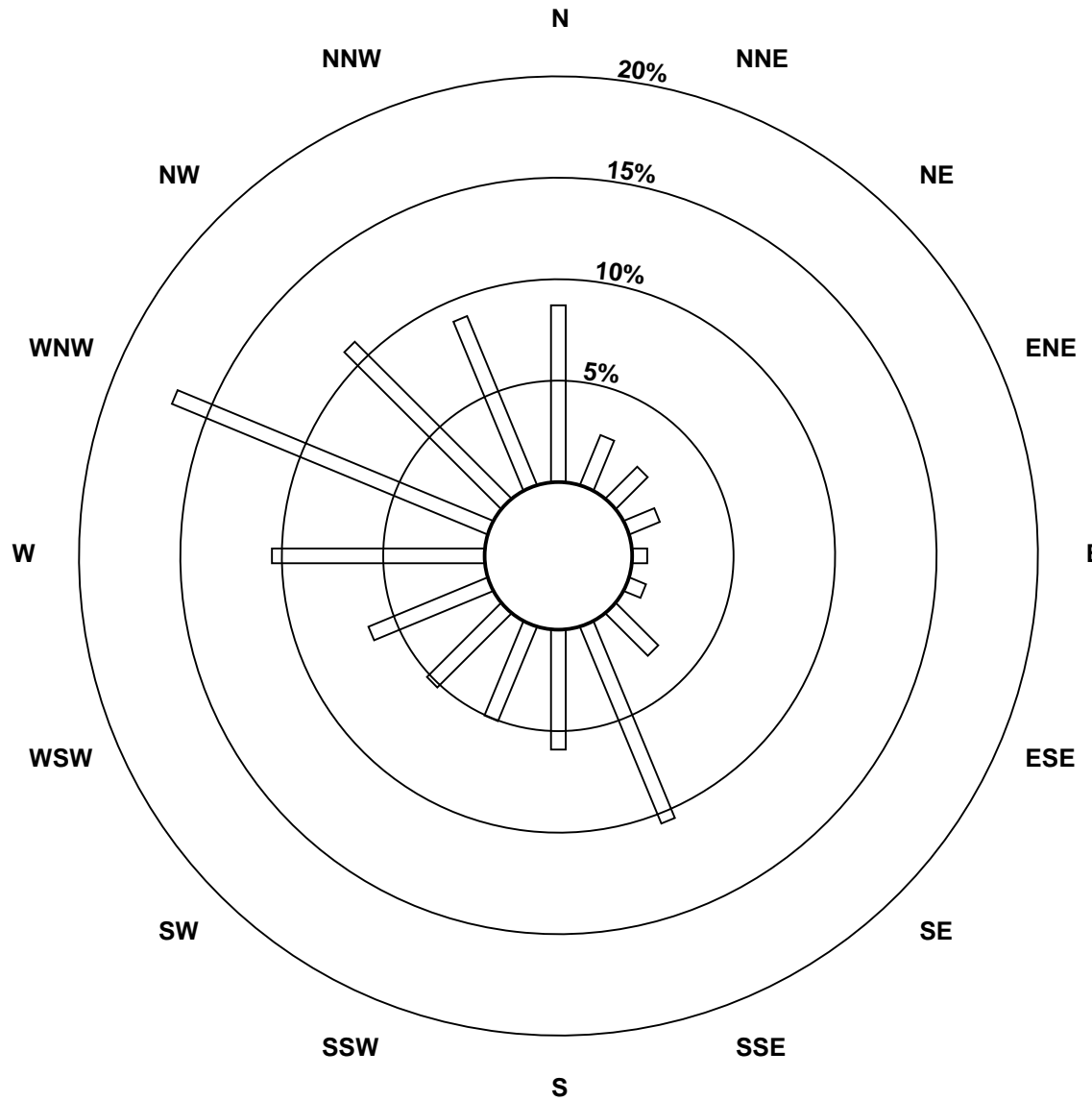
Total Number of Valid Hours: 677

Total Number of Hours: 720

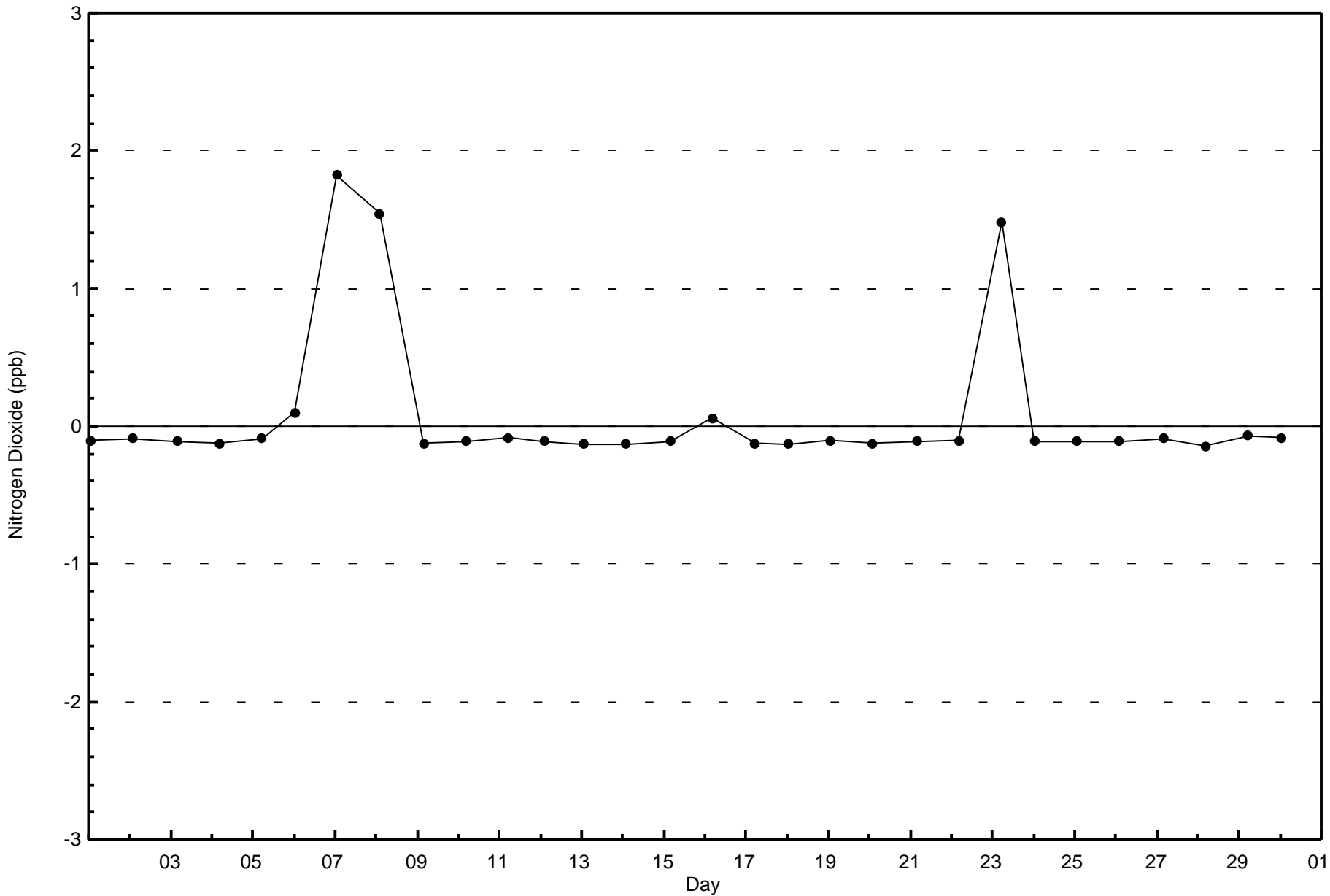


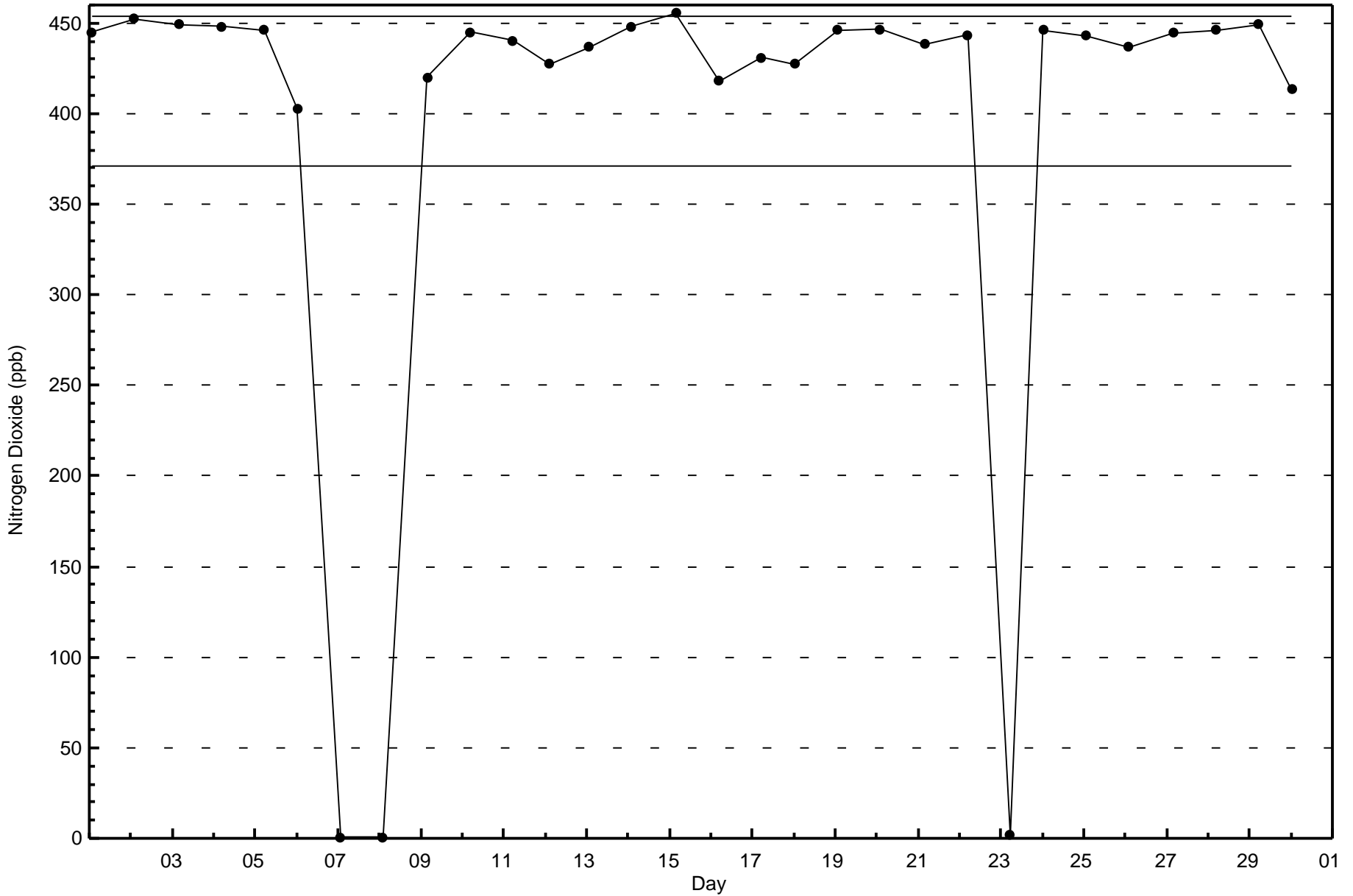
Wood Buffalo Environmental Association
Wind Rose Jun 2015

Nitrogen Dioxide (NO₂) - ppb
Anzac (AMS 14)



Total Number of Valid Hours: 677





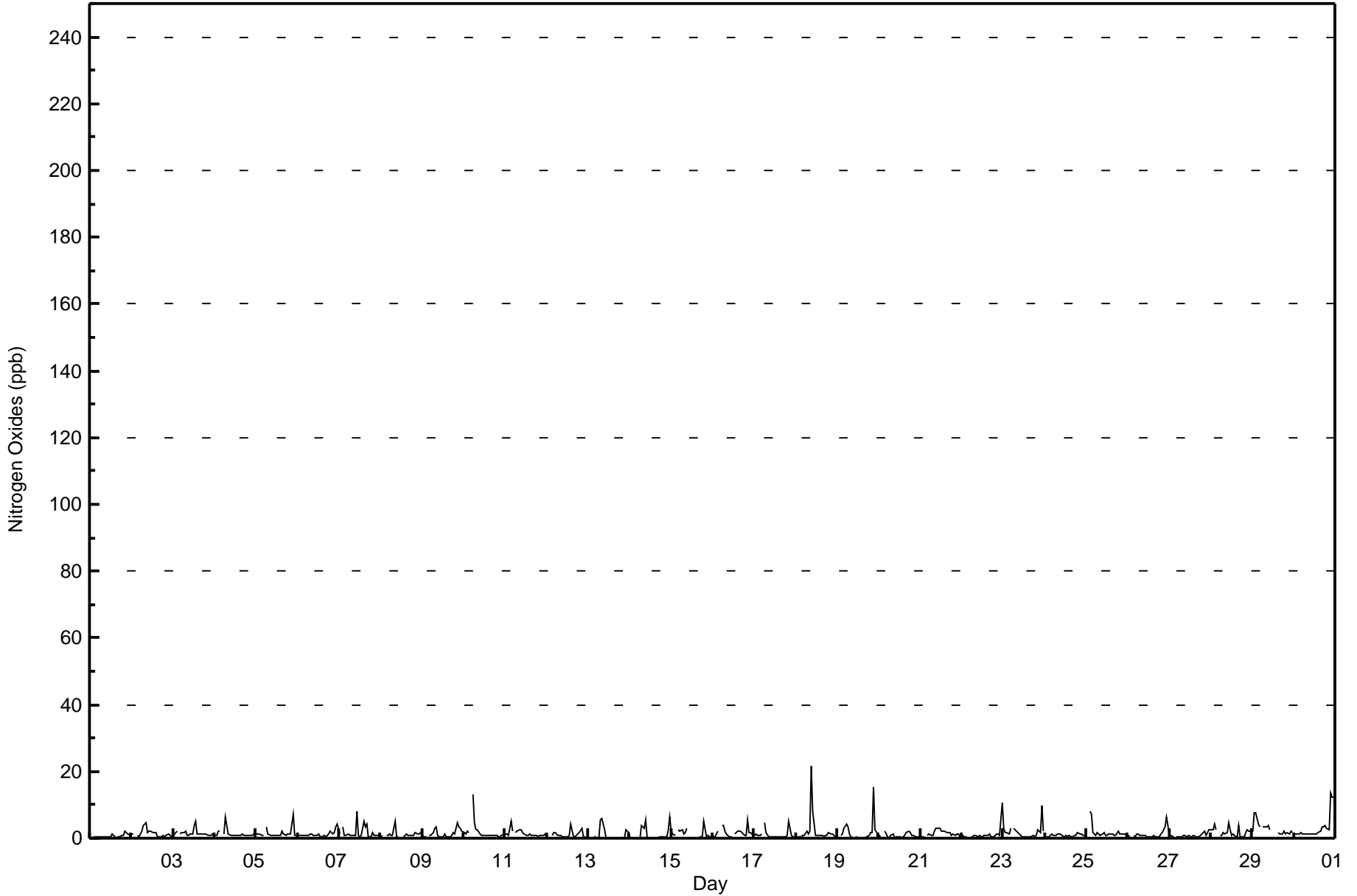


Maximum Value: 22 ppb on Jun 18 10:00		Maximum Daily Average: 3.3 ppb on Jun 30		Hours in Service: 720																																													
Minimum Value: 0 ppb on Jun 14 05:00		Minimum Daily Average: 0.6 ppb on Jun 1		Hours of Data: 677																																													
Maximum Diurnal Average: 2.3 ppb at hour 22		Minimum Diurnal Average: 0.8 ppb at hour 13		Hours of Missing Data: 43																																													
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 = 10		Hours of Calibration: 36																																													
				Percent Operational Time: 99.0																																													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jun	1	Z	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	1	2	2	1	1	0.6	2																							
2-Jun	1	1	Z	1	0	1	2	4	5	2	2	2	2	2	2	0	1	0	1	0	1	1	1	0	1.4	5																							
3-Jun	1	1	2	Z	1	2	2	2	1	1	1	1	4	5	1	1	1	1	1	1	1	1	1	1	1.5	5																							
4-Jun	1	1	2	2	Z	1	6	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1.4	6																							
5-Jun	1	1	1	1	1	Z	3	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	7	1	1.4	7																							
6-Jun	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	2	1	2	3	4	1.2	4																							
7-Jun	1	Z	3	1	1	1	1	1	1	1	8	1	1	1	5	3	4	1	1	2	1	1	1	1	1.8	8																							
8-Jun	1	1	Z	1	1	1	1	1	5	0	0	M	M	0	1	1	1	1	1	2	1	1	1	1	1.1	5																							
9-Jun	1	1	1	Z	1	1	2	3	3	1	1	1	0	1	1	0	1	1	1	1	4	4	3	2	1.5	4																							
10-Jun	2	1	2	2	Z	13	5	2	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.8	13																							
11-Jun	1	1	1	5	2	Z	2	2	2	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1.4	5																							
12-Jun	1	1	Z	1	2	2	1	1	1	1	1	1	1	1	4	1	0	1	1	1	3	0	0	0	1.1	4																							
13-Jun	0	Z	0	0	0	0	0	5	6	2	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0.9	6																							
14-Jun	0	0	Z	0	0	0	0	4	3	6	0	0	0	0	0	0	0	0	0	0	1	0	3	6	1.1	6																							
15-Jun	2	1	1	Z	2	2	2	1	2	3	C	C	C	C	C	C	1	1	1	5	0	1	0	1	--	5																							
16-Jun	0	0	1	2	Z	4	4	2	1	1	0	0	M	1	2	2	2	2	1	1	6	2	2	1	1.7	6																							
17-Jun	1	1	1	1	1	Z	5	2	0	0	1	0	0	0	0	0	0	0	0	1	5	1	1	1	1.0	5																							
18-Jun	Z	0	0	0	1	1	2	1	2	22	8	1	1	1	1	1	1	1	1	2	1	1	1	1	2.1	22																							
19-Jun	1	Z	1	1	3	4	3	1	0	0	0	0	0	0	0	0	0	0	1	2	2	15	2	1	1.7	15																							
20-Jun	1	0	Z	2	1	0	0	1	1	0	0	0	0	0	0	1	2	2	2	2	1	1	1	0	0.8	2																							
21-Jun	0	1	1	Z	1	1	1	1	2	3	3	3	2	2	2	2	2	2	2	1	1	1	1	1	1.5	3																							
22-Jun	1	0	0	1	Z	0	1	1	1	1	1	1	0	1	1	1	1	0	1	1	1	1	11	11	1.2	11																							
23-Jun	3	2	2	1	3	Z	3	3	2	1	1	0	1	0	0	1	1	1	1	1	2	2	10	2	1.8	10																							
24-Jun	Z	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	0.9	2																							
25-Jun	1	Z	8	7	2	1	2	1	1	1	2	1	1	1	1	1	1	1	1	2	1	1	1	1	1.7	8																							
26-Jun	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	2	3	6	4	1.2	6																							
27-Jun	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	2	1	2	2	0.9	2																							
28-Jun	3	3	4	3	Z	1	1	2	1	2	4	2	1	1	1	0	4	0	0	0	2	3	2	2	1.8	4																							
29-Jun	2	8	8	4	3	Z	3	3	4	4	3	PF	PF	PF	PF	2	1	1	2	1	2	1	2	2	3.0	8																							
30-Jun	Z	1	1	1	2	1	1	1	1	1	1	1	1	1	2	2	3	4	4	3	3	14	12	12	3.3	14																							
																								1.1	1.2	1.7	1.6	1.3	1.7	1.9	1.8	1.8	2.1	1.5	0.9	0.8	1.0	1.1	0.9	1.1	0.9	1.0	1.3	1.7	2.3	2.2	2.2	Diurnal Average	
																								3	8	8	7	3	13	6	5	6	22	8	3	4	5	5	3	4	4	4	5	6	15	12	12	Diurnal Maximum	
Z - zerspan		C - Calibration				M - Maintenance				PF - Power Failure																																							



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Anzac - June 2015





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Anzac - June 2015

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



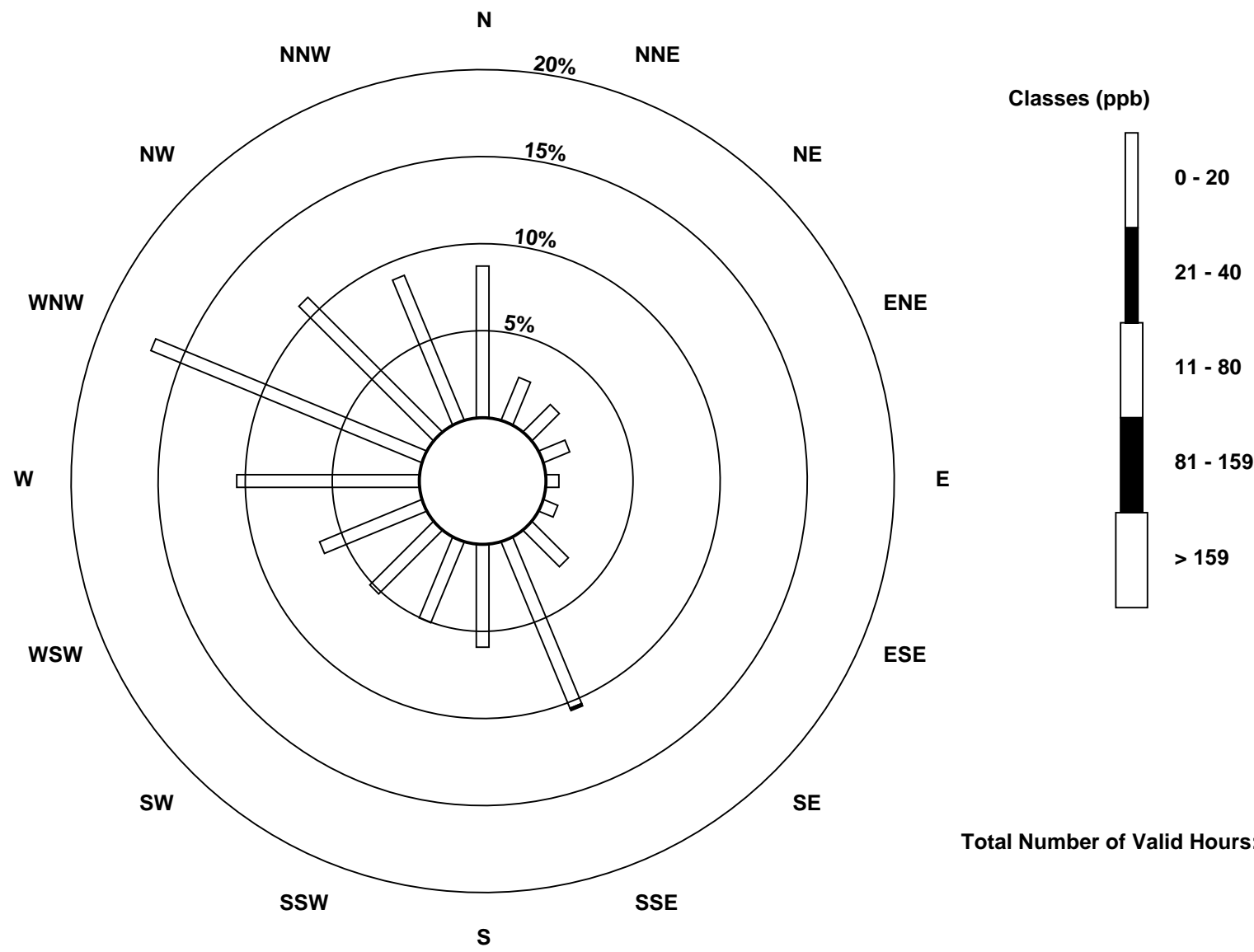
Wood Buffalo Environmental Association
Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Anzac - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	59	18	15	11	5	6	20	70	40	34	35	43	71	114	74	61	676
21 - 40	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	59	18	15	11	5	6	20	71	40	34	35	43	71	114	74	61	677

Total Number of Valid Hours: 677

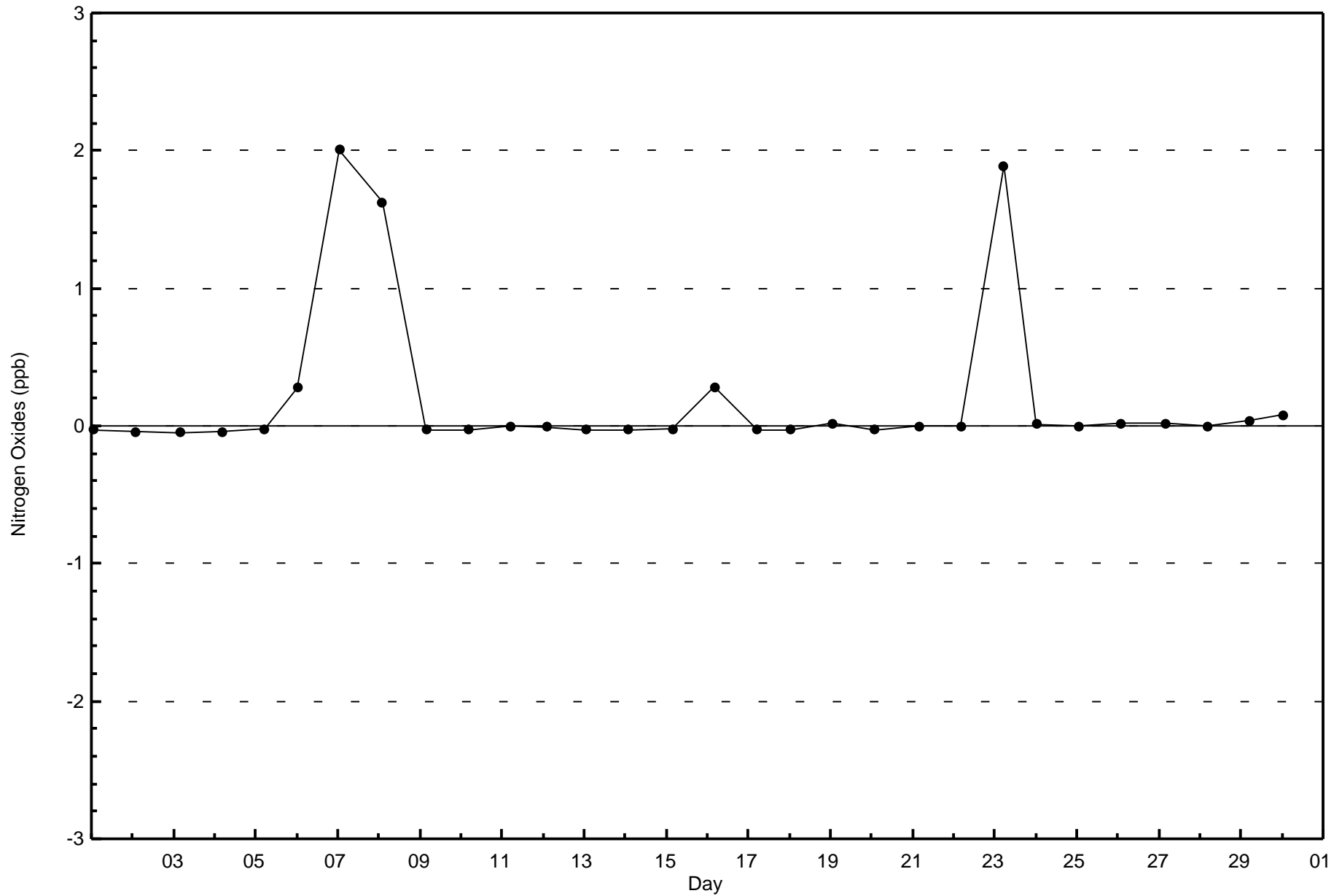
Total Number of Hours: 720

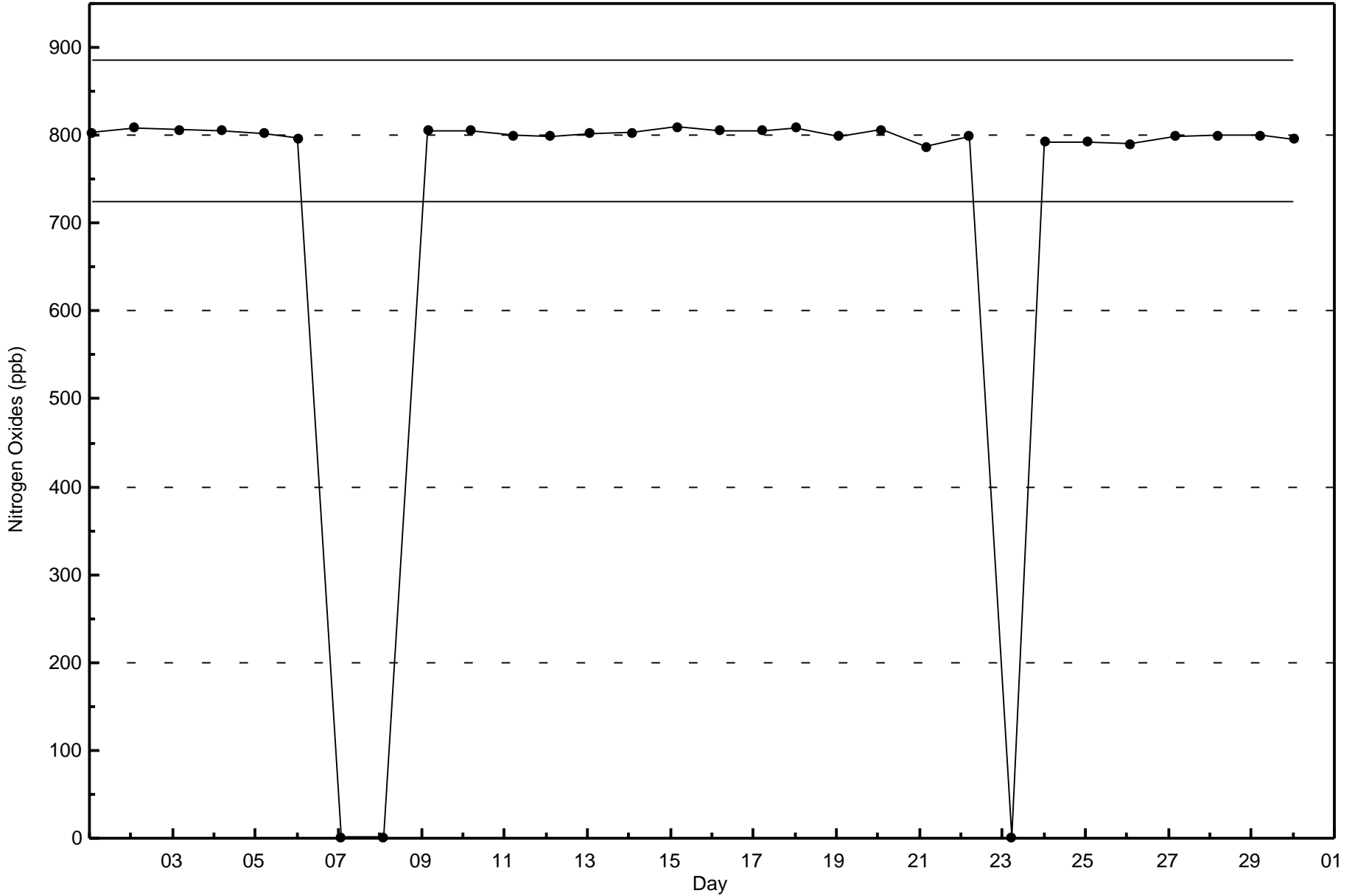




Wood Buffalo Environmental Association
Zero Responses

Nitrogen Oxides (NO_x) - ppb
Anzac - June 2015







Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

Anzac - June 2015

Number of Exceedences (AAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 61 ppb on Jun 28 11:00	Maximum Daily Average: 44.7 ppb on Jun 4		Hours of Data:	680
Minimum Value: 4 ppb on Jun 17 01:00	Minimum Daily Average: 15.2 ppb on Jun 16		Hours of Missing Data:	40
Maximum Diurnal Average: 41.9 ppb at hour 18	Minimum Diurnal Average: 19.6 ppb at hour 4		Hours of Calibration:	34
Monthly Average: 31.6 ppb	Percentiles: P ₁ = 5 P ₁₀ = 14 Q ₁ = 24 Median = 33 Q ₃ = 40 P ₉₀ = 45 P ₉₉ = 57		Percent Operational Time:	99.2

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	33	31	27	Z	16	14	13	14	15	14	16	20	27	30	33	36	38	36	35	36	30	22	20	11	24.6	38
2-Jun	13	12	12	11	Z	15	25	28	29	33	36	40	42	42	41	43	44	44	43	42	38	28	23	20	30.6	44
3-Jun	21	29	27	31	30	Z	34	33	33	33	36	38	43	48	51	50	51	51	50	48	46	41	41	37	39.2	51
4-Jun	27	27	28	24	27	31	Z	44	51	57	60	61	57	55	53	50	49	50	50	49	49	47	41	39	44.7	61
5-Jun	40	37	34	24	30	32	39	Z	52	52	55	57	56	56	56	54	53	52	50	45	37	29	32	37	44.0	57
6-Jun	42	36	Z	37	35	34	34	34	34	35	36	38	39	47	44	45	46	45	47	40	32	21	13	13	35.9	47
7-Jun	16	11	11	Z	31	33	35	38	41	43	44	45	44	44	44	45	44	44	42	39	34	30	32	30	35.7	45
8-Jun	23	23	21	17	Z	18	24	25	22	23	26	M	M	28	26	29	31	31	29	25	27	25	24	21	24.7	31
9-Jun	22	26	27	29	28	Z	30	30	32	38	37	39	39	40	41	43	43	43	44	41	32	23	16	11	32.8	44
10-Jun	9	7	8	5	6	7	Z	32	32	36	36	38	38	42	44	44	45	44	42	40	38	36	34	34	30.4	45
11-Jun	31	31	31	29	29	30	33	Z	34	40	49	55	52	53	52	52	50	56	58	50	48	46	48	43	43.5	58
12-Jun	25	30	36	30	Z	34	39	40	39	43	42	42	42	43	43	44	43	48	45	36	35	40	39	30	38.6	48
13-Jun	30	30	32	Z	26	24	22	19	20	23	32	37	40	41	39	40	39	39	37	36	30	27	23	26	31.0	41
14-Jun	28	28	28	26	Z	25	22	23	29	34	37	39	41	42	41	41	42	42	43	44	34	23	15	7	32.0	44
15-Jun	12	12	9	9	10	Z	14	18	17	17	17	22	25	27	30	31	29	25	24	18	9	7	10	10	17.5	31
16-Jun	6	8	16	8	9	14	Z	16	20	C	C	C	C	14	16	20	27	31	28	22	14	8	6	4	15.2	31
17-Jun	4	7	6	7	7	11	17	Z	26	28	30	30	31	33	34	35	36	36	37	37	25	24	25	25	23.9	37
18-Jun	25	23	Z	26	25	25	26	26	25	26	37	42	42	44	43	40	40	40	39	40	35	29	24	26	32.5	44
19-Jun	17	11	20	Z	19	16	16	19	27	29	30	31	34	33	35	35	36	38	40	38	33	27	31	18	27.5	40
20-Jun	17	16	14	9	Z	15	27	33	35	38	39	41	45	43	41	46	56	59	48	36	33	32	33	30	34.2	59
21-Jun	28	24	23	20	18	Z	13	19	21	30	35	38	42	43	48	47	46	43	35	31	30	24	26	27	30.9	48
22-Jun	26	25	24	26	26	24	Z	22	28	33	32	29	28	29	30	31	34	34	33	33	28	18	10	7	26.5	34
23-Jun	5	4	5	4	6	10	24	Z	32	35	35	35	32	30	31	29	33	37	36	29	16	18	17	15	22.4	37
24-Jun	15	18	Z	15	12	17	23	31	36	37	39	40	43	44	45	46	44	40	40	38	27	24	37	28	32.4	46
25-Jun	24	17	10	Z	10	10	21	29	32	38	47	44	43	45	45	39	40	39	45	42	36	26	27	15	31.4	47
26-Jun	12	21	24	27	Z	21	31	36	36	37	37	40	40	40	41	43	43	40	39	43	41	32	20	20	33.4	43
27-Jun	28	23	32	33	32	Z	32	32	32	33	37	38	36	38	40	40	42	44	44	43	32	27	27	18	34.0	44
28-Jun	18	18	14	16	27	33	Z	36	36	43	61	51	40	39	40	43	44	44	42	40	41	33	25	19	34.9	61
29-Jun	16	11	8	7	6	6	9	Z	34	43	49	PF	PF	PF	PF	51	48	47	44	42	40	31	21	35	28.8	51
30-Jun	42	39	32	Z	23	29	35	34	33	35	37	39	38	38	37	38	40	36	33	25	16	14	9	7	30.9	42

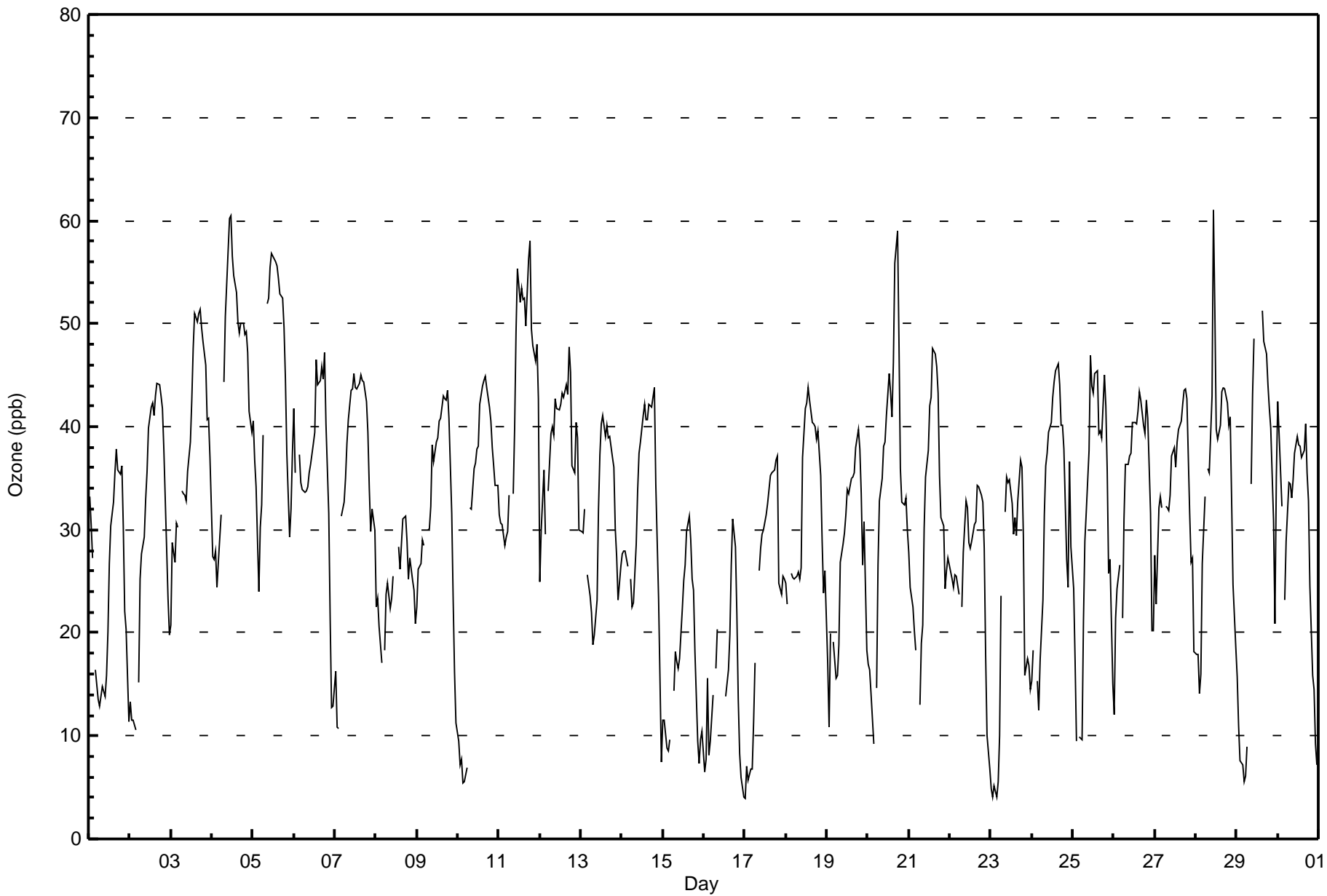
21.9	21.1	20.6	19.6	20.3	21.1	25.5	28.5	31.1	34.7	38.1	39.6	40.0	39.7	40.2	41.1	41.8	41.9	40.8	37.6	32.2	27.2	25.0	22.2	Diurnal Average	
42	39	36	37	35	34	39	44	52	57	61	61	57	56	56	54	56	59	58	50	49	47	48	43	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance PF - Power Failure
 Alberta Ambient Air Quality Objectives (AAQO): 1-hr 82 ppb



Wood Buffalo Environmental Association
Hourly Averages

Ozone (O₃) - ppb
Anzac - June 2015





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Anzac - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	132	19.41	19.41
21 - 50	516	75.88	95.29
51 - 82	32	4.71	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 (O₃) - ppb
Anzac - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	6	2	1	3	2	0	2	7	3	7	13	20	10	18	24	14	132
21 - 50	47	15	14	9	3	6	18	58	31	22	16	23	60	99	49	46	516
51 - 82	1	1	0	0	0	0	1	5	6	5	4	1	2	2	2	2	32
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	54	18	15	12	5	6	21	70	40	34	33	44	72	119	75	62	680

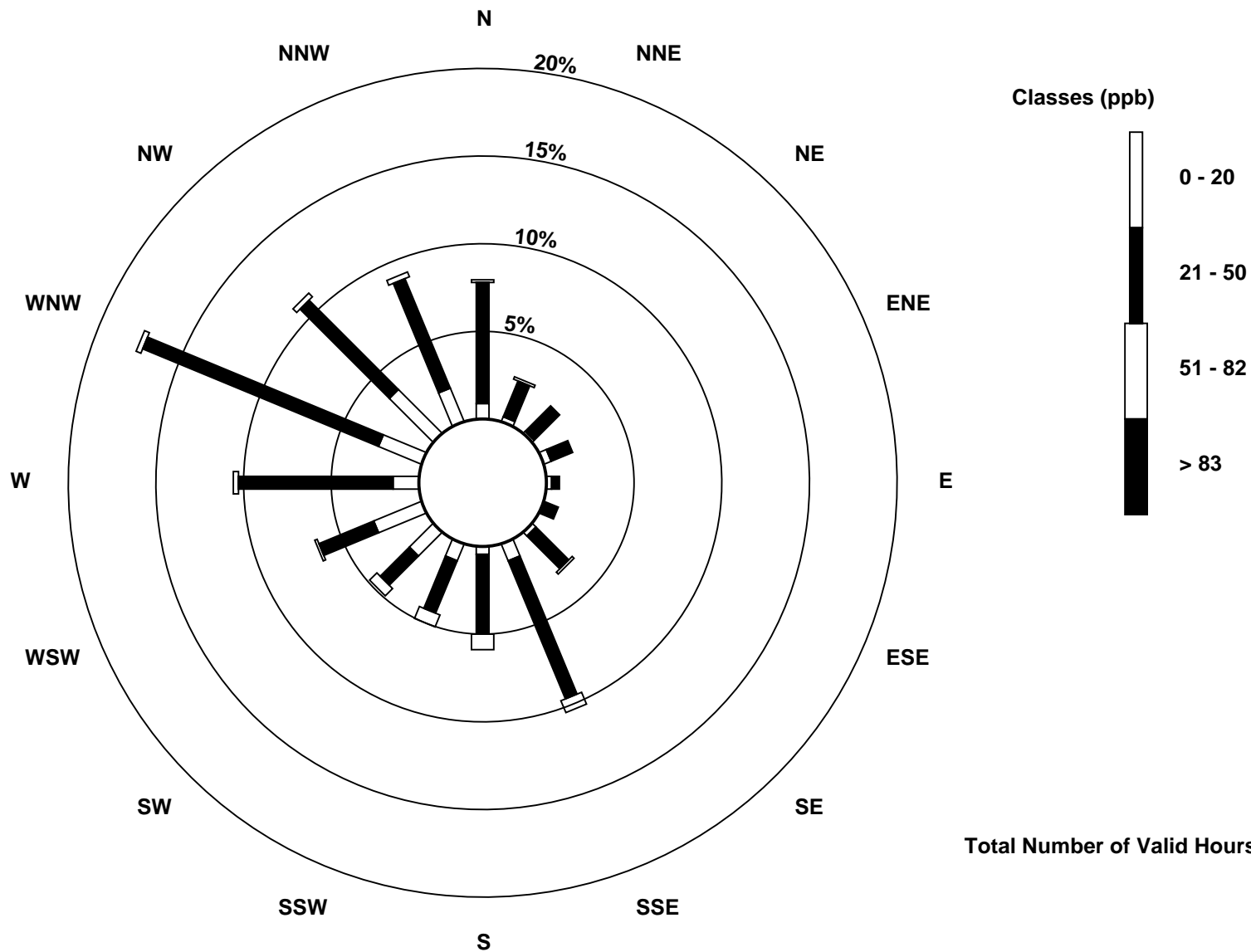
Total Number of Valid Hours: 680

Total Number of Hours: 720

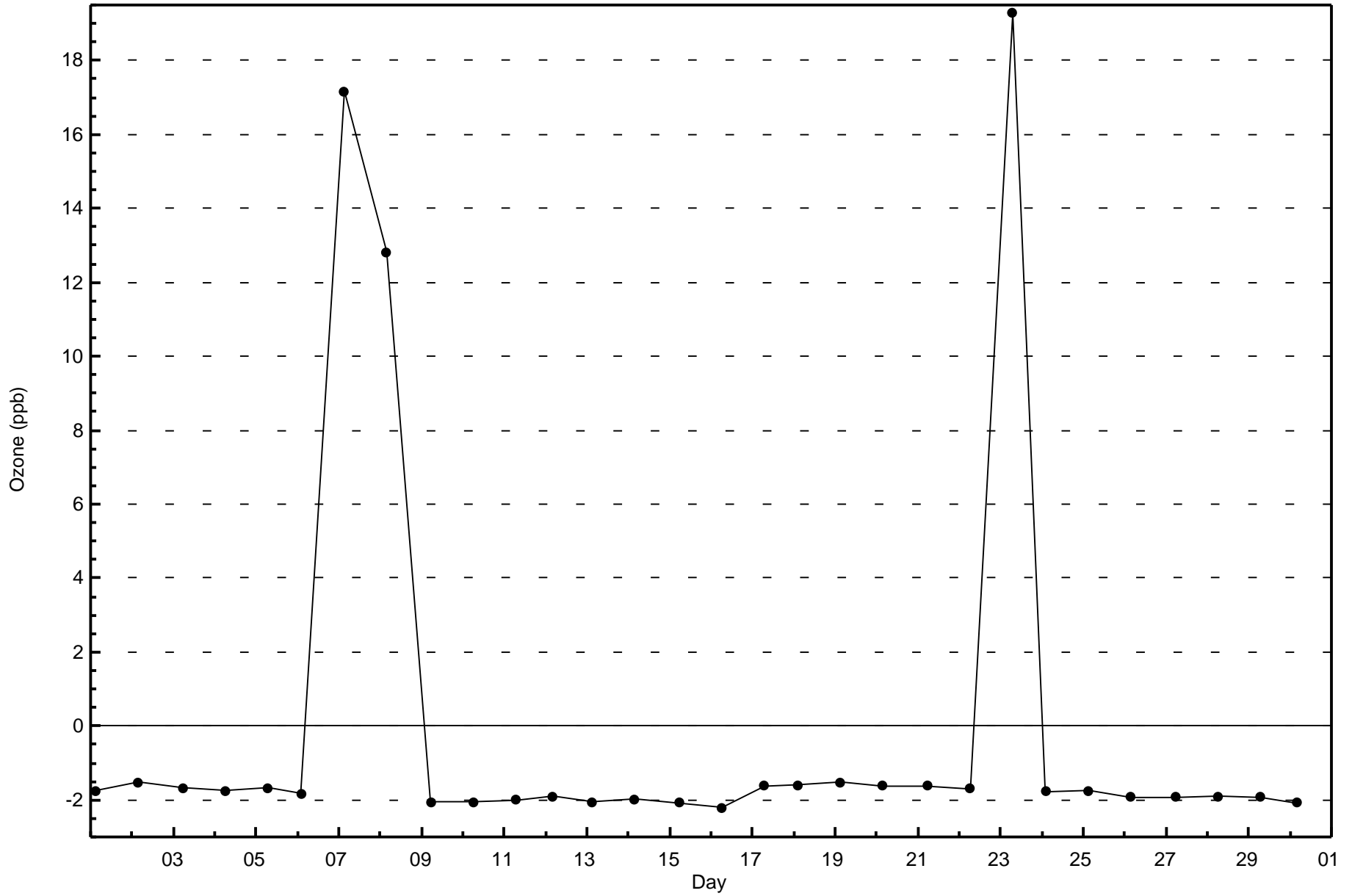


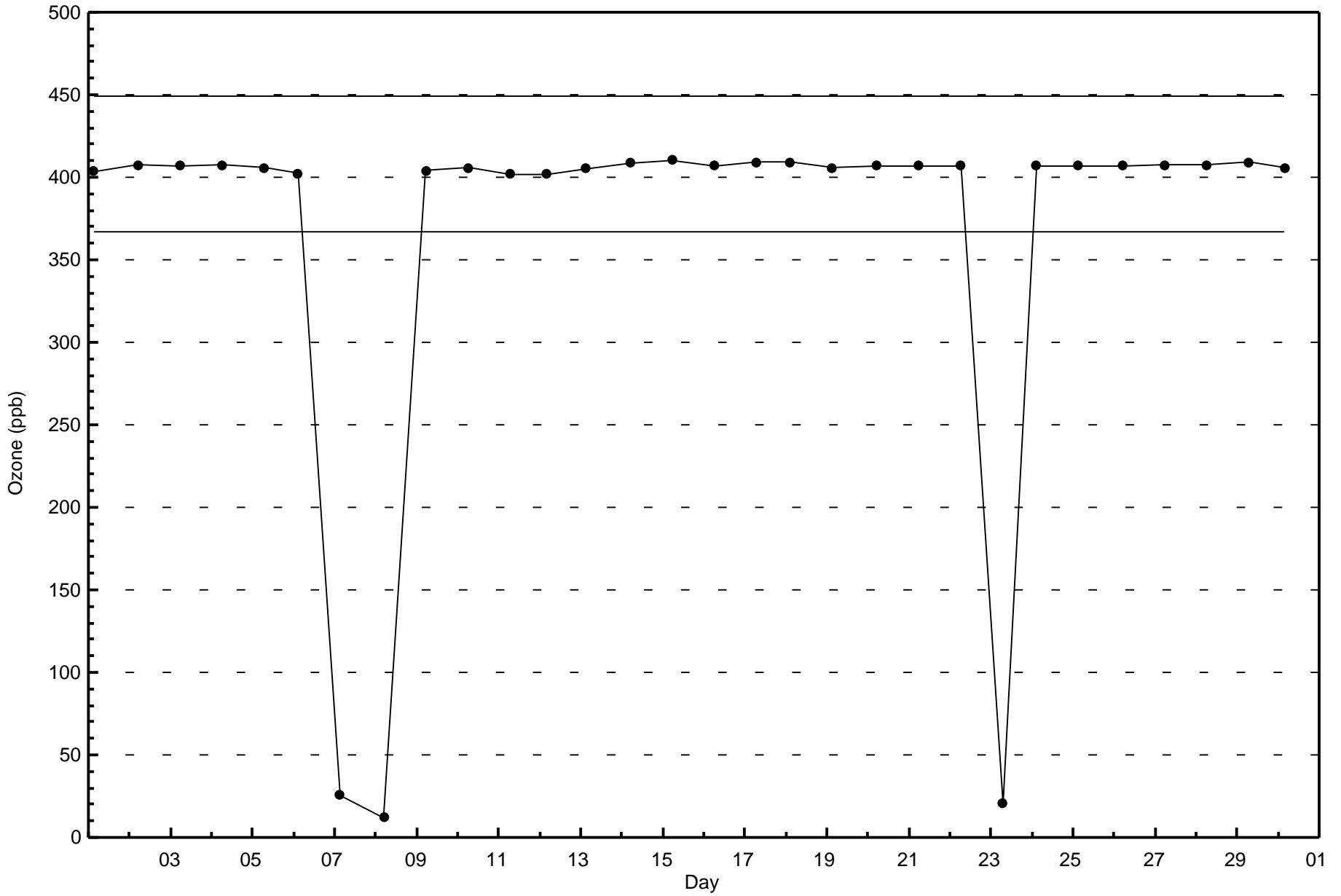
Wood Buffalo Environmental Association
Wind Rose Jun 2015

Ozone (O₃) - ppb
Anzac (AMS 14)



Total Number of Valid Hours: 680







Summary of Hour Averages

Anzac - June 2015

Number of Exceedences (AAAQO):	24-hr: 2	Hours in Service:	720
Maximum Value: 257.2 µg/m ³ on Jun 30 19:00	Maximum Daily Average: 80.8 µg/m ³ on Jun 30	Hours of Data:	689
Minimum Value: 0.6 µg/m ³ on Jun 2 15:00	Minimum Daily Average: 2.5 µg/m ³ on Jun 2	Hours of Missing Data:	31
Maximum Diurnal Average: 19.4 µg/m ³ at hour 23	Minimum Diurnal Average: 4.1 µg/m ³ at hour 13	Hours of Calibration:	2
Monthly Average: 11.88 µg/m ³	Percentiles: P ₁ = 0.8 P ₁₀ = 1.5 Q ₁ = 2.4 Median = 5.3 Q ₃ = 10.0 P ₉₀ = 17.8 P ₉₉ = 206.7	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-Jun	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--																							
2-Jun	AF	4.0	3.9	3.7	3.8	3.9	2.5	1.8	1.5	1.2	1.2	1.1	0.8	0.7	0.6	0.8	0.8	0.8	1.0	1.6	2.7	5.0	6.8	7.1	2.5	7.1																							
3-Jun	9.1	13.7	17.1	12.5	11.4	9.8	7.4	6.1	4.7	3.9	2.9	2.5	3.2	3.9	4.0	4.0	4.1	3.2	3.4	4.2	6.0	7.1	8.6	8.8	6.7	17.1																							
4-Jun	8.5	8.3	10.0	10.2	9.3	7.3	5.9	3.9	2.2	1.3	1.2	1.3	1.3	1.5	1.5	1.5	1.5	1.5	2.5	3.3	4.1	5.0	5.9	7.2	4.4	10.2																							
5-Jun	8.7	10.6	10.7	9.4	8.6	7.1	4.6	3.5	2.5	1.6	1.6	1.8	1.5	1.5	1.5	2.1	1.9	2.3	3.5	4.0	5.0	8.5	7.6	8.5	4.9	10.7																							
6-Jun	9.8	10.7	9.6	8.4	7.4	6.9	6.0	5.5	4.2	3.2	2.4	2.1	1.8	1.6	1.5	1.9	2.8	8.3	14.6	14.6	16.2	19.1	22.8	22.7	8.5	22.8																							
7-Jun	20.6	19.2	19.9	24.9	27.1	32.2	22.4	20.5	17.9	23.7	21.9	17.4	11.9	12.8	15.6	15.2	14.2	14.8	16.4	18.2	20.5	22.8	22.1	16.6	19.5	32.2																							
8-Jun	13.8	11.1	12.4	10.2	4.7	2.9	1.7	2.1	1.8	1.2	1.0	0.7	1.0	1.0	1.5	1.7	2.1	3.2	4.3	5.2	6.9	13.7	11.8	11.3	5.3	13.8																							
9-Jun	13.5	16.0	23.6	28.9	35.6	31.9	34.2	35.3	20.1	14.5	7.1	4.5	4.5	5.7	4.1	3.5	3.3	2.6	2.5	2.5	4.9	7.1	8.4	9.6	13.5	35.6																							
10-Jun	11.7	12.6	13.0	12.0	12.0	12.1	9.7	5.4	3.5	2.1	1.5	1.2	1.1	1.3	1.7	2.1	2.6	4.1	4.8	5.4	5.7	6.7	7.7	8.3	6.2	13.0																							
11-Jun	8.7	9.6	9.2	9.7	10.4	10.7	11.0	9.2	8.5	8.2	7.2	6.8	3.9	3.3	5.8	5.6	6.4	3.7	1.8	3.5	5.1	5.5	6.5	8.7	7.0	11.0																							
12-Jun	9.6	10.0	10.1	10.9	10.4	7.3	3.9	3.0	2.1	1.1	0.9	1.1	1.1	1.1	1.0	1.2	6.5	4.5	3.0	4.1	6.3	7.7	7.5	6.2	5.0	10.9																							
13-Jun	2.9	1.9	2.3	3.0	3.6	4.0	5.5	9.4	9.8	7.2	2.3	1.2	1.2	1.3	1.2	1.2	1.1	1.3	1.7	2.6	3.1	3.2	3.4	3.4	3.2	9.8																							
14-Jun	3.1	4.5	5.1	4.7	4.6	3.3	2.1	2.9	2.6	2.1	1.5	1.6	1.8	1.6	1.8	2.0	2.1	2.5	2.9	2.6	3.1	4.4	9.4	12.9	3.5	12.9																							
15-Jun	12.3	11.9	12.5	11.7	10.2	7.1	5.6	3.8	5.1	5.6	6.0	4.2	3.4	4.4	5.3	3.2	1.6	1.7	2.0	2.9	3.1	4.3	5.4	6.0	5.8	12.5																							
16-Jun	6.3	8.2	11.0	13.6	10.6	12.3	9.5	5.1	3.8	3.3	3.5	3.4	3.0	2.5	2.4	1.6	2.2	1.6	1.5	2.1	3.0	3.9	6.2	9.7	5.4	13.6																							
17-Jun	10.7	10.0	9.1	7.2	6.1	5.8	3.6	1.8	1.5	1.5	1.7	C	C	1.0	1.0	1.0	1.1	1.1	1.2	1.8	1.9	1.4	1.1	1.1	3.3	10.7																							
18-Jun	1.6	1.6	1.7	1.9	1.9	1.3	1.4	1.4	1.5	7.3	3.9	2.1	2.1	1.9	1.9	1.8	1.7	1.9	1.9	2.1	4.4	4.6	7.1	6.9	2.7	7.3																							
19-Jun	7.6	9.5	7.4	7.9	11.7	13.3	13.1	14.4	13.9	9.2	6.4	4.2	1.7	1.0	1.0	0.9	0.9	1.2	2.0	3.6	4.4	5.4	5.8	8.4	6.4	14.4																							
20-Jun	7.6	9.3	11.0	11.9	10.5	7.8	4.5	4.6	3.4	1.3	1.6	2.2	5.0	2.6	1.6	2.8	5.4	8.5	7.1	4.2	5.4	5.0	4.8	5.3	5.6	11.9																							
21-Jun	7.3	8.8	10.0	10.9	10.6	11.4	10.7	6.5	4.9	3.1	2.4	3.2	6.5	9.4	9.7	9.9	10.5	12.3	8.8	10.4	11.8	17.1	13.0	9.9	9.1	17.1																							
22-Jun	7.7	5.3	5.3	5.9	6.8	7.2	7.8	7.4	5.6	3.4	3.3	4.9	4.9	6.5	5.4	4.4	3.2	3.4	2.9	4.5	7.4	12.5	12.7	15.2	6.4	15.2																							
23-Jun	14.5	13.9	13.6	13.6	14.5	8.7	3.7	2.1	3.9	2.2	1.5	1.4	1.8	1.4	1.6	1.1	1.5	1.8	2.3	3.6	5.9	6.6	7.4	7.9	5.7	14.5																							
24-Jun	8.5	10.4	10.7	10.3	10.2	9.7	8.1	7.1	5.6	2.7	2.2	2.2	1.9	1.9	1.9	1.8	1.8	3.1	4.1	5.7	7.2	10.9	9.4	9.6	6.1	10.9																							
25-Jun	10.1	12.8	14.6	13.6	13.0	11.5	9.9	7.3	5.5	4.4	3.7	2.7	10.7	8.4	3.9	5.1	4.6	6.7	20.4	19.4	17.2	17.8	16.1	9.5	10.4	20.4																							
26-Jun	5.4	3.5	3.6	6.8	10.3	9.6	4.5	2.9	2.5	2.6	2.6	2.1	1.7	1.8	1.5	1.4	1.4	1.4	2.3	2.0	2.5	7.2	6.1	6.2	3.8	10.3																							
27-Jun	6.5	7.5	5.9	5.0	4.6	4.1	3.3	2.9	3.2	8.5	7.2	4.7	1.4	1.0	1.1	1.1	1.1	1.3	2.0	3.5	6.4	8.2	10.7	14.5	4.8	14.5																							
28-Jun	27.3	117.6	31.0	16.2	10.1	7.1	6.3	6.4	7.8	23.1	38.2	26.7	24.8	23.3	4.3	4.1	4.6	9.0	11.0	10.0	50.2	79.2	86.2	80.9	29.4	117.6																							
29-Jun	74.8	70.7	64.9	59.9	55.9	57.9	59.3	79.3	242.9	216.0	153.5	PF	PF	PF	PF	62.0	43.5	46.0	54.9	49.5	45.7	44.4	59.2	24.6	78.3	242.9																							
30-Jun	7.7	2.4	2.4	3.0	3.4	3.2	3.0	3.1	4.5	4.6	5.2	5.8	7.3	39.0	65.0	93.3	207.7	214.3	257.2	241.2	210.4	188.4	183.2	183.2	80.8	257.2																							
																								12.0	15.0	12.5	12.0	11.7	10.9	9.3	9.1	13.7	12.8	10.2	4.2	4.1	5.1	5.3	8.2	11.8	12.7	15.3	15.1	16.4	18.4	19.4	18.3	Diurnal Average	
																								74.8	117.6	64.9	59.9	55.9	57.9	59.3	79.3	242.9	216.0	153.5	26.7	24.8	39.0	65.0	93.3	207.7	214.3	257.2	241.2	210.4	188.4	183.2	183.2	Diurnal Maximum	

C - Calibration	AF - Analyzer Failure	PF - Power Failure
Alberta Ambient Air Quality Objectives (AAAQO):		
24-hr		30 µg/m ³

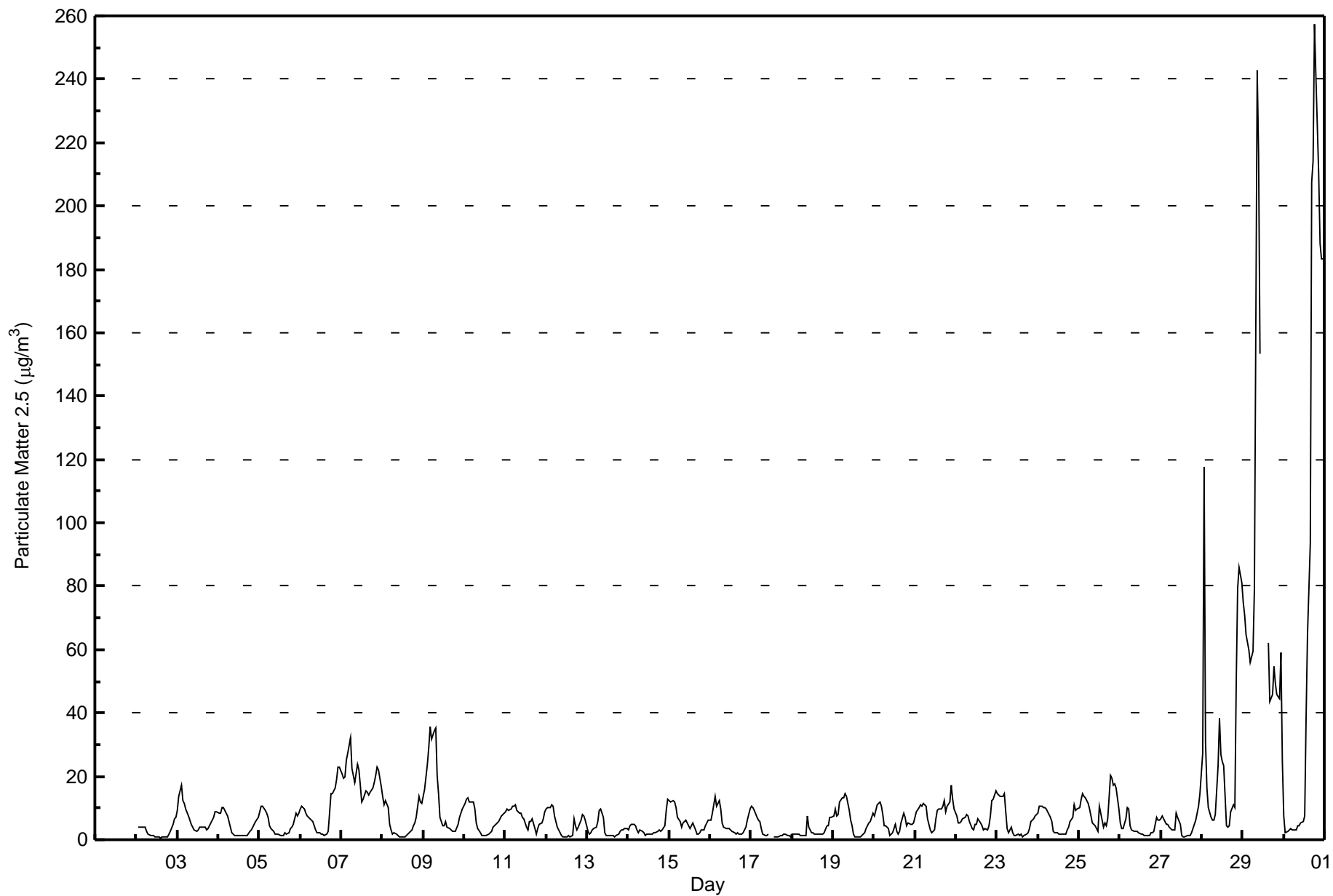


Wood Buffalo Environmental Association

Hourly Averages

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

Anzac - June 2015





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Anzac - June 2015

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	340	49.35	49.35
6 - 15	250	36.28	85.63
16 - 25	36	5.22	90.86
26 - 80	31	4.50	95.36
> 81.0	15	2.18	97.53

Total Number of Valid Hours: 689

Total Number of Hours: 720



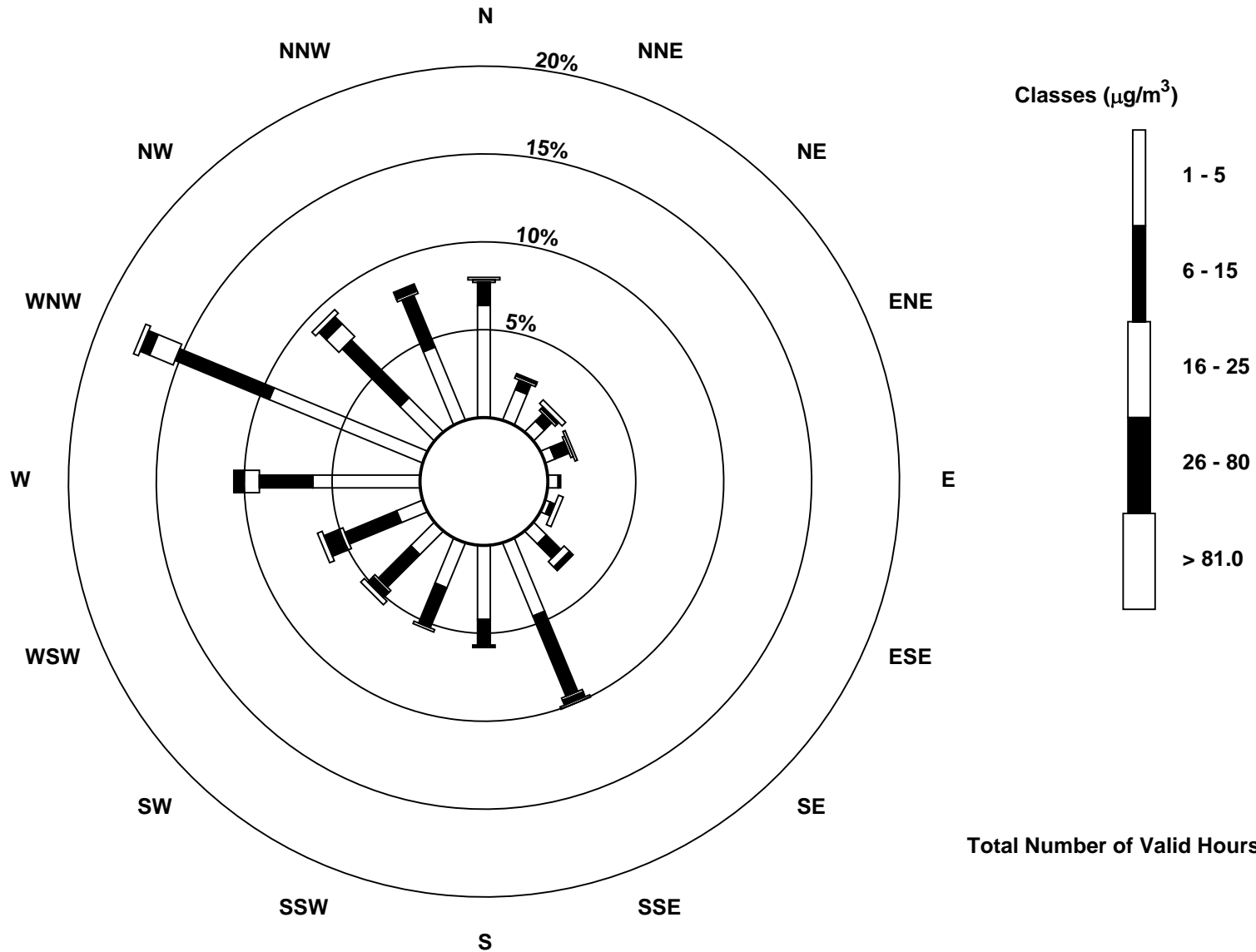
Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Anzac - June 2015

Concentration Ranges (μg/m ³)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	44	13	6	4	4	2	7	31	29	19	13	11	42	65	19	31	340
6 - 15	9	4	4	6	1	2	8	34	10	17	18	22	21	40	32	22	250
16 - 25	1	1	1	1	0	0	3	1	0	1	1	2	6	10	7	1	36
26 - 80	0	1	1	0	0	0	2	2	1	0	3	6	4	4	4	3	31
> 81.0	1	0	2	1	0	2	0	1	0	0	2	2	0	2	2	0	15
Totals	55	19	14	12	5	6	20	69	40	37	37	43	73	121	64	57	672

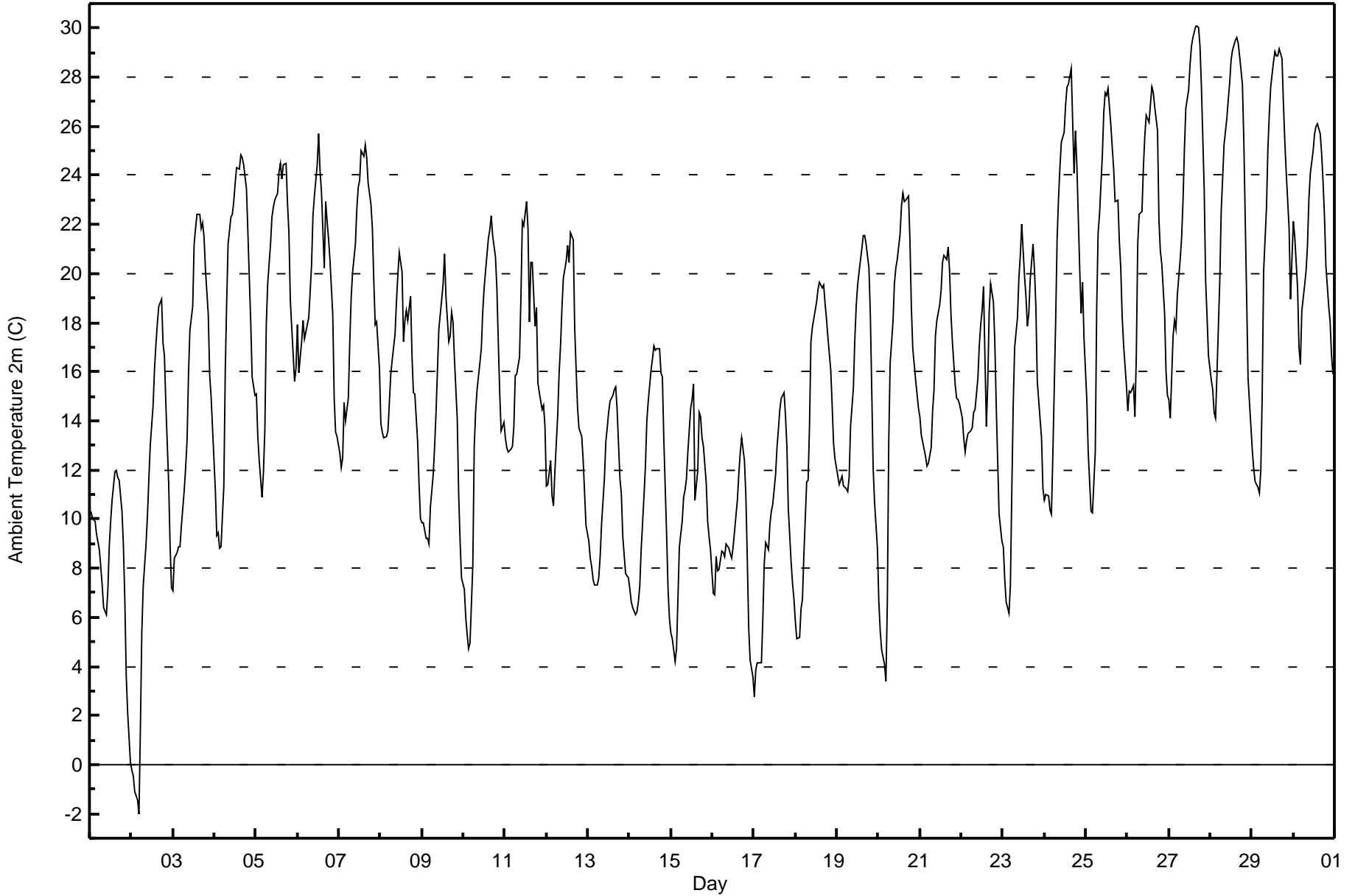
Total Number of Valid Hours: 689

Total Number of Hours: 720





Maximum Value: 30.1 C on Jun 27 17:00 Maximum Daily Average: 23.3 C on Jun 27																				Hours in Service: 720 Hours of Data: 720																													
Minimum Value: -2.0 C on Jun 2 05:00 Minimum Daily Average: 8.4 C on Jun 1 Maximum Diurnal Average: 21.1 C at hour 17 Minimum Diurnal Average: 10.1 C at hour 5 Monthly Average: 16.04 C Percentiles: P ₁ = 1.9 P ₁₀ = 7.9 Q ₁ = 11.4 Median = 15.9 Q ₃ = 20.6 P ₉₀ = 24.5 P ₉₉ = 29.4																				Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jun	10.3	10.1	9.9	9.9	9.4	8.7	8.1	7.3	6.4	6.1	7.1	8.9	9.9	10.8	11.9	12.0	11.7	11.6	10.3	8.9	6.8	3.6	2.1	0.0	8.4	12.0																							
2-Jun	-0.2	-0.5	-1.1	-1.4	-2.0	1.4	5.4	7.2	9.0	10.1	11.7	13.0	14.6	16.1	17.1	18.0	18.6	19.0	17.2	16.7	14.7	11.4	8.9	7.2	9.7	19.0																							
3-Jun	7.1	8.4	8.6	8.9	8.9	9.8	11.2	12.1	13.2	15.9	17.7	18.7	21.2	21.8	22.4	22.4	21.9	22.1	21.5	20.2	18.3	15.9	15.0	13.7	15.7	22.4																							
4-Jun	11.2	9.3	9.5	8.8	8.8	11.3	16.0	18.9	21.2	22.3	22.4	22.9	23.7	24.3	24.3	24.8	24.7	24.4	23.4	21.6	19.8	18.0	15.8	15.1	18.4	24.8																							
5-Jun	15.1	13.4	12.4	10.9	11.9	13.7	17.9	19.6	21.2	22.3	22.7	23.0	23.3	24.2	24.5	23.9	24.4	24.5	22.9	21.7	18.9	16.7	15.6	16.1	19.2	24.5																							
6-Jun	17.9	16.0	17.2	18.1	17.3	17.6	18.2	19.2	20.4	22.3	23.2	24.5	25.7	24.2	23.4	20.2	23.0	22.1	21.4	20.6	18.3	14.9	13.5	13.3	19.7	25.7																							
7-Jun	12.7	12.1	12.5	14.8	14.0	14.9	17.1	19.0	20.0	21.2	22.7	23.5	23.8	25.0	24.8	25.2	24.7	23.7	22.8	21.8	19.7	17.9	18.0	16.1	19.5	25.2																							
8-Jun	13.9	13.5	13.3	13.3	13.6	14.8	15.9	16.5	17.5	18.9	19.9	20.8	20.1	17.2	18.1	18.5	18.1	19.1	16.6	15.2	15.1	13.1	11.4	10.0	16.0	20.8																							
9-Jun	9.8	9.9	9.2	9.2	9.0	10.5	11.8	13.0	14.3	16.1	17.7	19.0	19.6	20.8	19.1	17.2	17.5	18.4	18.0	16.5	14.1	11.0	9.1	7.6	14.1	20.8																							
10-Jun	7.2	6.0	5.3	4.7	5.0	8.1	12.9	14.4	15.2	16.3	17.0	18.5	19.4	20.1	21.5	21.8	22.3	21.6	20.7	19.4	17.2	15.1	13.6	13.9	14.9	22.3																							
11-Jun	13.3	12.9	12.7	12.9	13.0	13.8	15.8	15.9	16.6	19.0	22.1	21.9	22.9	21.8	18.0	20.5	20.5	17.9	18.6	15.5	15.2	14.5	14.7	13.8	16.8	22.9																							
12-Jun	11.4	11.4	12.4	10.9	10.5	11.9	14.2	15.9	17.1	18.6	19.8	20.5	21.1	20.4	21.7	21.4	17.8	16.1	14.6	13.7	13.3	12.4	11.1	9.7	15.3	21.7																							
13-Jun	9.1	8.4	8.0	7.5	7.3	7.3	7.6	8.5	9.8	11.7	13.1	13.7	14.3	14.8	15.0	15.3	15.4	14.5	11.6	11.0	9.3	8.5	7.8	7.6	10.7	15.4																							
14-Jun	7.2	6.6	6.4	6.1	6.2	6.6	7.3	8.8	10.9	12.2	14.0	14.8	16.1	16.5	17.1	16.9	16.9	15.9	15.8	13.3	9.3	7.1	5.9	5.9	11.4	17.1																							
15-Jun	5.3	5.1	4.2	4.7	6.8	8.9	9.9	10.9	11.2	11.6	12.7	14.5	14.9	15.5	10.8	12.0	14.3	14.2	13.3	13.0	11.5	9.9	9.2	8.7	10.6	15.5																							
16-Jun	7.0	6.9	8.5	7.9	7.9	8.7	8.6	8.5	9.0	8.8	8.6	8.4	8.9	9.5	10.8	11.8	12.6	13.3	12.4	10.9	8.4	5.6	4.2	3.6	8.8	13.3																							
17-Jun	2.7	3.8	4.1	4.1	4.1	5.9	8.2	9.0	8.8	9.8	10.3	10.6	11.8	12.9	13.7	14.4	14.9	15.1	14.3	13.0	10.4	8.2	7.4	6.7	9.4	15.1																							
18-Jun	5.8	5.1	5.2	6.3	6.7	8.5	11.5	11.6	13.8	17.3	17.8	18.5	18.8	19.4	19.7	19.4	19.5	18.8	18.1	17.4	16.1	14.6	13.1	12.4	14.0	19.7																							
19-Jun	11.7	11.4	11.6	11.7	11.4	11.2	11.1	11.7	13.7	15.3	17.3	18.7	19.5	20.0	21.0	21.5	21.6	21.2	20.2	18.3	15.2	12.1	10.7	8.8	15.3	21.6																							
20-Jun	6.6	5.4	4.7	4.1	3.4	6.5	13.2	16.4	18.1	19.6	20.2	20.6	21.6	22.8	23.3	22.9	23.0	23.1	21.3	18.6	17.0	15.6	15.1	14.5	15.7	23.3																							
21-Jun	14.2	13.4	12.9	12.5	12.2	12.3	12.9	14.4	15.3	17.5	18.1	18.7	19.3	20.4	20.7	20.6	21.1	20.1	18.3	17.2	15.5	14.9	14.9	14.7	16.3	21.1																							
22-Jun	14.1	13.3	12.7	13.2	13.5	13.6	13.7	14.3	14.5	15.7	17.0	17.9	18.5	19.4	13.8	15.5	18.4	19.6	18.9	17.2	14.6	12.4	10.2	9.1	15.1	19.6																							
23-Jun	8.9	7.6	6.6	6.2	7.3	11.2	14.7	17.0	18.2	19.8	20.7	22.0	19.9	19.1	17.8	18.4	19.8	21.2	20.2	18.7	15.6	14.1	13.3	11.2	15.4	22.0																							
24-Jun	10.8	11.0	10.9	10.3	10.2	12.6	18.1	21.4	23.0	24.3	25.4	25.8	26.8	27.6	27.7	28.4	26.2	24.1	25.8	24.4	20.2	18.4	19.7	17.4	20.4	28.4																							
25-Jun	14.9	12.8	11.5	10.3	10.3	12.8	18.6	21.7	22.4	24.9	26.6	27.4	27.2	27.6	26.1	25.1	24.2	23.0	23.0	21.3	20.2	18.3	17.1	15.4	20.1	27.6																							
26-Jun	14.4	15.2	15.2	15.4	14.2	16.6	21.2	22.4	22.5	24.3	25.6	26.4	26.2	26.9	27.6	27.4	26.8	25.8	22.2	20.9	20.4	18.4	16.0	15.0	21.1	27.6																							
27-Jun	14.9	14.1	17.5	18.1	17.8	19.2	20.6	21.4	22.9	25.1	26.7	27.5	28.5	29.3	29.6	30.1	30.1	30.0	29.3	27.7	23.4	19.7	18.3	16.7	23.3	30.1																							
28-Jun	15.7	15.3	14.4	14.1	15.9	19.7	22.5	23.9	25.2	26.4	27.1	27.8	28.7	29.1	29.5	29.6	29.4	28.9	27.7	25.4	22.2	19.0	15.7	13.8	22.8	29.6																							
29-Jun	12.8	12.1	11.5	11.3	11.1	12.0	15.1	20.1	22.7	25.1	26.5	27.6	28.7	29.0	28.9	28.9	29.1	28.8	26.9	25.3	24.1	21.8	18.9	20.6	21.6	29.1																							
30-Jun	22.1	21.5	19.4	17.0	16.3	18.5	19.6	20.1	21.1	23.0	24.1	25.0	25.7	26.0	26.1	25.7	24.9	23.7	22.4	20.3	18.7	18.0	16.7	15.9	21.3	26.1																							
																								10.9	10.4	10.2	10.1	10.1	11.6	14.0	15.4	16.5	18.0	19.2	20.0	20.7	21.1	20.9	21.0	21.1	20.8	19.7	18.3	16.2	14.1	12.8	11.8	Diurnal Average	
																								22.1	21.5	19.4	18.1	17.8	19.7	22.5	23.9	25.2	26.4	27.1	27.8	28.7	29.3	29.6	30.1	30.1	30.0	29.3	27.7	24.1	21.8	19.7	20.6	Diurnal Maximum	





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ambient Temperature 2m (AT 2m) - C
Anzac - June 2015

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	5	0.69	0.69
0 - 10	130	18.06	18.75
10 - 20	381	52.92	71.67
> 20	204	28.33	100.00

Total Number of Valid Hours: 720

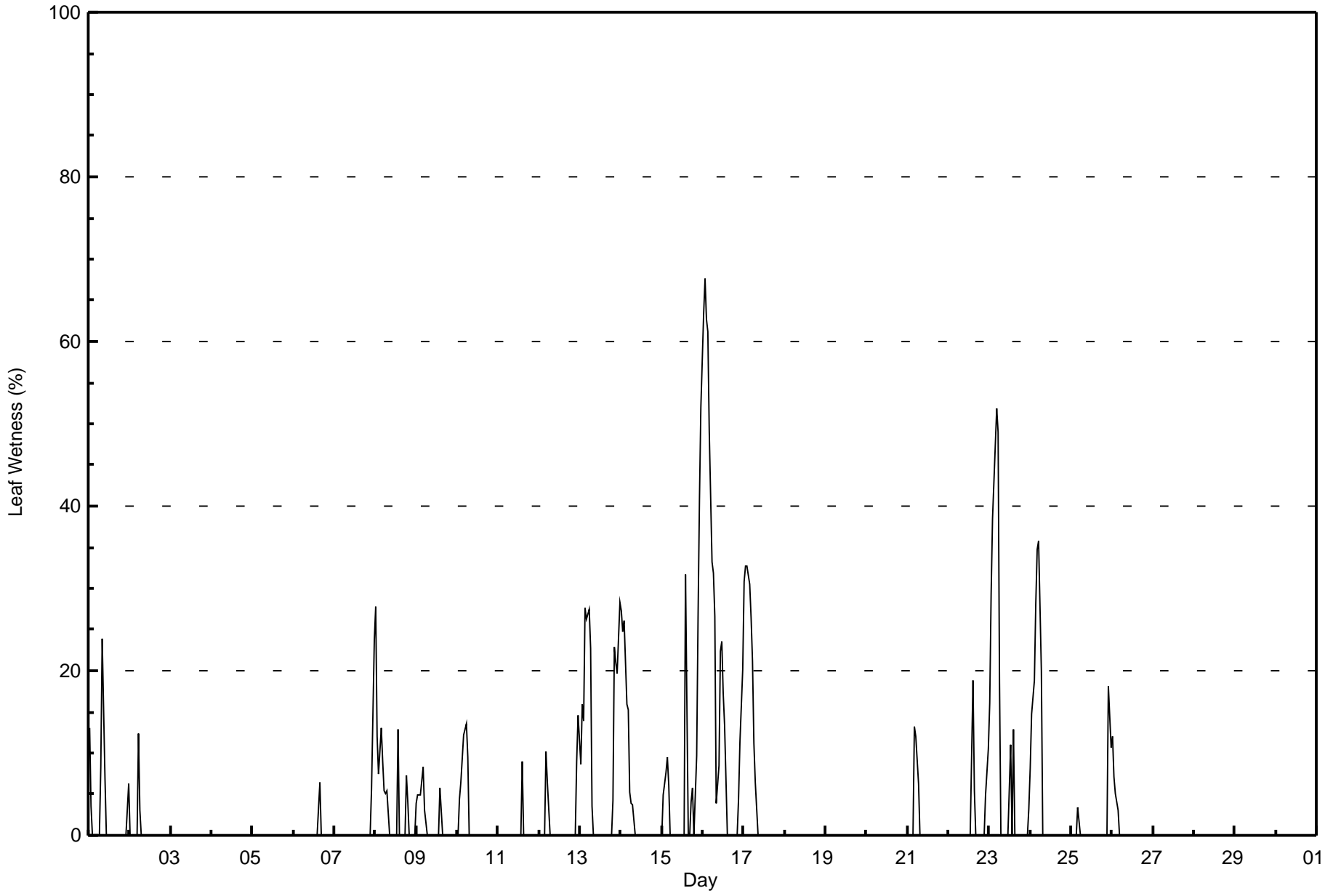
Total Number of Hours: 720



Summary of Hour Averages

Anzac - June 2015

Maximum Value: 68 % on Jun 16 02:00 Maximum Daily Average: 21.7 % on Jun 16																	Hours in Service: 720 Hours of Data: 720									
Minimum Value: 0 % on Jun 1 03:00 Minimum Daily Average: 0.0 % on Jun 3 Maximum Diurnal Average: 8.9 % at hour 5 Minimum Diurnal Average: 0.0 % at hour 17 Monthly Average: 3.1 % Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 10 P ₉₉ = 47																	Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	13	4	0	0	0	0	0	8	24	7	0	0	0	0	0	0	0	0	0	0	0	0	0	6	2.6	24
2-Jun	0	0	0	0	0	12	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	12
3-Jun	0	0	0	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-Jun	0	0	0	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-Jun	0	0	0	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-Jun	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0.3	6
7-Jun	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	24	1.2	24
8-Jun	28	12	7	13	9	5	5	5	0	0	0	0	13	0	0	0	0	7	4	0	0	0	0	0	4.6	28
9-Jun	4	5	5	7	8	3	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	1.6	8
10-Jun	0	4	6	9	12	14	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.3	14
11-Jun	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0.4	9
12-Jun	0	0	0	0	10	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	14	1.7	14
13-Jun	9	16	14	28	26	27	23	4	0	0	0	0	0	0	0	0	0	0	4	23	21	20	28	10.1	28	
14-Jun	27	25	26	16	15	5	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.1	27
15-Jun	0	5	8	10	6	0	0	0	0	0	0	0	0	32	0	0	4	6	0	10	27	41	52	8.3	52	
16-Jun	63	68	63	61	49	33	32	27	4	9	22	24	17	13	0	0	0	0	0	0	4	11	20	21.7	68	
17-Jun	31	33	33	31	26	21	11	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.0	33
18-Jun	0	0	0	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-Jun	0	0	0	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-Jun	0	0	0	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-Jun	0	0	0	0	13	12	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.3	13
22-Jun	0	0	0	0	0	0	0	0	0	0	0	0	0	19	5	0	0	0	0	0	0	0	5	11	1.7	19
23-Jun	16	29	39	47	52	49	19	0	0	0	0	0	11	0	13	0	0	0	0	0	0	0	3	11.6	52	
24-Jun	8	15	19	28	35	36	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.7	36
25-Jun	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	11	1.3	18	
26-Jun	12	7	5	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	12
27-Jun	0	0	0	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-Jun	0	0	0	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-Jun	0	0	0	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-Jun	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
																	Diurnal Average									
																	Diurnal Maximum									
																	7.0		63							
																	7.4		68							
																	7.5		63							
																	8.4		61							
																	8.9		52							
																	7.5		49							
																	4.4		32							
																	1.8		27							
																	0.9		24							
																	0.5		9							
																	0.7		22							
																	0.8		24							
																	0.9		17							
																	0.9		13							
																	2.6		32							
																	0.4		6							
																	0.0		0							
																	0.1		4							
																	0.4		7							
																	0.3		4							
																	1.1		23							
																	1.7		27							
																	3.7		41							
																	5.6		52							





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Leaf Wetness (SW) - %
Anzac - June 2015

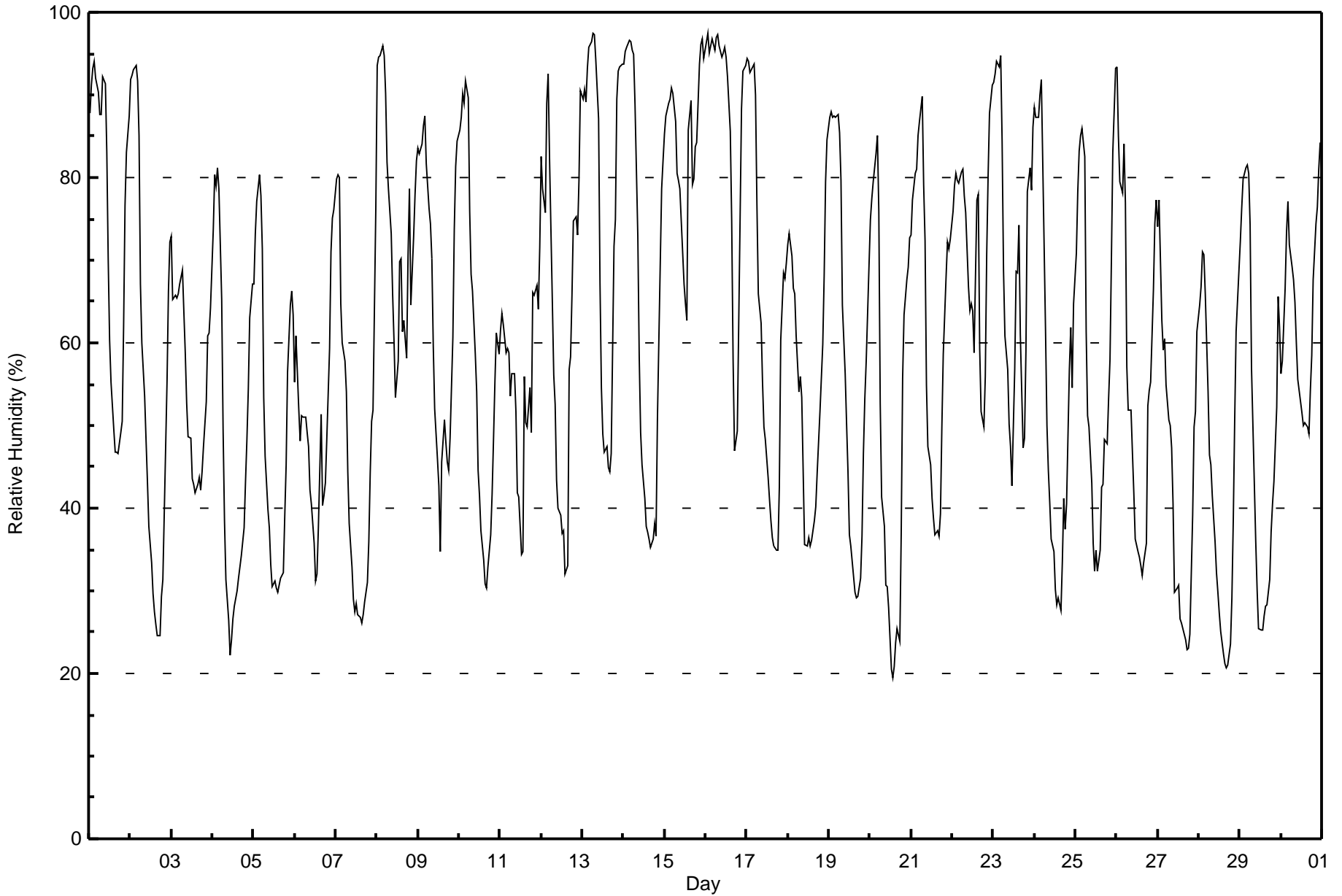
Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 0.3	592	82.22	82.22
0.4 - 0.5	0	0.00	82.22
0.6 - 0.7	0	0.00	82.22
0.8 - 1.4	0	0.00	82.22
1.5 - 10	54	7.50	89.72
> 10	74	10.28	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Maximum Value: 98 % on Jun 16 02:00														Maximum Daily Average: 86.1 % on Jun 16														Hours in Service: 720	
Minimum Value: 19 % on Jun 20 14:00														Minimum Daily Average: 43.1 % on Jun 28														Hours of Data: 720	
Maximum Diurnal Average: 82.0 % at hour 5														Minimum Diurnal Average: 40.6 % at hour 14														Hours of Missing Data: 0	
Monthly Average: 60.2 %														Percentiles: P ₁ = 22 P ₁₀ = 31 Q ₁ = 42 Median = 59 Q ₃ = 79 P ₉₀ = 90 P ₉₉ = 97														Hours of Calibration: 0	
																												Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Jun	88	91	93	94	92	90	88	88	92	91	83	70	60	55	49	47	47	47	49	50	62	77	83	87	73.9	94			
2-Jun	92	92	93	94	92	85	67	60	54	48	43	38	33	30	27	26	25	24	29	31	39	55	66	72	54.9	94			
3-Jun	73	65	66	65	66	67	69	64	59	53	49	49	44	43	42	43	44	42	44	47	53	61	61	64	55.5	73			
4-Jun	74	80	79	81	79	65	49	39	31	26	22	24	27	28	30	31	33	34	38	43	48	54	63	67	47.8	81			
5-Jun	67	73	77	80	78	71	53	46	40	38	33	31	31	30	30	31	32	32	39	45	56	65	66	63	50.3	80			
6-Jun	55	61	52	48	51	51	51	49	47	42	40	36	31	32	38	51	40	42	43	48	59	71	75	76	49.7	76			
7-Jun	80	80	80	65	60	58	54	44	38	33	29	28	29	27	27	26	27	29	31	36	44	51	52	76	46.0	80			
8-Jun	93	95	95	96	95	90	82	79	73	66	60	53	58	70	70	61	63	58	71	79	64	73	78	82	75.2	96			
9-Jun	84	83	84	86	88	82	76	74	70	60	52	46	43	35	46	51	48	46	45	48	61	74	81	84	64.4	88			
10-Jun	86	87	90	89	92	90	76	68	66	59	54	45	42	37	34	31	30	33	37	42	48	55	61	59	58.7	92			
11-Jun	61	63	62	59	59	59	54	56	56	52	42	41	34	35	56	50	50	55	49	66	66	67	64	71	55.4	71			
12-Jun	82	79	76	89	93	82	65	56	53	43	40	39	37	37	32	33	57	58	66	75	75	73	80	91	62.9	93			
13-Jun	90	91	89	93	96	96	97	97	94	87	67	55	49	47	47	45	44	47	72	75	90	93	93	94	77.0	97			
14-Jun	94	95	96	97	96	95	95	89	73	58	49	45	41	38	37	36	35	36	38	37	51	69	79	82	65.1	97			
15-Jun	85	87	89	89	91	90	87	80	80	79	75	67	65	63	86	89	79	80	84	84	94	96	97	94	83.7	97			
16-Jun	96	98	95	96	97	95	97	97	96	95	95	96	95	92	86	75	58	47	49	62	75	88	93	94	86.1	98			
17-Jun	94	94	93	93	94	90	77	66	62	55	50	48	44	41	38	36	35	35	35	43	60	68	68	70	62.1	94			
18-Jun	72	73	71	67	66	61	54	56	53	45	36	35	36	35	36	38	40	44	48	52	60	68	80	85	54.6	85			
19-Jun	87	88	87	87	87	88	85	80	65	56	50	44	37	35	32	30	29	29	31	37	47	53	58	69	58.0	88			
20-Jun	75	77	80	83	85	76	53	41	38	31	30	28	21	19	21	24	25	24	37	56	63	68	69	73	49.9	85			
21-Jun	73	77	80	81	85	87	90	79	72	55	47	45	41	39	37	37	37	39	50	59	68	72	71	72	62.3	90			
22-Jun	76	79	81	80	79	81	81	78	76	67	64	65	64	59	77	78	59	52	50	56	71	80	88	91	72.1	91			
23-Jun	92	93	94	93	95	84	69	61	57	50	48	43	57	69	69	74	61	47	48	59	78	81	79	86	70.2	95			
24-Jun	88	87	87	90	92	82	61	50	45	41	36	35	30	28	29	28	34	41	37	40	57	62	55	65	54.2	92			
25-Jun	71	78	83	85	86	83	61	51	50	43	36	32	35	32	35	43	43	48	48	53	58	70	83	93	58.4	93			
26-Jun	93	85	79	78	84	77	57	52	52	47	42	36	35	34	33	32	33	36	52	54	55	66	74	77	56.9	93			
27-Jun	74	77	63	59	61	55	51	50	47	40	30	30	31	27	26	25	24	23	23	25	39	50	52	61	43.4	77			
28-Jun	65	67	71	71	66	54	46	45	42	36	32	30	27	25	22	21	21	21	24	29	39	51	61	69	43.1	71			
29-Jun	72	76	80	81	81	80	74	57	43	36	30	25	25	25	27	28	28	31	37	41	43	52	66	62	50.1	81			
30-Jun	56	58	67	73	77	72	69	68	65	60	56	53	52	50	50	50	49	54	58	68	74	76	81	84	63.3	84			
79.6														81.1														Diurnal Average	
96														98														Diurnal Maximum	





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Anzac - June 2015

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	1	0.14	0.14
20 - 40	158	21.94	22.08
40 - 60	207	28.75	50.83
60 - 80	191	26.53	77.36
80 - 100	163	22.64	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Maximum Speed: 16 km/h on Jun 11 14:00	Maximum Daily Speed Average: 10.4 km/h on Jun 3	Hours in Service: 720
Minimum Speed Value: 0 km/h on Jun 20 05:00	Minimum Daily Speed Average: 0.9 km/h on Jun 25	Hours of Data: 720
Maximum Diurnal Speed Average: 5.1 km/h at hour 12	Minimum Diurnal Speed Average: 0.7 km/h at hour 21	Hours of Missing Data: 0
Monthly Average Velocity: 2.7 km/h 280.7 deg	Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 5 Median = 7 Q ₃ = 9 P ₉₀ = 12 P ₉₉ = 15	Percent Operational Time: 100.0

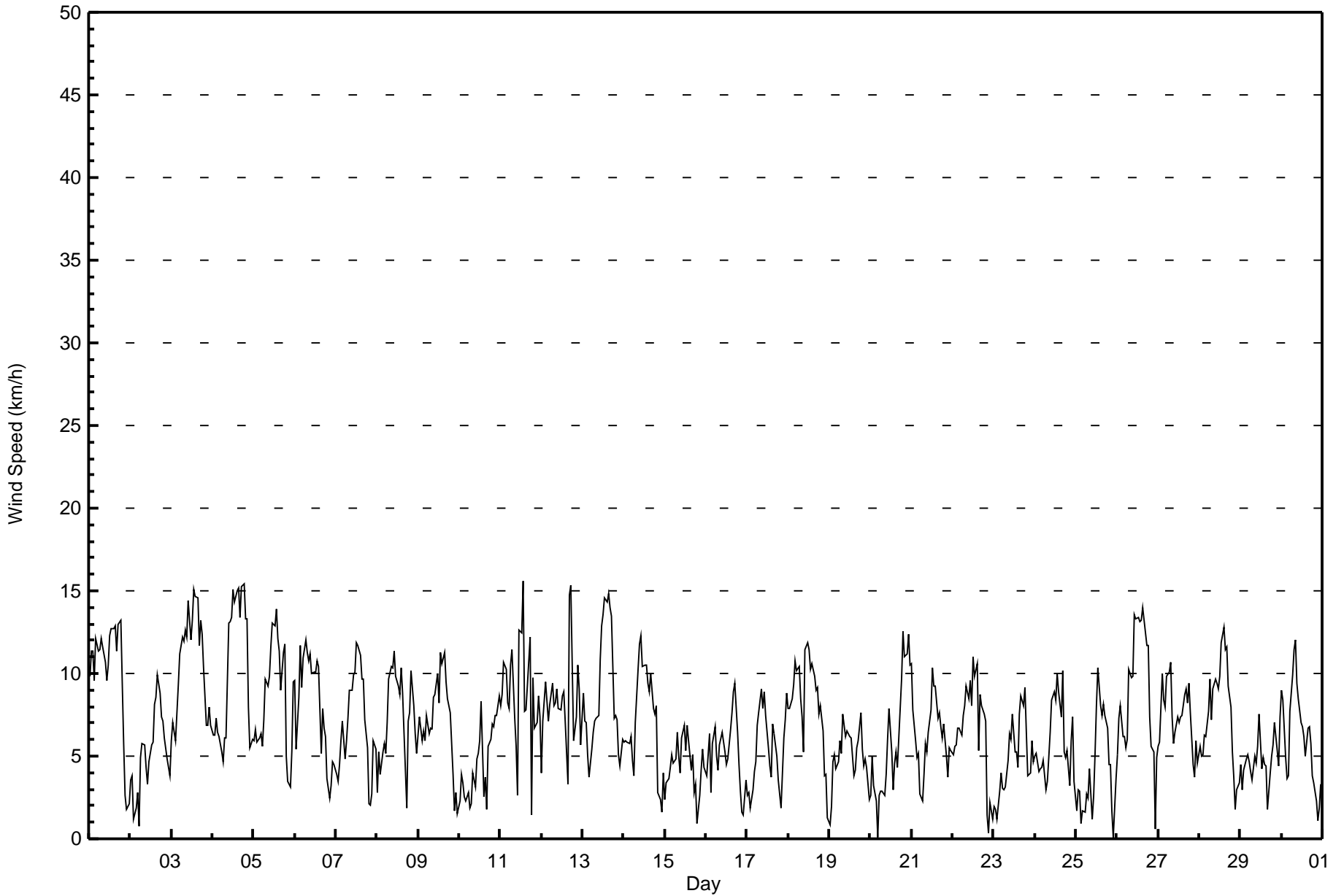
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	W10WNW11	NW11	NW10	NW12	NW11	NW11	NW12	NW12	NW11	NW10	NW11	NW12	NW13	NW13	NW13	NNW11	NNW13	NNW13	NNW9	N6	N3	WSW2	WSW2	NW9.5	NNW13	
2-Jun	W4	WSW4	W1	W2	N3	NNE1	S5	ESE6	SSW6	SSW4	SSE3	SSE5	SSE6	SSE6	SSE8	S9	SSE10	SE9	SSE7	SE7	SSW6	S5	SSE4	SE4	SSE4.0	SSE10
3-Jun	SE6	ESE7	SE6	SE8	SE9	SSE11	SSE12	SSE12	SSE13	SSE12	SE14	SE12	SSE13	SSE15	S15	S15	S12	SSE13	SSE12	SSE10	SSE7	SSE7	SSE8	SSE7	SSE10.4	SSE15
4-Jun	SSE6	SE6	SE7	SSE6	SSE6	SSE5	SSE5	SSE6	SSE6	SSE13	SSE13	S15	S14	S15	SSE15	S13	S15	S15	S13	SSW13	SSW8	S5	SSW6	S9.8	S15	
5-Jun	S6	S7	S6	SSW6	SSW6	SSW6	S7	SW10	SW9	S10	SSW12	SSW13	SW13	SSW14	SSW12	SW11	SSW9	SW11	WSW12	SW5	NE3	SSE3	SSW5	SSW7.9	SSW14	
6-Jun	SW10	WSW5	W9	W12	W9	W11	W12	W11	WNW11	WNW11	WNW10	WNW10	WNW10	NNW11	NNW10	NW5	NNW8	NW7	W6	NW4	W2	W3	WNW5	W5	WNW7.2	W12
7-Jun	WSW4	WSW3	WNW4	NW6	NNW7	W5	WNW6	WNW7	WNW9	W9	WNW10	NW10	WNW12	NW12	NW11	NW10	WNW10	NW7	NNW6	NNE2	SE2	SE3	SSW6	SW5	WNW5.7	WNW12
8-Jun	S3	SSE5	SSW4	SW5	SW6	WSW5	W7	W10	WNW10	WNW10	WNW11	WNW10	W9	NW9	W10	NE9	ENE6	NNW2	NNW7	NW8	NNW10	NNW8	NNW6	NW5	WNW4.9	WNW11
9-Jun	NW6	NW7	NW6	WNW6	NW6	WNW7	NW6	WNW7	WNW7	WNW9	WNW9	WNW10	WNW8	WNW11	N11	NNE11	NNW10	NNW8	NNW8	N8	N4	NNE2	W3	NW2	NW6.3	NNE11
10-Jun	WNW2	WNW4	WNW3	NW3	WNW2	WNW3	WNW2	E2	NW4	N3	W5	WSW5	W6	W8	NW3	WNW4	SW2	W6	S6	S7	SSE7	SSE7	SSE7	SSE9	WSW2.3	SSE9
11-Jun	SSE8	SSE9	SSE11	SSE10	SSE8	SSE8	SSE11	SSE11	S7	SSW6	WSW3	W13	WNW12	W16	WSW8	SE8	E9	WNW12	NNE1	ESE10	SE7	SSE7	SSE9	SSE7	S4.8	W16
12-Jun	SW4	WNW7	WNW9	NW8	NW7	WNW8	WNW9	NW8	WNW8	NW9	NW8	WNW8	WNW9	W9	WNW7	WNW3	ENE15	ENE15	SE11	ENE6	NE7	ENE10	ENE9	NE6	NNW3.3	ENE15
13-Jun	NE9	NE7	NE7	NNE5	N4	NNW5	NNW6	NNW7	NNW7	NNW7	N11	N13	N14	N15	N14	N15	N14	N14	E7	NE7	NE7	NNE5	N4	NE6	N7.9	N15
14-Jun	NNE6	N6	N6	NNW6	N6	N5	NW4	NNW7	NNW10	N12	NNE12	NNE10	N11	N11	N9	N10	N8	N8	N8	NNW3	NNW2	WNW2	W4	W4	N6.8	NNE12
15-Jun	WNW2	WNW3	NW4	NW4	NW5	NW5	NW5	N6	NNW5	NW4	NW6	WNW7	NNW5	NNW7	WNW6	WNW4	WNW5	W3	WSW3	SSW1	E3	SSE4	SSE5	S4	NW2.9	WNW7
16-Jun	SSW4	SW5	NW6	WSW3	NW6	NNW7	N5	N4	N6	N6	N6	NNW5	NW4	WNW5	NW7	NW8	NNW9	NNW9	NNW6	NNW5	NNW3	NNW2	WNW1	WSW4	NW4.3	NNW9
17-Jun	WNW3	NNW3	NW2	NNW3	NW4	NW5	NNW7	N8	N9	NNE8	N9	N7	NNW6	NNW4	WSW4	WSW7	W6	WNW5	W4	NW3	SE2	SSE6	SSE7	SSE9	NW2.6	N9
18-Jun	S8	SSE8	S8	S9	SSE11	SSE10	SSE10	SSE8	SE7	SE5	SSW11	SSW12	SSW11	S10	S11	S10	SSE9	SSE9	S8	SW8	SW7	S4	NNW4	NNW1	S7.3	SSW12
19-Jun	NNW1	WNW2	WNW5	NW5	NNW4	NNW5	NNW6	N5	NNE8	NE6	N7	NNE6	N6	NNE6	N4	NE4	N5	N6	NNW8	NNW5	NNW4	NNW5	N4	N2	N4.4	NNW8
20-Jun	NNE3	ENE5	ENE3	SSW2	SSW0	NE3	ENE3	S3	S3	E4	WNW6	W8	N5	NNW3	NW5	NW5	N4	NNW8	W10	W13	W11	W11	WNW12	WNW11	WNW3.6	W13
21-Jun	WNW11	NW8	NW6	NW5	WNW5	WSW3	WNW2	NW4	WNW6	NNW5	N6	N8	N10	NNW9	N9	N7	NNW8	NW7	WNW6	WNW7	W5	WNW4	WNW5	WNW5	NW5.6	WNW11
22-Jun	WNW5	WSW6	WSW6	W7	WNW7	WNW6	WNW7	WNW8	W9	WNW8	W10	WNW8	W11	WNW10	N11	WNW5	WNW9	NW8	NW8	N7	NW1	ENE0	SW2	SE1	WNW5.9	W11
23-Jun	SSE2	S2	SSE1	SW3	SW4	SSW3	SW3	SSW3	WNW5	WNW6	WNW6	W8	WNW5	SSW5	S4	SSE8	SSW9	SW8	SW9	SW6	W4	WSW4	SW6	SW5	SW3.9	SW9
24-Jun	SW5	SW5	SSW4	SSW4	SSW5	SSW3	SSW3	WSW5	WNW6	WNW8	WNW9	WNW8	WNW10	WNW9	WNW7	WNW10	W5	WNW5	WSW5	SW3	W6	W7	NW3	W4.9	WNW10	
25-Jun	WNW2	WSW3	SW3	SW1	E2	S2	WSW3	SW2	W4	SSW1	SSE3	WNW5	NNE8	S10	S8	W7	W8	N7	NE7	ENE4	SSE4	N2	NW0	SSE4	SW0.9	S10
26-Jun	SSE5	S7	WSW8	SW6	SW6	WSW6	W6	W10	W10	W10	W14	W13	W13	WNW13	WNW13	WNW14	WNW13	WNW12	NW12	WNW7	WNW6	WSW5	WSW1	WSW5	W7.6	WNW14
27-Jun	SW6	WSW6	W10	WNW8	WNW8	W10	W10	WNW11	WNW7	WNW6	W6	W7	WNW7	WNW7	WNW7	W9	W9	W8	W9	WSW8	WSW5	WSW4	WSW6	WSW5	W7.1	WNW11
28-Jun	W6	WSW5	SW5	W6	W6	W8	W10	WNW7	WNW9	NW10	NW9	NW9	NW10	NW12	NW13	NW11	NW12	NW9	NNW8	NNW5	NE4	SW2	SW3	WSW3	WNW6.5	NW13
29-Jun	WSW4	SW3	W4	WSW5	WSW5	WSW5	W4	WNW4	NW5	WNW5	NW6	WNW8	WNW4	W5	NW5	NNW4	WSW2	SSE4	SSE5	SE6	SE7	S5	WSW4	W7	W2.7	WNW8
30-Jun	W9	W8	W5	WSW4	W4	WNW8	WNW10	WNW11	WNW12	WNW9	WNW8	NW7	NW7	NNW6	NE5	NE7	NE7	ENE6	ESE4	ESE3	N2	SW1	SSE2	WNW3	NW3.7	WNW12

WSW2.2	WSW2.1	W2.5	W2.9	W2.7	W3.0	W3.3	WNW3.3	WNW4.2	WNW3.5	WNW4.3	WNW5.1	WNW5.0	WNW4.6	WNW3.8	WNW2.8	NW2.6	NW2.8	WNW1.9	WNW1.1	WSW0.7	SW1.3	SW1.9	SW2.2	Diurnal Average
WNW11	WNW11	NW11	W12	NW12	NW11	SSE12	NW12	SSE13	SSE13	SE14	SSE13	S15	W16	S15	SSE15	ENE15	ENE15	S15	S13	SSW13	W11	WNW12	WNW11	Diurnal Maximum

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



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 9 km/h on Jun 11 18:00 Minimum Value: 0 km/h on Jun 19 01:00 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 Maximum																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																		
1-Jun	4	5	5	4	5	5	5	6	5	4	4	5	6	6	6	5	5	5	5	4	3	1	1	1	6																	
2-Jun	2	1	1	1	1	2	2	2	2	3	2	3	3	3	5	4	4	3	3	2	3	1	1	2	5																	
3-Jun	2	1	2	2	2	3	3	4	4	4	5	4	4	5	5	4	4	4	4	3	2	2	2	1	5																	
4-Jun	1	1	1	1	1	1	2	2	3	5	5	5	6	5	5	5	5	6	6	5	5	3	1	2	6																	
5-Jun	2	2	2	2	2	1	3	3	3	4	4	4	5	4	5	4	4	4	5	2	2	2	2	4	5																	
6-Jun	5	2	3	5	4	4	4	4	4	4	4	4	4	5	5	4	4	3	3	2	1	1	1	1	5																	
7-Jun	1	1	2	3	3	1	2	3	3	3	5	4	5	5	5	4	5	3	2	2	1	1	3	3	5																	
8-Jun	1	2	2	2	1	2	2	4	5	4	4	4	5	4	4	5	3	2	4	3	4	3	2	1	5																	
9-Jun	2	2	2	3	2	3	3	2	3	4	4	4	3	5	7	5	4	4	3	3	1	1	1	1	7																	
10-Jun	1	1	1	1	2	1	1	2	2	2	3	2	2	3	2	3	2	3	2	2	1	1	2	2	3																	
11-Jun	2	2	3	3	2	2	2	3	4	2	3	6	5	6	4	3	4	9	4	4	2	2	2	3	9																	
12-Jun	1	3	4	3	3	3	4	3	3	3	4	3	3	4	3	5	6	6	4	3	3	3	4	2	6																	
13-Jun	4	3	3	2	1	2	2	3	3	3	5	6	6	5	5	6	6	6	4	3	4	2	1	2	6																	
14-Jun	3	2	2	2	2	2	1	3	5	5	6	4	5	4	4	4	4	4	3	3	2	1	1	1	6																	
15-Jun	1	1	1	1	1	2	2	2	2	2	2	3	3	3	7	2	2	2	1	1	2	2	1	2	7																	
16-Jun	1	1	4	1	3	3	2	2	2	3	2	2	2	2	3	3	4	4	3	1	1	1	1	1	4																	
17-Jun	1	2	1	1	1	1	3	3	4	3	4	3	3	3	3	4	3	2	2	2	1	1	1	2	4																	
18-Jun	2	2	2	2	2	2	3	2	3	3	4	5	5	4	4	4	3	3	3	3	2	2	1	1	5																	
19-Jun	0	1	1	2	1	2	2	2	4	3	3	3	3	3	3	3	2	2	3	2	1	1	2	1	4																	
20-Jun	1	1	2	2	1	1	2	1	2	3	3	3	3	3	3	3	3	3	6	4	4	3	4	4	6																	
21-Jun	4	3	3	2	2	2	1	2	2	3	3	3	4	4	4	3	3	3	4	4	2	1	2	2	4																	
22-Jun	2	1	2	3	3	3	3	3	3	4	4	3	4	4	5	2	4	3	3	4	2	1	1	1	5																	
23-Jun	1	1	1	1	1	1	1	2	2	2	2	3	4	4	4	4	3	3	3	3	1	1	1	1	4																	
24-Jun	1	1	1	1	1	1	1	1	2	3	3	3	4	4	4	3	4	3	2	2	2	2	2	3	4																	
25-Jun	1	2	1	1	1	1	2	2	2	2	2	3	5	5	3	3	4	3	3	3	1	2	2	2	5																	
26-Jun	2	2	3	2	1	2	2	4	4	4	5	6	6	6	5	6	6	5	6	3	2	1	2	1	6																	
27-Jun	1	2	4	3	3	4	4	4	3	2	2	3	3	3	3	3	4	4	5	3	2	1	1	1	5																	
28-Jun	1	1	1	2	2	3	4	3	4	4	4	4	5	5	6	5	5	4	4	2	2	1	1	1	6																	
29-Jun	1	0	1	1	1	1	1	1	2	2	2	3	2	3	2	2	2	2	1	1	1	2	2	2	3																	
30-Jun	3	3	2	1	2	3	4	4	4	4	3	3	3	2	2	2	2	2	1	1	1	1	1	3	4																	
Diurnal Maximum																		5	5	5	5	5	5	5	6	5	5	6	6	6	6	7	6	6	9	6	5	5	3	4	4	





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Anzac - June 2015

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	262	36.39	36.39
6 - 11	383	53.19	89.58
12 - 19	75	10.42	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: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Wind Speed (WS) - km/h
Anzac - June 2015

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	18	8	4	5	4	2	5	19	12	17	22	35	20	39	26	26	262
6 - 11	34	10	11	5	1	4	14	42	19	14	14	11	48	78	43	35	383
12 - 19	8	1	0	2	0	0	2	12	10	6	1	1	8	10	12	2	75
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	60	19	15	12	5	6	21	73	41	37	37	47	76	127	81	63	720

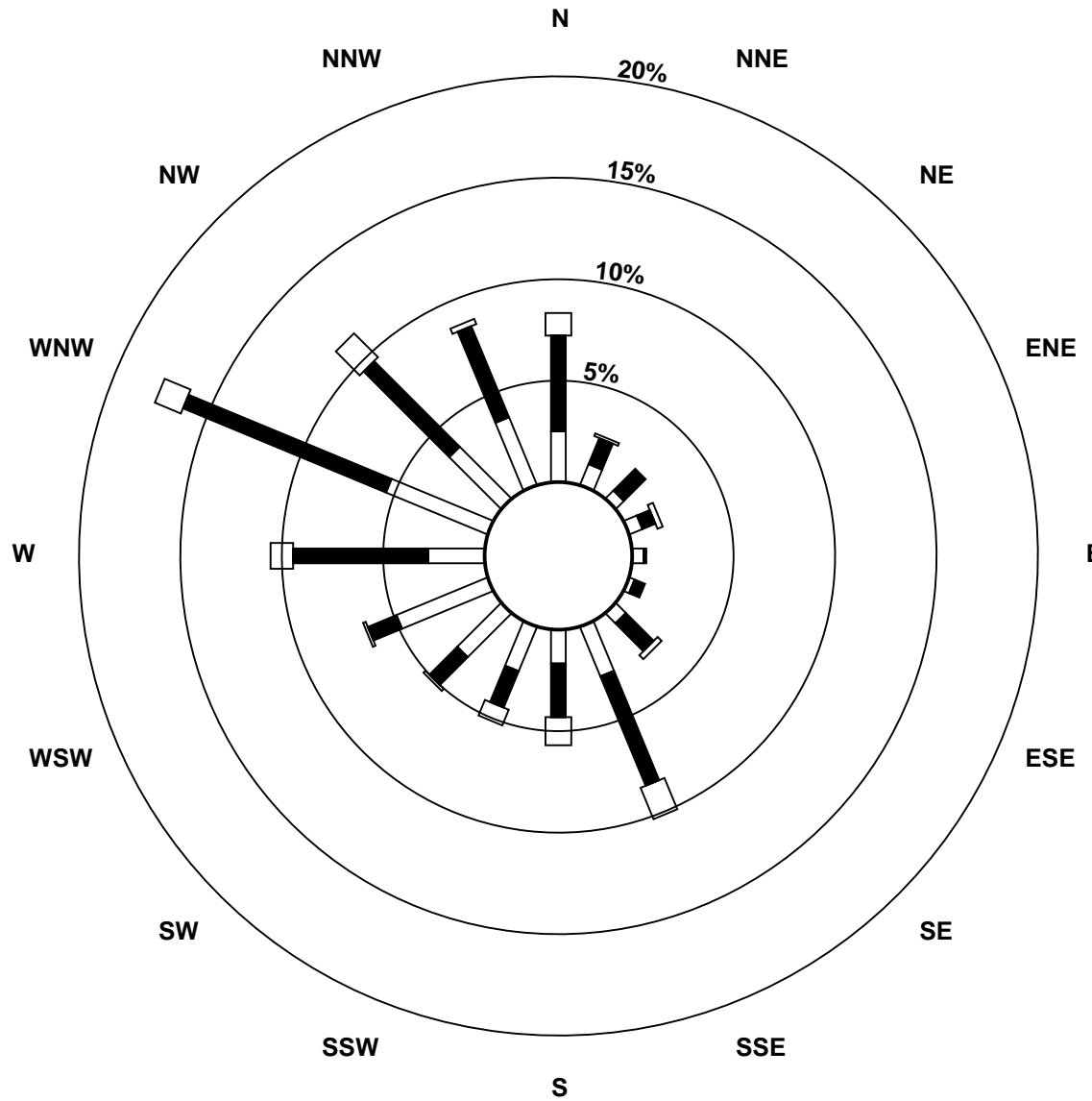
Total Number of Valid Hours: 720

Total Number of Hours: 720

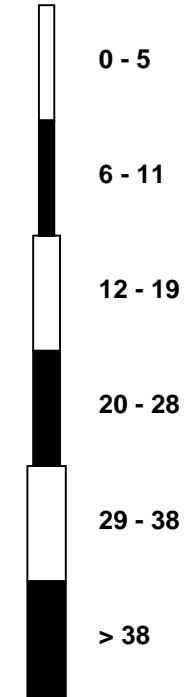


Wood Buffalo Environmental Association
Wind Rose Jun 2015

Wind Speed (WS) - km/h
Anzac (AMS 14)



Classes (km/h)



Total Number of Valid Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Anzac - June 2015

Direction of Maximum Speed: 265 deg on Jun 11 14:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 154.2 deg on Jun 3	Hours of Data: 720
Direction of Minimum Speed: 198 deg on Jun 20 05:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 0.9 deg on Jun 25	Percent Operational Time: 100.0
Monthly Average Direction: 286.8 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	273	293	304	309	313	311	310	312	315	311	318	318	310	312	320	326	343	346	343	343	349	351	257	252	317.4
2-Jun	259	247	264	271	352	12	182	117	192	211	161	151	147	150	149	183	160	146	149	142	202	188	167	136	167.2
3-Jun	126	118	143	142	132	149	158	150	153	148	142	144	147	155	175	169	174	168	166	164	156	154	164	160	154.2
4-Jun	160	129	140	157	165	167	161	165	166	160	161	160	174	179	175	167	171	174	178	186	207	206	188	192	171.9
5-Jun	182	173	180	200	194	208	189	228	224	188	206	213	214	210	192	218	213	218	241	221	41	164	194	220	207.3
6-Jun	235	247	259	269	265	267	280	281	291	293	291	291	292	345	346	321	331	309	268	304	272	264	292	271	287.4
7-Jun	242	242	285	304	330	279	283	298	288	281	284	304	298	312	307	312	301	320	342	21	139	137	210	219	294.5
8-Jun	173	150	195	232	235	249	275	281	289	297	291	292	265	309	278	34	67	330	336	319	335	334	340	324	297.8
9-Jun	323	322	314	303	307	297	306	296	296	289	287	282	295	292	358	12	338	333	338	350	350	30	260	304	316.2
10-Jun	286	285	301	312	283	284	300	93	313	356	271	253	278	259	325	294	233	263	181	175	163	168	162	164	237.0
11-Jun	153	151	159	162	165	153	154	154	178	193	247	281	282	265	253	142	101	290	26	109	138	161	162	168	178.6
12-Jun	222	294	300	305	309	300	303	309	296	326	314	294	285	260	282	299	69	77	124	71	55	73	58	43	336.0
13-Jun	47	34	48	33	351	342	328	330	339	341	2	5	6	358	1	6	6	8	91	55	44	28	9	43	11.2
14-Jun	18	360	356	347	355	354	319	337	346	4	16	15	2	356	357	2	360	8	1	7	346	335	294	259	357.5
15-Jun	303	292	308	311	318	320	332	349	336	317	316	303	342	345	302	290	287	272	254	196	101	156	163	183	309.0
16-Jun	201	220	311	258	308	327	349	4	357	354	357	337	309	300	324	325	329	333	341	334	335	340	285	256	324.4
17-Jun	282	328	309	329	322	323	337	358	2	12	357	355	335	342	257	249	278	292	280	316	139	160	165	168	322.9
18-Jun	169	168	174	172	166	159	166	148	129	146	212	208	209	178	188	189	161	161	171	214	222	180	329	328	179.0
19-Jun	341	301	299	314	327	336	347	353	21	39	3	33	4	28	350	37	11	3	331	333	336	345	10	358	356.0
20-Jun	28	63	77	209	198	39	65	175	190	95	282	259	354	341	325	320	352	329	280	281	276	274	282	286	296.9
21-Jun	292	306	312	313	295	239	288	312	289	334	4	353	354	339	356	353	332	315	291	288	278	298	294	300	318.1
22-Jun	291	252	254	275	284	294	297	288	279	287	280	285	280	290	349	288	288	317	324	358	317	67	232	125	292.9
23-Jun	157	190	166	219	219	212	218	209	286	283	301	268	287	192	178	165	192	229	235	236	262	238	229	235	230.7
24-Jun	235	224	211	213	203	198	197	204	241	289	292	296	293	286	293	302	289	269	291	246	228	275	270	322	268.0
25-Jun	289	252	215	222	91	183	246	227	268	194	156	286	31	170	190	267	271	7	43	63	166	3	304	157	231.6
26-Jun	159	180	247	216	214	258	270	281	274	272	261	268	273	287	292	286	291	296	326	300	294	251	237	238	272.6
27-Jun	236	242	274	290	282	278	276	287	285	293	281	280	295	289	284	262	279	270	263	256	245	249	240	242	272.5
28-Jun	259	237	234	260	281	273	279	291	294	320	323	318	308	304	314	319	311	322	330	340	34	233	229	240	300.2
29-Jun	250	236	269	249	255	258	261	302	314	302	309	285	285	270	315	340	250	151	147	137	137	177	237	273	260.1
30-Jun	273	277	262	248	272	293	294	292	287	298	299	318	321	336	36	49	54	69	113	107	0	227	147	291	306.0

240.8 244.3 261.4 261.1 271.3 271.8 274.8 284.8 289.2 299.3 294.0 289.8 294.7 287.2 298.0 299.7 311.4 309.5 285.1 288.5 252.1 214.5 226.1 229.9

Diurnal Average

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



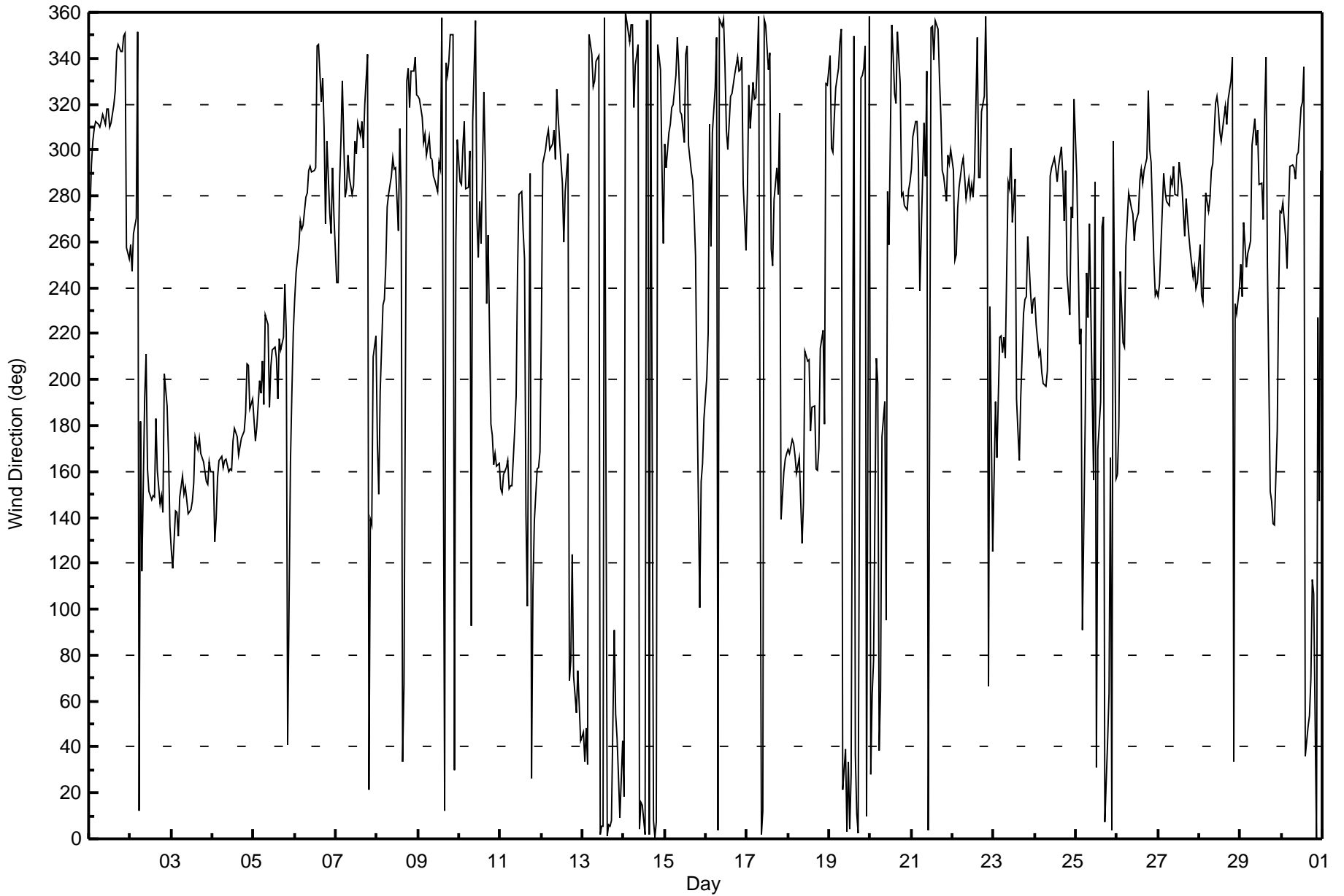
Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg

Anzac - June 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 106 deg on Jun 25 23:00 Minimum Value: 8 deg on Jun 28 03:00 Percentiles: P ₁ = 12 P ₁₀ = 18 Q ₁ = 24 Median = 29 Q ₃ = 37 P ₉₀ = 56 P ₉₉ = 88																			Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0						
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	28	28	27	26	26	27	28	27	27	29	29	28	31	32	34	26	25	25	24	25	26	30	36	46	46
2-Jun	36	26	70	49	28	83	38	39	46	86	81	74	65	63	56	50	35	36	23	22	42	27	23	21	86
3-Jun	17	22	23	21	18	18	19	21	23	28	25	26	31	26	29	27	31	26	22	23	16	15	14	15	31
4-Jun	15	16	12	13	15	16	17	26	40	29	30	37	30	35	28	26	28	29	30	28	28	28	21	23	40
5-Jun	21	17	22	25	25	19	24	30	35	44	37	31	30	33	31	32	38	26	28	24	56	57	26	19	57
6-Jun	29	24	26	32	29	28	28	31	30	29	33	32	35	44	34	54	27	34	30	25	20	24	19	16	54
7-Jun	17	11	22	27	20	28	33	32	29	36	39	35	30	33	37	34	32	32	26	50	29	26	39	32	50
8-Jun	41	29	48	26	17	22	28	27	33	31	34	33	43	30	33	58	51	76	28	25	22	20	18	21	76
9-Jun	20	21	23	28	25	29	28	34	39	40	41	39	34	35	38	32	28	30	28	24	17	54	29	37	54
10-Jun	24	23	22	24	27	35	74	81	65	74	62	69	45	39	88	79	96	45	25	25	15	13	13	15	96
11-Jun	15	16	16	16	22	18	18	19	56	32	79	34	33	33	49	38	32	62	82	27	22	22	19	19	82
12-Jun	33	30	25	25	21	25	25	28	32	30	42	43	42	30	37	79	25	27	36	43	27	21	26	32	79
13-Jun	28	28	31	32	31	21	21	23	24	25	28	28	28	25	26	27	27	27	32	33	36	29	25	33	36
14-Jun	32	24	23	20	24	27	26	25	25	29	32	34	38	34	34	32	28	32	25	26	28	20	37	13	38
15-Jun	36	34	22	20	18	22	25	28	31	38	33	49	58	39	56	40	40	56	44	66	31	24	17	17	66
16-Jun	18	14	48	30	35	28	34	32	26	26	29	25	34	28	28	29	25	26	26	19	14	22	35	13	48
17-Jun	43	55	43	21	20	20	25	31	26	41	34	37	62	83	82	52	43	53	57	43	51	12	12	14	83
18-Jun	14	14	18	19	18	16	23	24	29	58	32	37	35	30	28	32	26	22	26	27	15	34	30	79	79
19-Jun	75	27	22	21	21	21	21	28	32	49	47	54	60	63	85	68	53	44	25	22	16	16	26	30	85
20-Jun	24	20	61	33	87	53	41	58	74	75	47	48	69	82	71	53	74	30	49	28	30	26	26	30	87
21-Jun	29	27	38	31	36	39	44	25	33	57	45	37	30	38	38	42	35	35	33	30	24	20	26	28	57
22-Jun	29	24	20	30	29	29	26	33	32	32	39	37	32	38	25	44	30	30	22	30	69	91	33	75	91
23-Jun	32	26	79	12	14	17	44	47	53	41	37	47	72	39	78	34	34	25	19	19	21	16	13	21	79
24-Jun	14	24	14	12	12	15	24	34	41	35	35	31	38	33	35	36	27	40	34	21	19	29	21	45	45
25-Jun	73	42	35	60	60	68	61	70	55	100	88	64	49	48	34	33	36	31	31	30	27	86	106	37	106
26-Jun	19	27	33	26	18	21	36	34	30	37	34	38	34	35	30	33	31	29	22	28	26	18	95	21	95
27-Jun	15	20	25	27	26	27	26	27	35	36	41	39	47	43	40	40	39	37	38	24	17	14	12	9	47
28-Jun	13	9	8	21	22	24	28	34	32	29	29	33	35	33	31	29	32	31	29	27	28	50	13	9	50
29-Jun	14	12	21	17	11	12	16	31	25	38	45	35	69	58	47	57	79	32	14	14	16	22	22	23	79
30-Jun	22	26	29	22	32	26	24	30	29	28	29	35	32	33	44	28	23	23	23	38	62	77	43	70	77
																			75 55 79 60 87 83 74 81 74 100 88 74 72 83 88 79 96 76 82 66 69 91 106 79						
Diurnal Maximum																									



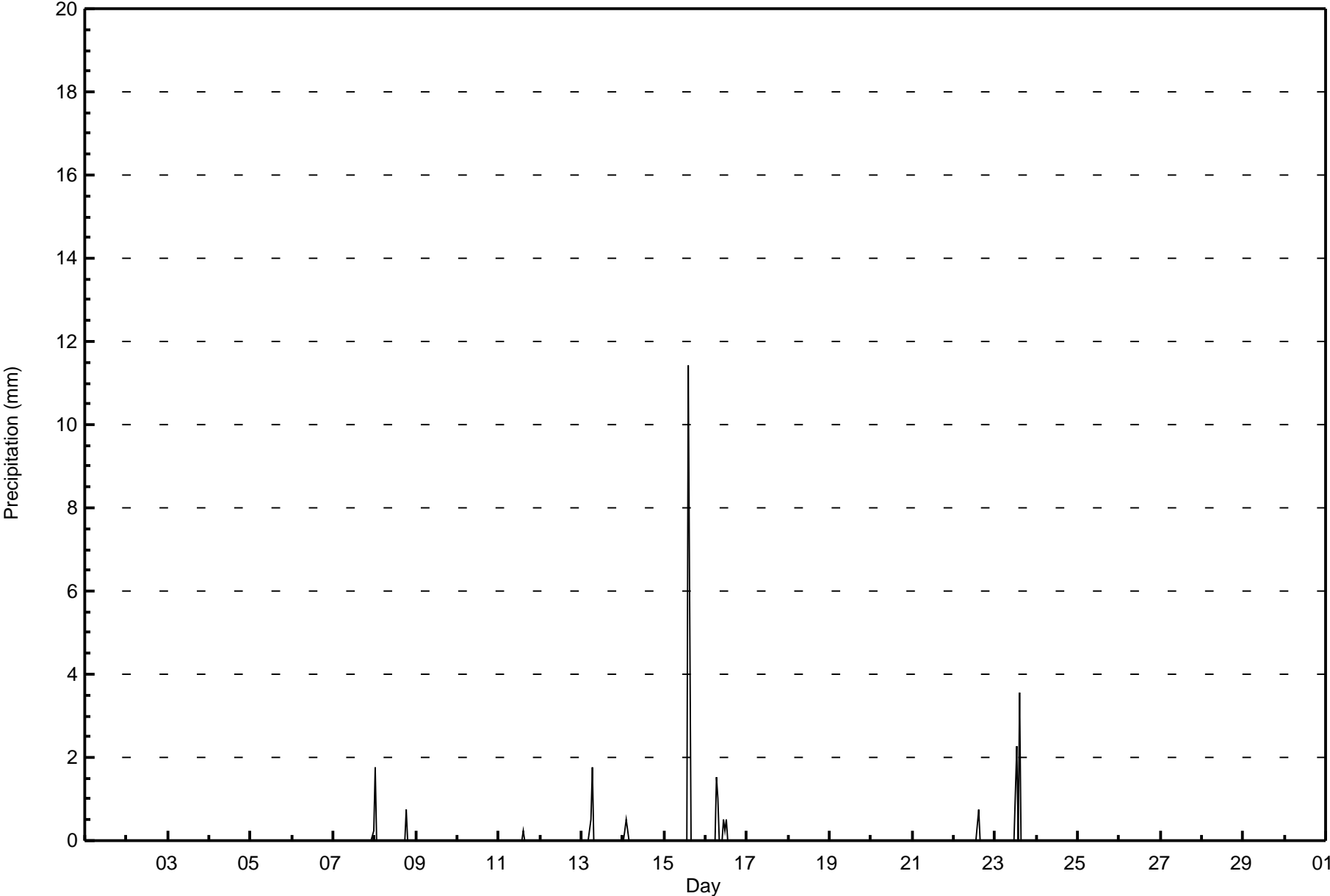


Maximum Value: 11.4 mm on Jun 15 15:00		Maximum Daily Total: 11.4 mm on Jun 15		Hours in Service: 720																																													
Minimum Value: 0.0 mm on Jun 1 01:00		Minimum Daily Total: 0.0 mm on Jun 1		Hours of Data: 720																																													
Maximum Diurnal Total: 16.0 mm at hour 15		Minimum Diurnal Total: 0.0 mm at hour 4		Hours of Missing Data: 0																																													
Monthly Total: 27.94 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 of Calibration: 0																																													
				Percent Operational Time: 100.0																																													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3																				
8-Jun	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	1.8																				
9-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3																				
12-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.5	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	1.8																				
14-Jun	0.0	0.3	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.5																				
15-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.4	11.4																				
16-Jun	0.0	0.0	0.0	0.0	0.0	0.0	1.5	1.0	0.0	0.0	0.5	0.3	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	3.8	1.5																				
17-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.8																				
23-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	0.0	3.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.8	3.6																				
24-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																				
																								1.8	0.3	0.5	0.0	0.0	0.5	3.3	1.0	0.0	0.0	0.5	0.3	2.8	0.0	16.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.3	Diurnal Average	
																								1.8	0.3	0.5	0.0	0.0	0.5	1.8	1.0	0.0	0.0	0.5	0.3	2.3	0.0	11.4	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.3	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Precipitation (PC) - mm
Anzac - June 2015





Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	June 15, 2015	Last Calibration	May 21, 2015
Station Name	Anzac	Station Number	AMS 14
Reason:	Routine		
Start Time (MST)	10:20	End Time (MST)	15:15
Gas Cert Reference	SA130026A	Station temp.	20 Deg C
Cal Gas Concentration	47.2 ppm	Cal Gas Exp Date	12/12/2016
Calibrator Make/Model	Sabio 4010	Serial Number	8400311
ZAG Make/Model	API 701	Serial Number	764
DACS make/model	Campbell Scientific CR3000	DACS serial No.	8790

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		HVPS voltage	524	524
Analyzer IP address	192.168.1.43		Lamp voltage	3017	2935
Calculated slope	0.999522	0.995556	Chamber temp	50.0	50.0
Calculated intercept	-0.313316	-0.209621	Pressure	25.2	25.2
Analyzer Background	19.7	19.5	Flow	658	660
Analyzer Coefficient	0.988	1.011	Intensity	75	72.4
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	-0.3	----
as found span	5000	74.9	707.1	696.1	1.016
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	74.9	707.1	710.7	0.995
second point	5000	37.5	354.0	354.8	0.998
third point	5000	18.7	176.5	178.5	0.989
as left zero	5000	0.0	0.0	0.1	----
as left span	5000	74.9	707.1	705.6	1.002
Average Correction Factor					0.994

Corrected As found	696.4	Previous response	707.7	% change	1.6%
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Notes:

Filter changed after As Found. Zero and Span with small adjustments

Calibration Performed By:

Ryan Power



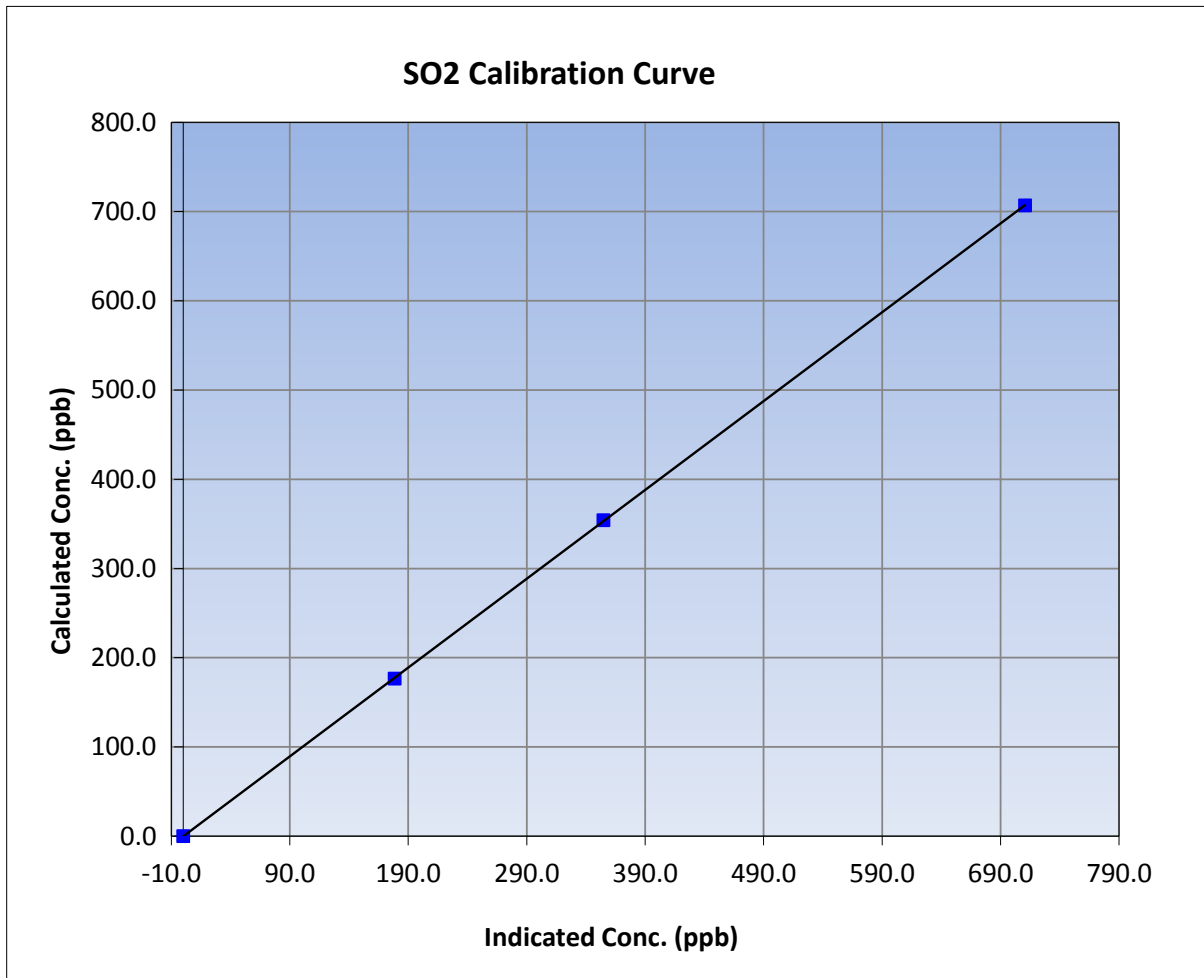
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	June 15, 2015	Previous Calibration	May 21, 2015
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	10:20	End Time (MST)	15:15
Analyzer make	API T100	Analyzer serial #	723

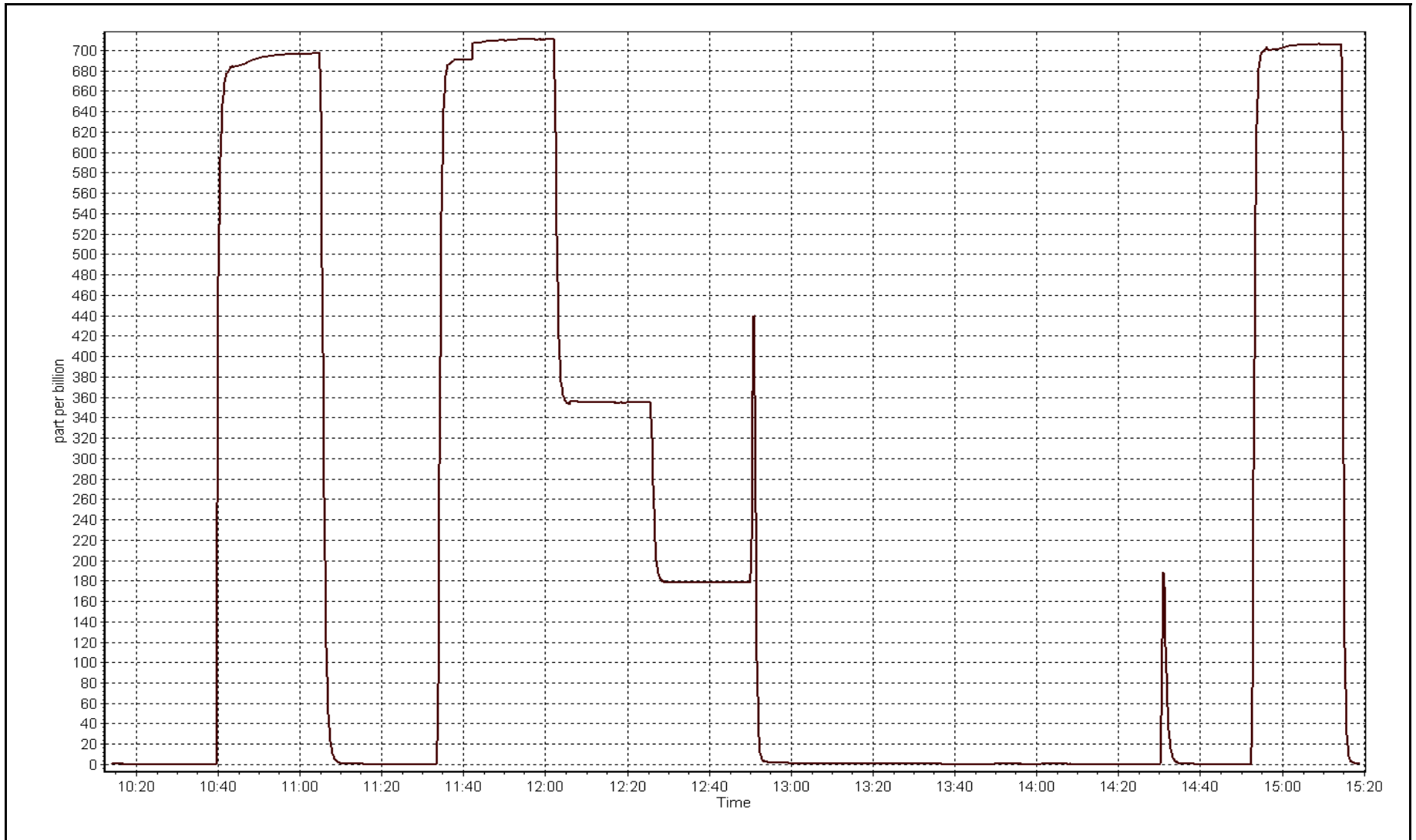
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999993
707.1	710.7	0.9949		
354.0	354.8	0.9977	Slope	0.995556
176.5	178.5	0.9890		
			Intercept	-0.209621



SO2 Calibration Plot

Date: June 15, 2015





Wood Buffalo Environmental Association TRS Calibration Report

Station Information

Calibration Date	June 17, 2015	Last Calibration	May 27, 2015
Station Name	Anzac	Station Number	AMS 14
Reason:	Routine		
Start Time (MST)	9:00	End Time (MST)	12:38
Gas Cert Reference	56532297-003	Station temp.	22 Deg C
Cal Gas Concentration	5.05 ppm	Cal Gas Exp Date	09/09/2017
Calibrator Make/Model	Sabio 4010	Serial Number	8400311
Dil air Make/Model	API 701	Serial Number	4764
DACS make/model	Campbell Scientific CR3000	DACS serial No.	8790
SO2 gas concentration	47.2 ppm	SO2 gas cert/exp	SA130026A 2016/12/12

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-732	-731
Analyzer IP address	192.168.1.42		Lamp voltage	992	985
Calculated slope	1.006780	0.999489	Chamber temp	45	45
Calculated intercept	0.286341	-0.188390	Pressure	656.8	662.0
Analyzer Background	1.69	1.76	Flow	0.390	0.391
Analyzer Coefficient	1.166	1.225	Intensity	95	98
			Converter temp.	800	800
Analyzer make/model	Thermo 43i-TLE		Analyzer serial #	1300156232	
Converter make/model	CDN-101		Converter serial #	510	

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.0	----
as found span	5000	74.3	75.0	70.3	1.067
SO2 scrubber check	5000	18.7	176.5	0.4	----
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	74.3	75.0	75.2	0.999
second point	5000	39.6	40.0	40.3	0.992
third point	5000	19.8	20.0	20.4	0.979
as left zero	5000	0.0	0.0	0.0	----
as left span	5000	74.3	75.0	77.5	0.969
Average Correction Factor					0.990

Corrected As found 70.4 Previous response 74.3 % change 5.5%

Notes:

High %change due to cal gas change and gooseneck installation. Span adjusted, filter change after As Finds. Scubber check after third point.

Calibration Performed By:

Ryan Power



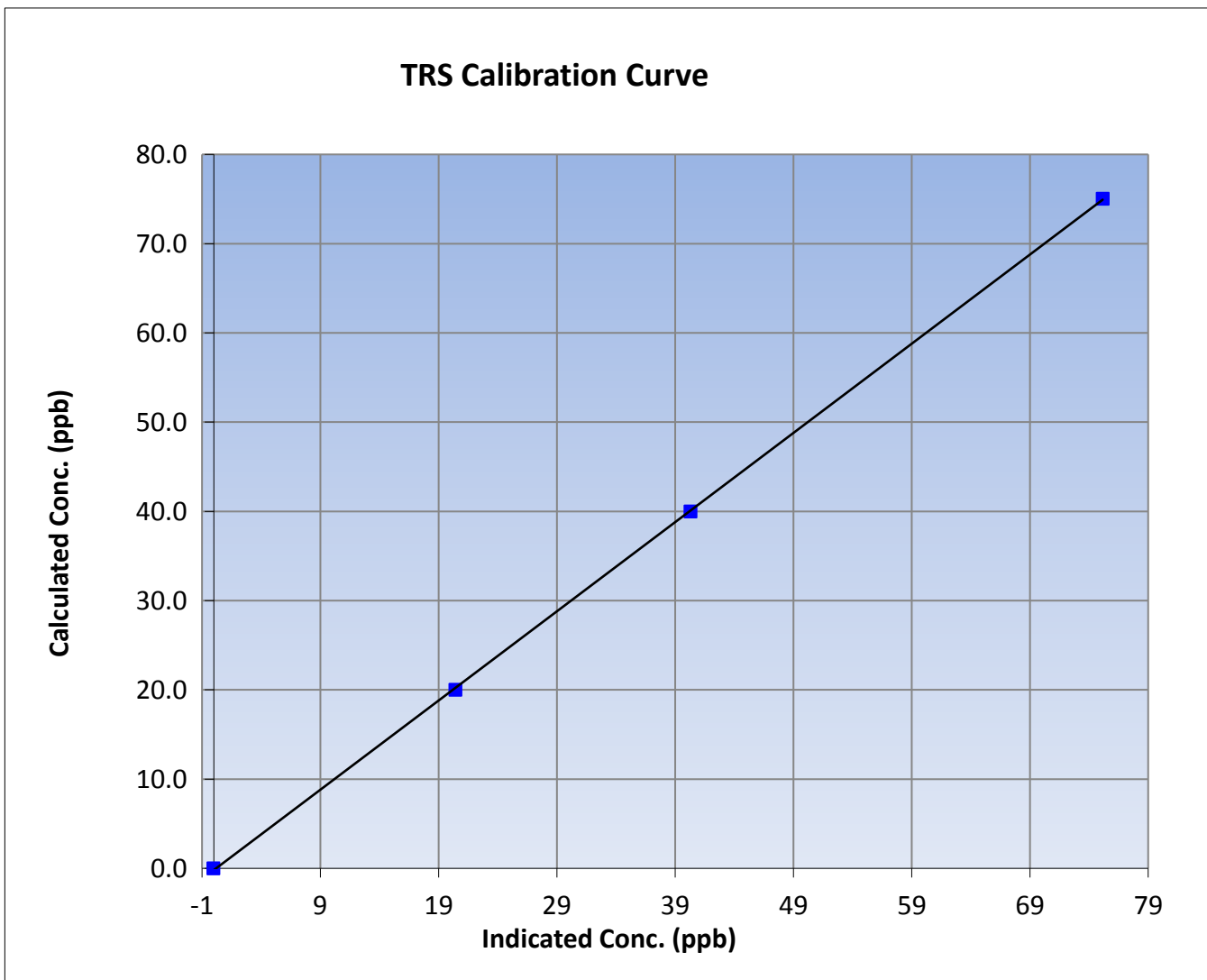
Wood Buffalo Environmental Association TRS Calibration Report

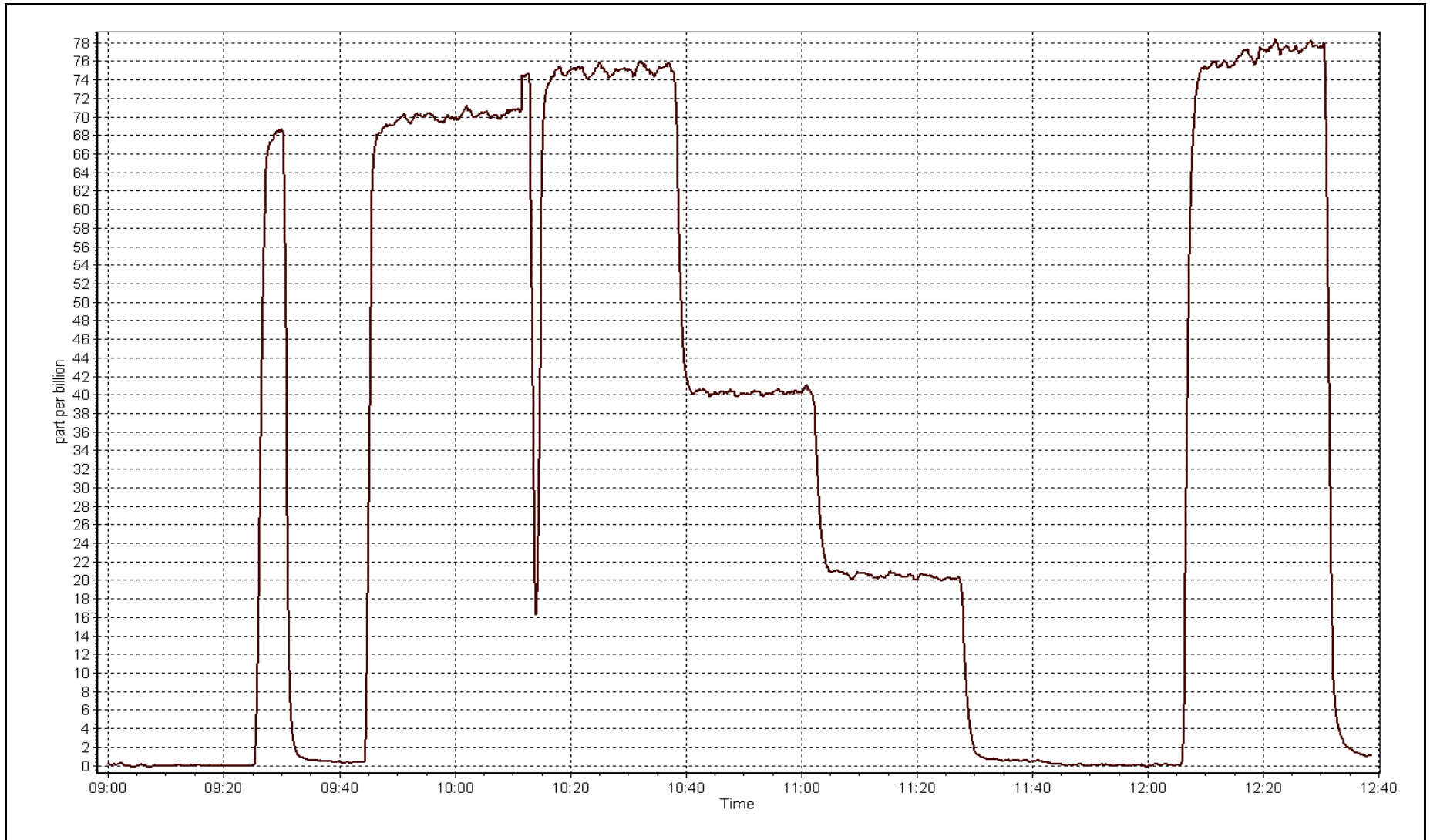
Station Information

Calibration Date	June 17, 2015	Previous Calibration	May 27, 2015
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	9:00	End Time (MST)	12:38
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	0.999959
75.0	75.2	0.9986		
40.0	40.3	0.9922	Slope	0.999489
20.0	20.4	0.9789		
			Intercept	-0.188390







Wood Buffalo Environmental Association THC / NMHC Calibration Report

Station Information

Calibration Date	June-15-15	Last Calibration	May-21-15
Station Name	Anzac	Station Number	AMS 14
Reason:	Routine		
Start Time (MST)	10:20	End Time (MST)	15:15
Gas Cert Reference	SA130026A	Cal Gas Expiry Date	December-12-16
CH4 Cal Gas Conc.	512.0 ppm	CH4 Equiv Conc.	1092.3 ppm
C3H8 Cal Gas Conc.	211.0 ppm	Station temp.	20 Deg C
Calibrator Model	Sabio 4010	Serial Number	8400311
ZAG make/model	Teledyne API 701	Serial Number	4764
DACS make/model	Campbell Scientific CR3000	Serial Number	8790

Analyzer Information

	Before	After		Before	After
THC Range (ppm)	0 - 50 ppm		Column Temp	74.9	75.1
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	175.0	175.1
Analyzer IP address	192.168.1.55		Flame Temp	405.0	398.0
THC Calc slope	0.999522	1.000912	Carrier Pressure	31.8	31.8
THC Calc intercept	0.008118	0.008186	Fuel Pressure	41.4	41.4
NMHC Calc slope	0.997898	1.002887	Air Pressure	32.4	32.4
NMHC Calc intercept	-0.005936	-0.009938			

Analyzer make Thermo 55i Analyzer serial # 1218153355

THC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	0.00	----
as found span	5000	74.9	16.36	15.84	1.033
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	74.9	16.36	16.36	1.000
second point	5000	37.5	8.19	8.12	1.009
third point	5000	18.7	4.09	4.10	0.996
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	74.9	16.36	16.28	1.005
Average Correction Factor					1.002

Corrected As found 15.84 Previous response 16.36 % change 3.3%

Notes:

Filter changed after As Found. Span adjusted

Calibration Performed By: Ryan Power



Wood Buffalo Environmental Association THC / NMHC Calibration Report

NMHC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0	0.00	0.00	----
as found span	5000	74.9	8.69	8.38	1.037
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	74.9	8.69	8.68	1.001
second point	5000	37.5	4.35	4.33	1.005
third point	5000	18.7	2.17	2.20	0.986
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	74.9	8.69	8.64	1.006
Average Correction Factor					0.998

Corrected As found 8.38 Previous response 8.72 % change 4.0%

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	74.9	7.67	7.45	1.029
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	74.9	7.67	7.67	1.000
second point	5000	37.5	3.84	3.79	1.013
third point	5000	18.7	1.91	1.89	1.013
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	74.9	7.67	7.64	1.004
Average Correction Factor					1.009

Corrected As found 7.45 Previous response 7.65 % change 2.6%



Wood Buffalo Environmental Association

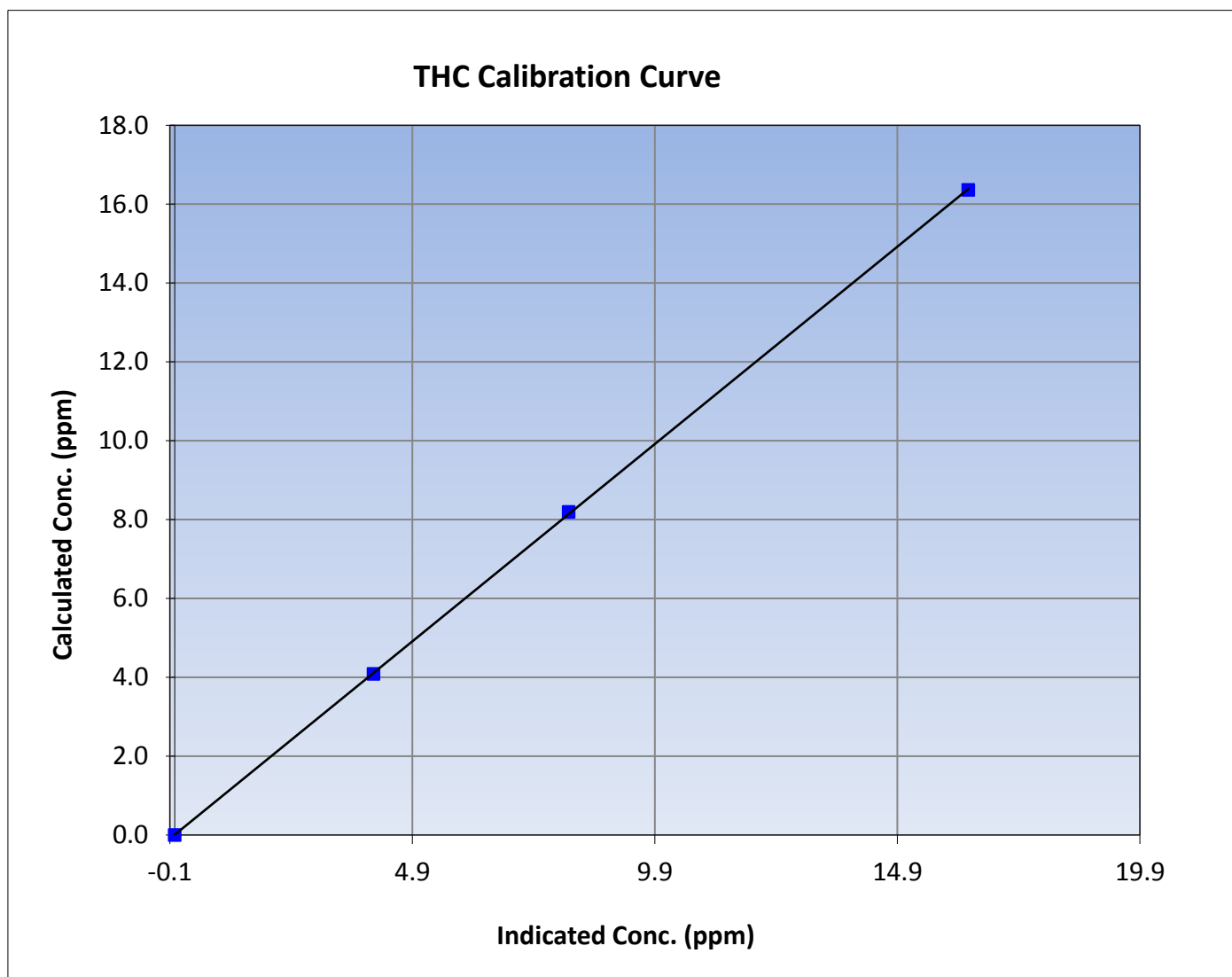
THC Calibration Summary

Station Information

Calibration Date	June 15, 2015	Previous Calibration	May 21, 2015
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	10:20	End Time (MST)	15:15
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	0.999970
16.36	16.36	1.0001		
8.19	8.12	1.0089	Slope	1.000912
4.09	4.10	0.9963		
			Intercept	0.008186





Wood Buffalo Environmental Association

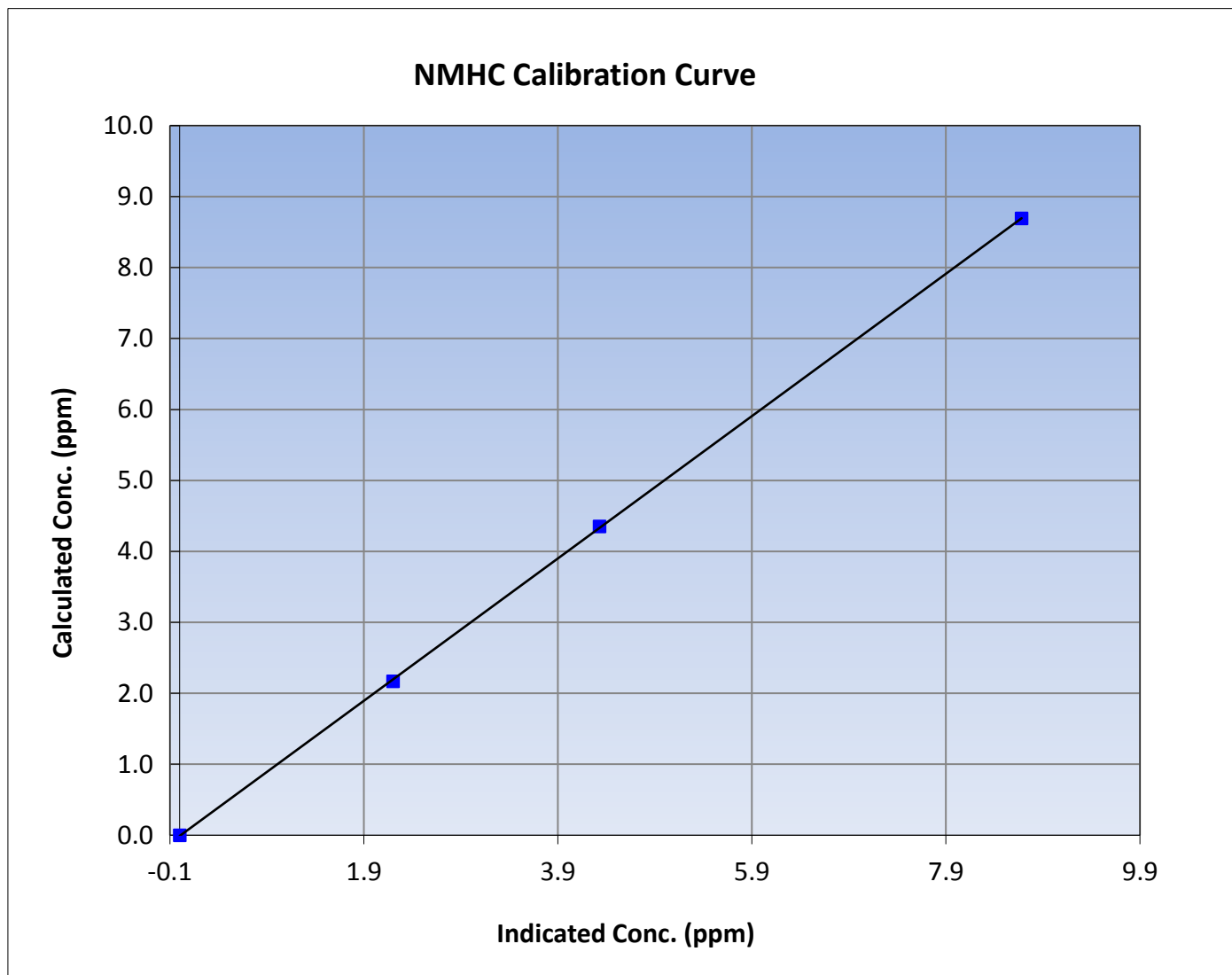
NMHC Calibration Summary

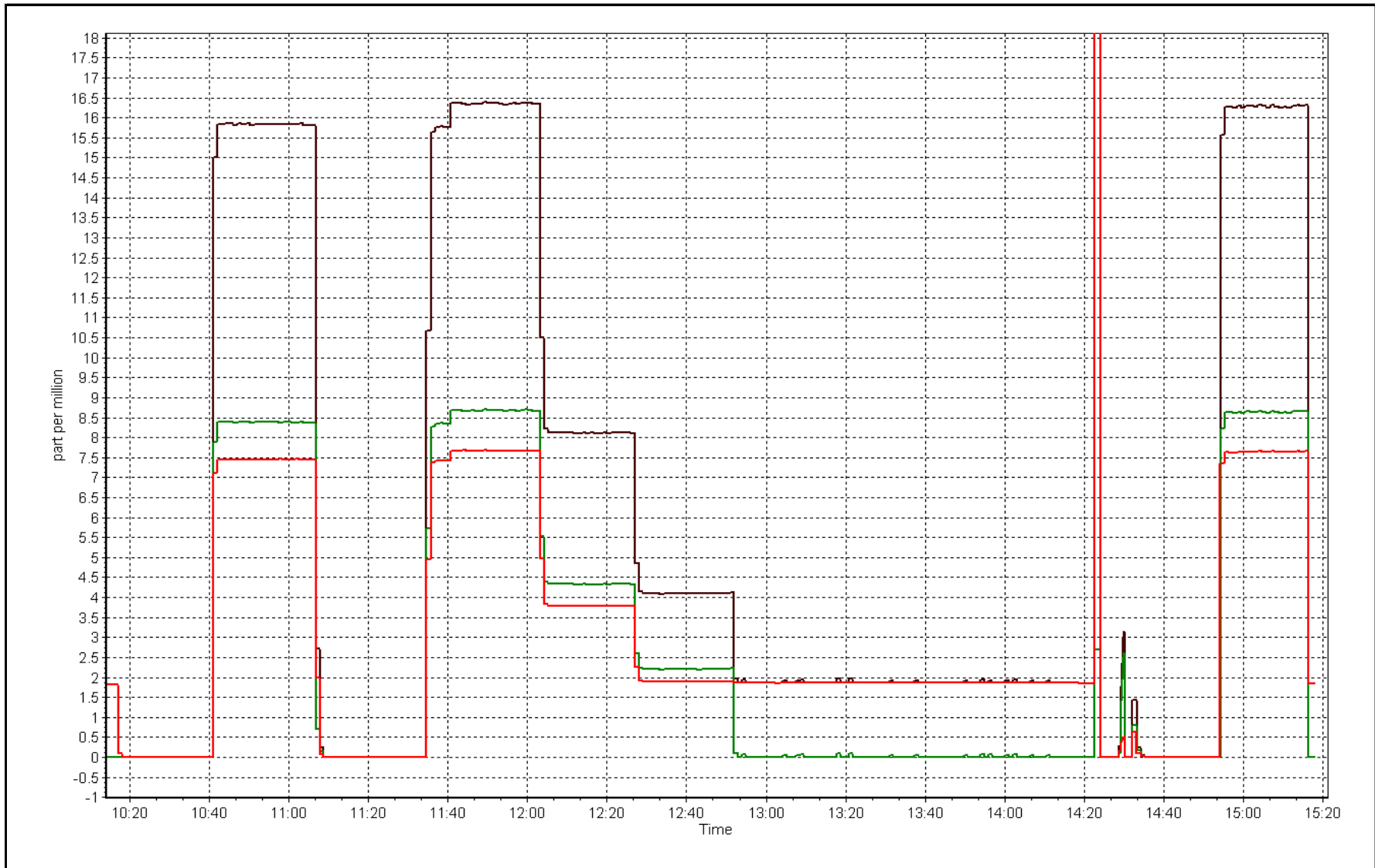
Station Information

Calibration Date	June 15, 2015	Previous Calibration	May 21, 2015
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	10:20	End Time (MST)	15:15
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	0.999972
8.69	8.68	1.0014		
4.35	4.33	1.0051	Slope	1.002887
2.17	2.20	0.9864		
			Intercept	-0.009938







Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

Calibration Date	June 16, 2015	Previous Calibration	May 22, 2015
Station Name	Anzac	Station Number	AMS 14
Reason:	Routine		
Start Time (MST)	9:00	End Time (MST)	12:38
NO2 GPT Ref date	June-15-15	Transfer Standard	NO2
		Station temp.	23 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	8400311
ZAG make/model	Teledyne API 701	Serial Number	4764
DACS make/model	Campbell Scientific CR3000	Serial Number	8790

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 500 ppb		Bench temp.	27.6	27.6
Analyzer IP address	192.168.1.48		Lamp temp.	53.8	53.8
Calculated slope	0.998394	1.002518	Pressure	656.7	657.4
Calculated intercept	-0.057943	-0.932870	Flow cell A	0.702	0.703
Analyzer Background	-0.8	-1.0	Flow cell B	0.706	0.704
Analyzer Coefficient	0.970	0.970	Cell A Intensity	131300	130300
			Cell B Intensity	134800	132900

Analyzer make	Thermo 49i	Analyzer serial #	1426262596
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Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator Lamp Intensity (mA)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.00	0.0	-0.3	----
as found span	5000	1.190	402.3	401.9	1.001
calibrator zero	5000	0.00	0.0	0.0	----
high point	5000	1.190	402.3	401.5	1.002
second point	5000	0.847	275.6	276.1	0.998
third point	5000	0.505	143.1	145.0	0.987
as left zero	5000	0.00	0.0	0.1	----
as left span	5000	1.190	402.3	408.6	0.985
Average Correction Factor					0.996

Corrected As found	402.2	Previous response	403.0	% change	0.2%
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Notes:

No adjustments. As Finds used as Calibrator Zero and High Point

Calibration Performed By:

Ryan Power



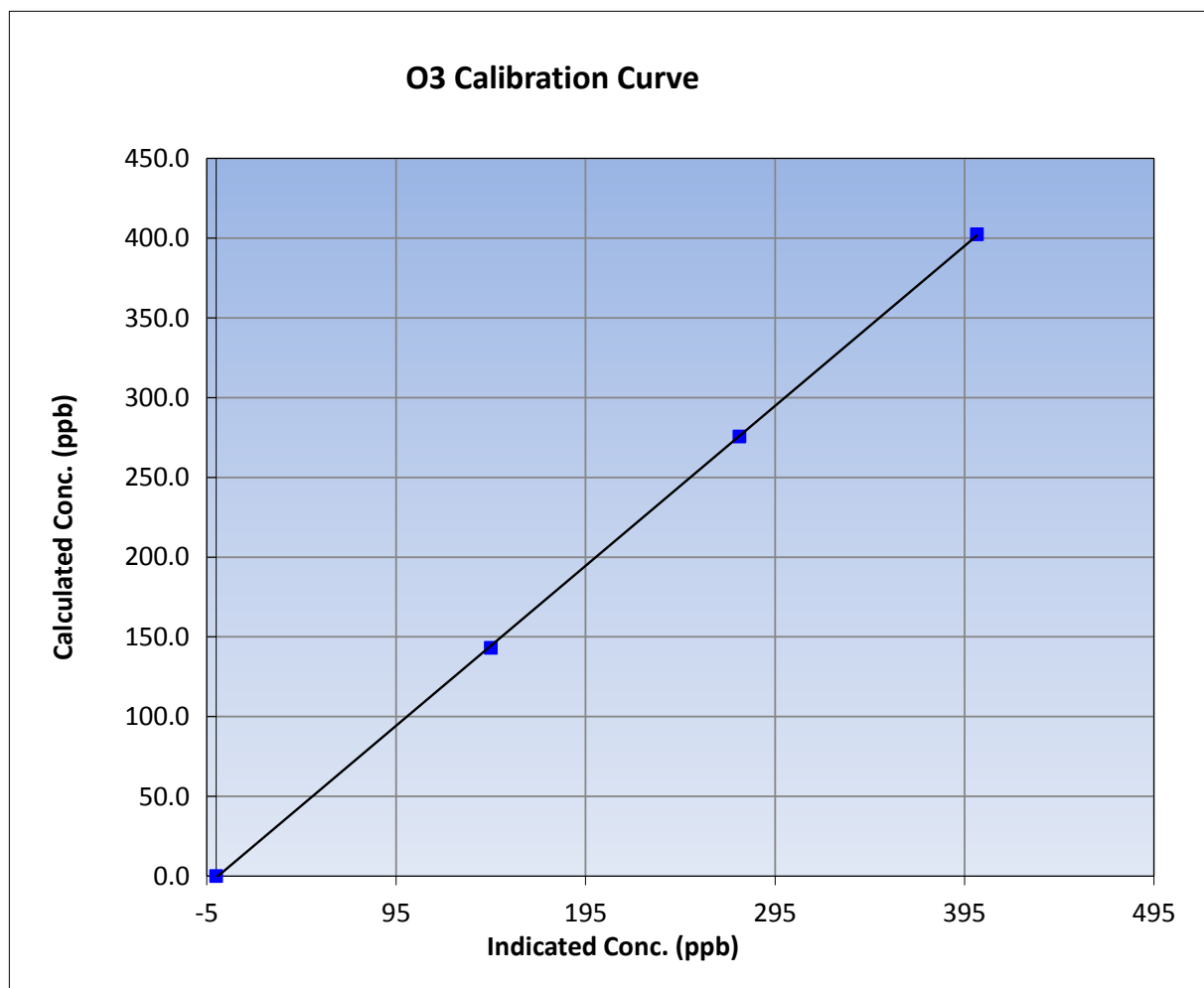
Wood Buffalo Environmental Association O3 Calibration Report

Station Information

Calibration Date	June-16-15	Previous Calibration	May 22, 2015
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	9:00	End Time (MST)	12:38
Analyzer make	Thermo 49i	Analyzer serial #	1426262596

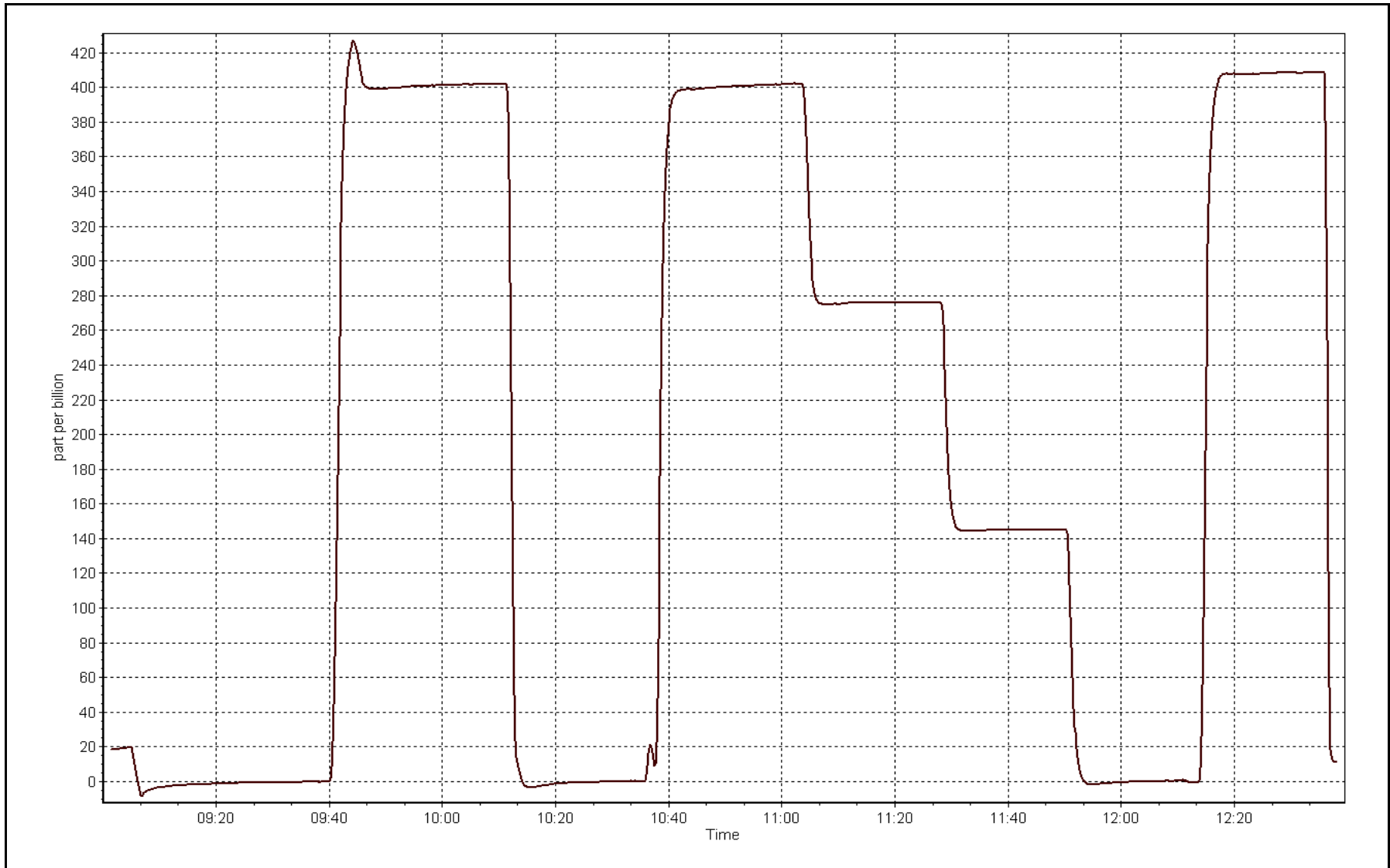
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999965
402.3	401.5	1.0019		
275.6	276.1	0.9980	Slope	1.002518
143.1	145.0	0.9870		
			Intercept	-0.932870



O3 Calibration Plot

Date: June 16, 2015





Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	June 15, 2015	Previous Calibration	May 21, 2015
Station Name	Anzac	Station Number	AMS 14
Reason:	Routine		
Start Time (MST)	10:20	End Time (MST)	15:15
NO Cal Gas Conc	53.4 ppm	Gas Cert Reference	SA130026A
NOx Cal Gas Conc	53.4 ppm	Cal Gas Expiry Date	12/12/2016
Calibrator	Sabio 4010	Serial Number	8400311
Zero air Generator	Teledyne API T701	Serial Number	4764

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	8790
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Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.998548	0.998570	0.999335
	Data Offset	0.068439	0.090685	-0.074630
Current Calibration	Data Slope	0.997531	1.001039	0.993927
	Data Offset	-0.211174	-0.394079	-1.156336

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1426262592
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Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
NO coefficient	0.677		0.679	
NOx coefficient	0.998		1.001	
NO2 coefficient	1.000		1.000	
NO bkgrnd	3.0		3.0	
NOx bkgrnd	3.2		3.2	
Chamber Temp	50	Deg C	50.3	Deg C
Moly Temp	324.2	Deg C	325	Deg C
PMT voltage	-845.1	V	-845.1	V
PMT Temp	-2.8	Deg C	-3.1	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	160.6	mmHg	157.9	mmHg
R Cell Press Nox	160.6	mmHg	158.2	mmHg
NO sample flow	0.845	lpm	0.83	lpm
Nox sample Flow	0.845	lpm	0.832	lpm

Notes:

Filter changed after As Finds. Span adjusted. No second high reference point due to power failure after third gpt point



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date:

June 15, 2015

Station Number:

AMS 14

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	0.0	0.1	-0.1	----	----
as found span	5000	74.9	799.9	799.9	0.0	797.5	796.8	0.7	1.0031	1.0039
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	0.2	-0.1	----	----
high point	5000	74.9	799.9	799.9	0.0	802.3	799.6	2.7	0.9971	1.0004
second point	5000	37.5	400.5	400.5	0.0	401.1	399.9	1.2	0.9986	1.0015
third point	5000	18.7	199.7	199.7	0.0	201.0	200.6	0.5	0.9935	0.9958
as left zero	5000	0.0	0.0	0.0	0.0	0.3	0.3	0.0	----	----
as left span	5000	74.9	799.9	397.7	402.2	805.5	394.1	411.4	0.9931	1.0092
Average Correction Factor									0.9964	0.9992

Corrected As found

NO_x= 797.5

NO= 796.8

Percent Change

NO_x= 0.4%

NO= 0.5%

Previous Response

NO_x= 801.0

NO= 801.0

GPT Calibration Data

Dilution Flow

5000

ccm

Source Gas Flow

74.9

ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
Cal zero			0.0			-0.1			N/A	
1st NO2 (300)	----	397.7	402.3	802.7	397.7	405.0	0.9819	1.0000	0.9934	100.7%
2nd NO2 (200)	----	524.4	275.6	803.3	524.4	279.0	0.9811	1.0000	0.9881	101.2%
3rd NO2 (100)	----	656.9	143.1	803.8	656.9	146.9	0.9805	1.0000	0.9742	102.6%
4th NO2 (0)	800.0	----	2.2	802.2	800.0	2.2	0.9825	1.0000	N/A	----
Average Correction Factor							0.9815	1.0000	0.9852	101.5%

Calibration Performed By:

Ryan Power



Wood Buffalo Environmental Association

NO_x Calibration Summary

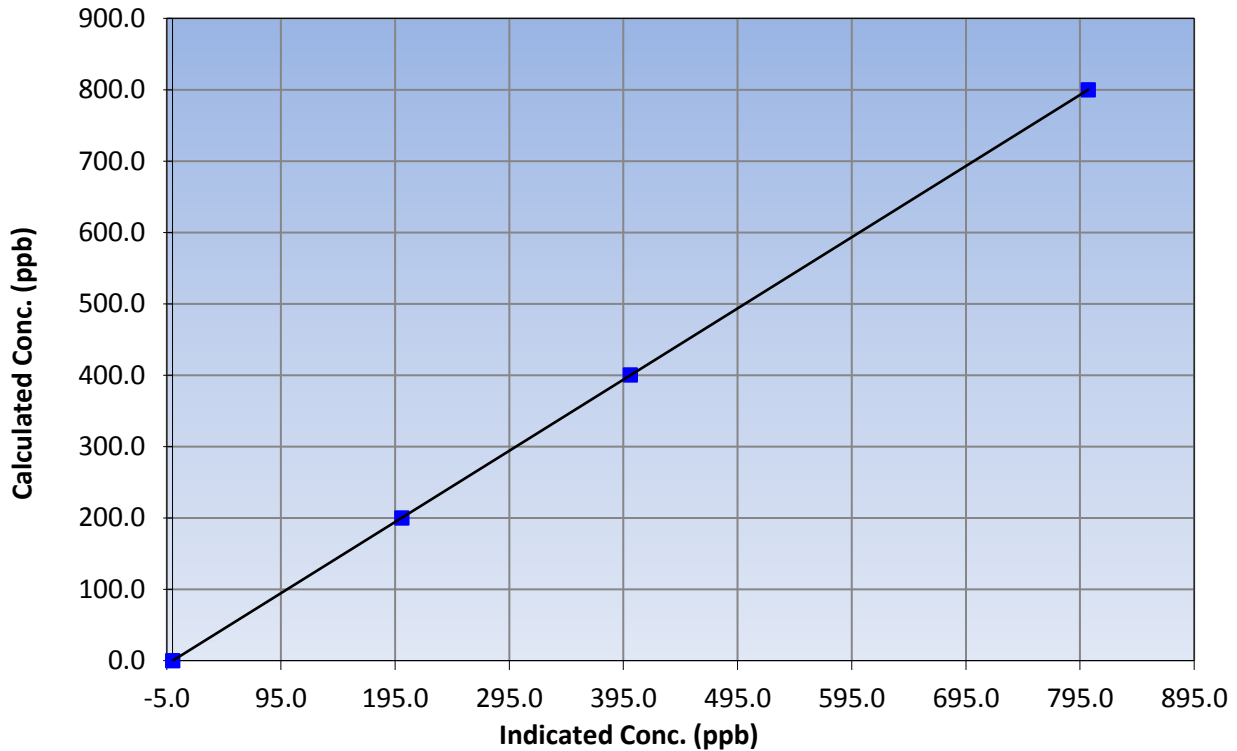
Station Information

Calibration Date	June 15, 2015	Previous Calibration	May 21, 2015
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	10:20	End Time (MST)	15:15
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	0.999998
799.9	802.3	0.9971		
400.5	401.1	0.9986	Slope	0.997531
199.7	201.0	0.9935		
			Intercept	-0.211174

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

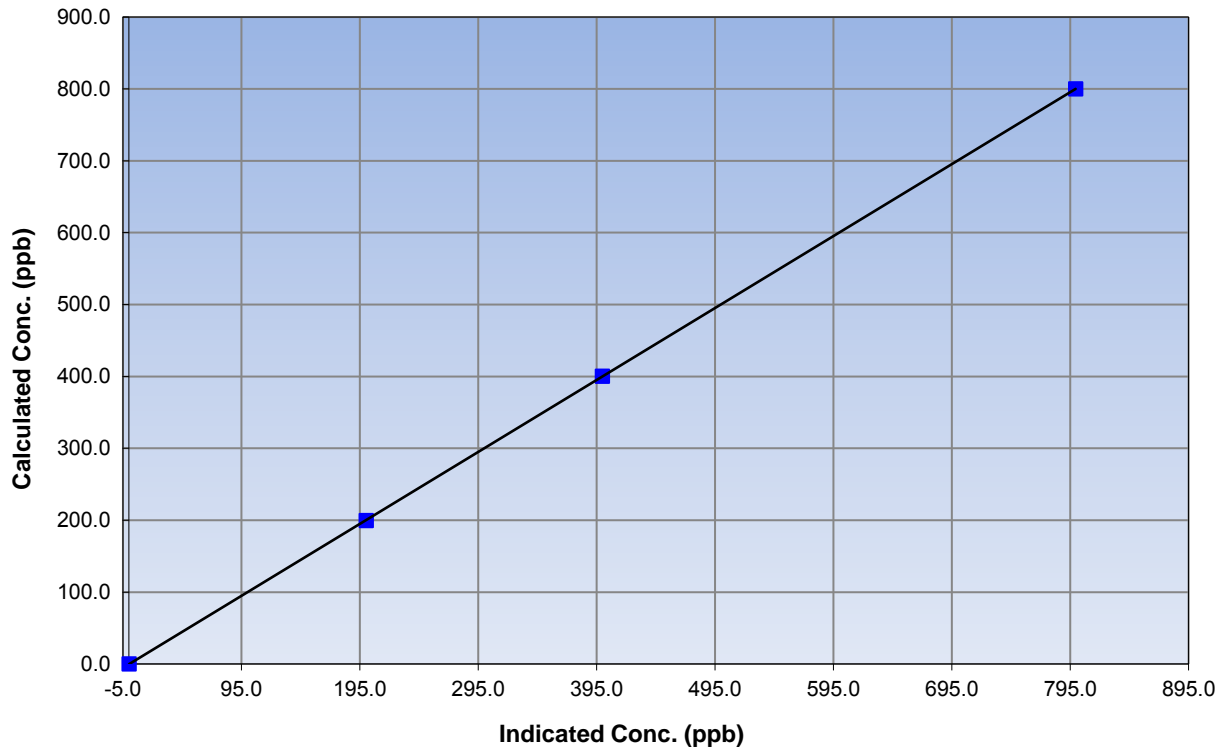
Station Information

Calibration Date	June 15, 2015	Previous Calibration	May 21, 2015
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	10:20	End Time (MST)	15:15
Analyzer make	Thermo 42i	Analyzer serial #	1426262592

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	N/A	Correlation Coefficient	0.999998
799.9	799.6	1.0004		
400.5	399.9	1.0015	Slope	1.001039
199.7	200.6	0.9958		
			Intercept	-0.394079

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

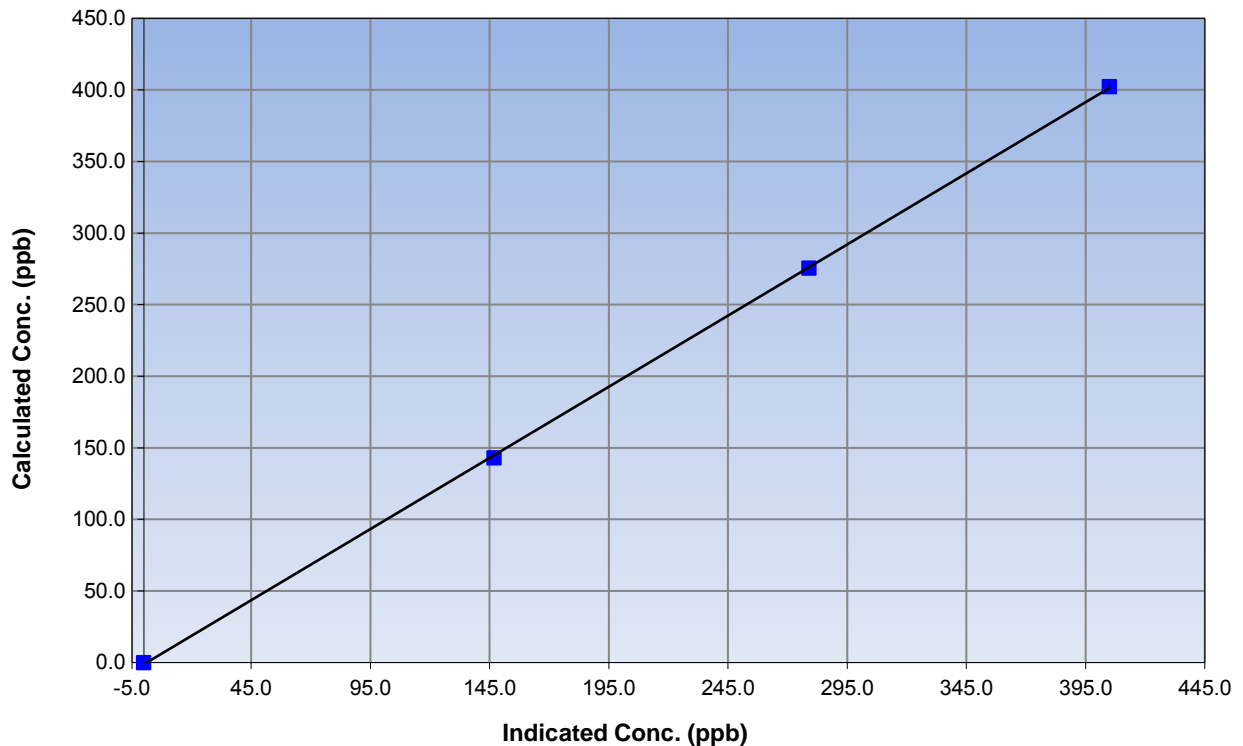
Station Information

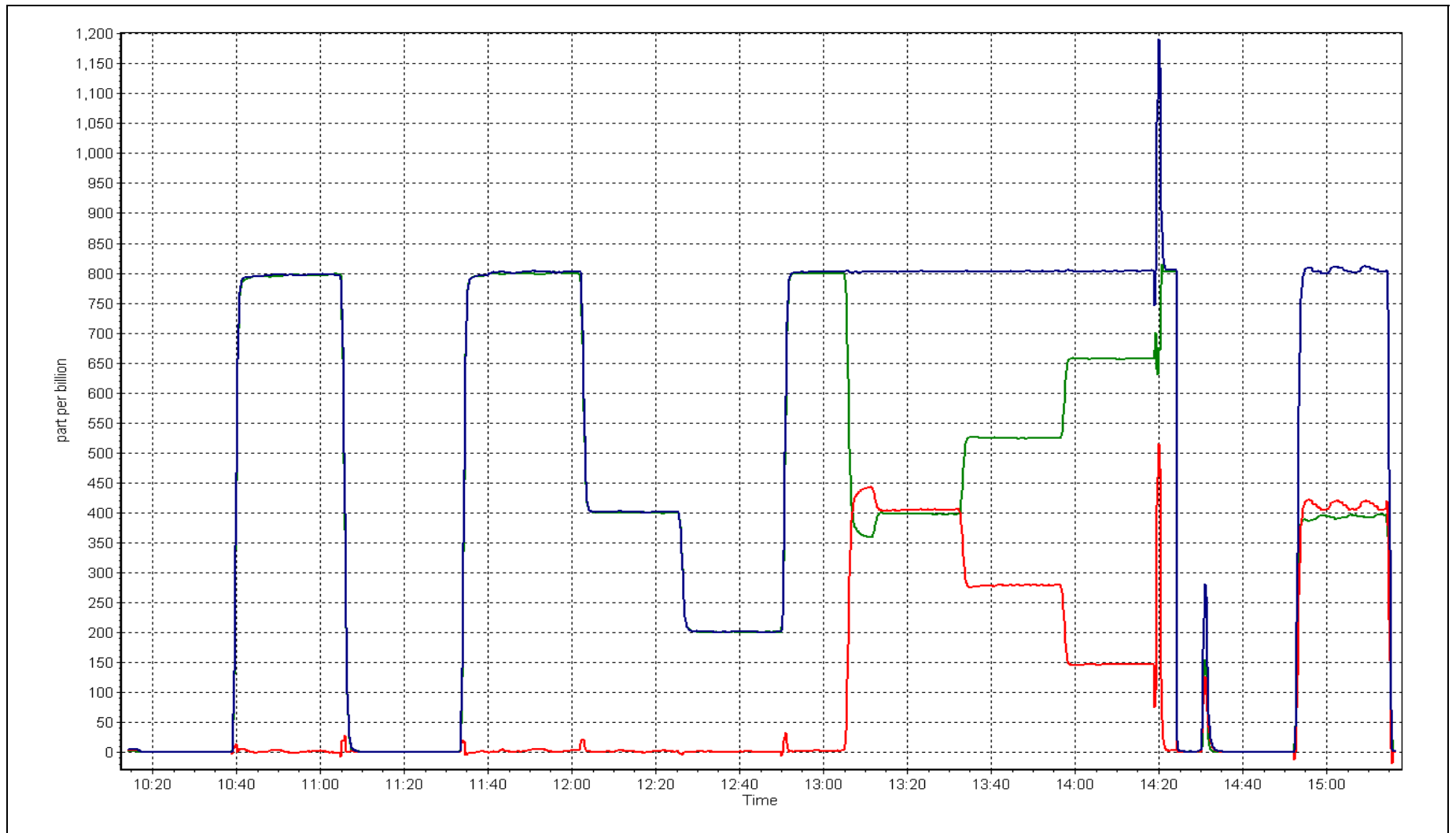
Calibration Date	June 15, 2015	Previous Calibration	May 21, 2015
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	10:20	End Time (MST)	15:15
Analyzer make	Thermo 42i	Analyzer serial #	1426262592

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999936
402.3	405.0	0.9934		
275.6	279.0	0.9881	Slope	0.993927
143.1	146.9	0.9742		
			Intercept	-1.156336

NO₂ Calibration Curve







Wood Buffalo Environmental Association

SHARP CALIBRATION

STATION INFORMATION

Calibration Date:	<u>June 17, 2015</u>	Previous Calibration:	<u>May 27, 2015</u>
Station Name:	<u>Anzac</u>	Station Number:	<u>AMS 14</u>
Start Time (MST):	<u>11:30</u>	End Time (MST):	<u>12:15</u>
Calibrator Make/Model:	<u>Delta Cal</u>	Calibrator Serial Number:	<u>1212</u>

SHARP INFORMATION

Particulate Fraction:	<u>PM2.5</u>
Make/Model:	<u>Thermo / SHARP 5030</u>
Serial Number:	<u>E-2025</u>
Source SN:	<u>4933</u>
HEPA PN:	<u>12144</u>
Time Correct (MST):	<u>YES</u>
Parameters Checked:	<u>T1, T2, T2,T4, P3, Main Flow, Beta, Neph</u>

CALIBRATION DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	11.0	10.6	-0.4	11.0
T2	28.0	na	na	24.0
T3	25.0	na	na	23.0
T4	23.0	na	na	28.0
RH (%)	19.0	na	na	28.0

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	961	962.0	1.0	961

Main Flow (Lph)

Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
1000	1005	5	1005	1000

Nephelometer Calibration

Parameter	As Found	Zeroed (Limit +/- 2.0ug/m3)	As Left
Analog	189		189
Neph	0.5		0.5
C14	450		450
Indicated Concentration (ug/m3)	0.2	no	0.2
Offset 1	161.4		161.4
Offset 2	28.8		28.8

Leak Check (Quarterly)

Leak Check Date:	<u>April 27, 2015</u>	Previous Leak Check Date:	NA
	Measured	Difference LPM (Limit +/- 0.42 LPM)	
Flow without adaptor (LPM):	16.60		
Flow with adaptor [turn off pump first](LPM):	16.50	0.10	

Mass Foil Calibration (Annually)

Foil Calibration Date:	<u>June 17, 2015</u>	Previous Foil Calibration:	NA
Zeroed?:			
Foil Mass:	<u>1278</u>		
Previous Correction Factor:	<u>7020</u>	Mass foil set S/N:	2520
New Correction Factor:	<u>6936</u>		

INSPECTION DATA

Item	Condition	Date of install or rebuild
Cyclone	Good / cleaned	17/06/2015
Pump	Good	NA
Filter Tape	Good	NA
Mass Foil Cal Set	Good	NA
HEPA filter	Good	NA

NOTES:

No adjustments, Foil cal carried out

Calibration Performed By:

Ryan Power



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 15
CNRL HORIZON
JUNE 2015**

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

July 30, 2015



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CNRL HORIZON (AMS 15)
 JUNE 2015

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	685	35	35	100.00	72	0	9	0
TRS (ppb) Average	683	35	37	99.72	1	0	1	0
THC (ppm) Average	684	35	36	99.86	6.1	-	2.9	-
NO2 (ppb) Average	684	35	36	99.86	36	0	11	-
NO (ppb) Average	684	35	36	99.86	50	-	4	-
NOX (ppb) Average	684	35	36	99.86	79	-	15	-
PM2.5 (ug/m3) Average	718	0	2	99.72	352.2	-	163.7	5
Temperature 2 m (C) Average	720	0	0	100.00	32.3	-	24.4	-
Wind Speed 10 m (km/h) Average	720	0	0	100.00	29	-	17.0	-
Wind Direction 10 m (deg) Average	720	0	0	100.00	-	-	-	-
Precipitation (mm) Total	720	0	0	100.00	6.9	-	11.4	-
Relative Humidity (%) Average	720	0	0	100.00	99	-	72	-
Global Solar Radiation (W/m2) Average	720	0	0	100.00	919	-	378	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CNRL HORIZON (AMS 15)
 JUNE 2015

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	685	1.5	5	-	0	0	0	0	1	3	72
TRS (ppb) Average	683	0.2	0	-	0	0	0	0	0	0	1
THC (ppm) Average	684	2.14	0.3	-	1.8	1.9	2	2.1	2.2	2.4	6.1
NO2 (ppb) Average	684	4	6	-	0	0	1	2	5	10	36
NO (ppb) Average	684	1.2	4	-	0	0	0	0	0	2	50
NOX (ppb) Average	684	5.2	9	-	0	0	1	2	5	13	79
PM2.5 (ug/m3) Average	718	24.19	43.3	-	1.7	3.6	5.3	9.2	20.7	48.5	352.2
Temperature 2 m (C) Average	720	16.88	6.5	-	-3.1	9.4	12.2	16.6	21.2	25.6	32.3
Wind Speed 10 m (km/h) Average	720	8.6	5	-	0	3	5	8	11	16	29
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-
Precipitation (mm) Total	720	-	-	33.02	-	-	-	-	-	-	-
Relative Humidity (%) Average	720	55.3	22	-	18	26	36	55	73	87	99
Global Solar Radiation (W/m2) Average	720	280.9	298	-	0	0	3	161	523	764	919

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CNRL HORIZON (AMS 15)
JUNE 2015

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
TRS	18 Jun 2015 12:00	18 Jun 2015 13:00	2	Maintenance - cleaned glass manifold
THC	19 Jun 2015 10:00	19 Jun 2015 10:00	1	Station Power Failure
NO2, NO, NOX	19 Jun 2015 10:00	19 Jun 2015 10:00	1	Station Power Failure
PM2.5	22 Jun 2015 15:00	22 Jun 2015 16:00	2	Maintenance - Flow and zero check, sample head cleaning



Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 72 ppb on Jun 21 19:00	Maximum Daily Average: 9.3 ppb on Jun 21		Hours of Data:	685
Minimum Value: 0 ppb on Jun 1 07:00	Minimum Daily Average: 0.0 ppb on Jun 27		Hours of Missing Data:	35
Maximum Diurnal Average: 3.7 ppb at hour 19	Minimum Diurnal Average: 0.1 ppb at hour 2		Hours of Calibration:	35
Monthly Average: 1.5 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 3 P ₉₉ = 21		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	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-Jun	0	0	0	Z	0	0	0	1	0	0	0	1	6	20	26	18	6	5	5	4	2	1	0	1	4.3	26
3-Jun	0	0	0	0	Z	0	0	17	30	11	1	3	12	8	4	4	3	5	3	2	2	1	1	2	4.8	30
4-Jun	1	0	0	0	0	Z	1	1	0	1	0	1	2	4	3	1	0	0	0	0	0	0	0	0	0.8	4
5-Jun	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	3	2	1	0	0.4	3
6-Jun	0	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
7-Jun	0	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-Jun	0	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-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
10-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.1	1
11-Jun	Z	0	0	0	0	0	0	1	8	13	4	7	7	4	1	0	0	0	0	1	2	0	0	6	2.3	13
12-Jun	2	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2
13-Jun	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
14-Jun	0	0	0	Z	0	0	0	0	0	0	1	1	1	0	0	12	20	13	22	10	2	0	0	30	4.9	30
15-Jun	1	0	0	0	Z	0	1	2	0	0	2	6	1	0	0	0	6	1	0	0	0	0	0	0	1.0	6
16-Jun	1	0	0	0	0	Z	0	0	0	0	3	3	3	5	7	5	2	6	1	4	0	0	0	5	2.0	7
17-Jun	Z	1	1	0	2	9	15	0	1	0	3	12	4	2	0	0	0	0	1	4	3	3	2	1	2.8	15
18-Jun	0	Z	0	0	0	0	1	4	4	1	C	C	C	C	C	1	3	3	1	0	0	0	0	1	1.1	4
19-Jun	5	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.3	5
20-Jun	0	0	0	Z	0	0	0	2	3	6	22	13	6	9	4	7	3	0	0	0	0	0	0	1	3.4	22
21-Jun	0	0	0	0	Z	0	0	0	8	60	32	6	4	10	3	10	0	7	72	0	0	0	0	0	9.3	72
22-Jun	0	0	0	0	0	Z	0	1	3	1	7	14	3	16	2	0	0	0	0	1	1	0	0	0	2.2	16
23-Jun	Z	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-Jun	0	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-Jun	0	0	Z	0	0	0	0	0	0	0	0	1	4	5	14	1	1	0	2	1	1	0	0	0	1.3	14
26-Jun	0	0	0	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-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
28-Jun	0	0	0	0	0	Z	0	2	3	1	2	0	0	0	1	1	1	1	1	1	0	0	1	0	0.6	3
29-Jun	Z	0	1	1	1	1	1	0	0	0	0	1	0	0	0	1	1	1	1	1	1	1	1	2	0.7	2
30-Jun	2	Z	2	1	0	0	0	1	0	0	0	0	2	2	2	3	2	2	1	1	1	0	0	0	1.0	3

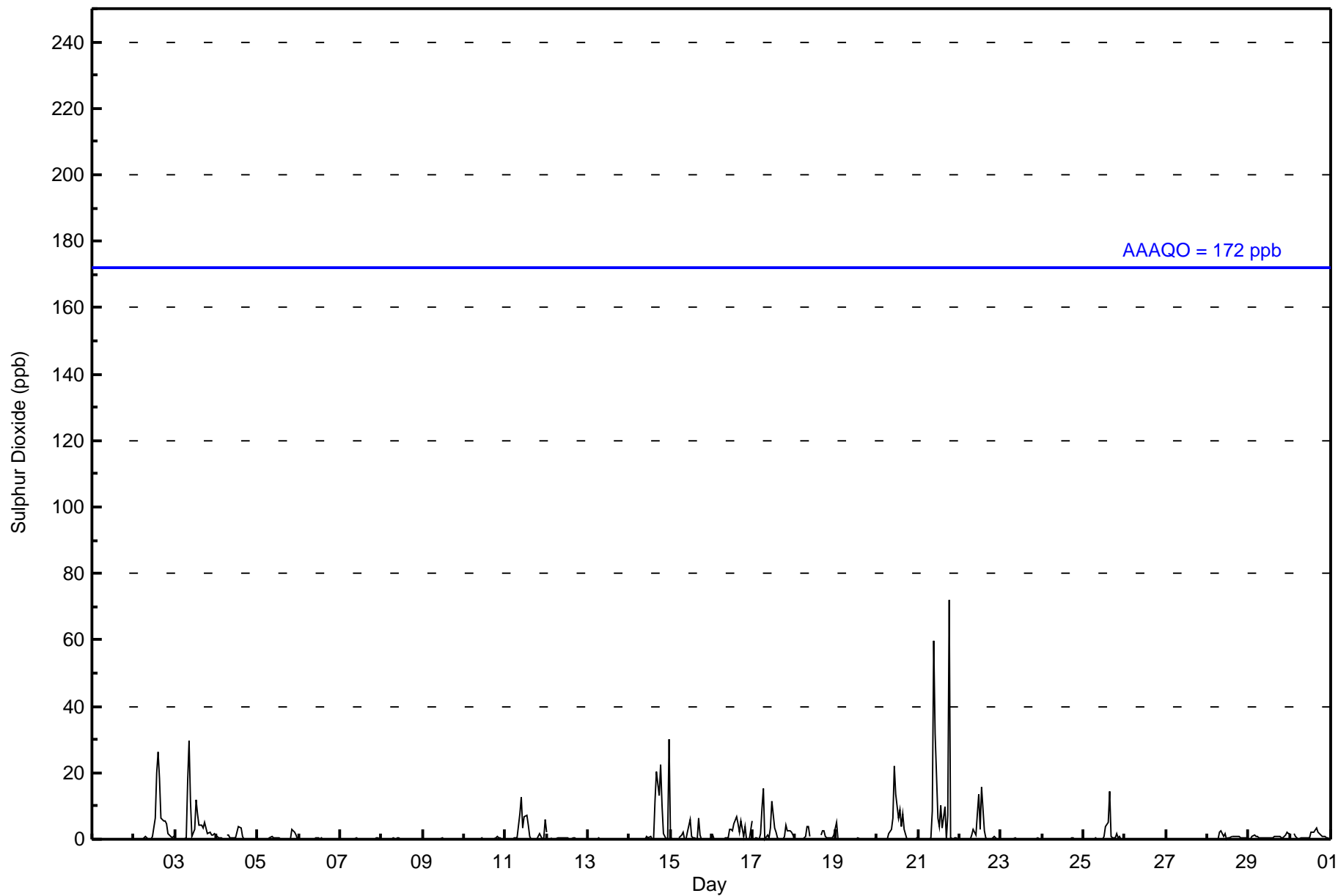
0.6	0.1	0.2	0.1	0.1	0.5	0.8	1.2	2.1	3.2	2.8	2.4	1.8	3.0	2.1	2.6	1.7	1.5	3.7	1.0	0.6	0.4	0.4	1.7	Diurnal Average	
5	1	2	1	2	9	15	17	30	60	32	14	12	20	26	18	20	13	72	10	3	3	2	30	Diurnal Maximum	

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



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
CNRL Horizon - June 2015





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
CNRL Horizon - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	662	96.64	96.64
11 - 20	15	2.19	98.83
21 - 60	7	1.02	99.85
61 - 110	1	0.15	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
CNRL Horizon - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	83	59	11	17	13	19	16	37	72	87	62	29	49	46	34	28	662
11 - 20	4	1	1	0	0	1	0	6	0	0	0	0	0	0	0	2	15
21 - 60	2	2	0	0	0	0	1	1	0	0	0	0	0	0	1	0	7
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
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	89	62	12	17	13	20	17	44	72	87	62	29	49	46	35	31	685

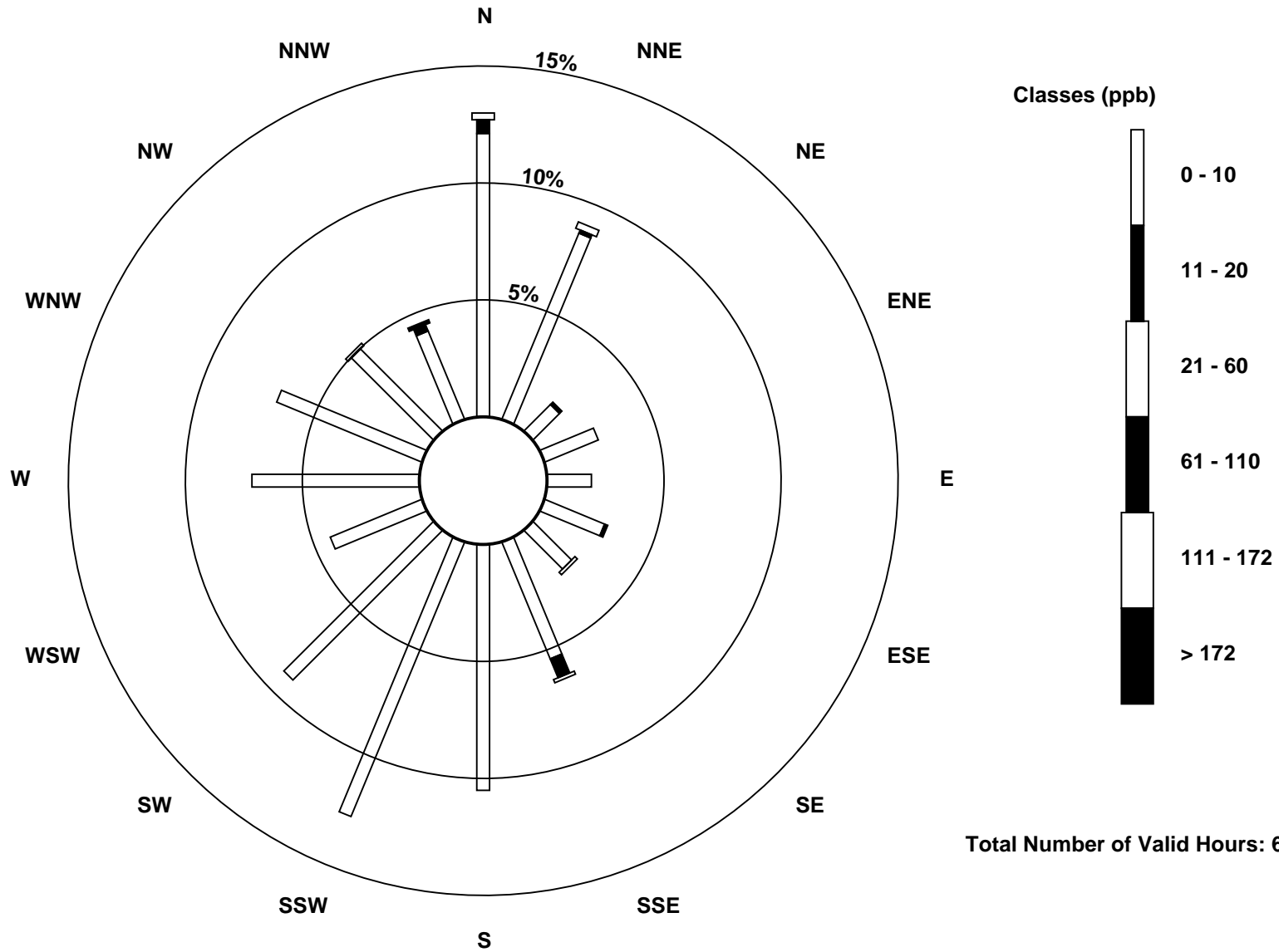
Total Number of Valid Hours: 685

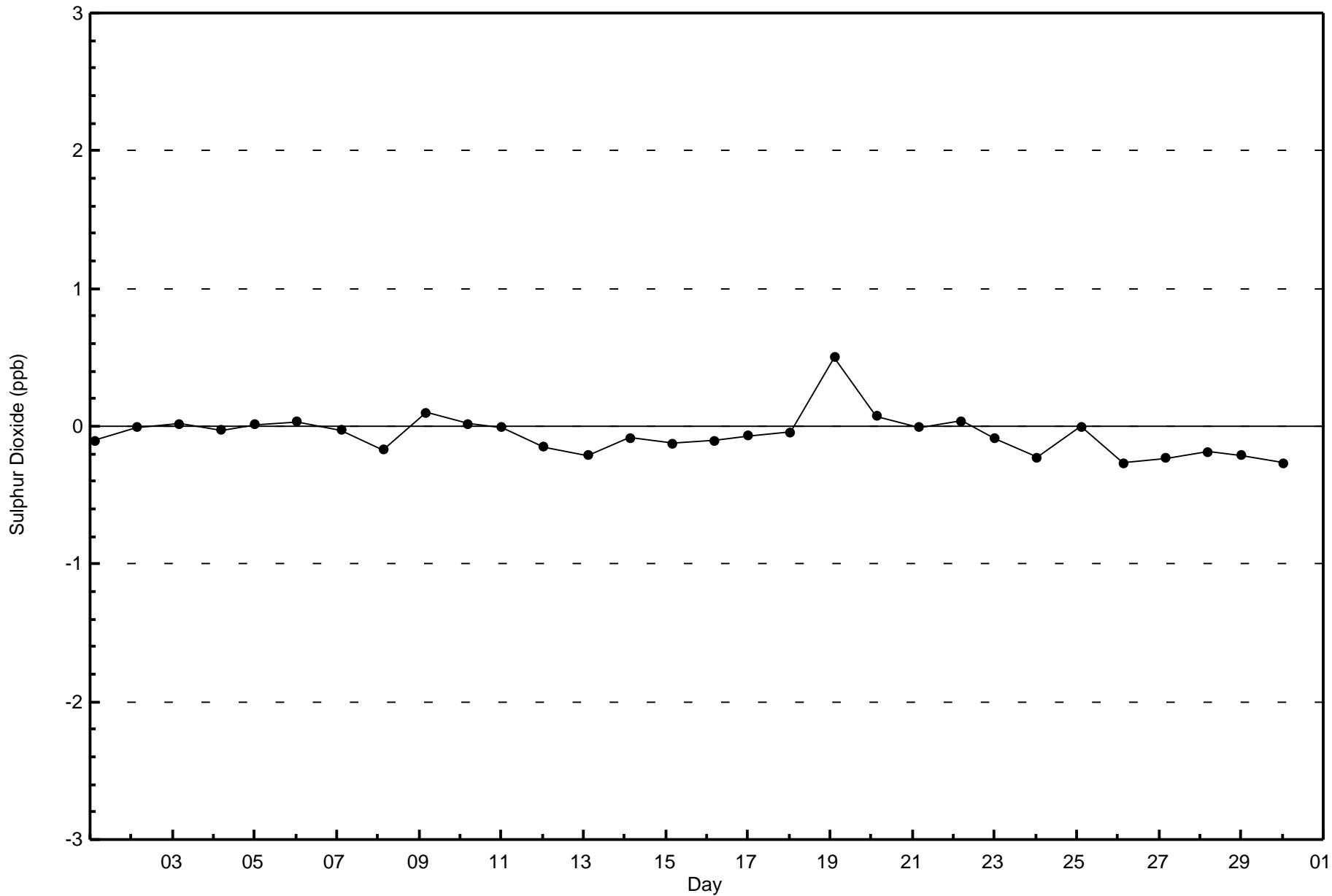
Total Number of Hours: 720

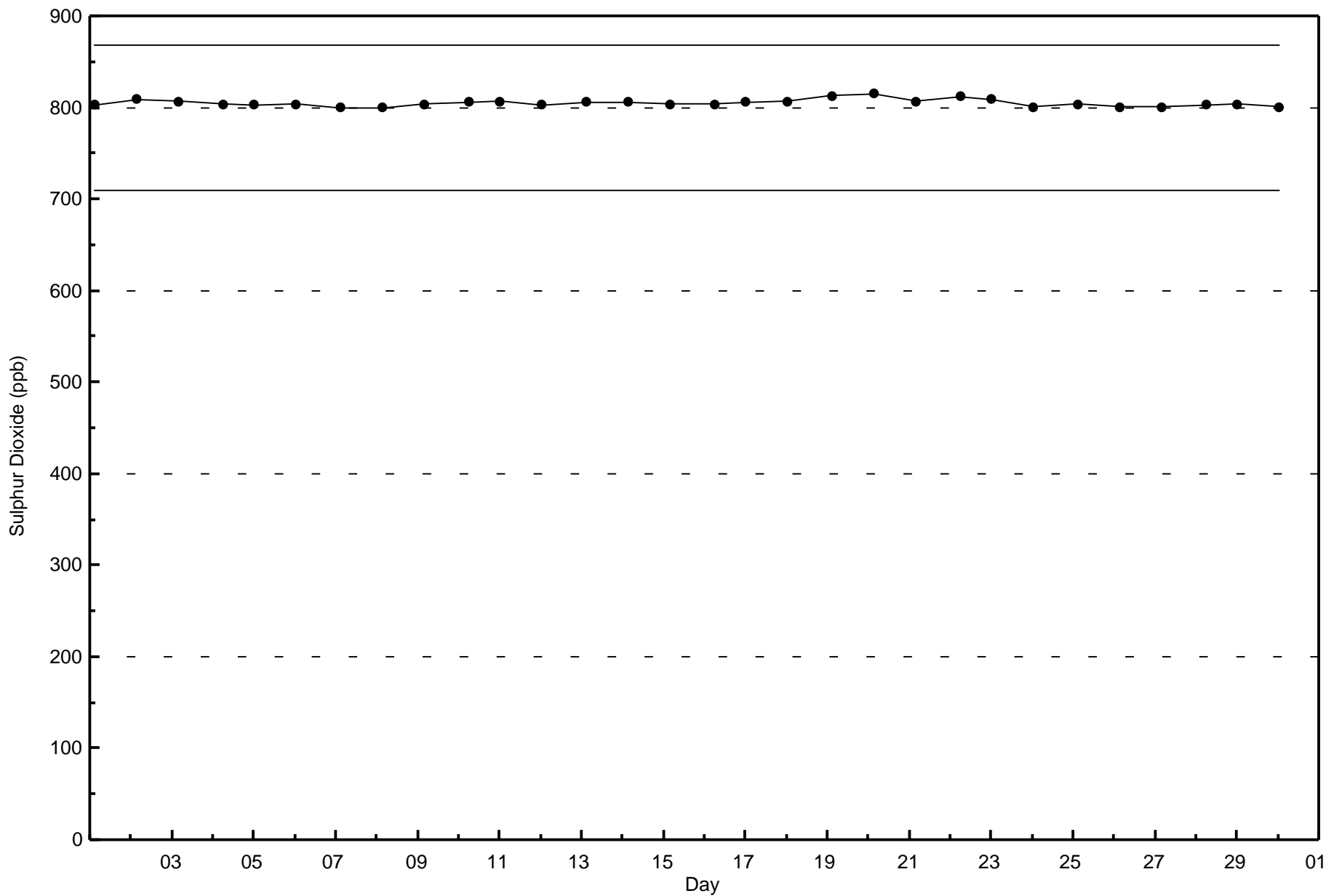


Wood Buffalo Environmental Association
Wind Rose Jun 2015

Sulphur Dioxide (SO₂) - ppb
CNRL Horizon (AMS 15)









Summary of Hour Averages

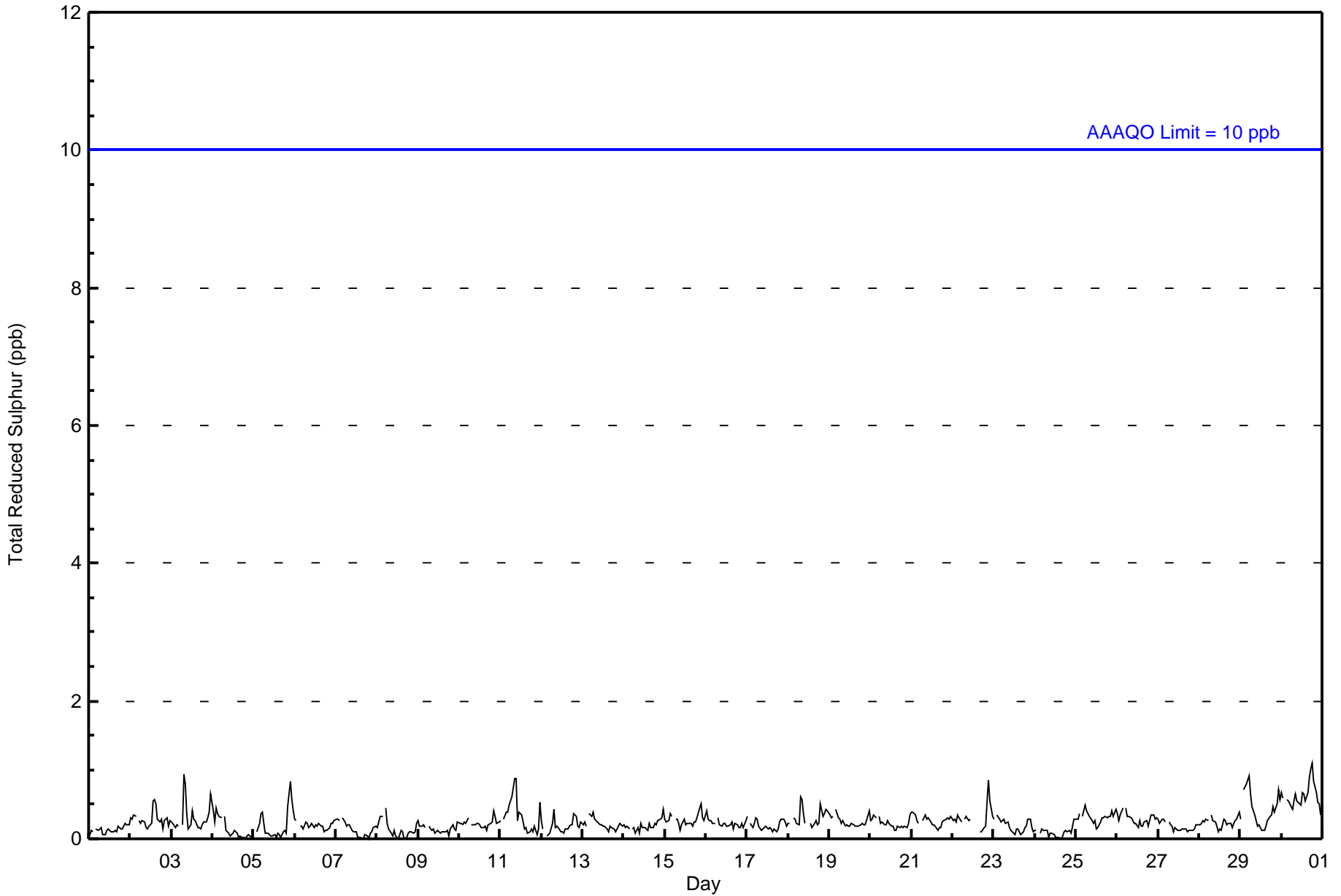
CNRL Horizon - June 2015

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 1 ppb on Jun 30 19:00	Maximum Daily Average: 0.6 ppb on Jun 30		Hours of Data:	683
Minimum Value: 0 ppb on Jun 7 17:00	Minimum Daily Average: 0.1 ppb on Jun 24		Hours of Missing Data:	37
Maximum Diurnal Average: 0.3 ppb at hour 6	Minimum Diurnal Average: 0.2 ppb at hour 17		Hours of Calibration:	35
Monthly Average: 0.2 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1		Percent Operational Time:	99.7

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
2-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0.3	1
3-Jun	0	0	0	0	0	Z	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.3	1
4-Jun	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
5-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.2	1
6-Jun	0	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-Jun	0	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
8-Jun	0	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-Jun	0	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-Jun	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-Jun	0	Z	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.3	1
12-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
13-Jun	0	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-Jun	0	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-Jun	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
16-Jun	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-Jun	0	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-Jun	0	0	Z	0	0	0	0	1	1	0	0	M	M	0	0	0	0	0	0	0	1	0	0	0	0.3	1
19-Jun	0	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-Jun	0	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-Jun	0	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-Jun	0	0	0	0	0	0	Z	0	0	0	0	C	C	C	C	C	0	0	0	0	0	1	1	1	0.3	1
23-Jun	0	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-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
25-Jun	0	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-Jun	0	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-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
28-Jun	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-Jun	0	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.4	1
30-Jun	1	1	Z	1	1	1	0	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	0	0.6	1

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	0.3	0.3	Diurnal Average
1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	Diurnal Maximum

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
CNRL Horizon - June 2015

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

Total Number of Valid Hours: 683

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
CNRL Horizon - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	89	61	11	17	13	20	17	43	72	89	60	30	49	46	35	31	683
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	89	61	11	17	13	20	17	43	72	89	60	30	49	46	35	31	683

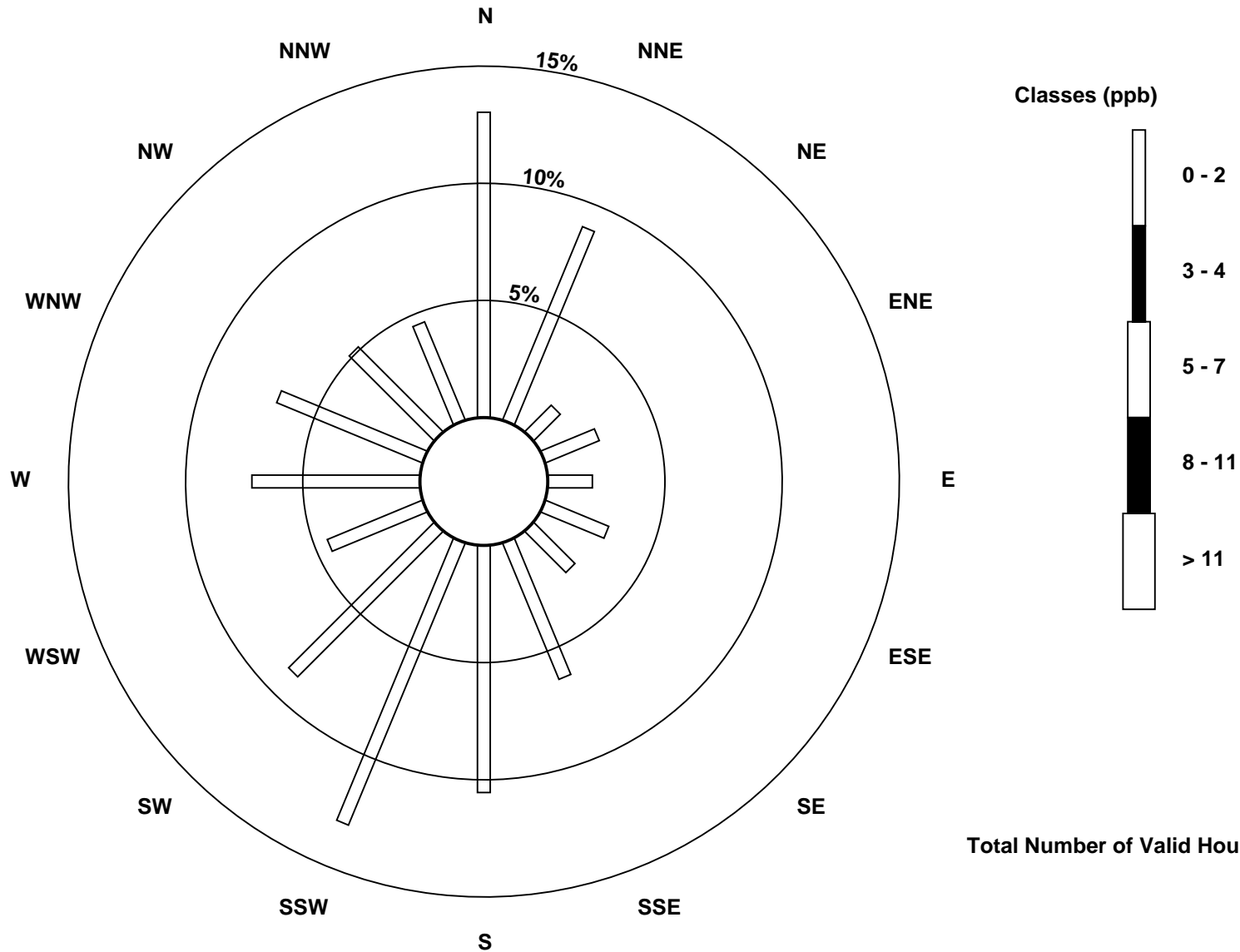
Total Number of Valid Hours: 683

Total Number of Hours: 720

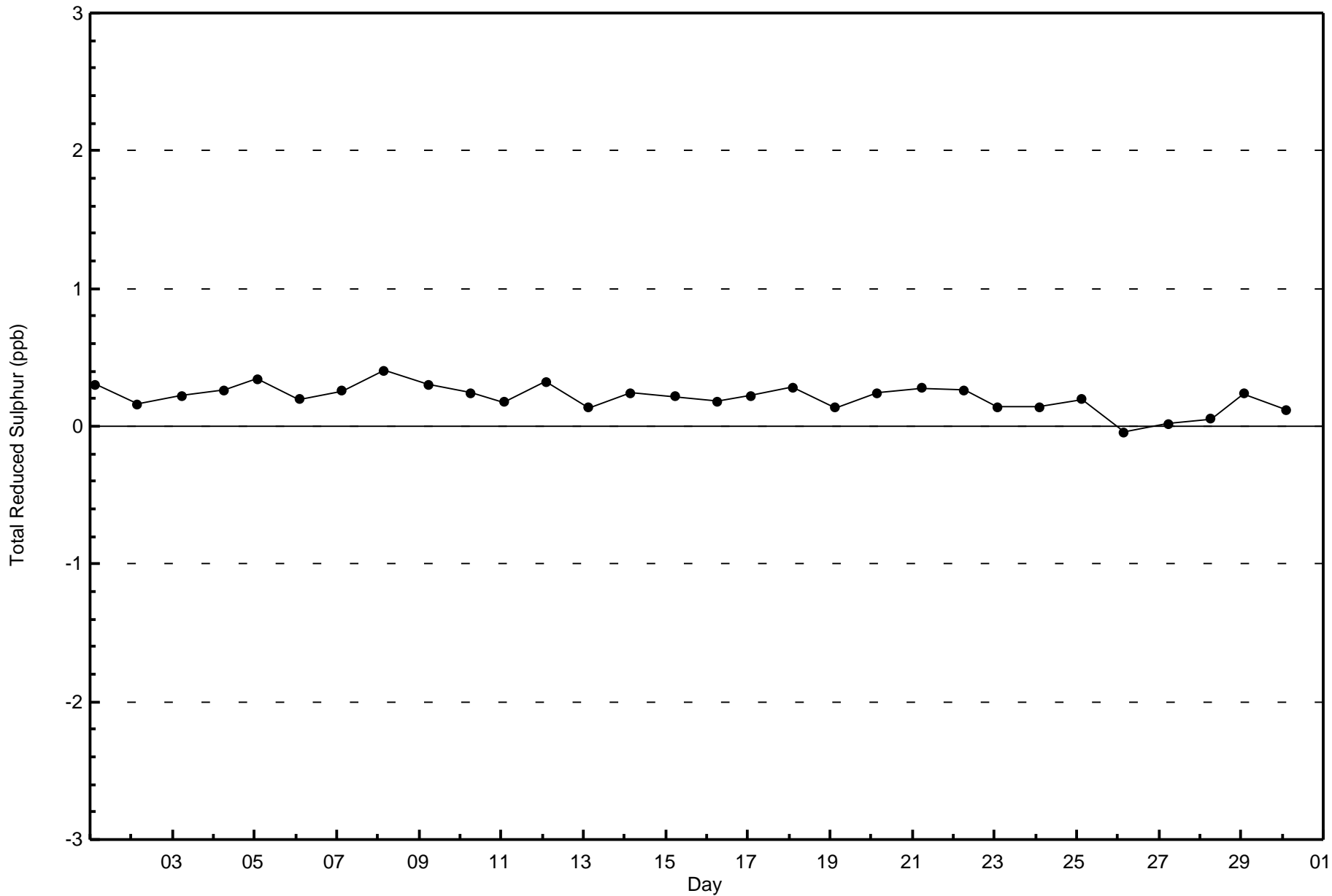


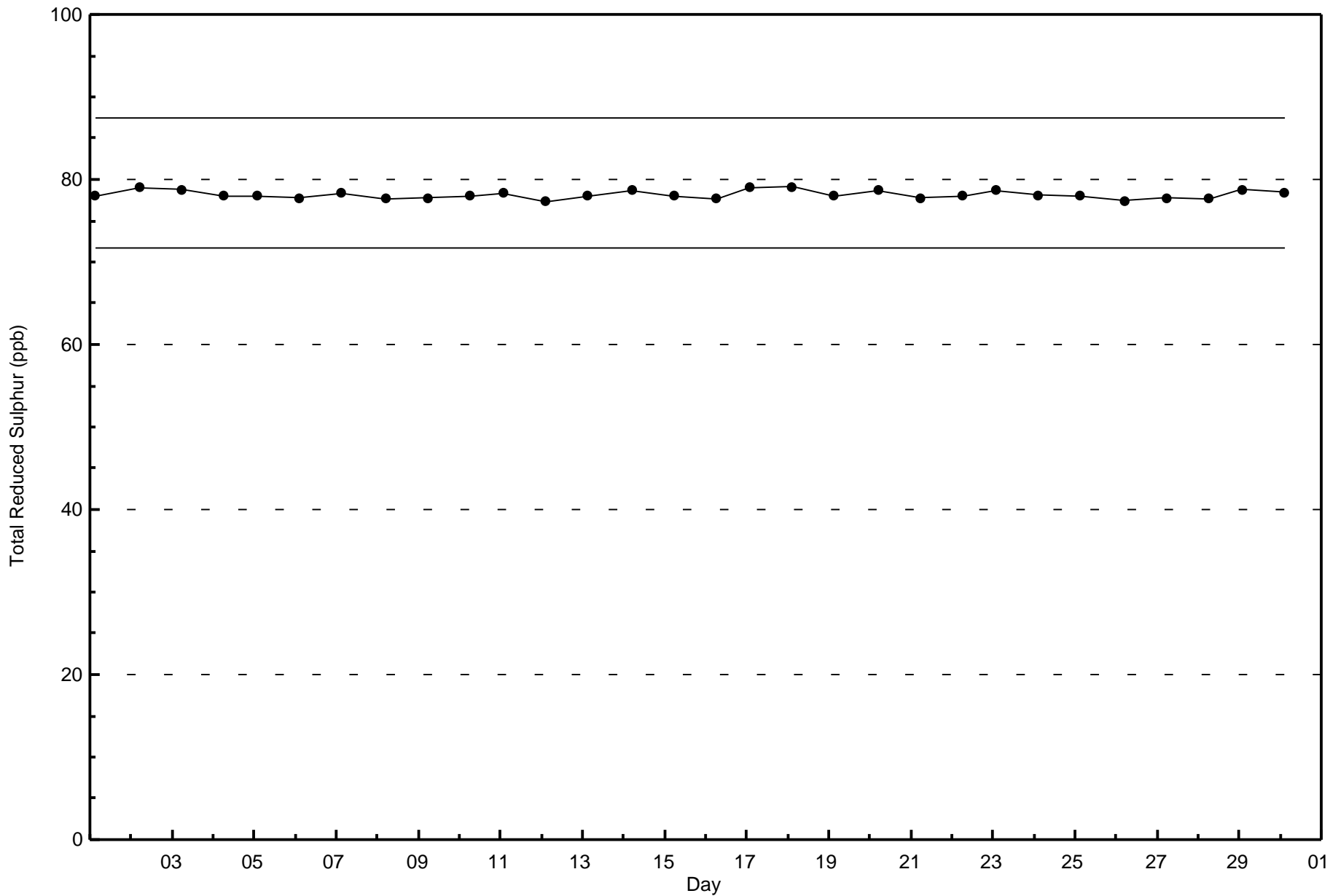
Wood Buffalo Environmental Association
Wind Rose Jun 2015

Total Reduced Sulphur (TRS) - ppb
CNRL Horizon (AMS 15)



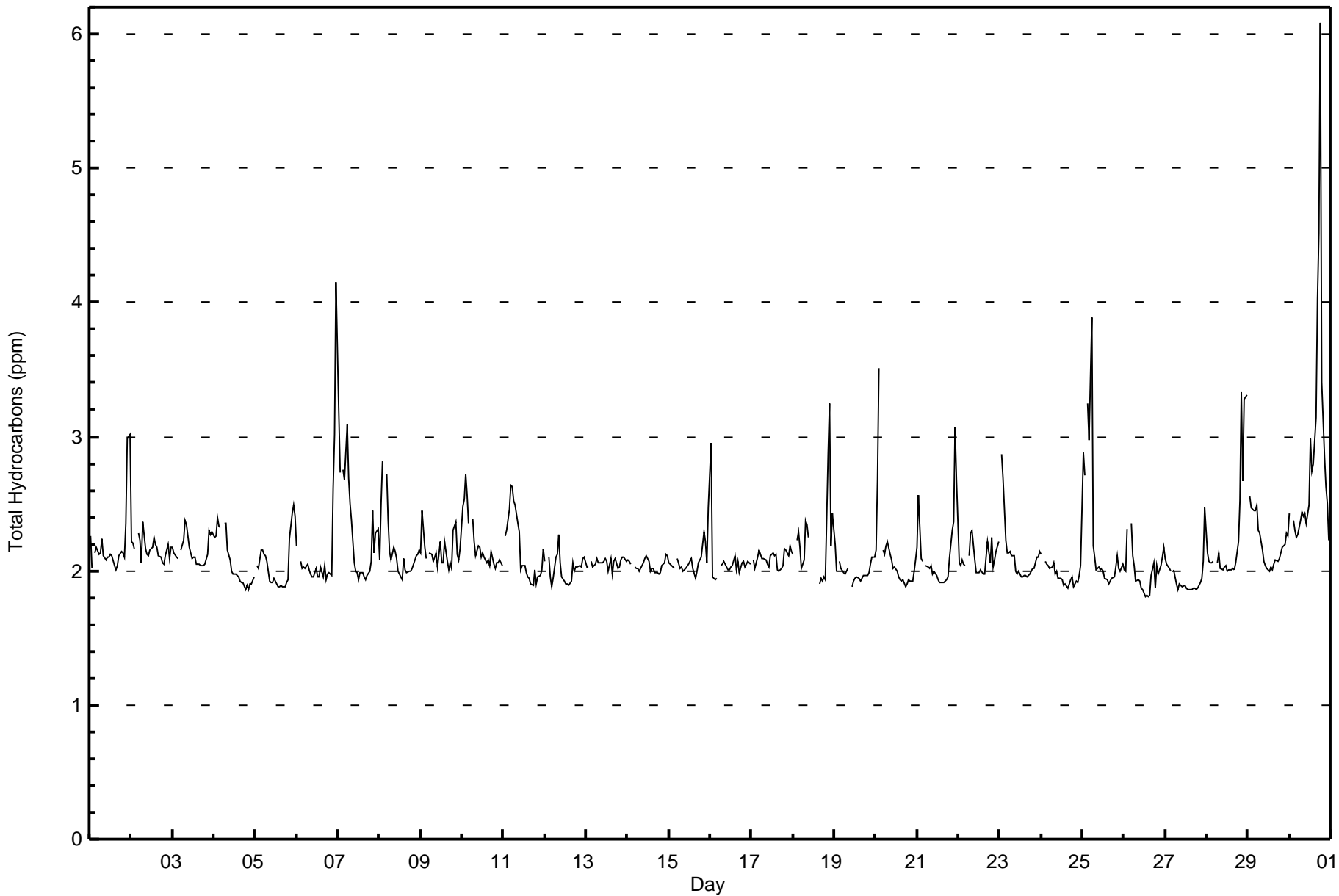
Total Number of Valid Hours: 683







Maximum Value: 6.1 ppm on Jun 30 19:00 Maximum Daily Average: 2.9 ppm on Jun 30																				Hours in Service: 720 Hours of Data: 684 Hours of Missing Data: 36 Hours of Calibration: 35 Percent Operational Time: 99.9							
Minimum Value: 1.8 ppm on Jun 26 13:00 Minimum Daily Average: 1.9 ppm on Jun 27 Maximum Diurnal Average: 2.3 ppm at hour 24 Minimum Diurnal Average: 2.0 ppm at hour 16 Monthly Average: 2.14 ppm Percentiles: P ₁ = 1.9 P ₁₀ = 1.9 Q ₁ = 2.0 Median = 2.1 Q ₃ = 2.2 P ₉₀ = 2.4 P ₉₉ = 3.4																											
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	2.3	2.0	Z	2.1	2.2	2.1	2.1	2.2	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	2.4	3.0	3.0	2.2	3.0	
2-Jun	2.2	2.2	2.2	Z	2.3	2.2	2.1	2.4	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.0	2.1	2.2	2.1	2.2	2.2	2.4	
3-Jun	2.2	2.1	2.1	2.1	Z	2.2	2.2	2.4	2.4	2.3	2.2	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.3	2.3	2.3	2.2	2.4	
4-Jun	2.2	2.3	2.4	2.3	Z	2.4	2.4	2.4	2.2	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	2.1	2.4	
5-Jun	Z	2.0	2.0	2.2	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	2.2	2.4	2.5	2.4	2.0	2.5
6-Jun	2.2	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	1.9	2.0	2.0	2.0	2.6	3.0	4.1	2.2	4.1	
7-Jun	3.2	2.7	Z	2.8	2.7	3.1	2.7	2.5	2.4	2.1	2.0	2.0	1.9	2.0	2.0	2.0	1.9	2.0	2.0	2.1	2.4	2.1	2.3	2.3	2.3	2.3	3.2
8-Jun	2.1	2.5	2.8	Z	2.7	2.4	2.1	2.1	2.2	2.1	2.1	2.0	1.9	1.9	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.2	2.2	2.8	
9-Jun	2.1	2.5	2.2	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.0	2.2	2.1	2.1	2.2	2.1	2.0	2.1	2.0	2.3	2.4	2.1	2.1	2.2	2.1	2.5	
10-Jun	2.5	2.5	2.7	2.6	2.4	Z	2.4	2.2	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.0	2.0	2.1	2.1	2.1	2.0	2.2	2.7	
11-Jun	Z	2.3	2.3	2.5	2.6	2.6	2.5	2.5	2.4	2.3	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	2.0	1.9	2.0	2.0	2.0	2.2	2.2	2.6	
12-Jun	2.1	Z	2.1	2.0	1.9	1.9	2.1	2.1	2.3	2.1	2.0	1.9	1.9	1.9	1.9	1.9	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.3	
13-Jun	2.0	2.0	Z	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.0	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	
14-Jun	2.1	2.1	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.0	2.1
15-Jun	2.1	2.0	2.0	2.0	Z	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	1.9	2.0	2.1	2.1	2.1	2.3	2.2	2.1	2.5	2.1	2.5	
16-Jun	3.0	1.9	1.9	1.9	1.9	Z	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1	2.0	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	3.0
17-Jun	Z	2.1	2.0	2.1	2.2	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.2	2.2	2.1	2.2	2.1	2.1	2.2
18-Jun	2.1	Z	2.2	2.3	2.2	2.0	2.1	2.4	2.3	2.3	C	C	C	C	C	1.9	1.9	1.9	2.0	1.9	2.9	3.2	2.2	2.4	2.2	3.2	
19-Jun	2.2	2.0	Z	2.1	2.0	2.0	2.0	2.0	2.0	2.0	PF	1.9	1.9	1.9	2.0	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.2	
20-Jun	2.2	2.7	3.5	Z	2.2	2.1	2.2	2.2	2.2	2.1	2.1	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1	2.1	3.5	
21-Jun	2.2	2.6	2.1	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	2.0	2.1	2.3	2.4	3.1	2.7	2.1	3.1
22-Jun	2.1	2.0	2.1	2.1	2.0	Z	2.1	2.3	2.3	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.1	2.2	2.0	2.1	2.1	2.2	2.1	2.1	2.3
23-Jun	Z	2.9	2.7	2.2	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.9
24-Jun	2.1	Z	2.1	2.1	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	2.0	2.0	2.0	2.0	2.1
25-Jun	2.9	2.7	Z	3.2	3.0	3.9	2.2	2.1	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.1	2.0	2.0	2.1	2.3	3.9
26-Jun	2.0	2.0	2.3	Z	2.4	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	2.0	2.1	1.9	2.0	2.0	2.0	2.1	2.2	2.0	2.4	
27-Jun	2.1	2.1	2.0	2.0	Z	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1	2.5	1.9	2.5
28-Jun	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	2.1	2.2	2.5	3.3	2.7	3.3	3.3	2.3	3.3
29-Jun	Z	2.6	2.5	2.5	2.4	2.5	2.3	2.3	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.2	2.2	2.3	2.3	2.2	2.6
30-Jun	2.4	Z	2.4	2.3	2.2	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.5	3.0	2.7	2.8	3.1	4.0	4.5	6.1	3.4	2.8	2.6	2.5	2.2	2.9	6.1
																								Diurnal Average			
																								Diurnal Maximum			
Z - zerospan C - Calibration PF - Power Failure																											





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
CNRL Horizon - June 2015

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	316	46.20	46.20
2.1 - 3.0	352	51.46	97.66
3.1 - 10.0	16	2.34	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
CNRL Horizon - June 2015

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	39	46	7	11	5	11	4	23	38	34	34	11	11	13	15	14	316
2.1 - 3.0	49	16	4	6	8	9	13	21	34	51	28	16	32	29	20	16	352
3.1 - 10.0	1	0	0	0	0	0	0	0	0	2	0	2	6	4	0	1	16
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	89	62	11	17	13	20	17	44	72	87	62	29	49	46	35	31	684

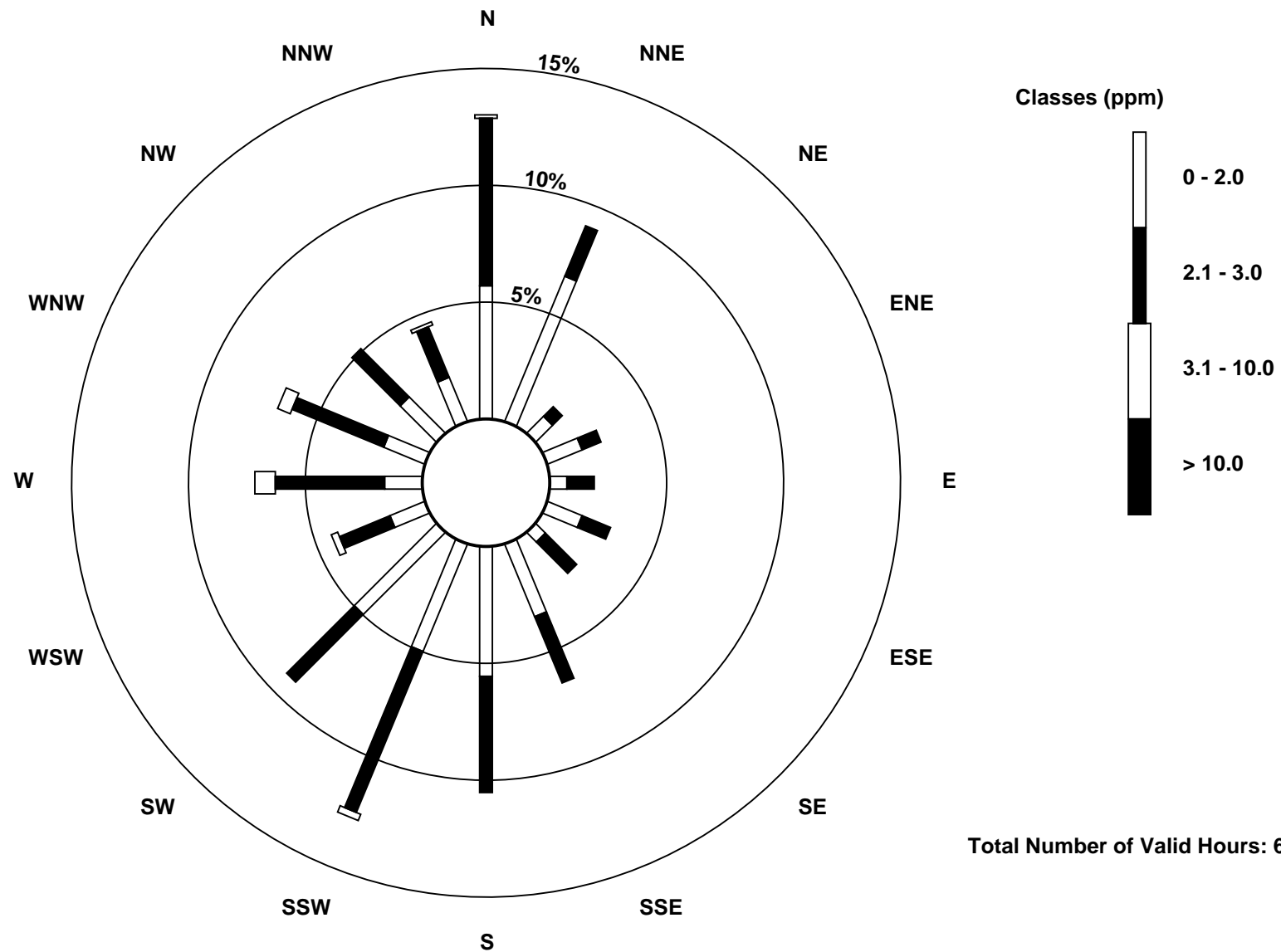
Total Number of Valid Hours: 684

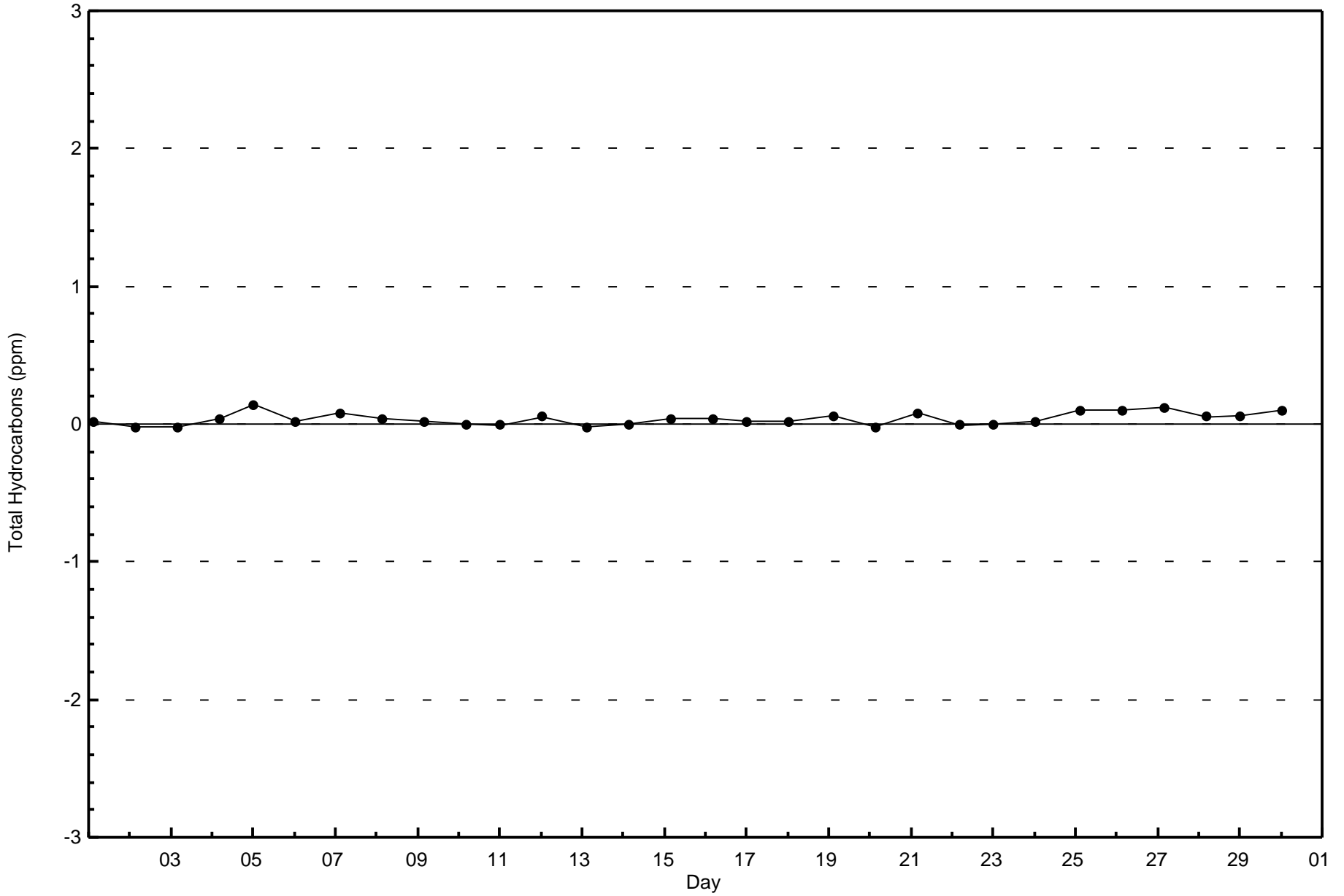
Total Number of Hours: 720

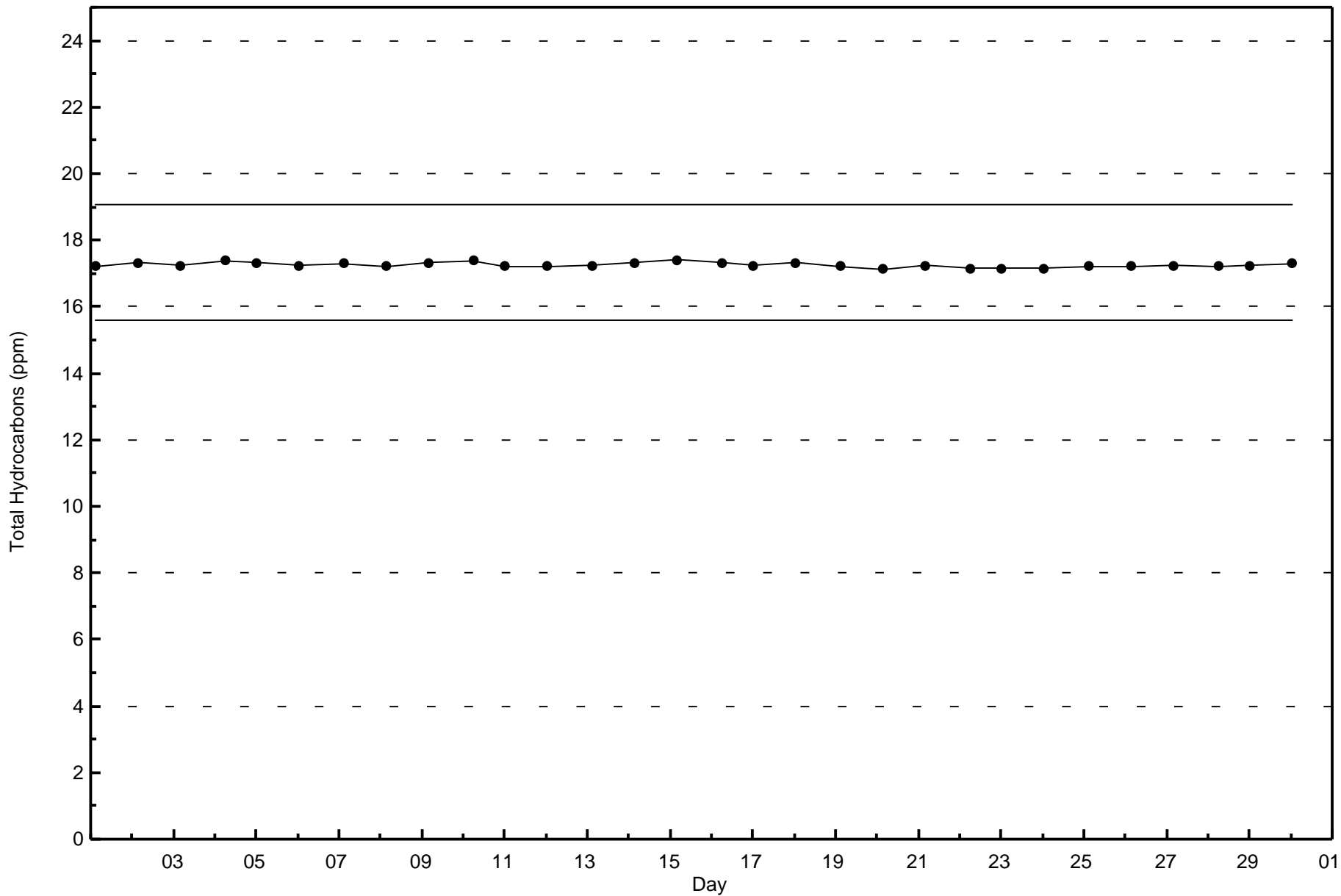


Wood Buffalo Environmental Association
Wind Rose Jun 2015

Total Hydrocarbons (THC) - ppm
CNRL Horizon (AMS 15)







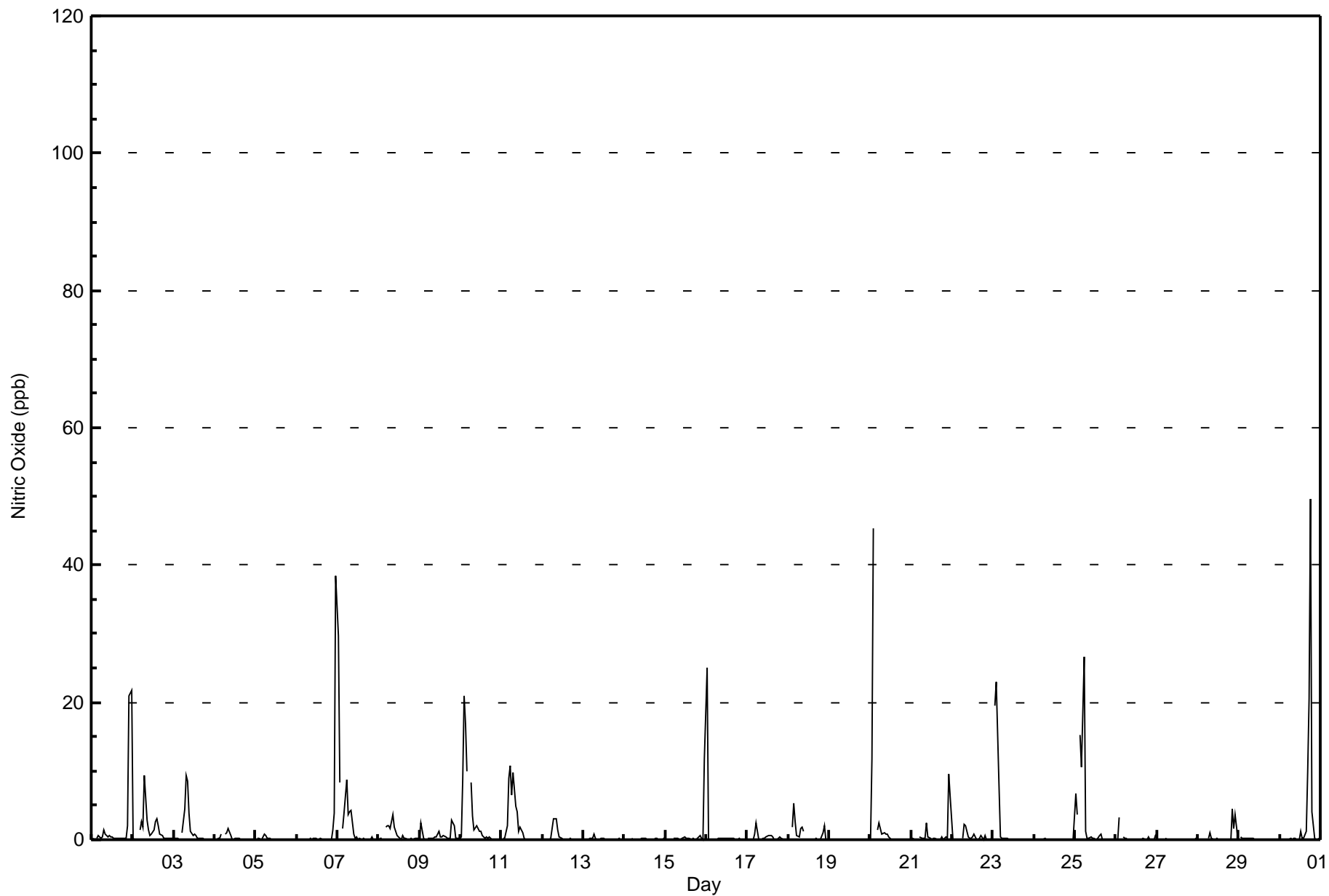


Maximum Value: 50 ppb on Jun 30 19:00	Maximum Daily Average: 3.9 ppb on Jun 30	Hours in Service: 720
Minimum Value: 0 ppb on Jun 3 20:00	Minimum Daily Average: 0.0 ppb on Jun 24	Hours of Data: 684
Maximum Diurnal Average: 3.8 ppb at hour 3	Minimum Diurnal Average: 0.2 ppb at hour 16	Hours of Missing Data: 36
Monthly Average: 1.2 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 2 P ₉₉ = 22	Hours of Calibration: 35
		Percent Operational Time: 99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	0	0	Z	0	1	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	2	21	22	2.2	22	
2-Jun	0	0	0	Z	1	3	2	9	3	2	1	1	1	3	3	2	1	1	0	0	0	0	0	0	1.4	9	
3-Jun	0	0	0	0	Z	1	4	9	9	4	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1.4	9	
4-Jun	0	0	0	0	1	Z	1	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2	
5-Jun	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1	
6-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	38	1.9	38	
7-Jun	30	8	Z	2	4	9	4	4	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.9	30	
8-Jun	0	0	0	Z	2	2	2	2	4	2	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0.7	4	
9-Jun	0	2	0	0	Z	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	3	2	0	0	0.6	3	
10-Jun	0	9	21	17	10	Z	8	3	1	2	2	1	1	1	0	0	0	0	0	0	0	0	0	0	3.4	21	
11-Jun	Z	0	0	2	9	11	6	10	5	4	1	2	1	0	0	0	0	0	0	0	0	0	0	0	2.2	11	
12-Jun	0	Z	0	0	0	0	3	3	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	3	
13-Jun	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1	
14-Jun	0	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-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	12	0.7	12	
16-Jun	25	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.2	25	
17-Jun	Z	0	0	0	1	2	1	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0.4	2	
18-Jun	0	Z	2	5	3	1	0	2	2	1	C	C	C	C	C	0	0	0	0	0	1	2	0	0	1.0	5	
19-Jun	0	0	Z	0	0	0	0	0	0	0	PF	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
20-Jun	0	12	45	Z	2	2	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2.9	45	
21-Jun	0	0	0	0	Z	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	10	6	0.9	10	
22-Jun	0	0	0	0	0	Z	0	2	2	0	0	0	0	1	0	0	0	0	1	0	1	0	0	0	0.4	2	
23-Jun	Z	19	23	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.2	23	
24-Jun	0	Z	0	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-Jun	7	4	Z	15	11	27	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	2.9	27	
26-Jun	0	0	3	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.2	3	
27-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
28-Jun	0	0	0	0	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	5	2	4	0	0.5	5
29-Jun	Z	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-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	1	10	21	50	4	0	0	0	0	3.9	50	

2.5	2.2	3.8	2.0	1.8	2.4	1.3	1.7	1.3	0.8	0.4	0.3	0.3	0.3	0.3	0.2	0.4	0.8	1.7	0.3	0.3	0.3	1.3	2.7	Diurnal Average	
30	19	45	17	11	27	8	10	9	4	2	2	1	3	3	2	10	21	50	4	5	2	21	38	Diurnal Maximum	

Z - zerospan C - Calibration PF - Power Failure





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
CNRL Horizon - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	673	98.39	98.39
21 - 40	9	1.32	99.71
41 - 80	2	0.29	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Nitric Oxide (NO) - ppb
CNRL Horizon - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	89	62	11	17	13	20	17	44	72	86	61	27	46	44	35	29	673
21 - 40	0	0	0	0	0	0	0	0	0	0	1	1	3	2	0	2	9
41 - 80	0	0	0	0	0	0	0	0	0	1	0	1	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	89	62	11	17	13	20	17	44	72	87	62	29	49	46	35	31	684

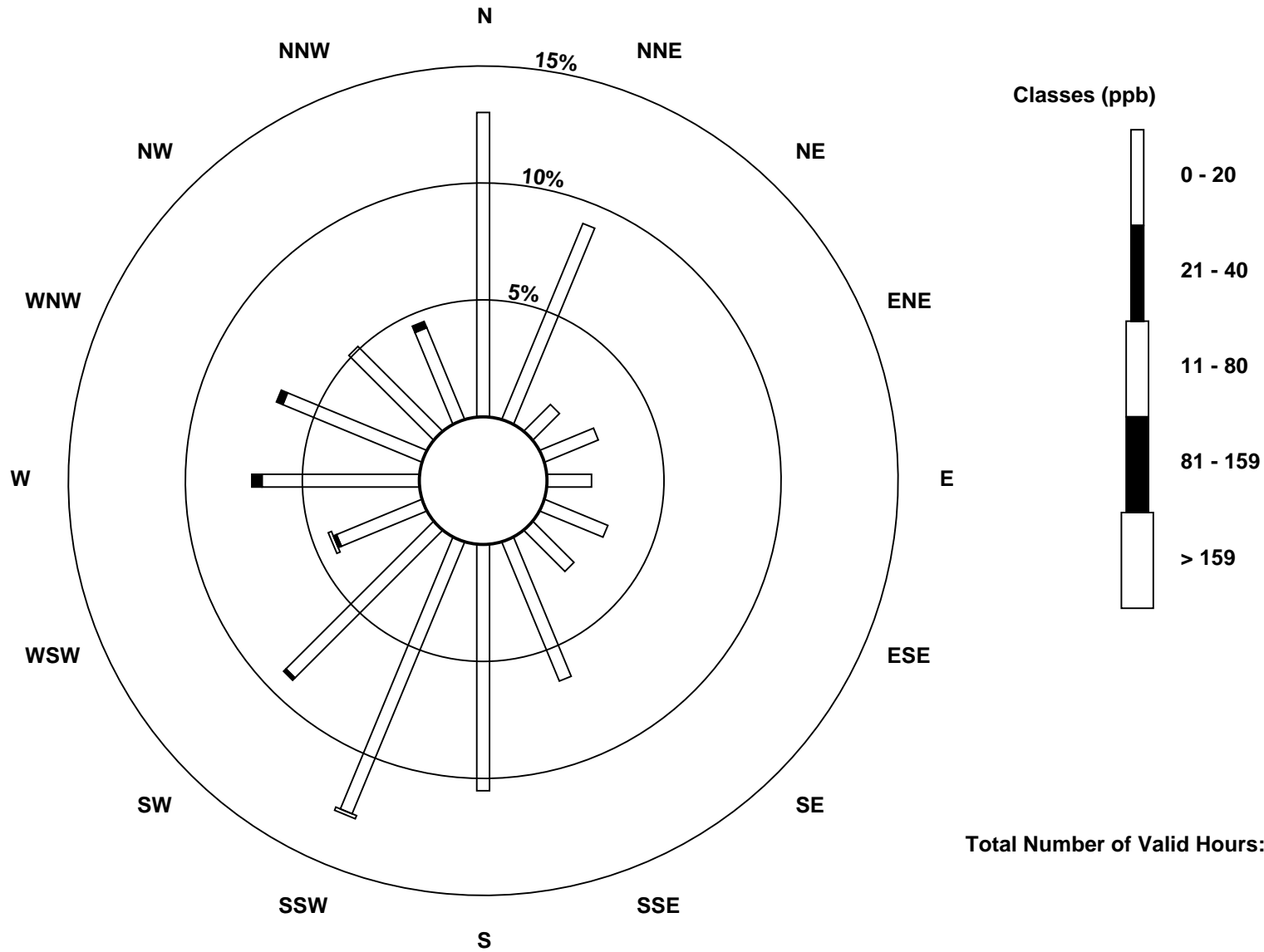
Total Number of Valid Hours: 684

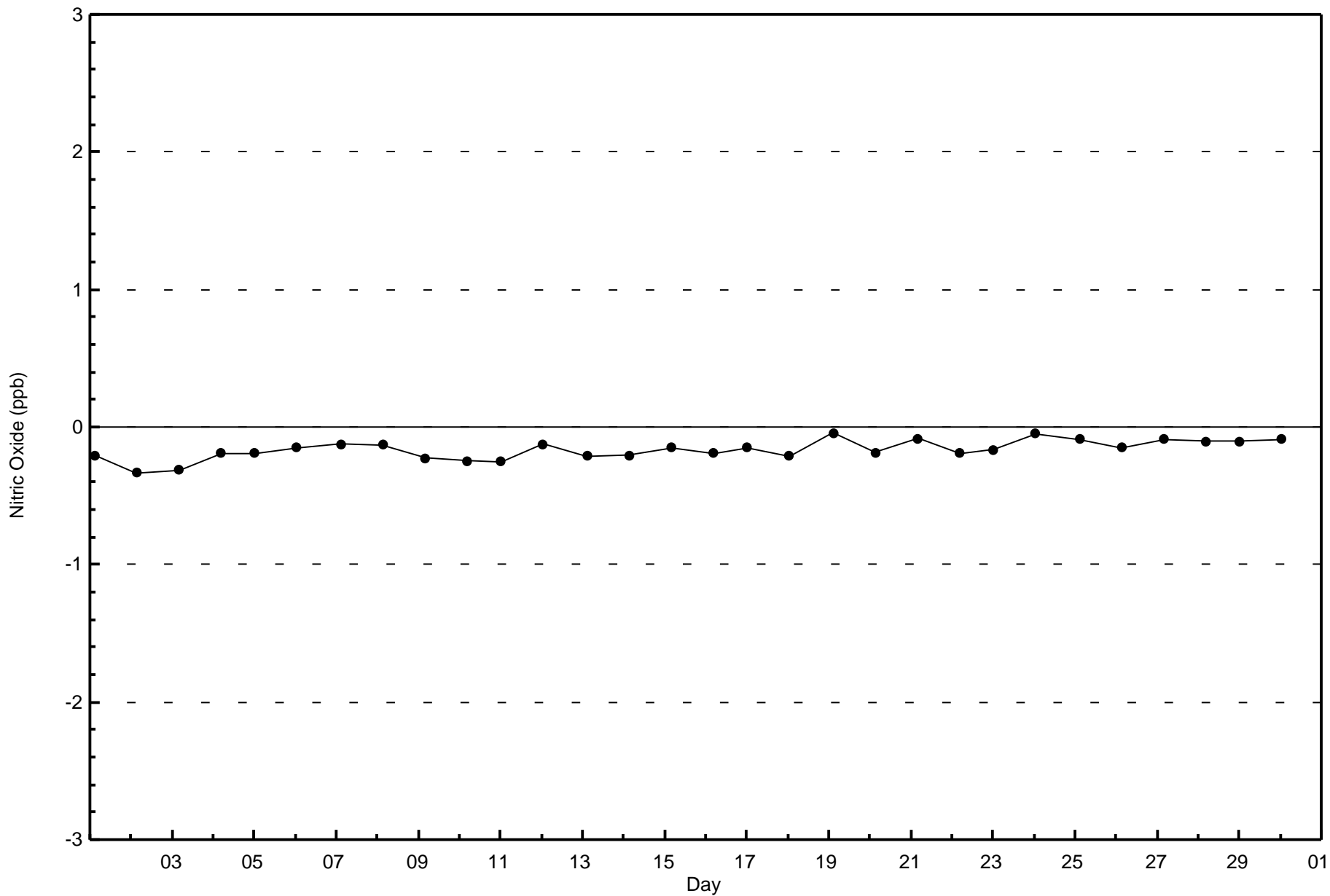
Total Number of Hours: 720

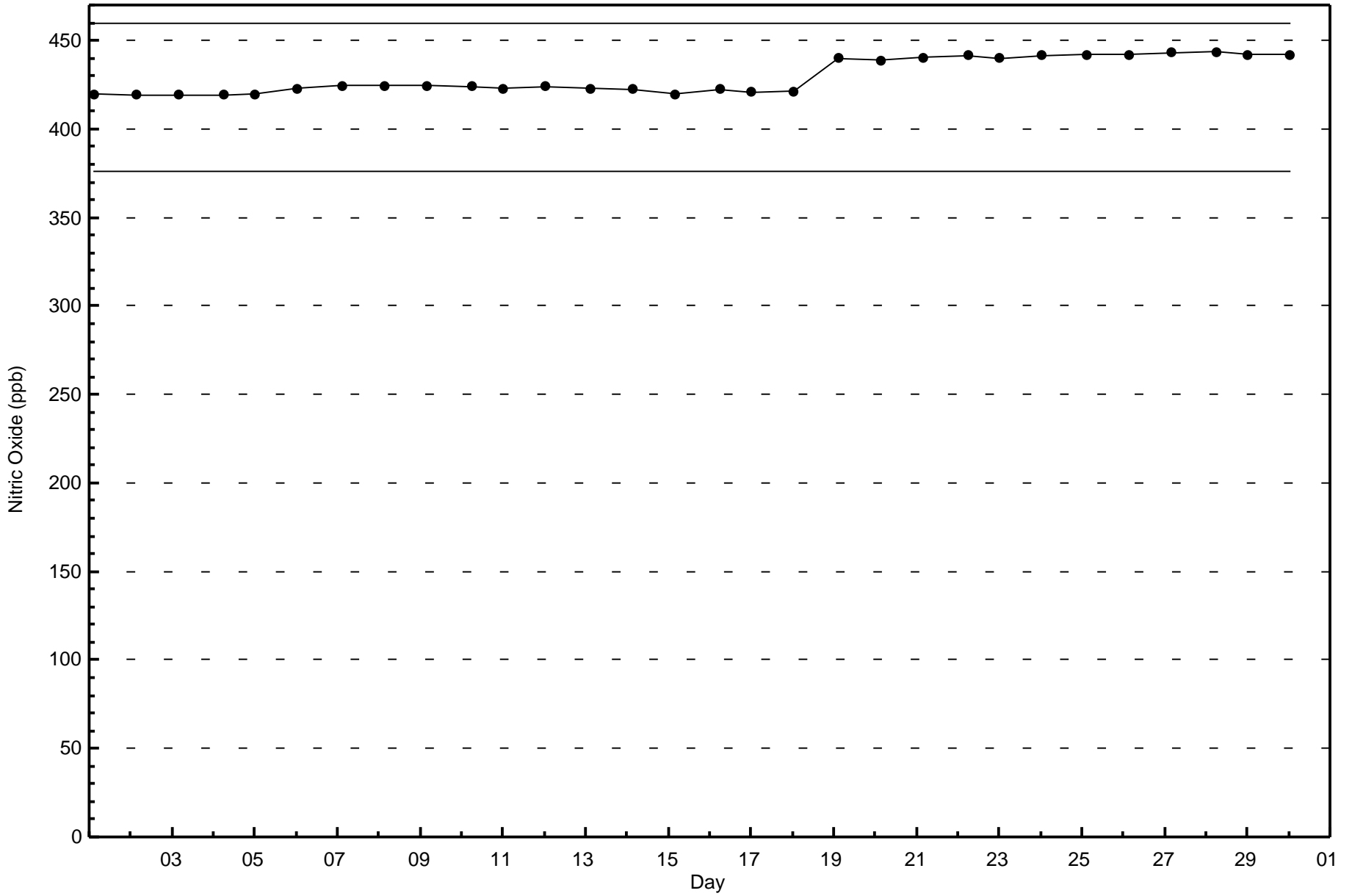


Wood Buffalo Environmental Association
Wind Rose Jun 2015

Nitric Oxide (NO) - ppb
CNRL Horizon (AMS 15)







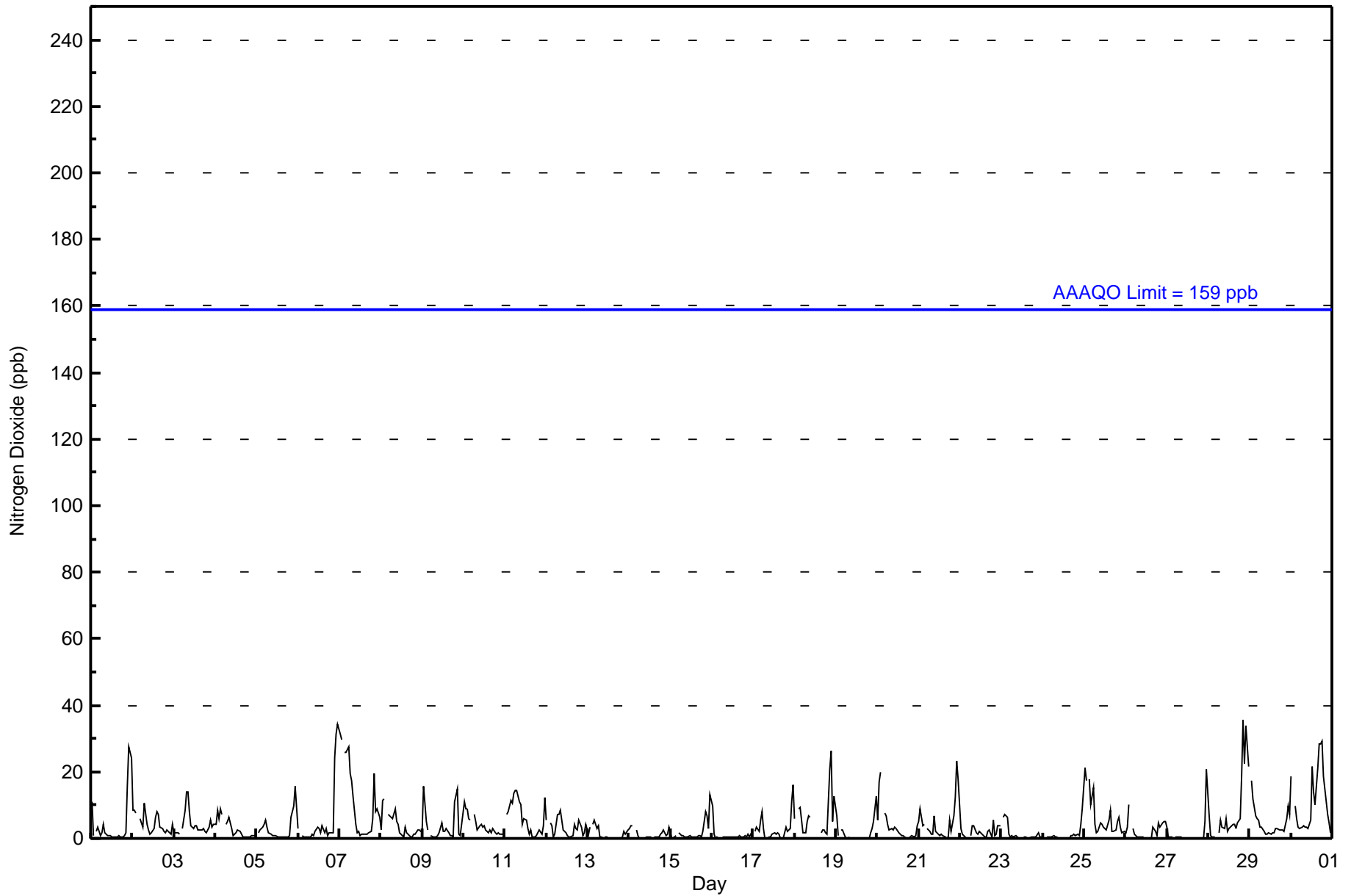


Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 36 ppb on Jun 28 21:00	Maximum Daily Average: 11.3 ppb on Jun 30		Hours of Data:	684
Minimum Value: 0 ppb on Jun 26 16:00	Minimum Daily Average: 1.0 ppb on Jun 16		Hours of Missing Data:	36
Maximum Diurnal Average: 8.8 ppb at hour 24	Minimum Diurnal Average: 1.8 ppb at hour 12		Hours of Calibration:	35
Monthly Average: 4.0 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 2 Q ₃ = 5 P ₉₀ = 10 P ₉₉ = 29		Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	11	1	Z	2	3	1	2	4	2	1	1	1	1	1	0	0	1	0	1	1	2	16	28	24	4.5	28
2-Jun	9	8	8	Z	6	5	4	11	4	3	1	2	3	6	8	7	4	3	2	2	2	2	1	4	4.6	11
3-Jun	2	2	2	1	Z	3	9	14	14	8	4	3	4	4	3	3	3	3	2	2	3	5	3	4	4.3	14
4-Jun	4	8	6	9	7	Z	4	5	6	3	1	1	2	3	2	1	1	1	1	1	1	1	1	1	3.0	9
5-Jun	Z	2	2	4	4	5	4	2	1	1	1	1	1	1	1	0	0	1	1	1	6	10	16	10	3.1	16
6-Jun	3	Z	1	1	1	0	1	1	1	1	2	3	3	2	4	2	3	1	2	2	2	24	31	34	5.4	34
7-Jun	31	30	Z	26	26	28	20	17	13	4	2	2	1	1	1	1	1	2	2	6	19	8	9	7	11.2	31
8-Jun	3	12	12	Z	7	7	7	6	9	5	4	2	1	1	3	2	1	1	1	1	1	3	3	2	4.0	12
9-Jun	2	16	5	2	Z	1	1	0	0	1	2	5	2	2	3	2	1	1	0	11	15	1	1	4	3.4	16
10-Jun	11	9	9	6	6	Z	7	5	3	4	4	3	4	2	2	3	2	3	2	1	2	1	1	1	3.9	11
11-Jun	Z	7	8	12	11	13	14	14	11	10	4	6	5	3	1	3	1	1	1	2	2	1	4	12	6.3	14
12-Jun	6	Z	5	4	0	1	7	7	9	5	3	2	1	0	0	1	4	3	3	6	4	1	2	4	3.3	9
13-Jun	1	4	Z	4	6	3	4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	2	1.3	6
14-Jun	3	4	4	Z	3	1	0	0	0	0	1	0	0	0	0	0	1	1	1	2	3	1	1	4	1.2	4
15-Jun	2	0	0	1	Z	2	1	1	0	0	0	1	1	0	0	0	1	1	1	2	8	7	3	13	2.0	13
16-Jun	10	1	0	0	0	Z	0	0	0	0	1	0	0	1	1	0	1	0	0	1	1	1	0	2	1.0	10
17-Jun	Z	2	4	2	6	8	3	0	0	0	1	1	2	1	2	1	0	0	2	3	2	3	11	16	3.0	16
18-Jun	6	Z	9	10	5	2	2	5	7	6	C	C	C	C	C	2	3	2	2	1	21	26	5	13	7.0	26
19-Jun	7	1	Z	2	3	1	0	0	0	PF	0	0	0	0	0	0	0	0	0	0	2	3	5	13	1.7	13
20-Jun	6	17	20	Z	8	7	4	3	3	3	3	3	2	1	1	1	1	0	0	0	1	1	1	4	3.8	20
21-Jun	5	9	4	4	Z	3	2	1	1	7	2	1	1	1	1	0	0	0	5	2	7	12	23	18	4.8	23
22-Jun	3	1	1	0	0	Z	1	4	4	2	1	2	2	1	1	1	2	2	1	5	1	1	4	4	1.9	5
23-Jun	Z	6	7	6	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	2	0	1	1.3	7
24-Jun	1	Z	1	1	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	4	9	1.0	9
25-Jun	21	17	Z	18	10	15	4	2	2	5	4	4	3	3	6	9	2	2	3	5	6	3	2	2	6.4	21
26-Jun	2	3	10	Z	3	1	1	1	1	1	0	0	0	0	0	0	4	2	1	5	4	5	5	5	2.2	10
27-Jun	3	1	1	0	Z	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	5	21	1.4	21
28-Jun	7	1	0	0	0	Z	2	6	3	3	6	2	3	4	4	4	3	5	6	19	36	23	34	21	8.3	36
29-Jun	Z	17	12	7	6	6	4	3	2	1	1	2	1	2	2	3	3	3	3	3	2	6	10	7	4.6	17
30-Jun	19	Z	10	6	3	3	4	4	3	4	3	5	22	14	10	21	29	29	29	19	11	7	5	2	11.3	29

7.0	7.1	5.6	5.1	5.0	4.6	3.7	3.9	3.4	2.7	1.8	1.8	2.2	1.9	1.9	2.3	2.3	2.2	2.4	3.4	5.5	5.9	7.3	8.8	Diurnal Average		
31	30	20	26	26	28	20	17	14	10	6	6	22	14	10	21	29	29	29	29	19	36	26	34	34	Diurnal Maximum	

Z - zerspan C - Calibration PF - Power Failure
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
CNRL Horizon - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	660	96.49	96.49
21 - 40	24	3.51	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
CNRL Horizon - June 2015**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	88	62	11	17	13	19	17	44	72	87	62	24	38	40	35	31	660
21 - 40	1	0	0	0	0	1	0	0	0	0	0	5	11	6	0	0	24
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	89	62	11	17	13	20	17	44	72	87	62	29	49	46	35	31	684

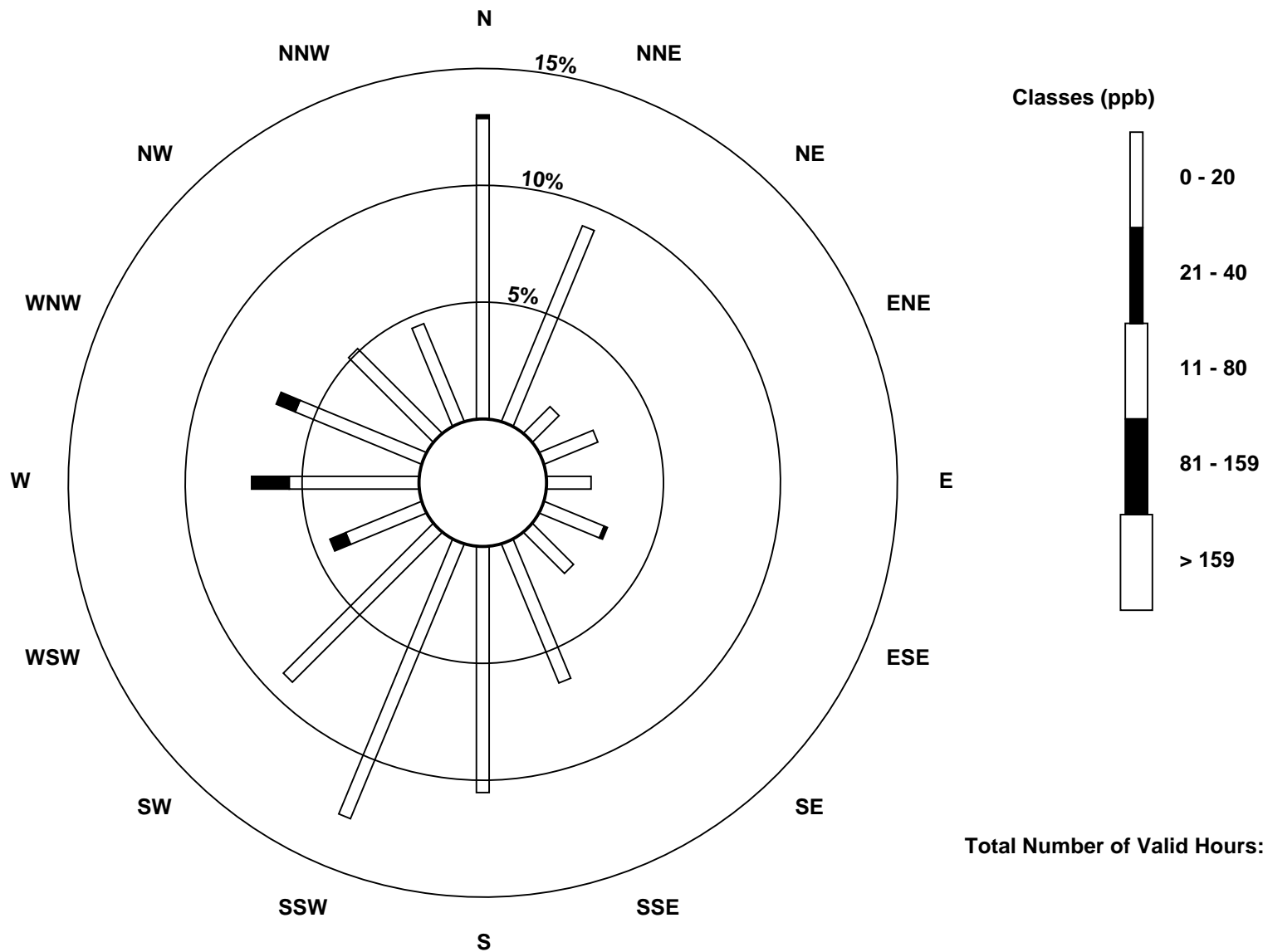
Total Number of Valid Hours: 684

Total Number of Hours: 720

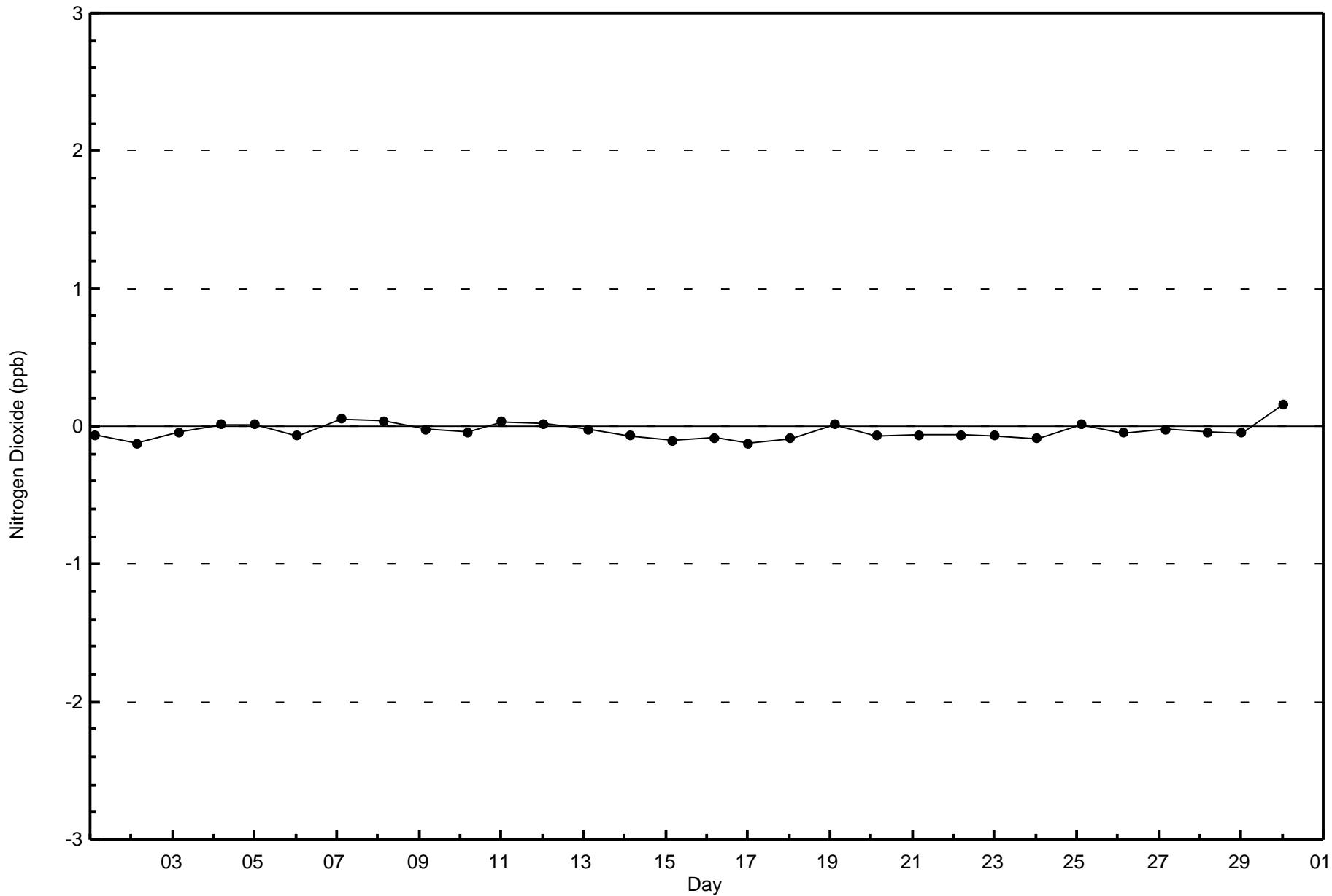


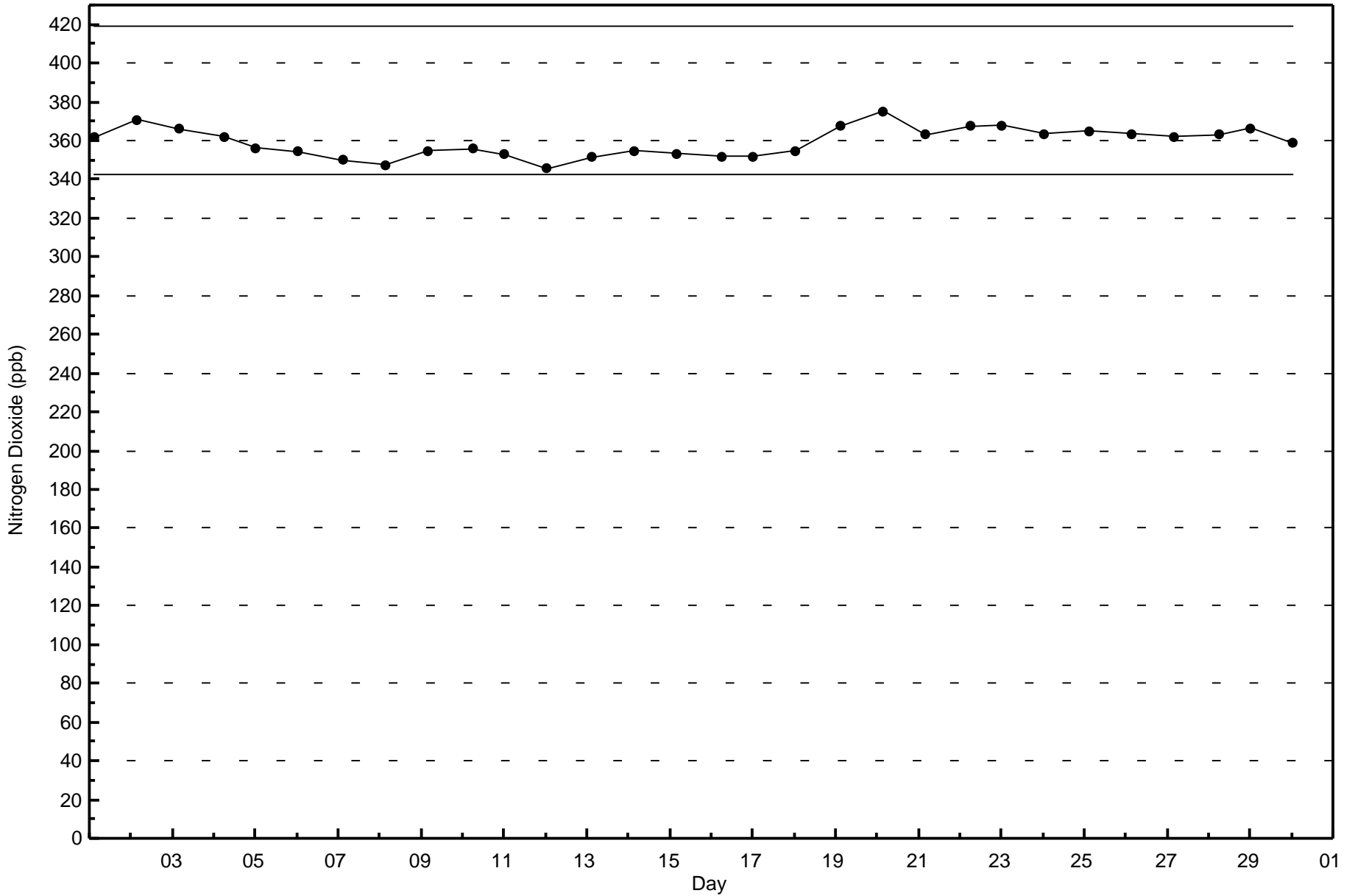
Wood Buffalo Environmental Association
Wind Rose Jun 2015

Nitrogen Dioxide (NO₂) - ppb
CNRL Horizon (AMS 15)



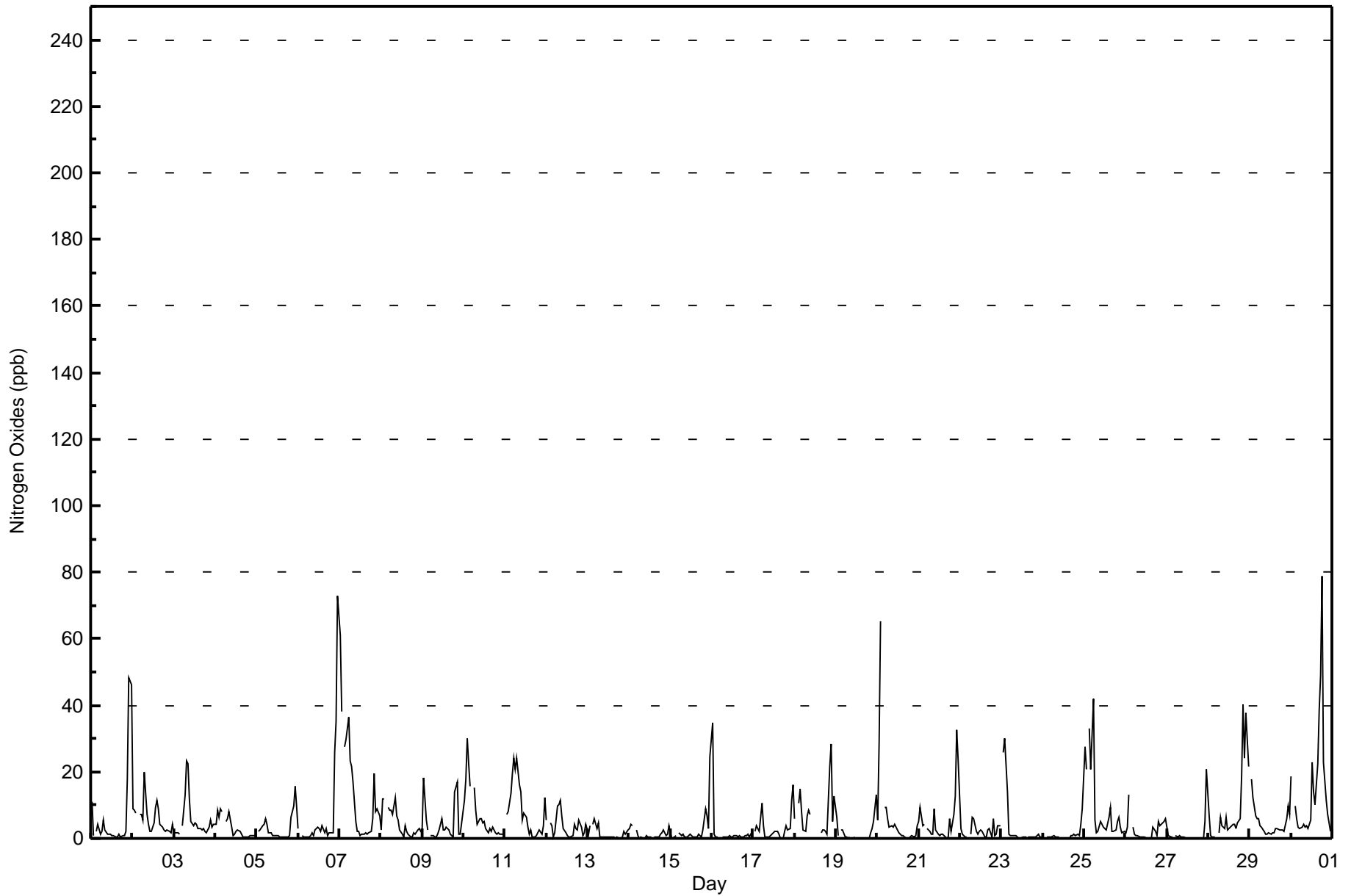
Total Number of Valid Hours: 684







Maximum Value: 79 ppb on Jun 30 19:00																		Maximum Daily Average: 15.1 ppb on Jun 30						Hours in Service: 720		
Minimum Value: 0 ppb on Jun 27 15:00																		Minimum Daily Average: 1.1 ppb on Jun 24						Hours of Data: 684		
Maximum Diurnal Average: 11.5 ppb at hour 24																		Minimum Diurnal Average: 2.1 ppb at hour 14						Hours of Missing Data: 36		
Monthly Average: 5.2 ppb																		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 2 Q ₃ = 5 P ₉₀ = 13 P ₉₉ = 45						Hours of Calibration: 35		
																								Percent Operational Time: 99.9		
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	11	1	Z	2	4	1	2	5	3	1	1	1	1	1	1	1	1	1	1	1	2	18	49	46	6.7	49
2-Jun	9	8	8	Z	7	7	5	20	7	4	2	2	5	9	11	9	4	4	3	2	3	2	2	4	6.0	20
3-Jun	2	2	2	1	Z	4	13	23	22	12	5	4	5	4	3	3	3	3	2	2	3	5	3	4	5.7	23
4-Jun	4	8	6	9	8	Z	5	6	8	3	1	1	2	3	2	1	1	1	1	1	1	1	1	1	3.2	9
5-Jun	Z	2	2	4	4	6	4	2	2	1	1	1	1	1	0	0	0	1	1	1	6	10	16	10	3.2	16
6-Jun	3	Z	1	1	0	0	1	1	2	1	3	3	3	2	4	2	3	1	2	2	2	26	35	73	7.3	73
7-Jun	61	38	Z	28	30	36	23	21	17	5	2	2	1	1	1	2	1	1	2	6	20	8	9	7	14.1	61
8-Jun	3	12	12	Z	9	9	8	7	12	7	5	2	1	1	4	2	1	1	0	2	1	3	3	2	4.7	12
9-Jun	2	18	6	2	Z	1	1	1	1	1	2	6	3	2	3	2	1	1	1	14	17	1	1	5	4.0	18
10-Jun	12	18	30	23	16	Z	15	9	4	6	6	4	5	3	2	3	2	3	2	1	1	1	1	1	7.4	30
11-Jun	Z	7	8	14	19	24	21	24	16	14	5	8	6	3	1	3	1	1	1	1	2	1	4	12	8.6	24
12-Jun	6	Z	5	4	0	2	10	10	12	7	3	2	1	0	0	1	4	3	3	6	4	1	2	4	3.8	12
13-Jun	1	4	Z	4	6	3	5	1	0	0	1	0	0	0	0	0	0	0	0	0	1	2	1	3	1.5	6
14-Jun	3	4	4	Z	3	1	0	0	0	0	1	0	1	0	0	1	1	0	1	2	3	1	1	4	1.3	4
15-Jun	2	0	0	1	Z	2	1	1	0	0	1	1	1	0	0	1	0	1	1	3	9	7	3	25	2.6	25
16-Jun	35	1	0	0	0	Z	0	1	0	0	1	0	0	1	1	0	1	0	0	1	1	1	0	2	2.2	35
17-Jun	Z	2	4	2	6	11	4	0	0	0	1	1	2	2	2	1	0	0	2	4	3	3	11	16	3.4	16
18-Jun	6	Z	11	15	8	2	2	7	8	7	C	C	C	C	C	2	3	2	2	1	22	28	5	13	8.0	28
19-Jun	7	1	Z	2	3	1	0	0	0	0	PF	0	0	0	0	0	0	0	0	0	2	3	5	13	1.7	13
20-Jun	6	29	65	Z	9	9	6	4	4	3	4	3	2	1	1	1	0	0	0	0	1	1	1	4	6.7	65
21-Jun	5	9	4	4	Z	3	2	1	1	9	2	1	1	1	1	0	0	0	6	2	7	13	33	24	5.7	33
22-Jun	3	1	1	0	0	Z	1	6	6	2	1	2	2	2	1	1	2	3	0	6	1	1	4	4	2.3	6
23-Jun	Z	26	30	14	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	0	1	1	0	0	3.5	30
24-Jun	1	Z	1	1	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	4	9	1.1	9
25-Jun	28	21	Z	33	21	42	5	2	2	5	4	4	3	3	6	9	2	2	3	5	6	3	2	2	9.3	42
26-Jun	2	3	13	Z	3	1	1	1	0	0	0	0	0	0	0	0	4	2	1	5	4	5	5	6	2.5	13
27-Jun	3	1	1	0	Z	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	5	21	1.5	21
28-Jun	7	1	0	0	0	Z	2	7	4	3	6	2	3	3	4	4	3	4	6	19	40	24	38	22	8.8	40
29-Jun	Z	18	12	7	6	6	4	3	2	1	1	2	1	2	2	3	3	3	3	2	2	6	10	7	4.6	18
30-Jun	19	Z	10	6	3	3	4	4	3	4	3	6	23	14	10	22	39	49	79	23	12	7	5	2	15.1	79
																		9.5 9.4 9.4 7.1 6.8 7.1 5.0 5.6 4.7 3.5 2.2 2.1 2.5 2.1 2.2 2.5 2.8 3.0 4.1 3.7 5.8 6.2 8.6 11.5						Diurnal Average		
																		61 38 65 33 30 42 23 24 22 14 6 8 23 14 11 22 39 49 79 23 40 28 49 73						Diurnal Maximum		
Z - zerspan			C - Calibration			PF - Power Failure																				





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
CNRL Horizon - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	639	93.42	93.42
21 - 40	37	5.41	98.83
41 - 80	8	1.17	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
CNRL Horizon - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	87	62	11	17	13	19	16	43	71	83	59	23	31	40	35	29	639
21 - 40	2	0	0	0	0	1	1	1	1	3	3	4	16	4	0	1	37
11 - 80	0	0	0	0	0	0	0	0	0	1	0	2	2	2	0	1	8
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	89	62	11	17	13	20	17	44	72	87	62	29	49	46	35	31	684

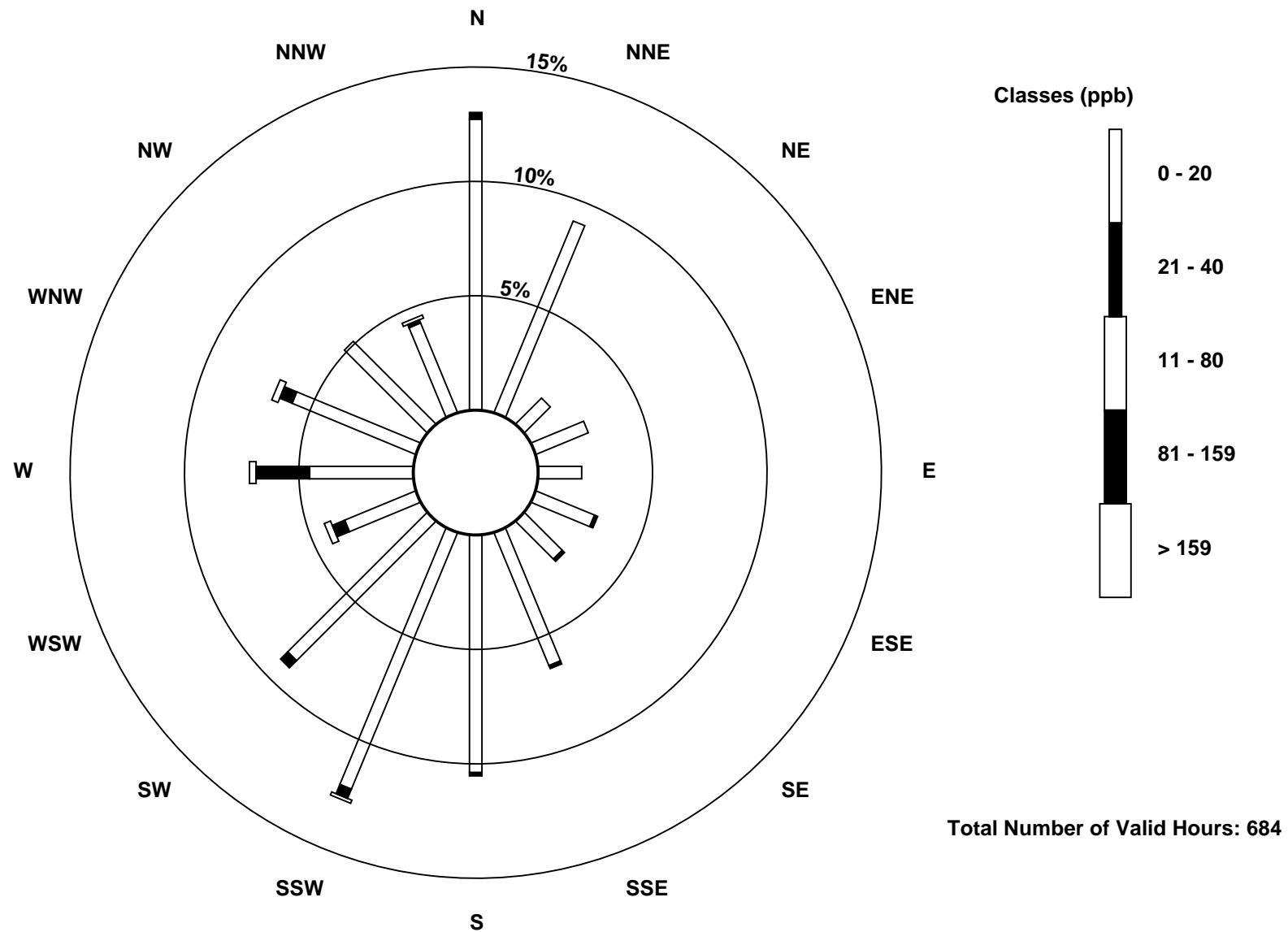
Total Number of Valid Hours: 684

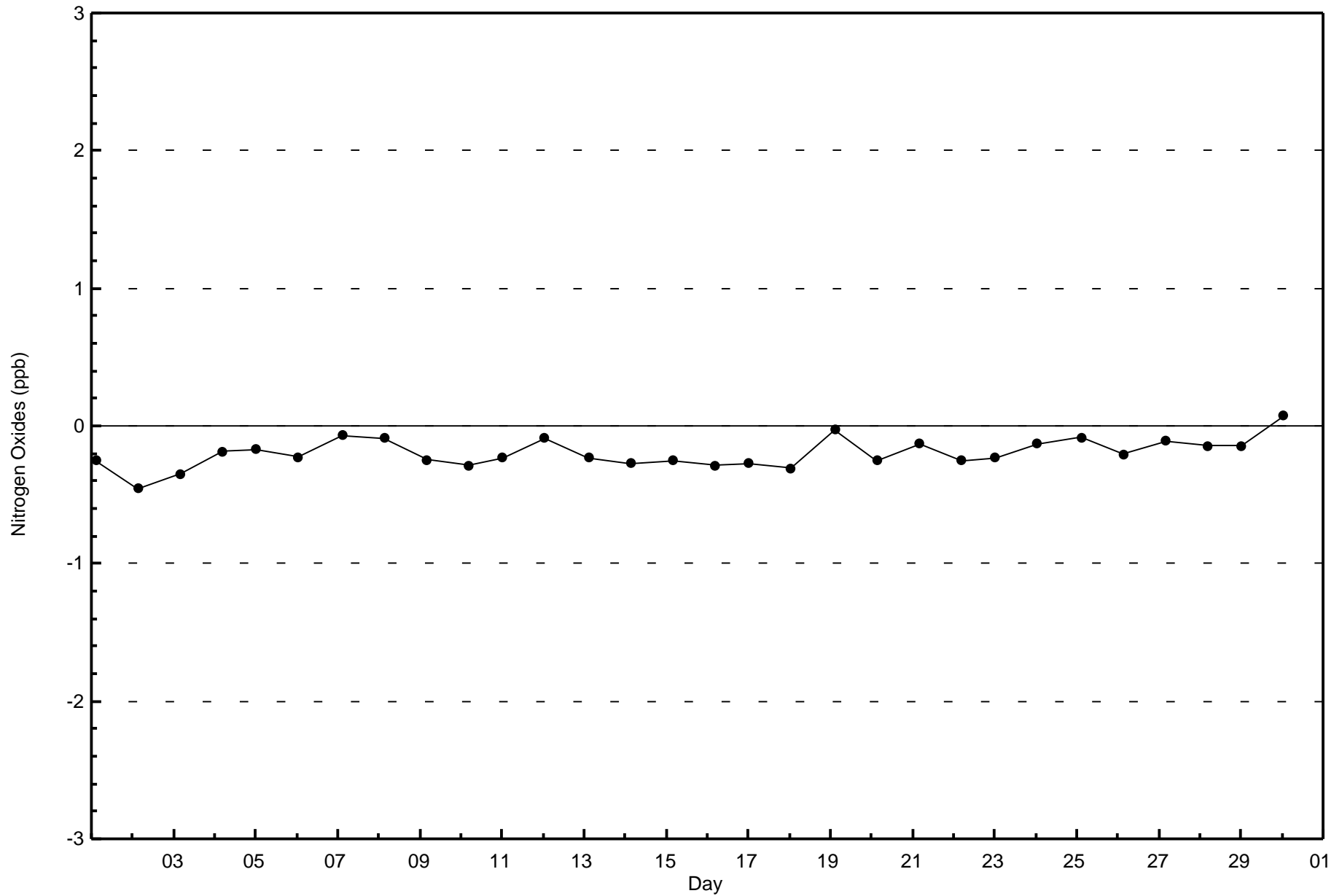
Total Number of Hours: 720

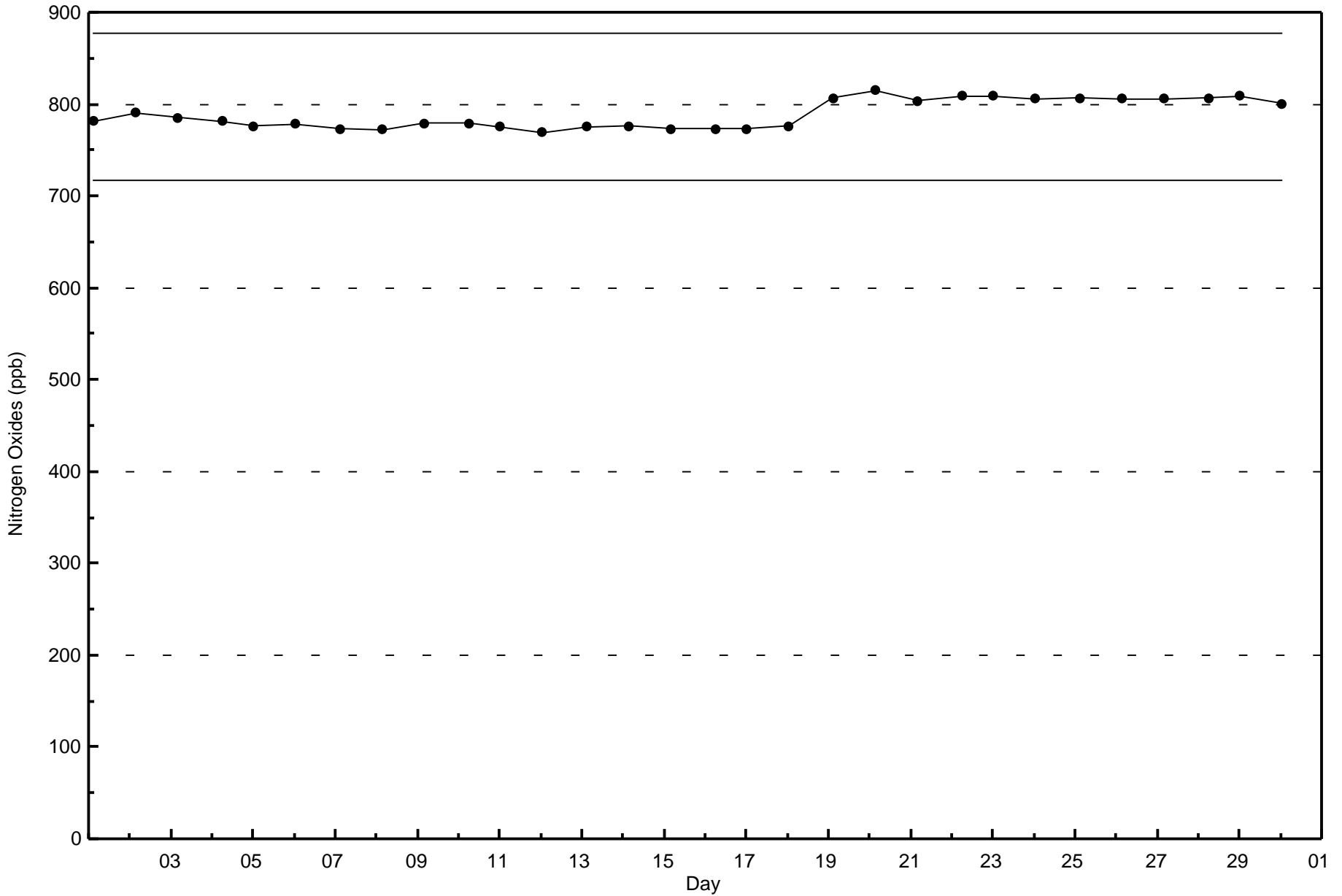


Wood Buffalo Environmental Association
Wind Rose Jun 2015

Nitrogen Oxides (NO_x) - ppb
CNRL Horizon (AMS 15)









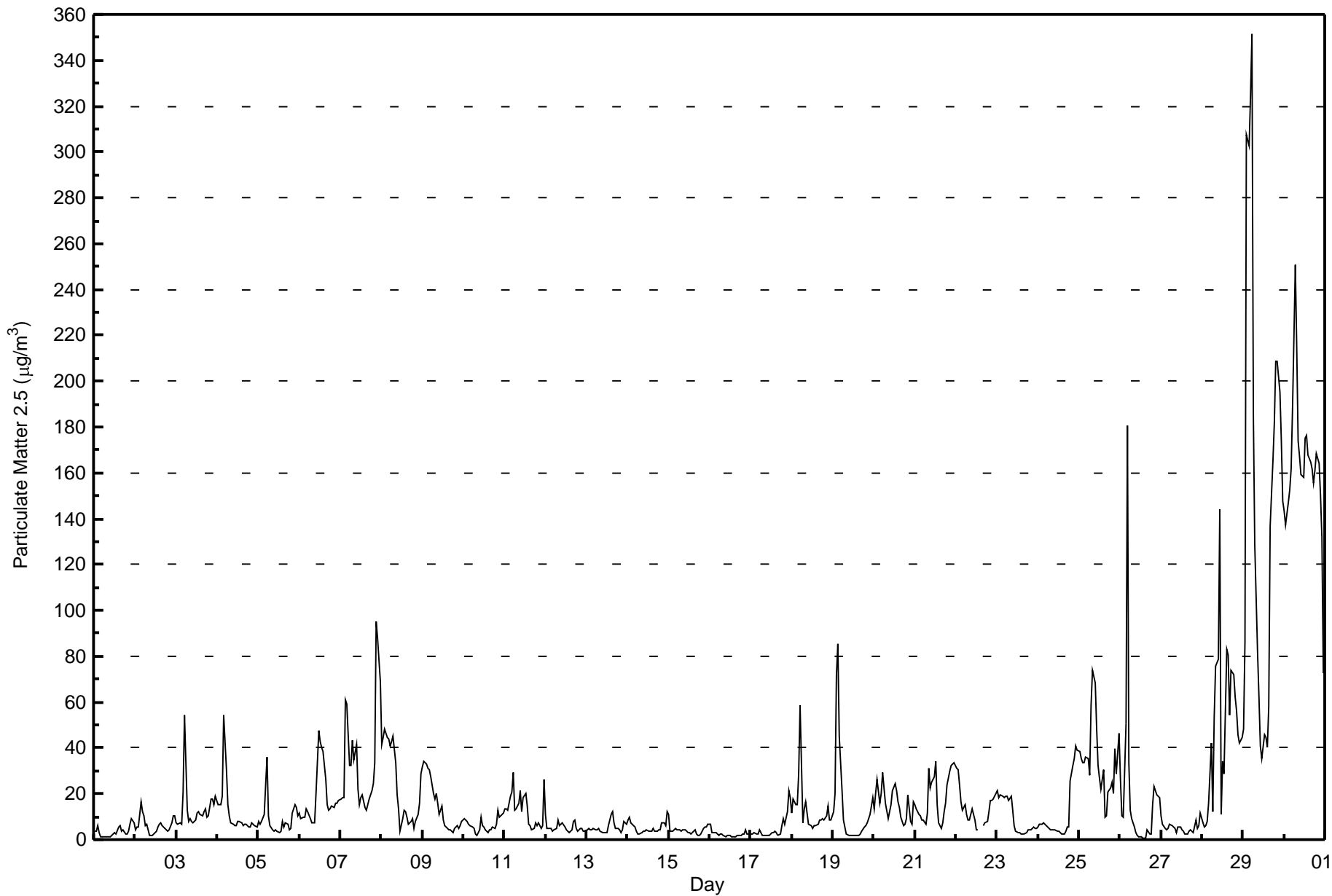
Summary of Hour Averages

CNRL Horizon - June 2015

Number of Exceedences (AAAQO): 24-hr: 5	Hours in Service: 720
Maximum Value: 351.2 µg/m ³ on Jun 29 06:00	Maximum Daily Average: 162.7 µg/m ³ on Jun 30
Minimum Value: 0.7 µg/m ³ on Jun 26 16:00	Hours of Data: 718
Maximum Diurnal Average: 39.2 µg/m ³ at hour 5	Hours of Missing Data: 2
Monthly Average: 23.19 µg/m ³	Hours of Calibration: 2
Minimum Daily Average: 2.4 µg/m ³ on Jun 16	Percent Operational Time: 100.0
Minimum Diurnal Average: 15.5 µg/m ³ at hour 12	
Percentiles: P ₁ = 1.3 P ₁₀ = 2.6 Q ₁ = 4.3 Median = 8.2 Q ₃ = 19.7 P ₉₀ = 47.5 P ₉₉ = 204.4	

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-Jun	3.9	3.9	6.3	3.2	1.3	1.0	1.1	1.3	1.3	1.5	1.8	2.5	2.8	2.6	5.5	5.9	3.8	4.2	2.5	2.6	3.4	6.5	9.4	7.2	3.5	9.4																						
2-Jun	4.1	5.3	5.4	16.5	12.1	10.2	5.9	6.7	1.9	1.8	2.0	2.5	3.8	5.7	6.7	7.6	5.9	5.2	4.4	3.7	4.5	7.1	10.3	10.6	6.2	16.5																						
3-Jun	7.2	6.5	7.6	6.6	20.7	54.3	12.7	8.2	9.4	7.8	7.4	8.3	11.4	12.4	10.9	10.5	12.2	13.4	10.1	10.6	17.7	17.9	15.1	18.7	13.2	54.3																						
4-Jun	15.3	15.2	15.4	18.8	54.6	30.7	15.1	10.3	7.6	7.0	6.4	6.2	7.8	8.2	7.5	6.4	6.6	6.6	5.8	5.4	7.3	6.7	5.9	5.2	11.7	54.6																						
5-Jun	7.7	6.9	7.7	11.0	23.6	36.2	10.2	6.2	4.2	3.9	4.1	3.7	3.2	3.4	8.1	5.6	7.6	6.5	4.3	5.0	11.4	15.1	14.0	10.3	9.2	36.2																						
6-Jun	11.5	9.4	9.9	10.0	13.4	12.0	9.4	7.4	7.2	7.1	20.3	47.7	42.8	40.3	38.6	26.0	15.5	12.8	13.7	14.8	14.1	15.9	15.7	16.9	18.0	47.7																						
7-Jun	17.9	18.0	18.5	60.9	59.3	32.1	32.5	43.3	34.5	41.7	21.9	15.5	18.3	19.7	14.3	12.8	15.5	17.5	21.1	24.2	33.5	95.4	87.7	68.8	34.4	95.4																						
8-Jun	41.5	44.6	48.4	44.3	44.0	41.1	42.6	45.0	33.7	19.8	13.3	3.4	9.4	12.8	11.9	9.5	7.0	8.1	9.0	5.0	7.9	11.0	15.7	28.8	23.2	48.4																						
9-Jun	31.5	34.1	33.2	31.3	30.7	27.5	20.4	17.4	20.0	15.6	11.0	14.7	8.3	6.0	5.5	4.3	4.1	3.8	3.2	5.0	6.3	4.6	6.0	8.1	14.7	34.1																						
10-Jun	9.1	8.5	8.1	6.6	6.2	5.2	4.9	2.6	1.8	4.0	9.9	6.0	5.3	4.1	3.3	4.4	4.0	5.3	5.0	6.9	12.6	9.5	10.4	11.5	6.5	12.6																						
11-Jun	13.6	13.3	13.0	18.8	20.7	29.5	12.6	13.6	15.9	21.1	12.1	18.1	20.3	14.5	6.7	5.8	4.5	5.0	7.5	6.3	7.4	4.8	6.1	26.3	13.2	29.5																						
12-Jun	10.8	5.0	4.7	4.6	3.9	4.1	4.6	8.8	6.3	6.8	7.1	5.6	4.5	3.9	3.3	4.6	8.0	8.5	4.8	3.4	4.8	5.0	3.9	3.7	5.4	10.8																						
13-Jun	4.0	5.0	4.4	4.3	5.2	4.3	4.3	4.6	3.4	3.2	2.9	3.0	3.2	6.2	11.1	12.3	7.1	5.0	4.9	4.3	3.2	4.1	8.1	6.8	5.2	12.3																						
14-Jun	8.7	9.6	7.2	6.2	5.3	3.8	2.5	2.3	2.9	3.5	3.8	4.1	3.4	3.4	3.6	4.7	3.8	3.4	4.2	4.5	7.1	7.5	6.1	12.1	5.2	12.1																						
15-Jun	11.2	3.8	3.6	4.2	5.0	4.4	4.0	3.6	4.2	4.0	4.2	3.1	3.0	2.6	3.3	4.2	2.4	1.7	2.0	2.4	5.0	5.6	5.4	6.8	4.2	11.2																						
16-Jun	6.7	3.0	3.1	3.2	2.8	2.1	2.5	2.2	1.8	1.5	1.5	1.8	1.6	1.5	1.5	1.5	1.9	2.1	1.9	2.3	2.5	4.0	2.6	2.7	2.4	6.7																						
17-Jun	2.6	2.4	2.8	2.2	2.7	4.2	3.1	1.7	2.0	1.7	1.8	2.1	2.9	3.0	3.5	3.0	1.9	2.4	6.0	9.3	6.8	12.3	21.5	18.5	5.0	21.5																						
18-Jun	11.6	17.5	15.2	15.2	28.5	58.8	7.4	13.6	16.4	11.4	6.6	6.0	5.1	5.9	6.4	6.9	8.8	8.6	9.2	8.6	10.4	14.5	8.3	8.6	12.9	58.8																						
19-Jun	12.4	20.3	71.8	85.6	45.5	21.4	8.6	5.4	2.2	1.7	1.6	1.7	1.8	1.8	1.8	2.0	2.3	3.6	5.6	6.3	7.5	9.0	10.8	18.6	14.5	85.6																						
20-Jun	13.4	20.2	26.5	16.0	20.3	29.0	22.6	15.7	9.3	12.2	15.3	21.4	24.2	21.6	16.6	14.3	9.8	6.2	6.6	9.4	19.3	8.0	6.8	16.2	15.9	29.0																						
21-Jun	15.5	13.1	10.9	10.1	8.5	8.5	6.8	11.4	31.0	22.7	24.9	27.2	34.2	15.2	7.2	4.9	7.4	12.3	15.8	24.0	29.7	32.2	32.9	33.6	18.3	34.2																						
22-Jun	31.0	30.3	23.6	16.7	12.8	15.0	10.7	8.3	8.2	13.6	11.1	8.6	4.3	4.4	C	C	6.1	7.1	7.6	12.3	17.1	17.0	17.9	19.9	13.8	31.0																						
23-Jun	21.1	18.3	19.7	18.6	18.1	19.2	18.7	17.1	18.9	12.7	5.9	3.7	3.3	3.2	2.3	2.4	2.6	3.0	4.3	4.2	4.2	5.5	5.0	5.1	9.9	21.1																						
24-Jun	5.8	6.6	6.8	7.5	6.9	6.1	5.0	4.1	4.5	4.5	4.2	3.8	3.4	2.8	2.4	2.2	3.5	5.4	5.6	25.6	32.5	35.4	40.9	39.1	11.0	40.9																						
25-Jun	38.4	35.3	33.7	33.7	35.9	35.5	28.0	58.8	74.1	68.2	48.3	32.3	26.9	21.9	30.4	9.8	10.3	20.9	22.5	24.8	20.0	39.7	29.0	46.4	34.4	74.1																						
26-Jun	26.2	10.5	9.6	50.9	180.7	33.4	12.8	9.3	5.4	3.3	2.1	1.4	0.9	0.8	0.7	0.7	4.1	2.2	2.2	15.5	22.9	19.7	18.9	18.1	18.9	180.7																						
27-Jun	10.6	6.5	4.8	4.3	4.9	6.7	6.1	5.7	4.6	3.3	5.4	5.7	4.6	3.7	2.6	2.6	4.0	4.0	3.7	3.1	8.6	4.9	6.4	11.7	5.3	11.7																						
28-Jun	7.6	5.6	6.2	7.9	16.1	41.9	12.0	53.2	75.8	78.9	143.8	11.1	34.1	28.9	83.3	80.2	54.5	73.9	72.2	62.0	56.2	45.9	42.4	44.6	47.4	143.8																						
29-Jun	48.3	86.1	307.6	302.7	325.2	351.2	185.2	128.6	81.7	62.4	40.6	35.6	45.9	44.5	40.3	57.7	137.0	165.6	181.6	208.7	208.7	195.5	174.0	147.7	148.4	351.2																						
30-Jun	143.7	137.0	147.2	152.6	161.8	188.1	250.8	215.0	174.0	167.4	159.2	158.0	175.3	176.3	167.5	165.0	161.7	155.8	161.0	168.2	163.9	150.0	131.9	72.6	162.7	250.8																						
																								19.8	20.1	29.4	32.5	39.2	37.3	25.4	24.4	22.1	20.5	20.0	15.5	17.2	16.0	17.5	16.5	17.5	19.3	20.3	22.9	25.2	27.0	25.6	24.8	Diurnal Average
																								143.7	137.0	307.6	302.7	325.2	351.2	250.8	215.0	174.0	167.4	159.2	158.0	175.3	176.3	167.5	165.0	161.7	165.6	181.6	208.7	208.7	195.5	174.0	147.7	Diurnal Maximum

C - Calibration
 Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m³





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
CNRL Horizon - June 2015

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	237	33.01	33.01
6 - 15	250	34.82	67.83
16 - 25	82	11.42	79.25
26 - 80	100	13.93	93.18
> 81.0	45	6.27	99.44

Total Number of Valid Hours: 718

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
CNRL Horizon - June 2015

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	53	27	3	6	4	6	6	6	21	25	26	4	6	18	14	12	237
6 - 15	26	17	7	4	7	7	8	27	40	37	17	11	12	11	11	8	250
16 - 25	3	5	1	1	0	4	2	6	7	13	9	3	17	5	2	4	82
26 - 80	6	10	2	5	1	2	0	3	6	13	9	5	16	10	8	4	100
> 81.0	8	3	0	1	1	1	1	2	4	8	3	4	0	3	2	4	45
Totals	96	62	13	17	13	20	17	44	78	96	64	27	51	47	37	32	714

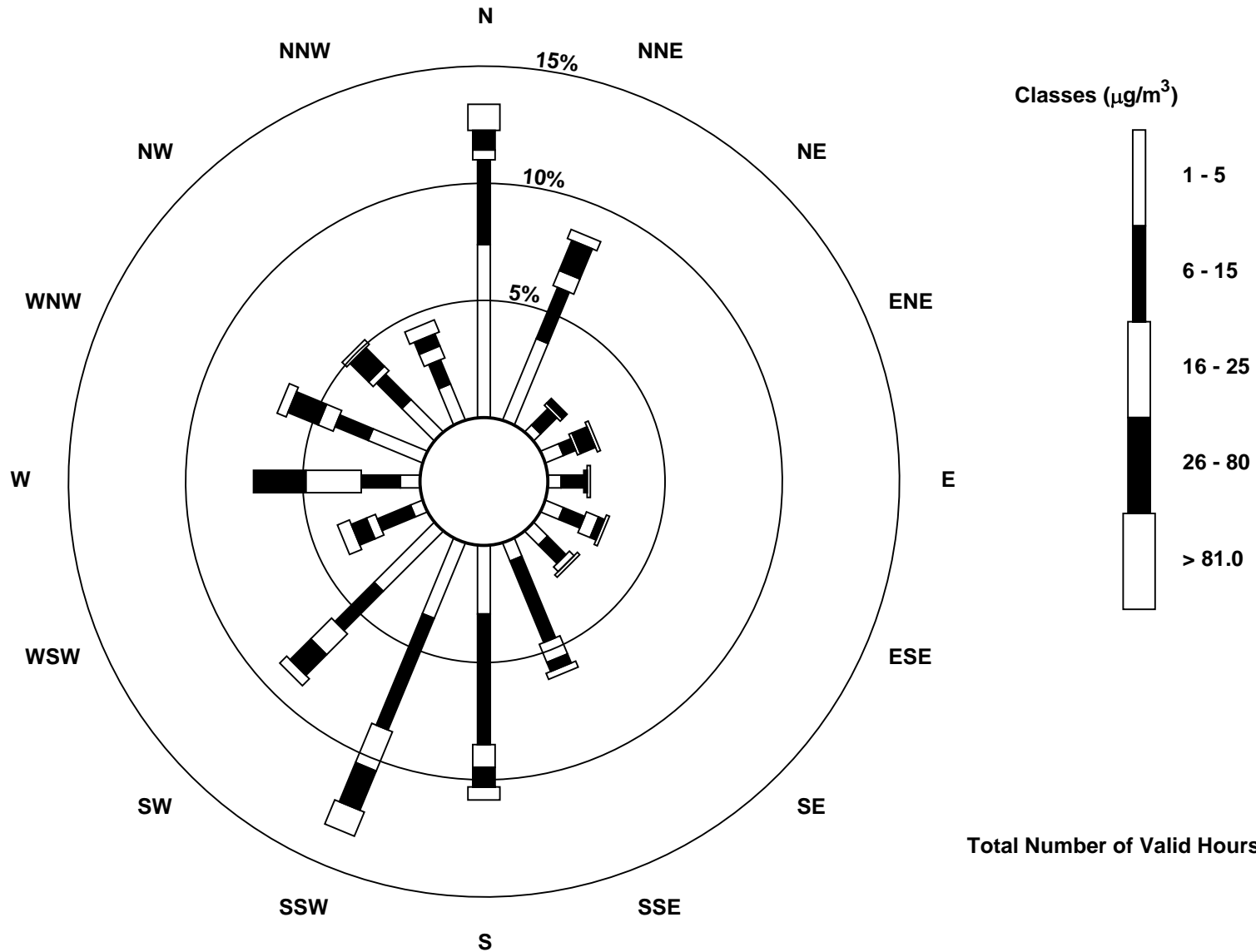
Total Number of Valid Hours: 718

Total Number of Hours: 720



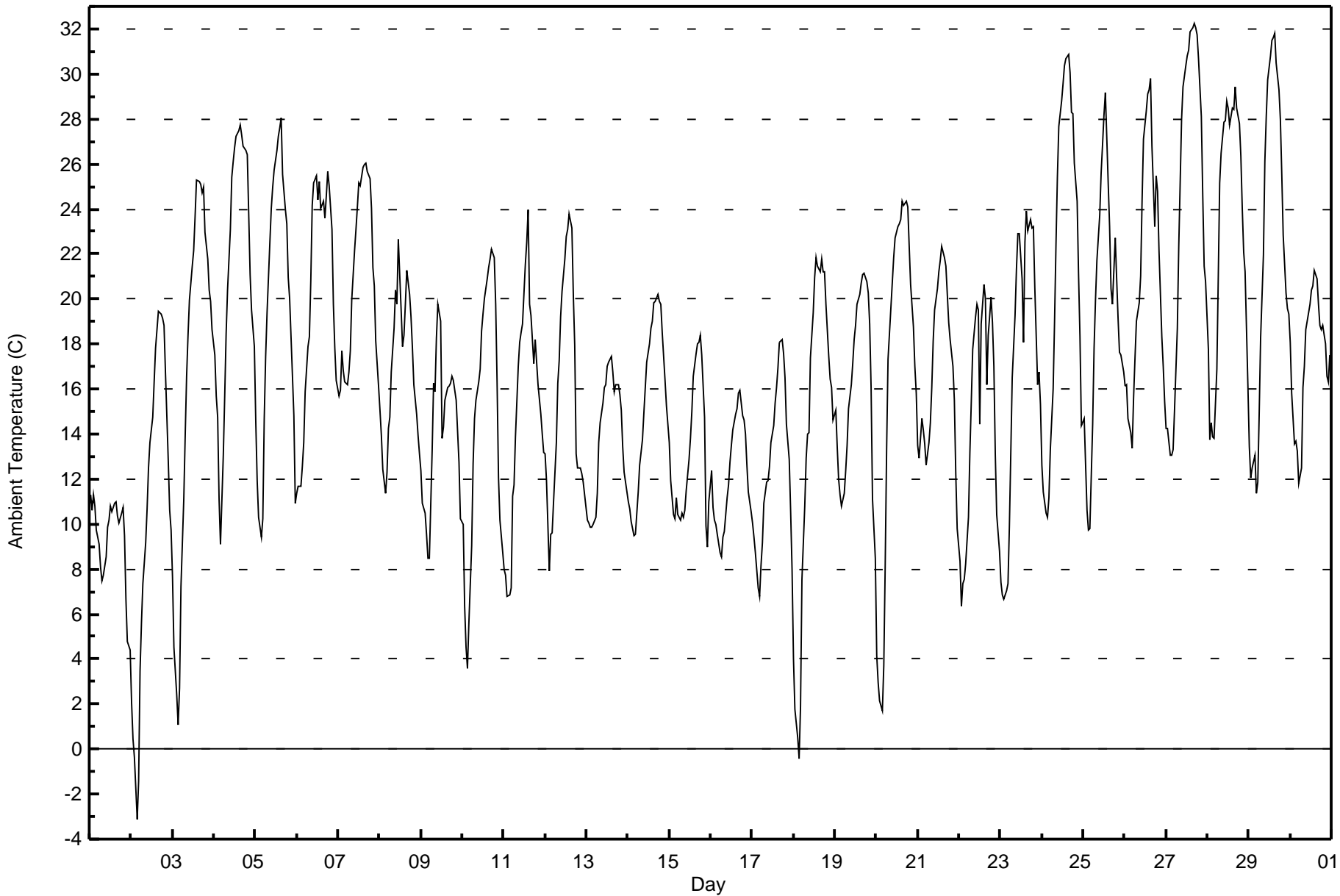
Wood Buffalo Environmental Association
Wind Rose Jun 2015

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
CNRL Horizon (AMS 15)





Maximum Value: 32.3 C on Jun 27 17:00 Maximum Daily Average: 24.4 C on Jun 27																						Hours in Service: 720 Hours of Data: 720																										
Minimum Value: -3.1 C on Jun 2 04:00 Minimum Daily Average: 9.4 C on Jun 1 Maximum Diurnal Average: 22.5 C at hour 16 Minimum Diurnal Average: 9.2 C at hour 4 Monthly Average: 16.88 C Percentiles: P ₁ = 1.7 P ₁₀ = 9.4 Q ₁ = 12.2 Median = 16.6 Q ₃ = 21.2 P ₉₀ = 25.6 P ₉₉ = 31.5																						Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jun	11.3	10.6	11.3	10.8	9.7	9.1	8.1	7.5	7.7	8.5	9.9	10.2	10.8	10.6	10.9	11.0	10.4	10.1	10.5	10.7	9.5	6.7	4.8	4.4	9.4	11.3																						
2-Jun	2.1	0.4	-0.3	-3.1	-1.4	3.4	5.6	7.4	9.2	10.7	12.5	13.6	14.8	16.3	17.8	18.7	19.4	19.3	19.2	18.8	16.7	12.8	10.6	9.7	10.6	19.4																						
3-Jun	7.7	4.5	2.4	1.1	2.7	7.2	11.1	14.0	16.6	18.4	20.0	21.5	22.1	23.6	25.3	25.2	25.1	24.7	25.0	23.0	21.8	20.4	19.9	18.6	16.7	25.3																						
4-Jun	17.5	15.7	14.8	11.1	9.1	13.1	15.7	18.5	20.4	23.1	25.4	26.1	26.7	27.2	27.5	27.7	27.3	26.8	26.6	26.4	23.8	21.1	19.5	17.9	21.2	27.7																						
5-Jun	14.5	12.0	10.3	9.4	10.2	14.7	17.5	19.4	22.5	24.0	24.9	25.7	26.6	27.2	27.6	28.1	25.6	24.0	23.4	21.0	20.0	16.6	14.8	11.0	19.6	28.1																						
6-Jun	11.4	11.7	11.7	12.5	13.6	15.9	17.9	18.3	20.8	24.1	25.2	25.5	24.4	25.2	24.0	24.4	23.6	24.6	25.7	25.0	23.1	19.8	17.8	16.4	20.1	25.7																						
7-Jun	15.7	15.9	17.7	16.8	16.3	16.2	16.8	17.7	19.9	22.1	23.1	24.1	25.2	25.0	25.9	26.0	26.0	25.7	25.3	24.0	21.4	20.6	18.1	16.1	20.9	26.0																						
8-Jun	15.0	14.0	12.4	11.4	12.3	14.2	14.7	16.8	18.7	20.4	19.8	22.7	19.5	17.9	18.4	19.8	21.3	20.2	19.2	17.8	16.2	14.9	14.0	13.1	16.9	22.7																						
9-Jun	12.4	10.9	10.5	9.5	8.5	8.5	13.3	16.3	15.9	18.2	19.7	19.0	13.8	14.3	15.5	16.0	16.1	16.3	16.6	16.4	15.5	14.1	12.7	10.2	14.2	19.7																						
10-Jun	10.0	6.3	4.5	3.6	5.6	9.1	12.7	14.7	15.5	16.3	16.9	18.6	19.3	20.0	20.9	21.4	21.8	22.2	21.9	19.7	16.2	12.1	10.2	8.7	14.5	22.2																						
11-Jun	8.0	7.7	6.8	6.9	7.2	11.2	11.7	13.9	17.0	18.1	18.5	18.9	21.5	22.5	24.0	19.7	19.3	17.1	18.2	17.2	16.2	14.9	14.0	13.2	15.2	24.0																						
12-Jun	13.1	12.0	7.9	9.5	9.6	11.0	13.6	16.2	17.3	19.2	20.3	21.8	22.8	23.1	23.8	23.2	20.2	18.0	13.1	12.5	12.5	12.2	11.9	11.3	15.7	23.8																						
13-Jun	10.2	10.0	9.9	9.9	10.0	10.3	11.4	13.6	14.5	15.4	16.1	16.2	17.0	17.2	17.4	16.7	15.9	16.2	16.2	15.8	15.0	13.5	12.3	11.4	13.8	17.4																						
14-Jun	11.0	10.7	10.1	9.5	9.5	10.5	11.4	12.6	13.7	14.9	16.0	17.2	18.0	18.7	19.0	19.9	19.9	20.2	19.9	19.8	18.5	16.4	15.2	14.5	15.3	20.2																						
15-Jun	13.6	11.9	10.5	10.2	11.2	10.4	10.2	10.5	10.3	10.6	11.5	12.9	13.8	15.0	16.6	17.6	18.0	18.1	18.4	17.5	14.7	9.9	9.0	11.0	13.1	18.4																						
16-Jun	12.4	10.8	10.2	10.0	9.5	8.7	8.5	9.4	9.7	11.2	11.7	12.7	13.5	14.2	14.9	15.2	15.8	15.9	14.8	14.6	14.0	12.6	11.4	10.6	12.2	15.9																						
17-Jun	10.1	9.4	8.8	7.2	6.8	8.2	9.2	11.0	11.9	11.9	12.5	13.6	14.4	15.4	16.0	16.9	18.1	18.2	17.6	16.5	14.4	12.8	10.5	8.0	12.5	18.2																						
18-Jun	4.0	1.8	0.5	-0.4	1.9	7.5	10.8	12.9	14.0	14.0	17.4	19.4	21.0	21.9	21.5	21.2	21.8	21.2	21.2	19.8	17.4	16.4	16.0	14.6	14.1	21.9																						
19-Jun	15.0	13.4	12.0	11.3	10.8	11.4	12.4	13.5	15.1	16.2	17.1	18.2	18.8	19.7	20.2	20.7	21.1	21.1	20.8	20.3	18.9	16.0	11.1	8.5	16.0	21.1																						
20-Jun	4.2	3.0	2.2	1.7	3.7	8.1	13.3	17.3	19.6	20.7	21.9	22.7	23.2	23.3	23.5	24.3	24.2	24.4	24.1	22.4	20.7	18.7	17.0	15.8	16.7	24.4																						
21-Jun	13.5	12.9	14.7	14.2	13.6	12.6	13.6	14.5	16.1	18.1	19.5	20.5	21.2	21.7	22.3	21.9	21.4	20.2	18.9	18.2	17.0	15.5	12.3	9.8	16.8	22.3																						
22-Jun	8.4	6.3	7.4	7.6	8.2	10.3	13.2	15.5	17.8	19.2	19.8	19.5	14.4	18.9	20.6	20.0	16.2	18.4	20.1	18.9	17.0	13.1	10.4	8.8	14.6	20.6																						
23-Jun	7.4	6.9	6.7	7.1	7.4	9.9	13.2	16.5	19.3	21.3	22.9	22.9	20.9	18.1	22.5	23.9	23.0	23.5	23.1	23.2	20.5	16.2	16.8	15.3	17.0	23.9																						
24-Jun	12.6	11.4	10.5	10.3	11.2	13.3	16.0	19.0	22.4	25.4	27.7	28.8	29.5	30.4	30.7	30.9	30.1	28.3	28.2	26.0	24.4	21.1	18.3	14.4	21.7	30.9																						
25-Jun	14.7	12.6	10.6	9.7	9.8	14.5	17.8	20.0	21.7	23.7	25.6	26.9	28.2	29.2	25.1	23.2	20.4	19.8	22.7	20.9	19.1	17.6	17.5	16.8	19.5	29.2																						
26-Jun	16.2	16.2	14.7	14.1	13.4	15.7	17.4	19.0	19.9	21.0	24.3	27.1	28.4	29.1	29.3	29.8	26.8	23.2	25.5	24.8	22.2	18.4	17.0	15.4	21.2	29.8																						
27-Jun	14.3	14.2	13.1	13.1	13.3	15.1	18.7	22.3	25.2	28.0	29.4	30.4	30.8	31.0	31.9	32.1	32.3	32.1	31.7	30.7	28.1	24.6	21.5	20.8	24.4	32.3																						
28-Jun	17.8	13.8	14.5	13.9	13.8	16.9	21.0	25.2	26.5	27.9	27.9	28.8	28.5	27.7	28.5	28.4	29.4	28.5	27.8	26.4	24.0	22.1	21.2	16.1	23.2	29.4																						
29-Jun	13.4	12.0	12.5	13.1	11.3	11.9	15.0	18.3	22.0	26.1	28.1	29.7	30.8	31.5	31.6	31.8	30.5	29.3	28.0	25.5	22.9	20.3	19.6	19.3	22.3	31.8																						
30-Jun	18.0	15.8	13.6	13.7	13.2	11.8	12.5	16.1	17.0	18.6	19.0	19.8	20.4	20.6	21.3	20.9	19.8	18.8	18.6	18.8	18.0	16.5	16.3	17.5	17.4	21.3																						
																								11.8	10.5	9.7	9.2	9.4	11.4	13.5	15.6	17.3	18.9	20.2	21.2	21.3	21.9	22.5	22.5	22.0	21.5	21.4	20.4	18.7	16.3	14.7	13.3	Diurnal Average
																								18.0	16.2	17.7	16.8	16.3	16.9	21.0	25.2	26.5	28.0	29.4	30.4	30.8	31.5	31.9	32.1	32.3	32.1	31.7	30.7	28.1	24.6	21.5	20.8	Diurnal Maximum





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ambient Temperature (AT) - C
CNRL Horizon - June 2015

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	4	0.56	0.56
0 - 10	89	12.36	12.92
10 - 20	408	56.67	69.58
> 20	219	30.42	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

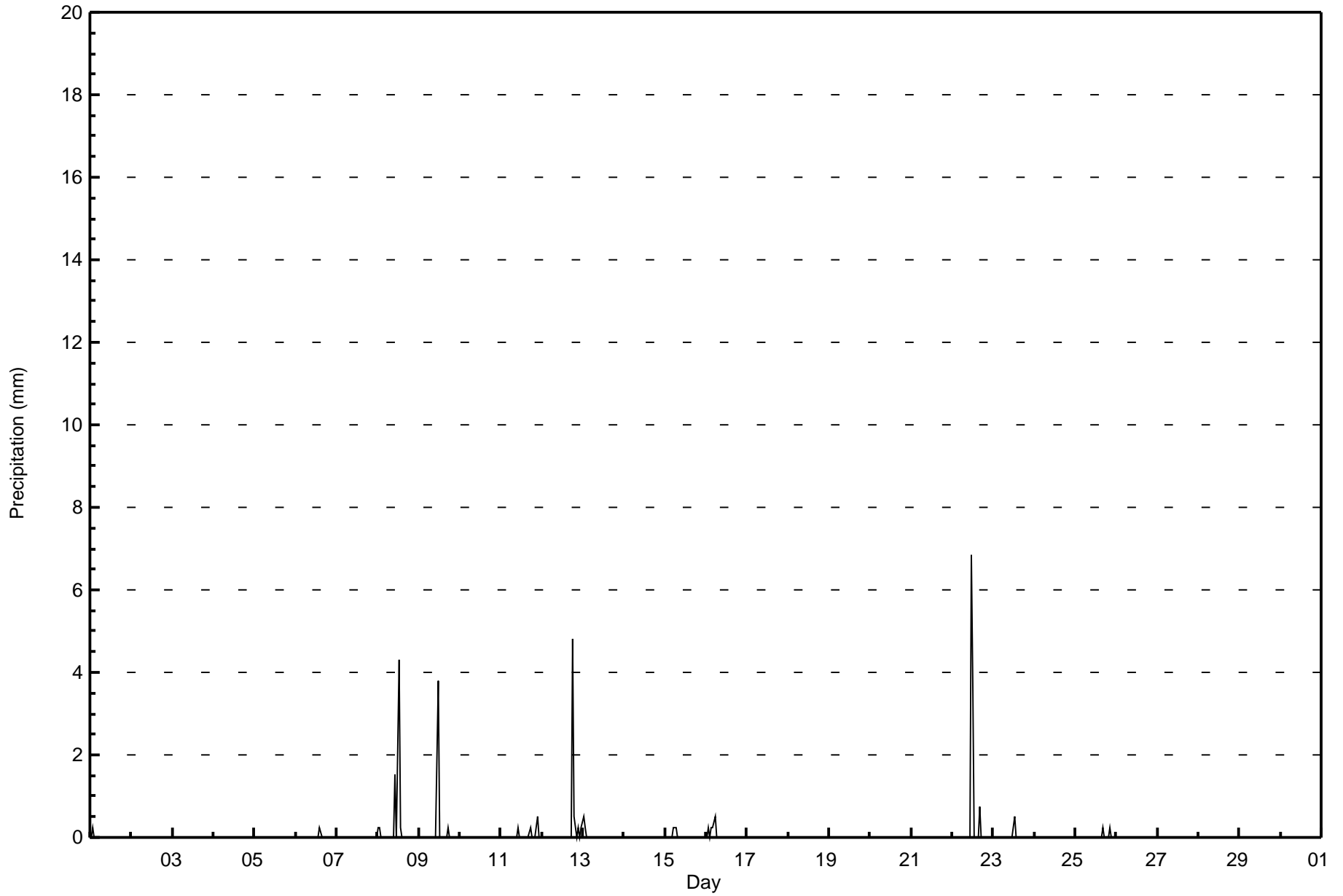


Maximum Value: 6.9 mm on Jun 22 12:00																		Maximum Daily Total: 11.4 mm on Jun 22																		Hours in Service: 720												
Minimum Value: 0.0 mm on Jun 1 01:00																		Minimum Daily Total: 0.0 mm on Jun 2																		Hours of Data: 720												
Maximum Diurnal Total: 10.7 mm at hour 12																		Minimum Diurnal Total: 0.0 mm at hour 3																		Hours of Missing Data: 0												
Monthly Total: 33.02 mm																		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 0.2																		Hours of Calibration: 0												
																																				Percent Operational Time: 100.0												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jun	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																						
2-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3																					
7-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	4.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.6	4.3																					
9-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8	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	4.1	3.8																					
10-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	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	0.3	0.0	0.0	0.0	0.5	0.0	0.0	1.0	0.5																						
12-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.8	0.5	0.0	0.3	0.0	0.3	5.8	4.8																						
13-Jun	0.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.5																						
14-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.3																						
16-Jun	0.0	0.3	0.0	0.3	0.3	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.5																						
17-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.9	3.8	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.4	6.9																						
23-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.5																						
24-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	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	0.3	0.0	0.0	0.5	0.3	0.3																						
26-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																					
																								0.8	1.0	0.0	0.3	0.3	0.8	0.3	0.0	0.0	0.0	1.8	10.7	8.6	0.3	0.3	0.0	1.0	0.5	4.8	0.5	0.3	0.8	0.0	0.3	Diurnal Average
																								0.5	0.3	0.0	0.3	0.3	0.5	0.3	0.0	0.0	0.0	1.5	6.9	4.3	0.3	0.3	0.0	0.8	0.3	4.8	0.5	0.3	0.5	0.0	0.3	Diurnal Maximum



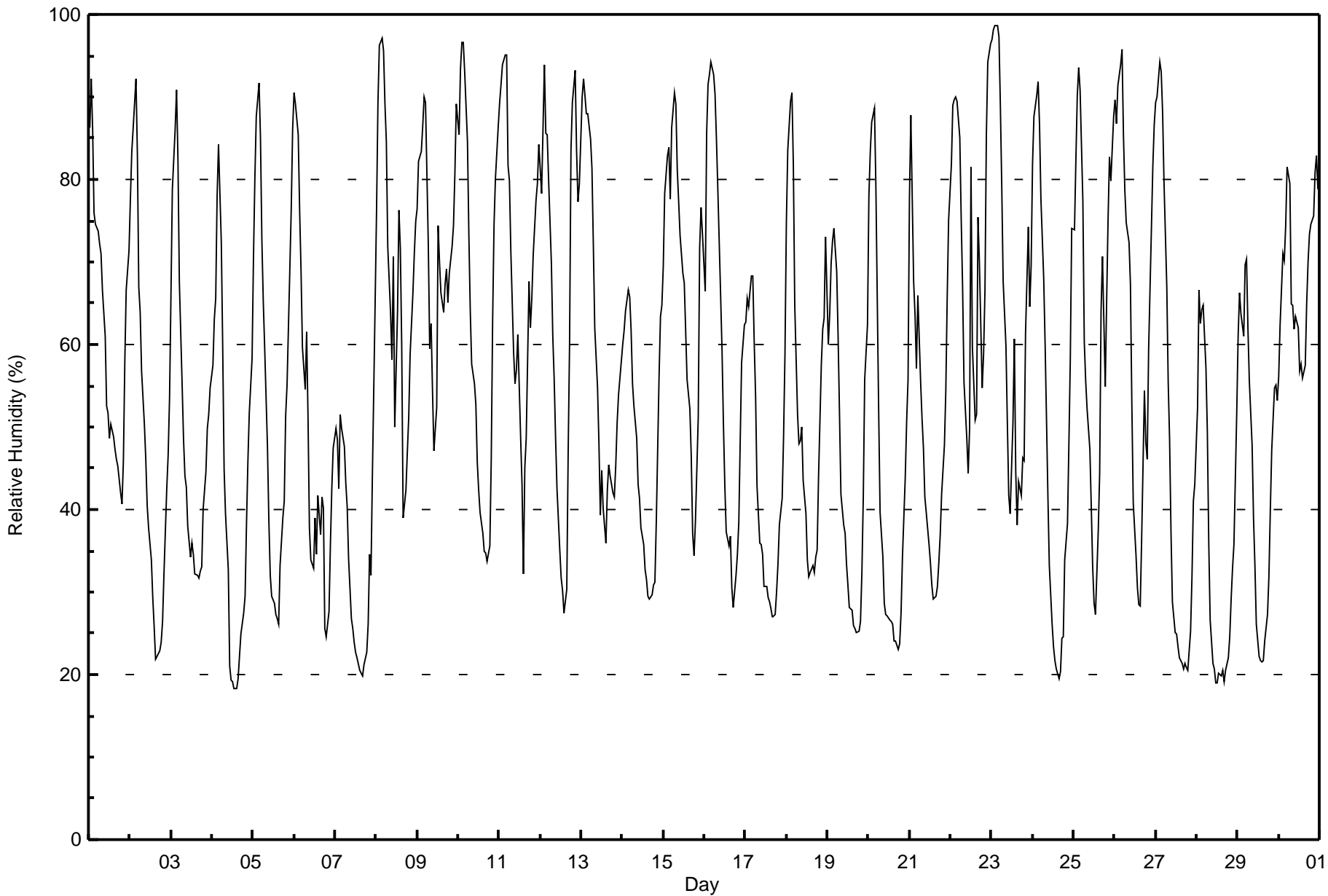
Wood Buffalo Environmental Association
Hourly Averages

Precipitation (PC) - mm
CNRL Horizon - June 2015





Maximum Value: 99 % on Jun 23 04:00																			Maximum Daily Average: 71.5 % on Jun 9						Hours in Service: 720																			
Minimum Value: 18 % on Jun 4 15:00																			Minimum Daily Average: 34.8 % on Jun 7						Hours of Data: 720																			
Maximum Diurnal Average: 82.9 % at hour 4																			Minimum Diurnal Average: 34.7 % at hour 16						Hours of Missing Data: 0																			
Monthly Average: 55.3 %																			Percentiles: P ₁ = 19 P ₁₀ = 26 Q ₁ = 36 Median = 55 Q ₃ = 73 P ₉₀ = 87 P ₉₉ = 97						Hours of Calibration: 0																			
																									Percent Operational Time: 100.0																			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																				
1-Jun	86	92	86	76	75	74	72	71	67	61	52	52	49	50	49	47	46	45	42	41	46	58	67	71	61.4	92																		
2-Jun	78	83	86	92	83	67	64	57	50	46	40	38	34	29	26	22	22	23	24	26	32	43	47	54	48.6	92																		
3-Jun	66	79	86	91	82	68	55	49	44	43	38	34	36	35	32	32	32	33	33	40	45	50	52	55	50.3	91																		
4-Jun	57	63	66	78	84	72	60	45	39	33	21	19	19	18	18	19	22	25	27	29	38	46	52	58	42.1	84																		
5-Jun	70	80	88	92	85	73	65	60	48	39	32	30	29	27	27	26	33	39	41	51	55	69	76	86	55.0	92																		
6-Jun	91	89	85	76	69	60	55	62	51	38	34	33	39	35	42	37	42	40	26	25	28	36	43	47	49.1	91																		
7-Jun	50	48	42	51	50	48	43	40	34	27	26	24	23	22	20	20	20	21	23	26	35	32	44	65	34.8	65																		
8-Jun	76	89	96	97	96	89	85	72	64	58	71	50	64	76	72	60	39	42	47	51	59	66	71	75	69.4	97																		
9-Jun	76	82	83	86	90	89	72	60	62	54	47	52	74	70	66	64	67	69	65	69	72	74	81	89	71.5	90																		
10-Jun	85	93	97	97	93	85	73	64	58	55	53	46	42	40	37	35	35	34	36	46	63	75	80	87	62.8	97																		
11-Jun	89	92	94	95	95	82	80	71	59	55	57	61	49	43	32	45	49	68	62	66	71	78	80	84	69.0	95																		
12-Jun	81	78	94	86	85	80	70	61	56	49	43	35	32	30	27	30	47	60	84	89	93	84	77	79	64.6	94																		
13-Jun	90	92	90	88	88	85	81	72	62	55	48	39	45	40	36	42	45	44	42	42	45	51	54	58	59.8	92																		
14-Jun	60	62	64	67	66	62	55	52	49	43	41	38	36	33	32	29	29	30	31	31	38	56	63	65	47.2	67																		
15-Jun	70	78	83	84	78	86	91	89	81	77	73	69	67	62	56	52	46	37	34	39	51	72	77	73	67.7	91																		
16-Jun	66	86	92	93	94	93	90	85	79	66	59	50	43	37	36	37	31	28	32	35	38	48	58	62	59.9	94																		
17-Jun	63	66	65	68	68	60	54	43	36	36	35	31	31	29	29	28	27	27	30	33	38	41	49	59	43.5	68																		
18-Jun	75	84	89	91	82	65	51	48	48	50	44	39	34	32	32	33	32	34	35	44	58	62	63	73	54.1	91																		
19-Jun	60	64	70	73	74	69	61	52	42	38	37	33	31	28	28	26	26	25	25	26	32	41	56	62	45.0	74																		
20-Jun	78	83	87	89	79	65	52	40	34	29	27	27	27	26	26	24	24	23	24	27	34	44	51	56	44.9	89																		
21-Jun	78	88	68	63	57	66	55	51	47	41	40	36	34	31	29	29	31	34	37	42	48	54	66	75	50.0	88																		
22-Jun	82	89	90	90	89	85	75	67	55	49	44	50	82	60	51	52	75	70	55	59	67	85	94	97	71.3	97																		
23-Jun	97	98	99	99	97	89	79	68	60	50	42	40	50	61	45	38	43	42	46	46	61	74	65	70	64.9	99																		
24-Jun	82	88	90	92	87	78	68	60	51	42	33	26	23	22	21	19	20	24	25	34	38	48	58	74	50.1	92																		
25-Jun	74	82	90	94	91	77	60	56	52	47	40	33	29	27	38	44	64	71	55	65	75	83	80	88	63.1	94																		
26-Jun	90	87	91	94	96	85	79	75	72	67	53	41	34	30	29	28	36	54	48	46	59	74	82	87	64.1	96																		
27-Jun	89	90	94	93	88	80	67	55	49	37	29	25	25	23	22	21	21	21	21	21	25	32	41	43	46.4	94																		
28-Jun	52	67	63	64	65	57	49	36	27	21	21	19	19	20	20	20	19	21	22	25	29	33	36	52	35.7	67																		
29-Jun	61	66	64	61	70	70	62	56	48	39	33	26	22	22	22	22	24	27	32	40	47	55	55	53	44.8	70																		
30-Jun	56	62	71	70	74	82	79	65	65	62	63	62	57	58	56	57	65	70	73	75	76	81	83	79	68.4	83																		
																			74.3	80.0	82.1	82.9	81.0	74.7	66.8	59.3	53.0	46.9	42.5	38.6	39.2	37.2	35.1	34.7	37.1	39.4	39.2	42.9	49.9	58.1	63.2	69.2	Diurnal Average	
																			97	98	99	99	97	93	91	89	81	77	73	69	82	76	72	64	75	71	84	89	93	85	94	97	Diurnal Maximum	





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
CNRL Horizon - June 2015

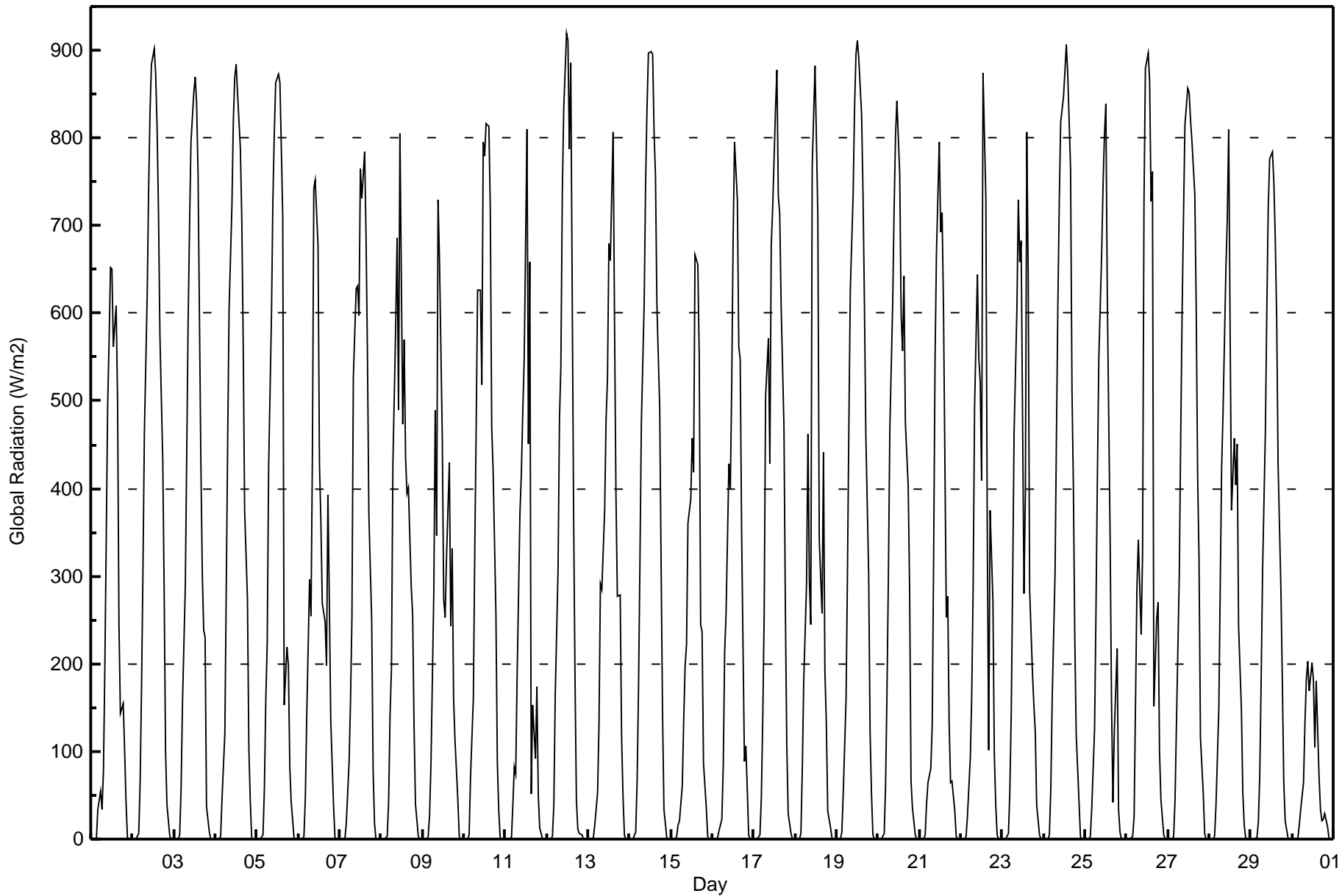
Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	11	1.53	1.53
20 - 40	208	28.89	30.42
40 - 60	196	27.22	57.64
60 - 80	178	24.72	82.36
80 - 100	127	17.64	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Maximum Value: 919 W/m2 on Jun 12 12:00		Maximum Daily Average: 378.4 W/m2 on Jun 14		Hours in Service: 720																							
Minimum Value: 0 W/m2 on Jun 1 01:00		Minimum Daily Average: 69.3 W/m2 on Jun 30		Hours of Data: 720																							
Maximum Diurnal Average: 725.1 W/m2 at hour 12		Minimum Diurnal Average: 0.0 W/m2 at hour 1		Hours of Missing Data: 0																							
Monthly Average: 280.9 W/m2		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 3 Median = 161 Q ₃ = 523 P ₉₀ = 764 P ₉₉ = 897		Hours of Calibration: 0																							
				Percent Operational Time: 100.0																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	0	0	0	0	34	55	35	77	197	497	568	653	650	561	609	501	245	143	154	101	42	2	0	0	213.5	653	
2-Jun	0	0	0	6	65	175	309	463	622	741	831	884	901	873	812	715	575	433	283	99	38	3	0	0	367.9	901	
3-Jun	0	0	0	4	57	156	289	441	593	700	795	851	870	839	760	431	304	238	230	38	8	0	0	0	316.9	870	
4-Jun	0	0	0	3	47	120	288	455	606	723	819	870	884	850	787	706	564	375	274	103	44	2	0	0	354.9	884	
5-Jun	0	0	0	4	58	160	223	423	595	727	806	862	873	863	788	709	153	219	198	83	42	2	0	0	324.5	873	
6-Jun	0	0	0	2	47	141	296	255	437	742	752	676	429	364	269	248	197	393	270	135	38	2	0	0	237.2	752	
7-Jun	0	0	0	0	17	88	157	253	527	628	631	598	765	730	784	686	550	370	249	79	17	1	0	0	297.1	784	
8-Jun	0	0	0	3	44	142	195	426	586	685	490	805	473	570	435	395	401	289	255	129	40	3	0	0	265.3	805	
9-Jun	0	0	0	4	27	86	283	489	346	730	662	457	274	252	323	430	243	332	162	113	45	2	0	0	219.2	730	
10-Jun	0	0	0	5	71	161	329	471	626	626	518	795	779	816	813	720	470	421	256	86	33	2	0	0	333.2	816	
11-Jun	0	0	0	2	40	82	75	185	372	417	488	547	809	451	658	52	154	92	173	50	14	0	0	0	194.2	809	
12-Jun	0	0	0	3	39	165	307	479	540	736	832	919	911	787	886	374	184	44	11	7	5	0	0	0	301.2	919	
13-Jun	0	0	0	2	16	53	133	291	286	375	478	524	680	661	807	590	394	276	279	118	49	4	0	0	250.6	807	
14-Jun	0	0	0	8	66	174	318	475	611	749	834	897	898	896	806	757	610	492	312	143	33	2	0	0	378.4	898	
15-Jun	0	0	0	3	16	21	61	137	198	223	360	389	457	418	666	655	549	245	237	87	35	3	0	0	198.3	666	
16-Jun	0	0	0	1	10	23	84	214	258	428	400	518	686	796	729	562	548	353	89	107	57	5	0	0	244.5	796	
17-Jun	0	0	0	5	48	141	259	505	572	428	678	720	832	877	735	714	608	470	264	108	30	6	0	0	333.3	877	
18-Jun	0	0	0	7	80	181	291	462	295	245	767	882	799	710	342	258	442	192	133	32	13	1	0	0	255.5	882	
19-Jun	0	0	0	9	53	161	307	477	626	736	835	896	911	891	826	736	610	461	303	122	51	6	0	0	375.7	911	
20-Jun	0	0	0	6	63	173	304	468	611	717	802	842	758	597	557	643	475	402	286	65	35	5	0	0	325.5	842	
21-Jun	0	0	0	5	40	64	80	129	319	544	668	796	692	716	605	253	276	133	64	66	32	3	0	0	228.5	796	
22-Jun	0	0	0	4	28	93	165	288	492	644	548	521	410	874	731	354	101	375	273	96	39	4	0	0	251.6	874	
23-Jun	0	0	0	6	55	146	296	465	605	729	659	682	280	397	807	641	285	190	153	122	39	4	0	0	273.4	807	
24-Jun	0	0	0	5	57	161	303	460	608	728	818	847	877	907	872	765	513	401	229	118	42	4	0	0	363.1	907	
25-Jun	0	0	0	4	35	125	260	414	548	667	746	803	839	624	346	158	42	124	218	34	8	0	0	0	249.8	839	
26-Jun	0	0	0	3	25	154	287	341	233	327	726	879	898	864	728	761	151	252	271	100	46	4	0	0	293.7	898	
27-Jun	0	0	0	3	45	132	301	458	601	712	815	857	851	819	795	736	605	415	316	115	52	6	0	0	359.9	857	
28-Jun	0	0	0	4	39	148	288	424	488	649	707	810	581	375	457	405	451	244	148	53	16	1	0	0	261.9	810	
29-Jun	0	0	0	2	20	73	181	306	467	604	719	776	784	748	684	593	426	284	180	67	20	2	0	0	289.0	784	
30-Jun	0	0	0	2	17	34	65	133	182	203	168	201	182	105	180	71	34	21	23	29	15	1	0	0	69.3	203	
		0.0	0.0	0.0	3.8	42.0	119.6	225.7	362.2	468.2	588.6	664.0	725.1	701.1	674.4	653.2	520.6	372.0	289.2	209.8	86.8	32.5	2.7	0.0	0.0	Diurnal Average	
		0	0	0	9	80	181	329	505	626	749	835	919	911	907	886	765	610	492	316	143	57	6	0	0	Diurnal Maximum	





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

CNRL Horizon - June 2015

Maximum Speed: 29 km/h on Jun 13 15:00	Maximum Daily Speed Average: 16.4 km/h on Jun 13	Hours in Service: 720
Minimum Speed Value: 0 km/h on Jun 10 22:00	Minimum Daily Speed Average: 0.9 km/h on Jun 29	Hours of Data: 720
Maximum Diurnal Speed Average: 2.9 km/h at hour 5	Minimum Diurnal Speed Average: 0.6 km/h at hour 8	Hours of Missing Data: 0
Monthly Average Velocity: 1.9 km/h 282.8 deg	Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 5 Median = 8 O ₃ = 11 P ₉₀ = 16 P ₉₉ = 24	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	SW5	SSW6	NW10	NW16	WNW17	WNW15	WNW16	WNW13	WNW17	WNW19	WNW19	WNW21	WNW22	WNW20	WNW23	NW23	WNW20	NW18	NW14	NW13	WNW7	W7	WSW8	WNW5	WNW14.2	WNW23
2-Jun	NW6	NNW6	NW5	WSW4	W4	NW2	NE4	SSE5	S5	SSW4	SSW6	E4	ESE10	SSE9	SSE10	S10	SSE9	SE10	ESE11	ESE7	ESE6	SE6	SSE7	SSW8	SSE3.6	ESE11
3-Jun	S4	S5	WSW4	SSW3	SSW4	SSW1	NNE2	SSE5	SE6	SE9	ESE13	SE12	SSE11	SSE10	SSE10	SSE11	SSE11	SSE12	SSE12	SSE11	SSE9	W4	SE6	SSE8	SSE6.7	ESE13
4-Jun	S10	S7	S6	SSW6	SSW5	SSW5	S7	S8	S9	S11	S16	S16	SSE14	SSE15	SSE15	S17	S18	S15	S11	SSW7	SSW4	S18	SSW10	S8	S10.5	S18
5-Jun	S5	S6	S5	SSW3	S4	SSW4	S6	S9	S13	SSW19	SSW19	S20	SSW18	S18	S17	S16	SSW15	SSW13	S17	S14	S8	SW6	SW5	SW5	SSW10.7	S20
6-Jun	SSW8	SSW10	SSW8	SSW10	SSW9	SSW9	SW10	SSW7	SSW6	SW2	ENE5	ENE9	NE9	NNE6	SW4	ENE8	SSE7	S7	NW16	NW15	WNW9	W7	W6	W6	WSW2.9	NW16
7-Jun	W6	W7	W11	WNW9	W9	W11	W12	W13	W13	WNW13	W13	W13	W17	W20	W18	WNW17	W16	W15	WNW11	W7	WSW3	ENE4	SW6	SSE2	W10.4	W20
8-Jun	SSW6	NNW3	SSE1	W1	N2	WNW3	WNW5	NW4	W4	NNE2	SSW2	WNW12	NNW15	NE12	ESE12	NNW4	WNW24	NW25	NW24	NW17	NW13	NW11	WNW10	NW12	NW6.8	NW25
9-Jun	NW9	W7	NW9	WNW6	SW7	SSW8	SW7	SW8	WSW9	SW6	WSW5	E7	NE13	ENE10	SE6	S6	SW9	SSW8	SW6	W5	W5	N8	N8	WNW6	WSW2.7	NE13
10-Jun	WNW7	W4	W5	SSW1	SSW5	SSW5	S2	ESE3	ESE4	NNE2	NNW2	S2	N3	SE6	E8	E8	SE5	SE6	SSE8	S7	E2	SW0	WSW1	WNW1	SSE1.5	SSE8
11-Jun	NE1	NE2	WNW3	NNW2	W3	S5	N3	SSW1	SE9	SSE11	ESE10	ESE8	ESE7	SSE7	SW3	WSW7	SSW5	SW7	SSE7	SSE6	WSW5	W4	SSE8	SSW5	S2.9	SSE11
12-Jun	W7	WNW5	W5	SW8	SW4	SSW5	SE4	SE1	N4	ENE2	ESE5	E1	SSW4	SSW2	ENE4	E9	E17	ESE12	WNW14	NNW9	N7	NE8	ENE11	ENE8	ENE1.4	E17
13-Jun	NNE6	N5	N6	N8	NNW8	NNW9	NNW11	N17	N18	N24	N25	N24	NNE24	N26	NNE29	NNE27	NNE27	NNE22	NNE22	NNE18	N12	N12	N11	N11	N16.4	NNE29
14-Jun	N10	N10	N10	N9	N10	N11	NNE13	N13	N16	N18	N17	N19	N18	N17	NNE18	N16	N14	N13	N12	NNW11	NNW12	N15	N7	N9	N13.2	N19
15-Jun	N10	NNE8	NNE7	N4	NW8	N6	N3	NNE7	NNE10	NNE7	NE5	SSW2	S7	SSW6	SW7	SSW10	N2	NW10	WNW9	W5	WSW3	SSW3	SSW6	W5	NW2.3	SSW10
16-Jun	NNW9	N10	N9	NNE8	N11	N12	N13	NNE14	N15	N14	N13	N13	N15	N13	N12	N11	N14	N12	NNE8	NNE8	N9	N11	N11	N10	N11.3	N15
17-Jun	NNW10	NW11	NW12	NNW11	NNW9	NNW13	N13	N11	N11	NNW10	NNW5	NNW5	NNW6	N5	ENE4	SE3	S6	S9	SSE11	SSE10	SSE9	SSE9	S9	SW6	NNW2.4	N13
18-Jun	SW4	SSW4	SW4	SW4	SSW5	S3	SE2	S6	S7	SSW7	SSW8	SSW5	S6	S11	S12	SSE8	SE6	E7	ESE4	WSW2	W10	WNW7	NW8	SW4	SSW3.9	S12
19-Jun	N9	N12	N13	N12	N11	N12	NNE14	NNE14	NNE14	NE12	NNE13	N11	NNE9	NNE7	ENE10	NNE9	NNE10	NNE12	NNE10	NNE8	N9	N8	N3	NW4	NNE9.8	NNE14
20-Jun	WSW3	W4	SSW4	SW4	SW4	SSW6	SSW1	S4	S5	N3	NNE2	NE7	SE4	NNE7	NNE7	ENE1	ENE7	NNE8	NNE11	NNE6	N12	N13	NNE5	NNW4	NNE2.3	N13
21-Jun	W4	NNW4	N7	N6	N5	NNW5	N5	N4	NE2	NW2	NE3	N5	NNE7	NNE6	NE7	NNE10	NNE13	N13	NNW11	WNW9	W5	WSW7	W6	SW6	N4.5	N13
22-Jun	SW6	SW5	SSW7	SSW10	SSW9	SW7	SW4	E2	NE7	NE10	E7	NNE6	NE6	SSE2	SW11	SW12	WNW11	WSW7	W4	NNE6	NNE4	WNW3	WNW4	W4	WSW2.1	SW12
23-Jun	WSW3	SW4	SW4	SSW6	SSW7	SSW7	S7	SSE6	SSE7	S8	S7	SW9	SW11	SSW11	S11	SSE7	SSE7	SSE5	S4	SSE4	S5	S7	SW8	SW8	SSW6.1	SW11
24-Jun	SSW6	S8	S9	S10	S13	S12	S13	S11	S10	S11	SSW11	SW14	SW13	SW13	SW12	SW11	WNW11	NW15	WNW7	NNE8	NNE13	NNE10	N6	W3	SW5.2	NW15
25-Jun	WSW4	W3	N1	WSW1	W2	NNW3	NNE3	NNE5	NNE8	NNE6	E4	ENE6	ESE6	ESE1	NNW23	N12	SSW9	S9	SSW6	W8	SSW8	SW7	SSW10	SSW9	W1.2	NNW23
26-Jun	SW6	SW4	SW5	S7	S7	S7	S12	S10	S9	SSW12	SW14	SW17	WSW16	WSW17	WSW16	WSW16	W19	W11	WSW7	NNW8	ESE4	S6	SSW7	SW5	SW8.1	W19
27-Jun	SSW7	SSW7	SSW8	SSW9	SSW7	SSW8	SSW8	SSW8	SSW9	SSW8	SW10	SW11	SW11	WSW9	SW12	SW10	SW11	SW11	SW10	WSW8	SW6	SW7	WSW8	WSW9	SW8.4	SW12
28-Jun	SSW5	SSW7	SSW9	SSW8	SSW8	SSW6	SSW5	NW8	NNW12	NW16	WNW24	WNW22	WNW22	NW18	NW21	NW16	NW18	WNW15	WNW11	W8	W8	W8	WNW8	W4	WNW9.5	WNW24
29-Jun	SW6	SSW5	SSW7	SW8	SSW7	SSW7	SSW5	S6	SSW5	S2	ENE6	ESE7	S3	SSE2	ENE2	NNE8	N14	NNE13	N11	N8	NNE5	NNW5	NNW7	NNW8	NNW0.9	N14
30-Jun	NNW6	N5	N4	NNE4	N2	NW3	W4	WSW3	S5	SSE5	SE3	E3	ESE3	SSE4	WSW2	WNW4	N1	WNW3	WSW5	SSW5	S7	SW1	SSW8	SW10	SW1.4	SW10

W2.7	W2.1	W2.6	W2.7	WSW2.9	WSW2.7	W1.7	W0.6	NW0.7	NW1.0	NNW1.1	WNW1.5	WNW1.7	WNW1.0	W1.6	NNW1.7	NNW2.7	NNW2.8	NNW2.9	NW2.8	NW1.9	NNW2.0	W2.1	W2.9	Diurnal Average	
N10	N12	N13	NW16	WNW17	WNW15	WNW16	N17	N18	N24	N25	N24	NNE24	N26	NNE29	NNE27	NNE27	NW25	NW24	NNE18	NW13	S18	N11	NW12	Diurnal Maximum	

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



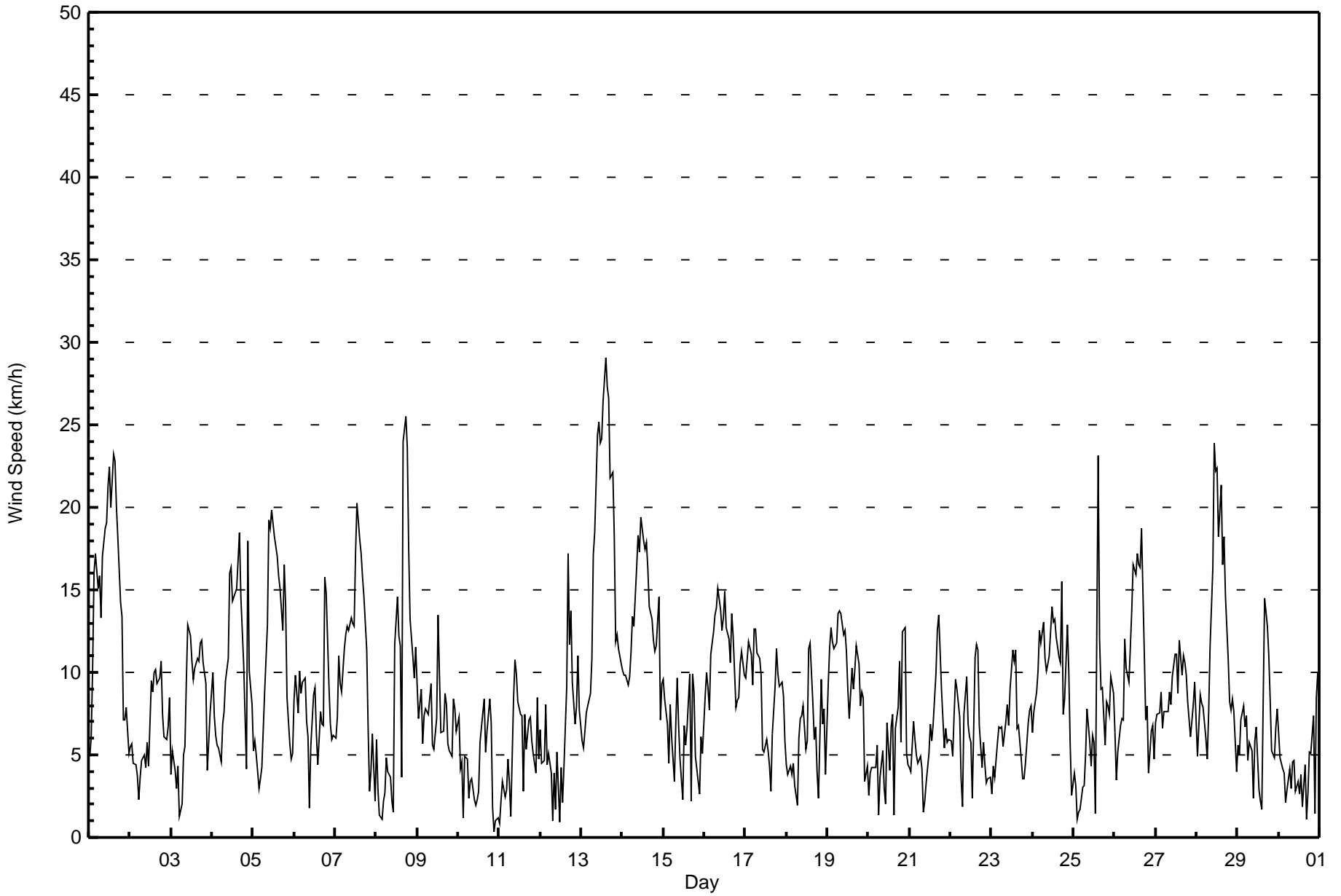
Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Speed (WS) - km/h

CNRL Horizon - June 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 11 km/h on Jun 25 15:00 Minimum Value: 1 km/h on Jun 18 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: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0							
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	1	1	5	5	4	5	4	4	6	6	6	6	6	7	6	5	5	4	4	2	1	1	2	7	
2-Jun	1	1	1	1	1	1	2	2	2	3	3	3	4	4	4	4	3	3	2	1	1	1	2	4	
3-Jun	2	1	2	1	1	1	1	2	2	3	4	4	5	4	4	4	4	4	3	3	2	3	2	5	
4-Jun	2	1	1	1	1	1	2	2	3	4	6	5	5	5	5	5	5	4	4	3	2	7	4	7	
5-Jun	1	1	1	1	1	1	2	3	4	6	6	6	5	6	5	5	6	5	5	4	3	2	2	1	6
6-Jun	1	2	2	2	2	2	2	3	2	2	3	4	2	3	2	3	3	3	6	3	3	1	2	1	6
7-Jun	2	3	4	3	2	3	4	3	3	3	5	5	6	6	6	5	5	5	4	2	1	2	2	2	6
8-Jun	2	2	2	2	1	1	1	2	2	2	2	6	7	3	3	8	6	6	6	4	4	3	3	3	8
9-Jun	4	2	2	2	2	2	2	3	3	3	3	6	5	3	3	2	3	3	2	2	2	2	3	2	6
10-Jun	2	1	1	1	1	1	1	2	2	2	2	2	3	3	3	3	3	3	5	3	1	1	1	1	5
11-Jun	1	1	1	1	1	2	2	2	3	3	3	3	3	5	7	4	4	5	3	2	2	4	2	2	7
12-Jun	3	2	3	3	3	2	1	2	2	2	3	3	4	3	3	6	5	5	6	3	2	3	3	2	6
13-Jun	2	2	1	2	2	2	3	5	5	6	7	6	7	7	7	8	7	6	7	5	3	3	2	2	8
14-Jun	2	2	2	2	2	3	4	4	5	5	5	6	6	6	6	5	4	4	4	3	6	5	2	2	6
15-Jun	3	2	1	2	2	2	1	3	3	2	2	2	2	2	3	4	3	4	3	2	2	1	1	1	4
16-Jun	3	3	3	2	5	3	3	4	4	4	4	4	5	4	5	4	5	4	2	2	2	3	3	3	5
17-Jun	3	3	3	2	2	3	3	4	4	3	3	3	3	3	3	3	4	4	3	3	2	2	1	2	4
18-Jun	1	1	1	1	1	1	1	3	2	2	3	3	4	4	4	3	3	2	2	1	4	2	2	1	4
19-Jun	3	2	3	3	3	3	4	3	4	4	4	4	4	3	3	3	3	4	3	2	2	2	2	1	4
20-Jun	1	1	1	1	2	1	1	2	2	2	3	4	3	4	4	4	3	3	3	2	3	4	3	1	4
21-Jun	1	1	1	1	1	1	1	2	2	2	2	3	3	4	4	3	4	4	3	2	1	1	1	1	4
22-Jun	1	2	1	2	2	2	2	1	3	3	3	8	4	4	4	4	5	2	2	3	1	2	1	1	8
23-Jun	1	1	2	2	2	2	2	1	2	3	3	4	5	3	3	3	3	2	1	1	1	2	1	1	5
24-Jun	1	1	1	1	2	2	3	3	3	4	4	5	5	5	5	5	7	5	3	3	5	4	1	2	7
25-Jun	2	1	2	1	1	2	1	2	2	2	2	4	4	3	11	5	6	3	2	2	3	2	3	2	11
26-Jun	2	1	2	2	3	3	3	3	2	3	5	6	6	7	6	6	9	4	4	3	1	1	1	2	9
27-Jun	1	2	2	2	1	2	2	2	3	3	4	4	5	5	5	5	6	4	4	3	1	2	2	2	6
28-Jun	2	1	2	2	1	2	2	5	4	6	6	6	6	5	6	5	5	4	4	2	1	2	2	2	6
29-Jun	2	2	1	2	1	2	3	2	2	2	3	3	3	4	5	6	4	3	3	2	1	2	2	2	6
30-Jun	1	1	1	2	2	2	1	1	1	1	1	1	2	1	2	2	2	1	2	2	3	2	3	3	3
																		Diurnal Maximum							





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
CNRL Horizon - June 2015

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	209	29.03	29.03
6 - 11	347	48.19	77.22
12 - 19	138	19.17	96.39
20 - 28	25	3.47	99.86
29 - 38	1	0.14	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
CNRL Horizon - June 2015**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	20	12	4	7	6	7	7	10	16	33	22	16	22	10	6	11	209
6 - 11	36	32	6	10	6	10	9	29	44	57	36	11	18	16	12	15	347
12 - 19	36	12	3	0	1	3	1	5	17	6	8	4	10	12	15	5	138
20 - 28	4	5	0	0	0	0	0	0	1	0	0	0	1	9	4	1	25
29 - 38	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	96	62	13	17	13	20	17	44	78	96	66	31	51	47	37	32	720

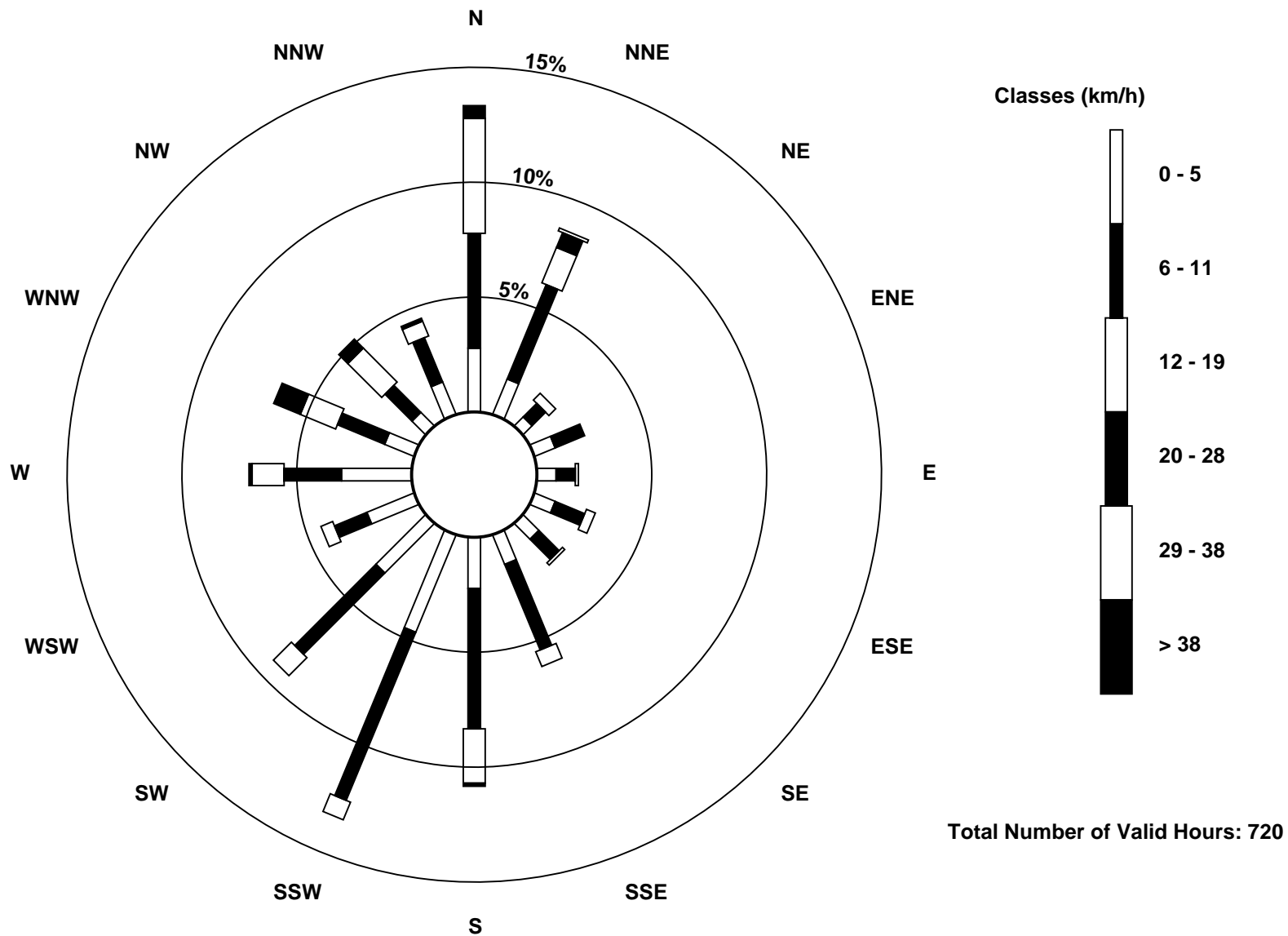
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

Wind Speed (WS) - km/h
CNRL Horizon (AMS 15)





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

CNRL Horizon - June 2015

Direction of Maximum Speed: 13 deg on Jun 13 15:00 Direction of Maximum Daily Speed Average: 7.9 deg on Jun 13	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0
Direction of Minimum Speed: 236 deg on Jun 10 22:00 Direction of Minimum Daily Speed Average: 0.9 deg on Jun 29	Percent Operational Time: 100.0
Monthly Average Direction: 253.8 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	232	212	304	309	292	296	294	290	294	293	294	294	299	292	301	306	298	313	319	310	290	263	258	298	296.0
2-Jun	313	327	310	237	260	326	34	148	170	208	198	93	108	149	166	169	165	128	109	108	111	133	167	212	153.0
3-Jun	183	178	239	201	196	197	14	168	140	124	122	137	158	168	165	147	157	159	158	157	165	269	145	160	157.3
4-Jun	171	175	188	208	202	199	176	178	172	177	175	171	168	156	155	178	181	174	186	207	195	187	201	175	178.0
5-Jun	187	183	177	211	179	203	190	175	187	192	201	187	193	184	181	187	212	206	188	178	171	220	233	222	191.4
6-Jun	199	209	197	204	204	212	224	210	212	220	64	66	35	27	227	74	153	184	310	304	303	279	276	278	238.2
7-Jun	265	275	275	283	260	270	268	276	281	300	272	263	265	275	272	285	280	280	285	269	248	77	214	162	273.9
8-Jun	204	329	165	265	1	295	291	305	274	15	210	282	345	52	117	341	299	305	313	323	311	306	298	314	312.5
9-Jun	310	273	304	296	228	211	232	219	238	217	256	93	36	62	137	180	222	207	226	274	274	8	8	298	258.0
10-Jun	296	259	265	203	194	212	171	117	103	31	344	190	0	128	83	81	132	127	150	183	88	236	249	301	146.6
11-Jun	36	52	302	330	263	172	355	206	145	152	116	107	113	148	235	257	208	234	165	164	248	276	163	194	171.0
12-Jun	266	301	259	235	222	208	132	135	8	78	120	93	194	198	63	82	80	108	289	332	4	56	64	69	64.0
13-Jun	33	355	357	355	327	317	339	9	5	11	1	7	12	10	13	18	24	17	23	14	6	354	0	359	7.9
14-Jun	349	350	356	356	359	359	12	0	9	11	359	360	358	9	12	1	357	355	358	329	346	3	358	356	359.7
15-Jun	7	30	17	358	324	352	8	33	19	19	36	203	182	213	222	206	350	306	301	262	254	210	213	262	323.6
16-Jun	331	6	10	16	11	4	0	13	7	2	1	2	5	2	357	7	359	353	15	20	9	4	5	3	4.0
17-Jun	343	322	323	321	331	333	354	11	10	341	347	335	329	11	73	141	188	180	165	158	157	160	169	219	336.0
18-Jun	224	207	217	222	206	183	139	173	189	193	197	200	184	172	174	166	135	81	102	244	271	296	312	224	195.1
19-Jun	353	5	1	2	4	7	14	20	25	35	16	6	30	12	63	29	18	16	20	15	1	4	353	304	13.8
20-Jun	240	275	213	220	217	209	201	184	191	1	21	45	140	27	32	58	78	19	22	17	8	10	15	336	17.7
21-Jun	269	327	352	6	4	341	351	1	52	316	34	352	26	31	35	19	23	8	342	303	275	250	274	225	349.1
22-Jun	224	224	206	208	212	219	234	86	39	45	79	12	52	167	226	236	286	239	278	24	16	298	282	275	247.9
23-Jun	241	232	236	209	194	198	185	168	166	174	182	217	220	195	179	152	159	160	171	165	178	191	216	222	192.0
24-Jun	194	189	178	181	188	183	181	180	179	182	211	232	224	230	221	231	284	316	321	28	23	17	353	277	217.0
25-Jun	249	260	0	246	278	332	16	31	28	32	82	74	111	112	328	349	198	186	207	264	203	226	204	205	267.3
26-Jun	227	233	228	189	186	184	183	179	187	205	216	224	242	245	248	251	278	263	238	346	120	181	210	236	226.7
27-Jun	213	200	196	212	206	201	199	196	206	208	227	219	219	247	221	230	228	227	220	245	229	234	254	242	220.6
28-Jun	194	207	207	200	206	200	200	311	328	309	300	290	300	316	309	311	310	297	294	279	260	259	293	260	288.6
29-Jun	231	198	211	215	212	207	208	185	200	173	61	116	169	153	77	28	11	14	10	6	13	343	332	336	347.2
30-Jun	336	0	3	16	7	312	259	245	184	162	142	92	114	149	239	301	349	292	253	205	191	217	192	214	226.3

268.2 271.8 277.7 262.4 252.0 257.5 277.5 279.6 308.3 318.1 288.6 288.5 303.4 282.2 268.9 292.3 295.7 300.8 303.7 309.6 308.3 302.3 263.2 261.1

Diurnal Average

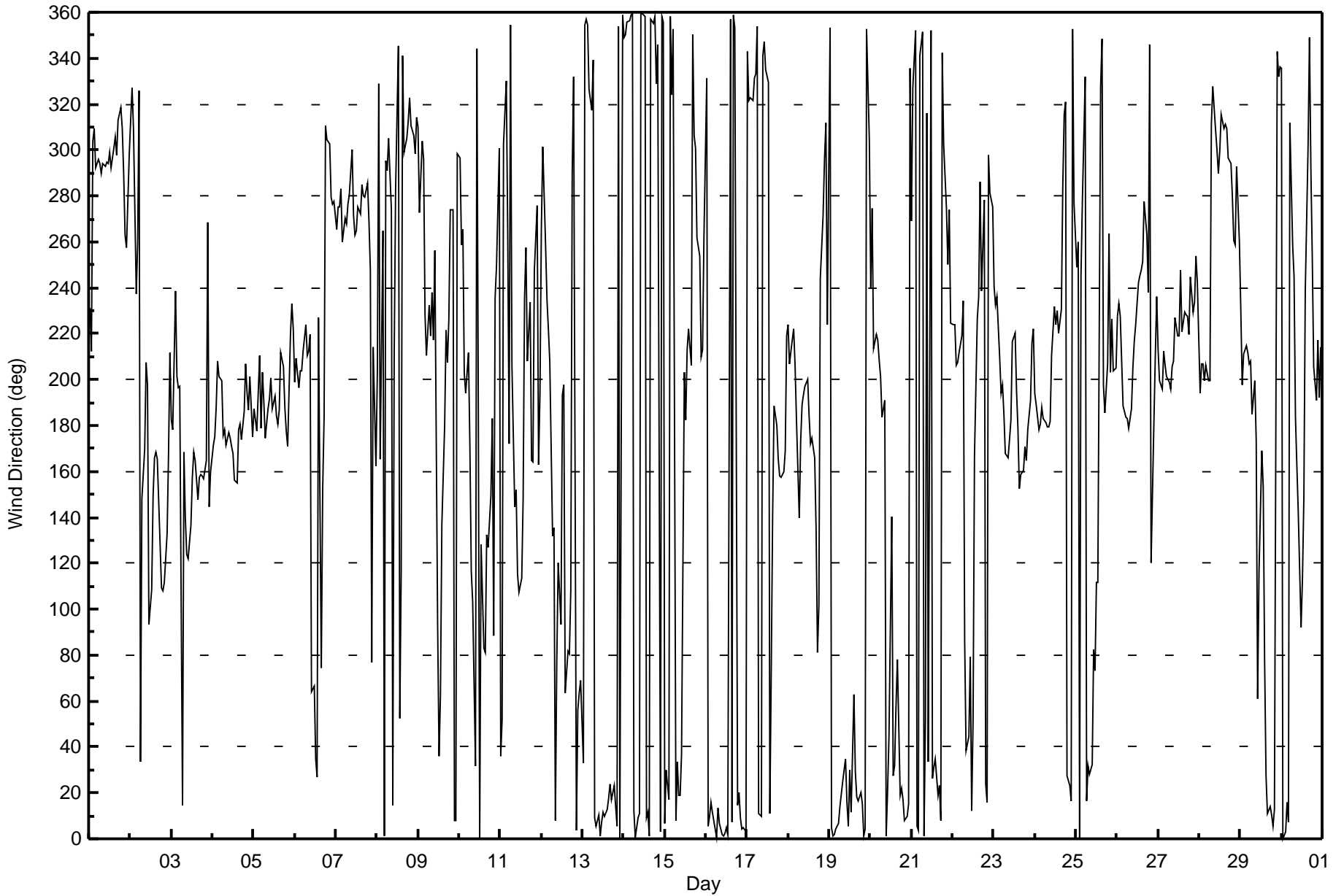
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
CNRL Horizon - June 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 106 deg on Jun 12 12:00 Minimum Value: 7 deg on Jun 23 21:00 Percentiles: P ₁ = 10 P ₁₀ = 15 Q ₁ = 19 Median = 26 Q ₃ = 38 P ₉₀ = 65 P ₉₉ = 93																			Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0						
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	26	19	26	19	18	18	19	22	22	21	25	21	20	22	20	22	20	20	23	19	16	16	15	56	56
2-Jun	20	20	38	33	37	40	59	52	56	82	68	90	48	50	33	35	33	32	23	21	10	18	17	19	90
3-Jun	45	21	34	36	16	69	65	75	48	32	30	37	35	36	39	32	29	23	20	18	22	54	46	15	75
4-Jun	16	12	15	15	9	12	25	30	27	28	29	25	29	30	26	28	20	20	30	23	14	19	29	22	30
5-Jun	16	12	12	49	22	25	25	25	28	25	25	23	25	26	23	25	30	23	19	17	16	23	29	12	49
6-Jun	10	12	15	15	19	21	22	28	28	100	57	42	23	52	36	45	34	59	29	17	15	14	15	14	100
7-Jun	17	26	21	23	18	18	20	19	21	23	29	29	29	24	28	25	25	25	23	23	50	32	30	73	73
8-Jun	54	75	64	71	35	31	22	47	71	82	82	37	49	24	24	88	20	17	18	19	16	15	18	18	88
9-Jun	21	16	15	27	17	16	21	32	24	61	66	75	32	25	51	26	22	24	32	25	27	32	19	22	75
10-Jun	12	36	27	64	12	14	45	64	72	90	84	85	89	67	70	43	57	49	34	18	21	73	59	76	90
11-Jun	84	49	21	29	47	23	74	89	27	28	29	30	42	49	79	53	38	66	33	21	32	89	18	40	89
12-Jun	32	27	31	31	72	37	36	93	69	93	65	106	73	86	77	51	19	43	28	22	24	17	16	18	106
13-Jun	19	15	16	16	20	17	25	22	22	20	22	22	23	23	21	23	19	22	21	20	21	19	19	18	25
14-Jun	15	16	17	17	18	21	22	23	23	24	28	25	28	25	25	27	28	32	29	23	23	21	18	18	32
15-Jun	24	16	14	22	16	31	28	21	22	25	42	87	37	56	63	31	86	31	30	26	43	65	11	41	87
16-Jun	33	22	19	19	20	21	19	21	22	22	25	28	27	31	32	35	31	28	25	20	20	19	18	21	35
17-Jun	23	18	20	16	18	19	22	26	29	41	76	74	60	60	72	85	68	40	22	19	16	13	11	27	85
18-Jun	14	19	12	14	12	28	68	37	28	26	36	68	72	39	22	32	48	23	39	46	19	24	20	46	72
19-Jun	30	18	18	19	18	19	22	24	27	28	29	35	45	57	33	40	36	28	23	22	17	15	56	37	57
20-Jun	48	24	34	56	47	16	84	47	50	81	98	57	77	61	58	100	48	32	21	21	18	18	13	26	100
21-Jun	26	29	15	16	15	13	20	39	79	78	66	67	53	72	66	26	23	24	25	18	21	16	18	27	79
22-Jun	20	35	13	14	13	19	47	67	32	32	38	86	38	85	26	26	36	24	43	37	22	39	38	29	86
23-Jun	45	25	46	16	15	18	21	24	31	33	52	37	34	25	27	52	27	27	19	16	7	15	13	12	52
24-Jun	13	13	9	11	14	15	16	19	23	25	32	30	33	35	35	37	48	19	34	18	18	22	15	48	48
25-Jun	38	43	81	64	49	21	34	32	24	42	54	51	57	97	27	31	52	21	37	20	36	27	30	19	97
26-Jun	34	41	36	15	22	23	16	19	20	23	26	27	31	29	26	26	23	32	39	49	43	13	13	35	49
27-Jun	13	15	13	13	10	14	19	22	27	32	33	35	38	46	31	40	36	28	28	23	13	16	17	15	46
28-Jun	52	18	12	14	12	15	17	38	24	22	18	23	23	21	19	19	20	19	18	16	14	18	26	35	52
29-Jun	26	28	14	16	8	11	42	26	32	65	42	43	81	91	89	56	21	20	20	18	16	16	16	12	91
30-Jun	10	9	30	59	54	43	38	61	19	27	31	36	37	23	45	16	55	41	17	30	20	89	20	20	89
																			84 75 81 71 72 69 84 93 79 100 98 106 89 97 89 100 86 66 43 49 50 89 59 76						
Diurnal Maximum																									





Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	June 18, 2015	Last Calibration	May 13, 2015
Station Name	CNRL Horizon	Station Number	AMS 15
Reason:	Routine		
Start Time (MST)	9:55	End Time (MST)	14:20
Gas Cert Reference	S0002486	Station temp.	21 Deg C
Cal Gas Concentration	50 ppm	Cal Gas Exp Date	26/09/2017
Calibrator Make/Model	Teledyne API T700	Serial Number	1223
ZAG Make/Model	Teledyne API 701	Serial Number	1004
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2580

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		PMT voltage	-622	-622
Analyzer IP address	192.168.1.43		Lamp voltage	844	840
Calculated slope	0.996242	0.993887	Chamber temp	45	45.3
Calculated intercept	1.685493	0.850101	Pressure	706	703.3
Analyzer Background	18.0	18.1	Flow	0.427	0.425
Analyzer Coefficient	0.990	0.995	Intensity	91	91

Analyzer make Thermo 43i Analyzer serial # 10710321322

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.0	----
as found span	5000	81.8	818.0	813.9	1.005
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	81.8	818.0	822.5	0.995
second point	5000	40.9	409.0	410.6	0.996
third point	5000	20.4	204.0	203.3	1.003
as left zero	5000	0.0	0.0	1.4	----
as left span	5000	81.8	818.0	828.0	0.988
Average Correction Factor					0.998

Corrected As found 813.9 Previous response 819.4 % change 0.7%

Notes:

Filter changed after As Found. Span adjusted

Calibration Performed By: Ryan Power



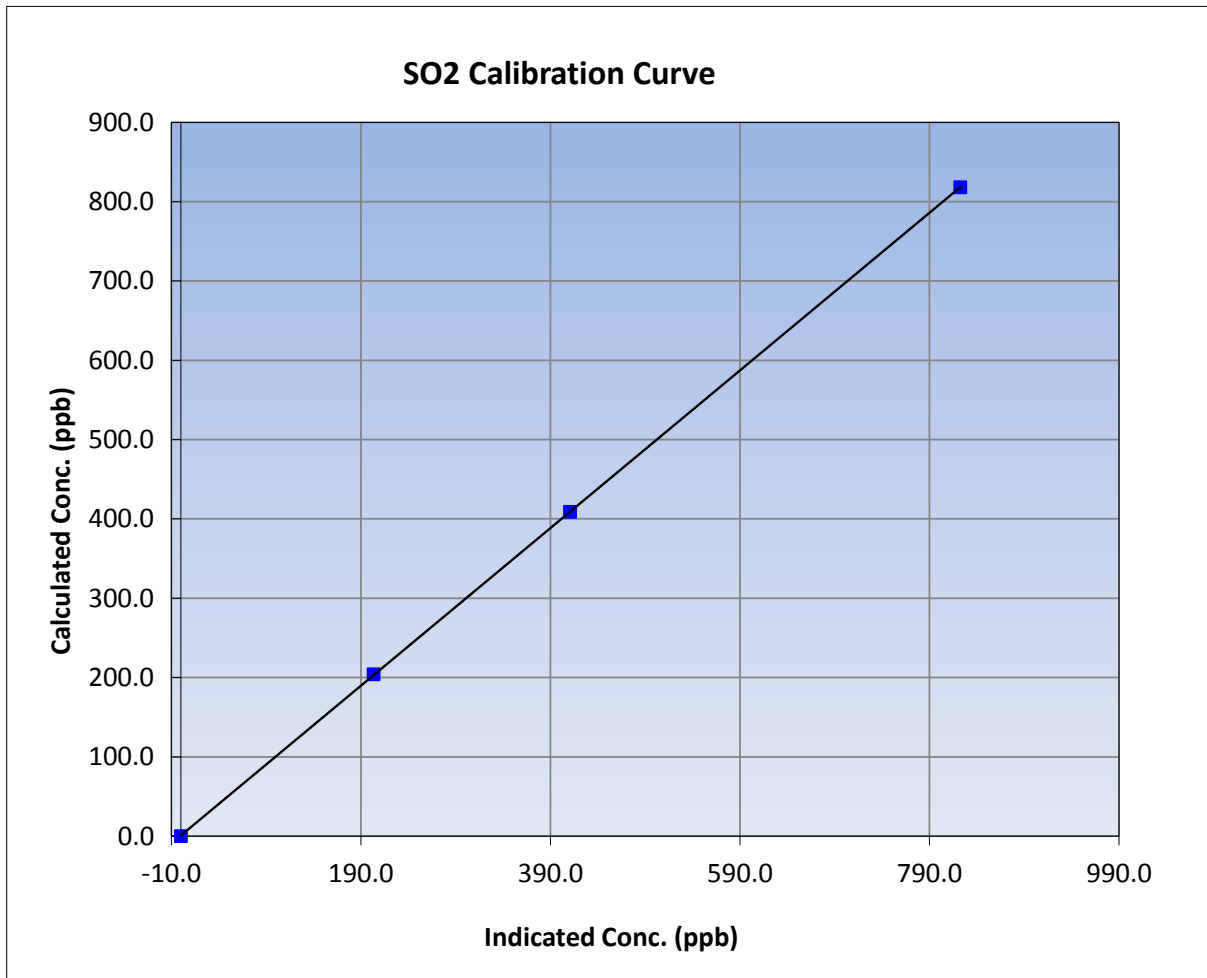
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	June 18, 2015	Previous Calibration	May 13, 2015
Station Name	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	9:55	End Time (MST)	14:20
Analyzer make	Thermo 43i	Analyzer serial #	10710321322

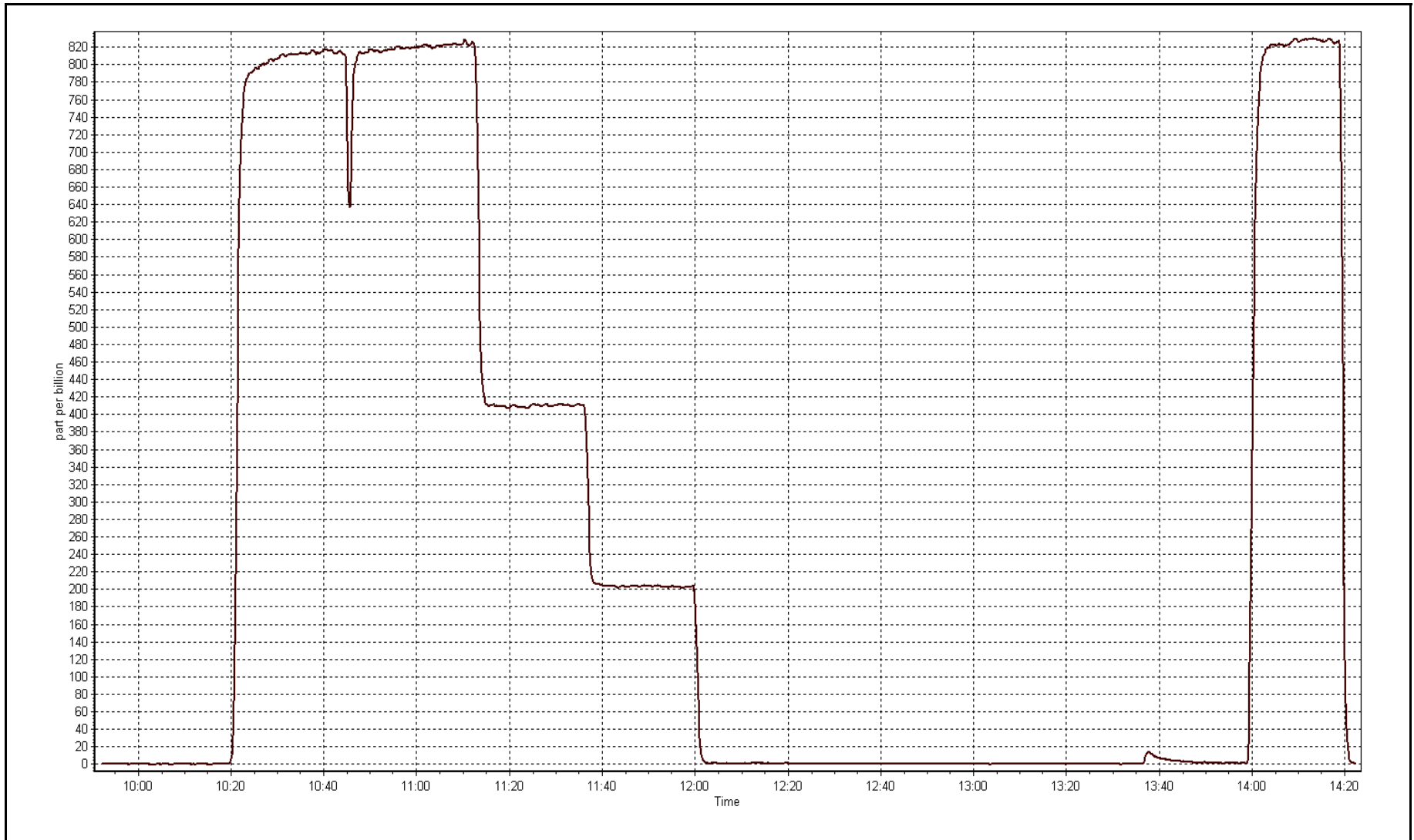
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999994
818.0	822.5	0.9946		
409.0	410.6	0.9961	Slope	0.993887
204.0	203.3	1.0035		
			Intercept	0.850101



SO2 Calibration Plot

Date: June 18, 2015





Wood Buffalo Environmental Association TRS Calibration Report

Station Information

Calibration Date	June 22, 2015	Last Calibration	May 14, 2015
Station Name	CNRL Horizon	Station Number	AMS 15
Reason:	Routine		
Start Time (MST)	11:20	End Time (MST)	15:10
Gas Cert Reference	LL155297	Station temp.	21 Deg C
Cal Gas Concentration	10.4 ppm	Cal Gas Exp Date	30/05/2013
Calibrator Make/Model	API T700	Serial Number	1223
Dil air Make/Model	API 701	Serial Number	1004
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2580
SO2 gas concentration	50 ppm	SO2 gas cert/exp	S0002486 26/09/2017

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-672	-672
Analyzer IP address	192.168.1.42		Lamp voltage	764	757
Calculated slope	0.993327	1.008501	Chamber temp	45	45
Calculated intercept	-0.105743	-0.175789	Pressure	687.6	686.4
Analyzer Background	9.1	9.2	Flow	0.417	0.418
Analyzer Coefficient	0.910	0.91	Intensity	91	90
			Converter temp.	810	809
Analyzer make/model	Thermo 43i		Analyzer serial #	0710321323	
Converter make/model	CDN-101		Converter serial #	363	

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6000	0.0	0.0	0.3	----
as found span	6000	46.2	80.1	79.7	1.004
SO2 scrubber check	6000	24.5	204.2	0.4	----
calibrator zero	6000	0.0	0.0	0.2	----
high point	6000	46.2	80.1	79.6	1.007
second point	6000	23.1	40.0	39.9	1.003
third point	6000	11.5	19.9	19.9	1.001
as left zero	6000	0.0	0.0	0.2	----
as left span	6000	46.2	80.1	79.8	1.004
Average Correction Factor					1.003

Corrected As found	79.4	Previous response	80.7	% change	1.6%
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Notes:

Converter powered down to be moved into rack after As Finds. Filter changed, scrubber check after calibrator zero. Zero with a small adjustment.

Calibration Performed By:

Ryan Power



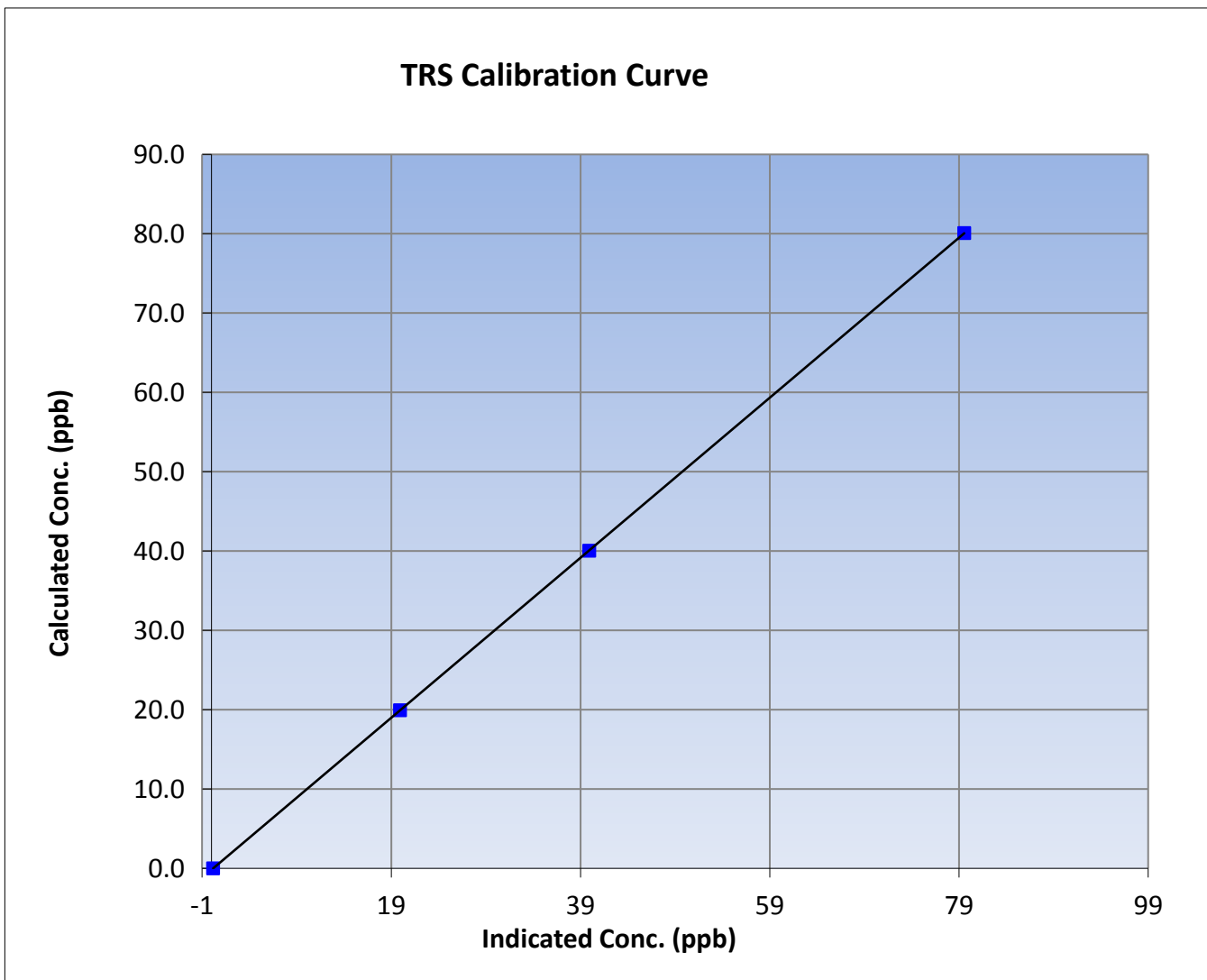
Wood Buffalo Environmental Association TRS Calibration Report

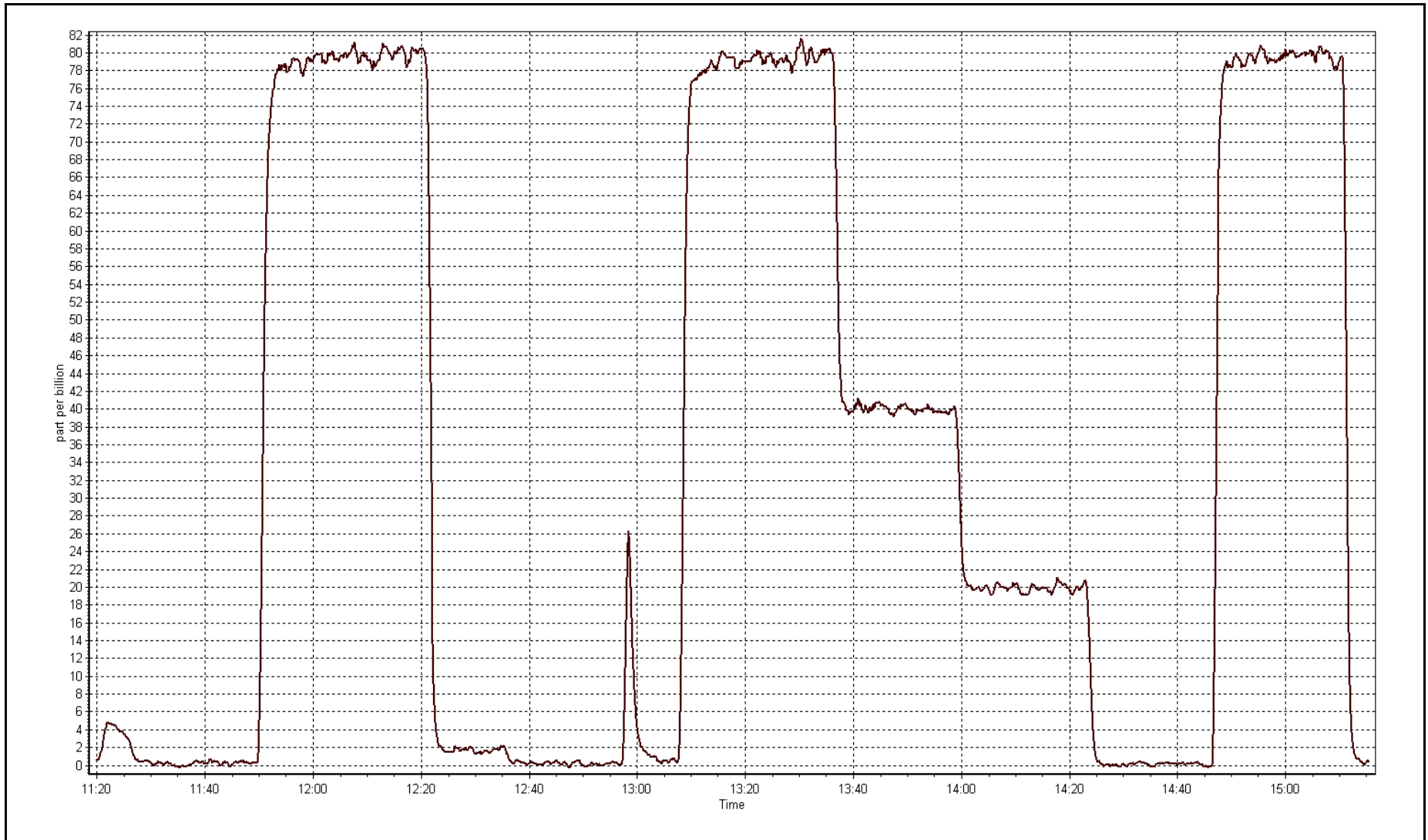
Station Information

Calibration Date	June 22, 2015	Previous Calibration	May 14, 2015
Station Name	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	11:20	End Time (MST)	15:10
Analyzer make	Thermo 43i	Analyzer serial #	0710321323

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	----	Correlation Coefficient	0.999999
80.1	79.6	1.0065		
40.0	39.9	1.0028	Slope	1.008501
19.9	19.9	1.0012		
			Intercept	-0.175789







Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	June-18-15	Last Calibration	May-13-15
Station Name	CNRL Horizon	Station Number	AMS 15
Reason:	Routine		
Start Time (MST)	9:55	End Time (MST)	14:20
Gas Cert Reference	S0002486	Cal Gas Expiry Date	26/09/2017
CH4 Cal Gas Conc.	505 ppm	CH4 Equiv Conc.	1046.8 ppm
C3H8 Cal Gas Conc.	197 ppm	Station temp.	22 Deg C
Calibrator Make/Model	Teledyne API T700	Serial Number	1223
ZAG make/model	Teledyne API 701	Serial Number	1004
DACS make/model	Campbell Scientific CR3000	Serial Number	2580

Analyzer Information

	<i>Before</i>	<i>After</i>		<i>Before</i>	<i>After</i>
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	0.995164	1.010796	Fuel Pressure	26.3	26.3
Calculated intercept	0.035721	0.012131	Analyzer Coeff	0.0	0.02
			Analyzer BKG	3.0	3.007

Analyzer make	Thermo 51i-LT	Analyzer serial #	1327059295
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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	81.8	17.12	17.19	0.996
calibrator zero	5000	0.0	0.00	0.02	----
high point	5000	81.8	17.12	16.95	1.010
second point	5000	40.9	8.56	8.43	1.016
third point	5000	20.4	4.27	4.19	1.019
as left zero	5000	0.0	0.00	-0.02	----
as left span	5000	81.8	17.12	17.00	1.007
Average Correction Factor					1.015

Corrected As found	17.17	Previous response	17.17	% change	0.0%
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Notes:

Filter changed after As Found. Span adjusted

Calibration Performed By:

Ryan Power



Wood Buffalo Environmental Association THC Calibration Report

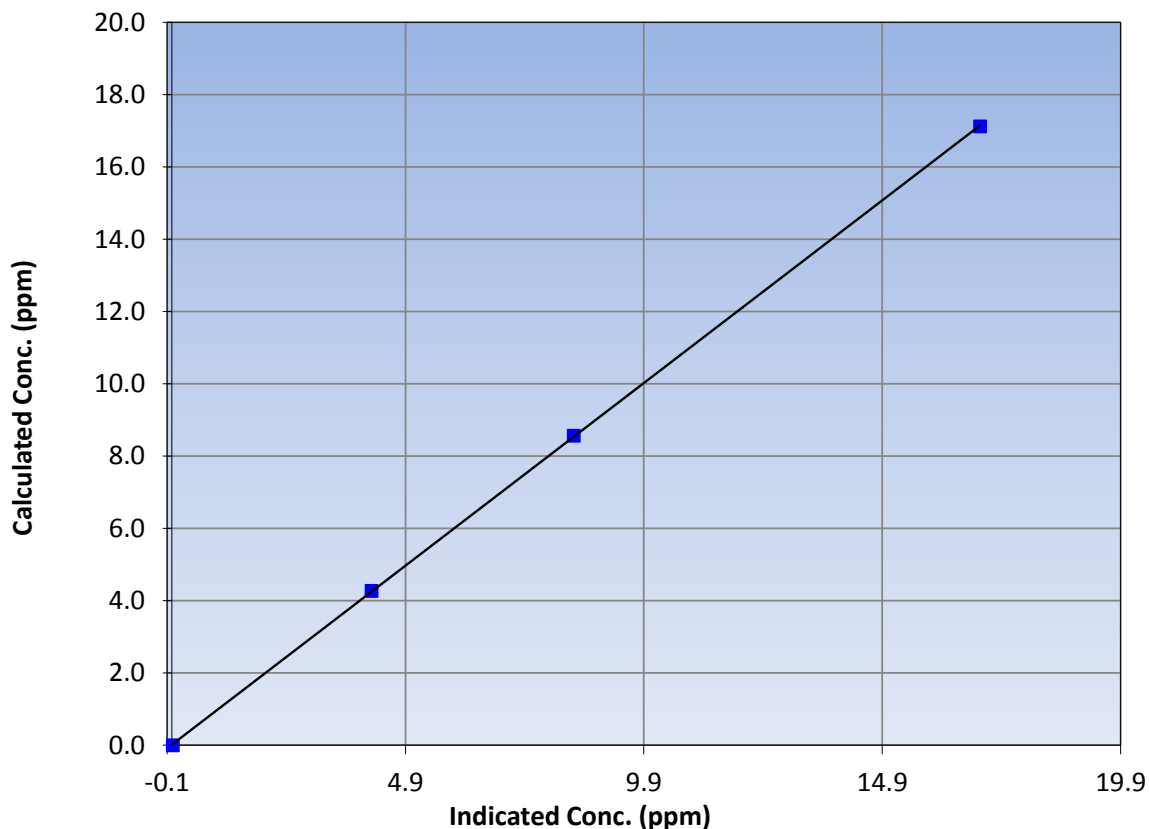
Station Information

Calibration Date	June 18, 2015	Previous Calibration	May 13, 2015
Station Name	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	9:55	End Time (MST)	14:20
Analyzer make	Thermo 51i-LT	Analyzer serial #	1327059295

Calibration Data

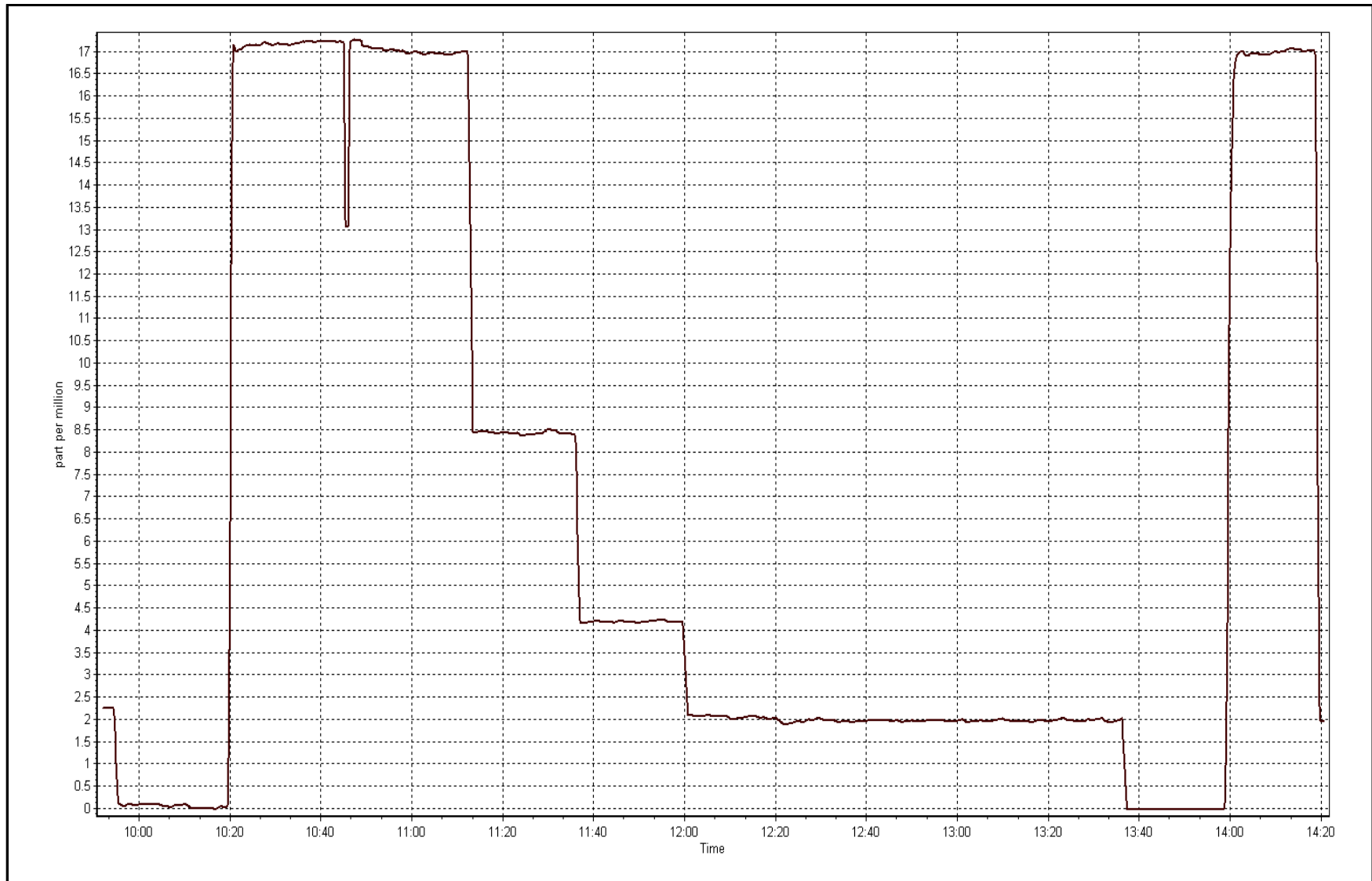
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.02	----	Correlation Coefficient	0.999982
17.12	16.95	1.0103		
8.56	8.43	1.0157	Slope	1.010796
4.27	4.19	1.0193		
			Intercept	0.012131

THC Calibration Curve



THC Calibration Plot

Date: June 18, 2015





Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	June 18, 2015	Previous Calibration	May 13, 2015
Station Name	CNRL Horizon	Station Number	AMS 15
Reason:	Routine		
Start Time (MST)	9:55	End Time (MST)	14:20
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
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Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.999108	1.000460	0.995692
	Data Offset	1.560371	1.454331	-1.108707
Current Calibration	Data Slope	0.994468	0.996606	0.990817
	Data Offset	0.391128	0.501754	-0.763788

Analyzer Information

Analyzer make/model	Termo 42i	Analyzer serial #	710321429
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Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
NO coefficient	0.745		0.779	
NOx coefficient	1.001		1.002	
NO2 coefficient	1		1.000	
NO bkgrnd	9.2		9.8	
NOx bkgrnd	9.4		10.0	
Chamber Temp	50.1	Deg C	49.8	Deg C
Moly Temp	326.6	Deg C	324.2	Deg C
PMT voltage	-784	V	-786	V
PMT Temp	-3.1	Deg C	-3	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	166.2	mmHg	159.3	mmHg
R Cell Press Nox	166.5	mmHg	159.6	mmHg
NO sample flow	0.719	lpm	0.677	lpm
Nox sample Flow	0.720	lpm	0.678	lpm

Notes:

Filter changed after As Finds. Span adjusted.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date:

June 18, 2015

Station Number:

AMS 15

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.1	0.0	----	----
as found span	5000	81.8	800.0	800.0	0.0	767.9	767.3	0.5	1.0418	1.0426
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.1	0.0	----	----
high point	5000	81.8	800.0	800.0	0.0	803.9	802.1	1.7	0.9952	0.9973
second point	5000	40.9	400.0	400.0	0.0	402.7	401.5	1.2	0.9934	0.9963
third point	5000	20.4	199.5	199.5	0.0	199.4	198.8	0.6	1.0008	1.0036
as left zero	5000	0.0	0.0	0.0	0.0	3.5	3.6	-0.1	----	----
as left span	5000	81.8	800.0	441.9	358.1	810.8	442.5	368.3	0.9867	0.9988
Average Correction Factor									0.9965	0.9991

Corrected As found
Previous Response

NO_x= 768.0
NO_x= 799.2

NO= 767.5
NO= 798.2

Percent Change

NO_x= 4.1%

NO= 4.0%

GPT Calibration Data

Dilution Flow

5000

ccm

Source Gas Flow

81.80

ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
Cal zero			0.0			0.0			N/A	
1st NO2 (300)	----	441.9	363.8	809.2	441.9	367.2	0.9728	1.0000	0.9906	100.9%
2nd NO2 (200)	----	556.9	248.8	809.3	556.9	252.3	0.9727	1.0000	0.9859	101.4%
3rd NO2 (100)	----	675.2	130.5	808.7	675.2	133.5	0.9734	1.0000	0.9778	102.3%
4th NO2 (0)	805.7	----	4.2	809.9	805.7	4.2	0.9719	1.0000	N/A	----
Average Correction Factor							0.9727	1.0000	0.9848	101.6%

Calibration Performed By:

Ryan Power



Wood Buffalo Environmental Association

NO_x Calibration Summary

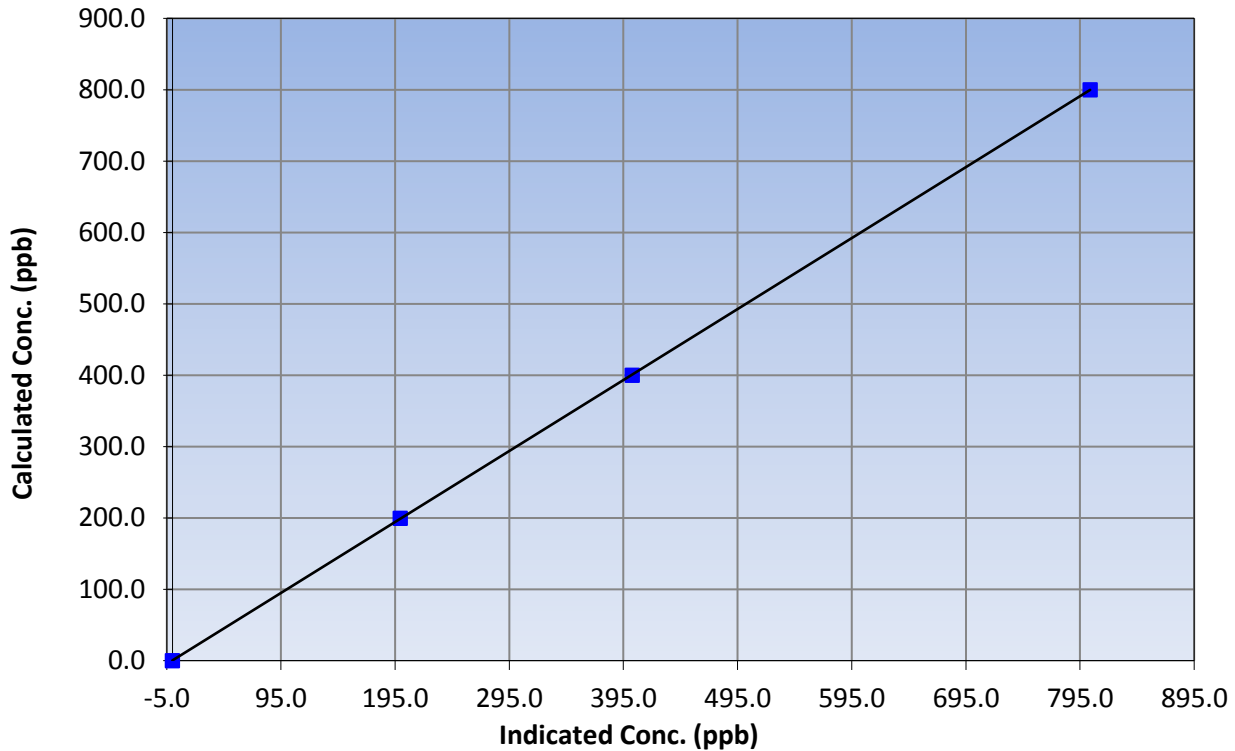
Station Information

Calibration Date	June 18, 2015	Previous Calibration	May 13, 2015
Station Name	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	9:55	End Time (MST)	14:20
Analyzer make	Termo 42i	Analyzer serial #	710321429

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	----	Correlation Coefficient	0.999996
800.0	803.9	0.9952		
400.0	402.7	0.9934	Slope	0.994468
199.5	199.4	1.0008		
			Intercept	0.391128

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

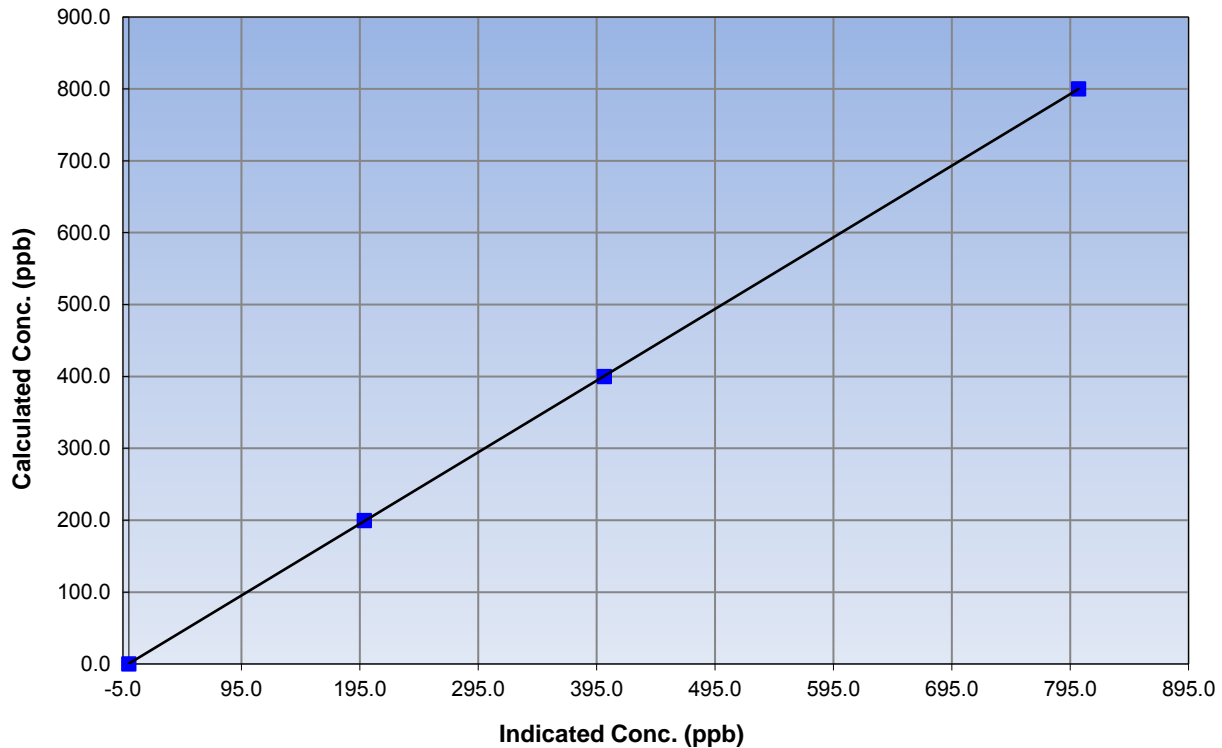
Station Information

Calibration Date	June 18, 2015	Previous Calibration	May 13, 2015
Station Name	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	9:55	End Time (MST)	14:20
Analyzer make	Termo 42i	Analyzer serial #	710321429

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999996
800.0	802.1	0.9973		
400.0	401.5	0.9963	Slope	0.996606
199.5	198.8	1.0036		
			Intercept	0.501754

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

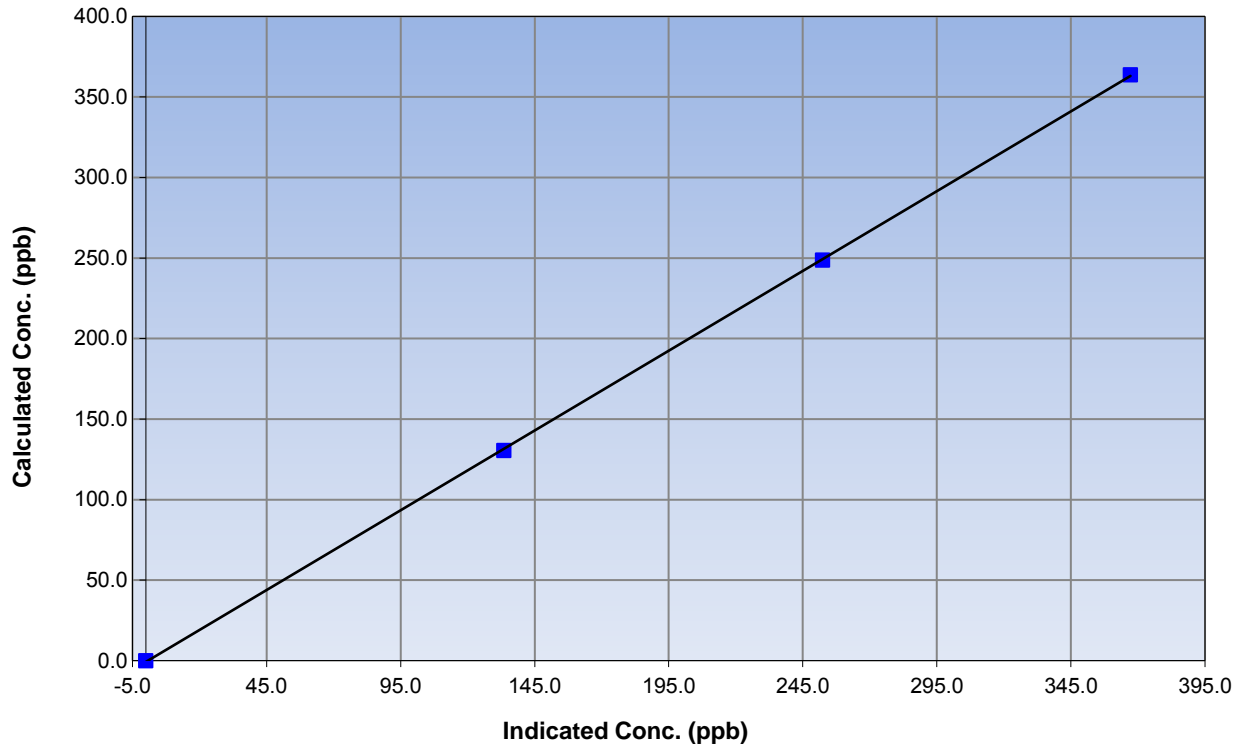
Station Information

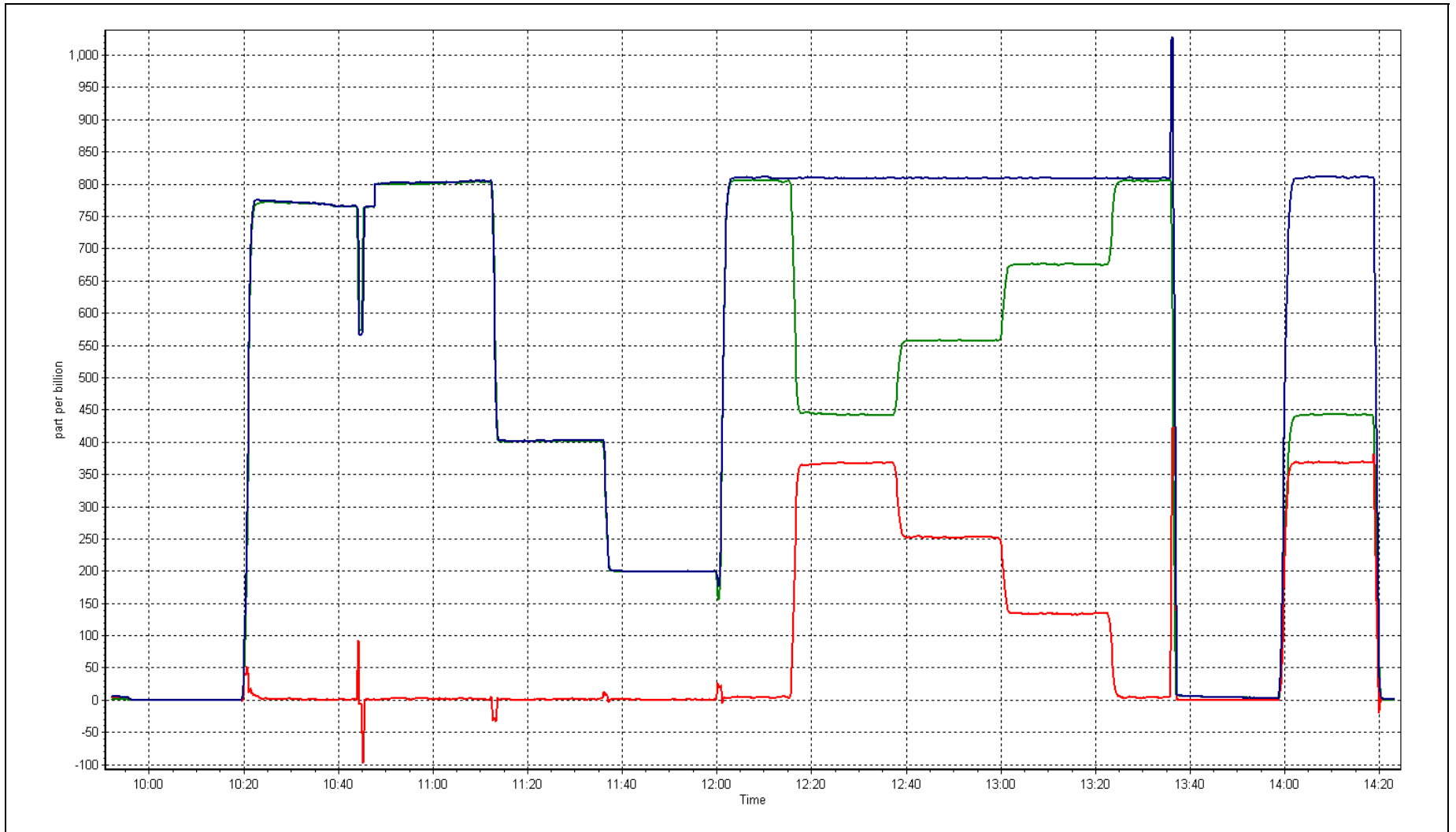
Calibration Date	June 18, 2015	Previous Calibration	May 13, 2015
Station Name	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	9:55	End Time (MST)	14:20
Analyzer make	Termo 42i	Analyzer serial #	710321429

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999969
363.8	367.2	0.9906		
248.8	252.3	0.9859	Slope	0.990817
130.5	133.5	0.9778		
			Intercept	-0.763788

NO₂ Calibration Curve







Wood Buffalo Environmental Association

SHARP CALIBRATION

STATION INFORMATION

Calibration Date:	<u>June 22, 2015</u>	Previous Calibration:	<u>May 14, 2015</u>
Station Name:	<u>CNRL Horizon</u>	Station Number:	<u>AMS 15</u>
Start Time (MST):	<u>14:20</u>	End Time (MST):	<u>15:00</u>
Calibrator Make/Model:	<u>Delta Cal</u>	Calibrator Serial Number:	<u>1212</u>

SHARP INFORMATION

Particulate Fraction:	<u>PM2.5</u>
Make/Model:	<u>Thermo / SHARP 5030</u>
Serial Number:	<u>E-2020</u>
Source SN:	<u>7409</u>
HEPA PN:	<u>12144</u>
Time Correct (MST):	<u>Yes</u>
Parameters Checked:	<u>T1, T2, T2,T4, P3, Main Flow, Beta, Neph</u>

CALIBRATION DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	20.0	21.2	1.2	20.0
T2	26.0	na	na	26.0
T3	24.0	na	na	24.0
T4	23.0	na	na	23.0
RH (%)	39.0	na	na	39.0

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	972	974.0	2.0	972

Main Flow (Lph)

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

Nephelometer Calibration

Parameter	As Found	Zeroed (Limit +/- 2.0ug/m3)	As Left
Analog	167		167
Neph	0.3		0.3
C14	191.3		191.3
Indicated Concentration (ug/m3)	0.1	no	0.1
Offset 1	NA		NA
Offset 2	NA		NA

Leak Check (Quarterly)

Leak Check Date:	<u>May 14, 2015</u>	Previous Leak Check Date:	NA
	Measured	Difference LPM (Limit +/- 0.42 LPM)	
Flow without adaptor (LPM):	16.68		
Flow with adaptor [turn off pump first](LPM):	16.50	0.18	

Mass Foil Calibration (Annualy)

Foil Calibration Date:	<u>June 22, 2015</u>	Previous Foil Calibration:	NA
Zeroed?:	<u>Yes</u>		
Foil Mass:	<u>1507</u>		
Previous Correction Factor:	<u>7091</u>	Mass foil set S/N:	2022
New Correction Factor:	<u>7029</u>		

INSPECTION DATA

Item	Condition	Date of install or rebuild
Cyclone	Good / cleaned	22/06/2015
Pump	Good	09/06/2014
Filter Tape	Good	09/06/2014
Mass Foil Cal Set	Good	NA
HEPA filter	Good	09/06/2014

NOTES:

Annual foil calibration finished. No other adjustments.

Calibration Performed By: Ryan Power



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 16
SHELL MUSKEG RIVER
JUNE 2015**

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

July 30, 2015



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SHELL MUSKEG RIVER (AMS 16)
 JUNE 2015

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	684	36	36	100.00	16	0	4	0
THC (ppm) Average	684	36	36	100.00	4.9	-	2.9	-
NO2 (ppb) Average	684	36	36	100.00	32	0	20	-
NO (ppb) Average	684	36	36	100.00	56	-	21	-
NOX (ppb) Average	684	36	36	100.00	82	-	41	-
PM2.5 (ug/m3) Average	717	0	3	99.58	192.7	-	152.3	5
Temperature 2 m (C) Average	720	0	0	100.00	31.6	-	23.1	-
Relative Humidity (%) Average	720	0	0	100.00	98	-	75	-
Barometric Pressure (inHg) Average	720	0	0	100.00	29.1	-	29.1	-
Wind Speed 10 m (km/h) Average	718	0	2	99.72	32	-	22	-
Wind Direction 10 m (deg) Average	718	0	2	99.72	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SHELL MUSKEG RIVER (AMS 16)
 JUNE 2015

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	684	1	2	-	0	0	0	0	1	3	16
THC (ppm) Average	684	2.37	0.4	-	1.8	2	2.1	2.3	2.5	2.8	4.9
NO2 (ppb) Average	684	7.2	7	-	0	1	2	5	10	18	32
NO (ppb) Average	684	3.9	7	-	0	0	0	1	5	12	56
NOX (ppb) Average	684	11.1	13	-	0	1	2	6	15	27	82
PM2.5 (ug/m3) Average	717	21.85	33.7	-	0.3	3.7	5.9	10	19.5	48.6	192.7
Temperature 2 m (C) Average	720	16.92	6	-	0.1	10	12.8	16.5	20.9	25.4	31.6
Relative Humidity (%) Average	720	57.6	21	-	20	29	39	59	75	86	98
Barometric Pressure (inHg) Average	720	28.82	0.1	-	28.5	28.6	28.8	28.8	28.9	29	29.1
Wind Speed 10 m (km/h) Average	718	9.9	6	-	0	3	6	9	13	18	32
Wind Direction 10 m (deg) Average	718	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SHELL MUSKEG RIVER (AMS 16)
JUNE 2015

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
PM2.5	17 Jun 2015 08:00	17 Jun 2015 08:00	1	Maintenance - Flow and zero check, sample head cleaning
PM2.5	22 Jun 2015 11:00	22 Jun 2015 12:00	2	Maintenance - replace filter tape
Wind Speed, Wind Direction	30 Jun 2015 14:00	30 Jun 2015 14:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	30 Jun 2015 18:00	30 Jun 2015 18:00	1	Flat line in sensor output signal



Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 16 ppb on Jun 18 09:00	Maximum Daily Average: 3.5 ppb on Jun 18		Hours of Data:	684
Minimum Value: 0 ppb on Jun 9 03:00	Minimum Daily Average: 0.2 ppb on Jun 9		Hours of Missing Data:	36
Maximum Diurnal Average: 2.0 ppb at hour 9	Minimum Diurnal Average: 0.4 ppb at hour 4		Hours of Calibration:	36
Monthly Average: 1.0 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 3 P ₉₉ = 10		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	0	0	Z	0	0	0	0	0	1	1	0	0	0	2	1	12	3	1	0	0	0	0	0	0	1.0	12	
2-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	1	7	8	3	7	6	3	1	1	1	0	1	1.7	8	
3-Jun	1	1	1	0	Z	1	1	1	1	1	1	1	2	6	4	4	3	4	2	2	1	0	0	0	1.5	6	
4-Jun	0	0	0	0	0	Z	3	9	6	4	4	4	3	2	3	3	2	2	3	3	2	1	0	1	2.5	9	
5-Jun	Z	3	3	2	5	6	4	7	8	4	1	2	3	3	4	1	1	0	1	5	2	1	2	6	3.1	8	
6-Jun	4	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0.6	4	
7-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
8-Jun	0	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-Jun	0	0	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
10-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	3	2	1	0.6	3
11-Jun	Z	1	1	0	0	0	1	1	1	0	0	1	7	6	1	0	0	0	1	1	0	3	1	1	1.2	7	
12-Jun	0	Z	1	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1	
13-Jun	0	0	Z	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0.5	1	
14-Jun	0	0	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
15-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0.3	1	
16-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.4	1	
17-Jun	Z	0	0	0	0	0	C	C	C	C	C	C	0	1	2	2	1	1	4	11	4	4	4	2	--	11	
18-Jun	2	Z	0	0	0	0	1	12	16	10	6	2	5	3	3	4	4	5	2	1	1	1	1	1	3.5	16	
19-Jun	0	0	Z	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1	
20-Jun	0	0	0	Z	0	0	1	1	10	15	8	2	1	0	0	0	0	0	1	0	1	0	0	0	1.9	15	
21-Jun	0	0	0	0	Z	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	1	0	0	0.4	1	
22-Jun	0	0	0	0	0	Z	0	0	3	2	1	1	0	0	1	2	8	1	0	2	1	1	0	0	1.1	8	
23-Jun	Z	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	1	1	3	1	1	0	0.6	3	
24-Jun	0	Z	1	0	0	1	3	4	3	7	3	0	0	0	0	0	0	0	0	0	0	1	0	1	1.1	7	
25-Jun	0	0	Z	0	0	0	1	1	1	1	1	1	1	1	3	0	1	0	0	0	1	1	0	1	0.7	3	
26-Jun	1	1	1	Z	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1	
27-Jun	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	
28-Jun	0	0	0	0	0	Z	0	1	1	1	2	1	1	1	2	1	1	2	1	1	1	1	1	1	0.8	2	
29-Jun	Z	0	0	0	0	0	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	0.6	1	
30-Jun	1	Z	1	0	0	0	0	0	0	1	1	2	2	2	1	2	1	1	1	1	1	1	1	1	1.0	2	

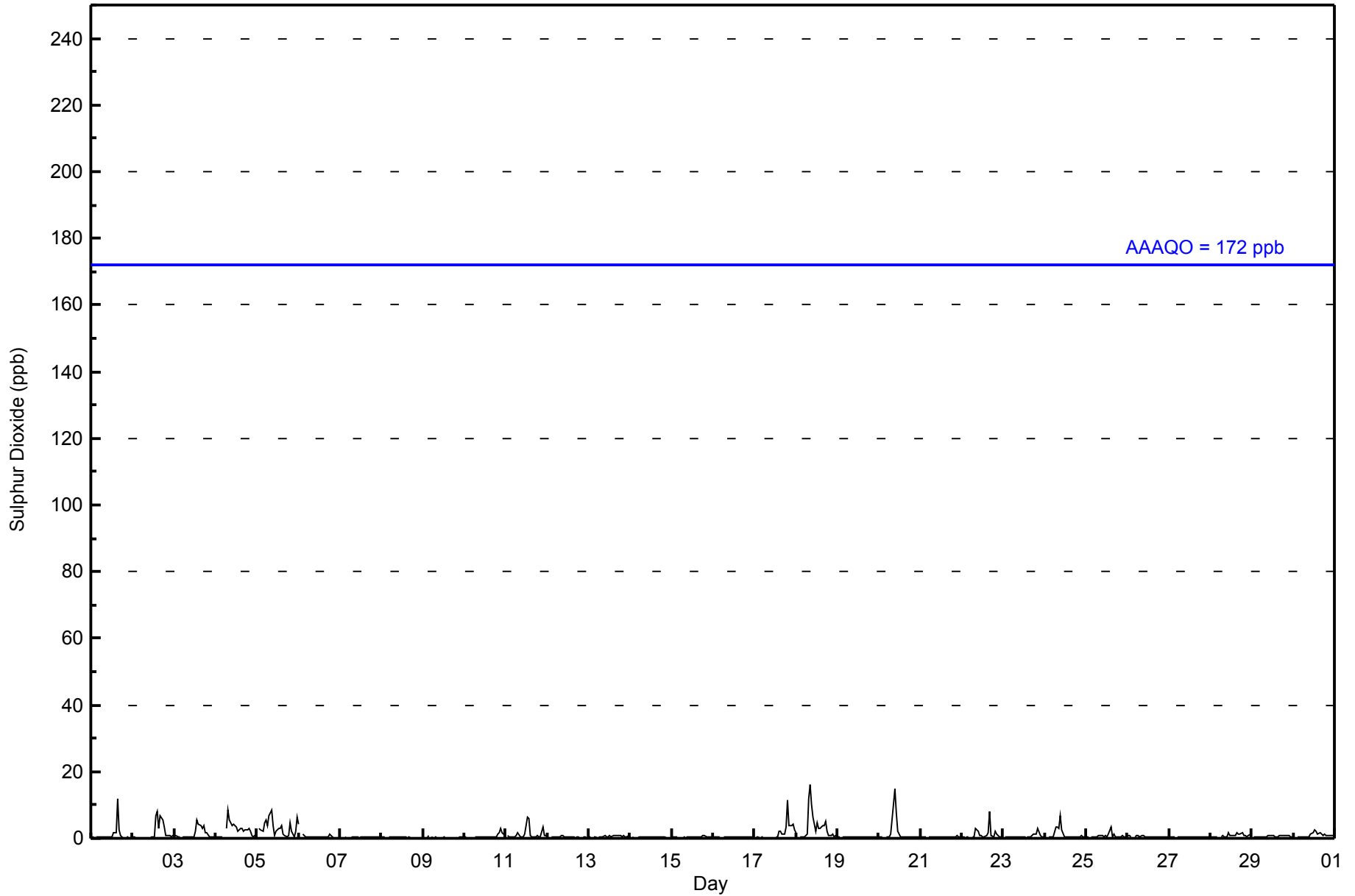
0.6	0.5	0.5	0.4	0.5	0.5	0.7	1.5	2.0	1.8	1.2	0.8	1.1	1.3	1.3	1.4	1.3	1.0	1.0	1.2	0.8	0.8	0.6	0.8	Diurnal Average	
4	3	3	2	5	6	4	12	16	15	8	4	7	7	8	12	8	6	4	11	4	4	4	6	Diurnal Maximum	

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



WBEA
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Shell Muskeg River - June 2015





WBEA
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Shell Muskeg River - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	679	99.27	99.27
11 - 20	5	0.73	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



WBEA
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Shell Muskeg River - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	36	60	54	22	15	8	19	35	102	94	45	50	25	35	47	30	677
11 - 20	0	0	0	0	0	0	0	0	1	2	0	0	1	0	1	0	5
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	36	60	54	22	15	8	19	35	103	96	45	50	26	35	48	30	682

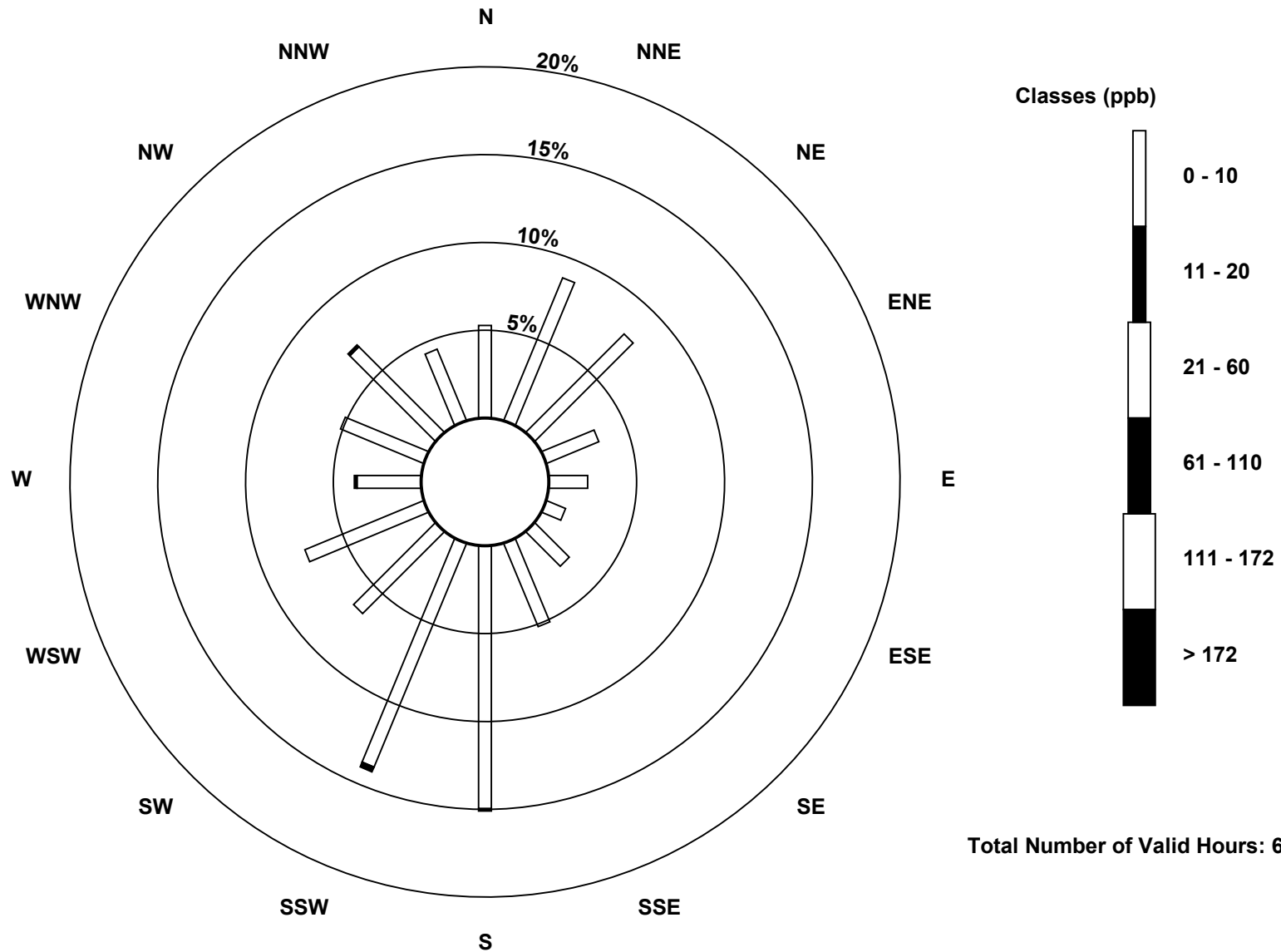
Total Number of Valid Hours: 682

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

Sulphur Dioxide (SO₂) - ppb
Shell Muskeg River (AMS 16)

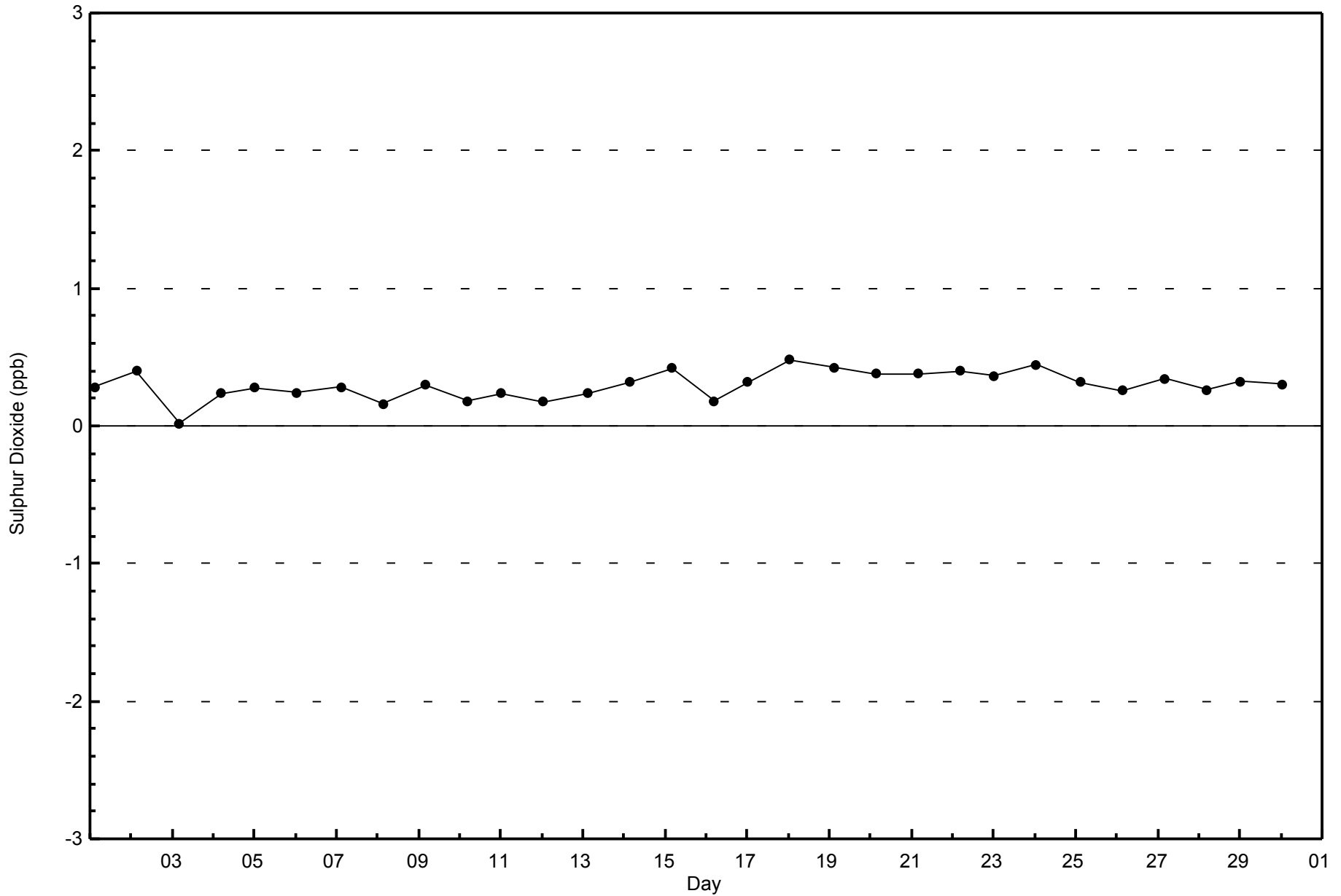


Total Number of Valid Hours: 682



WBEA
Zero Responses

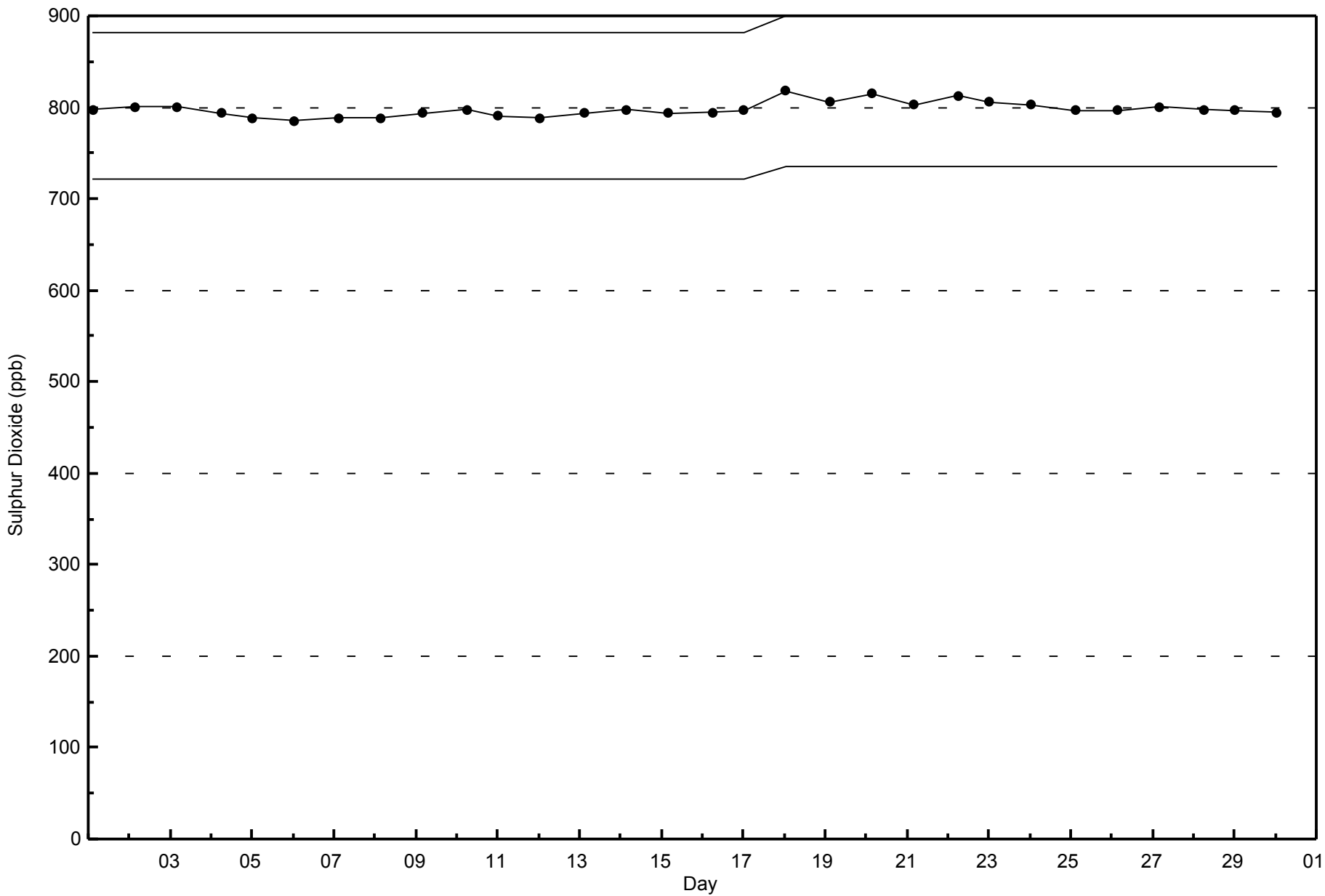
Sulphur Dioxide (SO₂) - ppb
Shell Muskeg River - June 2015





WBEA
Span Responses

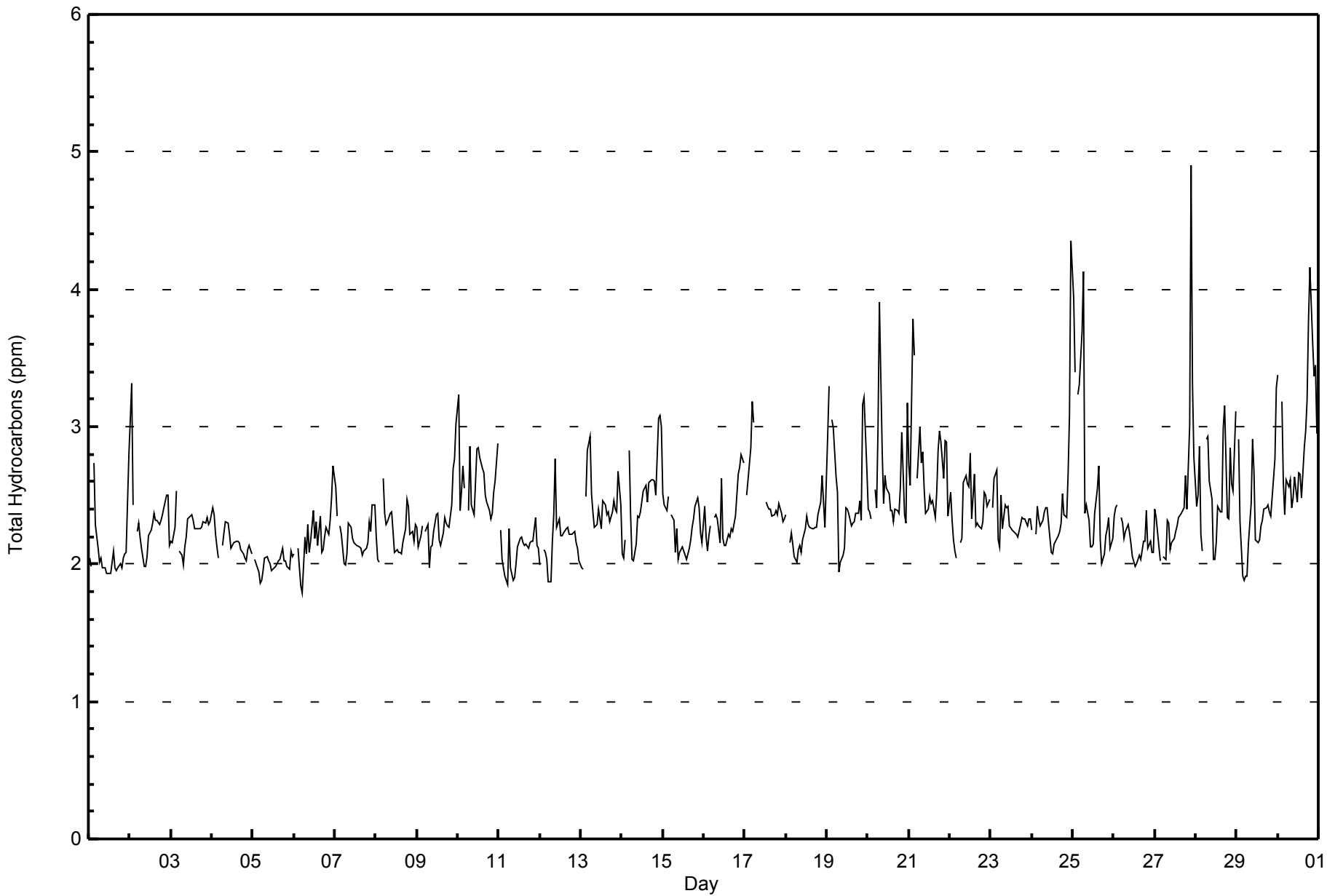
Sulphur Dioxide (SO₂) - ppb
Shell Muskeg River - June 2015





WBEA
Hourly Averages

Total Hydrocarbons (THC) - ppm
Shell Muskeg River - June 2015





WBEA
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Shell Muskeg River - June 2015

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	86	12.57	12.57
2.1 - 3.0	564	82.46	95.03
3.1 - 10.0	34	4.97	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



WBEA
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Shell Muskeg River - June 2015

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	0	0	7	2	0	0	3	4	19	22	5	3	5	3	13	0	86
2.1 - 3.0	31	55	44	19	14	7	15	31	81	73	36	46	21	30	33	27	563
3.1 - 10.0	5	5	3	1	1	1	1	0	3	1	4	1	0	2	2	3	33
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	36	60	54	22	15	8	19	35	103	96	45	50	26	35	48	30	682

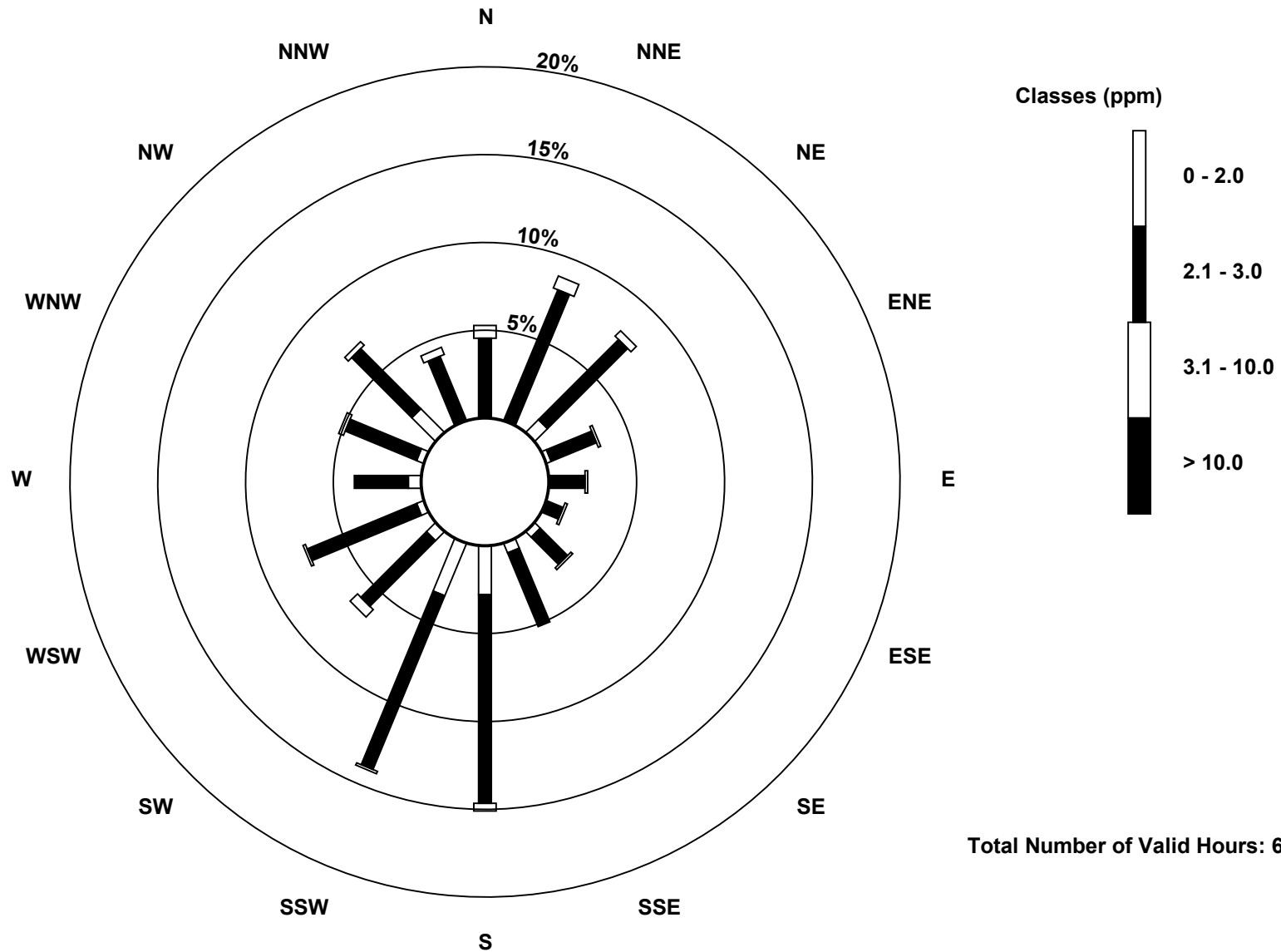
Total Number of Valid Hours: 682

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

Total Hydrocarbons (THC) - ppm
Shell Muskeg River (AMS 16)

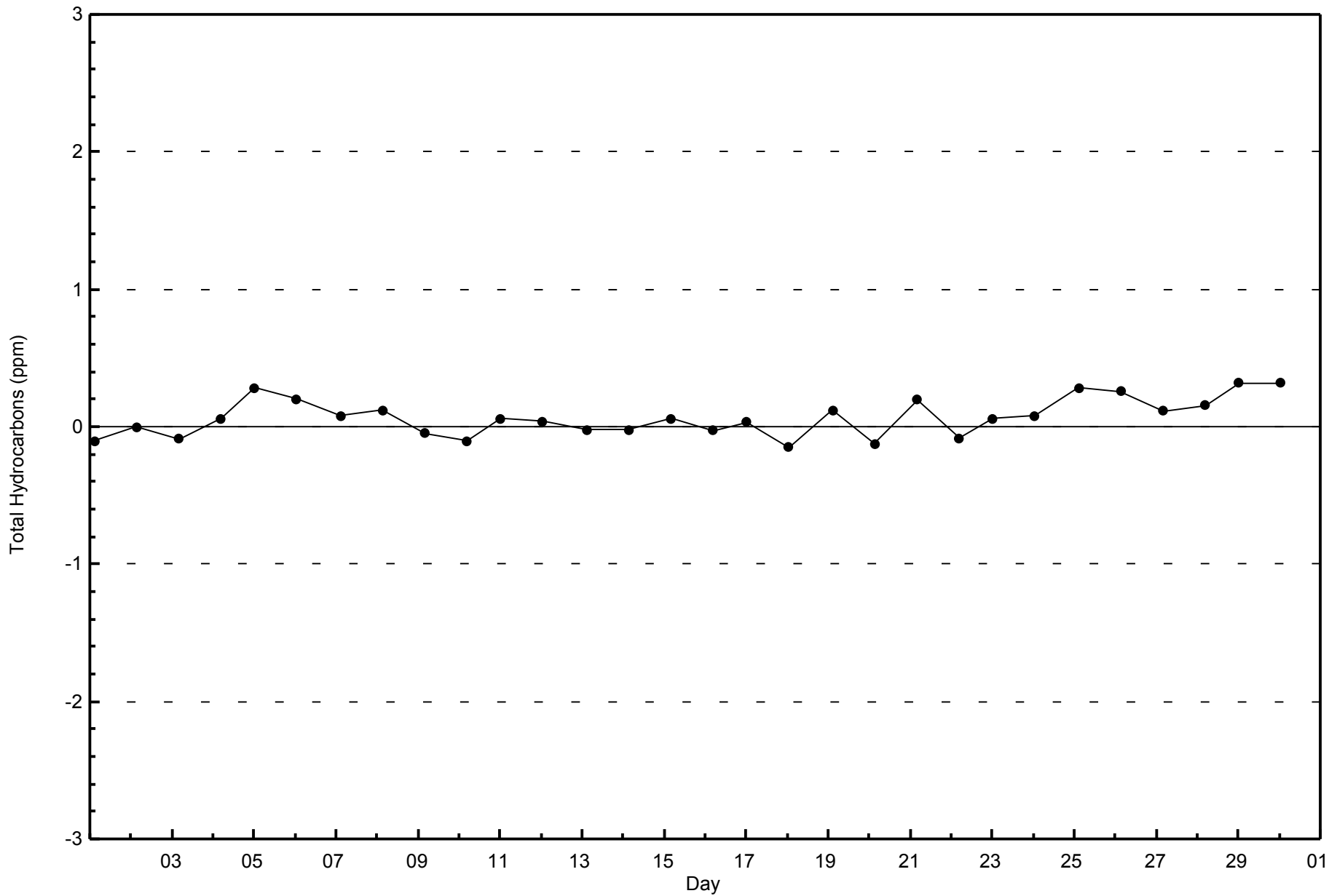


Total Number of Valid Hours: 682



WBEA
Zero Responses

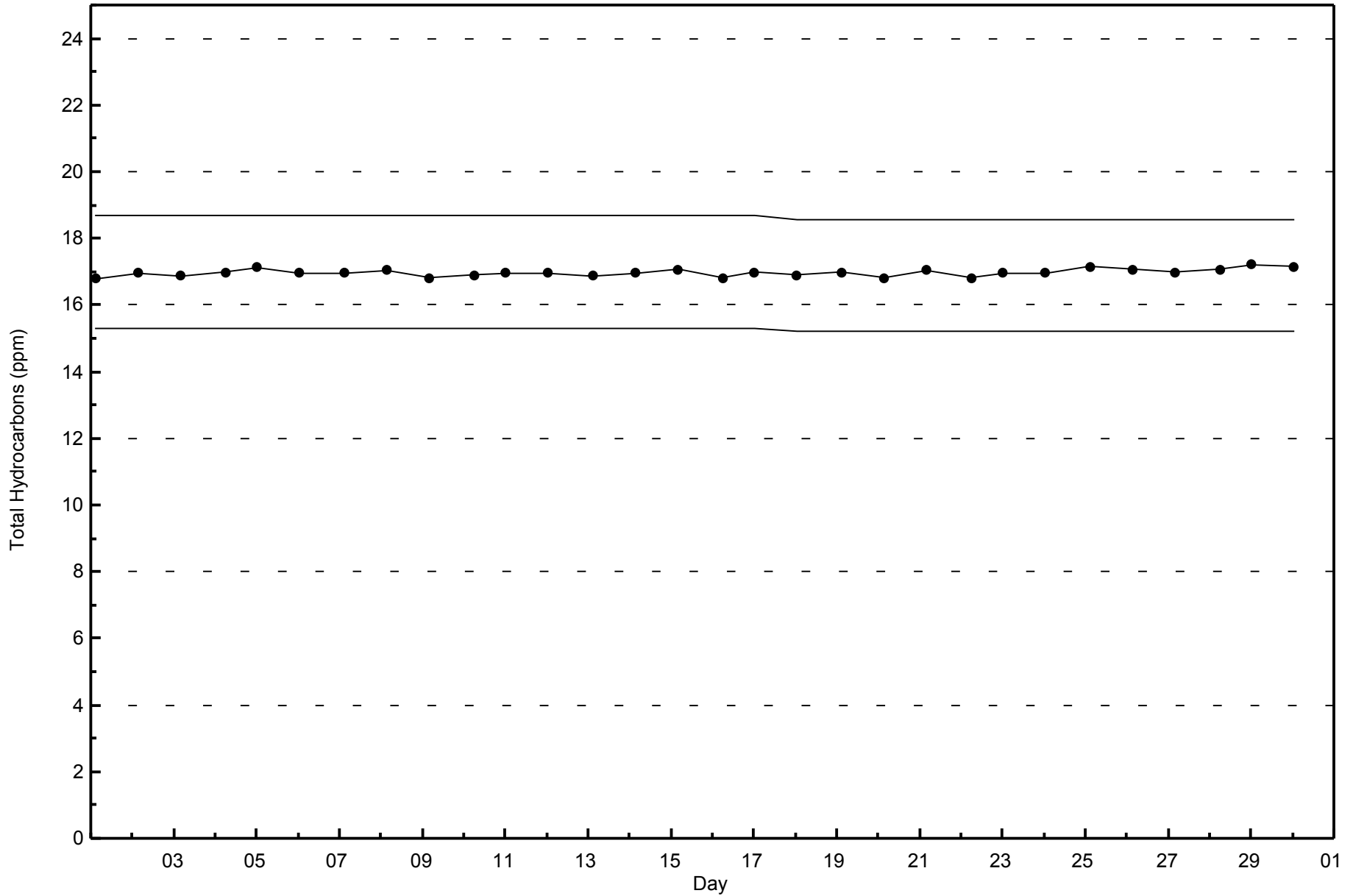
Total Hydrocarbons (THC) - ppm
Shell Muskeg River - June 2015





WBEA
Span Responses

Total Hydrocarbons (THC) - ppm
Shell Muskeg River - June 2015





Maximum Value: 56 ppb on Jun 2 02:00	Maximum Daily Average: 20.9 ppb on Jun 13	Hours in Service: 720
Minimum Value: 0 ppb on Jun 11 04:00	Minimum Daily Average: 0.2 ppb on Jun 7	Hours of Data: 684
Maximum Diurnal Average: 6.3 ppb at hour 6	Minimum Diurnal Average: 2.0 ppb at hour 20	Hours of Missing Data: 36
Monthly Average: 3.9 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 5 P ₉₀ = 12 P ₉₉ = 33	Hours of Calibration: 36
		Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	0	Z	16	5	3	2	1	1	1	1	1	0	2	1	1	0	1	0	0	0	0	33	3.0	33	
2-Jun	50	56	3	Z	2	5	7	6	3	1	1	2	1	1	2	1	0	0	0	0	0	0	0	6.2	56	
3-Jun	0	0	0	5	Z	2	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.5	5	
4-Jun	0	0	0	0	0	Z	2	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	3	
5-Jun	Z	0	0	0	0	1	1	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2	
6-Jun	0	Z	0	0	0	0	0	0	0	0	1	3	1	2	1	3	0	0	0	0	0	0	0	0.5	3	
7-Jun	0	0	Z	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2	
8-Jun	0	0	0	Z	2	2	1	2	2	2	1	0	7	0	0	1	1	1	1	1	0	0	0	1.1	7	
9-Jun	0	0	0	1	Z	1	1	1	0	0	0	1	6	2	0	1	0	0	0	2	12	7	26	2.7	26	
10-Jun	30	2	3	6	5	Z	9	19	8	8	8	8	9	5	6	5	3	1	0	0	0	0	2	5.9	30	
11-Jun	Z	0	0	0	0	0	3	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0.4	3	
12-Jun	0	Z	0	0	0	1	1	4	4	3	1	0	0	1	0	0	0	0	0	0	0	0	0	0.7	4	
13-Jun	0	1	Z	6	18	13	10	13	20	34	26	23	34	24	29	30	30	25	28	25	27	22	12	31	20.9	34
14-Jun	1	1	7	Z	15	21	16	14	18	20	16	18	11	16	11	12	7	5	5	8	5	10	8	9	11.0	21
15-Jun	18	22	16	8	Z	5	6	11	4	13	9	10	2	1	0	0	2	1	2	2	3	1	0	0	5.9	22
16-Jun	3	7	9	15	5	Z	6	5	6	6	7	10	4	5	11	6	3	4	2	3	3	6	6	8	6.1	15
17-Jun	Z	6	8	16	35	21	C	C	C	C	C	C	1	1	0	0	0	0	1	1	0	0	0	4	--	35
18-Jun	6	Z	0	1	2	1	3	8	4	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	1.5	8
19-Jun	12	10	Z	11	10	12	11	16	15	15	5	7	9	12	2	1	4	4	6	4	0	3	17	5	8.3	17
20-Jun	0	0	0	Z	4	5	6	8	15	5	5	6	7	4	5	8	5	7	9	4	15	4	1	5	5.6	15
21-Jun	2	1	36	6	Z	6	6	17	21	6	2	2	2	4	1	18	12	5	2	1	0	0	0	6.6	36	
22-Jun	0	0	0	0	0	Z	1	2	14	9	7	7	3	2	3	0	0	0	1	1	0	0	0	2.3	14	
23-Jun	Z	3	9	11	8	8	24	7	5	3	1	0	0	0	1	0	0	0	0	0	0	0	0	3.5	24	
24-Jun	0	Z	2	26	27	25	16	2	1	2	1	0	0	0	0	0	0	1	2	3	12	10	31	7.1	31	
25-Jun	10	4	Z	2	7	17	34	11	14	9	3	4	0	1	1	3	0	0	0	0	0	0	0	5.3	34	
26-Jun	0	0	0	Z	1	2	1	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2	
27-Jun	0	1	1	0	Z	0	2	5	4	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.7	5	
28-Jun	0	0	0	0	0	Z	0	1	2	3	0	0	1	0	0	0	1	0	0	0	0	0	2	0.5	3	
29-Jun	Z	1	0	0	0	0	1	2	2	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0.4	2	
30-Jun	5	Z	0	0	0	5	4	9	4	2	0	0	0	0	1	1	1	1	7	7	4	2	4	0	2.4	9

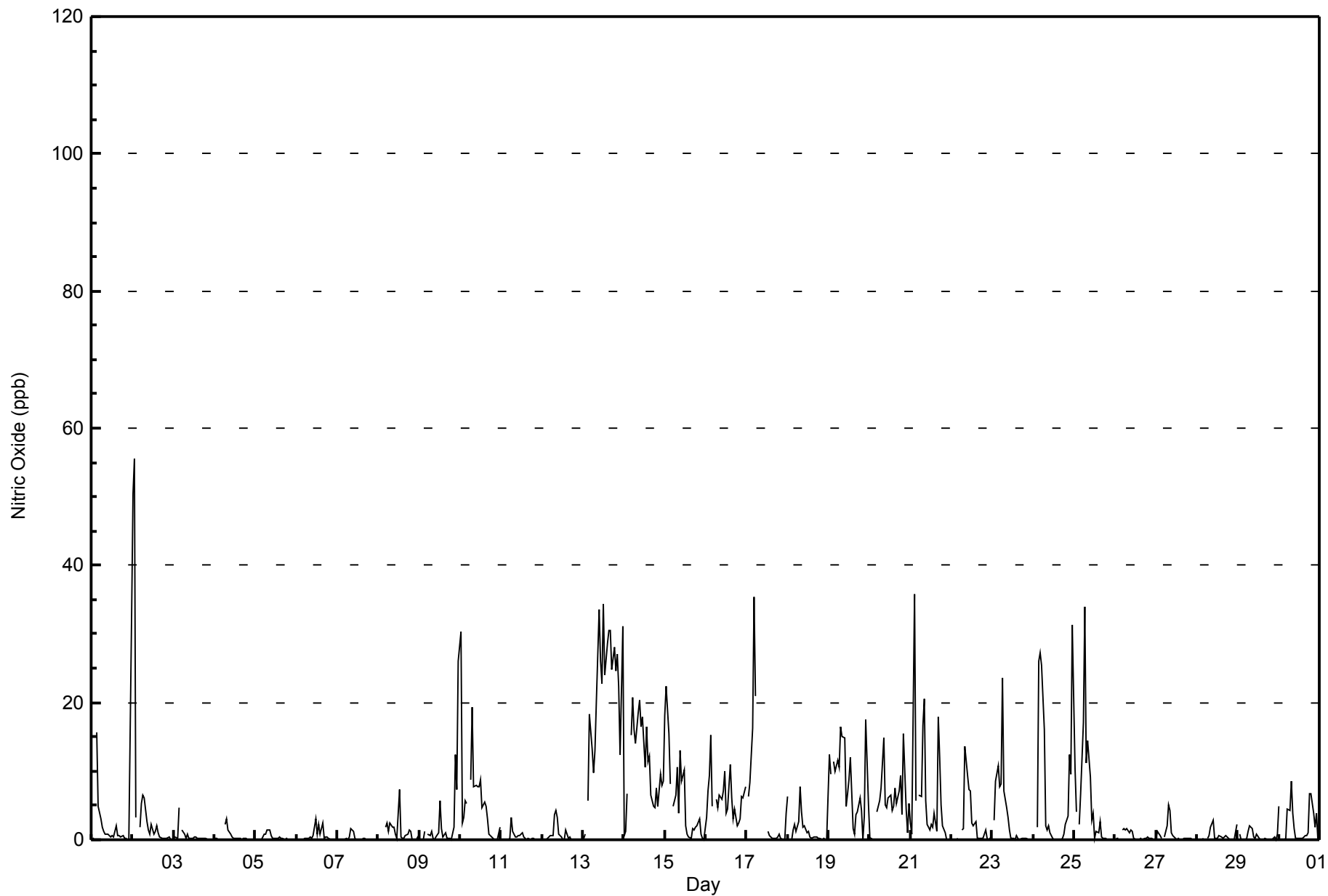
5.6	4.7	3.8	5.2	5.9	6.3	6.0	5.9	6.0	5.2	3.5	3.6	3.4	2.7	2.7	2.5	2.6	2.2	2.3	2.0	2.2	2.5	2.2	5.3	Diurnal Average	
50	56	36	26	35	25	34	19	21	34	26	23	34	24	29	30	30	25	28	25	27	22	17	33	Diurnal Maximum	

Z - zerospan C - Calibration



WBEA
Hourly Averages

Nitric Oxide (NO) - ppb
Shell Muskeg River - June 2015





WBEA
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Shell Muskeg River - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	653	95.47	95.47
21 - 40	29	4.24	99.71
41 - 80	2	0.29	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



WBEA
Frequency Distribution

Nitric Oxide (NO) - ppb
Shell Muskeg River - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	33	48	49	21	15	7	19	35	99	96	45	49	26	35	46	28	651
21 - 40	2	11	5	1	0	1	0	0	4	0	0	1	0	0	2	2	29
11 - 80	1	1	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	36	60	54	22	15	8	19	35	103	96	45	50	26	35	48	30	682

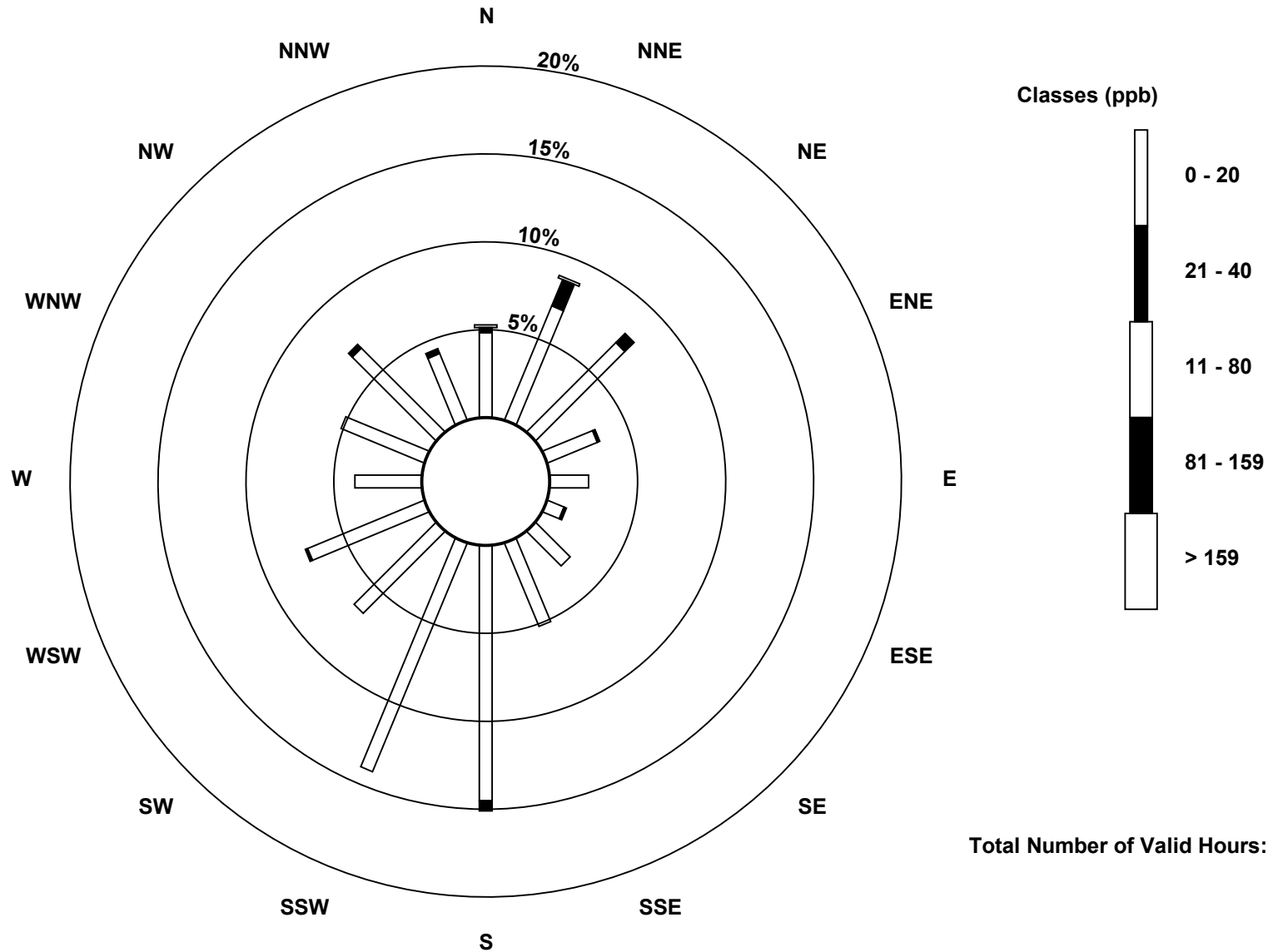
Total Number of Valid Hours: 682

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

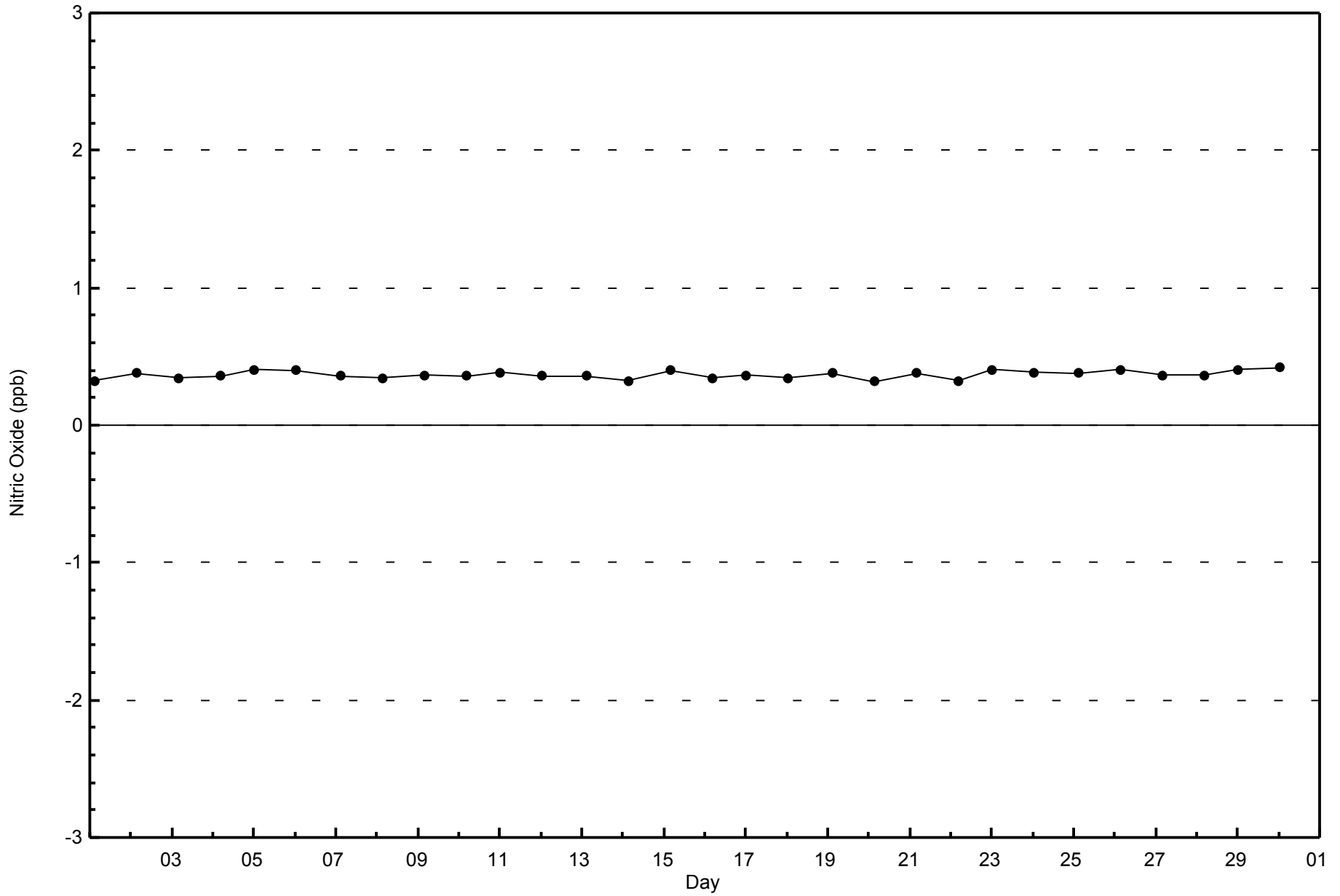
Nitric Oxide (NO) - ppb
Shell Muskeg River (AMS 16)





WBEA
Zero Responses

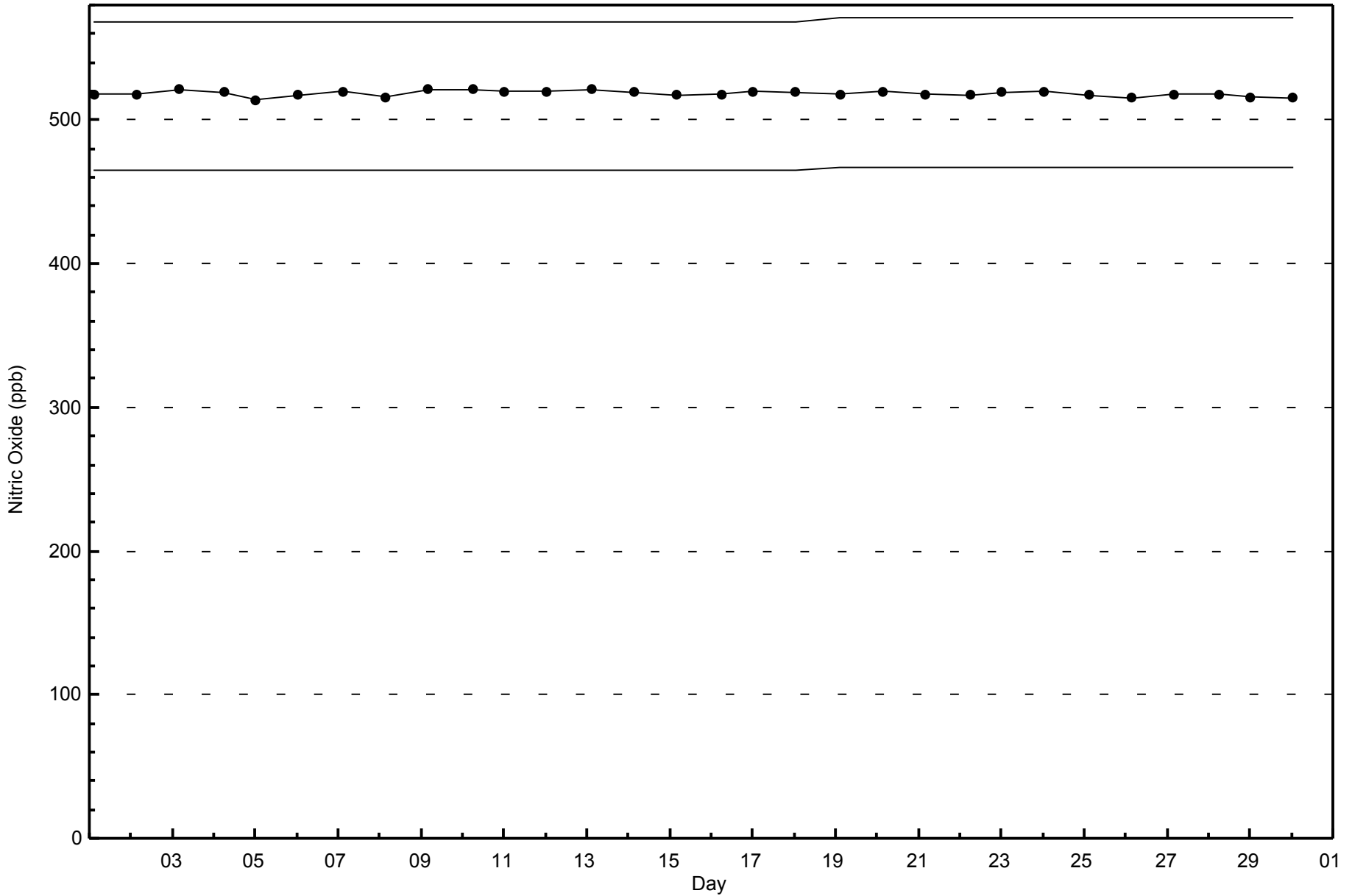
Nitric Oxide (NO) - ppb
Shell Muskeg River - June 2015





WBEA
Span Responses

Nitric Oxide (NO) - ppb
Shell Muskeg River - June 2015





Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Shell Muskeg River - June 2015

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 32 ppb on Jun 25 00:00	Maximum Daily Average: 19.8 ppb on Jun 13		Hours of Data:	684
Minimum Value: 0 ppb on Jun 27 15:00	Minimum Daily Average: 2.8 ppb on Jun 7		Hours of Missing Data:	36
Maximum Diurnal Average: 11.6 ppb at hour 24	Minimum Diurnal Average: 4.3 ppb at hour 15		Hours of Calibration:	36
Monthly Average: 7.2 ppb	Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 2 Median = 5 Q ₃ = 10 P ₉₀ = 18 P ₉₉ = 27		Percent Operational Time:	100.0

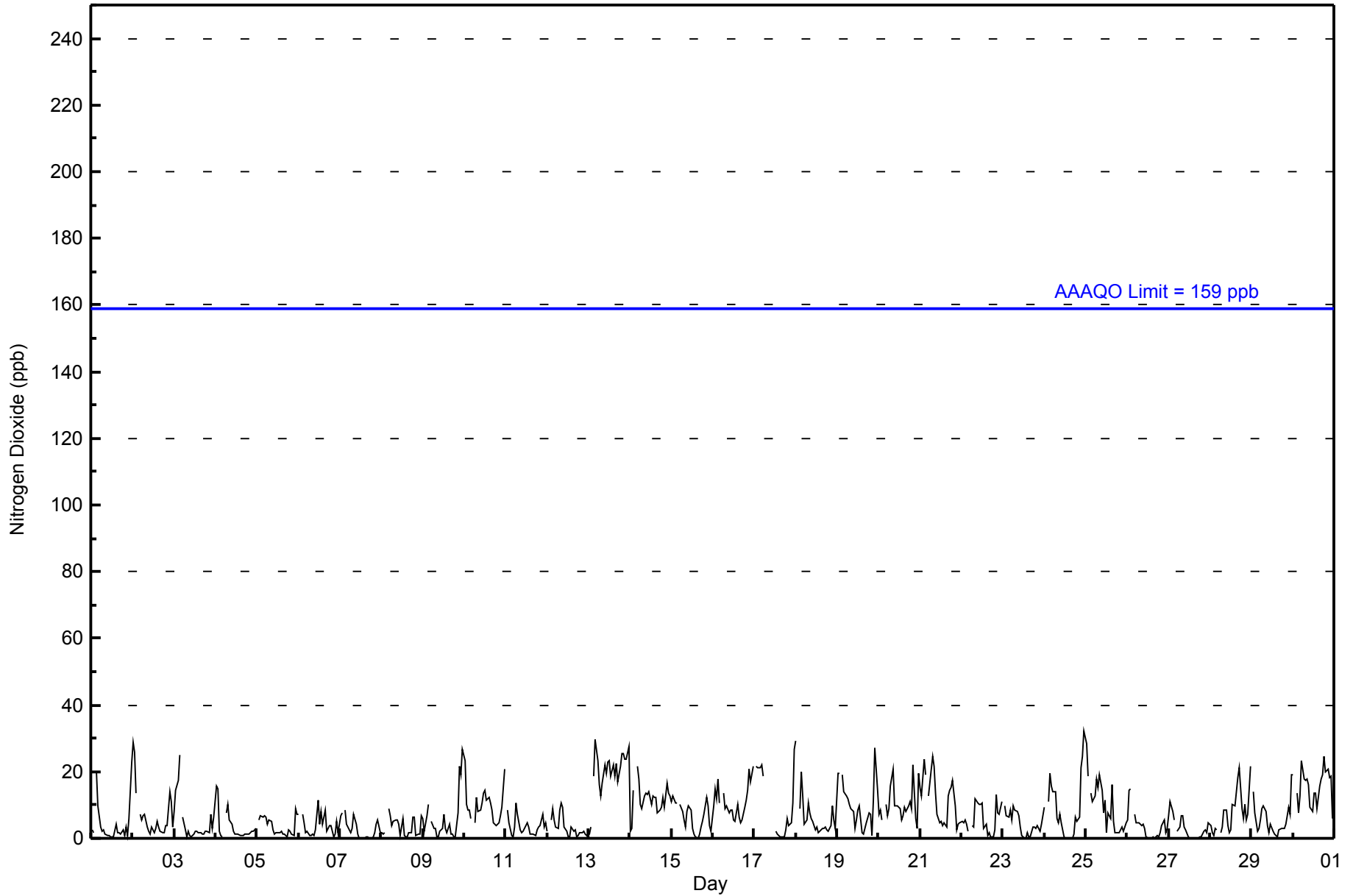
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jun	3	2	Z	20	10	4	2	3	1	1	1	1	1	4	2	2	1	3	1	3	1	6	23	4.0	23																								
2-Jun	29	26	14	Z	7	6	7	7	4	2	1	3	2	3	5	3	2	2	2	4	4	14	11	4	7.0	29																							
3-Jun	8	14	17	25	Z	6	2	1	2	1	1	1	2	2	2	1	1	2	2	2	7	3	6	4.8	25																								
4-Jun	16	15	2	1	1	Z	8	10	6	4	2	1	1	1	1	1	1	1	1	1	2	2	3	3.6	16																								
5-Jun	Z	6	7	6	7	6	4	5	5	3	1	2	2	2	2	1	1	1	3	2	1	9	7	3.6	9																								
6-Jun	7	Z	7	5	2	2	1	1	1	1	3	12	4	8	4	8	2	3	4	4	0	1	5	2	3.8	12																							
7-Jun	7	8	Z	9	4	3	2	3	7	4	1	0	0	0	0	0	0	0	0	1	2	4	6	2	2.8	9																							
8-Jun	2	1	2	Z	9	7	4	5	5	6	4	1	6	1	1	0	2	2	7	7	1	1	1	7	3.5	9																							
9-Jun	6	2	7	10	Z	5	3	3	1	0	2	3	7	3	2	4	1	1	1	1	8	22	19	27	6.0	27																							
10-Jun	23	10	9	9	6	Z	5	12	8	8	11	14	14	11	12	11	9	5	4	4	5	7	10	21	9.8	23																							
11-Jun	Z	9	5	1	1	3	11	7	3	2	2	3	5	3	1	1	1	1	2	3	4	7	3	5	3.6	11																							
12-Jun	2	Z	6	9	5	3	3	9	10	9	4	2	1	1	3	2	3	0	1	2	2	2	1	1	3.5	10																							
13-Jun	1	3	Z	19	30	24	16	13	17	22	19	23	23	19	22	19	22	17	22	26	25	24	24	28	19.8	30																							
14-Jun	2	3	15	Z	21	18	10	9	13	14	13	14	10	13	12	8	8	9	12	9	16	13	13	13	11.6	21																							
15-Jun	11	13	10	11	Z	10	8	6	3	8	10	8	3	1	1	0	1	3	5	7	12	10	4	2	6.4	13																							
16-Jun	10	15	12	18	10	Z	13	9	10	8	8	8	5	5	10	7	5	6	9	12	15	21	17	22	11.0	22																							
17-Jun	Z	22	21	21	22	19	C	C	C	C	C	C	2	1	1	1	1	1	3	6	4	5	10	27	--	27																							
18-Jun	29	Z	9	20	13	4	5	11	8	6	5	3	3	2	2	3	3	4	3	2	4	10	5	3	6.8	29																							
19-Jun	19	20	Z	19	14	13	12	10	9	8	3	6	8	10	2	1	3	5	8	7	1	12	27	15	10.0	27																							
20-Jun	7	8	6	Z	10	7	9	16	21	10	10	10	9	6	7	9	8	10	11	9	22	6	3	19	10.1	22																							
21-Jun	15	13	24	19	Z	13	21	25	22	13	7	5	5	4	5	3	13	15	15	18	10	2	4	5	11.9	25																							
22-Jun	5	5	5	4	2	Z	4	4	12	11	10	10	10	3	4	1	2	1	0	3	13	8	7	11	5.9	13																							
23-Jun	Z	10	7	6	8	6	10	8	8	7	4	1	0	0	2	1	0	3	3	3	4	2	4	7	4.6	10																							
24-Jun	9	Z	11	20	16	14	14	6	5	7	5	0	0	0	0	0	0	1	6	5	6	21	24	32	8.9	32																							
25-Jun	29	19	Z	14	11	13	18	15	19	15	8	11	2	8	6	16	5	2	2	3	3	2	5	5	9.8	29																							
26-Jun	5	15	15	Z	7	5	5	5	4	4	3	0	0	0	0	0	0	1	1	2	4	5	2	3	3.7	15																							
27-Jun	7	11	8	6	Z	2	3	7	7	3	2	0	0	0	0	0	0	0	0	0	2	3	2	5	3.0	11																							
28-Jun	4	2	1	3	3	Z	2	3	9	9	4	2	3	10	10	14	18	21	9	6	10	6	7	22	7.6	22																							
29-Jun	Z	14	8	2	3	5	9	10	8	4	2	4	2	1	1	1	2	3	3	3	4	10	7	19	5.4	19																							
30-Jun	19	Z	14	8	13	23	18	17	18	16	10	8	14	14	9	16	18	19	25	20	21	18	19	6	15.7	25																							
																								11.0	10.5	9.5	11.3	9.4	8.8	7.8	8.2	8.4	7.1	5.3	5.4	4.9	4.4	4.3	4.6	4.4	4.6	5.4	5.8	6.7	8.4	8.6	11.6	Diurnal Average	
																								29	26	24	25	30	24	21	25	22	22	19	23	23	19	22	19	22	21	25	26	25	24	27	32	Diurnal Maximum	

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



WBEA
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Shell Muskeg River - June 2015





WBEA
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Shell Muskeg River - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	638	93.27	93.27
21 - 40	46	6.73	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



WBEA
Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Shell Muskeg River - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	29	48	49	22	15	7	19	33	100	95	45	48	26	33	46	21	636
21 - 40	7	12	5	0	0	1	0	2	3	1	0	2	0	2	2	9	46
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	36	60	54	22	15	8	19	35	103	96	45	50	26	35	48	30	682

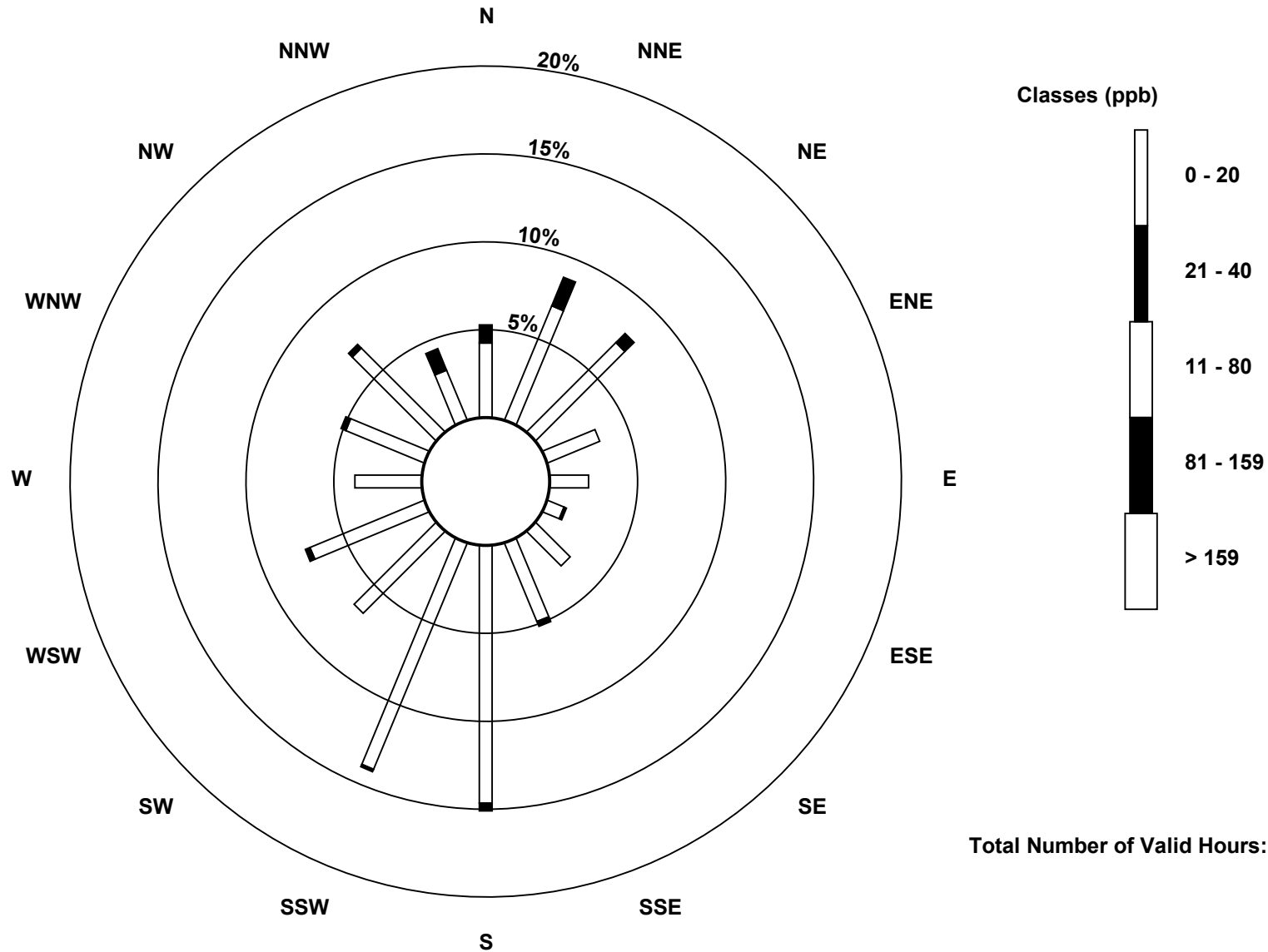
Total Number of Valid Hours: 682

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

Nitrogen Dioxide (NO₂) - ppb
Shell Muskeg River (AMS 16)

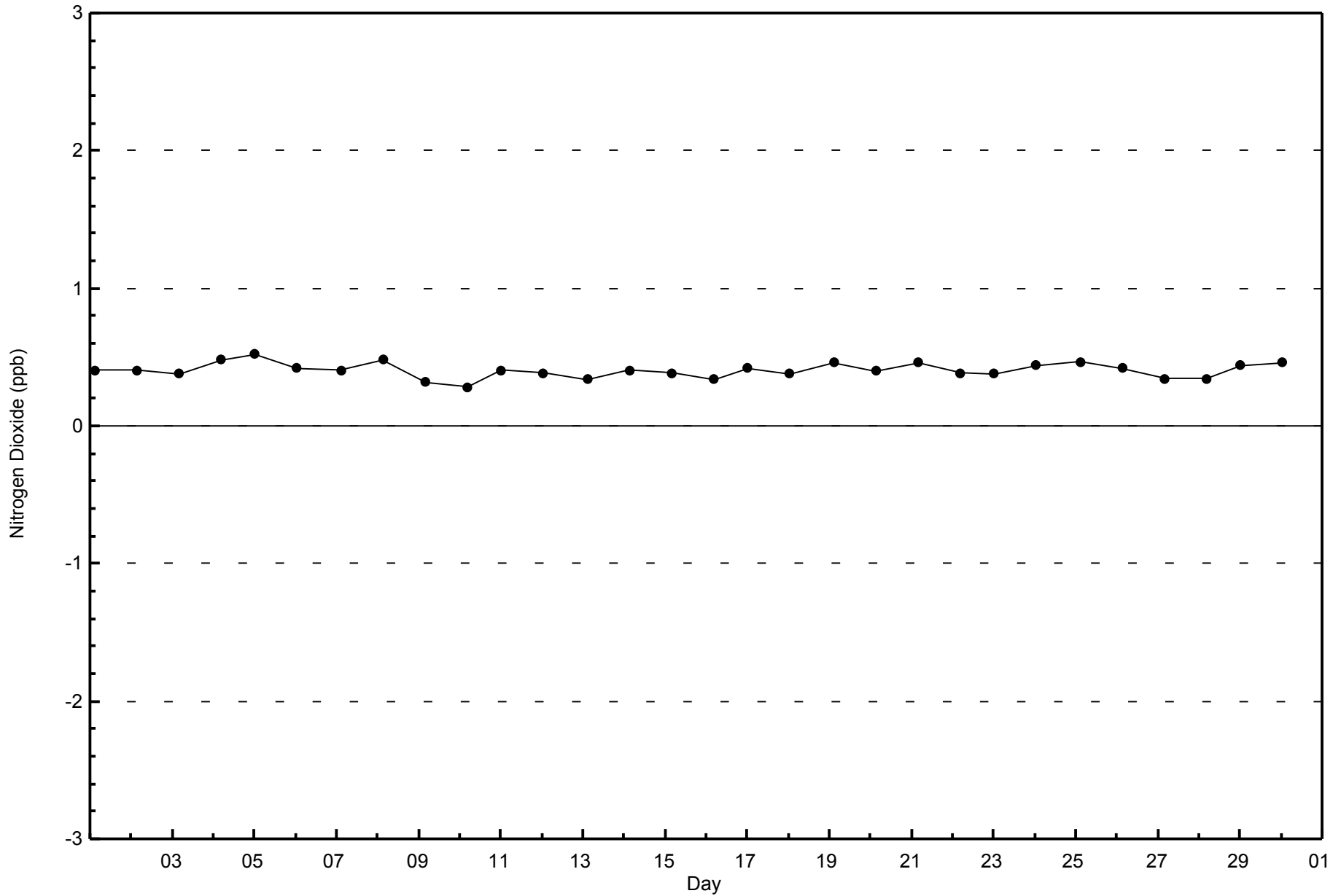


Total Number of Valid Hours: 682



WBEA
Zero Responses

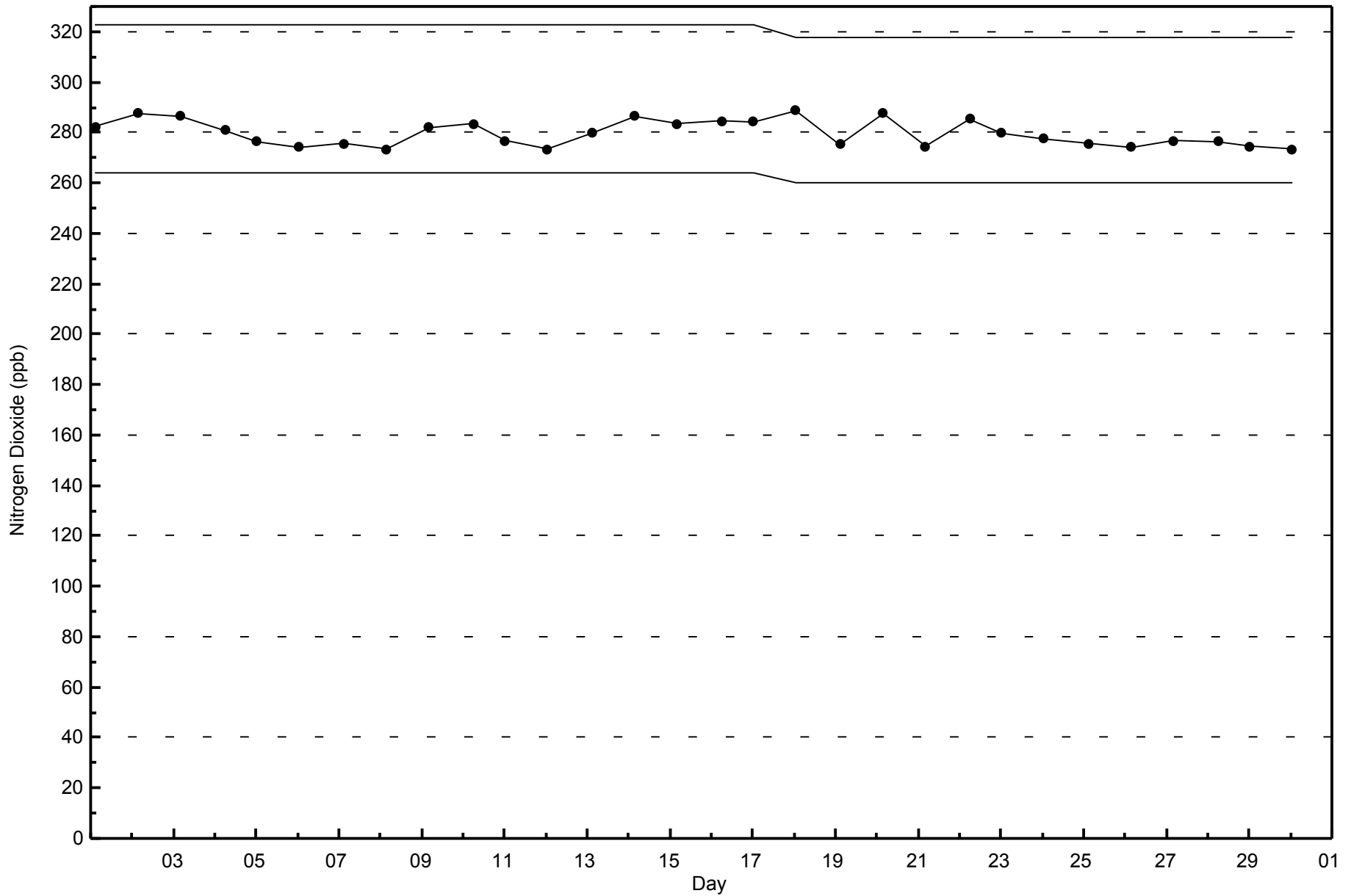
Nitrogen Dioxide (NO₂) - ppb
Shell Muskeg River - June 2015





WBEA
Span Responses

Nitrogen Dioxide (NO₂) - ppb
Shell Muskeg River - June 2015





Maximum Value: 82 ppb on Jun 2 02:00	Maximum Daily Average: 40.7 ppb on Jun 13	Hours in Service: 720
Minimum Value: 0 ppb on Jun 27 15:00	Minimum Daily Average: 3.0 ppb on Jun 7	Hours of Data: 684
Maximum Diurnal Average: 16.9 ppb at hour 24	Minimum Diurnal Average: 6.7 ppb at hour 18	Hours of Missing Data: 36
Monthly Average: 11.1 ppb	Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 2 Median = 6 Q ₃ = 15 P ₉₀ = 27 P ₉₉ = 57	Hours of Calibration: 36
		Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	3	2	Z	36	15	7	4	4	2	2	1	1	1	1	6	2	2	2	3	1	3	1	6	56	6.9	56	
2-Jun	79	82	Z	17	Z	9	11	13	13	6	4	2	6	3	4	7	4	2	2	2	4	4	14	11	4	13.2	82
3-Jun	8	15	17	30	Z	8	3	1	3	1	1	1	3	2	2	2	2	2	2	2	2	7	3	6	5.3	30	
4-Jun	16	15	2	1	1	Z	10	13	7	5	3	1	1	1	1	1	1	1	1	1	2	2	2	3	3	4.0	16
5-Jun	Z	6	7	6	7	7	5	7	7	3	1	2	2	2	2	1	1	1	3	2	1	1	9	7	3.9	9	
6-Jun	7	Z	7	5	2	2	1	1	2	1	3	15	5	10	5	11	2	3	4	4	0	1	5	2	4.3	15	
7-Jun	7	8	Z	9	4	3	2	3	9	6	1	0	0	0	0	1	0	0	0	1	2	4	6	2	3.0	9	
8-Jun	2	1	2	Z	11	9	5	7	7	7	5	1	13	1	1	0	2	3	8	8	1	1	1	7	4.6	13	
9-Jun	6	2	7	11	Z	6	3	4	1	0	2	4	13	4	2	5	1	2	1	1	9	34	26	53	8.7	53	
10-Jun	53	13	12	14	11	Z	13	32	16	16	18	21	23	16	18	16	12	5	4	4	5	7	10	23	15.7	53	
11-Jun	Z	9	5	1	1	4	14	9	3	2	3	4	6	4	1	1	1	1	3	4	4	7	3	5	4.0	14	
12-Jun	2	Z	5	9	6	4	3	12	15	13	4	3	1	1	5	2	3	0	1	2	2	2	1	1	4.2	15	
13-Jun	1	4	Z	25	48	37	26	26	37	55	45	46	58	43	51	49	53	42	50	50	53	46	36	59	40.7	59	
14-Jun	3	4	21	Z	37	39	26	23	31	34	29	32	21	29	23	24	14	13	14	20	14	26	21	21	22.6	39	
15-Jun	29	35	26	19	Z	15	15	16	7	21	18	18	5	2	1	0	3	5	7	9	15	11	4	2	12.3	35	
16-Jun	13	22	21	33	15	Z	19	13	16	14	15	18	9	10	21	12	8	10	11	14	18	27	23	29	17.1	33	
17-Jun	Z	28	29	37	58	39	C	C	C	C	C	C	3	2	1	1	1	1	3	7	4	5	10	31	--	58	
18-Jun	36	Z	9	21	15	6	8	19	12	8	7	4	5	2	3	3	3	4	3	2	4	10	5	3	8.3	36	
19-Jun	32	29	Z	30	24	24	23	27	24	23	8	12	17	22	3	2	7	9	14	12	1	15	45	20	18.3	45	
20-Jun	7	8	6	Z	14	12	15	23	35	15	14	16	15	10	12	17	13	17	21	12	37	11	4	25	15.6	37	
21-Jun	18	14	59	25	Z	19	27	41	42	19	10	6	7	6	9	5	30	27	20	20	11	3	4	5	18.5	59	
22-Jun	5	5	6	4	3	Z	5	5	25	20	18	17	13	5	7	1	2	1	1	3	15	8	7	11	8.1	25	
23-Jun	Z	12	15	17	16	14	34	15	13	10	5	1	0	0	2	1	1	4	4	3	4	2	4	7	8.1	34	
24-Jun	9	Z	13	46	43	40	30	8	6	9	6	0	0	0	0	0	0	2	7	7	10	33	34	64	16.0	64	
25-Jun	39	23	Z	16	18	30	52	26	34	24	11	15	2	9	7	19	5	2	2	2	3	3	2	5	15.1	52	
26-Jun	6	15	15	Z	9	6	6	6	5	6	4	0	0	0	0	0	0	1	1	2	4	5	2	3	4.2	15	
27-Jun	7	12	8	6	Z	2	5	12	11	4	3	1	0	0	0	0	0	0	0	1	2	3	2	5	3.7	12	
28-Jun	4	2	1	3	3	Z	2	4	10	11	4	2	3	11	10	14	19	22	9	6	10	6	7	24	8.1	24	
29-Jun	Z	15	8	2	3	6	10	12	10	4	2	5	3	1	1	1	3	3	3	3	4	10	7	20	5.8	20	
30-Jun	24	Z	14	8	13	28	22	26	22	18	10	8	14	14	9	16	18	20	31	27	24	20	23	6	18.0	31	

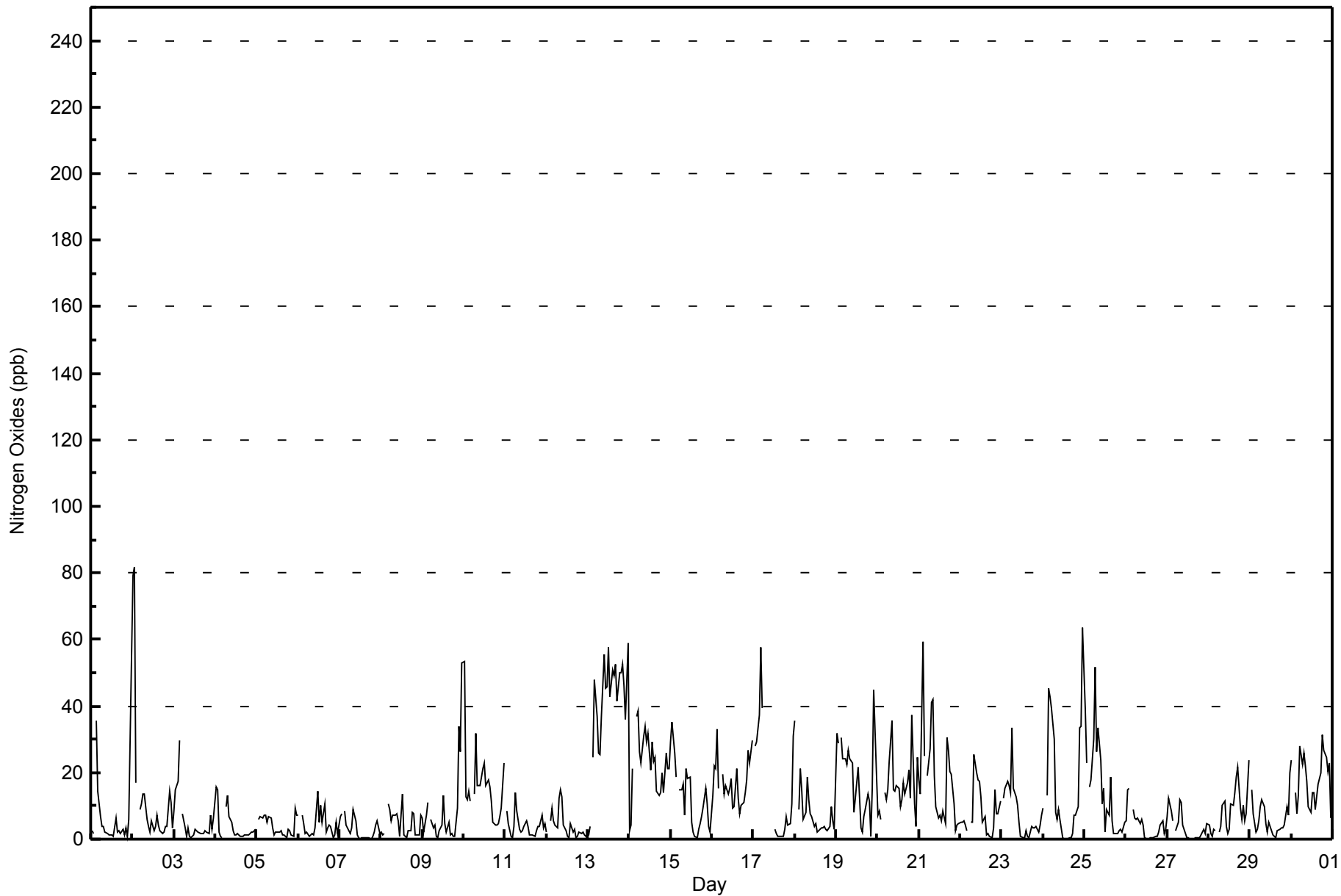
16.6	15.2	13.3	16.6	15.3	15.0	13.9	14.1	14.4	12.2	8.8	9.0	8.2	7.1	7.0	7.1	7.0	6.7	7.8	7.8	8.9	10.9	10.8	16.9	Diurnal Average	
79	82	59	46	58	40	52	41	42	55	45	46	58	43	51	49	53	42	50	50	53	46	45	64	Diurnal Maximum	

Z - zerospan C - Calibration



WBEA
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Shell Muskeg River - June 2015





WBEA
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Shell Muskeg River - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	565	82.60	82.60
21 - 40	90	13.16	95.76
41 - 80	28	4.09	99.85
81 - 159	1	0.15	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



WBEA
Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Shell Muskeg River - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	22	20	34	20	14	7	19	33	90	94	42	48	25	33	44	18	563
21 - 40	11	30	14	1	1	0	0	2	11	2	3	1	1	2	2	9	90
11 - 80	3	9	6	1	0	1	0	0	2	0	0	1	0	0	2	3	28
81 - 159	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	36	60	54	22	15	8	19	35	103	96	45	50	26	35	48	30	682

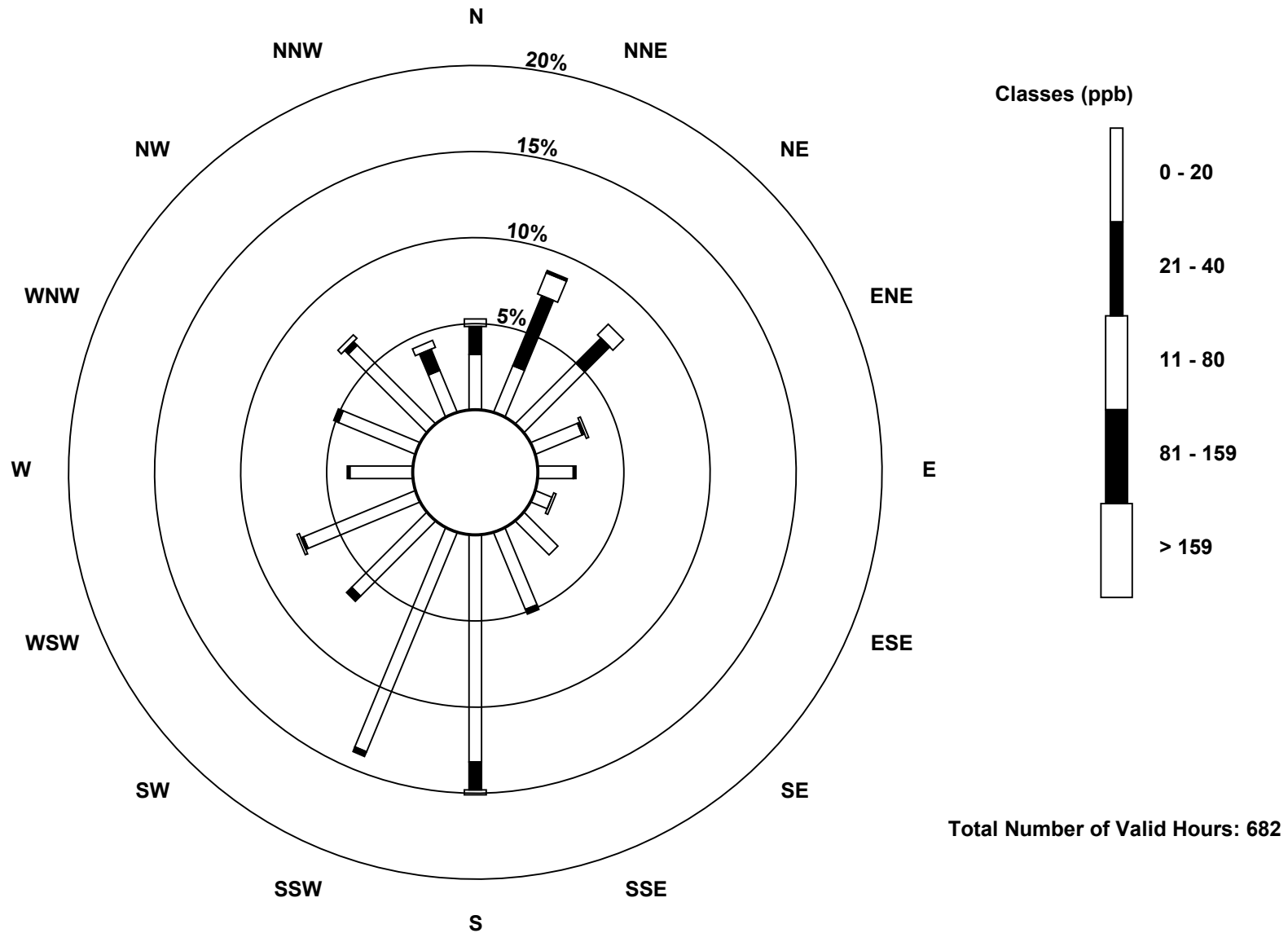
Total Number of Valid Hours: 682

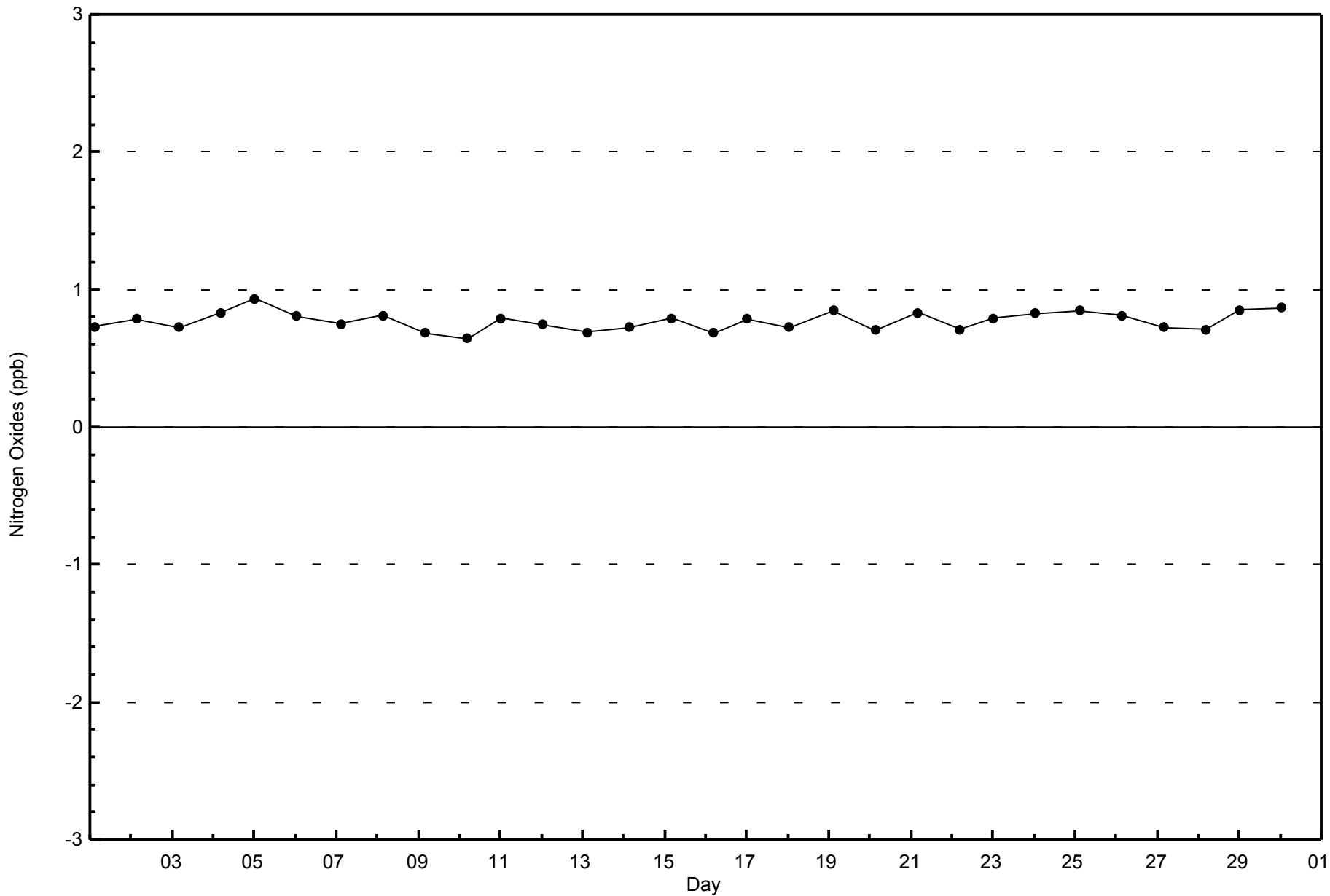
Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

Nitrogen Oxides (NO_x) - ppb
Shell Muskeg River (AMS 16)

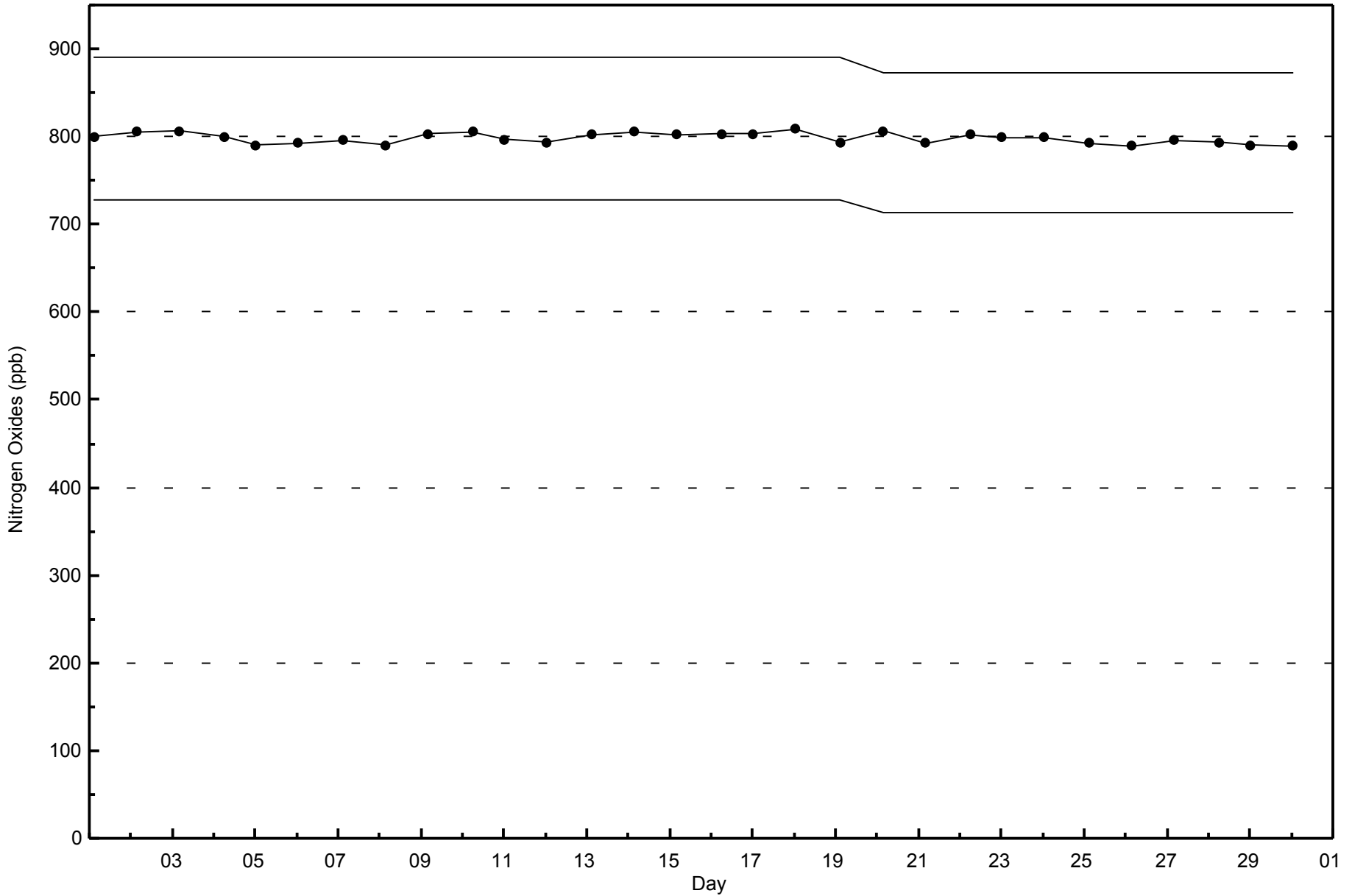






WBEA
Span Responses

Nitrogen Oxides (NO_x) - ppb
Shell Muskeg River - June 2015





Summary of Hour Averages

Shell Muskeg River - June 2015

Number of Exceedences (AAAQO): 24-hr: 5	Hours in Service: 720
Maximum Value: 192.7 µg/m ³ on Jun 29 20:00	Maximum Daily Average: 152.3 µg/m ³ on Jun 30
Minimum Value: 0.3 µg/m ³ on Jun 19 14:00	Hours of Data: 717
Maximum Diurnal Average: 30.7 µg/m ³ at hour 22	Hours of Missing Data: 3
Monthly Average: 21.85 µg/m ³	Hours of Calibration: 0
Minimum Daily Average: 5.0 µg/m ³ on Jun 16	Percent Operational Time: 99.6
Minimum Diurnal Average: 16.6 µg/m ³ at hour 7	
Percentiles: P ₁ = 1.4 P ₁₀ = 3.7 Q ₁ = 5.9 Median = 10.0 Q ₃ = 19.5 P ₉₀ = 48.6 P ₉₉ = 167.0	

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	4.9	3.2	3.4	5.8	3.8	2.8	3.2	3.6	3.9	4.6	4.0	5.8	7.0	4.4	25.0	18.6	23.4	22.0	13.1	10.0	17.3	17.9	11.1	11.3	9.6	25.0
2-Jun	11.7	9.9	6.4	6.0	6.5	6.4	4.9	4.5	2.9	2.6	2.6	2.9	2.8	2.8	4.1	3.6	4.4	3.6	4.2	5.4	7.4	8.2	7.1	9.3	5.4	11.7
3-Jun	13.9	13.3	12.4	10.3	8.2	12.1	4.9	2.9	2.6	3.3	2.4	4.4	7.4	8.0	8.5	9.1	11.7	12.6	12.4	13.0	14.2	17.1	14.1	12.6	9.6	17.1
4-Jun	13.8	14.4	11.3	11.6	12.0	10.7	7.8	6.2	9.6	9.7	7.6	9.0	7.5	7.7	7.0	7.4	7.3	8.3	9.3	8.2	18.3	26.4	10.5	6.9	10.4	26.4
5-Jun	6.4	10.1	11.2	8.8	7.3	7.8	5.1	7.3	11.6	11.1	15.0	14.0	13.0	26.5	19.1	28.7	16.9	36.5	12.5	8.3	5.9	6.7	8.7	5.2	12.7	36.5
6-Jun	6.6	12.7	12.8	11.7	10.1	9.3	6.1	5.1	6.1	6.1	11.8	48.7	82.0	40.5	36.5	24.6	13.0	9.3	13.6	17.2	13.0	14.7	21.6	25.0	19.1	82.0
7-Jun	29.0	23.1	19.4	38.9	37.8	35.3	30.2	42.7	37.4	30.0	25.6	16.2	18.3	20.3	16.8	13.8	14.8	17.0	20.2	24.6	36.4	92.2	83.1	26.3	31.2	92.2
8-Jun	22.4	19.4	17.1	18.3	23.7	19.5	13.8	30.3	35.8	30.9	24.1	8.8	7.3	9.8	8.6	6.3	8.5	4.8	7.9	4.4	10.5	13.1	12.2	13.1	15.4	35.8
9-Jun	18.8	23.4	28.5	44.8	24.7	18.7	16.7	14.2	10.3	11.0	9.8	10.8	6.4	6.2	4.8	2.5	2.7	3.6	3.7	4.5	6.0	7.3	8.9	7.7	12.3	44.8
10-Jun	6.1	8.6	10.0	9.1	8.8	7.3	2.3	2.1	1.6	2.1	3.6	5.9	8.0	8.5	9.4	8.5	10.6	12.0	11.6	23.1	37.0	41.5	41.9	30.6	12.9	41.9
11-Jun	20.9	16.5	15.0	11.2	10.5	8.7	5.2	7.4	6.4	5.4	5.2	6.0	9.8	12.4	7.9	9.3	10.0	8.3	8.5	7.9	10.0	11.0	8.4	3.8	9.4	20.9
12-Jun	2.5	6.1	8.6	12.7	8.9	2.2	1.5	3.5	6.1	8.3	6.5	7.1	5.3	5.5	5.9	10.3	16.9	10.8	5.1	8.4	8.6	7.9	6.5	6.7	7.2	16.9
13-Jun	6.2	3.6	4.3	5.7	6.3	4.0	2.3	2.6	2.3	5.2	8.4	11.7	11.6	14.5	15.3	12.8	11.1	11.7	8.5	6.2	8.9	9.3	17.5	19.6	8.7	19.6
14-Jun	12.1	9.8	6.9	9.4	9.2	5.8	4.6	4.0	4.0	4.2	4.0	4.2	5.7	4.6	7.0	5.3	5.6	5.7	6.9	5.6	6.1	12.0	7.9	6.0	6.5	12.1
15-Jun	6.8	6.9	6.5	5.9	4.2	4.3	2.7	1.9	3.9	5.9	7.5	7.2	5.5	2.8	3.5	4.6	5.0	5.7	6.9	7.9	12.1	13.3	10.9	6.9	6.2	13.3
16-Jun	2.2	1.7	3.8	6.5	4.2	1.6	2.9	4.1	4.7	5.2	5.9	5.4	5.7	4.1	4.0	4.6	5.0	4.2	7.0	6.7	7.1	8.8	7.0	7.0	5.0	8.8
17-Jun	8.1	10.0	11.2	10.7	12.7	10.5	9.1	M	7.1	5.8	3.3	3.5	3.0	1.9	4.2	3.4	16.4	2.7	19.2	17.1	10.3	13.2	15.7	21.7	9.6	21.7
18-Jun	20.8	13.8	9.6	9.7	10.1	4.9	4.4	7.7	15.8	14.2	12.5	8.5	7.8	4.9	5.5	7.2	7.5	7.8	12.8	27.5	50.2	13.7	15.6	4.2	12.4	50.2
19-Jun	5.3	14.3	27.7	81.8	58.2	33.9	16.7	2.7	1.4	0.5	0.5	1.0	1.2	0.3	0.5	1.1	14.3	1.5	3.8	5.4	3.9	8.4	12.6	11.1	12.8	81.8
20-Jun	15.0	21.3	16.0	17.2	29.6	19.7	16.4	17.2	19.7	24.5	21.8	19.5	24.7	19.2	16.2	10.5	22.9	7.3	8.4	16.0	26.6	11.5	8.0	9.9	17.5	29.6
21-Jun	27.1	12.1	7.8	8.4	8.4	17.8	45.2	47.0	60.4	73.6	69.6	43.5	34.8	18.2	8.1	5.7	6.9	14.1	17.1	36.9	22.5	35.2	56.2	44.0	30.0	73.6
22-Jun	42.7	43.9	37.0	25.4	18.5	15.0	7.8	6.9	10.2	14.5	M	M	8.4	3.3	2.8	3.7	5.5	7.0	5.3	10.7	11.4	13.2	16.0	17.9	14.9	43.9
23-Jun	13.9	13.3	14.1	15.5	14.7	7.3	3.7	5.7	10.5	11.6	6.7	4.9	4.6	5.4	3.2	2.9	4.0	7.6	9.5	11.3	12.1	7.9	10.9	9.8	8.8	15.5
24-Jun	10.4	11.6	10.5	6.4	7.6	4.9	2.6	3.9	9.8	21.1	15.1	6.8	6.2	5.8	5.2	4.6	6.4	7.4	10.2	17.7	27.2	61.7	48.6	42.3	14.7	61.7
25-Jun	39.3	45.2	49.8	47.6	39.2	41.2	49.5	77.2	54.2	39.0	32.2	28.2	24.7	27.9	46.8	20.5	35.4	18.6	9.5	8.9	11.5	18.3	20.2	21.5	33.6	77.2
26-Jun	20.8	22.2	21.3	17.5	19.6	19.7	13.2	10.4	11.3	9.0	4.3	4.8	4.3	4.3	4.3	6.1	7.7	5.2	1.9	3.2	12.6	17.5	18.2	14.4	11.4	22.2
27-Jun	7.9	7.4	6.6	6.7	5.9	2.9	2.8	6.0	8.0	4.9	5.1	6.5	5.2	4.1	2.3	2.7	2.8	2.7	5.3	4.2	41.7	26.8	18.9	27.6	9.0	41.7
28-Jun	7.7	5.9	6.4	8.5	12.4	12.5	9.6	14.4	49.7	55.5	107.1	41.9	44.1	54.1	83.4	133.9	146.8	155.8	95.2	73.7	68.4	59.2	43.7	74.7	56.8	155.8
29-Jun	85.2	64.3	52.1	60.9	87.3	82.8	67.3	59.4	65.2	72.6	51.5	35.2	40.5	48.3	44.3	34.8	57.6	109.5	148.4	192.7	190.7	170.6	157.8	156.3	89.0	192.7
30-Jun	161.5	162.4	166.9	157.1	149.6	142.0	136.2	120.7	122.1	142.1	156.6	162.8	167.3	156.9	152.7	167.1	174.4	172.1	160.3	155.7	155.8	157.6	158.8	96.0	152.3	174.4
	21.7	21.0	20.5	23.0	22.0	19.0	16.6	18.0	19.8	21.2	21.7	18.5	19.3	17.8	18.8	19.1	22.5	23.2	21.9	24.7	28.8	30.7	29.3	25.0		Diurnal Average
	161.5	162.4	166.9	157.1	149.6	142.0	136.2	120.7	122.1	142.1	156.6	162.8	167.3	156.9	152.7	167.1	174.4	172.1	160.3	192.7	190.7	170.6	158.8	156.3		Diurnal Maximum

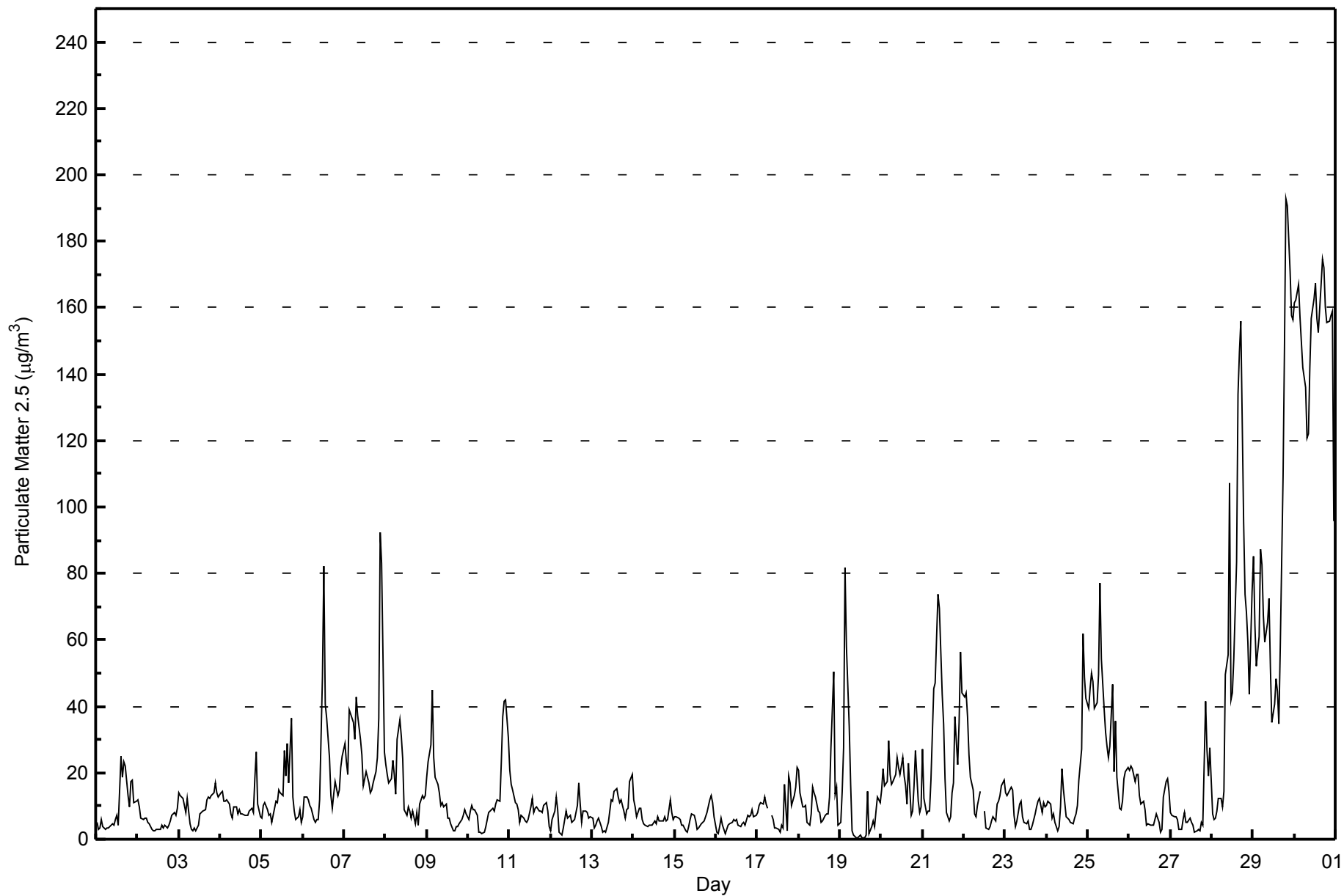
M - Maintenance

Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m³



WBEA
Hourly Averages

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Shell Muskeg River - June 2015





WBEA
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Shell Muskeg River - June 2015

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	155	21.62	21.62
6 - 15	328	45.75	67.36
16 - 25	91	12.69	80.06
26 - 80	95	13.25	93.31
> 81.0	44	6.14	99.44

Total Number of Valid Hours: 717

Total Number of Hours: 720



WBEA
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Shell Muskeg River - June 2015

Concentration Ranges (μg/m ³)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	10	22	11	4	3	0	8	7	10	14	12	26	5	9	9	5	155
6 - 15	25	28	23	9	9	4	7	20	71	54	21	10	10	6	18	13	328
16 - 25	3	7	2	1	1	0	1	10	19	15	2	5	8	4	10	3	91
26 - 80	2	6	10	4	0	3	2	1	6	12	8	8	5	16	7	5	95
> 81.0	1	1	7	3	2	1	2	1	7	3	2	3	0	1	4	4	42
Totals	41	64	53	21	15	8	20	39	113	98	45	52	28	36	48	30	711

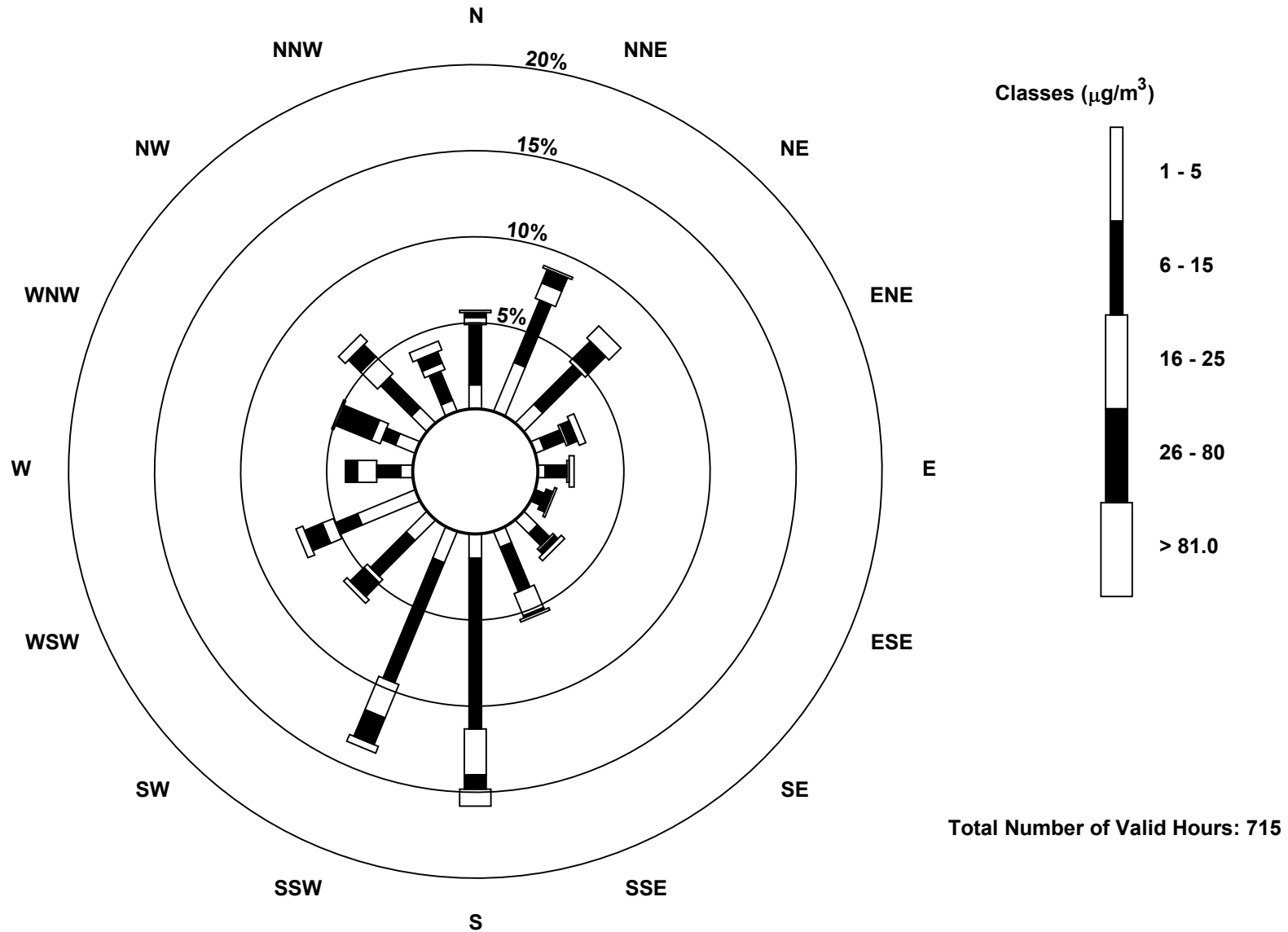
Total Number of Valid Hours: 715

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Shell Muskeg River (AMS 16)



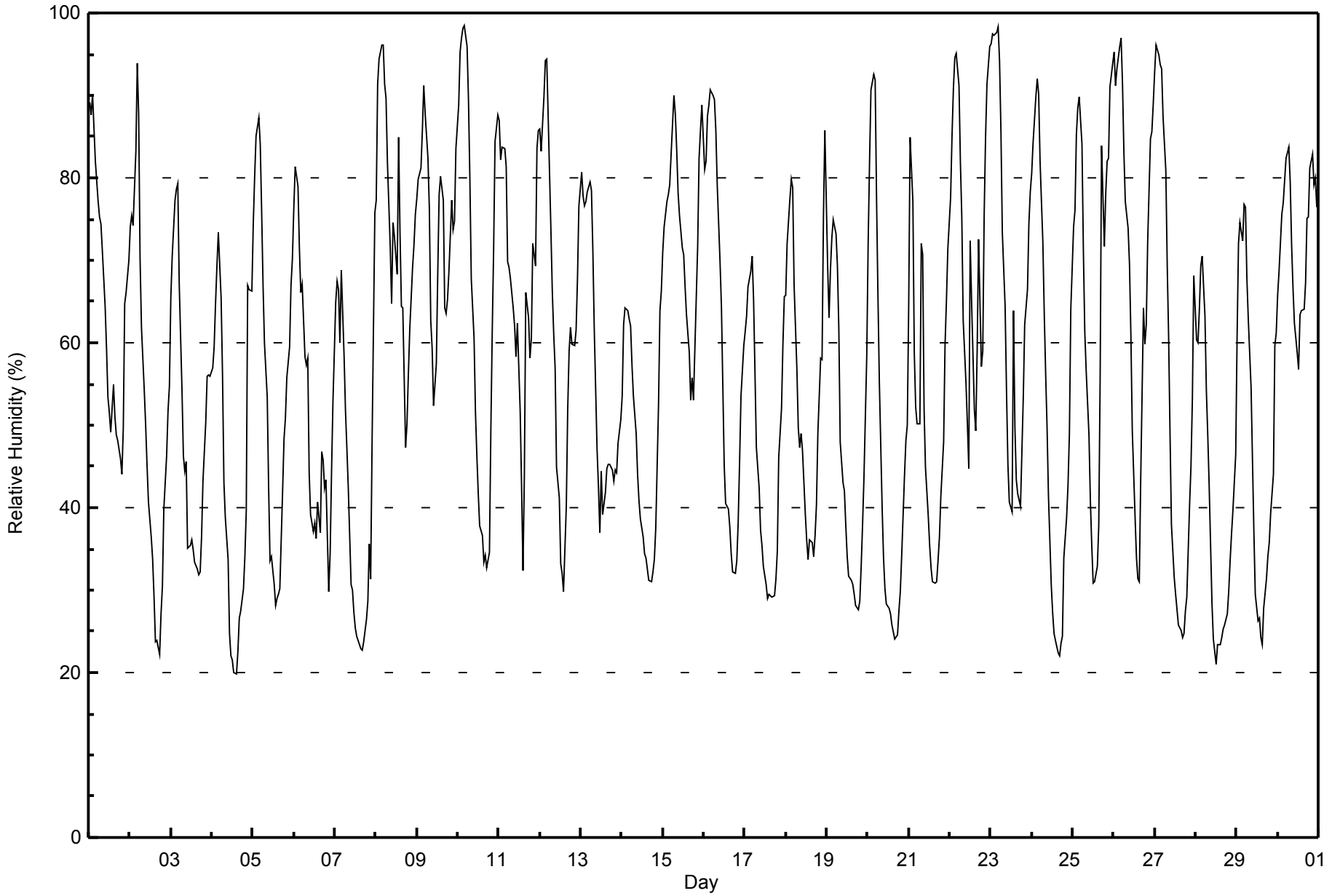


Maximum Value: 98 % on Jun 10 05:00														Maximum Daily Average: 74.6 % on Jun 8														Hours in Service: 720	
Minimum Value: 20 % on Jun 4 15:00														Minimum Daily Average: 40.2 % on Jun 28														Hours of Data: 720	
Maximum Diurnal Average: 82.6 % at hour 5														Minimum Diurnal Average: 37.5 % at hour 16														Hours of Missing Data: 0	
Monthly Average: 57.6 %														Percentiles: P ₁ = 22 P ₁₀ = 29 Q ₁ = 39 Median = 59 Q ₃ = 75 P ₉₀ = 86 P ₉₉ = 97														Hours of Calibration: 0	
																												Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Jun	89	88	90	86	82	77	75	74	71	64	59	53	51	49	55	51	49	48	46	44	50	65	66	70	64.8	90			
2-Jun	74	75	74	83	94	88	70	62	54	50	45	41	37	34	29	24	24	22	27	30	40	46	52	55	51.2	94			
3-Jun	65	71	77	79	79	67	54	46	44	46	35	35	36	35	33	32	32	36	43	50	56	56	56	49.9	79				
4-Jun	57	59	65	69	73	65	56	43	39	34	25	22	22	20	20	23	27	30	34	40	67	66	66	43.7	73				
5-Jun	74	80	85	87	84	76	67	60	53	42	34	34	31	28	29	29	30	42	48	51	56	60	67	70	54.9	87			
6-Jun	76	81	79	72	66	67	58	57	58	44	39	37	38	36	41	37	47	46	42	43	30	34	44	53	51.1	81			
7-Jun	65	67	66	60	69	58	52	47	42	31	30	27	25	24	23	23	23	24	26	29	36	31	48	76	41.8	76			
8-Jun	77	91	94	96	96	91	90	82	72	65	75	73	68	85	73	64	64	47	50	56	62	69	72	76	74.6	96			
9-Jun	78	80	81	86	91	88	82	76	63	59	52	57	68	78	80	77	64	64	65	69	77	74	75	84	73.7	91			
10-Jun	89	95	97	98	98	96	90	80	68	61	52	46	42	38	37	33	34	33	35	49	61	71	84	88	65.6	98			
11-Jun	87	82	84	84	81	70	69	68	64	62	58	62	52	43	32	44	66	63	58	60	72	69	84	86	66.7	87			
12-Jun	86	83	90	94	94	88	74	66	61	57	45	41	33	32	30	40	52	59	62	60	60	61	68	77	63.0	94			
13-Jun	81	78	77	77	78	79	79	71	62	47	42	37	44	39	42	45	45	45	44	43	45	44	48	51	56.0	81			
14-Jun	54	62	64	64	63	62	57	53	49	44	41	39	36	34	34	33	31	31	32	34	38	53	64	66	47.4	66			
15-Jun	71	74	77	78	79	83	90	88	83	78	75	72	71	67	63	59	53	56	53	59	72	82	86	89	73.2	90			
16-Jun	81	82	87	89	91	90	89	86	79	70	64	55	45	41	40	38	34	32	32	34	38	46	54	60	60.7	91			
17-Jun	61	63	67	69	71	65	57	47	42	37	35	33	31	29	30	29	29	29	31	35	46	52	60	66	46.4	71			
18-Jun	66	72	77	80	79	67	57	50	47	49	47	39	36	34	36	36	34	37	40	49	58	58	75	86	54.5	86			
19-Jun	69	63	69	73	75	73	69	62	48	43	42	38	34	32	31	31	29	28	28	29	33	38	44	58	47.4	75			
20-Jun	72	82	91	93	92	77	66	55	40	34	30	28	28	27	26	25	24	25	27	30	34	44	48	50	47.8	93			
21-Jun	64	85	77	59	52	50	50	72	71	52	45	39	35	33	31	31	31	34	36	41	48	60	65	71	51.4	85			
22-Jun	78	85	91	95	95	91	82	75	63	55	50	45	72	65	52	49	59	73	57	59	75	85	91	96	72.4	96			
23-Jun	96	97	97	98	98	94	86	73	64	54	45	41	40	64	50	43	42	40	47	53	62	67	74	78	66.9	98			
24-Jun	81	84	90	92	90	82	72	64	56	50	42	31	27	25	24	22	22	24	24	34	39	43	49	64	51.3	92			
25-Jun	74	76	85	88	90	84	71	61	57	49	41	35	31	31	33	38	56	84	72	78	82	82	91	94	66.0	94			
26-Jun	95	91	93	96	97	91	83	77	74	70	61	49	39	34	31	31	43	64	60	62	72	85	86	89	69.7	97			
27-Jun	93	96	95	94	93	88	81	69	61	49	38	32	29	28	26	25	24	25	27	29	40	45	53	68	54.5	96			
28-Jun	60	60	64	69	71	63	54	49	43	28	24	23	21	23	23	24	25	26	27	30	34	37	40	46	40.2	71			
29-Jun	61	72	75	72	77	76	68	63	55	46	37	29	26	27	24	23	28	31	34	36	39	44	60	61	48.5	77			
30-Jun	66	69	76	77	80	82	84	80	72	67	62	59	57	63	64	64	67	75	75	81	83	79	80	76	72.4	84			
																												Diurnal Average	
																												Diurnal Maximum	



WBEA
Hourly Averages

Relative Humidity (RH) - %
Shell Muskeg River - June 2015





WBEA
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Shell Muskeg River - June 2015

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	1	0.14	0.14
20 - 40	191	26.53	26.67
40 - 60	186	25.83	52.50
60 - 80	217	30.14	82.64
80 - 100	125	17.36	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

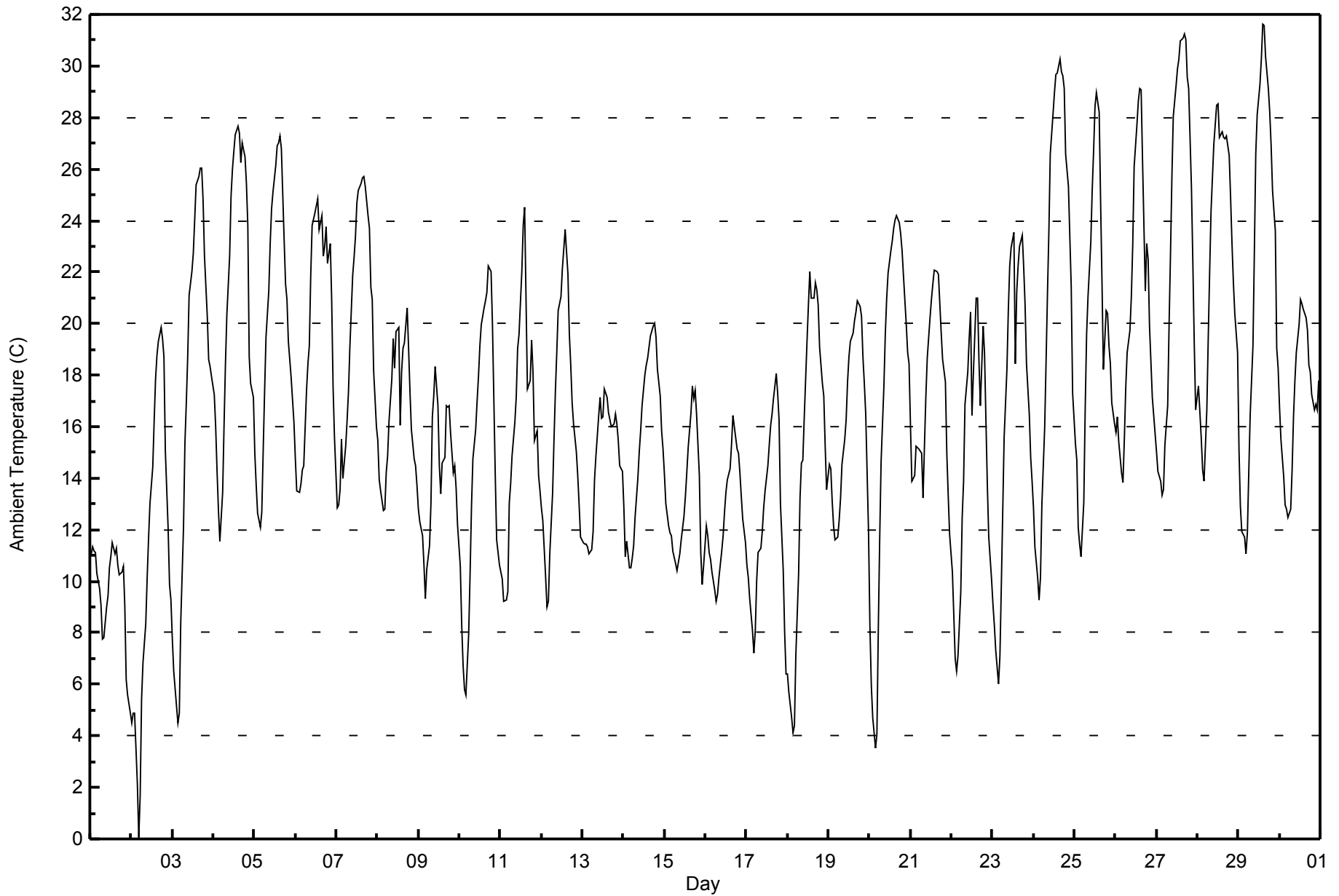
Shell Muskeg River - June 2015

Maximum Value: 31.6 C on Jun 29 15:00		Maximum Daily Average: 23.1 C on Jun 27		Hours in Service: 720																																													
Minimum Value: 0.1 C on Jun 2 05:00		Minimum Daily Average: 9.6 C on Jun 1		Hours of Data: 720																																													
Maximum Diurnal Average: 22.2 C at hour 15		Minimum Diurnal Average: 10.0 C at hour 5		Hours of Missing Data: 0																																													
Monthly Average: 16.92 C		Percentiles: P ₁ = 4.5 P ₁₀ = 10.0 Q ₁ = 12.8 Median = 16.5 Q ₃ = 20.9 P ₉₀ = 25.4 P ₉₉ = 29.9		Hours of Calibration: 0																																													
				Percent Operational Time: 100.0																																													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jun	11.0	11.4	11.2	11.1	10.3	9.7	9.0	7.8	7.8	9.0	9.4	10.5	10.9	11.5	11.0	11.3	10.6	10.3	10.3	10.6	9.0	6.2	5.6	4.9	9.6	11.5																							
2-Jun	4.5	4.9	4.9	2.1	0.1	1.7	5.4	6.8	8.3	10.2	11.6	13.0	14.4	16.2	17.8	18.7	19.3	19.8	19.4	18.7	15.1	12.1	9.9	9.3	11.0	19.8																							
3-Jun	7.7	6.5	5.1	4.5	4.9	8.4	12.1	15.4	16.9	18.7	21.1	22.0	22.7	24.0	25.4	25.7	26.0	26.0	24.8	22.6	20.3	18.6	18.3	18.0	17.3	26.0																							
4-Jun	17.3	16.0	14.3	12.7	11.6	13.4	16.0	18.5	20.4	22.6	25.0	26.0	26.7	27.3	27.7	27.4	26.3	27.0	26.5	25.5	23.8	18.7	17.7	17.1	21.1	27.7																							
5-Jun	15.0	13.7	12.7	12.1	12.7	15.1	17.4	19.5	21.3	23.1	24.4	25.1	26.2	26.9	27.0	27.3	26.8	23.2	21.5	20.9	19.3	17.9	17.0	16.2	20.1	27.3																							
6-Jun	14.7	13.5	13.5	13.8	14.3	14.5	17.4	18.5	19.1	21.9	23.8	24.3	24.6	24.8	23.6	24.2	22.6	23.0	23.7	22.4	23.1	20.9	17.5	15.6	19.8	24.8																							
7-Jun	12.9	13.0	13.5	15.5	14.0	15.2	16.2	17.4	19.1	21.9	22.5	23.4	24.7	25.2	25.4	25.7	25.7	25.3	24.2	23.7	21.4	20.9	18.2	16.0	20.0	25.7																							
8-Jun	15.4	13.9	13.5	12.8	12.8	14.2	14.9	16.2	17.8	19.4	18.3	19.7	19.9	16.1	18.1	19.0	19.3	20.6	19.0	17.3	15.9	14.8	14.5	13.7	16.5	20.6																							
9-Jun	12.8	12.3	11.8	10.6	9.3	10.5	11.4	13.0	16.4	17.2	18.3	16.8	14.5	13.4	14.6	14.8	16.8	16.8	16.8	15.8	14.2	14.5	13.6	12.2	14.1	18.3																							
10-Jun	10.6	8.3	6.7	5.8	5.6	8.0	10.3	12.9	14.8	15.9	17.0	18.0	19.1	20.0	20.6	20.9	21.2	22.2	22.0	20.0	17.0	14.1	11.6	10.7	14.7	22.2																							
11-Jun	10.4	10.1	9.2	9.3	9.6	13.0	13.8	14.9	16.2	17.2	19.0	19.6	22.0	23.8	24.5	21.0	17.5	17.8	19.3	18.1	15.4	15.9	14.1	13.5	16.0	24.5																							
12-Jun	12.8	12.4	10.2	9.0	9.2	11.1	13.4	15.5	17.4	18.9	20.5	21.0	22.1	22.9	23.7	21.9	19.6	18.4	16.9	16.1	15.0	14.1	13.0	11.7	16.1	23.7																							
13-Jun	11.5	11.4	11.4	11.3	11.1	11.2	11.9	13.9	14.9	16.4	17.1	16.3	16.4	17.5	17.1	16.5	16.3	16.0	16.1	16.5	16.1	15.5	14.5	14.3	14.6	17.5																							
14-Jun	12.9	11.0	11.6	10.5	10.5	10.9	11.4	12.5	14.0	15.0	15.8	16.8	18.0	18.4	18.7	19.1	19.5	19.9	20.0	19.5	18.2	17.2	15.8	15.1	15.5	20.0																							
15-Jun	14.1	13.0	12.2	11.9	11.8	11.2	10.7	10.4	10.7	11.1	11.6	12.5	13.3	14.2	15.2	16.5	17.6	17.1	17.4	16.5	14.1	11.1	9.9	10.6	13.1	17.6																							
16-Jun	12.2	11.8	11.1	10.8	10.4	9.6	9.2	9.5	10.1	11.2	11.8	12.7	13.5	13.9	14.4	15.3	16.4	16.0	15.2	15.0	14.2	13.3	12.4	11.5	12.6	16.4																							
17-Jun	10.6	10.1	9.4	8.1	7.2	8.1	10.0	11.1	11.3	11.9	12.9	13.5	14.5	15.3	16.1	16.5	17.1	18.0	17.3	16.3	13.0	10.4	8.0	6.4	12.2	18.0																							
18-Jun	6.4	5.7	4.7	4.1	4.4	7.1	10.3	13.2	14.6	14.7	16.3	19.3	20.7	22.0	21.0	21.0	21.6	21.3	20.7	19.1	17.7	17.2	15.3	13.6	14.7	22.0																							
19-Jun	14.5	14.4	13.1	12.1	11.6	11.7	12.3	13.3	14.5	15.5	16.3	17.7	18.7	19.3	19.6	20.1	20.5	20.9	20.6	20.3	18.7	17.7	16.5	11.9	16.3	20.9																							
20-Jun	8.3	5.9	4.7	3.5	4.1	8.1	11.7	14.6	17.6	19.6	21.0	22.0	22.8	23.2	23.7	24.0	24.2	23.9	23.5	22.9	21.9	20.0	18.9	18.4	17.0	24.2																							
21-Jun	16.0	13.9	14.1	15.2	15.2	15.2	14.9	13.2	15.2	17.2	18.7	20.2	20.9	21.5	22.1	22.0	21.9	20.8	19.6	18.6	17.7	14.9	13.3	11.8	17.3	22.1																							
22-Jun	10.3	8.7	7.0	6.5	7.1	9.6	12.5	13.9	16.9	18.1	19.4	20.5	16.4	18.0	21.0	21.0	18.5	16.8	19.9	18.8	16.2	13.7	11.7	10.1	14.7	21.0																							
23-Jun	9.1	8.3	7.3	6.0	7.1	9.8	12.7	15.5	18.2	20.5	22.3	23.0	23.6	18.4	21.2	22.2	23.0	23.4	22.2	20.7	18.4	16.5	14.8	13.9	16.6	23.6																							
24-Jun	12.9	11.3	10.2	9.3	10.2	12.9	16.0	18.5	21.1	23.5	26.6	28.1	29.0	29.7	29.7	30.2	29.8	29.6	29.1	26.6	25.3	23.4	21.4	17.3	21.7	30.2																							
25-Jun	15.3	14.7	12.1	11.4	11.0	13.1	16.7	19.6	21.0	23.2	25.1	26.7	28.4	28.9	28.2	24.8	21.6	18.2	20.5	20.4	19.2	18.5	16.9	16.1	19.7	28.9																							
26-Jun	15.8	16.4	15.4	14.2	13.9	15.5	17.5	18.9	19.7	21.0	23.1	26.1	27.7	28.6	29.1	29.1	26.4	21.2	23.1	22.5	19.9	17.1	16.4	15.7	20.6	29.1																							
27-Jun	15.0	14.3	13.9	13.3	13.6	15.3	16.8	19.9	22.7	25.6	28.0	29.2	29.9	30.3	30.9	31.1	31.2	31.0	29.5	29.1	25.3	22.4	19.3	16.7	23.1	31.2																							
28-Jun	17.6	16.6	15.6	14.3	13.9	16.7	19.4	21.9	24.3	27.0	27.7	28.5	28.5	27.3	27.4	27.2	27.2	27.3	26.5	24.9	23.1	21.6	20.4	18.9	22.7	28.5																							
29-Jun	15.1	12.9	11.9	11.7	11.1	11.9	14.2	16.4	19.1	22.8	26.6	28.1	29.3	30.3	31.6	31.6	30.4	29.1	28.2	26.9	25.2	23.6	19.1	18.3	21.9	31.6																							
30-Jun	16.8	15.5	14.1	13.0	12.8	12.5	12.8	14.3	16.4	17.8	18.9	19.9	20.9	20.8	20.5	20.2	19.7	18.4	18.1	17.3	16.6	16.9	16.7	17.8	17.0	20.9																							
																								12.7	11.7	10.9	10.2	10.0	11.5	13.3	14.9	16.6	18.3	19.7	20.7	21.3	21.7	22.2	22.2	21.8	21.3	21.1	20.1	18.3	16.6	15.1	13.9	Diurnal Average	
																								17.6	16.6	15.6	15.5	15.2	16.7	19.4	21.9	24.3	27.0	28.0	29.2	29.9	30.3	31.6	31.6	31.2	31.0	29.5	29.1	25.3	23.6	21.4	18.9	Diurnal Maximum	



WBEA
Hourly Averages

Ambient Temperature (AT) - C
Shell Muskeg River - June 2015





WBEA
Cumulative Frequency Distribution

Ambient Temperature (AT) - C
Shell Muskeg River - June 2015

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	72	10.00	10.00
10 - 20	443	61.53	71.53
> 20	205	28.47	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

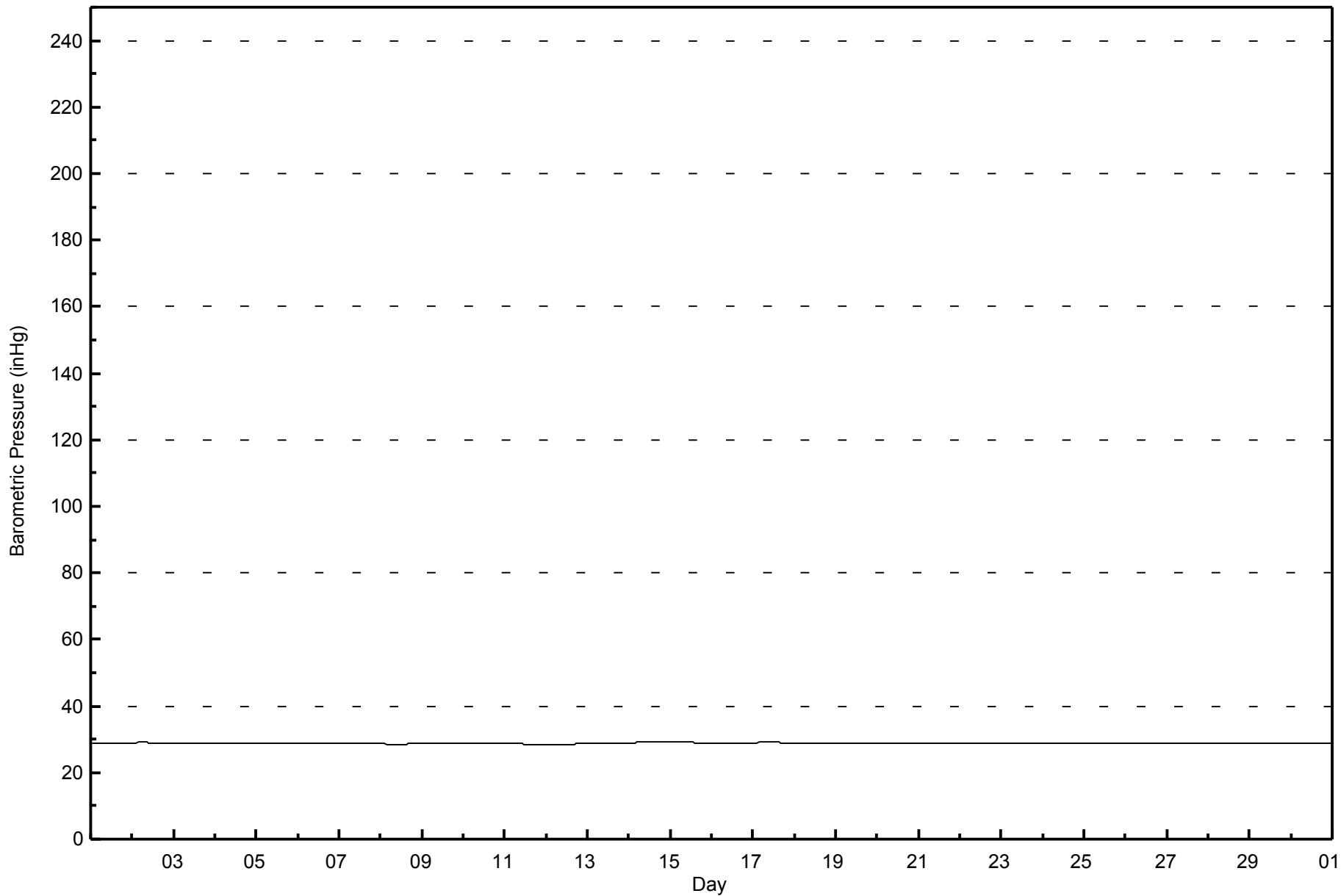


Maximum Value: 29.1 inHg on Jun 15 04:00		Maximum Daily Average: 29.1 inHg on Jun 14		Hours in Service: 720																						
Minimum Value: 28.5 inHg on Jun 11 15:00		Minimum Daily Average: 28.6 inHg on Jun 12		Hours of Data: 720																						
Maximum Diurnal Average: 28.8 inHg at hour 8		Minimum Diurnal Average: 28.8 inHg at hour 18		Hours of Missing Data: 0																						
Monthly Average: 28.82 inHg		Percentiles: P ₁ = 28.5 P ₁₀ = 28.6 Q ₁ = 28.8 Median = 28.8 Q ₃ = 28.9 P ₉₀ = 29.0 P ₉₉ = 29.1		Hours of Calibration: 0																						
				Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	28.6	28.6	28.6	28.7	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.0	29.0	28.8	29.0
2-Jun	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	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9
3-Jun	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	28.9
4-Jun	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0
5-Jun	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	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.6	28.6	28.6	28.8	28.9
6-Jun	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.7	28.7	28.7	28.7	28.6	28.7	28.7
7-Jun	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.6	28.6	28.6	28.6	28.6	28.6	28.7	28.7
8-Jun	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.5	28.5	28.6	28.6	28.6	28.6	28.6	28.7	28.7	28.7	28.7	28.7	28.6	28.7
9-Jun	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.8	28.9	28.9
10-Jun	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.7	28.7	28.8	28.9
11-Jun	28.7	28.7	28.7	28.7	28.7	28.7	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.5	28.5	28.5	28.6	28.6	28.5	28.5	28.6	28.6	28.6	28.6	28.6	28.7
12-Jun	28.5	28.6	28.5	28.5	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.5	28.5	28.5	28.6	28.6	28.6	28.6	28.7	28.7	28.7	28.8	28.8	28.8
13-Jun	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0	28.8	29.0
14-Jun	29.0	29.0	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1
15-Jun	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
16-Jun	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.0	28.9	29.0
17-Jun	29.0	29.0	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.1
18-Jun	29.0	29.0	29.0	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.8	28.8	28.8	28.9	29.0
19-Jun	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9
20-Jun	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.8	28.8	28.8	28.8
21-Jun	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.8	28.8	28.8	28.8
22-Jun	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.8
23-Jun	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9
24-Jun	28.8	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	28.8	28.8	28.8	28.8	28.8
25-Jun	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.9
26-Jun	28.8	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	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8
27-Jun	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.8	28.8	28.8	28.9
28-Jun	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9
29-Jun	28.9	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9
30-Jun	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8
																								Diurnal Average		
																								Diurnal Maximum		



WBEA
Hourly Averages

Barometric Pressure (BP) - inHg
Shell Muskeg River - June 2015





Maximum Speed: 32 km/h on Jun 13 16:00	Maximum Daily Speed Average: 21.6 km/h on Jun 13	Hours in Service: 720
Minimum Speed Value: 0 km/h on Jun 25 04:00	Minimum Daily Speed Average: 0.9 km/h on Jun 10	Hours of Data: 718
Maximum Diurnal Speed Average: 4.5 km/h at hour 13	Minimum Diurnal Speed Average: 0.0 km/h at hour 3	Hours of Missing Data: 2
Monthly Average Velocity: 1.4 km/h 303.1 deg	Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 6 Median = 9 Q ₃ = 13 P ₉₀ = 18 P ₉₉ = 28	Percent Operational Time: 99.7

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	W8	W11	WNW7	NNW10	NW11	NW14	NW18	WNW20	NW20	NW21	WNW20	NW20	NW22	NW24	NNW18	NW19	NW19	NW17	NW13	NW14	NW9	WNW10	WNW11	NW8	NW14.6	NW24
2-Jun	N6	NNE9	N10	SE1	SSE2	S3	ENE4	SSW4	SW5	SSE3	WNW4	ENE3	E3	SW2	SW8	SSW9	SSW10	S8	SE7	SE8	SE6	SE6	SSE7	S7	SSE2.3	SSW10
3-Jun	SSE6	S5	SE4	SSE4	SSE4	SSW3	SSE5	S6	S5	SSE9	SSE13	SSE13	SSW13	S10	S12	S12	S13	S13	S14	S12	S11	SSE10	SSE11	S10	S8.9	S14
4-Jun	S9	S10	S9	S9	S9	S7	S6	SSW9	SSW9	SSW12	SSW15	S16	S14	S11	S13	S16	S14	SSW13	SSW10	S7	S14	SSW16	S10	S10	S11.1	SSW16
5-Jun	S10	S9	S9	S8	SSW6	S9	S12	S12	S15	SSW17	SSW20	SSW16	SSW17	SSW17	SSW17	SSW15	SSW14	SSW14	S14	S9	SSW12	S13	SSW11	SSW13.0	SW26	
6-Jun	S7	S7	S8	S10	SSW11	SW9	SW10	SW9	WSW9	WSW6	W3	NE9	NE15	NE13	WNW7	N8	SSW7	S6	SSW6	W6	NW15	NW10	NW8	NW7	WSW2.6	NW15
7-Jun	SSW3	SSW4	W5	WNW10	WSW6	W11	W14	WNW9	W10	WNW15	WNW13	W19	W26	W29	W26	WNW21	WNW18	W19	W13	WNW10	N2	E7	WSW12	WSW2	W11.6	W29
8-Jun	S6	S5	SSW3	SSE3	SSE4	S5	SW10	WSW7	SW7	WNW1	S3	SSE6	NE6	ENE13	SE9	S5	SSE2	NW22	NNW19	NW16	NW17	NW13	NW14	NW12	WNW3.1	NW22
9-Jun	NW10	NW10	WNW10	NW8	WSW5	WSW8	SSW6	SW7	WSW12	WSW9	W1	ENE18	NE17	ENE11	SSE4	SSW5	WSW13	WSW13	W7	WNW8	NW7	NNE15	N13	N9	NW3.4	ENE18
10-Jun	NW5	W4	S3	S5	SSE4	SSE4	SSW4	SW4	E1	NNE7	NW4	NW3	W6	SSW2	ESE1	NE8	NE6	E5	SSE3	SSW5	ESE5	SE5	SE4	SSE3	SE0.9	NE8
11-Jun	SSE4	SSE4	S6	S6	S6	SSW6	NNW1	SW10	SSE9	SE11	SE11	SE3	S4	SSW6	SW6	W19	W11	SW6	SSE7	SSE7	SW2	SW4	SSE9	SE8	S4.9	W19
12-Jun	SE2	W10	NW3	SSE4	SSW8	SSE4	SSW4	SE3	SSW2	NW4	S2	SW5	W6	WSW7	N3	E15	E17	ESE13	E10	E14	E9	E12	ENE14	ENE12	ESE3.5	E17
13-Jun	NE17	NE13	NE14	NNE12	NNW9	NNW9	N13	NNE19	NNE23	NNE32	NNE28	NNE29	NE30	NNE29	NNE28	NE32	NNE28	NE28	NNE27	NNE23	NE24	NNE26	NNE18	NE19	NNE21.6	NE32
14-Jun	NE19	ENE10	NE13	N7	N14	NNE18	NE21	NE18	NNE19	NNE20	NNE19	NE21	NNE20	NNE19	NNE19	NNE18	NNE15	N14	NNE13	NNE13	NE11	NNE16	N17	NNE16	NNE15.6	NNE21
15-Jun	NNE18	NNE17	NNE17	N13	NNE13	N9	NNE10	NNE15	N11	NE11	NNW4	WNW3	SW7	SW6	SW7	SW13	WSW9	E5	ENE6	E5	ESE5	SSE5	SSW7	SSW6	NNE3.8	NNE18
16-Jun	NNW9	NNE17	NE17	NNE16	N14	NNE16	N14	N12	N13	N13	N14	N13	N15	N11	NNE12	NNE12	NNW13	NNE12	NNW10	N12	N11	N11	N16	N15	N12.9	NE17
17-Jun	N12	NNW11	NNW10	NNW10	NNW10	NNW13	N13	N13	NNE14	N10	NNE9	NE5	WNW7	WNW7	WSW7	WSW6	SSE4	SSW8	SSW9	S10	SSE8	S7	S8	S9	NNW2.8	NNE14
18-Jun	S11	S10	S7	S3	S5	SSW4	S5	SSW9	SSW9	SSW10	SW9	SSW10	SSW10	SSW11	SSW10	S8	S4	SSW5	SW8	WSW5	WNW5	NW12	WNW6	WNW9	SSW6.1	NW12
19-Jun	NNW12	N16	NNE14	N16	NNE15	NNE16	NNE14	NE19	NE20	NE19	NE17	NNE13	NNE11	NNE11	NE13	ENE13	NE12	NE12	NE13	NE11	ENE10	NNE12	NE13	NE5	NNE13.0	NE20
20-Jun	SE1	SE3	SSW4	S5	SSW4	S4	S3	SW6	WSW8	W6	NW3	NNE9	N9	NNE8	NNE8	NNE7	NNE8	NE12	NE14	NE16	NE16	NE20	NE15	NE8	NE4.7	NE20
21-Jun	NE4	ENE1	N6	N11	N13	NNE11	N11	NNW7	WSW1	WNW5	WNW8	NW8	NNW10	NNW8	N9	NNW8	NNE19	NNE16	N13	NNW10	NW8	WSW8	W8	W7	N6.8	NNE19
22-Jun	WSW6	SSW3	SSW7	SSW7	SSW6	S5	S4	SSW3	ENE5	NE12	ENE6	NE9	NNW8	WSW3	WSW14	WSW20	WNW20	WNW10	W7	NE8	E6	E6	SSE1	SSW5	W2.1	WSW20
23-Jun	SSW3	SSW4	S5	S7	S6	S6	S6	SSW4	SW5	SSW6	WSW8	WSW8	WSW17	WSW12	SE8	S5	SSW5	SSW7	SSW5	SSW5	S7	S7	SSW7	SSW6	SSW5.8	WSW17
24-Jun	S6	S7	S9	S8	S6	S7	S8	S10	SSW9	SSW10	SW11	WSW17	WSW18	WSW17	WSW14	WSW12	NW14	NNW7	ENE13	NE13	NNE17	NNE11	ESE1		SW4.4	WSW19
25-Jun	WNW4	NW3	S1	SW0	S1	S2	E2	NE10	NE8	NE7	ENE4	ENE3	S1	NNE1	NW12	NNW18	SW15	SSE12	SW10	SSE2	SW11	WSW9	S7	S7	WSW1.0	NNW18
26-Jun	S8	SSW2	WSW3	S6	SSE4	S5	S7	SSW9	SSW9	SW13	SW14	WSW23	WSW26	WSW27	WSW24	W25	W24	W19	WSW16	NNE1	ESE5	S6	SSW7	SSW5	WSW9.8	WSW27
27-Jun	SW4	SSW6	SSW9	SSW5	S6	S6	SSW8	SSW8	SSW7	SW8	SSW9	WSW13	WSW15	WSW13	WSW15	WSW15	WSW12	WSW15	WSW14	SW8	SW9	WSW10	SW9	SW5	SW9.0	WSW15
28-Jun	W3	SW8	SSW7	SSW7	SSW8	SSW5	SW5	SW4	NW4	NW11	NW18	WNW24	NW22	NNW15	NNW11	NNW12	NNW7	NNW9	NW12	WNW11	WNW13	WNW12	WNW10	NNW6	WNW7.9	WNW24
29-Jun	WSW4	S4	S8	SSW8	SSW8	S7	SSW6	SSW5	S3	SW2	SW1	NE3	ENE4	ESE2	SSW8	SSW2	NE11	NE17	NE14	NE16	NE12	NE10	ENE6	NE6	E2.5	NE17
30-Jun	E4	NE5	NNE2	ENE4	ESE2	SSW2	S2	S5	S4	S4	S3	SSE0	SE1	AF	WSW3	NW5	NW4	AF	WNW4	SSW5	S7	SE4	SW7	SW7	S1.5	S7

N0.4	NW0.4	N0.0	NW0.2	WSW0.9	WSW0.7	W1.0	W1.2	NNW1.0	NW1.8	NNW1.9	NW2.6	NNW4.5	NNW3.5	W3.4	NNW3.7	NNW3.0	NNW2.6	NW1.8	NNE1.9	NNE1.3	NNE1.9	NW0.9	WNW0.4		Diurnal Average
NE19	NNE17	NE17	N16	NNE15	NNE18	NE21	WNW20	NNE23	NNE32	NNE28	NNE29	NE30	W29	NNE28	NE32	NNE28	NE28	NNE27	NNE23	NE24	NNE26	NNE18	NE19		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
Shell Muskeg River - June 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 11 km/h on Jun 4 21:00	Hours of Data: 718
Minimum Value: 1 km/h on Jun 10 22:00	Hours of Missing Data: 2
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 5 P ₉₀ = 6 P ₉₉ = 8	Hours of Calibration: 0
	Percent Operational Time: 99.7

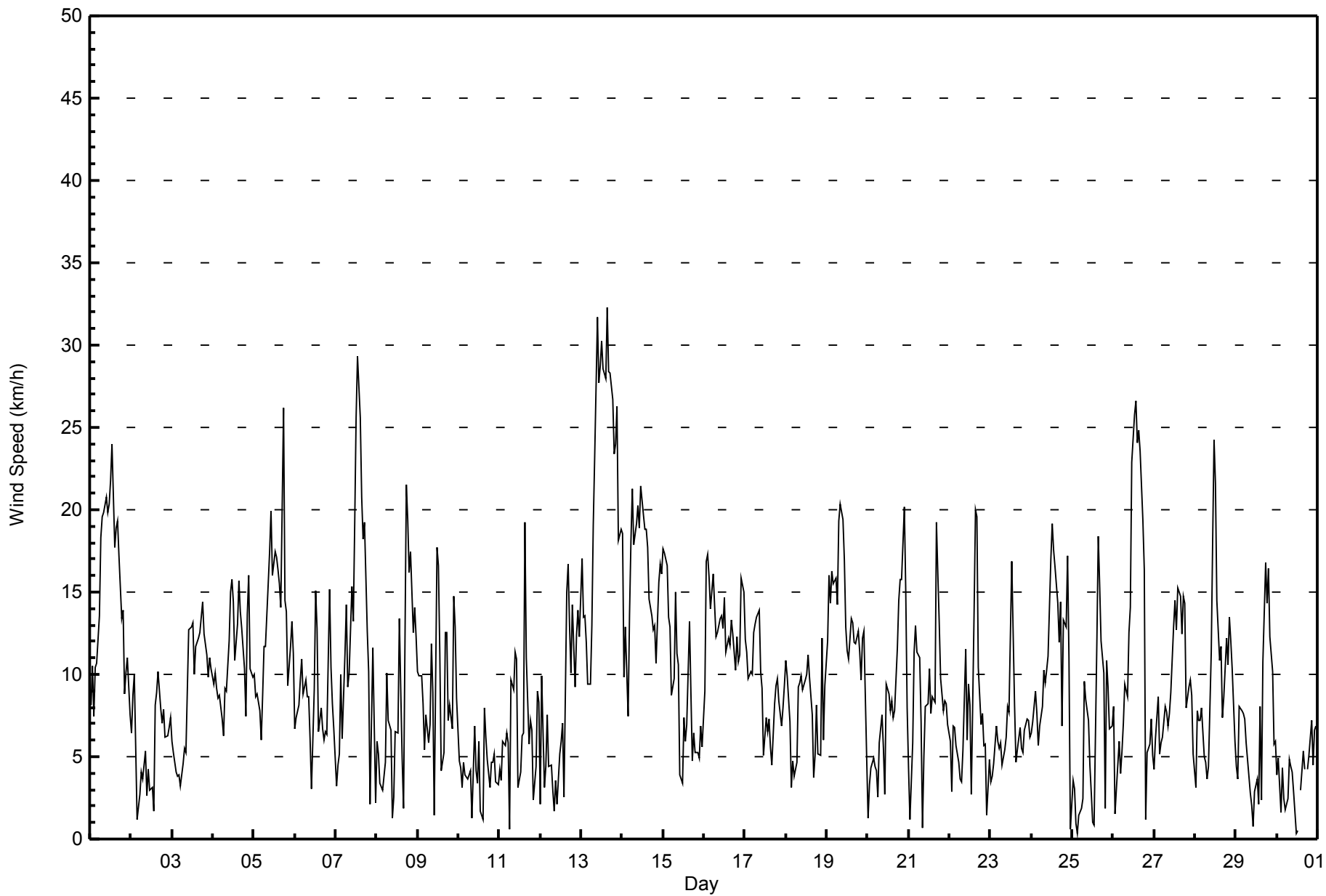
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	2	2	3	4	5	5	5	5	5	7	5	6	7	7	7	8	7	7	5	5	3	2	1	3	8
2-Jun	2	3	3	3	2	1	2	2	2	2	2	3	3	4	4	4	4	3	3	3	1	1	3	2	4
3-Jun	2	1	1	1	1	1	2	3	3	4	5	5	5	4	5	5	5	5	4	4	3	3	3	3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

AF - Analyzer Failure



WBEA
Hourly Averages

Wind Speed (WS) - km/h
Shell Muskeg River - June 2015





WBEA
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Shell Muskeg River - June 2015

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	178	24.79	24.79
6 - 11	298	41.50	66.30
12 - 19	198	27.58	93.87
20 - 28	38	5.29	99.16
29 - 38	6	0.84	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 718

Total Number of Hours: 720



WBEA
Frequency Distribution

Wind Speed (WS) - km/h
Shell Muskeg River - June 2015

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	2	3	5	9	6	7	11	24	33	32	14	8	5	7	10	2	178
6 - 11	16	13	16	6	5	0	9	12	63	51	26	17	12	19	13	20	298
12 - 19	24	36	29	7	4	1	0	3	17	14	4	22	6	5	18	8	198
20 - 28	0	10	5	0	0	0	0	0	0	1	1	5	4	5	7	0	38
29 - 38	0	3	2	0	0	0	0	0	0	0	0	0	1	0	0	0	6
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	42	65	57	22	15	8	20	39	113	98	45	52	28	36	48	30	718

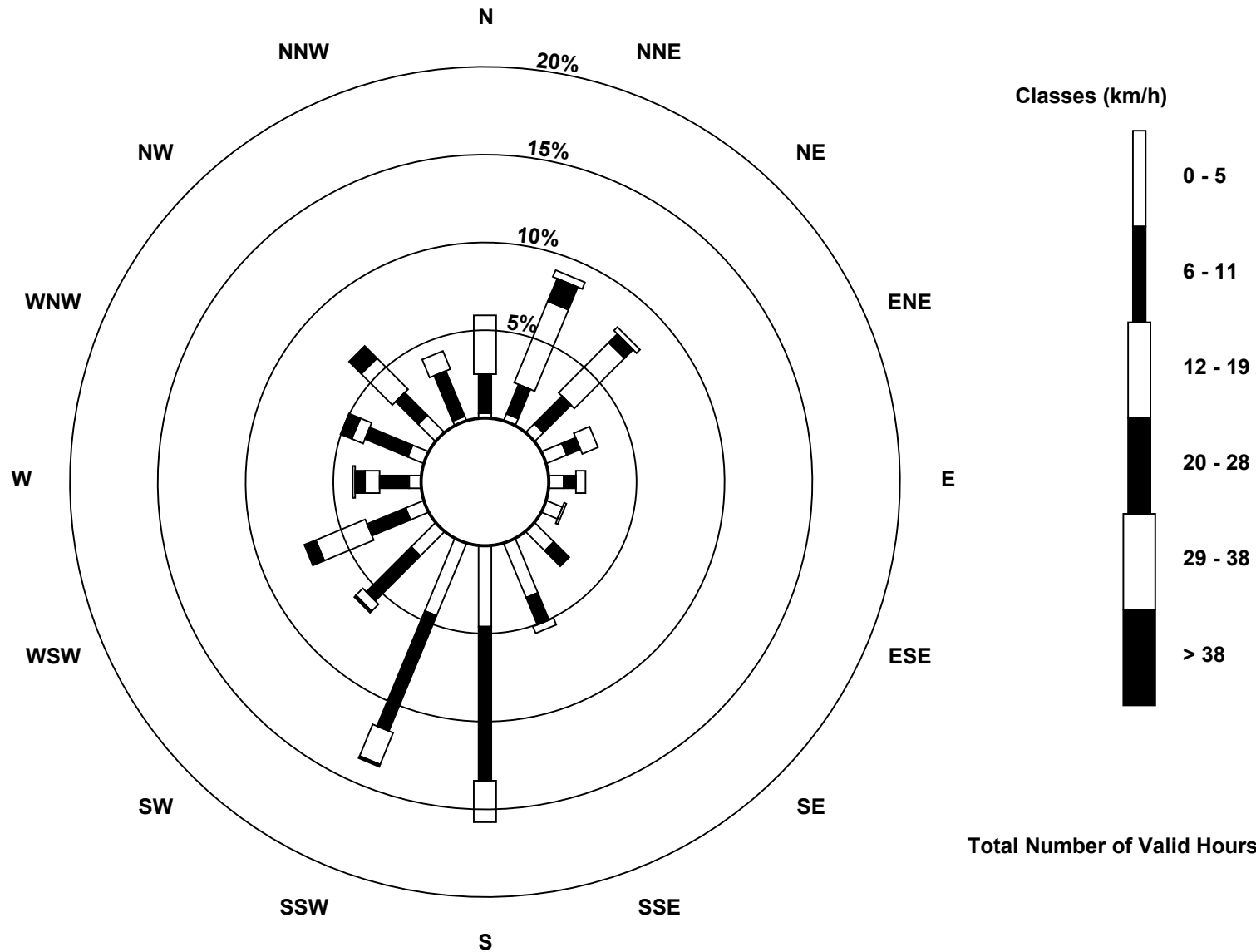
Total Number of Valid Hours: 718

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

Wind Speed (WS) - km/h
Shell Muskeg River (AMS 16)





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Shell Muskeg River - June 2015

Direction of Maximum Speed: 34 deg on Jun 13 16:00 Direction of Maximum Daily Speed Average: 27.2 deg on Jun 13	Hours in Service: 720 Hours of Data: 718 Hours of Missing Data: 2
Direction of Minimum Speed: 214 deg on Jun 25 04:00 Direction of Minimum Daily Speed Average: 0.9 deg on Jun 10	Percent Operational Time: 99.7
Monthly Average Direction: 242.4 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	272	271	295	343	323	322	305	296	308	307	297	307	308	305	328	322	318	323	324	318	316	286	287	320	309.3
2-Jun	6	12	10	140	148	173	78	203	231	152	285	67	98	222	218	207	208	176	144	134	130	142	157	173	164.0
3-Jun	159	191	140	159	151	195	150	170	175	155	152	166	193	190	178	181	171	173	172	171	169	160	167	173	170.6
4-Jun	181	183	177	184	181	183	189	192	203	200	192	182	185	176	178	185	183	203	204	183	184	196	186	179	187.3
5-Jun	181	184	183	178	194	180	183	183	187	209	209	204	208	204	205	204	203	232	206	185	184	193	189	193	198.6
6-Jun	179	171	184	187	213	217	227	232	242	246	275	47	48	53	290	9	198	169	195	281	314	305	313	307	248.4
7-Jun	196	199	265	293	251	271	274	284	276	293	282	281	279	271	277	292	288	278	277	292	352	82	237	241	277.3
8-Jun	183	188	203	147	149	183	232	252	234	291	175	153	56	73	124	187	159	323	329	319	316	317	305	313	297.9
9-Jun	317	304	298	324	244	248	210	226	245	241	281	64	49	64	152	200	252	253	260	287	320	29	9	351	306.3
10-Jun	319	268	170	189	166	168	194	233	89	32	324	325	276	196	119	49	56	99	147	195	117	125	139	159	143.0
11-Jun	158	167	187	184	187	205	327	232	149	146	137	132	178	195	225	259	281	219	153	161	223	235	157	141	189.7
12-Jun	130	280	308	164	212	167	192	141	207	311	177	235	268	256	350	95	97	105	99	84	97	84	71	67	103.8
13-Jun	46	45	40	16	346	339	353	12	21	24	21	23	34	24	32	34	29	41	33	26	36	30	19	39	27.2
14-Jun	53	62	45	11	359	29	42	38	29	24	23	34	19	22	12	25	17	1	12	26	49	12	1	13	25.0
15-Jun	29	28	25	10	20	355	20	27	9	39	331	287	229	223	216	232	255	81	74	88	103	153	202	206	18.5
16-Jun	329	18	38	26	11	15	6	8	359	356	6	4	358	357	21	12	342	14	342	358	4	1	8	6	6.5
17-Jun	358	348	343	345	339	346	360	10	25	6	32	39	303	299	243	242	156	206	195	180	165	171	179	189	339.6
18-Jun	183	180	177	169	176	196	184	203	200	204	216	206	213	200	210	187	176	206	218	258	282	310	283	288	211.9
19-Jun	339	9	15	6	13	24	20	37	45	42	51	29	22	22	53	58	52	38	47	46	73	27	34	51	32.4
20-Jun	130	131	208	179	208	171	169	224	245	264	307	29	359	22	30	15	17	41	45	51	35	48	50	38	37.6
21-Jun	36	70	352	4	11	30	7	347	252	295	301	314	340	342	5	345	32	21	7	334	307	251	272	262	349.4
22-Jun	252	209	198	209	206	184	180	213	62	52	57	41	330	251	257	252	293	282	281	56	98	101	150	205	260.8
23-Jun	199	197	178	182	177	188	183	207	216	202	243	257	251	242	144	174	210	210	198	201	188	189	194	192	206.1
24-Jun	174	178	181	181	186	184	189	191	193	198	216	252	256	248	256	249	239	317	336	57	45	30	32	123	232.9
25-Jun	297	311	171	214	173	175	79	52	46	53	58	59	169	16	317	343	221	165	221	149	224	245	183	187	238.6
26-Jun	181	209	241	174	154	169	181	195	195	220	223	240	249	254	257	259	276	270	250	15	109	186	201	203	237.0
27-Jun	235	208	210	193	182	189	211	212	199	217	213	240	240	238	241	250	241	244	240	219	236	242	235	221	228.5
28-Jun	270	232	211	200	210	196	215	227	313	324	313	302	314	333	336	327	342	339	313	293	287	286	298	328	299.9
29-Jun	247	188	186	196	200	188	201	192	175	229	230	45	65	110	201	206	55	55	54	50	56	51	59	34	90.9
30-Jun	85	55	32	70	107	204	182	175	174	173	187	153	129	AF	244	314	324	AF	296	209	182	127	229	215	188.8

355.8	315.7	8.4	311.5	248.7	256.4	278.4	271.3	292.9	326.0	292.3	316.4	301.0	291.3	273.3	287.0	291.8	303.1	307.1	22.6	32.3	19.4	316.1	283.9
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
Shell Muskeg River - June 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 110 deg on Jun 11 07:00	Hours of Data: 718
Minimum Value: 5 deg on Jun 27 22:00	Hours of Missing Data: 2
Percentiles: P ₁ = 8 P ₁₀ = 15 Q ₁ = 18 Median = 25 Q ₃ = 36 P ₉₀ = 57 P ₉₉ = 91	Hours of Calibration: 0
	Percent Operational Time: 99.7

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	13	11	35	29	26	26	19	14	16	22	24	22	23	19	32	28	22	26	27	24	23	6	7	31	35
2-Jun	20	20	20	81	51	44	57	68	45	86	74	84	89	101	47	47	39	34	24	18	15	17	20	19	101
3-Jun	21	20	20	21	22	42	31	34	46	31	26	32	28	39	35	36	28	27	24	19	17	18	18	18	46
4-Jun	18	17	16	17	17	20	26	27	29	28	27	27	30	37	31	26	26	27	26	21	22	20	19	17	37
5-Jun	15	17	16	18	21	19	23	25	24	24	24	26	27	27	29	26	26	21	22	20	17	17	18	19	29
6-Jun	18	14	13	13	24	17	22	26	18	30	57	16	13	13	71	47	26	24	22	53	13	14	12	11	71
7-Jun	66	30	76	41	20	13	13	21	17	23	32	17	17	17	17	20	22	16	18	13	70	17	39	81	81
8-Jun	29	33	39	22	17	29	20	21	30	87	74	32	80	33	28	44	82	29	26	27	15	17	17	22	87
9-Jun	19	13	16	20	42	17	27	24	18	21	96	20	26	38	61	44	18	10	14	10	22	19	25	23	96
10-Jun	59	42	57	24	26	22	36	31	94	36	62	74	51	92	92	32	62	52	53	31	20	9	25	23	94
11-Jun	19	33	20	20	30	31	110	53	29	22	23	53	53	31	55	37	28	63	20	20	59	52	23	28	110
12-Jun	80	13	56	45	23	33	31	61	76	71	85	71	45	52	78	24	22	22	22	18	19	18	17	19	85
13-Jun	8	8	18	22	26	34	27	21	20	18	20	20	14	22	18	15	18	13	17	18	14	14	21	13	34
14-Jun	12	19	15	31	25	18	13	20	22	23	25	19	31	25	27	26	32	33	33	31	22	25	22	21	33
15-Jun	18	18	20	23	23	31	26	22	27	23	63	70	28	46	32	28	69	42	32	32	21	26	15	21	70
16-Jun	51	22	15	18	21	21	23	25	27	24	28	36	31	39	35	38	33	41	32	27	28	29	21	23	51
17-Jun	24	27	31	30	23	22	27	28	31	43	48	84	50	63	70	69	58	34	24	21	16	15	15	17	84
18-Jun	15	15	18	33	20	36	35	24	28	26	29	40	38	36	24	31	48	35	21	10	32	18	58	28	58
19-Jun	26	20	20	22	20	18	21	13	13	16	15	36	40	36	23	25	25	35	20	20	10	30	15	36	40
20-Jun	66	25	15	13	31	16	31	19	24	37	84	43	47	54	48	59	53	26	17	10	20	9	7	49	84
21-Jun	83	89	54	23	20	18	24	36	94	45	47	40	37	44	46	41	20	22	27	33	30	9	15	23	94
22-Jun	24	64	19	16	16	17	27	36	67	12	40	27	54	74	38	13	27	16	23	59	16	19	54	13	74
23-Jun	29	48	26	21	21	18	25	36	35	39	34	40	19	40	29	56	32	22	17	17	15	17	17	14	56
24-Jun	10	9	10	15	19	19	27	29	25	31	20	16	22	26	23	21	34	32	19	22	16	17	17	95	95
25-Jun	42	17	79	78	85	81	56	13	16	16	25	74	71	90	46	28	42	25	26	62	27	45	25	18	90
26-Jun	18	82	43	15	20	19	24	24	24	25	22	15	14	16	17	18	20	21	11	89	38	18	18	20	89
27-Jun	25	23	16	48	21	20	18	21	28	25	35	30	26	25	25	21	23	18	16	19	8	5	8	36	48
28-Jun	86	21	22	22	17	26	16	41	30	32	23	20	29	32	34	30	35	33	16	10	8	8	16	29	86
29-Jun	49	68	18	14	15	16	28	25	36	41	61	45	40	67	36	65	50	10	11	9	15	16	23	20	68
30-Jun	53	29	53	31	55	72	55	13	17	21	30	89	44	AF	41	17	15	AF	34	32	19	36	32	26	89

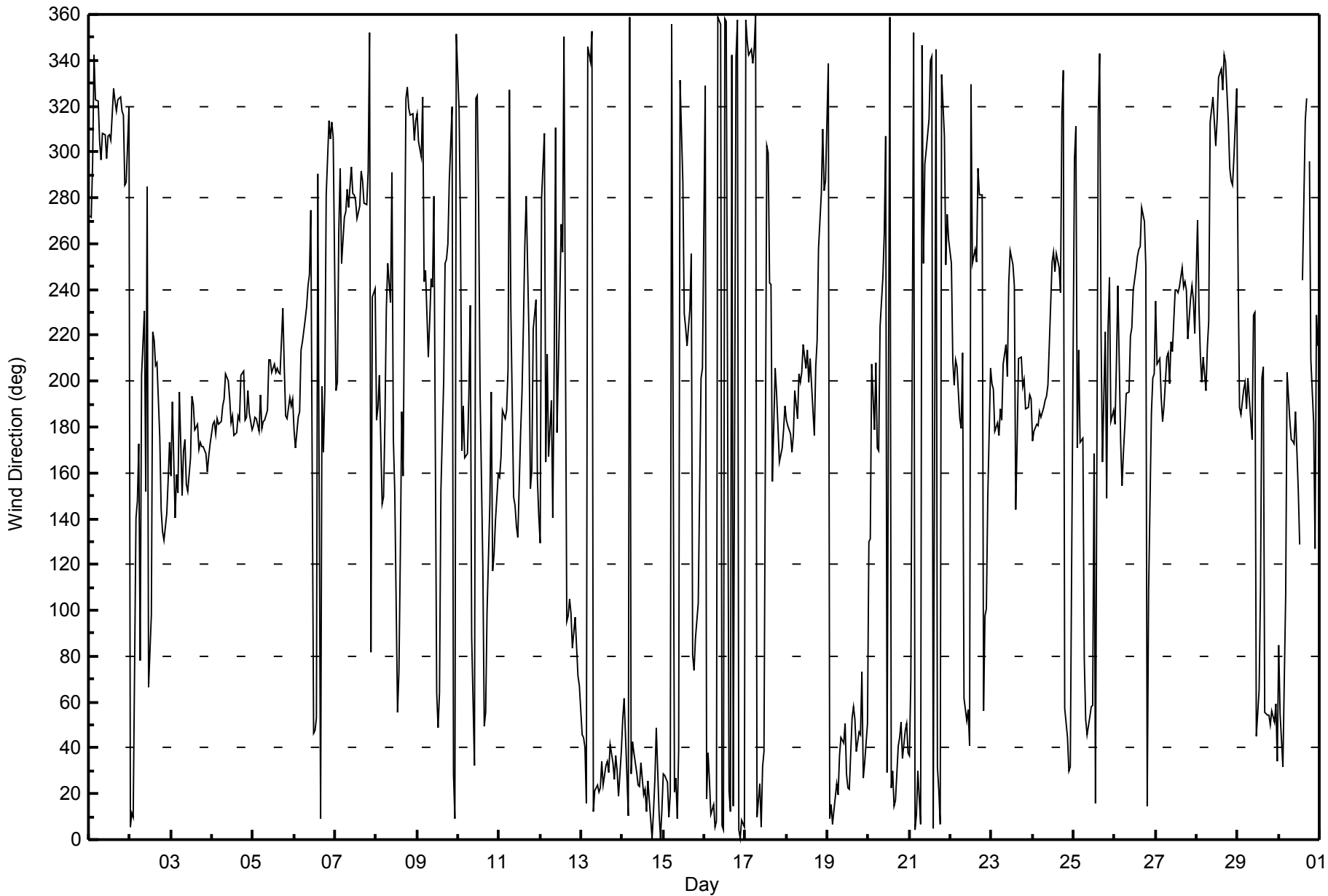
86	89	79	81	85	81	110	68	94	87	96	89	89	101	92	69	82	63	53	89	70	52	58	95	
Diurnal Maximum																								

AF - Analyzer Failure



WBEA
Hourly Averages

Wind Direction (WD) - deg
Shell Muskeg River - June 2015





Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

Calibration Date	June 17, 2015	Last Calibration	May 6, 2015
Station Name	Shell Muskeg River	Station Number	AMS 16
Reason:	Routine		
Start Time (MST)	6:20	End Time (MST)	11:07
Gas Cert Reference	LL104193	Station temp.	22 Deg C
Cal Gas Concentration	48.3 ppm	Cal Gas Exp Date	12-Feb-18
Calibrator Make/Model	Sabio 4010	Serial Number	11081107
ZAG Make/Model	API 701	Serial Number	2155
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2632

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		PMT voltage	-710	-710
Analyzer IP address	192.168.1.43		Lamp voltage	815	807
Calculated slope	0.999742	0.982540	Chamber temp	45.3	44.8
Calculated intercept	0.731291	1.065515	Pressure	709.9	709.6
Analyzer Background	5.9	5.9	Flow	0.444	0.449
Analyzer Coefficient	1.210	1.210	Intensity	90	89
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	0.0	----
as found span	5000	82.8	799.8	816.5	0.980
calibrator zero	5000	0.0	0.0	0.4	----
high point	5000	82.8	799.8	814.0	0.983
second point	5000	41.4	399.9	404.3	0.989
third point	5000	20.7	200.0	201.6	0.992
as left zero	5000	0.0	0.0	0.6	----
as left span	5000	82.8	799.8	805.2	0.993
Average Correction Factor					0.988

Corrected As found	816.5	Previous response	799.3	% change	-2.1%
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Notes:

No maintenance or adjustments done, filter changed out

Calibration Performed By:

Melissa Lemay



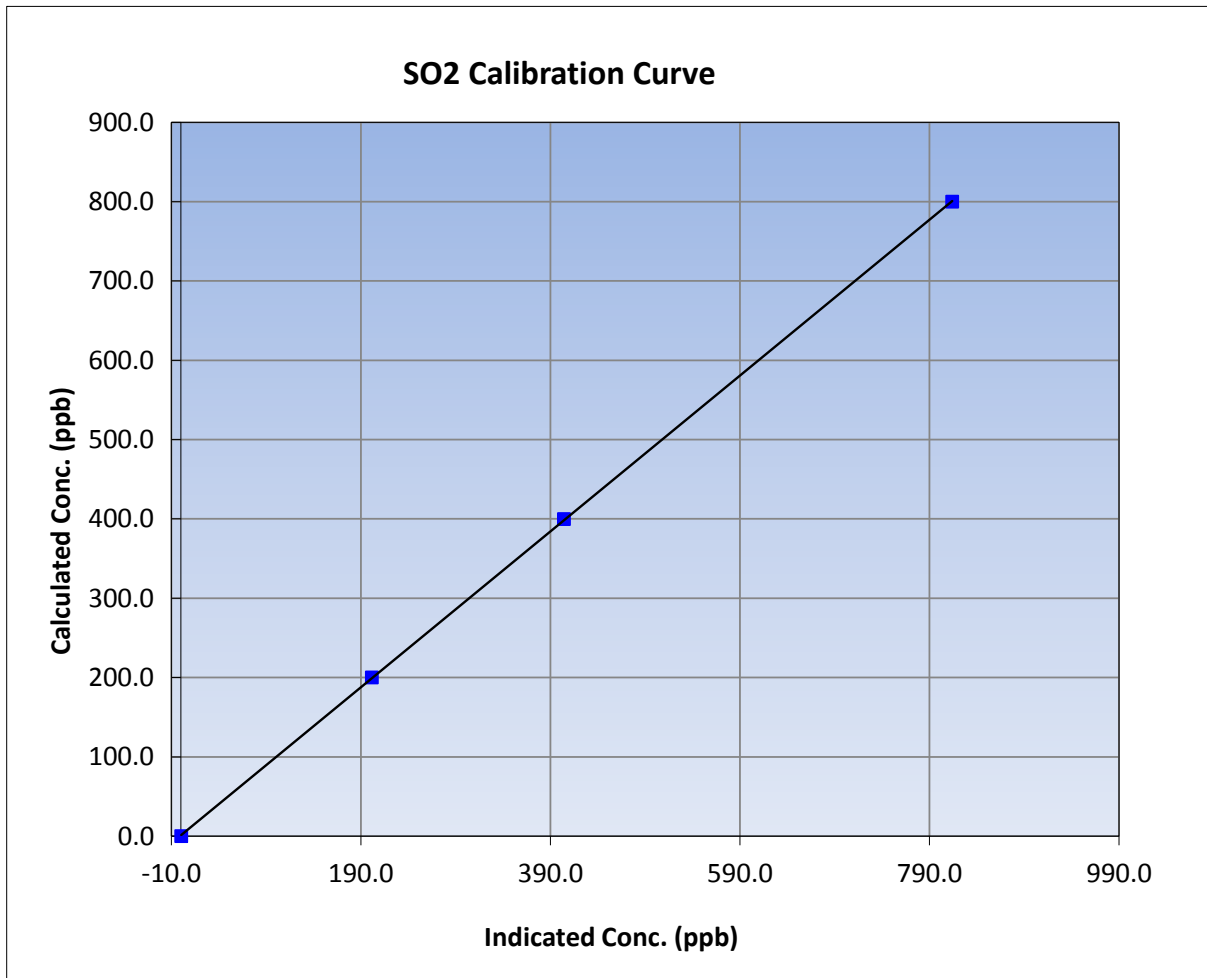
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	June 17, 2015	Previous Calibration	May 6, 2015
Station Name	Shell Muskeg River	Station Number	AMS 16
Start Time (MST)	6:20	End Time (MST)	11:07
Analyzer make	Thermo 43i	Analyzer serial #	1118148498

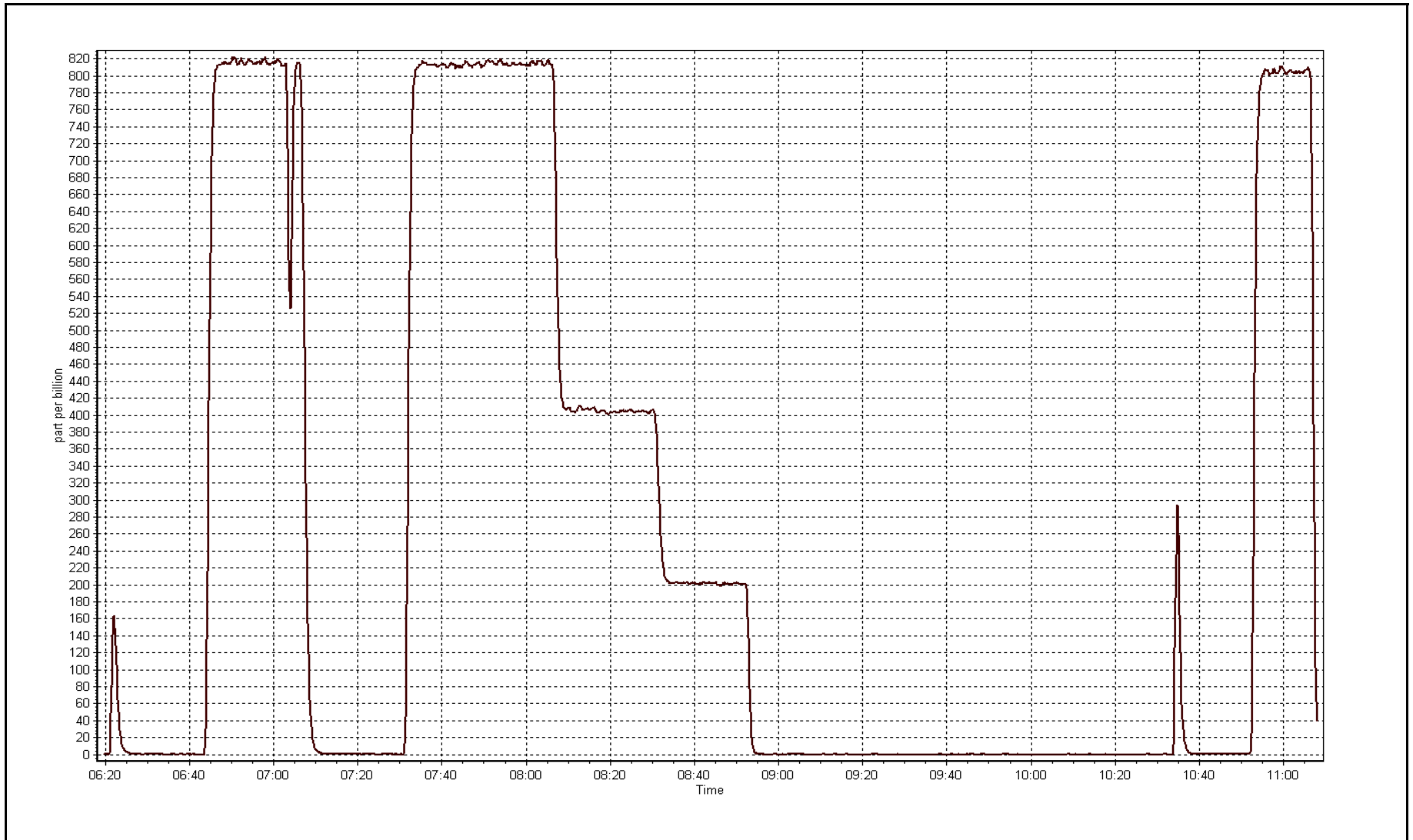
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.4	----	Correlation Coefficient	0.999982
799.8	814.0	0.9826		
399.9	404.3	0.9892	Slope	0.982540
200.0	201.6	0.9919		
			Intercept	1.065515



SO2 Calibration Plot

Date: June 17, 2015





Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	June-17-15	Last Calibration	May-06-15
Station Name	Shell Muskeg River	Station Number	AMS 16
Reason:	Routine		
Start Time (MST)	6:20	End Time (MST)	11:07
Gas Cert Reference	LL104193	Cal Gas Expiry Date	12-Feb-18
CH4 Cal Gas Conc.	487 ppm	CH4 Equiv Conc.	1017.8 ppm
C3H8 Cal Gas Conc.	193 ppm	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11081107
ZAG make/model	Teledyne API 701	Serial Number	2155
DACS make/model	Campbell Scientific CR3000	Serial Number	2632

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 50 ppm		Sample Pressure	8.2	8.2
Analyzer IP address	192.168.1.51		Air or Bypass Press	34.8	34.8
Calculated slope	1.004150	0.998926	Fuel Pressure	24.2	24.2
Calculated intercept	-0.042052	-0.000974	Analyzer Coeff	4.317	4.317
			Analyzer BKG	2.70	2.700
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	-0.11	----
as found span	5000	82.8	16.85	16.42	1.026
calibrator zero	5000	0.0	0.00	-0.09	----
high point	5000	82.8	16.85	16.82	1.002
second point	5000	41.4	8.43	8.50	0.991
third point	5000	20.7	4.21	4.30	0.980
as left zero	5000	0.0	0.00	0.26	----
as left span	5000	82.8	16.85	17.20	0.980
Average Correction Factor					0.991

Corrected As found	16.53	Previous response	16.83	% change	1.8%
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Notes:

No maintenance or adjustments done, filter changed out

Calibration Performed By:

Melissa Lemay



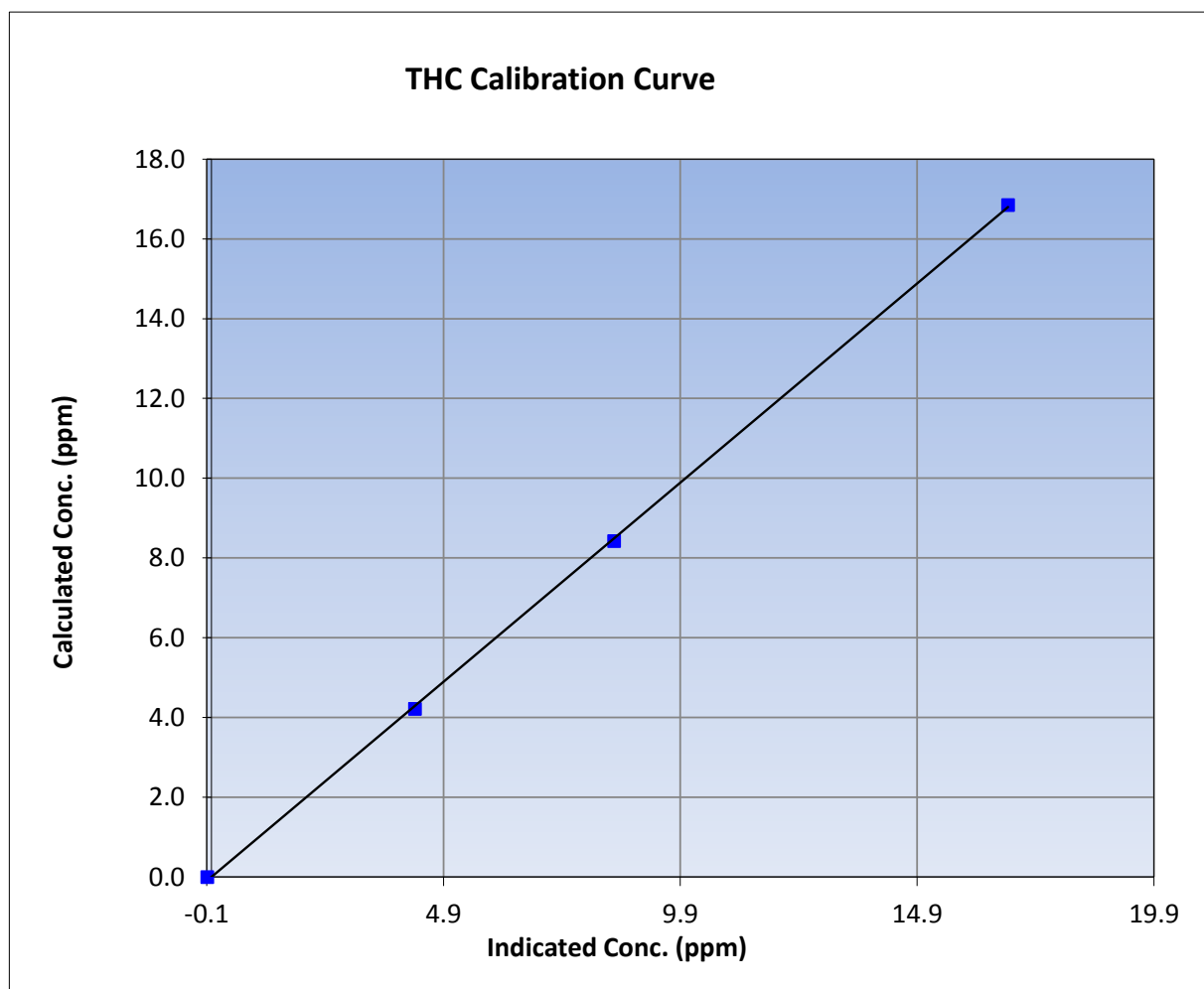
Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	June 17, 2015	Previous Calibration	May 6, 2015
Station Name	Shell Muskeg River	Station Number	AMS 16
Start Time (MST)	6:20	End Time (MST)	11:07
Analyzer make	Thermo 51i-LT	Analyzer serial #	1218153458

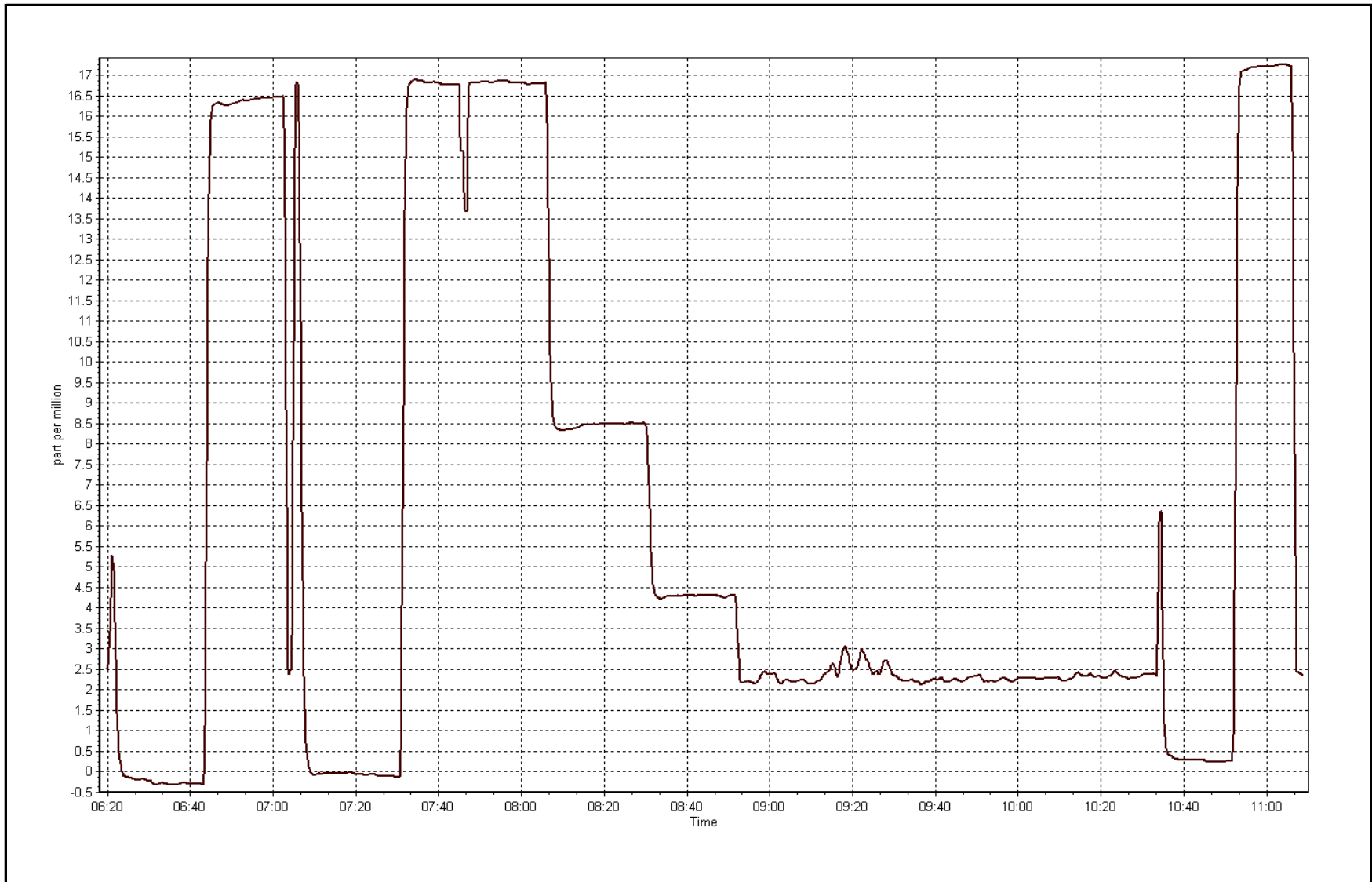
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	-0.09	----	Correlation Coefficient	0.999861
16.85	16.82	1.0020		
8.43	8.50	0.9914	Slope	0.998926
4.21	4.30	0.9799		
			Intercept	-0.000974



THC Calibration Plot

Date: June 17, 2015





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	June 17, 2015	Previous Calibration	May 6, 2015
Station Name	Shell Muskeg River	Station Number	AMS 16
Reason:	Routine		
Start Time (MST)	6:20	End Time (MST)	11:07
NO Cal Gas Conc	48 ppm	Gas Cert Reference	LL104193
NOx Cal Gas Conc	48 ppm	Cal Gas Expiry Date	February 12, 2018
Calibrator	Sabio 4010	Serial Number	11081107
Zero air Generator	Teledyne API T701	Serial Number	2155

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	2632
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Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	1.001831	1.001434	1.008514
	Data Offset	-0.175946	0.340132	0.427632
Current Calibration	Data Slope	0.997525	0.996273	1.006495
	Data Offset	0.152627	0.628448	1.473270

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1426262593
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Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
NO coefficient	0.767		0.767	
NOx coefficient	0.996		0.996	
NO2 coefficient	1.000		1.000	
NO bkgrnd	8.0		8.0	
NOx bkgrnd	8.0		8.0	
Chamber Temp	50.4	Deg C	50	Deg C
Moly Temp	325	Deg C	324.7	Deg C
PMT voltage	-774	V	-774	V
PMT Temp	-3.1	Deg C	-3.2	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	173.7	mmHg	174	mmHg
R Cell Press Nox	173.7	mmHg	174	mmHg
NO sample flow	0.871	lpm	0.863	lpm
Nox sample Flow	0.872	lpm	0.865	lpm

Notes:

No maintenance or adjustments done, filter changed out



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date:

June 17, 2015

Station Number:

AMS 16

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	0.5	0.3	0.2	----	----
as found span	5000	82.8	794.9	794.9	0.0	799.0	797.9	1.2	0.9948	0.9962
calibrator zero	5000	0.0	0.0	0.0	0.0	0.5	0.4	0.1	----	----
high point	5000	82.8	794.9	794.9	0.0	797.0	797.8	-0.8	0.9973	0.9963
second point	5000	41.4	397.4	397.4	0.0	398.0	397.6	0.5	0.9986	0.9996
third point	5000	20.7	198.7	198.7	0.0	198.4	197.9	0.5	1.0016	1.0041
as left zero	5000	0.0	0.0	0.0	0.0	0.9	0.6	0.5	----	----
as left span	5000	82.8	794.9	507.6	287.3	792.7	520.0	273.2	1.0028	0.9762
Average Correction Factor									0.9992	1.0000

Corrected As found

NO_x= 798.5

NO= 797.6

Percent Change

NO_x= -0.6%

NO= -0.5%

Previous Response

NO_x= 793.6

NO= 793.4

GPT Calibration Data

Dilution Flow

5000

ccm

Source Gas Flow

82.80

ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
Cal zero			0.0			0.1			N/A	
1st NO2 (300)	----	507.6	286.9	792.1	507.6	284.6	0.9872	1.0000	1.0081	99.2%
2nd NO2 (200)	----	599.4	195.1	791.3	599.4	192.0	0.9882	1.0000	1.0161	98.4%
3rd NO2 (100)	----	690.0	104.5	790.2	690.0	100.2	0.9895	1.0000	1.0429	95.9%
4th NO2 (0)	794.5	----	-1.1	793.4	794.5	-1.2	0.9855	1.0000	N/A	----
Average Correction Factor							0.9876	1.0000	1.0224	97.8%

Calibration Performed By:

Melissa Lemay



Wood Buffalo Environmental Association

NO_x Calibration Summary

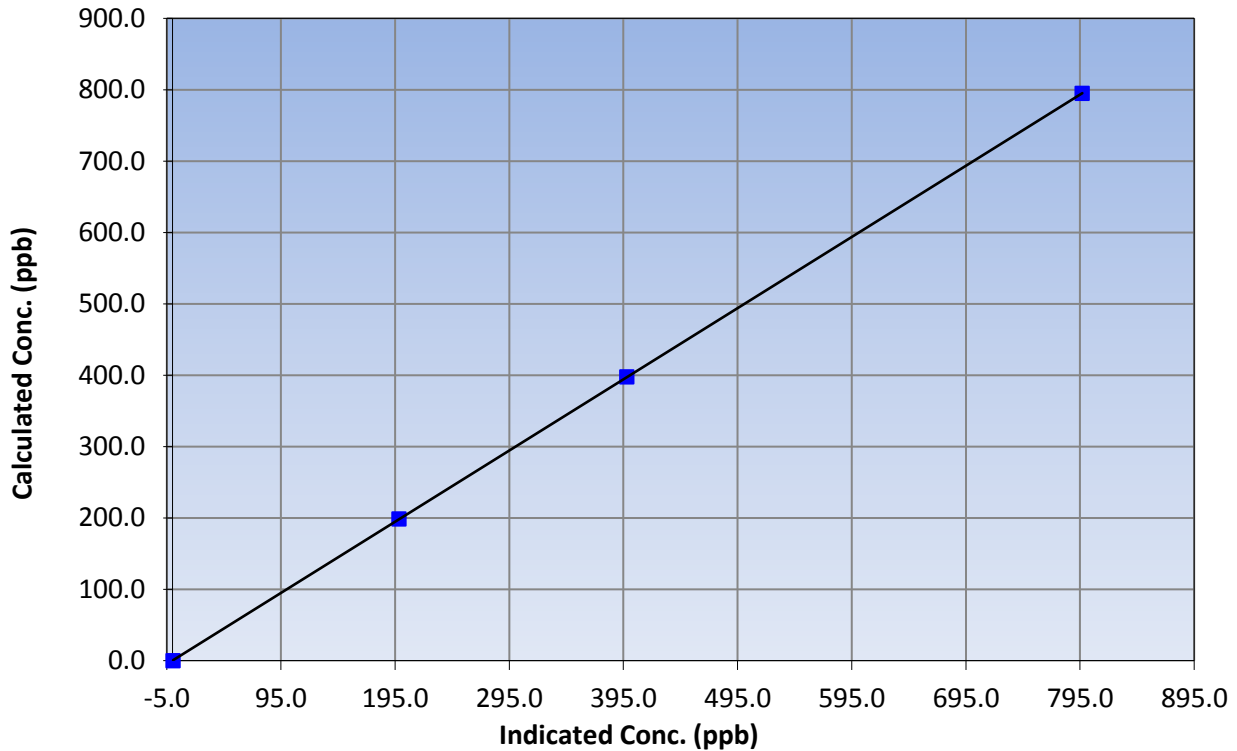
Station Information

Calibration Date	June 17, 2015	Previous Calibration	May 6, 2015
Station Name	Shell Muskeg River	Station Number	AMS 16
Start Time (MST)	6:20	End Time (MST)	11:07
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	0.5	----	Correlation Coefficient	0.999997
794.9	797.0	0.9973		
397.4	398.0	0.9986	Slope	0.997525
198.7	198.4	1.0016		
			Intercept	0.152627

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

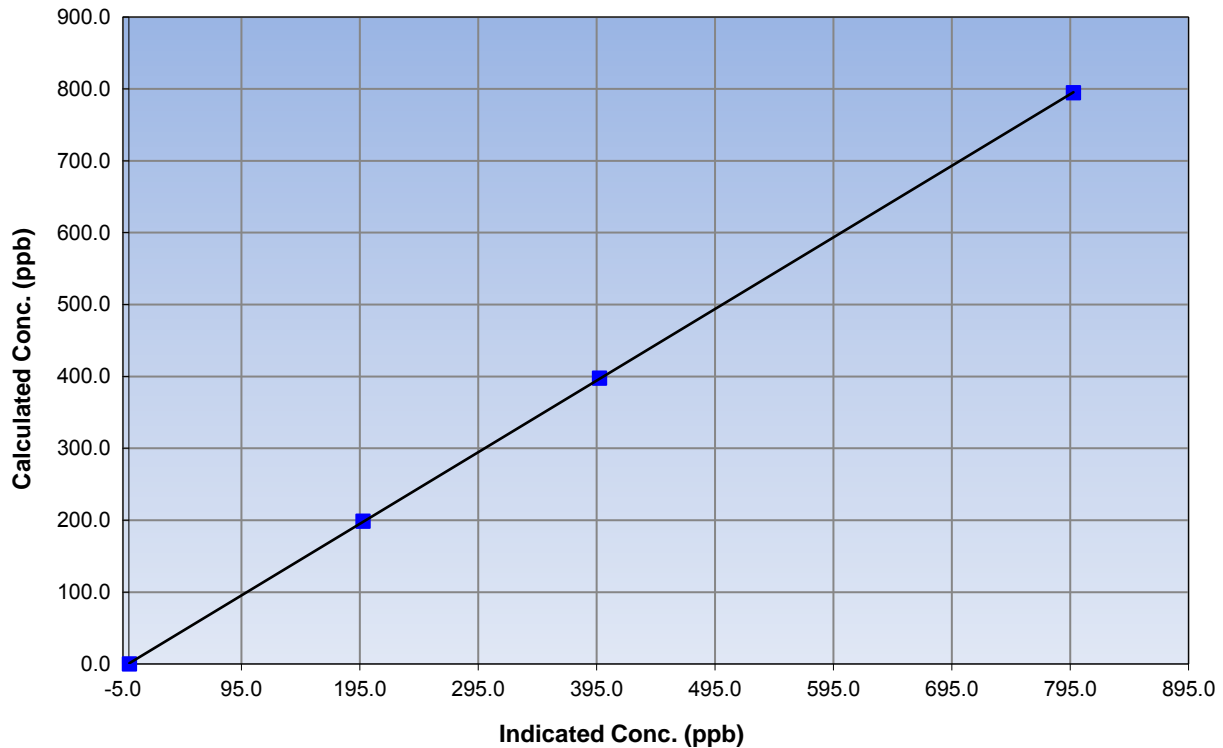
Station Information

Calibration Date	June 17, 2015	Previous Calibration	May 6, 2015
Station Name	Shell Muskeg River	Station Number	AMS 16
Start Time (MST)	6:20	End Time (MST)	11:07
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	0.4	N/A	Correlation Coefficient	0.999992
794.9	797.8	0.9963		
397.4	397.6	0.9996	Slope	0.996273
198.7	197.9	1.0041		
			Intercept	0.628448

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

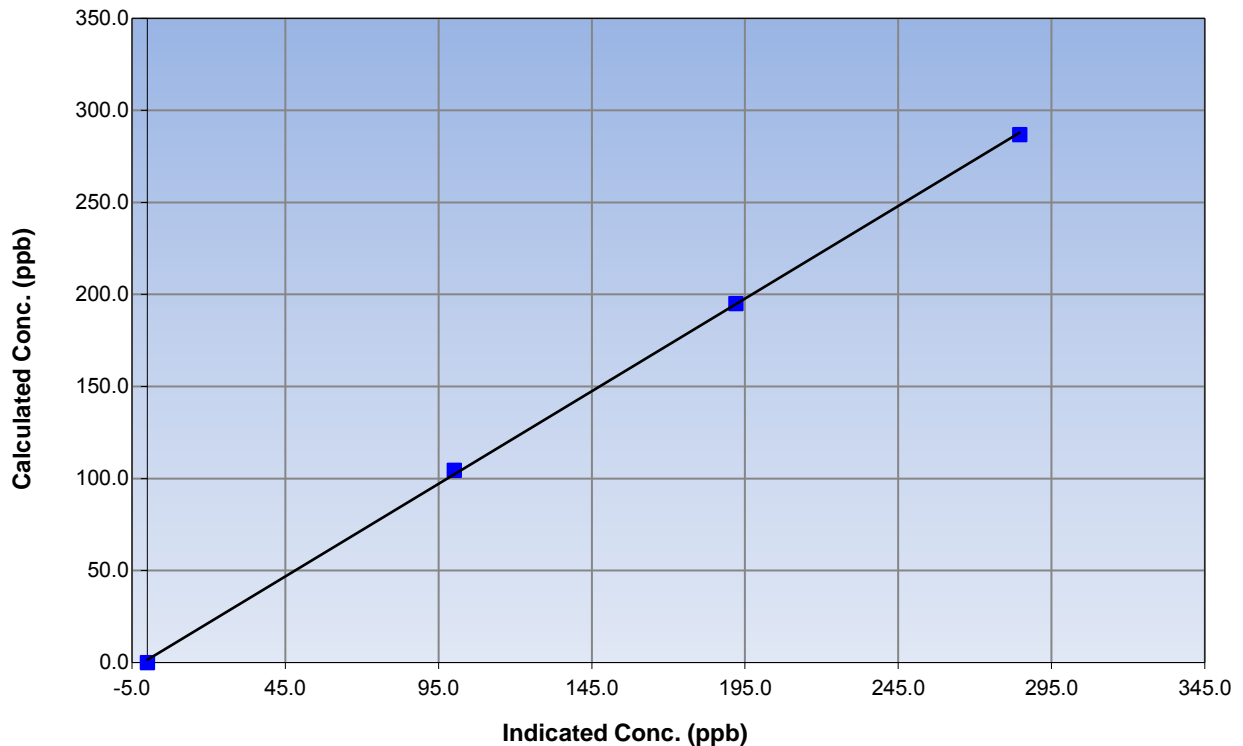
Station Information

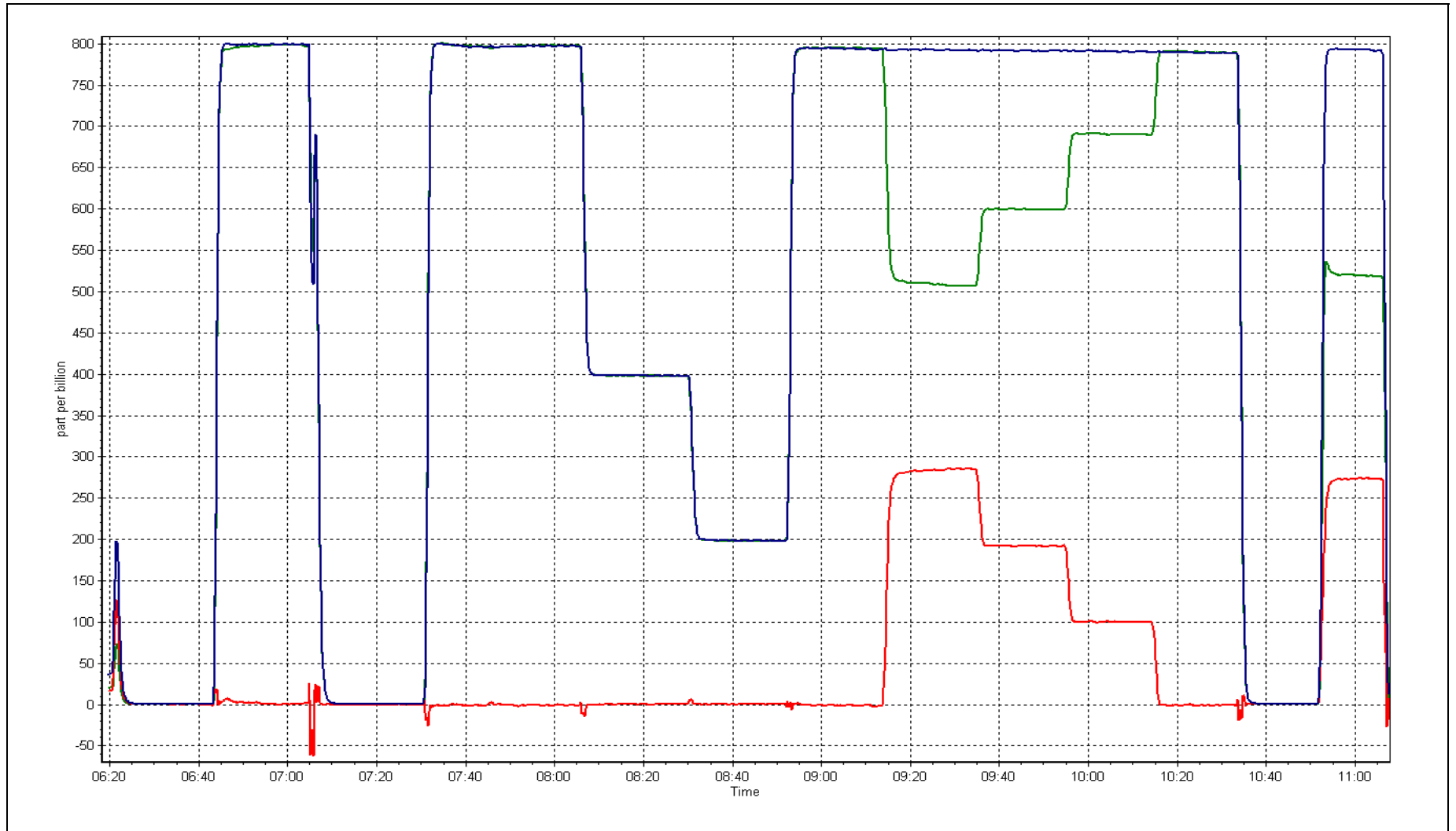
Calibration Date	June 17, 2015	Previous Calibration	May 6, 2015
Station Number	Shell Muskeg River	Station Number	AMS 16
Start Time (MST)	6:20	End Time (MST)	11:07
Analyzer make	Thermo 42i	Analyzer serial #	1426262593

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	N/A	Correlation Coefficient	0.999817
286.9	284.6	1.0081		
195.1	192.0	1.0161	Slope	1.006495
104.5	100.2	1.0429		
			Intercept	1.473270

NO₂ Calibration Curve







Wood Buffalo Environmental Association

SHARP CONFORMANCE TEST

STATION INFORMATION

Calibration Date:	June 17, 2015	Previous Calibration:	May 25, 2015
Station Name:	Shell Muskeg River	Station Number:	AMS 16
Start Time (MST):	6:45	End Time (MST):	7:05
Calibrator Make/Model:	Delta Cal	Calibrator Serial Number:	

SHARP INFORMATION

Particulate Fraction:	PM2.5
Make/Model:	Thermo / SHARP 5030
Serial Number:	E-798
Source SN:	4142
HEPA PN:	12144
Time Correct (MST):	Yes
Parameters Checked:	T1, P3, Main Flow, Beta, Neph

AUDIT DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	10.0	10.4	0.4	10.0
T2	18.0	na	na	18.0
T3	20.0	na	na	20.0
T4	12.0	na	na	12.0
RH (%)	32.0	na	na	32.0

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	984	985.0	1.0	984

Main Flow (Lph)

Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
1000	1006	6		1000

Nephelometer Calibration

Parameter	As Found	adjusted (Limit +/- 2.0ug/m3)	As Left
Analog	536		529
Neph	5.6		-0.9
C14	0.1	yes	1.2
Indicated Concentration (ug/m3)	2.1		-0.3
Offset 1	527.4		535.6
Offset 2	67.3		68

Leak Check (Quarterly)

Leak Check Date:	May 25, 2015	Previous Leak Check Date:	May 6, 2015
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Measured

Difference LPM (Limit +/- 0.42 LPM)

Flow without adaptor (LPM):	16.80	Difference LPM (Limit +/- 0.42 LPM)	0.08
Flow with adaptor [turn off pump first](LPM):	16.72		

Mass Foil Calibration (Annualy)

Foil Calibration Date:	May 25, 2015	Previous Foil Calibration:	n/a
Zeroed?:	Yes		
Foil Mass:	1337		
Previous Correction Factor:	7029	Mass foil set S/N:	2518
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:

cyclone head cleaned, Nephelometer adjusted

Audit Performed By: Melissa Lemay



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 17
WAPASU
JUNE 2015**

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

July 30, 2015



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WAPASU (AMS 17)
 JUNE 2015

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	682	37	38	99.86	11	0	3	0
H2S (ppb) Average	686	34	34	100.00	2	0	1	0
THC (ppm) Average	682	37	38	99.86	3.8	-	2.8	-
O3 (ppb) Average	687	33	33	100.00	64	0	49	0
NO2 (ppb) Average	682	37	38	99.86	27	0	10	0
NO (ppb) Average	682	37	38	99.86	6	-	1	-
NOX (ppb) Average	682	37	38	99.86	30	-	11	-
PM2.5 (ug/m3) Average	718	0	2	99.72	285	-	200.1	4
Temperature 2 m (C) Average	720	0	0	100.00	29.6	-	21.8	-
Relative Humidity (%) Average	720	0	0	100.00	99	-	81	-
Wind Speed 10 m (km/h) Average	720	0	0	100.00	20	-	12	-
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 - WAPASU (AMS 17)
 JUNE 2015

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	682	0.8	1	-	0	0	0	0	1	1	11
H2S (ppb) Average	686	0.3	0	-	0	0	0	0	0	0	2
THC (ppm) Average	682	2.07	0.2	-	1.8	1.9	2	2	2.1	2.2	3.8
O3 (ppb) Average	687	31.2	13	-	1	11	21	32	41	48	64
NO2 (ppb) Average	682	2.3	3	-	0	0	0	1	3	7	27
NO (ppb) Average	682	0.7	1	-	0	0	0	1	1	1	6
NOX (ppb) Average	682	2.9	4	-	0	0	1	2	3	8	30
PM2.5 (ug/m3) Average	718	23.18	48.8	-	0	1.5	3.5	6.1	15.6	55	285
Temperature 2 m (C) Average	720	15.39	6.1	-	-2.8	7.9	11.1	15.3	19.5	23.9	29.6
Relative Humidity (%) Average	720	57.9	22	-	20	29	39	56	76	90	99
Wind Speed 10 m (km/h) Average	720	7.7	4	-	0	3	5	7	10	13	20
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WAPASU (AMS 17)
JUNE 2015

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2	10 Jun 2015 12:00	10 Jun 2015 12:00	1	Maintenance - cleaned glass manifold
THC	10 Jun 2015 12:00	10 Jun 2015 12:00	1	Maintenance - cleaned glass manifold
NO2, NO, NOX	10 Jun 2015 12:00	10 Jun 2015 12:00	1	Maintenance - cleaned glass manifold
PM2.5	10 Jun 2015 10:00	10 Jun 2015 11:00	2	Maintenance - Flow and zero check, sample head cleaning



Summary of Hour Averages

Wapasu - June 2015

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 11 ppb on Jun 24 10:00	Maximum Daily Average: 2.8 ppb on Jun 24		Hours of Data:	682
Minimum Value: 0 ppb on Jun 6 00:00	Minimum Daily Average: 0.2 ppb on Jun 3		Hours of Missing Data:	38
Maximum Diurnal Average: 1.4 ppb at hour 11	Minimum Diurnal Average: 0.4 ppb at hour 15		Hours of Calibration:	37
Monthly Average: 0.8 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 1 P ₉₉ = 7		Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	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
2-Jun	0	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
3-Jun	0	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-Jun	0	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-Jun	0	0	0	0	0	Z	0	1	0	1	1	0	0	0	0	1	1	1	1	2	0	0	0	0	0.5	2
6-Jun	Z	2	4	6	4	4	4	2	1	0	0	0	0	0	0	0	0	2	6	7	4	1	0	0	2.1	7
7-Jun	0	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
8-Jun	0	0	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
9-Jun	0	0	0	Z	0	0	0	0	0	C	C	C	C	C	C	C	0	0	0	0	0	0	0	0	--	0
10-Jun	0	0	0	0	Z	0	0	0	0	0	M	0	0	0	0	0	0	0	0	0	0	0	0	2	0.4	2
11-Jun	1	1	0	0	0	Z	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	1	0.5	1
12-Jun	Z	0	0	0	0	0	1	1	1	1	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0.4	1
13-Jun	0	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-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
15-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0.3	1
16-Jun	0	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
17-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	4	3	2	0.8	4
18-Jun	Z	0	0	0	0	0	0	0	0	1	2	4	0	1	1	1	1	1	1	1	1	0	0	0	0.8	4
19-Jun	0	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
20-Jun	0	0	Z	0	0	1	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1
21-Jun	0	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
22-Jun	0	0	0	0	Z	0	1	11	2	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0.9	11
23-Jun	0	0	0	0	0	Z	0	0	4	5	5	3	1	0	0	0	0	0	0	3	4	2	1	1	1.4	5
24-Jun	Z	1	1	1	1	4	6	5	11	11	9	7	2	1	1	1	1	1	1	1	0	0	0	0	2.8	11
25-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	2	2	4	0.7	4
26-Jun	3	1	Z	0	1	2	6	5	8	6	7	6	0	0	0	0	0	1	1	0	0	0	0	0	2.2	8
27-Jun	0	0	0	Z	1	2	3	2	2	2	2	1	1	2	0	0	0	0	1	0	0	0	1	1	1.0	3
28-Jun	0	1	1	1	Z	3	3	1	1	1	1	1	2	2	2	2	2	2	1	1	1	0	0	0	1.2	3
29-Jun	0	0	0	1	1	Z	1	1	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1.1	3
30-Jun	Z	1	1	1	1	1	1	1	1	4	6	6	8	4	1	1	1	1	1	1	1	1	1	1	1.9	8

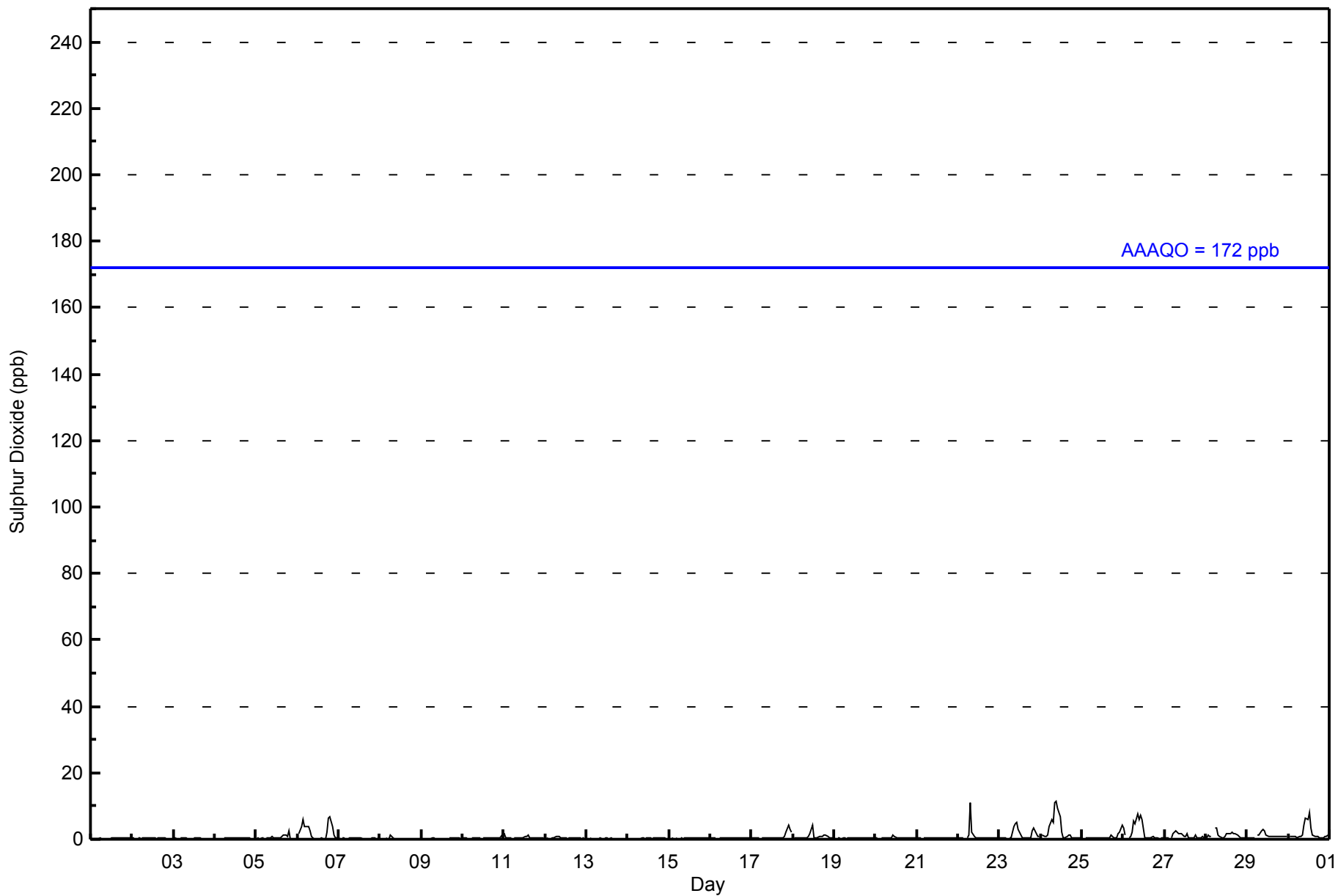
0.5	0.5	0.5	0.6	0.5	0.8	1.1	1.2	1.3	1.4	1.4	1.3	0.8	0.6	0.4	0.5	0.5	0.6	0.7	0.8	0.6	0.5	0.5	0.6	Diurnal Average		
3	2	4	6	4	4	6	11	11	11	9	7	8	4	2	2	2	2	2	6	7	4	4	3	4	Diurnal Maximum	

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



WBEA
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Wapasu - June 2015





WBEA
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Wapasu - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	679	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: 682

Total Number of Hours: 720



WBEA
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Wapasu - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	57	30	21	23	21	31	74	85	39	37	31	41	38	39	57	55	679
11 - 20	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	3
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	57	30	21	23	21	31	74	85	39	38	32	42	38	39	57	55	682

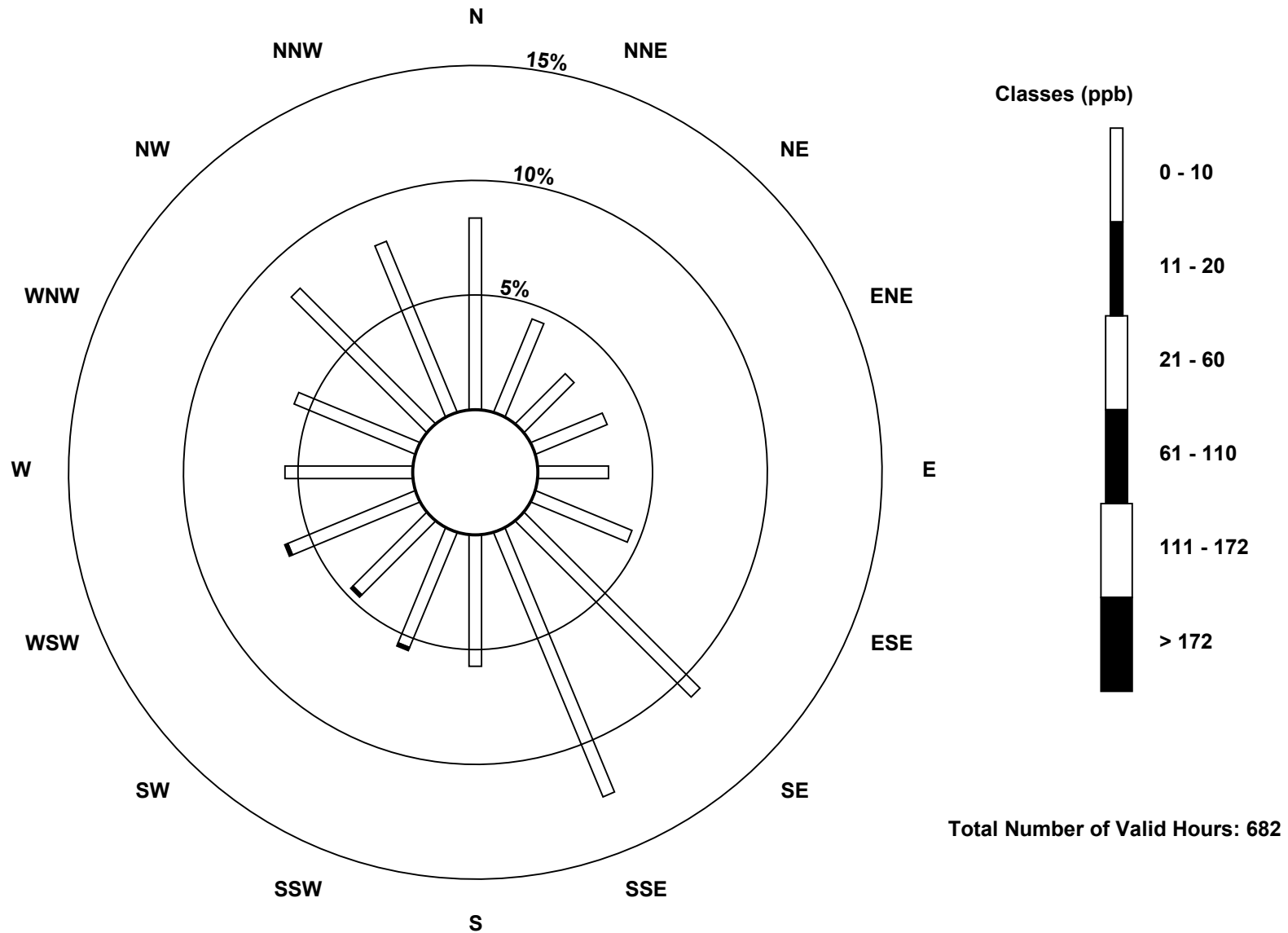
Total Number of Valid Hours: 682

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

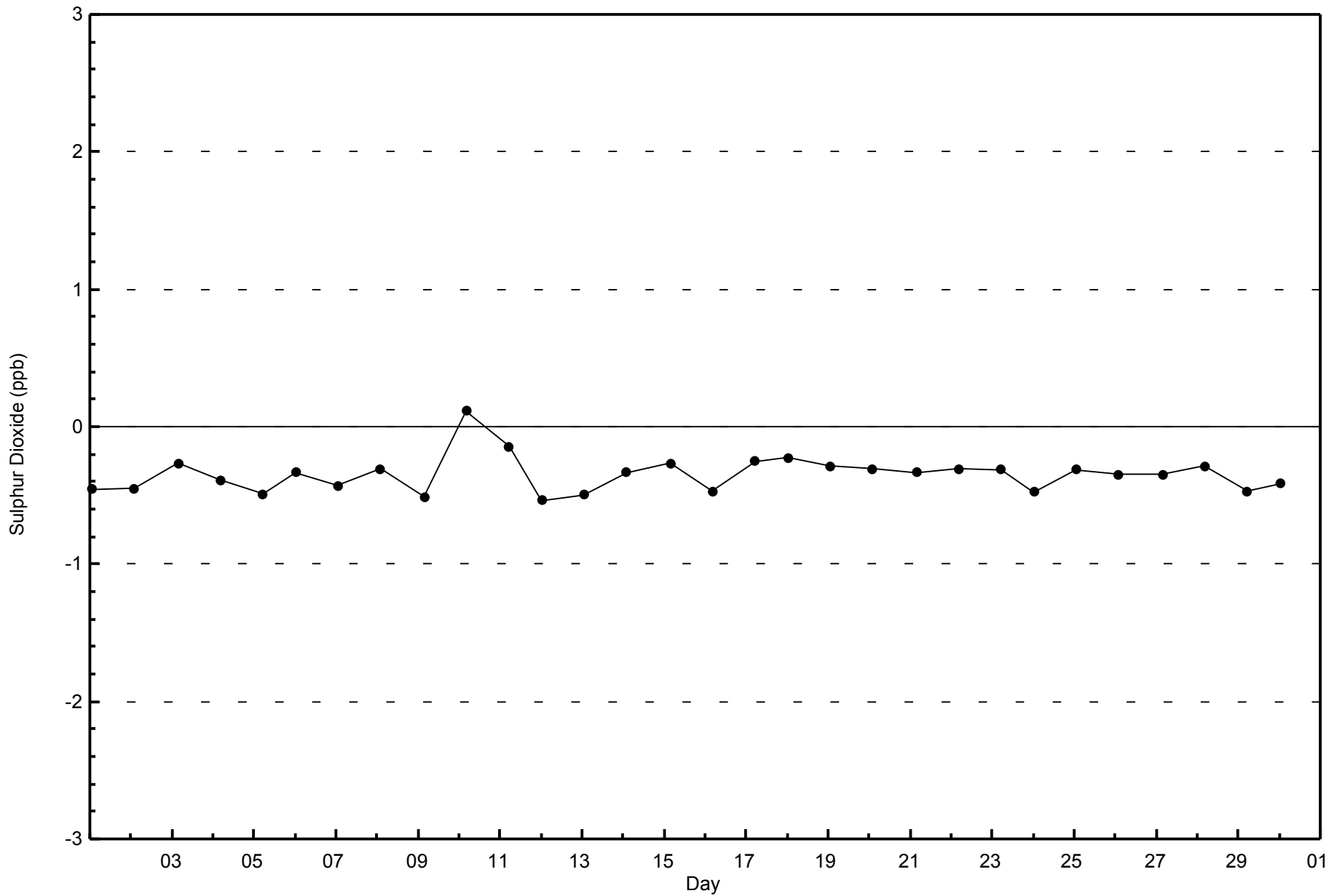
Sulphur Dioxide (SO₂) - ppb
Wapasu (AMS 17)





WBEA
Zero Responses

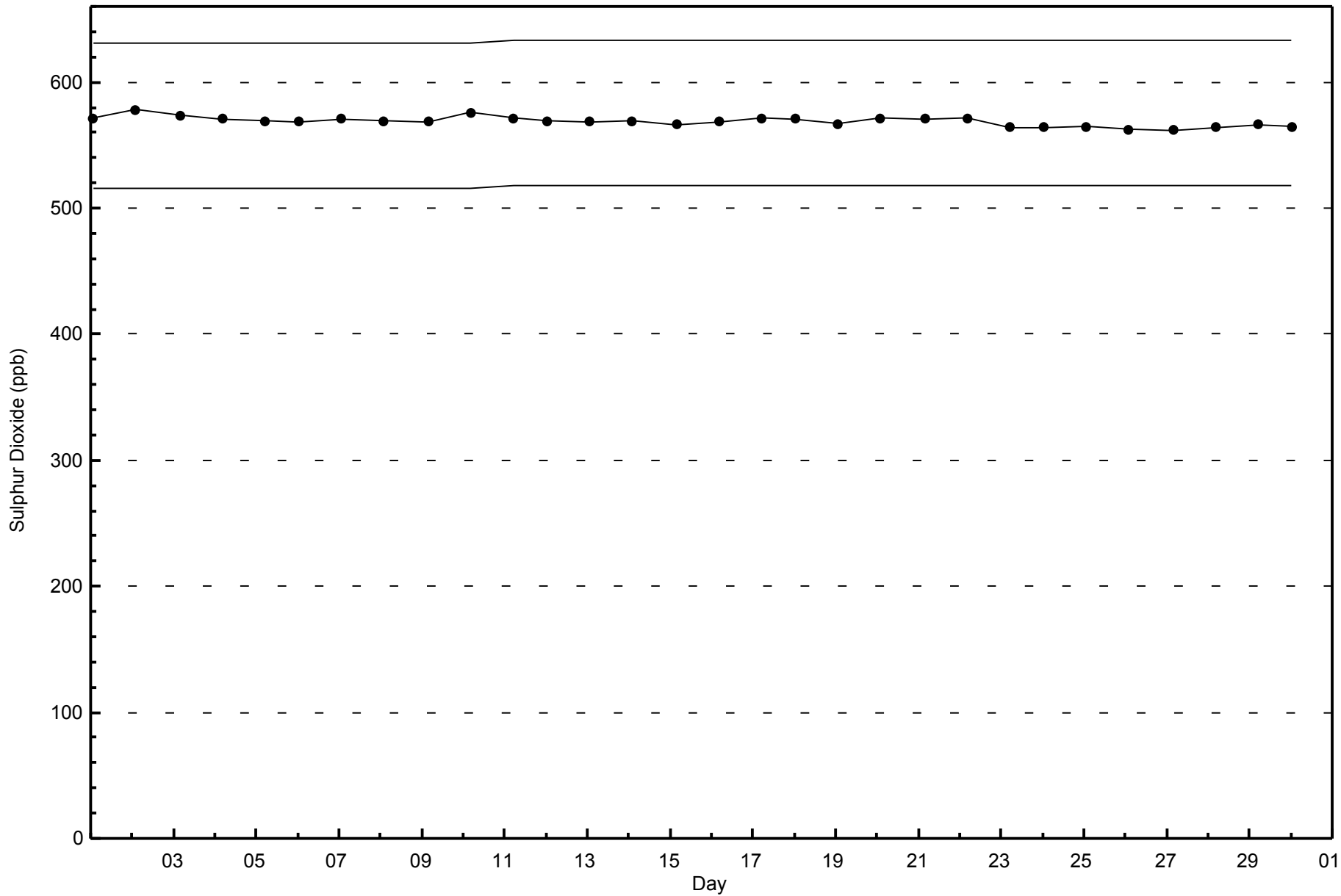
Sulphur Dioxide (SO₂) - ppb
Wapasu - June 2015





WBEA
Span Responses

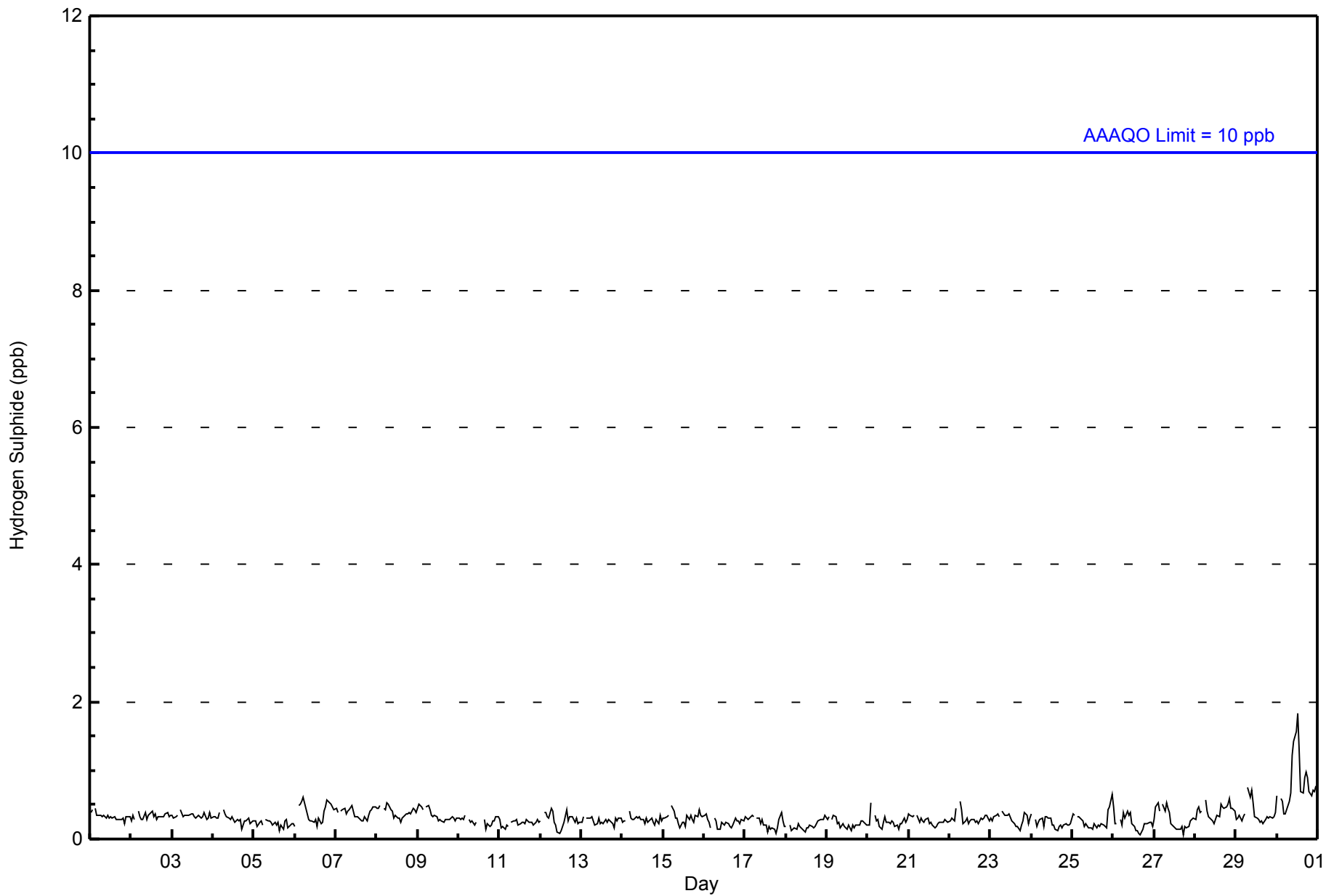
Sulphur Dioxide (SO₂) - ppb
Wapasu - June 2015





WBEA
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
Wapasu - June 2015





WBEA
Cumulative Frequency Distribution

Hydrogen Sulphide (H₂S) - ppb
Wapasu - June 2015

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



WBEA
Frequency Distribution

Hydrogen Sulphide (H₂S) - ppb
Wapasu - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	59	29	23	23	19	34	73	86	38	37	32	44	36	39	59	55	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	59	29	23	23	19	34	73	86	38	37	32	44	36	39	59	55	686

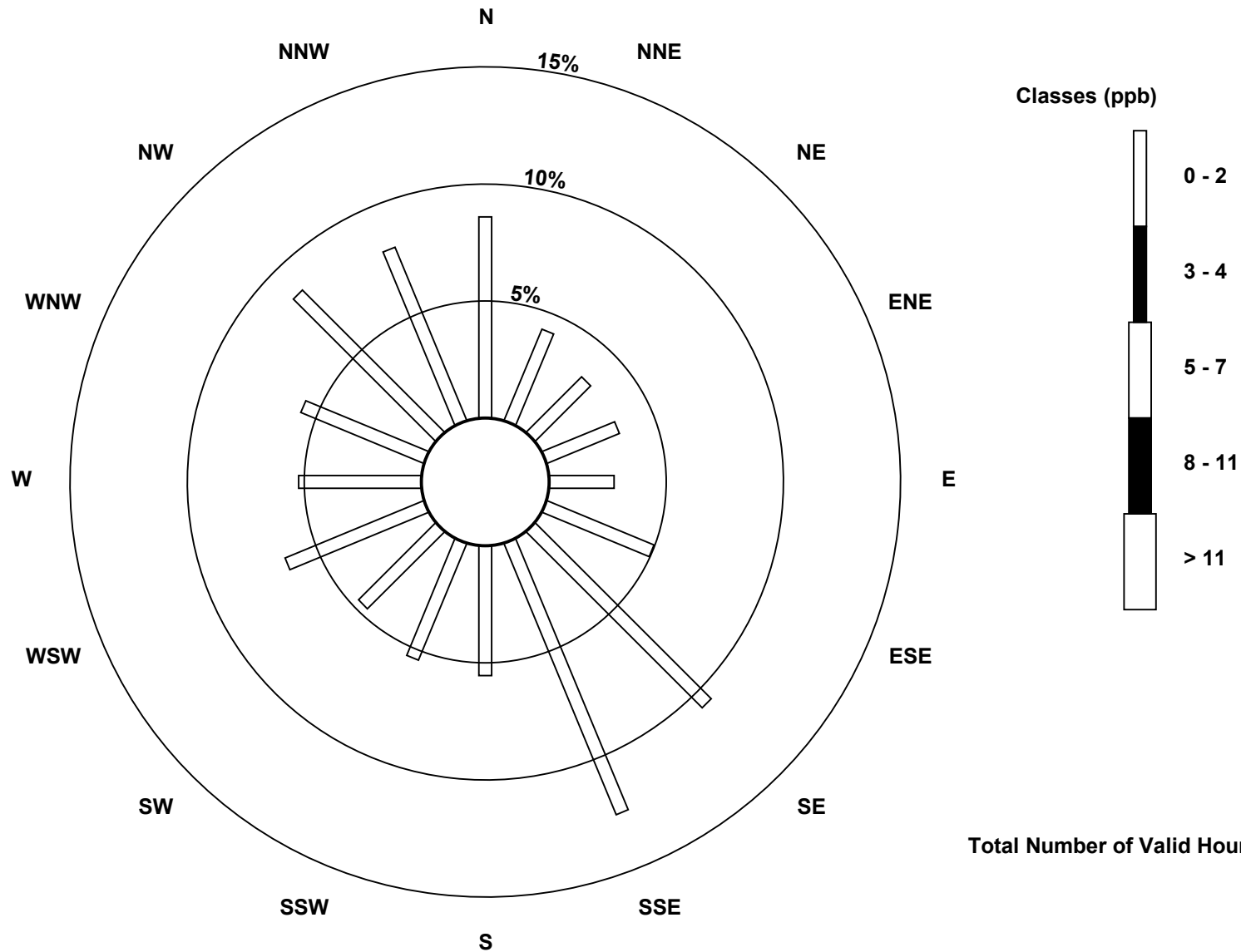
Total Number of Valid Hours: 686

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

Hydrogen Sulphide (H₂S) - ppb
Wapasu (AMS 17)

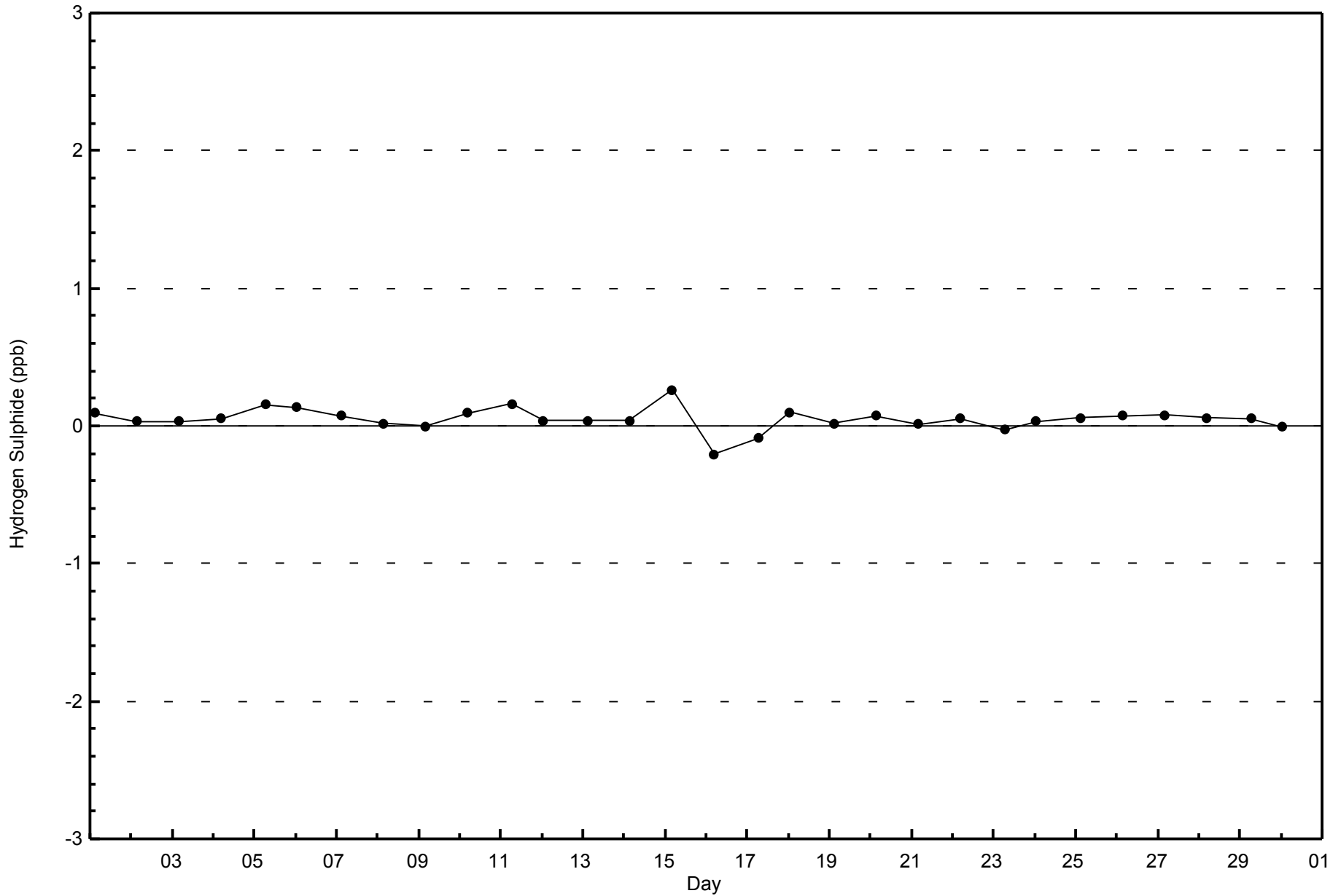


Total Number of Valid Hours: 686



WBEA
Zero Responses

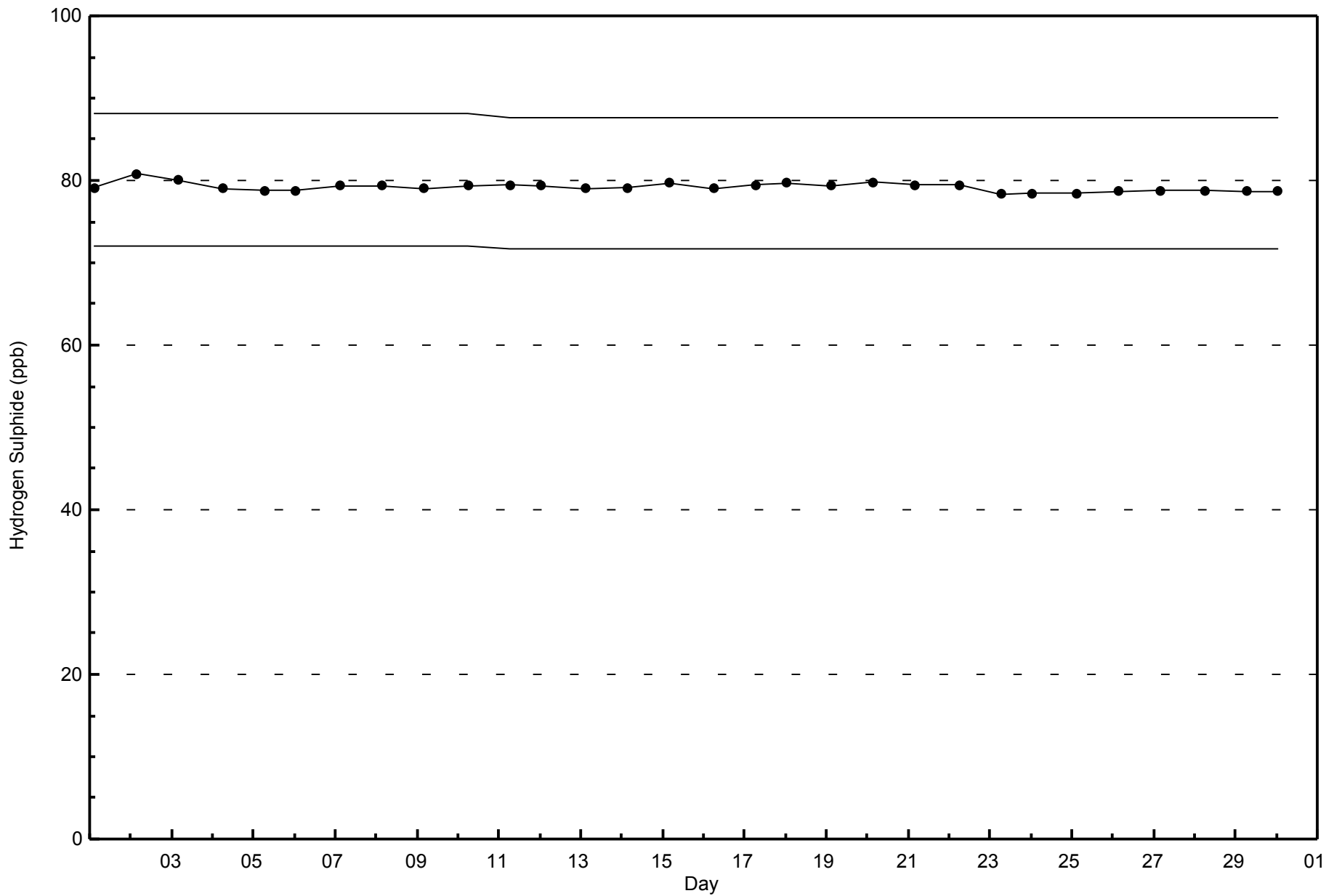
Hydrogen Sulphide (H₂S) - ppb
Wapasu - June 2015





WBEA
Span Responses

Hydrogen Sulphide (H₂S) - ppb
Wapasu - June 2015



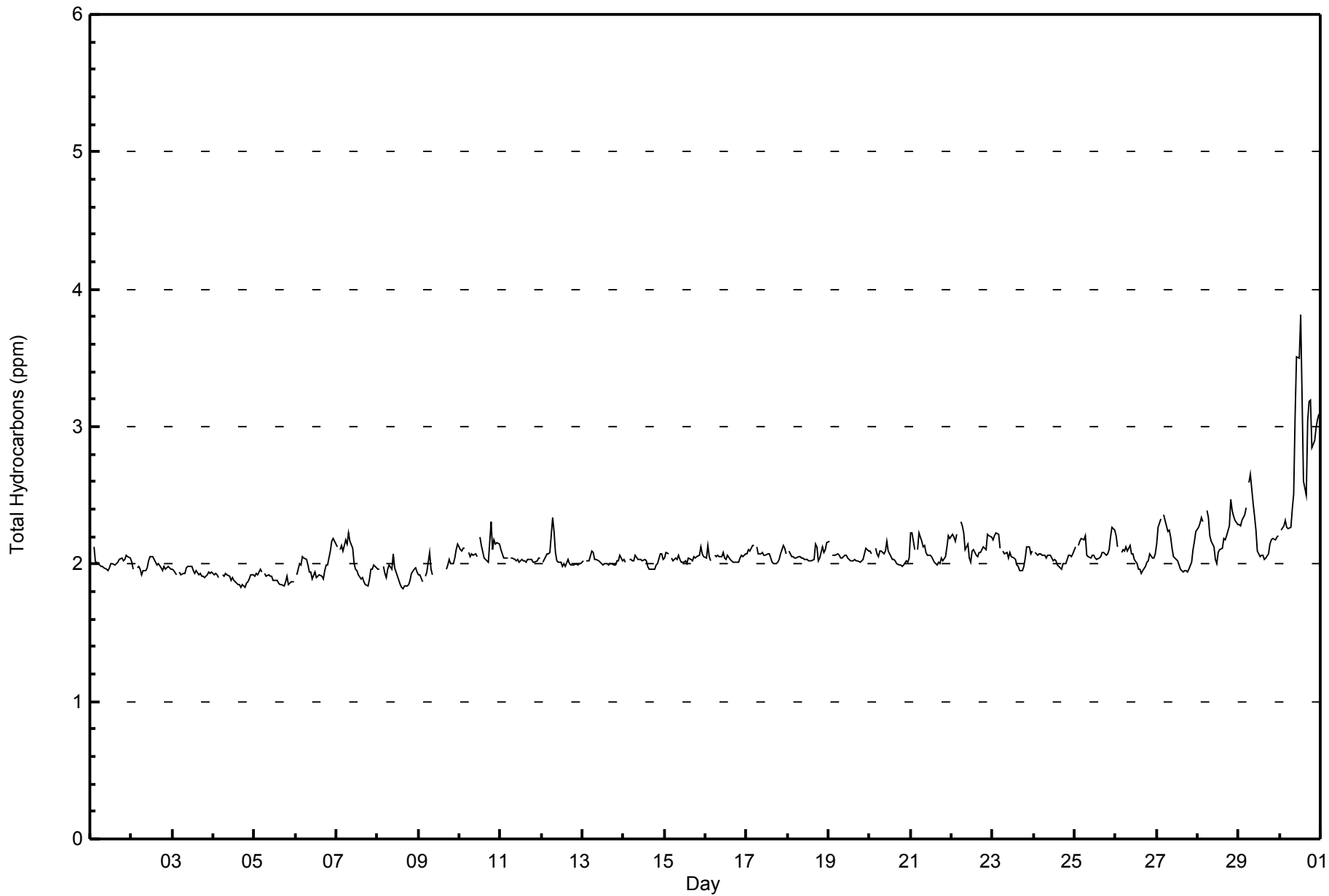


Maximum Value: 3.8 ppm on Jun 30 13:00		Maximum Daily Average: 2.8 ppm on Jun 30		Hours in Service: 720																													
Minimum Value: 1.8 ppm on Jun 8 16:00		Minimum Daily Average: 1.9 ppm on Jun 4		Hours of Data: 682																													
Maximum Diurnal Average: 2.1 ppm at hour 24		Minimum Diurnal Average: 2.0 ppm at hour 16		Hours of Missing Data: 38																													
Monthly Average: 2.07 ppm		Percentiles: P ₁ = 1.8 P ₁₀ = 1.9 Q ₁ = 2.0 Median = 2.0 Q ₃ = 2.1 P ₉₀ = 2.2 P ₉₉ = 3.1		Hours of Calibration: 37																													
				Percent Operational Time: 99.9																													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24									
1-Jun	2.1	Z	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	2.0	2.0	2.0	2.1	2.1						
2-Jun	2.0	2.0	Z	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1			
3-Jun	2.0	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	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	2.0		
4-Jun	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	1.8	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		
5-Jun	1.9	1.9	1.9	2.0	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0		
6-Jun	Z	1.9	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	2.0	2.0	2.0	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2		
7-Jun	2.1	Z	2.1	2.1	2.1	2.2	2.1	2.2	2.2	2.2	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2		
8-Jun	2.0	2.0	Z	2.0	1.9	1.9	2.0	2.0	2.0	2.1	2.0	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	2.1		
9-Jun	1.9	1.9	1.9	Z	1.9	1.9	2.1	2.0	1.9	C	C	C	C	C	C	C	C	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2		
10-Jun	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	M	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.3	2.1	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.3		
11-Jun	2.1	2.1	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1		
12-Jun	Z	2.0	2.1	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.3	
13-Jun	2.0	Z	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.1	
14-Jun	2.0	2.0	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	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	
15-Jun	2.0	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	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	
16-Jun	2.0	2.1	2.1	2.0	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	
17-Jun	2.1	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	
18-Jun	Z	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	
19-Jun	2.2	Z	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2
20-Jun	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2
21-Jun	2.2	2.2	2.1	Z	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
22-Jun	2.2	2.2	2.2	2.2	Z	2.3	2.3	2.2	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
23-Jun	2.2	2.2	2.2	2.2	2.1	Z	2.1	2.1	2.1	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2
24-Jun	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.1	2.0	2.1	2.0	2.1	2.0	2.1	
25-Jun	2.1	Z	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3
26-Jun	2.2	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.1	2.0	2.0	2.1	2.0	2.1	2.0	2.2
27-Jun	2.1	2.3	2.3	Z	2.4	2.3	2.2	2.2	2.2	2.1	2.1	2.0	2.0	2.0	2.0	1.9	2.0	2.0	1.9	2.0	2.0	2.1	2.2	2.2	2.2	2.1	2.0	2.1	2.2	2.2	2.1	2.4	
28-Jun	2.3	2.3	2.3	2.3	Z	2.4	2.3	2.2	2.2	2.1	2.0	2.0	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.3	2.5	2.4	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.5
29-Jun	2.3	2.3	2.3	2.4	2.4	Z	2.6	2.7	2.4	2.3	2.3	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.7
30-Jun	Z	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.5	3.1	3.5	3.5	3.8	3.2	2.6	2.5	3.0	3.2	3.2	2.8	2.9	3.0	3.0	3.1	2.8	2.8	2.8	2.8	2.8	2.8	2.8	3.8	
																								Diurnal Average									
																								Diurnal Maximum									
																								2.1									
																								2.3									
																								Z - zerspan									
																								C - Calibration									
																								M - Maintenance									



WBEA
Hourly Averages

Total Hydrocarbons (THC) - ppm
Wapasu - June 2015





WBEA
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Wapasu - June 2015

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	383	56.16	56.16
2.1 - 3.0	291	42.67	98.83
3.1 - 10.0	8	1.17	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 720



WBEA
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Wapasu - June 2015

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	38	20	13	8	9	12	34	40	24	20	17	32	24	24	33	35	383
2.1 - 3.0	18	10	8	15	12	19	38	45	13	17	15	10	12	15	24	20	291
3.1 - 10.0	1	0	0	0	0	0	2	0	2	1	0	0	2	0	0	0	8
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	57	30	21	23	21	31	74	85	39	38	32	42	38	39	57	55	682

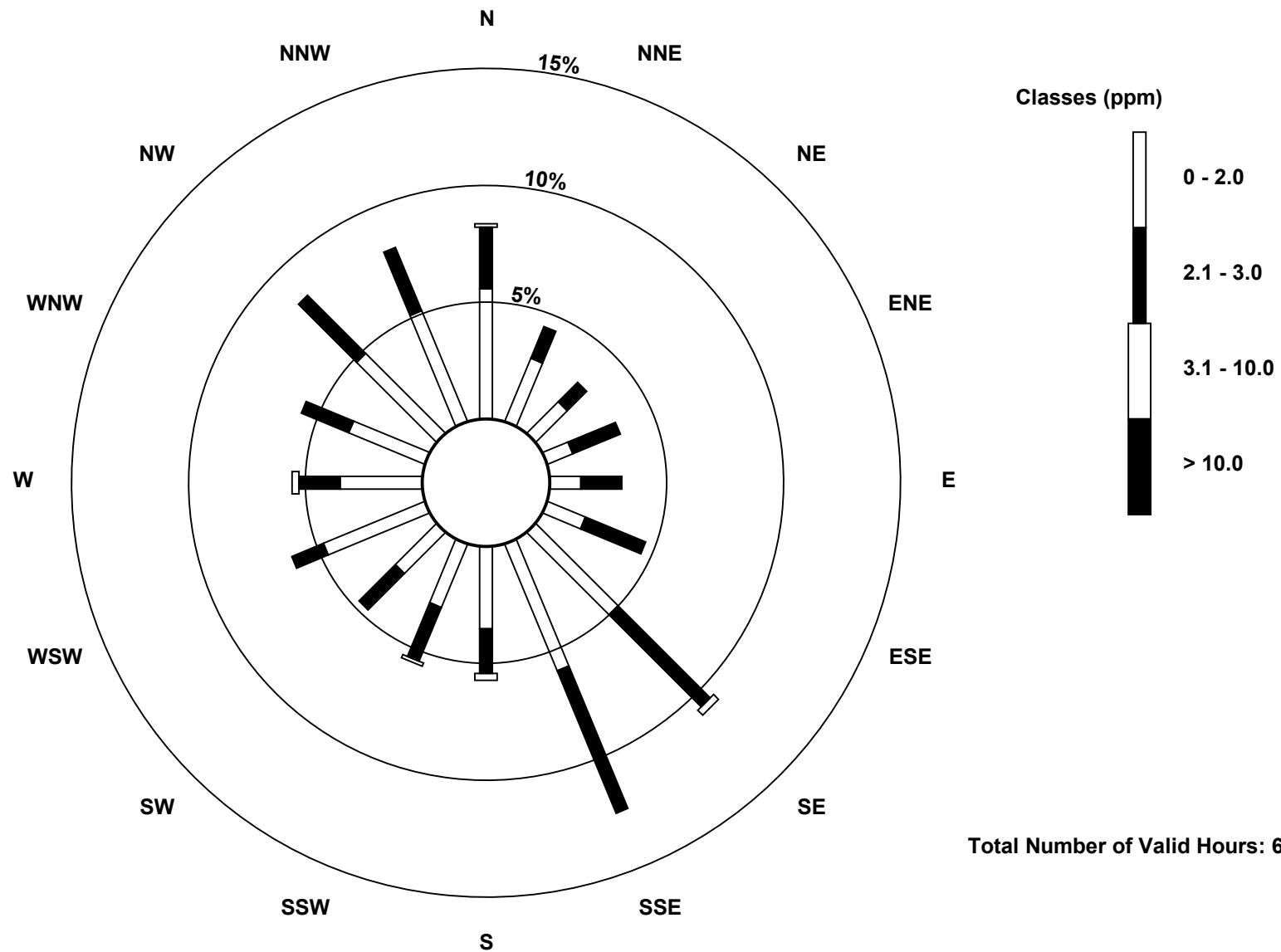
Total Number of Valid Hours: 682

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

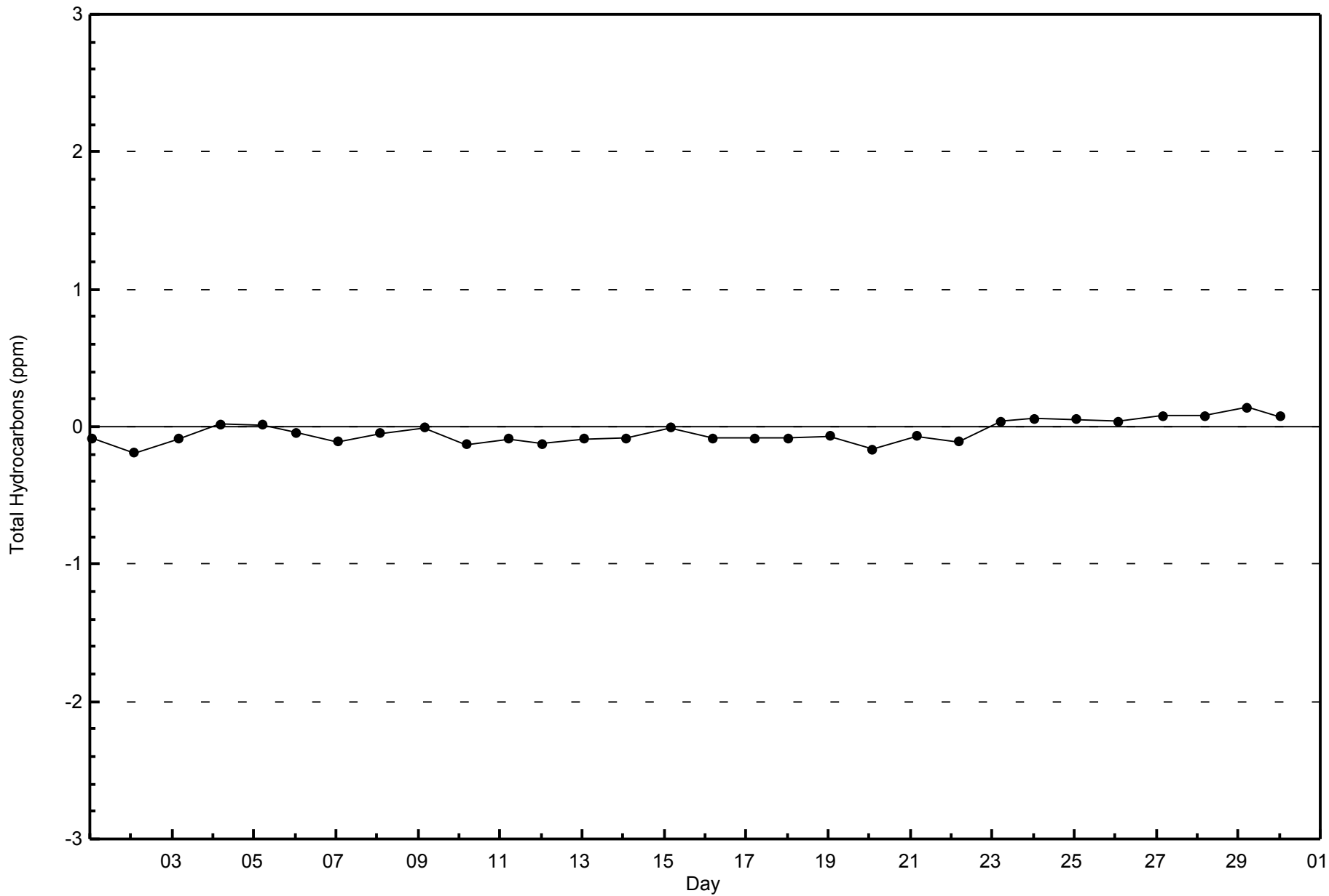
Total Hydrocarbons (THC) - ppm
Wapasu (AMS 17)





WBEA
Zero Responses

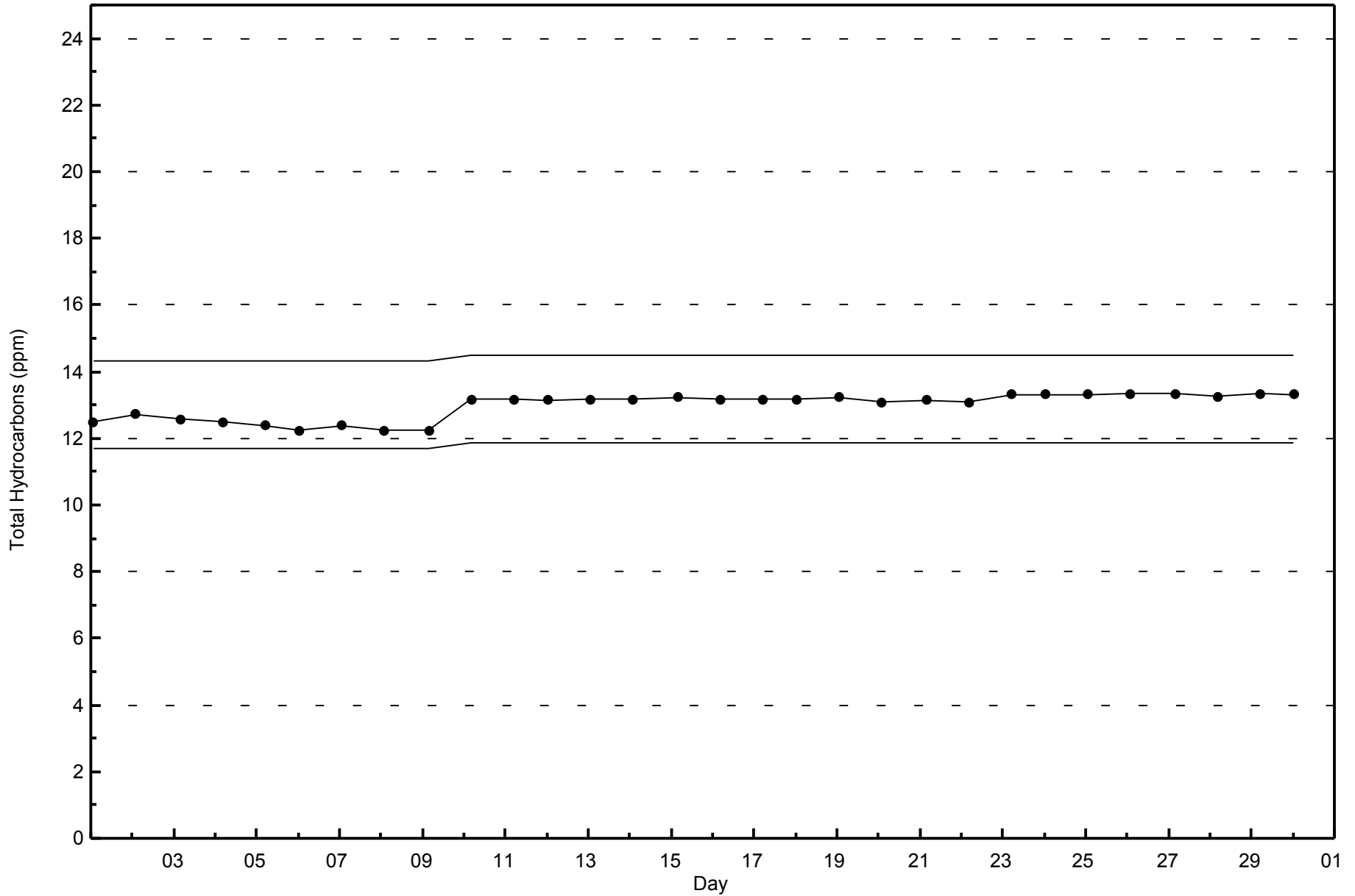
Total Hydrocarbons (THC) - ppm
Wapasu - June 2015





WBEA
Span Responses

Total Hydrocarbons (THC) - ppm
Wapasu - June 2015





Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

Wapasu - June 2015

Number of Exceedences (AAAO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 64 ppb on Jun 29 12:00	Maximum Daily Average: 49.0 ppb on Jun 4		Hours of Data:	687
Minimum Value: 1 ppb on Jun 10 03:00	Minimum Daily Average: 16.7 ppb on Jun 15		Hours of Missing Data:	33
Maximum Diurnal Average: 41.3 ppb at hour 15	Minimum Diurnal Average: 18.6 ppb at hour 3		Hours of Calibration:	33
Monthly Average: 31.2 ppb	Percentiles: P ₁ = 3 P ₁₀ = 11 Q ₁ = 21 Median = 32 Q ₃ = 41 P ₉₀ = 48 P ₉₉ = 59		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	18	11	18	Z	15	15	16	16	16	16	20	29	29	27	29	31	32	32	32	32	23	11	8	7	21.0	32
2-Jun	7	14	20	10	Z	19	29	31	31	32	34	35	39	41	39	39	40	41	43	42	38	34	36	35	31.8	43
3-Jun	34	33	32	31	32	Z	35	37	38	39	42	45	48	50	51	50	50	50	50	50	48	47	45	45	42.8	51
4-Jun	44	43	41	40	40	40	Z	49	53	56	55	54	56	60	57	55	53	52	50	48	48	46	43	44	49.0	60
5-Jun	43	43	42	42	39	40	39	Z	48	52	56	58	59	59	58	57	55	52	47	48	50	47	45	45	48.8	59
6-Jun	43	36	Z	27	23	21	23	29	36	40	52	52	53	51	49	43	45	43	43	46	37	25	15	11	36.6	53
7-Jun	11	11	11	Z	27	18	23	23	29	37	45	46	47	47	47	48	49	49	50	44	36	33	39	35.4	50	
8-Jun	30	22	13	16	Z	19	24	26	32	37	39	34	32	26	28	30	29	28	24	23	23	17	12	18	25.2	39
9-Jun	22	22	21	19	18	Z	16	25	33	37	37	37	40	36	43	43	42	41	37	35	31	25	13	4	29.4	43
10-Jun	3	2	1	5	5	13	Z	28	29	C	C	C	38	38	39	41	44	45	45	39	24	16	21	32	25.4	45
11-Jun	35	36	33	31	31	30	32	Z	29	28	24	30	38	50	48	48	45	43	46	46	44	43	38	42	37.9	50
12-Jun	48	32	Z	10	16	25	23	33	47	53	54	52	53	46	46	36	29	32	37	36	38	33	31	26	36.3	54
13-Jun	24	17	19	Z	22	17	22	26	29	36	44	41	36	38	38	37	39	38	38	38	36	33	22	27	31.2	44
14-Jun	31	29	29	25	Z	29	30	31	32	35	35	38	39	40	44	43	44	41	38	36	30	20	16	15	32.6	44
15-Jun	14	15	13	14	12	Z	12	14	14	17	19	19	20	22	23	24	22	22	22	20	14	8	13	12	16.7	24
16-Jun	11	15	17	20	21	22	Z	23	24	24	26	26	30	32	33	33	33	32	33	33	26	22	26	30	25.7	33
17-Jun	28	22	23	14	9	10	19	Z	28	31	33	34	35	35	35	35	35	37	37	36	35	28	31	34	29.0	37
18-Jun	30	27	Z	28	28	27	27	29	30	32	34	39	42	43	43	44	46	45	44	43	33	32	27	14	34.2	46
19-Jun	8	18	27	Z	25	25	25	28	31	32	32	34	35	37	37	39	40	40	40	40	38	31	27	30	31.2	40
20-Jun	27	24	19	21	Z	28	26	33	36	37	36	42	39	40	42	44	42	41	40	38	34	30	29	23	33.6	44
21-Jun	17	9	5	14	18	Z	31	32	35	37	37	37	36	37	38	38	37	38	36	35	35	24	15	10	28.3	38
22-Jun	8	10	9	7	8	10	Z	19	27	33	35	35	36	31	36	36	34	27	24	20	10	3	2	3	20.0	36
23-Jun	3	2	2	5	14	17	20	Z	29	35	34	40	42	43	41	44	45	40	39	35	25	24	24	21	27.1	45
24-Jun	15	14	Z	22	21	18	20	25	27	34	39	43	45	45	48	50	51	49	45	41	30	36	36	33	34.3	51
25-Jun	29	26	21	Z	8	10	29	40	41	41	43	47	51	51	55	47	46	44	41	36	28	26	21	21	34.9	55
26-Jun	22	28	32	31	Z	24	23	26	24	29	31	39	36	36	40	40	38	34	25	17	18	17	13	12	27.5	40
27-Jun	8	4	5	5	7	Z	10	15	25	33	39	40	44	43	37	37	39	41	41	38	30	22	19	13	25.9	44
28-Jun	10	12	11	17	16	15	Z	36	43	45	41	55	49	35	38	42	42	40	30	17	12	8	6	7	27.3	55
29-Jun	6	5	2	3	6	10	14	Z	32	48	60	64	61	61	62	56	56	56	58	46	45	45	45	43	38.5	64
30-Jun	39	32	Z	35	34	29	30	29	16	8	7	12	16	23	17	11	6	5	3	6	6	4	8	8	16.7	39

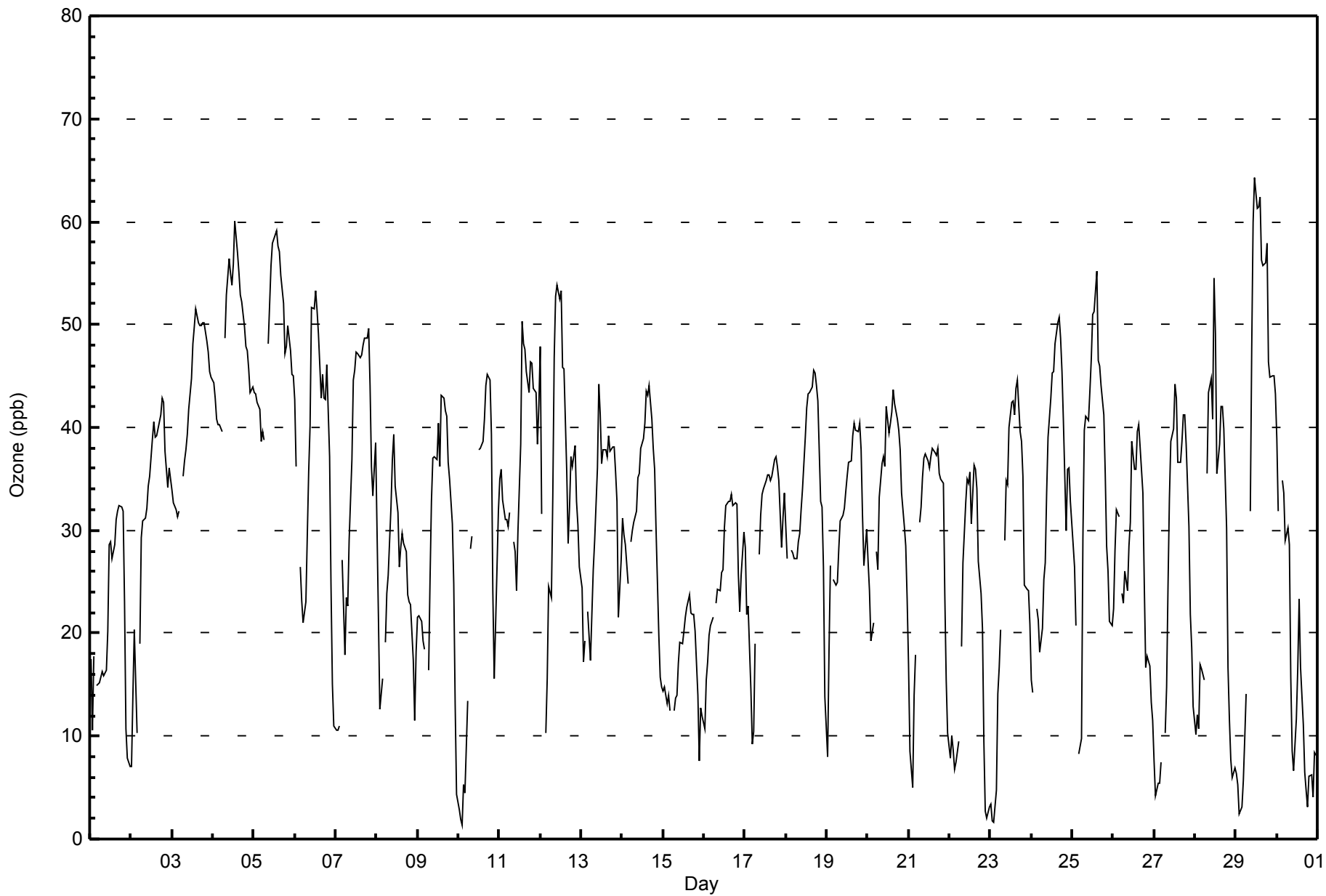
22.3	20.5	18.6	19.7	19.8	21.2	24.0	28.1	31.4	34.9	37.4	39.8	40.9	40.9	41.3	40.6	40.2	39.2	37.8	35.7	31.0	26.4	24.0	23.5	Diurnal Average	
48	43	42	42	40	40	39	49	53	56	60	64	61	61	62	57	56	56	58	50	50	47	45	45	Diurnal Maximum	

Z - zeronspan C - Calibration
 Alberta Ambient Air Quality Objectives (AAAO): 1-hr 82 ppb



WBEA
Hourly Averages

Ozone (O₃) - ppb
Wapasu - June 2015





WBEA
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Wapasu - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	158	23.00	23.00
21 - 50	487	70.89	93.89
51 - 82	42	6.11	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720



WBEA
Frequency Distribution

Ozone (O₃) - ppb
Wapasu - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	9	6	3	8	3	15	32	30	7	4	1	4	4	4	12	16	158
21 - 50	47	23	18	16	15	18	42	54	25	24	29	39	29	31	42	35	487
51 - 82	1	1	2	0	1	0	0	2	8	8	2	1	3	7	4	2	42
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	57	30	23	24	19	33	74	86	40	36	32	44	36	42	58	53	687

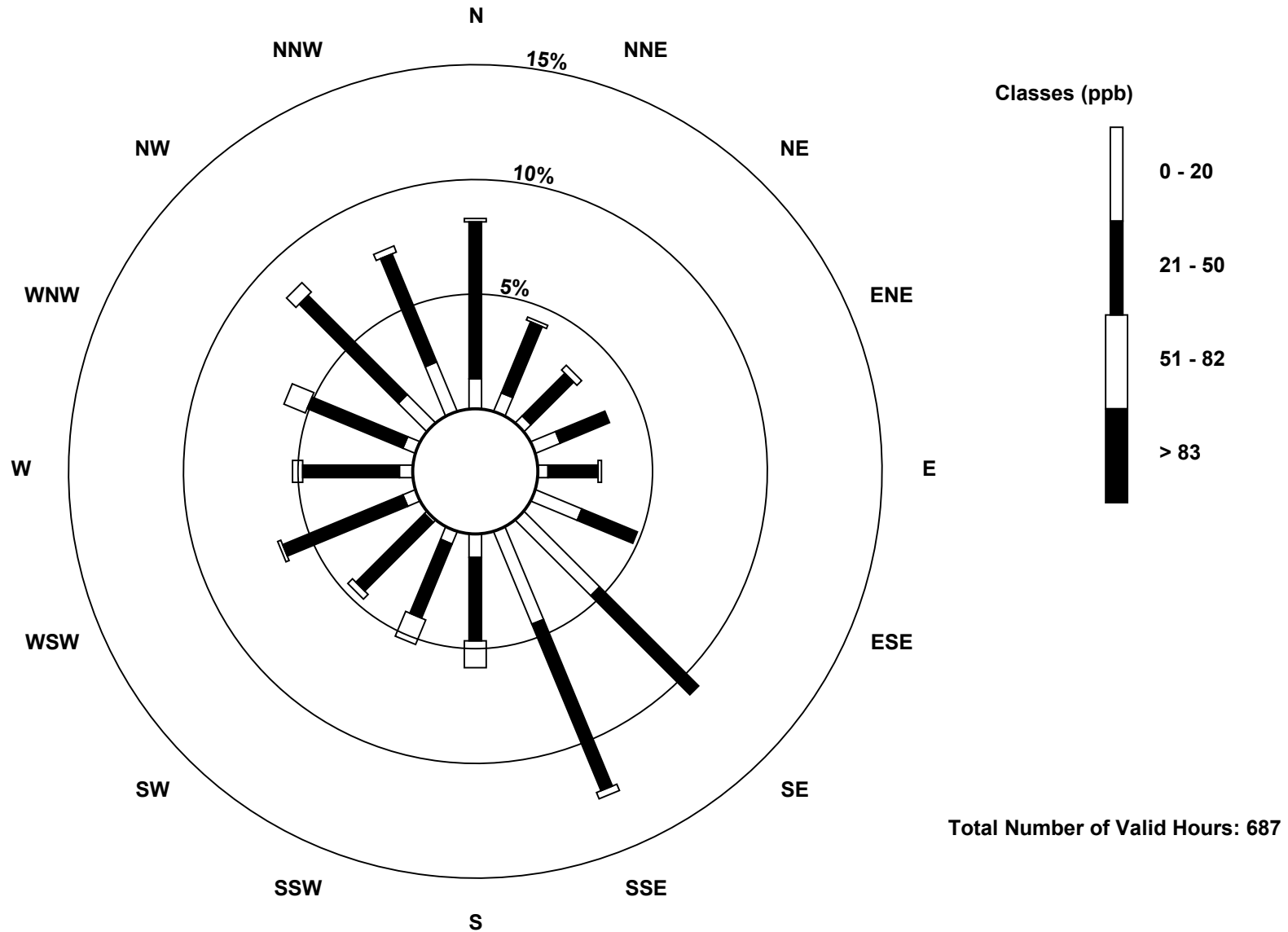
Total Number of Valid Hours: 687

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

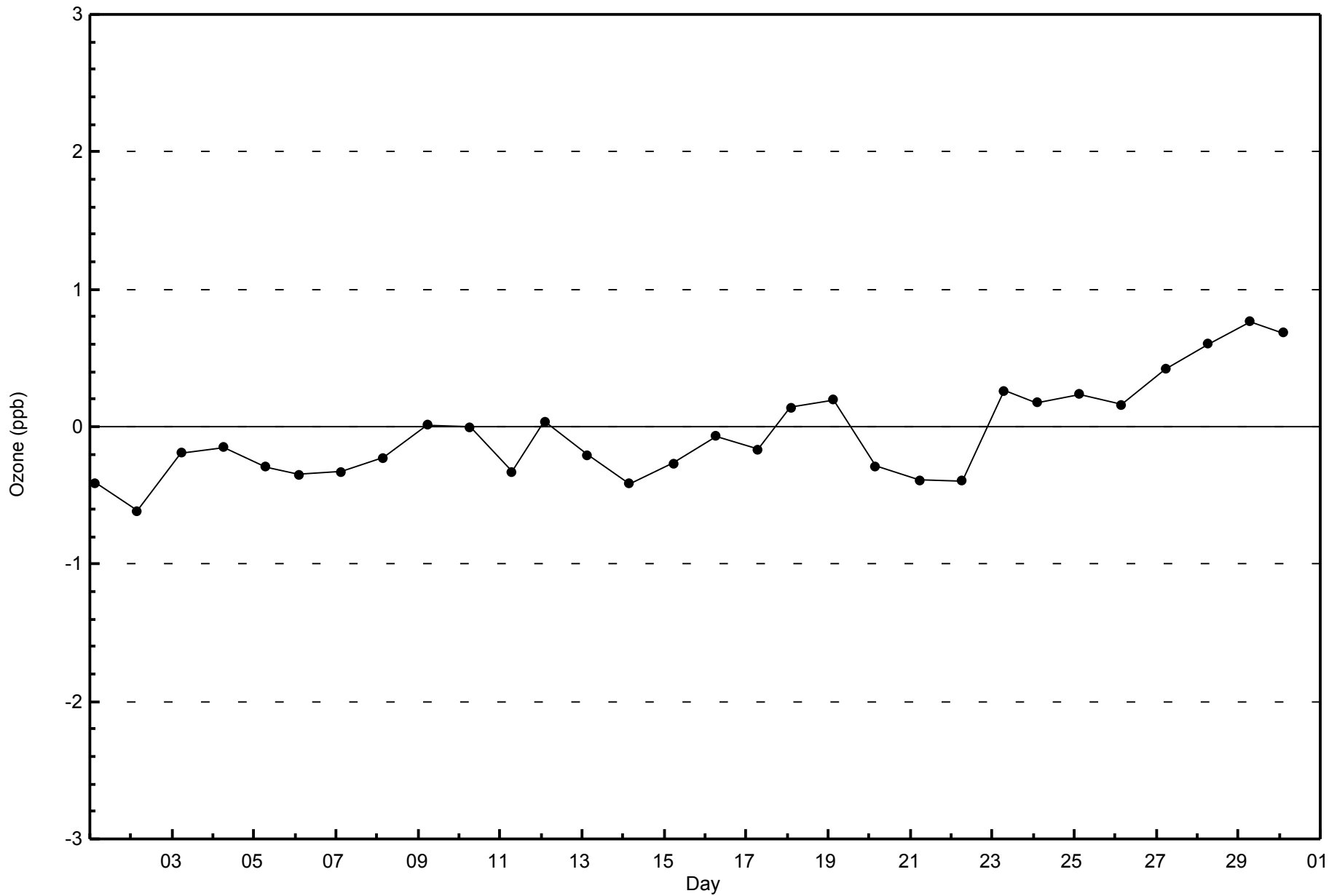
Ozone (O₃) - ppb
Wapasu (AMS 17)





WBEA
Zero Responses

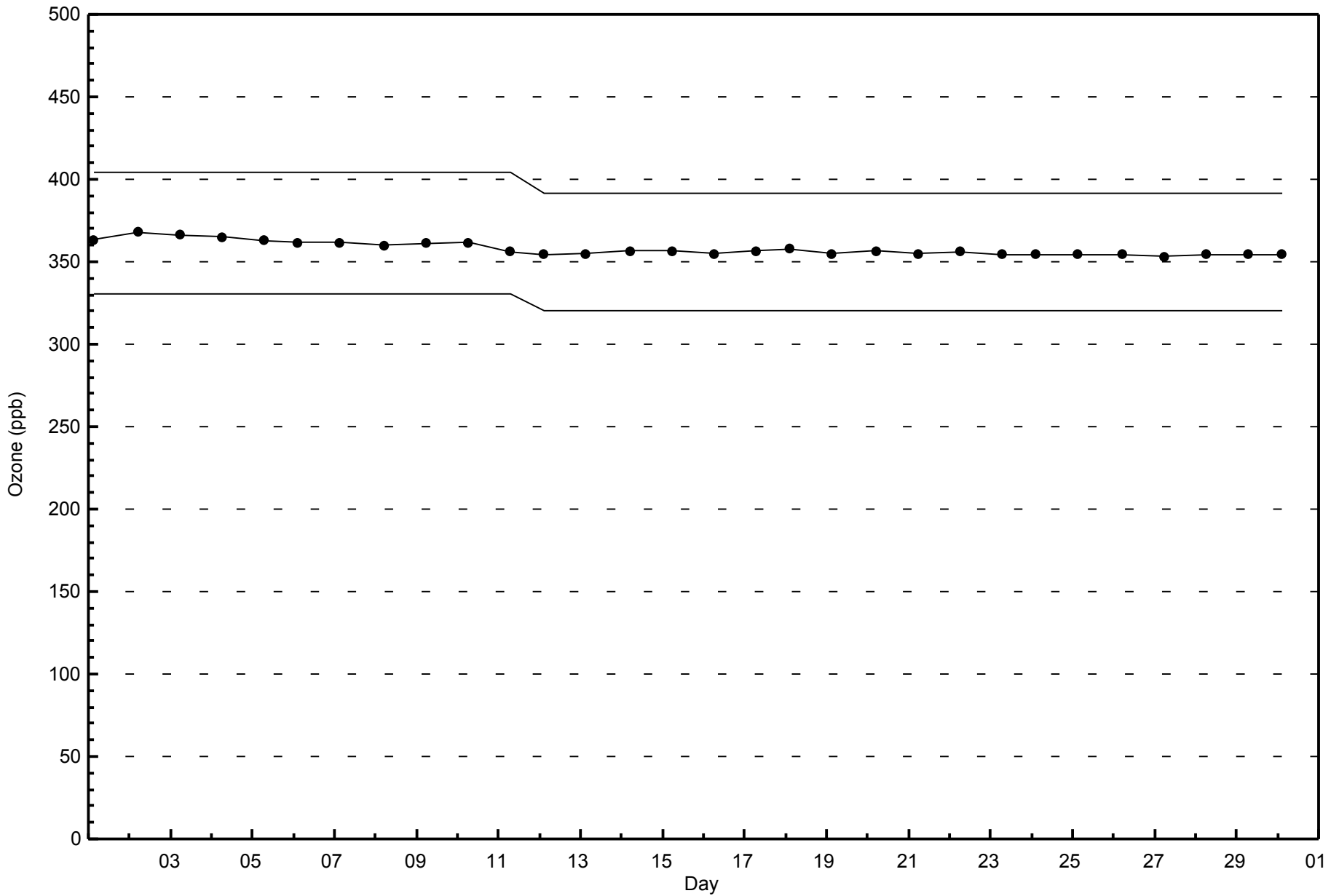
Ozone (O₃) - ppb
Wapasu - June 2015





WBEA
Span Responses

Ozone (O₃) - ppb
Wapasu - June 2015



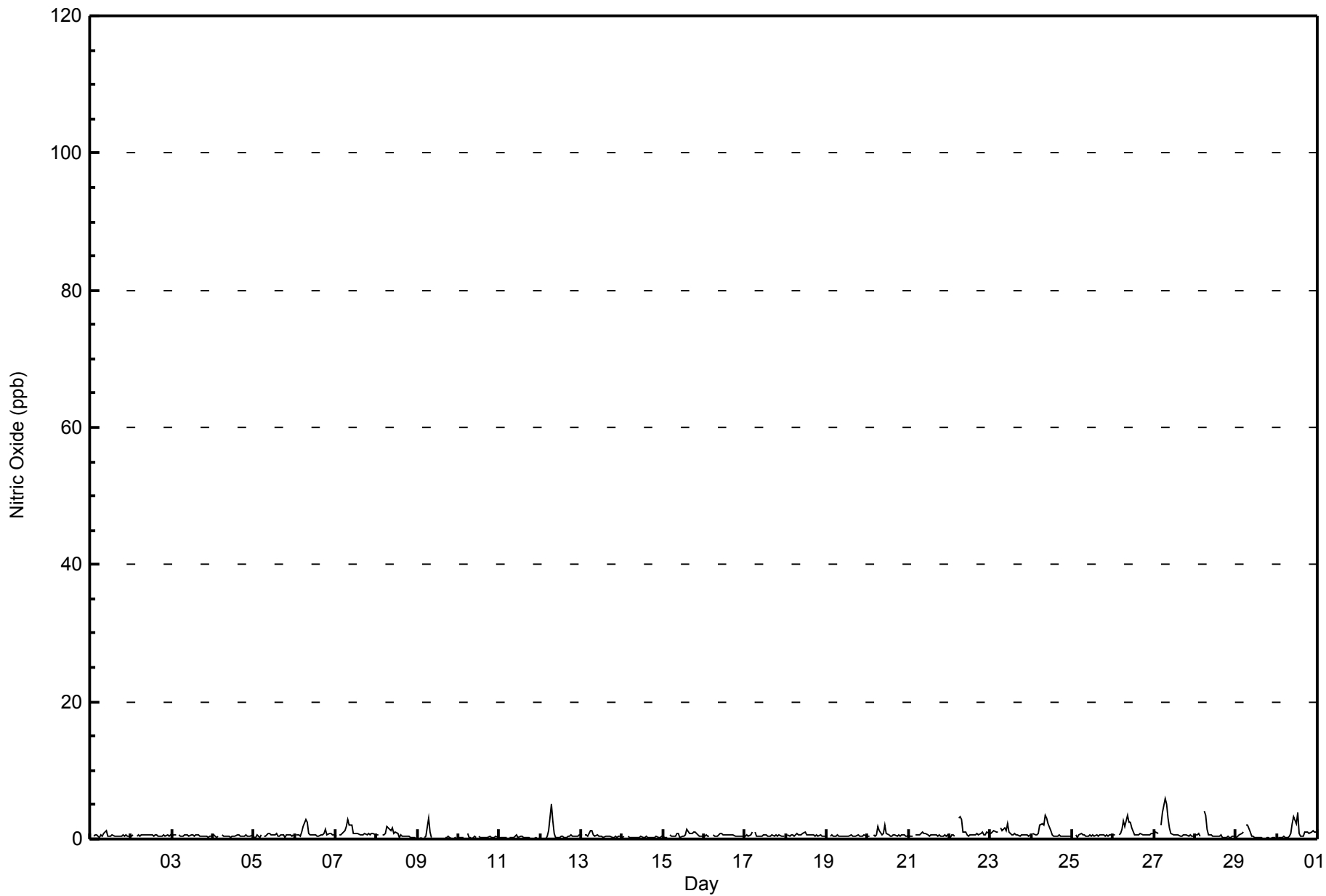


Maximum Value: 6 ppb on Jun 27 07:00		Maximum Daily Average: 1.4 ppb on Jun 27		Hours in Service: 720																						
Minimum Value: 0 ppb on Jun 11 21:00		Minimum Daily Average: 0.2 ppb on Jun 11		Hours of Data: 682																						
Maximum Diurnal Average: 1.6 ppb at hour 7		Minimum Diurnal Average: 0.4 ppb at hour 1		Hours of Missing Data: 38																						
Monthly Average: 0.7 ppb		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 1 P ₉₀ = 1 P ₉₉ = 3		Hours of Calibration: 37																						
				Percent Operational Time: 99.9																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	Z	0	1	1	0	1	1	1	1	0	0	0	1	0	0	0	1	0	1	1	1	0	0	0.5	1
2-Jun	0	1	Z	0	1	0	1	1	1	1	1	1	0	1	1	0	0	0	0	1	1	1	1	1	0.5	1
3-Jun	0	1	1	Z	1	0	0	1	1	1	0	1	1	0	1	1	0	0	0	0	0	0	0	0	0.5	1
4-Jun	1	0	0	0	Z	1	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0	0	0	1	0.4	1
5-Jun	0	0	1	0	1	Z	0	0	1	1	1	1	1	1	0	0	1	1	0	1	1	1	0	1	0.5	1
6-Jun	Z	1	1	0	1	2	3	3	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	0.9	3
7-Jun	1	Z	1	1	1	1	2	3	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.0	3
8-Jun	1	1	Z	1	1	1	2	2	1	2	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0.7	2
9-Jun	0	0	0	Z	0	0	3	1	0	C	C	C	C	C	C	C	0	0	0	0	0	0	0	0	--	3
10-Jun	0	0	0	0	Z	1	0	0	0	0	0	M	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
11-Jun	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
12-Jun	Z	0	0	0	0	1	5	3	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0.7	5
13-Jun	1	Z	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1
14-Jun	0	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
15-Jun	0	0	0	Z	1	0	0	0	1	1	0	0	0	1	1	1	1	1	1	1	1	1	0	0	0.6	1
16-Jun	0	1	0	0	Z	1	0	0	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0.5	1
17-Jun	0	1	0	1	1	Z	1	0	0	1	0	1	1	0	0	0	1	0	1	0	1	0	0	0	0.5	1
18-Jun	Z	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	0	0	0	0.6	1
19-Jun	0	Z	0	1	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0.4	1
20-Jun	0	0	Z	1	1	1	2	1	1	1	2	1	1	0	1	1	1	0	1	0	1	1	0	0	0.7	2
21-Jun	1	0	0	Z	1	1	1	1	1	1	1	1	0	1	1	1	1	0	1	0	0	1	0	1	0.6	1
22-Jun	0	1	1	0	Z	3	3	3	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1.0	3
23-Jun	1	1	1	1	1	Z	2	1	2	1	2	1	1	1	1	1	0	1	1	1	1	1	0	1	0.9	2
24-Jun	Z	1	1	1	1	2	2	2	3	3	2	1	1	0	0	0	1	0	0	0	0	0	0	0	1.0	3
25-Jun	0	Z	1	0	1	1	1	1	0	0	1	0	1	0	1	0	1	1	1	0	1	1	1	1	0.5	1
26-Jun	1	1	Z	1	1	1	3	2	3	2	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1.2	3
27-Jun	1	1	1	Z	2	4	6	5	3	2	1	1	1	1	1	0	0	1	1	1	1	0	1	0	1.4	6
28-Jun	1	1	1	0	Z	4	3	1	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.7	4
29-Jun	0	0	1	1	1	Z	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2
30-Jun	Z	0	0	0	0	0	0	0	1	2	3	2	4	1	0	1	1	1	1	1	1	1	1	1	1.0	4
																								Diurnal Average		
																								Diurnal Maximum		
																								Z - zerspan		
																								C - Calibration		
																								M - Maintenance		



WBEA
Hourly Averages

Nitric Oxide (NO) - ppb
Wapasu - June 2015





WBEA
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Wapasu - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	682	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 720



WBEA
Frequency Distribution

Nitric Oxide (NO) - ppb
Wapasu - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	57	30	21	23	21	31	74	85	39	38	32	42	38	39	57	55	682
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	57	30	21	23	21	31	74	85	39	38	32	42	38	39	57	55	682

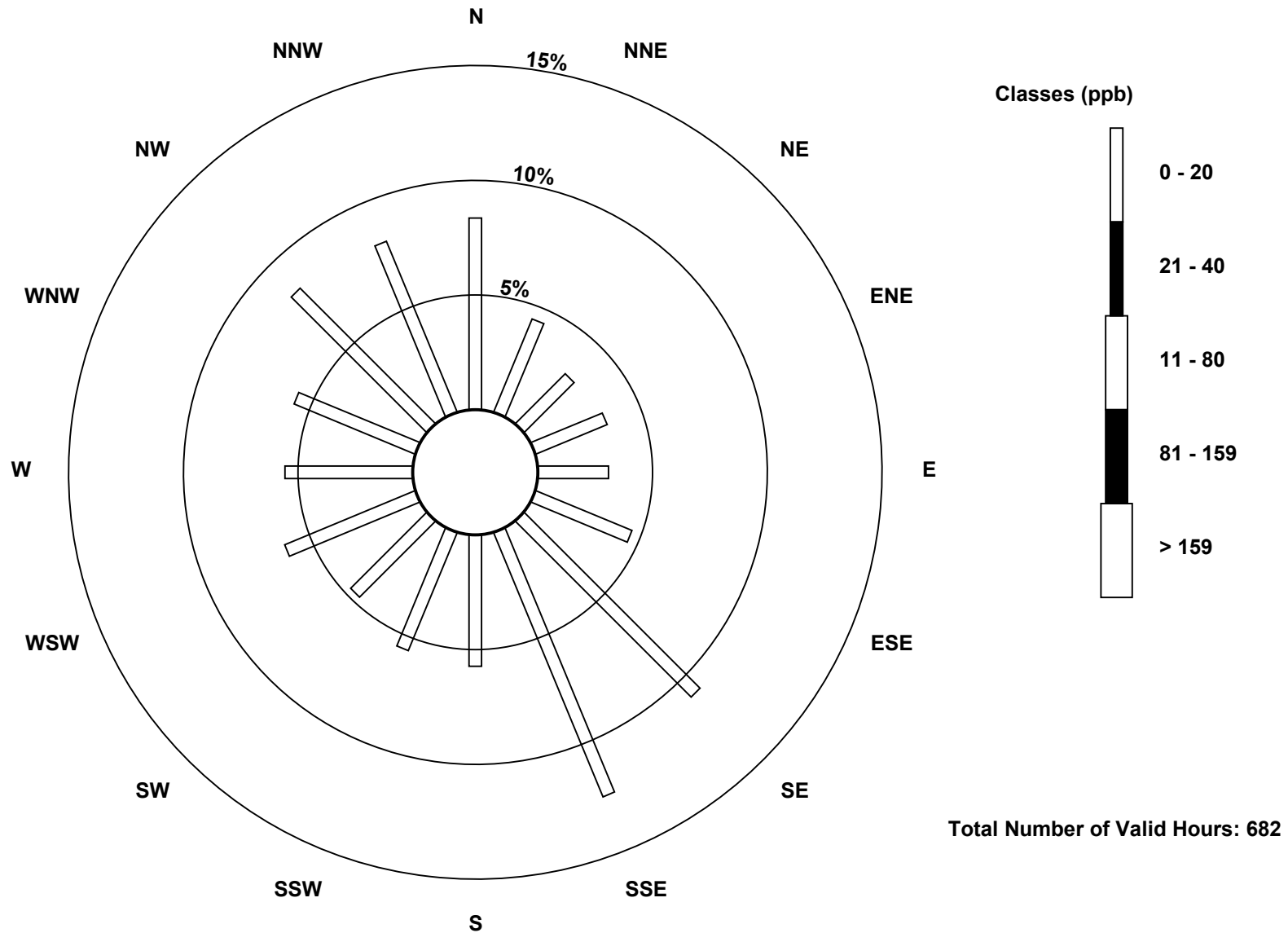
Total Number of Valid Hours: 682

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

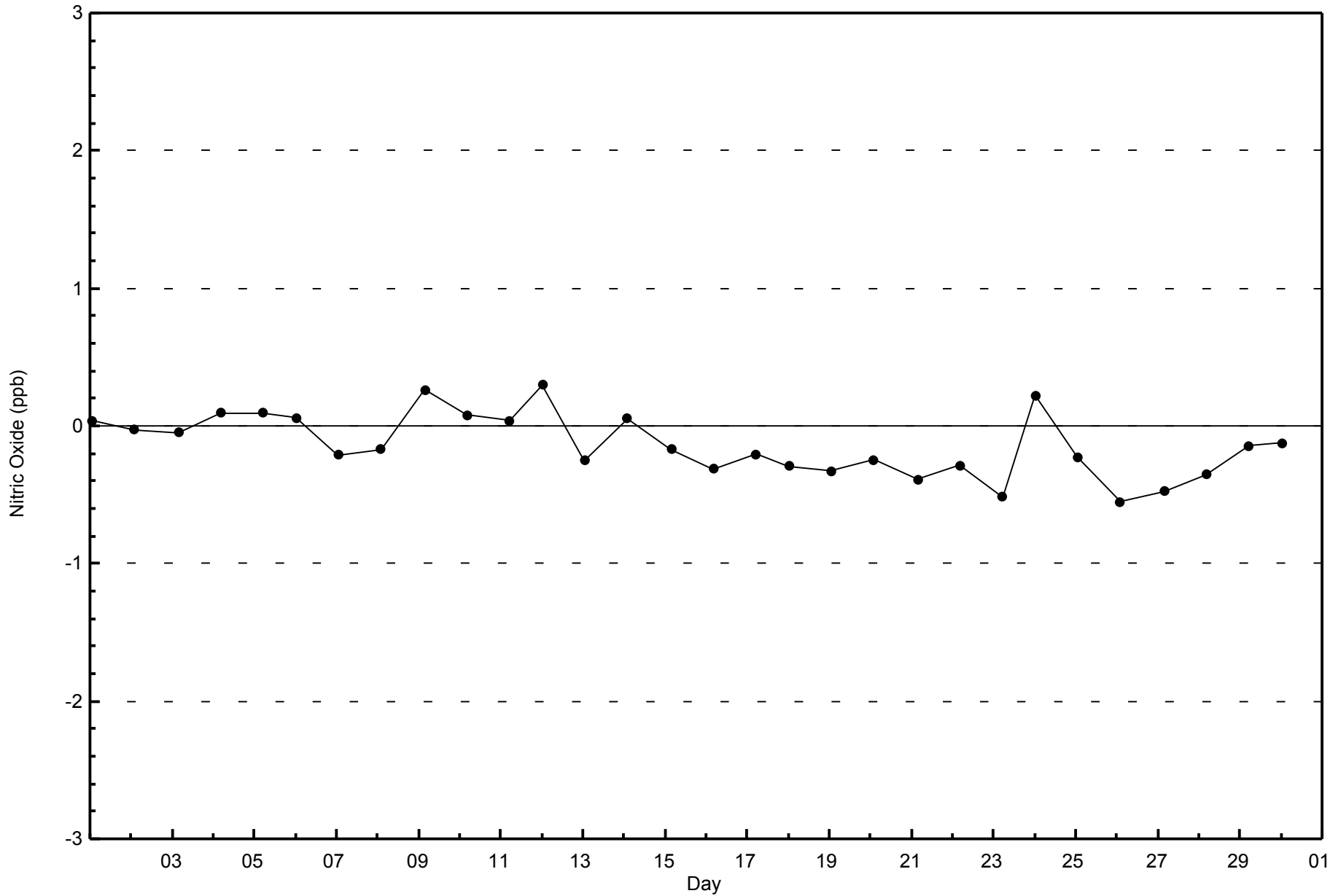
Nitric Oxide (NO) - ppb
Wapasu (AMS 17)





WBEA
Zero Responses

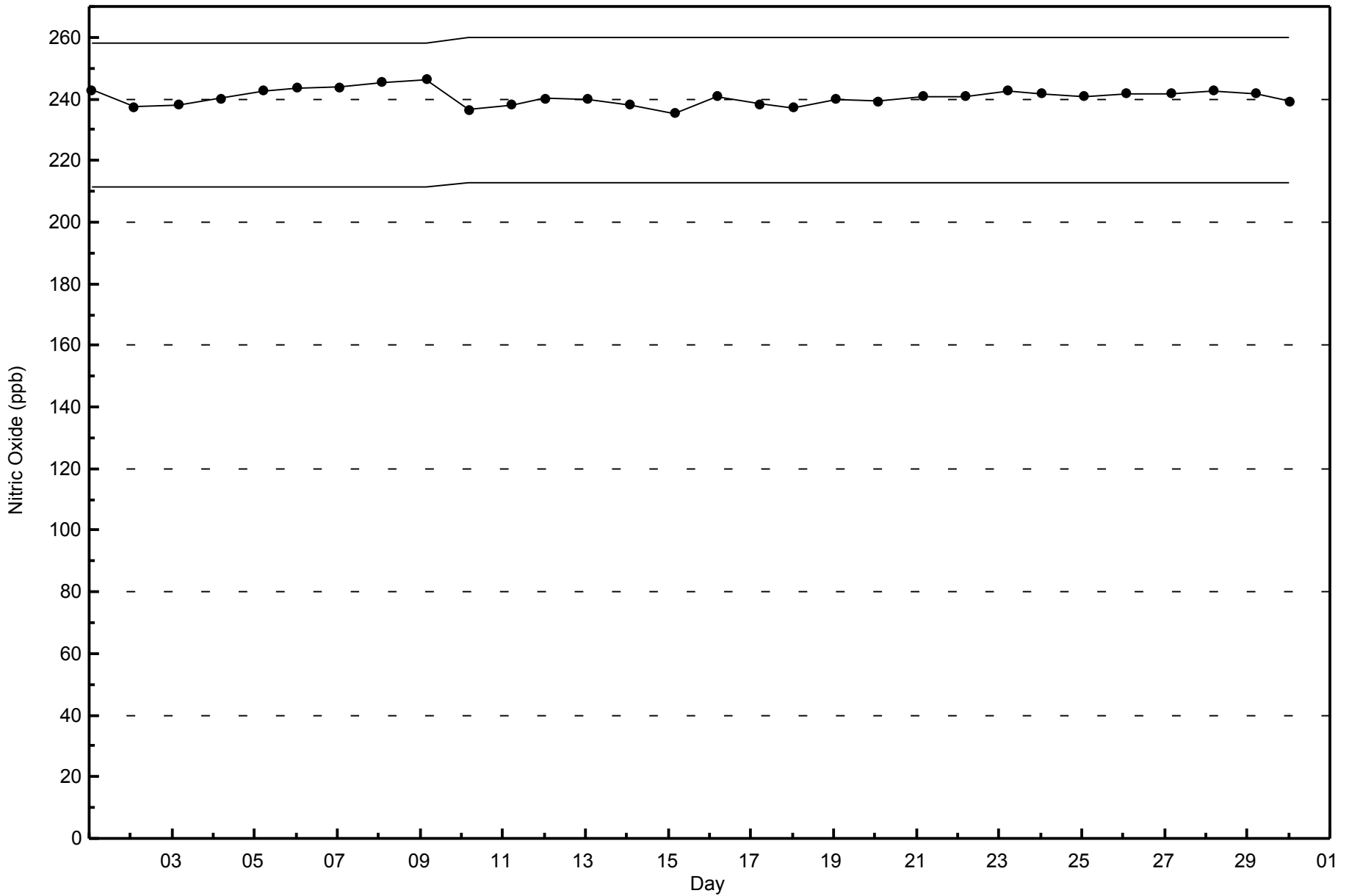
Nitric Oxide (NO) - ppb
Wapasu - June 2015





WBEA
Span Responses

Nitric Oxide (NO) - ppb
Wapasu - June 2015





Summary of Hour Averages

Wapasu - June 2015

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 27 ppb on Jun 30 13:00	Maximum Daily Average: 10.3 ppb on Jun 30		Hours of Data:	682
Minimum Value: 0 ppb on Jun 1 12:00	Minimum Daily Average: 0.1 ppb on Jun 19		Hours of Missing Data:	38
Maximum Diurnal Average: 4.3 ppb at hour 7	Minimum Diurnal Average: 1.1 ppb at hour 15		Hours of Calibration:	37
Monthly Average: 2.3 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 3 P ₉₀ = 7 P ₉₉ = 15		Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	5	Z	8	4	5	2	2	2	1	2	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1.5	8
2-Jun	1	1	Z	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0.3	1
3-Jun	0	0	0	Z	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	0.6	2
4-Jun	1	1	1	0	Z	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1.0	2
5-Jun	1	1	1	1	2	Z	2	2	2	3	2	2	2	1	1	2	2	3	3	2	1	1	1	1	1.7	3
6-Jun	Z	2	6	7	10	10	9	7	2	2	2	3	1	1	1	1	0	3	7	4	6	8	6	3	4.4	10
7-Jun	2	Z	6	9	7	11	13	14	10	8	2	1	1	1	1	1	1	1	1	2	2	1	1	4	4.3	14
8-Jun	4	5	Z	3	1	2	4	4	3	5	3	4	2	1	1	1	1	1	1	2	3	3	2	2	2.5	5
9-Jun	3	3	1	Z	2	3	9	5	2	C	C	C	C	C	C	C	0	1	2	0	0	1	1	0	--	9
10-Jun	0	0	0	2	Z	1	0	0	0	0	0	M	1	1	0	1	1	1	2	2	1	1	1	4	0.9	4
11-Jun	2	1	0	0	0	Z	2	1	2	3	2	1	1	2	2	1	2	2	1	1	1	1	3	4	1.4	4
12-Jun	Z	1	4	2	3	5	14	9	3	1	1	1	1	1	0	3	1	1	2	2	0	0	0	0	2.3	14
13-Jun	0	Z	0	0	0	6	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	6
14-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2	0.2	4
15-Jun	2	0	1	Z	2	3	1	0	1	1	0	0	0	0	2	1	2	2	2	3	2	1	1	3	1.3	3
16-Jun	4	5	1	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	5
17-Jun	1	5	2	7	4	Z	2	0	0	0	0	0	0	0	0	0	0	0	1	2	2	6	4	2	1.7	7
18-Jun	Z	2	0	0	0	0	1	1	0	1	1	2	1	2	2	2	2	1	2	2	4	1	3	5	1.5	5
19-Jun	3	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	3
20-Jun	0	0	Z	1	1	1	4	2	0	1	4	2	0	0	0	0	1	0	0	0	0	0	0	0	0.8	4
21-Jun	0	0	0	Z	2	0	0	2	2	2	1	1	0	0	0	0	0	0	1	1	0	0	2	2	0.7	2
22-Jun	3	6	3	2	Z	10	8	7	2	2	1	0	0	1	0	0	1	2	1	1	1	0	0	0	2.2	10
23-Jun	0	0	0	0	0	Z	2	2	3	2	5	2	1	1	1	1	0	0	1	3	5	7	5	5	2.0	7
24-Jun	Z	11	4	3	2	6	5	4	7	7	6	3	1	1	1	1	1	1	1	0	0	1	1	1	2.9	11
25-Jun	1	Z	1	1	1	1	2	2	1	1	1	1	1	1	1	1	2	2	2	1	3	4	7	8	1.9	8
26-Jun	7	2	Z	1	2	5	8	5	8	5	6	4	0	0	0	1	1	1	1	1	0	0	1	5	2.7	8
27-Jun	7	7	10	Z	10	7	8	7	6	3	2	1	1	1	0	0	0	0	1	0	2	4	6	7	3.9	10
28-Jun	6	11	15	9	Z	15	14	7	4	3	1	2	7	8	7	9	7	8	7	5	4	3	3	2	6.8	15
29-Jun	3	5	5	9	8	Z	13	15	11	7	7	4	2	2	3	2	2	2	3	3	2	2	2	2	5.0	15
30-Jun	Z	2	2	3	2	1	2	4	10	20	23	21	27	15	7	5	15	11	10	6	5	14	16	14	10.3	27

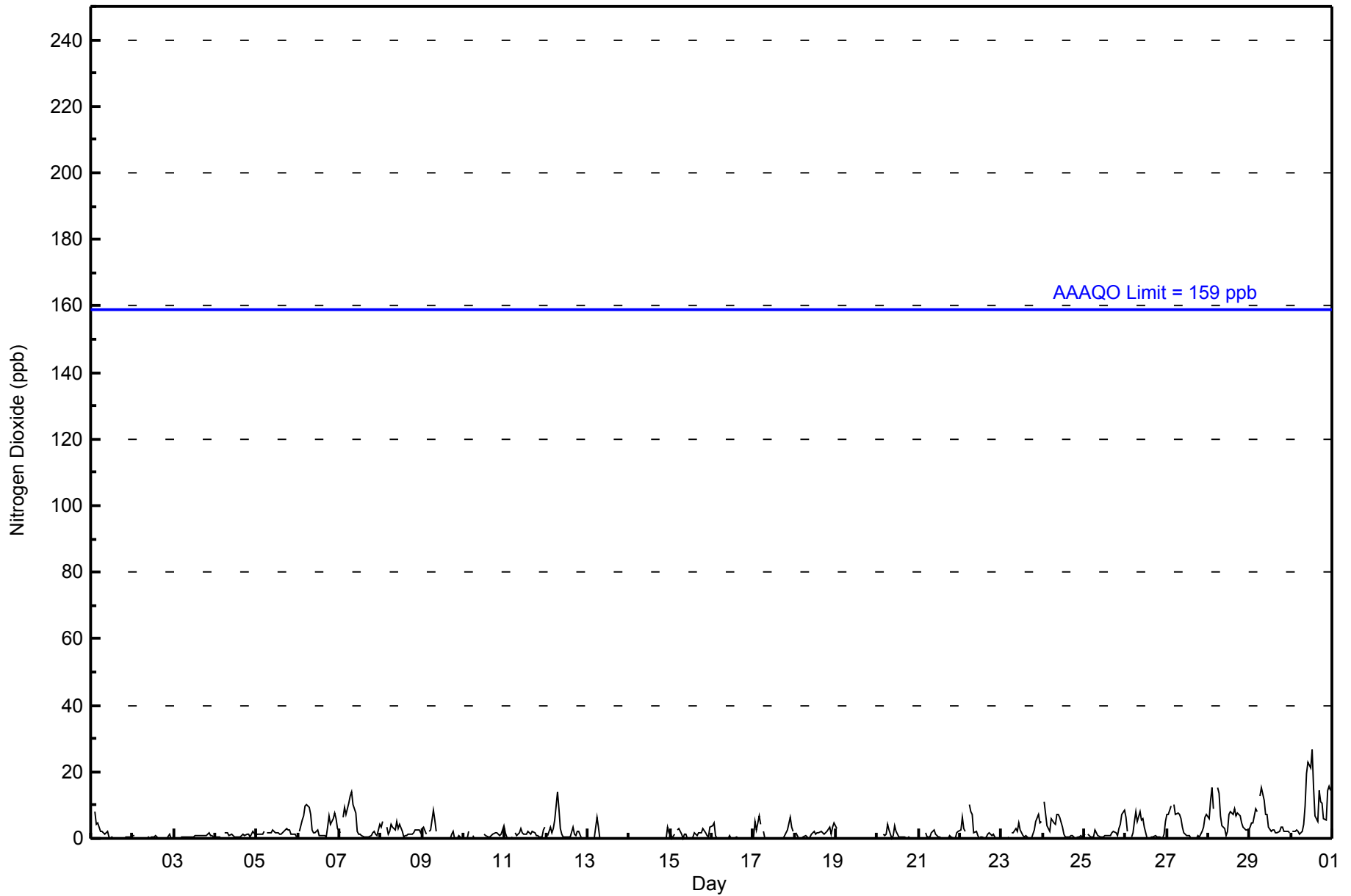
2.2	2.8	2.9	2.6	2.6	3.7	4.3	3.5	2.7	2.8	2.5	2.0	1.9	1.4	1.1	1.1	1.4	1.5	1.7	1.4	1.6	2.1	2.4	2.6	Diurnal Average	
7	11	15	9	10	15	14	15	11	20	23	21	27	15	7	9	15	11	10	6	6	14	16	14	Diurnal Maximum	

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



WBEA
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Wapasu - June 2015





WBEA
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Wapasu - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	679	99.56	99.56
21 - 40	3	0.44	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 720



WBEA
Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Wapasu - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	57	30	21	23	21	31	74	85	38	38	32	42	36	39	57	55	679
21 - 40	0	0	0	0	0	0	0	0	1	0	0	0	2	0	0	0	3
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	57	30	21	23	21	31	74	85	39	38	32	42	38	39	57	55	682

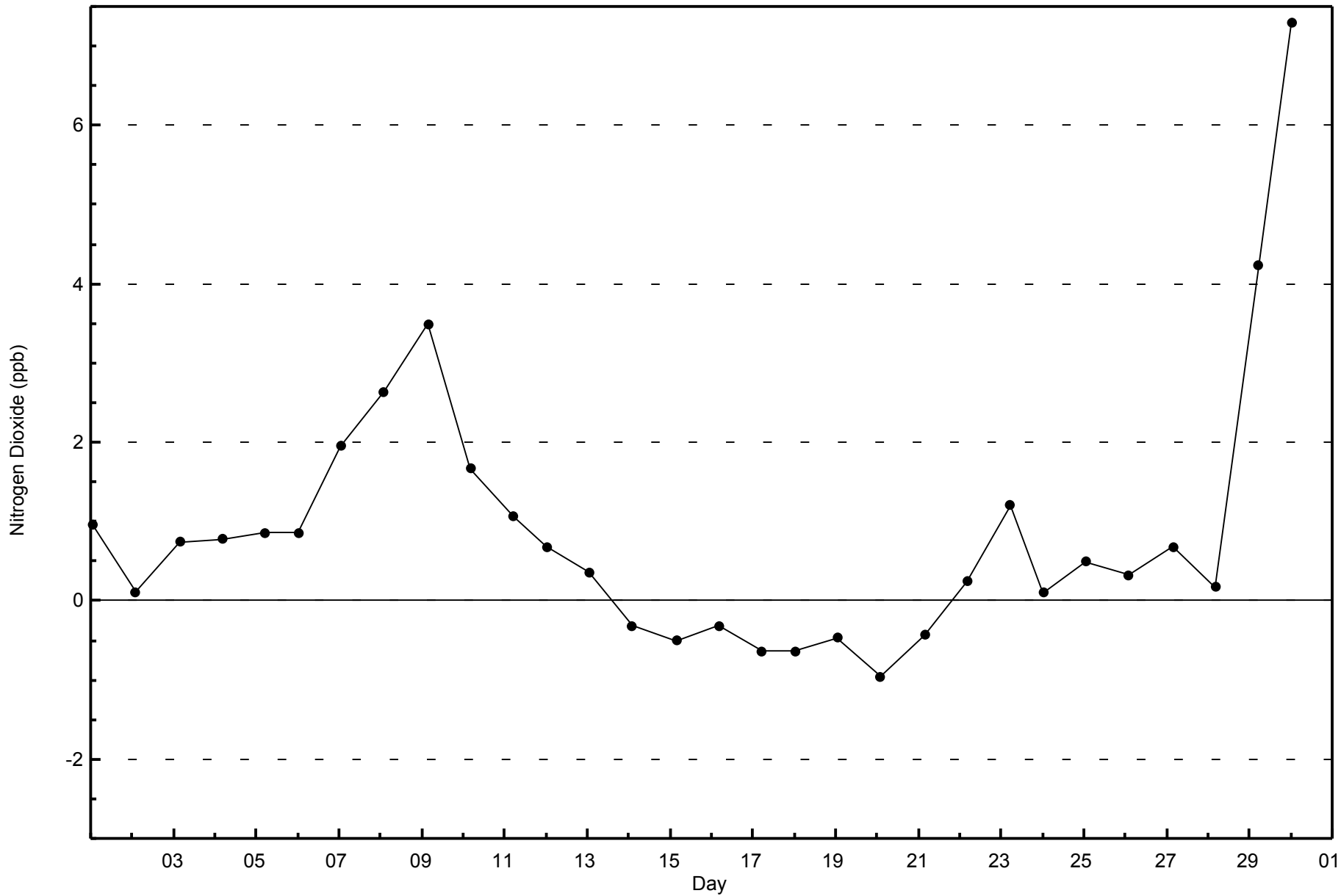
Total Number of Valid Hours: 682

Total Number of Hours: 720



WBEA
Zero Responses

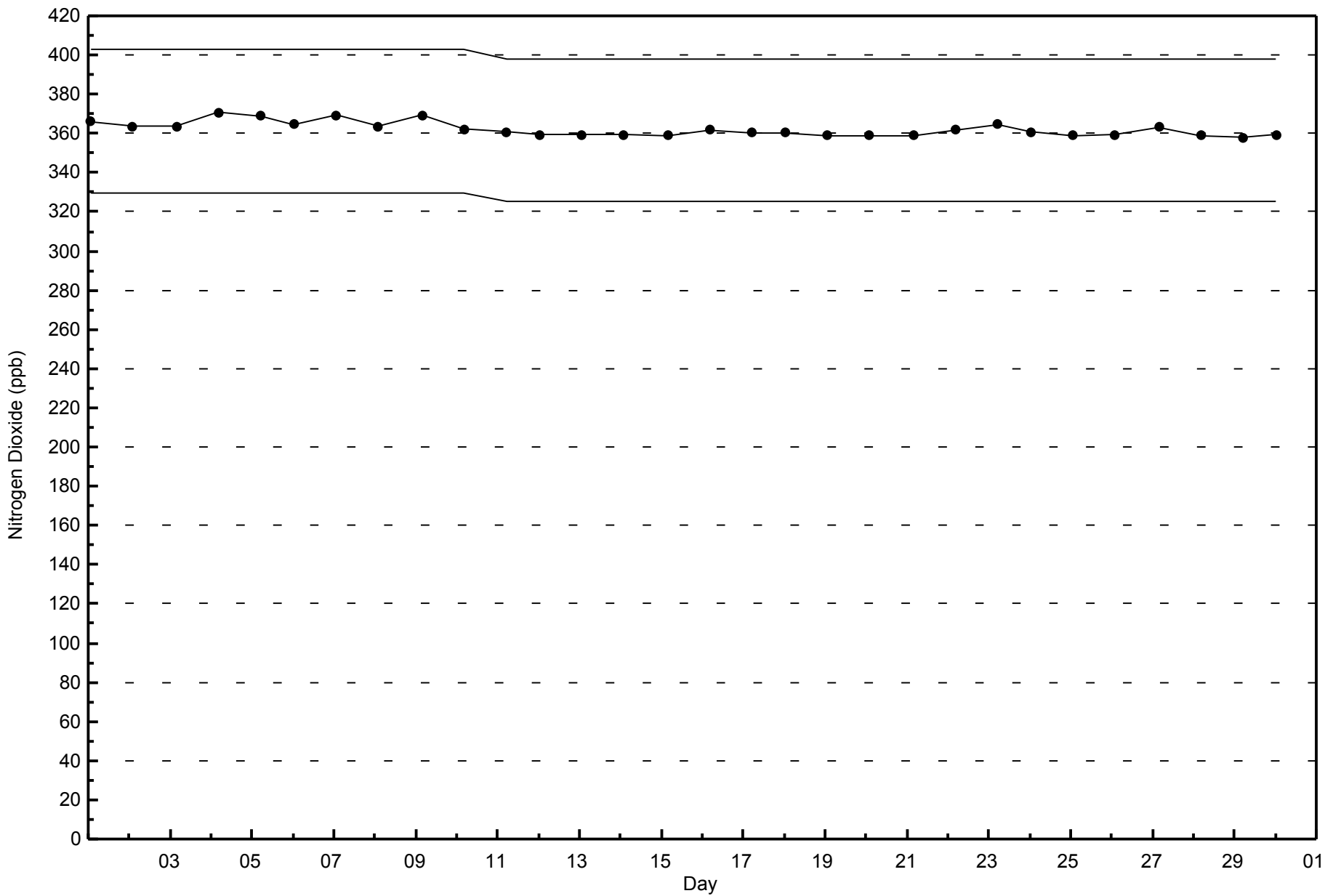
Nitrogen Dioxide (NO₂) - ppb
Wapasu - June 2015





WBEA
Span Responses

Nitrogen Dioxide (NO₂) - ppb
Wapasu - June 2015



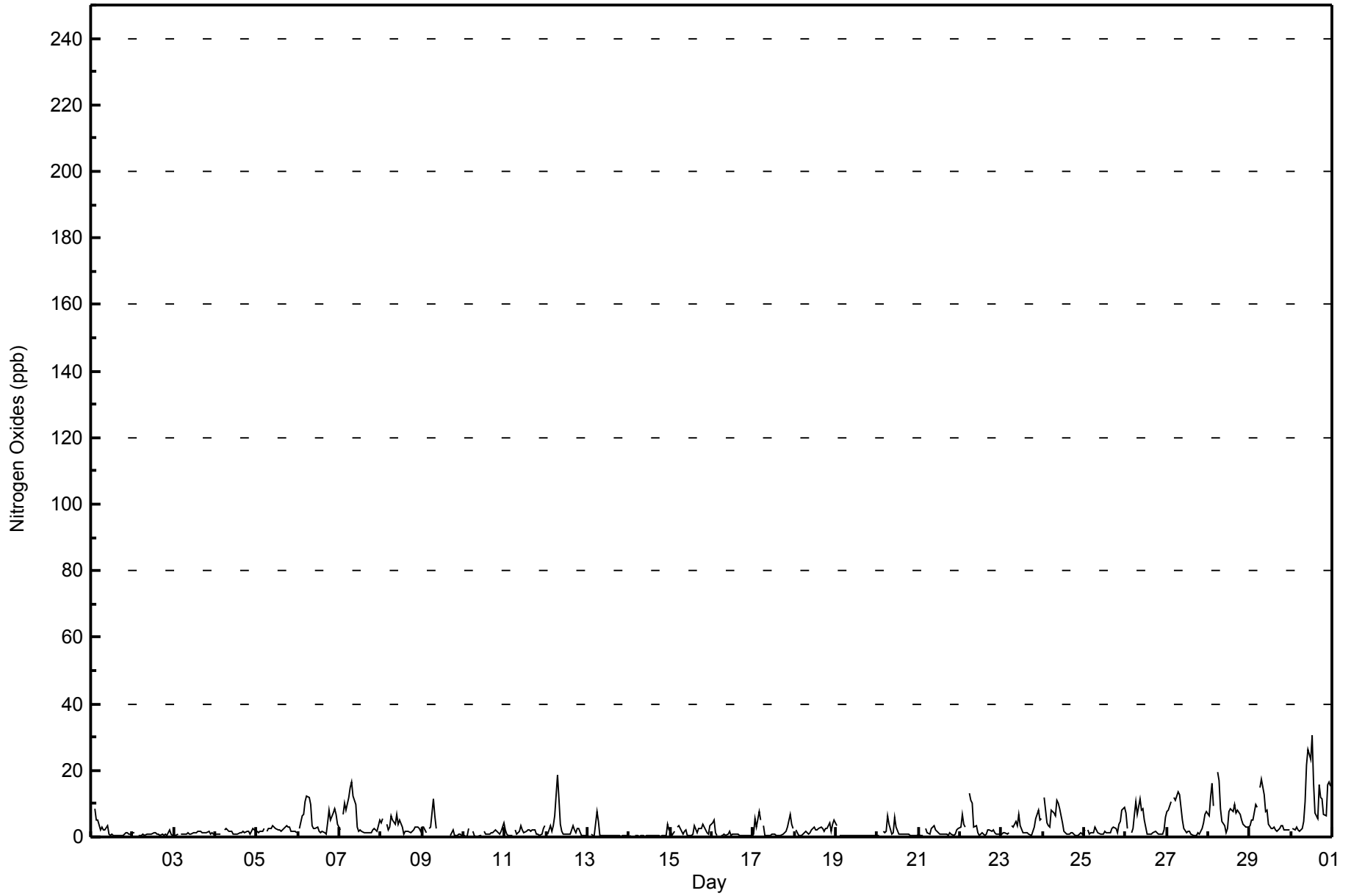


Maximum Value: 30 ppb on Jun 30 13:00		Maximum Daily Average: 11.3 ppb on Jun 30		Hours in Service: 720																																													
Minimum Value: 0 ppb on Jun 10 09:00		Minimum Daily Average: 0.5 ppb on Jun 14		Hours of Data: 682																																													
Maximum Diurnal Average: 5.9 ppb at hour 7		Minimum Diurnal Average: 1.6 ppb at hour 15		Hours of Missing Data: 38																																													
Monthly Average: 2.9 ppb		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 2 Q ₃ = 3 P ₉₀ = 8 P ₉₉ = 17		Hours of Calibration: 37																																													
				Percent Operational Time: 99.9																																													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jun	6	Z	9	5	5	2	3	2	2	3	1	0	1	1	1	0	1	1	1	1	1	1	1	1	2.0	9																							
2-Jun	1	1	Z	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	2	1	1	0.8	2																							
3-Jun	0	1	1	Z	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1	1	2	1	1	1	1.1	2																							
4-Jun	1	1	1	1	Z	2	2	2	2	2	1	1	1	1	1	1	2	1	2	2	1	2	2	2	1.4	2																							
5-Jun	2	1	2	2	3	Z	2	2	2	3	3	2	2	2	2	2	3	3	3	3	2	2	2	1	2.2	3																							
6-Jun	Z	3	6	7	11	12	12	10	3	3	2	3	2	1	2	1	1	4	8	5	7	8	7	4	5.3	12																							
7-Jun	2	Z	7	10	8	12	15	17	12	10	3	2	2	2	1	1	1	1	1	2	3	2	2	5	5.3	17																							
8-Jun	4	5	Z	4	2	3	6	5	4	7	4	5	3	1	2	2	2	1	2	2	3	3	3	2	3.2	7																							
9-Jun	3	3	1	Z	3	3	12	7	2	C	C	C	C	C	C	C	0	1	2	0	0	1	1	0	--	12																							
10-Jun	0	0	0	3	Z	2	0	0	0	0	1	M	2	1	1	1	1	1	2	2	1	1	2	4	1.1	4																							
11-Jun	2	1	0	0	0	Z	2	1	2	3	2	1	2	2	2	2	2	2	1	1	1	1	3	4	1.6	4																							
12-Jun	Z	1	3	2	3	7	19	12	4	2	1	1	1	1	1	4	2	1	3	2	0	0	0	1	3.0	19																							
13-Jun	1	Z	1	1	1	8	4	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.9	8																							
14-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2	0.5	4																							
15-Jun	2	0	2	Z	3	3	2	1	2	2	0	0	0	1	3	1	3	3	3	4	2	1	1	4	1.9	4																							
16-Jun	4	5	1	0	Z	1	0	1	0	1	2	1	1	1	1	1	1	1	0	0	0	0	0	1	1.0	5																							
17-Jun	1	6	3	7	5	Z	3	0	0	1	0	1	1	0	0	0	1	1	1	2	3	7	4	3	2.2	7																							
18-Jun	Z	2	0	1	1	1	2	1	1	1	2	3	2	2	2	3	3	2	2	3	4	2	4	5	2.1	5																							
19-Jun	3	Z	0	1	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0.6	3																							
20-Jun	0	0	Z	2	1	2	6	4	1	1	6	3	1	1	1	1	1	1	1	0	1	1	0	0	1.5	6																							
21-Jun	1	1	0	Z	2	1	1	2	3	3	2	1	1	1	1	1	1	0	1	1	1	1	2	2	1.3	3																							
22-Jun	3	7	4	3	Z	13	11	10	3	3	1	0	1	1	1	1	2	2	2	2	1	1	1	1	3.2	13																							
23-Jun	1	1	1	1	1	Z	4	3	4	4	7	3	1	1	1	1	1	1	2	3	6	8	5	6	2.9	8																							
24-Jun	Z	12	4	3	3	8	7	6	11	10	8	4	2	1	1	1	1	1	1	1	1	1	1	1	3.9	12																							
25-Jun	2	Z	2	1	1	1	3	2	1	1	1	1	2	1	1	1	1	2	3	2	1	4	5	8	2.5	9																							
26-Jun	7	3	Z	1	2	7	11	7	11	8	9	5	1	1	1	1	1	2	1	1	1	1	2	6	3.8	11																							
27-Jun	8	8	10	Z	12	11	14	13	9	5	2	1	2	2	1	0	0	1	1	1	2	4	7	8	5.3	14																							
28-Jun	7	12	16	9	Z	19	17	8	5	3	1	3	7	8	8	10	7	8	7	5	4	3	3	3	7.5	19																							
29-Jun	4	5	5	10	9	Z	15	17	13	8	8	4	2	3	3	2	2	2	3	3	2	2	2	2	5.5	17																							
30-Jun	Z	2	2	3	2	2	3	5	11	22	26	23	30	16	7	6	15	12	11	7	6	16	17	15	11.3	30																							
																								2.6	3.3	3.3	3.1	3.2	4.8	5.9	4.7	3.7	3.8	3.3	2.6	2.5	1.9	1.6	1.6	1.9	2.0	2.2	1.9	2.0	2.5	2.9	3.1	Diurnal Average	
																								8	12	16	10	12	19	19	17	13	22	26	23	30	16	8	10	15	12	11	7	7	16	17	15	Diurnal Maximum	
Z - zerspan																								C - Calibration				M - Maintenance																					



WBEA
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Wapasu - June 2015





WBEA
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Wapasu - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	678	99.41	99.41
21 - 40	4	0.59	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 720



WBEA
Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Wapasu - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	57	30	21	23	21	31	74	85	37	38	32	42	36	39	57	55	678
21 - 40	0	0	0	0	0	0	0	0	2	0	0	0	2	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	57	30	21	23	21	31	74	85	39	38	32	42	38	39	57	55	682

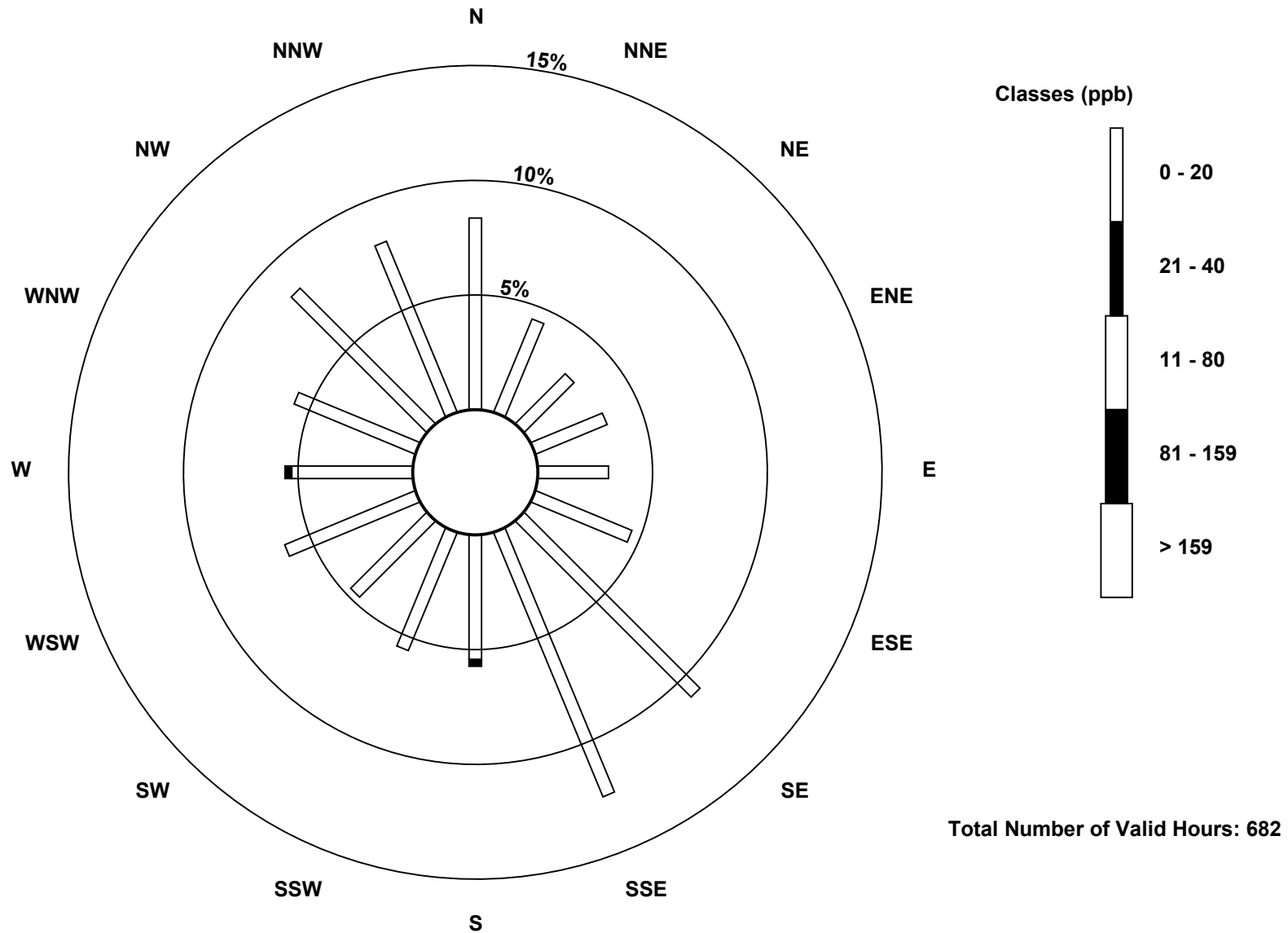
Total Number of Valid Hours: 682

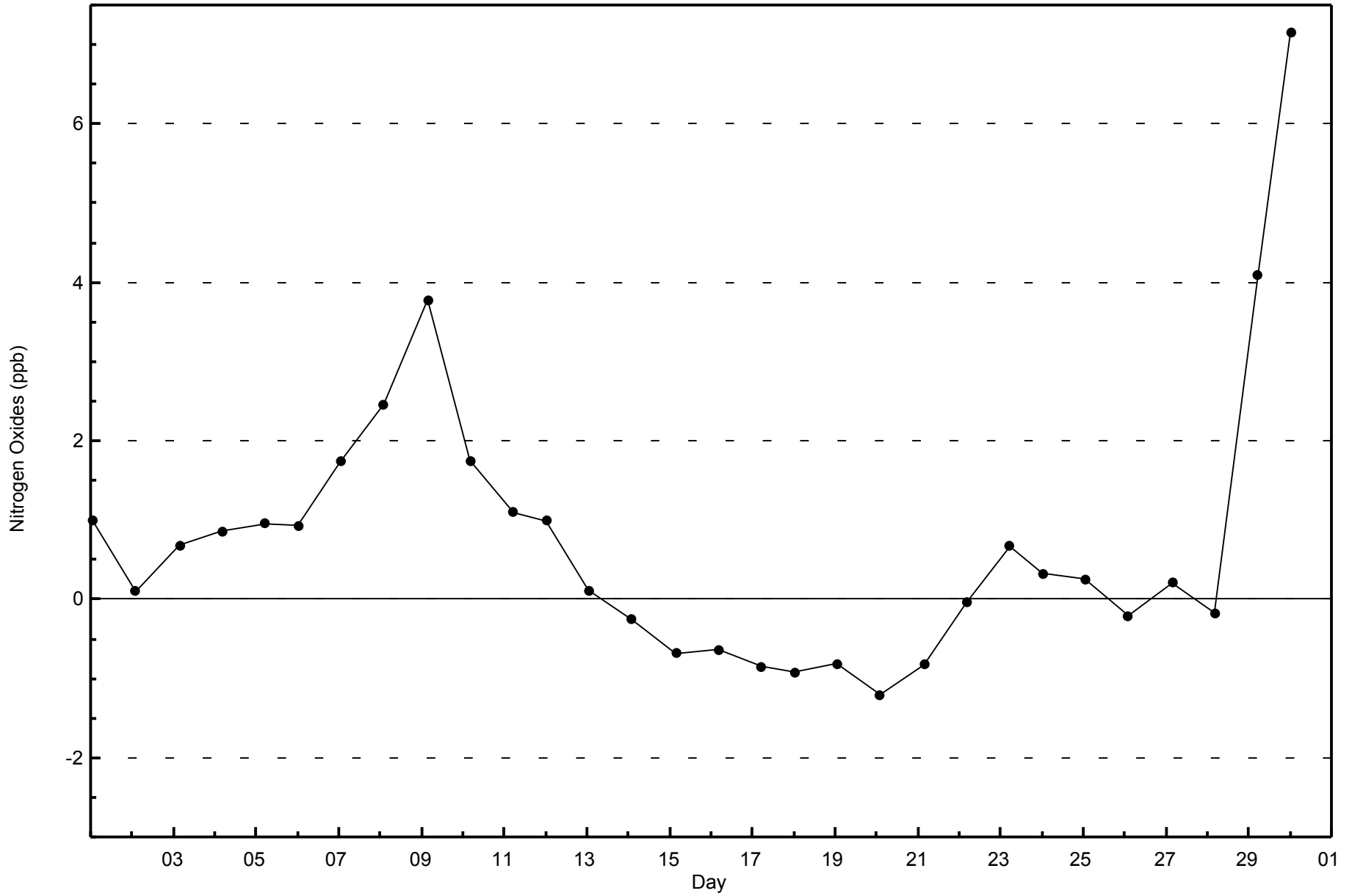
Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

Nitrogen Oxides (NO_x) - ppb
Wapasu (AMS 17)

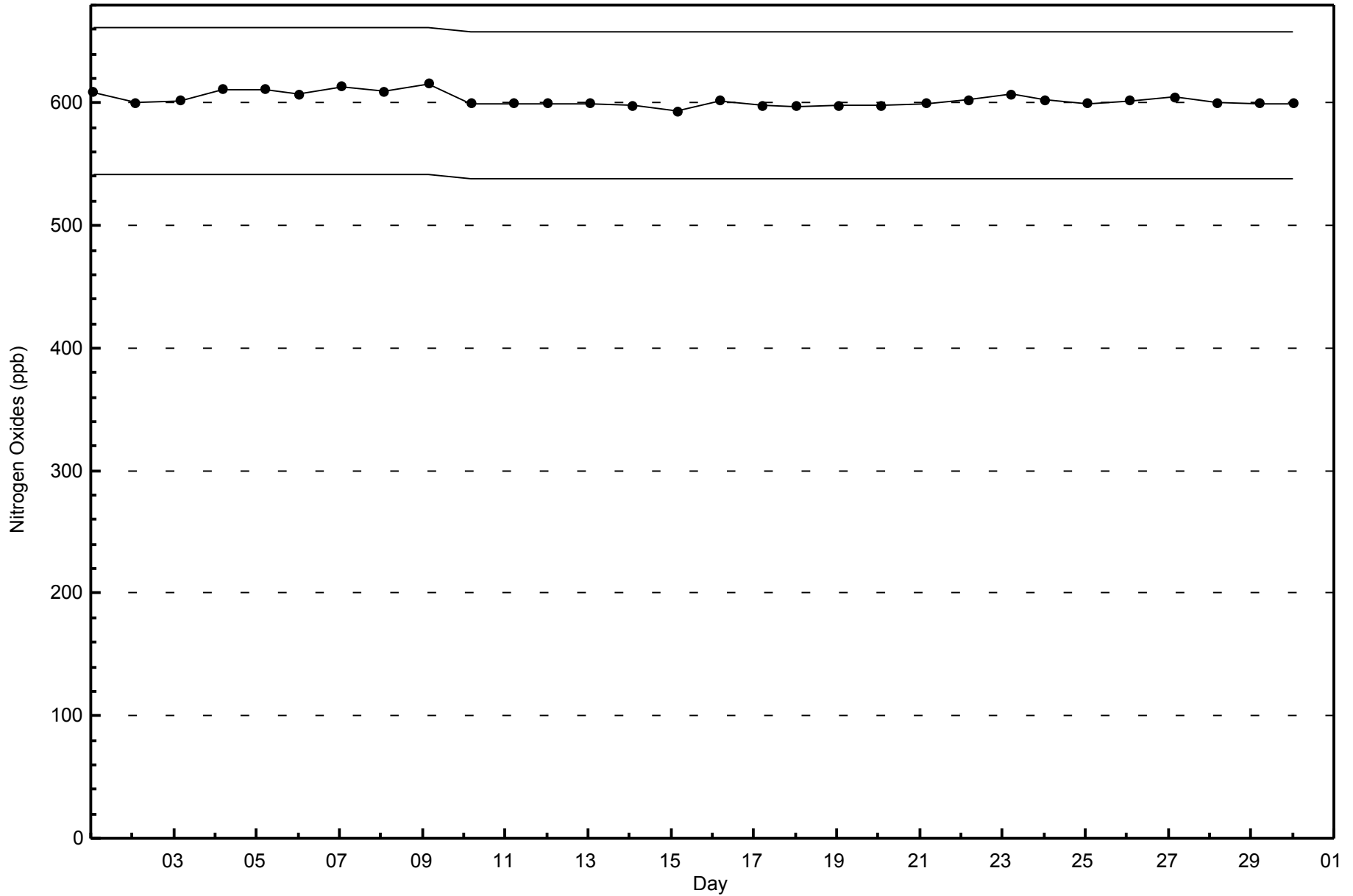






WBEA
Span Responses

Nitrogen Oxides (NO_x) - ppb
Wapasu - June 2015





Summary of Hour Averages

Wapasu - June 2015

Number of Exceedences (AAAQO):	24-hr: 4	Hours in Service:	720
Maximum Value: 285.0 µg/m ³ on Jun 30 13:00	Maximum Daily Average: 200.1 µg/m ³ on Jun 30	Hours of Data:	718
Minimum Value: 0.0 µg/m ³ on Jun 17 11:00	Minimum Daily Average: 1.4 µg/m ³ on Jun 2	Hours of Missing Data:	2
Maximum Diurnal Average: 31.3 µg/m ³ at hour 23	Minimum Diurnal Average: 16.6 µg/m ³ at hour 2	Hours of Calibration:	0
Monthly Average: 23.18 µg/m ³	Percentiles: P ₁ = 0.6 P ₁₀ = 1.5 Q ₁ = 3.5 Median = 6.1 Q ₃ = 15.6 P ₉₀ = 55.0 P ₉₉ = 230.2	Percent Operational Time:	99.7

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jun	4.7	4.8	6.1	11.0	5.3	1.1	0.8	0.6	0.5	0.8	0.7	0.7	1.0	0.8	0.8	1.0	1.3	1.2	1.2	1.3	1.4	1.3	1.4	1.7	2.2	11.0																							
2-Jun	1.8	1.8	1.5	1.5	1.4	1.4	1.2	1.2	1.1	1.3	1.4	1.6	1.7	1.5	1.0	1.0	1.0	1.1	1.0	1.1	1.2	1.3	1.8	1.7	1.4	1.8																							
3-Jun	1.6	2.1	2.4	2.8	3.3	3.5	3.3	3.4	4.5	4.7	4.2	4.1	3.8	3.7	4.2	5.0	5.5	6.1	6.9	7.3	6.8	6.2	5.9	5.5	4.4	7.3																							
4-Jun	5.3	5.8	5.6	4.9	5.0	4.7	4.0	3.6	3.4	3.2	3.8	3.8	4.1	4.1	3.8	5.0	4.9	5.8	4.6	4.9	4.2	4.5	5.0	3.6	4.5	5.8																							
5-Jun	3.0	3.5	3.8	4.2	4.2	3.4	3.8	4.0	4.5	4.4	5.0	4.8	5.1	5.3	5.3	6.0	5.9	5.9	5.7	4.3	2.2	1.9	3.1	3.3	4.3	6.0																							
6-Jun	3.6	4.3	6.9	7.1	8.6	7.9	8.0	8.1	6.6	6.6	12.5	23.5	23.4	41.0	60.8	33.1	14.1	16.4	24.4	28.7	27.4	25.9	23.8	21.7	18.5	60.8																							
7-Jun	19.9	18.1	18.7	48.4	117.4	59.2	39.6	50.8	58.9	67.0	47.4	29.7	18.4	16.4	17.3	12.5	12.1	15.7	19.0	62.1	99.6	88.5	85.5	79.2	45.9	117.4																							
8-Jun	55.9	35.4	28.8	25.4	24.2	24.2	22.1	21.2	23.6	30.1	31.1	29.7	18.8	15.8	11.9	9.5	12.3	12.6	13.0	21.3	32.4	49.8	56.9	52.3	27.4	56.9																							
9-Jun	32.5	33.3	32.9	33.9	32.4	32.7	37.0	32.4	23.0	21.2	16.1	10.2	7.0	6.0	2.9	2.6	3.7	4.4	4.7	4.8	5.4	6.3	5.6	5.3	16.5	37.0																							
10-Jun	5.6	5.7	18.9	15.7	5.8	2.4	0.9	1.0	1.4	M	M	2.9	2.8	2.2	2.2	3.3	4.0	4.5	5.0	4.5	4.2	4.7	6.2	11.7	5.3	18.9																							
11-Jun	10.9	6.9	5.9	5.8	7.1	7.5	10.4	11.5	10.0	4.6	5.0	5.3	7.0	10.6	7.9	5.0	7.8	6.5	7.7	4.0	3.3	3.5	4.7	6.0	6.9	11.5																							
12-Jun	5.0	5.2	5.7	5.8	7.4	6.1	2.9	3.5	4.7	5.4	4.1	4.7	5.5	7.3	6.4	11.2	4.2	2.8	5.4	5.7	5.2	3.7	3.8	4.3	5.3	11.2																							
13-Jun	4.9	5.8	6.0	6.1	6.2	7.0	6.2	3.0	2.1	1.8	1.9	1.5	2.0	1.6	1.7	1.8	2.2	3.1	2.5	2.2	2.2	2.5	2.5	3.3	7.0																								
14-Jun	2.5	2.3	2.1	2.1	2.4	2.1	1.2	0.5	0.6	0.8	1.0	0.9	1.3	1.7	1.9	2.2	2.1	2.4	2.3	2.9	2.7	4.0	6.9	2.0	2.1	6.9																							
15-Jun	2.0	2.6	3.9	4.9	5.6	6.6	7.2	6.3	10.9	9.2	6.1	5.3	4.0	3.8	4.3	4.0	4.8	4.3	3.8	4.6	5.1	6.0	6.9	9.5	5.5	10.9																							
16-Jun	8.4	6.3	5.1	3.7	3.1	2.6	3.4	3.8	3.0	2.5	2.2	1.5	1.5	1.7	1.7	1.3	0.8	1.2	1.2	0.9	2.7	1.3	2.4	1.9	2.7	8.4																							
17-Jun	6.5	3.4	2.9	3.3	4.7	3.3	2.1	0.8	0.4	0.2	0.0	0.7	1.3	1.1	1.6	1.1	1.3	3.5	6.8	4.1	8.6	15.3	12.9	10.1	4.0	15.3																							
18-Jun	3.9	3.8	1.8	1.8	1.9	2.8	3.9	5.6	5.0	5.7	5.1	9.0	8.9	7.4	9.6	8.7	7.4	6.1	6.2	7.6	10.4	12.5	9.9	5.3	6.3	12.5																							
19-Jun	4.0	7.6	14.5	19.4	19.7	16.1	10.4	5.3	1.7	1.5	0.5	0.4	0.6	0.9	1.5	1.1	1.1	1.2	2.0	2.7	2.1	2.1	1.2	1.0	4.9	19.7																							
20-Jun	1.0	1.2	1.9	1.7	1.3	3.0	6.6	2.9	1.3	7.0	14.6	12.3	9.9	7.8	8.7	7.6	6.9	3.9	3.7	10.0	15.6	11.1	6.9	7.3	6.4	15.6																							
21-Jun	8.1	7.0	4.9	6.9	6.6	7.7	23.2	45.7	44.9	41.6	38.7	33.6	16.9	9.9	7.3	4.0	2.6	4.8	7.2	10.6	14.5	18.8	17.1	15.7	16.6	45.7																							
22-Jun	18.7	27.7	27.6	27.9	31.5	21.1	11.5	9.6	10.0	20.4	11.8	3.4	4.9	4.1	3.3	6.7	6.9	6.8	4.9	7.0	9.6	10.0	9.4	10.3	12.7	31.5																							
23-Jun	10.1	9.0	9.1	11.1	12.9	11.6	6.0	5.7	8.8	8.9	9.0	12.4	6.5	5.2	5.4	4.6	2.6	3.5	4.3	8.2	11.9	8.8	7.0	7.5	7.9	12.9																							
24-Jun	7.6	7.1	6.1	5.9	6.8	9.4	8.7	6.6	5.7	5.3	7.0	8.0	7.9	7.1	6.3	5.6	6.1	5.8	3.6	3.9	4.4	16.8	32.0	28.3	8.8	32.0																							
25-Jun	31.8	40.3	44.1	38.6	35.4	35.8	27.3	18.9	16.5	17.9	21.9	22.0	19.1	16.3	17.9	31.4	21.3	17.0	8.2	8.9	10.1	16.6	17.3	13.7	22.9	44.1																							
26-Jun	15.1	13.2	10.8	10.1	10.9	13.0	16.9	13.3	12.1	8.6	8.6	8.0	4.0	4.2	4.5	4.8	5.9	6.9	4.3	3.8	13.9	20.0	20.1	17.0	10.4	20.1																							
27-Jun	15.8	12.9	12.8	15.1	10.3	7.0	7.5	8.1	7.8	7.7	9.2	9.5	11.0	8.4	5.1	4.6	4.4	4.0	4.6	5.8	5.7	6.0	12.1	9.7	8.5	15.8																							
28-Jun	9.6	11.5	14.5	12.9	12.6	14.4	14.6	46.0	55.6	55.1	39.6	82.4	221.0	207.9	184.6	268.5	198.2	205.6	235.1	234.9	226.2	211.0	190.7	154.3	121.1	268.5																							
29-Jun	117.1	88.3	69.9	61.7	65.2	84.5	180.5	235.5	210.5	183.7	146.7	78.6	58.1	63.5	51.2	44.7	48.7	56.2	97.0	112.1	123.0	130.3	135.9	133.9	107.4	235.5																							
30-Jun	129.2	121.2	189.1	258.5	181.6	144.9	152.0	231.2	235.2	165.5	133.9	213.4	285.0	271.3	211.0	192.2	171.1	166.1	160.8	192.8	232.1	235.0	243.3	284.9	200.1	285.0																							
																								18.2	16.6	18.8	21.9	21.4	18.2	20.8	26.3	25.8	23.9	20.3	20.8	25.4	24.6	21.7	23.0	19.0	19.5	21.9	25.8	29.8	30.8	31.3	30.4	Diurnal Average	
																								129.2	121.2	189.1	258.5	181.6	144.9	180.5	235.5	235.2	183.7	146.7	213.4	285.0	271.3	211.0	268.5	198.2	205.6	235.1	234.9	232.1	235.0	243.3	284.9	Diurnal Maximum	

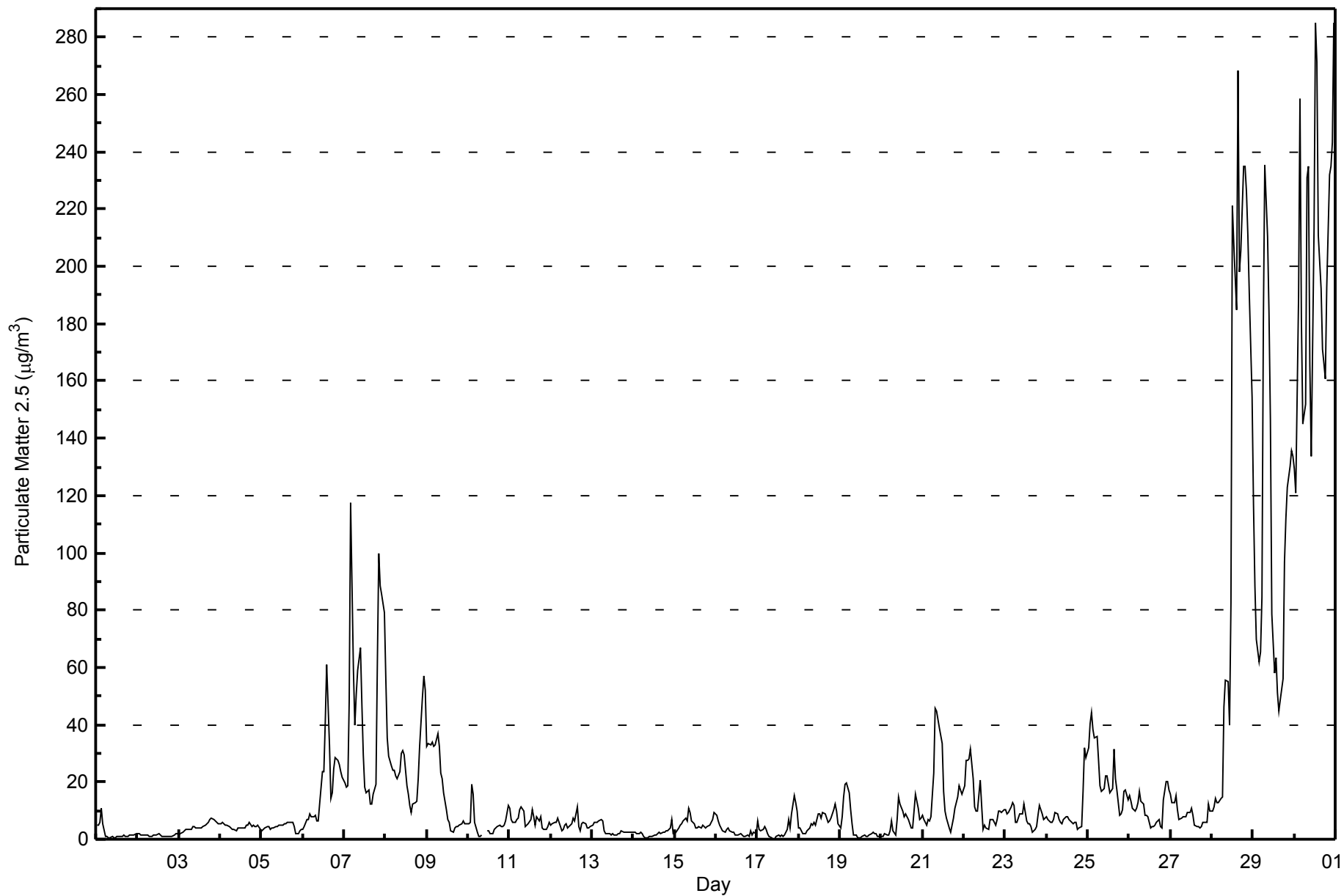
M - Maintenance

Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m³



WBEA
Hourly Averages

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Wapasu - June 2015





WBEA
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Wapasu - June 2015

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	287	39.97	39.97
6 - 15	223	31.06	71.03
16 - 25	58	8.08	79.11
26 - 80	67	9.33	88.44
> 81.0	55	7.66	96.10

Total Number of Valid Hours: 718

Total Number of Hours: 720



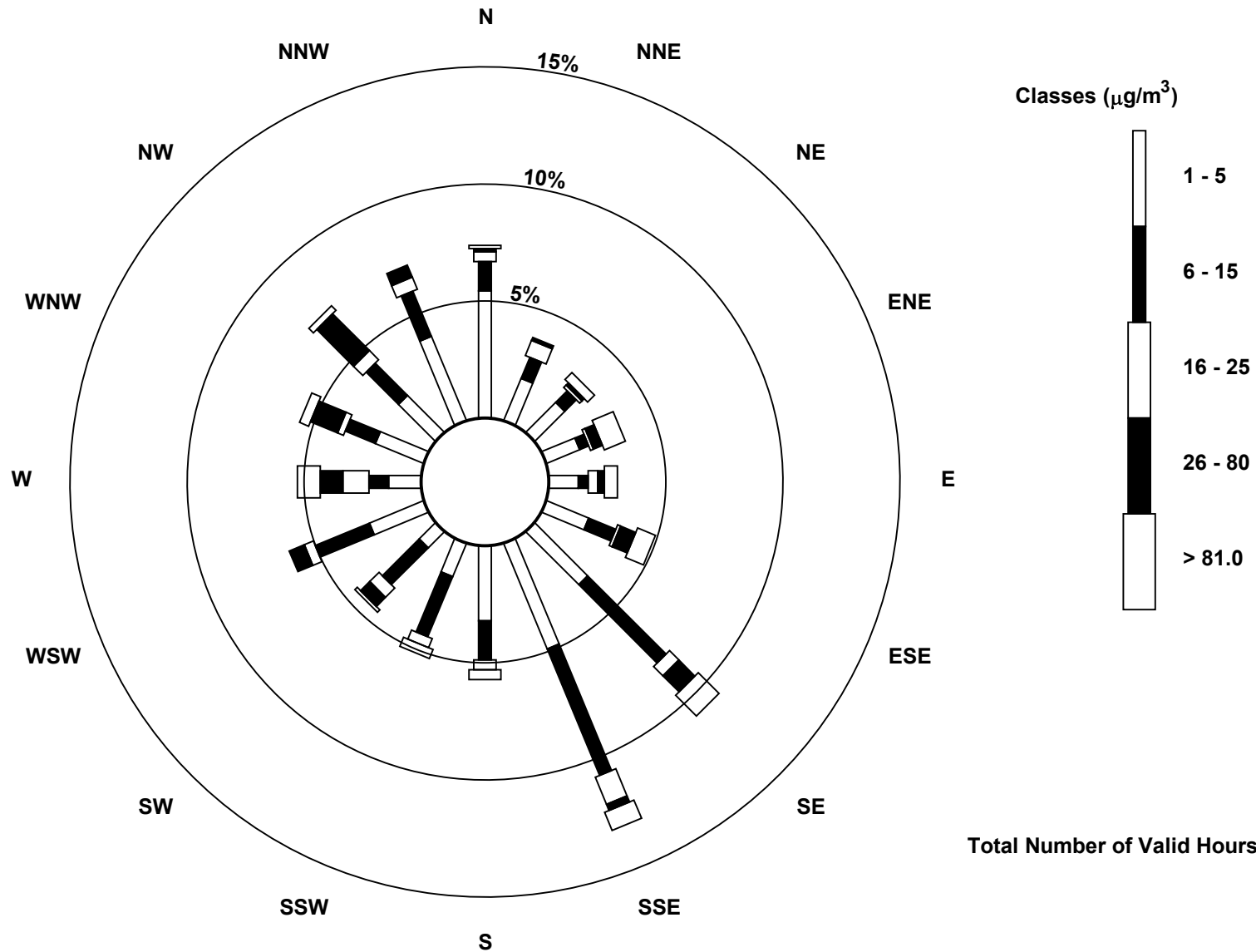
WBEA
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Wapasu - June 2015

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	39	14	13	11	9	14	23	35	23	11	7	18	10	16	16	28	287
6 - 15	9	7	5	3	3	9	34	42	12	20	16	18	6	10	14	15	223
16 - 25	3	5	1	1	3	1	4	9	3	3	4	3	8	2	4	4	58
26 - 80	1	1	1	3	2	5	7	2	0	0	4	5	7	9	16	4	67
> 81.0	1	0	3	7	4	6	9	6	3	3	1	0	7	3	2	0	55
Totals	53	27	23	25	21	35	77	94	41	37	32	44	38	40	52	51	690

Total Number of Valid Hours: 718

Total Number of Hours: 720



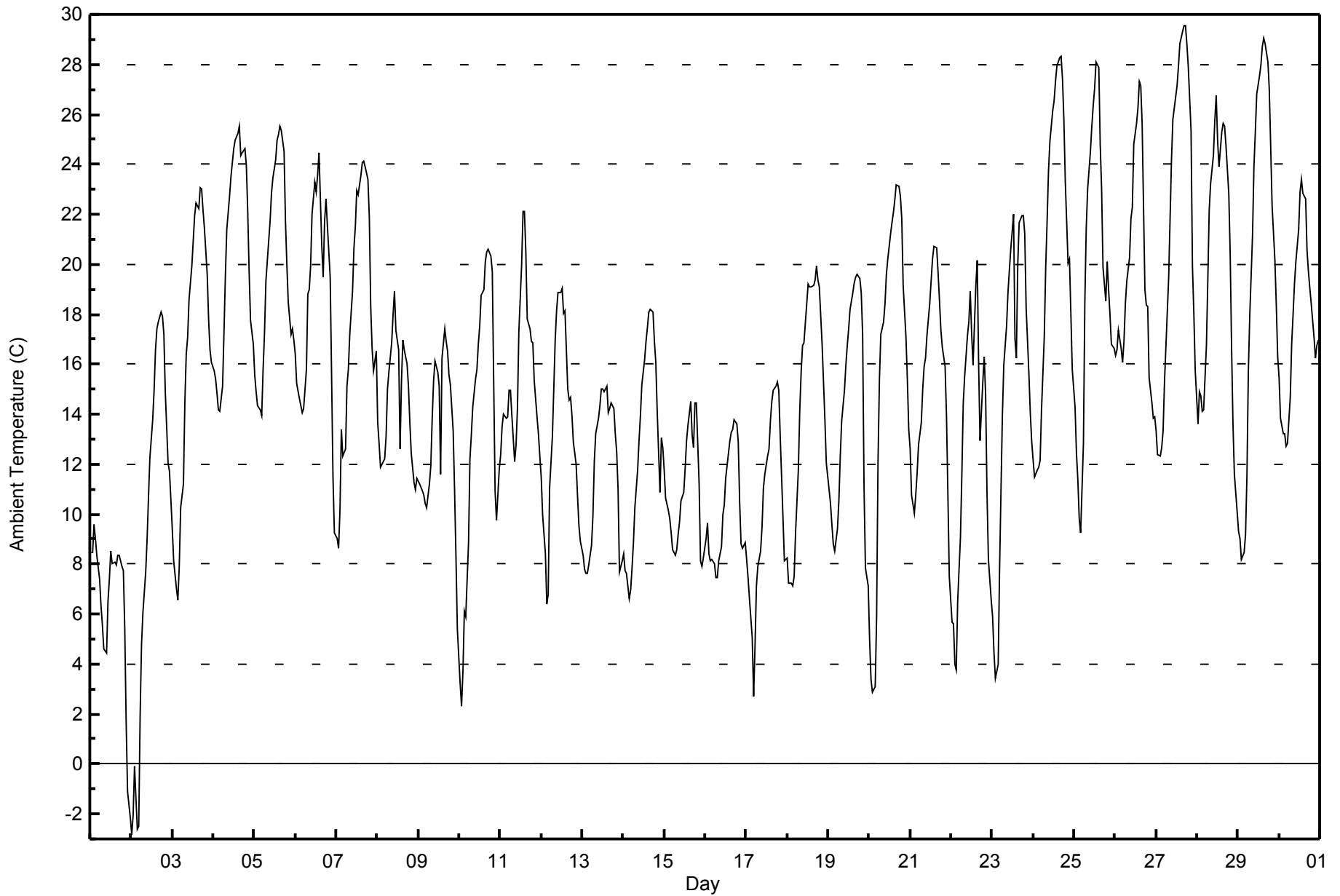


Maximum Value: 29.6 C on Jun 27 18:00		Maximum Daily Average: 21.8 C on Jun 27		Hours in Service: 720																							
Minimum Value: -2.8 C on Jun 2 01:00		Minimum Daily Average: 6.5 C on Jun 1		Hours of Data: 720																							
Maximum Diurnal Average: 20.5 C at hour 16		Minimum Diurnal Average: 9.3 C at hour 4		Hours of Missing Data: 0																							
Monthly Average: 15.39 C		Percentiles: P ₁ = 1.6 P ₁₀ = 7.9 Q ₁ = 11.1 Median = 15.3 Q ₃ = 19.5 P ₉₀ = 23.9 P ₉₉ = 28.8		Hours of Calibration: 0																							
				Percent Operational Time: 100.0																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	8.5	8.4	9.6	9.0	8.4	7.4	6.4	5.5	4.6	4.4	6.5	7.4	8.5	8.0	8.1	7.9	8.4	8.3	7.9	7.8	5.5	1.7	-1.1	-2.2	6.5	9.6	
2-Jun	-2.8	-2.0	-0.1	-2.6	-2.5	1.9	4.8	6.1	7.7	9.0	10.7	12.3	13.8	15.0	16.6	17.4	17.7	18.1	17.9	17.2	14.9	12.1	11.7	10.6	9.4	18.1	
3-Jun	9.4	8.2	7.0	6.6	7.9	10.2	11.2	14.4	16.4	17.1	18.6	19.9	20.9	22.0	22.5	22.3	23.1	23.0	22.2	21.4	19.6	17.8	16.6	16.1	16.4	23.1	
4-Jun	15.7	15.4	14.8	14.2	14.1	15.1	17.3	19.6	21.4	22.7	23.5	24.1	24.6	25.0	25.2	25.5	24.4	24.5	24.6	24.0	22.1	19.7	17.8	16.8	20.5	25.5	
5-Jun	15.5	14.9	14.3	14.2	14.0	15.8	17.2	19.3	20.9	21.7	22.9	23.4	24.2	25.0	25.2	25.5	25.4	24.5	21.7	20.0	18.5	17.2	17.4	17.0	19.8	25.5	
6-Jun	16.4	15.2	14.6	14.3	14.0	14.2	15.8	18.8	19.0	19.9	22.0	23.3	22.9	23.6	24.5	20.7	19.5	21.7	22.6	21.5	19.5	15.6	11.5	9.3	18.4	24.5	
7-Jun	9.0	8.6	10.2	13.4	12.3	12.6	15.1	15.8	17.2	18.9	20.7	21.5	22.9	22.8	23.6	24.1	24.1	23.9	23.4	21.9	18.3	16.6	15.7	16.5	17.9	24.1	
8-Jun	13.7	12.8	11.9	12.1	12.2	13.1	15.0	15.7	16.9	17.9	18.9	17.4	16.6	12.6	15.3	17.0	16.6	16.0	15.1	13.6	12.5	11.3	11.0	11.4	14.4	18.9	
9-Jun	11.3	11.2	10.9	10.7	10.4	10.3	11.2	12.0	13.8	15.4	16.1	15.7	15.1	11.6	16.3	17.4	16.9	16.5	15.6	15.2	13.3	11.0	8.3	5.4	13.0	17.4	
10-Jun	3.2	2.3	3.7	6.1	5.9	8.8	12.2	13.1	14.3	15.4	15.8	16.8	17.5	18.7	19.0	20.1	20.5	20.6	20.3	19.7	15.3	10.9	9.7	11.8	13.4	20.6	
11-Jun	12.4	13.5	14.0	13.8	13.9	14.9	14.9	14.0	12.1	12.8	14.2	17.3	20.0	22.1	22.1	20.5	17.8	17.4	16.9	16.9	15.4	13.9	13.2	12.3	15.7	22.1	
12-Jun	11.5	9.9	8.4	6.4	6.8	11.1	13.1	15.0	16.9	18.2	18.9	18.9	19.1	18.0	18.1	15.0	14.6	14.7	13.9	12.9	12.0	10.7	9.5	8.9	13.4	19.1	
13-Jun	8.4	7.8	7.6	7.6	8.0	8.8	9.9	12.1	13.2	13.8	14.4	15.0	15.0	14.9	15.1	14.0	14.2	14.4	14.2	13.2	12.5	11.0	7.7	8.1	11.7	15.1	
14-Jun	8.4	7.8	7.6	6.6	6.9	7.9	8.9	10.3	11.8	12.9	13.9	15.2	16.2	16.9	17.5	18.1	18.2	18.1	16.9	16.1	14.1	10.9	13.1	12.7	12.8	18.2	
15-Jun	11.8	10.6	10.1	9.8	9.3	8.6	8.3	8.6	9.2	9.7	10.5	10.9	11.8	12.9	13.5	14.5	13.2	12.7	14.4	14.4	11.2	8.2	7.9	8.3	10.8	14.5	
16-Jun	9.0	9.6	8.4	8.1	8.2	8.0	7.5	7.5	8.1	8.7	10.0	10.4	11.5	11.9	13.0	13.3	13.4	13.8	13.6	12.9	10.5	8.8	8.7	8.8	10.1	13.8	
17-Jun	8.2	7.4	6.6	5.0	2.7	4.7	7.1	7.9	8.5	9.5	11.0	11.6	12.3	12.6	13.7	14.5	15.0	15.1	15.3	14.9	13.2	9.8	8.1	8.2	10.1	15.3	
18-Jun	8.3	7.2	7.2	7.1	7.5	9.3	11.8	14.1	15.7	16.7	16.9	18.4	19.2	19.1	19.1	19.2	19.3	19.9	19.4	19.1	16.8	15.3	13.8	12.0	14.7	19.9	
19-Jun	11.0	10.4	9.6	8.8	8.5	9.4	10.6	12.3	13.7	14.9	16.0	16.7	17.4	18.2	18.9	19.2	19.5	19.6	19.4	18.9	17.2	11.1	7.8	7.1	14.0	19.6	
20-Jun	4.9	3.4	2.9	3.1	5.9	12.0	15.4	17.2	17.7	18.4	19.6	20.2	21.2	21.7	22.0	22.5	23.2	23.1	22.8	21.8	19.1	17.1	15.4	13.4	16.0	23.2	
21-Jun	12.6	10.7	10.1	10.8	11.7	12.8	13.7	15.0	15.9	16.2	17.2	18.4	19.3	20.2	20.7	20.7	19.6	18.5	17.4	16.7	15.9	14.0	10.8	7.5	15.3	20.7	
22-Jun	5.7	5.6	4.0	3.8	6.5	9.1	11.6	14.4	15.5	17.2	17.7	18.9	17.2	16.0	19.2	20.2	16.0	12.9	15.3	16.3	14.8	10.8	8.2	6.6	12.6	20.2	
23-Jun	5.9	4.4	3.4	4.0	7.8	10.9	14.0	15.9	17.5	18.9	19.8	20.6	22.0	17.0	16.3	20.0	21.7	22.0	22.0	21.2	18.3	15.6	14.0	12.9	15.3	22.0	
24-Jun	12.1	11.5	11.7	11.9	12.2	14.1	17.1	19.9	21.7	23.7	24.9	26.1	26.5	27.3	27.9	28.3	28.3	27.4	25.8	23.3	20.0	20.2	18.0	15.8	20.7	28.3	
25-Jun	14.3	12.4	11.4	9.8	9.2	12.8	18.5	21.4	23.0	24.5	25.5	26.4	27.1	28.1	27.9	24.8	23.0	19.9	18.6	20.1	19.0	18.0	16.8	16.6	19.5	28.1	
26-Jun	16.4	16.6	17.3	16.6	16.1	16.9	18.4	19.3	20.3	21.8	22.3	24.8	25.6	26.3	27.3	27.1	25.6	19.0	18.4	18.3	15.4	14.5	13.8	13.9	19.7	27.3	
27-Jun	13.4	12.4	12.3	12.7	13.3	15.3	18.1	19.5	21.8	24.2	25.8	26.7	27.1	27.9	28.8	29.3	29.5	29.6	28.8	28.0	25.3	19.9	18.0	15.8	21.8	29.6	
28-Jun	13.6	14.9	14.7	14.1	14.2	16.8	19.4	22.2	23.2	24.3	25.8	26.7	25.0	23.9	25.3	25.6	25.5	24.8	22.8	20.4	16.7	13.6	11.6	10.1	19.8	26.7	
29-Jun	9.3	9.1	8.2	8.5	9.2	11.5	15.7	17.9	21.2	23.9	25.3	26.8	27.5	28.0	28.7	29.1	28.8	28.1	27.0	24.7	22.3	20.2	18.4	16.3	20.2	29.1	
30-Jun	15.5	13.8	13.2	13.2	12.7	12.9	14.7	16.8	18.0	19.2	20.1	21.4	22.9	23.4	22.8	22.6	20.5	19.7	19.1	18.4	17.1	16.2	16.7	17.0	17.8	23.4	
		10.4	9.8	9.5	9.3	9.6	11.2	13.2	14.7	15.9	17.1	18.2	19.1	19.7	19.7	20.5	20.5	20.1	19.6	19.1	18.4	16.2	13.8	12.3	11.5	Diurnal Average	
		16.4	16.6	17.3	16.6	16.1	16.9	19.4	22.2	23.2	24.5	25.8	26.8	27.5	28.1	28.8	29.3	29.5	29.6	28.8	28.0	25.3	20.2	18.4	17.0	Diurnal Maximum	



WBEA
Hourly Averages

Ambient Temperature (AT) - C
Wapasu - June 2015





WBEA
Cumulative Frequency Distribution

Ambient Temperature (AT) - C
Wapasu - June 2015

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	7	0.97	0.97
0 - 10	141	19.58	20.56
10 - 20	413	57.36	77.92
> 20	159	22.08	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

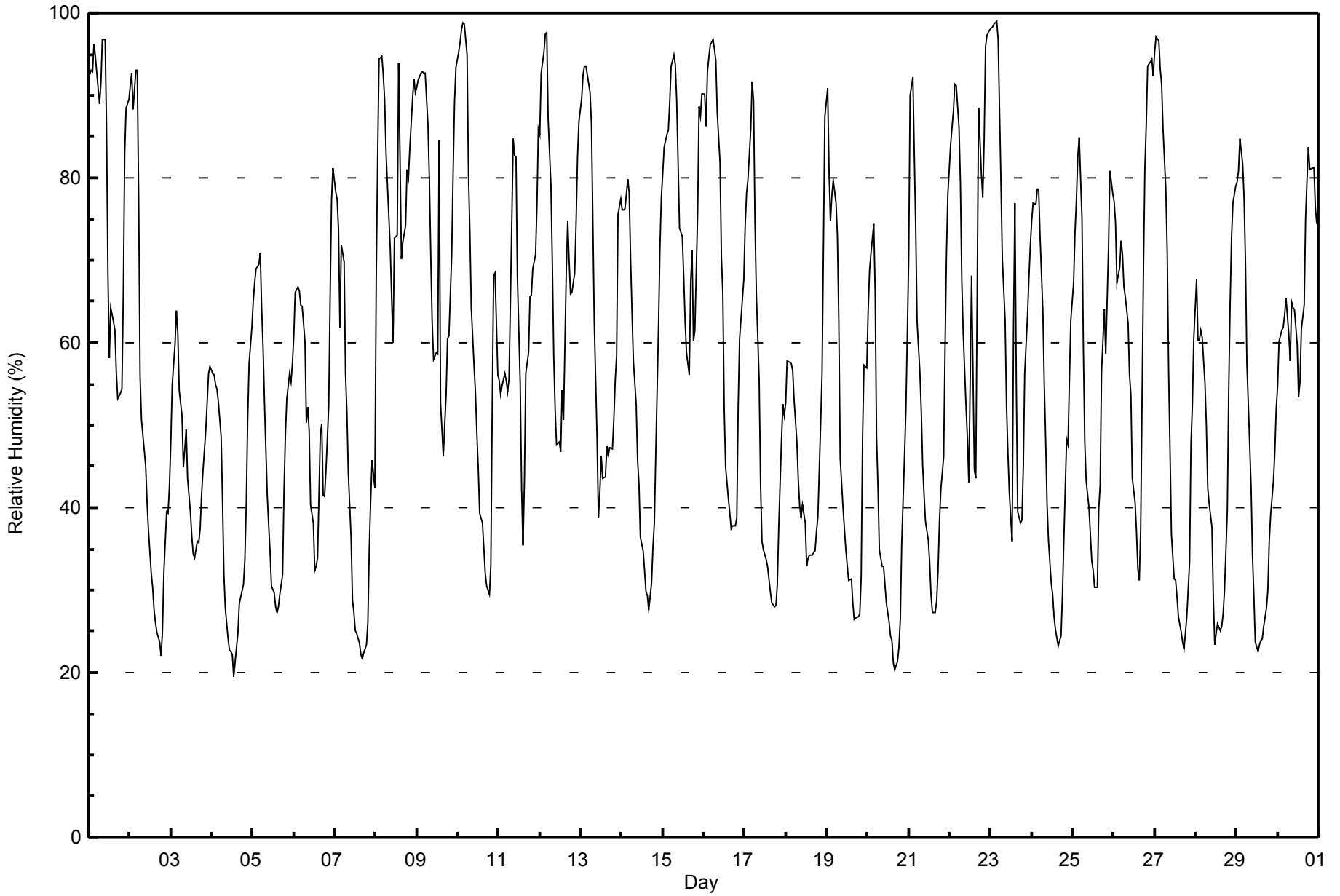


Maximum Value: 99 % on Jun 23 04:00														Maximum Daily Average: 80.7 % on Jun 8														Hours in Service: 720	
Minimum Value: 20 % on Jun 4 14:00														Minimum Daily Average: 38.1 % on Jun 4														Hours of Data: 720	
Maximum Diurnal Average: 79.9 % at hour 4														Minimum Diurnal Average: 38.5 % at hour 16														Hours of Missing Data: 0	
Monthly Average: 57.9 %														Percentiles: P ₁ = 22 P ₁₀ = 29 Q ₁ = 39 Median = 56 Q ₃ = 76 P ₉₀ = 90 P ₉₉ = 98														Hours of Calibration: 0	
																												Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Jun	93	93	93	96	95	91	89	92	97	97	86	68	58	64	62	62	56	53	54	54	66	83	89	90	78.3	97			
2-Jun	91	93	88	93	93	77	56	51	47	45	41	37	32	30	28	26	25	24	22	25	32	39	39	43	49.1	93			
3-Jun	48	55	60	64	61	54	51	45	47	50	44	39	37	34	34	36	36	38	42	44	49	53	56	57	47.2	64			
4-Jun	56	56	55	54	53	49	41	32	28	24	23	22	22	20	23	25	28	29	31	34	41	51	57	62	38.1	62			
5-Jun	65	67	69	70	71	64	59	53	42	38	35	31	30	28	27	28	30	32	42	49	53	56	55	58	48.0	71			
6-Jun	61	66	67	66	65	64	60	50	52	49	40	38	32	33	34	49	50	42	41	44	52	66	77	81	53.4	81			
7-Jun	78	77	74	62	72	70	56	52	44	36	29	27	25	25	24	22	22	22	23	26	35	41	46	42	43.0	78			
8-Jun	68	83	94	95	93	89	83	79	72	66	60	73	73	94	83	70	72	74	81	80	84	90	92	90	80.7	95			
9-Jun	91	92	93	93	93	93	86	80	71	62	58	59	59	85	53	46	50	54	60	61	71	81	89	93	73.8	93			
10-Jun	95	96	98	99	99	95	80	73	64	57	54	49	45	39	38	35	32	30	29	33	53	68	68	56	62.0	99			
11-Jun	55	54	55	56	55	54	56	65	85	83	82	68	55	43	35	43	56	59	66	66	69	71	77	86	62.2	86			
12-Jun	85	93	95	97	98	87	79	70	59	52	48	48	47	54	51	69	75	70	66	66	69	75	82	87	71.7	98			
13-Jun	90	92	94	94	93	90	86	75	63	48	39	42	46	43	44	48	46	47	47	51	55	59	76	77	64.3	94			
14-Jun	76	76	76	80	78	70	64	58	53	46	43	36	35	32	30	29	28	31	35	38	46	62	72	78	53.0	80			
15-Jun	80	84	85	86	89	94	95	94	89	82	74	73	68	63	59	56	67	71	60	61	76	89	88	90	78.0	95			
16-Jun	90	86	93	95	96	97	96	94	88	82	70	66	52	45	41	39	37	38	38	39	52	61	63	68	67.7	97			
17-Jun	74	78	80	86	92	89	75	66	55	43	36	35	34	33	31	30	28	28	28	31	38	48	53	51	51.7	92			
18-Jun	53	58	58	57	57	53	48	43	40	39	40	38	33	34	34	34	35	35	37	39	50	56	72	87	47.1	87			
19-Jun	91	81	75	78	80	77	73	63	46	40	37	35	33	31	31	28	26	27	27	27	32	49	57	57	50.0	91			
20-Jun	64	69	71	74	66	48	43	35	33	33	31	29	26	24	24	21	20	21	23	27	36	46	52	61	40.7	74			
21-Jun	70	90	92	83	74	63	56	52	45	42	38	36	33	29	27	27	29	32	38	42	46	59	70	78	52.2	92			
22-Jun	84	86	88	91	91	86	79	68	61	52	49	43	56	68	45	44	66	88	80	78	85	96	97	98	74.1	98			
23-Jun	98	98	99	99	97	88	79	70	63	52	47	42	36	62	77	55	39	38	39	45	56	63	68	72	65.9	99			
24-Jun	75	77	77	79	79	73	64	55	48	40	36	31	30	27	25	23	24	24	29	36	48	48	55	63	48.6	79			
25-Jun	67	73	77	82	85	75	59	48	43	40	37	33	32	30	30	40	43	56	64	59	65	72	81	78	57.1	85			
26-Jun	77	75	67	69	72	71	67	66	62	56	54	43	41	37	33	31	37	69	81	86	93	94	94	92	65.4	94			
27-Jun	95	97	97	93	91	86	79	71	57	47	37	31	31	29	27	25	24	23	25	27	33	48	52	60	53.5	97			
28-Jun	68	60	60	61	61	55	50	42	40	38	29	23	25	26	25	26	27	30	40	54	65	73	77	79	47.3	79			
29-Jun	79	81	85	82	77	70	58	53	42	34	29	24	23	23	24	24	26	28	30	36	39	43	47	52	46.2	85			
30-Jun	55	60	61	62	63	65	61	58	65	64	64	60	53	55	62	65	75	80	84	81	81	81	77	74	66.9	84			
																												Diurnal Average	
																												Diurnal Maximum	



WBEA
Hourly Averages

Relative Humidity (RH) - %
Wapasu - June 2015





WBEA
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Wapasu - June 2015

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	1	0.14	0.14
20 - 40	192	26.67	26.81
40 - 60	198	27.50	54.31
60 - 80	186	25.83	80.14
80 - 100	143	19.86	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Maximum Speed: 20 km/h on Jun 12 17:00	Maximum Daily Speed Average: 11.1 km/h on Jun 4	Hours in Service: 720
Minimum Speed Value: 0 km/h on Jun 28 19:00	Minimum Daily Speed Average: 0.7 km/h on Jun 25	Hours of Data: 720
Maximum Diurnal Speed Average: 5.3 km/h at hour 15	Minimum Diurnal Speed Average: 0.3 km/h at hour 20	Hours of Missing Data: 0
Monthly Average Velocity: 0.9 km/h 249.5 deg	Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 5 Median = 7 Q ₃ = 10 P ₉₀ = 13 P ₉₉ = 17	Percent Operational Time: 100.0

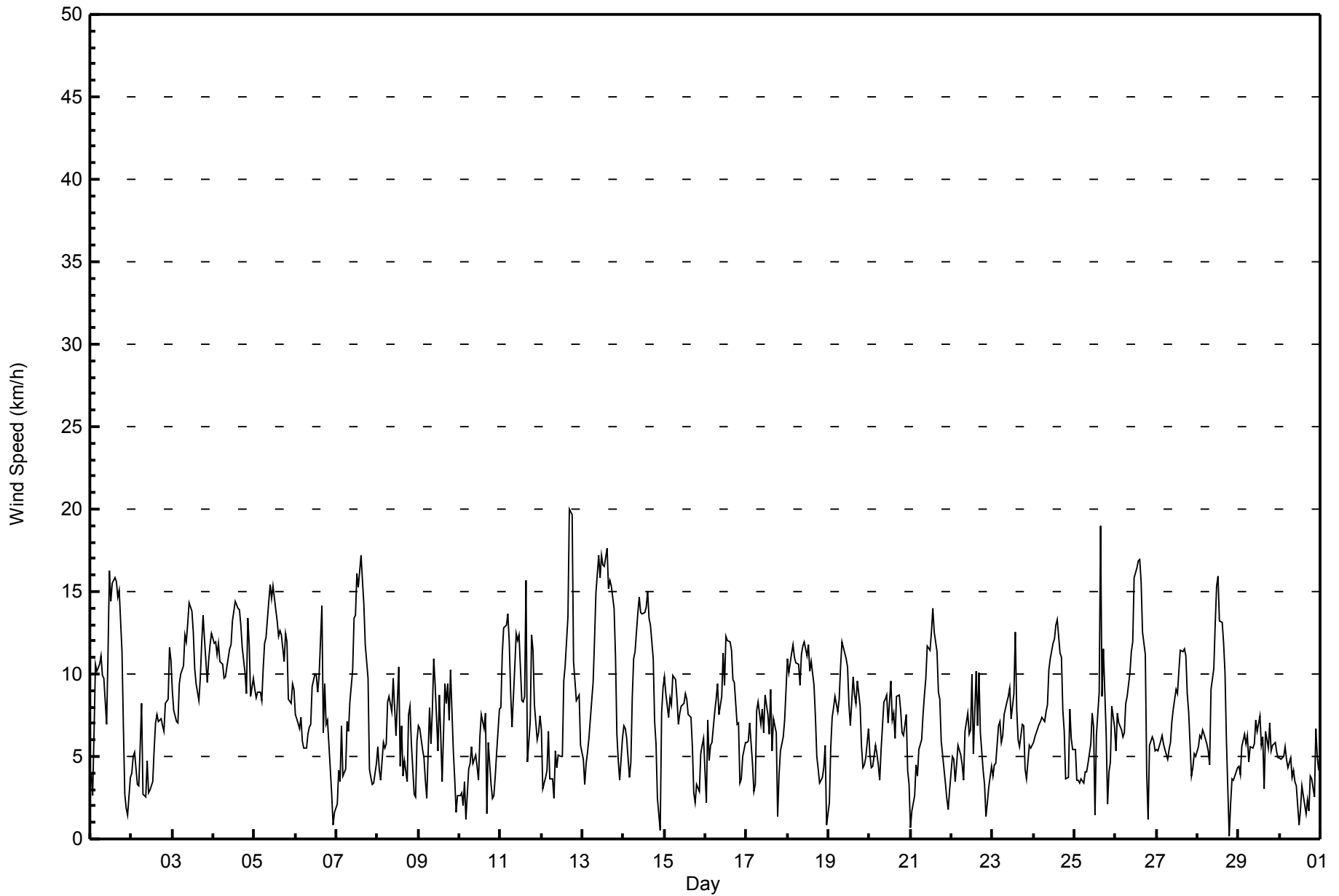
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	S4	WSW3	WNW6	NNW11	NNW10	NNW11	NNW11	NW10	NW10	NNW7	NW11	NW16	WNW14	WNW16	NW16	NW16	NW15	NW15	NW11	WNW7	WSW3	S2	WNW1	N4	NW8.7	NW16
2-Jun	NNE4	NNE5	NNE5	E3	E3	ENE6	NE8	ENE3	WSW3	W5	WNW3	ESE3	SE3	SSW5	SSW7	SSW8	SSE7	S7	S7	SSE6	SE8	ESE8	SE12	SE11	SE3.0	SE12
3-Jun	SE9	SE8	SE7	SE7	SE9	SE10	SE10	SE12	SSE12	SSE13	SE14	SSE14	SSE13	S10	S9	S8	SSE10	SSE12	SE14	SSE12	SSE10	SE11	SE12	SE12	SSE10.5	SE14
4-Jun	SE12	SE12	SE11	SE12	SSE11	SSE11	SSE10	SSE10	S10	S12	S12	SSE13	SSE14	S14	S14	S14	S13	S12	S10	S9	S13	S12	SSE9	SSE10	SSE11.1	S14
5-Jun	SSE9	SSE9	SSE9	SSE9	SSE8	S10	S12	S12	S14	SSW15	SSW15	SSW15	SSW14	SSW13	SSW12	SW13	SSW12	SSW11	SW12	S12	SSE8	SE8	SSE9	SSE9	S10.6	SSW15
6-Jun	S8	SSE7	SSE7	SSE7	S6	S6	S6	SSW6	SW7	W7	WNW9	NNW10	NW10	WNW9	W10	WNW14	NE6	SW9	SW7	WSW7	SW4	SW3	SSE1	SSE2	WSW3.6	WNW14
7-Jun	SSW2	SSE4	SSW3	W7	SSW4	SW4	WSW7	WSW7	W8	WNW10	WNW13	W14	W16	W15	W17	WNW16	WNW14	W12	WNW10	NW4	NE4	E3	ESE3	SW5	W6.7	W17
8-Jun	SE6	SSE4	ESE4	SE6	SSE5	SSE6	SW8	WSW9	W8	WNW10	WNW8	WSW6	NNE10	E4	ESE7	SW4	N5	NNE3	NW8	NNW8	NW6	NNW3	NW3	NW6	WNW1.3	NNE10
9-Jun	NNW7	NNW7	NW5	NW5	W4	W2	WSW8	W6	WSW8	WSW11	WNW9	NW5	NNW9	NE6	WNW3	WNW9	W8	WNW9	WNW7	NW10	NNW5	N4	ENE2	ESE3	WNW5.0	WSW11
10-Jun	ESE3	SE3	E2	ENE3	ESE1	ENE4	N5	NNW6	NNW5	NNW5	NW4	NW4	WNW6	WNW8	W7	NW8	W2	W6	SSW3	SW2	E3	ESE4	ESE5	SE8	NW1.0	SE8
11-Jun	SE8	SE11	SE13	SE13	SE14	SSE12	SE9	SE7	ESE11	ESE12	ESE12	ESE12	SE8	SSW8	SW9	SSE16	SSE5	SE7	SE12	SE11	SE8	SE6	SSW6	S7	SE8.8	SSE16
12-Jun	ENE7	ESE3	ESE4	SE4	E7	SW4	SW4	WSW2	N5	N4	NNW5	NW5	WNW5	E10	E11	ESE14	ESE20	ESE20	E20	E11	ENE8	ENE9	ENE9	NE6	E5.6	ESE20
13-Jun	NE5	N3	N5	N5	NNW6	NNW8	NNW9	N12	N15	N17	N16	N17	N17	N16	N18	NNE15	N16	N15	N14	NNE11	N6	NE5	ENE4	ENE6	N10.5	N18
14-Jun	ENE7	NE7	NE6	NNE4	N5	NNE9	NE11	N11	N14	N15	N14	N14	N14	N15	N13	N13	N11	N7	N6	N2	NNW1	NNW8	NNW9	N8.9	N15	
15-Jun	NNW10	N9	NNW7	NNW9	NNW8	NNW10	NW10	NW9	NNW7	NW8	NW8	WNW8	WNW9	W8	W5	WSW7	NW6	SE3	WSW2	SSE3	ESE3	SE5	SE6	SSE6	NW4.1	NNW10
16-Jun	SSE2	N7	NE5	NNE6	N6	N8	NNW8	N9	NNW8	NNW9	NW11	N9	NNW12	NW12	NNW12	NNW11	NNW10	NNW9	NNE7	NNE7	N3	NNE4	N5	N6	NNW7.2	NNW12
17-Jun	NNW6	NW6	NW7	NNW5	N3	N3	NNW8	N8	N7	NNW8	NNE6	NW9	NW8	WNW6	WNW9	NW5	WNW7	WNW6	WNW1	SSE4	S5	SSE6	SE7	SSE9	NW3.2	WNW9
18-Jun	SSE11	SSE10	SSE11	SSE12	SSE11	SSE11	SSE11	SSE9	S11	SSW12	SW12	SSW11	SW12	SSW10	SSW11	SW9	SW7	SSW5	WSW4	WSW3	SE4	SE4	SSW6	SE1	S7.4	SW12
19-Jun	E2	NNE6	NNE7	NNE8	NNE9	NNE8	NNE8	NNE10	NNE12	NE11	NNE11	NNE10	N8	NNE7	NNW10	NNW9	N8	NNW10	NNW8	N6	N4	NE5	E5	E7	NNE6.9	NNE12
20-Jun	E5	E4	ESE4	SE6	ESE5	SE5	SSW4	SW5	W8	WNW8	NW9	NW7	NNW10	NW7	NNW8	NNW6	NNW9	NNW9	NNW8	NNW6	NNE6	NE8	NE4	NE3	NNW3.1	NNW10
21-Jun	WSW1	SE2	NE3	N4	NNE4	NNE5	N6	NNW8	N9	NW10	NW12	NW11	NW13	NW14	NW13	NNW11	NNW9	N8	NW6	W5	N3	S2	S2	ESE3	NNW5.7	NW14
22-Jun	SE5	SE5	ESE3	SSE4	SE6	SSE5	SSE4	WSW4	NW7	N8	NNE6	NNW7	NW10	W5	W10	WNW7	WNW10	SW6	WNW4	NW3	N1	ESE2	ESE3	ENE4	WNW1.3	W10
23-Jun	SE4	SE4	SE5	SE7	SE7	SSE6	S6	SSW8	SW8	SW9	WSW9	WSW7	W9	NW13	ESE8	SSE6	SW6	WSW7	WSW7	WSW4	SSW4	SSE6	SSE6	SSE6	SSW3.8	NW13
24-Jun	SSE6	SE6	SE7	SSE7	SSE7	SSE7	SSE7	S8	SSW8	SW10	WSW11	SW12	WSW13	WSW13	WSW13	WSW11	WSW11	WNW8	NNE7	NE4	E4	N8	ENE6	ESE5	SW3.8	WSW13
25-Jun	ESE5	ESE4	E4	E3	SE4	ENE3	ENE4	NE4	NNW5	NW6	NNW8	NW7	E1	W6	W9	WNW19	W9	SW12	SE6	SSE2	S4	SSW5	SSE8	SSE7	W0.7	NW19
26-Jun	SSE5	SE8	SSE7	S7	SSE6	SSE6	S8	SSW9	SSW10	SSW11	SW12	WSW16	WSW16	WSW17	WSW17	WSW16	W13	WSW11	WSW4	NE1	SSE6	SE6	SE6	SSE5	SW6.9	WSW17
27-Jun	SSE5	SSE5	SSE6	SSE6	SSE6	SSE5	S5	SSW5	SW6	WSW7	W8	W9	WSW9	WSW10	WSW11	WSW11	WSW12	WSW11	WSW9	SW8	SSW4	S4	SSE5	SSE5	SW5.3	WSW12
28-Jun	SE6	SSE6	SSE6	SE7	SSE6	SSE6	SSW5	NW4	NW9	NW10	NW13	WNW15	NW16	WNW13	W13	W12	W10	WNW6	S0	SSE2	SE4	ESE4	ESE4	ESE4	W3.2	NW16
29-Jun	ESE4	SE4	SE6	SE6	SE6	SE6	SSE5	SSE6	SSW6	SW6	W7	WNW7	WNW7	WNW6	NW6	NW3	NNE7	NE6	NE7	NE5	ENE6	E6	E5	E5	E1.1	WNW7
30-Jun	ENE5	ENE5	ENE5	ENE6	ENE5	ESE4	SE5	SSE4	SSE4	S3	S3	W1	W2	N3	ENE3	NW2	W2	SE2	SE4	SE4	SSE3	SE7	SE5	SSW4	ESE2.2	SE7
SE3.2 ESE2.9 ESE2.7 ESE2.6 SE2.9 SE2.1 S1.2WSW1.2 W2.1WNW3.6NNW4.6NNW4.8NNW5.2NNW4.8 W5.3WNW4.8NNW3.6 W2.9 W1.1SSW0.3 SE1.8 ESE2.9 SE3.4 SE3.3																								Diurnal Average		
SE12 SE12 SE13 SE13 SE14 SSE12 S12 SE12 N15 N17 N16 N17 N17 WSW17 N18 NW19 ESE20 ESE20 E20 SSE12 S13 S12 SE12 SE12																								Diurnal Maximum		

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



WBEA
Hourly Averages

Wind Speed (WS) - km/h
Wapasu - June 2015





WBEA
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Wapasu - June 2015

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	222	30.83	30.83
6 - 11	376	52.22	83.06
12 - 19	119	16.53	99.58
20 - 28	3	0.42	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



WBEA
Frequency Distribution

Wind Speed (WS) - km/h
Wapasu - June 2015

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	20	8	12	14	15	25	23	25	11	13	9	11	9	6	13	8	222
6 - 11	21	22	11	11	5	4	41	58	19	16	15	24	21	28	33	47	376
12 - 19	20	2	0	0	0	4	13	11	11	9	8	9	8	8	14	2	119
20 - 28	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	3
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	61	32	23	25	21	35	77	94	41	38	32	44	38	42	60	57	720

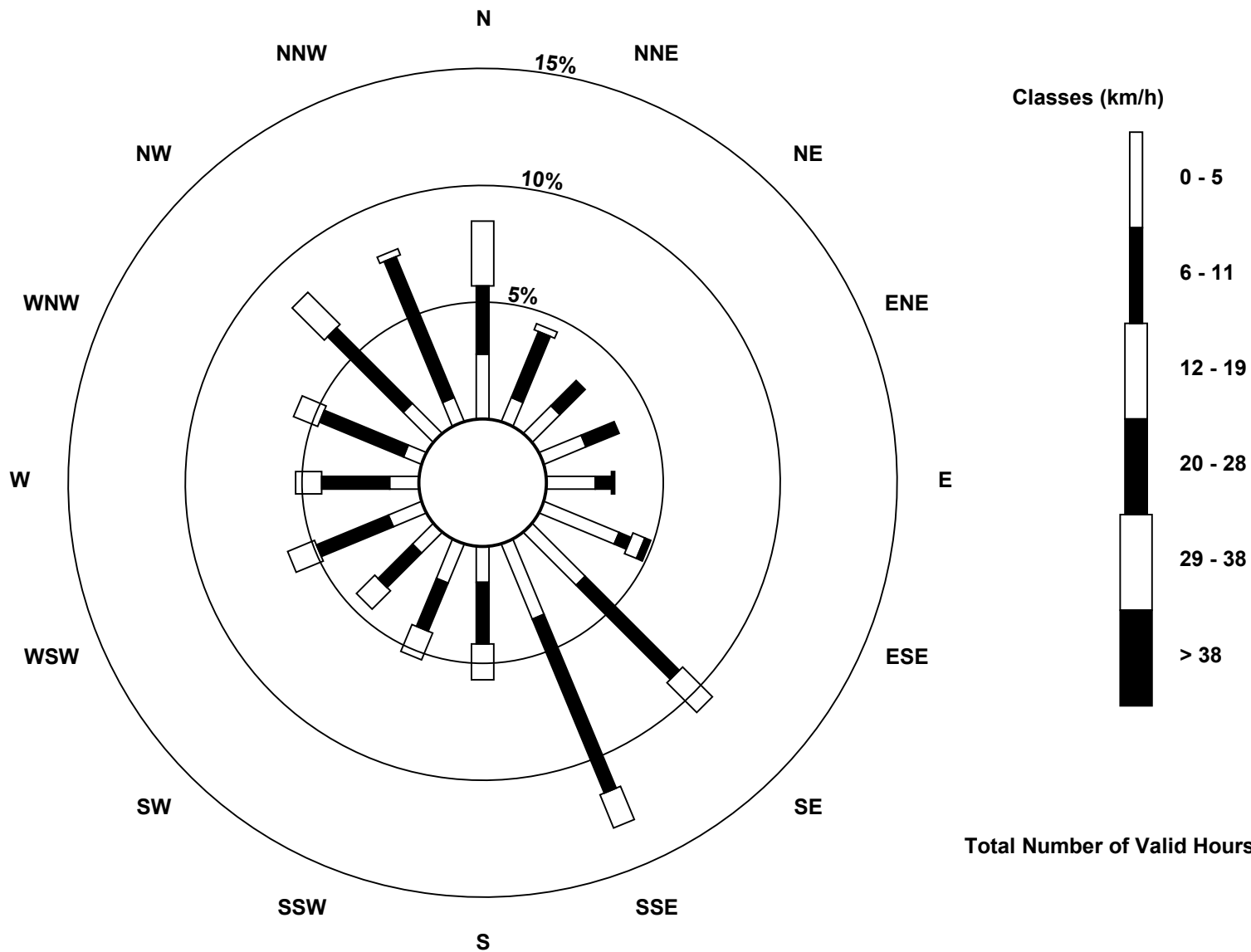
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

Wind Speed (WS) - km/h
Wapasu (AMS 17)





Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Speed (WS) - km/h

Wapasu - June 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 9 km/h on Jun 26 18:00 Minimum Value: 0 km/h on Jun 30 05:00 Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 1 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 Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	1	2	2	3	3	4	4	3	3	2	4	5	5	6	5	5	5	5	4	3	1	0	1	1	6
2-Jun	1	1	1	1	1	2	3	2	2	2	2	2	3	4	3	3	3	3	2	2	2	3	3	4	
3-Jun	2	2	1	1	2	2	3	4	4	4	5	4	5	4	4	3	4	4	4	3	3	3	3	5	
4-Jun	3	3	3	3	3	3	3	3	4	5	5	5	5	5	5	5	5	5	4	4	5	5	3	3	5
5-Jun	3	3	3	2	2	4	4	4	5	5	5	5	5	6	5	5	4	4	5	5	3	2	3	3	6
6-Jun	2	2	2	2	2	2	2	2	4	3	3	3	4	3	4	7	5	3	3	2	1	1	1	1	7
7-Jun	1	0	2	5	1	1	2	2	3	3	4	4	6	6	6	5	5	4	3	2	1	0	2	2	6
8-Jun	1	1	1	1	2	2	3	3	3	3	3	3	4	3	3	2	2	2	5	3	2	2	1	4	5
9-Jun	2	2	1	1	1	1	3	2	3	3	3	4	7	3	2	4	3	4	3	3	2	1	1	1	7
10-Jun	1	1	1	1	1	1	2	2	2	2	3	3	3	4	3	3	2	2	2	3	0	1	1	1	4
11-Jun	1	3	3	3	3	3	3	3	3	4	4	4	3	3	4	7	6	3	4	4	2	2	3	2	7
12-Jun	4	3	2	1	1	2	1	2	2	2	3	2	1	5	3	4	6	6	6	6	3	3	4	2	6
13-Jun	2	2	1	1	2	3	3	5	6	6	6	6	6	6	7	6	6	6	5	4	2	3	1	2	7
14-Jun	2	2	3	1	1	3	4	4	5	5	5	5	5	5	6	5	5	5	3	2	1	2	2	3	6
15-Jun	4	3	3	3	3	3	3	3	2	2	2	3	3	3	3	3	4	1	1	1	1	1	1	1	4
16-Jun	3	3	2	2	2	3	3	3	3	3	3	4	4	4	4	4	3	4	3	2	1	1	2	2	4
17-Jun	2	2	2	1	1	2	3	3	3	3	3	4	3	4	4	3	3	2	2	2	1	1	1	2	4
18-Jun	3	3	3	3	3	3	3	3	4	4	4	4	5	4	4	3	3	2	2	1	1	1	2	1	5
19-Jun	1	2	2	3	3	3	3	3	4	4	4	4	4	4	3	4	4	3	3	2	1	1	1	1	4
20-Jun	1	1	1	1	1	1	2	2	3	3	4	4	4	4	4	3	4	4	3	3	3	2	2	1	4
21-Jun	1	1	1	1	1	2	2	3	3	3	4	4	5	5	5	4	3	3	2	2	2	1	0	1	5
22-Jun	1	1	1	1	1	1	1	2	2	3	3	4	6	3	3	3	4	2	2	1	1	1	1	1	6
23-Jun	1	1	1	1	1	1	2	3	3	3	3	3	4	9	3	2	2	2	3	1	1	1	1	1	9
24-Jun	1	1	1	1	1	2	2	3	3	3	4	4	5	5	4	4	3	3	1	1	3	2	1	1	5
25-Jun	1	1	1	1	0	1	1	2	2	2	3	3	3	4	3	7	6	4	3	2	2	2	1	1	7
26-Jun	1	2	2	2	2	2	3	3	4	4	4	5	6	6	5	5	5	9	3	2	2	1	1	1	9
27-Jun	1	1	1	1	2	1	1	2	2	3	3	3	3	4	4	4	4	4	3	3	1	1	1	1	4
28-Jun	1	1	1	1	1	2	2	3	3	4	4	5	5	4	4	4	3	2	1	1	0	1	1	1	5
29-Jun	1	1	1	1	1	1	1	2	2	2	2	3	3	3	3	3	3	2	2	2	1	1	1	1	3
30-Jun	1	1	1	1	0	1	1	1	1	1	1	1	2	1	1	2	2	2	1	1	1	1	2	2	2
Diurnal Maximum																									



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Wapasu - June 2015

Direction of Maximum Speed: 103 deg on Jun 12 17:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 167.5 deg on Jun 4	Hours of Data: 720
Direction of Minimum Speed: 179 deg on Jun 28 19:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 0.7 deg on Jun 25	Percent Operational Time: 100.0
Monthly Average Direction: 277.6 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	178	238	298	328	330	338	334	319	321	332	306	311	296	302	309	308	313	307	305	300	257	172	291	350	311.4
2-Jun	17	13	23	94	100	58	50	70	248	268	285	120	132	213	198	192	164	181	179	149	125	119	131	139	137.3
3-Jun	146	139	135	125	134	137	139	146	157	149	140	160	153	169	181	172	163	157	144	157	153	144	143	143	149.7
4-Jun	142	140	142	143	148	152	158	168	185	186	191	163	158	171	176	186	172	183	188	180	172	184	164	164	167.5
5-Jun	163	168	168	161	161	179	178	187	191	208	202	217	200	196	207	215	204	212	221	182	160	146	160	167	189.4
6-Jun	170	162	166	168	175	175	187	211	230	261	293	333	315	283	281	303	47	220	217	241	221	231	166	153	239.3
7-Jun	194	148	200	277	199	231	251	255	263	286	294	279	274	275	275	291	287	276	297	325	52	97	117	222	274.0
8-Jun	133	150	105	124	150	155	219	244	276	294	302	237	20	80	113	221	360	21	306	329	313	334	305	324	289.1
9-Jun	328	327	310	305	275	269	248	268	258	250	301	324	337	50	288	296	280	287	293	312	329	357	58	114	298.9
10-Jun	105	125	87	77	115	64	5	329	346	337	310	309	284	291	269	309	262	275	196	215	79	114	113	128	323.0
11-Jun	132	137	136	137	139	150	146	127	106	104	106	114	136	211	224	148	159	141	135	133	138	127	203	175	139.5
12-Jun	63	120	118	128	79	227	214	258	6	353	333	308	284	85	90	103	103	104	101	89	66	67	77	47	86.4
13-Jun	47	2	5	357	343	330	343	357	4	360	0	355	0	8	5	16	359	359	10	26	11	35	69	61	4.9
14-Jun	60	47	47	19	354	16	35	11	8	352	350	352	352	1	354	351	354	4	352	350	358	338	330	329	1.5
15-Jun	343	0	340	335	329	328	324	322	335	314	308	290	296	265	264	250	308	143	238	152	110	132	136	148	312.3
16-Jun	154	350	36	19	7	354	341	350	348	332	325	353	330	317	327	332	338	341	19	16	352	27	8	359	346.5
17-Jun	337	324	321	329	10	353	338	356	350	348	22	304	317	301	290	307	298	288	297	164	175	148	146	148	321.5
18-Jun	153	152	149	149	151	156	159	162	181	196	221	213	217	204	210	215	214	202	257	254	131	128	209	142	183.4
19-Jun	95	15	29	28	32	31	24	24	31	35	18	16	359	22	335	342	351	330	332	358	10	36	86	91	16.3
20-Jun	95	99	117	127	119	137	210	235	280	296	321	321	338	311	327	335	346	343	338	347	17	34	45	50	344.7
21-Jun	250	138	41	359	20	14	352	340	349	317	321	323	319	323	323	337	343	355	311	280	351	185	184	118	333.4
22-Jun	134	126	103	152	146	151	154	254	319	355	28	334	305	259	268	289	288	228	284	316	6	115	104	73	286.6
23-Jun	135	130	135	138	139	148	177	196	215	228	247	253	267	318	116	159	222	257	256	237	196	160	164	151	199.5
24-Jun	150	143	144	147	149	155	161	191	207	231	243	235	238	245	255	254	257	284	15	42	83	11	60	114	215.8
25-Jun	108	108	92	95	126	75	63	47	347	317	328	313	82	281	280	323	276	223	144	159	178	210	151	155	276.3
26-Jun	154	141	168	172	164	163	175	201	199	208	227	238	249	252	258	257	267	237	247	49	148	142	145	155	215.5
27-Jun	149	147	154	160	163	161	178	193	230	241	266	273	253	251	255	244	258	245	239	233	196	171	153	148	221.5
28-Jun	143	147	147	142	147	166	203	316	321	314	309	295	306	292	276	276	277	288	179	155	140	113	112	122	274.7
29-Jun	112	130	132	134	139	140	159	167	204	236	259	282	303	294	315	311	18	49	48	54	72	79	85	81	101.1
30-Jun	70	76	75	74	73	111	125	163	154	189	180	264	268	7	63	323	274	146	138	140	166	139	138	204	122.0

123.8 121.4 119.8 122.7 127.1 133.1 171.8 246.7 279.5 283.8 295.4 289.7 293.0 282.6 277.1 283.2 292.2 267.9 269.9 202.7 124.3 120.3 129.5 131.3

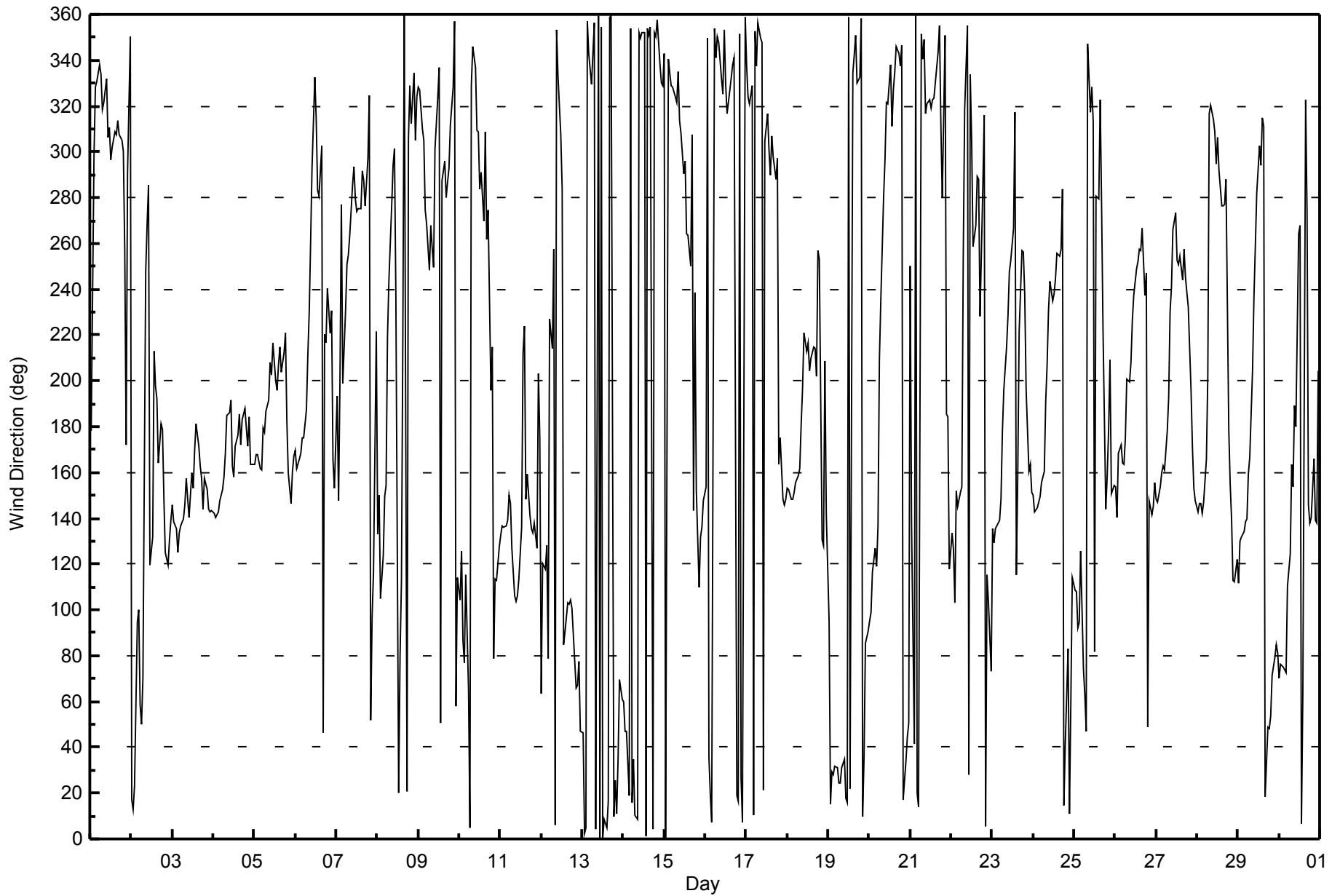
Diurnal Average

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



WBEA
Hourly Averages

Wind Direction (WD) - deg
Wapasu - June 2015





Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg

Wapasu - June 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 99 deg on Jun 29 16:00																	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Minimum Value: 6 deg on Jun 23 04:00																									
Percentiles: P ₁ = 9 P ₁₀ = 16 Q ₁ = 24 Median = 33 Q ₃ = 41 P ₉₀ = 57 P ₉₉ = 91																									
Day	Hourly Period Ending At (MST)																							Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23		24
1-Jun	26	51	32	27	27	33	28	21	29	33	27	23	27	24	26	26	26	23	25	27	29	43	63	22	63
2-Jun	18	17	22	34	22	22	31	97	78	66	84	94	87	77	59	57	55	47	43	31	16	14	15	18	97
3-Jun	20	17	12	11	15	18	20	27	31	29	28	33	33	49	43	41	40	32	26	30	24	19	18	19	49
4-Jun	18	19	20	18	23	26	26	32	37	43	43	40	35	37	39	40	38	37	38	35	32	34	27	29	43
5-Jun	27	30	27	27	25	36	33	36	37	35	38	34	41	41	39	36	36	36	33	34	27	20	25	27	41
6-Jun	30	20	24	23	27	31	39	41	43	41	32	35	35	36	35	39	76	36	35	21	24	31	86	71	86
7-Jun	55	11	38	42	35	34	23	26	29	28	29	28	31	29	30	29	32	31	28	47	16	32	41	42	55
8-Jun	16	33	53	16	33	26	29	35	35	29	41	38	38	63	40	52	56	64	46	28	23	45	42	27	64
9-Jun	30	25	22	22	39	28	23	26	35	30	38	70	74	50	79	47	40	42	42	23	30	23	61	32	79
10-Jun	36	19	33	27	64	23	44	40	58	57	66	85	65	54	59	40	96	47	53	78	15	13	10	10	96
11-Jun	13	16	17	18	19	23	26	37	24	21	22	24	44	41	42	31	91	30	21	20	17	38	50	36	91
12-Jun	61	66	46	20	11	55	47	84	56	75	61	53	43	54	23	22	22	22	23	47	27	27	25	29	84
13-Jun	32	33	33	32	33	26	34	40	39	37	40	40	38	39	40	37	38	36	41	32	36	39	18	24	41
14-Jun	23	23	24	23	27	39	33	37	38	38	41	42	43	43	41	42	39	43	42	39	50	84	27	23	84
15-Jun	35	40	36	31	31	26	25	25	32	31	32	36	33	34	42	49	68	50	65	30	34	7	9	10	68
16-Jun	71	39	30	36	38	34	37	36	37	33	30	40	36	33	35	37	37	42	44	36	23	26	32	34	71
17-Jun	38	33	25	21	19	45	32	38	48	48	63	53	60	63	48	70	62	40	92	36	25	16	17	21	92
18-Jun	23	22	23	23	25	27	30	35	35	37	32	39	42	40	37	34	38	51	41	41	21	16	36	86	86
19-Jun	45	29	27	33	30	34	40	37	36	38	47	52	58	59	46	49	50	35	40	42	20	17	16	11	59
20-Jun	15	11	21	11	15	42	40	42	33	37	51	79	51	83	57	69	48	46	41	44	36	27	27	25	83
21-Jun	76	69	36	19	25	34	37	38	42	31	31	42	38	37	35	41	39	39	24	28	57	27	38	19	76
22-Jun	15	16	16	12	11	17	22	58	42	48	51	61	59	39	32	58	41	29	45	30	73	36	31	24	73
23-Jun	20	25	12	6	10	23	29	33	37	33	33	49	48	53	29	39	46	26	25	25	25	17	17	11	53
24-Jun	9	8	12	13	16	23	26	38	37	32	31	38	34	33	33	35	36	44	43	41	26	36	21	16	44
25-Jun	15	21	25	35	29	19	31	58	54	50	41	55	98	75	38	29	57	29	32	60	35	46	23	20	98
26-Jun	19	17	29	28	24	25	31	36	37	35	30	30	33	31	29	28	37	47	71	88	22	11	11	23	88
27-Jun	8	10	17	12	26	21	32	44	30	35	40	37	37	38	37	38	33	32	30	24	25	17	9	16	44
28-Jun	15	8	9	9	12	29	33	86	31	30	27	29	23	25	27	27	27	30	89	34	9	15	23	24	89
29-Jun	29	19	11	13	11	10	19	29	41	32	29	49	51	66	66	99	40	32	20	16	22	13	14	13	99
30-Jun	15	14	16	9	9	24	16	26	24	41	44	88	82	49	25	52	59	69	20	19	60	12	17	38	88
	76	69	53	42	64	55	47	97	78	75	84	94	98	83	79	99	96	69	92	88	73	84	86	86	
	Diurnal Maximum																								



Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	June 9, 2015	Last Calibration	May 7, 2015
Station Name	Wapasu	Station Number	AMS 17
Reason:	Routine		
Start Time (MST)	9:40	End Time (MST)	15:20
Gas Cert Reference	SA130010A	Station temp.	23 Deg C
Cal Gas Concentration	47.8 ppm	Cal Gas Exp Date	12-Dec-16
Calibrator Make/Model	API T700	Serial Number	493
ZAG Make/Model	API 701	Serial Number	4427
DACS make/model	Campbell Scientific CR3000	DACS serial No.	6894

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		PMT voltage	-702	-702
Analyzer IP address	192.168.1.43		Lamp voltage	887	871
Calculated slope	0.991537	0.994227	Chamber temp	44.9	45.2
Calculated intercept	0.106835	0.922427	Pressure	696.7	690.4
Analyzer Background	8.4	8.5	Flow	0.456	0.453
Analyzer Coefficient	0.808	0.808	Intensity	82	83

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	-0.5	----
as found span	5000	60.4	577.4	577.3	1.000
calibrator zero	5000	0.0	0.0	-0.5	----
high point	5000	60.4	577.4	579.6	0.996
second point	5000	30.2	288.7	290.7	0.993
third point	5000	15.2	145.3	143.8	1.010
as left zero	5000	0.0	0.0	-0.5	----
as left span	5000	60.4	577.4	579.5	0.996
Average Correction Factor					1.000

Corrected As found 577.8 Previous response 582.2 % change 0.8%

Notes:

Filter changed after as founds. No adjustments made.

Calibration Performed By: Devin Russell



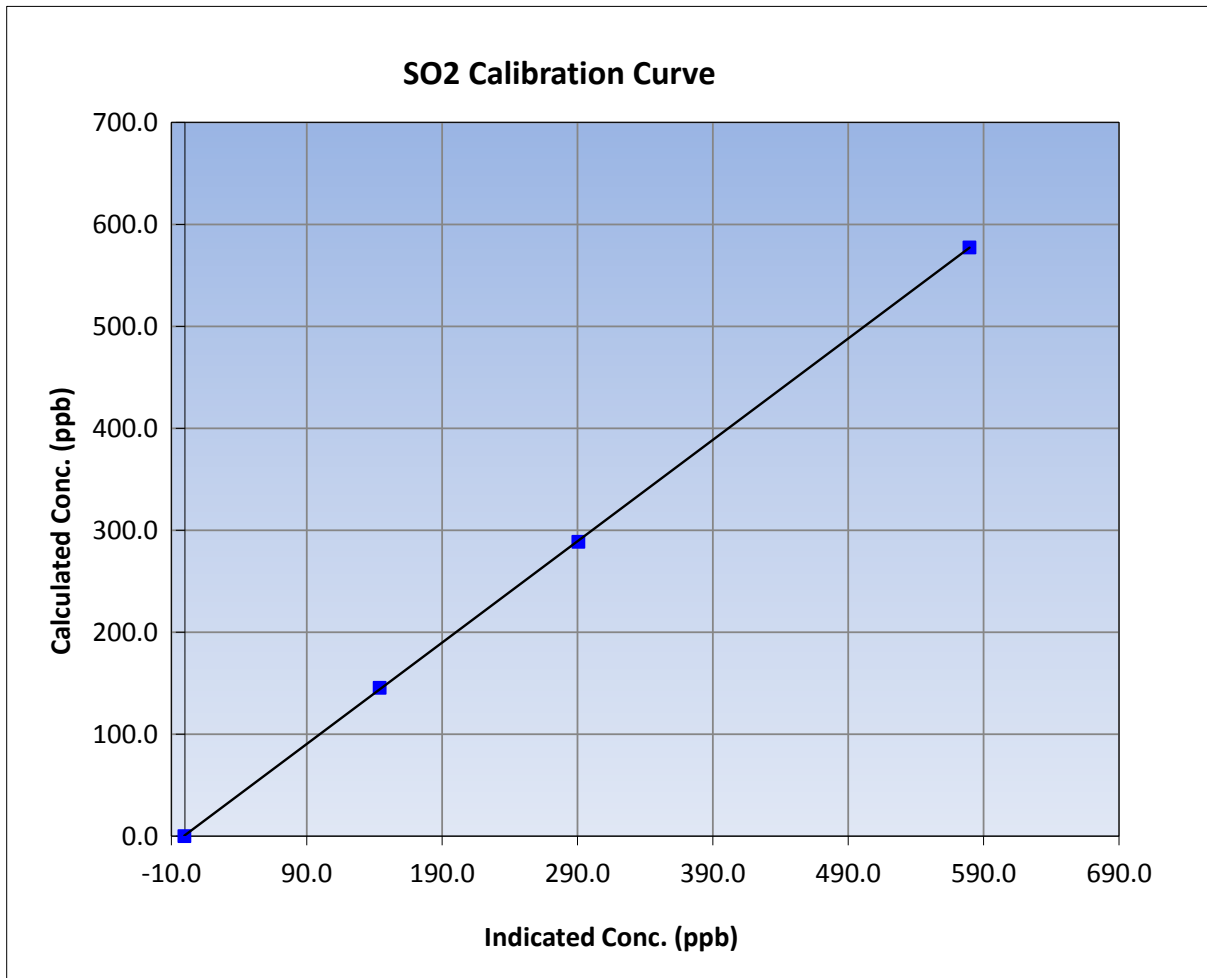
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	June 9, 2015	Previous Calibration	May 7, 2015
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	9:40	End Time (MST)	15:20
Analyzer make	Thermo 43i	Analyzer serial #	1218153459

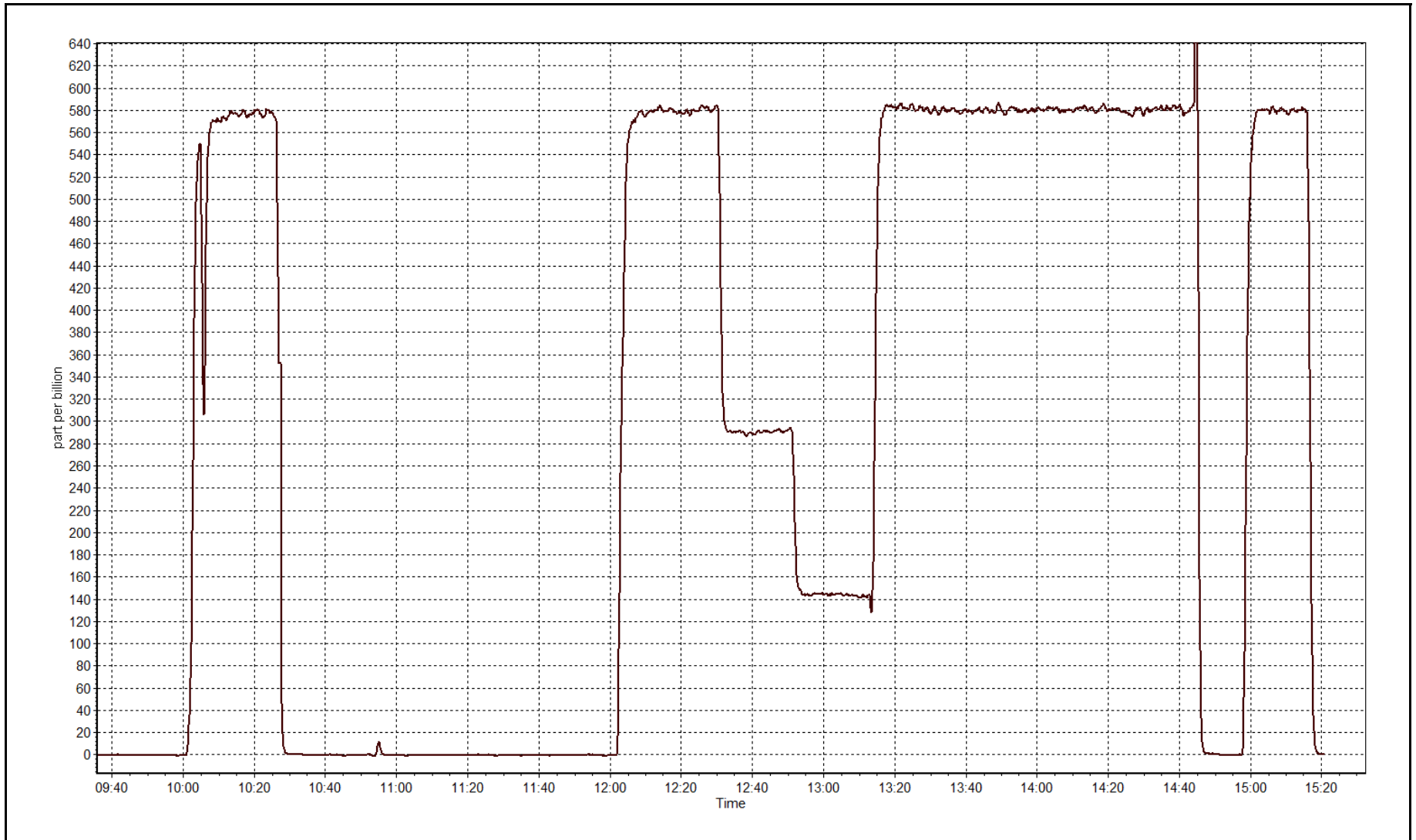
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.5	----	Correlation Coefficient	0.999980
577.4	579.6	0.9962		
288.7	290.7	0.9933	Slope	0.994227
145.3	143.8	1.0103		
			Intercept	0.922427



SO2 Calibration Plot

Date: June 9, 2015





Wood Buffalo Environmental Association H2S Calibration Report

Station Information

Calibration Date	June 10, 2015	Last Calibration	May 19, 2015
Station Name	Wapasu	Station Number	AMS 17
Reason:	Routine		
Start Time (MST)	11:00	End Time (MST)	14:20
Gas Cert Reference	CC107167	Station temp.	23 Deg C
Cal Gas Concentration	5.1 ppm	Cal Gas Exp Date	09-Sep-17
Calibrator Make/Model	API T700	Serial Number	997
ZAG air Make/Model	API 701	Serial Number	4227
DACS make/model	Campbell Scientific CR3000	Serial Number	6894
SO2 gas concentration	47.8 ppm	SO2 gas cert/exp	SA130010A 12-Dec-16

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-651	-651
Analyzer IP address	192.168.1.42		Lamp voltage	812	808
Calculated slope	1.000892	1.002091	Chamber temp	45	45
Calculated intercept	-0.228940	-0.208606	Pressure	564.5	554.3
Analyzer Background	11.5	11.6	Flow	0.990	0.995
Analyzer Coefficient	0.842	0.842	Intensity	91	92
			Converter temp.	339	339

Analyzer make/model	Thermo 450i	Analyzer serial #	1218153583
Converter make/model		Converter serial #	

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.1	----
as found span	5000	78.5	80.1	79.9	1.002
SO2 scrubber check	5000	20.9	199.8	1.7	----
calibrator zero	5000	0.0	0.0	-0.1	----
high point	5000	78.5	80.1	79.9	1.002
second point	5000	39.3	40.1	40.5	0.989
third point	5000	19.7	20.1	20.5	0.982
as left zero	5000	0.0	0.0	0.4	----
as left span	5000	78.5	80.1	80.9	0.990
Average Correction Factor					0.991

Corrected As found	80.0	Previous response	80.2	% change	0.3%
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Notes:

Filter changed after as founds. Scrubber check completed after as founds. No adjustments made.

Calibration Performed By: Devin Russell



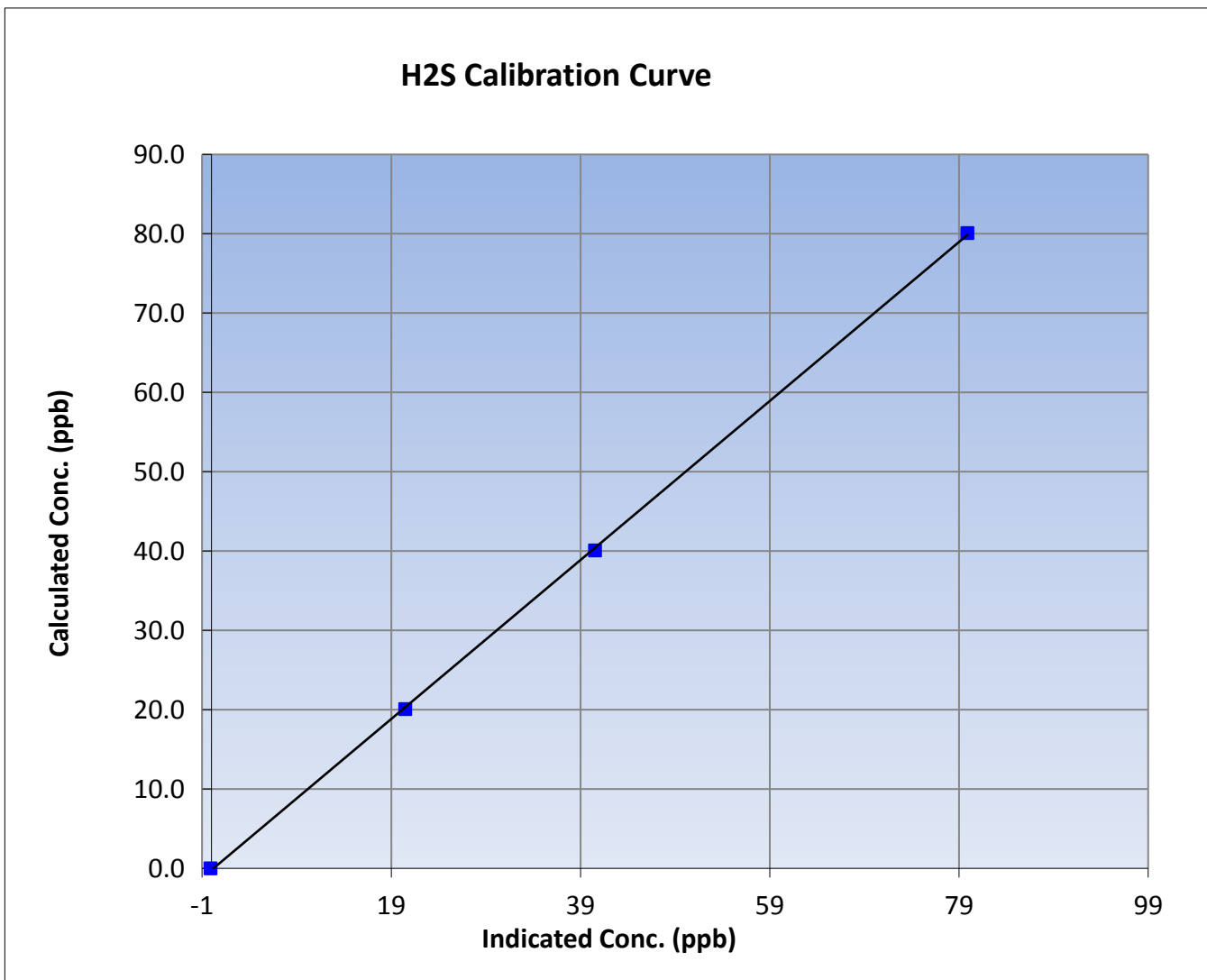
Wood Buffalo Environmental Association H2S Calibration Report

Station Information

Calibration Date	June 10, 2015	Previous Calibration	May 19, 2015
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	11:00	End Time (MST)	14:20
Analyzer make	Thermo 450i	Analyzer serial #	1218153583

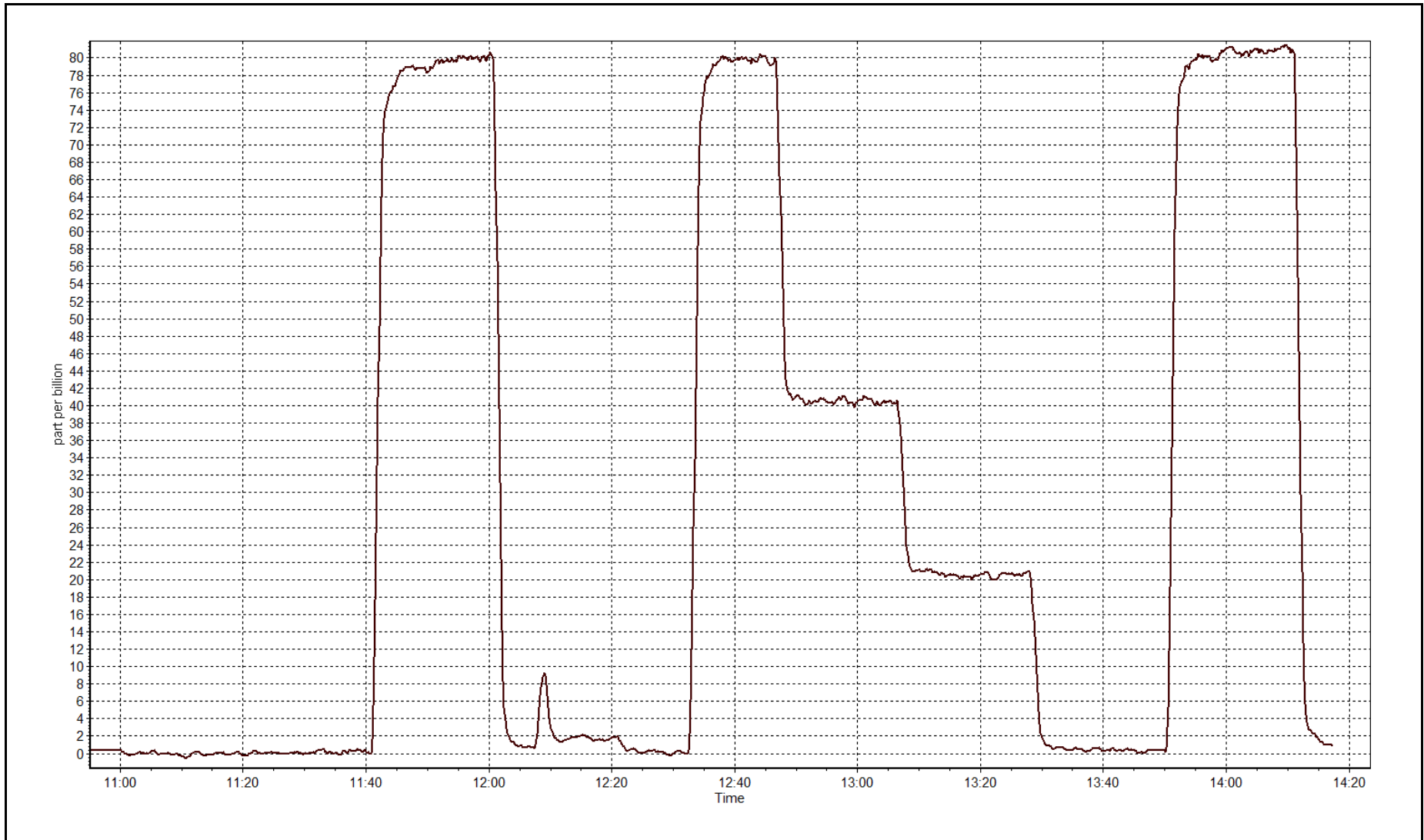
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999920
80.1	79.9	1.0021		
40.1	40.5	0.9893	Slope	1.002091
20.1	20.5	0.9816		
			Intercept	-0.208606



H2S Calibration Plot

Date: June 10, 2015





Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	June-09-15	Last Calibration	May-07-15
Station Name	Wapasu	Station Number	AMS 17
Reason:	Routine		
Start Time (MST)	9:40	End Time (MST)	15:20
Gas Cert Reference	SA130010A	Cal Gas Expiry Date	12/12/2015
CH4 Cal Gas Conc.	512 ppm	CH4 Equiv Conc.	1092.3 ppm
C3H8 Cal Gas Conc.	211 ppm	Station temp.	23 Deg C
Calibrator Make/Model	API T700	Serial Number	493
ZAG make/model	Teledyne API 701	Serial Number	4427
DACS make/model	Campbell Scientific CR3000	Serial Number	6894

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 50 ppm		Sample Pressure	8.5	8.5
Analyzer IP address	192.168.1.51		Air or Bypass Press	40.8	40.9
Calculated slope	1.005849	0.992204	Fuel Pressure	24.8	24.8
Calculated intercept	-0.073525	0.030659	Analyzer Coeff	5.0	4.2
			Analyzer BKG	2.850	2.560

Analyzer make	Thermo 51i-LT	Analyzer serial #	1218153352
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Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	0.06	----
as found span	5000	60.4	13.19	12.54	1.052
calibrator zero	5000	0.0	0.00	-0.05	----
high point	5000	60.4	13.19	13.26	0.995
second point	5000	30.2	6.60	6.62	0.997
third point	5000	15.2	3.32	3.34	0.994
as left zero				-0.06	
as left span	5000	60.4	13.19	13.14	1.004
Average Correction Factor					0.995

Corrected As found	12.48	Previous response	13.19	% change	5.7%
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Notes:

Filter changed after as founds. As found span 5.2% low. Pump changed after as founds increasing span significantly. Zero and span adjusted.

Calibration Performed By: Devin Russell



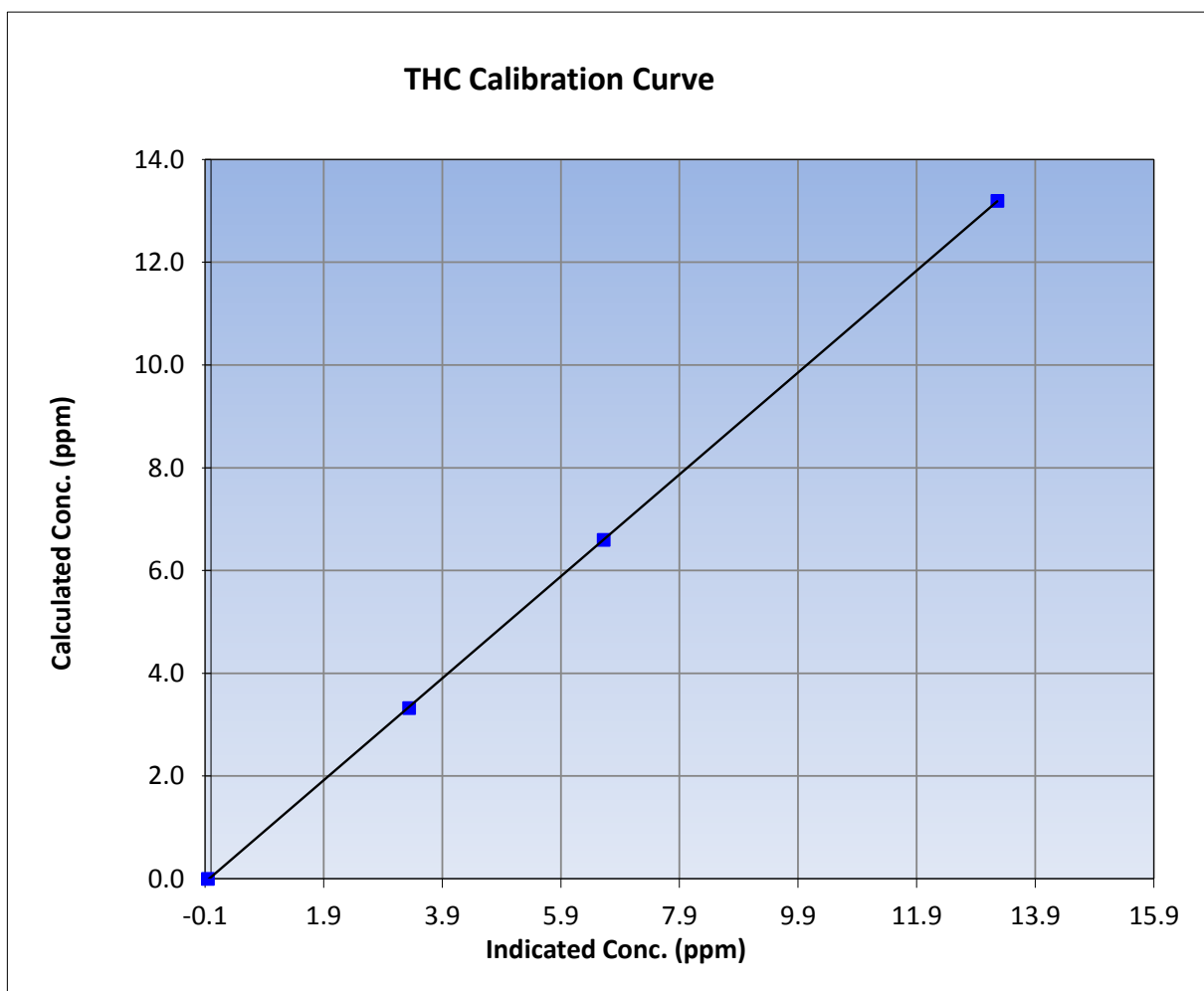
Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	June 9, 2015	Previous Calibration	May 7, 2015
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	9:40	End Time (MST)	15:20
Analyzer make	Thermo 51i-LT	Analyzer serial #	1218153352

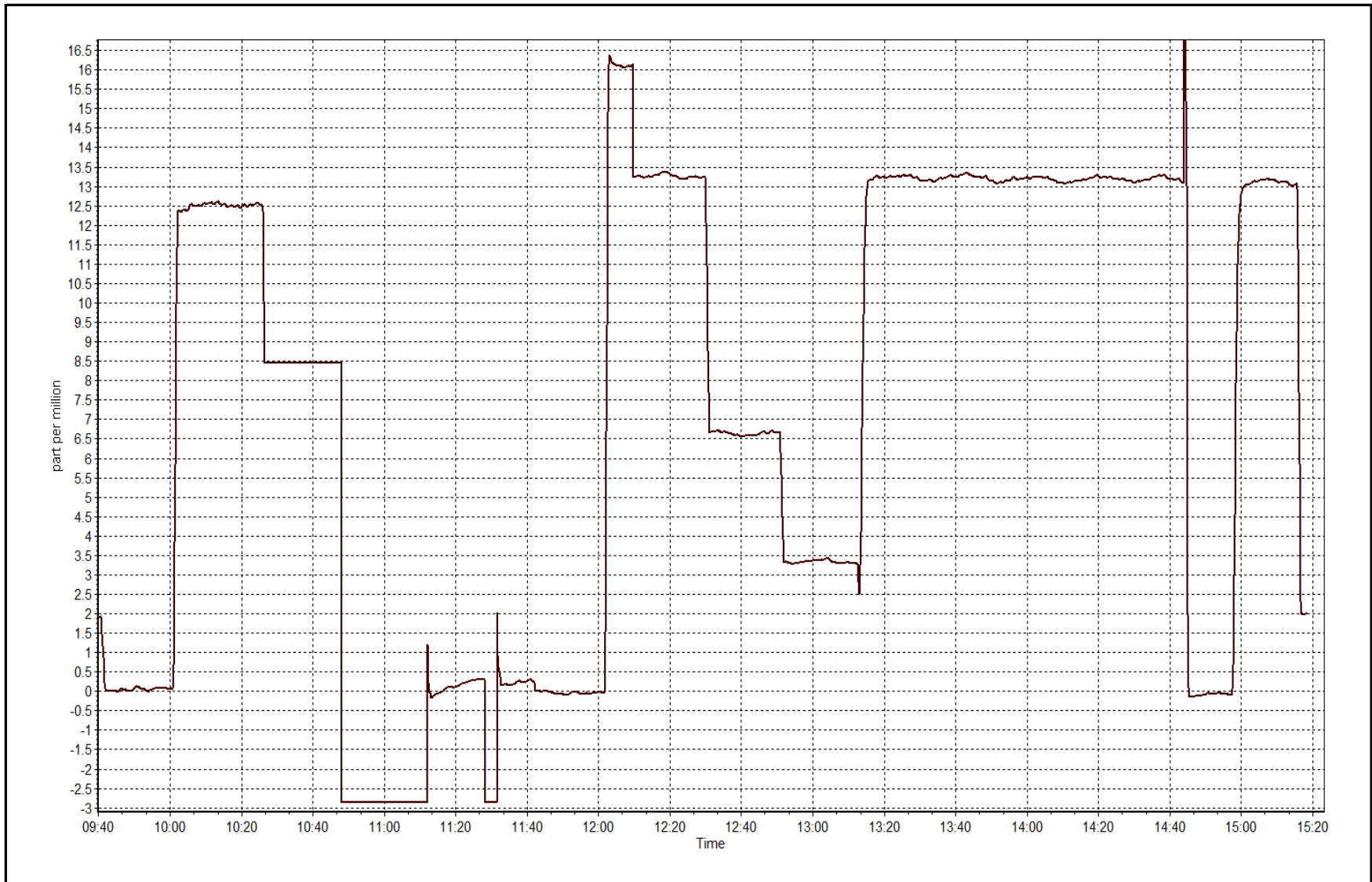
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	-0.05	----	Correlation Coefficient	0.999990
13.19	13.26	0.9951		
6.60	6.62	0.9966	Slope	0.992204
3.32	3.34	0.9941		
			Intercept	0.030659



THC Calibration Plot

Date: June 9, 2015





Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

Calibration Date	June 10, 2015	Previous Calibration	May 20, 2015
Station Name	Wapasu	Station Number	AMS 17
Reason:	Routine		
Start Time (MST)	9:00	End Time (MST)	11:45
NO2 GPT Ref date	April-01-15	Transfer Standard	23
		Station temp.	23 Deg C
Calibrator Make/Model	Teledyne API T700	Serial Number	997
ZAG make/model	Teledyne API 701	Serial Number	4427
DACS make/model	Campbell Scientific CR3000	Serial Number	6894

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 500 ppb		Bench temp.	25.0	25.8
Analyzer IP address	192.168.1.48		Lamp temp.	58.0	58.0
Calculated slope	0.993383	0.996118	Pressure	26.1	35.7
Calculated intercept	0.617060	-0.248534	Flow cell A	0.731	0.723
Analyzer Background	5.5	5.4	Flow cell B	0.743	0.733
Analyzer Coefficient	0.974	0.960	Cell A Intensity		
			Cell B Intensity		
Analyzer make	Teledyne API T400		Analyzer serial #	824	

Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator Lamp Intensity (mA)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	197.0/800	0.0	0.3	----
as found span	5000	713.2/1081.4	355.4	361.2	0.984
calibrator zero	5000	195.9/800	0.0	0.3	----
high point	5000	713.2/1081.4	355.4	357.2	0.995
second point	5000	495.5/973.5	240.3	241.2	0.996
third point	5000	261.2/846.7	123.3	124.1	0.994
as left zero	5000	195.9/800	0.0	0.0	----
as left span	5000	713.9/1083.6	355.4	357.9	0.993
Average Correction Factor					0.995

Corrected As found	360.9	Previous response	357.2	% change	-1.0%
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Notes:

Changed filter after as founds. Span adjusted.

Calibration Performed By:

Devin Russell



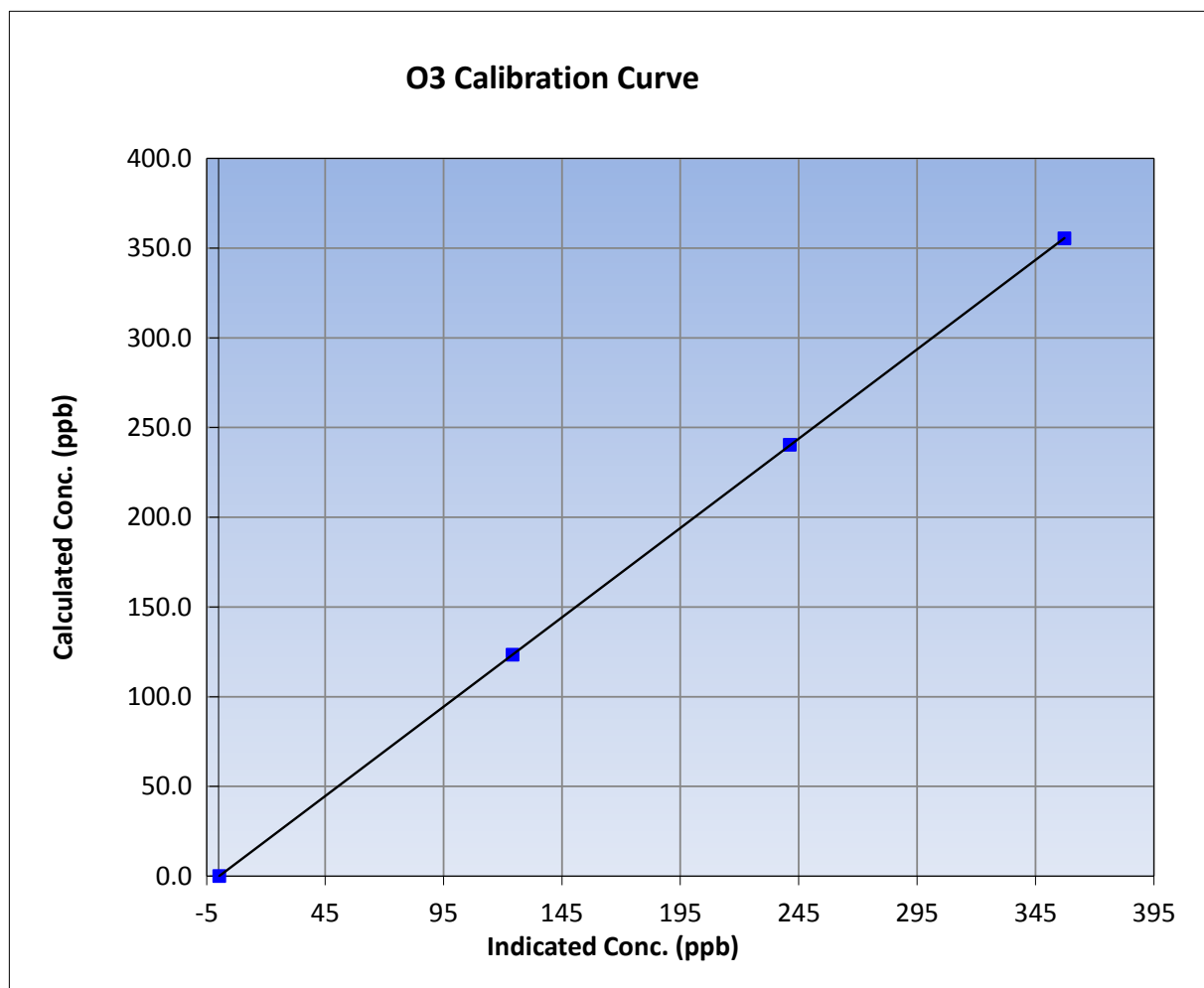
Wood Buffalo Environmental Association O3 Calibration Report

Station Information

Calibration Date	June-10-15	Previous Calibration	May 20, 2015
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	9:00	End Time (MST)	11:45
Analyzer make	Teledyne API T400	Analyzer serial #	824

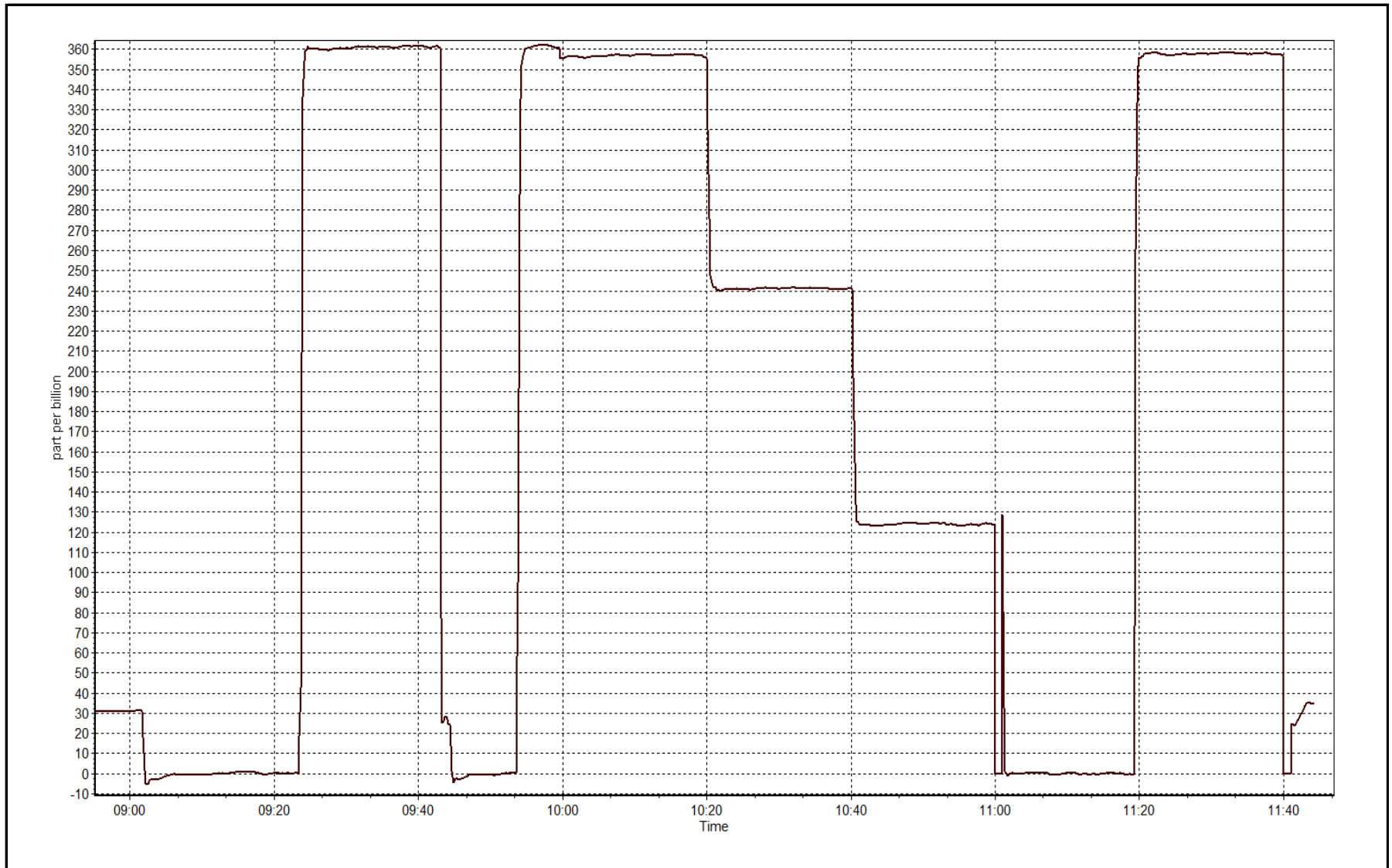
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.3	----	Correlation Coefficient	0.999998
355.4	357.2	0.9949		
240.3	241.2	0.9963	Slope	0.996118
123.3	124.1	0.9936		
			Intercept	-0.248534



O3 Calibration Plot

Date: June 10, 2015





Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	June 9, 2015	Previous Calibration	May 7, 2015
Station Name	Wapasu	Station Number	AMS 17
Reason:	Routine		
Start Time (MST)	9:40	End Time (MST)	15:20
NO Cal Gas Conc	49.7 ppm	Gas Cert Reference	SA130010A
NOx Cal Gas Conc	49.7 ppm	Cal Gas Expiry Date	December 12, 2016
Calibrator	API T700	Serial Number	997
Zero air Generator	Teledyne API T701	Serial Number	4427

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	6894
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Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.997016	0.997914	0.992902
	Data Offset	0.914679	0.870802	-0.261381
Current Calibration	Data Slope	0.997293	1.004264	0.993375
	Data Offset	1.487535	0.775034	0.256954

Analyzer Information

Analyzer make/model	API T200	Analyzer serial #	833
---------------------	----------	-------------------	-----

Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
NO coefficient	0.977		0.883	
NOx coefficient	0.978		0.886	
NO2 coefficient	1.000		1.000	
NO bkgrnd	-0.4		0.0	
NOx bkgrnd	0.7		2.9	
Chamber Temp	50	Deg C	50	Deg C
Moly Temp	315.6	Deg C	316.5	Deg C
PMT voltage	12.6	V	781	mV
PMT Temp	7	Deg C	7	Deg C
O3 flow	71	ccm	71	ccm
R Cell press NO	6	mmHg	3.9	mmHg
R Cell Press Nox	6	mmHg	3.9	mmHg
NO sample flow	0.448	lpm	0.444	lpm
Nox sample Flow	0.448	lpm	0.445	lpm

Notes:

Filter changed after as founds. Pump changed after as founds. Zero and span adjusted.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date:

June 9, 2015

Station Number:

AMS 17

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	2.4	0.1	2.3	----	----
as found span	5000	60.4	600.4	600.4	0.0	605.6	602.5	3.1	0.9914	0.9965
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.8	0.0	-0.8	----	----
high point	5000	60.4	600.4	600.4	0.0	600.4	597.2	3.2	0.9999	1.0054
second point	5000	30.2	300.2	300.2	0.0	300.4	298.6	1.9	0.9992	1.0054
third point	5000	15.2	151.1	151.1	0.0	148.5	148.3	0.2	1.0176	1.0187
as left zero	5000	0.0	0.0	0.0	0.0	-0.9	0.2	-1.1	----	----
as left span	5000	60.4	600.4	242.6	357.8	598.1	240.8	357.3	1.0039	1.0074
Average Correction Factor									1.0056	1.0098

Corrected As found
Previous Response

NO_x= 603.2
NO_x= 601.3

NO= 602.4
NO= 600.8

Percent Change

NO_x= -0.3%

NO= -0.3%

GPT Calibration Data

Dilution Flow

5000

ccm

Source Gas Flow

60.40

ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
Cal zero			0.0			-0.8			N/A	
1st NO2 (300)	----	242.6	355.4	599.8	242.6	357.2	0.9890	1.0000	0.9949	100.5%
2nd NO2 (200)	----	357.8	240.3	599.3	357.8	241.6	0.9898	1.0000	0.9946	100.5%
3rd NO2 (100)	----	474.7	123.3	599.5	474.7	124.7	0.9896	1.0000	0.9883	101.2%
4th NO2 (0)	598.0	----	1.7	599.7	598.0	1.7	0.9892	1.0000	N/A	----
Average Correction Factor							0.9894	1.0000	0.9926	100.7%

Calibration Performed By:

Devin Russell



Wood Buffalo Environmental Association

NO_x Calibration Summary

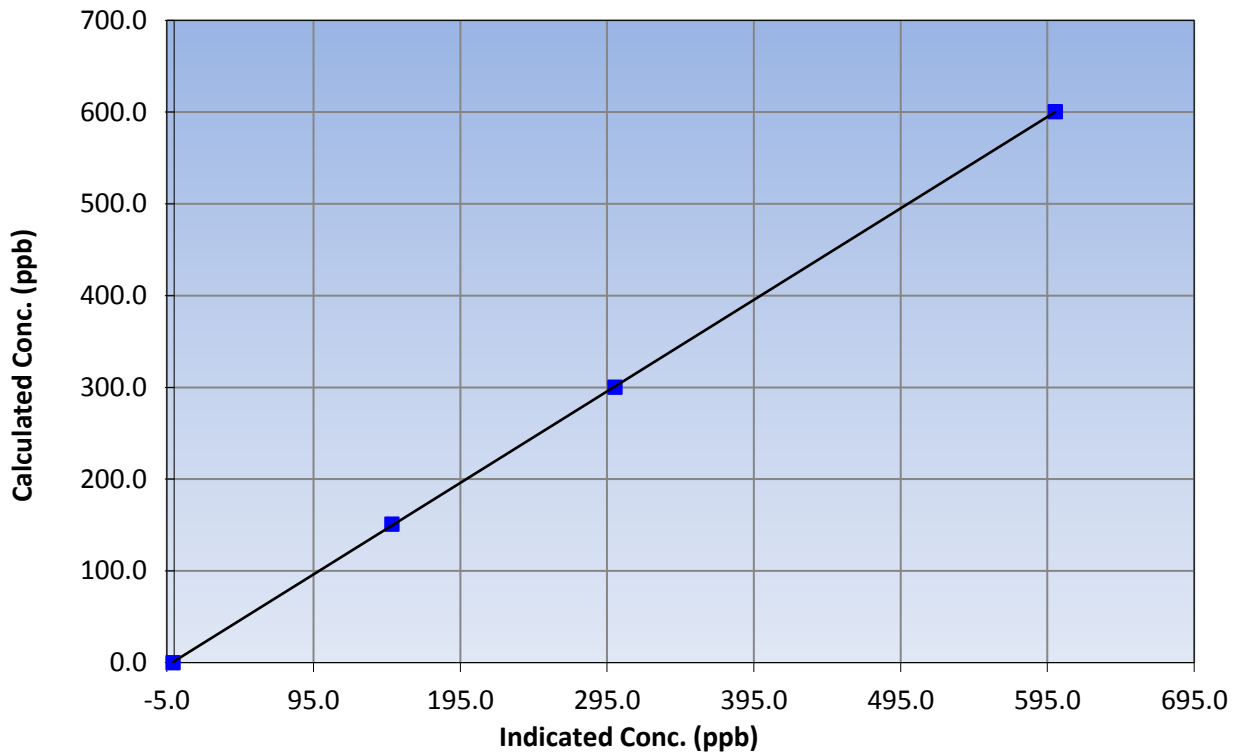
Station Information

Calibration Date	June 9, 2015	Previous Calibration	May 7, 2015
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	9:40	End Time (MST)	15:20
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	-0.8	----	Correlation Coefficient	0.999981
600.4	600.4	0.9999		
300.2	300.4	0.9992	Slope	0.997293
151.1	148.5	1.0176		
			Intercept	1.487535

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

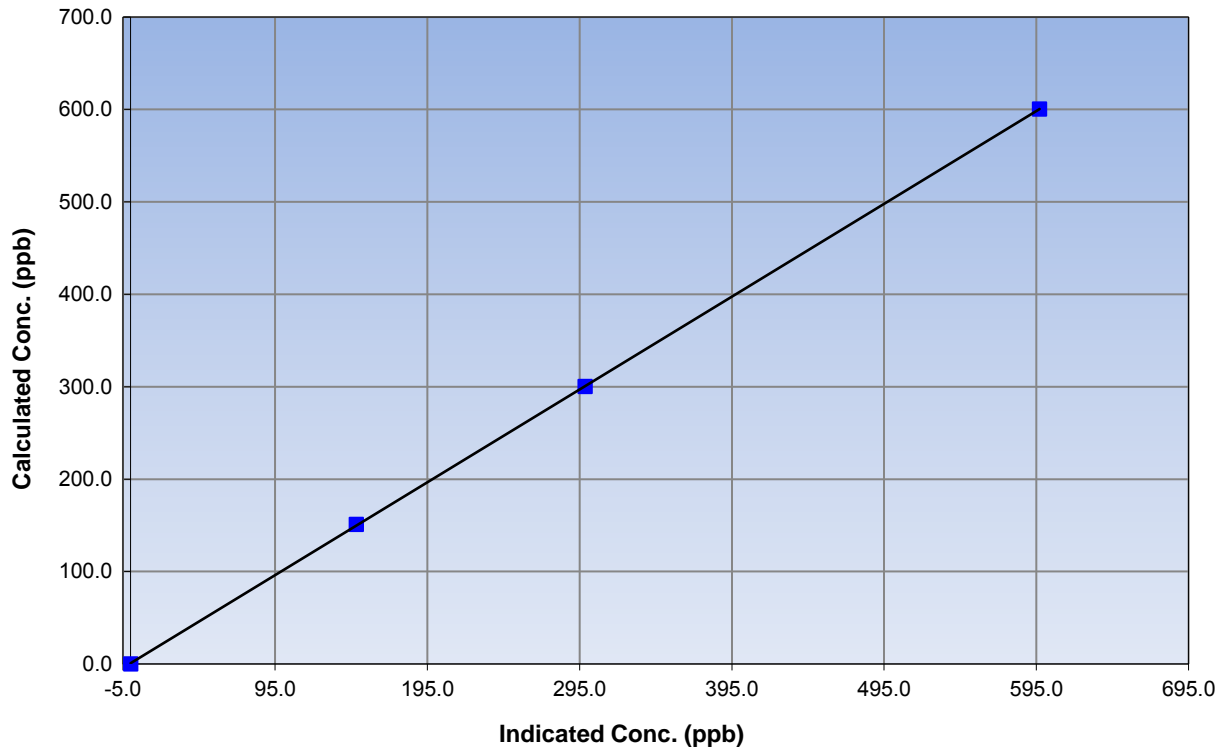
Station Information

Calibration Date	June 9, 2015	Previous Calibration	May 7, 2015
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	9:40	End Time (MST)	15:20
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	0.0	N/A	Correlation Coefficient	0.999986
600.4	597.2	1.0054		
300.2	298.6	1.0054	Slope	1.004264
151.1	148.3	1.0187		
			Intercept	0.775034

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

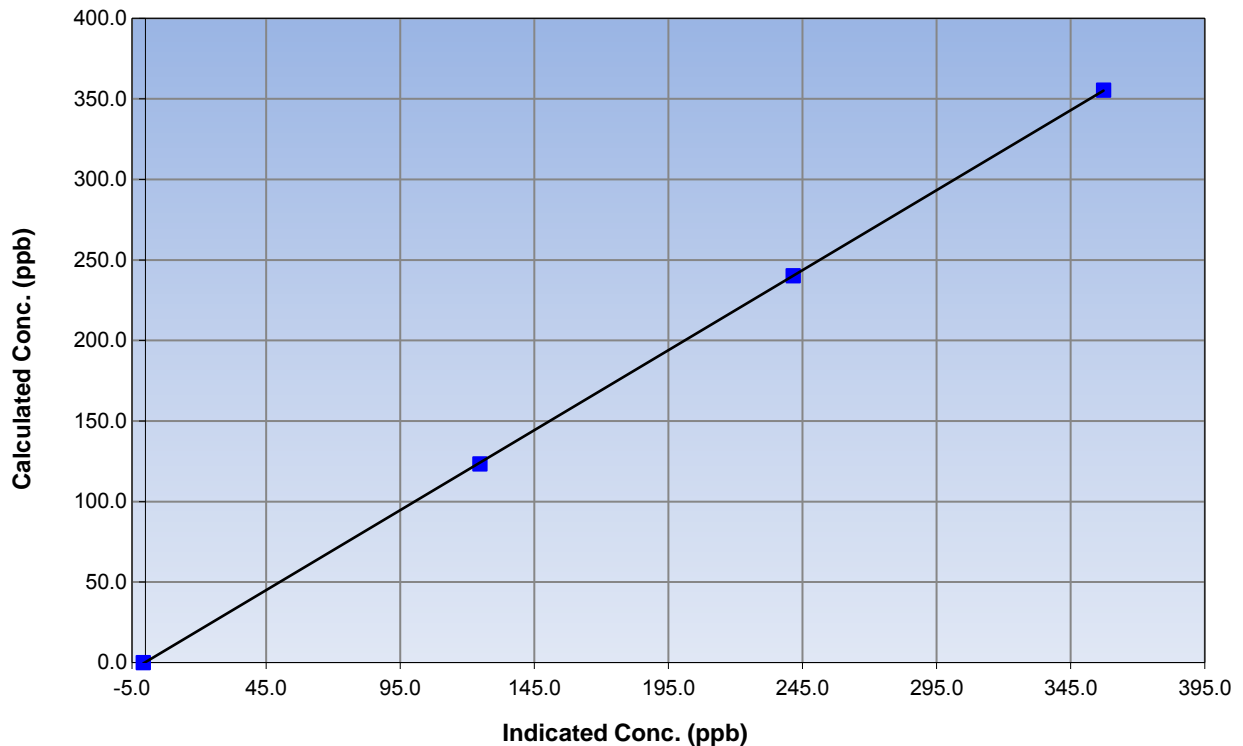
Station Information

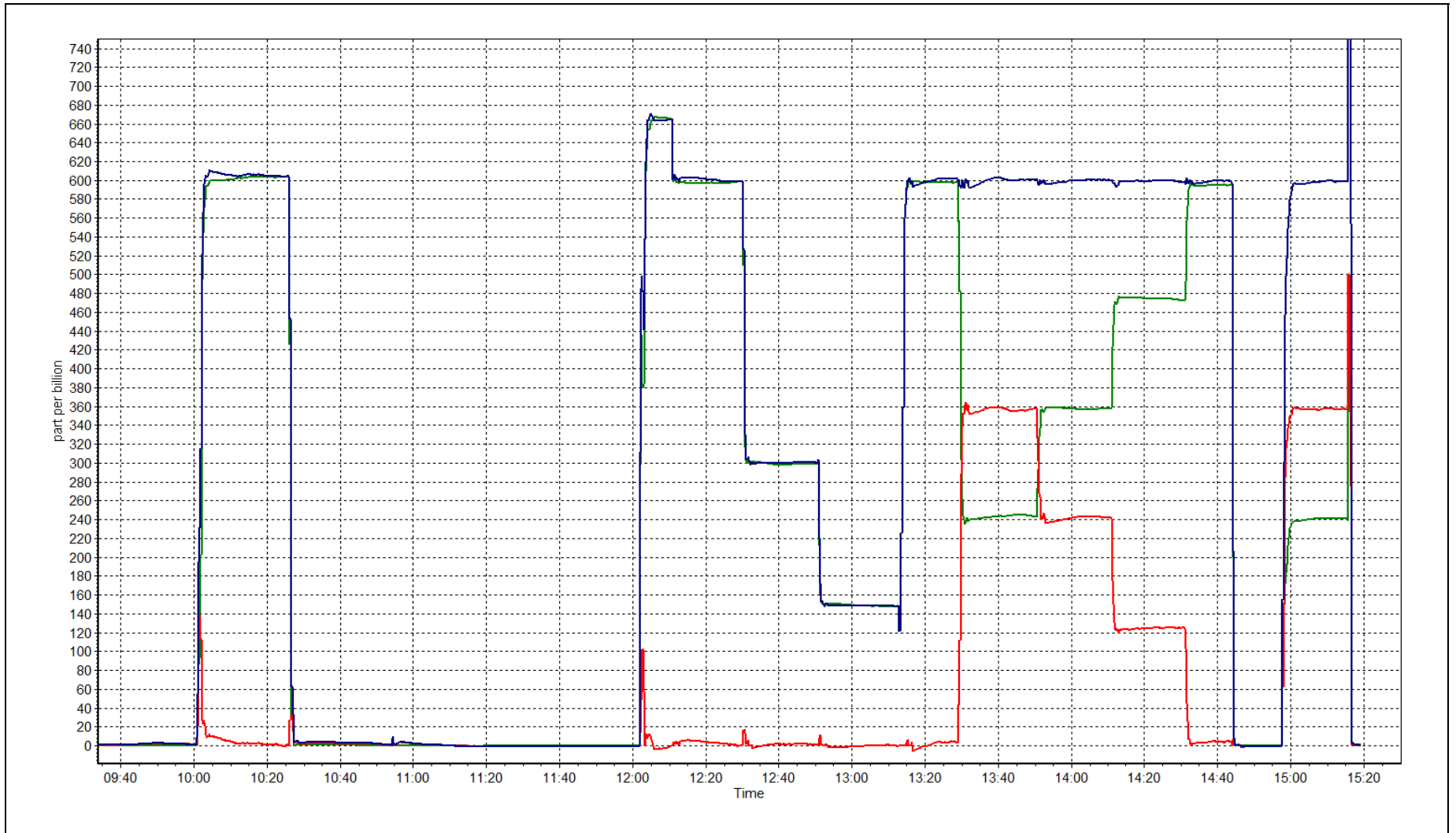
Calibration Date	June 9, 2015	Previous Calibration	May 7, 2015
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	9:40	End Time (MST)	15:20
Analyzer make	API T200	Analyzer serial #	833

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.8	N/A	Correlation Coefficient	0.999983
355.4	357.2	0.9949		
240.3	241.6	0.9946	Slope	0.993375
123.3	124.7	0.9883		
			Intercept	0.256954

NO₂ Calibration Curve







Wood Buffalo Environmental Association

SHARP CONFORMANCE TEST

STATION INFORMATION

Calibration Date:	<u>June 10, 2015</u>	Previous Calibration:	<u>May 20, 2015</u>
Station Name:	<u>Wapasu</u>	Station Number:	<u>AMS 17</u>
Start Time (MST):	<u>9:27</u>	End Time (MST):	<u>10:16</u>
Calibrator Make/Model:	<u>Delta Cal</u>	Calibrator Serial Number:	<u>954</u>

SHARP INFORMATION

Particulate Fraction:	<u>PM2.5</u>
Make/Model:	<u>Thermo / SHARP 5030</u>
Serial Number:	<u>E-1107</u>
Source SN:	<u>2618</u>
HEPA PN:	<u>1337</u>
Time Correct (MST):	<u>Yes</u>
Parameters Checked:	<u>T1, T2, T2,T4, P3, Main Flow, Beta, Neph</u>

AUDIT DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	15.0	15.1	0.1	15.0
T2	26.0	na	na	26.0
T3	24.0	na	na	24.0
T4	32.0	na	na	32.0
RH (%)	27.0	na	na	27.0

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	953	953.7	0.6	953

Main Flow (Lph)

Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
1000	995	-5	995	1000

Nephelometer Calibration

Parameter	As Found	adjusted (Limit +/- 2.0ug/m3)	As Left
Analog	194		193
Neph	2.1		-0.1
C14	12.7	yes	34.9
Indicated Concentration (ug/m3)	0.8		0
Offset 1	191.8		193.6
Offset 2	31.5		31.8

Leak Check (Quarterly)

Leak Check Date:	<u>June 10, 2015</u>	Previous Leak Check Date:	
	<u>Measured</u>	<u>Difference LPM (Limit +/- 0.42 LPM)</u>	
Flow without adaptor (LPM):	16.59		
Flow with adaptor [turn off pump first](LPM):	16.50	0.09	

Mass Foil Calibration (Annualy)

Foil Calibration Date:		Previous Foil Calibration:	
Zeroed?:	<u>NO</u>		
Foil Mass:	<u>1337</u>		
Previous Correction Factor:	<u>6775</u>	<u>Mass foil set S/N:</u>	
New Correction Factor:	<u>6924</u>		

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:

Nephelometer zeroed. Cyclone Head changed with a clean head. Leak check completed.

Audit Performed By: Devin Russell



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 19
SUNCOR FIREBAG
JUNE 2015**

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

July 30, 2015



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FIREBAG (AMS 19)

JUNE 2015
 MONTHLY SUMMARY for
 AMD SECTION III.B.1(c)

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	684	36	36	100.00	14	0	3	0
H2S (ppb) Average	685	35	35	100.00	2	0	1	0
THC (ppm) Average	685	35	35	100.00	3	-	2.6	-
NO2 (ppb) Average	684	36	36	100.00	26	0	7	-
NO (ppb) Average	684	36	36	100.00	14	-	2	-
NOX (ppb) Average	684	36	36	100.00	39	-	8	-
Temperature 2 m (C) Average	720	0	0	100.00	28.4	-	22.2	-
Relative Humidity (%) Average	720	0	0	100.00	99	-	80	-
Wind Speed 10 m (km/h) Average	709	0	11	98.47	32	-	21	-
Wind Direction 10 m (deg) Average	709	0	11	98.47	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FIREBAG (AMS 19)
 JUNE 2015

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	684	0.7	1	-	0	0	0	0	1	2	14
H2S (ppb) Average	685	0.3	0	-	0	0	0	0	0	0	2
THC (ppm) Average	685	2.12	0.2	-	1.9	2	2	2.1	2.1	2.3	3
NO2 (ppb) Average	684	2.7	3	-	0	0	1	1	4	7	26
NO (ppb) Average	684	0.4	1	-	0	0	0	0	0	1	14
NOX (ppb) Average	684	3.1	4	-	0	0	1	1	4	8	39
Temperature 2 m (C) Average	720	15.31	5.5	-	-0.3	7.9	11.4	15.2	19	23	28.4
Relative Humidity (%) Average	720	56.2	21	-	21	30	39	55	72	87	99
Wind Speed 10 m (km/h) Average	709	12.6	6	-	0	5	8	12	17	22	32
Wind Direction 10 m (deg) Average	709	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FIREBAG (AMS 19)
JUNE 2015

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
Wind Speed, Wind Direction	10 Jun 2015 05:00	10 Jun 2015 05:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	22 Jun 2015 23:00	22 Jun 2015 23:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	25 Jun 2015 03:00	25 Jun 2015 03:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	25 Jun 2015 09:00	25 Jun 2015 09:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	28 Jun 2015 21:00	28 Jun 2015 21:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	30 Jun 2015 10:00	30 Jun 2015 12:00	3	Flat line in sensor output signal
Wind Speed, Wind Direction	30 Jun 2015 17:00	30 Jun 2015 19:00	3	Flat line in sensor output signal



Summary of Hour Averages

Firebag - June 2015

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 14 ppb on Jun 29 09:00	Maximum Daily Average: 2.9 ppb on Jun 6		Hours of Data:	684
Minimum Value: 0 ppb on Jun 14 09:00	Minimum Daily Average: 0.1 ppb on Jun 13		Hours of Missing Data:	36
Maximum Diurnal Average: 1.6 ppb at hour 7	Minimum Diurnal Average: 0.4 ppb at hour 2		Hours of Calibration:	36
Monthly Average: 0.7 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 2 P ₉₉ = 8		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	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-Jun	0	0	0	Z	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1
3-Jun	0	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-Jun	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
5-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0.3	1
6-Jun	0	Z	5	6	6	5	5	3	1	1	0	0	0	0	0	0	0	0	8	13	7	3	1	0	2.9	13
7-Jun	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
8-Jun	1	1	1	Z	0	0	2	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.4	2
9-Jun	0	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-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0.3	3
11-Jun	Z	1	0	0	0	0	0	0	0	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0.4	1
12-Jun	0	Z	1	0	0	1	1	1	1	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0.4	1
13-Jun	0	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-Jun	0	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-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0.3	1
16-Jun	0	0	0	0	0	Z	0	0	0	C	C	C	C	C	C	0	0	0	0	0	0	0	0	0	--	0
17-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	5	3	2	0.7	5
18-Jun	1	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	1	1	0.4	1
19-Jun	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
20-Jun	0	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-Jun	0	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-Jun	0	0	0	0	0	Z	2	7	5	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.9	7
23-Jun	Z	0	0	0	0	0	1	1	3	3	3	2	2	1	1	0	0	0	0	2	5	2	0	1	1.3	5
24-Jun	1	Z	0	0	1	6	10	4	5	6	4	3	4	2	2	2	3	2	0	0	0	0	0	0	2.5	10
25-Jun	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	7	0.8	7
26-Jun	5	1	0	Z	0	4	10	5	8	5	7	3	2	0	0	0	0	0	1	1	0	0	0	0	2.3	10
27-Jun	1	1	1	2	Z	3	5	3	2	1	1	1	3	1	0	0	1	2	2	0	0	1	1	1	1.4	5
28-Jun	1	1	1	1	2	Z	4	2	1	0	0	0	2	2	2	2	2	2	2	1	1	1	1	0	1.4	4
29-Jun	Z	0	0	1	1	1	1	13	14	3	2	2	1	1	1	1	1	1	1	1	1	1	1	1	2.0	14
30-Jun	1	Z	1	1	1	1	1	1	1	2	1	1	1	2	3	1	1	1	1	1	1	1	1	1	1.2	3

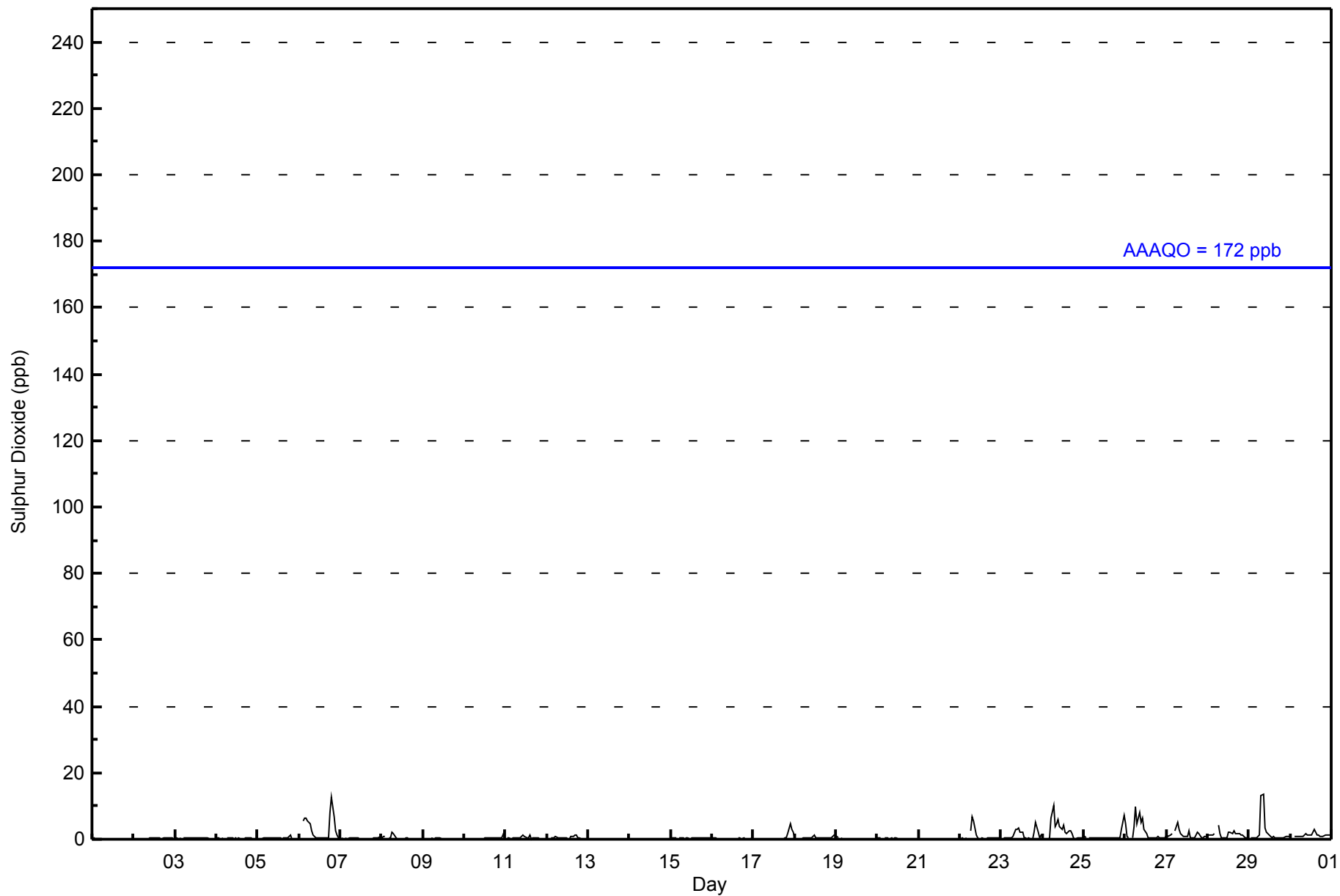
0.6	0.4	0.6	0.6	0.6	1.0	1.6	1.5	1.5	0.9	0.8	0.6	0.6	0.5	0.5	0.4	0.4	0.4	0.7	0.9	0.7	0.6	0.5	0.8	Diurnal Average
5	1	5	6	6	6	10	13	14	6	7	3	4	3	3	2	3	2	8	13	7	5	3	7	Diurnal Maximum

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



WBEA
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Firebag - June 2015





WBEA
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Firebag - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	681	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: 684

Total Number of Hours: 720



WBEA
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Firebag - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	65	54	31	14	15	18	9	25	52	69	70	38	48	50	58	55	671
11 - 20	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	3
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	65	54	31	14	15	18	9	25	52	69	70	41	48	50	58	55	674

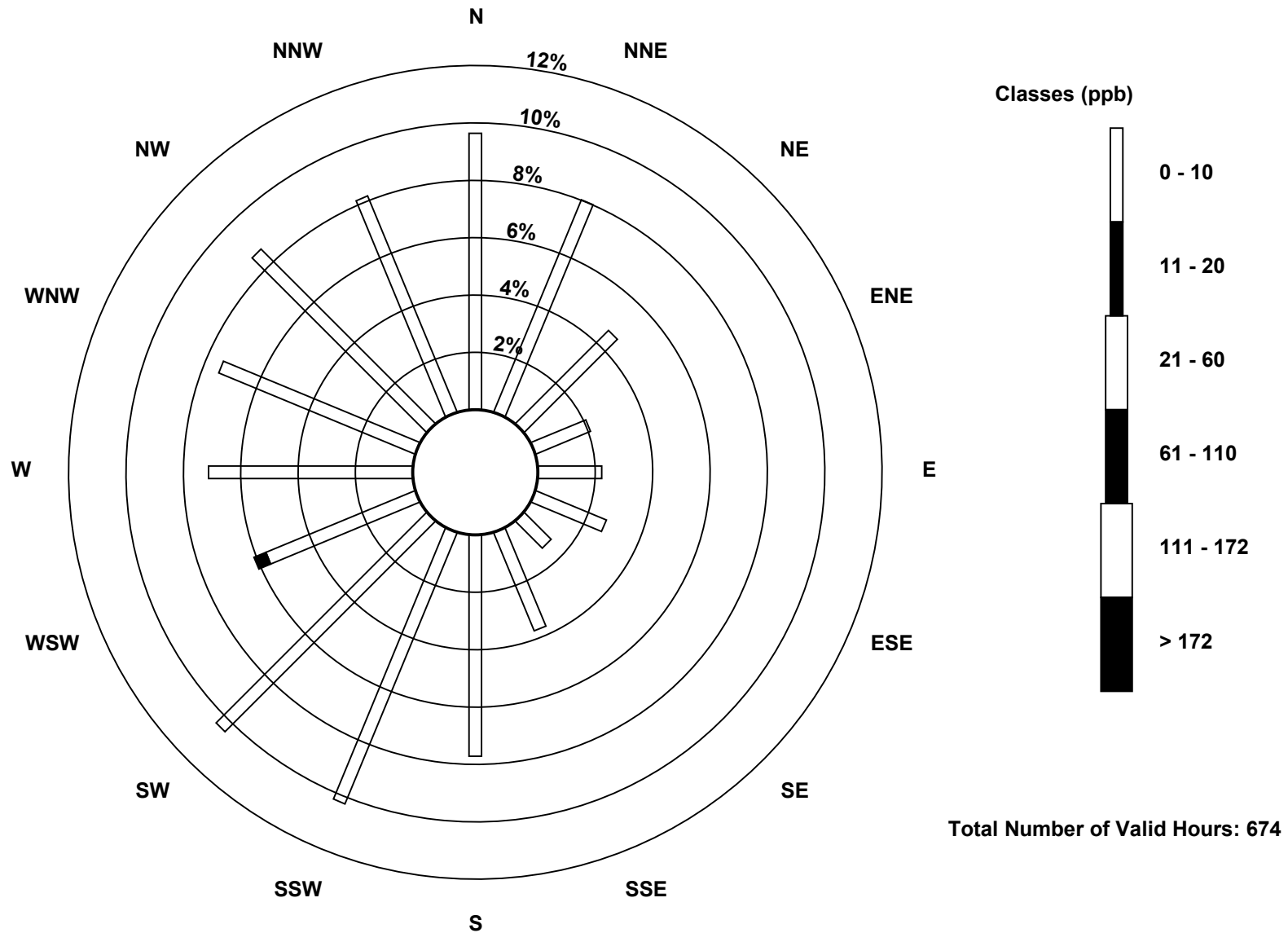
Total Number of Valid Hours: 674

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

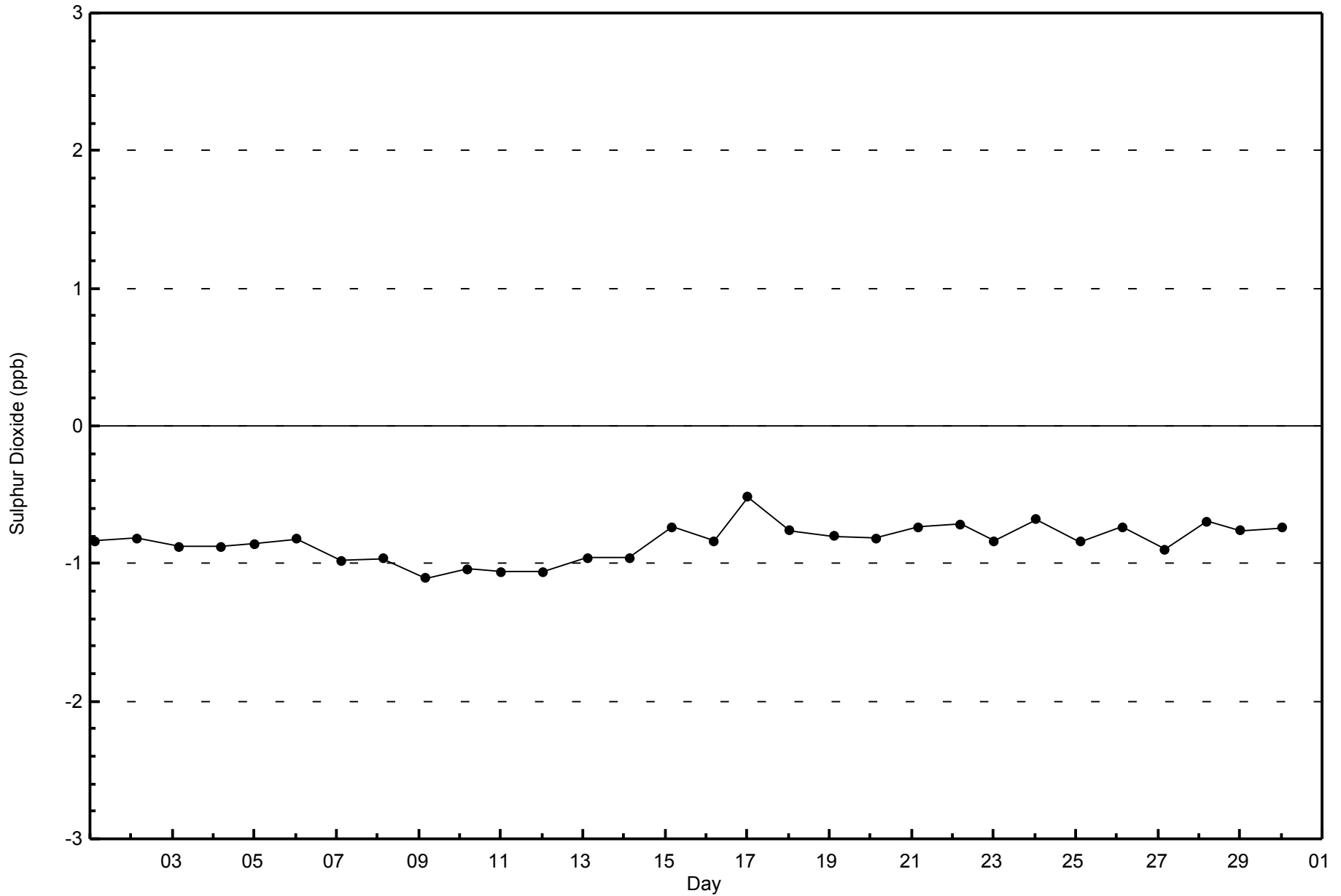
Sulphur Dioxide (SO₂) - ppb
Firebag (AMS 19)





WBEA
Zero Responses

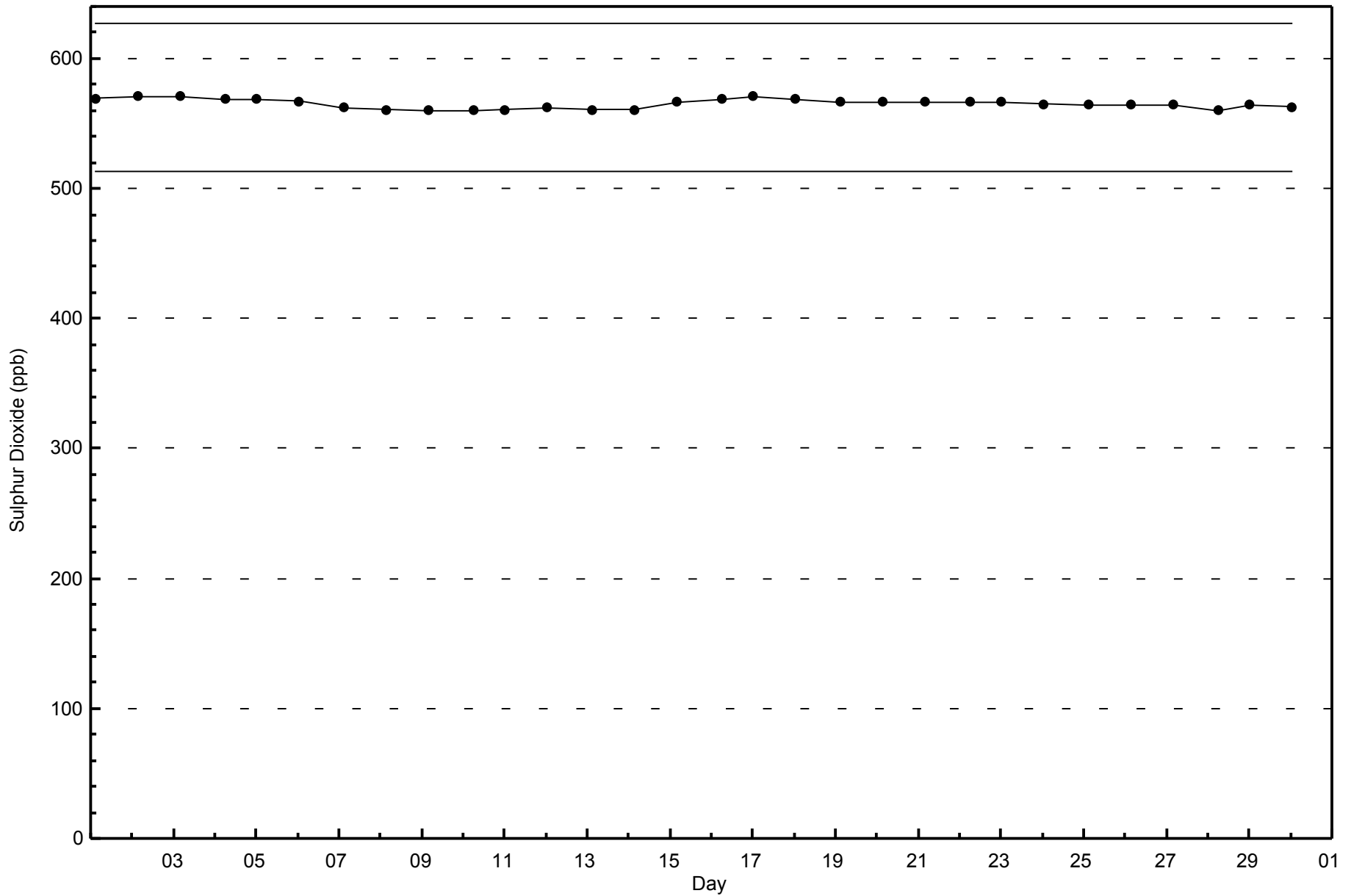
Sulphur Dioxide (SO₂) - ppb
Firebag - June 2015





WBEA
Span Responses

Sulphur Dioxide (SO₂) - ppb
Firebag - June 2015





Summary of Hour Averages

Firebag - June 2015

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 2 ppb on Jun 20 03:00	Maximum Daily Average: 0.8 ppb on Jun 30		Hours of Data:	685
Minimum Value: 0 ppb on Jun 13 18:00	Minimum Daily Average: 0.1 ppb on Jun 13		Hours of Missing Data:	35
Maximum Diurnal Average: 0.4 ppb at hour 2	Minimum Diurnal Average: 0.2 ppb at hour 14		Hours of Calibration:	35
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		Percent Operational Time:	100.0

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

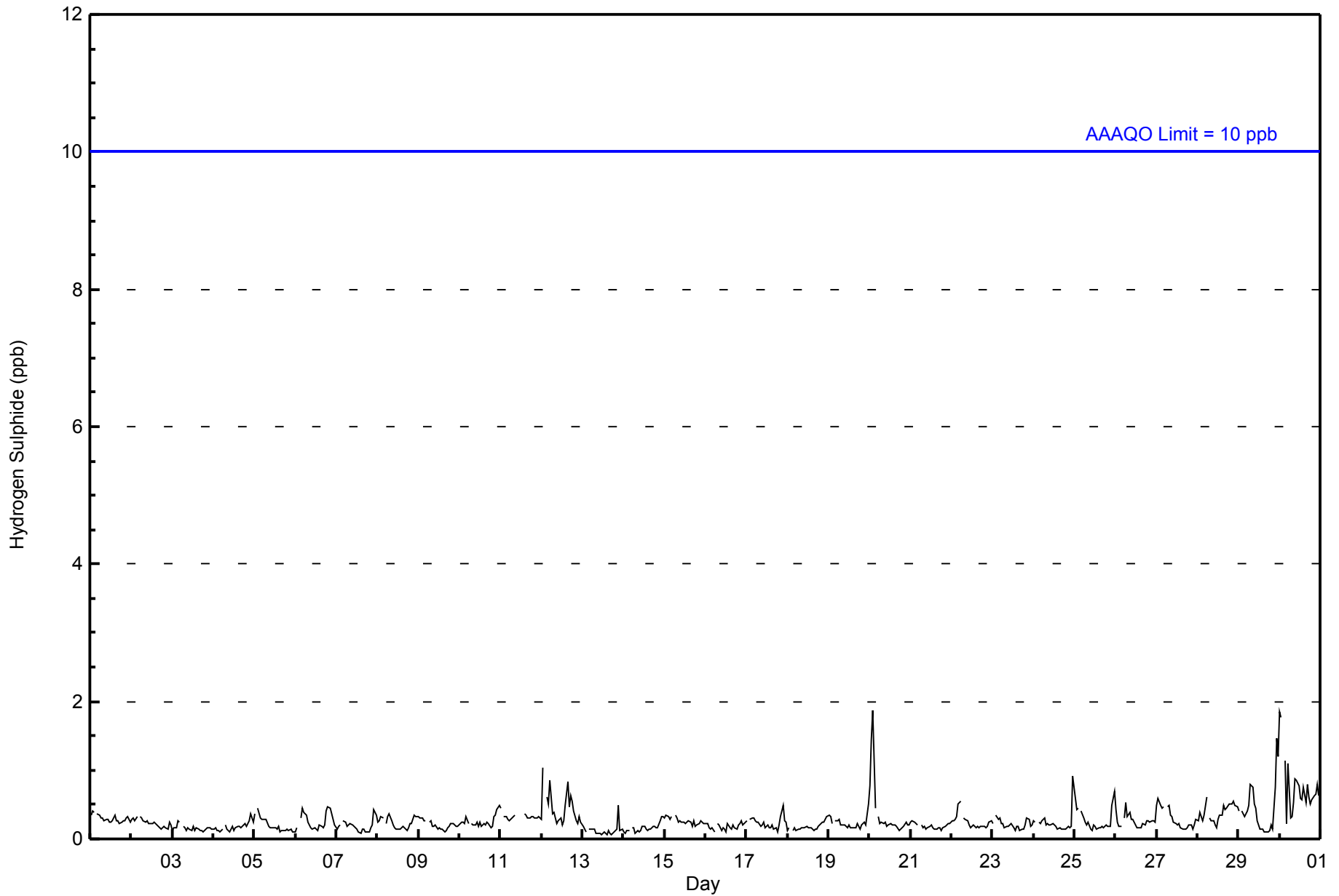
0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	Diurnal Average
2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Diurnal Maximum

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



WBEA
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
Firebag - June 2015





WBEA
Cumulative Frequency Distribution

Hydrogen Sulphide (H₂S) - ppb
Firebag - June 2015

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



WBEA
Frequency Distribution

Hydrogen Sulphide (H₂S) - ppb
Firebag - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	70	59	29	14	15	17	9	24	50	69	70	39	49	48	60	52	674
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	70	59	29	14	15	17	9	24	50	69	70	39	49	48	60	52	674

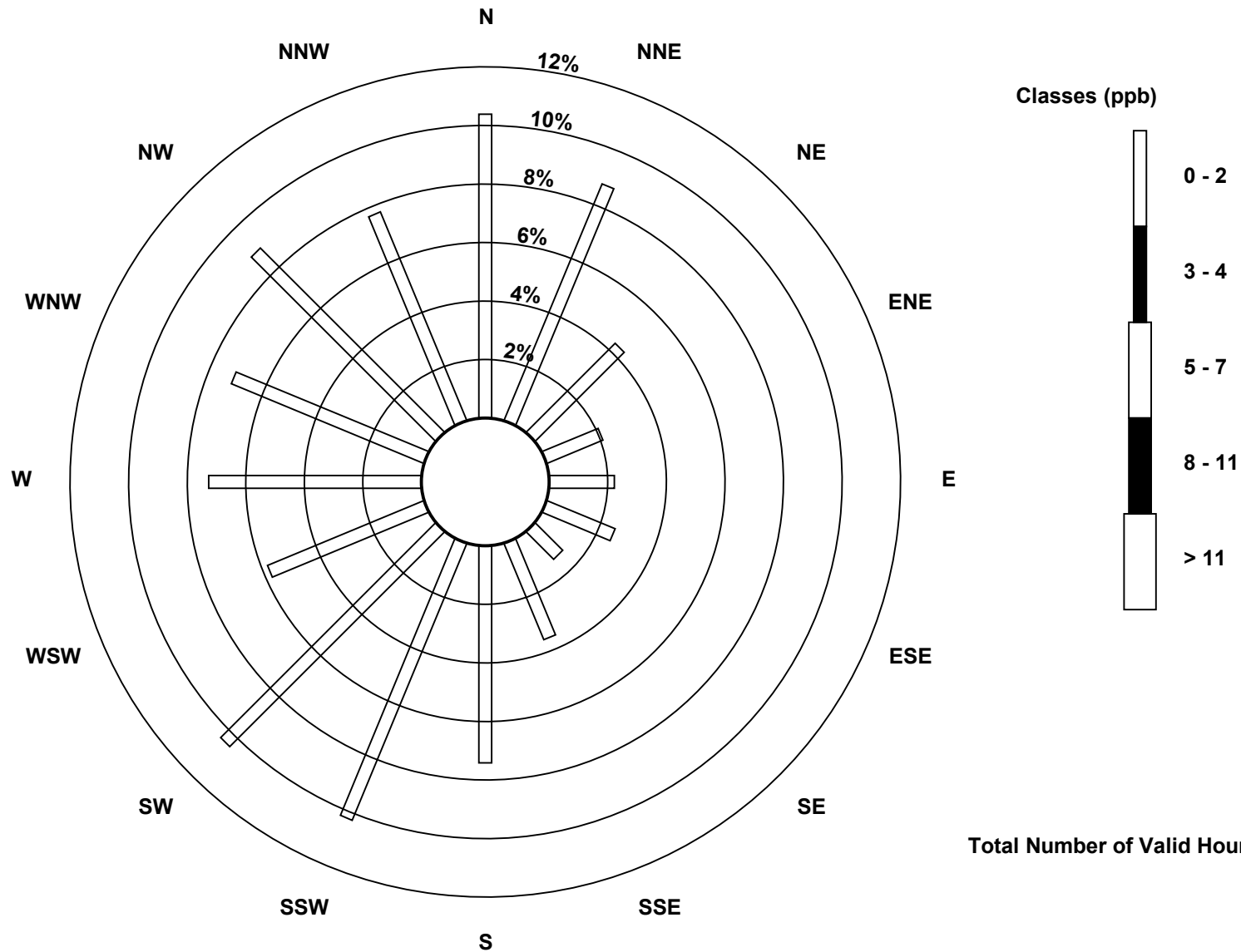
Total Number of Valid Hours: 674

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

Hydrogen Sulphide (H₂S) - ppb
Firebag (AMS 19)

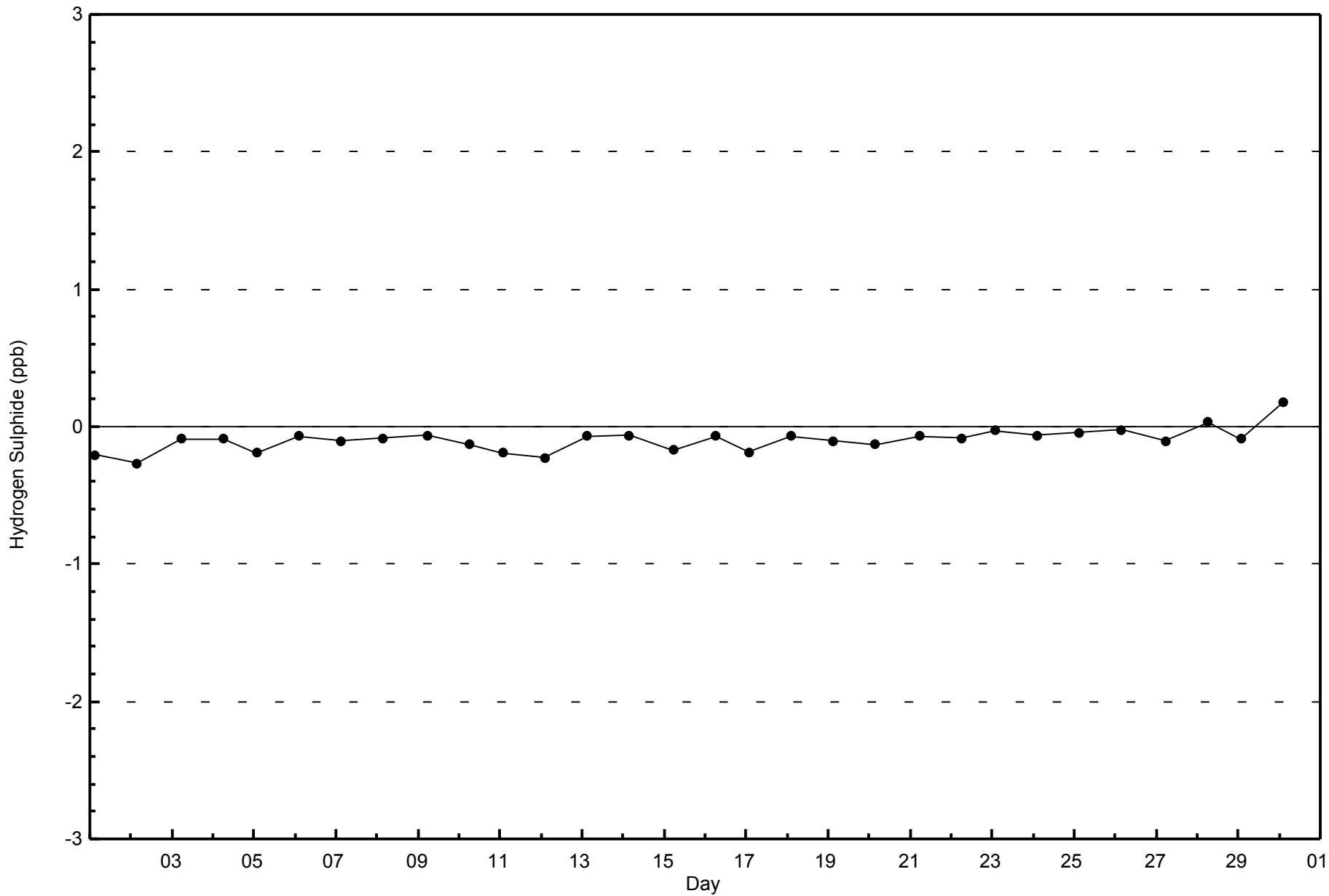


Total Number of Valid Hours: 674



WBEA
Zero Responses

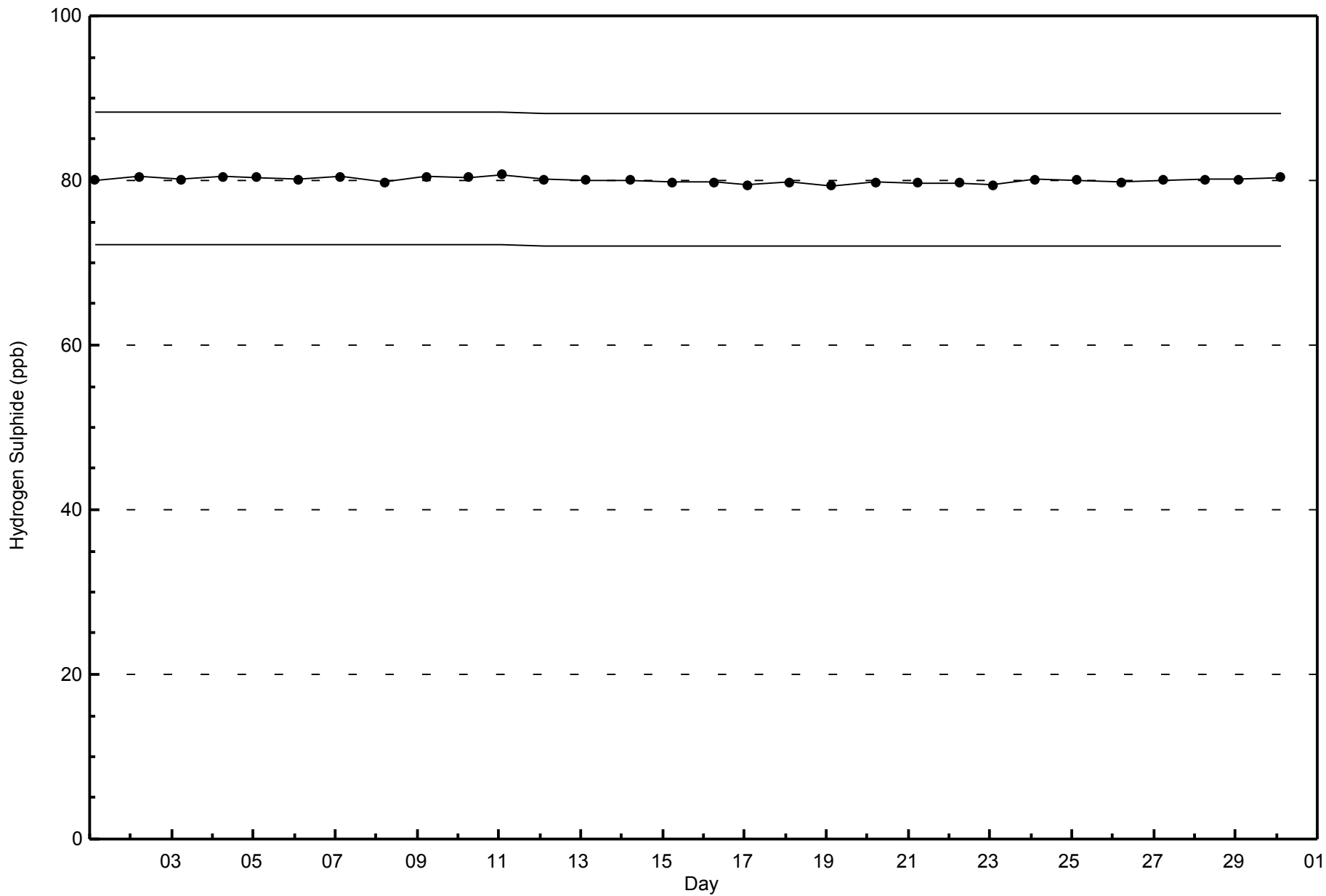
Hydrogen Sulphide (H₂S) - ppb
Firebag - June 2015





WBEA
Span Responses

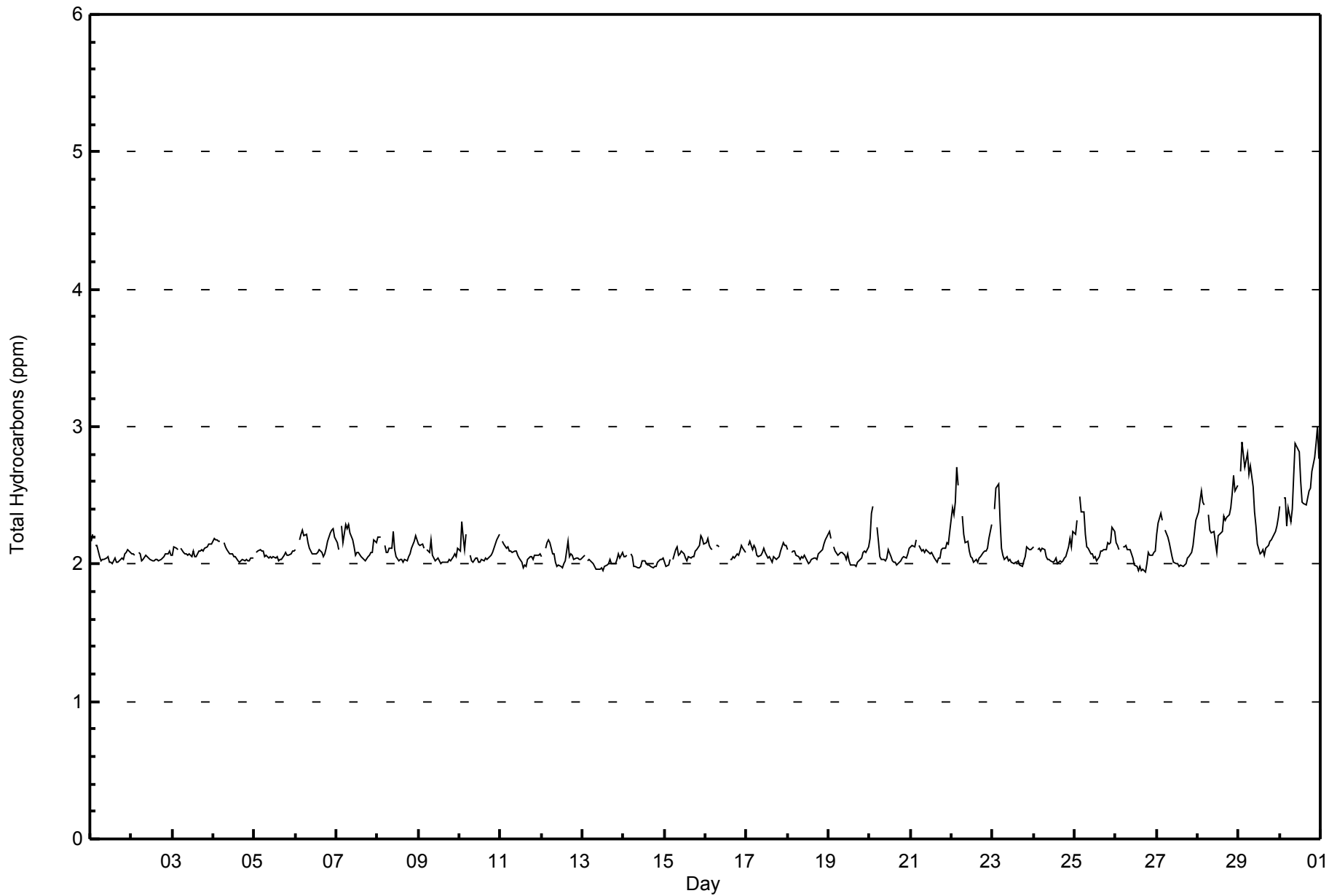
Hydrogen Sulphide (H₂S) - ppb
Firebag - June 2015





WBEA
Hourly Averages

Total Hydrocarbons (THC) - ppm
Firebag - June 2015





WBEA
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Firebag - June 2015

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	226	32.99	32.99
2.1 - 3.0	459	67.01	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



WBEA
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Firebag - June 2015

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	29	31	11	3	5	2	1	5	8	18	11	14	27	9	27	25	226
2.1 - 3.0	37	23	20	11	10	16	8	20	44	51	59	27	21	41	31	30	449
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	66	54	31	14	15	18	9	25	52	69	70	41	48	50	58	55	675

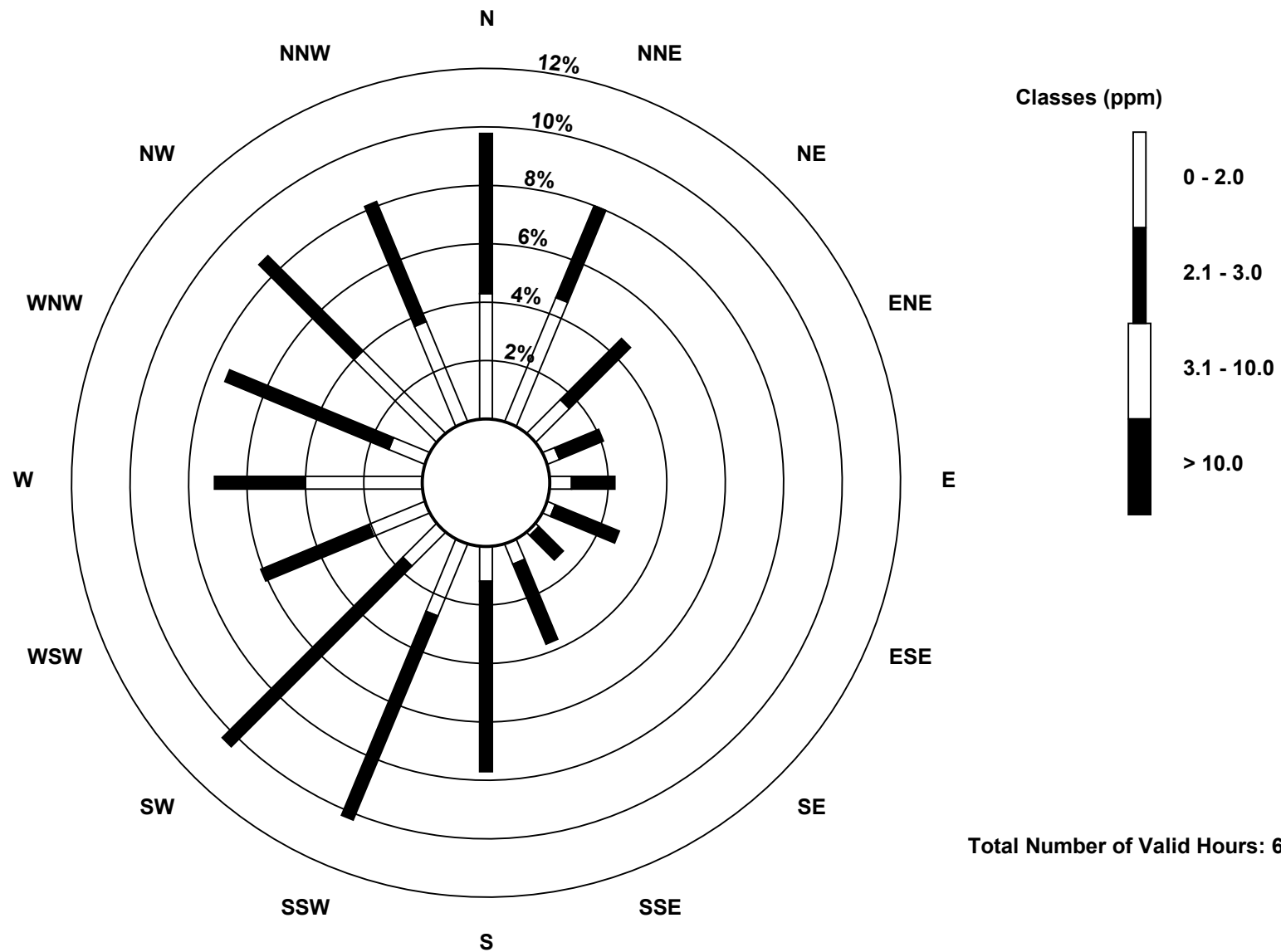
Total Number of Valid Hours: 675

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

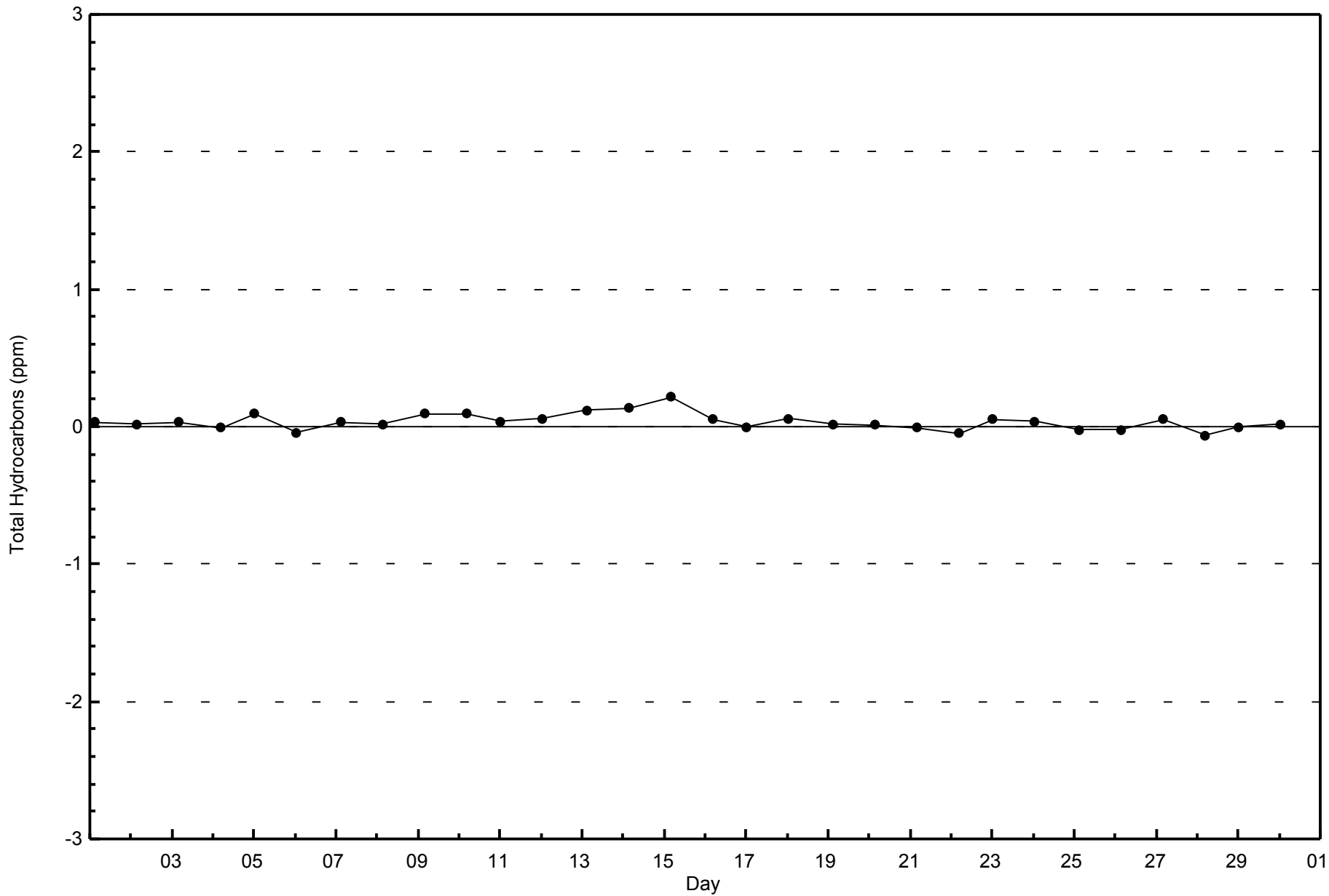
Total Hydrocarbons (THC) - ppm
Firebag (AMS 19)





WBEA
Zero Responses

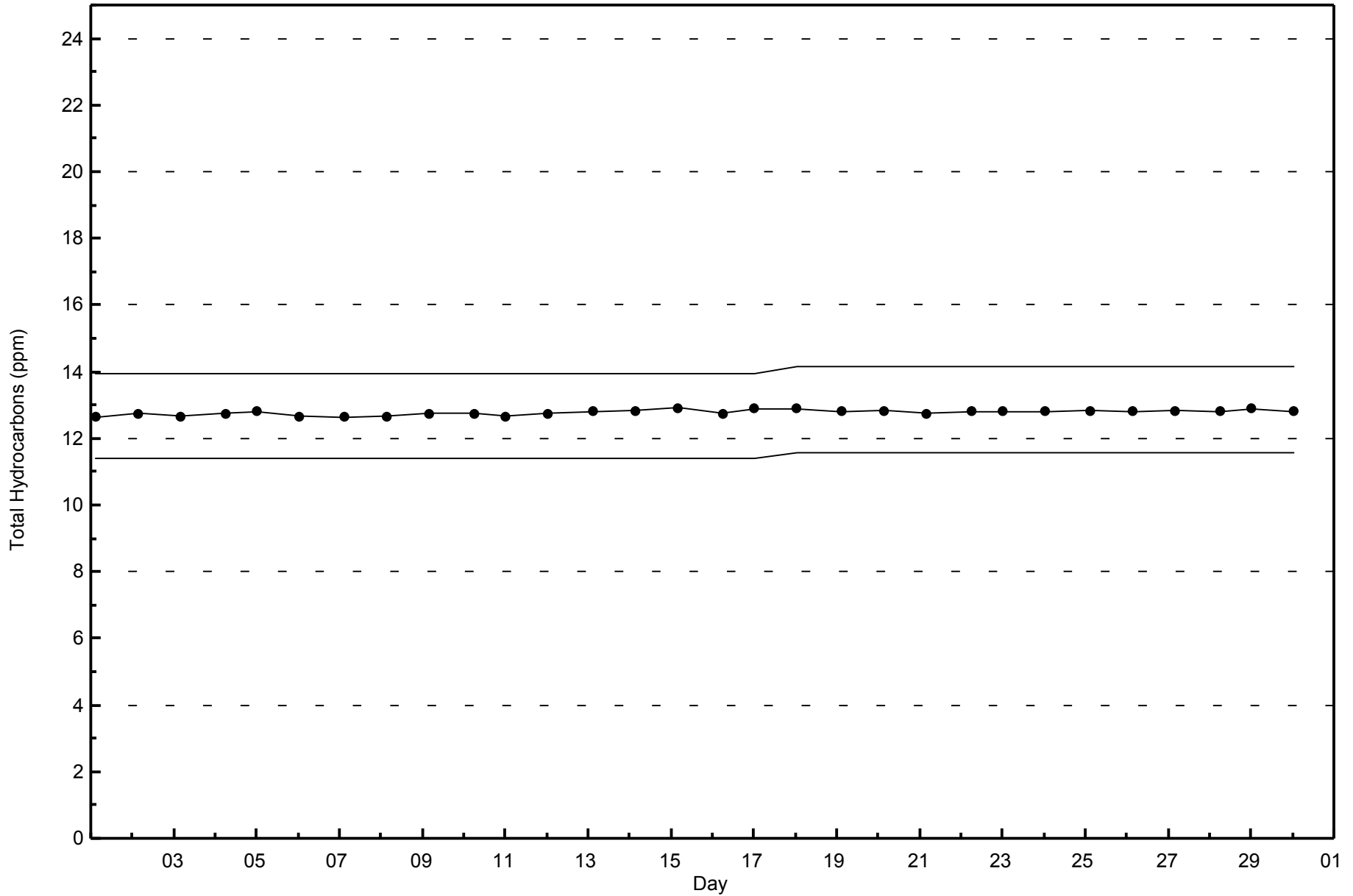
Total Hydrocarbons (THC) - ppm
Firebag - June 2015





WBEA
Span Responses

Total Hydrocarbons (THC) - ppm
Firebag - June 2015



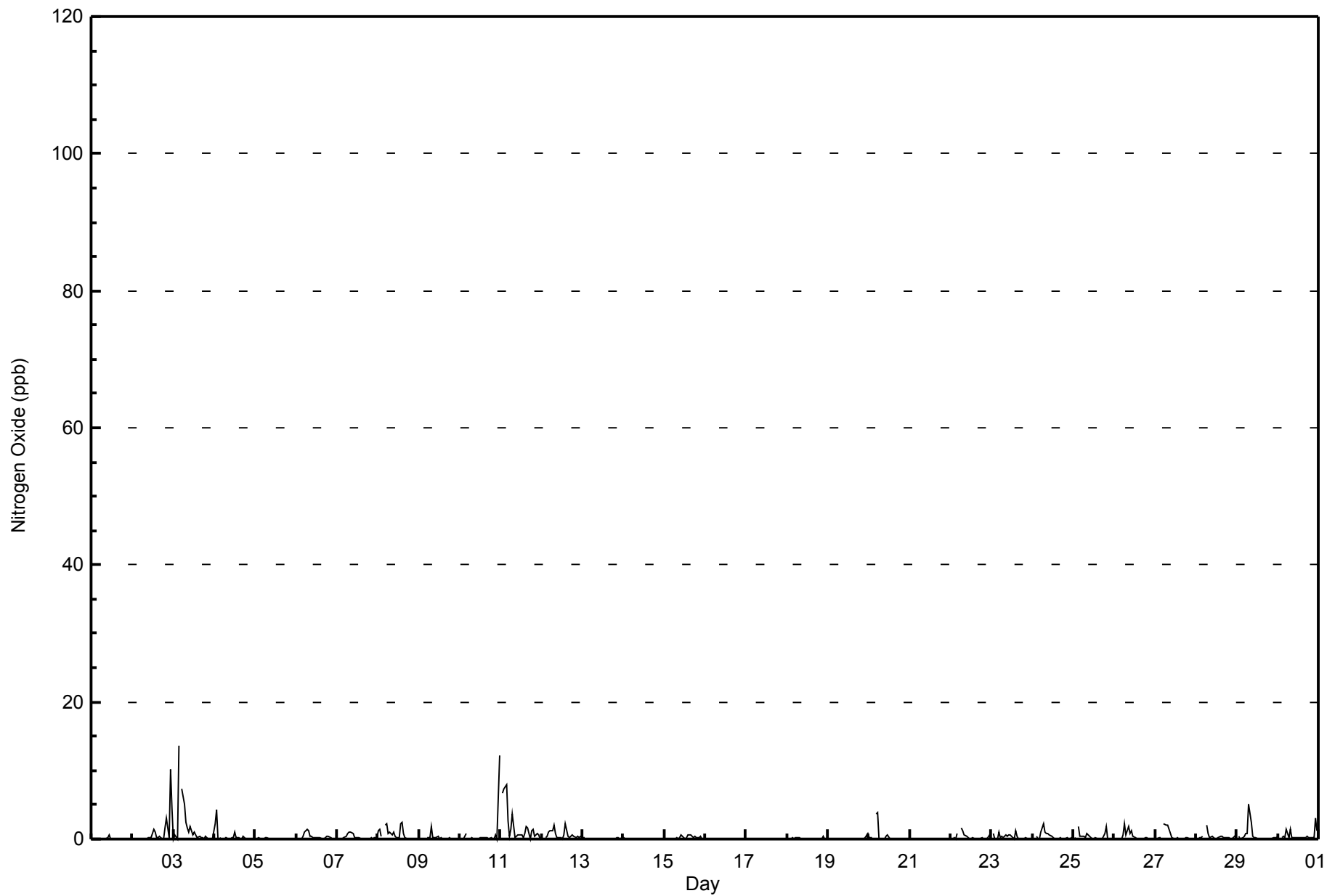


Maximum Value: 14 ppb on Jun 3 04:00																	Maximum Daily Average: 1.8 ppb on Jun 11							Hours in Service: 720		
Minimum Value: 0 ppb on Jun 2 01:00																	Minimum Daily Average: 0.0 ppb on Jun 14							Hours of Data: 684		
Maximum Diurnal Average: 1.0 ppb at hour 4																	Minimum Diurnal Average: 0.1 ppb at hour 18							Hours of Missing Data: 36		
Monthly Average: 0.4 ppb																	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 6							Hours of Calibration: 36		
																	Percent Operational Time: 100.0									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	0	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
2-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	2	3	0	10	5	1.0	10
3-Jun	0	1	0	14	Z	7	5	2	2	1	2	1	1	1	0	0	0	0	0	0	0	0	0	1.6	14	
4-Jun	2	4	0	0	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.4	4	
5-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
6-Jun	0	Z	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
7-Jun	0	0	Z	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
8-Jun	1	1	0	Z	2	2	1	1	1	1	0	0	2	2	1	0	0	0	0	0	0	0	0	0.8	2	
9-Jun	0	0	0	0	Z	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2	
10-Jun	0	0	0	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.7	12	
11-Jun	Z	7	7	8	3	0	1	4	0	0	1	1	1	0	1	2	2	0	1	1	0	1	1	1.8	8	
12-Jun	0	Z	0	0	1	1	1	2	1	0	0	0	1	2	0	0	0	0	1	0	0	0	0	0.6	2	
13-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
14-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
15-Jun	0	0	0	0	Z	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0.2	1	
16-Jun	0	0	0	0	0	Z	0	0	0	C	C	C	C	C	C	0	0	0	0	0	0	0	0	--	0	
17-Jun	Z	0	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-Jun	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-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.1	1	
20-Jun	0	0	0	Z	4	4	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.4	4	
21-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
22-Jun	0	0	0	0	1	Z	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.3	2	
23-Jun	Z	1	0	0	1	0	0	0	1	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0.3	1	
24-Jun	0	Z	0	0	0	1	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2	
25-Jun	0	0	Z	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0.3	2	
26-Jun	0	0	0	Z	0	1	2	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2	
27-Jun	0	0	0	0	Z	2	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2	
28-Jun	0	0	0	0	0	Z	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.3	2	
29-Jun	Z	0	0	0	0	1	1	5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	5	
30-Jun	0	Z	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0.5	3	
																								Diurnal Average		
																								Diurnal Maximum		
0.2 0.6 0.4 1.0 0.6 1.0 0.8 0.9 0.5 0.3 0.3 0.2 0.2 0.2 0.3 0.2 0.1 0.1 0.2 0.2 0.2 0.1 0.5 0.7																										
2 7 7 14 4 7 5 5 2 1 2 1 1 2 2 2 2 0 1 2 3 1 10 12																										
Z - zerospan C - Calibration																										



WBEA
Hourly Averages

Nitrogen Oxide (NO) - ppb
Firebag - June 2015





WBEA
Cumulative Frequency Distribution

Nitrogen Oxide (NO) - ppb
Firebag - June 2015

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

Total Number of Valid Hours: 684

Total Number of Hours: 720



WBEA
Frequency Distribution

Nitrogen Oxide (NO) - ppb
Firebag - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	65	54	31	14	15	18	9	25	52	69	70	41	48	50	58	55	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	65	54	31	14	15	18	9	25	52	69	70	41	48	50	58	55	674

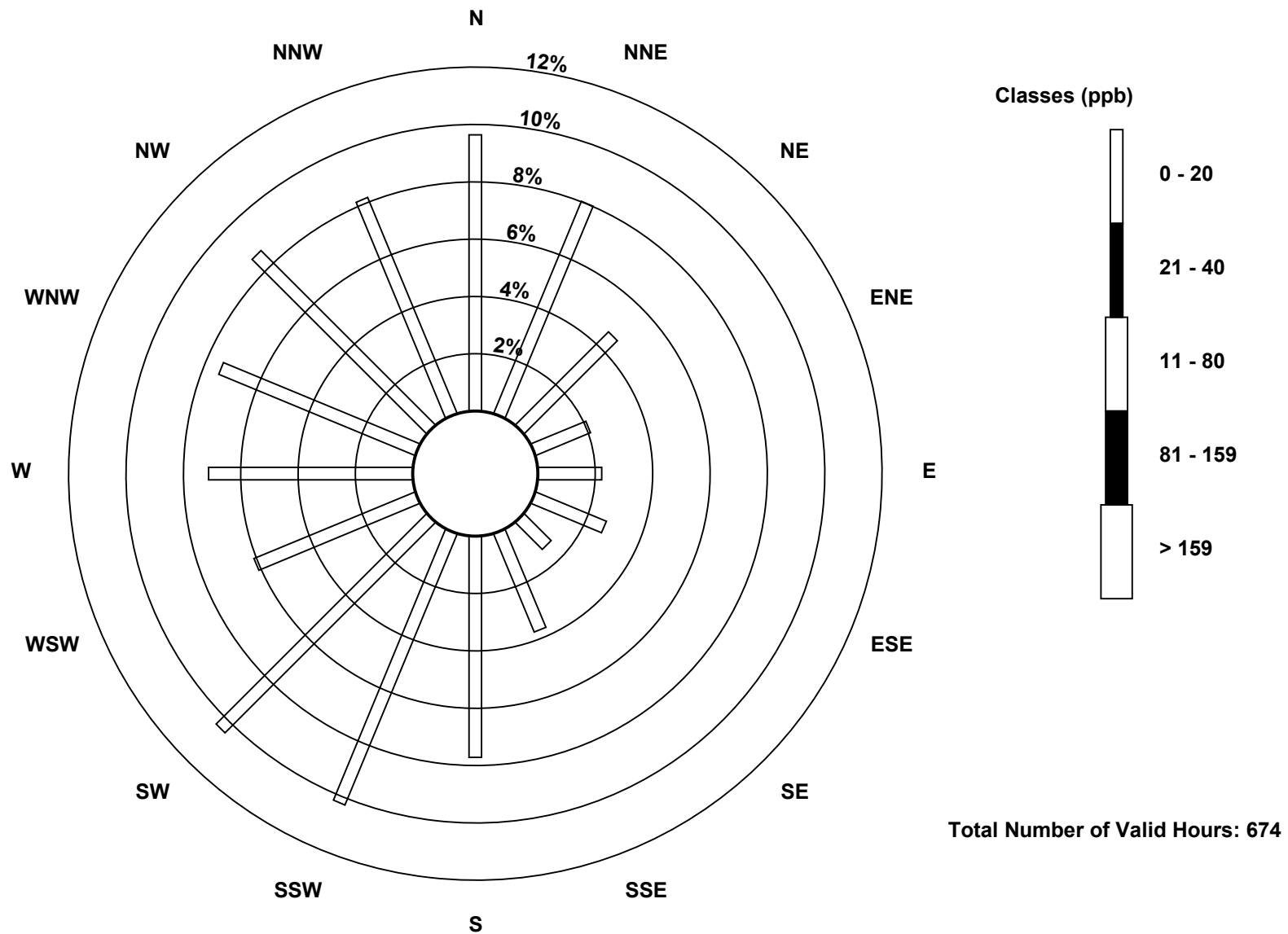
Total Number of Valid Hours: 674

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

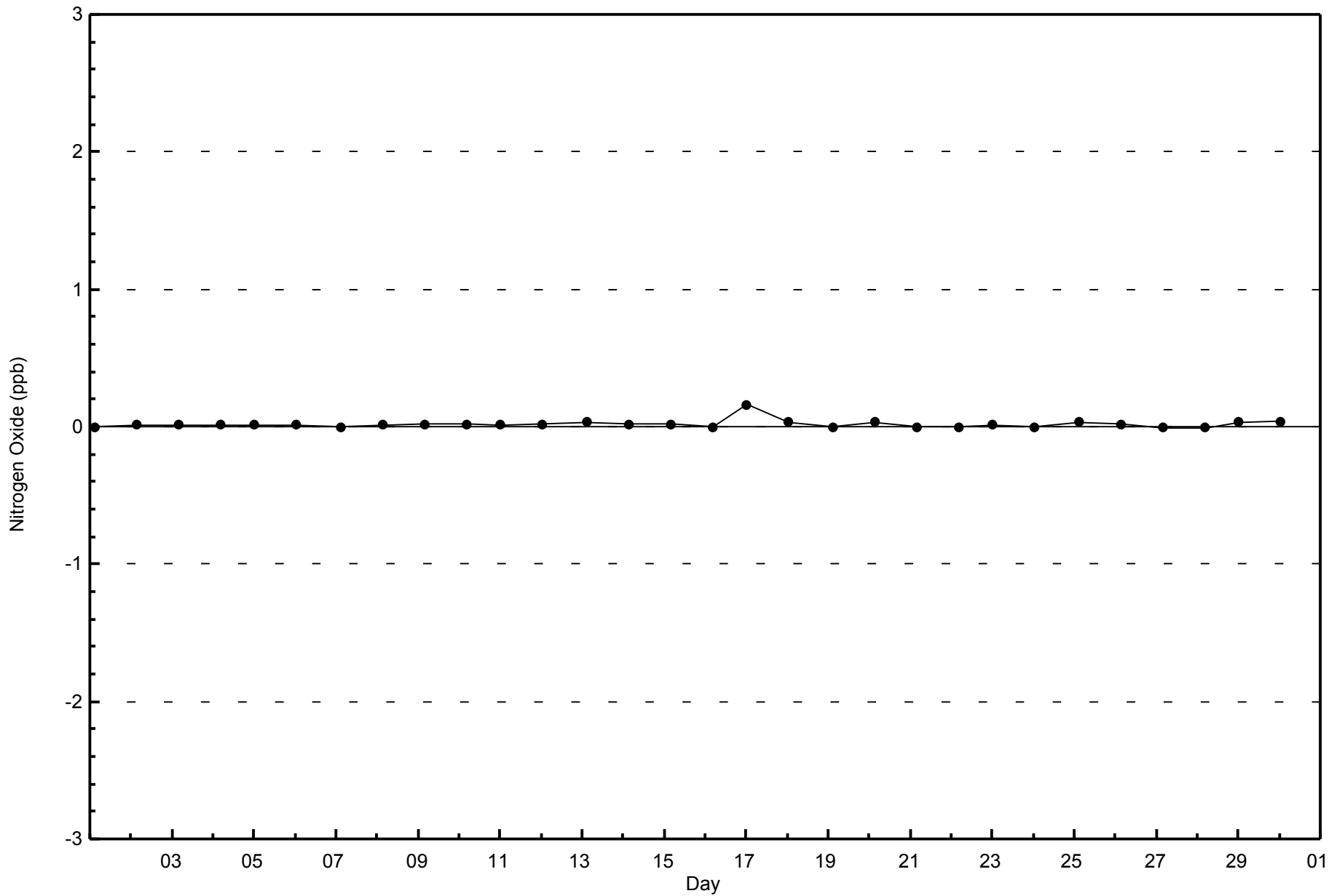
Nitrogen Oxide (NO) - ppb
Firebag (AMS 19)





WBEA
Zero Responses

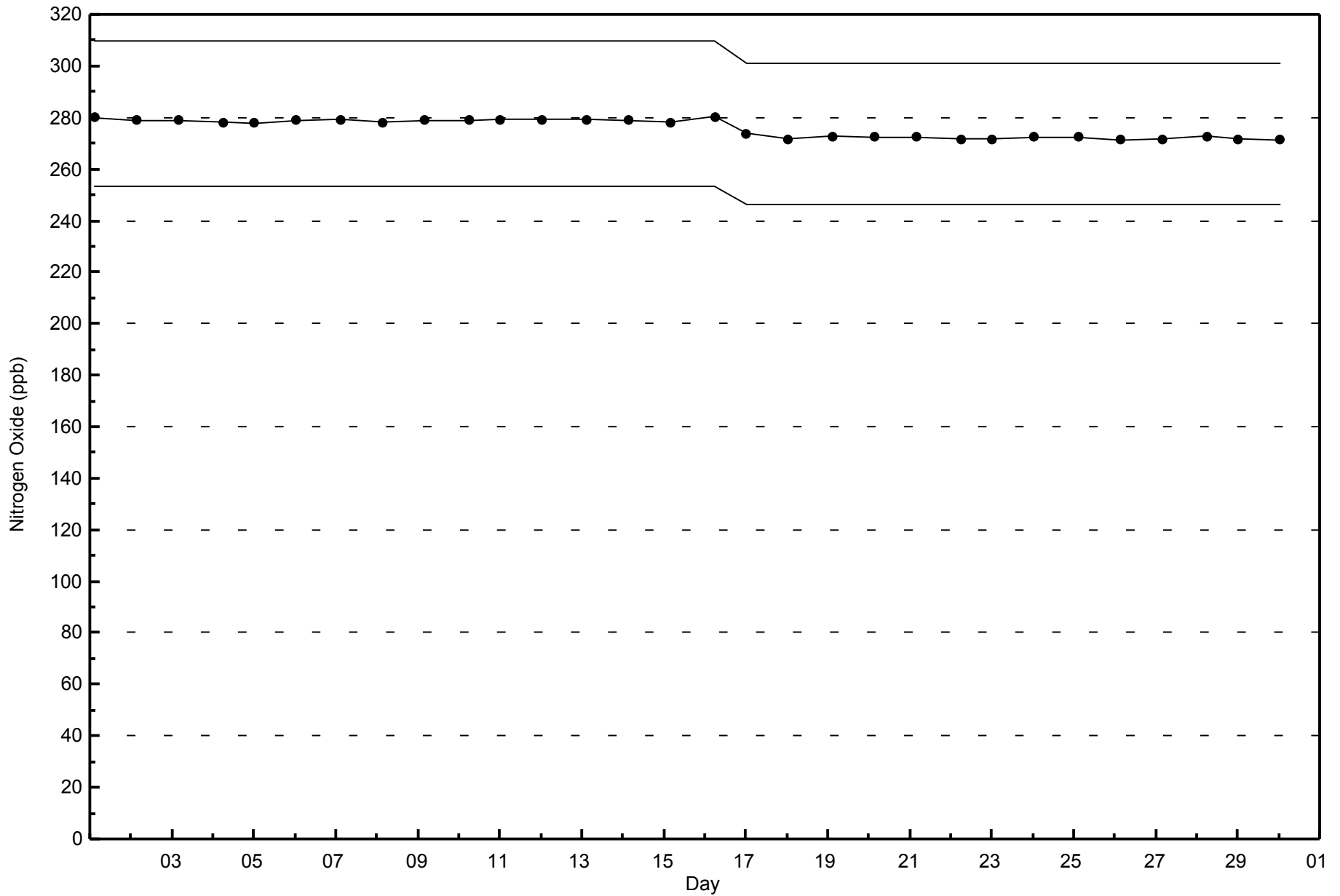
Nitrogen Oxide (NO) - ppb
Firebag - June 2015





WBEA
Span Responses

Nitrogen Oxide (NO) - ppb
Firebag - June 2015





Number of Exceedences (AAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 26 ppb on Jun 11 00:00	Maximum Daily Average: 7.3 ppb on Jun 28		Hours of Data:	684
Minimum Value: 0 ppb on Jun 14 07:00	Minimum Daily Average: 0.1 ppb on Jun 14		Hours of Missing Data:	36
Maximum Diurnal Average: 5.1 ppb at hour 4	Minimum Diurnal Average: 1.3 ppb at hour 17		Hours of Calibration:	36
Monthly Average: 2.7 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 1 Q ₃ = 4 P ₉₀ = 7 P ₉₉ = 14		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	4	4	Z	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	2	4	2	1.0	4
2-Jun	1	0	0	Z	0	0	0	0	0	1	0	0	3	2	1	1	1	0	0	5	11	4	16	7	2.3	16
3-Jun	0	1	1	18	Z	12	8	4	3	2	3	2	3	1	1	2	1	1	1	2	1	2	1	1	3.1	18
4-Jun	7	11	1	1	1	Z	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1	1	1	1	1.7	11
5-Jun	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	0.9	2
6-Jun	1	Z	5	6	8	8	6	5	3	2	1	2	2	2	2	1	1	1	5	7	6	6	6	3	3.8	8
7-Jun	1	3	Z	10	5	8	9	9	7	5	2	1	2	1	1	1	1	1	1	1	4	4	5	5	3.7	10
8-Jun	8	7	5	Z	6	5	3	3	2	4	2	2	1	3	5	3	1	1	1	1	1	1	3	2	3.0	8
9-Jun	2	2	5	3	Z	2	1	6	1	1	1	2	1	1	0	0	0	1	1	1	1	2	0	0	1.6	6
10-Jun	1	0	3	3	5	Z	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	6	3	26	2.5	26
11-Jun	Z	15	13	12	5	1	4	7	3	2	2	2	2	2	3	5	5	1	5	7	3	6	5	1	4.8	15
12-Jun	5	Z	5	6	9	5	3	5	3	2	2	1	1	4	8	5	1	3	5	4	2	4	2	4	3.9	9
13-Jun	2	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0.3	2
14-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.1	1
15-Jun	0	0	0	0	Z	0	0	1	0	0	1	0	0	0	0	2	2	2	1	2	2	6	2	1	1.1	6
16-Jun	1	4	1	0	0	Z	0	0	0	C	C	C	C	C	C	0	0	0	0	0	0	0	0	0	--	4
17-Jun	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	3	5	4	3	0.9	5
18-Jun	1	Z	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	3	3	4	1.2	4
19-Jun	4	2	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	6	0.8	6
20-Jun	5	6	8	Z	15	10	1	0	1	1	2	3	1	0	1	0	0	0	0	0	0	0	0	0	2.4	15
21-Jun	0	0	0	2	Z	0	0	1	1	1	1	1	1	1	1	0	0	0	1	1	1	0	1	7	0.9	7
22-Jun	6	3	4	4	9	Z	6	4	3	2	1	1	1	1	0	0	1	1	1	1	1	1	4	4	2.5	9
23-Jun	Z	5	3	3	4	1	2	1	2	2	3	3	2	1	4	2	1	1	1	2	4	4	3	5	2.5	5
24-Jun	6	Z	3	1	1	5	6	3	3	3	3	2	2	2	2	2	2	2	2	1	1	4	1	4	2.5	6
25-Jun	4	5	Z	9	7	3	3	2	5	4	2	2	2	2	2	2	2	3	6	10	1	2	7	9	4.0	10
26-Jun	6	3	1	Z	1	3	7	4	7	4	5	2	1	1	1	1	1	1	1	2	2	1	1	1	2.4	7
27-Jun	5	5	10	14	Z	7	5	5	4	3	1	1	1	2	1	1	1	1	2	2	1	1	2	4	3.4	14
28-Jun	4	9	10	9	8	Z	10	6	4	4	2	2	8	10	8	11	8	8	7	7	7	6	10	12	7.3	12
29-Jun	Z	9	7	12	12	10	10	22	21	7	5	4	3	2	3	3	2	3	3	4	3	6	6	6	7.0	22
30-Jun	10	Z	7	10	4	17	7	13	8	7	6	8	6	6	5	4	4	6	6	4	5	5	11	8	7.2	17

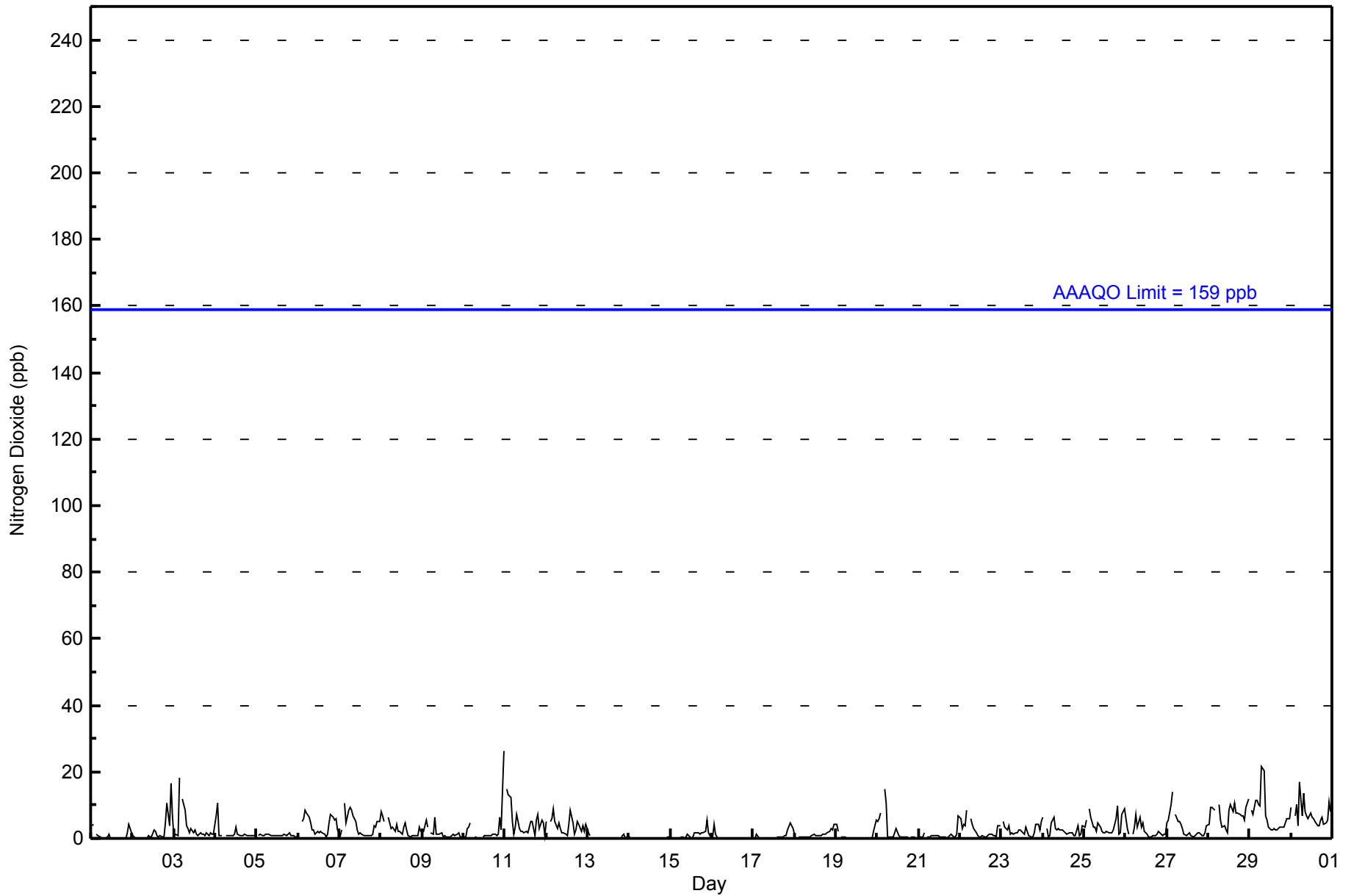
3.3	3.9	3.8	5.1	4.1	4.0	3.2	3.5	2.7	2.0	1.7	1.5	1.6	1.7	1.8	1.6	1.3	1.4	1.9	2.3	2.3	2.6	3.5	4.2	Diurnal Average	
10	15	13	18	15	17	10	22	21	7	6	8	8	10	8	11	8	8	7	10	11	6	16	26	Diurnal Maximum	

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



WBEA
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Firebag - June 2015





WBEA
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Firebag - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	681	99.56	99.56
21 - 40	3	0.44	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



WBEA
Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Firebag - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	65	54	31	14	15	18	9	24	52	69	70	39	48	50	58	55	671
21 - 40	0	0	0	0	0	0	0	1	0	0	0	2	0	0	0	0	3
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	65	54	31	14	15	18	9	25	52	69	70	41	48	50	58	55	674

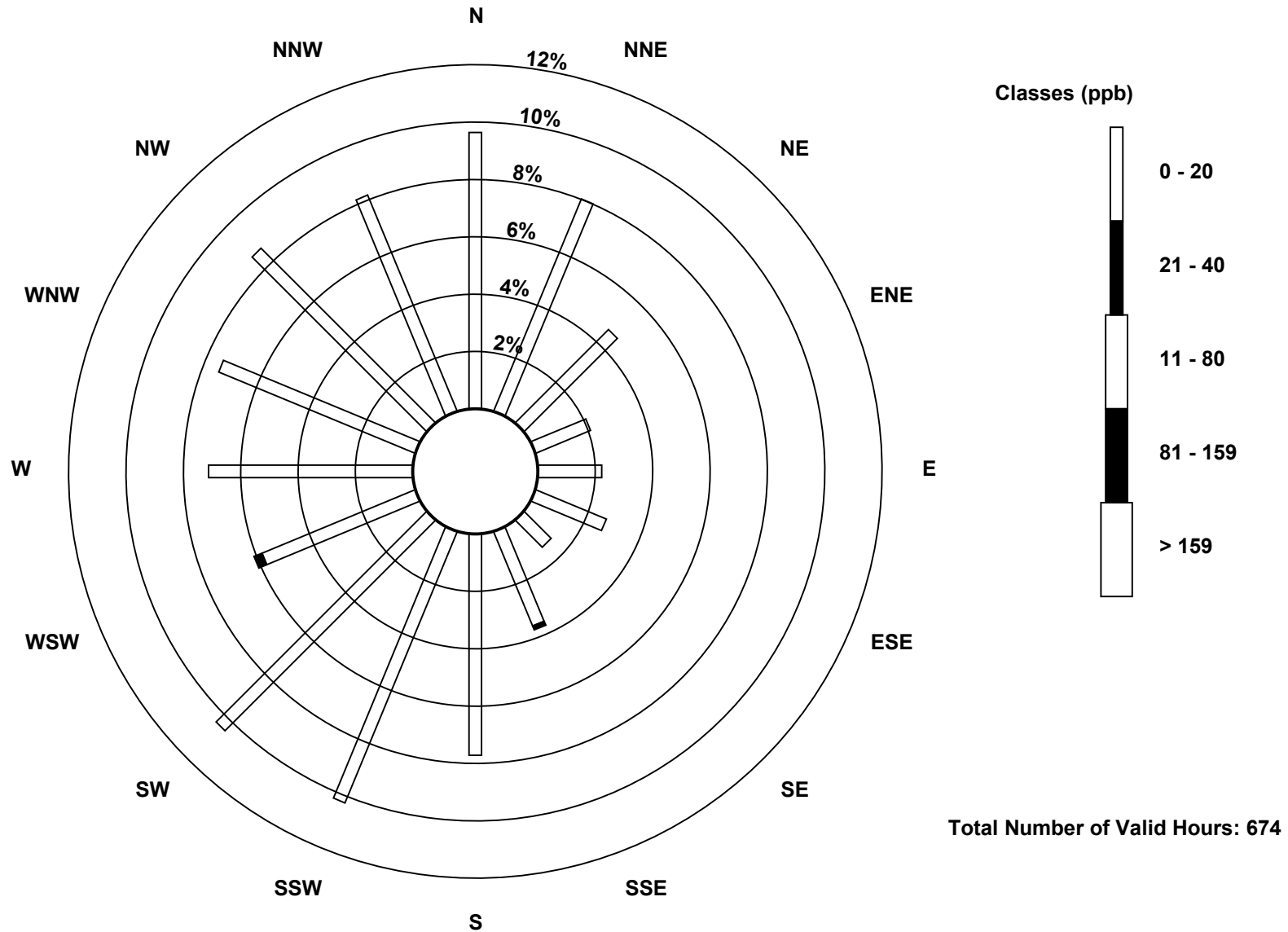
Total Number of Valid Hours: 674

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

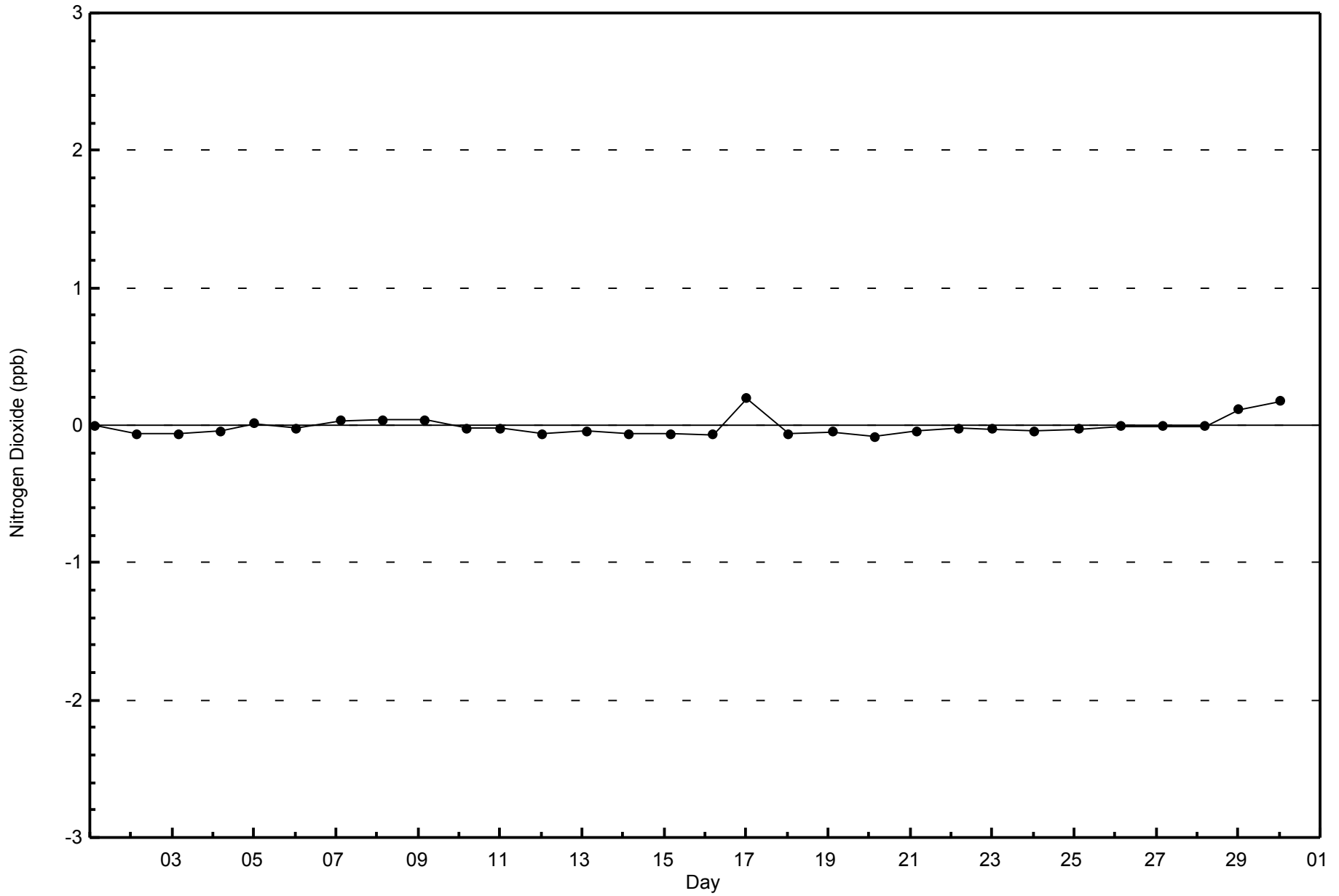
Nitrogen Dioxide (NO₂) - ppb
Firebag (AMS 19)





WBEA
Zero Responses

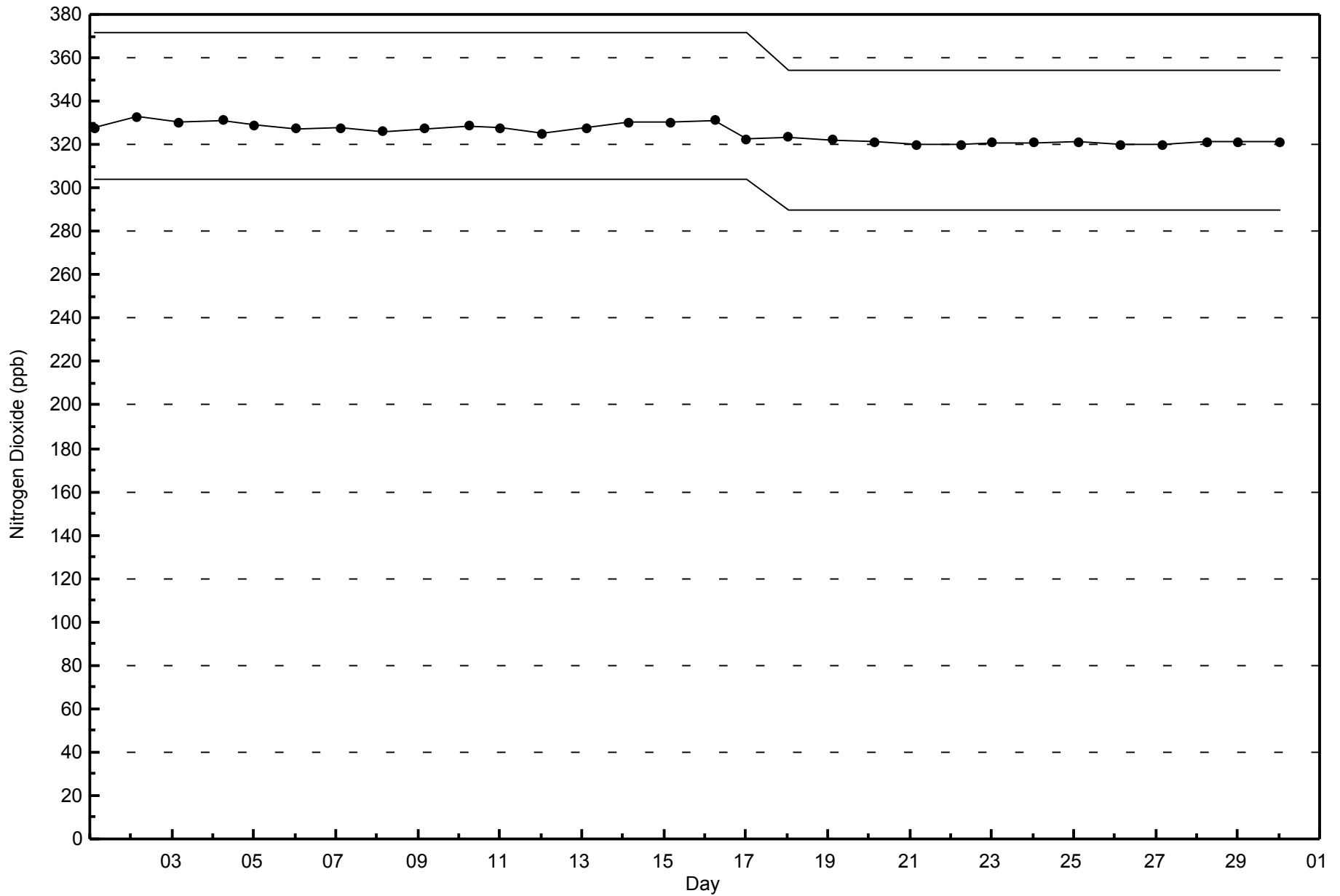
Nitrogen Dioxide (NO₂) - ppb
Firebag - June 2015





WBEA
Span Responses

Nitrogen Dioxide (NO₂) - ppb
Firebag - June 2015



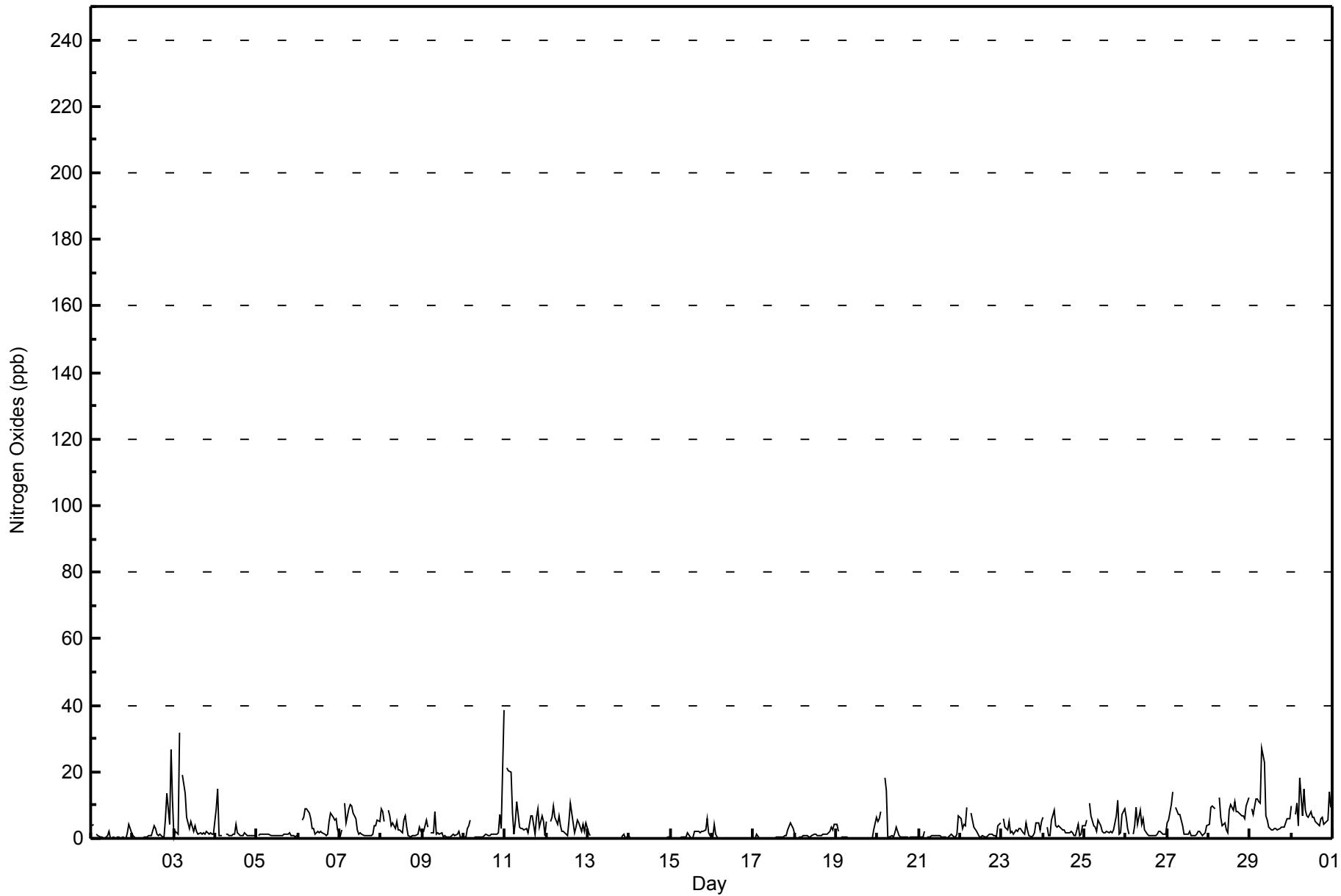


Maximum Value: 39 ppb on Jun 11 00:00																		Maximum Daily Average: 7.7 ppb on Jun 30						Hours in Service: 720			
Minimum Value: 0 ppb on Jun 17 08:00																		Minimum Daily Average: 0.1 ppb on Jun 14						Hours of Data: 684			
Maximum Diurnal Average: 6.1 ppb at hour 4																		Minimum Diurnal Average: 1.4 ppb at hour 17						Hours of Missing Data: 36			
Monthly Average: 3.1 ppb																		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 1 Q ₃ = 4 P ₉₀ = 8 P ₉₉ = 20						Hours of Calibration: 36			
																		Percent Operational Time: 100.0									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	4	4	Z	1	1	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	2	4	2	1.0	4	
2-Jun	1	0	0	Z	0	0	0	0	0	1	1	1	4	3	1	1	1	0	0	6	14	4	27	11	3.4	27	
3-Jun	0	2	1	32	Z	19	14	6	5	3	5	2	4	2	1	2	1	2	1	2	1	2	1	1	4.7	32	
4-Jun	9	15	1	1	1	Z	1	1	1	1	1	1	4	2	1	1	1	2	1	1	1	1	1	1	2.1	15	
5-Jun	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1.0	2	
6-Jun	1	Z	5	6	9	9	8	6	3	3	1	2	2	2	2	1	1	1	5	8	6	6	6	3	4.1	9	
7-Jun	1	3	Z	11	5	9	10	10	8	6	3	1	2	1	1	1	1	1	1	4	4	5	5	5	4.0	11	
8-Jun	9	8	5	Z	8	7	4	4	3	5	3	2	2	6	7	3	1	1	1	1	1	4	2	2	3.8	9	
9-Jun	2	2	5	3	Z	2	2	8	1	2	1	2	1	1	1	0	0	1	1	1	1	2	0	0	1.7	8	
10-Jun	0	0	3	4	6	Z	0	0	0	0	0	0	1	1	1	1	1	1	1	1	2	7	3	39	3.2	39	
11-Jun	Z	21	20	20	8	1	5	11	3	3	3	3	3	2	4	7	7	1	7	9	3	7	5	1	6.7	21	
12-Jun	5	Z	5	6	10	6	4	7	4	2	2	1	1	5	11	5	2	3	6	5	2	4	2	5	4.5	11	
13-Jun	2	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0.3	2	
14-Jun	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	
15-Jun	0	0	0	0	Z	0	1	1	0	0	2	1	0	0	2	2	2	2	2	2	3	6	2	1	1.3	6	
16-Jun	1	4	1	0	0	Z	0	0	0	C	C	C	C	C	C	0	0	0	0	0	0	0	0	0	--	4	
17-Jun	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	3	5	4	3	0.9	5
18-Jun	1	Z	1	1	0	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	2	4	3	4	1.3	4	
19-Jun	4	2	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	6	0.8	6	
20-Jun	5	6	8	Z	18	14	1	0	1	1	2	4	1	0	0	0	0	0	0	0	0	0	0	0	2.8	18	
21-Jun	0	0	0	2	Z	0	0	1	1	1	1	1	1	1	0	0	0	0	0	1	1	1	0	1	7	0.9	7
22-Jun	6	3	4	4	9	Z	8	5	3	2	1	0	1	1	0	0	1	1	1	1	1	1	4	5	2.8	9	
23-Jun	Z	6	3	3	5	2	2	1	2	2	3	3	2	1	5	3	1	1	1	2	4	4	3	5	2.8	6	
24-Jun	6	Z	3	1	1	6	8	4	3	4	3	3	3	2	1	2	2	2	2	1	1	4	1	4	2.8	8	
25-Jun	4	6	Z	11	7	4	3	2	5	4	2	2	2	2	1	2	2	3	7	12	1	2	7	9	4.3	12	
26-Jun	6	3	1	Z	1	4	9	4	8	4	6	3	1	1	1	1	1	1	1	2	2	1	1	1	2.8	9	
27-Jun	5	5	10	14	Z	10	7	7	6	4	1	1	1	2	1	1	1	1	2	2	1	1	2	4	3.9	14	
28-Jun	4	9	10	9	9	Z	12	6	4	4	3	2	9	10	8	11	8	8	7	7	7	6	10	12	7.6	12	
29-Jun	Z	9	7	12	12	11	10	27	23	7	5	4	3	2	3	3	3	3	3	4	3	6	6	6	7.5	27	
30-Jun	10	Z	7	11	4	18	7	15	8	7	6	8	6	6	5	4	4	6	7	4	5	6	14	9	7.7	18	
																		Diurnal Average		Diurnal Maximum							
																		3.5		4.9							
																		10		39							
Z - zerospan																		C - Calibration									



WBEA
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Firebag - June 2015





WBEA
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Firebag - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	678	99.12	99.12
21 - 40	6	0.88	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



WBEA
Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Firebag - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	65	54	31	14	15	18	9	21	52	69	70	39	48	50	58	55	668
21 - 40	0	0	0	0	0	0	0	4	0	0	0	2	0	0	0	0	6
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	65	54	31	14	15	18	9	25	52	69	70	41	48	50	58	55	674

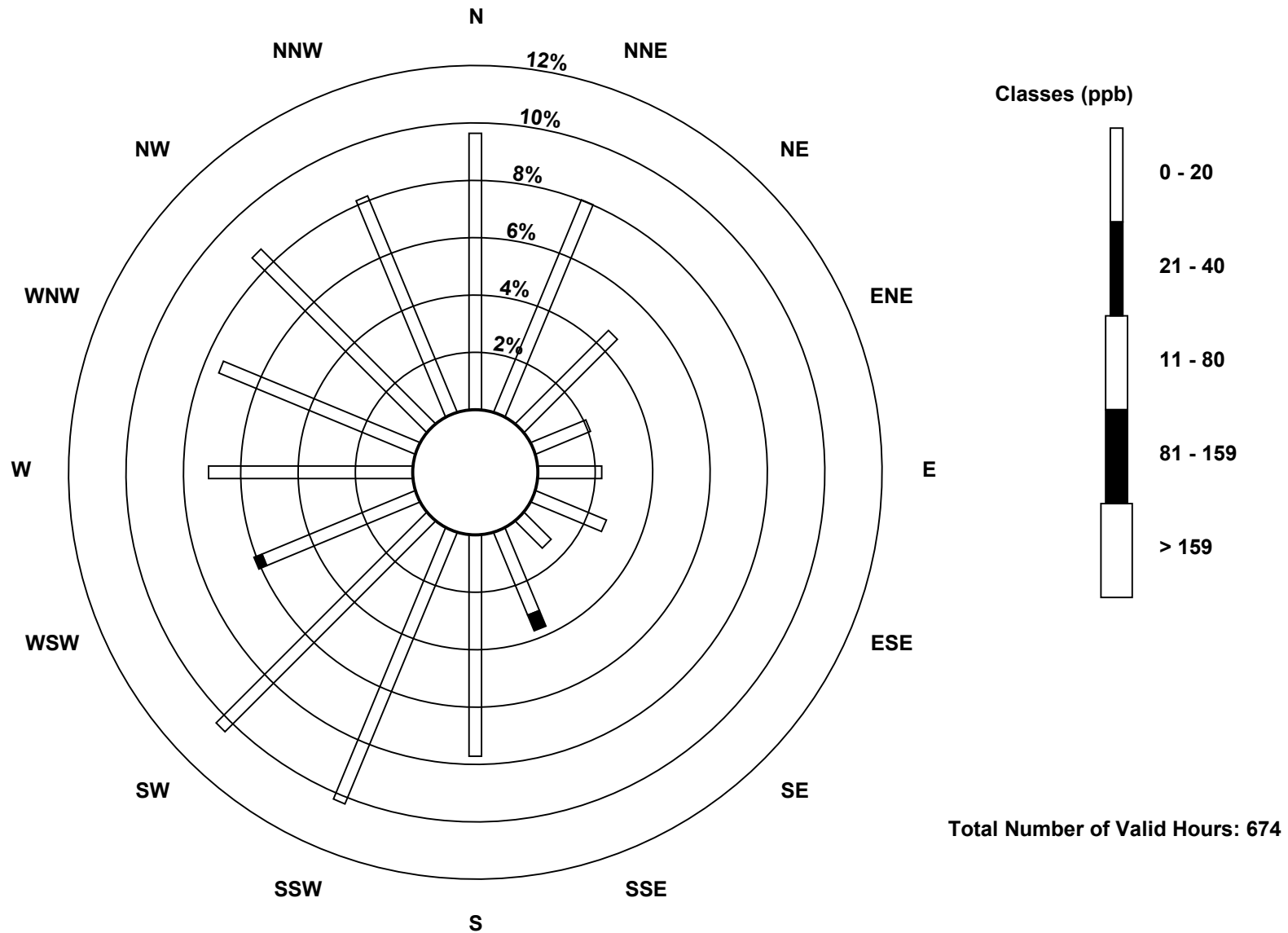
Total Number of Valid Hours: 674

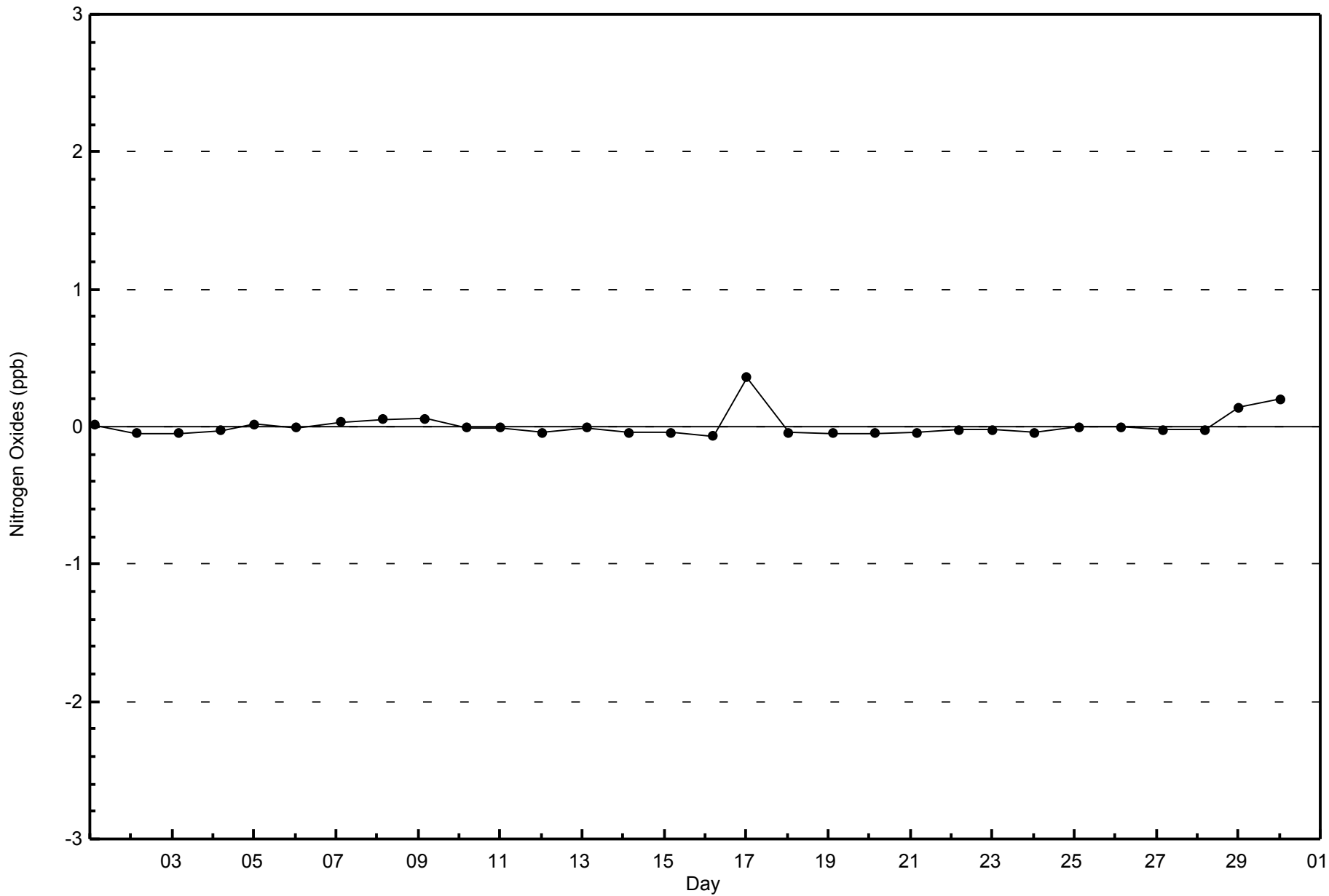
Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

Nitrogen Oxides (NO_x) - ppb
Firebag (AMS 19)

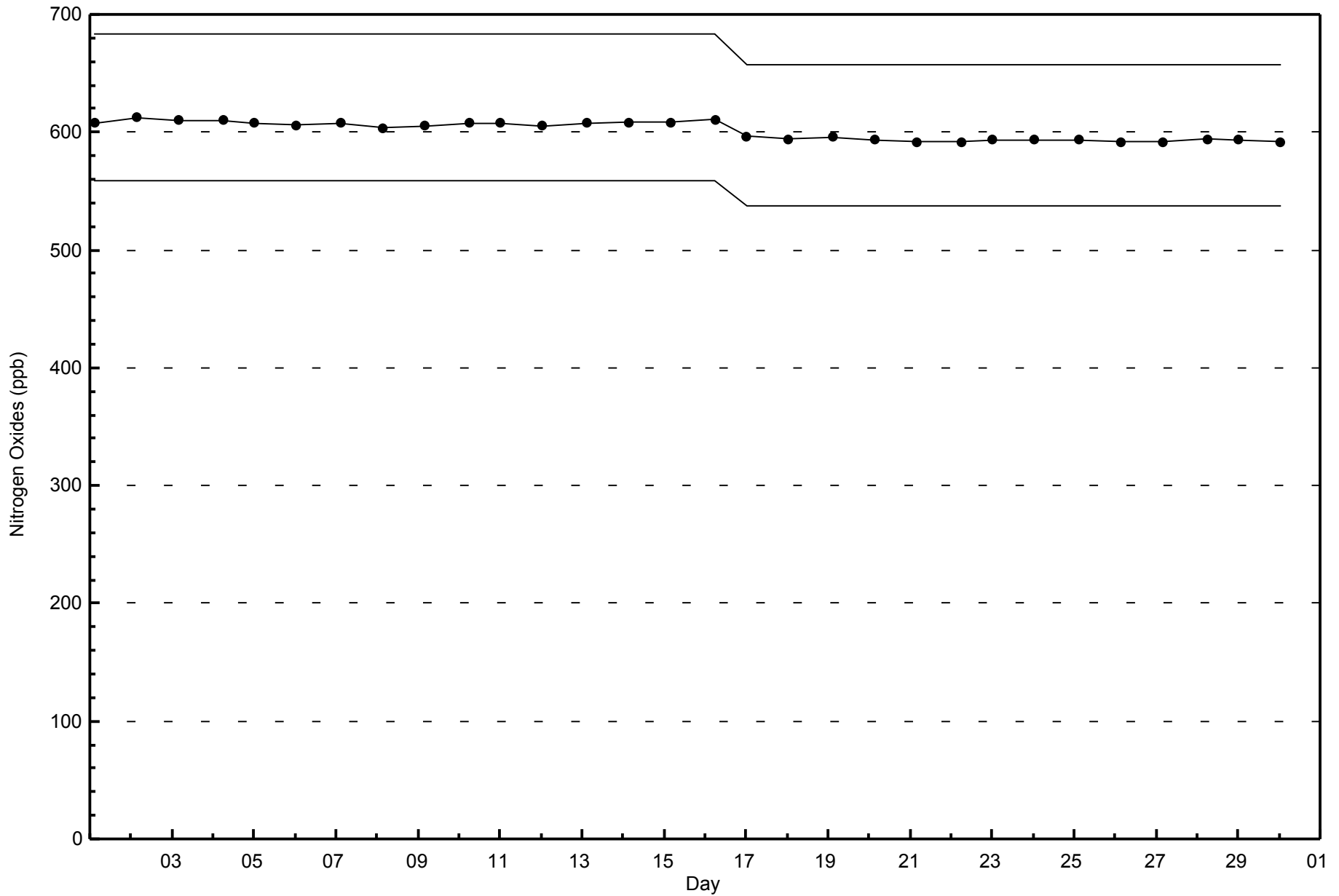






WBEA
Span Responses

Nitrogen Oxides (NO_x) - ppb
Firebag - June 2015



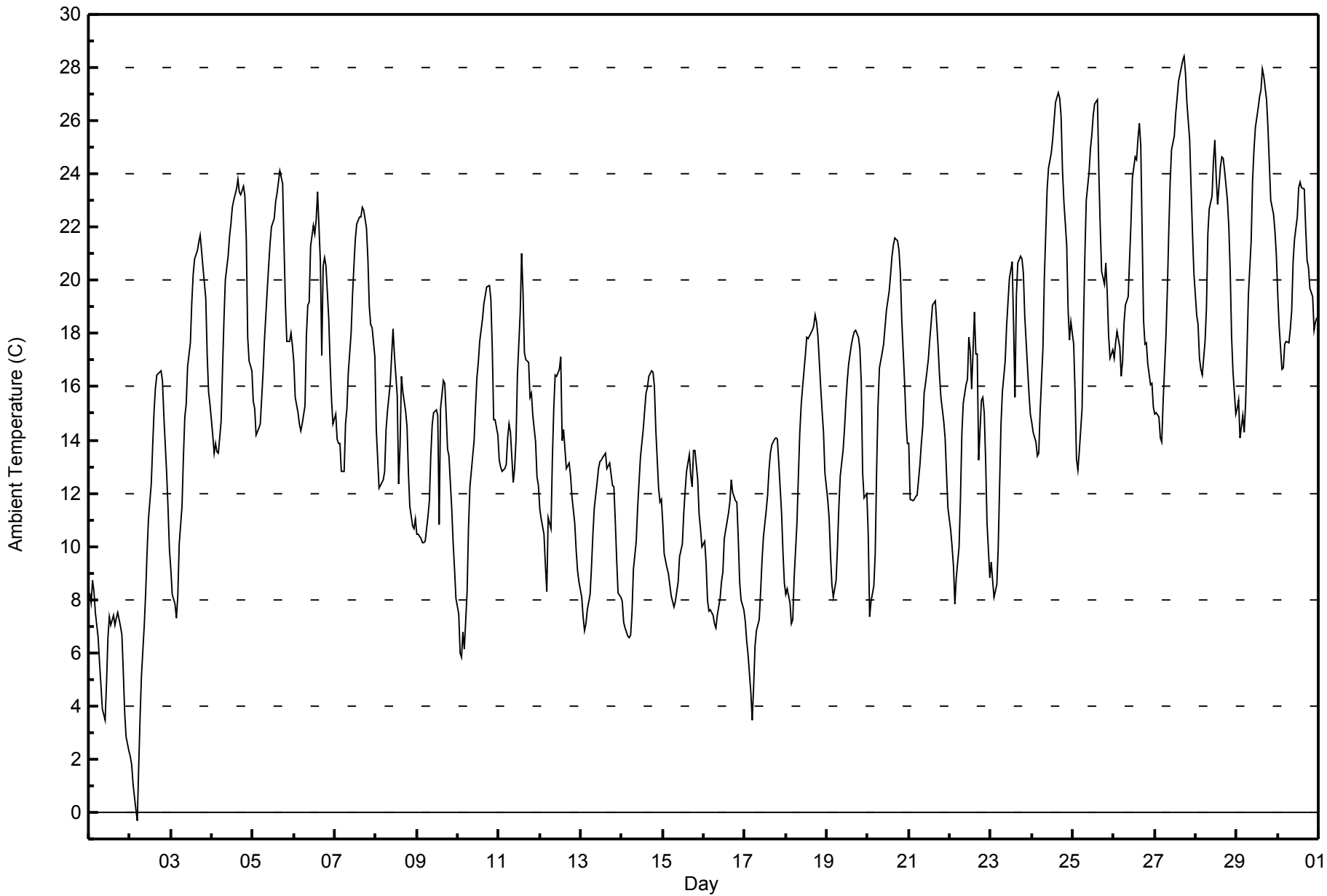


Maximum Value: 28.4 C on Jun 27 18:00		Maximum Daily Average: 22.2 C on Jun 27		Hours in Service: 720																																												
Minimum Value: -0.3 C on Jun 2 05:00		Minimum Daily Average: 6.2 C on Jun 1		Hours of Data: 720																																												
Maximum Diurnal Average: 19.3 C at hour 16		Minimum Diurnal Average: 10.5 C at hour 5		Hours of Missing Data: 0																																												
Monthly Average: 15.31 C		Percentiles: P ₁ = 2.7 P ₁₀ = 7.9 Q ₁ = 11.4 Median = 15.2 Q ₃ = 19.0 P ₉₀ = 23.0 P ₉₉ = 27.3		Hours of Calibration: 0																																												
				Percent Operational Time: 100.0																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jun	8.2	7.9	8.7	8.3	7.5	6.5	5.6	4.8	3.9	3.5	4.9	6.5	7.3	7.0	7.4	7.0	7.3	7.5	7.0	6.7	5.2	3.7	2.9	2.3	6.2	8.7																						
2-Jun	2.1	1.8	1.1	0.1	-0.3	1.7	3.6	5.2	7.0	8.3	9.7	11.0	12.4	13.8	15.1	16.0	16.5	16.5	16.6	16.3	14.9	12.8	11.4	9.9	9.3	16.6																						
3-Jun	9.2	8.2	7.8	7.3	8.1	10.1	11.5	13.3	14.9	15.4	16.7	17.7	19.2	20.2	20.8	21.1	21.4	21.7	21.1	20.5	19.3	17.2	15.8	15.3	15.6	21.7																						
4-Jun	14.2	13.5	13.9	13.6	13.5	14.7	16.6	18.5	20.0	20.9	21.7	22.1	22.7	23.0	23.5	23.8	23.3	23.2	23.5	23.2	21.6	17.8	17.0	16.6	19.3	23.8																						
5-Jun	15.4	15.2	14.2	14.4	14.6	15.5	16.5	17.8	19.7	20.6	21.4	22.0	22.3	22.9	23.3	23.7	24.1	23.6	21.3	19.0	17.7	17.7	18.0	17.5	19.1	24.1																						
6-Jun	16.9	15.6	15.0	14.6	14.3	14.6	15.3	17.9	19.1	19.2	21.3	22.1	21.8	22.3	23.3	20.7	17.2	20.5	20.9	20.6	18.5	16.8	15.5	14.6	18.3	23.3																						
7-Jun	15.0	14.0	13.9	13.8	12.8	12.8	14.6	15.2	16.5	18.0	19.4	20.5	21.5	22.1	22.4	22.4	22.8	22.6	22.0	20.8	19.0	18.4	18.2	17.1	18.2	22.8																						
8-Jun	14.4	13.3	12.2	12.4	12.5	12.8	14.4	15.1	16.1	17.2	18.2	17.2	15.6	12.4	13.8	16.4	15.8	15.1	14.5	12.8	11.5	10.7	10.7	11.0	14.0	18.2																						
9-Jun	10.5	10.5	10.3	10.2	10.2	10.2	11.1	11.7	13.4	14.6	15.0	15.1	14.9	10.8	15.2	16.3	16.2	14.9	13.7	13.4	11.4	10.1	9.1	8.0	12.4	16.3																						
10-Jun	7.5	6.0	5.8	6.8	6.1	8.3	10.7	12.3	12.8	14.0	15.3	16.3	16.9	17.7	18.5	19.1	19.4	19.8	19.8	19.3	17.5	14.8	14.8	14.2	13.9	19.8																						
11-Jun	13.2	13.0	12.8	12.9	13.1	14.1	14.6	14.3	12.4	12.9	14.0	16.4	18.8	21.0	19.5	17.3	17.0	16.9	15.6	15.7	14.9	13.9	12.6	12.3	15.0	21.0																						
12-Jun	11.4	11.0	10.5	9.3	8.3	11.1	10.6	13.3	15.2	16.4	16.4	16.7	17.1	14.0	14.4	12.9	13.0	13.1	12.7	11.9	10.9	9.9	9.1	8.7	12.4	17.1																						
13-Jun	8.1	7.4	6.8	7.1	7.6	8.2	9.2	10.4	11.4	12.4	12.9	13.2	13.2	13.4	13.5	12.9	13.0	13.1	12.3	12.2	11.0	9.5	8.3	8.1	10.6	13.5																						
14-Jun	7.9	7.2	6.9	6.6	6.6	6.7	7.6	9.2	10.2	11.5	12.4	13.4	14.4	15.1	15.7	16.0	16.4	16.6	16.6	16.0	14.4	12.2	11.7	11.8	11.8	16.6																						
15-Jun	10.9	9.7	9.2	9.0	8.6	8.1	7.7	8.0	8.3	8.7	9.6	10.1	11.3	12.1	12.8	13.4	12.6	12.3	13.6	13.6	12.5	11.2	10.7	10.0	10.6	13.6																						
16-Jun	10.2	9.4	8.0	7.6	7.6	7.4	7.1	6.9	7.4	8.0	8.7	9.0	10.3	10.6	11.3	11.7	12.5	12.0	11.7	11.7	10.3	8.7	8.0	7.6	9.3	12.5																						
17-Jun	7.2	6.5	5.9	4.5	3.5	4.7	6.2	6.8	7.3	8.3	9.5	10.3	11.3	11.9	12.9	13.5	13.8	14.0	14.1	14.0	13.2	11.2	9.8	8.6	9.5	14.1																						
18-Jun	8.2	8.4	7.9	7.1	7.3	8.8	10.9	12.6	14.2	15.3	16.0	17.2	17.8	17.8	17.9	18.1	18.3	18.7	18.4	17.9	16.0	15.1	14.3	12.8	14.0	18.7																						
19-Jun	11.8	11.1	9.7	8.6	8.1	8.7	10.0	11.5	12.7	13.6	14.4	15.4	16.3	16.9	17.6	17.9	18.1	18.1	17.8	17.4	16.2	12.8	11.8	12.0	13.7	18.1																						
20-Jun	10.5	7.3	7.9	8.5	9.7	12.9	15.3	16.7	17.3	17.6	18.2	18.9	19.6	20.3	20.9	21.3	21.6	21.5	21.1	20.3	18.5	16.2	14.8	13.9	16.3	21.6																						
21-Jun	13.8	11.8	11.7	11.8	11.8	11.9	13.1	13.9	14.5	15.7	16.1	17.0	17.8	18.4	19.1	19.2	18.4	17.5	16.4	15.6	14.7	14.1	12.8	11.5	14.9	19.2																						
22-Jun	10.6	10.0	9.2	7.8	8.8	10.0	11.8	14.2	15.4	16.1	16.3	17.9	17.3	15.9	18.8	17.2	17.2	13.3	15.5	15.6	15.0	13.2	10.9	8.8	13.6	18.8																						
23-Jun	9.4	8.7	8.1	8.5	9.9	12.3	14.6	15.8	17.0	18.3	19.2	20.1	20.7	18.3	15.6	19.4	20.6	20.9	20.8	20.3	18.7	16.7	15.7	14.9	16.0	20.9																						
24-Jun	14.7	14.3	13.9	13.4	13.5	15.1	17.5	20.1	21.8	23.4	24.2	24.8	25.3	26.0	26.7	27.1	26.9	26.2	24.1	23.0	21.3	18.9	17.8	18.4	20.8	27.1																						
25-Jun	17.6	15.8	13.3	12.9	13.5	15.2	18.3	20.9	23.0	24.1	25.0	25.5	26.2	26.6	26.8	24.1	22.0	20.3	19.9	20.6	19.6	17.9	17.1	17.4	20.1	26.8																						
26-Jun	17.1	17.6	18.1	17.5	16.4	17.0	18.4	19.1	19.4	20.8	22.2	23.9	24.6	24.5	25.3	25.9	25.0	18.5	17.6	17.6	16.8	16.1	16.2	15.2	19.6	25.9																						
27-Jun	15.0	15.0	14.9	14.1	13.9	15.4	17.9	19.6	21.7	23.6	24.9	25.4	26.2	26.8	27.5	28.0	28.2	28.4	27.8	26.7	25.3	23.5	21.8	20.3	22.2	28.4																						
28-Jun	18.7	18.3	17.0	16.6	16.4	17.7	19.0	21.7	22.7	23.2	24.5	25.3	23.9	22.9	24.3	24.6	24.6	24.1	23.0	22.0	20.3	17.9	16.6	15.0	20.8	25.3																						
29-Jun	15.2	15.5	14.1	14.9	14.3	15.4	17.3	19.4	21.5	23.8	24.9	25.8	26.5	26.9	27.2	28.0	27.7	26.8	25.8	24.4	23.0	22.5	21.8	21.0	21.8	28.0																						
30-Jun	19.5	18.3	16.7	16.7	17.6	17.7	17.6	18.2	18.9	20.7	21.5	22.4	23.5	23.7	23.5	23.4	22.0	20.7	20.5	19.7	19.4	18.1	18.4	18.6	19.9	23.7																						
																								12.1	11.4	10.8	10.6	10.5	11.5	12.8	14.1	15.2	16.2	17.1	18.0	18.6	18.5	19.1	19.3	19.1	18.6	18.2	17.6	16.3	14.7	13.8	13.1	Diurnal Average
																								19.5	18.3	18.1	17.5	17.6	17.7	19.0	21.7	23.0	24.1	25.0	25.8	26.5	26.9	27.5	28.0	28.2	28.4	27.8	26.7	25.3	23.5	21.8	21.0	Diurnal Maximum



WBEA
Hourly Averages

Ambient Temperature (AT) - C
Firebag - June 2015





WBEA
Cumulative Frequency Distribution

Ambient Temperature (AT) - C
Firebag - June 2015

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	1	0.14	0.14
0 - 10	135	18.75	18.89
10 - 20	432	60.00	78.89
> 20	152	21.11	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

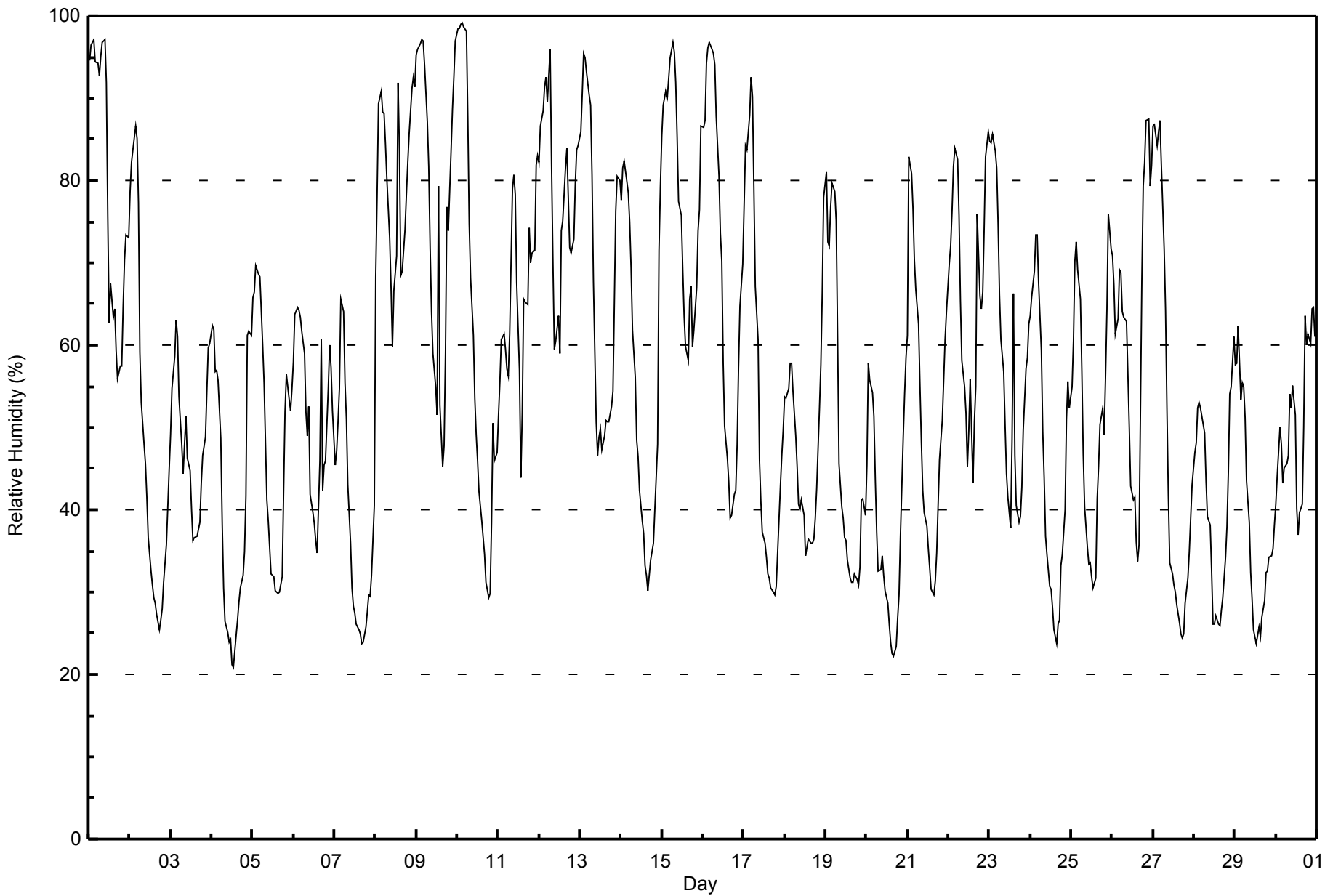


Maximum Value: 99 % on Jun 10 04:00																	Maximum Daily Average: 79.7 % on Jun 8																	Hours in Service: 720															
Minimum Value: 21 % on Jun 4 14:00																	Minimum Daily Average: 37.8 % on Jun 7																	Hours of Data: 720															
Maximum Diurnal Average: 75.3 % at hour 4																	Minimum Diurnal Average: 40.1 % at hour 16																	Hours of Missing Data: 0															
Monthly Average: 56.2 %																	Percentiles: P ₁ = 24 P ₁₀ = 30 Q ₁ = 39 Median = 55 Q ₃ = 72 P ₉₀ = 87 P ₉₉ = 96																	Hours of Calibration: 0															
																																		Percent Operational Time: 100.0															
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jun	95	97	97	97	94	94	93	95	97	97	92	76	63	67	63	64	59	56	57	57	65	70	73	73	78.8	97																							
2-Jun	79	82	84	87	85	77	59	53	48	46	42	37	33	31	29	29	27	25	27	28	31	36	40	45	48.3	87																							
3-Jun	49	55	59	63	61	54	48	44	48	51	46	45	40	36	37	37	38	39	43	47	49	54	60	60	48.4	63																							
4-Jun	62	62	57	57	56	49	38	31	26	25	24	24	21	21	25	27	29	30	32	35	42	61	62	61	39.9	62																							
5-Jun	66	66	70	69	68	64	60	55	41	39	35	32	32	30	30	30	30	32	42	52	57	53	52	55	48.4	70																							
6-Jun	58	64	65	64	63	62	59	52	49	53	42	40	38	36	35	46	61	42	45	46	55	60	57	52	51.8	65																							
7-Jun	45	47	51	55	66	64	55	51	43	36	30	28	27	26	25	25	24	24	26	28	30	29	32	40	37.8	66																							
8-Jun	68	78	89	91	88	88	84	80	73	67	60	67	71	92	84	69	69	74	78	82	86	91	93	91	79.7	93																							
9-Jun	95	96	97	97	97	94	87	82	72	64	59	55	52	79	53	45	48	59	77	74	83	89	93	97	76.8	97																							
10-Jun	98	99	99	99	99	98	88	75	68	61	54	49	46	42	39	37	35	31	29	30	38	51	46	47	60.7	99																							
11-Jun	52	56	61	61	59	57	56	61	79	81	78	68	57	44	52	66	65	65	74	70	71	71	82	83	65.4	83																							
12-Jun	82	87	89	91	93	89	96	82	70	59	60	64	59	74	75	82	84	78	72	71	73	80	84	84	78.2	96																							
13-Jun	86	90	95	95	93	90	89	81	68	51	47	49	50	47	49	51	51	52	54	65	76	81	80	80	68.4	95																							
14-Jun	78	81	82	80	79	75	69	62	56	49	46	42	39	37	33	32	30	34	35	36	40	48	72	79	54.8	82																							
15-Jun	85	89	91	90	93	95	97	96	92	85	77	76	69	64	60	58	66	67	60	62	67	74	76	87	78.1	97																							
16-Jun	86	87	94	96	97	96	95	94	88	80	74	70	58	50	46	43	39	39	42	42	48	57	65	70	69.1	97																							
17-Jun	77	84	84	88	93	90	79	67	61	46	41	37	36	34	32	32	30	30	30	31	35	43	47	50	53.2	93																							
18-Jun	54	54	55	58	58	54	49	45	41	40	41	39	34	35	36	36	36	36	39	43	52	58	67	78	47.4	78																							
19-Jun	81	73	72	77	80	79	75	61	46	40	39	37	36	34	32	31	31	32	32	31	33	41	41	39	48.8	81																							
20-Jun	45	58	56	54	51	44	37	33	33	34	32	30	29	26	24	22	22	23	27	30	37	49	54	58	37.9	58																							
21-Jun	61	83	81	77	70	67	63	55	48	42	40	38	35	33	30	30	31	35	41	46	51	56	61	64	51.5	83																							
22-Jun	70	72	76	82	84	82	76	65	58	55	52	45	50	56	43	51	55	76	66	64	67	74	83	86	66.1	86																							
23-Jun	85	84	86	84	82	75	66	61	57	50	44	42	38	49	66	47	40	39	39	43	50	57	58	63	58.4	86																							
24-Jun	64	66	69	73	73	68	59	49	44	37	35	31	30	28	25	24	26	27	33	35	40	51	56	52	45.6	73																							
25-Jun	55	61	70	72	69	66	57	47	40	35	33	33	32	31	32	41	45	50	52	49	56	64	76	72	51.7	76																							
26-Jun	71	67	61	63	69	69	64	63	63	57	50	43	41	41	36	34	36	68	79	82	87	87	79	82	62.3	87																							
27-Jun	87	87	84	86	87	82	72	64	52	42	34	32	31	30	28	26	25	24	25	29	32	35	39	43	49.0	87																							
28-Jun	47	48	52	53	52	50	49	43	39	38	33	26	26	27	26	26	28	29	34	38	45	54	55	61	40.9	61																							
29-Jun	58	58	62	53	55	55	51	44	38	32	29	25	24	25	26	24	27	29	32	33	34	34	35	38	38.5	62																							
30-Jun	41	44	50	48	43	45	46	47	54	52	55	52	40	37	40	41	50	64	60	61	60	64	65	61	50.8	65																							
																								69.3	72.5	74.6	75.3	75.3	72.4	67.3	61.3	56.4	51.5	47.5	44.4	41.2	42.1	40.4	40.1	41.2	43.6	46.1	47.6	52.6	59.0	62.7	65.1	Diurnal Average	
																								98	99	99	99	99	98	97	96	97	97	92	76	71	92	84	82	84	78	79	82	87	91	93	97	Diurnal Maximum	



WBEA
Hourly Averages

Relative Humidity (RH) - %
Firebag - June 2015





WBEA
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Firebag - June 2015

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	194	26.94	26.94
40 - 60	230	31.94	58.89
60 - 80	174	24.17	83.06
80 - 100	122	16.94	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Maximum Speed: 32 km/h on Jun 13 10:00	Maximum Daily Speed Average: 20.2 km/h on Jun 5	Hours in Service: 720
Minimum Speed Value: 0 km/h on Jun 25 14:00	Minimum Daily Speed Average: 1.6 km/h on Jun 29	Hours of Data: 709
Maximum Diurnal Speed Average: 7.8 km/h at hour 14	Minimum Diurnal Speed Average: 1.1 km/h at hour 20	Hours of Missing Data: 11
Monthly Average Velocity: 3.2 km/h 285.3 deg	Percentiles: P ₁ = 1 P ₁₀ = 5 Q ₁ = 8 Median = 12 Q ₃ = 17 P ₉₀ = 22 P ₉₉ = 29	Percent Operational Time: 98.5

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	SW9	WSW8	NW13	NNW21	NNW21	N20	NNW20	NNW15	NNW17	NNW15	NW17	NW24	NW23	NW23	NW24	NW24	NW22	NW20	NW18	NW11	WNW8	W8	WNW7	NNW8	NW15.3	NW24	
2-Jun	N10	N10	NNE12	NNE6	NE8	NE8	ENE12	NNE3	W3	WNW7	NE4	SSW2	S2	S7	S9	SSW11	S10	SSW14	SSW12	S13	SSE10	SE10	SSE14	S15	SSE3.0	S15	
3-Jun	S15	S14	S13	SSE11	SSE12	SSE15	SSE18	S22	SSE21	S22	S22	S24	S19	SSW19	SSW18	SSW13	SSW15	S17	S22	S19	S18	S15	S16	S15	S17.0	S24	
4-Jun	SSE16	SSE17	S17	S18	S17	S17	SSW17	SSW18	SSW20	SSW22	S22	S22	SSE23	S23	SSW26	SSW24	SSW23	S22	SSW22	S23	SSW26	SSW22	SSW17	SSW19	SSW20.0	SSW26	
5-Jun	SSW18	SSW19	SSW16	SSW17	SSW18	SSW21	SSW25	SSW25	SSW28	SSW27	SSW23	SSW24	SSW24	SSW22	SSW22	SSW22	SSW22	SSW22	SSW22	SSW22	SSW22	SSW22	SSW22	SSW22	SSW20.2	SSW28	
6-Jun	SSW18	SW15	SW14	SW15	SW16	SW16	SW12	WSW10	W11	W9	WNW12	NW13	NNW14	NW11	NNW13	NW19	N15	WSW12	WSW13	WSW10	WSW10	W8	WNW7	WNW7	W8.9	NW19	
7-Jun	WNW9	WSW10	W9	WNW13	W9	W8	WNW11	WNW13	WNW14	WNW17	WNW21	WNW21	WNW24	WNW24	WNW25	NW20	WNW21	WNW19	WNW15	NNW8	ENE6	ENE6	E7	SW10	WNW12.0	WNW25	
8-Jun	S6	SW7	SE1	SE8	S10	S9	SW13	W14	WNW13	NW15	NW15	WNW10	NNE15	NE7	SSE9	W6	NNW12	NNW10	NW12	NNW16	NNW11	NW7	NW7	NW12	NW4.7	NNW16	
9-Jun	NNW11	NNW13	NW13	NW12	NW10	NNW8	WNW10	WNW11	WNW12	W16	NW14	NNW14	NW11	NNE16	NNW6	NW16	NW13	NW15	NW7	NNW10	NNW9	N8	NNE8	NW4	NW10.2	NNE16	
10-Jun	N3	NW3	NNW8	NNE2	AF	NNE7	NE7	NE6	N6	NNW6	NNW6	W6	WNW6	NW7	W4	NW6	W4	NW5	WSW6	WSW6	NE2	ESE4	SE9	SSE11	NW2.1	SSE11	
11-Jun	SSE11	SSE15	SSE17	SSE18	SSE18	S18	S14	S10	ENE7	E11	ESE17	SE16	SSE12	WSW15	S6	SSE26	SSE19	S20	SSE19	SSE17	S12	SSE12	SSW9	SW14	SSE12.6	SSE26	
12-Jun	NE1	E5	WSW5	WSW3	ENE5	ESE8	S5	W3	NNE8	N6	N4	NNE7	NE8	E2	ESE6	ESE15	ESE24	ESE25	ESE26	ESE24	ENE15	E15	E16	E15	E8.1	ESE26	
13-Jun	E14	ENE8	NNE11	NNE12	N14	N17	N19	NNE23	NNE29	NNE32	NNE30	NNE31	NNE31	NNE29	NNE30	NNE29	NNE27	N28	NNE24	NE22	ENE9	E6	NE6	ENE11	NNE19.4	NNE32	
14-Jun	ENE12	NE10	NE10	NNE8	N12	NNE18	NE18	NNE21	NNE26	NNE25	NNE24	NNE22	N22	NNE23	N25	NNE24	N22	N19	NNE19	NNE15	NNE7	N4	NNW12	NNW11	NNE16.4	NNE26	
15-Jun	N19	N21	N16	N16	N14	NNW13	NNW13	N12	N11	NW12	NW12	NW12	WNW12	WNW13	WNW11	W11	NW11	W6	WNW6	WSW5	SSW2	SSE5	S7	SSW9	NW8.4	N21	
16-Jun	SW9	N14	NNE10	NNE13	NNE14	NNE15	N15	N17	N14	N15	N15	N17	N18	N17	N17	N17	N17	N17	N12	N11	NNE9	NNE8	NNE8	N13	N12.9	N18	
17-Jun	N11	NNW8	NNW10	NNW9	NNW8	N9	N12	NNE15	N12	N11	N10	N11	NNW10	WNW7	W4	WNW9	N4	NNW6	WSW6	SW5	SSW9	SSW12	SSW12	S14	NNW4.7	NNE15	
18-Jun	S16	S18	S19	S21	S18	S20	S19	S16	SSW18	SSW18	SW18	WSW18	SW20	SW18	SW18	SW14	SW11	SW8	WNW4	SW9	SSW7	S7	SW12	W6	SSW13.7	S21	
19-Jun	NW6	N9	NNE15	NNE15	NE14	NE15	NNE16	NE19	NE20	NE18	NE17	NNE14	NNE13	N8	N10	N11	N13	NNE13	N13	N10	NNE10	NNE10	ENE8	E11	NNE11.9	NE20	
20-Jun	ESE6	ESE5	SE7	SE4	SE6	SSE7	SSW7	WSW5	NW9	NW12	NNW13	N11	N13	NNW12	NNW12	NNW12	NW12	NNW12	N14	N13	NNE13	NE13	NE9	NNE8	N5.7	N14	
21-Jun	N6	WNW5	NW6	N8	N8	N7	N8	N13	N16	NNW16	NNW19	NNW20	NNW23	NNW21	NNW18	NNW19	N17	N16	NNW9	WNW8	NW8	WNW6	W7	W6	NNW11.3	NNW23	
22-Jun	SW6	SW6	SW2	WSW5	SW9	SW6	SW7	W7	NNW12	NNE12	NE11	N11	NNW15	WNW13	NW13	NNE14	NW10	W14	NW10	N8	N4	WNW4	AF	NE4	NW5.4	NNW15	
23-Jun	NNE1	S3	S3	SSW5	SSW5	SSW10	SW12	SW15	SW14	SW13	WSW13	W14	WNW13	NW25	E5	SSW9	WSW11	W10	W11	W7	WSW8	SW10	SW12	SW11	WSW7.6	NW25	
24-Jun	SW11	SSW10	SSW12	SSW11	SSW10	SSW11	SW11	SW12	WSW15	WSW17	W16	WSW17	W18	W19	WSW20	W19	WSW18	W11	NNE13	NNE4	E5	NNE12	NE10	E8	WSW8.1	WSW20	
25-Jun	SE7	SE4	AF	WNW1	N4	NNE5	NE5	NE4	AF	SW2	WSW2	NNW5	SSW2	NE0	WNW9	NNW23	NW14	WSW18	SSW9	SSE7	SW7	WSW9	SSW12	SSW12	W2.6	NNW23	
26-Jun	SSW9	SSW9	SSW14	SW15	SW12	SSW11	SSW13	SW16	SW20	WSW18	WSW21	WSW26	W25	W24	W25	W25	W21	WNW19	W9	N5	SSW5	SSW8	SW9	SW10	WSW13.3	WSW26	
27-Jun	SW11	SW10	SW11	SW10	SW9	SW9	WSW8	WSW11	W11	WNW12	NW13	NW13	NW13	W13	W14	W14	W15	W15	W16	WSW15	WSW12	SW7	SW9	SW10	SW9	WSW10.4	W16
28-Jun	SW9	SW11	SW11	SW8	SW10	SW9	WSW10	NNW13	NNW21	NNW20	NW19	NW21	NW24	NW21	WNW24	WNW24	WNW20	NW13	NW5	W5	AF	W4	WNW1	WNW2	WNW10.6	WNW24	
29-Jun	WSW4	SW1	WSW4	SW5	SW4	SW4	SW4	WSW9	WSW11	W10	WNW10	NW9	NW8	WNW8	NNW7	W4	SSW2	NE8	NE8	ENE9	ENE10	E8	E8	ESE8	WNW1.6	WSW11	
30-Jun	ESE6	E5	E5	ENE7	ENE8	ESE7	ESE10	SSE6	SSW4	AF	AF	AF	ESE1	ESE2	SE6	ESE4	AF	AF	AF	SSW4	SW6	SSW6	S9	SW8	SE3.6	ESE10	

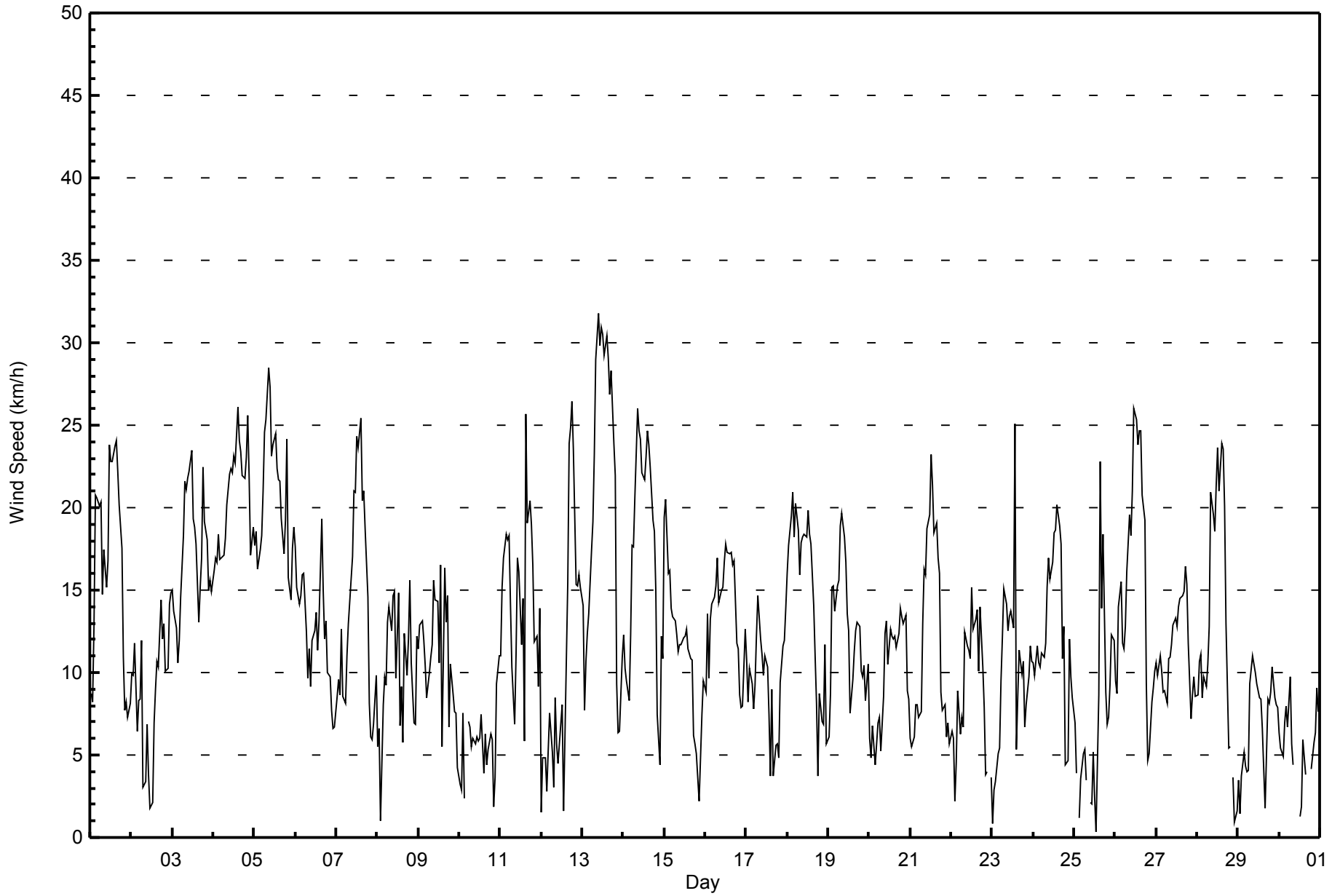
SSW2.7	SSW2.4	SW2.2	SW1.6	SW1.6	SW1.7	WSW2.4	W3.3	NW5.4	NW6.1	NW6.6	NW7.4	NW7.3	WNW7.8	WNW6.8	WNW6.9	WNW6.4	WNW6.1	WNW3.6	W1.1	SSW1.3	S2.1	S3.1	SSW3.3	Diurnal Average
N19	N21	S19	S21	NNW21	SSW21	SSW25	SSW25	NNE29	NNE32	NNE30	NNE31	NNE31	NNE29	NNE30	NNE29	NNE27	N28	ESE26	SW24	SSW26	SSW22	SSW18	SSW19	Diurnal Maximum

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



WBEA
Hourly Averages

Wind Speed (WS) - km/h
Firebag - June 2015





WBEA
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Firebag - June 2015

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	83	11.71	11.71
6 - 11	257	36.25	47.95
12 - 19	263	37.09	85.05
20 - 28	98	13.82	98.87
29 - 38	8	1.13	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 720



WBEA
Frequency Distribution

Wind Speed (WS) - km/h
Firebag - June 2015

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	7	5	7	1	6	5	3	1	4	9	8	8	8	6	4	1	83
6 - 11	24	16	15	10	7	7	7	8	11	18	37	16	22	20	18	21	257
12 - 19	36	22	7	3	4	2	1	15	25	30	23	15	14	15	26	25	263
20 - 28	6	10	2	0	0	4	0	3	13	15	7	3	5	9	12	9	98
29 - 38	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	73	61	31	14	17	18	11	27	53	72	75	42	49	50	60	56	709

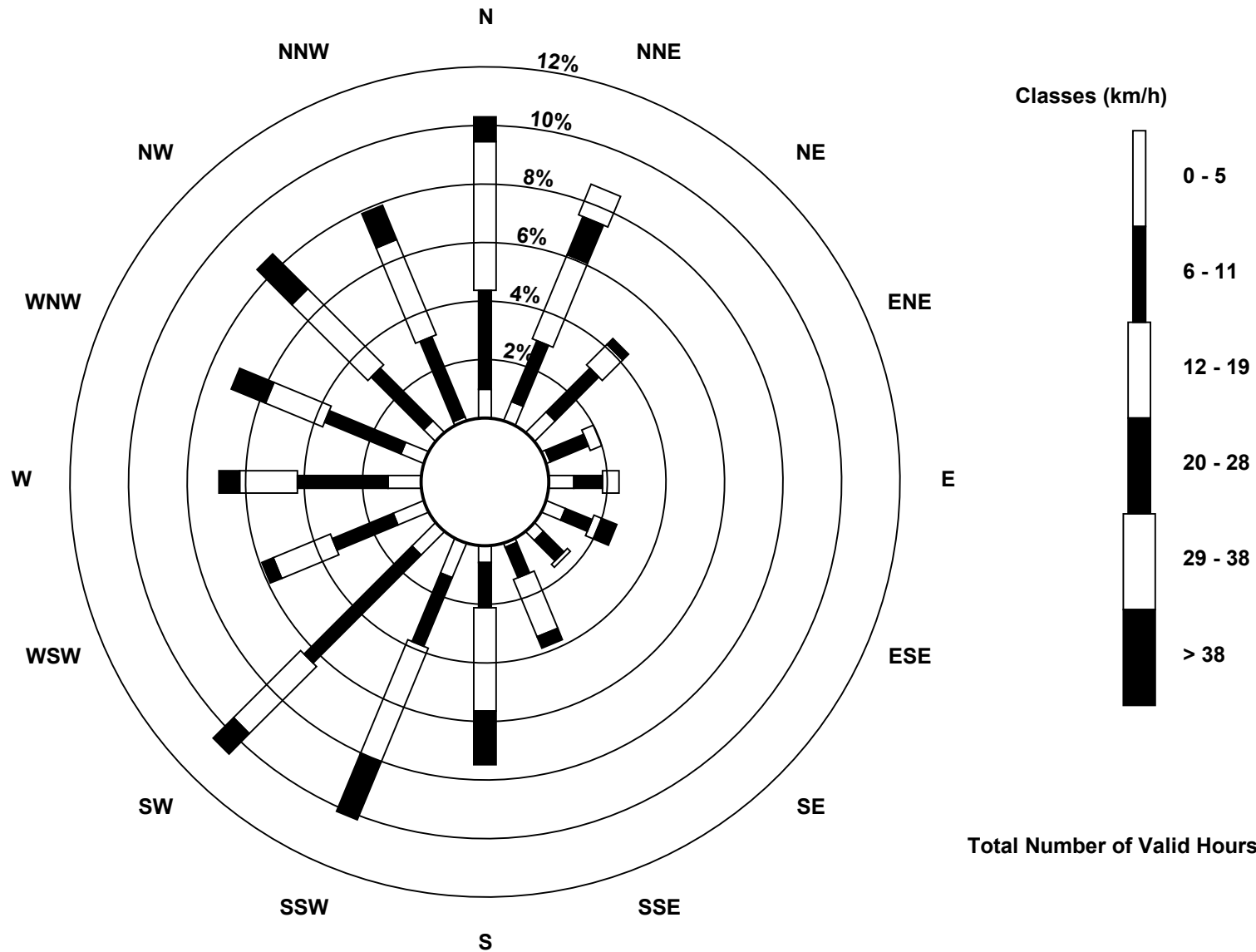
Total Number of Valid Hours: 709

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

Wind Speed (WS) - km/h
Firebag (AMS 19)



Total Number of Valid Hours: 709



Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Speed (WS) - km/h

Firebag - June 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 11 km/h on Jun 23 14:00	Hours of Data: 709
Minimum Value: 0 km/h on Jun 22 22:00	Hours of Missing Data: 11
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 8	Hours of Calibration: 0
	Percent Operational Time: 98.5

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

5	4	5	4	5	4	5	7	7	6	6	6	8	11	8	11	10	10	8	5	6	7	5	5	
Diurnal Maximum																								

AF - Analyzer Failure



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Firebag - June 2015

Direction of Maximum Speed: 17 deg on Jun 13 10:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 211.4 deg on Jun 5	Hours of Data: 709
Direction of Minimum Speed: 47 deg on Jun 25 14:00	Hours of Missing Data: 11
Direction of Minimum Daily Speed Average: 1.6 deg on Jun 29	Percent Operational Time: 98.5
Monthly Average Direction: 278.2 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	227	255	312	346	340	351	343	342	348	340	326	325	321	326	317	325	324	325	320	317	294	280	292	337	325.6
2-Jun	359	6	14	23	52	52	60	29	263	299	45	195	176	173	170	196	188	194	201	170	150	142	150	169	147.6
3-Jun	175	172	174	160	164	165	164	169	168	171	173	177	175	192	192	192	198	189	187	178	183	172	172	172	176.7
4-Jun	167	166	176	177	182	188	193	202	207	204	188	185	166	180	201	206	208	190	202	191	200	205	200	201	191.8
5-Jun	197	195	194	201	200	206	211	208	217	215	216	228	204	207	211	214	233	236	250	218	200	202	201	200	211.4
6-Jun	208	218	223	221	230	233	236	246	261	275	298	318	331	321	333	318	7	247	241	257	254	260	293	300	266.0
7-Jun	292	258	264	296	272	259	283	284	291	299	300	300	295	292	292	310	301	302	300	334	49	75	98	215	294.0
8-Jun	190	223	143	145	175	176	226	263	295	304	323	283	29	42	150	272	347	348	325	347	334	316	309	322	305.7
9-Jun	332	329	325	322	324	331	300	290	297	272	310	329	315	17	341	322	321	318	310	328	342	2	13	308	322.8
10-Jun	358	319	328	28	AF	27	35	40	357	344	330	281	303	308	270	305	261	308	248	246	52	122	129	156	325.0
11-Jun	157	163	162	163	167	179	176	176	71	95	106	133	167	243	186	149	168	187	165	150	173	164	204	225	164.8
12-Jun	42	91	258	247	70	112	182	271	18	10	8	22	47	90	116	114	120	113	110	104	78	87	96	81	95.3
13-Jun	92	69	15	13	360	350	5	14	19	17	20	18	15	27	23	18	25	10	26	40	61	83	40	70	22.9
14-Jun	64	51	41	28	6	19	43	23	15	22	16	17	11	16	10	18	9	10	14	20	19	350	341	333	17.2
15-Jun	355	1	353	353	351	343	340	350	349	325	322	316	301	298	296	280	320	266	296	244	212	165	190	210	325.8
16-Jun	227	356	26	20	21	12	359	4	8	357	1	11	355	349	350	0	0	352	7	11	23	26	15	9	3.7
17-Jun	356	331	336	343	346	354	8	12	351	1	357	3	333	288	281	301	355	328	243	227	204	197	194	180	329.9
18-Jun	189	191	189	188	189	188	188	189	196	212	233	245	232	222	219	222	222	224	282	219	204	175	219	261	207.9
19-Jun	317	8	28	33	41	37	29	39	39	35	39	30	12	5	358	3	3	18	358	10	13	29	66	81	25.9
20-Jun	108	118	131	138	141	167	202	256	311	321	345	0	355	334	329	337	322	345	8	350	23	42	35	32	357.2
21-Jun	357	290	311	359	11	351	355	357	351	342	344	341	337	339	337	344	355	350	332	299	320	292	275	280	338.8
22-Jun	230	233	236	245	226	227	229	279	347	16	35	354	341	290	321	14	324	276	307	3	356	285	AF	55	317.5
23-Jun	15	181	185	205	192	197	223	216	228	235	256	276	282	314	79	207	251	275	278	278	248	217	220	217	244.3
24-Jun	214	207	208	208	203	211	219	226	252	250	264	253	260	268	254	259	257	278	24	25	85	21	51	101	247.7
25-Jun	129	136	AF	292	7	21	42	45	AF	218	253	337	195	47	292	335	325	249	201	160	228	248	197	201	260.6
26-Jun	201	192	205	219	214	212	213	224	232	238	245	253	268	280	279	270	269	282	280	350	192	204	218	224	245.7
27-Jun	234	233	223	226	234	236	252	257	279	293	308	307	272	261	266	270	262	268	256	257	234	219	219	224	256.9
28-Jun	233	220	228	217	224	235	258	331	345	337	325	309	317	306	291	293	295	311	310	267	AF	273	301	286	295.4
29-Jun	252	235	239	217	218	218	233	242	256	281	300	313	313	302	328	259	198	36	46	64	70	84	86	109	303.0
30-Jun	103	99	86	68	65	113	123	159	202	AF	AF	AF	122	109	126	108	AF	AF	AF	208	219	196	172	226	137.0

202.2 213.2 235.2 236.0 227.8 228.9 248.7 280.0 307.3 306.6 316.0 310.2 310.9 302.3 293.6 301.4 302.4 293.7 294.1 280.2 199.7 183.0 182.3 197.2

Diurnal Average

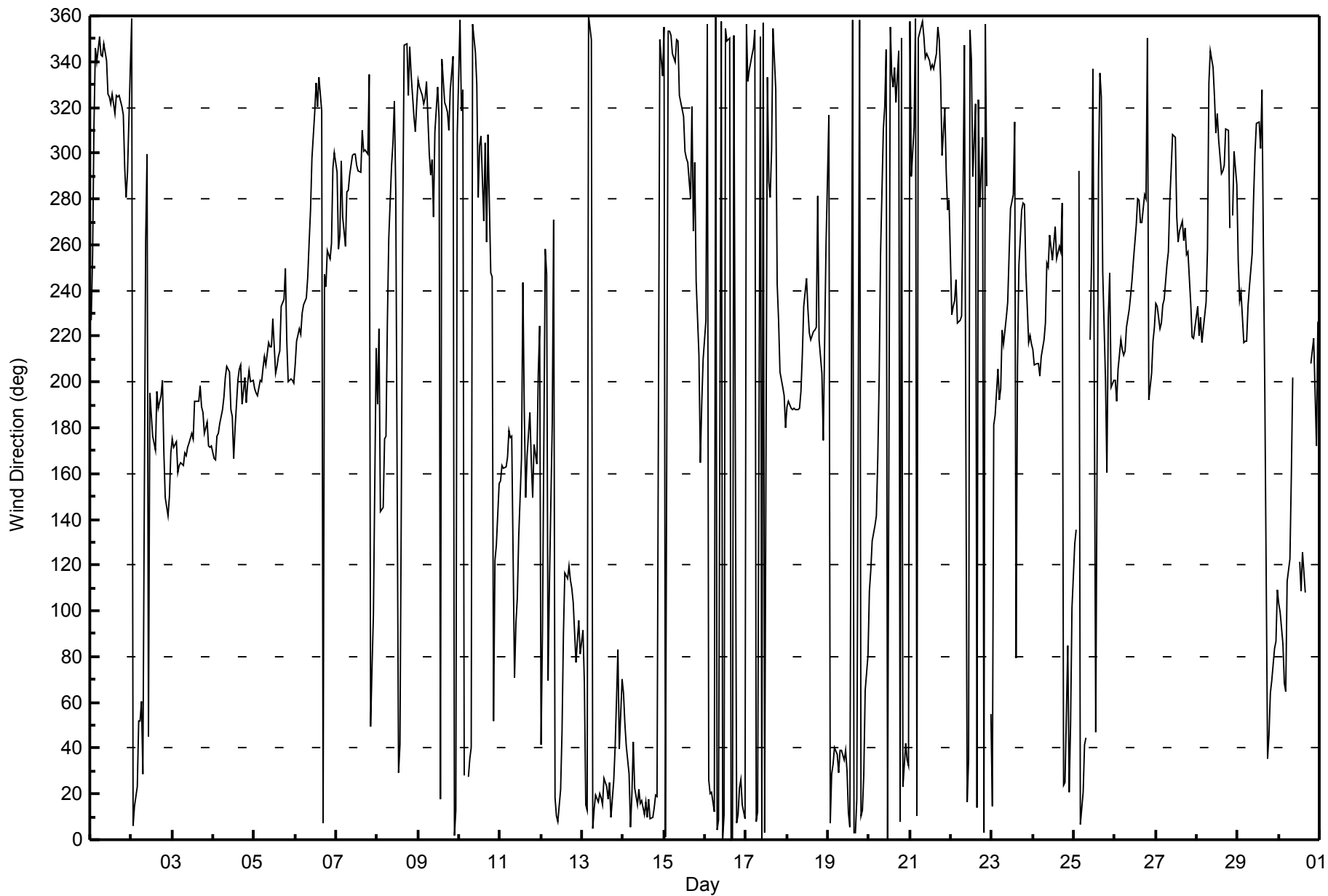
AF - Analyzer Failure

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



WBEA
Hourly Averages

Wind Direction (WD) - deg
Firebag - June 2015





Summary of Hour Standard Deviations

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 101 deg on Jun 8 03:00	Hours of Data: 709
Minimum Value: 5 deg on Jun 24 05:00	Hours of Missing Data: 11
Percentiles: P ₁ = 6 P ₁₀ = 8 Q ₁ = 11 Median = 16 Q ₃ = 24 P ₉₀ = 41 P ₉₉ = 90	Hours of Calibration: 0
	Percent Operational Time: 98.5

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	9	17	19	13	13	14	12	13	14	16	15	13	16	20	16	14	13	15	12	14	18	8	17	8	20
2-Jun	9	10	8	9	5	7	10	88	69	53	79	90	92	54	46	34	37	20	23	22	11	10	9	11	92
3-Jun	7	7	7	8	7	9	9	10	11	12	16	15	19	25	20	22	19	19	13	11	9	7	7	7	25
4-Jun	7	8	7	7	8	7	8	9	13	16	17	21	17	17	20	16	13	16	12	9	8	11	9	7	21
5-Jun	7	8	8	6	7	10	9	10	12	15	14	15	13	18	17	13	19	16	17	13	9	6	6	6	19
6-Jun	8	7	7	7	7	8	11	16	35	35	25	23	23	26	27	22	38	27	13	10	7	14	14	16	38
7-Jun	12	8	17	18	33	13	12	11	13	14	15	18	19	19	18	17	21	17	16	34	22	21	17	47	47
8-Jun	33	33	101	11	11	13	19	21	21	21	23	29	44	63	23	51	26	23	21	11	12	11	11	12	101
9-Jun	12	10	12	12	18	12	16	18	23	17	27	23	46	34	64	18	23	25	19	13	17	13	12	24	64
10-Jun	18	36	5	46	AF	15	21	42	36	49	68	66	60	42	84	66	82	56	32	21	43	20	11	9	84
11-Jun	9	8	9	8	8	12	16	44	56	22	14	18	30	28	64	14	29	10	11	11	8	13	42	29	64
12-Jun	92	55	58	70	12	45	27	69	35	50	38	17	31	87	37	12	11	11	10	11	17	16	14	13	92
13-Jun	15	26	11	10	13	13	15	13	15	14	16	17	17	14	14	15	16	14	13	11	18	19	16	12	26
14-Jun	11	10	12	11	13	13	12	19	15	17	22	19	23	19	20	19	16	17	19	12	9	19	10	11	23
15-Jun	14	15	13	12	13	13	14	13	14	13	20	22	22	20	22	27	35	25	26	24	52	18	9	8	52
16-Jun	11	43	13	10	11	12	15	15	15	16	17	16	19	19	20	18	22	15	17	13	12	7	11	11	43
17-Jun	13	11	14	9	10	13	14	17	25	25	48	40	49	57	88	47	86	64	56	51	12	5	7	10	88
18-Jun	8	6	6	7	6	7	8	13	14	18	20	23	17	25	18	16	20	30	24	12	21	13	20	25	30
19-Jun	27	35	9	9	9	9	15	14	16	19	24	37	38	63	47	35	33	23	24	17	8	9	12	7	63
20-Jun	12	13	10	16	22	15	15	40	32	29	34	39	34	34	36	40	31	28	19	17	14	9	6	6	40
21-Jun	38	46	29	11	9	10	18	15	16	20	21	20	21	21	23	21	18	12	18	15	22	15	12	10	46
22-Jun	16	9	37	25	9	10	10	21	25	25	26	46	31	17	25	19	30	18	36	18	36	11	AF	24	46
23-Jun	93	24	12	11	14	8	10	12	17	23	23	28	27	17	60	31	21	15	13	17	14	12	7	9	93
24-Jun	9	6	6	6	5	8	9	12	13	20	22	25	21	21	17	19	15	23	15	26	24	20	13	20	26
25-Jun	12	44	AF	69	16	14	13	23	AF	64	84	52	92	96	28	23	42	11	32	21	25	16	15	8	96
26-Jun	11	17	12	9	10	9	11	10	11	15	13	15	16	17	15	14	16	34	37	33	53	10	9	8	53
27-Jun	7	6	7	7	8	8	13	10	15	20	24	26	28	26	23	25	21	21	13	9	12	9	9	8	28
28-Jun	7	9	7	10	9	15	11	25	13	17	19	21	15	13	12	12	12	14	12	17	AF	33	26	45	45
29-Jun	30	46	36	10	7	13	14	10	11	19	21	27	28	40	53	41	81	15	12	9	8	12	11	16	81
30-Jun	12	20	26	10	11	16	10	22	14	AF	AF	AF	59	37	17	21	AF	AF	AF	13	13	19	11	31	59
	93	55	101	70	33	45	27	88	69	64	84	90	92	96	88	66	86	64	56	51	53	33	42	47	

Diurnal Maximum

AF - Analyzer Failure



Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

Calibration Date	June 16, 2015	Last Calibration	May 26, 2015
Station Name	Firebag	Station Number	AMS 19
Reason:	Routine		
Start Time (MST)	9:20	End Time (MST)	13:55
Gas Cert Reference	SA130123A	Station temp.	Deg C
Cal Gas Concentration	49.3 ppm	Cal Gas Exp Date	December 12, 2016
Calibrator Make/Model	API T700	Serial Number	996
ZAG Make/Model	API 701	Serial Number	4891
DACS make/model	Campbell Scientific CR3000	DACS serial No.	9037

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		PMT voltage	-606	-606
Analyzer IP address	192.168.1.43		Lamp voltage	797	790
Calculated slope	0.996812	0.996119	Chamber temp	44.9	45.0
Calculated intercept	0.175618	-0.336761	Pressure	686.2	688.9
Analyzer Background	8.5	8.4	Flow	0.447	0.451
Analyzer Coefficient	0.952	0.952	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	-0.8	----
as found span	5000	58.3	574.8	572.0	1.005
calibrator zero	5000	0.0	0.0	-0.6	----
high point	5000	58.3	574.8	576.7	0.997
second point	5000	29.2	287.9	290.7	0.990
third point	5000	14.7	144.9	146.2	0.992
as left zero	5000	0.0	0.0	-0.6	----
as left span	5000	58.3	574.8	575.7	0.999
Average Correction Factor					0.993

Corrected As found	572.8	Previous response	576.5	% change	0.6%
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Notes:

Filter changed after as founds.

Calibration Performed By:

Devin Russell



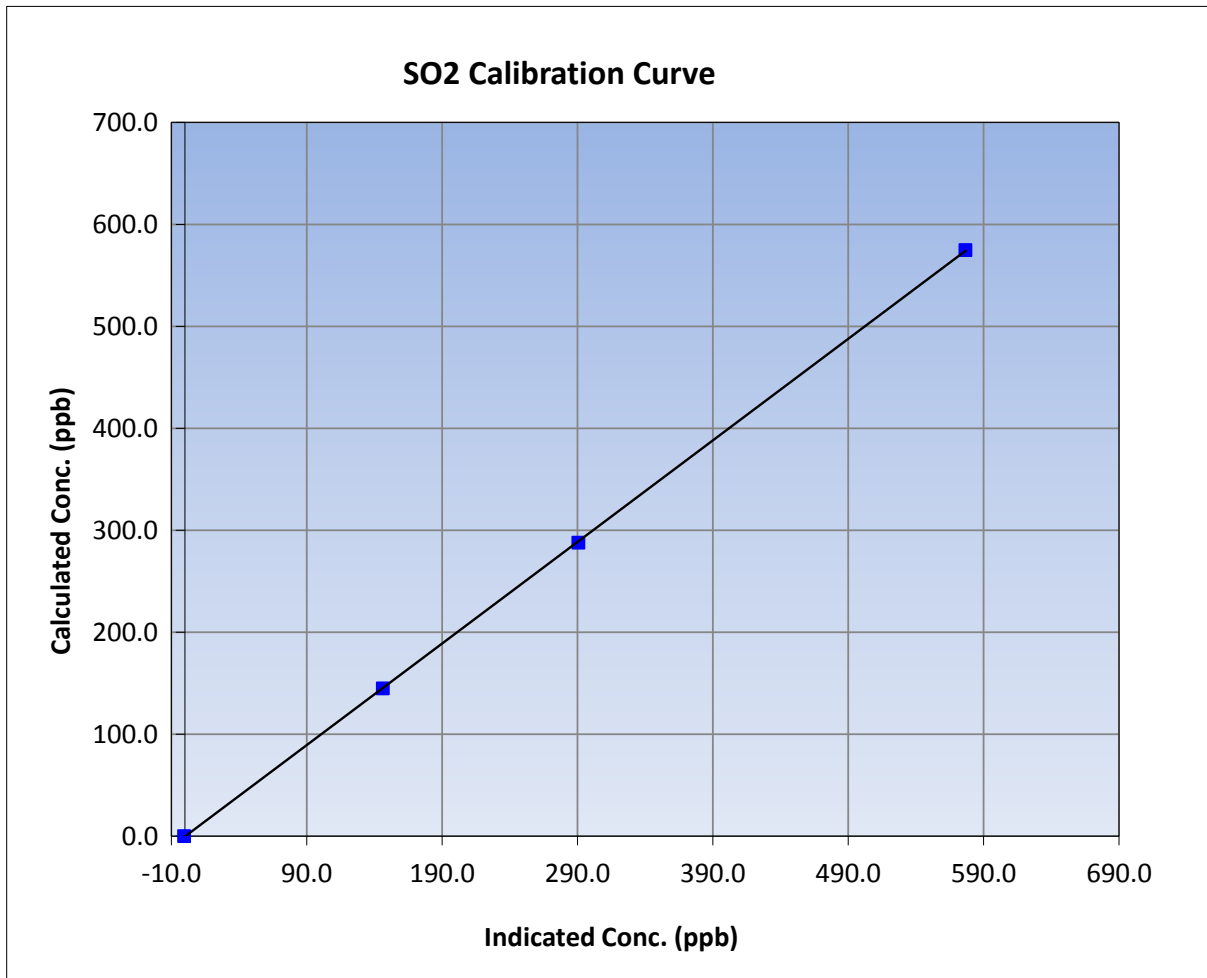
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	June 16, 2015	Previous Calibration	May 26, 2015
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	9:20	End Time (MST)	13:55
Analyzer make	Thermo 43i	Analyzer serial #	1410661308

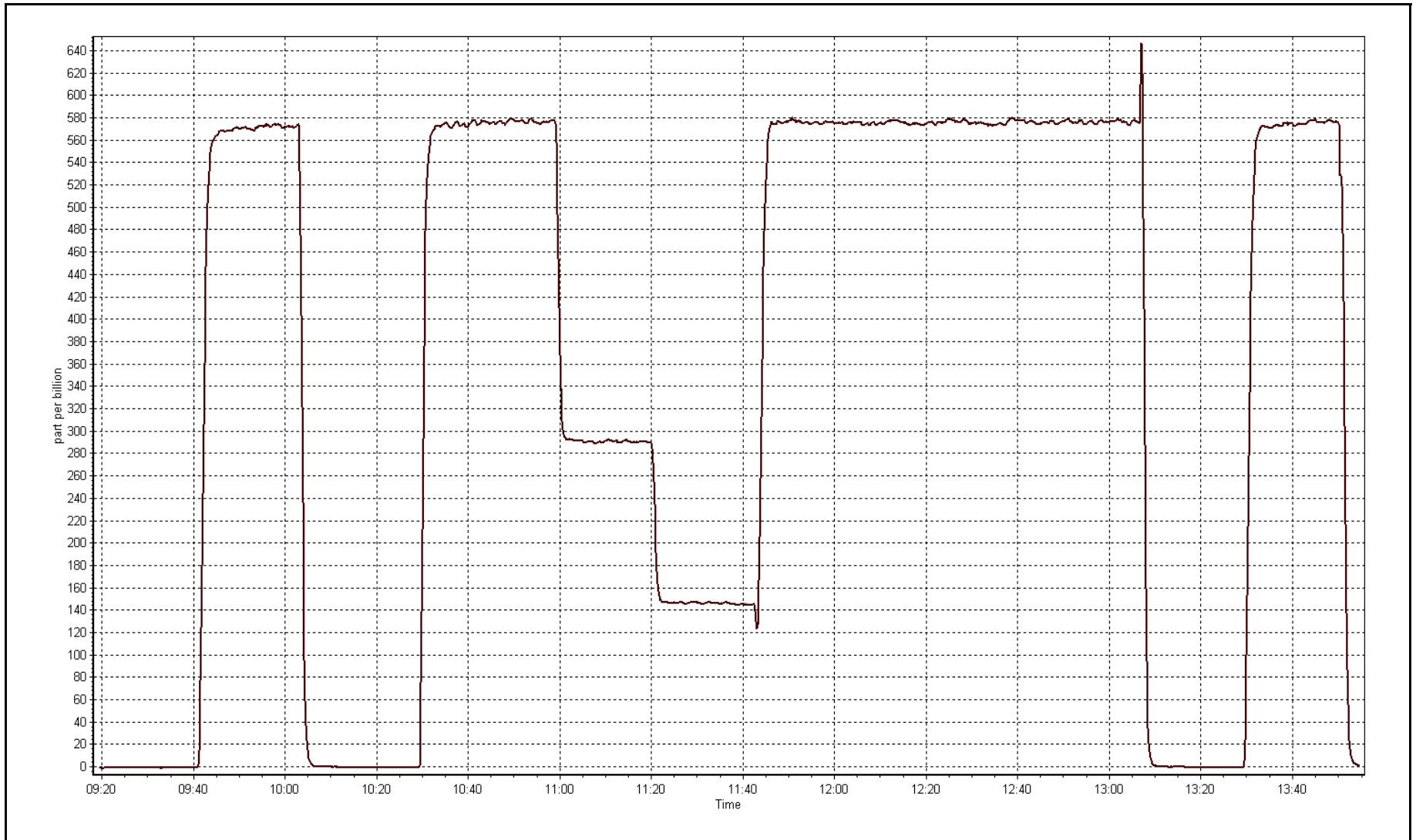
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.6	----	Correlation Coefficient	0.999982
574.8	576.7	0.9968		
287.9	290.7	0.9904	Slope	0.996119
144.9	146.2	0.9915		
			Intercept	-0.336761



SO2 Calibration Plot

Date: June 16, 2015





Wood Buffalo Environmental Association H2S Calibration Report

Station Information

Calibration Date	June 11, 2015	Last Calibration	May 22, 2015
Station Name	Firebag	Station Number	AMS 19
Reason:	Routine		
Start Time (MST)	9:25	End Time (MST)	12:55
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 12-Dec-16

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-574	-574
Analyzer IP address	192.168.1.42		Lamp voltage	925	921
Calculated slope	0.998564	0.995167	Chamber temp	45	45
Calculated intercept	0.095784	0.014391	Pressure	538.9	539.5
Analyzer Background	12.2	12.1	Flow	0.950	0.958
Analyzer Coefficient	1.083	1.073	Intensity	85	86
			Converter temp.	334	337

Analyzer make/model	Thermo 450i	Analyzer serial #	815129098
Converter make/model		Converter serial #	

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.1	----
as found span	5000	83.3	80.8	81.4	0.992
SO2 scrubber check	5000	15.2	149.9	1.1	----
calibrator zero	5000	0.0	0.0	-0.1	----
high point	5000	83.3	80.8	81.1	0.996
second point	5000	41.7	40.4	40.7	0.993
third point	5000	21.0	20.4	20.5	0.992
as left zero	5000	0.0	0.0	-0.1	----
as left span	5000	83.3	80.8	81.2	0.995
Average Correction Factor					0.994

Corrected As found	81.5	Previous response	80.8	% change	-0.9%
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Notes:

Scrubber check completed after as founds. Pump changed after as founds. Span was adjusted.

Calibration Performed By: Devin Russell



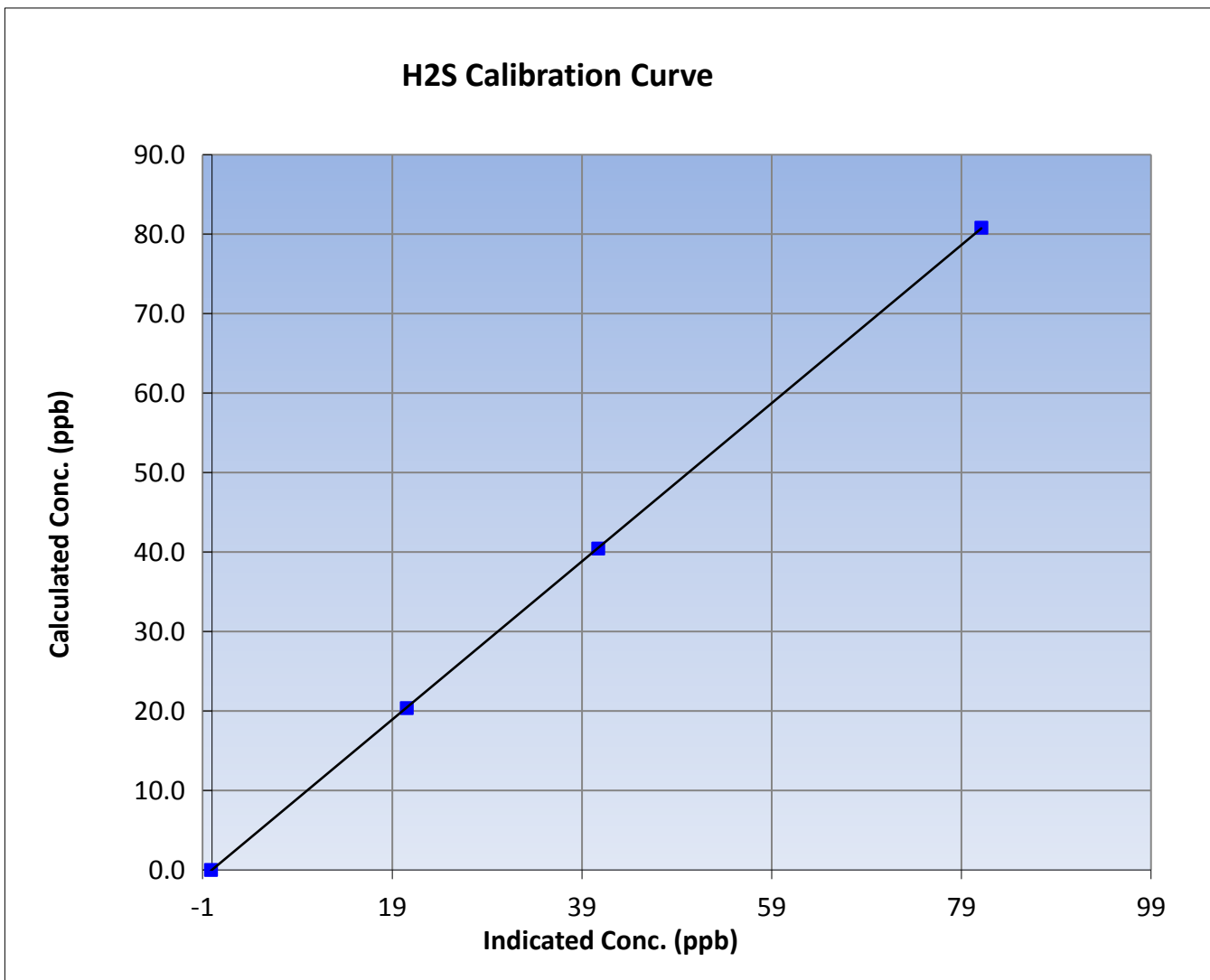
Wood Buffalo Environmental Association H2S Calibration Report

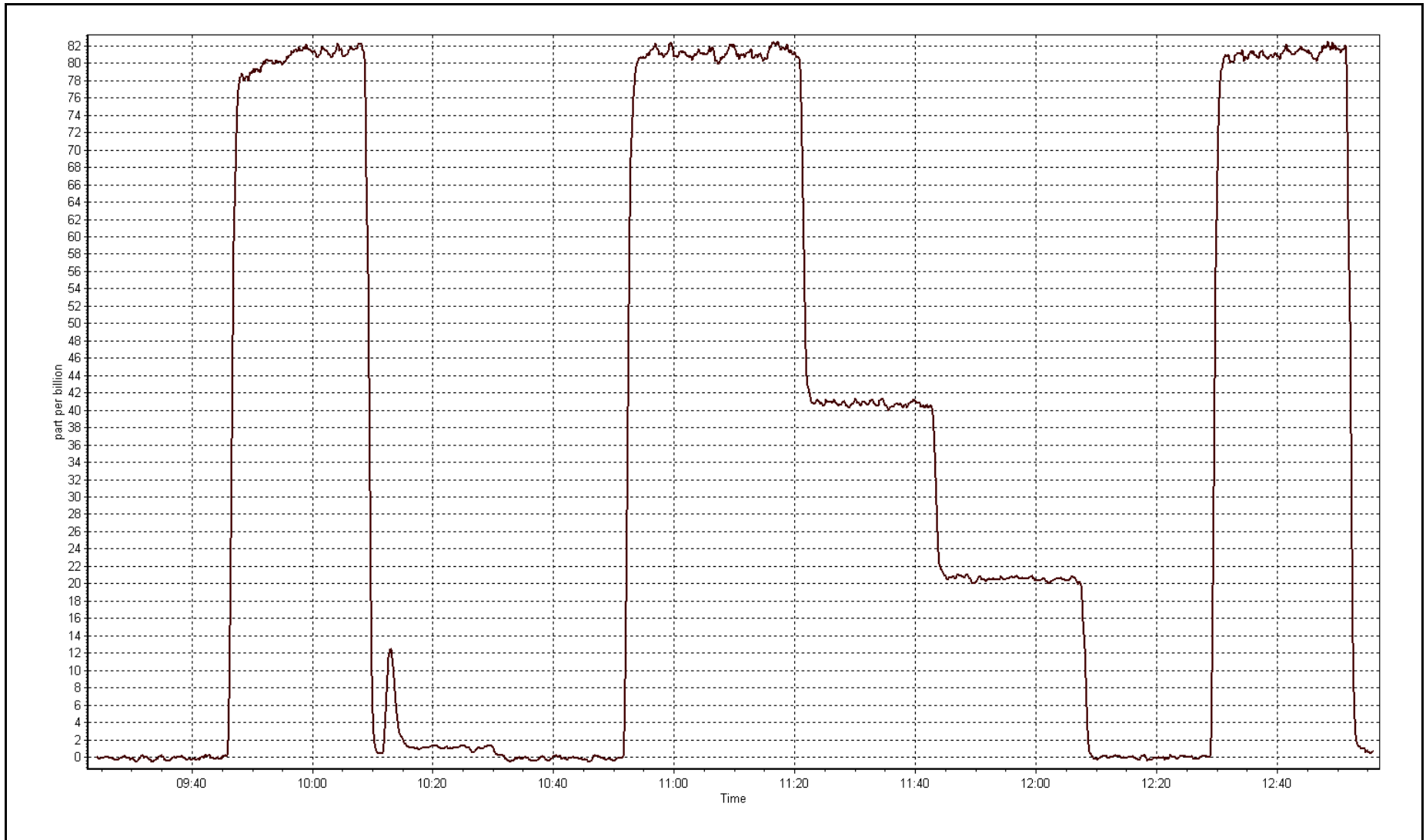
Station Information

Calibration Date	June 11, 2015	Previous Calibration	May 22, 2015
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	9:25	End Time (MST)	12:55
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	-0.1	----	Correlation Coefficient	0.999991
80.8	81.1	0.9962		
40.4	40.7	0.9931	Slope	0.995167
20.4	20.5	0.9922		
			Intercept	0.014391







Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	June-16-15	Last Calibration	May-26-15
Station Name	Firebag	Station Number	AMS 19
Reason:	Routine		
Start Time (MST)	9:20	End Time (MST)	13:55
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	8.5
Analyzer IP address	192.168.1.51		Air or Bypass Press	34.9	34.9
Calculated slope	0.997037	0.999302	Fuel Pressure	23.0	23.0
Calculated intercept	0.015438	-0.014696	Analyzer Coeff	3.5	3.6
			Analyzer BKG	4.570	4.730
Analyzer make	Thermo 51i-LT		Analyzer serial #	1336160089	

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	0.09	----
as found span	5000	58.3	12.74	12.86	0.990
calibrator zero	5000	0.0	0.00	-0.01	----
high point	5000	58.3	12.74	12.74	1.000
second point	5000	29.2	6.38	6.43	0.992
third point	5000	14.7	3.21	3.24	0.991
as left zero	5000	0.0	0.00	0.01	----
as left span	5000	58.3	12.74	12.72	1.001
Average Correction Factor					0.994

Corrected As found	12.77	Previous response	12.76	% change	-0.1%
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Notes:

Filter changed after as founds. Zero adjusted.

Calibration Performed By:

Devin Russell



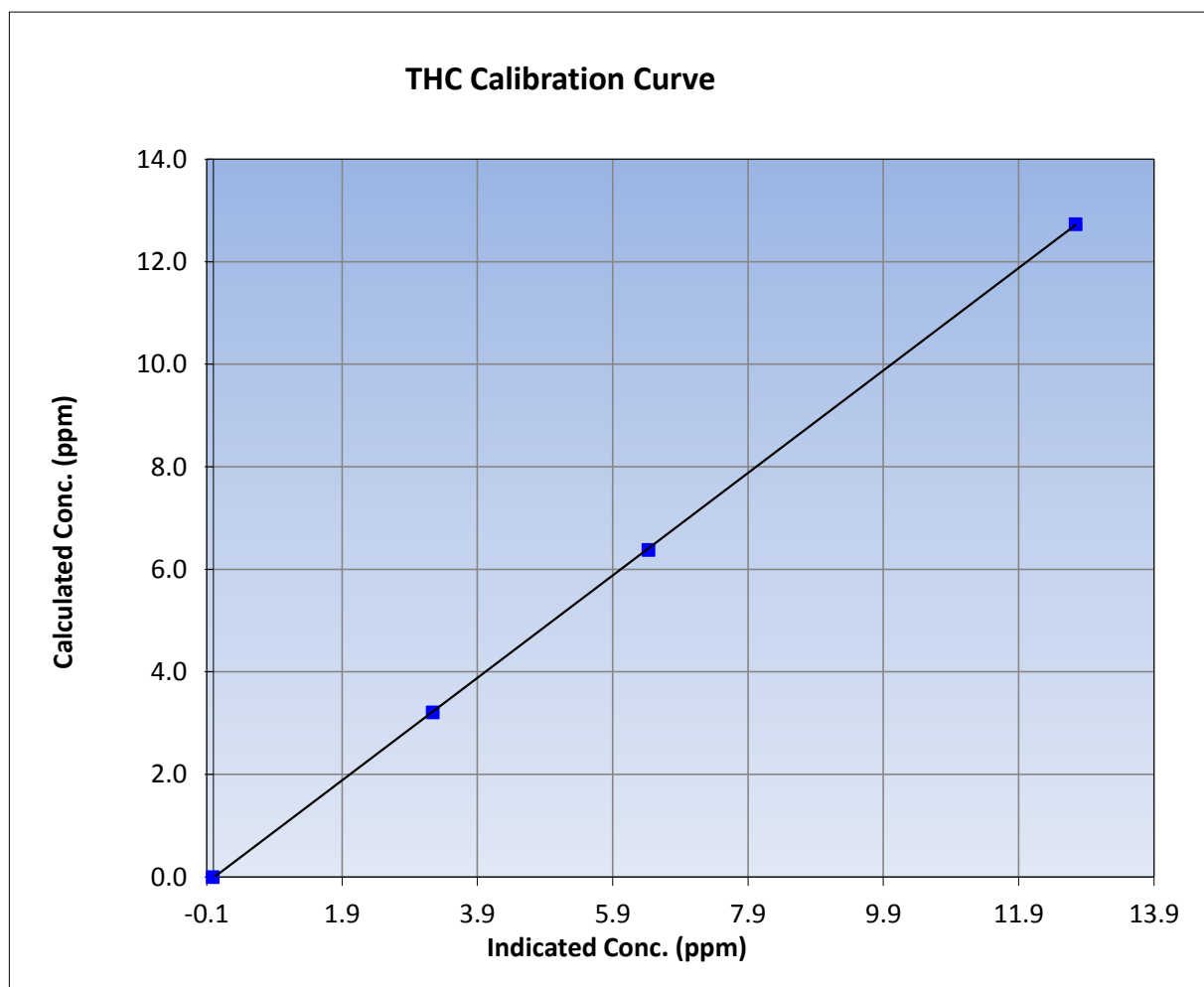
Wood Buffalo Environmental Association THC Calibration Report

Station Information

Calibration Date	June 16, 2015	Previous Calibration	May 26, 2015
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	9:20	End Time (MST)	13:55
Analyzer make	Thermo 51i-LT	Analyzer serial #	1336160089

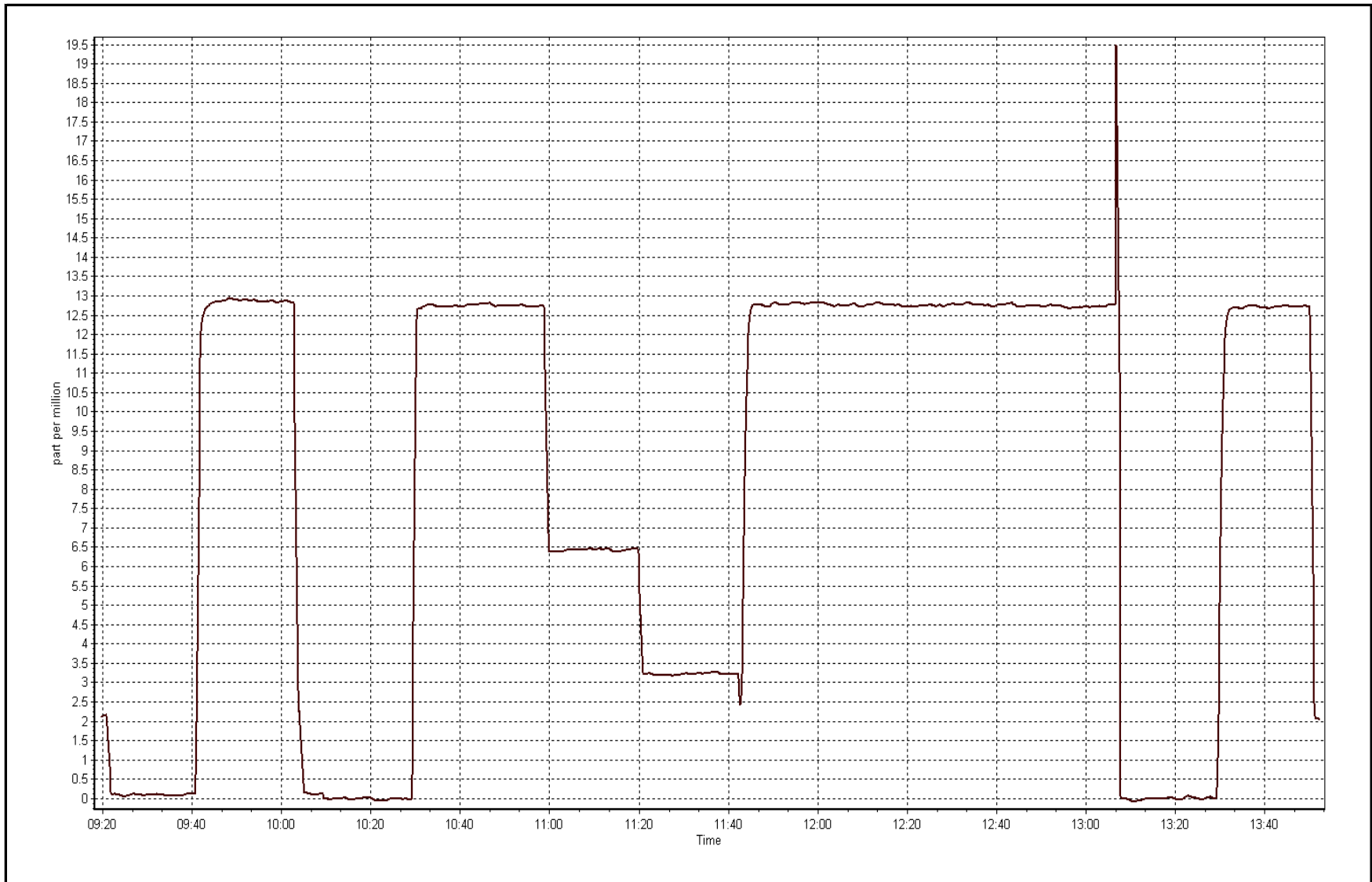
Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	-0.01	----	Correlation Coefficient	0.999976
12.74	12.74	0.9997		
6.38	6.43	0.9920	Slope	0.999302
3.21	3.24	0.9911		
			Intercept	-0.014696



THC Calibration Plot

Date: June 16, 2015





Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	June 16, 2015	Previous Calibration	May 27, 2015
Station Name	Firebag	Station Number	AMS 19
Reason:	Routine		
Start Time (MST)	9:20	End Time (MST)	13:55
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
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Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.999453	0.999861	1.020108
	Data Offset	-1.195290	-0.843410	-0.907039
Current Calibration	Data Slope	0.999940	0.999670	0.996253
	Data Offset	-1.294125	-1.067892	-0.372093

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1410661309
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Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
NO coefficient	0.867		0.847	
NOx coefficient	1.000		1.000	
NO2 coefficient	1.000		1.000	
NO bkgrnd	3.7		3.6	
NOx bkgrnd	3.8		3.7	
Chamber Temp	50.6	Deg C	50.8	Deg C
Moly Temp	323.4	Deg C	326.8	Deg C
PMT voltage	-780	V	-780	V
PMT Temp	-3	Deg C	-2.9	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	160.8	mmHg	158.6	mmHg
R Cell Press Nox	160.8	mmHg	158.6	mmHg
NO sample flow	0.649	lpm	0.649	lpm
Nox sample Flow	0.650	lpm	0.651	lpm

Notes:

Filter changed after as founds. Span adjusted.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date:

June 16, 2015

Station Number:

AMS 19

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1	----	----
as found span	5000	58.3	600.5	600.5	0.0	612.1	610.9	1.2	0.9810	0.9830
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	0.1	-0.1	----	----
high point	5000	58.3	600.5	600.5	0.0	600.8	600.9	0.0	0.9995	0.9994
second point	5000	29.2	300.8	300.8	0.0	303.8	303.6	0.2	0.9899	0.9905
third point	5000	14.7	151.4	151.4	0.0	153.2	152.7	0.5	0.9885	0.9919
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.1	0.0	----	----
as left span	5000	58.3	600.5	280.9	319.6	602.1	279.4	322.7	0.9974	1.0055
Average Correction Factor									0.9926	0.9939

Corrected As found
Previous Response

NO_x= 612.2
NO_x= 602.0

NO= 610.9
NO= 601.4

Percent Change

NO_x= -1.7%

NO= -1.5%

GPT Calibration Data

Dilution Flow

5000

ccm

Source Gas Flow

58.30

ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
Cal zero			0.0			-0.1			N/A	
1st NO2 (300)	----	280.9	319.9	601.8	280.9	320.9	0.9864	1.0000	0.9968	100.3%
2nd NO2 (200)	----	385.7	215.0	602.6	385.7	216.8	0.9850	1.0000	0.9916	100.8%
3rd NO2 (100)	----	490.5	110.3	601.9	490.5	111.4	0.9862	1.0000	0.9899	101.0%
4th NO2 (0)	600.7	----	1.4	602.1	600.7	1.4	0.9858	1.0000	N/A	----
Average Correction Factor							0.9859	1.0000	0.9928	100.7%

Calibration Performed By:

Devin Russell



Wood Buffalo Environmental Association

NO_x Calibration Summary

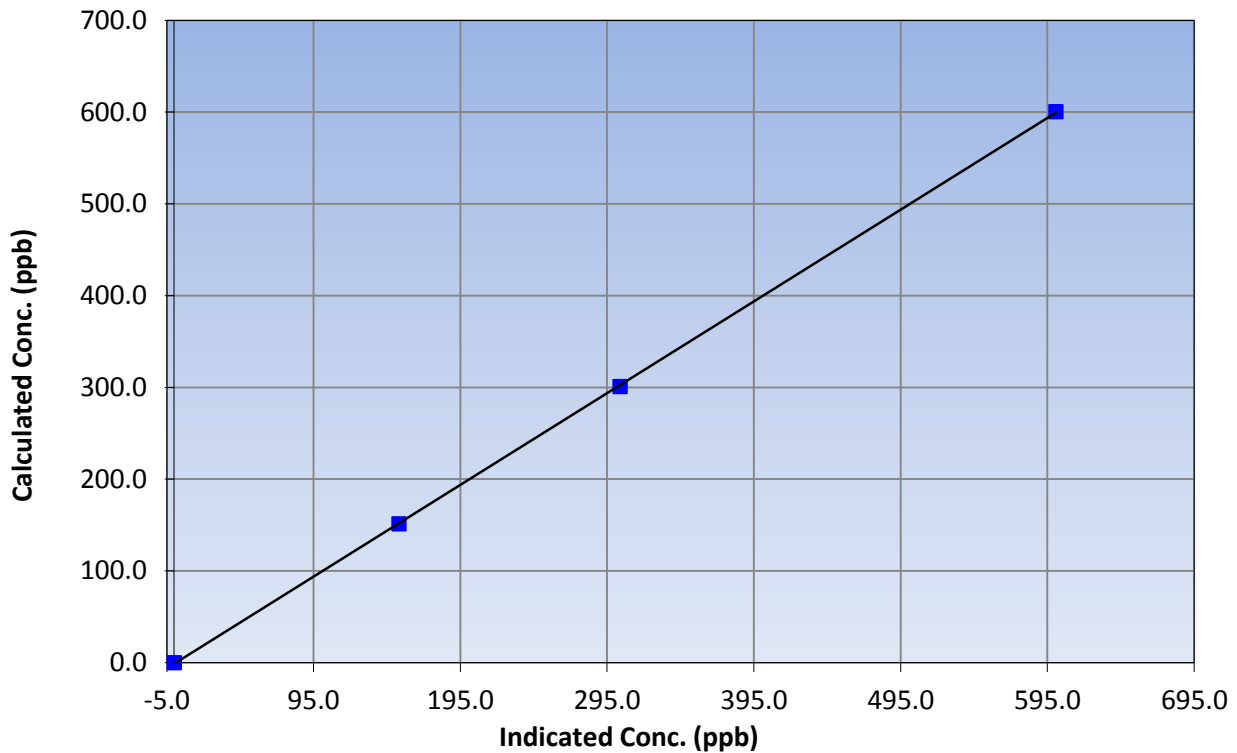
Station Information

Calibration Date	June 16, 2015	Previous Calibration	May 27, 2015
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	9:20	End Time (MST)	13:55
Analyzer make	Thermo 42i	Analyzer serial #	1410661309

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	0.999970
600.5	600.8	0.9995		
300.8	303.8	0.9899	Slope	0.999940
151.4	153.2	0.9885		
			Intercept	-1.294125

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

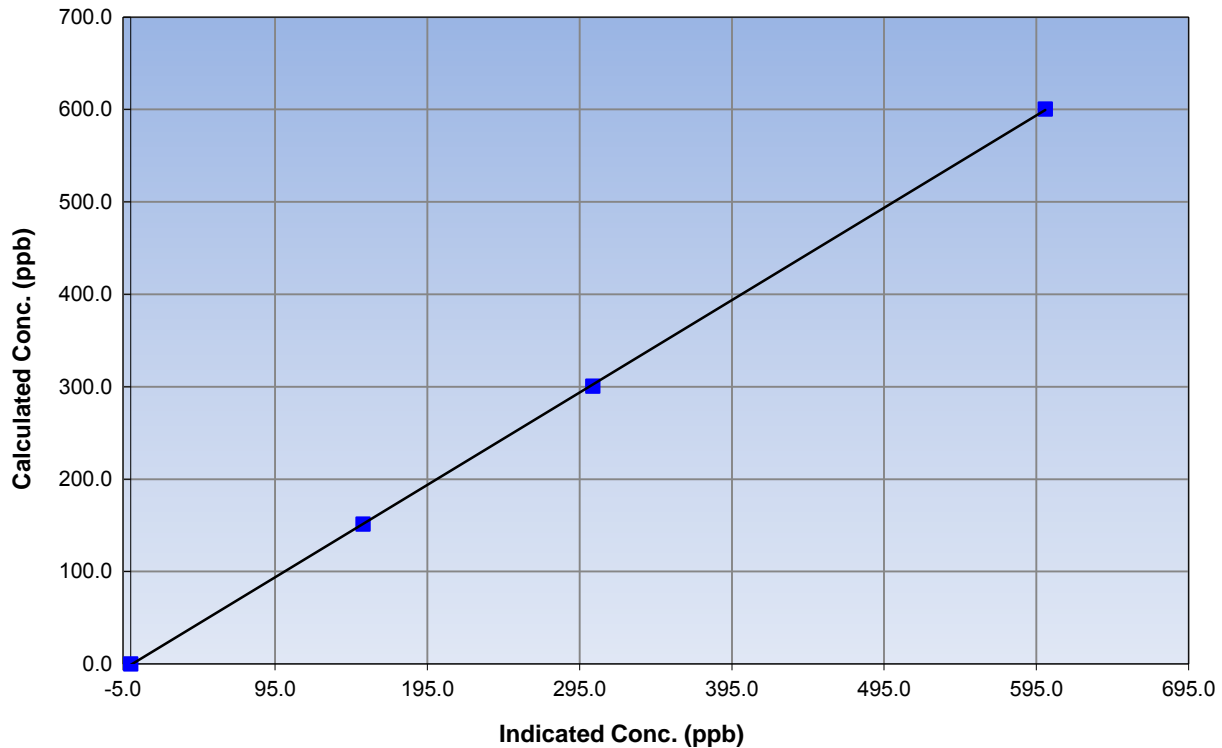
Station Information

Calibration Date	June 16, 2015	Previous Calibration	May 27, 2015
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	9:20	End Time (MST)	13:55
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	0.999976
600.5	600.9	0.9994		
300.8	303.6	0.9905	Slope	0.999670
151.4	152.7	0.9919		
			Intercept	-1.067892

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

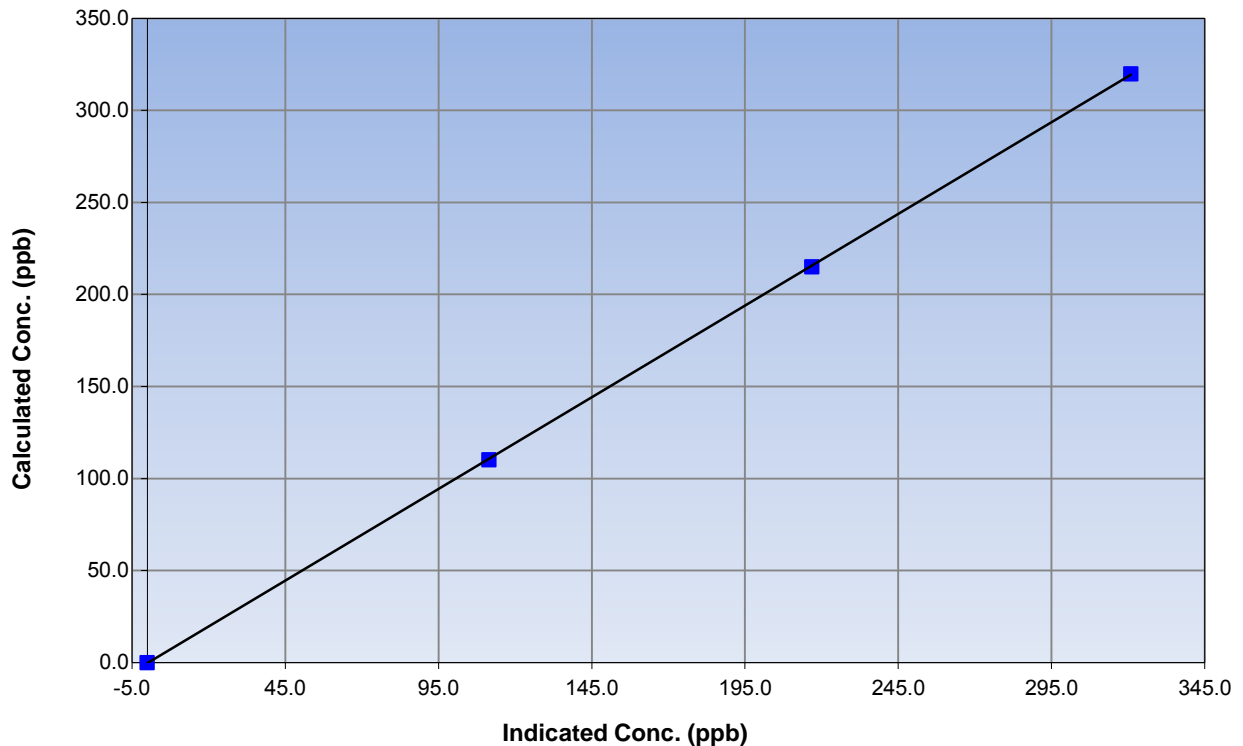
Station Information

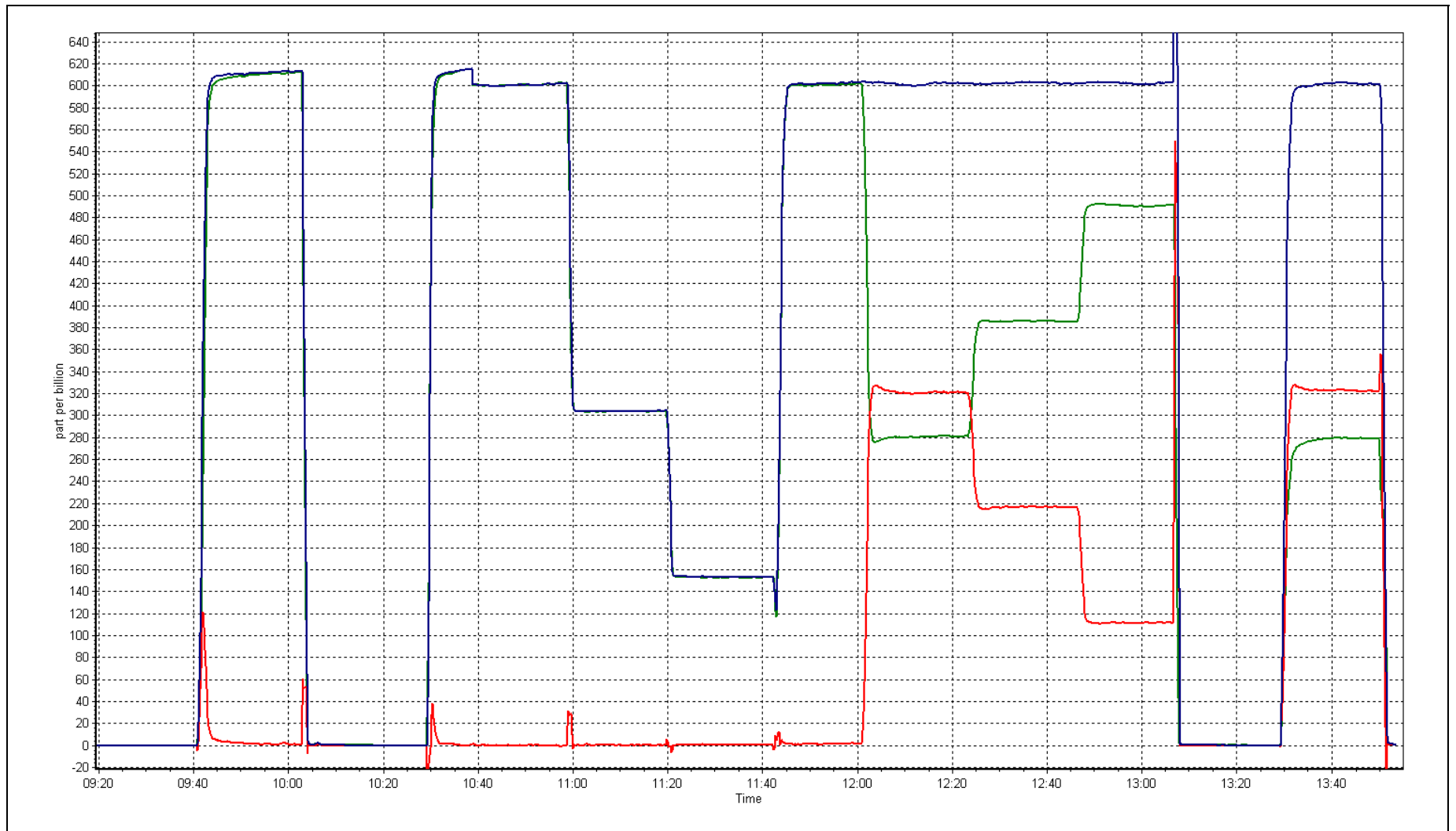
Calibration Date	June 16, 2015	Previous Calibration	May 27, 2015
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	9:20	End Time (MST)	13:55
Analyzer make	Thermo 42i	Analyzer serial #	1410661309

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999983
319.9	320.9	0.9968		
215.0	216.8	0.9916	Slope	0.996253
110.3	111.4	0.9899		
			Intercept	-0.372093

NO₂ Calibration Curve







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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 502
CONOCOPHILLIPS
SURMONT
JUNE 2015**

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

July 30, 2015



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONOCOPHILLIPS SURMONT (AMS 502)
 JUNE 2015

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	672	36	48	98.33	10	0	3	0
H2S (ppb) Average	683	34	37	99.58	2	0	1	0
NO2 (ppb) Average	684	36	36	100.00	22	0	4	-
NO (ppb) Average	684	36	36	100.00	26	-	5	-
NOX (ppb) Average	684	36	36	100.00	47	-	7	-
Temperature 2 m (C) Average	720	0	0	100.00	28.8	-	23.8	-
Relative Humidity (%) Average	720	0	0	100.00	98	-	85.0	-
Wind Speed 10 m (km/h) Average	720	0	0	100.00	28	-	20.0	-
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)
 JUNE 2015

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	672	1	1	-	0	0	0	0	1	3	10
H2S (ppb) Average	683	0.3	0	-	0	0	0	0	0	1	2
NO2 (ppb) Average	684	1.8	2	-	0	0	1	1	3	4	22
NO (ppb) Average	684	1.7	2	-	0	0	1	1	2	4	26
NOX (ppb) Average	684	3.5	4	-	0	1	1	2	4	8	47
Temperature 2 m (C) Average	720	16.06	5.5	-	1.5	8.6	11.9	16.3	19.7	23.6	28.8
Relative Humidity (%) Average	720	56.7	18	-	22	33	42	55	69	84	98
Wind Speed 10 m (km/h) Average	720	12.8	5	-	1	6	9	12	16	20	28
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONOCOPHILLIPS SURMONT (AMS 502)
JUNE 2015

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2	04 Jun 2015 06:00	04 Jun 2015 17:00	12	Intermittent unstable operation - excessive baseline drift
H2S	08 Jun 2015 23:00	08 Jun 2015 23:00	1	Intermittent unstable operation - excessive baseline drift
H2S	15 Jun 2015 01:00	15 Jun 2015 01:00	1	Intermittent unstable operation - excessive baseline drift
H2S	24 Jun 2015 03:00	24 Jun 2015 03:00	1	Intermittent unstable operation - excessive baseline drift

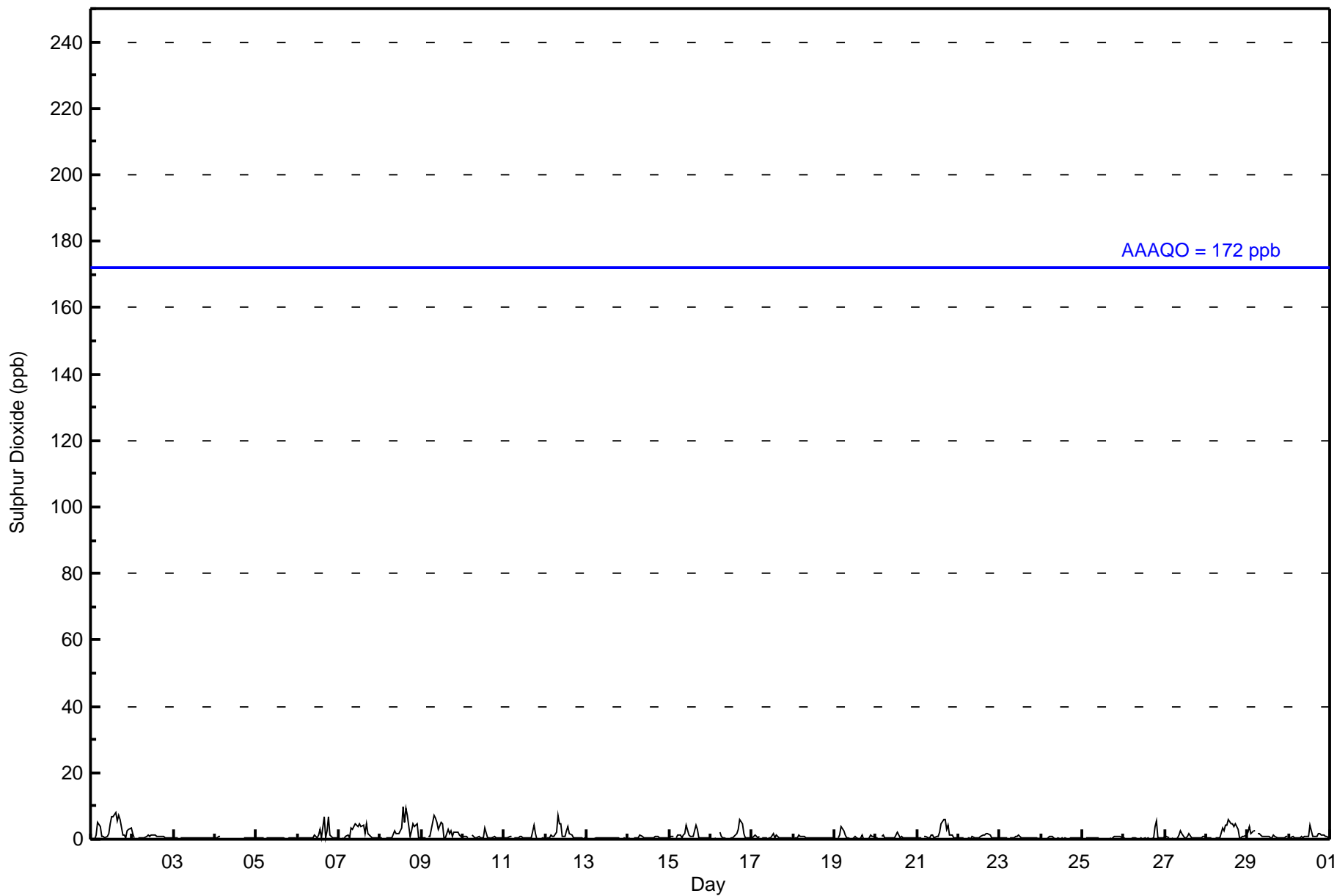


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 10 ppb on Jun 8 14:00	Maximum Daily Average: 3.1 ppb on Jun 1
Minimum Value: 0 ppb on Jun 26 05:00	Hours of Data: 672
Maximum Diurnal Average: 1.9 ppb at hour 16	Hours of Missing Data: 48
Monthly Average: 1.0 ppb	Hours of Calibration: 36
Minimum Daily Average: 0.3 ppb on Jun 24	Percent Operational Time: 98.3
Minimum Diurnal Average: 0.5 ppb at hour 1	
Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 3 P ₉₉ = 7	

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	Z	0	1	5	4	1	1	0	1	1	4	7	7	8	5	7	6	1	1	0	3	3	3	3.1	8
2-Jun	2	0	Z	0	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0.8	2
3-Jun	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
4-Jun	0	0	1	1	Z	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	0	0	0	0	0	0	0	--	1
5-Jun	0	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
6-Jun	Z	0	0	0	1	1	1	0	0	0	1	0	1	3	1	7	0	3	7	1	0	0	0	0	1.3	7
7-Jun	0	Z	0	0	1	1	0	3	3	5	4	4	5	4	4	2	5	2	1	0	0	0	0	0	2.0	5
8-Jun	0	0	Z	0	0	0	0	0	3	2	2	2	3	10	5	9	7	1	2	5	4	5	1	0	2.7	10
9-Jun	0	0	1	Z	1	1	5	7	6	5	3	5	4	0	0	3	2	3	1	2	2	2	1	1	2.5	7
10-Jun	1	1	1	0	Z	1	1	0	0	1	0	0	1	3	0	1	0	0	1	0	0	0	0	0	0.7	3
11-Jun	0	0	0	1	1	Z	1	1	1	1	1	0	0	0	0	0	0	4	2	0	0	0	0	0	0.7	4
12-Jun	Z	0	1	1	1	1	2	7	5	5	1	1	3	4	2	1	1	0	0	0	0	0	0	0	1.6	7
13-Jun	0	Z	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
14-Jun	0	0	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0.4	1
15-Jun	0	1	1	Z	1	1	1	1	1	2	4	1	1	1	1	4	3	0	0	0	0	0	0	0	1.1	4
16-Jun	0	0	0	0	Z	2	1	0	0	0	0	0	0	0	1	1	3	6	5	2	1	1	1	0	1.1	6
17-Jun	1	1	1	1	1	Z	1	1	0	0	1	0	2	0	1	1	0	1	0	0	0	0	0	0	0.6	2
18-Jun	Z	0	0	1	1	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1
19-Jun	0	Z	1	1	4	3	1	1	0	0	0	0	1	1	0	0	1	0	0	0	1	1	1	1	0.8	4
20-Jun	1	0	Z	1	1	1	0	0	1	0	0	0	2	1	0	1	0	0	0	0	1	0	0	0	0.6	2
21-Jun	0	0	0	Z	1	1	0	0	1	1	0	1	1	2	5	6	6	3	4	1	1	0	0	0	1.6	6
22-Jun	0	0	0	0	Z	0	0	0	1	0	0	0	0	1	1	1	2	2	1	1	1	0	0	0	0.6	2
23-Jun	0	0	0	0	0	Z	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
24-Jun	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.3	1
25-Jun	0	Z	0	0	0	0	0	0	0	0	0	C	C	C	C	C	C	0	0	1	1	1	1	1	--	1
26-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	6	0	0	0	0	0.6	6
27-Jun	1	1	0	Z	0	0	0	0	1	3	2	1	1	1	2	0	0	0	0	0	0	0	1	1	0.7	3
28-Jun	1	0	1	0	Z	0	0	0	0	4	3	4	4	6	4	5	4	5	3	0	0	1	1	1	2.1	6
29-Jun	2	4	2	2	3	Z	2	2	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1.2	4
30-Jun	Z	1	1	1	0	0	0	1	0	1	1	1	4	3	1	1	1	2	1	1	1	1	1	0	1.0	4

0.5	0.5	0.5	0.6	0.9	0.9	0.8	1.1	1.1	1.2	1.1	1.1	1.1	1.6	1.8	1.5	1.9	1.6	1.4	1.3	0.9	0.6	0.7	0.6	0.5	Diurnal Average
2	4	2	2	5	4	5	7	6	5	4	5	7	10	8	9	7	6	7	6	4	5	3	3	Diurnal Maximum	

Z - zeronspan C - Calibration UO - Unstable Operation
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
ConocoPhillips - Surmont - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	672	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: 672

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
ConocoPhillips - Surmont - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	39	17	17	10	10	11	34	37	37	16	68	104	106	61	51	54	672
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	39	17	17	10	10	11	34	37	37	16	68	104	106	61	51	54	672

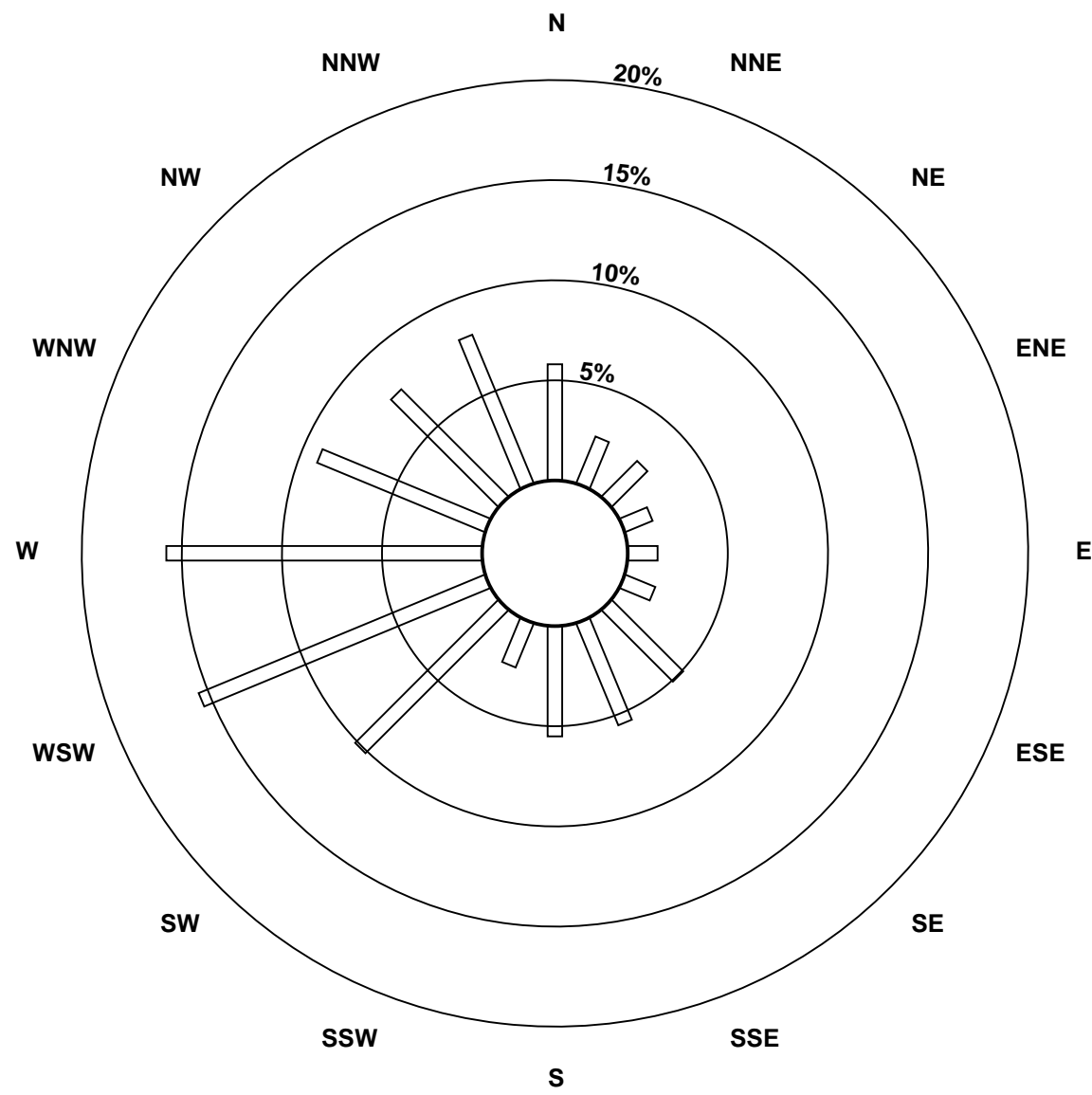
Total Number of Valid Hours: 672

Total Number of Hours: 720

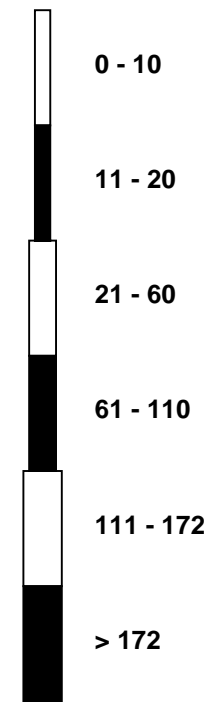


Wood Buffalo Environmental Association
Wind Rose Jun 2015

Sulphur Dioxide (SO₂) - ppb
ConocoPhillips - Surmont (AMS502)



Classes (ppb)

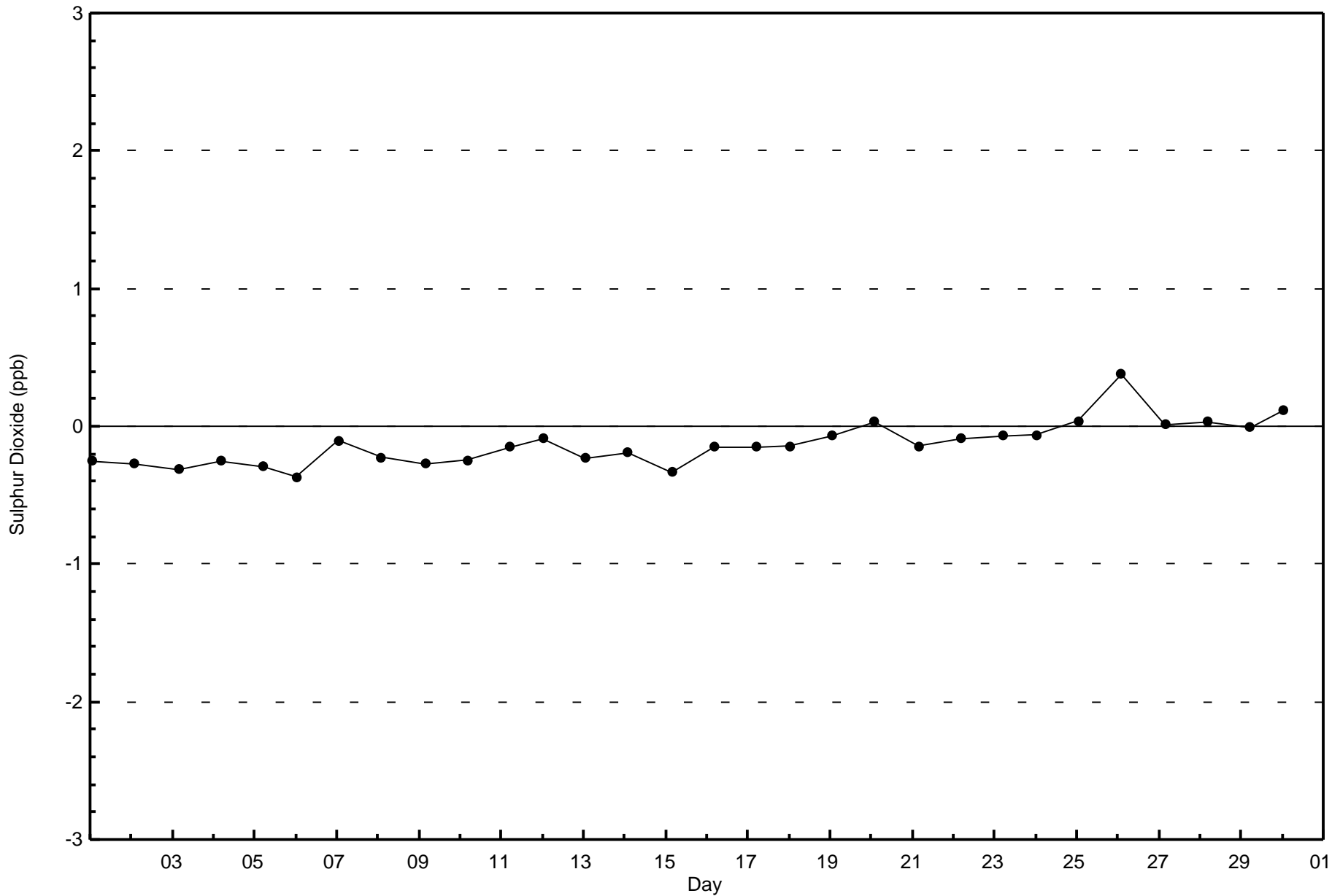


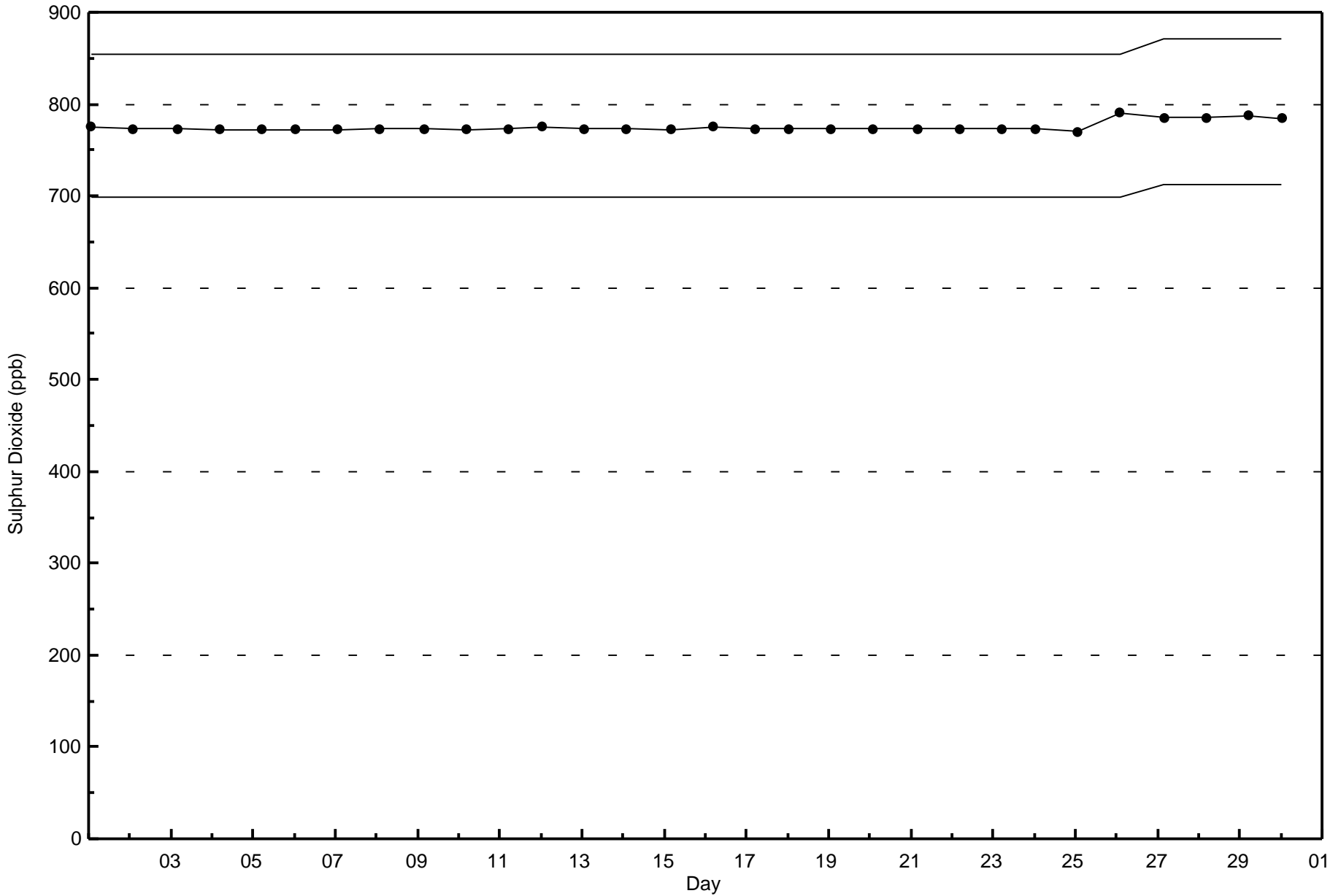
Total Number of Valid Hours: 672



Wood Buffalo Environmental Association
Zero Responses

Sulphur Dioxide (SO₂) - ppb
ConocoPhillips - Surmont - June 2015





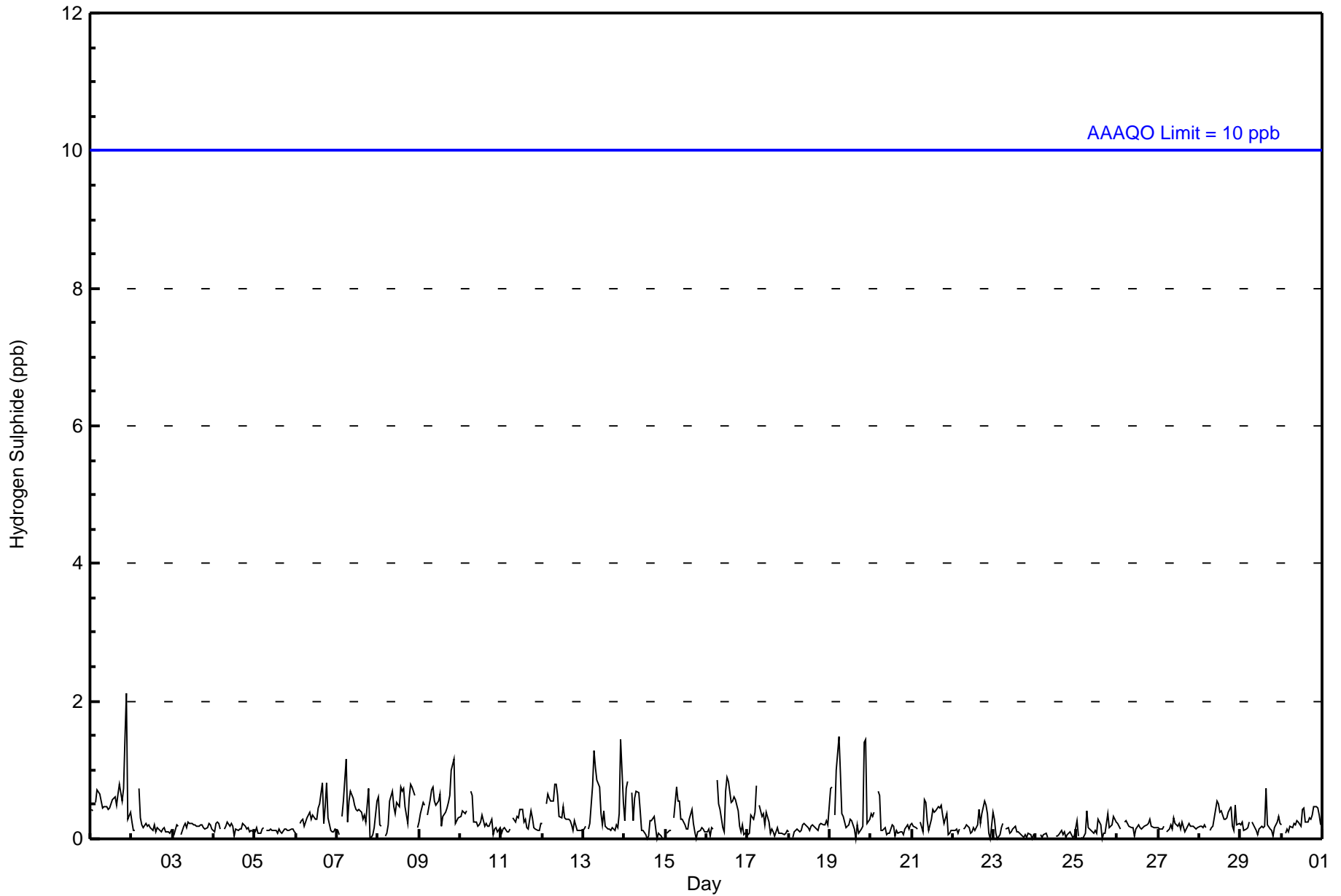


Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 2 ppb on Jun 1 22:00	Maximum Daily Average: 0.6 ppb on Jun 1		Hours of Data:	683
Minimum Value: 0 ppb on Jun 14 14:00	Minimum Daily Average: 0.1 ppb on Jun 24		Hours of Missing Data:	37
Maximum Diurnal Average: 0.4 ppb at hour 7	Minimum Diurnal Average: 0.2 ppb at hour 24		Hours of Calibration:	34
Monthly Average: 0.3 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 1		Percent Operational Time:	99.6

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	0	Z	1	1	1	1	0	0	0	0	0	1	1	1	0	1	1	1	1	1	2	0	0	0.6	2
2-Jun	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
3-Jun	0	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-Jun	0	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-Jun	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
6-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0.3	1
7-Jun	0	0	Z	0	1	1	0	1	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0.4	1
8-Jun	1	0	0	Z	0	0	0	1	1	0	0	1	0	1	1	1	0	0	1	1	1	1	UO	0	0.5	1
9-Jun	0	0	1	0	Z	0	1	1	1	1	0	1	1	0	0	0	0	1	1	1	1	0	0	0	0.5	1
10-Jun	0	0	0	0	0	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
11-Jun	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-Jun	0	Z	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
13-Jun	0	0	Z	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.4	1
14-Jun	0	1	1	Z	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
15-Jun	UO	0	0	0	Z	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
16-Jun	0	0	0	0	0	Z	1	1	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0.4	1
17-Jun	0	0	0	0	0	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
18-Jun	0	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-Jun	1	1	Z	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0.5	1
20-Jun	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
21-Jun	0	0	0	0	Z	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
22-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.2	1
23-Jun	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-Jun	0	Z	UO	0	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
25-Jun	0	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-Jun	0	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-Jun	0	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-Jun	0	0	0	0	0	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
29-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.2	1
30-Jun	0	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	0.3	0.4	0.4	0.4	0.4	0.4	0.3	0.2	0.3	0.3	0.3	0.2	0.3	0.2	0.3	0.3	0.2	0.3	0.3	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	2	1	1	Diurnal Maximum

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Hydrogen Sulphide (H₂S) - ppb
ConocoPhillips - Surmont - June 2015

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

Total Number of Valid Hours: 683

Total Number of Hours: 720



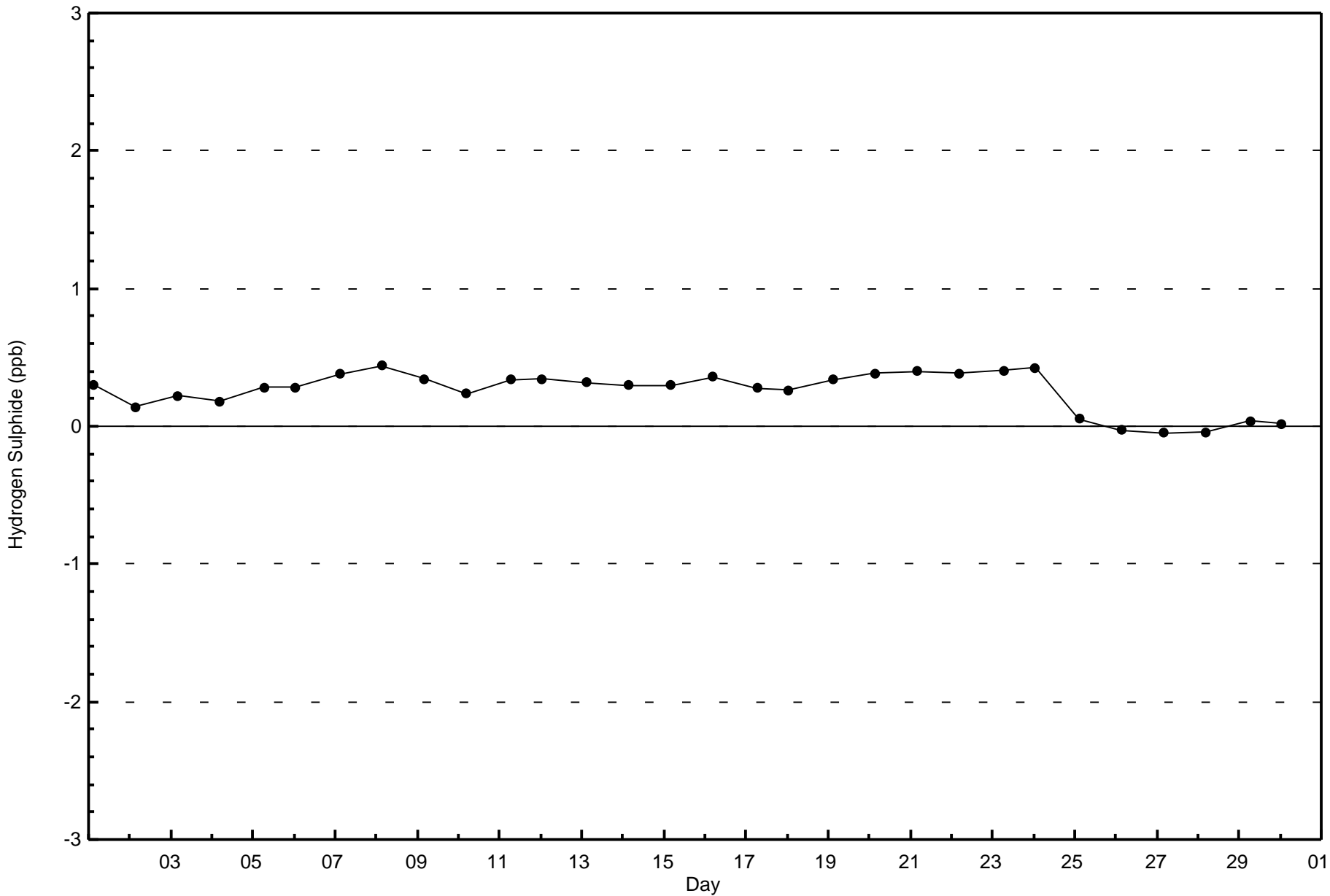
Wood Buffalo Environmental Association
Frequency Distribution

Hydrogen Sulphide (H₂S) - ppb
ConocoPhillips - Surmont - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	39	17	17	10	10	14	43	39	39	18	65	100	105	61	53	53	683
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	39	17	17	10	10	14	43	39	39	18	65	100	105	61	53	53	683

Total Number of Valid Hours: 683

Total Number of Hours: 720



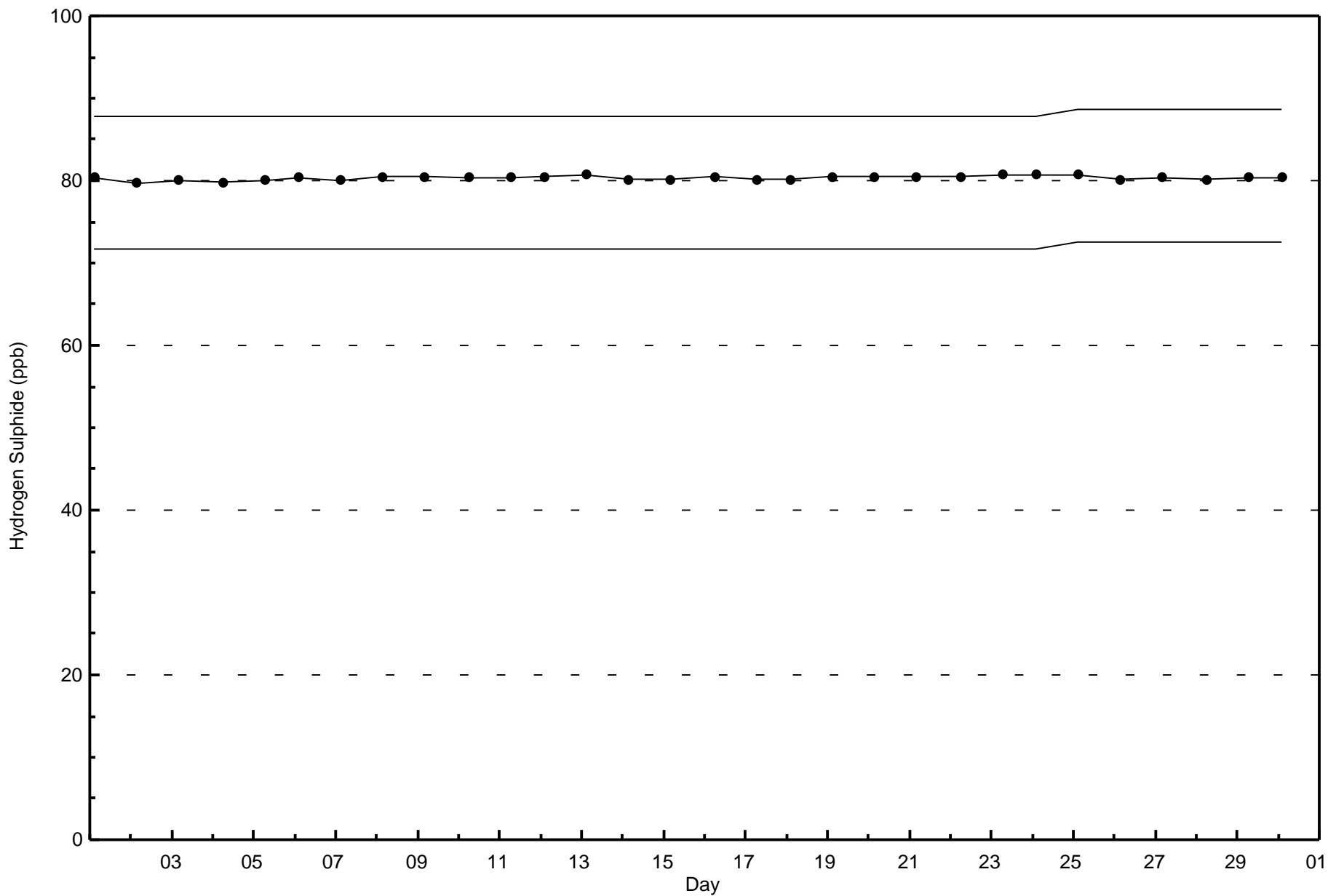


Wood Buffalo Environmental Association

Span Responses

Hydrogen Sulphide (H₂S) - ppb

ConocoPhillips - Surmont - June 2015





Maximum Value: 26 ppb on Jun 29 16:00														Maximum Daily Average: 5.0 ppb on Jun 1														Hours in Service: 720			
Minimum Value: 0 ppb on Jun 13 21:00														Minimum Daily Average: 0.6 ppb on Jun 13														Hours of Data: 684			
Maximum Diurnal Average: 3.9 ppb at hour 16														Minimum Diurnal Average: 0.5 ppb at hour 24														Hours of Missing Data: 36			
Monthly Average: 1.7 ppb														Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 1 Q ₃ = 2 P ₉₀ = 4 P ₉₉ = 12														Hours of Calibration: 36			
																												Percent Operational Time: 100.0			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24							
1-Jun	1	Z	1	4	12	6	1	1	1	2	3	8	12	13	15	10	11	9	1	1	0	1	1	0	5.0	15					
2-Jun	1	0	Z	1	0	1	2	2	2	1	3	1	1	1	2	2	3	1	2	1	1	1	1	1	1.3	3					
3-Jun	1	1	3	Z	1	1	6	7	3	5	3	2	2	3	2	2	1	1	1	1	2	0	0	2.1	7						
4-Jun	0	0	0	0	Z	1	0	2	2	2	2	1	2	2	1	2	2	1	1	1	1	0	0	1.1	2						
5-Jun	0	0	1	0	0	Z	0	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0.6	1						
6-Jun	Z	1	1	0	1	1	1	1	1	1	2	1	2	4	1	8	0	3	8	1	1	1	1	1.7	8						
7-Jun	1	Z	1	1	1	2	1	5	5	6	6	5	8	6	5	3	6	3	1	1	1	1	1	2.9	8						
8-Jun	0	1	Z	1	1	1	1	1	6	3	3	3	6	15	6	14	9	2	4	6	6	7	1	4.1	15						
9-Jun	1	1	1	Z	1	2	5	7	8	7	5	7	6	1	1	5	3	4	1	2	1	1	3	3.1	8						
10-Jun	1	1	1	1	Z	3	2	2	2	1	1	2	1	4	1	1	0	0	1	0	1	1	1	1.2	4						
11-Jun	1	2	1	1	1	Z	3	3	4	4	3	1	1	1	1	2	7	2	1	1	1	1	1	2.0	7						
12-Jun	Z	1	3	2	2	1	3	10	6	5	2	2	4	5	2	2	1	1	0	0	1	1	1	2.3	10						
13-Jun	0	Z	0	0	0	1	1	1	2	1	0	0	0	1	1	1	1	0	0	0	0	0	0	0.6	2						
14-Jun	0	0	Z	0	0	1	0	4	1	1	0	1	0	0	0	1	1	2	0	0	0	1	0	0.6	4						
15-Jun	0	0	0	Z	1	4	3	1	2	2	6	1	1	0	1	6	3	0	0	0	0	0	0	1.4	6						
16-Jun	0	0	0	1	Z	4	1	1	1	1	0	1	1	2	3	3	5	9	6	2	0	0	0	1.9	9						
17-Jun	0	1	2	1	2	Z	2	3	2	2	1	1	4	2	2	2	2	1	1	1	1	1	0	1.6	4						
18-Jun	Z	0	0	0	0	0	1	1	4	3	4	3	1	3	4	1	1	1	0	0	1	0	0	1.4	4						
19-Jun	1	Z	1	1	1	1	2	1	1	1	1	1	2	1	1	1	2	0	1	0	0	0	1	1.0	2						
20-Jun	0	1	Z	1	1	1	1	1	2	1	1	1	4	2	1	2	1	0	0	0	0	0	0	0.9	4						
21-Jun	0	0	0	Z	2	1	1	1	2	2	1	1	1	2	4	6	5	3	5	1	2	0	0	1.7	6						
22-Jun	0	0	0	0	Z	2	1	0	2	1	1	1	1	2	3	3	2	3	2	1	1	1	1	1.3	3						
23-Jun	1	1	1	1	4	Z	2	1	3	2	2	2	2	2	2	2	1	1	1	1	1	0	0	1.4	4						
24-Jun	Z	0	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	0	1	1	0	0.8	2						
25-Jun	1	Z	1	0	1	1	2	1	2	0	C	C	C	C	C	C	1	1	1	1	1	0	1	--	2						
26-Jun	0	0	Z	0	0	0	0	0	1	0	1	0	1	1	1	0	1	5	8	1	1	0	0	1.0	8						
27-Jun	1	1	1	Z	2	2	1	1	3	5	4	2	2	2	3	1	1	0	1	1	1	0	0	1.4	5						
28-Jun	1	0	0	1	Z	1	1	1	1	6	2	4	6	9	9	9	6	8	3	0	1	0	0	3.0	9						
29-Jun	0	2	0	0	0	Z	1	1	1	1	1	1	1	1	4	26	1	0	0	1	0	0	0	1.9	26						
30-Jun	Z	0	0	0	0	0	1	1	1	1	1	1	6	4	1	1	0	0	1	1	0	1	0	1.0	6						
														0.5 0.6 0.8 0.8 1.4 1.4 1.5 2.2 2.3 2.4 2.2 2.0 2.8 3.1 2.8 3.9 2.5 2.1 1.6 1.1 0.8 0.8 0.6 0.5														Diurnal Average			
														1 2 3 4 12 6 6 10 8 7 6 8 12 15 15 26 11 9 8 8 6 7 3 2														Diurnal Maximum			
Z - zerospan														C - Calibration																	

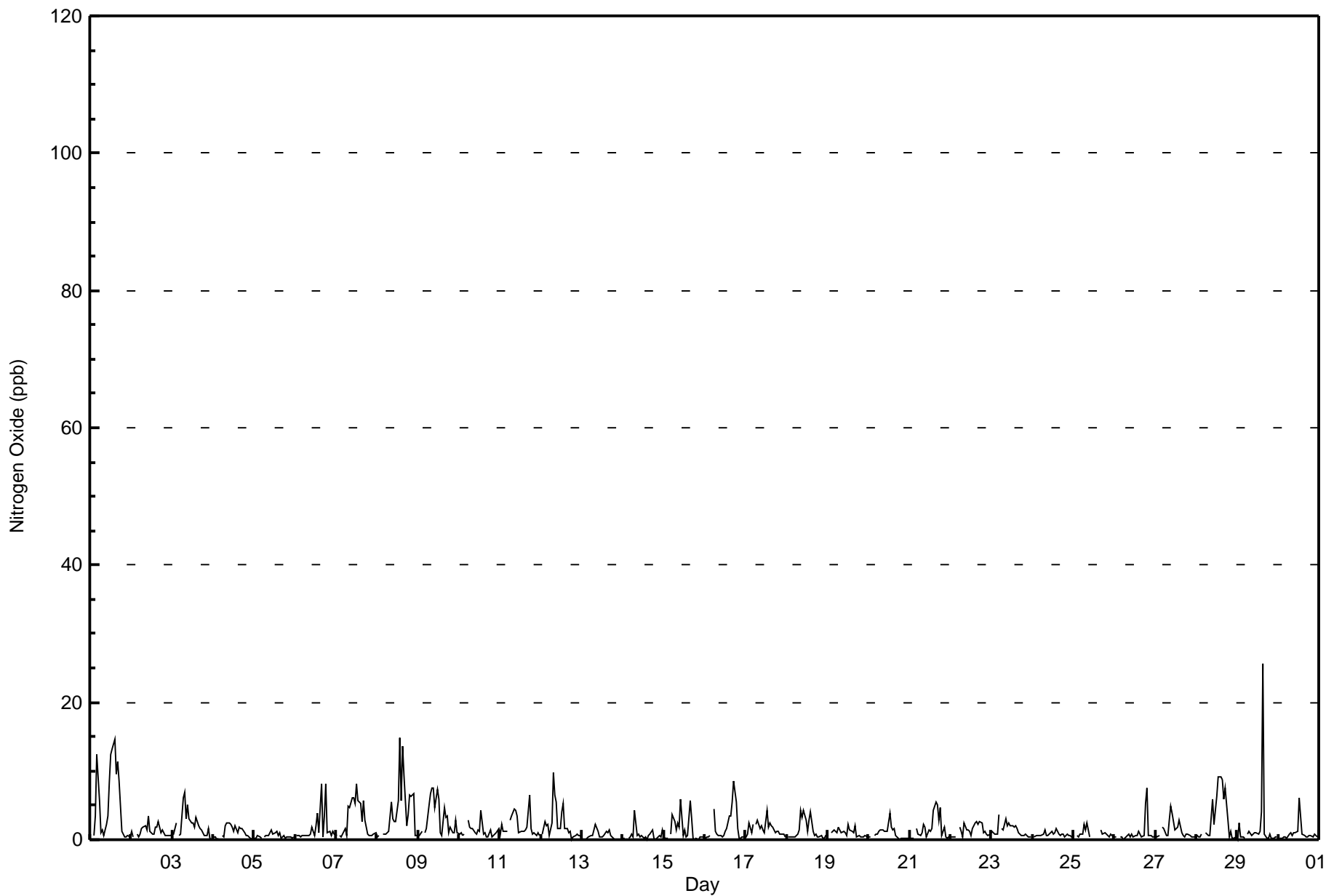


Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Oxide (NO) - ppb

ConocoPhillips - Surmont - June 2015





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxide (NO) - ppb
ConocoPhillips - Surmont - June 2015

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 Oxide (NO) - ppb
ConocoPhillips - Surmont - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	39	17	17	10	10	10	42	39	37	18	68	104	106	61	51	54	683
21 - 40	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	39	17	17	10	10	11	42	39	37	18	68	104	106	61	51	54	684

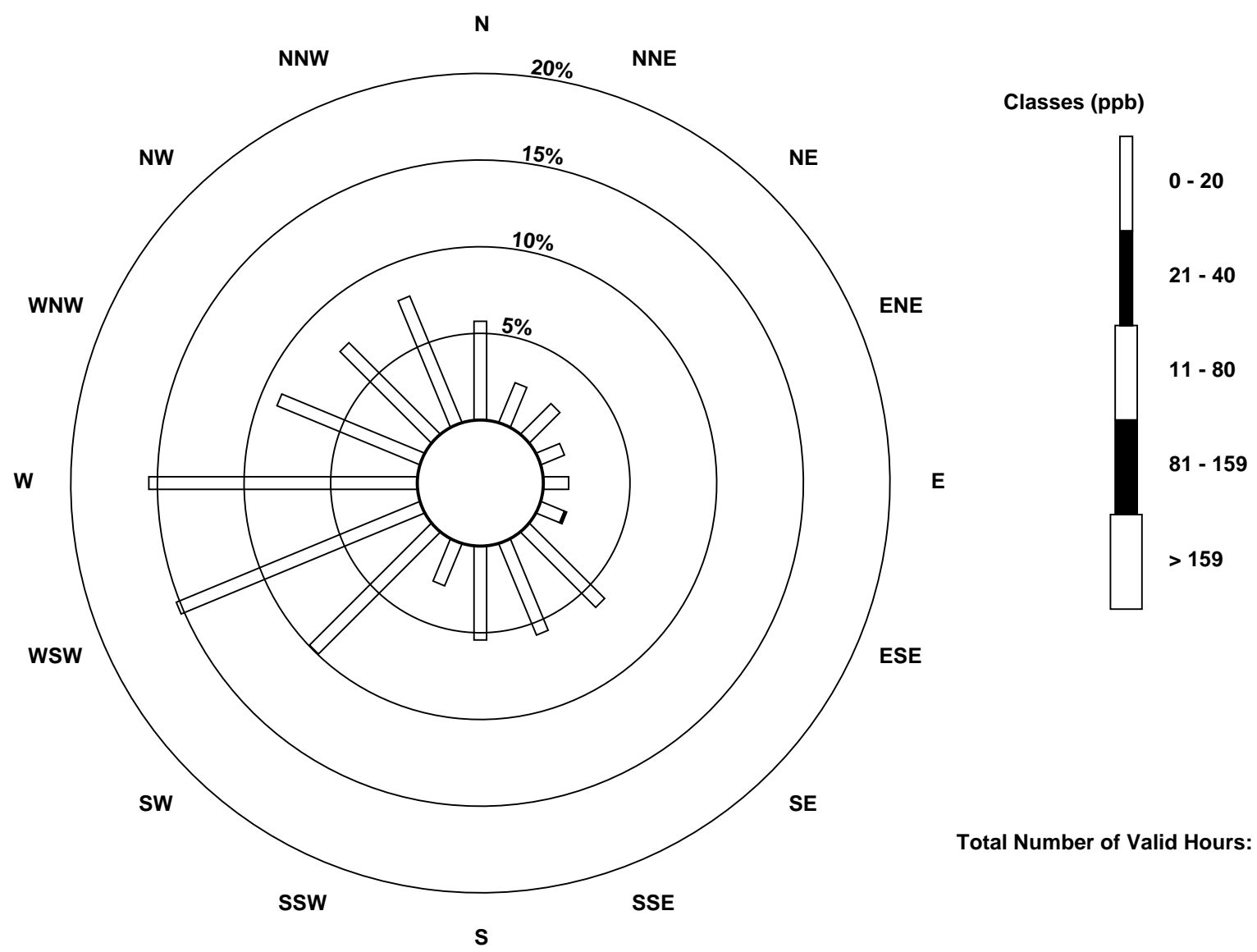
Total Number of Valid Hours: 684

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

Nitrogen Oxide (NO) - ppb
ConocoPhillips - Surmont (AMS502)



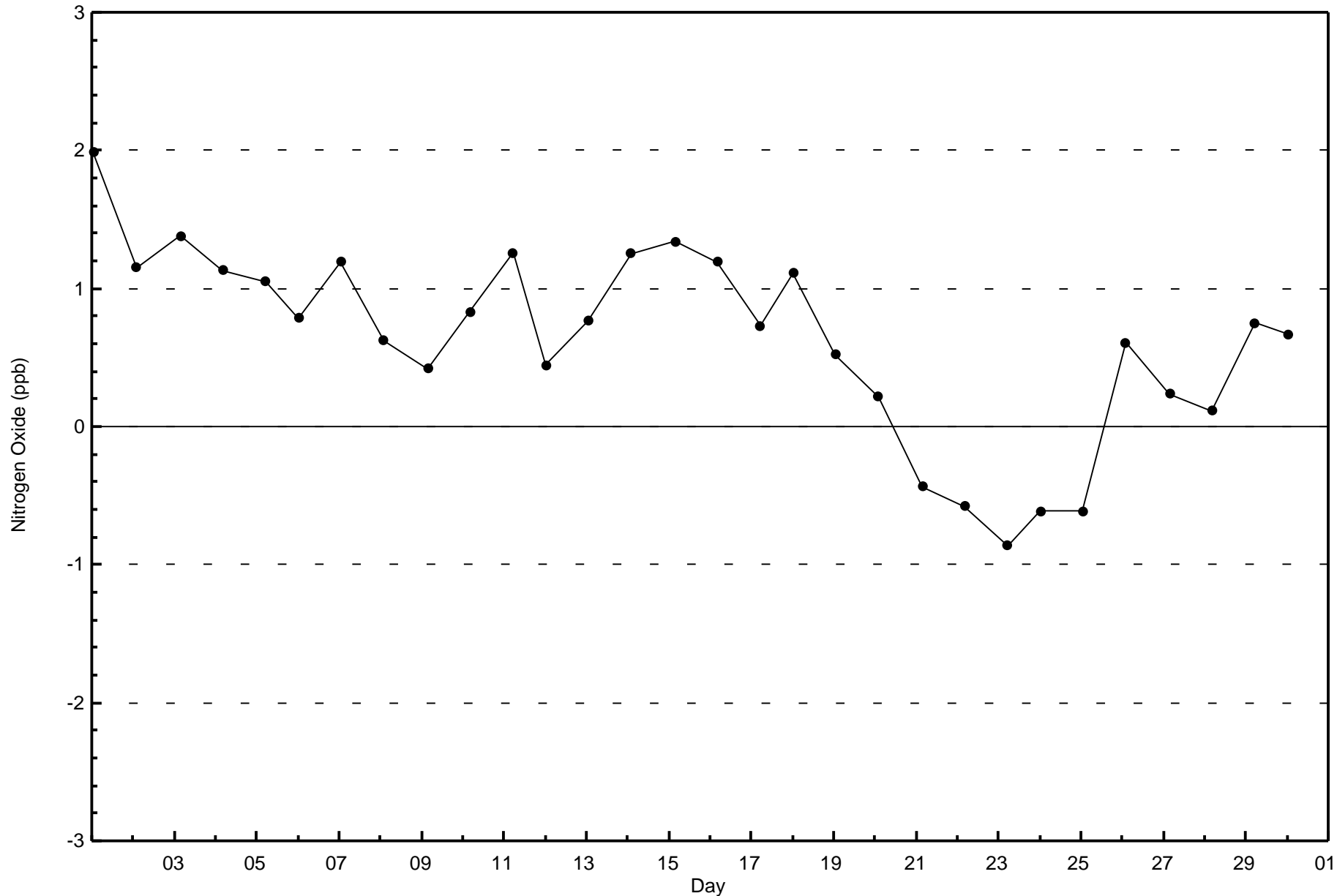


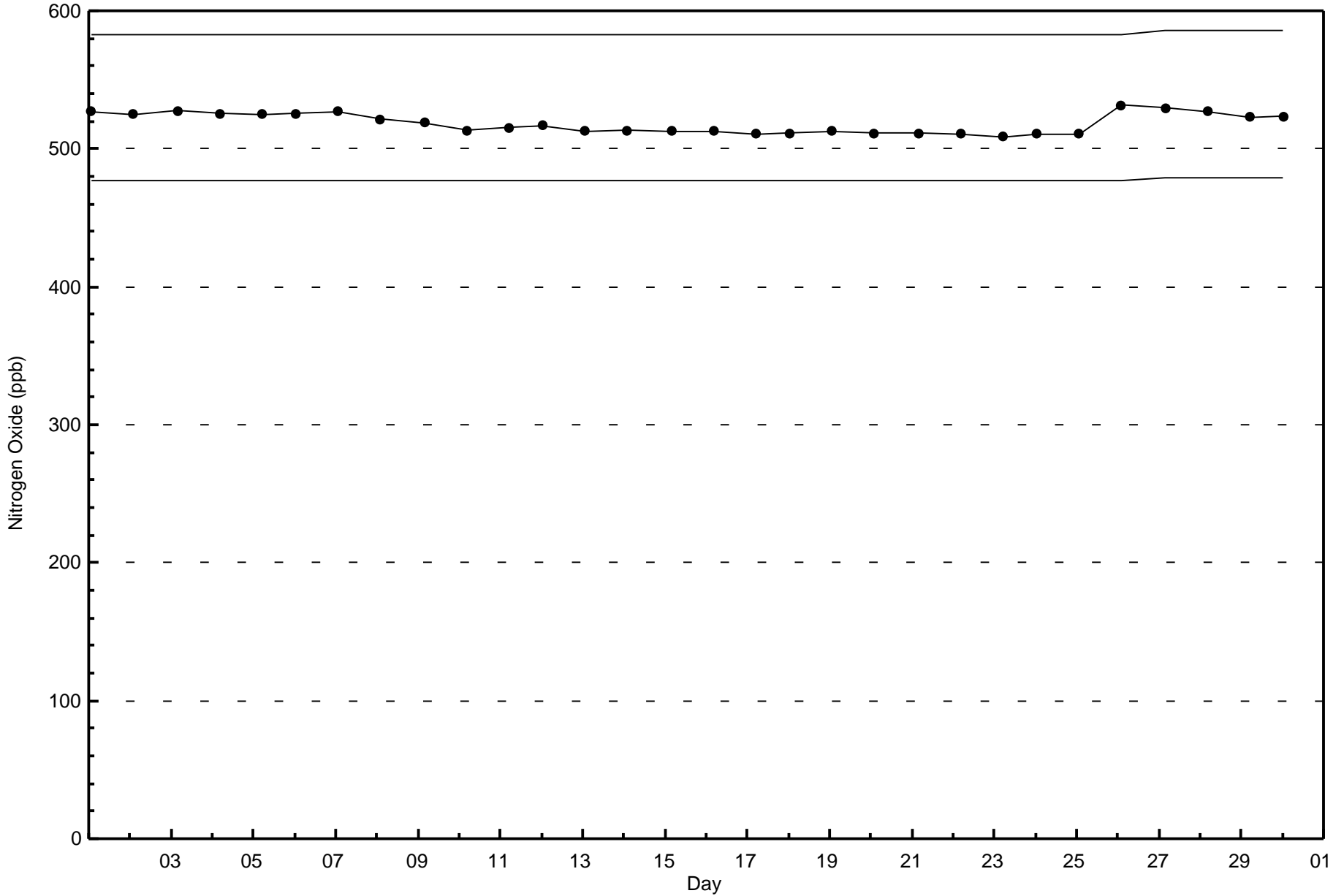
Wood Buffalo Environmental Association

Zero Responses

Nitrogen Oxide (NO) - ppb

ConocoPhillips - Surmont - June 2015







Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 22 ppb on Jun 29 16:00	Maximum Daily Average: 4.4 ppb on Jun 3		Hours of Data:	684
Minimum Value: 0 ppb on Jun 1 01:00	Minimum Daily Average: 0.4 ppb on Jun 24		Hours of Missing Data:	36
Maximum Diurnal Average: 3.3 ppb at hour 16	Minimum Diurnal Average: 1.2 ppb at hour 21		Hours of Calibration:	36
Monthly Average: 1.8 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 1 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 7		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	Z	0	2	4	1	0	0	0	0	0	3	4	5	5	5	5	5	1	1	0	2	2	3	2.1	5
2-Jun	2	1	Z	1	2	2	2	2	2	1	1	1	1	1	1	2	1	2	3	1	0	1	1	1	1.3	3
3-Jun	5	4	6	Z	2	1	11	8	4	7	3	4	3	3	2	4	5	4	4	3	4	9	3	3	4.4	11
4-Jun	3	4	3	3	Z	1	1	3	2	3	3	4	3	4	2	4	4	5	3	1	2	2	2	3	2.8	5
5-Jun	3	3	2	2	1	Z	1	1	1	3	4	2	4	4	2	2	1	2	1	1	1	1	1	1	1.8	4
6-Jun	Z	1	1	1	1	1	1	1	0	0	1	0	1	3	1	5	0	3	5	1	1	0	0	0	1.2	5
7-Jun	0	Z	0	0	2	2	0	4	4	5	4	4	3	4	4	2	5	3	1	2	2	4	3	2	2.5	5
8-Jun	2	2	Z	2	1	0	0	0	2	1	2	2	2	7	2	6	4	2	2	4	3	4	0	0	2.1	7
9-Jun	1	0	1	Z	1	1	5	4	6	4	3	4	4	0	0	3	1	2	1	2	2	1	2	1	2.1	6
10-Jun	1	3	4	3	Z	5	2	1	1	1	0	0	0	3	0	1	0	0	0	0	0	3	4	4	1.5	5
11-Jun	1	5	1	2	2	Z	5	7	6	7	4	1	1	1	1	3	6	1	1	1	1	3	1	1	2.5	7
12-Jun	Z	1	2	2	2	2	3	7	4	4	1	2	3	4	2	2	2	2	1	1	1	0	0	0	2.0	7
13-Jun	1	Z	0	1	1	1	1	2	4	2	1	0	0	1	2	2	1	1	0	1	0	0	1	1	1.0	4
14-Jun	1	0	Z	0	0	1	1	2	1	2	0	0	0	0	0	0	1	1	0	0	1	1	0	1	0.6	2
15-Jun	0	1	1	Z	3	4	2	2	3	1	3	1	2	1	1	5	3	0	0	0	0	1	0	0	1.5	5
16-Jun	0	0	0	1	Z	3	2	3	2	1	1	1	1	2	1	2	4	5	5	2	1	1	1	1	1.7	5
17-Jun	1	2	3	2	3	Z	3	2	2	1	1	0	1	1	1	1	0	1	1	1	2	3	3	1	1.5	3
18-Jun	Z	1	0	1	1	1	2	2	5	5	6	4	2	5	7	4	1	1	1	1	2	1	2	1	2.4	7
19-Jun	2	Z	2	3	6	6	5	1	1	1	0	0	1	1	1	1	1	0	0	0	1	2	2	3	1.7	6
20-Jun	3	2	Z	1	3	1	1	1	1	0	0	0	2	1	0	1	0	0	0	0	0	0	0	0	0.9	3
21-Jun	0	0	0	Z	2	1	0	1	2	1	0	2	2	3	5	6	4	3	4	1	1	0	0	0	1.7	6
22-Jun	0	0	0	0	Z	1	1	0	1	1	1	0	0	1	1	2	2	2	1	1	2	0	0	1	0.8	2
23-Jun	2	0	0	0	4	Z	1	1	2	1	2	2	2	2	1	2	1	0	0	0	0	0	0	0	1.0	4
24-Jun	Z	0	0	0	1	1	1	1	0	0	0	0	1	1	2	1	0	0	0	0	0	0	0	0	0.4	2
25-Jun	1	Z	1	0	1	1	5	3	4	0	C	C	C	C	C	C	2	1	1	1	2	6	2	3	--	6
26-Jun	6	1	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	3	6	0	0	0	0	0.8	6
27-Jun	0	1	0	Z	1	1	0	0	2	3	3	1	1	1	2	1	1	0	1	1	0	0	0	0	0.8	3
28-Jun	0	0	0	1	Z	1	1	1	1	4	2	5	5	6	5	7	7	8	5	1	2	3	2	4	2.9	8
29-Jun	4	8	3	3	3	Z	3	3	2	2	2	2	2	1	3	22	3	2	1	5	1	1	1	1	3.5	22
30-Jun	Z	1	1	1	1	1	1	2	1	1	1	2	6	5	2	2	2	4	4	4	4	4	2	1	2.2	6

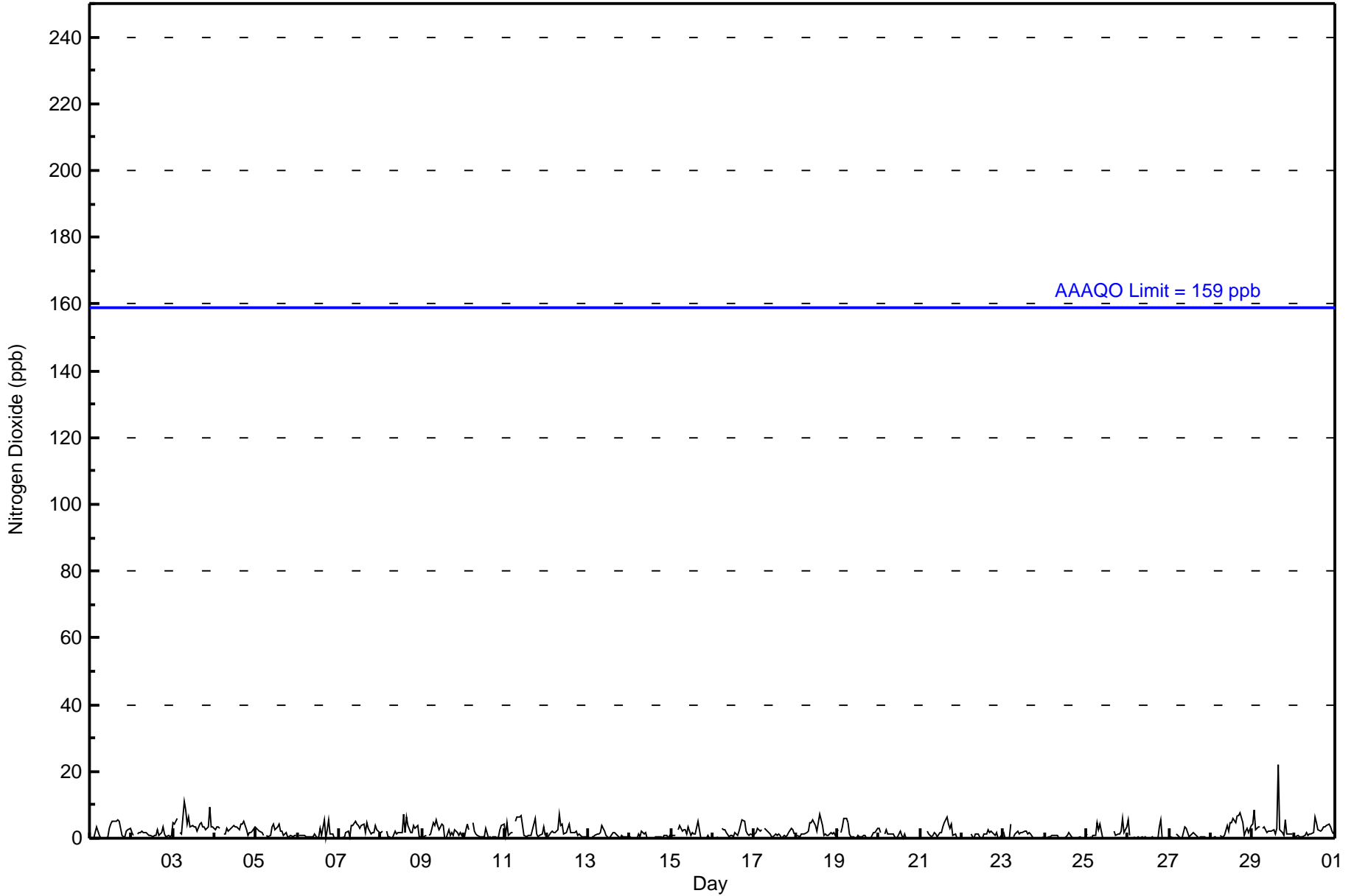
1.5	1.5	1.2	1.3	1.8	1.6	2.0	2.2	2.1	2.1	1.7	1.6	1.9	2.4	1.9	3.3	2.1	2.1	1.6	1.4	1.2	1.7	1.2	1.3	Diurnal Average
6	8	6	3	6	6	11	8	6	7	6	5	6	7	7	22	7	8	5	6	4	9	4	4	Diurnal Maximum

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



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
ConocoPhillips - Surrmont - June 2015





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
ConocoPhillips - Surmont - June 2015

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 Dioxide (NO₂) - ppb
ConocoPhillips - Surmont - June 2015

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	39	17	17	10	10	10	42	39	37	18	68	104	106	61	51	54	683
21 - 40	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	39	17	17	10	10	11	42	39	37	18	68	104	106	61	51	54	684

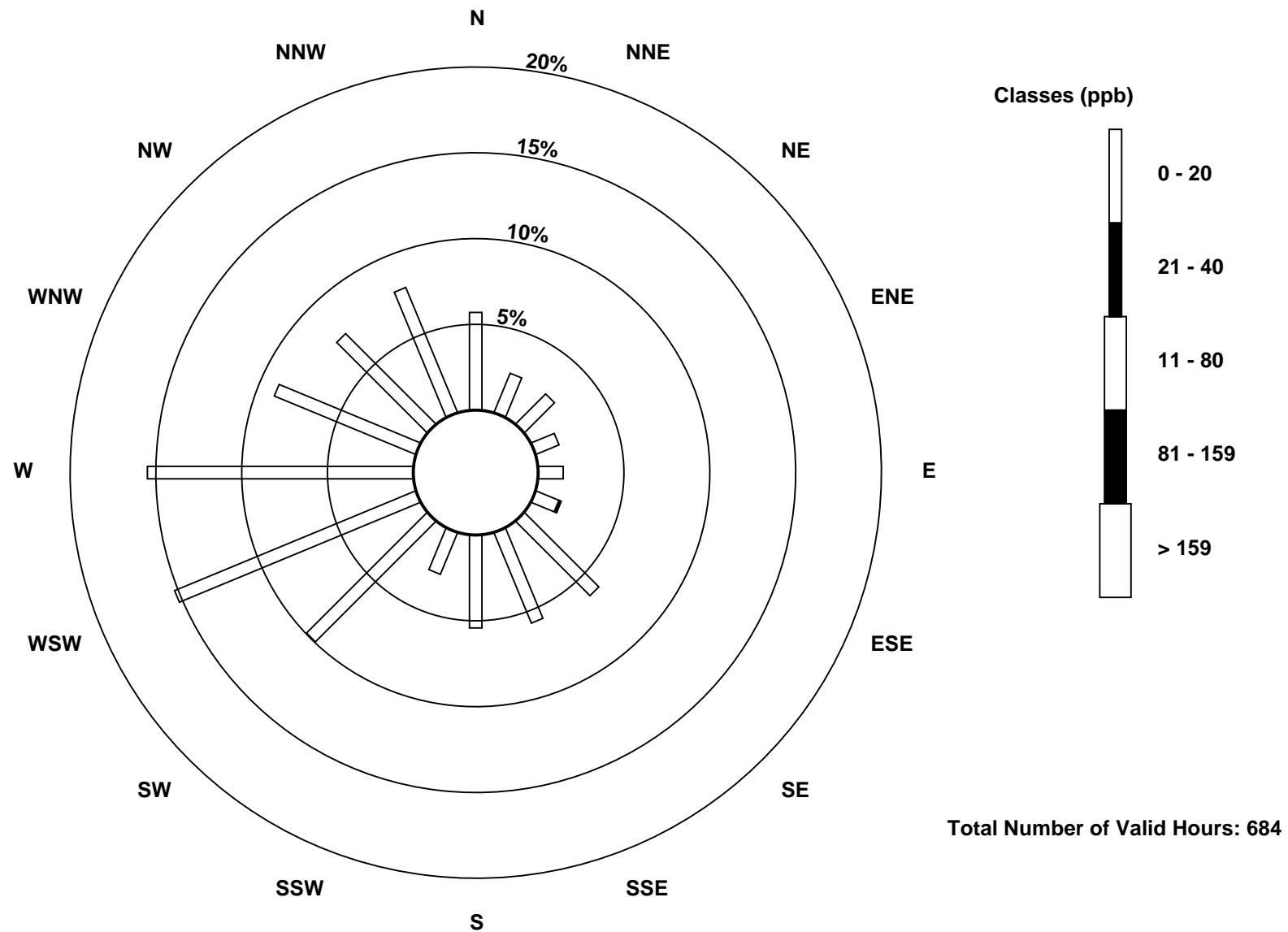
Total Number of Valid Hours: 684

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

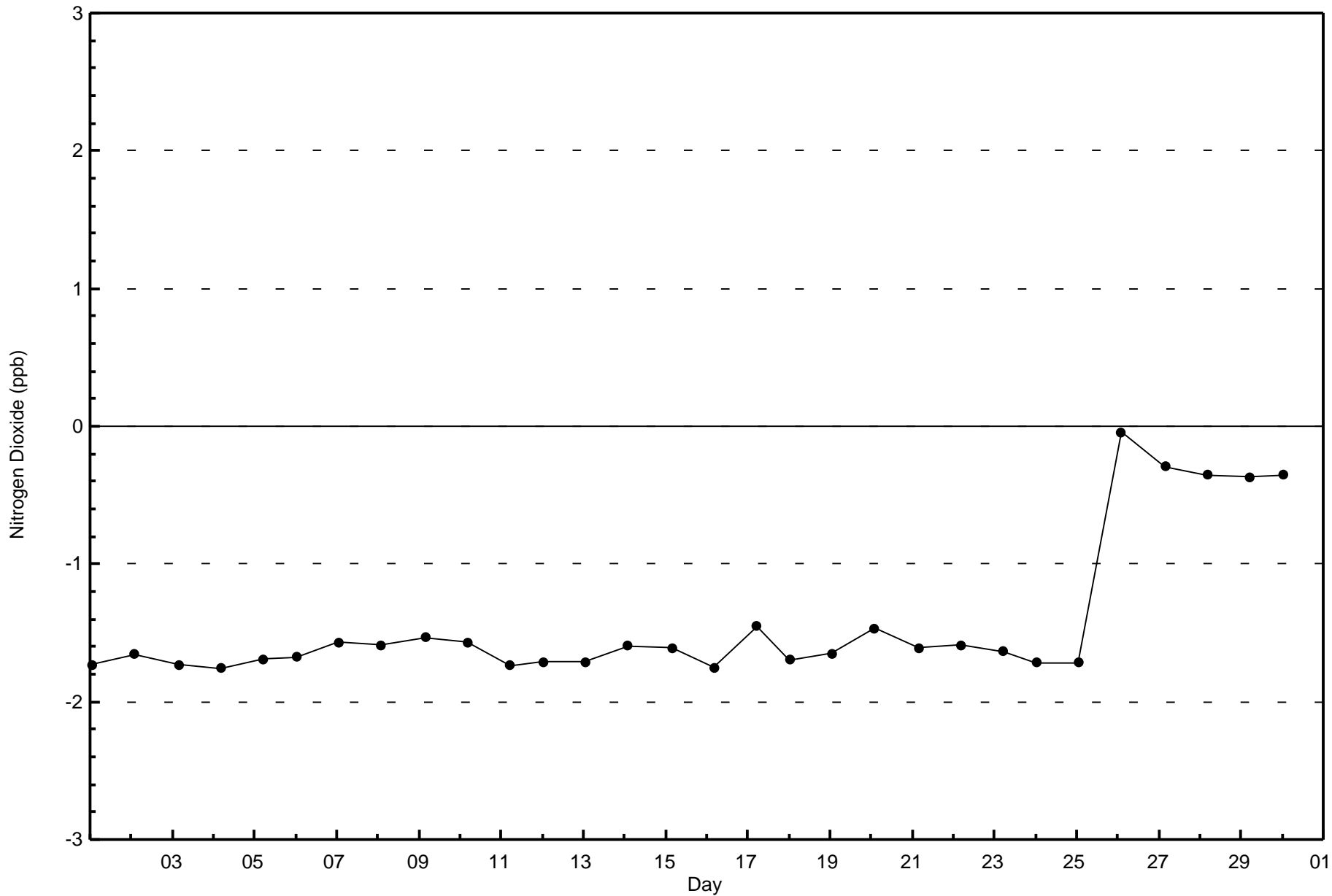
Nitrogen Dioxide (NO₂) - ppb
ConocoPhillips - Surmont (AMS502)

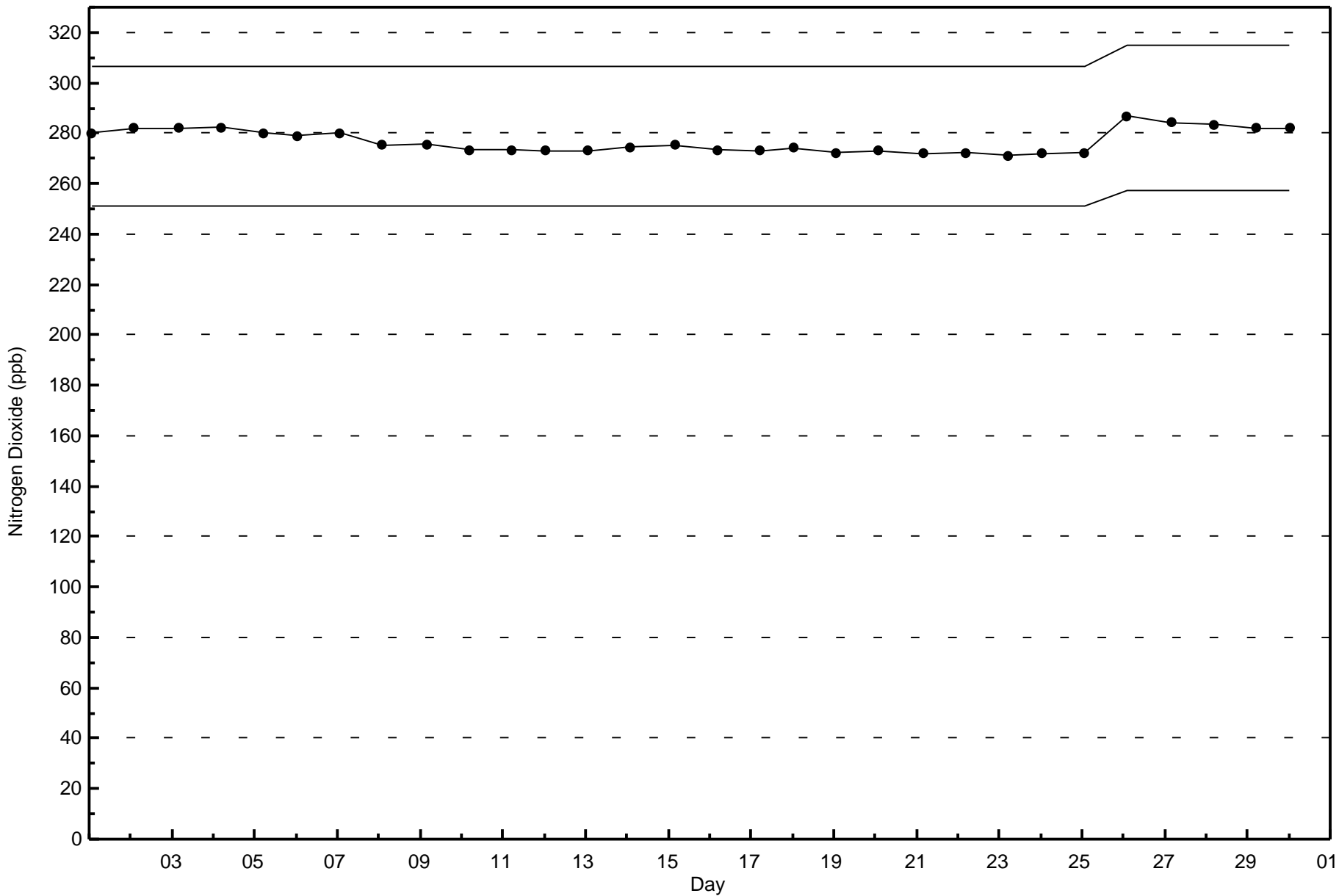




Wood Buffalo Environmental Association
Zero Responses

Nitrogen Dioxide (NO₂) - ppb
ConocoPhillips - Surmont - June 2015







Maximum Value: 47 ppb on Jun 29 16:00	Maximum Daily Average: 7.1 ppb on Jun 1	Hours in Service: 720
Minimum Value: 0 ppb on Jun 15 19:00	Minimum Daily Average: 1.2 ppb on Jun 24	Hours of Data: 684
Maximum Diurnal Average: 7.2 ppb at hour 16	Minimum Diurnal Average: 1.8 ppb at hour 24	Hours of Missing Data: 36
Monthly Average: 3.5 ppb	Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 4 P ₉₀ = 8 P ₉₉ = 17	Hours of Calibration: 36
		Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	1	Z	1	5	16	7	1	1	1	2	4	11	17	18	19	15	17	14	2	1	1	3	3	3	7.1	19	
2-Jun	3	1	Z	2	2	2	4	4	3	2	4	2	1	2	3	4	3	3	5	2	1	2	1	2	2.5	5	
3-Jun	5	5	9	Z	3	2	17	15	7	12	6	6	5	5	5	6	6	5	5	3	4	11	3	3	6.6	17	
4-Jun	3	4	3	3	Z	2	1	5	4	6	6	6	4	6	4	6	6	7	4	1	2	2	2	4	3.9	7	
5-Jun	3	3	3	2	1	Z	1	1	1	4	6	3	5	5	3	3	1	2	1	1	1	1	1	1	2.4	6	
6-Jun	Z	1	1	1	1	1	1	1	1	1	3	1	3	7	2	14	1	6	13	2	2	1	1	1	2.9	14	
7-Jun	1	Z	1	1	2	4	1	9	8	11	10	9	11	9	10	4	10	6	2	3	2	4	3	3	5.4	11	
8-Jun	2	3	Z	3	1	1	1	1	8	4	4	4	7	22	7	20	13	4	5	10	9	10	1	1	6.3	22	
9-Jun	1	1	2	Z	2	3	10	11	13	11	7	12	10	1	1	7	4	5	2	4	3	2	5	2	5.2	13	
10-Jun	1	3	5	3	Z	7	4	3	3	1	1	2	2	7	1	1	1	1	2	0	1	4	5	6	2.8	7	
11-Jun	2	7	2	3	3	Z	8	10	11	11	7	2	2	2	2	2	4	12	3	1	2	2	4	2	4.5	12	
12-Jun	Z	1	4	4	4	2	5	17	10	10	3	3	7	10	3	3	2	3	1	1	1	1	1	1	4.3	17	
13-Jun	0	Z	0	1	1	2	2	3	6	3	1	1	1	1	3	3	3	1	0	1	0	0	1	1	1.6	6	
14-Jun	1	0	Z	0	0	2	1	6	2	2	1	1	0	0	1	1	2	1	0	1	0	1	2	0	2	1.2	6
15-Jun	1	1	1	Z	3	8	5	4	5	3	9	1	3	2	2	11	6	0	0	0	0	1	0	0	3.0	11	
16-Jun	0	0	1	1	Z	7	3	3	2	1	1	2	2	3	5	6	9	14	10	4	1	1	2	1	3.5	14	
17-Jun	2	3	5	3	5	Z	5	5	3	3	2	2	5	2	4	3	2	2	2	2	2	4	3	2	3.1	5	
18-Jun	Z	1	1	1	1	2	2	4	9	8	10	7	3	7	11	5	2	2	1	1	2	2	2	1	3.8	11	
19-Jun	3	Z	2	4	8	7	7	3	2	2	1	1	3	2	2	2	3	0	1	1	1	2	3	3	2.7	8	
20-Jun	4	2	Z	2	4	2	3	3	3	2	1	2	6	3	1	3	1	0	0	0	0	0	0	0	1.8	6	
21-Jun	0	0	0	Z	4	2	1	2	4	3	1	3	3	5	9	12	9	6	9	2	3	0	0	0	3.4	12	
22-Jun	0	0	0	0	Z	3	2	1	4	3	2	1	1	3	4	5	4	4	4	2	3	1	1	2	2.1	5	
23-Jun	3	1	1	1	8	Z	2	2	5	3	4	4	4	3	4	2	1	1	1	1	1	0	1	1	2.4	8	
24-Jun	Z	1	1	1	1	1	2	2	1	1	1	1	1	2	3	1	1	1	1	0	1	1	1	1	1.2	3	
25-Jun	2	Z	1	0	2	2	7	4	7	0	C	C	C	C	C	C	4	2	2	2	3	6	3	4	--	7	
26-Jun	6	1	Z	1	1	0	1	1	1	0	1	0	1	1	2	1	0	1	8	13	1	1	1	0	1.8	13	
27-Jun	1	1	1	Z	3	3	1	1	5	8	7	2	3	3	5	2	1	0	1	1	1	0	1	1	2.2	8	
28-Jun	1	1	1	1	Z	2	1	1	1	10	5	9	11	15	14	16	12	15	8	1	3	3	2	5	5.9	16	
29-Jun	4	11	3	4	4	Z	4	4	2	3	3	3	3	3	7	47	3	2	1	6	2	1	2	1	5.4	47	
30-Jun	Z	1	1	1	1	1	2	3	1	2	2	3	12	8	3	3	3	4	4	4	4	5	4	3	3.2	12	

2.0	2.2	2.0	2.0	3.3	3.0	3.5	4.4	4.5	4.5	3.9	3.6	4.7	5.5	4.7	7.2	4.5	4.2	3.3	2.5	2.0	2.4	1.8	1.8	Diurnal Average	
6	11	9	5	16	8	17	17	13	12	10	12	17	22	19	47	17	15	13	13	9	11	5	6	Diurnal Maximum	

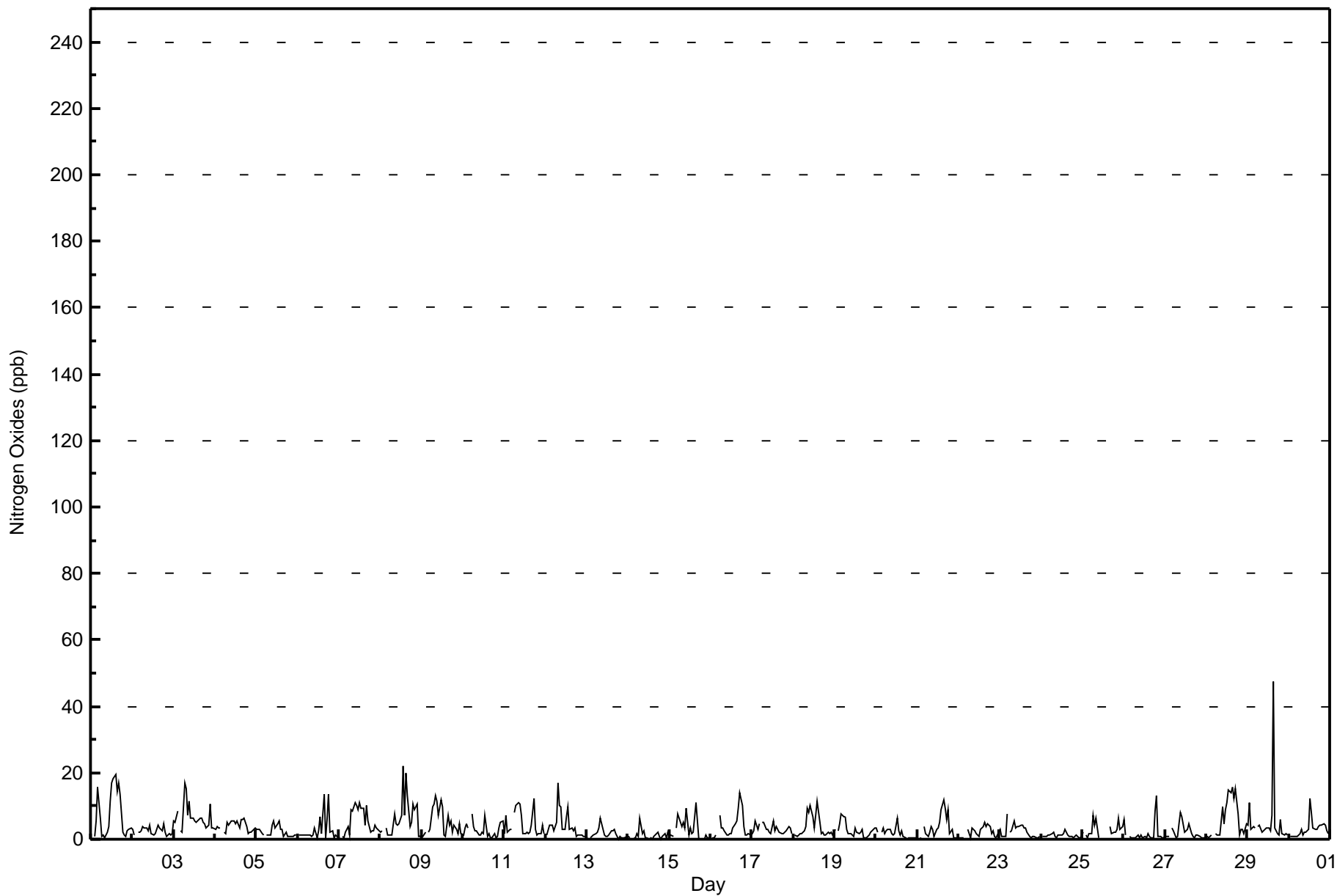
Z - zerospan C - Calibration



Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Oxides (NO_x) - ppb
ConocoPhillips - Surmont - June 2015





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
ConocoPhillips - Surmont - June 2015

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	682	99.71	99.71
21 - 40	1	0.15	99.85
41 - 80	1	0.15	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



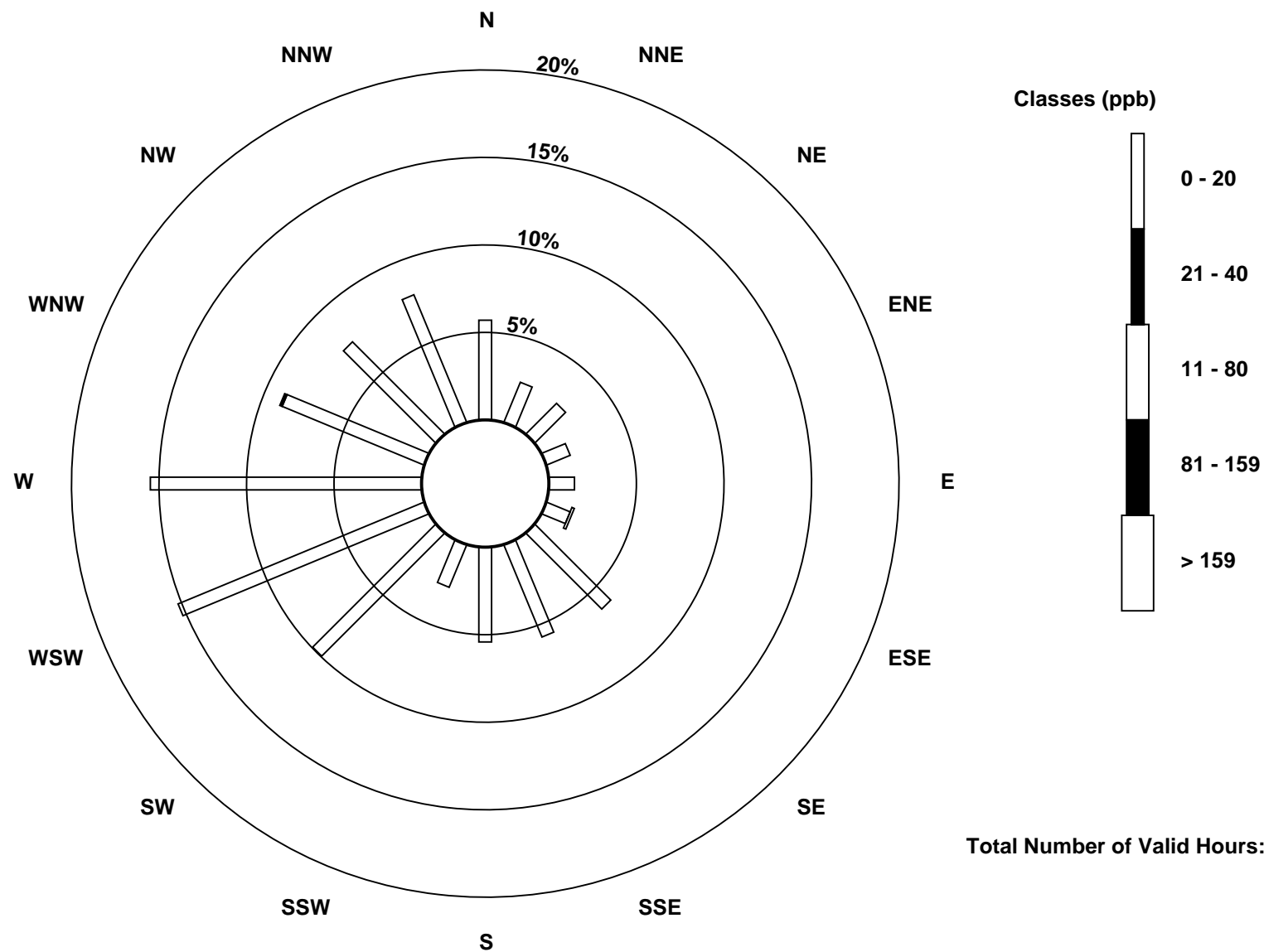
Wood Buffalo Environmental Association
Frequency Distribution

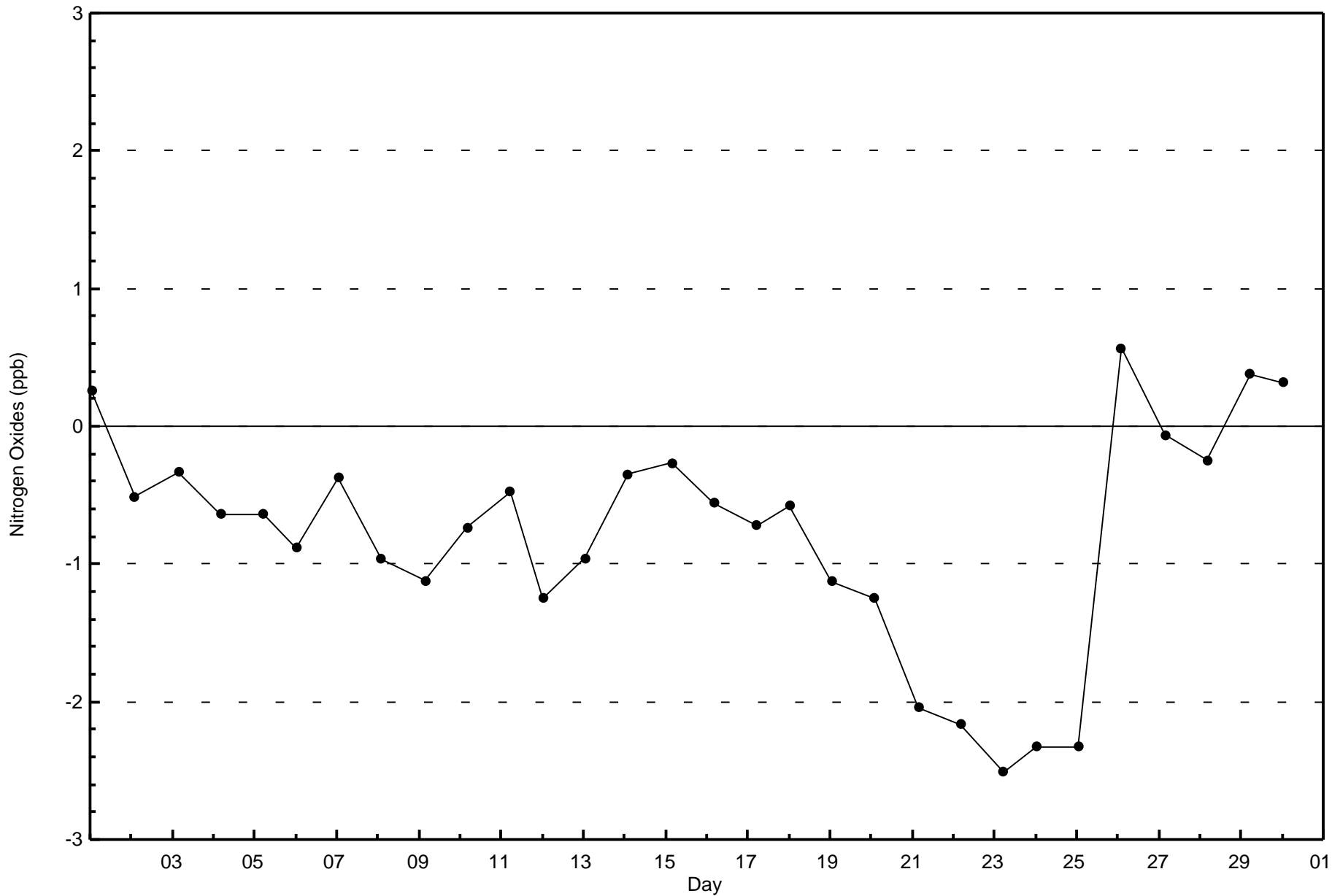
Nitrogen Oxides (NO_x) - ppb
ConocoPhillips - Surmont - June 2015

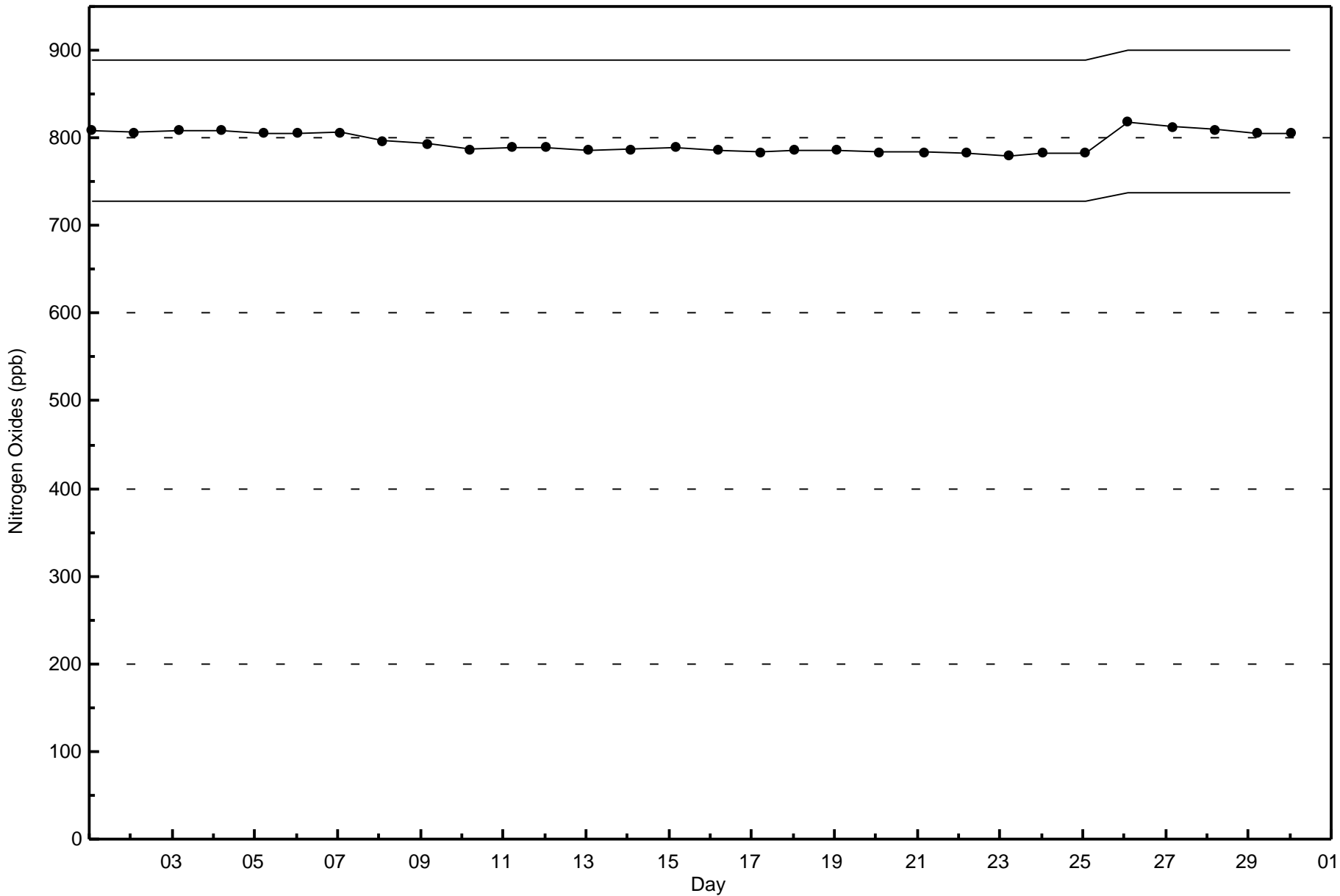
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	39	17	17	10	10	10	42	39	37	18	68	104	106	60	51	54	682
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
11 - 80	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	39	17	17	10	10	11	42	39	37	18	68	104	106	61	51	54	684

Total Number of Valid Hours: 684

Total Number of Hours: 720









Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

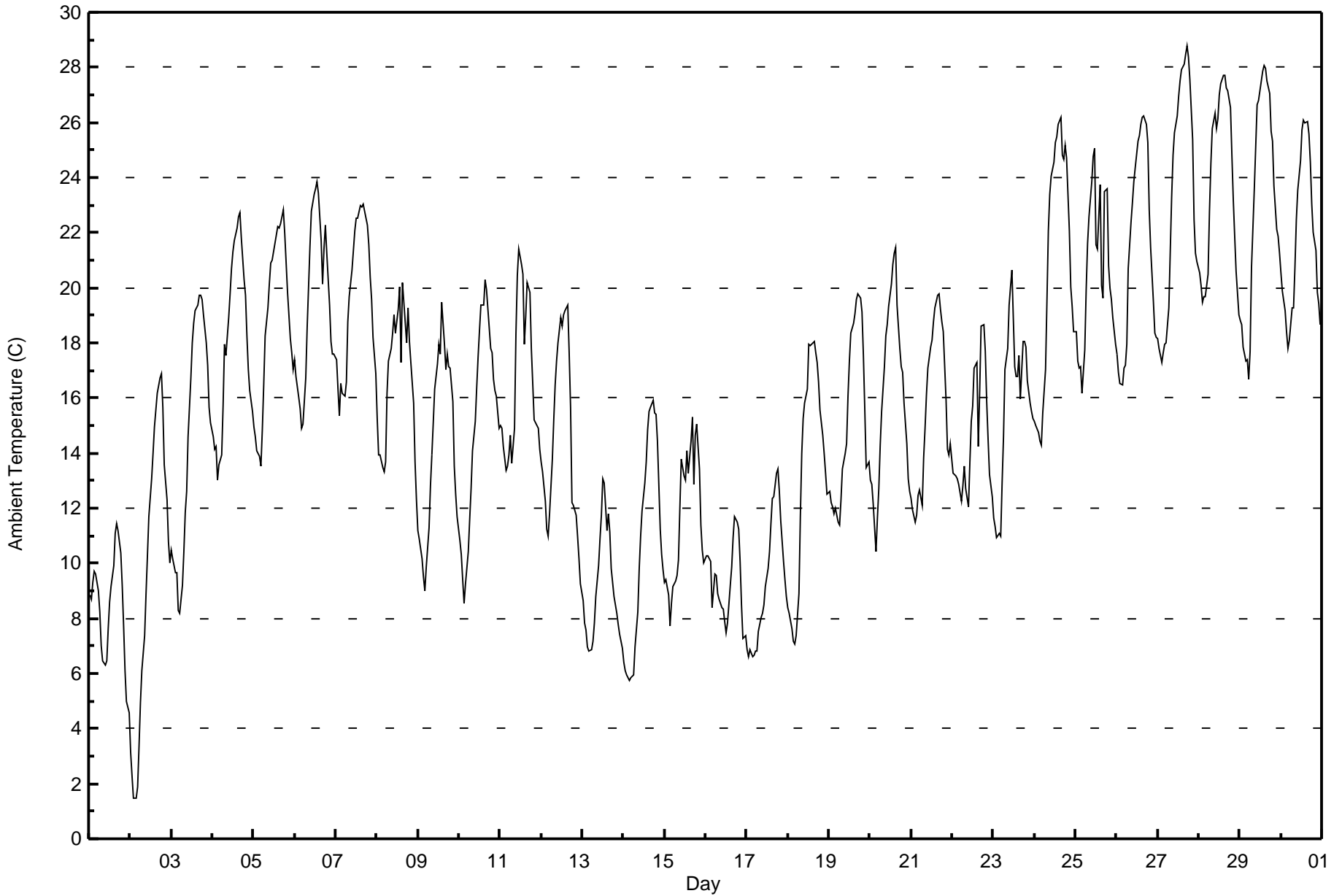
ConocoPhillips - Surmont - June 2015

Maximum Value: 28.8 C on Jun 27 18:00																						Maximum Daily Average: 23.8 C on Jun 28																						Hours in Service: 720	
Minimum Value: 1.5 C on Jun 2 04:00																						Minimum Daily Average: 8.4 C on Jun 1																						Hours of Data: 720	
Maximum Diurnal Average: 19.6 C at hour 16																						Minimum Diurnal Average: 11.9 C at hour 5																						Hours of Missing Data: 0	
Monthly Average: 16.06 C																						Percentiles: P₁ = 4.9 P₁₀ = 8.6 Q₁ = 11.9 Median = 16.3 Q₃ = 19.7 P₉₀ = 23.6 P₉₉ = 27.9																						Hours of Calibration: 0	
																																												Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																					
1-Jun	8.9	8.7	9.3	9.7	9.6	9.0	8.3	7.0	6.5	6.3	6.5	7.6	8.6	9.2	9.9	11.1	11.4	11.2	10.4	9.2	7.7	6.1	5.0	4.6	8.4	11.4																			
2-Jun	3.2	2.3	1.5	1.5	1.9	3.3	5.0	6.1	7.4	8.9	10.2	11.7	13.1	14.0	14.9	15.5	16.2	16.7	16.9	15.7	13.6	12.3	10.8	10.0	9.7	16.9																			
3-Jun	10.5	10.2	9.7	9.6	8.3	8.2	9.2	10.4	11.8	12.6	14.6	16.7	18.0	18.7	19.2	19.4	19.7	19.7	19.6	19.0	18.0	17.2	15.6	15.1	14.6	19.7																			
4-Jun	14.6	14.1	14.3	13.0	13.6	13.9	15.7	17.9	17.5	18.9	19.8	20.7	21.3	21.7	22.2	22.6	22.7	21.8	20.3	19.7	18.2	17.0	16.2	15.5	18.1	22.7																			
5-Jun	15.0	14.6	14.1	13.9	13.5	14.9	16.5	18.3	19.3	20.1	20.9	21.0	21.6	21.9	22.2	22.2	22.3	22.8	22.0	20.9	19.8	18.1	17.7	17.0	18.8	22.8																			
6-Jun	17.4	16.8	16.0	15.6	14.9	15.1	16.7	18.6	20.1	21.5	22.8	23.4	23.6	23.9	23.5	21.7	20.2	21.4	22.2	21.3	19.4	18.0	17.6	17.6	19.5	23.9																			
7-Jun	17.4	16.3	15.4	16.5	16.2	16.1	16.6	18.8	19.7	20.6	21.4	22.1	22.5	22.5	23.0	22.9	23.1	22.8	22.3	21.6	20.4	19.6	18.2	16.9	19.7	23.1																			
8-Jun	15.3	13.9	13.9	13.5	13.3	13.7	16.2	17.3	17.8	18.3	19.0	18.3	19.2	20.0	17.3	20.2	19.5	18.0	19.3	18.1	17.3	15.8	13.7	12.3	16.7	20.2																			
9-Jun	11.2	10.9	10.2	9.5	9.0	9.8	11.3	12.8	13.9	15.1	16.3	17.2	17.9	17.6	19.5	18.0	17.0	17.6	17.2	17.1	15.9	13.5	12.5	11.7	14.3	19.5																			
10-Jun	10.8	10.3	9.4	8.5	9.3	10.4	11.6	12.7	14.1	15.1	16.4	17.5	18.5	19.4	19.3	20.3	19.9	19.2	17.8	17.6	16.7	16.3	16.1	14.9	15.1	20.3																			
11-Jun	15.0	14.9	14.2	13.4	13.5	13.9	14.6	13.6	14.9	18.3	20.4	21.4	20.9	20.5	17.9	19.0	20.2	19.8	17.8	16.5	15.2	15.0	14.9	14.1	16.7	21.4																			
12-Jun	13.7	13.3	12.3	11.2	11.0	11.8	13.8	15.2	16.5	17.3	18.0	18.9	18.6	19.0	19.2	19.4	17.7	15.7	12.2	12.1	11.8	11.0	10.2	9.3	14.5	19.4																			
13-Jun	8.7	7.8	7.6	7.0	6.8	6.9	7.2	7.8	8.8	9.9	10.9	11.7	13.1	12.9	11.2	11.8	11.1	9.8	8.8	8.5	8.2	7.8	7.4	6.9	9.1	13.1																			
14-Jun	6.4	6.1	5.9	5.8	5.8	5.9	6.0	7.0	8.2	9.8	11.0	11.9	12.9	13.7	14.9	15.5	15.7	15.9	15.4	15.4	14.5	11.2	10.3	9.8	10.6	15.9																			
15-Jun	9.3	9.4	8.8	7.7	8.6	9.2	9.4	9.5	10.1	12.0	13.8	13.1	13.0	14.1	13.3	14.5	15.3	12.9	14.6	15.1	13.4	11.4	10.5	10.0	11.6	15.3																			
16-Jun	10.3	10.3	10.2	10.1	8.4	9.6	9.5	8.9	8.7	8.4	8.4	7.9	7.5	7.8	9.2	9.9	10.9	11.7	11.5	11.2	10.1	8.5	7.3	7.4	9.3	11.7																			
17-Jun	6.8	6.6	6.8	6.6	6.6	6.8	6.8	7.5	8.0	8.2	8.5	9.2	9.8	10.4	11.5	12.4	12.4	13.3	13.4	12.6	11.5	10.1	9.4	8.8	9.3	13.4																			
18-Jun	8.4	8.2	7.6	7.2	7.1	7.4	8.9	11.7	14.0	15.2	15.8	16.3	17.9	17.9	17.9	18.0	17.6	17.3	16.6	15.6	14.7	14.0	13.3	12.5	13.4	18.0																			
19-Jun	12.6	12.2	12.1	11.8	12.0	11.5	11.4	12.3	13.4	14.0	14.3	16.1	17.3	18.4	18.7	19.0	19.6	19.8	19.6	19.1	17.5	15.6	13.5	13.7	15.2	19.8																			
20-Jun	13.0	12.9	12.1	10.4	11.6	12.7	14.3	15.5	17.1	18.3	18.7	19.3	20.1	20.8	21.3	21.5	19.4	17.8	17.1	16.9	15.8	14.3	13.1	12.6	16.1	21.5																			
21-Jun	12.4	11.9	11.5	11.7	12.4	12.7	12.1	13.8	14.9	16.1	17.1	17.8	18.1	18.8	19.3	19.7	19.8	19.2	18.8	18.4	15.9	14.1	13.9	14.3	15.6	19.8																			
22-Jun	13.3	13.2	13.2	13.1	12.9	12.3	12.8	13.5	12.7	12.1	13.7	15.1	15.7	17.1	17.3	14.2	16.3	18.6	18.6	17.7	15.9	14.5	13.2	12.4	14.6	18.6																			
23-Jun	11.6	11.4	10.9	11.1	11.0	12.9	14.6	17.0	17.8	19.4	20.0	20.7	17.1	16.8	16.8	17.6	16.0	18.1	18.1	17.9	16.6	15.8	15.5	15.3	15.8	20.7																			
24-Jun	15.1	15.0	14.8	14.4	14.3	15.5	17.0	19.5	22.1	23.4	24.0	24.6	25.3	25.5	25.9	26.2	24.8	24.7	25.2	24.7	22.1	20.0	19.3	18.4	20.9	26.2																			
25-Jun	18.4	17.3	17.1	17.1	16.2	17.8	19.9	21.6	22.6	23.8	24.8	25.1	21.5	21.4	23.7	20.1	19.6	23.5	23.6	20.8	20.0	19.6	18.9	17.9	20.5	25.1																			
26-Jun	17.6	17.0	16.5	16.5	17.1	17.2	18.0	20.7	22.4	23.1	23.9	24.4	25.3	25.5	25.9	26.2	26.2	25.9	25.3	22.8	21.4	19.5	18.4	18.2	21.5	26.2																			
27-Jun	18.2	17.8	17.3	17.6	17.9	18.0	19.3	21.3	23.3	24.8	25.6	26.2	26.9	27.5	27.9	28.1	28.5	28.8	28.4	27.6	25.4	22.5	21.3	21.0	23.4	28.8																			
28-Jun	20.5	20.1	19.5	19.7	19.7	20.5	22.8	24.5	25.8	26.3	25.8	26.2	27.0	27.4	27.7	27.7	27.3	27.2	26.6	24.8	23.2	21.9	20.6	19.0	23.8	27.7																			
29-Jun	18.8	18.6	17.9	17.3	17.4	16.7	17.7	20.7	23.6	25.1	26.6	26.8	27.5	27.8	28.1	28.0	27.5	27.0	25.7	25.3	23.7	22.1	21.9	21.2	23.0	28.1																			
30-Jun	20.6	19.9	19.2	18.4	17.8	18.1	19.2	19.3	20.7	22.5	23.6	24.6	25.7	26.1	26.0	26.0	25.6	24.6	23.0	22.0	21.3	19.8	19.4	18.7	21.8	26.1																			
																								Diurnal Average																					
																								Diurnal Maximum																					



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
ConocoPhillips - Surmont - June 2015





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ambient Temperature (AT) - C
ConocoPhillips - Surmont - June 2015

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	116	16.11	16.11
10 - 20	439	60.97	77.08
> 20	165	22.92	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

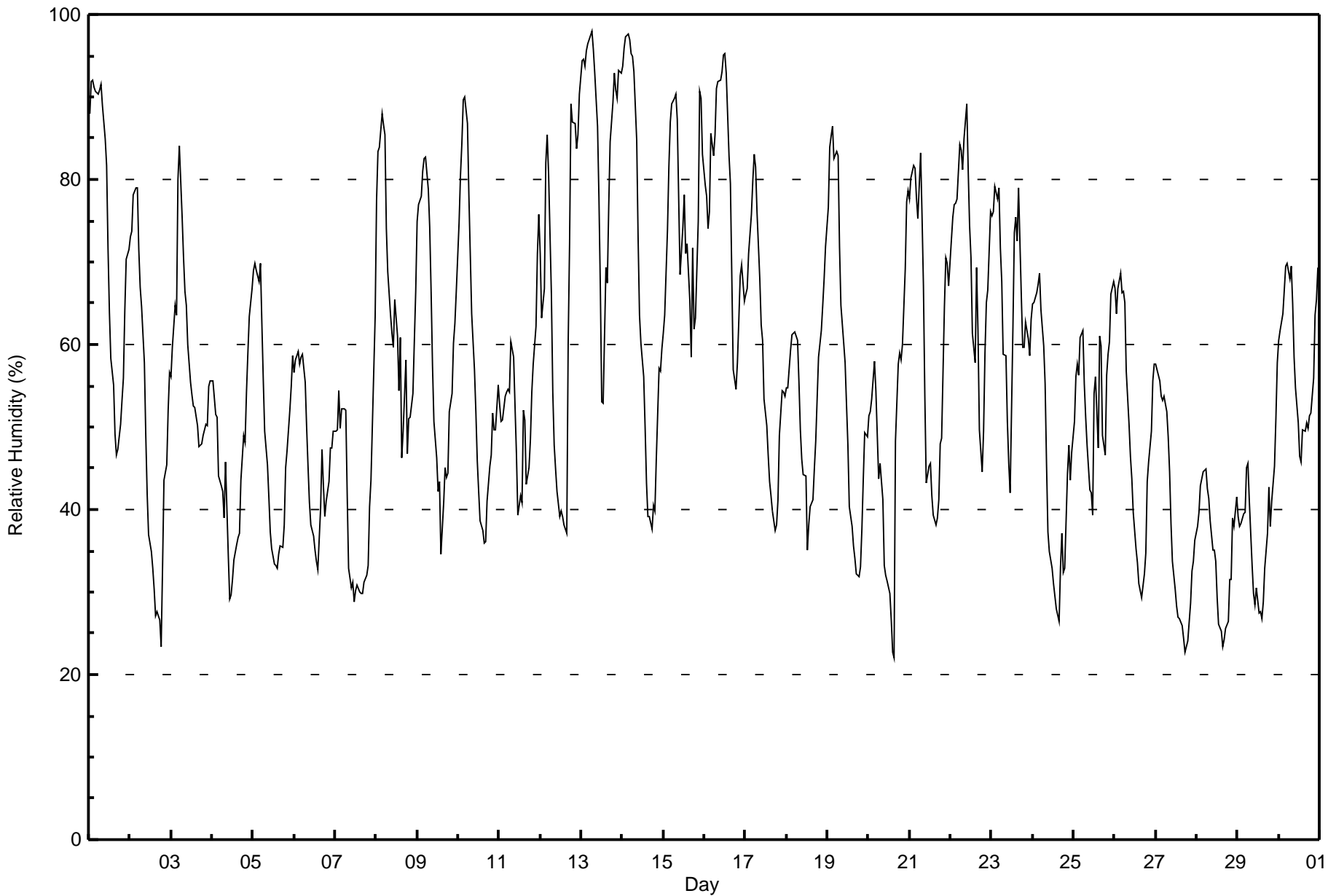
ConocoPhillips - Surmont - June 2015

Maximum Value: 98 % on Jun 13 07:00 Maximum Daily Average: 85.1 % on Jun 13																	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																									
Minimum Value: 22 % on Jun 20 16:00 Minimum Daily Average: 35.1 % on Jun 28 Maximum Diurnal Average: 71.8 % at hour 5 Minimum Diurnal Average: 43.2 % at hour 16 Monthly Average: 56.7 % Percentiles: P ₁ = 24 P ₁₀ = 33 Q ₁ = 42 Median = 55 Q ₃ = 69 P ₉₀ = 84 P ₉₉ = 96																																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																		
1-Jun	88	92	92	91	91	90	91	92	89	85	82	72	64	58	55	49	47	47	50	53	56	64	70	72	72.5	92																
2-Jun	73	74	78	79	79	71	67	64	58	49	42	37	35	33	30	27	28	27	23	33	44	45	52	57	50.2	79																
3-Jun	56	60	65	63	80	84	75	70	66	65	60	56	54	53	52	50	48	48	48	49	50	50	55	56	58.9	84																
4-Jun	56	53	51	51	44	43	42	39	46	34	29	30	31	34	36	37	37	43	49	48	54	59	63	67	44.9	67																
5-Jun	69	70	69	68	70	63	56	50	45	42	37	35	33	33	33	35	36	35	38	45	47	52	55	59	48.9	70																
6-Jun	57	58	59	58	59	59	55	50	45	41	38	37	35	34	33	40	47	43	39	41	43	47	47	49	46.5	59																
7-Jun	49	50	54	50	52	52	52	42	33	30	31	29	30	31	30	30	30	31	32	33	40	44	50	63	40.4	63																
8-Jun	77	83	84	88	87	85	74	69	64	61	60	65	61	54	61	46	49	58	47	51	51	54	60	66	64.9	88																
9-Jun	75	77	78	81	83	83	79	74	66	57	51	46	42	43	35	41	45	44	44	52	54	60	63	66	60.0	83																
10-Jun	75	80	84	90	90	87	78	71	64	57	52	46	42	39	37	36	36	41	45	47	52	50	50	55	58.5	90																
11-Jun	53	51	51	54	54	55	54	60	58	53	47	39	42	41	52	51	43	45	48	54	58	62	71	76	53.0	76																
12-Jun	71	63	67	82	85	81	66	54	48	45	42	39	40	39	38	37	60	72	89	87	87	84	85	90	64.7	90																
13-Jun	94	95	94	96	97	97	98	96	93	86	78	67	53	53	69	67	77	85	89	93	91	90	93	93	85.1	98																
14-Jun	94	96	97	98	97	95	95	93	85	73	64	60	56	50	43	39	39	38	41	40	46	57	57	59	67.1	98																
15-Jun	61	64	74	82	87	89	90	90	87	78	68	74	78	71	72	65	58	72	62	63	75	91	90	83	76.0	91																
16-Jun	79	78	74	76	86	83	85	91	92	92	93	95	95	93	83	80	68	57	55	58	63	68	70	65	78.3	95																
17-Jun	66	67	71	76	80	83	82	76	68	62	60	53	50	47	43	42	40	38	38	41	49	54	54	54	58.1	83																
18-Jun	55	55	59	61	61	62	61	55	50	46	44	44	35	38	40	41	45	48	53	58	62	65	68	72	53.3	72																
19-Jun	77	84	85	87	83	83	83	72	65	60	58	53	48	40	38	36	34	32	32	33	38	44	49	49	56.7	87																
20-Jun	51	52	53	58	54	49	44	46	41	33	32	31	30	27	23	22	48	58	59	58	60	69	77	79	48.1	79																
21-Jun	78	80	82	81	78	75	83	76	67	54	43	45	46	42	39	38	39	41	48	49	65	71	70	67	60.6	83																
22-Jun	73	75	77	77	78	84	84	81	85	89	81	74	70	61	58	69	62	50	45	50	59	65	67	76	70.4	89																
23-Jun	76	76	79	78	79	72	68	59	59	51	46	42	62	73	75	73	79	66	60	60	63	61	59	63	65.6	79																
24-Jun	65	65	66	67	69	64	60	55	46	37	35	33	31	30	28	26	33	37	32	33	44	48	44	47	45.6	69																
25-Jun	51	56	58	56	61	62	55	51	48	42	42	39	54	56	47	61	60	49	47	56	59	60	66	68	54.3	68																
26-Jun	67	64	67	69	66	66	65	57	50	46	44	40	35	34	31	30	29	32	35	43	46	50	56	58	49.1	69																
27-Jun	58	57	56	54	53	54	52	49	45	38	34	30	28	27	27	26	24	23	23	24	29	33	34	36	38.0	58																
28-Jun	38	40	43	44	45	45	43	41	39	35	35	34	29	26	25	23	24	26	26	32	32	39	38	42	35.1	45																
29-Jun	39	38	38	39	40	45	46	41	33	30	28	31	27	28	27	29	33	37	43	38	41	45	51	58	37.7	58																
30-Jun	60	62	64	67	69	70	68	70	65	59	55	51	46	46	50	50	51	50	51	52	56	64	65	69	58.6	70																
																	66.0	67.1	69.0	70.6	71.8	71.0	68.3	64.5	59.9	54.4	50.4	47.6	46.2	44.4	43.7	43.2	45.0	45.7	46.4	49.1	53.7	58.1	61.0	63.8	Diurnal Average	
																	94	96	97	98	97	97	98	96	93	92	93	95	95	93	83	80	79	85	89	93	91	91	93	93	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
ConocoPhillips - Surmont - June 2015





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
ConocoPhillips - Surmont - June 2015

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	150	20.83	20.83
40 - 60	284	39.44	60.28
60 - 80	187	25.97	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 (WS) - km/h

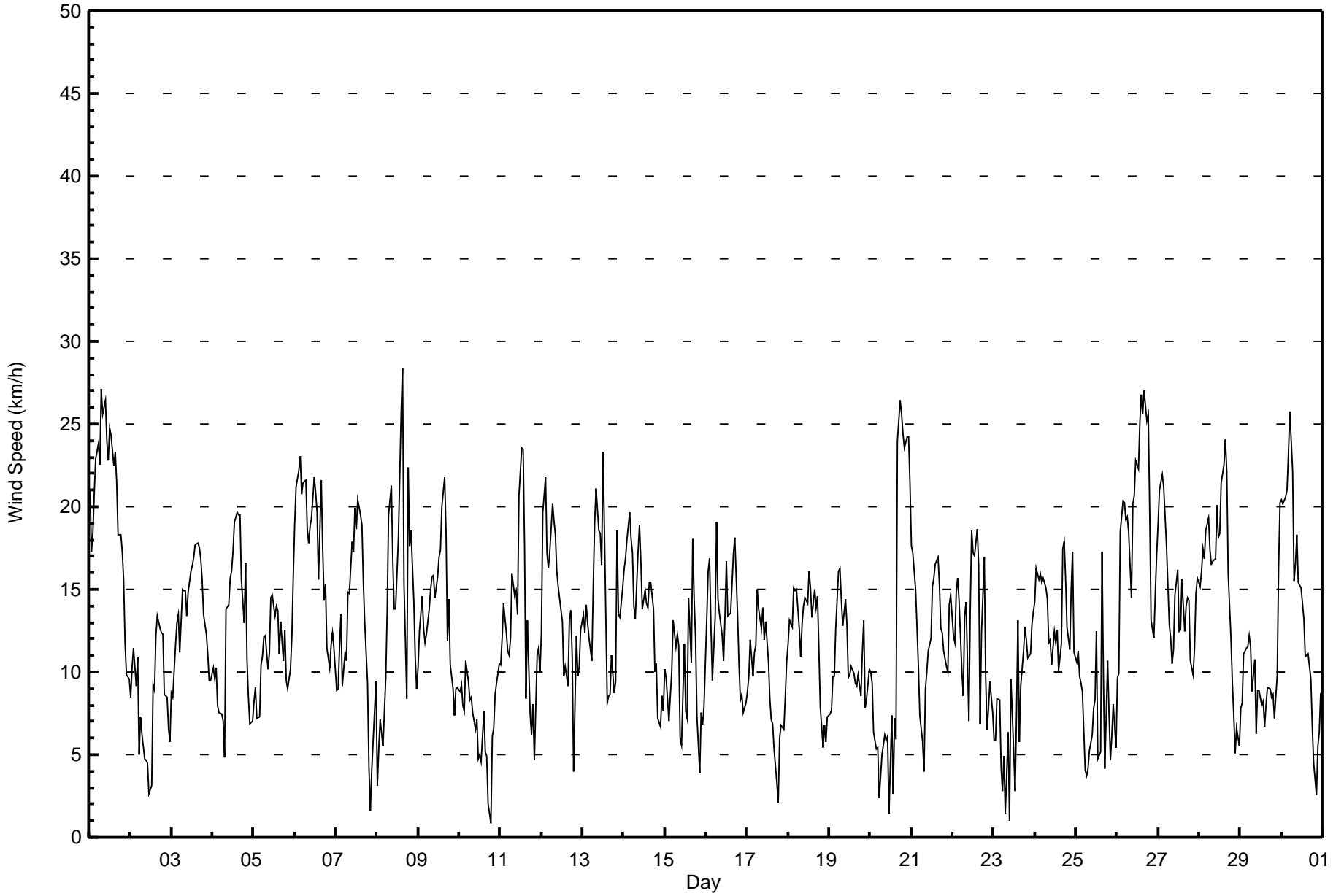
ConocoPhillips - Surrmont - June 2015

Maximum Speed: 28 km/h on Jun 8 16:00	Maximum Daily Speed Average: 19.3 km/h on Jun 1	Hours in Service: 720
Minimum Speed Value: 1 km/h on Jun 10 19:00	Minimum Daily Speed Average: 1.5 km/h on Jun 10	Hours of Data: 720
Maximum Diurnal Speed Average: 10.0 km/h at hour 3	Minimum Diurnal Speed Average: 4.1 km/h at hour 20	Hours of Missing Data: 0
Monthly Average Velocity: 6.5 km/h 262.4 deg	Percentiles: P ₁ = 2 P ₁₀ = 6 Q ₁ = 9 Median = 12 Q ₃ = 16 P ₉₀ = 20 P ₉₉ = 25	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	WSW21	W17	W18	W21WNW23	W24	W23	W27	W26	W26	W24	W23WNW25WNW24WNW22WNW23	NW22	NW18	NW18	NW17	NW16	NW12WNW10WNW10	WNW19.3	W27							
2-Jun	WSW8	SW10	SW11	WSW9WNW11	SW5	NE7	E6	SE5	NNE5	NE4	ENE3	ESE3	ESE9	SE9	SE12	SE13	SE13	SE12	SSE12	SSW9	S8	SSW7	S6	SSE4.3	SE13	
3-Jun	SSE9	SE9	SE12	SE13	SSE13	S11	SSE15	SE15	SE15	SE13	SE15	SE16	SE16	SE17	SE18	SE18	SE18	SE17	SE16	SE13	SE12	SSE11	S9	S9	SE13.4	SE18
4-Jun	S10	S10	S10	S8	S8	SSW7	SSW7	SSE5	SE14	SE14	SE16	SE16	SE17	SE19	SE20	SE20	SE19	SSE16	SSE13	S17	S11	S8	S7	SSE7	SSE11.5	SE20
5-Jun	SSE8	SSE9	S7	S7	SW10	SSW11	SSW12	SW12	SSW10	SSE11	SSE15	SSE15	SSE13	SSE14	S14	S11	S13	S11	SW13	SW9	SSW9	SSW10	SW12	SW16	S10.4	SW16
6-Jun	SW19	SW21WSW22WSW23	SW21	SW21WSW22	W19	W18	W19	W19WSW22	W21	W20	NW16	NW22WSW17WNW14WNW15	W11WSW10WSW12WSW12WSW11	WSW16.3	WSW23											
7-Jun	WSW9	SW9	SW11	W13	W9WNW11	W11WNW15	NW15WNW18WNW17	W20	W19	W20	W19	W19	W15	W13	NNW9	N4	S2	S4	SW6	W9	W11.2	W20				
8-Jun	NW3	N5	SSE7	SW6	SSW8	SW10WSW14	W19	W21	W17	W14WNW14	W18WNW22	W26WNW28	NW15	N8	W22WNW18	W19WNW14	W11	WSW9	W12.5	WNW28						
9-Jun	W10	W12	W15	W13	W12	W12	W14WNW15WNW16WNW16WNW14WNW16	W17WSW17	W20	NNW22	NNW18	NW12	NNW14	NW10	NW9	W7	WSW9	W9	WNW12.3	NNW22						
10-Jun	W9	W9	WSW8	W8WNW11	WNW9	NW8	NNW8	N8	N7	NNE7	NNE5	N5	WNW5	NE8	NE5	ENE5	WSW2	S1	E6	ESE7	SE9	SE9	SSE11	NNW1.5	WNW11	
11-Jun	S10	SSE12	SSE14	S12	S11	S11	SSE12	SSE16	SSE15	SE15	SSE14WSW21WSW24	SW23WSW18	SSW8	SE13	WSW7	N6	NE8	ESE5	SE11	SSE11	SSW10	S9.0	WSW24			
12-Jun	SW12	SW20WSW22	W17	W16	W17	W20WNW19	NW18	NW16	NNW15	NNW14WNW13	W10	W10	W9	ENE13	ENE14	ENE11	N4	NNE12	NE10	NE10	NNE13	NW7.8	WSW22			
13-Jun	NNE13	N12	N14	NNE13	N12	NNW11	NW15	NW19	NW21	NNW19	NNW18	NNW16	NNW23	N18	NE8	NE9	ENE9	ENE11	NE9	N9	NNW19	NNW13	NW13	NNW15	N12.5	NNW23
14-Jun	NNW16	NNW17	NNW18	NNW20	NNW18	NNW17	NNW14	NW13	NW17	NNW19	N17	N14	N14	NNW15	NNW15	NNW14	N10	N11	WNW7	WSW7	WSW9	WSW8	NNW12.7	NNW20		
15-Jun	WSW10	W10	WSW7	W9	W10WNW13	NW12	NNW12	NNW12	NW6	NNW6	N12	NNE8	NNE7WNW14WNW11	W18WSW14WSW12	WSW7	SSE4	SSE8	S7	SSW8	W6.3	W18					
16-Jun	SW13	SW16	SW17	W13	WSW9WNW13	NW19	NNW14	NNW14	N12	N11	NNW13	NW17	NNW13	NW14	NW15	NW17	NW18WNW13WNW10	W8	W9	W8	WSW8	WNW10.3	NW19			
17-Jun	WSW9	W10WNW12WNW10WNW11	NW12	NNW15	NNW14	NNW13	NNW14	NNW12	NNW13	NNW11	N8	N7	NNW7	NE5	N3	NE2	E6	ESE7	SE7	S8	S11	NW5.2	NNW15			
18-Jun	S12	S13	S13	SSE15	SSE15	SSE15	SSE13	SSE11	SSE13	SE14	SE15	SE14	SSE16	SSE15	SE13	SSE15	S14	SSE15	S11	S8	S5	S7	SSW6	WSW7	SSE11.6	SSE16
19-Jun	NNW7	WNW8	W10WNW10	NW13	NW16	NW16	NNW14	NNW13	N14	N13	NNW10	N10	NNE10	NE10	N9	N9	NNE10	N9	NNW11	NNW13	NW8	WNW8WNW10	NNW9.6	NW16		
20-Jun	NW10	NW9	WNW6	W5	WNW5	WNW2	NNE4	N5	N6	ENE6	ESE6	ENE1	NNW7	N3	NNE7	NW6	SW24WSW26WSW26WSW24WSW24WSW24WSW24	W21	W8.2	WSW26						
21-Jun	W18	W17	W15	W13WNW10	WNW7	SW6	WNW4	NNW9	NNW10	N11	NNW12	NNW15	NNW16	NW17	NW17	NW15	NW13WNW12	W11WNW10WSW10WSW14	W15	WNW10.4	W18					
22-Jun	WSW12	W12	W15	W16	W14WSW10	WSW9	W13	W14	WSW7WSW14WSW19	W17	W17WNW19	NW16	WNW7	NW12	NW17	NW10	WNW7	SW8	WSW9	W8	W11.5	WNW19				
23-Jun	W6	WSW6	SW8	WSW8	WSW4	WSW3	WSW5	N1	E6	W1	W10	W7	E3	E7	ESE13	E6	S9	SW11	SW13	SW12	SW11	SW11	SW13	SW14	SW4.9	SW14
24-Jun	SW14	SW16	SW16	SW16	SW15	SW16	SW15	SW14	SW12WSW12WSW10	SW12	SW12WSW13WSW10WSW12	SW17	SW18WSW16	SW13	SW11	SW15WSW17	SW11	SW13.9	SW18							
25-Jun	W11WSW11WSW10	SW9	SW9	SW4	NNW4	NNE4	ENE5	E6	ESE8	ESE8	S12	NW5	ESE5	SSW17	SSE10	SW4	NNW11	NE7	SE5	SSE6	W8	SSW5	SSW2.6	SSW17		
26-Jun	S10	SSW10	SW18	SW20	SW19	SW19WSW18WSW15WSW20WSW21WSW23WSW22WSW25WSW27WSW26WSW27WSW25	W26	W20	W13WSW12WSW15WSW17	WSW18.6	WSW27															
27-Jun	WSW19WSW21WSW22WSW21WSW19WSW18	W13WSW12	W11	W11	W15	W16WSW12WSW13	W16WSW12WSW14WSW15	W14WSW11	SW10	SW11	SW15	SW16	WSW14.5	WSW22												
28-Jun	SW15	SW16	SW17WSW17WSW19WSW19WSW17WSW17	W17WNW17	NW20	NW18WNW18WNW21WNW23	W24	W22WNW16WNW12	W9	W7	NW5	W7	WSW6	W14.0	W24											
29-Jun	WSW8	WSW8	SW11WSW11	SW12	SW12	SW12	SW9	W11	WNW6	N9	N9	N8	NE8	NE7	ESE8	ESE9	ESE9	ESE9	SE9	SSW7	SSW10	SW16WSW20	SW3.9	WSW20		
30-Jun	WSW20WSW20	SW21	SW21	SW23WSW26WSW22	W16	W17	W18	W15	W15WNW14	NW13	NNE11	N11	NNE10	NNE10	NE7	E4	E3	SW5	SSW6	SW9	W9.3	WSW26				

WSW8.2WSW9.0WSW10.0WSW9.8WSW9.5WSW9.2	W8.2	W7.8	NNW6.9	NNW6.1	NNW5.3	NNW6.4	W7.1	NNW6.2	NNW5.3	NNW6.1	W4.5	W4.8	NNW5.4	W4.1	WSW4.3	SW5.4	SW7.8	WSW7.9	Diurnal Average									
WSW21	SW21	WSW22	WSW23	WSW23	WSW26	W23	W27	W26	W26	W24	WSW23	WNW25	WSW25	WSW27	WNW28	WSW27	WSW26	WSW26	WSW24	WSW24	WSW24	WSW24	W21	Diurnal Maximum				

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
ConocoPhillips - Surmont - June 2015

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	53	7.36	7.36
6 - 11	266	36.94	44.31
12 - 19	319	44.31	88.61
20 - 28	82	11.39	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
ConocoPhillips - Surmont - June 2015

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	8	4	4	4	3	3	2	2	4	1	4	4	2	4	3	1	53
6 - 11	19	9	13	4	7	10	7	13	28	17	22	37	35	22	10	13	266
12 - 19	13	4	0	2	0	1	32	26	8	2	40	36	53	28	36	38	319
20 - 28	0	0	0	0	0	0	2	0	0	0	9	33	21	10	4	3	82
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	40	17	17	10	10	14	43	41	40	20	75	110	111	64	53	55	720

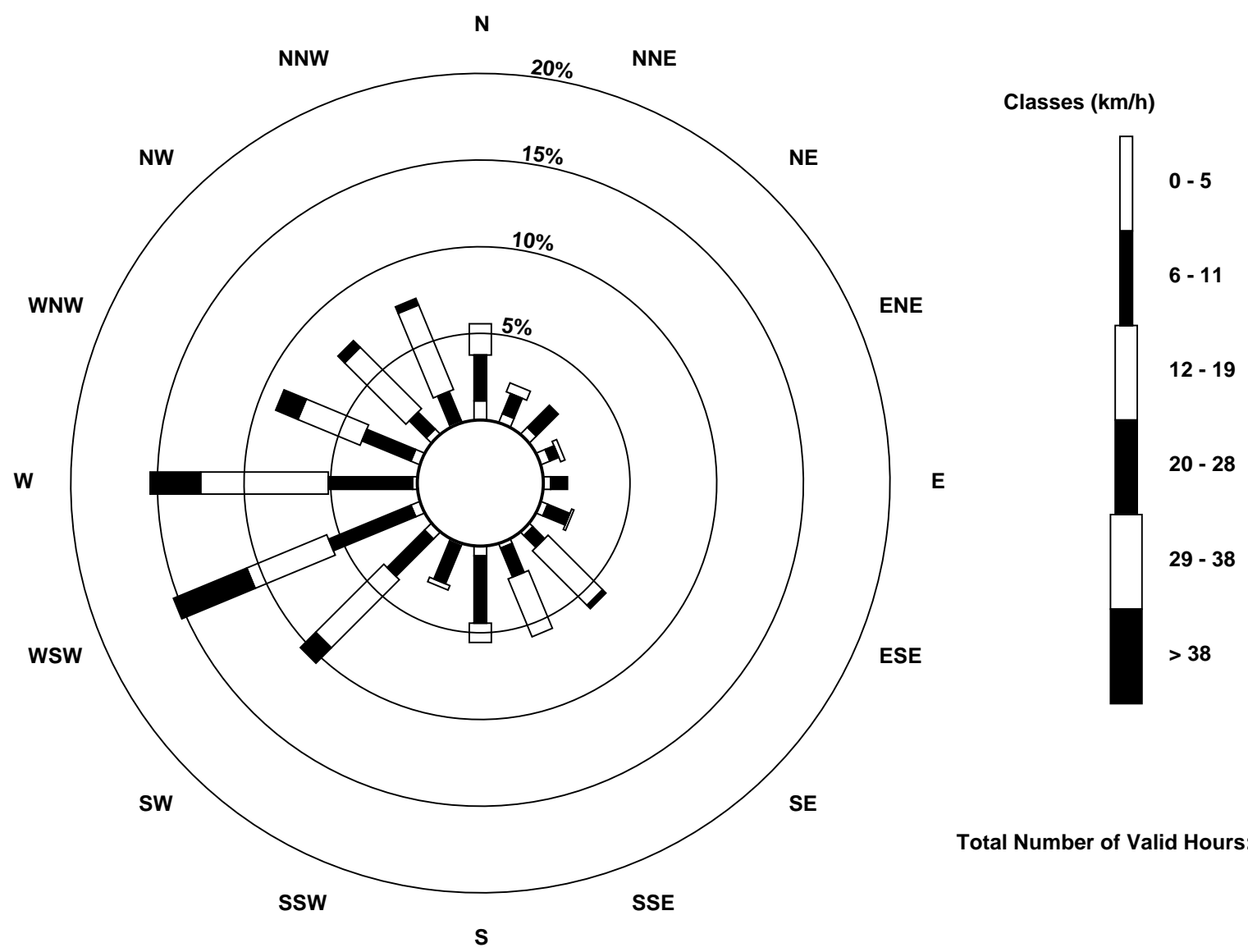
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2015

Wind Speed (WS) - km/h
ConocoPhillips - Surmont (AMS502)



Total Number of Valid Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Speed (WS) - km/h

ConocoPhillips - Surmont - June 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 9 km/h on Jun 9 16:00 Minimum Value: 1 km/h on Jun 6 22:00 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: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0									
Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	4	3	3	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	4	4	3	3	2	2	5	
2-Jun	1	2	2	2	4	3	2	2	2	3	3	2	3	4	4	4	4	4	3	4	2	2	1	1	4	
3-Jun	2	2	2	4	3	2	3	3	3	3	3	3	4	4	4	4	4	4	3	3	3	3	2	2	4	
4-Jun	2	2	2	1	1	1	2	2	3	3	4	5	4	5	5	5	5	5	4	6	4	2	2	1	6	
5-Jun	2	2	2	2	2	3	3	3	3	3	5	4	4	5	4	4	4	3	4	2	2	2	3	3	5	
6-Jun	4	3	5	3	3	3	4	4	4	5	5	5	5	6	4	8	6	4	3	2	1	1	1	2	8	
7-Jun	1	2	2	3	2	2	2	3	3	4	5	6	4	5	5	4	5	3	2	1	1	1	4	3	6	
8-Jun	3	2	3	2	1	2	3	4	4	4	4	5	4	9	8	7	9	4	5	4	4	4	2	2	9	
9-Jun	1	3	2	2	2	2	2	3	4	4	5	5	4	4	5	9	4	4	3	3	3	1	2	2	9	
10-Jun	1	2	2	3	1	2	1	3	3	2	3	3	3	4	3	3	3	7	7	1	1	2	2	2	7	
11-Jun	2	3	3	3	2	3	3	3	3	3	4	5	5	6	6	3	3	7	4	3	1	2	3	2	7	
12-Jun	4	3	4	3	2	3	3	4	4	4	4	5	4	3	2	2	3	5	4	4	3	2	3	3	5	
13-Jun	5	3	3	3	2	2	3	4	4	4	4	4	6	5	3	2	3	3	3	4	4	3	2	3	6	
14-Jun	3	3	3	4	3	3	2	2	3	4	3	4	4	4	4	4	4	4	2	2	2	1	2	2	4	
15-Jun	1	2	1	3	1	2	2	3	3	3	3	3	3	2	3	5	3	6	4	3	2	3	2	1	2	6
16-Jun	2	2	3	5	2	2	4	3	3	3	3	3	3	3	3	3	3	4	3	2	1	1	1	1	5	
17-Jun	1	2	2	3	2	3	3	3	3	4	3	3	4	3	4	4	2	3	2	2	1	2	1	2	4	
18-Jun	2	3	3	3	3	3	3	3	3	3	4	3	4	5	4	3	4	4	4	2	1	1	1	2	5	
19-Jun	1	2	2	2	3	2	3	3	3	4	3	4	4	3	4	5	4	3	2	2	2	3	1	3	5	
20-Jun	3	2	2	2	1	2	1	2	2	2	3	3	4	3	4	4	7	5	5	5	4	4	4	4	7	
21-Jun	3	3	2	2	2	4	2	3	2	4	3	5	4	5	5	5	4	3	2	2	4	4	4	2	5	
22-Jun	2	2	3	2	2	2	2	3	3	3	4	4	3	3	7	7	3	4	3	3	3	2	2	2	7	
23-Jun	2	2	3	1	2	3	2	2	2	2	3	4	6	4	3	4	2	5	3	3	1	2	2	2	6	
24-Jun	2	2	2	2	2	2	2	2	3	4	4	4	4	4	4	5	9	4	3	4	1	2	3	2	9	
25-Jun	2	2	2	1	1	2	2	2	1	2	3	3	4	6	2	7	6	2	4	2	1	1	4	3	7	
26-Jun	2	3	3	3	3	3	3	4	3	4	4	5	5	6	6	6	6	6	6	4	4	2	2	2	6	
27-Jun	2	3	3	3	3	3	3	3	3	3	4	5	4	5	7	4	5	3	4	2	1	2	1	2	7	
28-Jun	2	2	2	2	2	3	3	3	3	4	5	4	5	6	5	5	4	4	3	1	1	1	1	4	6	
29-Jun	2	2	1	1	1	1	1	1	2	3	3	3	3	3	3	2	2	2	1	2	1	3	3	3	3	
30-Jun	3	3	3	3	4	4	5	4	4	4	3	3	4	4	2	3	2	3	2	1	2	2	1	2	5	
Diurnal Maximum																										



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

ConocoPhillips - Surmont - June 2015

Direction of Maximum Speed: 282 deg on Jun 8 16:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 285.5 deg on Jun 1	Hours of Data: 720
Direction of Minimum Speed: 187 deg on Jun 10 19:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 1.5 deg on Jun 10	Percent Operational Time: 100.0
Monthly Average Direction: 271.4 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	254	262	267	277	284	280	274	273	272	275	275	279	285	287	288	287	306	308	326	326	326	320	287	295	285.5
2-Jun	248	222	215	237	302	222	41	87	143	32	43	57	108	122	129	139	124	127	132	161	193	182	200	178	159.7
3-Jun	158	135	144	138	161	172	151	145	140	143	137	136	126	129	128	137	140	141	135	130	134	158	181	180	142.7
4-Jun	177	172	169	189	188	201	202	154	125	132	135	145	146	141	131	132	146	154	162	171	189	177	180	167	155.3
5-Jun	164	166	185	190	219	207	207	220	202	162	159	167	168	158	170	183	187	189	221	219	210	210	216	222	191.2
6-Jun	225	233	237	241	236	234	243	263	265	267	264	258	264	273	317	311	256	286	302	269	243	240	241	247	257.6
7-Jun	252	229	228	265	272	303	265	294	311	299	288	273	276	276	281	272	279	273	334	357	180	174	226	266	277.0
8-Jun	317	359	153	234	199	220	237	260	276	271	271	296	279	288	277	282	325	353	278	295	279	283	262	255	276.3
9-Jun	261	268	270	272	260	271	280	289	291	292	288	283	280	238	264	330	331	322	331	317	313	259	257	262	285.9
10-Jun	268	277	256	259	283	285	318	344	8	4	29	30	353	301	42	40	73	239	187	89	114	141	138	163	327.4
11-Jun	170	162	163	170	171	171	159	153	157	146	163	237	237	234	243	208	136	241	5	47	102	125	157	194	181.7
12-Jun	219	235	255	276	281	270	278	294	304	304	339	343	303	281	267	272	63	58	68	356	18	40	39	24	303.8
13-Jun	19	7	5	12	350	333	325	321	323	329	339	346	334	358	37	48	69	71	34	350	347	338	323	336	350.0
14-Jun	341	328	327	329	327	338	332	312	323	328	352	6	5	350	359	335	330	335	352	355	296	258	249	243	332.7
15-Jun	240	261	252	260	275	293	313	334	328	325	330	357	28	27	288	292	268	244	244	250	157	160	188	205	280.8
16-Jun	226	226	234	269	253	289	323	332	336	353	6	333	324	328	323	322	314	310	292	282	265	273	264	257	299.5
17-Jun	242	260	286	301	295	314	327	335	340	344	328	337	322	7	352	345	45	350	53	101	108	145	176	174	322.9
18-Jun	175	173	170	167	167	160	163	162	150	140	145	126	167	152	144	154	176	164	176	184	188	173	193	238	163.0
19-Jun	333	299	280	287	316	324	326	346	346	357	356	348	351	12	38	2	353	12	5	340	328	312	282	302	336.7
20-Jun	304	309	298	278	295	302	12	6	358	71	112	68	346	349	30	321	230	238	242	248	249	246	248	261	262.1
21-Jun	271	265	260	273	292	288	229	292	333	342	349	337	336	333	325	312	308	325	286	272	284	244	248	260	295.5
22-Jun	258	264	263	261	263	258	248	268	277	254	251	258	263	269	294	312	298	320	321	313	295	235	241	281	274.1
23-Jun	266	254	225	242	254	240	246	358	91	279	260	270	80	97	109	82	175	218	234	234	226	223	225	227	222.4
24-Jun	226	229	228	229	230	232	231	232	229	241	243	231	231	242	243	242	234	230	243	233	228	232	237	236	233.5
25-Jun	268	246	250	233	217	235	336	24	60	88	115	110	169	315	108	208	167	229	340	52	135	153	274	194	205.2
26-Jun	172	201	224	228	233	236	235	240	251	239	242	242	242	255	251	254	255	257	273	281	267	245	237	238	245.0
27-Jun	238	238	244	253	254	249	260	246	275	275	275	267	249	253	262	250	254	247	259	254	236	224	232	234	250.6
28-Jun	236	234	234	240	241	241	245	247	259	293	319	319	298	296	283	279	280	292	300	266	272	307	274	255	271.4
29-Jun	252	255	232	246	230	219	220	236	260	294	357	358	4	35	52	103	107	110	108	134	194	212	231	238	228.4
30-Jun	238	237	236	236	236	239	249	271	271	272	267	266	293	320	15	9	23	29	48	87	91	230	207	227	261.0

242.1 242.7 240.7 250.3 254.0 255.6 263.4 275.8 285.9 290.3 290.5 285.9 280.4 282.1 285.6 283.8 262.5 267.4 283.3 270.9 258.2 229.2 234.9 240.8

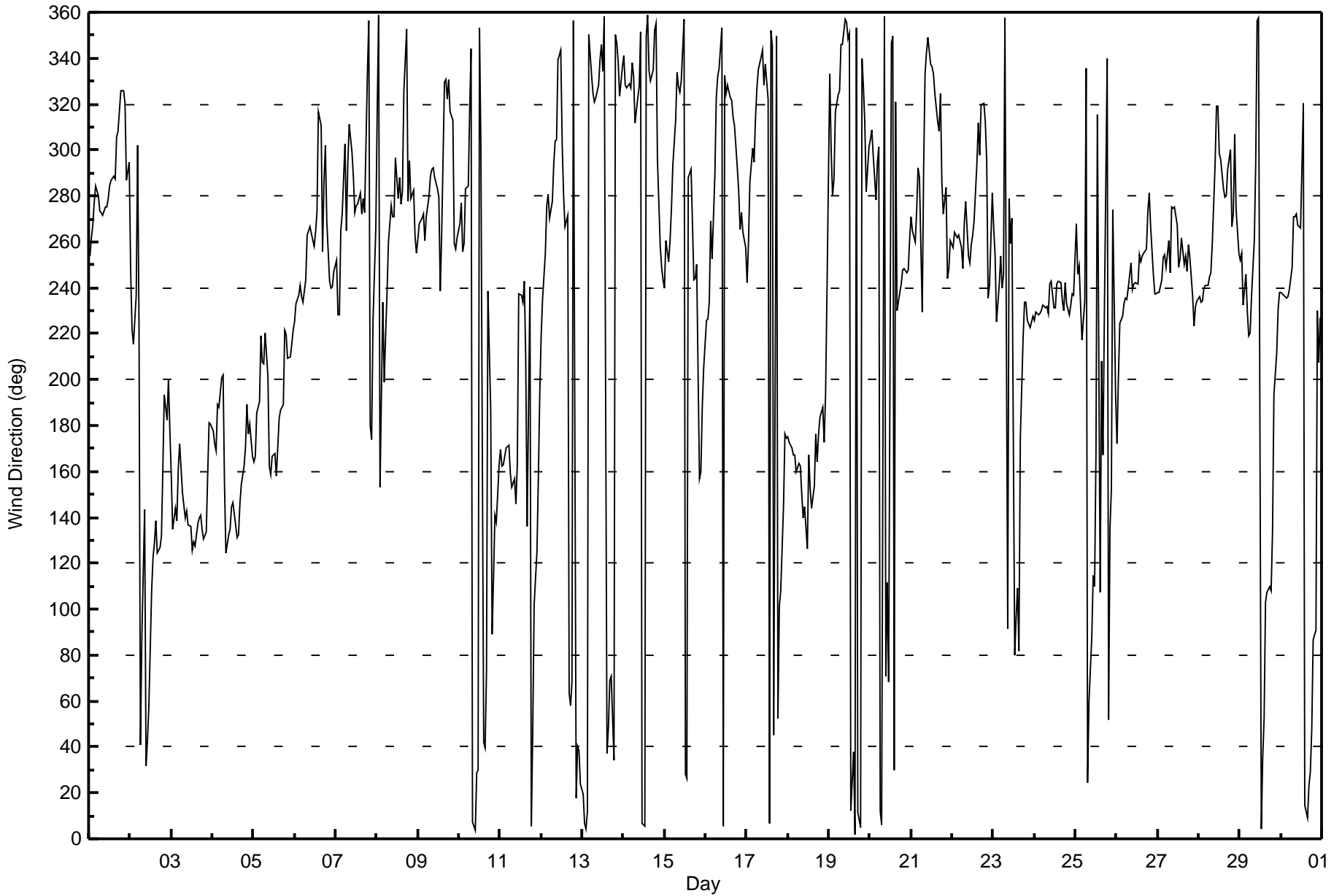
Diurnal Average

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



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
ConocoPhillips - Surmont - June 2015





Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg

ConocoPhillips - Surmont - June 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 104 deg on Jun 23 10:00	Hours of Data: 720
Minimum Value: 4 deg on Jun 29 04:00	Hours of Missing Data: 0
Percentiles: P ₁ = 7 P ₁₀ = 9 Q ₁ = 13 Median = 17 Q ₃ = 25 P ₉₀ = 41 P ₉₉ = 86	Hours of Calibration: 0
	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	10	9	10	11	12	10	10	11	11	11	13	15	14	18	19	22	20	15	17	12	9	19	13	15	22
2-Jun	20	17	11	32	23	54	24	38	63	70	75	84	93	47	42	27	28	19	17	30	16	19	17	17	93
3-Jun	16	19	20	16	13	17	13	13	15	15	19	18	18	20	16	19	15	16	15	12	13	16	14	13	20
4-Jun	14	15	16	14	12	15	18	37	16	20	21	25	27	19	19	16	18	23	18	19	20	18	20	14	37
5-Jun	14	17	16	22	14	18	18	16	28	25	27	29	26	25	25	31	27	28	17	15	15	14	15	12	31
6-Jun	12	8	8	8	8	9	11	13	14	15	16	15	19	16	26	25	28	24	17	13	9	5	6	12	28
7-Jun	15	11	11	13	28	19	10	20	19	23	23	19	22	18	21	14	19	13	19	15	82	15	54	10	82
8-Jun	87	44	32	50	21	17	10	15	13	17	22	27	18	20	12	14	46	44	23	22	11	15	13	14	87
9-Jun	15	9	11	11	12	12	13	21	18	24	30	23	23	17	25	32	21	26	15	21	28	15	7	8	32
10-Jun	12	10	10	22	10	15	27	25	38	52	55	76	69	85	42	76	65	82	97	22	10	12	13	23	97
11-Jun	14	16	12	14	21	22	16	17	15	17	42	16	15	19	14	39	26	60	44	24	30	11	20	17	60
12-Jun	17	9	18	10	8	10	10	16	19	26	24	28	31	31	14	32	16	31	25	57	25	15	16	12	57
13-Jun	20	20	16	16	14	13	11	12	11	13	18	18	17	27	29	22	29	22	22	22	16	16	10	14	29
14-Jun	14	12	11	13	11	14	15	15	11	14	20	27	26	25	23	21	18	22	18	16	33	13	7	13	33
15-Jun	7	14	20	19	9	14	18	14	17	53	68	22	34	42	29	33	19	21	17	24	47	25	12	15	68
16-Jun	9	8	12	17	19	14	10	13	16	17	23	14	10	12	19	16	18	17	19	20	9	11	9	12	23
17-Jun	13	15	11	20	15	20	11	16	18	21	30	24	34	44	69	58	50	81	85	24	10	26	13	14	85
18-Jun	14	15	15	14	15	14	15	18	17	19	18	15	23	23	20	23	23	20	23	19	15	13	22	18	23
19-Jun	22	24	13	15	15	8	12	17	20	19	21	34	40	39	33	55	42	32	28	15	10	26	12	17	55
20-Jun	17	14	21	25	20	75	35	30	35	47	46	92	55	84	54	72	13	10	11	10	9	9	9	10	92
21-Jun	10	12	12	9	17	43	35	69	24	28	25	37	26	24	27	26	25	25	19	17	32	14	11	8	69
22-Jun	8	9	10	9	9	16	16	10	10	22	15	14	15	15	28	21	41	27	13	28	40	13	24	24	41
23-Jun	31	26	24	13	36	62	31	88	29	104	29	70	74	61	22	54	26	26	11	10	9	10	9	8	104
24-Jun	9	8	8	7	8	8	8	9	14	23	29	25	33	20	35	24	18	12	11	13	8	7	10	9	35
25-Jun	39	8	8	14	11	52	51	43	34	34	28	30	22	86	51	17	38	29	26	28	42	26	56	67	86
26-Jun	13	22	11	9	8	8	8	11	14	14	16	15	16	15	16	15	13	14	21	13	9	8	7	7	22
27-Jun	7	8	8	10	10	10	12	16	26	30	23	19	28	29	26	22	24	13	14	8	12	8	6	6	30
28-Jun	7	7	8	7	8	8	9	9	11	22	19	22	29	22	22	16	14	17	22	8	31	31	21	43	43
29-Jun	10	8	11	4	8	8	9	8	11	49	27	31	45	41	36	26	20	11	11	21	17	16	8	8	49
30-Jun	9	8	9	9	9	9	14	17	12	13	14	15	25	23	25	20	17	16	16	18	49	42	13	16	49

87	44	32	50	36	75	51	88	63	104	75	92	93	86	69	76	65	82	97	57	82	42	56	67	
Diurnal Maximum																								



Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

Calibration Date	June 25, 2015	Last Calibration	May 26, 2015
Station Name	ConocoPhillips - Surmont	Station Number	AMS 502
Reason:	Routine		
Start Time (MST)	10:10	End Time (MST)	10:55
Gas Cert Reference	LL110503	Station temp.	21 Deg C
Cal Gas Concentration	51.1 ppm	Cal Gas Exp Date	April-1-2016
Calibrator Make/Model	API T700	Serial Number	522
ZAG Make/Model	API 701	Serial Number	4865
DACS make/model	Campbell Scientific CR3000	DACS serial No.	7882

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		PMT voltage	762	NA
Analyzer IP address	192.168.1.43		Lamp voltage	2527	NA
Calculated slope	1.004091	1.007265	Chamber temp	49.9	NA
Calculated intercept	0.290761	-0.030218	Pressure	22.3	NA
Analyzer Background	18.5	NA	Flow	0.555	NA
Analyzer Coefficient	1.012	NA	Intensity	62	NA

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	0.0	----
as found span	5000	76.7	783.9	778.3	1.007
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	76.7	783.9	778.3	1.007
second point					
third point					
as left zero					
as left span					
Average Correction Factor					1.007

Corrected As found 778.2 Previous response 780.4 % change 0.3%

Notes:

As founds based on response to existing calibration cylinder input prior to replacement.

Calibration Performed By: Asad Hidayat



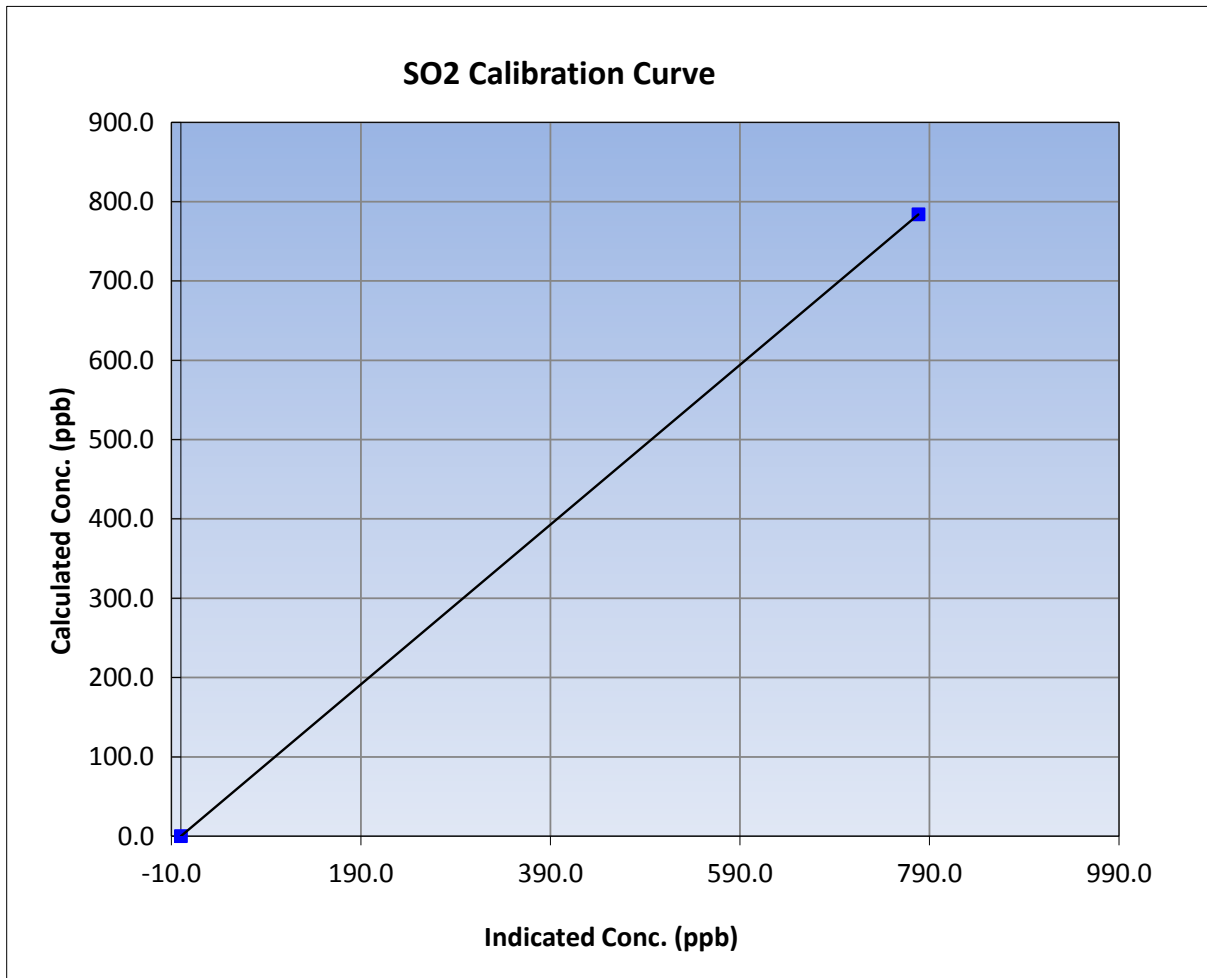
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	June 25, 2015	Previous Calibration	May 26, 2015
Station Name	ConocoPhillips - Surmont	Station Number	AMS 502
Start Time (MST)	10:10	End Time (MST)	10:55
Analyzer make	API T100	Analyzer serial #	598

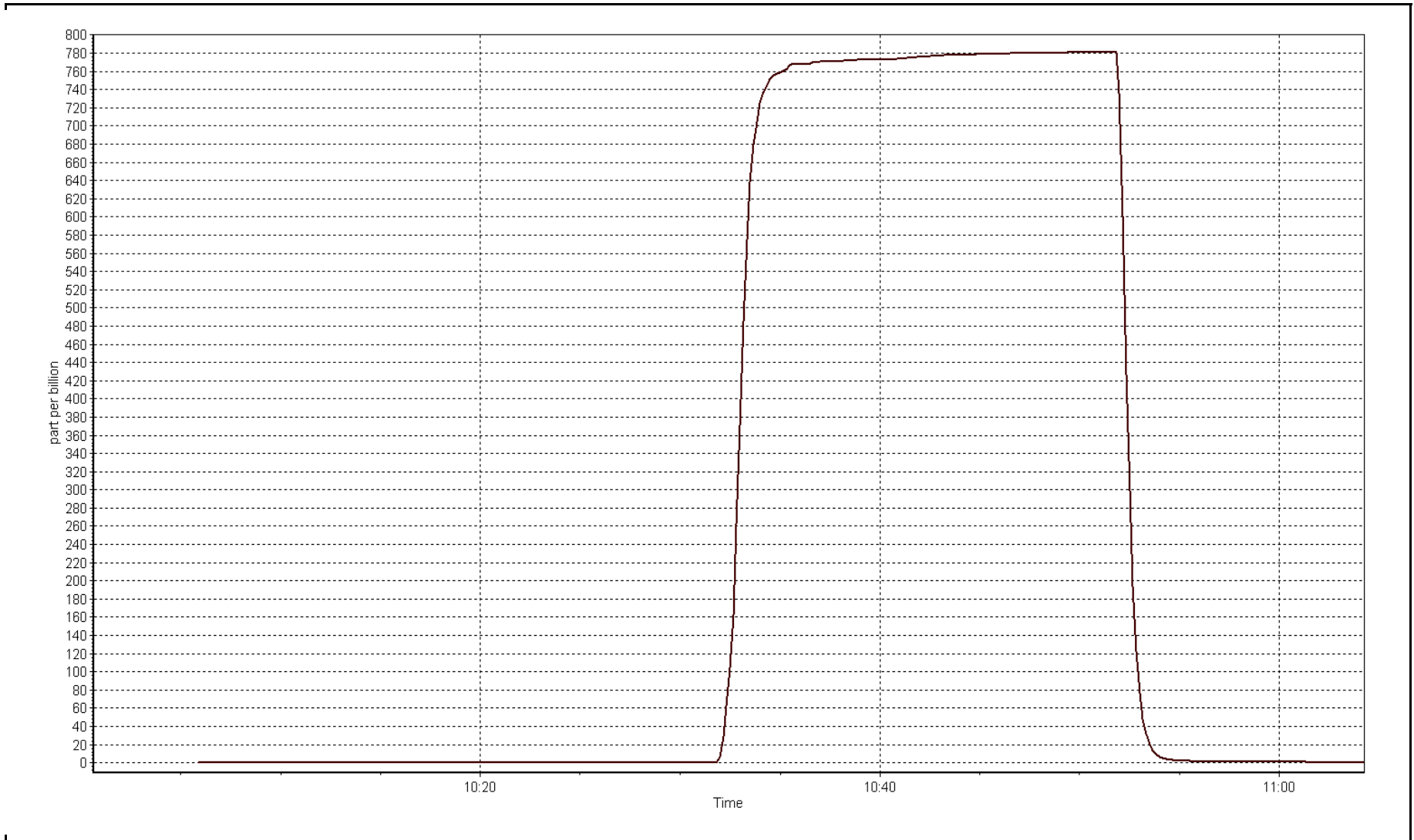
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	1.000000
783.9	778.3	1.0072		Slope
			Intercept	-0.030218



SO2 Calibration Plot

Date: June 25, 2015





Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

Calibration Date	June 25, 2015	Last Calibration	May 26, 2015
Station Name	ConocoPhillips - Surmont	Station Number	AMS 502
Reason:	Routine		
Start Time (MST)	10:10	End Time (MST)	15:37
Gas Cert Reference	LL104215	Station temp.	21 Deg C
Cal Gas Concentration	48.3 ppm	Cal Gas Exp Date	12-Feb-18
Calibrator Make/Model	API T700	Serial Number	522
ZAG Make/Model	API 701	Serial Number	4865
DACS make/model	Campbell Scientific CR3000	DACS serial No.	7882

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		PMT voltage	762	761
Analyzer IP address	192.168.1.43		Lamp voltage	2527	2468
Calculated slope	1.007265	1.003998	Chamber temp	49.9	50.0
Calculated intercept	-0.030218	-0.064523	Pressure	22.3	22.3
Analyzer Background	18.5	18.5	Flow	555	560
Analyzer Coefficient	1.012	1.014	Intensity	62	61
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	0.0	----
as found span	5000	82.9	800.8	780.0	1.027
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	82.9	800.8	797.5	1.004
second point	5000	41.4	399.9	398.9	1.003
third point	5000	20.7	200.0	199.0	1.005
as left zero	5000	0.0	0.0	0.3	----
as left span	6000	99.8	803.4	795.4	1.010
Average Correction Factor					1.004

Corrected As found 780.0 Previous response 795.1 % change 1.9%

Notes:

Changed inlet filter after as founds. Data reflects new calibration gas cylinder input. Adjusted span.

Calibration Performed By:

Asad Hidayat



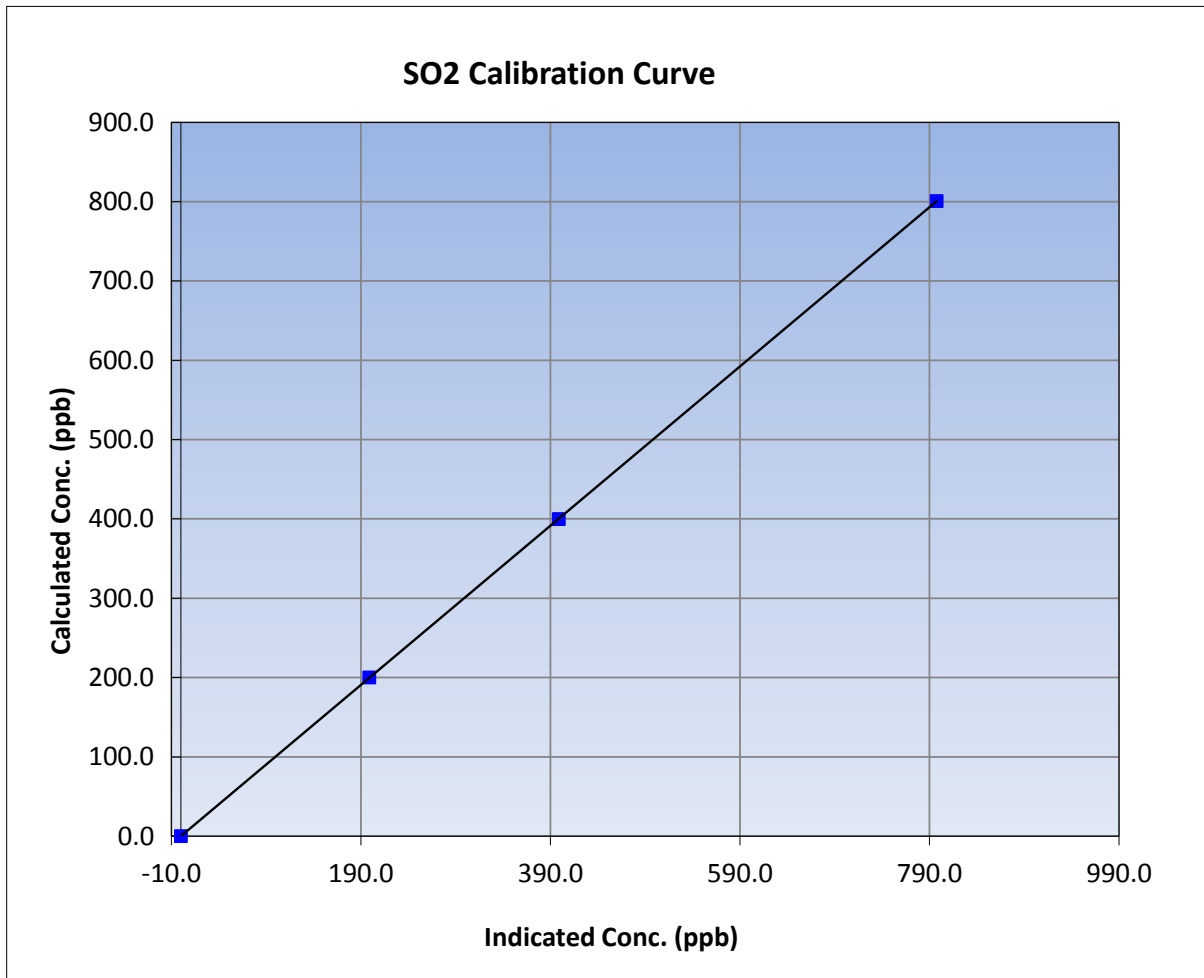
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	June 25, 2015	Previous Calibration	May 26, 2015
Station Name	ConocoPhillips - Surmont	Station Number	AMS 502
Start Time (MST)	10:10	End Time (MST)	15:37
Analyzer make	API T100	Analyzer serial #	598

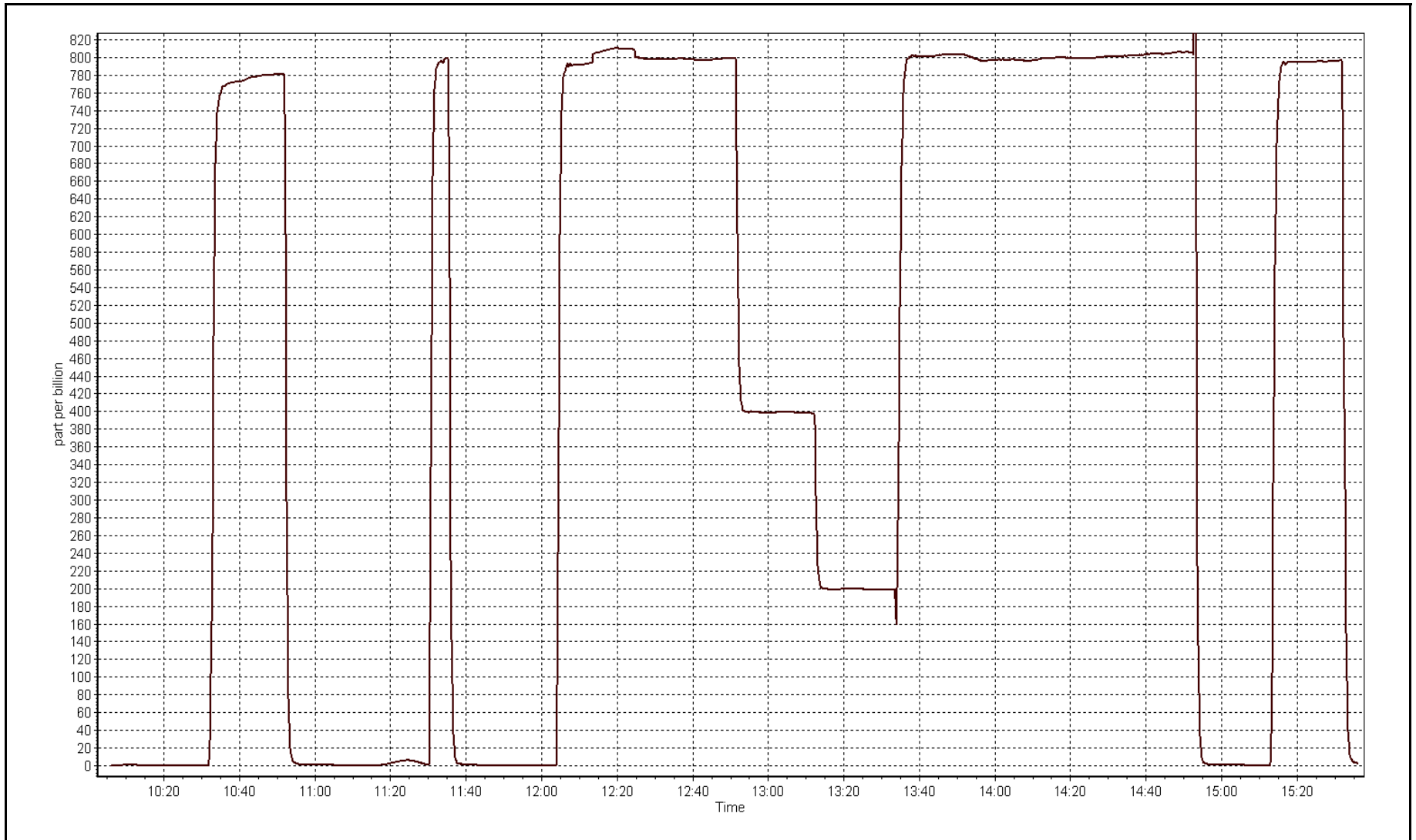
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999999
800.8	797.5	1.0041		
399.9	398.9	1.0026	Slope	1.003998
200.0	199.0	1.0050		
			Intercept	-0.064523



SO2 Calibration Plot

Date: June 25, 2015





Wood Buffalo Environmental Association H2S Calibration Report

Station Information

Calibration Date	June 24, 2015	Last Calibration	May 22, 2015
Station Name	ConocoPhillips-Surmont	Station Number	AMS 502
Reason:	Routine		
Start Time (MST)	8:00	End Time (MST)	11:00
Gas Cert Reference	LL34303	Station temp.	21 Deg C
Cal Gas Concentration	10.4 ppm	Cal Gas Exp Date	30 May, 2016
Calibrator Make/Model	API T700	Serial Number	622
ZAG air Make/Model	API 701	Serial Number	4865
DACS make/model	Campbell Scientific CR3000	Serial Number	7882
SO2 gas concentration	51.1 ppm	SO2 gas cert/exp	LL110503 April-1-2016

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	85	84
Analyzer IP address	192.168.1.75		Lamp voltage	2480	2404
Calculated slope	1.008776	0.999914	Chamber temp	50	50
Calculated intercept	-0.085506	-0.091368	Pressure	22.7	22.9
Analyzer Background	19.3	20.1	Flow	561.000	567.000
Analyzer Coefficient	0.937	0.942	Intensity	55	53
			Converter temp.	315	316

Analyzer make/model	API T101	Analyzer serial #	197
Converter make/model	N/A	Converter serial #	N/A

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.4	----
as found span	5000	38.5	80.1	80.9	0.990
SO2 scrubber check	5000	19.6	200.3	3.7	----
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	38.5	80.1	80.1	1.000
second point	5000	19.3	40.1	40.4	0.994
third point	5000	12.1	25.2	25.3	0.995
as left zero	5000	0.0	0.0	0.0	----
as left span	5000	38.5	80.1	80.2	0.998
Average Correction Factor					0.996

Corrected As found	80.5	Previous response	79.5	% change	-1.2%
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Notes:

Inlet filter replaced and scrubber check done after as founds. Adjusted zero.

Calibration Performed By: Asad Hidayat



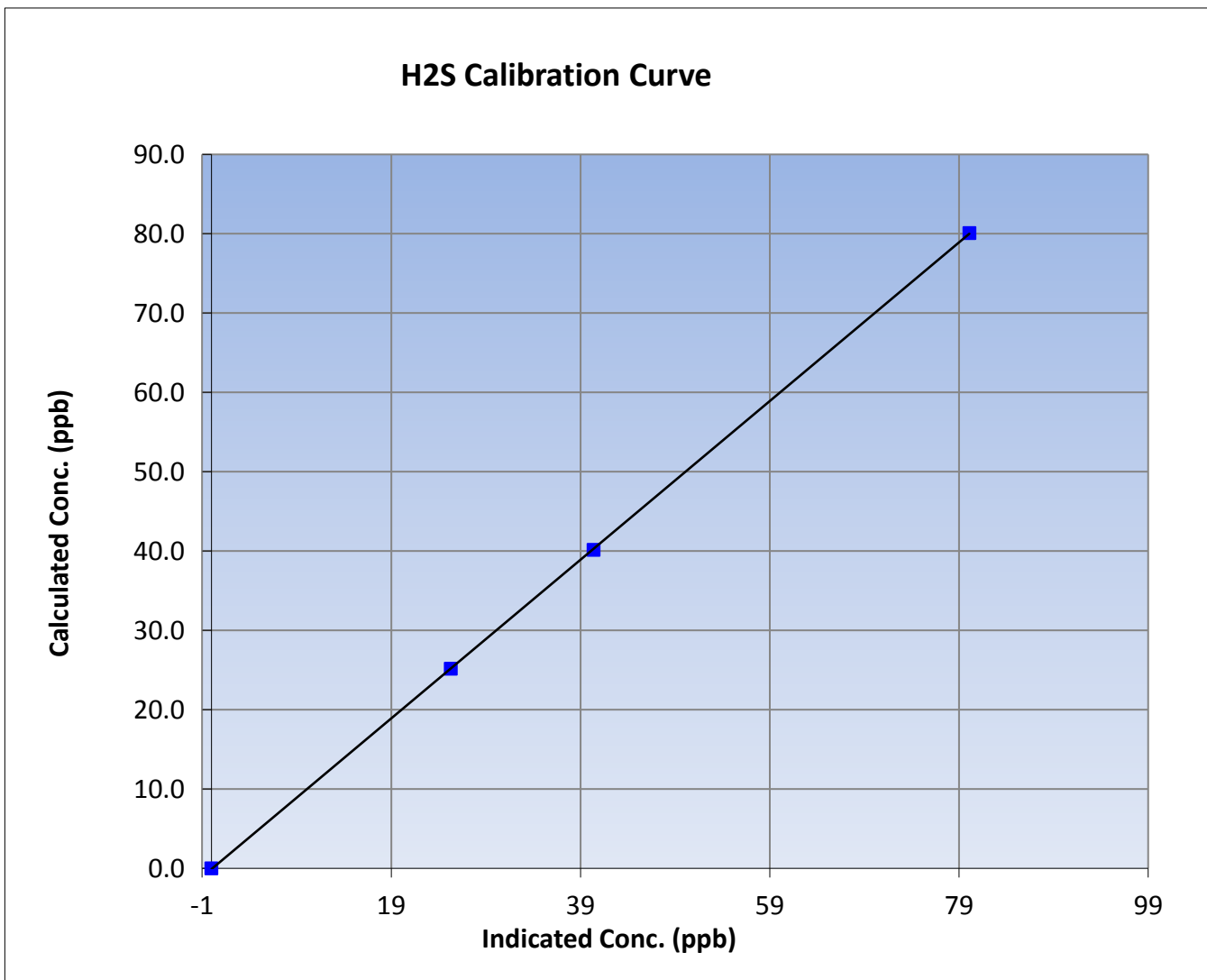
Wood Buffalo Environmental Association H2S Calibration Report

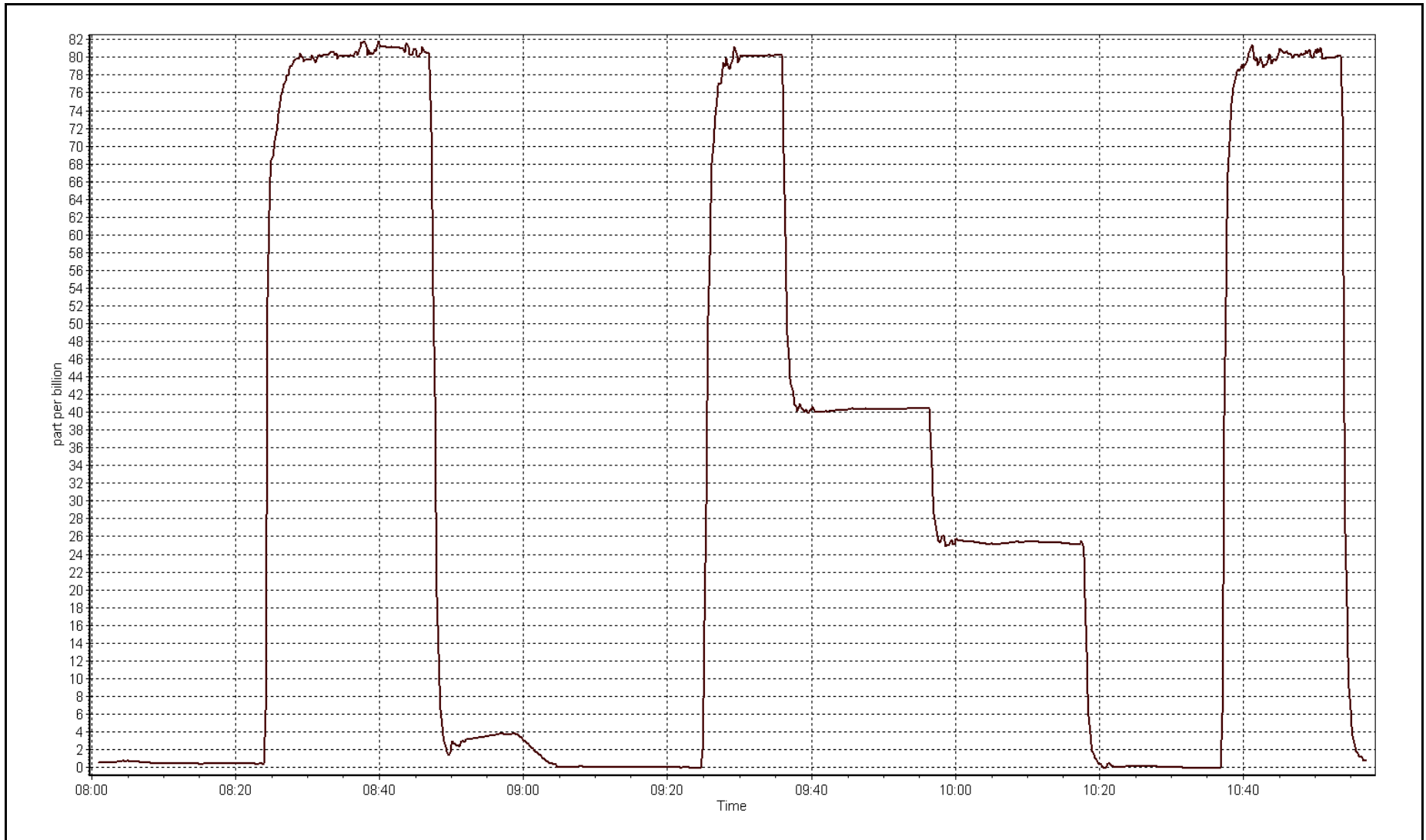
Station Information

Calibration Date	June 24, 2015	Previous Calibration	May 22, 2015
Station Name	ConocoPhillips-Surmont	Station Number	AMS 502
Start Time (MST)	8:00	End Time (MST)	11:00
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	0.999990
80.1	80.1	0.9998		
40.1	40.4	0.9944	Slope	0.999914
25.2	25.3	0.9948		
			Intercept	-0.091368







Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	June 25, 2015	Previous Calibration	May 26, 2015
Station Name	ConocoPhillips - Surmont	Station Number	AMS 502
Reason:	Routine		
Start Time (MST)	10:10	End Time (MST)	10:55
NO Cal Gas Conc	52.2 ppm	Gas Cert Reference	LL110503
NOx Cal Gas Conc	52.2 ppm	Cal Gas Expiry Date	01-Apr-16
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
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Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.998278	0.998683	0.980838
	Data Offset	-0.142424	-1.193296	1.206103
Current Calibration	Data Slope	1.034640	1.036154	
	Data Offset	1.976162	0.528439	

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1218153356
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Test Point	before		after	
Concentration range	0-1000	ppb	NA	ppb
NO coefficient	0.706		NA	
NOx coefficient	1.001		NA	
NO2 coefficient	1.000		NA	
NO bkgrnd	4.8		NA	
NOx bkgrnd	6.6		NA	
Chamber Temp	50.6	Deg C	NA	Deg C
Moly Temp	327.6	Deg C	NA	Deg C
PMT voltage	-940.9	V	NA	V
PMT Temp	-3	Deg C	NA	Deg C
O3 flow	ok	ccm	NA	ccm
R Cell press NO	204.4	mmHg	NA	mmHg
R Cell Press Nox	204.4	mmHg	NA	mmHg
NO sample flow	0.506	lpm	NA	lpm
Nox sample Flow	0.506	lpm	NA	lpm

Notes:

As founds based on response to existing calibration cylinder input prior to replacement.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date:

June 25, 2015

Station Number:

AMS 502

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	-1.9	-0.5	-1.4	----	----
as found span	5000	76.7	800.7	800.7	0.0	771.0	771.3	-0.3	1.0386	1.0382
calibrator zero	5000	0.0	0.0	0.0	0.0	-1.9	-0.5	-1.4	----	----
high point	5000	76.6	799.7	799.7	0.0	771.0	771.3	-0.3	1.0372	1.0368
second point										
third point										
as left zero										
as left span										
Average Correction Factor									1.0372	1.0368

Corrced As found NO_x= 772.9 NO= 771.8 Percent Change NO_x= 3.8% NO= 4.0%
 Previous Response NO_x= 802.3 NO= 803.0

GPT Calibration Data

Dilution Flow 5000 ccm Source Gas Flow 76.70 ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
Cal zero										
1st NO2 (300)										
2nd NO2 (200)										
3rd NO2 (100)										
4th NO2 (0)										
Average Correction Factor										

Calibration Performed By: Asad Hidayat



Wood Buffalo Environmental Association

NO_x Calibration Summary

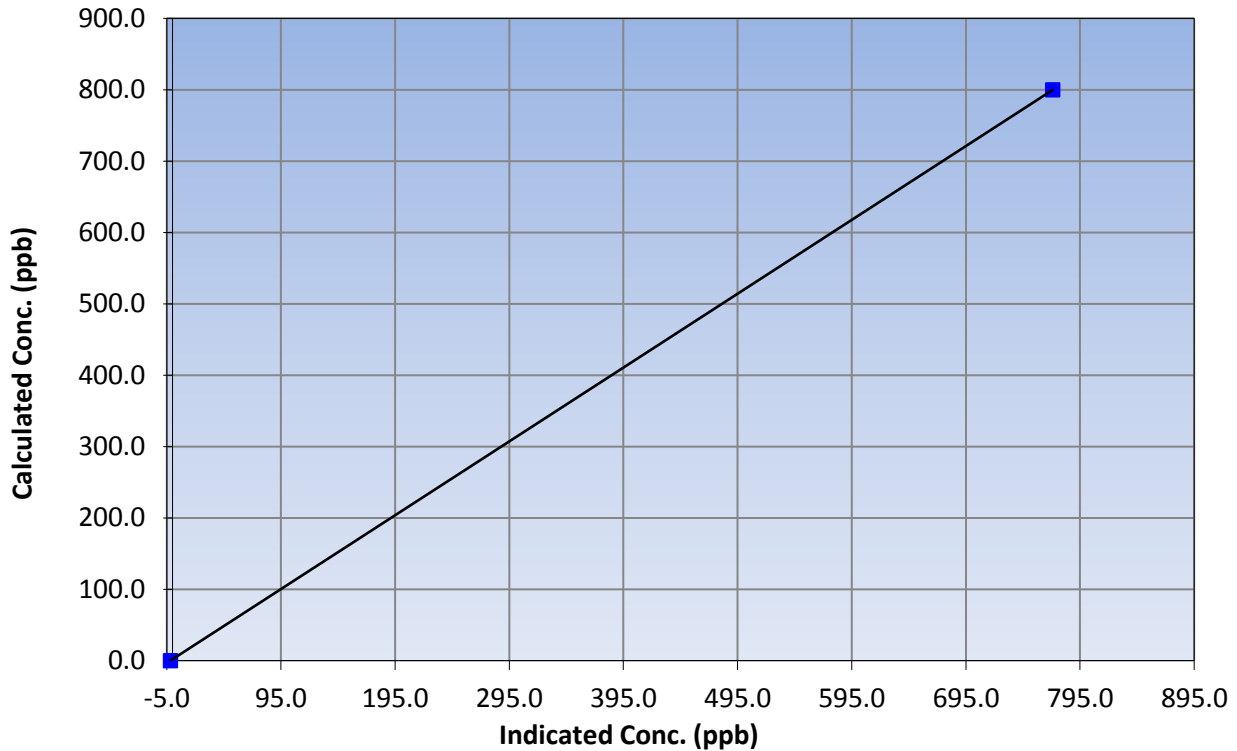
Station Information

Calibration Date	June 25, 2015	Previous Calibration	May 26, 2015
Station Name	ConocoPhillips - Surmont	Station Number	AMS 502
Start Time (MST)	10:10	End Time (MST)	10:55
Analyzer make	Thermo 42i	Analyzer serial #	1218153356

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-1.9	----	Correlation Coefficient	1.000000
799.7	771.0	1.0372		
			Slope	1.034640
			Intercept	1.976162

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

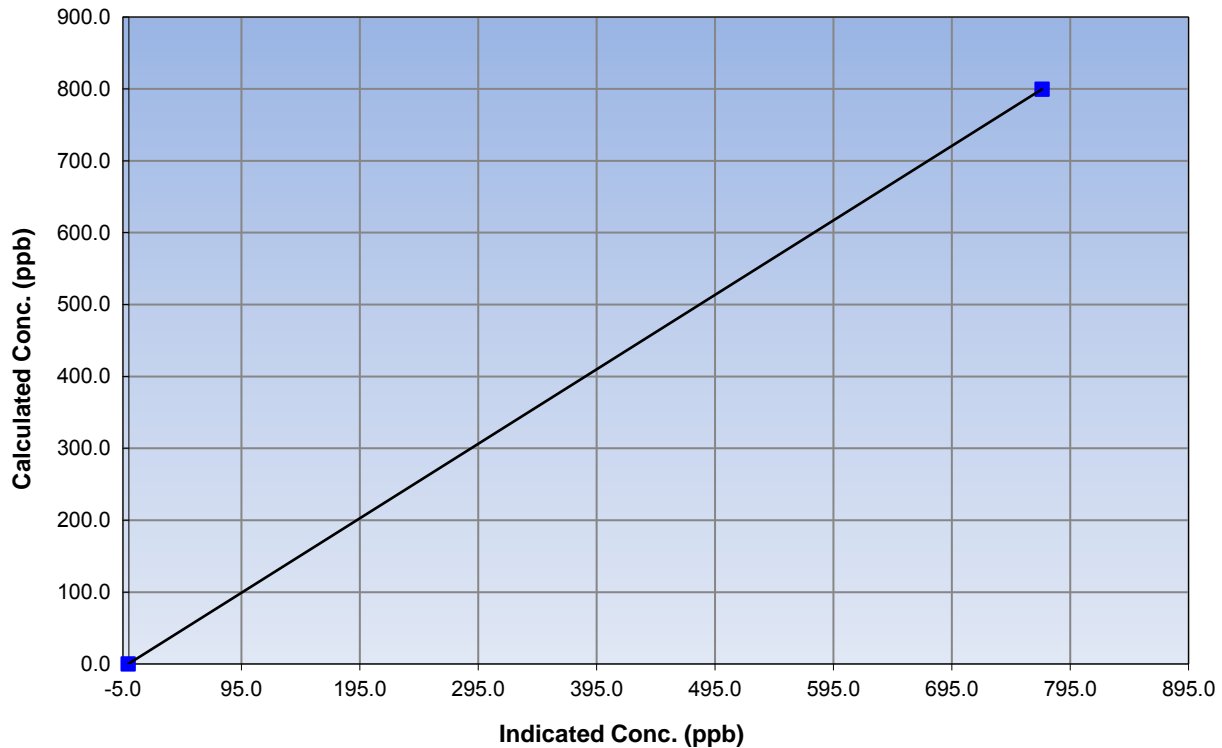
Station Information

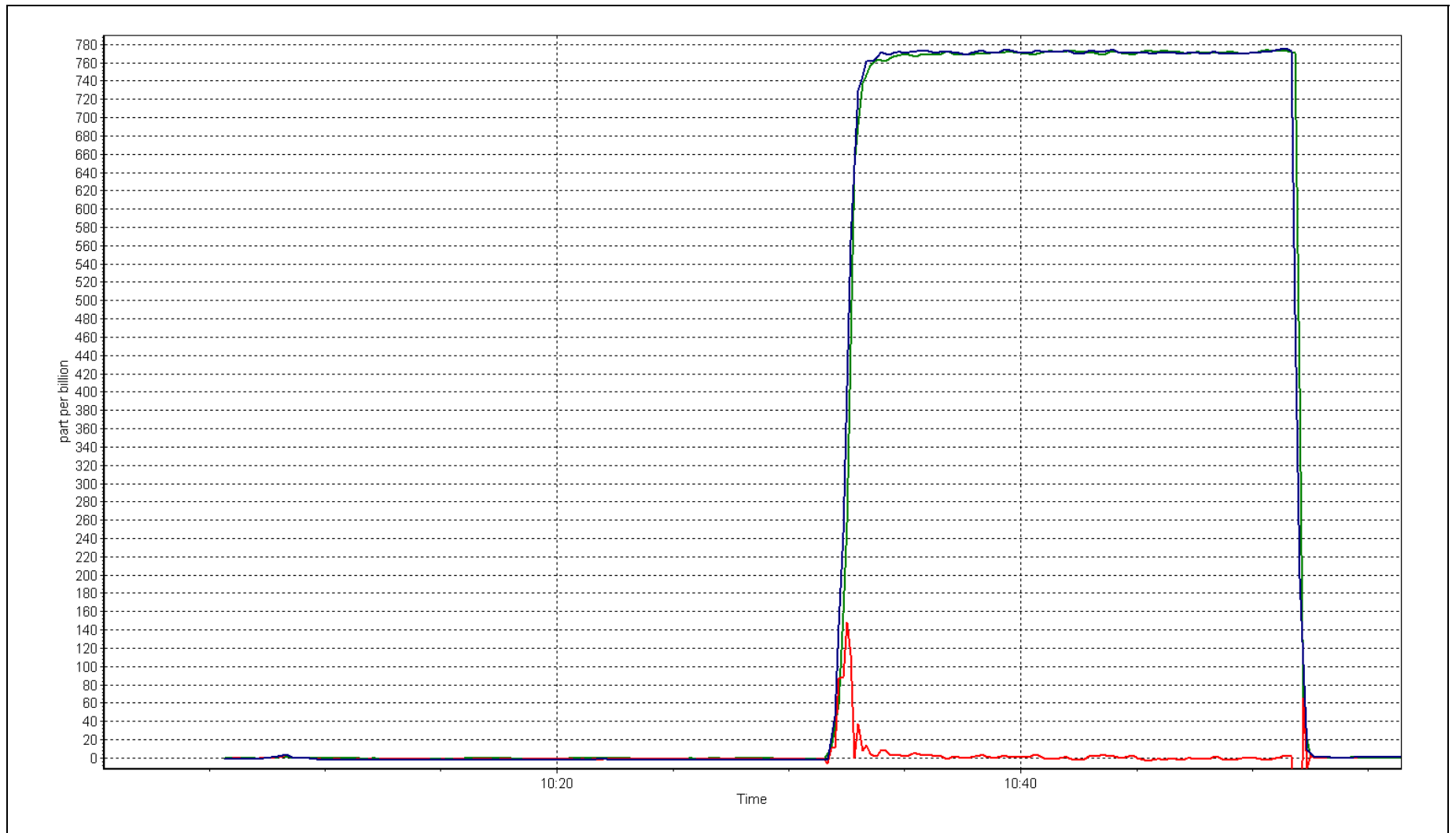
Calibration Date	June 25, 2015	Previous Calibration	May 26, 2015
Station Name	ConocoPhillips - Surmont	Station Number	AMS 502
Start Time (MST)	10:10	End Time (MST)	10:55
Analyzer make	Thermo 42i	Analyzer serial #	1218153356

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.5	N/A	Correlation Coefficient	1.000000
799.7	771.3	1.0368		
			Slope	1.036154
			Intercept	0.528439

NO Calibration Curve







Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	June 25, 2015	Previous Calibration	May 26, 2015
Station Name	ConocoPhillips - Surmont	Station Number	AMS 502
Reason:	Routine		
Start Time (MST)	10:10	End Time (MST)	15:35
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
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Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	1.034640	1.036154	0.980838
	Data Offset	1.976162	0.528439	1.206103
Current Calibration	Data Slope	1.000582	0.998670	0.986045
	Data Offset	-0.290343	-0.240349	0.576412

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1218153356
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Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
NO coefficient	0.706		0.736	
NOx coefficient	1.001		0.999	
NO2 coefficient	1.000		1.000	
NO bkgrnd	4.8		4.4	
NOx bkgrnd	6.6		4.9	
Chamber Temp	50.6	Deg C	50.1	Deg C
Moly Temp	327.6	Deg C	325	Deg C
PMT voltage	-940.9	V	-941.3	V
PMT Temp	-3	Deg C	-3	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	204.4	mmHg	207.9	mmHg
R Cell Press Nox	204.4	mmHg	207.9	mmHg
NO sample flow	0.506	lpm	0.493	lpm
Nox sample Flow	0.506	lpm	0.493	lpm

Notes:

Changed inlet filter after as founds. Cal gas cylinder changed after as founds. Adjusted both Nox and NO zero and span.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date:

June 25, 2015

Station Number:

AMS 502

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	0.0	0.1	-0.1	----	----
as found span	5000	82.9	797.5	797.5	0.0	767.0	766.0	1.0	1.0398	1.0411
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	0.1	-0.1	----	----
high point	5000	82.9	797.5	797.5	0.0	797.1	798.7	-1.5	1.0005	0.9986
second point	5000	41.4	398.3	398.3	0.0	398.8	399.3	-0.6	0.9987	0.9974
third point	5000	20.7	199.1	199.1	0.0	199.4	199.7	-0.3	0.9987	0.9973
as left zero	5000	0.0	0.0	0.0	0.0	-0.1	0.3	-0.3	----	----
as left span	6000	99.8	800.1	515.2	284.9	813.1	528.5	284.5	0.9839	0.9749
Average Correction Factor									0.9993	0.9977

Corrcctd As found NO_x= 767.0 NO= 765.9 Percent Change NO_x= 0.2% NO= 0.4%
 Previous Response NO_x= 768.8 NO= 769.1

GPT Calibration Data

Dilution Flow 5000 ccm Source Gas Flow 83.30 ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
Cal zero			0.0			-0.1			N/A	
1st NO2 (300)	N/A	515.2	277.1	801.3	519.7	281.1	0.9837	0.9914	0.9858	101.4%
2nd NO2 (200)	N/A	599.5	192.8	801.0	606.7	194.2	0.9840	0.9881	0.9926	100.7%
3rd NO2 (100)	N/A	690.0	102.3	800.2	697.5	102.7	0.9850	0.9892	0.9961	100.4%
4th NO2 (0)	792.3	N/A	8.2	800.5	800.6	-0.2	0.9847	0.9897	N/A	----
Average Correction Factor							0.9844	0.9896	0.9915	100.9%

Calibration Performed By: Asad Hidayat



Wood Buffalo Environmental Association

NO_x Calibration Summary

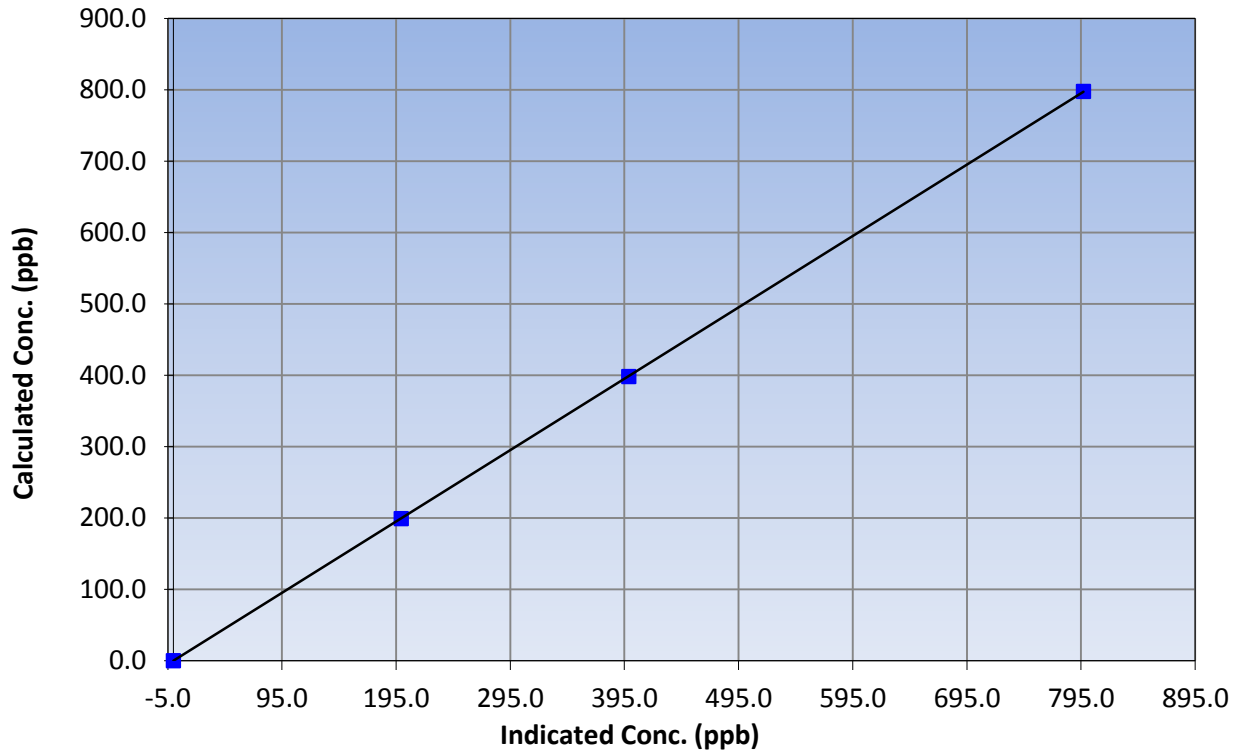
Station Information

Calibration Date	June 25, 2015	Previous Calibration	May 26, 2015
Station Name	ConocoPhillips - Surmont	Station Number	AMS 502
Start Time (MST)	10:10	End Time (MST)	15:35
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	----	Correlation Coefficient	0.999999
797.5	797.1	1.0005		
398.3	398.8	0.9987	Slope	1.000582
199.1	199.4	0.9987		
			Intercept	-0.290343

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

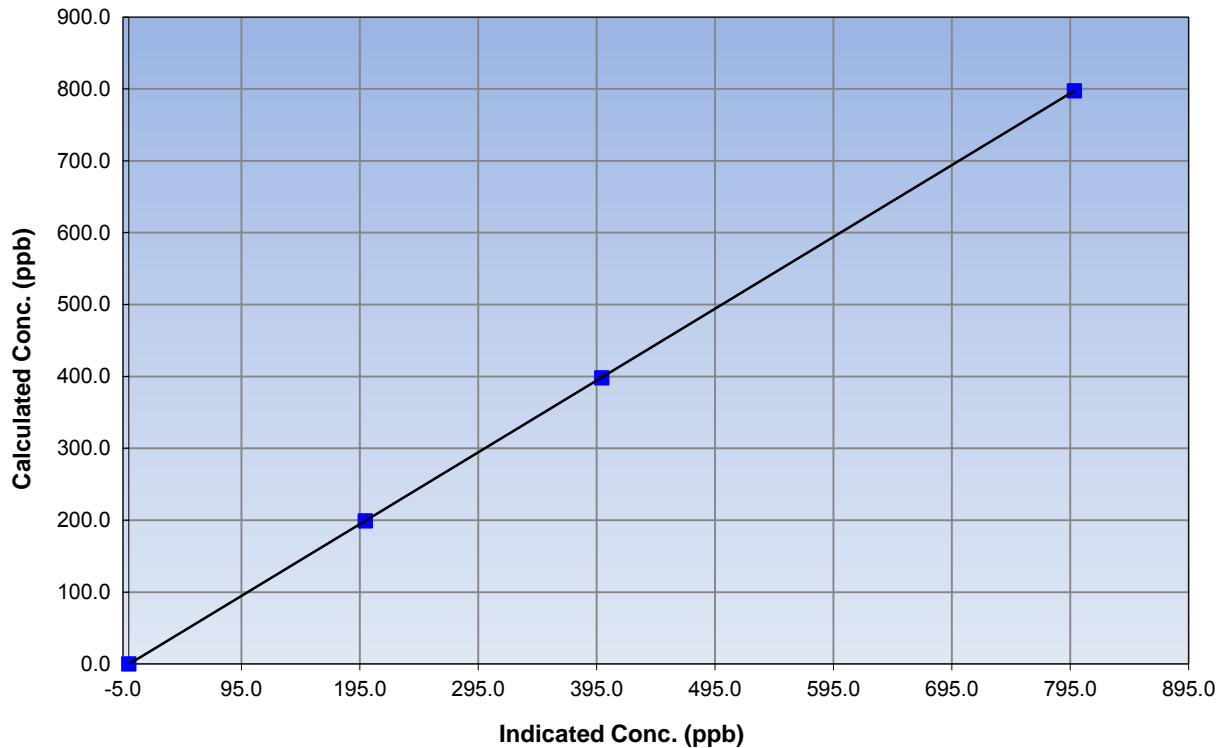
Station Information

Calibration Date	June 25, 2015	Previous Calibration	May 26, 2015
Station Name	ConocoPhillips - Surmont	Station Number	AMS 502
Start Time (MST)	10:10	End Time (MST)	15:35
Analyzer make	Thermo 42i	Analyzer serial #	1218153356

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	N/A	Correlation Coefficient	1.000000
797.5	798.7	0.9986		
398.3	399.3	0.9974	Slope	0.998670
199.1	199.7	0.9973		
			Intercept	-0.240349

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

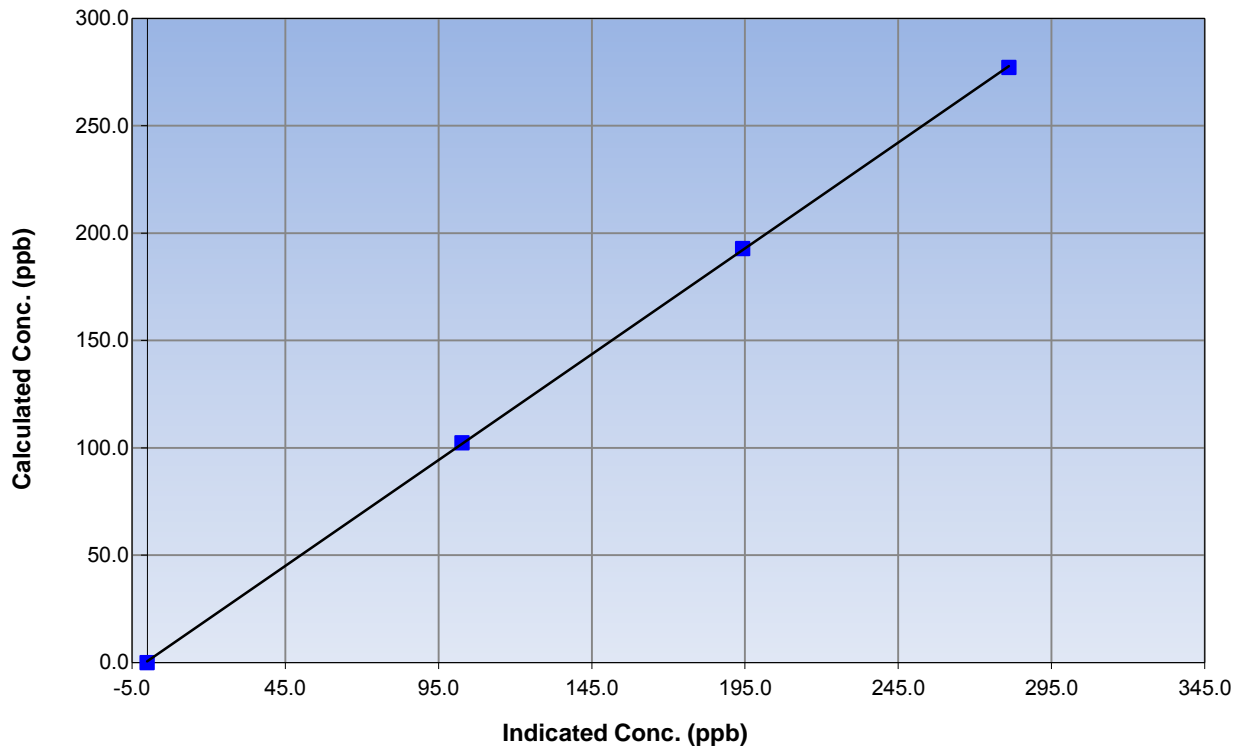
Station Information

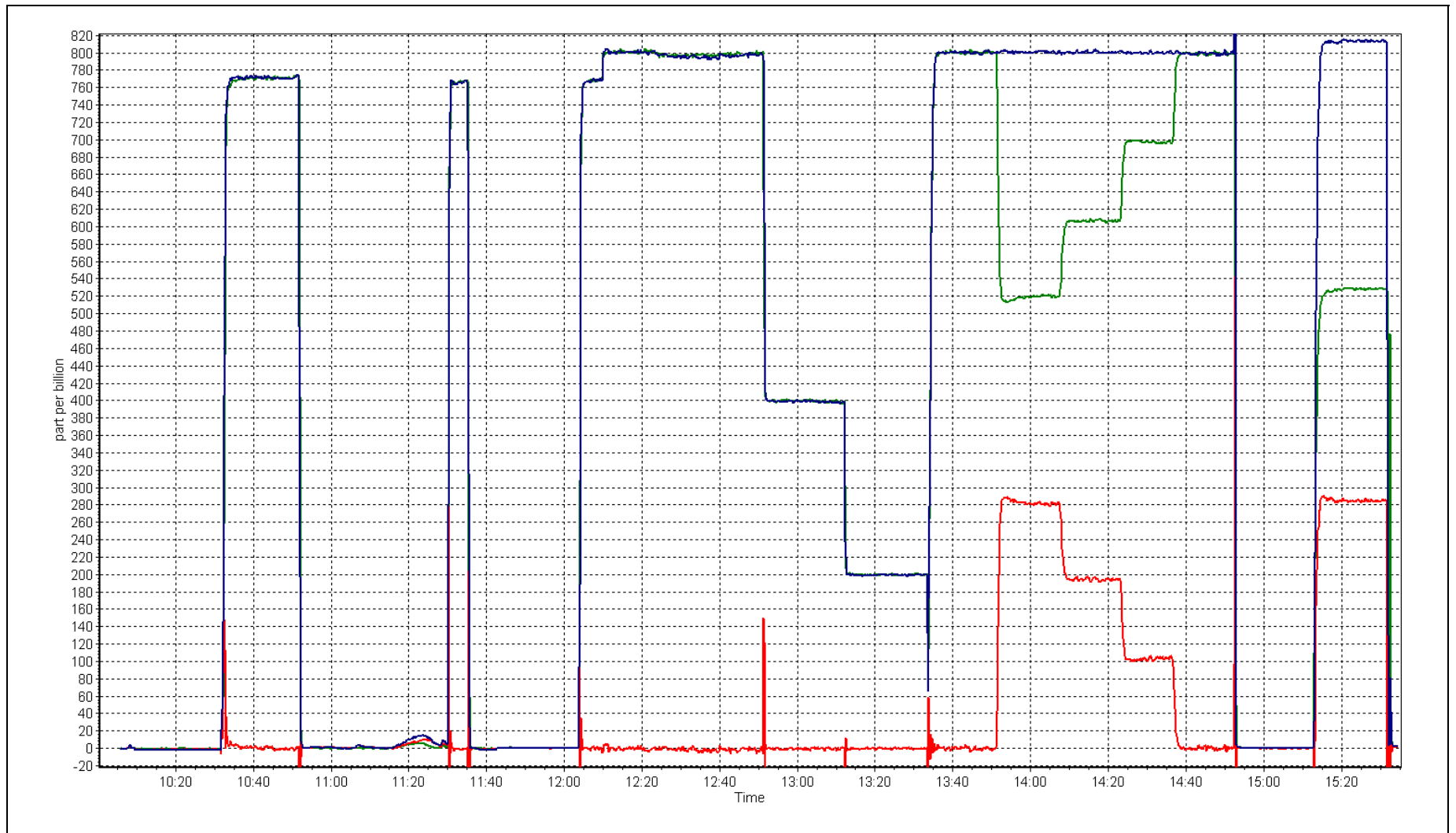
Calibration Date	June 25, 2015	Previous Calibration	May 26, 2015
Station Name	ConocoPhillips - Surmont	Station Number	AMS 502
Start Time (MST)	10:10	End Time (MST)	15:35
Analyzer make	Thermo 42i	Analyzer serial #	1218153356

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999967
277.1	281.1	0.9858		
192.8	194.2	0.9926	Slope	0.986045
102.3	102.7	0.9961		
			Intercept	0.576412

NO₂ Calibration Curve







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