



**Wood Buffalo Environmental Association**

# **JULY 2015**

# **MONTHLY REPORT**

CONTINUOUS MONITORING  
INTEGRATED MONITORING  
August 28, 2015

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



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August 28, 2015

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

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[www.wbea.org](http://www.wbea.org)

Enclosed is the July 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:

<b>Member</b>	<b>EPEA Approval No.</b>
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



<b>Member</b>	<b>EPEA Approval No.</b>
ConocoPhillips Canada	48263-00-00
Devon Canada Corporation	224816-00-03
Finning Canada Ltd.	Not Applicable
Hammerstone Corporation	189942-00-02
Husky Oil Operations Ltd.	206355-00-00
Imperial Oil Ltd.	00046586-00-00
MEG Energy Corporation	00216466-00-04
Nexen Energy ULC.	137467-00-00
Shell Canada Energy	20809-01-00
Statoil Canada Ltd.	241311-00-00
Suncor Energy Inc.	094-02-00
Sunshine Oilsands Ltd.	305529-00-00
Syncrude Canada Ltd.	026-02-00
Teck Resources Ltd.	EIA Application
Total E&P Canada Ltd.	228044-00-00
Williams Energy (Canada) Inc.	73203-01-00

#### **Aboriginal Communities**

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

#### **Government and Non-Industrial Organizations**

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



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

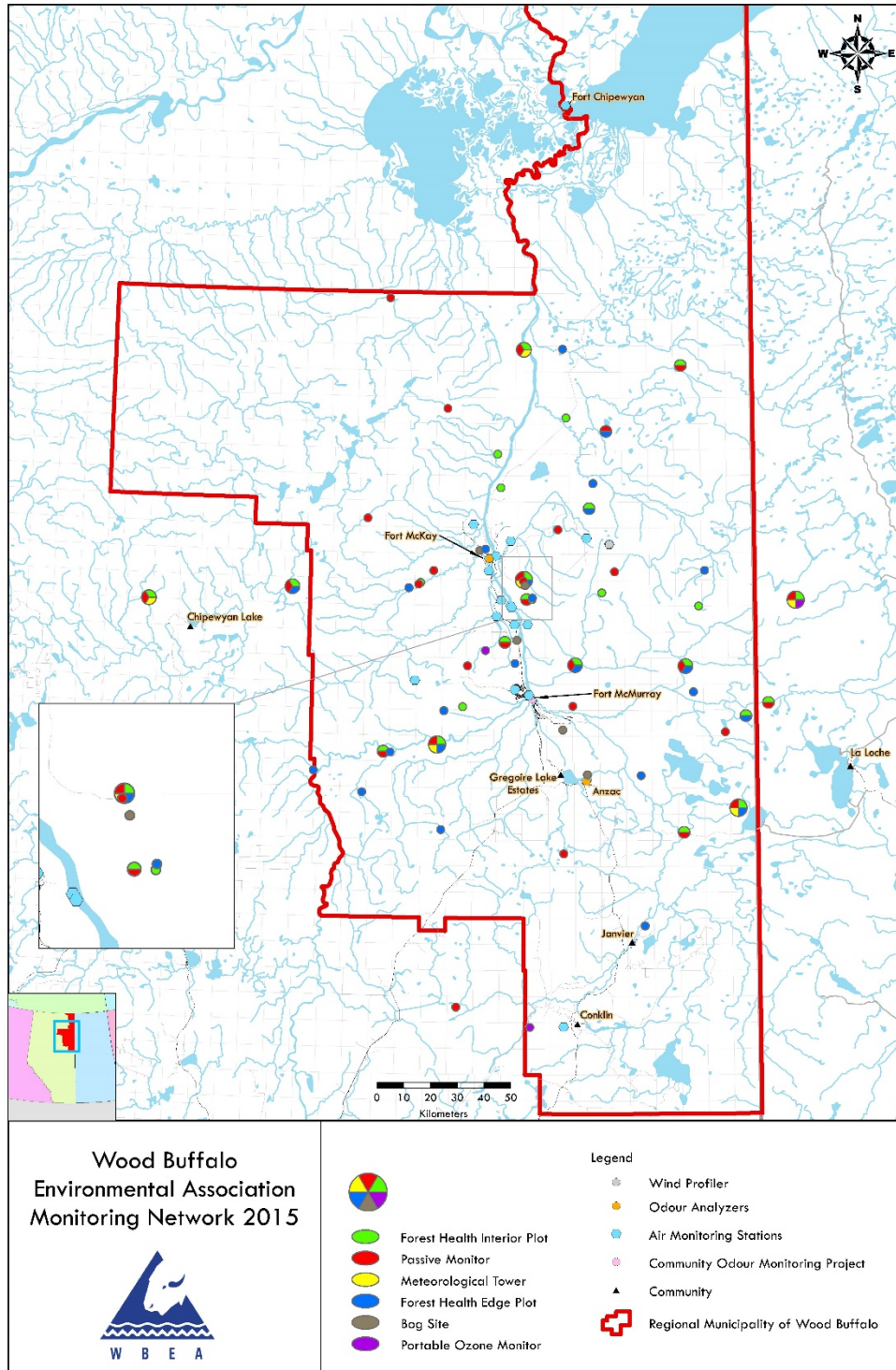


Figure 1 Map of WBEA Air Monitoring Network.

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

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

There were no ambient concentrations in excess of the air quality objectives as indicated in the Air Monitoring Directive Section III.A.3 (a & b) for SO<sub>2</sub>, CO, NO<sub>2</sub>, NH<sub>3</sub> and O<sub>3</sub>.

There were 65 ambient ground level concentrations of Particulate Matter (PM<sub>2.5</sub>) in excess of the PM<sub>2.5</sub> 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 63 concentrations in excess of the PM<sub>2.5</sub> air quality objective. There were two 24-hour objective exceedances reported in real-time that were found not to be in exceedance after data processing and validation.

There were 19 H<sub>2</sub>S ambient ground level concentration in excess of the 1-hour and 24-hour H<sub>2</sub>S air quality objectives reported to the Energy and Environmental Response Centre in real time. After data processing to account for analyzer drift with baseline correction, there were 13 concentrations in excess of the H<sub>2</sub>S air quality objective. Of these, 11 hourly average concentrations were in exceedance of the 1-hour objective, and two daily average concentrations in exceedance of the 24-hour air quality objective. There were four 1-hour and two 24-hour objective exceedances reported in real-time that were found not to be in exceedance after data processing.

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

<u>Site</u>	<u>Parameter</u>	<u>Date / Time</u>	<u>Reference</u>	<u>Period</u>	Concentration ppb or ug/m <sup>3</sup>		<u>Status</u>
					<u>Reported</u>	<u>Final</u>	
AMS 2 Mildred Lake	H <sub>2</sub> S	04Jul15:13:00	300373	1-hour	16.0	16	exc
AMS 5 Mannix	H <sub>2</sub> S	08Jul15:21:00	300568	1-hour	10.0	10	nae
AMS 5 Mannix	H <sub>2</sub> S	09Jul15:22:00	300629	1-hour	11.0	11	exc
AMS 5 Mannix	H <sub>2</sub> S	09Jul15:24:00	300632	1-hour	12.0	12	exc
AMS 5 Mannix	H <sub>2</sub> S	09Jul15:24:00	300629	24-hour	4.0	3.9	exc
AMS 5 Mannix	H <sub>2</sub> S	10Jul15:24:00	300632	24-hour	3.0	3.4	nae
AMS 5 Mannix	H <sub>2</sub> S	10Jul15:01:00	300632	1-hour	11.0	11	exc
AMS 5 Mannix	H <sub>2</sub> S	11Jul15:17:00	300719	1-hour	12.0	12	exc
AMS 5 Mannix	H <sub>2</sub> S	11Jul15:18:00	300719	1-hour	12.0	12	exc
AMS 5 Mannix	H <sub>2</sub> S	11Jul15:19:00	300719	1-hour	16.0	16	exc
AMS 5 Mannix	H <sub>2</sub> S	11Jul15:20:00	300719	1-hour	11.0	11	exc
AMS 5 Mannix	H <sub>2</sub> S	11Jul15:24:00	300719	24-hour	3.0	3.3	nae

Concentration ppb or  
 ug/m<sup>3</sup>

<u>Site</u>	<u>Parameter</u>	<u>Date / Time</u>	<u>Reference</u>	<u>Period</u>	<u>Reported</u>	<u>Final</u>	<u>Status</u>
AMS 5 Mannix	H <sub>2</sub> S	12Jul15:04:00	300745	1-hour	4.0	17	exc
AMS 5 Mannix	H <sub>2</sub> S	12Jul15:20:00	300773	1-hour	10.0	10	nae
AMS 5 Mannix	H <sub>2</sub> S	12Jul15:21:00	300773	1-hour	12.0	12	exc
AMS 5 Mannix	H <sub>2</sub> S	12Jul15:24:00	300773	1-hour	10.0	10	nae
AMS 5 Mannix	H <sub>2</sub> S	12Jul15:24:00	300776	24-hour	5.0	4.9	exc
AMS 5 Mannix	H <sub>2</sub> S	26Jul15:03:00	301447	1-hour	10.0	10	nae
AMS 5 Mannix	H <sub>2</sub> S	26Jul15:06:00	301447	1-hour	12.0	12	exc
AMS 1 Fort McKay	PM <sub>2.5</sub>	01Jul15:24:00	300236	24-hour	33.0	34	exc
AMS 1 Fort McKay	PM <sub>2.5</sub>	02Jul15:24:00	300296	24-hour	32.0	32	exc
AMS 1 Fort McKay	PM <sub>2.5</sub>	03Jul15:24:00	300356	24-hour	162.0	162	exc
AMS 1 Fort McKay	PM <sub>2.5</sub>	04Jul15:24:00	300381	24-hour	159.0	160	exc
AMS 1 Fort McKay	PM <sub>2.5</sub>	08Jul15:24:00	300571	24-hour	34.0	34	exc
AMS 1 Fort McKay	PM <sub>2.5</sub>	11Jul15:24:00	300729	24-hour	98.0	99	exc
AMS 1 Fort McKay	PM <sub>2.5</sub>	12Jul15:24:00	300775	24-hour	149.0	150	exc
AMS 6 Patricia McInnes	PM <sub>2.5</sub>	01Jul15:24:00	300237	24-hour	37.0	37	exc
AMS 6 Patricia McInnes	PM <sub>2.5</sub>	03Jul15:24:00	300355	24-hour	123.0	123	exc
AMS 6 Patricia McInnes	PM <sub>2.5</sub>	04Jul15:24:00	300382	24-hour	125.0	125	exc
AMS 6 Patricia McInnes	PM <sub>2.5</sub>	08Jul15:24:00	300572	24-hour	36.0	36	exc
AMS 6 Patricia McInnes	PM <sub>2.5</sub>	11Jul15:24:00	300730	24-hour	112.0	112	exc
AMS 6 Patricia McInnes	PM <sub>2.5</sub>	12Jul15:24:00	300777	24-hour	129.0	129	exc
AMS 7 Athabasca Valley	PM <sub>2.5</sub>	01Jul15:24:00	300238	24-hour	52.0	53	exc
AMS 7 Athabasca Valley	PM <sub>2.5</sub>	03Jul15:24:00	300354	24-hour	136.0	137	exc
AMS 7 Athabasca Valley	PM <sub>2.5</sub>	04Jul15:24:00	300383	24-hour	131.0	132	exc
AMS 7 Athabasca Valley	PM <sub>2.5</sub>	08Jul15:24:00	300573	24-hour	45.0	46	exc
AMS 7 Athabasca Valley	PM <sub>2.5</sub>	11Jul15:24:00	300731	24-hour	130.0	130	exc
AMS 7 Athabasca Valley	PM <sub>2.5</sub>	12Jul15:24:00	300778	24-hour	144.0	145	exc
AMS 8 Fort Chipewyan	PM <sub>2.5</sub>	01Jul15:24:00	300239	24-hour	309.0	309	exc
AMS 8 Fort Chipewyan	PM <sub>2.5</sub>	02Jul15:24:00	300297	24-hour	167.0	167	exc
AMS 8 Fort Chipewyan	PM <sub>2.5</sub>	03Jul15:24:00	300353	24-hour	112.0	112	exc
AMS 8 Fort Chipewyan	PM <sub>2.5</sub>	04Jul15:24:00	300384	24-hour	40.0	40	exc
AMS 8 Fort Chipewyan	PM <sub>2.5</sub>	11Jul15:24:00	300733	24-hour	97.0	97	exc
AMS 8 Fort Chipewyan	PM <sub>2.5</sub>	12Jul15:24:00	300779	24-hour	52.0	52	exc

<u>Site</u>	<u>Parameter</u>	<u>Date / Time</u>	<u>Reference</u>	<u>Period</u>	Concentration ppb or ug/m <sup>3</sup>		<u>Status</u>
					<u>Reported</u>	<u>Final</u>	
AMS 8 Fort Chipewyan	PM <sub>2.5</sub>	13Jul15:24:00	300856	24-hour	35.0	35	exc
AMS 8 Fort Chipewyan	PM <sub>2.5</sub>	14Jul15:24:00	300933	24-hour	43.0	43	exc
AMS 12 Millennium Mine	PM <sub>2.5</sub>	01Jul15:24:00	300240	24-hour	37.0	38	exc
AMS 12 Millennium Mine	PM <sub>2.5</sub>	03Jul15:24:00	300352	24-hour	161.0	162	exc
AMS 12 Millennium Mine	PM <sub>2.5</sub>	04Jul15:24:00	300390	24-hour	148.0	148	exc
AMS 12 Millennium Mine	PM <sub>2.5</sub>	08Jul15:24:00	300574	24-hour	38.0	39	exc
AMS 12 Millennium Mine	PM <sub>2.5</sub>	11Jul15:24:00	300734	24-hour	121.0	122	exc
AMS 12 Millennium Mine	PM <sub>2.5</sub>	12Jul15:24:00	300780	24-hour	117.0	118	exc
AMS 12 Millennium Mine	PM <sub>2.5</sub>	13Jul15:24:00	300854	24-hour	30.0	32	exc
AMS 13 Fort McKay - South	PM <sub>2.5</sub>	01Jul15:24:00	300241	24-hour	36.0	36	exc
AMS 13 Fort McKay - South	PM <sub>2.5</sub>	03Jul15:24:00	300351	24-hour	155.0	155	exc
AMS 13 Fort McKay - South	PM <sub>2.5</sub>	04Jul15:24:00	300385	24-hour	158.0	158	exc
AMS 13 Fort McKay - South	PM <sub>2.5</sub>	11Jul15:24:00	300735	24-hour	67.0	67	exc
AMS 13 Fort McKay - South	PM <sub>2.5</sub>	12Jul15:24:00	300781	24-hour	149.0	149	exc
AMS 14 Anzac	PM <sub>2.5</sub>	01Jul15:24:00	300242	24-hour	58.0	57	exc
AMS 14 Anzac	PM <sub>2.5</sub>	02Jul15:24:00	300298	24-hour	38.0	38	exc
AMS 14 Anzac	PM <sub>2.5</sub>	03Jul15:24:00	300350	24-hour	108.0	108	exc
AMS 14 Anzac	PM <sub>2.5</sub>	04Jul15:24:00	300386	24-hour	85.0	88	exc
AMS 14 Anzac	PM <sub>2.5</sub>	11Jul15:24:00	300736	24-hour	146.0	145	exc
AMS 14 Anzac	PM <sub>2.5</sub>	12Jul15:24:00	300782	24-hour	143.0	-	nae
AMS 15 CNRL Horizon	PM <sub>2.5</sub>	01Jul15:24:00	300243	24-hour	40.0	39	exc
AMS 15 CNRL Horizon	PM <sub>2.5</sub>	03Jul15:24:00	300349	24-hour	176.0	176	exc
AMS 15 CNRL Horizon	PM <sub>2.5</sub>	04Jul15:24:00	300387	24-hour	132.0	132	exc
AMS 15 CNRL Horizon	PM <sub>2.5</sub>	11Jul15:24:00	300737	24-hour	88.0	88	exc
AMS 15 CNRL Horizon	PM <sub>2.5</sub>	12Jul15:24:00	300783	24-hour	140.0	140	exc
AMS 16 Shell Muskeg River	PM <sub>2.5</sub>	01Jul15:24:00	300244	24-hour	40.0	40	exc
AMS 16 Shell Muskeg River	PM <sub>2.5</sub>	02Jul15:24:00	300299	24-hour	31.0	31	exc
AMS 16 Shell Muskeg River	PM <sub>2.5</sub>	03Jul15:24:00	300348	24-hour	171.0	171	exc
AMS 16 Shell Muskeg River	PM <sub>2.5</sub>	04Jul15:24:00	300388	24-hour	141.0	141	exc
AMS 16 Shell Muskeg River	PM <sub>2.5</sub>	11Jul15:24:00	300738	24-hour	123.0	123	exc
AMS 16 Shell Muskeg River	PM <sub>2.5</sub>	12Jul15:24:00	300784	24-hour	139.0	139	exc

<u>Site</u>	<u>Parameter</u>	<u>Date / Time</u>	<u>Reference</u>	<u>Period</u>	Concentration ppb or ug/m <sup>3</sup>		<u>Status</u>
					<u>Reported</u>	<u>Final</u>	
AMS 17 Wapasu	PM <sub>2.5</sub>	01Jul15:24:00	300245	24-hour	59.0	59	exc
AMS 17 Wapasu	PM <sub>2.5</sub>	02Jul15:24:00	300300	24-hour	37.0	37	exc
AMS 17 Wapasu	PM <sub>2.5</sub>	03Jul15:24:00	300347	24-hour	169.0	169	exc
AMS 17 Wapasu	PM <sub>2.5</sub>	04Jul15:24:00	300389	24-hour	155.0	155	exc
AMS 17 Wapasu	PM <sub>2.5</sub>	08Jul15:24:00	300575	24-hour	37.0	37	exc
AMS 17 Wapasu	PM <sub>2.5</sub>	11Jul15:24:00	300739	24-hour	204.0	204	exc
AMS 17 Wapasu	PM <sub>2.5</sub>	12Jul15:24:00	300785	24-hour	108.0	107	exc
AMS 17 Wapasu	PM <sub>2.5</sub>	13Jul15:24:00	300855	24-hour	31.0	30	nae
AMS 17 Wapasu	PM <sub>2.5</sub>	14Jul15:24:00	300932	24-hour	42.0	42	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<sub>2.5</sub>, the final 5-minute data values were determined by subtracting from the raw 5-minute data values, the daily zero responses interpolated to the time of each raw 5-minute value. The final 5-minute data values were then rounded to one decimal place greater than the reporting precision indicated in the Air Monitoring Directive (AMD). The final 1-hour data values were calculated from final 5-minute data values and then rounded to reporting precision. The final 24-hour data values were calculated from final 1-hour values.

After data processing and validation, NO<sub>2</sub> concentrations were re-calculated from baseline-corrected NO<sub>x</sub> and NO concentrations. Specifically, the NO concentration was subtracted from the NO<sub>x</sub> concentration to determine the NO<sub>2</sub> concentration. In cases where the NO<sub>x</sub> and/or NO values exceeded the operating range of the analyzer, values reported for NO<sub>2</sub> were determined as the largest of either the difference between baseline-corrected NO<sub>x</sub> and NO values, or the NO<sub>2</sub> value reported by the data acquisition system with baseline correction applied.

## **1.2 Revisions to CASA Data Warehouse**

Data from June 29 to 30 at Fort Chipewyan AMS 8 for NO<sub>2</sub> were re-processed based on new information relating to filter loading associated with forest fire smoke, which was discovered during routine July calibrations. Revised summary tables for AMS 8 and network summary for June 2015 have been submitted with this report. Historical data on the CASA Data Warehouse has also been revised.

## **2.0 Operational Status**

### **2.1 Continuous Monitoring**

The Ammonia (NH<sub>3</sub>) and Nitrogen Dioxide (NO<sub>2</sub>) analyzers at AMS 1, Bertha Ganter Fort McKay, operated less than 90% of the time in July 2015.

There were three issues associated with the operation of the NH<sub>3</sub> and NO<sub>2</sub> analyzers, resulting in 147 and 100 hours of invalid data, respectively:

- From July 4 to July 8, particulate matter associated with forest fire smoke accumulated on the analyzer inlet filters and limited sample flow to the analyzers for a total of 100 hours for NH<sub>3</sub> and 99 hours for NO<sub>2</sub>.
- The NH<sub>3</sub> analyzer required additional time to stabilize to levels below ambient concentrations following the automated daily span period. Additional time for stabilization after spanning is an inherent behavior in the NH<sub>3</sub> analyzer operations resulting from the properties of the NH<sub>3</sub> gas. Data for up to three hours following each daily span has been reported as invalid for 45 hours the month of July.
- A station power interruption on July 14 contributed to additional downtime for both analyzers.

After flagging and processing for monthly reports, data for NH<sub>3</sub> was available for 80% of the month and data for NO<sub>2</sub> was available for 87% of the month. This incident was reported to Alberta Environment and Parks on August 11, 2015 (reference number 302029).

In July 2015, there was one incident 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 744 hours due to wiring issues. The sensor was removed for repairs and returned back to service on August 5, 2015.

### **2.2 Intermittent Monitoring**

The results for passive and integrated monitoring of PAH, VOC, RSC, PM<sub>2.5</sub> and PM<sub>10</sub> samples were not available in time for submission with this report. These results will be submitted at a later date.

### **3.0 Monitoring Notes**

#### **General Network Notes**

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

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

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

The NH<sub>3</sub> analyzer required additional time to stabilize to levels below ambient concentrations following the automated daily spans and routine monthly multipoint calibrations. Additional time for stabilization after exposure to high concentrations of NH<sub>3</sub> gas is an inherent behavior in the NH<sub>3</sub> analyzer operations resulting from the properties of the NH<sub>3</sub> gas. Data for 1 to 3 hours following the daily spans have been reported as invalid for a total of 45 hours this month.

Inlet filter particulate buildup associated with forest fire smoke from July 4 to July 8 interrupted the normal operations of the THC, NO<sub>2</sub> and NH<sub>3</sub> analyzers for 62, 99 and 100 hours, respectively.

Maintenance and cleaning of the sample manifold on July 8 interrupted the normal operations of SO<sub>2</sub>, THC and O<sub>3</sub> for 1 hour.

Maintenance to the sample inlet, flow audits and zero reference checks on July 8 interrupted the normal operations of the PM<sub>2.5</sub> analyzer for 1 hour.

Malfunction and replacement of the wind sensors at the station from July 11 to July 13 resulted in 44 hours of invalid data this reporting period.

A power outage at the station on July 14 affected the normal operations of all air quality analyzers for 1 hour. The NH<sub>3</sub> analyzer required an additional 1 hour to stabilize to ambient conditions following the power outage.

Depletion and replacement of the carrier gas cylinder at the station on July 24 affected the normal operations of the THC analyzer for 2 hours.

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

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

Maintenance and cleaning of the sample manifold on July 15 interrupted the normal operations of the H<sub>2</sub>S analyzer for 2 hours.

### ***Station 3, Lower Camp B - Meteorology***

Flat-lines in the output signal of the 167 m elevation wind sensors resulted in 4 hours of downtime this reporting period.

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

Annual maintenance and calibration on July 7 interrupted the normal operations of wind speed and wind direction sensors for 1 hour.

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

A power interruption at the station on July 1 affected the normal operations of all meteorological sensors for 12 hours. After power was re-established, communication issues with all temperature and relative humidity sensors resulted in an additional 20 hours of invalid data this reporting period.

Maintenance and cleaning of the sample manifold on July 2 affected the normal operations of the H<sub>2</sub>S analyzer for 1 hour.

Maintenance to the data logger on July 17 interrupted the normal operations of all meteorological sensors for 1 hour.

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

Maintenance and cleaning of the sample manifold on July 8 affected the normal operations of TRS, O<sub>3</sub> and NH<sub>3</sub> analyzers for 2 hours.

Replacement of sample inlet filters, to prevent particulate buildup from forest fire smoke affected the normal operations of TRS, O<sub>3</sub> and NH<sub>3</sub> analyzers for 2 hours on July 8.

Confirmation of reference points on July 13 for O<sub>3</sub> calibration interrupted the normal operation of the NO<sub>2</sub> analyzer for 2 hours.

Maintenance to the sample inlet, flow audits and zero reference checks on July 15 interrupted the normal operations of the PM<sub>2.5</sub> analyzer for 1 hour.

A power outage at the station on July 27 interrupted the normal operations of all air quality analyzers for 2 hours. THC and NH<sub>3</sub> analyzers required stabilization time following the power outage, resulting in 1 additional hour of downtime.



Maintenance to the automated daily zero and span system on July 27 interrupted the normal operations of SO<sub>2</sub>, THC and NO<sub>2</sub> for 2 hours.

The NH<sub>3</sub> analyzer required additional time to stabilize to levels below ambient concentrations following the automated daily span and routine monthly multipoint calibration periods. Additional time for stabilization after exposure to high concentrations of the NH<sub>3</sub> gas is an inherent behavior in the NH<sub>3</sub> analyzer operations resulting from the properties of the NH<sub>3</sub> gas. Data for 1 to 3 hours following each daily span has been reported as invalid for a total of 42 hours this month.

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

Depletion and replacement of the carrier gas cylinder at the station on July 3 affected the normal operations of the THC analyzer for 1 hour.

Analyzer failure due to the filter tape failing to advance on July 5 interrupted the normal operations of the PM<sub>2.5</sub> analyzer for 8 hours.

Maintenance and cleaning of the sample manifold on July 8 affected the normal operations of TRS, O<sub>3</sub> and CO analyzers for 1 hour.

Confirmation of reference points for O<sub>3</sub> calibration interrupted the normal operation of the NO<sub>2</sub> analyzer for 6 hours this reporting period.

Maintenance to the sample inlet, flow audits and zero reference checks on July 22 interrupted the normal operations of the PM<sub>2.5</sub> analyzer for 1 hour.

Annual maintenance and calibration interrupted the normal operations of wind speed and wind direction sensors for 1 hour on July 27.

Maintenance to standardize the automated daily zero and span system interrupted the normal operation of O<sub>3</sub> for 7 hours on July 30.

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

Inlet filter particulate buildup associated with forest fire smoke from July 1 to July 2 interrupted the normal operations of the NO<sub>2</sub> analyzer for 33 hours.

Maintenance to the sample inlet, flow audits and zero reference checks on July 2 interrupted the normal operations of the PM<sub>2.5</sub> analyzer for 1 hour.

Maintenance and cleaning of the sample manifold on July 2 interrupted the normal operations of the SO<sub>2</sub> analyzer for 1 hour.

A flat-line in the output signal of the wind sensor on July 31 resulted in 1 hour of invalid data.

Intermittent lamp instability interrupted the normal operation of the O<sub>3</sub> analyzer for a total of 15 hours this reporting period.

The solar radiation sensor was removed for repairs on July 2, 2015 and put back in service on August 5, 2015. Data for this reporting period was flagged, resulting in 744 hours of invalid data.

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

Maintenance and cleaning of the sample manifold on July 9 interrupted the normal operations of the TRS analyzer for 1 hour.

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

No operational issues to report this month.

### ***Station 12, Millennium Mine***

Maintenance and cleaning of the sample manifold on July 13 interrupted the normal operations of the SO<sub>2</sub>, TRS and THC analyzers for 1 hour.

Maintenance to the sample inlet, flow audits and zero reference checks on July 13 interrupted the normal operations of the PM<sub>2.5</sub> analyzer for 2 hours. Replacement of the PM<sub>2.5</sub> analyzer for maintenance on July 14 resulted in 5 hours of invalid data.

Replacement and stabilization time affected the normal operations of the NO<sub>2</sub> analyzer for 23 hours between July 13 and 14. Additional calibrations to adjust drift in the new analyzer interrupted the normal operations of the NO<sub>2</sub> analyzer for 17 hours this reporting period.

A power outage at the station on July 17 interrupted the normal operations of all air quality analyzers for 14 hours.

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

The O<sub>3</sub> analyzer experienced a single episode of excessive baseline drift on July 1 resulting in 1 hour of invalid data.

An automated daily span below target on July 13 resulted in 28 hours of invalid data for the TRS analyzer.

Site operator activity on July 14 interrupted the normal operation of the THC analyzer for 3 hours.

Maintenance to the sample inlet, flow audits and zero reference checks on July 14 interrupted the normal operations of the PM<sub>2.5</sub> analyzer for 6 hours. The PM<sub>2.5</sub> analyzer experienced multiple instances of baseline drift between July 15 and 19, resulting in 5 hours of invalid data.

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

Failure of the filter tape to self-advance on July 4 and 12 interrupted the normal operations of the PM<sub>2.5</sub> analyzer for a total of 17 hours. Negative baseline drift on July 5 resulted in 1 hour of invalid data. Maintenance to the sample inlet, flow audits and zero reference checks on July 21 interrupted the normal operations of the PM<sub>2.5</sub> analyzer for 2 hours.

Maintenance and cleaning of the sample manifold on July 20 interrupted the normal operations of the TRS analyzer for 1 hour and the O<sub>3</sub> analyzer for 2 hours.

A flat-line in the output signal of the wind sensor on July 25 resulted in 1 hour of invalid data.

A power interruption on July 26 affected the normal operations of the THC analyzer for 1 hour.

### ***Station 15, CNRL Horizon***

Maintenance to the sample inlet, flow audits, zero reference checks and sample pump repair on July 29 interrupted the normal operations of the PM<sub>2.5</sub> analyzer for 2 hours.

Maintenance and cleaning of the sample manifold on July 30 interrupted the normal operations of TRS analyzer for 2 hours.

### ***Station 16, Shell Muskeg River***

Flat-lines in the output signals of the wind sensor on July 1 and 25 resulted in a total of 3 hours of invalid data this reporting period.

Maintenance to the sample inlet, flow audits and zero reference checks on July 28 interrupted the normal operations of the PM<sub>2.5</sub> analyzer for 1 hour.

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

The H<sub>2</sub>S analyzer experienced multiple instances of excessive baseline drift resulting in 30 hours of invalid data.

Site operator activity on July 23 interrupted the normal operations of the H<sub>2</sub>S and O<sub>3</sub> analyzers for 1 and 2 hours, respectively.

Maintenance to the sample inlet, flow audits and zero reference checks on July 28 interrupted the normal operations of the PM<sub>2.5</sub> analyzer for 2 hours.

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

Flat-lines in the output signals of the wind sensor on July 16 and July 25 resulted in 2 hours of invalid data this reporting period.

***Station 502, ConocoPhillips Surrmont***

Maintenance and cleaning of the sample manifold on July 22 interrupted the normal operations of H<sub>2</sub>S analyzer for 2 hours.

The H<sub>2</sub>S analyzer experienced a single episode of unstable operations on July 31 resulting in 1 hour of invalid data.

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

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


JULY 2015  
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APPROVAL NUMBERS	REPORT DATE						
	MONTH	YEAR					
289664-00-00	7	2015					
254465-00-00							
149968-00-01							
48522-01-00							
240008-00-03	CONTINUOUS AMBIENT MONITORING						
48263-00-00							
224816-00-03							
189942-00-02							
206355-00-00							
46586-00-00							
216466-00-04							
137467-00-00							
20809-01-00							
241311-00-00							
094-02-00							
305529-00-00							
026-02-00							
228044-00-00							
73203-01-00							
			ONE-HOUR AVERAGE		24-HOUR AVERAGE		
	PARAMETER	STN. NO.	% TIME OPERATIONAL	MAXIMUM CONCENTRATION	NO. READINGS > REGULATION	MAXIMUM CONCENTRATION	NO. READINGS > REGULATION
	SO2(ppm)	1	99.87	0.015	0	0.002	0
	SO2(ppm)	2	100.00	0.031	0	0.004	0
	SO2(ppm)	4	100.00	0.013	0	0.002	0
	SO2(ppm)	5	100.00	0.065	0	0.006	0
	SO2(ppm)	6	99.73	0.013	0	0.002	0
	SO2(ppm)	7	100.00	0.016	0	0.005	0
	SO2(ppm)	8	99.87	0.001	0	0.000	0
	SO2(ppm)	11	100.00	0.038	0	0.007	0
	SO2(ppm)	12	97.98	0.026	0	0.004	0
	SO2(ppm)	13	100.00	0.012	0	0.002	0
	SO2(ppm)	14	100.00	0.008	0	0.001	0
	SO2(ppm)	15	100.00	0.014	0	0.002	0
	SO2(ppm)	16	100.00	0.010	0	0.003	0
	SO2(ppm)	17	100.00	0.015	0	0.003	0
	SO2(ppm)	19	100.00	0.012	0	0.003	0
	SO2(ppm)	502	100.00	0.008	0	0.003	0
	H2S(ppm)	2	99.73	0.016	1	0.002	0
	H2S(ppm)	4	100.00	0.004	0	0.001	0
	H2S(ppm)	5	99.87	0.017	10	0.005	2
	H2S(ppm)	11	100.00	0.006	0	0.002	0
	H2S(ppm)	17	95.83	0.001	0	0.001	0
	H2S(ppm)	19	100.00	0.003	0	0.001	0
	H2S(ppm)	502	99.60	0.006	0	0.002	0
	TRS(ppm)	1	100.00	0.003	0	0.001	0
	TRS(ppm)	6	99.19	0.002	0	0.001	0
	TRS(ppm)	7	99.87	0.001	0	0.001	0
	TRS(ppm)	9	99.87	0.002	0	0.001	0
	TRS(ppm)	12	97.98	0.008	0	0.001	0
	TRS(ppm)	13	96.24	0.003	0	0.001	0
	TRS(ppm)	14	99.87	0.003	0	0.001	0
	TRS(ppm)	15	99.73	0.002	0	0.001	0
	THC(ppm)	1	91.13	2.4	-	2.0	-
	THC(ppm)	2	100.00	4.3	-	2.7	-
	THC(ppm)	4	100.00	3.6	-	2.6	-
	THC(ppm)	5	100.00	3.9	-	2.8	-
	THC(ppm)	6	99.33	2.3	-	2.0	-
	THC(ppm)	7	99.87	2.3	-	2.0	-
	THC(ppm)	9	100.00	3.4	-	2.6	-
	THC(ppm)	11	100.00	4.3	-	2.8	-
	THC(ppm)	12	97.98	4.5	-	2.8	-
	THC(ppm)	13	99.60	3.3	-	2.5	-
	THC(ppm)	14	99.87	3.2	-	2.2	-
	THC(ppm)	15	100.00	5.0	-	2.7	-
	THC(ppm)	16	100.00	5.2	-	2.9	-
	THC(ppm)	17	100.00	3.2	-	2.4	-
	THC(ppm)	19	100.00	3.1	-	2.4	-
	O3(ppm)	1	99.87	0.072	0	0.040	-
	O3(ppm)	6	99.19	0.062	0	0.041	-

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

JULY 2015  
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APPROVAL NUMBERS	REPORT DATE						
	MONTH	YEAR					
289664-00-00	7	2015					
254465-00-00							
149968-00-01							
48522-01-00							
24008-00-03	CONTINUOUS AMBIENT MONITORING						
48263-00-00			ONE-HOUR AVERAGE		24-HOUR AVERAGE		
224816-00-03	PARAMETER	STN. NO.	% TIME OPERATIONAL	MAXIMUM CONCENTRATION	NO. READINGS > REGULATION	MAXIMUM CONCENTRATION	NO. READINGS > REGULATION
189942-00-02	O3(ppm)	7	98.92	0.059	0	0.035	-
206355-00-00	O3(ppm)	8	97.98	0.062	0	0.038	-
46586-00-00	O3(ppm)	13	99.87	0.056	0	0.027	-
216466-00-04	O3(ppm)	14	99.73	0.065	0	0.043	-
137467-00-00	O3(ppm)	17	99.73	0.063	0	0.035	-
20809-01-00	NO2(ppm)	1	86.56	0.021	0	0.008	-
241311-00-02	NO2(ppm)	6	99.19	0.015	0	0.005	-
094-02-00	NO2(ppm)	7	99.19	0.017	0	0.006	-
305529-00-00	NO2(ppm)	8	95.56	0.008	0	0.003	-
026-02-00	NO2(ppm)	12	92.74	0.028	0	0.013	-
228044-00-00	NO2(ppm)	13	100.00	0.027	0	0.006	-
73203-01-00	NO2(ppm)	14	100.00	0.017	0	0.003	-
	NO2(ppm)	15	100.00	0.036	0	0.011	-
	NO2(ppm)	16	100.00	0.032	0	0.012	-
	NO2(ppm)	17	100.00	0.019	0	0.007	-
	NO2(ppm)	19	100.00	0.023	0	0.007	-
	NO2(ppm)	502	100.00	0.021	0	0.005	-
	CO(ppm)	7	99.87	2.4	-	1.1	0
	NH3(ppm)	1	80.24	18	-	5	0
	NH3(ppm)	6	93.41	67	-	26	0
	PM2.5(ug/m <sup>3</sup> )	1	99.73	472.1	-	162.2	7
	PM2.5(ug/m <sup>3</sup> )	6	99.60	373.5	-	128.5	6
	PM2.5(ug/m <sup>3</sup> )	7	98.79	386.9	-	145.1	6
	PM2.5(ug/m <sup>3</sup> )	8	99.87	973.5	-	309.2	8
	PM2.5(ug/m <sup>3</sup> )	12	97.18	446.9	-	161.9	7
	PM2.5(ug/m <sup>3</sup> )	13	98.12	422.3	-	158.2	5
	PM2.5(ug/m <sup>3</sup> )	14	97.31	337	-	145.2	5
	PM2.5(ug/m <sup>3</sup> )	15	99.73	470.3	-	175.7	5
	PM2.5(ug/m <sup>3</sup> )	16	99.87	466.8	-	171.2	6
	PM2.5(ug/m <sup>3</sup> )	17	99.73	503.1	-	203.5	8
	WIND	1	94.09	-	-	-	-
	WIND	2	100.00	-	-	-	-
	WIND	4	99.87	-	-	-	-
	WIND	5	98.25	-	-	-	-
	WIND	6	99.73	-	-	-	-
	WIND	7	99.87	-	-	-	-
	WIND	8	99.87	-	-	-	-
	WIND	9	100.00	-	-	-	-
	WIND	11	100.00	-	-	-	-
	WIND	12	100.00	-	-	-	-
	WIND	13	100.00	-	-	-	-
	WIND	14	99.87	-	-	-	-
	WIND	15	100.00	-	-	-	-
	WIND	16	99.60	-	-	-	-
	WIND	17	100.00	-	-	-	-
	WIND	19	99.73	-	-	-	-
	WIND	502	100.00	-	-	-	-
							
SIGNATURE OF ASSOCIATION REPRESENTATIVE				FOR ALBERTA ENVIRONMENT USE ONLY			



## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS 1**  
**BERTHA GANTER FORT MCKAY**  
**JULY 2015**

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

August 26, 2015



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT MCKAY - BERTHA GANTER (AMS 1)  
 JULY 2015

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	708	35	36	99.87	15	0	2	0
TRS(ppb) Average	709	35	35	100.00	3	0	1	0
THC(ppm) Average	647	31	97	91.13	2.4	-	2	-
NMHC(ppm) Average	647	31	97	91.13	0.231	-	0.07	-
CH4(ppm) Average	647	31	97	91.13	2.4	-	2	-
O3 (ppb) Average	709	34	35	99.87	72	0	40	-
NO2 (ppb) Average	612	32	132	86.56	21	0	8	-
NO (ppb) Average	612	32	132	86.56	38	-	4	-
NOX (ppb) Average	612	32	132	86.56	50	-	10	-
NH3 (ppb) Average	563	34	181	80.24	18	0	5	-
PM2.5 (ug/m3) Average	742	0	2	99.73	472.1	-	162.2	7
Wind Speed 10 m (km/h) Average	697	3	47	94.09	18	-	9	-
Wind Direction 10 m (deg) Average	697	3	47	94.09	-	-	-	-
Temperature 2 m (C) Average	744	0	0	100.00	31.8	-	22.9	-
Temperature 10 m (C) Average	744	0	0	100.00	31.2	-	23.4	-
Relative Humidity (%) Average	744	0	0	100.00	99	-	88	-
Precipitation (mm) Total	744	0	0	100.00	13	-	30.7	-
Surface Wetness (% of range) Average	744	0	0	100.00	51	-	15	-
Global Solar Radiation (W/m2) Average	744	0	0	100.00	880	-	327	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BERTHA GANTER FORT McKAY (AMS 1)  
 JULY 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	708	0.4	1	-	0	0	0	0	0	1	15
TRS (ppb) Average	709	0.5	0	-	0	0	0	0	1	1	3
THC (ppm) Average	647	1.86	0.1	-	1.7	1.8	1.8	1.8	1.9	2	2.4
NMHC(ppm) Average	647	0.006	0.025	-	0	0	0	0	0	0	0.231
CH4(ppm) Average	647	1.86	0.1	-	1.7	1.8	1.8	1.8	1.9	2	2.4
O3 (ppb) Average	709	23.1	11	-	5	9	14	22	30	38	72
NO2 (ppb) Average	612	2.5	3	-	0	0	0	1	4	6	21
NO (ppb) Average	612	0.7	3	-	0	0	0	0	0	1	38
NOX (ppb) Average	612	3.2	5	-	0	0	0	2	4	8	50
NH3 (ppb) Average	563	0.5	3	-	0	0	0	0	0	0	18
PM2.5 (ug/m3) Average	742	26.04	63.1	-	0	1.2	2.7	5.6	12.4	60.7	472.1
Wind Speed 10 m (km/h) Average	697	5.5	3	-	0	2	3	5	7	10	18
Wind Direction 10 m (deg) Average	697	-	-	-	-	-	-	-	-	-	-
Temperature 2 m (C) Average	744	17.7	5.2	-	4.7	11.3	13.7	17.4	21.7	24.6	31.8
Temperature 10 m (C) Average	744	18.07	4.6	-	5.8	12.3	14.6	18.1	21.7	23.9	31.2
Relative Humidity (%) Average	744	72.5	21	-	23	42	55	76	92	98	99
Precipitation (mm) Total	744	-	-	102.36	-	-	-	-	-	-	-
Surface Wetness (% of range) Average	744	5.7	11	-	0	0	0	0	6	23	51
Global Solar Radiation (W/m2) Average	744	205	247	-	0	0	1	81	377	626	880

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

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2	08 Jul 2015 14:00	08 Jul 2015 14:00	1	Maintenance - manifold cleaning
NMHC, CH4, THC	04 Jul 2015 20:00	07 Jul 2015 09:00	62	Unstable Operation - filter loading from forest fire
NMHC, CH4, THC	08 Jul 2015 14:00	08 Jul 2015 14:00	1	Maintenance - manifold cleaning
NMHC, CH4, THC	14 Jul 2015 14:00	14 Jul 2015 14:00	1	Station power outage
NMHC, CH4, THC	24 Jul 2015 10:00	24 Jul 2015 11:00	2	Maintenance - replaced carrier gas
O3	08 Jul 2015 14:00	08 Jul 2015 14:00	1	Maintenance - manifold cleaning
NO2, NO, NOX	04 Jul 2015 07:00	08 Jul 2015 09:00	99	Unstable Operation - filter loading from forest fire
NO2, NO, NOX	14 Jul 2015 14:00	14 Jul 2015 14:00	1	Station power outage
NH3	01 Jul 2015 07:00	31 Jul 2015 07:00	45	Stabilization after daily span
NH3	04 Jul 2015 06:00	08 Jul 2015 09:00	100	Unstable Operation - filter loading from forest fire
NH3	14 Jul 2015 14:00	14 Jul 2015 15:00	2	Station power outage
PM2.5	08 Jul 2015 13:00	08 Jul 2015 13:00	1	Maintenance - Flow and zero check, sample head cleaning
PM2.5	14 Jul 2015 14:00	14 Jul 2015 14:00	1	Station power outage
Wind Speed, Wind Direction	11 Jul 2015 16:00	13 Jul 2015 11:00	44	Analyzer Failure - flat line in sensor output signal

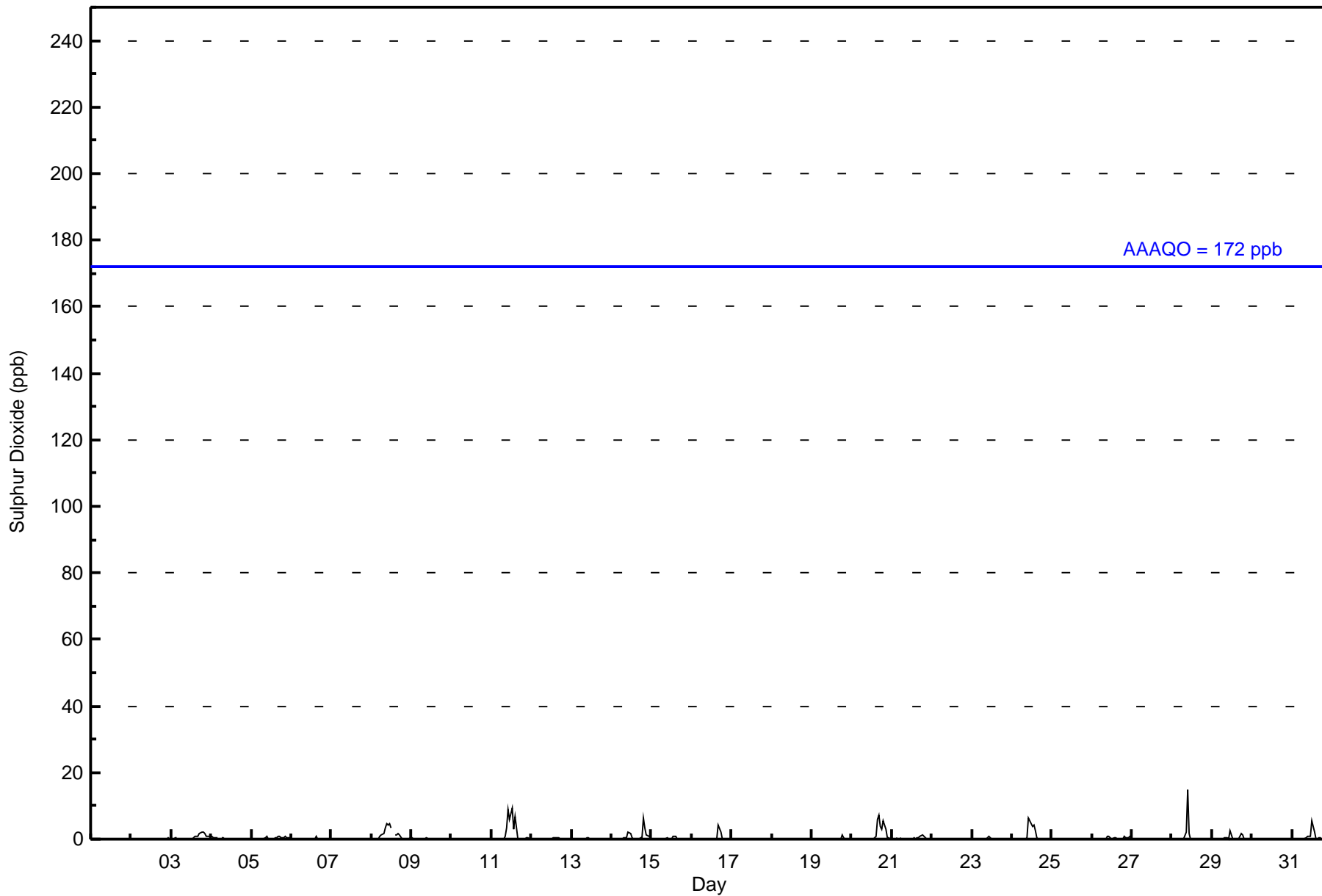


Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 15 ppb on Jul 28 10:00	Maximum Daily Average: 1.9 ppb on Jul 11		Hours of Data:	708
Minimum Value: 0 ppb on Jul 2 20:00	Minimum Daily Average: 0.0 ppb on Jul 22		Hours of Missing Data:	36
Maximum Diurnal Average: 1.0 ppb at hour 10	Minimum Diurnal Average: 0.0 ppb at hour 2		Hours of Calibration:	35
Monthly Average: 0.4 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 O <sub>3</sub> = 0 P <sub>90</sub> = 1 P <sub>99</sub> = 6		Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	0	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-Jul	0	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-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	1	2	2	2	2	1	1	1	0.6	2
4-Jul	1	1	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
5-Jul	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	0	1	1	0	0.3	1
6-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.1	1
7-Jul	0	0	Z	0	0	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.0	0
8-Jul	0	0	0	Z	0	1	1	2	3	5	4	5	4	M	1	1	2	1	0	0	0	0	0	0	1.4	5
9-Jul	0	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-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
11-Jul	Z	0	0	0	0	0	0	0	1	3	9	6	9	3	7	3	0	0	0	0	0	0	0	0	1.9	9
12-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
13-Jul	0	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-Jul	0	0	0	Z	0	0	0	0	0	1	2	2	1	0	0	0	0	0	1	6	3	1	1	0	0.8	6
15-Jul	0	0	0	0	Z	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0.1	1
16-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	4	2	0	0	0	0	0	0	0	0.3	4
17-Jul	Z	0	0	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-Jul	0	Z	0	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-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0.1	1
20-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	6	7	4	3	5	3	1	0	0	1.3	7
21-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0.2	1
22-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
23-Jul	Z	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
24-Jul	0	Z	0	0	0	0	0	0	0	6	4	4	4	2	0	0	0	0	0	0	0	0	0	0	1.0	6
25-Jul	0	0	Z	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-Jul	0	0	0	Z	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	1	0	0	1	0.2	1
27-Jul	0	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-Jul	0	0	0	0	0	Z	0	0	2	15	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	15
29-Jul	Z	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2	1	0	0	0	0	0	0.3	2
30-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
31-Jul	0	0	Z	0	0	0	0	0	0	1	1	1	5	2	0	0	0	0	0	0	0	0	0	0	0.5	5

0.1	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.3	1.0	0.9	0.7	0.8	0.4	0.5	0.5	0.5	0.4	0.4	0.5	0.3	0.2	0.1	0.1	Diurnal Average	
1	1	0	0	0	1	1	2	3	15	9	6	9	4	7	6	7	4	3	6	3	1	1	1	Diurnal Maximum		

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





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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Fort McKay - Bertha Ganter - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	707	99.86	99.86
11 - 20	1	0.14	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Fort McKay - Bertha Ganter - July 2015**

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	69	17	11	16	8	9	20	40	61	69	52	57	49	63	76	45	662
11 - 20	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	69	17	11	16	8	9	20	41	61	69	52	57	49	63	76	45	663

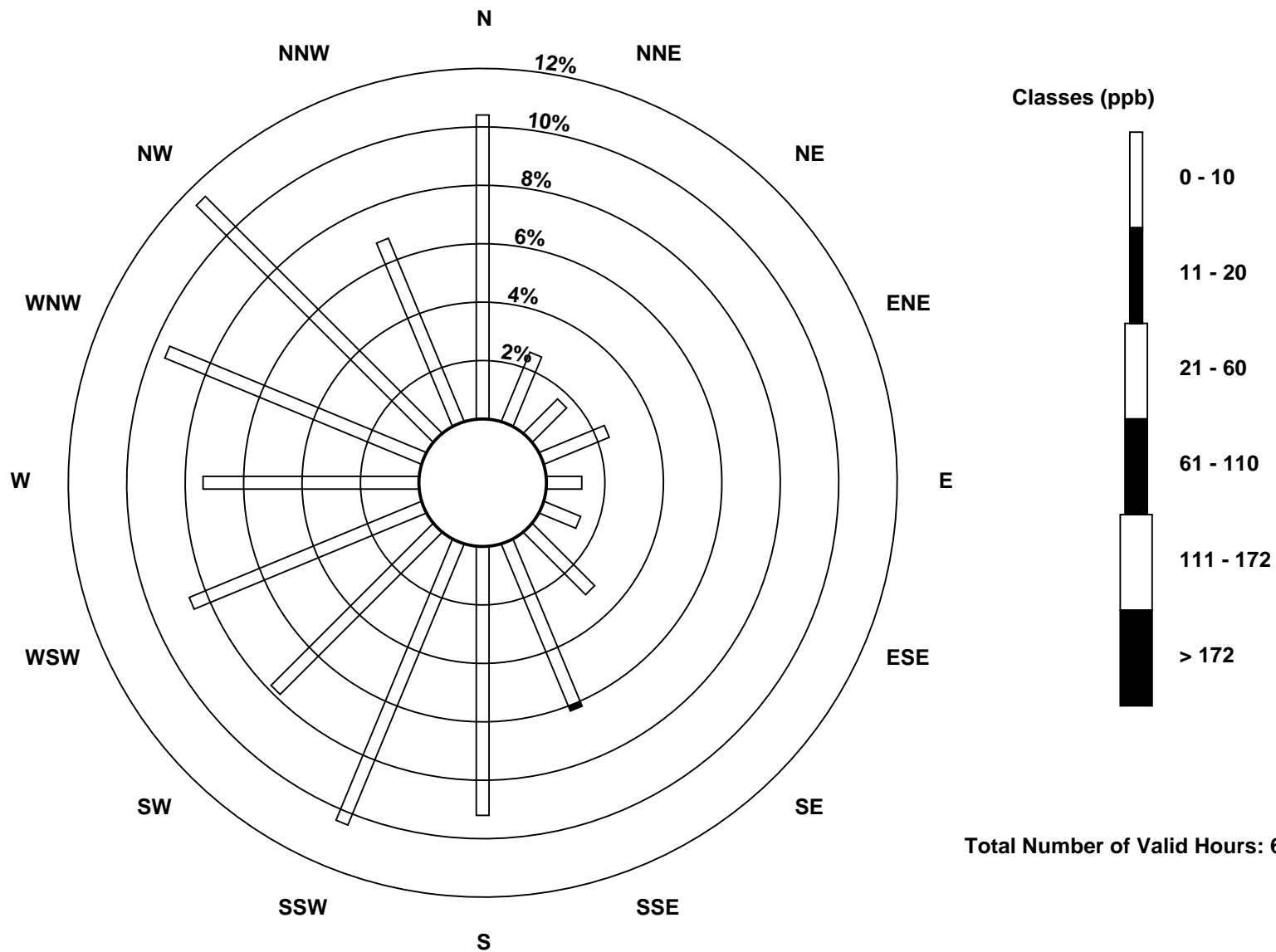
Total Number of Valid Hours: 663

Total Number of Hours: 744

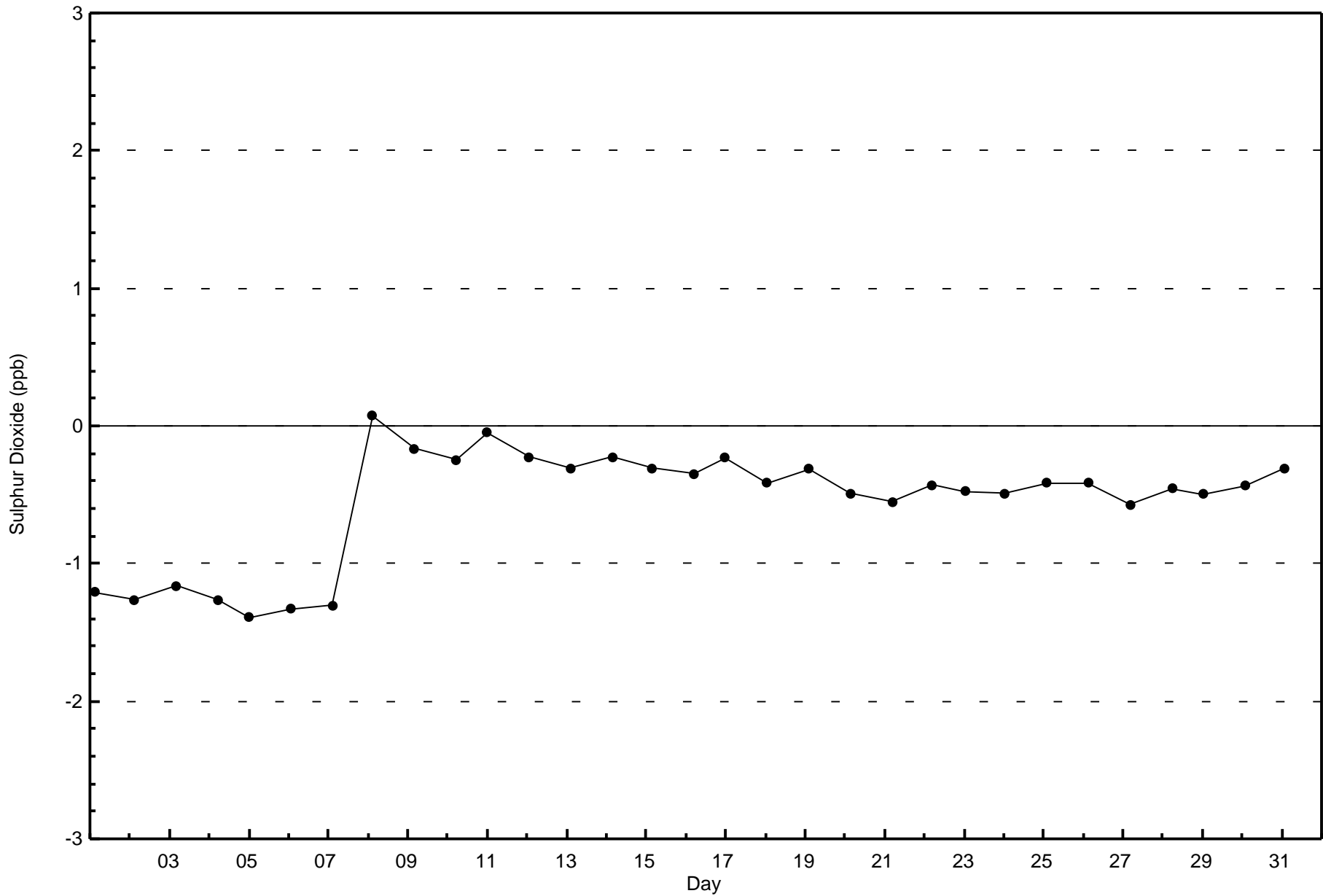


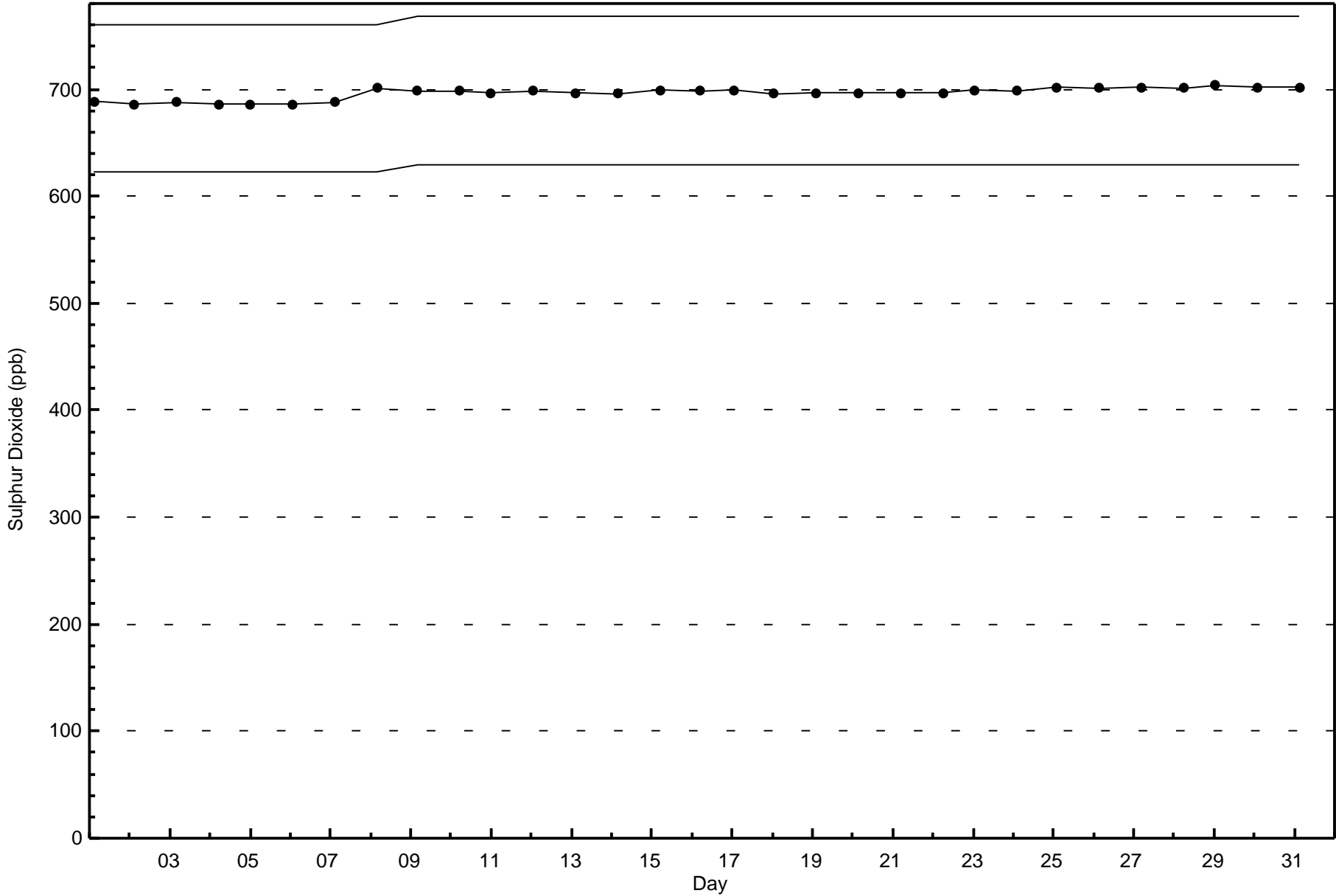
Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Fort McKay - Bertha Ganter (AMS 1)









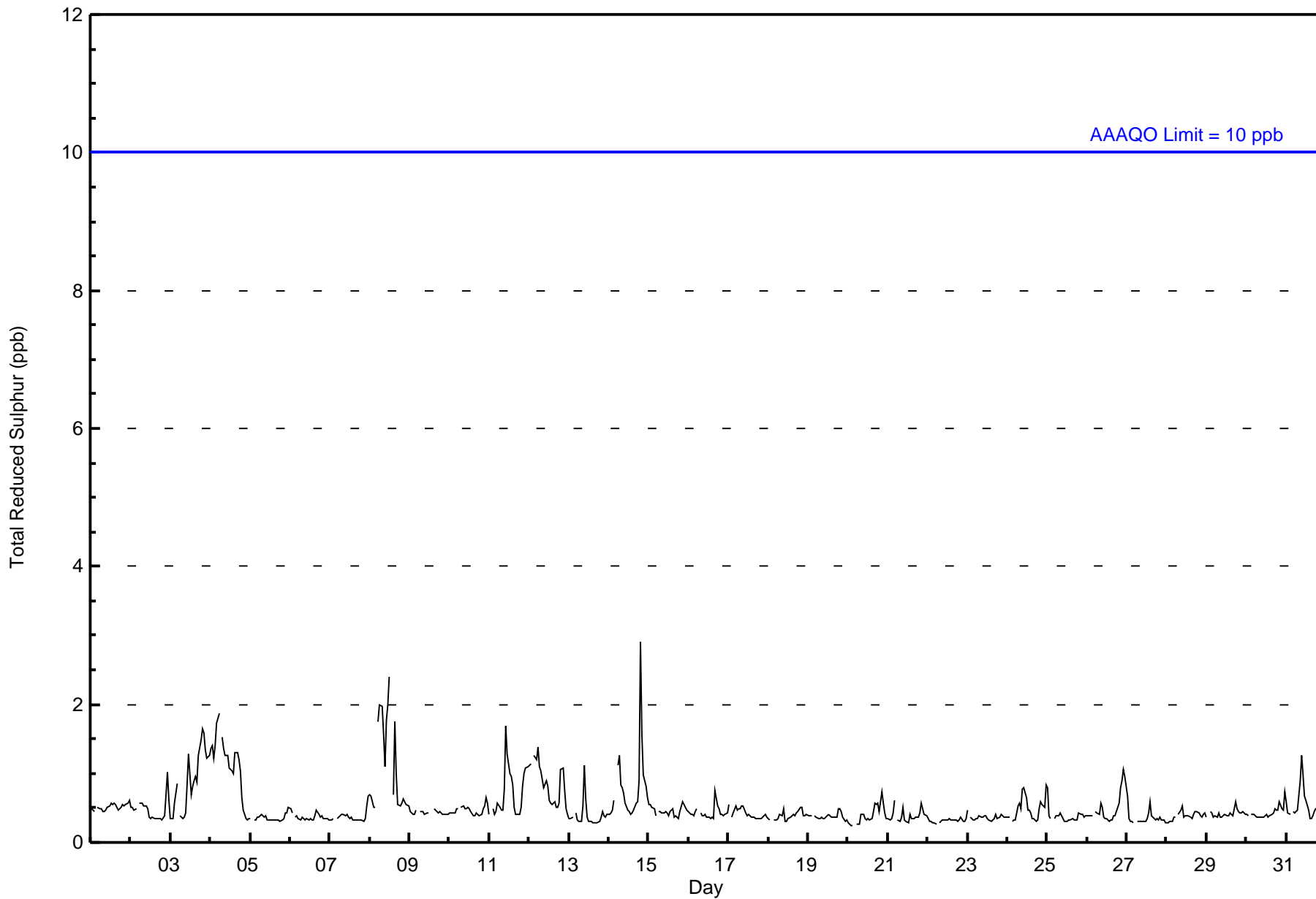


Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 3 ppb on Jul 14 20:00	Maximum Daily Average: 1.1 ppb on Jul 4		Hours of Data:	709
Minimum Value: 0 ppb on Jul 20 03:00	Minimum Daily Average: 0.3 ppb on Jul 22		Hours of Missing Data:	35
Maximum Diurnal Average: 0.6 ppb at hour 20	Minimum Diurnal Average: 0.4 ppb at hour 3		Hours of Calibration:	35
Monthly Average: 0.5 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 1 P <sub>90</sub> = 1 P <sub>99</sub> = 2		Percent Operational Time:	100.0

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

0.5	0.5	0.4	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.6	0.6	0.5	0.5	0.4	0.4	0.5	0.5	0.5	0.5	0.6	0.6	0.5	0.5	0.5	Diurnal Average
1	1	1	1	2	2	2	2	2	2	1	2	2	2	1	1	2	1	1	1	3	2	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 - Bertha Ganter - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	708	99.86	99.86
3 - 4	1	0.14	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb  
Fort McKay - Bertha Ganter - July 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	69	16	10	16	7	9	20	41	63	70	51	60	48	62	76	45	663
3 - 4	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	69	16	10	16	7	9	20	41	64	70	51	60	48	62	76	45	664

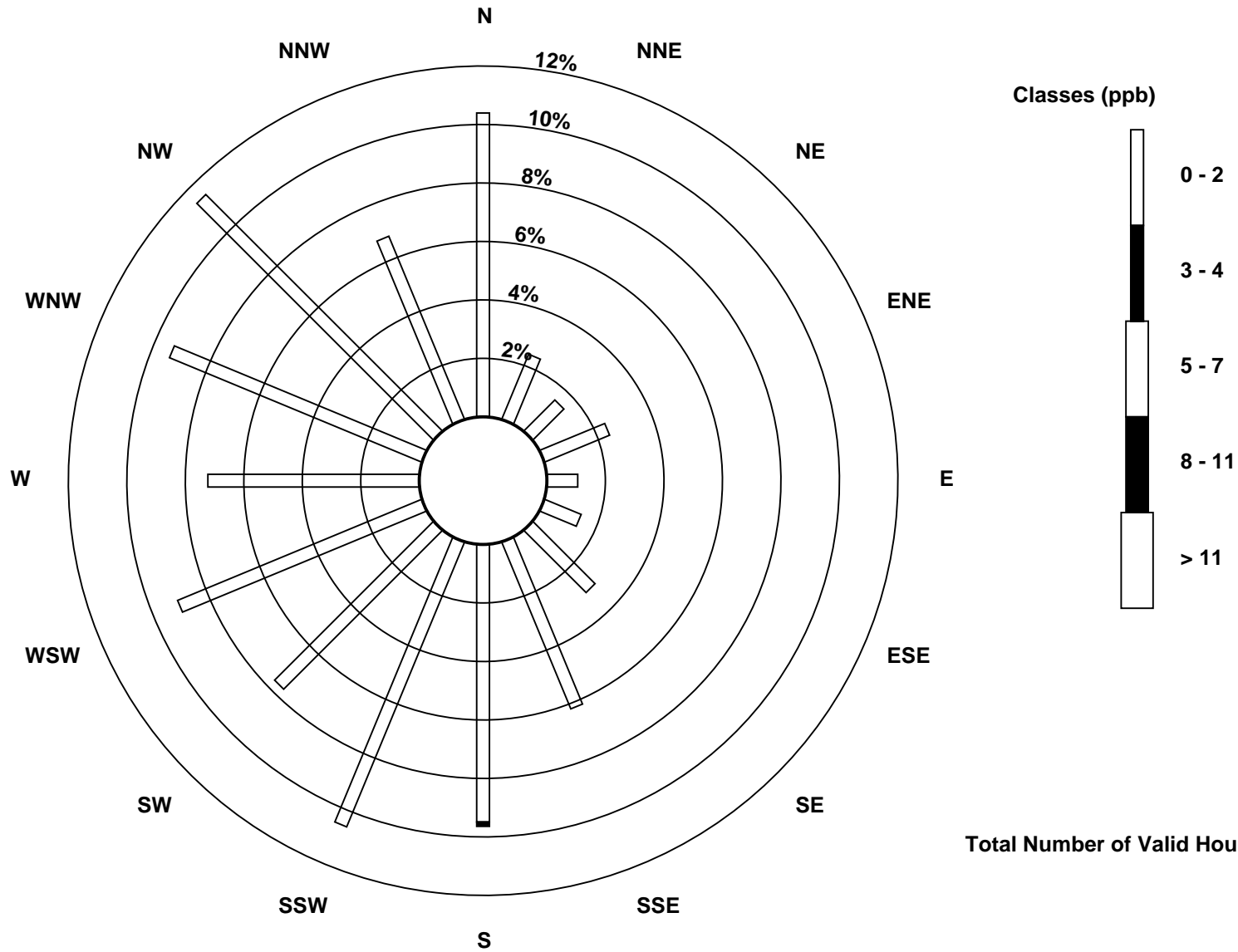
Total Number of Valid Hours: 664

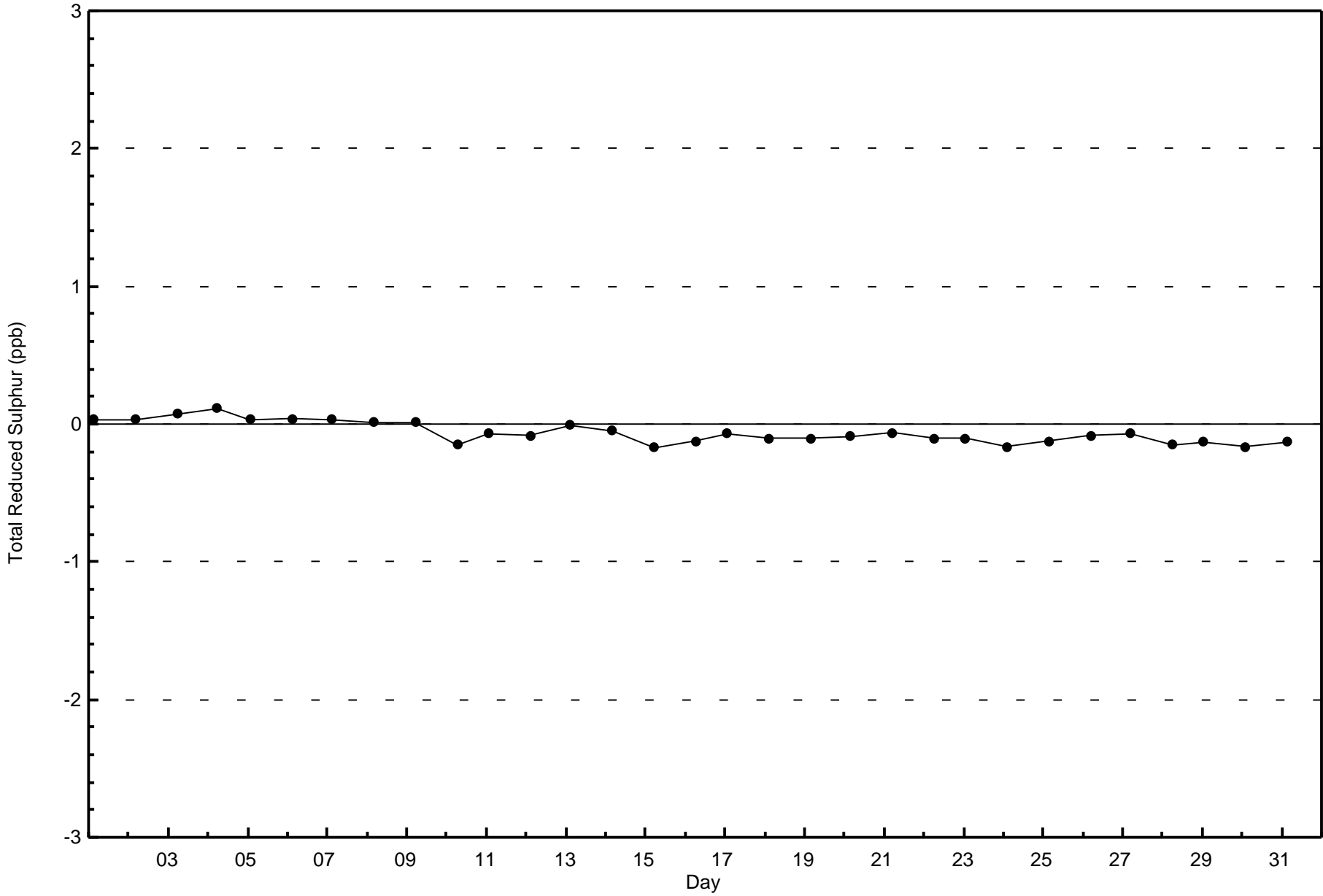
Total Number of Hours: 744



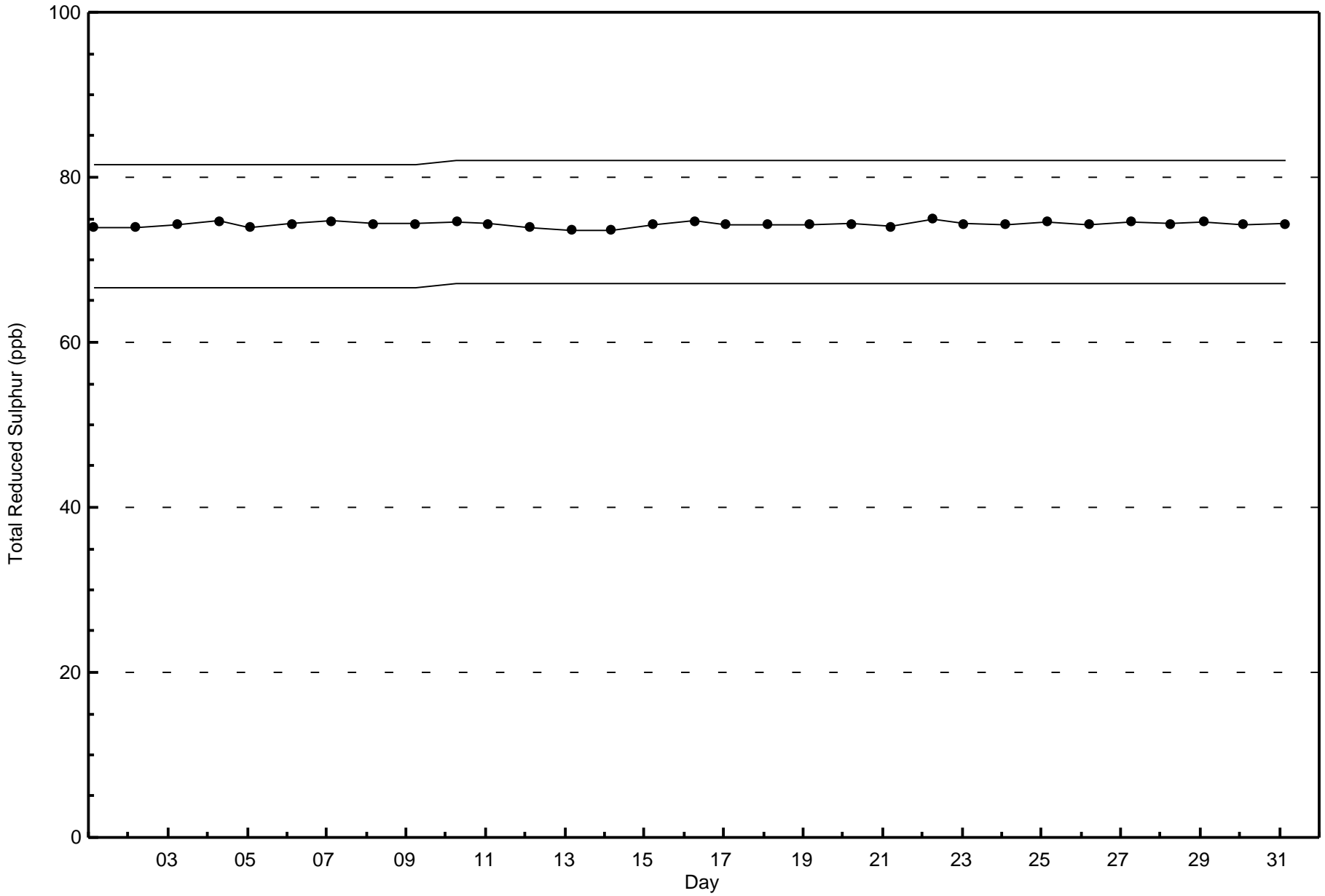
Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Total Reduced Sulphur (TRS) - ppb  
Fort McKay - Bertha Ganter (AMS 1)



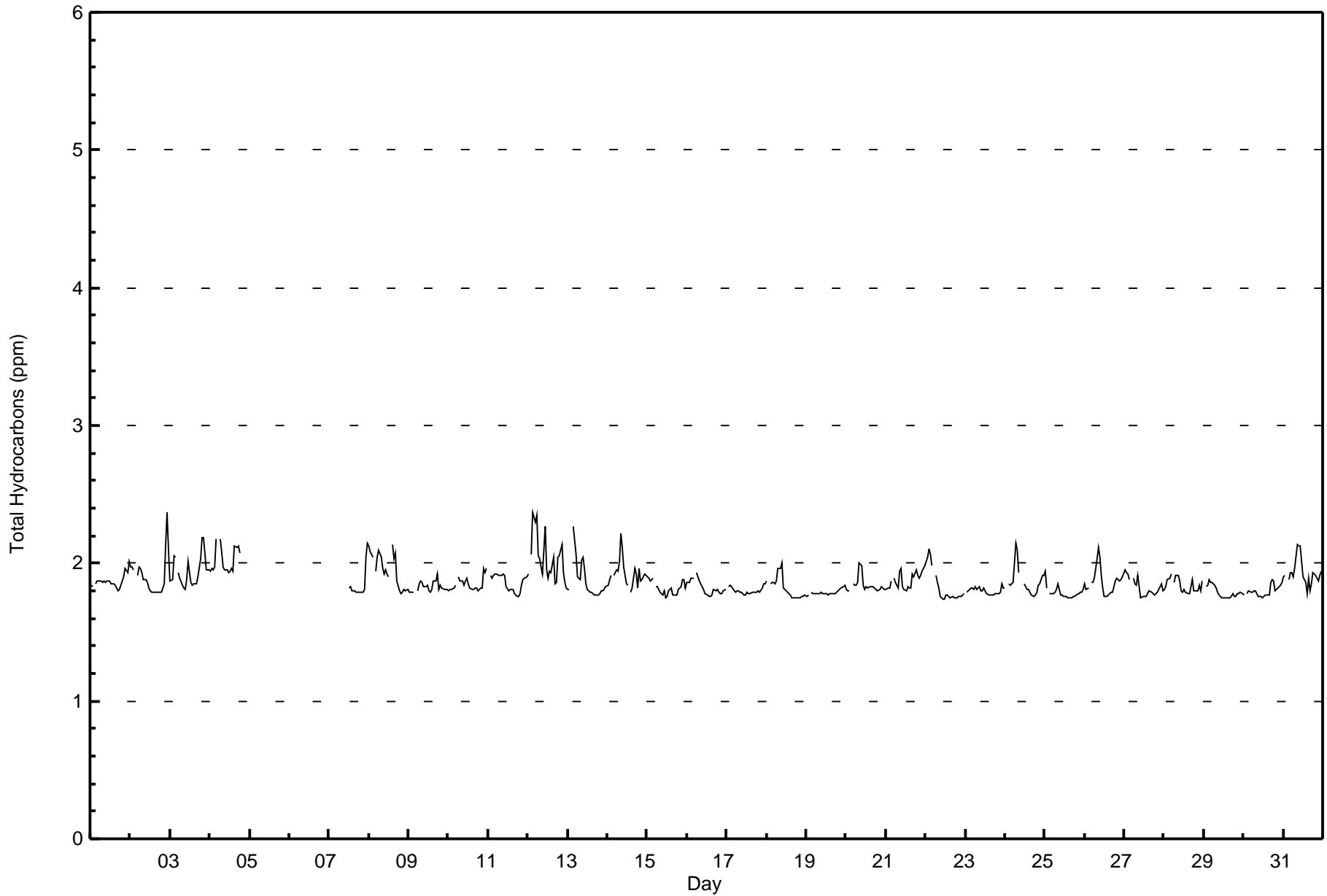








Maximum Value: 2.4 ppm on Jul 12 04:00																		Maximum Daily Average: 2.0 ppm on Jul 12						Hours in Service: 744		
Minimum Value: 1.7 ppm on Jul 22 12:00																		Minimum Daily Average: 1.8 ppm on Jul 25						Hours of Data: 647		
Maximum Diurnal Average: 1.9 ppm at hour 5																		Minimum Diurnal Average: 1.8 ppm at hour 14						Hours of Missing Data: 97		
Monthly Average: 1.86 ppm																		Percentiles: P <sub>1</sub> = 1.7 P <sub>10</sub> = 1.8 Q <sub>1</sub> = 1.8 Median = 1.8 Q <sub>3</sub> = 1.9 P <sub>90</sub> = 2.0 P <sub>99</sub> = 2.3						Hours of Calibration: 31		
																		Percent Operational Time: 91.1								
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-Jul	1.8	1.8	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	2.0	1.9	2.0	1.9	2.0
2-Jul	2.0	2.0	1.9	Z	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.1	2.4	2.1	1.9	2.4
3-Jul	1.9	1.9	2.0	2.0	Z	1.9	1.9	1.8	1.8	1.8	1.9	2.0	1.9	1.8	1.8	1.9	1.8	1.9	2.0	2.2	2.2	2.1	2.0	1.9	1.9	2.2
4-Jul	1.9	2.0	2.0	2.0	2.2	Z	2.2	2.1	2.0	2.0	2.0	1.9	1.9	2.0	1.9	2.1	2.1	2.1	2.1	UO	UO	UO	UO	UO	2.0	2.2
5-Jul	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--
6-Jul	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--
7-Jul	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	C	C	C	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.0	2.1	--	2.1	
8-Jul	2.1	2.1	2.0	Z	1.9	2.0	2.1	2.0	2.0	1.9	1.9	1.9	1.9	M	2.1	2.0	2.1	1.9	1.8	1.8	1.8	1.8	1.8	2.0	2.1	
9-Jul	1.8	1.8	1.8	1.8	Z	1.8	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.9	
10-Jul	1.8	1.8	1.8	1.8	1.8	Z	1.9	1.9	1.9	1.8	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.0	1.9	2.0	1.9	2.0
11-Jul	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	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9
12-Jul	1.9	Z	2.1	2.4	2.3	2.3	2.1	2.0	2.0	1.9	2.3	2.0	1.9	1.9	1.9	2.0	1.8	1.9	2.0	2.1	2.1	1.9	1.8	2.0	2.4	
13-Jul	1.8	1.8	Z	2.3	2.2	2.1	1.9	1.9	2.0	2.0	2.0	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.3	
14-Jul	1.8	1.9	1.9	Z	1.9	2.0	1.9	2.0	2.2	2.1	2.0	1.9	1.8	PF	1.8	1.8	2.0	1.9	1.8	2.0	1.9	1.9	1.9	1.9	2.2	
15-Jul	1.9	1.9	1.9	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	1.8	1.8	1.9	
16-Jul	1.9	1.9	1.9	1.9	1.9	Z	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	1.9	
17-Jul	Z	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.8	1.8	1.9	
18-Jul	1.9	Z	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.8	1.8	1.8	1.8	1.8	1.8	1.7	1.7	1.7	1.7	1.7	1.8	1.8	1.8	1.8	2.0
19-Jul	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	
20-Jul	1.8	1.8	1.8	Z	1.9	1.8	1.8	1.9	2.0	2.0	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.0	
21-Jul	1.8	1.8	1.8	1.9	Z	1.9	1.9	1.8	1.9	2.0	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	2.0	1.9	1.9	1.9	2.0	1.9	2.0	
22-Jul	2.0	2.0	2.1	2.1	2.0	Z	1.9	1.9	1.8	1.8	1.7	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.1	
23-Jul	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	
24-Jul	1.8	Z	1.8	1.8	1.9	1.9	2.1	2.1	1.9	M	M	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	2.1	
25-Jul	1.9	1.8	Z	1.8	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	
26-Jul	1.9	1.8	1.8	Z	1.9	1.9	1.9	2.0	2.1	2.0	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	2.1	
27-Jul	2.0	1.9	1.9	1.9	Z	1.9	1.9	1.8	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.0	
28-Jul	1.8	1.8	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	1.9	1.8	1.8	1.8	1.8	1.9	1.8	1.9	
29-Jul	Z	1.8	1.8	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.7	1.7	1.8	1.8	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	
30-Jul	1.8	Z	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.7	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.8	1.8	1.8	1.9	1.8	1.9	
31-Jul	1.9	1.9	Z	1.9	1.9	1.9	1.9	2.0	2.1	2.1	2.1	2.0	1.9	1.9	1.8	1.9	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	2.1	
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan			C - Calibration					M - Maintenance					UO - Unstable Operation					PF - Power Failure								





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

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

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	607	93.82	93.82
2.1 - 3.0	40	6.18	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 647

Total Number of Hours: 744



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

**Total Hydrocarbons (THC) - ppm**  
**Fort McKay - Bertha Ganter - July 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	12	10	14	7	7	17	37	55	60	45	48	45	59	60	39	573
2.1 - 3.0	0	0	0	0	1	1	1	3	5	6	2	2	2	0	6	0	29
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	58	12	10	14	8	8	18	40	60	66	47	50	47	59	66	39	602

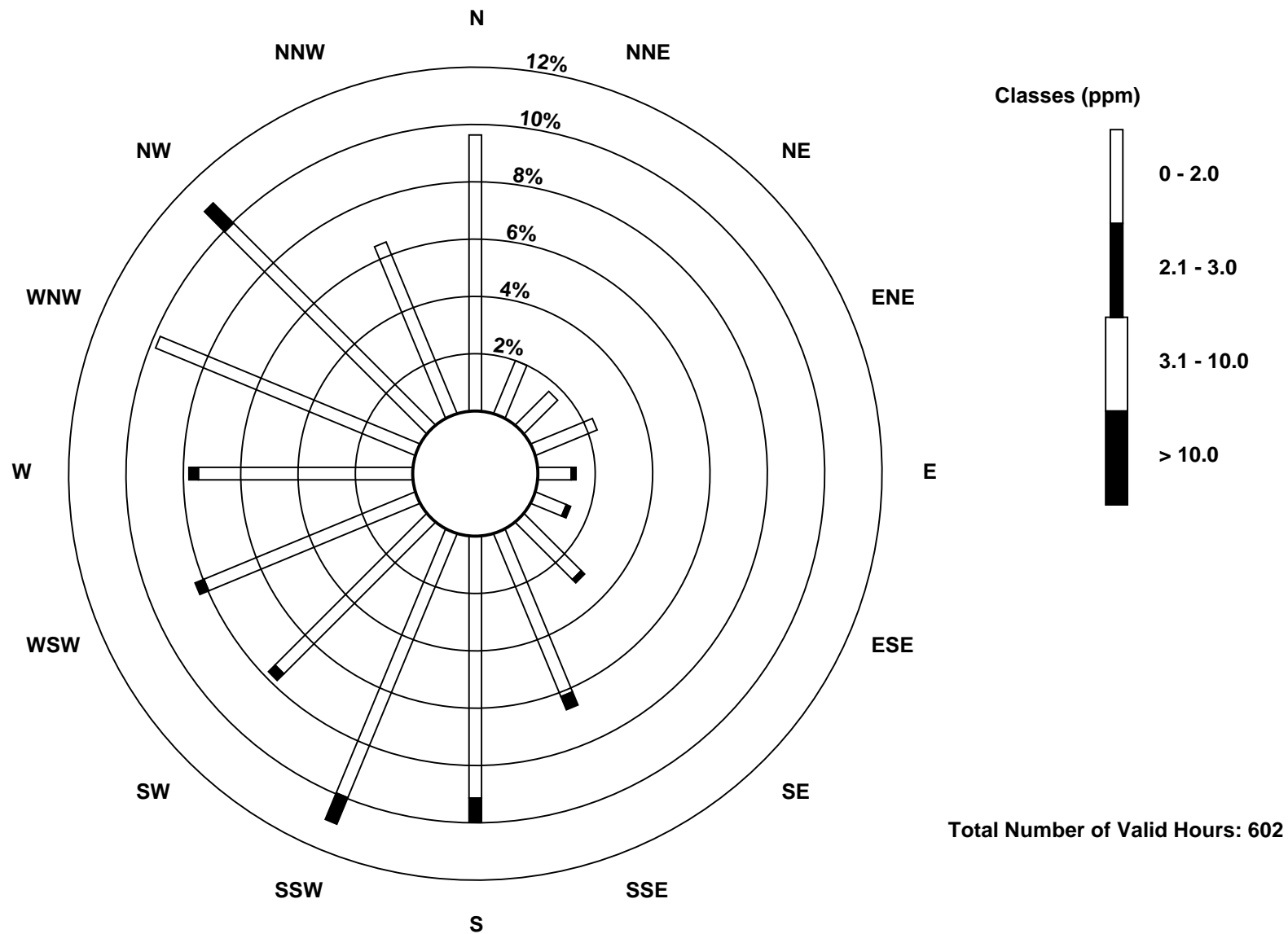
Total Number of Valid Hours: 602

Total Number of Hours: 744



Wood Buffalo Environmental Association  
Wind Rose Jul 2015

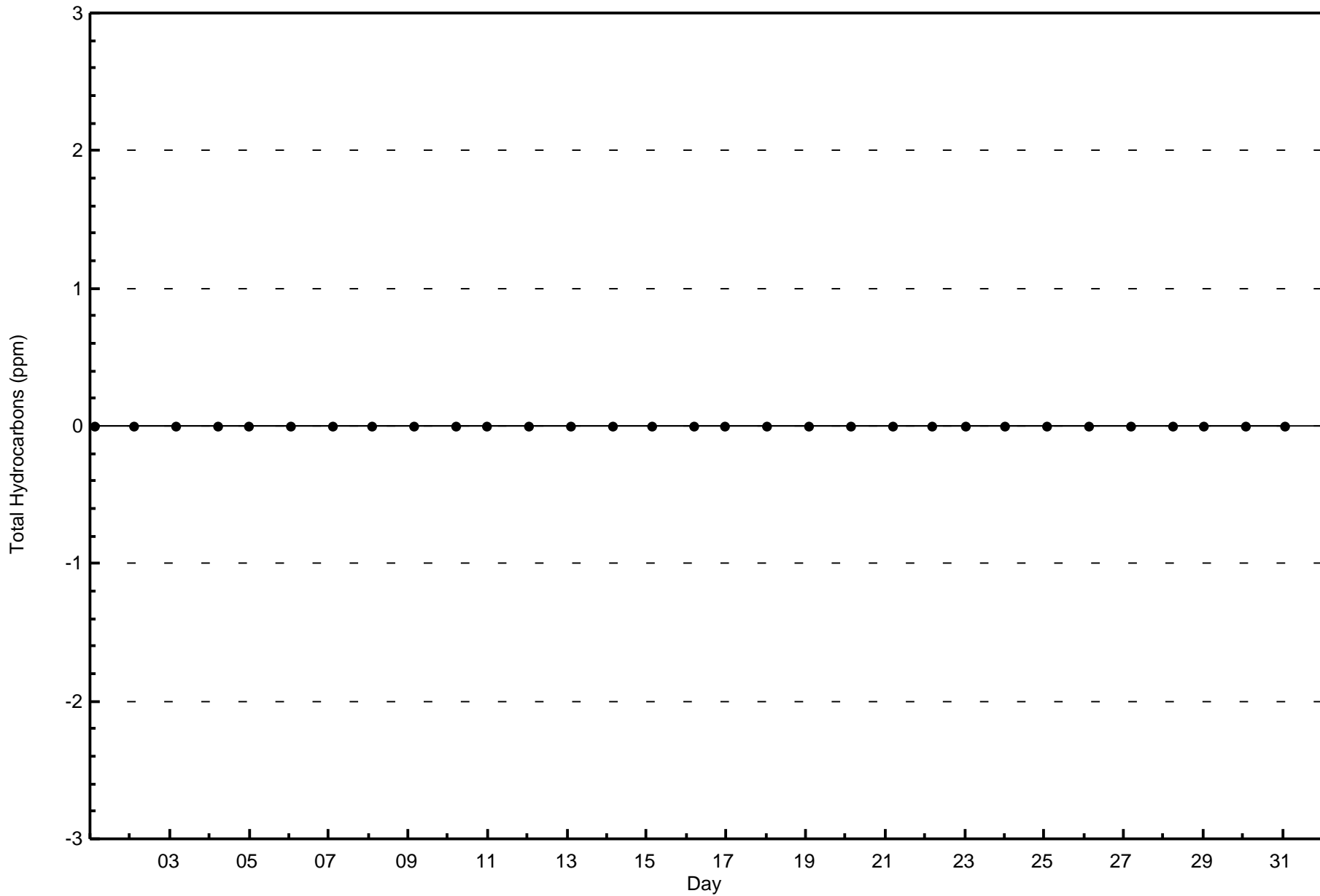
Total Hydrocarbons (THC) - ppm  
Fort McKay - Bertha Ganter (AMS 1)

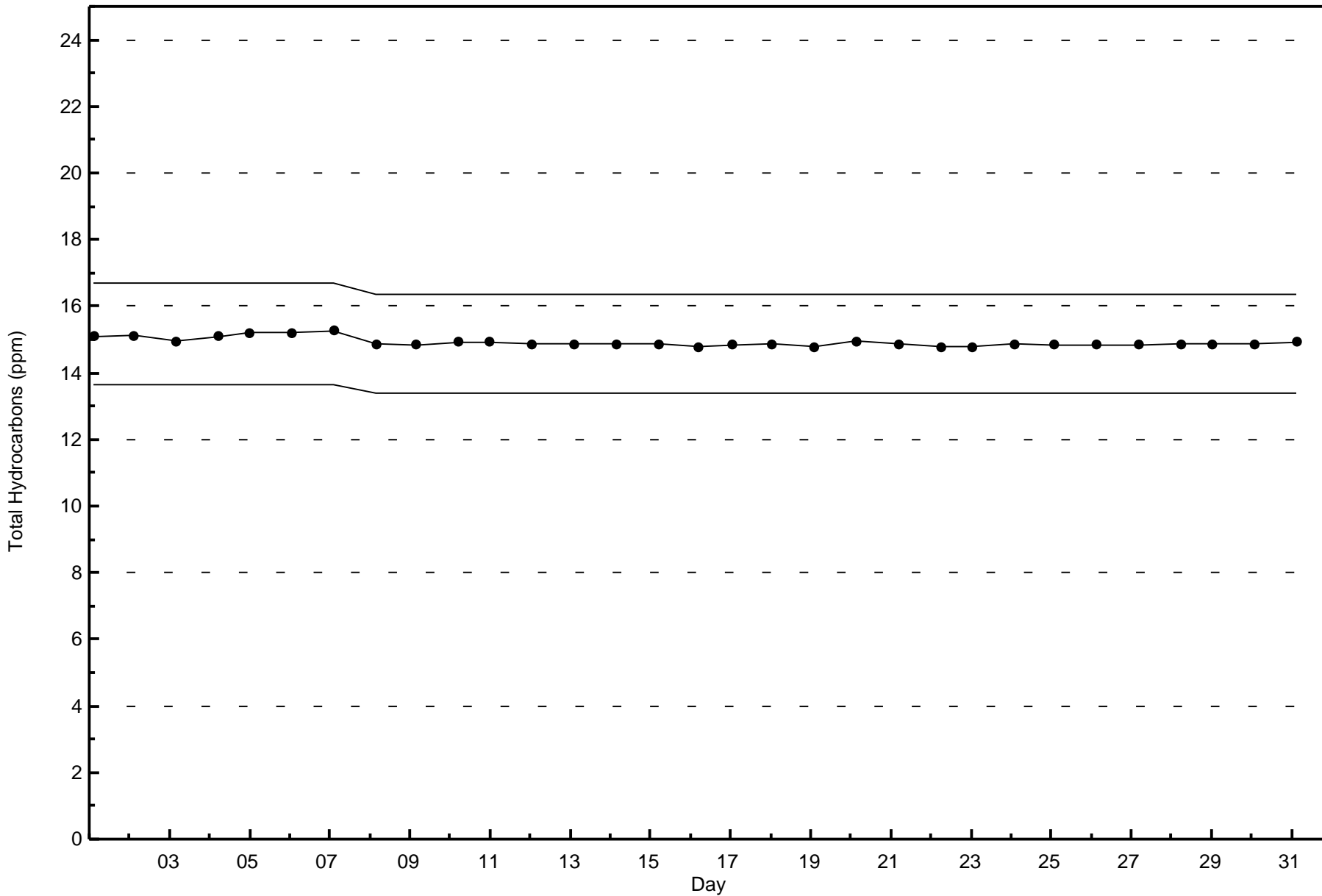




Wood Buffalo Environmental Association  
Zero Responses

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

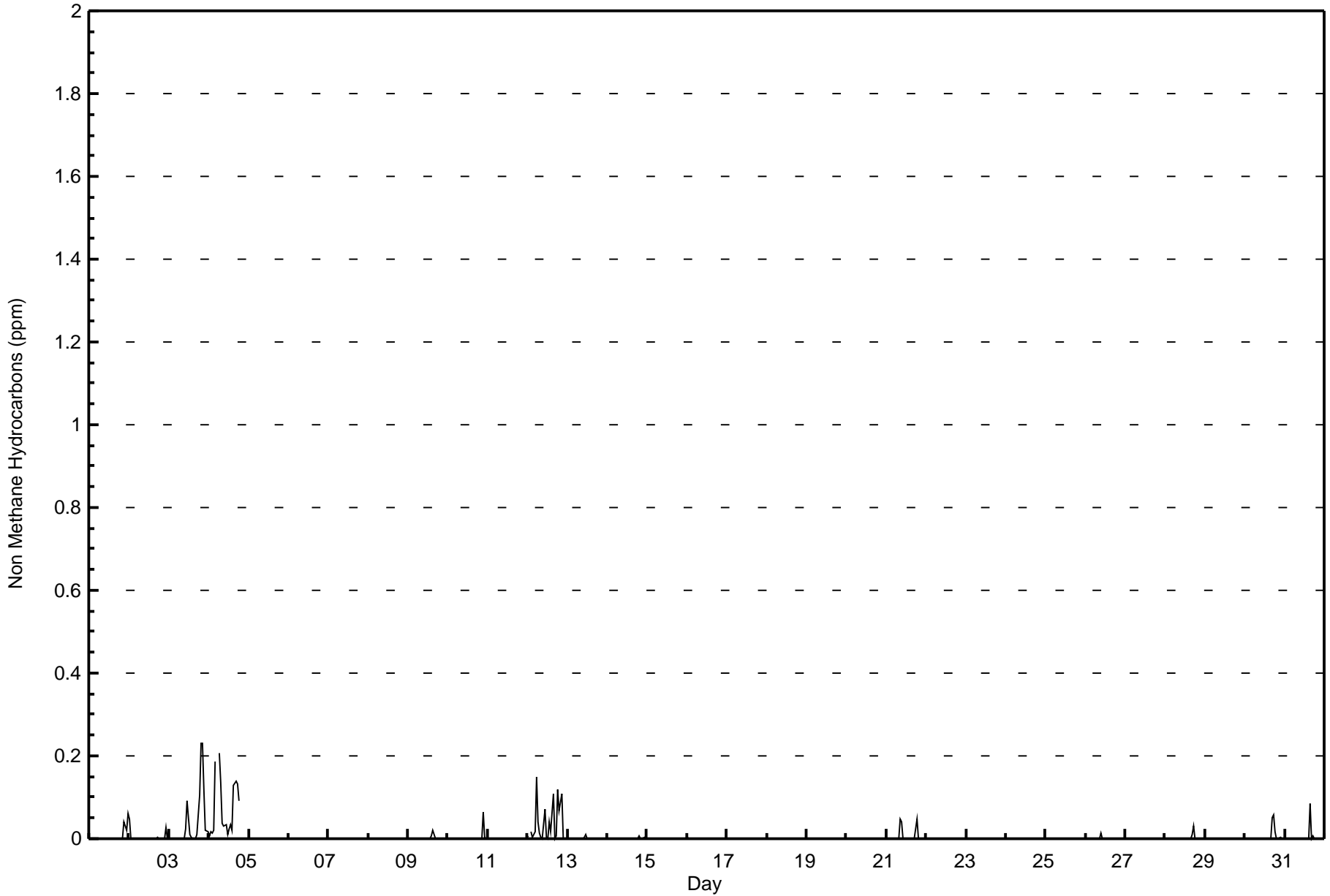








Maximum Value: 0.231 ppm on Jul 3 20:00																				Maximum Daily Average: 0.070 ppm on Jul 4					Hours in Service: 744	
Minimum Value: 0.000 ppm on Jul 1 01:00																				Minimum Daily Average: 0.000 ppm on Jul 15					Hours of Data: 647	
Maximum Diurnal Average: 0.013 ppm at hour 19																				Minimum Diurnal Average: 0.001 ppm at hour 2					Hours of Missing Data: 97	
Monthly Average: 0.006 ppm																				Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 0.0 P <sub>90</sub> = 0.0 P <sub>99</sub> = 0.1					Hours of Calibration: 31	
																									Percent Operational Time: 91.1	
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-Jul	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.041	0.021	0.062	0.005	0.062
2-Jul	0.047	0.001	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.028	0.001	0.004	0.047
3-Jul	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.023	0.090	0.009	0.002	0.000	0.000	0.000	0.010	0.104	0.231	0.229	0.118	0.020	0.016	0.037	0.231
4-Jul	0.006	0.017	0.014	0.022	0.186	Z	0.205	0.136	0.037	0.031	0.033	0.011	0.025	0.033	0.021	0.128	0.139	0.132	0.090	UO	UO	UO	UO	UO	0.070	0.205
5-Jul	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--
6-Jul	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--
7-Jul	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	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
8-Jul	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	M	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
9-Jul	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	0.008	0.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.021
10-Jul	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	0.064	0.003	0.003	0.064
11-Jul	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.002
12-Jul	0.006	Z	0.017	0.003	0.016	0.150	0.042	0.012	0.003	0.000	0.072	0.004	0.000	0.039	0.016	0.108	0.000	0.007	0.117	0.067	0.108	0.000	0.000	0.000	0.034	0.150
13-Jul	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.009
14-Jul	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	PF	0.000	0.000	0.000	0.000	0.000	0.008	0.000	0.002	0.000	0.000	0.008
15-Jul	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
16-Jul	0.003	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	0.003
17-Jul	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Jul	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Jul	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Jul	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
21-Jul	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.048	0.042	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.047	0.000	0.000	0.000	0.000	0.000	0.006	0.048
22-Jul	0.000	0.000	0.001	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
23-Jul	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Jul	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	M	M	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001
25-Jul	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Jul	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.012	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.012
27-Jul	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
28-Jul	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	0.010	0.031	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.031
29-Jul	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Jul	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.052	0.059	0.016	0.000	0.000	0.002	0.000	0.000	0.006	0.059
31-Jul	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.083	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.083
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan			C - Calibration					M - Maintenance					UO - Unstable Operation					PF - Power Failure								





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

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

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.005	584	90.26	90.26
0.006 - 0.05	41	6.34	96.60
0.06 - 0.1	17	2.63	99.23
> 0.1	5	0.77	100.00

Total Number of Valid Hours: 647

Total Number of Hours: 744



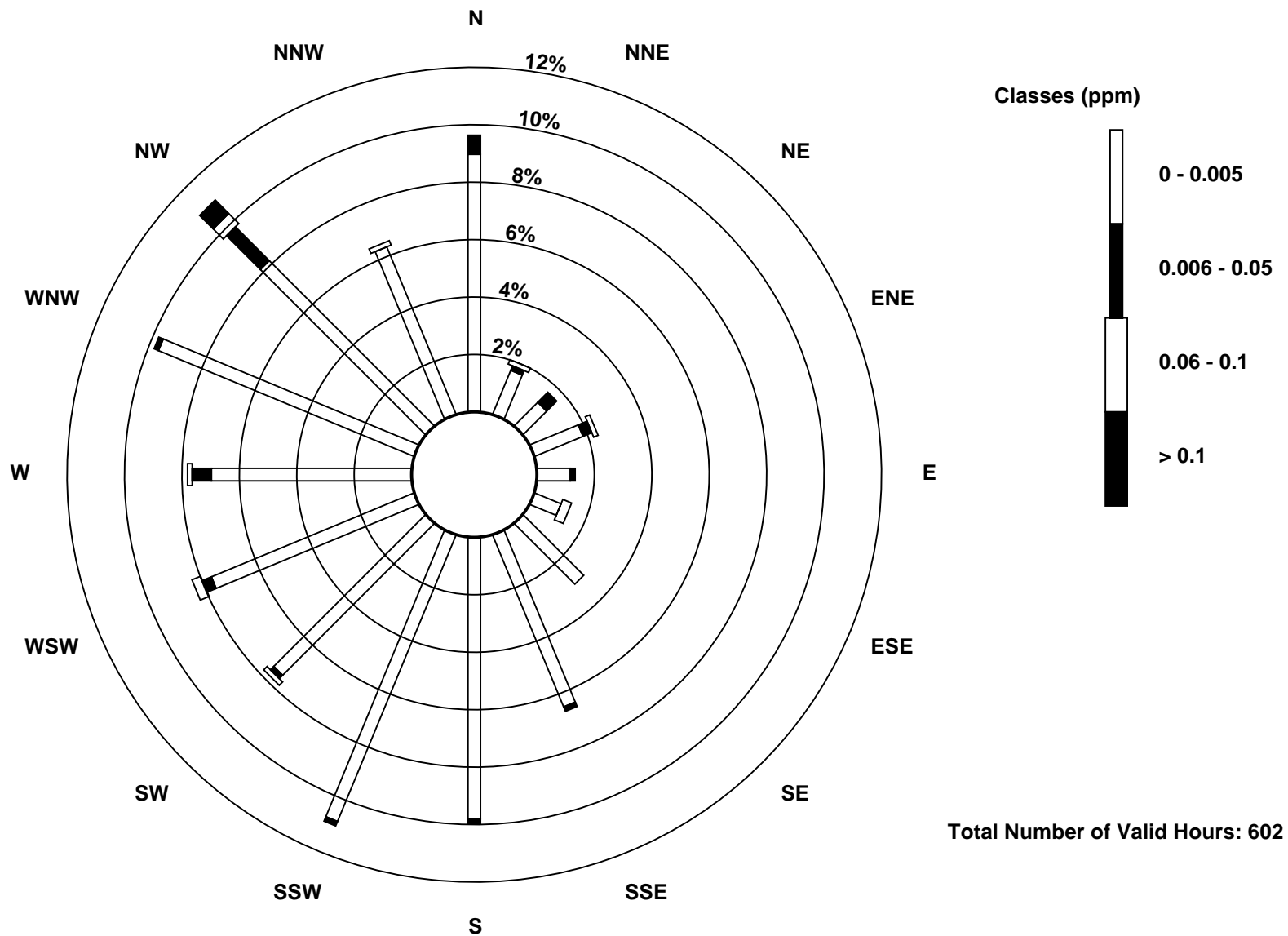
**Wood Buffalo Environmental Association  
Frequency Distribution**

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

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	54	10	7	11	7	6	18	39	59	65	45	46	42	58	49	38	554
0.006 - 0.05	4	1	3	2	1	0	0	1	1	1	1	2	4	1	10	0	32
0.06 - 0.1	0	1	0	1	0	2	0	0	0	0	1	2	1	0	3	1	12
> 0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4
<b>Totals</b>	58	12	10	14	8	8	18	40	60	66	47	50	47	59	66	39	602

Total Number of Valid Hours: 602

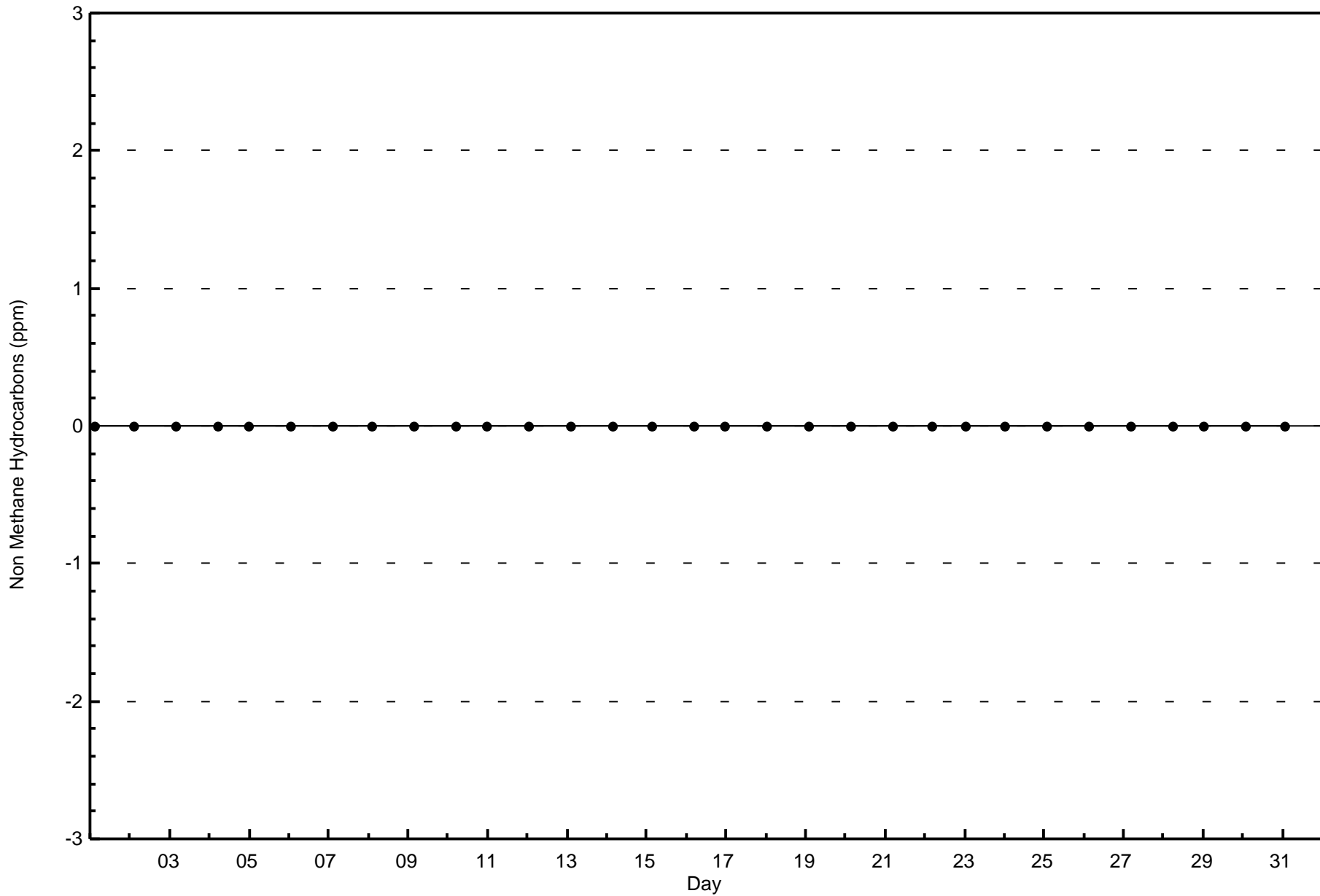
Total Number of Hours: 744

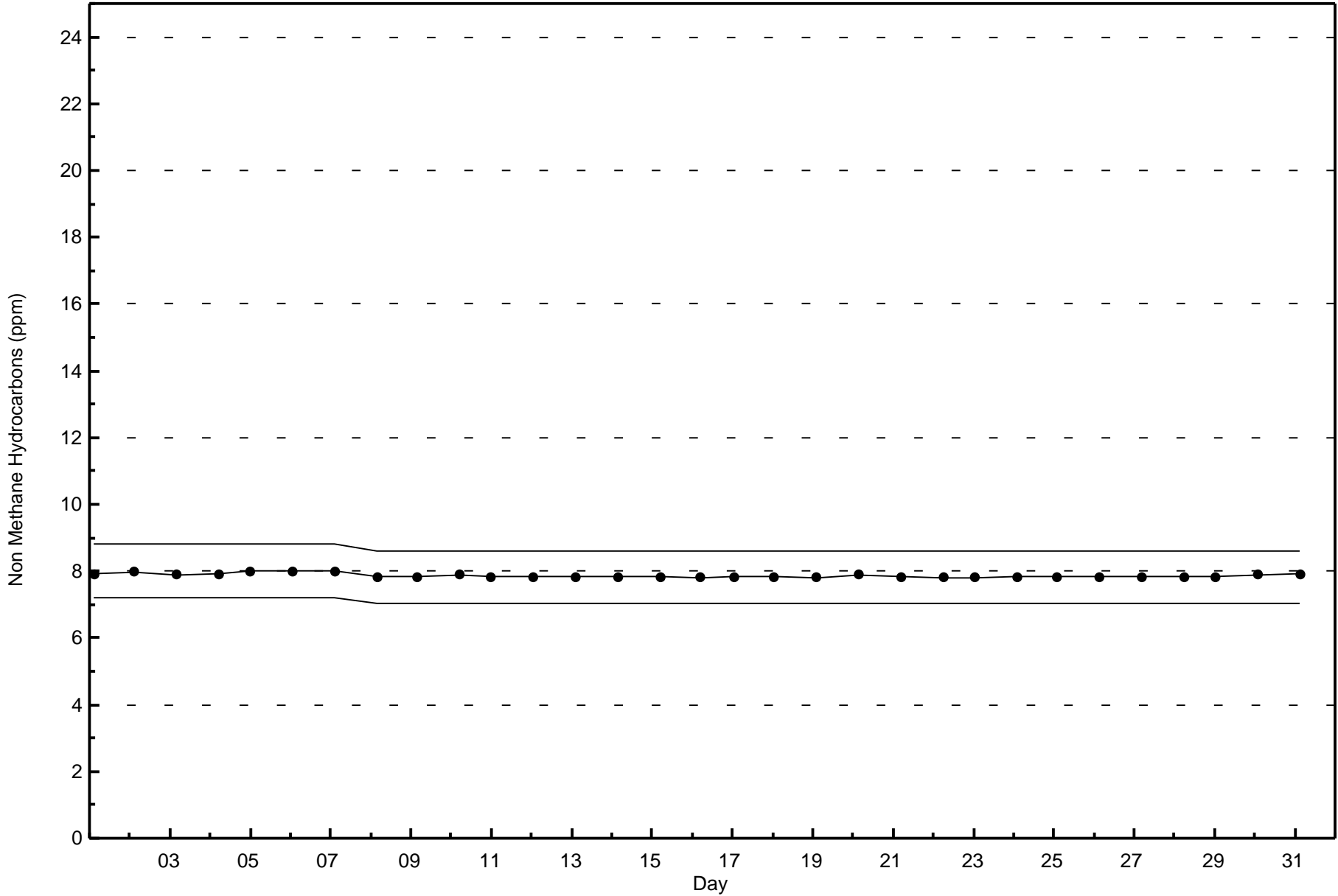




Wood Buffalo Environmental Association  
Zero Responses

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





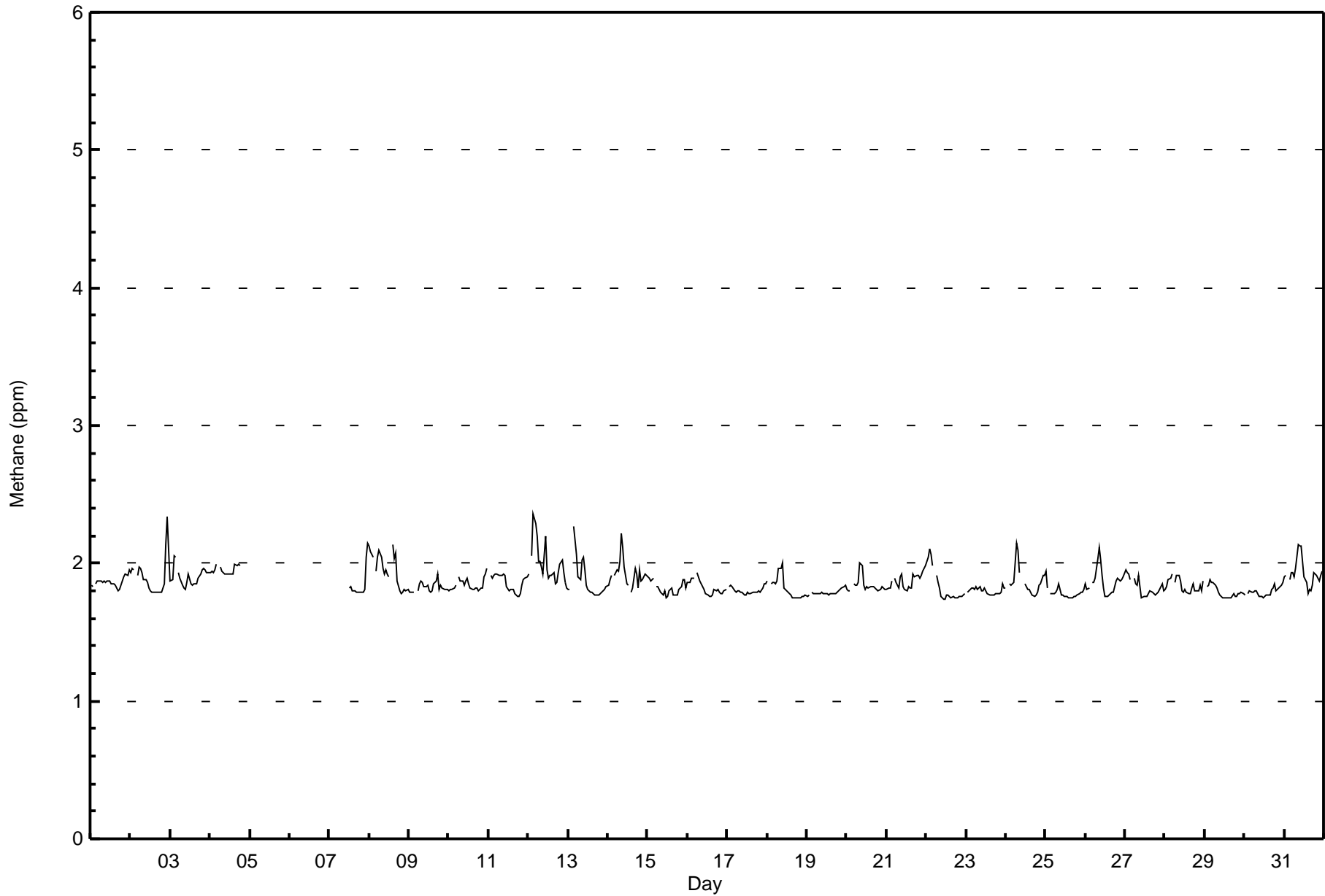


Summary of Hour Averages

Fort McKay - Bertha Ganter - July 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0												Hours in Service: 744															
Maximum Value: 2.4 ppm on Jul 12 04:00												Maximum Daily Average: 2.0 ppm on Jul 12															
Minimum Value: 1.7 ppm on Jul 22 12:00												Minimum Daily Average: 1.8 ppm on Jul 25															
Maximum Diurnal Average: 1.9 ppm at hour 4												Minimum Diurnal Average: 1.8 ppm at hour 14															
Monthly Average: 1.86 ppm												Percentiles: P <sub>1</sub> = 1.7 P <sub>10</sub> = 1.8 Q <sub>1</sub> = 1.8 Median = 1.8 Q <sub>3</sub> = 1.9 P <sub>90</sub> = 2.0 P <sub>99</sub> = 2.2															
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-Jul	1.8	1.8	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	2.0	1.9	2.0	
2-Jul	1.9	2.0	1.9	Z	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.1	2.3	2.1	1.9	2.3	
3-Jul	1.9	1.9	2.0	2.0	Z	1.9	1.9	1.8	1.8	1.8	1.9	1.9	1.8	1.8	1.8	1.9	1.8	1.9	1.9	2.0	2.0	2.0	1.9	1.9	2.0		
4-Jul	1.9	1.9	1.9	1.9	2.0	Z	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	2.0		
5-Jul	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	
6-Jul	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	
7-Jul	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	C	C	C	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.0	2.1	--	2.1	
8-Jul	2.1	2.1	2.0	Z	1.9	2.0	2.1	2.0	2.0	1.9	1.9	1.9	1.9	M	2.1	2.0	2.1	1.9	1.8	1.8	1.8	1.8	1.8	1.8	2.0	2.1	
9-Jul	1.8	1.8	1.8	1.8	Z	1.8	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	
10-Jul	1.8	1.8	1.8	1.8	1.8	Z	1.9	1.9	1.9	1.8	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	2.0	1.8	2.0	
11-Jul	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	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	
12-Jul	1.9	Z	2.1	2.4	2.3	2.2	2.0	2.0	2.0	1.9	2.2	1.9	1.9	1.9	1.9	1.9	1.8	1.9	1.9	1.9	2.0	2.0	1.9	1.9	1.8	2.0	
13-Jul	1.8	1.8	Z	2.3	2.2	2.1	1.9	1.9	2.0	2.0	2.0	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.3	
14-Jul	1.8	1.9	1.9	Z	1.9	2.0	1.9	2.0	2.2	2.1	2.0	1.9	1.8	PF	1.8	1.8	2.0	1.9	1.8	2.0	1.9	1.9	1.9	1.9	1.9	2.2	
15-Jul	1.9	1.9	1.9	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	1.8	1.8	1.9	
16-Jul	1.9	1.9	1.9	1.9	1.9	Z	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	1.9	
17-Jul	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	1.8	1.8	1.9	
18-Jul	1.9	Z	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.8	1.8	1.8	1.8	1.8	1.8	1.7	1.7	1.7	1.7	1.7	1.8	1.8	1.8	1.8	2.0	
19-Jul	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	
20-Jul	1.8	1.8	1.8	Z	1.9	1.8	1.8	1.9	2.0	2.0	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.0	
21-Jul	1.8	1.8	1.8	1.9	Z	1.9	1.9	1.8	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.0	
22-Jul	2.0	2.0	2.1	2.1	2.0	Z	1.9	1.9	1.8	1.8	1.7	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.1
23-Jul	Z	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	
24-Jul	1.8	Z	1.8	1.8	1.9	1.9	2.1	2.1	1.9	M	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	2.1	
25-Jul	1.9	1.8	Z	1.8	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	1.8	1.9	
26-Jul	1.9	1.8	1.8	Z	1.9	1.9	1.9	2.0	2.1	2.0	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	2.1	
27-Jul	2.0	1.9	1.9	1.9	Z	1.9	1.9	1.8	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.0	
28-Jul	1.8	1.8	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	1.9	1.8	1.9	
29-Jul	Z	1.8	1.8	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.7	1.7	1.8	1.8	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	
30-Jul	1.8	Z	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.8	1.8	1.8	1.8	1.9	1.8	1.9	
31-Jul	1.9	1.9	Z	1.9	1.9	1.9	1.9	2.0	2.1	2.1	2.1	2.0	1.9	1.9	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1	
																								Diurnal Average			
																								Diurnal Maximum			
Z - zerospan C - Calibration M - Maintenance UO - Unstable Operation PF - Power Failure																											







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

**Methane (CH<sub>4</sub>) - ppm**  
**Fort McKay - Bertha Ganter - July 2015**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	620	95.83	95.83
2.1 - 3.0	27	4.17	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 647

Total Number of Hours: 744



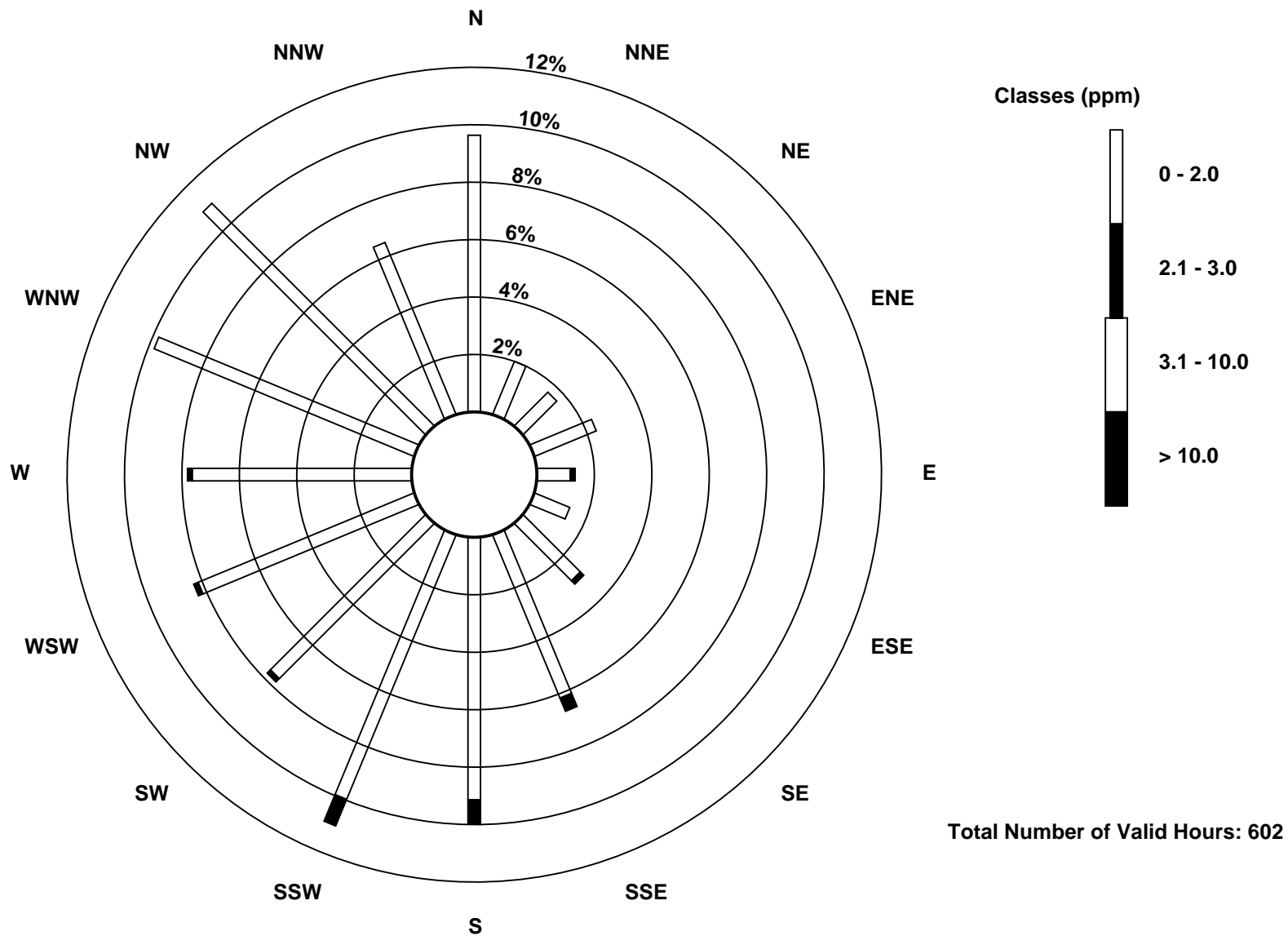
**Wood Buffalo Environmental Association**  
**Frequency Distribution**

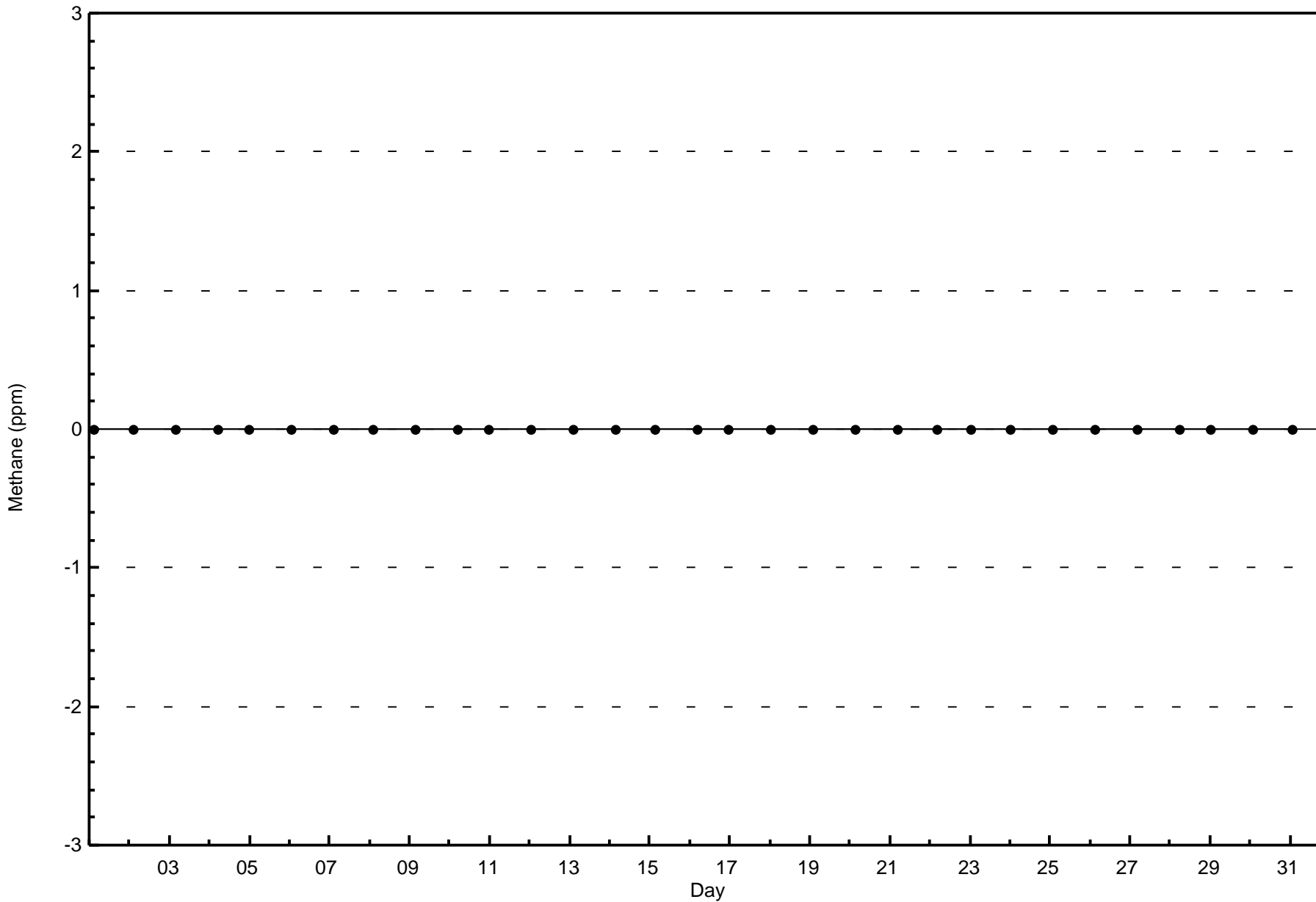
**Methane (CH<sub>4</sub>) - ppm**  
**Fort McKay - Bertha Ganter - July 2015**

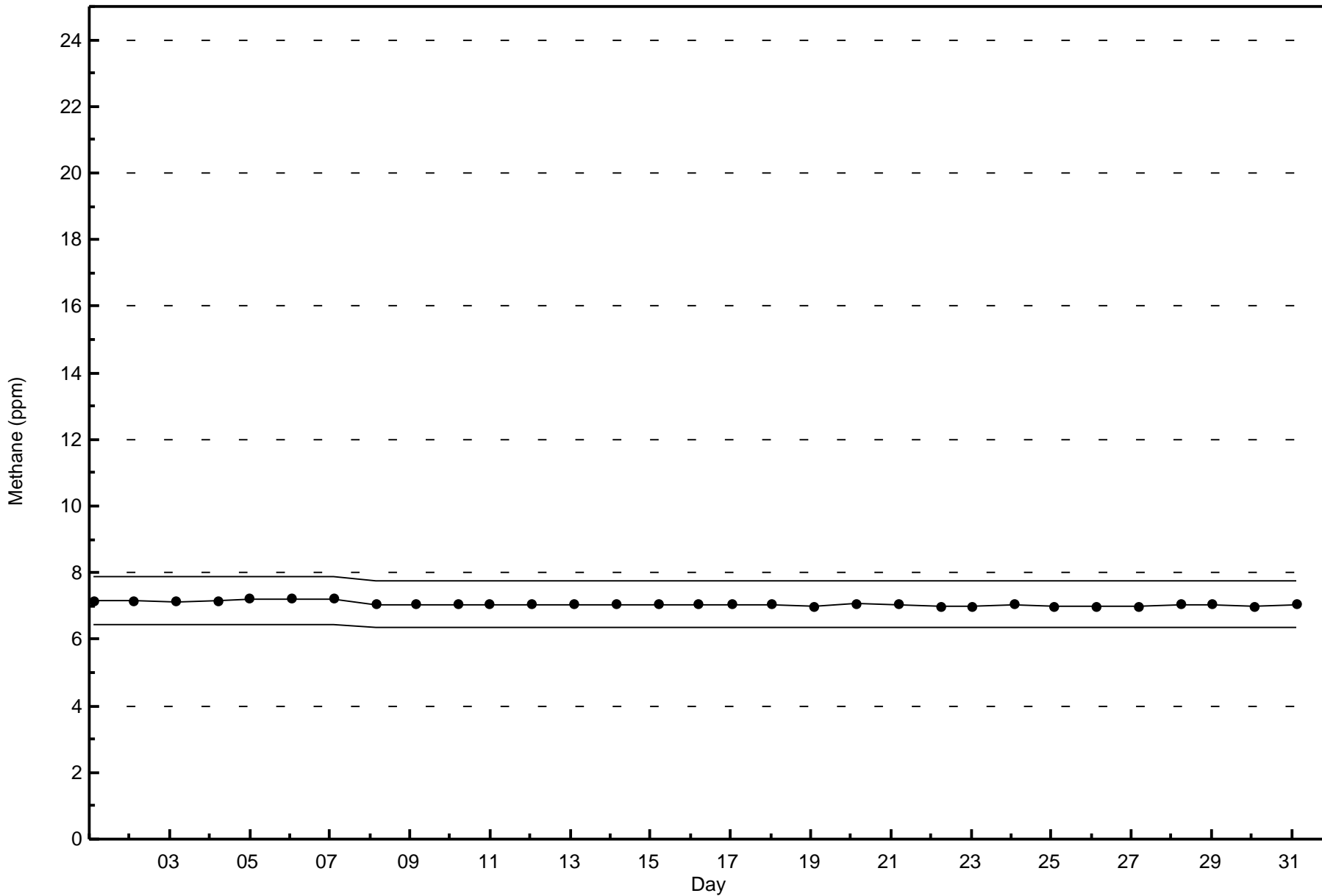
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	58	12	10	14	7	8	17	37	55	60	46	49	46	59	66	39	583
2.1 - 3.0	0	0	0	0	1	0	1	3	5	6	1	1	1	0	0	0	19
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	58	12	10	14	8	8	18	40	60	66	47	50	47	59	66	39	602

Total Number of Valid Hours: 602

Total Number of Hours: 744

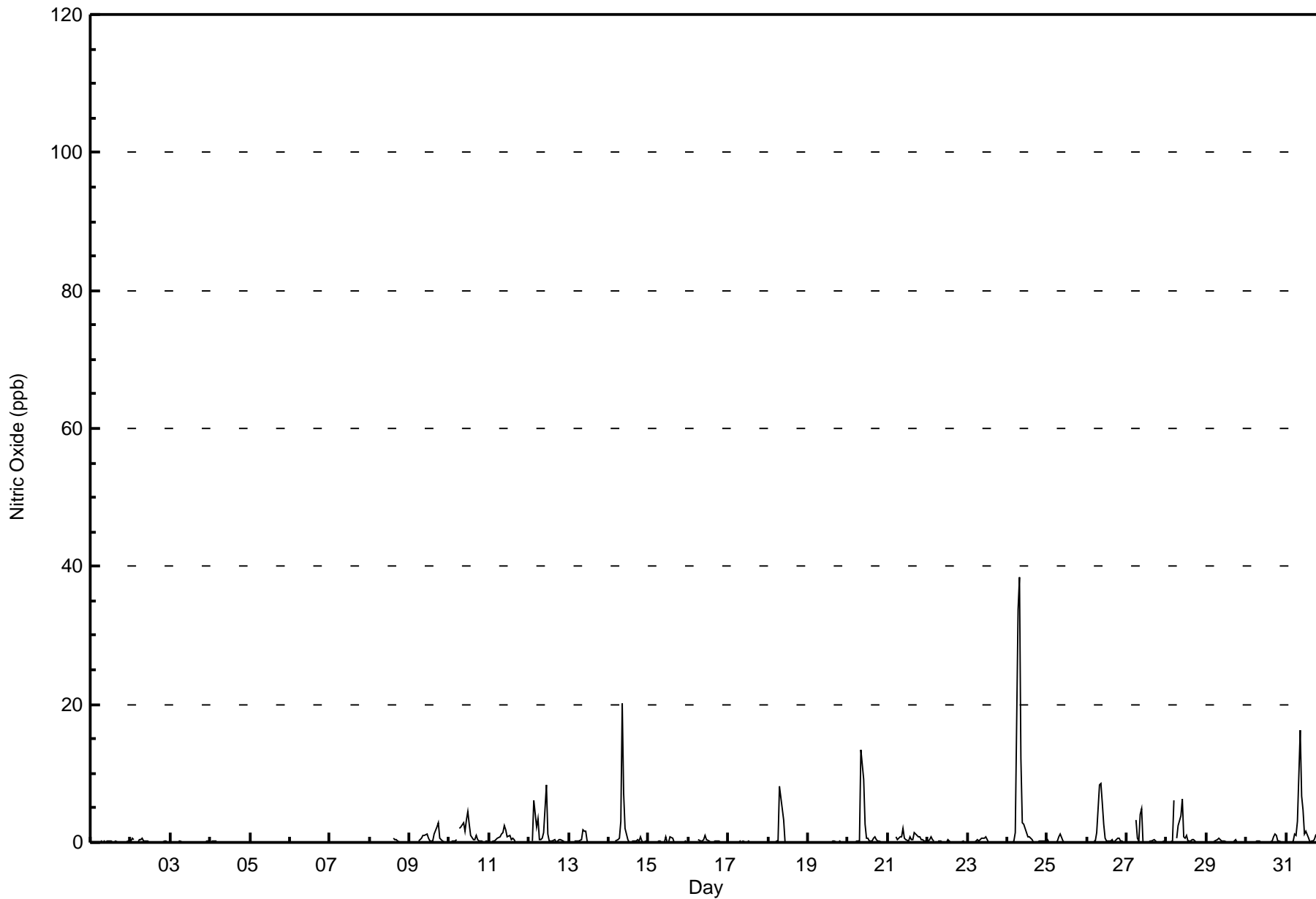








Maximum Value: 38 ppb on Jul 24 08:00														Maximum Daily Average: 4.2 ppb on Jul 24														Hours in Service: 744	
Minimum Value: 0 ppb on Jul 2 12:00														Minimum Daily Average: 0.0 ppb on Jul 3														Hours of Data: 612	
Maximum Diurnal Average: 3.7 ppb at hour 9														Minimum Diurnal Average: 0.1 ppb at hour 22														Hours of Missing Data: 132	
Monthly Average: 0.7 ppb														Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 O <sub>3</sub> = 0 P <sub>90</sub> = 1 P <sub>99</sub> = 12														Hours of Calibration: 32	
																												Percent Operational Time: 86.6	
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-Jul	0	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-Jul	0	1	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			
3-Jul	0	0	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-Jul	0	0	0	0	0	Z	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	0			
5-Jul	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--			
6-Jul	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--			
7-Jul	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--			
8-Jul	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	1			
9-Jul	0	0	0	0	Z	0	0	1	1	1	1	1	0	0	0	1	2	3	1	0	0	0	0	0.6	3				
10-Jul	0	0	0	0	0	Z	2	2	3	2	3	4	3	1	0	0	1	0	0	0	0	0	0	1.0	4				
11-Jul	Z	0	0	0	0	1	1	1	2	2	2	1	1	0	1	0	0	0	0	0	0	0	0	0.5	2				
12-Jul	0	Z	0	6	2	4	0	0	1	1	8	1	0	0	0	0	0	0	0	0	0	0	0	1.2	8				
13-Jul	0	0	Z	0	0	0	0	0	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2				
14-Jul	0	0	0	Z	0	0	1	3	20	7	2	0	0	PF	0	0	0	0	1	0	0	0	0	1.7	20				
15-Jul	0	0	0	0	Z	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0.2	1				
16-Jul	0	0	0	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1				
17-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0				
18-Jul	0	Z	0	0	0	0	0	8	5	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	8				
19-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0				
20-Jul	0	0	0	Z	0	0	0	0	13	9	3	1	1	0	0	1	1	0	0	0	0	0	0	1.3	13				
21-Jul	0	0	0	0	Z	1	0	1	1	2	1	0	0	1	0	0	1	1	1	1	1	0	0	0.6	2				
22-Jul	0	0	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1				
23-Jul	Z	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1				
24-Jul	0	Z	0	0	0	1	34	38	12	3	3	1	1	1	1	1	0	0	0	0	0	0	0	4.2	38				
25-Jul	0	0	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1				
26-Jul	0	0	0	Z	0	0	1	8	9	6	3	1	0	0	0	0	0	0	1	1	0	0	0	1.3	9				
27-Jul	0	0	0	0	Z	3	1	0	4	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	5				
28-Jul	0	0	0	0	6	Z	1	2	4	6	1	1	1	0	0	0	0	0	0	0	0	0	0	1.0	6				
29-Jul	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1				
30-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0.2	1				
31-Jul	0	0	Z	0	0	1	1	3	16	7	5	1	2	1	0	0	0	0	1	0	0	0	0	1.7	16				
																								Diurnal Average					
																								Diurnal Maximum					
Z - zerospan																													
C - Calibration																													
UO - Unstable Operation																													
PF - Power Failure																													







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

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

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	610	99.67	99.67
21 - 40	2	0.33	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: 612  
Total Number of Hours: 744



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

**Nitric Oxide (NO) - ppb**  
**Fort McKay - Bertha Ganter - July 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	12	10	14	8	7	19	41	53	57	40	45	43	57	63	39	565
21 - 40	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	57	12	10	14	8	7	19	41	55	57	40	45	43	57	63	39	567

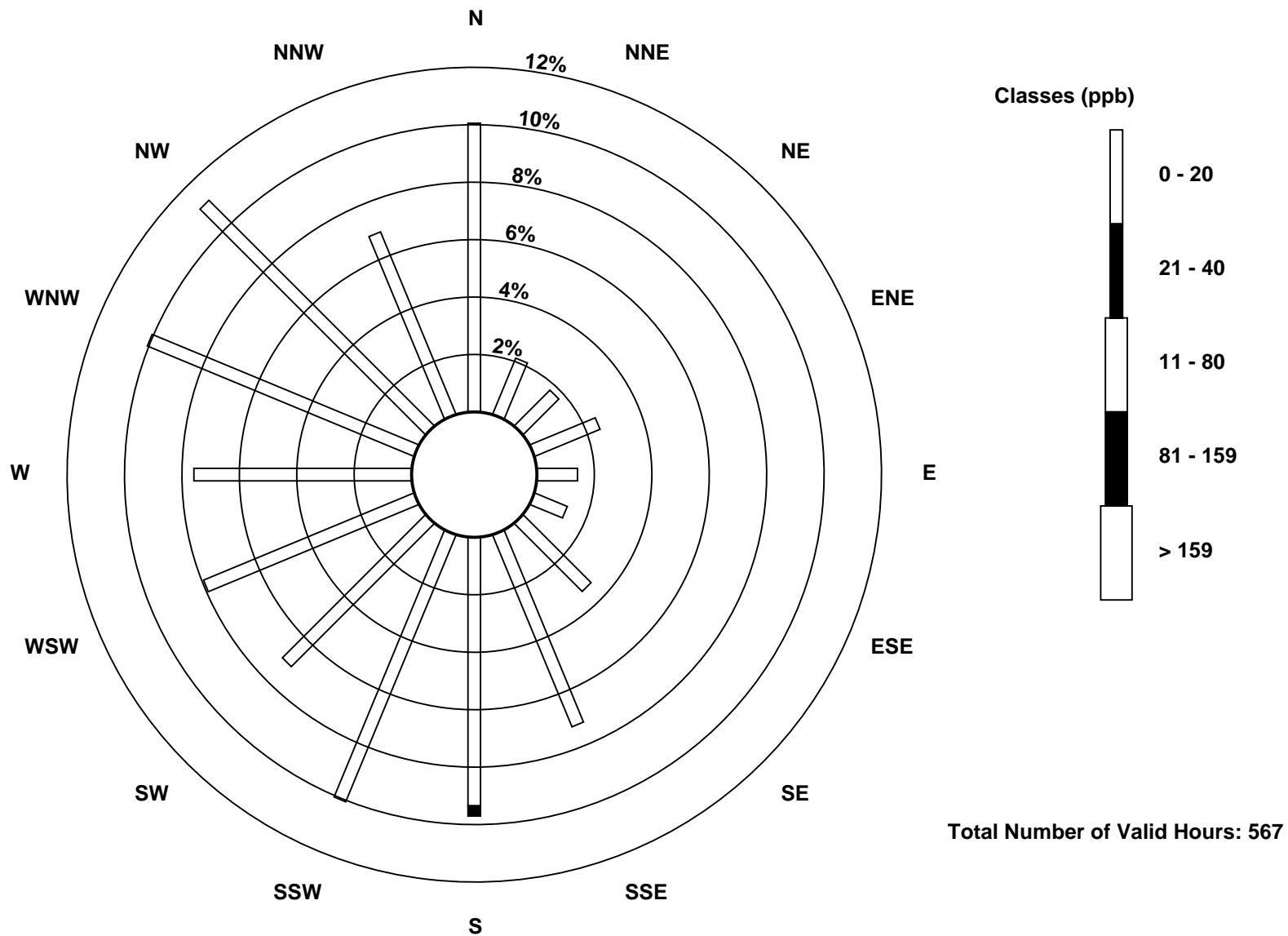
Total Number of Valid Hours: 567

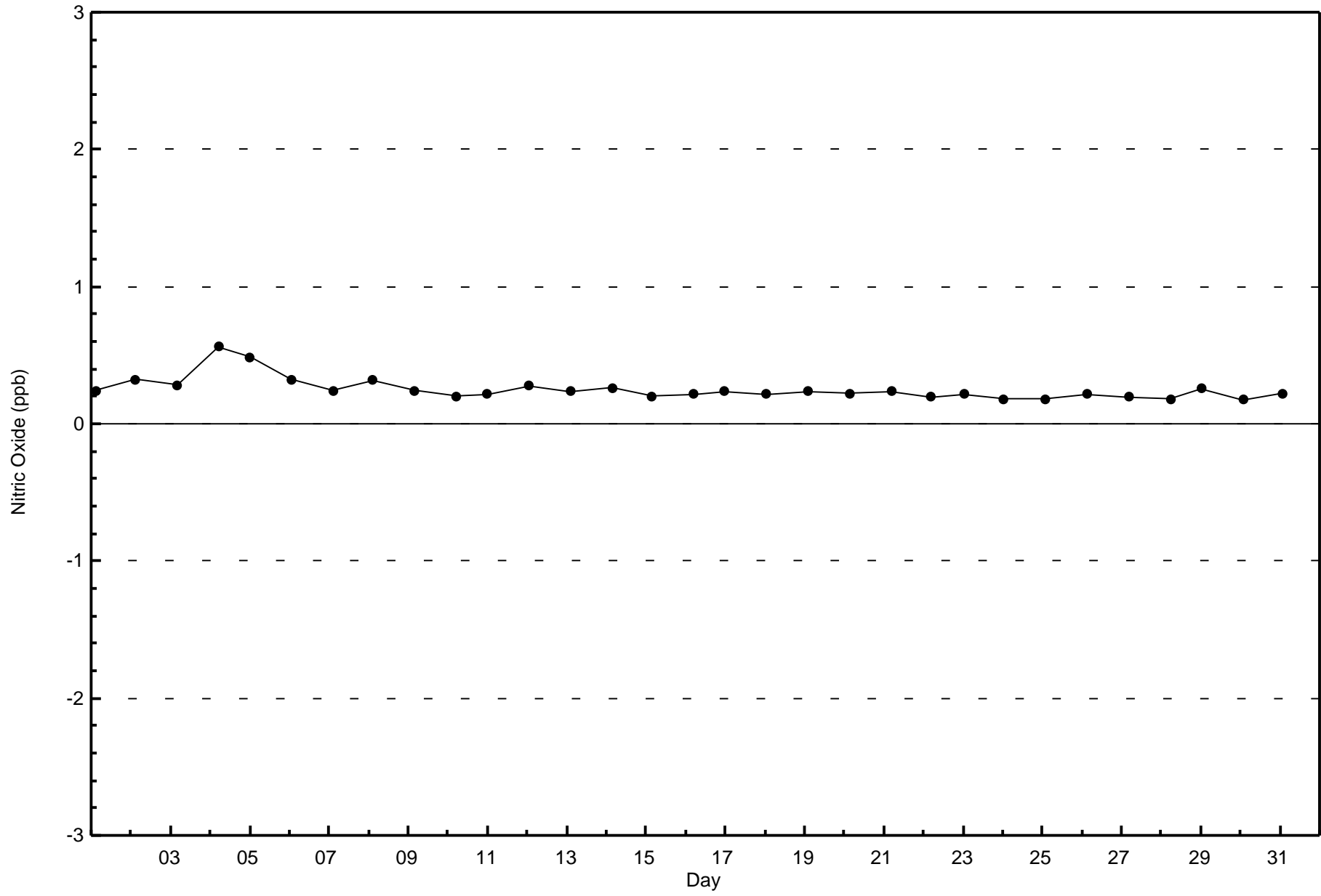
Total Number of Hours: 744

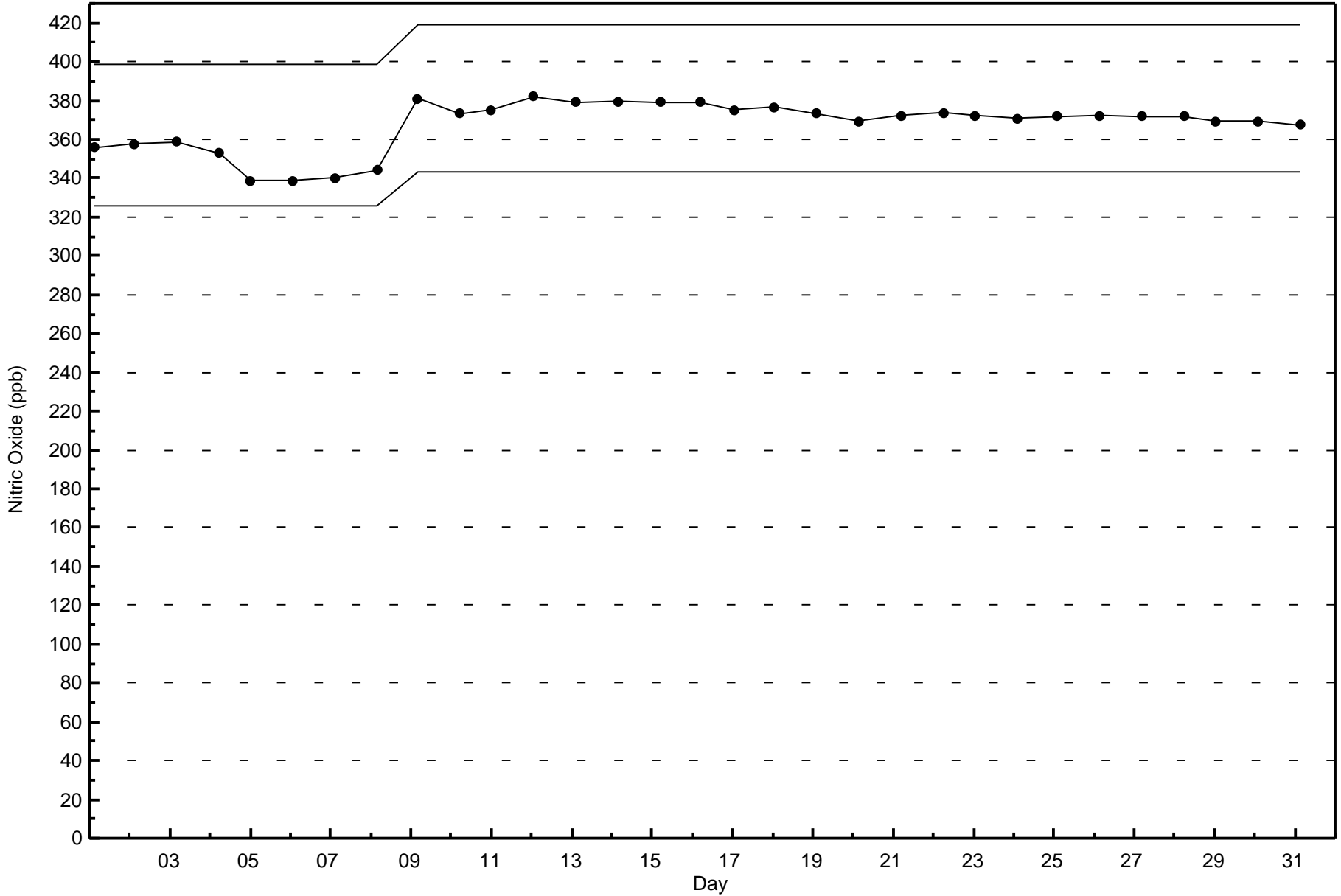


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Nitric Oxide (NO) - ppb  
Fort McKay - Bertha Ganter (AMS 1)









Wood Buffalo Environmental Association

Summary of Hour Averages

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

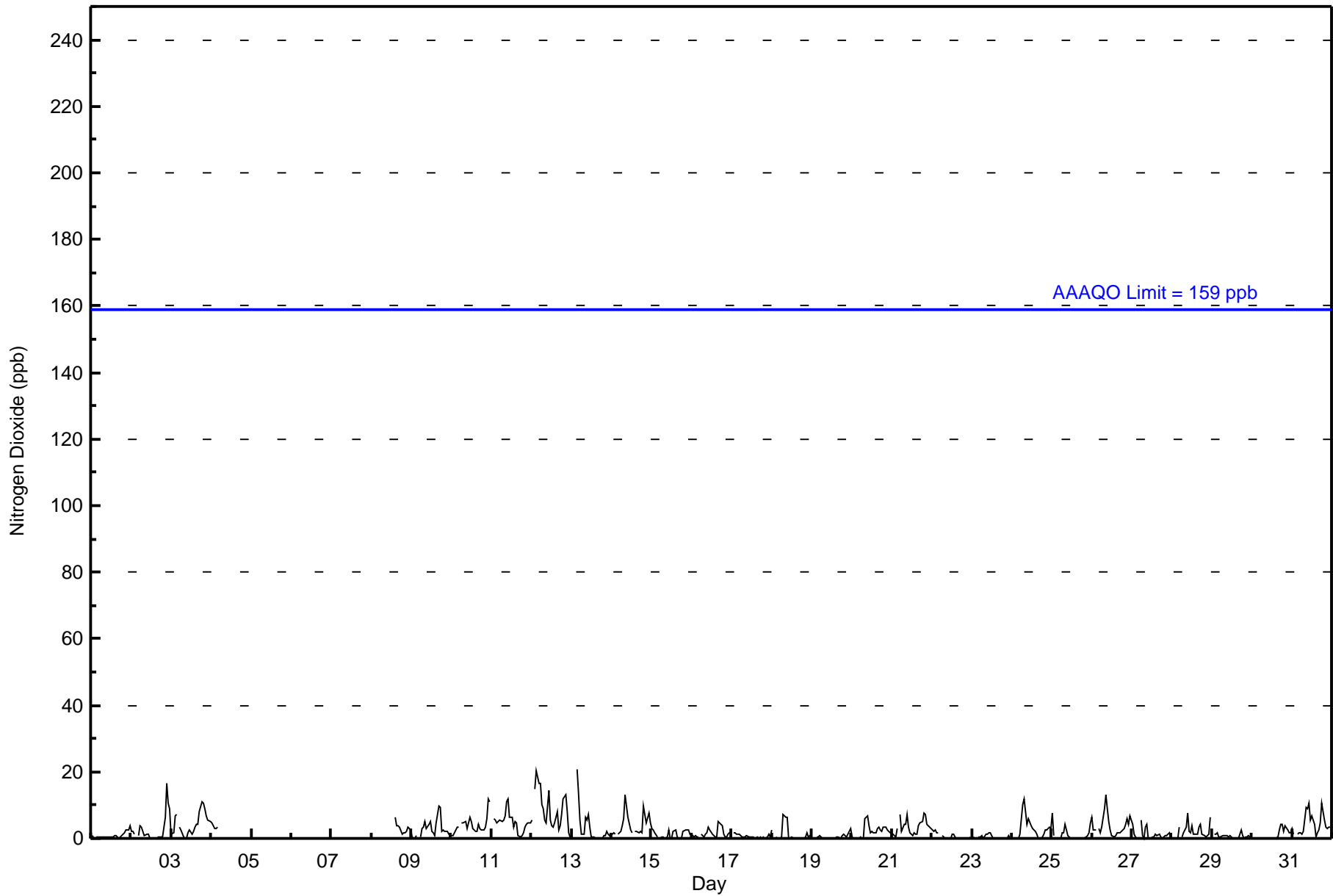
Fort McKay - Bertha Ganter - July 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 21 ppb on Jul 13 04:00	Maximum Daily Average: 8.3 ppb on Jul 12
Minimum Value: 0 ppb on Jul 2 12:00	Hours of Data: 612
Maximum Diurnal Average: 4.1 ppb at hour 9	Hours of Missing Data: 132
Monthly Average: 2.5 ppb	Hours of Calibration: 32
Minimum Daily Average: 0.5 ppb on Jul 23	Percent Operational Time: 86.6
Minimum Diurnal Average: 1.3 ppb at hour 14	
Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 1 O <sub>3</sub> = 4 P <sub>90</sub> = 6 P <sub>99</sub> = 14	

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	1	1	Z	1	1	1	1	0	0	0	1	0	1	1	1	1	0	0	1	1	2	2	2	4	0.9	4
2-Jul	2	2	1	Z	1	4	3	2	1	1	1	0	0	0	0	0	1	1	1	0	6	17	10	9	2.7	17
3-Jul	1	2	7	7	Z	4	3	0	0	0	2	2	1	2	4	4	4	8	11	11	9	7	6	5	4.4	11
4-Jul	5	4	3	3	3	Z	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	5
5-Jul	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--
6-Jul	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--
7-Jul	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--
8-Jul	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	6
9-Jul	0	0	0	1	Z	1	3	4	5	3	4	5	2	2	1	5	10	9	2	3	2	2	1	1	2.8	10
10-Jul	1	1	2	3	4	Z	5	5	5	3	5	6	5	3	2	2	4	3	3	3	3	6	12	11	4.1	12
11-Jul	Z	6	6	5	5	6	5	6	7	11	12	6	6	3	5	5	1	1	1	2	3	4	5	5	4.9	12
12-Jul	6	Z	15	20	17	17	10	9	6	5	15	6	4	4	5	8	3	4	7	12	13	8	2	1	8.3	20
13-Jul	0	0	Z	21	14	6	1	1	6	5	7	3	1	0	0	0	0	0	0	1	1	2	1	1	3.1	21
14-Jul	1	2	1	Z	1	2	4	6	13	10	6	3	2	PF	2	2	2	2	2	10	7	5	8	5	4.3	13
15-Jul	3	3	2	1	Z	0	0	0	0	0	0	3	0	0	2	3	0	0	0	2	3	3	3	1	1.2	3
16-Jul	1	1	1	0	1	Z	1	1	1	2	4	2	1	1	0	1	5	4	4	1	0	0	1	2	1.5	5
17-Jul	Z	2	2	1	1	1	1	1	0	1	0	0	1	0	0	0	0	0	0	1	0	1	1	1	0.6	2
18-Jul	3	Z	0	0	0	0	0	7	6	6	0	0	0	0	0	0	0	0	0	0	1	2	0	1	1.2	7
19-Jul	0	0	Z	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	2	3	0.5	3
20-Jul	0	0	0	Z	0	0	0	0	6	7	4	2	2	2	2	3	4	2	2	4	3	3	2	2	2.1	7
21-Jul	2	1	1	3	Z	7	2	4	4	7	3	2	1	2	1	1	4	5	5	8	7	4	4	3	3.5	8
22-Jul	3	2	3	2	2	Z	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0.7	3
23-Jul	Z	0	0	0	1	0	1	0	1	1	2	2	1	0	0	0	0	0	0	0	0	0	1	0	0.5	2
24-Jul	0	Z	0	0	0	1	10	12	8	4	6	4	3	3	2	1	0	0	0	1	2	3	3	3	3.0	12
25-Jul	8	1	Z	0	0	0	2	2	4	1	0	0	0	0	0	0	0	0	0	0	1	1	2	5	1.2	8
26-Jul	6	3	3	Z	3	2	3	9	13	9	5	2	1	1	1	2	2	2	3	3	4	6	4	7	4.0	13
27-Jul	4	1	1	0	Z	5	1	0	4	4	0	0	0	0	1	1	1	1	0	0	1	1	2	0	1.3	5
28-Jul	0	0	0	0	4	Z	1	2	4	8	2	2	4	1	1	1	3	4	1	1	1	1	1	6	2.1	8
29-Jul	Z	1	1	2	1	0	1	1	1	1	0	1	0	0	0	0	0	2	1	0	0	1	1	0	0.7	2
30-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	4	4	2	4	2	2	2	1.0	4
31-Jul	3	1	Z	1	2	2	1	2	9	9	11	5	7	4	0	2	3	5	11	5	4	3	3	4	4.2	11

2.2	1.4	2.1	3.1	2.7	2.7	2.3	2.8	4.1	3.8	3.5	2.1	1.7	1.3	1.4	1.6	2.0	2.3	2.2	2.7	3.0	3.1	3.0	3.0	Diurnal Average
8	6	15	21	17	17	10	12	13	11	15	6	7	4	6	8	10	9	11	12	13	17	12	11	Diurnal Maximum

Z - zerospan      C - Calibration      UO - Unstable Operation      PF - Power Failure  
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb





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

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Fort McKay - Bertha Ganter - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	611	99.84	99.84
21 - 40	1	0.16	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: 612

Total Number of Hours: 744





**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Fort McKay - Bertha Ganter - July 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	12	10	14	8	7	19	41	55	57	40	45	43	57	63	39	567
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	57	12	10	14	8	7	19	41	55	57	40	45	43	57	63	39	567

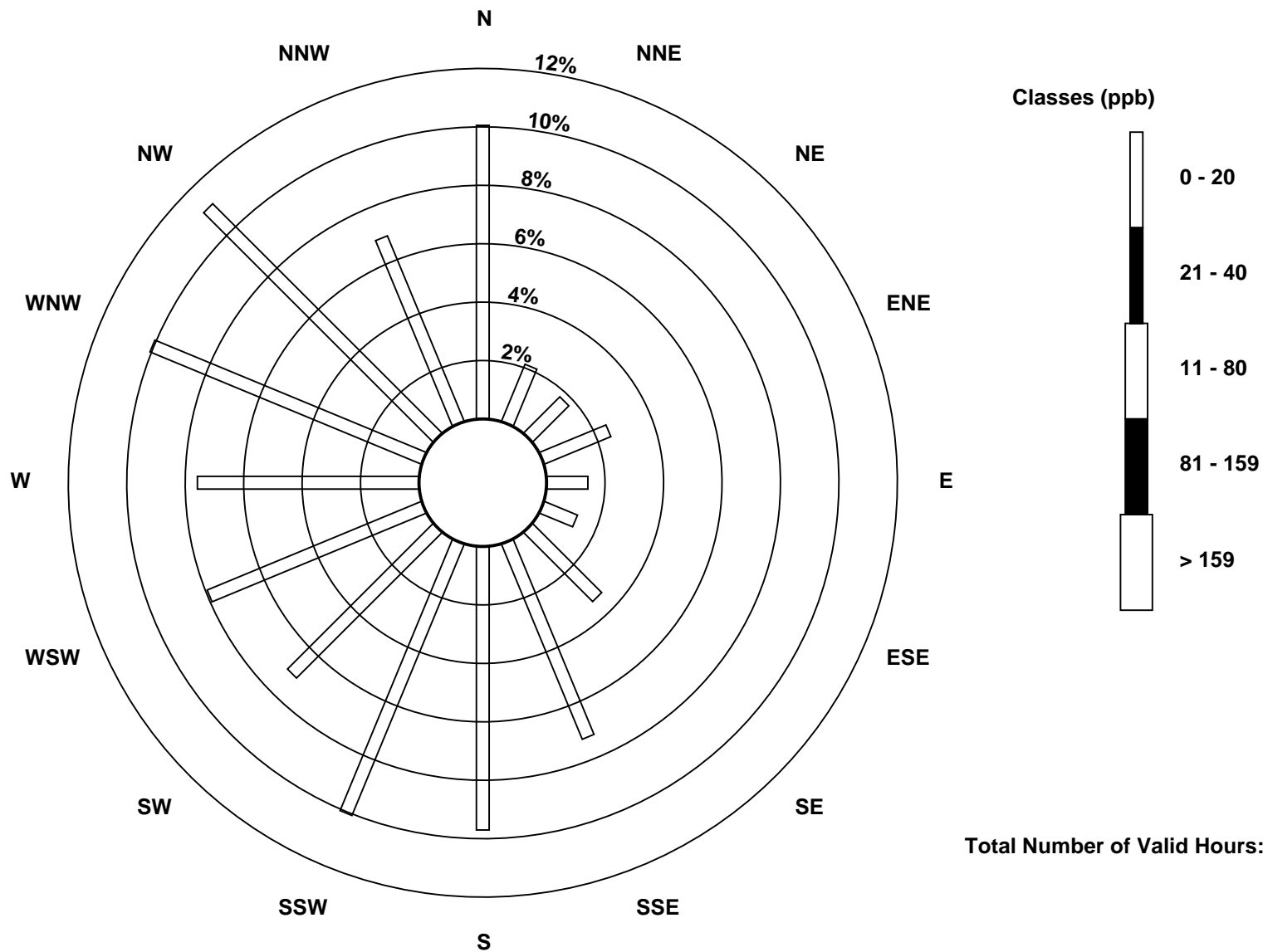
Total Number of Valid Hours: 567

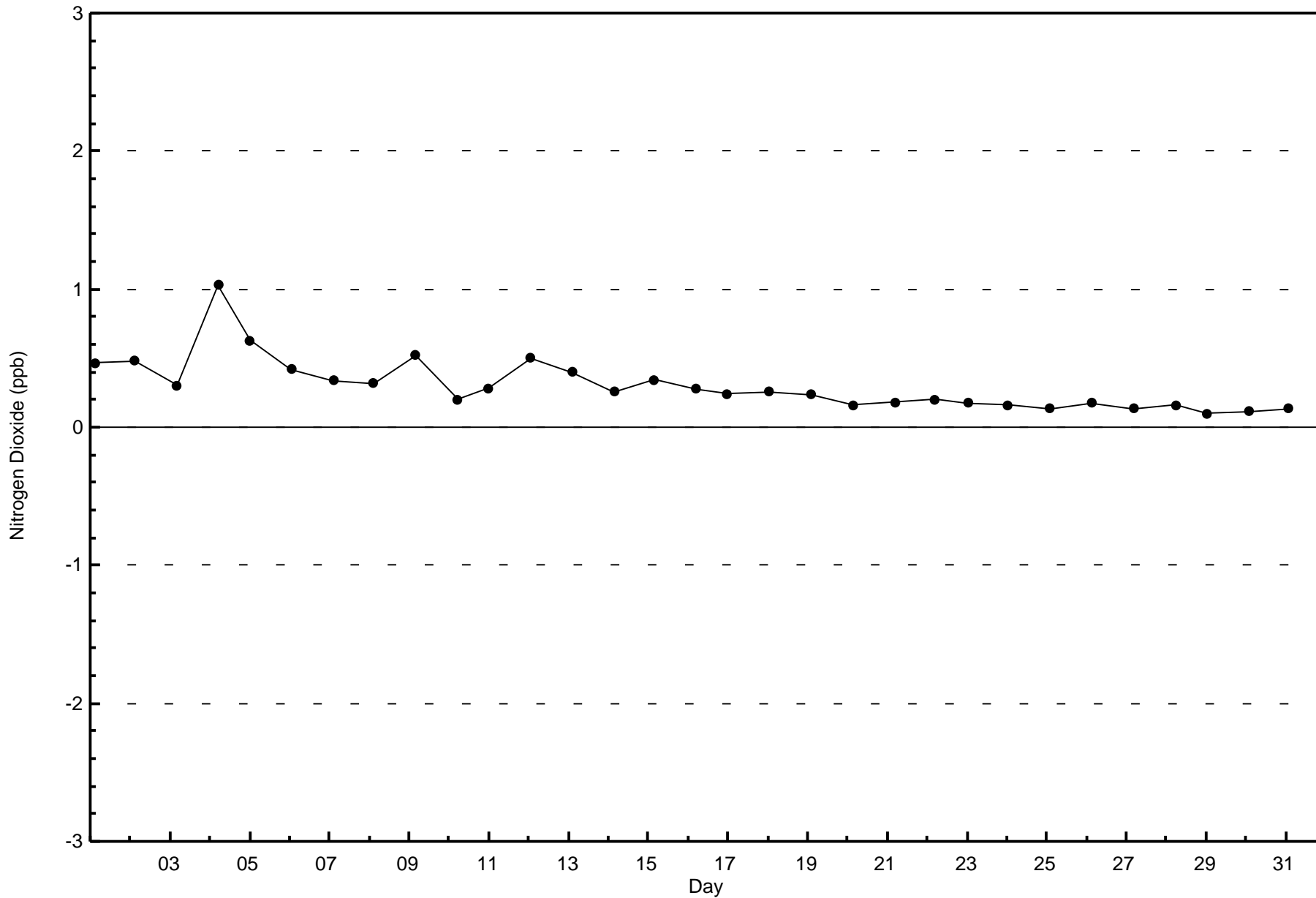
Total Number of Hours: 744

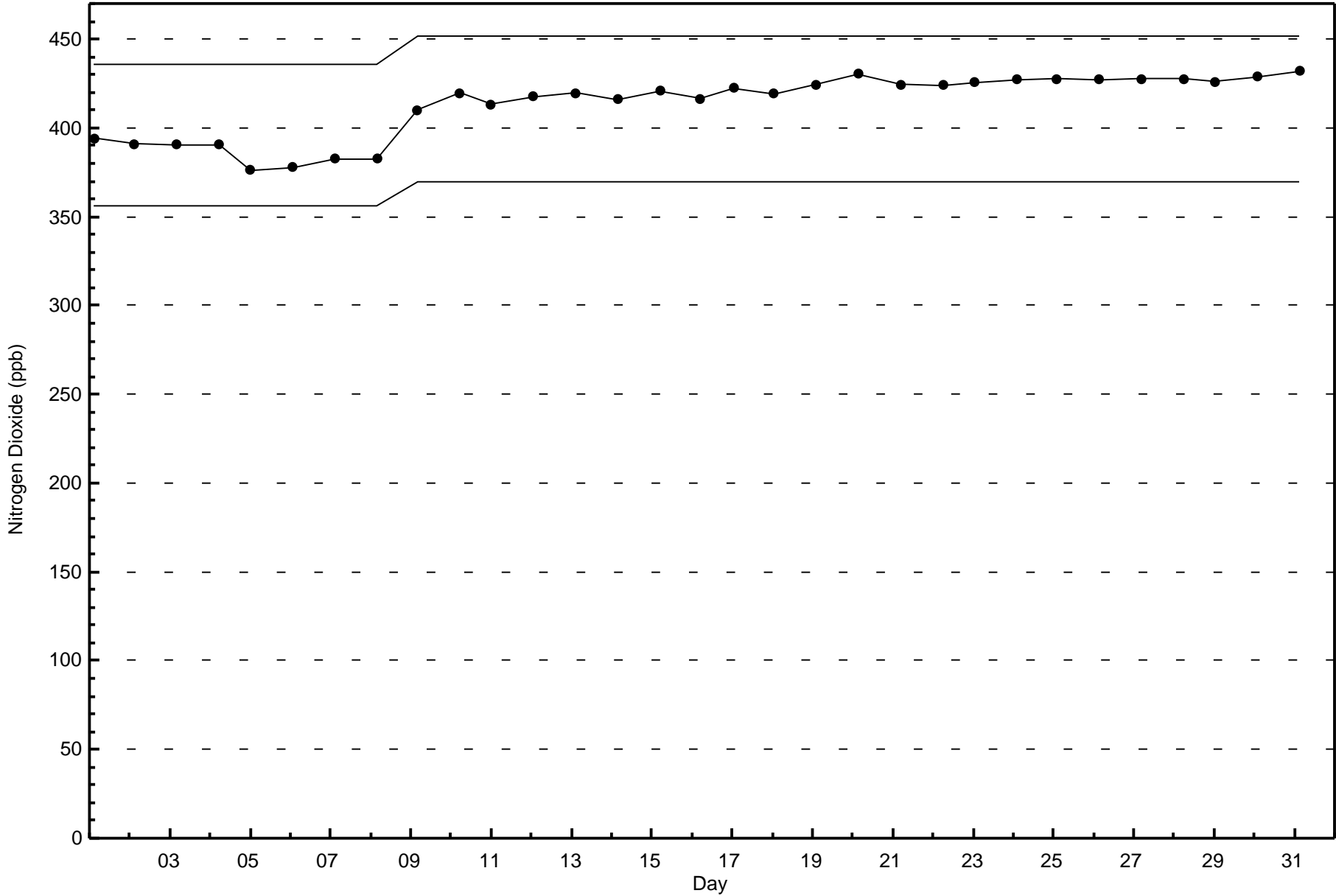


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Fort McKay - Bertha Ganter (AMS 1)

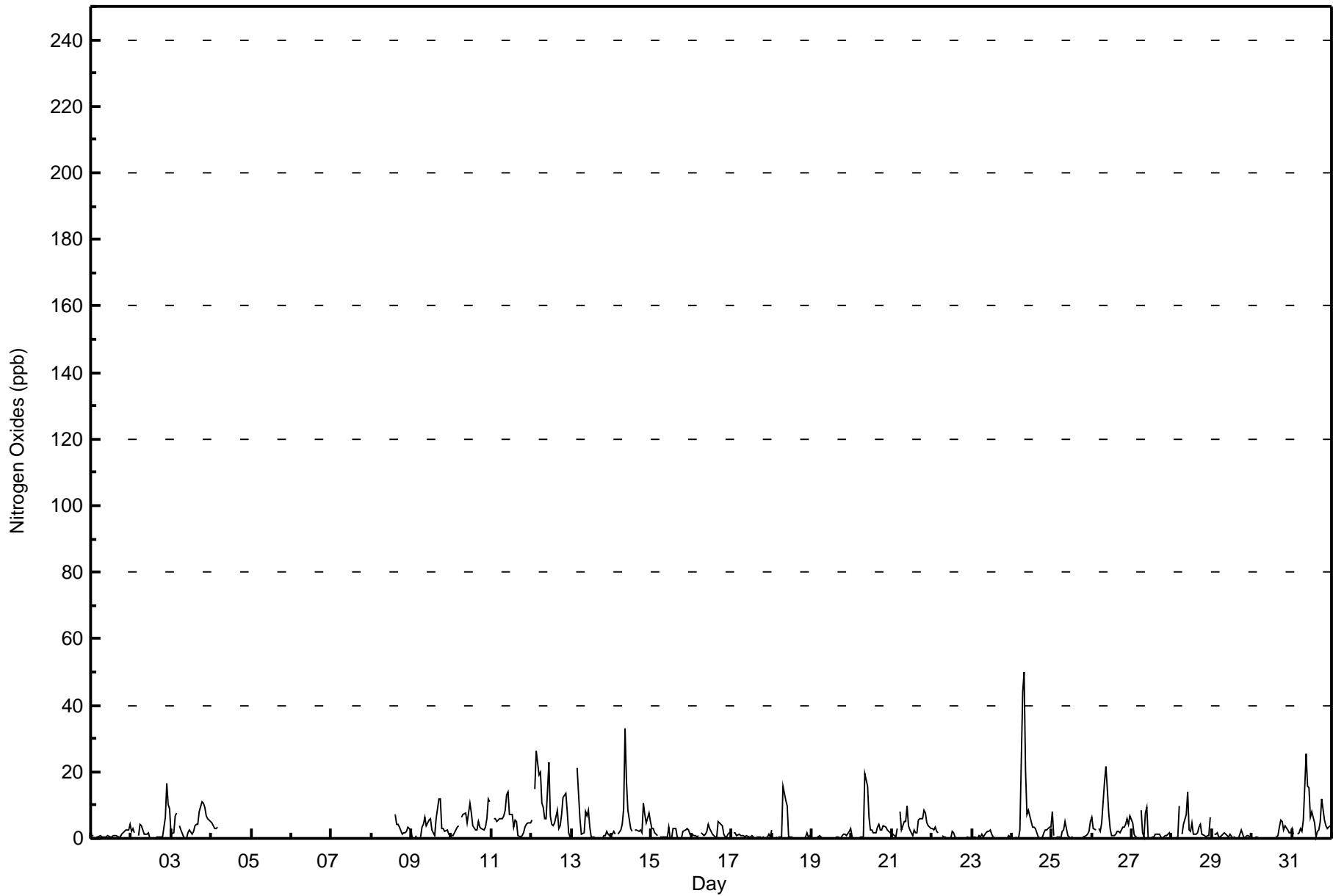








Maximum Value: 50 ppb on Jul 24 08:00														Maximum Daily Average: 9.5 ppb on Jul 12														Hours in Service: 744																					
Minimum Value: 0 ppb on Jul 2 13:00														Minimum Daily Average: 0.6 ppb on Jul 19														Hours of Data: 612																					
Maximum Diurnal Average: 7.7 ppb at hour 9														Minimum Diurnal Average: 1.5 ppb at hour 14														Hours of Missing Data: 132																					
Monthly Average: 3.2 ppb														Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 2 O <sub>3</sub> = 4 P <sub>90</sub> = 8 P <sub>99</sub> = 21														Hours of Calibration: 32																					
																												Percent Operational Time: 86.6																					
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-Jul	1	1	Z	1	1	1	1	1	0	0	1	1	1	1	1	1	0	0	1	2	2	2	2	4	1.1	4																							
2-Jul	2	3	2	Z	1	4	4	3	1	1	2	0	0	0	0	0	0	1	1	0	7	17	10	9	2.9	17																							
3-Jul	1	2	7	7	Z	4	3	1	0	0	2	2	1	2	4	4	4	8	11	11	9	7	6	5	4.4	11																							
4-Jul	5	4	3	3	3	Z	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	5																							
5-Jul	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--																							
6-Jul	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--																							
7-Jul	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--																							
8-Jul	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	7																							
9-Jul	0	0	0	1	Z	1	3	4	6	4	5	6	2	2	1	6	12	12	3	3	2	2	1	1	3.4	12																							
10-Jul	1	1	2	3	4	Z	6	7	8	5	8	11	8	4	3	3	5	4	3	3	3	6	12	11	5.1	12																							
11-Jul	Z	6	6	5	5	6	6	7	8	13	14	7	7	4	6	5	1	1	1	2	3	4	5	5	5.5	14																							
12-Jul	6	Z	15	26	19	20	11	9	6	6	23	7	4	4	5	8	3	4	7	12	13	8	2	1	9.5	26																							
13-Jul	0	0	Z	21	14	6	1	2	8	7	9	4	1	0	0	0	0	0	0	1	1	2	1	1	3.4	21																							
14-Jul	1	2	1	Z	1	3	4	9	33	17	8	3	2	PF	3	2	2	3	2	11	7	5	8	5	6.0	33																							
15-Jul	3	3	2	1	Z	0	0	0	0	0	0	0	0	3	3	0	0	0	0	2	3	3	3	1	1.4	4																							
16-Jul	1	1	1	1	1	Z	2	1	1	2	4	3	1	1	0	1	5	4	4	1	0	0	1	2	1.7	5																							
17-Jul	Z	2	2	1	1	1	1	1	1	1	0	0	1	0	0	0	0	0	0	1	0	1	1	1	0.7	2																							
18-Jul	2	Z	0	0	0	0	1	16	11	10	0	0	0	0	0	0	0	0	0	0	0	2	0	1	2.0	16																							
19-Jul	0	0	Z	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	2	3	0.6	3																							
20-Jul	0	0	0	Z	0	0	0	0	19	16	7	3	3	2	2	3	4	3	2	4	4	3	2	1	3.4	19																							
21-Jul	2	1	1	3	Z	8	3	5	5	10	4	2	1	2	2	2	6	6	6	9	8	5	4	3	4.1	10																							
22-Jul	3	2	4	2	2	Z	1	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0.9	4																							
23-Jul	Z	0	0	0	1	1	1	0	2	2	2	3	1	0	0	0	0	0	0	0	0	0	1	0	0.7	3																							
24-Jul	0	Z	0	0	0	3	44	50	20	7	8	5	4	3	3	2	0	0	0	2	3	3	4	3	7.1	50																							
25-Jul	8	1	Z	0	0	0	2	3	5	1	0	0	0	0	0	0	0	0	0	0	1	1	2	5	1.4	8																							
26-Jul	6	3	3	Z	3	2	5	17	22	15	8	3	1	1	1	2	2	2	3	3	4	6	4	7	5.3	22																							
27-Jul	4	1	1	0	Z	9	2	1	8	9	0	0	0	0	1	1	1	1	0	0	1	1	2	0	1.9	9																							
28-Jul	0	0	0	0	10	Z	1	4	7	14	3	2	5	1	1	2	4	4	1	1	1	1	1	6	3.1	14																							
29-Jul	Z	1	1	1	1	1	1	2	1	1	1	1	0	0	0	0	0	3	1	0	0	1	1	0	0.8	3																							
30-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	5	5	3	4	2	2	2	1.3	5																							
31-Jul	3	1	Z	1	2	3	2	5	25	16	15	7	8	5	0	2	3	5	12	6	4	3	3	4	5.9	25																							
																								2.2	1.6	2.2	3.5	3.1	3.3	4.0	5.6	7.7	6.0	4.9	2.7	2.1	1.5	1.6	1.9	2.3	2.6	2.5	2.9	3.1	3.2	3.1	3.1	Diurnal Average	
																								8	6	15	26	19	20	44	50	33	17	23	11	8	5	7	8	12	12	12	12	13	17	12	11	Diurnal Maximum	
Z - zerospan																								C - Calibration						UO - Unstable Operation						PF - Power Failure													





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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Fort McKay - Bertha Ganter - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	604	98.69	98.69
21 - 40	6	0.98	99.67
41 - 80	2	0.33	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 612

Total Number of Hours: 744



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Fort McKay - Bertha Ganter - July 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	12	10	14	7	7	19	40	52	57	40	45	43	57	63	39	562
21 - 40	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	3
11 - 80	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	57	12	10	14	8	7	19	41	55	57	40	45	43	57	63	39	567

Total Number of Valid Hours: 567

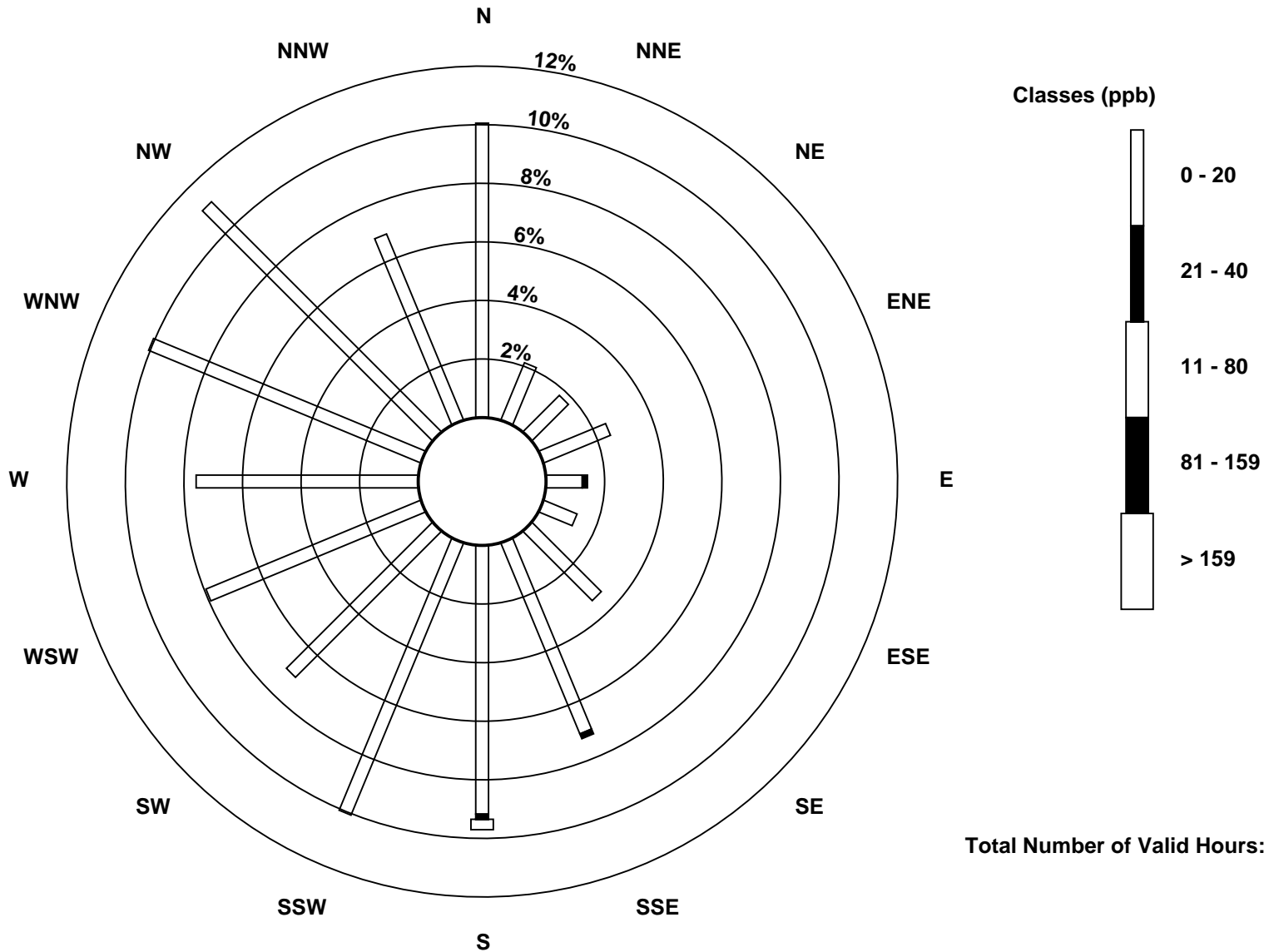
Total Number of Hours: 744

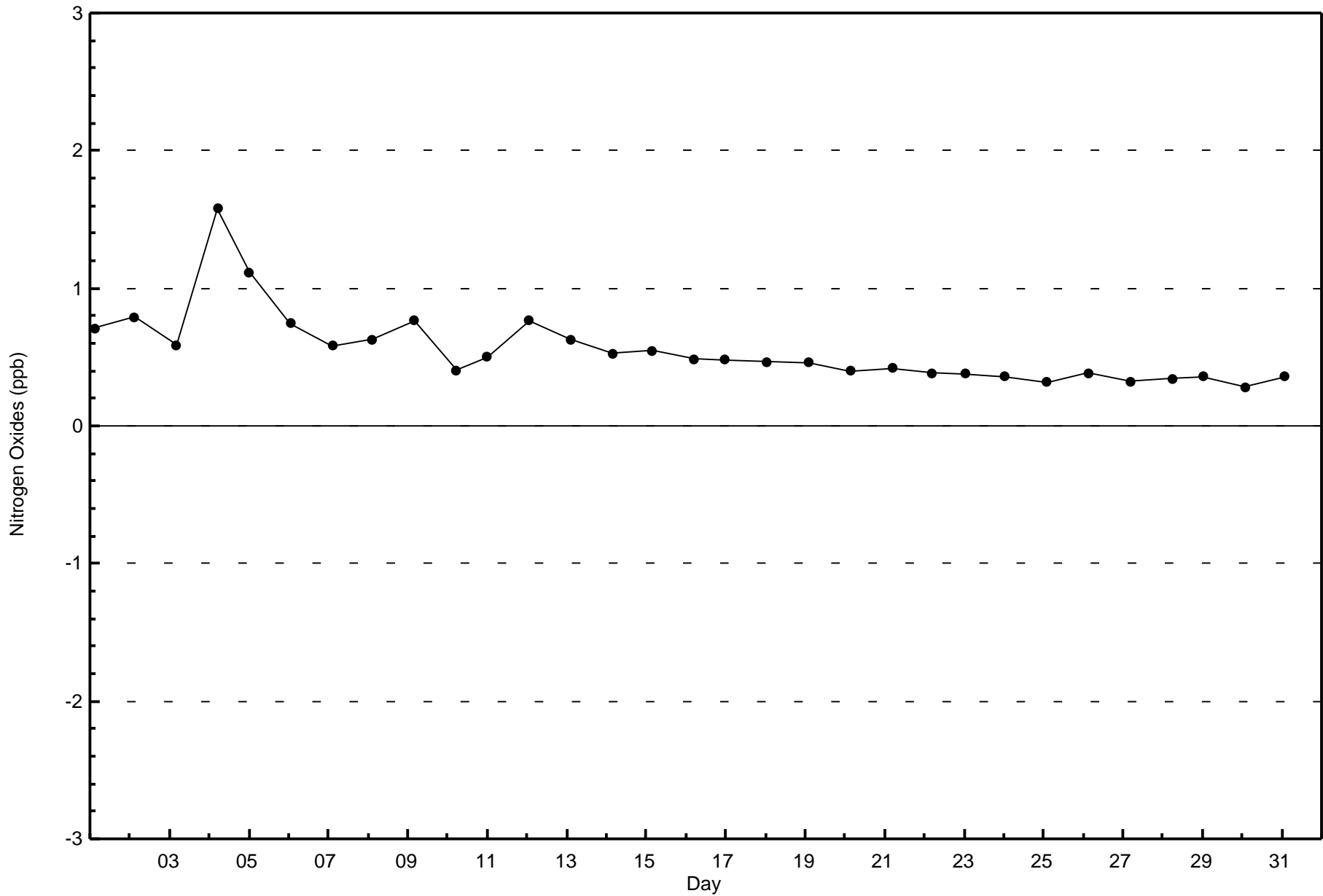


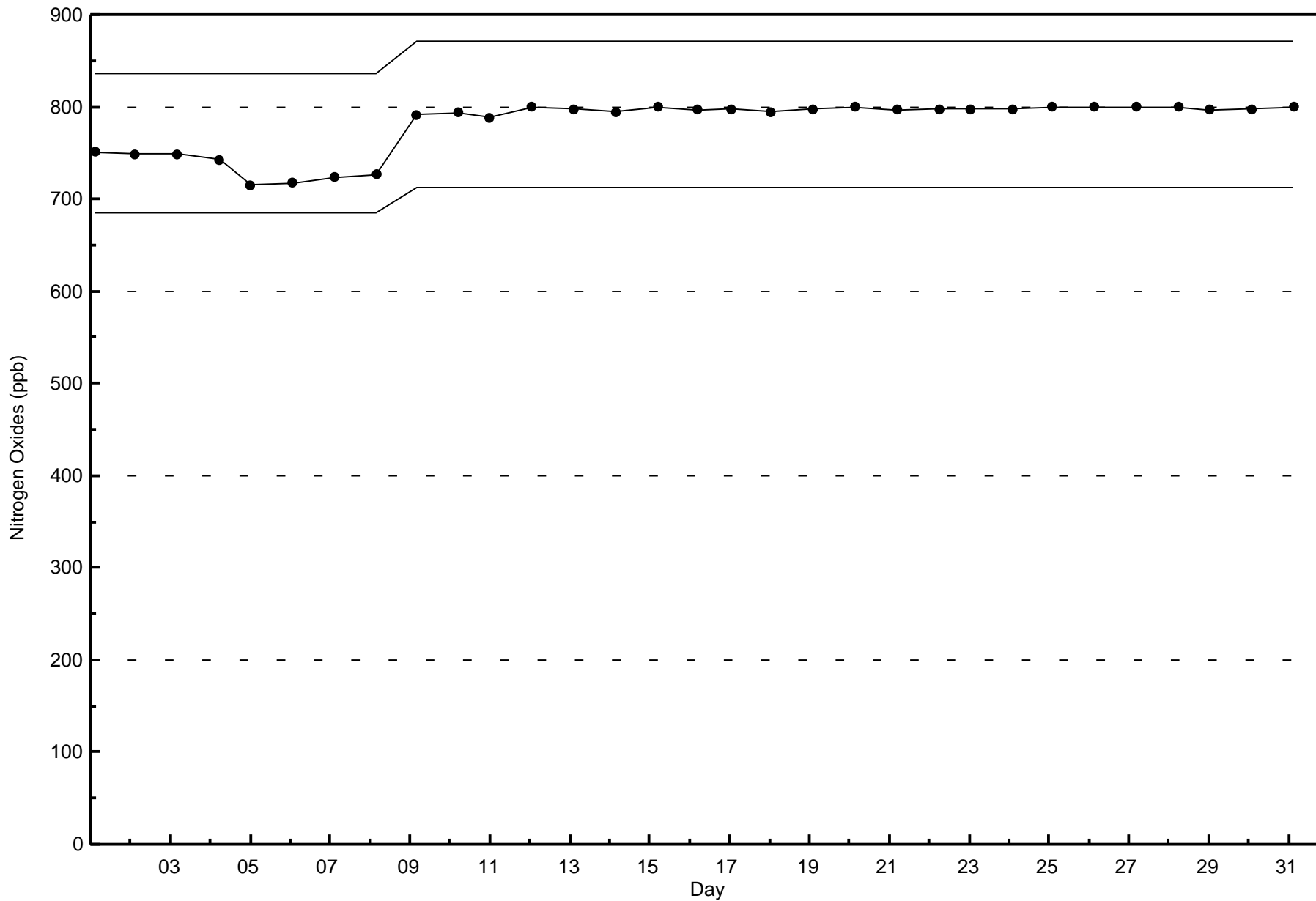


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Fort McKay - Bertha Ganter (AMS 1)









Summary of Hour Averages

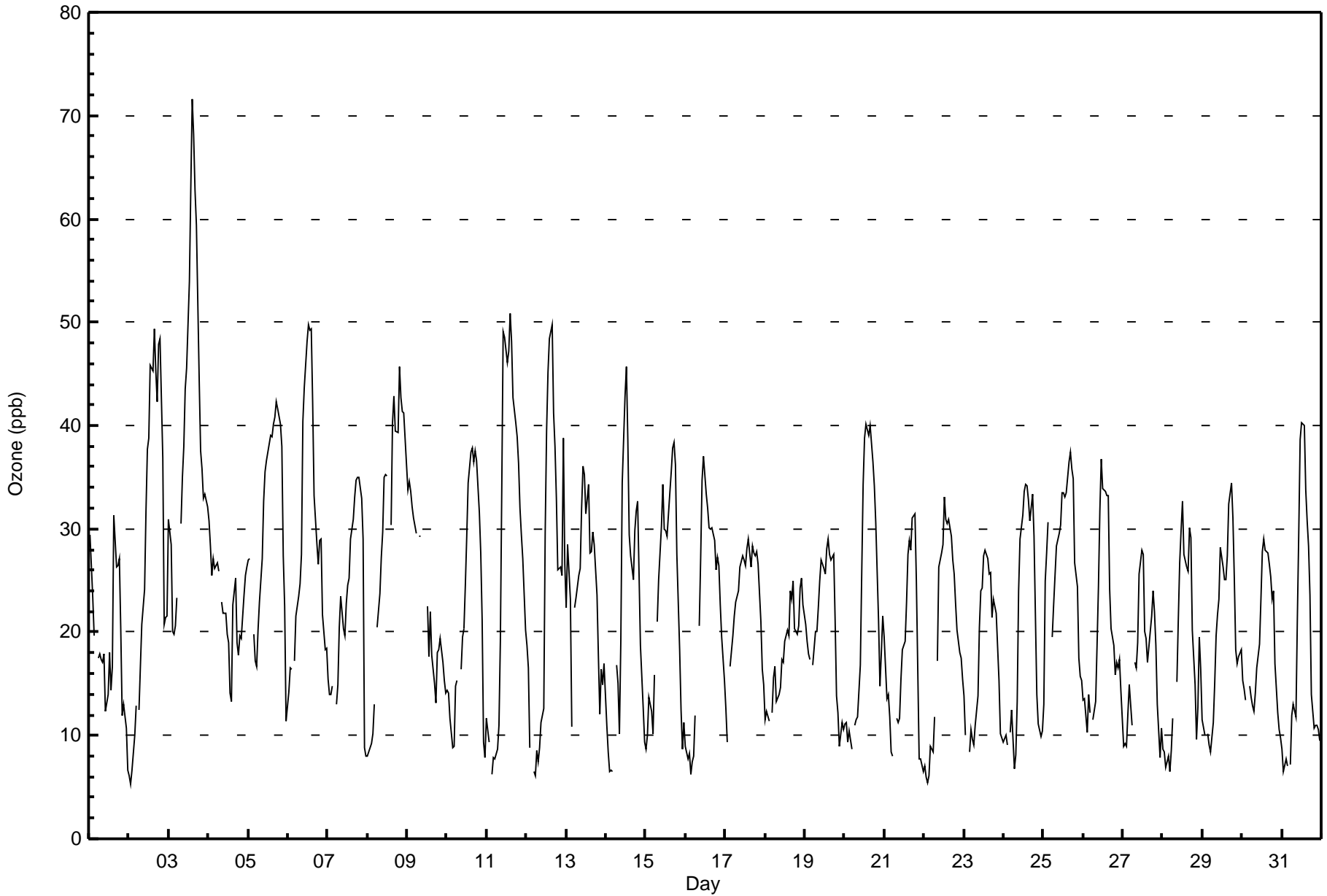
Fort McKay - Bertha Ganter - July 2015

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 72 ppb on Jul 3 15:00	Maximum Daily Average: 40.5 ppb on Jul 3		Hours of Data:	709
Minimum Value: 5 ppb on Jul 2 02:00	Minimum Daily Average: 17.1 ppb on Jul 27		Hours of Missing Data:	35
Maximum Diurnal Average: 33.3 ppb at hour 16	Minimum Diurnal Average: 12.9 ppb at hour 5		Hours of Calibration:	34
Monthly Average: 23.1 ppb	Percentiles: P <sub>1</sub> = 6 P <sub>10</sub> = 9 Q <sub>1</sub> = 14 Median = 22 Q <sub>3</sub> = 30 P <sub>90</sub> = 38 P <sub>99</sub> = 49		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-Jul	29	26	23	20	Z	17	18	17	17	18	12	14	18	14	17	31	26	26	27	20	12	13	11	7	18.9	31
2-Jul	6	5	7	10	13	Z	13	17	21	24	32	38	39	46	45	49	45	42	48	48	37	21	21	22	28.2	49
3-Jul	31	29	20	20	21	23	Z	30	35	38	44	46	54	63	72	68	63	59	44	38	36	33	33	32	40.5	72
4-Jul	31	28	25	27	26	27	26	Z	23	22	22	20	19	14	13	23	25	19	18	20	19	24	25	26	22.7	31
5-Jul	27	27	Z	20	17	17	20	23	27	33	35	37	37	39	39	40	41	42	42	40	38	27	23	11	30.5	42
6-Jul	14	17	16	Z	17	21	23	25	28	40	44	48	50	49	49	42	33	29	27	29	29	22	18	18	30.0	50
7-Jul	15	14	14	15	Z	13	15	21	23	20	20	23	25	25	29	31	33	35	35	35	33	29	9	8	22.6	35
8-Jul	8	8	9	10	13	Z	21	24	27	30	35	35	35	M	30	40	43	39	39	46	43	41	41	36	29.8	46
9-Jul	34	35	34	32	31	30	Z	29	29	C	C	C	22	18	22	18	15	13	18	18	19	17	15	14	23.2	35
10-Jul	14	14	12	9	9	15	15	Z	16	19	20	24	29	34	37	38	37	38	37	32	28	21	9	8	22.4	38
11-Jul	12	9	Z	6	8	8	9	11	19	34	49	49	46	47	51	48	43	40	39	36	32	29	27	20	29.2	51
12-Jul	19	17	9	Z	6	6	9	7	9	11	13	30	39	45	48	50	41	38	33	26	26	26	39	27	24.9	50
13-Jul	22	29	23	11	Z	22	23	25	26	32	36	35	31	34	28	28	30	29	24	18	12	16	15	17	24.6	36
14-Jul	11	8	7	7	6	Z	17	15	10	19	34	43	46	39	29	27	25	30	32	33	26	19	13	9	21.9	46
15-Jul	9	10	14	12	10	16	Z	21	25	30	34	30	30	29	34	36	38	38	36	28	18	12	9	11	23.1	38
16-Jul	9	8	8	6	7	8	12	Z	21	27	35	37	33	32	30	30	30	29	26	27	26	23	19	15	21.7	37
17-Jul	13	9	Z	17	20	22	23	23	24	26	27	27	26	28	29	26	28	28	27	28	27	21	16	15	23.1	29
18-Jul	12	12	11	Z	12	16	17	13	14	15	17	17	19	20	20	24	23	25	20	20	21	24	25	23	18.3	25
19-Jul	21	19	18	17	Z	17	20	20	22	25	27	26	26	28	29	27	27	28	21	14	12	9	11	11	20.7	29
20-Jul	11	11	9	10	9	Z	11	12	12	17	26	34	39	40	39	40	38	36	34	31	21	15	18	22	23.3	40
21-Jul	20	14	14	12	8	8	Z	12	11	12	15	18	19	23	28	29	28	31	31	25	16	8	8	7	17.2	31
22-Jul	7	6	5	6	9	8	12	Z	17	26	28	29	33	31	30	31	29	27	26	23	20	18	17	15	19.8	33
23-Jul	14	10	Z	8	11	10	9	11	14	21	24	24	27	28	27	26	26	21	23	22	19	15	10	10	17.8	28
24-Jul	9	10	9	Z	10	12	7	8	13	24	29	31	34	34	34	33	31	33	29	22	14	11	10	10	20.0	34
25-Jul	13	25	28	31	Z	20	23	25	28	30	30	34	33	33	34	36	37	36	35	27	24	17	16	15	27.4	37
26-Jul	13	14	10	14	12	Z	12	13	19	24	32	37	34	34	33	33	24	20	19	16	17	17	17	14	20.8	37
27-Jul	9	9	9	12	15	11	Z	17	17	19	26	28	28	20	19	17	20	22	24	22	19	13	8	11	17.1	28
28-Jul	9	8	7	8	6	9	12	Z	15	21	27	30	33	27	26	26	30	29	20	15	10	13	20	16	18.1	33
29-Jul	12	10	Z	10	9	8	11	15	20	22	23	28	26	25	25	27	32	35	31	25	18	17	18	18	20.3	35
30-Jul	15	14	13	Z	15	14	13	12	14	16	19	23	28	29	28	28	27	25	23	24	17	12	11	10	18.7	29
31-Jul	9	7	8	7	Z	7	12	13	12	21	30	39	40	40	34	31	28	24	14	11	11	11	11	9	18.5	40

15.4	14.9	14.0	13.7	12.9	14.8	15.4	17.7	19.6	23.9	28.2	31.1	32.2	32.3	32.6	33.3	32.2	31.2	29.1	26.3	22.6	19.2	17.5	15.8	Diurnal Average	
34	35	34	32	31	30	26	30	35	40	49	49	54	63	72	68	63	59	48	48	43	41	41	36	Diurnal Maximum	

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





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

**Ozone (O<sub>3</sub>) - ppb**  
**Fort McKay - Bertha Ganter - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	324	45.70	45.70
21 - 50	378	53.31	99.01
51 - 82	7	0.99	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



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

**Ozone (O<sub>3</sub>) - ppb**  
**Fort McKay - Bertha Ganter - July 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	28	7	4	4	3	3	5	10	29	36	29	32	32	32	36	22	312
21 - 50	42	10	6	11	4	5	16	30	31	35	21	28	16	30	38	22	345
51 - 82	0	0	0	0	0	0	0	0	1	0	0	0	0	0	5	1	7
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	70	17	10	15	7	8	21	40	61	71	50	60	48	62	79	45	664

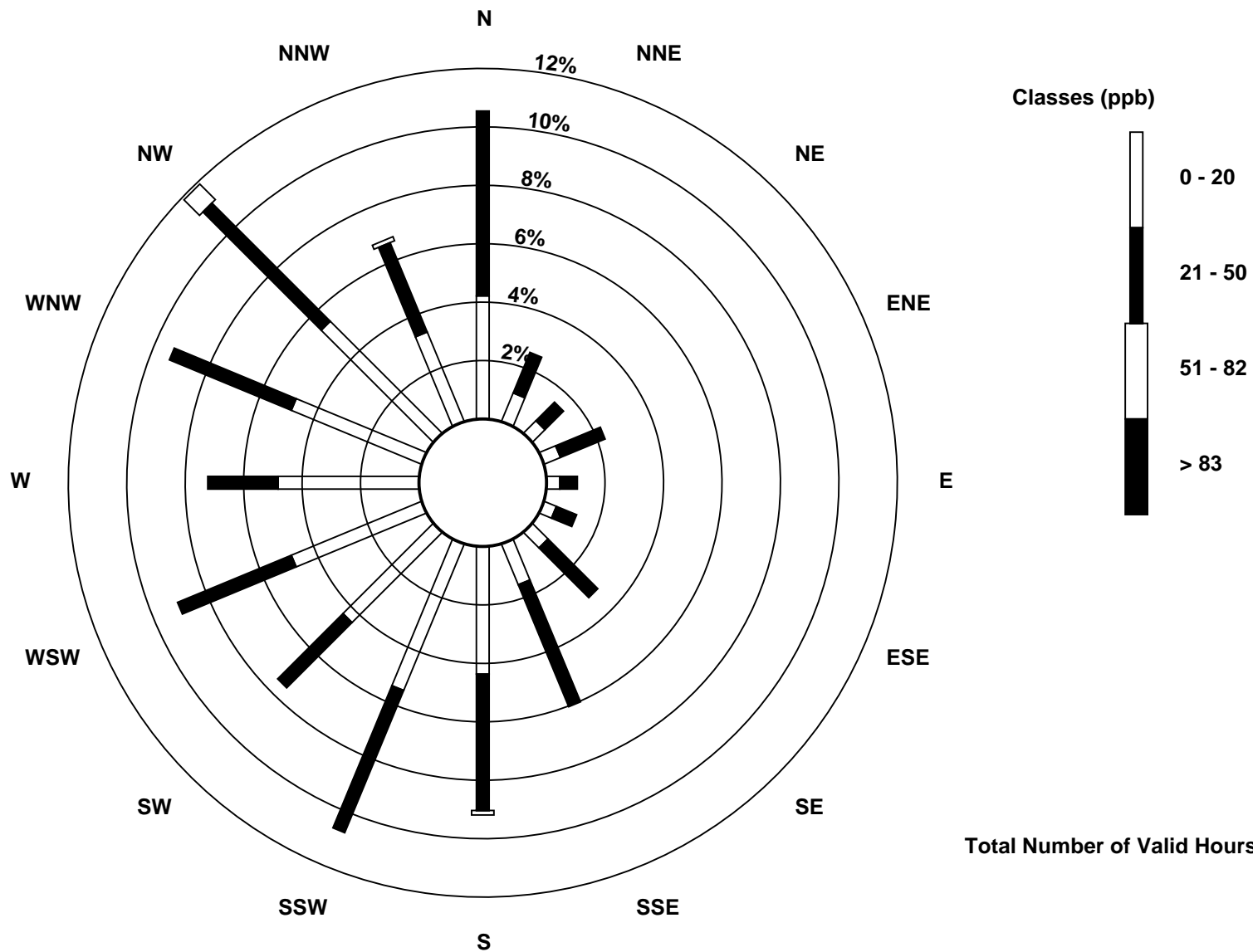
Total Number of Valid Hours: 664

Total Number of Hours: 744



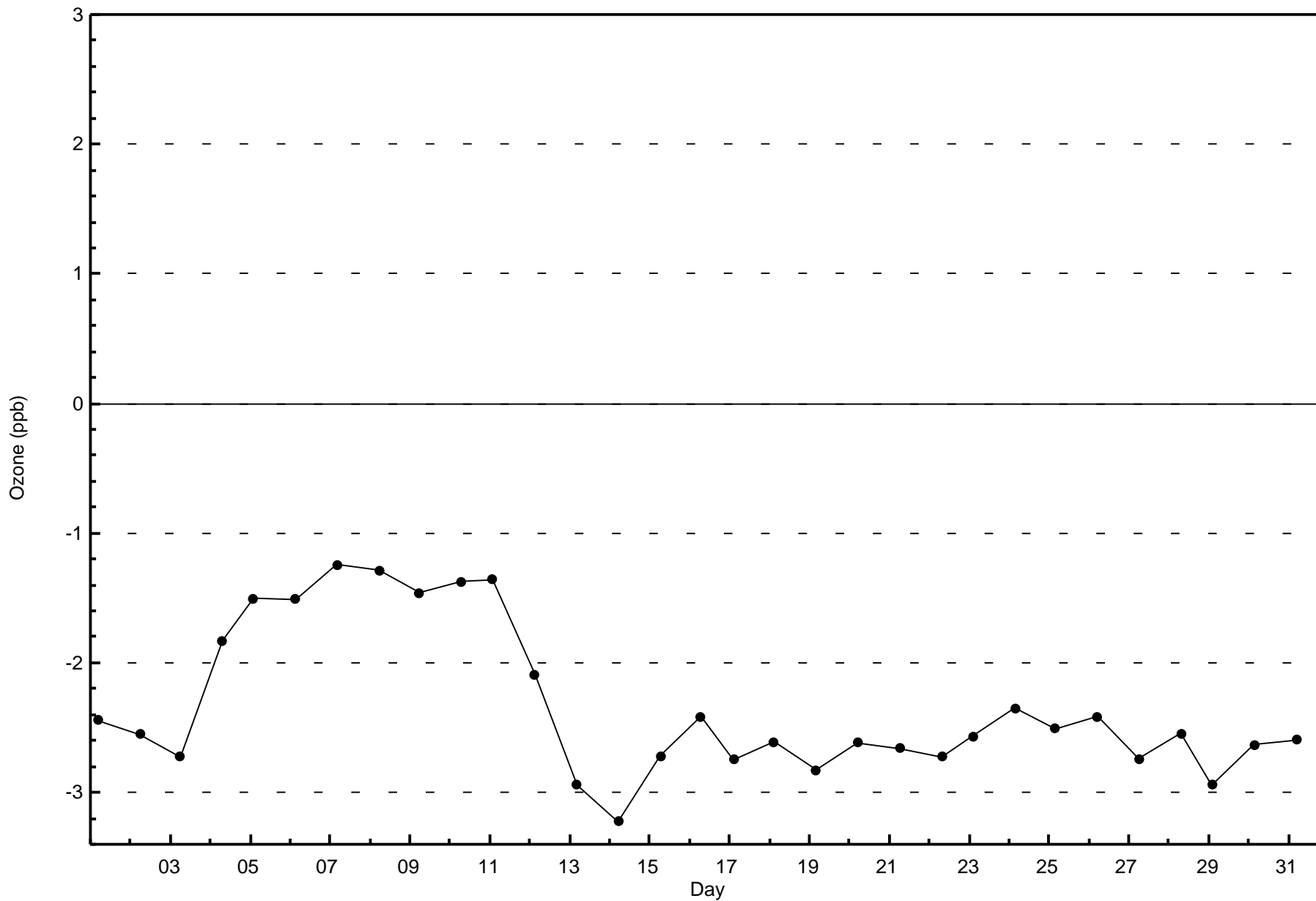
Wood Buffalo Environmental Association  
Wind Rose Jul 2015

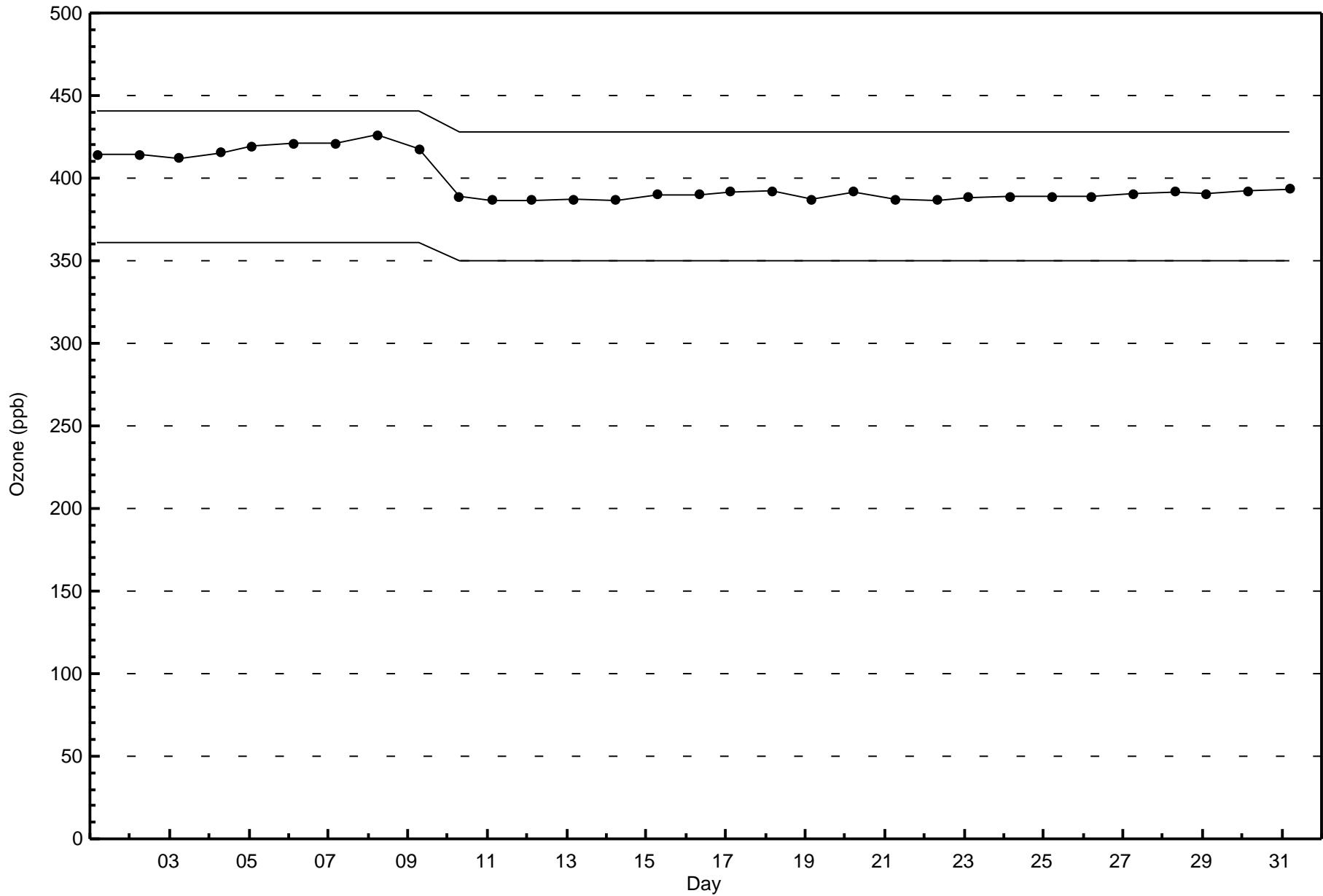
Ozone (O<sub>3</sub>) - ppb  
Fort McKay - Bertha Ganter (AMS 1)



Total Number of Valid Hours: 664









Wood Buffalo Environmental Association

Summary of Hour Averages

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

Fort McKay - Bertha Ganter - July 2015

Number of Exceedences (AAAQO): 24-hr: 7 Maximum Value: 472.1 µg/m <sup>3</sup> on Jul 3 20:00 Maximum Daily Average: 162.2 µg/m <sup>3</sup> on Jul 3		Hours in Service: 744 Hours of Data: 742 Hours of Missing Data: 2 Hours of Calibration: 0 Percent Operational Time: 99.7																								
Minimum Value: 0.0 µg/m <sup>3</sup> on Jul 22 10:00 Maximum Diurnal Average: 31.8 µg/m <sup>3</sup> at hour 23 Monthly Average: 26.04 µg/m <sup>3</sup>		Minimum Daily Average: 1.1 µg/m <sup>3</sup> on Jul 23 Minimum Diurnal Average: 18.7 µg/m <sup>3</sup> at hour 13 Percentiles: P <sub>1</sub> = 0.5 P <sub>10</sub> = 1.2 Q <sub>1</sub> = 2.7 Median = 5.6 Q <sub>3</sub> = 12.4 P <sub>90</sub> = 60.7 P <sub>99</sub> = 299.9																								
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-Jul	33.4	24.1	21.0	19.5	30.4	37.9	35.0	27.4	26.0	31.1	34.2	37.9	39.4	42.4	42.7	41.5	35.4	32.1	29.4	28.7	30.8	34.1	41.0	47.7	33.5	47.7
2-Jul	40.1	38.1	35.5	35.2	55.1	75.6	88.9	82.7	61.6	53.6	39.5	13.2	8.9	10.6	8.3	12.7	11.2	14.2	13.0	10.8	12.0	24.4	19.5	11.2	32.3	88.9
3-Jul	4.7	5.1	9.5	10.2	12.1	9.6	6.6	4.3	6.3	21.7	152.0	194.3	92.3	120.0	181.8	219.1	207.9	349.9	420.9	472.1	458.4	361.7	292.0	279.5	162.2	472.1
4-Jul	289.4	269.1	247.9	279.4	351.0	312.7	244.9	190.2	161.1	144.1	164.9	161.7	158.0	142.2	122.3	136.6	150.6	154.2	118.7	29.1	4.1	0.4	0.5	0.8	159.7	351.0
5-Jul	1.3	1.9	2.1	2.2	2.5	3.5	3.8	4.9	6.3	4.9	2.2	1.8	1.9	2.2	2.4	2.7	3.3	3.7	3.8	4.2	4.5	5.5	5.9	8.2	3.6	8.2
6-Jul	8.5	8.2	8.5	9.8	11.4	11.8	10.8	11.2	13.5	8.4	9.4	8.3	7.8	8.0	9.9	17.9	18.8	1.4	0.7	0.9	1.1	1.0	1.2	1.5	7.9	18.8
7-Jul	2.4	3.5	4.9	3.2	2.8	4.0	4.9	4.6	4.3	7.5	7.5	3.2	3.3	4.5	4.3	5.3	4.6	4.0	4.5	4.5	5.0	5.4	8.9	7.6	4.8	8.9
8-Jul	7.3	8.1	6.3	6.1	6.5	9.2	9.9	8.6	15.6	16.3	6.4	6.8	M	31.4	34.0	29.4	28.1	23.6	78.0	104.3	133.9	87.9	66.5	54.3	33.8	133.9
9-Jul	15.3	5.1	4.1	4.2	4.5	4.5	4.6	4.4	3.4	2.8	2.4	3.1	3.3	2.6	1.1	1.1	1.5	2.0	1.5	1.6	1.8	2.3	2.7	2.7	3.4	15.3
10-Jul	3.4	4.1	4.1	4.3	3.9	3.0	3.0	3.7	3.2	2.6	3.0	3.6	4.2	4.8	5.9	5.8	7.2	8.0	9.3	8.4	6.6	9.1	11.0	16.8	5.8	16.8
11-Jul	10.5	11.7	32.0	23.1	29.8	54.9	81.7	78.0	89.6	168.2	173.3	63.5	37.7	54.6	54.7	70.9	62.9	48.1	39.2	65.0	191.1	284.3	323.9	320.1	98.7	323.9
12-Jul	312.5	302.5	296.7	317.7	290.2	230.2	218.9	219.2	196.2	166.0	157.8	123.7	105.1	95.9	98.2	99.7	82.7	67.9	39.8	23.4	12.2	40.2	69.5	21.7	149.5	317.7
13-Jul	14.5	12.7	14.5	11.9	11.7	6.3	5.5	6.3	8.3	9.9	7.3	9.5	17.7	14.4	15.9	13.6	9.4	10.6	10.3	9.4	9.8	16.0	27.9	32.3	12.7	32.3
14-Jul	28.9	30.4	33.5	27.9	24.1	20.3	6.7	12.0	24.2	26.0	24.9	15.8	18.8	PF	11.9	10.8	9.4	6.6	4.6	6.7	6.0	5.6	4.8	7.9	16.0	33.5
15-Jul	10.7	10.6	5.8	5.5	6.0	7.8	8.1	5.9	4.8	2.1	2.4	4.0	2.1	4.5	4.4	1.6	2.5	3.2	3.7	6.8	5.6	5.4	11.4	9.3	5.6	11.4
16-Jul	10.9	9.0	8.9	9.7	8.2	5.2	6.8	9.0	8.5	4.0	5.3	10.6	7.0	4.5	5.4	7.6	13.3	6.8	6.7	8.6	8.8	9.5	8.0	5.1	7.8	13.3
17-Jul	7.4	8.8	8.1	10.4	6.7	7.6	16.3	15.3	12.1	13.2	11.4	7.5	8.0	6.0	5.9	8.2	7.1	10.4	9.0	8.8	7.8	7.1	6.1	7.9	9.0	16.3
18-Jul	9.7	10.9	9.3	7.5	6.5	6.6	15.5	17.9	7.1	5.4	3.8	4.7	6.3	8.6	7.6	3.4	3.0	6.0	4.2	2.7	5.3	4.6	3.6	3.8	6.8	17.9
19-Jul	4.2	4.4	6.1	6.8	6.2	3.8	3.2	4.5	3.3	4.8	5.9	6.1	2.8	1.1	2.1	2.5	1.2	0.5	1.4	0.8	0.2	0.6	1.1	2.0	3.1	6.8
20-Jul	2.7	3.8	4.6	4.3	4.8	4.6	3.0	1.9	2.1	2.0	1.7	2.1	3.9	4.7	5.8	6.4	8.6	7.5	8.0	6.7	6.7	9.2	12.1	12.4	5.4	12.4
21-Jul	13.8	12.4	11.2	8.5	3.8	4.6	6.8	9.3	8.5	5.5	5.6	6.6	5.0	8.1	14.6	17.2	14.1	16.5	18.4	15.3	16.5	20.4	22.1	22.1	12.0	22.1
22-Jul	21.6	18.8	18.5	15.1	8.4	6.1	5.3	4.0	1.8	0.0	0.3	0.7	1.6	1.9	1.5	1.3	1.3	1.4	1.1	1.1	1.4	0.9	0.9	1.1	4.8	21.6
23-Jul	1.4	0.7	0.5	0.5	0.8	1.0	0.8	0.8	1.0	0.9	0.9	1.0	1.0	0.9	0.8	0.9	0.9	0.9	0.7	0.8	0.9	1.8	3.9	2.7	1.1	3.9
24-Jul	2.7	4.5	5.3	4.9	4.9	5.8	4.5	4.0	2.9	2.7	6.7	2.7	3.2	4.1	4.6	5.0	5.1	5.0	6.2	14.0	7.2	10.0	12.5	10.1	5.8	14.0
25-Jul	11.7	5.9	5.6	5.1	2.3	1.2	1.8	3.0	2.5	0.6	0.6	0.9	1.1	0.7	0.6	0.7	0.8	1.0	1.2	2.0	1.4	1.4	2.9	4.4	2.5	11.7
26-Jul	5.7	2.6	2.1	3.5	4.5	2.8	2.4	4.8	4.1	2.8	2.4	2.8	1.3	1.0	1.5	2.5	3.6	2.3	1.8	3.6	6.8	6.4	8.4	8.5	3.7	8.5
27-Jul	6.1	5.4	4.3	4.1	4.8	5.0	3.0	3.4	2.5	1.7	0.9	1.0	1.3	1.9	1.5	1.1	0.9	1.1	0.7	1.0	1.4	1.4	1.2	1.2	2.4	6.1
28-Jul	1.6	2.6	3.1	3.0	3.3	3.6	2.9	2.6	3.7	2.9	2.1	1.6	3.1	4.3	2.1	1.0	2.7	5.6	2.1	1.3	1.1	2.9	3.3	5.0	2.8	5.6
29-Jul	4.0	2.9	4.6	6.9	7.7	7.9	4.2	2.2	1.8	2.2	1.5	1.1	0.7	1.2	2.1	2.1	1.3	2.3	2.4	3.2	2.0	1.3	1.3	1.5	2.9	7.9
30-Jul	1.7	2.0	1.8	1.5	1.8	2.0	1.7	1.8	1.7	1.9	1.7	0.9	0.0	0.4	1.2	2.5	2.8	2.5	1.1	1.3	2.4	3.6	3.8	2.9	1.9	3.8
31-Jul	3.1	2.4	3.7	4.1	5.9	5.6	5.2	4.5	4.3	3.4	3.5	5.1	14.3	10.4	4.4	7.7	5.8	5.1	4.7	3.4	4.6	6.8	8.7	9.0	5.6	14.3
28.7 26.8 26.6 27.6 29.8 27.9 26.4 24.3 22.3 23.2 27.1 22.8 18.7 19.9 21.3 23.8 22.8 25.9 27.3 27.4 30.9 31.3 31.8 29.7																								Diurnal Average		
312.5 302.5 296.7 317.7 351.0 312.7 244.9 219.2 196.2 168.2 173.3 194.3 158.0 142.2 181.8 219.1 207.9 349.9 420.9 472.1 458.4 361.7 323.9 320.1																								Diurnal Maximum		
M - Maintenance PF - Power Failure Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m <sup>3</sup>																										

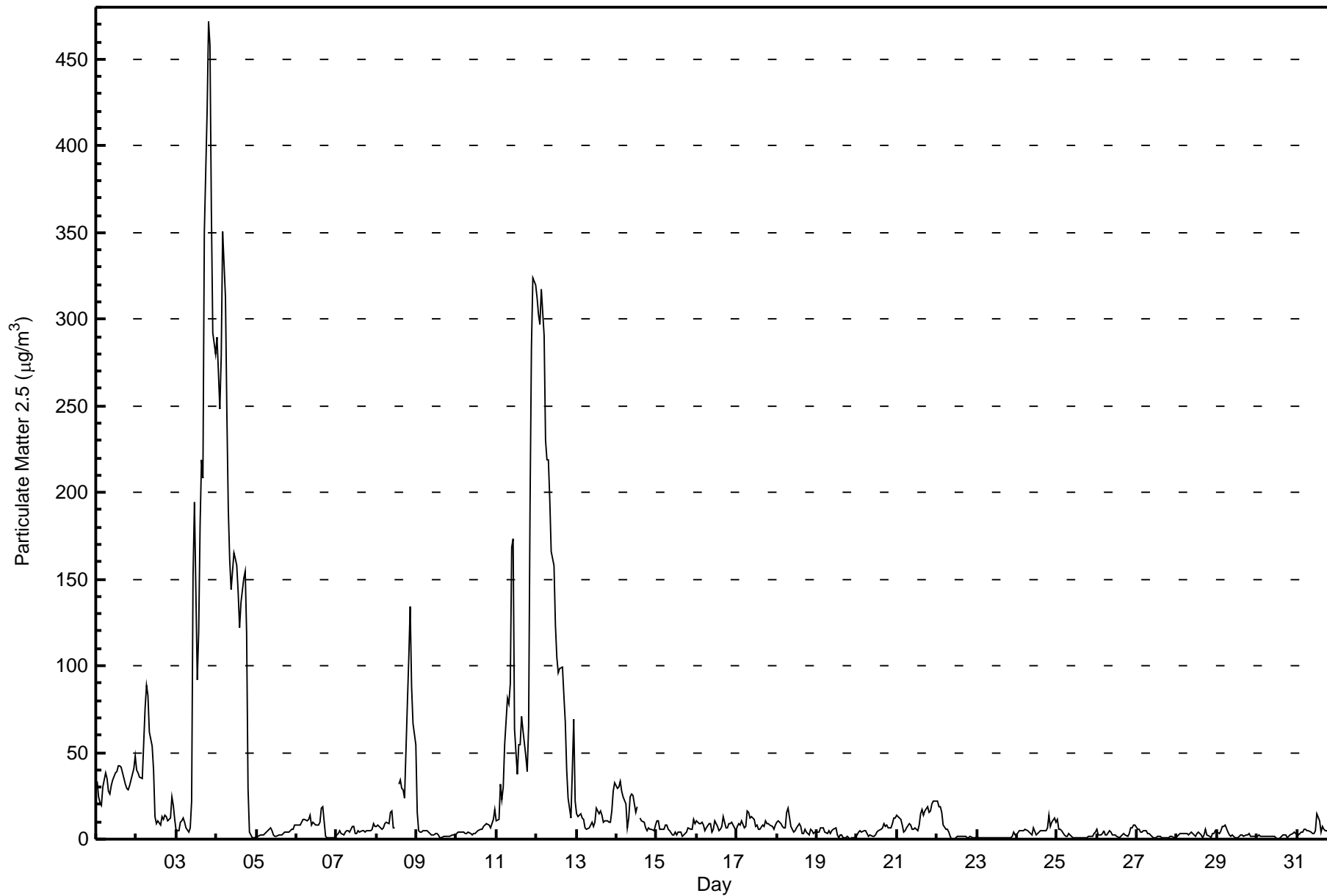


Wood Buffalo Environmental Association

Hourly Averages

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

Fort McKay - Bertha Ganter - July 2015





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

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Fort McKay - Bertha Ganter - July 2015**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
1 - 5	315	42.45	42.45
6 - 15	217	29.25	71.70
16 - 25	37	4.99	76.68
26 - 80	62	8.36	85.04
> 81.0	63	8.49	93.53

Total Number of Valid Hours: 742

Total Number of Hours: 744



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

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Fort McKay - Bertha Ganter - July 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	30	14	6	8	4	5	13	28	24	35	17	22	21	26	38	24	315
6 - 15	28	2	5	7	2	3	5	8	22	30	24	20	15	17	8	7	203
16 - 25	3	1	0	1	1	0	2	1	6	3	0	6	2	4	1	3	34
26 - 80	2	0	0	0	1	0	1	3	9	5	6	8	4	5	4	5	53
> 81.0	2	1	0	0	0	1	0	1	3	0	2	3	2	1	23	3	42
<b>Totals</b>	65	18	11	16	8	9	21	41	64	73	49	59	44	53	74	42	647

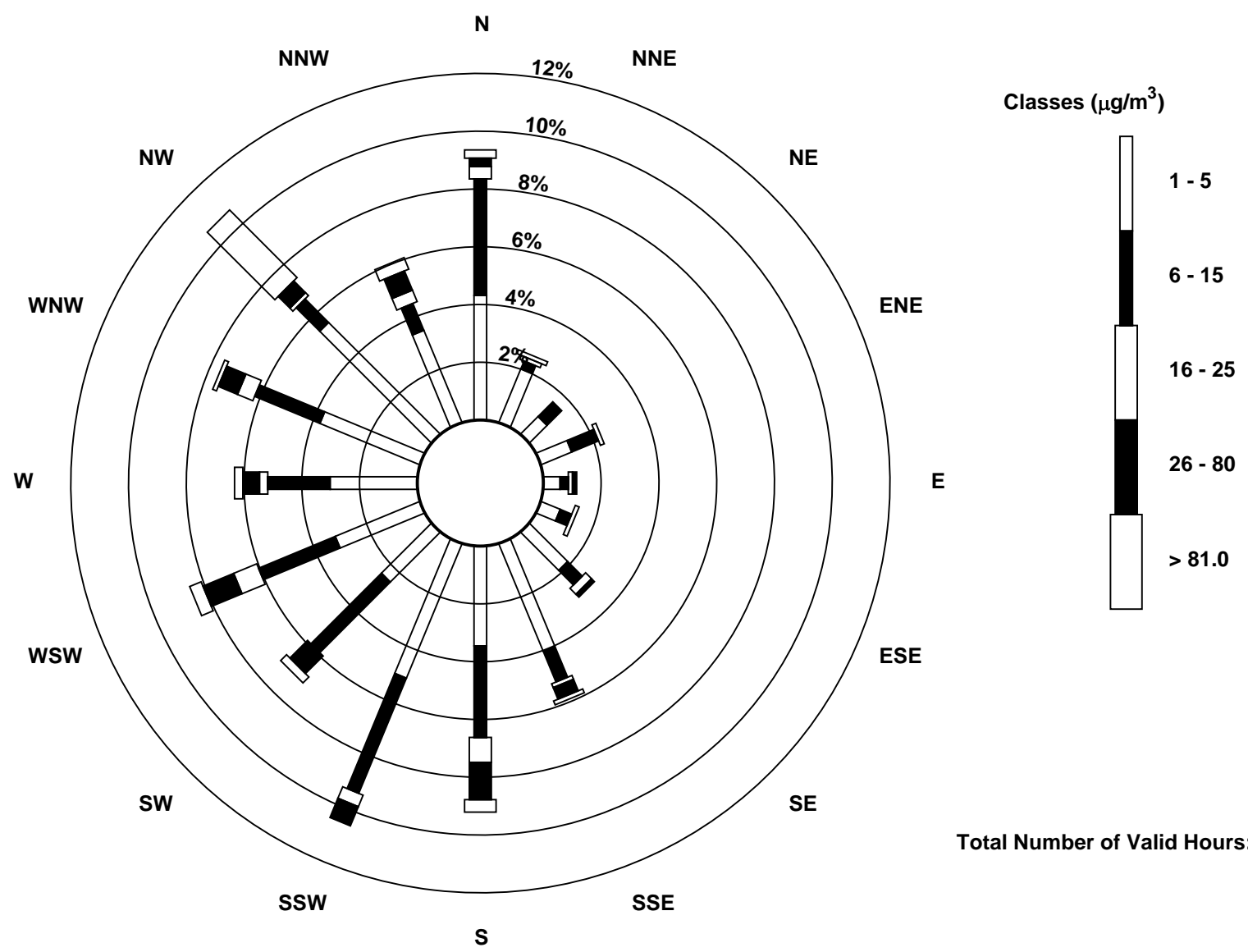
Total Number of Valid Hours: 695

Total Number of Hours: 744



Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
Fort McKay - Bertha Ganter (AMS 1)





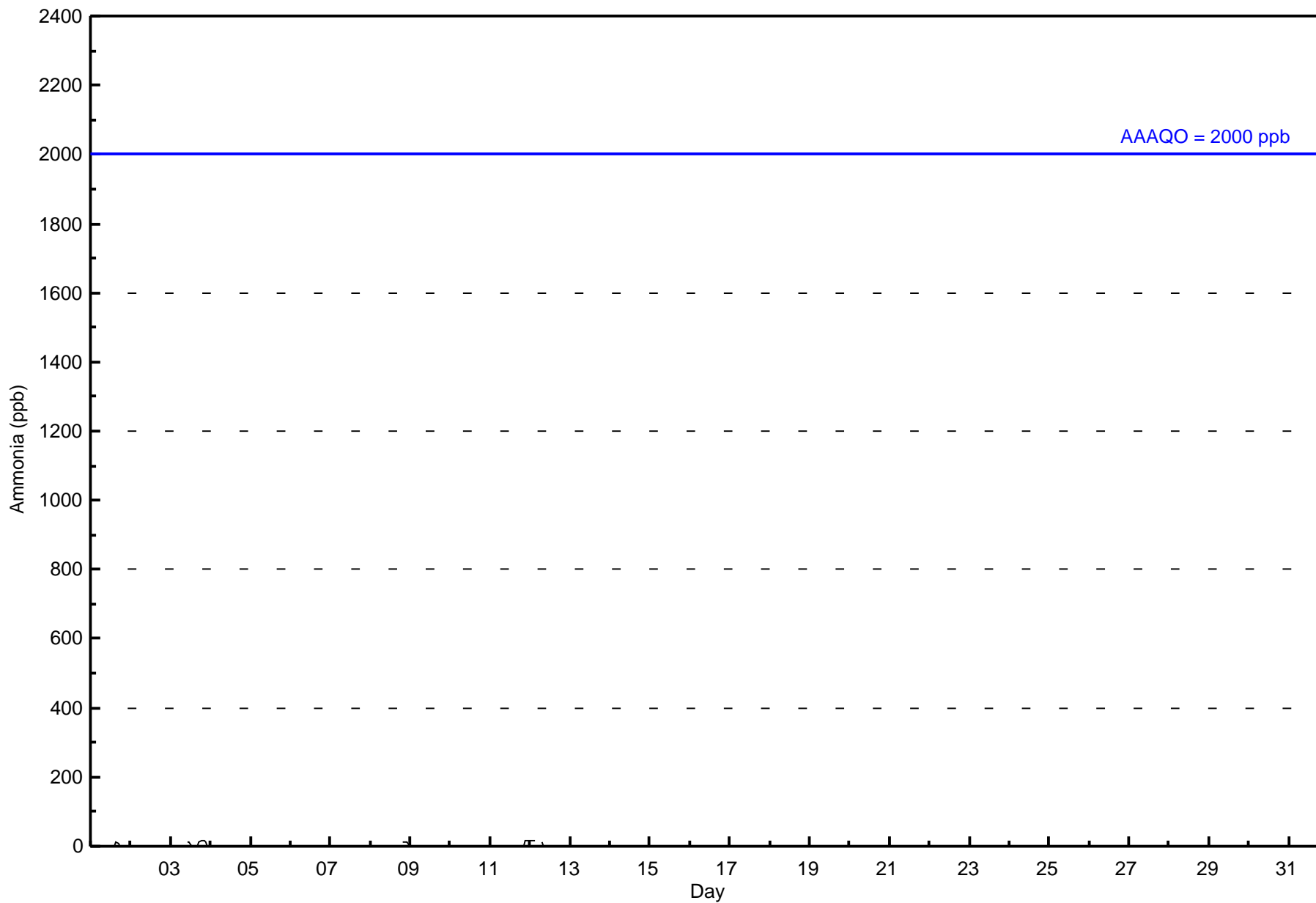
Number of Exceedences (AAAQO): 1-hr: 0	Maximum Value: 18 ppb on Jul 3 20:00	Maximum Daily Average: 4.7 ppb on Jul 3	Hours in Service: 744
Minimum Value: 0 ppb on Jul 1 01:00	Maximum Diurnal Average: 1.4 ppb at hour 22	Minimum Daily Average: 0.0 ppb on Jul 2	Hours of Data: 563
Monthly Average: 0.5 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 0 P <sub>99</sub> = 15		Hours of Missing Data: 181
			Hours of Calibration: 34
			Percent Operational Time: 80.2

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-Jul	0	0	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	11	10	0	0	0	0	0	0	0	1.1	11
2-Jul	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
3-Jul	0	0	0	0	0	0	0	Z	RE	RE	11	14	0	0	0	0	0	12	16	18	15	11	0	0	4.7	18
4-Jul	0	0	0	0	0	0	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	0
5-Jul	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--
6-Jul	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--
7-Jul	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--
8-Jul	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	C	C	C	C	C	C	C	C	RE	RE	13	13	13	10	0	13
9-Jul	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
10-Jul	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
11-Jul	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	16	16	2.2	16
12-Jul	15	16	14	15	Z	RE	RE	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.4	16
13-Jul	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-Jul	0	0	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	PF	PF	0	0	0	0	0	0	0	0.0	0
15-Jul	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
16-Jul	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
17-Jul	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
18-Jul	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
19-Jul	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-Jul	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-Jul	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
22-Jul	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-Jul	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-Jul	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
25-Jul	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
26-Jul	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
27-Jul	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-Jul	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-Jul	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
30-Jul	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
31-Jul	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

0.6	0.6	0.5	0.7	0.0	0.0	0.0	0.8	0.0	0.0	0.5	0.5	0.0	0.0	0.0	0.4	0.4	0.5	0.6	1.1	1.1	1.4	1.0	0.6	Diurnal Average
15	16	14	15	0	0	0	11	0	0	11	14	0	0	0	11	10	12	16	18	15	15	16	16	Diurnal Maximum

Z - zerospan      C - Calibration      UO - Unstable Operation      PF - Power Failure      RE - Recovery  
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 2000 ppb







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

**Ammonia (NH<sub>3</sub>) - ppb**  
**Fort McKay - Bertha Ganter - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	542	96.27	96.27
6 - 10	2	0.36	96.63
11 - 15	14	2.49	99.11
16 - 20	5	0.89	100.00
21 - 25	0	0.00	100.00
> 26	0	0.00	100.00

Total Number of Valid Hours: 563

Total Number of Hours: 744



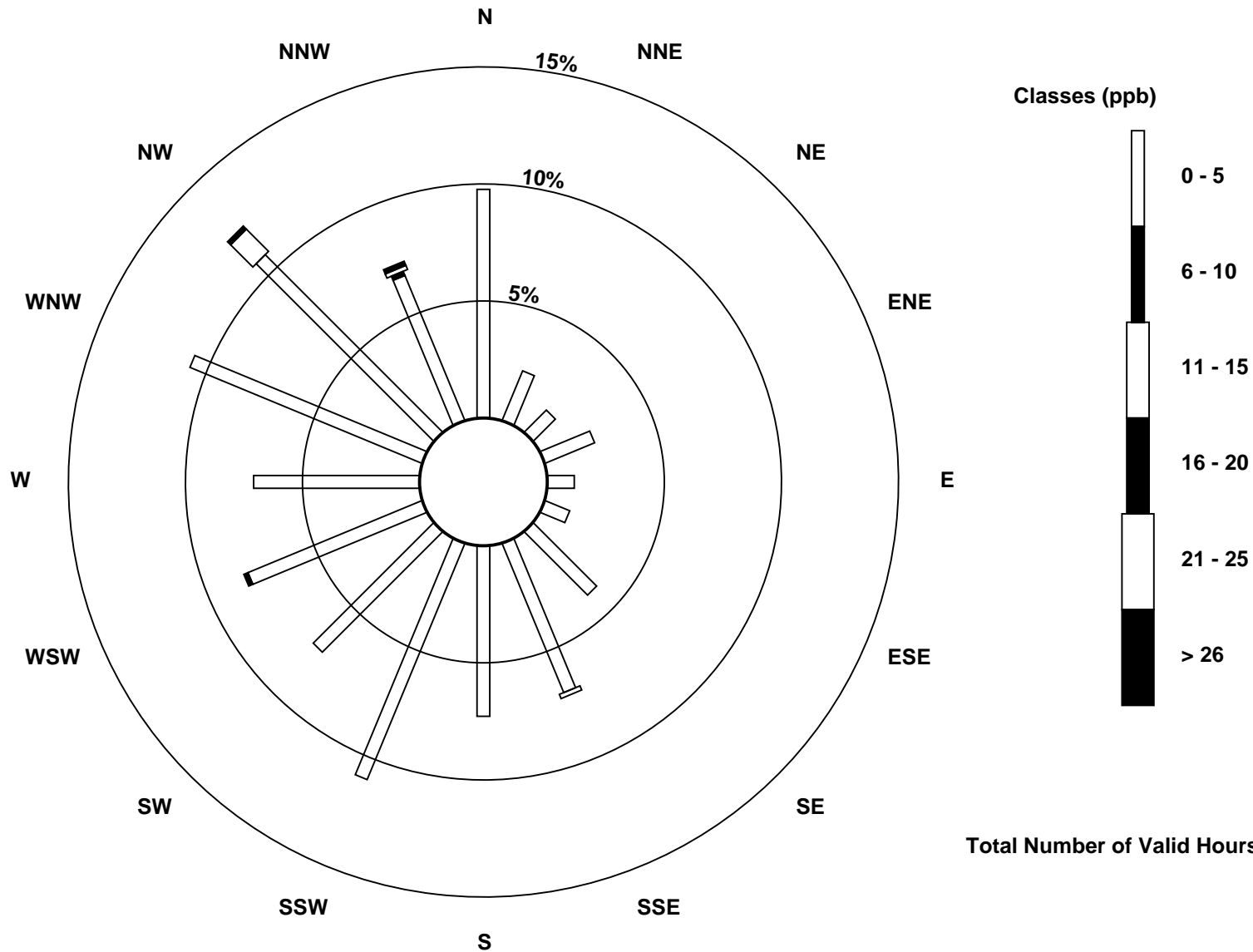
**Wood Buffalo Environmental Association**  
**Frequency Distribution**

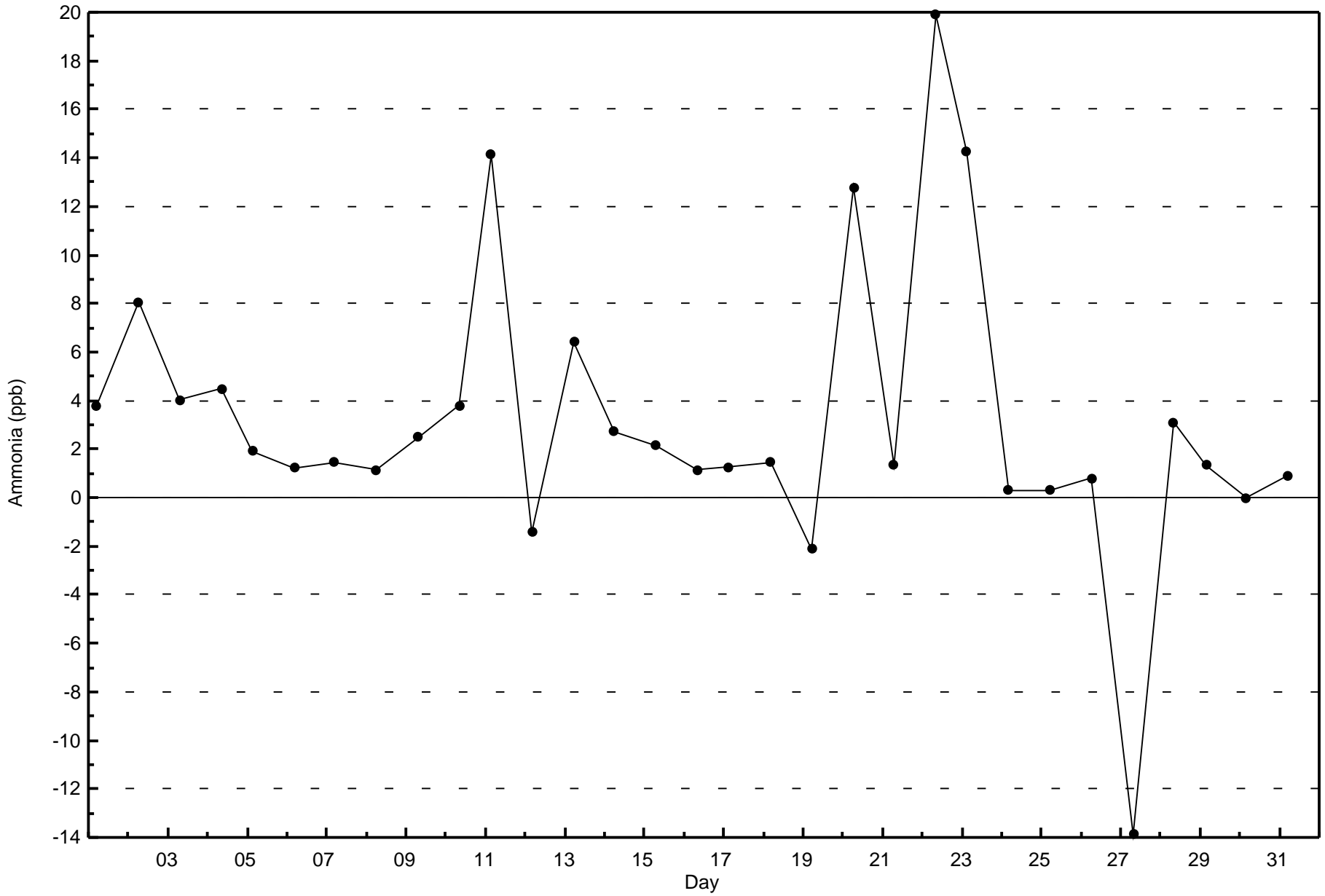
**Ammonia (NH<sub>3</sub>) - ppb**  
**Fort McKay - Bertha Ganter - July 2015**

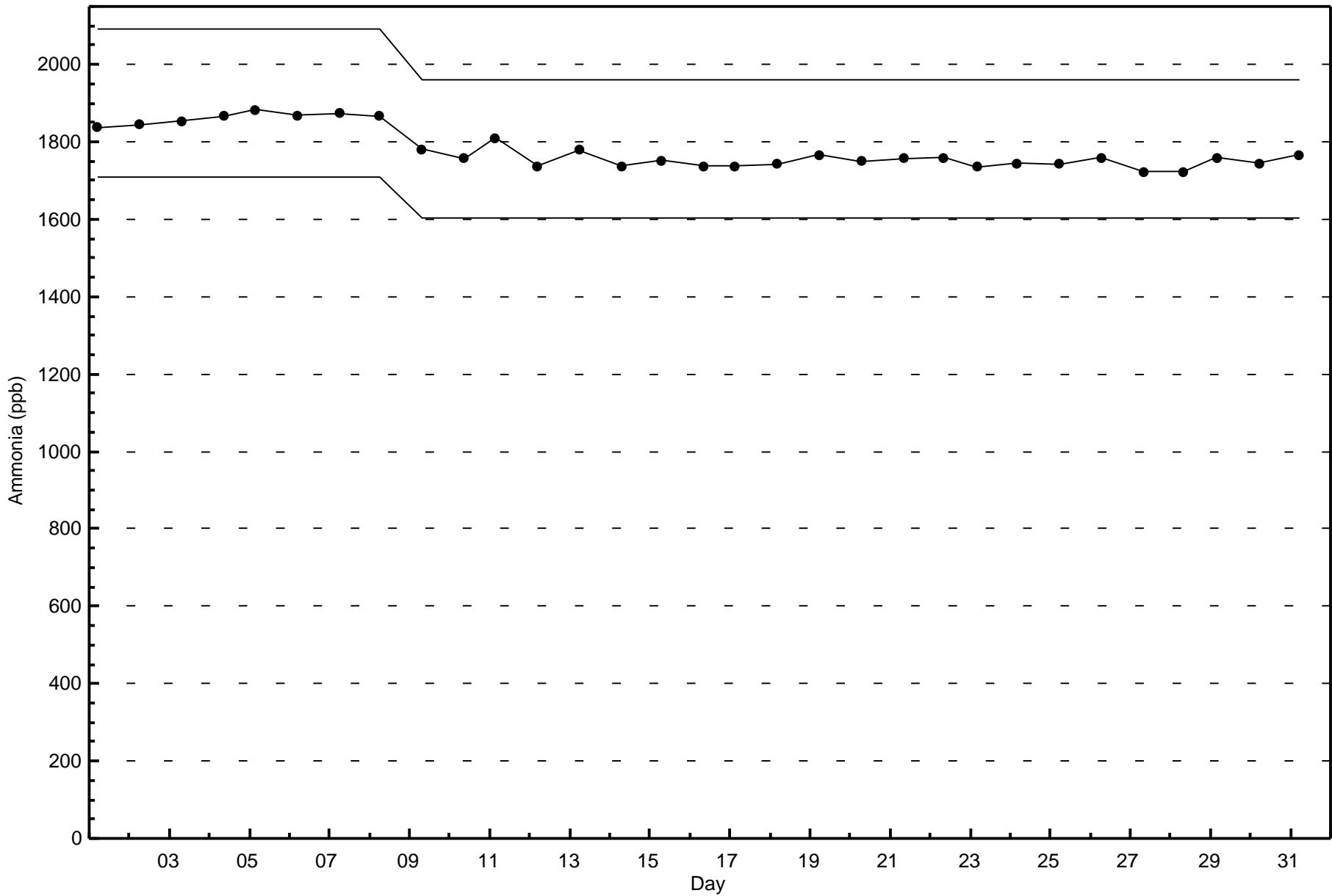
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	51	12	7	12	6	6	20	36	38	57	38	42	37	56	56	35	509
6 - 10	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2
11 - 15	0	0	0	0	0	0	0	1	0	0	0	0	0	0	7	1	9
16 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2
21 - 25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	51	12	7	12	6	6	20	37	38	57	38	43	37	56	64	38	522

Total Number of Valid Hours: 522

Total Number of Hours: 744

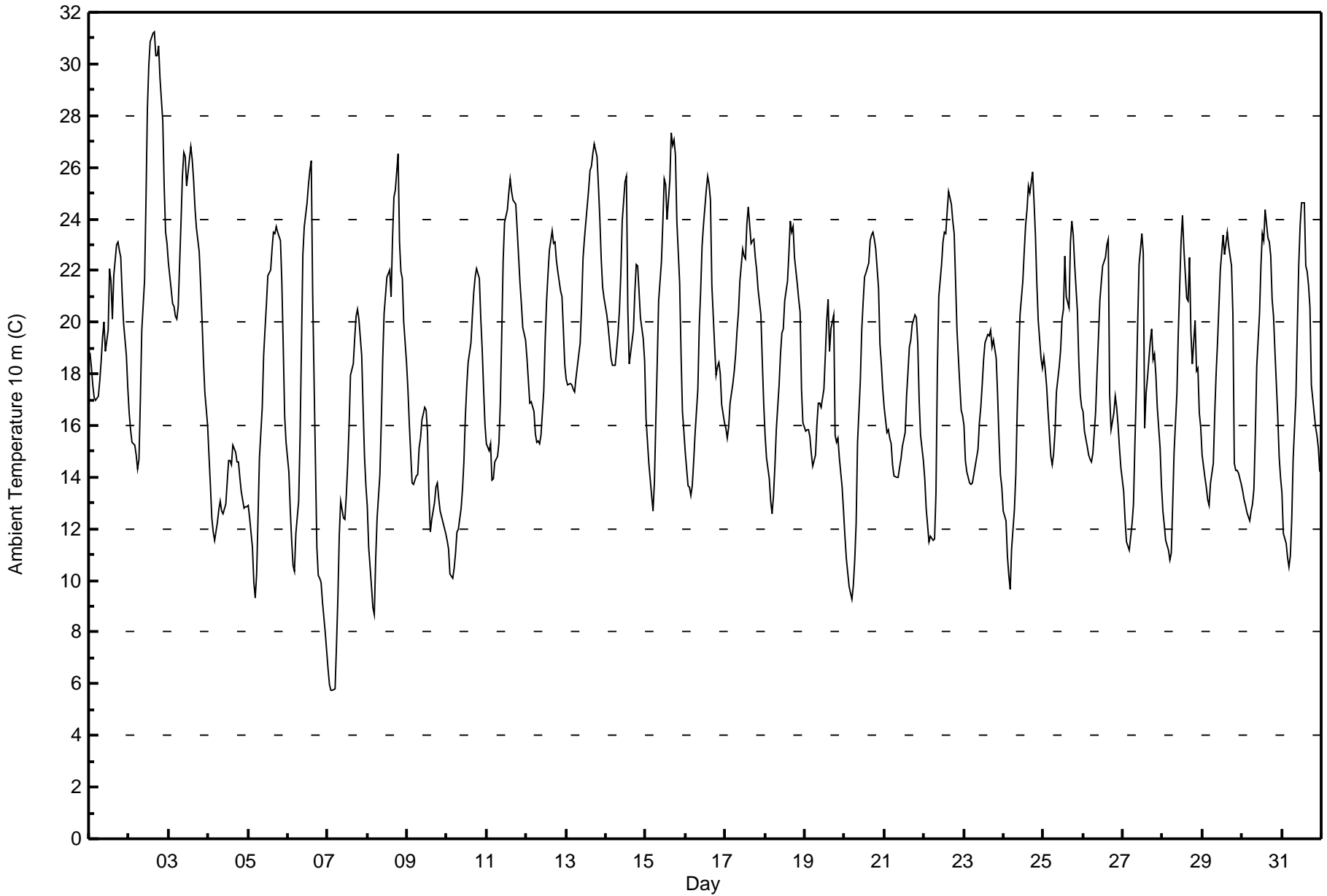








Maximum Value: 31.2 C on Jul 2 16:00		Maximum Daily Average: 23.4 C on Jul 2		Hours in Service: 744																																													
Minimum Value: 5.8 C on Jul 7 03:00		Minimum Daily Average: 13.4 C on Jul 7		Hours of Data: 744																																													
Maximum Diurnal Average: 22.2 C at hour 16		Minimum Diurnal Average: 13.1 C at hour 5		Hours of Missing Data: 0																																													
Monthly Average: 18.07 C		Percentiles: P <sub>1</sub> = 7.9 P <sub>10</sub> = 12.3 Q <sub>1</sub> = 14.6 Median = 18.1 Q <sub>3</sub> = 21.7 P <sub>90</sub> = 23.9 P <sub>99</sub> = 29.6		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-Jul	18.8	18.3	17.6	17.1	17.0	17.1	17.8	18.5	19.4	20.0	18.9	19.7	22.1	21.6	20.1	21.8	23.0	23.1	22.8	22.5	21.1	20.0	18.7	17.5	19.8	23.1																							
2-Jul	16.5	15.8	15.3	15.2	14.9	14.3	14.7	17.0	19.7	21.7	24.7	28.3	29.9	30.9	31.2	31.2	30.3	30.3	30.7	29.4	27.8	25.2	23.5	23.0	23.4	31.2																							
3-Jul	22.3	21.3	20.7	20.6	20.2	20.1	20.6	23.9	25.7	26.6	26.4	25.3	26.3	26.8	26.3	25.5	24.4	23.6	22.7	21.5	20.1	18.6	17.3	16.0	22.6	26.8																							
4-Jul	14.8	13.7	12.4	11.9	11.6	12.3	12.7	13.1	12.7	12.6	13.0	13.8	14.6	14.6	14.5	15.2	15.0	14.6	14.6	14.0	13.5	12.8	12.8	12.9	13.5	15.2																							
5-Jul	12.9	12.4	11.3	9.9	9.3	10.2	12.5	14.7	16.7	18.7	19.7	20.7	21.8	22.0	22.8	23.5	23.5	23.7	23.5	23.2	21.6	19.0	16.4	15.3	17.7	23.7																							
6-Jul	14.2	12.7	11.6	10.6	10.3	11.8	13.1	15.6	19.1	22.6	23.7	24.6	25.3	25.9	26.2	21.1	17.8	11.3	10.2	10.1	9.9	9.2	8.0	7.3	15.5	26.2																							
7-Jul	6.6	6.0	5.8	5.8	5.8	7.5	9.3	11.8	13.1	12.4	12.3	13.3	14.5	16.0	17.9	18.4	19.4	20.2	20.5	20.1	18.7	16.7	14.8	13.7	13.4	20.5																							
8-Jul	12.9	11.3	9.8	8.9	8.7	10.8	12.4	14.1	16.2	18.6	20.3	21.0	21.7	22.0	21.0	23.2	24.8	25.1	26.5	23.1	21.9	21.7	20.0	18.4	18.1	26.5																							
9-Jul	17.4	16.0	14.9	13.8	13.7	14.0	14.1	15.1	15.5	16.2	16.7	16.6	15.7	13.3	11.9	12.4	13.0	13.6	13.8	13.2	12.7	12.2	12.0	11.8	14.2	17.4																							
10-Jul	11.6	11.2	10.3	10.1	10.5	11.1	11.9	12.0	12.8	13.5	14.7	16.3	17.5	18.4	19.2	20.2	21.2	21.8	22.1	21.7	20.2	19.0	17.5	16.1	15.9	22.1																							
11-Jul	15.3	15.0	15.3	13.9	14.0	14.6	14.8	15.3	16.9	19.6	22.4	23.9	24.4	25.0	25.5	25.0	24.7	24.6	23.6	22.6	21.5	20.7	19.8	19.3	19.9	25.5																							
12-Jul	18.6	17.7	16.9	16.9	16.6	15.7	15.4	15.4	15.3	15.6	17.4	19.3	20.8	21.8	22.8	23.5	23.1	23.1	22.4	21.9	21.2	21.0	19.7	18.3	19.2	23.5																							
13-Jul	17.8	17.6	17.6	17.5	17.4	17.3	17.8	18.8	19.2	20.6	22.5	23.2	23.9	25.1	25.9	26.0	26.5	26.9	26.4	25.3	24.0	22.4	21.4	20.9	21.8	26.9																							
14-Jul	20.3	19.8	19.2	18.6	18.3	18.3	18.9	19.6	20.4	21.9	23.9	25.4	25.7	20.5	18.4	18.8	19.7	21.2	22.3	22.2	21.2	20.2	19.4	18.5	20.5	25.7																							
15-Jul	16.3	15.4	14.5	13.3	12.7	13.8	16.2	18.4	20.8	22.4	23.9	25.6	25.3	23.9	25.5	27.3	26.8	27.0	26.5	23.9	21.5	18.7	16.5	15.8	20.5	27.3																							
16-Jul	15.0	13.7	13.6	13.3	13.7	14.6	15.7	17.4	19.8	21.2	22.9	23.8	25.1	25.7	25.3	24.7	21.4	19.1	17.9	18.3	18.5	18.0	16.8	16.1	18.8	25.7																							
17-Jul	15.9	15.5	15.9	16.9	17.6	18.1	18.8	19.7	20.4	21.6	22.9	22.5	22.5	23.8	24.4	23.1	23.1	23.2	22.5	22.0	21.3	20.3	18.5	16.9	20.3	24.4																							
18-Jul	15.6	14.8	13.9	13.1	12.6	13.3	14.4	15.8	17.6	18.8	19.6	19.7	20.8	21.6	22.7	23.9	23.5	23.7	22.5	21.5	20.9	20.4	17.4	16.1	18.5	23.9																							
19-Jul	15.8	15.9	15.9	15.5	14.9	14.4	14.8	16.0	16.9	16.9	16.7	17.4	18.7	20.1	20.9	18.9	19.8	20.3	15.6	15.4	15.5	14.8	13.6	12.7	16.6	20.9																							
20-Jul	11.7	10.8	10.3	9.7	9.3	9.8	10.8	12.2	15.4	17.7	19.7	20.8	21.8	21.9	22.3	23.2	23.4	23.5	23.2	22.8	21.3	19.2	18.4	17.4	17.4	23.5																							
21-Jul	16.7	15.7	15.8	15.5	15.3	14.5	14.1	14.0	14.0	14.4	14.7	15.2	15.7	17.1	18.1	19.0	19.3	19.9	20.3	20.2	19.2	17.0	15.6	14.6	16.5	20.3																							
22-Jul	13.9	12.8	12.2	11.5	11.7	11.6	11.6	13.4	18.1	21.0	22.2	23.1	23.5	23.4	24.3	25.0	24.6	23.9	23.4	21.6	19.7	17.5	16.6	16.4	18.5	25.0																							
23-Jul	16.0	14.6	14.2	13.8	13.7	13.8	14.1	14.4	15.1	16.1	16.7	17.6	18.6	19.2	19.5	19.5	19.7	19.0	19.3	18.6	17.2	15.5	14.1	13.6	16.4	19.7																							
24-Jul	12.7	12.3	11.0	10.2	9.6	11.2	12.8	14.1	16.6	18.5	20.3	21.6	22.7	23.8	24.3	25.3	25.0	25.8	24.7	23.4	21.6	20.1	18.6	18.2	18.5	25.8																							
25-Jul	18.7	18.2	17.5	16.6	14.8	14.5	14.9	15.8	17.3	18.3	18.9	20.1	20.5	22.5	21.0	20.5	23.1	23.9	23.4	22.2	20.4	18.5	17.2	16.7	19.0	23.9																							
26-Jul	16.6	15.8	15.2	14.9	14.7	14.6	14.9	16.6	18.1	19.4	20.8	21.5	22.2	22.5	23.0	23.2	17.2	15.8	16.5	17.1	16.7	16.0	15.1	14.4	17.6	23.2																							
27-Jul	13.4	12.3	11.5	11.3	11.2	12.2	13.0	15.2	17.4	20.0	22.2	23.4	22.7	15.9	17.2	17.9	19.3	19.8	18.5	18.7	18.0	16.7	15.2	13.7	16.5	23.4																							
28-Jul	12.7	12.1	11.6	11.2	10.8	11.1	13.0	15.0	17.2	19.6	21.4	23.2	24.1	22.9	21.0	20.8	22.5	19.7	18.4	20.0	18.1	18.2	16.5	16.0	17.4	24.1																							
29-Jul	14.9	14.0	13.6	13.1	12.9	13.8	14.5	16.5	18.0	19.2	20.6	22.0	23.4	22.6	23.1	23.5	23.0	22.2	20.3	14.5	14.3	14.3	14.2	13.7	17.6	23.5																							
30-Jul	13.5	13.1	12.9	12.6	12.3	12.7	13.0	13.6	15.7	18.3	20.3	22.2	23.4	23.2	24.4	23.3	23.1	22.6	20.9	20.2	18.9	16.4	14.8	14.0	17.7	24.4																							
31-Jul	13.4	11.8	11.4	10.9	10.5	11.0	12.4	14.7	17.1	19.8	22.3	23.7	24.6	24.6	22.2	22.0	21.4	20.6	17.5	16.5	15.9	15.6	15.2	14.2	17.1	24.6																							
																								15.2	14.4	13.9	13.4	13.1	13.6	14.4	15.7	17.4	18.8	20.1	21.1	21.9	21.9	22.0	22.2	22.0	21.7	21.1	20.3	19.2	17.9	16.6	15.8	Diurnal Average	
																								22.3	21.3	20.7	20.6	20.2	20.1	20.6	23.9	25.7	26.6	26.4	28.3	29.9	30.9	31.2	31.2	30.3	30.3	30.7	29.4	27.8	25.2	23.5	23.0	Diurnal Maximum	







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

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

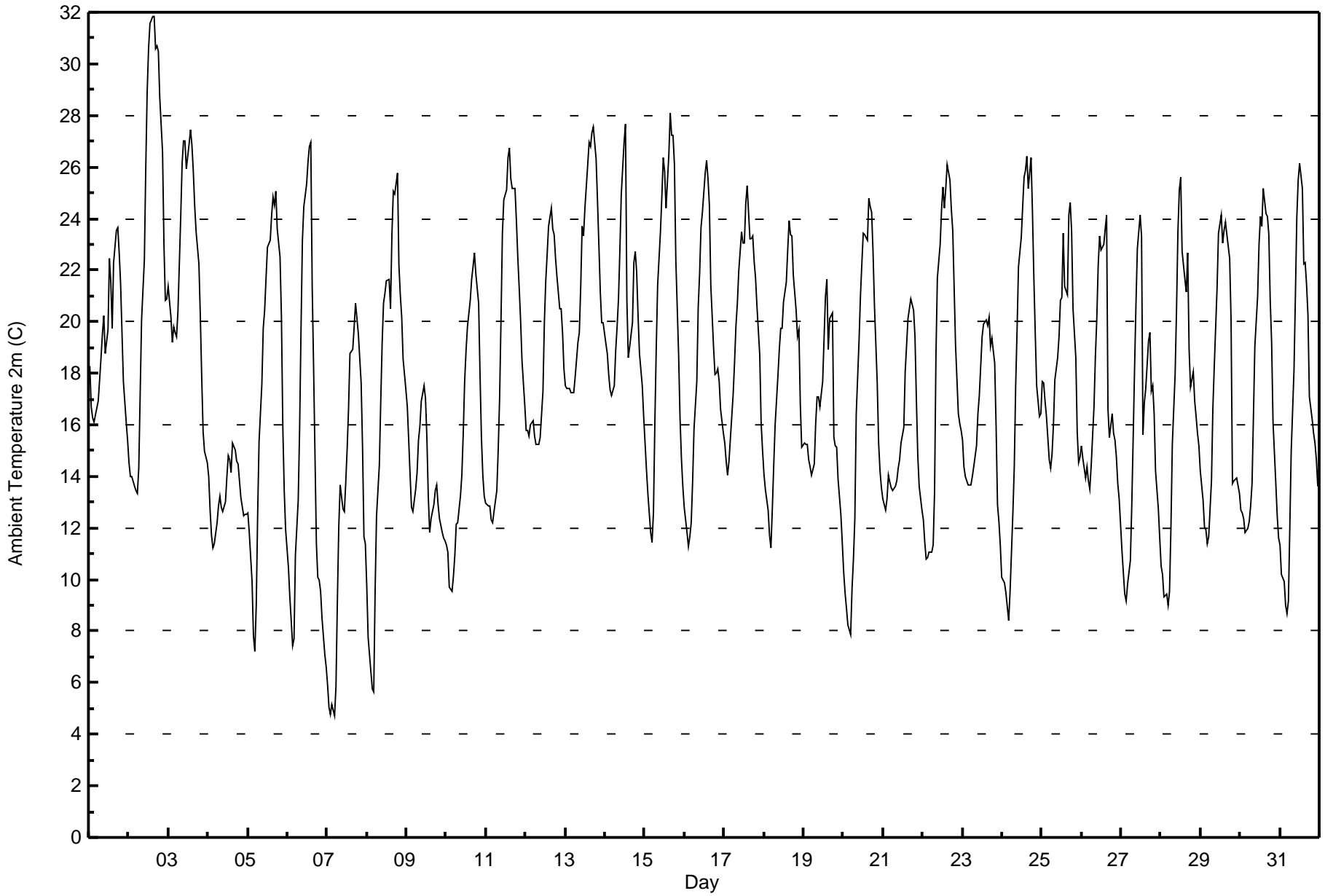
<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	20	2.69	2.69
10 - 20	454	61.02	63.71
> 20	270	36.29	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Maximum Value: 31.8 C on Jul 2 15:00		Maximum Daily Average: 22.9 C on Jul 2		Hours in Service: 744																						
Minimum Value: 4.7 C on Jul 7 05:00		Minimum Daily Average: 13.0 C on Jul 7		Hours of Data: 744																						
Maximum Diurnal Average: 22.7 C at hour 13		Minimum Diurnal Average: 12.0 C at hour 5		Hours of Missing Data: 0																						
Monthly Average: 17.70 C		Percentiles: P <sub>1</sub> = 5.9 P <sub>10</sub> = 11.3 Q <sub>1</sub> = 13.7 Median = 17.4 Q <sub>3</sub> = 21.7 P <sub>90</sub> = 24.6 P <sub>99</sub> = 30.4		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-Jul	18.3	16.7	16.3	16.1	16.4	16.9	17.8	18.6	19.5	20.2	18.7	19.7	22.5	21.6	19.7	22.3	23.5	23.7	22.7	21.5	19.6	17.7	16.1	15.4	19.2	23.7
2-Jul	14.5	14.0	14.0	13.6	13.5	13.4	14.3	17.2	20.1	22.4	26.0	28.9	30.6	31.6	31.8	31.8	30.6	30.7	30.5	28.7	26.6	23.0	20.9	20.9	22.9	31.8
3-Jul	21.4	20.2	19.2	19.8	19.6	19.4	20.4	24.1	26.2	27.0	27.0	25.9	26.9	27.4	26.8	25.8	24.5	23.5	22.3	20.2	17.8	15.8	14.9	14.5	22.1	27.4
4-Jul	14.0	12.7	11.7	11.2	11.4	12.2	12.8	13.2	12.8	12.6	13.0	14.0	14.8	14.6	14.2	15.3	15.1	14.6	14.5	13.8	13.2	12.5	12.5	12.5	13.3	15.3
5-Jul	12.6	11.8	9.9	7.8	7.2	9.0	12.5	15.3	17.6	19.7	20.4	21.7	22.9	23.2	24.1	24.8	24.5	25.1	23.6	22.5	20.2	15.9	13.4	11.9	17.4	25.1
6-Jul	10.5	9.4	8.4	7.4	7.7	10.9	13.1	15.8	19.7	23.1	24.5	25.3	26.2	26.8	26.9	21.4	18.2	11.4	10.1	10.0	9.6	8.5	7.1	6.6	14.9	26.9
7-Jul	5.9	5.1	4.8	5.1	4.7	5.9	9.2	12.0	13.7	12.8	12.7	13.8	15.1	16.7	18.7	18.9	19.8	20.7	20.1	19.5	17.6	15.1	11.7	11.4	13.0	20.7
8-Jul	9.8	7.8	6.4	5.7	5.6	9.6	12.5	14.4	16.9	19.2	20.7	21.1	21.6	21.6	20.5	23.4	25.0	25.0	25.8	22.2	21.1	20.2	18.5	17.4	17.2	25.8
9-Jul	16.7	15.4	14.1	12.8	12.6	13.5	14.2	15.4	15.9	16.9	17.5	17.0	15.5	13.2	11.8	12.4	12.9	13.4	13.7	12.9	12.4	11.8	11.6	11.5	14.0	17.5
10-Jul	11.3	11.1	9.7	9.5	10.1	11.0	12.1	12.2	13.3	14.0	15.7	17.7	18.9	19.8	20.8	21.6	22.2	22.7	21.9	20.7	17.9	15.5	14.0	13.2	15.7	22.7
11-Jul	13.0	12.9	12.9	12.3	12.2	12.7	13.4	15.0	17.0	20.1	23.4	24.7	25.1	26.4	26.7	25.5	25.2	25.2	23.9	22.5	21.3	20.1	18.5	16.8	19.4	26.7
12-Jul	15.8	15.8	15.6	16.0	16.2	15.5	15.3	15.2	15.2	15.5	17.3	20.0	21.6	22.6	23.7	24.4	23.6	23.4	22.4	21.8	20.5	20.5	19.6	18.2	19.0	24.4
13-Jul	17.5	17.4	17.4	17.3	17.2	17.2	17.8	19.2	19.6	21.4	23.7	23.3	24.4	26.1	26.9	26.8	27.3	27.5	26.3	24.7	23.0	21.1	20.0	20.0	21.8	27.5
14-Jul	19.1	18.7	17.9	17.4	17.1	17.5	18.9	19.8	20.9	22.8	24.9	27.0	27.7	20.8	18.6	19.1	20.0	22.3	22.7	21.9	20.3	18.7	17.5	16.3	20.3	27.7
15-Jul	15.3	14.3	13.3	11.8	11.5	12.6	16.1	19.0	21.4	23.5	24.9	26.4	25.8	24.4	26.5	28.1	27.2	27.3	26.1	22.4	18.7	16.3	14.7	13.6	20.0	28.1
16-Jul	12.8	11.8	11.3	11.6	12.2	13.8	15.8	17.7	20.5	21.9	23.7	24.2	25.8	26.2	25.5	24.5	21.4	19.0	18.0	18.0	18.2	17.7	16.6	15.7	18.5	26.2
17-Jul	15.3	14.6	14.0	14.6	16.3	17.2	18.4	19.8	20.7	21.9	23.5	23.0	23.1	24.6	25.3	23.2	23.2	23.3	22.3	21.7	20.6	18.7	16.1	15.0	19.9	25.3
18-Jul	14.1	13.5	12.7	11.7	11.2	12.7	14.4	16.0	17.9	18.9	19.8	19.8	20.8	21.5	22.8	23.9	23.4	23.3	21.8	20.4	19.4	19.7	16.8	15.1	18.0	23.9
19-Jul	15.3	15.2	15.2	14.7	14.4	14.0	14.5	16.1	17.1	17.1	16.7	17.7	19.4	21.0	21.6	18.9	20.1	20.3	15.5	15.2	15.2	13.9	12.5	11.4	16.4	21.6
20-Jul	10.3	9.5	8.9	8.3	7.9	9.6	10.8	12.4	16.4	19.3	21.0	22.2	23.4	23.4	23.2	24.8	24.4	24.3	22.7	20.7	17.6	15.3	14.2	13.6	16.8	24.8
21-Jul	13.1	12.7	13.1	14.1	13.8	13.6	13.4	13.6	13.8	14.3	14.6	15.3	15.9	18.0	19.1	20.1	20.5	20.9	20.4	19.4	17.0	14.8	13.6	12.7	15.8	20.9
22-Jul	12.3	11.5	10.8	10.8	11.1	11.1	11.3	13.4	18.7	21.7	23.0	24.3	25.2	24.4	25.2	26.1	25.5	24.4	23.5	21.3	19.1	16.4	16.1	15.8	18.5	26.1
23-Jul	15.4	14.4	14.0	13.7	13.6	13.7	14.0	14.4	15.2	16.4	17.1	18.3	19.4	19.9	20.1	19.8	20.2	19.0	19.4	18.4	16.0	12.9	12.3	11.3	16.2	20.2
24-Jul	10.1	9.9	9.5	9.0	8.4	9.5	12.6	14.3	17.5	19.7	22.1	23.3	24.5	25.6	25.9	26.4	25.2	26.4	24.2	21.7	19.5	17.5	16.3	16.4	18.1	26.4
25-Jul	17.7	17.6	16.9	16.3	14.7	14.3	14.8	16.0	17.8	18.6	19.4	20.8	20.9	23.4	21.4	21.1	24.2	24.6	23.5	20.5	18.6	15.7	14.5	14.8	18.7	24.6
26-Jul	15.2	14.7	13.9	14.4	13.8	13.5	14.4	16.7	18.7	20.1	22.2	23.3	22.8	23.0	23.6	24.2	16.6	15.5	16.4	15.7	15.4	14.8	13.7	13.1	17.3	24.2
27-Jul	11.1	10.2	9.5	9.2	9.8	10.8	12.8	15.5	18.2	20.7	22.8	24.1	23.3	15.6	16.9	17.4	19.3	19.6	17.3	17.5	16.4	14.2	12.8	11.6	15.7	24.1
28-Jul	10.5	10.2	9.3	9.4	9.0	9.5	12.0	15.2	17.9	20.4	23.5	25.1	25.6	22.7	21.6	21.1	22.7	18.9	17.5	18.1	16.9	16.3	15.7	15.2	16.9	25.6
29-Jul	14.2	13.1	12.1	11.9	11.4	11.7	13.8	16.7	18.3	19.8	21.3	23.4	24.1	23.0	23.5	23.8	23.4	22.5	20.1	13.7	13.8	13.9	13.9	13.4	17.4	24.1
30-Jul	12.7	12.6	12.4	11.8	12.0	12.3	12.9	13.7	16.3	19.0	21.0	23.0	24.1	23.7	25.1	24.2	24.1	23.4	20.8	19.2	16.1	13.7	12.5	11.6	17.4	25.1
31-Jul	11.3	10.2	9.9	9.0	8.7	9.2	12.0	15.0	18.1	21.0	24.0	25.5	26.2	25.2	22.3	22.3	21.4	20.2	17.1	16.2	15.7	15.3	14.6	13.6	16.8	26.2
13.8 13.1 12.4 12.1 12.0 12.7 14.1 15.9 17.8 19.4 20.8 21.9 22.7 22.5 22.6 22.7 22.4 22.0 20.9 19.5 17.9 16.2 14.9 14.2																								Diurnal Average		
21.4 20.2 19.2 19.8 19.6 19.4 20.4 24.1 26.2 27.0 27.0 28.9 30.6 31.6 31.8 31.8 30.6 30.7 30.5 28.7 26.6 23.0 20.9 20.9																								Diurnal Maximum		





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

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

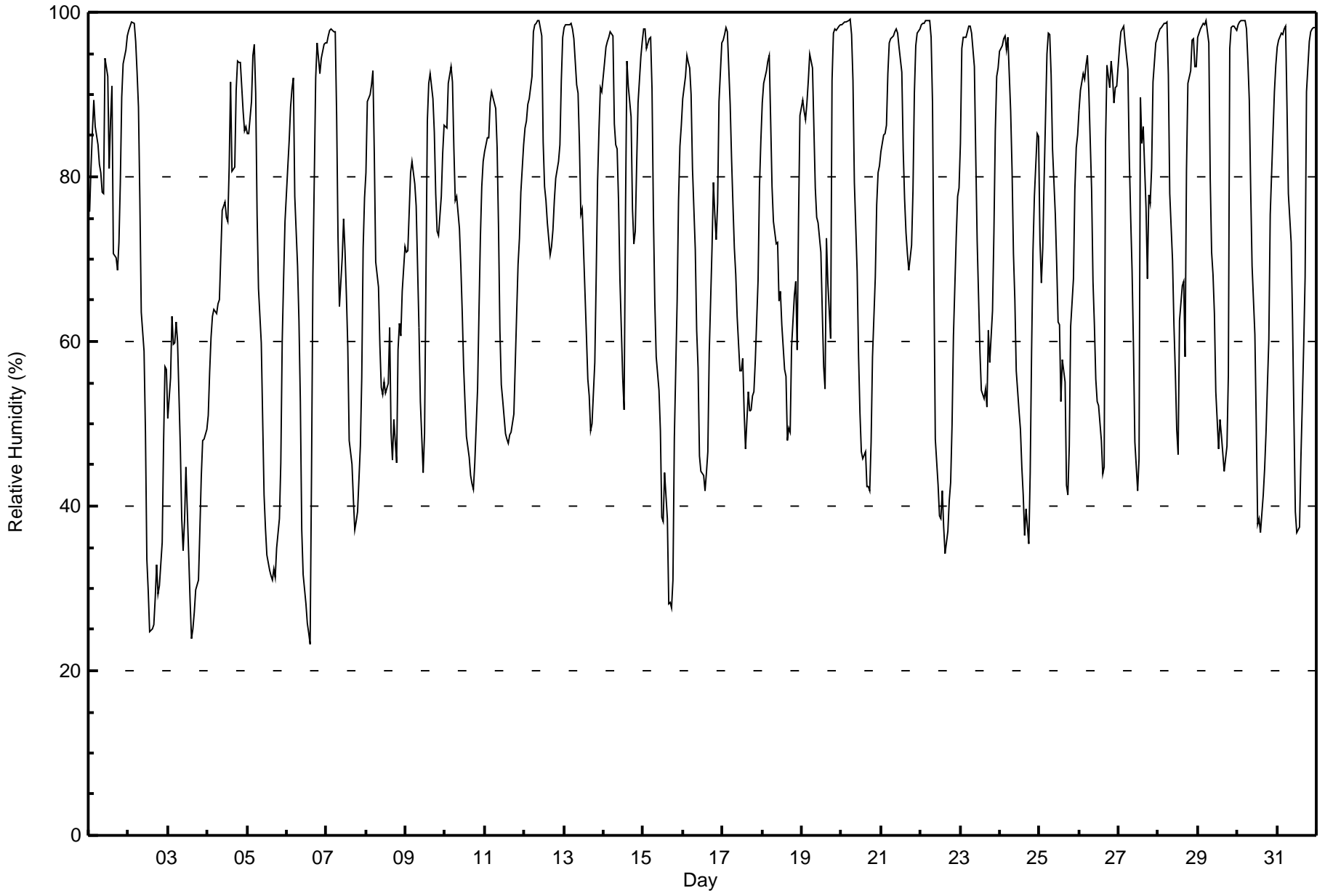
<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	49	6.59	6.59
10 - 20	433	58.20	64.78
> 20	262	35.22	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Maximum Value: 99 % on Jul 20 06:00																			Maximum Daily Average: 87.8 % on Jul 21						Hours in Service: 744	
Minimum Value: 23 % on Jul 6 15:00																			Minimum Daily Average: 43.3 % on Jul 3						Hours of Data: 744	
Maximum Diurnal Average: 92.4 % at hour 5																			Minimum Diurnal Average: 53.2 % at hour 13						Hours of Missing Data: 0	
Monthly Average: 72.5 %																			Percentiles: P <sub>1</sub> = 26 P <sub>10</sub> = 42 Q <sub>1</sub> = 55 Median = 76 Q <sub>3</sub> = 92 P <sub>90</sub> = 98 P <sub>99</sub> = 99						Hours of Calibration: 0	
																			Percent Operational Time: 100.0							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	76	81	86	89	86	84	81	80	78	78	94	92	81	87	91	71	70	69	72	79	90	94	95	97	83.4	97
2-Jul	98	98	99	99	96	93	88	77	64	59	49	34	30	25	25	26	29	33	29	30	36	48	57	57	57.4	99
3-Jul	51	56	63	60	60	62	60	47	38	35	38	45	34	28	24	25	27	30	31	37	44	48	48	49	43.3	63
4-Jul	51	56	61	63	64	63	65	65	70	76	77	75	81	92	81	90	94	94	94	94	88	86	86	86	76.1	94
5-Jul	85	85	89	95	96	90	75	66	60	50	41	37	34	32	31	31	32	31	35	38	45	60	68	75	57.7	96
6-Jul	81	84	88	91	92	78	69	62	53	37	32	28	26	25	23	44	68	92	96	94	93	94	96	96	68.5	96
7-Jul	96	97	98	98	98	98	87	73	64	70	75	71	66	59	48	45	41	37	38	39	47	56	71	77	68.7	98
8-Jul	81	89	90	91	93	83	70	67	60	54	54	55	54	55	62	49	46	50	45	59	62	61	66	71	65.2	93
9-Jul	71	71	76	80	82	79	77	69	62	53	44	49	68	87	91	92	89	85	78	73	73	78	83	86	74.9	92
10-Jul	86	86	91	93	92	84	77	78	74	69	64	57	53	49	46	44	43	42	45	54	64	72	79	82	67.6	93
11-Jul	83	85	85	89	90	90	88	84	74	61	55	53	49	48	48	49	49	51	57	63	69	73	78	84	68.9	90
12-Jul	86	87	89	89	92	98	98	99	99	99	97	84	79	77	74	71	71	74	77	80	82	84	92	97	86.4	99
13-Jul	98	99	98	99	99	98	97	91	90	84	75	76	71	61	55	53	49	50	57	68	79	86	91	90	79.8	99
14-Jul	94	96	96	97	98	97	86	84	83	77	68	56	52	76	94	91	87	76	72	73	82	89	95	96	83.9	98
15-Jul	98	98	96	97	97	91	75	65	58	54	49	39	38	44	38	28	28	28	31	48	65	77	84	86	63.0	98
16-Jul	89	92	95	94	93	90	81	71	61	57	46	44	44	42	44	47	59	71	79	75	72	77	89	96	71.2	96
17-Jul	97	97	98	98	89	82	77	71	68	63	56	57	58	51	47	54	52	52	53	54	58	67	79	84	69.2	98
18-Jul	89	91	93	94	95	87	79	75	72	72	65	66	62	57	56	48	50	49	59	66	67	59	75	87	71.3	95
19-Jul	89	88	87	89	92	95	93	86	79	75	74	71	64	57	54	72	67	60	92	97	98	98	98	98	82.3	98
20-Jul	99	99	99	99	99	99	97	92	79	68	58	51	47	46	47	42	42	42	48	58	68	77	81	81	71.6	99
21-Jul	83	85	85	86	93	96	97	97	98	98	97	96	93	83	77	73	71	69	72	78	90	96	97	98	87.8	98
22-Jul	98	99	99	99	99	99	97	89	68	48	43	39	39	42	37	34	37	41	43	50	61	73	78	79	66.2	99
23-Jul	84	96	97	97	98	98	98	98	93	82	72	66	59	54	53	54	52	61	57	64	73	86	92	93	78.2	98
24-Jul	95	96	97	97	95	97	88	81	71	65	56	52	49	45	41	36	40	35	44	59	71	78	85	85	69.1	97
25-Jul	72	67	71	80	95	98	97	92	83	75	69	62	62	53	58	55	42	41	47	62	68	78	84	85	70.8	98
26-Jul	88	91	93	92	93	95	90	78	67	62	55	53	52	48	44	45	84	93	91	94	92	89	91	91	78.0	95
27-Jul	96	98	98	98	96	93	82	75	69	59	48	42	46	90	84	86	76	68	78	77	81	92	96	97	80.2	98
28-Jul	97	98	98	99	99	99	92	78	70	62	56	49	46	63	67	67	58	81	91	93	97	97	93	93	81.0	99
29-Jul	97	98	98	99	99	99	96	80	71	68	63	54	47	51	49	46	44	47	56	96	98	98	98	98	77.1	99
30-Jul	98	99	99	99	99	98	94	89	78	69	61	50	38	38	37	41	45	49	55	60	75	85	90	94	72.6	99
31-Jul	96	97	97	97	98	98	89	78	72	63	51	39	37	37	46	53	60	68	90	96	98	98	98	98	77.2	98
																			87.2						Diurnal Average	
																			99						Diurnal Maximum	



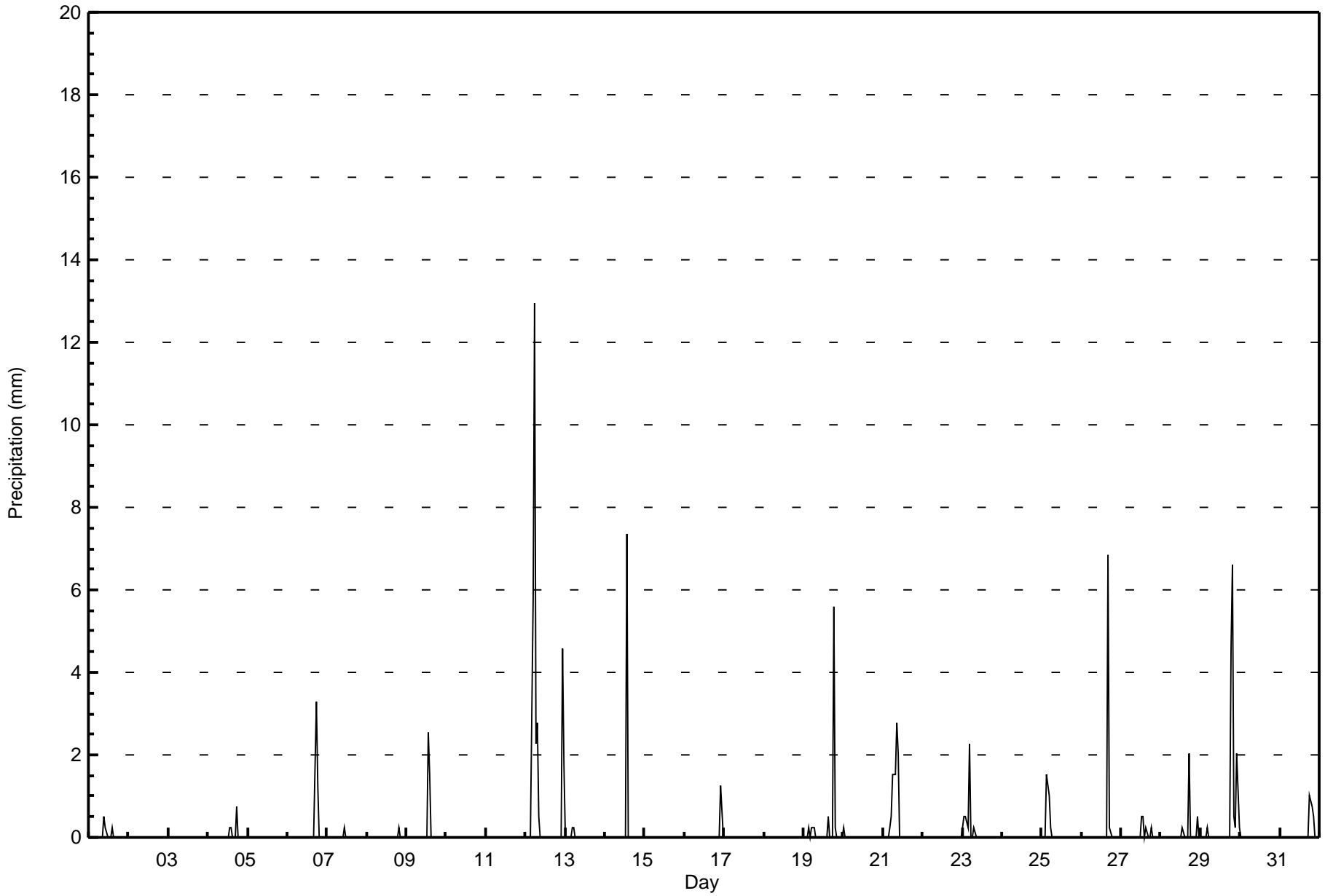


Maximum Value: 13.0 mm on Jul 12 06:00		Maximum Daily Total: 30.7 mm on Jul 12		Hours in Service: 744																							
Minimum Value: 0.0 mm on Jul 1 01:00		Minimum Daily Total: 0.0 mm on Jul 2		Hours of Data: 744																							
Maximum Diurnal Total: 14.2 mm at hour 6		Minimum Diurnal Total: 0.0 mm at hour 12		Hours of Missing Data: 0																							
Monthly Total: 102.36 mm		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 0.0 P <sub>90</sub> = 0.0 P <sub>99</sub> = 3.6		Hours of Calibration: 0																							
				Percent Operational Time: 100.0																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.3	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	1.0	0.5	
2-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.8	
5-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	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	1.3	0.0	0.0	0.0	0.0	0.0	4.6	3.3		
7-Jul	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	0.3	0.3	0.3	
8-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.3	0.3	0.3	
9-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.1	2.5	2.5	
10-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	5.8	13.0	2.3	2.8	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.6	1.8	30.7	13.0	13.0	
13-Jul	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	0.0	0.5	0.3	0.3	
14-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.4	7.4	7.4	
15-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	1.3	1.3	1.3	
17-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.3	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	5.6	0.3	0.0	0.0	0.0	7.1	5.6	5.6	
20-Jul	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3	0.3
21-Jul	0.0	0.0	0.0	0.0	0.3	0.5	1.5	1.5	2.8	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.6	2.8	2.8	2.8	
22-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23-Jul	0.3	0.5	0.5	0.3	2.3	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.1	2.3	2.3	2.3	
24-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	1.5	1.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	1.5	1.5	1.5	
26-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.9	0.3	0.0	0.0	0.0	0.0	0.0	7.1	6.9	6.9	6.9	
27-Jul	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	0.0	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.0	1.5	0.5	0.5	0.5	
28-Jul	0.0	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	2.0	0.0	0.0	0.0	0.5	0.0	2.8	2.0	2.0	2.0	
29-Jul	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	4.6	6.6	0.5	0.3	2.0	14.5	6.6	6.6	6.6	
30-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31-Jul	0.0	0.0	0.0	0.0	0.0	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	0.5	0.0	0.0	2.3	1.0	1.0	1.0	
		0.5	0.5	0.5	2.0	9.9	14.2	4.1	4.6	3.3	2.5	0.5	0.0	0.5	10.9	2.0	0.8	6.9	6.4	12.7	7.9	1.0	0.3	8.4	2.0	Diurnal Average	
		0.3	0.5	0.5	1.5	5.8	13.0	2.3	2.8	2.8	2.0	0.3	0.0	0.5	7.4	1.5	0.5	6.9	3.3	5.6	6.6	0.5	0.3	4.6	1.8	Diurnal Maximum	



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

**Precipitation (PC) - mm**  
**Fort McKay - Bertha Ganter - July 2015**







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

**Precipitation (PC) - mm**  
**Fort McKay - Bertha Ganter - July 2015**

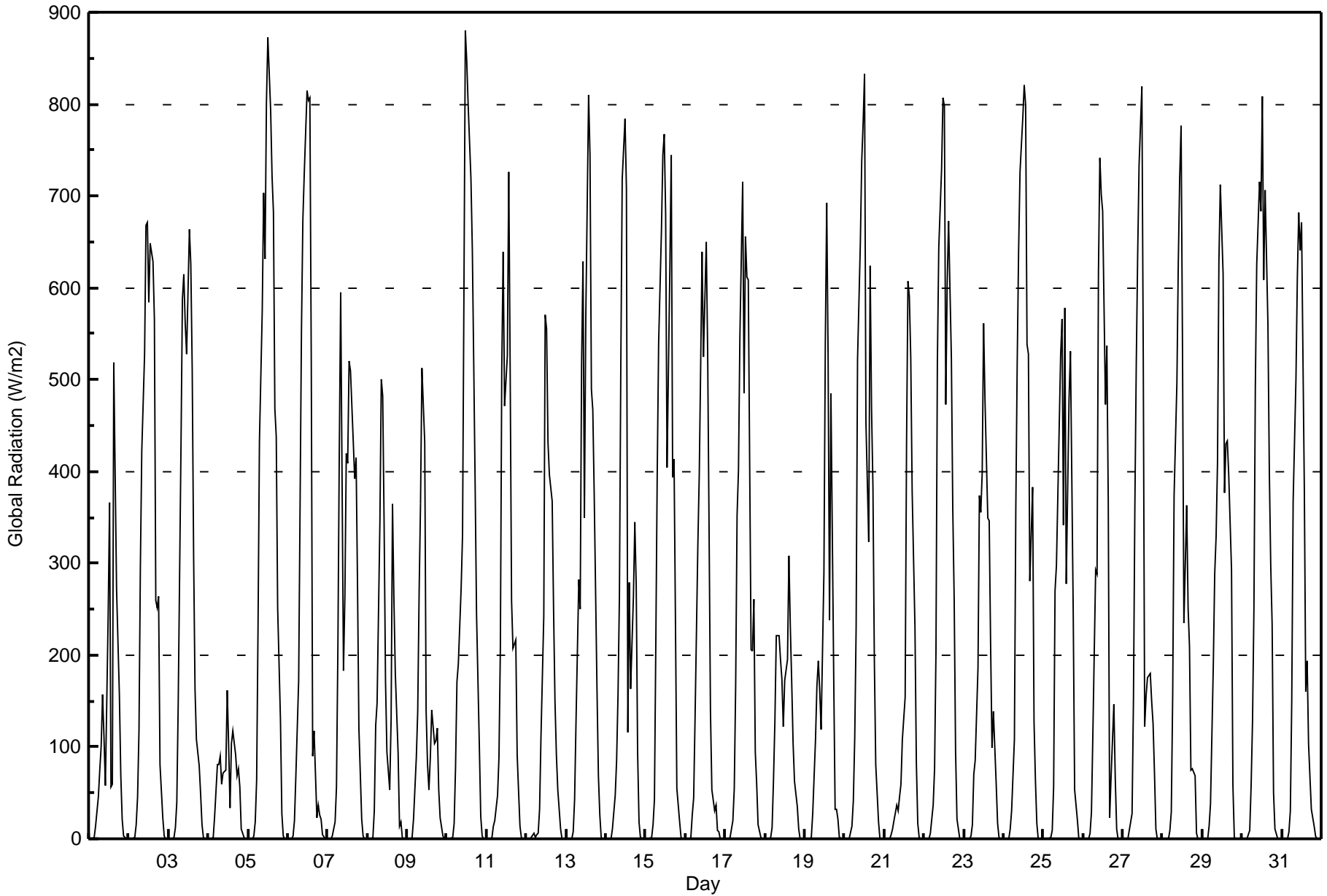
<b>Concentration Ranges (mm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.3	705	94.76	94.76
0.4 - 0.5	11	1.48	96.24
0.6 - 0.7	0	0.00	96.24
0.8 - 1.4	6	0.81	97.04
1.5 - 10	21	2.82	99.87
> 10	1	0.13	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Maximum Value: 880 W/m2 on Jul 10 12:00																			Maximum Daily Average: 327.1 W/m2 on Jul 5						Hours in Service: 744	
Minimum Value: 0 W/m2 on Jul 1 01:00																			Minimum Daily Average: 54.6 W/m2 on Jul 4						Hours of Data: 744	
Maximum Diurnal Average: 555.7 W/m2 at hour 13																			Minimum Diurnal Average: 0.0 W/m2 at hour 1						Hours of Missing Data: 0	
Monthly Average: 205.0 W/m2																			Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 1 Median = 81 Q <sub>3</sub> = 377 P <sub>90</sub> = 626 P <sub>99</sub> = 811						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-Jul	0	0	0	1	14	46	75	101	157	111	58	243	366	57	59	518	272	214	156	70	21	2	0	0	106.0	518
2-Jul	0	0	0	1	15	46	118	297	423	529	669	671	585	649	628	566	259	252	264	80	23	2	0	0	253.1	671
3-Jul	0	0	0	1	12	40	146	429	587	615	561	528	664	626	511	310	163	109	80	49	15	1	0	0	227.0	664
4-Jul	0	0	0	2	24	81	81	90	60	72	75	162	102	34	103	117	91	69	76	57	11	2	0	0	54.6	162
5-Jul	0	0	0	3	19	64	232	433	575	703	631	802	873	793	721	682	468	437	252	130	27	4	0	0	327.1	873
6-Jul	0	0	0	2	20	69	172	362	554	674	725	815	804	807	521	91	118	22	36	26	22	5	0	0	243.6	815
7-Jul	0	0	0	3	18	56	207	421	595	182	264	419	409	521	509	432	392	416	278	120	21	3	0	0	219.4	595
8-Jul	0	0	0	2	30	123	148	344	501	482	344	172	94	54	130	364	261	180	93	13	18	1	0	0	139.8	501
9-Jul	0	0	0	2	21	89	138	268	364	512	431	139	81	54	88	141	104	106	121	54	23	3	0	0	114.2	512
10-Jul	0	0	0	1	16	77	171	190	273	332	596	880	847	799	718	641	515	385	244	101	25	3	0	0	283.9	880
11-Jul	0	0	0	1	13	20	48	89	208	511	640	471	526	727	511	260	208	217	91	52	13	2	0	0	192.0	727
12-Jul	0	0	0	1	5	2	4	7	32	112	242	571	555	432	396	368	248	149	92	53	11	0	0	0	136.7	571
13-Jul	0	0	0	0	8	43	127	282	251	518	628	349	569	811	744	489	467	375	162	68	26	2	0	0	246.6	811
14-Jul	0	0	0	0	11	47	86	157	263	517	718	784	707	116	279	163	263	345	274	93	19	1	0	0	201.9	784
15-Jul	0	0	0	1	16	43	215	399	540	663	744	767	681	404	619	744	394	413	238	54	18	1	0	0	289.8	767
16-Jul	0	0	0	1	26	44	132	320	397	515	639	525	650	530	338	138	54	30	36	10	8	0	0	0	183.0	650
17-Jul	0	0	0	1	19	55	168	353	401	546	716	484	656	612	608	206	205	261	94	60	16	1	0	0	227.6	716
18-Jul	0	0	0	1	13	64	127	221	221	195	174	123	173	195	307	231	170	104	62	36	10	0	0	0	101.2	307
19-Jul	0	0	0	0	2	27	109	166	193	161	118	290	540	693	522	237	485	175	31	33	22	1	0	0	158.6	693
20-Jul	0	0	0	1	14	41	110	230	522	648	739	779	833	453	323	625	468	383	195	81	19	1	0	0	269.4	833
21-Jul	0	0	0	0	4	11	20	37	31	45	59	108	154	432	606	590	524	378	231	83	16	1	0	0	138.8	606
22-Jul	0	0	0	0	6	37	76	204	519	643	729	807	798	473	604	673	523	358	262	95	21	1	0	0	284.5	807
23-Jul	0	0	0	0	3	15	71	85	186	374	355	398	561	478	349	346	212	100	139	60	17	1	0	0	156.1	561
24-Jul	0	0	0	0	10	30	109	361	518	640	725	786	821	799	538	527	281	383	128	65	17	0	0	0	280.9	821
25-Jul	0	0	0	0	1	10	56	269	298	449	526	566	342	578	277	479	530	390	243	54	19	0	0	0	212.1	578
26-Jul	0	0	0	0	6	29	113	293	289	616	741	701	683	473	536	368	23	67	146	65	11	0	0	0	215.1	741
27-Jul	0	0	0	0	9	28	153	363	517	637	733	819	522	122	155	175	180	149	125	71	11	0	0	0	198.8	819
28-Jul	0	0	0	0	9	28	156	374	496	627	720	776	535	236	363	252	209	75	77	69	6	0	0	0	208.7	776
29-Jul	0	0	0	0	13	39	190	289	329	410	628	712	615	377	431	433	396	293	58	2	0	0	0	0	217.4	712
30-Jul	0	0	0	0	8	58	129	250	491	626	716	683	809	608	706	560	400	298	234	50	10	0	0	0	276.5	809
31-Jul	0	0	0	0	8	31	150	367	500	612	681	641	670	379	160	193	104	68	32	13	3	0	0	0	192.2	681
																			0.0						Diurnal Average	
																			0						Diurnal Maximum	





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

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

<b>Concentration Ranges (W/m2)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	277	37.23	37.23
21 - 100	114	15.32	52.55
101 - 300	137	18.41	70.97
301 - 600	131	17.61	88.58
601 - 900	85	11.42	100.00
> 900	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

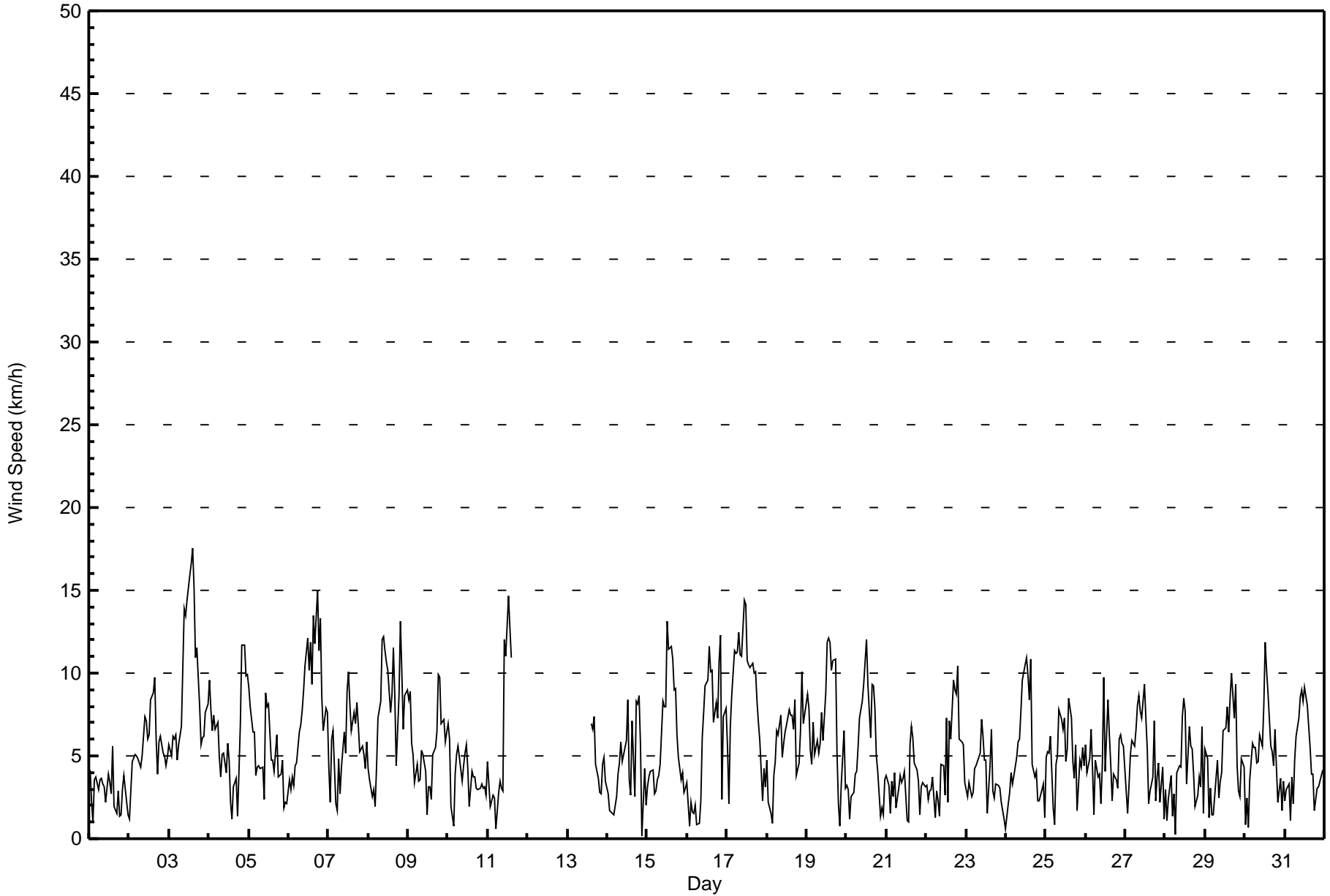


Maximum Speed: 18 km/h on Jul 3 15:00	Maximum Daily Speed Average: 8.4 km/h on Jul 17	Hours in Service: 744
Minimum Speed Value: 0 km/h on Jul 14 22:00	Minimum Daily Speed Average: 0.4 km/h on Jul 26	Hours of Data: 697
Maximum Diurnal Speed Average: 2.9 km/h at hour 1	Minimum Diurnal Speed Average: 1.6 km/h at hour 6	Hours of Missing Data: 47
Monthly Average Velocity: 1.7 km/h 270.8 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 2 Q <sub>1</sub> = 3 Median = 5 Q <sub>3</sub> = 7 P <sub>90</sub> = 10 P <sub>99</sub> = 14	Percent Operational Time: 94.1

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-Jul	WSW4	NNW2	W1	WSW4	WNW4	WSW3	WSW4	SW4	WSW3	W3	SW2	SSW4	WSW3	NW3	NW6	SSE2	WSW2	E3	SE1	WNW1	WSW3	W4	W2	WSW1	WSW2.1	NW6	
2-Jul	W1	SW3	SW5	SW5	SSW5	SSW5	S5	S4	SSW5	S7	SSE7	SW6	W6	W8	WSW9	WSW10	SW6	SSW4	SSW6	SW6	SSW5	SSW5	SSW4	SW5	SW4.7	WSW10	
3-Jul	SSW6	SSW5	S6	SSW6	SSW6	SSW5	SSW6	WSW7	W10	W14	NW13	NW14	NW16	NNW17	NW18	NW15	NW11	NW12	NNW8	NW6	NW6	NW6	NW8	NW8	WNW6.7	NW18	
4-Jul	NW10	NW8	NW7	NW7	NW7	NW7	NW5	W4	WSW5	SW5	WSW4	W6	NNW5	NW2	N1	ESE3	SW4	WSW1	NW4	NNW7	N12	N12	N10	N10	NW4.3	N12	
5-Jul	N9	N8	N6	NNW6	NW4	NW4	NW4	WNW4	WNW4	NNE2	N9	NNE8	N8	NNE5	NE5	ENE4	NE5	ESE6	SE4	SSW4	SW5	WSW2	W2	SW2	N2.7	N9	
6-Jul	WSW4	WSW3	SW4	SW3	SW4	SSW5	SSW6	SSW7	S8	WSW9	WNW10	WSW12	WSW10	WSW12	W9	NNW14	NNE12	NNE15	N11	N13	N9	NNW7	NW8	NW8	WNW4.0	NNE15	
7-Jul	NW4	NW2	NW6	NW7	NW2	NNW2	NW5	WNW3	WSW4	WSW6	SW5	SSW9	SSW10	SSW8	SW7	SW8	W7	WNW8	W7	WSW5	SSW6	SW5	SW4	SSW6	WSW4.0	SSW10	
8-Jul	SSW4	SSW4	WSW3	W3	SW2	SSW4	SSW7	S8	S12	S12	S11	S11	SSW10	SSW8	S9	S11	S9	SSW4	NW9	NW13	NW10	NNW7	NNW9	NNW9	SW4.0	NW13	
9-Jul	N8	N9	N6	N5	NNW3	NW4	NW3	NNE4	ENE5	NE5	ENE4	ESE1	NW3	NNE3	NNE2	N5	N5	N6	NNE10	NNE10	NNE7	N7	N6	N6	N4.8	NNE10	
10-Jul	N7	N6	N2	NNW1	N4	NNE5	NE6	NNE5	NE3	N4	ESE5	ESE6	ENE4	ENE2	SE4	ESE4	ENE4	ENE3	NE3	N3	N3	NNE3	NNW3	N3	NE2.9	N7	
11-Jul	N5	N2	NNW2	WSW3	S2	WNW1	N3	N3	NNE3	SSE3	S12	S11	S15	S13	S11	AF	AF	AF	AF	AF	AF	AF	AF	AF	----	S15	
12-Jul	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-Jul	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	C	C	C	WSW7	SSW7	S7	SW5	WNW4	SSW3	N3	NW5	NNW5	N3	----	S7	
14-Jul	WNW3	SW2	WNW2	NW2	WNW1	S3	S4	S5	S6	SSE5	SSE5	SE6	SE8	NNW4	N3	S7	SSE3	SE8	SSE8	S9	S6	SSE0	N4	W2	SSE2.7	S9	
15-Jul	WNW3	SSW4	SSW4	SSW4	SSW3	WSW3	SW4	SW4	SSW4	SSE8	S8	SW8	SSW13	S11	SSE12	SSW11	SSW9	SSW9	WSW6	NW5	WNW4	W4	WSW3	NW3	SSW4.7	SSW13	
16-Jul	W3	NNW1	SW2	WSW2	S2	SSW2	E1	WSW1	WNW2	NNW6	N8	N9	N10	NNW12	N10	N10	SSW7	WNW8	SW7	NW11	NW12	W2	SSW7	WNW8	NW3.7	NW12	
17-Jul	NW6	NW2	NNW7	NNW9	N11	N11	N11	N12	N11	N11	N14	N14	N11	N11	NNW10	N11	N10	N10	N8	N7	N6	WNW2	W4	W3	N8.4	N14	
18-Jul	WNW5	WSW2	W1	SW1	S4	S5	S7	S6	S7	SSW5	SSW6	SSW6	SW7	SW8	SW7	W7	WSW7	WNW8	NW4	NW5	NW6	NNW10	NW7	WNW8	WSW3.5	NNW10	
19-Jul	WNW9	WNW8	WNW5	WNW5	WNW7	NW5	NW6	WNW5	WNW6	WNW8	WNW6	WNW9	NW12	NW12	NW12	NW10	NNW11	NNW11	NNW5	NNW2	NW1	WNW3	NW7	WNW3	NW6.7	NW12	
20-Jul	WNW3	W3	SSW1	S3	SSW3	S4	S4	S5	SE7	SE8	SSE9	SSE11	SSE12	SE9	SE6	SSE9	SSE9	S8	SSE5	SE4	N1	NNW2	NE1	NE4	SSE4.4	SSE12	
21-Jul	NNE4	N3	ENE2	SSE3	SE3	SE4	E2	NE3	N4	ENE3	ENE4	ESE4	SE1	WSW1	NW6	NNW7	NNW6	ENE5	E4	ENE3	N1	WNW3	WNW3	W3	NNE1.5	NNW7	
22-Jul	WNW3	WSW2	WSW3	W3	SW4	WSW1	SW3	W2	S1	WNW4	SW4	WSW3	SE7	S2	SSW7	WSW6	WNW10	WNW9	WNW9	WNW10	WNW6	WNW6	NW6	NNW3	W3.5	WNW10	
23-Jul	NW3	W3	W3	W3	W3	WNW4	WNW4	NW5	NNW5	NW7	NW6	NW5	NW5	WNW2	WNW4	NW7	WSW3	W2	SW3	W3	W3	W2	SSW2	W1	WNW3.2	NW7	
24-Jul	SSE1	WSW2	SSW3	SSW4	SW3	SW4	S5	S6	SSE6	SSE8	SE10	SSE10	SSE11	SSE10	SSE8	S11	W4	WSW4	SSW4	SSW2	SSW2	SSW3	S3	WSW1	S4.4	SSE11	
25-Jul	SW5	SSW5	S5	WSW6	WSW2	E1	S4	S5	S8	SW7	SW7	SSW7	SSW5	SW5	WNW8	WNW7	WSW5	WSW4	SSE6	SSW2	N5	NNW4	NNW6	NNW4	SW3.0	WNW8	
26-Jul	NNW6	NW4	NW5	NNW7	NNW4	NW1	NNW5	N4	E4	SSE2	SSE5	SSE10	W4	N8	NNW6	E5	NNW2	S4	SSE4	SSW3	S6	S6	SSW6	S6	W0.4	SSE10	
27-Jul	SSW3	SSW1	SSW3	S5	S6	SSW6	S7	S8	SSE9	S8	WSW7	SW9	WNW7	N5	SSW2	WNW3	SSW4	NW7	WNW2	S4	SSW5	SSW2	WSW4	NNW1	SSW3.3	SW9	
28-Jul	NW3	WSW1	SW2	WSW4	W1	NW3	SW0	SSE4	SSE4	SSE4	SE7	SE8	SE8	NNE3	SSE7	SSE6	NE5	NE4	WSW2	WNW3	NNW4	NNW3	N7	ESE1	SE1.0	SE8	
29-Jul	WNW5	WNW5	SW1	WSW3	ENE1	W1	WSW4	W5	SSW2	S3	S4	SSE7	SW7	WSW8	W6	WNW8	NNW10	N7	NW9	NW4	SW3	SSW3	SW5	WNW4	W2.9	NNW10	
30-Jul	W1	SSW2	NNW1	WSW4	W6	W6	W5	WSW5	WSW5	W6	SW6	NW8	WNW12	NW10	NNW9	NNE6	ENE5	ENE4	NE7	E4	SW2	W4	WSW2	NW3	WNW2.6	WNW12	
31-Jul	SW2	WSW3	SW3	NW1	SW4	SSW2	S5	SSE6	SSE7	SSE9	SE9	SE8	SSE9	S8	W7	ESE5	SSE4	N4	WNW2	NW3	W3	WNW3	W4	NW4	S2.4	SSE9	

NW2.9	WNW1.9	W1.7	W2.2	W1.8	WSW1.6	WSW1.7	SW1.7	SSW2.1	SSW2.3	SSW2.1	SSW2.6	SW2.6	W2.1	W2.7	W1.8	WNW1.7	NW1.9	NW1.7	NW2.3	NW2.6	NW2.5	WNW2.7	NW2.7	Diurnal Average	
NW10	N9	NNW7	NNW9	N11	N11	N11	N12	S12	W14	N14	NW14	NW16	NNW17	NW18	NW15	NNE12	NNE15	N11	N13	NW12	N12	N10	N10	Diurnal Maximum	

C - Calibration      AF - Analyzer Failure  
 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 - July 2015**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	397	56.96	56.96
6 - 11	266	38.16	95.12
12 - 19	34	4.88	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: 697

Total Number of Hours: 744



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

**Wind Speed (WS) - km/h**  
**Fort McKay - Bertha Ganter - July 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	26	11	9	16	8	7	7	16	26	48	40	48	36	40	37	22	397
6 - 11	39	5	2	0	0	2	14	23	33	27	15	13	13	24	34	22	266
12 - 19	6	2	0	0	0	0	0	2	5	1	0	2	1	1	11	3	34
20 - 28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	71	18	11	16	8	9	21	41	64	76	55	63	50	65	82	47	697

Total Number of Valid Hours: 697

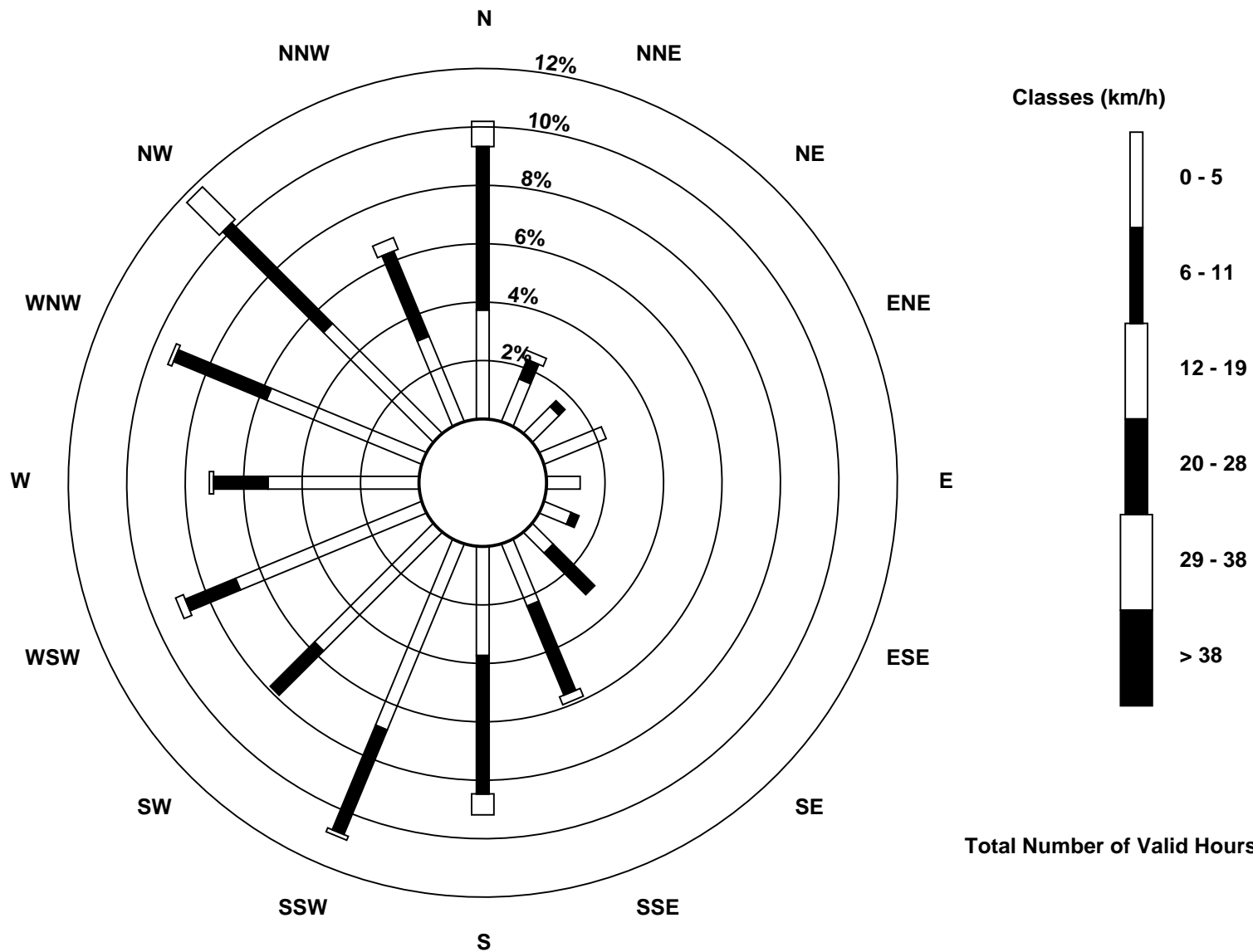
Total Number of Hours: 744





Wood Buffalo Environmental Association  
Wind Rose Jul 2015

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





Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 7 km/h on Jul 8 20:00 Minimum Value: 1 km/h on Jul 23 22:00 Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 O <sub>1</sub> = 1 Median = 2 O <sub>3</sub> = 3 P <sub>90</sub> = 4 P <sub>99</sub> = 6																	Hours in Service: 744 Hours of Data: 697 Hours of Missing Data: 47 Hours of Calibration: 3 Percent Operational Time: 94.1									
Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	2	1	1	2	2	1	1	1	1	2	1	2	2	2	2	2	2	2	2	1	2	1	1	2	2	
2-Jul	1	1	1	1	1	1	1	1	2	2	2	3	3	3	4	4	2	1	2	1	1	1	1	2	4	
3-Jul	2	1	1	1	1	1	2	4	5	6	6	5	6	6	6	5	5	4	3	1	1	1	2	6		
4-Jul	2	2	2	2	2	3	2	2	2	1	2	3	2	1	2	1	2	1	2	2	5	4	3	4	5	
5-Jul	3	3	2	1	1	1	2	2	2	3	4	3	4	4	3	3	2	2	1	1	1	1	1	4		
6-Jul	1	1	1	1	1	1	2	2	2	3	4	5	5	5	5	6	5	6	4	5	3	2	2	2	6	
7-Jul	1	1	2	2	1	1	2	2	2	2	2	3	3	3	3	3	3	3	3	2	1	1	1	1	3	
8-Jul	2	1	1	1	1	2	1	2	3	3	3	3	2	2	2	4	3	2	4	7	4	2	3	3	7	
9-Jul	4	2	3	1	1	1	1	2	2	2	2	2	1	2	2	1	2	2	4	4	3	3	2	2	4	
10-Jul	2	2	2	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	2	
11-Jul	1	2	1	1	1	1	2	1	1	2	3	3	3	3	3	AF	AF	AF	AF	AF	AF	AF	AF	AF	3	
12-Jul	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-Jul	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	C	C	C	3	2	2	2	2	1	2	1	1	2	3	
14-Jul	1	1	1	1	1	1	2	1	1	1	2	3	3	3	7	2	2	2	3	2	2	1	3	2	1	7
15-Jul	1	1	1	1	1	1	1	1	2	3	3	3	5	3	3	4	5	3	3	2	1	1	1	2	5	
16-Jul	1	1	2	1	1	1	1	1	2	2	3	3	4	4	4	4	6	3	4	4	4	4	2	2	6	
17-Jul	4	2	2	2	4	4	4	5	4	4	5	6	5	4	4	4	4	4	3	3	2	1	1	1	6	
18-Jul	1	1	1	1	1	1	2	1	2	2	2	2	3	3	3	3	3	4	2	2	2	4	3	2	4	
19-Jul	2	2	1	1	2	2	2	2	2	3	2	3	4	5	4	3	4	5	5	1	1	1	2	1	5	
20-Jul	1	1	1	1	1	1	1	1	2	2	3	3	3	3	2	3	2	3	2	1	1	1	1	1	3	
21-Jul	1	1	1	1	1	2	1	1	1	1	1	1	1	2	2	3	3	2	2	1	1	1	1	1	3	
22-Jul	1	1	1	1	1	1	1	1	1	2	2	2	3	3	3	3	4	3	3	4	2	2	2	1	4	
23-Jul	1	1	1	1	1	2	1	1	2	3	2	2	2	2	2	2	2	1	1	1	1	1	1	1	3	
24-Jul	1	1	1	1	1	1	2	2	1	2	2	3	3	3	3	3	2	2	2	1	1	1	1	1	3	
25-Jul	2	2	2	3	2	1	2	2	2	2	3	4	3	3	5	3	2	2	1	1	2	1	1	2	5	
26-Jul	1	2	2	2	2	1	1	2	2	2	2	4	4	4	4	3	5	2	1	1	1	1	1	1	5	
27-Jul	1	2	1	2	1	2	1	2	2	3	3	4	5	3	3	2	2	5	3	1	1	1	1	1	5	
28-Jul	1	1	1	1	1	1	1	1	1	2	2	2	3	2	2	3	3	2	2	2	2	2	4	2	4	
29-Jul	2	2	1	1	1	1	1	2	1	1	2	2	3	3	3	4	3	3	6	4	1	1	2	1	6	
30-Jul	1	1	1	1	2	2	2	2	2	2	3	4	5	4	4	3	2	4	3	2	1	1	1	2	5	
31-Jul	1	1	1	1	1	1	1	1	2	2	2	2	2	4	4	2	1	2	1	1	1	1	1	2	4	
																	Diurnal Maximum									
																	4 3 3 3 4 4 4 5 5 6 6 6 6 7 6 6 6 6 6 7 5 4 4 4									
C - Calibration AF - Analyzer Failure																										



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Fort McKay - Bertha Ganter - July 2015

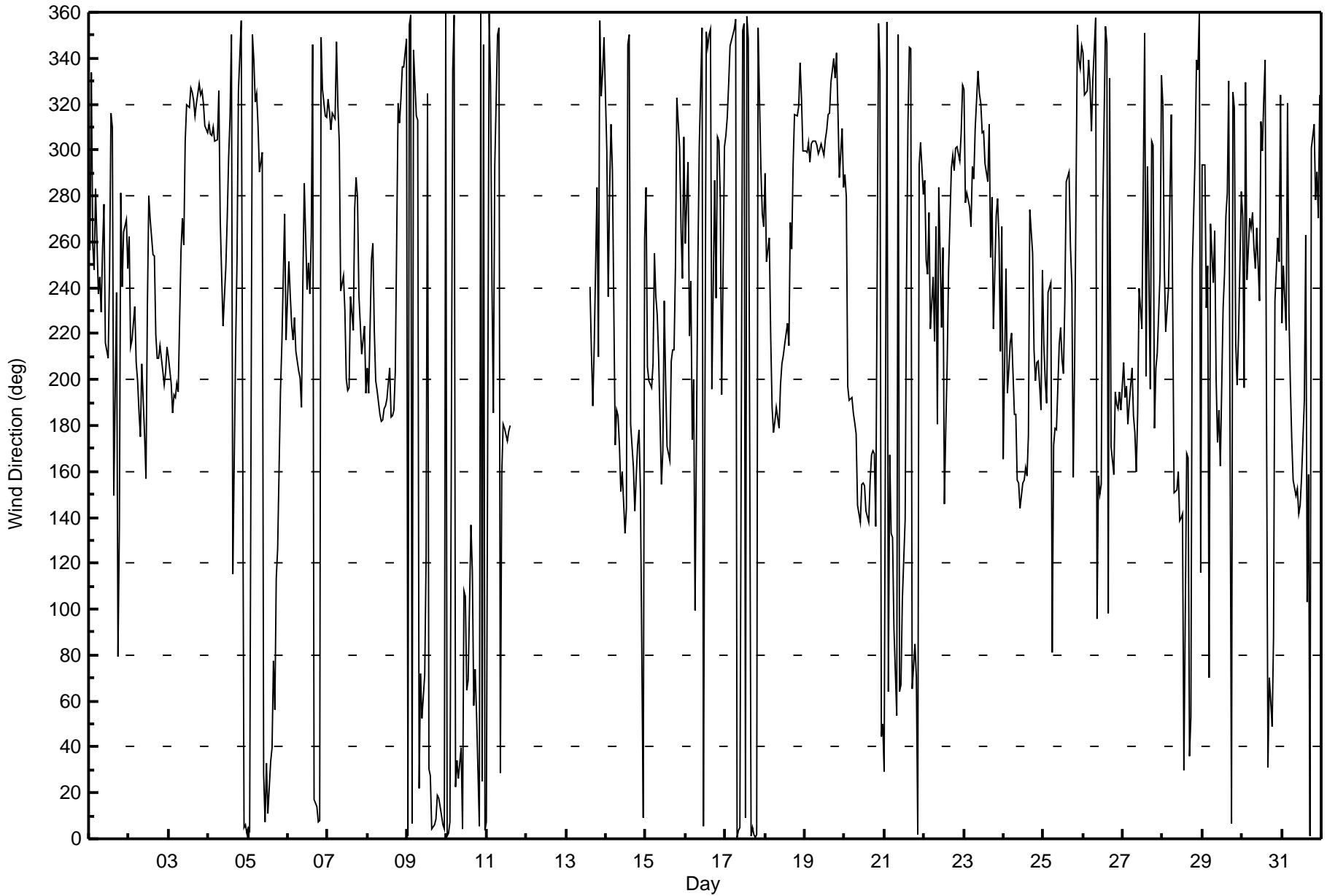
Direction of Maximum Speed: 325 deg on Jul 3 15:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 352.5 deg on Jul 17	Hours of Data: 697
Direction of Minimum Speed: 152 deg on Jul 14 22:00	Direction of Minimum Daily Speed Average: 0.4 deg on Jul 26
Direction of Minimum Speed: 152 deg on Jul 14 22:00	Hours of Missing Data: 47
Monthly Average Direction: 273.5 deg	Percent Operational Time: 94.1

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-Jul	256	334	259	248	283	238	244	229	257	277	216	209	247	316	310	150	238	79	136	282	241	265	270	248	256.6
2-Jul	262	214	217	232	207	199	186	175	207	176	157	232	280	270	254	254	219	209	209	215	204	198	203	214	218.1
3-Jul	210	198	185	193	192	198	194	256	270	259	304	320	318	327	325	322	315	320	329	324	326	320	311	307	298.1
4-Jul	311	307	306	310	304	305	326	270	246	223	249	271	297	314	351	115	214	252	326	341	356	5	6	2	318.1
5-Jul	5	3	350	339	321	325	310	290	299	28	7	33	11	33	40	77	56	114	126	195	216	244	272	218	3.3
6-Jul	252	237	224	217	227	212	204	201	188	243	286	239	251	238	262	346	17	14	7	8	349	327	315	314	291.4
7-Jul	322	317	309	316	314	347	319	303	238	245	230	200	196	197	236	221	275	288	279	237	211	217	223	194	246.9
8-Jul	205	194	253	259	222	200	195	185	182	183	187	188	192	205	184	184	187	204	320	312	322	336	336	348	215.5
9-Jul	1	354	359	7	343	315	313	22	72	53	72	123	325	31	27	4	6	9	19	18	14	6	4	360	10.1
10-Jul	1	3	7	335	359	23	34	26	40	5	108	106	64	69	137	117	58	74	54	5	359	25	346	4	37.5
11-Jul	7	360	328	242	185	293	350	353	29	159	181	179	174	178	180	AF	AF	AF	AF	AF	AF	AF	AF	AF	--
12-Jul	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-Jul	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-Jul	300	236	282	311	291	171	187	184	172	151	160	133	144	346	350	181	162	143	158	172	178	152	9	261	167.7
15-Jul	283	205	200	196	207	255	236	228	210	154	169	234	199	171	165	208	213	213	249	323	301	265	244	306	209.7
16-Jul	259	295	219	243	174	200	100	250	301	328	353	5	351	345	351	353	196	287	236	306	304	280	193	301	312.0
17-Jul	307	314	329	345	350	353	357	1	3	5	352	355	9	358	348	1	5	2	1	2	354	292	272	266	352.5
18-Jul	290	251	262	219	188	177	182	188	179	198	207	211	215	225	215	268	257	293	316	315	319	338	322	299	248.5
19-Jul	300	299	303	295	303	304	304	302	299	300	303	298	305	309	316	316	330	340	331	342	317	288	309	284	309.2
20-Jul	289	279	197	191	192	186	181	176	145	138	154	155	154	143	138	156	167	169	168	136	355	334	44	50	157.9
21-Jul	29	356	64	167	133	131	92	54	350	64	67	104	139	247	312	345	344	66	85	70	2	293	303	280	30.0
22-Jul	287	252	246	272	222	245	217	267	181	283	223	257	146	179	207	248	292	298	291	301	301	295	307	329	270.6
23-Jul	326	277	281	275	266	293	287	309	334	325	320	307	308	294	286	311	253	279	222	271	279	260	212	267	294.7
24-Jul	165	248	194	204	216	220	185	185	156	155	144	155	156	162	158	175	274	255	213	199	207	208	187	248	178.4
25-Jul	216	200	190	238	242	81	171	179	178	215	223	209	203	234	286	290	258	242	157	208	355	339	335	345	230.1
26-Jul	342	324	326	339	328	308	331	357	96	158	150	155	270	354	346	98	331	171	158	195	189	188	195	187	261.2
27-Jul	207	192	197	181	190	205	184	177	160	186	240	222	285	351	201	293	196	304	302	179	205	212	247	333	213.6
28-Jul	320	250	221	240	279	316	233	151	152	160	138	139	142	30	168	166	36	53	249	298	339	335	359	116	141.9
29-Jul	293	293	231	250	70	268	242	265	201	173	186	162	231	246	272	282	330	7	325	318	216	198	219	282	268.5
30-Jul	271	196	330	243	271	266	273	257	248	266	234	313	300	321	339	31	70	60	49	88	234	262	251	324	299.5
31-Jul	225	250	222	320	230	198	174	156	149	153	141	145	158	191	263	103	159	1	301	311	278	291	270	324	184.1

304.9 289.4 271.2 267.6 261.1 257.4 238.7 226.9 196.4 210.1 202.6 204.8 228.3 268.6 269.5 274.5 287.6 321.4 310.6 313.6 306.7 305.4 302.3 310.7

Diurnal Average

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





Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 103 deg on Jul 10 14:00	Hours of Data: 697
Minimum Value: 9 deg on Jul 17 23:00	Hours of Missing Data: 47
Percentiles: P <sub>1</sub> = 12 P <sub>10</sub> = 18 Q <sub>1</sub> = 23 Median = 35 Q <sub>3</sub> = 53 P <sub>90</sub> = 70 P <sub>99</sub> = 95	Hours of Calibration: 3
	Percent Operational Time: 94.1

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jul	51	78	89	48	59	53	48	44	57	51	54	38	58	67	45	76	100	53	71	57	21	11	41	74	100
2-Jul	82	24	14	13	15	12	11	19	38	21	20	52	55	50	48	46	32	29	23	18	16	15	13	20	82
3-Jul	16	16	12	12	12	25	18	56	54	46	43	29	28	27	24	23	27	24	22	15	14	11	15	16	56
4-Jul	17	16	26	23	29	39	47	51	40	31	54	52	46	40	65	62	20	65	34	24	26	30	29	27	65
5-Jul	29	26	19	12	18	23	41	51	64	89	38	55	54	73	81	81	58	40	44	18	13	30	33	24	89
6-Jul	17	26	13	19	19	20	19	21	29	44	48	44	51	50	55	29	35	35	32	29	25	19	15	19	55
7-Jul	26	44	19	23	56	83	31	59	68	36	47	29	21	26	52	34	52	47	48	42	13	18	20	11	83
8-Jul	24	15	27	16	47	30	16	19	16	16	17	16	16	19	14	15	21	38	27	29	24	18	21	22	47
9-Jul	27	22	33	26	30	20	38	62	55	61	67	99	37	58	62	24	27	27	34	31	35	29	27	23	99
10-Jul	26	30	66	81	35	50	49	48	62	52	50	58	76	103	67	74	66	67	61	33	22	29	27	42	103
11-Jul	18	48	54	35	25	95	36	20	34	68	18	19	18	22	22	AF	AF	AF	AF	AF	AF	AF	AF	AF	95
12-Jul	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-Jul	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	C	C	C	52	42	27	58	44	26	63	24	19	37	63
14-Jul	61	38	53	67	55	70	31	23	28	41	48	57	27	87	77	25	71	21	22	16	13	98	43	78	98
15-Jul	42	22	24	19	41	59	55	55	53	34	43	49	32	21	20	39	45	36	46	23	34	24	28	36	59
16-Jul	33	80	61	78	75	58	84	95	90	34	40	35	33	31	33	30	89	36	55	28	17	84	27	18	95
17-Jul	44	93	14	22	24	28	30	33	35	39	34	31	43	39	36	34	34	35	36	35	26	48	9	40	93
18-Jul	19	58	63	85	18	16	16	20	17	32	49	29	39	37	34	46	46	32	39	41	18	28	27	17	85
19-Jul	16	18	18	19	17	15	21	25	36	25	24	26	27	32	29	28	26	39	68	47	85	20	14	29	85
20-Jul	17	41	81	16	17	20	24	18	19	18	29	22	21	22	29	23	23	24	28	20	69	31	66	20	81
21-Jul	20	20	65	33	46	25	65	47	41	44	43	35	84	85	47	39	48	52	40	30	73	31	36	23	85
22-Jul	14	46	32	24	20	69	36	79	89	59	62	92	62	87	43	56	36	32	34	21	22	19	38	44	92
23-Jul	37	50	32	53	40	25	30	26	23	25	28	49	59	95	65	32	54	39	40	38	21	25	35	57	95
24-Jul	83	34	21	28	22	30	25	27	25	23	20	24	26	30	41	27	55	65	31	28	21	16	20	73	83
25-Jul	34	26	31	52	85	95	36	22	25	39	54	44	51	59	52	43	56	65	18	68	22	18	19	56	95
26-Jul	24	17	16	18	19	73	20	40	51	94	78	38	72	46	61	91	95	53	37	27	12	15	17	20	95
27-Jul	30	85	41	19	21	19	18	16	20	40	53	48	67	55	91	77	56	56	85	45	23	43	25	78	91
28-Jul	51	79	63	29	66	67	94	36	34	50	17	20	35	67	36	36	60	71	90	48	39	58	50	84	94
29-Jul	27	19	74	36	73	66	44	46	55	50	57	37	52	49	53	47	30	32	42	71	46	36	33	35	74
30-Jul	97	37	87	44	37	44	61	57	49	47	54	44	37	39	53	54	51	55	45	35	59	29	59	43	97
31-Jul	58	20	35	69	15	43	19	16	22	18	16	17	25	41	51	41	46	35	74	31	32	25	31	33	74
	97	93	89	85	85	95	94	95	90	94	78	99	84	103	91	91	100	71	90	71	85	98	66	84	
	Diurnal Maximum																								

C - Calibration      AF - Analyzer Failure



# Wood Buffalo Environmental Association

## SO2 Calibration Report

### Station Information

Calibration Date	July 7, 2015	Last Calibration	June 17, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	Routine		
Start Time (MST)	9:00	End Time (MST)	12:03
Gas Cert Reference	SA140071A	Station temp.	21 Deg C
Cal Gas Concentration	50 ppm	Cal Gas Exp Date	26-Sep-17
Calibrator Make/Model	Sabio 4010	Serial Number	1730512
ZAG Make/Model	API 701	Serial Number	587
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2582

### Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		PMT voltage	-614	-614
Analyzer IP address	192.168.1.43		Lamp voltage	818	819
Calculated slope	0.997312	0.991630	Chamber temp	45.3	45.1
Calculated intercept	1.769132	2.126419	Pressure	726.4	715.2
Analyzer Background	12.7	11.8	Flow	0.524	0.518
Analyzer Coefficient	0.985	1.002	Intensity	91	90

Analyzer make Thermo 43i      Analyzer serial # JC1501301448

### Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5500	0.0	0.0	-1.3	----
as found span	5500	78.1	710.0	700.3	1.014
calibrator zero	5500	0.0	0.0	0.1	----
high point	5500	78.1	710.0	715.5	0.992
second point	5500	43.8	398.2	397.3	1.002
third point	5500	21.9	199.1	196.9	1.011
as left zero	5500	0.0	0.0	0.3	----
as left span	5500	78.1	710.0	714.0	0.994
Average Correction Factor					1.002

Corrected As found    701.6      Previous response    710.1      % change    1.2%

**Notes:**

Replaced inlet filter after as founds. Adjusted zero and span.

Calibration Performed By:

Michael Martineau



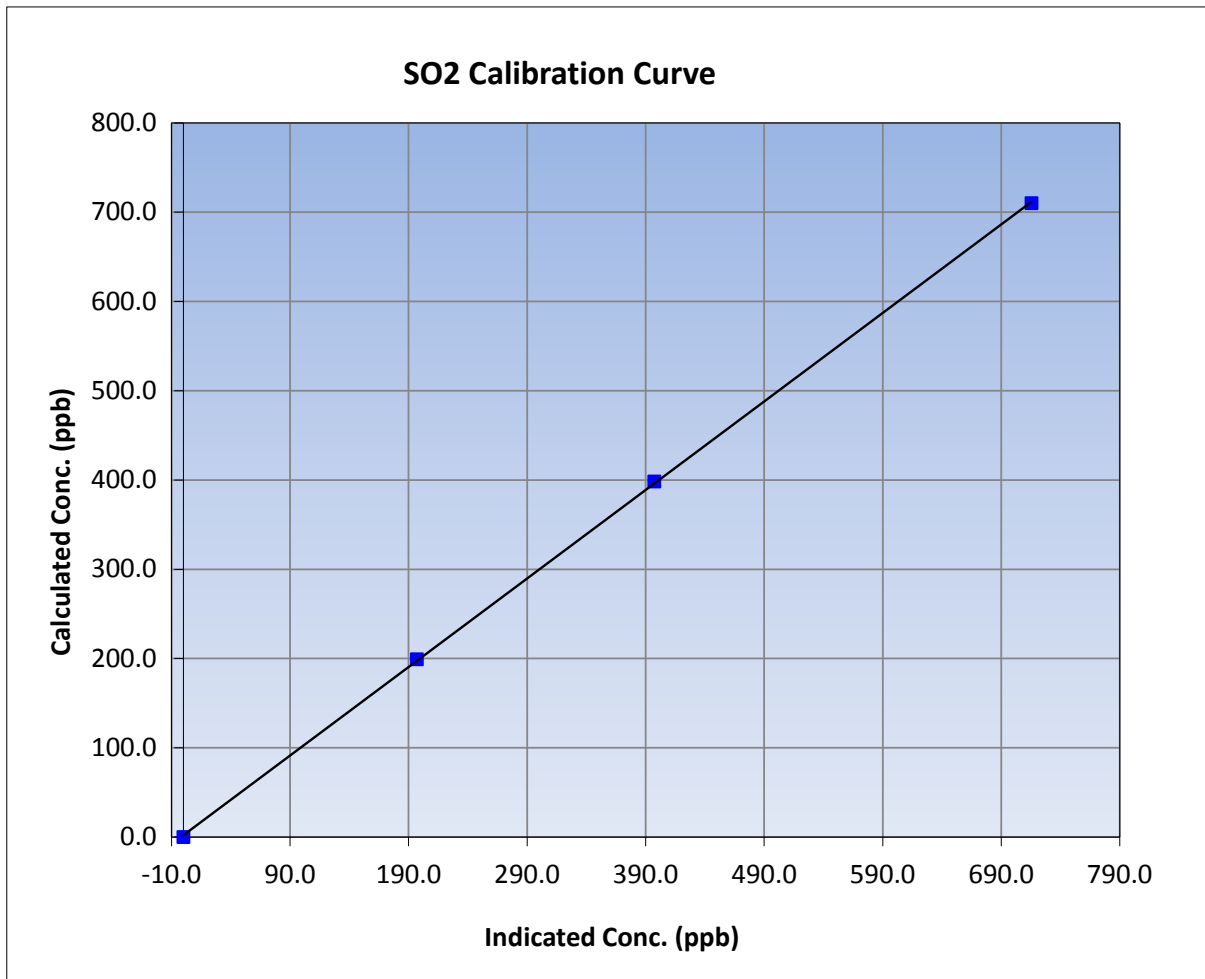
## Wood Buffalo Environmental Association SO2 Calibration Report

### Station Information

Calibration Date	July 7, 2015	Previous Calibration	June 17, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:00	End Time (MST)	12:03
Analyzer make	Thermo 43i	Analyzer serial #	JC1501301448

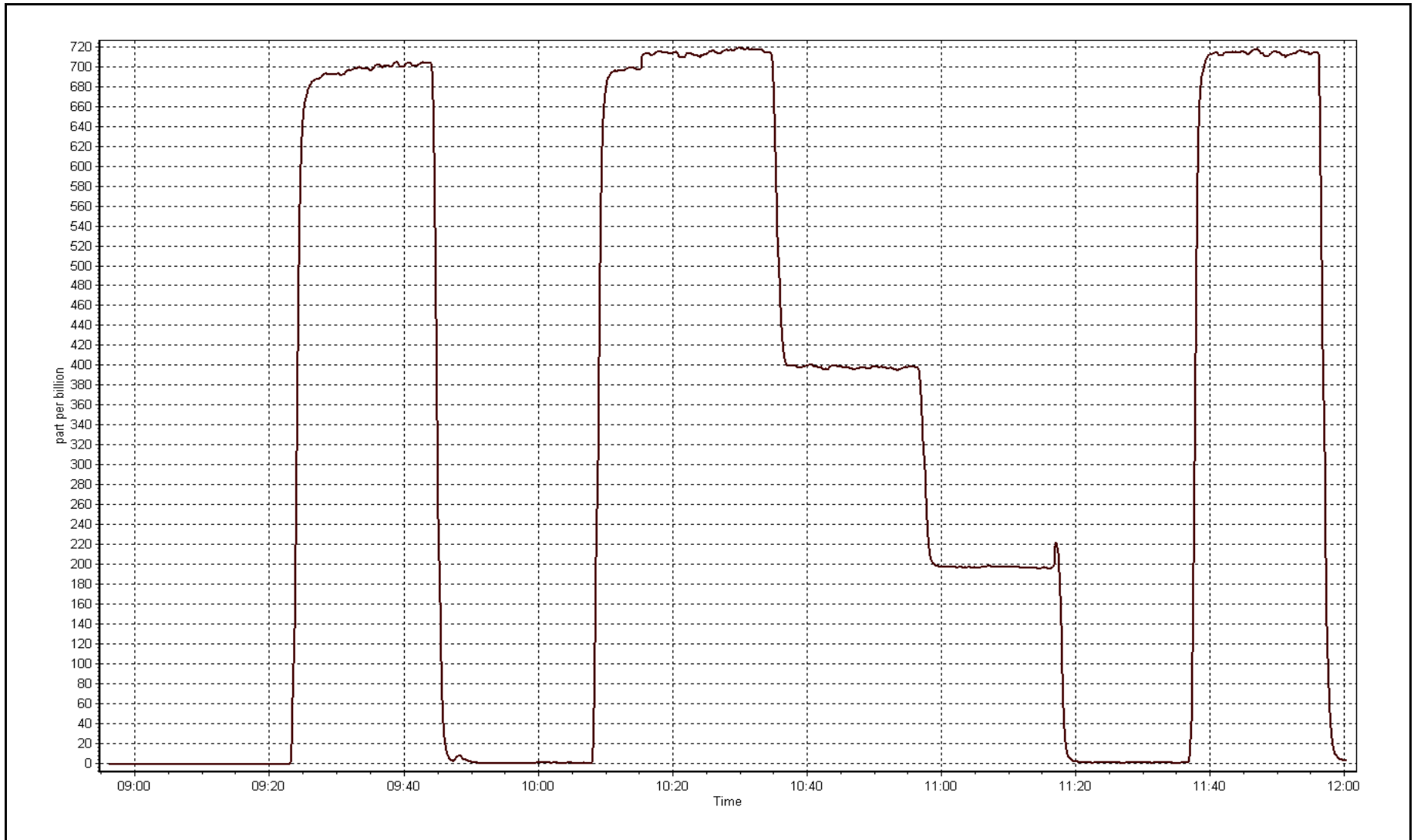
### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	0.999946
710.0	715.5	0.9923		
398.2	397.3	1.0022	Slope	0.991630
199.1	196.9	1.0113		
			Intercept	2.126419



SO2 Calibration Plot

Date: July 7, 2015







# Wood Buffalo Environmental Association

## TRS Calibration Report

### Station Information

Calibration Date	July 9, 2015	Last Calibration	June 18, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	Routine		
Start Time (MST)	11:45	End Time (MST)	14:45
Gas Cert Reference	LL27480	Station temp.	21 Deg C
Cal Gas Concentration	10.6 ppm	Cal Gas Exp Date	41264
Calibrator Make/Model	SABIO 4010	Serial Number	1730512
Dil air Make/Model	API 701	Serial Number	587
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2582
SO2 gas concentration	50 ppm	SO2 gas cert/exp	SA140071A September-26-17

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-860	-860
Analyzer IP address	192.168.1.42		Lamp voltage	1152	1144
Calculated slope	0.991793	0.998896	Chamber temp	45	45
Calculated intercept	0.153607	0.207305	Pressure	667.2	661.8
Analyzer Background	1.7	1.81	Flow	0.410	0.405
Analyzer Coefficient	1.006	1.006	Intensity	80	80
			Converter temp.	800	800

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

### Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6500	0.0	0.0	0.6	----
as found span	6500	46.0	75.0	74.2	1.011
SO2 scrubber check	5500	21.9	199.1	0.5	----
calibrator zero	6500	0.0	0.0	0.0	----
high point	6500	46.0	75.0	75.0	1.000
second point	6500	24.6	40.1	39.8	1.008
third point	6500	12.3	20.1	19.7	1.017
as left zero	6500	0.0	0.0	0.0	----
as left span	6500	46.0	75.0	76.1	0.985
Average Correction Factor					1.008

Corrected As found	73.7	Previous response	75.5	% change	2.5%
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Notes:

inlet filter changed after as founds. Adjusted zero.

Calibration Performed By: Michael Martineau



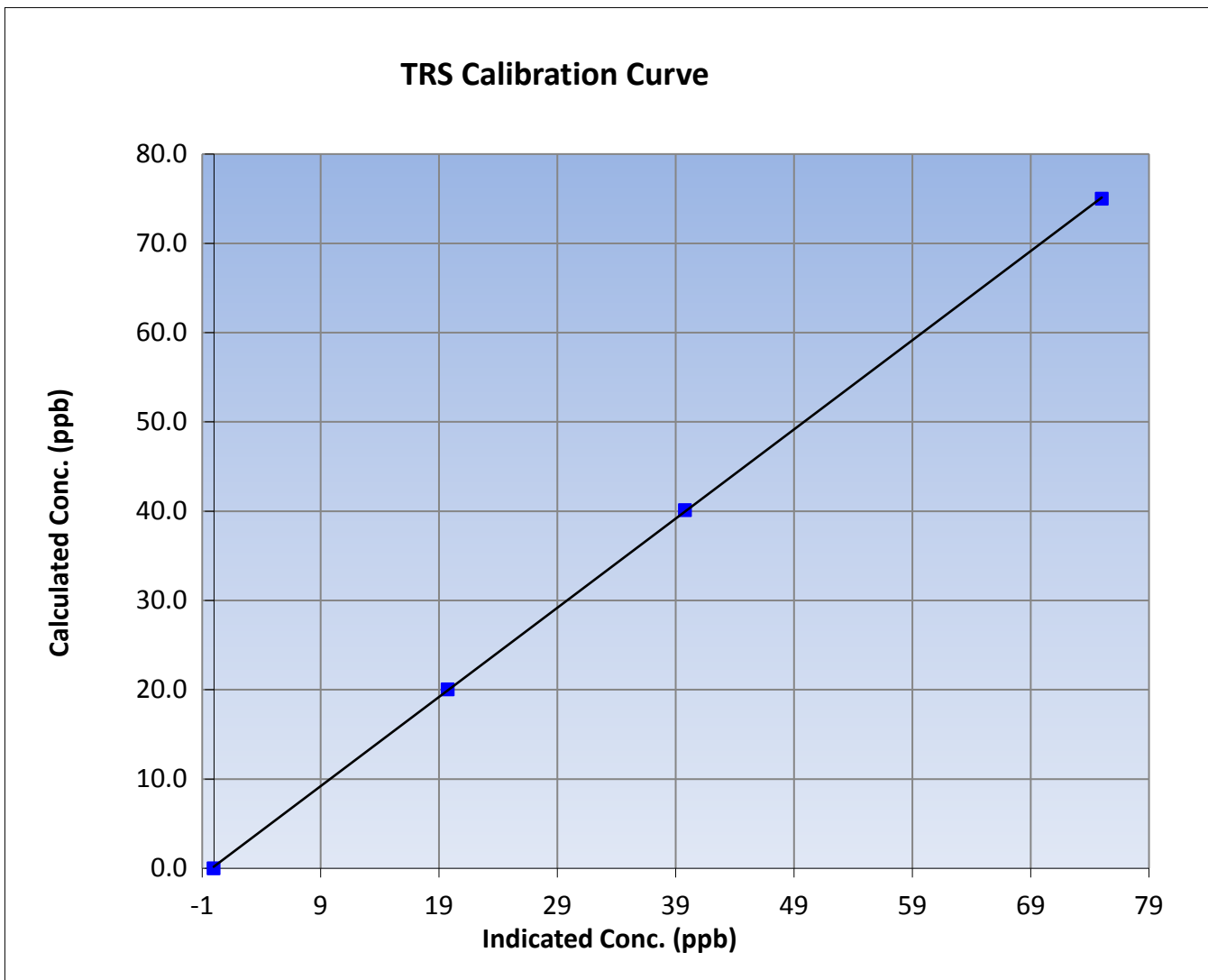
# Wood Buffalo Environmental Association TRS Calibration Report

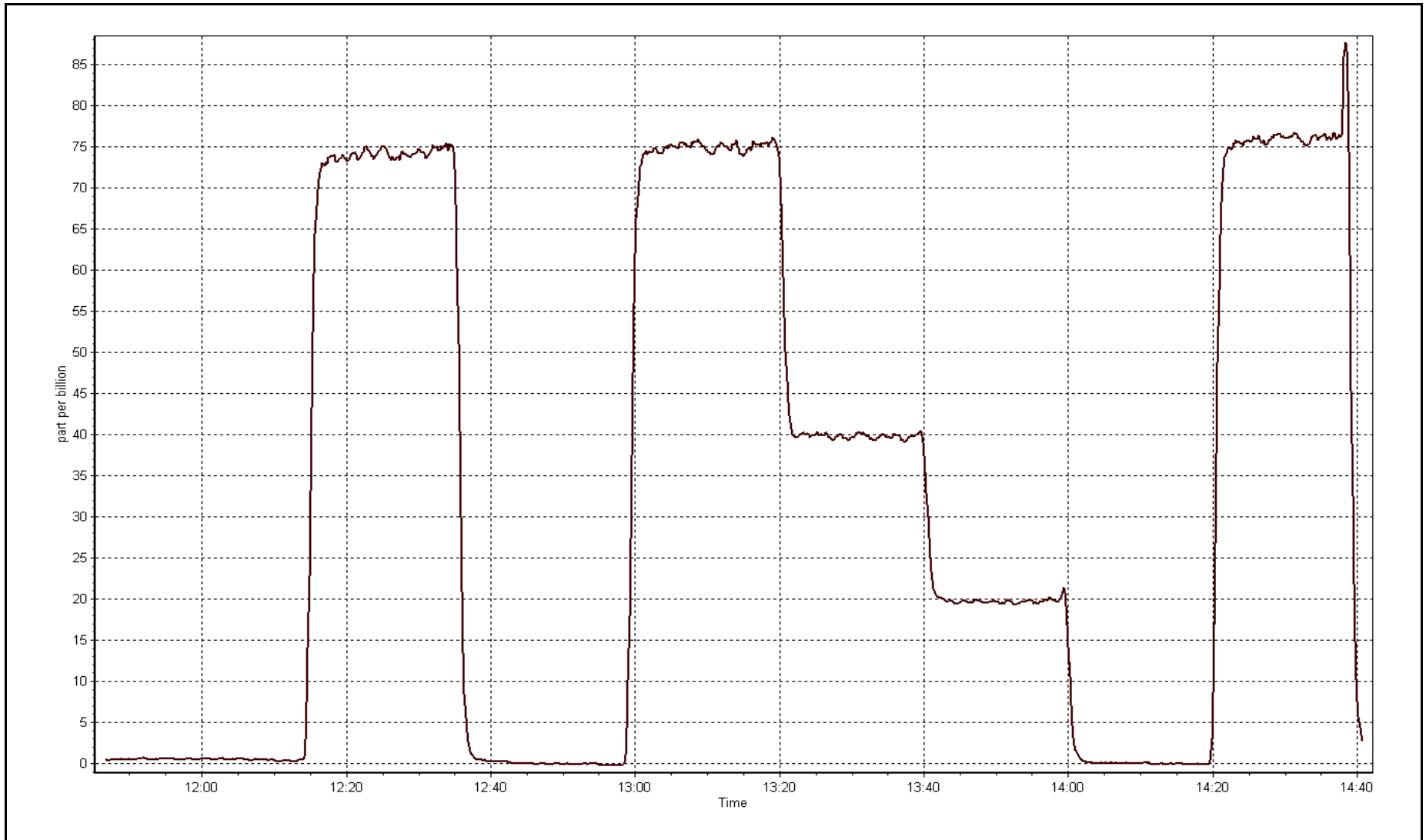
## Station Information

Calibration Date	July 9, 2015	Previous Calibration	June 18, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	11:45	End Time (MST)	14:45
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1218153461

## Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999971
75.0	75.0	1.0001		
40.1	39.8	1.0080	Slope	0.998896
20.1	19.7	1.0166		
			Intercept	0.207305







# Wood Buffalo Environmental Association THC / NMHC Calibration Report

## Station Information

Calibration Date	July-07-15	Last Calibration	June-16-15
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	Routine		
Start Time (MST)	9:00	End Time (MST)	12:03
Gas Cert Reference	SA140071A	Cal Gas Expiry Date	September-26-17
CH4 Cal Gas Conc.	499.0 ppm	CH4 Equiv Conc.	1054.5 ppm
C3H8 Cal Gas Conc.	202.0 ppm	Station temp.	20 Deg C
Calibrator Model	Sabio 4010	Serial Number	1730512
ZAG make/model	Teledyne API 701	Serial Number	587
DACS make/model	Campbell Scientific CR3000	Serial Number	2582

## Analyzer Information

	Before	After		Before	After
THC Range (ppm)	0 - 50 ppm		Column Temp	75.0	75.0
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	1.001668	0.999391	Carrier Pressure	40.4	40.4
THC Calc intercept	0.056213	0.056014	Fuel Pressure	42.2	42.2
NMHC Calc slope	1.002999	1.000242	Air Pressure	32.3	32.3
NMHC Calc intercept	0.020152	0.022577			

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	1.14	----
as found span	5500	78.1	14.97	8.39	1.785
calibrator zero	5500	0.0	0.00	0.00	----
high point	5500	78.1	14.97	14.97	1.000
second point	5500	43.8	8.40	8.29	1.013
third point	5500	21.9	4.20	4.10	1.023
as left zero	5500	0.0	0.00	0.00	----
as left span	5500	78.1	14.97	14.99	0.999
Average Correction Factor					1.012

Corrected As found 7.25 Previous response 14.89 % change 105.4%

**Notes:**

Replaced inlet filter 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	3.84	2.055
calibrator zero	5500	0.0	0.00	0.00	----
high point	5500	78.1	7.89	7.88	1.001
second point	5500	43.8	4.42	4.38	1.010
third point	5500	21.9	2.21	2.17	1.019
as left zero	5500	0.0	0.00	0.00	----
as left span	5500	78.1	7.89	7.90	0.998
Average Correction Factor					1.010

Corrected As found      3.84      Previous response      7.84      % change      104.3%

### CH4 Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5500	0	0.00	1.14	----
as found span	5500	78.1	7.09	4.55	1.557
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	3.91	1.016
third point	5500	21.9	1.99	1.93	1.032
as left zero	5500	0.0	0.00	0.00	----
as left span	5500	78.1	7.09	7.09	0.999
Average Correction Factor					1.016

Corrected As found      3.41      Previous response      7.05      % change      106.7%



# Wood Buffalo Environmental Association

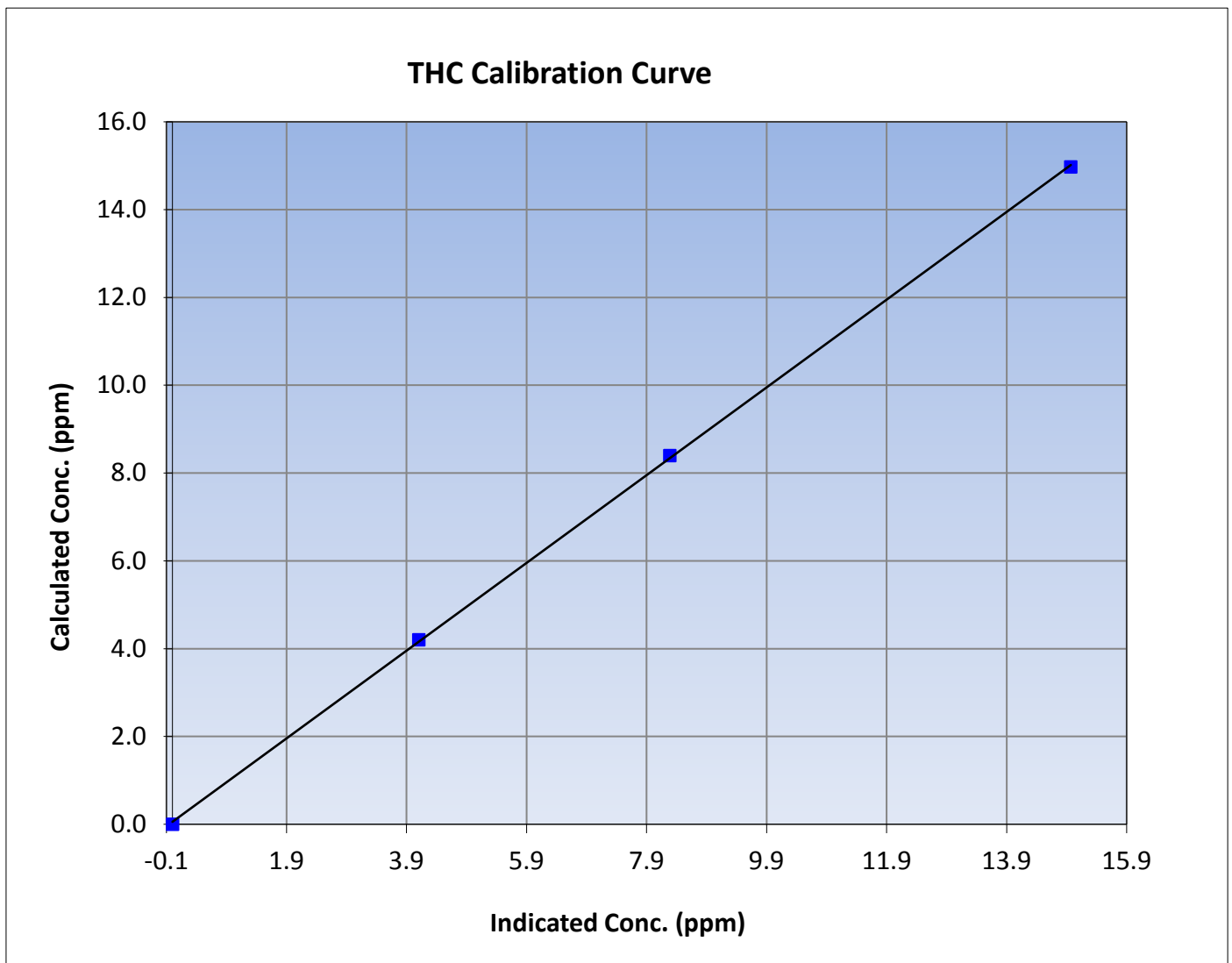
## THC Calibration Summary

### Station Information

Calibration Date	July 7, 2015	Previous Calibration	June 16, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:00	End Time (MST)	12:03
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	0.999918
14.97	14.97	1.0003		
8.40	8.29	1.0130	Slope	0.999391
4.20	4.10	1.0234		
			Intercept	0.056014





# Wood Buffalo Environmental Association

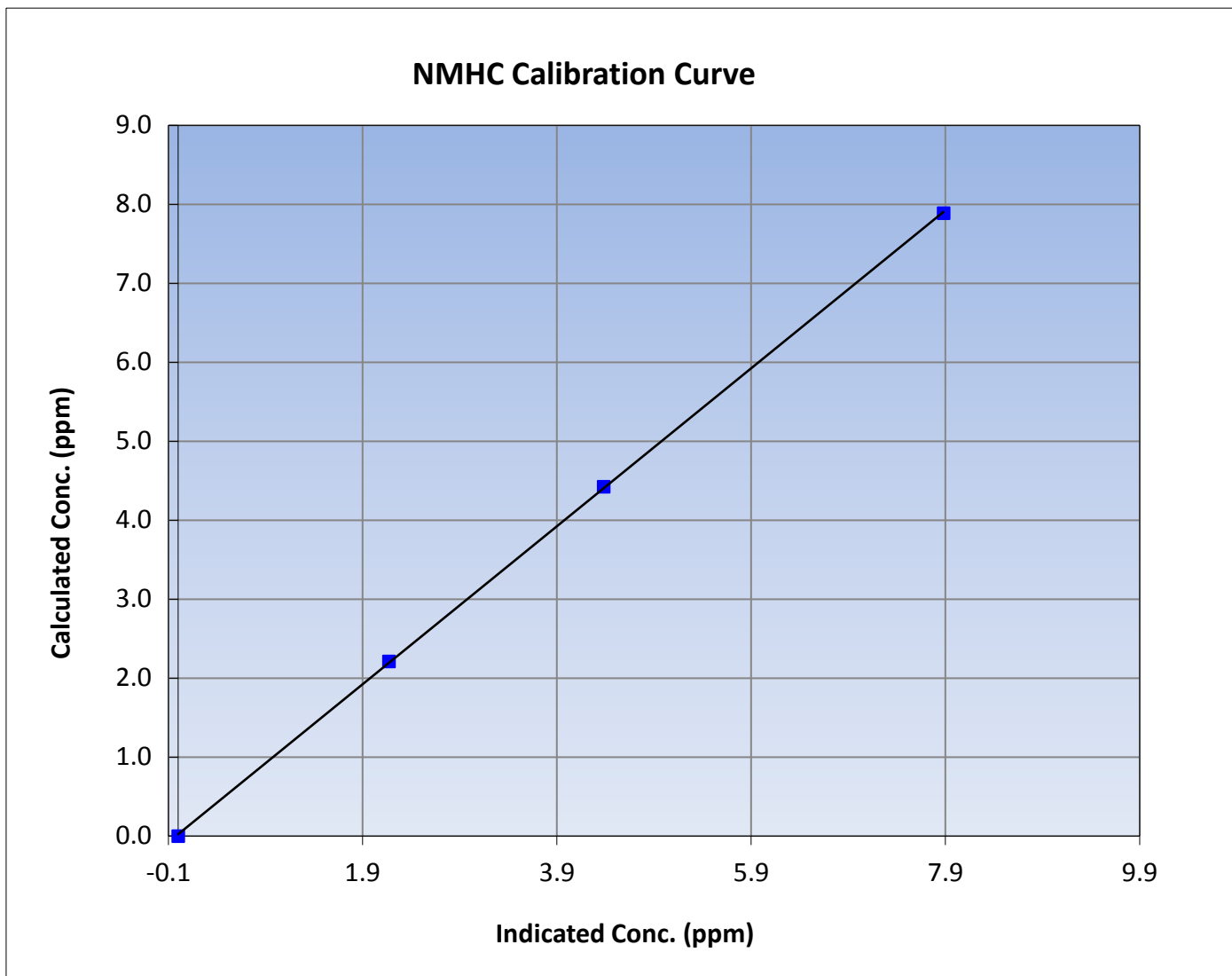
## NMHC Calibration Summary

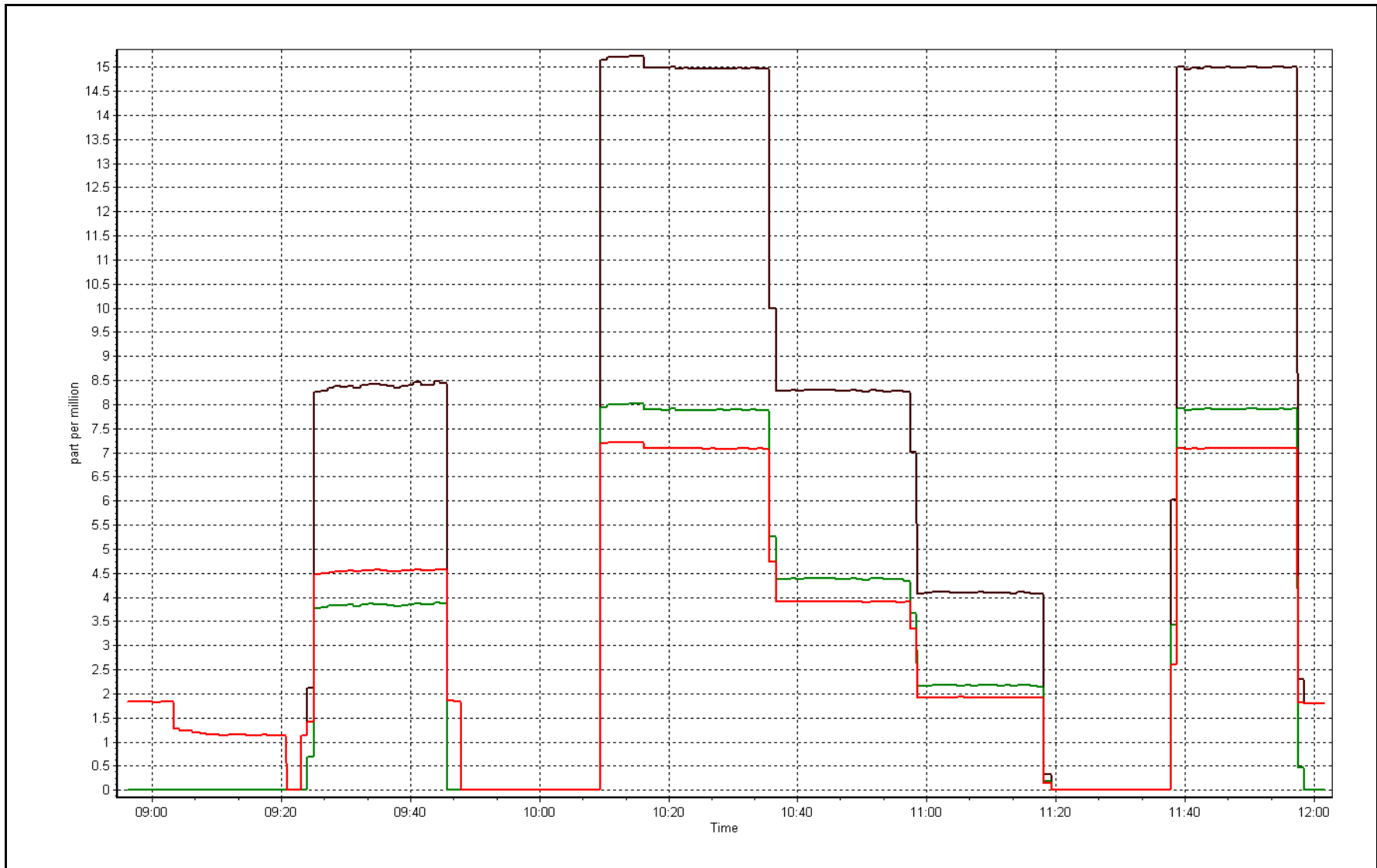
### Station Information

Calibration Date	July 7, 2015	Previous Calibration	June 16, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:00	End Time (MST)	12:03
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	0.999955
7.89	7.88	1.0010		
4.42	4.38	1.0100		
2.21	2.17	1.0193		
			Slope	1.000242
			Intercept	0.022577









# Wood Buffalo Environmental Association

## O<sub>3</sub> Calibration Report

### Station Information

Calibration Date	July 9, 2015	Previous Calibration	June 6, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	Routine		
Start Time (MST)	8:46	End Time (MST)	11:50
NO2 GPT Ref date	July-08-15	Transfer Standard	N/A
Calibrator Make/Model	SABIO 4010	Station temp.	21 Deg C
ZAG make/model	Teledyne API 701	Serial Number	1730512
DACS make/model	Campbell Scientific CR3000	Serial Number	587
		Serial Number	2582

### Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 500 ppb		Bench temp.	26.5	26.6
Analyzer IP address	192.168.1.48		Lamp temp.	53.5	53.6
Calculated slope	0.998152	1.001773	Pressure	681.5	655.5
Calculated intercept	-2.108262	0.493319	Flow cell A	0.736	0.718
Analyzer Background	-2.0	-2.4	Flow cell B	0.739	0.721
Analyzer Coefficient	1.050	0.982	Cell A Intensity	78050	76380
			Cell B Intensity	72920	71560
Analyzer make	Thermo 49i		Analyzer serial #	1300156233	

### Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator Lamp Intensity (mA)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.00	0.0	0.7	----
as found span	5500	0.98	393.2	409.8	0.959
calibrator zero	5500	0.00	0.0	0.6	----
high point	5000	0.98	393.2	392.8	1.001
second point	5000	0.56	206.6	204.6	1.010
third point	5000	0.34	106.5	105.0	1.014
as left zero	5500	0.00	0.0	1.2	----
as left span	5000	0.98	393.2	388.6	1.012
Average Correction Factor					1.008

Corrected As found	409.2	Previous response	396.0	% change	-3.2%
--------------------	-------	-------------------	-------	----------	-------

**Notes:**

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

Calibration Performed By:

Michael Martineau



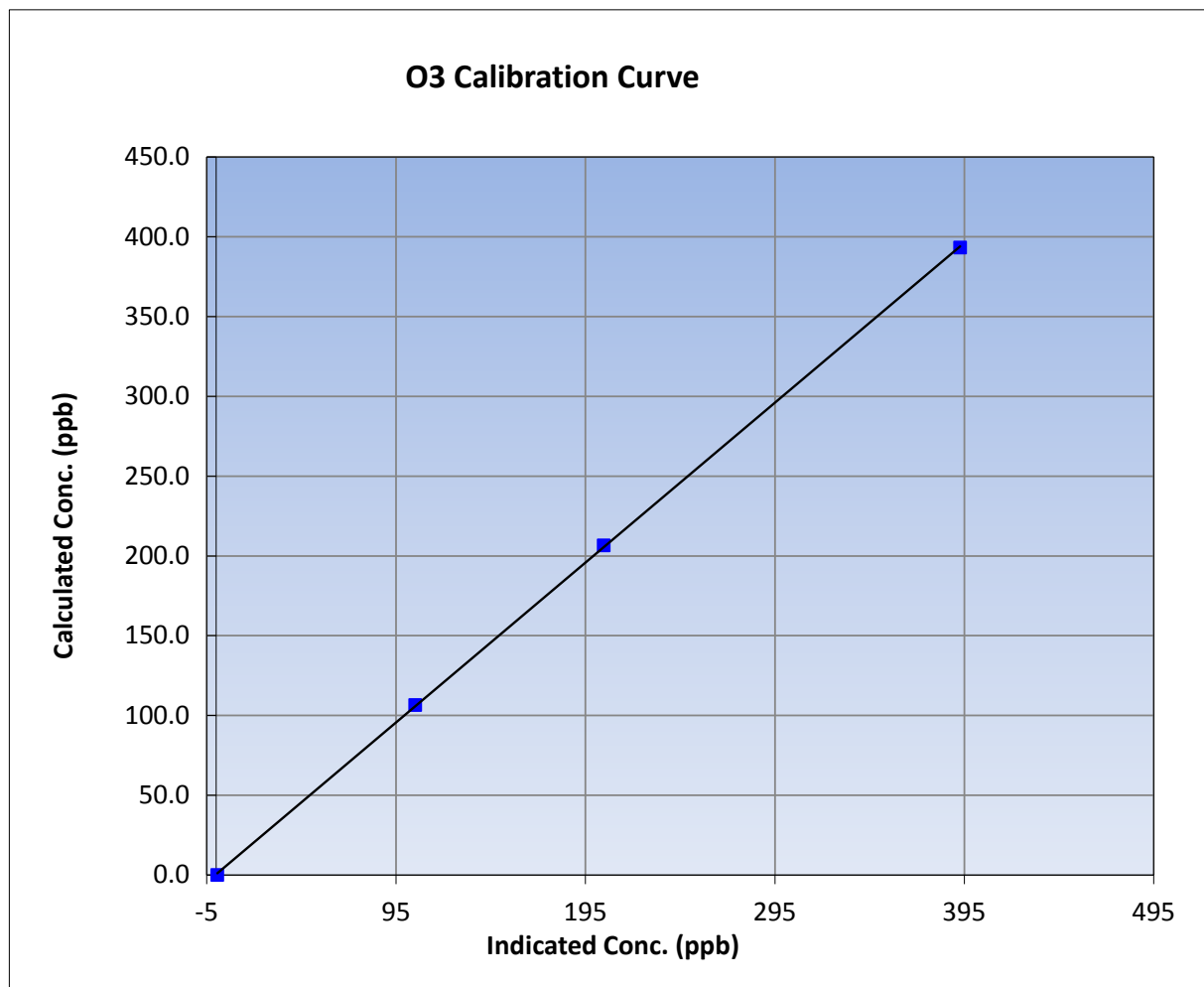
## Wood Buffalo Environmental Association O3 Calibration Report

### Station Information

Calibration Date	July-09-15	Previous Calibration	June 6, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	8:46	End Time (MST)	11:50
Analyzer make	Thermo 49i	Analyzer serial #	1300156233

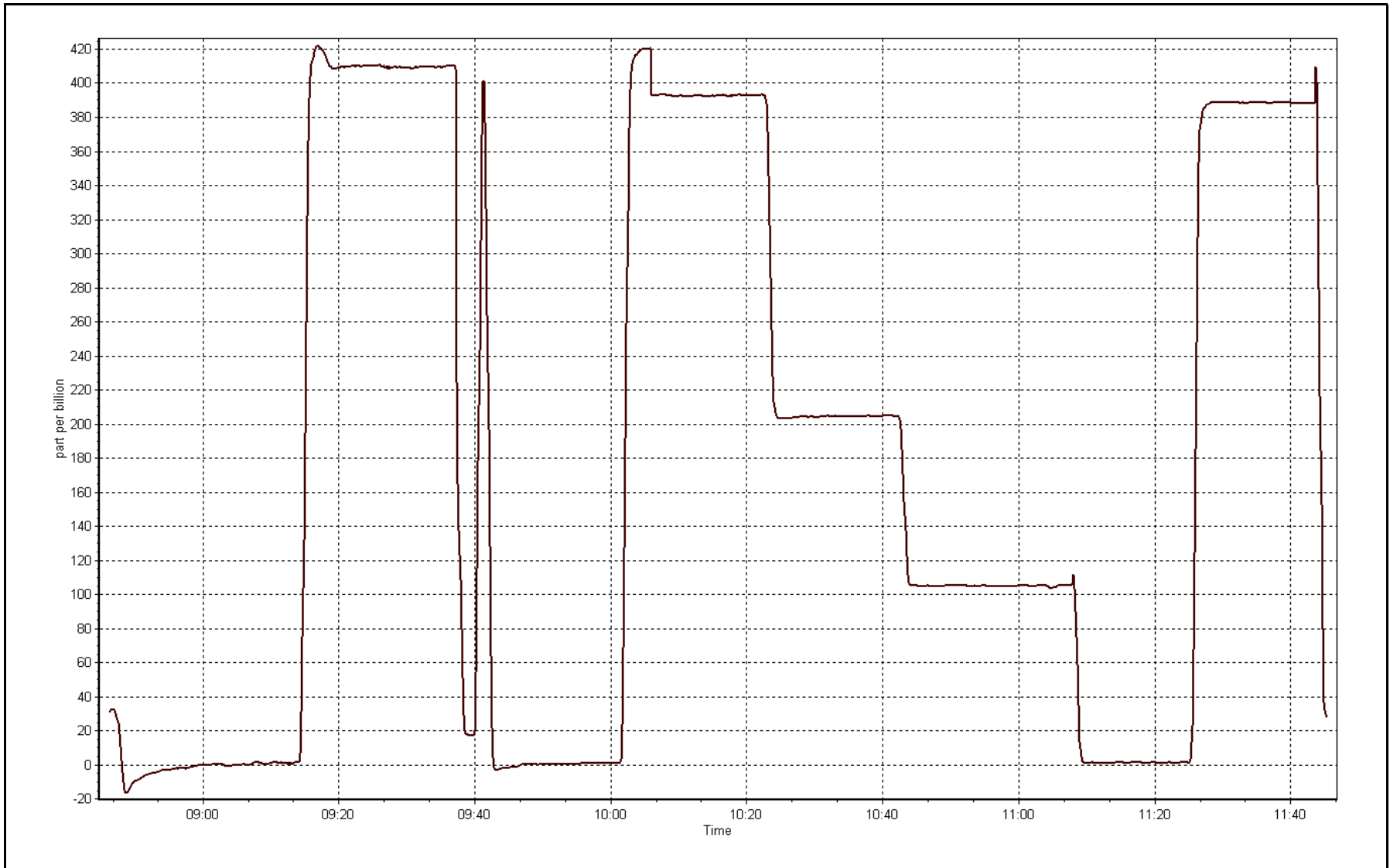
### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.6	----	Correlation Coefficient	0.999956
393.2	392.8	1.0010		
206.6	204.6	1.0096	Slope	1.001773
106.5	105.0	1.0140		
			Intercept	0.493319



O3 Calibration Plot

Date: July 9, 2015





## Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

### Station Information

Calibration Date	July 8, 2015	Previous Calibration	June 16, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	Routine		
Start Time (MST)	8:55	End Time (MST)	13:55
NO Cal Gas Conc	52.8 ppm	Gas Cert Reference	SA140071A
NOx Cal Gas Conc	52.8 ppm	Cal Gas Expiry Date	September 26, 2017
Calibrator	Sabio 4010	Serial Number	1730512
Zero air Generator	Teledyne API T701	Serial Number	587

### DACS Information

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

### Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.999528	0.998203	1.003421
	Data Offset	2.239287	2.179978	0.150510
Current Calibration	Data Slope	1.000016	1.001043	1.010025
	Data Offset	-0.257864	0.050304	-0.255120

### Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1218153357
---------------------	------------	-------------------	------------

Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
NO coefficient	0.882		0.744	
NOx coefficient	0.997		1.000	
NO2 coefficient	1.000		1.000	
NO bkgrnd	6.2		5.6	
NOx bkgrnd	6.3		5.7	
Chamber Temp	50.3	Deg C	50.4	Deg C
Moly Temp	322	Deg C	325.5	Deg C
PMT voltage	-850	V	-850	V
PMT Temp	-3	Deg C	-2.9	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	210.5	mmHg	179.1	mmHg
R Cell Press Nox	210.8	mmHg	179.1	mmHg
NO sample flow	0.448	lpm	0.511	lpm
Nox sample Flow	0.449	lpm	0.511	lpm

**Notes:**

Replaced sample pump and charcoal scrubber for preventative maint. Changed inlet filter. Adjusted span. Large percent change due to filter loading from forest fires.



# Wood Buffalo Environmental Association

## NOX-NO-NO2 Calibration Report

### Station Information

Calibration Date:

July 8, 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	0.4	0.3	0.1	----	----
as found span	5500	78.1	749.8	749.8	0.0	496.1	495.8	0.3	1.5115	1.5123
calibrator zero	5500	0.0	0.0	0.0	0.0	0.5	0.3	0.2	----	----
high point	5500	78.1	749.8	749.8	0.0	749.8	748.9	0.9	0.9999	1.0012
second point	5500	43.8	420.5	420.5	0.0	421.5	420.5	1.0	0.9976	1.0000
third point	5500	21.9	210.2	210.2	0.0	209.6	209.1	0.5	1.0029	1.0054
as left zero										
as left span										
Average Correction Factor									1.0001	1.0022

Corrced As found    NO<sub>x</sub>= 495.6                      NO= 495.5                      Percent Change                      NO<sub>x</sub>= 50.9%                      NO= 51.2%  
 Previous Response    NO<sub>x</sub>= 747.9                      NO= 748.9

### GPT Calibration Data

Dilution Flow                      5500                      ccm                      Source Gas Flow                      78.10                      ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
Cal zero			0.0			0.2			N/A	
1st NO2 (300)	----	383.6	393.2	773.2	383.6	389.6	0.9561	1.0000	1.0093	99.1%
2nd NO2 (200)	----	570.3	206.6	774.9	570.3	204.6	0.9541	1.0000	1.0096	99.0%
3rd NO2 (100)	----	670.3	106.5	776.2	670.3	105.9	0.9525	1.0000	1.0059	99.4%
4th NO2 (0)	776.8	----	0.9	777.7	776.8	1.0	0.9506	1.0000	N/A	----
Average Correction Factor							0.9533	1.0000	1.0082	99.2%

Calibration Performed By: Michael Martineau



# Wood Buffalo Environmental Association

## NO<sub>x</sub> Calibration Summary

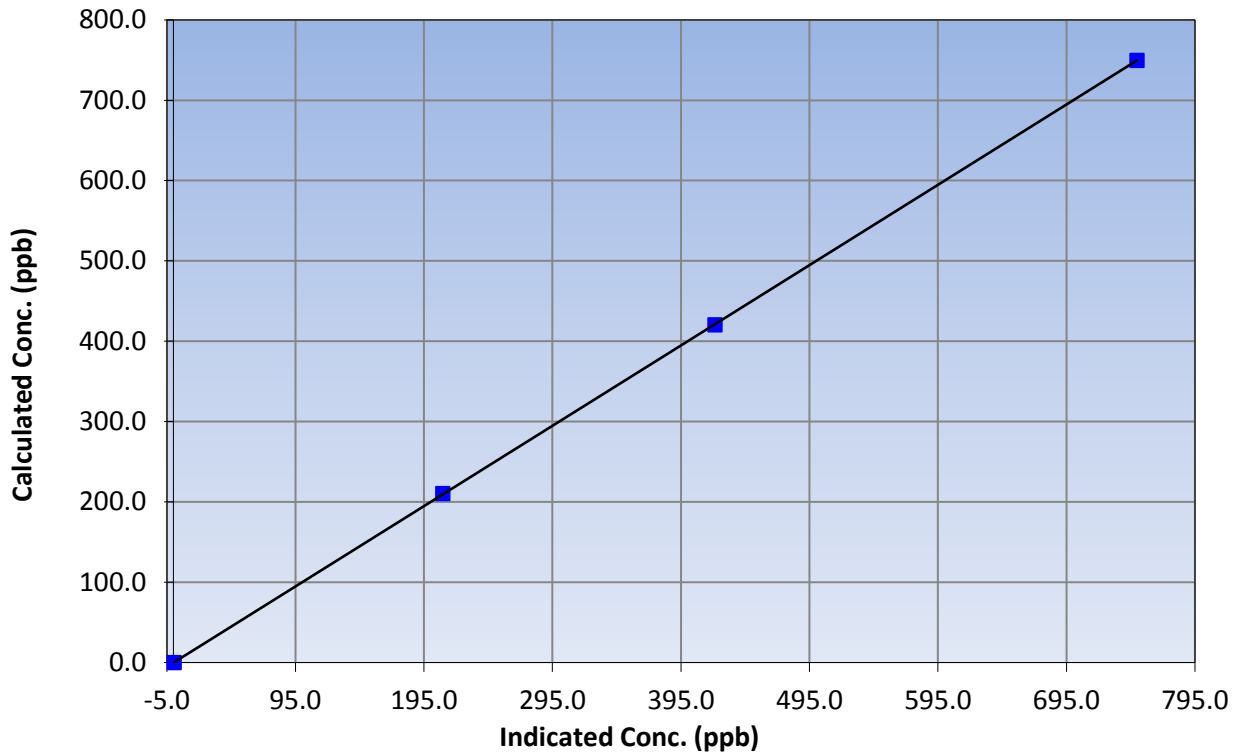
### Station Information

Calibration Date	July 8, 2015	Previous Calibration	June 16, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	8:55	End Time (MST)	13:55
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	0.5	----	Correlation Coefficient	0.999995
749.8	749.8	0.9999		
420.5	421.5	0.9976	Slope	1.000016
210.2	209.6	1.0029		
			Intercept	-0.257864

### NO<sub>x</sub> Calibration Curve





# Wood Buffalo Environmental Association

## NO Calibration Summary

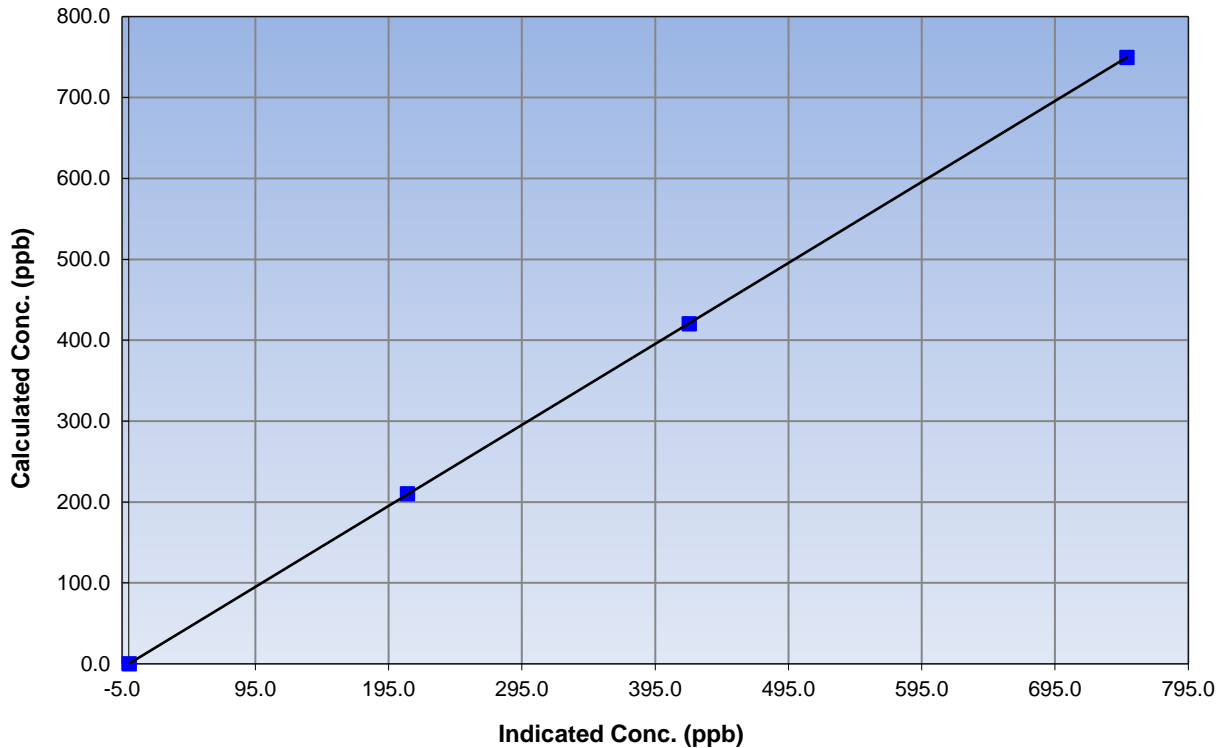
### Station Information

Calibration Date	July 8, 2015	Previous Calibration	June 16, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	8:55	End Time (MST)	13:55
Analyzer make	Thermo 42i	Analyzer serial #	1218153357

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.3	N/A	Correlation Coefficient	0.999996
749.8	748.9	1.0012		
420.5	420.5	1.0000	Slope	1.001043
210.2	209.1	1.0054		
			Intercept	0.050304

### NO Calibration Curve





# Wood Buffalo Environmental Association

## NO<sub>2</sub> Calibration Summary

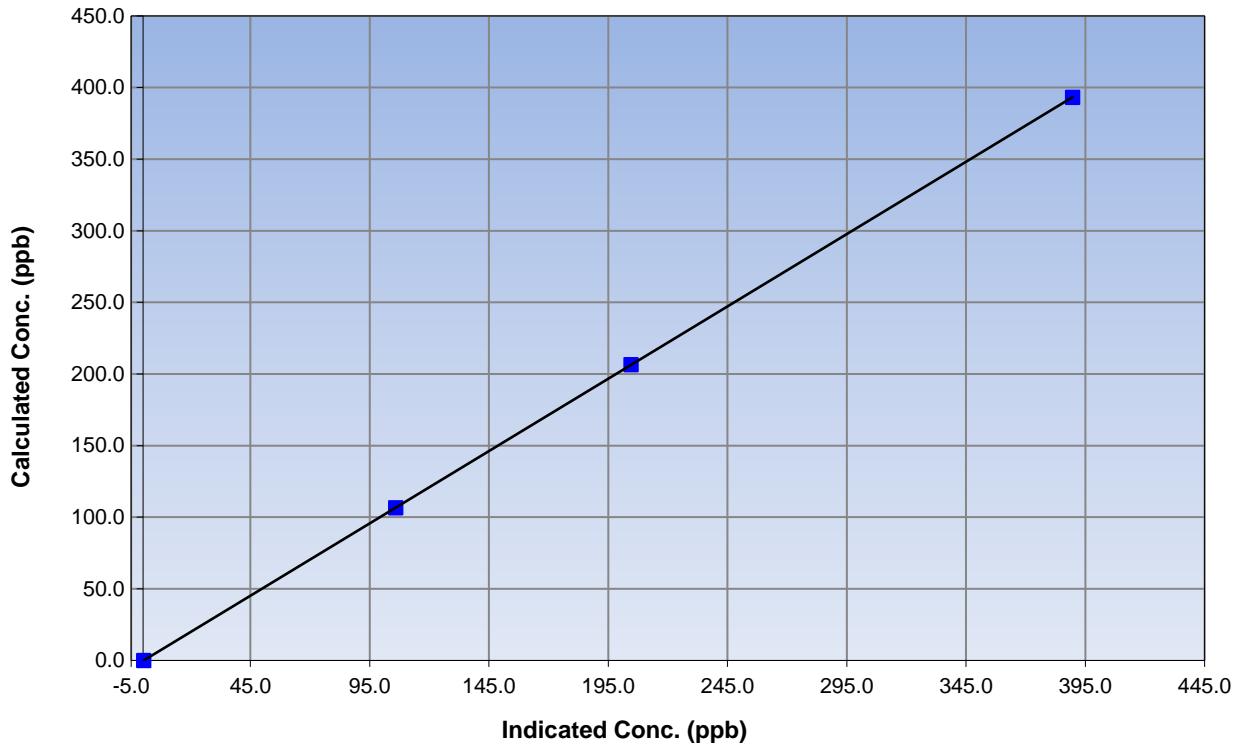
### Station Information

Calibration Date	July 8, 2015	Previous Calibration	June 16, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	8:55	End Time (MST)	13:55
Analyzer make	Thermo 42i	Analyzer serial #	1218153357

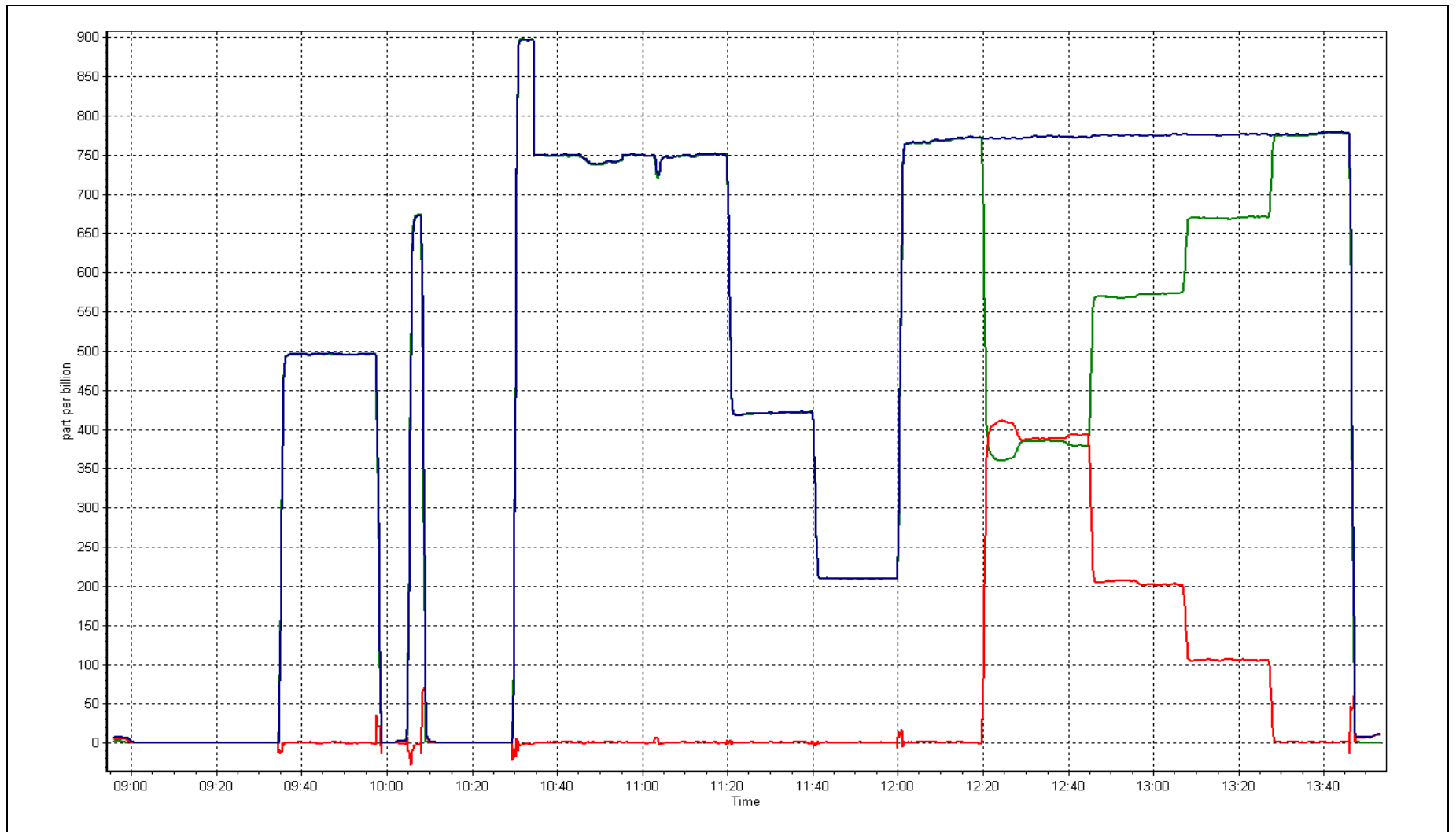
### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	N/A	Correlation Coefficient	0.999999
393.2	389.6	1.0093		
206.6	204.6	1.0096	Slope	1.010025
106.5	105.9	1.0059		
			Intercept	-0.255120

### NO<sub>2</sub> Calibration Curve









# Wood Buffalo Environmental Association

## N<sub>t</sub>-NO<sub>x</sub>-NH<sub>3</sub> Calibration Report

### Station Information

Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
NOX Calibration Date	July 8, 2015	NOX Previous Cal Date	June 16, 2015
NH3 Calibration Date	July 8, 2015	NH3 Previous Cal Date	June 16, 2015
Reason:	Routine		
Start Time (MST)	8:55	End Time (MST)	17:00
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	1.005983	0.997481	0.999658	1.001176	1.001735
	Data Offset	-4.379433	-5.633379	2.117238	1.879381	-2.831741
Cal Stats After	Data Slope	1.017379	1.007447	0.998277	0.997480	1.001476
	Data Offset	-0.779009	-1.396697	2.638581	2.348379	0.687962
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	1.126		1.140	
NO2 coefficient	1.000	ppb	1.000	ppb
NOx coefficient	1.217		1.233	
NH3 coefficient	0.895		0.895	
Nt coefficient	1.253		1.246	
NH3 conv temp	825	DegC	825	Deg C
Chamber Temp	50.0	Deg C	50.0	Deg C
Moly Temp	315.4	Deg C	316.3	Deg C
PMT Temp	7.0	Deg C	7.0	Deg C
O3 flow	84.0	ccm	84.0	ccm
R Cell Press	4.6	mmHg	4.6	mmHg
PMT Voltage	645.0	v	645.0	v
Sample Flow 1 NO	513.0	ccm	515.0	ccm
Sample Flow 2 Nox	518.0	ccm	521.0	ccm
Sample Flow 3 Nt	548.0	ccm	550.0	ccm

**Notes:**

changed inlet filter after as founds. Adjusted NO/Nox/Nt spans. High percent change in response due to inlet filter loading from forest fires. Changed "filter delay time" from 12 min to 2 min back to factory default.



# Wood Buffalo Environmental Association

## Nt-NO<sub>x</sub>-NH<sub>3</sub> Calibration Report

### Station Information

Calibration Date:

July 8, 2015

Station Number:

AMS 1

### NH<sub>3</sub> Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated Nt conc (ppb)	Calculated NO <sub>x</sub> conc (ppb)	Calculated NH <sub>3</sub> conc (ppb)	Indicated Nt conc (ppb)	Indicated NO <sub>x</sub> conc (ppb)	Indicated NH <sub>3</sub> conc (ppb)	Nt Correction factor	NH <sub>3</sub> Correction factor
as found zero	5500	0.0	0.0	0.0	0.0	-0.2	0.6	-0.7	----	----
as found NO	5500	78.1	749.8	749.8	----	326.3	281.5	44.8	2.298	----
calibrator zero	5500	0.0	0.0	0.0	0.0	0.3	0.0	0.3	----	----
high NO point	5500	78.1	749.8	749.8	----	749.6	750.1	-0.5	1.000	----
NO/O <sub>3</sub> point	5500	78.1	749.8	749.8	----	748.4	749.0	-0.7	1.002	----
as found NH <sub>3</sub>	6500	67.7	1999.8	NA	1999.8	1981.3	19.5	1961.9	1.009	1.019
first NH <sub>3</sub>	6500	67.7	1999.8	NA	1999.8	1981.3	19.5	1961.9	1.009	1.019
second NH <sub>3</sub>	6500	33.9	1001.4	NA	1001.4	1008.9	11.3	997.6	0.993	1.004
third NH <sub>3</sub>	6500	17.0	502.2	NA	502.2	492.4	5.7	486.7	1.020	1.032
Average Correction Factor									1.0011	1.0183

NH<sub>3</sub> Corrected As Found  
 Nt Corrected As Found  
 NO<sub>x</sub> Corrected As Found

NH<sub>3</sub> = 1962.6 ppb  
 Nt = 326.5 ppb  
 NO<sub>x</sub> = 281.0 ppb

Previous Response  
 Previous Response  
 Previous Response

NH<sub>3</sub> = 1992.2 ppb  
 Nt = 757.3 ppb  
 NO<sub>x</sub> = 747.9 ppb

NH<sub>3</sub> percent change 1.5%  
 Nt percent change 132.0%  
 NO<sub>x</sub> percent change 166.2%



# Wood Buffalo Environmental Association

## NO<sub>x</sub>(NH<sub>3</sub>) Calibration Report

### Station Information

Calibration Date:

July 8, 2015

Station Number:

AMS 1

### NO<sub>x</sub> / NO / Nt Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NO <sub>x</sub> conc (ppb)	Calculated NO conc (ppb)	Calculated Nt conc (ppb)	Indicated NO <sub>x</sub> conc (ppb)	Indicated NO conc (ppb)	Indicated Nt conc (ppb)	NO <sub>x</sub> Correction factor	NO Correction factor
as found zero	5500	0.0	0.0	0.0	0.0	0.6	0.8	-0.2	----	----
as found span	5500	78.1	749.8	749.8	749.8	281.5	307.6	326.3	2.6633	2.4377
calibrator zero	5500	0.0	0.0	0.0	0.0	0.0	0.0	0.3	----	----
high point	5500	78.1	749.8	749.8	749.8	750.1	750.7	749.6	0.9996	0.9988
second point	5500	43.8	420.5	420.5	420.5	416.9	417.9	413.5	1.0086	1.0061
third point	5500	21.9	210.2	210.2	210.2	205.3	205.9	203.6	1.0241	1.0212
as left zero										
as left span										
<b>Average Correction Factor</b>									<b>1.0108</b>	<b>1.0087</b>

	<u>Nt</u>	<u>NO<sub>x</sub></u>	<u>NO</u>	<u>NO<sub>2</sub></u>
Corrected As found	326.5	281.0	306.8	387.2
Previous Response	757.3	747.9	747.0	389.9
Percent Change	132.0%	166.2%	143.5%	0.7%

### GPT Calibration Data

Dilution Flow 5000 ccm      Source Gas Flow 78.10 ccm

O <sub>3</sub> Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO <sub>2</sub> conc (ppb)	Indicated NO <sub>x</sub> conc (ppb)	Indicated NO conc (ppb)	Indicated NO <sub>2</sub> conc (ppb)	NO <sub>x</sub> Correction factor	NO Correction factor	NO <sub>2</sub> Correction factor	Converter Efficiency
Cal zero			0.0			-0.8			----	
1st NO <sub>2</sub> (300)	----	362.2	387.7	748.5	362.2	386.3	1.1019	1.0000	1.0035	99.6%
2nd NO <sub>2</sub> (200)	----	551.5	198.4	749.0	551.5	197.6	1.1011	1.0000	1.0041	99.6%
3rd NO <sub>2</sub> (100)	----	649.2	100.6	749.1	649.2	99.9	1.1009	1.0000	1.0074	99.3%
4th NO <sub>2</sub> (0)	749.9	----	-0.8	749.0	749.9	-0.8	1.1011	1.0000	----	----
<b>Average Correction Factor</b>							<b>1.1012</b>	<b>1.0000</b>	<b>1.0050</b>	<b>99.5%</b>

Calibration Performed By: Michael Martineau



# Wood Buffalo Environmental Association

## NH3 Calibration Summary

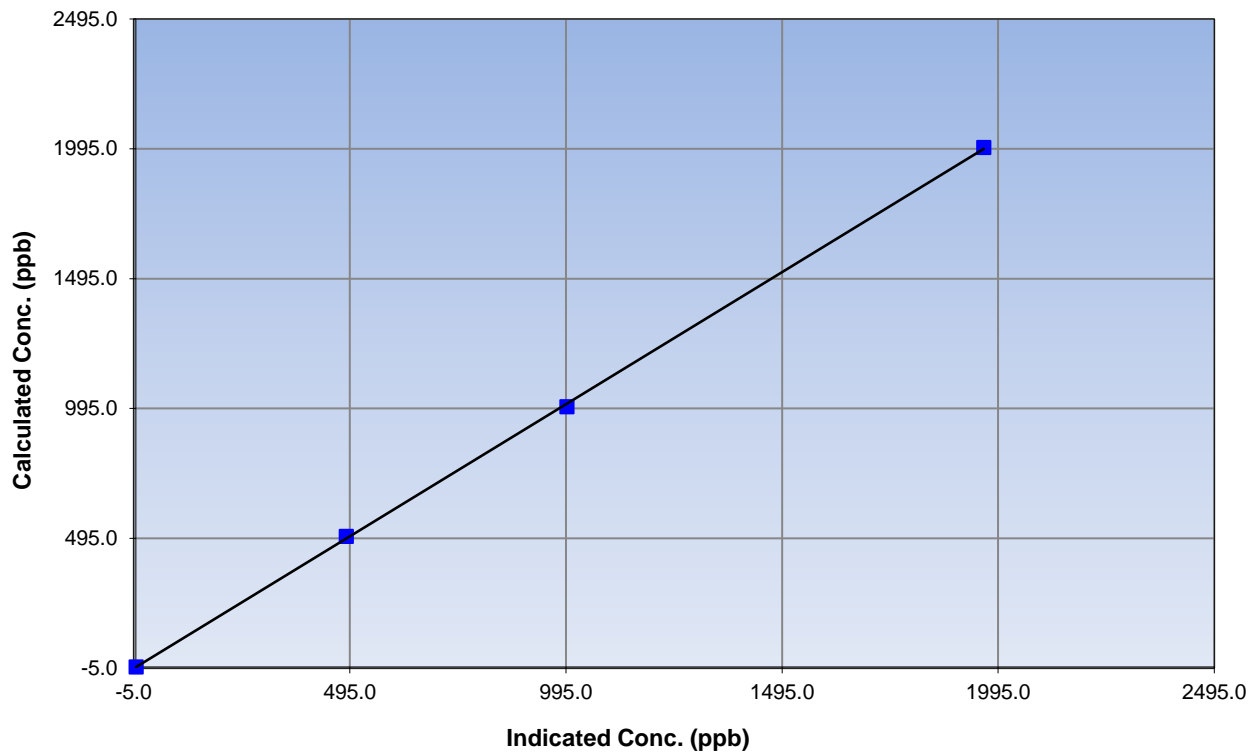
### Station Information

Calibration Date	July 8, 2015	Previous Calibration	June 16, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	8:55	End Time (MST)	17:00
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	0.3	----	Correlation Coefficient	0.999888
1999.8	1961.9	1.0193		
1001.4	997.6	1.0038	Slope	1.017379
502.2	486.7	1.0317		
			Intercept	-0.779009

### NH3 Calibration Curve





# Wood Buffalo Environmental Association

## Nt Calibration Summary

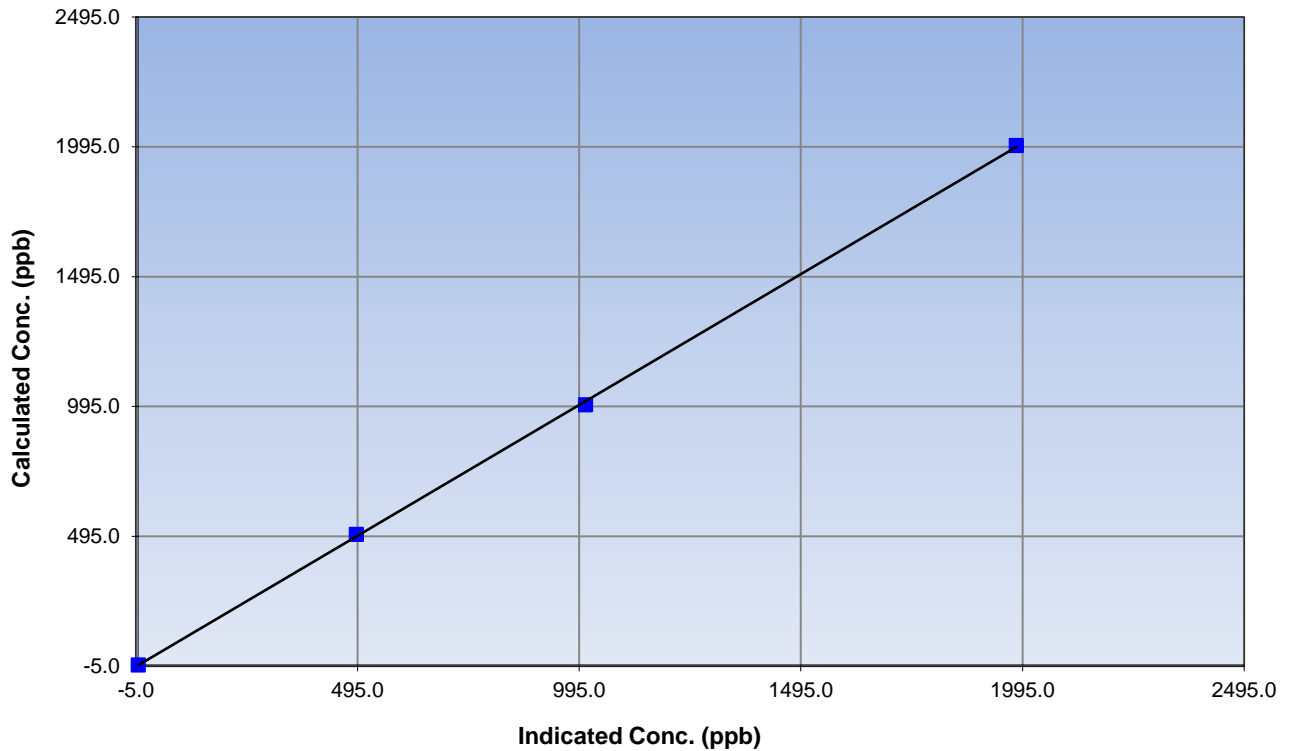
### Station Information

Calibration Date	July 8, 2015	Previous Calibration	June 16, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	8:55	End Time (MST)	17:00
Analyzer make	API T201	Analyzer serial #	152

### Nt (NH<sub>3</sub>) Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.3	----	Correlation Coefficient	0.999876
1999.8	1981.3	1.0093		
1001.4	1008.9	0.9925	Slope	1.007447
502.2	492.4	1.0199		
			Intercept	-1.396697

### Nt Calibration Curve





# Wood Buffalo Environmental Association

## NOx Calibration Summary

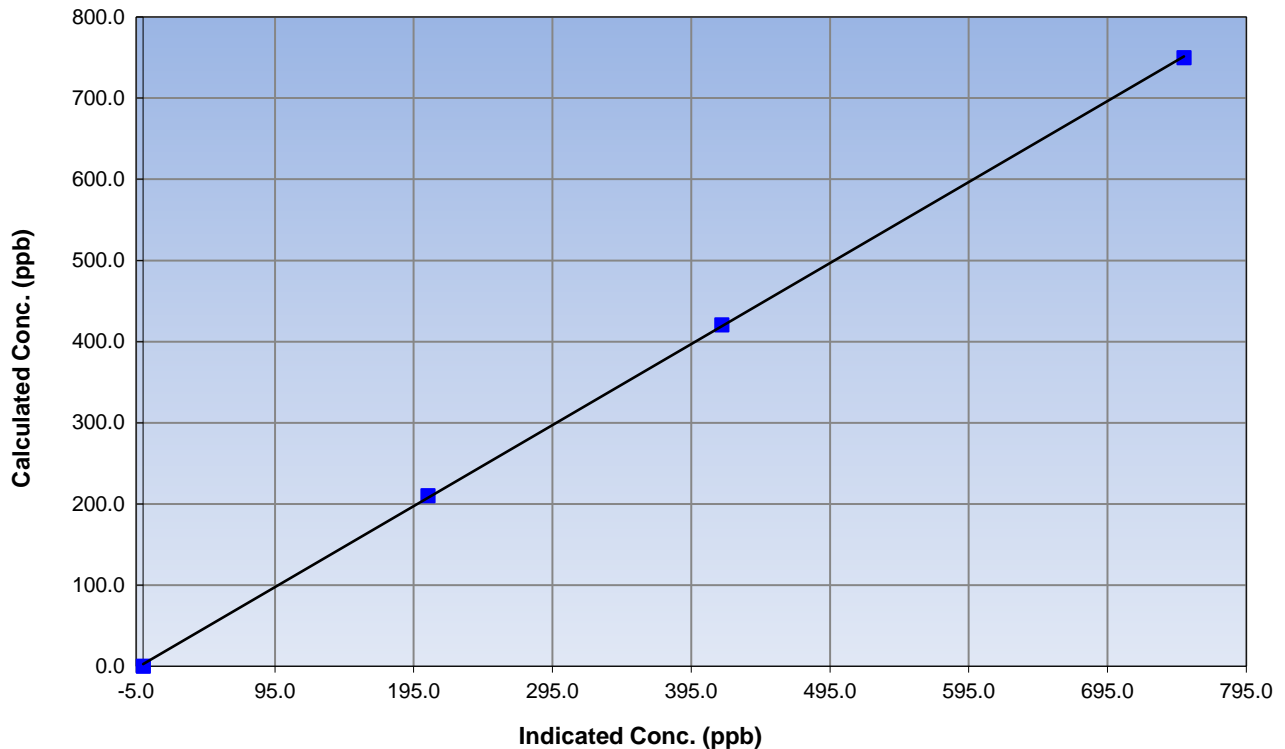
### Station Information

Calibration Date	July 8, 2015	Previous Calibration	June 16, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	8:55	End Time (MST)	17:00
Analyzer make	API T201	Analyzer serial #	152

### NO<sub>x</sub> Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999936
749.8	750.1	0.9996		
420.5	416.9	1.0086	Slope	0.998277
210.2	205.3	1.0241		
			Intercept	2.638581

### NO<sub>x</sub> Calibration Curve





# Wood Buffalo Environmental Association

## NO Calibration Summary

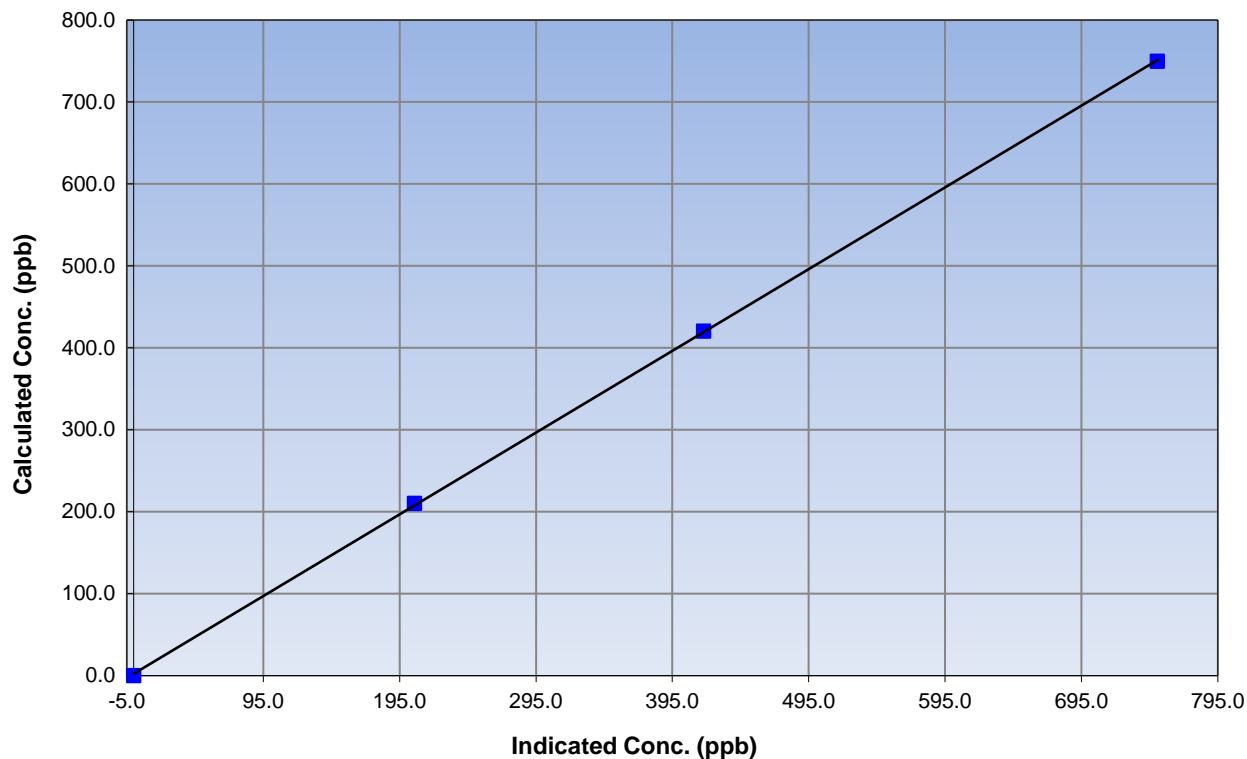
### Station Information

Calibration Date	July 8, 2015	Previous Calibration	June 16, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	8:55	End Time (MST)	17:00
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	0.0	----	Correlation Coefficient	0.999949
749.8	750.7	0.9988		
420.5	417.9	1.0061	Slope	0.997480
210.2	205.9	1.0212		
			Intercept	2.348379

### NO Calibration Curve







# Wood Buffalo Environmental Association

## NO<sub>2</sub> Calibration Summary

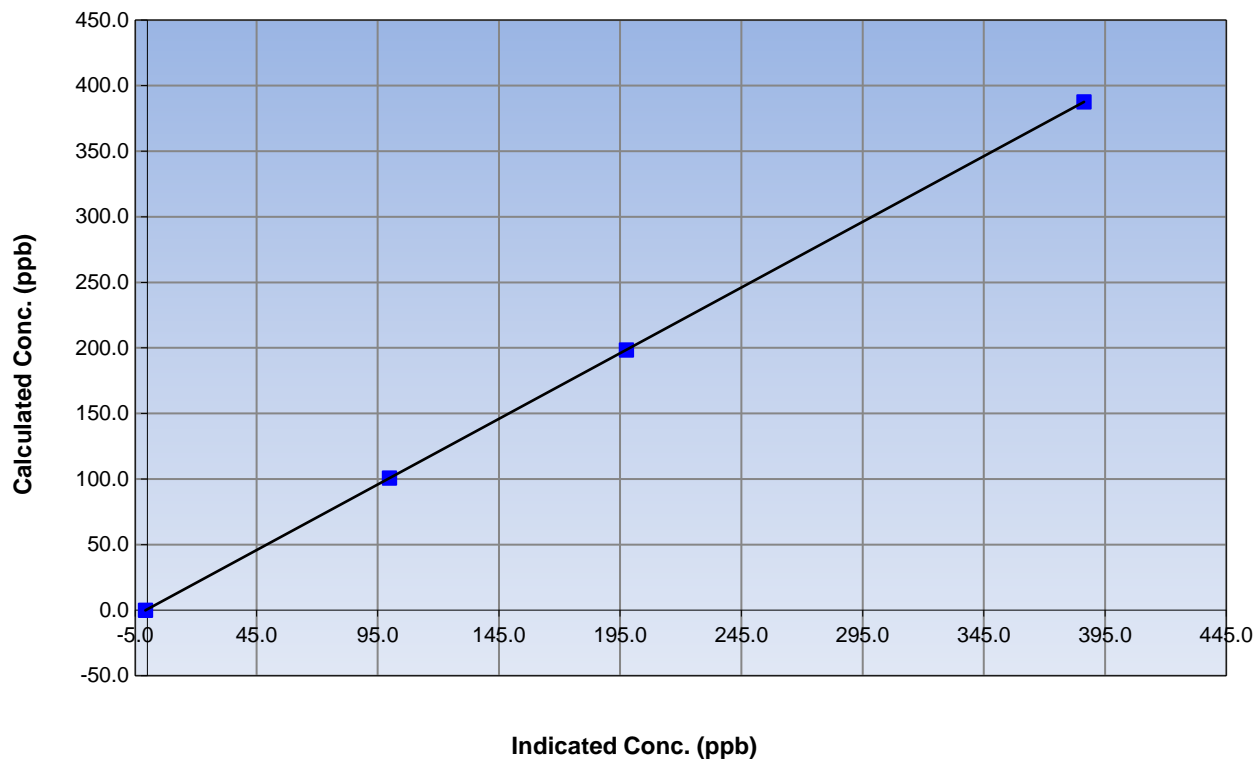
### Station Information

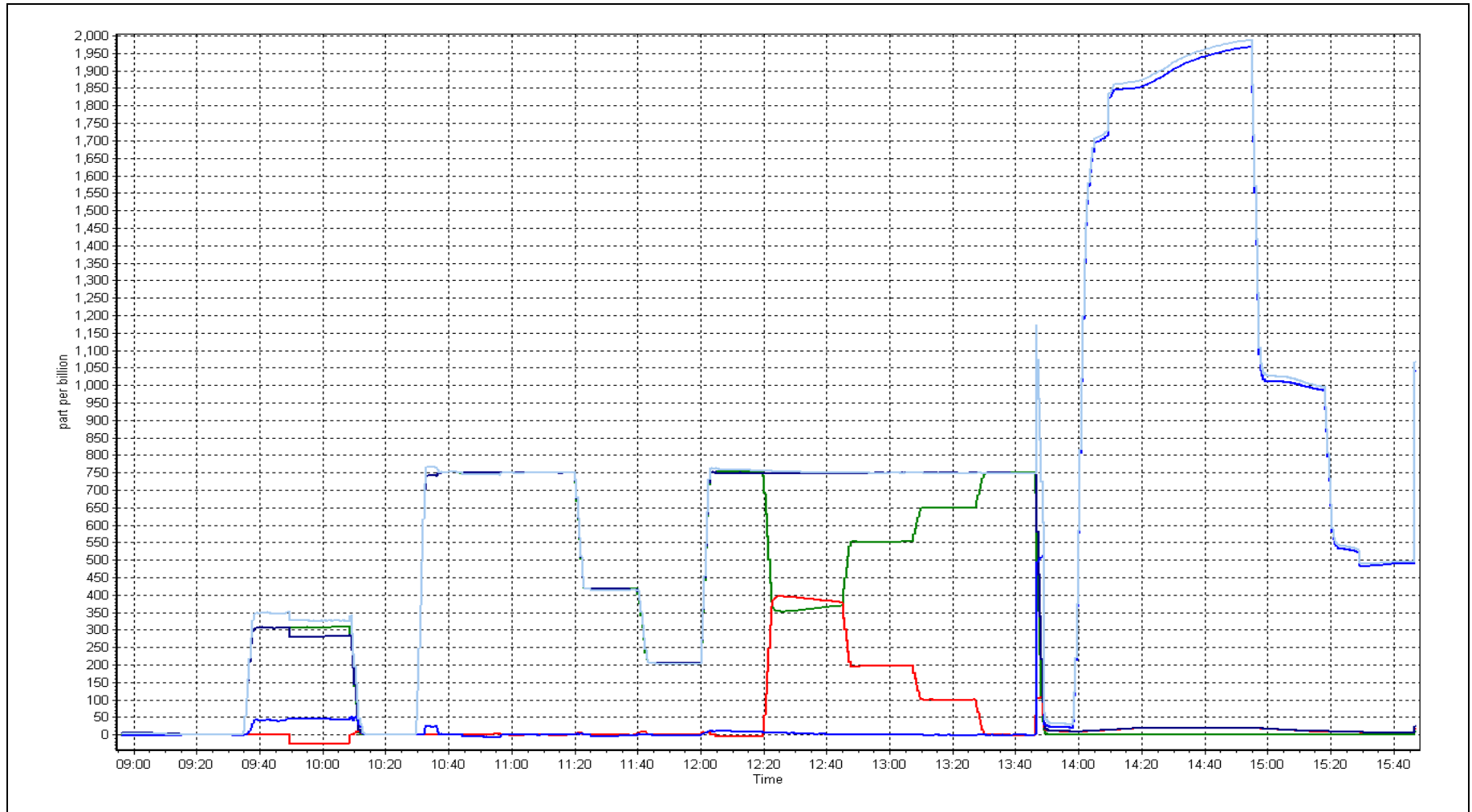
Calibration Date	July 8, 2015	Previous Calibration	June 16, 2015
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	8:55	End Time (MST)	17:00
Analyzer make	API T201	Analyzer serial #	152

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.8	----	Correlation Coefficient	0.999999
387.7	386.3	1.0035		
198.4	197.6	1.0041	Slope	1.001476
100.6	99.9	1.0074		
			Intercept	0.687962

### NO<sub>2</sub> Calibration Curve







## Wood Buffalo Environmental Association

### SHARP CALIBRATION

#### STATION INFORMATION

Calibration Date:	<u>July 8, 2015</u>	Previous Calibration:	<u>June 18, 2015</u>
Station Name:	<u>Bertha Ganter</u>	Station Number:	<u>AMS 1</u>
Start Time (MST):	<u>12:05</u>	End Time (MST):	<u>13:00</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	20.3	21.3	1.0	20.3
T2	30.0	na	na	
T3	27.0	na	na	
T4	41.0	na	na	
RH (%)	36.0	na	na	

##### Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	966	969.0	3.0	

##### Main Flow (Lph)

Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
1000	1004	4	1004	1000

#### Nephelometer Calibration

Parameter	As Found	Zeroed (Limit +/- 2.0ug/m3)	As Left
Analog	218		218
Neph	-0.6		-0.6
C14	51.9		51.9
<b>Indicated Concentration (ug/m3)</b>	<b>-0.4</b>	<b>NO</b>	<b>-0.4</b>
Offset 1	219.5		219.5
Offset 2	34.6		34.6

#### Leak Check (Quarterly)

Leak Check Date:	<u>April 20, 2015</u>	Previous Leak Check Date:	<u>April 20, 2015</u>
------------------	-----------------------	---------------------------	-----------------------

##### 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 (Annualy)

Foil Calibration Date:	not performed this month	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:

Changed out cyclone head

Calibration Performed By:

Michael Martineau



# Wood Buffalo Environmental Association

## WS/WD Calibration Report

### Station Information

Calibration Date	July-13-15	Previous Calibration	May-14-14
Station Number	AMS 01	Station Location	Bertha Ganter
Reason:	Routine      Installation	Removal	Other: <span style="background-color: #e0e0e0;">repair</span>
Start Time (MST)	11:20	End Time (MST)	11:40
Barometric Pressure	_____ mm Hg	Station Temperature	20 Deg C
WS Calibrator	MetOne 053	Serial Number	K13090

### WIND SPEED

Sensor make/model	Met One 10C-1	Sensor serial #	P10041
DACS make	Campbel Scientific CR3000	DACS serial No.	2582
DACS voltage range	0-5 VDC	DACS channel #	P1
	<u>Before</u>		<u>After</u>
DACS slope	_____	DACS slope	_____
DACS intercept	_____	DACS intercept	_____
Calculated slope	0.99940661	Calculated slope	1.000197
Calculated intercept	-0.000879476	Calculated intercept	-0.085336

### Wind Speed Calibration Data

Shaft RPM	Actual Speed (K/hr)	Indicated Speed (K/hr)	Correction factor
0	0	0.0	n/a
200	20.16	20.3	0.9931
400	39.3	39.5	0.9949
600	58.5	58.5	1.0000
800	77.752	77.8	0.9994
Average Correction Factor			0.9969

### WIND DIRECTION

Sensor make/model	Met One 20C-1	Sensor serial #	P22884
DACS make	Campbel Scientific CR3000	DACS serial No.	2582
DACS voltage range	0-5 VDC	DACS channel #	SE 24
	<u>Before</u>		<u>After</u>
DACS slope	_____	DACS slope	_____
DACS intercept	_____	DACS intercept	_____
Calculated slope	1.00458088	Calculated slope	0.997085
Calculated intercept	-2.307319859	Calculated intercept	-1.672449

### Wind Direction Calibration Data

Physical Direction (Degrees)	Indicated Direction (Degrees)	Correction factor
0	1.8	n/a
90	91.7	0.9815
180	182.4	0.9868
270	272.3	0.9916
354	356.8	0.9922
Average Correction Factor		0.9880

**Notes:**

WS sensor removed due to wiring fault (SN P19837). Installed new 010C-1 SN P10041 WBEA tag 10386.

Adjusted wind vane 15 degrees east to true magnetic north.

Calibration Performed By: \_\_\_\_\_ Mike Martineau



## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

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

**AMS 2  
MILDRED LAKE  
JULY 2015**

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

August 26, 2015



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MILDRED LAKE (AMS 2)  
 JULY 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	709	35	35	100.00	31	0	4	0
H2S (ppb) Average	707	35	37	99.73	16	1	2	0
THC (ppm) Average	709	35	35	100.00	4.3	-	2.7	-
Temperature (C) Average	744	0	0	100.00	31.6	-	23.8	-
Relative Humidity (%) Average	744	0	0	100.00	100	-	87	-
Wind Speed 10 m (km/h) Average	744	0	0	100.00	26	-	14	-
Wind Direction 10 m (deg) Average	744	0	0	100.00	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MILDRED LAKE (AMS 2)  
 JULY 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	709	1.5	3	-	0	0	0	0	1	4	31
H2S (ppb) Average	707	0.7	1	-	0	0	0	0	1	1	16
THC (ppm) Average	709	2.37	0.3	-	2	2.1	2.1	2.3	2.5	2.8	4.3
Temperature 2 m (C) Average	744	18.43	4.5	-	7.7	12.9	15	18.2	22	24.4	31.6
Relative Humidity (%) Average	744	68.1	18	-	23	41	54	70	83	91	100
Wind Speed 10 m (km/h) Average	744	8.1	4	-	0	3	5	7	10	14	26
Wind Direction 10 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-



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

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
H2S	15 Jul 2015 11:00	15 Jul 2015 12:00	2	Maintenance - sample manifold cleaning



Summary of Hour Averages

Mildred Lake - July 2015

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 31 ppb on Jul 4 13:00	Maximum Daily Average: 4.3 ppb on Jul 4		Hours of Data:	709
Minimum Value: 0 ppb on Jul 13 18:00	Minimum Daily Average: 0.3 ppb on Jul 19		Hours of Missing Data:	35
Maximum Diurnal Average: 3.6 ppb at hour 13	Minimum Diurnal Average: 0.5 ppb at hour 22		Hours of Calibration:	35
Monthly Average: 1.5 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 1 P <sub>90</sub> = 4 P <sub>99</sub> = 13		Percent Operational Time:	100.0

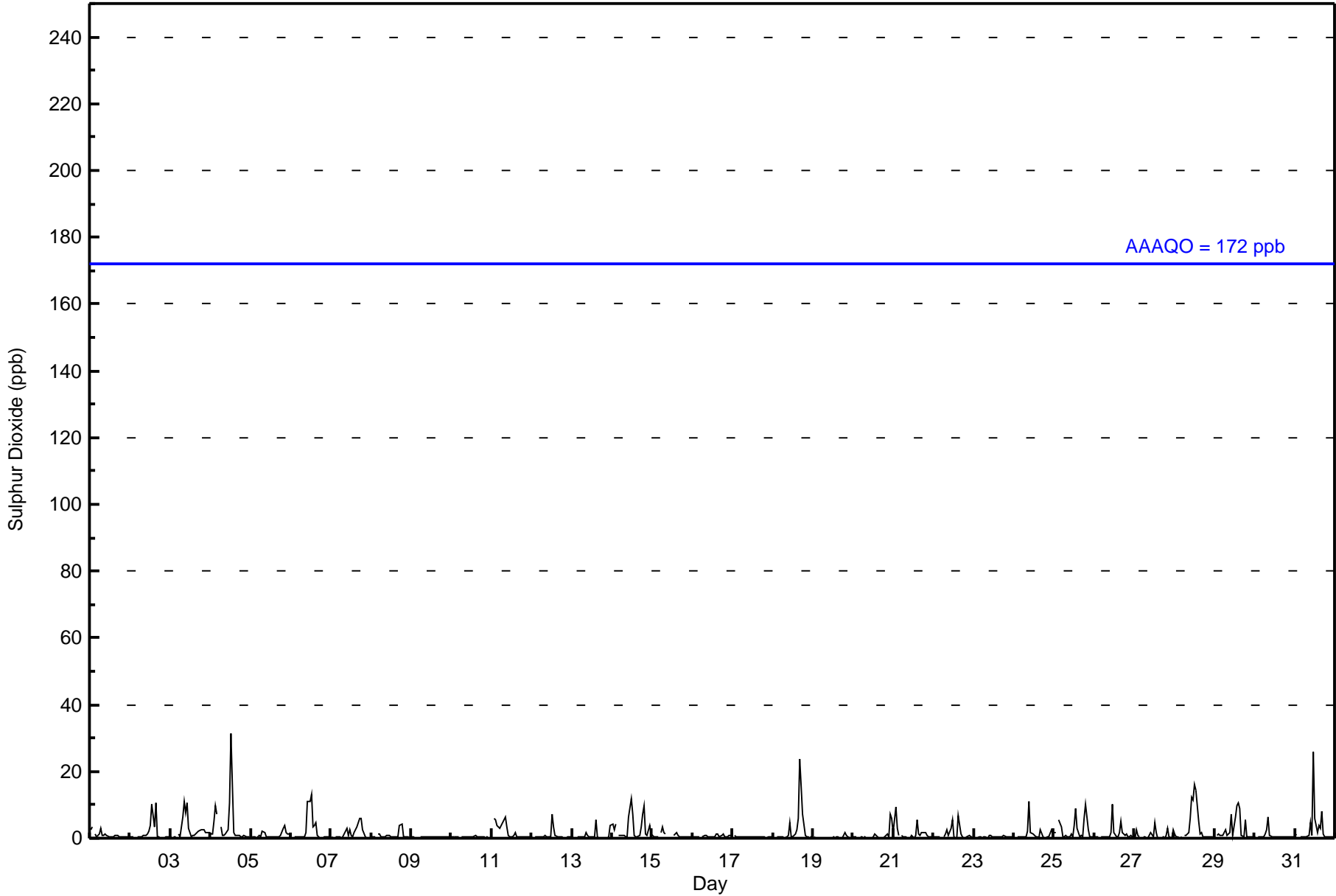
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	3	3	Z	1	1	1	3	1	1	1	1	0	0	1	1	1	1	1	1	0	0	0	0	0	0.9	3
2-Jul	0	0	0	Z	0	0	0	0	1	1	1	2	4	10	4	11	0	0	0	0	0	0	0	0	1.6	11
3-Jul	0	0	0	0	Z	1	0	6	11	8	11	3	1	1	1	1	2	2	2	2	2	2	2	2.6	11	
4-Jul	1	1	5	10	7	Z	3	1	1	1	3	11	31	16	2	1	1	1	1	1	1	0	0	4.3	31	
5-Jul	Z	0	0	0	0	1	1	2	2	0	1	0	0	0	0	1	0	1	0	1	3	4	2	1	0.9	4
6-Jul	1	Z	0	0	0	0	0	0	0	2	11	11	13	3	4	5	1	0	0	0	0	0	0	2.4	13	
7-Jul	0	0	Z	0	0	0	0	0	1	3	1	2	1	0	2	4	5	6	6	2	0	0	0	1.5	6	
8-Jul	0	0	1	Z	1	1	0	0	0	1	1	1	1	0	0	0	0	4	4	0	0	0	0	0.8	4	
9-Jul	0	0	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
10-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0.3	1	
11-Jul	Z	6	6	4	3	3	4	5	6	3	1	1	1	2	0	0	0	0	0	0	0	0	0	2.1	6	
12-Jul	0	Z	0	0	0	0	0	0	1	0	0	1	7	4	1	1	0	0	0	0	0	0	1	0.8	7	
13-Jul	0	1	Z	0	0	0	0	0	2	1	0	0	0	0	6	1	0	0	0	0	0	0	4	0.8	6	
14-Jul	4	2	4	Z	1	1	1	1	1	1	6	12	7	1	0	1	1	4	7	10	1	1	4	3.1	12	
15-Jul	1	0	0	0	Z	2	3	2	1	C	C	C	C	1	2	1	0	0	0	0	0	0	0	0.8	3	
16-Jul	0	0	1	0	0	Z	0	1	1	1	1	0	0	1	1	0	1	1	1	0	0	1	1	0.6	1	
17-Jul	Z	1	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-Jul	0	Z	0	0	0	0	0	0	0	1	4	1	0	1	2	6	24	16	7	1	0	0	0	2.9	24	
19-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	0	0	0.3	2	
20-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	7	0.9	7	
21-Jul	2	9	3	1	Z	1	0	0	0	0	0	1	0	1	5	1	1	2	2	2	1	0	0	1.4	9	
22-Jul	1	0	0	0	0	Z	0	1	2	1	3	5	0	0	7	1	0	0	0	0	1	1	0	1.2	7	
23-Jul	Z	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	1	0	0.4	1	
24-Jul	0	Z	0	0	0	0	0	0	2	11	2	1	1	1	0	0	2	1	0	0	0	3	2	1.3	11	
25-Jul	2	2	Z	5	3	1	0	1	0	0	1	0	4	9	3	0	1	0	6	10	2	1	0	2.3	10	
26-Jul	0	0	0	Z	0	0	0	0	0	0	2	10	2	1	0	2	5	2	1	1	0	1	1	1.3	10	
27-Jul	0	2	1	0	Z	0	0	0	0	1	2	0	4	2	0	0	0	1	0	1	3	0	2	0.9	4	
28-Jul	1	0	0	0	0	Z	1	1	2	6	12	12	16	14	5	1	2	1	0	0	0	0	0	3.4	16	
29-Jul	Z	1	1	1	1	1	3	1	1	1	7	1	6	10	11	9	1	0	5	1	0	0	1	2.7	11	
30-Jul	0	Z	0	1	0	0	1	3	6	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.8	6	
31-Jul	1	1	Z	1	0	0	1	0	1	5	1	26	6	2	4	3	8	1	1	1	0	0	0	2.8	26	
	0.8	1.3	1.1	1.1	0.9	0.6	0.9	1.0	1.5	1.7	2.5	3.5	3.6	2.6	1.9	1.9	1.9	1.5	1.6	1.3	0.7	0.5	0.8	0.8	Diurnal Average	
	4	9	6	10	7	3	4	6	11	11	12	26	31	16	11	11	24	16	7	10	4	2	7	6	Diurnal Maximum	

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



Wood Buffalo Environmental Association  
Hourly Averages

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Mildred Lake - July 2015





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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Mildred Lake - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	690	97.32	97.32
11 - 20	16	2.26	99.58
21 - 60	3	0.42	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



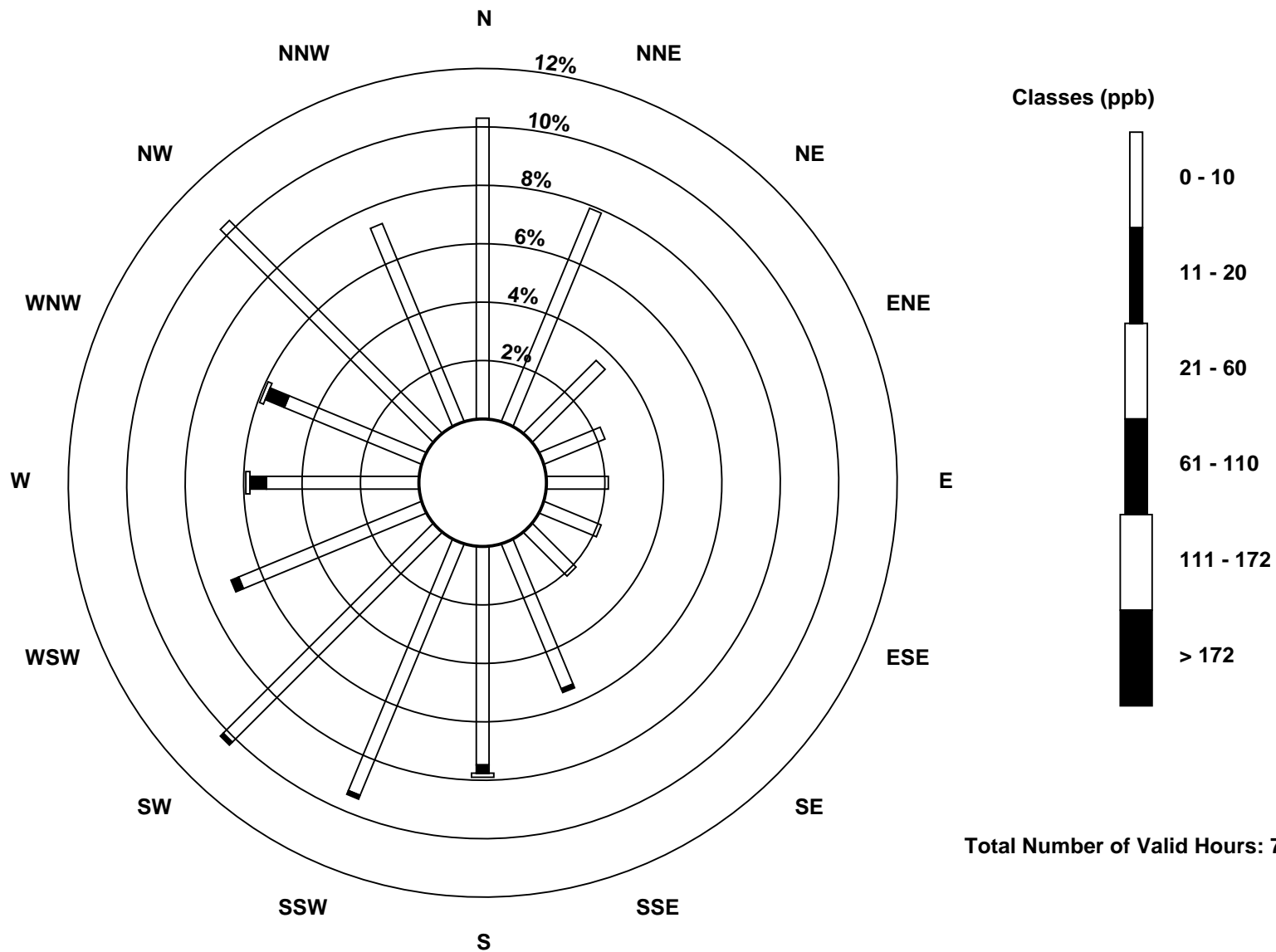
**Wood Buffalo Environmental Association  
Frequency Distribution**

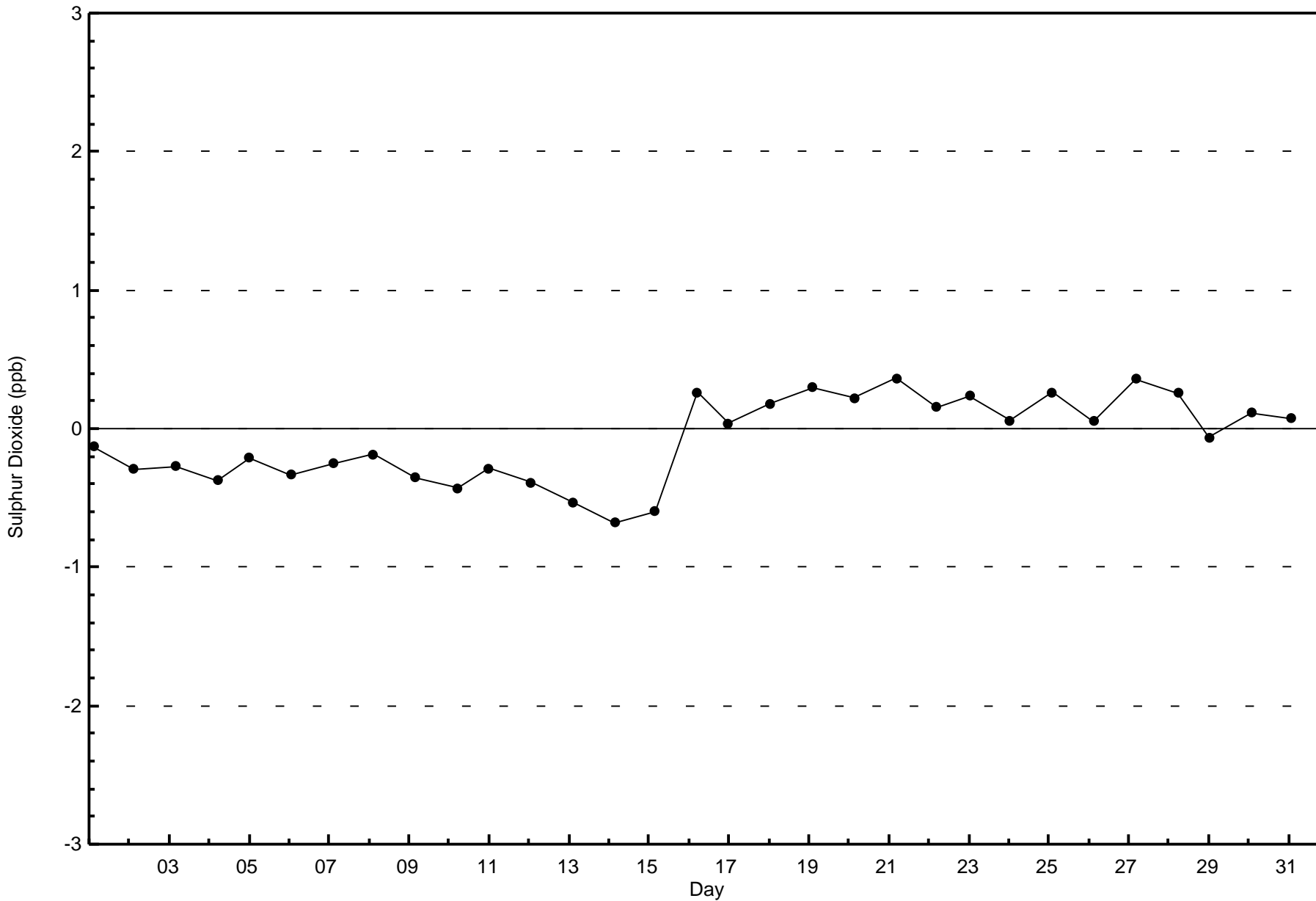
**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Mildred Lake - July 2015**

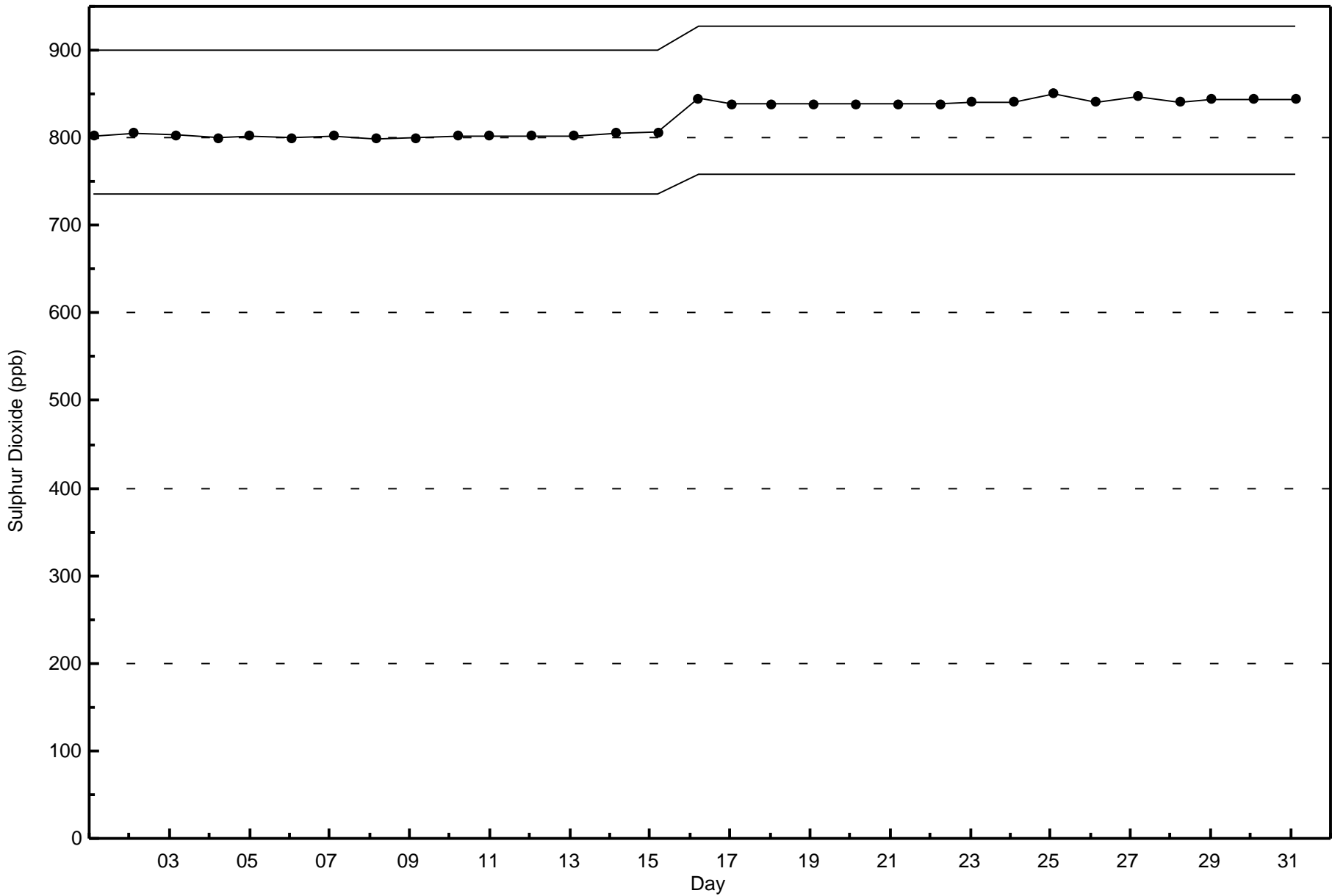
<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 10	73	56	25	16	15	15	15	38	53	66	72	48	37	36	73	52	690
11 - 20	0	0	0	0	0	0	0	1	2	1	1	2	4	5	0	0	16
21 - 60	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	3
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>73</b>	<b>56</b>	<b>25</b>	<b>16</b>	<b>15</b>	<b>15</b>	<b>15</b>	<b>39</b>	<b>56</b>	<b>67</b>	<b>73</b>	<b>50</b>	<b>42</b>	<b>42</b>	<b>73</b>	<b>52</b>	<b>709</b>

Total Number of Valid Hours: 709

Total Number of Hours: 744



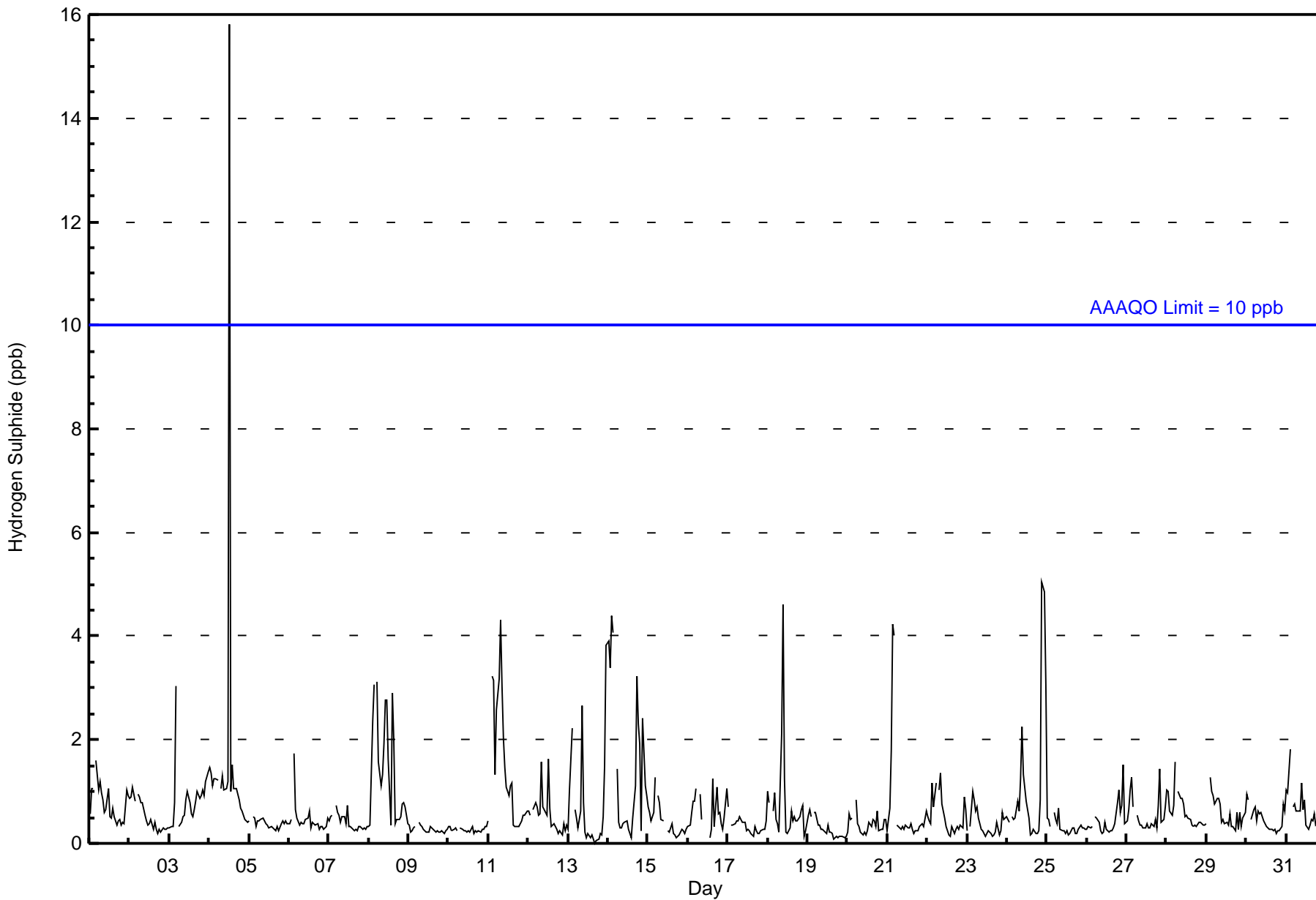








Number of Exceedences (AAAQO): 1-hr: 1 24-hr: 0										Hours in Service: 744																
Maximum Value: 16 ppb on Jul 4 13:00										Maximum Daily Average: 1.7 ppb on Jul 4										Hours of Data: 707						
Minimum Value: 0 ppb on Jul 13 17:00										Minimum Daily Average: 0.3 ppb on Jul 10										Hours of Missing Data: 37						
Maximum Diurnal Average: 1.2 ppb at hour 4										Minimum Diurnal Average: 0.4 ppb at hour 17										Hours of Calibration: 35						
Monthly Average: 0.7 ppb										Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 1 P <sub>90</sub> = 1 P <sub>99</sub> = 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-Jul	1	1	1	Z	2	1	1	1	1	1	1	1	0	1	1	0	0	0	0	0	0	1	1	1	0.7	2
2-Jul	1	1	1	1	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1
3-Jul	0	0	0	1	3	Z	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.8	3
4-Jul	1	1	1	1	1	1	Z	1	1	1	1	1	16	1	2	1	1	1	1	1	1	1	0	0	1.7	16
5-Jul	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
6-Jul	0	0	Z	2	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.5	2
7-Jul	0	1	1	Z	1	1	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
8-Jul	0	0	2	3	Z	3	2	1	1	2	3	3	2	0	3	2	0	0	0	1	1	1	1	0	1.4	3
9-Jul	0	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-Jul	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-Jul	0	Z	3	3	1	3	3	4	3	2	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1.4	4
12-Jul	1	1	Z	1	1	1	1	1	2	1	1	1	2	1	0	0	0	0	0	0	0	0	0	0	0.6	2
13-Jul	0	1	2	Z	1	0	0	1	3	1	0	0	0	0	0	0	0	0	0	0	0	1	1	4	0.7	4
14-Jul	4	3	4	4	Z	1	0	0	0	0	0	0	0	0	0	0	1	3	2	2	0	2	1	1	1.5	4
15-Jul	1	1	0	1	1	Z	1	1	0	0	M	M	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
16-Jul	0	0	1	1	1	1	Z	1	0	C	C	C	C	0	0	1	0	1	1	1	0	0	0	1	0.6	1
17-Jul	1	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
18-Jul	1	1	Z	1	1	0	0	0	2	5	1	0	0	0	1	0	1	0	0	1	1	1	0	0	0.8	5
19-Jul	1	1	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
20-Jul	0	1	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.4	1
21-Jul	0	1	2	4	4	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.7	4
22-Jul	1	0	0	1	1	1	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.5	1
23-Jul	0	Z	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.4	1
24-Jul	1	0	Z	1	0	0	1	1	1	2	1	1	1	0	0	0	0	0	0	0	1	5	5	3	1.1	5
25-Jul	0	0	0	Z	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
26-Jul	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	2	0	0.5	2
27-Jul	0	1	1	1	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0.5	1
28-Jul	1	1	1	1	1	2	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.6	2
29-Jul	0	Z	1	1	1	1	1	1	1	0	0	0	0	0	1	0	0	0	1	0	1	0	0	1	0.6	1
30-Jul	1	1	Z	0	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.5	1
31-Jul	1	1	2	Z	1	1	1	1	1	1	1	0	0	0	0	0	0	1	0	0	0	0	0	1	0.7	2
0.7 0.7 1.1 1.2 1.0 0.9 0.7 0.7 0.8 0.8 0.6 0.6 1.0 0.4 0.5 0.4 0.4 0.5 0.4 0.4 0.4 0.6 0.7 0.7																								Diurnal Average		
4 3 4 4 4 3 3 4 3 5 3 3 16 1 3 2 1 3 2 2 1 5 5 4																								Diurnal Maximum		
Z - zerospan C - Calibration M - Maintenance																										
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb																										





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

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Mildred Lake - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	681	96.32	96.32
3 - 4	22	3.11	99.43
5 - 7	3	0.42	99.86
8 - 11	0	0.00	99.86
> 11	1	0.14	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Mildred Lake - July 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	55	25	16	16	13	11	21	55	70	73	48	43	39	74	52	681
3 - 4	0	0	0	0	0	0	2	17	3	0	0	0	0	0	0	0	22
5 - 7	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	3
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	1	0	0	1
<b>Totals</b>	70	55	25	16	16	13	14	40	58	70	73	48	43	40	74	52	707

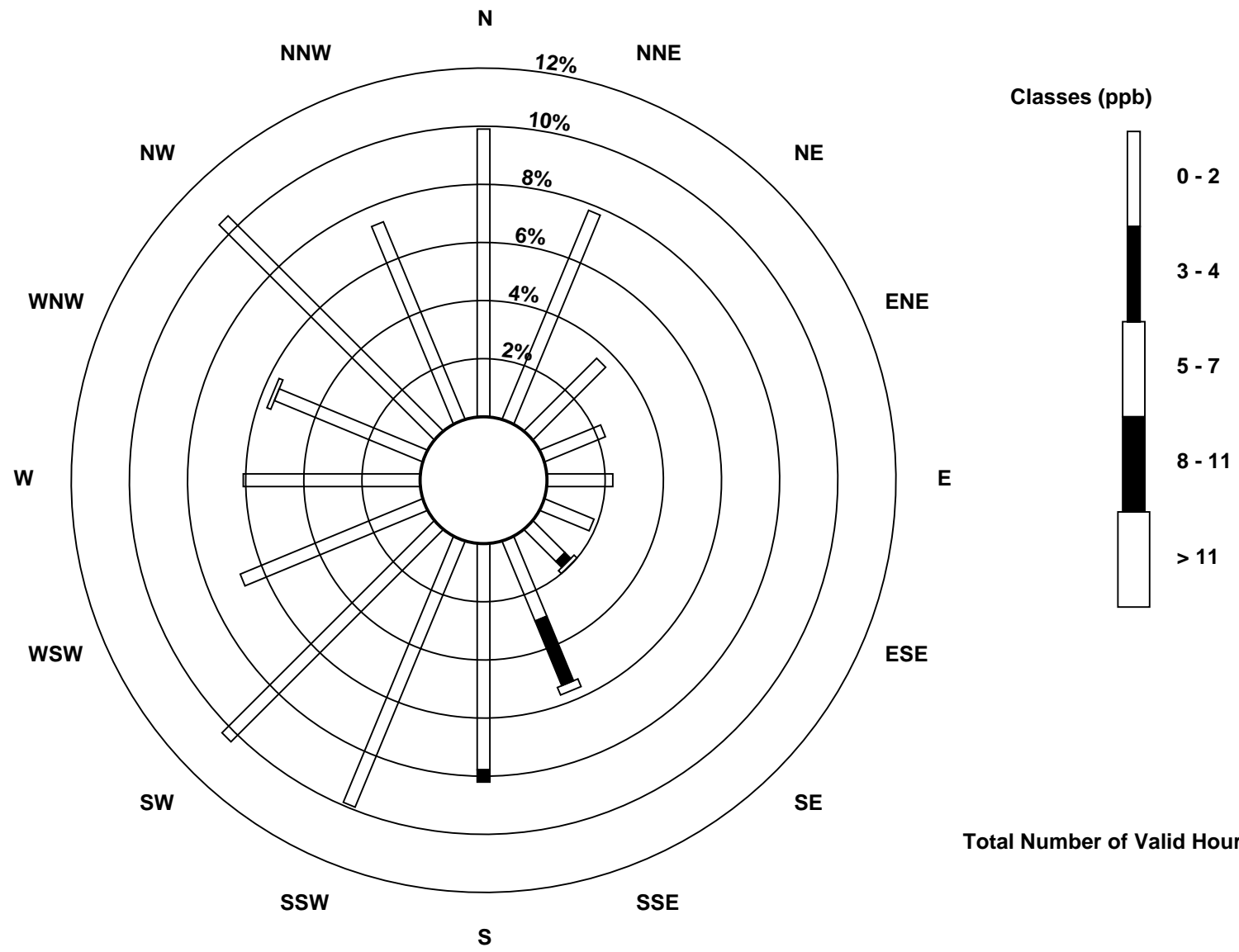
Total Number of Valid Hours: 707

Total Number of Hours: 744

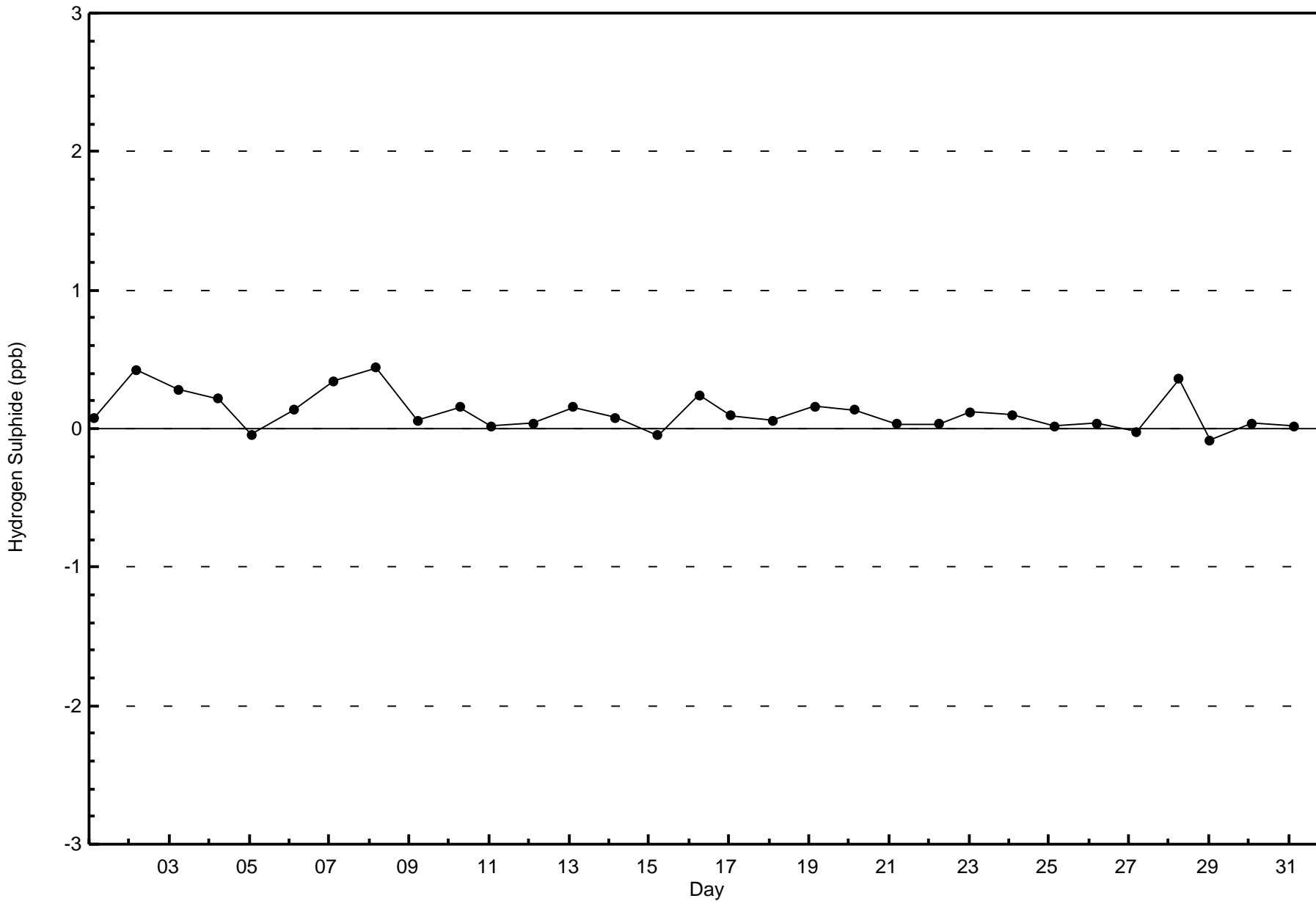


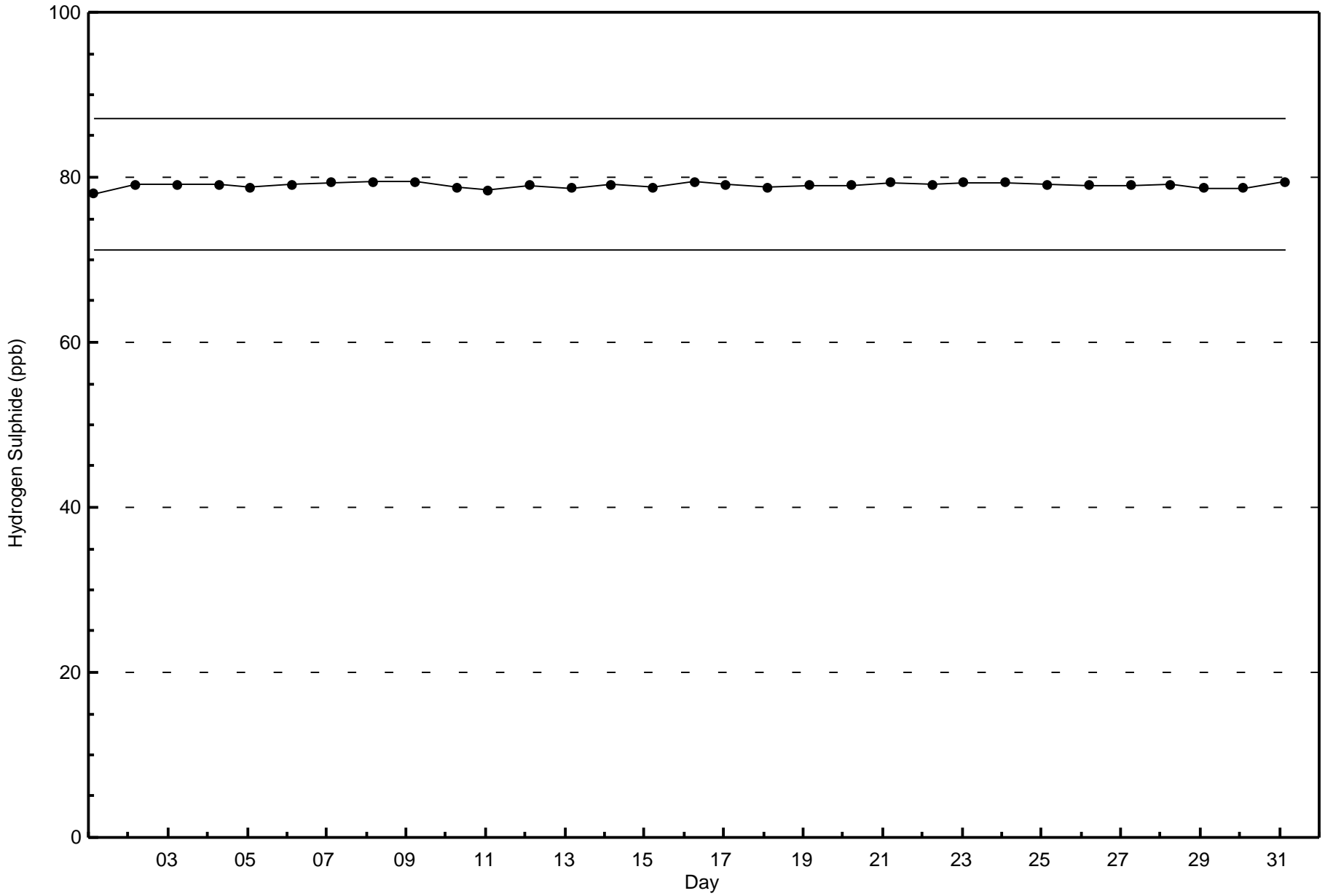
Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Mildred Lake (AMS 2)



Total Number of Valid Hours: 707

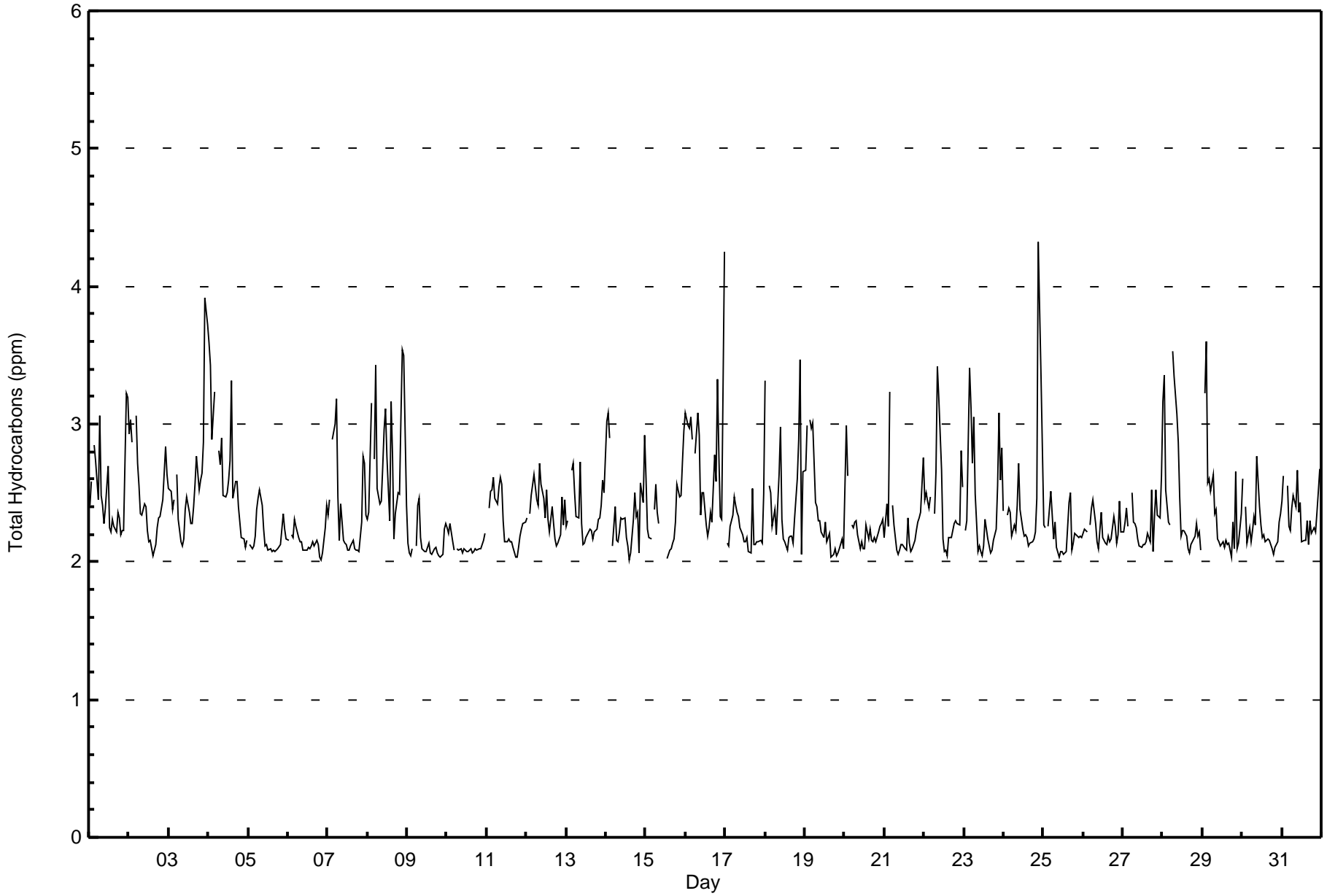






Maximum Value: 4.3 ppm on Jul 24 22:00		Maximum Daily Average: 2.7 ppm on Jul 8		Hours in Service: 744																						
Minimum Value: 2.0 ppm on Jul 6 21:00		Minimum Daily Average: 2.1 ppm on Jul 10		Hours of Data: 709																						
Maximum Diurnal Average: 2.6 ppm at hour 2		Minimum Diurnal Average: 2.2 ppm at hour 14		Hours of Missing Data: 35																						
Monthly Average: 2.37 ppm		Percentiles: P <sub>1</sub> = 2.0 P <sub>10</sub> = 2.1 Q <sub>1</sub> = 2.1 Median = 2.3 Q <sub>3</sub> = 2.5 P <sub>90</sub> = 2.8 P <sub>99</sub> = 3.5		Hours of Calibration: 35																						
				Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	2.4	2.6	Z	2.8	2.7	2.5	3.1	2.5	2.4	2.3	2.4	2.7	2.2	2.2	2.3	2.3	2.2	2.4	2.3	2.2	2.2	2.2	3.2	3.2	2.5	3.2
2-Jul	2.9	3.0	2.9	Z	3.1	2.7	2.6	2.3	2.3	2.4	2.4	2.2	2.1	2.2	2.0	2.1	2.1	2.3	2.3	2.3	2.4	2.6	2.8	2.6	2.5	3.1
3-Jul	2.5	2.5	2.4	2.5	Z	2.6	2.3	2.1	2.1	2.2	2.4	2.5	2.4	2.3	2.3	2.4	2.6	2.8	2.5	2.6	2.6	2.9	3.9	3.7	2.6	3.9
4-Jul	3.6	3.4	2.9	3.1	3.2	Z	2.8	2.7	2.9	2.5	2.5	2.6	2.7	3.3	2.5	2.6	2.6	2.4	2.3	2.2	2.2	2.1	2.2	2.2	2.7	3.6
5-Jul	Z	2.1	2.1	2.1	2.2	2.4	2.5	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	2.2	2.2	2.5
6-Jul	2.2	Z	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.0	2.0	2.1	2.2	2.4	2.2	2.4
7-Jul	2.3	2.4	Z	2.9	3.0	3.2	2.5	2.2	2.4	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.3	2.8	2.7	2.3	2.4	3.2
8-Jul	2.3	2.4	3.2	Z	2.8	3.4	2.5	2.4	2.4	2.7	3.0	3.1	2.8	2.3	3.2	2.8	2.2	2.3	2.5	2.5	3.0	3.5	3.5	2.4	2.7	3.5
9-Jul	2.1	2.1	2.0	2.1	Z	2.1	2.4	2.5	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.2	2.3	2.1	2.5
10-Jul	2.2	2.2	2.3	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.3
11-Jul	Z	2.4	2.5	2.5	2.6	2.5	2.4	2.5	2.6	2.6	2.3	2.1	2.2	2.2	2.1	2.1	2.1	2.0	2.0	2.1	2.2	2.2	2.3	2.3	2.3	2.6
12-Jul	2.3	Z	2.3	2.5	2.6	2.5	2.4	2.4	2.7	2.6	2.5	2.3	2.5	2.3	2.2	2.4	2.3	2.2	2.1	2.1	2.2	2.5	2.3	2.5	2.4	2.7
13-Jul	2.3	2.3	Z	2.7	2.7	2.5	2.3	2.3	2.7	2.3	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.4	2.6	2.5	2.3	2.7
14-Jul	3.0	3.1	2.9	Z	2.1	2.4	2.2	2.1	2.2	2.3	2.3	2.2	2.2	2.1	2.0	2.1	2.3	2.5	2.3	2.4	2.1	2.6	2.4	2.9	2.4	3.1
15-Jul	2.6	2.2	2.2	2.2	Z	2.4	2.6	2.4	2.3	C	C	C	C	2.0	2.1	2.1	2.1	2.2	2.3	2.6	2.5	2.5	2.7	3.0	2.4	3.0
16-Jul	3.1	3.0	3.0	3.1	2.9	Z	2.8	3.1	2.9	2.3	2.5	2.5	2.3	2.2	2.2	2.4	2.3	2.8	2.6	3.3	2.8	2.3	2.3	4.2	2.7	4.2
17-Jul	Z	2.1	2.1	2.3	2.3	2.5	2.4	2.4	2.3	2.2	2.2	2.1	2.1	2.2	2.1	2.1	2.5	2.1	2.1	2.2	2.1	2.2	2.1	2.5	2.2	2.5
18-Jul	3.3	Z	2.6	2.5	2.3	2.3	2.4	2.2	2.6	3.0	2.3	2.2	2.1	2.1	2.2	2.2	2.2	2.1	2.3	2.6	2.9	3.5	2.1	2.7	2.5	3.5
19-Jul	2.7	3.0	Z	3.0	3.0	3.0	2.4	2.4	2.3	2.3	2.2	2.2	2.3	2.1	2.2	2.2	2.0	2.1	2.1	2.0	2.1	2.1	2.2	2.1	2.3	3.0
20-Jul	2.5	3.0	2.6	Z	2.3	2.3	2.3	2.3	2.2	2.1	2.2	2.1	2.1	2.3	2.2	2.2	2.2	2.1	2.2	2.1	2.2	2.3	2.3	2.3	2.3	3.0
21-Jul	2.2	2.4	2.3	3.2	Z	2.4	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.1	2.1	2.1	2.2	2.2	2.3	2.3	2.4	2.8	2.3	3.2
22-Jul	2.5	2.5	2.4	2.4	2.5	Z	2.4	2.7	3.4	3.2	2.7	2.2	2.1	2.1	2.0	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.8	2.5	2.4	3.4
23-Jul	Z	2.2	2.3	3.4	3.1	2.7	3.0	2.5	2.1	2.1	2.1	2.0	2.1	2.3	2.2	2.1	2.1	2.1	2.2	2.2	2.5	3.1	2.6	2.8	2.4	3.4
24-Jul	2.4	Z	2.3	2.4	2.4	2.2	2.3	2.2	2.4	2.7	2.4	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.5	4.3	3.3	2.8	2.4	4.3
25-Jul	2.3	2.2	Z	2.3	2.5	2.3	2.2	2.3	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.4	2.5	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.5
26-Jul	2.2	2.2	2.2	Z	2.3	2.4	2.5	2.3	2.1	2.1	2.2	2.4	2.2	2.1	2.1	2.2	2.1	2.2	2.3	2.3	2.1	2.2	2.4	2.2	2.2	2.5
27-Jul	2.2	2.3	2.4	2.3	Z	2.5	2.3	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.5	2.1	2.3	2.5	2.3	2.3	2.6	2.3	2.6
28-Jul	3.2	3.4	2.5	2.3	2.3	Z	3.5	3.3	3.1	2.9	2.5	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.3	2.2	2.2	2.1	2.5	3.5
29-Jul	Z	3.2	3.6	2.6	2.6	2.5	2.6	2.3	2.4	2.2	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.0	2.3	2.1	2.7	2.1	2.1	2.3	2.4	3.6
30-Jul	2.6	Z	2.4	2.1	2.2	2.1	2.2	2.3	2.3	2.8	2.4	2.3	2.2	2.2	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.3	2.4	2.3	2.8
31-Jul	2.4	2.6	Z	2.6	2.3	2.2	2.4	2.5	2.4	2.7	2.4	2.4	2.1	2.2	2.2	2.3	2.1	2.3	2.2	2.2	2.2	2.4	2.5	2.7	2.4	2.7
																								Diurnal Average		
																								Diurnal Maximum		
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration																										







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

**Total Hydrocarbons (THC) - ppm**  
**Mildred Lake - July 2015**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	17	2.40	2.40
2.1 - 3.0	651	91.82	94.22
3.1 - 10.0	41	5.78	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



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

**Total Hydrocarbons (THC) - ppm**  
**Mildred Lake - July 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	6	5	1	1	0	0	0	0	1	0	1	2	0	0	0	0	17
2.1 - 3.0	66	51	24	15	15	14	14	33	53	64	70	47	41	34	60	50	651
3.1 - 10.0	1	0	0	0	0	1	1	6	2	3	2	1	1	8	13	2	41
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	73	56	25	16	15	15	15	39	56	67	73	50	42	42	73	52	709

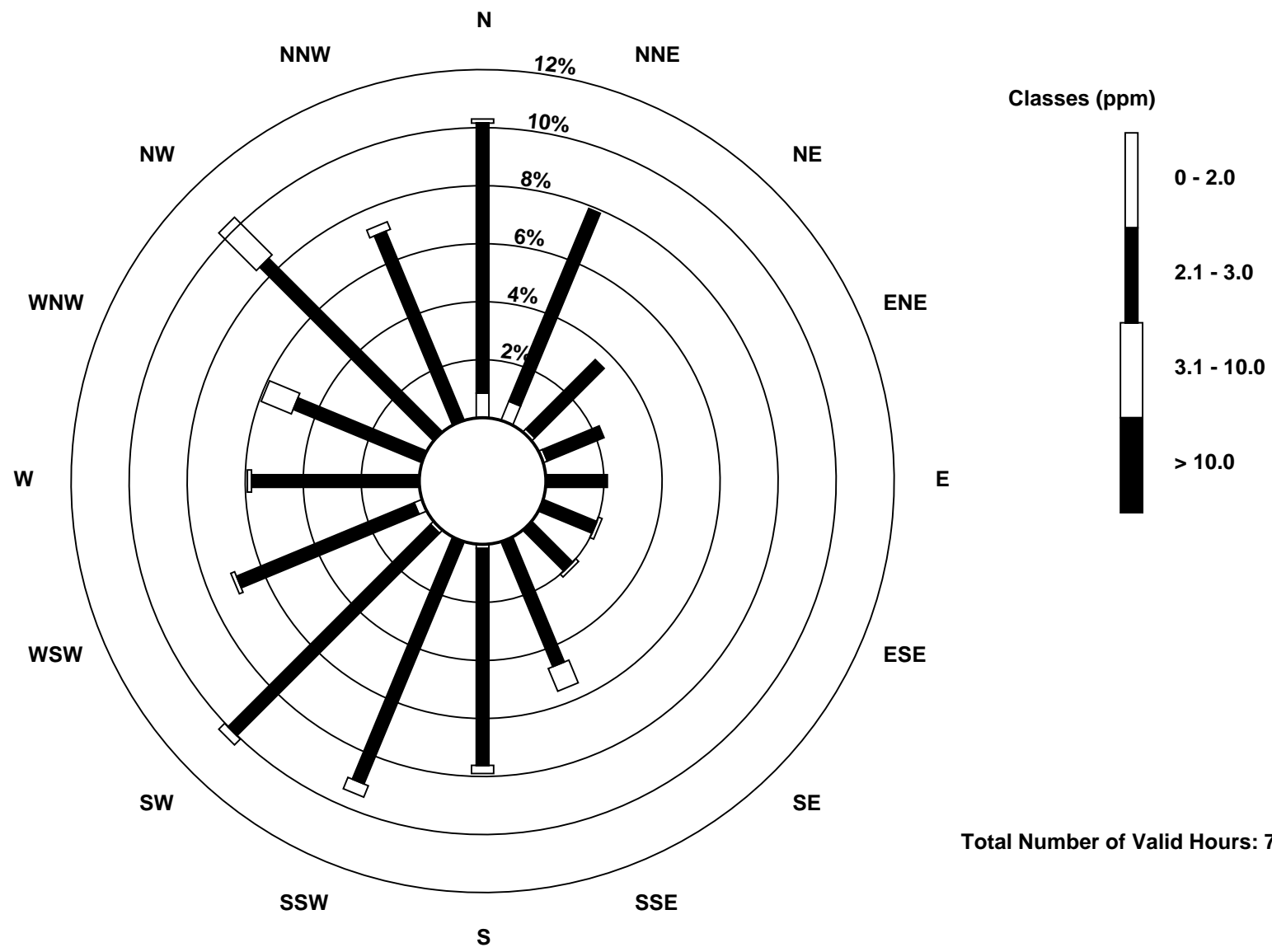
Total Number of Valid Hours: 709

Total Number of Hours: 744



Wood Buffalo Environmental Association  
Wind Rose Jul 2015

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



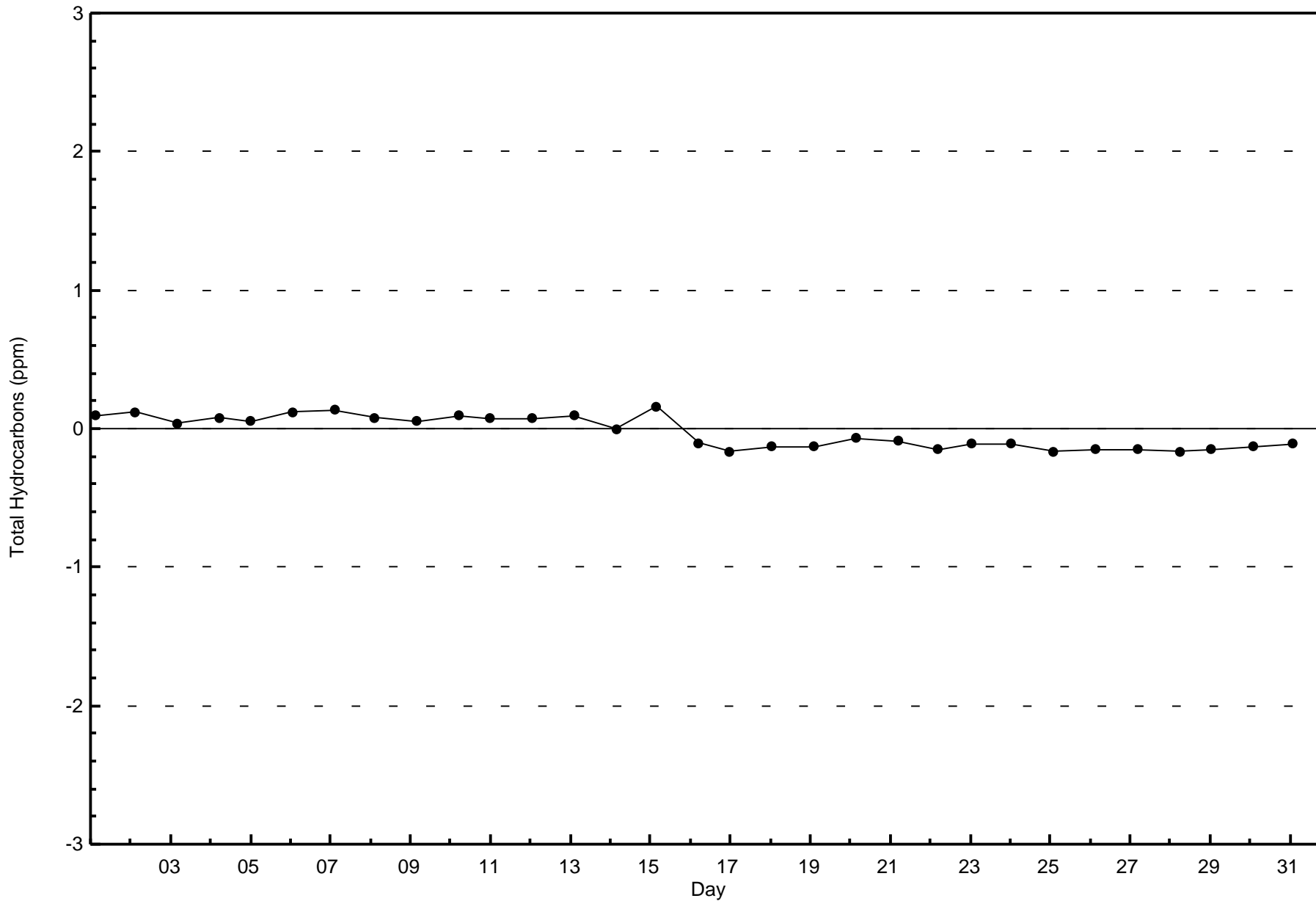


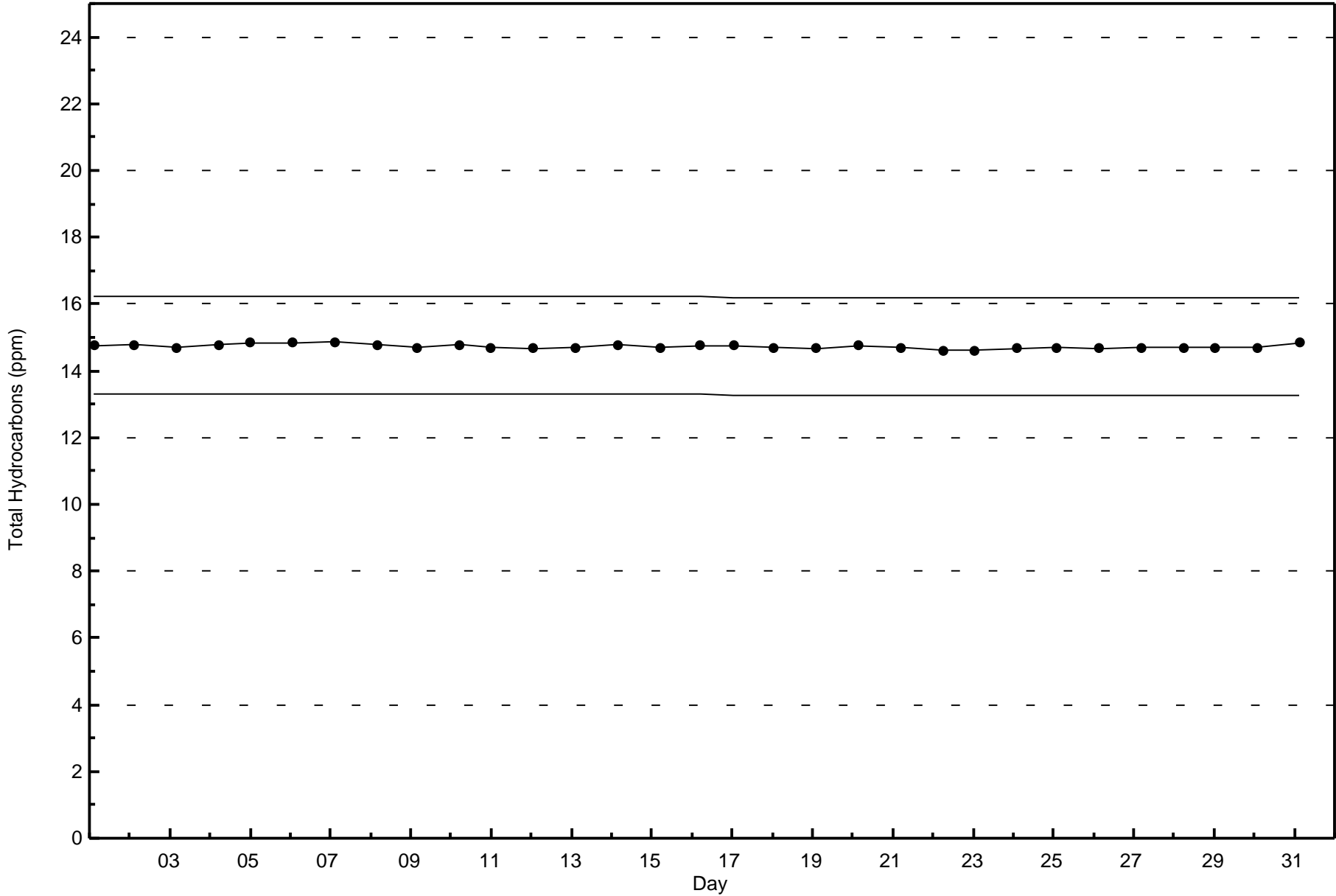
Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Mildred Lake - July 2015





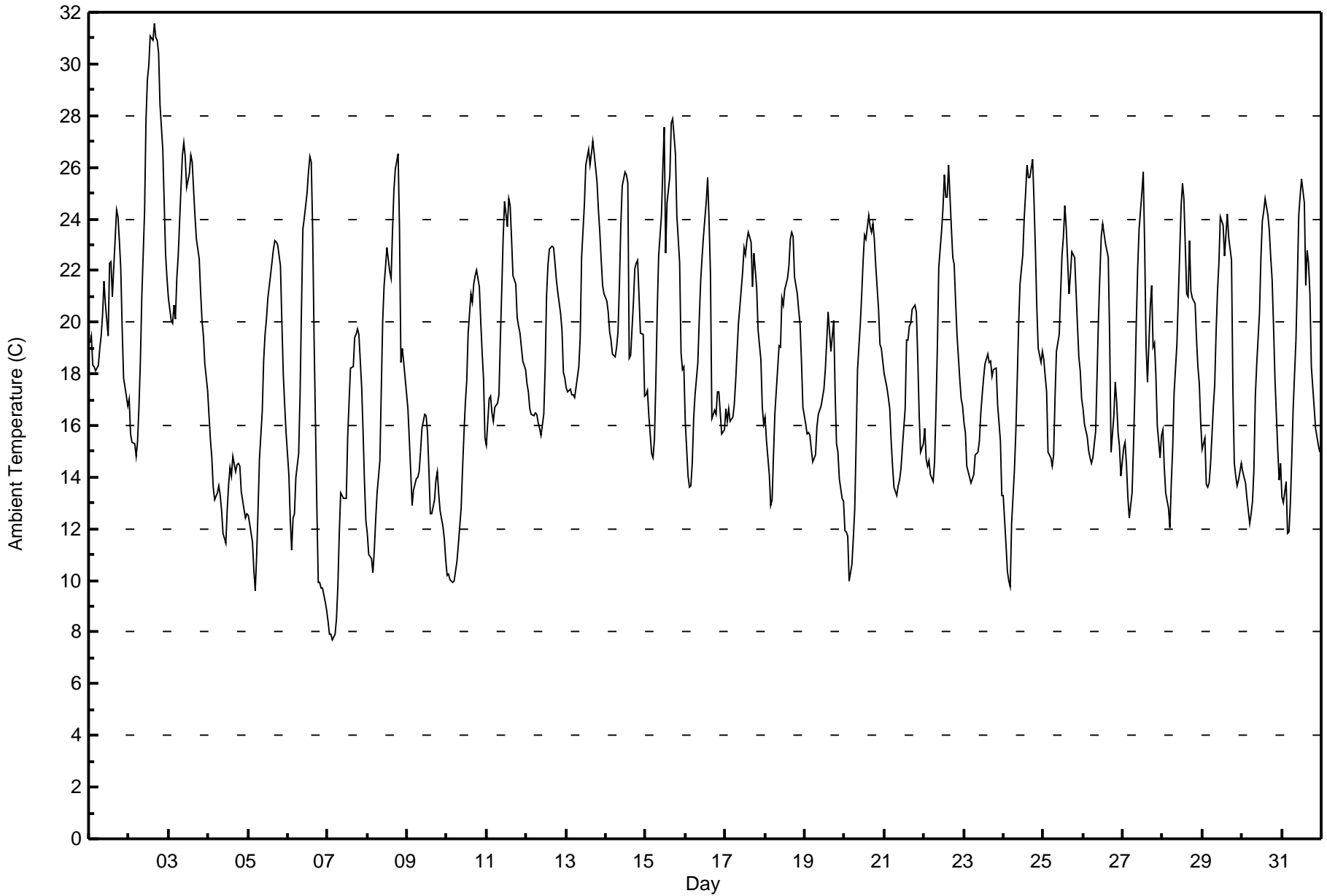


Maximum Value: 31.6 C on Jul 2 16:00		Maximum Daily Average: 23.8 C on Jul 2		Hours in Service: 744																							
Minimum Value: 7.7 C on Jul 7 04:00		Minimum Daily Average: 13.7 C on Jul 4		Hours of Data: 744																							
Maximum Diurnal Average: 22.8 C at hour 14		Minimum Diurnal Average: 13.8 C at hour 5		Hours of Missing Data: 0																							
Monthly Average: 18.43 C		Percentiles: P <sub>1</sub> = 9.1 P <sub>10</sub> = 12.9 Q <sub>1</sub> = 15.0 Median = 18.2 Q <sub>3</sub> = 22.0 P <sub>90</sub> = 24.4 P <sub>99</sub> = 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-Jul	19.2	19.5	18.3	18.3	18.1	18.4	19.0	19.5	20.3	21.6	20.7	19.5	22.3	22.3	21.0	22.1	24.4	24.1	23.2	22.1	19.8	17.8	17.2	16.7	20.2	24.4	
2-Jul	17.1	15.7	15.3	15.3	14.8	15.4	16.7	18.5	20.9	24.3	27.8	29.4	29.9	31.1	30.9	31.6	31.0	30.9	30.5	28.4	26.7	24.6	22.6	21.7	23.8	31.6	
3-Jul	21.0	20.1	20.0	20.6	20.1	21.7	22.6	25.2	26.5	26.9	26.4	25.2	25.7	26.5	26.2	25.1	24.1	23.2	22.5	21.2	20.1	19.5	18.4	17.3	22.8	26.9	
4-Jul	16.4	15.5	14.8	13.6	13.1	13.4	13.7	13.3	12.7	11.8	11.4	12.8	13.7	14.4	14.1	14.8	14.2	14.5	14.5	14.4	13.4	12.8	12.4	12.6	13.7	16.4	
5-Jul	12.5	12.2	11.5	10.4	9.6	10.9	12.8	14.7	16.5	18.5	19.5	20.1	21.0	21.8	22.3	22.8	23.2	23.1	23.0	22.2	20.0	18.0	16.8	15.7	17.5	23.2	
6-Jul	14.1	12.4	11.2	12.4	12.6	14.0	14.9	17.2	20.5	23.6	24.0	25.0	25.8	26.4	26.2	23.5	19.4	12.8	10.0	9.9	9.7	9.7	9.2	8.8	16.4	26.4	
7-Jul	8.4	7.9	7.9	7.7	7.9	8.5	9.8	11.8	13.4	13.2	13.2	13.2	15.6	16.9	18.2	18.3	19.4	19.5	19.8	19.5	17.4	15.7	13.8	12.3	13.7	19.8	
8-Jul	11.8	11.0	10.8	10.3	11.2	12.4	13.4	14.6	17.4	20.1	21.4	22.1	22.9	22.0	21.7	23.5	25.1	26.0	26.5	23.6	18.5	19.0	18.4	17.3	18.4	26.5	
9-Jul	16.6	15.5	14.2	12.9	13.5	13.9	14.0	14.2	15.0	15.9	16.5	16.4	15.7	14.3	12.6	12.6	13.1	13.9	14.2	13.4	12.7	12.1	11.6	10.8	14.0	16.6	
10-Jul	10.2	10.2	10.0	9.9	10.0	10.4	10.7	11.4	12.8	14.3	15.7	16.9	17.7	19.6	21.1	20.8	21.5	21.8	22.0	21.4	20.0	18.8	17.8	15.5	15.9	22.0	
11-Jul	15.2	17.0	17.1	16.5	16.1	16.7	16.9	17.2	19.4	21.3	23.3	24.7	23.7	24.8	24.5	23.2	21.8	21.5	20.2	19.8	19.6	19.0	18.5	18.2	19.8	24.8	
12-Jul	17.6	17.3	16.6	16.4	16.4	16.5	16.4	16.1	15.9	15.6	16.5	18.3	21.1	22.2	22.8	22.9	22.9	22.3	21.6	21.1	20.3	19.7	18.1	17.9	18.9	22.9	
13-Jul	17.4	17.3	17.4	17.2	17.2	17.1	17.5	18.3	19.4	22.5	23.6	24.5	26.1	26.7	26.1	26.5	27.0	26.5	25.5	24.4	23.5	22.4	21.4	21.1	21.9	27.0	
14-Jul	20.8	20.4	19.7	19.3	18.8	18.6	19.0	19.6	21.5	23.7	25.3	25.8	25.7	25.4	18.6	18.7	20.8	22.1	22.3	22.4	21.0	19.6	19.5	17.1	21.1	25.8	
15-Jul	17.2	17.4	16.4	14.9	14.8	15.5	17.7	20.5	22.6	24.1	26.0	27.5	22.7	24.6	25.6	27.7	27.9	27.3	26.5	24.1	22.3	18.8	18.2	18.3	21.6	27.9	
16-Jul	16.2	14.0	13.6	13.7	14.5	16.3	17.2	18.4	20.1	21.6	22.5	23.3	24.7	25.6	23.9	21.8	16.3	16.6	16.4	17.3	17.3	16.5	15.7	15.8	18.3	25.6	
17-Jul	16.6	16.2	16.6	16.2	16.4	16.8	17.7	18.9	19.9	20.6	21.9	22.9	22.6	23.2	23.5	23.1	21.4	22.7	22.0	21.3	19.7	18.5	16.7	16.0	19.6	23.5	
18-Jul	16.3	15.4	14.1	12.9	13.1	14.9	16.5	17.4	19.1	19.0	20.9	20.7	21.3	21.7	22.2	23.2	23.5	23.3	21.8	21.1	20.4	19.9	18.4	16.7	18.9	23.5	
19-Jul	16.1	15.7	15.7	15.6	15.1	14.6	14.8	16.0	16.4	16.6	16.8	17.4	18.2	19.3	20.4	19.6	18.9	20.1	17.3	15.3	15.0	13.9	13.2	13.1	16.5	20.4	
20-Jul	11.9	11.9	11.7	10.0	10.6	11.7	12.7	15.4	18.2	20.0	21.1	22.4	23.4	23.2	24.1	23.7	23.5	23.8	23.2	22.2	20.5	19.2	19.0	18.5	18.4	24.1	
21-Jul	18.0	17.4	17.1	16.7	15.4	14.4	13.6	13.3	13.6	13.9	14.3	15.1	16.7	19.3	19.3	19.8	19.9	20.5	20.7	20.4	18.6	16.4	15.0	15.3	16.9	20.7	
22-Jul	15.9	14.7	14.4	14.6	14.1	13.9	14.6	16.6	19.1	22.2	23.6	24.4	25.7	24.8	24.8	26.1	23.6	22.5	22.2	20.8	19.5	17.8	17.0	16.7	19.6	26.1	
23-Jul	16.1	15.7	14.4	14.0	13.8	13.9	14.1	14.9	15.0	15.4	16.5	17.2	17.9	18.4	18.8	18.4	18.5	17.9	18.2	18.2	16.8	16.1	15.4	13.3	16.2	18.8	
24-Jul	13.3	11.4	10.4	10.0	9.8	12.2	14.3	15.7	17.7	19.9	21.5	22.6	24.0	25.0	26.1	25.6	25.6	26.3	24.7	22.8	20.6	19.0	18.4	18.8	19.0	26.3	
25-Jul	18.5	17.9	17.3	15.0	14.8	14.4	14.9	17.1	18.9	19.5	21.1	22.6	23.3	24.5	23.6	21.1	21.8	22.7	22.6	22.5	19.9	18.7	18.1	17.0	19.5	24.5	
26-Jul	16.6	16.0	15.6	15.0	14.7	14.6	14.8	15.8	17.9	20.1	21.8	23.3	23.8	23.0	22.8	22.5	19.4	15.0	16.4	17.7	16.9	15.8	15.2	14.1	17.9	23.8	
27-Jul	15.1	15.4	14.5	13.3	12.4	13.4	15.2	17.3	20.0	22.1	23.6	25.0	25.8	22.9	19.1	17.7	20.6	21.4	19.0	19.2	17.9	16.0	14.7	15.6	18.2	25.8	
28-Jul	15.9	14.4	13.4	12.8	12.0	13.8	15.2	17.3	19.1	20.9	22.7	24.4	25.4	24.8	21.1	21.0	23.2	21.2	20.9	20.7	19.4	18.3	17.6	16.1	18.8	25.4	
29-Jul	15.1	15.5	13.7	13.6	13.8	14.5	16.7	17.6	19.6	21.2	22.3	24.1	23.7	22.6	23.4	24.2	23.3	22.4	17.4	14.5	14.0	13.7	13.9	14.6	18.1	24.2	
30-Jul	14.2	14.0	13.8	13.2	12.2	12.6	13.1	14.3	17.1	18.4	20.4	22.5	23.9	24.3	24.8	24.1	23.5	22.5	21.7	19.8	17.8	15.1	13.9	14.5	18.0	24.8	
31-Jul	13.2	13.0	13.8	11.8	11.9	12.9	14.7	16.6	19.3	21.6	24.1	24.9	25.6	24.6	21.4	22.8	22.3	21.1	18.3	16.7	15.9	15.6	15.3	15.0	18.0	25.6	
		15.6	15.1	14.6	14.0	13.8	14.5	15.3	16.6	18.3	19.7	20.8	21.8	22.4	22.8	22.3	22.2	22.0	21.6	20.8	20.0	18.6	17.4	16.5	15.9	Diurnal Average	
		21.0	20.4	20.0	20.6	20.1	21.7	22.6	25.2	26.5	26.9	27.8	29.4	29.9	31.1	30.9	31.6	31.0	30.9	30.5	28.4	26.7	24.6	22.6	21.7	Diurnal Maximum	



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

**Ambient Temperature (AT) - C**  
**Mildred Lake - July 2015**







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

**Ambient Temperature (AT) - C**  
**Mildred Lake - July 2015**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	19	2.55	2.55
10 - 20	451	60.62	63.17
> 20	274	36.83	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Relative Humidity (RH) - %**

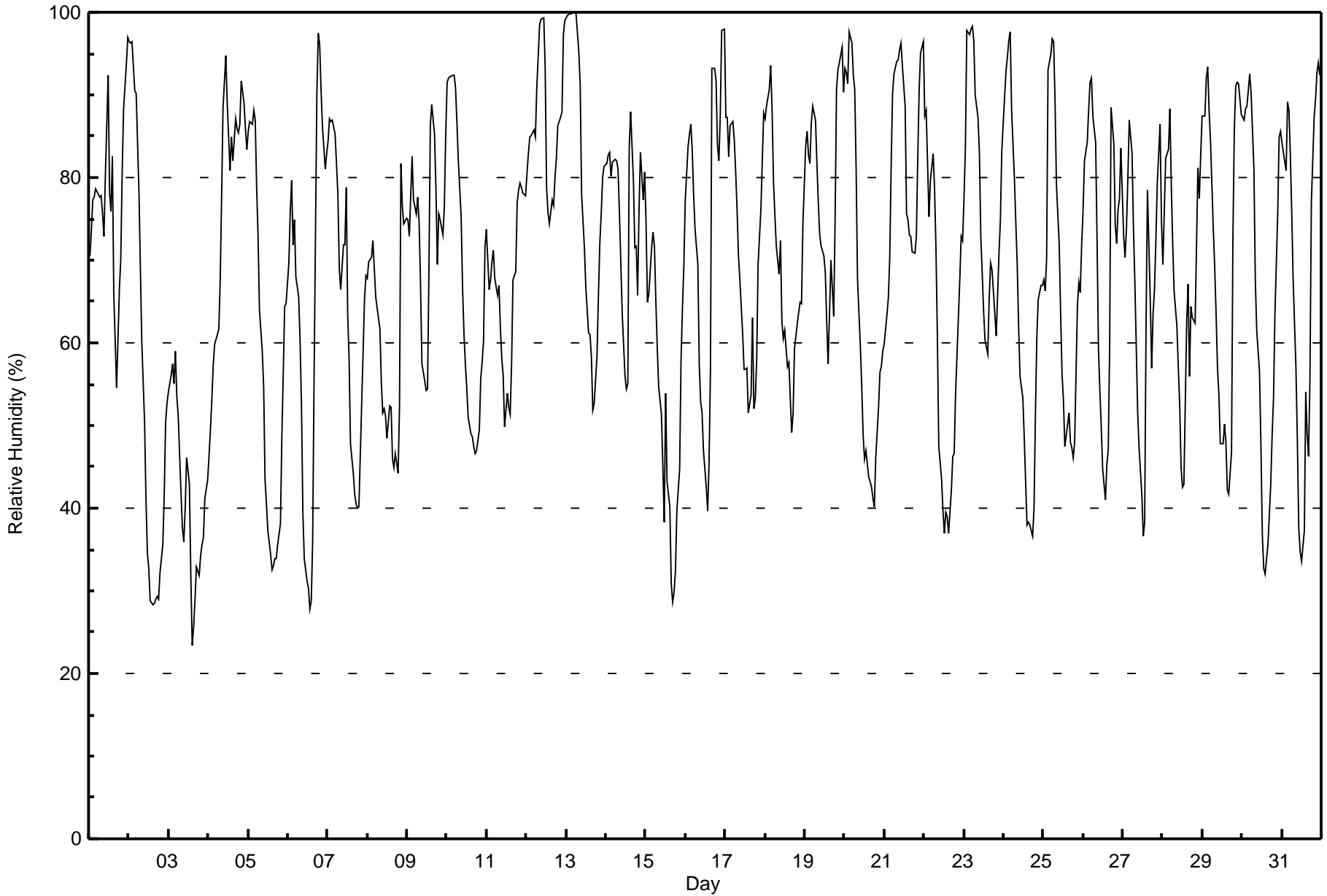
**Mildred Lake - July 2015**

Maximum Value: 100 % on Jul 13 06:00																			Maximum Daily Average: 86.8 % on Jul 12						Hours in Service: 744																			
Minimum Value: 23 % on Jul 3 15:00																			Minimum Daily Average: 41.5 % on Jul 3						Hours of Data: 744																			
Maximum Diurnal Average: 84.3 % at hour 5																			Minimum Diurnal Average: 50.6 % at hour 14						Hours of Missing Data: 0																			
Monthly Average: 68.1 %																			Percentiles: P <sub>1</sub> = 29 P <sub>10</sub> = 41 Q <sub>1</sub> = 54 Median = 70 Q <sub>3</sub> = 83 P <sub>90</sub> = 91 P <sub>99</sub> = 99						Hours of Calibration: 0																			
																									Percent Operational Time: 100.0																			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																				
1-Jul	71	74	77	78	79	78	78	78	76	73	80	92	78	76	82	66	55	60	66	70	81	88	94	97	76.9	97																		
2-Jul	96	96	96	91	90	84	78	69	60	50	41	35	33	29	28	28	29	29	29	32	36	41	50	53	54.4	96																		
3-Jul	54	56	57	55	59	54	51	42	38	36	40	46	43	32	23	26	29	33	32	34	36	36	41	43	41.5	59																		
4-Jul	46	50	53	57	60	61	62	68	78	88	95	89	85	81	85	82	87	86	85	86	92	89	86	83	76.4	95																		
5-Jul	86	87	86	88	87	79	73	64	59	55	43	40	37	34	33	33	34	34	36	38	49	56	64	65	56.7	88																		
6-Jul	70	76	80	72	75	68	66	60	53	39	34	31	30	28	29	36	56	90	98	96	91	86	81	83	63.6	98																		
7-Jul	84	87	87	87	85	82	78	69	67	72	72	79	63	58	48	44	42	41	40	40	53	59	65	68	65.4	87																		
8-Jul	68	70	70	72	69	66	64	62	55	52	52	51	49	52	52	46	45	47	44	52	82	77	74	75	60.3	82																		
9-Jul	75	73	78	82	77	76	78	75	67	57	55	54	54	69	86	89	85	79	69	76	75	73	76	85	73.5	89																		
10-Jul	91	92	92	92	92	91	87	82	75	67	61	57	55	51	49	49	47	47	47	50	56	58	60	72	67.5	92																		
11-Jul	74	66	68	70	71	68	66	67	62	58	56	50	54	52	51	57	68	69	77	79	79	79	78	78	66.5	79																		
12-Jul	81	83	85	85	86	85	91	95	98	99	99	93	79	76	74	77	77	80	82	86	87	88	97	99	86.8	99																		
13-Jul	99	100	100	100	100	100	100	95	91	78	75	72	67	61	61	58	52	53	59	66	72	76	80	81	78.9	100																		
14-Jul	82	83	83	80	82	82	82	81	76	70	64	56	54	55	84	88	80	72	72	66	76	83	77	81	75.3	88																		
15-Jul	75	65	66	72	73	72	65	59	55	51	45	38	54	43	40	31	29	30	32	40	45	58	64	69	53.0	75																		
16-Jul	77	84	85	86	83	78	74	70	57	53	51	47	43	40	46	57	93	93	92	84	82	88	98	98	73.2	98																		
17-Jul	87	87	83	86	87	85	81	76	71	68	61	57	57	52	54	63	52	53	58	69	76	82	88	70.4	88																			
18-Jul	87	89	91	94	88	79	75	72	68	72	62	60	62	57	58	53	49	52	59	62	64	65	65	74	69.1	94																		
19-Jul	84	86	83	82	87	89	87	82	77	73	72	71	69	63	57	64	70	63	75	91	93	94	96	90	78.9	96																		
20-Jul	93	93	91	98	96	92	91	81	68	60	55	49	46	47	44	43	43	41	40	46	52	56	57	59	64.2	98																		
21-Jul	60	63	65	70	81	90	92	94	94	96	96	94	89	76	75	73	73	71	71	73	82	91	95	96	81.7	96																		
22-Jul	87	88	82	75	80	83	79	71	61	47	44	40	37	40	39	37	42	46	47	54	58	68	73	72	60.4	88																		
23-Jul	77	84	98	97	98	98	97	90	87	83	73	68	64	60	59	65	70	69	66	61	66	71	75	83	77.5	98																		
24-Jul	87	93	95	97	98	88	80	75	69	62	56	53	49	43	38	38	38	37	40	51	61	65	67	67	64.4	98																		
25-Jul	68	66	70	93	95	97	96	89	79	72	64	56	53	48	49	52	48	47	46	48	65	67	66	72	66.9	97																		
26-Jul	76	82	84	88	92	92	88	84	73	59	54	50	45	41	45	47	60	89	84	74	72	76	78	84	71.5	92																		
27-Jul	73	70	74	80	87	83	74	67	59	52	47	42	37	38	63	79	65	57	64	66	72	79	86	75	66.2	87																		
28-Jul	69	76	82	83	88	79	72	66	62	57	53	45	43	43	63	67	56	64	63	62	72	81	78	83	67.0	88																		
29-Jul	87	87	92	93	88	84	74	69	63	57	54	48	48	50	48	42	42	47	73	86	91	92	91	88	70.6	93																		
30-Jul	87	87	88	89	93	90	86	81	68	62	56	48	37	33	32	36	39	43	49	53	64	76	85	86	65.2	93																		
31-Jul	84	83	81	89	88	83	76	68	57	48	38	35	34	37	54	49	46	56	77	87	89	93	94	92	68.2	94																		
																			78.6	79.8	81.4	83.3	84.3	81.7	78.6	74.2	68.5	63.4	59.6	56.3	53.0	50.6	53.1	53.7	55.1	57.2	60.2	63.5	69.7	73.7	76.6	78.7	Diurnal Average	
																			99	100	100	100	100	100	100	95	98	99	99	94	89	81	86	89	93	93	98	96	93	94	98	99	Diurnal Maximum	



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

**Relative Humidity (RH) - %**  
**Mildred Lake - July 2015**





Maximum Speed: 26 km/h on Jul 3 15:00	Maximum Daily Speed Average: 12.8 km/h on Jul 17	Hours in Service: 744
Minimum Speed Value: 0 km/h on Jul 13 01:00	Minimum Daily Speed Average: 0.7 km/h on Jul 28	Hours of Data: 744
Maximum Diurnal Speed Average: 4.3 km/h at hour 13	Minimum Diurnal Speed Average: 1.4 km/h at hour 22	Hours of Missing Data: 0
Monthly Average Velocity: 2.4 km/h 297.1 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 3 Q <sub>1</sub> = 5 Median = 7 Q <sub>3</sub> = 10 P <sub>90</sub> = 14 P <sub>99</sub> = 20	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	SSW3	W4	NW4	WNW7	W5	W7	WNW8	WNW7	WNW7	WSW6	NW9	W3	SW7	W2	NW9	W4	NNW1	ESE2	NNE4	ENE3	ENE2	SSW3	SSW4	SSW3	WNW3.0	NW9
2-Jul	SW5	SSW4	SW4	SW5	SSW5	SW7	SW6	WSW6	SW4	SW5	SSW6	SW8	WNW8	W11	WSW9	WSW11	SW8	SW8	SW9	SSW8	S7	SSW7	SSW8	SW7	SW6.4	WSW11
3-Jul	SW6	SSW8	S9	S8	S8	SW9	SW11	WSW14	WSW15	W19	WNW18	WNW20	NW19	NW20	NNW26	NW23	NW18	NW14	NNW12	NNW10	NNW10	NW11	NW10	NW12	WNW10.0	NNW26
4-Jul	NW12	NW12	WNW13	WNW13	WNW14	WNW12	NW11	NW8	NW6	W6	W8	WNW11	WNW11	WNW10	NW7	N5	NNE2	N2	NNW6	NNW12	NNW14	N19	NNE18	N16	NW8.6	N19
5-Jul	N14	N14	N14	N10	NNW9	NNW9	NNW7	NW6	NW7	NW6	N12	N12	NNW12	N9	N9	NNW8	NNW6	NE5	S4	S6	S5	SSW5	SSW7	SW6	NNW5.4	N14
6-Jul	SSW5	SSE4	SSE4	SW5	S5	SSW6	SSW9	SSW9	SSW10	SW10	W11	W13	W12	WSW12	W13	NNW17	N21	NNE25	NNE20	N23	N17	NNW12	NNW12	NW12	NW5.5	NNE25
7-Jul	NW13	NNW12	NW11	NW11	NW9	NNW9	NNW10	NNW5	W5	WSW9	WSW5	WSW6	SSW9	SSW8	W6	WNW9	WNW9	WNW12	WNW9	WSW7	SSW7	SSW7	SSW8	SW7	WNW5.8	NW13
8-Jul	SSW7	S4	SSE8	SSE7	S12	SSE13	S13	S15	S14	SSE16	SSE15	SSE14	S11	SSW8	S16	S11	S11	W8	NW13	NW24	NW13	NW12	NW11	NNW11	SSW5.7	NW24
9-Jul	N11	N9	N8	NNE6	N10	N5	NNW6	NNW8	NE9	NNE8	NE5	N6	N7	NE6	NE5	NNE12	NE12	NNE13	NNE16	NNE12	NNE10	N8	N7	N7	NNE8.2	NNE16
10-Jul	N6	N7	N7	NNE7	NNE5	NNE8	NNE9	NE6	NNE7	NNE7	NNE7	NE7	NE6	NW4	WSW5	NE4	NE3	N7	NNW6	N7	NE6	NE8	NNE7	NNE3	NNE5.4	NNE9
11-Jul	E3	SSE8	SSE10	SE7	SE10	SSE12	SSE16	SSE11	SE7	SSE12	S14	S16	SSE17	SSE14	SSE12	SE8	ESE6	ENE7	NE7	ENE10	ENE7	E6	E6	ENE5	SE7.8	SSE17
12-Jul	NE5	NNE5	N9	N8	N7	NNE8	NE4	ENE3	NNE3	N10	ENE6	NNW4	N4	NNE6	NNE9	NNE10	NE8	N9	NNE7	NNE5	NNW7	WSW14	SW7	NNE8	NNE5.1	WSW14
13-Jul	WSW0	SSE4	SSW4	W3	SSW4	SW6	SSW4	SSE5	SSE7	SSW8	SSW8	SW8	SW9	SW8	WSW6	SW6	SW8	SSW7	SE4	S7	SSW7	SSE5	E2	SSE7	SSW4.8	SW9
14-Jul	SSE9	SSE9	SSE8	S9	S8	S10	S9	SSW9	SSW6	SSW6	SW5	S4	S3	NW3	NNE7	SSW2	SSW5	SSE7	SE8	S10	S7	SSE8	N1	WNW2	S5.1	S10
15-Jul	W6	SW6	WSW6	WSW8	W9	WSW8	W7	SW6	SW6	SSW7	SSW10	SW10	SSW11	S8	SSE9	SW11	WSW11	WSW10	SW9	SW8	W2	E1	SSW3	SW5	SW6.5	WSW11
16-Jul	SW3	ESE1	SSE1	S3	S1	S4	SE2	NNW2	NNW7	NNW10	N14	N14	NNE15	NNE13	NNE6	S2	SW12	WSW6	WNW13	NW14	NNW14	E1	NW4	WNW8	NNW4.0	NNE15
17-Jul	NNW16	NNW17	N16	N16	N15	N14	N15	NNE16	N20	N20	N19	N20	N19	NNE15	N17	N16	NNW9	NNE12	N11	NNE5	NE3	NE2	W2	W4	N12.8	N20
18-Jul	WSW4	SW4	WSW3	SW3	WSW5	WSW5	SSW8	SSW9	S8	SSE8	WSW8	WSW11	SW10	WSW14	W11	WNW13	W18	WNW19	WNW16	WNW14	WNW13	NW12	NNW15	NNW11	W7.4	WNW19
19-Jul	NW11	NW11	NW13	NW11	NW10	NW11	NW12	NW12	NW13	NW15	NW13	NW16	NW14	NW14	NW16	NW13	N16	N11	NNE12	NNE7	N4	N4	N6	NNW7	NNW10.7	NW16
20-Jul	NW5	WNW5	WNW5	W3	WSW4	SW4	SW5	SW6	SW6	SSW7	SSW8	SSW10	SSW8	S8	S8	SSE10	S9	S8	SSE8	ESE7	ESE8	ESE9	SE11	SE12	S4.8	SE12
21-Jul	SE12	SE9	SSE10	SSE10	SSE8	ESE5	ENE5	ENE7	ENE6	E5	ESE9	ESE8	SSW6	SW5	N6	N9	N9	NNE10	NE7	ENE5	NNE3	NW0	S3	SSE2	E3.2	SE12
22-Jul	S4	SSW2	W4	W6	WSW5	WSW4	WSW4	NW3	N2	WNW3	SW5	SSW6	SW7	SW6	WSW5	WSW6	WNW6	NW12	NW10	NW12	WNW12	WNW11	NW9	NNW9	W4.9	WNW12
23-Jul	NNW8	N7	NW4	NW8	NW7	NW5	NW4	NNW10	NNW12	N11	N12	N9	NNW8	NW7	NNW7	WSW6	SSW9	SE6	E3	NW7	NW4	WNW5	WNW5	WSW3	NNW5.1	N12
24-Jul	WSW5	S3	ESE1	SW2	SSW4	SSW6	SSW7	S5	S5	S7	S7	SSE7	S6	SSE7	SSW8	SSW9	WSW9	SW7	SSW5	S5	S6	SSE6	SE6	SSE6	S5.2	SSW9
25-Jul	SW6	WSW8	WSW10	W11	NNW4	ESE3	SE4	SSW7	SW8	SW9	WSW10	WSW9	WSW10	W9	WNW9	NNW16	NNW7	E3	E7	E5	NE3	N6	N9	NNE9	W3.2	NNW16
26-Jul	NNE12	N11	NNE6	N8	NNE7	NNE6	NNE5	NE5	NNE5	N4	W5	SW7	WSW6	NW13	N11	W4	WNW7	SSW6	SE6	S6	S10	S10	S8	SSW5	NNW1.6	NNW13
27-Jul	WSW8	W5	SW6	SW5	SSW6	SSW8	SW6	SW9	SW10	SW9	SW9	SW10	WSW12	N11	N12	N5	NNE1	NNW8	N9	S5	SW5	S1	SSW4	W5	WSW3.8	WSW12
28-Jul	NW10	WNW4	SSW6	SSW8	WSW3	NW5	NW5	W3	SW5	SSW5	SSW4	SW2	W2	SSE3	ENE8	E6	ESE6	NNE9	ESE5	ESE5	NNW3	NNE7	NNE14	NE8	NNE0.7	NNE14
29-Jul	W4	WNW7	ESE2	SW4	ENE2	NNE1	W7	W6	SW5	WSW6	SW6	SW6	W8	W11	WNW10	WNW11	NNW11	NNE10	NW14	NNW12	NE2	E3	SW2	NW8	WNW4.4	NW14
30-Jul	NW8	NW5	NW7	WNW6	WSW6	WSW9	WSW9	W8	W8	NW10	NW10	NW11	NW17	NW16	NNW15	N11	NE10	E8	NE11	ENE7	E2	SSW2	SW4	SSW4	NW5.0	NW17
31-Jul	E5	S4	SSW5	SW4	SSW6	SSW7	S5	S6	S5	S6	SSW5	S4	S5	SW8	SW8	SW6	W5	NW7	N8	NNE6	NNE5	NNW1	SW3	WNW5	SSW2.6	SW8

NW2.9	NW2.1	NNW1.9	W2.7	W2.1	WSW2.0	WSW2.4	WSW2.2	W2.2	W2.9	W3.0	W3.3	W4.3	NNW4.1	NW4.2	NW4.1	NW3.1	NNW3.5	N3.8	NNW3.2	NNW2.3	NNW1.4	NW1.9	NW2.6		Diurnal Average
NNW16	NNW17	N16	N16	N15	N14	SSE16	NNE16	N20	N20	N19	N20	N19	NW20	NNW26	NW23	N21	NNE25	NNE20	NW24	N17	N19	NNE18	N16		Diurnal Maximum

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



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

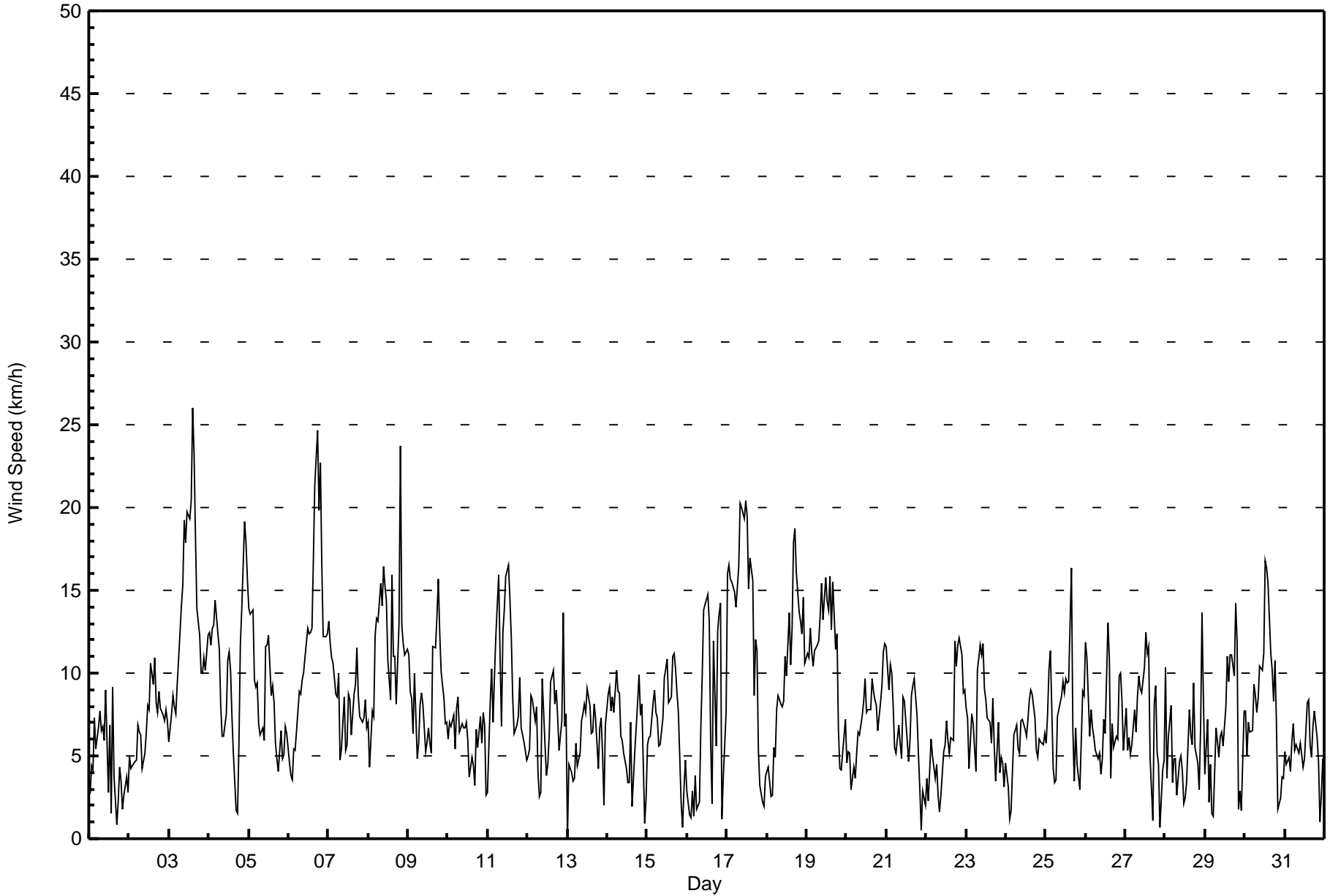
**Wind Speed (WS) - km/h**  
**Mildred Lake - July 2015**

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



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

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





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

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

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	211	28.36	28.36
6 - 11	395	53.09	81.45
12 - 19	126	16.94	98.39
20 - 28	12	1.61	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



**Wood Buffalo Environmental Association  
Frequency Distribution**

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

<b>Wind Speed Ranges (km/h)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	9	15	11	8	11	8	3	8	23	25	26	15	20	8	14	7	211
6 - 11	40	28	13	8	5	7	10	24	30	48	49	31	20	21	32	29	395
12 - 19	22	13	1	0	0	0	2	10	7	0	1	6	5	13	29	17	126
20 - 28	5	2	0	0	0	0	0	0	0	0	0	0	0	1	3	1	12
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	76	58	25	16	16	15	15	42	60	73	76	52	45	43	78	54	744

Total Number of Valid Hours: 744

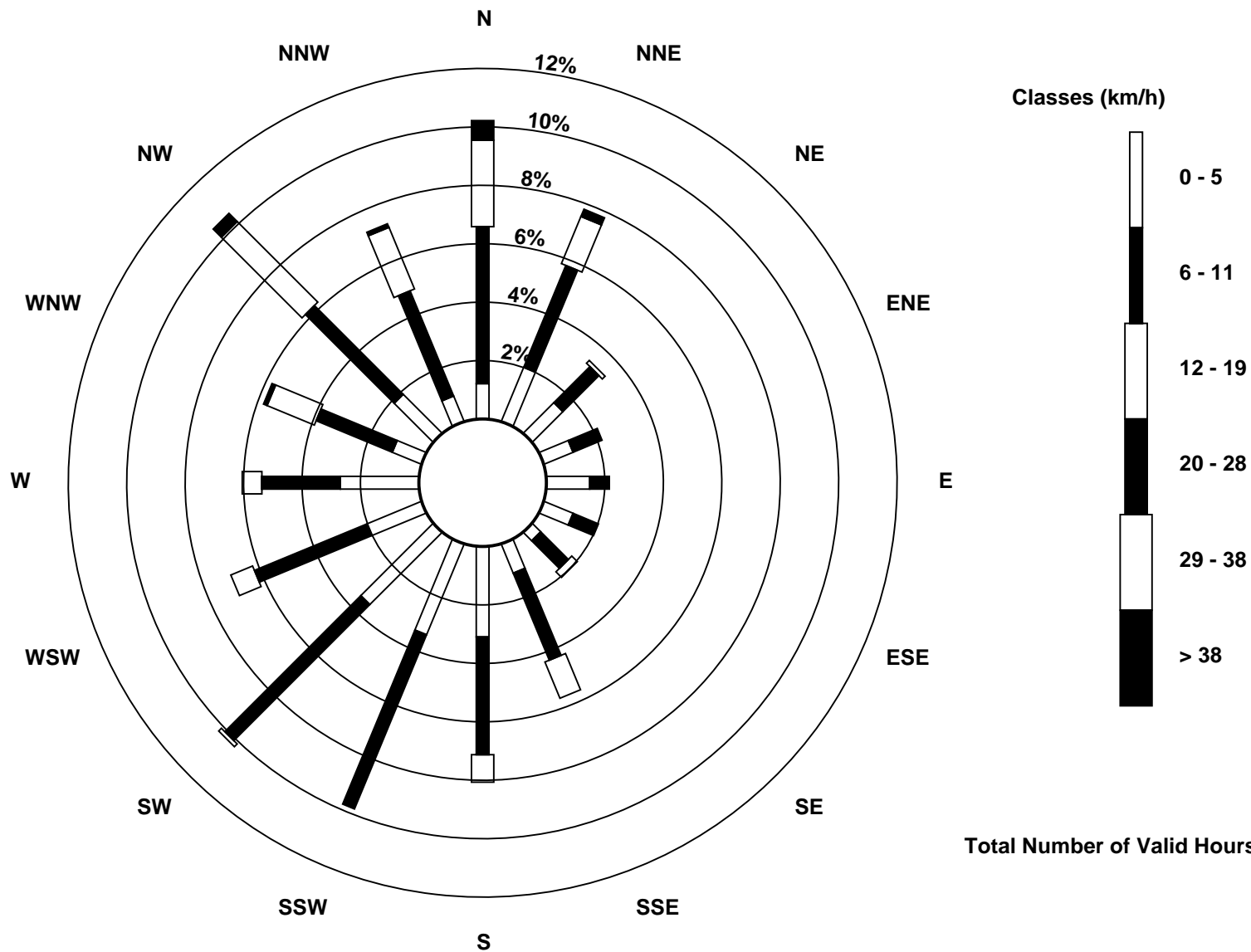
Total Number of Hours: 744





Wood Buffalo Environmental Association  
Wind Rose Jul 2015

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





**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Wind Direction (WD) - deg**

**Mildred Lake - July 2015**

Direction of Maximum Speed: 330 deg on Jul 3 15:00																		Hours in Service: 744	
Direction of Maximum Daily Speed Average: 4.4 deg on Jul 17																		Hours of Data: 744	
Direction of Minimum Speed: 240 deg on Jul 13 01:00									Direction of Minimum Daily Speed Average: 0.7 deg on Jul 28									Hours of Missing Data: 0	
Monthly Average Direction: 271.5 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-Jul	209	268	311	298	263	272	293	288	293	246	326	266	230	277	324	265	343	120	31	67	61	192	197	211	282.4
2-Jul	224	200	224	220	212	225	222	239	215	230	211	221	285	274	254	258	228	229	218	213	190	204	209	217	228.2
3-Jul	223	208	184	170	183	230	234	255	253	275	282	303	317	319	330	318	316	319	344	338	342	325	308	306	296.3
4-Jul	305	307	294	294	292	293	309	325	310	262	260	286	285	297	318	11	21	349	346	348	5	12	3		319.6
5-Jul	7	4	4	354	341	341	333	315	313	315	0	358	347	5	354	342	330	48	185	181	188	196	212	219	344.3
6-Jul	211	155	159	229	190	196	199	202	204	233	269	266	260	256	268	329	359	13	13	2	4	338	328	322	310.5
7-Jul	324	327	323	309	320	343	345	341	272	249	253	251	200	210	274	303	284	294	291	254	211	208	208	214	282.9
8-Jul	205	187	168	161	171	167	173	171	175	165	163	167	179	206	170	187	191	276	306	324	306	315	323	336	198.8
9-Jul	359	358	355	14	7	358	327	343	43	31	34	4	354	35	47	16	34	21	26	24	25	11	9	1	14.5
10-Jul	360	8	11	21	28	20	25	42	19	22	15	43	40	308	245	41	41	356	340	6	36	55	31	24	19.7
11-Jul	92	147	152	145	144	151	162	164	139	165	171	171	167	160	161	124	104	73	55	71	60	81	79	76	140.6
12-Jul	50	19	8	9	7	23	47	75	33	5	71	334	359	19	23	21	42	6	14	18	344	244	236	14	11.4
13-Jul	240	148	213	278	196	214	194	153	159	204	198	227	236	229	255	225	218	201	133	179	200	163	95	147	199.9
14-Jul	160	168	163	174	188	185	188	192	209	213	224	184	178	308	16	194	200	152	140	182	187	163	353	293	181.3
15-Jul	268	228	238	249	262	256	269	231	231	208	211	214	199	179	154	221	238	239	230	226	268	99	200	218	226.1
16-Jul	226	102	149	180	170	190	135	342	338	342	352	7	15	17	29	189	222	241	293	325	331	79	308	301	333.6
17-Jul	339	347	353	1	5	9	11	15	11	9	11	9	9	17	354	354	341	30	10	18	49	48	278	281	4.4
18-Jul	257	233	258	235	248	239	211	206	185	151	245	245	232	250	262	285	280	289	291	296	302	323	348	328	271.5
19-Jul	306	314	318	313	307	316	320	323	316	313	314	324	316	322	317	318	354	358	20	12	10	3	349	342	326.8
20-Jul	312	294	286	270	242	224	232	225	223	212	198	196	204	174	182	159	171	182	152	123	122	107	133	126	179.9
21-Jul	129	142	152	163	150	109	65	70	66	81	118	119	196	227	9	358	9	13	41	58	28	325	184	164	98.7
22-Jul	191	211	267	262	238	239	251	307	8	292	224	209	233	223	245	239	298	314	314	307	300	297	306	331	279.2
23-Jul	327	4	317	311	324	316	304	340	346	351	1	2	335	325	332	257	202	133	83	324	323	300	293	253	329.8
24-Jul	238	175	121	215	210	199	205	186	186	170	170	166	184	163	194	208	237	235	209	172	169	165	130	155	188.2
25-Jul	234	248	244	272	337	102	137	207	218	231	251	244	250	264	284	332	348	84	99	89	47	2	8	18	276.5
26-Jul	15	11	21	6	18	31	17	41	18	351	270	225	251	326	352	274	291	204	142	188	179	172	189	209	332.9
27-Jul	239	270	227	227	208	206	216	221	216	232	236	236	245	359	7	9	26	336	3	179	227	171	212	281	250.1
28-Jul	311	301	200	205	254	319	317	259	221	204	197	225	260	168	75	96	109	27	116	121	339	12	17	53	19.6
29-Jul	265	298	108	229	71	28	268	270	230	245	215	230	276	271	282	296	330	16	309	339	56	101	218	321	291.3
30-Jul	306	321	304	292	255	258	249	260	278	326	316	311	312	313	328	7	50	87	47	74	83	202	215	208	315.1
31-Jul	96	185	199	215	199	194	191	179	189	186	212	169	172	229	227	220	261	325	360	17	25	333	226	302	212.9

306.0 306.7 285.7 278.7 268.7 256.6 256.2 253.0 260.6 261.7 265.0 266.1 272.1 288.3 310.8 311.4 307.5 341.3 353.3 345.0 335.9 328.3 323.0 321.1  
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

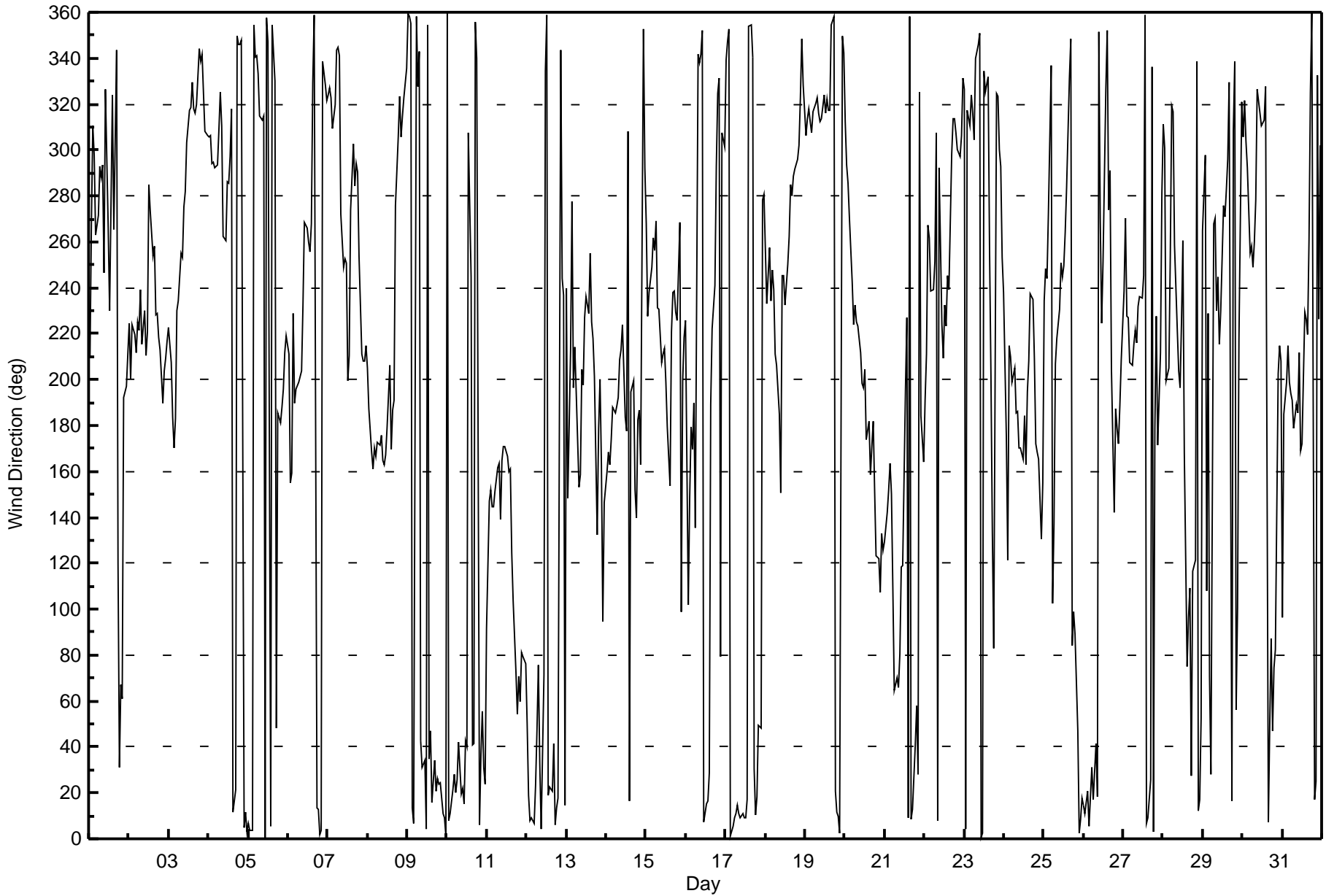
Mildred Lake - July 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 108 deg on Jul 14 23:00 Minimum Value: 7 deg on Jul 5 05:00 Percentiles: P <sub>1</sub> = 10 P <sub>10</sub> = 15 Q <sub>1</sub> = 18 Median = 25 Q <sub>3</sub> = 36 P <sub>90</sub> = 57 P <sub>99</sub> = 86																			Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0						
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jul	66	53	64	25	31	25	18	24	23	38	22	68	27	83	36	67	84	65	65	23	65	15	14	31	84
2-Jul	19	19	18	16	19	19	18	23	40	30	29	35	37	28	31	30	30	27	21	19	15	18	17	20	40
3-Jul	23	19	14	26	22	30	29	25	26	25	22	20	20	16	16	16	19	11	11	10	12	17	17	30	
4-Jul	16	19	18	18	18	21	26	22	27	36	31	25	21	19	26	24	71	72	18	11	13	16	17	15	72
5-Jul	14	15	13	13	7	7	19	39	32	48	30	27	24	47	41	56	53	56	74	16	13	17	18	26	74
6-Jul	27	27	33	31	20	17	15	20	20	35	31	33	29	33	30	47	19	17	15	16	14	12	13	15	47
7-Jul	13	13	15	17	20	17	15	39	49	30	45	32	25	27	61	28	32	22	28	31	15	14	14	17	61
8-Jul	27	31	12	12	11	10	14	13	17	14	13	11	15	28	12	32	20	47	25	18	19	15	15	13	47
9-Jul	18	22	14	31	18	39	17	21	28	33	49	33	25	27	37	15	19	16	18	19	18	16	13	13	49
10-Jul	10	11	11	17	22	19	22	22	34	41	42	45	54	73	51	58	83	33	25	12	17	15	16	48	83
11-Jul	56	16	14	16	16	17	13	21	34	18	18	15	15	18	19	17	20	23	26	21	28	19	32	23	56
12-Jul	17	16	13	12	17	21	85	81	72	41	43	46	30	29	31	24	27	15	22	22	34	35	52	21	85
13-Jul	100	19	42	39	37	23	29	20	21	24	22	33	29	28	62	37	22	23	36	27	14	27	66	16	100
14-Jul	14	13	16	20	18	20	21	19	23	34	39	61	70	79	74	75	28	28	22	20	21	31	108	67	108
15-Jul	24	35	33	21	19	19	23	29	32	30	24	27	40	28	30	37	28	27	25	21	94	91	58	14	94
16-Jul	48	69	83	62	73	45	56	93	21	22	17	17	20	23	79	88	41	66	30	17	17	96	67	21	96
17-Jul	10	10	12	13	14	14	15	16	17	17	20	21	21	25	19	20	33	23	16	22	34	41	30	20	41
18-Jul	24	22	53	50	18	31	21	20	22	23	38	27	26	26	26	25	21	20	19	18	17	18	13	25	53
19-Jul	20	20	17	18	18	16	16	16	18	18	19	19	19	21	22	34	15	16	23	18	20	27	12	16	34
20-Jul	22	16	32	42	25	23	23	26	39	28	24	26	33	45	49	28	27	23	25	17	15	12	15	15	49
21-Jul	16	18	21	15	16	24	30	20	17	19	19	22	37	47	45	31	20	21	26	31	48	87	26	70	87
22-Jul	51	75	35	22	23	29	32	81	74	69	50	48	39	37	44	42	49	18	18	19	18	18	17	24	81
23-Jul	18	28	42	19	21	20	22	17	14	15	17	22	30	24	28	51	22	32	59	20	64	21	24	39	64
24-Jul	21	25	43	58	14	17	14	27	35	37	38	48	52	47	37	29	35	29	31	10	10	17	25	28	58
25-Jul	41	33	26	27	54	55	45	19	26	27	30	35	36	34	45	19	39	66	13	19	33	14	12	16	66
26-Jul	16	12	23	13	18	26	27	25	40	78	56	36	61	33	24	66	82	39	16	24	16	14	20	27	82
27-Jul	28	44	31	29	27	18	26	26	19	29	30	32	33	44	25	44	76	32	29	34	33	88	35	24	88
28-Jul	18	61	33	16	48	67	36	73	38	32	65	89	84	74	44	44	50	35	39	38	53	19	23	32	89
29-Jul	47	21	72	40	67	78	27	34	36	36	27	54	43	28	31	29	24	19	52	31	85	38	78	22	85
30-Jul	18	30	32	25	23	20	23	28	26	26	28	28	22	22	26	44	40	16	26	17	64	51	9	53	64
31-Jul	34	38	34	28	13	13	23	26	33	26	37	54	63	65	37	42	54	36	16	19	21	73	39	46	73
Diurnal Maximum																									



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

**Wind Direction (WD) - deg**  
**Mildred Lake - July 2015**





# Wood Buffalo Environmental Association SO2 Calibration Report

## Station Information

Calibration Date	July 15, 2015	Last Calibration	June 22, 2015
Station Name	Mildred Lake	Station Number	AMS 2
Reason:	Routine		
Start Time (MST)	9:38	End Time (MST)	12:40
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	-654	-653
Analyzer IP address	192.168.1.43		Lamp voltage	809	795
Calculated slope	1.002731	0.999415	Chamber temp	45.1	45.1
Calculated intercept	0.734685	1.040728	Pressure	692.6	688.8
Analyzer Background	22.4	22.4	Flow	0.489	0.484
Analyzer Coefficient	1.022	1.060	Intensity	89	90
Analyzer make	TEI 43i		Analyzer serial #	JC1404901075	

## Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.6	----
as found span	5000	69.9	830.4	804.4	1.032
calibrator zero	5000	0.0	0.0	0.1	----
high point	5000	69.9	830.4	830.6	1.000
second point	5000	35.4	420.6	418.6	1.005
third point	5000	17.7	210.3	208.6	1.008
as left zero	5000	0.0	0.0	0.6	----
as left span	5000	69.9	830.4	822.0	1.010
Average Correction Factor					1.004

Corrected As found	804.9	Previous response	827.4	% change	2.8%
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**Notes:**

Inlet filter replaced after as founds. Adjusted both zero and span.

Calibration Performed By:

Asad Hidayat



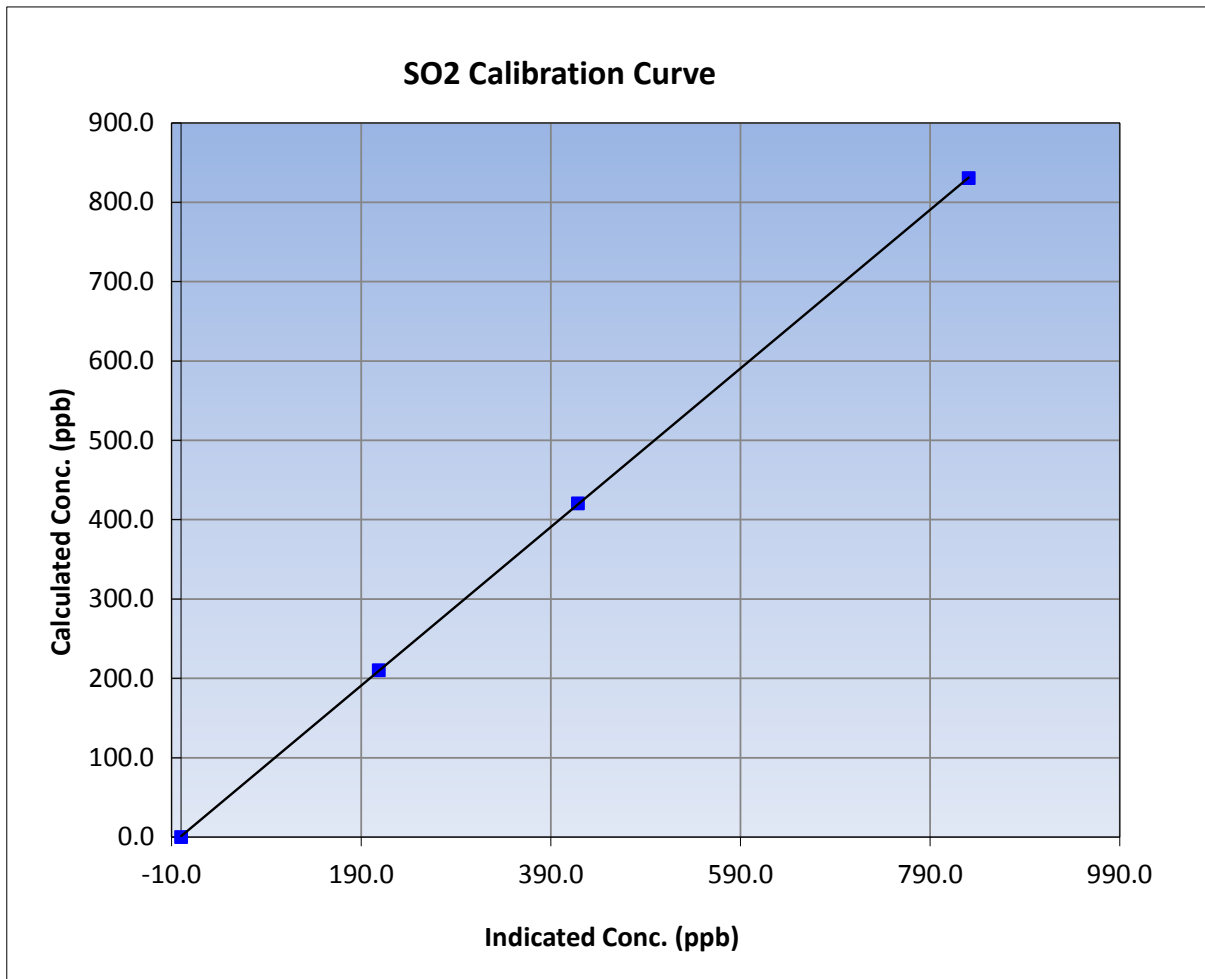
## Wood Buffalo Environmental Association SO2 Calibration Report

### Station Information

Calibration Date	July 15, 2015	Previous Calibration	June 22, 2015
Station Name	Mildred Lake	Station Number	AMS 2
Start Time (MST)	9:38	End Time (MST)	12:40
Analyzer make	TEI 43i	Analyzer serial #	JC1404901075

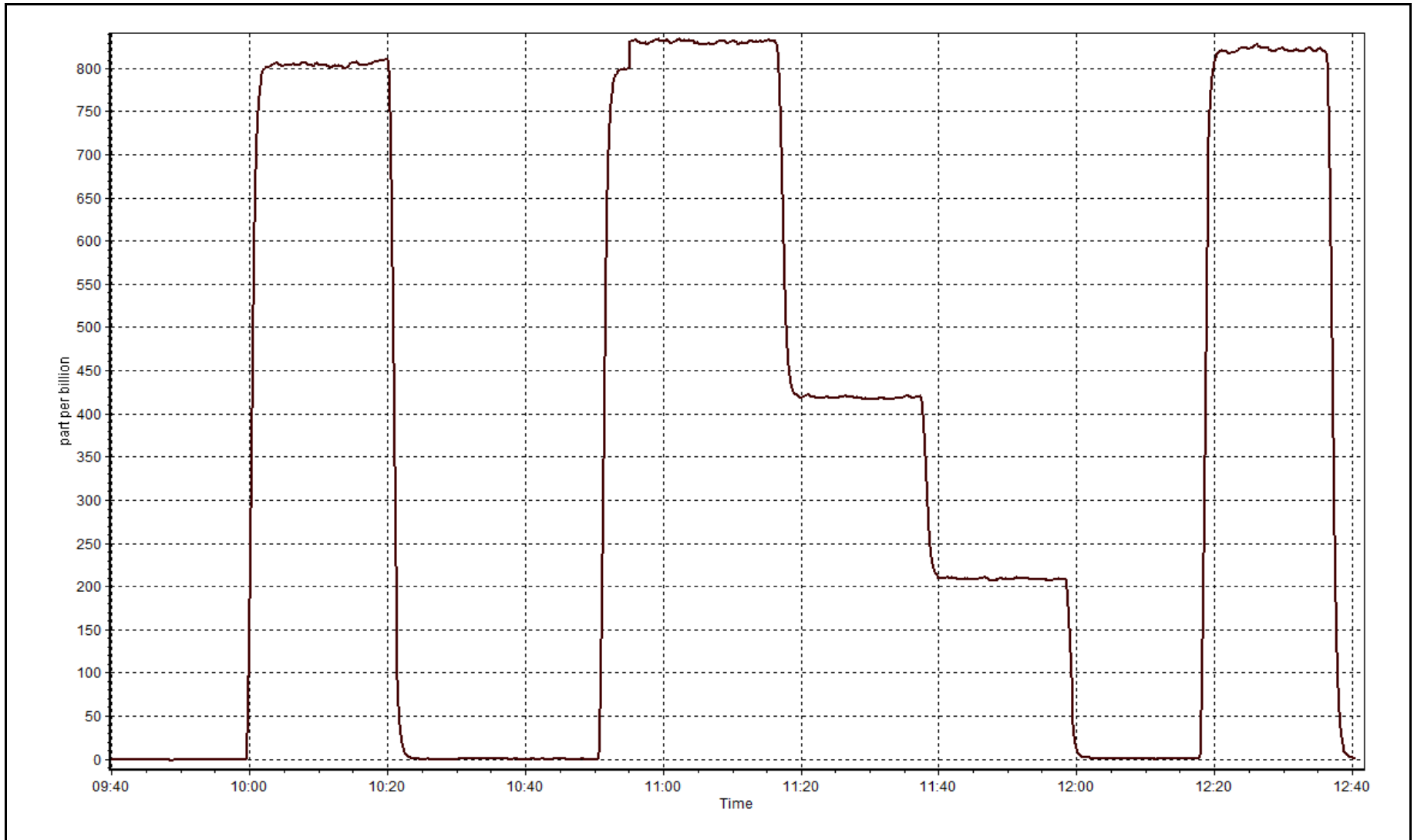
### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	0.999990
830.4	830.6	0.9997		
420.6	418.6	1.0048	Slope	0.999415
210.3	208.6	1.0078		
			Intercept	1.040728



SO2 Calibration Plot

Date: July 15, 2015





# Wood Buffalo Environmental Association H2S Calibration Report

## Station Information

Calibration Date	July 16, 2015	Last Calibration	June 23, 2015
Station Name	Mildred Lake	Station Number	AMS 2
Reason:	Routine		
Start Time (MST)	9:42	End Time (MST)	12:25
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	774	775
Calculated slope	1.007763	1.002476	Chamber temp	45	45
Calculated intercept	-0.173163	-0.058657	Pressure	558.2	551.5
Analyzer Background	13.9	14	Flow	0.951	0.947
Analyzer Coefficient	0.908	0.908	Intensity	88	87
			Converter temp.	325	327

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	0.0	----
as found span	4000	63.5	80.0	79.8	1.003
SO2 scrubber check	5000	17.7	210.3	0.3	----
calibrator zero	4000	0.0	0.0	0.0	----
high point	4000	63.5	80.0	79.8	1.003
second point	4000	31.8	40.1	40.2	0.997
third point	4000	15.9	20.0	20.0	1.002
as left zero	5000	0.0	0.0	0.1	----
as left span	4000	63.5	80.0	79.9	1.002
Average Correction Factor					1.001

Corrected As found	79.8	Previous response	79.6	% change	-0.3%
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**Notes:**

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

Calibration Performed By:

Evan Magill





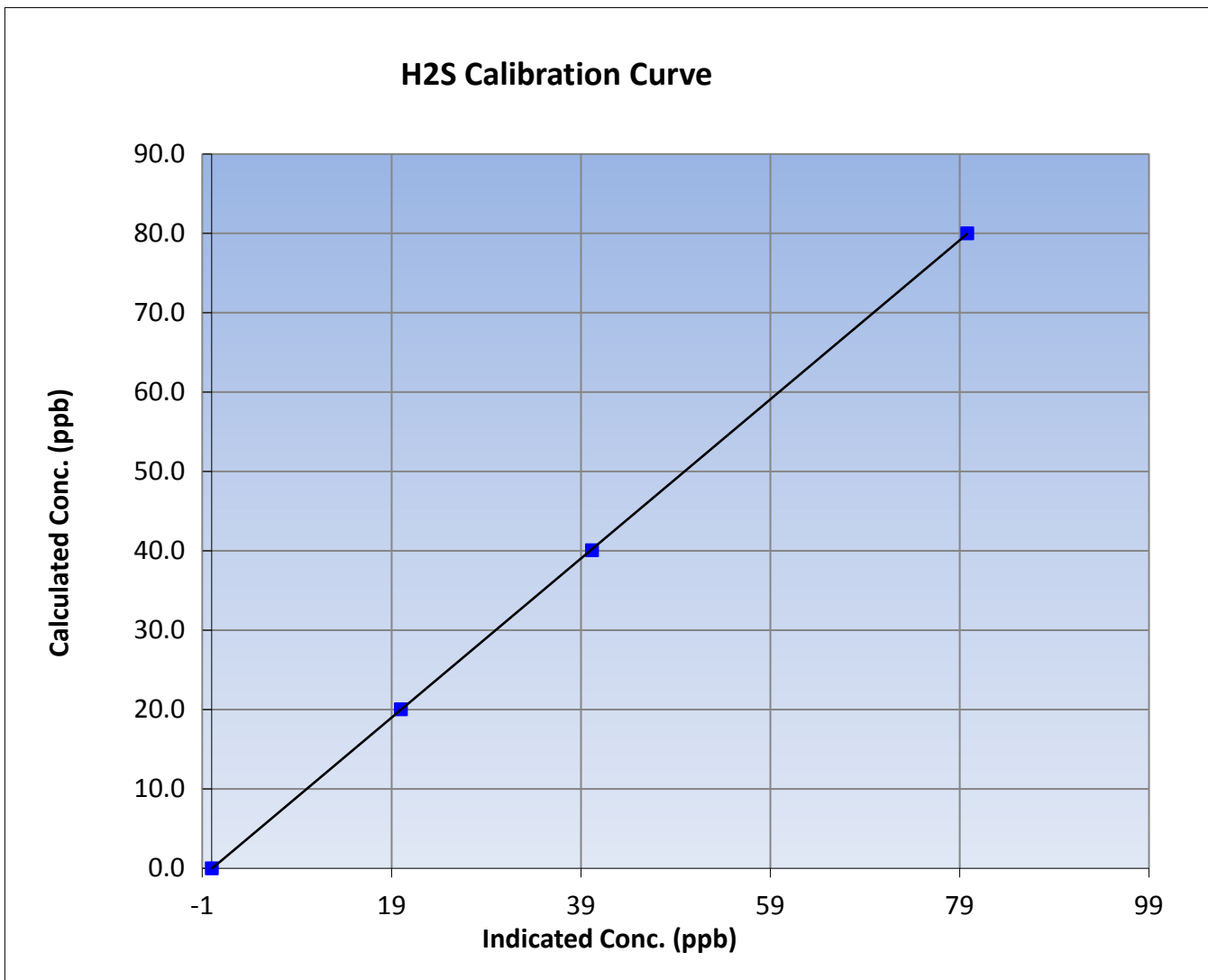
# Wood Buffalo Environmental Association H2S Calibration Report

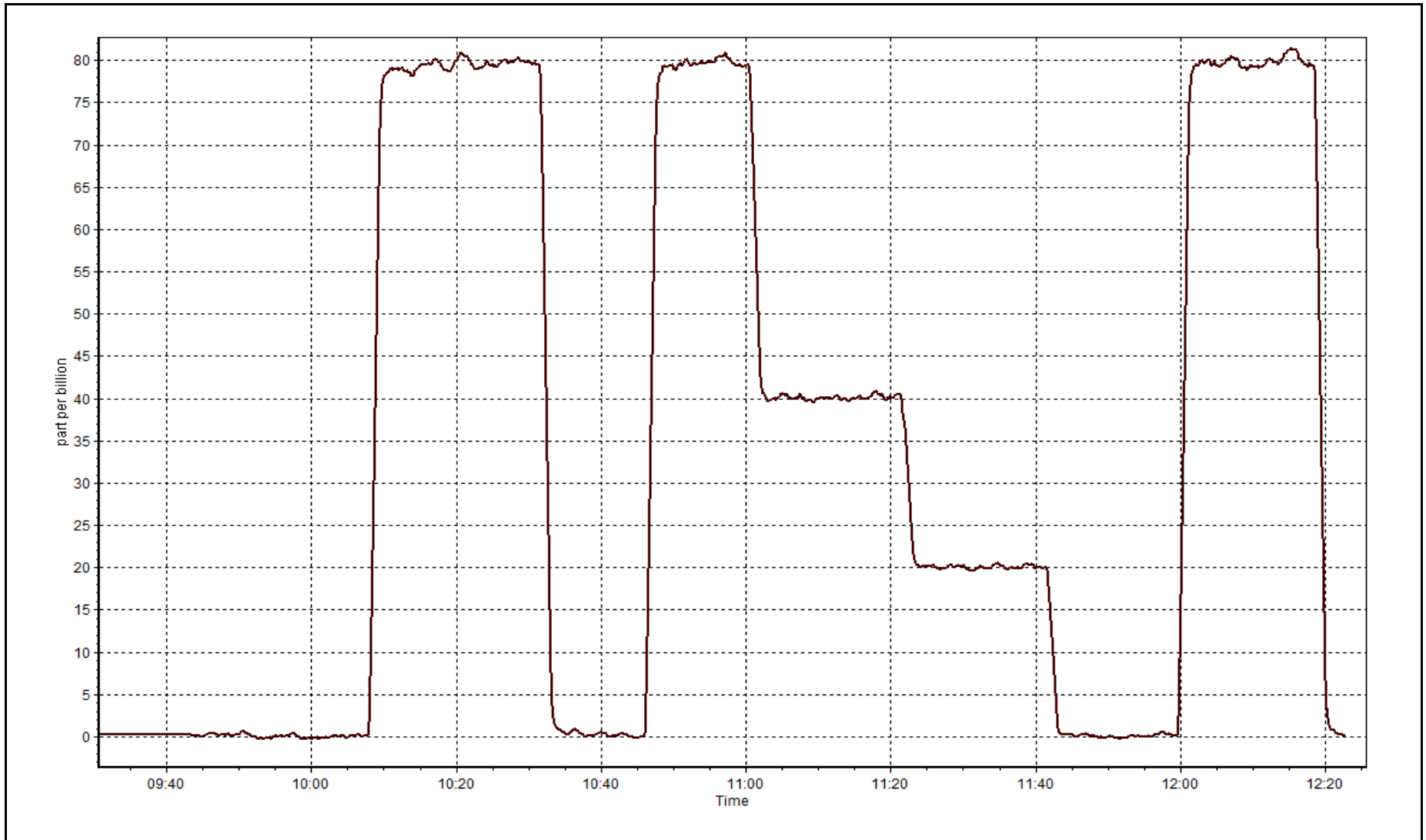
## Station Information

Calibration Date	July 16, 2015	Previous Calibration	June 23, 2015
Station Name	Mildred Lake	Station Number	AMS 2
Start Time (MST)	9:42	End Time (MST)	12:25
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	0.0	----	Correlation Coefficient	0.999992
80.0	79.8	1.0025		
40.1	40.2	0.9975	Slope	1.002476
20.0	20.0	1.0017		
			Intercept	-0.058657







# Wood Buffalo Environmental Association THC Calibration Report

### Station Information

Calibration Date	July-15-15	Last Calibration	June-22-15
Station Name	Mildred Lake	Station Number	AMS 2
Reason:	Routine		
Start Time (MST)	9:38	End Time (MST)	12:40
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

	Before	After		Before	After
Analyzer Range	0 - 50 ppm		Sample Pressure	8.2	8.2
Analyzer IP address	192.168.1.51		Air or Bypass Press	39.8	39.9
Calculated slope	1.003694	1.002694	Fuel Pressure	25.7	25.7
Calculated intercept	-0.022007	0.012082	Analyzer Coeff	4.6	4.7
			Analyzer BKG	2.380	2.610
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	0.21	----
as found span	5000	69.9	14.83	14.79	1.002
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	7.46	1.006
third point	5000	17.7	3.75	3.70	1.015
as left zero	5000	0.0	0.00	-0.03	----
as left span	5000	69.9	14.83	14.83	1.000
Average Correction Factor					1.008

Corrected As found	14.58	Previous response	14.79	% change	1.5%
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**Notes:**

Inlet filter replaced after as founds. Adjusted zero.

Calibration Performed By:

Asad Hidayat



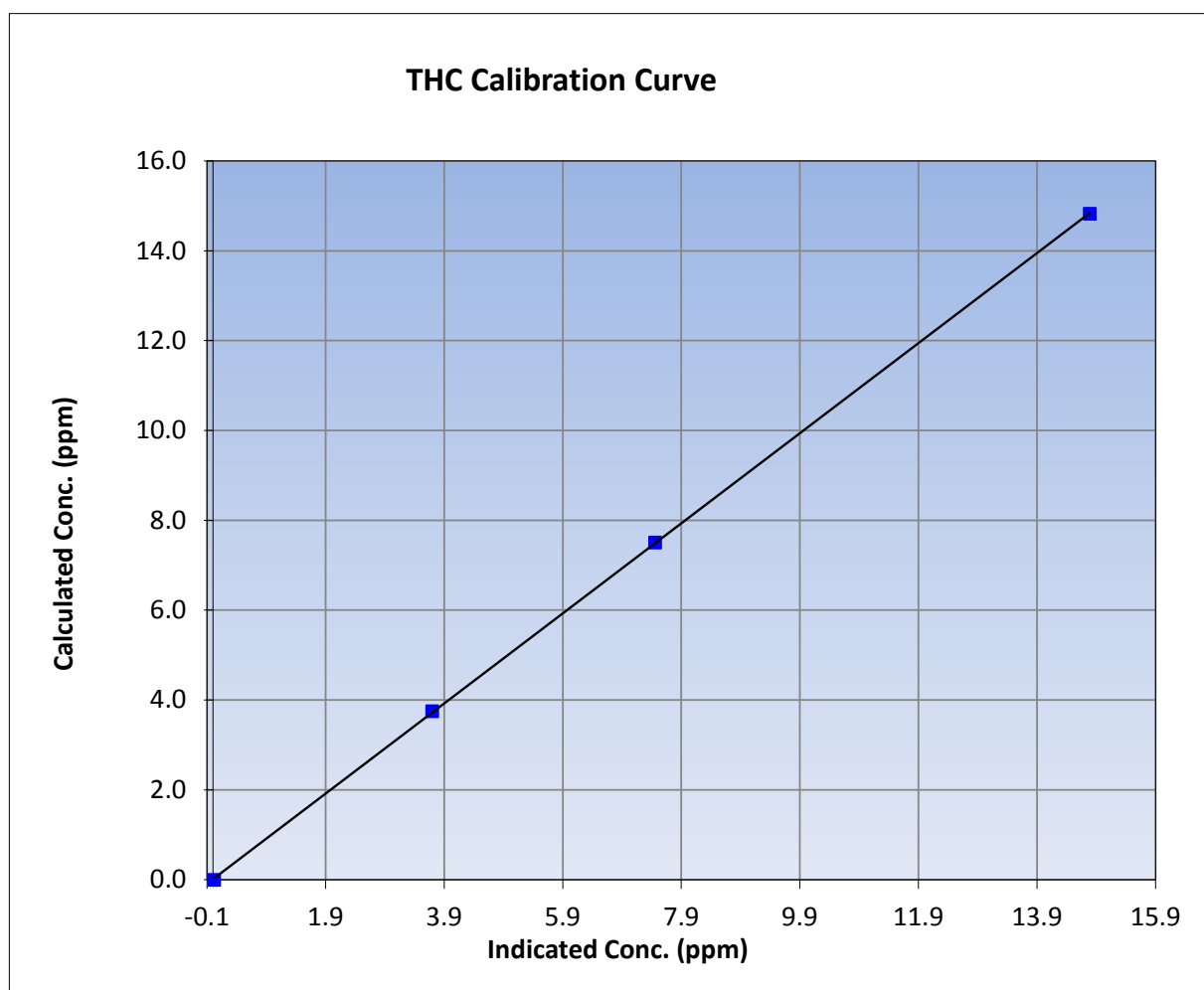
## Wood Buffalo Environmental Association THC Calibration Report

### Station Information

Calibration Date	July 15, 2015	Previous Calibration	June 22, 2015
Station Name	Mildred Lake	Station Number	AMS 2
Start Time (MST)	9:38	End Time (MST)	12:40
Analyzer make	51i-LT	Analyzer serial #	1300156231

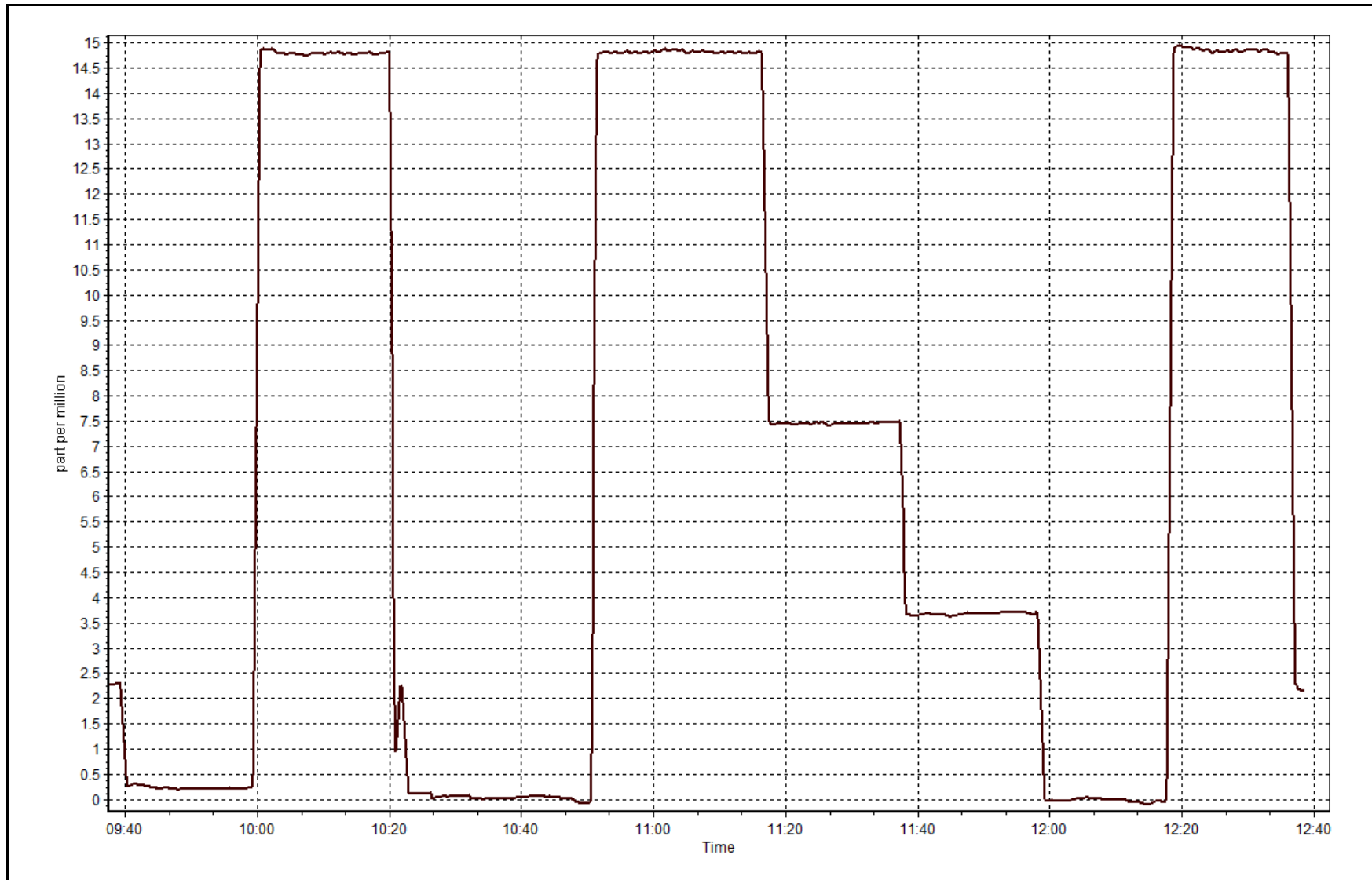
### Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.02	----	Correlation Coefficient	0.999978
14.83	14.79	1.0024		
7.51	7.46	1.0065	Slope	1.002694
3.75	3.70	1.0146		
			Intercept	0.012082



THC Calibration Plot

Date: July 15, 2015





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## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

### **AMS 3 LOWER CAMP METEOROLOGY JULY 2015**

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

August 26, 2015



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

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
Temperature 20 m (C) Average	744	0	0	100.00	31.3	-	24.4	-
Temperature 45 m (C) Average	744	0	0	100.00	31.2	-	24.4	-
Temperature 100 m (C) Average	744	0	0	100.00	30.7	-	24.6	-
Temperature 167 m (C) Average	744	0	0	100.00	30	-	24.4	-
Relative Humidity 20 m (%) Average	744	0	0	100.00	99	-	86.0	-
Relative Humidity 45 m (%) Average	744	0	0	100.00	98	-	86.0	-
Relative Humidity 100 m (%) Average	744	0	0	100.00	97	-	83.0	-
Relative Humidity 167 m (%) Average	744	0	0	100.00	96	-	81.0	-
Wind Speed 20 m (km/h) Average	744	0	0	100.00	21	-	12.0	-
Wind Speed 45 m (km/h) Average	744	0	0	100.00	31	-	17.0	-
Wind Speed 100 m (km/h) Average	744	0	0	100.00	39	-	23.0	-
Wind Speed 167 m (km/h) Average	740	0	4	99.46	47	-	28.0	-
Wind Direction 20 m (deg) Average	744	0	0	100.00	-	-	-	-
Wind Direction 45 m (deg) Average	744	0	0	100.00	-	-	-	-
Wind Direction 100 m (deg) Average	744	0	0	100.00	-	-	-	-
Wind Direction 167 m (deg) Average	740	0	4	99.46	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	744	0	0	100.00	0.8	-	0.1	-
Vertical Wind Speed 45 m (km/h) Average	744	0	0	100.00	1.4	-	0.3	-
Vertical Wind Speed 100 m (km/h) Average	744	0	0	100.00	2.7	-	0.9	-
Vertical Wind Speed 167 m (km/h) Average	740	0	4	99.46	6.6	-	1.4	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP MET TOWER (AMS 3)  
 JULY 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	744	18.69	4.3	-	6.9	13.4	15.4	18.4	21.9	24.1	31.3
Temperature 45 m (C) Average	744	18.66	4.2	-	7.2	13.5	15.6	18.4	21.7	23.9	31.2
Temperature 100 m (C) Average	744	18.51	4	-	7.6	13.4	15.6	18.5	21.5	23.5	30.7
Temperature 167 m (C) Average	744	18.31	4	-	7.6	13.2	15.4	18.4	21.3	23	30
Relative Humidity 20 m (%) Average	744	67.7	19	-	23	40	54	71	83	91	99
Relative Humidity 45 m (%) Average	744	65.9	18	-	23	39	53	69	80	88	98
Relative Humidity 100 m (%) Average	744	63.2	17	-	22	38	51	65	77	84	97
Relative Humidity 167 m (%) Average	744	61.7	17	-	22	38	50	63	75	83	96
Wind Speed 20 m (km/h) Average	744	6.3	4	-	0	2	3	5	9	12	21
Wind Speed 45 m (km/h) Average	744	8.6	5	-	0	2	5	7	12	17	31
Wind Speed 100 m (km/h) Average	744	12.5	7	-	0	4	7	11	17	23	39
Wind Speed 167 m (km/h) Average	740	15.3	9	-	0	5	9	13	20	28	47
Wind Direction 20 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-
Wind Direction 45 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-
Wind Direction 100 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-
Wind Direction 167 m (deg) Average	740	-	-	-	-	-	-	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	744	-0.1	0.3	-	-1.1	-0.4	-0.3	-0.1	0.1	0.2	0.8
Vertical Wind Speed 45 m (km/h) Average	744	-0.08	0.5	-	-2	-0.7	-0.4	-0.1	0.2	0.6	1.4
Vertical Wind Speed 100 m (km/h) Average	744	0.13	0.6	-	-1.6	-0.4	-0.2	0.1	0.4	0.8	2.7
Vertical Wind Speed 167 m (km/h) Average	740	0.44	0.8	-	-1.5	-0.3	0	0.3	0.7	1.3	6.6

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

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
Wind Speed. Wind Direction, Vertical Wind Speed 167 m	12 Jul 2015 09:00	12 Jul 2015 10:00	2	Intermittent unstable operation
Wind Speed. Wind Direction, Vertical Wind Speed 167 m	12 Jul 2015 23:00	13 Jul 2015 00:00	2	Intermittent unstable operation

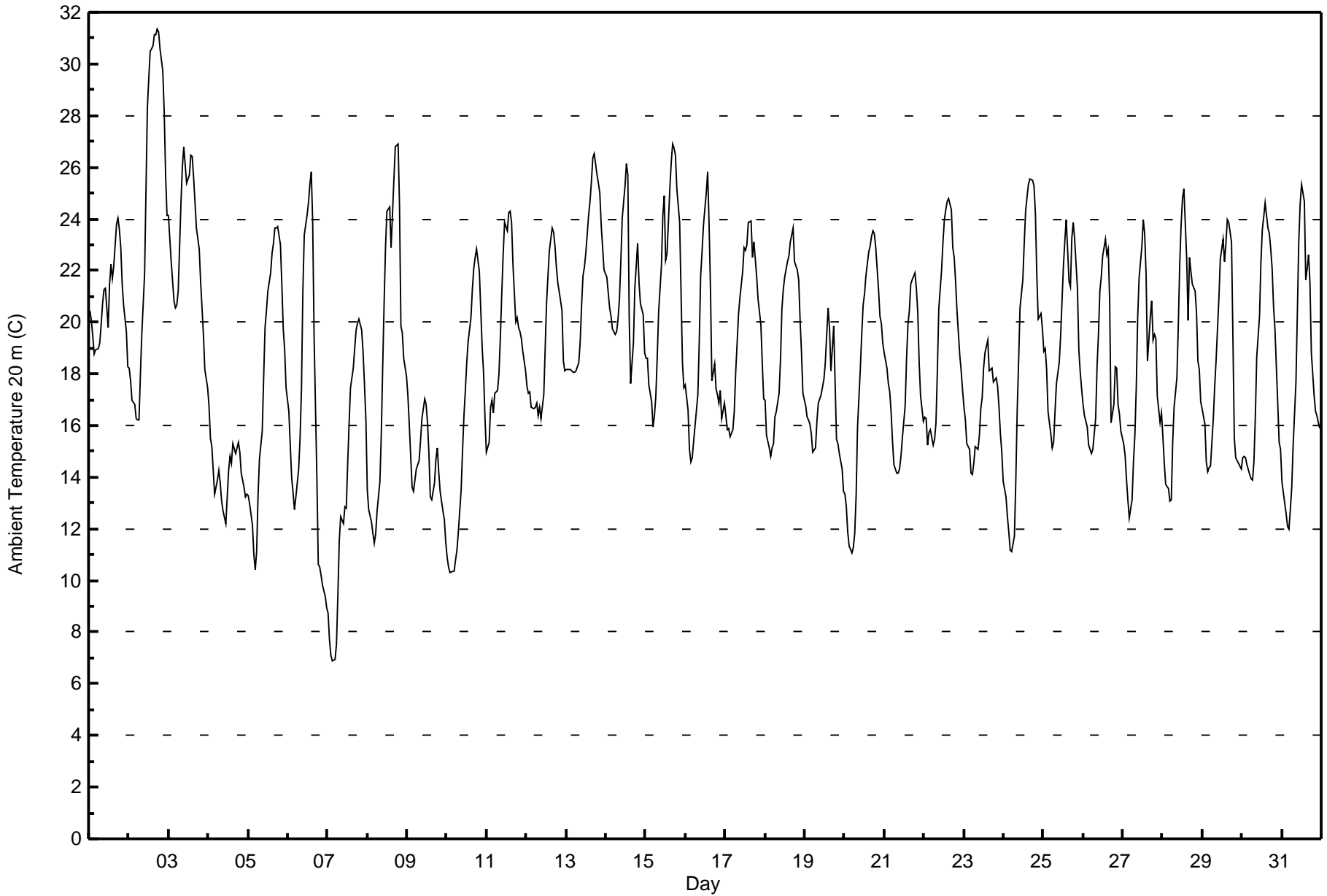


Maximum Value: 31.3 C on Jul 2 18:00		Maximum Daily Average: 24.4 C on Jul 2		Hours in Service: 744																																												
Minimum Value: 6.9 C on Jul 7 04:00		Minimum Daily Average: 13.9 C on Jul 7		Hours of Data: 744																																												
Maximum Diurnal Average: 22.5 C at hour 14		Minimum Diurnal Average: 14.5 C at hour 5		Hours of Missing Data: 0																																												
Monthly Average: 18.69 C		Percentiles: P <sub>1</sub> = 9.4 P <sub>10</sub> = 13.4 Q <sub>1</sub> = 15.4 Median = 18.4 Q <sub>3</sub> = 21.9 P <sub>90</sub> = 24.1 P <sub>99</sub> = 30.4		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-Jul	20.4	20.1	19.5	18.8	18.9	19.0	19.2	19.9	20.7	21.2	21.3	19.8	21.5	22.2	21.7	22.2	23.8	24.0	23.6	22.9	21.5	20.7	19.6	18.3	20.9	24.0																						
2-Jul	18.2	17.7	17.0	16.8	16.3	16.2	16.2	18.0	19.5	21.8	25.1	28.3	29.5	30.5	30.7	31.1	31.1	31.3	31.2	30.6	29.7	28.1	25.7	24.2	24.4	31.3																						
3-Jul	24.2	22.3	21.6	20.8	20.6	20.7	21.2	24.7	26.0	26.8	26.1	25.4	25.7	26.5	26.4	25.6	24.6	23.6	22.8	21.6	20.5	19.5	18.2	17.5	23.0	26.8																						
4-Jul	16.8	15.5	15.2	14.3	13.4	13.9	14.3	13.8	13.1	12.7	12.2	13.2	14.3	14.8	14.5	15.3	14.9	15.1	15.3	15.0	14.2	13.6	13.3	13.4	14.2	16.8																						
5-Jul	13.3	13.0	12.2	11.0	10.4	11.1	13.3	14.7	15.8	17.9	19.8	20.5	21.2	21.9	22.7	23.1	23.7	23.6	23.7	23.0	21.4	19.8	18.9	17.5	18.1	23.7																						
6-Jul	16.6	15.2	14.0	13.4	12.8	13.2	14.3	15.5	17.4	21.2	23.4	24.1	24.6	25.3	25.8	23.9	19.5	14.0	10.6	10.5	10.2	9.8	9.4	8.9	16.4	25.8																						
7-Jul	8.7	7.7	7.1	6.9	6.9	7.5	9.4	11.6	12.5	12.2	12.8	12.8	14.5	16.0	17.5	18.2	19.0	19.7	20.0	20.1	19.7	18.8	17.6	16.2	13.9	20.1																						
8-Jul	13.5	12.8	12.3	11.8	11.5	11.8	12.7	13.8	15.7	18.3	20.7	22.9	24.3	24.5	22.9	24.2	25.6	26.8	26.9	24.5	19.8	19.6	18.6	17.9	18.9	26.9																						
9-Jul	17.1	16.0	14.8	13.6	13.5	14.3	14.5	14.7	15.4	16.3	17.0	16.8	16.1	14.9	13.2	13.1	13.8	14.7	15.1	14.2	13.5	12.7	12.3	11.5	14.5	17.1																						
10-Jul	10.9	10.5	10.3	10.3	10.4	10.8	11.2	11.9	13.5	15.0	16.4	17.4	18.4	19.3	20.2	21.2	22.1	22.5	22.8	21.9	20.5	19.0	18.0	16.3	16.3	22.8																						
11-Jul	15.0	15.4	16.7	17.0	16.5	17.2	17.4	18.0	19.4	21.1	22.6	23.8	23.5	24.2	24.3	23.9	22.2	20.0	20.2	19.8	19.6	19.4	18.9	18.1	19.8	24.3																						
12-Jul	17.5	17.2	17.3	16.7	16.7	16.7	16.8	16.4	16.7	16.3	17.2	19.0	20.8	21.8	22.8	23.7	23.5	23.0	22.1	21.5	20.8	20.4	18.5	18.1	19.2	23.7																						
13-Jul	18.1	18.1	18.2	18.1	18.0	18.1	18.1	18.5	19.2	20.6	21.8	22.1	22.6	24.1	24.7	25.5	26.3	26.5	25.7	25.4	25.0	23.8	22.9	22.0	21.8	26.5																						
14-Jul	21.7	21.2	20.5	20.2	19.8	19.5	19.6	20.1	20.9	22.4	24.0	25.3	26.2	25.7	20.1	17.6	19.2	21.3	22.2	23.0	21.5	20.7	20.3	18.8	21.3	26.2																						
15-Jul	18.6	18.6	17.6	16.9	15.9	16.4	17.2	18.7	20.4	22.2	24.1	24.9	22.4	22.6	25.1	26.2	26.9	26.7	26.5	25.2	23.9	21.2	18.5	17.5	21.4	26.9																						
16-Jul	17.6	16.6	15.1	14.6	14.7	15.4	16.0	17.2	19.3	21.8	22.7	23.8	25.0	25.8	23.8	21.3	17.7	18.4	17.4	17.2	16.9	17.4	16.2	16.9	18.7	25.8																						
17-Jul	16.4	15.8	15.9	15.6	15.8	16.5	18.1	19.2	20.3	21.0	22.0	22.9	22.8	23.0	23.9	23.9	22.5	23.1	22.5	21.7	20.9	19.9	18.4	17.0	20.0	23.9																						
18-Jul	17.0	15.6	15.1	14.8	15.2	15.3	16.3	16.5	17.3	18.6	20.5	21.3	21.8	22.3	22.5	23.1	23.4	23.6	22.4	22.0	21.6	20.1	18.8	17.2	19.3	23.6																						
19-Jul	16.8	16.3	16.2	16.0	15.7	15.0	15.1	16.2	16.9	17.1	17.2	17.8	18.5	19.5	20.5	19.8	18.1	19.9	17.6	15.4	15.3	14.9	14.3	13.5	16.8	20.5																						
20-Jul	13.3	12.9	11.9	11.3	11.0	11.3	11.8	13.3	16.0	18.2	19.6	20.7	21.1	21.8	22.8	23.0	23.3	23.6	23.4	22.9	21.2	20.2	20.0	19.2	18.1	23.6																						
21-Jul	18.8	18.2	17.6	17.3	16.5	15.3	14.5	14.2	14.1	14.3	14.8	15.5	16.8	18.6	19.9	20.5	21.5	21.6	21.9	21.3	20.4	18.4	17.1	16.1	17.7	21.9																						
22-Jul	16.3	16.3	15.2	15.7	15.8	15.2	15.4	16.1	18.1	20.5	22.0	23.1	24.0	24.4	24.7	24.8	24.3	22.9	22.5	21.6	20.4	18.7	18.1	17.4	19.7	24.8																						
23-Jul	16.7	16.2	15.3	15.1	14.1	14.1	14.5	15.2	15.1	15.6	16.7	17.1	18.2	18.8	19.3	18.1	18.1	18.2	17.7	17.8	17.5	16.7	15.7	15.0	16.5	19.3																						
24-Jul	13.8	13.2	12.5	11.9	11.1	11.1	11.7	13.9	16.6	18.5	20.5	21.6	23.0	24.3	24.9	25.3	25.5	25.5	25.3	24.2	21.8	20.1	20.3	19.7	19.0	25.5																						
25-Jul	18.9	19.0	18.2	16.6	15.7	15.1	15.3	16.6	17.6	18.4	19.5	20.8	22.2	23.2	24.0	21.6	21.3	23.2	23.9	23.2	21.3	18.9	18.1	17.4	19.6	24.0																						
26-Jul	16.8	16.4	15.9	15.2	15.1	14.9	15.1	16.3	18.3	19.5	21.2	21.8	22.6	23.2	22.6	22.9	20.8	16.1	16.8	18.3	18.2	16.8	16.4	15.8	18.2	23.2																						
27-Jul	15.3	14.9	14.0	13.1	12.4	13.1	14.6	15.6	17.5	20.2	21.7	23.0	24.0	23.4	21.9	18.5	20.2	20.8	19.3	19.5	19.4	17.2	16.1	16.5	18.0	24.0																						
28-Jul	15.6	14.6	13.7	13.6	13.1	13.1	15.4	16.7	17.8	19.9	22.2	23.8	24.8	25.1	22.5	20.1	22.5	22.0	21.5	21.2	20.4	18.5	18.2	16.9	18.9	25.1																						
29-Jul	16.6	16.1	14.6	14.2	14.4	14.4	16.3	17.5	18.6	19.8	20.9	22.5	23.2	22.3	23.1	24.0	23.9	23.1	19.4	15.5	14.8	14.7	14.5	14.3	18.3	24.0																						
30-Jul	14.8	14.8	14.7	14.5	14.1	13.9	13.9	14.6	16.3	18.7	20.2	22.4	23.6	24.1	24.6	23.6	23.4	22.8	22.1	20.6	19.8	16.9	15.3	15.1	18.5	24.6																						
31-Jul	13.8	13.4	12.6	12.1	12.0	12.8	13.6	15.2	17.7	20.3	23.1	24.5	25.3	24.7	21.6	22.1	22.6	21.6	18.8	17.1	16.5	16.4	16.1	15.9	17.9	25.3																						
																								16.4	15.9	15.2	14.8	14.5	14.6	15.3	16.3	17.5	19.0	20.3	21.2	22.0	22.5	22.4	22.2	22.1	21.9	21.3	20.6	19.6	18.5	17.6	16.8	Diurnal Average
																								24.2	22.3	21.6	20.8	20.6	20.7	21.2	24.7	26.0	26.8	26.1	28.3	29.5	30.5	30.7	31.1	31.1	31.3	31.2	30.6	29.7	28.1	25.7	24.2	Diurnal Maximum



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

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





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

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

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	10	1.34	1.34
10 - 20	443	59.54	60.89
> 20	291	39.11	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

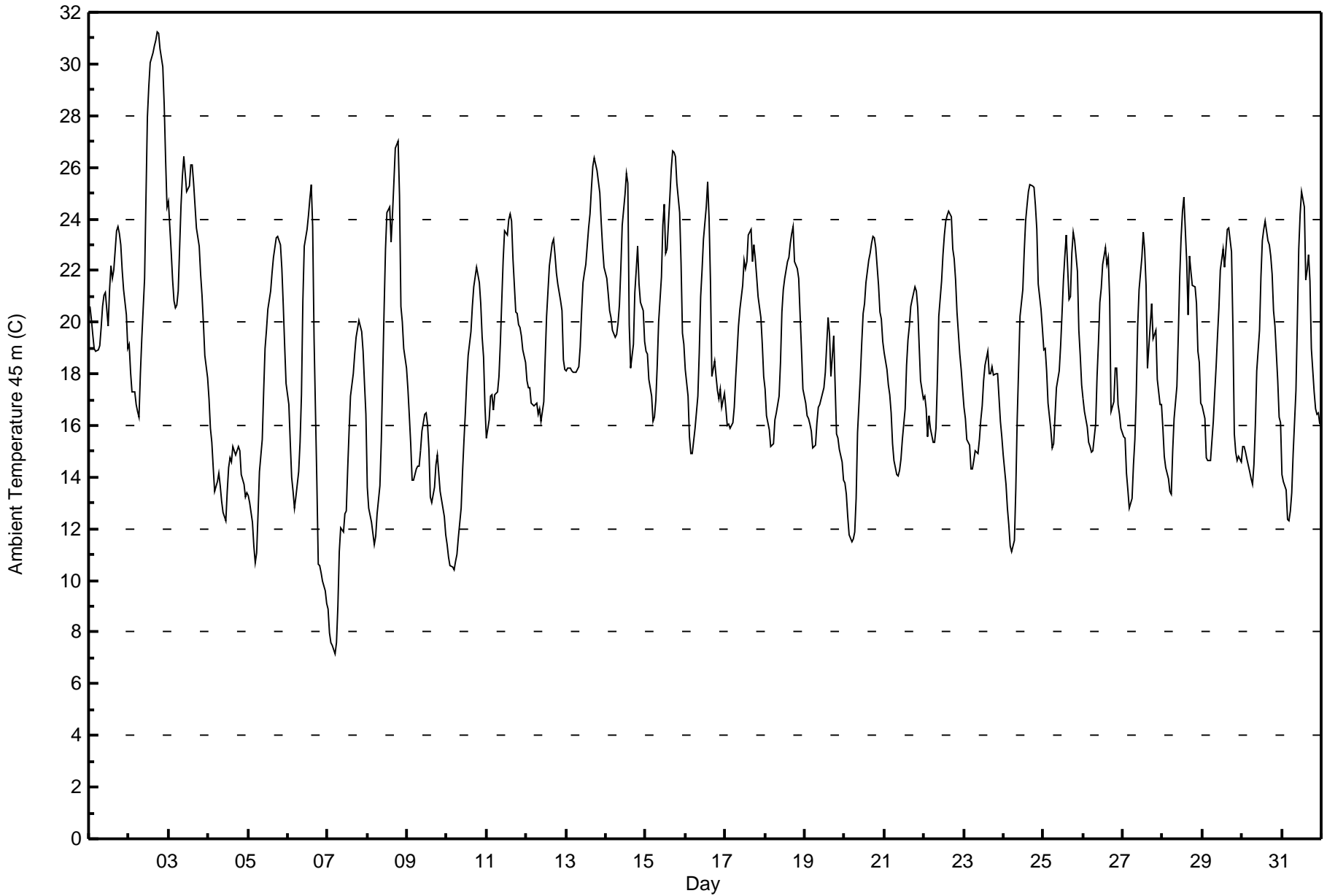


Maximum Value: 31.2 C on Jul 2 18:00		Maximum Daily Average: 24.4 C on Jul 2		Hours in Service: 744																																												
Minimum Value: 7.2 C on Jul 7 05:00		Minimum Daily Average: 13.8 C on Jul 7		Hours of Data: 744																																												
Maximum Diurnal Average: 22.2 C at hour 14		Minimum Diurnal Average: 14.6 C at hour 5		Hours of Missing Data: 0																																												
Monthly Average: 18.66 C		Percentiles: P <sub>1</sub> = 9.1 P <sub>10</sub> = 13.5 Q <sub>1</sub> = 15.6 Median = 18.4 Q <sub>3</sub> = 21.7 P <sub>90</sub> = 23.9 P <sub>99</sub> = 29.8		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-Jul	20.6	20.1	19.5	19.0	18.9	18.9	19.1	19.8	20.6	21.0	21.1	19.9	21.3	22.2	21.7	22.0	23.5	23.7	23.4	23.0	22.0	21.3	20.3	19.0	20.9	23.7																						
2-Jul	19.1	18.1	17.3	17.3	16.8	16.5	16.3	18.0	19.4	21.7	24.8	28.0	29.1	30.1	30.4	30.7	30.9	31.2	31.2	30.6	29.9	28.4	26.3	24.5	24.4	31.2																						
3-Jul	24.7	22.7	21.6	20.8	20.5	20.6	21.2	24.5	25.7	26.4	25.8	25.1	25.3	26.1	26.1	25.4	24.5	23.6	22.9	21.9	21.0	20.0	18.7	17.8	23.0	26.4																						
4-Jul	17.0	15.9	15.4	14.4	13.4	13.9	14.1	13.7	13.1	12.7	12.3	13.5	14.4	14.8	14.6	15.2	14.9	15.0	15.2	15.0	14.1	13.7	13.2	13.4	14.3	17.0																						
5-Jul	13.3	13.0	12.3	11.3	10.7	11.1	12.6	14.2	15.4	17.3	19.0	19.7	20.5	21.2	21.9	22.5	22.9	23.2	23.3	23.0	22.1	20.7	19.1	17.6	17.8	23.3																						
6-Jul	16.8	15.3	14.0	13.5	12.8	13.2	14.2	15.3	17.2	20.8	22.9	23.6	24.1	24.8	25.3	23.7	19.4	13.8	10.6	10.6	10.3	10.0	9.6	9.1	16.3	25.3																						
7-Jul	8.9	8.0	7.6	7.5	7.2	7.6	9.0	11.1	12.0	11.9	12.6	12.7	14.3	15.8	17.1	18.0	18.8	19.4	19.8	20.0	19.7	18.9	17.6	16.4	13.8	20.0																						
8-Jul	13.6	12.8	12.3	11.8	11.4	11.7	12.6	13.6	15.4	18.0	20.5	22.8	24.3	24.5	23.1	24.2	25.5	26.8	27.0	24.9	20.6	20.0	19.0	18.2	18.9	27.0																						
9-Jul	17.4	16.4	15.3	13.9	13.9	14.3	14.4	14.4	15.0	15.8	16.4	16.5	16.0	15.1	13.3	13.0	13.6	14.5	14.9	14.1	13.5	12.8	12.4	11.8	14.5	17.4																						
10-Jul	11.4	10.9	10.6	10.5	10.4	10.7	11.0	11.7	12.8	14.2	15.4	16.5	17.7	18.7	19.7	20.6	21.4	21.7	22.1	21.5	20.7	19.4	18.7	16.7	16.0	22.1																						
11-Jul	15.5	16.2	17.1	17.2	16.6	17.2	17.3	17.9	19.2	20.8	22.4	23.5	23.4	24.0	24.2	23.9	22.4	20.4	20.3	19.9	19.8	19.5	19.0	18.5	19.8	24.2																						
12-Jul	17.7	17.5	17.5	16.9	16.8	16.8	16.9	16.4	16.6	16.1	16.9	18.6	20.2	21.2	22.2	23.1	23.2	22.6	21.9	21.5	20.8	20.4	18.6	18.1	19.1	23.2																						
13-Jul	18.1	18.2	18.2	18.1	18.1	18.0	18.1	18.3	19.1	20.4	21.5	21.9	22.3	23.6	24.2	25.1	26.0	26.3	25.8	25.4	25.0	23.9	22.9	22.1	21.7	26.3																						
14-Jul	21.7	21.1	20.5	20.2	19.7	19.4	19.5	20.0	20.7	22.1	23.7	24.9	25.8	25.4	19.9	18.2	19.2	21.2	22.0	23.0	21.5	20.8	20.4	19.3	21.2	25.8																						
15-Jul	18.9	18.8	17.8	17.2	16.2	16.3	17.0	18.4	20.0	21.7	23.8	24.6	22.6	22.8	24.8	25.9	26.6	26.6	26.4	25.4	24.2	22.3	19.6	19.1	21.5	26.6																						
16-Jul	18.2	17.1	15.6	14.9	14.9	15.4	15.9	17.1	18.8	21.0	22.0	23.2	24.5	25.4	24.0	21.6	17.9	18.5	17.9	17.4	17.0	17.4	16.7	17.3	18.7	25.4																						
17-Jul	16.7	16.0	16.0	15.9	16.1	16.7	17.8	18.8	19.9	20.5	21.4	22.4	22.1	22.4	23.4	23.6	22.4	23.0	22.5	21.8	21.0	20.2	19.2	17.9	19.9	23.6																						
18-Jul	17.4	16.4	15.8	15.2	15.3	15.3	16.2	16.5	17.1	18.4	20.4	21.2	21.7	22.3	22.5	23.1	23.5	23.7	22.4	22.1	21.7	20.3	18.9	17.4	19.4	23.7																						
19-Jul	16.9	16.4	16.3	16.1	15.8	15.1	15.2	16.1	16.7	16.8	17.0	17.5	18.1	19.1	20.2	19.5	17.9	19.5	17.6	15.7	15.5	15.1	14.6	13.9	16.8	20.2																						
20-Jul	13.8	13.4	12.5	11.8	11.5	11.6	11.9	13.2	15.7	17.9	19.2	20.3	20.7	21.5	22.4	22.7	23.1	23.3	23.2	22.9	21.4	20.4	20.1	19.3	18.1	23.3																						
21-Jul	18.8	18.2	17.6	17.2	16.5	15.3	14.6	14.1	14.0	14.3	14.7	15.4	16.6	18.3	19.3	19.8	20.6	20.9	21.4	21.2	20.5	19.1	17.7	17.0	17.6	21.4																						
22-Jul	17.1	16.7	15.6	16.4	15.9	15.4	15.4	15.9	17.8	20.3	21.6	22.6	23.4	23.9	24.2	24.3	24.1	22.8	22.5	21.7	20.4	18.8	18.1	17.4	19.7	24.3																						
23-Jul	16.7	16.3	15.5	15.2	14.3	14.3	14.6	15.0	14.9	15.4	16.2	16.7	17.7	18.4	18.9	18.0	18.0	18.3	17.9	18.0	18.0	17.1	16.1	15.6	16.6	18.9																						
24-Jul	14.9	13.7	12.8	12.2	11.3	11.1	11.6	13.6	16.3	18.2	20.2	21.3	22.7	23.9	24.5	25.1	25.3	25.2	24.5	23.6	21.5	20.5	19.7	19.1	21.5	25.3																						
25-Jul	18.9	19.0	18.1	16.8	15.8	15.2	15.3	16.4	17.4	18.1	19.1	20.3	21.6	22.6	23.4	20.9	21.0	22.7	23.5	23.2	22.0	19.7	18.7	17.6	19.5	23.5																						
26-Jul	17.0	16.5	16.0	15.4	15.2	15.0	15.0	16.1	17.9	19.2	20.8	21.3	22.2	22.9	22.3	22.5	20.9	16.5	16.9	18.2	18.2	16.8	16.4	15.9	18.1	22.9																						
27-Jul	15.6	15.5	14.1	13.5	12.8	13.2	14.5	15.5	17.2	19.8	21.3	22.5	23.5	22.8	21.4	18.2	19.9	20.7	19.4	19.5	19.7	17.8	16.8	16.8	18.0	23.5																						
28-Jul	15.9	14.8	14.4	13.9	13.4	13.3	15.0	16.3	17.5	19.5	21.8	23.3	24.3	24.8	22.3	20.3	22.5	22.0	21.4	21.4	20.7	18.9	18.4	16.9	18.9	24.8																						
29-Jul	16.8	16.3	14.8	14.6	14.6	14.7	16.2	17.3	18.3	19.5	20.6	22.0	22.8	22.1	22.8	23.6	23.6	22.7	19.8	15.7	15.0	14.7	14.8	14.6	18.2	23.6																						
30-Jul	15.2	15.2	15.0	14.7	14.2	13.9	13.7	14.5	16.0	18.1	19.7	21.7	23.2	23.6	23.9	23.1	23.0	22.5	21.9	20.5	19.8	17.7	16.3	16.1	18.5	23.9																						
31-Jul	14.1	13.8	13.5	12.4	12.3	12.7	13.4	14.9	17.3	20.0	22.8	24.2	25.1	24.4	21.6	22.0	22.6	21.6	19.0	17.3	16.6	16.4	16.5	16.0	17.9	25.1																						
																								16.7	16.1	15.5	15.0	14.6	14.7	15.2	16.1	17.3	18.6	19.9	20.9	21.7	22.2	22.1	21.9	21.9	21.7	21.3	20.7	19.9	18.8	17.9	17.1	Diurnal Average
																								24.7	22.7	21.6	20.8	20.5	20.6	21.2	24.5	25.7	26.4	25.8	28.0	29.1	30.1	30.4	30.7	30.9	31.2	31.2	30.6	29.9	28.4	26.3	24.5	Diurnal Maximum



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

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







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

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

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	10	1.34	1.34
10 - 20	447	60.08	61.42
> 20	287	38.58	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

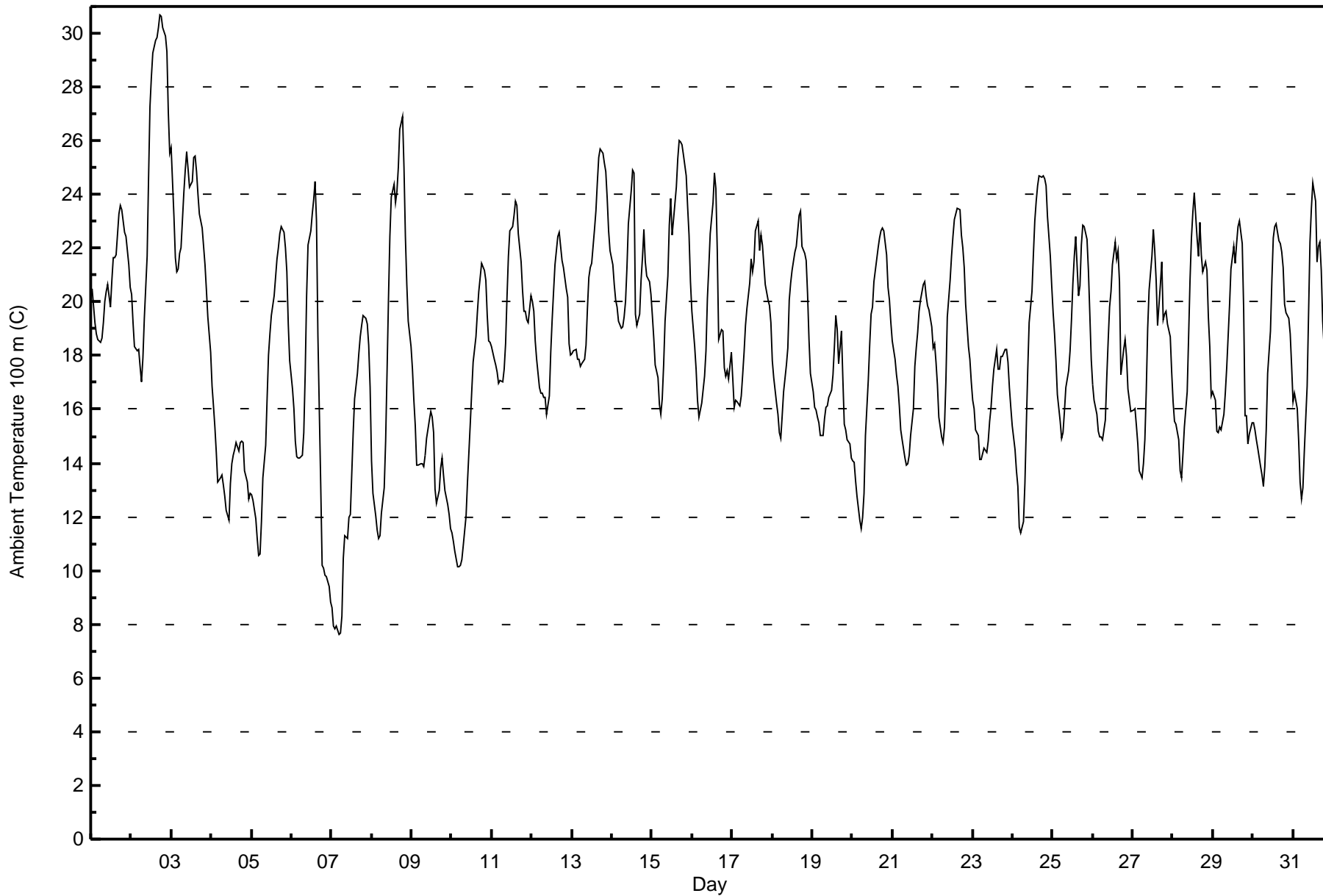


Maximum Value: 30.7 C on Jul 2 18:00		Maximum Daily Average: 24.6 C on Jul 2		Hours in Service: 744																																													
Minimum Value: 7.6 C on Jul 7 05:00		Minimum Daily Average: 13.5 C on Jul 7		Hours of Data: 744																																													
Maximum Diurnal Average: 21.6 C at hour 15		Minimum Diurnal Average: 14.6 C at hour 6		Hours of Missing Data: 0																																													
Monthly Average: 18.51 C		Percentiles: P <sub>1</sub> = 8.8 P <sub>10</sub> = 13.4 Q <sub>1</sub> = 15.6 Median = 18.5 Q <sub>3</sub> = 21.5 P <sub>90</sub> = 23.5 P <sub>99</sub> = 29.6		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-Jul	20.5	19.9	19.2	18.8	18.6	18.5	18.6	19.3	20.0	20.4	20.6	19.8	20.8	21.7	21.6	21.7	23.3	23.6	23.5	23.0	22.6	22.4	21.4	20.6	20.9	23.6	23.6																						
2-Jul	20.3	19.2	18.3	18.2	18.2	17.6	17.0	17.9	19.4	21.7	24.6	27.3	28.4	29.3	29.7	29.9	30.2	30.7	30.6	30.2	29.9	29.3	27.1	25.5	24.6	30.7	30.7																						
3-Jul	25.8	23.2	21.7	21.1	21.2	21.8	22.0	24.1	24.9	25.6	24.9	24.3	24.5	25.4	25.4	24.8	24.0	23.3	22.7	22.1	21.4	20.4	19.4	18.2	23.0	25.8	25.8																						
4-Jul	16.9	16.1	15.4	14.4	13.3	13.4	13.6	13.2	12.8	12.3	11.9	13.2	14.0	14.3	14.5	14.7	14.5	14.8	14.8	14.7	13.7	13.3	12.6	12.9	14.0	16.9	16.9																						
5-Jul	12.8	12.6	11.9	11.2	10.6	10.6	11.8	13.4	14.6	16.4	18.0	18.8	19.5	20.2	20.9	21.6	22.0	22.6	22.8	22.6	22.0	21.1	19.2	17.8	17.3	22.8	22.8																						
6-Jul	16.8	16.0	14.8	14.3	14.2	14.2	14.3	15.1	17.3	20.2	22.1	22.6	23.3	23.8	24.5	23.0	18.8	13.2	10.2	10.1	9.8	9.8	9.4	8.8	16.1	24.5	24.5																						
7-Jul	8.6	7.9	7.8	7.9	7.6	7.7	8.3	10.5	11.3	11.2	12.0	12.1	13.6	15.1	16.4	17.3	18.1	18.7	19.1	19.5	19.4	19.2	18.4	16.8	13.5	19.5	19.5																						
8-Jul	14.1	12.9	12.0	11.5	11.2	11.3	12.2	13.1	14.8	17.4	20.1	22.4	23.9	24.4	23.7	24.1	25.0	26.4	26.9	25.0	22.4	20.7	19.3	18.4	18.9	26.9	26.9																						
9-Jul	17.5	16.4	15.4	13.9	13.9	14.0	14.0	13.9	14.3	14.9	15.6	15.9	15.7	15.1	13.0	12.5	13.0	13.8	14.2	13.6	13.0	12.5	12.1	11.6	14.2	17.5	17.5																						
10-Jul	11.4	11.1	10.7	10.1	10.1	10.2	10.4	10.9	12.0	13.3	14.4	15.5	16.7	17.7	18.7	19.6	20.4	20.9	21.4	21.2	20.8	19.5	18.6	18.5	15.6	21.4	21.4																						
11-Jul	18.3	17.8	17.6	17.4	16.9	17.1	17.0	17.5	18.5	20.2	21.7	22.7	22.8	23.2	23.7	23.6	22.5	21.5	20.4	19.7	19.6	19.3	19.2	20.2	19.9	23.7	23.7																						
12-Jul	20.0	19.7	18.5	17.8	16.8	16.6	16.6	16.5	16.4	15.8	16.5	18.1	19.3	20.4	21.4	22.4	22.6	22.0	21.5	21.3	20.5	20.2	18.5	18.0	19.1	22.6	22.6																						
13-Jul	18.1	18.2	18.2	17.8	17.9	17.6	17.7	17.9	18.4	19.7	20.9	21.3	21.4	22.7	23.4	24.4	25.4	25.7	25.6	25.1	24.8	23.9	22.6	21.9	21.3	25.7	25.7																						
14-Jul	21.4	20.7	20.1	19.8	19.3	19.0	19.1	19.4	20.0	21.3	22.9	24.1	24.9	24.8	19.6	19.1	19.5	20.8	21.7	22.7	21.5	21.0	20.7	20.3	21.0	24.9	24.9																						
15-Jul	19.5	18.7	17.6	17.2	16.2	15.8	16.4	17.6	19.3	21.0	22.9	23.9	22.5	23.1	24.3	25.3	26.0	26.0	25.8	25.5	24.7	23.6	22.5	20.7	21.5	26.0	26.0																						
16-Jul	19.6	18.3	17.5	16.4	15.7	16.0	16.3	17.2	18.2	20.1	21.3	22.5	23.7	24.8	24.2	21.9	18.6	19.0	18.9	17.5	17.2	17.4	17.1	18.1	19.1	24.8	24.8																						
17-Jul	17.2	16.1	16.4	16.3	16.1	16.5	17.3	18.2	19.1	19.8	20.7	21.6	21.1	21.5	22.7	23.0	21.9	22.5	22.1	21.4	20.7	20.1	19.9	19.3	19.6	23.0	23.0																						
18-Jul	17.8	17.2	16.3	15.8	15.1	14.9	15.7	16.7	17.7	18.3	20.1	20.7	21.2	21.9	22.1	22.7	23.2	23.4	22.1	21.8	21.5	20.3	18.6	17.4	19.3	23.4	23.4																						
19-Jul	16.6	16.1	16.0	15.7	15.5	15.0	15.0	15.7	16.1	16.2	16.4	16.7	17.3	18.4	19.5	19.0	17.7	18.9	17.1	15.5	15.2	14.9	14.7	14.2	16.4	19.5	19.5																						
20-Jul	14.1	14.0	13.4	12.8	11.9	11.5	12.0	12.9	15.0	17.1	18.4	19.5	19.8	20.8	21.6	22.0	22.4	22.6	22.8	22.6	21.8	20.5	20.1	19.3	17.9	22.8	22.8																						
21-Jul	18.6	17.8	17.3	16.9	16.1	15.2	14.9	14.2	13.9	14.0	14.3	15.0	16.1	17.6	18.3	18.8	19.7	20.1	20.7	20.8	20.2	19.9	19.7	19.1	17.5	20.8	20.8																						
22-Jul	18.3	18.5	17.8	16.9	15.7	15.0	14.8	15.3	17.0	19.4	20.8	21.7	22.4	23.1	23.3	23.5	23.5	22.5	22.0	21.3	19.9	18.4	17.9	17.0	19.4	23.5	23.5																						
23-Jul	16.4	16.0	15.2	15.0	14.1	14.1	14.3	14.5	14.4	14.8	15.5	16.1	16.9	17.5	18.2	17.5	17.5	17.9	18.0	18.2	18.2	17.8	16.8	16.1	16.3	18.2	18.2																						
24-Jul	15.4	14.5	13.7	13.1	11.6	11.4	11.8	13.3	15.4	17.4	19.2	20.4	21.7	23.0	23.8	24.3	24.7	24.6	24.7	24.6	24.3	23.2	21.7	20.6	19.1	24.7	24.7																						
25-Jul	19.6	18.8	17.8	16.6	15.6	14.9	15.2	15.9	16.8	17.4	18.2	19.3	20.7	21.7	22.5	20.2	20.6	22.1	22.8	22.8	22.3	21.2	19.6	17.9	19.2	22.8	22.8																						
26-Jul	16.9	16.3	15.8	15.2	14.9	15.0	14.9	15.6	17.2	18.5	19.8	20.4	21.4	22.2	21.6	21.9	20.7	17.3	18.2	18.6	18.0	16.8	16.3	15.9	17.9	22.2	22.2																						
27-Jul	16.0	16.0	15.4	14.7	13.7	13.5	14.0	14.9	16.7	19.0	20.4	21.7	22.7	21.9	20.8	19.1	20.7	21.5	19.3	19.5	19.7	19.2	18.7	17.4	18.2	22.7	22.7																						
28-Jul	16.3	15.6	15.5	14.9	13.7	13.4	14.3	15.3	16.7	18.7	20.8	22.4	23.3	24.1	22.4	21.7	23.0	21.8	21.1	21.5	21.2	19.4	18.3	16.5	18.8	24.1	24.1																						
29-Jul	16.7	16.4	15.2	15.1	15.3	15.2	15.8	16.6	17.6	18.7	19.9	21.2	22.1	21.4	22.2	22.8	23.0	22.2	19.8	15.8	15.8	14.7	15.1	15.5	18.1	23.0	23.0																						
30-Jul	15.5	15.2	14.9	14.6	13.9	13.6	13.2	13.9	15.2	17.3	18.9	20.8	22.4	22.8	22.9	22.3	22.2	21.9	21.3	19.9	19.6	19.4	18.8	17.6	18.3	22.9	22.9																						
31-Jul	16.3	16.6	16.0	14.8	13.3	12.7	13.1	14.4	16.9	19.5	22.2	23.5	24.4	23.7	21.5	22.1	22.2	21.2	19.3	17.4	16.4	16.2	16.4	16.3	18.2	24.4	24.4																						
																								17.2	16.6	15.9	15.4	14.8	14.6	14.9	15.6	16.7	18.0	19.2	20.2	20.9	21.5	21.6	21.5	21.5	21.4	21.0	20.5	19.9	19.2	18.4	17.7	Diurnal Average	
																								25.8	23.2	21.7	21.1	21.2	21.8	22.0	24.1	24.9	25.6	24.9	27.3	28.4	29.3	29.7	29.9	30.2	30.7	30.6	30.2	29.9	29.3	27.1	25.5	Diurnal Maximum	



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

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





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

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

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	11	1.48	1.48
10 - 20	455	61.16	62.63
> 20	278	37.37	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

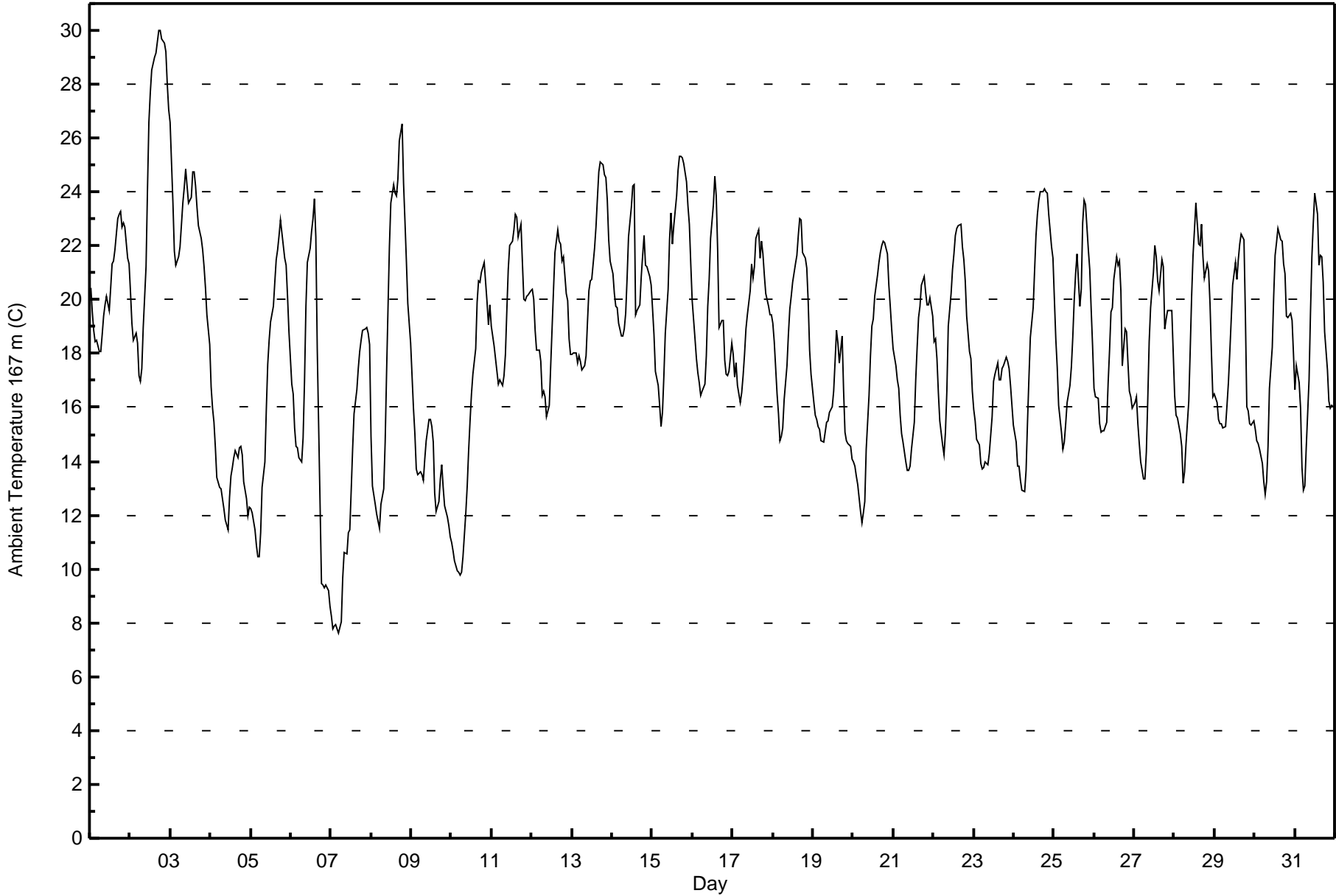


Maximum Value: 30.0 C on Jul 2 18:00		Maximum Daily Average: 24.4 C on Jul 2		Hours in Service: 744																																												
Minimum Value: 7.6 C on Jul 7 05:00		Minimum Daily Average: 13.2 C on Jul 7		Hours of Data: 744																																												
Maximum Diurnal Average: 21.3 C at hour 16		Minimum Diurnal Average: 14.6 C at hour 6		Hours of Missing Data: 0																																												
Monthly Average: 18.31 C		Percentiles: P <sub>1</sub> = 8.6 P <sub>10</sub> = 13.2 Q <sub>1</sub> = 15.4 Median = 18.4 Q <sub>3</sub> = 21.3 P <sub>90</sub> = 23.0 P <sub>99</sub> = 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-Jul	20.4	19.5	18.9	18.4	18.5	18.1	18.1	18.7	19.4	19.8	20.1	19.6	20.5	21.3	21.4	21.9	23.0	23.2	23.3	22.7	22.8	22.7	21.5	21.3	20.6	23.3																						
2-Jul	20.3	19.1	18.5	18.7	18.4	17.2	17.0	17.4	18.9	21.2	24.1	26.6	27.7	28.5	29.0	29.2	29.6	30.0	30.0	29.7	29.5	29.2	28.0	27.0	24.4	30.0																						
3-Jul	26.6	23.6	21.8	21.3	21.5	21.6	22.0	23.6	24.2	24.9	24.2	23.6	23.8	24.7	24.8	24.2	23.4	22.8	22.3	21.9	21.2	20.4	19.5	18.3	22.8	26.6																						
4-Jul	16.8	16.0	15.5	14.5	13.4	13.0	13.0	12.6	12.3	11.8	11.5	12.7	13.4	13.8	14.1	14.4	14.1	14.5	14.5	14.3	13.2	12.6	12.0	12.3	13.6	16.8																						
5-Jul	12.2	12.1	11.5	10.9	10.4	10.4	11.4	13.0	14.0	15.9	17.6	18.5	19.2	19.7	20.7	21.5	21.9	22.4	23.0	22.0	21.5	21.3	20.1	18.8	17.1	23.0																						
6-Jul	16.9	16.5	15.3	14.6	14.5	14.2	14.0	14.9	17.0	19.8	21.4	21.9	22.5	23.0	23.7	22.3	18.2	12.4	9.4	9.4	9.3	9.4	9.2	8.6	15.8	23.7																						
7-Jul	8.3	7.8	7.9	7.9	7.6	7.8	8.1	9.7	10.6	10.6	11.4	11.5	12.9	14.4	15.8	16.7	17.4	18.1	18.5	18.9	18.9	19.0	18.8	18.3	13.2	19.0																						
8-Jul	14.9	13.1	12.4	12.0	11.8	11.5	12.4	13.0	14.7	17.3	19.7	21.9	23.6	24.3	24.0	23.9	24.5	25.9	26.5	24.3	22.9	21.4	19.9	18.4	18.9	26.5																						
9-Jul	17.2	16.0	15.0	13.7	13.5	13.6	13.5	13.3	14.1	14.8	15.6	15.5	15.3	14.7	12.8	12.1	12.5	13.4	13.9	13.0	12.4	11.9	11.6	11.2	13.8	17.2																						
10-Jul	11.0	10.7	10.3	9.9	9.9	9.8	9.9	10.4	12.1	13.1	14.4	15.5	16.5	17.3	18.2	19.9	20.7	20.7	21.0	21.4	20.6	19.9	19.1	19.8	15.5	21.4																						
11-Jul	19.0	18.3	17.8	17.3	16.8	17.0	16.8	17.2	18.0	19.6	21.1	22.0	22.2	22.6	23.2	23.1	22.3	22.8	21.4	20.0	20.0	20.1	20.2	20.4	20.0	23.2																						
12-Jul	20.4	20.0	18.9	18.1	18.1	17.7	16.5	16.6	16.4	15.6	16.1	17.6	19.0	20.4	21.8	22.6	22.2	22.1	21.4	21.6	20.2	19.9	18.6	18.0	19.2	22.6																						
13-Jul	18.0	18.0	18.0	17.7	17.9	17.7	17.4	17.6	17.9	19.2	20.3	20.7	20.8	21.9	22.7	23.8	24.7	25.1	25.0	24.7	24.5	23.7	22.2	21.4	20.9	25.1																						
14-Jul	21.0	20.2	19.7	19.7	19.1	18.6	18.6	18.9	19.5	20.8	22.3	23.4	24.2	24.3	19.5	19.6	19.8	20.8	21.6	22.4	21.3	21.2	20.9	20.6	20.8	24.3																						
15-Jul	19.6	18.7	17.4	16.8	16.1	15.3	15.8	17.2	18.7	20.4	22.2	23.2	22.1	22.8	23.9	24.8	25.3	25.3	25.3	25.1	24.4	23.5	22.8	21.3	21.2	25.3																						
16-Jul	20.0	18.5	17.8	17.3	16.9	16.5	16.6	16.8	17.9	19.7	20.8	22.3	23.5	24.6	23.8	21.9	19.0	19.2	19.3	17.8	17.2	17.2	17.4	18.4	19.2	24.6																						
17-Jul	17.9	17.1	17.6	16.8	16.2	16.5	17.2	18.0	18.9	19.4	20.4	21.3	20.8	21.2	22.3	22.6	21.6	22.1	21.7	20.9	20.3	19.8	19.4	19.4	19.6	22.6																						
18-Jul	19.1	18.5	16.5	15.8	14.8	14.9	15.2	16.3	17.6	18.7	19.7	20.1	20.6	21.3	21.6	22.4	23.0	23.0	21.7	21.5	21.2	19.9	18.1	17.2	19.1	23.0																						
19-Jul	16.2	15.7	15.6	15.3	15.2	14.8	14.7	15.1	15.4	15.5	15.8	16.0	16.6	17.7	18.9	18.4	17.7	18.7	16.6	15.1	14.8	14.6	14.6	14.1	16.0	18.9																						
20-Jul	14.0	13.8	13.5	13.1	12.1	11.7	12.1	12.5	14.4	16.4	17.9	19.0	19.3	20.1	20.9	21.4	21.8	22.0	22.2	22.1	21.7	20.5	19.7	18.9	17.6	22.2																						
21-Jul	18.2	17.5	17.0	16.7	15.7	15.0	14.7	14.0	13.7	13.6	13.8	14.4	15.4	17.0	18.2	19.4	19.8	20.6	20.8	20.3	19.8	19.8	20.1	19.4	17.3	20.8																						
22-Jul	18.4	18.5	17.8	16.6	15.5	14.6	14.3	15.1	16.6	19.0	20.2	21.1	21.7	22.4	22.6	22.8	22.8	22.0	21.5	20.7	19.4	18.1	17.8	16.6	19.0	22.8																						
23-Jul	15.9	15.5	14.8	14.6	13.9	13.7	13.8	14.0	13.9	14.3	15.0	15.6	16.9	17.2	17.6	17.0	17.0	17.4	17.6	17.9	17.7	17.4	16.8	16.1	15.9	17.9																						
24-Jul	15.3	14.7	13.8	13.8	13.3	12.9	12.9	13.6	15.4	17.1	18.6	19.7	21.0	22.4	23.2	23.7	24.0	24.0	24.1	24.0	23.9	23.2	21.9	21.5	19.1	24.1																						
25-Jul	20.0	18.6	17.5	16.1	15.1	14.4	14.7	15.4	16.2	16.8	17.5	18.6	19.9	20.9	21.7	19.8	20.4	22.9	23.7	23.5	21.9	21.1	19.7	18.3	18.9	23.7																						
26-Jul	16.7	16.4	16.4	15.4	15.1	15.1	15.1	15.4	16.9	18.1	19.5	19.7	20.7	21.6	21.3	21.5	20.3	17.6	18.9	18.8	17.6	16.6	16.4	15.9	17.8	21.6																						
27-Jul	16.2	16.4	15.4	14.6	14.0	13.3	13.4	14.3	16.3	18.4	19.7	21.0	22.0	21.6	20.7	20.4	21.5	21.2	18.9	19.3	19.6	19.6	19.6	18.0	18.1	22.0																						
28-Jul	16.4	15.7	15.6	15.0	14.6	13.2	13.6	14.6	16.2	18.1	20.1	21.7	22.6	23.6	22.1	22.0	22.8	21.6	20.8	21.3	21.1	19.8	18.0	16.4	18.6	23.6																						
29-Jul	16.5	16.2	15.6	15.4	15.4	15.3	15.3	16.1	16.9	18.1	19.3	20.5	21.4	20.8	21.5	22.1	22.4	22.2	19.4	16.0	15.9	15.4	15.3	15.5	17.8	22.4																						
30-Jul	15.2	14.8	14.7	14.5	13.9	13.2	12.8	13.3	14.5	16.7	18.2	20.1	21.7	22.1	22.7	22.2	22.2	21.3	21.0	19.4	19.3	19.5	19.2	18.0	17.9	22.7																						
31-Jul	16.7	17.6	16.9	16.0	13.8	12.9	13.1	14.5	17.0	19.5	21.6	22.9	24.0	23.2	21.3	21.6	21.6	20.6	18.8	17.4	16.2	16.0	16.1	16.0	18.1	24.0																						
																								17.3	16.6	16.0	15.4	14.9	14.6	14.6	15.3	16.3	17.6	18.7	19.6	20.4	21.0	21.2	21.3	21.2	21.2	20.8	20.2	19.7	19.2	18.5	17.9	Diurnal Average
																								26.6	23.6	21.8	21.3	21.5	21.6	22.0	23.6	24.2	24.9	24.2	26.6	27.7	28.5	29.0	29.2	29.6	30.0	30.0	29.7	29.5	29.2	28.0	27.0	Diurnal Maximum



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

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





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

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

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	18	2.42	2.42
10 - 20	461	61.96	64.38
> 20	265	35.62	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



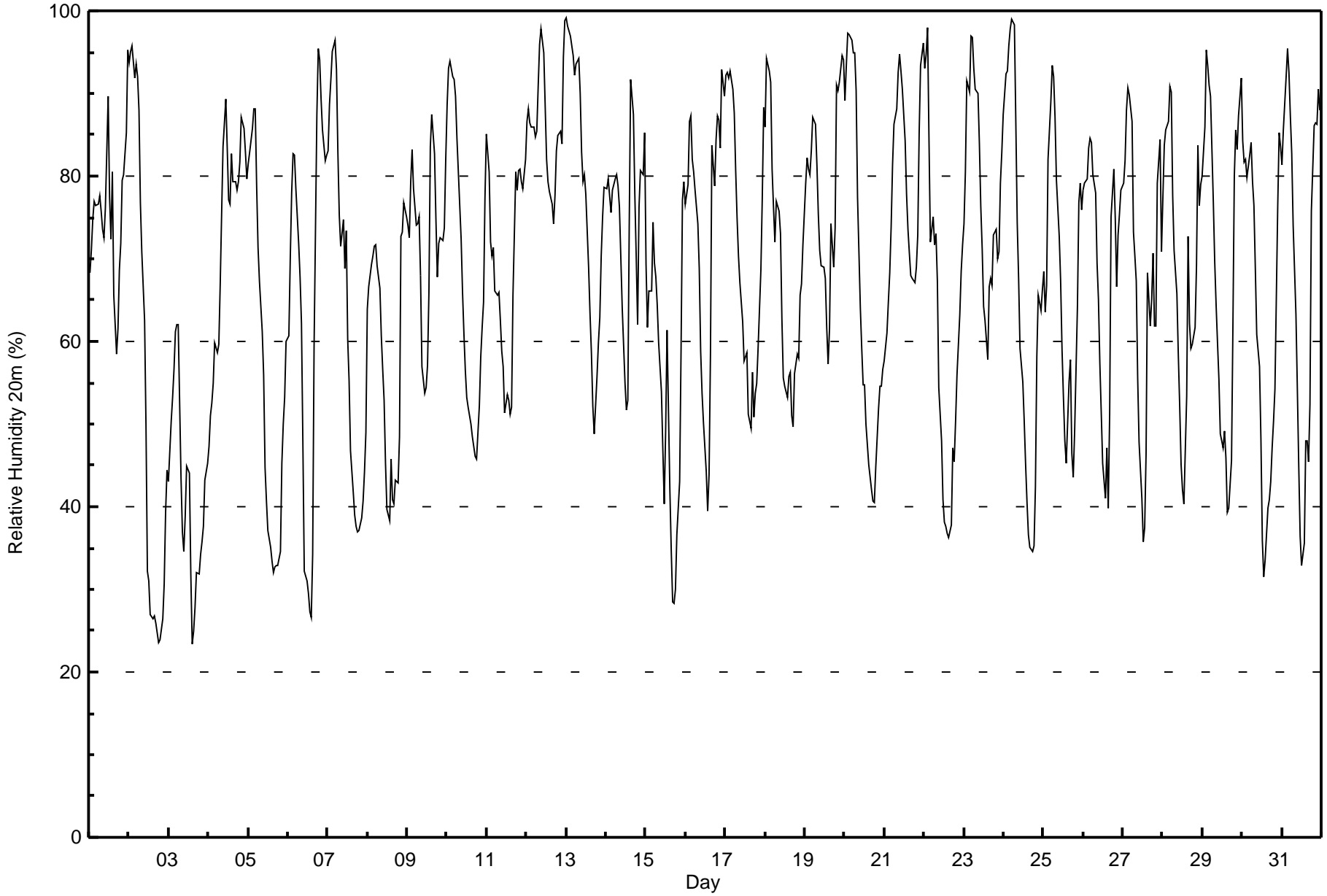
Maximum Value: 99 % on Jul 13 01:00																			Maximum Daily Average: 86.2 % on Jul 12						Hours in Service: 744																							
Minimum Value: 23 % on Jul 3 15:00																			Minimum Daily Average: 41.6 % on Jul 3						Hours of Data: 744																							
Maximum Diurnal Average: 83.8 % at hour 5																			Minimum Diurnal Average: 50.5 % at hour 14						Hours of Missing Data: 0																							
Monthly Average: 67.7 %																			Percentiles: P <sub>1</sub> = 26 P <sub>10</sub> = 40 Q <sub>1</sub> = 54 Median = 71 Q <sub>3</sub> = 83 P <sub>90</sub> = 91 P <sub>99</sub> = 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-Jul	68	71	75	77	76	77	78	76	74	72	76	90	77	72	81	66	58	62	69	72	80	80	85	95	75.3	95																						
2-Jul	94	95	96	92	94	92	88	77	71	63	50	32	31	27	26	27	26	25	24	24	26	31	39	44	53.9	96																						
3-Jul	43	50	53	57	61	62	62	43	37	35	39	45	44	32	23	25	28	32	32	34	36	38	43	45	41.6	62																						
4-Jul	47	51	52	55	60	59	60	67	75	83	89	83	77	77	83	79	79	78	79	82	87	86	83	80	73.0	89																						
5-Jul	81	83	86	88	88	79	71	67	61	56	45	41	37	35	33	32	33	33	33	35	45	50	53	60	55.2	88																						
6-Jul	61	70	78	83	83	78	72	68	62	48	32	31	30	27	27	34	59	87	96	94	89	86	82	83	64.9	96																						
7-Jul	83	89	92	95	96	93	83	75	71	75	69	73	60	55	47	42	39	38	37	37	39	41	44	49	63.4	96																						
8-Jul	64	67	69	70	72	72	69	66	61	57	53	45	40	38	46	41	40	43	43	48	73	73	77	75	58.4	77																						
9-Jul	74	73	79	83	78	74	74	75	68	57	54	54	57	66	84	88	83	75	68	72	72	72	74	82	72.3	88																						
10-Jul	89	93	94	92	92	90	85	80	72	66	61	56	53	52	50	49	47	46	46	52	58	62	65	77	67.8	94																						
11-Jul	85	81	72	70	71	66	66	66	63	59	57	51	54	53	51	52	66	80	78	81	81	79	78	82	68.4	85																						
12-Jul	87	88	86	86	86	85	85	91	96	98	95	89	82	79	78	77	74	78	83	85	85	84	94	99	86.2	99																						
13-Jul	99	98	97	96	95	92	94	94	90	83	79	80	78	69	63	59	52	49	56	60	63	70	75	79	77.9	99																						
14-Jul	78	80	78	76	78	80	80	79	76	70	64	55	52	53	74	92	88	78	70	62	76	81	80	85	74.3	92																						
15-Jul	69	62	66	66	74	70	68	64	60	54	47	40	49	61	42	35	28	28	30	37	43	59	77	79	54.6	79																						
16-Jul	77	79	87	87	82	81	78	74	69	59	54	50	44	39	44	58	84	79	84	87	87	83	93	90	72.9	93																						
17-Jul	92	93	92	93	90	88	81	75	70	67	62	58	58	59	51	49	56	51	54	55	59	69	77	88	70.3	93																						
18-Jul	86	94	93	91	81	76	72	77	76	73	63	56	55	53	56	56	51	50	56	58	58	66	67	72	68.1	94																						
19-Jul	79	82	81	80	83	87	86	81	75	71	69	69	68	62	57	61	74	69	74	91	90	91	95	94	78.0	95																						
20-Jul	89	93	97	97	96	95	95	90	78	64	59	55	55	50	45	43	42	41	41	45	52	55	55	57	66.2	97																						
21-Jul	58	61	65	68	74	81	86	88	92	95	93	90	84	78	74	71	68	68	67	69	73	85	93	96	78.2	96																						
22-Jul	93	95	98	85	72	75	72	73	67	54	48	41	38	38	37	36	38	47	45	50	56	63	68	72	60.9	98																						
23-Jul	74	81	92	90	97	97	93	90	90	84	76	71	64	62	58	67	68	67	73	74	70	71	79	83	77.9	97																						
24-Jul	87	92	93	96	98	99	98	87	74	68	59	55	50	45	41	37	35	35	35	42	58	66	64	66	65.8	99																						
25-Jul	68	64	67	82	89	93	92	87	80	73	67	59	53	48	45	55	58	46	44	49	64	77	79	76	67.3	93																						
26-Jul	78	79	80	83	84	84	80	78	69	65	57	51	45	41	47	40	51	75	81	75	67	73	75	78	68.3	84																						
27-Jul	79	82	88	91	90	87	73	70	67	56	48	41	36	38	46	68	62	65	71	62	62	79	84	71	67.3	91																						
28-Jul	77	84	86	87	91	90	78	71	66	59	52	45	42	40	53	73	62	59	60	62	69	84	76	79	68.5	91																						
29-Jul	80	86	95	93	91	90	77	70	64	60	55	49	47	49	46	39	40	46	62	80	86	83	87	92	69.5	95																						
30-Jul	84	82	82	80	83	84	79	76	69	61	57	48	36	31	34	40	41	43	47	50	54	76	85	84	62.8	85																						
31-Jul	81	86	92	95	93	87	83	74	63	54	45	36	33	36	48	48	46	52	76	86	86	86	90	88	69.4	95																						
																								77.7	80.0	82.5	83.4	83.8	82.6	79.3	75.9	71.2	65.7	60.5	56.2	52.5	50.5	51.3	52.8	54.1	55.6	58.4	61.6	66.0	70.9	74.8	77.4	Diurnal Average
																								99	98	98	97	98	99	98	94	96	98	95	90	84	79	84	92	88	87	96	94	90	91	95	99	Diurnal Maximum





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

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





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

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

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	72	9.68	9.68
40 - 60	184	24.73	34.41
60 - 80	264	35.48	69.89
80 - 100	224	30.11	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

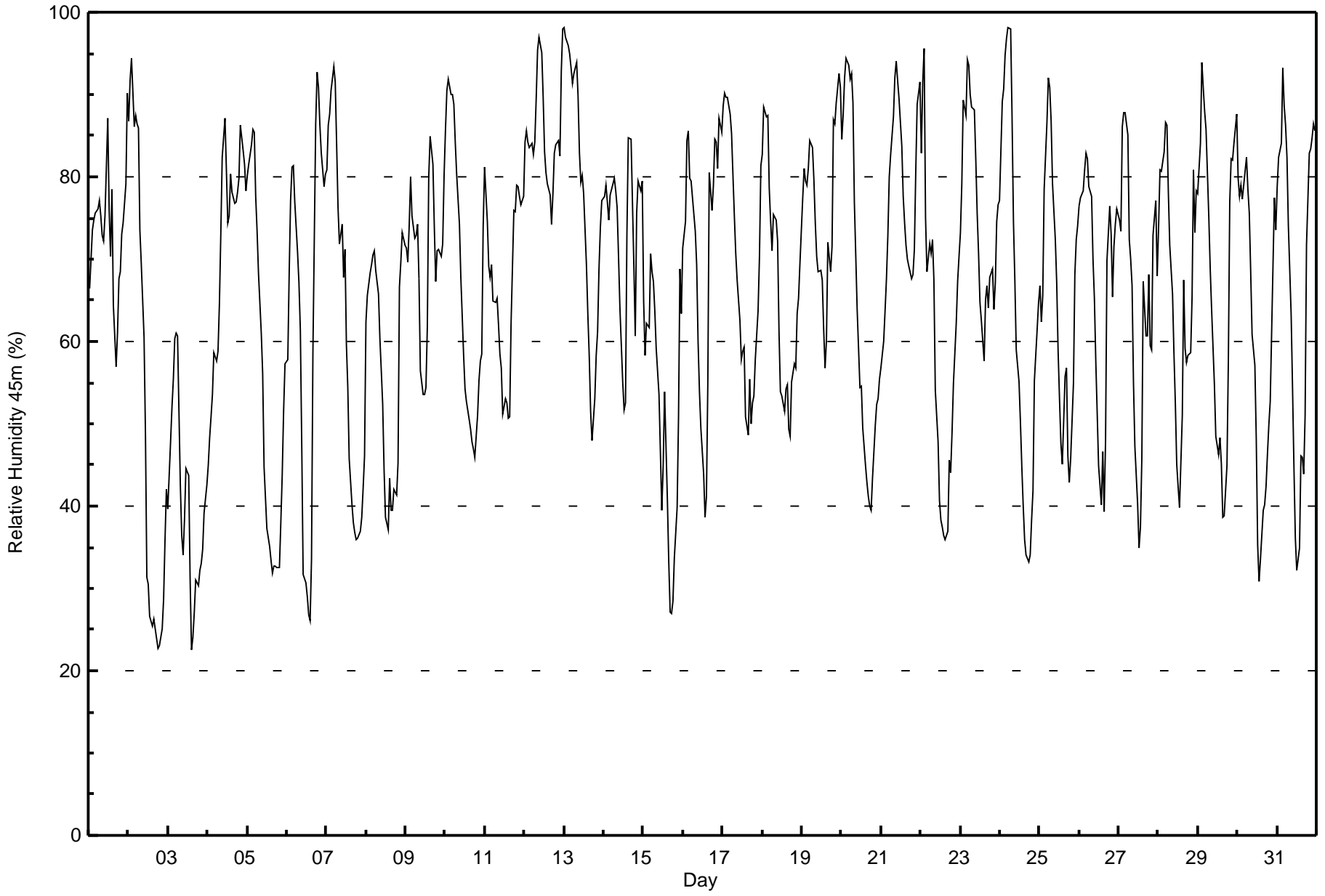


Maximum Value: 98 % on Jul 24 06:00																			Maximum Daily Average: 85.5 % on Jul 12						Hours in Service: 744																			
Minimum Value: 23 % on Jul 3 15:00																			Minimum Daily Average: 40.2 % on Jul 3						Hours of Data: 744																			
Maximum Diurnal Average: 81.5 % at hour 5																			Minimum Diurnal Average: 49.8 % at hour 14						Hours of Missing Data: 0																			
Monthly Average: 65.9 %																			Percentiles: P <sub>1</sub> = 25 P <sub>10</sub> = 39 Q <sub>1</sub> = 53 Median = 69 Q <sub>3</sub> = 80 P <sub>90</sub> = 88 P <sub>99</sub> = 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-Jul	66	70	74	75	76	76	77	75	73	72	75	87	76	70	78	64	57	61	68	68	73	74	79	90	73.2	90																		
2-Jul	87	92	94	86	88	86	86	74	70	60	49	31	30	27	26	26	25	24	23	23	25	29	36	42	51.6	94																		
3-Jul	40	48	52	55	60	61	61	42	36	34	39	45	44	31	23	24	27	31	30	32	33	35	39	43	40.2	61																		
4-Jul	45	48	51	54	59	58	59	65	73	82	87	81	74	75	80	78	77	77	78	80	86	83	82	78	71.2	87																		
5-Jul	80	82	84	86	85	78	73	68	61	56	45	41	37	35	33	32	33	33	33	33	38	44	52	57	54.1	86																		
6-Jul	58	68	77	81	81	77	71	67	61	47	32	31	29	27	26	33	59	86	93	91	86	83	79	80	63.5	93																		
7-Jul	81	86	88	90	93	92	84	76	72	74	68	71	60	54	46	40	38	37	36	36	37	39	42	46	61.9	93																		
8-Jul	62	66	68	69	71	71	69	66	60	56	52	44	39	37	43	40	40	42	41	45	67	70	73	72	56.8	73																		
9-Jul	71	70	74	80	75	73	73	74	68	56	54	54	54	62	80	85	82	74	67	71	71	70	72	80	70.4	85																		
10-Jul	86	91	92	90	90	89	84	80	74	68	63	58	54	53	51	49	48	47	46	51	55	58	58	74	67.0	92																		
11-Jul	81	75	69	68	69	65	65	65	62	58	57	51	53	53	51	51	62	76	76	79	79	78	77	78	66.5	81																		
12-Jul	84	86	84	84	84	83	84	90	95	97	95	90	83	81	79	78	74	78	83	84	84	83	93	98	85.5	98																		
13-Jul	98	97	96	95	93	91	93	94	90	83	79	80	78	69	63	58	51	48	53	58	61	69	74	77	77.1	98																		
14-Jul	78	79	77	75	78	79	80	78	76	70	64	55	52	53	73	85	85	77	69	61	76	79	78	80	73.1	85																		
15-Jul	65	58	62	62	71	68	67	64	59	53	47	40	45	54	41	33	27	27	29	34	40	51	69	63	51.2	71																		
16-Jul	71	75	84	86	80	79	78	73	69	60	54	49	44	39	41	55	81	76	79	85	84	81	87	85	70.7	87																		
17-Jul	89	90	90	90	88	85	80	75	71	68	63	58	59	59	51	49	55	50	52	53	58	64	70	81	68.6	90																		
18-Jul	83	88	87	88	79	75	71	75	75	72	61	54	53	52	54	55	49	48	55	57	57	63	65	69	66.1	88																		
19-Jul	77	81	80	79	81	84	83	80	74	70	68	69	67	61	57	60	72	68	72	87	86	89	92	91	76.3	92																		
20-Jul	85	88	92	94	93	92	93	89	77	64	59	54	55	50	45	43	41	40	40	43	50	52	53	55	64.4	94																		
21-Jul	57	60	64	68	73	80	83	87	92	94	92	90	84	78	74	72	70	69	68	68	71	81	89	92	77.2	94																		
22-Jul	83	91	96	75	69	72	71	72	67	54	48	41	38	38	37	36	37	46	44	49	55	62	67	70	59.0	96																		
23-Jul	73	79	89	88	94	94	90	89	88	82	76	71	65	63	58	65	67	64	68	69	64	67	75	77	75.5	94																		
24-Jul	77	89	91	95	97	98	98	87	75	68	59	55	50	45	40	36	34	33	34	38	42	55	61	65	63.4	98																		
25-Jul	67	62	66	78	87	92	91	87	79	72	67	59	53	48	45	56	57	46	43	46	55	68	72	74	65.4	92																		
26-Jul	76	77	78	81	83	82	79	78	70	65	58	51	45	40	47	39	48	70	76	73	65	72	74	76	66.8	83																		
27-Jul	75	73	86	88	88	85	72	70	67	55	47	40	35	38	46	67	61	61	68	59	59	73	77	68	64.9	88																		
28-Jul	74	81	81	83	87	86	78	72	66	59	53	45	42	40	51	67	59	57	58	59	65	81	73	78	66.5	87																		
29-Jul	78	84	94	91	88	86	75	69	64	59	55	49	46	48	45	39	39	45	58	77	82	82	84	88	67.6	94																		
30-Jul	80	78	79	77	81	82	79	76	68	61	57	48	35	31	34	39	40	42	46	50	53	69	77	74	60.7	82																		
31-Jul	79	82	84	93	89	86	82	74	63	54	45	36	32	35	46	46	44	51	72	83	83	85	86	86	67.4	93																		
																			74.4	77.2	80.1	80.7	81.5	80.8	78.3	75.2	70.9	65.4	60.2	55.7	52.0	49.8	50.4	51.6	52.8	54.3	56.7	59.4	62.6	67.3	71.2	73.8	Diurnal Average	
																			98	97	96	95	97	98	98	94	95	97	95	90	84	81	80	85	85	86	93	91	86	89	93	98	Diurnal Maximum	



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

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





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

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

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	83	11.16	11.16
40 - 60	185	24.87	36.02
60 - 80	291	39.11	75.13
80 - 100	185	24.87	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Relative Humidity 100m (RH100m) - %**

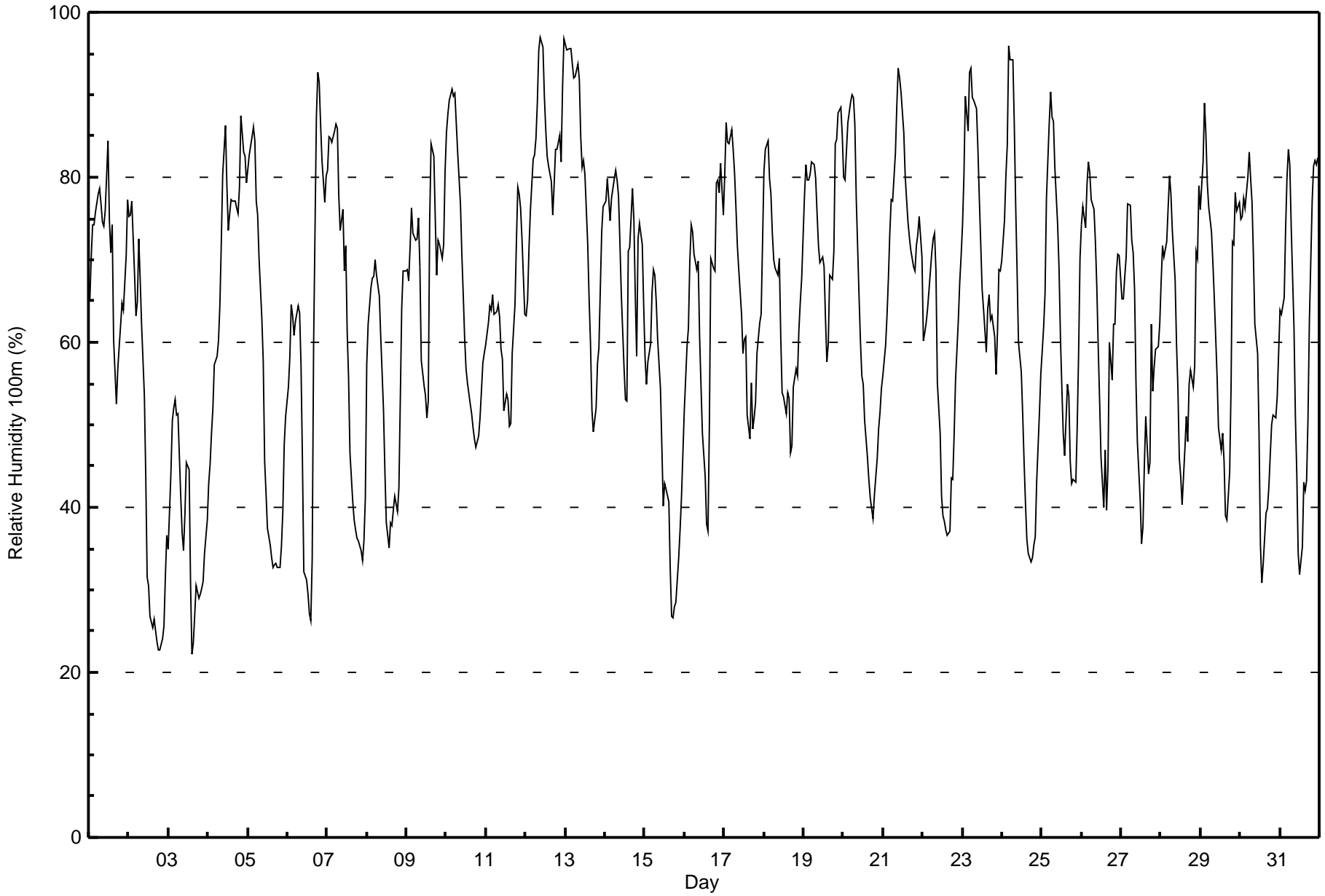
**Lower Camp Met Tower - July 2015**

Maximum Value: 97 % on Jul 12 10:00      Maximum Daily Average: 83.2 % on Jul 12																		Hours in Service: 744								
Minimum Value: 22 % on Jul 3 15:00      Minimum Daily Average: 37.8 % on Jul 3																		Hours of Data: 744								
Maximum Diurnal Average: 77.6 % at hour 6      Minimum Diurnal Average: 49.7 % at hour 14																		Hours of Missing Data: 0								
Monthly Average: 63.2 %      Percentiles: P <sub>1</sub> = 25 P <sub>10</sub> = 38 Q <sub>1</sub> = 51 Median = 65 Q <sub>3</sub> = 77 P <sub>90</sub> = 84 P <sub>99</sub> = 96																		Hours of Calibration: 0								
																		Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	65	70	74	74	76	78	79	77	75	74	76	84	75	71	74	60	53	57	60	62	65	64	70	77	70.4	84
2-Jul	75	75	77	68	63	65	73	68	62	54	44	31	31	27	25	26	25	24	23	23	24	26	31	37	44.9	77
3-Jul	35	44	51	52	53	51	51	41	37	35	39	45	45	31	22	24	27	31	29	29	30	31	34	38	37.8	53
4-Jul	43	45	49	52	57	58	60	65	72	80	86	79	74	76	77	77	76	76	79	87	83	83	79	79	70.4	87
5-Jul	81	83	85	86	84	77	75	70	63	58	46	42	37	35	34	33	33	33	33	33	35	39	48	51	53.9	86
6-Jul	55	58	65	63	61	63	64	64	57	46	32	31	29	27	26	34	59	87	93	92	86	82	77	80	59.6	93
7-Jul	81	85	85	84	86	86	86	78	74	76	69	72	61	56	47	41	38	37	36	36	35	33	36	41	60.7	86
8-Jul	57	62	67	68	68	70	68	66	61	56	52	44	38	35	38	38	40	41	40	42	53	64	69	69	54.4	70
9-Jul	69	68	72	76	73	72	73	75	69	58	55	54	51	53	75	84	83	75	68	72	72	70	72	81	69.5	84
10-Jul	85	88	89	91	90	90	87	83	77	71	66	61	57	55	53	51	50	48	47	49	51	54	58	59	66.9	91
11-Jul	60	62	64	64	66	63	64	65	63	59	58	52	54	53	50	50	59	65	72	79	78	76	72	63	63.0	79
12-Jul	63	65	71	76	82	83	85	89	95	97	96	90	86	83	81	80	75	79	83	83	85	82	91	97	83.2	97
13-Jul	96	95	96	96	94	92	92	94	92	85	81	82	80	72	65	60	52	49	52	57	59	66	73	76	77.4	96
14-Jul	77	80	77	75	77	80	81	80	78	72	66	57	53	53	71	72	79	75	66	58	73	74	72	65	71.2	81
15-Jul	58	55	58	60	66	69	68	65	60	54	48	40	43	42	41	33	27	27	28	29	34	37	41	46	47.0	69
16-Jul	52	59	62	70	74	73	71	69	70	61	55	49	44	38	37	50	70	69	69	79	80	78	82	75	64.0	82
17-Jul	81	87	84	84	86	83	80	76	72	69	63	59	60	61	51	48	55	50	51	53	59	62	63	72	67.1	87
18-Jul	81	83	84	80	78	73	70	69	68	70	61	54	53	51	54	53	47	47	55	57	56	62	65	68	64.1	84
19-Jul	78	81	80	80	80	82	82	80	76	72	70	70	69	63	58	60	68	68	71	84	85	88	88	85	75.7	88
20-Jul	80	80	83	87	89	90	90	86	77	66	60	56	55	50	46	43	41	40	39	42	46	49	52	54	62.6	90
21-Jul	56	60	63	68	73	77	77	83	89	93	92	90	85	80	77	75	73	71	69	69	72	73	75	70	75.4	93
22-Jul	60	61	62	64	66	71	72	73	69	55	49	41	39	38	37	37	37	44	43	49	55	63	67	70	55.2	73
23-Jul	74	80	90	86	93	93	90	89	88	83	77	72	66	64	59	64	66	63	63	61	56	61	69	69	74.0	93
24-Jul	70	75	80	84	96	94	94	86	77	69	60	57	51	46	41	36	34	33	34	35	36	43	51	56	60.0	96
25-Jul	59	62	66	78	87	90	87	87	81	74	69	61	55	49	46	55	54	46	43	43	43	50	59	70	63.0	90
26-Jul	74	76	74	79	82	81	77	76	72	67	59	53	46	40	47	40	45	60	56	62	62	68	71	71	64.1	82
27-Jul	65	65	68	70	77	77	72	71	66	55	48	41	36	38	45	51	44	45	62	54	57	59	59	62	57.9	77
28-Jul	67	72	70	72	76	80	78	74	68	60	54	46	44	40	47	51	48	55	57	55	57	71	70	79	62.1	80
29-Jul	76	82	89	85	79	76	73	70	65	61	56	50	47	49	46	39	38	44	55	72	72	78	76	77	64.8	89
30-Jul	75	75	77	76	80	83	80	77	70	62	59	49	35	31	33	39	40	42	46	50	51	51	53	59	58.1	83
31-Jul	64	63	65	74	80	83	82	74	62	51	44	34	32	35	43	42	43	51	63	77	81	82	82	82	62.1	83
																		Diurnal Average								
																		Diurnal Maximum								



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

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





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

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

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	93	12.50	12.50
40 - 60	209	28.09	40.59
60 - 80	309	41.53	82.12
80 - 100	133	17.88	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744





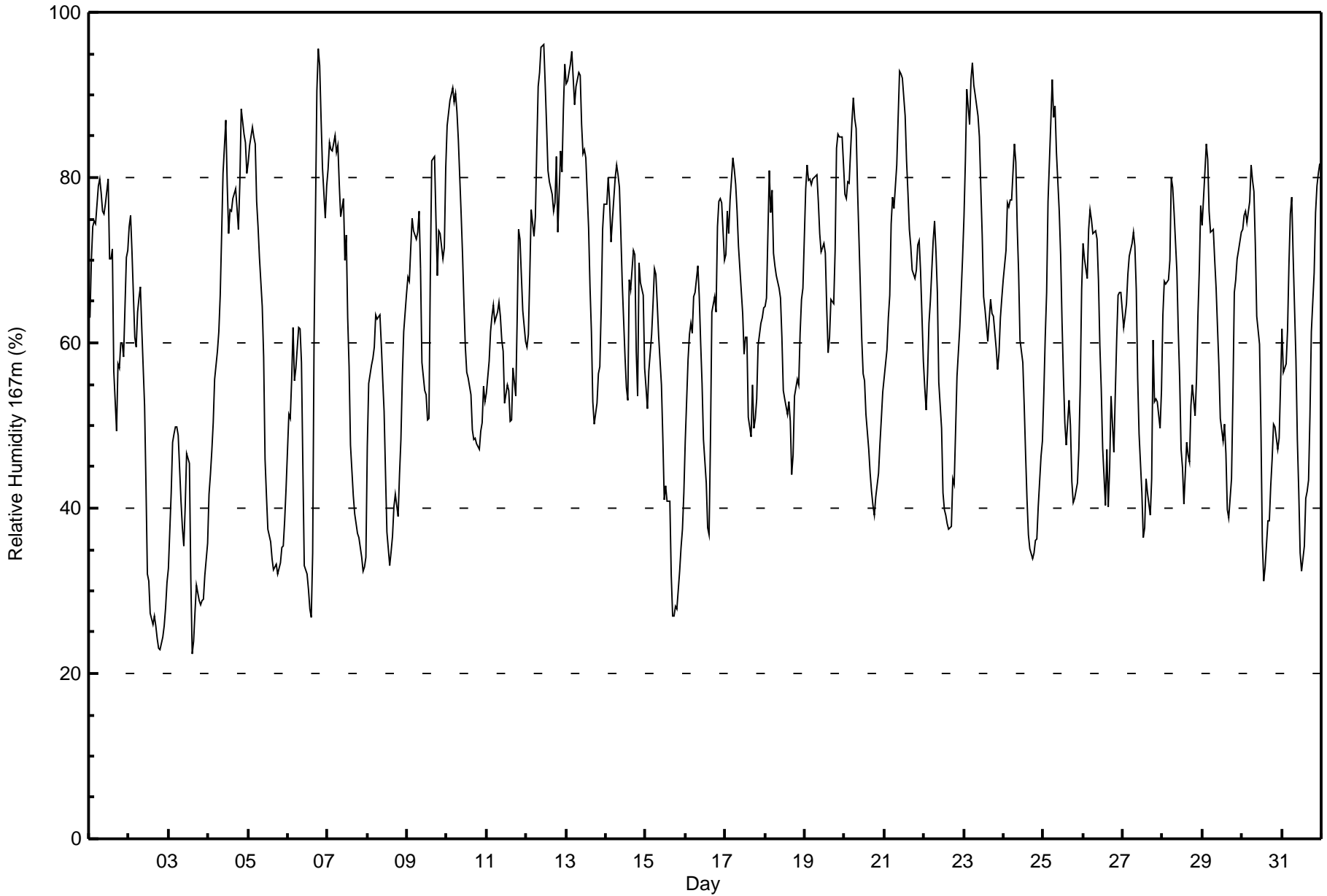
**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Relative Humidity 167m (RH167m) - %**

**Lower Camp Met Tower - July 2015**

Maximum Value: 96 % on Jul 12 11:00      Maximum Daily Average: 80.9 % on Jul 12																		Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Minimum Value: 22 % on Jul 3 15:00      Minimum Daily Average: 36.9 % on Jul 3 Maximum Diurnal Average: 75.5 % at hour 7      Minimum Diurnal Average: 48.9 % at hour 16 Monthly Average: 61.7 %      Percentiles: P <sub>1</sub> = 26 P <sub>10</sub> = 38 Q <sub>1</sub> = 50 Median = 63 Q <sub>3</sub> = 75 P <sub>90</sub> = 83 P <sub>99</sub> = 94																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	63	70	74	75	74	79	80	78	76	76	77	80	70	70	71	57	49	57	57	60	60	58	70	71	68.9	80
2-Jul	74	75	71	61	60	64	65	67	62	52	43	32	31	27	26	27	26	24	23	23	24	26	28	31	43.4	75
3-Jul	33	42	48	49	50	50	49	41	38	35	40	47	45	32	22	24	27	31	29	28	29	29	32	36	36.9	50
4-Jul	42	44	47	50	56	59	61	66	73	80	87	79	73	76	76	77	79	76	74	79	88	85	84	81	70.6	88
5-Jul	82	84	86	85	84	77	74	70	64	58	46	42	38	36	34	33	33	33	32	33	35	35	39	42	53.2	86
6-Jul	51	51	56	62	55	57	62	62	58	45	33	32	30	28	27	35	61	91	96	94	87	81	75	79	58.6	96
7-Jul	81	84	83	83	85	83	84	79	75	77	70	73	63	57	48	42	39	38	37	37	34	32	33	34	60.5	85
8-Jul	47	55	57	58	59	63	63	63	60	56	52	44	37	33	35	37	40	42	39	44	48	56	61	66	50.7	66
9-Jul	68	68	71	75	74	72	73	76	69	58	54	54	51	51	68	82	82	75	68	74	73	70	71	81	69.1	82
10-Jul	86	88	89	91	89	90	88	85	76	71	65	59	56	56	54	50	48	48	48	47	49	50	55	53	66.3	91
11-Jul	54	58	61	63	65	63	64	65	63	60	59	53	55	54	51	51	57	54	63	74	73	68	64	60	60.4	74
12-Jul	59	61	68	76	73	75	84	91	93	96	96	91	86	81	80	78	76	77	82	73	83	81	88	94	80.9	96
13-Jul	91	92	94	95	92	89	91	93	92	87	83	83	82	74	67	61	53	50	53	56	57	64	74	77	77.1	95
14-Jul	77	80	77	72	75	80	82	80	79	73	67	58	55	53	68	66	71	71	59	54	70	67	66	57	69.0	82
15-Jul	55	52	57	61	65	69	68	65	61	55	49	41	43	41	41	32	27	27	28	28	32	35	38	42	46.2	69
16-Jul	48	58	61	62	61	66	66	69	66	60	55	48	43	38	37	48	64	66	64	74	77	77	77	70	60.6	77
17-Jul	71	76	73	77	82	81	79	76	72	69	64	59	61	61	51	49	55	50	51	53	60	62	63	64	64.9	82
18-Jul	64	65	81	76	78	71	69	68	67	65	61	54	53	51	53	50	44	46	54	56	55	61	65	67	61.5	81
19-Jul	79	82	80	80	79	80	80	80	77	73	71	72	71	64	59	61	65	65	71	84	85	85	85	81	75.4	85
20-Jul	78	77	79	79	87	90	87	86	79	67	61	56	55	51	47	44	42	40	39	41	44	48	51	54	61.8	90
21-Jul	56	59	63	66	74	78	76	82	87	93	93	92	87	82	78	74	72	69	68	69	72	72	69	58	74.5	93
22-Jul	55	52	56	62	65	72	75	71	66	55	50	42	40	39	38	37	38	43	43	49	56	62	66	70	54.3	75
23-Jul	75	82	91	86	92	94	91	90	88	85	79	73	66	64	60	63	65	63	63	59	57	59	63	66	73.9	94
24-Jul	68	71	77	76	77	77	84	82	74	69	60	58	52	46	41	37	35	34	35	36	36	40	46	48	56.7	84
25-Jul	54	61	66	77	87	92	87	89	83	76	71	62	56	50	48	53	50	43	41	41	43	47	55	66	62.4	92
26-Jul	72	70	68	74	76	75	73	73	73	68	60	54	47	40	47	40	45	54	47	54	60	66	66	66	61.2	76
27-Jul	62	63	65	68	71	72	73	72	66	56	49	42	36	38	44	42	39	44	60	53	53	53	50	54	55.2	73
28-Jul	63	67	67	68	70	80	79	76	69	61	56	47	45	40	48	46	46	52	55	51	56	63	69	77	60.5	80
29-Jul	74	81	84	82	76	73	74	70	67	62	57	51	48	50	47	40	39	44	53	66	68	70	71	73	63.3	84
30-Jul	74	75	76	75	77	82	80	78	72	63	60	50	36	31	33	38	39	43	46	50	50	47	48	55	57.4	82
31-Jul	62	56	58	61	70	76	78	70	58	48	42	35	32	35	41	42	43	51	61	68	76	79	80	82	58.5	82
																		65.1 67.7 70.5 71.9 73.5 75.1 75.5 74.6 70.9 66.1 61.5 56.9 53.1 50.0 49.6 48.9 50.0 51.6 52.8 55.1 57.8 59.1 61.4 63.1						Diurnal Average		
																		91 92 94 95 92 94 91 93 93 96 96 92 87 82 80 82 82 91 96 94 88 85 88 94						Diurnal Maximum		





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

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

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	92	12.37	12.37
40 - 60	232	31.18	43.55
60 - 80	314	42.20	85.75
80 - 100	106	14.25	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Maximum Speed: 21 km/h on Jul 3 11:00	Maximum Daily Speed Average: 9.0 km/h on Jul 17	Hours in Service: 744
Minimum Speed Value: 0 km/h on Jul 31 04:00	Minimum Daily Speed Average: 0.7 km/h on Jul 26	Hours of Data: 744
Maximum Diurnal Speed Average: 4.5 km/h at hour 14	Minimum Diurnal Speed Average: 0.3 km/h at hour 1	Hours of Missing Data: 0
Monthly Average Velocity: 1.6 km/h 276.5 deg	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 2 Q <sub>1</sub> = 3 Median = 5 Q <sub>3</sub> = 9 P <sub>90</sub> = 12 P <sub>99</sub> = 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-Jul	WSW5	SSW5	WNW2	WSW0	SW5	SW6	W4	W6	WSW8	WSW9	NW6	ENE1	SW5	WNW4	NW6	NW3	NNW3	NNE1	NNW2	NNE1	NNW2	WNW0	WSW1	SSE1	W2.7	WSW9	
2-Jul	SE4	SSE3	SE4	SE5	SE6	SE7	SE7	SSE6	SE7	SE6	ESE4	WSW9	W8	W10	W9	W11	WSW9	WSW13	SW11	SW9	SSW8	S8	S3	SE3	SSW4.3	WSW13	
3-Jul	S6	ESE4	SE12	SE10	SSE12	SE13	SSE11	WSW13	W16	W21	W21	NNW21	NW15	NW16	NW19	NW17	NW16	NW11	NNW9	NNW6	NNW6	NW5	NNW5	NNW5	WNW5.7	W21	
4-Jul	N5	NNW4	W10	W12	W11	WNW13	NW8	NW5	WNW2	WSW9	WSW5	W10	W14	WNW6	NNW3	N3	NW1	WNW3	NW5	NNW8	NNW9	N13	N14	N10	NW6.0	W14	
5-Jul	N9	NNW8	NNW8	NNW4	NW4	NNW4	NNW2	N2	WSW6	NNW4	N8	N9	N10	NNW8	NNW7	NNW5	N5	SW1	SW0	S2	SE6	SE3	ESE3	SE3	NNW3.4	N10	
6-Jul	SE7	SE7	SE7	SSE8	SE9	SSE11	SSE8	SSE9	SSE11	SW5	W15	W13	W15	W13	WSW15	NW14	N14	N17	N13	NNW13	NNW12	NW7	NNW6	NNW5	WNW2.6	N17	
7-Jul	NNW6	NNW3	N4	NNW3	NNE2	NNW3	NNE2	N2	W5	WSW11	W6	WSW6	SW3	WSW7	WSW8	W10	WSW8	W11	W10	WSW9	SW6	SSW6	SSW7	S6	W4.3	W11	
8-Jul	ESE8	ESE10	SSE10	SSE11	SSE14	SSE12	SSE13	SSE13	SSE14	SSE13	SSE15	SSE17	SSE19	S14	SSE18	S17	SSE16	W8	WNW10	NW18	NW9	NNW6	NNW2	W4	SSE7.6	SSE19	
9-Jul	N5	NW2	NNW3	NNW4	NW5	NNW4	NW4	NNW4	N5	NNE6	N4	NW4	NNW5	NNE5	NNE2	N6	N7	N9	N10	N8	N8	NNW5	N6	NNW5	N4.9	N10	
10-Jul	NNW3	NNW2	NNW3	N8	NNW5	N6	NNE6	ENE2	NNW5	N5	N6	NNW6	N5	N3	W4	N3	N3	NW5	NNW3	N3	N3	NNW1	N4	NNW3	N3.7	N8	
11-Jul	N3	NNW4	SSE1	SSE1	SSE3	SSE9	SSE11	SSE7	ESE2	SSE10	SSE13	SSE13	SSE16	SSE12	SE9	ESE6	ESE2	NNW2	SSE1	NNE1	N1	E1	ENE3	NNE4	SSE4.2	SSE16	
12-Jul	N2	NNW3	N7	NNW5	NW2	NNW3	NNW0	SSW1	ENE2	NNW6	SE1	WNW3	N5	N6	N7	N8	NNE4	NNW5	NNW5	NNW4	NW4	WSW18	WSW9	NNW3	NNW3.0	WSW18	
13-Jul	SSW1	SE4	WSW2	W2	SSW3	S4	SE3	SE5	SSE7	SSE6	SE5	SSE5	W11	W9	WSW10	WSW8	W5	WSW5	SE5	S8	SSW6	SSE5	SE4	S3	SSW3.2	W11	
14-Jul	SSE8	SSE8	SSE9	SSE11	SSE11	SSE10	SSE7	SSE8	SSE6	SSE7	S4	WSW4	W6	WNW4	NNW5	SE1	SE4	SE5	SSE6	S8	SE4	SSE8	SE4	SE2	SSE5.0	SSE11	
15-Jul	SW4	S5	S7	S6	S3	WSW6	W5	WSW7	WSW7	WSW6	WSW4	WSW7	SSW12	ESE4	ENE2	ENE2	SW5	WSW14	WSW13	WSW11	WSW8	W6	W1	S1	SSE4	SW4.9	WSW14
16-Jul	SE6	SE3	ESE1	SE2	SE3	SE5	SE4	SE1	NNE2	N5	NNW9	NNW7	N9	N8	NE3	S11	SW13	SSW6	NW13	NNW7	NNW5	SSE2	NW5	NW5	NNW1.1	NW13	
17-Jul	N7	N11	N11	NNW7	NNW4	NNW6	N10	N14	N14	N15	N15	N14	N16	N13	N13	N14	NNW8	N11	N7	NNE4	NNW2	W1	W1	ENE0	N9.0	N16	
18-Jul	W1	SSE1	SE1	SSE3	S4	S5	S6	SSE12	SSE14	SE9	WSW5	WSW12	SW12	WSW15	W12	WSW14	W13	WNW17	WNW16	WNW15	NW15	NNW7	NNW9	NW8	WSW5.6	WNW17	
19-Jul	NW9	NW9	NW8	NW5	NW11	NW9	NW9	NW9	NW9	NW11	WNW15	NW11	NW12	NW10	NW12	NW11	NW13	N7	N5	N10	N4	NW3	N2	NW1	NW3	NW8.0	WNW15
20-Jul	NW2	NNW1	SE1	SE1	SE4	SE5	SE7	SSE6	SSE4	S3	SE5	ESE5	SE7	SSE4	SSE7	SSE8	SSE7	SSE7	SSE6	SE4	SSE2	SE3	SE10	SE10	SE4.6	SE10	
21-Jul	SSE9	SE13	SE11	SSE10	SSE6	ESE3	E3	NE4	NNE3	NE2	ESE6	SE4	S5	SSW1	NNE5	NNE6	NNW7	N8	N4	NE3	NNW3	NW1	SSE1	N2	E1.9	SE13	
22-Jul	SSE2	S1	NNE1	WSW2	S4	S3	SW4	W5	NW1	SSW3	WSW2	WSW4	NW4	W3	WNW3	WNW8	WNW7	NW10	WNW10	WNW11	WNW10	W11	WNW9	NNW4	WNW4.1	WNW11	
23-Jul	WNW5	NNW4	WNW4	NNW3	NW4	NNW4	NW3	NNW5	NNW5	NNW6	NNW5	N4	NNE4	NNE3	WNW4	WSW6	S5	ESE4	ENE3	N2	NW4	WNW3	NNW2	SSE2	NNW2.4	NNW6	
24-Jul	SE2	SE3	ESE3	ESE2	SE2	SE5	SE6	SE5	SE6	SSE8	SE6	SE8	SE6	ESE4	SSE8	S7	WSW10	W8	WSW5	SE3	SE4	SE5	SSE6	SSE9	SSE4.2	WSW10	
25-Jul	SW5	SW7	SW11	W13	NW3	SE1	SSE3	SE4	SSW7	SSW10	W8	W10	W10	W11	W11	NNW10	NNE3	NNE3	NNE3	NNE1	N3	N5	N4		W3.8	W13	
26-Jul	NNW4	NNW5	NNE3	NNW4	N3	NE2	N2	NNE1	W2	WSW1	WSW1	W6	WSW9	NW11	NNW5	NW3	WNW9	SE2	ESE3	SSE5	SSE8	SE7	SSE9	SSE7	W0.7	NW11	
27-Jul	SSE6	SE6	SE6	SE7	SE6	SSE7	S5	S5	SSE7	WSW5	W10	WSW14	WSW17	NNW8	NNW7	NNW3	NE1	N4	N4	SSE6	SW1	E0	SSW1	WSW2	SSW2.1	WSW17	
28-Jul	N2	E1	SE6	ESE4	NE2	NNE1	NNE2	SW1	WSW4	WSW3	WSW2	W5	W4	NNE1	NNE5	ESE2	SE1	N7	SE3	ESE3	NNW3	NNW3	N8	NNE3	N0.9	N8	
29-Jul	WSW4	NNW3	N1	SE2	E1	WNW0	WSW6	WSW8	W6	W7	W7	WSW7	W9	W14	W10	W12	NW7	N7	WNW13	NNW8	NE2	ESE2	E1	N3	WNW4.5	W14	
30-Jul	NW5	NNW4	WNW6	WNW8	WSW11	WSW9	WNW7	W6	W9	WNW8	WNW6	NW8	NW15	NW15	NNW9	NNE7	NE6	E5	NE8	ENE4	NE0	NNE1	SSW0	ESE1	NW4.4	NW15	
31-Jul	W1	NW0	N3	WSW0	ESE3	SSE9	SSE7	SE7	SE6	SSE5	SSE3	E3	ESE2	WSW11	SW8	ESE3	W7	NW2	NNW4	NNW3	NNW2	W0	S1	WSW4	S1.5	WSW11	

W0.3	E0.3	S0.5	SSW0.8	S1.5	SSE1.9	S1.6	SSW1.6	SW1.8	WSW2.6	W2.6	W3.6	W4.3	NNW4.5	NNW3.6	NNW3.1	NNW3.1	NW3.4	NW3.4	NW2.3	NW2.1	NNW1.0	NNW0.8	NNW0.6		Diurnal Average
N9	SE13	SE12	W13	SSE14	WNW13	SSE13	N14	W16	W21	W21	NNW21	SSE19	NW16	NW19	S17	NW16	WNW17	WNW16	NW18	NW15	WSW18	N14	N10		Diurnal Maximum

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



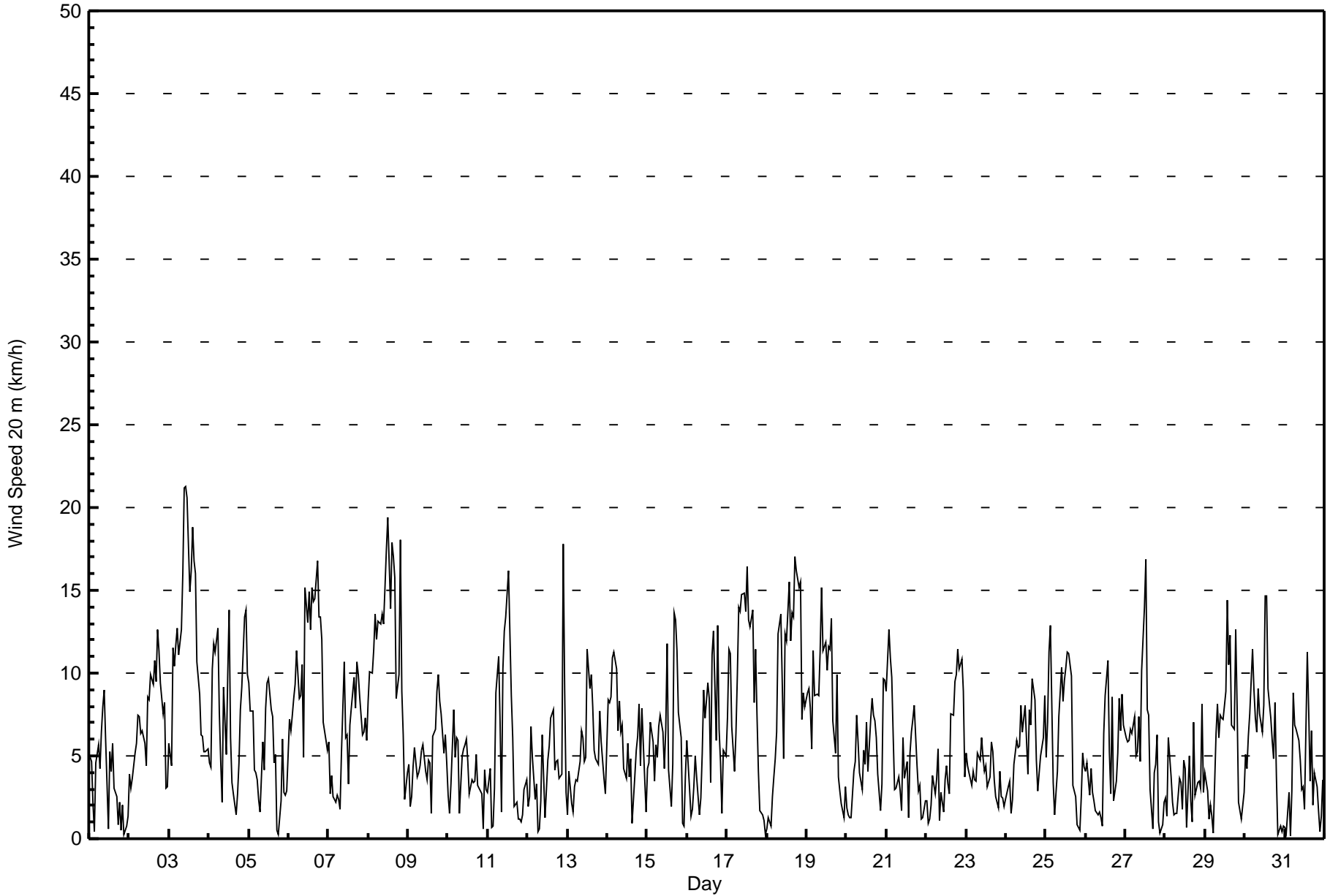
Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Speed 20 m (WS20m) - km/h

Lower Camp Met Tower - July 2015

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





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

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

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	378	50.81	50.81
6 - 11	278	37.37	88.17
12 - 19	85	11.42	99.60
20 - 28	3	0.40	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

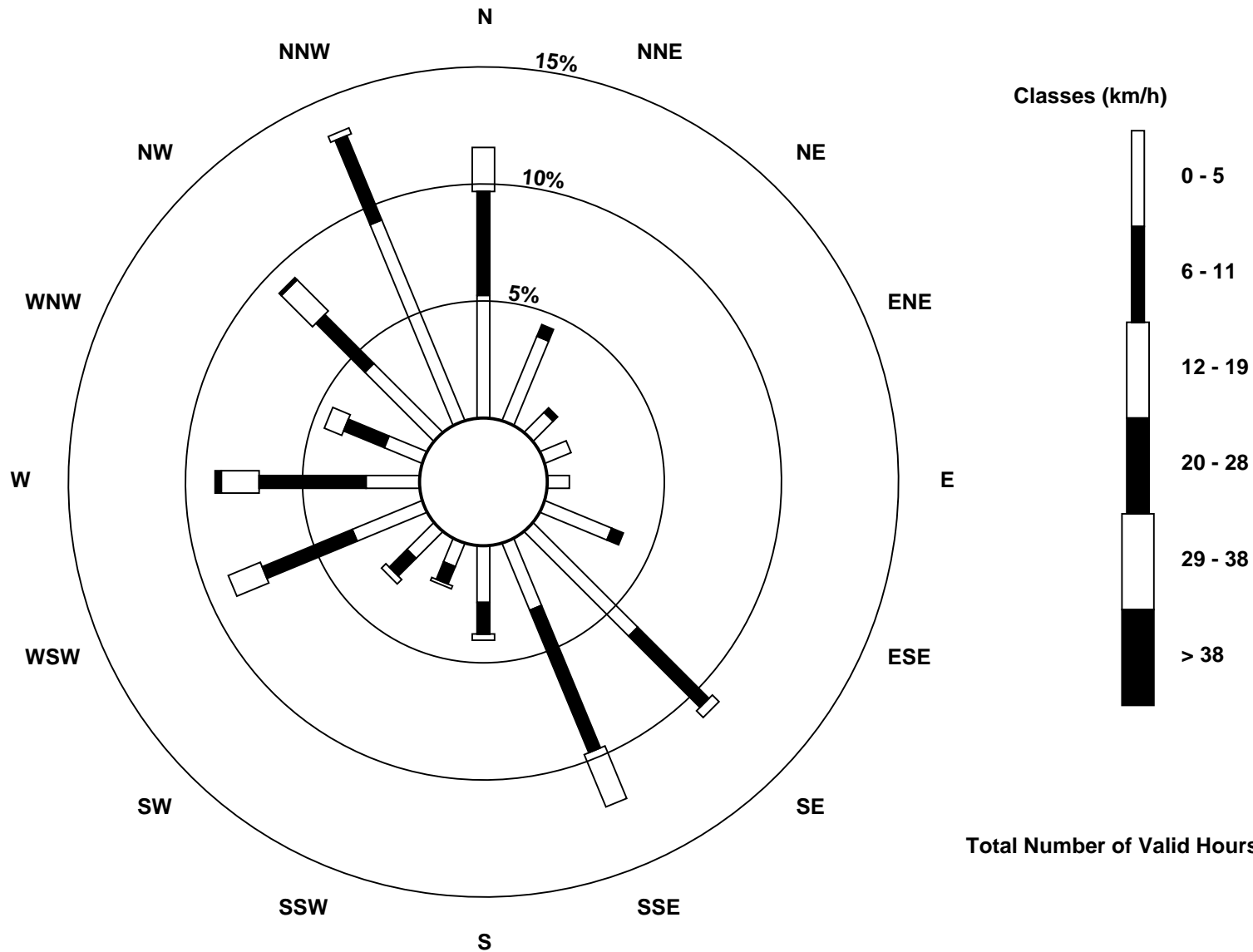
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association  
Wind Rose Jul 2015

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







Maximum Speed: 31 km/h on Jul 3 10:00	Maximum Daily Speed Average: 13.0 km/h on Jul 17	Hours in Service: 744
Minimum Speed Value: 0 km/h on Jul 5 19:00	Minimum Daily Speed Average: 1.0 km/h on Jul 26	Hours of Data: 744
Maximum Diurnal Speed Average: 6.2 km/h at hour 14	Minimum Diurnal Speed Average: 0.4 km/h at hour 2	Hours of Missing Data: 0
Monthly Average Velocity: 2.4 km/h 285.0 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 2 Q <sub>1</sub> = 5 Median = 7 Q <sub>3</sub> = 12 P <sub>90</sub> = 17 P <sub>99</sub> = 23	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	WSW8	SSW6	WNW3	WSW2	SW7	SW7	W6	W9WSW11	WSW12	NW8	ENE1	SW8	WNW6	NW9	NW5	NNW4	NNE1	NNW3	NNE2	NNW2	WNW1	WSW1	SSE2	W3.9	WSW12	
2-Jul	SE6	SSE5	SE6	SE6	SE7	SE9	SE9	SSE7	SE7	SE6	ESE5	WSW11	W11	W13	W13	W15WSW13	WSW17	SW15	SW12	SSW10	S11	S6	SE4	SSW5.7	WSW17	
3-Jul	S8	ESE6	SE14	SE14	SSE15	SE16	SSE14	WSW19	W23	W31	W30	NW28	NW21	NW22	NW25	NW23	NW22	NW15	NNW13	NNW10	NNW10	NW8	NNW9	NNW9	WNW8.5	W31
4-Jul	N7	NNW7	W15	W18	W17WNW18	NW10	NW7	WNW4	WSW13	WSW7	W14	W20	WNW9	NNW6	N4	NW2	WNW3	NW6	NNW12	NNW13	N19	N19	N15	NW8.7	W20	
5-Jul	N13	NNW12	NNW12	NNW7	NW6	NNW6	NNW3	N2	WSW8	NNW6	N11	N12	N12	NNW10	NNW10	NNW6	N7	SW1	SW0	S3	SE6	SE4	ESE3	SE4	NNW4.8	N13
6-Jul	SE9	SE8	SE9	SSE11	SE12	SSE14	SSE10	SSE10	SSE12	SW6	W21	W18	W20	W17WSW21	NW20	N21	N24	N19	NNW21	NNW18	NW10	NNW9	NNW8	WNW4.1	N24	
7-Jul	NNW9	NNW5	N7	NNW4	NNE3	NNW3	NNE3	N2	W6WSW15	W8	WSW9	SW4	WSW9	WSW11	W13WSW11	W15	W14WSW11	SW8	SSW9	SSW9	S8	S8	W5.8	W15		
8-Jul	ESE10	ESE13	SSE13	SSE14	SSE17	SSE15	SSE17	SSE16	SSE16	SSE17	SSE18	SSE20	SSE23	S17	SSE21	S19	SSE18	W12WNW14	NW25	NW15	NNW10	NNW5	W6	SSE8.6	NW25	
9-Jul	N8	NW4	NNW4	NNW7	NW9	NNW6	NW6	NNW6	N7	NNE8	N5	NW5	NNW8	NNE8	NNE3	N9	N9	N12	N14	N12	N11	NNW8	N10	NNW8	N7.4	N14
10-Jul	NNW5	NNW3	NNW6	N11	NNW8	N9	NNE8	ENE3	NNW6	N7	N7	NNW7	N6	N3	W4	N4	N4	NW7	NNW4	N6	N5	NNW2	N6	NNW4	N5.3	N11
11-Jul	N4	NNW3	SSE3	SSE3	SSE5	SSE13	SSE15	SSE9	ESE2	SSE12	SSE14	SSE16	SSE18	SSE15	SE12	ESE9	ESE5	NNW5	SSE1	NNE2	N2	E3	ENE4	NNE5	SE5.6	SSE18
12-Jul	N3	NNW5	N9	NNW8	NW4	NNW6	NNW2	SSW1	ENE3	NNW10	SE2	WNW4	N6	N7	N10	N10	NNE6	NNW7	NNW7	NNW6	NW6	WSW24	WSW13	NNW5	NNW4.5	WSW24
13-Jul	SSW2	SE6	WSW3	W3	SSW5	S4	SE4	SE6	SSE8	SSE7	SE5	SSE5	W15	W12WSW13	WSW10	W7	WSW7	SE5	S9	SSW7	SSE7	SE6	S4	SSW4.0	W15	
14-Jul	SSE10	SSE11	SSE11	SSE14	SSE13	SSE12	SSE8	SSE9	SSE8	SSE8	S4	WSW4	W7	WNW5	NNW8	SE2	SE5	SE6	SSE8	S10	SE6	SSE10	SE4	SE2	SSE6.0	SSE14
15-Jul	SW6	S5	S8	S7	S5	WSW9	W7WSW10	WSW10	WSW8	WSW5	WSW9	SSW14	ESE5	ENE2	SW6WSW18	WSW18	WSW14	WSW10	W10	W2	S1	SE7	SE7	SW6.7	WSW18	
16-Jul	SE8	SE5	ESE3	SE4	SE6	SE7	SE4	SE2	NNE3	N6	NNW13	NNW11	N12	N12	NE6	S12	SW17	SSW8	NW19	NNW10	NNW8	SSE2	NW8	NW8	NNW1.7	NW19
17-Jul	N12	N17	N16	NNW12	NNW7	NNW10	N14	N19	N19	N21	N21	N19	N22	N18	N18	N20	NNW11	N16	N11	NNE7	NNW3	W1	W2	ENE2	N13.0	N22
18-Jul	W2	SSE2	SE2	SSE3	S4	S5	S7	SSE14	SSE16	SE12	WSW7	WSW17	SW15	WSW23	W17WSW19	W19WNW24	WNW23	WNW21	NW22	NNW11	NNW14	NW11	NW11	W8.0	WNW24	
19-Jul	NW13	NW13	NW11	NW8	NW16	NW12	NW13	NW12	NW16	WNW21	NW15	NW16	NW14	NW16	NW15	NW19	N10	N7	N14	N6	NW5	N3	NW2	NW5	NW11.3	WNW21
20-Jul	NW4	NNW3	SE1	SE1	SE4	SE5	SE8	SSE7	SSE4	S3	SE6	ESE5	SE8	SSE5	SSE8	SSE10	SSE9	SSE9	SSE8	SE6	SSE4	SE6	SE14	SE14	SE5.6	SE14
21-Jul	SSE12	SE17	SE15	SSE12	SSE8	ESE5	E5	NE5	NNE4	NE3	ESE9	SE5	S6	SSW1	NNE6	NNE9	NNW9	N11	N6	NE5	NNW3	NW2	SSE2	N1	E2.6	SE17
22-Jul	SSE3	S3	NNE1	WSW5	S5	S3	SW5	W7	NW2	SSW3	WSW2	WSW4	NW5	W4	WNW3	WNW9	NNW10	NW13	WNW14	WNW16	WNW15	W16	WNW14	NNW6	WNW5.7	W16
23-Jul	WNW7	NNW7	WNW6	NNW5	NW6	NNW5	NW5	NNW8	NNW8	NNW9	NNW7	N6	NNE5	NNE4	WNW5	WSW7	S6	ESE5	ENE3	N2	NW7	WNW5	NNW4	SSE2	NNW3.6	NNW9
24-Jul	SE3	SE5	ESE5	ESE2	SE4	SE6	SE7	SE6	SE6	SSE9	SE7	SE9	SE7	ESE4	SSE9	S8WSW13	W11	WSW6	SE3	SE7	SE9	SSE10	SSE12	SSE5.3	WSW13	
25-Jul	SW7	SW10	SW15	W19	NW5	SE2	SSE4	SE4	SSW9	SW13	W11	W13	W14	W16	W16	NNW14	NNE5	NNE4	NNE3	NNE3	NNE1	N5	N8	N8	W5.3	W19
26-Jul	NNW7	NNW7	NNE4	NNW7	N4	NE4	N2	NNE2	W2	WSW2	WSW1	W8WSW11	NW15	NNW7	NW4	WNW12	SE3	ESE5	SSE7	SSE11	SE9	SSE11	SSE8	WNW1.0	NW15	
27-Jul	SSE7	SE7	SE8	SE9	SE9	SSE9	S6	S6	SSE8	WSW6	W13WSW18	WSW23	NNW10	NNW11	NNW4	NE1	N5	N7	SSE7	SW3	E1	SSW3	WSW5	SW2.8	WSW23	
28-Jul	N4	E1	SE8	ESE5	NE1	NNE2	NNE2	SW2	WSW4	WSW4	WSW2	W6	W5	NNE1	NNE7	ESE4	SE2	N11	SE4	ESE5	NNW4	NNW5	N13	NNE5	NNE1.3	N13
29-Jul	WSW5	NNW4	N2	SE2	E1	WNW1	WSW9	WSW12	W8	W9	W10	WSW9	W12	W20	W14	W17	NW10	N10	WNW18	NNW12	NE4	ESE2	E1	N5	WNW6.3	W20
30-Jul	NW9	NNW6	NNW10	NNW12	WSW18	WSW15	WNW11	W9	W12	WNW10	WNW8	NW11	NW20	NW20	NNW12	NNE11	NE9	E7	NE13	ENE6	NE1	NNE0	SSW1	ESE1	NW6.2	NW20
31-Jul	W0	NW1	N3	WSW1	ESE5	SSE11	SSE8	SE8	SE7	SSE5	SSE3	E3	ESE2	WSW15	SW11	ESE5	W9	NW3	NNW6	NNW6	NNW3	W0	S3	WSW6	S1.7	WSW15

NW0.8	NE0.4	SSW0.5	SW1.1	SSW1.8	S2.0	S1.7	SW1.9	SW2.3	WSW3.6	W3.7	W5.0	W5.9	NNW6.2	NNW5.2	NNW4.4	NNW4.3	NW4.8	NW5.0	NW3.6	NW3.3	NNW1.5	NNW1.4	NNW1.2	Diurnal Average	
N13	N17	N16	W19	WSW18	WNW18	SSE17	WSW19	W23	W31	W30	NW28	SSE23	WSW23	NW25	NW23	NW22	WNW24	WNW23	NW25	NW22	WSW24	N19	N15	Diurnal Maximum	

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



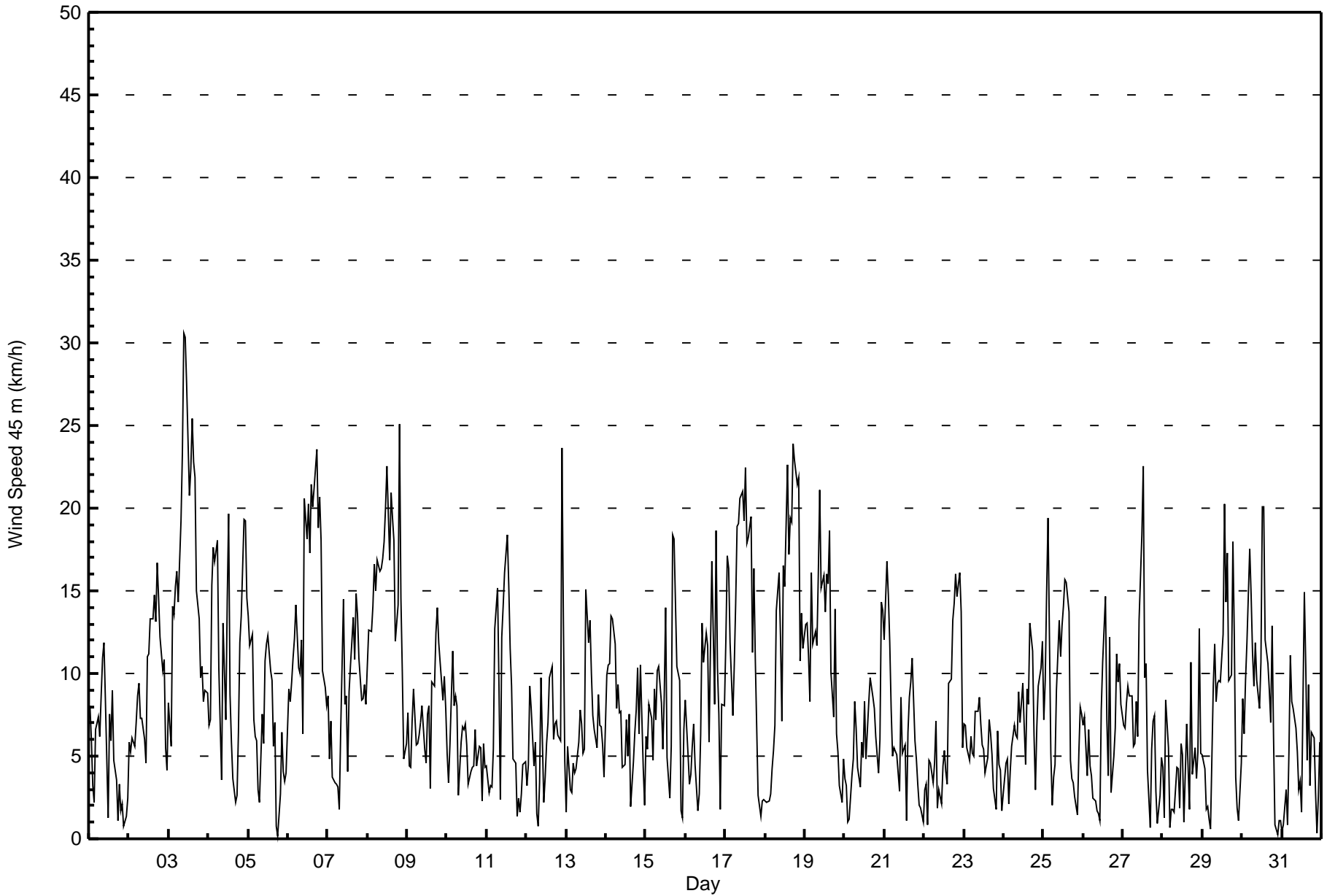
Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Speed 45 m (WS45m) - km/h

Lower Camp Met Tower - July 2015

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





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

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

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	250	33.60	33.60
6 - 11	297	39.92	73.52
12 - 19	161	21.64	95.16
20 - 28	34	4.57	99.73
29 - 38	2	0.27	100.00
> 38	0	0.00	100.00

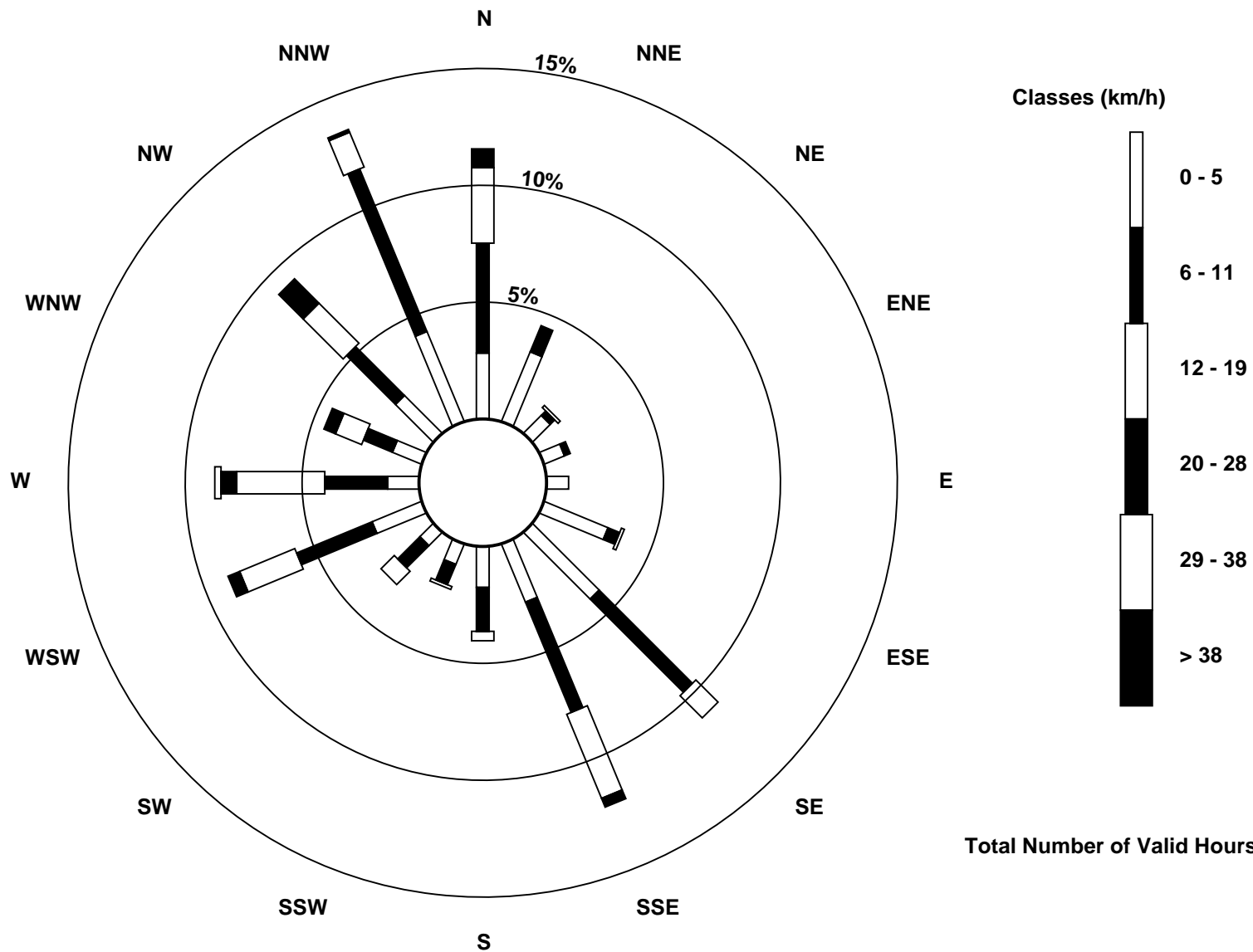
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association  
Wind Rose Jul 2015

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





Maximum Speed: 39 km/h on Jul 8 20:00	Maximum Daily Speed Average: 19.9 km/h on Jul 17	Hours in Service: 744
Minimum Speed Value: 0 km/h on Jul 21 22:00	Minimum Daily Speed Average: 0.8 km/h on Jul 26	Hours of Data: 744
Maximum Diurnal Speed Average: 7.6 km/h at hour 14	Minimum Diurnal Speed Average: 2.1 km/h at hour 22	Hours of Missing Data: 0
Monthly Average Velocity: 3.7 km/h 277.0 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 4 Q <sub>1</sub> = 7 Median = 11 Q <sub>3</sub> = 17 P <sub>90</sub> = 23 P <sub>99</sub> = 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-Jul	WSW14	WSW11	W7	W7	WSW11	WSW11	W12	WSW11	WSW12	WSW13	WNW12	W7	SW11	W8	NW15	W9	WNW5	ENE2	NNE5	E8	ESE8	SSE7	SSE3	SSW6	WSW6.0	NW15
2-Jul	SW10	SW7	SSW6	SW8	SW9	SSW8	S7	SSW6	S5	SSW4	SSW3	WSW13	WSW13	W16	WSW15	W19	WSW16	SW20	SW19	SW19	SSW13	SSW19	SSW17	SSW15	SW11.1	SW20
3-Jul	SSW21	S10	SE14	SSE15	SSE15	SSE14	SSE11	WSW25	WSW28	WSW36	W39	WNW36	NW27	NW31	NW35	NW33	NW30	NW22	NNW23	NW20	NNW19	NW19	WNW21	NW20	WNW15.2	W39
4-Jul	NW11	WNW17	W23	W26	W25	W25	WNW14	WNW10	W7	WSW16	WSW11	W21	WSW25	WNW13	NW12	N6	NNE3	NW2	NNW10	NNW19	NNW21	N29	N30	N23	WNW12.8	N30
5-Jul	N21	N18	N20	N13	NNW11	NNW11	NW4	N3	WSW8	NW8	NNW14	N15	N16	NNW13	NNW12	NNW8	NNW9	WNW2	NNW1	SSE2	S7	SSW7	S7	S9	NNW6.9	N21
6-Jul	SSE7	S6	S7	S6	S7	S7	S8	S8	SSE9	SW9	WSW23	W23	WSW23	W22	WSW25	NW26	N30	N34	N27	NNW32	NNW28	NNW17	NW16	NW15	WNW8.4	N34
7-Jul	NW16	NW12	NW10	WNW10	WNW7	WNW5	NNW3	NNW2	W7	WSW14	WSW9	WSW10	SW6	SW8	WSW12	W16	WSW13	W19	WSW17	WSW13	SW15	SW22	SSW22	SSW17	WSW9.5	SSW22
8-Jul	SSE13	SE15	SSE17	SSE19	SSE22	SSE21	SSE23	SSE25	SSE22	SE24	SSE24	SSE26	SSE26	S23	SSE28	SSE26	SSE19	WSW19	WNW23	NW39	WNW32	NW23	NW13	NW13	S10.8	NW39
9-Jul	N17	N12	N10	N13	NNW17	N11	NW9	NNW9	NNE10	NNE11	N7	NNW6	NNW11	NNE14	ENE9	N15	NNE14	NNE19	NNE21	N18	N16	N14	N16	N14	N12.3	NNE21
10-Jul	N12	N11	N14	N16	N13	N14	NNE11	NE5	N6	NNW8	N8	N8	N7	NNW4	WNW4	N5	N5	NW7	NW5	NNW9	NE11	NE9	NE5	SE3	N7.5	N16
11-Jul	SE12	SE13	SE15	SE12	SE17	SE25	SE27	SE22	SE7	SE18	SSE18	SE25	SSE22	SE23	SE19	ESE15	E13	NE15	ENE11	ENE9	ENE7	E8	E10	SE9	SE13.9	SE27
12-Jul	ESE9	ESE10	NNE9	NNE11	N8	N8	NE5	SE5	SE8	NNW16	ESE6	WNW3	NNW7	N8	N12	N13	NE9	N10	NNW10	N8	NNW8	WSW31	WSW19	N10	N4.4	WSW31
13-Jul	NNW2	SE9	S5	WSW7	SW8	SSW7	S4	SE7	SE10	SSE7	SE5	SE6	WSW17	W14	WSW14	WSW11	WSW9	SW8	SSE6	S11	SSW10	SE13	SE14	SSE8	SSW5.7	WSW17
14-Jul	SSE13	SE16	SSE16	SSE19	SSE18	SSE17	SSE10	SSE11	SSE10	SSE9	SE4	W4	W9	WNW7	N13	S2	S4	SE9	SE13	S14	SSE11	SSE14	SSW3	WSW8	SSE7.7	SSE19
15-Jul	WSW13	SW8	SSW8	SW13	WSW11	WSW13	WSW11	WSW10	WSW9	WSW6	WSW10	SSW17	ESE5	E4	SSW7	SW21	SW20	SW16	SW16	W14	NW3	S3	SSW5	SSW5	SW9.4	SW21
16-Jul	SSW6	SSW3	SW4	S4	SSE4	SSE6	SE3	NE1	WNW3	NNW8	NNW17	NNW15	N18	N17	NE12	SSE12	SW21	SSW13	W26	NW16	NW13	NE5	NNW8	WNW14	NW4.0	W26
17-Jul	NNW19	NNW29	NNW26	N22	N16	N21	N22	N27	N28	N28	N30	N28	N30	N25	NNW25	N29	NNW17	N25	N19	NNE12	NE7	NE4	W3	W11	N19.9	N30
18-Jul	WSW10	WSW8	WSW7	WSW7	SW6	SW8	SSW7	S8	SSE9	SE14	SW11	SW19	SW20	WSW26	WSW23	WSW24	W30	W35	W34	W31	WNW33	NW20	NNW21	NW22	W14.2	W35
19-Jul	WNW22	WNW22	WNW21	WNW16	WNW26	WNW22	WNW21	WNW17	WNW21	WNW27	NW21	NW21	NW18	WNW21	WNW21	WNW25	NNW18	NNW12	N22	N10	N7	N5	NW7	NNW12	NW17.0	WNW27
20-Jul	WNW10	W10	W7	W5	SW7	SW6	SSW5	S5	S4	SSW3	SE6	ESE4	ESE10	SE6	SSE10	SSE11	SE12	SE11	SE11	SE14	ESE16	SE17	SE25	SE25	SSE6.9	SE25
21-Jul	SE23	SE26	SE25	SSE17	SE12	SE12	ESE13	E9	E9	ESE8	ESE15	SE9	S6	SSE1	N8	N10	NNW11	N14	NNE9	ENE8	NE4	ESE0	S5	S7	ESE6.6	SE26
22-Jul	SSW5	S6	SW6	WSW11	SW8	SW6	SW6	W9	WNW3	SW3	WSW3	W5	WNW6	W5	W5	W11	WNW12	WNW19	WNW20	WNW22	W20	W23	W21	NW9	W9.0	W23
23-Jul	WNW9	NNW11	NW7	WNW8	WNW10	WNW8	WNW7	NW10	NNW12	NNW11	NNW8	NNW7	N6	N5	WNW6	WSW10	SSE7	SE5	ENE3	NNW2	WNW11	W11	W11	WSW6	NW5.6	NNW12
24-Jul	SW4	SSW3	SSE4	SSE4	SSE6	SSE5	SE8	SE6	SE8	SE10	SE9	SE12	SE9	ESE6	SE11	SSE10	WSW15	WSW13	WSW8	S4	SSE9	SSE15	SE20	SSE19	SSE7.2	SE20
25-Jul	SW13	WSW14	WSW20	W26	WNW8	NE4	ESE7	SE5	SSW9	SE15	WSW14	WSW16	WSW17	WSW18	W19	NNW19	NNW5	NNE3	NNE4	NE4	E5	N7	N11	N12	W6.5	WSW26
26-Jul	NNE10	N12	NE5	N8	N8	NNE7	NE5	NNE3	NW1	NW2	W2	WSW9	SW12	NW21	NNW10	NW6	WNW19	SSW7	SE8	SSE12	SSE17	SE18	SSE16	S6	WNW0.8	NW21
27-Jul	SW7	SW6	S6	S6	S6	S9	S6	S6	S7	WSW9	WSW16	WSW20	WSW24	NNW12	NNW15	NNW9	NNW3	NW8	NNW14	SE7	SW7	S7	SW11	WSW14	WSW5.4	WSW24
28-Jul	NW10	W5	S7	S6	SW5	W7	WNW2	WSW3	WSW4	WSW4	W3	W6	W6	NNW1	NNE9	ESE11	E6	NNE18	ESE8	SE12	W1	N11	N21	NE12	N1.6	N21
29-Jul	SSW5	W10	WNW4	SW8	W4	N4	WSW13	WSW14	WSW9	W10	W11	WSW11	W15	WSW25	WSW17	W21	WNW13	N14	WNW25	NNW21	N6	ENE5	S3	WNW13	W9.1	WNW25
30-Jul	WNW17	WNW11	W16	W20	WSW21	WSW19	WSW18	WSW13	W14	WNW11	WNW9	NW15	NW26	NW27	NNW17	NNE15	NE13	ENE10	NE18	ENE11	ESE6	SSE4	S3	S4	WNW7.8	NW27
31-Jul	E9	SSE10	S3	SSE8	SSE9	SSE13	SSE9	SE9	SE8	SE5	ESE3	E4	E2	SW19	SW17	SE5	WSW12	W7	N12	N10	NNE6	NW1	SW6	WSW11	S3.2	SW19

W3.4 W2.4	WSW2.4	WSW3.7	WSW3.6	SW2.6	SSW2.4	SW2.6	SW2.6	WSW3.9	W4.5	W5.7	W7.2	WNW7.6	WNW6.3	WNW5.5	WNW5.6	NW5.9	NW6.4	NW4.7	NW3.9	W2.1	W2.3	W3.4	Diurnal Average	
SE23	NNW29	NNW26	W26	WNW26	W25	SE27	N27	N28	WSW36	W39	WNW36	N30	NW31	NW35	NW33	W30	W35	W34	NW39	WNW33	WSW31	N30	SE25	Diurnal Maximum

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



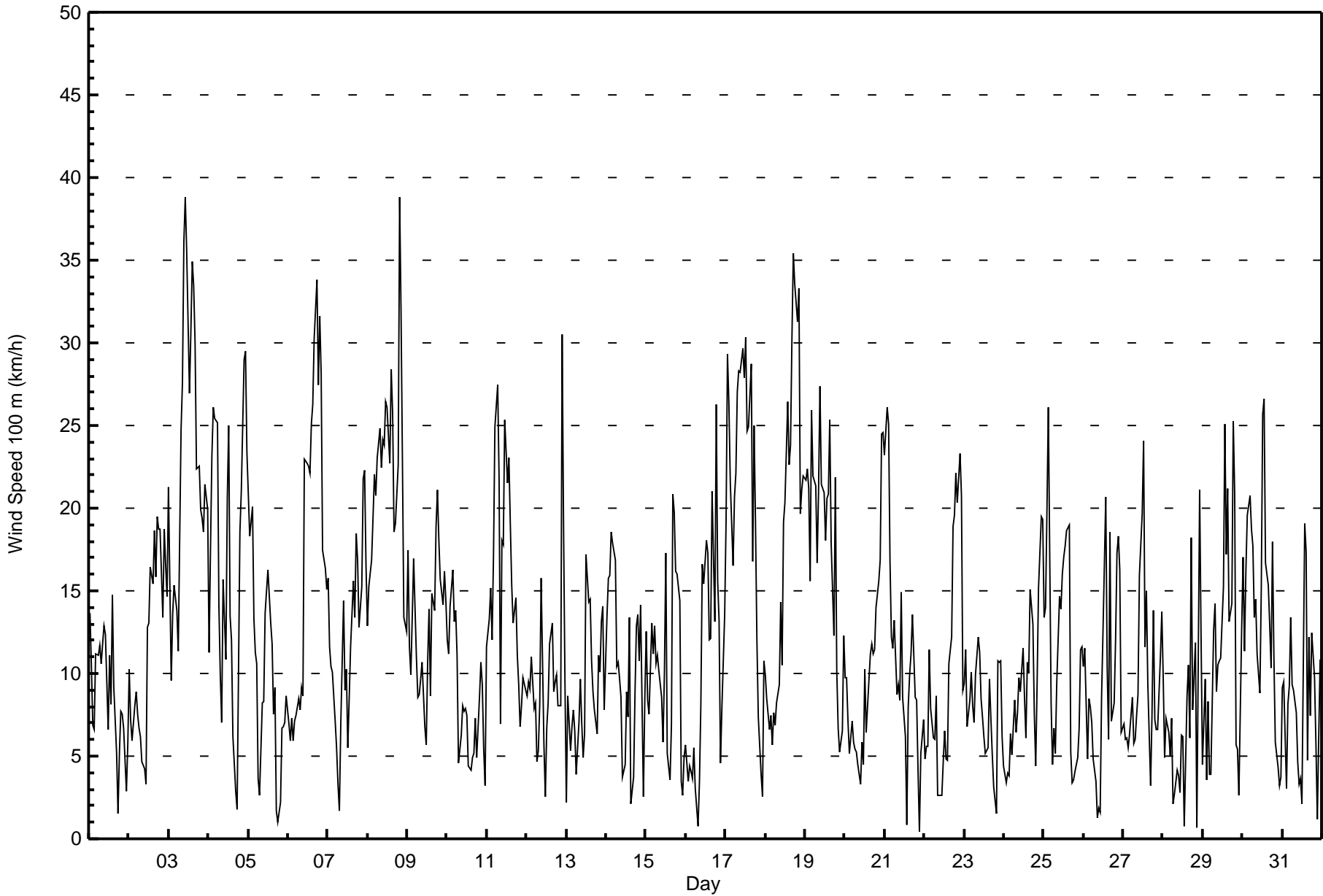
Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Speed 100 m (WS100m) - km/h

Lower Camp Met Tower - July 2015

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







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

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

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	119	15.99	15.99
6 - 11	286	38.44	54.44
12 - 19	203	27.28	81.72
20 - 28	112	15.05	96.77
29 - 38	22	2.96	99.73
> 38	2	0.27	100.00

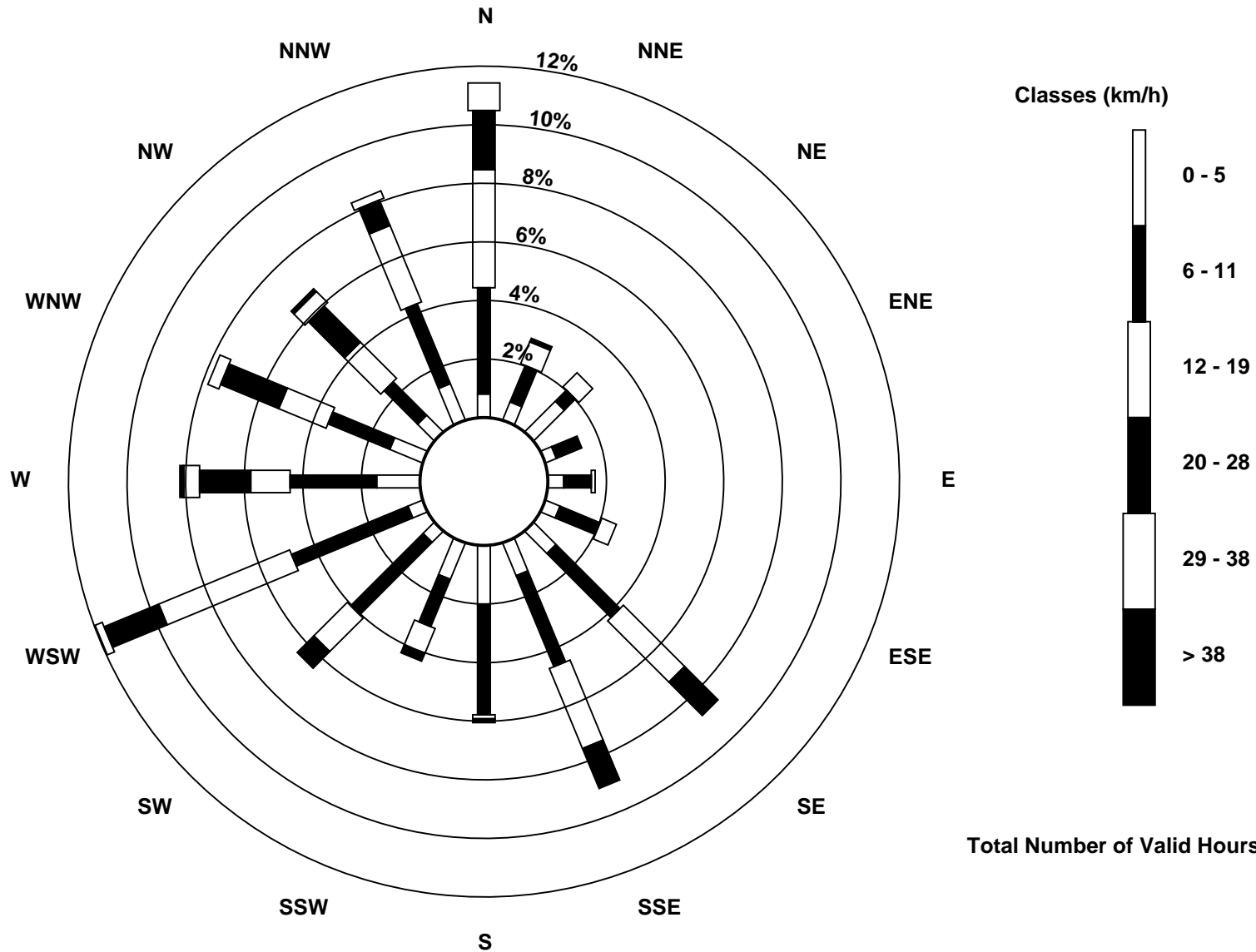
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association  
Wind Rose Jul 2015

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





Maximum Speed: 47 km/h on Jul 8 20:00	Maximum Daily Speed Average: 23.6 km/h on Jul 17	Hours in Service: 744
Minimum Speed Value: 0 km/h on Jul 1 18:00	Minimum Daily Speed Average: 1.9 km/h on Jul 26	Hours of Data: 740
Maximum Diurnal Speed Average: 9.1 km/h at hour 14	Minimum Diurnal Speed Average: 2.8 km/h at hour 22	Hours of Missing Data: 4
Monthly Average Velocity: 5.7 km/h 278.7 deg	Percentiles: P <sub>1</sub> = 2 P <sub>10</sub> = 5 Q <sub>1</sub> = 9 Median = 13 Q <sub>3</sub> = 20 P <sub>90</sub> = 28 P <sub>99</sub> = 41	Percent Operational Time: 99.5

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jul	W21WSW17	W13	W11	W12WSW15	W15	W12WSW13WSW14WNW14	W9WSW15	W10	NW19	W10	W7	NE0	NE5	E9	ESE10	SSE9	S7	SW12								W8.6	W21
2-Jul	SW13	WSW9WSW12WSW16WSW13	SW12	SW11	SW10	SW9	SW9	SW8WSW15WSW15	W18WSW18WSW21WSW18	SW22	SW21	SW22	SSW21	SW26	SW31	SW31									SW16.1	SW31	
3-Jul	SW34	SW24	S13	S14	SSW12	S10	SSW12WSW32WSW32WSW42	W43WNW38	NW29	NW33	NW38	NW37	NW32	NW27	NNW27	NW27	NNW26	NW28	NW32	NW32					WNW21.1	W43	
4-Jul	WNW21WNW27WNW26WNW31WNW31WNW29WNW17WNW12	W10WSW18WSW15	W26	W30	W17	NW15	N8	NNE3	N4	NNW11	NNW21	NNW26	N32	N33	N28										NNW16.2	N33	
5-Jul	N25	N20	N20	NNW16	NNW15	NW7	NW4	W9	NW10	NNW15	N16	N17	NNW14	NNW13	NNW9	NNW10	NW2	N2	S2	SSW8	SSW11	SSW18	SSW21	WNW7.9	N25		
6-Jul	SW11	SW11	SW9	SW7	SW11	SW11	SSW8	SSW9	S8	SW12WSW26	W25WSW25WSW25WSW30	NW29	N33	N36	N30	N36	N33	NNW23	NW24	NW24				WNW12.4	N36		
7-Jul	NW22	NW20	NW19WNW17WNW12WNW12WNW10	WNW4	W8WSW16WSW10WSW11	SW7WSW10WSW14	W18WSW15	W21	W20WSW15	SW18	SW23	SW28	SSW33											WSW13.2	SSW33		
8-Jul	SSW16	S13	S17	S15	S19	S17	S20	SSE21	SSE19	SSE21	SSE23	SSE27	S29	SSW33	S34	S31	S22	W23WNW28	NW47	NW41	NW31	NW23	NNW22	SSW11.4	NW47		
9-Jul	N24	N17	N14	N21	NNW21	N15	NNW9	NNW10	NNE10	NNE11	N7	NNW6	N10	NNE15	ENE15	NNE16	NNE16	NNE21	NNE24	NNE20	NNE17	N18	N21	N20	N14.9	N24	
10-Jul	N18	N17	N17	NNE19	NNE16	NNE17	NNE12	NNE5	NNE6	NNW8	N8	N8	N8	NNW5	WNW4	N4	NNW5	NW7	NW5	N9	NE17	ENE20	E11	SSE17	NNE8.5	ENE20	
11-Jul	SE25	SE25	SE24	SE17	SE23	SE29	SSE30	SSE21	SE12	SSE18	SSE18	SE26	SSE22	SE24	SE20	ESE18	E16	ENE23	ENE27	E22	E16	E18	ESE17	SE16	SE19.0	SSE30	
12-Jul	SE16	SE18	E10	NE9	NE13	NNE13	NE7	SE10	UO	UO	E9	S1	NW6	NNW7	N11	NNE13	NE9	NNE9	N9	NE9	N8WSW38	UO	UO	NE4.2	WSW38		
13-Jul	NNW6	SE8	SSE7	WSW8	SW11	SW12	SW6	SSE5	SSE9	S6	SSE4	SE5WSW18WSW15WSW16WSW12WSW10	SW9	S7	S13	SSW15	SSE14	SE17	SSE11					SSW7.0	WSW18		
14-Jul	SSE15	SSE14	SSE14	SSE20	S19	S19	S12	S11	SSE7	S7	S3	W5	W10	WNW9	N19	E2	SW5	SSE5	SSE14	S16	S12	S14	WSW8WSW16	S7.7	SSE20		
15-Jul	WSW19WSW17	SW14WSW17WSW19WSW17WSW17WSW15WSW13WSW11	SW10	WSW7	WSW11	SSW19	SE6	ESE3	SW10	SW24	SW22	SW18WSW21	W18	NNW3	SW7WSW10									WSW12.7	SW24		
16-Jul	WSW14	W7	W4	WSW6	W6	SW6	W3	W5	W8	NW8	NNW18	N17	N19	NNE18	NE15	SSE12	SSW17	SW11WNW28	NW24	NW20	NE7	NNE8WNW14	NW6.9	WNW28			
17-Jul	NW28	NNW38	NNW36	N31	N27	N29	N27	N29	N30	N30	N31	N29	N31	N25	NNW28	N32	N20	N27	N22	NE16	NE12	NE10	N3	W10	N23.6	NNW38	
18-Jul	W17	W15	W13	W12WSW11WSW13	SW11	SSW10	SSW8	S9WSW15WSW23	SW25WSW34WSW31WSW30	W39	W45	W41WNW38WNW41	NW26	NNW25	NW29									W20.3	W45		
19-Jul	WNW28WNW29	NW28	NW21	NW30	NW29	NW28	NW20WNW23WNW29WNW24	NW23	NW20	NW22	NW23WNW28	NNW26	NNW17	N26	N13	N8	N8	NW12	NNW19					NW21.1	NW30		
20-Jul	NW15WNW12WNW11	WNW9	W11	W11WSW10	SW8	SW6	SSW4	SSE4	ESE3	SE9	SSE6	SSE9	SSE11	SSE11	SE11	SE11	SE17	SE23	SE25	SE31	SE30			SSE6.6	SE31		
21-Jul	SE30	SE32	SE28	SSE19	SSE13	SE13	SE15	ESE13	ESE14	ESE12	SE19	SE10	SSW7	WSW1	N8	N9	NNW12	N13	NNE9	ENE9	ENE7	S3	SSW9	SW10	SE8.1	SE32	
22-Jul	WSW7	SW6WSW12WSW14WSW11	WSW9	WSW7	W11	WNW7	W3	W4	W6	WNW7	W6	W5	W11WNW13WNW21WNW22WNW25	W23	W26	WNW23	NW13							W11.5	W26		
23-Jul	NW10	N13	NNW9	NNW11	NNW12	NNW11	WNW8	NW12	NNW16	NNW12	NNW9	NNW8	N6	NNW6	WNW6WSW11	S8	SSE5	E2	WNW5	WNW12	W15	W15	W10	NW7.3	NNW16		
24-Jul	WSW8	WSW5	WSW2	WSW3	SW4	SW5	SSW5	S4	SSE5	SE8	SE9	SE11	SE8	SE6	SSE10	S10WSW17WSW15	WSW9	SSW6	S12	S18	SSE20	S23		S7.0	S23		
25-Jul	SW20WSW20WSW26	W33WNW12	NNE5	ESE4	S4	SSW11	SW15WSW16WSW18WSW19WSW20	W21	NW23	NW7	NNE3	NNE2	NNE3	E6	NNE6	NNE10	NE15							W8.4	W33		
26-Jul	NNE12	NNE13	E8	N6	NNE10	NE9	E7	NE3	NW2	NNW3	W3	W9WSW14	NW23	NNW11	NW7WNW20	SW13	SSW6	S11	S18	SSE20	S16	SW12	WSW1.9	NW23			
27-Jul	WSW17WSW16	SW8	SW9	SW11	SSW12	SSW7	SSW7	SSW8WSW11WSW18WSW22WSW27	NNW13	NNW17	NNW13	NNW5	WNW8	NNW17	SSE5	SW12	SW11	SW20	W24					WSW9.7	WSW27		
28-Jul	WNW19	W12	SW8	SSW12WSW14	W12	W7	W4	W4	W4	W4	W7	W7	W1	NNE7	ESE8	E7	NNE21	E10	SE16	S3	N13	N26	NE22	NW2.4	N26		
29-Jul	SE5	W14	W11WSW13WNW11	NNW6	W14WSW17WSW10WSW11WSW12WSW12	W17WSW27WSW20	W24WNW15	N15WNW29	NNW25	NNW7	NE6	SSW3WNW19												W11.5	WNW29		
30-Jul	WNW20WNW14	W21	W20	W23	W24	W23	W18	W17WNW12WNW10	NW17	NW28	NW29	NNW18	NNE16	NE14	ENE10	NE20	ENE15	E11	SE9	S8	SSW11			WNW9.3	NW29		
31-Jul	E8	SSE12	S10	S10	S11	SSW8	SSW7	S5	S5	SSW3	SE3	E3	ESE2	SW21	SW21	SSW5WSW15	W11	N15	NNE14	NNE11	N4	WSW7WSW13			SW4.0	SW21	

W7.0	W6.0	W5.4	W6.7	W6.5	W5.2WSW4.7WSW4.7WSW4.7WSW5.9	W5.7	W6.9	W8.7	W9.1	NNW7.6	NNW6.8	NNW6.8	NW6.8	NW7.4	NNW5.7	NW4.5	NNW2.8	W3.8	W6.8						Diurnal Average
SW34	NNW38	NNW36	W33WNW31	NW29	SSE30	WSW32	WSW32	WSW42	W43WNW38	N31	WSW34	NW38	NW37	W39	W45	W41	NW47	NW41	WSW38	N33	SSW33				Diurnal Maximum

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



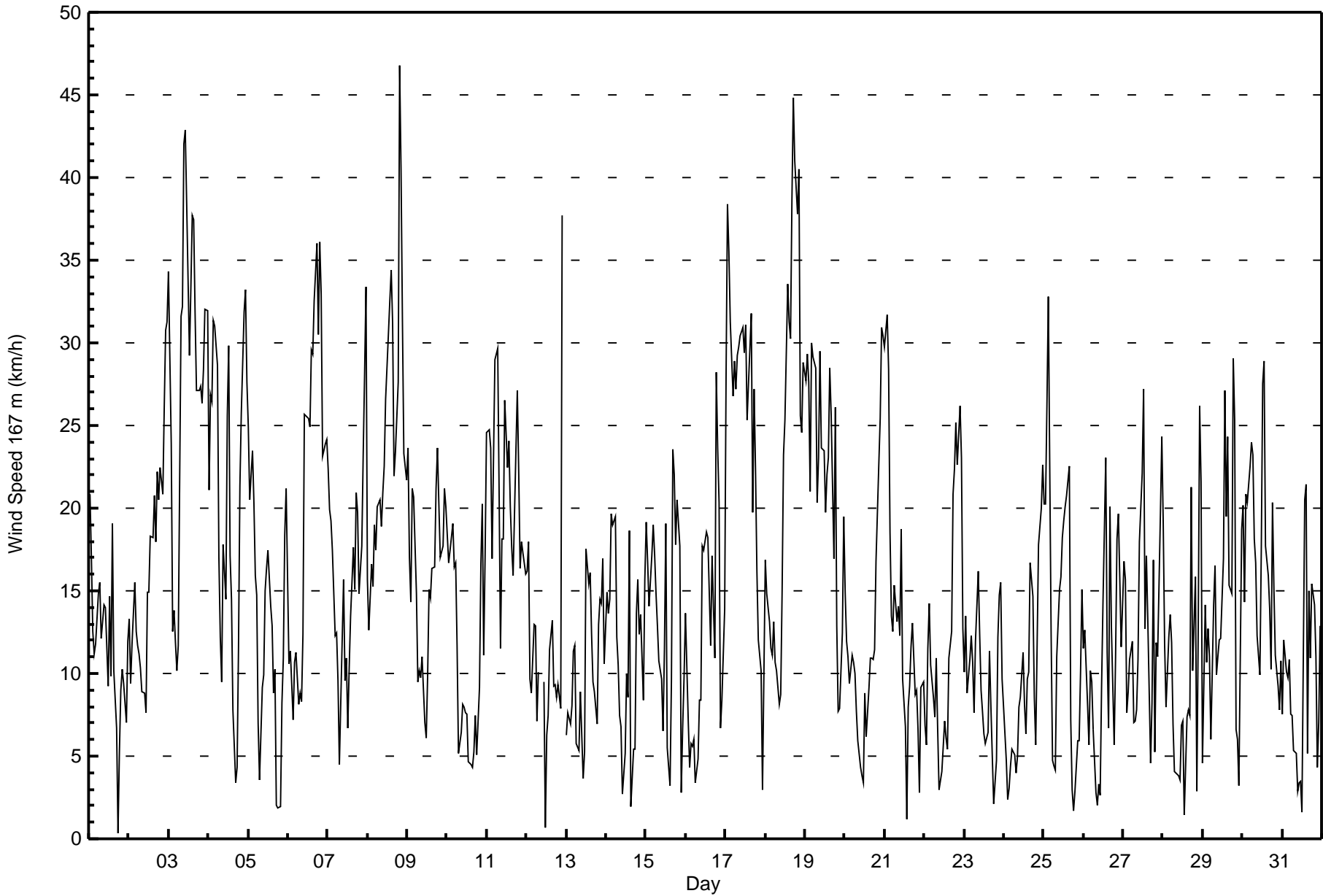
**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 18 km/h on Jul 26 17:00	Hours in Service: 744 Hours of Data: 740 Hours of Missing Data: 4 Hours of Calibration: 0 Percent Operational Time: 99.5
Minimum Value: 1 km/h on Jul 31 10:00	
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 2 O <sub>1</sub> = 2 Median = 3 O <sub>3</sub> = 4 P <sub>90</sub> = 6 P <sub>99</sub> = 13	

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

UO - Unstable Operation





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

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

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	77	10.41	10.41
6 - 11	224	30.27	40.68
12 - 19	226	30.54	71.22
20 - 28	143	19.32	90.54
29 - 38	62	8.38	98.92
> 38	8	1.08	100.00

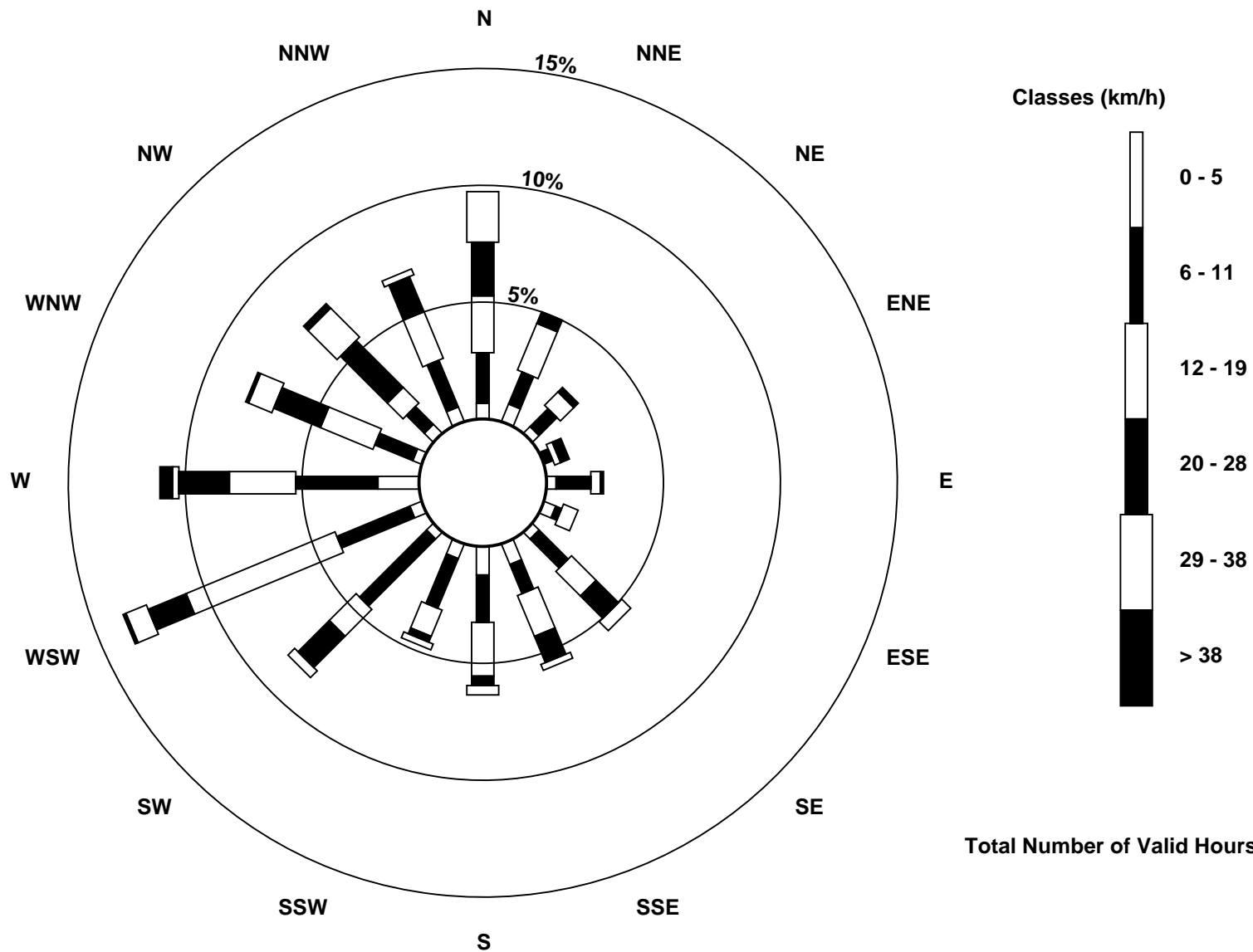
Total Number of Valid Hours: 740

Total Number of Hours: 744



Wood Buffalo Environmental Association  
Wind Rose Jul 2015

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





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

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

Direction of Maximum Speed: 273 deg on Jul 3 11:00 Direction of Maximum Daily Speed Average: 355.4 deg on Jul 17	Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0
Direction of Minimum Speed: 240 deg on Jul 31 04:00 Direction of Minimum Daily Speed Average: 0.7 deg on Jul 26	Percent Operational Time: 100.0
Monthly Average Direction: 297.1 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-Jul	256	212	294	241	228	226	273	261	256	250	306	66	235	282	315	306	343	13	338	22	335	301	250	153	267.2
2-Jul	144	152	144	144	143	136	137	150	144	134	122	248	264	271	265	273	254	243	223	220	195	191	175	130	205.2
3-Jul	172	115	135	135	147	143	148	253	261	264	273	306	315	317	325	320	318	314	333	327	331	323	330	345	293.5
4-Jul	11	344	281	280	279	285	307	315	300	244	242	278	272	301	340	7	325	296	322	329	331	356	6	356	307.9
5-Jul	357	348	346	334	321	337	333	6	258	331	349	352	3	337	342	339	350	230	235	169	140	132	116	126	347.1
6-Jul	141	142	145	149	139	148	152	153	155	226	263	273	261	272	258	312	352	2	357	347	347	324	334	342	288.6
7-Jul	328	345	353	347	12	348	21	358	266	252	275	244	217	244	244	271	257	281	268	249	218	204	199	184	259.4
8-Jul	109	115	153	153	155	151	152	155	155	148	159	167	167	183	167	173	167	263	294	325	307	345	340	280	165.9
9-Jul	354	316	344	340	321	339	309	331	8	26	5	324	335	15	20	350	8	5	7	7	0	343	352	341	353.2
10-Jul	340	343	332	354	348	11	25	57	348	349	354	348	11	355	280	1	2	316	342	352	351	334	5	331	351.6
11-Jul	349	341	158	156	155	148	150	166	118	158	167	155	167	152	146	120	108	347	160	28	359	80	58	19	148.1
12-Jul	349	332	354	345	313	335	340	203	78	339	124	291	4	3	9	359	25	348	338	337	314	243	243	348	329.1
13-Jul	212	140	250	269	208	177	145	138	148	152	136	162	267	275	258	250	265	238	145	170	195	157	131	184	200.9
14-Jul	166	166	167	163	166	168	162	166	161	160	176	252	271	287	344	136	128	138	157	173	140	149	134	127	165.5
15-Jul	220	182	170	184	180	249	259	256	253	255	243	251	200	102	73	224	247	244	238	241	265	278	188	151	229.3
16-Jul	142	138	113	129	125	130	132	124	16	357	334	347	3	11	48	175	225	194	308	347	337	152	309	307	332.6
17-Jul	353	354	355	341	335	345	356	1	2	354	356	8	355	3	351	350	341	2	3	22	344	267	270	60	355.4
18-Jul	268	154	146	155	186	183	180	156	154	145	239	243	229	251	261	252	274	282	286	290	305	335	338	319	255.5
19-Jul	317	313	320	323	308	317	314	309	308	303	317	320	314	306	312	307	356	353	7	351	322	360	319	315	318.3
20-Jul	309	347	139	129	142	142	145	151	147	183	133	122	125	149	168	156	147	147	151	140	147	132	136	124	143.1
21-Jul	148	140	142	159	153	118	79	35	18	51	113	143	188	194	12	17	348	349	4	55	332	325	152	3	100.7
22-Jul	157	170	15	244	190	188	230	273	315	208	249	257	314	277	288	290	298	310	293	301	285	281	283	331	282.7
23-Jul	302	328	298	337	326	332	309	339	336	341	355	21	30	298	240	174	120	64	357	306	302	329	164		327.1
24-Jul	138	133	118	119	141	126	132	130	137	156	135	142	141	118	154	173	245	260	246	142	136	132	151	153	154.0
25-Jul	222	230	236	273	306	130	148	141	204	235	267	268	260	263	274	345	21	12	14	31	22	3	350	349	268.0
26-Jul	345	345	15	341	359	36	358	13	263	257	252	259	242	314	337	323	300	135	118	157	156	145	158	152	270.2
27-Jul	154	145	144	135	127	147	186	189	160	239	268	250	253	328	338	343	43	350	350	162	221	99	195	253	213.7
28-Jul	349	93	139	115	46	15	28	235	255	253	248	273	271	20	25	121	142	7	129	113	345	339	1	28	7.3
29-Jul	252	341	10	136	100	303	258	256	267	274	280	253	268	271	268	272	308	8	303	328	44	114	87	356	283.5
30-Jul	321	339	286	286	257	255	282	273	269	303	285	317	314	319	336	26	46	79	42	59	46	12	205	106	310.9
31-Jul	259	308	350	240	115	150	148	136	140	147	154	96	115	241	219	111	259	306	344	346	340	263	169	252	179.3

276.3 97.5 183.8 200.9 188.0 168.5 170.0 200.5 218.0 249.6 270.2 272.0 268.5 290.6 292.6 293.7 291.9 310.9 315.2 313.0 306.5 282.2 333.3 348.5  
 Diurnal Average

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





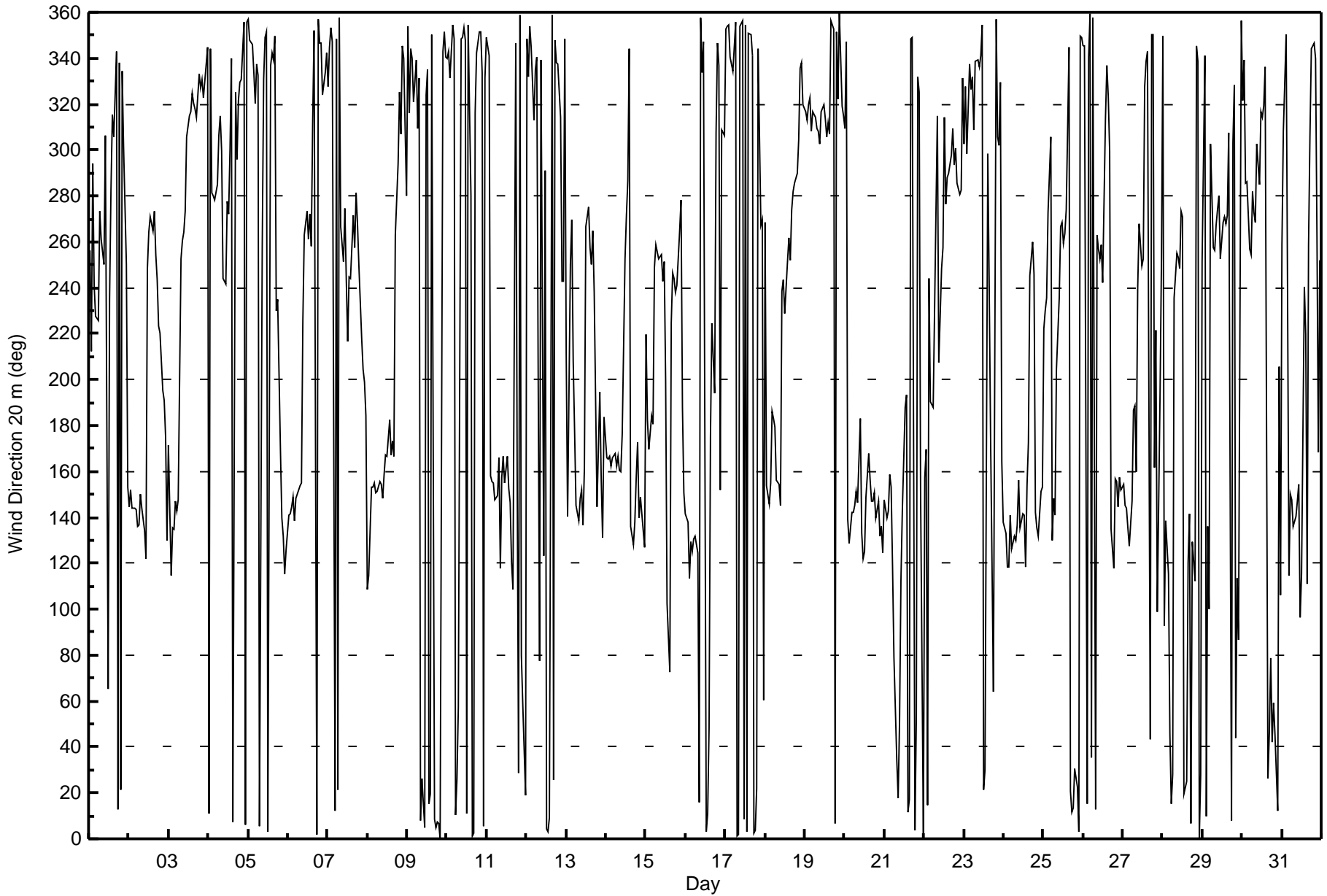
**Wood Buffalo Environmental Association**

**Summary of Hour Standard Deviations**

**Wind Direction 20 m (WD20m) - deg**

**Lower Camp Met Tower - July 2015**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 110 deg on Jul 27 17:00																			Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0						
Minimum Value: 9 deg on Jul 8 13:00																									
Percentiles: P <sub>1</sub> = 12 P <sub>10</sub> = 17 Q <sub>1</sub> = 22 Median = 31 Q <sub>3</sub> = 52 P <sub>90</sub> = 79 P <sub>99</sub> = 100																									
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-Jul	27	31	55	100	32	25	49	24	21	22	42	86	34	52	42	80	49	71	55	91	51	98	95	51	100
2-Jul	28	58	18	15	16	11	16	16	15	19	37	33	30	24	25	24	31	22	15	12	17	14	64	55	64
3-Jul	36	51	11	18	15	14	15	45	20	20	23	22	25	21	22	20	20	19	12	12	12	18	28	51	
4-Jul	19	31	26	19	20	20	31	36	54	23	34	21	17	38	30	48	66	18	20	17	19	23	22	26	66
5-Jul	22	23	21	22	15	29	41	79	60	60	39	26	33	41	41	59	39	100	97	32	12	49	39	62	100
6-Jul	41	15	15	14	13	14	18	16	13	66	24	28	26	26	24	46	23	23	22	22	21	18	21	22	66
7-Jul	24	27	16	31	35	55	47	67	64	19	39	31	74	27	30	26	29	23	22	20	15	12	14	28	74
8-Jul	15	15	14	16	14	17	16	19	16	20	18	10	9	18	10	13	13	31	28	19	38	19	52	28	52
9-Jul	39	88	44	26	21	48	19	25	35	49	48	33	24	36	79	26	31	24	26	28	22	24	23	22	88
10-Jul	23	33	39	17	18	30	27	81	34	44	40	37	53	77	64	53	49	30	25	22	24	101	19	55	101
11-Jul	64	25	96	98	47	23	21	59	87	21	17	20	15	19	23	23	96	88	85	81	80	80	31	32	98
12-Jul	65	50	20	32	58	68	98	100	64	35	103	67	42	27	27	23	46	25	26	23	37	26	70	49	103
13-Jul	93	51	59	69	28	25	46	22	22	24	26	46	20	28	24	21	31	37	27	17	16	31	72	76	93
14-Jul	12	18	17	13	12	16	23	16	26	24	40	51	40	58	85	87	20	22	18	24	56	47	67	79	87
15-Jul	49	22	24	31	41	57	41	29	23	25	51	44	47	43	79	63	21	19	14	10	31	81	69	58	81
16-Jul	24	38	78	90	41	25	31	80	76	29	23	25	24	27	81	82	47	84	42	21	23	98	34	42	98
17-Jul	20	17	16	20	21	21	21	21	22	19	21	28	22	23	21	23	28	23	23	35	42	36	67	93	93
18-Jul	99	41	92	38	42	24	19	12	12	17	72	15	15	18	18	17	19	20	20	20	18	22	21	20	99
19-Jul	24	22	25	38	18	17	20	19	23	21	22	24	24	26	26	29	26	28	31	40	21	50	81	20	81
20-Jul	32	79	75	67	24	31	13	18	41	54	29	46	24	58	35	25	24	22	22	38	64	43	21	21	79
21-Jul	24	16	20	15	21	53	52	30	48	78	29	40	41	77	55	30	25	20	34	34	30	79	87	66	87
22-Jul	58	96	82	53	37	39	29	26	97	38	92	61	64	87	82	31	30	19	21	18	23	20	23	35	97
23-Jul	29	36	26	33	31	22	33	25	26	25	39	41	38	58	48	50	32	44	66	57	33	44	56	58	66
24-Jul	37	24	17	72	58	23	17	22	24	16	23	26	38	70	34	44	33	21	35	30	22	24	23	16	72
25-Jul	56	17	13	22	63	97	44	22	18	21	31	31	32	27	34	26	50	34	31	86	87	75	31	23	97
26-Jul	28	25	41	28	53	47	79	79	96	81	95	41	34	32	47	97	83	85	44	29	27	31	19	16	97
27-Jul	23	38	48	14	14	23	32	23	21	57	27	20	18	53	38	46	110	41	72	18	76	96	94	75	110
28-Jul	70	70	58	42	51	46	50	70	35	44	69	52	60	89	58	85	67	48	74	69	39	65	52	89	89
29-Jul	68	43	64	63	83	95	36	29	26	29	27	32	29	21	22	23	34	36	42	33	67	40	83	64	95
30-Jul	27	27	43	28	19	23	51	43	26	31	33	36	28	27	38	40	38	36	35	71	94	78	84	76	94
31-Jul	91	94	72	106	31	18	19	18	19	23	53	35	66	58	69	54	43	91	29	27	54	81	71	63	106
Diurnal Maximum																									





**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Wind Direction 45 m (WD45m) - deg**

**Lower Camp Met Tower - July 2015**

Direction of Maximum Speed: 255 deg on Jul 3 10:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 350.3 deg on Jul 17	Hours of Data: 744
Direction of Minimum Speed: 303 deg on Jul 5 19:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 0.9 deg on Jul 26	Percent Operational Time: 100.0
Monthly Average Direction: 291.5 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-Jul	249	213	277	271	225	221	269	255	249	242	298	298	231	268	308	292	334	1	346	77	358	175	227	153	259.9
2-Jul	151	145	141	152	146	140	135	150	137	132	120	241	257	263	256	263	246	234	216	212	185	182	182	140	201.8
3-Jul	181	122	126	126	139	137	140	245	251	255	263	296	306	308	316	313	310	306	328	321	327	316	315	331	285.1
4-Jul	353	327	270	269	267	273	295	306	286	237	238	268	261	289	327	3	340	292	317	325	326	350	3	351	299.2
5-Jul	350	341	339	337	328	336	330	7	249	324	342	346	358	331	336	330	341	228	303	160	154	149	134	129	339.2
6-Jul	131	137	137	139	136	142	143	145	143	223	253	263	253	263	250	302	347	358	352	340	339	321	328	333	289.1
7-Jul	325	338	347	346	9	350	15	354	259	245	265	239	207	239	238	262	251	271	260	242	211	195	190	178	253.7
8-Jul	109	112	142	143	144	142	142	143	143	138	148	158	158	174	158	163	159	254	286	316	294	329	337	288	158.6
9-Jul	348	331	346	342	326	346	304	326	6	21	356	320	331	14	30	348	7	3	4	5	355	342	348	341	350.9
10-Jul	345	354	345	350	345	5	22	41	346	342	351	340	4	340	281	358	357	310	335	342	2	34	3	338	350.0
11-Jul	360	350	144	128	131	133	136	147	109	144	155	140	156	140	135	112	92	11	85	46	10	77	64	32	129.0
12-Jul	5	345	353	343	327	336	10	138	80	334	111	286	354	1	5	353	24	340	332	333	317	236	238	350	329.1
13-Jul	221	138	227	259	209	171	139	128	136	143	129	151	259	266	249	245	260	234	146	165	187	146	125	164	196.3
14-Jul	151	149	153	151	154	156	151	155	150	147	163	257	264	285	343	123	124	128	143	163	127	138	134	140	152.7
15-Jul	227	179	165	195	192	243	250	249	246	248	240	246	194	94	68	221	238	236	230	231	255	264	219	151	225.5
16-Jul	142	144	137	139	126	128	127	102	2	352	328	341	357	7	43	169	220	194	294	340	334	119	300	295	319.7
17-Jul	346	346	348	335	338	344	353	359	1	347	351	5	349	358	342	345	337	0	2	20	0	261	261	250	350.3
18-Jul	240	193	195	180	188	180	172	148	145	137	233	235	221	243	251	243	263	271	277	280	294	324	334	312	250.5
19-Jul	306	302	310	312	297	305	306	301	299	293	308	312	305	297	303	298	347	349	3	348	327	357	310	323	310.1
20-Jul	305	306	207	177	158	155	143	144	142	181	124	111	115	138	156	147	141	139	140	125	122	125	129	120	136.9
21-Jul	135	132	132	145	141	110	88	41	29	66	108	128	181	189	5	7	342	345	358	50	346	350	156	129	93.5
22-Jul	167	150	5	238	196	194	222	268	311	212	252	257	305	272	285	283	290	301	284	292	275	270	272	323	274.0
23-Jul	293	328	296	323	319	321	297	331	331	334	343	12	16	297	235	162	108	52	3	300	285	286	195	317.9	
24-Jul	167	149	128	141	136	125	125	121	127	142	129	131	130	111	143	165	238	254	239	152	142	131	137	140	149.2
25-Jul	213	225	230	261	295	84	133	134	195	228	258	261	252	255	265	337	6	5	5	39	99	349	345	344	263.5
26-Jul	346	341	9	340	1	21	5	10	251	280	264	254	237	304	334	318	291	155	115	148	144	138	146	144	291.5
27-Jul	153	148	137	136	133	144	179	179	150	237	258	242	245	323	334	336	20	342	347	150	206	191	223	244	213.3
28-Jul	341	112	137	127	49	338	7	235	252	256	252	268	260	12	18	98	98	7	118	110	346	339	358	33	10.4
29-Jul	242	323	17	178	144	26	250	248	259	264	269	247	259	261	259	262	299	4	293	323	32	96	151	333	275.0
30-Jul	304	316	274	271	248	246	268	260	261	291	279	309	305	309	332	24	40	71	38	52	102	12	197	138	299.3
31-Jul	138	218	356	219	122	141	136	129	131	134	134	89	97	233	214	109	249	286	345	342	2	235	202	251	175.7

293.0 51.7 185.7 223.5 193.1 167.1 164.2 202.2 218.8 249.4 267.9 268.6 264.1 283.4 288.8 290.9 288.1 306.2 311.6 315.5 303.9 282.0 314.5 331.3  
Diurnal Average

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



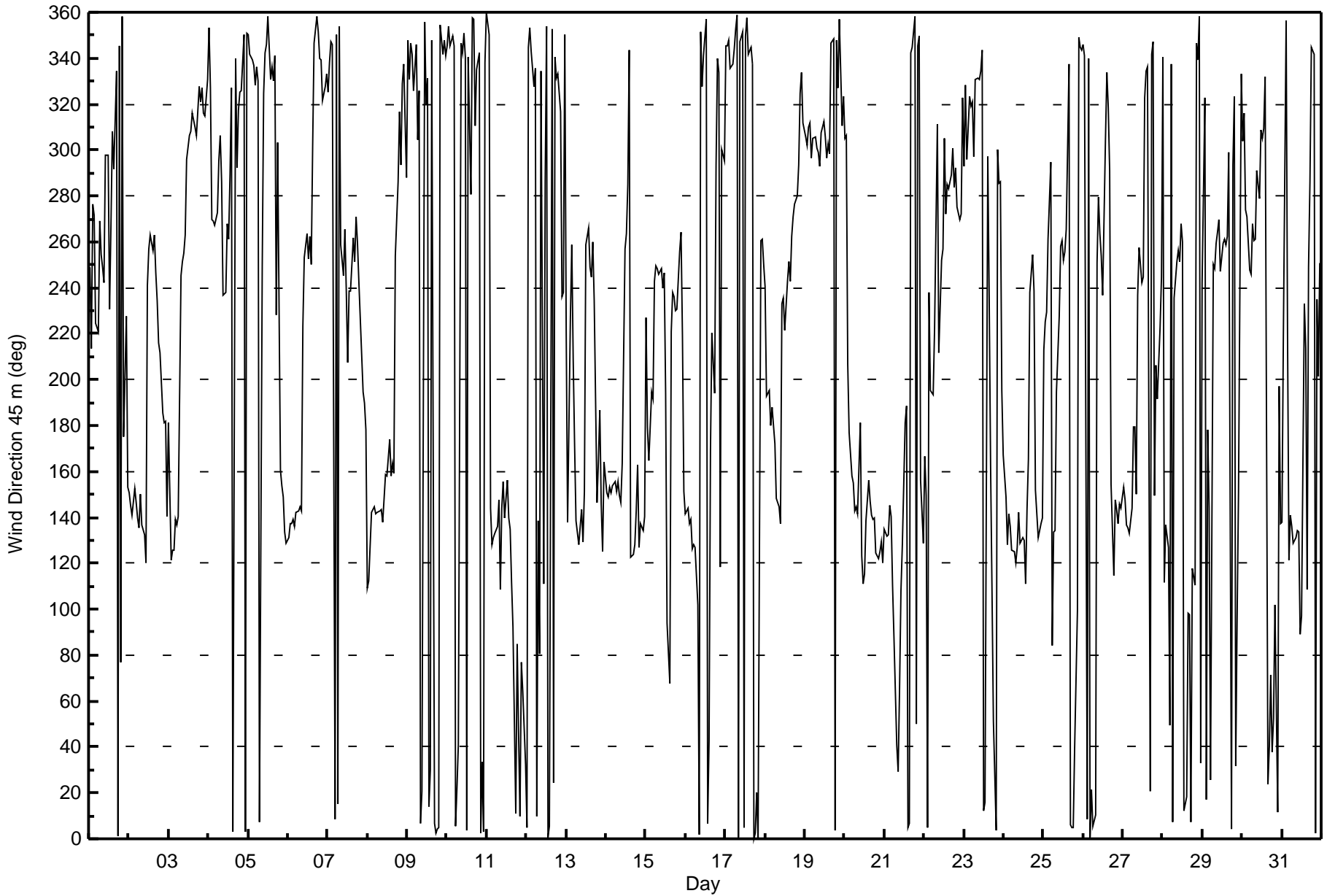
**Wood Buffalo Environmental Association**

**Summary of Hour Standard Deviations**

**Wind Direction 45 m (WD45m) - deg**

**Lower Camp Met Tower - July 2015**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 102 deg on Jul 11 19:00		Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																							
Minimum Value: 6 deg on Jul 8 13:00																									
Percentiles: P <sub>1</sub> = 8 P <sub>10</sub> = 12 Q <sub>1</sub> = 16 Median = 23 Q <sub>3</sub> = 41 P <sub>90</sub> = 66 P <sub>99</sub> = 94																									
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-Jul	21	25	54	80	23	21	33	19	15	17	41	86	26	41	37	72	40	68	44	56	44	74	85	53	86
2-Jul	12	33	10	18	12	12	11	16	13	20	32	29	25	17	18	17	26	18	13	11	12	7	41	52	52
3-Jul	25	52	8	12	10	9	10	40	12	13	15	17	19	18	15	16	14	14	13	10	8	9	13	23	52
4-Jul	15	22	20	11	12	13	26	27	38	18	29	15	10	31	22	40	53	25	15	11	13	18	17	20	53
5-Jul	18	16	13	13	10	15	39	69	51	51	30	23	27	35	36	55	31	92	94	33	13	29	29	32	94
6-Jul	33	11	11	9	10	9	13	13	10	66	18	19	18	17	16	45	17	18	16	15	15	14	15	14	66
7-Jul	15	15	8	25	29	55	37	74	58	11	31	25	61	21	21	17	22	16	17	16	15	10	11	20	74
8-Jul	13	11	10	11	10	13	12	15	13	15	15	8	6	15	10	10	10	28	26	15	31	13	32	20	32
9-Jul	30	42	27	19	13	38	15	17	29	36	34	28	15	30	66	19	23	20	20	21	18	17	16	13	66
10-Jul	12	15	29	12	14	22	22	64	28	36	34	32	39	80	62	43	38	24	20	12	14	68	19	44	80
11-Jul	33	62	68	72	32	16	16	50	69	18	14	16	13	15	17	16	60	64	102	66	76	59	25	32	102
12-Jul	53	38	21	21	39	57	93	89	59	25	97	59	33	21	20	19	35	18	19	15	32	21	54	36	97
13-Jul	86	24	54	54	21	23	39	16	19	20	21	44	13	19	16	15	22	30	27	14	12	21	64	81	86
14-Jul	10	15	14	11	10	15	20	14	21	22	42	45	31	52	86	74	17	16	13	19	37	35	67	73	86
15-Jul	46	22	20	25	37	41	31	16	13	18	40	40	46	46	86	63	15	12	10	8	26	57	47	27	86
16-Jul	13	22	43	40	14	19	26	75	73	26	15	17	20	22	66	80	43	75	40	13	14	95	32	34	95
17-Jul	11	11	10	12	15	14	14	16	17	14	16	20	16	17	16	19	24	18	18	23	58	33	19	34	58
18-Jul	50	56	49	30	33	23	17	11	7	12	70	10	12	9	12	11	12	14	12	13	11	19	13	17	70
19-Jul	18	16	19	29	12	12	13	14	16	13	17	19	19	19	21	26	19	22	28	30	15	41	65	12	65
20-Jul	19	49	74	61	26	27	14	13	40	56	25	41	20	54	29	21	19	19	17	28	52	31	13	14	74
21-Jul	18	11	15	14	19	36	38	23	45	77	20	31	39	83	61	22	21	15	26	26	37	84	49	82	84
22-Jul	39	52	84	33	30	32	25	20	82	42	89	54	48	83	79	25	26	15	14	12	18	12	13	29	89
23-Jul	23	32	25	31	17	17	21	20	16	17	29	29	29	49	40	50	28	40	61	58	32	29	40	66	66
24-Jul	28	13	12	59	24	21	15	19	20	13	19	20	34	65	29	41	30	14	31	31	12	12	15	11	65
25-Jul	52	13	9	14	58	74	35	19	15	17	22	22	22	17	28	20	31	26	24	54	61	37	22	15	74
26-Jul	21	16	25	18	27	41	73	70	101	86	91	37	30	28	41	95	85	73	32	21	17	22	16	14	101
27-Jul	18	27	26	8	9	17	29	21	19	56	17	14	12	53	30	34	101	39	63	20	55	56	59	54	101
28-Jul	65	83	21	21	86	38	44	67	29	34	69	46	49	87	57	70	61	38	72	63	48	54	32	80	87
29-Jul	73	42	62	49	73	92	27	18	19	21	22	24	21	14	16	17	27	31	40	28	57	38	76	40	92
30-Jul	19	24	39	18	11	12	37	36	19	23	27	31	22	20	35	32	25	28	20	42	84	102	34	58	102
31-Jul	83	77	86	47	13	13	13	14	15	18	52	29	78	48	56	43	43	83	23	16	37	82	37	56	86
86 83 86 80 86 92 93 89 101 86 97 86 78 87 86 95 101 92 102 66 84 102 85 82																									
Diurnal Maximum																									





Direction of Maximum Speed: 313 deg on Jul 8 20:00		Hours in Service:	744
Direction of Maximum Daily Speed Average: 354.7 deg on Jul 17		Hours of Data:	744
Direction of Minimum Speed: 107 deg on Jul 21 22:00		Hours of Missing Data:	0
Direction of Minimum Daily Speed Average: 0.8 deg on Jul 26		Percent Operational Time:	100.0
Monthly Average Direction: 275.2 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-Jul	258	237	272	261	243	240	262	255	250	240	296	265	231	262	304	279	282	65	33	98	106	148	160	207	254.3
2-Jul	218	219	205	224	218	203	183	199	190	193	203	241	254	263	253	259	244	232	218	217	203	207	208	213	225.0
3-Jul	212	189	141	148	159	153	164	243	250	253	261	294	305	309	315	312	307	305	329	323	328	315	302	307	284.4
4-Jul	315	303	269	274	272	275	293	300	271	241	262	258	282	304	11	14	320	330	336	333	357	7	357	301.0	
5-Jul	358	352	352	354	333	333	326	354	255	325	341	351	357	337	339	338	343	282	340	161	187	194	187	178	339.3
6-Jul	159	180	171	169	177	186	169	172	157	221	252	262	249	259	249	309	352	3	358	346	345	328	320	317	300.2
7-Jul	319	320	318	298	297	302	347	336	262	239	258	238	214	236	238	259	251	268	258	241	220	215	209	202	252.4
8-Jul	150	142	150	148	152	148	150	148	147	144	151	157	162	186	164	165	168	255	285	313	296	310	315	320	175.4
9-Jul	352	354	356	3	342	5	316	328	12	27	5	333	341	25	66	1	15	13	13	11	5	357	360	356	2.4
10-Jul	351	359	359	3	9	10	21	43	7	341	358	351	5	332	293	2	351	318	326	346	35	53	55	131	3.7
11-Jul	126	125	134	130	131	137	139	144	125	142	152	138	157	137	132	115	92	53	61	72	57	88	96	129	126.0
12-Jul	110	107	30	17	10	5	37	127	127	348	105	298	339	350	2	9	38	353	348	1	337	238	246	352	356.6
13-Jul	334	144	179	257	228	205	170	140	136	156	137	139	256	262	249	243	252	232	167	175	196	144	135	156	195.6
14-Jul	152	146	148	150	155	158	156	159	147	151	168	270	261	284	354	171	182	128	143	170	151	150	200	244	159.7
15-Jul	249	214	203	231	239	247	248	250	246	239	240	243	203	118	92	208	235	234	230	236	259	309	190	193	232.9
16-Jul	213	203	216	177	156	163	139	39	300	335	331	347	2	11	47	165	215	207	281	321	320	52	335	290	306.4
17-Jul	334	339	340	351	358	0	2	3	3	352	355	7	354	1	343	351	345	7	8	30	38	52	279	260	354.7
18-Jul	256	250	245	253	232	214	193	178	166	144	233	235	223	242	250	247	260	268	274	280	291	312	335	311	260.3
19-Jul	296	297	303	301	296	303	303	299	299	294	304	310	306	300	302	299	337	341	4	1	350	1	319	333	309.6
20-Jul	301	276	272	265	229	220	193	184	177	196	128	107	121	141	150	149	145	141	138	126	121	126	134	129	148.2
21-Jul	133	136	138	150	141	127	120	82	85	102	118	130	183	167	3	7	343	350	16	65	38	107	183	171	114.4
22-Jul	201	172	236	250	223	221	231	268	297	234	258	265	297	261	273	281	288	302	282	292	273	268	272	310	271.1
23-Jul	301	345	316	295	302	299	289	325	335	336	333	348	10	5	299	239	168	130	60	340	297	262	262	250	307.3
24-Jul	219	192	160	167	156	166	146	135	124	133	126	134	131	123	146	166	238	252	238	183	161	153	144	152	160.0
25-Jul	219	242	237	259	291	36	111	146	198	225	255	257	250	255	266	327	335	12	29	45	97	355	357	5	265.5
26-Jul	12	359	48	352	4	32	40	22	304	322	271	256	236	305	343	315	290	210	137	152	155	145	151	178	287.0
27-Jul	219	221	174	188	182	184	191	185	172	238	255	241	242	333	343	341	343	311	346	146	220	185	216	256	242.4
28-Jul	308	274	180	184	225	275	294	256	254	255	266	263	270	348	21	111	95	17	109	131	259	1	4	44	358.0
29-Jul	210	279	290	232	273	351	257	250	254	260	261	245	260	257	257	262	294	7	290	330	3	72	171	298	275.4
30-Jul	289	290	264	264	252	252	258	255	259	290	283	306	304	306	332	28	44	73	41	62	105	148	186	184	293.8
31-Jul	99	151	185	150	157	153	154	137	137	127	116	91	92	231	224	143	247	273	356	9	28	305	230	251	180.1

273.0 267.7 247.1 252.8 242.1 225.6 203.9 217.4 228.8 251.6 267.2 269.2 266.0 283.7 292.2 295.9 290.5 311.0 320.1 325.2 306.4 270.0 275.7 278.8  
Diurnal Average

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



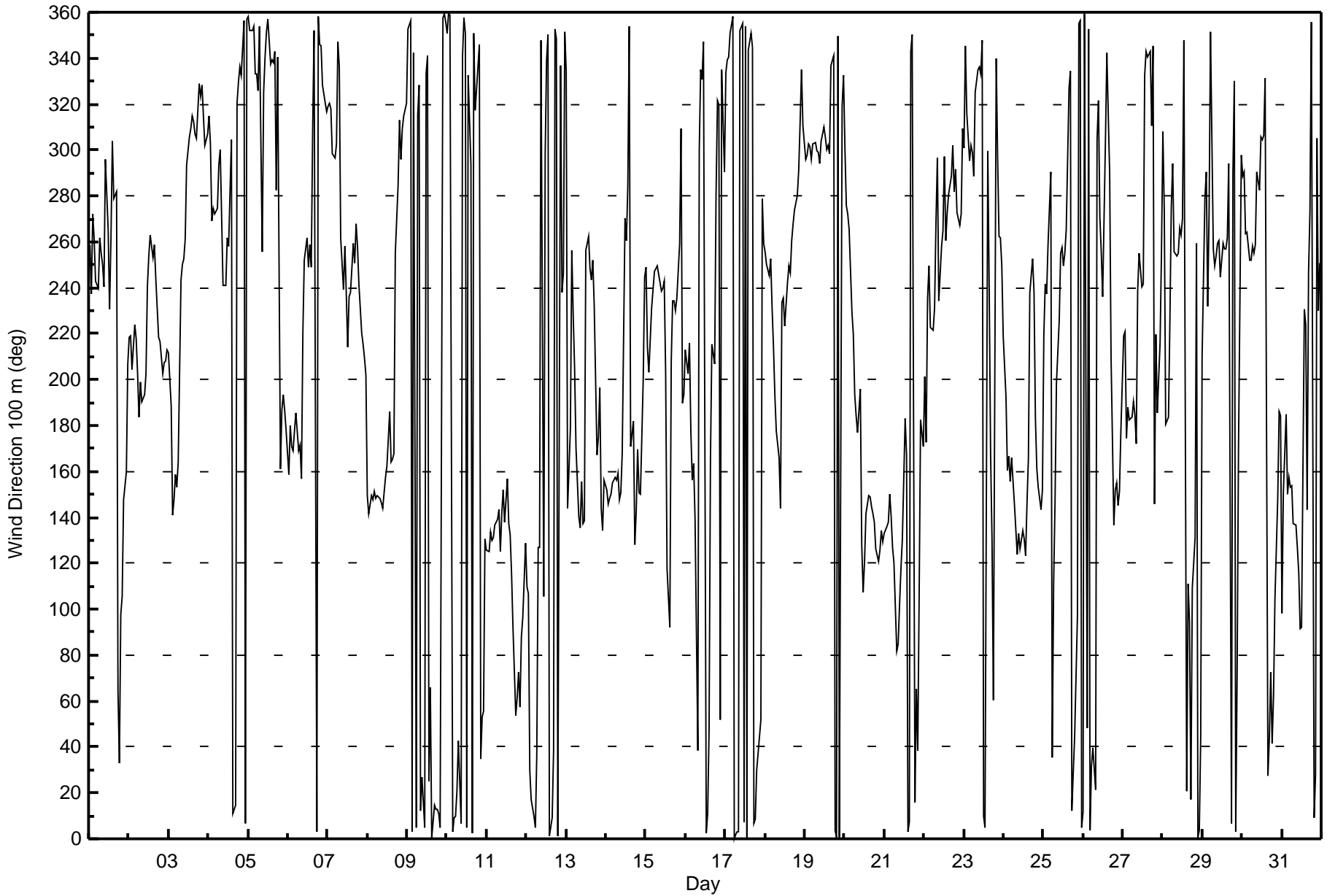
Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction 100 m (WD100m) - deg

Lower Camp Met Tower - July 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 99 deg on Jul 26 10:00		Hours in Service: 744 Hours of Data: 744																							
Minimum Value: 3 deg on Jul 7 22:00		Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																							
Percentiles: P <sub>1</sub> = 5 P <sub>10</sub> = 8 Q <sub>1</sub> = 11 Median = 16 Q <sub>3</sub> = 27 P <sub>90</sub> = 45 P <sub>99</sub> = 89																									
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-Jul	13	15	42	31	11	14	17	15	10	12	35	36	11	18	27	56	21	58	44	18	21	10	38	24	58
2-Jul	9	17	17	20	11	16	17	20	26	33	44	22	18	11	12	11	22	12	8	5	10	6	11	25	44
3-Jul	13	41	15	12	13	15	16	27	8	9	10	13	15	14	11	12	9	11	8	4	4	6	6	12	41
4-Jul	15	14	10	8	7	9	23	20	29	12	18	9	6	25	15	29	53	77	9	9	9	12	8	14	77
5-Jul	12	10	9	9	6	7	34	56	33	40	25	16	15	29	27	40	22	79	84	33	22	15	19	21	84
6-Jul	41	19	13	16	15	19	20	21	19	54	15	13	14	13	10	45	12	11	9	11	8	12	9	10	54
7-Jul	9	9	6	13	14	29	47	70	46	7	27	15	38	20	18	15	18	11	12	12	7	3	4	12	70
8-Jul	18	8	8	6	6	7	6	6	7	7	8	5	6	16	10	10	10	22	22	11	10	7	16	11	22
9-Jul	16	14	14	11	9	23	14	13	21	19	26	28	16	25	41	13	12	10	11	12	9	10	8	9	41
10-Jul	7	7	7	7	9	12	14	51	25	28	24	22	27	50	62	33	31	23	17	8	10	27	21	56	62
11-Jul	17	10	9	10	5	5	7	7	25	8	14	7	11	6	8	8	21	28	28	29	34	23	17	15	34
12-Jul	15	17	37	11	23	32	62	75	57	13	52	93	22	13	11	16	25	15	15	11	32	18	24	21	93
13-Jul	72	10	38	17	15	27	33	18	10	22	21	37	7	11	10	11	14	19	30	12	11	26	27	39	72
14-Jul	10	5	6	7	7	16	19	12	16	17	59	46	24	53	87	59	36	8	8	14	23	22	66	41	87
15-Jul	20	18	22	11	17	13	17	12	9	14	35	33	34	47	72	58	13	8	7	4	21	33	27	23	72
16-Jul	20	28	36	18	20	24	29	83	38	20	11	14	15	11	48	90	41	51	32	11	10	94	57	21	94
17-Jul	10	5	5	6	8	5	7	7	8	8	9	13	10	9	11	14	21	9	8	13	14	22	25	5	25
18-Jul	14	11	17	14	30	20	20	19	17	8	50	7	9	7	8	11	5	8	8	9	6	15	9	16	50
19-Jul	12	9	11	16	5	6	7	11	10	8	10	13	15	14	17	25	12	13	24	17	10	22	25	7	25
20-Jul	18	17	23	16	12	15	25	22	29	47	23	34	12	45	27	17	15	14	12	11	16	15	5	5	47
21-Jul	7	4	7	7	13	14	14	24	27	38	9	25	36	94	53	13	13	9	21	15	25	82	33	32	94
22-Jul	25	21	25	14	24	16	22	14	89	43	87	61	46	82	65	20	23	11	12	10	15	6	7	28	89
23-Jul	21	20	34	26	13	12	25	18	9	12	17	21	22	35	36	39	29	40	60	75	12	9	16	15	75
24-Jul	25	25	15	15	14	23	9	17	8	8	13	16	22	59	25	36	25	10	19	33	10	9	6	11	59
25-Jul	37	8	5	10	50	45	26	15	15	10	16	13	16	12	23	12	32	15	17	25	14	23	18	13	50
26-Jul	20	12	36	14	14	40	49	54	91	99	83	29	22	27	28	72	49	34	10	11	9	9	10	27	99
27-Jul	21	33	18	21	18	19	21	20	23	39	11	11	9	54	21	16	36	34	29	45	22	30	21	16	54
28-Jul	34	44	32	20	26	11	80	66	24	31	60	44	44	89	64	47	37	26	36	19	73	16	26	40	89
29-Jul	58	23	41	12	67	59	19	13	13	13	15	18	14	7	12	12	22	19	40	21	49	26	51	23	67
30-Jul	9	12	15	7	5	7	15	15	12	16	23	24	16	15	31	19	15	17	12	15	24	21	24	54	54
31-Jul	35	10	61	9	9	8	13	9	13	20	37	20	62	42	44	78	29	46	18	11	21	68	9	34	78
	72	44	61	31	67	59	80	83	91	99	87	93	62	94	87	90	53	79	84	75	73	94	66	56	
	Diurnal Maximum																								







Maximum Value: 0.8 km/h on Jul 8 13:00		Maximum Daily Average: 0.1 km/h on Jul 8		Hours in Service: 744																									
Minimum Value: -1.1 km/h on Jul 6 18:00		Minimum Daily Average: -0.5 km/h on Jul 17		Hours of Data: 744																									
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: $P_1 = -0.8$ $P_{10} = -0.4$ $Q_1 = -0.3$ Median = -0.1 $Q_3 = 0.1$ $P_{90} = 0.2$ $P_{99} = 0.7$		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-Jul	-0.1	0.1	-0.1	-0.1	0.0	0.0	-0.3	-0.1	-0.1	-0.1	-0.3	0.0	0.2	-0.2	-0.2	-0.2	-0.1	-0.1	-0.2	0.0	0.0	0.1	0.0	0.1	-0.1	0.2			
2-Jul	0.1	0.1	-0.1	0.1	0.0	0.2	0.2	0.3	0.3	0.1	0.1	-0.1	-0.2	-0.4	-0.1	-0.3	-0.1	-0.1	0.1	0.1	0.5	0.6	0.4	0.1	0.1	0.6			
3-Jul	0.7	-0.3	-0.2	-0.4	0.0	-0.1	0.3	-0.1	-0.5	-0.6	-0.6	-0.9	-0.5	-0.5	-1.0	-0.8	-0.8	-0.5	-0.4	-0.4	-0.4	-0.2	-0.2	-0.2	-0.4	0.7			
4-Jul	-0.3	-0.1	-0.5	-0.4	-0.4	-0.5	-0.2	-0.2	-0.1	-0.1	0.0	-0.3	-0.6	-0.3	-0.1	-0.2	-0.1	-0.2	-0.1	-0.3	-0.3	-0.6	-1.0	-0.3	-0.3	0.0			
5-Jul	-0.5	-0.2	-0.2	-0.2	-0.2	-0.2	-0.1	0.0	-0.1	-0.2	-0.4	-0.8	-0.8	-0.4	-0.3	-0.4	-0.2	-0.1	0.1	0.1	0.1	0.1	0.0	0.0	-0.2	0.1			
6-Jul	0.1	0.3	0.4	0.4	0.3	0.3	0.0	0.2	0.2	0.2	-0.5	-0.3	-0.3	-0.4	0.0	-0.8	-0.5	-1.1	-0.6	-0.4	-0.4	-0.3	-0.4	-0.3	-0.2	0.4			
7-Jul	-0.3	-0.1	-0.3	-0.1	0.0	-0.2	-0.2	-0.1	-0.2	-0.1	-0.2	-0.1	0.0	-0.2	0.2	-0.4	-0.2	-0.4	-0.4	-0.2	0.1	0.1	0.5	0.6	-0.1	0.6			
8-Jul	-0.5	-0.8	0.2	0.2	0.3	0.2	0.2	0.5	0.2	0.3	0.2	0.7	0.8	0.5	0.7	0.7	0.8	0.0	-0.3	-0.8	-0.4	-0.4	-0.1	-0.2	0.1	0.8			
9-Jul	-0.2	0.0	-0.1	-0.3	-0.3	-0.3	-0.2	-0.1	-0.2	-0.3	-0.1	-0.2	-0.2	-0.2	-0.2	-0.2	-0.3	-0.5	-0.5	-0.3	-0.4	-0.2	-0.2	-0.2	-0.2	0.0			
10-Jul	-0.1	0.0	-0.1	-0.3	-0.2	-0.4	-0.4	0.0	-0.4	-0.3	-0.4	-0.6	0.1	-0.1	0.0	0.0	-0.2	-0.2	-0.1	-0.1	-0.1	-0.1	-0.2	-0.1	-0.2	0.1			
11-Jul	0.0	-0.3	0.0	0.0	0.0	0.1	0.1	0.5	0.2	0.4	0.4	0.6	0.6	0.4	0.2	-0.2	-0.1	-0.3	0.2	-0.1	-0.2	-0.1	-0.2	-0.1	0.1	0.6			
12-Jul	0.0	-0.1	-0.5	-0.3	-0.1	-0.1	0.0	0.0	-0.1	-0.3	0.0	-0.1	-0.2	0.0	-0.3	-0.5	-0.4	-0.1	-0.2	-0.1	-0.2	0.0	-0.2	-0.2	-0.2	0.0			
13-Jul	0.0	0.0	-0.2	-0.1	0.3	0.2	0.0	0.2	0.1	0.0	0.0	0.0	-0.5	-0.2	-0.2	-0.2	-0.1	0.0	0.1	0.5	0.5	0.2	0.0	0.1	0.0	0.5			
14-Jul	0.1	0.3	0.2	0.3	0.1	0.6	0.2	0.3	0.3	0.2	0.3	-0.1	-0.1	0.0	-0.3	0.0	0.0	-0.1	0.2	0.2	-0.2	0.1	0.0	0.0	0.1	0.6			
15-Jul	0.1	0.2	0.4	0.4	0.1	0.0	-0.3	0.1	0.0	-0.1	0.1	0.1	0.3	-0.1	-0.2	0.1	-0.3	-0.1	-0.1	0.0	-0.2	0.1	0.1	0.1	0.0	0.4			
16-Jul	0.1	0.0	0.0	0.1	0.0	0.1	0.1	-0.1	-0.2	-0.3	-0.4	-0.3	-0.5	-0.5	-0.3	0.4	-0.1	0.0	-0.6	-0.2	-0.2	-0.2	-0.2	-0.3	-0.2	0.4			
17-Jul	-0.2	-0.4	-0.5	-0.1	-0.2	-0.4	-0.5	-0.9	-0.8	-0.8	-0.7	-0.8	-0.9	-1.0	-0.6	-0.6	-0.5	-0.6	-0.4	-0.2	0.0	0.1	0.1	0.1	-0.5	0.1			
18-Jul	0.0	0.1	0.1	0.1	0.2	0.3	0.4	0.3	0.2	0.2	-0.2	-0.1	0.0	-0.3	-0.4	-0.2	-0.5	-0.5	-0.6	-0.6	-0.4	-0.3	-0.4	-0.3	-0.1	0.4			
19-Jul	-0.4	-0.3	-0.4	-0.1	-0.4	-0.4	-0.4	-0.4	-0.4	-0.5	-0.6	-0.5	-0.3	-0.5	-0.6	-0.4	-0.3	-0.3	-0.5	-0.2	-0.2	-0.2	0.0	-0.2	-0.3	0.0			
20-Jul	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.3	0.0	0.1	0.3	0.1	-0.2	0.1	0.2	0.2	0.3	0.5	0.2	0.0	0.0	0.0	-0.2	-0.4	0.1	0.5			
21-Jul	0.4	0.0	0.0	0.3	0.1	-0.1	0.0	-0.2	-0.2	-0.2	-0.2	0.2	0.2	0.1	-0.1	-0.2	-0.4	-0.4	-0.2	-0.3	-0.2	0.0	0.1	0.0	-0.1	0.4			
22-Jul	0.1	0.1	0.0	0.0	0.2	0.1	0.0	-0.1	0.1	0.5	0.2	0.1	0.1	-0.3	0.0	-0.4	-0.5	-0.4	-0.4	-0.5	-0.3	-0.4	-0.2	-0.1	-0.1	0.5			
23-Jul	-0.3	-0.1	-0.3	-0.1	-0.2	-0.2	-0.2	-0.2	0.0	-0.2	-0.1	-0.2	-0.4	-0.1	-0.1	0.0	0.2	-0.1	0.0	0.0	-0.2	0.0	-0.1	0.1	-0.1	0.2			
24-Jul	0.1	0.0	0.1	0.0	0.1	-0.1	0.0	-0.1	0.0	0.3	0.5	0.1	0.3	0.0	0.1	0.4	-0.1	-0.3	-0.2	0.1	0.1	0.2	0.2	0.1	0.1	0.5			
25-Jul	0.0	0.0	0.0	-0.4	-0.2	0.0	-0.1	0.0	0.3	0.0	0.0	0.0	0.0	-0.2	-0.1	-0.5	-0.2	-0.1	0.0	0.0	0.1	-0.1	-0.3	-0.2	-0.1	0.3			
26-Jul	-0.3	-0.3	-0.2	-0.3	-0.2	-0.2	-0.1	-0.1	0.4	-0.2	0.3	0.2	-0.2	-0.4	-0.4	-0.2	-0.2	0.1	-0.1	0.2	0.3	0.0	0.0	0.2	-0.1	0.4			
27-Jul	0.2	0.3	0.2	0.2	0.1	0.3	0.4	0.2	0.2	0.0	-0.3	-0.3	-0.5	-0.8	-0.4	-0.2	0.0	-0.2	-0.2	0.2	0.1	0.1	0.1	0.0	0.0	0.4			
28-Jul	-0.1	0.1	0.1	0.0	-0.1	0.0	-0.1	0.1	0.3	0.5	0.4	0.1	-0.1	0.0	-0.6	-0.1	0.0	-0.3	0.0	-0.3	-0.2	-0.2	-0.4	-0.1	0.0	0.5			
29-Jul	-0.1	-0.2	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.1	-0.3	-0.3	0.1	0.0	-0.5	-0.4	-0.3	-0.2	-0.3	-0.5	-0.4	-0.2	0.0	0.0	-0.1	-0.2	0.1			
30-Jul	-0.3	-0.2	-0.2	-0.3	-0.2	0.0	-0.3	-0.3	-0.3	-0.3	-0.1	-0.1	-0.6	-0.7	-0.5	-0.5	-0.1	-0.3	-0.7	-0.4	0.0	0.1	0.1	0.1	-0.3	0.1			
31-Jul	-0.1	0.0	-0.1	0.1	0.1	0.0	0.3	0.1	0.4	0.5	0.7	-0.1	-0.1	0.0	-0.1	0.0	-0.1	0.0	-0.3	-0.1	-0.1	0.0	0.0	-0.1	0.1	0.7			
																								-0.1	0.7	Diurnal Average		Diurnal Maximum	
																								-0.1	0.7	Diurnal Average		Diurnal Maximum	



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 4.3 km/h on Jul 3 11:00 Minimum Value: 0.1 km/h on Jul 30 23:00 Percentiles: P <sub>1</sub> = 0.2 P <sub>10</sub> = 0.5 Q <sub>1</sub> = 0.8 Median = 1.4 Q <sub>3</sub> = 1.9 P <sub>90</sub> = 2.5 P <sub>99</sub> = 3.7																								Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jul	0.9	0.9	0.8	0.7	0.9	1.0	1.4	1.4	1.5	1.7	1.5	0.6	1.4	1.1	1.5	1.8	0.9	0.6	0.6	0.3	0.2	0.2	0.2	0.2	1.8
2-Jul	0.5	0.5	0.6	0.7	0.7	1.0	1.1	1.0	1.2	1.3	1.3	1.9	2.0	2.2	2.0	2.5	1.9	1.9	1.7	1.3	1.1	1.2	1.1	1.2	2.5
3-Jul	1.6	1.6	1.5	1.8	2.1	2.1	2.0	3.0	3.1	4.1	4.3	4.3	3.4	3.7	3.9	3.7	3.3	2.2	2.0	0.8	0.9	0.6	0.9	1.3	4.3
4-Jul	0.9	1.1	2.2	2.3	2.4	2.6	1.9	1.2	0.6	1.6	1.2	2.1	2.5	1.8	0.8	0.9	0.7	0.4	0.9	1.7	2.1	3.2	3.4	2.6	3.4
5-Jul	2.2	1.8	1.8	0.9	0.5	0.9	0.8	1.3	1.6	1.9	2.4	2.2	2.5	2.4	2.2	1.8	1.7	1.0	0.7	0.3	0.6	0.4	0.6	0.8	2.5
6-Jul	1.3	0.9	1.2	1.3	1.5	1.9	1.7	1.6	1.8	2.2	2.9	3.0	3.0	3.0	3.1	3.8	3.4	3.9	3.1	3.3	2.9	1.5	1.3	1.1	3.9
7-Jul	1.2	0.6	0.7	0.3	0.3	0.5	1.0	1.1	1.5	1.9	1.4	1.3	1.3	1.5	1.7	2.0	1.7	2.4	2.1	1.2	0.9	1.2	1.4	1.3	2.4
8-Jul	1.4	1.6	1.6	2.1	2.3	2.4	2.6	3.0	2.6	3.1	2.7	2.1	2.1	1.9	2.0	1.9	2.1	1.8	2.2	3.8	2.0	1.3	0.7	0.7	3.8
9-Jul	1.3	0.7	0.5	0.8	1.1	1.1	0.6	1.0	1.6	1.8	1.5	0.8	1.0	1.1	1.0	1.6	1.7	2.3	2.6	2.2	1.8	1.3	1.4	1.0	2.6
10-Jul	0.4	0.3	0.7	1.5	1.0	1.6	1.7	1.2	1.5	1.7	1.9	1.9	1.9	1.9	1.7	1.7	1.4	1.3	0.7	0.6	0.4	0.5	0.5	0.4	1.9
11-Jul	0.6	0.6	0.7	0.6	1.0	2.2	2.6	2.2	1.1	2.2	2.1	3.1	2.4	2.7	2.0	1.5	0.9	1.1	1.0	1.1	0.7	0.7	0.6	0.5	3.1
12-Jul	0.3	0.5	1.2	0.9	0.6	0.9	0.8	0.7	1.0	1.7	1.0	1.3	1.6	1.7	2.1	1.8	1.4	1.1	1.0	0.7	1.0	2.8	1.7	0.7	2.8
13-Jul	0.3	0.8	0.7	0.5	0.7	0.7	0.8	1.2	1.4	1.6	1.2	1.4	2.3	2.4	2.1	1.6	1.4	1.2	0.6	0.9	0.9	1.2	1.5	0.7	2.4
14-Jul	1.2	1.6	1.6	1.7	1.7	1.8	1.3	1.4	1.6	1.6	1.5	1.6	1.8	1.7	2.6	0.7	0.8	1.2	1.2	1.4	1.4	1.4	1.2	0.8	2.6
15-Jul	0.8	0.8	1.0	1.1	1.0	1.6	1.5	1.8	1.7	1.6	1.6	1.7	1.9	1.3	1.1	1.6	2.3	2.1	1.4	0.8	0.9	0.3	0.2	0.5	2.3
16-Jul	0.7	0.6	0.4	0.5	0.6	0.9	0.7	0.6	1.1	1.6	2.2	1.9	2.3	2.2	1.9	2.2	2.7	2.0	3.1	1.4	0.8	1.4	0.8	0.8	3.1
17-Jul	1.6	2.3	2.1	1.5	0.9	1.5	2.3	3.1	3.4	3.2	3.5	3.7	3.7	3.1	2.9	3.2	1.9	2.9	1.8	1.3	0.3	0.2	0.2	0.3	3.7
18-Jul	0.5	0.3	0.4	0.5	0.8	0.9	1.1	1.8	2.0	1.9	1.8	1.8	1.7	2.8	2.3	2.3	2.7	3.5	3.3	3.1	3.4	1.5	2.0	1.7	3.5
19-Jul	2.1	2.2	2.0	1.5	2.4	1.8	1.9	1.7	2.5	3.3	2.4	2.8	2.4	2.7	2.7	3.1	1.9	1.4	2.7	1.0	0.5	0.5	0.4	0.4	3.3
20-Jul	0.3	0.4	0.3	0.3	0.7	0.6	1.1	1.3	1.3	1.4	1.7	1.7	1.9	1.6	1.7	1.7	1.7	1.6	1.2	1.1	0.8	1.0	2.1	2.2	2.2
21-Jul	2.1	2.4	2.3	1.7	1.1	0.9	1.0	0.9	0.8	1.0	1.6	1.2	1.1	1.3	1.9	2.0	1.8	1.8	1.2	0.9	0.3	0.4	0.3	0.3	2.4
22-Jul	0.3	0.4	0.2	0.6	0.8	0.6	0.9	1.3	1.2	1.3	1.7	1.5	1.8	1.6	1.6	1.9	1.6	2.0	2.1	2.2	2.1	2.3	1.8	1.0	2.3
23-Jul	0.8	0.9	0.6	0.7	0.9	0.6	0.6	1.2	1.3	1.5	1.4	1.2	1.4	1.3	1.2	1.1	1.2	1.0	0.8	0.4	0.6	0.4	0.6	0.3	1.5
24-Jul	0.4	0.3	0.5	0.3	0.5	0.9	1.2	1.3	1.6	1.7	2.0	1.9	1.9	1.7	1.8	1.9	2.1	1.7	0.9	0.3	0.4	0.7	1.5	1.8	2.1
25-Jul	1.4	1.0	1.5	2.5	1.3	0.6	0.7	1.0	1.4	1.8	2.1	2.4	2.5	2.5	2.9	2.6	1.1	0.9	0.6	0.4	0.3	0.4	0.8	0.8	2.9
26-Jul	0.8	1.0	0.5	0.7	0.7	0.7	0.7	0.8	1.3	1.3	1.6	1.9	2.0	2.6	1.7	1.5	2.7	0.8	0.7	0.8	1.8	1.7	1.5	0.8	2.7
27-Jul	0.8	0.9	1.0	0.8	0.8	1.1	1.1	1.1	1.5	1.7	2.3	2.5	2.8	2.6	1.9	0.9	0.7	1.0	1.4	0.8	0.5	0.3	0.5	0.6	2.8
28-Jul	0.7	0.4	0.8	0.8	0.4	0.3	0.6	0.9	1.4	1.4	1.5	1.8	1.7	1.4	2.1	1.1	1.2	2.0	0.8	0.9	0.5	0.7	2.4	1.8	2.4
29-Jul	0.8	0.6	0.3	0.4	0.4	0.4	1.4	1.8	1.4	1.7	1.7	1.8	2.1	2.9	2.2	2.7	1.6	1.9	3.1	2.0	0.7	0.3	0.3	0.6	3.1
30-Jul	1.2	0.7	1.6	1.7	2.1	2.0	2.1	1.8	2.1	1.9	2.0	2.3	3.3	3.5	2.7	2.4	2.1	1.5	2.5	1.3	0.3	0.2	0.1	0.5	3.5
31-Jul	0.7	0.2	0.4	0.2	0.5	1.6	1.4	1.6	1.7	1.5	1.4	1.4	1.1	2.3	1.8	0.9	1.5	1.1	0.7	0.6	0.5	0.3	0.4	0.8	2.3
Diurnal Maximum																									



Maximum Value: 1.4 km/h on Jul 8 13:00		Maximum Daily Average: 0.3 km/h on Jul 11		Hours in Service: 744																																												
Minimum Value: -2.0 km/h on Jul 3 12:00		Minimum Daily Average: -0.7 km/h on Jul 17		Hours of Data: 744																																												
Maximum Diurnal Average: 0.1 km/h at hour 6		Minimum Diurnal Average: -0.3 km/h at hour 14		Hours of Missing Data: 0																																												
Monthly Average: -0.08 km/h		Percentiles: $P_1 = -1.3$ $P_{10} = -0.7$ $Q_1 = -0.4$ Median = -0.1 $Q_3 = 0.2$ $P_{90} = 0.6$ $P_{99} = 1.1$		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-Jul	0.0	0.1	-0.1	0.0	-0.2	0.0	-0.4	-0.2	-0.1	-0.1	-0.4	0.0	0.2	-0.3	-0.5	0.0	-0.2	0.0	-0.2	0.0	0.0	0.1	0.1	0.2	-0.1	0.2																						
2-Jul	0.4	0.4	0.3	0.4	0.4	0.9	0.8	0.7	0.6	0.4	0.4	-0.2	-0.3	-0.6	-0.2	-0.4	-0.2	0.3	0.3	0.1	0.2	0.7	0.6	0.3	0.3	0.9																						
3-Jul	1.0	0.0	0.2	0.0	0.6	0.5	1.0	0.1	-0.3	-1.0	-1.1	-2.0	-0.8	-1.4	-1.8	-1.5	-1.4	-1.0	-0.7	-0.6	-0.7	-0.5	-0.5	-0.4	-0.5	1.0																						
4-Jul	-0.5	-0.4	-0.6	-0.8	-0.7	-0.9	-0.5	-0.4	-0.2	0.1	0.0	-0.6	-1.0	-0.4	-0.4	0.0	-0.2	-0.2	-0.3	-0.6	-0.7	-0.5	-0.9	-0.7	-0.5	0.1																						
5-Jul	-0.6	-0.3	-0.3	-0.3	-0.3	-0.2	0.0	0.2	-0.1	-0.3	-0.3	-0.9	-0.8	-0.6	-0.6	-0.3	-0.2	-0.1	0.1	0.2	0.5	0.2	0.1	0.3	-0.2	0.5																						
6-Jul	0.6	0.8	1.1	0.9	1.0	0.9	0.2	0.5	0.7	0.2	-0.5	-0.5	-0.5	-0.8	0.0	-1.2	-0.9	-1.3	-0.8	-0.5	-0.7	-0.7	-0.7	-0.6	-0.1	1.1																						
7-Jul	-0.5	-0.2	-0.5	-0.2	0.0	-0.2	-0.2	0.1	-0.2	-0.1	-0.2	0.2	0.1	0.0	0.2	-0.7	-0.4	-0.8	-0.3	0.0	0.2	0.3	0.6	1.0	-0.1	1.0																						
8-Jul	-0.1	-0.4	0.5	0.7	0.8	0.7	0.6	0.8	0.7	0.7	0.9	1.3	1.4	0.5	1.2	1.1	1.4	-0.2	-0.9	-1.8	-0.8	-1.0	-0.2	-0.3	0.3	1.4																						
9-Jul	-0.4	-0.1	-0.1	-0.4	-0.4	-0.2	-0.3	-0.3	-0.2	-0.3	-0.2	-0.2	-0.3	-0.2	-0.1	-0.3	-0.3	-0.4	-0.4	-0.4	-0.4	-0.3	-0.4	-0.3	-0.3	-0.1																						
10-Jul	-0.2	-0.1	-0.3	-0.5	-0.2	-0.3	-0.3	0.0	-0.5	-0.4	-0.2	-0.6	0.3	0.1	0.0	0.1	0.0	-0.4	-0.2	-0.2	-0.2	0.1	-0.3	-0.1	-0.2	0.3																						
11-Jul	0.2	-0.2	0.2	0.2	0.2	0.6	0.6	0.9	0.2	0.8	0.9	1.2	0.9	1.0	0.7	0.2	0.1	-0.3	0.1	0.0	-0.2	0.0	-0.2	0.0	0.3	1.2																						
12-Jul	0.0	-0.1	-0.7	-0.5	-0.2	-0.3	0.0	0.0	0.0	-0.3	0.1	-0.2	-0.1	-0.1	-0.4	-0.5	-0.1	-0.3	-0.3	-0.2	-0.3	0.1	0.0	-0.2	-0.2	0.1																						
13-Jul	0.1	0.3	-0.1	-0.3	0.3	0.3	0.3	0.5	0.3	0.2	0.2	-0.6	-0.5	-0.2	-0.2	0.0	0.0	0.5	0.7	0.5	0.4	0.2	0.2	0.2	0.1	0.7																						
14-Jul	0.4	0.5	0.5	0.8	0.5	0.8	0.4	0.5	0.4	0.5	0.5	-0.1	-0.1	0.0	-0.3	0.0	0.2	0.2	0.3	0.3	-0.4	0.5	0.3	0.0	0.3	0.8																						
15-Jul	0.1	0.3	0.7	0.3	0.2	0.2	-0.2	0.2	0.0	-0.4	0.0	0.2	0.4	0.1	-0.2	0.2	-0.2	0.1	0.1	0.0	-0.2	0.1	0.1	0.5	0.1	0.7																						
16-Jul	0.7	0.3	0.2	0.3	0.4	0.4	0.4	0.0	-0.2	-0.3	-0.8	-0.4	-0.6	-0.4	-0.1	0.5	-0.2	0.1	-1.0	-0.6	-0.4	0.0	-0.5	-0.5	-0.1	0.7																						
17-Jul	-0.6	-0.8	-0.8	-0.4	-0.3	-0.5	-0.7	-1.1	-1.0	-1.1	-1.2	-1.0	-1.2	-1.0	-1.0	-1.0	-0.8	-0.7	-0.4	-0.1	0.0	0.1	0.0	0.0	-0.7	0.1																						
18-Jul	-0.1	0.0	0.1	0.1	0.0	0.4	0.4	0.9	0.9	0.6	-0.1	0.0	0.2	-0.1	-0.5	-0.1	-0.8	-1.1	-1.3	-1.1	-1.1	-0.4	-0.8	-0.6	-0.2	0.9																						
19-Jul	-0.7	-0.7	-0.4	-0.2	-0.9	-0.7	-0.7	-0.6	-0.9	-1.3	-0.9	-0.9	-0.5	-0.8	-0.9	-1.0	-0.4	-0.4	-0.6	-0.3	-0.3	-0.2	-0.1	-0.3	-0.6	-0.1																						
20-Jul	-0.1	-0.2	0.1	0.1	0.1	0.4	0.5	0.5	0.2	0.1	0.7	0.3	0.1	0.1	0.4	0.5	0.7	0.7	0.3	0.4	0.3	0.3	0.3	0.2	0.3	0.7																						
21-Jul	0.8	0.5	0.6	0.7	0.5	0.2	0.1	-0.3	-0.1	-0.1	0.0	0.3	0.3	0.3	0.1	-0.2	-0.4	-0.7	-0.2	-0.1	-0.2	0.0	0.1	0.1	0.1	0.8																						
22-Jul	0.2	0.2	0.1	-0.1	0.1	0.0	0.0	-0.1	0.1	0.3	0.5	0.2	0.0	-0.3	-0.1	-0.6	-0.9	-0.9	-0.7	-0.9	-0.6	-0.7	-0.5	-0.2	-0.2	0.5																						
23-Jul	-0.5	-0.3	-0.3	-0.4	-0.4	-0.4	-0.4	-0.4	-0.2	-0.4	-0.2	-0.3	-0.4	0.0	-0.3	0.0	0.3	-0.1	-0.1	0.0	-0.3	-0.2	-0.2	0.0	-0.2	0.3																						
24-Jul	0.1	0.3	0.4	0.1	0.3	0.2	0.3	0.1	0.4	0.7	0.8	0.5	0.7	0.2	0.4	0.8	-0.2	-0.4	-0.1	0.2	0.5	0.8	0.5	0.5	0.3	0.8																						
25-Jul	0.3	0.1	0.2	-0.8	-0.4	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.1	-0.4	-0.1	-0.8	-0.1	0.0	0.1	0.1	0.2	-0.3	-0.4	-0.4	-0.1	0.3																						
26-Jul	-0.4	-0.5	-0.2	-0.5	-0.2	-0.2	0.0	-0.1	0.6	-0.3	0.7	0.2	-0.2	-0.6	-0.4	-0.3	-0.5	0.2	0.2	0.4	0.6	0.3	0.3	0.7	0.0	0.7																						
27-Jul	0.5	0.7	0.6	0.8	0.7	0.6	0.5	0.1	0.5	0.1	-0.4	-0.4	-0.5	-0.6	-0.6	-0.2	-0.1	-0.2	-0.4	0.6	0.1	0.1	0.1	0.0	0.1	0.8																						
28-Jul	-0.3	0.2	0.6	0.3	0.0	0.0	0.1	0.0	0.3	0.3	0.4	0.1	0.0	0.1	-0.6	-0.2	0.1	-0.2	0.2	-0.1	-0.2	-0.3	-0.5	-0.1	0.0	0.6																						
29-Jul	0.0	-0.4	0.0	0.1	0.1	-0.1	0.1	0.1	-0.2	-0.4	-0.5	0.1	-0.1	-0.8	-0.5	-0.4	-0.4	-0.4	-1.1	-0.7	-0.3	0.0	0.1	-0.2	-0.2	0.1																						
30-Jul	-0.6	-0.5	-0.4	-0.4	-0.1	0.3	0.0	-0.4	-0.5	-0.5	-0.4	-0.3	-1.1	-1.2	-0.6	-0.3	-0.1	-0.2	-0.5	-0.2	0.0	0.1	0.0	0.1	-0.3	0.3																						
31-Jul	0.0	0.0	-0.1	0.1	0.5	0.5	0.7	0.4	0.7	0.6	1.1	0.1	0.1	0.0	0.2	0.2	-0.1	0.1	-0.3	-0.3	-0.1	0.0	0.0	-0.1	0.2	1.1																						
																								0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	-0.1	0.0	-0.1	-0.1	-0.3	-0.2	-0.2	-0.2	-0.3	-0.3	-0.2	-0.2	0.0	-0.1	0.0	Diurnal Average
																								1.0	0.8	1.1	0.9	1.0	0.9	1.0	0.9	0.9	0.8	1.1	1.3	1.4	1.0	1.2	1.1	1.4	0.7	0.5	0.7	0.6	0.8	0.6	1.0	Diurnal Maximum



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 4.4 km/h on Jul 3 11:00 Minimum Value: 0.2 km/h on Jul 30 22:00 Percentiles: P <sub>1</sub> = 0.3 P <sub>10</sub> = 0.6 Q <sub>1</sub> = 0.9 Median = 1.5 Q <sub>3</sub> = 2.1 P <sub>90</sub> = 2.7 P <sub>99</sub> = 3.7																								Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jul	1.0	0.9	1.1	0.8	0.9	1.2	1.8	1.4	1.6	1.7	1.7	0.7	1.4	1.2	1.5	2.0	1.0	0.6	0.7	0.4	0.3	0.2	0.2	0.4	2.0
2-Jul	0.7	0.7	0.7	0.9	0.8	1.1	1.1	1.2	1.1	1.3	1.4	2.1	2.2	2.3	2.1	2.6	2.1	2.1	1.8	1.3	0.9	1.2	1.2	1.4	2.6
3-Jul	1.9	2.0	1.3	1.6	2.0	1.9	1.9	3.0	3.2	3.9	4.4	4.3	3.7	3.8	4.1	4.0	3.5	2.5	2.2	0.9	0.9	0.7	1.2	1.7	4.4
4-Jul	1.0	1.4	2.3	2.5	2.5	2.8	2.0	1.3	0.8	1.6	1.4	2.3	2.5	1.9	1.1	1.0	0.7	0.4	1.0	1.7	2.3	3.5	3.6	2.7	3.6
5-Jul	2.5	2.0	2.2	1.2	0.5	1.2	1.0	1.5	1.9	2.2	2.6	2.3	2.5	2.5	2.2	2.0	1.9	1.2	0.8	0.6	0.7	0.6	0.8	1.1	2.6
6-Jul	1.7	1.0	1.3	1.4	1.5	1.8	1.8	1.7	1.7	2.3	2.9	3.2	3.0	3.2	3.1	3.9	3.6	4.0	3.1	3.8	3.1	1.5	1.5	1.4	4.0
7-Jul	1.5	0.8	0.6	0.4	0.5	0.7	1.1	1.2	1.6	2.0	1.4	1.5	1.6	1.6	1.7	2.1	1.8	2.5	2.1	1.4	0.9	1.1	1.4	1.5	2.5
8-Jul	1.5	1.4	1.7	2.1	2.3	2.6	2.7	3.0	2.8	3.1	2.8	2.3	2.1	2.1	2.1	2.1	2.1	2.0	2.3	4.2	2.3	1.6	0.9	0.8	4.2
9-Jul	1.7	0.9	0.8	1.0	1.2	1.2	0.7	1.1	1.6	1.9	1.6	1.0	0.9	1.2	1.1	1.7	1.9	2.6	2.8	2.4	1.9	1.5	1.7	1.2	2.8
10-Jul	0.5	0.4	0.9	1.6	1.2	1.7	1.6	1.3	1.5	1.9	2.1	2.0	2.2	2.1	1.9	1.9	1.6	1.3	0.8	0.7	0.6	0.7	0.5	0.5	2.2
11-Jul	1.0	0.8	1.0	0.8	1.3	2.3	2.9	2.5	1.3	2.3	2.3	3.2	2.4	2.8	2.1	1.6	0.9	1.3	1.3	1.2	0.9	0.9	0.7	0.5	3.2
12-Jul	0.4	0.7	1.4	1.0	0.7	1.0	0.9	0.7	1.1	1.8	1.0	1.4	1.7	1.9	2.1	1.8	1.6	1.1	1.2	0.8	1.0	2.8	1.7	0.9	2.8
13-Jul	0.3	0.7	0.8	0.8	0.8	1.0	0.9	1.1	1.4	1.7	1.3	1.4	2.2	2.5	1.9	1.6	1.5	1.3	0.7	1.0	1.0	1.4	1.6	0.9	2.5
14-Jul	1.3	1.8	1.7	1.9	1.8	2.0	1.3	1.5	1.7	1.7	1.7	1.9	2.1	1.9	2.9	0.7	0.7	1.2	1.2	1.4	1.6	1.6	1.3	0.9	2.9
15-Jul	0.9	1.1	1.2	1.2	1.2	1.8	1.6	1.9	1.6	1.5	1.7	1.8	2.2	1.3	1.2	1.6	2.2	1.9	1.4	0.8	0.8	0.4	0.2	0.6	2.2
16-Jul	0.9	0.6	0.4	0.6	0.6	0.9	0.8	0.5	1.1	1.8	2.3	2.0	2.4	2.3	2.1	2.7	2.9	2.0	3.2	1.5	1.0	1.5	1.0	1.0	3.2
17-Jul	1.7	2.5	2.1	1.7	1.2	1.8	2.4	3.3	3.5	3.2	3.6	3.6	3.7	3.2	3.0	3.4	2.2	3.0	2.2	1.3	0.3	0.3	0.2	0.4	3.7
18-Jul	0.7	0.5	0.5	0.5	0.9	1.1	1.4	1.8	1.8	1.9	1.8	1.9	1.9	2.6	2.3	2.1	2.7	3.8	3.5	3.2	3.1	1.9	2.2	1.8	3.8
19-Jul	2.5	2.4	2.2	1.7	2.4	1.9	2.0	1.8	2.7	3.1	2.6	3.1	2.6	2.7	2.8	3.2	2.1	1.6	2.9	1.0	0.5	0.5	0.6	0.5	3.2
20-Jul	0.4	0.6	0.4	0.3	0.7	0.7	1.2	1.2	1.4	1.5	1.9	1.9	1.9	1.8	1.8	1.7	1.7	1.7	1.2	1.2	1.1	1.2	2.0	2.1	2.1
21-Jul	2.3	2.2	2.3	1.8	1.2	1.0	1.0	1.0	0.9	1.1	1.6	1.3	1.2	1.4	2.1	2.0	2.0	1.8	1.3	1.0	0.4	0.5	0.4	0.4	2.3
22-Jul	0.4	0.6	0.3	0.8	0.9	0.8	1.0	1.4	1.3	1.4	1.9	1.7	2.1	1.9	1.7	2.2	1.8	2.0	2.3	2.2	2.2	2.4	1.9	1.1	2.4
23-Jul	0.9	1.0	0.6	0.9	1.0	0.7	0.6	1.3	1.5	1.6	1.6	1.3	1.6	1.6	1.3	1.2	1.2	1.0	0.9	0.5	0.7	0.5	0.8	0.4	1.6
24-Jul	0.5	0.4	0.5	0.3	0.6	0.9	1.2	1.4	1.7	1.7	2.0	2.2	2.0	1.8	1.9	2.0	2.0	1.6	1.0	0.5	0.6	0.9	1.6	1.8	2.2
25-Jul	1.4	1.1	1.7	2.7	1.5	0.7	0.7	1.0	1.5	1.8	2.3	2.7	2.8	2.6	2.9	2.8	1.3	1.1	0.8	0.4	0.3	0.5	0.7	0.9	2.9
26-Jul	1.0	1.0	0.7	0.8	0.7	0.7	0.8	0.9	1.6	1.5	1.8	2.2	2.2	2.8	1.8	1.6	2.9	1.0	0.7	0.9	2.1	1.9	1.7	0.9	2.9
27-Jul	0.9	1.1	1.2	0.8	0.7	1.1	1.2	1.2	1.6	1.9	2.3	2.6	2.8	2.6	2.0	0.8	0.7	1.1	1.6	0.8	0.7	0.4	0.7	0.8	2.8
28-Jul	0.9	0.5	0.8	0.8	0.5	0.4	0.7	1.0	1.6	1.6	1.7	2.0	2.0	1.5	2.1	1.2	1.2	2.2	0.8	0.9	0.5	0.7	2.6	2.1	2.6
29-Jul	0.9	0.8	0.4	0.6	0.5	0.5	1.5	1.9	1.5	1.8	1.8	2.0	2.2	2.9	2.3	2.8	1.8	2.0	3.3	2.2	0.9	0.4	0.3	0.8	3.3
30-Jul	1.3	0.8	1.8	2.0	1.9	2.1	2.5	2.0	2.3	2.0	2.1	2.7	3.7	3.5	2.8	2.4	2.1	1.5	2.6	1.5	0.4	0.2	0.2	0.6	3.7
31-Jul	0.8	0.2	0.4	0.3	0.6	1.6	1.5	1.6	1.6	1.6	1.6	1.4	1.2	2.5	2.0	1.0	1.7	1.4	0.9	0.8	0.7	0.3	0.5	1.0	2.5
Diurnal Maximum																									



Maximum Value: 2.7 km/h on Jul 11 08:00		Maximum Daily Average: 0.9 km/h on Jul 11		Hours in Service: 744																						
Minimum Value: -1.6 km/h on Jul 3 15:00		Minimum Daily Average: -0.4 km/h on Jul 19		Hours of Data: 744																						
Maximum Diurnal Average: 0.3 km/h at hour 11		Minimum Diurnal Average: -0.1 km/h at hour 14		Hours of Missing Data: 0																						
Monthly Average: 0.13 km/h		Percentiles: P <sub>1</sub> = -1.2 P <sub>10</sub> = -0.4 Q <sub>1</sub> = -0.2 Median = 0.1 Q <sub>3</sub> = 0.4 P <sub>90</sub> = 0.8 P <sub>99</sub> = 1.9		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-Jul	0.3	0.3	0.5	0.0	-0.4	0.2	-0.2	0.2	0.5	-0.5	-0.3	-0.1	0.9	-0.3	-0.4	1.0	-0.3	-0.1	0.1	0.2	0.3	0.4	0.1	0.1	0.1	1.0
2-Jul	0.4	0.4	0.1	0.2	0.0	-0.1	0.0	0.2	0.0	0.0	0.3	0.0	0.1	-0.9	0.3	-0.3	0.0	1.3	1.1	0.6	0.6	0.7	1.3	1.2	0.3	1.3
3-Jul	2.6	0.8	-0.7	-0.7	0.1	0.0	0.3	0.9	0.4	0.9	-0.1	-1.5	-0.4	-1.2	-1.6	-1.1	-0.8	-0.8	-1.0	-0.5	-0.5	-0.2	-0.1	0.2	-0.2	2.6
4-Jul	-0.5	0.3	0.4	-0.2	-0.1	-0.3	0.0	-0.2	0.1	1.0	0.6	0.1	-0.2	0.1	-0.3	0.6	0.0	-0.1	-0.2	-0.4	-0.6	0.2	0.0	0.1	0.0	1.0
5-Jul	0.3	0.2	0.3	-0.1	0.0	-0.2	-0.1	0.5	0.5	-0.3	0.2	-0.5	-0.9	-0.2	-0.6	0.7	-0.2	-0.2	0.5	-0.1	0.3	0.1	-0.1	0.4	0.0	0.7
6-Jul	0.0	0.1	0.2	0.3	-0.1	-0.1	0.2	0.2	0.2	0.2	0.1	-0.3	0.4	-0.5	0.4	-0.9	0.3	-0.1	0.6	0.2	-0.4	-0.7	-1.2	-1.1	-0.1	0.6
7-Jul	-0.7	-0.4	-0.5	-0.5	-0.1	-0.3	-0.2	0.5	-0.1	0.4	0.0	1.0	0.1	0.1	0.4	-0.4	-0.4	-0.5	0.3	0.4	0.5	0.9	0.6	1.1	0.1	1.1
8-Jul	0.0	-1.1	0.5	0.9	0.8	1.0	0.7	1.6	0.9	1.1	2.0	1.0	0.2	-0.3	0.3	0.2	0.7	0.4	-0.7	-1.4	-0.5	-1.4	-0.4	-0.3	0.3	2.0
9-Jul	-0.1	0.2	-0.1	0.0	-0.1	0.1	-0.3	-0.3	0.1	0.2	0.1	-0.2	-0.1	0.1	0.0	0.6	0.1	0.5	0.3	0.4	0.1	0.2	0.0	-0.2	0.1	0.6
10-Jul	-0.2	-0.1	0.1	0.0	0.2	0.2	0.2	0.4	-0.1	0.1	-0.1	-0.2	0.5	0.4	0.4	-0.3	0.3	-0.2	-0.1	0.0	0.0	0.1	-0.1	0.2	0.1	0.5
11-Jul	0.5	0.8	0.6	0.4	1.2	2.0	2.3	2.7	0.3	1.1	1.4	2.4	0.9	1.5	1.3	0.4	0.2	0.1	0.1	0.3	-0.1	0.0	-0.3	0.3	0.9	2.7
12-Jul	0.5	0.4	-0.4	-0.3	0.0	-0.1	0.4	0.3	0.4	-0.2	0.1	-0.2	-0.4	-0.3	-0.4	-0.2	0.3	-0.1	-0.1	0.0	-0.1	0.9	0.5	-0.1	0.0	0.9
13-Jul	0.0	0.3	0.2	-0.4	0.5	0.4	0.3	0.5	0.5	0.2	0.0	0.4	-0.2	-0.4	-0.1	-0.4	0.3	0.0	0.7	0.3	0.6	0.9	1.0	0.3	0.3	1.0
14-Jul	1.1	1.1	1.3	1.3	1.4	1.2	0.6	0.5	0.7	0.7	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.9	0.2	0.4	0.3	0.0	0.2	0.5	1.4
15-Jul	0.2	0.0	0.2	0.6	0.4	1.6	0.8	1.2	-0.2	-0.2	0.2	0.1	0.2	-0.2	-0.3	0.8	0.6	0.6	0.5	0.5	0.1	0.1	0.0	0.0	0.3	1.6
16-Jul	-0.2	0.0	0.2	0.0	0.3	0.2	0.1	0.0	-0.3	-0.2	-0.9	0.2	0.6	0.3	0.3	0.9	0.8	1.2	0.3	-0.8	-0.4	0.1	-0.4	-0.5	0.1	1.2
17-Jul	-0.4	-0.9	-0.7	0.1	0.0	0.1	0.3	-0.5	0.3	-0.1	-0.4	0.3	-0.5	-0.5	-0.7	-0.2	-0.7	-0.2	0.2	0.0	0.0	-0.1	0.0	0.0	-0.2	0.3
18-Jul	-0.3	-0.2	-0.1	0.3	-0.2	0.4	-0.1	0.1	0.3	0.2	0.1	0.8	0.9	0.9	0.5	0.6	0.0	-0.6	-1.4	-0.8	-1.2	-0.3	-0.6	-0.5	0.0	0.9
19-Jul	-0.1	-0.4	0.2	0.1	-0.7	-0.7	-0.6	-0.7	-0.9	-1.2	-0.7	-0.4	1.0	-0.6	-0.5	-1.2	-0.3	-0.4	-0.3	-0.3	-0.1	-0.1	-0.3	-0.3	-0.4	1.0
20-Jul	-0.3	-0.3	0.1	0.0	-0.1	-0.3	-0.2	0.2	-0.1	0.2	0.3	0.4	0.5	-0.1	0.2	0.3	0.6	0.9	0.6	1.3	1.6	0.9	0.9	0.9	0.4	1.6
21-Jul	1.3	0.6	1.6	1.9	0.7	0.6	0.7	-0.5	0.1	0.3	0.1	0.4	0.4	0.9	0.0	-0.2	0.1	-0.4	0.2	0.1	-0.1	0.1	0.2	0.3	0.4	1.9
22-Jul	0.1	0.1	-0.1	0.0	0.1	-0.1	0.0	-0.2	-0.2	0.0	2.1	0.2	0.0	0.2	-0.4	-0.6	-1.1	-0.9	-0.6	-0.6	-0.2	-0.1	0.0	0.4	-0.1	2.1
23-Jul	-0.4	-0.1	-0.3	-0.3	-0.3	-0.7	-0.3	-0.2	-0.2	-0.2	0.4	-0.3	-0.6	-0.5	-0.1	0.2	0.2	-0.3	-0.2	0.0	-0.5	0.5	0.1	0.1	-0.2	0.5
24-Jul	-0.1	0.1	0.2	0.1	0.4	0.2	0.3	0.1	0.3	0.3	0.4	0.6	0.5	0.3	0.8	0.9	0.5	0.1	0.2	0.2	0.4	1.2	1.6	1.4	0.5	1.6
25-Jul	1.1	0.6	0.9	0.2	0.0	0.0	0.1	0.2	0.0	0.5	0.2	0.1	0.4	-0.3	0.3	-0.2	0.1	-0.2	0.1	0.1	0.2	-0.2	-0.2	-0.2	0.2	1.1
26-Jul	0.1	-0.2	0.0	-0.3	-0.1	-0.1	-0.1	-0.2	0.8	0.2	1.5	0.5	0.1	-0.2	0.0	-0.1	0.1	0.1	0.6	0.7	1.8	1.3	0.0	-0.1	0.3	1.8
27-Jul	-0.1	-0.2	0.1	-0.1	-0.1	0.2	0.4	0.0	0.3	0.5	-0.2	-0.4	-0.1	-0.3	-0.2	-0.1	0.0	-0.2	-0.4	0.3	0.3	0.2	0.4	0.8	0.0	0.8
28-Jul	0.0	-0.1	0.0	0.0	0.0	0.0	0.3	-0.2	0.3	0.0	0.9	0.7	0.3	-0.2	-0.6	-0.1	0.2	-0.1	0.3	0.1	0.1	-0.2	0.0	0.2	0.1	0.9
29-Jul	0.2	-0.1	0.0	0.0	0.1	-0.1	0.5	0.9	0.1	0.0	-0.1	0.3	0.0	-0.1	-0.2	-0.1	-0.1	-0.4	-0.4	-0.5	-0.3	0.0	0.0	-0.2	0.0	0.9
30-Jul	-0.4	-0.5	0.6	0.9	1.0	1.8	1.6	0.5	-0.1	-0.2	-0.2	-0.2	-0.8	-1.0	-0.1	-0.1	0.0	-0.2	0.1	0.0	0.1	0.1	0.0	-0.1	0.1	1.8
31-Jul	0.3	0.4	0.1	0.5	0.6	0.6	0.6	0.3	0.3	0.2	1.1	-0.1	0.3	0.6	0.8	0.3	0.9	0.7	0.1	0.0	-0.2	-0.1	-0.2	0.8	0.4	1.1
																								Diurnal Average		
																								Diurnal Maximum		



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 4.3 km/h on Jul 30 13:00 Minimum Value: 0.3 km/h on Jul 4 18:00 Percentiles: P <sub>1</sub> = 0.4 P <sub>10</sub> = 0.7 Q <sub>1</sub> = 1.1 Median = 1.6 Q <sub>3</sub> = 2.2 P <sub>90</sub> = 2.7 P <sub>99</sub> = 3.8																							Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0		
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jul	1.3	1.7	1.5	1.4	1.1	1.3	2.1	1.6	1.8	1.9	1.3	0.8	1.6	1.0	1.4	2.3	1.0	0.4	0.4	0.5	0.4	0.5	0.5	0.8	2.3
2-Jul	1.1	0.9	0.9	1.5	1.1	1.2	1.2	1.3	1.2	1.2	1.3	2.6	2.5	2.6	2.4	2.4	2.7	2.8	2.7	1.6	1.3	1.3	2.1	2.7	2.8
3-Jul	2.6	2.8	1.7	1.6	1.6	1.9	1.9	3.2	3.1	3.9	3.7	4.0	3.8	3.8	3.9	4.0	3.3	2.5	1.9	1.2	0.8	1.2	1.4	2.0	4.0
4-Jul	1.8	1.8	1.9	2.2	2.3	2.6	2.5	1.8	1.4	1.9	1.9	2.7	2.4	1.9	0.9	1.4	0.8	0.3	0.7	1.6	2.1	3.1	3.4	2.7	3.4
5-Jul	2.5	1.9	2.1	1.7	0.4	1.0	1.1	1.8	2.5	2.4	2.9	2.9	2.4	2.8	2.8	2.6	2.4	1.8	1.1	0.8	0.9	1.0	1.2	1.6	2.9
6-Jul	2.0	1.1	1.2	1.1	1.2	1.2	1.7	1.6	1.3	2.4	3.6	3.5	3.4	3.2	3.6	3.5	3.6	3.4	2.9	3.7	3.1	1.7	1.5	1.8	3.7
7-Jul	1.7	1.2	0.8	1.0	0.5	0.7	1.1	1.4	2.1	2.3	1.7	1.9	1.8	2.0	2.4	2.5	2.0	2.4	2.2	1.6	0.9	1.0	1.6	1.8	2.5
8-Jul	1.6	1.4	1.6	1.7	1.9	1.9	2.0	2.2	2.0	2.1	2.6	2.3	1.7	2.1	2.2	2.4	2.4	2.2	2.2	3.8	1.9	1.6	1.5	1.4	3.8
9-Jul	2.0	1.6	1.0	1.4	1.4	1.3	0.6	1.1	1.9	2.4	1.8	1.3	0.8	0.6	1.4	1.7	2.0	2.6	3.1	2.7	1.8	1.7	1.7	1.6	3.1
10-Jul	0.9	0.6	0.9	1.3	1.2	1.4	2.1	1.7	1.7	2.5	2.4	2.5	2.9	3.0	2.5	2.1	1.9	1.8	1.2	0.4	0.8	1.4	0.9	1.0	3.0
11-Jul	1.9	1.5	1.6	1.3	1.2	1.8	2.2	1.8	1.7	2.2	2.5	2.5	2.7	2.1	1.6	1.3	1.2	2.0	2.3	2.0	1.7	1.2	0.9	0.7	2.7
12-Jul	0.7	1.1	1.1	0.7	0.6	0.6	0.9	0.9	1.2	1.2	1.1	1.9	1.6	1.3	1.3	1.8	1.9	0.8	0.7	0.4	0.7	2.8	1.9	0.8	2.8
13-Jul	0.4	0.6	0.9	1.0	1.0	1.3	1.0	0.8	1.1	1.5	1.2	1.3	1.9	2.3	2.3	2.1	1.9	1.9	1.0	1.0	1.1	1.6	1.6	1.5	2.3
14-Jul	1.4	1.3	1.3	1.6	1.8	2.1	1.3	1.6	1.3	1.4	1.7	2.4	2.8	2.4	2.5	0.5	0.5	0.7	1.2	1.5	1.6	2.0	1.7	1.4	2.8
15-Jul	1.2	1.7	1.7	1.5	1.9	2.3	2.1	1.9	1.5	1.7	1.9	2.6	3.1	1.3	1.6	2.5	2.8	2.3	1.7	0.7	1.0	0.6	0.7	0.8	3.1
16-Jul	1.0	0.8	0.4	0.5	0.5	0.9	0.5	0.4	1.0	1.7	2.3	2.4	2.3	2.5	2.5	2.9	2.3	1.8	2.5	1.6	1.2	1.7	1.5	1.2	2.9
17-Jul	1.3	1.7	1.3	1.2	1.5	1.4	2.1	2.6	2.7	2.9	2.7	3.3	3.2	2.4	2.9	3.1	2.3	2.5	1.9	1.4	0.5	0.7	0.4	0.6	3.3
18-Jul	1.0	0.8	1.0	1.1	1.4	1.6	1.5	1.5	1.3	1.3	2.1	2.2	2.3	2.4	2.3	2.1	2.2	3.4	3.1	2.8	2.5	1.8	1.8	1.7	3.4
19-Jul	2.6	2.3	2.2	1.8	1.5	1.6	1.9	1.9	2.6	2.7	2.7	3.3	3.4	3.1	3.2	3.2	2.3	1.7	2.8	1.0	0.8	0.5	1.0	0.7	3.4
20-Jul	0.6	0.7	0.7	0.5	1.1	0.9	1.1	1.0	1.5	1.8	1.9	2.2	1.6	2.1	2.3	1.8	2.0	1.8	1.3	1.2	1.2	1.5	1.7	1.7	2.3
21-Jul	2.1	1.8	2.0	1.6	1.2	0.9	1.4	1.3	1.2	1.4	1.8	1.5	1.4	2.1	2.0	1.8	2.0	1.5	1.3	1.1	0.7	0.5	0.5	1.0	2.1
22-Jul	0.6	0.8	0.7	0.8	1.1	1.1	1.1	1.4	1.3	1.5	2.1	2.2	2.7	2.6	2.3	2.6	1.9	1.7	1.9	2.0	1.7	2.0	1.7	1.6	2.7
23-Jul	0.9	1.1	1.0	1.2	1.0	1.0	1.0	1.4	1.7	1.9	2.0	1.6	1.4	1.7	1.7	1.3	1.1	1.1	1.2	0.8	1.0	0.8	0.9	0.7	2.0
24-Jul	1.0	0.6	0.6	0.5	0.7	0.7	0.9	0.9	1.1	1.0	1.8	2.3	2.4	2.0	2.4	2.7	2.5	1.9	1.5	0.7	1.0	1.7	1.4	1.7	2.7
25-Jul	1.7	1.2	1.7	2.5	1.8	0.6	0.6	1.1	1.7	2.6	2.8	3.2	3.2	3.1	3.5	2.9	1.2	0.5	0.7	0.5	0.6	0.6	0.8	0.6	3.5
26-Jul	1.1	1.0	0.8	0.6	0.8	0.7	0.8	0.7	1.7	2.1	2.1	3.0	3.2	3.0	2.0	2.1	3.1	1.3	0.8	0.9	2.2	2.0	1.7	1.2	3.2
27-Jul	1.3	1.4	1.0	0.9	0.9	1.1	1.5	1.3	1.7	2.5	2.6	3.4	3.3	2.9	2.3	0.7	0.6	1.0	1.5	0.8	1.0	1.0	1.4	1.4	3.4
28-Jul	1.7	1.1	0.8	1.1	1.0	0.8	0.7	1.1	1.6	1.9	2.1	2.5	2.9	1.9	2.1	1.3	1.2	1.8	1.0	0.8	0.6	0.8	2.3	2.7	2.9
29-Jul	1.4	1.1	0.6	0.9	1.1	0.6	1.6	2.1	1.8	2.2	1.9	2.7	2.7	2.5	2.6	2.9	2.4	1.5	3.5	1.9	1.1	0.7	0.7	1.2	3.5
30-Jul	1.3	1.1	1.6	1.7	1.7	2.2	2.5	2.4	2.4	2.3	2.2	3.3	4.3	3.8	3.2	2.4	2.0	1.4	2.6	1.8	0.7	0.4	0.6	1.2	4.3
31-Jul	1.0	0.6	0.8	0.5	0.7	1.4	1.5	0.9	0.7	0.7	1.8	0.8	1.1	2.8	2.6	1.7	2.2	2.0	1.2	0.8	1.0	0.4	0.6	1.2	2.8
Diurnal Maximum																									



Maximum Value: 6.6 km/h on Jul 3 01:00																	Maximum Daily Average: 1.4 km/h on Jul 11																	Hours in Service: 744	
Minimum Value: -1.5 km/h on Jul 3 15:00																	Minimum Daily Average: -0.1 km/h on Jul 19																	Hours of Data: 740	
Maximum Diurnal Average: 1.0 km/h at hour 24																	Minimum Diurnal Average: 0.2 km/h at hour 14																	Hours of Missing Data: 4	
Monthly Average: 0.44 km/h																	Percentiles: P <sub>1</sub> = -1.0 P <sub>10</sub> = -0.3 Q <sub>1</sub> = 0.0 Median = 0.3 Q <sub>3</sub> = 0.7 P <sub>90</sub> = 1.3 P <sub>99</sub> = 2.9																	Hours of Calibration: 0	
																																		Percent Operational Time: 99.5	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24											
1-Jul	0.5	0.6	1.2	0.3	-0.2	0.4	0.6	0.4	0.8	-0.4	0.0	0.3	1.9	-0.1	0.1	1.2	-0.4	0.0	0.3	0.5	0.8	0.5	0.5	0.8	0.4	1.9									
2-Jul	1.3	0.6	1.1	1.2	0.3	0.5	0.8	0.8	0.3	-0.1	0.2	0.5	-0.1	-0.8	0.7	0.0	0.5	2.1	2.0	1.6	2.0	3.1	4.6	4.8	1.2	4.8									
3-Jul	6.6	3.7	-0.3	-0.3	0.5	0.2	0.6	1.7	0.8	2.1	0.9	-1.5	0.1	-1.0	-1.5	-1.0	-0.2	-0.5	-0.8	-0.4	-0.4	-0.1	0.4	1.2	0.4	6.6									
4-Jul	0.3	1.0	0.8	-0.2	0.2	0.1	0.6	-0.2	0.5	1.4	1.4	0.7	0.3	0.7	0.1	0.5	0.2	-0.1	-0.1	0.0	-0.4	0.7	0.3	0.4	0.4	1.4									
5-Jul	0.3	0.5	0.4	0.1	0.2	0.0	-0.2	0.3	0.4	-0.2	0.5	-0.5	-1.3	-0.1	-0.9	1.0	0.1	-0.3	0.3	-0.1	1.1	1.4	2.5	3.3	0.4	3.3									
6-Jul	0.3	0.5	0.3	0.3	0.1	0.8	0.6	0.5	0.3	0.2	0.9	0.1	0.7	0.0	0.8	-0.4	0.6	0.3	0.6	0.5	-0.2	-0.3	-1.3	-1.4	0.2	0.9									
7-Jul	-0.8	-0.3	-0.4	-0.1	0.2	-0.1	-0.2	-0.1	0.2	0.7	0.2	1.6	0.3	0.4	0.6	0.0	0.2	-0.1	0.9	0.9	1.3	1.9	3.9	6.4	0.7	6.4									
8-Jul	1.5	-0.6	0.0	0.2	-0.1	0.3	0.0	0.9	0.2	0.7	1.3	0.5	-0.1	1.7	0.5	0.2	0.4	0.8	-0.4	-1.3	0.4	-1.0	-0.1	-0.1	0.2	1.7									
9-Jul	0.3	0.4	0.1	0.6	0.1	0.1	-0.2	-0.2	0.3	0.3	0.2	-0.1	-0.1	0.3	0.5	1.2	0.2	0.6	0.7	0.5	0.3	0.1	0.2	0.0	0.3	1.2									
10-Jul	-0.1	-0.1	0.3	0.4	0.4	0.4	0.3	0.9	-0.1	0.6	-0.5	-0.5	0.1	0.2	1.0	-1.0	0.1	-0.2	0.1	0.1	0.4	1.0	0.2	0.8	0.2	1.0									
11-Jul	1.4	2.1	1.6	1.0	2.0	2.7	2.8	2.8	0.7	1.1	1.5	2.7	1.0	1.9	1.5	0.8	0.8	1.0	1.0	1.6	0.2	0.9	0.5	0.8	1.4	2.8									
12-Jul	1.0	1.1	0.1	0.0	0.3	0.0	0.7	0.9	UO	UO	0.6	-0.2	-0.5	-0.2	-0.5	0.0	0.5	0.2	0.1	0.2	-0.1	2.0	UO	UO	0.3	2.0									
13-Jul	0.0	0.5	0.5	-0.1	1.2	1.6	0.5	0.5	0.7	0.3	0.0	0.4	0.2	0.2	0.2	-0.1	0.3	0.3	1.0	0.5	1.9	1.5	1.3	0.6	0.6	1.9									
14-Jul	1.3	0.8	0.9	0.9	1.1	1.4	0.5	0.4	0.7	0.5	0.1	-0.2	-0.2	0.4	0.4	0.0	0.4	0.3	1.0	0.5	1.1	0.3	0.5	0.7	0.6	1.4									
15-Jul	0.7	0.6	1.1	0.6	1.2	2.6	1.4	2.0	0.2	0.2	0.1	0.2	0.4	-0.1	-0.3	1.2	1.4	1.3	1.1	1.1	0.5	0.2	0.6	0.7	0.8	2.6									
16-Jul	0.0	0.4	0.2	0.4	0.2	0.3	0.0	0.0	-0.5	-0.2	-0.4	0.3	1.4	0.4	0.5	1.4	1.2	1.7	0.6	-1.0	-0.4	0.3	-0.2	-0.1	0.3	1.7									
17-Jul	-0.3	-0.7	-0.3	-0.1	0.5	0.6	0.5	-0.1	0.3	0.4	-0.3	0.9	-0.6	-0.4	-0.6	0.0	-0.2	-0.3	0.3	0.3	0.3	0.2	0.0	0.2	0.0	0.9									
18-Jul	0.3	-0.2	0.0	0.6	0.0	1.6	0.5	0.5	0.5	0.1	0.6	1.5	1.9	1.6	1.2	1.0	0.7	0.1	-0.8	-0.3	-0.9	0.1	-0.3	-0.3	0.4	1.9									
19-Jul	0.5	0.3	0.6	0.9	-0.5	-0.4	-0.3	-0.6	-0.6	-0.9	-0.7	-0.3	1.5	-0.3	0.3	-0.3	-0.6	-0.4	-0.2	-0.1	0.0	0.0	-0.3	-0.5	-0.1	1.5									
20-Jul	-0.2	-0.1	0.2	0.1	0.5	0.0	-0.2	0.6	0.3	0.3	0.1	-0.1	0.3	-0.1	0.0	0.3	0.3	0.8	0.6	2.0	2.9	2.3	1.4	1.6	0.6	2.9									
21-Jul	2.2	0.7	2.1	1.5	0.8	1.0	0.8	0.0	1.1	0.6	0.3	0.7	0.7	1.1	0.2	-0.4	0.5	-0.3	0.3	0.5	0.1	0.3	0.7	0.7	0.7	2.2									
22-Jul	0.3	0.4	0.1	0.1	0.6	0.1	0.5	-0.2	-0.3	-0.3	3.1	0.2	0.0	0.5	-0.1	-0.9	-1.2	-0.6	-0.2	-0.3	0.4	0.4	0.3	1.0	0.2	3.1									
23-Jul	-0.1	0.2	0.0	0.3	0.0	-0.5	0.0	-0.3	-0.4	0.0	0.5	0.0	-0.8	-0.6	0.3	0.8	1.0	-0.1	0.1	0.1	-0.2	1.2	0.4	0.2	0.1	1.2									
24-Jul	0.5	0.3	0.0	0.3	0.3	0.4	0.4	0.2	0.2	0.1	0.0	0.4	0.0	0.0	0.7	0.6	1.0	0.3	0.2	0.4	0.3	0.5	1.3	1.2	0.4	1.3									
25-Jul	2.0	0.9	1.3	1.0	0.0	0.0	0.3	0.4	0.6	1.1	0.4	0.3	0.6	0.0	0.8	-0.1	0.2	-0.4	-0.1	0.1	0.5	0.0	0.0	0.0	0.4	2.0									
26-Jul	0.5	0.1	0.6	0.0	-0.1	0.1	0.1	-0.2	0.6	-0.1	1.8	0.2	0.5	0.1	0.3	-0.1	0.7	0.8	0.4	0.3	1.2	1.2	0.0	0.4	0.4	1.8									
27-Jul	0.7	0.1	0.6	0.5	0.6	1.0	0.5	0.4	0.4	1.2	0.0	-0.1	0.2	-0.3	-0.1	-0.1	-0.1	0.0	-0.3	0.3	1.1	0.9	2.0	2.0	0.5	2.0									
28-Jul	0.4	-0.2	0.4	1.1	0.6	0.2	0.6	0.1	0.1	0.0	0.8	0.7	0.0	-1.0	-0.7	0.0	0.2	0.4	0.5	0.5	0.3	-0.1	0.4	1.1	0.3	1.1									
29-Jul	0.6	0.9	0.4	0.4	0.3	0.0	1.1	1.2	0.5	0.6	0.1	0.2	0.6	0.3	0.2	0.0	0.4	-0.4	0.3	-0.1	-0.2	0.2	0.3	0.1	0.3	1.2									
30-Jul	0.3	-0.1	1.4	1.2	1.1	2.4	2.9	1.0	0.4	0.1	-0.3	-0.8	-0.5	-0.9	-0.2	-0.1	-0.1	0.1	0.5	0.4	0.5	0.5	0.6	1.0	0.5	2.9									
31-Jul	0.3	0.4	0.5	0.1	0.3	0.7	0.7	0.3	0.3	0.3	0.6	0.1	0.6	1.4	2.1	0.4	1.2	1.8	0.2	0.2	0.2	-0.1	0.0	1.3	0.6	2.1									
																								Diurnal Average											
																								Diurnal Maximum											
UO - Unstable Operation																																			



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 5.9 km/h on Jul 8 20:00	Hours of Data: 740
Minimum Value: 0.3 km/h on Jul 16 05:00	Hours of Missing Data: 4
Percentiles: P <sub>1</sub> = 0.4 P <sub>10</sub> = 0.7 Q <sub>1</sub> = 1.0 Median = 1.5 Q <sub>3</sub> = 2.2 P <sub>90</sub> = 2.8 P <sub>99</sub> = 4.0	Hours of Calibration: 0
	Percent Operational Time: 99.5

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jul	1.3	1.9	2.1	1.5	1.1	1.2	2.0	1.4	1.3	1.7	1.3	1.0	1.2	0.9	1.4	2.3	1.0	0.6	0.5	0.6	0.4	0.6	0.7	0.7	2.3
2-Jul	0.9	0.7	0.6	1.4	0.9	1.3	1.4	1.6	1.5	1.6	1.5	2.8	2.6	2.6	2.4	2.0	2.8	3.0	2.5	1.2	0.7	0.8	1.4	2.0	3.0
3-Jul	1.8	4.1	1.4	1.1	1.2	1.7	1.8	2.7	2.5	3.4	3.4	4.1	4.4	4.0	3.9	4.0	3.5	2.7	1.7	0.8	1.0	1.0	1.5	2.3	4.4
4-Jul	2.2	2.1	1.8	1.9	2.0	2.5	2.7	2.1	1.9	1.9	2.1	2.4	2.0	2.2	0.9	1.5	1.0	0.5	0.6	1.7	2.1	3.0	3.7	2.7	3.7
5-Jul	2.4	2.3	2.8	2.1	0.6	0.6	1.0	1.7	2.5	2.6	3.5	3.3	2.6	3.6	3.4	3.2	2.7	2.0	1.4	0.8	0.9	0.7	1.1	1.9	3.6
6-Jul	2.4	1.6	0.7	0.7	0.6	1.2	1.2	1.5	1.3	2.4	3.7	3.6	3.4	3.2	3.5	2.9	3.6	3.4	3.2	3.5	2.8	1.4	1.5	1.9	3.7
7-Jul	1.7	1.4	1.0	1.1	0.9	0.6	1.1	1.3	2.1	2.0	1.4	1.8	1.9	2.2	2.6	2.5	2.4	2.4	2.3	1.5	0.6	0.4	1.4	1.4	2.6
8-Jul	1.8	1.1	1.1	1.0	1.1	1.2	1.2	1.6	1.6	2.0	2.3	1.9	1.1	2.0	1.7	1.8	1.9	2.3	2.5	5.9	3.6	1.2	1.4	1.2	5.9
9-Jul	2.2	1.7	1.1	1.4	1.5	1.2	0.6	1.0	1.9	2.6	2.0	1.5	0.9	0.6	1.4	1.6	2.2	2.7	3.3	2.8	2.0	1.7	1.3	1.4	3.3
10-Jul	0.8	0.7	0.7	1.0	0.8	1.2	2.3	1.7	1.7	2.8	2.3	2.6	2.9	3.3	2.9	1.7	2.0	2.0	1.3	0.4	0.6	1.3	1.4	1.7	3.3
11-Jul	1.7	1.3	1.8	1.5	1.6	2.0	2.3	2.1	1.7	2.3	2.7	2.6	2.6	2.0	1.6	1.4	1.2	1.9	2.1	2.6	1.8	1.6	1.0	0.8	2.7
12-Jul	0.8	1.0	0.8	0.5	0.8	0.7	1.2	1.3	UO	UO	1.3	1.7	1.6	1.7	1.5	1.7	2.0	0.8	0.6	0.5	0.8	2.5	UO	UO	2.5
13-Jul	0.4	0.6	0.8	0.9	0.9	1.6	1.0	0.7	1.0	1.2	1.2	1.3	1.3	2.1	2.1	2.1	1.8	2.0	1.1	0.7	0.8	2.0	2.1	1.5	2.1
14-Jul	1.3	1.3	1.4	1.6	1.3	1.9	1.1	1.0	1.3	1.3	1.5	2.4	2.9	2.7	2.2	0.4	0.4	0.6	1.2	1.0	1.2	2.1	1.7	1.2	2.9
15-Jul	0.9	1.3	2.1	1.3	1.4	2.0	1.9	1.5	1.2	1.4	2.1	2.9	3.6	1.3	1.7	2.8	2.7	2.3	1.7	0.7	1.3	0.7	1.0	1.0	3.6
16-Jul	0.8	0.6	0.4	0.5	0.3	0.6	0.3	0.4	1.2	2.0	2.2	2.6	2.7	3.1	2.9	3.1	2.2	1.7	2.6	2.0	1.9	2.4	1.6	1.5	3.1
17-Jul	1.6	1.0	0.9	1.8	1.5	1.5	2.3	2.9	3.1	2.8	2.7	3.8	3.4	2.7	3.0	3.2	2.3	2.6	1.8	1.3	0.5	0.7	0.4	0.5	3.8
18-Jul	0.5	0.4	0.8	1.2	1.6	1.6	1.8	1.3	1.4	0.9	2.2	1.9	2.0	1.8	1.5	1.9	1.5	2.6	2.1	2.1	2.1	2.2	1.5	1.3	2.6
19-Jul	2.7	2.5	2.2	2.0	1.1	1.3	1.7	2.0	2.6	2.4	2.7	3.4	3.9	3.5	3.8	5.6	2.3	1.6	2.5	1.1	0.9	0.7	1.1	0.8	5.6
20-Jul	0.6	0.8	0.7	0.6	0.7	0.9	1.3	1.1	1.5	1.8	1.6	1.9	1.7	2.5	2.3	2.1	2.1	1.9	1.4	1.1	1.1	1.4	1.9	2.0	2.5
21-Jul	2.2	1.9	2.3	1.5	1.1	1.1	1.3	1.2	1.3	1.6	1.8	1.6	1.3	2.0	2.3	2.0	2.3	1.6	1.4	1.2	0.8	0.6	0.8	1.1	2.3
22-Jul	0.4	1.0	1.0	0.7	1.4	0.9	1.1	1.3	1.2	1.4	1.8	2.6	2.9	2.8	2.5	2.7	2.1	1.5	1.4	1.9	1.5	1.4	1.4	2.0	2.9
23-Jul	1.0	1.1	1.1	1.4	1.1	1.1	1.1	1.5	1.2	1.9	2.1	1.7	1.5	1.8	2.0	1.4	1.4	1.0	1.4	0.9	1.3	0.6	1.3	0.7	2.1
24-Jul	1.0	0.6	0.4	0.4	0.4	0.5	0.5	0.4	0.6	0.9	1.6	2.6	2.6	2.2	2.8	2.8	2.4	1.8	1.5	0.9	0.5	1.4	1.8	1.4	2.8
25-Jul	1.8	1.2	1.4	1.8	1.8	0.5	0.6	0.9	1.6	2.6	2.6	3.1	3.3	3.1	3.7	2.5	1.2	0.6	0.5	0.5	0.8	0.6	1.0	0.9	3.7
26-Jul	1.4	1.2	0.7	0.7	0.9	0.9	1.0	0.8	1.6	2.2	2.5	3.1	3.8	3.1	2.1	2.8	3.4	1.7	0.6	0.6	1.4	1.7	1.4	1.3	3.8
27-Jul	1.3	1.3	1.2	0.8	0.9	1.2	1.5	1.2	1.7	2.9	2.4	3.2	2.9	3.0	2.5	0.8	0.7	1.0	1.3	0.7	1.2	0.9	1.3	1.3	3.2
28-Jul	2.1	1.5	0.6	1.3	1.3	0.8	0.7	0.9	1.4	1.7	1.8	2.4	3.0	1.7	2.5	1.6	1.4	1.8	1.2	1.0	0.8	0.9	2.2	2.9	3.0
29-Jul	1.7	1.4	0.9	0.9	1.6	0.9	1.6	1.9	1.8	2.0	1.8	2.7	2.9	2.3	2.6	2.6	3.2	1.3	3.9	2.0	1.2	0.7	0.9	1.6	3.9
30-Jul	1.6	1.3	1.4	1.5	1.1	1.5	2.2	2.2	2.3	2.4	2.1	3.9	4.8	4.2	3.3	2.6	1.7	1.5	2.4	1.5	0.5	0.4	0.8	1.2	4.8
31-Jul	1.1	0.6	0.8	0.6	0.7	0.6	1.0	0.6	0.5	0.4	1.4	0.7	1.2	3.1	2.6	1.8	2.2	2.4	1.3	1.0	1.0	0.4	0.4	1.2	3.1
	2.7	4.1	2.8	2.1	2.0	2.5	2.7	2.9	3.1	3.4	3.7	4.1	4.8	4.2	3.9	5.6	3.6	3.4	3.9	5.9	3.6	3.0	3.7	2.9	
	Diurnal Maximum																								

UO - Unstable Operation





## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS 4  
BUFFALO VIEWPOINT  
JULY 2015**

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

August 26, 2015



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BUFFALO VIEWPOINT (AMS 4)  
 JULY 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	709	35	35	100.00	13	0	2	0
H2S (ppb) Average	709	35	35	100.00	4	0	1	0
THC (ppm) Average	709	35	35	100.00	3.6	-	2.6	-
Temperature (C) Average	744	0	0	100.00	31.2	-	22.8	-
Relative Humidity (%) Average	744	0	0	100.00	99	-	86	-
Wind Speed 10 m (km/h) Average	743	0	1	99.87	35	-	18	-
Wind Direction 10 m (deg) Average	743	0	1	99.87	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BUFFALO VIEWPOINT (AMS 4)  
 JULY 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	709	0.7	1	-	0	0	0	0	0	2	13
H2S (ppb) Average	709	0.5	0	-	0	0	0	0	1	1	4
THC (ppm) Average	709	2.26	0.2	-	2	2.1	2.1	2.2	2.3	2.5	3.6
Temperature 2 m (C) Average	744	18.06	4.6	-	6.9	12.2	14.5	17.9	21.7	24	31.2
Relative Humidity (%) Average	744	69.3	19	-	24	42	55	73	85	91	99
Wind Speed 10 m (km/h) Average	743	9.5	5	-	1	4	6	8	12	17	35
Wind Direction 10 m (deg) Average	743	-	-	-	-	-	-	-	-	-	-

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

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
Wind Speed, Wind Direction	07 Jul 2015 11:00	07 Jul 2015 11:00	1	Annual maintenance and calibration

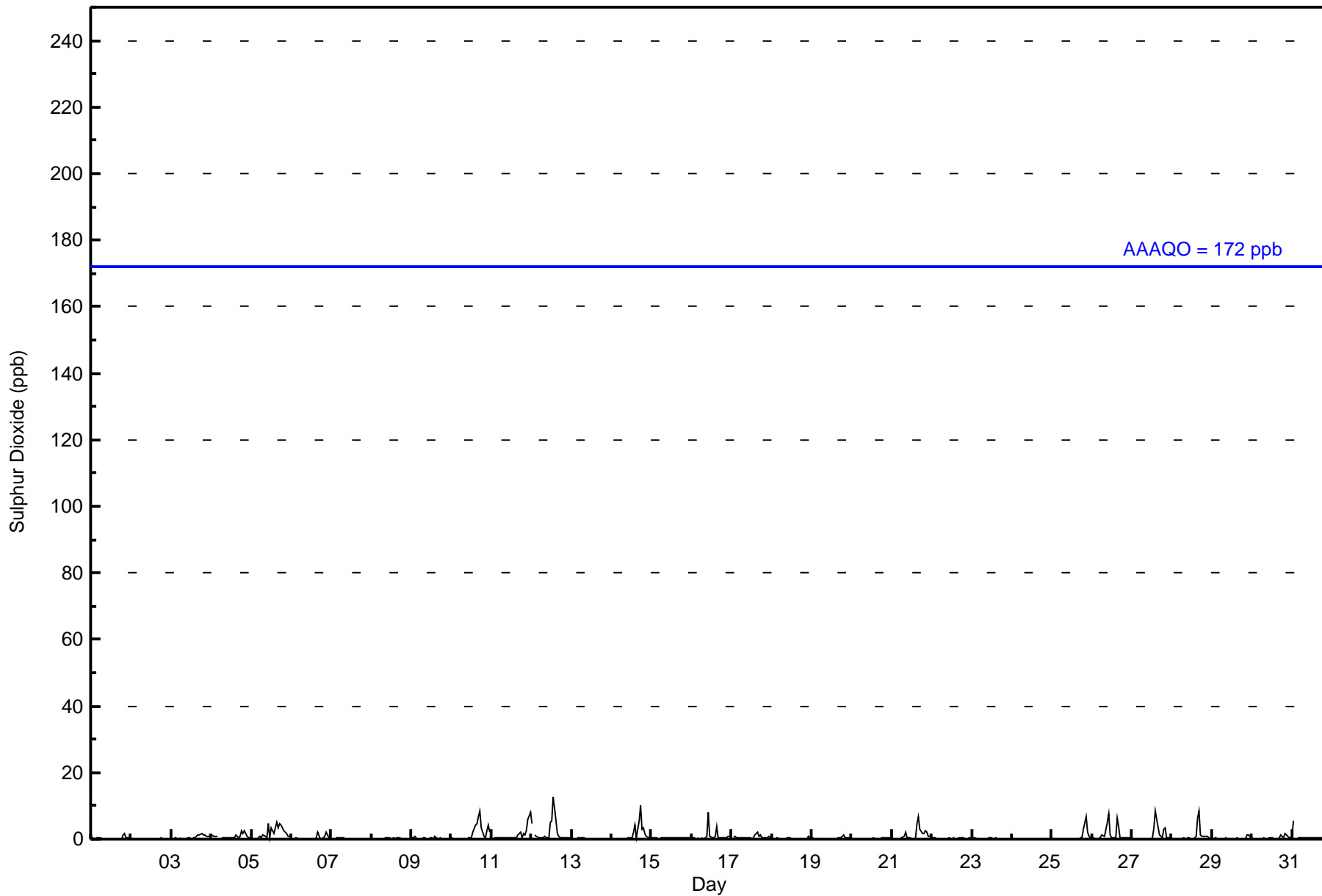


Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 13 ppb on Jul 12 14:00	Maximum Daily Average: 2.1 ppb on Jul 12		Hours of Data:	709
Minimum Value: 0 ppb on Jul 2 06:00	Minimum Daily Average: 0.1 ppb on Jul 24		Hours of Missing Data:	35
Maximum Diurnal Average: 1.5 ppb at hour 16	Minimum Diurnal Average: 0.2 ppb at hour 6		Hours of Calibration:	35
Monthly Average: 0.7 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 O <sub>3</sub> = 0 P <sub>90</sub> = 2 P <sub>99</sub> = 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-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	0	0	0.3	2
2-Jul	0	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-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0.6	1
4-Jul	1	1	1	1	1	Z	1	0	0	0	0	0	0	0	0	1	1	1	2	2	3	1	0	0	0.8	3
5-Jul	Z	0	0	0	1	1	0	1	1	0	5	0	3	2	3	5	3	5	4	3	2	1	1	1	1.9	5
6-Jul	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	2	0	0	0.4	2
7-Jul	0	0	Z	0	0	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.1	0
8-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
9-Jul	0	0	1	0	Z	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.3	1
10-Jul	0	0	0	0	0	Z	0	0	0	0	1	0	0	2	4	5	7	9	3	1	0	3	4	2	1.9	9
11-Jul	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	2	1	3	6	8	1.2	8
12-Jul	4	Z	1	1	1	1	0	1	1	1	1	5	5	13	9	2	1	1	0	0	0	0	0	0	2.1	13
13-Jul	0	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-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	2	4	1	6	10	3	3	2	1	1	0	1.5	10
15-Jul	0	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-Jul	0	0	0	0	0	Z	0	0	0	1	8	1	1	0	1	4	1	0	0	0	0	0	1	1	0.9	8
17-Jul	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	1	2	1	1	0	0	0	1	1	1	0.6	2
18-Jul	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
19-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0.2	1
20-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
21-Jul	0	0	0	0	Z	0	0	1	2	0	0	0	0	0	5	7	3	2	2	3	2	1	1	1	1.3	7
22-Jul	0	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-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
24-Jul	0	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-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	7	2	1	0	0.6	7
26-Jul	0	0	0	Z	0	0	1	1	3	5	8	1	0	0	7	4	0	0	0	0	0	0	0	0	1.5	8
27-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	4	8	6	1	1	0	3	3	1	0	0	0	1.3	8
28-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	1	6	8	1	1	1	1	1	1	0	0	1.0	8
29-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0.3	1
30-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	1	0	0	0.4	2
31-Jul	1	5	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	5

0.5	0.5	0.3	0.3	0.2	0.2	0.2	0.3	0.4	0.4	0.9	0.4	0.5	0.9	1.2	1.5	1.5	1.3	0.8	0.8	1.0	0.8	0.7	0.6	Diurnal Average
4	5	1	1	1	1	1	1	3	5	8	5	5	13	9	7	8	10	4	3	7	3	6	8	Diurnal Maximum

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





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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Buffalo Viewpoint - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	708	99.86	99.86
11 - 20	1	0.14	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744





**Wood Buffalo Environmental Association  
Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Buffalo Viewpoint - July 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	80	36	11	10	7	16	56	93	48	32	54	62	74	51	55	23	708
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	80	36	11	10	7	16	56	93	48	32	54	62	74	52	55	23	709

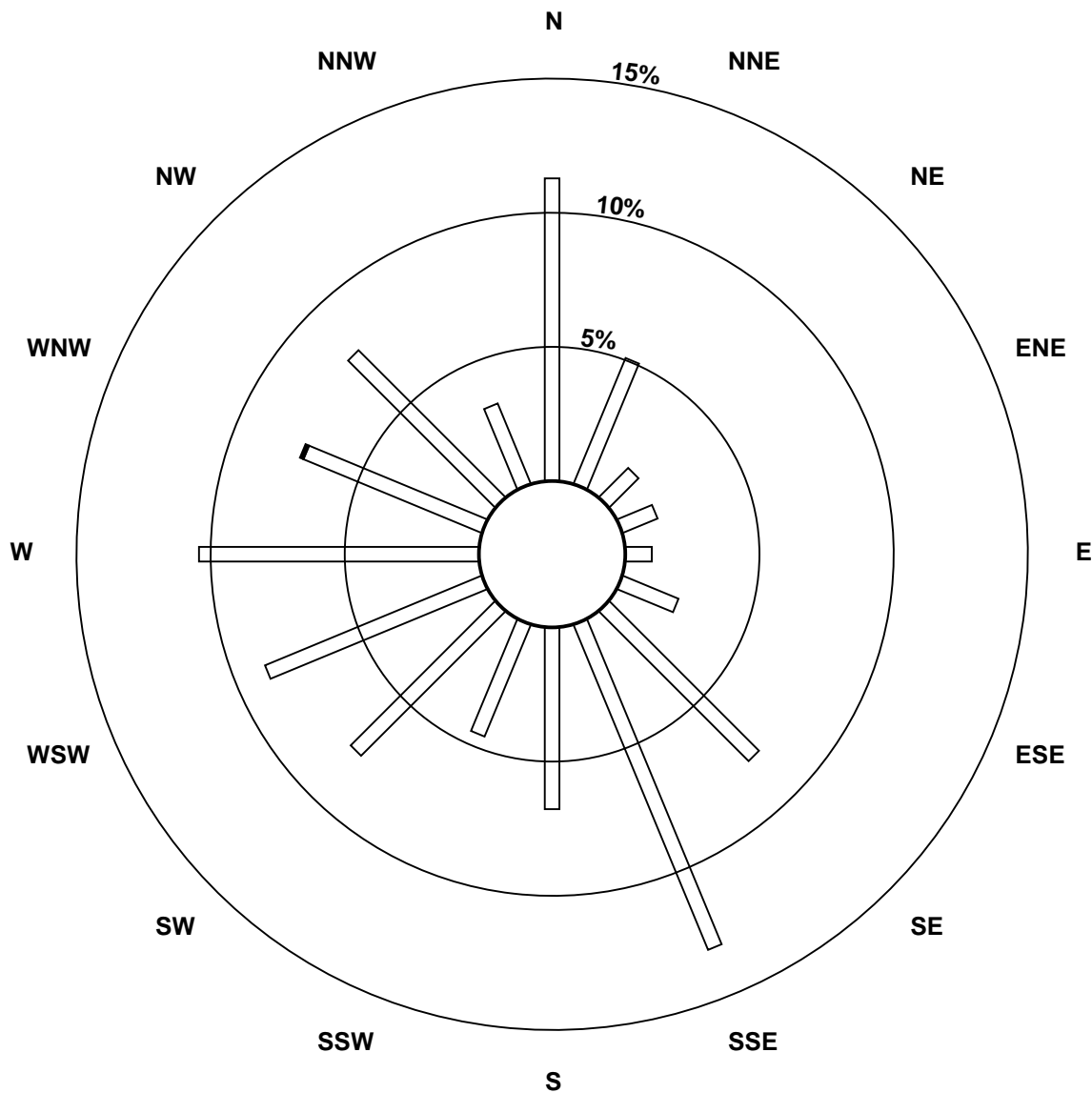
Total Number of Valid Hours: 709

Total Number of Hours: 744

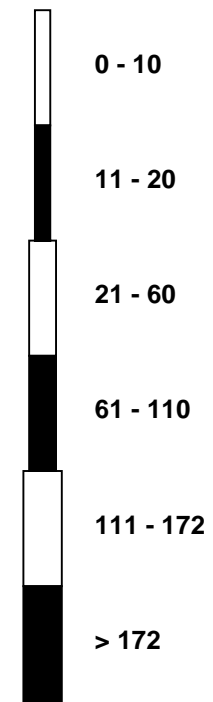


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

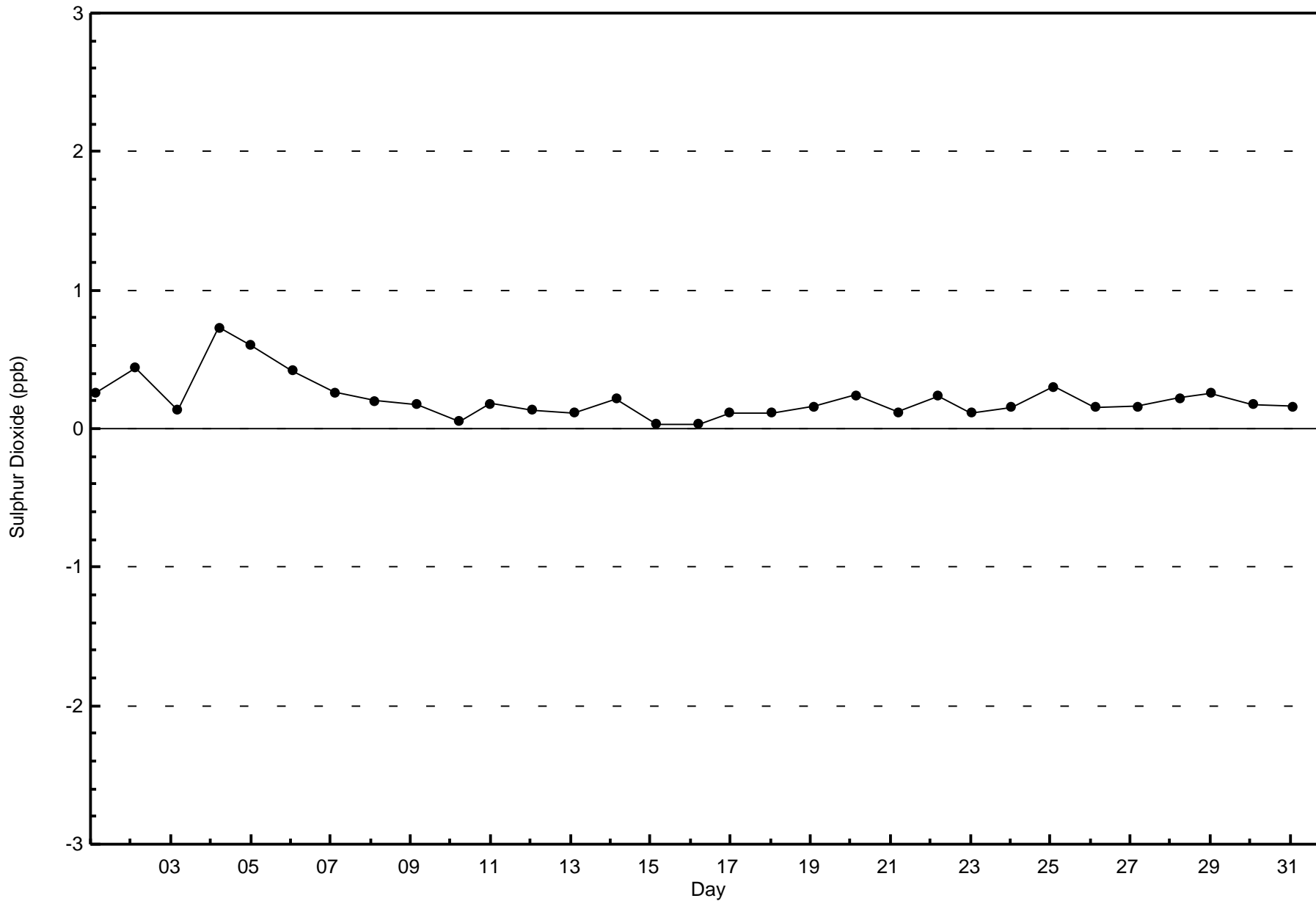
Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Buffalo Viewpoint (AMS 4)

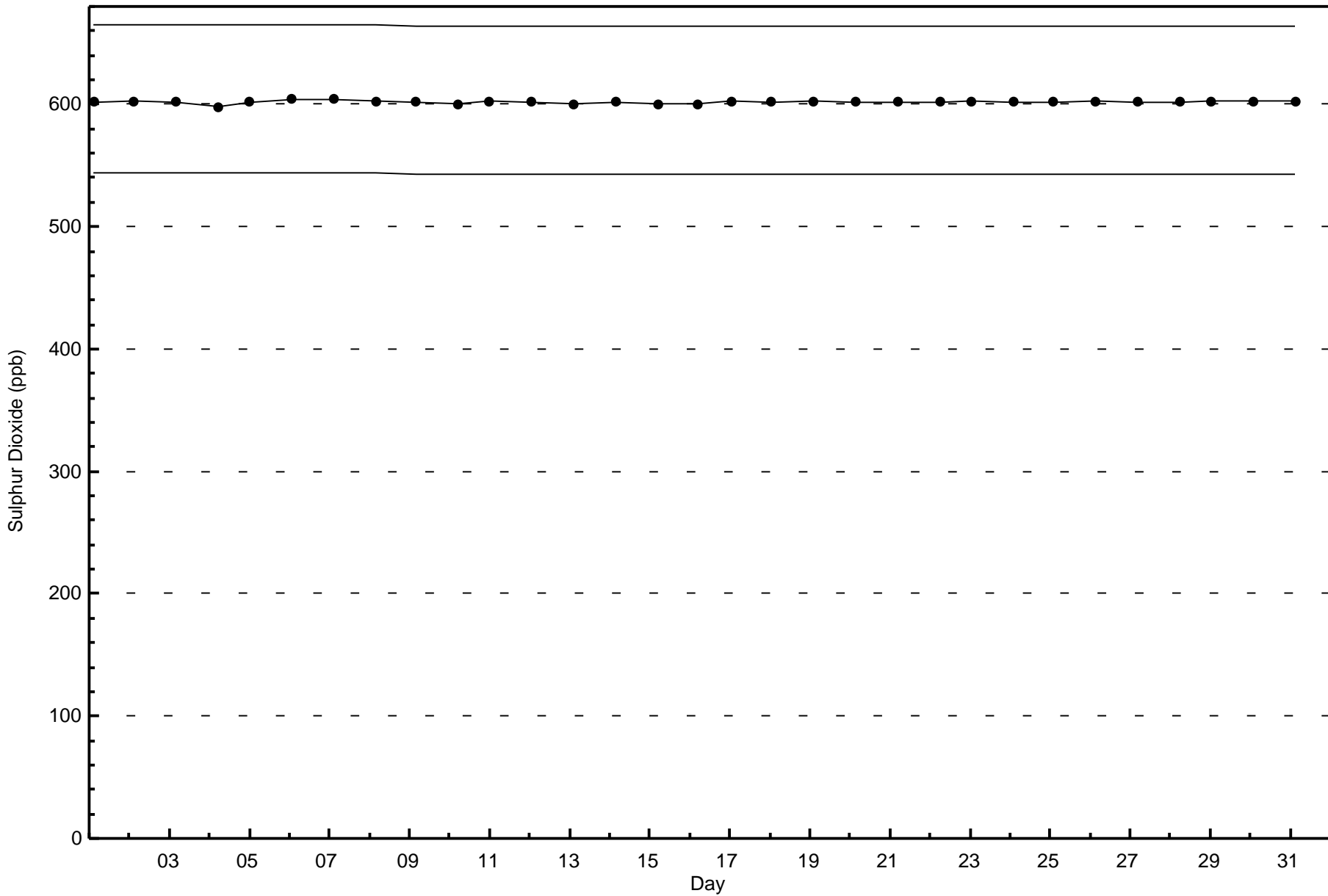


Classes (ppb)



Total Number of Valid Hours: 709





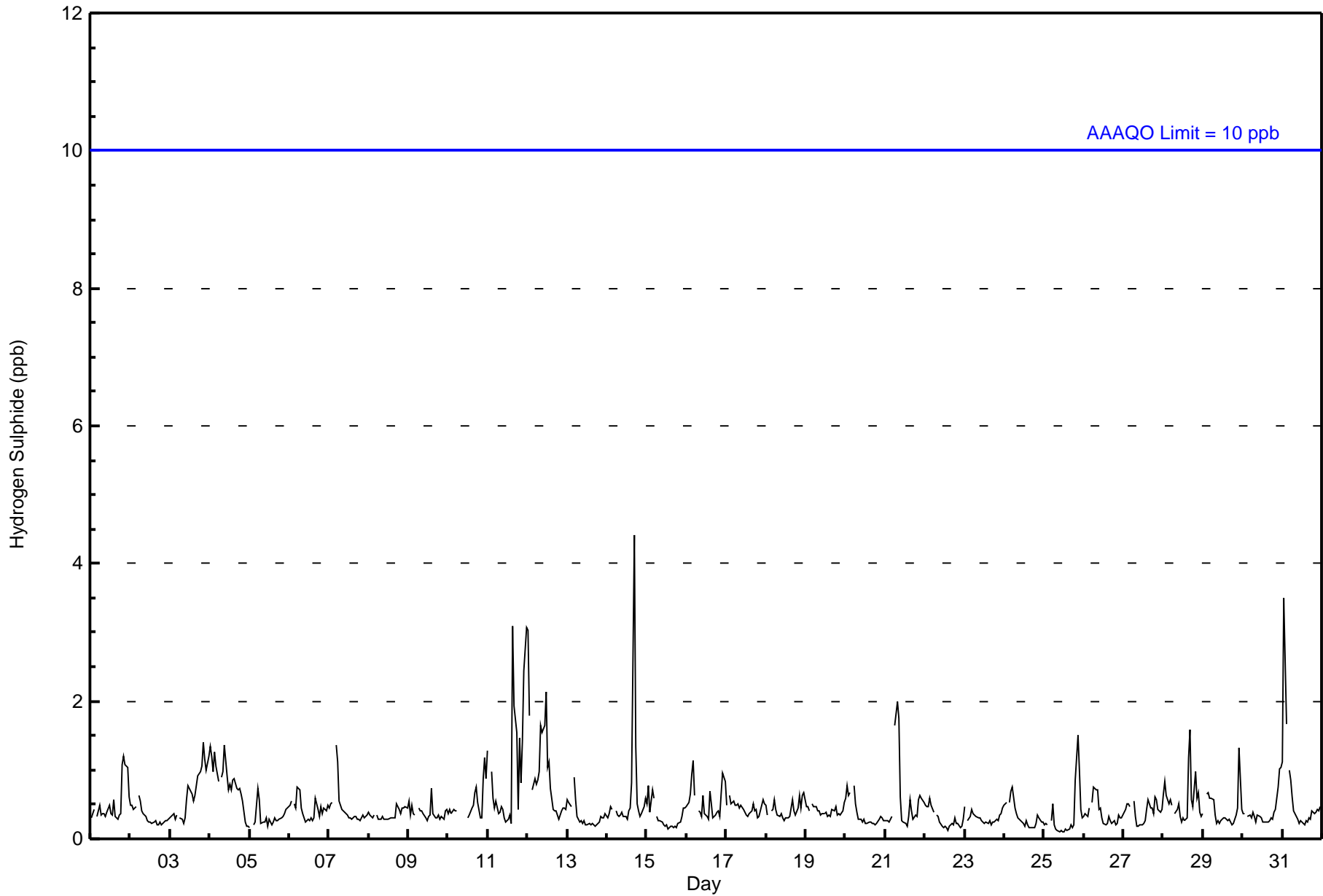


Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 4 ppb on Jul 14 17:00	Maximum Daily Average: 1.0 ppb on Jul 11		Hours of Data:	709
Minimum Value: 0 ppb on Jul 25 13:00	Minimum Daily Average: 0.3 ppb on Jul 22		Hours of Missing Data:	35
Maximum Diurnal Average: 0.7 ppb at hour 2	Minimum Diurnal Average: 0.3 ppb at hour 13		Hours of Calibration:	35
Monthly Average: 0.5 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 1 P <sub>90</sub> = 1 P <sub>99</sub> = 2		Percent Operational Time:	100.0

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

0.6	0.7	0.5	0.5	0.6	0.6	0.5	0.5	0.4	0.4	0.4	0.4	0.3	0.3	0.4	0.5	0.6	0.4	0.4	0.5	0.5	0.5	0.6	0.6	Diurnal Average
3	3	2	1	1	1	2	2	2	2	2	2	1	1	1	3	4	2	1	1	1	1	2	3	Diurnal Maximum

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





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Buffalo Viewpoint - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	704	99.29	99.29
3 - 4	5	0.71	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Buffalo Viewpoint - July 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	79	32	10	9	8	14	57	89	50	33	56	61	72	55	55	23	703
3 - 4	0	0	1	1	0	1	0	2	0	0	0	0	0	0	0	0	5
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	79	32	11	10	8	15	57	91	50	33	56	61	72	55	55	23	708

Total Number of Valid Hours: 708

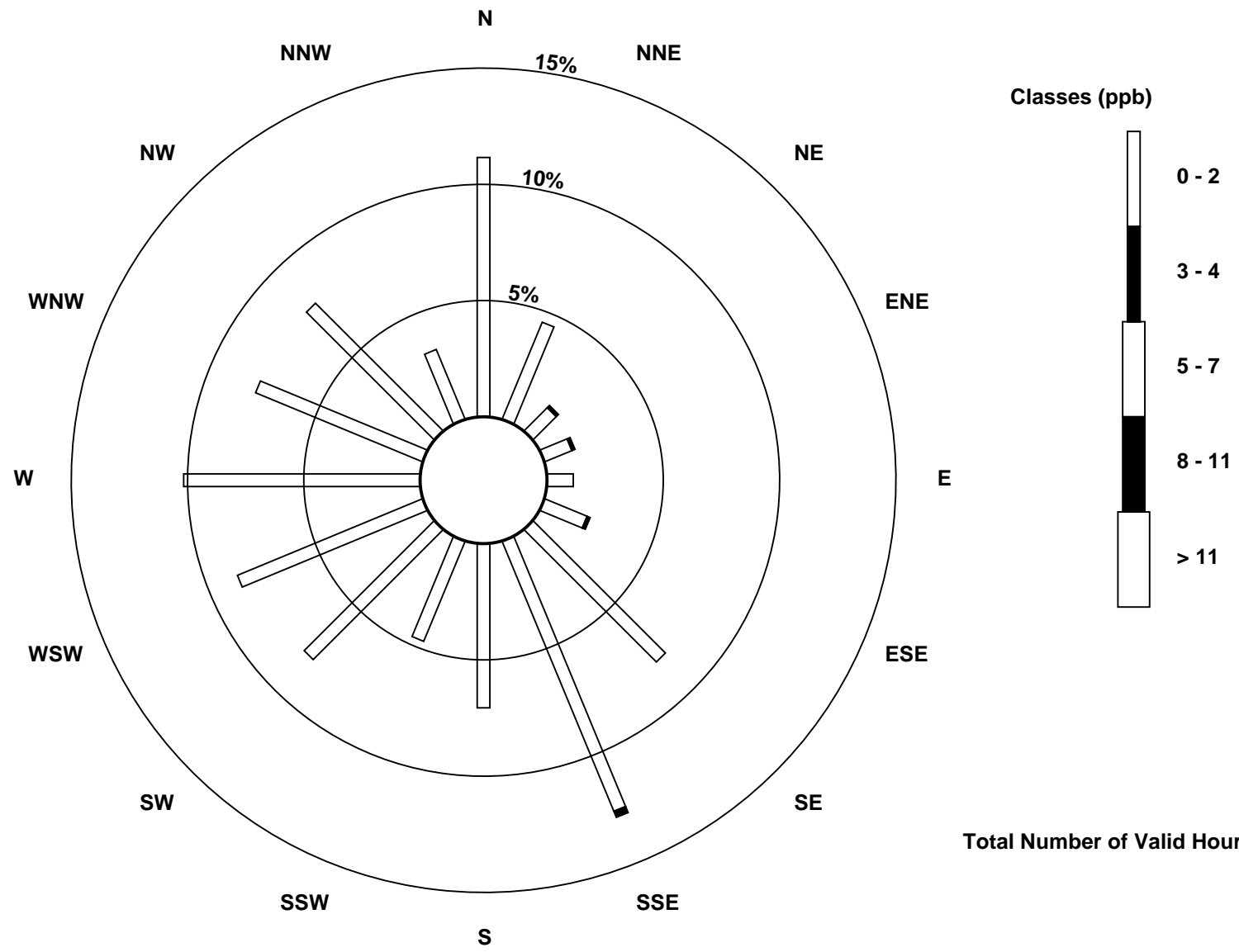
Total Number of Hours: 744

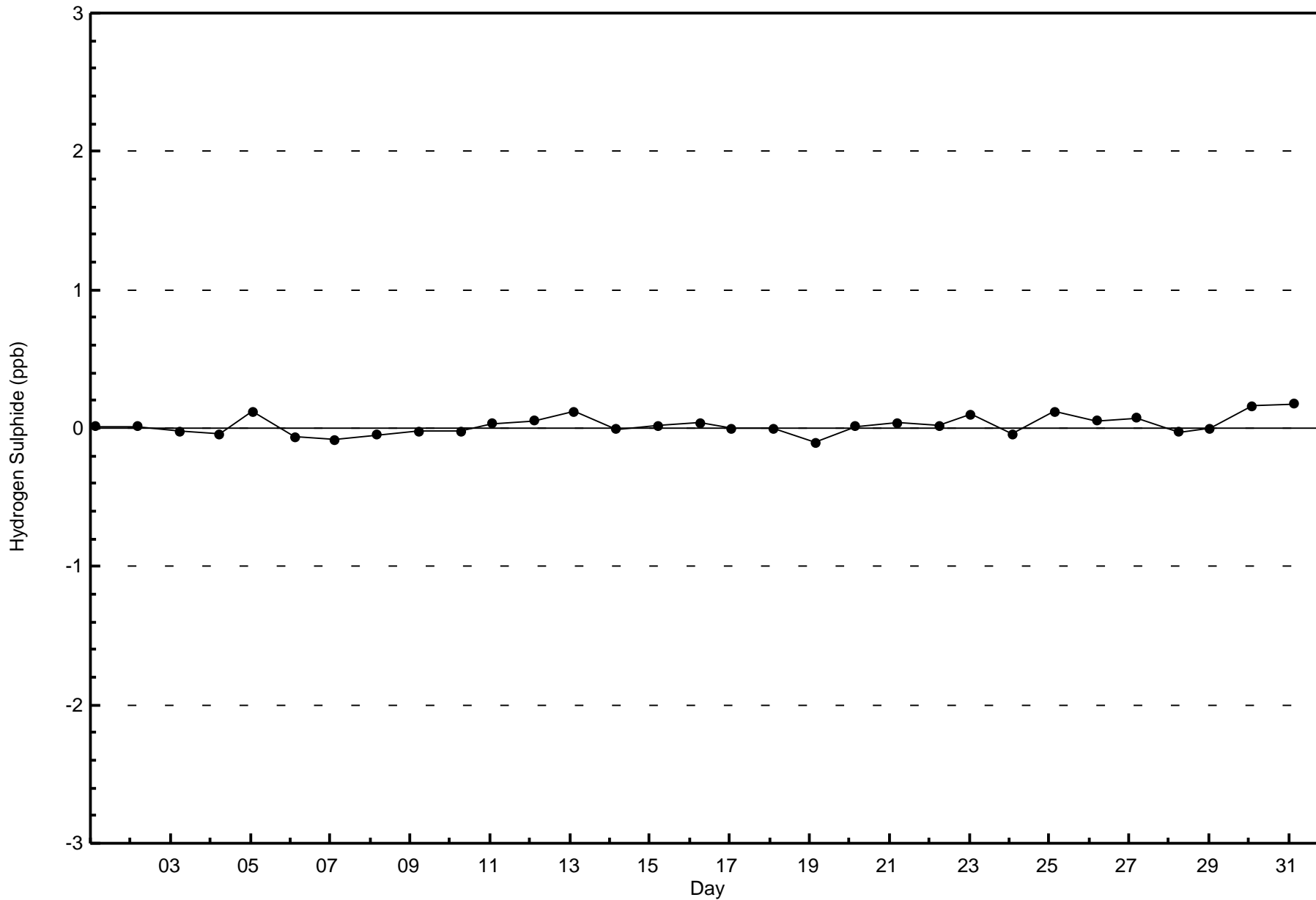


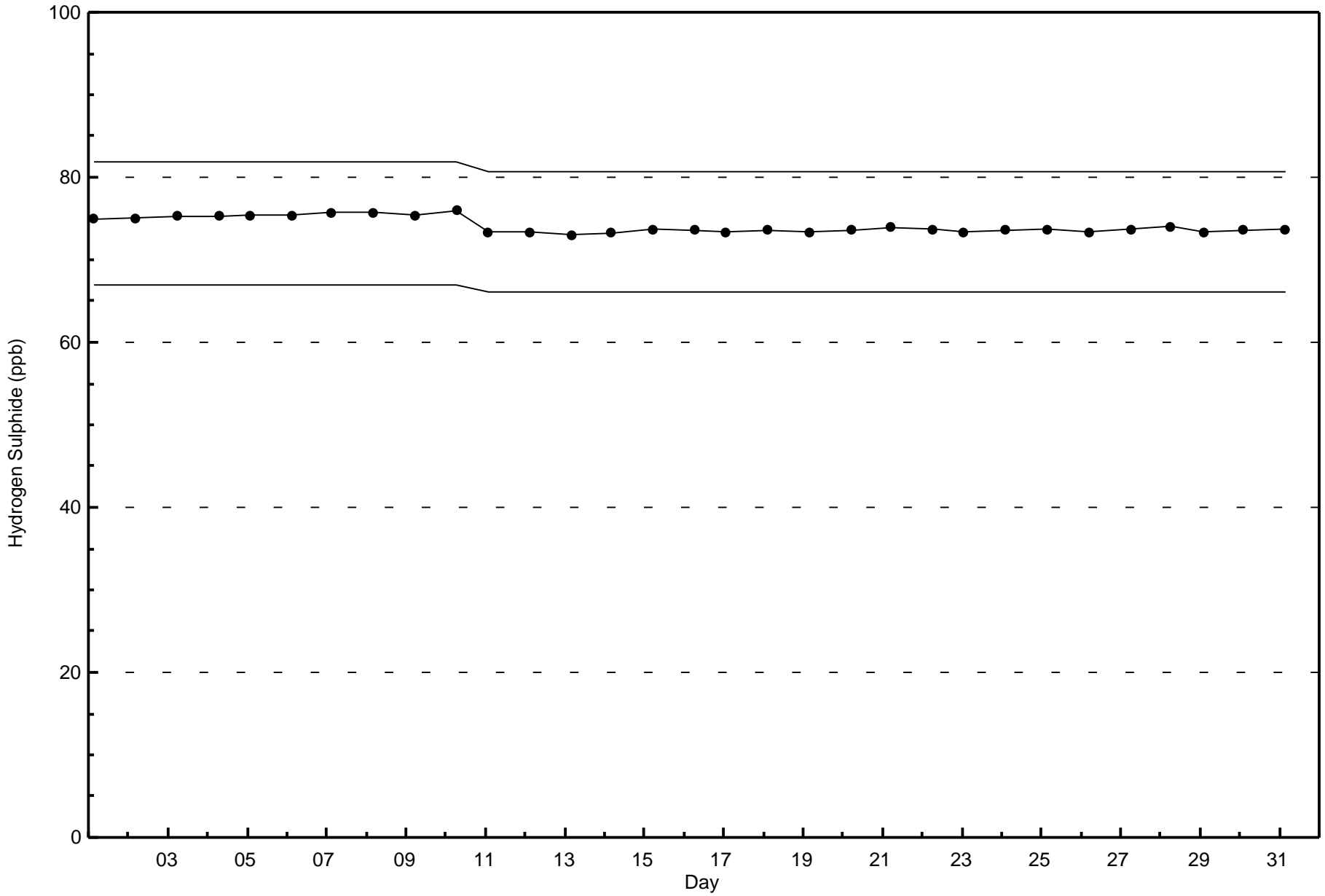


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Buffalo Viewpoint (AMS 4)

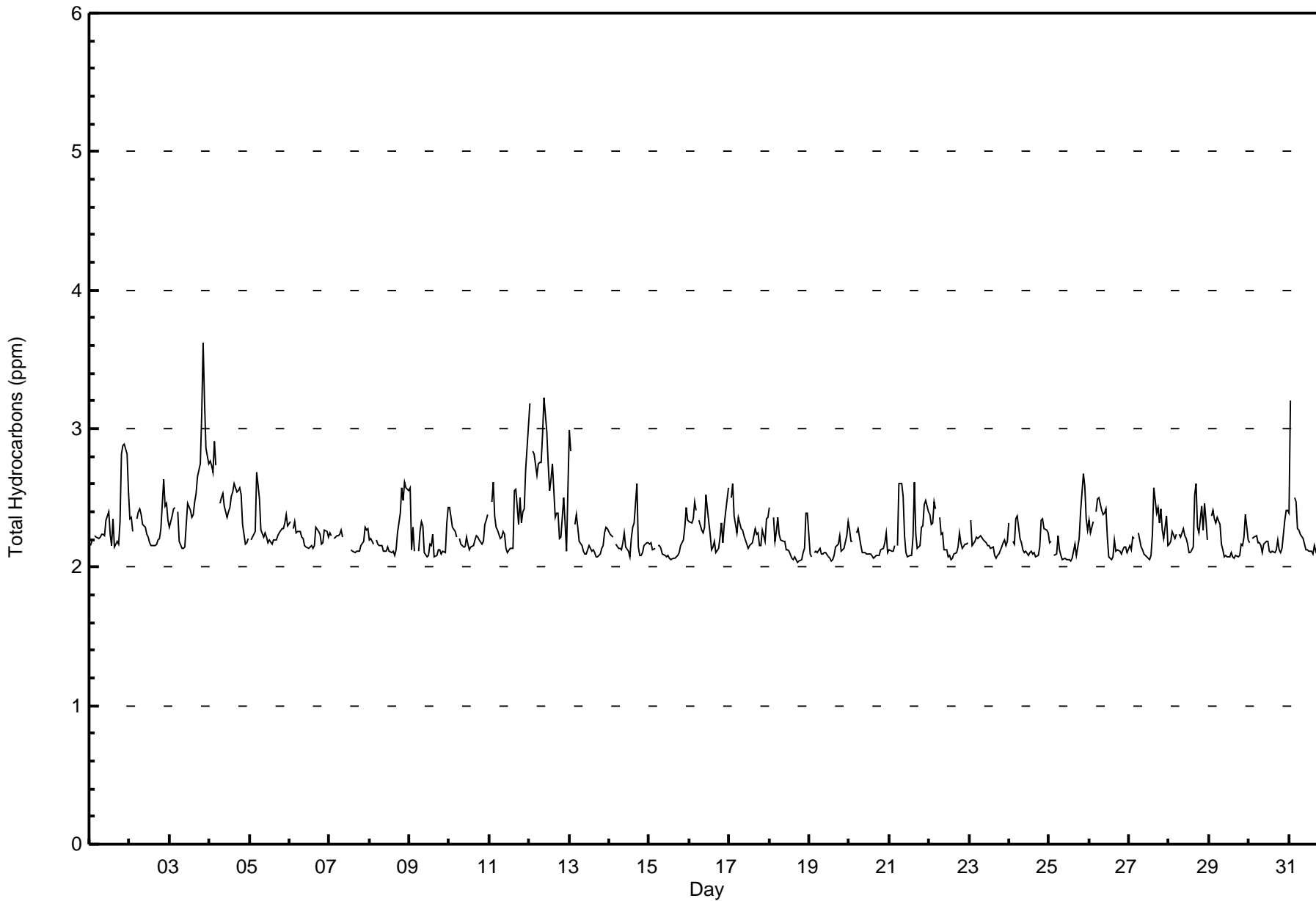








Maximum Value: 3.6 ppm on Jul 3 21:00																			Maximum Daily Average: 2.6 ppm on Jul 12						Hours in Service: 744																								
Minimum Value: 2.0 ppm on Jul 18 18:00																			Minimum Daily Average: 2.1 ppm on Jul 19						Hours of Data: 709																								
Maximum Diurnal Average: 2.4 ppm at hour 23																			Minimum Diurnal Average: 2.2 ppm at hour 14						Hours of Missing Data: 35																								
Monthly Average: 2.26 ppm																			Percentiles: P <sub>1</sub> = 2.1 P <sub>10</sub> = 2.1 Q <sub>1</sub> = 2.1 Median = 2.2 Q <sub>3</sub> = 2.3 P <sub>90</sub> = 2.5 P <sub>99</sub> = 3.0						Hours of Calibration: 35																								
																									Percent Operational Time: 100.0																								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jul	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.2	2.2	2.3	2.1	2.2	2.2	2.3	2.8	2.9	2.9	2.8	2.5	2.4	2.9																							
2-Jul	2.3	2.4	2.3	Z	2.3	2.4	2.4	2.4	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.6	2.4	2.5	2.3	2.3	2.6																							
3-Jul	2.3	2.4	2.4	2.4	Z	2.4	2.2	2.1	2.1	2.1	2.3	2.5	2.4	2.4	2.4	2.5	2.5	2.7	2.7	3.1	3.6	3.2	2.9	2.7	2.5	3.6																							
4-Jul	2.8	2.7	2.7	2.9	2.7	Z	2.5	2.5	2.5	2.4	2.4	2.4	2.4	2.5	2.5	2.6	2.5	2.5	2.6	2.5	2.3	2.2	2.2	2.2	2.5	2.9																							
5-Jul	Z	2.2	2.2	2.3	2.7	2.6	2.5	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.4	2.3	2.3	2.7																							
6-Jul	2.3	Z	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.1	2.2	2.3	2.3	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.3																							
7-Jul	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.3	2.2	C	C	C	C	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.3	2.3	2.3	2.2	2.3																							
8-Jul	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.4	2.6	2.5	2.6	2.6	2.2	2.6																							
9-Jul	2.6	2.1	2.3	2.1	Z	2.1	2.3	2.3	2.3	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.4	2.2	2.6																						
10-Jul	2.4	2.4	2.3	2.3	2.2	Z	2.2	2.2	2.1	2.1	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.4	2.2	2.4																							
11-Jul	Z	2.5	2.6	2.4	2.3	2.3	2.2	2.2	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.5	2.6	2.3	2.5	2.3	2.4	2.4	2.7	3.0	2.4	3.0																							
12-Jul	3.2	Z	2.8	2.8	2.7	2.7	2.8	2.8	3.0	3.2	3.0	2.7	2.6	2.6	2.7	2.4	2.4	2.4	2.2	2.2	2.5	2.3	2.1	2.6	2.6	3.2																							
13-Jul	3.0	2.8	Z	2.3	2.4	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.3	2.3	2.2	3.0																							
14-Jul	2.2	2.2	2.2	Z	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.1	2.2	2.3	2.3	2.6	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.6																						
15-Jul	2.2	2.2	2.1	2.1	Z	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.3	2.4	2.3	2.1	2.4																						
16-Jul	2.3	2.3	2.3	2.5	2.4	Z	2.3	2.3	2.3	2.3	2.5	2.4	2.2	2.1	2.1	2.2	2.1	2.1	2.2	2.3	2.2	2.3	2.4	2.6	2.3	2.6																							
17-Jul	Z	2.5	2.6	2.4	2.2	2.4	2.3	2.3	2.3	2.2	2.2	2.1	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.3	2.2	2.4	2.4	2.3	2.6																							
18-Jul	2.4	Z	2.4	2.2	2.3	2.4	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.4	2.2	2.4																							
19-Jul	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.1	2.3																							
20-Jul	2.3	2.2	2.2	Z	2.2	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.3																							
21-Jul	2.1	2.1	2.1	2.2	Z	2.2	2.6	2.6	2.5	2.2	2.1	2.1	2.1	2.1	2.2	2.6	2.2	2.1	2.2	2.3	2.3	2.5	2.5	2.4	2.3	2.6																							
22-Jul	2.4	2.3	2.3	2.5	2.4	Z	2.4	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.5																							
23-Jul	Z	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.3																							
24-Jul	2.3	Z	2.2	2.2	2.4	2.4	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.3	2.3	2.2	2.2	2.4																							
25-Jul	2.2	2.2	Z	2.1	2.1	2.2	2.1	2.1	2.0	2.1	2.1	2.1	2.0	2.0	2.1	2.2	2.1	2.1	2.2	2.4	2.7	2.6	2.3	2.3	2.2	2.7																							
26-Jul	2.3	2.2	2.3	Z	2.4	2.5	2.5	2.4	2.4	2.4	2.4	2.2	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.5																							
27-Jul	2.2	2.1	2.2	2.2	Z	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.6	2.4	2.4	2.3	2.4	2.3	2.2	2.4	2.2	2.2	2.6																							
28-Jul	2.2	2.2	2.3	2.2	2.2	Z	2.2	2.2	2.3	2.2	2.2	2.2	2.1	2.1	2.1	2.5	2.6	2.3	2.3	2.4	2.3	2.5	2.3	2.2	2.3	2.6																							
29-Jul	Z	2.4	2.4	2.3	2.3	2.4	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.4	2.2	2.2	2.4																							
30-Jul	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.3	2.4	2.2	2.4																							
31-Jul	2.4	3.2	Z	2.5	2.5	2.3	2.3	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.3	2.3	2.3	2.3	2.5	2.5	2.3	3.2																							
																								2.4	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.4	2.4	Diurnal Average	
																								3.2	3.2	2.8	2.9	2.7	2.7	2.8	2.8	3.0	3.2	3.0	2.7	2.6	2.6	2.7	2.6	2.6	2.7	2.7	3.1	3.6	3.2	2.9	3.0	Diurnal Maximum	
Z - zerospan																								C - Calibration																									





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

**Total Hydrocarbons (THC) - ppm**  
**Buffalo Viewpoint - July 2015**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	6	0.85	0.85
2.1 - 3.0	697	98.31	99.15
3.1 - 10.0	6	0.85	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



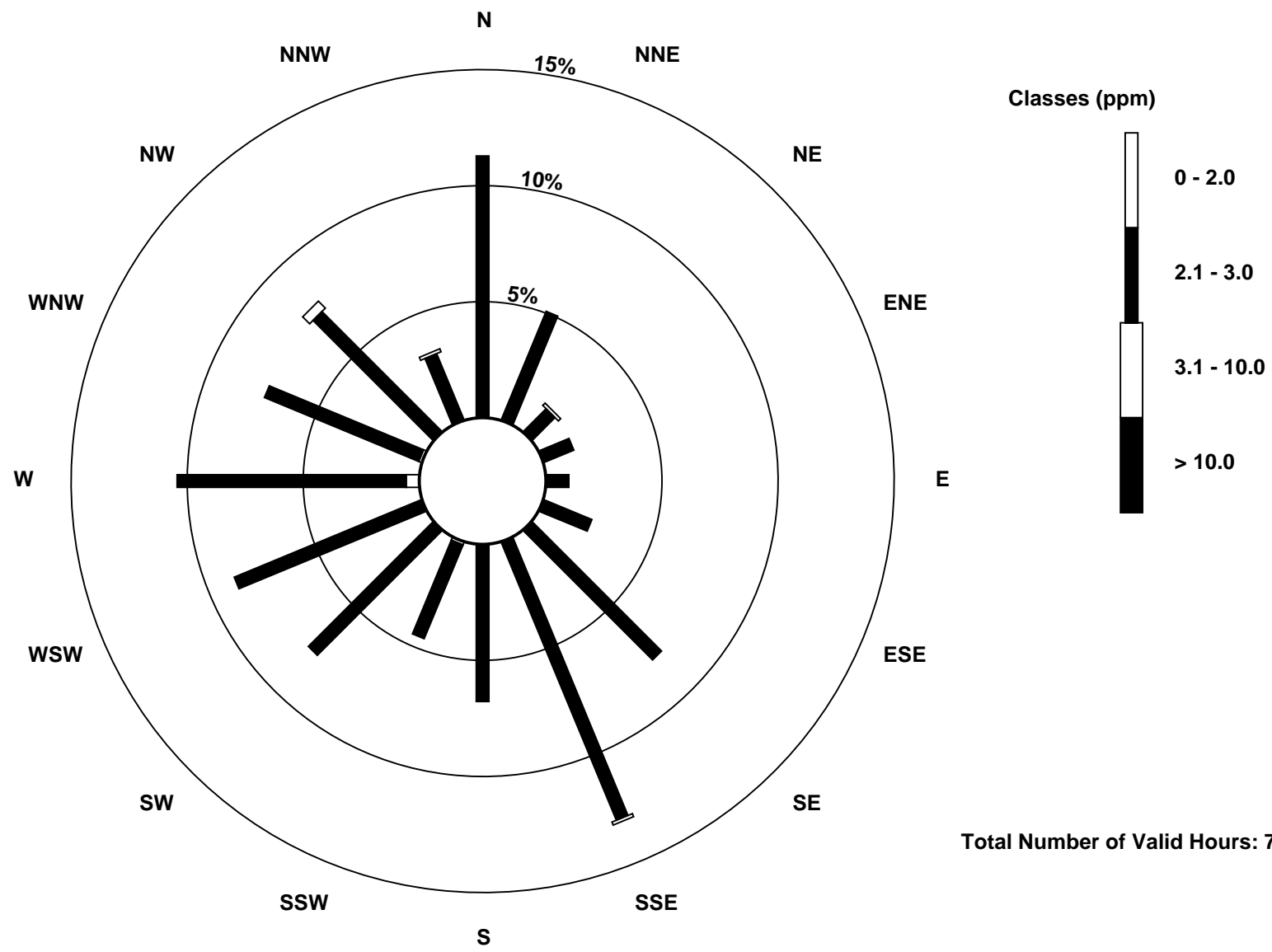
**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Buffalo Viewpoint - July 2015**

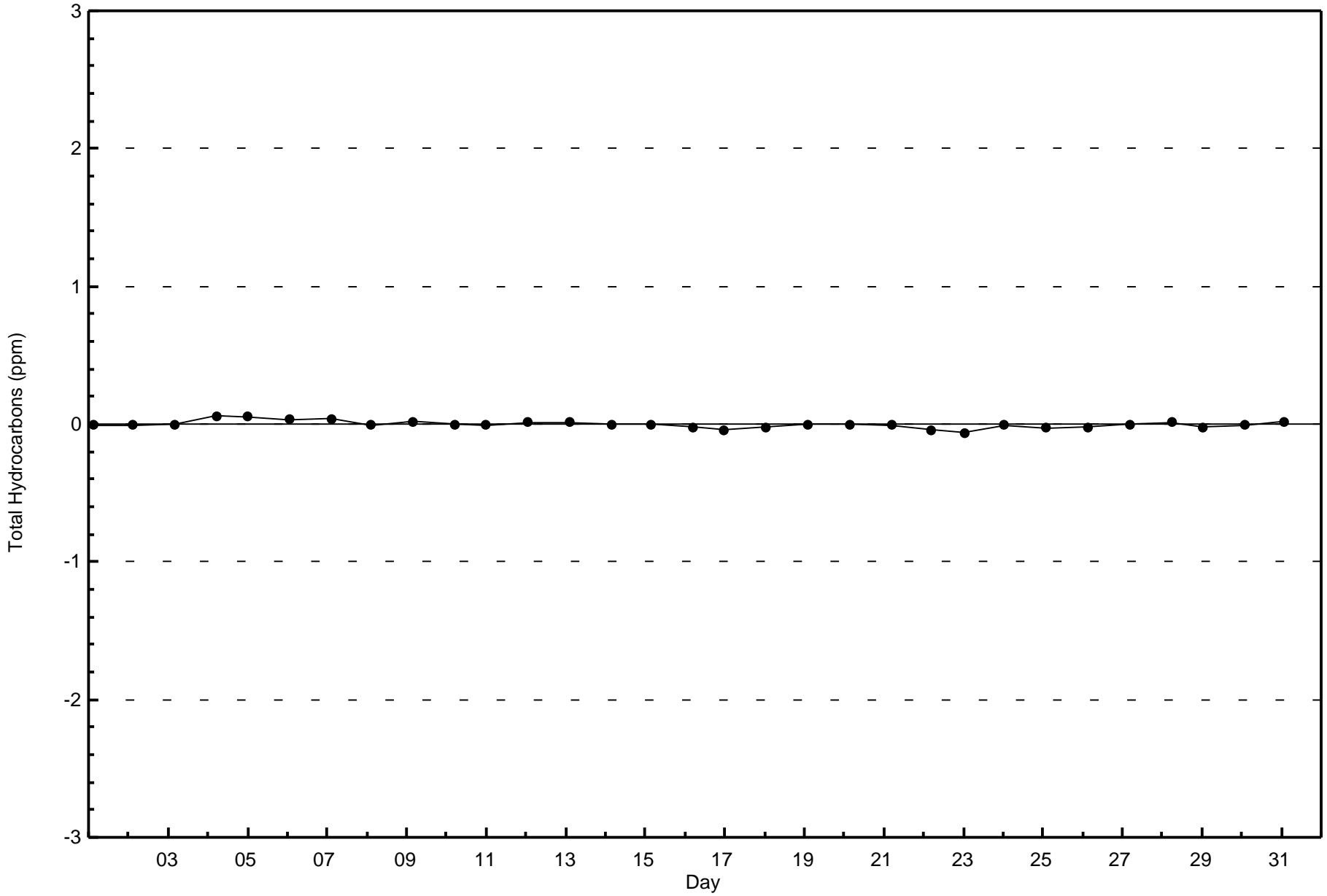
Concentration Ranges (ppm)	Wind Direction																Totals	
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW		
0 - 2.0	0	0	0	0	0	0	0	0	0	0	1	0	0	4	1	0	0	6
2.1 - 3.0	80	36	10	10	7	16	56	92	48	31	54	62	70	51	52	22	697	
3.1 - 10.0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	3	1	6	
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
<b>Totals</b>	80	36	11	10	7	16	56	93	48	32	54	62	74	52	55	23	709	

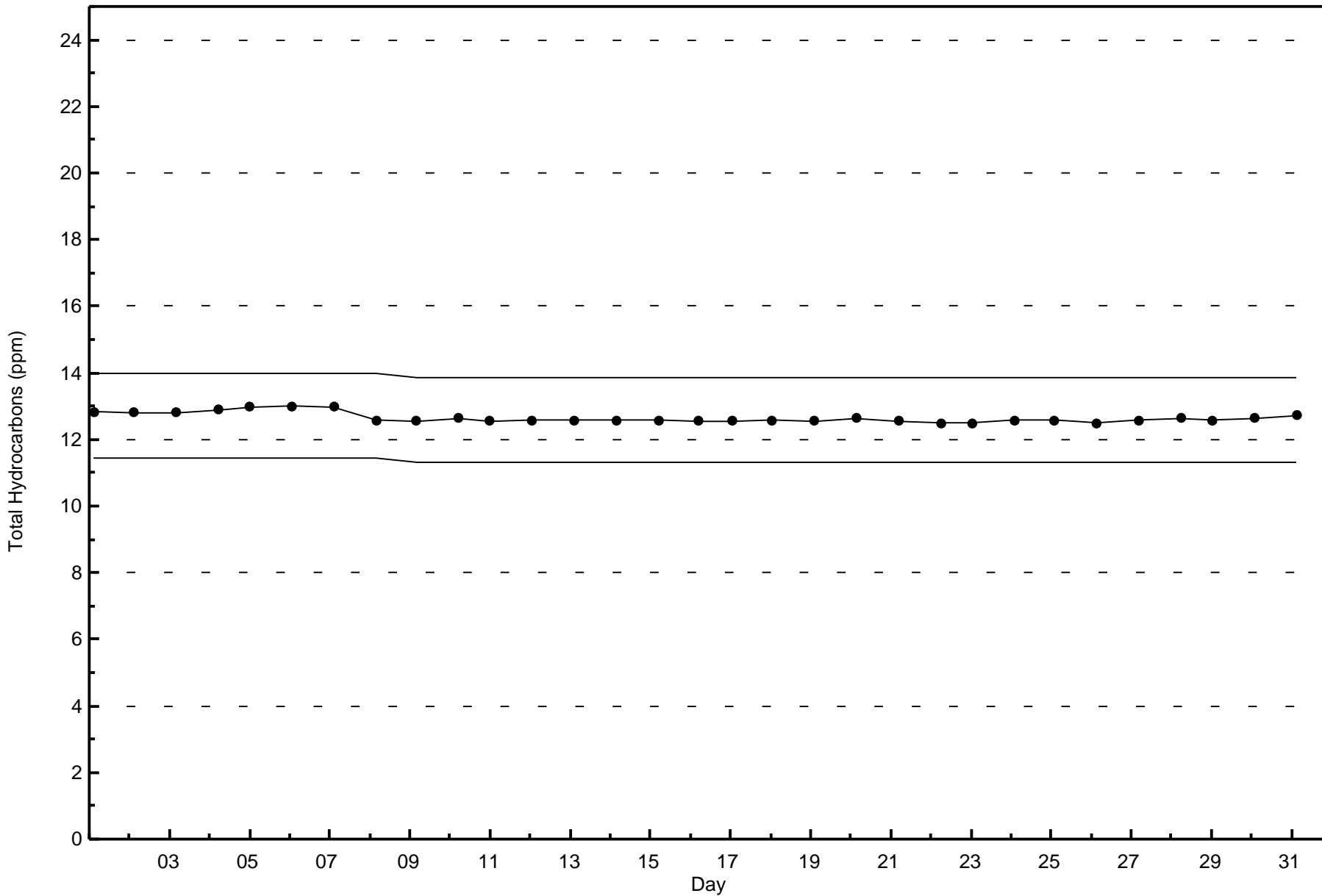
Total Number of Valid Hours: 709

Total Number of Hours: 744











**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Ambient Temperature (AT) - C**

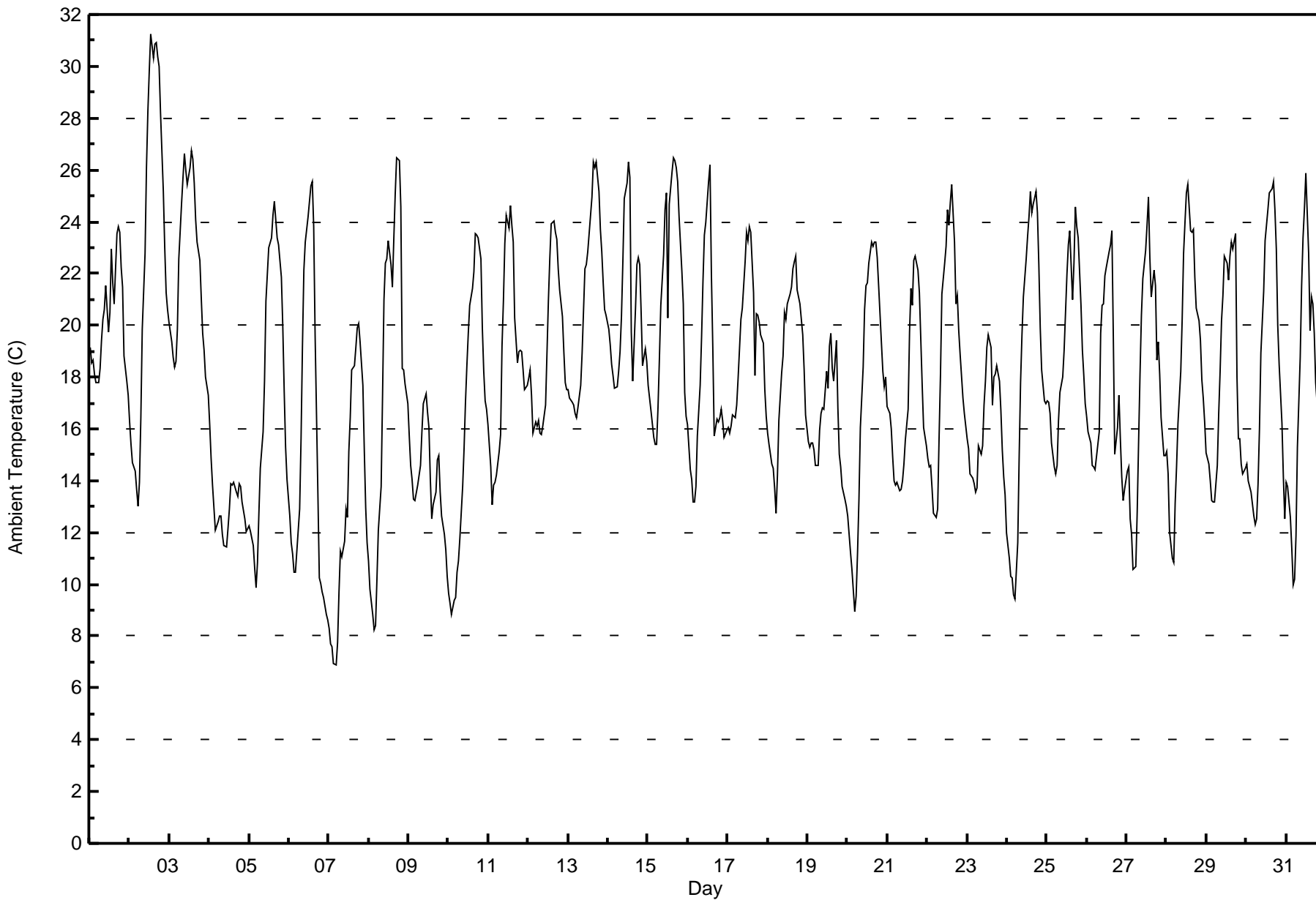
**Buffalo Viewpoint - July 2015**

Maximum Value: 31.2 C on Jul 2 14:00		Maximum Daily Average: 22.8 C on Jul 2		Hours in Service: 744																																												
Minimum Value: 6.9 C on Jul 7 05:00		Minimum Daily Average: 13.1 C on Jul 4		Hours of Data: 744																																												
Maximum Diurnal Average: 22.7 C at hour 14		Minimum Diurnal Average: 13.0 C at hour 5		Hours of Missing Data: 0																																												
Monthly Average: 18.06 C		Percentiles: P <sub>1</sub> = 8.4 P <sub>10</sub> = 12.2 Q <sub>1</sub> = 14.5 Median = 17.9 Q <sub>3</sub> = 21.7 P <sub>90</sub> = 24.0 P <sub>99</sub> = 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-Jul	19.2	18.5	18.7	18.1	17.8	17.8	18.3	19.4	20.2	20.6	21.5	19.7	20.5	22.9	21.7	20.8	23.6	23.8	23.6	22.3	21.5	18.8	17.8	17.3	20.2	23.8																						
2-Jul	16.3	15.4	14.7	14.4	13.7	13.0	13.9	16.4	19.8	22.8	26.1	28.3	29.8	31.2	30.3	30.9	30.9	30.4	30.0	28.2	25.2	23.0	21.3	20.6	22.8	31.2																						
3-Jul	20.1	19.4	18.8	18.4	18.6	19.8	22.5	24.7	25.7	26.6	26.0	25.4	26.1	26.7	26.4	25.5	24.1	23.2	22.5	21.1	19.7	19.0	18.0	17.3	22.3	26.7																						
4-Jul	16.1	14.8	13.8	13.0	12.1	12.4	12.6	12.6	11.9	11.5	11.4	12.1	12.9	13.9	13.9	13.6	13.4	13.9	13.8	13.2	12.5	12.1	12.2	12.2	13.1	16.1																						
5-Jul	12.2	12.1	11.5	10.6	9.9	10.9	12.7	14.5	15.9	17.8	20.9	22.0	23.0	23.4	24.3	24.8	24.1	23.4	23.1	21.8	19.9	17.5	15.3	14.1	17.7	24.8																						
6-Jul	12.6	11.6	11.2	10.5	10.5	11.3	12.9	15.6	19.2	22.1	23.2	24.2	24.8	25.4	25.5	23.8	19.6	13.5	10.3	10.0	9.7	9.5	8.8	8.6	15.6	25.5																						
7-Jul	8.3	7.7	7.6	7.0	6.9	7.7	9.7	11.3	11.1	11.7	12.9	12.6	15.2	16.4	18.3	18.4	19.1	19.9	20.0	19.4	17.7	15.2	13.0	11.6	13.3	20.0																						
8-Jul	10.9	9.8	8.8	8.3	8.4	10.2	12.1	13.8	17.3	21.0	22.4	22.6	23.3	22.3	21.5	23.3	25.1	26.5	26.4	24.6	18.3	18.3	17.8	17.0	17.9	26.5																						
9-Jul	15.7	14.6	14.1	13.3	13.2	13.8	14.2	14.6	15.9	17.0	17.4	16.6	16.1	14.1	12.5	13.1	13.6	14.8	15.0	13.6	12.6	11.9	11.4	10.3	14.1	17.4																						
10-Jul	9.7	9.3	8.8	9.4	9.5	10.5	10.9	11.8	13.8	15.3	17.0	18.4	19.7	20.8	21.5	22.1	23.5	23.5	23.4	22.5	19.9	18.2	17.1	16.7	16.4	23.5																						
11-Jul	16.2	14.5	13.1	13.8	14.0	14.2	15.1	15.8	19.2	20.9	23.2	24.2	23.8	24.6	23.9	23.2	20.3	18.6	19.0	19.0	19.0	18.3	17.5	17.7	18.7	24.6																						
12-Jul	18.0	18.3	17.3	15.8	16.3	16.1	16.4	15.9	15.8	16.1	16.9	18.9	20.9	22.5	23.9	24.0	23.6	23.3	22.2	21.3	20.3	19.0	17.8	17.5	19.1	24.0																						
13-Jul	17.5	17.2	17.0	16.9	16.6	16.4	16.8	17.7	18.9	20.6	22.2	22.3	22.9	24.3	24.9	26.3	26.1	26.3	25.2	23.7	22.8	21.7	20.6	20.4	21.0	26.3																						
14-Jul	19.9	19.2	18.5	18.1	17.6	17.6	18.2	19.0	20.3	22.5	24.9	25.5	26.3	25.7	19.7	17.9	20.7	22.3	22.6	22.3	20.5	18.5	19.1	18.6	20.6	26.3																						
15-Jul	17.7	17.2	16.7	15.7	15.4	15.4	16.8	18.7	20.8	22.7	24.4	25.1	20.3	24.7	25.9	26.5	26.4	26.1	25.6	24.2	22.1	20.8	17.4	16.5	21.0	26.5																						
16-Jul	16.2	14.4	14.0	13.2	13.2	13.8	15.7	17.7	19.5	21.7	23.5	24.0	25.5	26.2	22.0	19.1	15.7	16.4	16.2	16.4	16.7	16.3	15.7	15.9	17.9	26.2																						
17-Jul	16.0	15.8	16.1	16.5	16.4	16.9	17.9	19.1	20.2	20.7	22.4	23.6	23.3	23.8	23.6	21.3	18.0	20.4	20.4	20.1	19.7	19.3	17.5	16.5	19.4	23.8																						
18-Jul	15.8	15.4	14.7	14.5	13.7	12.7	14.2	16.3	18.2	18.8	20.5	20.2	20.8	21.2	21.5	22.2	22.5	22.7	21.4	20.9	20.2	19.6	18.3	16.5	18.5	22.7																						
19-Jul	15.5	15.3	15.5	15.4	15.2	14.6	14.6	16.0	16.6	16.8	16.7	18.2	17.6	19.2	19.7	18.3	17.9	19.4	16.8	15.0	14.5	13.8	13.3	13.0	16.2	19.7																						
20-Jul	12.6	11.9	11.2	10.6	8.9	9.5	11.2	13.3	16.1	18.4	20.6	21.5	21.7	22.4	23.2	23.1	23.2	23.2	22.6	21.5	19.3	18.2	17.6	18.0	17.5	23.2																						
21-Jul	16.9	16.6	16.0	14.9	14.0	13.8	13.9	13.6	13.7	14.0	14.6	15.5	16.7	19.7	21.4	20.8	22.5	22.7	22.1	21.3	19.5	17.7	16.1	15.4	17.2	22.7																						
22-Jul	14.9	14.5	14.6	13.7	12.7	12.6	12.9	15.6	18.1	21.2	22.4	23.1	24.4	23.9	24.7	25.4	23.2	20.8	21.1	19.8	18.8	17.2	16.6	16.1	18.7	25.4																						
23-Jul	15.6	15.2	14.3	14.1	13.9	13.5	13.7	15.3	15.0	15.4	16.9	17.9	19.1	19.6	19.1	16.9	18.0	18.1	18.4	17.9	16.7	15.2	14.2	13.5	16.2	19.6																						
24-Jul	12.0	11.0	10.3	10.2	9.6	9.5	11.6	14.9	17.8	19.6	21.1	22.6	23.4	24.2	25.2	24.3	24.7	25.2	24.3	22.4	19.9	18.3	17.1	17.0	18.2	25.2																						
25-Jul	17.1	17.1	16.6	15.5	14.6	14.3	14.6	16.3	17.4	18.0	19.1	20.5	21.9	23.1	23.7	21.0	22.4	24.6	23.8	23.4	20.8	19.1	18.0	17.0	19.1	24.6																						
26-Jul	16.5	15.9	15.5	14.6	14.5	14.4	14.9	15.9	19.7	20.8	20.8	21.9	22.2	22.8	23.1	23.6	19.6	15.0	16.1	17.3	15.6	14.1	13.3	13.7	17.6	23.6																						
27-Jul	14.4	14.6	12.5	11.9	10.6	10.7	12.8	15.5	18.1	20.4	21.8	22.9	23.9	24.9	22.6	21.1	22.1	21.5	18.7	19.4	18.1	16.4	15.0	15.0	17.7	24.9																						
28-Jul	15.1	14.2	12.1	11.0	10.9	13.1	14.5	16.2	18.2	20.3	22.8	24.0	25.1	25.4	23.7	23.6	23.7	21.9	20.7	20.2	19.4	17.9	17.2	16.2	18.6	25.4																						
29-Jul	15.1	14.7	14.0	13.2	13.2	13.2	14.6	16.6	18.2	20.2	21.1	22.7	22.4	21.8	22.7	23.2	23.0	23.5	18.0	15.6	15.6	14.6	14.3	14.5	17.7	23.5																						
30-Jul	14.6	14.0	13.8	13.6	12.7	12.3	12.5	13.9	16.0	18.9	21.3	23.2	23.9	24.5	25.1	25.3	25.5	24.5	23.0	20.0	18.5	16.2	14.1	12.6	18.3	25.5																						
31-Jul	13.9	13.8	12.6	11.4	10.0	10.2	11.9	15.3	18.8	21.5	23.4	24.5	25.9	22.8	19.8	21.1	20.8	19.7	17.8	16.2	15.8	15.4	15.2	14.7	17.2	25.9																						
																								15.2	14.6	14.0	13.5	13.0	13.3	14.4	15.9	17.7	19.2	20.6	21.4	22.0	22.7	22.4	22.1	21.8	21.6	20.8	19.8	18.4	17.1	16.1	15.5	Diurnal Average
																								20.1	19.4	18.8	18.4	18.6	19.8	22.5	24.7	25.7	26.6	26.1	28.3	29.8	31.2	30.3	30.9	30.9	30.4	30.0	28.2	25.2	23.0	21.3	20.6	Diurnal Maximum



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

**Ambient Temperature (AT) - C**  
**Buffalo Viewpoint - July 2015**





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

**Ambient Temperature (AT) - C**  
**Buffalo Viewpoint - July 2015**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	25	3.36	3.36
10 - 20	457	61.42	64.78
> 20	262	35.22	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

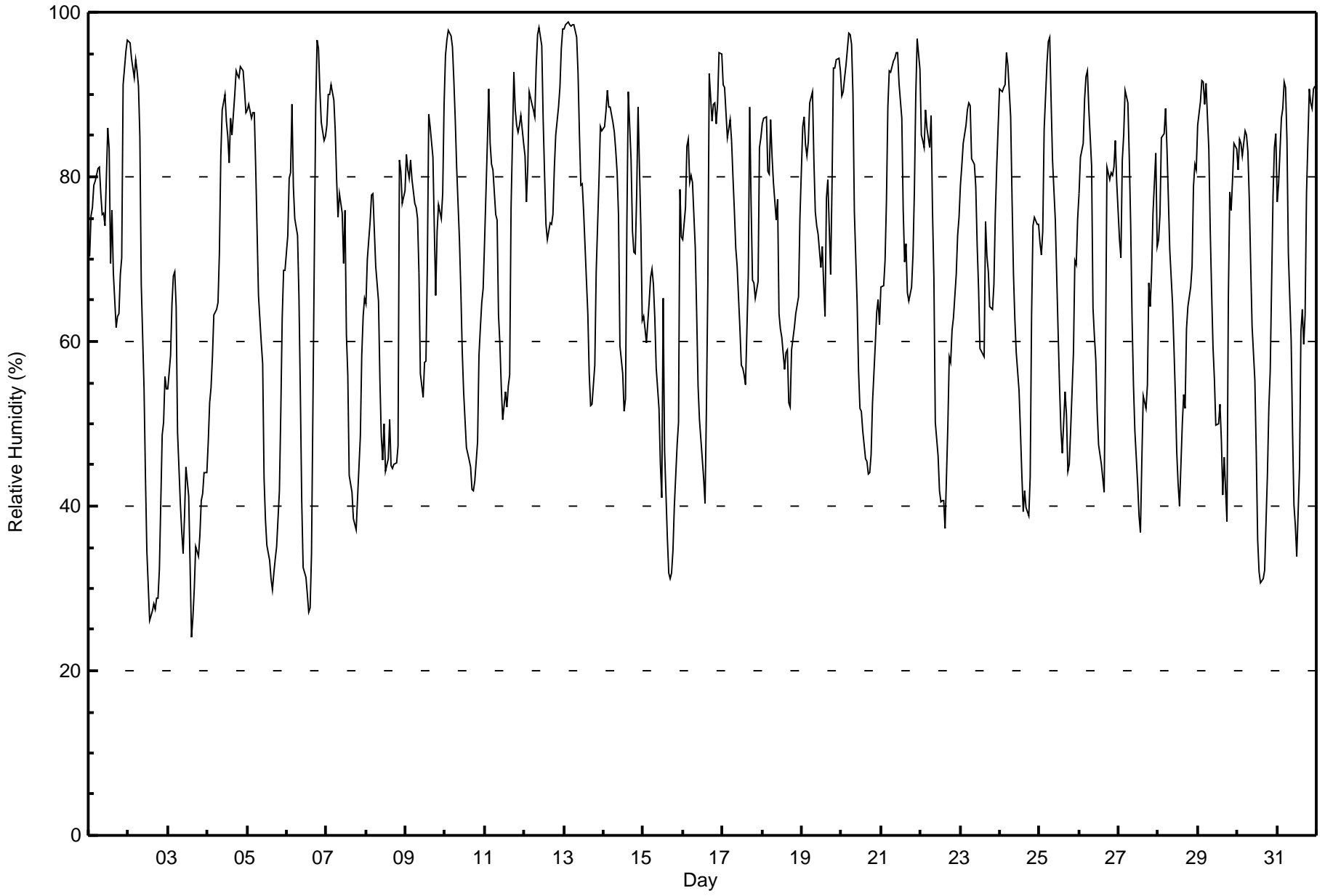


**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

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

Maximum Value: 99 % on Jul 13 03:00																		Maximum Daily Average: 85.7 % on Jul 12																		Hours in Service: 744													
Minimum Value: 24 % on Jul 3 15:00																		Minimum Daily Average: 43.8 % on Jul 3																		Hours of Data: 744													
Maximum Diurnal Average: 85.7 % at hour 5																		Minimum Diurnal Average: 50.7 % at hour 14																		Hours of Missing Data: 0													
Monthly Average: 69.3 %																		Percentiles: P <sub>1</sub> = 28 P <sub>10</sub> = 42 Q <sub>1</sub> = 55 Median = 73 Q <sub>3</sub> = 85 P <sub>90</sub> = 91 P <sub>99</sub> = 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-Jul	70	75	76	79	80	81	81	78	75	76	74	86	83	69	76	68	62	63	63	68	70	91	95	97	76.6	97																							
2-Jul	96	96	94	92	94	93	91	85	67	54	44	35	30	26	27	28	27	29	29	32	49	50	56	54	57.5	96																							
3-Jul	54	58	65	68	68	64	49	40	37	34	39	45	41	33	24	26	30	35	34	37	41	42	44	44	43.8	68																							
4-Jul	48	53	54	58	63	64	65	71	83	88	90	87	85	82	87	85	90	93	92	92	93	93	90	88	78.9	93																							
5-Jul	88	89	87	88	88	81	73	66	60	57	43	38	35	33	31	30	32	34	35	42	52	63	69	69	57.6	89																							
6-Jul	73	80	80	89	79	75	73	65	54	40	33	31	29	27	28	34	52	88	97	96	90	87	84	85	65.4	97																							
7-Jul	86	90	90	91	89	86	80	75	78	76	69	76	61	56	44	42	38	38	37	41	48	58	63	65	65.7	91																							
8-Jul	65	70	75	78	78	74	69	65	55	48	46	50	44	46	51	45	45	45	45	47	82	81	77	78	60.7	82																							
9-Jul	83	81	80	82	80	77	76	75	68	56	53	57	58	69	88	86	82	74	66	73	77	75	78	89	74.3	89																							
10-Jul	95	97	98	97	96	92	87	81	72	66	59	54	50	47	46	45	42	42	43	48	58	62	65	67	67.0	98																							
11-Jul	72	84	91	84	81	81	75	75	63	60	54	51	54	52	55	56	76	93	88	86	85	86	87	84	73.9	93																							
12-Jul	82	77	81	90	89	88	87	93	97	98	96	87	80	74	72	74	74	75	81	85	89	91	96	98	85.7	98																							
13-Jul	98	98	99	99	98	98	99	97	93	85	79	79	76	67	63	56	52	52	57	68	74	80	86	86	80.8	99																							
14-Jul	86	88	90	88	88	87	85	83	81	75	59	56	52	53	75	90	82	73	71	71	78	89	74	63	76.6	90																							
15-Jul	63	62	60	65	68	69	67	63	57	52	45	41	65	47	36	32	31	32	35	40	47	50	78	73	53.2	78																							
16-Jul	72	76	84	85	79	80	79	71	63	55	51	48	43	40	52	67	93	87	89	89	86	89	95	95	73.7	95																							
17-Jul	91	91	88	85	87	84	80	76	71	69	62	57	57	56	55	68	88	77	67	67	65	67	84	85	74.1	91																							
18-Jul	86	87	87	81	80	87	83	79	75	77	63	62	60	57	59	59	53	52	59	62	63	64	65	75	69.8	87																							
19-Jul	86	87	84	83	84	89	90	82	76	74	73	69	72	67	63	77	80	68	79	93	93	94	94	93	81.3	94																							
20-Jul	90	90	92	94	97	97	96	90	76	65	56	52	52	49	46	45	44	44	46	53	60	64	65	62	67.7	97																							
21-Jul	67	67	70	77	89	93	93	94	94	95	95	91	87	76	70	72	66	65	67	70	78	90	97	93	81.4	97																							
22-Jul	85	84	84	88	86	84	87	76	68	50	46	42	40	41	41	37	50	58	57	61	63	68	73	75	64.4	88																							
23-Jul	79	81	84	86	88	89	89	82	81	79	72	66	59	59	58	75	70	68	64	64	67	75	81	86	75.2	89																							
24-Jul	91	90	91	91	95	94	87	77	68	63	59	54	49	44	39	42	40	39	44	63	74	75	74	74	67.4	95																							
25-Jul	72	70	73	86	94	96	97	89	82	75	68	61	55	49	46	54	51	44	45	49	59	70	69	75	67.9	97																							
26-Jul	78	82	84	89	92	93	88	81	64	61	58	51	48	45	43	42	59	81	80	80	80	81	84	79	71.9	93																							
27-Jul	72	70	82	85	91	89	82	74	63	55	49	43	39	37	46	53	52	55	67	64	69	76	83	72	65.3	91																							
28-Jul	72	75	85	85	88	84	77	71	65	59	54	47	43	40	50	54	52	62	64	67	69	79	82	81	66.8	88																							
29-Jul	86	89	92	91	89	91	83	74	66	59	55	50	50	52	48	41	46	38	65	78	76	80	84	83	69.5	92																							
30-Jul	81	85	84	83	86	85	83	77	69	62	55	46	36	32	31	31	32	38	44	52	56	78	84	85	62.3	86																							
31-Jul	77	79	87	88	92	91	84	71	60	49	40	38	34	45	61	64	60	63	78	91	89	88	91	91	71.2	92																							
																								78.9	80.8	82.9	84.7	85.7	85.0	81.9	76.7	70.4	64.9	59.3	56.5	53.8	50.7	51.9	54.2	56.5	58.2	60.9	65.5	70.4	75.3	79.0	78.8	Diurnal Average	
																								98	98	99	99	98	98	99	97	97	98	96	91	87	82	88	90	93	93	97	96	93	94	97	98	Diurnal Maximum	





Maximum Speed: 35 km/h on Jul 6 18:00	Maximum Daily Speed Average: 16.3 km/h on Jul 17	Hours in Service: 744
Minimum Speed Value: 1 km/h on Jul 4 18:00	Minimum Daily Speed Average: 1.5 km/h on Jul 28	Hours of Data: 743
Maximum Diurnal Speed Average: 6.2 km/h at hour 15	Minimum Diurnal Speed Average: 1.2 km/h at hour 23	Hours of Missing Data: 1
Monthly Average Velocity: 2.9 km/h 286.3 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 4 Q <sub>1</sub> = 6 Median = 8 Q <sub>3</sub> = 12 P <sub>90</sub> = 17 P <sub>99</sub> = 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-Jul	W6	SW6	W8	W8	WSW7	SW7	W10	WSW7	WSW10	SW9	WNW9	W6	SSW6	WSW3	NW14	SSW7	SSW5	SSE3	ENE2	E4	ENE3	S6	SSE7	SSE7	WSW4.3	NW14
2-Jul	S8	SSE6	SSE8	SSE7	S8	S9	SSE6	SSE6	SSW4	SSW4	SW5	SW8	W11	W12	WSW11	WSW11	SW10	SW10	SSW8	S5	SE6	S7	SSE10	SSE10	SSW6.2	W12
3-Jul	SSE10	SE11	SE11	SE11	SE9	SE8	SW12	WSW18	WSW18	WSW25	W25	WNW24	WNW23	WNW25	NW29	NW25	WNW22	WNW14	NW14	NW10	NW11	NW11	WNW12	WNW13	WNW10.2	NW29
4-Jul	W11	W11	WSW12	W13	WSW15	W15	WSW12	WNW11	W9	SW8	SW11	SW11	SW9	W11	NW10	NNW12	NNE6	SSW1	W2	NNW14	NNW20	N32	N29	N25	WNW8.6	N32
5-Jul	N23	N22	N24	N18	NW11	NW10	WNW8	WNW8	W8	WNW8	NNW13	N16	N12	N14	N9	N9	NW4	SW6	S3	SSE5	SSE6	S7	S8	SSE10	NNW6.7	N24
6-Jul	SSE11	SE12	SE10	SE8	SE9	SSE8	SSE7	S6	SSW7	WSW12	WSW17	WSW18	WSW16	WSW15	WSW17	NW18	NNW31	N35	N29	N33	N32	NNW20	NW17	NW19	NW7.1	N35
7-Jul	NW16	WNW13	WNW13	W12	W12	W9	WNW7	WNW7	W11	WSW8	M	WSW6	S7	SW6	WSW9	W9	W10	W12	W9	SW7	S6	SSE8	S9	SSE8	WSW7.1	NW16
8-Jul	SSE10	SE12	SE12	SE12	SE12	SE9	SSE10	SSE12	SSE12	SSE12	SSE14	SSE10	SSE11	S12	SSE13	SSE11	SSE9	W10	W11	NW23	NW18	NW17	NW12	NW13	S4.9	NW23
9-Jul	NNW13	N15	NNW17	N15	N16	N10	NW6	NW9	N10	NNE11	NNE7	N5	NNW6	NNE9	ENE6	NNE14	NNE17	NNE20	NNE23	N17	N15	N13	N13	N13	N11.8	NNE23
10-Jul	N11	N8	N9	N12	N11	N12	NNE12	NNE8	NNE6	N6	NNE7	N7	N8	N9	N7	NNW8	N8	NNE6	NNE4	N8	NNE9	NE12	NE10	ENE2	N8.0	N12
11-Jul	SE4	SSE3	S3	SSW4	SE5	S7	SSE11	SSE9	SE8	SSE12	SE15	SE14	SE15	SE13	SE8	ESE7	ENE8	NNE10	NNE13	NE13	NE8	NE8	NE7	ENE1	ESE5.5	SE15
12-Jul	NE2	E4	NNE5	NNE8	N6	NNE9	ENE2	E1	S2	NNW10	ESE5	SW4	NW7	WNW7	N8	NNE12	NNE12	N8	N8	N8	NNW7	SW17	WSW8	N9	N3.9	SW17
13-Jul	WSW1	SSE6	SSW5	WSW5	S6	SSE6	SE6	SE6	SSE6	S6	SSW4	WSW8	WSW10	WSW9	WNW8	W6	WSW6	SSW5	SSE5	SSE6	S6	SSE5	SE3	SE6	SSW4.0	WSW10
14-Jul	SSE8	SE8	SSE8	SSE8	SSE7	SSE8	SSE7	SSE7	SSW4	SSW4	WSW4	S4	WSW4	WNW6	N13	ESE3	S6	SSE6	SSE8	SSE9	SSE8	SE11	WSW2	WSW8	SSE4.2	N13
15-Jul	SW7	SW9	SW9	SSW4	WSW8	W9	W8	WSW7	W7	WSW6	SW6	WSW6	SSE8	SE4	WNW2	SW11	SW12	SW11	SW8	SW8	SW7	SW4	S8	SSE4	SW6.2	SW12
16-Jul	S5	SSE7	SSE5	S7	SSE6	SSE6	SSE3	W8	WNW8	WNW12	NNW14	N18	N20	N20	NNE9	S7	SSW12	SW8	NW19	WNW14	WNW16	NNW3	WNW5	WNW11	NW4.7	N20
17-Jul	NW15	NW21	NNW21	N28	N23	N21	N23	N23	N26	N26	N27	N28	N28	N19	NNW20	NW18	WNW7	N10	N17	N12	NNE6	E4	SW5	SW6	N16.3	N28
18-Jul	SW6	SW5	SW6	WSW7	SSW4	SE7	SSE7	SSE7	SE7	SE6	WSW8	SW11	SW11	WSW15	SW12	WSW13	WSW17	W21	W20	W16	WNW18	WNW19	NW18	NW15	WSW8.0	W21
19-Jul	W16	WNW17	WNW16	WNW15	WNW16	WNW15	NW13	NW15	NW17	NW14	WNW17	NW17	WNW16	WNW16	NW19	WNW11	NNW17	NW13	N21	N13	NNE5	NNE5	NW9	NW8	NW13.1	N21
20-Jul	W7	WSW5	SW7	SW5	SSE7	S5	SSE5	S5	SSW5	SSW5	SSE2	WSW1	ESE5	ESE7	ESE8	SE7	SE7	SE8	SE9	SE6	SE7	SE8	SE10	SE12	SSE4.8	SE12
21-Jul	SE9	SE11	SSE9	SSE7	SE6	ESE5	ESE4	ENE7	E6	E6	SE8	SE8	S5	N5	N10	N9	N11	N11	NNE8	NE5	E1	SSW4	SE7	SSE9	E3.2	N11
22-Jul	SE8	SE5	S5	SSW6	SSE7	S5	SSE5	W6	W7	NW6	WNW5	SW3	WNW5	SW3	WNW5	NW7	NW8	WNW13	WNW7	W13	W11	W13	W11	W8	W4.6	WNW13
23-Jul	WNW9	W4	W7	W8	W9	W11	W8	NW12	NW15	NW12	NW10	NW9	NW7	NNW7	WNW3	SW10	SSW7	S5	W6	WNW8	W7	SW6	SSW4	SSE6	W6.1	NW15
24-Jul	S7	SSE7	SE7	SSE6	S7	SSE7	SSE6	SE5	SE4	ESE7	ESE7	ESE8	ESE7	SE4	S7	S6	WSW12	WSW6	S3	SE5	SE6	SSE7	SSE6	SSE8	SSE5.3	WSW12
25-Jul	SW5	SW8	SW9	WSW11	WNW5	SSE3	S5	S7	SSW7	SW9	WSW11	W11	W13	W11	W15	NW17	NW8	N4	E2	SSE3	SSE4	N2	NNE7	NNE12	W4.2	NW17
26-Jul	NNE11	N12	N4	N9	N10	NNE8	N3	NNE5	N6	NNW6	W4	S5	WSW9	W17	W16	NNW7	WNW14	S9	SE6	S8	SSE9	SSE9	SSE12	S6	NW1.7	W17
27-Jul	SSW8	SW6	SSE5	S6	SSE6	SSE7	SSE5	S5	SSW8	SW8	W11	WSW13	WSW14	W6	N13	NNW6	NNE3	WNW5	NNW12	S7	SSW7	S7	S10	WSW5	SW3.9	WSW14
28-Jul	WNW13	WSW5	SSE9	SSE8	SSW5	WNW5	W7	W5	W4	W3	WSW2	W3	W6	WSW7	NNE9	ENE7	ESE5	N15	ESE5	SSE5	SW3	N4	N18	NE9	NW1.5	N18
29-Jul	WSW7	WSW6	S5	SW6	SSE4	SE5	SSW6	SW9	WSW7	WSW8	SW6	W8	W13	W14	WSW12	W12	WSW6	W10	W23	NW17	WNW5	ESE3	SSW5	WNW9	WSW6.9	W23
30-Jul	W9	W7	WSW11	W7	WSW9	WSW10	W11	W11	WSW8	NW5	NW7	NW10	WNW17	WNW23	WNW21	NW19	NNW15	NE11	NNE15	NE11	ESE4	SSW6	S7	SE9	WNW6.3	WNW23
31-Jul	ENE7	SSE6	S6	SSE8	SSE10	SSE8	SE8	SSE5	SE4	SE2	S2	SSW4	W1	SW9	SW2	S5	SW7	W7	NW9	N8	NNE6	NW1	SSW5	SW6	S2.5	SSE10

W2.7	WSW1.9	WSW2.1	WSW1.9	SW1.5	SW1.4	SW2.0	WSW2.5	W3.3	W3.3	W3.8	W4.2	W5.1	WNW5.8	NW6.2	WNW5.1	WNW4.5	NW4.3	NNW4.7	NNW4.2	NW2.8	WNW1.4	WNW1.2	WNW1.9	Diurnal Average
N23	N22	N24	N28	N23	N21	N23	N23	N26	N26	N27	N28	N28	WNW25	NW29	NW25	NNW31	N35	N29	N33	N32	N32	N29	N25	Diurnal Maximum

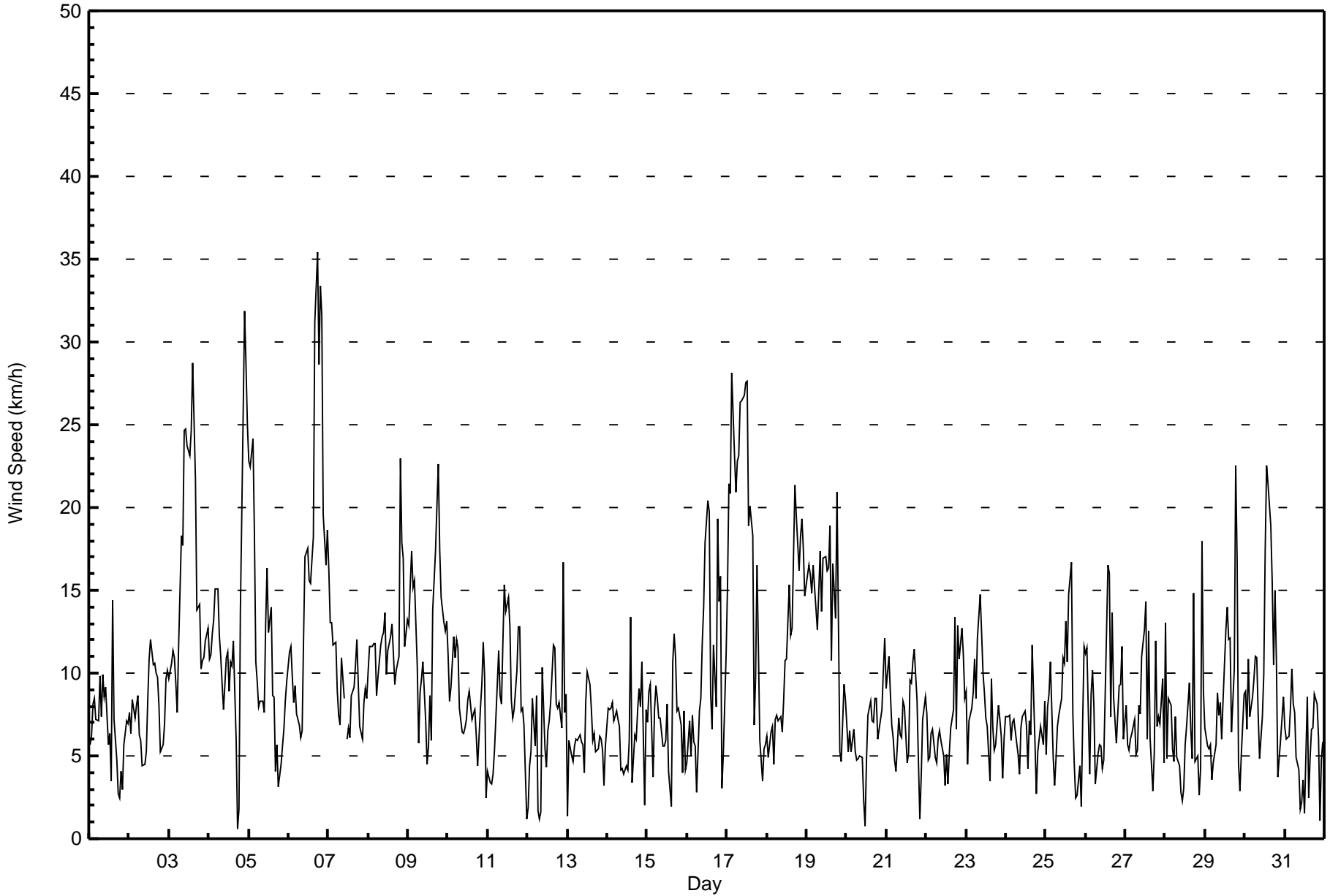
M - Maintenance  
 All monthly, daily, and diurnal averages have been calculated using vector methods





Summary of Hour Standard Deviations

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





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

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

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	149	20.05	20.05
6 - 11	398	53.57	73.62
12 - 19	151	20.32	93.94
20 - 28	37	4.98	98.92
29 - 38	8	1.08	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 743

Total Number of Hours: 744



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Buffalo Viewpoint - July 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	6	2	5	6	9	11	21	18	20	11	12	7	10	3	1	149
6 - 11	30	20	7	5	2	7	40	70	32	12	42	35	49	18	21	8	398
12 - 19	24	8	2	0	0	0	10	7	1	1	4	18	17	22	28	9	151
20 - 28	17	2	0	0	0	0	0	0	0	0	0	1	4	6	3	4	37
29 - 38	6	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	8
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	84	36	11	10	8	16	61	98	51	33	57	66	77	56	56	23	743

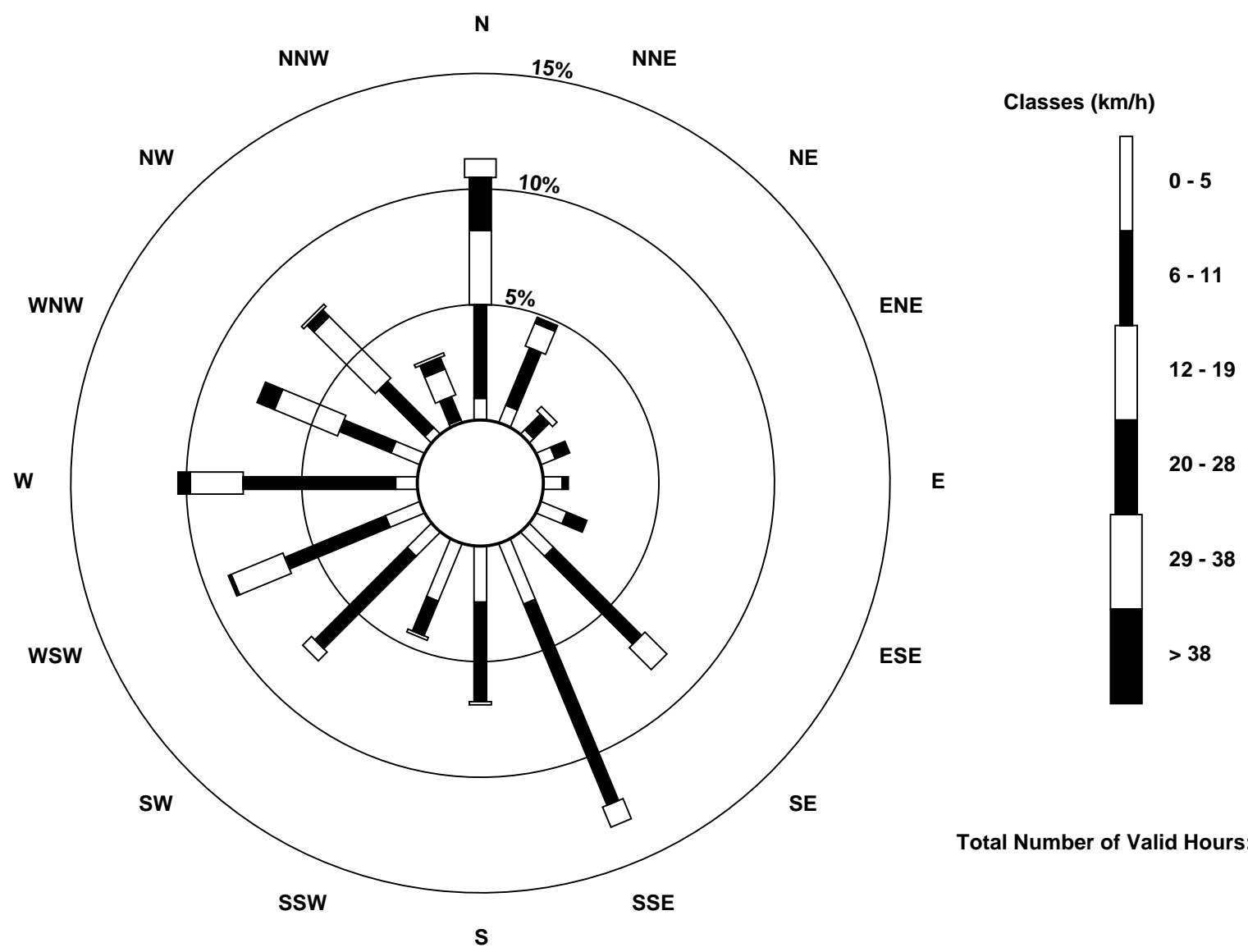
Total Number of Valid Hours: 743

Total Number of Hours: 744



Wood Buffalo Environmental Association  
Wind Rose Jul 2015

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





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

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

Direction of Maximum Speed: 1 deg on Jul 6 18:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 350.8 deg on Jul 17	Hours of Data: 743
Direction of Minimum Speed: 196 deg on Jul 4 18:00	Hours of Missing Data: 1
Direction of Minimum Daily Speed Average: 1.5 deg on Jul 28	Percent Operational Time: 99.9
Monthly Average Direction: 264.3 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-Jul	265	228	279	273	249	234	265	248	253	226	287	262	198	247	311	213	209	147	59	81	74	186	154	154	243.2
2-Jul	170	158	156	159	171	169	158	164	204	204	221	214	261	279	249	240	218	214	200	191	146	170	159	158	195.8
3-Jul	151	142	141	135	132	139	226	244	245	254	260	288	302	303	307	309	302	291	323	318	319	315	301	298	281.6
4-Jul	273	268	257	259	255	262	255	284	265	227	229	233	235	259	307	327	26	196	272	341	337	354	359	354	298.3
5-Jul	352	355	353	349	314	308	303	292	277	293	345	1	350	359	356	351	310	233	186	154	154	180	173	163	336.6
6-Jul	150	135	138	136	141	157	162	171	200	239	256	257	251	252	249	305	338	1	358	350	351	327	313	310	311.4
7-Jul	307	298	284	270	276	279	294	283	260	244	M	243	190	222	250	270	259	273	262	223	186	167	169	162	257.7
8-Jul	154	146	143	145	144	143	151	149	156	159	164	148	159	174	151	162	165	268	277	316	311	308	305	304	180.4
9-Jul	329	358	346	3	1	6	322	316	11	29	22	355	348	25	58	14	20	14	14	8	10	360	356	351	4.0
10-Jul	350	351	357	8	11	6	15	22	17	359	15	9	352	351	3	345	359	15	21	360	15	45	40	78	9.0
11-Jul	136	162	169	198	130	172	156	161	133	152	146	133	141	135	124	102	59	22	26	42	38	46	49	57	115.2
12-Jul	46	97	22	13	350	21	68	90	185	343	112	226	304	302	353	12	21	0	359	1	330	225	244	360	351.1
13-Jul	257	153	207	239	170	158	144	146	148	186	205	253	244	258	284	273	238	195	159	168	178	160	128	138	197.4
14-Jul	148	146	154	156	156	160	156	163	212	208	257	191	254	293	353	113	169	148	150	160	157	140	258	256	167.9
15-Jul	230	224	220	211	250	267	270	258	264	255	215	238	160	144	286	229	219	225	221	223	217	224	179	167	226.8
16-Jul	188	163	149	169	150	156	157	278	292	302	343	351	354	358	29	188	212	228	306	293	301	344	298	291	306.3
17-Jul	310	314	334	355	360	5	6	2	355	355	357	360	358	1	342	325	303	352	3	10	33	92	216	228	350.8
18-Jul	229	221	234	237	210	142	154	147	135	132	238	224	217	239	236	238	251	265	260	279	287	293	326	317	251.9
19-Jul	275	290	300	294	298	298	308	307	307	315	298	309	297	302	304	291	327	319	356	10	19	17	319	306	309.8
20-Jul	275	247	235	217	157	180	164	177	208	194	147	252	115	114	122	127	144	135	128	130	125	124	136	136	151.8
21-Jul	135	141	155	148	130	120	107	77	87	93	125	144	171	354	353	2	357	0	20	38	95	199	145	161	97.7
22-Jul	139	146	169	198	163	171	163	259	279	307	303	230	303	236	299	310	308	290	286	278	271	260	259	272	262.2
23-Jul	289	276	274	267	270	279	277	313	305	318	309	307	310	333	282	217	197	186	263	282	274	217	206	159	279.3
24-Jul	174	160	138	163	176	147	154	134	143	123	104	119	123	139	180	169	248	254	178	130	142	147	155	154	155.0
25-Jul	221	218	216	253	297	152	175	178	203	219	255	259	262	269	276	310	306	8	92	147	161	358	17	20	259.6
26-Jul	12	6	9	352	2	15	9	28	6	344	278	191	237	260	277	344	298	189	133	172	153	153	147	185	304.7
27-Jul	201	222	161	175	163	163	160	170	210	235	264	250	252	278	5	335	26	302	332	170	197	178	191	250	226.6
28-Jul	290	251	156	168	196	287	271	279	280	259	243	274	262	253	22	63	110	10	122	157	231	359	8	35	314.6
29-Jul	237	249	189	220	157	141	207	230	252	253	223	272	269	260	257	281	247	265	268	310	290	120	202	301	256.6
30-Jul	264	270	248	265	254	248	273	259	253	317	319	319	286	301	303	315	332	39	31	46	106	193	174	144	294.7
31-Jul	62	157	178	149	148	158	144	147	135	132	182	200	267	220	218	181	226	262	316	10	23	308	193	225	177.1

267.0 243.7 240.1 255.3 230.2 221.6 229.0 252.5 263.2 269.6 275.2 277.9 276.7 287.2 305.0 302.1 297.3 310.6 330.4 334.7 324.9 292.1 294.4 290.5  
 Diurnal Average

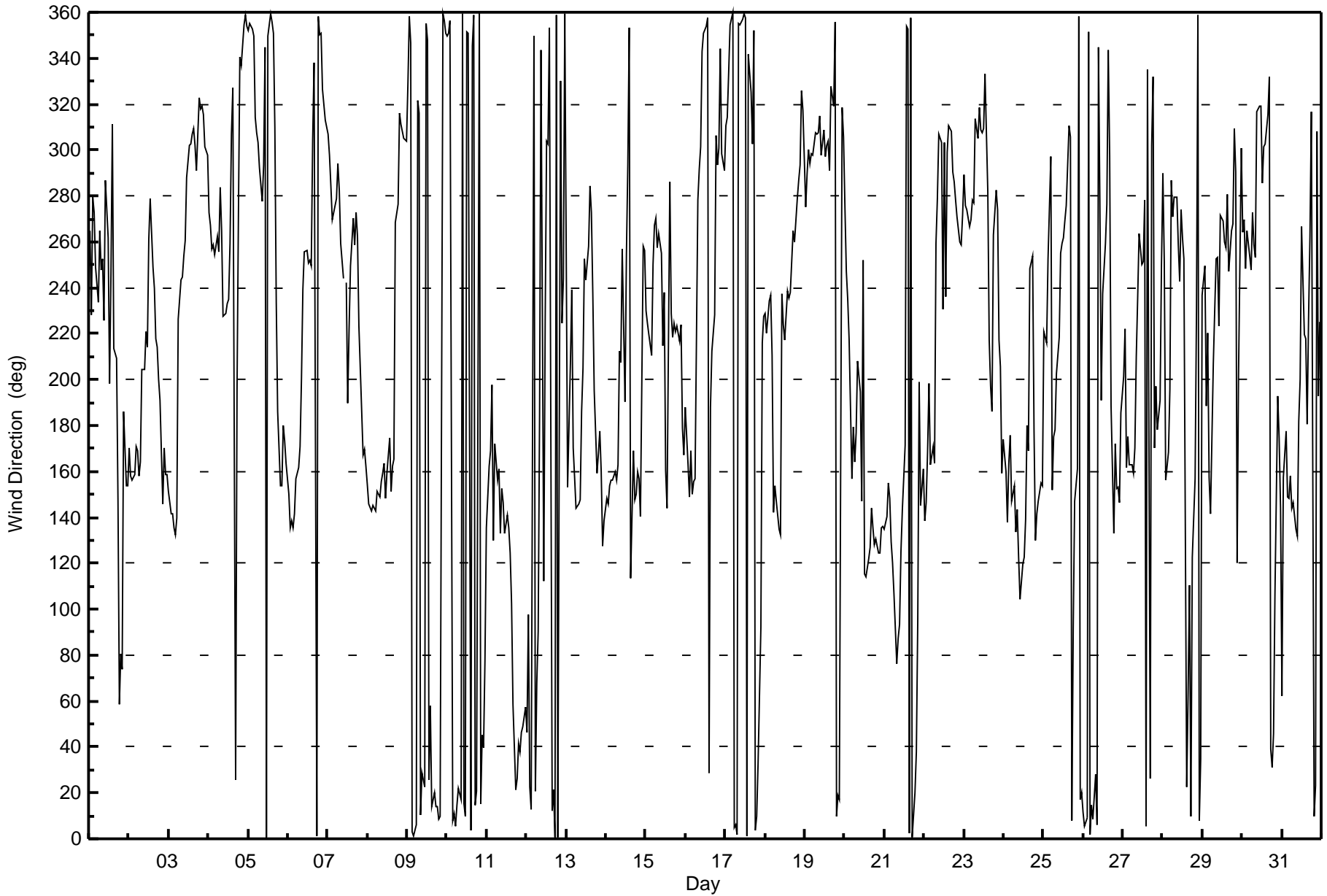
M - Maintenance  
 All monthly, daily, and diurnal averages have been calculated using vector methods



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

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 108 deg on Jul 20 12:00		Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9																							
Minimum Value: 5 deg on Jul 6 02:00																									
Percentiles: P <sub>1</sub> = 7 P <sub>10</sub> = 13 Q <sub>1</sub> = 17 Median = 21 Q <sub>3</sub> = 34 P <sub>90</sub> = 53 P <sub>99</sub> = 88																									
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-Jul	30	42	26	25	14	20	17	27	18	25	28	40	20	53	23	59	26	67	82	25	39	13	12	12	82
2-Jul	9	30	11	11	14	10	26	17	28	29	35	23	31	25	21	25	23	17	18	20	15	10	9	10	35
3-Jul	8	9	9	10	12	15	37	17	19	17	17	20	18	18	15	15	15	16	13	11	9	9	11	12	37
4-Jul	14	17	13	14	13	15	19	21	19	17	20	18	19	16	23	18	35	97	77	24	19	18	18	17	97
5-Jul	16	16	16	15	10	13	17	24	27	31	28	19	25	22	34	35	72	34	55	11	15	10	6	7	72
6-Jul	14	5	7	10	7	14	16	24	25	25	20	24	24	25	22	41	21	19	18	18	18	19	14	13	41
7-Jul	14	18	17	13	13	18	24	27	20	27	M	37	40	40	45	29	28	27	29	18	12	7	8	11	45
8-Jul	9	10	10	11	12	18	19	20	21	23	21	21	21	22	20	20	30	22	22	15	17	11	13	11	30
9-Jul	25	17	15	17	16	17	21	17	22	23	32	51	43	37	43	18	15	15	16	16	14	15	14	13	51
10-Jul	13	13	13	12	12	15	17	20	33	50	40	44	35	35	39	39	25	31	37	17	18	11	7	75	75
11-Jul	18	38	51	42	16	23	20	20	27	24	23	24	24	24	22	22	37	19	11	18	38	27	21	80	80
12-Jul	36	48	43	15	30	21	73	86	90	35	31	64	27	28	45	23	16	22	17	16	41	25	39	20	90
13-Jul	85	24	39	22	24	24	18	21	27	29	45	38	28	34	29	46	29	28	15	20	15	22	63	15	85
14-Jul	17	15	16	17	18	22	25	20	40	54	69	63	60	76	75	59	27	29	21	22	19	13	88	29	88
15-Jul	22	15	33	61	26	15	17	21	27	43	46	48	36	70	87	25	18	18	18	14	39	46	9	48	87
16-Jul	39	19	31	20	15	36	47	25	21	17	24	16	18	18	67	75	53	55	20	17	14	90	60	14	90
17-Jul	13	11	19	18	17	16	16	18	18	18	19	21	19	17	19	17	58	47	16	17	16	32	12	13	58
18-Jul	22	17	18	14	37	13	14	18	20	19	46	15	23	17	16	19	13	17	15	18	17	17	16	21	46
19-Jul	16	16	16	16	15	15	15	15	15	18	18	17	17	18	17	22	16	20	24	15	14	29	19	18	29
20-Jul	16	30	17	25	19	25	26	28	37	33	86	108	66	38	37	28	28	23	19	17	17	15	18	20	108
21-Jul	18	20	26	23	24	29	20	17	21	21	22	29	48	81	20	20	19	18	16	38	63	55	12	16	81
22-Jul	9	35	35	19	24	32	37	27	20	31	48	64	68	69	38	44	23	22	19	17	16	13	14	17	69
23-Jul	16	28	30	20	18	17	23	16	16	16	21	24	33	36	53	18	19	22	43	14	13	21	46	19	53
24-Jul	12	11	22	16	8	12	19	29	54	33	33	42	44	61	34	38	19	30	51	9	16	9	20	17	61
25-Jul	40	19	27	22	49	60	30	23	30	24	28	30	26	31	29	18	26	46	40	54	16	81	24	14	81
26-Jul	18	15	73	18	18	25	45	28	35	39	55	51	43	20	22	38	50	28	25	19	16	12	9	44	73
27-Jul	20	43	63	45	21	14	43	24	22	31	27	23	24	71	40	44	58	65	56	21	11	15	11	59	71
28-Jul	14	56	16	13	41	40	19	25	48	73	88	80	54	52	94	36	29	26	24	41	75	58	20	63	94
29-Jul	15	21	30	31	52	45	39	18	24	31	30	31	21	19	23	21	42	27	32	13	27	69	42	22	69
30-Jul	23	37	15	36	18	16	16	16	35	45	32	37	22	19	19	32	35	26	21	19	51	14	7	16	51
31-Jul	61	25	26	9	7	10	13	27	38	79	76	64	87	51	82	23	40	28	28	13	17	73	27	20	87
85 56 73 61 52 60 73 86 90 79 88 108 87 81 94 75 72 97 82 54 75 90 88 80																									
Diurnal Maximum																									
M - Maintenance																									







# Wood Buffalo Environmental Association

## SO2 Calibration Report

### Station Information

Calibration Date	July 7, 2015	Last Calibration	June 8, 2015
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Reason:	Routine		
Start Time (MST)	9:45	End Time (MST)	12:00
Gas Cert Reference	LL107926	Station temp.	21 Deg C
Cal Gas Concentration	51 ppm	Cal Gas Exp Date	5/29/2014
Calibrator Make/Model	Sabio 4010	Serial Number	11551008
ZAG Make/Model	API 701	Serial Number	4297
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2636

### Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		PMT voltage	-592	-593
Analyzer IP address	192.168.1.43		Lamp voltage	830	829
Calculated slope	1.005683	0.988729	Chamber temp	45.0	45.2
Calculated intercept	-2.441654	-0.416557	Pressure	692.6	700.0
Analyzer Background	10.1	10.0	Flow	0.449	0.492
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	0.2	----
as found span	5000	58.8	599.8	603.2	0.994
calibrator zero	5000	0.0	0.0	0.2	----
high point	5000	58.8	599.8	606.4	0.989
second point	5000	29.4	299.9	305.3	0.982
third point	5000	14.7	149.9	151.3	0.991
as left zero	5000	0.0	0.0	0.3	----
as left span	5000	58.8	599.8	607.8	0.987
Average Correction Factor					0.987

Corrected As found 603.0 Previous response 598.8 % change -0.7%

**Notes:**

Analyzer indicated low flow (0.309 L/min) alarm on arrival. Replaced the exhaust pump after as founds. Inlet filter replaced after as founds. No adjustments.

Calibration Performed By: Asad Hidayat



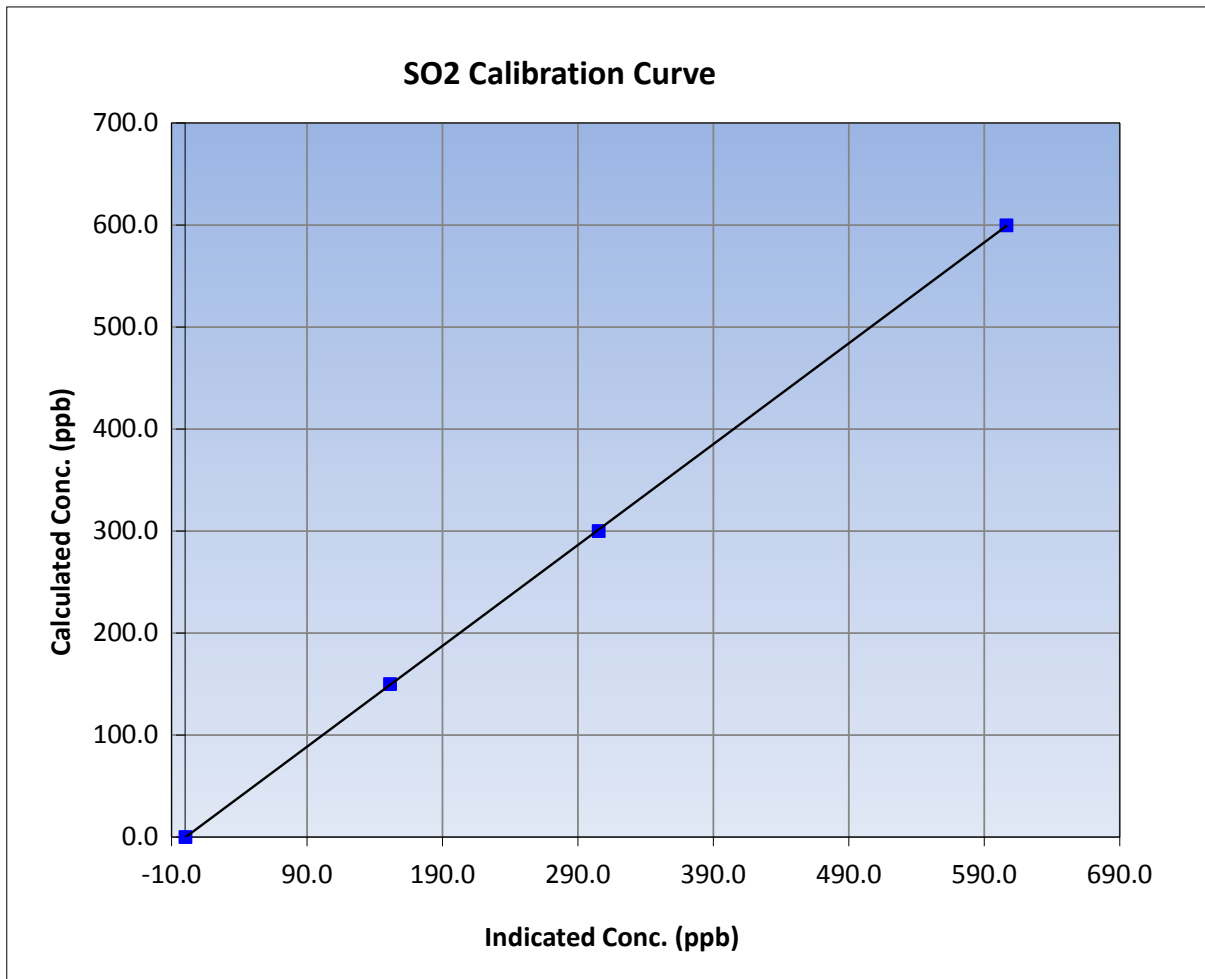
## Wood Buffalo Environmental Association SO2 Calibration Report

### Station Information

Calibration Date	July 7, 2015	Previous Calibration	June 8, 2015
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Start Time (MST)	9:45	End Time (MST)	12:00
Analyzer make	TEI 43i	Analyzer serial #	JC1327300932

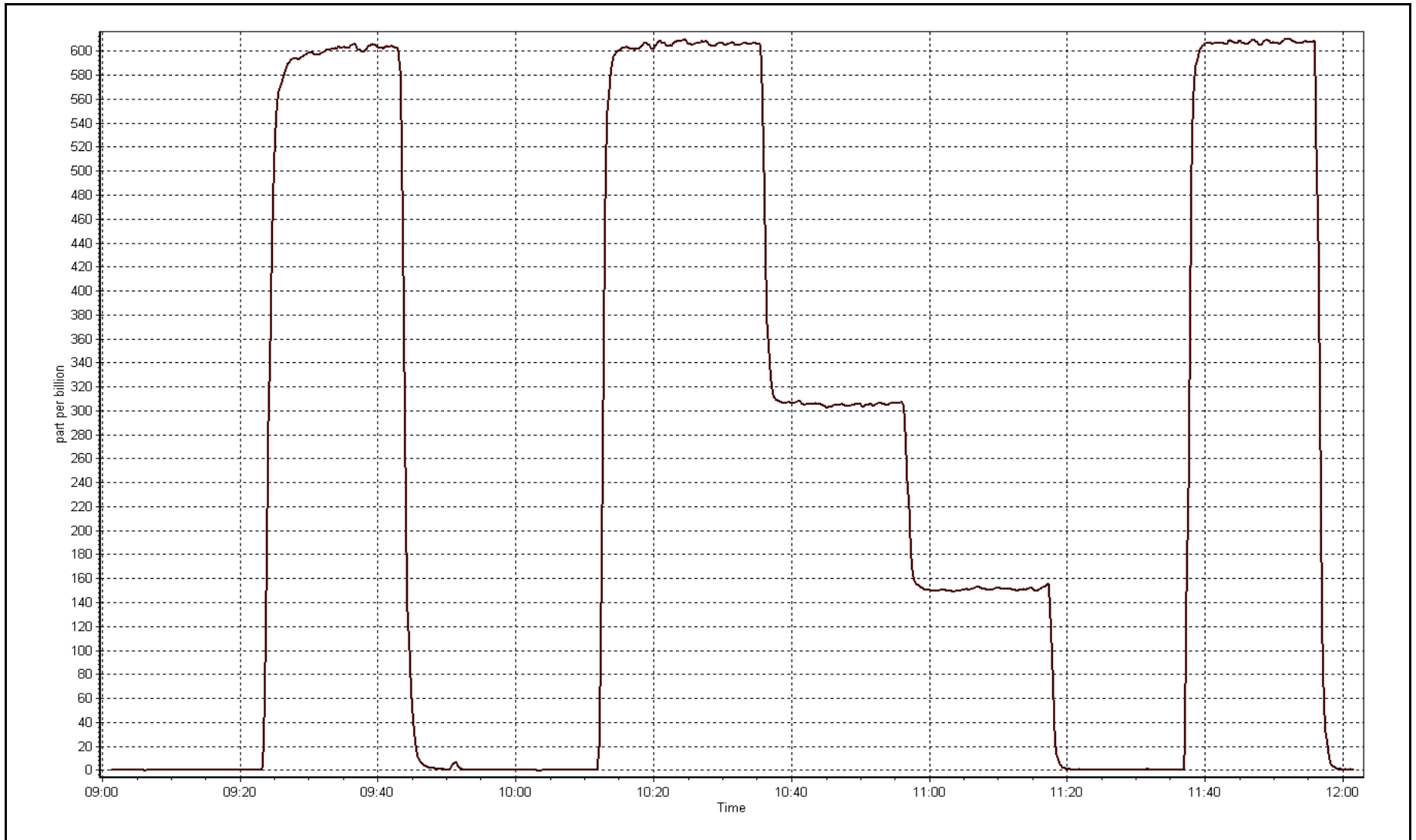
### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	----	Correlation Coefficient	0.999982
599.8	606.4	0.9891		
299.9	305.3	0.9822	Slope	0.988729
149.9	151.3	0.9909		
			Intercept	-0.416557



SO2 Calibration Plot

Date: July 7, 2015





# Wood Buffalo Environmental Association H2S Calibration Report

### Station Information

Calibration Date	July 10, 2015	Last Calibration	June 10, 2015
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Reason:	Routine		
Start Time (MST)	8:45	End Time (MST)	11:40
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	-617	-616
Analyzer IP address	192.168.1.42		Lamp voltage	868	868
Calculated slope	0.987114	0.999415	Chamber temp	45	45
Calculated intercept	-0.081677	-0.098555	Pressure	550.5	550.2
Analyzer Background	14.3	13.8	Flow	1.045	1.047
Analyzer Coefficient	0.852	0.828	Intensity	94	94
			Converter temp.	332	330

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

### Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6000	0.0	0.0	0.1	----
as found span	6000	46.1	74.9	76.3	0.982
SO2 scrubber check	5000	14.7	149.9	2.6	----
calibrator zero	6000	0.0	0.0	0.1	----
high point	6000	46.1	74.9	74.9	1.000
second point	6000	25.8	41.9	42.3	0.991
third point	6000	15.4	25.0	25.0	0.999
as left zero	6000	0.0	0.0	0.2	----
as left span	6000	46.1	74.9	74.9	1.001
Average Correction Factor					0.997

Corrected As found	76.3	Previous response	76.0	% change	-0.4%
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**Notes:**

Inlet filter changed after as founds. Scrubber check performed after as founds. Span adjusted.

Calibration Performed By: Evan Magill



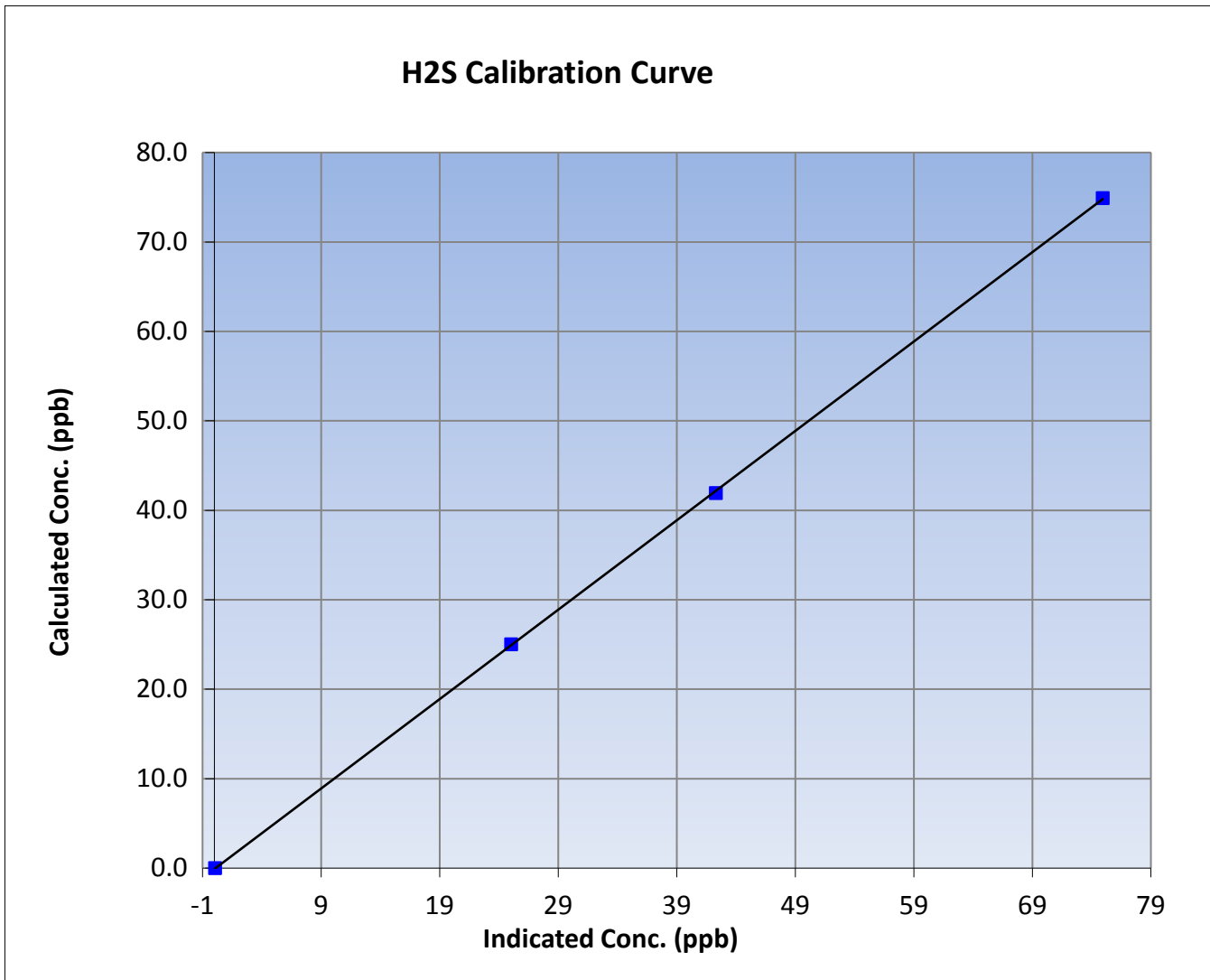
# Wood Buffalo Environmental Association H2S Calibration Report

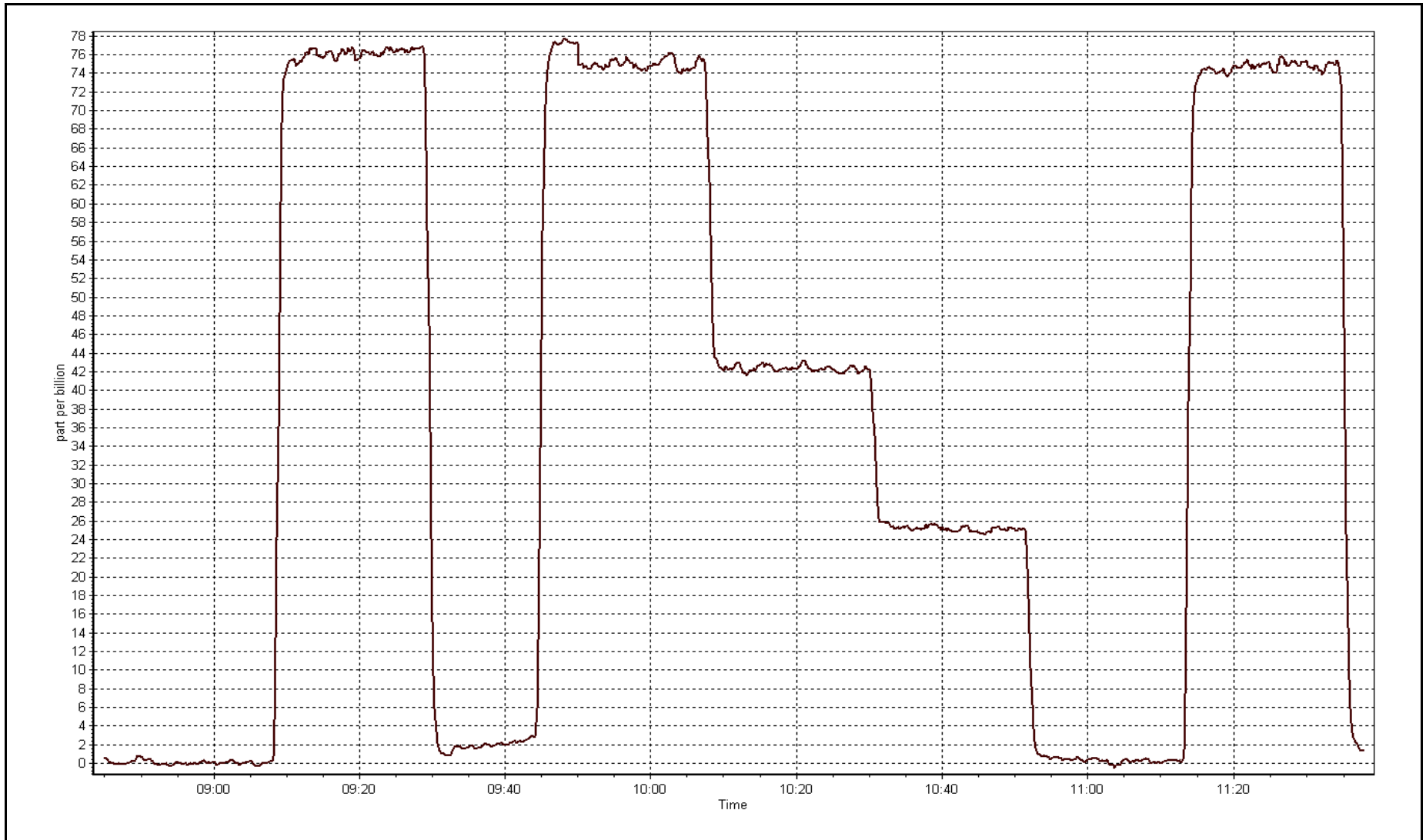
## Station Information

Calibration Date	July 10, 2015	Previous Calibration	June 10, 2015
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Start Time (MST)	8:45	End Time (MST)	11:40
Analyzer make	TEI 450i	Analyzer serial #	1336160094

## Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	0.999968
74.9	74.9	0.9996		
41.9	42.3	0.9909	Slope	0.999415
25.0	25.0	0.9994		
			Intercept	-0.098555







# Wood Buffalo Environmental Association THC Calibration Report

## Station Information

Calibration Date	July-07-15	Last Calibration	June-08-15
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Reason:	Routine		
Start Time (MST)	9:00	End Time (MST)	12:00
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	1.003694	0.999847	Fuel Pressure	19.9	19.9
Calculated intercept	-0.017895	-0.045579	Analyzer Coeff	4.2	4.1
			Analyzer BKG	0.970	0.950

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	0.06	----
as found span	5000	58.8	12.56	12.98	0.967
calibrator zero	5000	0.0	0.00	0.06	----
high point	5000	58.8	12.56	12.59	0.997
second point	5000	29.4	6.28	6.38	0.984
third point	5000	14.7	3.14	3.13	1.003
as left zero	5000	0.0	0.00	0.03	----
as left span	5000	58.8	12.56	12.61	0.996
Average Correction Factor					0.995

Corrected As found	12.92	Previous response	12.53	% change	-3.0%
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**Notes:**

Inlet filter replaced after as founds. Adjusted span.

Calibration Performed By:

Asad Hidayat



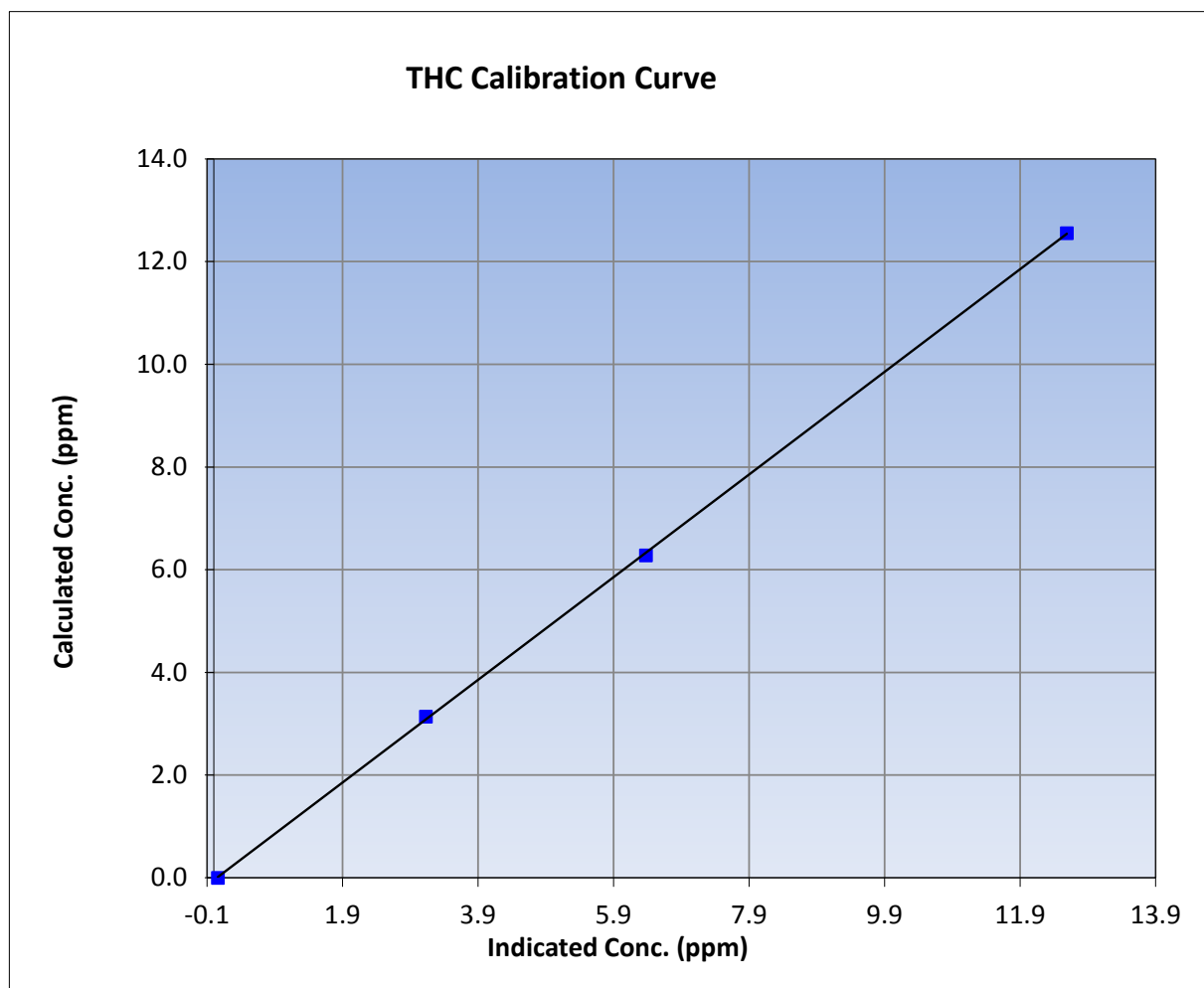
## Wood Buffalo Environmental Association THC Calibration Report

### Station Information

Calibration Date	July 7, 2015	Previous Calibration	June 8, 2015
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Start Time (MST)	9:00	End Time (MST)	12:00
Analyzer make	TEI 51i-LT	Analyzer serial #	1201650671

### Calibration Data

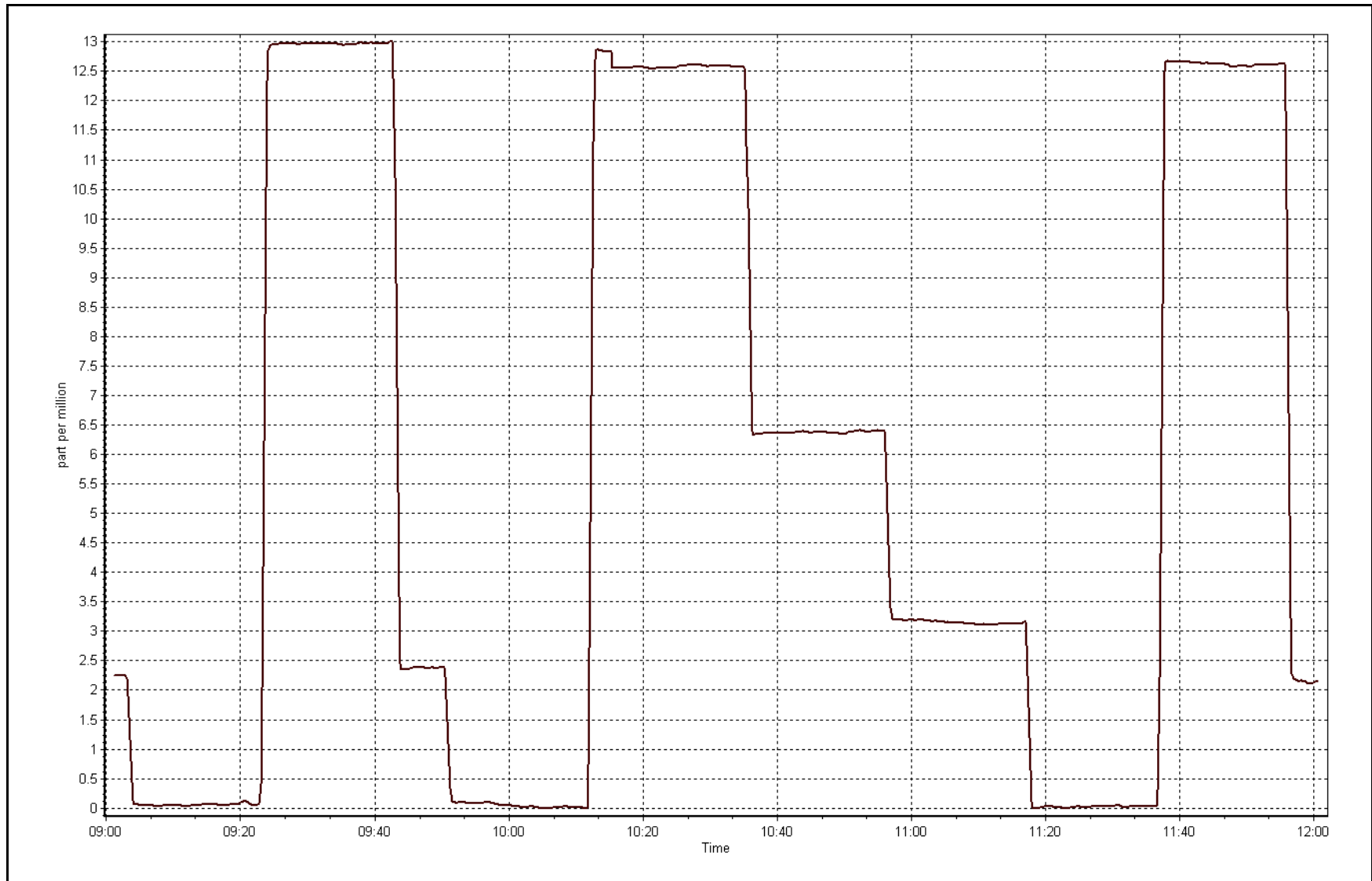
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.06	----	Correlation Coefficient	0.999925
12.56	12.59	0.9974		
6.28	6.38	0.9841	Slope	0.999847
3.14	3.13	1.0029		
			Intercept	-0.045579





THC Calibration Plot

Date: July 7, 2015





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## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

### CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT

#### **AMS 5 MANNIX JULY 2015**

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

August 26, 2015



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## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MANNIX (AMS 5)

JULY 2015

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	708	36	36	100.00	65	0	6	0
H2S (ppb) Average	707	36	37	99.87	17	10	5	2
THC (ppm) Average	708	36	36	100.00	3.9	-	2.8	-
Temperature 2 m (C) Average	711	0	33	95.56	31	-	22.1	-
Temperature 20 m (C) Average	711	0	33	95.56	30.9	-	22.7	-
Temperature 45 m (C) Average	711	0	33	95.56	30.5	-	22.6	-
Temperature 75 m (C) Average	711	0	33	95.56	30.1	-	22.6	-
Temperature 90 m (C) Average	711	0	33	95.56	30	-	22.6	-
Relative Humidity 2 m (%) Average	711	0	33	95.56	97	-	82	-
Relative Humidity 20 m (%) Average	711	0	33	95.56	98	-	81	-
Relative Humidity 45 m (%) Average	711	0	33	95.56	97	-	80	-
Relative Humidity 75 m (%) Average	711	0	33	95.56	96	-	80	-
Relative Humidity 90 m (%) Average	711	0	33	95.56	96	-	80	-
Wind Speed 20 m (km/h) Average	731	0	13	98.25	33	-	16	-
Wind Speed 45 m (km/h) Average	731	0	13	98.25	37	-	24	-
Wind Speed 75 m (km/h) Average	731	0	13	98.25	41	-	27	-
Wind Speed 90 m (km/h) Average	731	0	13	98.25	43	-	28	-
Wind Direction 20 m (deg) Average	731	0	13	98.25	-	-	-	-
Wind Direction 45 m (deg) Average	731	0	13	98.25	-	-	-	-
Wind Direction 75 m (deg) Average	731	0	13	98.25	-	-	-	-
Wind Direction 90 m (deg) Average	731	0	13	98.25	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	731	0	13	98.25	0.7	-	0.2	-
Vertical Wind Speed 45 m (km/h) Average	731	0	13	98.25	1.2	-	0.6	-
Vertical Wind Speed 75 m (km/h) Average	731	0	13	98.25	1.5	-	0.3	-
Vertical Wind Speed 90 m (km/h) Average	731	0	13	98.25	4.5	-	2.4	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MANNIX (AMS 5)  
 JULY 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	708	1.6	4	-	0	0	0	0	1	4	65
H2S (ppb) Average	707	1.3	2	-	0	0	0	0	1	3	17
THC (ppm) Average	708	2.24	0.3	-	1.9	2	2.1	2.1	2.3	2.6	3.9
Temperature 2 m (C) Average	711	18.02	4.6	-	6.8	12.2	14.5	17.8	21.7	24	31
Temperature 20 m (C) Average	711	18.24	4.2	-	7.2	12.7	15.1	18.1	21.6	23.5	30.9
Temperature 45 m (C) Average	711	18.17	4.1	-	7.2	12.6	15.1	18	21.4	23.2	30.5
Temperature 75 m (C) Average	711	18.13	4.1	-	7.3	12.7	15.1	18	21.3	23	30.1
Temperature 90 m (C) Average	711	18.11	4	-	7.4	12.9	15.2	18.1	21.1	22.9	30
Relative Humidity 2 m (%) Average	711	68.6	17	-	26	43	55	71	83	90	97
Relative Humidity 20 m (%) Average	711	64	17	-	23	39	51	66	78	85	98
Relative Humidity 45 m (%) Average	711	62.4	17	-	23	38	51	64	76	84	97
Relative Humidity 75 m (%) Average	711	61.7	17	-	23	38	49	63	75	83	96
Relative Humidity 90 m (%) Average	711	61.6	17	-	23	38	49	63	75	83	96
Wind Speed 20 m (km/h) Average	731	9.3	5	-	1	4	5	8	12	17	33
Wind Speed 45 m (km/h) Average	731	13.4	7	-	1	6	8	12	17	23	37
Wind Speed 75 m (km/h) Average	731	15.2	8	-	1	6	9	14	21	26	41
Wind Speed 90 m (km/h) Average	731	16.1	9	-	1	6	9	15	22	27	43
Wind Direction 20 m (deg) Average	731	-	-	-	-	-	-	-	-	-	-
Wind Direction 45 m (deg) Average	731	-	-	-	-	-	-	-	-	-	-
Wind Direction 75 m (deg) Average	731	-	-	-	-	-	-	-	-	-	-
Wind Direction 90 m (deg) Average	731	-	-	-	-	-	-	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	731	-0.03	0.3	-	-0.9	-0.4	-0.2	0	0.2	0.3	0.7
Vertical Wind Speed 45 m (km/h) Average	731	0.12	0.4	-	-1	-0.3	-0.1	0.1	0.4	0.6	1.2
Vertical Wind Speed 75 m (km/h) Average	731	0.09	0.3	-	-1	-0.3	-0.1	0.1	0.3	0.5	1.5
Vertical Wind Speed 90 m (km/h) Average	731	0.97	1	-	-1.1	-0.1	0.3	0.8	1.5	2.4	4.5

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

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
H2S	02 Jul 2015 10:00	02 Jul 2015 10:00	1	Maintenance - manifold cleaning
Temperature, Relative Humidity 2, 20, 45, 75, 90 m	01 Jul 2015 02:00	02 Jul 2015 09:00	32	Maintenance - power and communication re-establishment
Temperature, Relative Humidity 2, 20, 45, 75, 90 m	17 Jul 2015 23:00	17 Jul 2015 23:00	1	DAS collection error - data not recorded
Wind Speed. Wind Direction, Vertical Wind Speed 20, 45, 75, 90 m	01 Jul 2015 02:00	01 Jul 2015 13:00	12	Maintenance - power cord replacement
Wind Speed. Wind Direction, Vertical Wind Speed 20, 45, 75, 90 m	17 Jul 2015 23:00	17 Jul 2015 23:00	1	DAS collection error - data not recorded



Summary of Hour Averages

Mannix - July 2015

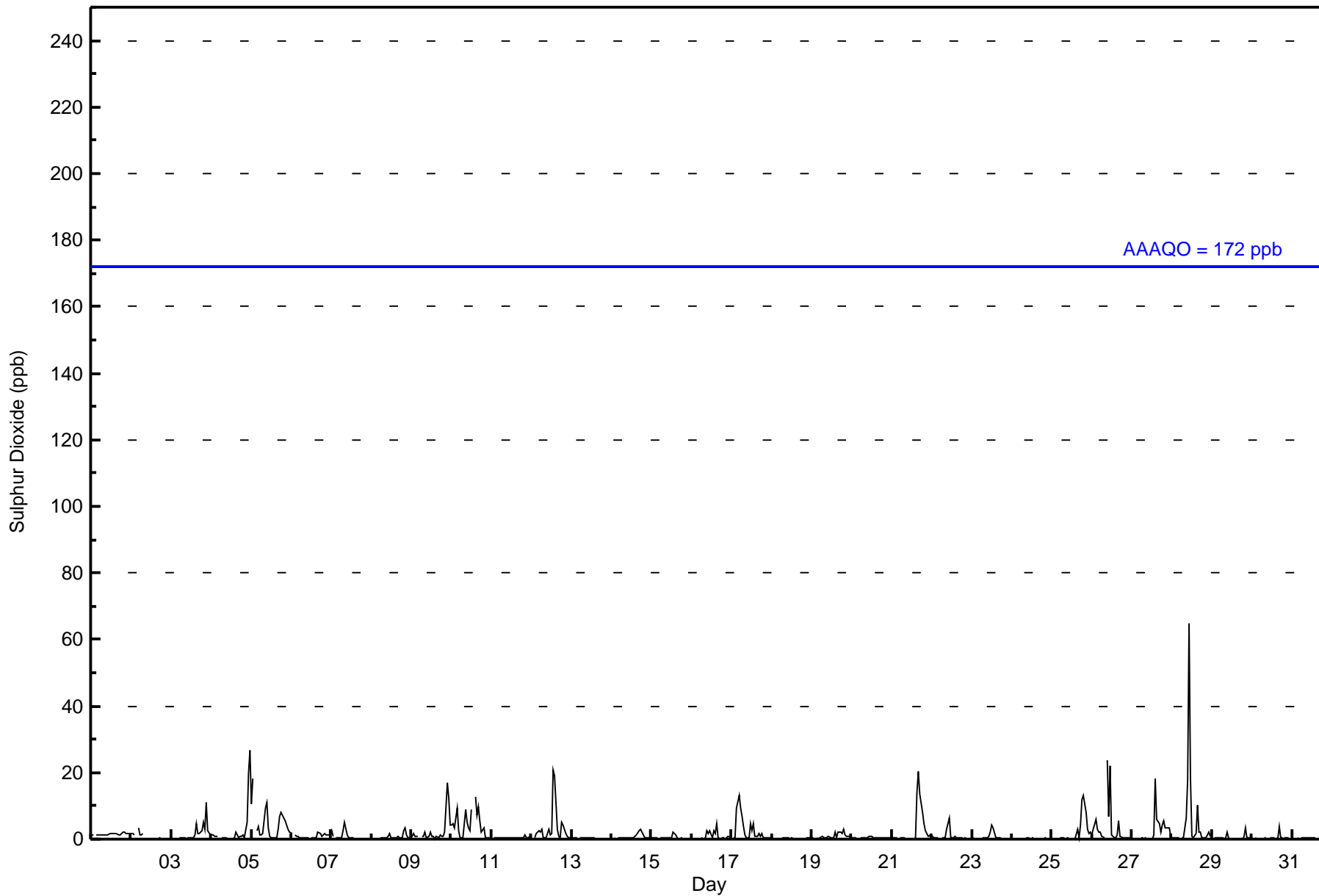
Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 65 ppb on Jul 28 11:00	Maximum Daily Average: 5.8 ppb on Jul 28		Hours of Data:	708
Minimum Value: 0 ppb on Jul 29 16:00	Minimum Daily Average: 0.2 ppb on Jul 24		Hours of Missing Data:	36
Maximum Diurnal Average: 3.3 ppb at hour 11	Minimum Diurnal Average: 0.7 ppb at hour 8		Hours of Calibration:	36
Monthly Average: 1.6 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 O <sub>3</sub> = 1 P <sub>90</sub> = 4 P <sub>99</sub> = 20		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	1	1	Z	1	1	1	1	1	1	1	1	2	2	2	2	1	1	1	2	2	2	2	2	2	1.5	2
2-Jul	2	1	1	Z	3	1	1	2	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.8	3
3-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	5	2	2	3	5	3	11	3	1	1.7	11
4-Jul	1	1	1	1	1	Z	0	0	0	0	0	0	0	0	0	2	0	1	1	1	0	5	20	27	2.8	27
5-Jul	11	18	Z	2	4	1	1	2	9	11	3	1	1	1	1	0	3	7	8	6	5	4	3	2	4.5	18
6-Jul	2	Z	1	1	1	1	0	0	0	0	0	0	0	0	1	2	2	1	1	2	1	1	1	1	0.9	2
7-Jul	2	1	Z	0	0	0	0	3	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	5
8-Jul	0	0	0	Z	0	0	0	0	0	1	1	2	1	0	0	1	1	0	0	3	3	1	0	0	0.7	3
9-Jul	1	2	1	1	1	Z	1	1	2	0	1	2	1	1	0	1	0	1	1	1	2	17	12	4	2.3	17
10-Jul	4	5	3	9	2	1	0	0	9	5	4	3	9	Z	13	7	10	6	2	3	0	0	0	0	4.2	13
11-Jul	Z	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0.4	1
12-Jul	1	Z	1	2	2	2	3	1	0	0	3	1	2	21	19	3	1	1	5	4	2	1	0	1	3.3	21
13-Jul	1	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	1
14-Jul	0	0	0	Z	0	0	0	0	1	1	1	0	0	0	1	1	3	3	2	1	1	0	0	0	0.8	3
15-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0.4	2
16-Jul	0	0	0	0	0	Z	0	0	1	3	2	3	1	3	2	5	0	0	0	0	0	0	1	1	0.9	5
17-Jul	Z	1	1	9	13	9	7	4	1	1	0	5	3	5	1	1	2	1	2	0	0	0	0	0	2.8	13
18-Jul	0	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-Jul	0	0	Z	0	0	0	1	0	0	0	1	0	0	1	2	0	2	2	2	3	1	1	1	1	0.9	3
20-Jul	0	0	0	0	Z	0	0	0	0	1	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0.4	1
21-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	14	20	13	8	5	2	2	1	1	3.1	20
22-Jul	1	1	0	0	0	Z	0	0	0	3	6	0	0	0	1	0	0	0	0	0	0	0	0	0	0.7	6
23-Jul	Z	0	0	0	0	0	0	0	0	0	1	2	4	3	0	0	0	0	0	0	0	0	0	0	0.7	4
24-Jul	0	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-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	3	0	4	12	13	8	3	2	2	2.2	13
26-Jul	1	3	6	3	2	2	1	1	Z	24	7	22	1	0	0	1	5	1	0	0	0	1	0	0	3.6	24
27-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	1	18	6	5	2	4	6	4	4	4	3	1	2.4	18
28-Jul	0	0	0	0	0	Z	0	1	7	18	65	18	1	0	2	10	2	2	1	0	1	1	2	1	5.8	65
29-Jul	Z	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	3	1	1	0	0.5	3
30-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0.4	4
31-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0.3	1

1.1	1.4	0.8	1.2	1.3	0.9	0.8	0.7	1.5	2.5	3.3	2.2	1.0	1.4	2.2	2.1	2.1	1.7	1.8	1.9	1.5	1.9	1.8	1.6	Diurnal Average
11	18	6	9	13	9	7	4	9	24	65	22	9	21	19	14	20	13	12	13	8	17	20	27	Diurnal Maximum

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







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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Mannix - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	685	96.75	96.75
11 - 20	18	2.54	99.29
21 - 60	4	0.56	99.86
61 - 110	1	0.14	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



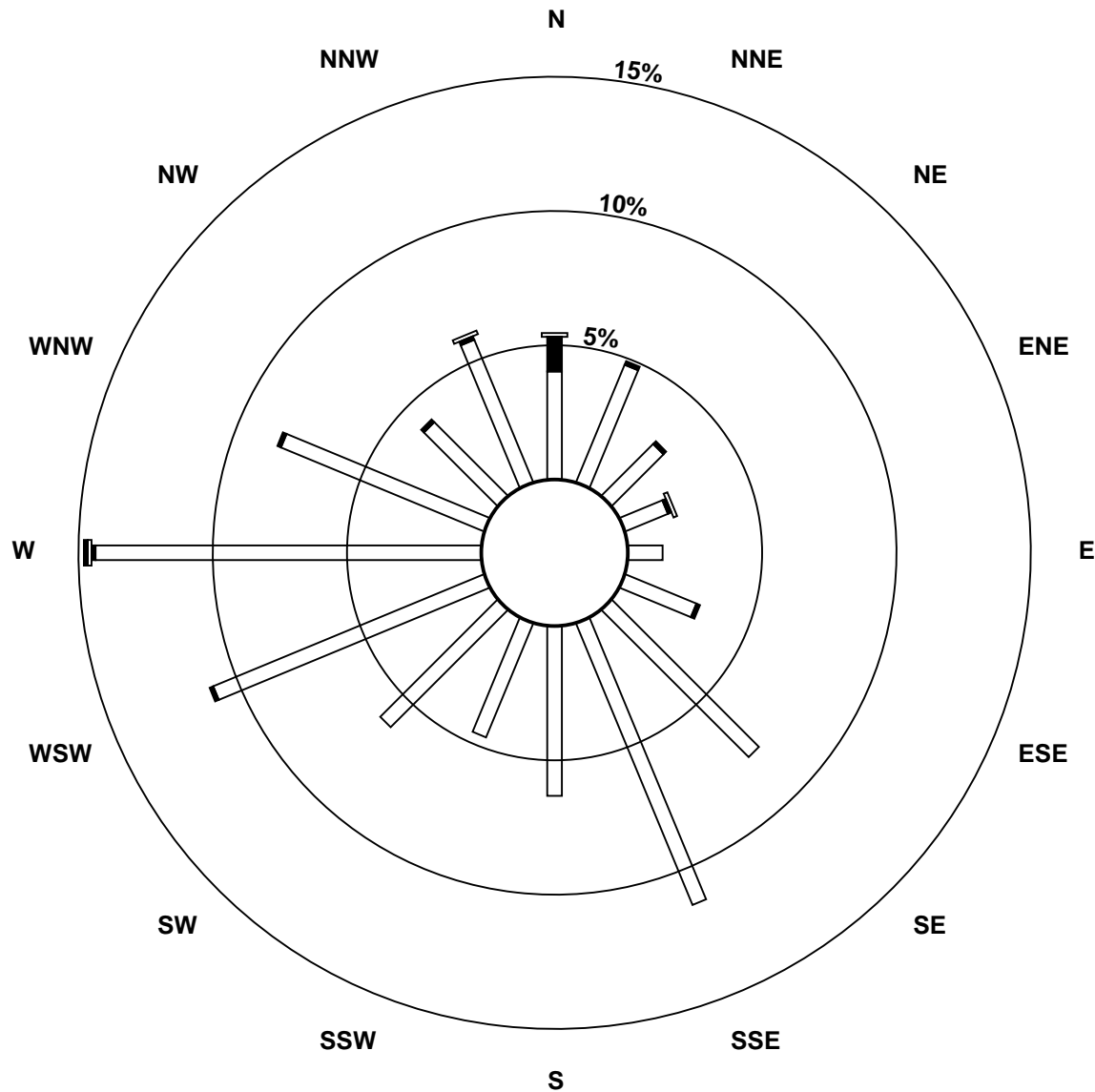
**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Mannix - July 2015**

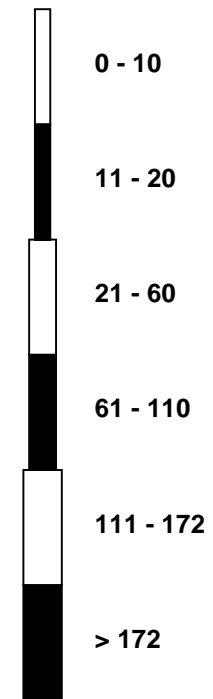
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	28	33	19	12	9	20	54	79	44	32	43	76	100	57	27	40	673
11 - 20	9	1	1	1	0	1	0	0	0	0	0	1	1	1	1	1	18
21 - 60	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	4
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>38</b>	<b>34</b>	<b>20</b>	<b>14</b>	<b>9</b>	<b>21</b>	<b>54</b>	<b>79</b>	<b>44</b>	<b>32</b>	<b>43</b>	<b>77</b>	<b>103</b>	<b>58</b>	<b>28</b>	<b>42</b>	<b>696</b>

Total Number of Valid Hours: 696

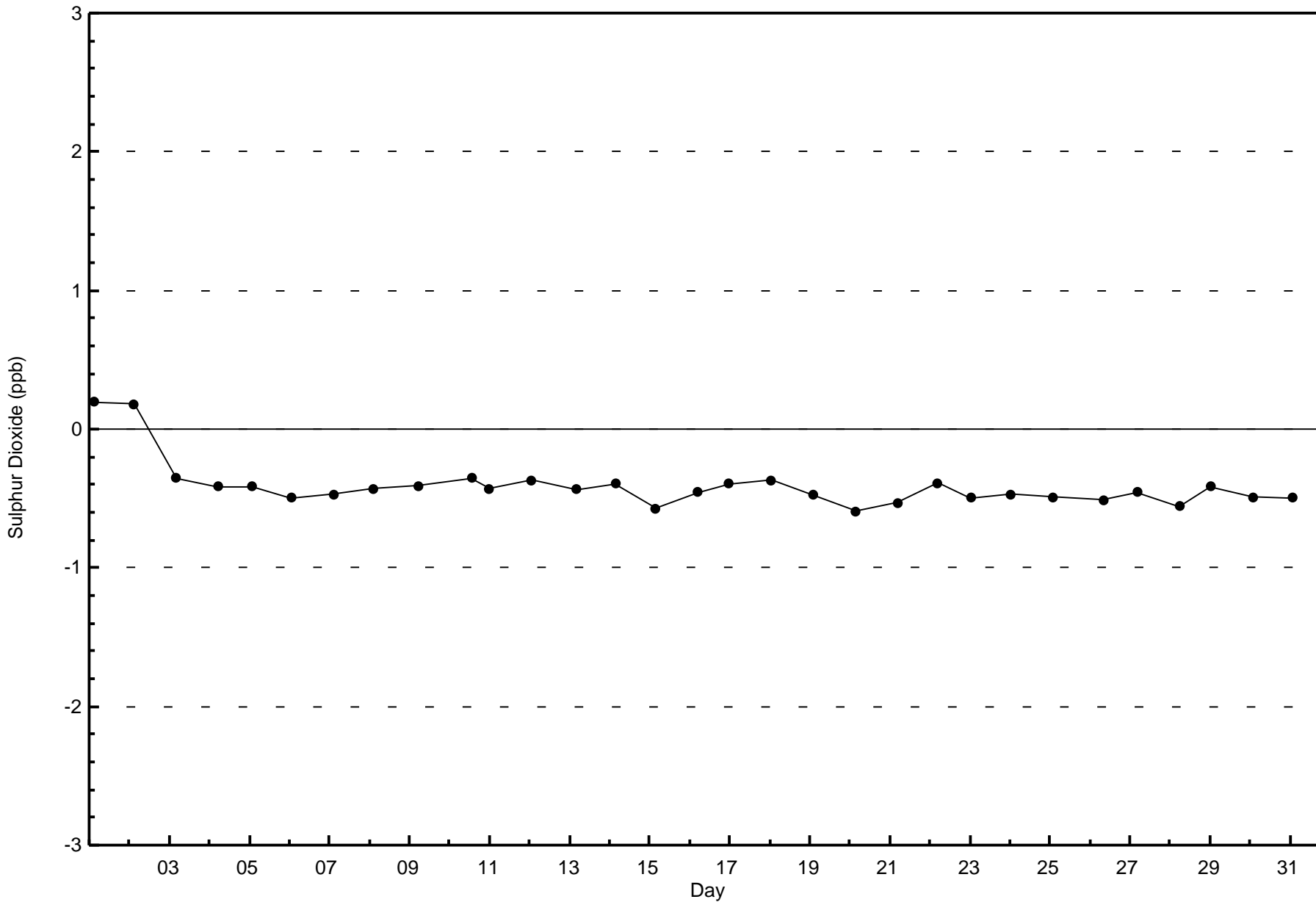
Total Number of Hours: 744

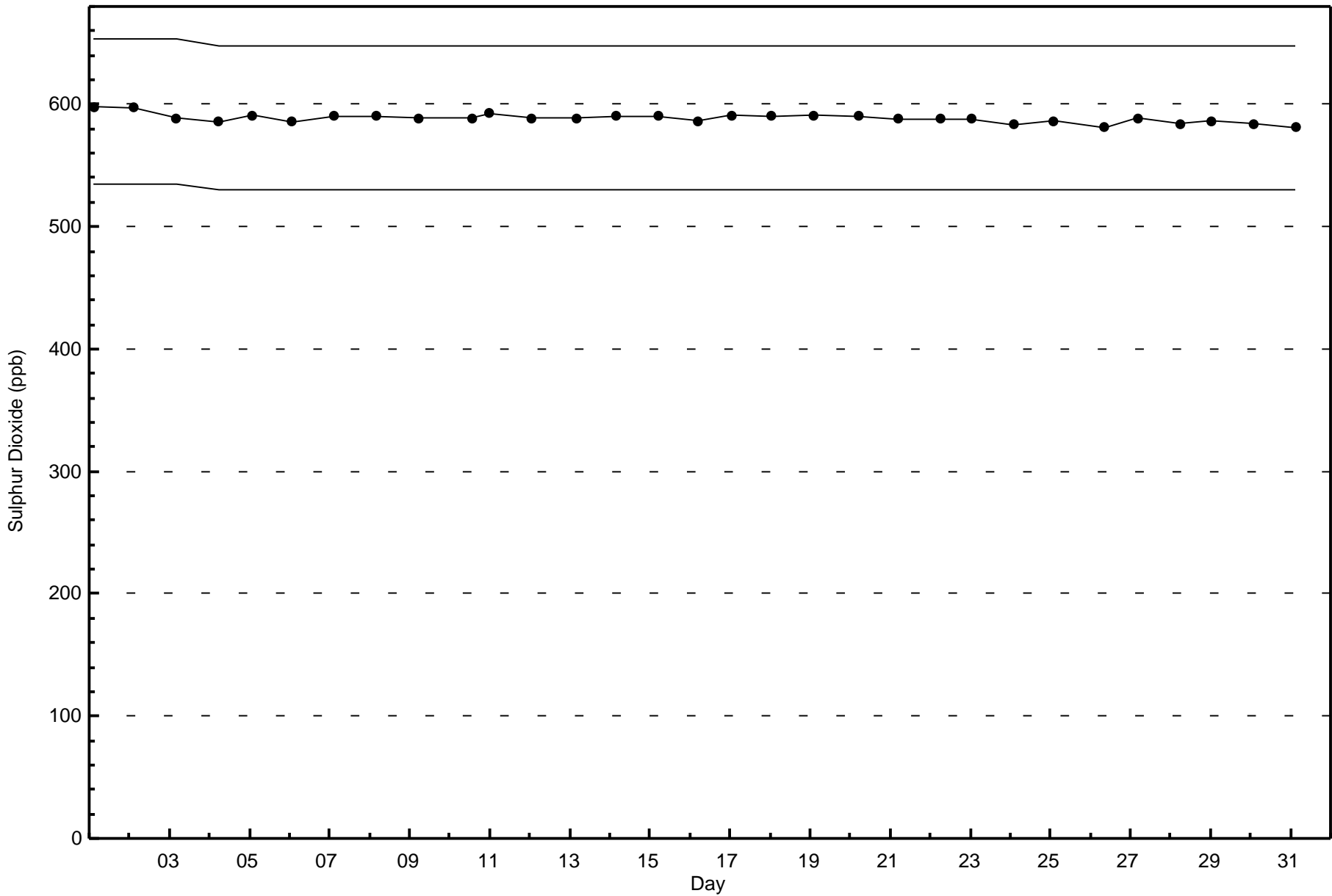


Classes (ppb)



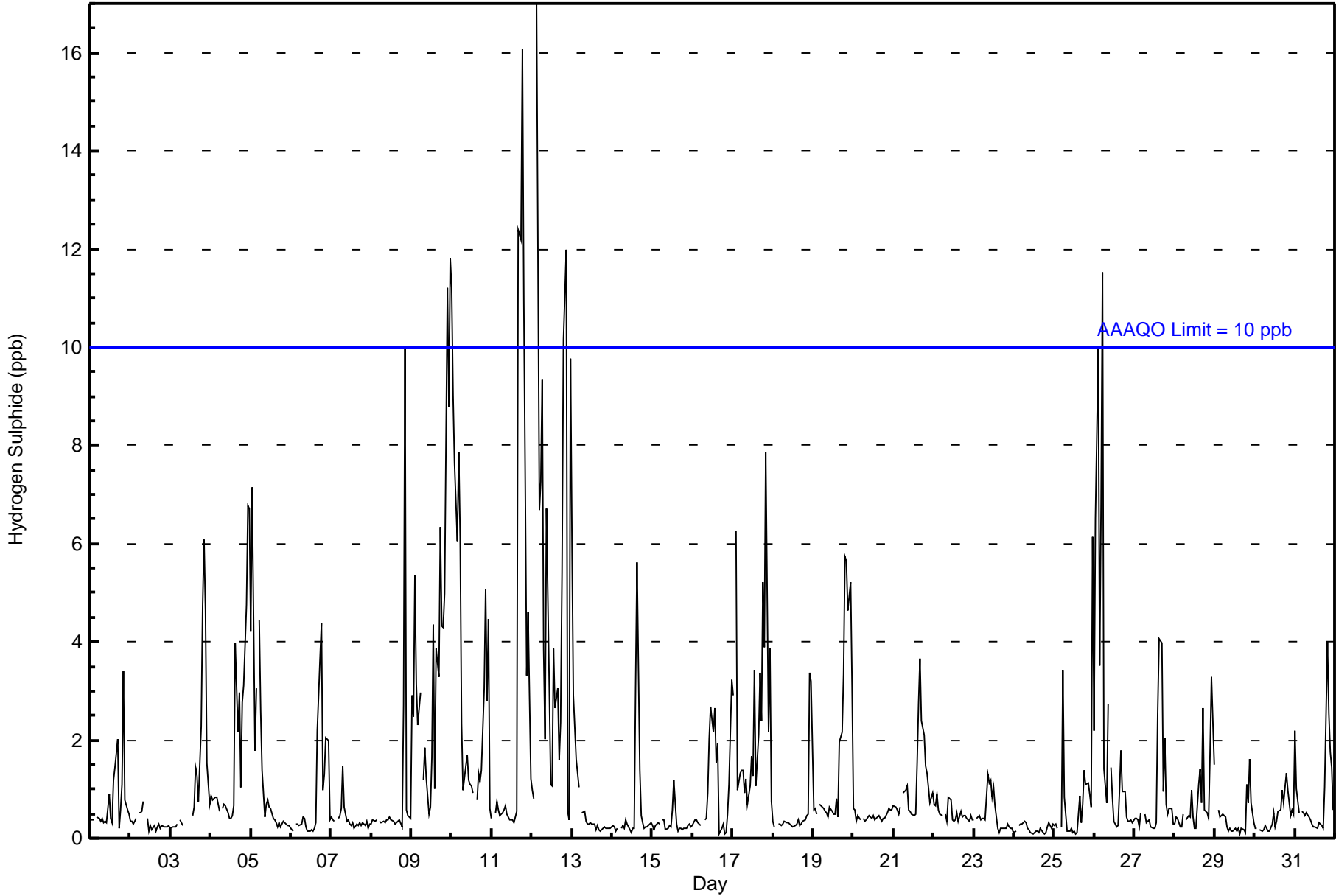
Total Number of Valid Hours: 696







Number of Exceedences (AAAQO): 1-hr: 10 24-hr: 2 Maximum Value: 17 ppb on Jul 12 04:00 Maximum Daily Average: 4.9 ppb on Jul 12																	Hours in Service: 744 Hours of Data: 707									
Minimum Value: 0 ppb on Jul 25 14:00 Minimum Daily Average: 0.2 ppb on Jul 24 Maximum Diurnal Average: 2.5 ppb at hour 21 Minimum Diurnal Average: 0.5 ppb at hour 13 Monthly Average: 1.3 ppb Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 O <sub>3</sub> = 1 P <sub>90</sub> = 3 P <sub>99</sub> = 11																	Hours of Missing Data: 37 Hours of Calibration: 36 Percent Operational Time: 99.9									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	0	0	0	Z	0	0	0	0	0	0	0	1	0	0	1	1	2	0	1	1	3	1	1	0	0.7	3
2-Jul	0	0	0	0	Z	1	1	1	1	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
3-Jul	0	0	0	0	0	Z	0	0	C	C	C	C	C	0	1	1	1	1	2	5	6	5	2	1.5	6	
4-Jul	1	1	1	1	1	1	Z	1	1	1	1	1	0	0	1	4	2	3	1	3	3	5	7	1.9	7	
5-Jul	4	7	2	3	Z	4	3	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1.4	7	
6-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	2	4	4	1	1	2	2	0.9	4	
7-Jul	0	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	
8-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	10	1	0	0.9	10	
9-Jul	3	2	5	3	2	3	Z	1	2	1	0	1	2	4	1	4	3	6	4	4	5	11	9	3.9	12	
10-Jul	11	9	8	6	8	6	2	1	1	2	1	1	1	1	Z	1	1	1	1	3	5	3	4	3.4	11	
11-Jul	0	Z	1	1	1	0	1	1	1	1	0	0	0	0	0	1	12	12	16	11	7	3	5	3.3	16	
12-Jul	1	1	Z	17	7	7	9	4	2	7	3	1	1	4	3	3	2	2	5	10	12	1	0	4.9	17	
13-Jul	6	3	2	1	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	6	
14-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	3	6	1	0	0	0	0	0	0	0.7	6	
15-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0.3	1	
16-Jul	0	0	0	0	0	0	Z	0	0	1	2	3	2	3	2	2	0	0	0	0	0	0	1	1.0	3	
17-Jul	3	Z	6	1	1	1	1	1	1	1	1	2	1	3	1	2	3	2	5	4	8	2	4	2.5	8	
18-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	0.6	3	
19-Jul	1	1	0	Z	1	1	1	1	1	0	1	1	0	0	1	0	2	2	3	6	6	5	5	1.8	6	
20-Jul	1	1	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.4	1	
21-Jul	1	1	1	0	1	Z	1	1	1	1	1	0	0	0	2	3	4	2	2	1	1	1	1	1.2	4	
22-Jul	1	1	1	1	0	0	Z	1	0	1	1	0	0	0	1	0	1	0	0	0	0	0	0	0.5	1	
23-Jul	0	Z	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0.5	1	
24-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
25-Jul	0	0	0	Z	0	3	1	0	0	0	0	0	0	0	0	1	0	1	1	1	1	1	1	0.9	6	
26-Jul	2	6	10	4	7	12	1	1	3	Z	1	1	0	0	0	1	2	1	1	0	0	0	0	2.4	12	
27-Jul	0	0	0	0	1	Z	0	0	0	0	0	0	0	0	3	4	4	1	2	1	1	1	1	0.9	4	
28-Jul	0	0	0	0	0	0	Z	0	0	0	1	0	0	0	1	1	1	3	1	1	0	2	3	0.9	3	
29-Jul	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	1	0.4	2	
30-Jul	0	0	Z	0	0	0	0	0	0	0	0	1	0	0	1	1	1	1	1	1	1	0	1	0.5	1	
31-Jul	2	1	1	Z	1	1	0	1	0	0	0	0	0	0	0	0	0	0	1	4	3	2	1	0.9	4	
1.4 1.4 1.6 1.6 1.3 1.8 1.0 0.7 0.7 0.7 0.6 0.6 0.5 0.8 0.8 1.3 1.5 1.5 1.8 2.1 2.5 1.6 1.8 1.8																								Diurnal Average		
11 9 10 17 8 12 9 4 3 7 3 3 2 4 3 6 12 12 16 11 12 11 9 12																								Diurnal Maximum		
Z - zerospan C - Calibration M - Maintenance Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb																										







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

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Mannix - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	602	85.15	85.15
3 - 4	55	7.78	92.93
5 - 7	30	4.24	97.17
8 - 11	10	1.41	98.59
> 11	10	1.41	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



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

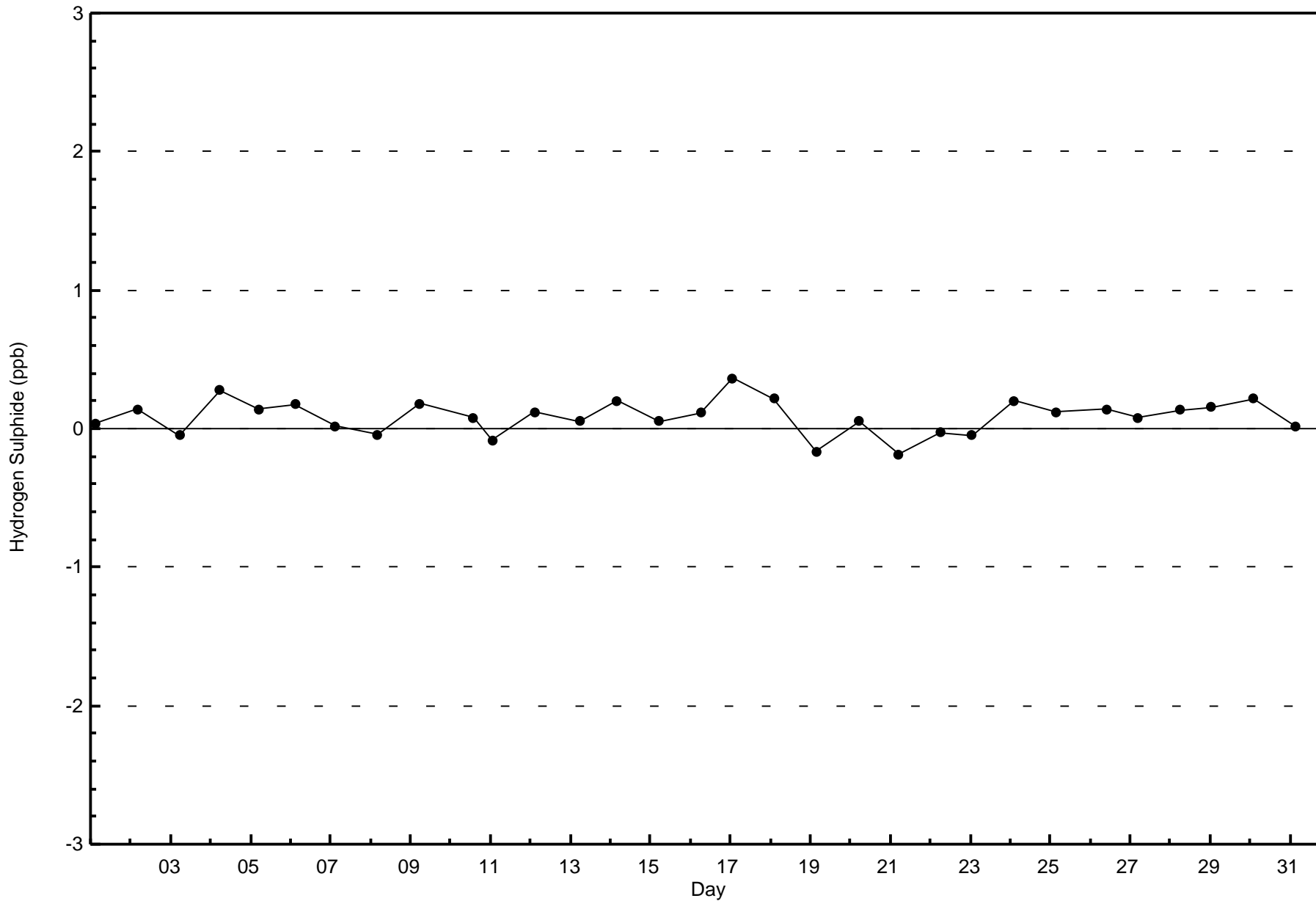
**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Mannix - July 2015**

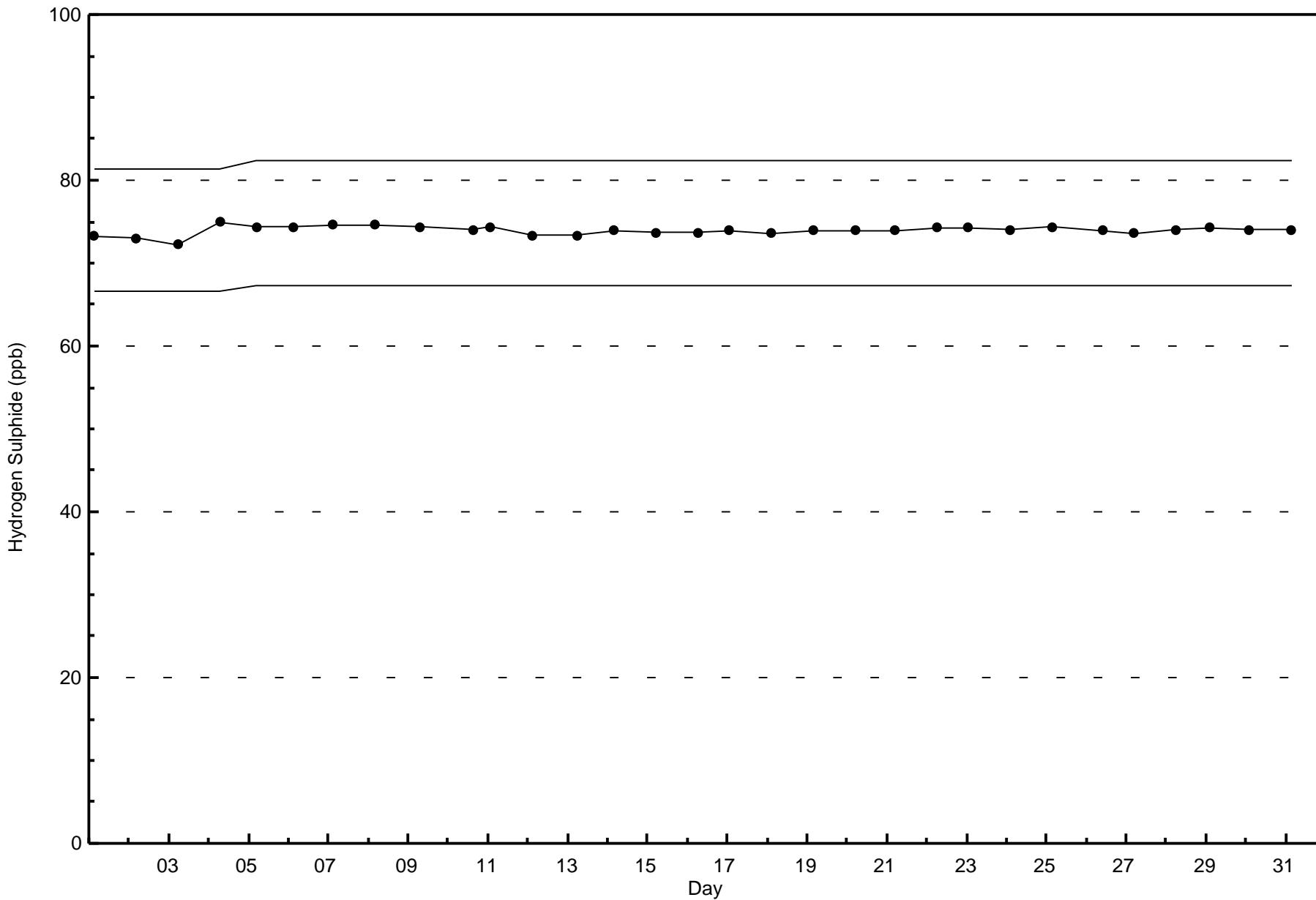
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	9	12	15	7	8	19	52	80	43	35	44	76	99	50	19	23	591
3 - 4	14	11	2	2	1	1	1	1	0	0	0	0	2	4	5	10	54
5 - 7	10	5	1	2	0	0	0	0	0	0	1	0	1	1	3	6	30
8 - 11	4	2	0	1	0	1	0	0	0	0	0	0	0	1	0	1	10
> 11	3	4	1	0	0	0	0	0	0	0	0	0	0	0	1	1	10
<b>Totals</b>	40	34	19	12	9	21	53	81	43	35	45	76	102	56	28	41	695

Total Number of Valid Hours: 695

Total Number of Hours: 744

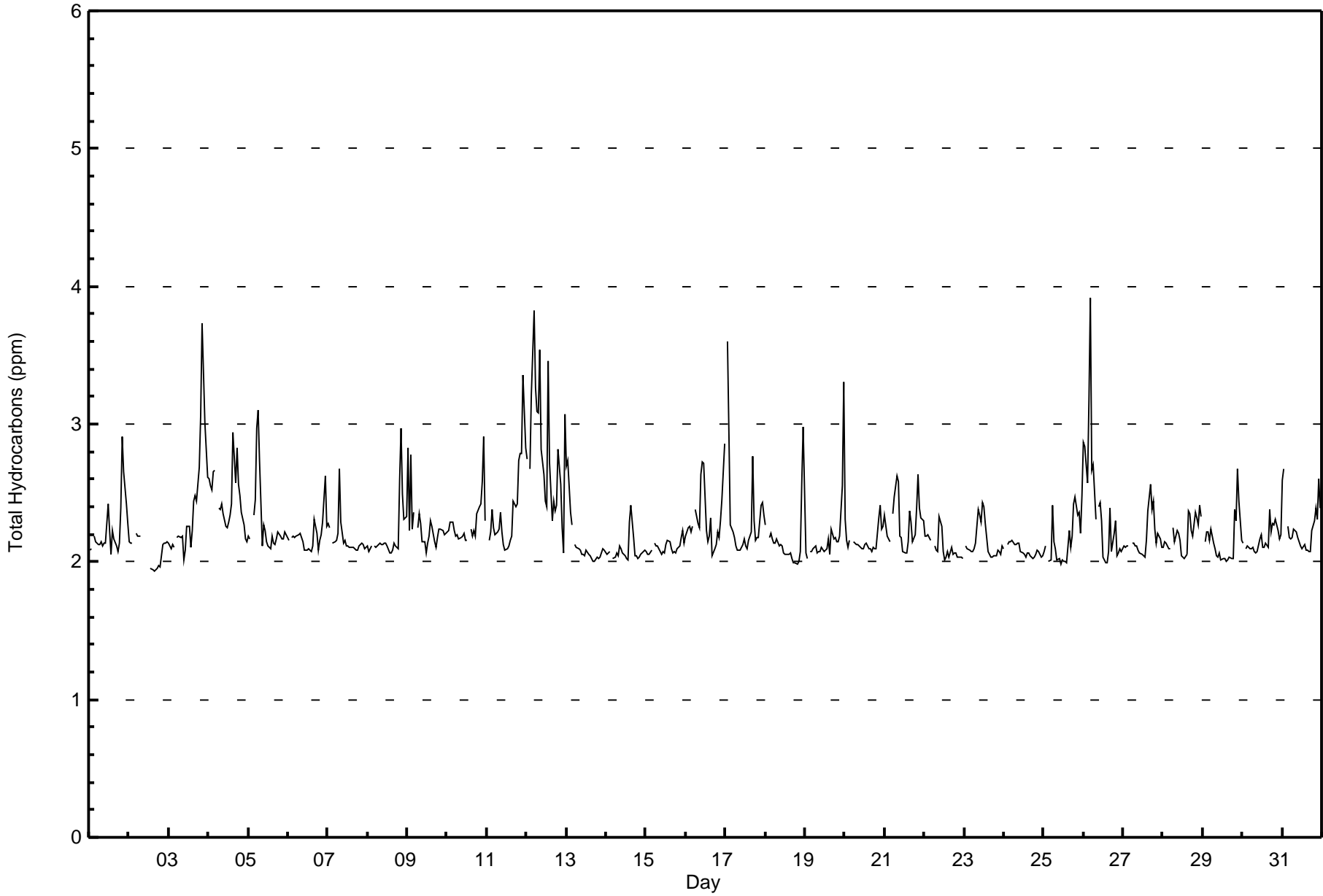








Maximum Value: 3.9 ppm on Jul 26 05:00		Maximum Daily Average: 2.8 ppm on Jul 12		Hours in Service: 744																							
Minimum Value: 1.9 ppm on Jul 2 16:00		Minimum Daily Average: 2.1 ppm on Jul 2		Hours of Data: 708																							
Maximum Diurnal Average: 2.3 ppm at hour 24		Minimum Diurnal Average: 2.1 ppm at hour 13		Hours of Missing Data: 36																							
Monthly Average: 2.24 ppm		Percentiles: P <sub>1</sub> = 2.0 P <sub>10</sub> = 2.0 Q <sub>1</sub> = 2.1 Median = 2.1 Q <sub>3</sub> = 2.3 P <sub>90</sub> = 2.6 P <sub>99</sub> = 3.3		Hours of Calibration: 36																							
				Percent Operational Time: 100.0																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jul	2.1	2.1	Z	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.4	2.2	2.1	2.2	2.2	2.1	2.1	2.1	2.4	2.9	2.7	2.4	2.3	2.2	2.9	
2-Jul	2.1	2.1	2.1	Z	2.2	2.2	2.2	2.2	C	C	C	C	C	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.2	
3-Jul	2.1	2.1	2.1	2.1	Z	2.2	2.2	2.2	2.2	2.0	2.1	2.3	2.3	2.1	2.2	2.4	2.5	2.4	2.7	3.1	3.7	3.4	3.0	2.6	2.4	3.7	
4-Jul	2.6	2.6	2.5	2.7	2.7	Z	2.4	2.4	2.4	2.4	2.3	2.2	2.3	2.3	2.4	2.9	2.6	2.8	2.6	2.5	2.4	2.3	2.2	2.2	2.2	2.5	2.9
5-Jul	2.2	2.2	Z	2.3	2.5	3.0	3.1	2.7	2.1	2.3	2.2	2.1	2.1	2.1	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	3.1
6-Jul	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.2	2.1	2.2	2.2	2.3	2.6	2.3	2.2	2.6	
7-Jul	2.3	2.2	Z	2.1	2.2	2.2	2.2	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	2.1	2.2	2.7
8-Jul	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.6	3.0	2.5	2.3	2.3	2.2	2.2	3.0
9-Jul	2.8	2.2	2.8	2.2	2.4	Z	2.2	2.4	2.3	2.1	2.1	2.1	2.1	2.2	2.3	2.3	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.8
10-Jul	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.4	2.4	2.4	2.6	2.9	2.3	2.3	2.9	
11-Jul	Z	2.2	2.2	2.4	2.2	2.2	2.2	2.2	2.4	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.4	2.4	2.4	2.7	2.8	2.8	3.4	2.8	2.4	3.4	
12-Jul	2.7	Z	2.7	3.2	3.8	3.3	3.1	3.1	3.5	2.8	2.6	2.4	2.4	3.5	2.7	2.3	2.4	2.4	2.4	2.8	2.6	2.2	2.1	3.1	2.8	3.8	
13-Jul	2.7	2.7	2.4	2.3	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.7
14-Jul	2.1	2.1	2.1	Z	2.0	2.0	2.1	2.0	2.1	2.1	2.1	2.0	2.0	2.0	2.3	2.4	2.2	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.4
15-Jul	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.2
16-Jul	2.2	2.2	2.3	2.2	2.3	Z	2.4	2.3	2.3	2.6	2.7	2.7	2.2	2.1	2.2	2.3	2.0	2.1	2.1	2.2	2.2	2.3	2.5	2.9	2.3	2.9	
17-Jul	Z	3.6	2.9	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.2	2.2	2.8	2.3	2.2	2.2	2.2	2.4	2.4	2.3	2.3	3.6	
18-Jul	2.3	Z	2.2	2.2	2.2	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.6	3.0	2.2	3.0	
19-Jul	2.1	2.0	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.2	2.2	2.1	2.1	2.2	2.5	3.3	2.2	3.3	
20-Jul	2.3	2.2	2.1	2.2	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.4	2.2	2.3	2.2	2.4	
21-Jul	2.3	2.2	2.2	2.2	Z	2.4	2.5	2.6	2.6	2.2	2.2	2.1	2.1	2.1	2.1	2.4	2.3	2.1	2.2	2.4	2.6	2.4	2.3	2.3	2.3	2.6	
22-Jul	2.2	2.2	2.2	2.2	2.2	Z	2.1	2.1	2.1	2.3	2.3	2.1	2.0	2.0	2.1	2.0	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.3
23-Jul	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.4	2.3	2.3	2.4	2.4	2.3	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.4
24-Jul	2.1	Z	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.1	2.2
25-Jul	2.1	2.1	Z	2.0	2.0	2.4	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.1	2.2	2.4	2.5	2.3	2.4	2.2	2.5	2.2	2.5	
26-Jul	2.9	2.8	2.6	3.2	3.9	2.7	2.7	2.3	Z	2.4	2.4	2.3	2.0	2.0	2.0	2.1	2.4	2.1	2.2	2.3	2.0	2.1	2.1	2.1	2.1	2.4	3.9
27-Jul	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.2	2.4	2.6	2.4	2.4	2.2	2.1	2.2	2.2	2.1	2.2	2.6	
28-Jul	2.1	2.1	2.1	2.1	2.1	Z	2.2	2.1	2.2	2.2	2.2	2.0	2.0	2.0	2.1	2.4	2.4	2.2	2.2	2.4	2.3	2.3	2.4	2.3	2.2	2.4	
29-Jul	Z	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.4	2.3	2.7	2.4	2.2	2.1	2.7	
30-Jul	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.4	2.2	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.4	
31-Jul	2.6	2.7	Z	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.4	2.3	2.6	2.4	2.2	2.7	
																								Diurnal Average			
																								Diurnal Maximum			
Z - zerospan		C - Calibration																									





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

**Total Hydrocarbons (THC) - ppm**  
**Mannix - July 2015**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	78	11.02	11.02
2.1 - 3.0	613	86.58	97.60
3.1 - 10.0	17	2.40	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744





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

**Total Hydrocarbons (THC) - ppm**  
**Mannix - July 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	3	8	6	5	5	15	34	1	0	1	78
2.1 - 3.0	37	34	20	13	9	18	51	71	38	27	37	62	69	54	24	37	601
3.1 - 10.0	1	0	0	1	0	3	0	0	0	0	1	0	0	3	4	4	17
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>38</b>	<b>34</b>	<b>20</b>	<b>14</b>	<b>9</b>	<b>21</b>	<b>54</b>	<b>79</b>	<b>44</b>	<b>32</b>	<b>43</b>	<b>77</b>	<b>103</b>	<b>58</b>	<b>28</b>	<b>42</b>	<b>696</b>

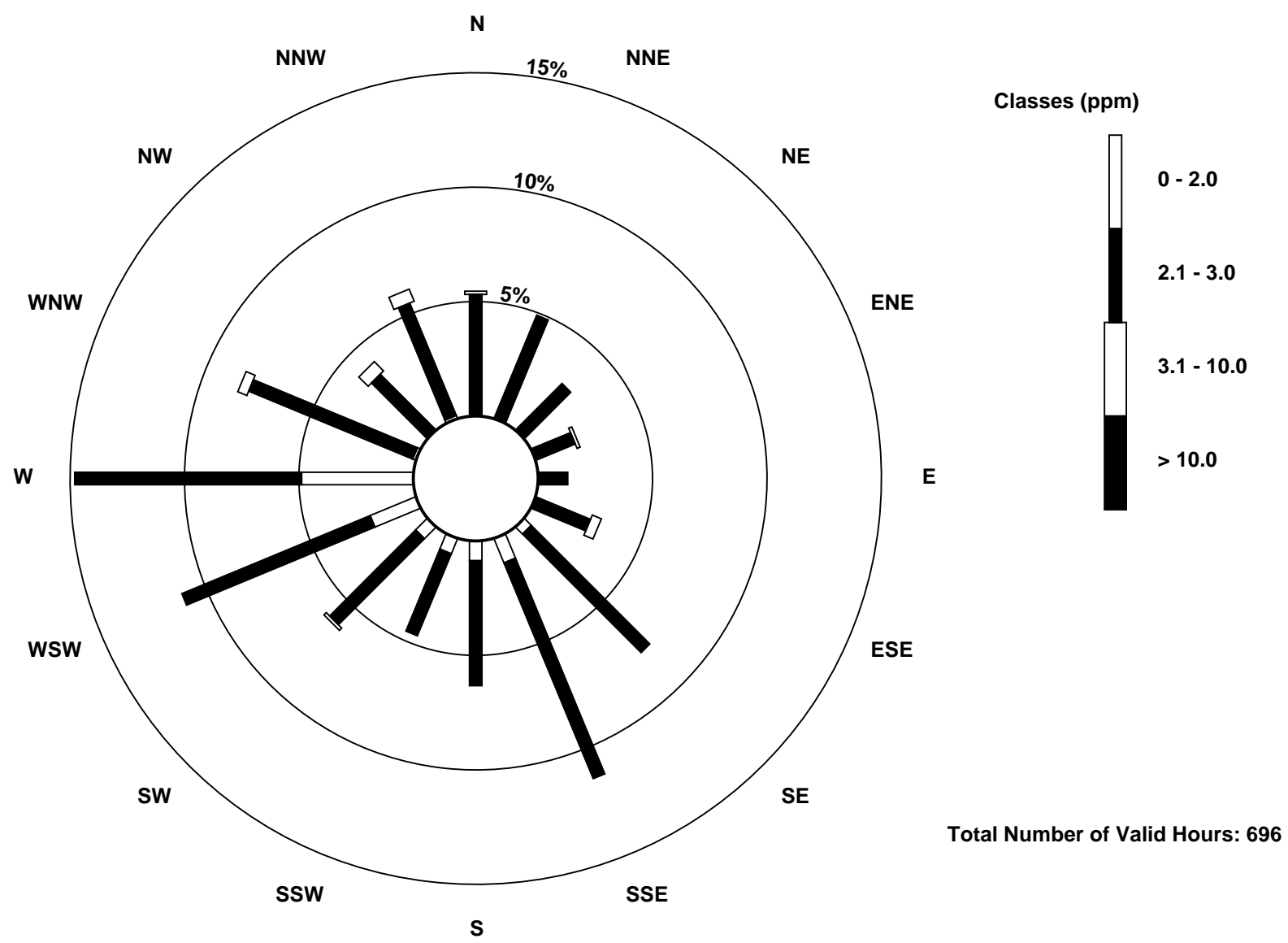
Total Number of Valid Hours: 696

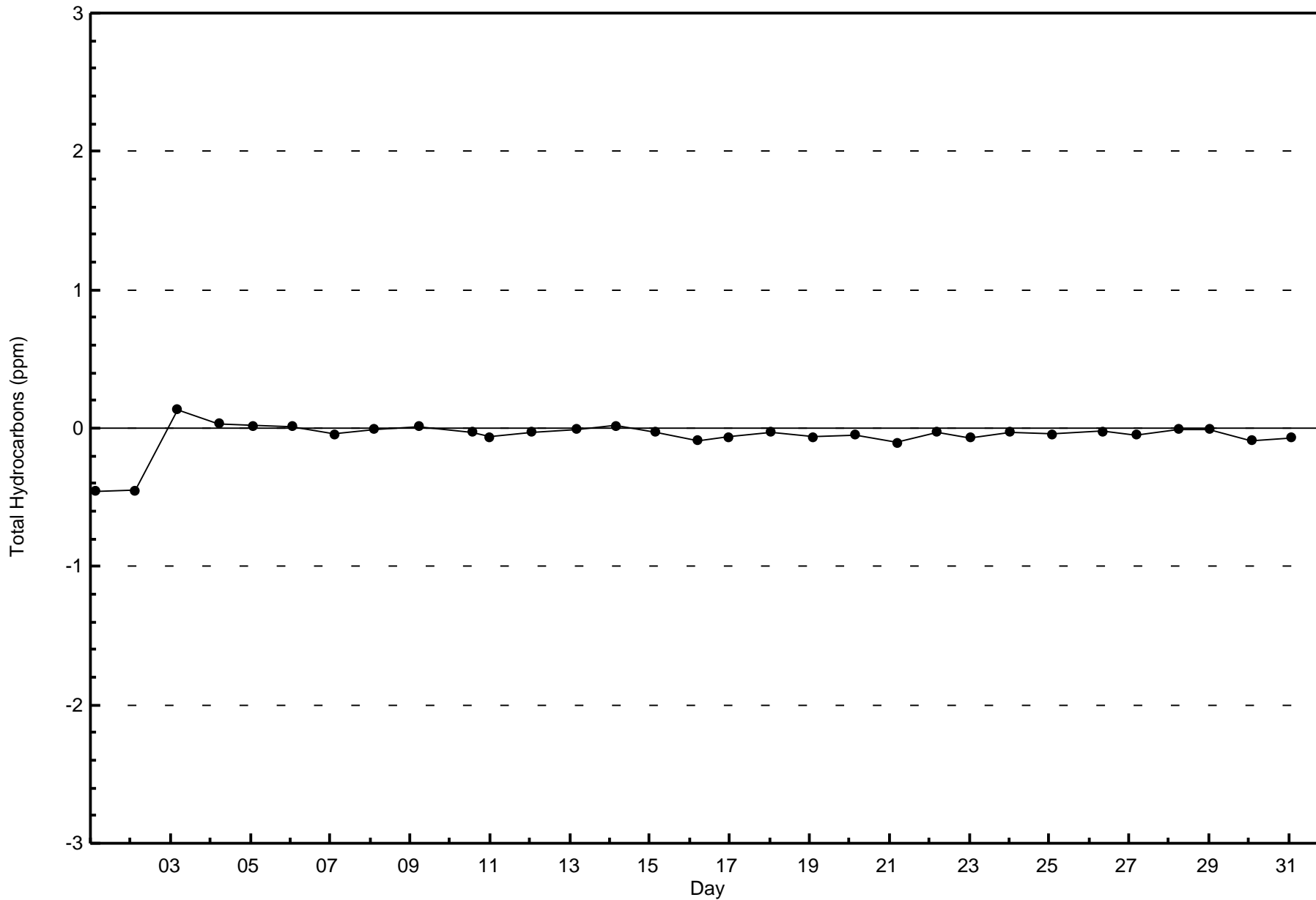
Total Number of Hours: 744

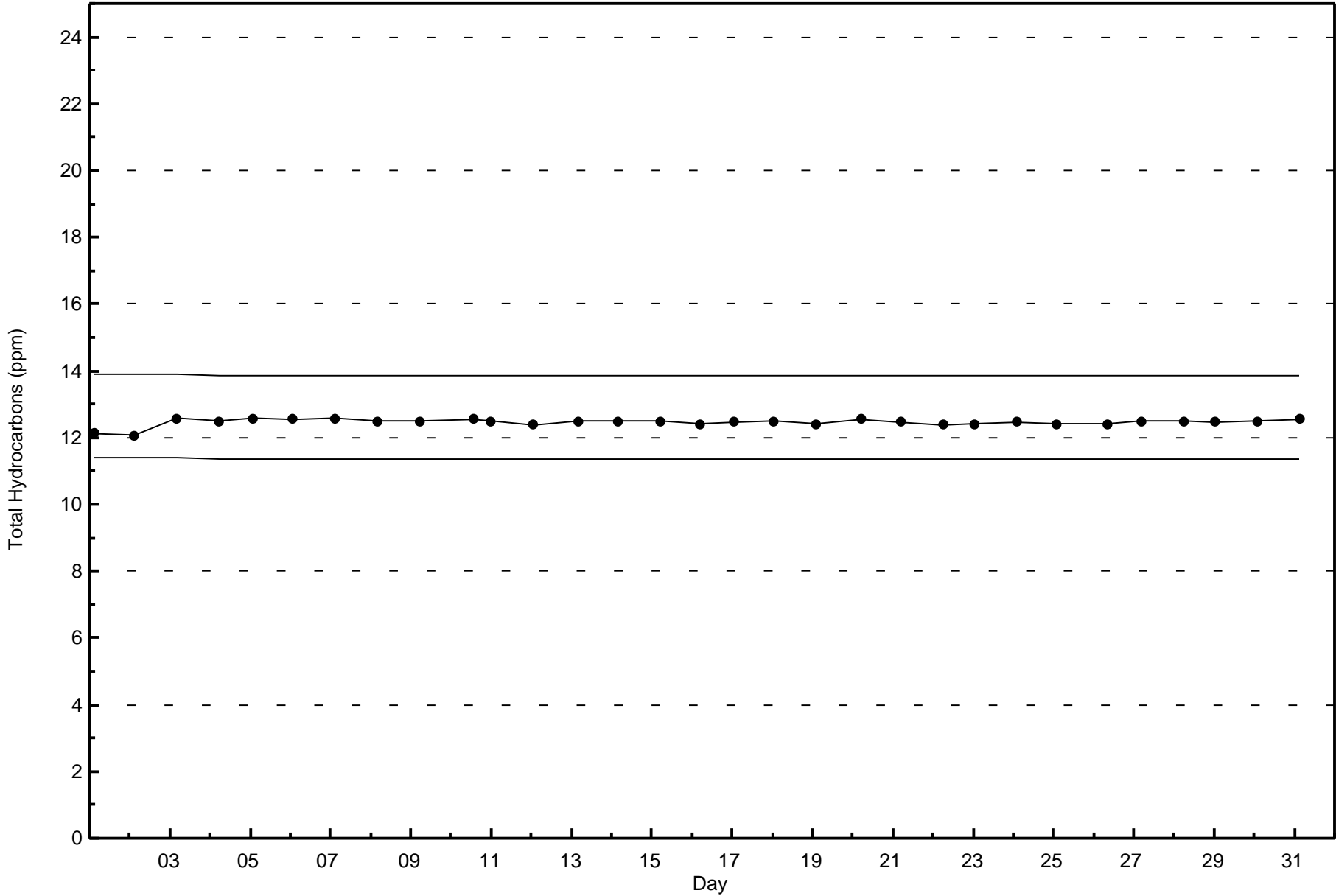


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

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

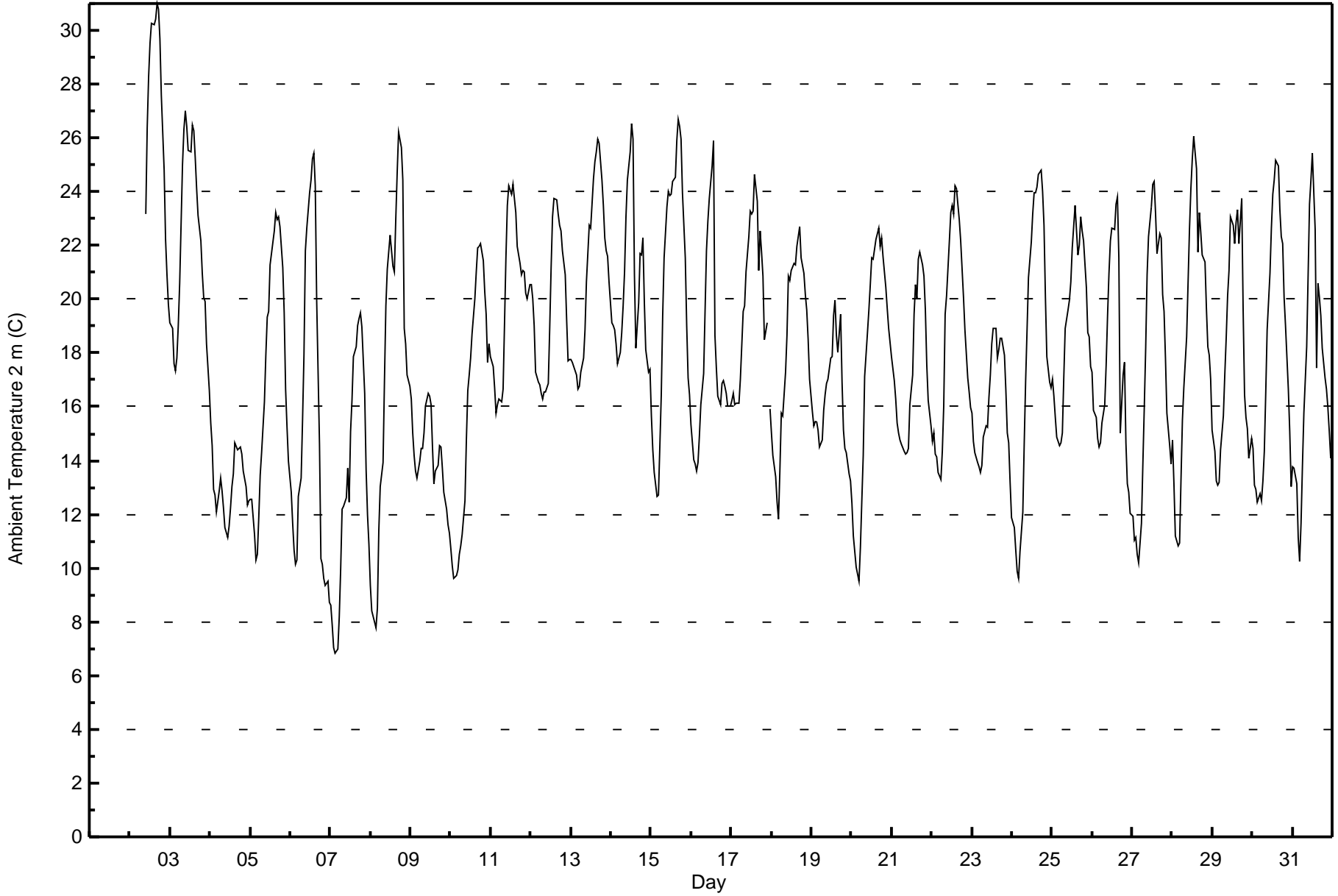








Maximum Value: 31.0 C on Jul 2 17:00		Maximum Daily Average: 22.1 C on Jul 3		Hours in Service: 744																						
Minimum Value: 6.8 C on Jul 7 04:00		Minimum Daily Average: 13.2 C on Jul 4		Hours of Data: 711																						
Maximum Diurnal Average: 22.4 C at hour 14		Minimum Diurnal Average: 12.9 C at hour 5		Hours of Missing Data: 33																						
Monthly Average: 18.02 C		Percentiles: P <sub>1</sub> = 8.4 P <sub>10</sub> = 12.2 Q <sub>1</sub> = 14.5 Median = 17.8 Q <sub>3</sub> = 21.7 P <sub>90</sub> = 24.0 P <sub>99</sub> = 29.4		Hours of Calibration: 0																						
				Percent Operational Time: 95.6																						
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-Jul	18.4	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	--	18.4
2-Jul	M	M	M	M	M	M	M	M	M	23.2	26.4	28.3	29.5	30.3	30.2	30.4	31.0	30.8	29.7	27.6	24.8	22.2	20.9	19.8	--	31.0
3-Jul	19.1	18.9	17.6	17.4	17.8	19.0	20.6	25.0	26.3	27.0	26.4	25.5	26.5	26.3	25.3	24.1	23.1	22.2	21.0	20.1	19.9	18.3	16.6	22.1	27.0	
4-Jul	15.4	14.5	12.9	12.7	12.1	12.8	13.4	12.9	12.2	11.5	11.1	11.5	12.3	13.1	13.5	14.6	14.4	14.5	14.3	13.6	13.0	12.4	12.5	13.2	15.4	
5-Jul	12.5	12.6	11.2	10.3	10.5	11.9	13.5	14.3	16.2	17.9	19.3	19.5	21.3	22.1	22.5	23.2	23.0	23.1	22.7	21.2	19.5	16.7	15.2	14.0	17.3	23.2
6-Jul	12.8	11.7	10.7	10.2	10.3	12.7	13.4	15.5	17.9	21.8	22.6	23.9	24.4	25.2	25.4	24.2	20.0	14.6	10.3	10.1	9.6	9.4	9.5	8.7	15.6	25.4
7-Jul	8.6	7.9	7.1	6.8	7.0	8.2	10.0	12.2	12.3	12.6	13.7	12.5	15.1	16.3	17.9	18.3	19.0	19.3	19.5	19.0	16.5	13.7	12.0	10.9	13.2	19.5
8-Jul	9.3	8.4	8.0	7.8	8.5	11.4	13.0	13.9	17.0	19.7	21.1	21.7	22.4	21.2	21.0	23.0	24.7	26.2	25.6	24.4	18.9	18.3	17.2	16.8	17.5	26.2
9-Jul	16.3	15.0	14.2	13.6	13.3	14.0	14.5	14.5	15.0	16.0	16.5	16.4	16.1	14.5	13.1	13.6	13.8	14.6	14.5	13.7	12.8	12.2	11.6	11.3	14.2	16.5
10-Jul	10.7	10.1	9.6	9.7	9.9	10.5	10.8	11.3	12.5	14.8	16.6	17.2	17.8	18.7	20.0	21.0	21.9	22.0	22.1	21.4	20.3	19.4	17.7	18.4	16.0	22.1
11-Jul	17.9	17.5	16.7	15.8	16.1	16.3	16.2	16.6	19.1	21.5	23.5	24.2	23.9	24.3	23.7	23.2	21.9	21.3	20.9	21.1	21.0	20.2	20.0	20.6	20.1	24.3
12-Jul	20.6	20.0	19.0	17.3	16.9	16.8	16.5	16.3	16.6	16.6	16.8	18.9	21.2	23.1	23.7	23.7	23.2	22.8	22.5	21.8	20.9	19.2	17.7	17.7	19.6	23.7
13-Jul	17.8	17.7	17.3	17.2	16.7	16.8	17.3	17.8	18.8	20.6	21.7	22.8	22.7	24.5	25.1	25.5	25.9	25.8	24.5	23.5	22.3	21.8	21.6	20.6	21.1	25.9
14-Jul	19.1	19.0	18.9	18.3	17.6	18.0	18.8	19.8	21.0	23.1	24.5	25.5	25.9	25.9	20.9	18.2	19.9	21.7	21.6	22.3	19.9	18.1	17.3	17.4	20.6	26.5
15-Jul	15.6	14.4	13.5	12.6	12.7	14.6	16.5	19.4	21.6	23.4	24.0	23.9	23.9	24.4	24.5	25.9	26.7	26.5	26.0	24.0	21.5	19.0	17.1	16.4	20.3	26.7
16-Jul	15.3	14.0	13.8	13.6	13.9	14.9	16.1	17.2	19.6	21.8	22.9	23.7	25.0	25.9	18.7	17.4	16.4	16.1	16.9	17.0	16.8	16.5	16.0	16.0	17.7	25.9
17-Jul	16.2	16.5	16.1	16.1	16.2	17.0	18.3	19.6	19.8	21.0	22.4	23.3	23.2	23.3	24.6	23.6	21.1	22.6	21.7	20.9	18.5	19.1	DF	15.9	19.9	24.6
18-Jul	15.0	14.2	13.4	12.4	11.8	13.7	15.8	15.7	17.3	18.7	20.9	20.7	21.1	21.3	21.3	21.9	22.3	22.7	21.5	20.9	20.2	19.6	18.5	17.0	18.2	22.7
19-Jul	15.8	15.3	15.4	15.5	15.1	14.5	14.8	15.9	16.5	16.8	17.0	17.8	17.9	19.4	20.0	18.7	18.0	19.4	16.9	15.1	14.5	14.3	13.5	13.2	16.3	20.0
20-Jul	12.4	11.2	10.6	10.0	9.5	10.8	12.5	14.2	17.1	18.7	19.6	20.6	21.6	21.5	22.2	22.4	22.7	21.9	22.3	21.6	20.5	19.6	18.9	18.4	17.5	22.7
21-Jul	17.9	17.0	16.3	15.4	15.0	14.7	14.6	14.3	14.2	14.3	14.5	16.1	17.2	19.4	20.5	20.0	21.5	21.7	21.3	20.8	19.6	17.6	16.3	15.3	17.3	21.7
22-Jul	14.7	15.0	14.2	14.1	13.5	13.3	14.3	16.0	19.5	20.1	22.2	23.2	23.5	23.2	24.2	24.1	22.9	22.2	21.1	20.1	18.8	17.1	16.6	16.0	18.8	24.2
23-Jul	15.7	14.7	14.3	13.9	13.8	13.5	13.8	14.9	15.3	15.2	16.4	17.2	18.3	18.9	18.9	17.8	18.1	18.5	18.5	17.9	16.6	15.0	14.6	13.2	16.1	18.9
24-Jul	11.9	11.5	10.7	9.9	9.6	10.6	12.1	14.6	17.0	18.8	20.8	22.1	23.2	24.0	24.0	24.2	24.6	24.8	24.0	22.7	20.1	17.9	16.9	16.7	18.0	24.8
25-Jul	17.0	16.4	15.6	14.9	14.6	14.7	15.0	17.1	18.9	19.6	20.0	20.7	21.9	22.7	23.5	21.7	22.0	23.0	22.6	22.2	20.4	18.8	18.6	17.5	19.1	23.5
26-Jul	17.3	15.8	15.6	14.8	14.5	14.7	15.4	16.1	17.5	19.4	21.0	22.2	22.6	22.6	23.5	23.8	21.5	15.0	17.2	17.7	14.7	13.1	12.8	12.0	17.5	23.8
27-Jul	11.9	11.0	11.1	10.5	10.2	11.7	13.9	16.0	18.2	20.9	22.4	23.4	24.3	24.4	23.2	21.7	22.4	22.3	20.2	19.6	17.8	15.8	14.6	13.9	17.6	24.4
28-Jul	14.8	13.1	11.2	10.8	10.9	13.3	15.5	16.7	18.6	20.6	22.6	24.1	25.2	26.1	24.8	21.7	23.2	22.5	21.6	21.4	19.6	18.2	17.9	17.0	18.8	26.1
29-Jul	15.1	14.4	13.3	13.1	13.2	14.4	15.7	17.2	18.5	20.1	21.0	23.1	22.8	22.1	22.8	23.3	22.1	23.7	19.6	16.5	15.6	15.2	14.1	14.8	18.0	23.7
30-Jul	14.5	13.1	13.0	12.5	12.8	12.5	13.2	14.3	16.5	18.9	20.9	22.6	23.9	24.5	25.1	25.0	23.3	22.3	22.1	20.1	19.0	16.7	15.1	13.0	18.1	25.1
31-Jul	13.7	13.7	13.1	11.1	10.3	11.7	13.8	15.8	18.3	20.8	23.5	24.4	25.4	22.6	17.5	20.6	20.1	19.4	18.2	17.1	16.6	15.9	15.1	14.1	17.2	25.4
																								Diurnal Average		
																								Diurnal Maximum		
M - Maintenance		DF - DAS Failure																								





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

**Ambient Temperature 2 m (AT2m) - C**  
**Mannix - July 2015**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	22	3.09	3.09
10 - 20	435	61.18	64.28
> 20	254	35.72	100.00

Total Number of Valid Hours: 711

Total Number of Hours: 744

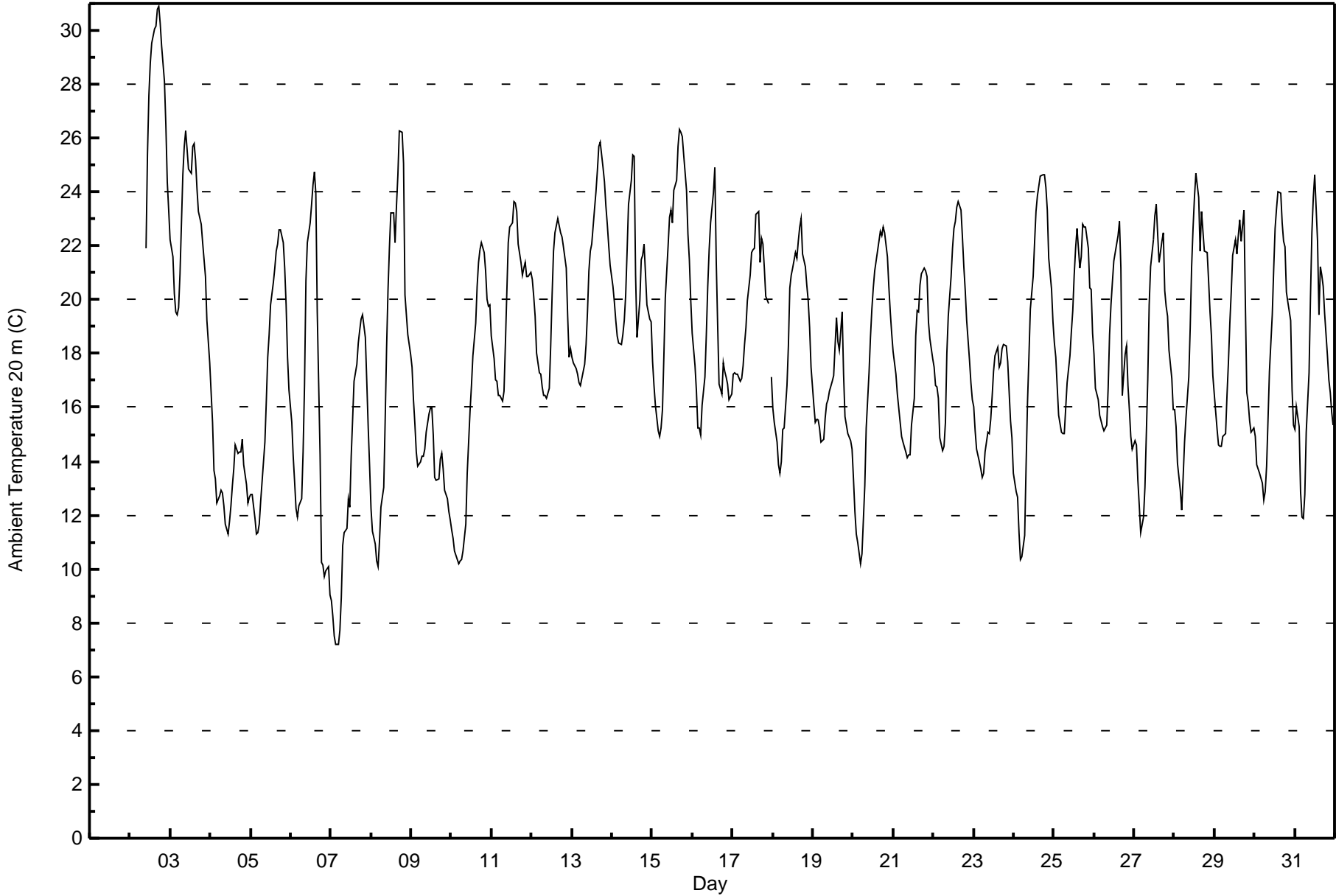


Summary of Hour Averages

Mannix - July 2015

Maximum Value: 30.9 C on Jul 2 18:00		Maximum Daily Average: 22.7 C on Jul 3		Hours in Service: 744																							
Minimum Value: 7.2 C on Jul 7 05:00		Minimum Daily Average: 13.3 C on Jul 7		Hours of Data: 711																							
Maximum Diurnal Average: 21.8 C at hour 14		Minimum Diurnal Average: 13.8 C at hour 5		Hours of Missing Data: 33																							
Monthly Average: 18.24 C		Percentiles: P <sub>1</sub> = 8.8 P <sub>10</sub> = 12.7 Q <sub>1</sub> = 15.1 Median = 18.1 Q <sub>3</sub> = 21.6 P <sub>90</sub> = 23.5 P <sub>99</sub> = 29.3		Hours of Calibration: 0																							
				Percent Operational Time: 95.6																							
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-Jul	19.6	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	--	19.6	
2-Jul	M	M	M	M	M	M	M	M	M	21.9	25.4	27.6	28.8	29.5	30.1	30.2	30.8	30.9	30.3	29.4	28.1	26.5	24.4	23.3	--	30.9	
3-Jul	22.2	21.6	20.2	19.5	19.5	19.7	20.9	24.7	25.7	26.3	25.6	24.8	24.7	25.7	25.8	25.2	24.1	23.3	22.8	22.1	21.5	20.8	19.2	17.7	22.7	26.3	
4-Jul	16.5	15.4	13.7	13.4	12.4	12.7	12.9	12.8	12.4	11.7	11.3	11.8	12.4	13.1	13.7	14.6	14.3	14.3	14.8	13.9	13.1	12.4	12.7	12.7	13.4	16.5	
5-Jul	12.8	12.8	11.9	11.3	11.4	11.7	12.5	13.2	14.7	16.3	17.9	18.7	19.8	20.6	21.2	21.8	22.0	22.6	22.6	22.1	21.2	19.8	17.8	16.6	17.2	22.6	
6-Jul	15.5	14.2	13.2	12.2	11.9	12.4	12.6	14.4	16.8	20.7	22.1	22.9	23.5	24.3	24.8	24.0	19.6	14.3	10.2	10.1	9.7	9.9	10.1	9.1	15.8	24.8	
7-Jul	8.8	8.3	7.5	7.2	7.2	7.7	8.9	10.9	11.3	11.5	12.6	12.3	14.2	15.5	17.0	17.6	18.4	18.9	19.3	19.5	18.6	17.0	15.3	13.8	13.3	19.5	
8-Jul	12.3	11.4	10.9	10.3	10.1	11.0	12.3	13.0	15.5	18.2	20.3	21.9	23.2	23.2	22.1	23.5	24.6	26.3	26.2	25.1	20.2	19.4	18.7	18.0	18.2	26.3	
9-Jul	17.5	16.3	15.4	14.3	13.8	14.0	14.2	14.2	14.4	15.1	15.8	16.0	16.0	15.0	13.4	13.3	13.3	14.1	14.3	13.7	12.9	12.6	12.1	11.8	14.3	17.5	
10-Jul	11.5	11.1	10.7	10.4	10.2	10.3	10.3	10.7	11.7	13.6	14.7	15.9	16.8	17.9	19.1	20.5	21.4	21.8	22.1	21.8	21.1	20.0	19.7	19.8	16.0	22.1	
11-Jul	18.7	17.8	17.0	17.0	16.4	16.5	16.3	16.6	18.4	20.3	22.1	22.7	22.9	23.6	23.6	23.3	22.0	21.4	20.9	21.2	21.4	20.9	20.9	21.0	20.1	23.6	
12-Jul	20.7	20.1	19.4	18.0	17.3	17.3	16.8	16.4	16.5	16.3	16.7	18.3	20.2	21.8	22.5	23.0	22.7	22.5	22.3	22.0	21.2	19.4	17.9	18.2	19.5	23.0	
13-Jul	17.9	17.7	17.4	17.2	16.9	16.8	17.1	17.6	18.3	19.5	21.0	21.8	22.1	23.4	24.0	24.8	25.7	25.9	24.9	24.4	23.5	22.8	22.0	21.3	21.0	25.9	
14-Jul	20.5	19.9	19.2	18.7	18.4	18.3	18.7	19.3	20.2	21.8	23.5	24.4	25.4	25.3	20.9	18.6	20.0	21.5	21.6	22.1	21.0	19.8	19.3	19.2	20.7	25.4	
15-Jul	17.7	16.8	16.1	15.1	14.9	15.2	15.9	17.9	20.1	22.0	23.0	23.3	22.9	24.1	24.4	25.7	26.3	26.2	26.1	25.4	24.0	22.4	21.5	20.0	21.1	26.3	
16-Jul	18.7	17.5	16.6	15.2	15.2	15.0	16.1	17.1	18.7	20.5	21.8	22.9	24.0	24.9	21.5	19.1	16.9	16.5	17.7	17.3	17.1	16.9	16.3	16.5	18.3	24.9	
17-Jul	17.2	17.3	17.2	17.2	17.0	17.1	17.5	18.3	19.0	19.9	20.9	21.8	21.8	21.9	23.2	23.3	21.4	22.3	22.1	21.2	20.1	19.9	DF	17.1	19.8	23.3	
18-Jul	16.0	15.5	14.7	13.9	13.6	14.0	15.2	15.2	16.8	18.3	20.4	20.9	21.2	21.7	21.6	22.2	22.7	23.0	21.7	21.3	20.6	20.0	19.0	17.5	18.6	23.0	
19-Jul	16.1	15.4	15.5	15.5	15.3	14.7	14.8	15.6	16.1	16.3	16.6	17.0	17.2	18.3	19.4	18.5	18.1	19.5	17.2	15.7	15.3	15.0	14.8	14.4	16.4	19.5	
20-Jul	13.4	12.1	11.3	11.0	10.2	10.6	11.8	13.1	15.2	17.3	18.6	19.6	20.4	21.0	21.8	22.2	22.5	22.4	22.7	22.5	21.6	20.5	19.5	18.8	17.5	22.7	
21-Jul	18.1	17.2	16.5	16.0	15.4	14.9	14.7	14.3	14.1	14.2	14.2	15.3	16.3	18.6	19.6	19.6	20.5	21.0	21.2	21.1	20.9	19.2	18.5	17.8	17.5	21.2	
22-Jul	17.5	16.8	16.8	16.3	14.9	14.4	14.5	15.4	18.0	19.4	20.9	21.9	22.6	22.9	23.5	23.7	23.3	22.3	21.2	20.3	19.2	17.7	16.9	16.3	19.0	23.7	
23-Jul	16.0	15.1	14.4	14.0	13.7	13.4	13.5	14.3	15.1	15.0	15.5	16.4	17.3	17.9	18.3	17.5	17.6	18.2	18.3	18.3	17.7	16.6	15.5	14.9	16.0	18.3	
24-Jul	13.6	12.9	12.7	11.3	10.3	10.5	11.2	13.8	16.2	17.9	19.6	20.9	22.1	23.3	23.9	24.2	24.6	24.7	24.7	24.2	23.3	21.5	20.4	19.2	18.6	24.7	
25-Jul	18.4	17.9	16.8	15.7	15.1	15.0	15.0	16.0	16.9	17.9	18.8	19.6	20.9	21.9	22.7	21.2	21.6	22.8	22.7	22.7	21.9	20.5	20.4	18.7	19.2	22.8	
26-Jul	18.0	16.7	16.3	15.7	15.5	15.3	15.1	15.3	16.7	18.7	19.8	20.6	21.4	22.1	22.4	22.9	21.2	16.4	18.0	18.3	16.8	15.9	14.9	14.4	17.9	22.9	
27-Jul	14.7	14.6	13.3	12.3	11.4	11.9	13.0	15.0	17.0	19.8	21.2	22.2	23.1	23.5	22.5	21.4	22.2	22.5	20.3	19.8	19.4	18.1	17.1	15.9	18.0	23.5	
28-Jul	15.9	15.3	13.9	12.9	12.2	13.4	14.7	15.6	17.2	19.0	21.2	22.7	23.8	24.7	23.8	21.8	23.3	22.6	21.8	21.7	20.7	19.5	18.7	17.2	18.9	24.7	
29-Jul	16.5	15.2	14.6	14.5	14.5	14.9	15.0	16.4	17.6	19.1	20.3	21.6	22.2	21.7	22.4	22.9	22.2	23.3	19.8	16.6	16.2	15.5	15.1	15.2	18.1	23.3	
30-Jul	14.9	13.9	13.7	13.6	13.2	12.6	12.9	13.8	15.5	17.3	19.5	21.1	22.7	23.4	24.0	24.0	22.8	22.2	22.0	20.3	19.9	19.2	16.6	15.4	18.1	24.0	
31-Jul	15.2	16.0	15.3	12.9	11.9	11.9	12.8	15.1	17.3	20.1	22.5	23.8	24.7	22.2	19.4	21.2	20.9	20.5	19.5	17.9	17.0	16.6	15.8	15.4	17.7	24.7	
		16.4	15.6	14.9	14.2	13.8	13.9	14.4	15.4	16.7	18.2	19.5	20.4	21.2	21.8	21.7	21.7	21.6	21.5	21.0	20.4	19.5	18.6	17.6	16.9	Diurnal Average	
		22.2	21.6	20.2	19.5	19.5	19.7	20.9	24.7	25.7	26.3	25.6	27.6	28.8	29.5	30.1	30.2	30.8	30.9	30.3	29.4	28.1	26.5	24.4	23.3	Diurnal Maximum	
M - Maintenance		DF - DAS Failure																									







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

**Ambient Temperature 20 m (AT20m) - C**  
**Mannix - July 2015**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	10	1.41	1.41
10 - 20	440	61.88	63.29
> 20	261	36.71	100.00

Total Number of Valid Hours: 711

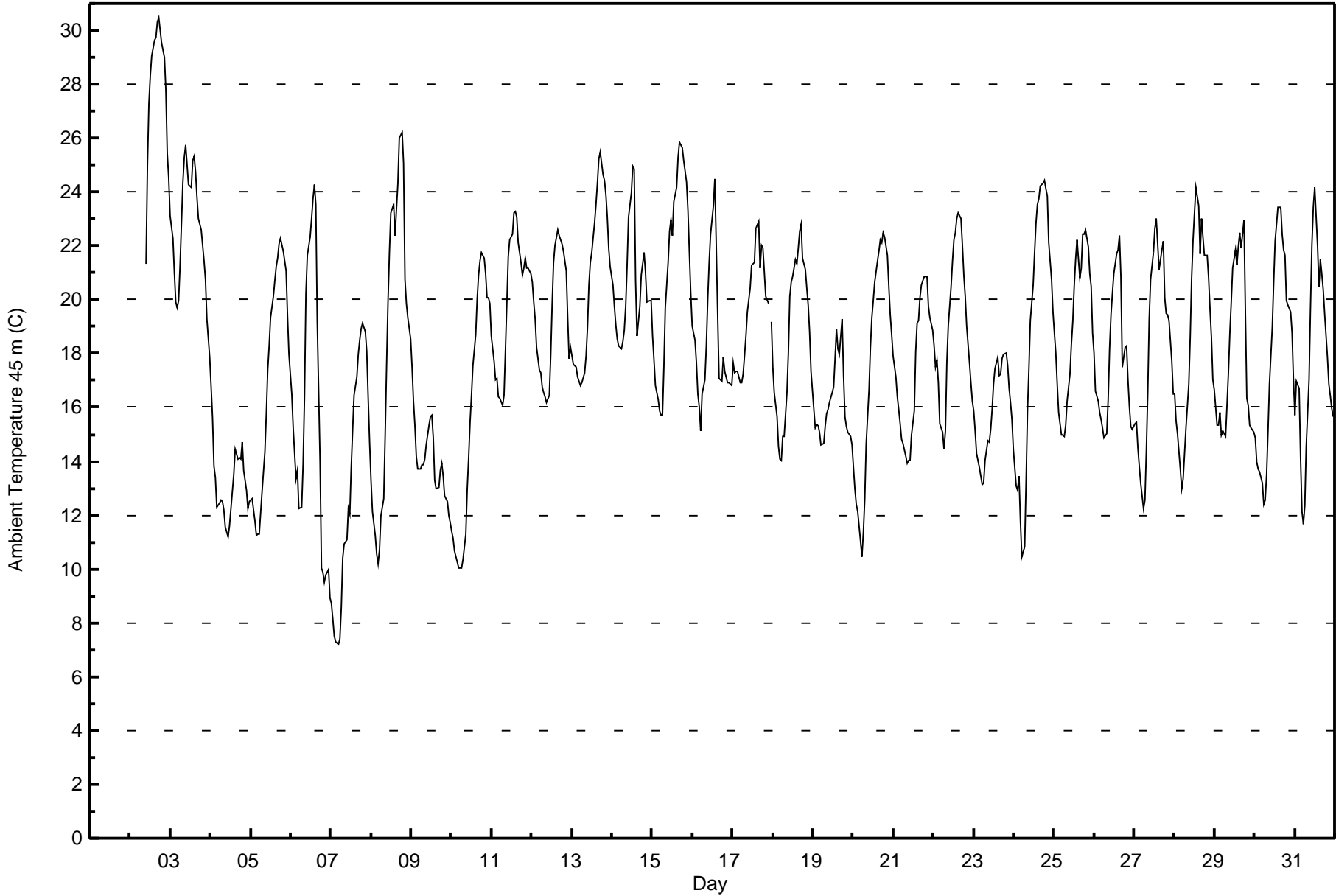
Total Number of Hours: 744



Summary of Hour Averages

Mannix - July 2015

Maximum Value: 30.5 C on Jul 2 18:00		Maximum Daily Average: 22.6 C on Jul 3		Hours in Service: 744																							
Minimum Value: 7.2 C on Jul 7 05:00		Minimum Daily Average: 13.2 C on Jul 7		Hours of Data: 711																							
Maximum Diurnal Average: 21.4 C at hour 15		Minimum Diurnal Average: 13.9 C at hour 6		Hours of Missing Data: 33																							
Monthly Average: 18.17 C		Percentiles: P <sub>1</sub> = 8.7 P <sub>10</sub> = 12.6 Q <sub>1</sub> = 15.1 Median = 18.0 Q <sub>3</sub> = 21.4 P <sub>90</sub> = 23.2 P <sub>99</sub> = 28.8		Hours of Calibration: 0																							
				Percent Operational Time: 95.6																							
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-Jul	19.7	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	--	19.7	
2-Jul	M	M	M	M	M	M	M	M	M	21.3	25.0	27.2	28.3	29.1	29.7	29.8	30.3	30.5	30.0	29.5	29.0	27.8	25.4	24.6	--	30.5	
3-Jul	23.1	22.3	21.0	19.9	19.7	20.0	21.2	24.3	25.3	25.7	25.0	24.3	24.2	25.2	25.3	24.8	23.8	23.0	22.6	22.0	21.4	20.8	19.3	17.9	22.6	25.7	
4-Jul	16.8	15.6	13.8	13.4	12.3	12.4	12.6	12.5	12.2	11.5	11.2	11.6	12.2	12.9	13.5	14.5	14.1	14.1	14.1	14.7	13.7	13.0	12.2	12.5	13.2	16.8	
5-Jul	12.6	12.6	11.8	11.3	11.3	11.3	12.1	12.9	14.3	15.8	17.4	18.3	19.3	20.1	20.7	21.2	21.6	22.1	22.3	21.8	21.5	21.1	19.4	18.0	17.1	22.3	
6-Jul	16.5	15.2	14.3	13.3	13.6	12.2	12.3	13.9	16.4	20.2	21.7	22.3	23.0	23.8	24.3	23.5	19.2	14.0	10.0	9.9	9.5	9.8	10.0	8.9	15.7	24.3	
7-Jul	8.7	8.1	7.5	7.3	7.2	7.4	8.5	10.4	10.9	11.1	12.2	12.0	13.8	15.1	16.5	17.1	18.0	18.5	18.9	19.1	18.8	18.1	16.3	14.7	13.2	19.1	
8-Jul	13.3	12.1	11.2	10.6	10.2	10.7	12.0	12.6	15.0	17.6	19.9	21.7	23.2	23.6	22.4	23.4	24.3	26.0	26.2	25.1	20.8	19.9	19.3	18.6	18.3	26.2	
9-Jul	17.5	16.2	15.4	14.2	13.7	13.7	13.9	13.9	14.1	14.6	15.3	15.7	15.7	14.9	13.3	13.0	13.0	13.7	14.0	13.5	12.7	12.5	12.0	11.7	14.1	17.5	
10-Jul	11.4	11.1	10.6	10.2	10.0	10.0	10.0	10.3	11.3	13.0	14.1	15.5	16.5	17.6	18.7	20.0	20.9	21.4	21.8	21.5	21.0	20.1	20.1	19.9	15.7	21.8	
11-Jul	18.7	17.7	17.0	17.1	16.4	16.3	16.1	16.4	18.1	19.8	21.6	22.2	22.4	23.2	23.3	23.0	22.1	21.4	20.9	21.2	21.5	21.2	21.2	21.0	20.0	23.3	
12-Jul	20.7	19.9	19.3	18.2	17.4	17.3	16.8	16.6	16.4	16.2	16.5	17.9	19.8	21.4	22.0	22.6	22.4	22.2	22.1	21.8	21.1	19.3	17.8	18.3	19.3	22.6	
13-Jul	17.9	17.6	17.5	17.1	17.0	16.8	16.9	17.3	17.9	19.0	20.6	21.4	21.7	22.9	23.6	24.3	25.2	25.5	24.7	24.4	23.9	23.1	21.9	21.2	20.8	25.5	
14-Jul	20.5	19.8	19.1	18.5	18.3	18.2	18.5	18.9	19.8	21.3	23.1	24.0	24.9	24.9	20.7	18.6	19.8	20.9	21.3	21.7	21.0	19.9	20.0	19.9	20.6	24.9	
15-Jul	18.7	17.8	16.8	16.3	15.9	15.7	15.7	17.5	19.7	21.4	22.6	23.0	22.4	23.7	24.1	25.3	25.8	25.7	25.6	25.2	24.4	23.3	21.7	20.3	21.2	25.8	
16-Jul	19.0	18.5	17.6	16.5	16.0	15.2	16.5	17.0	18.3	20.0	21.4	22.5	23.5	24.5	22.0	19.5	17.1	17.0	17.9	17.4	17.1	16.9	16.9	16.8	18.5	24.5	
17-Jul	17.6	17.3	17.3	17.3	16.9	16.9	17.2	17.9	18.6	19.5	20.5	21.3	21.4	21.4	22.6	22.9	21.2	22.0	21.9	21.0	20.1	19.8	DF	19.2	19.7	22.9	
18-Jul	17.5	16.6	15.7	14.6	14.1	14.0	14.9	14.9	16.6	18.0	20.1	20.6	20.9	21.5	21.3	21.9	22.5	22.8	21.6	21.1	20.5	19.8	18.8	17.3	18.7	22.8	
19-Jul	15.9	15.2	15.4	15.3	15.1	14.6	14.7	15.3	15.8	15.9	16.2	16.5	16.7	17.8	18.9	18.2	18.0	19.3	17.2	15.7	15.3	15.1	14.9	14.6	16.1	19.3	
20-Jul	13.8	13.0	12.4	12.2	11.1	10.5	11.3	12.6	14.7	16.7	18.2	19.3	20.0	20.7	21.4	21.8	22.2	22.1	22.5	22.3	21.6	20.5	19.4	18.7	17.5	22.5	
21-Jul	17.9	17.1	16.4	15.9	15.4	14.8	14.6	14.2	13.9	14.0	14.0	15.0	15.9	18.1	19.1	19.2	20.1	20.5	20.9	20.8	20.8	19.7	19.3	18.9	17.4	20.9	
22-Jul	18.3	17.5	17.8	16.9	15.4	15.1	14.4	15.1	17.7	19.0	20.5	21.4	22.2	22.5	23.0	23.2	23.0	22.0	20.9	20.1	19.0	17.6	16.9	16.2	19.0	23.2	
23-Jul	15.9	15.1	14.3	13.8	13.4	13.1	13.2	14.0	14.8	14.7	15.2	15.9	16.9	17.5	17.9	17.2	17.2	17.8	18.0	18.0	17.6	16.7	16.2	15.6	15.8	18.0	
24-Jul	14.4	13.1	12.9	13.4	11.8	10.5	10.8	13.3	15.9	17.4	19.2	20.5	21.7	22.9	23.5	23.7	24.2	24.3	24.4	24.1	23.8	22.1	20.8	19.6	18.7	24.4	
25-Jul	18.8	18.0	16.9	15.8	15.0	15.0	14.9	15.3	16.2	17.2	18.3	19.2	20.5	21.5	22.2	20.8	21.2	22.4	22.4	22.6	22.0	21.0	20.5	18.7	19.0	22.6	
26-Jul	18.0	16.6	16.2	15.8	15.5	15.2	14.9	15.0	16.3	18.2	19.4	20.2	21.0	21.7	21.8	22.4	20.8	17.5	18.2	18.3	17.0	16.0	15.3	15.2	17.8	22.4	
27-Jul	15.4	15.4	14.5	13.8	13.2	12.2	12.5	14.4	16.6	19.3	20.7	21.8	22.7	23.0	22.1	21.1	21.8	22.2	20.1	19.5	19.5	19.2	17.7	16.5	18.1	23.0	
28-Jul	16.5	15.5	15.0	13.7	13.0	13.3	14.3	15.3	16.9	18.6	20.8	22.2	23.2	24.2	23.5	21.7	23.0	22.3	21.7	21.7	20.8	19.7	18.6	17.0	18.9	24.2	
29-Jul	16.7	15.3	15.3	15.8	15.0	15.2	14.9	16.1	17.3	18.7	19.9	21.2	21.8	21.3	22.0	22.5	21.9	23.0	19.5	16.3	16.1	15.4	15.3	15.1	18.0	23.0	
30-Jul	14.8	14.0	13.7	13.6	13.2	12.4	12.6	13.5	15.1	16.9	19.0	20.7	22.2	22.8	23.4	23.4	22.4	21.9	21.6	20.0	19.8	19.5	18.8	17.0	18.0	23.4	
31-Jul	15.7	17.0	16.7	14.1	12.1	11.7	12.3	14.5	17.0	19.6	22.0	23.4	24.2	22.0	20.5	21.5	20.9	20.4	19.5	17.9	16.9	16.4	16.0	15.7	17.8	24.2	
		16.7	15.9	15.3	14.7	14.1	13.9	14.2	15.0	16.3	17.7	19.1	20.0	20.7	21.4	21.4	21.4	21.3	21.2	20.8	20.3	19.6	18.8	18.0	17.3	Diurnal Average	
		23.1	22.3	21.0	19.9	19.7	20.0	21.2	24.3	25.3	25.7	25.0	27.2	28.3	29.1	29.7	29.8	30.3	30.5	30.0	29.5	29.0	27.8	25.4	24.6	Diurnal Maximum	
M - Maintenance		DF - DAS Failure																									





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

**Ambient Temperature 45 m (AT45m) - C**  
**Mannix - July 2015**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	12	1.69	1.69
10 - 20	444	62.45	64.14
> 20	255	35.86	100.00

Total Number of Valid Hours: 711

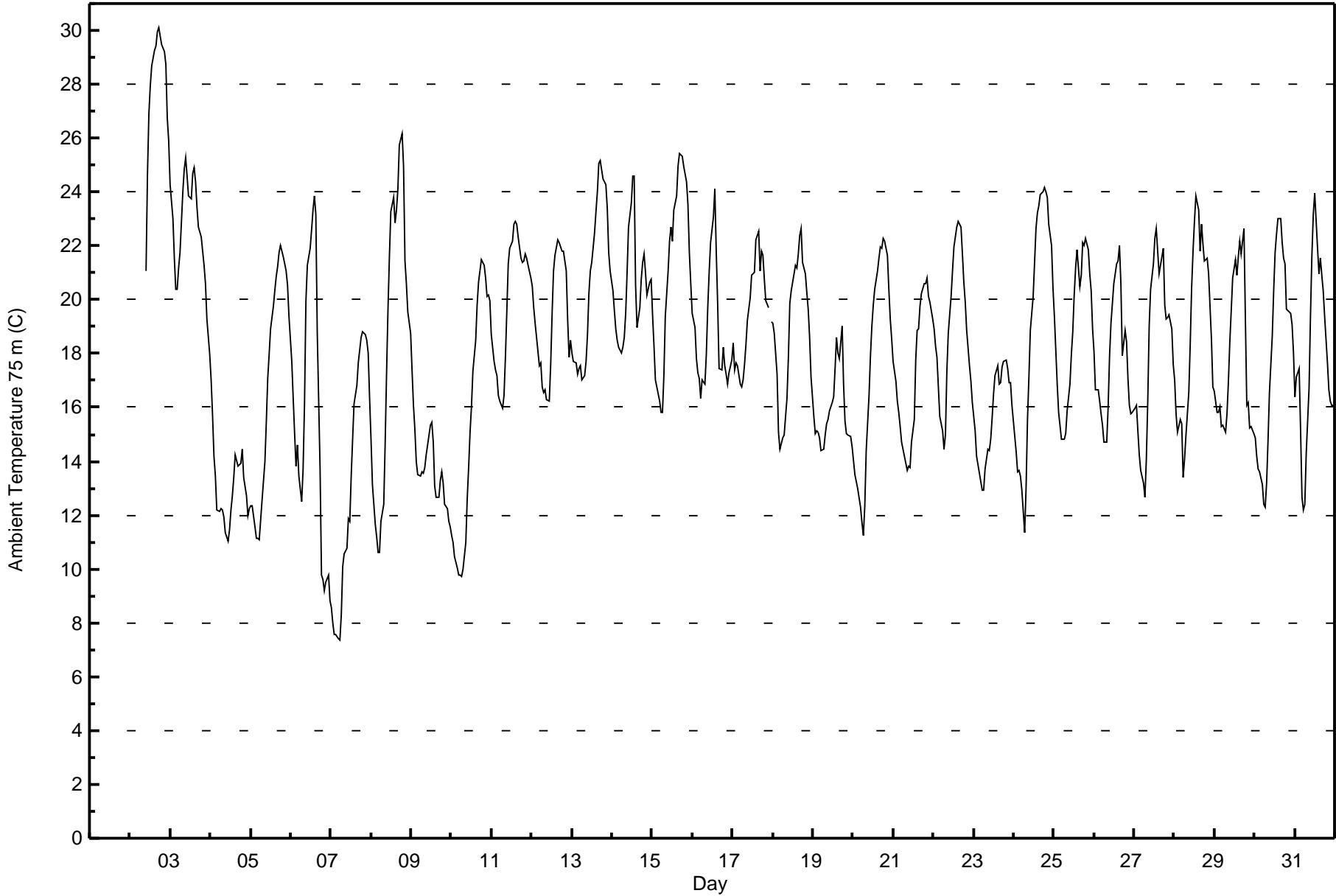
Total Number of Hours: 744



Summary of Hour Averages

Mannix - July 2015

Maximum Value: 30.1 C on Jul 2 18:00		Maximum Daily Average: 22.6 C on Jul 3		Hours in Service: 744																							
Minimum Value: 7.3 C on Jul 7 06:00		Minimum Daily Average: 13.1 C on Jul 4		Hours of Data: 711																							
Maximum Diurnal Average: 21.2 C at hour 15		Minimum Diurnal Average: 14.1 C at hour 7		Hours of Missing Data: 33																							
Monthly Average: 18.13 C		Percentiles: P <sub>1</sub> = 8.7 P <sub>10</sub> = 12.7 Q <sub>1</sub> = 15.1 Median = 18.0 Q <sub>3</sub> = 21.3 P <sub>90</sub> = 23.0 P <sub>99</sub> = 29.2		Hours of Calibration: 0																							
				Percent Operational Time: 95.6																							
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-Jul	19.6	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	--	19.6	
2-Jul	M	M	M	M	M	M	M	M	M	21.1	24.6	26.9	28.0	28.7	29.3	29.4	30.0	30.1	29.8	29.5	29.2	28.7	26.8	25.9	--	30.1	
3-Jul	24.3	23.0	21.5	20.4	20.4	21.2	21.8	24.0	24.8	25.3	24.6	23.9	23.8	24.7	24.9	24.4	23.5	22.7	22.3	21.8	21.3	20.6	19.3	18.0	22.6	25.3	
4-Jul	17.0	15.7	14.2	13.5	12.2	12.1	12.3	12.2	11.9	11.3	11.0	11.5	12.2	12.7	13.4	14.3	13.8	13.9	13.9	14.5	13.4	12.7	12.0	12.3	13.1	17.0	
5-Jul	12.3	12.4	11.6	11.2	11.2	11.1	11.8	12.5	14.0	15.4	17.1	17.9	18.9	19.8	20.3	20.9	21.2	21.8	22.0	21.6	21.3	21.1	20.6	19.4	17.0	22.0	
6-Jul	17.7	16.4	15.0	13.8	14.6	13.5	12.5	13.7	16.2	19.9	21.3	21.9	22.6	23.3	23.9	23.2	18.8	13.7	9.8	9.6	9.2	9.5	9.8	8.8	15.8	23.9	
7-Jul	8.6	8.0	7.6	7.5	7.4	7.3	8.3	10.1	10.6	10.8	11.9	11.7	13.4	14.8	16.1	16.8	17.6	18.1	18.6	18.8	18.7	18.5	18.0	16.3	13.2	18.8	
8-Jul	14.8	13.1	11.6	11.2	10.6	10.6	11.8	12.4	14.7	17.3	19.7	21.6	23.3	23.8	22.8	23.3	24.1	25.8	26.2	25.0	21.4	20.6	19.6	18.8	18.5	26.2	
9-Jul	17.4	16.1	15.2	14.0	13.5	13.5	13.6	13.6	13.7	14.3	14.9	15.4	15.4	14.7	13.1	12.7	12.7	13.3	13.6	13.2	12.4	12.3	11.8	11.5	13.8	17.4	
10-Jul	11.2	11.0	10.5	10.0	9.8	9.8	9.7	10.0	11.0	12.6	13.8	15.1	16.0	17.3	18.5	19.8	20.7	21.1	21.5	21.3	20.8	20.1	20.2	20.0	15.5	21.5	
11-Jul	18.7	17.7	17.4	17.2	16.5	16.2	16.0	16.4	17.8	19.6	21.3	21.9	22.2	22.8	22.9	22.8	22.3	21.5	21.4	21.4	21.7	21.5	21.3	20.8	20.0	22.9	
12-Jul	20.5	19.7	19.1	18.6	17.5	17.6	16.8	16.5	16.7	16.3	16.2	17.6	19.5	21.1	21.7	22.2	22.1	21.9	21.8	21.8	21.0	19.2	17.9	18.5	19.2	22.2	
13-Jul	18.0	17.7	17.7	17.2	17.4	17.5	17.0	17.2	17.7	18.7	20.2	21.1	21.4	22.5	23.3	24.0	25.1	25.2	24.5	24.4	24.3	23.4	21.7	21.1	20.8	25.2	
14-Jul	20.4	19.6	18.9	18.5	18.2	18.0	18.2	18.6	19.5	21.0	22.7	23.6	24.6	24.6	20.6	19.0	19.7	20.8	21.4	21.7	21.0	20.2	20.7	20.8	20.5	24.6	
15-Jul	19.5	18.3	17.0	16.5	16.3	15.8	15.8	17.2	19.4	21.1	22.2	22.7	22.2	23.3	23.9	25.0	25.4	25.4	25.3	25.0	24.4	23.6	21.8	20.6	21.1	25.4	
16-Jul	19.5	18.9	17.8	17.3	17.1	16.4	17.0	16.9	18.0	19.7	21.0	22.1	23.1	24.1	21.8	19.9	17.4	17.4	18.2	17.6	17.2	16.9	17.3	17.8	18.8	24.1	
17-Jul	18.4	17.4	17.6	17.5	16.9	16.8	17.0	17.6	18.3	19.2	20.1	20.9	21.0	21.0	22.2	22.5	21.1	21.8	21.6	20.8	20.0	19.7	DF	19.2	19.5	22.5	
18-Jul	19.1	18.8	17.2	15.1	14.5	14.6	14.9	15.0	16.4	17.9	19.9	20.3	20.6	21.3	21.2	21.7	22.4	22.6	21.4	20.9	20.3	19.6	18.6	17.1	18.8	22.6	
19-Jul	15.7	15.0	15.1	15.1	14.9	14.4	14.4	15.0	15.4	15.6	15.8	16.2	16.4	17.5	18.6	18.0	17.8	19.0	16.9	15.5	15.0	15.0	14.9	14.6	15.9	19.0	
20-Jul	14.0	13.5	13.2	13.0	12.3	11.7	11.3	12.4	14.4	16.5	17.9	19.0	19.8	20.4	21.1	21.5	22.0	21.9	22.3	22.2	21.6	20.4	19.3	18.5	17.5	22.3	
21-Jul	17.7	17.0	16.3	15.8	15.3	14.7	14.4	13.9	13.7	13.8	13.7	14.7	15.6	17.8	18.9	18.9	19.8	20.2	20.6	20.6	20.8	20.1	19.9	19.3	17.2	20.8	
22-Jul	18.9	18.3	17.9	16.8	15.6	15.1	14.5	14.9	17.3	18.8	20.1	21.1	22.0	22.3	22.7	22.9	22.7	21.7	20.6	19.9	18.8	17.5	17.0	16.2	18.9	22.9	
23-Jul	15.7	15.1	14.2	13.6	13.2	12.9	12.9	13.7	14.4	14.4	14.8	15.6	16.5	17.2	17.5	16.9	16.9	17.5	17.7	17.8	17.4	16.9	16.9	16.1	15.7	17.8	
24-Jul	15.5	14.3	13.6	13.7	13.5	12.9	11.3	13.1	15.6	17.2	18.9	20.1	21.4	22.7	23.2	23.5	23.9	24.0	24.2	24.0	23.8	22.8	22.0	20.5	19.0	24.2	
25-Jul	19.4	18.1	16.9	15.8	14.8	14.8	14.8	15.0	15.9	16.8	17.9	18.8	20.2	21.2	21.8	20.5	20.9	22.1	22.0	22.3	21.9	21.0	20.3	18.9	18.8	22.3	
26-Jul	18.1	16.7	16.6	16.2	15.7	15.3	14.7	14.7	16.0	17.9	19.1	19.9	20.6	21.3	21.4	22.0	20.6	17.9	18.8	18.4	17.1	16.1	15.8	15.8	17.8	22.0	
27-Jul	16.0	16.1	15.1	14.3	13.7	13.2	12.7	14.1	16.2	19.0	20.4	21.4	22.3	22.7	21.8	20.9	21.6	21.9	19.8	19.3	19.4	19.4	18.9	17.6	18.2	22.7	
28-Jul	17.0	15.7	15.1	15.5	15.4	13.4	14.1	15.0	16.5	18.3	20.5	21.8	22.9	23.8	23.3	21.8	22.8	22.0	21.4	21.5	20.9	19.8	18.6	16.8	18.9	23.8	
29-Jul	16.6	15.8	15.8	16.0	15.3	15.3	15.1	15.7	17.0	18.4	19.6	20.8	21.5	20.9	21.6	22.2	21.7	22.6	19.3	16.1	16.2	15.3	15.3	15.0	17.9	22.6	
30-Jul	14.9	14.2	13.7	13.6	13.1	12.4	12.3	13.2	14.8	16.6	18.6	20.3	21.8	22.4	23.0	23.0	22.1	21.5	21.3	19.6	19.6	19.5	19.1	18.0	17.9	23.0	
31-Jul	16.4	17.1	17.4	15.2	12.7	12.2	12.4	14.3	16.7	19.4	21.7	23.2	23.9	21.9	20.9	21.6	20.9	20.4	19.4	17.7	16.7	16.3	16.1	16.1	17.9	23.9	
		17.1	16.2	15.6	15.0	14.5	14.2	14.1	14.8	16.0	17.5	18.7	19.6	20.4	21.1	21.2	21.2	21.1	21.0	20.6	20.1	19.6	18.9	18.3	17.7	Diurnal Average	
		24.3	23.0	21.5	20.4	20.4	21.2	21.8	24.0	24.8	25.3	24.6	26.9	28.0	28.7	29.3	29.4	30.0	30.1	29.8	29.5	29.2	28.7	26.8	25.9	Diurnal Maximum	
M - Maintenance		DF - DAS Failure																									





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

**Ambient Temperature 75 m (AT75m) - C**  
**Mannix - July 2015**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	16	2.25	2.25
10 - 20	440	61.88	64.14
> 20	255	35.86	100.00

Total Number of Valid Hours: 711

Total Number of Hours: 744

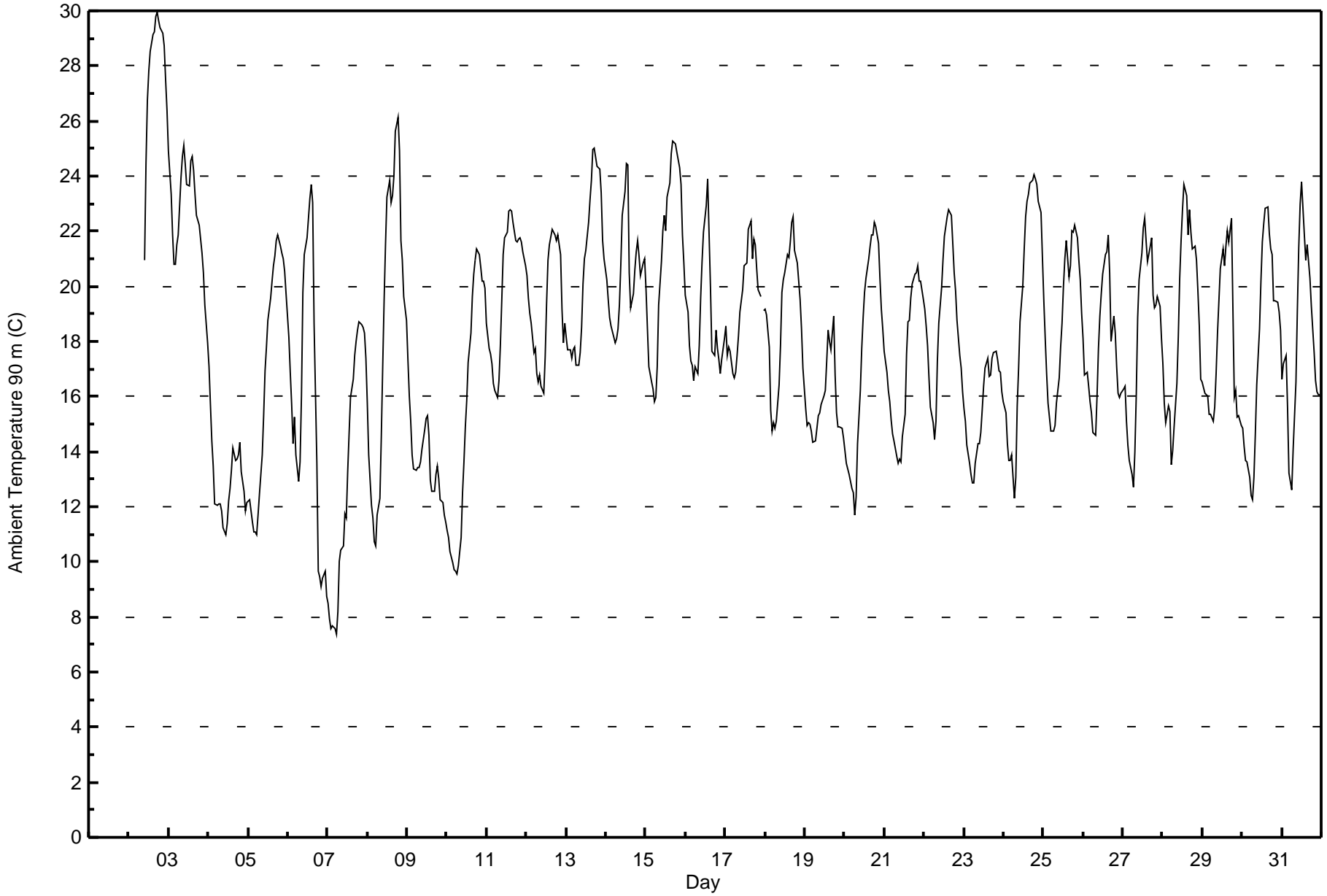




Summary of Hour Averages

Mannix - July 2015

Maximum Value: 30.0 C on Jul 2 18:00		Maximum Daily Average: 22.6 C on Jul 3		Hours in Service: 744																							
Minimum Value: 7.4 C on Jul 7 06:00		Minimum Daily Average: 13.0 C on Jul 4		Hours of Data: 711																							
Maximum Diurnal Average: 21.1 C at hour 16		Minimum Diurnal Average: 14.2 C at hour 7		Hours of Missing Data: 33																							
Monthly Average: 18.11 C		Percentiles: P <sub>1</sub> = 8.6 P <sub>10</sub> = 12.9 Q <sub>1</sub> = 15.2 Median = 18.1 Q <sub>3</sub> = 21.1 P <sub>90</sub> = 22.9 P <sub>99</sub> = 29.1		Hours of Calibration: 0																							
				Percent Operational Time: 95.6																							
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-Jul	19.6	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	--	19.6	
2-Jul	M	M	M	M	M	M	M	M	M	20.9	24.5	26.7	27.8	28.5	29.1	29.2	29.8	30.0	29.6	29.4	29.2	28.7	27.5	26.4	--	30.0	
3-Jul	24.9	23.3	21.8	20.8	20.8	21.5	21.9	23.9	24.7	25.1	24.4	23.7	23.6	24.6	24.7	24.2	23.3	22.6	22.2	21.7	21.2	20.5	19.3	18.0	22.6	25.1	
4-Jul	17.1	15.7	14.4	13.5	12.1	12.0	12.1	12.1	11.8	11.2	11.0	11.4	12.2	12.7	13.3	14.1	13.7	13.8	13.9	14.3	13.3	12.6	11.9	12.1	13.0	17.1	
5-Jul	12.2	12.2	11.5	11.1	11.1	11.0	11.7	12.5	13.9	15.3	16.9	17.8	18.8	19.6	20.2	20.7	21.1	21.6	21.9	21.5	21.2	21.0	20.5	19.8	16.9	21.9	
6-Jul	18.2	16.9	15.7	14.3	15.3	13.9	12.9	13.6	16.0	19.8	21.1	21.7	22.5	23.2	23.7	23.0	18.7	13.6	9.7	9.5	9.1	9.4	9.6	8.8	15.8	23.7	
7-Jul	8.5	7.9	7.6	7.7	7.6	7.4	8.2	10.0	10.4	10.6	11.7	11.6	13.3	14.6	16.0	16.6	17.5	18.0	18.4	18.7	18.6	18.5	18.3	17.4	13.1	18.7	
8-Jul	15.8	13.9	12.0	11.6	10.8	10.6	11.7	12.3	14.5	17.1	19.5	21.5	23.3	23.8	23.0	23.3	24.0	25.6	26.2	24.9	21.7	20.9	19.7	18.7	18.6	26.2	
9-Jul	17.3	16.0	15.1	13.9	13.4	13.3	13.4	13.4	13.6	14.1	14.8	15.2	15.3	14.6	13.0	12.6	12.5	13.2	13.5	13.0	12.3	12.1	11.7	11.5	13.7	17.3	
10-Jul	11.1	10.9	10.4	9.9	9.7	9.7	9.6	9.9	10.9	12.5	13.6	14.9	15.9	17.3	18.3	19.6	20.5	21.0	21.3	21.1	20.7	20.2	20.2	19.9	15.4	21.3	
11-Jul	18.7	17.7	17.5	17.2	16.5	16.2	16.0	16.6	17.8	19.5	21.1	21.8	22.0	22.7	22.8	22.7	22.3	21.7	21.6	21.7	21.7	21.6	21.3	20.7	20.0	22.8	
12-Jul	20.4	19.6	19.0	18.6	17.6	17.8	16.8	16.5	16.8	16.4	16.1	17.4	19.4	21.0	21.5	22.1	22.0	21.8	21.7	21.9	21.2	19.2	18.0	18.6	19.2	22.1	
13-Jul	18.1	17.7	17.7	17.4	17.7	17.8	17.2	17.1	17.6	18.5	20.1	21.0	21.3	22.3	23.1	23.9	24.9	25.0	24.3	24.2	23.4	21.7	21.0	20.7	20.7	25.0	
14-Jul	20.3	19.5	18.9	18.6	18.3	18.0	18.1	18.5	19.3	20.8	22.6	23.5	24.4	20.5	19.2	19.7	20.6	21.2	21.7	21.1	20.4	20.8	21.0	20.5	20.5	24.5	
15-Jul	19.9	18.5	17.1	16.5	16.3	15.8	16.0	17.1	19.3	20.9	22.0	22.6	24.0	23.2	23.7	24.8	25.3	25.2	25.2	24.9	24.3	23.7	21.9	20.9	21.1	25.3	
16-Jul	19.7	19.1	17.9	17.3	17.2	16.6	17.1	16.8	17.9	19.6	20.9	21.9	22.9	23.9	21.9	20.0	17.7	17.5	18.4	17.8	17.4	16.9	17.3	18.1	18.8	23.9	
17-Jul	18.6	17.5	17.8	17.6	16.8	16.7	16.9	17.5	18.2	19.0	19.9	20.7	20.8	20.8	22.1	22.4	21.0	21.7	21.5	20.6	19.9	19.6	DF	19.1	19.4	22.4	
18-Jul	19.2	18.9	17.8	15.5	14.8	15.0	14.8	15.1	16.4	17.9	19.8	20.2	20.5	21.1	21.1	21.6	22.3	22.5	21.3	20.9	20.2	19.5	18.5	17.0	18.8	22.5	
19-Jul	15.6	14.9	15.0	15.0	14.7	14.3	14.4	14.8	15.3	15.4	15.7	16.0	16.2	17.3	18.4	18.0	17.7	18.9	16.8	15.4	14.9	14.9	14.9	14.5	15.8	18.9	
20-Jul	14.0	13.6	13.4	13.2	12.6	12.5	11.7	12.4	14.3	16.2	17.7	18.9	19.8	20.3	21.0	21.5	21.9	21.9	22.3	22.2	21.5	20.3	19.2	18.5	17.5	22.3	
21-Jul	17.6	16.9	16.2	15.8	15.2	14.7	14.4	13.8	13.6	13.7	13.6	14.6	15.4	17.6	18.7	18.8	19.6	20.1	20.4	20.5	20.8	20.2	20.2	19.5	17.2	20.8	
22-Jul	19.1	18.5	17.8	16.7	15.6	15.1	14.4	15.1	17.3	18.7	20.0	21.0	21.8	22.2	22.5	22.8	22.6	21.6	20.5	19.8	18.8	17.5	17.0	16.2	18.9	22.8	
23-Jul	15.6	15.1	14.2	13.6	13.1	12.9	12.8	13.6	14.3	14.3	14.7	15.5	16.4	17.0	17.4	16.7	16.8	17.4	17.6	17.6	17.3	16.9	16.9	16.2	15.6	17.6	
24-Jul	15.8	15.4	14.3	13.7	13.7	13.9	12.3	13.1	15.7	17.1	18.7	20.0	21.3	22.5	23.1	23.3	23.8	23.8	24.0	23.9	23.7	23.1	22.7	21.0	19.2	24.0	
25-Jul	19.5	18.1	16.8	15.8	14.7	14.7	14.7	14.9	15.7	16.7	17.8	18.7	20.0	21.0	21.7	20.4	20.7	22.0	22.0	22.2	21.7	20.9	20.2	19.0	18.8	22.2	
26-Jul	18.1	16.8	16.9	16.4	15.8	15.4	14.7	14.6	16.0	17.7	18.9	19.7	20.5	21.2	21.3	21.9	20.5	18.0	18.9	18.3	17.1	16.1	16.0	16.1	17.8	21.9	
27-Jul	16.3	16.4	15.1	14.3	13.7	13.2	12.7	14.0	16.1	18.9	20.2	21.2	22.1	22.5	21.7	20.9	21.5	21.8	19.7	19.2	19.3	19.6	19.3	18.1	18.2	22.5	
28-Jul	17.2	15.8	15.1	15.6	15.5	13.5	14.0	14.9	16.5	18.2	20.3	21.6	22.8	23.7	23.3	21.9	22.8	21.9	21.3	21.5	21.0	19.8	18.6	16.7	18.9	23.7	
29-Jul	16.5	16.1	16.1	16.0	15.4	15.3	15.1	15.6	16.8	18.3	19.5	20.7	21.4	20.8	21.5	22.0	21.6	22.5	19.2	16.0	16.2	15.3	15.3	15.0	17.8	22.5	
30-Jul	14.8	14.2	13.7	13.6	13.1	12.4	12.2	13.1	14.7	16.4	18.5	20.2	21.6	22.2	22.8	22.9	21.9	21.4	21.2	19.5	19.5	19.4	19.1	18.4	17.8	22.9	
31-Jul	16.6	17.2	17.5	15.6	13.2	12.9	12.6	14.1	16.5	19.1	21.4	23.0	23.8	21.8	21.0	21.5	20.9	20.3	19.3	17.6	16.6	16.2	16.0	16.1	18.0	23.8	
		17.2	16.4	15.7	15.1	14.6	14.3	14.2	14.7	15.9	17.3	18.6	19.5	20.3	21.0	21.1	21.1	20.9	20.9	20.5	20.0	19.5	18.9	18.4	17.8	Diurnal Average	
		24.9	23.3	21.8	20.8	20.8	21.5	21.9	23.9	24.7	25.1	24.5	26.7	27.8	28.5	29.1	29.2	29.8	30.0	29.6	29.4	29.2	28.7	27.5	26.4	Diurnal Maximum	
M - Maintenance		DF - DAS Failure																									





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

**Ambient Temperature 90 m (AT90m) - C**  
**Mannix - July 2015**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	19	2.67	2.67
10 - 20	438	61.60	64.28
> 20	254	35.72	100.00

Total Number of Valid Hours: 711

Total Number of Hours: 744



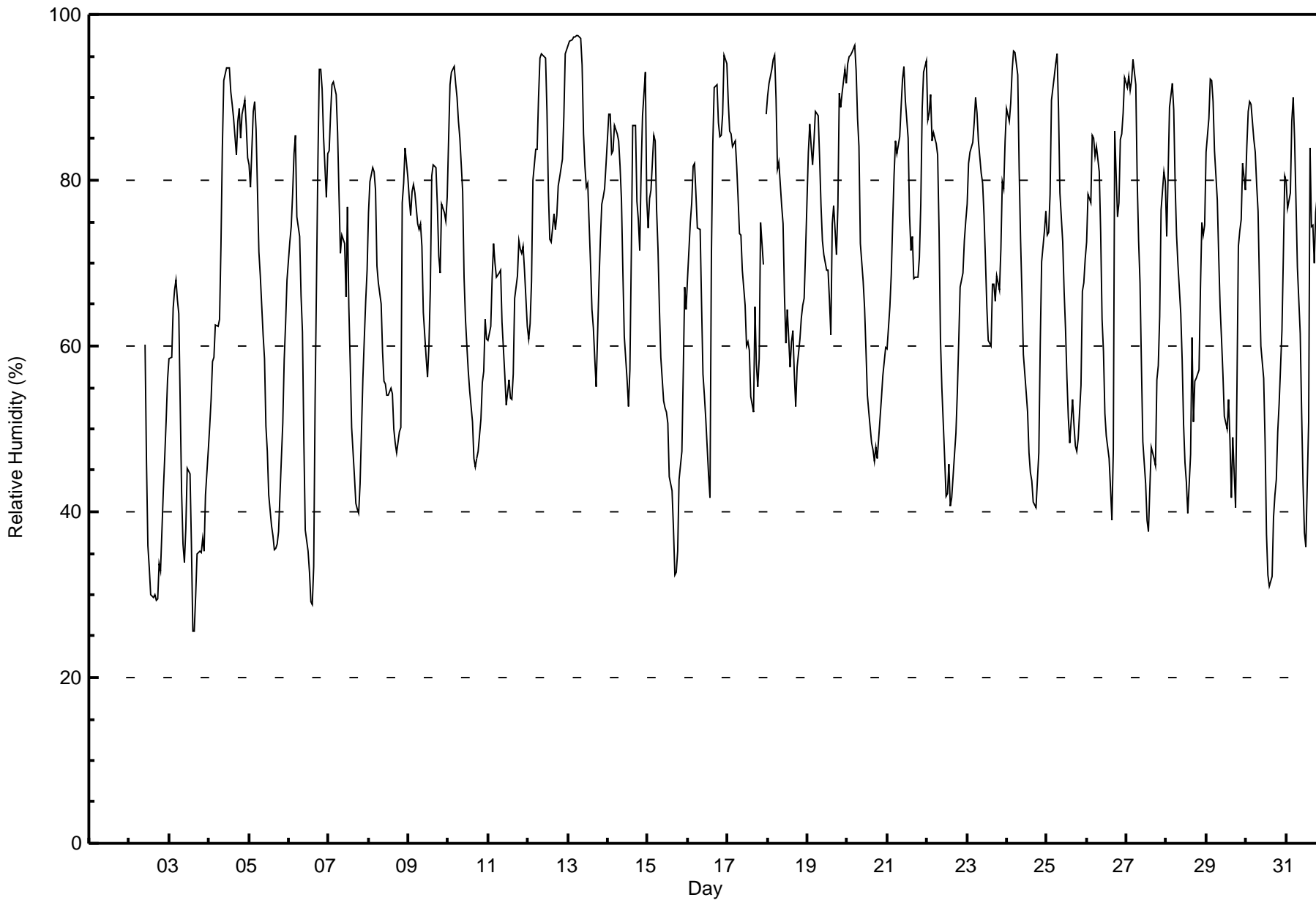
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Mannix - July 2015

Maximum Value: 97 % on Jul 13 06:00		Maximum Daily Average: 82.0 % on Jul 12		Hours in Service: 744																							
Minimum Value: 26 % on Jul 3 15:00		Minimum Daily Average: 44.6 % on Jul 3		Hours of Data: 711																							
Maximum Diurnal Average: 85.5 % at hour 5		Minimum Diurnal Average: 52.5 % at hour 14		Hours of Missing Data: 33																							
Monthly Average: 68.6 %		Percentiles: P <sub>1</sub> = 30 P <sub>10</sub> = 43 Q <sub>1</sub> = 55 Median = 71 Q <sub>3</sub> = 83 P <sub>90</sub> = 90 P <sub>99</sub> = 97		Hours of Calibration: 0																							
				Percent Operational Time: 95.6																							
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-Jul	74	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	--	74	
2-Jul	M	M	M	M	M	M	M	M	M	60	46	36	33	30	30	30	29	29	34	33	43	47	51	56	--	60	
3-Jul	58	59	65	67	68	66	64	42	36	34	38	45	45	36	26	26	30	35	35	35	37	35	42	47	44.6	68	
4-Jul	50	54	58	59	63	62	63	72	84	92	94	94	91	89	88	83	87	89	85	88	90	87	83	83	79.0	94	
5-Jul	82	79	88	89	86	79	71	68	61	58	50	47	42	38	37	35	36	36	38	46	51	58	63	68	58.7	89	
6-Jul	72	74	78	83	85	76	73	66	62	48	38	35	33	29	29	33	53	82	93	93	91	85	78	83	65.7	93	
7-Jul	84	88	92	92	90	86	78	71	73	72	66	77	65	58	50	44	41	40	40	43	56	61	65	69	66.8	92	
8-Jul	76	80	81	81	79	70	68	65	59	56	55	54	54	55	54	50	48	47	50	50	77	80	84	80	64.7	84	
9-Jul	78	76	79	79	78	75	74	75	72	64	59	56	60	67	81	82	82	77	71	69	77	76	75	78	73.3	82	
10-Jul	85	91	93	94	92	90	87	85	79	68	63	60	57	55	51	47	45	46	47	51	56	57	63	61	67.6	94	
11-Jul	61	62	68	72	70	68	69	69	63	60	56	53	56	54	54	57	66	69	73	72	71	72	69	62	64.4	73	
12-Jul	61	63	68	80	84	84	90	95	95	95	95	88	79	73	72	76	74	76	79	80	82	88	95	96	82.0	96	
13-Jul	96	97	97	97	97	97	97	97	94	86	82	79	80	70	64	62	59	55	68	73	77	78	79	82	81.8	97	
14-Jul	88	88	83	84	87	86	85	82	78	69	61	56	53	57	71	87	87	77	75	72	81	88	93	78	77.6	93	
15-Jul	74	78	79	86	85	76	72	65	59	53	53	52	51	44	43	38	32	33	35	44	47	57	67	64	57.7	86	
16-Jul	68	75	77	82	82	78	74	74	65	57	54	51	44	42	71	84	91	92	87	85	85	88	95	94	74.9	95	
17-Jul	90	86	86	84	85	82	78	74	73	69	65	60	60	59	54	52	65	58	55	59	75	70	DF	88	70.7	90	
18-Jul	90	92	93	95	95	90	81	82	77	75	66	60	64	57	61	62	57	53	57	61	63	65	66	71	72.2	95	
19-Jul	83	87	84	82	85	88	88	83	77	73	71	69	69	66	61	75	77	71	77	90	89	91	93	92	80.0	93	
20-Jul	94	95	95	95	96	93	87	84	72	68	65	60	54	52	48	47	46	48	46	49	54	56	58	60	67.7	96	
21-Jul	60	65	69	75	81	85	83	85	89	92	94	90	85	76	71	73	68	68	68	71	77	89	93	94	79.2	94	
22-Jul	87	88	90	85	86	84	83	74	61	55	46	42	42	46	41	42	47	50	54	61	67	69	73	75	64.5	90	
23-Jul	77	82	83	85	87	90	88	85	81	80	76	71	65	61	60	67	67	65	68	67	72	80	79	85	75.8	90	
24-Jul	89	87	89	93	96	95	93	81	73	66	59	54	52	47	45	44	41	41	44	47	60	70	74	76	67.4	96	
25-Jul	73	74	78	90	92	94	95	89	78	73	67	62	56	51	48	53	51	48	47	49	55	67	68	71	67.9	95	
26-Jul	73	78	77	85	85	83	84	81	74	63	59	52	49	46	43	39	47	86	76	77	85	86	88	92	71.2	92	
27-Jul	91	93	91	92	95	92	80	73	68	58	49	43	39	38	43	48	46	46	56	58	64	77	81	80	66.5	95	
28-Jul	73	81	89	92	89	80	73	70	64	58	51	46	44	40	47	61	51	56	56	57	67	75	73	75	65.2	92	
29-Jul	83	87	92	92	90	84	78	71	65	61	57	51	50	54	49	42	49	40	55	72	74	75	82	79	68.0	92	
30-Jul	84	88	89	89	85	83	80	76	67	60	56	48	37	32	31	32	39	42	44	50	53	62	71	81	61.7	89	
31-Jul	80	77	79	87	90	85	77	69	62	52	43	38	36	51	84	74	75	70	76	80	79	80	89	94	71.9	94	
		77.8	80.1	82.5	85.0	85.5	82.8	79.8	76.0	71.0	65.8	61.1	57.7	54.9	52.5	53.5	55.0	56.1	57.4	59.8	62.6	68.5	72.3	75.7	77.1	Diurnal Average	
		96	97	97	97	97	97	97	97	95	95	95	94	94	91	89	88	91	92	93	93	91	91	95	96	Diurnal Maximum	
M - Maintenance		DF - DAS Failure																									





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

**Relative Humidity (RH) - %**  
**Mannix - July 2015**

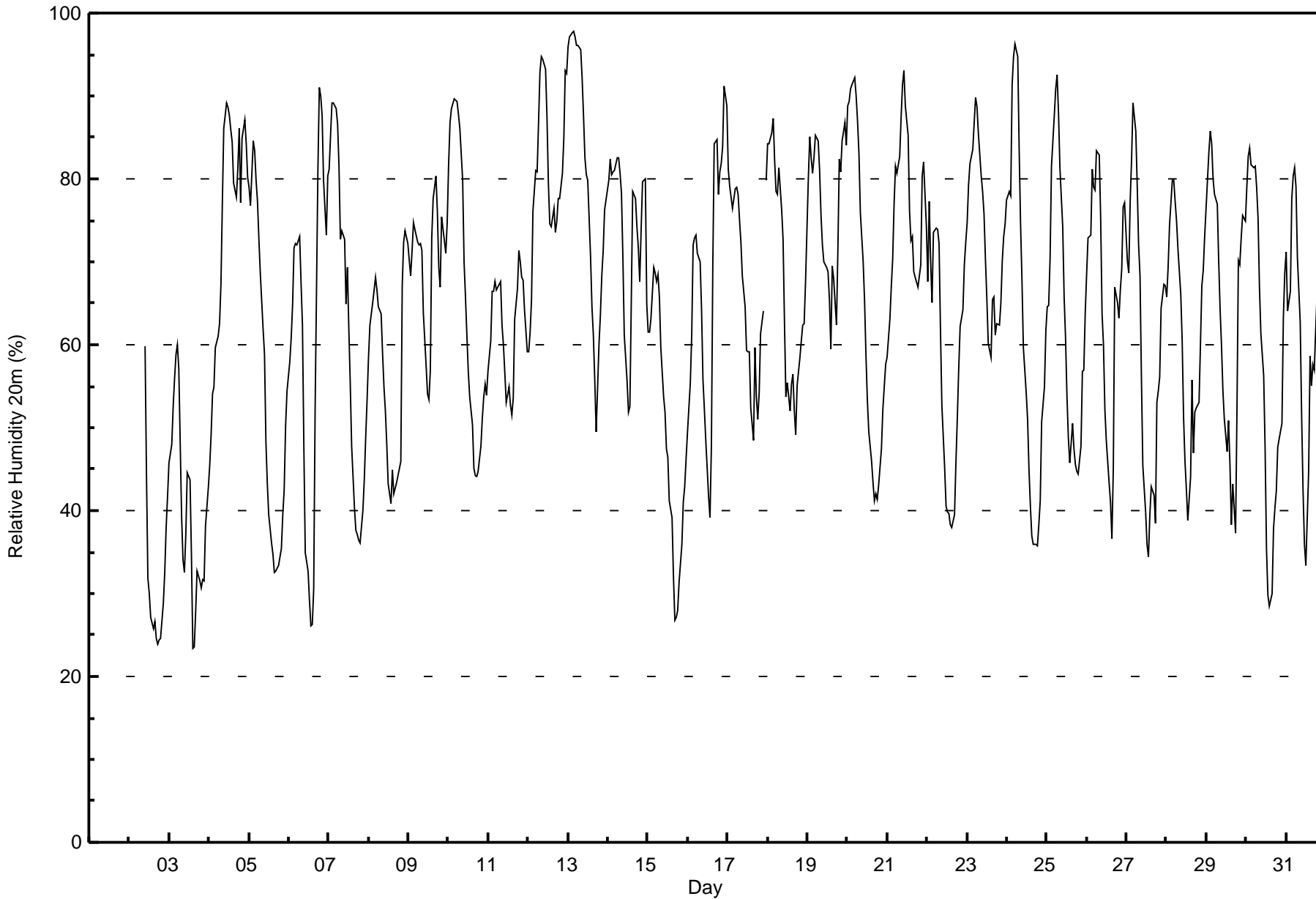
<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	49	6.89	6.89
40 - 60	179	25.18	32.07
60 - 80	264	37.13	69.20
80 - 100	219	30.80	100.00

Total Number of Valid Hours: 711

Total Number of Hours: 744



Maximum Value: 98 % on Jul 13 04:00																			Maximum Daily Average: 80.6 % on Jul 12						Hours in Service: 744	
Minimum Value: 23 % on Jul 3 15:00																			Minimum Daily Average: 39.9 % on Jul 3						Hours of Data: 711	
Maximum Diurnal Average: 79.5 % at hour 5																			Minimum Diurnal Average: 49.3 % at hour 15						Hours of Missing Data: 33	
Monthly Average: 64.0 %																			Percentiles: P <sub>1</sub> = 26 P <sub>10</sub> = 39 Q <sub>1</sub> = 51 Median = 66 Q <sub>3</sub> = 78 P <sub>90</sub> = 85 P <sub>99</sub> = 96						Hours of Calibration: 0	
																									Percent Operational Time: 95.6	
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-Jul	67	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	--	67
2-Jul	M	M	M	M	M	M	M	M	M	60	44	32	30	27	26	27	25	24	24	25	29	33	38	42	--	60
3-Jul	46	48	53	56	59	60	57	39	34	33	37	45	44	35	23	24	28	33	31	31	32	31	38	43	39.9	60
4-Jul	45	49	54	55	60	61	63	67	77	86	89	89	88	86	84	80	78	81	86	77	85	87	84	80	74.6	89
5-Jul	79	77	85	83	80	77	73	69	62	59	48	43	39	36	35	32	33	33	33	35	40	43	50	54	54.1	85
6-Jul	58	61	65	72	72	72	73	67	62	48	35	33	29	26	26	31	52	81	91	90	88	80	73	80	61.1	91
7-Jul	81	85	89	89	88	87	82	73	74	73	65	69	62	55	48	40	38	37	36	36	40	44	49	53	62.2	89
8-Jul	59	62	65	67	68	67	65	64	59	55	52	48	43	41	45	42	43	43	45	46	67	72	74	72	56.8	74
9-Jul	70	68	71	75	74	72	72	72	71	64	57	54	53	57	73	78	80	76	69	67	75	73	71	75	69.6	80
10-Jul	82	87	89	90	90	89	88	86	80	70	66	61	57	54	50	45	44	44	45	48	51	54	55	54	65.7	90
11-Jul	57	61	66	66	68	67	67	68	62	60	57	53	55	53	51	53	63	67	71	70	68	68	64	59	62.3	71
12-Jul	59	62	65	76	81	81	87	93	95	94	93	87	80	75	74	76	74	75	78	78	81	85	93	93	80.6	95
13-Jul	96	97	98	98	97	96	96	96	92	88	83	80	80	71	64	61	56	50	60	63	68	71	76	77	79.8	98
14-Jul	80	82	80	81	81	83	83	81	78	71	61	56	52	53	65	79	78	74	72	68	74	80	80	65	73.1	83
15-Jul	62	61	63	69	69	68	69	66	60	54	52	47	46	41	39	32	27	27	28	31	36	41	43	46	49.0	69
16-Jul	49	55	61	72	73	73	71	70	64	56	52	48	42	39	48	70	84	85	78	81	82	84	91	89	67.4	91
17-Jul	81	79	78	76	79	79	78	75	72	68	64	59	59	59	52	48	60	54	51	54	61	64	DF	80	66.7	81
18-Jul	84	84	86	87	82	79	78	81	76	73	63	54	55	52	55	57	52	49	55	59	61	62	63	68	67.3	87
19-Jul	80	85	82	81	83	85	84	81	76	72	70	69	69	65	59	70	68	62	71	82	81	85	87	84	76.3	87
20-Jul	89	89	91	91	92	90	87	83	76	70	65	59	53	49	46	43	41	42	41	43	48	52	55	58	64.7	92
21-Jul	58	63	67	70	77	82	81	83	87	91	93	89	85	76	73	73	69	68	67	68	70	80	82	74	76.1	93
22-Jul	68	77	70	65	74	74	74	72	62	53	45	40	40	40	38	38	39	46	51	57	62	64	70	72	58.0	77
23-Jul	75	79	82	83	87	90	89	86	80	79	76	70	66	60	58	65	66	61	63	62	65	70	73	75	73.3	90
24-Jul	77	78	78	91	95	96	95	84	75	68	60	54	51	45	41	37	36	36	36	38	41	51	55	62	61.6	96
25-Jul	65	65	70	81	88	91	93	88	81	74	66	61	54	49	46	50	47	46	45	44	48	57	57	64	63.7	93
26-Jul	68	73	73	81	79	79	83	83	75	64	60	52	48	43	41	37	45	67	65	63	67	69	77	77	65.4	83
27-Jul	70	69	77	82	89	86	79	72	68	56	45	40	36	34	39	43	42	38	53	54	56	64	67	67	59.6	89
28-Jul	66	69	74	80	80	77	75	72	66	61	51	46	42	39	44	56	47	52	52	53	60	67	69	73	61.3	80
29-Jul	76	83	86	84	80	78	77	70	64	60	54	51	47	51	46	38	43	37	52	70	70	73	76	75	64.3	86
30-Jul	79	83	84	82	81	81	79	75	67	61	56	48	35	30	29	30	38	40	42	48	49	51	63	69	58.3	84
31-Jul	71	64	66	78	80	81	79	71	63	52	43	36	33	45	59	55	58	57	62	71	75	75	84	88	64.3	88
																			69.9						Diurnal Average	
																			96						Diurnal Maximum	
M - Maintenance																			DF - DAS Failure							







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

**Relative Humidity 20m (RH20m) - %**  
**Mannix - July 2015**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	80	11.25	11.25
40 - 60	196	27.57	38.82
60 - 80	286	40.23	79.04
80 - 100	149	20.96	100.00

Total Number of Valid Hours: 711

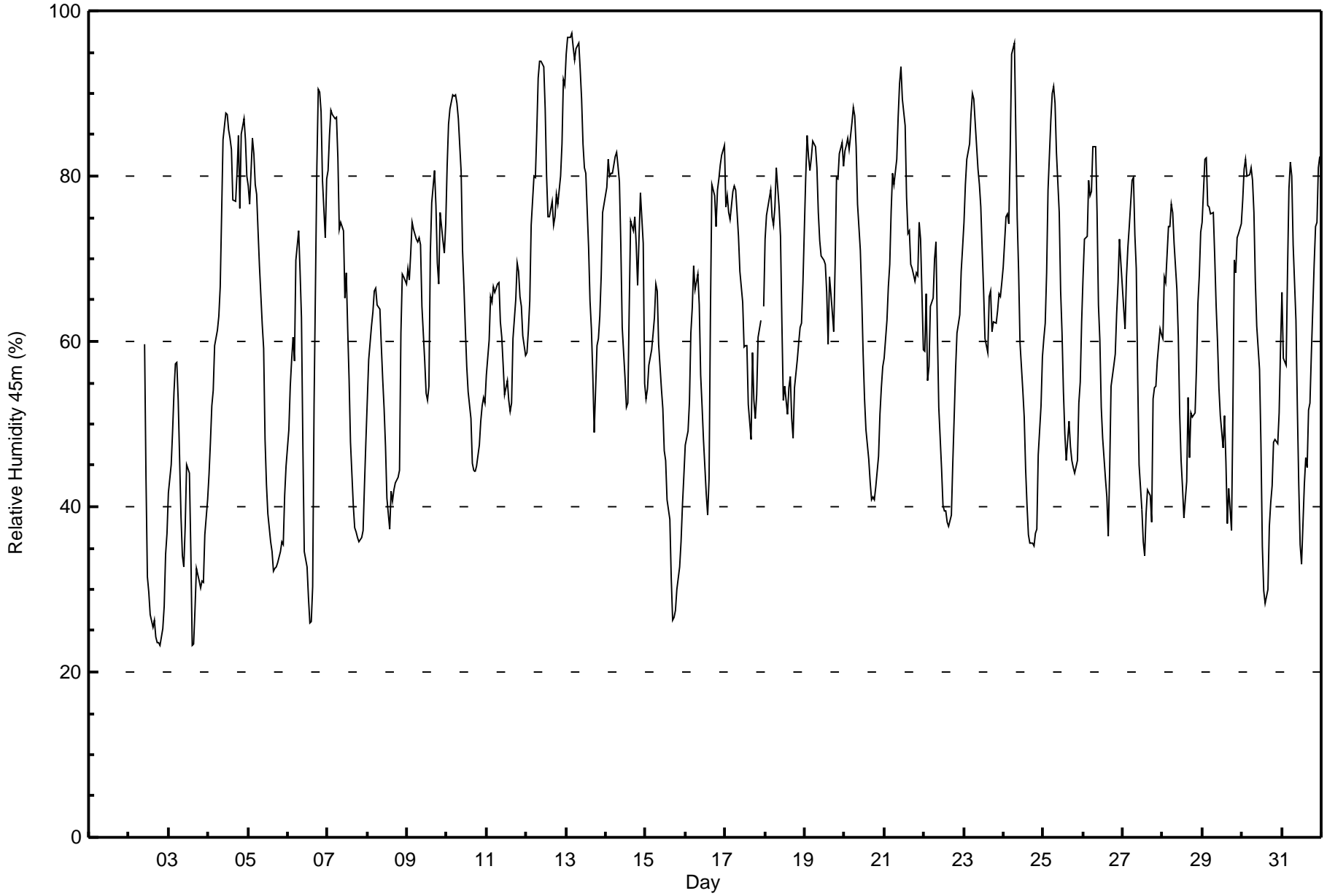
Total Number of Hours: 744



Summary of Hour Averages

Mannix - July 2015

Maximum Value: 97 % on Jul 13 04:00		Maximum Daily Average: 80.1 % on Jul 12		Hours in Service: 744																							
Minimum Value: 23 % on Jul 3 15:00		Minimum Daily Average: 38.8 % on Jul 3		Hours of Data: 711																							
Maximum Diurnal Average: 77.9 % at hour 7		Minimum Diurnal Average: 48.4 % at hour 15		Hours of Missing Data: 33																							
Monthly Average: 62.4 %		Percentiles: P <sub>1</sub> = 25 P <sub>10</sub> = 38 Q <sub>1</sub> = 51 Median = 64 Q <sub>3</sub> = 76 P <sub>90</sub> = 84 P <sub>99</sub> = 95		Hours of Calibration: 0																							
				Percent Operational Time: 95.6																							
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-Jul	66	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	--	66	
2-Jul	M	M	M	M	M	M	M	M	M	60	44	32	30	27	26	26	24	24	23	23	25	28	34	37	--	60	
3-Jul	42	45	49	54	57	58	53	39	34	33	38	45	44	35	23	23	28	33	31	30	31	31	37	41	38.8	58	
4-Jul	44	48	52	54	59	61	63	67	75	84	88	88	86	85	83	77	77	80	85	76	85	87	84	80	73.7	88	
5-Jul	79	77	85	83	79	78	73	69	62	59	48	43	39	36	35	32	33	33	33	35	36	35	41	45	52.8	85	
6-Jul	49	55	58	61	58	70	73	68	63	47	35	33	29	26	26	30	52	81	91	90	88	79	73	80	58.9	91	
7-Jul	81	85	88	88	87	87	82	74	74	73	65	68	61	55	48	40	38	37	36	36	36	37	43	48	61.2	88	
8-Jul	53	58	62	64	66	66	64	64	59	55	52	47	41	37	42	41	42	43	44	44	61	68	68	67	54.5	68	
9-Jul	69	67	71	74	74	72	72	72	72	64	58	54	53	55	71	77	81	76	69	67	76	72	71	74	69.2	81	
10-Jul	81	86	88	90	90	90	89	87	81	71	67	62	57	54	51	45	44	44	45	47	50	52	53	53	65.7	90	
11-Jul	56	60	65	65	67	66	67	67	62	61	57	53	55	53	51	53	60	65	69	68	65	64	61	58	61.3	69	
12-Jul	59	61	65	74	80	80	85	92	94	94	93	88	80	75	75	77	74	75	78	77	80	84	92	91	80.1	94	
13-Jul	95	97	97	97	96	94	95	96	93	89	84	81	80	71	65	62	56	49	59	60	63	68	76	77	79.2	97	
14-Jul	79	82	80	80	80	82	83	81	79	72	62	56	52	52	64	75	73	75	72	67	73	78	72	55	71.8	83	
15-Jul	53	54	57	59	61	63	67	66	60	54	52	47	46	41	38	31	26	27	28	30	33	36	40	44	46.3	67	
16-Jul	47	49	53	61	64	69	66	68	64	56	52	48	42	39	43	64	79	78	74	78	80	81	83	84	63.4	84	
17-Jul	76	78	76	75	78	79	78	76	73	69	65	59	59	60	52	48	59	53	51	54	60	63	DF	64	65.3	79	
18-Jul	72	75	77	78	75	74	76	81	76	73	62	53	54	51	54	56	51	48	54	58	60	62	62	67	64.7	81	
19-Jul	80	85	82	81	82	84	83	81	76	72	70	70	69	66	60	68	66	61	69	80	80	83	84	81	75.6	85	
20-Jul	83	84	85	83	87	88	87	84	77	71	66	58	53	49	46	43	41	41	41	42	46	51	54	57	63.2	88	
21-Jul	58	63	67	69	76	80	79	82	87	91	93	89	86	77	73	73	69	69	67	68	68	74	72	59	74.7	93	
22-Jul	59	66	55	57	64	65	70	72	61	52	45	40	39	39	38	38	39	45	51	57	61	63	69	71	54.9	72	
23-Jul	74	79	82	84	87	90	89	86	81	79	76	71	66	60	59	66	66	61	62	62	64	66	65	67	72.7	90	
24-Jul	69	75	75	74	83	95	96	85	75	68	60	54	51	45	40	37	36	36	35	37	37	46	52	58	59.2	96	
25-Jul	60	62	68	78	87	90	91	89	83	76	66	61	54	49	46	50	47	46	45	44	46	52	55	62	62.8	91	
26-Jul	68	72	73	79	78	78	84	84	76	64	60	52	48	43	41	36	44	55	57	59	63	67	72	69	63.5	84	
27-Jul	64	62	68	71	74	79	80	73	69	56	45	40	36	34	39	42	41	38	53	54	55	58	62	61	56.4	80	
28-Jul	60	68	67	74	74	77	76	72	66	61	51	46	42	39	43	53	46	51	51	51	57	65	68	73	59.6	77	
29-Jul	74	82	82	76	76	75	76	70	64	60	54	51	47	51	46	38	42	37	52	70	68	73	73	74	63.1	82	
30-Jul	77	81	82	80	80	81	79	76	67	62	57	48	35	30	28	30	38	40	43	48	48	48	51	59	57.0	82	
31-Jul	66	58	57	69	79	82	80	72	63	52	43	36	33	43	46	45	52	53	58	69	74	74	81	82	61.0	82	
		66.5	69.4	71.2	73.5	75.7	77.7	77.9	75.6	71.2	66.0	60.2	55.7	52.3	49.2	48.4	49.2	50.8	51.8	54.2	56.1	58.9	61.5	63.7	64.6	Diurnal Average	
		95	97	97	97	96	95	96	96	94	94	93	89	86	85	83	77	81	81	91	90	88	87	92	91	Diurnal Maximum	
M - Maintenance		DF - DAS Failure																									





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

**Relative Humidity 45m (RH45m) - %**  
**Mannix - July 2015**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	86	12.10	12.10
40 - 60	215	30.24	42.33
60 - 80	286	40.23	82.56
80 - 100	124	17.44	100.00

Total Number of Valid Hours: 711

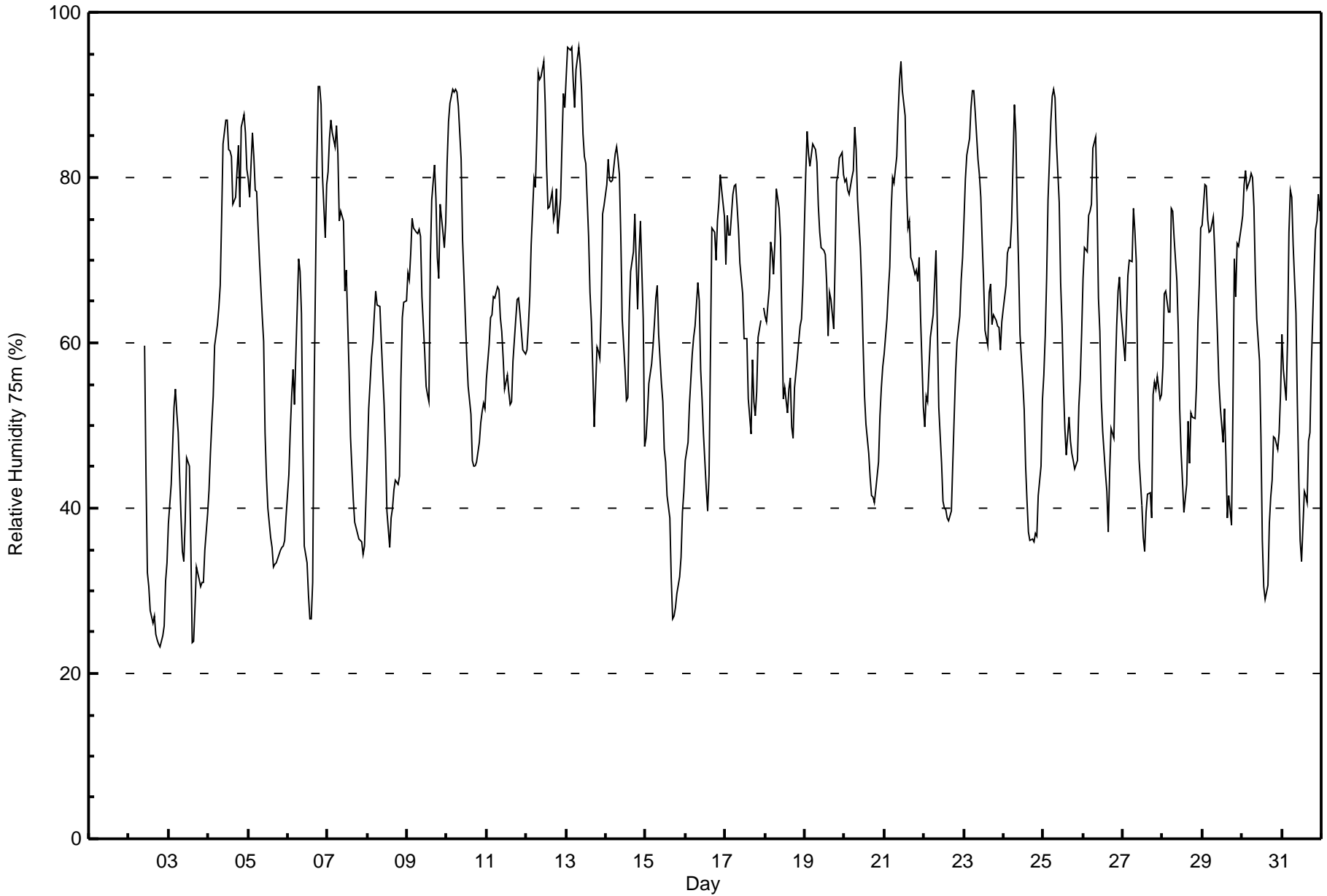
Total Number of Hours: 744



Summary of Hour Averages

Mannix - July 2015

Maximum Value: 96 % on Jul 13 04:00														Maximum Daily Average: 79.9 % on Jul 12														Hours in Service: 744	
Minimum Value: 23 % on Jul 2 20:00														Minimum Daily Average: 38.1 % on Jul 3														Hours of Data: 711	
Maximum Diurnal Average: 76.9 % at hour 7														Minimum Diurnal Average: 48.7 % at hour 15														Hours of Missing Data: 33	
Monthly Average: 61.7 %														Percentiles: P <sub>1</sub> = 26 P <sub>10</sub> = 38 Q <sub>1</sub> = 49 Median = 63 Q <sub>3</sub> = 75 P <sub>90</sub> = 83 P <sub>99</sub> = 94														Hours of Calibration: 0	
																												Percent Operational Time: 95.6	
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-Jul	66	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	--	66			
2-Jul	M	M	M	M	M	M	M	M	M	60	44	32	30	28	26	27	25	24	24	23	25	26	31	33	--	60			
3-Jul	38	43	47	52	54	52	49	39	35	34	39	46	45	36	24	24	28	33	31	30	31	31	35	39	38.1	54			
4-Jul	42	47	50	54	60	62	64	67	75	84	87	87	83	83	83	77	78	81	84	76	86	88	86	81	73.5	88			
5-Jul	80	78	85	83	78	78	74	70	63	60	49	44	40	36	35	33	33	33	34	35	35	35	36	39	52.8	85			
6-Jul	44	49	54	57	53	59	70	69	64	47	35	33	30	27	27	31	53	82	91	91	89	80	73	79	57.7	91			
7-Jul	81	85	87	85	84	86	83	75	76	75	66	69	62	57	49	41	38	38	37	36	36	34	35	41	60.6	87			
8-Jul	46	52	58	60	63	66	65	64	60	56	52	47	40	35	39	40	42	43	43	44	56	63	65	65	52.7	66			
9-Jul	68	68	71	75	74	73	73	74	73	66	59	55	54	53	70	77	82	78	70	68	77	73	72	75	69.8	82			
10-Jul	82	87	89	91	90	91	90	89	82	73	68	63	58	55	51	46	45	45	46	48	50	52	53	52	66.4	91			
11-Jul	56	60	63	63	66	65	67	66	63	61	58	54	56	54	52	53	58	63	65	65	64	61	59	59	60.5	67			
12-Jul	59	62	66	72	80	79	85	93	92	92	94	89	81	76	76	78	75	76	79	73	78	84	90	88	79.9	94			
13-Jul	92	96	95	96	92	88	93	96	94	90	85	83	82	73	66	63	57	50	59	59	58	64	76	77	78.5	96			
14-Jul	79	82	80	80	80	83	84	82	80	73	63	57	53	53	64	69	71	76	70	64	71	75	63	47	70.7	84			
15-Jul	49	51	55	57	60	62	65	67	61	55	53	47	46	41	39	32	27	27	28	30	32	34	40	42	45.8	67			
16-Jul	46	48	53	56	59	61	62	67	65	57	53	49	42	40	44	59	74	73	70	75	77	80	78	75	60.9	80			
17-Jul	70	75	73	73	78	79	79	77	74	70	66	61	61	61	53	49	58	53	51	54	61	63	DF	64	65.2	79			
18-Jul	63	63	67	72	71	68	72	79	76	73	63	53	55	52	54	56	50	48	55	58	60	62	63	67	62.5	79			
19-Jul	80	86	83	81	83	84	83	82	77	73	71	71	71	67	61	66	65	62	70	80	80	82	83	80	75.9	86			
20-Jul	80	80	79	78	80	81	86	83	77	72	67	60	54	50	47	44	41	41	41	42	46	51	55	57	62.1	86			
21-Jul	59	63	66	69	76	80	79	83	88	92	94	90	87	79	74	75	70	70	68	69	67	70	63	52	74.3	94			
22-Jul	50	54	53	57	61	63	67	71	62	52	45	41	40	40	39	38	40	45	51	56	60	63	68	70	53.6	71			
23-Jul	75	80	83	85	89	91	91	88	82	80	78	72	67	62	60	66	67	62	63	63	62	62	59	63	72.8	91			
24-Jul	64	67	71	72	72	75	89	85	76	69	61	55	52	45	41	37	36	36	36	37	37	42	45	53	56.3	89			
25-Jul	56	61	68	77	87	90	91	90	84	77	67	62	55	50	46	51	48	47	46	45	46	52	56	61	63.0	91			
26-Jul	68	71	71	75	76	77	84	85	77	65	61	53	49	44	42	37	44	50	48	56	62	66	68	64	62.3	85			
27-Jul	60	58	63	68	70	70	76	74	70	56	46	40	36	35	40	42	42	39	54	55	54	56	53	54	54.6	76			
28-Jul	57	66	66	64	64	76	76	73	68	62	52	47	43	39	43	50	45	52	51	51	55	62	67	74	58.4	76			
29-Jul	74	79	79	75	73	74	75	71	66	61	55	52	48	52	46	39	42	38	52	70	66	72	72	74	62.7	79			
30-Jul	75	79	81	79	80	80	80	76	68	63	58	49	36	31	29	31	38	41	43	49	48	47	49	54	56.9	81			
31-Jul	61	57	53	60	73	78	78	72	64	53	44	36	34	42	41	41	48	49	57	69	74	75	78	76	58.8	78			
														64.0 67.1 69.2 71.2 73.2 74.9 76.9 76.1 72.1 66.7 61.1 56.6 53.0 49.8 48.7 49.0 50.7 51.8 53.9 55.7 58.0 60.2 61.0 61.9														Diurnal Average	
														92 96 95 96 92 91 93 96 94 92 94 90 87 83 83 78 82 82 91 91 89 88 90 88														Diurnal Maximum	
M - Maintenance														DF - DAS Failure															





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

**Relative Humidity 75m (RH75m) - %**  
**Mannix - July 2015**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	92	12.94	12.94
40 - 60	220	30.94	43.88
60 - 80	292	41.07	84.95
80 - 100	107	15.05	100.00

Total Number of Valid Hours: 711

Total Number of Hours: 744

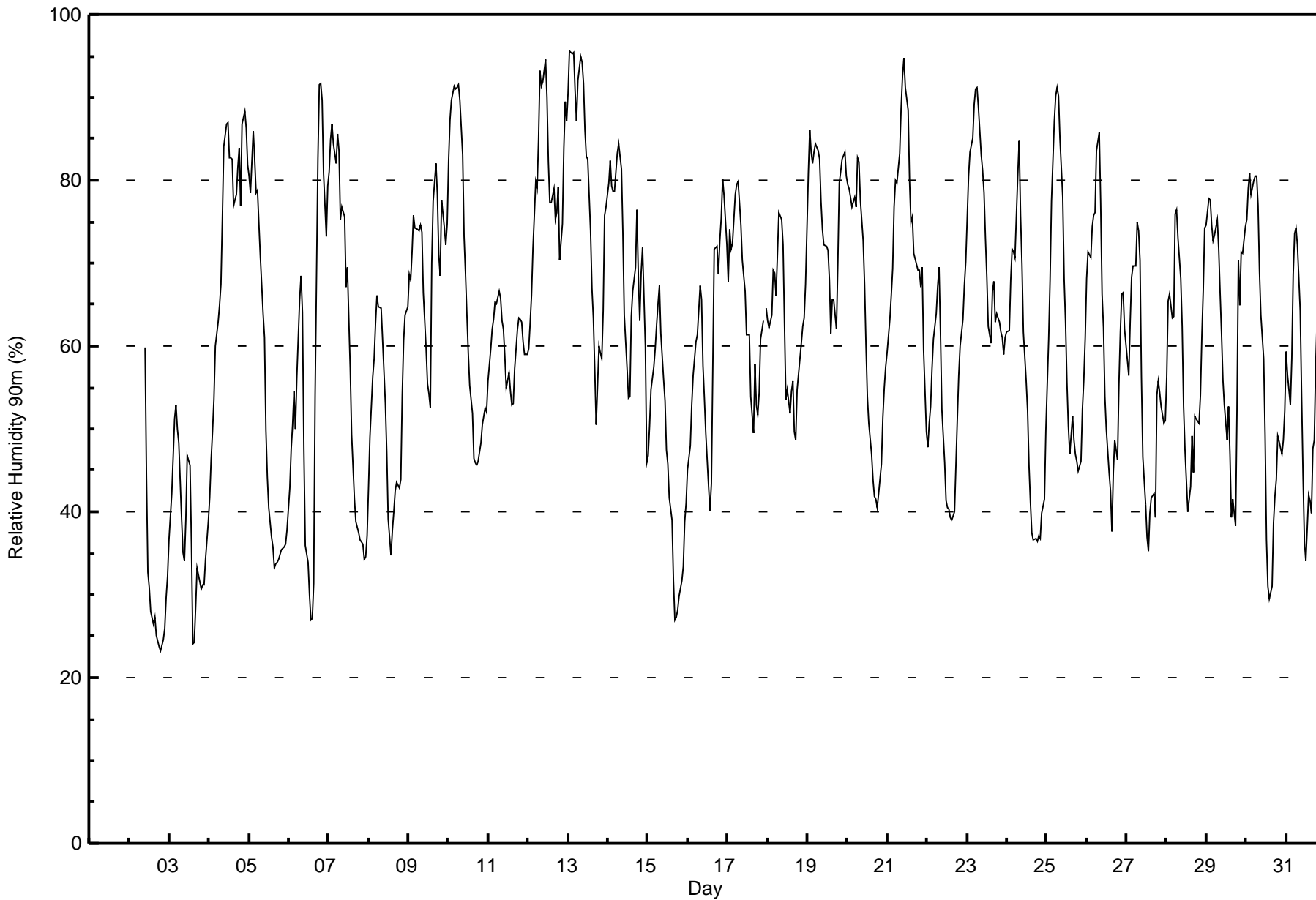


Summary of Hour Averages

Mannix - July 2015

Maximum Value: 96 % on Jul 13 02:00		Maximum Daily Average: 79.9 % on Jul 12		Hours in Service: 744																							
Minimum Value: 23 % on Jul 2 20:00		Minimum Daily Average: 37.9 % on Jul 3		Hours of Data: 711																							
Maximum Diurnal Average: 76.3 % at hour 7		Minimum Diurnal Average: 49.0 % at hour 15		Hours of Missing Data: 33																							
Monthly Average: 61.6 %		Percentiles: P <sub>1</sub> = 26 P <sub>10</sub> = 38 Q <sub>1</sub> = 49 Median = 63 Q <sub>3</sub> = 75 P <sub>90</sub> = 83 P <sub>99</sub> = 94		Hours of Calibration: 0																							
				Percent Operational Time: 95.6																							
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-Jul	66	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	--	66	
2-Jul	M	M	M	M	M	M	M	M	M	60	44	33	31	28	26	27	25	24	24	23	25	26	30	32	--	60	
3-Jul	37	42	47	51	53	50	48	39	35	34	39	47	46	36	24	24	28	33	32	31	31	31	34	39	37.9	53	
4-Jul	42	46	50	54	60	63	65	67	75	84	87	83	83	82	77	78	82	84	77	87	88	86	86	82	73.7	88	
5-Jul	80	78	86	83	78	79	75	71	64	61	50	44	40	37	36	33	34	34	34	35	36	36	36	38	53.2	86	
6-Jul	43	48	51	55	50	56	66	68	64	48	36	34	30	27	27	31	54	83	92	92	90	81	73	79	57.3	92	
7-Jul	81	85	87	84	82	86	84	75	77	76	67	69	63	57	49	42	39	38	37	37	36	34	35	37	60.7	87	
8-Jul	43	49	56	58	63	66	65	65	61	57	53	47	39	35	38	40	42	44	43	44	54	61	64	65	52.1	66	
9-Jul	69	68	71	76	74	74	74	75	74	66	60	55	54	53	70	77	82	78	71	68	78	74	72	75	70.4	82	
10-Jul	82	87	90	91	91	91	91	90	83	73	69	64	59	55	52	46	46	46	46	48	51	51	53	52	67.0	91	
11-Jul	56	60	62	63	65	65	67	66	63	62	59	55	57	55	53	53	57	62	63	63	63	61	59	59	60.3	67	
12-Jul	60	63	66	72	80	79	85	93	91	92	95	90	82	77	77	79	75	76	79	70	75	84	89	87	79.9	95	
13-Jul	90	96	95	95	91	87	92	95	94	92	86	83	83	74	67	63	57	50	60	59	58	64	76	77	78.5	96	
14-Jul	80	82	79	79	79	83	84	83	81	74	64	57	54	54	64	67	70	76	68	63	69	72	60	46	70.3	84	
15-Jul	47	50	55	58	60	63	65	67	61	56	53	47	46	42	39	32	27	27	28	30	32	33	39	41	45.7	67	
16-Jul	45	48	53	56	58	60	61	67	66	58	54	49	43	40	43	57	72	72	69	73	75	80	78	72	60.5	80	
17-Jul	68	74	72	72	78	79	80	77	75	70	67	61	61	61	54	50	58	53	52	54	61	63	DF	65	65.4	80	
18-Jul	63	62	64	69	69	66	71	76	75	72	63	54	55	52	55	56	50	49	55	58	60	62	63	67	61.9	76	
19-Jul	81	86	83	82	83	84	84	83	77	74	72	72	71	68	61	66	66	62	70	80	81	83	83	80	76.4	86	
20-Jul	79	79	78	77	78	77	83	82	78	73	68	60	54	51	47	44	42	42	41	42	46	51	55	57	61.7	83	
21-Jul	59	63	66	69	77	80	80	83	89	92	95	91	89	80	75	76	71	71	69	69	67	69	59	50	74.5	95	
22-Jul	48	51	53	57	61	64	67	70	62	52	46	41	41	40	39	39	40	46	51	56	60	63	67	70	53.5	70	
23-Jul	75	80	83	85	89	91	91	89	83	81	79	73	68	62	60	67	68	63	64	63	62	61	59	61	73.3	91	
24-Jul	62	62	68	72	71	71	81	85	76	70	62	56	52	46	41	37	37	37	36	37	37	40	41	50	55.2	85	
25-Jul	55	61	68	77	87	90	91	90	85	78	68	63	56	50	47	52	49	47	46	45	46	52	56	61	63.4	91	
26-Jul	68	71	71	74	76	76	84	86	77	66	62	54	50	45	43	38	45	49	46	55	62	66	66	62	62.2	86	
27-Jul	58	56	63	68	70	70	75	74	70	56	47	41	37	35	40	42	42	39	54	56	54	53	51	51	54.2	75	
28-Jul	56	65	66	63	64	76	76	73	68	62	53	47	44	40	43	49	45	52	51	51	54	61	67	74	58.4	76	
29-Jul	75	78	78	75	73	73	75	72	67	62	56	53	49	53	47	39	41	38	52	70	65	71	71	74	62.8	78	
30-Jul	75	79	81	78	80	80	80	77	69	64	58	49	37	31	29	31	39	42	44	49	48	47	49	52	57.1	81	
31-Jul	59	56	53	58	69	73	74	72	64	54	44	36	34	42	41	40	48	49	57	69	73	75	78	75	58.2	78	
		63.4	66.5	68.7	70.8	72.7	74.3	76.3	76.2	72.6	67.3	61.8	57.2	53.5	50.3	49.0	49.1	50.8	52.1	54.0	55.6	57.8	59.8	60.3	61.0	Diurnal Average	
		90	96	95	95	91	91	92	95	94	92	95	91	89	83	82	79	82	83	92	92	90	88	89	87	Diurnal Maximum	
M - Maintenance		DF - DAS Failure																									







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

**Relative Humidity 90m (RH90m) - %**  
**Mannix - July 2015**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	91	12.80	12.80
40 - 60	221	31.08	43.88
60 - 80	291	40.93	84.81
80 - 100	108	15.19	100.00

Total Number of Valid Hours: 711

Total Number of Hours: 744



Summary of Hour Averages

Mannix - July 2015

Maximum Speed: 33 km/h on Jul 3 11:00	Maximum Daily Speed Average: 14.4 km/h on Jul 17	Hours in Service: 744
Minimum Speed Value: 1 km/h on Jul 16 22:00	Minimum Daily Speed Average: 1.9 km/h on Jul 12	Hours of Data: 731
Maximum Diurnal Speed Average: 6.3 km/h at hour 15	Minimum Diurnal Speed Average: 2.1 km/h at hour 6	Hours of Missing Data: 13
Monthly Average Velocity: 3.5 km/h 266.6 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 4 O <sub>1</sub> = 5 Median = 8 O <sub>3</sub> = 12 P <sub>90</sub> = 17 P <sub>99</sub> = 25	Percent Operational Time: 98.3

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	WSW5	M	M	M	M	M	M	M	M	M	M	M	M	W6	NW9	WSW9	SW4	SW1	ESE3	E5	E3	SSE6	SSW4	SW5	----	NW9
2-Jul	S7	SSW5	S6	SSW6	S6	SSE8	SSE6	S5	SSE4	S4	SW4	WSW9	WSW12	W14	WSW12	WSW14	SW11	SW13	SSW10	SSW8	S7	S8	S7	S7	SSW6.6	W14
3-Jul	S10	S8	SSE9	SSE10	SSE8	SE6	SSE5	WSW16	WSW19	WSW29	W33	W30	NNW25	NNW25	NNW29	NNW24	NNW23	NNW17	NW11	NW10	NW10	NW12	W12	W14	W12.1	W33
4-Jul	W12	W12	W13	W15	W16	W21	W14	NNW16	W10	WSW7	WSW11	WSW8	WSW8	WSW10	W9	NNW6	N5	W2	W7	NNW11	NNW15	N18	N26	N20	NNW9.1	N26
5-Jul	N18	N20	N15	NNW13	NNW9	NNW6	WNV5	W9	W7	NNW8	NNW11	NNW11	NNW10	NNW10	NNW11	NNW9	NNW8	NNW5	WSW5	SSE4	S5	S8	SSW7	SSW6	NNW6.0	N20
6-Jul	S4	SSE5	SSE4	SE5	SSE7	SSE7	SSE7	SSE6	SE6	SW6	WSW21	W19	WSW18	WSW19	W19	NNW20	NNW23	N25	N20	NNW22	NNW19	NNW14	NW14	NNW15	NNW7.0	N25
7-Jul	NNW14	W12	W13	W15	W12	W6	W7	NNW7	WSW9	WSW10	WSW8	W9	SW4	WSW4	W8	W12	W12	W15	WSW12	WSW9	SSW7	S7	S8	S8	WSW8.3	W15
8-Jul	SSE10	SSE10	SSE10	SSE10	SSE10	SSE10	SSE12	SSE11	SSE13	SSE13	SSE14	SSE12	SSE11	S10	SSE15	SSE13	SSE13	WSW13	W12	NW19	NNW16	NNW13	W11	NNW13	S6.6	NW19
9-Jul	NNW13	NNW12	NNW8	N9	NNW11	N9	NNW4	NNW6	NNE6	NE9	NE6	NNE5	NNW5	NNE8	ENE6	NNE10	NNE15	NNE18	NNE20	NNE15	NNE13	N10	N15	N15	N9.6	NNE20
10-Jul	N10	N9	N8	N9	N11	NNE11	NNE9	NNE6	NE5	NNW4	NNW6	NE5	ENE7	ESE2	NE3	NE1	NE1	N2	NNE3	NNE6	NNE8	NE9	ENE5	SE9	NNE5.1	N11
11-Jul	SE10	SE11	SE8	SE6	SE8	SE12	SE12	SE9	SE12	SE11	SE11	SSE14	SSE14	SE12	SE11	E11	NNE10	NNE11	NNE9	NE10	NE7	NE7	ENE8	ESE7	ESE7.4	SSE14
12-Jul	ESE9	ESE11	ENE5	NNW3	SW2	N5	ESE2	ESE2	ESE6	NNW5	ENE4	SSW3	W5	NNW5	N7	NNE12	NE13	NNE8	NNW5	NNE6	NW4	SW23	W11	NNW7	N1.9	SW23
13-Jul	W2	SSE4	SSW4	W7	SW7	SSW5	SSE5	SE4	SSE6	S5	SE4	SE7	SW3	WSW8	W10	W4	W1	SW3	SSE6	S6	SSW6	SSE7	SE7	SSE6	S3.4	W10
14-Jul	SSE6	SE7	SE9	SSE9	SSE9	SSE9	SSE8	SSE7	SSE5	SSE6	WSW1	W4	W5	S9	NNW13	ENE4	SSW5	S4	SSE7	S8	S7	SSE6	SW5	WSW10	S4.4	NNW13
15-Jul	SW10	SSW9	S7	S7	SW9	SW8	SW5	WSW5	SW2	SE6	SSE9	WSW4	ESE6	SE7	SSW7	SW14	SW14	SW10	SW7	SW7	SW6	WSW6	SSW5	SSW6.0	SW14	
16-Jul	SSW3	S5	S5	S4	SE2	S3	ESE1	W4	W12	NNW11	NW10	N10	N16	N16	NNE9	SSE14	WSW12	W11	W14	NNW14	NNW15	NNE1	NNW8	W13	NNW4.5	N16
17-Jul	NNW13	NW17	NNW16	N20	N19	NNW20	N18	N19	NNW19	NNW20	NNW17	N19	NNW19	N16	NNW17	NNW17	NW13	NNW11	N13	NNE10	N4	NE6	DF	WSW9	NNW14.4	NNW20
18-Jul	WSW10	WSW9	WSW9	SW6	SW7	S5	SSE5	SE7	SE7	SSE7	WSW9	SW13	SW11	WSW17	WSW14	SW13	WSW17	W25	W24	W24	W22	W21	NW12	NNW14	WSW10.4	W25
19-Jul	W20	W20	W16	NNW16	NNW16	NNW15	NNW17	NNW15	NNW18	NNW20	NNW19	NNW20	NNW19	NNW16	NNW17	W19	NW12	NW8	N16	N8	N6	N5	NNW6	NNW8	NNW13.4	NNW20
20-Jul	W10	WSW11	W12	WSW6	SW8	SW5	SSW4	SSW4	SSW5	SE4	ESE4	SSE4	SE5	ESE7	ESE7	SE8	SE8	SSE8	SE9	SE11	SE11	ESE8	SE10	SE11	SSE4.5	W12
21-Jul	ESE13	SE11	SE10	SE8	SE8	ESE6	ESE7	E11	ESE8	ESE9	SE9	SE9	S6	SSW3	NE5	NNE6	N7	N7	NNE7	NE6	S2	WSW6	SW4	S6	ESE4.1	ESE13
22-Jul	SSE5	SSE4	SSE3	WSW9	SSW5	SSW4	SW6	W9	W7	NNW5	W6	W6	NNW2	SE1	NNE5	W6	NNW7	NNW16	W13	W14	W17	W15	W14	WSW10	W6.5	W17
23-Jul	W11	WSW9	WSW9	WSW9	W14	W11	WSW9	WSW6	NNW10	NNW9	NNW7	NNW6	NW4	NNW8	W9	WSW10	SSW4	SSW5	SW5	WSW7	W7	WSW7	W8	SW7	W7.2	W14
24-Jul	SW7	SSW3	SE3	S8	SSE6	SSE3	SSE5	SSE4	SE4	SE7	SE7	SE8	SSE6	SE7	SSE6	S7	WSW13	W9	W2	SSE5	SSE7	SSE9	SSE10	SSE10	SSE4.9	WSW13
25-Jul	SSW9	SW5	SW9	WSW11	W2	SE1	S3	S5	S8	SW8	WSW17	W12	W13	W14	W14	NNW18	NNW9	E3	ENE6	ESE4	SSE4	SSW3	SSE4	NNE5	WSW4.8	NNW18
26-Jul	NE2	NNW4	ENE3	NNW3	NNW5	NNE5	SE5	WSW5	NNW2	ENE3	NNW2	W6	WSW7	W17	W22	NNW8	NNW16	WSW8	E4	SSE8	SSE10	SE6	SSE7	S5	W2.7	W22
27-Jul	SSW4	S7	SE7	SSE6	SSE8	SSE8	SSE6	SSE5	SSE5	SW6	W13	WSW15	WSW18	W13	NNW11	N7	NNW4	NNW5	NNW9	ESE5	SW5	SSW5	SW5	WSW8	SW3.9	WSW18
28-Jul	W14	NNW4	S8	S6	WSW7	NNW4	NNW4	W6	WSW6	WSW5	W3	W6	NNW8	W8	NNW9	ENE8	E6	NNE11	E6	E8	WSW5	NW3	N12	NNE12	NNW2.3	W14
29-Jul	WSW5	W9	WSW9	WSW8	SW4	SSE2	WSW12	WSW11	WSW9	W7	W6	W9	W14	W19	WSW16	W18	WSW11	W15	W30	NNW17	NW4	ENE5	SSW4	W11	W9.7	W30
30-Jul	W12	WSW7	WSW9	W8	WSW14	WSW14	W13	WSW13	WSW13	W7	NNW9	NNW11	W22	NNW23	NNW19	NNW18	NE11	NE11	NE13	NE12	ENE6	S3	SW7	SSW5	W7.2	NNW23
31-Jul	ENE6	SSE7	SSW5	S5	S5	SSE6	SSE6	SE4	SE4	ESE3	SE3	SSE3	W1	SSW16	SSW6	SSW6	SW7	W8	NW6	N7	NNE6	NNE3	SW4	WSW6	S2.5	SSW16

WSW3.7	WSW2.8	SW3.0	WSW3.5	WSW3.4	SW2.1	SW2.5	WSW3.0	WSW2.8	WSW3.2	W4.4	W4.8	W5.8	W6.2	NNW6.3	NNW5.1	NNW4.7	NNW5.3	NW4.1	NW2.8	NNW2.7	W2.1	W2.7	W3.3	Diurnal Average
W20	W20	NNW16	NNW20	N19	W21	N18	N19	WSW19	WSW29	W33	W30	NNW25	NNW25	NNW29	NNW24	NNW23	W25	W30	W24	W22	SW23	N26	N20	Diurnal Maximum

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

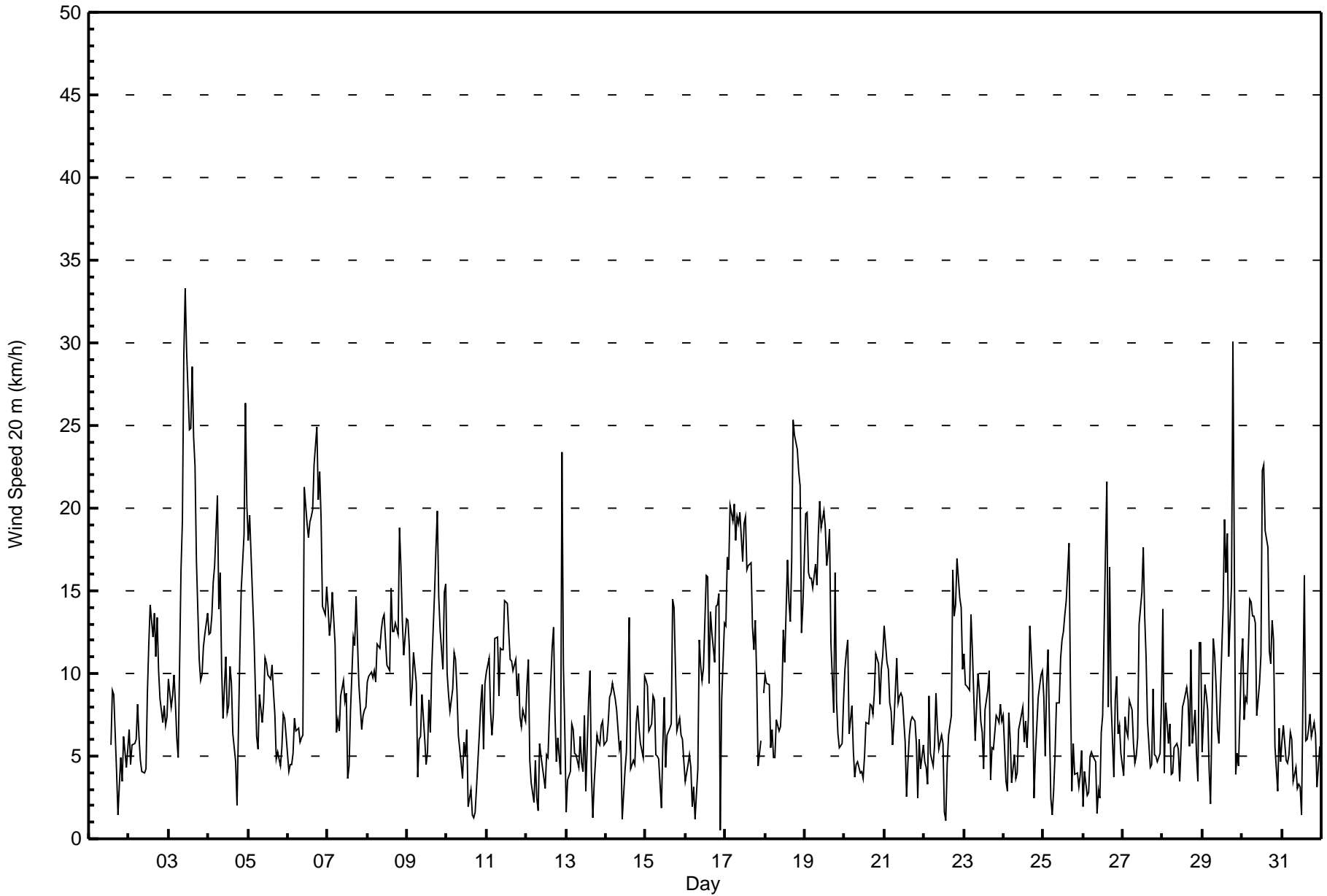


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 15 km/h on Jul 26 17:00	Hours of Data: 731
Minimum Value: 1 km/h on Jul 15 23:00	Hours of Missing Data: 13
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 2 O <sub>1</sub> = 2 Median = 3 O <sub>3</sub> = 4 P <sub>90</sub> = 6 P <sub>99</sub> = 9	Hours of Calibration: 0
	Percent Operational Time: 98.3

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

Diurnal Maximum

M - Maintenance DF - DAS Failure





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

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

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	184	25.17	25.17
6 - 11	351	48.02	73.19
12 - 19	160	21.89	95.08
20 - 28	31	4.24	99.32
29 - 38	5	0.68	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 731

Total Number of Hours: 744



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

**Wind Speed 20 m (WS20m) - km/h**  
**Mannix - July 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	8	7	7	4	9	14	23	18	23	20	10	12	9	4	12	184
6 - 11	16	19	10	7	5	13	38	51	28	12	22	48	37	15	17	13	351
12 - 19	15	6	3	0	0	1	4	11	0	1	5	22	45	26	8	13	160
20 - 28	5	1	0	0	0	0	0	0	0	0	1	1	10	8	0	5	31
29 - 38	0	0	0	0	0	0	0	0	0	0	0	1	3	1	0	0	5
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	40	34	20	14	9	23	56	85	46	36	48	82	107	59	29	43	731

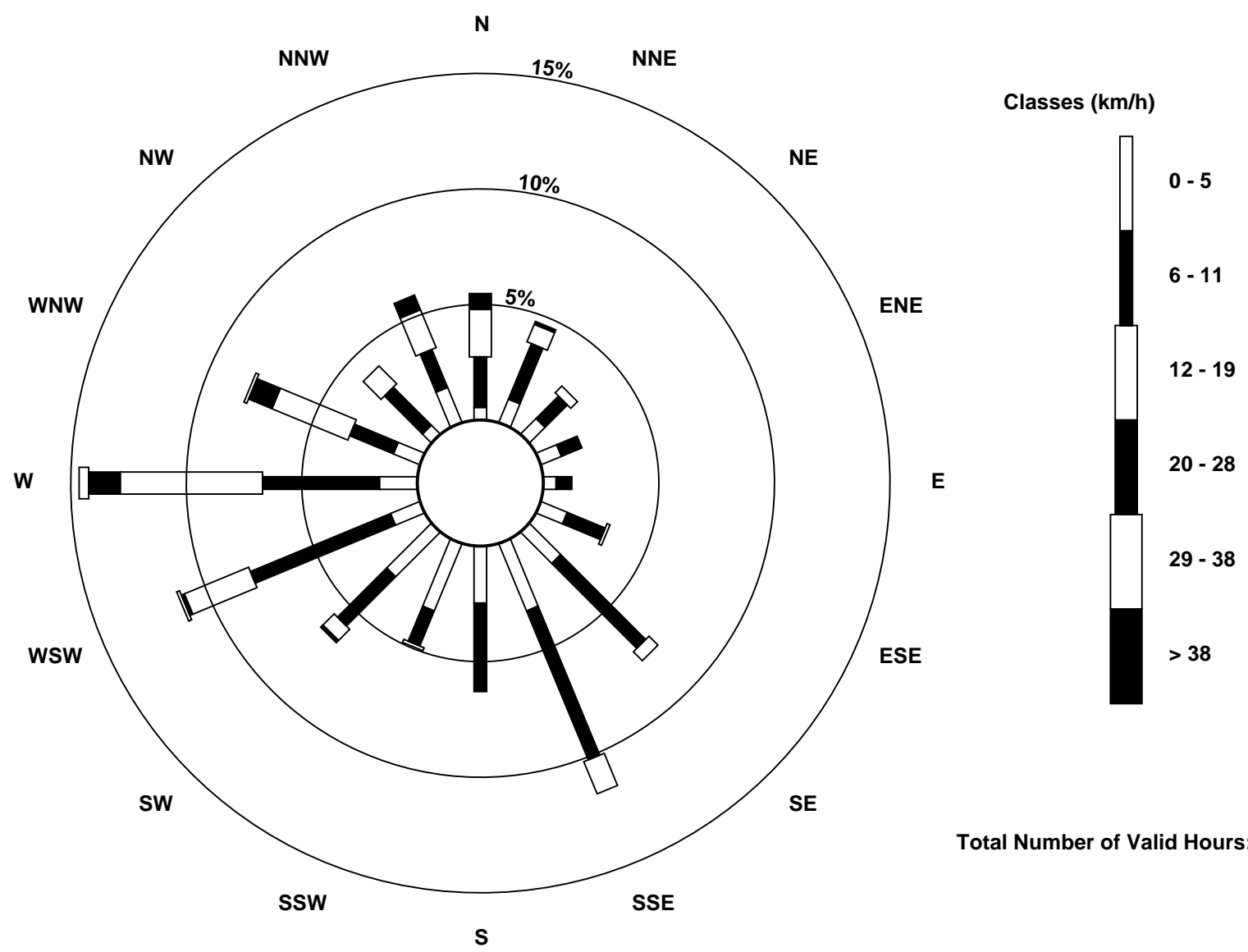
Total Number of Valid Hours: 731

Total Number of Hours: 744



Wood Buffalo Environmental Association  
Wind Rose Jul 2015

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



Total Number of Valid Hours: 731





Maximum Speed: 37 km/h on Jul 3 11:00	Maximum Daily Speed Average: 21.9 km/h on Jul 17	Hours in Service: 744
Minimum Speed Value: 1 km/h on Jul 29 06:00	Minimum Daily Speed Average: 3.2 km/h on Jul 28	Hours of Data: 731
Maximum Diurnal Speed Average: 8.0 km/h at hour 15	Minimum Diurnal Speed Average: 3.2 km/h at hour 22	Hours of Missing Data: 13
Monthly Average Velocity: 4.7 km/h 265.6 deg	Percentiles: P <sub>1</sub> = 2 P <sub>10</sub> = 6 Q <sub>1</sub> = 8 Median = 12 Q <sub>3</sub> = 17 P <sub>90</sub> = 23 P <sub>99</sub> = 34	Percent Operational Time: 98.3

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	WSW9	M	M	M	M	M	M	M	M	M	M	M	M	WSW7	NW14	W12	SW5	SW2	SE5	E7	E6	SSE12	SSW11	SW12	----	NW14
2-Jul	SSW12	SW10	SSW10	SSW10	SW8	S11	S11	S8	SSE5	S6	SW6	WSW11	WSW14	W17	WSW16	WSW15	SW16	SW21	SSW19	SSW17	S16	S22	SSW19	SSW21	SSW12.0	S22
3-Jul	S22	SSW20	S19	S21	SSE15	SSE11	S10	WSW21	WSW23	WSW37	W37	W35	WNW32	WNW31	WNW37	WNW34	WNW31	WNW22	NW17	NNW16	NNW17	NW20	WNW19	W18	W16.1	W37
4-Jul	W18	W18	W19	W21	W21	W24	W16	WNW21	WNW14	WSW10	WSW16	WSW11	WSW12	WSW13	WNW13	NNW11	N6	WNW3	W8	NNW18	NNW24	N27	N36	N29	WNW12.6	N36
5-Jul	N26	N28	N22	NNW21	NNW16	NNW10	NW8	WNW10	W9	WNW10	NW16	NNW16	NNW14	NNW14	WNW14	NW13	NW10	WNW6	WSW6	S7	S9	S16	SSW19	SSW15	NW8.0	N28
6-Jul	SSW12	S10	SSW10	S7	SSW10	SSE11	SSE9	SSE8	SE9	SW8	WSW25	W22	WSW23	WSW23	W23	WNW24	NNW33	N36	N32	NNW32	NNW29	NNW22	NW22	WNW23	WNW9.6	N36
7-Jul	WNW21	WNW17	W17	W20	WNW15	W8	WNW8	WNW9	WSW10	WSW11	WSW10	W10	SW4	WSW5	W9	W15	W14	W16	WSW14	WSW12	SSW14	SSW19	S22	S21	WSW11.0	S22
8-Jul	S21	S21	SSE20	SSE19	SSE19	SSE16	SSE20	SSE18	SSE19	SSE19	SSE19	SSE18	SSE19	S23	SSE24	SSE22	SSE19	WSW16	W17	NW29	WNW26	WNW22	W16	WNW23	S11.3	NW29
9-Jul	NNW22	NNW19	NNW13	N14	NNW18	NNE14	N6	NNW10	NNE8	NNE10	NE7	NNE6	NNW7	NNE13	ENE9	NNE13	NNE18	NNE23	NNE26	NNE20	NNE18	N16	N23	N24	N14.0	NNE26
10-Jul	N16	N14	N13	N14	N17	NNE15	NNE11	NNE8	NNE5	NNW5	NNW8	NE6	ENE7	SE3	NE3	NE2	E1	NNE3	NNE4	NNE8	NNE12	NE15	E9	SE15	NNE7.1	N17
11-Jul	SE17	SE17	SE15	SE11	SE14	SE18	SE18	SE14	SE15	SE15	SE16	SSE19	SSE19	SE16	ESE14	E14	NE15	NNE16	NNE12	NE14	NE11	ENE10	E12	ESE10	ESE11.4	SSE19
12-Jul	ESE13	ESE15	ENE7	N8	WNW2	N9	ESE4	E3	ESE8	NNW9	ENE5	SSW4	W5	NNW7	N11	NNE16	NE16	NNE10	NNW8	NNE9	NW6	SW34	W15	NNW12	N3.3	SW34
13-Jul	NW3	SE6	S9	W9	SW11	SW10	SSE8	SE5	SSE8	S7	SE4	SE9	SW3	WSW10	W11	W6	W2	SW6	SSE10	S13	SSW15	SSE13	SE11	SSW10	S5.7	SSW15
14-Jul	SSE12	SE12	SE13	SSE14	SSE17	SSE15	SSE13	SSE11	SSE8	SSE8	SW2	W5	W7	S14	NNW20	ENE6	SSW7	S7	SSE9	S14	S15	SSE12	SW8	WSW17	S7.5	NNW20
15-Jul	WSW19	SW18	SSW12	SSW12	SW15	WSW13	SW8	SW6	SW3	SE7	SSE12	WSW6	ESE8	SE8	SSW10	SW20	SW19	SW15	SW11	SW14	SW13	WSW8	SSW9	SW9.7	SW20	
16-Jul	SW6	SSW5	SSW5	SSW7	S2	SSW6	W2	W7	W13	NW14	NW15	N16	NNE22	NNE21	NNE15	SSE21	WSW16	W16	W18	WNW23	WNW25	N3	NW13	WNW19	WNW7.4	WNW25
17-Jul	NW24	NNW27	NNW28	N32	N29	N31	N27	N29	NNW28	NNW28	NNW25	N27	NNW28	N22	NNW24	NNW25	NW21	NNW18	N20	NNE14	NNE7	NE10	DF	WSW12	NNW21.9	N32
18-Jul	WSW17	W13	WSW15	WSW11	WSW11	SSW10	S9	SSE10	SE8	SSE10	WSW11	SW17	SW17	WSW23	WSW21	SW19	WSW23	W30	W29	W28	W27	WNW28	NW21	NW22	WSW14.5	W30
19-Jul	W23	W23	WNW22	WNW21	WNW23	WNW23	WNW24	WNW21	WNW25	WNW27	WNW25	WNW26	WNW23	WNW21	WNW23	W21	NW17	NNW12	N24	N13	N9	N9	NW10	NW14	WNW18.2	WNW27
20-Jul	WNW15	W14	W16	W10	WSW14	WSW9	SSW5	SSW7	SSW7	SSE5	ESE4	SSE4	SE6	ESE9	ESE8	SE11	SE10	SE10	SE11	SE15	SE16	ESE12	SE15	SE16	SSE5.3	SE16
21-Jul	ESE17	SE16	SE16	SE13	SE13	ESE9	ESE11	E14	ESE11	ESE11	SE12	SE12	S9	SSW3	NNE5	NNE8	N9	N10	NNE8	NE7	SSE3	SW8	SSW8	SSW10	ESE6.2	ESE17
22-Jul	S9	S8	SW5	WSW13	SW10	SSW8	SW8	W10	WNW7	WNW6	W7	WNW7	NNW2	S2	N6	W8	WNW10	WNW21	W16	W18	W20	W18	W18	W14	W8.8	WNW21
23-Jul	W14	W12	W12	WSW12	W16	W14	W11	WSW8	NW16	NW14	NW11	WNW9	NNW6	WNW9	W10	WSW12	SSW5	SSW9	SW9	W9	W9	WSW11	WSW14	WSW11	W9.5	W16
24-Jul	WSW13	SW7	S3	SSE7	S10	S6	S7	SSE5	SE4	SE8	ESE8	SE10	SSE8	SE9	SSE8	S11	WSW15	W11	W3	SSE8	SSE13	SSE17	SSE18	SSE19	S7.3	SSE19
25-Jul	SSW16	SW10	SW17	WSW18	WNW5	ESE1	SSE4	S9	S15	SSW12	WSW13	W14	W15	W15	W18	WNW25	WNW13	E3	ENE6	ESE4	SSE6	SSW7	S5	NNE8	WSW6.8	WNW25
26-Jul	NE3	NNW7	ENE4	WNW4	N9	NNE7	SE7	WSW5	NNW2	ENE3	WNW3	W8	WSW9	W20	W25	NW11	WNW22	WSW16	E4	SSE15	S20	SSE12	SSE15	S12	WSW3.6	W25
27-Jul	SW10	SSW11	SSE10	S10	S13	SSE13	SSE9	S7	SSE7	SW9	W15	WSW19	WSW20	W15	NNW15	N10	NNW6	WNW6	NW15	ESE6	SW7	SSW12	SW13	WSW15	SW6.3	WSW20
28-Jul	W22	WNW8	S14	S14	WSW13	WNW9	WNW5	W6	W6	WSW6	W4	W7	WNW10	WNW10	NNW14	ENE11	E7	NNE16	E8	ESE11	SW7	NW6	N19	NNE16	NW3.2	W22
29-Jul	WSW6	W13	WSW12	W13	W7	ENE1	WSW13	WSW14	WSW10	W8	W6	W10	W16	WSW22	WSW18	W21	WSW13	W17	W34	WNW23	NW7	ENE7	SSW7	W14	W11.9	W34
30-Jul	W17	W11	WSW13	W12	WSW19	WSW19	W16	WSW16	WSW15	WNW9	WNW12	WNW15	W25	WNW29	WNW25	WNW22	NNE14	NE12	NE17	NE15	ENE8	SE6	SSW11	SSW15	W9.2	WNW29
31-Jul	E8	SSE13	S15	S13	S12	SSE12	SSE8	SE4	SE5	SE3	SE4	SE3	W2	SSW26	SSW13	SW10	SW11	W11	NW10	N10	NNE8	NNE4	SW8	WSW9	S5.0	SSW26

WSW6.1	WSW4.6	WS5.0	WS5.4	WS5.9	WSW3.3	SW3.4	WSW3.8	WSW3.3	WSW4.0	W5.2	W5.7	W7.1	W7.5	WNW8.0	WNW6.4	WNW6.2	WNW6.8	NW5.5	NW3.8	WNW3.4	WSW3.2	WSW4.3	WSW5.7	Diurnal Average	
N26	N28	NNW28	N32	N29	N31	N27	N29	NNW28	WSW37	W37	W35	WNW32	WNW31	WNW37	WNW34	NNW33	N36	W34	NNW32	NNW29	SW34	N36	N29	Diurnal Maximum	

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



Summary of Hour Standard Deviations

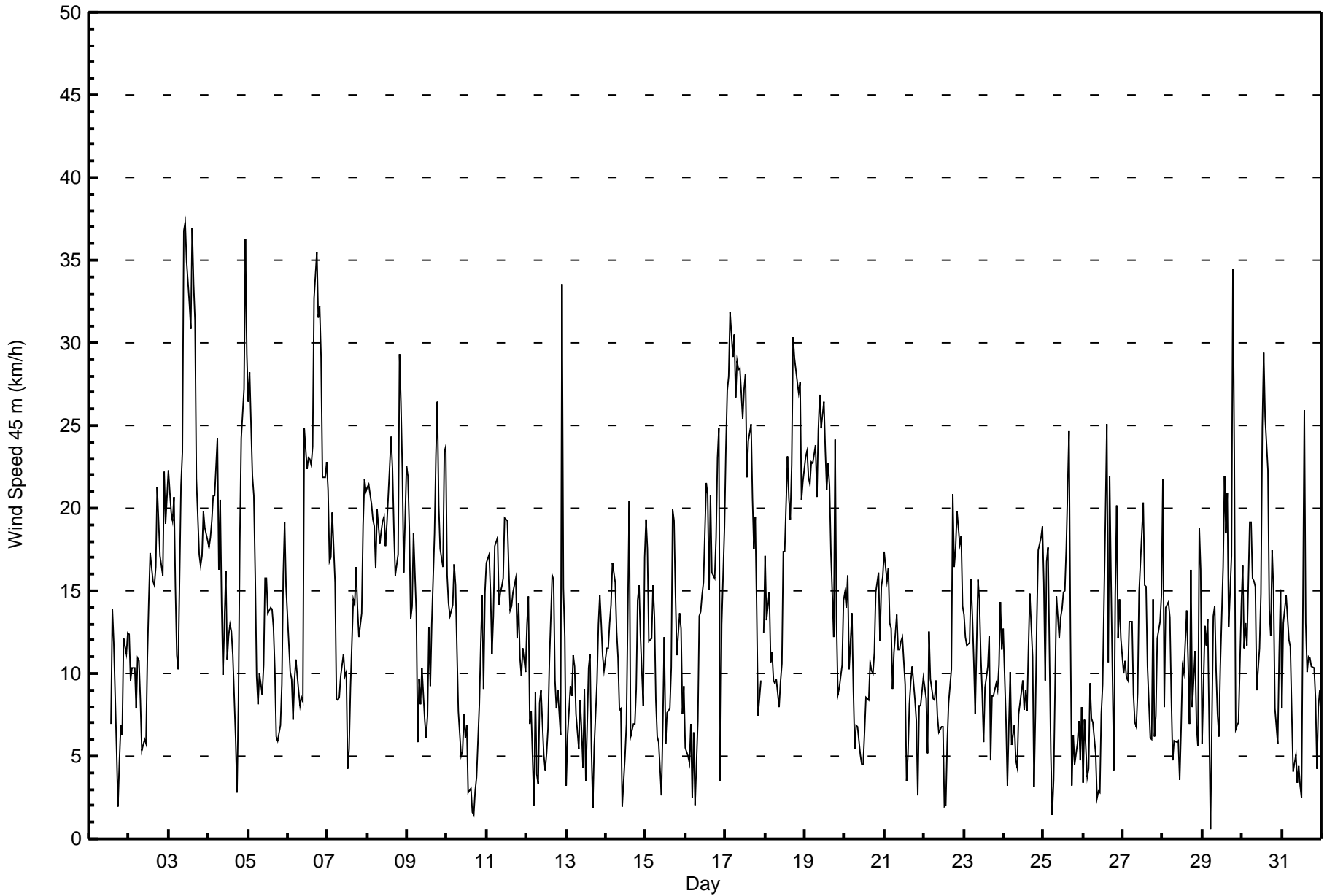
Mannix - July 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 20 km/h on Jul 26 17:00	Hours in Service: 744 Hours of Data: 731 Hours of Missing Data: 13 Hours of Calibration: 0 Percent Operational Time: 98.3
Minimum Value: 0 km/h on Jul 5 21:00	
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 2 O <sub>1</sub> = 2 Median = 3 O <sub>3</sub> = 4 P <sub>90</sub> = 6 P <sub>99</sub> = 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-Jul	2	M	M	M	M	M	M	M	M	M	M	M	M	3	5	8	2	1	3	2	2	1	2	2	8
2-Jul	1	2	2	1	2	1	1	2	1	2	3	4	5	4	4	4	5	4	4	3	3	2	1	2	5
3-Jul	3	4	3	2	2	2	2	7	6	8	6	6	5	7	7	6	6	3	4	3	4	3	2	8	
4-Jul	2	3	2	3	4	4	4	4	3	2	3	3	3	2	3	4	2	2	2	5	5	6	8	9	
5-Jul	10	7	4	3	4	2	2	2	3	3	4	4	4	4	5	5	3	2	3	3	0	3	1	2	10
6-Jul	1	1	2	1	1	3	2	2	2	7	5	5	5	6	6	9	8	9	7	7	8	4	4	2	9
7-Jul	3	3	1	2	3	3	3	2	3	2	2	5	3	3	5	3	4	4	4	3	2	1	2	2	5
8-Jul	2	2	2	2	2	3	3	3	4	4	4	3	3	3	4	4	3	4	2	13	8	4	4	3	13
9-Jul	5	5	4	6	4	6	3	3	3	4	3	3	4	5	3	3	4	5	5	5	3	5	6	5	6
10-Jul	4	3	3	4	3	3	3	2	2	3	3	3	3	3	2	3	2	2	2	2	2	2	2	4	4
11-Jul	5	5	3	4	4	4	4	3	6	4	5	5	4	5	4	3	3	4	3	2	2	2	2	3	6
12-Jul	3	4	3	1	2	4	2	3	2	5	3	4	3	3	3	4	4	3	2	2	7	7	4	3	7
13-Jul	3	3	2	1	2	2	2	1	2	2	3	3	3	3	3	3	2	3	2	1	1	2	3	3	3
14-Jul	2	2	3	3	3	3	3	3	2	3	3	3	4	8	10	4	3	2	3	3	4	3	2	10	
15-Jul	2	1	2	2	1	2	2	2	2	2	3	5	8	4	4	6	4	5	4	2	1	5	1	2	8
16-Jul	2	2	2	2	2	3	2	3	2	3	3	3	5	4	12	11	4	7	4	4	4	9	2	4	12
17-Jul	3	4	5	5	5	5	6	6	5	5	6	6	6	5	6	6	8	5	5	5	3	3	DF	2	8
18-Jul	1	1	1	2	2	2	2	2	3	2	6	4	4	4	3	3	5	6	5	4	4	4	5	4	6
19-Jul	3	3	3	4	3	3	4	3	5	4	5	5	5	5	4	7	6	3	9	4	3	2	4	3	9
20-Jul	2	1	1	3	1	2	2	3	3	2	2	3	3	3	3	3	3	2	2	3	3	4	4	5	5
21-Jul	5	4	4	3	3	3	3	3	3	4	3	3	3	3	3	2	3	3	2	2	2	1	1	2	5
22-Jul	1	3	1	2	2	1	3	2	2	3	3	3	2	2	3	4	5	5	4	5	3	2	2	2	5
23-Jul	2	3	2	2	2	1	3	3	3	2	3	3	3	3	3	4	2	2	1	2	1	1	1	1	4
24-Jul	1	2	2	2	3	2	1	2	2	3	3	4	4	4	5	4	5	2	2	1	2	2	2	3	5
25-Jul	3	5	5	2	4	2	2	2	3	3	3	4	4	4	5	4	6	5	4	2	1	2	4	2	6
26-Jul	4	3	2	3	2	2	3	3	2	2	3	3	4	6	4	6	20	9	2	4	3	2	2	3	20
27-Jul	4	1	3	2	1	1	3	2	2	5	3	5	5	5	6	4	3	3	9	2	4	1	3	2	9
28-Jul	3	2	4	2	2	3	2	2	2	2	2	4	4	4	11	5	2	7	2	3	2	3	9	7	11
29-Jul	6	3	3	2	4	2	6	3	2	2	3	4	4	4	4	4	5	5	11	6	4	3	4	2	11
30-Jul	3	3	3	5	2	3	2	3	3	4	3	4	6	5	5	7	6	3	9	6	3	2	3	2	9
31-Jul	3	4	3	1	1	2	1	1	2	2	2	2	2	16	9	3	2	2	3	3	2	2	2	2	16
	10	7	5	6	5	6	6	7	6	8	6	6	8	16	12	11	20	9	11	13	8	9	9	9	

Diurnal Maximum

M - Maintenance DF - DAS Failure





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

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

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	73	9.99	9.99
6 - 11	260	35.57	45.55
12 - 19	262	35.84	81.40
20 - 28	111	15.18	96.58
29 - 38	25	3.42	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 731

Total Number of Hours: 744



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

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

<b>Wind Speed</b> <b>Ranges (km/h)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 5	1	5	3	4	4	4	10	6	4	6	6	3	7	6	1	3	73
6 - 11	13	14	5	9	6	12	17	25	22	20	26	25	29	17	9	11	260
12 - 19	10	15	7	0	3	5	23	33	15	17	13	39	43	13	11	15	262
20 - 28	11	5	0	0	0	0	0	5	9	3	2	10	17	30	6	13	111
29 - 38	8	0	0	0	0	0	0	0	0	0	1	1	5	6	1	3	25
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>43</b>	<b>39</b>	<b>15</b>	<b>13</b>	<b>13</b>	<b>21</b>	<b>50</b>	<b>69</b>	<b>50</b>	<b>46</b>	<b>48</b>	<b>78</b>	<b>101</b>	<b>72</b>	<b>28</b>	<b>45</b>	<b>731</b>

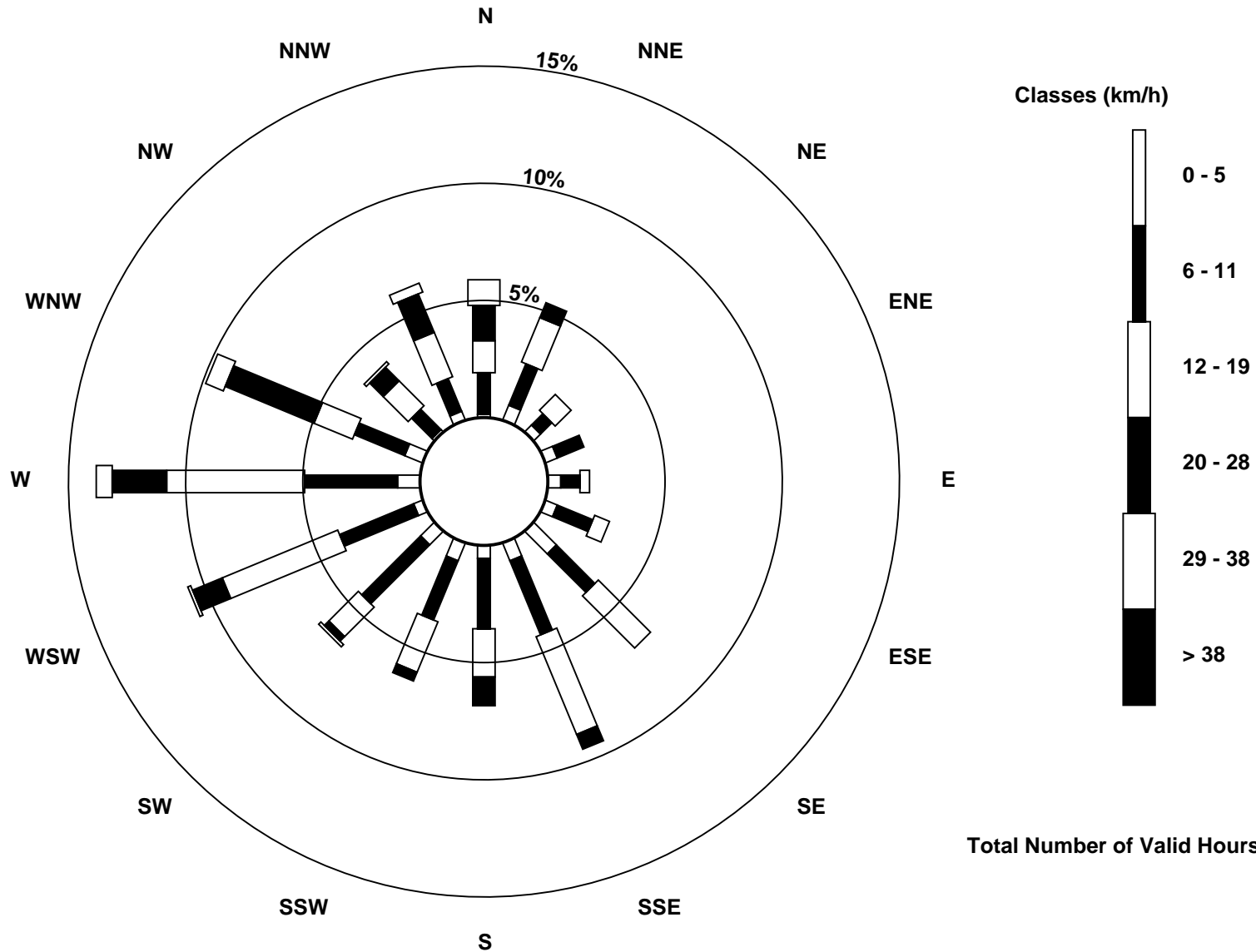
Total Number of Valid Hours: 731

Total Number of Hours: 744



Wood Buffalo Environmental Association  
Wind Rose Jul 2015

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





Maximum Speed: 41 km/h on Jul 4 23:00	Maximum Daily Speed Average: 25.1 km/h on Jul 17	Hours in Service: 744
Minimum Speed Value: 1 km/h on Jul 25 06:00	Minimum Daily Speed Average: 3.8 km/h on Jul 28	Hours of Data: 731
Maximum Diurnal Speed Average: 8.3 km/h at hour 1	Minimum Diurnal Speed Average: 3.6 km/h at hour 22	Hours of Missing Data: 13
Monthly Average Velocity: 5.5 km/h 268.0 deg	Percentiles: P <sub>1</sub> = 2 P <sub>10</sub> = 6 Q <sub>1</sub> = 9 Median = 14 Q <sub>3</sub> = 21 P <sub>90</sub> = 26 P <sub>99</sub> = 38	Percent Operational Time: 98.3

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	WSW13	M	M	M	M	M	M	M	M	M	M	M	M	WSW7	NW15	W13	SW6	SW2	SE5	E7	E6	SSE13	SSW13	SW11	----	NW15
2-Jul	SSW10	WSW9	SW10	WSW13	WSW9	SW11	SSW12	SW11	SSW6	SSW6	SW7	WSW12	WSW15	W18	WSW17	WSW16	SW18	SW23	SSW22	SSW21	S19	S27	SSW28	SSW28	SW14.0	SSW28
3-Jul	SSW29	SSW26	S24	S25	S18	SSW14	SSW15	WSW24	WSW26	WSW40	W39	W36	WNW33	WNW32	WNW38	WNW35	WNW34	WNW24	NNW20	NNW20	NNW21	NW23	WNW24	WNW22	W19.0	WSW40
4-Jul	WNW22	WNW22	W25	W25	W25	W26	W17	WNW22	WNW16	WSW12	WSW20	WSW14	WSW17	WSW16	WNW15	NNW12	N7	WNW3	WNW8	NNW20	NNW27	N32	N41	N34	WNW14.8	N41
5-Jul	N31	N32	N25	N23	N19	NNW11	NW8	WNW10	W9	WNW11	NW16	NNW16	NNW14	NNW15	NW14	NW13	NW10	WNW6	WSW6	SSE7	S9	S16	SSW24	SSW24	WNW8.1	N32
6-Jul	SSW20	SSW15	SW15	SW10	SW13	S13	SSE10	SSE9	SSE9	SW11	WSW27	W23	WSW24	WSW24	W24	WNW25	NNW36	N39	N37	NNW37	NNW33	NNW25	NW25	WNW26	WNW11.7	N39
7-Jul	WNW24	WNW20	WNW20	WNW23	WNW20	WNW11	WNW9	WNW9	WSW10	SW11	WSW10	W10	SW5	WSW5	W10	W15	WSW15	W17	WSW15	WSW13	SSW15	SSW23	SSW31	SSW32	WSW12.4	SSW32
8-Jul	SSW29	S28	S25	S25	S26	SSE20	S24	SSE21	SSE21	SSE20	SSE22	SSE21	SSE24	S29	SSE33	SSE27	SSE21	WSW18	W21	NW34	NW34	NW28	WNW20	NW25	SSW14.0	NW34
9-Jul	NNW27	NNW23	NNW16	N17	NNW22	NNE16	N6	NNW10	NNE8	NE11	NE8	NNE6	NNW8	NNE16	ENE11	NNE14	NNE20	NNE26	NNE30	NNE23	NNE20	N20	N27	N28	N16.1	NNE30
10-Jul	N20	N18	N16	N17	NNE19	NNE18	NNE13	NNE9	NE5	N5	NNW7	NE7	ENE7	SE3	NE3	ENE2	ESE2	NNE3	NNE4	NNE9	NNE15	NE18	E9	SE17	NNE8.3	N20
11-Jul	SE15	SE19	SE21	SE15	SE17	SE20	SE21	SE18	SE13	SE16	SSE16	SSE20	SSE20	SE15	ESE11	E13	NE19	NE19	NE15	ENE18	ENE13	E11	E11	ESE9	ESE12.9	SE21
12-Jul	ESE10	ESE12	ENE8	NNE8	N3	NNE11	E4	E4	ESE7	N10	ENE5	S4	WNW5	NNW6	N11	NNE18	NE17	NNE11	N9	NNE11	NNW8	SW38	W19	NNW16	N4.0	SW38
13-Jul	NNW6	SE6	S12	WSW11	WSW15	SW14	S8	SSE5	SSE8	S7	SE4	SE9	SW4	WSW11	W11	W6	WSW2	SW6	SSE10	S16	S19	SSE17	SE14	SE14	S6.8	SSW19
14-Jul	SSE15	SSE15	SSE17	SSE19	SSE21	SSE20	SSE15	SSE12	SSE8	SSE8	SW2	W5	W7	S14	NNW23	NE7	SSW7	S7	SSE10	S17	S20	SSE17	SW11	WSW22	S9.0	NNW23
15-Jul	WSW26	WSW22	SW15	SW12	WSW16	W18	WSW12	SW6	SW6	SW3	SE7	SSE13	WSW7	ESE7	SE6	SSW12	SW22	SW21	SW16	SW13	SW16	SW10	SW13	SW11.4	WSW26	
16-Jul	W10	WSW8	W4	WSW7	W5	WSW7	WNW7	WNW9	WNW13	NW14	NNW15	N17	NNE23	NNE22	NNE17	SSE21	WSW16	W18	WNW22	WNW29	WNW31	N6	NNW13	NW21	NW9.8	WNW31
17-Jul	NW30	NNW34	NNW36	N39	N34	N35	N30	N33	N31	N31	NNW27	N29	NNW30	N23	NNW26	NNW28	NNW23	N20	N23	NNE17	NNE11	NE12	DF	WSW10	N25.1	N39
18-Jul	WSW17	W20	W21	W14	WSW16	SW13	S12	SSE11	SE9	SSE11	WSW12	SW19	SW20	WSW26	WSW24	SW23	WSW28	W34	W33	W30	W30	WNW31	NW23	NW24	WSW17.4	W34
19-Jul	W25	W26	WNW25	WNW24	WNW26	WNW26	WNW27	WNW22	WNW26	WNW28	WNW26	WNW27	WNW24	WNW21	WNW23	W23	NW19	NNW13	N28	N15	N9	N11	NW14	NW17	WNW19.9	WNW28
20-Jul	NW16	WNW15	WNW14	WNW11	W14	W15	SW7	SSW8	SSW7	SSE5	ESE4	SSE5	SE6	ESE8	ESE8	SE10	SE10	SE10	SE12	SE15	SE13	ESE10	SE15	SE13	S4.1	NW16
21-Jul	ESE14	SE13	SE19	SSE17	SE12	SE9	ESE8	E14	ESE10	ESE9	SE12	SE12	S10	SSW4	NNE4	NNE9	N10	N11	NE9	NE8	SE3	SSW8	SSW11	SSW13	SE6.1	SE19
22-Jul	SSW11	SSW11	WSW8	W13	SW11	SW8	WSW9	W11	WNW8	WNW6	W7	WNW6	NW2	SSE2	N6	W8	WNW10	WNW22	W17	W19	W22	W21	W23	W17	W10.3	W23
23-Jul	W15	W12	W13	W15	W17	W15	W12	W8	NW16	NW15	NW11	WNW9	NW6	WNW9	W10	WSW12	SSW5	SSW9	SW9	W10	W11	WSW14	W18	W13	W10.5	W18
24-Jul	W13	WSW12	SW6	S4	SSE5	S7	S8	SSE4	SE4	SE7	SE7	SE9	SSE8	SE9	SSE7	S12	WSW15	W11	WSW3	SSE8	SSE14	SSE24	SSE26	SSE26	S7.8	SSE26
25-Jul	SSW19	WSW14	SW21	WSW22	WNW7	NNE1	SE3	S10	S15	SSW13	WSW14	W14	W15	W15	W18	WNW25	WNW12	E3	ENE6	ESE4	SSE5	SSW8	S5	NNE8	WSW7.6	WNW25
26-Jul	ENE4	N9	ENE4	NW2	N9	NE9	ESE7	WSW5	N2	NE2	W4	W7	WSW10	W20	W26	NW11	WNW23	WSW18	ESE2	SSE17	S26	SSE17	S20	SSW17	WSW4.4	W26
27-Jul	WSW18	WSW14	S8	SSW6	SSW11	S12	S10	S8	SSE8	SW10	W15	WSW20	WSW21	WSW16	NNW16	NNW11	NNW6	WNW6	NW16	ESE5	SSW8	SSW14	SW20	WSW23	WSW8.3	WSW23
28-Jul	W28	WNW12	S12	S19	WSW16	WNW12	WNW5	W6	W5	WSW6	W3	W7	WNW10	W10	NNW14	ENE12	E7	NNE19	E8	ESE10	SSW7	NW6	NNE23	NNE21	NW3.8	W28
29-Jul	SW3	WSW18	W14	W16	WNW12	N4	WSW12	WSW16	WSW10	W8	W6	W11	W17	WSW23	WSW19	W22	WSW14	W17	W37	WNW25	NW10	NE8	SSW6	WNW17	W12.8	W37
30-Jul	W20	W15	W16	W15	W22	WSW24	W18	W18	WSW16	WNW9	WNW12	NW15	W26	WNW30	WNW26	WNW23	NNE15	NE13	NE19	NE17	ENE9	SE7	S12	S21	WNW10.1	WNW30
31-Jul	ESE8	SSE12	S18	SSE18	S17	S15	S7	SSE4	SE5	SSE3	SE4	SE3	WSW3	SSW29	SSW14	SW11	SW13	W14	NW12	N12	NNE10	NNE5	SW8	WSW10	SSW5.9	SSW29

W8.3	W7.0	WSW6.3	WSW6.6	W7.1	WSW4.9	SW4.2	WSW4.5	WSW3.8	WSW4.3	W5.6	W5.9	W7.5	W8.0	WNW8.3	WNW6.7	WNW6.5	WNW7.2	NW6.2	NW4.4	WNW3.9	WSW3.6	WSW5.5	W7.3	Diurnal Average	
N31	NNW34	NNW36	N39	N34	N35	N30	N33	N31	WSW40	W39	W36	WNW33	WNW32	WNW38	WNW35	NNW36	N39	W37	NNW37	NW34	SW38	N41	N34	Diurnal Maximum	

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

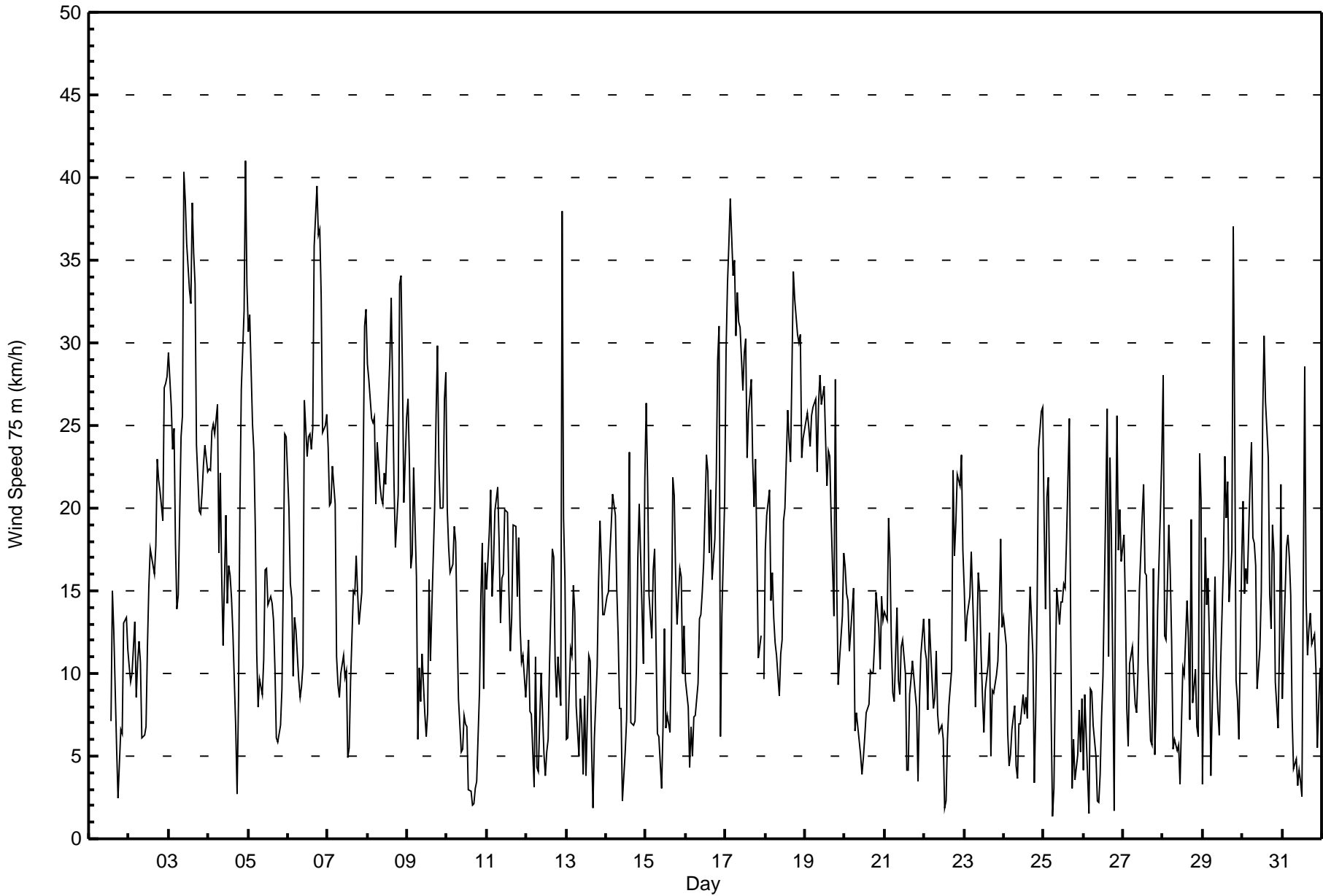


Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 21 km/h on Jul 26 17:00			Hours of Data:	731
Minimum Value: 1 km/h on Jul 5 21:00			Hours of Missing Data:	13
			Hours of Calibration:	0
			Percent Operational Time:	98.3
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 2 O <sub>1</sub> = 2 Median = 3 O <sub>3</sub> = 4 P <sub>90</sub> = 6 P <sub>99</sub> = 12				

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

M - Maintenance      DF - DAS Failure







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

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

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	69	9.44	9.44
6 - 11	217	29.69	39.12
12 - 19	234	32.01	71.14
20 - 28	161	22.02	93.16
29 - 38	45	6.16	99.32
> 38	5	0.68	100.00

Total Number of Valid Hours: 731

Total Number of Hours: 744



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

**Wind Speed 75 m (WS75m) - km/h**  
**Mannix - July 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	5	3	4	3	5	9	9	3	2	6	5	6	3	2	0	69
6 - 11	13	12	8	5	7	14	14	16	12	17	20	21	22	20	7	9	217
12 - 19	8	12	9	3	2	2	21	17	17	15	14	39	39	11	14	11	234
20 - 28	10	8	0	0	0	0	3	17	12	9	7	18	21	35	7	14	161
29 - 38	12	1	0	0	0	0	0	1	1	5	1	0	6	9	3	6	45
> 38	3	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	5
<b>Totals</b>	50	38	20	12	12	21	47	60	45	48	48	84	95	78	33	40	731

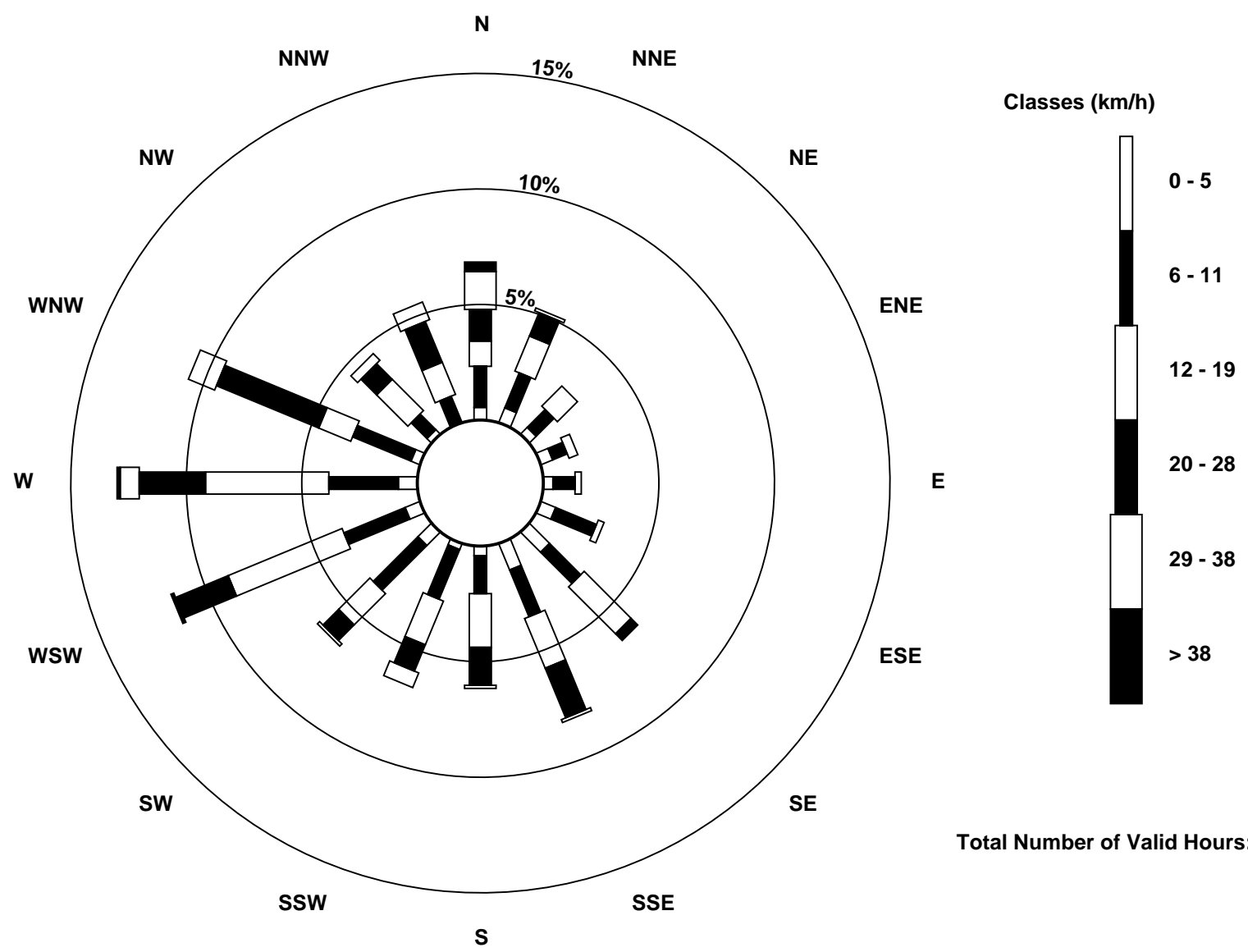
Total Number of Valid Hours: 731

Total Number of Hours: 744



Wood Buffalo Environmental Association  
Wind Rose Jul 2015

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





Summary of Hour Averages

Mannix - July 2015

Maximum Speed: 43 km/h on Jul 4 23:00	Maximum Daily Speed Average: 26.4 km/h on Jul 17	Hours in Service: 744
Minimum Speed Value: 1 km/h on Jul 26 04:00	Minimum Daily Speed Average: 4.1 km/h on Jul 28	Hours of Data: 731
Maximum Diurnal Speed Average: 8.8 km/h at hour 1	Minimum Diurnal Speed Average: 3.8 km/h at hour 22	Hours of Missing Data: 13
Monthly Average Velocity: 5.8 km/h 262.8 deg	Percentiles: P <sub>1</sub> = 2 P <sub>10</sub> = 6 Q <sub>1</sub> = 9 Median = 15 Q <sub>3</sub> = 22 P <sub>90</sub> = 27 P <sub>99</sub> = 39	Percent Operational Time: 98.3

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jul	WSW15	M	M	M	M	M	M	M	M	M	M	M	M	WSW7	NW15	W13	SW6	SW3	SE5	E8	E8	SSE13	SSW13	SW10	----	NW15	
2-Jul	SW10	WSW10	WSW11	WSW15	WSW10	SW11	SW12	SW12	SSW7	SSW7	SW7	SW12	WSW15	W18	WSW17	WSW16	SSW18	SSW24	SSW23	SSW23	S20	S28	SSW31	SSW31	SW14.8	SSW31	
3-Jul	SSW33	SSW29	S26	S27	S20	SSW16	SSW16	WSW25	SW26	WSW40	WSW38	W35	WNW33	WNW32	WNW38	WNW35	WNW34	W24	NW21	NW21	NW23	NW24	WNW26	WNW24	W20.4	WSW40	
4-Jul	WNW24	WNW24	W26	W26	W26	W27	W18	W23	W17	WSW13	WSW21	WSW16	WSW18	WSW18	WNW16	NNW13	N7	WNW3	WNW9	NNW21	NNW28	N34	N43	N35	WNW15.9	N43	
5-Jul	N32	N33	N26	N24	NNW20	NNW12	NW8	WNW10	W9	WNW11	NW16	NW17	NNW14	NNW15	WNW14	NW13	NW11	WNW6	WSW6	SSE7	S9	S16	S24	SSW27	NW8.3	N33	
6-Jul	SSW24	SSW20	SW19	SW13	SW16	S13	S10	S9	SSE10	SW11	WSW26	W23	WSW25	WSW25	WSW24	WNW25	NNW37	N41	N39	NNW39	NNW34	NW26	NW26	WNW26	WNW13.2	N41	
7-Jul	WNW24	WNW21	WNW21	W23	WNW22	WNW13	WNW10	WNW8	WSW10	SW11	SW10	W10	SW5	SW6	W10	W15	WSW15	W17	WSW15	SW13	SSW16	SSW23	SSW32	SSW37	WSW13.0	SSW37	
8-Jul	SSW31	S30	S27	S28	S29	SSE23	SSE26	SSE23	SSE21	SSE21	SSE24	SSE24	SSE27	S32	SSE37	SSE30	SSE23	WSW18	W22	WNW35	WNW36	WNW30	WNW22	NW26	S15.4	SSE37	
9-Jul	NNW28	NNW24	NNW18	N18	NNW24	N17	NNW6	NW11	N9	NNE12	NE8	NNE6	NNW8	NNE17	ENE13	NNE14	NNE21	N27	N31	NNE24	NNE21	N21	N27	N29	N17.0	N31	
10-Jul	N21	N19	N17	N17	N20	N19	NNE13	NNE9	NNE5	NNW6	NNW8	NNE7	ENE7	SE3	NE3	NE2	E2	NNE3	NNE4	NNE9	NNE16	NE19	E13	SE19	NNE8.7	N21	
11-Jul	ESE18	SE22	SE25	SE18	SE21	SE24	SE25	SE22	ESE17	SE17	SE17	SE21	SE21	SE17	ESE15	E17	NE20	NE20	NE16	ENE20	ENE14	E13	E15	ESE14	ESE15.7	SE25	
12-Jul	ESE19	E20	ENE9	NNE7	N4	N11	E6	E7	E11	N10	ENE6	SSE4	WNW5	NW6	NNW11	NNE18	NNE18	NNE11	NNW9	NNE12	NNW9	SW40	W23	NNW17	NNE4.1	SW40	
13-Jul	NNW7	ESE8	SSE12	SW11	SW14	SW12	S8	SE5	SSE9	SSE7	SE4	SE10	SW4	WSW11	W11	WSW6	WSW2	SSW6	SSE11	SSE16	S20	SSE18	SE16	SE15	S7.0	S20	
14-Jul	SSE16	SE17	SE20	SSE22	SSE23	SSE22	SSE17	SSE13	SSE8	SSE9	SW3	W6	WSW8	S15	NNW25	NNE7	SSW7	SSE7	SSE11	SSE18	S23	SSE18	WSW12	WSW23	S9.7	NNW25	
15-Jul	WSW29	WSW25	SW16	SW13	WSW17	WSW19	WSW14	SW7	SW6	SW3	SE7	SSE13	SW7	ESE8	SE8	SSW13	SW23	SW21	SW16	SW14	SW17	SW12	SW15	SW12.3	WSW29		
16-Jul	W12	WSW10	W6	WSW7	W7	WSW8	WNW9	WNW11	W13	WNW13	NW15	NNW17	N24	N23	NNE19	SE23	WSW15	W18	WNW23	WNW31	WNW33	N7	NNW14	NW20	WNW10.6	WNW33	
17-Jul	NW31	NW36	NNW39	N41	N36	N37	N32	N34	NNW32	NNW32	NNW28	N30	NNW31	N24	NNW26	NNW29	NW24	NNW21	N24	NNE19	NNE13	NE13	DF	WSW9	NNW26.4	N41	
18-Jul	WSW17	WSW19	WSW22	WSW17	WSW18	SW15	S13	S12	SSE10	SSE13	WSW13	SW20	SW21	WSW27	SW26	SW24	WSW29	WSW35	W33	W31	W31	W31	W31	NW24	WNW25	WSW18.5	WSW35
19-Jul	W26	W27	WNW26	W24	WNW26	WNW27	WNW27	WNW22	WNW26	WNW28	WNW26	WNW27	WNW24	WNW21	WNW24	W24	NW22	NW14	N30	N16	N10	NNW12	NW15	NW18	WNW20.4	N30	
20-Jul	WNW16	WNW15	WNW14	WNW10	W12	W15	WSW8	SSW8	SSW7	SSE5	ESE4	SE5	ESE7	ESE9	ESE9	SE11	SE11	SE11	SE13	SE15	ESE16	ESE15	SE18	ESE20	SSE4.5	ESE20	
21-Jul	ESE22	ESE18	SE22	SE19	SE13	ESE12	ESE14	E16	ESE14	ESE13	SE13	SE13	S10	SSW4	NNE4	NNE9	N10	N11	NNE9	NE8	SE4	S9	SSW12	SW16	ESE7.8	SE22	
22-Jul	SSW13	SSW11	W9	WSW14	SW12	SW8	WSW9	W13	WNW8	WNW7	W7	W6	WNW2	SSE2	N6	W8	WNW10	W22	W17	W20	W22	W23	W25	W19	W10.9	W25	
23-Jul	W16	WNW12	W14	W15	W18	W15	W12	W8	NW16	NW15	NW11	WNW9	NW7	WNW9	W10	WSW13	SSW5	SSW9	SW9	W10	W11	WSW14	WSW18	W14	W10.9	WSW18	
24-Jul	W14	WSW15	WSW9	SSW4	S4	SSE7	SE5	SE4	SE8	ESE8	SE10	SE8	SE10	SSE8	S12	WSW15	W11	WSW4	SE8	SSE14	SSE25	SSE27	SSE28	S7.8	SSE28		
25-Jul	SSW20	WSW16	SW22	WSW23	W9	N2	SE3	S10	S15	SSW13	WSW15	W14	WSW15	WSW15	W18	WNW25	WNW12	ENE3	ENE6	ESE4	SE5	S8	S5	NNE8	WSW7.9	WNW25	
26-Jul	ENE5	NNW9	E5	ESE1	N8	NNE10	ESE9	WSW5	NNW2	NE2	W3	W7	WSW10	W20	W26	NW11	WNW23	WSW20	SSE2	SSE18	SSE28	SSE20	S22	SSW20	SW4.8	SSE28	
27-Jul	SW23	WSW17	SSW8	SSW5	SSW10	SSW11	S10	S8	SSE8	SW10	W15	SW20	WSW22	WSW16	NNW16	NNW11	NW6	WNW6	NNW17	ESE7	SSW9	SSW14	SW22	WSW27	WSW9.3	WSW27	
28-Jul	W30	W14	S11	S18	WSW16	WNW14	WNW6	W6	W5	WSW6	W3	W7	WNW10	W10	NNW14	ENE13	ENE8	N20	ENE9	E14	S7	NW6	N25	NNE23	NW4.1	W30	
29-Jul	SSW3	WSW20	WSW16	W17	WNW14	NNW5	WSW12	WSW17	WSW10	WSW8	WSW6	WSW11	W17	WSW23	WSW19	W21	WSW15	W17	W37	WNW25	NW10	NE9	SSW6	WNW18	W13.2	W37	
30-Jul	W21	W16	WSW17	W17	WSW22	WSW25	W19	WSW19	WSW17	W9	WNW12	WNW15	W25	WNW30	WNW26	WNW23	NNE15	NE13	NNE20	NE18	ENE11	ESE9	SSE12	S24	W10.2	WNW30	
31-Jul	ESE9	SE14	SSE18	SSE21	S20	S14	SSW8	SSE4	SSE5	SSE3	SE4	SE3	WSW3	SSW29	SSW15	SW12	SW14	W14	NW12	N13	NNE11	N6	SSW8	WSW10	S6.1	SSW29	

WSW8.8	WSW7.6	WSW7.0	WSW7.1	WSW7.6	WSW5.5	SW4.5	WSW4.8	SW3.9	WSW4.5	WSW5.6	WSW6.0	W7.7	WSW8.1	WNW8.2	WNW6.8	WNW6.9	WNW7.5	NW6.6	NW4.6	WNW4.0	SW3.8	WSW5.8	WSW7.7	Diurnal Average	
SSW33	NW36	NNW39	N41	N36	N37	N32	N34	NNW32	WSW40	WSW38	W35	WNW33	WNW32	WNW38	WNW35	NNW37	N41	N39	NNW39	WNW36	SW40	N43	SSW37	Diurnal Maximum	

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



Summary of Hour Standard Deviations

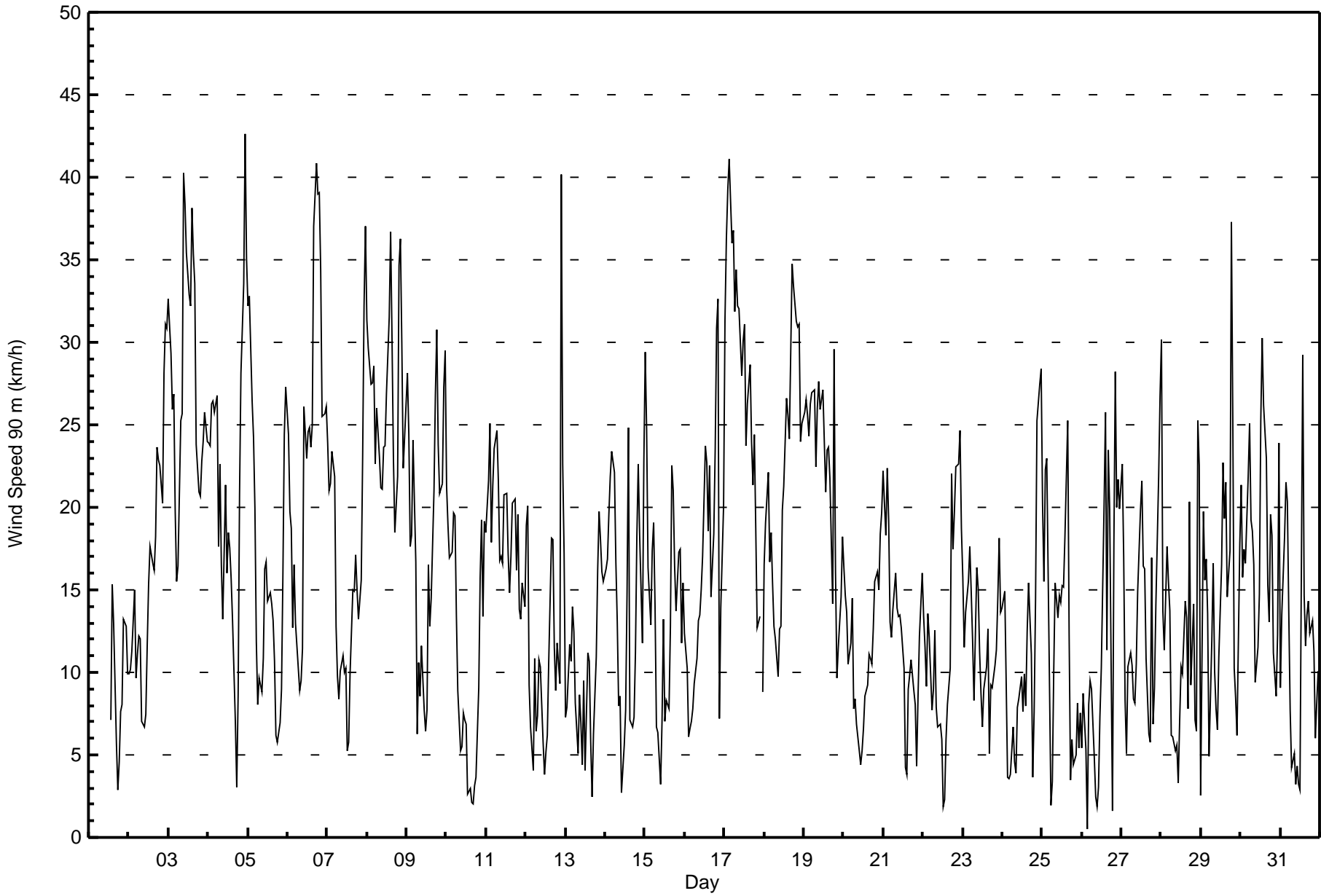
Mannix - July 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 21 km/h on Jul 26 17:00	Hours of Data: 731
Minimum Value: 1 km/h on Jul 5 21:00	Hours of Missing Data: 13
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 2 O <sub>1</sub> = 2 Median = 3 O <sub>3</sub> = 4 P <sub>90</sub> = 6 P <sub>99</sub> = 12	Hours of Calibration: 0
	Percent Operational Time: 98.3

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

Diurnal Maximum

M - Maintenance DF - DAS Failure





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

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

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	60	8.21	8.21
6 - 11	197	26.95	35.16
12 - 19	232	31.74	66.89
20 - 28	179	24.49	91.38
29 - 38	55	7.52	98.91
> 38	8	1.09	100.00

Total Number of Valid Hours: 731

Total Number of Hours: 744





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

**Wind Speed 90 m (WS90m) - km/h**  
**Mannix - July 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	4	3	2	2	3	12	8	2	5	5	4	3	3	0	2	60
6 - 11	11	12	3	7	5	10	11	13	12	15	16	24	21	17	10	10	197
12 - 19	8	12	5	3	6	13	15	15	9	11	21	45	32	14	12	11	232
20 - 28	12	6	2	1	0	3	11	18	13	9	11	18	23	31	11	10	179
29 - 38	12	0	0	0	0	0	0	2	3	8	0	4	7	11	2	6	55
> 38	4	0	0	0	0	0	0	0	0	0	1	1	0	0	0	2	8
<b>Totals</b>	49	34	13	13	13	29	49	56	39	48	54	96	86	76	35	41	731

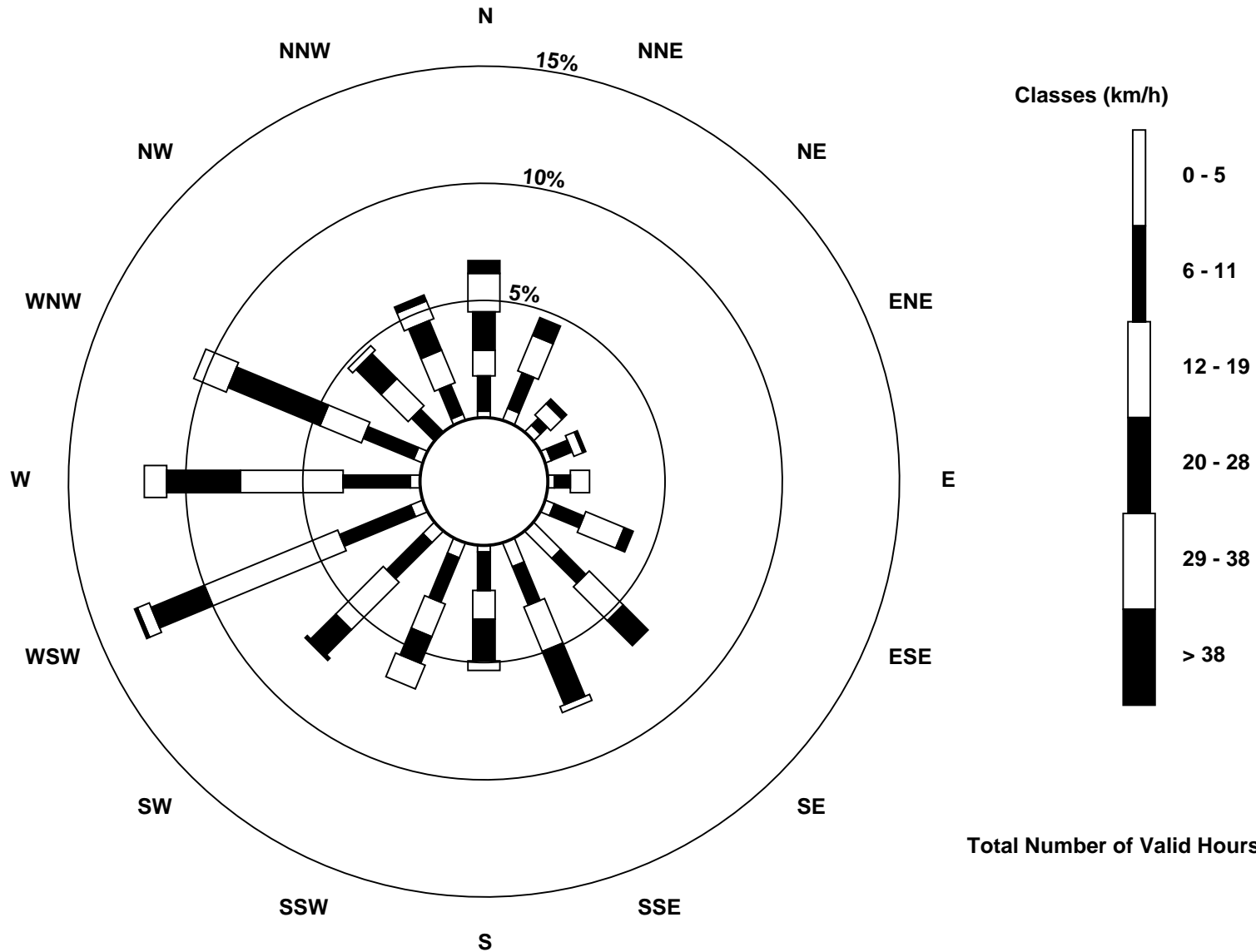
Total Number of Valid Hours: 731

Total Number of Hours: 744



Wood Buffalo Environmental Association  
Wind Rose Jul 2015

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





Direction of Maximum Speed: 262 deg on Jul 3 11:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 342.9 deg on Jul 17	Hours of Data: 731
Direction of Minimum Speed: 17 deg on Jul 16 22:00	Direction of Minimum Daily Speed Average: 1.9 deg on Jul 12
Direction of Minimum Speed: 17 deg on Jul 16 22:00	Hours of Missing Data: 13
Monthly Average Direction: 259.0 deg	Percent Operational Time: 98.3

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jul	244	M	M	M	M	M	M	M	M	M	M	M	M	260	306	258	216	231	121	81	82	160	213	220	--
2-Jul	188	193	190	211	191	163	165	171	153	180	235	243	258	274	250	255	223	220	204	209	174	180	189	185	213.2
3-Jul	178	186	162	160	154	145	166	238	243	248	262	276	293	287	292	298	294	283	321	323	323	310	278	270	270.6
4-Jul	268	269	261	262	265	272	273	282	281	246	237	246	241	254	279	333	10	278	270	327	329	351	8	4	291.6
5-Jul	2	6	350	341	337	322	303	281	275	291	317	322	329	342	296	316	310	290	253	168	175	190	205	206	317.2
6-Jul	191	167	153	145	161	156	153	151	140	233	258	266	243	246	262	288	339	359	351	342	338	329	309	289	292.2
7-Jul	289	279	269	265	271	266	279	290	254	241	241	273	233	245	268	270	259	266	258	240	201	187	187	181	256.6
8-Jul	168	161	158	156	154	160	162	156	157	155	152	152	158	182	150	162	158	258	264	304	297	287	265	290	187.3
9-Jul	329	340	343	360	327	10	347	330	18	34	49	17	333	14	68	18	20	15	17	19	17	1	5	7	6.7
10-Jul	2	359	355	358	10	13	31	25	35	343	332	42	68	122	47	36	55	5	13	12	25	45	69	141	23.3
11-Jul	135	133	132	133	127	135	136	136	133	144	145	150	154	135	125	85	28	24	15	51	36	49	73	103	114.5
12-Jul	109	105	60	343	235	360	116	118	102	339	62	212	270	330	351	17	42	22	336	14	307	233	262	339	0.9
13-Jul	274	164	204	264	228	206	157	146	147	179	126	137	224	253	272	274	278	232	156	176	196	147	137	150	190.7
14-Jul	158	143	141	149	156	159	160	167	157	149	245	279	264	181	327	78	198	177	147	170	172	150	221	246	172.1
15-Jul	230	206	169	178	219	229	221	223	238	229	136	156	243	111	129	201	234	234	229	226	220	236	241	203	211.1
16-Jul	198	169	177	181	140	185	122	271	277	298	316	350	11	11	19	159	245	261	267	288	289	17	283	281	289.1
17-Jul	306	326	336	349	349	348	352	350	344	343	340	350	340	359	338	329	313	343	4	24	11	42	DF	254	342.9
18-Jul	253	245	241	219	224	188	166	144	135	148	246	233	218	242	237	234	252	264	263	270	277	280	311	300	251.8
19-Jul	272	274	281	282	286	289	287	286	285	287	287	292	285	288	290	271	317	326	4	0	359	356	297	294	292.6
20-Jul	275	257	261	250	233	223	208	197	202	146	110	148	138	114	111	135	144	147	143	142	137	122	135	126	165.1
21-Jul	116	126	137	143	132	114	107	81	108	113	136	145	183	208	34	30	353	351	33	37	190	241	214	172	114.8
22-Jul	153	157	163	244	196	195	235	269	278	286	266	279	339	144	12	277	287	282	278	263	265	266	263	255	262.5
23-Jul	265	254	256	250	262	262	258	251	306	308	321	298	324	290	277	245	212	210	216	257	267	245	259	235	264.5
24-Jul	228	213	139	170	164	163	166	147	133	132	124	134	152	136	151	180	252	269	277	148	153	156	154	159	167.8
25-Jul	211	214	226	246	274	127	172	184	191	219	247	270	264	261	277	296	289	90	68	120	157	210	165	25	246.3
26-Jul	38	346	71	285	347	29	133	254	343	68	293	281	252	265	274	313	288	253	85	163	165	145	152	172	260.3
27-Jul	199	187	146	155	165	160	159	164	155	223	265	240	249	259	344	353	336	293	318	113	219	198	216	254	230.0
28-Jul	275	286	169	189	254	295	282	265	256	250	274	270	284	277	339	72	96	13	93	101	240	320	9	32	304.4
29-Jul	245	262	238	256	230	162	242	239	252	272	271	261	269	259	256	270	257	267	268	288	324	66	209	272	261.3
30-Jul	266	246	248	261	254	251	260	254	253	279	288	295	268	296	293	298	34	54	43	51	78	171	234	209	280.0
31-Jul	72	152	200	187	174	160	162	136	135	122	144	147	263	201	206	208	219	263	308	5	21	17	226	258	190.4

253.7 241.0 228.4 242.2 241.3 232.4 215.9 240.5 237.4 250.4 262.9 263.9 267.6 266.9 287.9 284.1 290.5 292.7 304.5 317.4 290.6 264.3 265.1 263.7

Diurnal Average

M - Maintenance DF - DAS Failure

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

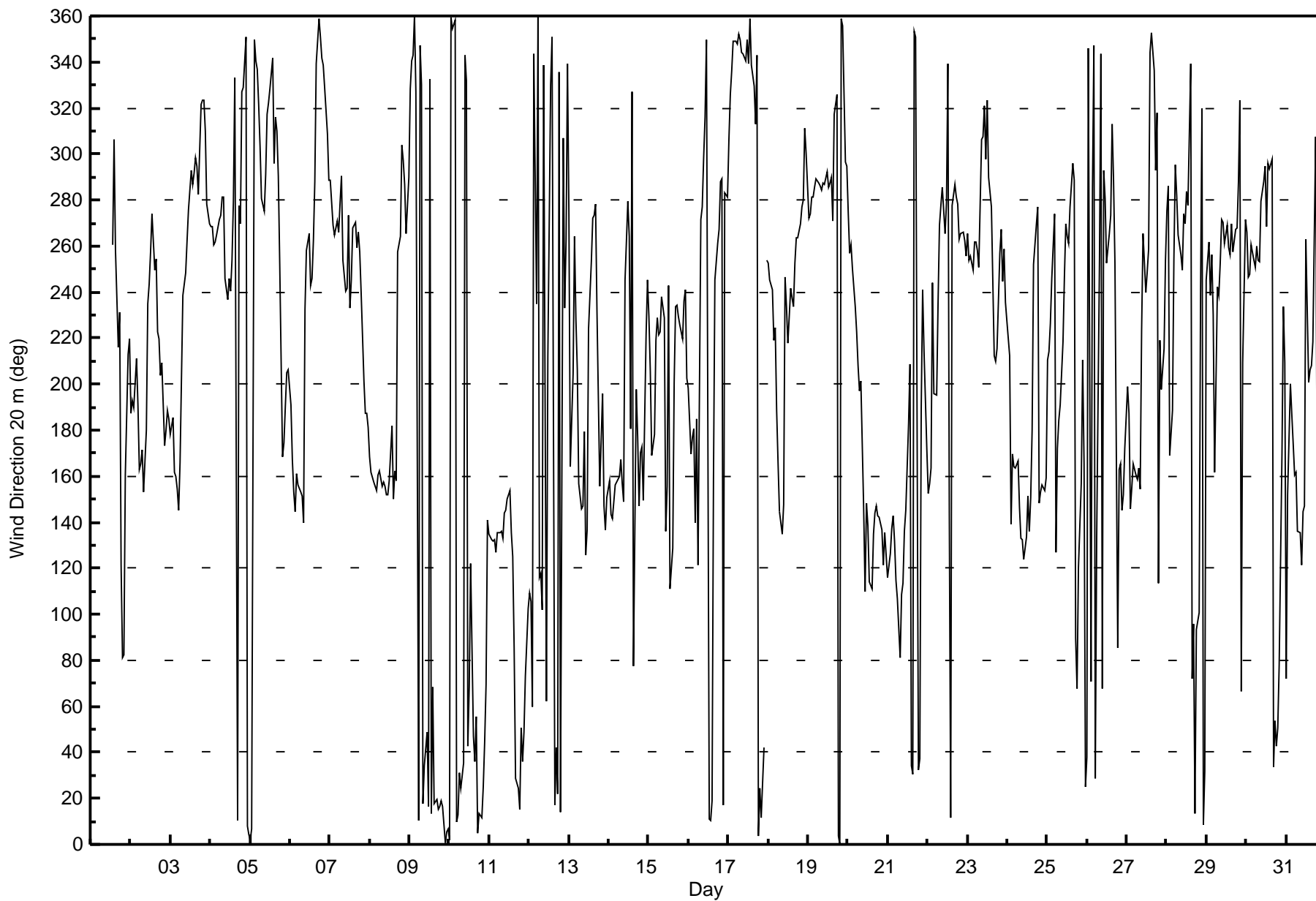


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 102 deg on Jul 10 17:00	Hours of Data: 731
Minimum Value: 5 deg on Jul 18 03:00	Hours of Missing Data: 13
Percentiles: P <sub>1</sub> = 7 P <sub>10</sub> = 11 Q <sub>1</sub> = 14 Median = 20 Q <sub>3</sub> = 31 P <sub>90</sub> = 53 P <sub>99</sub> = 91	Hours of Calibration: 0
	Percent Operational Time: 98.3

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jul	33	M	M	M	M	M	M	M	M	M	M	M	M	34	25	69	37	76	48	18	31	12	22	17	76
2-Jul	13	31	15	13	20	9	14	21	26	37	57	25	30	20	23	14	27	19	19	15	14	15	15	16	57
3-Jul	16	23	13	14	13	15	26	20	15	13	12	12	15	13	13	13	13	11	26	17	20	17	15	8	26
4-Jul	7	14	7	9	10	8	15	10	17	18	13	12	16	13	15	33	39	40	25	15	15	22	14	20	40
5-Jul	21	16	15	15	16	18	27	19	25	30	25	25	35	38	27	26	38	41	31	63	13	13	9	11	63
6-Jul	20	16	20	13	10	16	16	19	18	65	14	19	20	16	17	33	18	18	16	16	16	17	19	11	65
7-Jul	11	11	6	9	8	22	22	26	25	17	26	19	61	56	50	19	25	14	15	16	16	14	15	16	61
8-Jul	12	13	14	13	15	17	16	16	15	15	14	13	14	19	13	17	15	30	10	17	30	11	13	12	30
9-Jul	20	19	24	22	20	20	42	27	35	30	45	38	35	25	39	17	13	15	13	15	15	20	18	15	45
10-Jul	19	15	19	17	12	14	20	26	37	60	43	55	41	81	75	91	102	78	44	14	14	10	28	15	102
11-Jul	11	12	13	20	17	14	12	13	16	18	16	16	17	18	20	21	20	17	17	23	26	10	15	19	26
12-Jul	13	16	38	30	91	37	82	89	30	54	65	70	43	52	34	18	19	23	23	21	55	13	25	29	91
13-Jul	94	45	32	16	14	21	20	21	22	38	59	24	75	28	21	55	92	52	14	17	14	24	14	27	94
14-Jul	13	14	12	15	14	22	20	22	29	34	89	56	49	41	35	47	32	36	14	22	21	53	48	12	89
15-Jul	12	10	18	16	13	10	23	26	30	75	44	31	77	48	25	52	22	18	18	19	12	33	20	23	77
16-Jul	53	33	35	22	35	51	69	58	13	24	21	28	18	18	53	53	40	55	14	13	12	87	11	12	87
17-Jul	16	14	15	13	13	14	16	17	15	15	18	20	18	23	21	18	19	36	21	25	35	46	DF	7	46
18-Jul	12	6	5	15	17	20	23	14	16	17	45	13	20	12	12	13	11	10	8	7	8	10	21	19	45
19-Jul	8	8	10	10	11	11	11	13	11	12	13	14	14	16	20	9	29	27	22	19	17	26	24	21	29
20-Jul	9	10	7	25	11	19	29	36	34	46	47	70	59	28	34	24	19	15	11	10	12	19	14	14	70
21-Jul	18	14	13	12	13	25	17	13	22	19	18	21	31	71	55	34	27	27	24	16	53	21	31	13	71
22-Jul	14	22	32	9	23	18	27	12	20	47	29	41	91	89	55	61	22	12	10	15	9	7	8	10	91
23-Jul	11	12	10	12	10	10	20	35	17	17	27	29	61	35	21	19	41	26	20	24	10	12	8	14	61
24-Jul	12	24	31	11	17	33	20	29	28	20	27	28	56	39	57	31	32	17	86	13	9	11	11	13	86
25-Jul	36	51	18	13	76	73	60	27	25	32	27	24	25	16	19	16	20	95	20	23	17	72	22	31	95
26-Jul	80	36	53	50	21	23	39	26	81	63	95	43	38	16	17	44	40	45	41	14	15	12	15	21	95
27-Jul	43	28	21	23	10	13	20	30	33	53	18	17	18	47	35	29	33	27	62	29	30	19	23	13	62
28-Jul	7	40	15	17	16	37	25	22	20	29	55	45	32	35	49	27	19	33	21	25	42	66	26	20	66
29-Jul	81	10	13	14	29	54	11	16	15	24	28	42	18	13	13	13	18	13	10	14	63	26	34	14	81
30-Jul	18	12	11	39	10	9	9	10	15	32	20	24	13	17	19	41	23	14	15	13	39	54	8	16	54
31-Jul	52	32	40	29	20	16	15	28	23	46	53	66	88	37	48	23	24	22	34	18	16	70	29	20	88
	94	51	53	50	91	73	82	89	81	75	95	70	91	89	75	91	102	95	86	63	63	87	48	31	

Diurnal Maximum

M - Maintenance DF - DAS Failure





Direction of Maximum Speed: 262 deg on Jul 3 11:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 346.4 deg on Jul 17	Hours of Data: 731
Direction of Minimum Speed: 77 deg on Jul 29 06:00	Hours of Missing Data: 13
Direction of Minimum Daily Speed Average: 3.2 deg on Jul 28	Percent Operational Time: 98.3
Monthly Average Direction: 261.6 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-Jul	251	M	M	M	M	M	M	M	M	M	M	M	M	255	311	263	216	231	129	82	92	151	206	222	--
2-Jul	199	221	209	239	225	191	182	186	168	189	231	241	257	275	247	252	218	218	203	212	185	182	192	195	213.4
3-Jul	186	193	174	169	166	160	187	240	242	249	262	278	296	290	295	301	298	286	326	327	327	313	288	281	268.7
4-Jul	279	280	264	267	269	275	277	286	286	248	239	246	240	254	287	334	9	289	280	331	333	354	9	5	297.9
5-Jul	3	8	354	348	344	329	313	286	277	298	322	327	334	342	303	320	315	293	252	170	176	185	202	204	319.9
6-Jul	198	187	193	180	194	161	155	157	143	228	258	267	242	245	262	292	341	0	356	345	341	331	313	294	294.1
7-Jul	295	286	281	275	282	281	289	296	256	238	239	275	229	247	272	271	259	266	256	238	207	196	191	189	253.8
8-Jul	179	169	162	163	161	163	166	161	159	156	153	154	162	182	152	163	160	256	267	307	303	296	281	300	187.5
9-Jul	333	344	343	0	333	13	350	333	14	33	46	23	336	16	70	20	21	17	17	21	18	4	7	8	6.8
10-Jul	5	4	0	1	10	14	29	26	31	343	339	38	67	139	50	47	98	15	16	17	27	45	85	138	25.0
11-Jul	133	131	133	132	130	133	135	137	130	143	146	150	152	134	122	88	35	31	25	53	43	65	86	106	115.2
12-Jul	111	108	67	2	291	6	108	93	105	346	67	192	276	332	351	20	39	22	343	13	321	233	264	337	4.9
13-Jul	322	146	188	259	233	216	165	146	150	174	133	135	227	250	275	270	261	222	155	175	195	154	136	147	187.5
14-Jul	160	145	143	152	157	162	163	167	155	150	236	281	261	182	334	67	192	175	151	173	176	155	219	248	172.5
15-Jul	239	223	198	204	233	253	232	225	230	232	139	157	242	114	129	205	232	232	228	225	225	232	243	212	219.3
16-Jul	232	209	208	209	185	208	280	281	281	304	323	351	12	12	17	157	242	266	279	293	295	360	307	295	297.4
17-Jul	313	327	341	354	354	352	355	353	348	347	344	353	343	359	342	334	321	348	6	25	20	41	DF	252	346.4
18-Jul	252	259	253	248	245	209	174	151	138	152	242	233	217	243	237	234	254	264	264	272	281	284	317	306	253.9
19-Jul	274	279	286	286	290	294	293	289	290	291	291	296	289	292	294	275	323	329	4	3	6	355	310	310	298.8
20-Jul	291	275	269	269	246	238	211	196	196	149	112	149	131	116	115	133	143	142	139	137	131	121	134	126	165.2
21-Jul	118	126	135	145	131	119	108	84	111	115	134	145	178	203	31	29	355	354	31	42	150	230	199	199	120.2
22-Jul	174	177	227	257	216	211	236	268	286	291	269	285	327	170	7	281	290	286	281	266	268	268	266	263	263.2
23-Jul	273	264	263	255	266	269	264	257	311	313	324	302	329	296	278	242	212	208	214	259	273	250	256	251	269.6
24-Jul	239	218	175	166	174	174	169	147	132	133	123	136	152	133	156	179	251	271	268	151	156	156	153	157	169.5
25-Jul	206	234	230	250	282	107	166	183	189	212	242	270	264	260	278	300	293	83	69	116	156	206	178	18	244.0
26-Jul	53	348	69	302	350	32	129	250	344	58	291	280	251	266	275	319	291	250	86	162	170	156	162	189	247.1
27-Jul	230	212	154	169	178	166	163	172	157	220	266	240	248	259	347	350	338	297	321	113	215	200	216	252	229.2
28-Jul	280	286	173	190	245	301	292	270	263	249	279	269	291	282	341	70	92	15	90	104	228	322	10	30	305.3
29-Jul	242	264	252	260	272	77	246	238	251	267	271	262	271	258	255	271	258	267	268	295	320	63	206	280	264.7
30-Jul	273	261	254	269	258	253	260	257	252	285	291	301	271	298	296	301	32	53	40	48	73	143	200	194	280.7
31-Jul	88	149	183	176	176	163	166	145	135	136	145	144	270	200	206	215	222	267	311	9	26	19	223	253	190.9

253.2 246.2 230.2 246.0 247.4 237.9 214.3 238.3 236.8 252.7 265.8 266.5 268.0 264.8 291.8 286.5 292.7 295.2 310.9 319.7 284.5 243.2 249.3 257.5

Diurnal Average

M - Maintenance DF - DAS Failure

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



Summary of Hour Standard Deviations

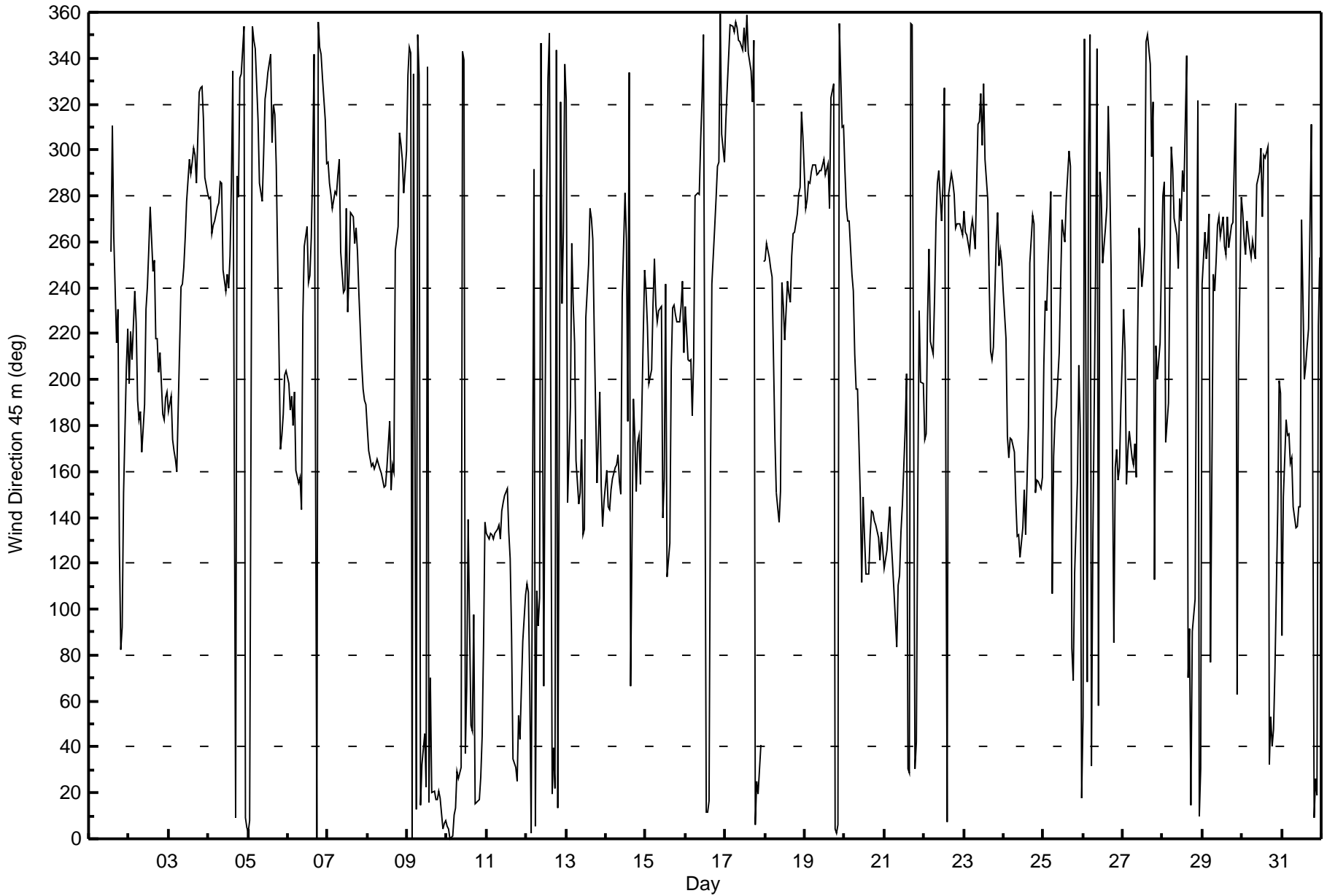
Mannix - July 2015

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 96 deg on Jul 29 06:00			Hours of Data:	731
Minimum Value: 3 deg on Jul 31 00:00			Hours of Missing Data:	13
Percentiles: P <sub>1</sub> = 4 P <sub>10</sub> = 7 Q <sub>1</sub> = 9 Median = 14 Q <sub>3</sub> = 24 P <sub>90</sub> = 44 P <sub>99</sub> = 82			Hours of Calibration:	0
			Percent Operational Time:	98.3

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

90	43	50	67	71	96	70	65	70	70	90	73	82	83	73	94	84	96	75	64	56	86	47	29	Diurnal Maximum
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M - Maintenance      DF - DAS Failure







Direction of Maximum Speed: 10 deg on Jul 4 23:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 350.5 deg on Jul 17	Hours of Data: 731
Direction of Minimum Speed: 26 deg on Jul 25 06:00	Hours of Missing Data: 13
Direction of Minimum Daily Speed Average: 3.8 deg on Jul 28	Percent Operational Time: 98.3
Monthly Average Direction: 264.9 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-Jul	257	M	M	M	M	M	M	M	M	M	M	M	M	255	311	266	216	232	135	83	98	152	209	226	--
2-Jul	210	243	235	258	247	215	213	215	195	196	233	240	257	274	246	250	215	217	203	213	191	189	197	207	219.9
3-Jul	198	203	185	180	184	194	210	241	240	248	260	278	296	290	295	302	298	287	328	329	329	316	294	288	267.7
4-Jul	287	287	268	271	272	277	277	287	284	251	242	247	244	256	290	335	8	301	295	335	336	356	10	6	299.8
5-Jul	5	10	356	355	351	335	318	287	274	298	326	330	336	339	307	321	318	296	252	168	180	181	192	200	323.6
6-Jul	206	207	221	221	226	182	168	168	157	229	258	265	242	245	260	293	343	1	358	348	343	332	315	299	291.0
7-Jul	300	291	288	282	288	291	293	296	256	236	240	273	232	240	268	269	258	266	255	237	210	204	197	195	254.3
8-Jul	192	181	171	175	171	168	169	165	162	160	155	156	165	183	155	163	162	256	268	309	306	304	291	307	192.4
9-Jul	337	348	344	1	339	13	351	334	16	34	43	24	341	20	69	25	24	19	18	23	20	8	9	11	8.9
10-Jul	9	10	6	5	12	16	30	31	34	350	344	42	66	142	50	63	104	28	21	22	31	52	95	136	29.1
11-Jul	133	134	137	139	135	135	137	138	132	143	148	149	151	134	121	89	44	44	45	65	58	87	96	109	117.0
12-Jul	110	106	73	19	5	12	88	86	105	358	66	177	289	332	355	22	40	25	350	16	335	233	264	337	5.4
13-Jul	341	127	173	242	237	227	176	148	152	172	141	136	230	248	275	263	248	217	153	173	191	158	139	146	187.5
14-Jul	158	148	147	156	159	161	163	166	156	154	228	279	261	182	340	45	198	170	156	173	178	164	236	254	174.2
15-Jul	246	239	220	226	251	260	252	231	231	228	142	158	241	114	129	207	230	231	228	227	230	227	235	223	227.6
16-Jul	260	256	270	241	280	238	294	288	284	305	327	353	14	14	21	152	244	274	292	295	296	0	330	309	305.6
17-Jul	320	328	346	359	358	356	358	356	350	350	346	356	345	360	344	337	330	353	8	28	30	45	DF	250	350.5
18-Jul	245	261	260	260	252	230	187	164	146	156	242	232	218	243	238	236	255	263	264	273	281	285	319	308	255.1
19-Jul	275	281	287	287	291	296	296	291	291	291	292	297	290	293	295	278	324	330	5	8	9	354	316	317	300.9
20-Jul	304	288	283	289	260	259	230	203	196	153	118	152	127	122	118	133	143	140	137	136	130	123	133	126	171.9
21-Jul	121	128	138	149	134	126	111	86	114	119	134	146	177	202	33	29	358	358	34	50	132	202	200	213	126.7
22-Jul	199	197	257	261	233	223	242	267	291	298	274	283	317	162	10	280	289	286	280	269	269	268	268	270	265.7
23-Jul	279	281	272	261	270	277	271	263	314	315	324	303	324	295	279	240	213	207	216	262	277	257	262	267	274.1
24-Jul	259	240	236	188	164	181	171	149	136	135	128	135	152	133	164	178	249	270	250	151	158	157	157	162	175.4
25-Jul	210	247	236	254	285	26	143	178	187	209	241	268	262	259	277	302	293	82	70	113	148	194	184	23	245.5
26-Jul	75	354	74	314	356	36	120	249	357	51	280	276	252	265	275	318	293	251	112	160	171	166	173	209	237.6
27-Jul	238	241	184	196	200	191	178	179	168	221	264	240	246	258	348	343	335	299	324	112	209	195	222	253	238.5
28-Jul	279	285	182	187	247	297	296	274	268	251	275	271	290	281	343	70	80	16	84	105	205	324	13	33	308.5
29-Jul	221	258	260	265	291	2	254	240	250	261	266	260	271	256	253	271	258	265	269	299	320	56	208	286	267.7
30-Jul	279	277	261	272	261	256	263	260	253	286	289	304	272	297	297	301	29	53	40	49	70	136	177	189	281.6
31-Jul	111	147	174	166	178	176	182	160	146	150	141	140	256	200	210	227	233	267	314	11	31	14	217	245	193.1

260.8 261.5 243.8 252.4 259.9 254.9 229.9 240.8 240.0 252.9 264.9 265.4 266.6 262.6 291.3 287.4 294.8 297.1 314.7 324.6 289.1 239.8 246.5 259.1

Diurnal Average

M - Maintenance DF - DAS Failure

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



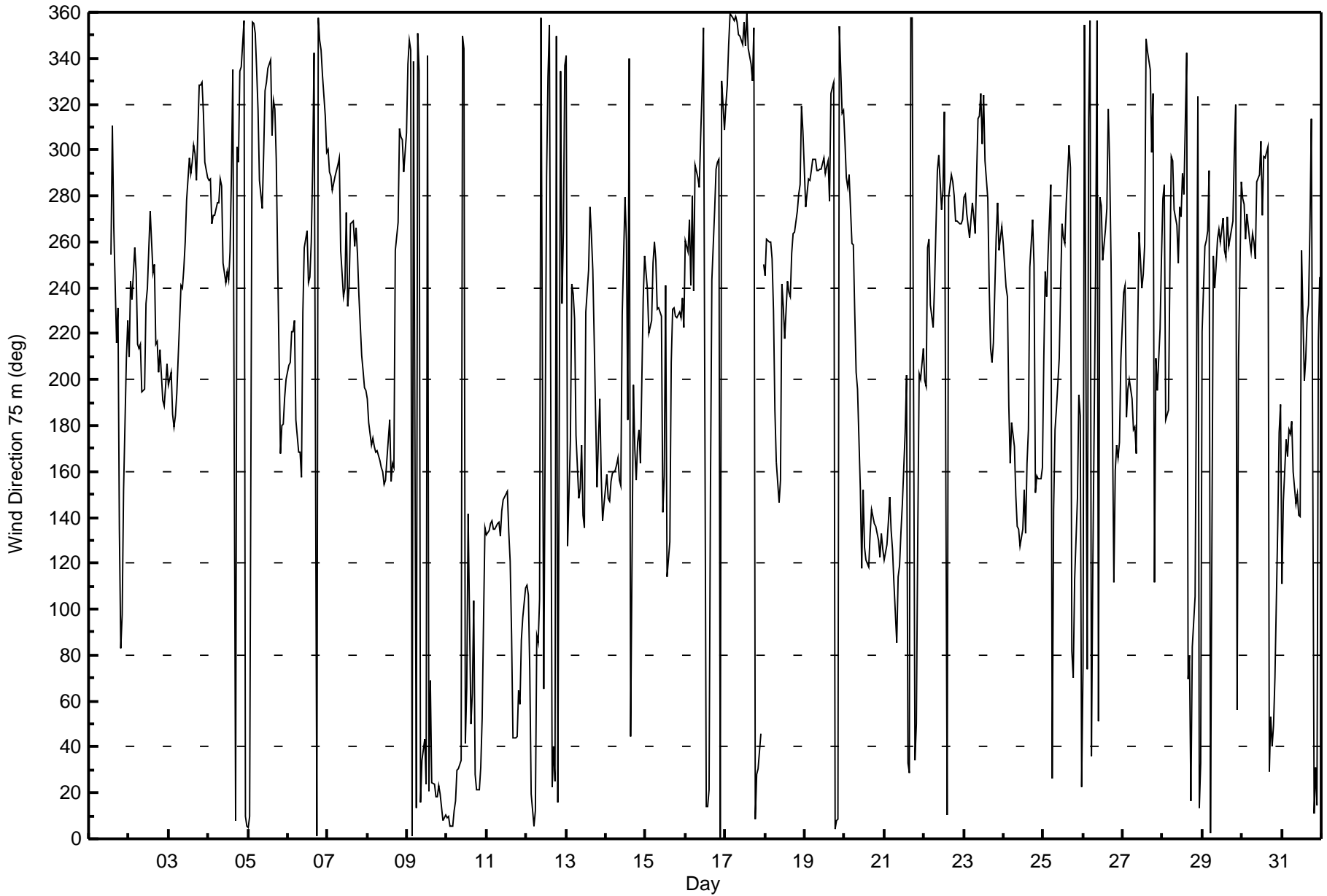
Summary of Hour Standard Deviations

Mannix - July 2015

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 94 deg on Jul 25 18:00			Hours of Data:	731
Minimum Value: 2 deg on Jul 15 01:00			Hours of Missing Data:	13
Percentiles: P <sub>1</sub> = 3 P <sub>10</sub> = 6 Q <sub>1</sub> = 8 Median = 13 Q <sub>3</sub> = 23 P <sub>90</sub> = 41 P <sub>99</sub> = 83			Hours of Calibration:	0
			Percent Operational Time:	98.3

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jul	15	M	M	M	M	M	M	M	M	M	M	M	M	27	22	59	30	75	45	20	21	13	14	9	75
2-Jul	9	13	9	6	24	8	8	12	20	21	31	17	23	17	22	12	20	12	9	5	7	4	6	4	31
3-Jul	5	7	6	4	7	14	14	11	10	8	11	10	10	10	10	9	8	7	20	9	11	10	8	6	20
4-Jul	4	10	3	5	7	7	12	7	12	15	8	8	7	10	16	26	35	30	25	8	8	17	8	12	35
5-Jul	13	9	6	6	10	10	20	19	16	23	18	16	26	23	16	20	25	38	32	67	8	6	3	6	67
6-Jul	3	5	7	12	15	11	9	12	12	50	10	15	15	12	15	34	12	11	8	8	8	10	12	5	50
7-Jul	5	6	4	5	3	12	17	19	20	12	20	21	60	46	39	16	20	12	12	12	7	5	3	2	60
8-Jul	3	6	4	4	6	7	6	8	8	8	7	7	6	9	7	8	7	30	9	13	19	6	8	8	30
9-Jul	13	12	12	14	12	13	32	19	24	17	28	22	35	17	26	12	8	8	7	9	9	9	8	4	35
10-Jul	8	6	8	9	5	7	11	13	25	40	38	35	30	71	70	77	72	54	35	8	8	7	17	8	77
11-Jul	8	5	4	8	8	7	6	5	11	9	12	10	11	10	17	15	9	8	10	13	18	13	10	14	18
12-Jul	12	13	28	13	71	16	57	51	22	33	56	80	49	51	27	11	12	20	12	11	48	7	23	23	80
13-Jul	62	22	19	16	5	8	23	18	15	21	49	15	72	21	20	36	89	35	8	8	2	21	8	11	89
14-Jul	7	7	7	9	6	13	10	12	15	22	75	50	47	34	21	42	23	17	7	12	5	8	42	5	75
15-Jul	2	4	11	7	7	3	9	18	23	63	36	29	72	37	26	41	16	13	11	10	6	11	9	11	72
16-Jul	13	31	41	12	26	36	27	19	10	21	14	21	10	10	42	82	43	50	11	6	4	72	15	11	82
17-Jul	8	6	9	5	6	7	7	7	8	7	10	11	10	16	12	11	14	25	12	11	25	35	DF	5	35
18-Jul	5	4	2	3	8	16	11	13	12	14	37	8	14	7	6	11	6	8	6	6	6	7	16	15	37
19-Jul	9	7	6	6	5	5	6	8	7	7	9	9	9	11	16	8	23	22	18	10	13	21	12	10	23
20-Jul	7	6	9	21	7	5	25	24	23	30	45	60	35	22	25	18	14	9	5	5	9	14	10	11	60
21-Jul	12	10	5	7	8	16	12	11	18	13	11	14	16	57	75	24	16	14	20	10	36	22	12	7	75
22-Jul	13	31	11	8	11	11	18	9	15	38	20	34	87	74	48	33	18	9	6	13	9	4	5	9	87
23-Jul	7	18	11	7	7	6	18	30	10	11	16	25	45	33	19	15	28	14	11	24	8	9	6	4	45
24-Jul	4	7	19	22	15	20	11	24	23	16	18	21	45	26	46	19	29	14	61	9	6	3	4	7	61
25-Jul	36	10	8	8	48	91	57	10	10	22	22	18	19	14	14	12	17	94	19	21	11	80	25	33	94
26-Jul	86	27	45	92	15	28	32	27	81	76	68	34	29	15	16	38	39	33	84	6	5	6	10	20	92
27-Jul	6	24	24	32	9	9	12	16	20	35	15	13	16	49	31	26	30	20	45	27	25	10	17	10	49
28-Jul	4	11	21	9	22	13	17	20	24	23	51	36	26	33	42	24	19	25	15	18	35	65	20	13	65
29-Jul	79	12	10	9	21	54	33	12	12	15	27	30	16	11	11	10	13	11	11	11	50	14	42	14	79
30-Jul	11	11	9	8	7	4	6	7	11	22	16	18	12	12	14	40	24	10	12	10	22	31	10	4	40
31-Jul	53	28	5	4	3	8	15	28	19	39	38	63	74	28	31	18	14	16	30	12	10	51	18	7	74
	86	31	45	92	71	91	57	51	81	76	75	80	87	74	75	82	89	94	84	67	50	80	42	33	
	Diurnal Maximum																								

M - Maintenance      DF - DAS Failure





Summary of Hour Standard Deviations

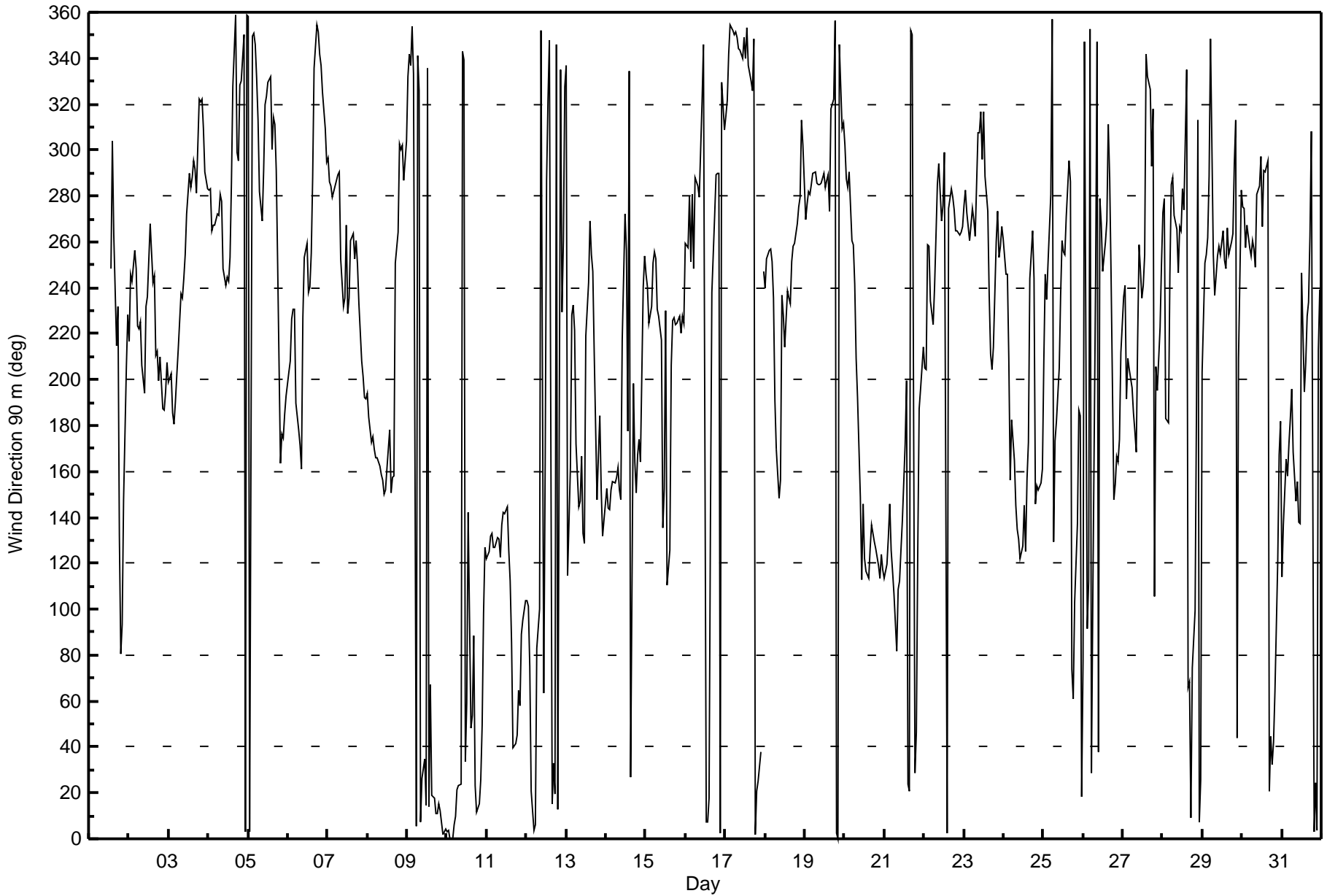
Mannix - July 2015

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 93 deg on Jul 25 18:00			Hours of Data:	731
Minimum Value: 1 deg on Jul 15 01:00			Hours of Missing Data:	13
			Hours of Calibration:	0
			Percent Operational Time:	98.3
Percentiles: P <sub>1</sub> = 3 P <sub>10</sub> = 5 Q <sub>1</sub> = 8 Median = 12 Q <sub>3</sub> = 22 P <sub>90</sub> = 40 P <sub>99</sub> = 83				

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

Diurnal Maximum

M - Maintenance      DF - DAS Failure





Summary of Hour Averages

Mannix - July 2015

Maximum Value: 0.7 km/h on Jul 21 08:00		Maximum Daily Average: 0.2 km/h on Jul 8		Hours in Service: 744																							
Minimum Value: -0.9 km/h on Jul 3 16:00		Minimum Daily Average: -0.4 km/h on Jul 17		Hours of Data: 731																							
Maximum Diurnal Average: 0.0 km/h at hour 8		Minimum Diurnal Average: -0.1 km/h at hour 17		Hours of Missing Data: 13																							
Monthly Average: -0.03 km/h		Percentiles: P <sub>1</sub> = -0.7 P <sub>10</sub> = -0.4 Q <sub>1</sub> = -0.2 Median = 0.0 Q <sub>3</sub> = 0.2 P <sub>90</sub> = 0.3 P <sub>99</sub> = 0.5		Hours of Calibration: 0																							
				Percent Operational Time: 98.3																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jul	-0.1	M	M	M	M	M	M	M	M	M	M	M	M	0.0	-0.4	-0.2	-0.1	0.0	0.1	0.3	0.2	0.2	-0.1	-0.1	--	0.3	
2-Jul	-0.2	-0.1	-0.2	-0.3	-0.4	-0.2	0.1	0.2	0.0	0.2	-0.2	-0.2	0.0	0.0	0.2	-0.1	0.0	0.0	0.1	-0.1	0.0	-0.1	-0.1	-0.1	-0.1	-0.1	0.2
3-Jul	0.0	0.0	0.4	0.7	0.3	0.1	0.1	-0.2	-0.2	0.0	0.1	0.0	-0.7	-0.4	-0.9	-0.9	-0.7	-0.1	-0.3	-0.3	-0.4	-0.5	0.0	0.3	-0.1	0.7	
4-Jul	0.3	0.1	0.1	0.2	0.2	0.4	0.2	-0.1	-0.2	0.0	-0.3	-0.1	-0.1	0.1	0.2	-0.1	0.0	0.1	-0.5	-0.5	-0.7	-0.7	-0.5	-0.1	-0.1	0.4	
5-Jul	-0.5	-0.6	-0.7	-0.3	-0.3	-0.3	0.0	-0.2	0.0	-0.4	-0.4	-0.4	-0.3	-0.1	0.2	-0.2	-0.4	-0.1	-0.1	0.0	-0.1	-0.2	-0.2	-0.2	-0.3	0.0	
6-Jul	-0.2	-0.1	-0.1	0.0	-0.2	0.1	0.1	0.2	0.3	0.2	0.1	0.1	-0.3	-0.1	0.2	-0.4	-0.8	-0.8	-0.5	-0.7	-0.6	-0.5	-0.6	-0.7	-0.2	0.3	
7-Jul	-0.5	0.2	0.4	0.2	0.2	-0.1	-0.1	0.1	0.2	-0.2	-0.1	-0.1	0.2	-0.1	-0.1	0.0	0.0	0.2	0.3	0.0	0.0	-0.1	-0.1	-0.1	0.0	0.4	
8-Jul	0.2	0.6	0.7	0.6	0.5	0.4	0.5	0.5	0.4	0.5	0.4	0.4	0.5	0.1	0.4	0.5	0.4	0.1	0.3	-0.7	-0.7	-0.6	0.0	-0.6	0.2	0.7	
9-Jul	-0.5	-0.4	-0.4	-0.2	-0.4	-0.2	0.0	-0.1	0.2	0.1	0.3	0.1	-0.1	-0.1	0.3	-0.2	-0.1	-0.3	-0.4	-0.1	-0.3	-0.1	-0.3	-0.4	-0.1	0.3	
10-Jul	-0.4	-0.2	-0.2	-0.3	-0.3	-0.2	0.4	0.3	0.1	0.1	-0.1	0.1	0.1	-0.1	0.2	0.3	0.0	0.0	0.0	-0.2	0.0	0.2	0.2	0.2	0.0	0.4	
11-Jul	0.2	0.1	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.5	0.4	0.2	0.2	0.3	0.6	-0.1	-0.1	-0.2	0.4	0.1	0.3	0.5	0.3	0.2	0.6	
12-Jul	0.2	0.4	0.2	-0.1	0.0	-0.2	0.1	0.0	0.1	-0.1	0.3	0.0	-0.1	-0.1	0.0	-0.1	0.3	0.0	0.0	-0.1	-0.1	-0.4	-0.3	-0.3	0.0	0.4	
13-Jul	0.0	0.1	0.0	0.2	-0.2	-0.1	0.1	0.2	0.2	0.2	0.2	0.0	0.2	-0.1	-0.2	0.1	0.2	0.3	0.3	0.1	-0.1	0.2	0.1	0.1	0.1	0.3	
14-Jul	0.3	0.3	0.2	0.3	0.6	0.3	0.3	0.2	0.2	-0.1	0.0	0.0	0.0	0.2	-0.4	0.2	-0.1	0.1	0.1	0.2	0.2	0.3	-0.1	-0.2	0.1	0.6	
15-Jul	-0.3	-0.3	-0.2	-0.2	-0.3	-0.5	-0.2	-0.3	-0.2	0.1	0.2	0.2	0.1	0.3	0.1	0.4	0.0	-0.1	0.0	0.0	-0.2	-0.1	-0.1	-0.2	-0.1	0.4	
16-Jul	-0.2	-0.1	-0.2	-0.2	0.1	0.1	0.1	-0.1	0.1	-0.3	-0.3	-0.2	-0.5	-0.6	-0.1	0.3	0.1	-0.3	0.0	-0.4	-0.6	0.1	-0.1	-0.1	-0.1	0.3	
17-Jul	-0.6	-0.7	-0.4	-0.7	-0.7	-0.9	-0.6	-0.4	-0.6	-0.7	-0.3	-0.6	-0.6	-0.6	-0.5	-0.5	-0.3	-0.1	-0.3	0.1	-0.1	0.2	DF	0.1	-0.4	0.2	
18-Jul	-0.1	-0.2	-0.3	-0.3	-0.3	0.0	0.2	0.2	0.1	0.2	0.1	-0.2	-0.1	-0.1	-0.2	-0.1	-0.1	0.4	0.4	0.6	0.0	0.0	-0.4	-0.5	0.0	0.6	
19-Jul	0.3	0.3	0.0	0.0	-0.4	-0.7	-0.5	-0.3	-0.3	-0.3	-0.1	-0.6	-0.2	-0.1	-0.2	0.3	-0.4	-0.2	-0.4	-0.3	-0.3	-0.1	-0.2	-0.2	-0.2	0.3	
20-Jul	0.2	0.1	0.1	-0.1	-0.3	-0.2	0.1	0.1	0.0	0.4	0.2	-0.1	0.2	0.5	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.3	0.2	0.2	0.1	0.5	
21-Jul	0.5	0.2	0.2	0.2	0.1	0.3	0.4	0.7	0.4	0.4	0.2	0.3	0.1	0.3	0.2	0.2	-0.3	-0.2	0.0	0.1	-0.2	-0.1	-0.2	-0.1	0.2	0.7	
22-Jul	0.0	0.0	-0.2	-0.2	-0.2	-0.2	-0.1	0.0	-0.1	0.0	0.0	-0.2	0.1	0.3	0.2	0.0	0.0	0.0	0.0	0.2	0.2	0.4	0.1	0.0	0.0	0.4	
23-Jul	0.2	0.1	0.0	0.0	0.0	0.0	-0.2	-0.1	-0.4	-0.4	-0.1	0.0	0.1	-0.2	0.1	-0.1	-0.1	0.0	0.0	0.0	0.2	-0.1	0.0	-0.2	-0.1	0.2	
24-Jul	-0.2	-0.1	0.0	-0.1	0.0	0.1	0.1	0.3	0.3	0.1	0.2	0.2	0.1	0.1	0.3	0.0	0.0	0.0	0.1	0.1	0.3	0.3	0.4	0.4	0.1	0.4	
25-Jul	0.0	-0.2	-0.2	-0.2	0.1	0.0	0.0	0.3	0.1	0.3	0.0	-0.2	0.0	0.0	0.1	-0.6	-0.2	0.0	0.5	0.1	-0.2	-0.1	0.0	0.1	0.0	0.5	
26-Jul	0.3	-0.1	0.1	0.0	-0.1	0.2	0.2	-0.3	0.0	0.6	0.1	-0.2	-0.1	0.0	0.2	0.2	-0.5	-0.4	0.2	0.3	0.4	0.4	0.3	0.0	0.1	0.6	
27-Jul	-0.2	-0.3	0.1	0.0	0.0	0.2	0.4	0.4	0.2	0.2	0.1	-0.2	-0.2	-0.1	-0.5	-0.2	0.0	-0.1	-0.4	0.2	-0.2	-0.2	-0.1	-0.1	0.0	0.4	
28-Jul	0.1	0.0	0.0	0.0	0.0	0.0	-0.1	-0.3	-0.4	-0.4	-0.1	-0.1	0.0	-0.1	-0.3	0.3	0.2	-0.2	0.2	0.3	0.0	-0.1	-0.2	0.0	0.0	0.3	
29-Jul	0.1	0.2	-0.3	-0.1	-0.2	0.0	-0.4	-0.3	-0.2	0.0	-0.2	-0.3	0.0	0.2	0.0	0.3	-0.1	0.1	0.2	-0.3	0.1	0.2	-0.1	0.2	0.0	0.3	
30-Jul	0.0	-0.1	-0.1	0.0	-0.2	-0.2	0.0	-0.1	-0.1	-0.4	-0.3	-0.1	0.0	-0.7	-0.2	-0.3	0.2	0.5	0.4	0.5	0.7	-0.2	-0.4	-0.1	-0.1	0.7	
31-Jul	0.2	0.2	-0.1	-0.1	0.1	0.3	0.1	0.3	0.0	0.1	0.3	0.2	0.5	-0.1	-0.1	-0.1	-0.2	-0.1	-0.2	-0.3	0.0	-0.1	-0.1	0.0	0.0	0.5	
																								Diurnal Average			
																								Diurnal Maximum			
0.0 0.0 0.0 0.0 -0.1 0.0 0.0 0.0 0.0 0.0 0.0 -0.1 0.0 0.0 0.0 0.0 -0.1 0.0 0.0 0.0 -0.1 0.0 -0.1 -0.1																											
0.5 0.6 0.7 0.7 0.6 0.4 0.5 0.7 0.4 0.6 0.5 0.4 0.5 0.5 0.4 0.6 0.4 0.5 0.5 0.6 0.7 0.4 0.5 0.4																											
M - Maintenance DF - DAS Failure																											



Summary of Hour Standard Deviations

Mannix - July 2015

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 3.9 km/h on Jul 6 18:00			Hours of Data:	731
Minimum Value: 0.3 km/h on Jul 16 05:00			Hours of Missing Data:	13
			Hours of Calibration:	0
			Percent Operational Time:	98.3
Percentiles: P <sub>1</sub> = 0.4 P <sub>10</sub> = 0.7 Q <sub>1</sub> = 1.0 Median = 1.5 Q <sub>3</sub> = 1.9 P <sub>90</sub> = 2.4 P <sub>99</sub> = 3.5				

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

M - Maintenance      DF - DAS Failure



Summary of Hour Averages

Mannix - July 2015

Maximum Value: 1.2 km/h on Jul 11 11:00		Maximum Daily Average: 0.6 km/h on Jul 11		Hours in Service:	744																					
Minimum Value: -1.0 km/h on Jul 6 18:00		Minimum Daily Average: -0.3 km/h on Jul 17		Hours of Data:	731																					
Maximum Diurnal Average: 0.3 km/h at hour 11		Minimum Diurnal Average: 0.0 km/h at hour 5		Hours of Missing Data:	13																					
Monthly Average: 0.12 km/h		Percentiles: P <sub>1</sub> = -0.9 P <sub>10</sub> = -0.3 Q <sub>1</sub> = -0.1 Median = 0.1 Q <sub>3</sub> = 0.4 P <sub>90</sub> = 0.6 P <sub>99</sub> = 1.0		Hours of Calibration:	0																					
				Percent Operational Time:	98.3																					
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	0.0	M	M	M	M	M	M	M	M	M	M	M	0.0	-0.2	0.0	0.2	0.2	0.5	0.4	0.3	0.6	0.0	-0.1	--	0.6	
2-Jul	-0.1	-0.1	-0.1	-0.2	-0.2	-0.1	0.1	0.1	0.2	0.4	0.0	-0.2	0.4	0.0	0.2	-0.3	0.3	0.0	-0.1	-0.2	0.2	0.3	0.1	0.0	0.0	0.4
3-Jul	0.1	0.0	0.6	0.7	0.5	0.4	0.1	-0.2	-0.1	-0.5	-0.4	-0.1	-0.6	0.2	-0.7	-0.4	-0.4	-0.2	-0.2	-0.2	-0.3	-0.2	-0.3	-0.1	-0.1	0.7
4-Jul	-0.2	-0.1	-0.3	-0.2	-0.1	0.1	0.3	-0.1	-0.1	-0.1	-0.3	-0.2	-0.2	-0.1	0.1	0.2	0.1	0.3	0.4	-0.6	-0.7	-0.4	-0.5	-0.2	-0.1	0.4
5-Jul	-0.4	-0.3	-0.9	-0.5	-0.5	-0.3	0.6	-0.1	0.2	-0.1	-0.1	-0.3	0.3	0.0	0.1	0.1	-0.6	0.0	0.4	0.3	0.1	0.2	-0.2	-0.2	-0.1	0.6
6-Jul	-0.1	0.1	-0.1	0.1	-0.1	0.1	0.4	0.4	0.5	0.2	-0.1	0.0	-0.2	0.0	0.2	-0.8	-0.8	-1.0	-0.5	-1.0	-1.0	-0.5	-0.1	-0.5	-0.2	0.5
7-Jul	-0.2	0.2	-0.1	-0.2	-0.2	-0.1	-0.3	0.6	0.4	-0.3	0.1	0.0	0.5	0.0	0.3	0.2	0.1	0.1	0.5	-0.1	-0.1	-0.1	0.0	0.0	0.1	0.6
8-Jul	0.4	0.7	1.1	1.0	0.9	0.7	0.9	0.9	1.0	0.8	1.0	0.9	0.8	0.4	1.1	0.8	0.7	-0.1	-0.1	-0.6	-0.8	-0.3	-0.3	-0.3	0.5	1.1
9-Jul	-0.6	-0.4	-0.3	0.0	-0.5	-0.1	0.3	0.0	0.6	0.1	0.5	0.2	0.1	0.0	0.5	0.1	0.1	0.2	-0.1	0.2	-0.1	0.3	-0.3	-0.1	0.0	0.6
10-Jul	0.0	0.1	-0.1	-0.3	-0.3	0.1	0.8	0.7	0.3	0.4	0.0	0.1	0.2	0.1	0.6	0.6	0.7	0.3	0.5	0.0	0.2	0.2	0.4	0.7	0.3	0.8
11-Jul	0.8	0.6	0.7	0.6	0.7	0.6	0.5	0.6	0.5	0.6	1.2	1.1	0.7	0.8	0.7	0.7	0.3	0.2	0.2	0.5	0.3	0.5	0.7	0.8	0.6	1.2
12-Jul	0.6	0.8	0.4	0.1	0.1	-0.1	0.3	0.2	0.5	-0.1	0.6	0.4	0.0	0.3	0.4	0.2	0.5	0.4	0.1	0.2	0.0	-0.8	-0.2	-0.4	0.2	0.8
13-Jul	0.1	0.4	0.3	0.1	-0.3	-0.1	0.3	0.5	0.6	0.7	0.6	0.4	0.7	0.0	-0.3	0.4	0.4	1.0	0.5	0.4	0.1	0.6	0.5	0.5	0.4	1.0
14-Jul	0.5	0.7	0.6	0.7	0.8	0.4	0.7	0.7	0.6	0.0	0.4	0.2	0.5	0.6	-0.5	0.1	0.3	0.3	0.4	0.6	0.6	0.7	0.1	-0.3	0.4	0.8
15-Jul	-0.5	-0.4	-0.2	-0.2	-0.3	-0.3	-0.1	0.0	0.2	0.7	0.7	0.5	0.4	0.5	0.4	0.7	0.1	0.0	0.0	0.0	-0.2	0.0	0.0	-0.2	0.1	0.7
16-Jul	-0.1	0.0	0.0	-0.1	0.2	0.0	0.1	0.0	0.2	-0.1	0.1	-0.1	-0.4	-0.3	-0.3	1.0	0.2	-0.2	-0.3	-0.3	-0.5	0.1	0.0	-0.3	0.0	1.0
17-Jul	-0.6	-1.0	-0.9	-0.8	-0.5	-0.5	-0.2	-0.5	-0.6	-1.0	-0.5	-0.6	-1.0	0.1	-0.4	-0.3	0.0	0.3	0.3	0.4	0.2	0.4	DF	0.2	-0.3	0.4
18-Jul	-0.3	-0.2	-0.3	-0.2	-0.3	-0.2	0.6	0.6	0.4	0.5	0.2	-0.2	-0.2	-0.3	-0.3	-0.2	-0.3	-0.1	-0.1	0.1	-0.1	-0.1	-0.1	-0.1	-0.1	0.6
19-Jul	0.0	-0.1	0.0	-0.1	-0.3	-0.2	-0.3	0.2	0.1	-0.1	0.3	0.0	-0.1	0.3	-0.1	-0.1	-0.4	-0.2	-0.4	-0.2	-0.2	-0.1	-0.1	-0.1	-0.1	0.3
20-Jul	-0.2	0.1	-0.2	0.1	-0.1	-0.1	0.2	0.1	0.3	0.7	0.5	0.1	0.5	1.0	0.5	0.3	0.4	0.1	0.2	0.4	0.5	1.0	0.5	0.5	0.3	1.0
21-Jul	1.1	0.6	0.6	0.7	0.5	0.5	1.0	0.7	0.5	0.7	0.8	0.8	0.4	0.9	0.1	0.5	0.2	0.2	0.3	0.3	0.1	0.1	0.0	0.0	0.5	1.1
22-Jul	0.1	0.1	0.0	0.0	-0.1	-0.1	0.0	0.2	0.1	0.1	0.3	-0.1	0.1	0.7	0.7	0.3	0.1	0.0	0.2	0.2	-0.1	-0.1	-0.2	-0.2	0.1	0.7
23-Jul	0.0	0.2	0.0	0.1	-0.1	-0.2	0.0	0.1	0.0	-0.1	-0.1	0.2	0.2	0.0	0.2	-0.1	0.0	0.3	-0.1	0.1	0.2	-0.1	-0.2	-0.2	0.0	0.3
24-Jul	-0.3	0.0	0.0	0.1	0.0	0.2	0.3	0.3	0.5	0.2	0.9	0.8	0.3	0.3	1.0	0.2	0.0	0.1	0.3	0.3	0.6	0.7	0.7	0.7	0.3	1.0
25-Jul	0.1	-0.2	-0.3	-0.3	-0.2	0.2	0.3	0.4	0.1	0.8	0.1	0.1	0.1	-0.3	0.0	-0.2	0.0	0.0	0.6	0.4	0.0	0.2	0.1	0.1	0.1	0.8
26-Jul	0.4	0.1	0.2	0.2	0.1	0.3	0.4	-0.1	0.2	0.9	0.3	-0.1	0.0	0.1	0.3	0.6	-0.3	-0.4	0.2	0.7	0.7	0.7	0.5	0.1	0.3	0.9
27-Jul	-0.3	-0.2	0.4	0.2	0.0	0.3	0.5	0.6	0.5	0.8	0.0	-0.2	-0.1	-0.3	-0.2	-0.1	0.2	0.1	-0.3	0.3	0.0	0.0	-0.2	-0.4	0.1	0.8
28-Jul	-0.3	-0.1	0.3	0.1	0.0	-0.1	0.1	-0.3	-0.3	-0.5	0.0	0.1	0.6	0.2	-0.1	0.5	0.3	0.3	0.4	0.5	0.2	0.1	-0.1	0.4	0.1	0.6
29-Jul	0.2	-0.1	-0.2	-0.2	-0.2	0.1	-0.4	-0.2	-0.1	0.2	-0.1	0.1	0.0	0.3	0.3	0.3	0.0	-0.1	-0.2	-0.1	0.1	0.2	0.1	0.0	0.0	0.3
30-Jul	-0.1	-0.1	-0.1	-0.1	-0.3	-0.4	-0.3	-0.1	-0.2	-0.3	-0.3	0.3	-0.1	-0.2	0.5	-0.1	0.2	0.6	0.3	0.6	1.1	0.1	-0.2	0.2	0.0	1.1
31-Jul	0.4	0.5	0.4	0.2	0.1	0.4	0.1	0.5	0.1	0.3	0.7	0.3	0.9	-0.1	0.1	-0.2	-0.1	0.0	0.0	-0.1	0.2	0.0	0.1	-0.1	0.2	0.9
																								Diurnal Average		
																								Diurnal Maximum		
M - Maintenance      DF - DAS Failure																										





Summary of Hour Standard Deviations

Mannix - July 2015

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 4.2 km/h on Jul 6 17:00			Hours of Data:	731
Minimum Value: 0.1 km/h on Jul 18 02:00			Hours of Missing Data:	13
			Hours of Calibration:	0
			Percent Operational Time:	98.3
Percentiles: P <sub>1</sub> = 0.2 P <sub>10</sub> = 0.5 Q <sub>1</sub> = 0.9 Median = 1.5 Q <sub>3</sub> = 2.1 P <sub>90</sub> = 2.6 P <sub>99</sub> = 3.6				

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

M - Maintenance      DF - DAS Failure



Summary of Hour Averages

Mannix - July 2015

Maximum Value: 1.5 km/h on Jul 30 15:00		Maximum Daily Average: 0.3 km/h on Jul 8		Hours in Service: 744																						
Minimum Value: -1.0 km/h on Jul 12 22:00		Minimum Daily Average: -0.2 km/h on Jul 6		Hours of Data: 731																						
Maximum Diurnal Average: 0.2 km/h at hour 15		Minimum Diurnal Average: 0.0 km/h at hour 5		Hours of Missing Data: 13																						
Monthly Average: 0.09 km/h		Percentiles: P <sub>1</sub> = -0.6 P <sub>10</sub> = -0.3 Q <sub>1</sub> = -0.1 Median = 0.1 Q <sub>3</sub> = 0.3 P <sub>90</sub> = 0.5 P <sub>99</sub> = 0.9		Hours of Calibration: 0																						
				Percent Operational Time: 98.3																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	0.0	M	M	M	M	M	M	M	M	M	M	M	M	-0.4	-0.1	0.0	0.2	0.1	0.4	0.2	0.0	0.2	-0.1	-0.1	--	0.4
2-Jul	-0.2	-0.1	-0.1	-0.1	-0.2	-0.3	-0.2	-0.2	-0.1	0.1	-0.2	-0.6	0.7	0.1	0.5	-0.5	0.4	-0.4	-0.3	-0.4	-0.1	-0.1	-0.4	-0.5	-0.1	0.7
3-Jul	-0.6	-0.5	0.2	0.4	0.2	0.0	-0.3	-0.3	-0.1	-0.4	-0.4	0.3	0.2	0.8	0.3	0.5	0.2	-0.1	0.2	0.0	0.2	0.2	0.1	0.0	0.1	0.8
4-Jul	-0.1	0.1	-0.1	-0.1	-0.1	0.2	0.5	0.1	-0.1	-0.2	-0.4	-0.2	-0.4	-0.3	0.1	0.5	0.0	0.3	0.6	-0.5	-0.4	0.1	0.0	0.3	0.0	0.6
5-Jul	0.0	0.1	-0.8	-0.1	-0.3	-0.1	1.1	0.1	0.4	0.0	0.4	0.0	0.4	-0.1	0.2	0.3	-0.9	-0.2	0.3	0.2	0.0	0.1	0.0	-0.4	0.0	1.1
6-Jul	-0.5	-0.3	-0.4	-0.2	-0.3	-0.1	0.0	0.2	0.2	-0.1	-0.1	0.0	-0.4	-0.2	0.2	-0.6	-0.1	-0.4	0.3	-0.5	-0.5	-0.3	0.3	0.2	-0.2	0.3
7-Jul	0.4	0.4	-0.1	-0.1	-0.3	-0.2	-0.3	0.9	0.2	-0.3	0.2	0.0	0.6	0.0	0.5	0.3	0.1	0.0	0.7	-0.2	-0.3	-0.5	-0.4	-0.4	0.1	0.9
8-Jul	-0.3	0.2	0.7	0.7	0.7	0.4	0.7	0.6	0.5	0.4	0.4	0.5	0.5	0.1	0.5	0.6	0.6	-0.2	0.0	0.1	-0.2	0.2	-0.1	0.2	0.3	0.7
9-Jul	-0.3	-0.1	0.1	0.3	-0.3	0.1	0.4	0.2	0.8	-0.1	0.5	0.2	0.3	0.2	0.5	0.3	0.2	0.5	0.4	0.4	0.2	0.5	0.1	0.4	0.2	0.8
10-Jul	0.3	0.5	0.2	-0.2	-0.1	0.4	1.0	0.5	0.3	0.5	0.1	0.1	-0.1	-0.3	0.8	0.8	1.0	0.3	0.7	-0.1	0.3	0.4	0.3	0.0	0.3	1.0
11-Jul	-0.1	-0.2	0.0	0.0	0.0	-0.3	-0.4	-0.1	-0.4	-0.1	0.9	0.6	0.2	0.2	0.0	0.3	0.5	0.3	0.4	0.5	0.3	0.2	0.1	0.4	0.1	0.9
12-Jul	0.5	0.3	0.4	0.3	0.0	0.1	0.1	0.1	0.1	0.0	0.4	0.2	0.1	0.6	0.3	0.2	0.5	0.3	0.0	0.2	0.1	-1.0	-0.2	-0.2	0.1	0.6
13-Jul	0.1	0.2	0.2	0.0	-0.4	-0.1	0.1	0.2	0.2	0.5	0.4	0.1	0.7	0.1	-0.1	0.5	0.3	1.1	0.0	0.3	0.0	0.1	-0.1	0.1	0.2	1.1
14-Jul	0.3	0.3	0.1	0.2	0.6	0.3	0.6	0.3	0.4	-0.4	0.0	0.1	0.4	0.7	-0.2	0.0	0.0	0.2	0.4	0.5	0.5	0.2	-0.2	-0.2	0.2	0.7
15-Jul	-0.5	-0.6	-0.4	-0.2	-0.1	-0.2	0.0	0.0	0.3	0.7	0.8	0.1	0.3	0.5	-0.1	0.6	0.1	-0.2	-0.1	-0.1	-0.3	-0.1	-0.2	-0.2	0.0	0.8
16-Jul	0.0	0.0	-0.1	-0.1	0.1	-0.1	0.2	0.0	0.4	0.0	0.2	0.3	-0.2	-0.1	-0.2	0.4	0.4	-0.1	0.0	0.3	0.1	0.1	0.2	0.2	0.1	0.4
17-Jul	-0.2	-0.5	-0.4	-0.2	0.0	0.0	0.4	-0.1	0.0	-0.6	-0.2	-0.5	-0.8	0.8	-0.1	0.1	0.5	0.7	0.6	0.7	0.5	0.4	DF	0.1	0.1	0.8
18-Jul	-0.3	-0.2	-0.2	0.0	-0.2	-0.4	0.2	0.2	0.1	0.2	0.2	-0.2	-0.3	-0.4	-0.4	-0.4	-0.4	-0.2	0.0	0.2	0.0	0.2	0.3	0.2	-0.1	0.3
19-Jul	0.2	0.0	0.2	0.3	0.1	0.3	0.2	0.5	0.5	0.3	0.8	0.7	0.2	0.9	0.3	0.0	0.0	0.2	0.0	0.2	-0.1	0.0	0.1	0.1	0.3	0.9
20-Jul	0.2	0.2	0.0	0.2	0.1	0.3	0.0	-0.1	0.3	0.3	0.2	-0.1	0.2	0.9	0.0	-0.2	0.0	-0.4	-0.6	-0.4	-0.4	0.6	-0.4	-0.2	0.0	0.9
21-Jul	0.5	-0.1	-0.1	0.1	-0.3	0.2	0.8	0.2	0.0	0.4	0.2	0.4	0.1	0.9	-0.4	0.5	0.1	0.2	0.3	0.2	0.0	0.2	-0.1	-0.3	0.2	0.9
22-Jul	-0.1	-0.1	0.0	0.0	-0.1	-0.1	0.0	0.3	0.0	0.0	0.5	0.0	-0.2	0.6	0.8	0.4	0.1	0.1	0.3	0.3	0.0	-0.1	-0.1	-0.1	0.1	0.8
23-Jul	0.1	0.4	0.1	0.2	0.0	-0.2	0.1	0.0	0.4	0.2	0.1	0.4	0.1	0.1	0.3	-0.3	-0.2	0.1	-0.1	0.0	0.2	-0.1	-0.1	-0.1	0.1	0.4
24-Jul	-0.1	-0.1	-0.2	-0.1	0.1	0.2	0.1	0.1	0.1	-0.1	0.5	0.5	-0.1	-0.1	1.1	0.0	0.0	0.1	0.3	0.0	0.4	0.5	0.4	0.4	0.2	1.1
25-Jul	0.0	-0.2	-0.4	-0.1	-0.1	0.1	0.2	0.1	-0.2	0.7	-0.2	-0.1	0.2	-0.5	0.1	0.5	0.4	0.0	0.6	0.3	-0.1	0.3	-0.1	0.2	0.1	0.7
26-Jul	0.4	0.3	0.0	0.2	0.3	0.2	0.1	-0.2	0.2	0.9	0.2	-0.1	-0.1	0.4	0.5	0.8	0.1	-0.3	0.0	0.6	0.6	0.6	0.4	-0.1	0.3	0.9
27-Jul	-0.5	-0.4	0.2	0.1	-0.2	-0.1	0.2	0.3	0.5	0.9	-0.1	-0.3	0.1	-0.6	0.0	-0.1	0.1	0.2	0.0	0.1	-0.1	0.0	-0.3	-0.5	0.0	0.9
28-Jul	0.0	0.0	0.1	0.0	0.2	0.1	0.1	-0.5	-0.3	-0.8	-0.4	-0.2	0.8	0.6	0.1	0.2	0.0	0.4	0.0	0.1	0.1	0.2	0.3	0.3	0.1	0.8
29-Jul	0.2	-0.2	-0.2	-0.1	-0.2	0.0	-0.3	-0.5	-0.1	0.0	-0.2	0.3	0.2	0.4	0.5	0.5	0.0	0.0	0.0	0.2	0.3	0.0	0.1	0.1	0.0	0.5
30-Jul	0.1	0.1	0.0	0.0	-0.2	-0.5	-0.4	-0.3	-0.2	-0.3	-0.4	0.5	0.2	0.5	1.5	0.4	0.1	0.5	0.2	0.5	0.9	0.0	0.1	0.2	0.1	1.5
31-Jul	0.3	0.2	0.7	0.4	0.2	0.2	-0.1	0.3	-0.1	0.1	0.6	-0.2	0.8	-0.4	0.0	-0.3	-0.2	-0.1	0.1	-0.1	0.2	0.1	0.0	-0.1	0.1	0.8
																								Diurnal Average		
																								Diurnal Maximum		
0.0 0.0 0.0 0.0 0.0 0.0 0.2 0.1 0.1 0.1 0.2 0.1 0.2 0.2 0.2 0.2 0.1 0.1 0.2 0.1 0.1 0.1 0.0 0.0																										
0.5 0.5 0.7 0.7 0.7 0.4 1.1 0.9 0.8 0.9 0.9 0.7 0.8 0.9 1.5 0.8 1.0 1.1 0.7 0.7 0.9 0.6 0.4 0.4																										
M - Maintenance      DF - DAS Failure																										



Summary of Hour Standard Deviations

Mannix - July 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 4.1 km/h on Jul 6 17:00	Hours of Data: 731
Minimum Value: 0.1 km/h on Jul 13 21:00	Hours of Missing Data: 13
Percentiles: P <sub>1</sub> = 0.2 P <sub>10</sub> = 0.5 Q <sub>1</sub> = 0.8 Median = 1.5 Q <sub>3</sub> = 2.2 P <sub>90</sub> = 2.8 P <sub>99</sub> = 3.6	Hours of Calibration: 0
	Percent Operational Time: 98.3

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

M - Maintenance DF - DAS Failure



Summary of Hour Averages

Mannix - July 2015

Maximum Value: 4.5 km/h on Jul 3 15:00																				Maximum Daily Average: 2.4 km/h on Jul 3					Hours in Service: 744	
Minimum Value: -1.1 km/h on Jul 21 00:00																				Minimum Daily Average: -0.2 km/h on Jul 11					Hours of Data: 731	
Maximum Diurnal Average: 1.3 km/h at hour 15																				Minimum Diurnal Average: 0.7 km/h at hour 9					Hours of Missing Data: 13	
Monthly Average: 0.97 km/h																				Percentiles: P <sub>1</sub> = -0.8 P <sub>10</sub> = -0.1 Q <sub>1</sub> = 0.3 Median = 0.8 Q <sub>3</sub> = 1.5 P <sub>90</sub> = 2.4 P <sub>99</sub> = 3.8					Hours of Calibration: 0	
																									Percent Operational Time: 98.3	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	1.5	M	M	M	M	M	M	M	M	M	M	M	M	0.2	1.3	1.3	0.4	0.4	0.4	-0.1	-0.2	0.4	0.4	0.5	--	1.5
2-Jul	0.2	0.8	0.8	1.4	0.6	0.4	0.4	0.5	0.1	0.3	0.1	0.1	2.2	1.8	1.8	0.7	1.5	0.7	0.7	0.5	0.8	1.3	1.1	0.8	0.8	2.2
3-Jul	0.8	0.7	1.3	1.4	0.8	0.5	0.5	1.8	1.9	3.1	3.4	4.1	3.7	4.1	4.5	4.3	3.8	2.6	1.9	1.8	1.8	2.7	2.9	2.5	2.4	4.5
4-Jul	2.6	2.8	2.6	2.7	2.5	2.9	2.3	2.4	1.5	0.9	1.5	1.2	1.2	1.3	1.6	1.6	0.1	0.5	1.5	0.9	1.4	1.4	0.6	0.9	1.6	2.9
5-Jul	0.5	0.5	0.3	1.0	0.5	0.7	1.7	1.1	1.1	0.9	1.6	1.1	1.2	0.8	1.5	1.3	-0.3	0.2	0.8	0.4	0.3	0.7	1.2	1.0	0.8	1.7
6-Jul	0.4	0.4	0.7	0.5	0.7	0.3	0.2	0.4	0.4	0.8	2.5	2.2	1.6	1.8	2.3	2.0	2.3	1.0	1.8	1.3	1.2	1.6	2.7	3.1	1.3	3.1
7-Jul	3.0	2.6	2.3	2.5	2.2	0.9	0.5	1.7	1.0	0.4	0.8	0.9	0.8	0.5	1.4	1.8	1.3	1.7	2.1	0.7	0.2	0.5	1.4	1.6	1.4	3.0
8-Jul	1.1	1.4	1.7	1.7	1.7	1.2	1.5	1.3	1.1	0.9	1.0	1.2	1.5	1.6	1.6	1.7	1.2	1.5	2.3	3.8	3.8	3.6	2.4	2.9	1.8	3.8
9-Jul	1.6	1.1	1.2	0.9	1.1	0.3	0.8	0.9	0.9	-0.4	0.3	0.1	0.7	0.1	-0.1	0.1	-0.1	0.4	0.3	0.1	0.1	0.9	0.4	0.7	0.5	1.6
10-Jul	0.6	0.6	0.6	0.0	-0.1	0.4	0.8	0.3	0.2	0.8	0.1	-0.3	-0.6	-0.3	0.6	0.7	1.0	0.1	0.8	-0.1	0.0	-0.1	-0.3	-0.3	0.2	1.0
11-Jul	-0.8	-0.8	0.2	0.1	-0.3	-0.7	-0.4	-0.1	-0.8	0.0	1.2	0.6	0.5	-0.4	-0.6	-0.3	0.0	-0.2	0.0	-0.2	-0.2	-0.4	-0.4	-0.5	-0.2	1.2
12-Jul	-0.6	-0.6	-0.1	0.2	0.0	0.1	-0.2	-0.2	-0.4	0.4	0.3	0.5	0.5	0.9	0.6	0.0	0.0	0.1	0.4	0.1	0.6	1.7	2.2	1.1	0.3	2.2
13-Jul	0.5	-0.1	0.5	0.6	0.5	0.6	0.3	0.1	0.2	0.7	0.3	-0.2	0.9	0.8	0.8	0.8	0.5	1.4	0.2	0.8	0.9	0.6	-0.1	0.3	0.5	1.4
14-Jul	0.7	0.7	0.5	0.8	1.3	0.8	1.1	0.6	0.5	-0.3	0.1	0.5	1.0	1.4	1.3	-0.1	0.2	0.2	0.5	1.1	1.2	1.1	1.3	2.1	0.8	2.1
15-Jul	2.1	1.3	0.6	0.5	1.6	1.6	1.5	0.4	0.7	0.8	0.5	0.4	1.1	0.2	-0.5	1.1	1.7	1.2	0.8	0.6	0.7	0.7	0.4	0.7	0.9	2.1
16-Jul	1.2	1.0	0.6	0.5	0.8	0.6	1.1	1.1	1.7	1.2	1.3	0.9	-0.3	0.0	-0.2	0.7	2.1	2.0	2.6	3.8	3.6	0.7	1.1	2.2	1.3	3.8
17-Jul	2.7	2.4	1.6	1.1	1.3	1.4	1.8	1.3	1.7	0.8	1.3	1.0	1.0	1.9	1.5	1.9	2.3	1.6	1.2	0.4	0.3	0.2	DF	0.7	1.4	2.7
18-Jul	0.9	1.6	2.0	1.7	1.5	0.6	0.5	0.4	0.2	0.6	1.4	1.1	0.8	1.8	1.6	1.5	2.6	3.4	3.4	3.5	3.3	3.6	2.4	2.8	1.8	3.6
19-Jul	2.9	2.8	3.0	2.9	2.9	3.0	3.1	2.8	3.2	3.3	3.5	3.5	2.7	3.1	2.7	2.4	1.6	1.2	0.8	0.3	0.0	0.4	1.4	1.8	2.3	3.5
20-Jul	1.9	1.8	1.4	1.4	1.5	2.0	0.8	0.1	0.5	0.1	-0.3	-0.2	-0.1	0.2	-0.6	-0.6	-0.1	-0.6	-0.8	-0.8	-1.0	-0.3	-1.0	-1.1	0.2	2.0
21-Jul	-0.4	-0.7	-0.2	0.5	-0.8	-0.2	-0.1	-0.4	-0.7	-0.5	-0.2	0.1	0.3	1.0	-0.7	0.5	0.3	0.6	0.1	-0.1	0.0	0.5	0.4	0.4	0.0	1.0
22-Jul	0.3	0.6	0.8	1.3	0.7	0.3	0.6	1.6	0.6	0.6	1.0	0.3	-0.3	0.7	1.0	1.0	1.1	2.4	2.2	2.3	2.4	2.1	2.5	1.8	1.2	2.5
23-Jul	1.8	1.6	1.7	2.0	1.9	1.2	1.3	0.7	1.9	1.6	0.8	0.9	0.5	0.8	1.2	0.5	0.1	0.4	0.3	0.9	1.4	1.2	1.8	1.4	1.2	2.0
24-Jul	1.4	1.2	0.6	0.0	0.1	0.2	0.3	0.0	-0.1	-0.4	0.0	0.0	-0.3	-0.7	1.2	0.4	1.5	1.0	0.6	0.0	0.7	1.2	1.3	1.5	0.5	1.5
25-Jul	1.5	1.1	1.2	2.1	0.9	0.1	0.2	0.3	0.3	1.1	0.8	1.2	1.5	0.9	1.8	3.2	1.5	-0.2	0.4	0.1	-0.1	0.9	0.0	0.2	0.9	3.2
26-Jul	0.2	0.6	-0.2	0.3	0.5	0.1	-0.2	0.0	0.2	0.8	0.4	0.2	0.8	2.5	3.3	1.8	2.5	1.6	0.0	1.1	1.6	1.2	1.2	0.8	0.9	3.3
27-Jul	1.1	1.0	0.5	0.2	0.1	0.2	0.5	0.5	0.7	1.8	1.4	1.0	2.1	0.9	0.7	0.6	0.4	0.6	1.5	-0.1	0.2	0.5	1.2	2.0	0.8	2.1
28-Jul	3.2	1.6	0.5	0.8	1.6	1.6	0.6	0.0	0.1	-0.4	-0.2	0.0	1.7	1.4	0.9	-0.4	-0.3	0.5	-0.4	-0.4	0.3	0.8	0.4	-0.1	0.6	3.2
29-Jul	0.3	1.6	1.2	1.5	1.3	0.1	0.8	0.7	0.6	0.6	0.3	1.2	1.8	2.9	2.3	2.6	1.4	1.6	3.9	2.9	1.4	-0.3	0.4	2.1	1.4	3.9
30-Jul	2.5	1.9	1.8	1.7	1.9	1.9	1.4	1.5	1.2	0.4	0.6	1.8	2.7	3.6	4.3	2.8	-0.3	0.1	-0.4	-0.1	0.3	-0.1	0.6	1.6	1.4	4.3
31-Jul	0.4	0.1	1.3	1.2	0.6	0.5	0.0	0.3	-0.2	-0.1	0.7	-0.5	0.9	1.1	0.8	0.4	0.8	1.4	1.3	0.0	0.0	0.1	0.4	0.6	0.5	1.4
																								Diurnal Average		
																								Diurnal Maximum		
1.2 1.1 1.0 1.1 1.0 0.8 0.8 0.7 0.7 0.7 0.9 0.8 1.1 1.2 1.3 1.2 1.0 1.0 1.0 0.8 0.9 1.0 1.0 1.2																										
3.2 2.8 3.0 2.9 2.9 3.0 3.1 2.8 3.2 3.3 3.5 4.1 3.7 4.1 4.5 4.3 3.8 3.4 3.9 3.8 3.8 3.6 2.9 3.1																										
M - Maintenance DF - DAS Failure																										



Summary of Hour Standard Deviations

Mannix - July 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 4.9 km/h on Jul 12 23:00	Hours of Data: 731
Minimum Value: 0.2 km/h on Jul 13 21:00	Hours of Missing Data: 13
Percentiles: P <sub>1</sub> = 0.3 P <sub>10</sub> = 0.6 Q <sub>1</sub> = 0.9 Median = 1.5 Q <sub>3</sub> = 2.3 P <sub>90</sub> = 2.9 P <sub>99</sub> = 4.0	Hours of Calibration: 0
	Percent Operational Time: 98.3

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

M - Maintenance DF - DAS Failure



# Wood Buffalo Environmental Association

## SO2 Calibration Report

### Station Information

Calibration Date	July 2, 2015	Last Calibration	June 11, 2015
Station Name	Mannix	Station Number	AMS 5
Reason:	Routine		
Start Time (MST)	8:38	End Time (MST)	12:00
Gas Cert Reference	S9610161A	Station temp.	22 Deg C
Cal Gas Concentration	50 ppm	Cal Gas Exp Date	26-Sep-17
Calibrator Make/Model	Sabio 4010	Serial Number	11061107
ZAG Make/Model	API 701	Serial Number	1083
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2633

### Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		PMT voltage	-634	-635
Analyzer IP address	192.168.1.43		Lamp voltage	865	866
Calculated slope	0.994251	0.991984	Chamber temp	45.3	44.9
Calculated intercept	-0.308001	0.717908	Pressure	689.4	696.4
Analyzer Background	7.3	7.9	Flow	0.469	0.485
Analyzer Coefficient	1.021	1.015	Intensity	91	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	0.2	----
as found span	5000	60.0	600.0	582.0	1.031
calibrator zero	5000	0.0	0.0	-0.3	----
high point	5000	60.0	600.0	603.8	0.994
second point	5000	30.0	300.0	303.1	0.990
third point	5000	15.0	150.0	149.0	1.007
as left zero	5000	0.0	0.0	-0.2	----
as left span	5000	60.0	600.0	601.4	0.998
Average Correction Factor					0.997

Corrected As found 581.8 Previous response 603.8 % change 3.8%

**Notes:**

Inlet filter replaced after as founds. Slightly adjusted zero and span.

Calibration Performed By: Asad Hidayat



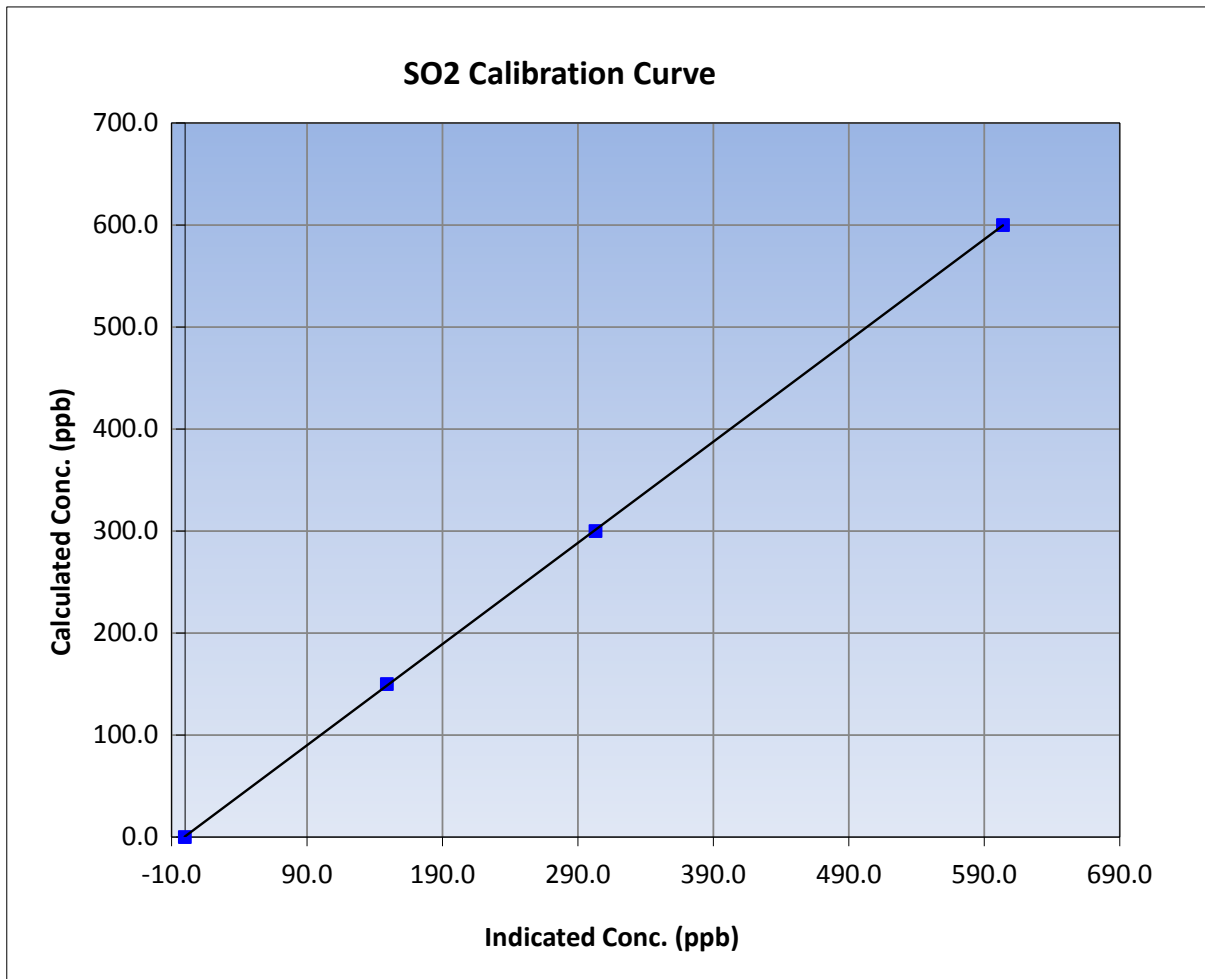
## Wood Buffalo Environmental Association SO2 Calibration Report

### Station Information

Calibration Date	July 2, 2015	Previous Calibration	June 11, 2015
Station Name	Mannix	Station Number	AMS 5
Start Time (MST)	8:38	End Time (MST)	12:00
Analyzer make	TEI 43i	Analyzer serial #	1008841399

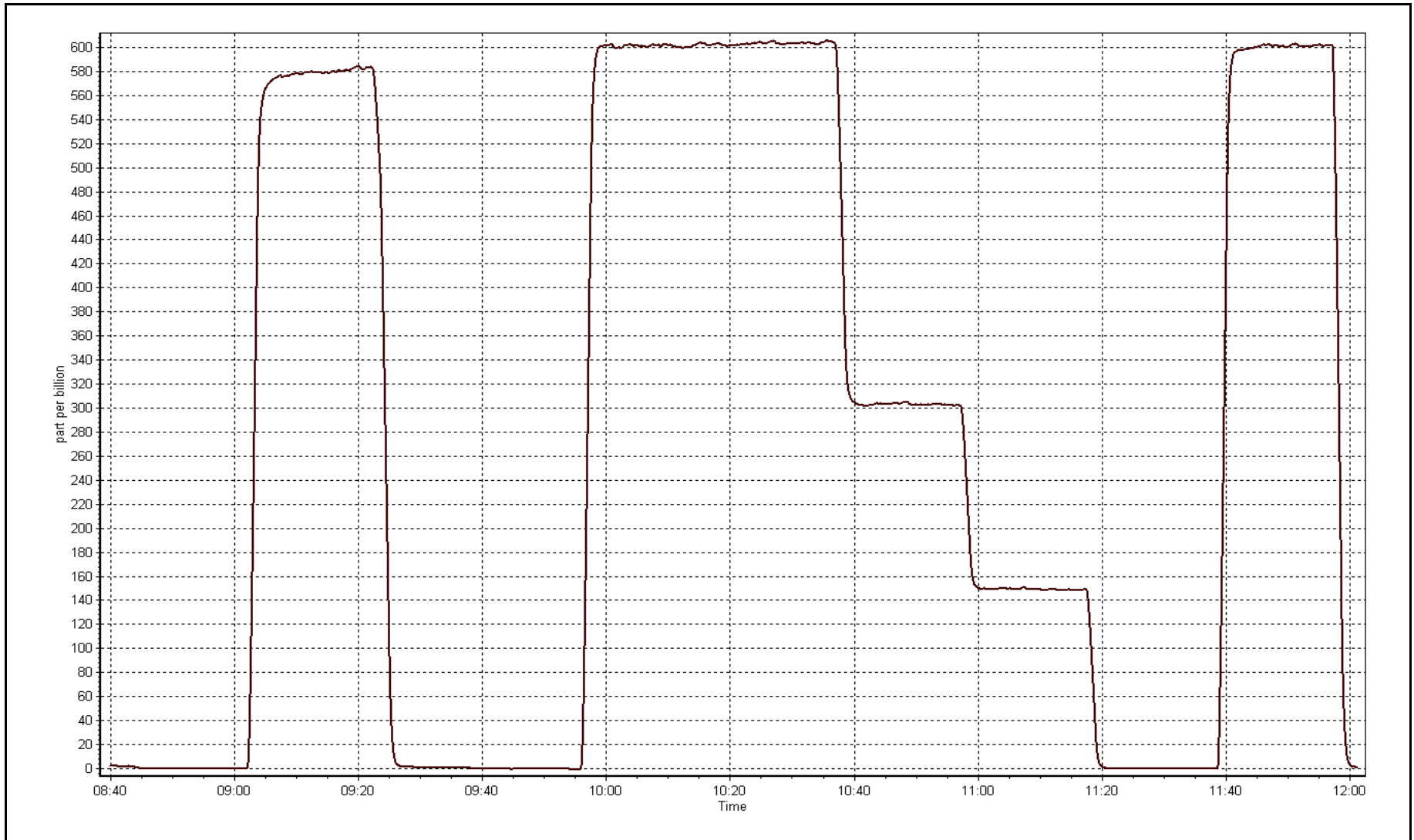
### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.3	----	Correlation Coefficient	0.999978
600.0	603.8	0.9937		
300.0	303.1	0.9899	Slope	0.991984
150.0	149.0	1.0066	Intercept	0.717908



SO2 Calibration Plot

Date: July 2, 2015







# Wood Buffalo Environmental Association H2S Calibration Report

### Station Information

Calibration Date	July 3, 2015	Last Calibration	June 12, 2015
Station Name	Mannix	Station Number	AMS 5
Reason:	Routine		
Start Time (MST)	8:10	End Time (MST)	12:13
Gas Cert Reference	CC62844	Station temp.	21 Deg C
Cal Gas Concentration	5.04 ppm	Cal Gas Exp Date	09/09/2017
Calibrator Make/Model	Sabio 4010	Serial Number	11061107
ZAG air Make/Model	API 701	Serial Number	1083
DACS make/model	Campbell Scientific CR3000	Serial Number	2633
SO2 gas concentration	50 ppm	SO2 gas cert/exp	S960161A September-09-17

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-624	-624
Analyzer IP address	192.168.1.42		Lamp voltage	883	885
Calculated slope	1.005316	0.981805	Chamber temp	45.1	45
Calculated intercept	-0.232171	0.056287	Pressure	518.3	519.2
Analyzer Background	17.4	17.5	Flow	1.068	1.068
Analyzer Coefficient	1.353	1.37	Intensity	116	115
			Converter temp.	323	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	-0.2	----
as found span	5000	74.4	75.0	72.8	1.030
SO2 scrubber check	5000	15.0	150.0	1.1	----
calibrator zero	5000	0.0	0.0	-0.2	----
high point	5000	74.4	75.0	76.2	0.984
second point	5000	41.7	42.0	42.8	0.981
third point	5000	24.8	25.0	25.5	0.979
as left zero	5000	0.0	0.0	0.0	----
as left span	5000	74.4	75.0	75.8	0.989
Average Correction Factor					0.981

Corrected As found	73.0	Previous response	74.8	% change	2.5%
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**Notes:**

Inlet filter replaced and scrubber check done after as founds. Adjusted span. Performed high point the second time to get better indicated concentration.

Calibration Performed By: Asad Hidayat



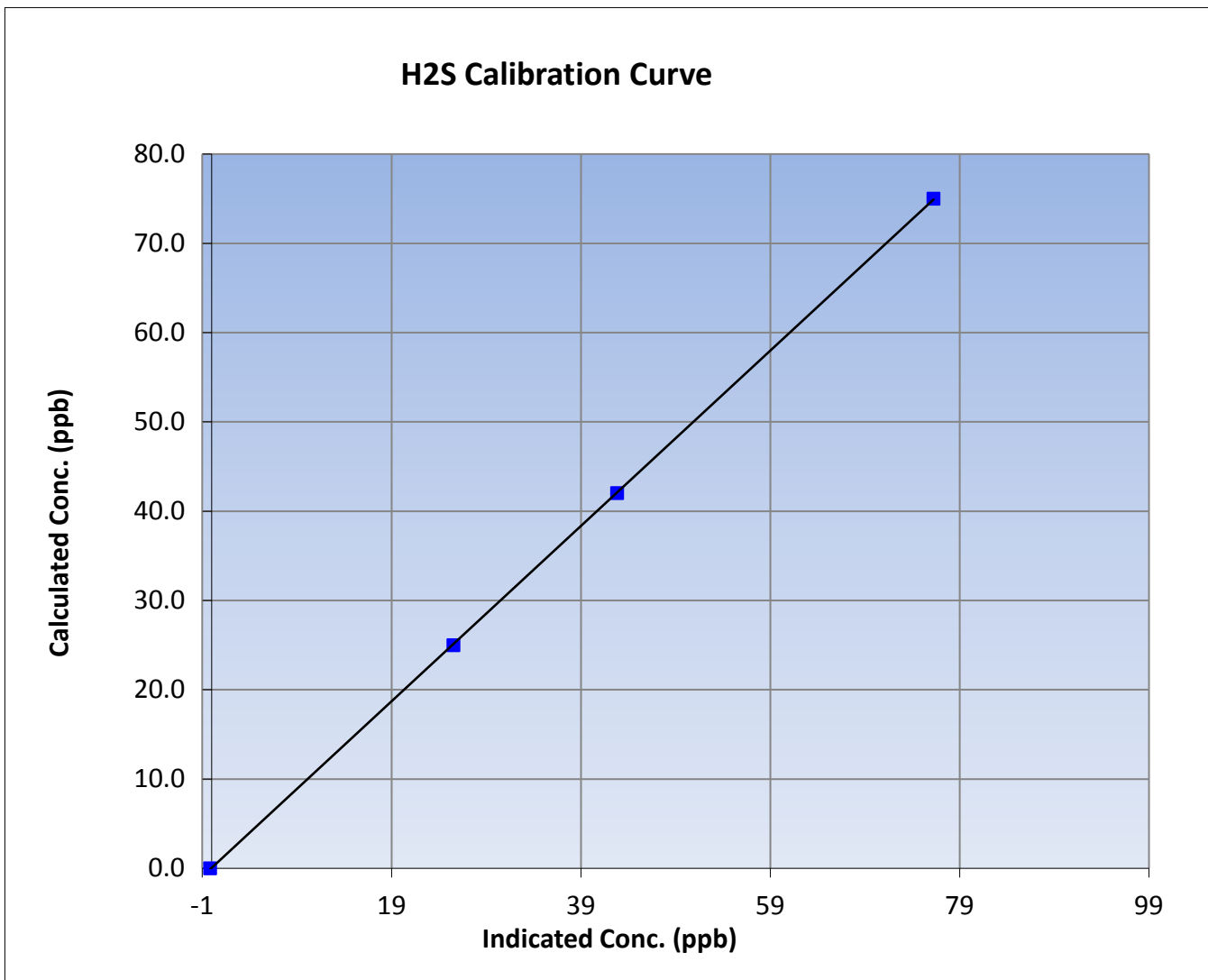
# Wood Buffalo Environmental Association H2S Calibration Report

## Station Information

Calibration Date	July 3, 2015	Previous Calibration	June 12, 2015
Station Name	Mannix	Station Number	AMS 5
Start Time (MST)	8:10	End Time (MST)	12:13
Analyzer make	TEI 450i	Analyzer serial #	815129108

## Calibration Data

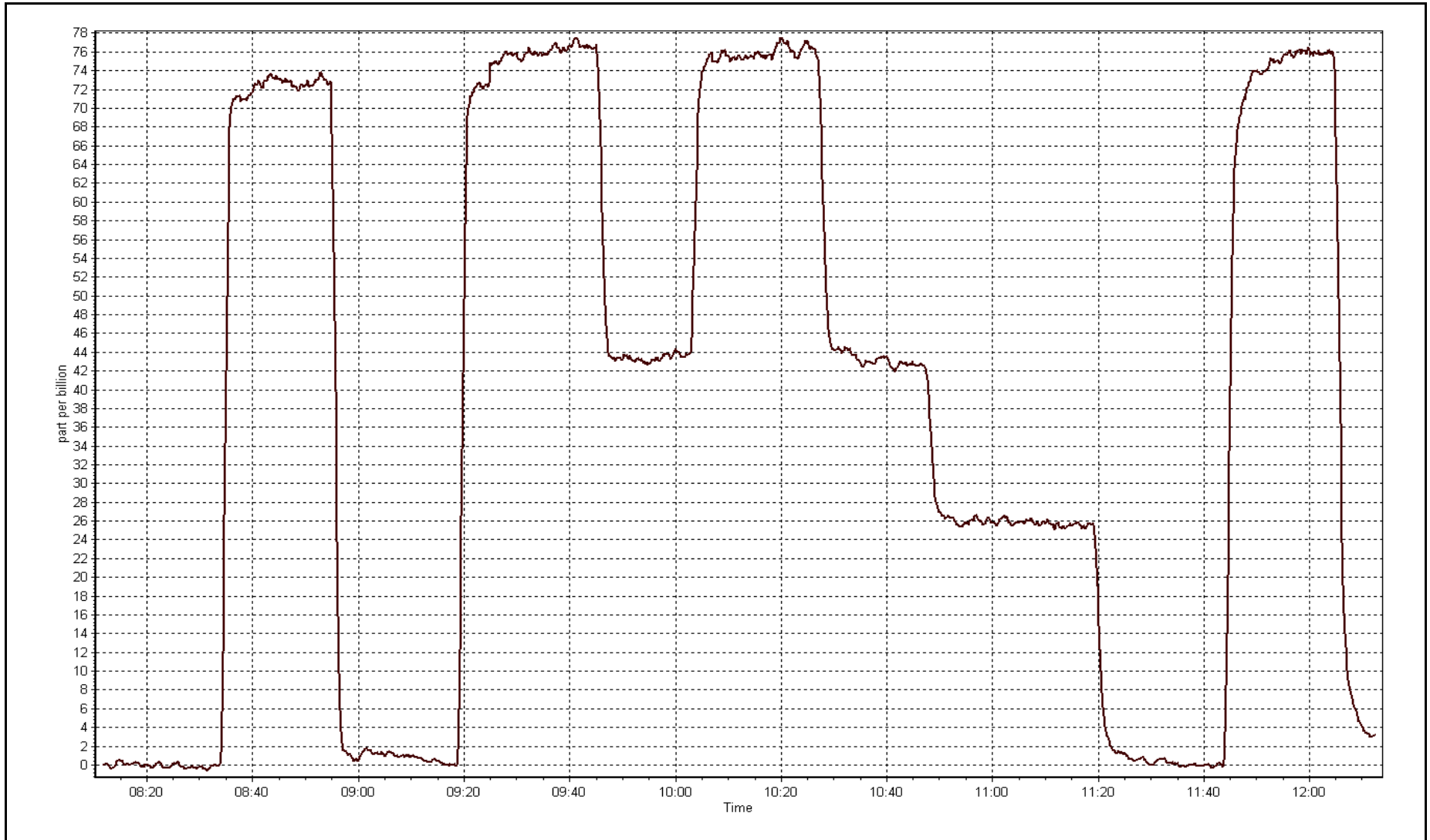
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	----	Correlation Coefficient	0.999985
75.0	76.2	0.9837		
42.0	42.8	0.9814	Slope	0.981805
25.0	25.5	0.9788		
			Intercept	0.056287



H2S Calibration Plot

Date:

July 3, 2015





# Wood Buffalo Environmental Association THC Calibration Report

### Station Information

Calibration Date	July-02-15	Last Calibration	June-11-15
Station Name	Mannix	Station Number	AMS 5
Reason:	Routine		
Start Time (MST)	8:38	End Time (MST)	12:00
Gas Cert Reference	S961061A	Cal Gas Expiry Date	Sept-26-2017
CH4 Cal Gas Conc.	499 ppm	CH4 Equiv Conc.	1038.0 ppm
C3H8 Cal Gas Conc.	196 ppm	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11061107
ZAG make/model	Teledyne API 701	Serial Number	1083
DACS make/model	Campbell Scientific CR3000	Serial Number	2633

### Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 50 ppm		Sample Pressure	9.4	9.4
Analyzer IP address	192.168.1.51		Air or Bypass Press	42.3	42.3
Calculated slope	0.996856	0.995764	Fuel Pressure	20.2	20.2
Calculated intercept	-0.005793	-0.049608	Analyzer Coeff	3.801	3.836
			Analyzer BKG	3.690	3.280

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	-0.41	----
as found span	5000	60.0	12.46	11.95	1.042
calibrator zero	5000	0.0	0.00	0.06	----
high point	5000	60.0	12.46	12.55	0.993
second point	5000	30.0	6.23	6.34	0.982
third point	5000	15.0	3.11	3.14	0.992
as left zero	5000	0.0	0.00	0.06	----
as left span	5000	60.0	12.46	12.56	0.992
Average Correction Factor					0.989

Corrected As found	12.36	Previous response	12.50	% change	1.1%
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**Notes:**

Replaced inlet filter after as founds. Adjusted both zero and span.

Calibration Performed By:

Asad Hidayat



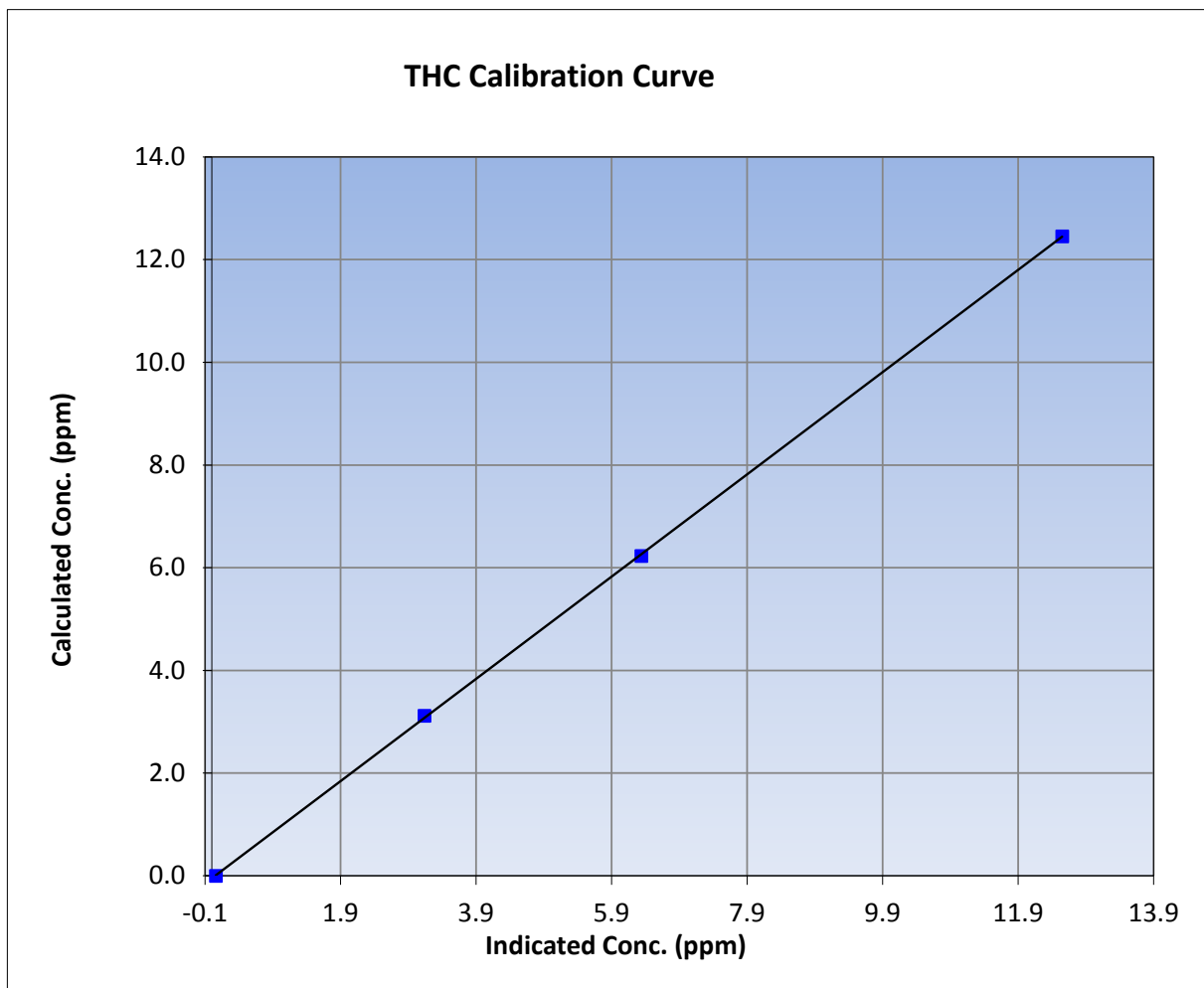
## Wood Buffalo Environmental Association THC Calibration Report

### Station Information

Calibration Date	July 2, 2015	Previous Calibration	June 11, 2015
Station Name	Mannix	Station Number	AMS 5
Start Time (MST)	8:38	End Time (MST)	12:00
Analyzer make	Thermo 51i-LT	Analyzer serial #	1317958295

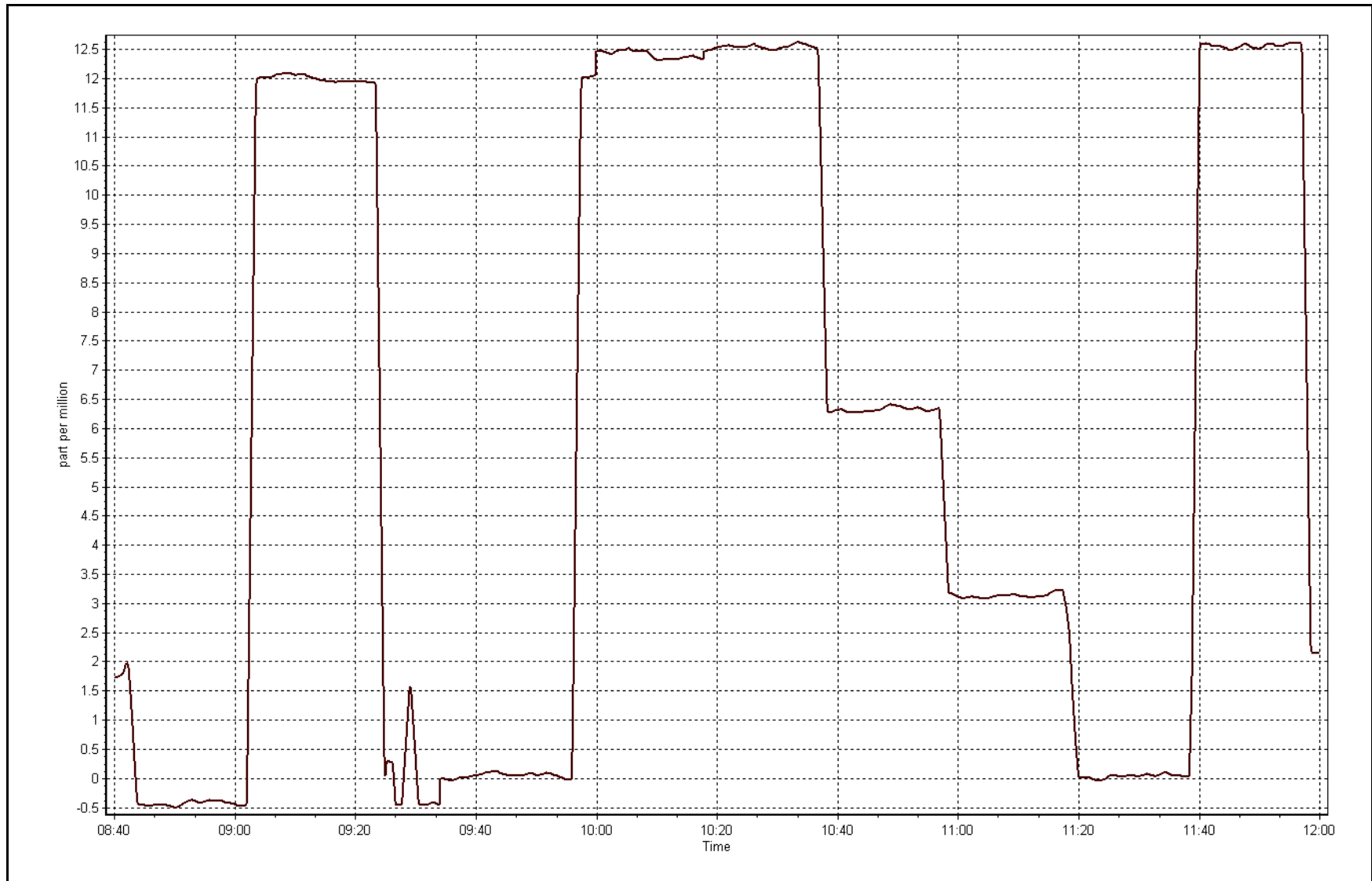
### Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.06	----	Correlation Coefficient	0.999967
12.46	12.55	0.9925		
6.23	6.34	0.9823	Slope	0.995764
3.11	3.14	0.9917		
			Intercept	-0.049608



THC Calibration Plot

Date: July 2, 2015





## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS 6**  
**PATRICIA MCINNES**  
**JULY 2015**

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

August 26, 2015



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

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	707	35	37	99.73	13	0	2	0
TRS (ppb) Average	703	35	41	99.19	2	0	1	0
THC (ppm) Average	705	34	39	99.33	2.3	-	2	-
NMHC(ppm) Average	705	34	39	99.33	0.254	-	0.034	-
CH4(ppm) Average	705	34	39	99.33	2.1	-	1.9	-
O3 (ppb) Average	703	35	41	99.19	62	0	41	-
NO2 (ppb) Average	704	34	40	99.19	15	0	5	-
NO (ppb) Average	704	34	40	99.19	32	-	3	-
NOX (ppb) Average	704	34	40	99.19	47	-	6	-
NH3 (ppb) Average	657	39	88	93.41	67	0	26	-
PM2.5 (ug/m3) Average	741	0	3	99.60	373.5	-	128.5	6
Temperature 2 m (C) Average	742	0	2	99.73	31	-	23.3	-
Relative Humidity (%) Average	742	0	2	99.73	97	-	81	-
Wind Speed 10 m (km/h) Average	742	0	2	99.73	28	-	15	-
Wind Direction 10 m (deg) Average	742	0	2	99.73	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - PATRICIA McINNES (AMS 6)  
 JULY 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	707	0.6	1	-	0	0	0	0	0	1	13
TRS (ppb) Average	703	0.3	0	-	0	0	0	0	0	1	2
THC (ppm) Average	705	1.89	0.1	-	1.8	1.8	1.9	1.9	1.9	2	2.3
NMHC(ppm) Average	705	0.003	0.017	-	0	0	0	0	0	0	0.254
CH4(ppm) Average	705	1.89	0	-	1.8	1.8	1.9	1.9	1.9	2	2.1
O3 (ppb) Average	703	24.3	9	-	3	14	18	23	30	37	62
NO2 (ppb) Average	704	1.9	2	-	0	0	0	1	3	5	15
NO (ppb) Average	704	0.7	2	-	0	0	0	0	1	1	32
NOX (ppb) Average	704	2.6	3	-	0	0	1	2	4	6	47
NH3 (ppb) Average	656	2	8	-	0	0	0	0	0	0	67
PM2.5 (ug/m3) Average	741	23.63	52.5	-	0.3	1.7	2.9	5.9	12.8	60.6	373.5
Temperature 2 m (C) Average	742	18.13	4.8	-	4.8	12.1	14.3	17.9	22.1	24.3	31
Relative Humidity (%) Average	742	65.9	19	-	24	38	52	68	82	89	97
Wind Speed 10 m (km/h) Average	742	9.4	5	-	0	4	6	9	12	16	28
Wind Direction 10 m (deg) Average	742	-	-	-	-	-	-	-	-	-	-

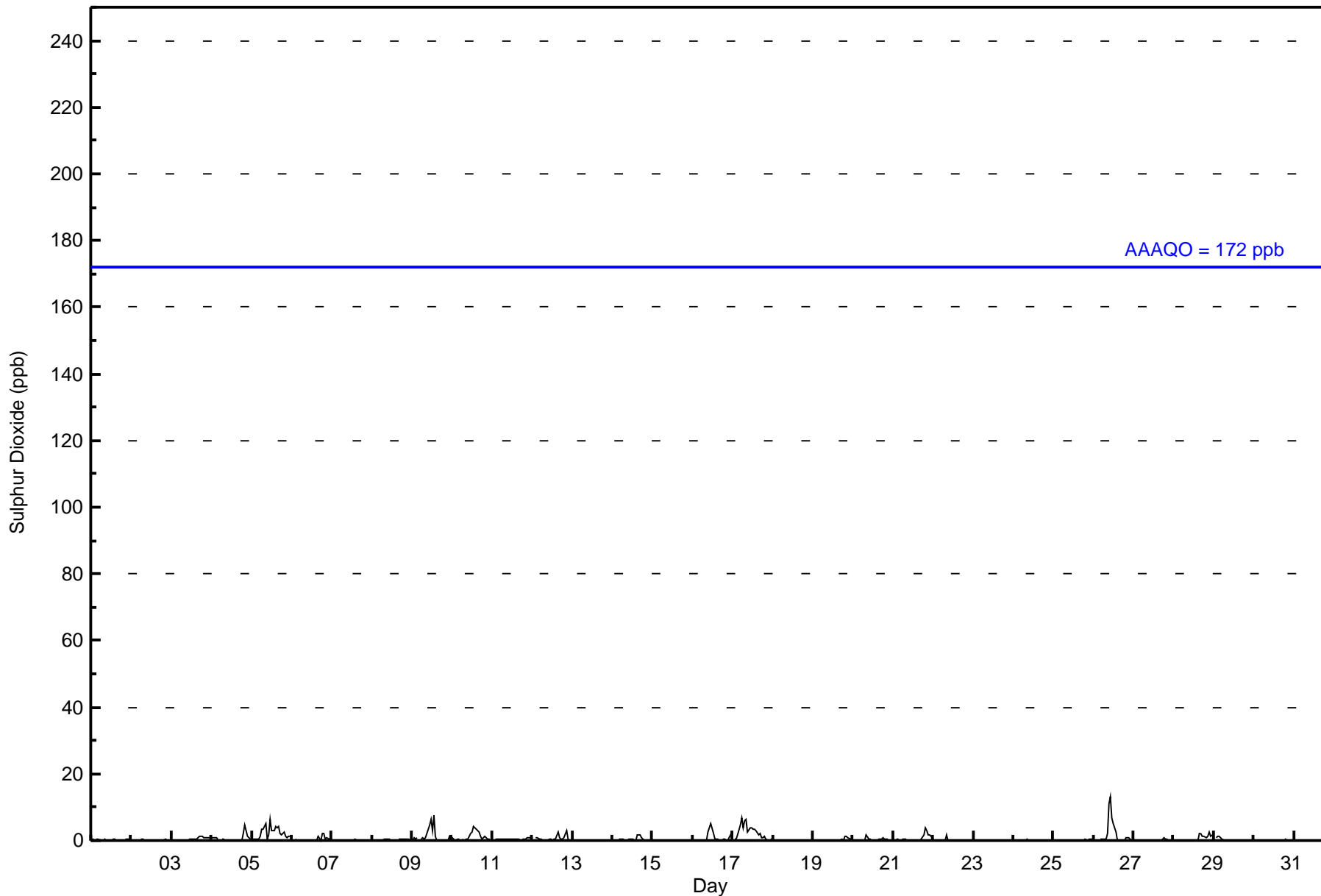
WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - PATRICIA McINNES (AMS 6)  
JULY 2015

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
NH3	01 Jul 2015 07:00	31 Jul 2015 07:00	42	Stabilization after daily span
TRS, O3, NH3	08 Jul 2015 14:00	08 Jul 2015 15:00	2	Maintenance - sample manifold cleaned
TRS	08 Jul 2015 09:00	08 Jul 2015 10:00	2	Maintenance - inlet filter replaced
O3	08 Jul 2015 10:00	08 Jul 2015 11:00	2	Maintenance - inlet filter replaced
NH3	08 Jul 2015 11:00	08 Jul 2015 12:00	2	Maintenance - inlet filter replaced
PM2.5	15 Jul 2015 11:00	15 Jul 2015 11:00	1	Maintenance - Flow and zero check, sample head cleaning
NO2, NO, NOX	13 Jul 2015 09:00	13 Jul 2015 10:00	2	Maintenance - confirmed calibration points for Ozone
ALL PARAMETERS	27 Jul 2015 04:00	27 Jul 2015 05:00	2	Power outage
NMHC, CH4, THC, NH3	27 Jul 2015 05:00	27 Jul 2015 06:00	1	Stabilization after power outage
THC, NO2, SO2	27 Jul 2015 11:00	27 Jul 2015 12:00	2	Maintenance - reinitiated daily QA check



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																
Maximum Value: 13 ppb on Jul 26 11:00										Maximum Daily Average: 2.5 ppb on Jul 17										Hours of Data: 707						
Minimum Value: 0 ppb on Jul 6 12:00										Minimum Daily Average: 0.0 ppb on Jul 7										Hours of Missing Data: 37						
Maximum Diurnal Average: 1.1 ppb at hour 12										Minimum Diurnal Average: 0.2 ppb at hour 2										Hours of Calibration: 35						
Monthly Average: 0.6 ppb										Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 O <sub>3</sub> = 0 P <sub>90</sub> = 1 P <sub>99</sub> = 6										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-Jul	0	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-Jul	0	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-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0.5	1
4-Jul	1	1	1	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	2	5	1	1	1	0.7	5
5-Jul	Z	1	0	0	0	1	3	3	5	0	2	6	3	3	4	4	4	2	2	2	1	1	1	1	2.3	6
6-Jul	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	2	0	1	1	0	0.4	2
7-Jul	0	0	Z	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-Jul	0	0	0	Z	0	0	0	0	1	1	0	0	C	C	C	C	1	0	0	0	0	0	0	0	0.3	1
9-Jul	0	1	0	1	Z	1	1	0	1	2	5	6	3	8	1	0	0	0	0	0	0	0	1	1	1.4	8
10-Jul	1	0	0	0	0	Z	0	0	1	0	1	2	2	4	4	3	2	1	1	1	1	0	0	0	1.2	4
11-Jul	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.4	1
12-Jul	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	2	1	0	0	1	3	0	0	0	0	0.6	3
13-Jul	0	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-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	2	2	1	0	0	0	0	0	0	0.4	2
15-Jul	0	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-Jul	0	0	0	0	0	Z	0	0	0	3	4	5	2	0	0	0	0	0	0	0	0	0	1	3	0.9	5
17-Jul	Z	0	0	2	5	7	4	6	6	2	4	4	3	3	3	2	2	1	1	1	0	0	0	0	2.5	7
18-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
19-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	0	0	0.3	1
20-Jul	0	0	0	Z	0	0	0	0	2	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0.3	2
21-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	2	4	3	2	2	1	0.7	4
22-Jul	0	0	0	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
23-Jul	Z	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-Jul	0	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-Jul	0	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-Jul	0	0	0	Z	0	0	0	0	2	11	13	7	5	3	0	0	0	0	0	1	1	1	0	0	2.0	13
27-Jul	0	0	0	0	Z	0	0	0	0	0	M	M	0	0	0	0	0	0	1	0	0	0	0	0	0.1	1
28-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	2	2	1	1	1	1	2	1	2	0.7	2
29-Jul	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
30-Jul	0	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
31-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
0.2 0.2 0.3 0.3 0.4 0.5 0.4 0.4 0.7 0.8 1.1 1.1 0.7 0.8 0.5 0.6 0.6 0.4 0.5 0.7 0.7 0.5 0.4 0.4																								Diurnal Average		
1 1 1 2 5 7 4 6 6 11 13 7 5 8 4 4 4 2 2 4 5 2 2 3																								Diurnal Maximum		
Z - zerospan C - Calibration M - Maintenance																										
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb																										





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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Patricia McInnes - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	705	99.72	99.72
11 - 20	2	0.28	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



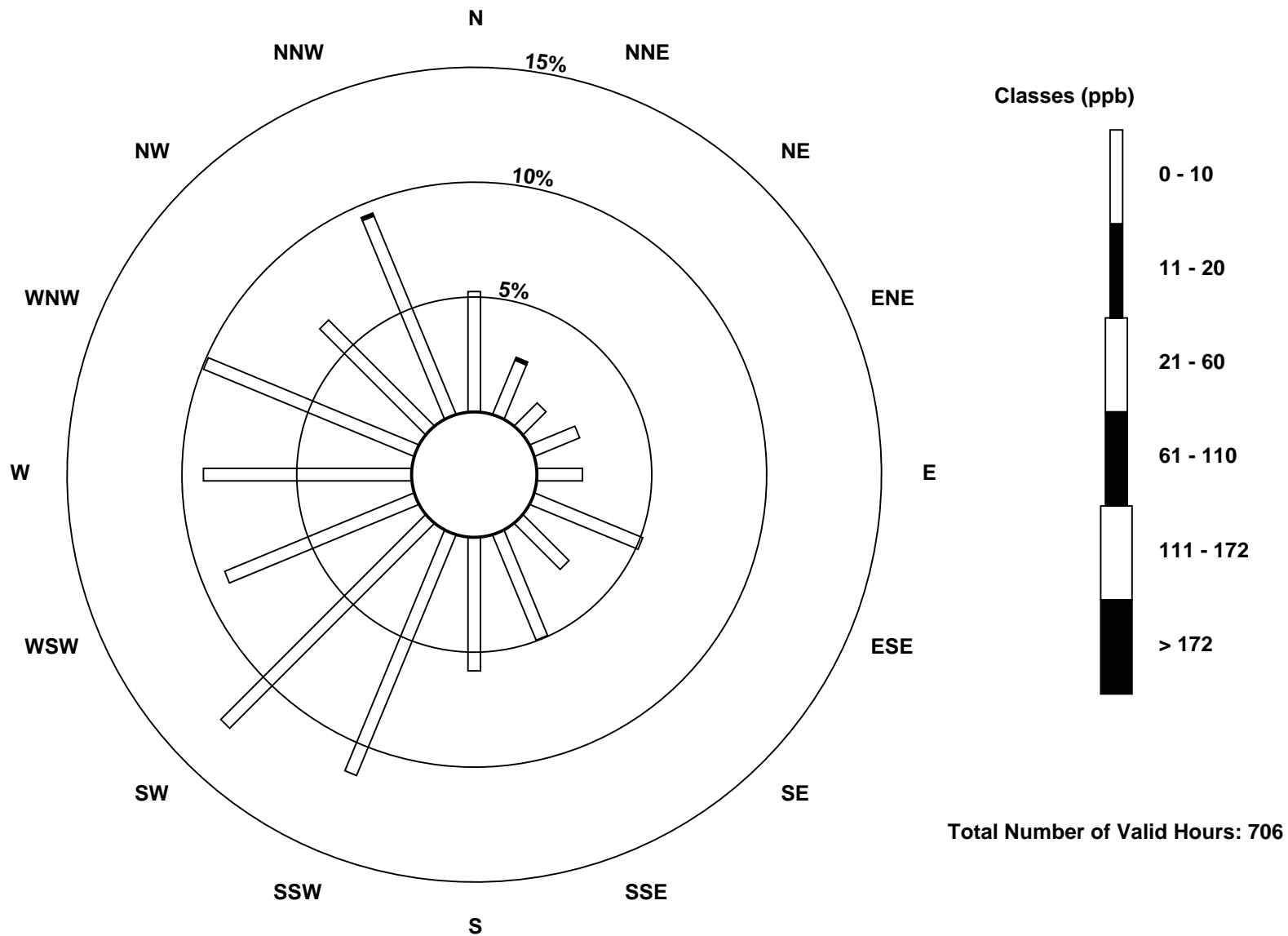
**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Patricia McInnes - July 2015**

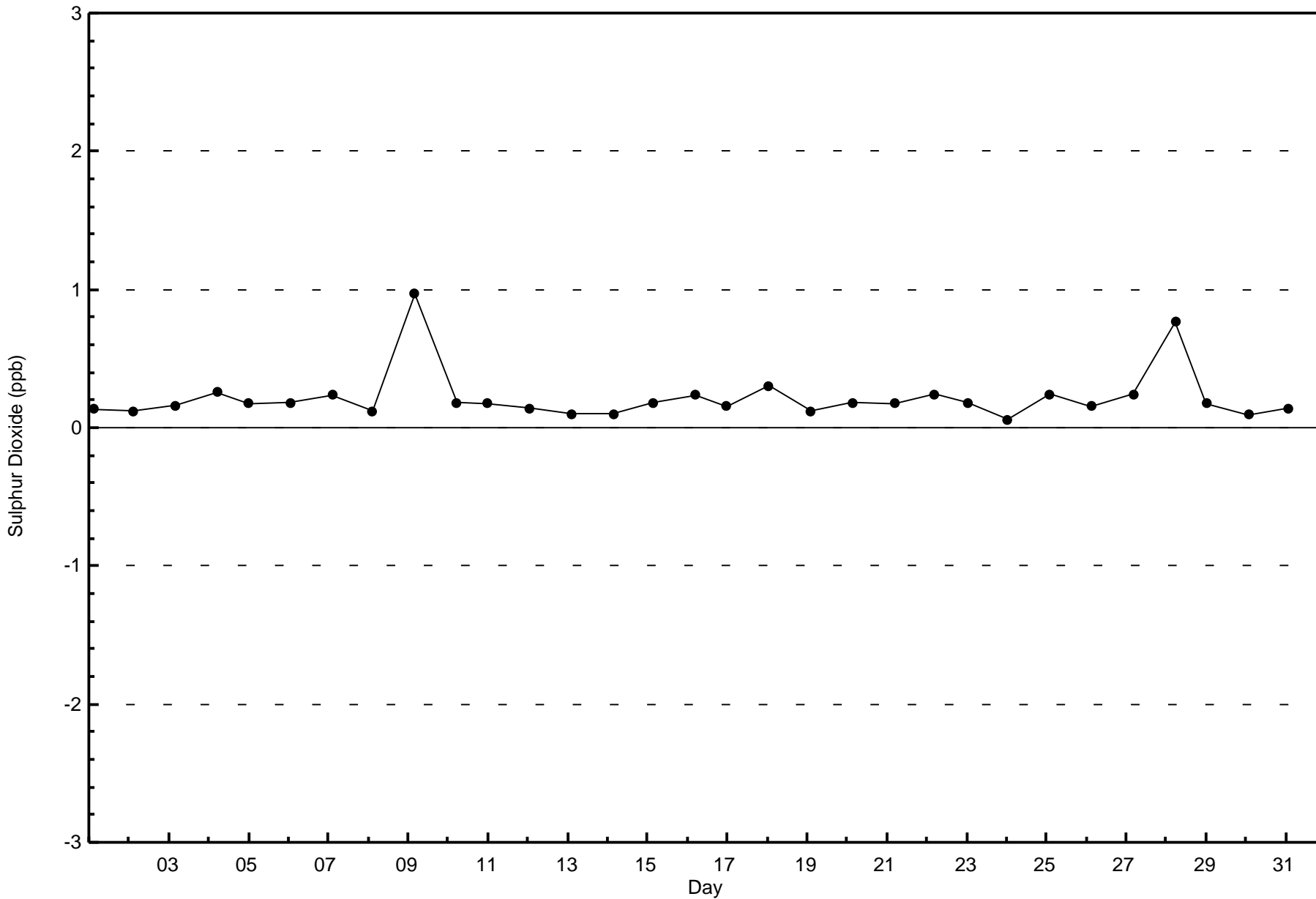
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	37	18	10	15	14	36	20	35	41	80	89	63	64	70	46	66	704
11 - 20	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	37	19	10	15	14	36	20	35	41	80	89	63	64	70	46	67	706

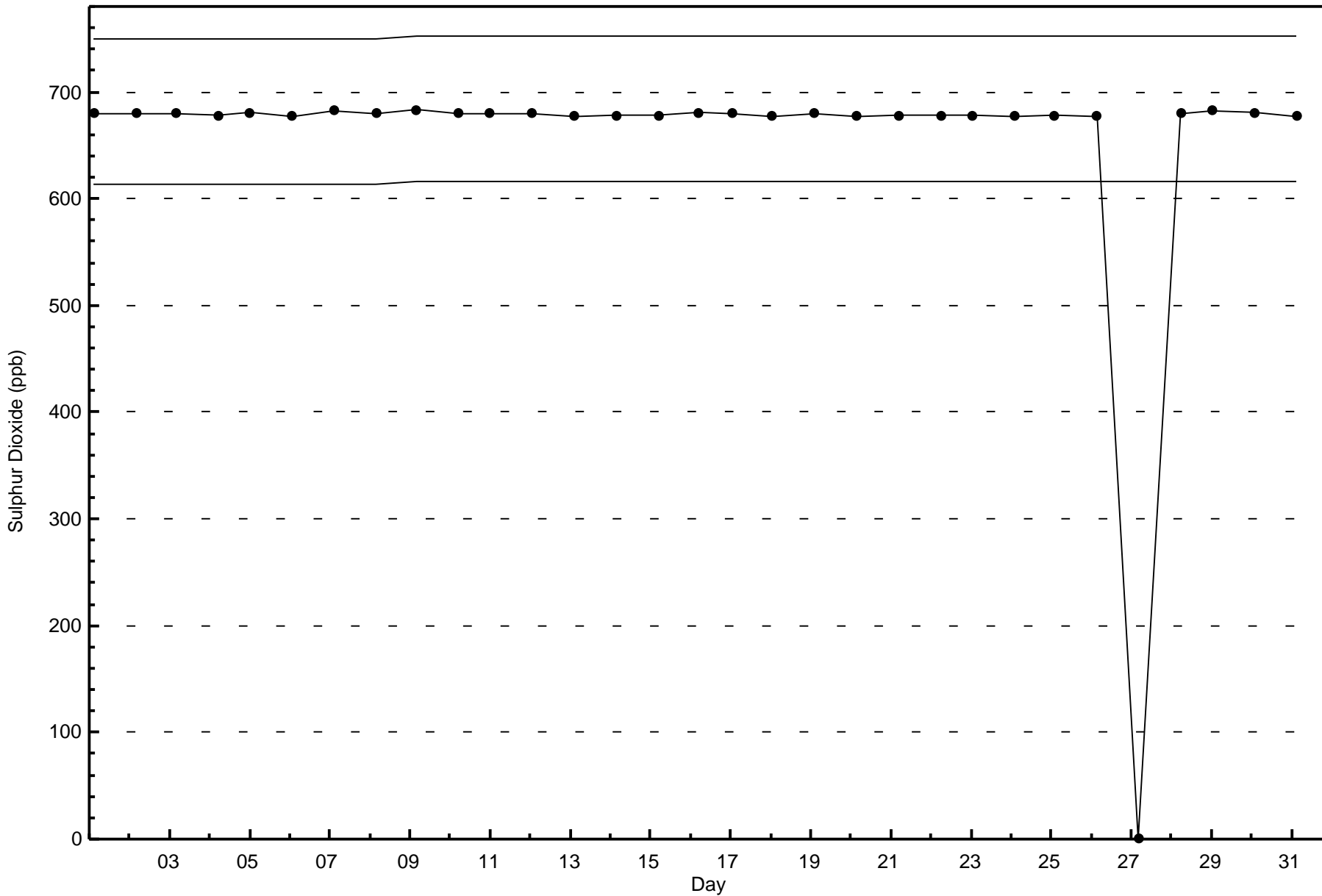
Total Number of Valid Hours: 706

Total Number of Hours: 744







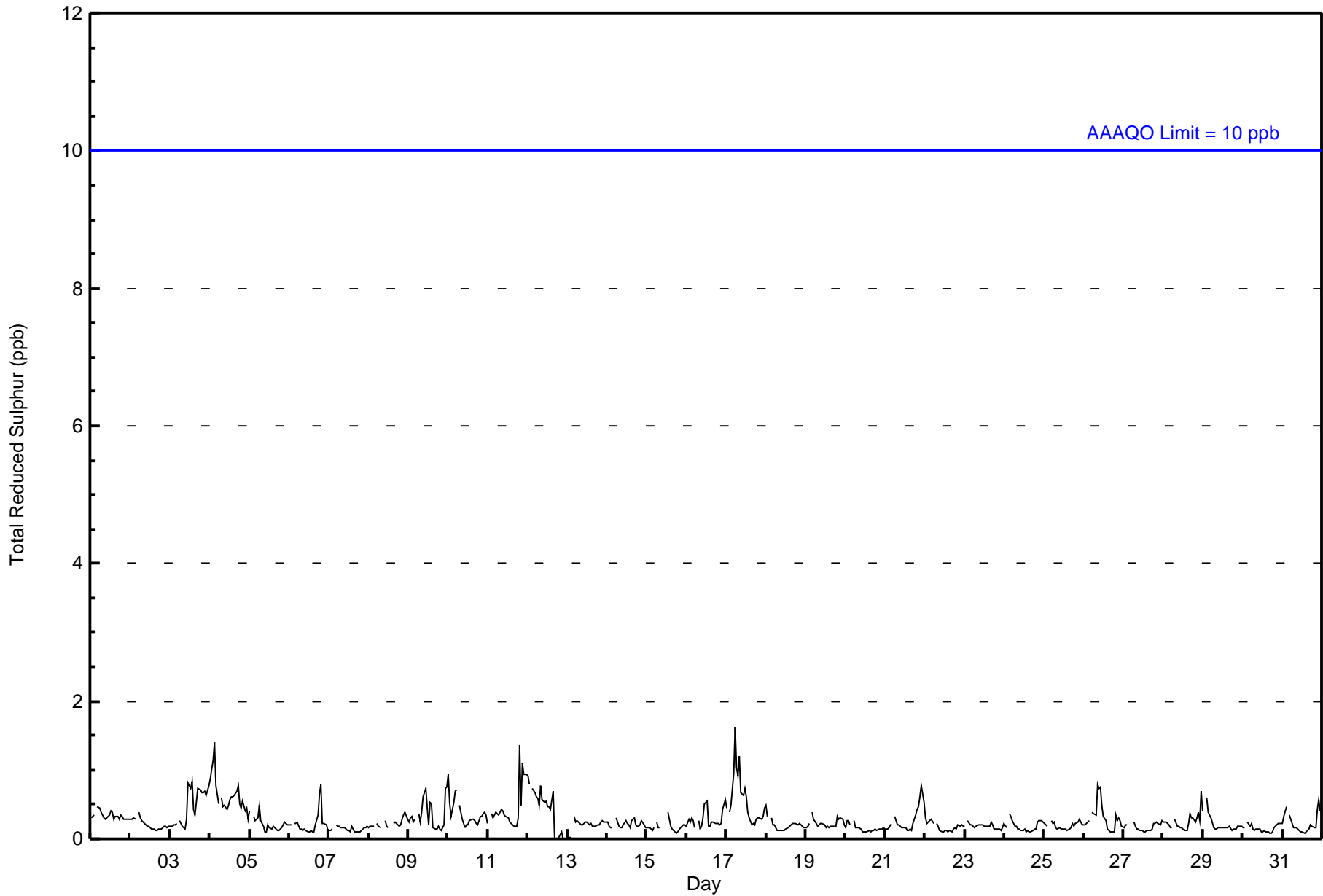




Summary of Hour Averages

Patricia McInnes - July 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 2 ppb on Jul 17 06:00      Maximum Daily Average: 0.6 ppb on Jul 4																	Hours in Service: 744 Hours of Data: 703																																
Minimum Value: 0 ppb on Jul 12 18:00      Minimum Daily Average: 0.1 ppb on Jul 7 Maximum Diurnal Average: 0.4 ppb at hour 6      Minimum Diurnal Average: 0.2 ppb at hour 17 Monthly Average: 0.3 ppb      Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 1 P <sub>99</sub> = 1																	Hours of Missing Data: 41 Hours of Calibration: 35 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-Jul	0	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-Jul	0	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-Jul	0	0	0	0	0	Z	0	0	0	0	1	1	1	0	0	1	1	1	1	1	1	1	1	1	0.5	1																							
4-Jul	1	1	1	1	1	1	Z	1	0	0	0	0	1	1	1	1	1	1	1	0	1	0	0	0	0.6	1																							
5-Jul	0	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-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0.2	1																							
7-Jul	0	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-Jul	0	0	0	0	Z	0	0	0	M	M	0	0	0	M	M	0	0	0	0	0	0	0	0	0	0.2	0																							
9-Jul	0	0	0	0	0	Z	0	0	0	1	1	0	0	1	1	0	0	0	0	0	0	0	0	1	1	0.3	1																						
10-Jul	1	1	0	1	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1																							
11-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	0.4	1																						
12-Jul	1	1	Z	1	1	1	1	0	1	1	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0.4	1																							
13-Jul	0	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-Jul	0	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-Jul	0	0	0	0	0	Z	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.2	0																							
16-Jul	0	0	0	0	0	0	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0.3	1																							
17-Jul	0	Z	0	0	1	2	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.6	2																							
18-Jul	0	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-Jul	0	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-Jul	0	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-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.3	1																						
22-Jul	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-Jul	0	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-Jul	0	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-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0																							
26-Jul	0	0	0	0	Z	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																							
27-Jul	0	0	0	PF	PF	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0																							
28-Jul	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.3	1																							
29-Jul	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																							
30-Jul	0	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																							
31-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.2	1																							
																								0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	Diurnal Average
																								1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	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**  
**Patricia McInnes - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	703	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 703

Total Number of Hours: 744



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

**Total Reduced Sulphur (TRS) - ppb**  
**Patricia McInnes - July 2015**

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 2	37	19	10	15	14	34	21	33	40	79	93	60	64	72	48	64	703
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>37</b>	<b>19</b>	<b>10</b>	<b>15</b>	<b>14</b>	<b>34</b>	<b>21</b>	<b>33</b>	<b>40</b>	<b>79</b>	<b>93</b>	<b>60</b>	<b>64</b>	<b>72</b>	<b>48</b>	<b>64</b>	<b>703</b>

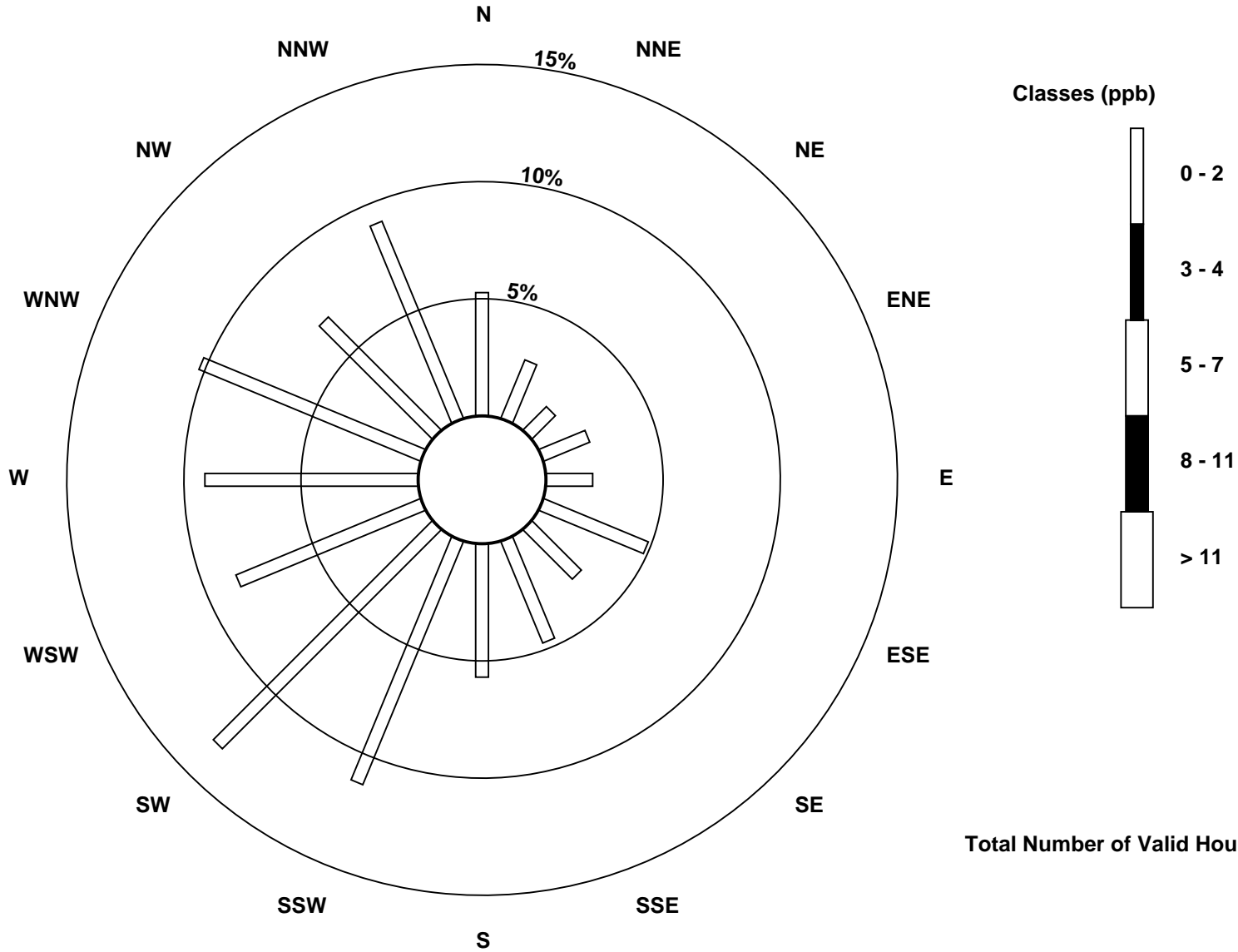
Total Number of Valid Hours: 703

Total Number of Hours: 744

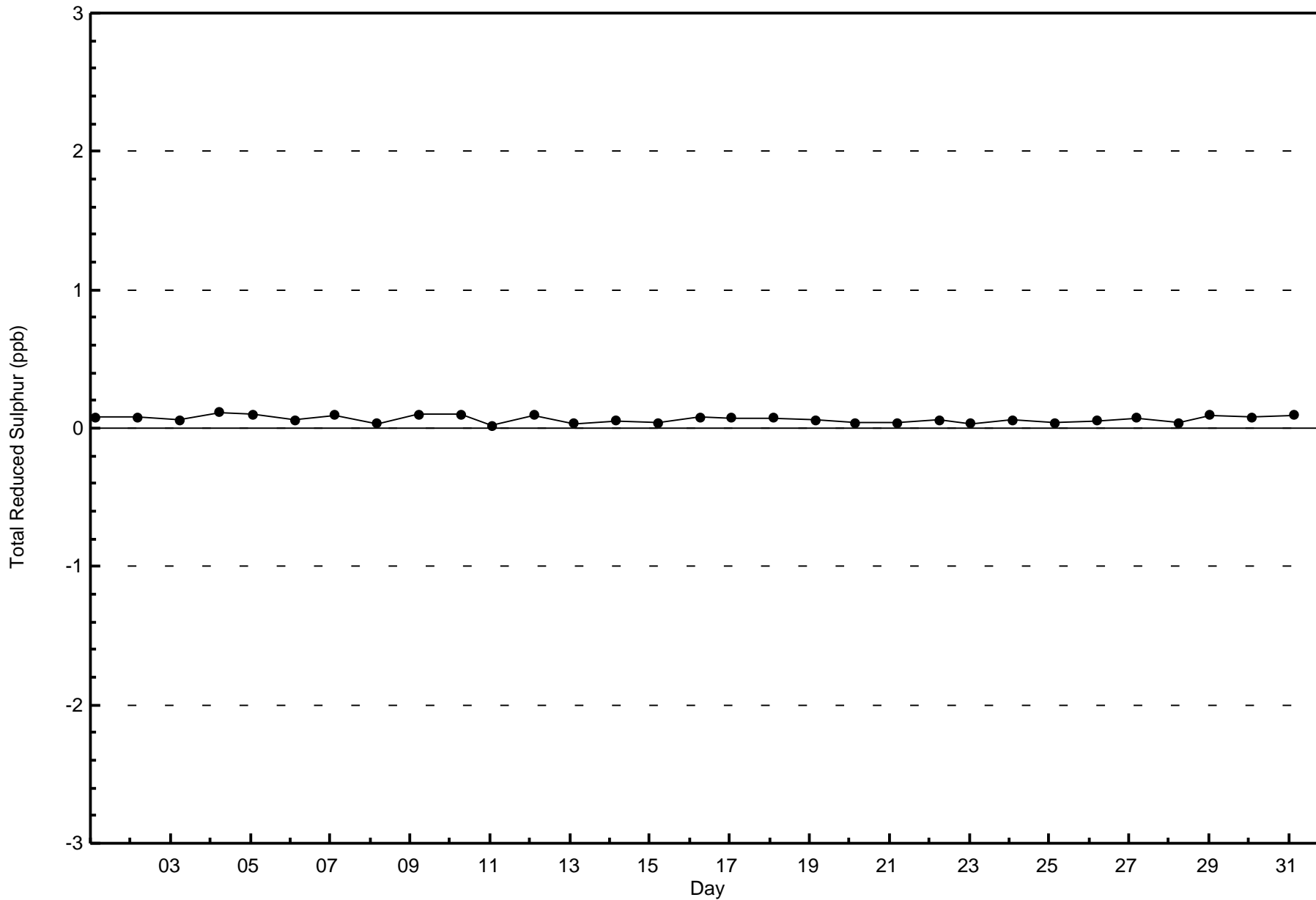


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

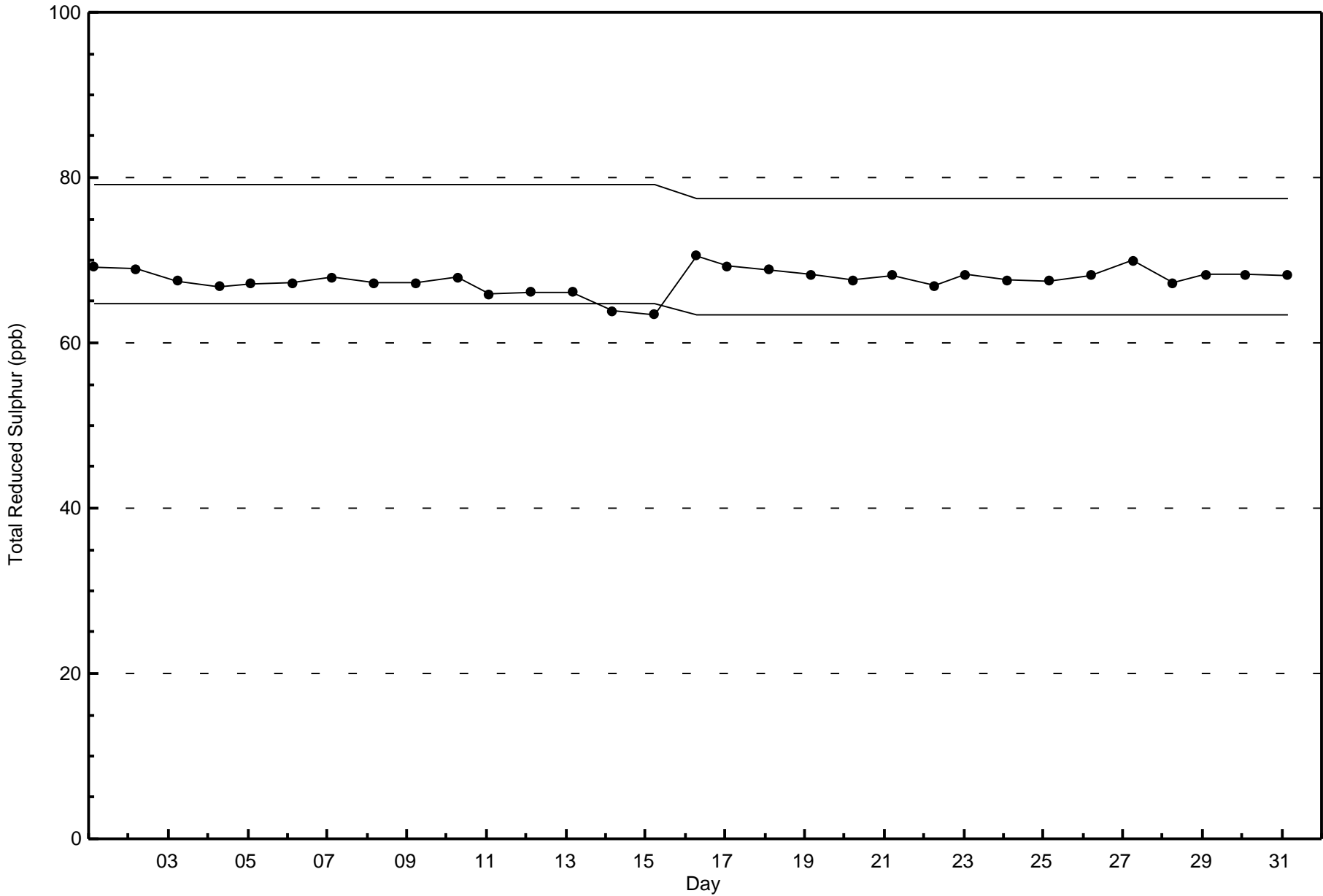
Total Reduced Sulphur (TRS) - ppb  
Patricia McInnes (AMS 6)



Total Number of Valid Hours: 703









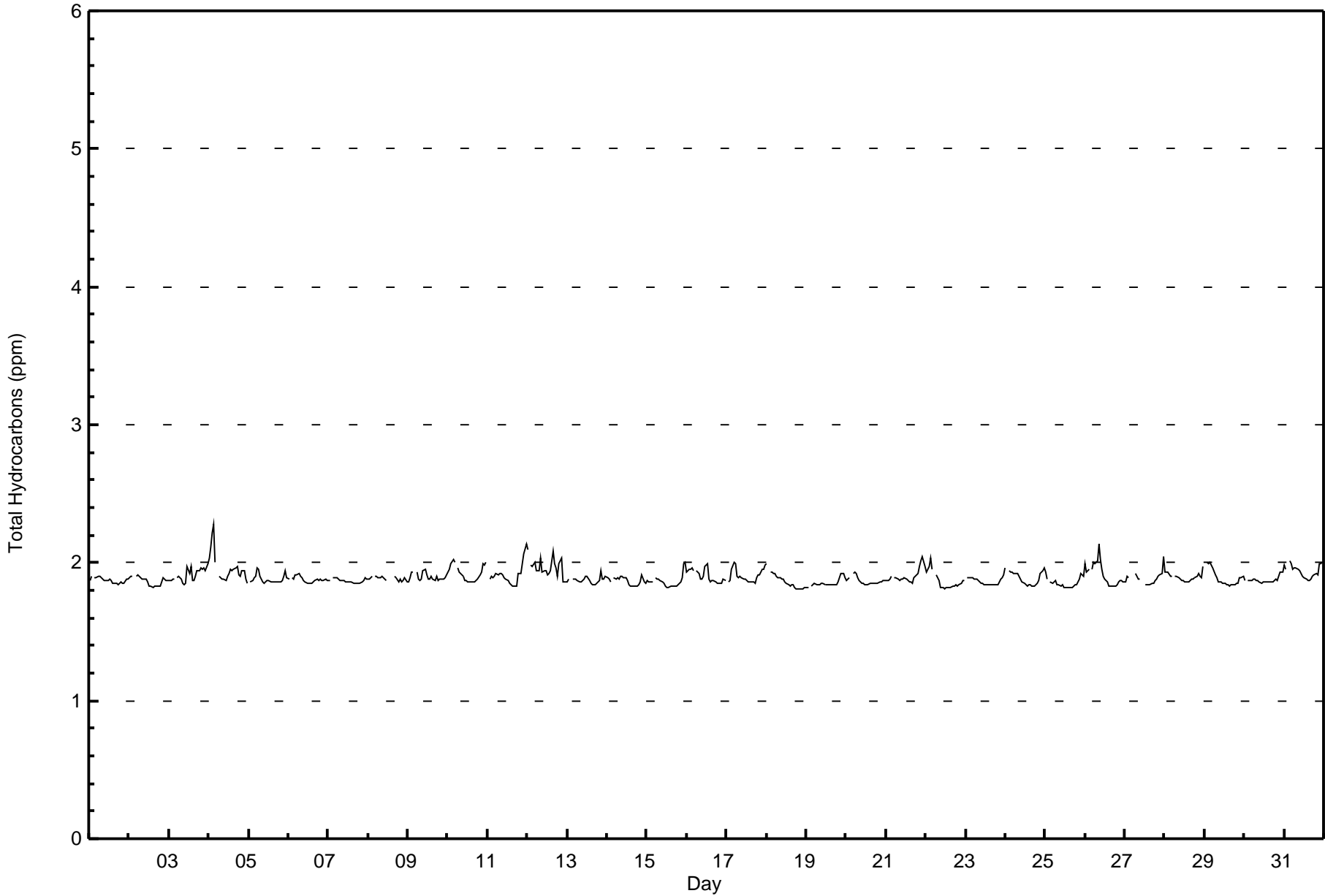
Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Patricia McInnes - July 2015

Maximum Value: 2.3 ppm on Jul 4 04:00													Maximum Daily Average: 2.0 ppm on Jul 4													Hours in Service: 744		
Minimum Value: 1.8 ppm on Jul 18 21:00													Minimum Daily Average: 1.9 ppm on Jul 19													Hours of Data: 705		
Maximum Diurnal Average: 1.9 ppm at hour 4													Minimum Diurnal Average: 1.9 ppm at hour 15													Hours of Missing Data: 39		
Monthly Average: 1.89 ppm													Percentiles: P <sub>1</sub> = 1.8 P <sub>10</sub> = 1.8 Q <sub>1</sub> = 1.9 Median = 1.9 Q <sub>3</sub> = 1.9 P <sub>90</sub> = 2.0 P <sub>99</sub> = 2.1													Hours of Calibration: 34		
																										Percent Operational Time: 99.3		
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
1-Jul	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.9	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9			
2-Jul	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9			
3-Jul	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.8	1.8	1.8	2.0	1.9	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.9	2.0	1.9			
4-Jul	2.0	2.1	2.2	2.3	2.0	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.3			
5-Jul	Z	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9			
6-Jul	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9			
7-Jul	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9			
8-Jul	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	C	C	C	C	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9			
9-Jul	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0			
10-Jul	1.9	2.0	2.0	2.0	2.0	Z	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.9			
11-Jul	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	2.0	2.1	2.1	1.9	2.1		
12-Jul	2.1	Z	2.0	2.0	2.0	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	2.1	2.0	2.0	1.9	2.0	2.0	1.9	1.9	1.9	2.0	2.1		
13-Jul	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9		
14-Jul	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9		
15-Jul	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	2.0	2.0	1.9	2.0		
16-Jul	1.9	2.0	2.0	2.0	1.9	Z	1.9	1.9	1.9	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.9	1.9	1.9	1.9	2.0		
17-Jul	Z	1.9	1.9	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.0		
18-Jul	2.0	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.0	
19-Jul	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	1.9	1.9	1.9	1.9	1.9	1.9	1.9	
20-Jul	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	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	
21-Jul	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	1.9	2.0		
22-Jul	1.9	2.0	2.0	2.0	1.9	Z	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	2.0	
23-Jul	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	
24-Jul	2.0	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	1.9	1.9	1.9	2.0	1.9	2.0		
25-Jul	1.9	1.9	Z	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	1.9	1.9	1.9	
26-Jul	2.0	1.9	2.0	Z	1.9	2.0	2.0	2.0	2.1	2.0	2.0	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	2.1	2.0	
27-Jul	1.9	1.9	1.9	PF	PF	PF	1.9	1.9	1.9	1.9	M	M	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.0		
28-Jul	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.0		
29-Jul	Z	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	2.0	1.9	2.0
30-Jul	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
31-Jul	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.9	2.0	1.9	
																										Diurnal Average		
																										Diurnal Maximum		
Z - zerospan			C - Calibration				M - Maintenance				PF - Power Failure																	





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

**Total Hydrocarbons (THC) - ppm**  
**Patricia McInnes - July 2015**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	697	98.87	98.87
2.1 - 3.0	8	1.13	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 705

Total Number of Hours: 744



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

**Total Hydrocarbons (THC) - ppm**  
**Patricia McInnes - July 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	36	19	10	12	14	36	20	35	41	79	89	63	63	68	46	66	697
2.1 - 3.0	1	0	0	3	0	0	0	0	0	0	0	0	1	2	0	1	8
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	37	19	10	15	14	36	20	35	41	79	89	63	64	70	46	67	705

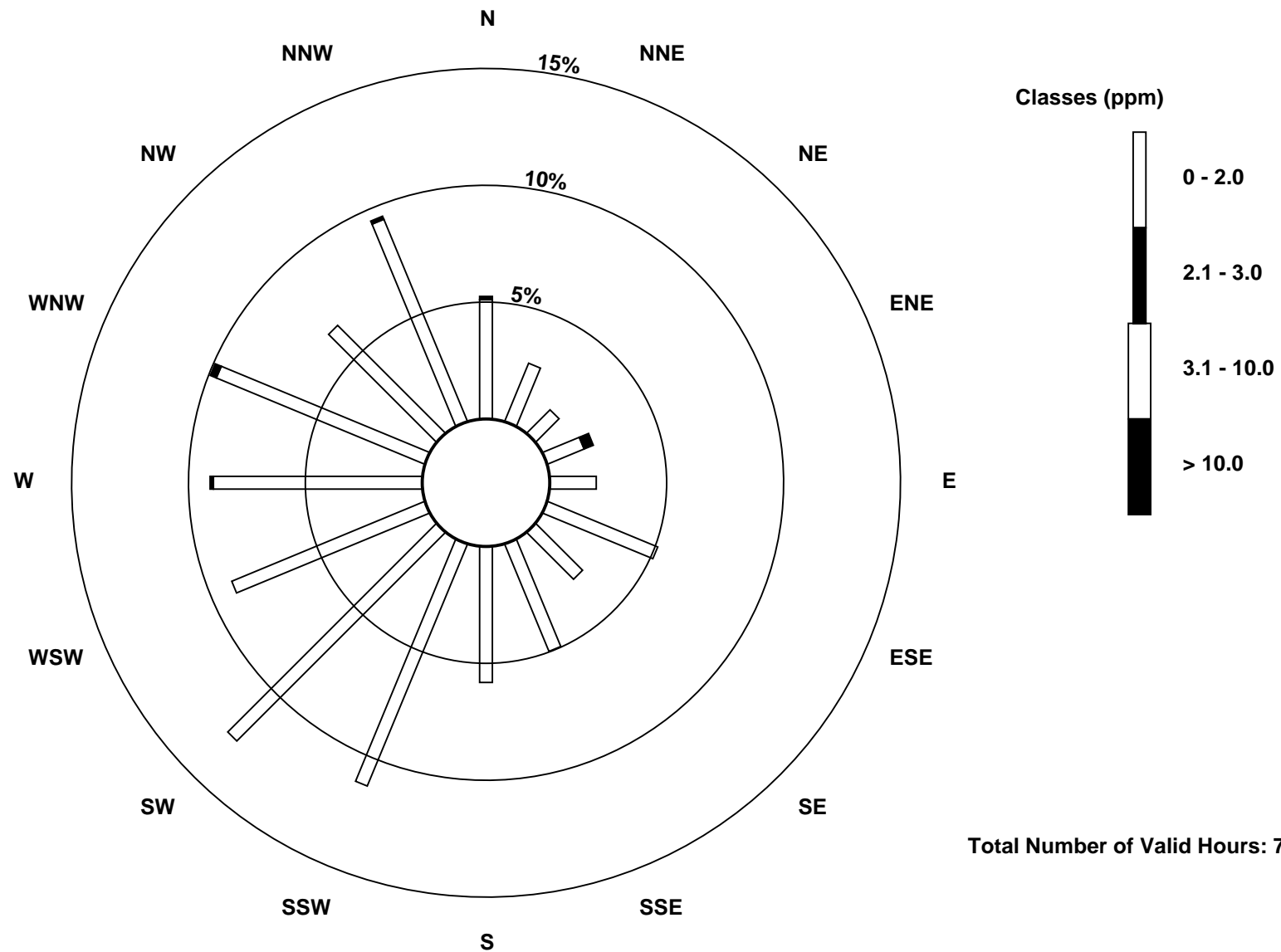
Total Number of Valid Hours: 705

Total Number of Hours: 744



Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Total Hydrocarbons (THC) - ppm  
Patricia McInnes (AMS 6)



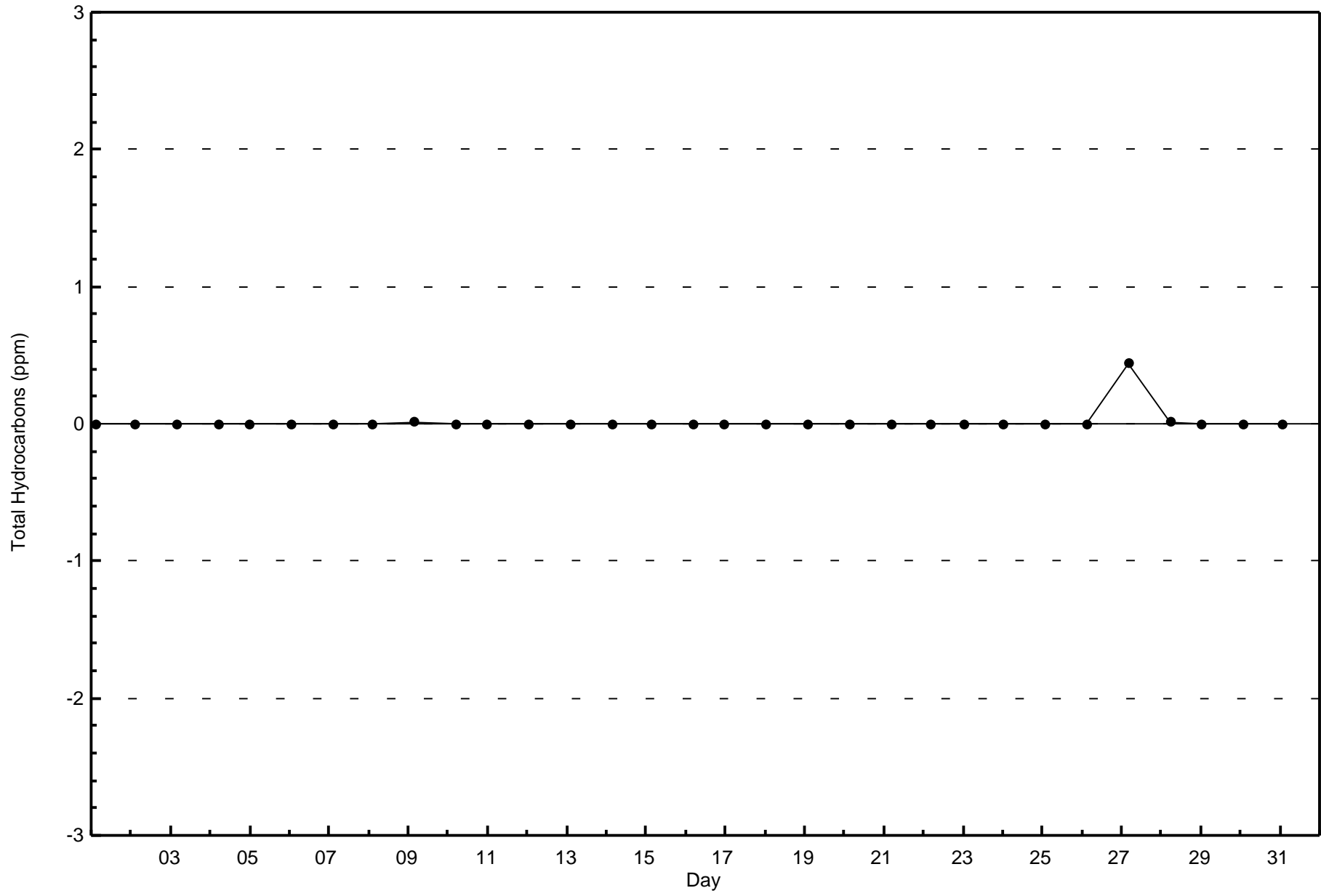


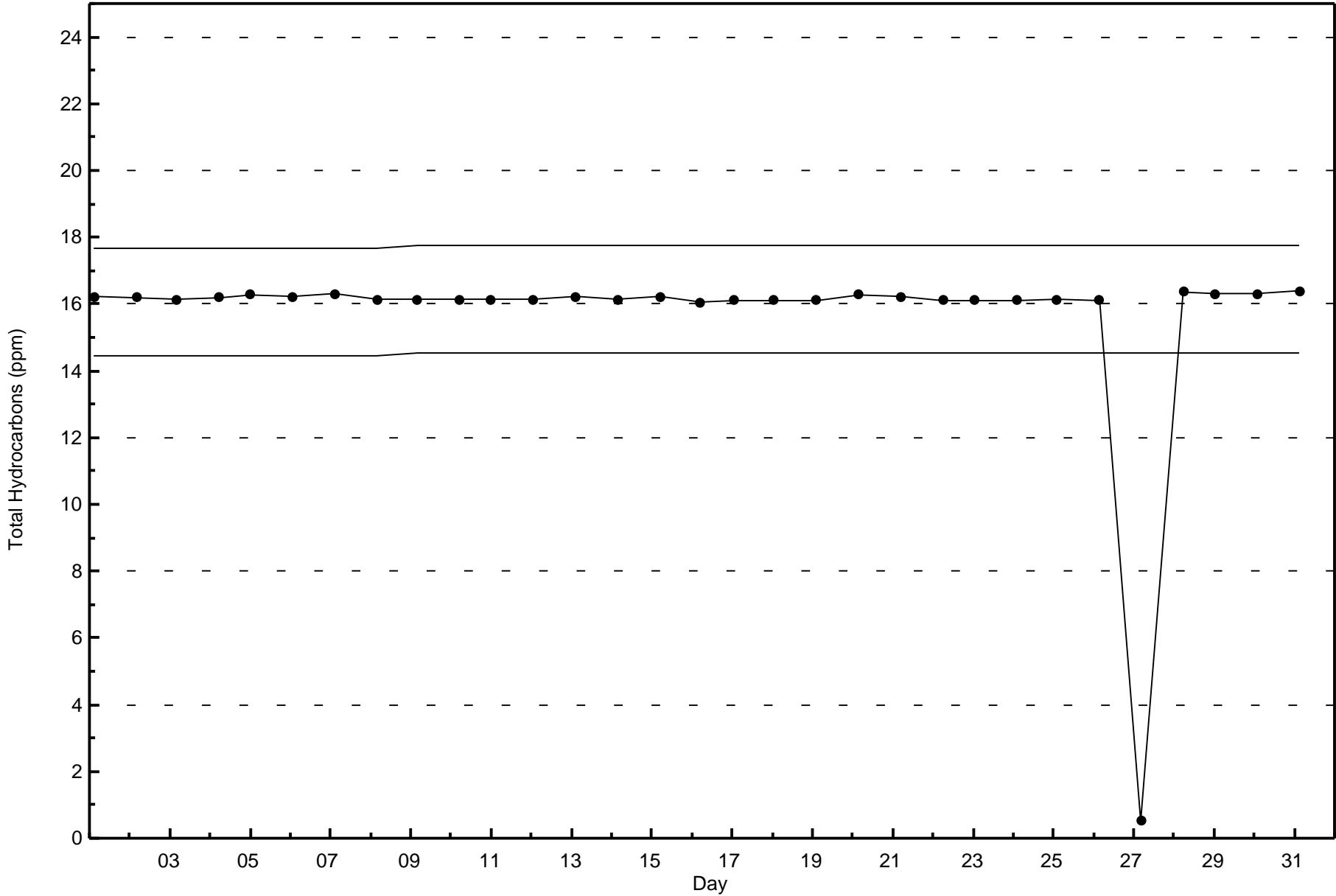
Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Patricia McInnes - July 2015





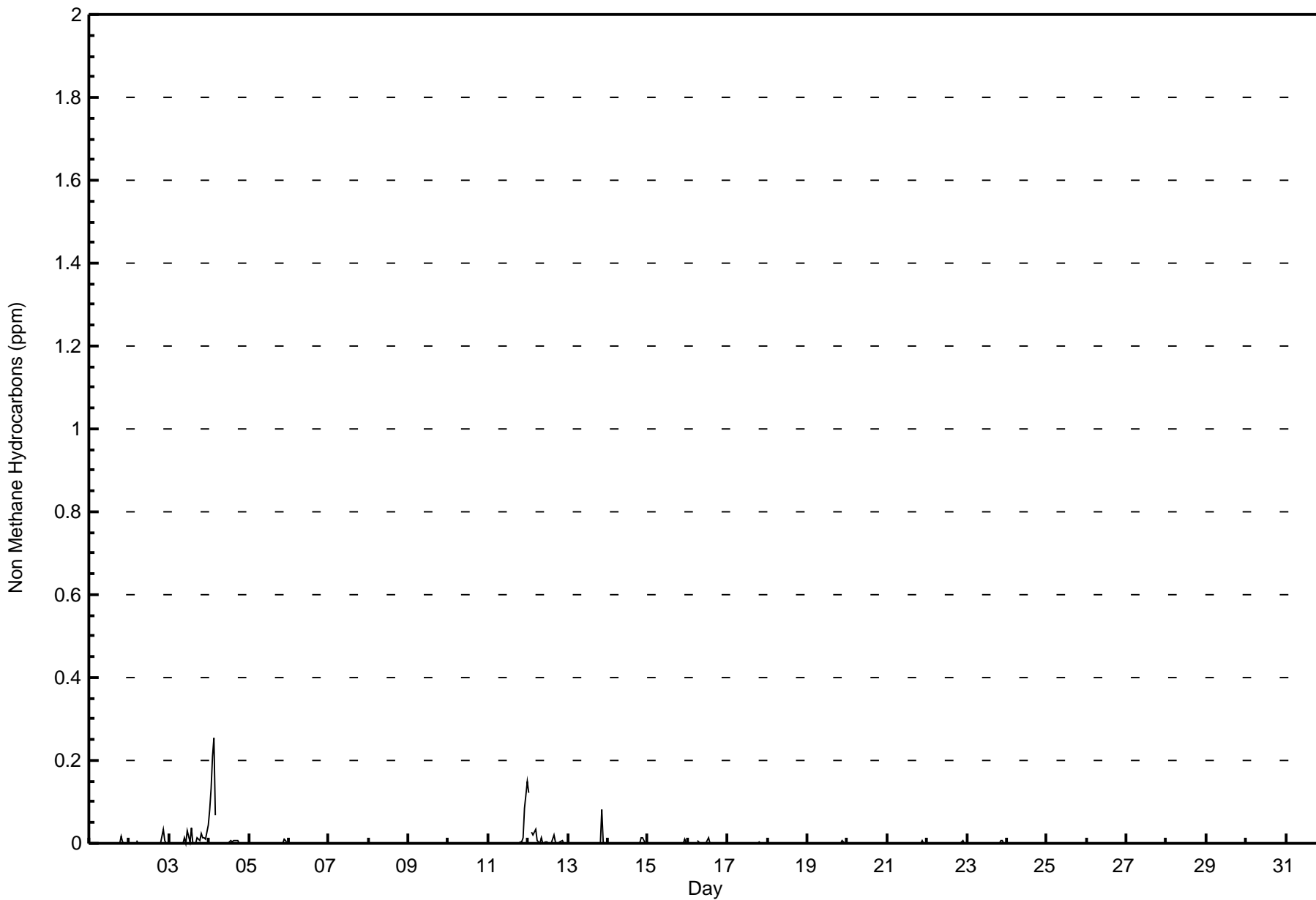




Summary of Hour Averages

Patricia McInnes - July 2015

Maximum Value: 0.254 ppm on Jul 4 04:00																				Maximum Daily Average: 0.034 ppm on Jul 4					Hours in Service: 744	
Minimum Value: 0.000 ppm on Jul 1 01:00																				Minimum Daily Average: 0.000 ppm on Jul 6					Hours of Data: 705	
Maximum Diurnal Average: 0.011 ppm at hour 4																				Minimum Diurnal Average: 0.000 ppm at hour 8					Hours of Missing Data: 39	
Monthly Average: 0.003 ppm																				Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 0.0 P <sub>90</sub> = 0.0 P <sub>99</sub> = 0.1					Hours of Calibration: 34	
																									Percent Operational Time: 99.3	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.018	0.004	0.000	0.000	0.000	0.001	0.018
2-Jul	0.000	0.000	0.000	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	0.000	0.000	0.033	0.006	0.000	0.000	0.002	0.033
3-Jul	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.014	0.000	0.030	0.002	0.039	0.000	0.000	0.000	0.013	0.008	0.024	0.015	0.013	0.010	0.044	0.009	0.044
4-Jul	0.081	0.133	0.212	0.254	0.069	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.006	0.004	0.008	0.005	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.034	0.254
5-Jul	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.007	0.001	0.010	
6-Jul	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7-Jul	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Jul	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	C	C	C	C	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9-Jul	0.000	0.000	0.000	0.001	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.001
10-Jul	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
11-Jul	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.002	0.015	0.085	0.149	0.011	0.149
12-Jul	0.123	Z	0.029	0.019	0.033	0.008	0.004	0.000	0.014	0.000	0.002	0.002	0.000	0.000	0.000	0.022	0.002	0.000	0.000	0.002	0.005	0.000	0.000	0.000	0.011	0.123
13-Jul	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.082	0.002	0.000	0.000	0.004	0.082
14-Jul	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	0.015	0.014	0.000	0.000	0.001	0.015
15-Jul	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.011	0.000	0.001	0.011
16-Jul	0.000	0.000	0.000	0.000	0.000	Z	0.008	0.000	0.000	0.000	0.000	0.000	0.014	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.014
17-Jul	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.004
18-Jul	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Jul	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.000	0.007
20-Jul	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
21-Jul	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.006	0.000	0.000	0.000	0.006
22-Jul	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	0.006	0.000	0.000	0.000	0.006
23-Jul	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.005	0.000	0.000	0.001	0.007
24-Jul	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Jul	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Jul	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
27-Jul	0.000	0.000	0.000	0.000	PF	PF	PF	0.000	0.000	0.000	0.000	M	M	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
28-Jul	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
29-Jul	Z	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002
30-Jul	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
31-Jul	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
																				0.008 0.005 0.010 0.011 0.004 0.000 0.000 0.000 0.000 0.000 0.000 0.001 0.001 0.001 0.000 0.001 0.000 0.001 0.000 0.002 0.005 0.003 0.004 0.006					Diurnal Average	
																				0.123 0.133 0.212 0.254 0.069 0.008 0.008 0.000 0.014 0.014 0.002 0.030 0.014 0.039 0.004 0.022 0.005 0.013 0.008 0.024 0.082 0.015 0.085 0.149					Diurnal Maximum	
Z - zerospan			C - Calibration			M - Maintenance			PF - Power Failure																	





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

**Non Methane Hydrocarbons (NMHC) - ppm**  
**Patricia McInnes - July 2015**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.005	662	93.90	93.90
0.006 - 0.05	34	4.82	98.72
0.06 - 0.1	7	0.99	99.72
> 0.1	2	0.28	100.00

Total Number of Valid Hours: 705

Total Number of Hours: 744



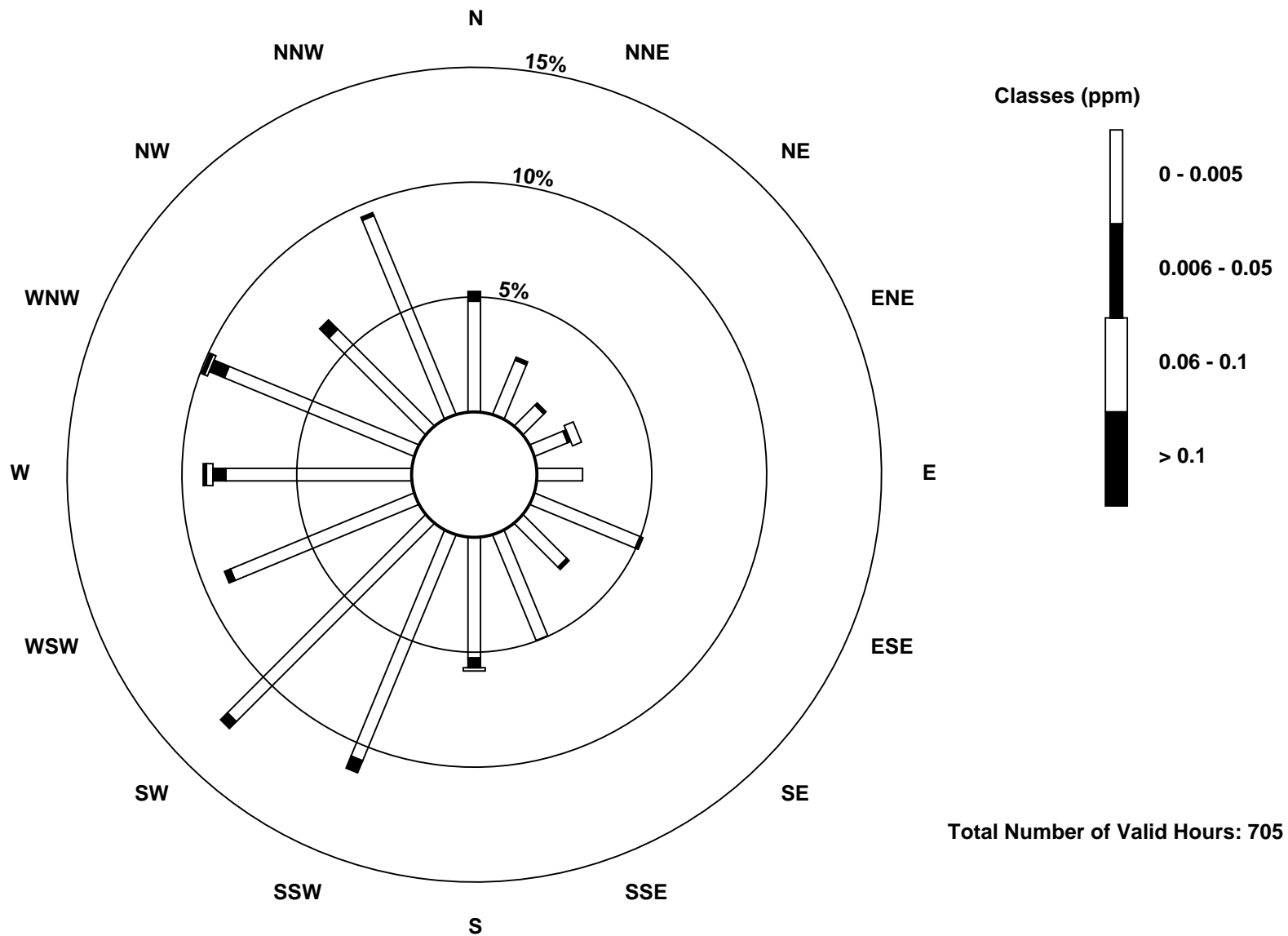
**Wood Buffalo Environmental Association**  
**Frequency Distribution**

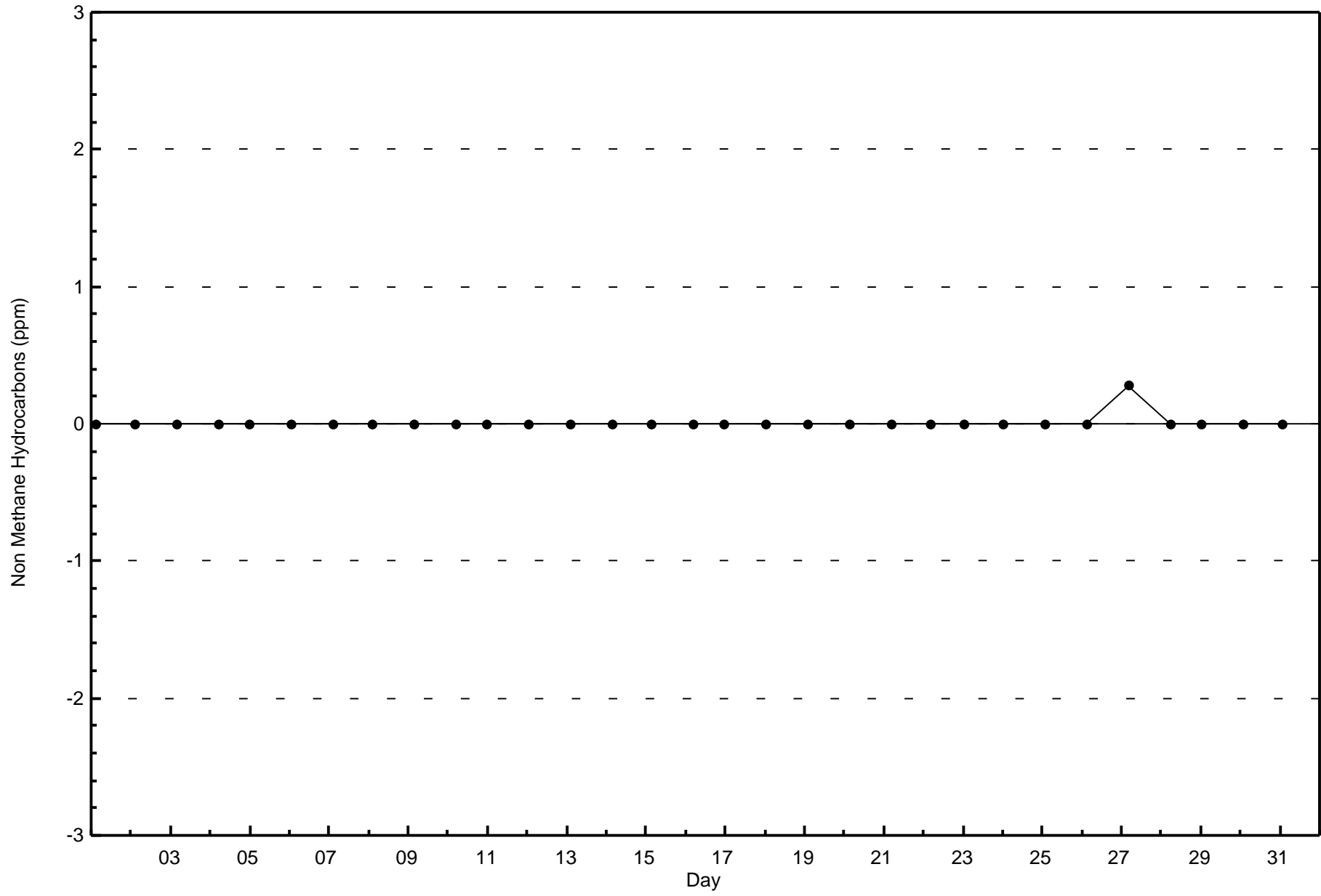
**Non Methane Hydrocarbons (NMHC) - ppm**  
**Patricia McInnes - July 2015**

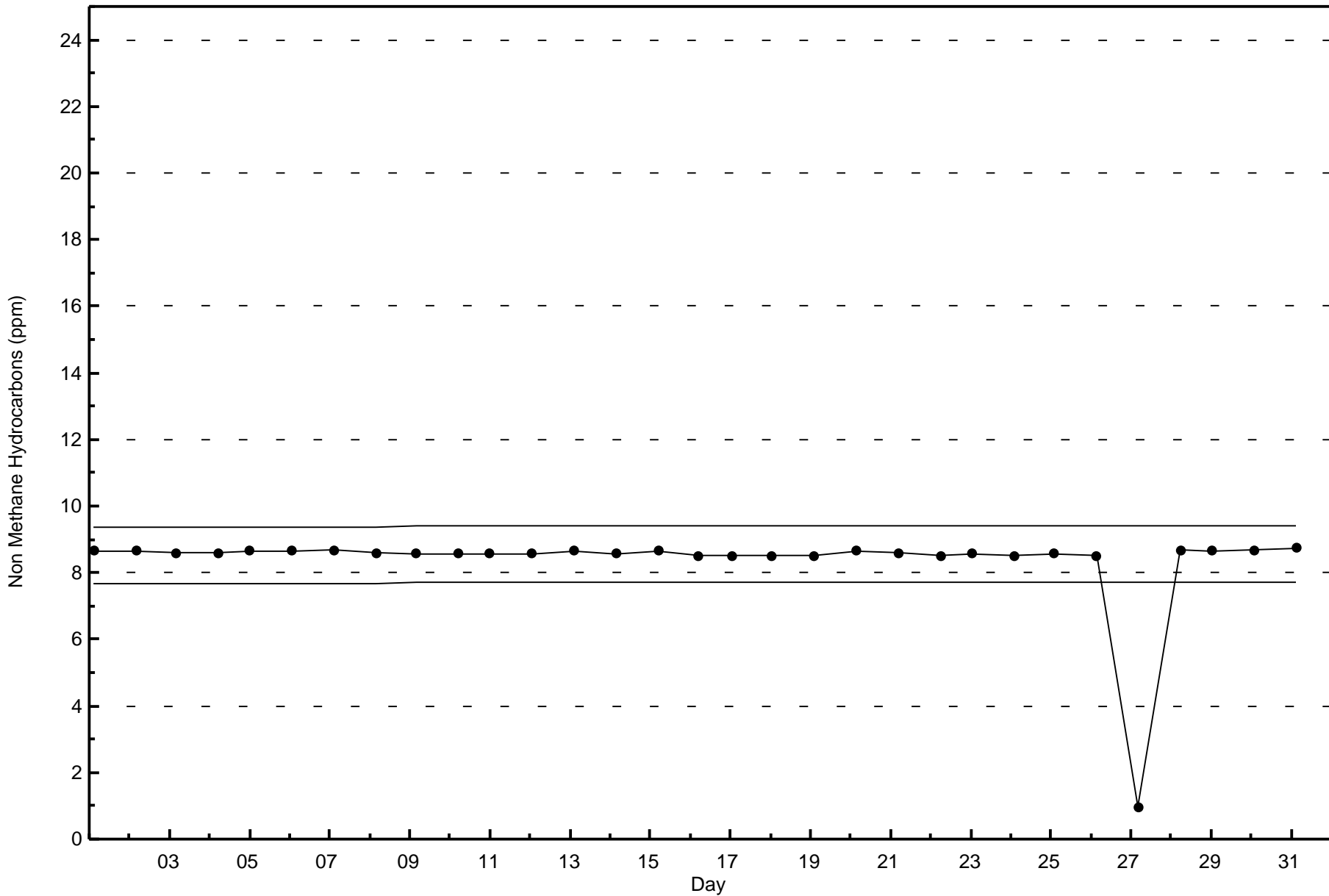
<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 0.005	34	18	9	11	14	35	19	35	37	75	86	61	57	63	42	66	662
0.006 - 0.05	3	1	1	1	0	1	1	0	3	4	3	2	4	5	4	1	34
0.06 - 0.1	0	0	0	3	0	0	0	0	1	0	0	0	2	1	0	0	7
> 0.1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2
<b>Totals</b>	<b>37</b>	<b>19</b>	<b>10</b>	<b>15</b>	<b>14</b>	<b>36</b>	<b>20</b>	<b>35</b>	<b>41</b>	<b>79</b>	<b>89</b>	<b>63</b>	<b>64</b>	<b>70</b>	<b>46</b>	<b>67</b>	<b>705</b>

Total Number of Valid Hours: 705

Total Number of Hours: 744

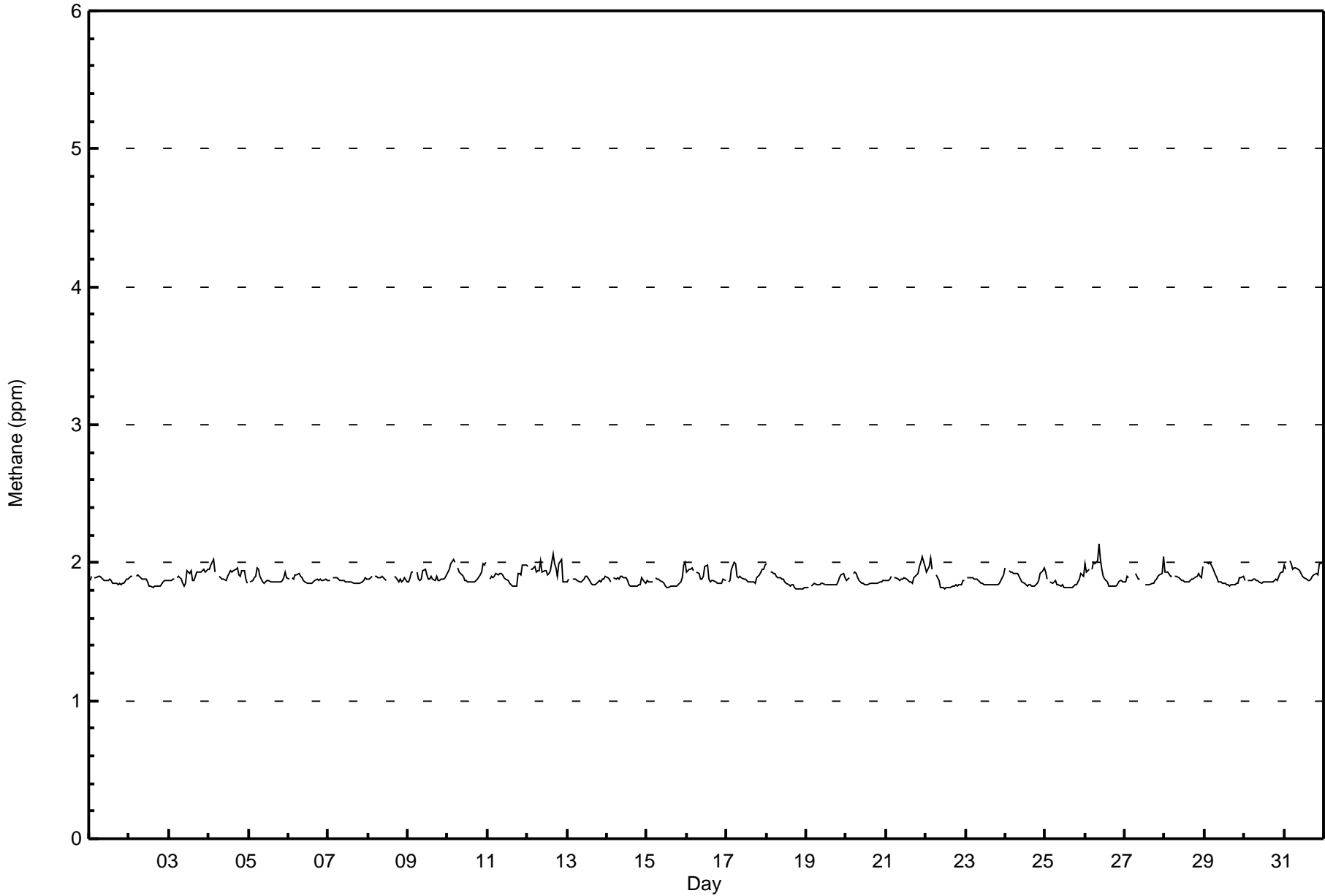














**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Methane (CH<sub>4</sub>) - ppm**  
**Patricia McInnes - July 2015**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	703	99.72	99.72
2.1 - 3.0	2	0.28	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 705

Total Number of Hours: 744



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

**Methane (CH<sub>4</sub>) - ppm**  
**Patricia McInnes - July 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	36	19	10	15	14	36	20	35	41	79	89	63	64	70	46	66	703
2.1 - 3.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	37	19	10	15	14	36	20	35	41	79	89	63	64	70	46	67	705

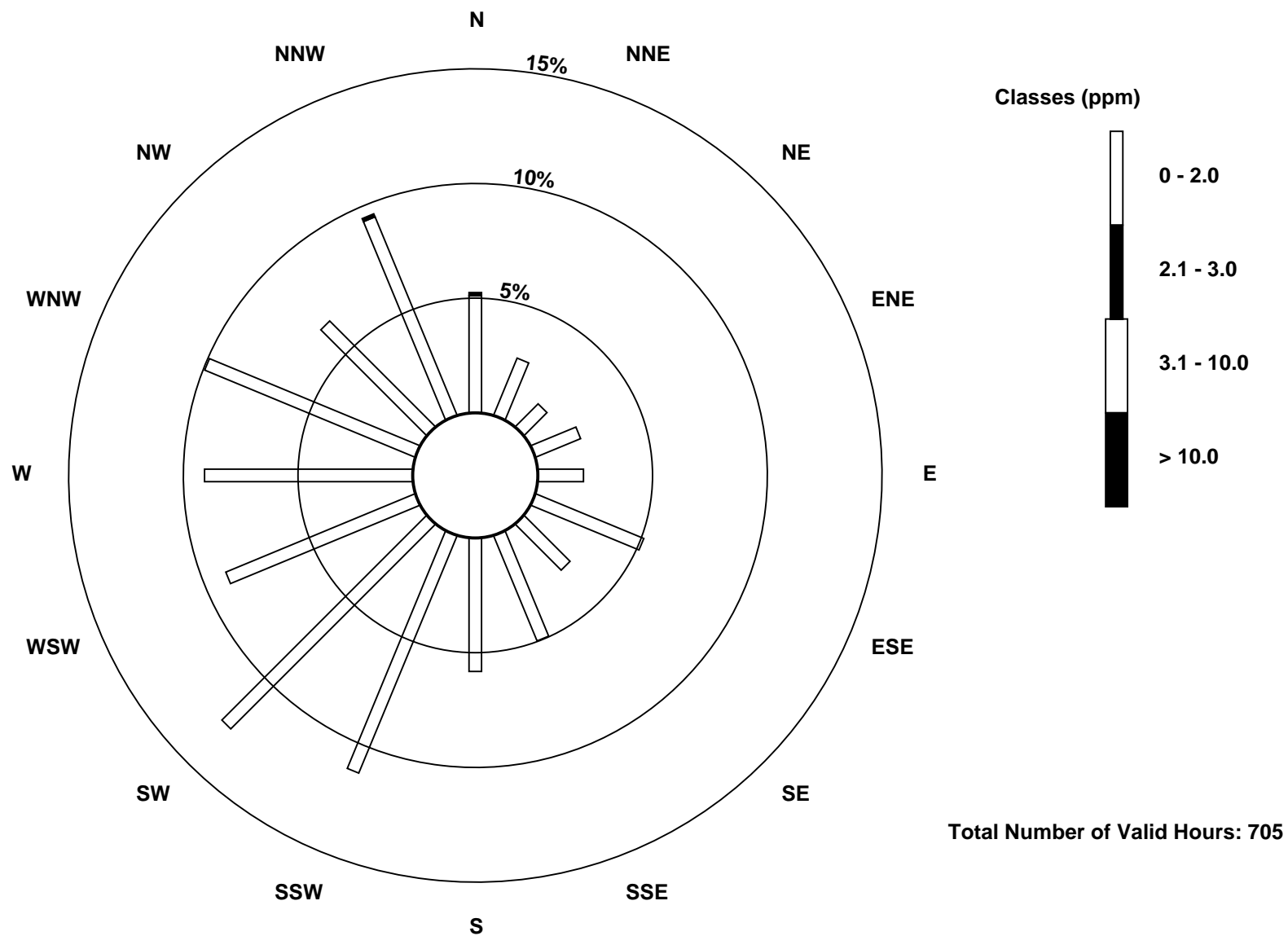
Total Number of Valid Hours: 705

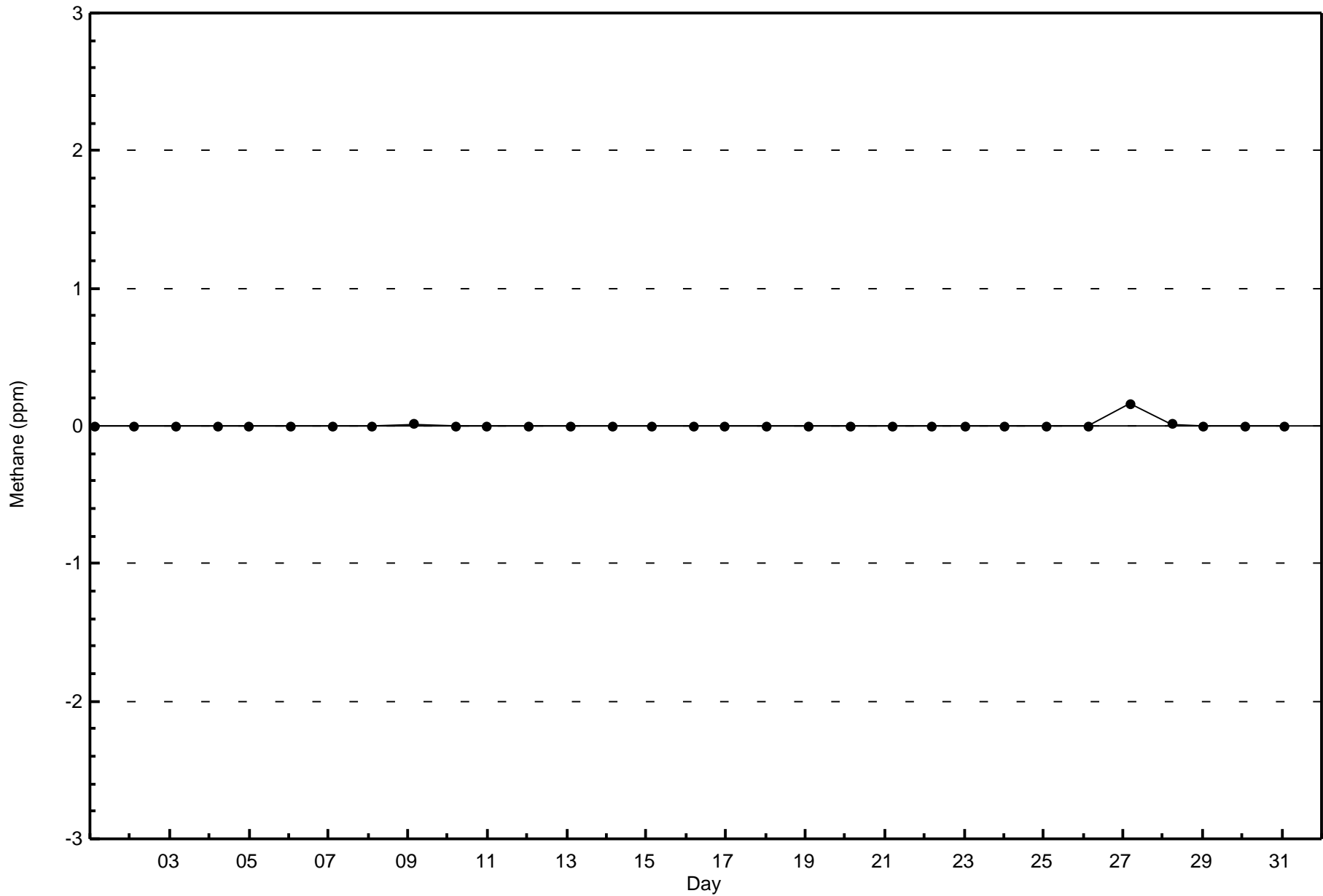
Total Number of Hours: 744

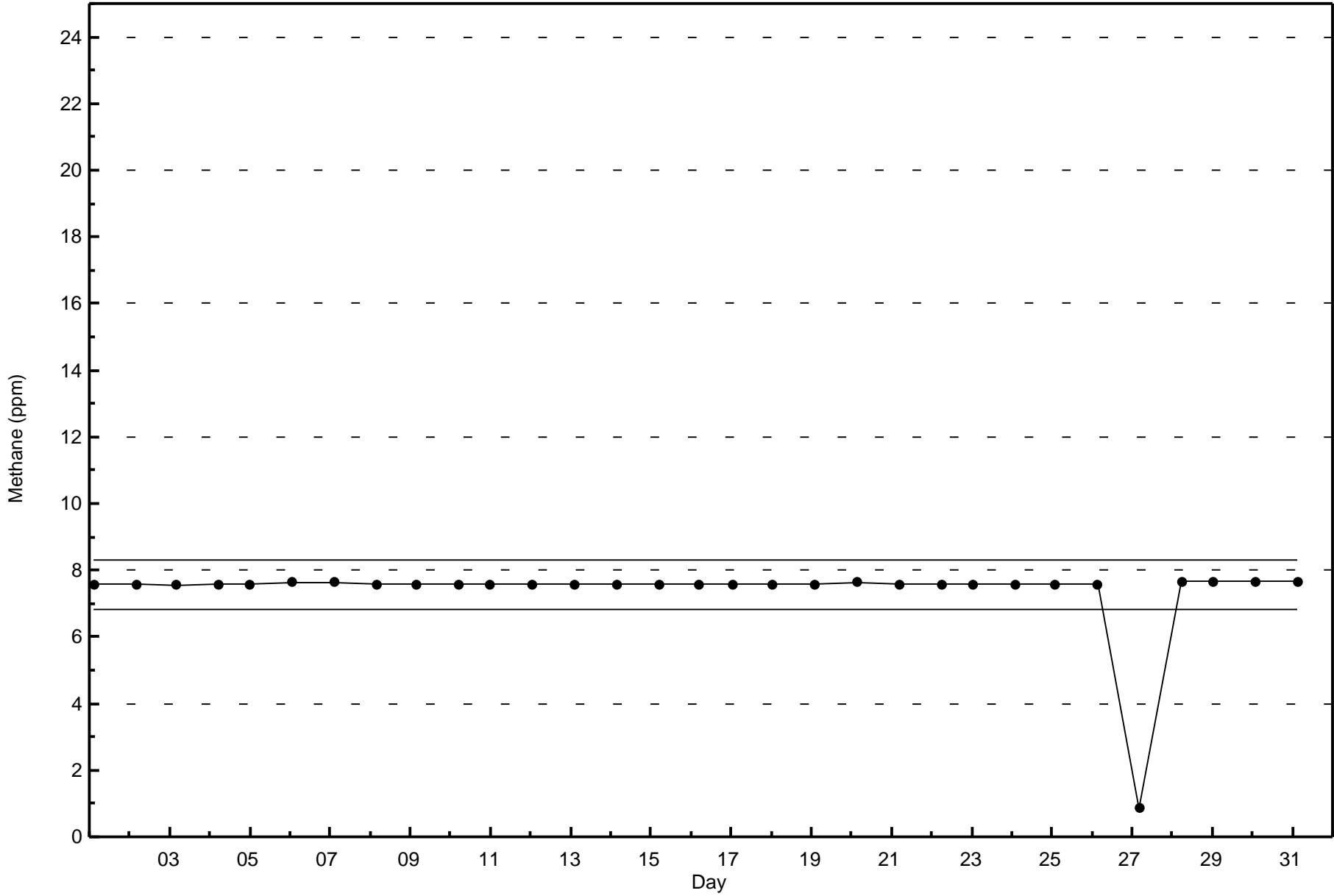


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Methane ( $\text{CH}_4$ ) - ppm  
Patricia McInnes (AMS 6)

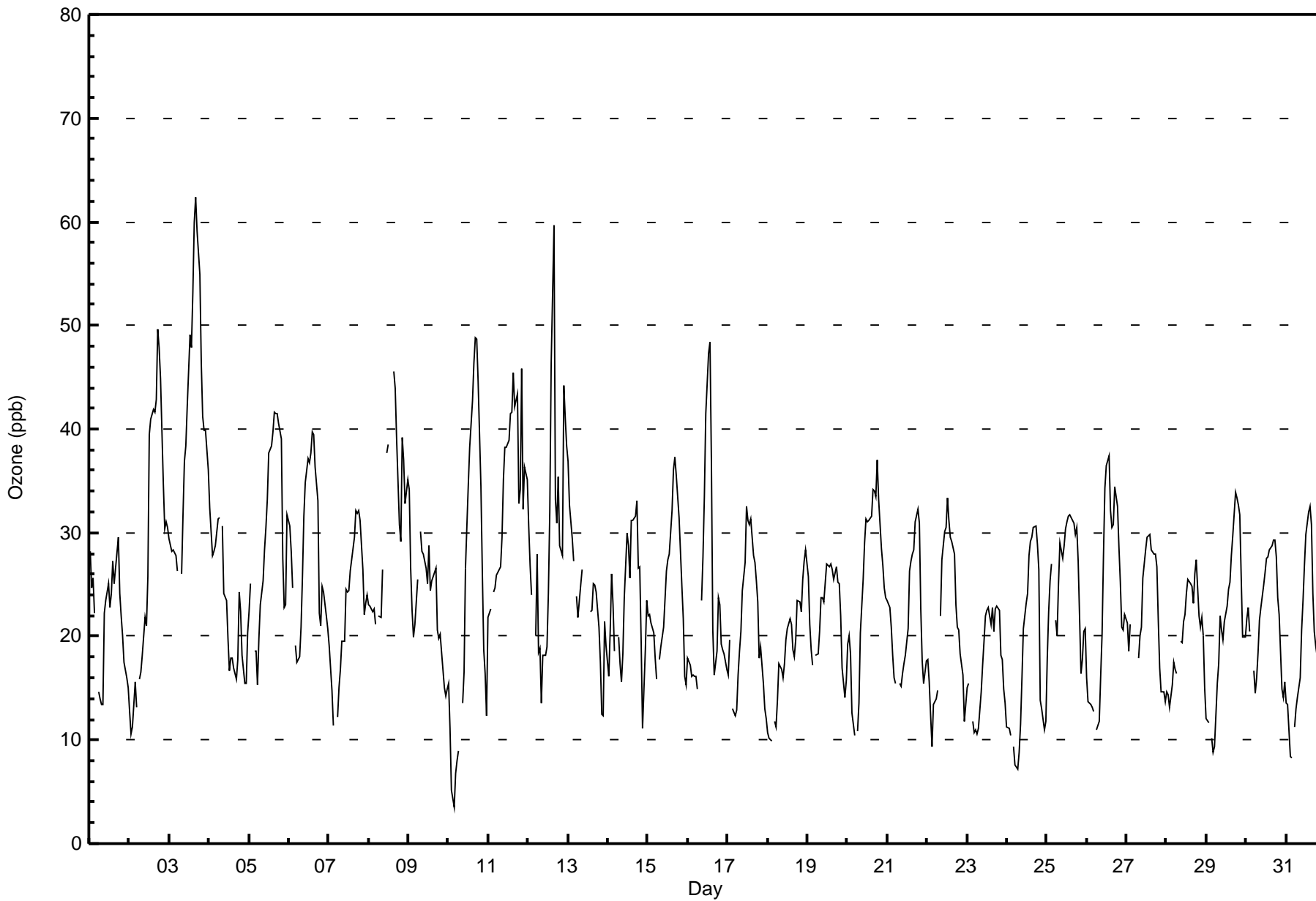








Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 62 ppb on Jul 3 17:00 Maximum Daily Average: 40.6 ppb on Jul 3		Hours in Service: 744 Hours of Data: 703 Hours of Missing Data: 41 Hours of Calibration: 35 Percent Operational Time: 99.2																								
Minimum Value: 3 ppb on Jul 10 04:00 Maximum Diurnal Average: 32.6 ppb at hour 16 Monthly Average: 24.3 ppb		Minimum Daily Average: 17.4 ppb on Jul 23 Minimum Diurnal Average: 16.4 ppb at hour 5 Percentiles: P <sub>1</sub> = 8 P <sub>10</sub> = 14 Q <sub>1</sub> = 18 Median = 23 Q <sub>3</sub> = 30 P <sub>90</sub> = 37 P <sub>99</sub> = 48																								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	28	25	26	22	Z	15	14	13	13	22	23	25	23	24	27	25	28	30	24	22	20	18	16	15	21.7	30
2-Jul	13	11	11	16	13	Z	16	17	18	22	21	26	39	41	42	42	43	50	48	45	35	30	31	30	28.6	50
3-Jul	29	28	28	28	28	26	Z	26	32	37	38	42	49	48	53	60	62	59	55	46	41	40	40	36	40.6	62
4-Jul	32	30	28	28	29	31	31	Z	31	24	23	20	17	18	18	17	16	18	24	22	18	15	15	20	22.9	32
5-Jul	22	25	Z	19	19	15	20	23	25	28	30	33	38	38	40	42	42	42	41	39	28	23	23	32	29.8	42
6-Jul	31	28	25	Z	19	18	18	21	26	32	35	37	37	38	40	39	36	33	22	21	25	24	22	21	28.1	40
7-Jul	19	17	15	11	Z	12	15	17	20	20	25	24	24	26	27	30	32	32	32	31	26	22	23	24	22.8	32
8-Jul	23	23	22	23	21	Z	22	22	26	M	M	38	39	M	M	46	44	39	31	29	39	37	33	35	31.1	46
9-Jul	34	27	22	20	21	26	Z	30	28	28	27	25	29	24	25	26	27	21	20	20	18	15	14	15	23.6	34
10-Jul	15	11	5	3	7	8	9	Z	14	17	27	31	35	38	43	46	49	49	45	34	26	19	16	12	24.3	49
11-Jul	22	23	Z	24	25	26	26	27	30	35	38	38	39	41	42	45	42	43	33	34	46	32	36	35	34.0	46
12-Jul	31	27	24	Z	20	28	18	19	14	18	18	19	24	32	46	60	33	31	35	29	28	44	41	38	29.5	60
13-Jul	37	33	29	27	Z	24	22	25	26	C	C	C	C	22	22	25	25	24	21	18	12	12	21	19	23.5	37
14-Jul	16	21	26	23	19	Z	20	17	16	18	24	30	29	26	31	31	32	33	27	27	20	11	19	23	23.3	33
15-Jul	22	22	21	20	18	16	Z	18	19	21	24	26	27	28	32	36	37	36	33	31	25	22	16	15	24.6	37
16-Jul	18	17	16	16	16	16	15	Z	23	28	33	41	47	48	37	21	16	19	24	23	19	19	18	17	23.9	48
17-Jul	16	20	Z	13	12	13	16	19	21	24	27	33	31	31	31	28	27	25	23	18	19	16	13	12	21.2	33
18-Jul	11	10	10	Z	12	11	14	17	17	16	17	20	21	22	21	19	18	20	24	23	22	26	27	28	18.5	28
19-Jul	26	21	19	17	Z	18	18	20	24	24	23	27	27	27	27	26	26	27	25	25	22	17	14	16	22.4	27
20-Jul	19	20	18	13	10	Z	11	14	20	25	29	31	31	31	32	34	34	33	37	33	28	27	25	24	25.2	37
21-Jul	24	23	21	18	16	15	Z	15	15	16	17	18	21	26	27	28	28	31	32	31	23	18	15	18	21.6	32
22-Jul	18	16	12	9	13	14	15	Z	22	27	30	30	33	31	30	29	28	23	21	21	18	16	12	13	21.0	33
23-Jul	15	15	Z	12	11	11	11	11	15	17	20	22	23	23	21	23	20	23	23	23	18	18	15	14	17.4	23
24-Jul	11	11	10	Z	9	8	7	9	12	16	21	23	24	28	29	30	30	31	29	27	14	13	11	12	18.0	31
25-Jul	18	22	25	27	Z	22	20	25	29	27	29	30	31	32	32	31	31	30	30	27	16	18	20	21	25.8	32
26-Jul	16	14	13	13	13	Z	11	12	16	20	28	34	37	37	32	30	31	34	32	29	25	21	21	22	23.6	37
27-Jul	21	19	21	PF	PF	15	Z	18	20	21	26	28	30	30	30	28	28	28	27	22	17	15	15	14	22.4	30
28-Jul	15	14	13	15	17	17	16	Z	19	19	21	22	24	26	25	25	23	26	27	22	21	22	20	15	20.3	27
29-Jul	12	12	Z	10	9	9	16	17	22	21	20	21	23	25	25	28	30	34	33	33	32	26	20	20	21.6	34
30-Jul	22	23	20	Z	17	15	16	18	22	23	25	26	28	28	28	29	29	29	28	24	22	15	14	16	22.4	29
31-Jul	14	13	8	8	Z	11	13	14	16	21	23	27	30	32	33	31	24	20	19	17	19	16	16	14	19.1	33
20.9 20.0 18.9 17.5 16.4 16.9 16.6 18.6 21.0 23.0 25.6 28.3 30.3 30.7 31.6 32.6 31.3 31.3 29.9 27.3 24.0 21.4 20.8 20.9																								Diurnal Average		
37 33 29 28 29 31 31 30 32 37 38 42 49 48 53 60 62 59 55 46 46 44 41 38																								Diurnal Maximum		
Z - zerospan C - Calibration M - Maintenance PF - Power Failure																										
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb																										







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

**Ozone (O<sub>3</sub>) - ppb**  
**Patricia McInnes - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	260	36.98	36.98
21 - 50	437	62.16	99.15
51 - 82	6	0.85	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 703

Total Number of Hours: 744



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

**Ozone (O<sub>3</sub>) - ppb**  
**Patricia McInnes - July 2015**

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	8	4	1	1	1	10	8	16	23	38	48	25	15	22	14	26	260
21 - 50	28	15	8	15	12	23	14	19	17	43	42	35	50	47	30	39	437
51 - 82	1	0	0	0	0	0	0	0	0	0	0	0	0	1	4	0	6
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>37</b>	<b>19</b>	<b>9</b>	<b>16</b>	<b>13</b>	<b>33</b>	<b>22</b>	<b>35</b>	<b>40</b>	<b>81</b>	<b>90</b>	<b>60</b>	<b>65</b>	<b>70</b>	<b>48</b>	<b>65</b>	<b>703</b>

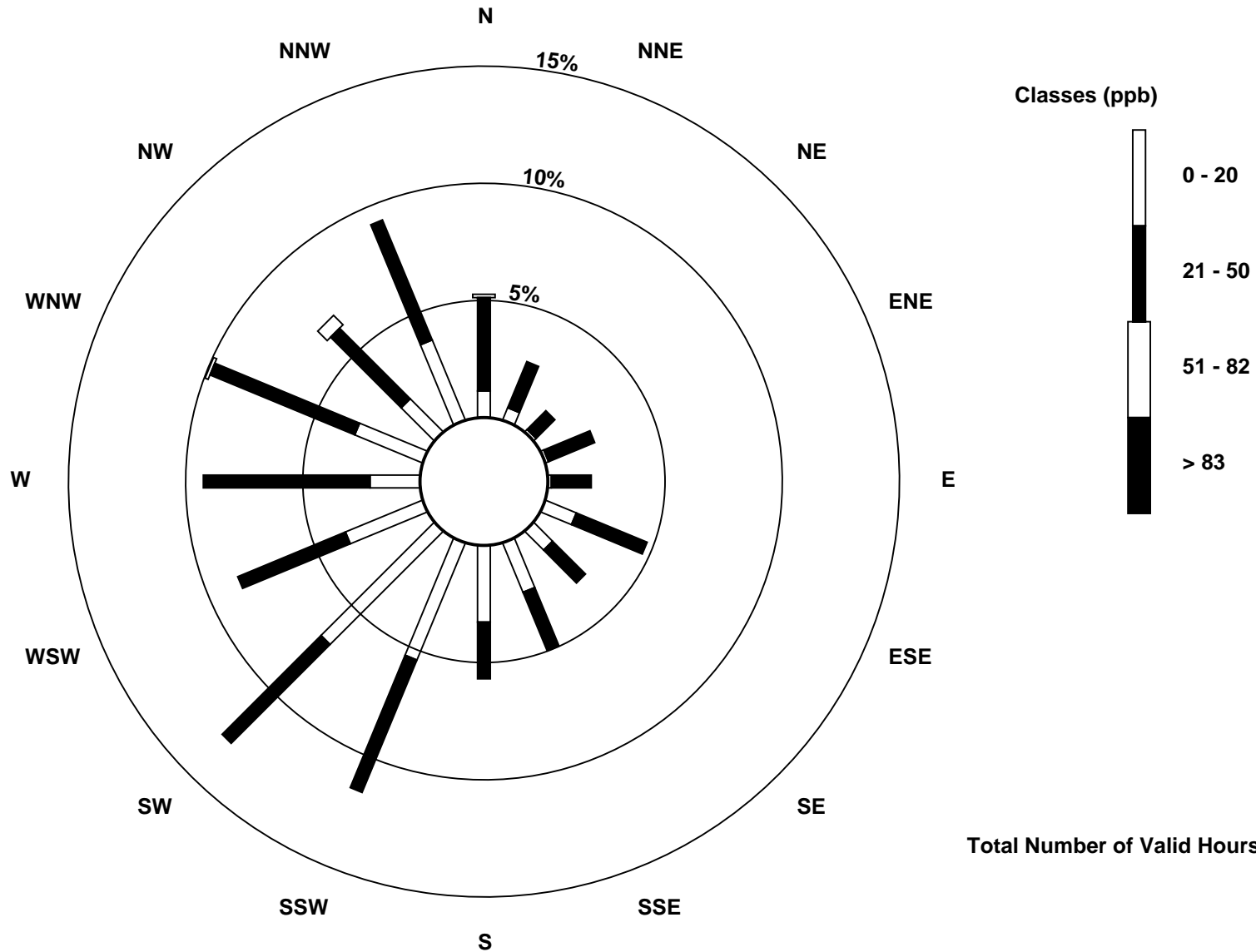
Total Number of Valid Hours: 703

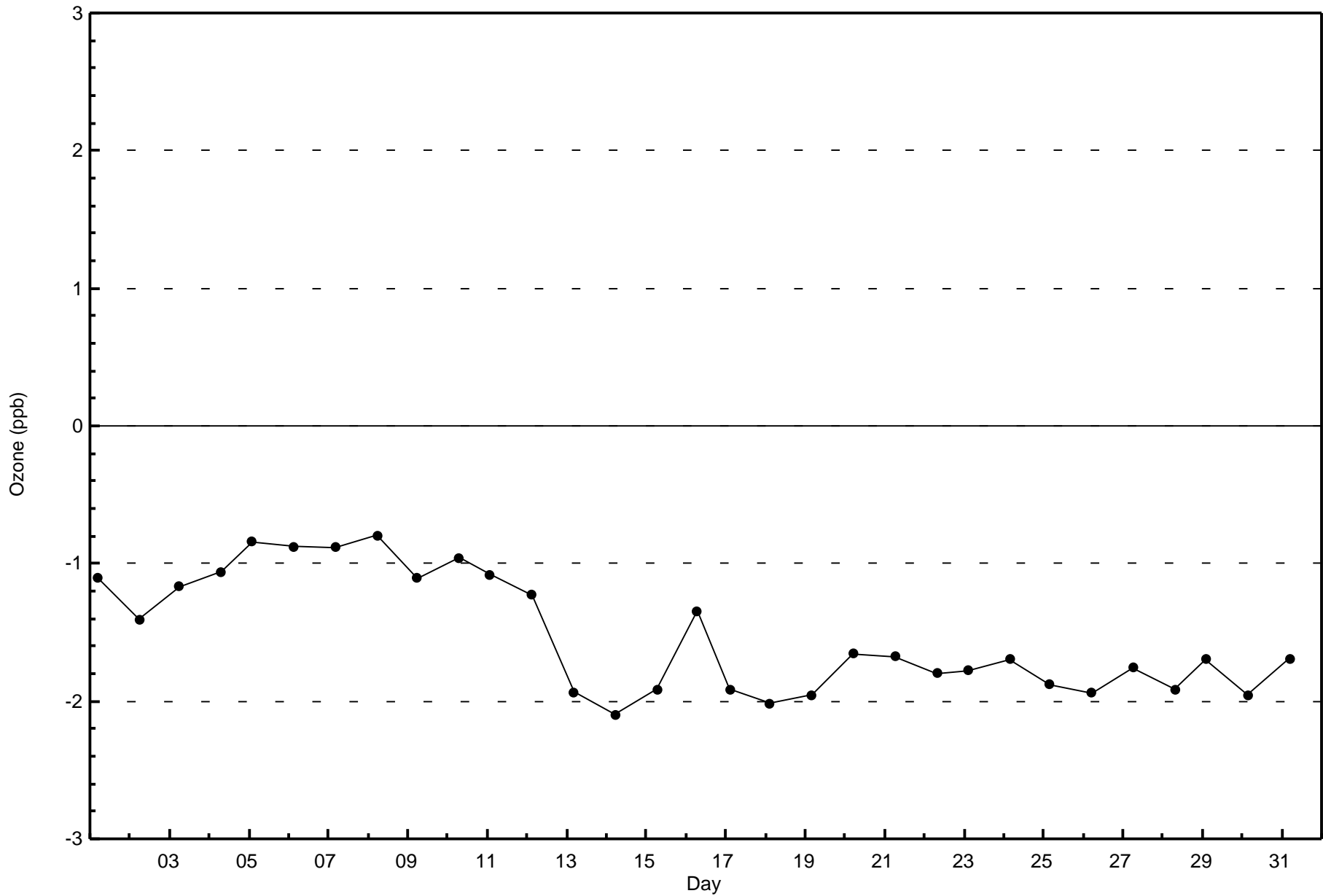
Total Number of Hours: 744



Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Ozone (O<sub>3</sub>) - ppb  
Patricia McInnes (AMS 6)





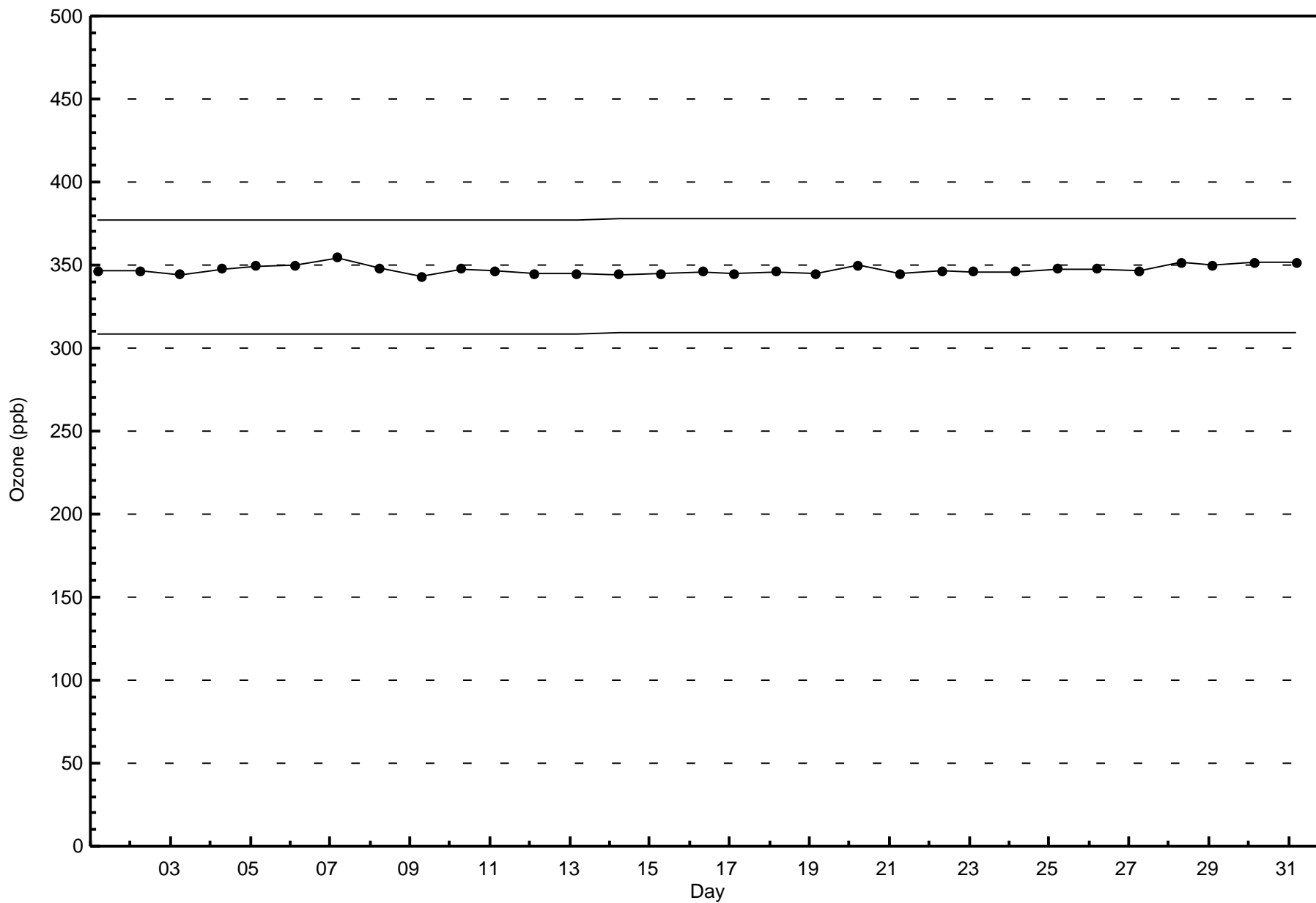


Wood Buffalo Environmental Association

Span Responses

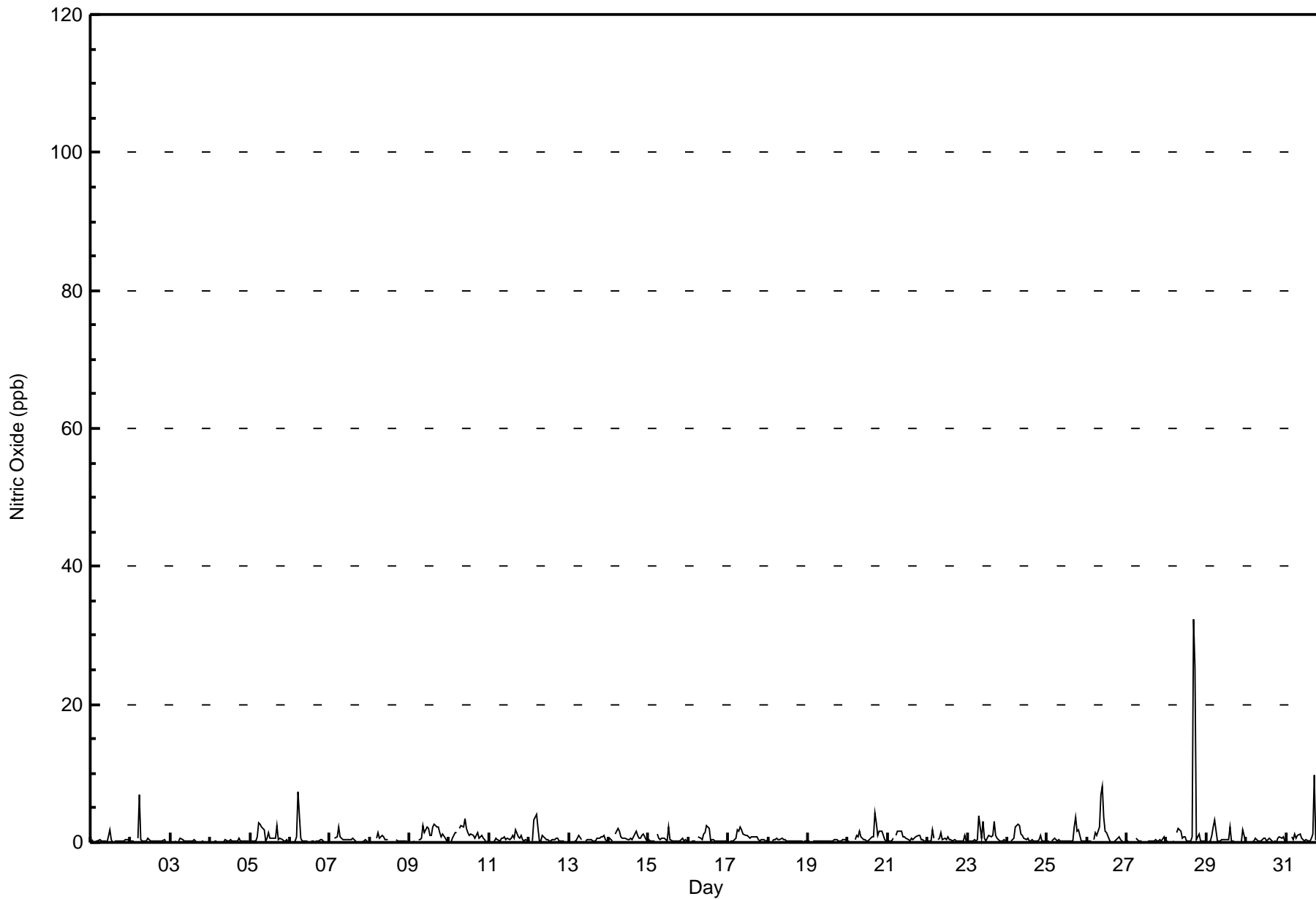
Ozone (O<sub>3</sub>) - ppb

Patricia McInnes - July 2015





Maximum Value: 32 ppb on Jul 28 17:00																		Maximum Daily Average: 3.0 ppb on Jul 28																		Hours in Service: 744	
Minimum Value: 0 ppb on Jul 3 17:00																		Minimum Daily Average: 0.2 ppb on Jul 3																		Hours of Data: 704	
Maximum Diurnal Average: 1.9 ppb at hour 17																		Minimum Diurnal Average: 0.1 ppb at hour 2																		Hours of Missing Data: 40	
Monthly Average: 0.7 ppb																		Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 O <sub>3</sub> = 1 P <sub>90</sub> = 1 P <sub>99</sub> = 7																		Hours of Calibration: 34	
																																				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-Jul	0	0	Z	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2										
2-Jul	0	0	0	Z	1	7	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	7										
3-Jul	0	0	0	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1										
4-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.2	1										
5-Jul	Z	0	0	0	1	3	3	2	2	0	1	1	1	1	1	1	2	0	1	0	0	0	0	0	0	0.9	3										
6-Jul	0	Z	0	0	1	7	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	7										
7-Jul	0	0	Z	1	1	2	1	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.4	2										
8-Jul	0	0	0	Z	1	1	1	1	1	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0.4	1										
9-Jul	0	0	0	0	Z	0	0	1	2	1	2	2	1	1	2	3	2	2	1	1	1	1	0	0	0	1.1	3										
10-Jul	0	0	1	1	1	Z	2	2	2	4	2	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1.1	4										
11-Jul	Z	0	0	0	1	0	0	1	1	1	0	1	0	1	1	1	2	1	1	1	0	0	0	0	0	0.5	2										
12-Jul	0	Z	0	3	4	2	0	0	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0.7	4										
13-Jul	0	0	Z	0	0	1	1	0	M	M	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0.4	1										
14-Jul	1	0	0	Z	1	2	2	1	1	1	1	0	0	1	0	1	2	1	1	1	1	1	0	0	0	0.8	2										
15-Jul	0	0	0	0	Z	1	1	0	1	1	1	0	2	0	0	0	0	0	0	0	1	0	0	0	0	0.4	2										
16-Jul	0	0	0	0	0	Z	1	1	0	1	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2										
17-Jul	Z	0	0	0	1	2	2	2	2	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0.8	2										
18-Jul	1	Z	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1										
19-Jul	0	0	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-Jul	0	0	0	Z	0	1	1	2	1	0	0	0	0	0	1	1	4	3	1	2	2	1	0	0	0	0.9	4										
21-Jul	0	0	0	1	Z	1	2	2	2	1	1	1	0	0	1	0	1	1	1	1	0	0	0	0	0	0.7	2										
22-Jul	0	0	0	2	1	Z	0	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0.5	2										
23-Jul	Z	0	0	0	0	0	0	4	1	3	1	0	1	1	1	1	3	1	1	0	0	0	0	0	0	0.8	4										
24-Jul	0	Z	0	0	1	2	3	2	1	1	1	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0.7	3										
25-Jul	0	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	2	4	2	2	0	0	0	0	0	0.6	4										
26-Jul	0	0	0	Z	0	1	1	2	7	8	4	2	1	0	0	0	0	0	1	1	0	0	0	0	0	1.3	8										
27-Jul	0	0	0	PF	PF	1	0	0	0	0	M	M	0	0	0	0	0	0	0	0	0	0	1	0	0	0.2	1										
28-Jul	0	0	0	0	0	Z	1	2	2	1	1	1	0	0	0	1	32	25	0	1	0	0	0	0	0	3.0	32										
29-Jul	Z	0	0	1	2	3	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2	0	0	0.6	3										
30-Jul	0	Z	0	0	0	1	0	0	0	0	0	1	1	0	0	1	0	0	0	1	1	1	1	0	0	0.4	1										
31-Jul	0	0	Z	1	0	1	1	1	1	1	0	0	0	0	0	1	1	10	0	0	0	0	0	0	0	0.9	10										
																								Diurnal Average													
																								Diurnal Maximum													
																								Z - zerospan													
																								C - Calibration													
																								M - Maintenance													
																								PF - Power Failure													





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

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

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	702	99.72	99.72
21 - 40	2	0.28	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 704

Total Number of Hours: 744





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

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

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	37	19	10	13	14	36	20	34	41	79	89	63	64	70	46	67	702
21 - 40	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>37</b>	<b>19</b>	<b>10</b>	<b>15</b>	<b>14</b>	<b>36</b>	<b>20</b>	<b>34</b>	<b>41</b>	<b>79</b>	<b>89</b>	<b>63</b>	<b>64</b>	<b>70</b>	<b>46</b>	<b>67</b>	<b>704</b>

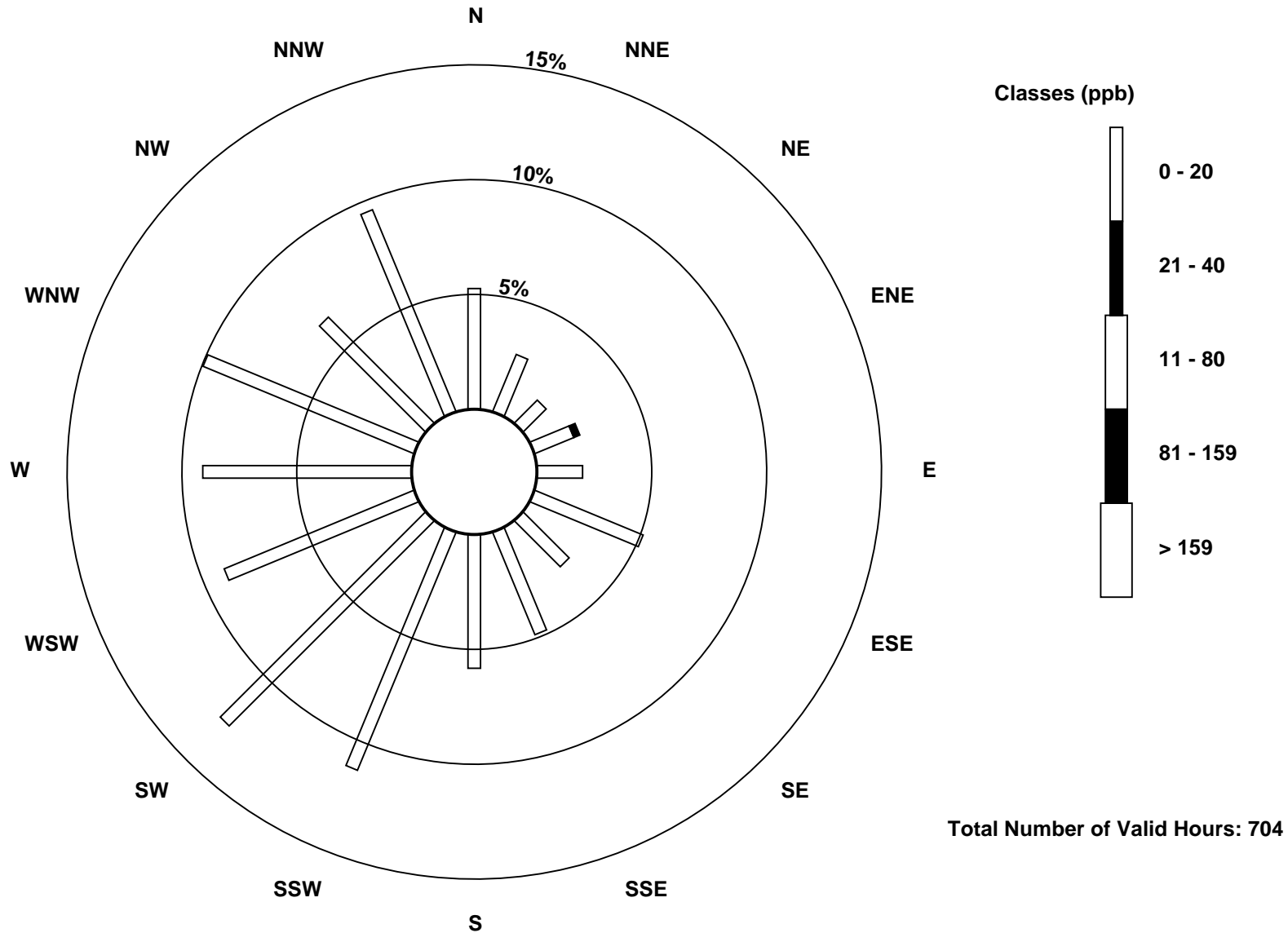
Total Number of Valid Hours: 704

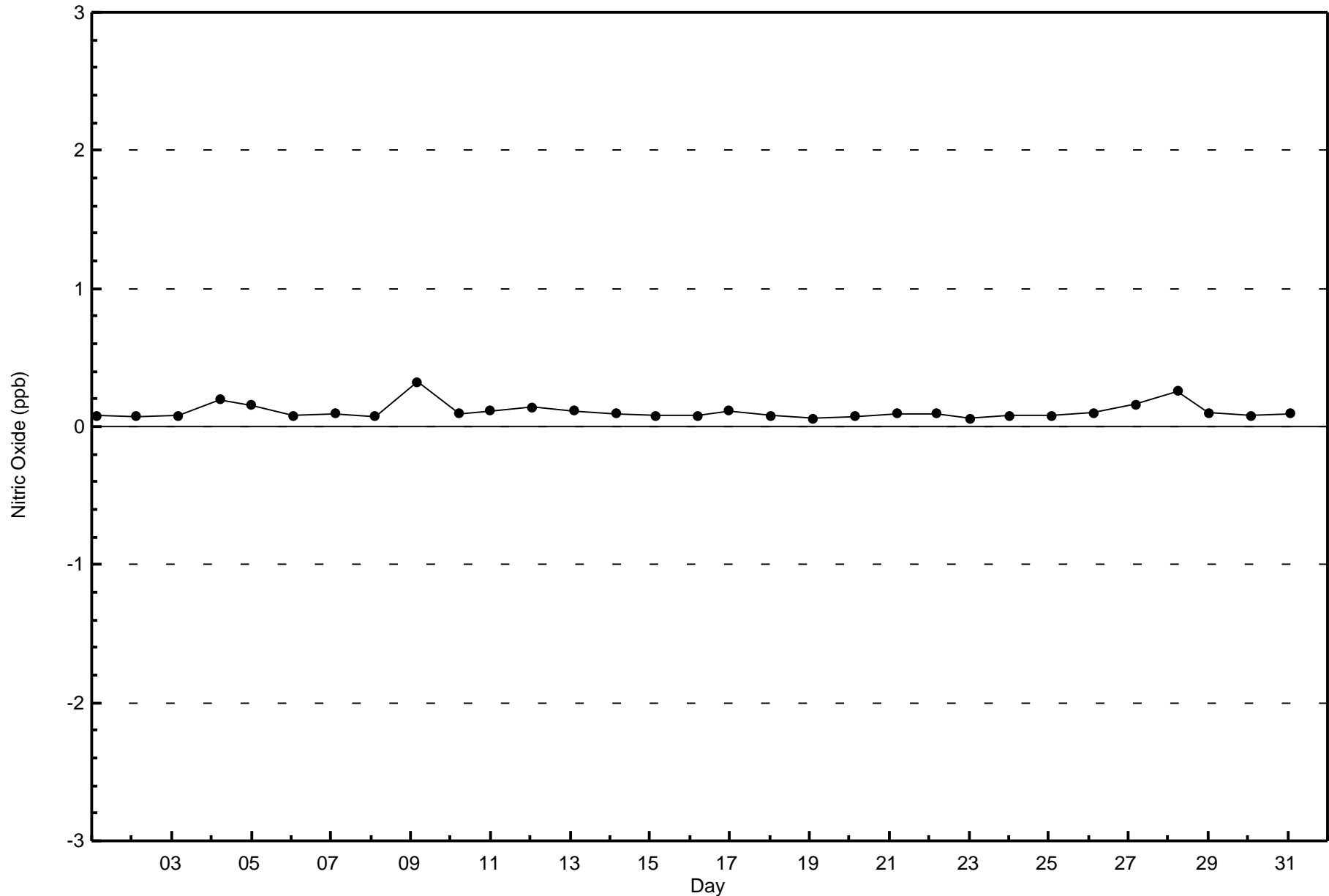
Total Number of Hours: 744

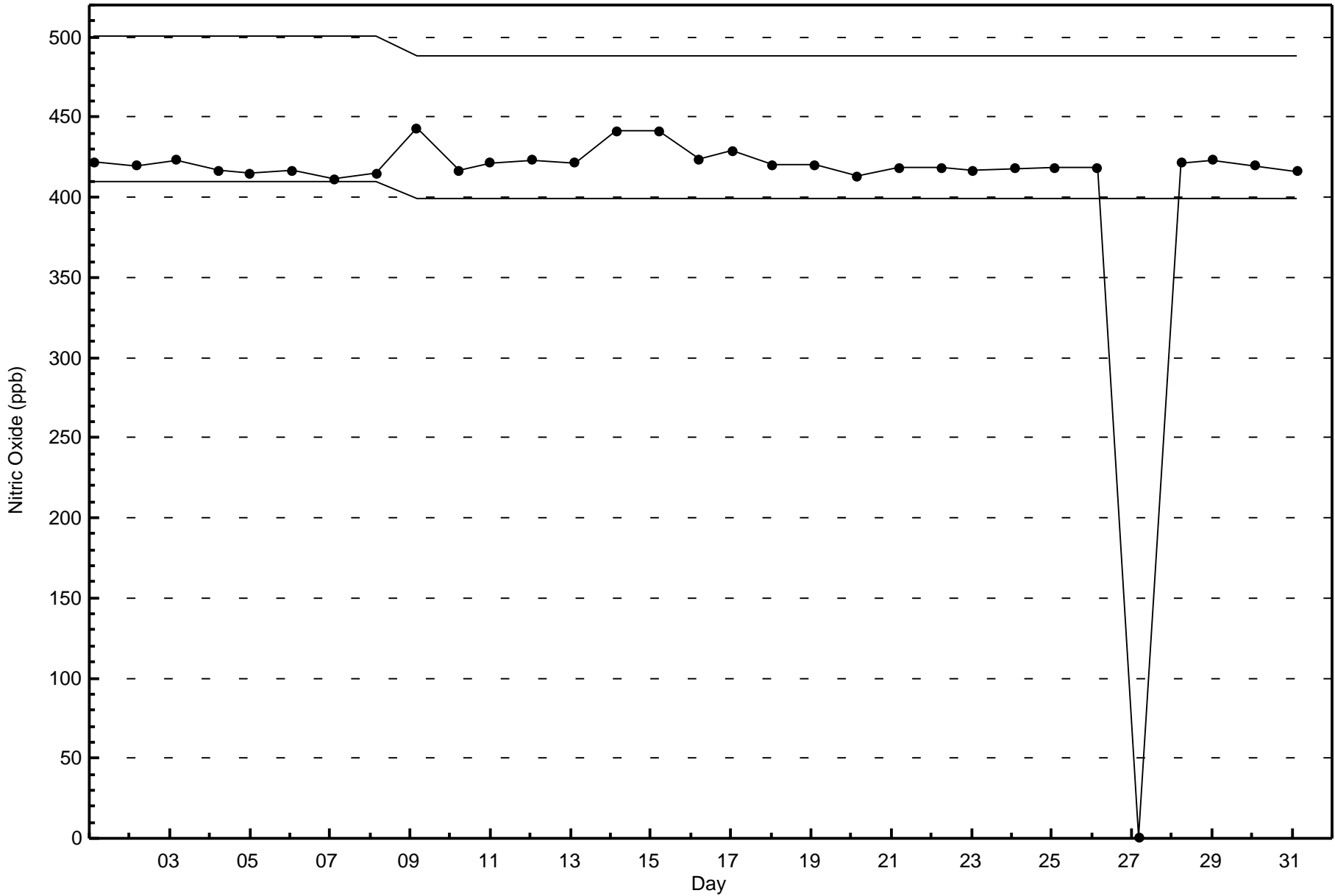


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Nitric Oxide (NO) - ppb  
Patricia McInnes (AMS 6)









Wood Buffalo Environmental Association

Summary of Hour Averages

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

Patricia McInnes - July 2015

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 15 ppb on Jul 28 17:00	Maximum Daily Average: 5.0 ppb on Jul 10		Hours of Data:	704
Minimum Value: 0 ppb on Jul 1 15:00	Minimum Daily Average: 0.2 ppb on Jul 18		Hours of Missing Data:	40
Maximum Diurnal Average: 3.2 ppb at hour 21	Minimum Diurnal Average: 1.2 ppb at hour 14		Hours of Calibration:	34
Monthly Average: 1.9 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 1 O <sub>3</sub> = 3 P <sub>90</sub> = 5 P <sub>99</sub> = 9		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-Jul	2	3	Z	2	2	2	1	0	0	0	0	2	0	0	0	1	1	1	1	1	2	4	3	1	1.3	4	
2-Jul	1	1	1	Z	2	4	1	1	0	0	1	1	1	1	0	1	1	1	1	2	6	4	2	1	1.4	6	
3-Jul	1	1	1	1	Z	1	2	1	1	0	1	3	3	3	2	4	5	7	6	7	6	6	6	6	3.1	7	
4-Jul	6	6	5	6	3	Z	1	1	0	1	1	1	2	1	1	1	1	2	1	2	3	4	1	1	2.2	6	
5-Jul	Z	1	2	2	3	7	5	3	2	0	1	3	2	2	2	2	3	2	2	3	5	3	6	2	2.7	7	
6-Jul	2	Z	1	1	2	4	1	0	0	0	1	0	0	1	0	0	2	1	4	3	1	2	2	0	1.3	4	
7-Jul	0	0	Z	2	2	3	1	1	1	0	0	0	0	1	1	0	0	0	0	0	3	4	2	1	0.9	4	
8-Jul	0	0	1	Z	3	4	2	2	2	2	2	2	C	C	C	C	3	1	1	1	2	2	2	1	1.6	4	
9-Jul	1	3	3	5	Z	3	3	3	4	5	7	10	7	8	6	5	4	5	4	3	4	3	3	3	4.5	10	
10-Jul	2	4	9	9	5	Z	4	4	3	3	3	3	3	4	4	4	4	4	6	6	9	12	7	5	4	5.0	12
11-Jul	Z	1	1	2	3	3	3	4	3	3	2	2	2	2	3	2	2	3	6	8	5	6	7	6	3.4	8	
12-Jul	5	Z	4	7	6	5	3	4	4	4	3	3	2	2	4	7	6	6	4	8	7	1	1	1	4.1	8	
13-Jul	1	2	Z	1	1	2	3	1	M	M	0	1	0	0	0	0	0	1	2	3	4	4	2	2	1.4	4	
14-Jul	3	2	2	Z	5	5	4	2	1	1	1	1	1	2	1	3	5	3	1	2	4	6	1	1	2.5	6	
15-Jul	1	0	0	0	Z	2	1	0	1	1	0	0	2	0	0	0	0	0	0	1	2	1	2	1	0.7	2	
16-Jul	0	1	1	1	1	Z	2	1	0	3	5	7	8	3	4	2	0	0	1	1	1	1	3	5	2.0	8	
17-Jul	Z	1	1	6	6	6	4	3	3	2	2	3	2	1	2	2	2	1	2	2	3	3	1	1	2.6	6	
18-Jul	2	Z	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2	
19-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	2	3	2	1	0.5	3
20-Jul	0	0	0	Z	0	1	0	1	1	0	0	0	0	0	2	1	2	2	2	2	4	3	1	1	1.0	4	
21-Jul	0	0	1	1	Z	2	3	4	3	2	1	1	0	0	0	1	1	3	5	7	6	6	5	2	2.3	7	
22-Jul	1	1	2	4	1	Z	0	1	2	1	1	1	1	0	0	0	0	0	0	0	0	0	2	0	0.8	4	
23-Jul	Z	0	0	0	0	0	0	0	0	2	0	0	0	0	1	2	1	3	3	2	1	0	0	1	1	0.7	3
24-Jul	1	Z	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	2	3	2	3	2	0.8	3
25-Jul	1	0	Z	0	2	3	1	0	0	0	0	0	0	0	0	0	0	3	4	3	6	3	2	2	1	1.4	6
26-Jul	2	1	2	Z	2	4	2	3	7	10	9	5	5	3	0	0	0	0	0	1	3	4	5	2	0	3.1	10
27-Jul	1	2	1	PF	PF	1	0	0	0	0	M	M	0	0	0	0	0	0	1	1	2	2	1	1	0	0.6	2
28-Jul	1	1	1	0	0	Z	2	2	2	1	1	1	0	0	0	2	15	11	4	7	3	4	1	5	2.8	15	
29-Jul	Z	5	5	5	7	6	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	5	1	1.6	7	
30-Jul	0	Z	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	3	3	2	0.7	3
31-Jul	2	3	Z	3	2	2	0	1	1	1	0	0	1	0	1	3	5	12	2	0	0	1	1	2	1.8	12	

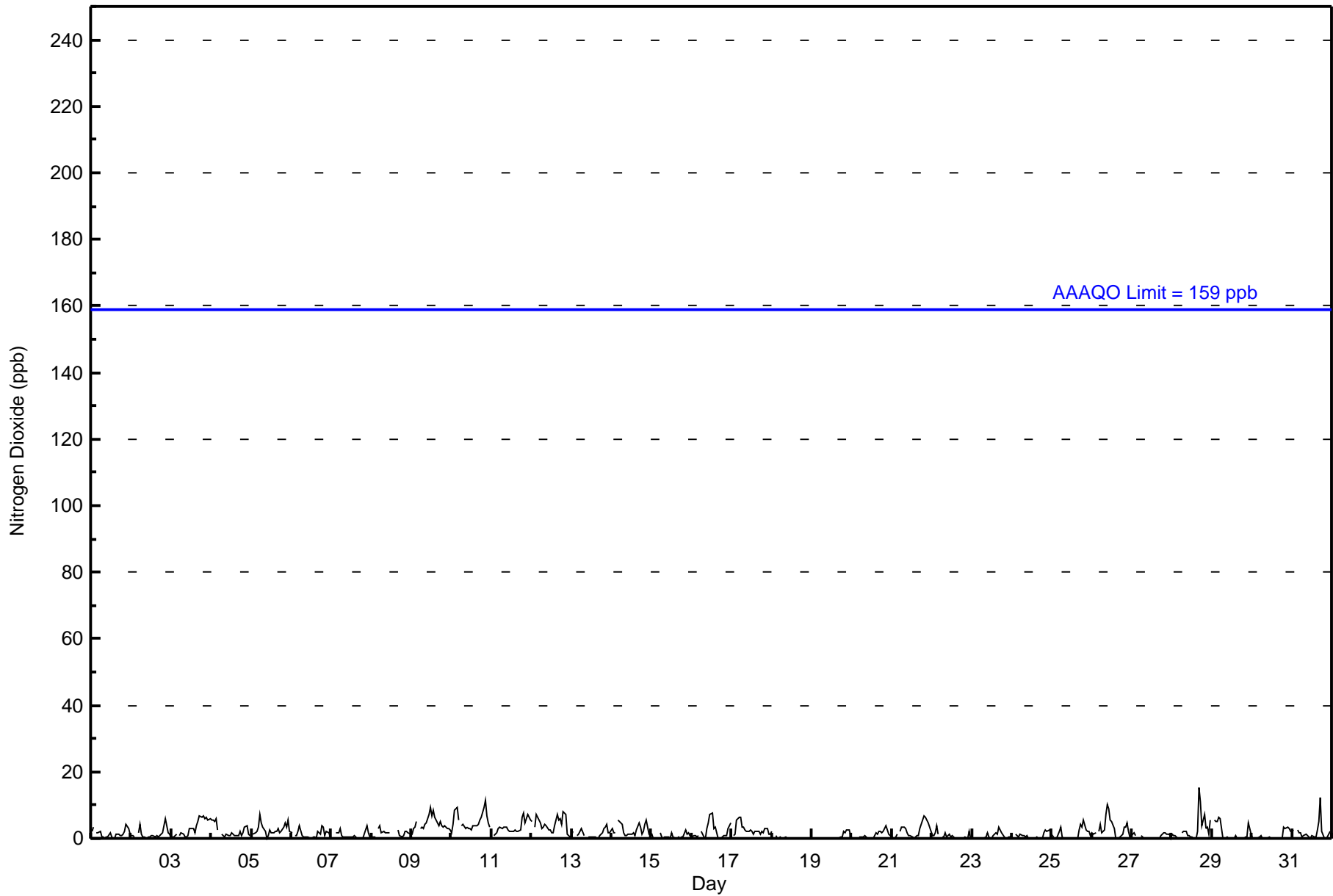
1.4	1.5	1.7	2.3	2.3	2.8	1.6	1.3	1.4	1.4	1.4	1.4	1.6	1.4	1.2	1.2	1.4	2.2	2.5	2.0	2.9	3.2	2.9	2.4	1.7	Diurnal Average	
6	6	9	9	7	7	5	4	7	10	9	10	8	8	6	7	15	12	12	6	9	12	7	7	6	Diurnal Maximum	

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



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

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Patricia McInnes - July 2015**





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

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Patricia McInnes - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	704	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: 704

Total Number of Hours: 744



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

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Patricia McInnes - July 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	37	19	10	15	14	36	20	34	41	79	89	63	64	70	46	67	704
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	37	19	10	15	14	36	20	34	41	79	89	63	64	70	46	67	704

Total Number of Valid Hours: 704

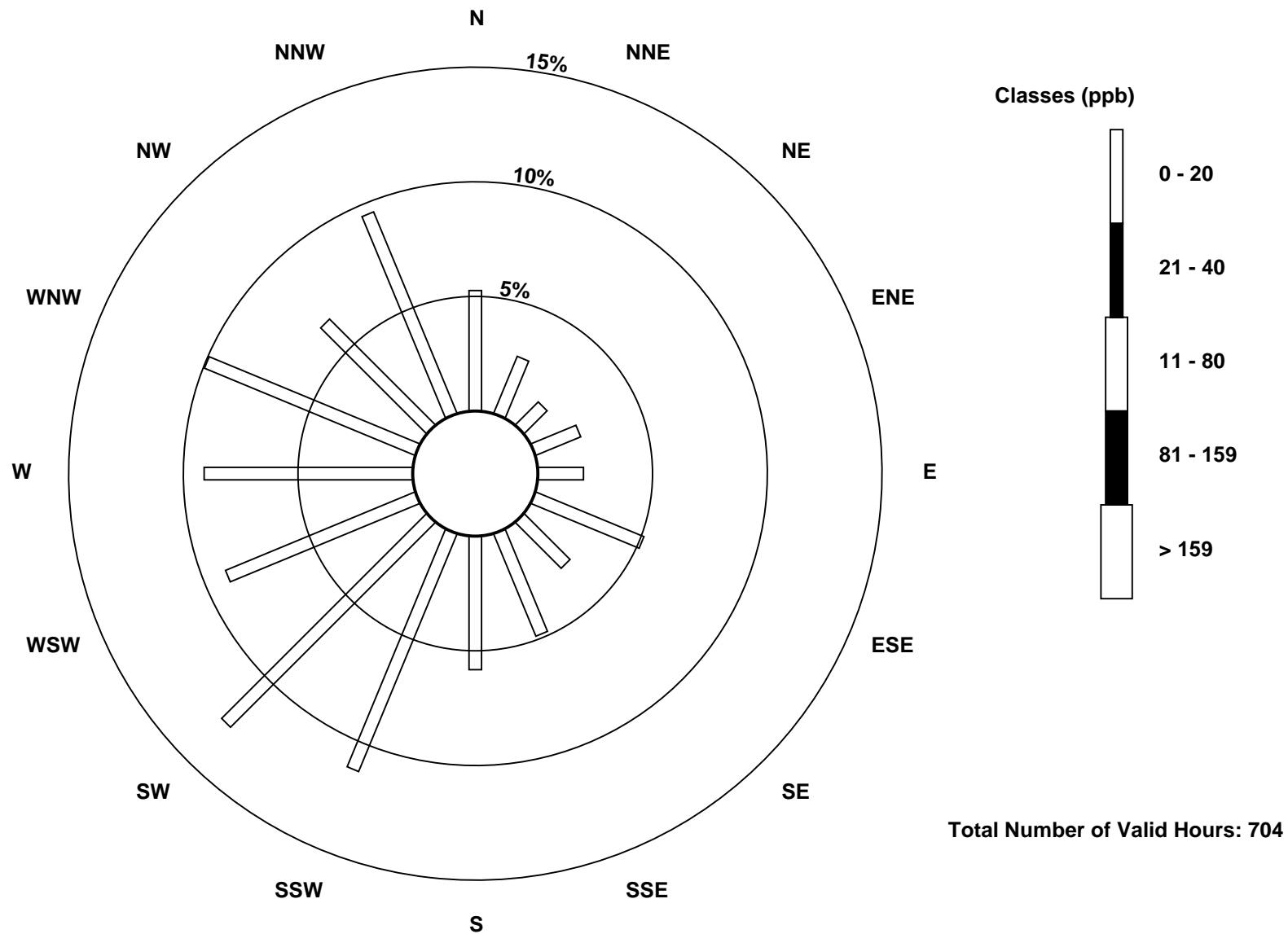
Total Number of Hours: 744

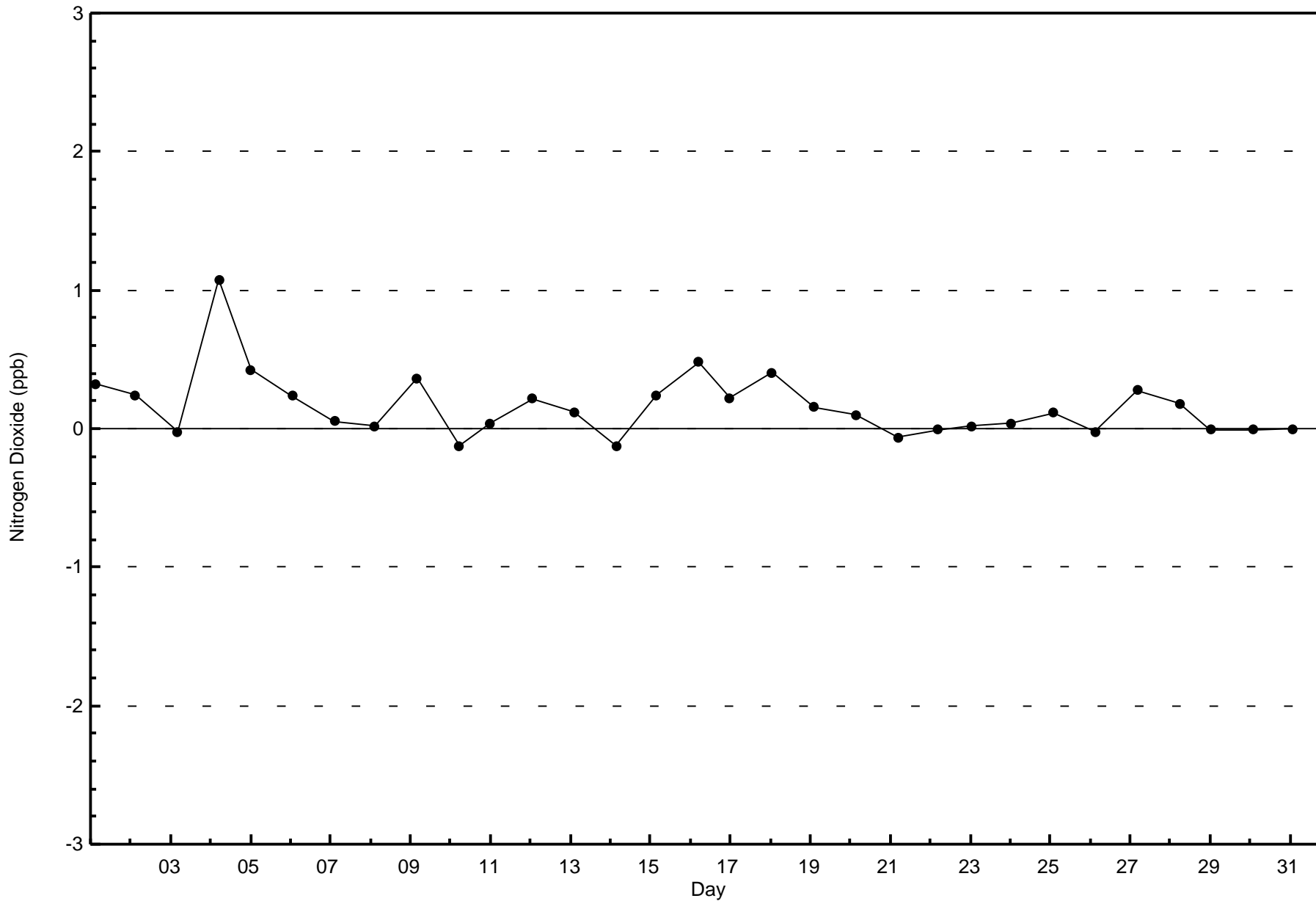


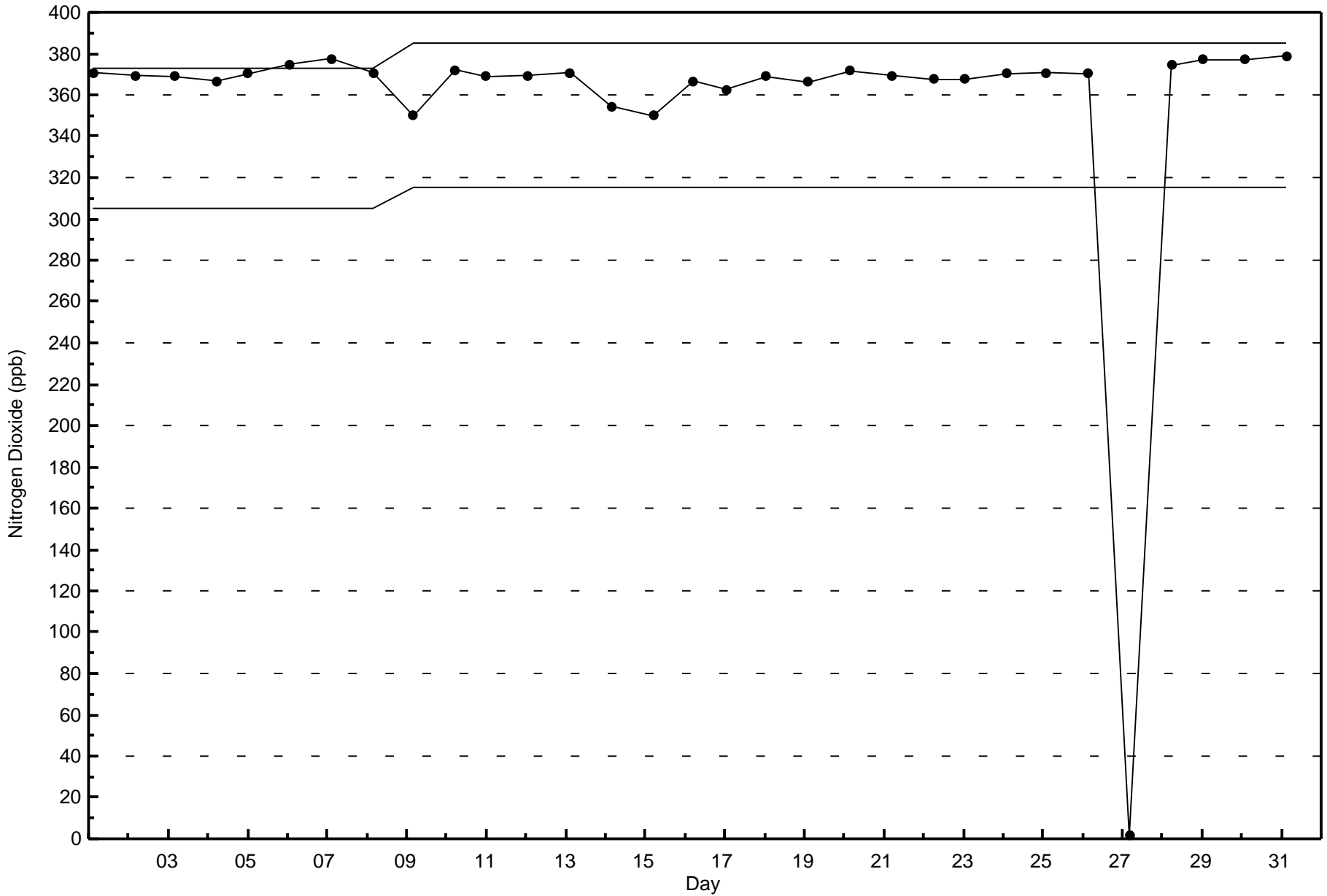


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Patricia McInnes (AMS 6)

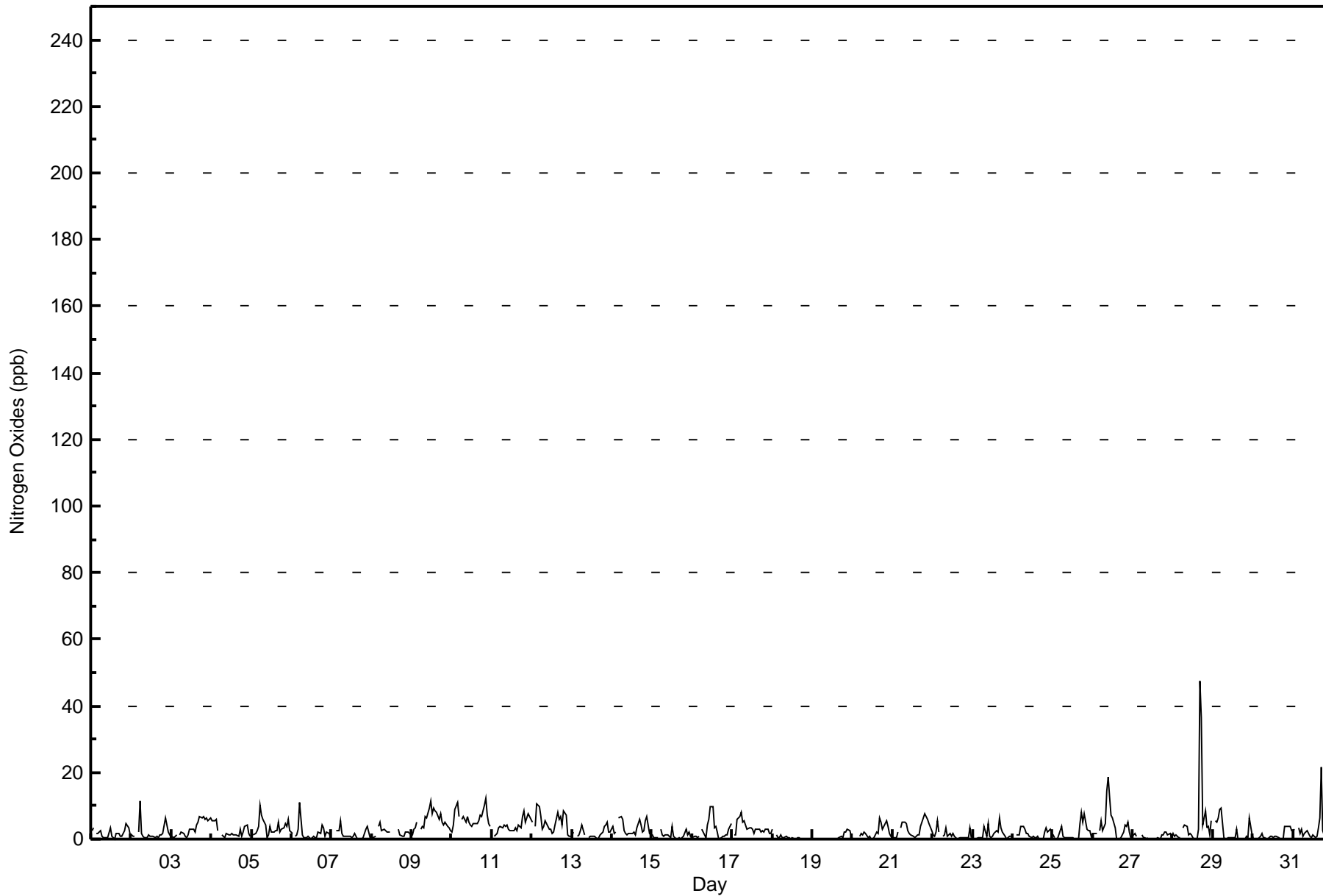








Maximum Value: 47 ppb on Jul 28 17:00																		Maximum Daily Average: 6.2 ppb on Jul 10						Hours in Service: 744			
Minimum Value: 0 ppb on Jul 26 17:00																		Minimum Daily Average: 0.5 ppb on Jul 18						Hours of Data: 704			
Maximum Diurnal Average: 4.4 ppb at hour 6																		Minimum Diurnal Average: 1.5 ppb at hour 14						Hours of Missing Data: 40			
Monthly Average: 2.6 ppb																		Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 1 Median = 2 O <sub>3</sub> = 4 P <sub>90</sub> = 6 P <sub>99</sub> = 12						Hours of Calibration: 34			
																		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-Jul	3	4	Z	2	2	2	1	1	0	1	1	3	1	0	0	2	2	1	1	1	3	5	3	1	1.6	5	
2-Jul	1	1	1	Z	2	11	2	1	1	0	1	1	1	1	1	1	1	1	1	2	6	4	2	1	1.9	11	
3-Jul	1	1	1	1	Z	1	2	2	1	0	1	3	3	3	2	4	5	7	6	7	6	6	6	6	3.3	7	
4-Jul	6	6	5	6	3	Z	1	1	1	2	1	1	2	1	1	1	1	3	1	2	4	4	2	1	2.4	6	
5-Jul	Z	1	2	3	4	10	7	6	4	0	1	4	2	2	3	3	5	2	3	4	5	4	6	2	3.6	10	
6-Jul	2	Z	1	1	3	11	1	1	0	0	1	0	0	1	1	0	2	2	4	4	1	2	2	0	1.8	11	
7-Jul	0	0	Z	2	3	5	2	1	1	1	1	1	1	1	2	0	0	0	0	0	3	4	2	1	1.3	5	
8-Jul	0	1	1	Z	4	5	3	3	2	2	2	2	C	C	C	C	3	1	1	1	2	2	2	1	2.0	5	
9-Jul	1	3	3	5	Z	3	4	3	7	6	10	12	8	9	9	8	6	7	5	4	5	4	3	3	5.6	12	
10-Jul	2	4	9	11	7	Z	6	7	5	7	5	4	4	5	5	5	5	7	7	10	12	7	5	4	6.2	12	
11-Jul	Z	1	1	2	4	4	3	4	4	4	3	2	3	2	4	3	4	4	7	9	5	6	7	6	4.0	9	
12-Jul	5	Z	4	11	10	7	3	4	5	5	3	3	2	2	4	8	6	7	4	8	7	1	1	1	4.8	11	
13-Jul	1	2	Z	1	1	3	4	1	M	M	1	1	1	1	0	0	0	1	2	4	4	5	2	2	1.8	5	
14-Jul	4	2	2	Z	6	7	6	3	2	1	2	2	2	2	1	3	6	4	2	3	5	7	2	1	3.2	7	
15-Jul	1	0	0	0	Z	3	1	1	1	1	1	0	4	1	0	0	1	0	1	1	3	1	2	1	1.1	4	
16-Jul	0	1	1	1	1	Z	3	1	0	4	6	10	10	3	4	2	0	0	1	1	1	1	3	5	2.5	10	
17-Jul	Z	1	1	6	7	8	5	6	4	3	3	4	3	2	3	3	3	2	2	2	3	3	2	2	3.4	8	
18-Jul	3	Z	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	3	
19-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	2	3	3	1	0.7	3	
20-Jul	0	0	0	Z	1	2	1	2	1	1	1	0	0	1	2	2	6	5	3	4	5	4	2	1	1.9	6	
21-Jul	0	0	1	2	Z	3	5	5	4	2	2	1	1	0	1	1	1	4	6	8	7	6	5	2	3.0	8	
22-Jul	1	1	2	6	2	Z	1	1	3	1	2	1	2	1	1	0	1	0	1	0	1	0	3	0	1.3	6	
23-Jul	Z	0	0	0	0	0	1	4	1	5	1	0	1	2	3	2	6	4	2	1	0	0	1	1	1.5	6	
24-Jul	1	Z	1	1	1	4	4	3	2	2	1	0	1	0	1	0	0	0	0	2	3	2	3	2	1.5	4	
25-Jul	1	0	Z	0	3	4	1	1	0	0	0	0	0	0	0	0	5	8	5	7	3	2	2	1	2.0	8	
26-Jul	2	2	2	Z	2	6	3	5	14	18	13	7	6	3	0	0	0	0	2	4	4	5	2	0	4.4	18	
27-Jul	1	2	1	PF	PF	1	1	0	0	0	M	M	0	0	0	0	0	1	1	2	2	1	2	0	0.9	2	
28-Jul	2	1	1	0	0	Z	3	4	4	1	2	1	0	0	0	3	47	36	4	9	3	4	1	5	5.8	47	
29-Jul	Z	6	5	6	9	9	0	0	0	1	1	1	0	0	3	0	0	0	0	0	1	1	6	1	2.2	9	
30-Jul	0	Z	0	0	1	2	0	0	0	0	1	1	0	1	1	0	0	0	0	4	4	4	4	2	1.1	4	
31-Jul	3	3	Z	4	2	3	1	2	2	2	1	0	1	1	1	3	6	22	3	0	0	1	1	2	2.8	22	
																		Diurnal Average									
																		Diurnal Maximum									
Z - zerospan																		C - Calibration						M - Maintenance		PF - Power Failure	





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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Patricia McInnes - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	701	99.57	99.57
21 - 40	2	0.28	99.86
41 - 80	1	0.14	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 704

Total Number of Hours: 744



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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Patricia McInnes - July 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	37	19	10	13	14	36	20	33	41	79	89	63	64	70	46	67	701
21 - 40	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	2
11 - 80	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	37	19	10	15	14	36	20	34	41	79	89	63	64	70	46	67	704

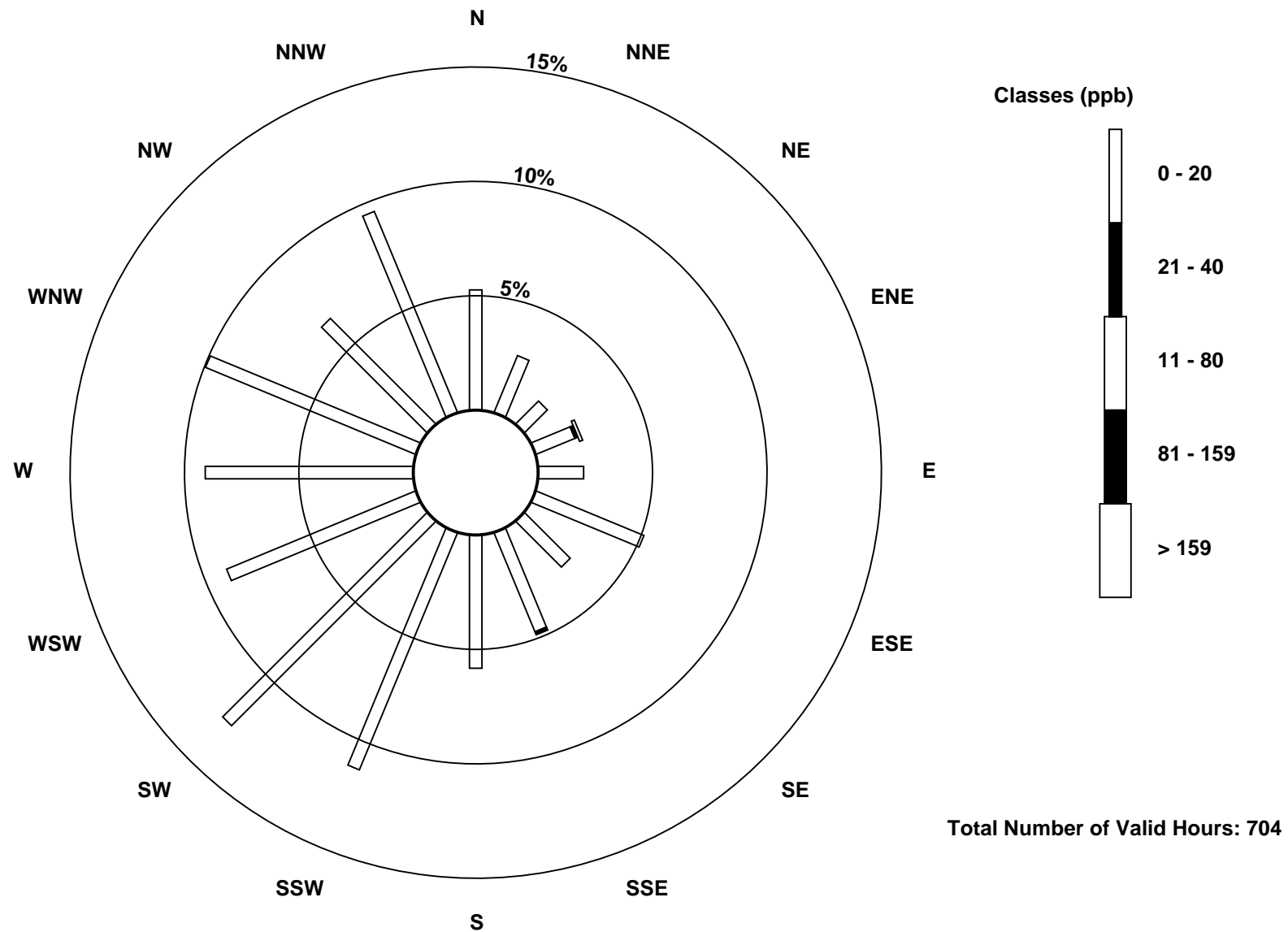
Total Number of Valid Hours: 704

Total Number of Hours: 744

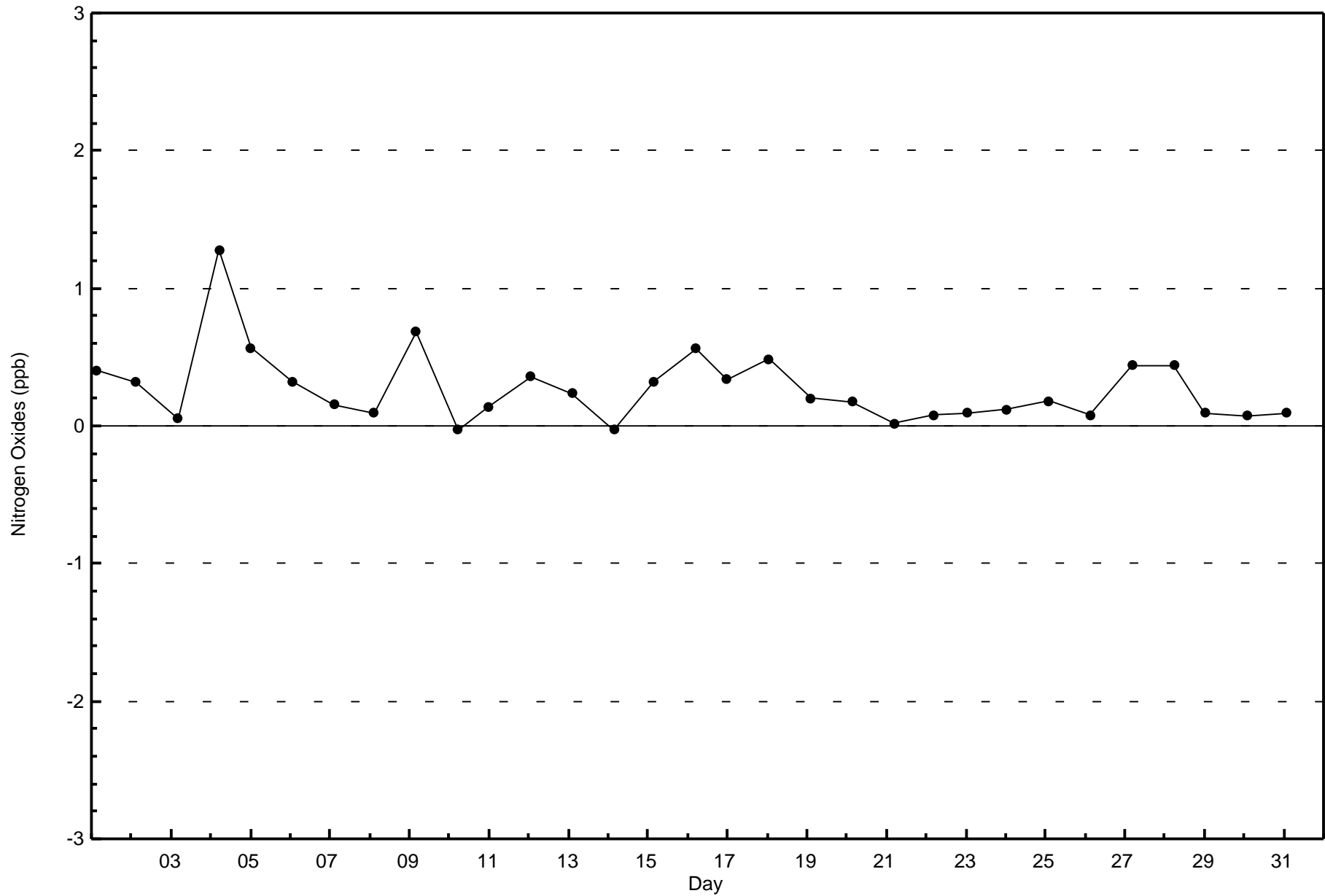


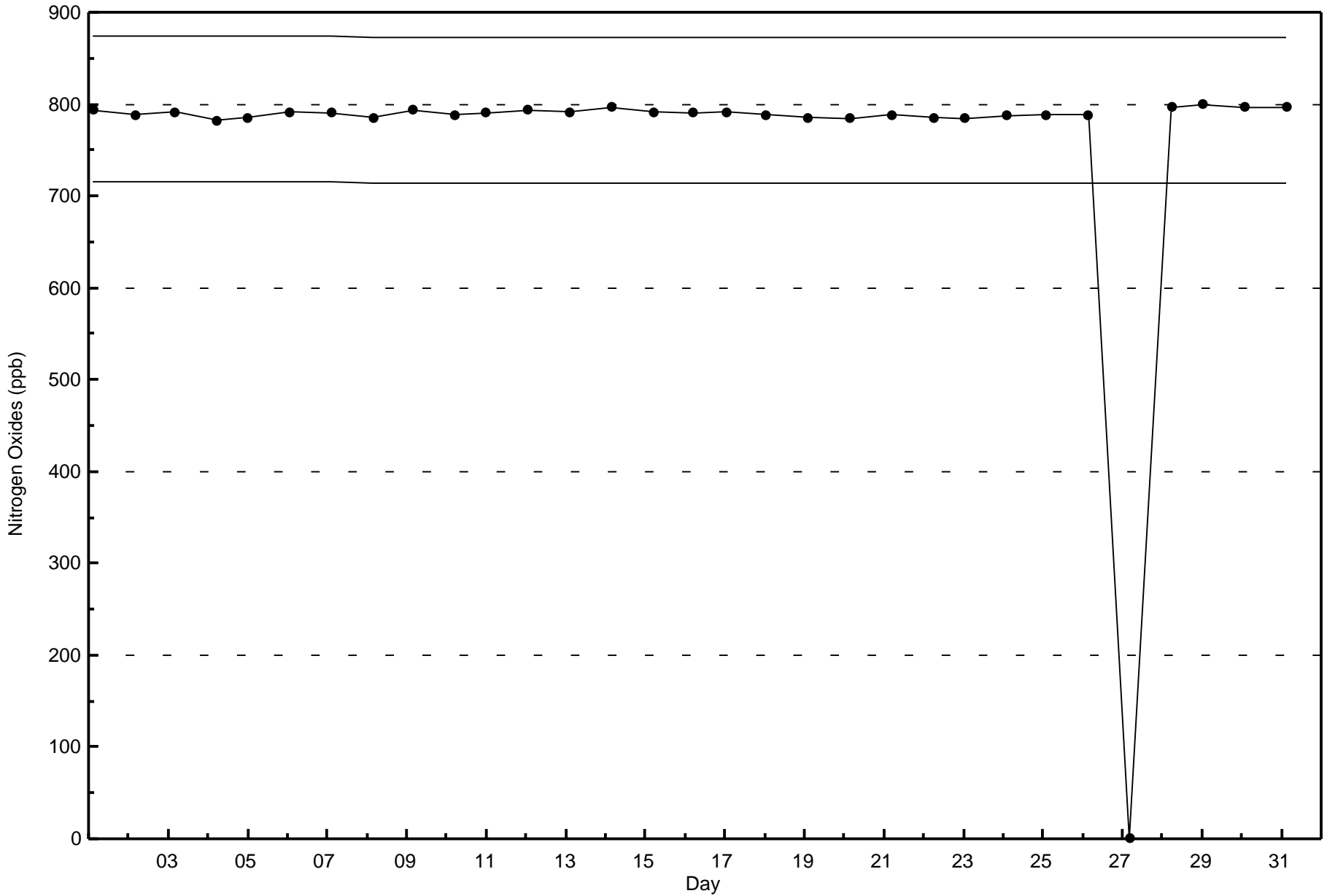
Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Patricia McInnes (AMS 6)











Number of Exceedences (AAAQO): 1-hr: 0	Hours in Service: 744
Maximum Value: 67 ppb on Jul 4 04:00	Maximum Daily Average: 26.3 ppb on Jul 4
Minimum Value: 0 ppb on Jul 1 01:00	Hours of Data: 656
Maximum Diurnal Average: 3.7 ppb at hour 4	Hours of Missing Data: 88
Monthly Average: 2.0 ppb	Hours of Calibration: 39
Minimum Daily Average: 0.0 ppb on Jul 1	Percent Operational Time: 93.4
Minimum Diurnal Average: 0.4 ppb at hour 10	
Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 0 P <sub>99</sub> = 37	

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jul	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-Jul	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-Jul	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	15.8	41
4-Jul	52	51	61	67	58	30	29	29	Z	RE	RE	RE	19	18	19	18	18	20	21	18	13	12	0	0	0	26.3	67
5-Jul	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
6-Jul	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-Jul	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-Jul	0	0	0	0	0	0	Z	RE	0	0	M	M	0	M	M	0	0	0	0	0	0	0	0	0	0	0.0	0
9-Jul	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
10-Jul	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-Jul	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	13	21	29	3.5	29
12-Jul	29	29	27	25	Z	RE	19	13	14	11	14	15	11	11	10	0	0	10	0	0	0	0	0	0	0	10.8	29
13-Jul	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
14-Jul	0	0	0	0	0	0	Z	RE	C	C	C	C	C	C	C	C	RE	RE	RE	0	0	0	0	0	0	--	0
15-Jul	0	0	0	0	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	21	2.0	22
16-Jul	14	19	0	0	0	0	14	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.3	19
17-Jul	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
18-Jul	10	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	10
19-Jul	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
20-Jul	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
21-Jul	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
22-Jul	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
23-Jul	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
24-Jul	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
25-Jul	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
26-Jul	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
27-Jul	0	0	0	PF	PF	PF	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
28-Jul	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
29-Jul	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
30-Jul	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
31-Jul	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

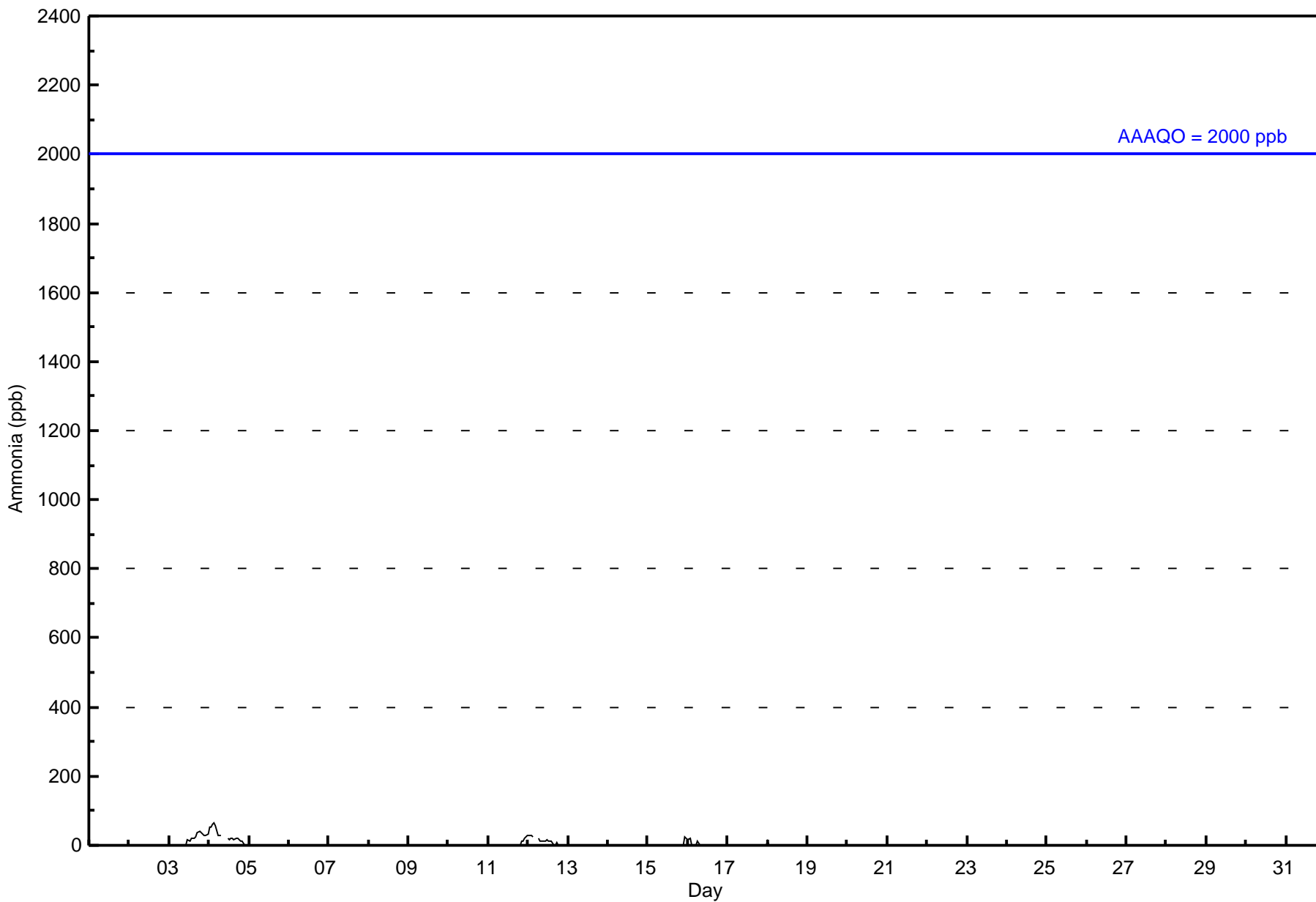
3.4	3.2	2.8	3.7	2.9	1.8	3.2	2.1	0.7	0.4	0.5	1.6	1.4	1.7	1.7	1.2	1.5	2.3	2.0	1.5	1.8	1.3	2.3	2.7	Diurnal Average
52	51	61	67	58	30	29	29	14	11	14	19	18	19	22	19	26	37	41	35	31	29	28	32	Diurnal Maximum

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



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

**Ammonia (NH<sub>3</sub>) - ppb**  
**Patricia McInnes - July 2015**





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

**Ammonia (NH<sub>3</sub>) - ppb**  
**Patricia McInnes - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	601	91.62	91.62
6 - 10	3	0.46	92.07
11 - 15	15	2.29	94.36
16 - 20	11	1.68	96.04
21 - 25	6	0.91	96.95
> 26	20	3.05	100.00

Total Number of Valid Hours: 656

Total Number of Hours: 744



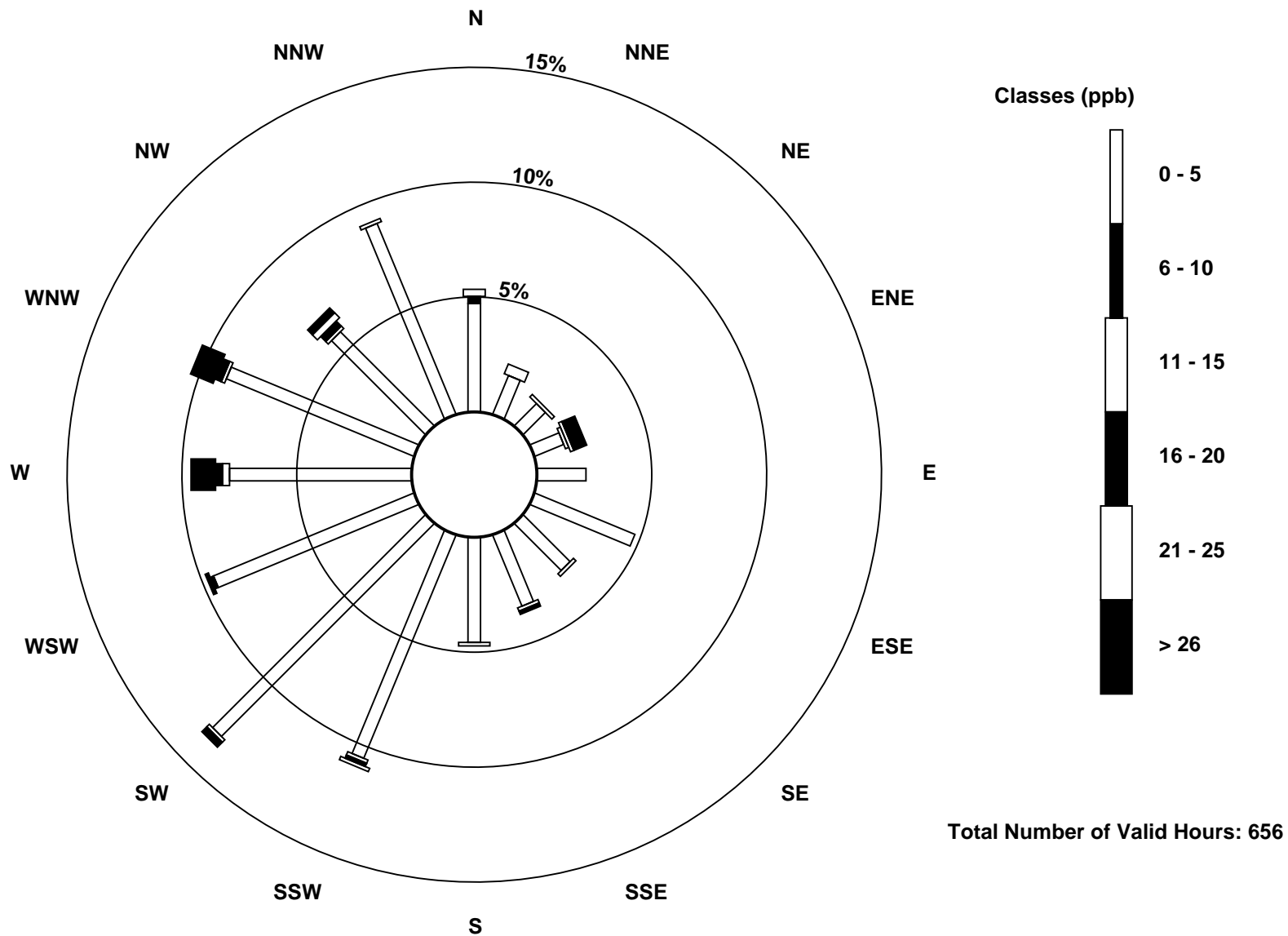
**Wood Buffalo Environmental Association**  
**Frequency Distribution**

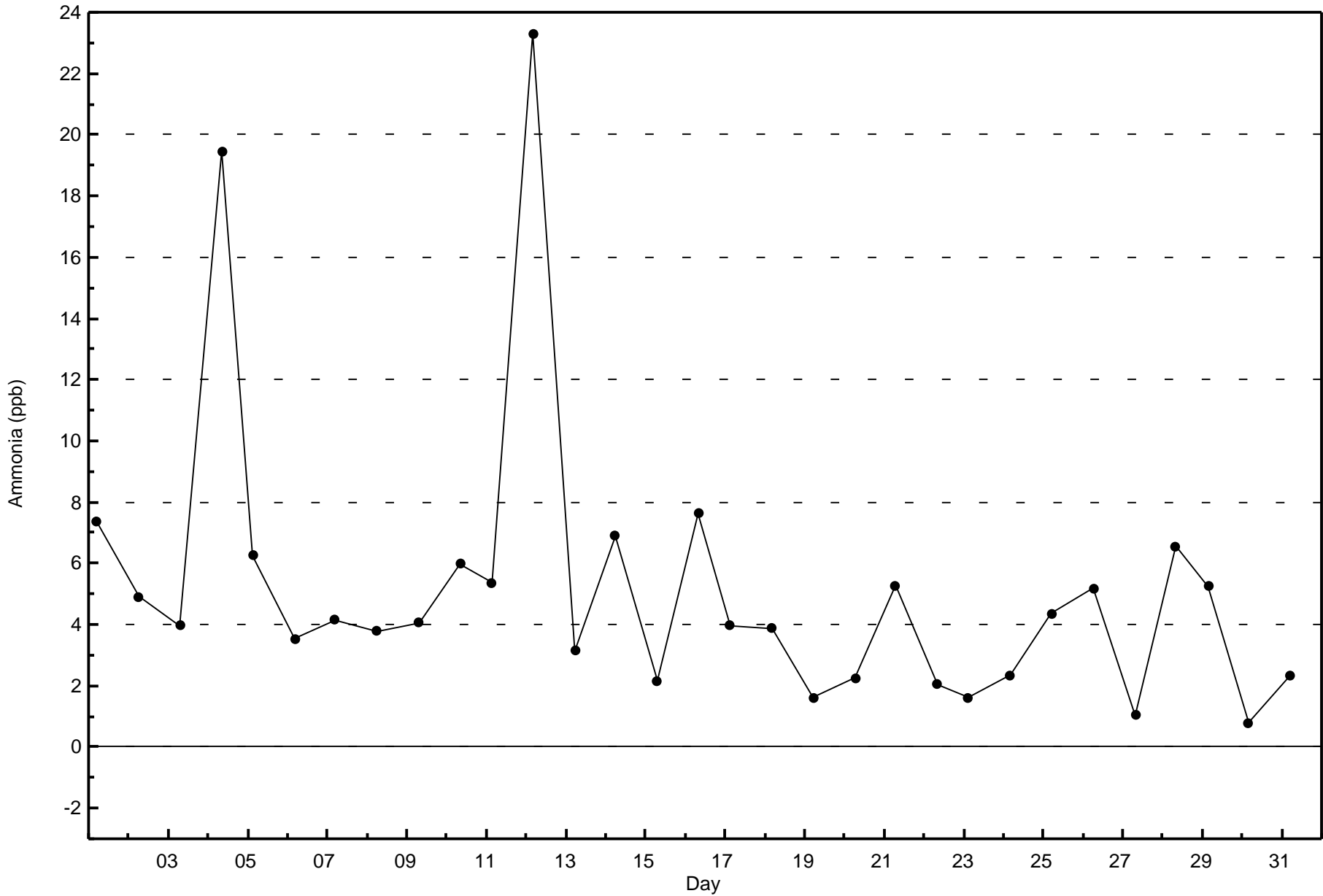
**Ammonia (NH<sub>3</sub>) - ppb**  
**Patricia McInnes - July 2015**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	31	12	9	9	14	31	19	22	30	69	86	62	52	58	38	59	601
6 - 10	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	3
11 - 15	2	3	0	1	0	0	1	1	0	1	1	0	2	1	1	1	15
16 - 20	0	0	0	0	0	0	0	1	0	1	2	1	2	2	2	0	11
21 - 25	0	0	1	1	0	0	0	0	1	1	0	0	0	0	2	0	6
> 26	0	0	0	4	0	0	0	0	0	0	0	0	7	7	2	0	20
<b>Totals</b>	<b>35</b>	<b>15</b>	<b>10</b>	<b>15</b>	<b>14</b>	<b>31</b>	<b>20</b>	<b>24</b>	<b>31</b>	<b>72</b>	<b>89</b>	<b>64</b>	<b>63</b>	<b>68</b>	<b>45</b>	<b>60</b>	<b>656</b>

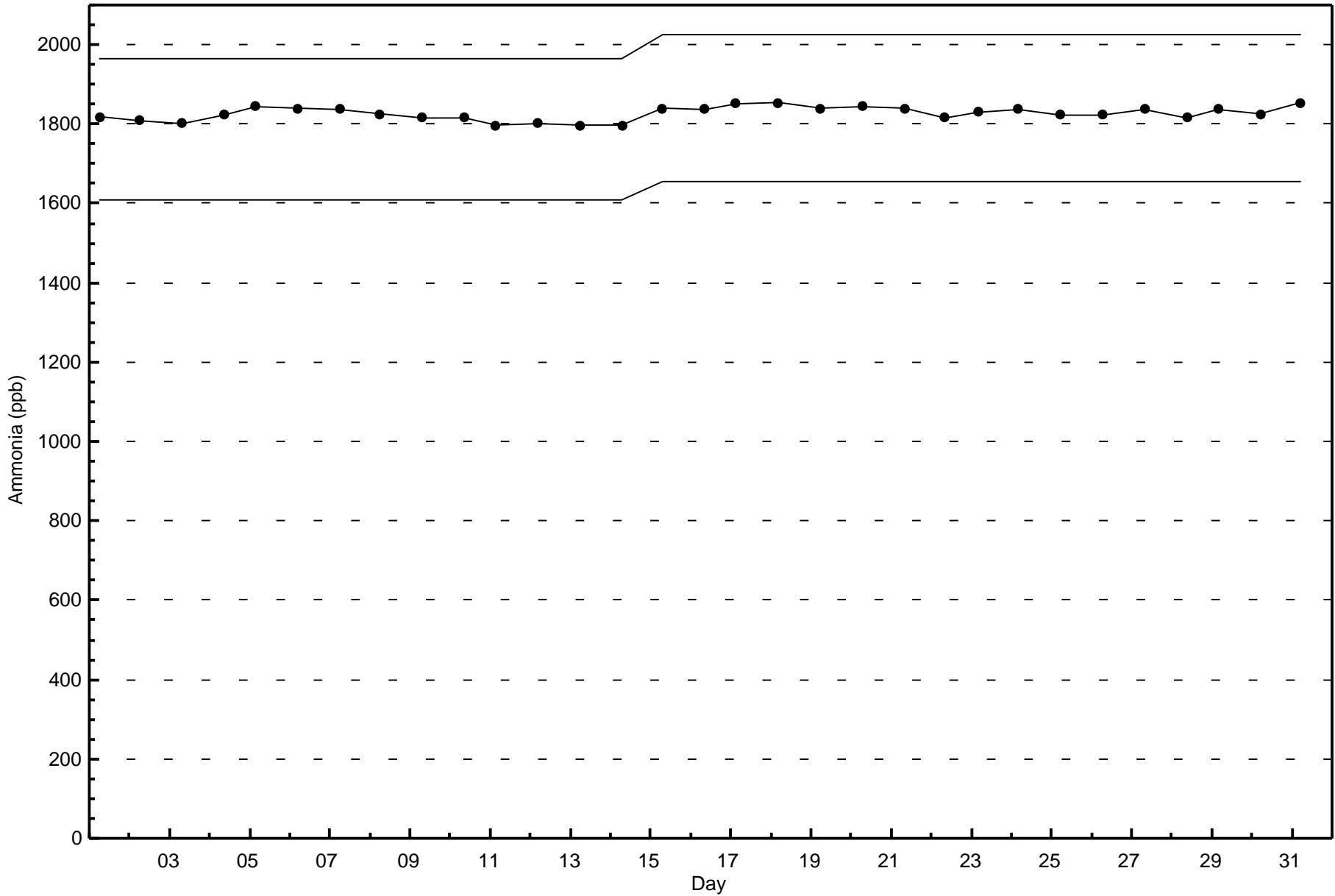
Total Number of Valid Hours: 656

Total Number of Hours: 744







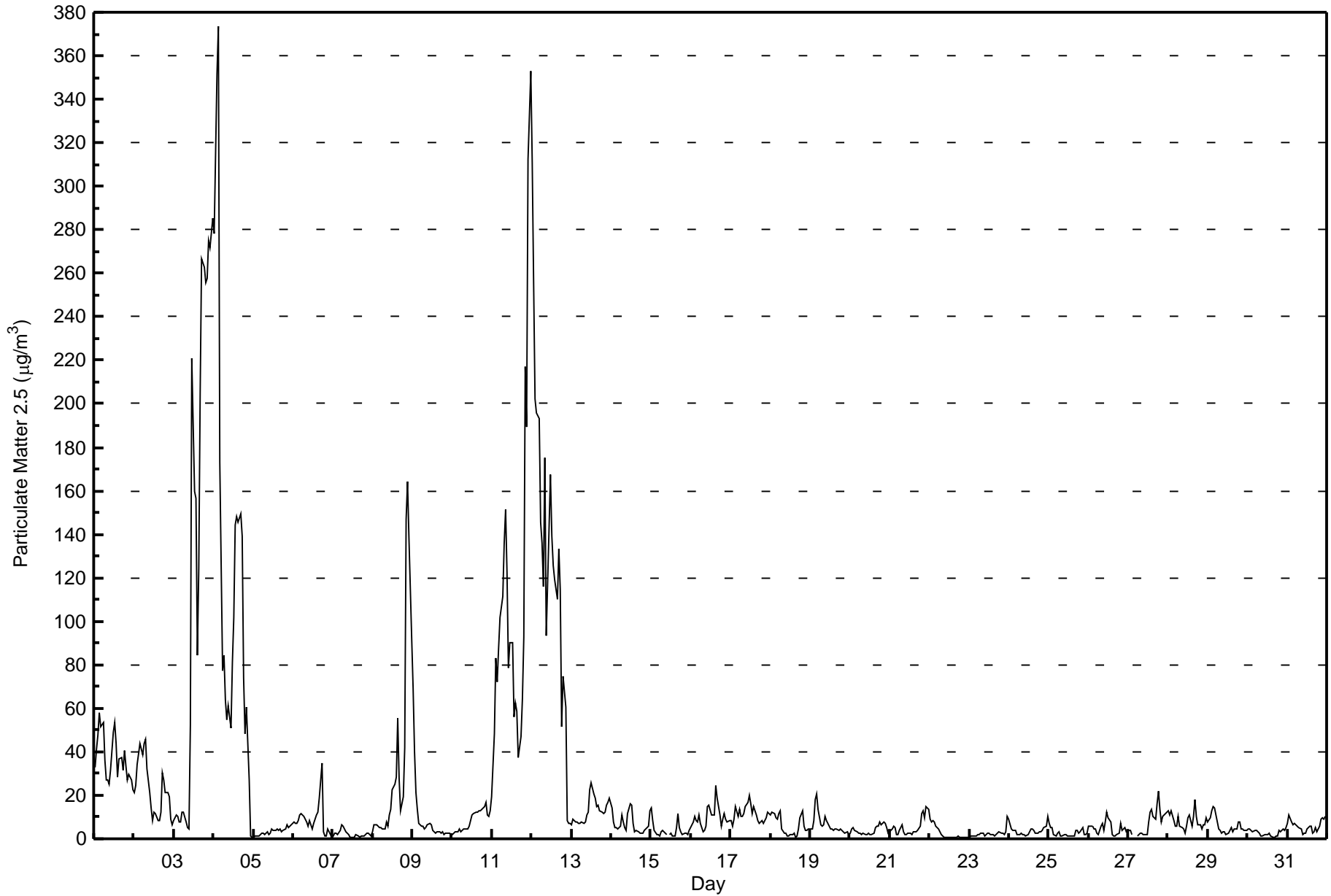




Summary of Hour Averages

Patricia McInnes - July 2015

Number of Exceedences (AAAQO): 24-hr: 6 Maximum Value: 373.5 µg/m <sup>3</sup> on Jul 4 04:00 Minimum Value: 0.3 µg/m <sup>3</sup> on Jul 22 12:00 Maximum Diurnal Average: 30.4 µg/m <sup>3</sup> at hour 4 Monthly Average: 23.63 µg/m <sup>3</sup>		Maximum Daily Average: 128.5 µg/m <sup>3</sup> on Jul 12 Minimum Daily Average: 2.2 µg/m <sup>3</sup> on Jul 7 Minimum Diurnal Average: 13.9 µg/m <sup>3</sup> at hour 10 Percentiles: P <sub>1</sub> = 0.5 P <sub>10</sub> = 1.7 Q <sub>1</sub> = 2.9 Median = 5.9 Q <sub>3</sub> = 12.8 P <sub>90</sub> = 60.6 P <sub>99</sub> = 261.7		Hours in Service: 744 Hours of Data: 741 Hours of Missing Data: 3 Hours of Calibration: 0 Percent Operational Time: 99.6																																													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jul	32.8	41.2	47.7	58.2	51.5	53.4	35.8	26.8	26.8	25.2	31.8	48.8	53.8	43.5	28.4	36.7	37.1	31.3	40.7	33.8	27.1	29.8	27.2	22.6	37.2	58.2																							
2-Jul	21.0	24.7	33.9	44.0	41.0	38.6	44.1	45.7	32.4	21.1	14.5	8.5	12.5	11.7	8.3	8.6	11.9	30.0	26.8	21.1	21.0	19.2	8.8	6.6	23.2	45.7																							
3-Jul	8.1	10.7	10.5	7.5	7.8	12.1	12.1	7.4	5.1	4.2	51.9	220.9	160.0	156.7	84.2	124.4	204.6	266.6	262.6	255.6	257.7	274.8	271.6	285.4	123.4	285.4																							
4-Jul	278.3	315.2	351.7	373.5	173.5	77.1	84.6	64.0	54.5	61.2	50.7	81.1	101.6	144.1	147.8	145.7	149.2	138.8	73.9	48.5	60.7	26.8	1.4	0.7	125.2	373.5																							
5-Jul	0.6	1.0	1.3	1.3	1.8	2.6	2.9	2.2	3.2	1.9	2.4	4.2	4.1	4.1	4.2	4.1	4.3	3.3	3.7	4.6	6.4	5.4	5.6	6.5	3.4	6.5																							
6-Jul	7.4	7.4	6.8	8.4	10.7	11.7	10.6	9.3	7.7	5.5	8.6	4.6	7.3	9.1	11.2	12.0	19.0	34.8	3.1	1.0	1.5	4.7	1.7	0.5	8.5	34.8																							
7-Jul	1.2	2.7	2.3	2.1	3.6	6.5	6.0	4.6	3.1	2.1	0.6	0.4	0.8	1.0	1.9	1.5	0.9	1.0	1.1	1.4	2.4	2.5	1.7	1.0	2.2	6.5																							
8-Jul	3.2	6.7	6.4	5.5	5.2	5.1	4.5	4.8	7.5	6.1	11.0	13.6	22.9	25.4	28.2	55.7	27.6	12.8	19.2	41.6	147.0	164.3	138.6	91.4	35.6	164.3																							
9-Jul	68.9	39.6	21.5	13.3	6.9	5.7	5.9	4.6	5.0	6.3	7.3	6.5	4.1	3.3	2.9	3.0	3.1	2.9	3.0	2.1	2.6	2.5	2.5	1.6	9.4	68.9																							
10-Jul	1.8	2.7	3.0	3.3	4.4	3.3	4.0	4.5	4.4	4.4	5.5	8.1	11.0	11.4	11.9	12.1	12.7	12.9	13.2	14.6	16.6	11.2	10.0	12.9	8.3	16.6																							
11-Jul	19.4	48.5	83.3	71.8	87.3	101.5	111.6	136.2	151.2	122.5	78.6	90.2	90.5	55.8	62.7	58.7	37.6	47.2	64.4	92.6	217.1	189.5	312.6	353.1	111.8	353.1																							
12-Jul	311.4	255.7	202.1	196.0	193.0	145.3	135.8	115.9	175.0	93.2	142.2	167.6	139.1	125.4	118.9	110.3	133.0	114.4	51.2	75.0	60.9	8.1	7.3	7.0	128.5	311.4																							
13-Jul	6.2	9.1	7.4	7.6	6.8	6.8	7.5	7.2	7.5	10.7	12.6	22.6	25.6	20.5	18.6	14.7	15.4	13.0	12.5	11.9	12.5	15.6	16.6	19.0	12.8	25.6																							
14-Jul	14.4	7.5	5.1	5.3	4.5	5.6	10.7	7.7	4.9	3.9	11.4	16.2	15.2	7.2	3.3	3.9	3.2	2.5	2.6	2.4	4.0	4.8	5.8	12.7	6.9	16.2																							
15-Jul	14.4	8.1	3.9	2.2	1.8	1.5	3.4	4.0	3.0	1.6	M	2.0	2.4	1.4	1.6	5.3	11.5	5.1	3.4	2.0	2.7	2.3	2.0	4.0	3.9	14.4																							
16-Jul	5.2	7.4	10.4	8.5	7.9	11.2	7.4	3.2	4.1	6.0	15.1	15.7	10.8	11.0	11.2	24.6	18.5	10.8	5.7	9.1	11.5	9.0	7.7	8.3	10.0	24.6																							
17-Jul	8.2	6.0	8.7	14.7	10.3	13.3	10.4	10.6	11.6	14.5	16.5	19.9	16.2	11.4	14.8	10.9	8.5	6.8	8.0	8.1	7.3	9.8	12.3	11.4	11.3	19.9																							
18-Jul	11.0	12.3	11.5	9.5	9.1	11.4	12.6	4.7	2.7	2.6	1.5	1.6	2.1	2.1	2.7	0.8	1.4	4.7	9.8	13.0	5.8	4.0	4.1	4.6	6.1	13.0																							
19-Jul	4.8	4.5	8.6	18.2	20.8	13.5	6.7	5.7	6.5	10.0	8.7	5.5	4.2	4.8	4.0	4.2	4.8	4.1	4.3	3.6	3.2	2.7	3.3	2.2	6.6	20.8																							
20-Jul	2.8	4.4	5.0	4.0	3.5	2.8	2.7	1.7	2.3	2.0	2.2	2.4	2.2	2.1	2.7	5.0	5.5	5.7	7.4	6.8	7.7	6.8	5.1	2.7	4.0	7.7																							
21-Jul	3.4	4.4	5.7	4.8	2.1	2.1	4.1	6.5	3.5	2.0	2.2	2.4	2.5	2.2	3.3	3.2	2.9	3.9	5.8	11.7	12.6	9.6	14.9	13.5	5.4	14.9																							
22-Jul	8.9	7.5	8.3	7.6	5.6	4.3	3.1	2.1	1.5	0.3	0.4	0.3	0.7	0.6	0.5	0.4	0.4	1.1	0.6	0.5	0.7	0.6	0.8	0.7	2.4	8.9																							
23-Jul	0.9	1.1	1.5	1.0	1.4	1.8	1.8	2.4	2.4	1.5	2.1	2.9	2.3	1.9	2.2	1.3	2.0	2.3	3.2	2.6	2.6	2.1	3.1	10.4	2.4	10.4																							
24-Jul	8.8	4.8	3.9	3.6	3.6	2.1	2.0	2.4	2.1	1.9	1.4	2.0	3.5	4.2	4.8	3.6	2.7	2.8	2.9	3.3	4.0	5.1	6.1	10.0	3.8	10.0																							
25-Jul	7.2	5.3	4.9	1.9	1.4	2.5	3.3	1.6	1.3	1.9	1.9	1.4	1.3	1.1	1.1	1.6	4.1	3.9	2.3	3.4	4.9	2.1	2.2	2.9	2.7	7.2																							
26-Jul	5.8	6.0	5.9	4.5	4.4	2.6	2.0	5.8	7.1	3.7	7.4	12.2	9.9	7.8	2.0	1.5	1.4	2.0	2.7	7.4	4.1	4.3	5.1	3.5	5.0	12.2																							
27-Jul	3.7	3.8	1.7	PF	PF	1.3	1.9	2.6	2.3	2.2	2.0	1.8	7.5	12.0	13.4	10.4	9.3	15.9	21.7	13.6	7.8	10.1	11.8	12.6	7.7	21.7																							
28-Jul	12.8	11.1	12.6	8.3	5.5	5.9	10.2	5.7	4.9	4.4	2.8	5.7	9.5	11.1	5.6	10.2	17.9	10.1	6.6	6.7	4.7	6.2	6.8	9.6	8.1	17.9																							
29-Jul	7.8	10.0	12.9	14.8	14.4	10.7	4.4	3.8	2.6	3.2	3.2	1.7	2.9	3.9	4.9	3.4	4.5	4.5	8.0	7.5	4.3	4.6	4.0	3.6	6.1	14.8																							
30-Jul	4.8	4.6	3.8	3.1	4.1	4.1	3.0	2.9	1.6	1.5	1.7	1.8	1.7	2.5	1.5	0.5	0.5	1.1	1.3	4.0	3.5	4.3	4.0	5.5	2.8	5.5																							
31-Jul	7.4	10.7	7.7	6.4	7.0	6.6	5.5	5.2	4.5	2.2	2.6	2.7	4.4	5.6	5.8	2.9	3.0	5.2	3.3	6.0	8.8	9.5	8.8	10.5	5.9	10.7																							
																								28.8	28.5	29.0	30.4	23.4	18.5	18.1	16.5	17.8	13.9	16.7	25.0	23.6	22.7	19.8	22.0	24.5	25.9	21.8	23.1	30.1	27.5	29.5	30.2	Diurnal Average	
																								311.4	315.2	351.7	373.5	193.0	145.3	135.8	136.2	175.0	122.5	142.2	220.9	160.0	156.7	147.8	145.7	204.6	266.6	262.6	255.6	257.7	274.8	312.6	353.1	Diurnal Maximum	
M - Maintenance      PF - Power Failure Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m <sup>3</sup>																																																	





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

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Patricia McInnes - July 2015**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
1 - 5	320	43.18	43.18
6 - 15	238	32.12	75.30
16 - 25	33	4.45	79.76
26 - 80	61	8.23	87.99
> 81.0	62	8.37	96.36

Total Number of Valid Hours: 741

Total Number of Hours: 744



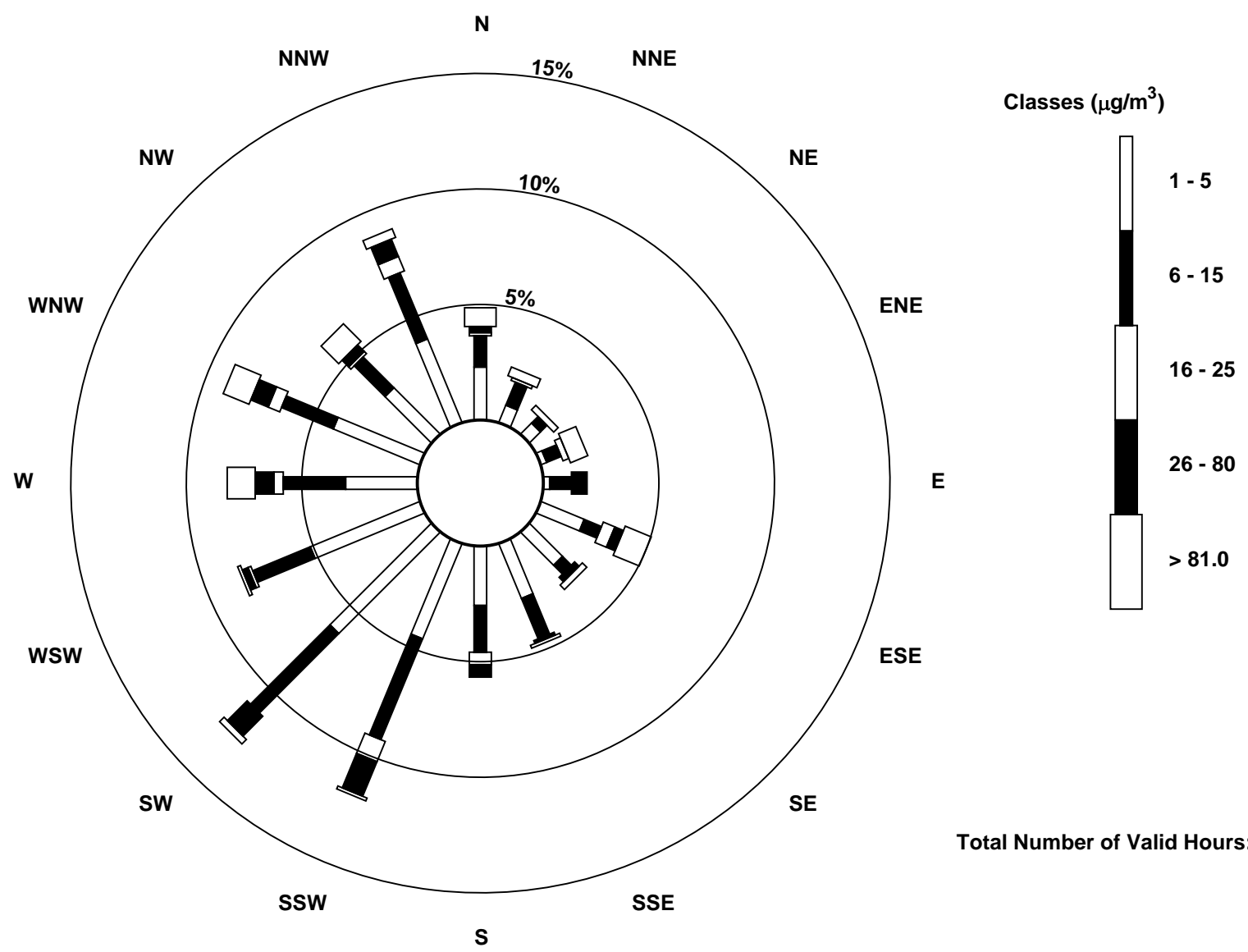
**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Patricia McInnes - July 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	6	5	2	2	15	15	19	19	33	46	38	23	30	21	29	320
6 - 15	10	8	3	5	7	6	4	14	15	35	36	20	20	18	14	23	238
16 - 25	1	1	0	2	0	4	0	0	4	7	0	1	3	4	1	5	33
26 - 80	2	0	0	0	5	3	2	1	4	12	9	2	6	6	3	6	61
> 81.0	6	3	2	6	0	9	2	1	0	1	2	1	9	9	8	3	62
<b>Totals</b>	<b>36</b>	<b>18</b>	<b>10</b>	<b>15</b>	<b>14</b>	<b>37</b>	<b>23</b>	<b>35</b>	<b>42</b>	<b>88</b>	<b>93</b>	<b>62</b>	<b>61</b>	<b>67</b>	<b>47</b>	<b>66</b>	<b>714</b>

Total Number of Valid Hours: 741

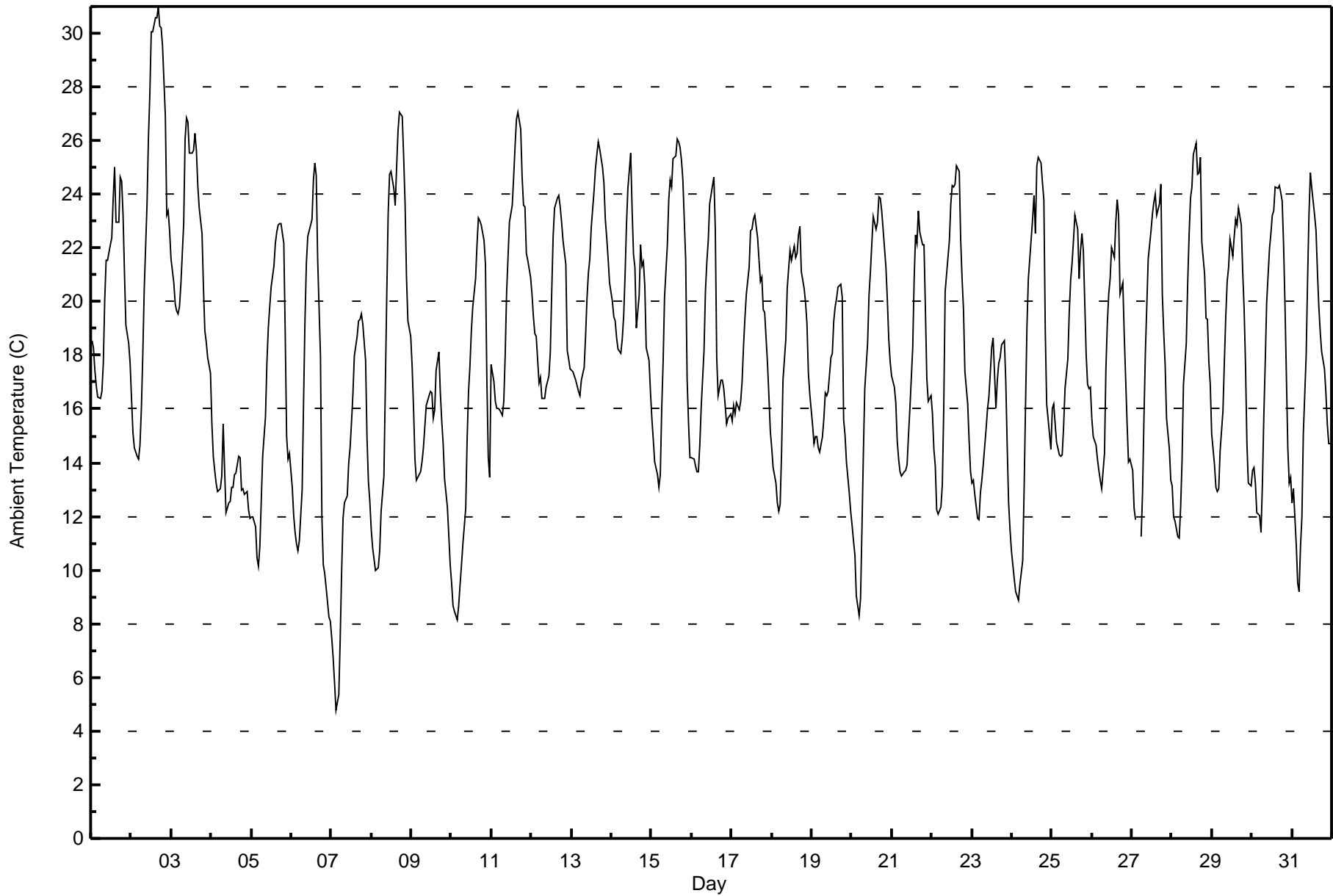
Total Number of Hours: 744



Total Number of Valid Hours: 741



Maximum Value: 31.0 C on Jul 2 17:00		Maximum Daily Average: 23.3 C on Jul 2		Hours in Service: 744																																												
Minimum Value: 4.8 C on Jul 7 04:00		Minimum Daily Average: 13.2 C on Jul 7		Hours of Data: 742																																												
Maximum Diurnal Average: 22.7 C at hour 15		Minimum Diurnal Average: 12.9 C at hour 5		Hours of Missing Data: 2																																												
Monthly Average: 18.13 C		Percentiles: P <sub>1</sub> = 8.1 P <sub>10</sub> = 12.1 Q <sub>1</sub> = 14.3 Median = 17.9 Q <sub>3</sub> = 22.1 P <sub>90</sub> = 24.3 P <sub>99</sub> = 30.0		Hours of Calibration: 0																																												
				Percent Operational Time: 99.7																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jul	18.5	18.3	17.4	16.9	16.4	16.4	16.7	17.7	20.1	21.6	21.5	22.1	22.4	23.8	25.0	23.0	23.0	24.6	24.5	23.2	21.1	19.1	18.4	17.7	20.4	25.0																						
2-Jul	16.4	15.1	14.6	14.2	14.1	14.7	16.0	18.0	20.4	23.7	26.1	27.8	30.1	30.0	30.6	30.6	31.0	30.3	30.2	29.5	26.9	23.2	23.4	22.6	23.3	31.0																						
3-Jul	21.6	20.7	19.9	19.7	19.5	19.8	20.6	22.9	26.1	26.9	26.7	25.5	25.6	25.6	26.3	25.6	24.3	23.5	22.5	20.6	18.9	18.5	17.9	17.4	22.4	26.9																						
4-Jul	15.5	14.2	13.7	13.3	12.9	13.0	13.5	15.4	13.7	12.1	12.5	12.6	13.1	13.1	13.6	13.6	14.2	14.2	13.0	13.0	12.8	13.0	12.2	11.9	13.3	15.5																						
5-Jul	12.0	12.0	11.6	10.5	10.1	10.9	12.6	14.2	15.7	17.7	19.0	19.8	20.6	21.3	22.2	22.6	22.9	22.9	22.9	22.1	18.8	15.0	14.1	14.4	16.9	22.9																						
6-Jul	13.1	12.0	11.4	11.0	10.7	11.1	13.0	16.3	19.3	21.4	22.4	22.9	23.1	24.5	25.2	24.7	21.6	17.9	12.0	10.2	9.9	9.4	8.3	8.1	15.8	25.2																						
7-Jul	7.5	6.7	5.8	4.8	5.4	7.5	9.9	11.9	12.5	12.8	14.0	14.6	15.5	16.6	18.0	18.7	19.3	19.3	19.6	19.2	17.8	14.9	13.3	12.6	13.2	19.6																						
8-Jul	11.5	10.8	10.0	10.0	10.1	10.7	12.2	13.5	16.9	20.2	23.3	24.8	24.9	24.2	23.6	25.0	26.4	27.1	26.9	25.4	23.6	20.9	19.3	18.7	19.2	27.1																						
9-Jul	17.6	16.0	14.1	13.3	13.4	13.7	14.0	14.6	15.3	16.2	16.5	16.7	16.6	15.7	16.0	17.4	18.1	16.6	15.5	14.7	13.4	12.4	11.3	10.2	15.0	18.1																						
10-Jul	9.5	8.7	8.4	8.2	8.7	9.4	10.2	11.0	12.3	14.9	16.6	17.6	18.9	19.8	20.9	22.1	23.1	23.0	22.8	22.3	21.4	17.1	14.2	13.4	15.6	23.1																						
11-Jul	17.7	17.0	16.3	16.0	16.0	16.0	15.7	16.3	18.0	20.3	21.7	23.0	23.6	24.6	25.8	26.8	27.1	26.4	24.6	23.6	23.5	21.8	21.5	20.9	21.0	27.1																						
12-Jul	20.3	19.4	18.8	18.7	17.0	17.2	16.4	16.4	16.4	16.8	17.2	18.1	20.4	22.4	23.5	23.9	24.0	23.5	23.0	22.3	21.4	18.2	17.9	17.5	19.6	24.0																						
13-Jul	17.4	17.4	17.1	16.9	16.7	16.5	17.1	17.5	18.7	20.1	21.1	21.6	22.8	24.1	25.0	25.5	26.0	25.7	25.0	24.4	23.1	22.4	21.6	20.7	21.0	26.0																						
14-Jul	20.0	19.5	19.3	18.7	18.2	18.1	18.6	19.4	21.0	22.8	24.2	25.5	23.4	21.8	21.3	19.0	20.2	22.1	21.4	21.5	20.6	18.3	17.8	16.7	20.4	25.5																						
15-Jul	15.7	14.9	14.1	13.6	13.1	13.5	16.0	17.7	20.2	22.1	23.8	24.5	24.3	25.3	25.4	26.0	25.9	25.7	25.3	24.5	21.6	17.1	15.5	14.2	20.0	26.0																						
16-Jul	14.2	14.2	13.9	13.6	13.6	14.7	16.1	18.2	20.4	21.5	22.3	23.6	24.3	24.7	22.7	17.9	16.5	17.1	17.1	16.8	16.1	15.4	15.6	15.8	17.8	24.7																						
17-Jul	15.6	16.1	15.8	16.2	16.0	16.3	17.0	18.3	19.4	20.3	21.3	22.7	22.7	23.1	23.2	22.4	21.5	20.7	20.9	19.7	19.6	17.7	16.5	15.2	19.1	23.2																						
18-Jul	14.6	13.8	13.2	12.5	12.2	12.5	14.4	17.1	18.6	20.5	21.2	21.9	21.6	22.0	21.6	21.8	22.5	22.8	21.1	20.5	20.0	19.2	17.3	16.5	18.3	22.8																						
19-Jul	15.4	14.7	15.0	15.0	14.5	14.4	15.0	15.7	16.6	16.5	16.7	17.9	18.1	19.3	19.8	20.1	20.5	20.6	20.2	15.6	15.0	14.0	12.9	12.2	16.5	20.6																						
20-Jul	11.6	11.1	10.6	9.1	8.3	8.9	11.6	14.3	16.7	18.5	20.2	21.1	22.2	23.2	22.7	23.0	23.9	23.8	23.4	22.7	21.3	20.0	18.6	17.8	17.7	23.9																						
21-Jul	17.3	16.8	16.3	14.8	14.1	13.7	13.5	13.7	13.7	13.9	15.0	16.0	18.3	20.8	22.5	22.2	23.4	22.6	22.1	22.1	19.7	17.1	16.3	16.5	17.6	23.4																						
22-Jul	15.8	14.5	13.9	12.2	12.1	12.3	13.2	16.0	20.4	21.0	22.3	23.7	24.3	24.3	24.4	25.0	24.8	22.3	20.9	19.7	17.4	16.2	14.8	13.7	18.6	25.0																						
23-Jul	13.2	13.4	12.8	11.9	11.9	12.9	13.3	13.9	15.3	16.0	16.4	17.3	18.3	18.6	16.0	17.1	17.7	17.9	18.4	18.6	17.0	14.6	12.5	11.5	15.3	18.6																						
24-Jul	10.7	9.6	9.2	9.0	8.9	9.4	10.3	13.0	16.1	19.1	20.9	22.3	23.1	23.9	22.5	25.1	25.4	25.2	24.4	23.8	18.9	16.2	15.1	14.5	17.4	25.4																						
25-Jul	16.0	16.2	15.5	14.7	14.3	14.3	14.3	15.4	16.8	17.9	19.6	20.8	21.4	22.3	23.2	22.7	20.9	21.9	22.5	21.9	18.0	16.9	16.8	16.8	18.4	23.2																						
26-Jul	15.7	15.0	14.6	14.1	13.7	13.4	13.1	14.4	17.5	19.2	20.3	20.9	22.0	21.6	23.0	23.8	23.2	20.3	20.7	18.7	17.1	15.5	14.0	14.2	17.7	23.8																						
27-Jul	13.7	12.3	11.9	PF	PF	11.2	12.9	15.7	18.1	19.8	21.6	22.7	23.3	23.7	24.0	23.2	23.6	24.4	20.3	18.8	17.7	15.6	14.5	13.4	18.3	24.4																						
28-Jul	13.2	12.0	11.8	11.3	11.2	12.3	14.1	16.9	18.4	20.7	22.5	23.8	24.3	25.5	25.9	24.7	24.8	25.4	22.2	21.0	19.4	19.4	17.8	16.9	19.0	25.9																						
29-Jul	15.1	13.9	13.1	12.9	13.0	14.4	15.9	17.8	19.5	20.7	21.3	22.3	21.7	22.4	23.0	22.8	23.5	22.9	21.1	19.8	17.6	14.7	13.3	13.1	18.2	23.5																						
30-Jul	13.7	13.8	13.2	12.2	12.0	11.4	13.3	15.8	17.8	20.0	21.9	22.5	23.2	23.4	24.3	24.2	24.3	24.1	23.8	22.1	19.9	14.5	13.2	13.4	18.3	24.3																						
31-Jul	12.5	13.1	10.9	9.5	9.2	10.9	12.0	15.1	18.0	20.7	23.2	24.8	24.2	23.2	22.7	21.1	19.8	18.9	18.1	17.5	16.6	15.4	14.7	14.7	17.0	24.8																						
																								14.9	14.3	13.7	13.2	12.9	13.3	14.3	15.9	17.7	19.2	20.4	21.3	21.9	22.4	22.7	22.6	22.7	22.4	21.5	20.5	18.9	16.9	15.8	15.3	Diurnal Average
																								21.6	20.7	19.9	19.7	19.5	19.8	20.6	22.9	26.1	26.9	26.7	27.8	30.1	30.0	30.6	30.6	31.0	30.3	30.2	29.5	26.9	23.2	23.4	22.6	Diurnal Maximum
PF - Power Failure																																																







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

**Ambient Temperature (AT) - C**  
**Patricia McInnes - July 2015**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	28	3.77	3.77
10 - 20	430	57.95	61.73
> 20	284	38.27	100.00

Total Number of Valid Hours: 742

Total Number of Hours: 744



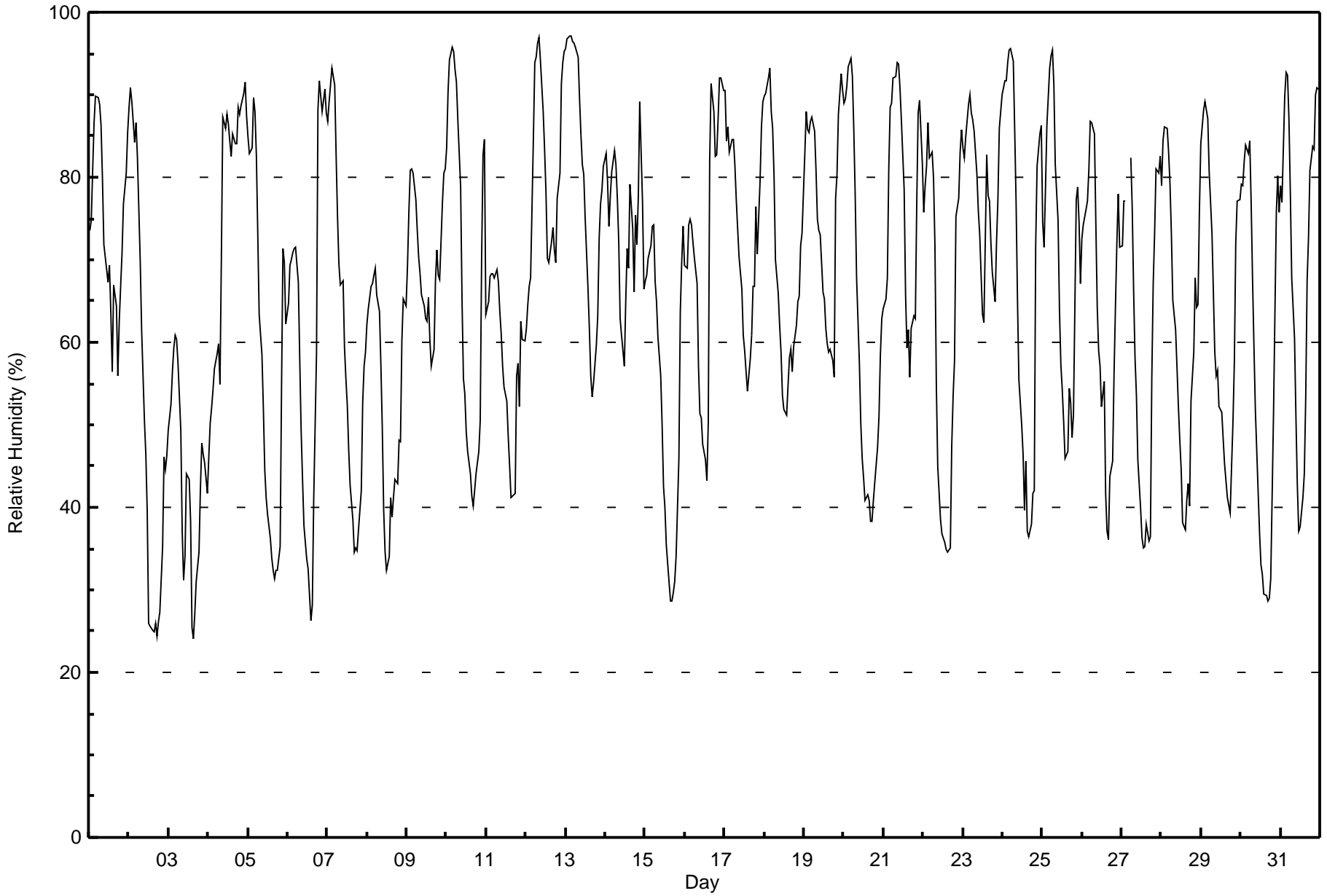
# Wood Buffalo Environmental Association

## Summary of Hour Averages

Relative Humidity (RH) - %

Patricia McInnes - July 2015

Maximum Value: 97 % on Jul 13 03:00																			Maximum Daily Average: 80.7 % on Jul 12						Hours in Service: 744																								
Minimum Value: 24 % on Jul 3 16:00																			Minimum Daily Average: 43.3 % on Jul 3						Hours of Data: 742																								
Maximum Diurnal Average: 83.2 % at hour 5																			Minimum Diurnal Average: 47.6 % at hour 15						Hours of Missing Data: 2																								
Monthly Average: 65.9 %																			Percentiles: P <sub>1</sub> = 26 P <sub>10</sub> = 38 Q <sub>1</sub> = 52 Median = 68 Q <sub>3</sub> = 82 P <sub>90</sub> = 89 P <sub>99</sub> = 96						Hours of Calibration: 0																								
																									Percent Operational Time: 99.7																								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jul	74	75	81	87	90	90	89	86	80	72	70	67	69	63	56	67	64	56	62	67	71	77	81	85	74.1	90																							
2-Jul	89	91	89	84	87	82	76	70	62	50	46	40	26	26	25	25	26	24	26	27	35	46	45	46	51.8	91																							
3-Jul	49	52	56	59	61	60	57	49	37	31	34	44	43	38	25	24	27	31	35	42	48	46	46	42	43.3	61																							
4-Jul	46	50	52	54	57	59	60	55	70	87	86	88	86	84	83	85	84	84	89	88	89	90	92	87	75.2	92																							
5-Jul	85	83	84	90	88	83	73	63	58	52	45	41	39	36	34	32	31	32	32	35	55	71	70	62	57.3	90																							
6-Jul	65	69	70	71	71	71	67	58	49	43	38	34	33	29	26	28	41	59	88	92	90	88	91	88	60.8	92																							
7-Jul	87	89	91	93	91	83	75	70	67	67	59	56	52	47	43	38	35	35	35	37	42	53	57	59	60.9	93																							
8-Jul	62	64	67	67	68	69	66	64	57	50	40	35	32	34	41	39	41	43	43	48	48	60	65	64	52.8	69																							
9-Jul	69	76	81	81	81	77	74	70	68	66	64	63	62	65	60	57	59	67	71	68	68	77	81	81	70.3	81																							
10-Jul	84	90	94	96	95	93	92	87	79	65	56	54	49	47	44	41	40	42	44	47	51	70	83	85	67.8	96																							
11-Jul	63	65	68	68	68	68	69	67	64	61	57	54	53	49	45	41	41	42	56	58	52	63	60	60	58.0	69																							
12-Jul	62	64	67	68	85	94	95	96	97	94	88	83	78	70	70	72	74	71	70	77	81	91	94	95	80.7	97																							
13-Jul	96	97	97	97	96	96	96	95	90	85	81	80	75	67	62	56	53	55	60	63	73	77	78	81	79.4	97																							
14-Jul	83	80	74	78	81	83	82	77	72	63	61	57	65	71	69	79	74	66	75	72	78	89	77	66	73.8	89																							
15-Jul	67	68	70	72	74	74	67	65	61	56	50	42	40	35	31	29	29	30	31	34	46	64	70	74	53.3	74																							
16-Jul	69	69	74	75	74	72	70	67	57	51	51	48	46	43	50	82	91	88	83	83	87	92	92	91	71.1	92																							
17-Jul	91	84	86	83	85	85	82	77	74	70	66	61	59	56	54	58	61	67	67	77	71	80	86	89	73.6	91																							
18-Jul	90	90	92	93	88	86	80	70	66	62	59	54	52	51	55	58	59	56	60	62	65	66	72	73	69.1	93																							
19-Jul	83	88	86	85	87	87	86	81	75	74	73	66	65	62	60	59	59	58	56	77	80	88	93	91	75.7	93																							
20-Jul	89	90	91	93	94	92	86	78	68	57	50	46	44	41	42	41	38	38	41	43	47	51	58	63	61.7	94																							
21-Jul	64	65	68	81	88	89	92	92	94	94	91	87	78	66	59	62	56	62	63	63	77	88	89	82	77.1	94																							
22-Jul	76	79	81	87	82	83	80	72	55	45	38	37	36	36	35	35	35	47	54	58	75	77	83	86	61.3	87																							
23-Jul	84	82	85	89	90	88	87	86	80	76	73	68	63	62	83	78	77	72	69	65	72	77	86	88	78.3	90																							
24-Jul	90	92	92	94	95	96	94	86	77	65	55	50	46	40	46	37	36	38	42	42	72	81	85	86	68.2	96																							
25-Jul	75	71	79	86	93	95	95	91	82	75	64	57	54	50	46	47	54	53	48	51	77	79	75	67	69.4	95																							
26-Jul	73	74	76	77	81	87	87	85	74	64	59	57	52	55	42	37	36	44	46	56	64	72	78	71	64.5	87																							
27-Jul	72	77	77	PF	PF	82	76	66	58	54	46	40	36	35	35	38	36	37	56	67	73	81	80	83	59.3	83																							
28-Jul	79	84	86	86	83	79	73	65	61	57	52	48	45	38	37	41	43	40	53	59	68	64	65	76	61.8	86																							
29-Jul	84	88	89	88	87	81	73	66	59	56	57	52	51	48	45	43	41	39	45	50	58	72	77	77	63.7	89																							
30-Jul	79	79	82	84	83	84	77	68	60	52	42	37	33	32	29	29	29	29	31	41	52	76	80	76	56.8	84																							
31-Jul	79	77	90	93	92	87	78	68	61	51	43	37	38	41	44	53	68	73	81	84	83	90	91	91	70.5	93																							
																								75.9	77.6	79.8	82.0	83.2	82.4	79.1	73.9	68.1	62.8	57.9	54.3	51.7	49.0	47.6	48.8	49.7	50.9	55.1	59.1	66.0	74.1	76.7	76.3	Diurnal Average	
																								96	97	97	97	96	96	96	96	97	94	91	88	86	84	83	85	91	88	89	92	90	92	94	95	Diurnal Maximum	
PF - Power Failure																																																	





Maximum Speed: 28 km/h on Jul 3 10:00	Maximum Daily Speed Average: 14.6 km/h on Jul 17	Hours in Service: 744
Minimum Speed Value: 0 km/h on Jul 11 00:00	Minimum Daily Speed Average: 1.6 km/h on Jul 28	Hours of Data: 742
Maximum Diurnal Speed Average: 6.7 km/h at hour 14	Minimum Diurnal Speed Average: 2.7 km/h at hour 1	Hours of Missing Data: 2
Monthly Average Velocity: 3.9 km/h 268.7 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 4 Q <sub>1</sub> = 6 Median = 9 Q <sub>3</sub> = 12 P <sub>90</sub> = 16 P <sub>99</sub> = 23	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-Jul	WNW2	ESE2	SSW8	SSW7	SSW6	SSW7	SW10	SSW9	SW8	W10	W8	W8	W8	W4	WNW6	NNW14	SW6	SSW8	SSW9	SW8	SW4	SW6	S5	SSW6	SW5.3	NNW14	
2-Jul	S5	S4	S6	SSW7	S6	S6	SSW8	SSW9	SSW10	SSW11	S11	S9	W11	WSW12	SW16	SSW12	SSW12	SW15	SW13	SSW8	S6	SSW6	SSW7	SSW7	SSW8.4	SW16	
3-Jul	SSW9	SSW10	SSW10	SSW10	SSW12	SW14	SW14	SW15	SW19	WSW28	WSW27	W24	WNW24	WNW22	NW24	NW23	NW22	NW17	WNW10	WNW6	WNW7	W7	W8	W9	W12.4	WSW28	
4-Jul	W9	WNW12	WNW13	W13	W15	WNW16	W15	WNW21	WNW16	NW8	NNW5	SW4	SW5	WSW7	W10	NW8	WNW5	NW6	W6	W8	NW9	NNW17	NNW20	N20	WNW9.6	WNW21	
5-Jul	N16	N17	NNW14	NNW13	NNW11	NW12	NW9	NW9	NW11	NNW11	NNW15	N15	NNW12	NNW13	NNW10	NW10	N10	NNW9	NNE6	ENE4	SSW3	SSW4	SW5	SW9	NNW8.6	N17	
6-Jul	SSW6	SSW8	SW11	SW11	S6	S9	SSW10	SW12	SW13	SW16	WSW16	W16	WSW15	WSW16	SW19	WSW17	NNW21	NNW26	N23	NNW20	NNW22	NNW13	WNW7	WNW10	W8.8	NNW26	
7-Jul	WNW10	WNW7	SW4	SSW4	WSW3	SSE2	W2	NE1	NW6	W10	WNW9	W13	NNW5	WNW8	NW5	W9	W12	W11	W9	WSW7	SSW5	SSW6	SSW7	SSW8	W5.6	W13	
8-Jul	SSW9	SSW9	SSW7	SSW8	S7	SSE8	S10	SSE9	SSE12	SSE13	S15	S14	S14	SSW11	SE14	SSE16	SSW15	W11	WNW11	WNW10	NNW20	NW14	WNW10	NW15	SSW6.0	NNW20	
9-Jul	NW16	NNW10	NW6	NNW8	NNW9	NNW9	NNW9	N7	NNE7	N6	NE1	NNW5	N8	N10	NE8	NE10	N15	N21	N21	N21	N17	NNW13	NNW10	NNW11	N10.0	N21	
10-Jul	NNW9	NW7	NNW8	NNW8	NNW9	NW7	NNW9	N10	N10	NNE3	NE5	NE8	NNE7	NNE4	N3	NW3	E1	NE7	NNE10	NNE10	NNE8	NNW4	WNW4	ENE0	N5.5	N10	
11-Jul	ESE10	ESE9	ESE8	ESE7	ESE7	SE9	ESE9	ESE9	ESE13	ESE13	SE12	ESE13	ESE13	E13	E10	E11	E12	E10	NNW9	NE6	ENE9	N7	ENE11	ENE12	E8.7	ESE13	
12-Jul	ENE10	ENE9	ENE10	NE5	NNW3	ESE6	SSW3	NNW6	NNE8	SE9	SSE9	NNE9	N10	NNE10	N12	N16	N18	N14	N10	N8	SW14	W16	NNW9	NW5	N5.2	N18	
13-Jul	ENE4	SSE4	WSW6	SW5	WSW6	SSW3	SSE4	SSE6	SSE6	SSW8	SW10	SSW9	SW11	W6	W7	W7	W2	S6	S7	S5	S3	ESE6	ESE8	ESE7	SSW3.9	SW11	
14-Jul	ESE5	ESE7	SE5	SE6	ESE6	ESE6	SSE6	S6	SSE7	SSE10	SSE6	ENE4	SSW12	SW9	WNW11	N11	SSE5	S4	S8	S6	SE4	SW4	SW10	WSW6	SSE4.0	SSW12	
15-Jul	SSW8	SW11	SW12	SW14	SSW6	SSW6	SSW6	SSW6	SSW8	S10	SE9	SSE10	WSW6	NNW7	SW3	SW14	SW18	SW16	SW14	SW12	SW9	SW6	SW6	SSW5	S3	SW8.1	SW18
16-Jul	SW4	S4	SSW5	SW4	SW6	WSW4	SSW4	WNW5	NW11	NW10	NNW13	N13	N16	N15	N9	SSW12	WSW16	W13	WNW14	WSW8	SSW7	NNW7	NW14	NW12	WNW5.7	WSW16	
17-Jul	WNW4	NNW13	NNW15	NNW20	NNW17	NNW15	N18	N20	NNW22	NNW23	NNW24	NNW22	NNW22	NNW24	NNW21	NW16	NNW20	NW12	NNW9	WNW7	NNW6	WNW3	W6	W4	NNW14.6	NNW24	
18-Jul	WSW4	SW8	SW10	SW10	SW10	SSW6	SSW12	SW11	SSW10	SW12	SW16	WSW14	SW17	WSW19	WSW15	SW11	WSW11	WSW15	W16	WSW16	W18	W17	WNW19	WNW16	WSW12.0	WSW19	
19-Jul	W19	W18	WNW17	WNW17	WNW16	WNW15	WNW14	WNW17	WNW20	WNW18	WNW13	NW20	NW16	NW16	NW16	NW16	NW15	NNW13	NNW15	NNW14	NW8	NW5	WNW5	W6	WNW13.9	WNW20	
20-Jul	WNW8	WNW7	WNW5	SW6	SSW7	SW7	SSW5	SSE8	S8	S8	SE7	SSE7	SE9	S8	ESE11	ESE8	SE7	E10	E12	E12	E10	E11	ESE11	ESE11	SE4.9	E12	
21-Jul	ESE14	ESE13	SE8	SE7	SE5	ESE10	ESE9	ESE5	ESE7	ESE9	ESE10	SSE5	SSW5	SSW3	SE4	NNW6	NW6	N9	NNE9	NNE6	NW3	SW5	SW6	SW8	ESE3.4	ESE14	
22-Jul	SSW5	SW3	SSE3	SSW4	SW5	SW7	WSW7	WSW4	ESE1	WNW8	NNE3	ENE2	SSE5	WSW10	SW11	W10	WSW10	WNW14	NW8	W11	WSW7	W8	SW6	SW9	WSW5.0	WNW14	
23-Jul	SW11	WSW11	WSW10	WSW11	WSW10	WSW9	SW8	WSW12	WNW10	NW14	NNW10	NW7	WNW6	NNE5	SSE6	NE4	ESE6	SE4	W2	WSW5	WNW6	W6	WSW6	SSW4	W4.9	NW14	
24-Jul	SSW3	SSW4	SSW4	SSW6	S7	S6	S6	SSE6	SE7	SE8	SSE8	S10	WSW6	SW8	SW10	SSW7	WSW7	W7	W4	S6	SSE2	WSW1	S1	W1	SSW4.4	S10	
25-Jul	SW5	SW9	SW10	WSW8	E3	S3	SSW6	SSW9	SW13	SW10	SW13	SW11	W12	W11	WSW13	SW13	NNW7	ENE6	E7	ESE5	SW3	SW4	SW7	WSW7	SW5.7	WSW13	
26-Jul	NW2	WSW2	SSW4	SW6	W7	SW3	SSW6	W5	NNW7	NNW10	NNE7	NW1	ENE3	W2	WNW17	WNW12	WNW11	NW23	SE2	SE11	SSE8	S5	SSW7	SW10	W3.2	NW23	
27-Jul	SSW5	S5	SSW7	PF	PF	SSW10	SW12	SW12	SW11	SSW12	SW12	WSW13	WSW16	WSW15	W19	WSW14	W13	WNW4	NNW13	NNW6	WSW6	WSW4	SW7	W4	WSW8.3	W19	
28-Jul	S5	S4	S6	SW9	WSW11	SW4	SSE5	ESE2	SSE4	SSW2	SE4	ESE3	NW4	WNW10	W7	N9	ENE9	ENE4	N16	ENE3	WNW8	SW7	W9	N12	W1.6	N16	
29-Jul	NW3	SW9	WSW7	NNE2	SE2	SSE4	SW8	WNW6	W5	WSW3	SW11	SW14	WSW16	W14	W14	WNW15	WNW14	W15	W22	WNW16	NW9	WNW3	SW1	WSW4	W7.8	W22	
30-Jul	W9	W7	WSW13	WSW12	SW5	SW9	WSW9	WSW7	WSW10	WSW11	WNW17	WNW19	W21	WNW21	WNW20	WNW20	WNW20	WNW19	WNW15	N13	NNE7	WNW3	SW5	SW6	W10.4	WNW21	
31-Jul	SSW4	E3	SSE2	SSW3	SSW5	SSW8	SSW8	S6	SE6	SSE7	SSE7	SSE5	SSW3	WNW4	NW8	NNE7	SSW1	SSE6	W5	WNW6	NW7	WNW5	W4	SW6	SSW2.2	SSW8	

WSW2.7	WSW2.7	WSW4.1	WSW4.6	WSW3.6	WSW3.4	SW4.3	WSW3.8	WSW3.4	WSW4.1	WSW3.6	W4.3	W5.6	W6.7	W6.3	WNW5.6	WNW5.5	WNW5.8	NW5.5	NW3.2	WNW3.3	WNW3.9	W3.7	W3.6	Diurnal Average
W19	W18	WNW17	NNW20	NNW17	WNW16	N18	WNW21	NNW22	WSW28	WSW27	W24	WNW24	NNW24	NW24	NW23	NW22	NNW26	N23	N21	NNW22	W17	NNW20	N20	Diurnal Maximum

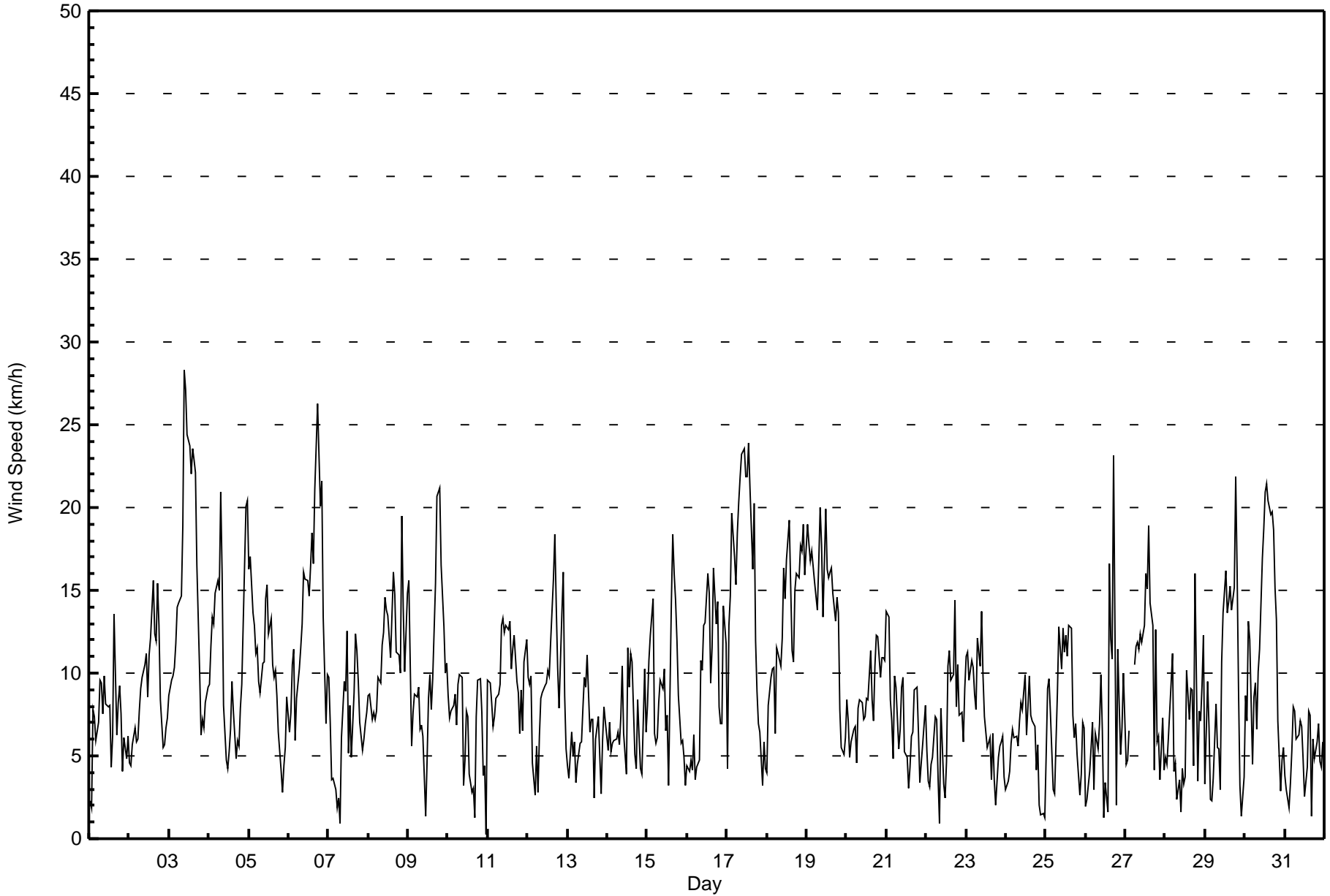
PF - Power Failure  
 All monthly, daily, and diurnal averages have been calculated using vector methods



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

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

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





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

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

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	161	21.70	21.70
6 - 11	373	50.27	71.97
12 - 19	169	22.78	94.74
20 - 28	39	5.26	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 742

Total Number of Hours: 744



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

**Wind Speed (WS) - km/h**  
**Patricia McInnes - July 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	1	5	5	8	3	7	8	14	14	26	20	11	12	13	9	5	161
6 - 11	15	14	5	7	7	24	13	20	25	53	52	31	31	26	21	29	373
12 - 19	16	0	0	1	4	6	2	3	3	9	26	22	19	25	14	19	169
20 - 28	6	0	0	0	0	0	0	0	0	0	0	2	3	9	4	15	39
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>38</b>	<b>19</b>	<b>10</b>	<b>16</b>	<b>14</b>	<b>37</b>	<b>23</b>	<b>37</b>	<b>42</b>	<b>88</b>	<b>98</b>	<b>66</b>	<b>65</b>	<b>73</b>	<b>48</b>	<b>68</b>	<b>742</b>

Total Number of Valid Hours: 742

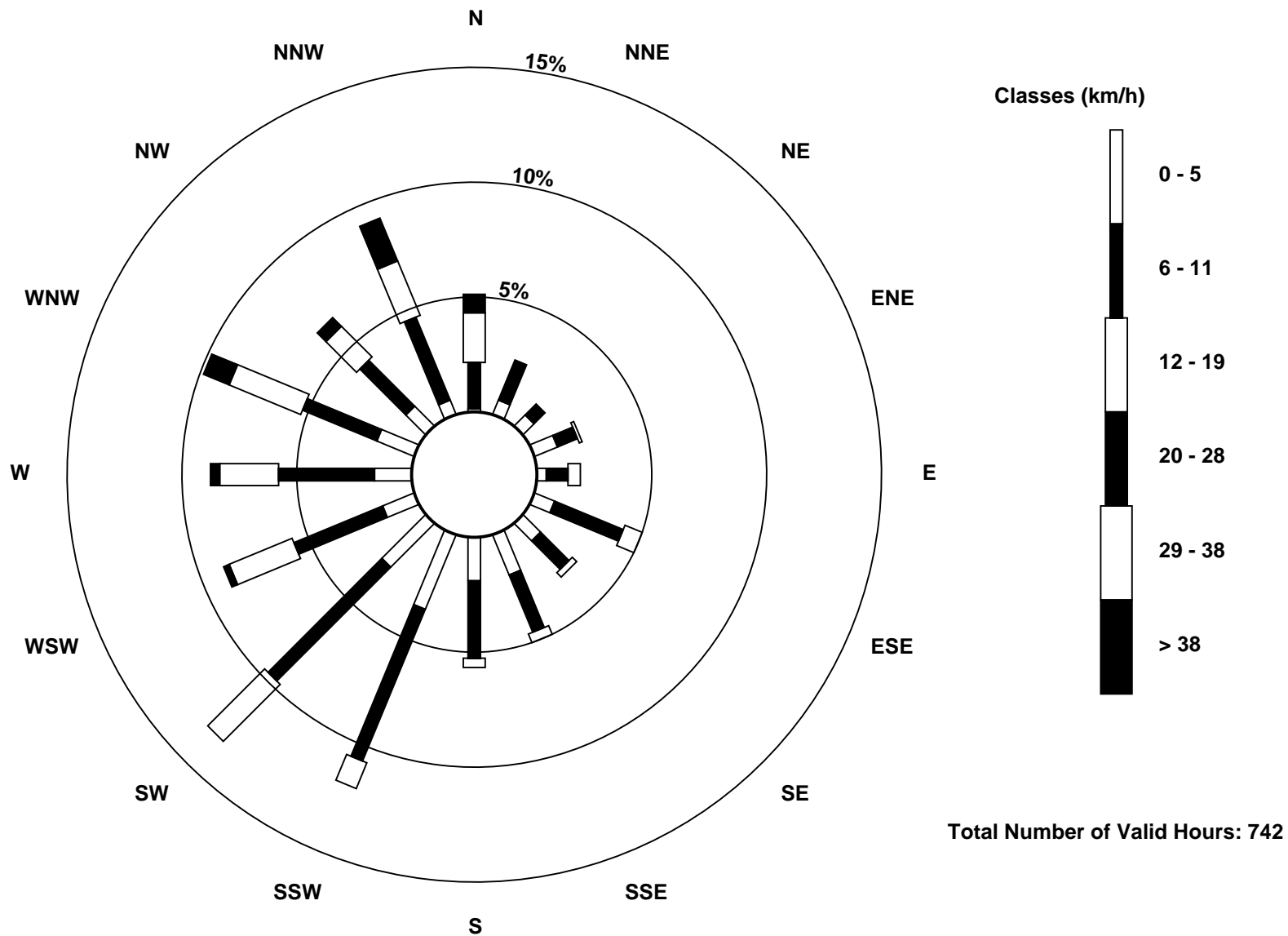
Total Number of Hours: 744





Wood Buffalo Environmental Association  
Wind Rose Jul 2015

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





# Wood Buffalo Environmental Association

## Summary of Hour Averages

Wind Direction (WD) - deg

Patricia McInnes - July 2015

Direction of Maximum Speed: 247 deg on Jul 3 10:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 333.9 deg on Jul 17	Hours of Data: 742
Direction of Minimum Speed: 71 deg on Jul 11 00:00	Hours of Missing Data: 2
Direction of Minimum Daily Speed Average: 1.6 deg on Jul 28	Percent Operational Time: 99.7
Monthly Average Direction: 265.9 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-Jul	300	120	200	208	212	209	215	211	218	264	261	268	273	278	302	344	219	213	205	217	231	220	185	196	233.2
2-Jul	177	178	190	201	181	177	198	204	210	210	187	182	263	251	222	200	208	219	214	204	177	198	200	202	206.7
3-Jul	204	209	207	207	209	219	220	221	228	247	257	259	288	285	306	312	311	306	300	295	288	281	267	276	263.6
4-Jul	262	288	290	280	277	286	277	284	301	309	339	233	222	245	272	324	290	313	266	278	305	329	343	351	296.4
5-Jul	350	354	342	330	333	326	323	322	305	337	337	355	336	332	335	318	358	338	12	63	192	212	222	225	333.8
6-Jul	209	211	227	229	187	185	207	220	220	233	254	261	245	243	233	257	328	332	357	338	335	329	287	287	271.2
7-Jul	285	285	223	208	238	148	274	50	306	264	283	277	333	282	315	267	271	268	264	253	207	203	208	206	263.6
8-Jul	209	200	201	193	170	161	169	164	165	167	169	173	173	196	146	163	198	261	282	299	332	308	300	313	203.3
9-Jul	320	334	317	344	345	332	346	4	24	3	42	341	350	359	45	56	6	352	349	2	354	342	344	336	352.4
10-Jul	338	326	333	331	331	323	339	354	359	20	38	38	25	14	6	311	89	53	27	26	27	339	302	71	358.9
11-Jul	112	117	123	121	102	125	123	111	119	115	124	116	111	92	84	82	96	99	339	41	76	11	69	67	98.2
12-Jul	68	57	66	40	347	115	199	343	16	145	151	26	359	13	4	4	1	4	356	9	236	268	339	323	8.7
13-Jul	66	166	238	233	242	207	151	168	160	210	218	198	233	273	269	273	274	182	176	175	180	117	120	117	199.6
14-Jul	117	122	130	138	117	121	149	176	159	155	152	73	205	218	297	8	147	171	178	173	145	185	226	250	167.6
15-Jul	213	220	222	228	206	206	204	198	184	144	155	240	328	231	229	235	223	235	218	234	219	223	213	191	217.3
16-Jul	223	169	210	214	228	247	203	291	306	315	343	351	349	351	360	199	253	263	287	252	203	327	323	318	295.7
17-Jul	292	337	333	336	341	347	352	350	342	337	334	336	335	332	338	322	332	326	328	295	346	282	262	261	333.9
18-Jul	245	220	231	226	229	200	209	216	208	214	229	242	226	241	249	229	237	255	266	257	259	278	286	287	243.3
19-Jul	278	281	288	294	295	292	287	303	301	299	296	304	317	312	306	316	314	343	329	347	317	304	283	269	303.2
20-Jul	284	297	285	219	213	223	207	167	179	179	141	150	137	179	117	121	133	80	93	96	96	96	102	112	136.6
21-Jul	113	117	146	126	125	117	102	114	113	111	106	161	194	212	138	339	323	7	23	18	325	224	216	220	115.4
22-Jul	194	228	147	197	221	220	244	246	113	301	24	62	161	247	215	259	250	290	319	272	248	276	221	234	248.6
23-Jul	231	246	242	237	243	256	232	249	288	312	341	319	302	14	163	50	118	131	274	240	284	275	252	205	261.9
24-Jul	197	203	197	207	184	176	175	164	144	135	166	178	254	236	232	208	247	268	264	176	166	247	174	277	199.0
25-Jul	228	218	227	247	93	191	205	202	215	221	231	264	263	238	236	348	63	80	108	221	230	224	247	247	228.7
26-Jul	321	238	204	234	259	225	206	280	347	347	18	320	67	259	299	301	297	320	133	138	160	189	213	225	278.2
27-Jul	197	188	201	PF	PF	208	215	228	221	209	219	248	239	245	259	253	275	295	335	328	238	253	232	262	241.4
28-Jul	173	180	181	235	244	216	158	123	156	209	130	103	306	293	279	350	64	61	356	76	282	214	277	350	277.8
29-Jul	306	231	238	12	131	166	233	285	270	237	217	236	245	267	272	293	292	267	267	287	310	291	218	241	263.7
30-Jul	269	275	244	243	236	219	239	253	253	254	283	289	276	284	291	295	291	294	293	8	31	295	223	222	277.7
31-Jul	203	85	149	198	206	196	198	174	137	158	153	163	209	298	325	27	202	168	268	297	315	294	268	218	209.6

251.5 245.0 237.6 245.4 245.4 223.8 225.1 242.3 246.0 244.3 242.8 266.4 275.9 279.4 278.8 290.8 293.7 303.0 309.2 310.2 294.5 281.7 268.4 272.0

Diurnal Average

PF - Power Failure

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



Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

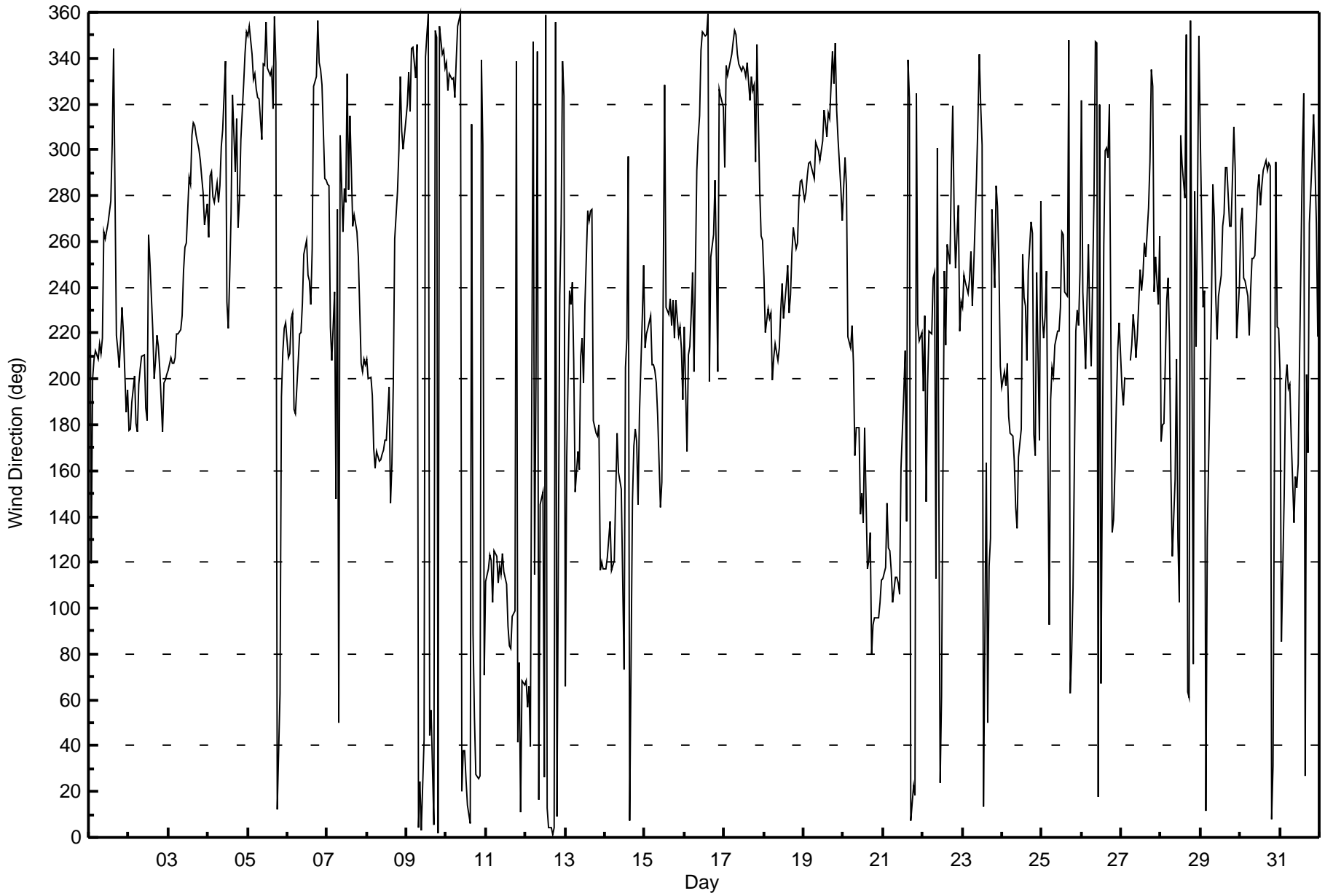
Wind Direction (WD) - deg

Patricia McInnes - July 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 103 deg on Jul 10 17:00	Hours of Data: 742
Minimum Value: 5 deg on Jul 5 23:00	Hours of Missing Data: 2
	Hours of Calibration: 0
	Percent Operational Time: 99.7
Percentiles: P <sub>1</sub> = 8 P <sub>10</sub> = 11 Q <sub>1</sub> = 14 Median = 20 Q <sub>3</sub> = 33 P <sub>90</sub> = 54 P <sub>99</sub> = 93	

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-Jul	63	76	15	14	20	17	11	13	22	16	13	20	19	51	52	21	24	25	16	13	34	10	21	19	76
2-Jul	21	16	17	17	18	20	17	15	14	16	23	38	33	19	24	24	30	13	20	20	10	16	11	14	38
3-Jul	13	10	11	11	12	10	11	14	16	14	17	15	18	17	15	13	13	12	10	11	18	10	14	18	
4-Jul	9	13	9	11	12	13	14	14	13	31	36	55	21	14	15	16	26	37	15	10	19	10	14	14	55
5-Jul	14	16	18	9	8	9	16	26	22	28	23	27	27	27	39	35	33	43	45	48	53	10	5	7	53
6-Jul	16	13	8	9	31	17	16	14	14	19	26	18	16	24	20	17	34	14	19	14	12	14	14	10	34
7-Jul	10	12	46	35	52	69	64	99	39	21	30	24	75	51	77	37	25	19	20	16	20	10	9	11	99
8-Jul	11	14	13	14	13	12	16	15	16	17	16	14	13	19	14	15	24	24	14	23	12	11	9	11	24
9-Jul	10	14	21	22	15	16	17	26	30	59	100	43	25	26	42	26	20	16	16	15	14	12	12	10	100
10-Jul	10	11	12	9	12	15	12	15	23	83	66	42	48	80	90	73	103	30	19	13	15	37	22	95	103
11-Jul	15	13	15	21	20	14	15	18	19	18	18	22	19	16	26	21	18	18	38	48	21	25	13	14	48
12-Jul	13	15	14	38	77	62	79	75	54	46	22	42	24	26	23	17	16	13	15	15	62	33	36	47	79
13-Jul	76	46	14	22	16	53	27	18	22	22	17	23	26	41	28	31	59	28	13	17	38	30	14	13	76
14-Jul	18	11	16	13	20	16	26	27	20	19	56	74	34	24	45	33	44	70	16	19	39	17	9	47	74
15-Jul	13	9	9	10	25	58	28	19	20	26	31	66	57	97	27	22	20	23	19	15	11	6	11	27	97
16-Jul	29	40	20	32	24	33	25	44	17	18	19	24	24	21	44	43	14	16	14	24	39	61	14	13	61
17-Jul	42	12	10	10	12	14	15	16	13	13	13	15	15	13	19	13	14	14	15	15	24	44	6	15	44
18-Jul	16	13	9	11	11	19	14	15	22	16	14	13	15	20	14	13	13	14	13	10	12	14	12	12	22
19-Jul	12	13	12	10	10	11	12	14	14	13	15	18	14	20	15	16	18	24	26	20	12	14	44	23	44
20-Jul	10	9	43	19	11	17	31	17	25	44	33	54	46	54	28	37	52	31	19	14	13	14	12	12	54
21-Jul	12	16	21	20	23	14	16	19	17	16	17	50	49	93	60	70	62	21	14	18	53	19	10	9	93
22-Jul	25	59	54	32	24	17	15	30	90	26	77	77	78	39	29	31	42	15	22	34	37	11	20	8	90
23-Jul	9	20	18	11	11	17	18	18	18	13	21	30	44	48	70	42	21	72	68	22	11	19	7	19	72
24-Jul	30	18	19	16	15	18	17	26	25	25	38	35	66	44	41	36	39	23	37	14	39	45	33	68	68
25-Jul	37	18	11	39	57	73	23	18	17	30	21	28	21	20	25	28	40	37	19	22	34	19	9	48	73
26-Jul	60	58	35	28	23	42	26	41	32	29	53	97	75	102	20	18	21	13	88	22	18	14	17	12	102
27-Jul	46	30	23	PF	PF	15	15	16	19	21	30	27	19	21	25	19	29	48	43	30	27	22	18	62	62
28-Jul	43	31	37	17	10	34	24	72	53	86	61	78	82	37	50	54	23	54	20	82	23	18	24	23	86
29-Jul	73	10	24	61	73	55	31	39	49	84	37	22	15	20	18	22	17	19	16	19	19	36	79	32	84
30-Jul	13	15	10	15	40	17	13	23	20	22	21	20	21	23	22	15	15	19	12	30	24	34	16	8	40
31-Jul	47	62	48	14	13	14	17	27	27	25	34	67	94	82	62	20	74	19	18	11	13	30	19	26	94
	76	76	54	61	77	73	79	99	90	86	100	97	94	102	90	73	103	72	88	82	62	61	79	95	
	Diurnal Maximum																								

PF - Power Failure





# Wood Buffalo Environmental Association

## SO2 Calibration Report

### Station Information

Calibration Date	July 8, 2015	Last Calibration	June 11, 2015
Station Name	Patricia McInnes	Station Number	AMS 6
Reason:	Routine		
Start Time (MST)	12:00	End Time (MST)	15:45
Gas Cert Reference	SA130110A	Station temp.	22 Deg C
Cal Gas Concentration	47 ppm	Cal Gas Exp Date	12/12/2016
Calibrator Make/Model	Sabio 4010	Serial Number	14300410
ZAG Make/Model	API 701	Serial Number	60
DACS make/model	Campbell Scientific CR3000	DACS serial No.	9036

### Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		PMT voltage	-677	-678
Analyzer IP address	192.168.1.43		Lamp voltage	769	764
Calculated slope	1.001268	1.001414	Chamber temp	45.0	45.1
Calculated intercept	0.862443	0.450365	Pressure	689.2	688.6
Analyzer Background	5.1	5.1	Flow	0.441	0.441
Analyzer Coefficient	0.999	0.999	Intensity	90	90

Analyzer make	Termo 43i	Analyzer serial #	1008841397
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### Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6000	0.0	0.0	0.2	----
as found span	6000	88.2	690.9	689.6	1.002
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	344.7	1.002
third point	6000	22.1	173.1	171.4	1.010
as left zero	6000	0.0	0.0	0.6	----
as left span	6000	88.2	690.9	685.7	1.008
Average Correction Factor					1.005

Corrected As found	689.4	Previous response	689.2	% change	0.0%
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**Notes:**

Sample inlet filter replaced after as founds. No adjustments.

Calibration Performed By:

Asad Hidayat



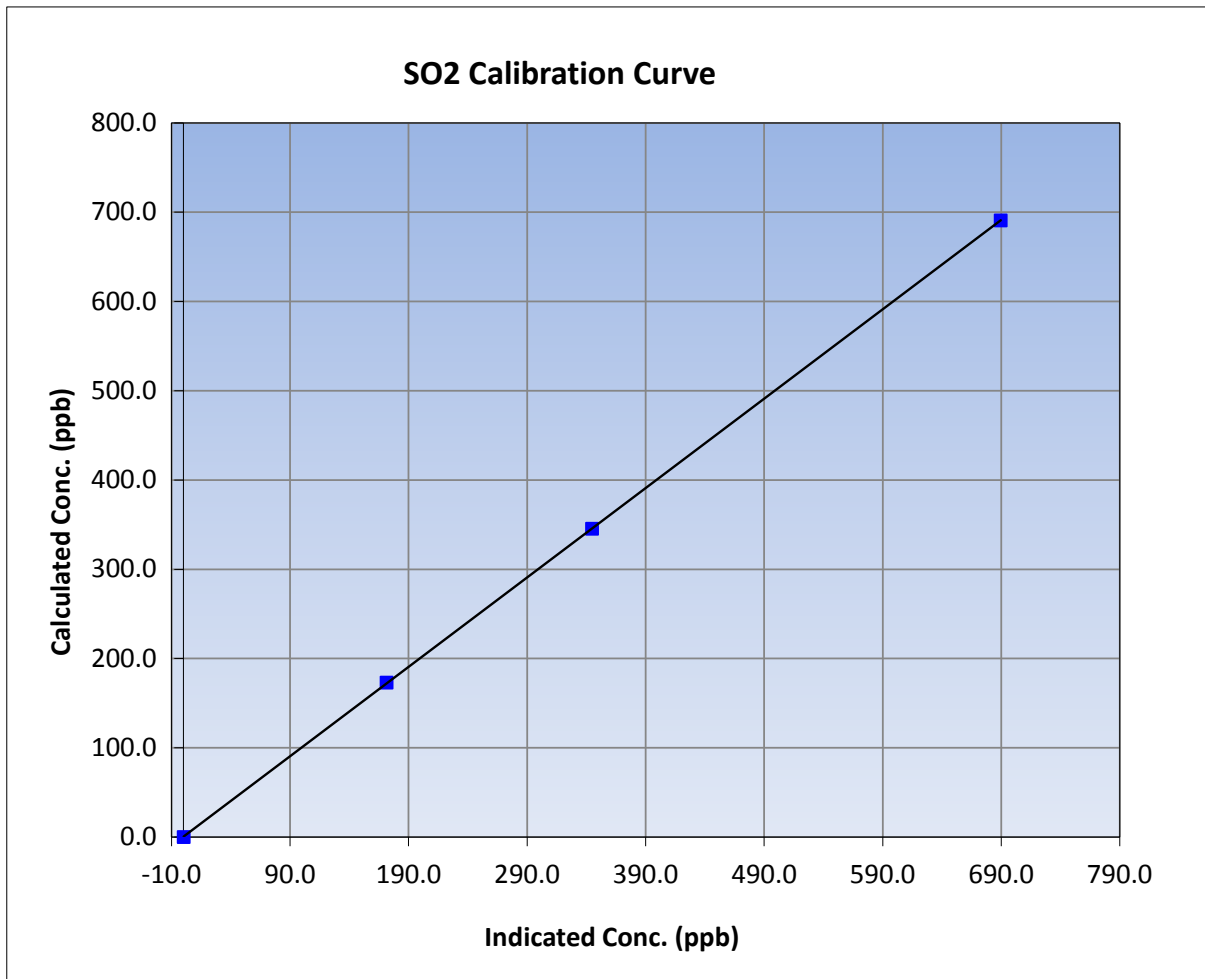
## Wood Buffalo Environmental Association SO2 Calibration Report

### Station Information

Calibration Date	July 8, 2015	Previous Calibration	June 11, 2015
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	12:00	End Time (MST)	15:45
Analyzer make	Termo 43i	Analyzer serial #	1008841397

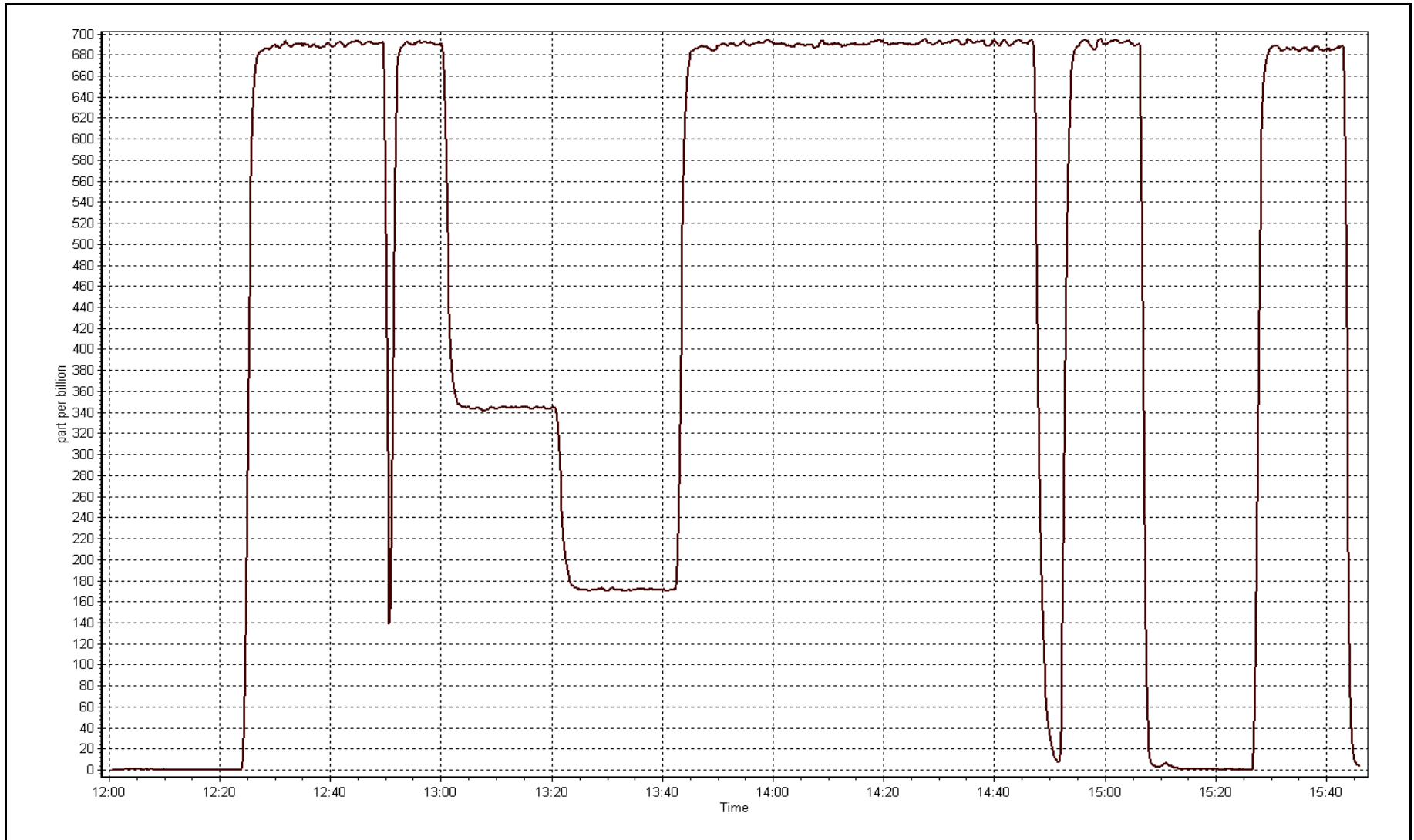
### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	----	Correlation Coefficient	0.999994
690.9	689.6	1.0018		
345.5	344.7	1.0022	Slope	1.001414
173.1	171.4	1.0099		
			Intercept	0.450365



SO2 Calibration Plot

Date: July 8, 2015





# Wood Buffalo Environmental Association TRS Calibration Report

## Station Information

Calibration Date	July 15, 2015	Last Calibration	June 24, 2015
Station Name	Patricia McInnes	Station Number	AMS 6
Reason:	Routine		
Start Time (MST)	8:45	End Time (MST)	12:20
Gas Cert Reference	ALM009562	Station temp.	22 Deg C
Cal Gas Concentration	4.84 ppm	Cal Gas Exp Date	05/02/2017
Calibrator Make/Model	Sabio 4010	Serial Number	14300410
Dil air Make/Model	API T701	Serial Number	60
DACS make/model	Campbell Scientific CR3000	DACS serial No.	9036
SO2 gas concentration	47 ppm	SO2 gas cert/exp	SA130110A December-12-16

## Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-720	-720
Analyzer IP address	192.168.1.42		Lamp voltage	986	980
Calculated slope	0.999319	1.004959	Chamber temp	45	45
Calculated intercept	-0.239704	-0.103104	Pressure	685.1	681.8
Analyzer Background	2.32	2.48	Flow	0.433	0.431
Analyzer Coefficient	1.281	1.367	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	0.0	----
as found span	6000	86.8	70.0	64.8	1.081
SO2 scrubber check	6000	22.1	173.1	1.3	----
calibrator zero	6000	0.0	0.0	0.0	----
high point	6000	86.8	70.0	69.7	1.005
second point	6000	43.4	35.0	35.2	0.995
third point	6000	22.3	18.0	18.0	1.002
as left zero	6000	0.0	0.0	0.5	----
as left span	6000	86.8	70.0	69.2	1.011
Average Correction Factor					1.001

Corrected As found	64.8	Previous response	70.3	% change	8.5%
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**Notes:**

Filter changed after As Found, span adjusted. Percent change of 8.5% investigated. Diagnostics very steady over the month. Filter not too dirty from recent smoke from close fires. Will discuss with senior techs on further action.

Calibration Performed By: Ryan Power





# Wood Buffalo Environmental Association TRS Calibration Report

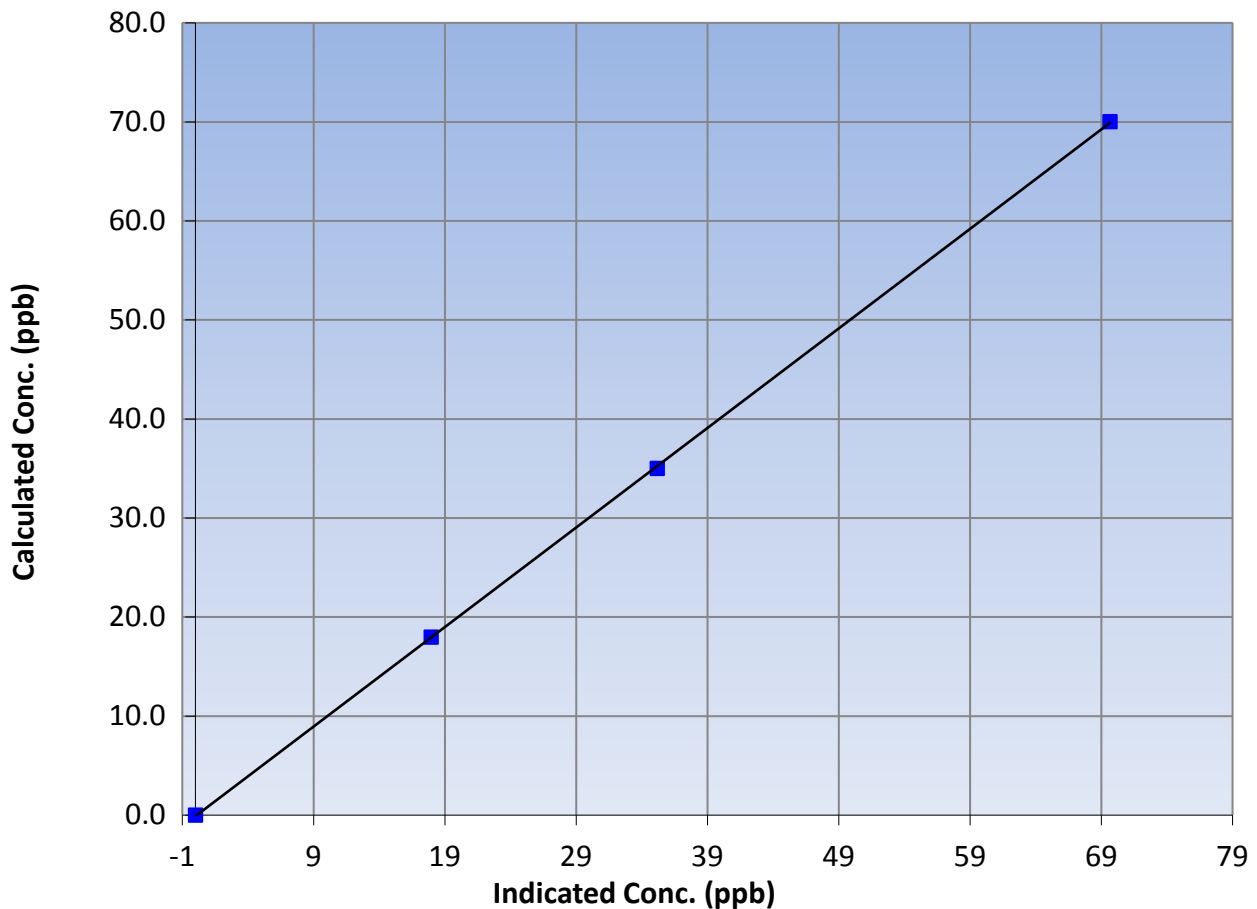
## Station Information

Calibration Date	July 15, 2015	Previous Calibration	June 24, 2015
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	8:45	End Time (MST)	12:20
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1218153358

## Calibration Data

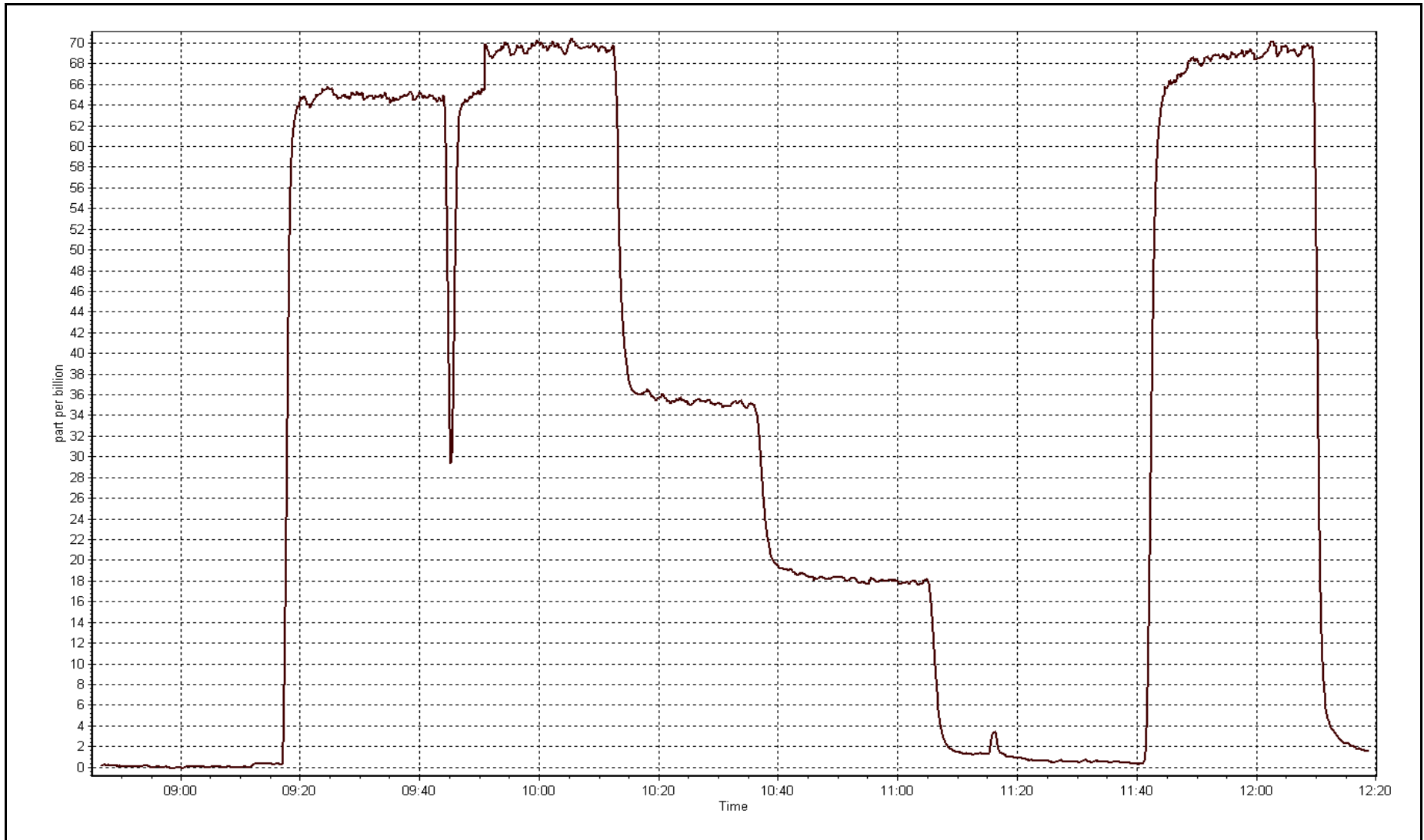
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999967
70.0	69.7	1.0051		
35.0	35.2	0.9949	Slope	1.004959
18.0	18.0	1.0016		
			Intercept	-0.103104

**TRS Calibration Curve**



TRS Calibration Plot

Date: July 15, 2015





## Wood Buffalo Environmental Association THC / NMHC Calibration Report

### Station Information

Calibration Date	July-08-15	Last Calibration	June-11-15
Station Name	Patricia McInnes	Station Number	AMS 6
Reason:	Routine		
Start Time (MST)	12:00	End Time (MST)	15:52
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	175.1
Analyzer IP address	192.168.1.55		Flame Temp	405.0	405.0
THC Calc slope	0.998977	0.994968	Carrier Pressure	34.5	34.5
THC Calc intercept	0.053946	0.039645	Fuel Pressure	42.3	42.3
NMHC Calc slope	0.999536	0.994118	Air Pressure	32.4	32.4
NMHC Calc intercept	0.032158	0.019912			

Analyzer make Thermo 55i Analyzer serial # 1331259521

### THC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6000	0.0	0.00	0.00	----
as found span	6000	88.2	16.06	16.12	0.996
calibrator zero	6000	0.0	0.00	0.00	----
high point	6000	88.2	16.06	16.12	0.996
second point	6000	44.1	8.03	8.00	1.004
third point	6000	22.1	4.02	3.97	1.013
as left zero	6000	0.0	0.00	0.00	----
as left span	6000	88.2	16.06	16.07	0.999
Average Correction Factor					1.004

Corrected As found 16.12 Previous response 16.02 % change -0.6%

**Notes:**

Inlet filter replaced after as founds. No adjustments.

Calibration Performed By: Asad Hidayat



# Wood Buffalo Environmental Association

## THC / NMHC Calibration Report

### NMHC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6000	0	0.00	0.00	----
as found span	6000	88.2	8.53	8.57	0.995
calibrator zero	6000	0.0	0.00	0.00	----
high point	6000	88.2	8.53	8.57	0.995
second point	6000	44.1	4.26	4.26	1.001
third point	6000	22.1	2.14	2.11	1.013
as left zero	6000	0.0	0.00	0.00	----
as left span	6000	88.2	8.53	8.54	0.999
Average Correction Factor					1.003

Corrected As found      8.57      Previous response      8.50      % change      -0.8%

### CH4 Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6000	0	0.00	0.00	----
as found span	6000	88.2	7.53	7.55	0.997
calibrator zero	6000	0.0	0.00	0.00	----
high point	6000	88.2	7.53	7.55	0.997
second point	6000	44.1	3.76	3.74	1.006
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	7.53	1.000
Average Correction Factor					1.007

Corrected As found      7.55      Previous response      7.52      % change      -0.4%



# Wood Buffalo Environmental Association

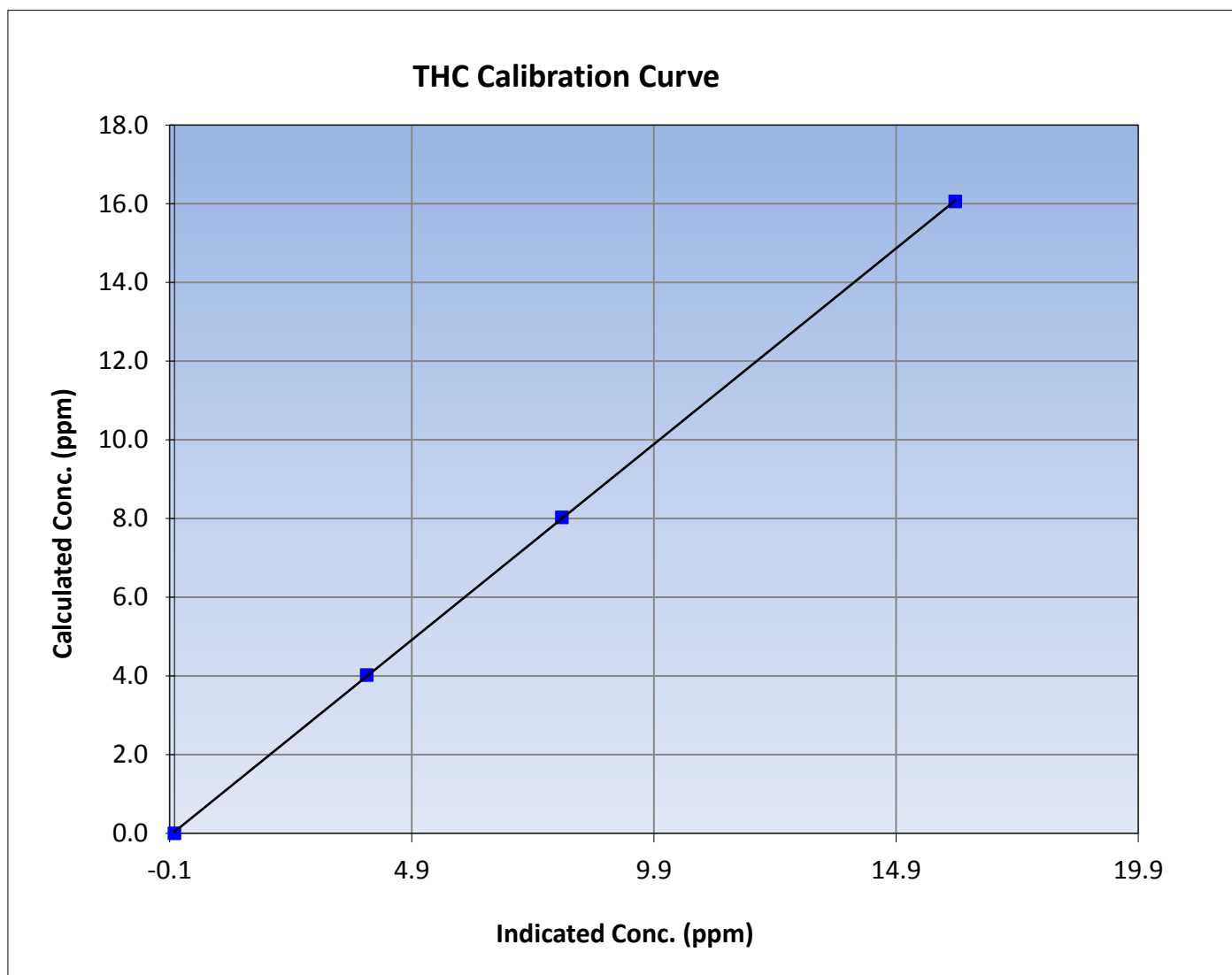
## THC Calibration Summary

### Station Information

Calibration Date	July 8, 2015	Previous Calibration	June 11, 2015
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	12:00	End Time (MST)	15:52
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	0.999972
16.06	16.12	0.9960		
8.03	8.00	1.0035	Slope	0.994968
4.02	3.97	1.0134		
			Intercept	0.039645





# Wood Buffalo Environmental Association

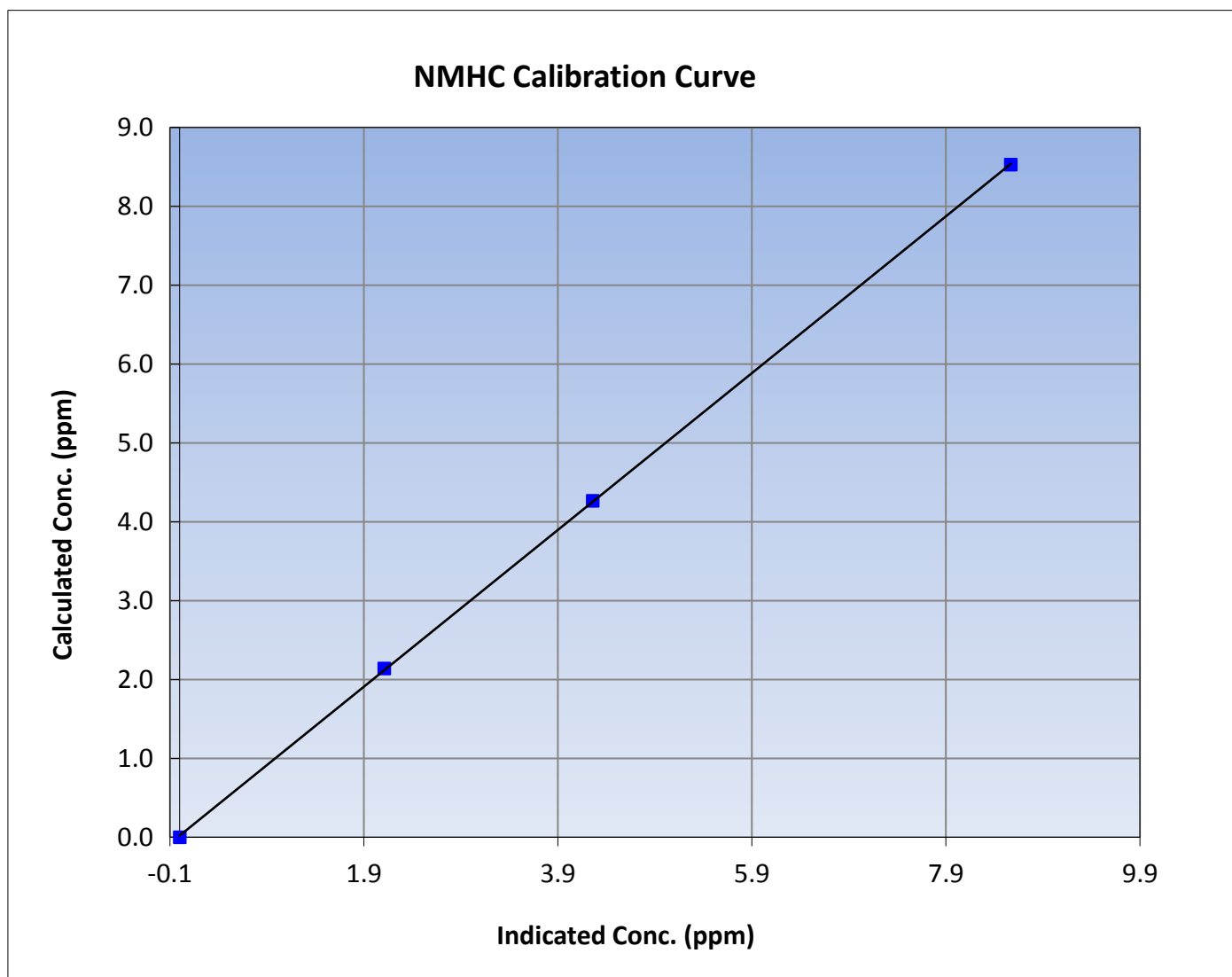
## NMHC Calibration Summary

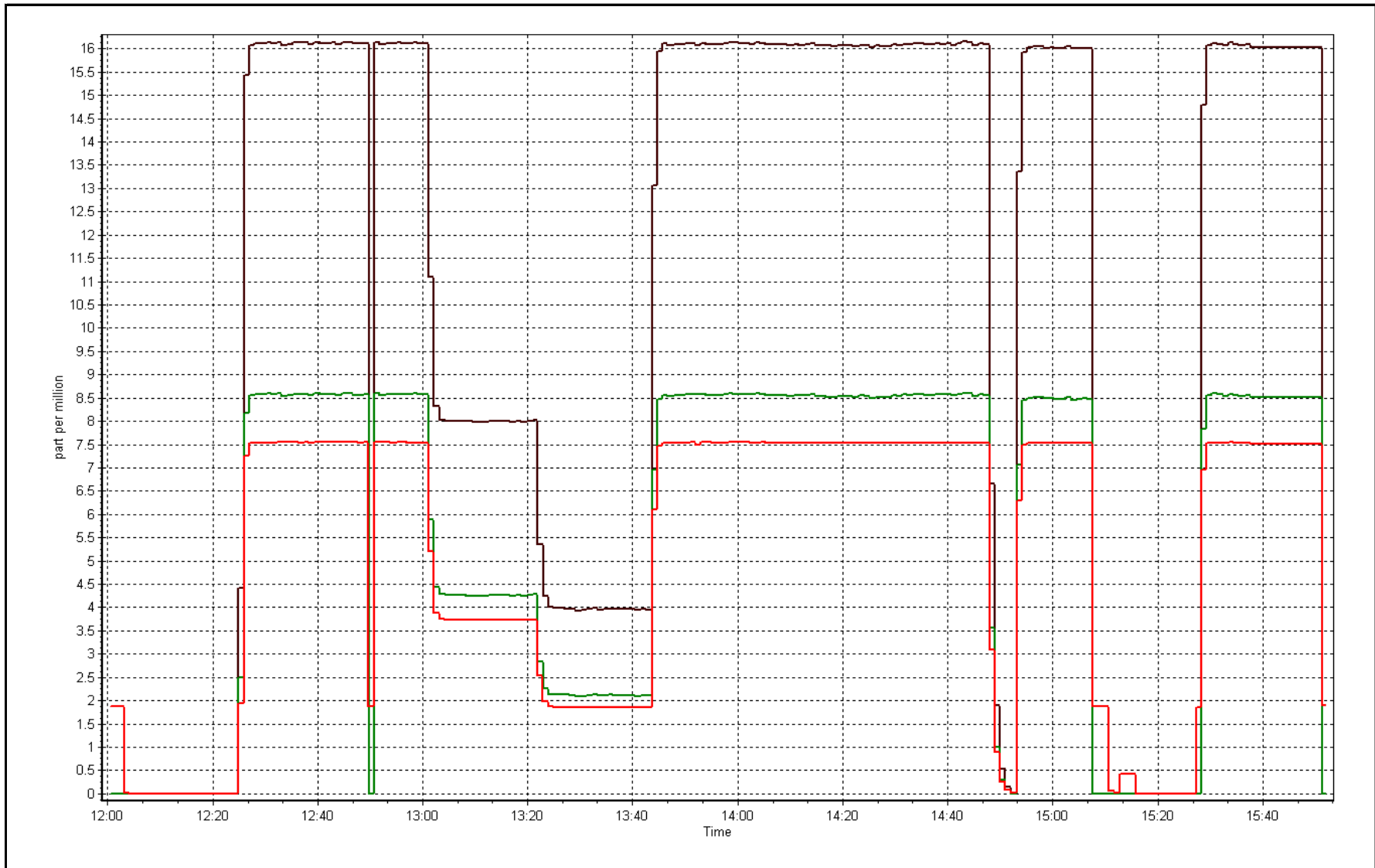
### Station Information

Calibration Date	July 8, 2015	Previous Calibration	June 11, 2015
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	12:00	End Time (MST)	15:52
Analyzer make	Thermo 55i	Analyzer serial #	1331259521

### Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999975
8.53	8.57	0.9953		
4.26	4.26	1.0011	Slope	0.994118
2.14	2.11	1.0129		
			Intercept	0.019912







# Wood Buffalo Environmental Association

## O<sub>3</sub> Calibration Report

### Station Information

Calibration Date	July 13, 2015	Previous Calibration	June 12, 2015
Station Name	Patricia McInnes	Station Number	AMS 6
Reason:	Routine		
Start Time (MST)	9:40	End Time (MST)	12:48
NO2 GPT Ref date	July-08-15	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.	26.7	27.7
Analyzer IP address	192.168.1.48		Lamp temp.	53.5	53.5
Calculated slope	0.999637	1.007251	Pressure	655.5	660.5
Calculated intercept	-1.238425	-0.859818	Flow cell A	0.696	0.703
Analyzer Background	-1.5	-1.5	Flow cell B	0.721	0.725
Analyzer Coefficient	0.925	0.925	Cell A Intensity	81800	80750
			Cell B Intensity	76500	75450

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	0.3	----
as found span	6000	0.783	346.3	345.2	1.003
calibrator zero	6000	0.00	0.0	0.3	----
high point	6000	0.783	346.3	344.4	1.006
second point	6000	0.522	218.6	218.0	1.003
third point	6000	0.261	92.8	93.7	0.991
as left zero	6000	0.00	0.0	0.2	----
as left span	6000	0.783	346.3	343.0	1.010
Average Correction Factor					1.000

Corrected As found	344.9	Previous response	347.7	% change	0.8%
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**Notes:**

Filter changed after As Finds. No adjustments. GPT points run prior to calibration to confirm NO2 values.

Calibration Performed By:

\_\_\_\_\_  
Ryan Power





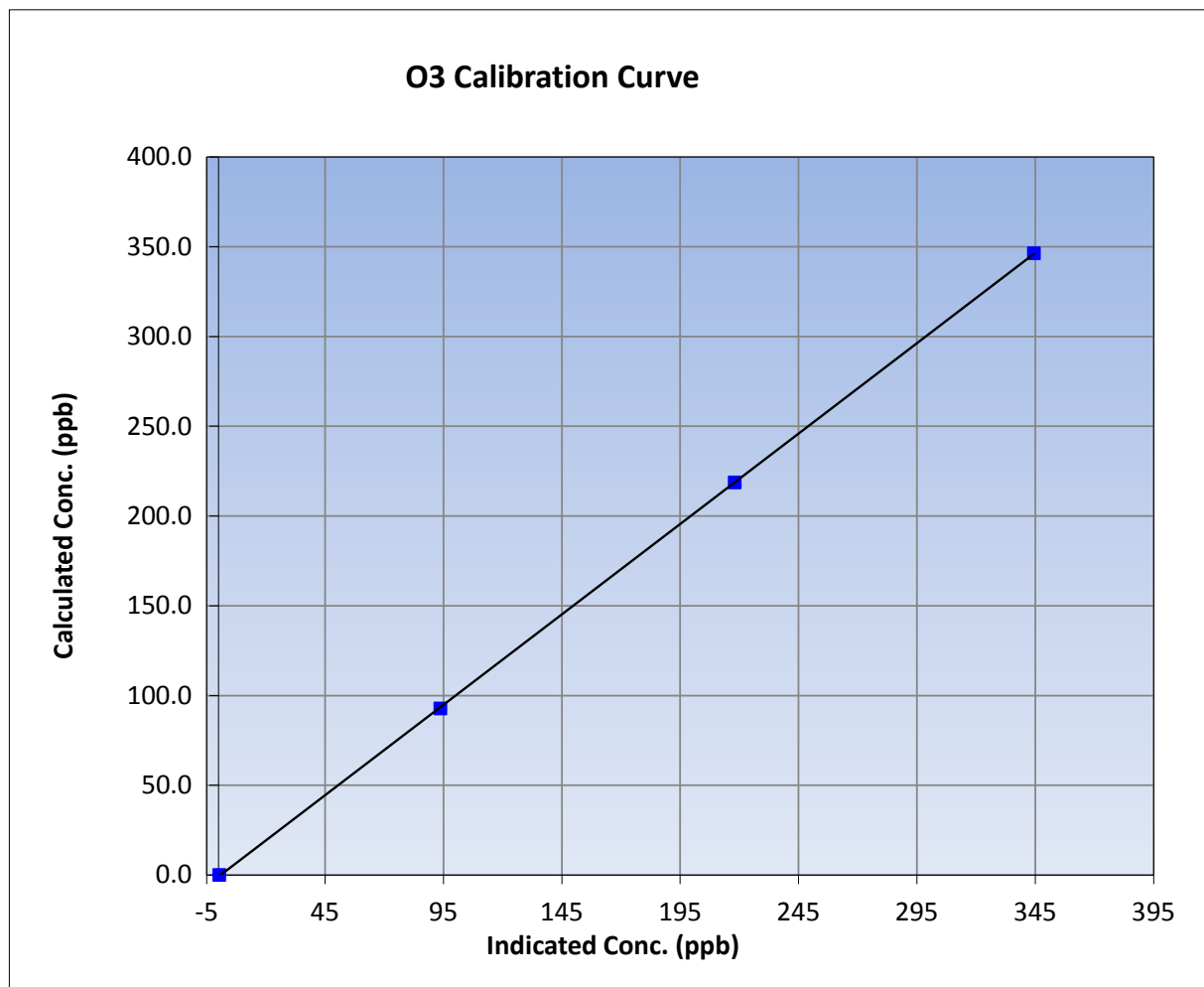
## Wood Buffalo Environmental Association O3 Calibration Report

### Station Information

Calibration Date	July-13-15	Previous Calibration	June 12, 2015
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	9:40	End Time (MST)	12:48
Analyzer make	Thermo 49i	Analyzer serial #	1300156234

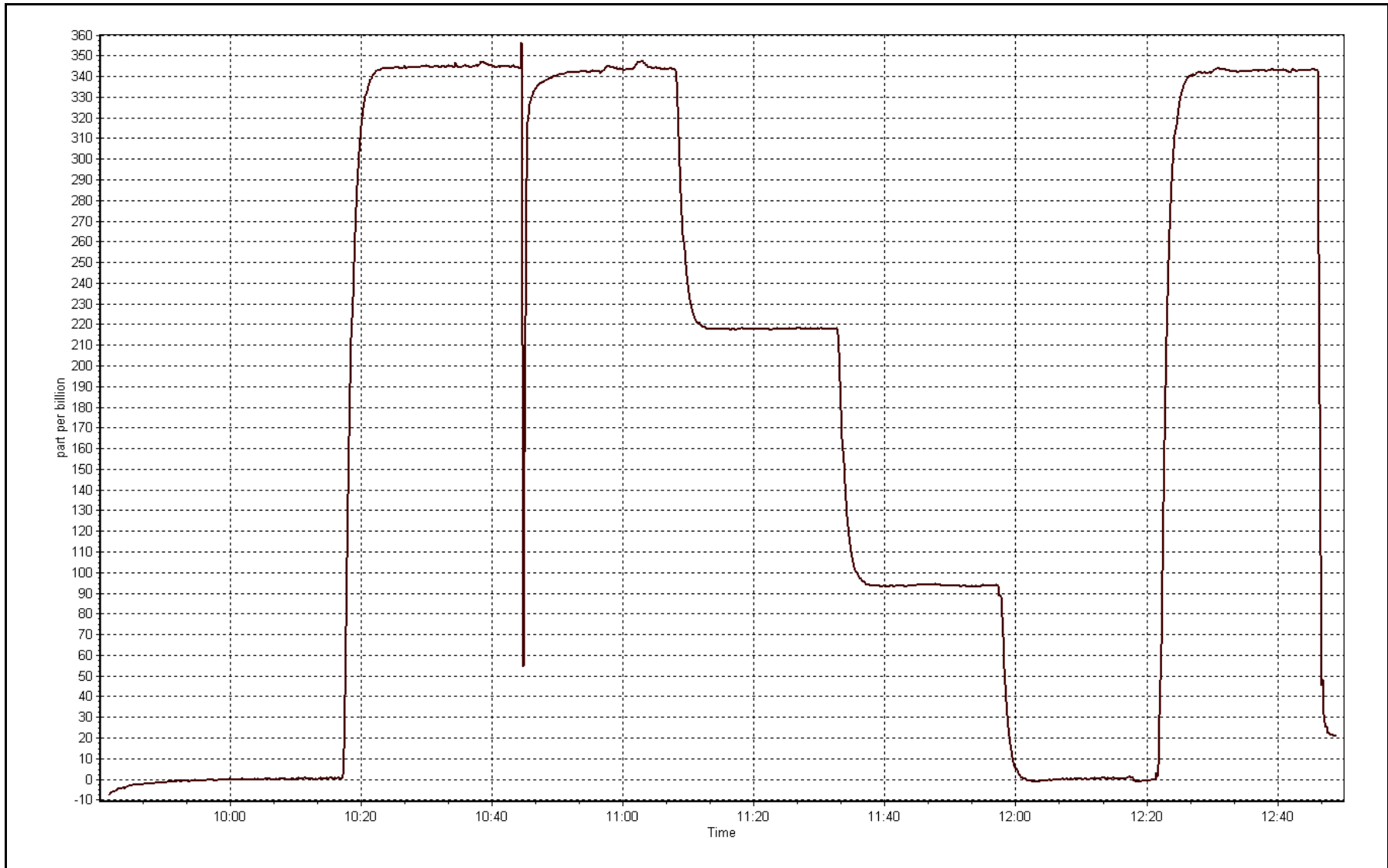
### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.3	----	Correlation Coefficient	0.999987
346.3	344.4	1.0055		
218.6	218.0	1.0028	Slope	1.007251
92.8	93.7	0.9905		
			Intercept	-0.859818



O3 Calibration Plot

Date: July 13, 2015





# Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

## Station Information

Calibration Date	July 8, 2015	Previous Calibration	June 11, 2015
Station Name	Patricia McInnes	Station Number	AMS 6
Reason:	Routine		
Start Time (MST)	12:00	End Time (MST)	15:45
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	0.996764	0.998473	0.996382
	Data Offset	0.562597	1.087009	-0.387790
Current Calibration	Data Slope	0.999149	1.001944	0.996724
	Data Offset	0.648300	1.126563	-0.737203

## 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	0.938		0.938	
NOx coefficient	1.000		1.000	
NO2 coefficient	1.000		1.000	
NO bkgrnd	2.3		2.3	
NOx bkgrnd	2.9		2.9	
Chamber Temp	50.4	Deg C	50.4	Deg C
Moly Temp	325.5	Deg C	325.3	Deg C
PMT voltage	-761	V	-761.5	V
PMT Temp	-3	Deg C	-3	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	162.6	mmHg	162	mmHg
R Cell Press Nox	162.6	mmHg	162	mmHg
NO sample flow	0.842	lpm	0.842	lpm
Nox sample Flow	0.841	lpm	0.842	lpm

**Notes:**

Sample inlet fitler replaced after as founds. No adjustments.



# Wood Buffalo Environmental Association

## NOX-NO-NO2 Calibration Report

### Station Information

Calibration Date:

July 8, 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	0.1	0.0	----	----
as found span	6000	88.2	799.7	799.7	0.0	799.9	797.5	2.4	0.9997	1.0027
calibrator zero	6000	0.0	0.0	0.0	0.0	0.1	0.1	0.0	----	----
high point	6000	88.2	799.7	799.7	0.0	799.9	797.5	2.4	0.9997	1.0027
second point	6000	44.1	399.8	399.8	0.0	399.7	397.6	2.2	1.0003	1.0056
third point	6000	22.1	200.4	200.4	0.0	198.8	197.4	1.4	1.0080	1.0150
as left zero	6000	0.0	0.0	0.0	0.0	0.4	0.2	0.2	----	----
as left span	6000	88.2	799.7	452.1	347.6	801.2	455.8	345.2	0.9982	0.9918
Average Correction Factor									1.0027	1.0078

Corrced As found NO<sub>x</sub>= 799.8 NO= 797.4 Percent Change NO<sub>x</sub>= 0.2% NO= 0.3%  
 Previous Response NO<sub>x</sub>= 801.7 NO= 799.8

### GPT Calibration Data

Dilution Flow 6000 ccm Source Gas Flow 88.20 ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
Cal zero			0.0			0.0			N/A	
1st NO2 (300)	----	452.1	346.3	799.9	452.1	347.6	0.9853	1.0000	0.9961	100.4%
2nd NO2 (200)	----	579.8	218.6	800.3	579.8	220.5	0.9848	1.0000	0.9913	100.9%
3rd NO2 (100)	----	705.6	92.8	800.3	705.6	94.6	0.9847	1.0000	0.9802	102.0%
4th NO2 (0)	798.4	----	1.4	799.7	798.4	1.4	0.9854	1.0000	N/A	----
Average Correction Factor							0.9851	1.0000	0.9892	101.1%

Calibration Performed By: Asad Hidayat



# Wood Buffalo Environmental Association

## NO<sub>x</sub> Calibration Summary

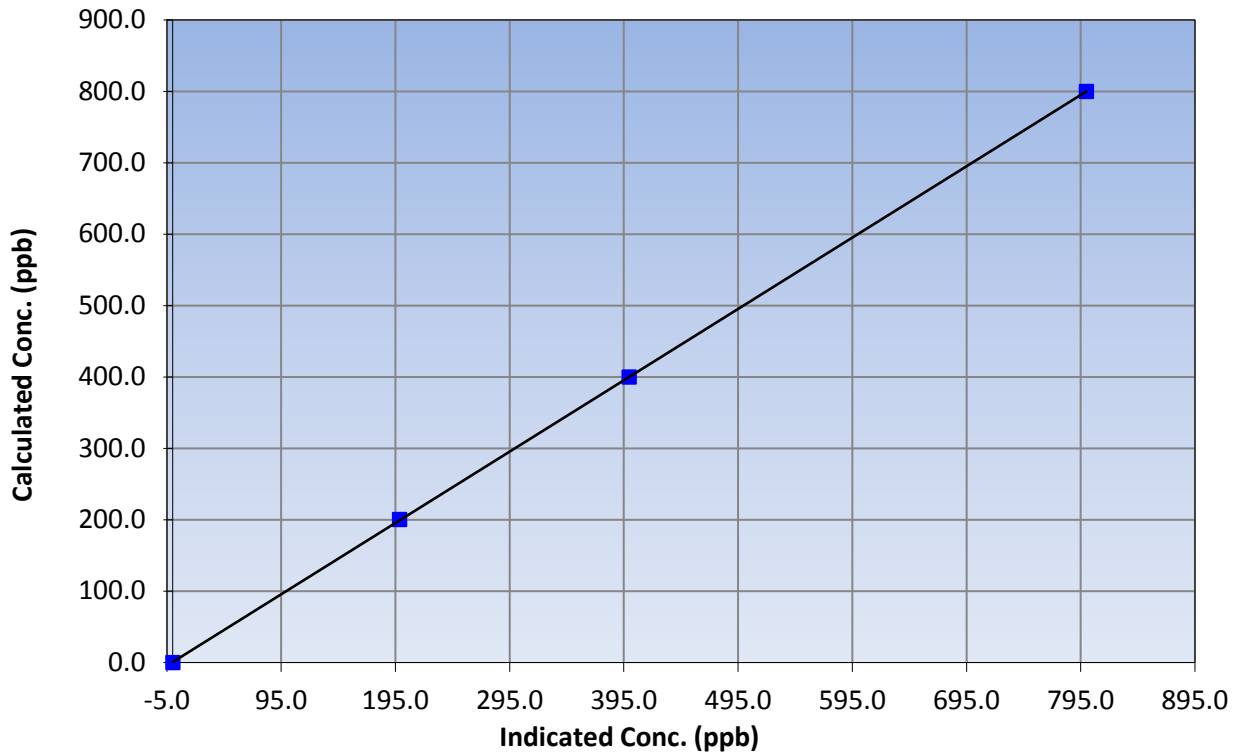
### Station Information

Calibration Date	July 8, 2015	Previous Calibration	June 11, 2015
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	12:00	End Time (MST)	15:45
Analyzer make	Thermo 42i	Analyzer serial #	1218153460

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	0.999995
799.7	799.9	0.9997		
399.8	399.7	1.0003	Slope	0.999149
200.4	198.8	1.0080		
			Intercept	0.648300

### NO<sub>x</sub> Calibration Curve





# Wood Buffalo Environmental Association

## NO Calibration Summary

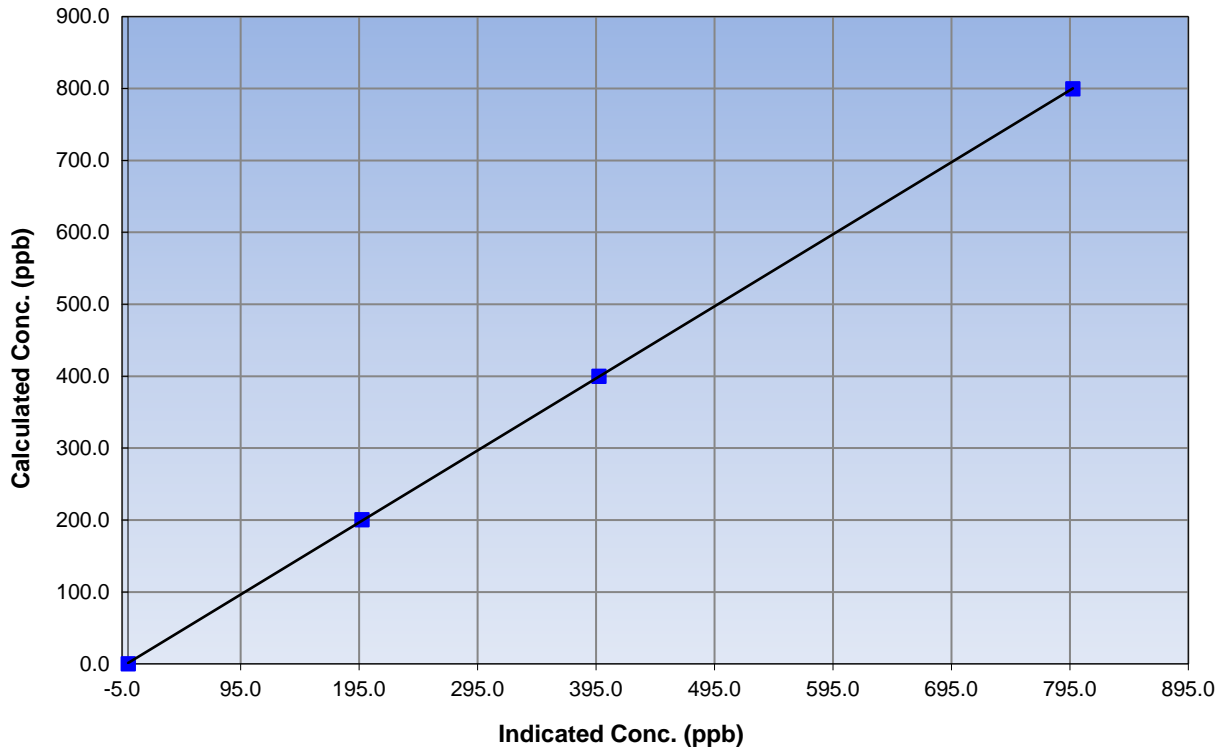
### Station Information

Calibration Date	July 8, 2015	Previous Calibration	June 11, 2015
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	12:00	End Time (MST)	15:45
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	0.999988
799.7	797.5	1.0027		
399.8	397.6	1.0056	Slope	1.001944
200.4	197.4	1.0150		
			Intercept	1.126563

### NO Calibration Curve





# Wood Buffalo Environmental Association

## NO<sub>2</sub> Calibration Summary

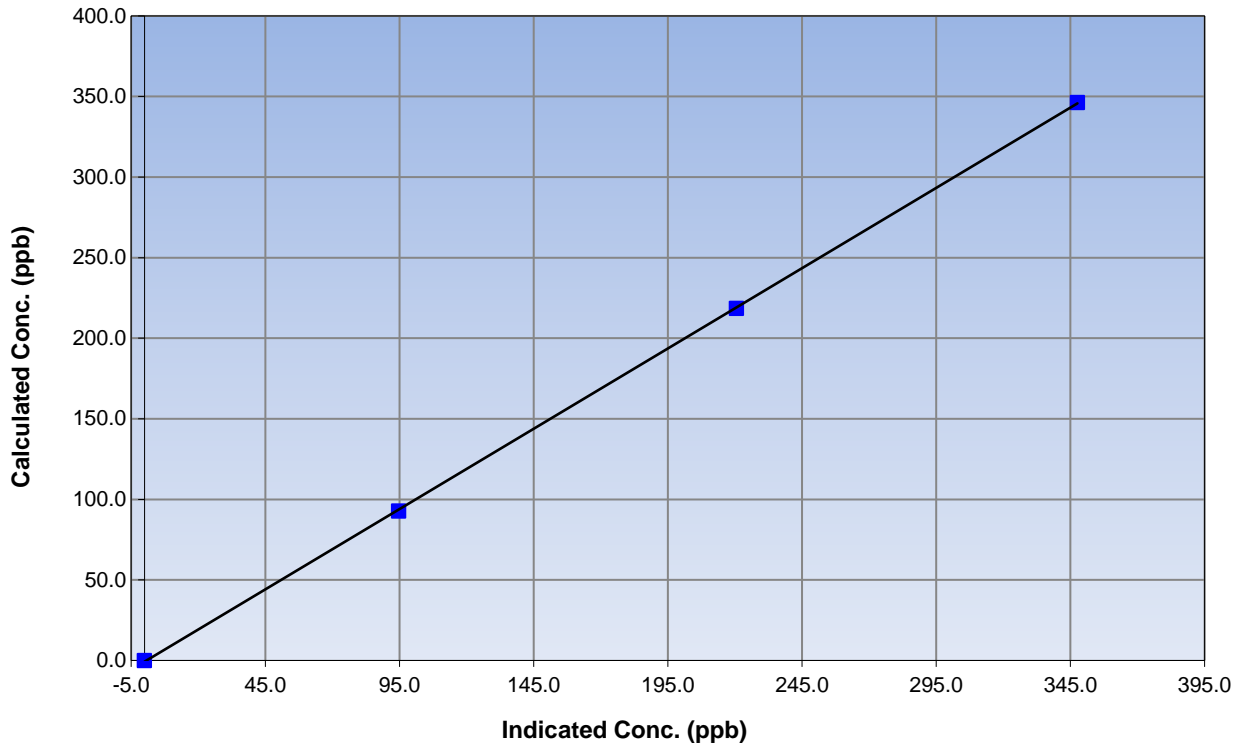
### Station Information

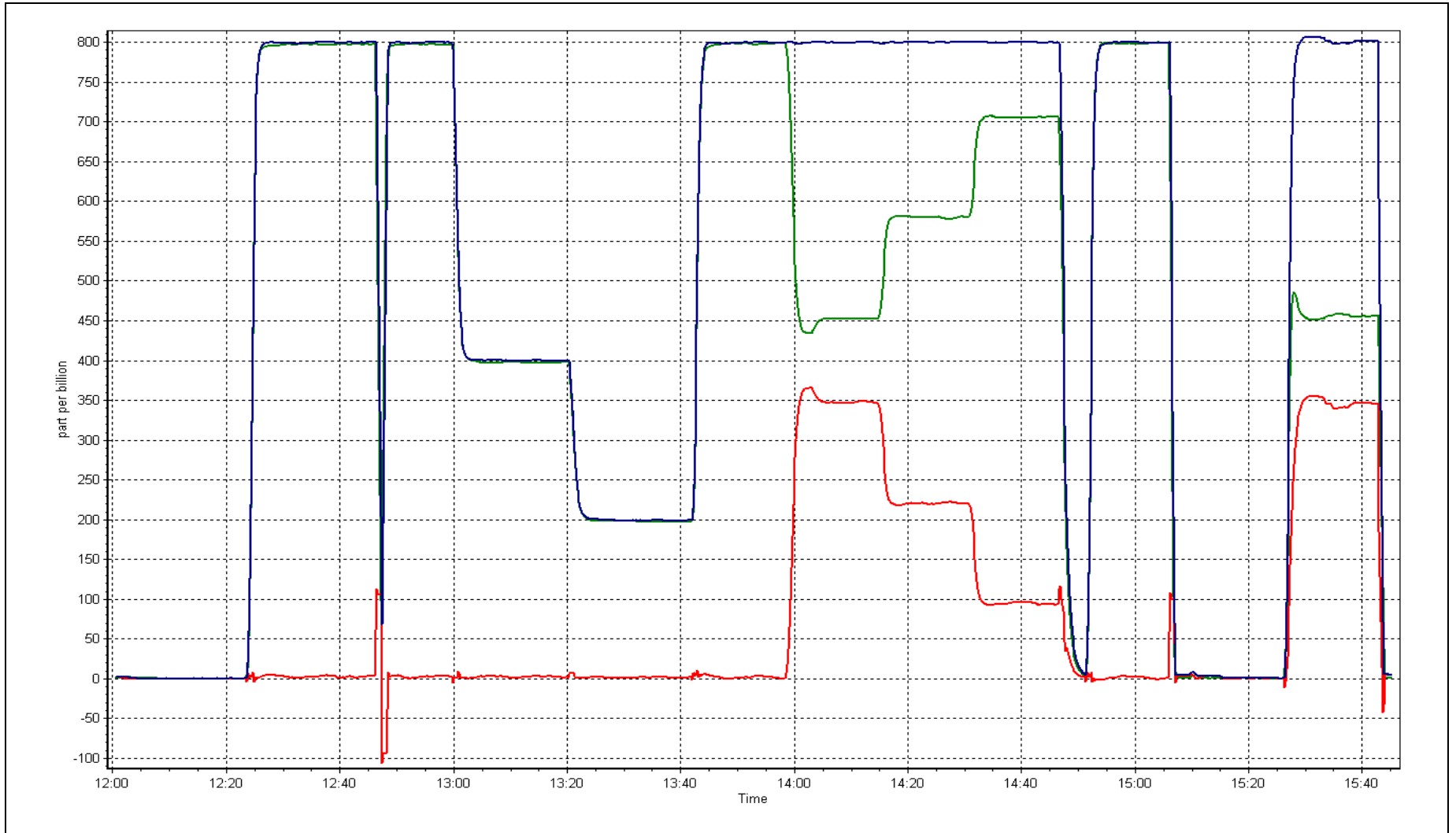
Calibration Date	July 8, 2015	Previous Calibration	June 11, 2015
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	12:00	End Time (MST)	15:45
Analyzer make	Thermo 42i	Analyzer serial #	1218153460

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999974
346.3	347.6	0.9961		
218.6	220.5	0.9913	Slope	0.996724
92.8	94.6	0.9802		
			Intercept	-0.737203

### NO<sub>2</sub> Calibration Curve









# Wood Buffalo Environmental Association

## N<sub>t</sub>-NO<sub>x</sub>-NH<sub>3</sub> Calibration Report

### Station Information

Station Name	Patricia McInnis	Station Number	AMS 6
NOX Calibration Date	July 14, 2015	NOX Previous Cal Date	June 11, 2015
NH3 Calibration Date	July 14, 2015	NH3 Previous Cal Date	June 12, 2015
Reason:	Routine		
Start Time (MST)	7:45	End Time (MST)	15:20
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	1.001944	0.986405	0.994087	0.992297	1.013443
	Data Offset	-9.238007	-9.261633	2.308877	2.984533	0.540661
Cal Stats After	Data Slope	0.995123	0.983724	0.995479	0.994494	1.027233
	Data Offset	2.169513	2.177552	1.548379	2.618854	-0.822596
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		0.969	
NO2 coefficient	1.000	ppb	1.000	ppb
NOx coefficient	0.973		0.977	
NH3 coefficient	NA		NA	
Nt coefficient	0.960		0.953	
NH3 conv temp	825	DegC	825	Deg C
Chamber Temp	50.0	Deg C	50.0	Deg C
Moly Temp	314.6	Deg C	316.1	Deg C
PMT Temp	7.0	Deg C	7.0	Deg C
O3 flow	86.0	ccm	85.0	ccm
R Cell Press	4.6	mmHg	4.5	mmHg
HVPS	693.0	v	693.0	v
Sample Flow 1 NO	553.0	ccm	547.0	ccm
Sample Flow 2 Nox	553.0	ccm	546.0	ccm
Sample Flow 3 Nt	553.0	ccm	546.0	ccm

Filter changed after As Finds. Spans adjusted



# Wood Buffalo Environmental Association

## Nt-NO<sub>x</sub>-NH<sub>3</sub> Calibration Report

### Station Information

Calibration Date:

July 14, 2015

Station Number:

AMS 6

### NH<sub>3</sub> Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated Nt conc (ppb)	Calculated NO <sub>x</sub> conc (ppb)	Calculated NH <sub>3</sub> conc (ppb)	Indicated Nt conc (ppb)	Indicated NO <sub>x</sub> conc (ppb)	Indicated NH <sub>3</sub> conc (ppb)	Nt Correction factor	NH <sub>3</sub> Correction factor
as found zero	6000	0.0	0.0	0.0	0.0	-0.2	-0.1	-0.2	----	----
as found NO	6000	88.2	799.7	799.7	----	782.4	790.7	-8.4	1.022	----
calibrator zero	6000	0.0	0.0	0.0	0.0	-0.2	-0.1	-0.2	----	----
high NO point	6000	88.2	799.7	799.7	----	801.2	802.3	-0.7	0.998	----
NO/O <sub>3</sub> point	6000	88.2	799.7	799.7	----	806.8	806.8	0.0	0.991	----
as found NH <sub>3</sub>	3500	93.2	1999.8	NA	1999.8	1973.8	23.2	1950.2	1.013	1.025
first NH <sub>3</sub>	3500	93.2	1999.8	NA	1999.8	2032.2	23.0	2009.0	0.984	0.995
second NH <sub>3</sub>	3500	46.6	999.9	NA	999.9	1011.6	11.9	999.8	0.988	1.000
third NH <sub>3</sub>	3500	23.3	500.0	NA	500.0	505.1	5.8	499.4	0.990	1.001
Average Correction Factor									0.9946	0.9989

NH<sub>3</sub> Corrected As Found  
 Nt Corrected As Found  
 NO<sub>x</sub> Corrected As Found

NH<sub>3</sub> = 1950.4 ppb  
 NH<sub>3</sub> = 782.6 ppb  
 NH<sub>3</sub> = 790.7 ppb

Previous Response  
 Previous Response  
 Previous Response

NH<sub>3</sub> = 1955.8 ppb  
 Nt = 802.6 ppb  
 NO<sub>x</sub> = 793.1 ppb

NH<sub>3</sub> percent change 0.3%  
 Nt percent change 2.6%  
 NO<sub>x</sub> percent change 0.3%



# Wood Buffalo Environmental Association

## NO<sub>x</sub>(NH<sub>3</sub>) Calibration Report

### Station Information

Calibration Date:

July 14, 2015

Station Number:

AMS 6

### NO<sub>x</sub> / NO / Nt Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NO <sub>x</sub> conc (ppb)	Calculated NO conc (ppb)	Calculated Nt conc (ppb)	Indicated NO <sub>x</sub> conc (ppb)	Indicated NO conc (ppb)	Indicated Nt conc (ppb)	NO <sub>x</sub> Correction factor	NO Correction factor
as found zero	6000	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.2	----	----
as found span	6000	88.2	799.7	799.7	799.7	790.7	793.8	782.4	1.0114	1.0074
calibrator zero	6000	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.2	----	----
high point	6000	88.2	799.7	799.7	799.7	802.3	802.7	801.2	0.9967	0.9963
second point	6000	44.1	399.8	399.8	399.8	399.9	398.4	399.6	0.9998	1.0037
third point	6000	22.1	200.4	200.4	200.4	197.9	196.2	197.9	1.0128	1.0215
calibrator zero										
as left zero										
as left span										
Average Correction Factor									1.0031	1.0072

	<u>Nt</u>	<u>NO<sub>x</sub></u>	<u>NO</u>	<u>NO<sub>2</sub></u>
Corrected As found	782.56	790.7	793.84	337.66
Previous Response	820.0	802.1	796.9	333.4
Percent Change	4.8%	1.4%	0.4%	-1.3%

### 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 NO <sub>2</sub> conc (ppb)	Indicated NO <sub>x</sub> conc (ppb)	Indicated NO conc (ppb)	Indicated NO <sub>2</sub> conc (ppb)	NO <sub>x</sub> Correction factor	NO Correction factor	NO <sub>2</sub> Correction factor	Converter Efficiency
Cal zero			0.0			0.8			----	
1st NO <sub>2</sub> (300)	----	459.1	347.0	797.5	459.1	338.4	1.0027	1.0000	1.0253	97.5%
2nd NO <sub>2</sub> (200)	----	584.5	221.6	801.3	584.5	216.8	0.9980	1.0000	1.0221	97.8%
3rd NO <sub>2</sub> (100)	----	711.0	95.1	804.0	711.0	93.3	0.9946	1.0000	1.0192	98.1%
4th NO <sub>2</sub> (0)	806.1	----	0.8	806.8	806.1	0.8	0.9912	1.0000	----	----
Average Correction Factor							0.9966	1.0000	1.0222	97.8%

Calibration Performed By: Ryan Power



# Wood Buffalo Environmental Association

## NH3 Calibration Summary

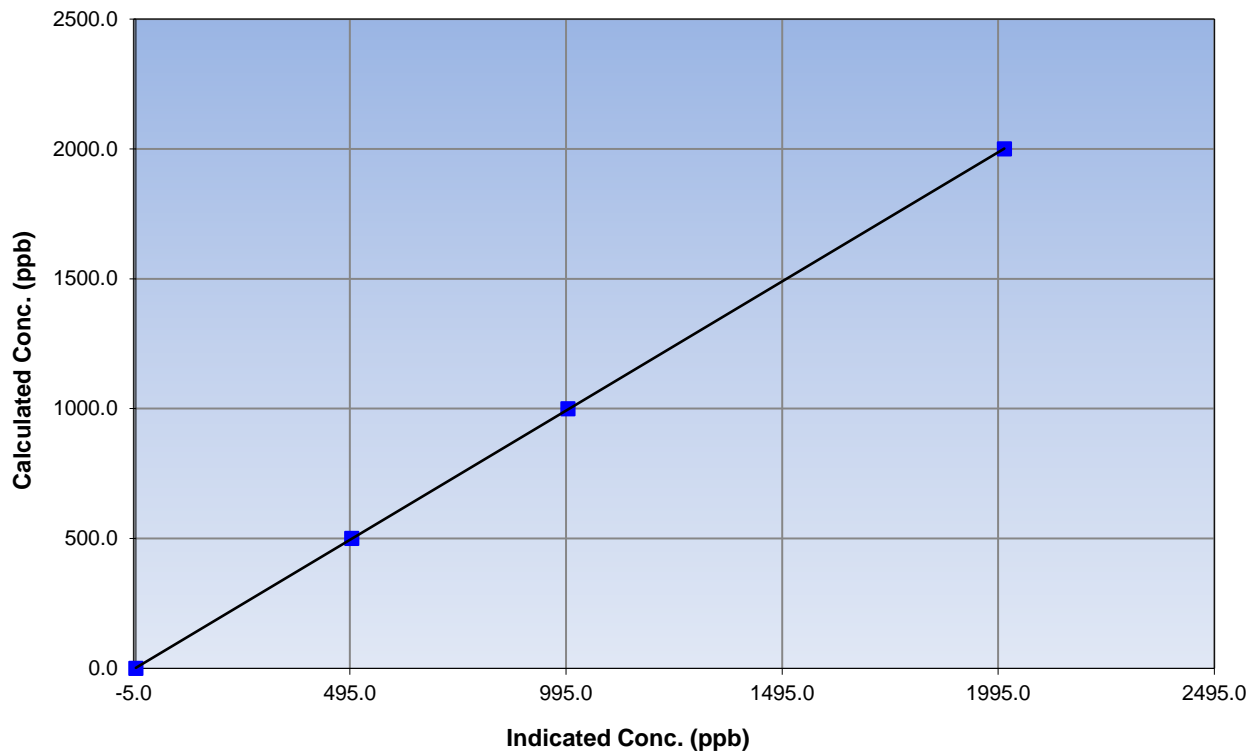
### Station Information

Calibration Date	July 14, 2015	Previous Calibration	June 11, 2015
Station Number	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	7:45	End Time (MST)	15:20
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	-0.2	----	Correlation Coefficient	0.999993
1999.8	2009.0	0.9954		
999.9	999.8	1.0001	Slope	0.995123
500.0	499.4	1.0010		
			Intercept	2.169513

### NH3 Calibration Curve





# Wood Buffalo Environmental Association

## Nt Calibration Summary

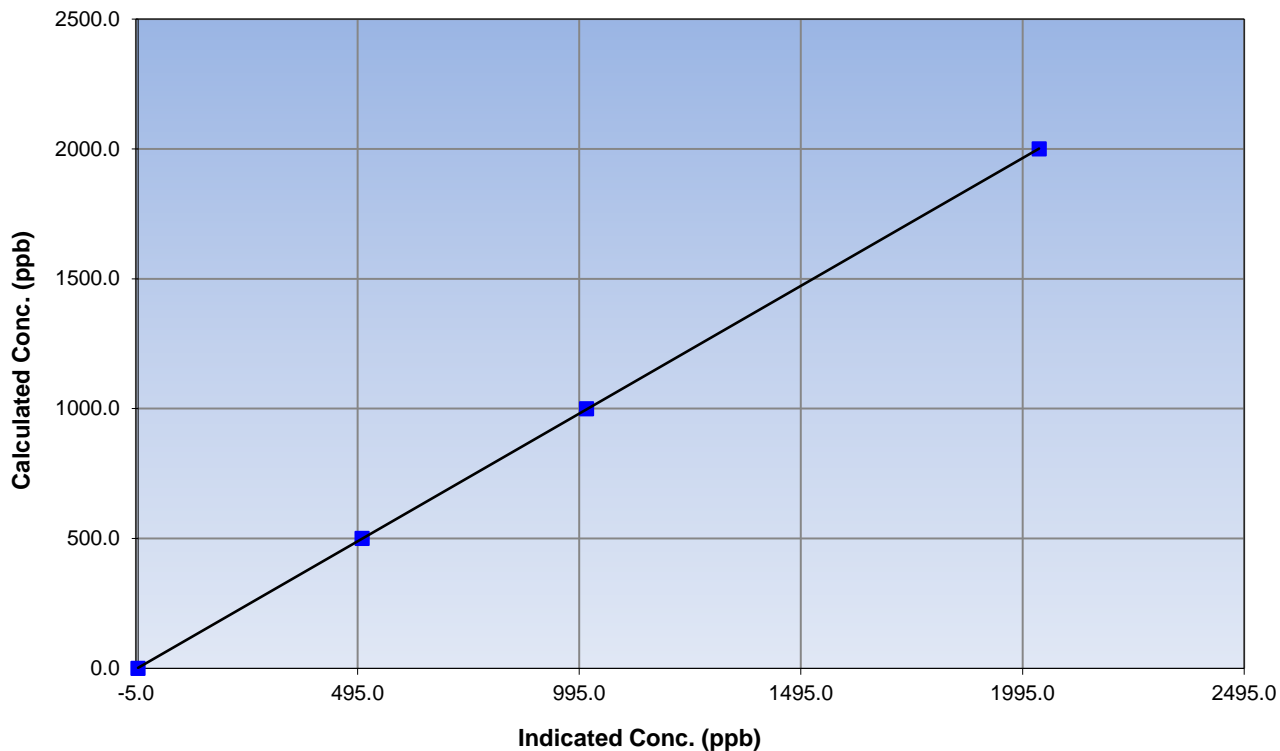
### Station Information

Calibration Date	July 14, 2015	Previous Calibration	June 11, 2015
Station Number	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	7:45	End Time (MST)	15:20
Analyzer make	API T201	Analyzer serial #	215

### Nt (NH<sub>3</sub>) Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	----	Correlation Coefficient	0.999994
1999.8	2032.2	0.9840		
999.9	1011.6	0.9884	Slope	0.983724
500.0	505.1	0.9898		
			Intercept	2.177552

### Nt Calibration Curve





# Wood Buffalo Environmental Association

## NOx Calibration Summary

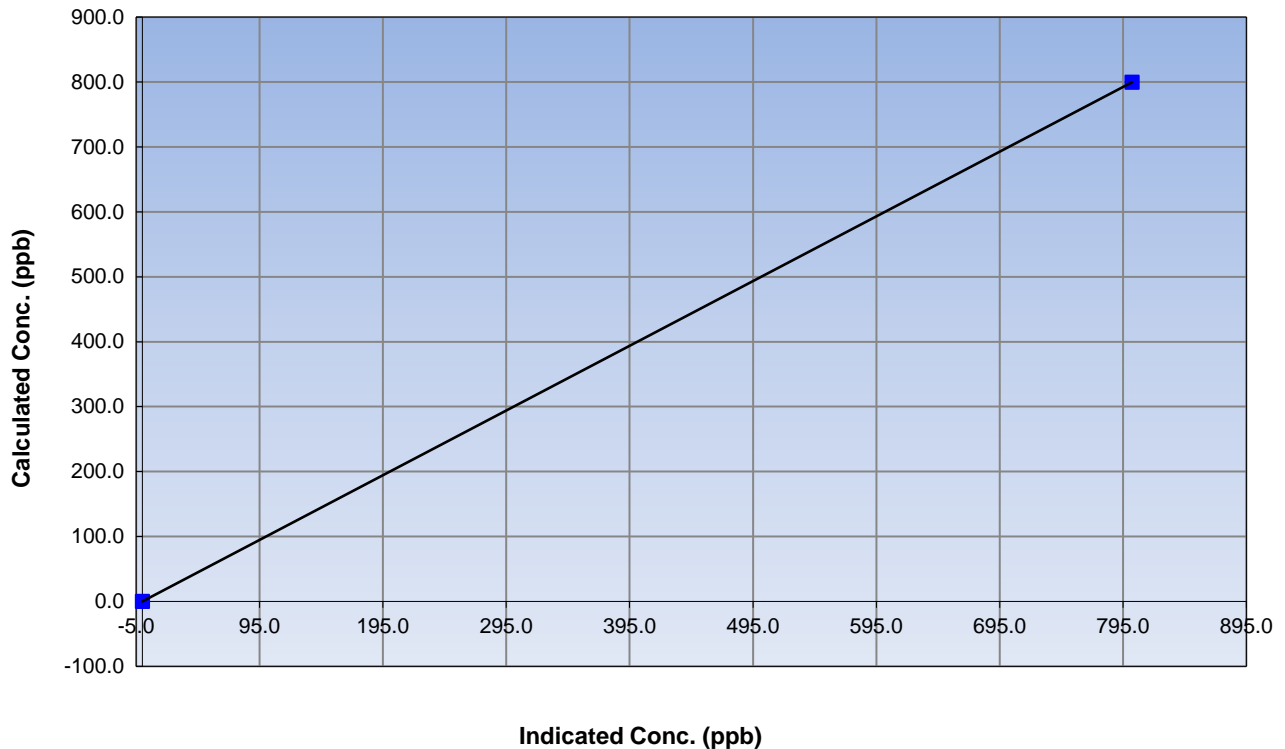
### Station Information

Calibration Date	July 14, 2015	Previous Calibration	June 11, 2015
Station Number	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	7:45	End Time (MST)	15:20
Analyzer make	API T201	Analyzer serial #	215

### NO<sub>x</sub> Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999983
799.7	802.3	0.9967		
399.8	399.9	0.9998	Slope	0.995479
200.4	197.9	1.0128		
			Intercept	1.548379

### NOx Calibration Curve





# Wood Buffalo Environmental Association

## NO Calibration Summary

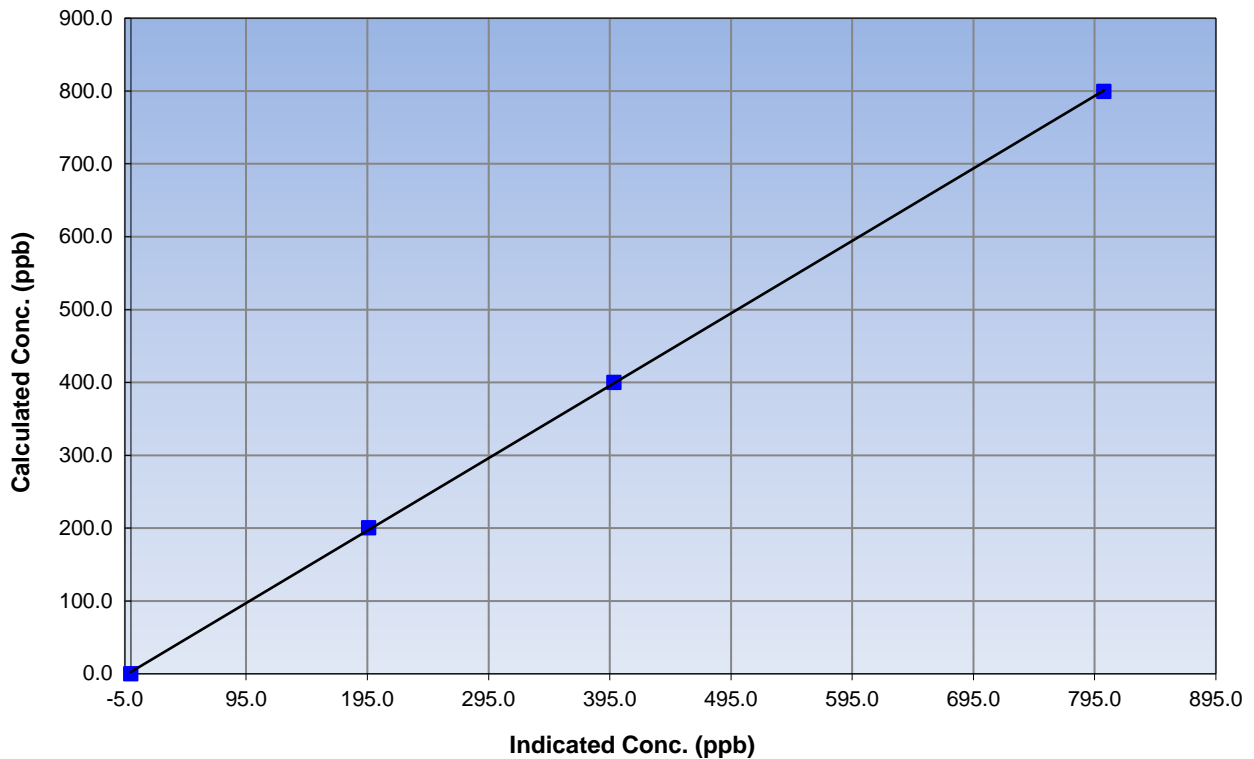
### Station Information

Calibration Date	July 14, 2015	Previous Calibration	June 11, 2015
Station Name	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	7:45	End Time (MST)	15:20
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	-0.1	----	Correlation Coefficient	0.999954
799.7	802.7	0.9963		
399.8	398.4	1.0037	Slope	0.994494
200.4	196.2	1.0215		
			Intercept	2.618854

### NO Calibration Curve





# Wood Buffalo Environmental Association

## NO<sub>2</sub> Calibration Summary

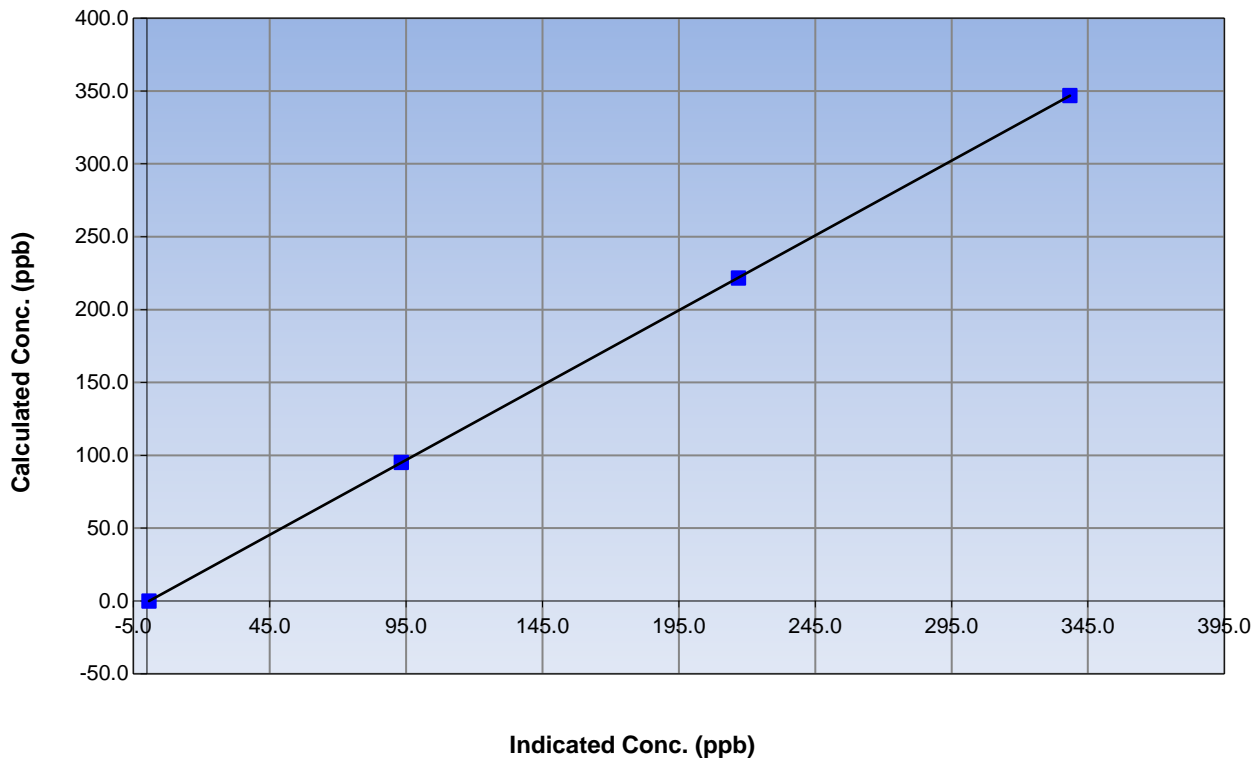
### Station Information

Calibration Date	July 14, 2015	Previous Calibration	June 11, 2015
Station Number	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	7:45	End Time (MST)	15:20
Analyzer make	API T201	Analyzer serial #	215

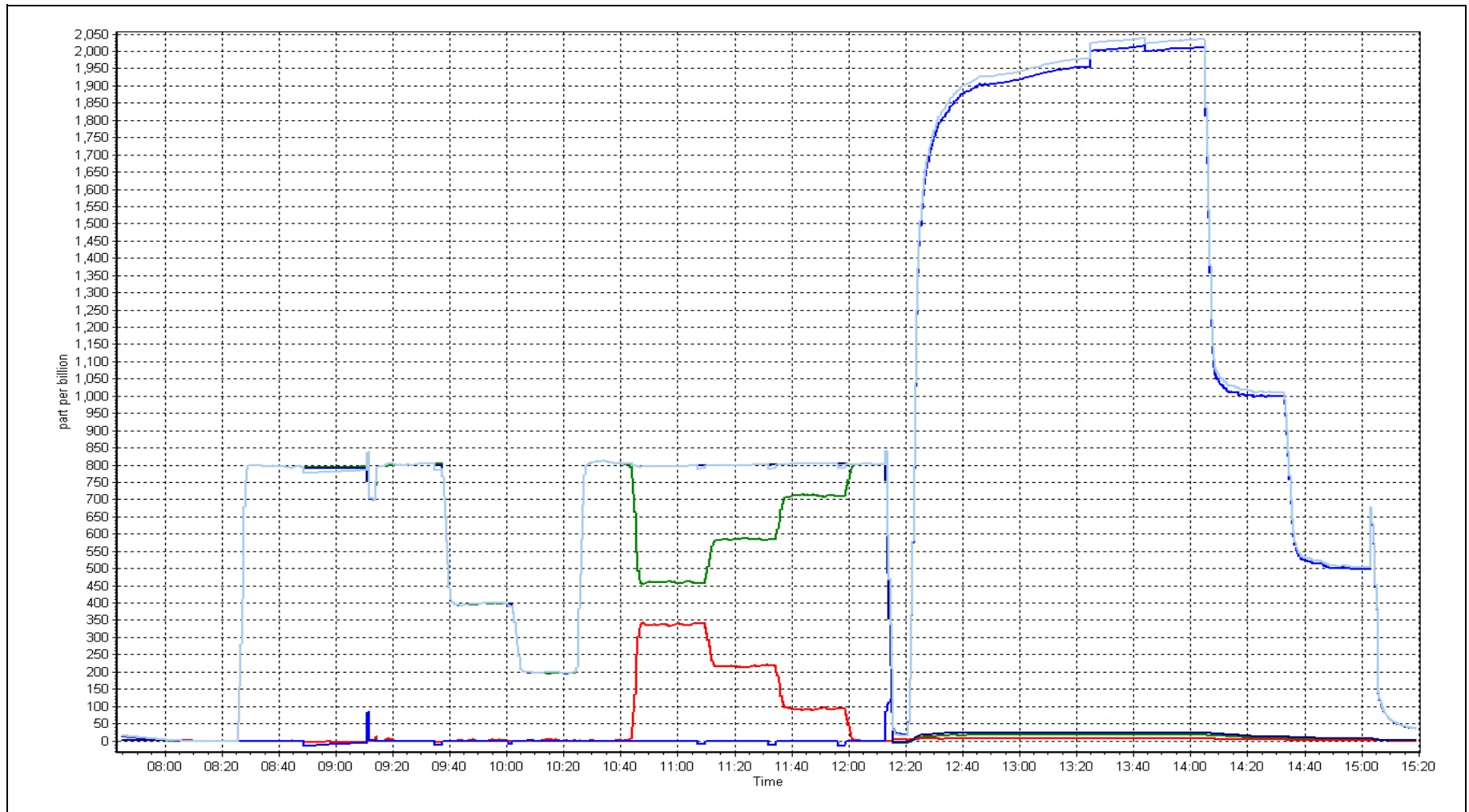
### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.8	----	Correlation Coefficient	0.999998
347.0	338.4	1.0253		
221.6	216.8	1.0221	Slope	1.027233
95.1	93.3	1.0192		
			Intercept	-0.822596

### NO<sub>2</sub> Calibration Curve









# Wood Buffalo Environmental Association

## SHARP CALIBRATION

### STATION INFORMATION

Calibration Date:	<u>July 15, 2015</u>	Previous Calibration:	<u>June 12, 2015</u>
Station Name:	<u>Patricia McInnis</u>	Station Number:	<u>AMS 6</u>
Start Time (MST):	<u>10:27</u>	End Time (MST):	<u>11:00</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-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	25.0	24.1	-0.9	25.0
T2	30.0	na	na	30.0
T3	28.0	na	na	28.0
T4	37.0	na	na	37.0
RH (%)	34.0	na	na	34.0

#### Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	965	964.0	-1.0	965

#### 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	202		202
Neph	0		0
C14	24.9		24.9
Indicated Concentration (ug/m3)	0	no	0
Offset 1	200.8		200.8
Offset 2	32.1		32.1

### Leak Check (Quarterly)

Leak Check Date:	<u>May 20, 2015</u>	Previous Leak Check Date:	NA
	<b>Measured</b>	<b>Difference LPM (Limit +/- 0.42 LPM)</b>	
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>	<b>Mass foil set S/N:</b>	2597
New Correction Factor:	<u>6978</u>		

### INSPECTION DATA

Item	Condition	Date of install or rebuild
Cyclone	Good / cleaned	15/07/2015
Pump	Good	NA
Filter Tape	Good	NA
Mass Foil Cal Set	Good	NA
HEPA filter	Good	NA

### NOTES:

No adjustments, cyclone head cleaned

Calibration Performed By: Ryan Power



## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS 7  
ATHABASCA VALLEY  
JULY 2015**

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

August 26, 2015



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ATHABASCA VALLEY (AMS 7)  
 JULY 2015

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	707	37	37	100.00	16	0	5	0
TRS (ppb) Average	709	34	35	99.87	1	0	1	0
THC (ppm) Average	706	37	38	99.87	2.3	-	2	-
NMHC (ppm) Average	706	37	38	99.87	0.271	-	0.111	-
CH4(ppm) Average	706	37	38	99.87	2.1	-	1.9	-
O3 (ppb) Average	699	37	45	98.92	59	0	35	-
NO2 (ppb) Average	701	37	43	99.19	17	0	6	-
NO (ppb) Average	701	37	43	99.19	37	-	7	-
NOX (ppb) Average	701	37	43	99.19	37	-	12	-
PM2.5 (ug/m3) Average	735	0	9	98.79	386.9	-	145.1	6
CO(ppm) Average	709	34	35	99.87	2.4	0	1.1	-
Temperature 2 m (C) Average	744	0	0	100.00	32	-	24	-
Barometric Pressure (inHg) Average	744	0	0	100.00	29.2	-	29.1	-
Relative Humidity (%) Average	744	0	0	100.00	97	-	80	-
Wind Speed 10 m (km/h) Average	743	0	1	99.87	31	-	15	-
Wind Direction 10 m (deg) Average	743	0	1	99.87	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ATHABASCA VALLEY (AMS 7)  
 JULY 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	707	1.1	1	-	1	1	1	1	1	2	16
TRS (ppb) Average	709	0.3	0	-	0	0	0	0	0	1	1
THC (ppm) Average	706	1.89	0.1	-	1.8	1.8	1.8	1.9	1.9	2	2.3
NMHC (ppm) Average	706	0.021	0.048	-	0	0	0	0	0	0.1	0.271
CH4(ppm) Average	706	1.87	0	-	1.8	1.8	1.8	1.9	1.9	1.9	2.1
O3 (ppb) Average	699	19.7	10	-	1	7	11	19	26	32	59
NO2 (ppb) Average	701	3.9	3	-	0	1	2	3	5	8	17
NO (ppb) Average	701	1.4	3	-	0	0	0	1	1	3	37
NOX (ppb) Average	701	5.3	4	-	0	2	2	4	7	10	37
PM2.5 (ug/m3) Average	735	28.49	56.3	-	0.5	3	4.8	8.2	18.1	72.3	386.9
CO(ppm) Average	709	0.2	0.4	-	0	0	0	0.1	0.2	0.5	2.4
Temperature 2 m (C) Average	744	18.92	4.6	-	7	13.3	15.6	18.7	22.7	24.9	32
Barometric Pressure (inHg) Average	744	28.82	0.1	-	28.5	28.7	28.7	28.8	28.9	29	29.2
Relative Humidity (%) Average	744	66.4	18	-	25	39	52	70	82	88	97
Wind Speed 10 m (km/h) Average	743	8.7	6	-	0	3	5	7	11	17	31
Wind Direction 10 m (deg) Average	743	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ATHABASCA VALLEY (AMS 7)  
JULY 2015

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
TRS, O3, CO	08 Jul 2015 08:00	08 Jul 2015 08:00	1	Maintenance - cleaned glass manifold
NMHC, CH4, THC	03 Jul 2015 11:00	03 Jul 2015 11:00	1	Maintenance - replaced carrier gas
O3	30 Jul 2015 09:00	30 Jul 2015 15:00	7	Maintenance - modified zero/span valves to network standard
NO2, NO, NOX	21 Jul 2015 07:00	21 Jul 2015 09:00	3	Maintenance - confirmed calibration points for Ozone
NO2, NO, NOX	30 Jul 2015 11:00	30 Jul 2015 13:00	3	Maintenance - confirmed calibration points for Ozone
PM2.5	05 Jul 2015 01:00	05 Jul 2015 08:00	8	Analyzer Failure - filter tape stuck
PM2.5	22 Jul 2015 08:00	22 Jul 2015 08:00	1	Maintenance - Flow and zero check, sample head cleaning
Wind Speed, Wind Direction	27 Jul 2015 11:00	27 Jul 2015 11:00	1	Annual maintenance and calibration



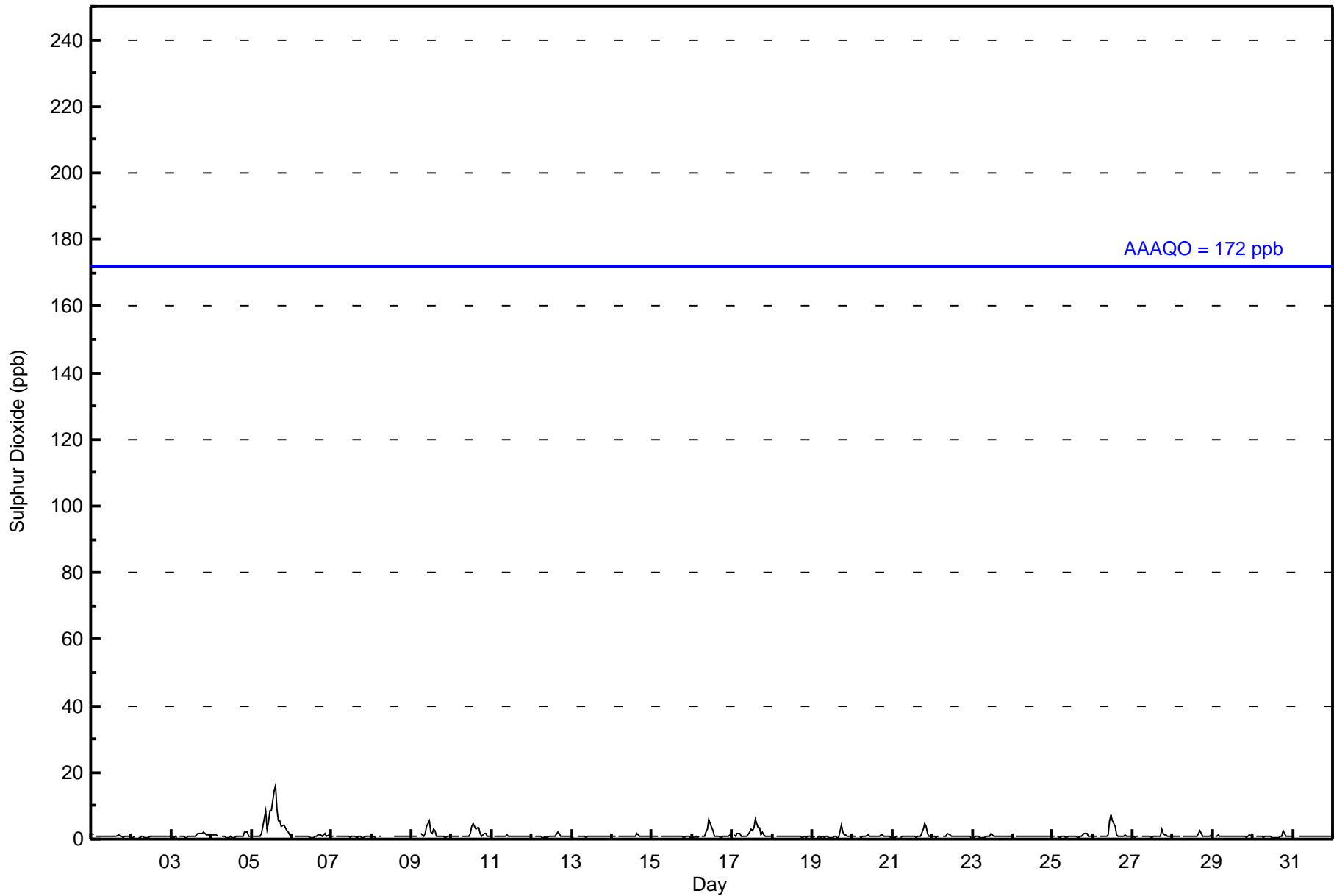
Number of Exceedences (AAAQO):		1-hr: 0    24-hr: 0		Hours in Service: 744																																														
Maximum Value: 16 ppb on Jul 5 15:00		Maximum Daily Average: 4.9 ppb on Jul 5		Hours of Data: 707																																														
Minimum Value: 1 ppb on Jul 23 07:00		Minimum Daily Average: 0.7 ppb on Jul 2		Hours of Missing Data: 37																																														
Maximum Diurnal Average: 1.6 ppb at hour 14		Minimum Diurnal Average: 0.8 ppb at hour 6		Hours of Calibration: 37																																														
Monthly Average: 1.1 ppb		Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 1 Median = 1 Q <sub>3</sub> = 1 P <sub>90</sub> = 2 P <sub>99</sub> = 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-Jul	2	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.8	2																								
2-Jul	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1																								
3-Jul	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	1	1	1	1.1	2																								
4-Jul	1	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1.0	2																								
5-Jul	Z	1	1	1	1	1	2	4	9	3	5	8	9	14	16	9	6	6	4	4	4	3	2	1	4.9	16																								
6-Jul	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	0.9	2																								
7-Jul	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1																								
8-Jul	1	1	1	Z	1	1	1	C	C	C	C	C	C	1	1	1	1	1	1	1	1	1	1	1	--	1																								
9-Jul	1	1	1	1	Z	2	1	1	2	4	5	2	1	3	3	1	1	1	1	1	1	1	1	1	1.5	5																								
10-Jul	1	1	1	1	1	Z	1	1	1	1	1	2	4	5	3	3	3	2	1	2	2	1	1	1	1.6	5																								
11-Jul	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																								
12-Jul	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1	1	1	1	1	1	0.9	2																								
13-Jul	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.8	1																								
14-Jul	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	0.9	2																								
15-Jul	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1																								
16-Jul	1	1	1	1	1	Z	1	1	2	3	6	5	2	1	1	1	1	1	1	1	1	1	1	2	1.4	6																								
17-Jul	Z	1	1	2	2	1	1	1	1	1	2	3	3	3	6	3	3	1	2	1	1	1	1	1	1.8	6																								
18-Jul	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																								
19-Jul	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4	2	1	1	1	1	1	0.9	4																								
20-Jul	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.9	1																								
21-Jul	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	3	5	4	2	1	1	1.2	5																								
22-Jul	1	1	1	1	1	Z	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.8	2																								
23-Jul	Z	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	0.8	2																								
24-Jul	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																								
25-Jul	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	0.8	2																								
26-Jul	1	1	1	Z	1	1	1	1	1	1	6	7	5	4	1	1	1	1	1	1	1	1	1	1	1.7	7																								
27-Jul	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	3	2	1	1	1	1	1	0.9	3																								
28-Jul	1	1	1	1	1	Z	1	1	1	1	1	1	1	1	2	2	2	2	1	1	1	1	1	1	0.9	2																								
29-Jul	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-Jul	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1	1	0.8	2																								
31-Jul	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.8	1																								
																								0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.9	1.1	1.0	1.5	1.5	1.4	1.6	1.6	1.3	1.2	1.3	1.2	1.2	1.1	1.0	0.9	0.8	Diurnal Average		
																								2	1	1	2	2	2	2	4	9	4	6	8	9	14	16	9	6	6	6	4	5	4	3	2	2	Diurnal Maximum	
Z - zerospan    C - Calibration																																																		
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb    24-hr 48 ppb																																																		





Wood Buffalo Environmental Association  
Hourly Averages

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Athabasca Valley - July 2015





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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Athabasca Valley - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	705	99.72	99.72
11 - 20	2	0.28	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Athabasca Valley - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	41	14	10	17	29	30	119	36	29	29	102	46	25	37	39	101	704
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	41	14	10	17	29	30	119	36	29	29	102	46	25	37	39	103	706

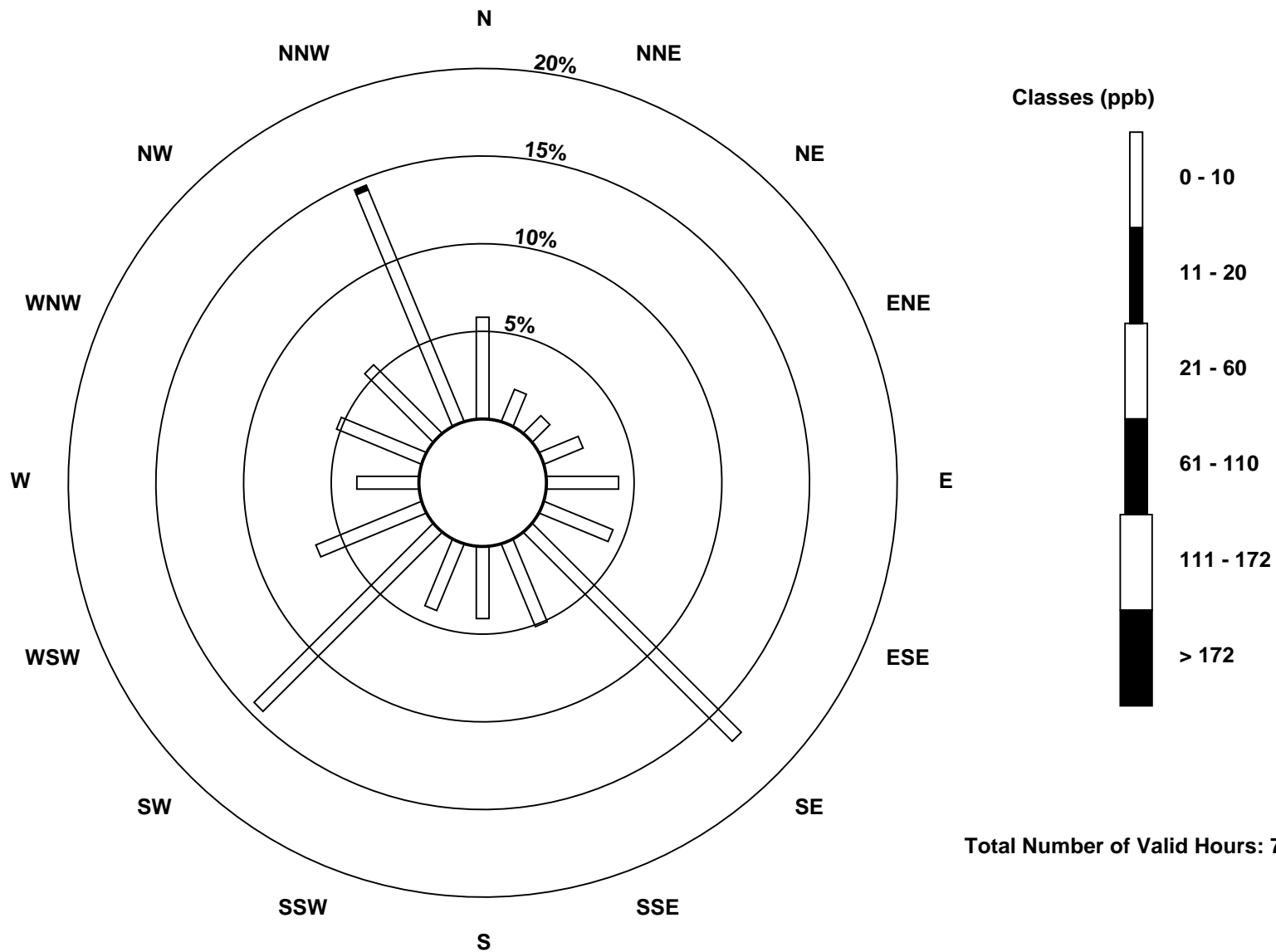
Total Number of Valid Hours: 706

Total Number of Hours: 744

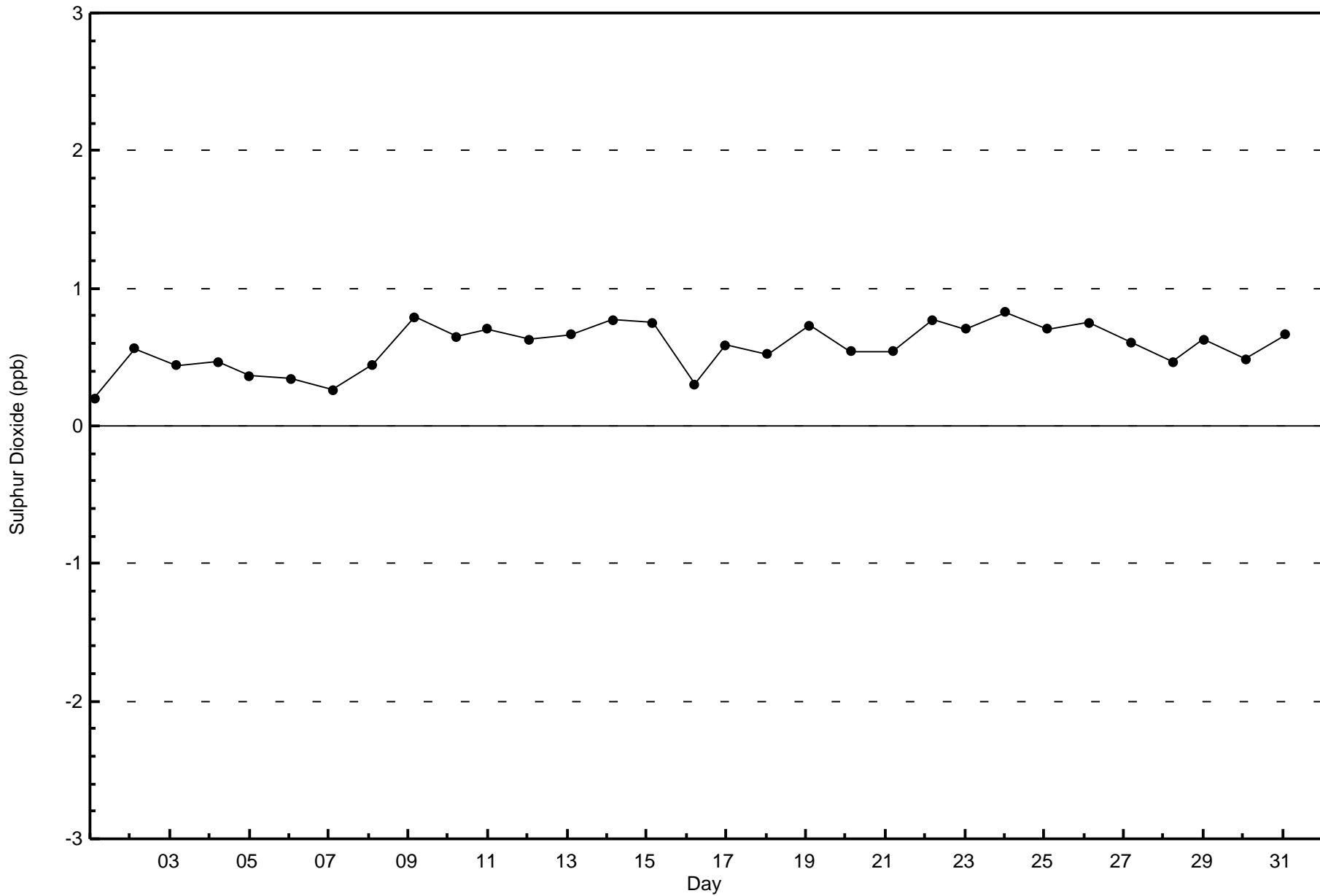


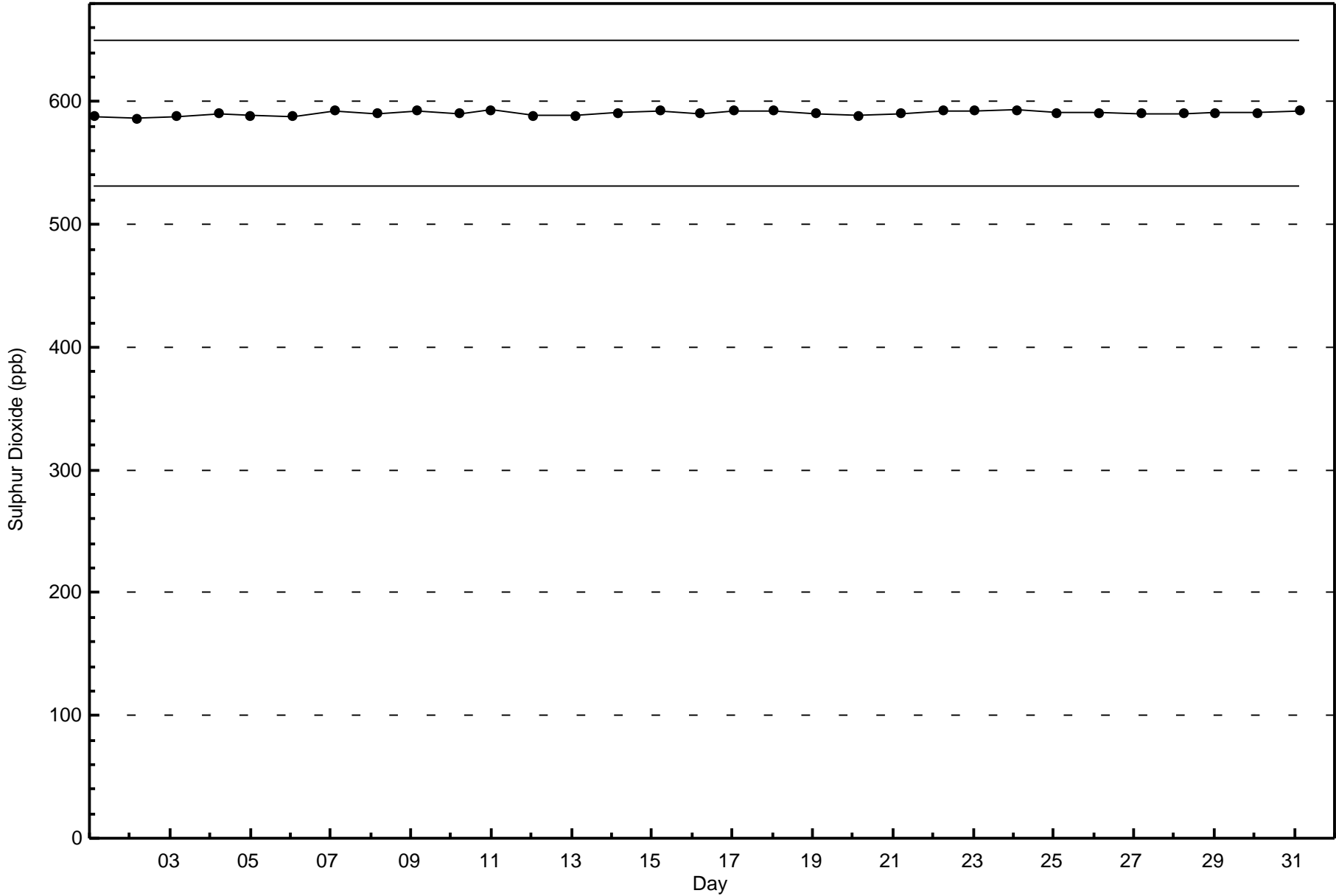
Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Athabasca Valley (AMS 7)



Total Number of Valid Hours: 706







Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 1 ppb on Jul 4 05:00	Maximum Daily Average: 0.9 ppb on Jul 4		Hours of Data:	709
Minimum Value: 0 ppb on Jul 9 16:00	Minimum Daily Average: 0.1 ppb on Jul 9		Hours of Missing Data:	35
Maximum Diurnal Average: 0.4 ppb at hour 4	Minimum Diurnal Average: 0.3 ppb at hour 15		Hours of Calibration:	34
Monthly Average: 0.3 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 1 P <sub>99</sub> = 1		Percent Operational Time:	99.9

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

0.3	0.3	0.3	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	Diurnal Average
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Diurnal Maximum

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

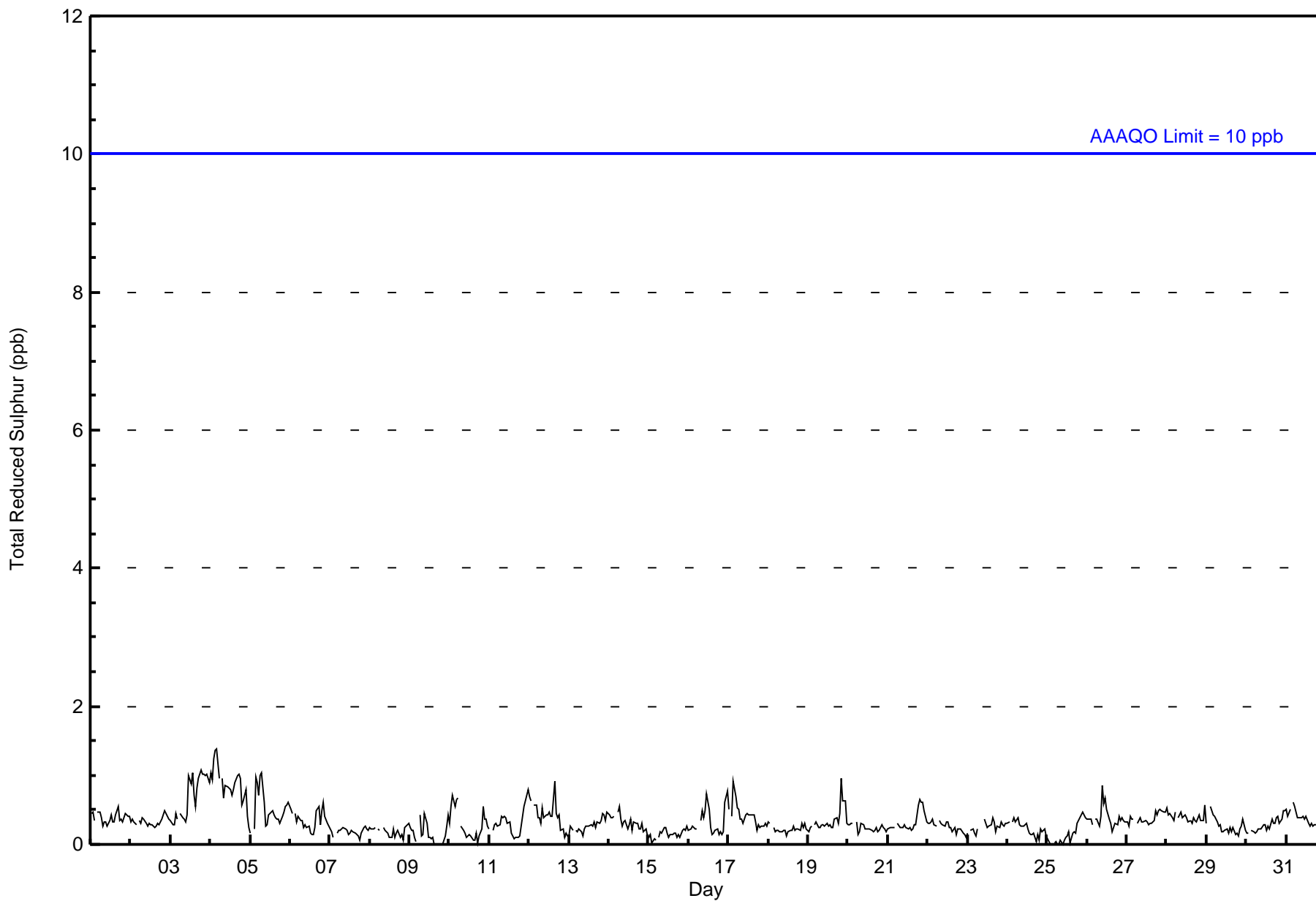


Wood Buffalo Environmental Association

Hourly Averages

Total Reduced Sulphur (TRS) - ppb

Athabasca Valley - July 2015







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

**Total Reduced Sulphur (TRS) - ppb**  
**Athabasca Valley - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	709	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



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

**Total Reduced Sulphur (TRS) - ppb**  
**Athabasca Valley - July 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	14	11	17	28	28	122	42	30	28	100	45	24	36	38	103	708
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	42	14	11	17	28	28	122	42	30	28	100	45	24	36	38	103	708

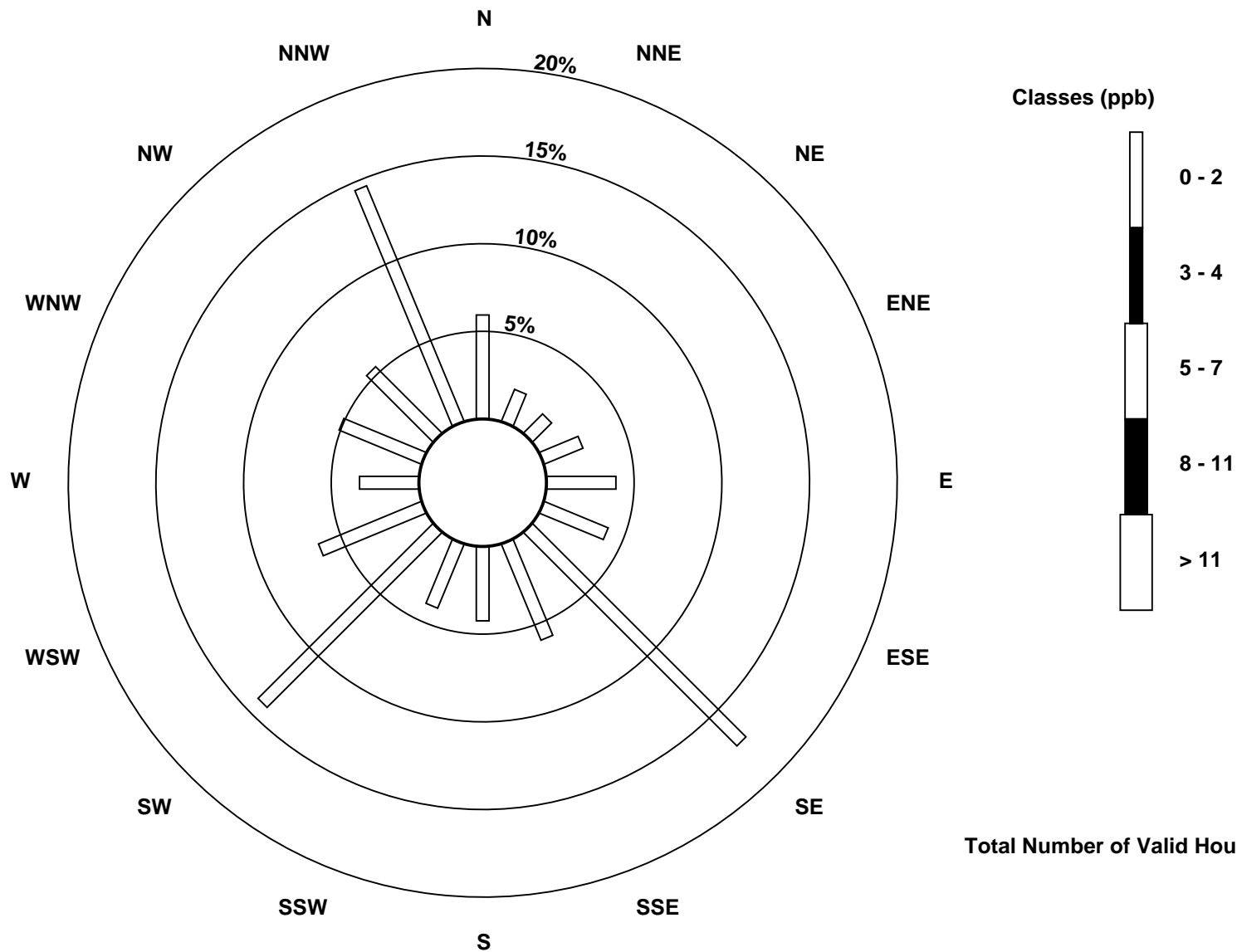
Total Number of Valid Hours: 708

Total Number of Hours: 744

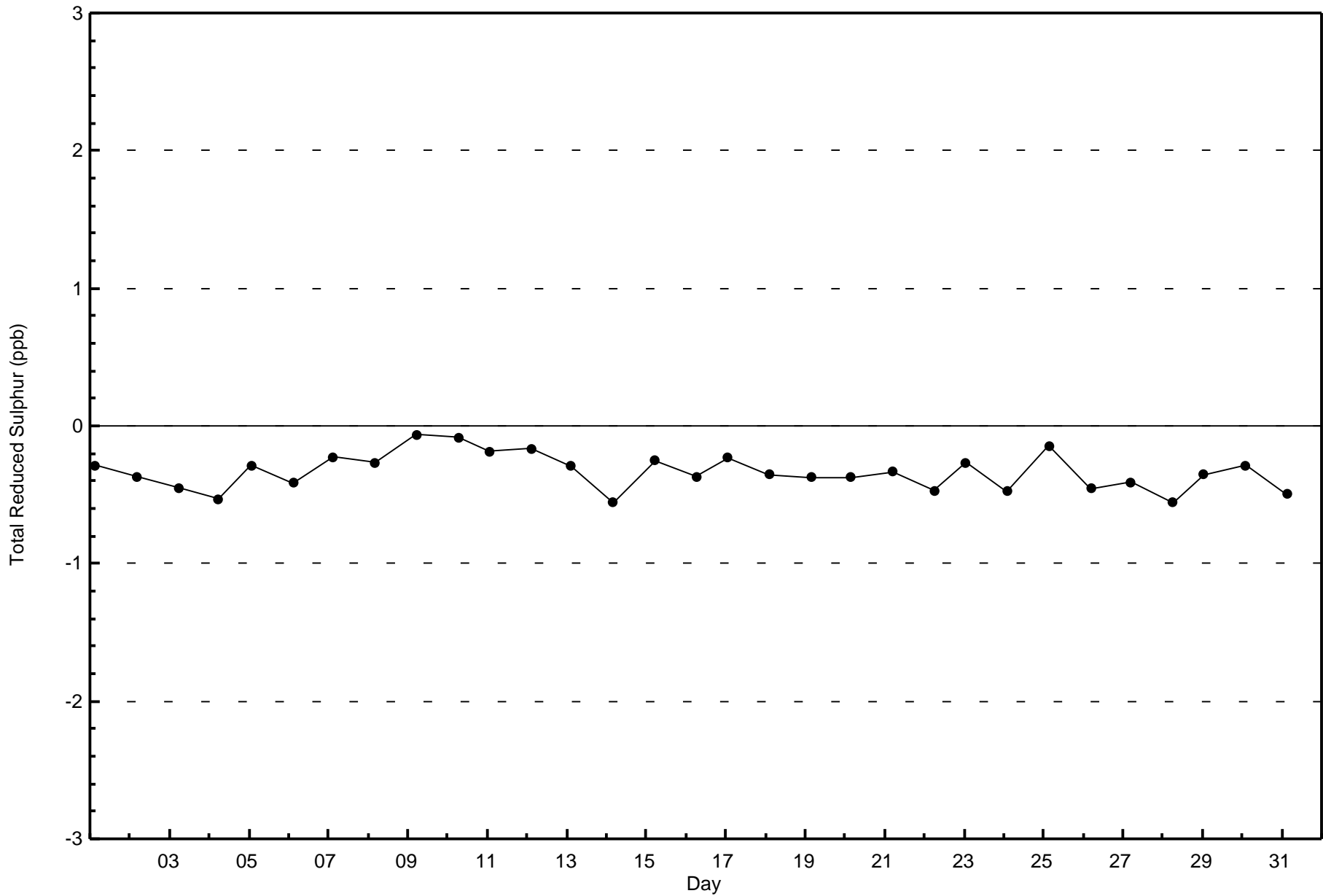


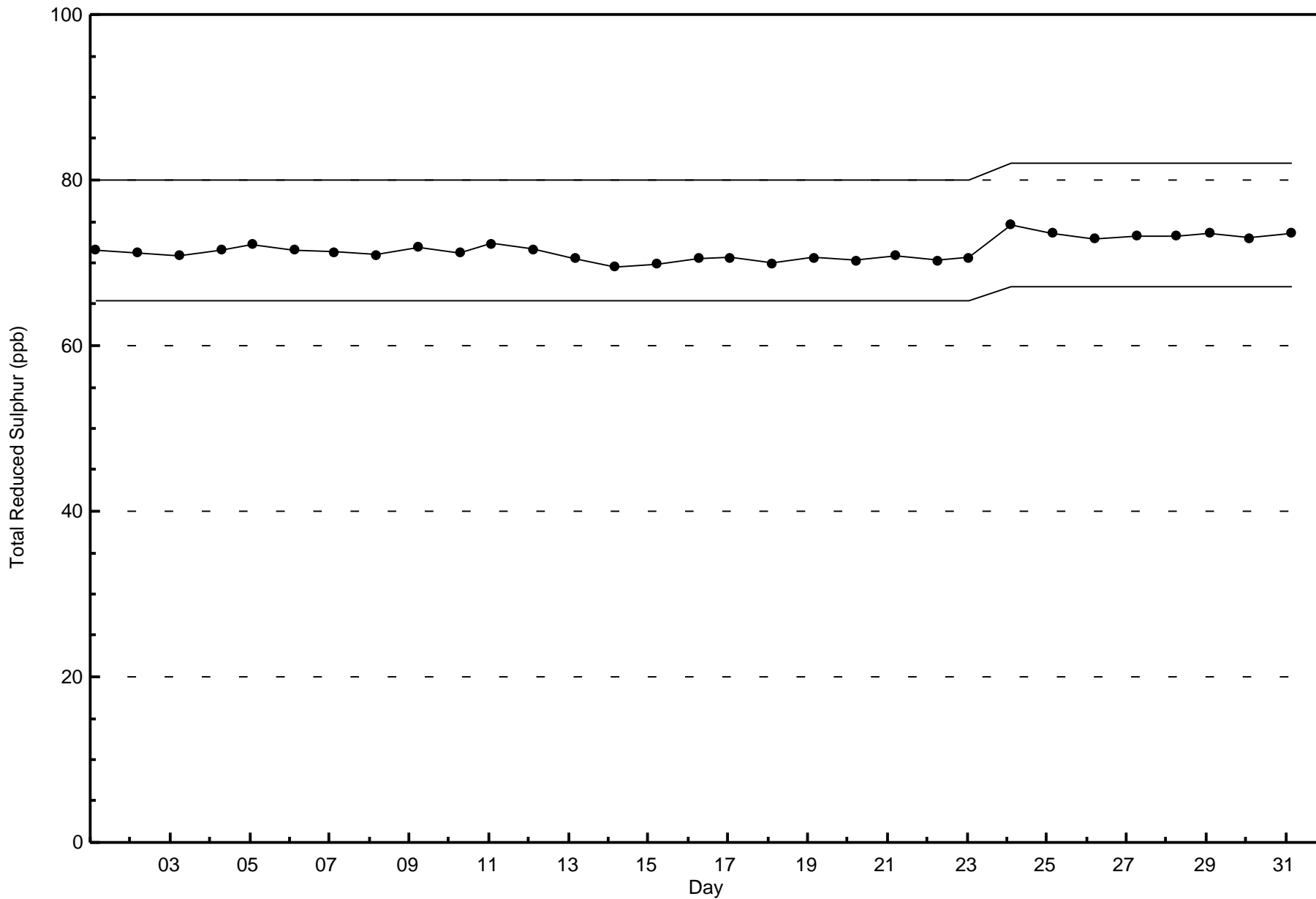
Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Total Reduced Sulphur (TRS) - ppb  
Athabasca Valley (AMS 7)



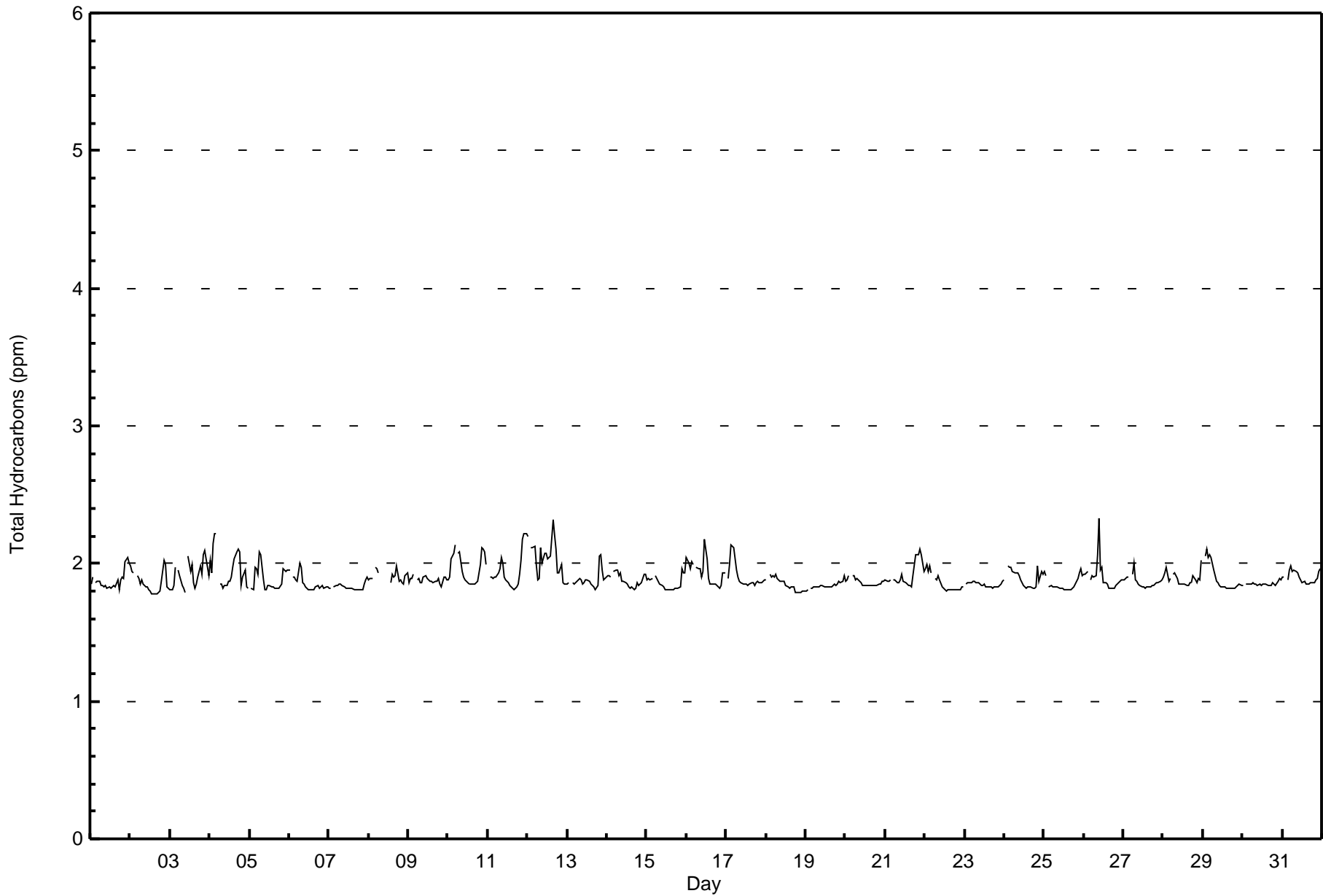
Total Number of Valid Hours: 708







Maximum Value: 2.3 ppm on Jul 26 10:00		Maximum Daily Average: 2.0 ppm on Jul 12		Hours in Service: 744																						
Minimum Value: 1.8 ppm on Jul 2 16:00		Minimum Daily Average: 1.8 ppm on Jul 7		Hours of Data: 706																						
Maximum Diurnal Average: 1.9 ppm at hour 5		Minimum Diurnal Average: 1.8 ppm at hour 15		Hours of Missing Data: 38																						
Monthly Average: 1.89 ppm		Percentiles: P <sub>1</sub> = 1.8 P <sub>10</sub> = 1.8 Q <sub>1</sub> = 1.8 Median = 1.9 Q <sub>3</sub> = 1.9 P <sub>90</sub> = 2.0 P <sub>99</sub> = 2.2		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-Jul	1.9	1.9	Z	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	1.8	1.9	1.9	1.9	2.0	2.0	2.0	1.9	2.0
2-Jul	2.0	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	1.9	2.0	2.0	1.8	1.8	1.9	2.0
3-Jul	1.8	1.8	1.8	2.0	Z	2.0	1.9	1.8	1.8	1.8	M	2.1	1.9	2.0	1.9	1.8	1.9	1.9	2.0	1.9	2.1	2.1	2.0	1.9	1.9	2.1
4-Jul	2.0	1.9	2.1	2.2	2.2	Z	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	2.0	2.0	2.1	2.1	2.1	1.8	1.9	2.0	1.8	1.8	2.0	2.2
5-Jul	Z	1.8	1.8	2.0	2.0	1.9	2.1	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	1.9	2.0	1.9	2.0	1.9	2.1
6-Jul	2.0	Z	1.9	1.9	1.9	1.9	2.0	2.0	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.0
7-Jul	1.8	1.8	Z	1.8	1.8	1.8	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.8	1.9
8-Jul	1.9	1.9	1.9	Z	2.0	2.0	1.9	C	C	C	C	C	C	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.8	1.9	1.9	--	2.0
9-Jul	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.9	1.9	1.9	1.9	1.9
10-Jul	1.9	1.9	2.0	2.1	2.1	Z	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	2.0	2.1	2.1	2.1	2.0	2.0	2.1
11-Jul	Z	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.0	2.2	2.2	2.2	1.9	2.2
12-Jul	2.2	Z	2.1	2.1	2.1	2.0	1.9	1.9	2.1	2.0	2.1	2.1	2.0	2.0	2.1	2.3	2.2	2.1	1.9	1.9	2.0	1.9	1.9	1.8	2.0	2.3
13-Jul	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	1.8	2.1	2.1	2.0	1.9	1.9	1.9	2.1
14-Jul	1.9	1.9	1.9	Z	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	1.9	1.9	1.9	1.9	1.9	2.0
15-Jul	1.9	1.9	1.9	1.9	Z	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	2.0	1.9	1.9	1.9	2.0
16-Jul	2.0	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	1.9	1.9	2.2	2.0	1.9	1.8	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.9	1.9	1.9	2.2
17-Jul	Z	1.9	2.0	2.1	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.9	1.9	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1
18-Jul	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	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9
19-Jul	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	1.9	1.9	1.9	1.9	1.8	1.9
20-Jul	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9
21-Jul	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	1.8	1.8	1.8	1.8	1.9	2.1	2.1	2.1	2.1	2.1	1.9	1.9	2.1
22-Jul	2.0	2.0	1.9	2.0	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	2.0
23-Jul	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	1.8	1.8	1.9	1.8	1.9
24-Jul	1.9	Z	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.0	1.9	1.9	1.9	1.9	2.0
25-Jul	1.9	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	1.9	2.0	1.9	2.0
26-Jul	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	2.1	2.3	2.0	2.0	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	2.3
27-Jul	1.9	1.9	1.9	1.9	Z	1.9	2.0	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	2.0
28-Jul	1.9	1.9	2.0	1.9	1.9	Z	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	2.0	1.9	2.0
29-Jul	Z	2.1	2.1	2.0	2.1	2.0	2.0	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.8	2.1
30-Jul	1.8	Z	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	1.8	1.9	1.9	1.8	1.9	1.9	1.9	1.9
31-Jul	1.9	1.9	Z	1.9	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	1.9	2.0
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan                      C - Calibration                      M - Maintenance																										





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

**Total Hydrocarbons (THC) - ppm**  
**Athabasca Valley - July 2015**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	659	93.34	93.34
2.1 - 3.0	47	6.66	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 706

Total Number of Hours: 744





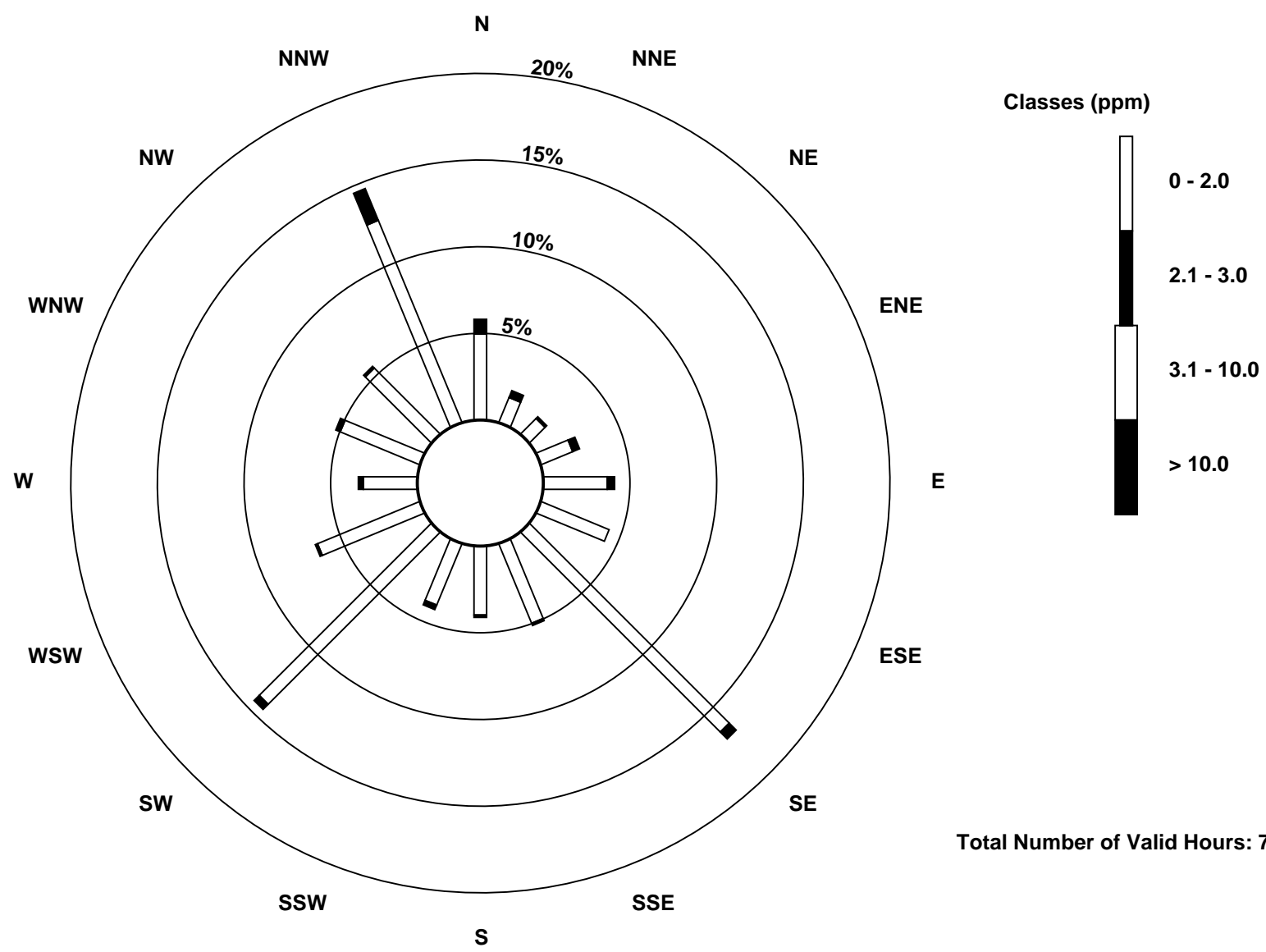
**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Athabasca Valley - July 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	35	11	9	14	26	30	115	35	28	27	99	45	22	35	38	89	658
2.1 - 3.0	6	3	1	3	3	0	4	1	1	2	3	1	2	2	1	14	47
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	41	14	10	17	29	30	119	36	29	29	102	46	24	37	39	103	705

Total Number of Valid Hours: 705

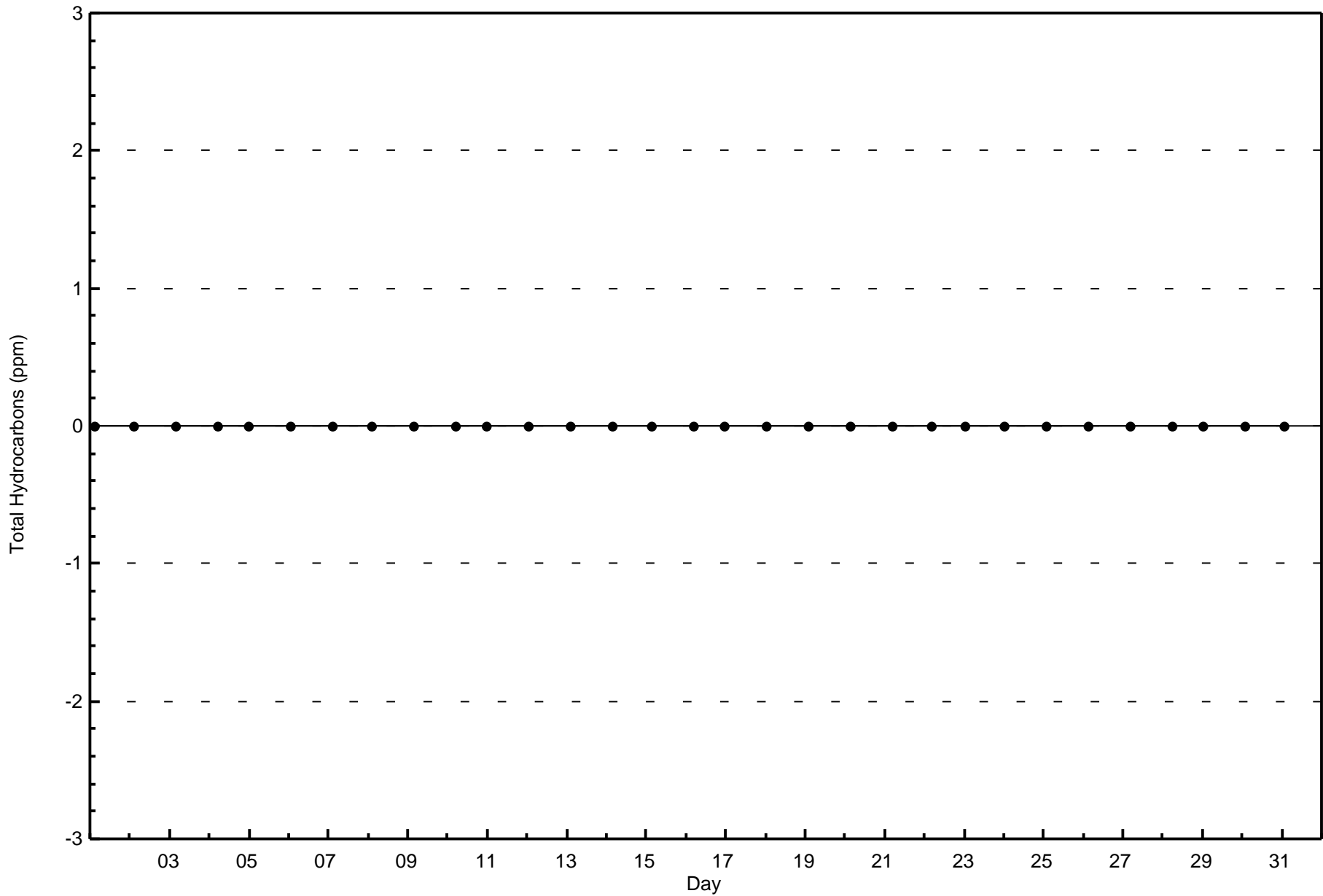
Total Number of Hours: 744

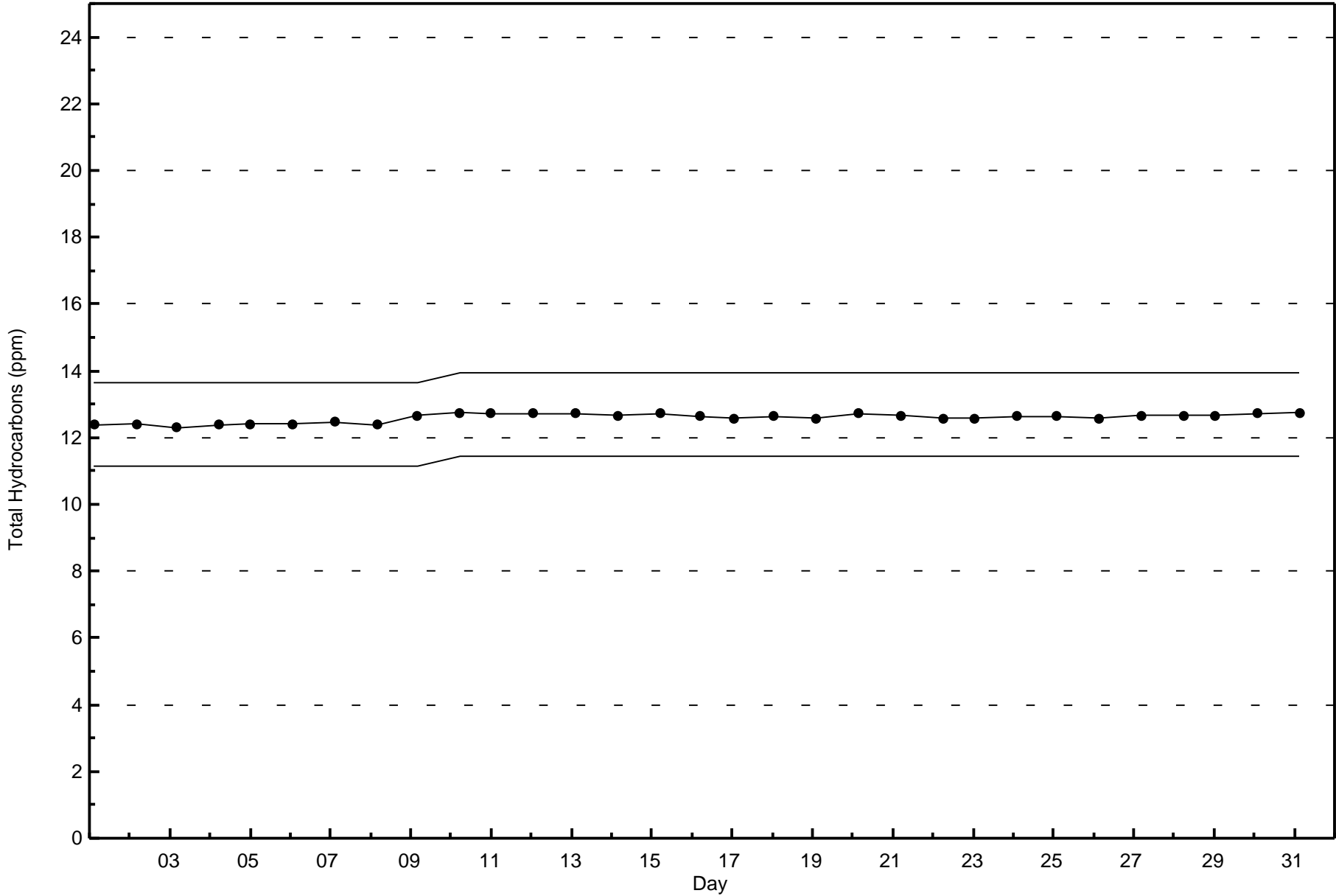




Wood Buffalo Environmental Association  
Zero Responses

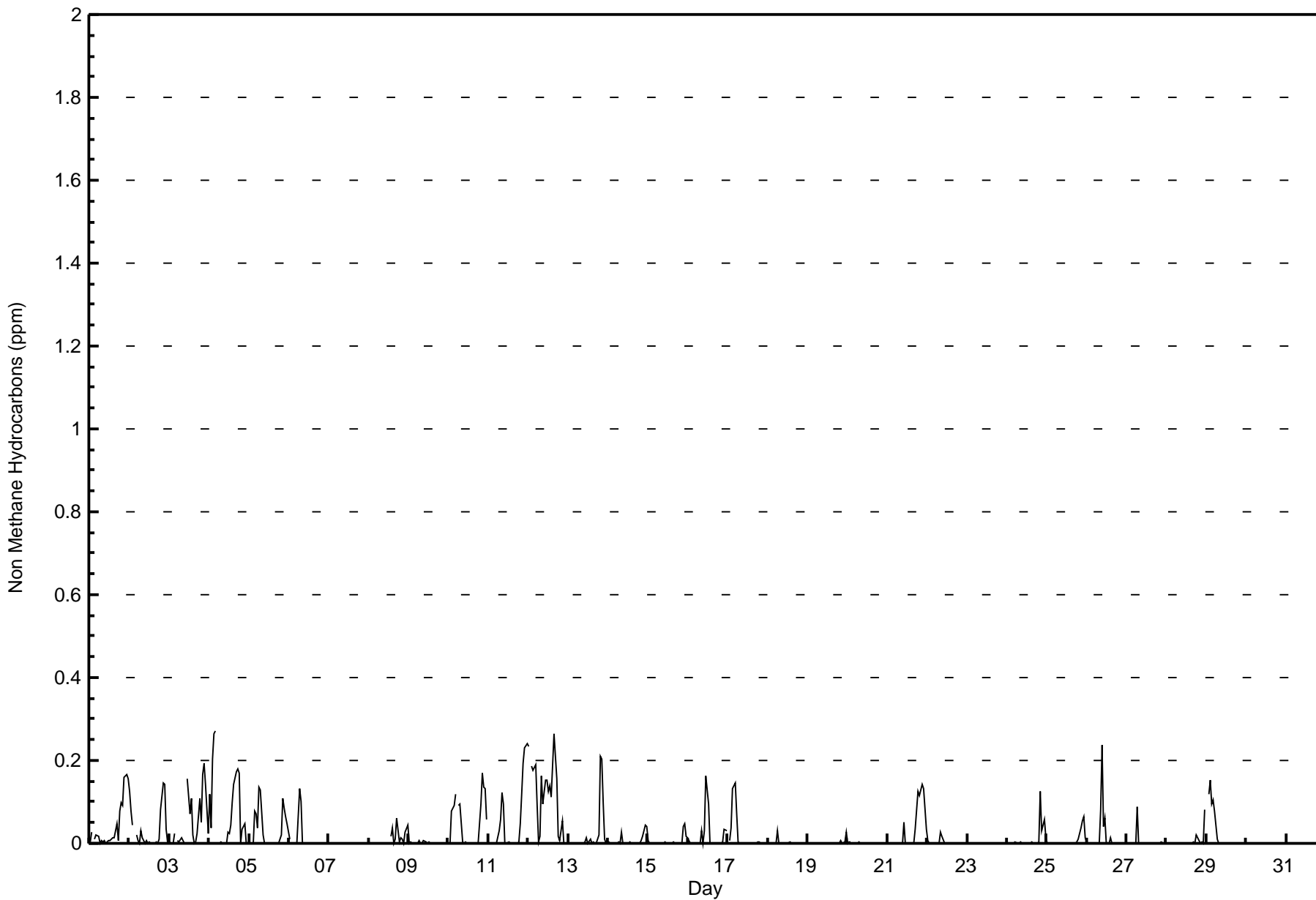
Total Hydrocarbons (THC) - ppm  
Athabasca Valley - July 2015







Maximum Value: 0.271 ppm on Jul 4 05:00																				Maximum Daily Average: 0.111 ppm on Jul 12					Hours in Service: 744	
Minimum Value: 0.000 ppm on Jul 1 11:00																				Minimum Daily Average: 0.000 ppm on Jul 7					Hours of Data: 706	
Maximum Diurnal Average: 0.045 ppm at hour 21																				Minimum Diurnal Average: 0.010 ppm at hour 15					Hours of Missing Data: 38	
Monthly Average: 0.021 ppm																				Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 0.0 P <sub>90</sub> = 0.1 P <sub>99</sub> = 0.2					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-Jul	0.002	0.027	Z	0.012	0.020	0.017	0.000	0.005	0.004	0.007	0.000	0.007	0.006	0.012	0.014	0.015	0.046	0.006	0.077	0.099	0.091	0.160	0.165	0.157	0.041	0.165
2-Jul	0.126	0.077	0.044	Z	0.019	0.006	0.000	0.029	0.012	0.001	0.008	0.000	0.005	0.000	0.000	0.000	0.002	0.000	0.010	0.081	0.146	0.142	0.033	0.005	0.032	0.146
3-Jul	0.003	0.000	0.001	0.025	Z	0.006	0.005	0.013	0.007	0.000	M	0.156	0.071	0.108	0.021	0.000	0.004	0.022	0.110	0.049	0.166	0.195	0.142	0.024	0.051	0.195
4-Jul	0.119	0.036	0.202	0.264	0.271	Z	0.000	0.002	0.000	0.000	0.000	0.028	0.023	0.044	0.099	0.143	0.172	0.180	0.169	0.000	0.034	0.049	0.000	0.000	0.080	0.271
5-Jul	Z	0.000	0.001	0.079	0.071	0.037	0.134	0.128	0.020	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.021	0.109	0.086	0.066	0.048	0.035	0.134
6-Jul	0.010	Z	0.001	0.000	0.000	0.000	0.133	0.100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.133
7-Jul	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Jul	0.000	0.000	0.000	Z	0.000	0.000	0.000	C	C	C	C	C	C	0.017	0.037	0.002	0.009	0.061	0.002	0.012	0.010	0.001	0.027	0.043	--	0.061
9-Jul	0.000	0.002	0.000	0.001	Z	0.000	0.006	0.000	0.000	0.008	0.002	0.000	0.003	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.008
10-Jul	0.001	0.001	0.078	0.092	0.119	Z	0.093	0.093	0.005	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.094	0.170	0.137	0.132	0.059	0.047	0.170
11-Jul	Z	0.000	0.000	0.000	0.000	0.000	0.032	0.056	0.123	0.094	0.000	0.001	0.003	0.000	0.001	0.000	0.000	0.000	0.004	0.048	0.119	0.193	0.231	0.242	0.050	0.242
12-Jul	0.235	Z	0.185	0.175	0.189	0.091	0.003	0.018	0.161	0.096	0.152	0.153	0.125	0.138	0.111	0.266	0.212	0.156	0.018	0.007	0.053	0.000	0.000	0.000	0.111	0.266
13-Jul	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.002	0.012	0.000	0.009	0.000	0.004	0.002	0.000	0.021	0.209	0.202	0.098	0.010	0.000	0.025	0.209
14-Jul	0.004	0.000	0.000	Z	0.000	0.000	0.004	0.000	0.028	0.000	0.000	0.000	0.000	0.003	0.000	0.001	0.001	0.000	0.000	0.000	0.006	0.016	0.045	0.040	0.006	0.045
15-Jul	0.007	0.001	0.000	0.000	Z	0.000	0.000	0.001	0.000	0.001	0.002	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.001	0.002	0.040	0.048	0.017	0.005	0.048	
16-Jul	0.012	0.000	0.000	0.000	0.000	Z	0.000	0.001	0.030	0.000	0.032	0.163	0.095	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.034	0.031	0.017	0.163
17-Jul	Z	0.006	0.038	0.134	0.147	0.071	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.003	0.005	0.002	0.000	0.000	0.000	0.000	0.018	0.147
18-Jul	0.000	Z	0.001	0.000	0.000	0.001	0.030	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.001	0.001	0.002	0.030
19-Jul	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.006	0.000	0.003	0.026	0.002	0.026
20-Jul	0.000	0.002	0.004	Z	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005
21-Jul	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.001	0.000	0.000	0.050	0.000	0.000	0.000	0.000	0.001	0.000	0.035	0.124	0.116	0.129	0.143	0.131	0.033	0.033	0.143
22-Jul	0.006	0.000	0.000	0.000	0.000	Z	0.001	0.000	0.027	0.018	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.002	0.027
23-Jul	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001
24-Jul	0.000	Z	0.001	0.000	0.000	0.003	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.005	0.124	0.032	0.059	0.014	0.011	0.124	
25-Jul	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.011	0.038	0.054	0.064	0.013	0.008	0.064	
26-Jul	0.003	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.081	0.238	0.039	0.062	0.001	0.001	0.012	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.019	0.238
27-Jul	0.000	0.000	0.000	0.000	Z	0.001	0.087	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.003	0.000	0.002	0.004	0.087	
28-Jul	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	0.003	0.000	0.020	0.008	0.000	0.003	0.000	0.080	0.005	0.080
29-Jul	Z	0.119	0.153	0.096	0.104	0.078	0.009	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.024	0.153
30-Jul	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.001
31-Jul	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.033	0.043	0.003	0.043	
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan                      C - Calibration                      M - Maintenance																										





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

**Non Methane Hydrocarbons (NMHC) - ppm**  
**Athabasca Valley - July 2015**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.005	516	73.09	73.09
0.006 - 0.05	95	13.46	86.54
0.06 - 0.1	64	9.07	95.61
> 0.1	31	4.39	100.00

Total Number of Valid Hours: 706

Total Number of Hours: 744



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

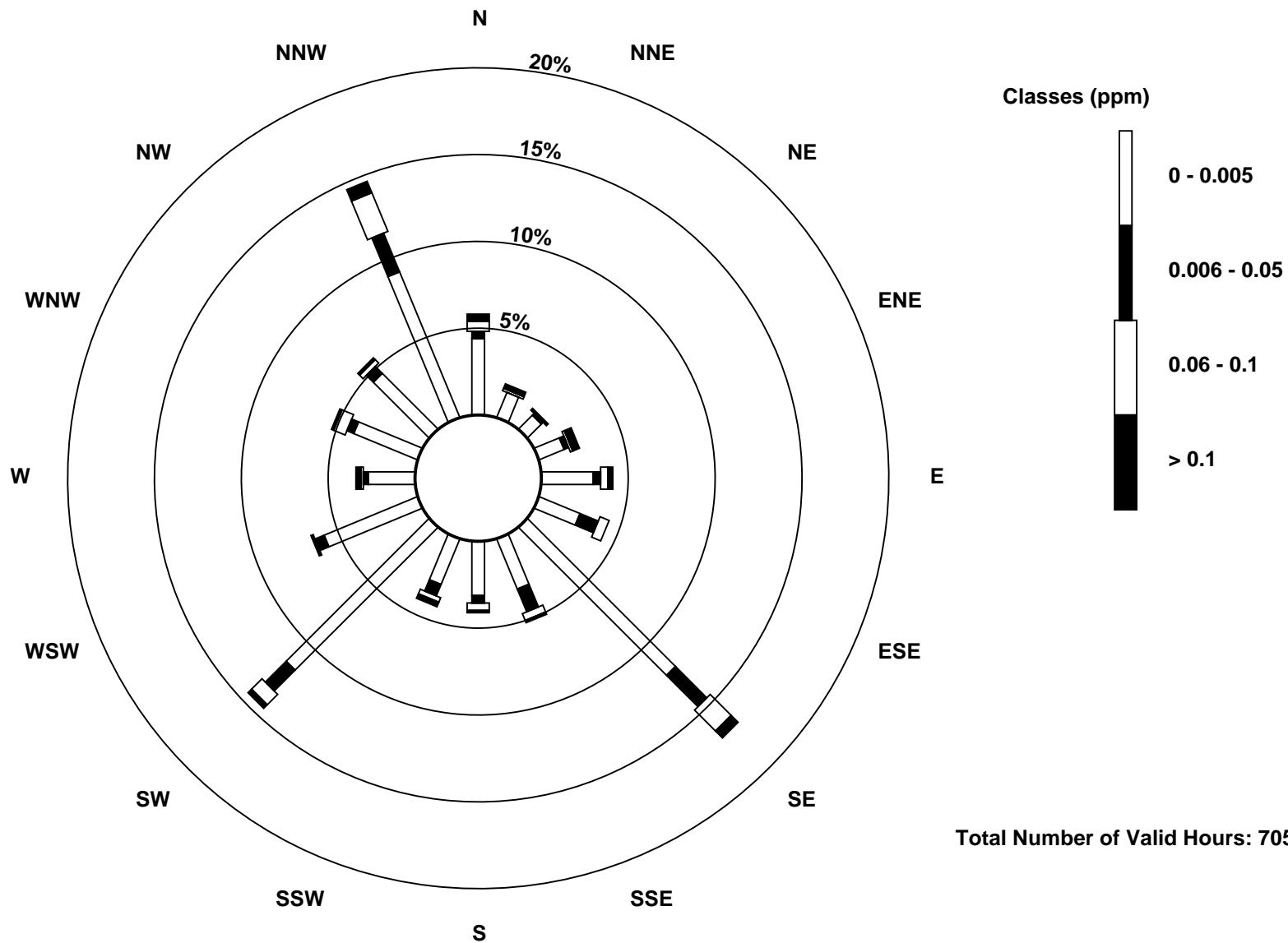
**Non Methane Hydrocarbons (NMHC) - ppm**  
**Athabasca Valley - July 2015**

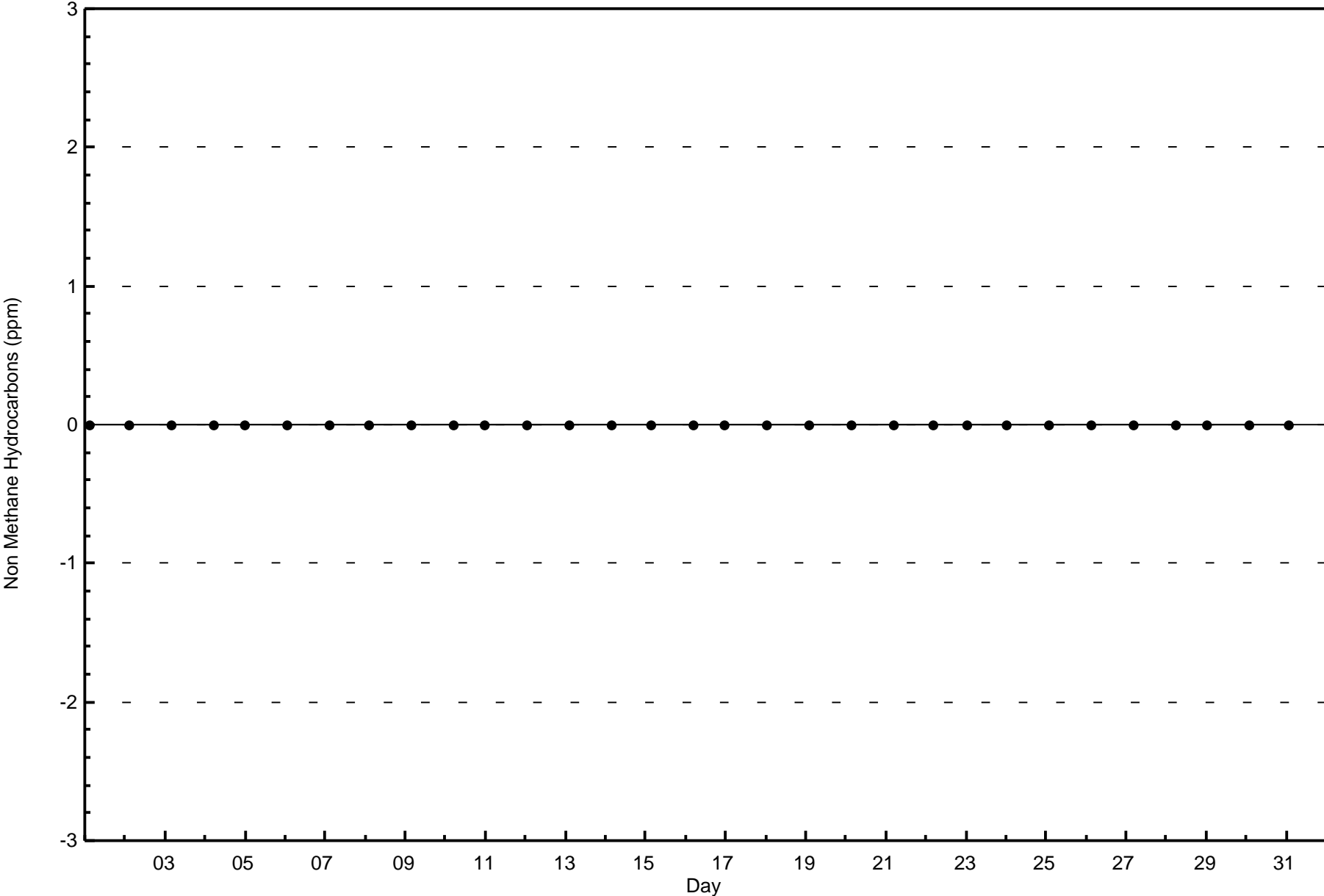
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	31	11	8	11	21	18	85	22	22	20	82	41	19	28	32	64	515
0.006 - 0.05	3	0	1	2	3	8	18	10	3	5	12	4	2	3	4	17	95
0.06 - 0.1	4	1	0	1	3	4	12	3	3	2	6	0	1	5	2	17	64
> 0.1	3	2	1	3	2	0	4	1	1	2	2	1	2	1	1	5	31
<b>Totals</b>	41	14	10	17	29	30	119	36	29	29	102	46	24	37	39	103	705

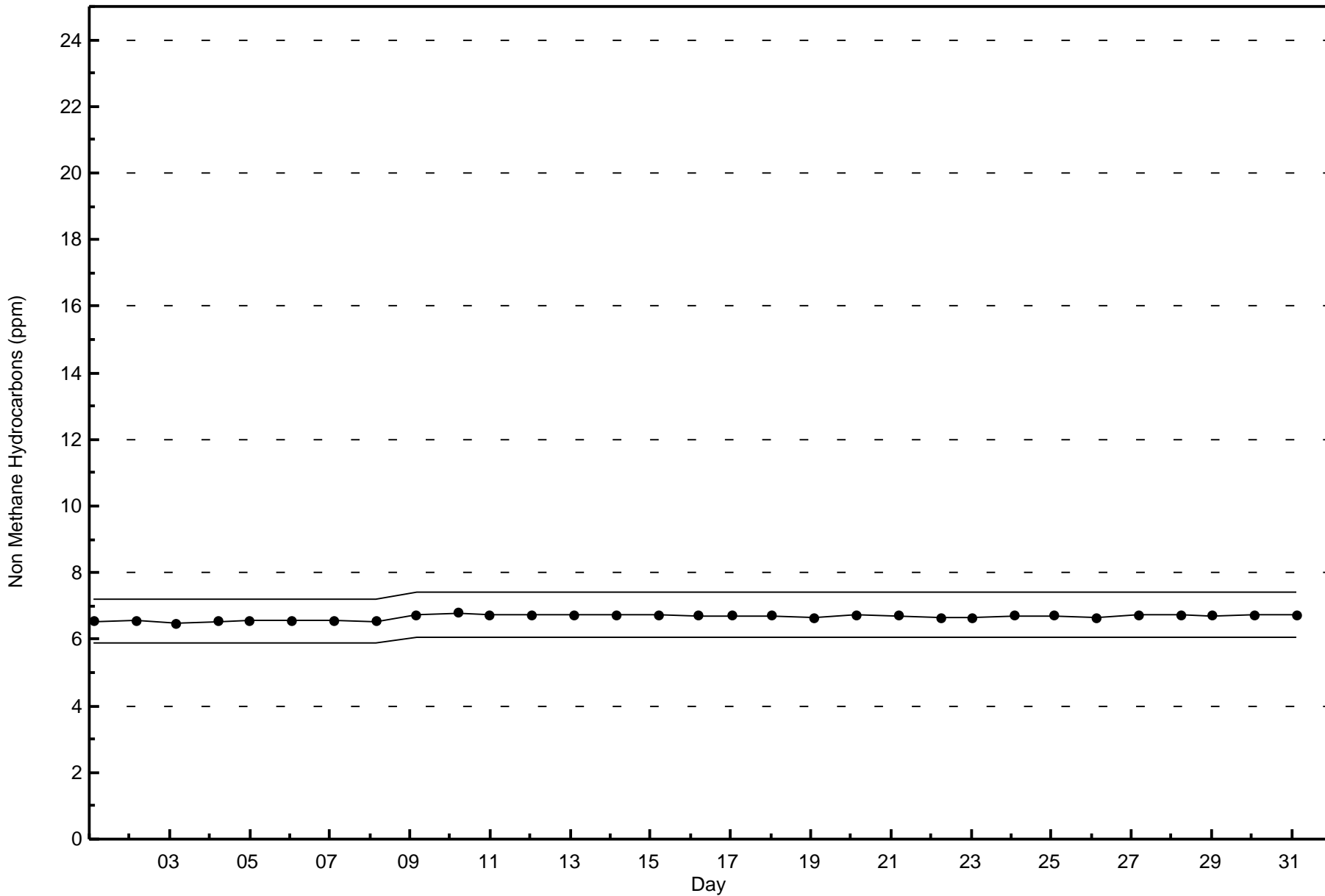
Total Number of Valid Hours: 705

Total Number of Hours: 744







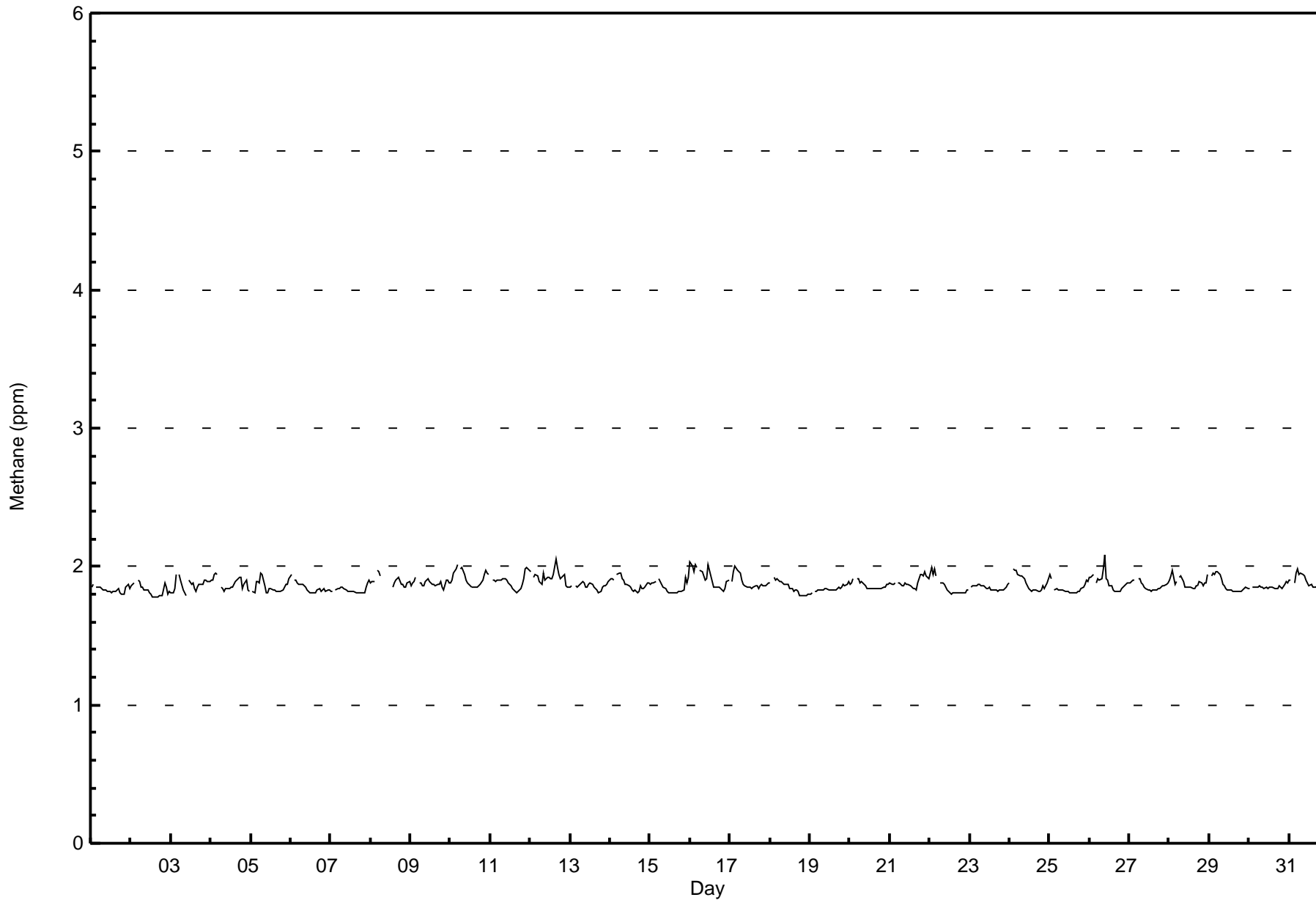




Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 2.1 ppm on Jul 26 10:00	Maximum Daily Average: 1.9 ppm on Jul 12		Hours of Data:	706
Minimum Value: 1.8 ppm on Jul 2 17:00	Minimum Daily Average: 1.8 ppm on Jul 2		Hours of Missing Data:	38
Maximum Diurnal Average: 1.9 ppm at hour 5	Minimum Diurnal Average: 1.8 ppm at hour 15		Hours of Calibration:	37
Monthly Average: 1.87 ppm	Percentiles: P <sub>1</sub> = 1.8 P <sub>10</sub> = 1.8 Q <sub>1</sub> = 1.8 Median = 1.9 Q <sub>3</sub> = 1.9 P <sub>90</sub> = 1.9 P <sub>99</sub> = 2.0		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-Jul	1.9	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	1.8	1.8	1.9																							
2-Jul	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	1.8	1.8	1.8	1.9																						
3-Jul	1.8	1.8	1.8	1.9	Z	1.9	1.9	1.8	1.8	1.8	M	1.9	1.9	1.9	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9																						
4-Jul	1.9	1.9	1.9	2.0	1.9	Z	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	1.8	1.9	1.9	1.8	1.8	1.8	1.9																						
5-Jul	Z	1.8	1.8	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	1.9	1.9	1.9	1.9	1.9																						
6-Jul	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8																						
7-Jul	1.8	1.8	Z	1.8	1.8	1.8	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.8	1.9																						
8-Jul	1.9	1.9	1.9	Z	2.0	2.0	1.9	C	C	C	C	C	C	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.9	1.9	--	2.0																						
9-Jul	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.9	1.9	1.9	1.9	1.9																						
10-Jul	1.9	1.9	2.0	2.0	2.0	Z	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	2.0																						
11-Jul	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	2.0	2.0	2.0	1.9	2.0																						
12-Jul	2.0	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.9	2.1																						
13-Jul	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9																						
14-Jul	1.9	1.9	1.9	Z	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	1.9	1.9	2.0																						
15-Jul	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9																						
16-Jul	2.0	2.0	2.0	2.0	2.0	Z	2.0	2.0	1.9	1.9	1.9	2.0	1.9	1.9	1.8	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.9	1.9	1.9	2.0																						
17-Jul	Z	1.9	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.9	1.9	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0																						
18-Jul	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	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9																						
19-Jul	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	1.9	1.9	1.9	1.9	1.9	1.9																						
20-Jul	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9																						
21-Jul	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	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	2.0																						
22-Jul	2.0	2.0	1.9	2.0	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	2.0																						
23-Jul	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	1.8	1.8	1.9	1.9	1.9																						
24-Jul	1.9	Z	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.8	1.9	1.9	2.0																						
25-Jul	1.9	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	1.9	1.9	1.9	1.9																						
26-Jul	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	2.0	2.1	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	2.1																						
27-Jul	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9																						
28-Jul	1.9	1.9	2.0	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	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0																						
29-Jul	Z	1.9	2.0	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.8	2.0																						
30-Jul	1.8	Z	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	1.8	1.9	1.9	1.8	1.9	1.9	1.9	1.9																						
31-Jul	1.9	1.9	Z	1.9	2.0	2.0	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0																						
																								1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	Diurnal Average
																								2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	1.9	2.0	1.9	1.9	1.9	2.1	2.0	1.9	1.9	1.9	1.9	2.0	2.0	2.0	Diurnal Maximum

Z - zerospan      C - Calibration      M - Maintenance





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

**Methane (CH<sub>4</sub>) - ppm**  
**Athabasca Valley - July 2015**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	704	99.72	99.72
2.1 - 3.0	2	0.28	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 706

Total Number of Hours: 744



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

**Methane (CH<sub>4</sub>) - ppm**  
**Athabasca Valley - July 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	41	13	10	17	29	30	119	36	29	29	102	46	24	37	39	102	703
2.1 - 3.0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	41	14	10	17	29	30	119	36	29	29	102	46	24	37	39	103	705

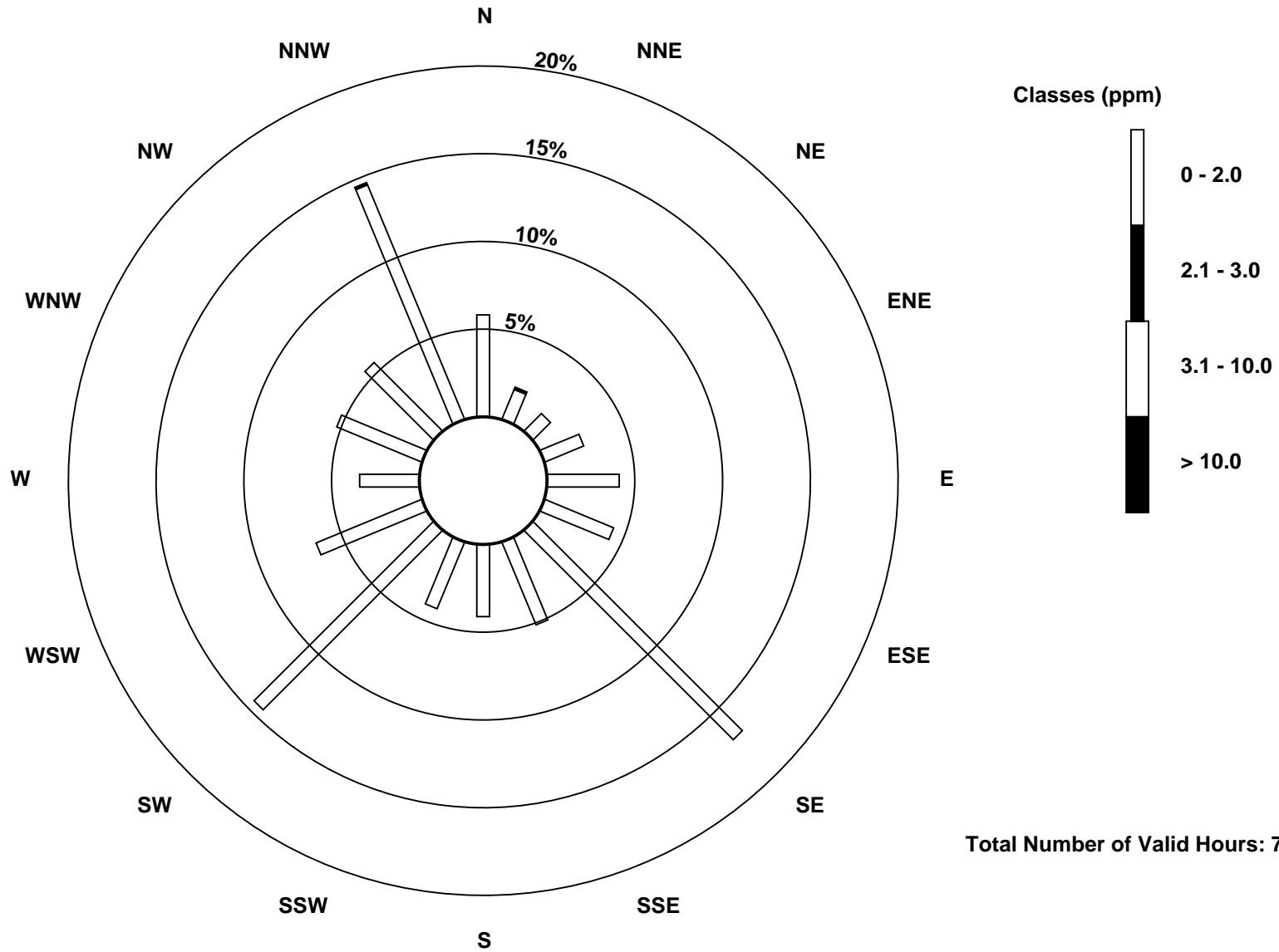
Total Number of Valid Hours: 705

Total Number of Hours: 744



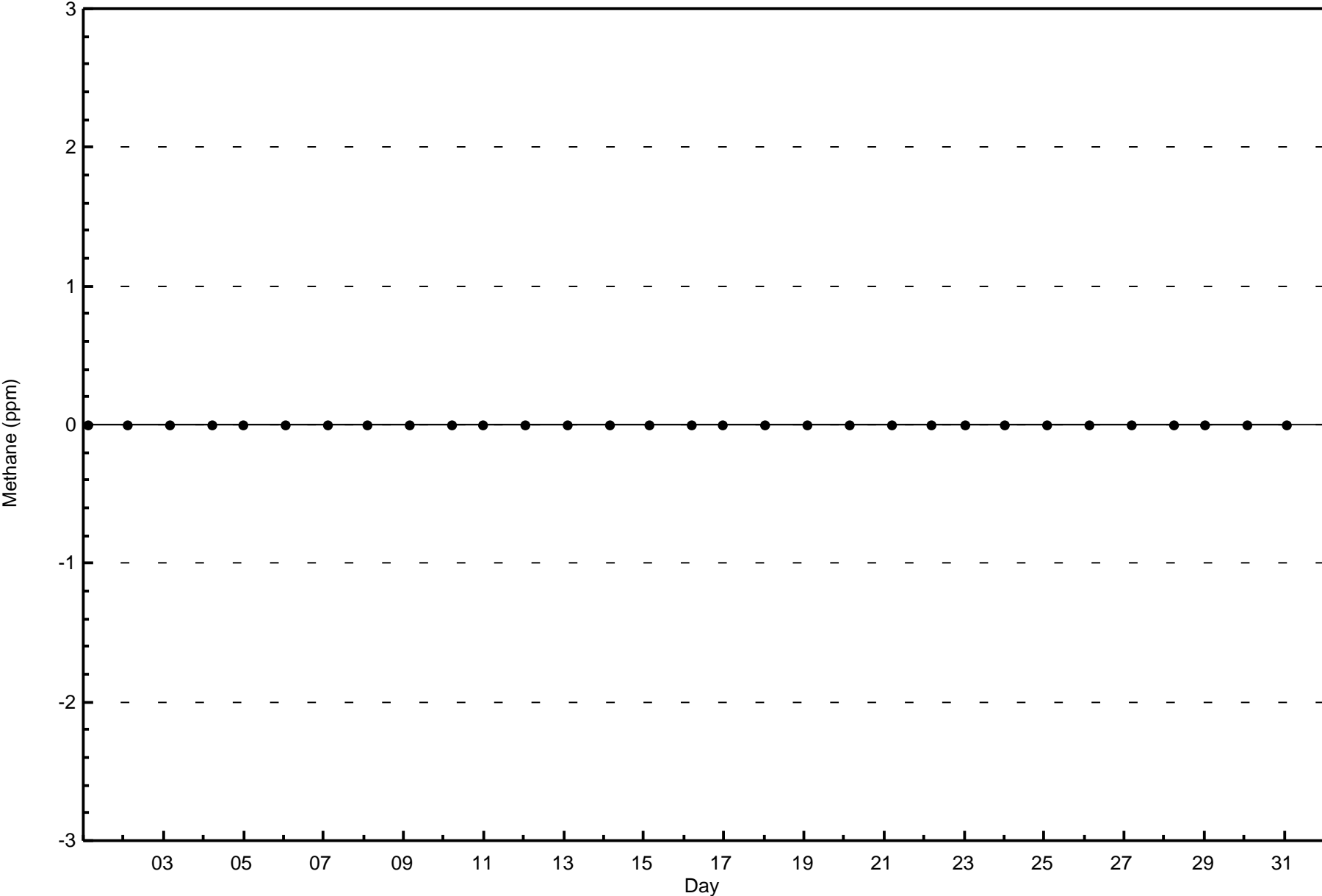
Wood Buffalo Environmental Association  
Wind Rose Jul 2015

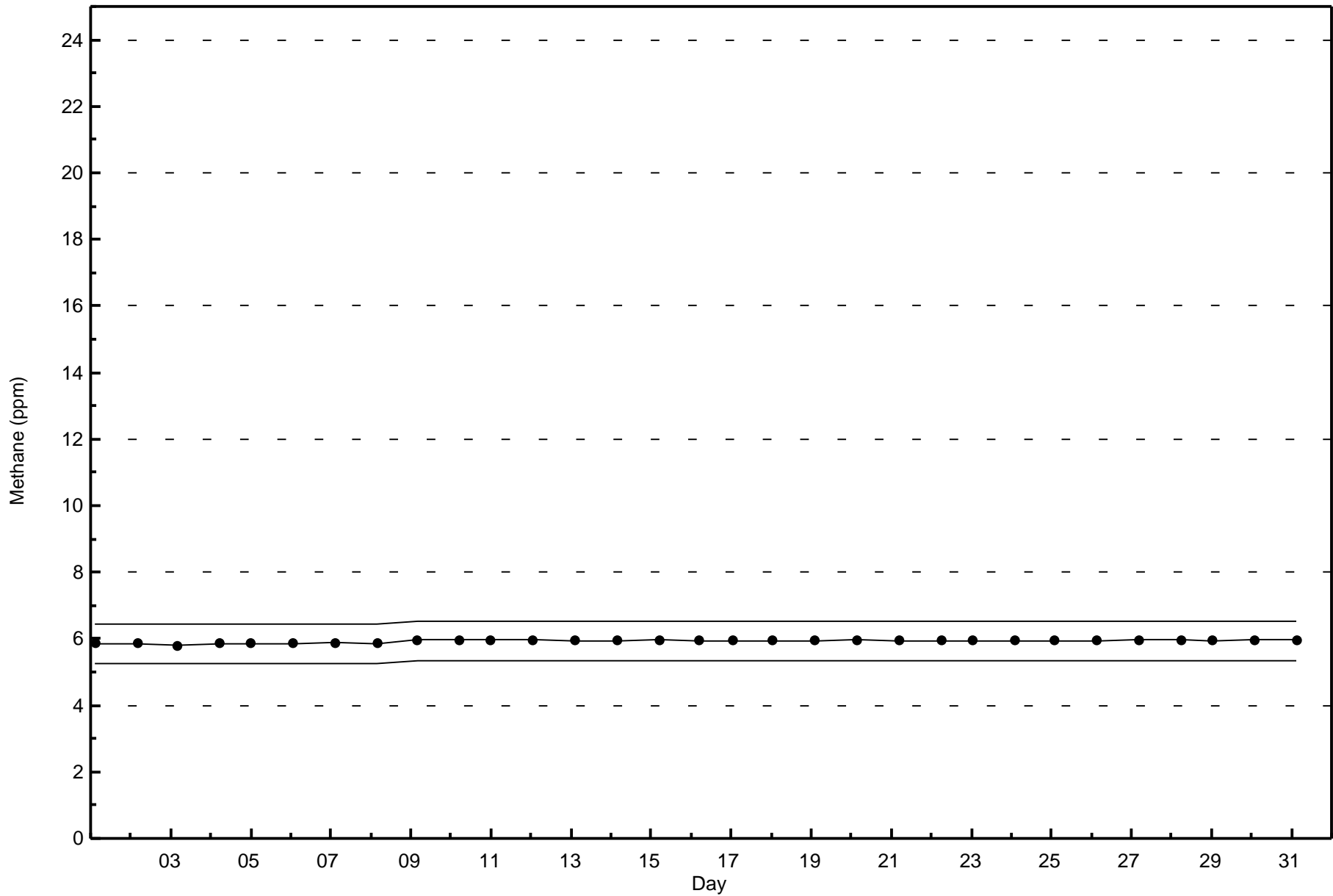
Methane (CH<sub>4</sub>) - ppm  
Athabasca Valley (AMS 7)



Total Number of Valid Hours: 705

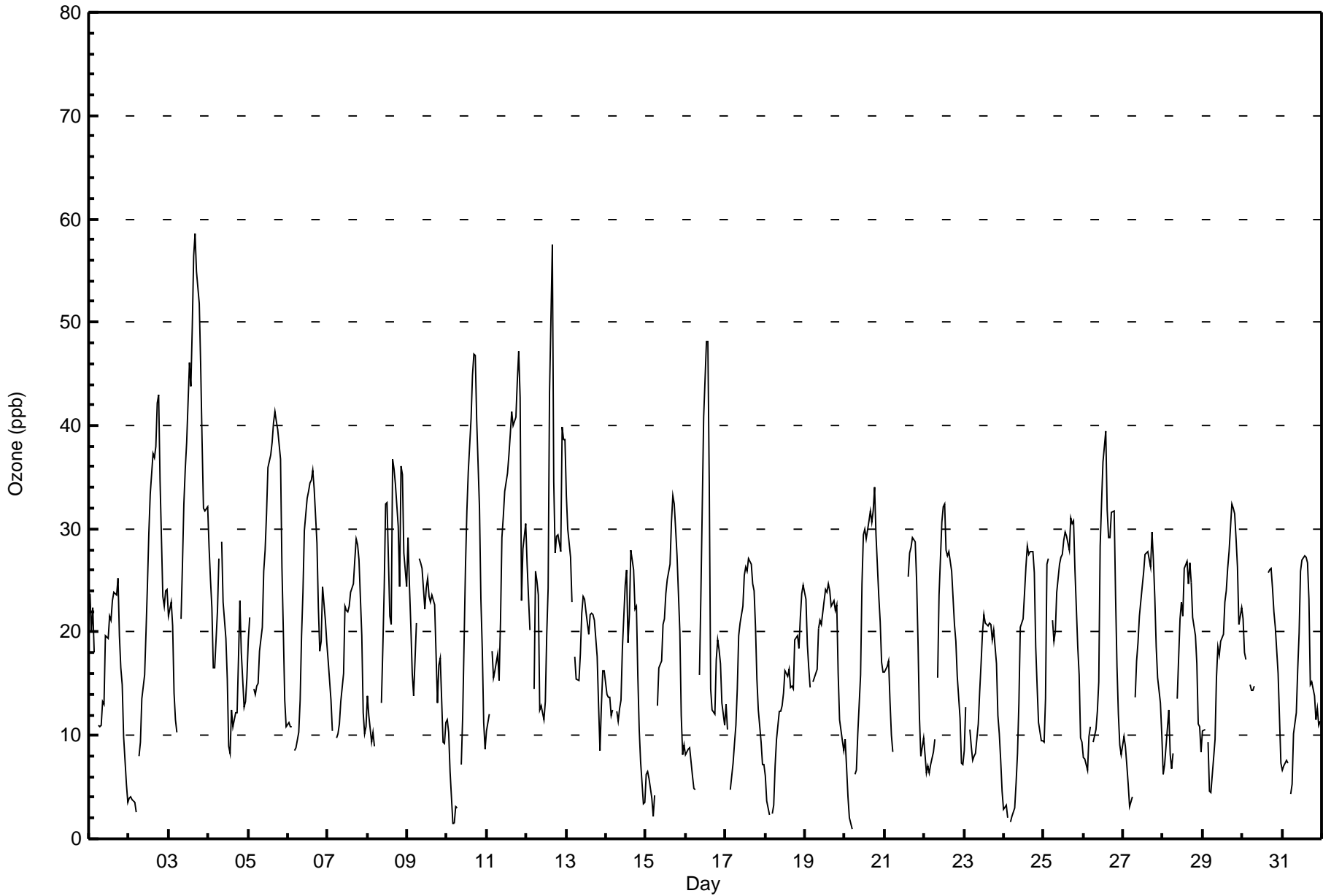








Number of Exceedences (AAAQO):		1-hr: 0    24-hr: 0		Hours in Service:		744																																											
Maximum Value: 59 ppb on Jul 3 17:00		Maximum Daily Average: 34.6 ppb on Jul 3		Hours of Data:		699																																											
Minimum Value: 1 ppb on Jul 20 05:00		Minimum Daily Average: 13.3 ppb on Jul 18		Hours of Missing Data:		45																																											
Maximum Diurnal Average: 29.6 ppb at hour 16		Minimum Diurnal Average: 8.3 ppb at hour 5		Hours of Calibration:		37																																											
Monthly Average: 19.7 ppb		Percentiles: P <sub>1</sub> = 2    P <sub>10</sub> = 7    Q <sub>1</sub> = 11    Median = 19    Q <sub>3</sub> = 26    P <sub>90</sub> = 32    P <sub>99</sub> = 47		Percent Operational Time:		98.9																																											
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jul	24	20	22	18	Z	11	11	11	13	13	20	19	22	21	23	24	24	25	20	17	15	10	5	4	17.0	25																							
2-Jul	4	4	4	4	3	Z	8	9	14	16	20	24	29	33	37	37	38	42	43	35	24	23	24	24	21.7	43																							
3-Jul	22	23	21	14	11	10	Z	21	27	32	36	38	46	44	49	56	59	55	52	46	38	32	32	32	34.6	59																							
4-Jul	28	25	22	16	17	22	27	Z	29	23	19	15	9	8	12	11	12	12	18	23	18	13	13	16	17.8	29																							
5-Jul	19	21	Z	15	14	15	15	18	21	26	28	31	36	37	38	40	41	40	40	37	26	20	13	11	26.2	41																							
6-Jul	11	11	11	Z	9	9	10	13	20	24	30	33	34	34	35	36	34	29	22	18	19	24	21	19	22.0	36																							
7-Jul	17	15	13	11	Z	10	10	11	13	16	22	22	22	23	24	25	27	29	29	27	20	12	10	11	18.2	29																							
8-Jul	14	12	9	10	9	Z	10	M	13	18	24	32	33	22	21	37	36	34	30	24	36	35	28	24	23.3	37																							
9-Jul	29	25	21	16	14	21	Z	27	27	26	22	24	25	23	23	24	23	18	13	17	18	9	9	11	20.2	29																							
10-Jul	12	10	6	2	2	3	3	Z	7	12	19	26	32	36	41	45	47	47	40	32	23	18	11	9	21.0	47																							
11-Jul	10	12	Z	18	16	16	18	15	21	29	31	34	35	37	39	41	40	41	44	47	43	23	28	31	29.1	47																							
12-Jul	27	23	20	Z	14	26	25	24	12	13	11	13	20	24	43	57	35	28	29	29	28	40	39	39	26.9	57																							
13-Jul	33	30	27	23	Z	18	15	15	18	22	23	23	22	20	22	22	22	21	18	13	9	13	16	16	20.0	33																							
14-Jul	14	14	14	12	12	Z	12	11	13	13	18	25	26	19	22	28	26	22	22	16	11	7	3	3	15.8	28																							
15-Jul	6	6	6	4	2	4	Z	13	17	17	21	21	24	25	27	31	33	32	30	27	20	12	8	9	17.2	33																							
16-Jul	8	9	9	7	6	5	5	Z	16	23	32	41	48	48	34	14	12	12	17	19	18	17	13	11	18.5	48																							
17-Jul	13	11	Z	5	7	9	11	14	20	21	22	25	26	26	27	27	25	24	20	15	12	9	7	7	16.8	27																							
18-Jul	6	4	2	Z	2	3	7	10	12	12	13	14	16	16	16	15	15	15	19	20	18	21	24	25	13.3	25																							
19-Jul	23	19	16	15	Z	15	16	16	20	21	21	23	24	24	25	24	23	23	22	23	16	11	10	8	19.1	25																							
20-Jul	10	7	4	2	1	Z	6	7	10	16	25	29	30	29	31	32	31	32	34	29	23	21	17	16	19.2	34																							
21-Jul	16	17	17	13	10	8	Z	7	C	C	C	C	C	C	25	28	28	29	29	25	19	12	8	10	--	29																							
22-Jul	8	6	7	6	7	8	10	Z	16	24	31	32	32	28	27	28	26	23	21	19	16	12	7	7	17.5	32																							
23-Jul	9	13	Z	11	9	8	8	8	11	14	17	20	22	21	21	21	21	19	20	17	12	10	8	5	14.0	22																							
24-Jul	3	3	2	Z	2	2	3	5	8	13	20	21	24	26	28	28	28	28	26	19	15	11	9	9	14.5	28																							
25-Jul	9	14	27	27	Z	21	19	20	24	27	27	28	29	30	29	28	31	31	31	26	19	16	10	9	23.0	31																							
26-Jul	8	8	7	10	11	Z	9	11	12	15	28	33	36	39	32	29	29	32	32	23	17	12	9	8	19.6	39																							
27-Jul	10	9	7	5	3	4	Z	14	17	19	22	24	26	27	28	28	26	30	27	23	19	16	13	10	17.7	30																							
28-Jul	6	7	9	12	8	7	8	Z	14	17	21	23	22	26	27	25	27	25	21	20	17	11	11	8	16.2	27																							
29-Jul	10	11	Z	9	5	4	8	10	16	19	18	19	20	23	24	26	28	32	32	31	29	26	21	22	19.3	32																							
30-Jul	21	18	17	Z	15	14	14	15	M	M	M	M	M	M	M	M	26	26	26	24	22	20	16	12	7	--	26																						
31-Jul	7	7	8	7	Z	4	5	10	12	16	20	26	27	27	27	27	23	15	15	14	12	13	11	11	15.0	27																							
																								14.1	13.3	12.6	11.3	8.3	10.7	11.3	13.5	16.3	19.3	22.9	25.6	27.5	27.5	28.6	29.6	28.8	28.1	27.1	24.3	20.3	17.0	14.6	14.0	Diurnal Average	
																								33	30	27	27	17	26	27	27	29	32	36	41	48	48	49	57	59	55	52	47	43	40	39	39	Diurnal Maximum	
Z - zerospan      C - Calibration      M - Maintenance																																																	
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb																																																	





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

**Ozone (O<sub>3</sub>) - ppb**  
**Athabasca Valley - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	377	53.93	53.93
21 - 50	317	45.35	99.28
51 - 82	5	0.72	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 699

Total Number of Hours: 744



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Ozone (O<sub>3</sub>) - ppb  
Athabasca Valley - July 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	13	6	5	6	15	18	106	35	18	18	48	20	12	15	8	34	377
21 - 50	29	8	6	11	11	10	15	5	11	11	47	27	14	19	25	67	316
51 - 82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	5
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	42	14	11	17	26	28	121	40	29	29	95	47	26	34	37	102	698

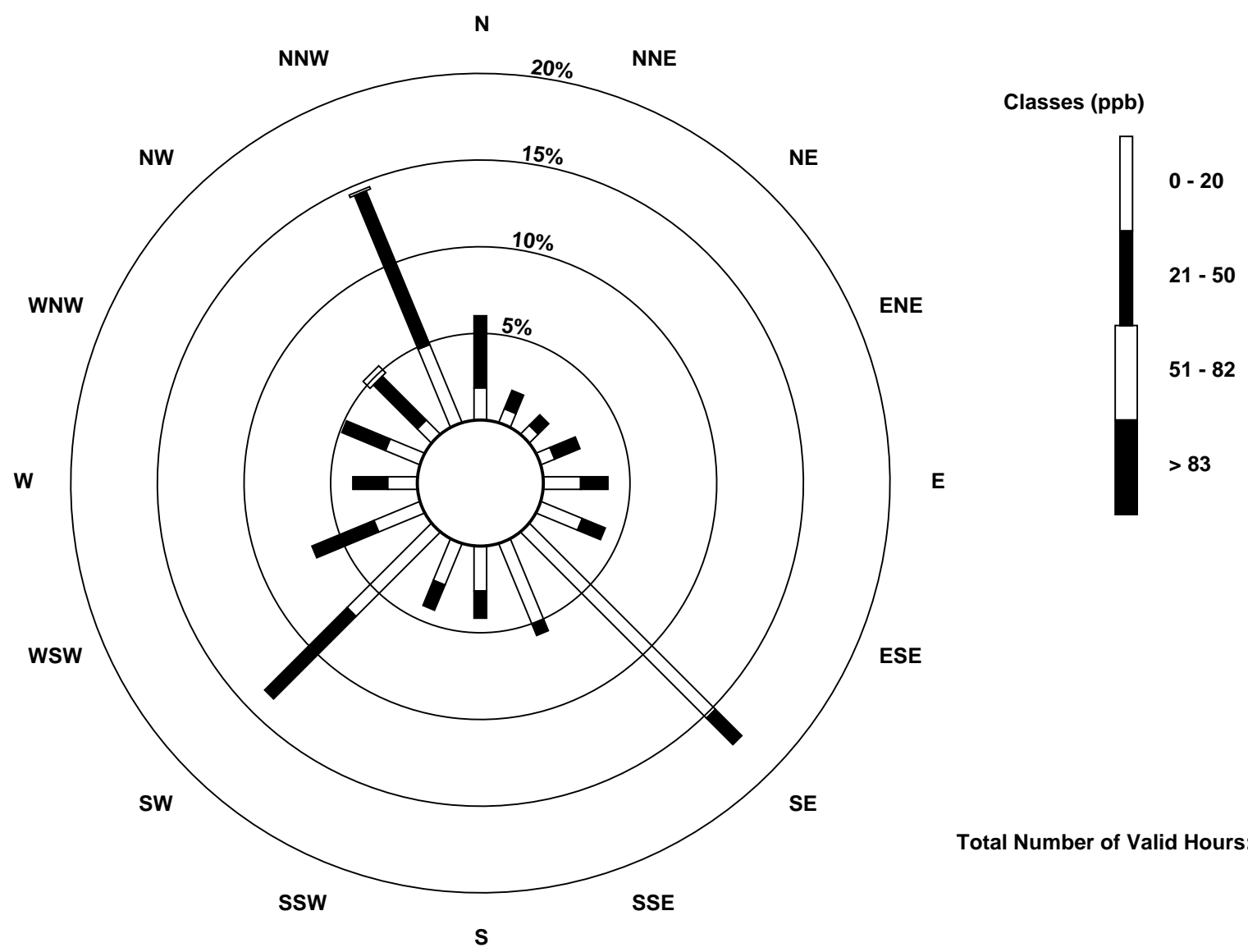
Total Number of Valid Hours: 698

Total Number of Hours: 744

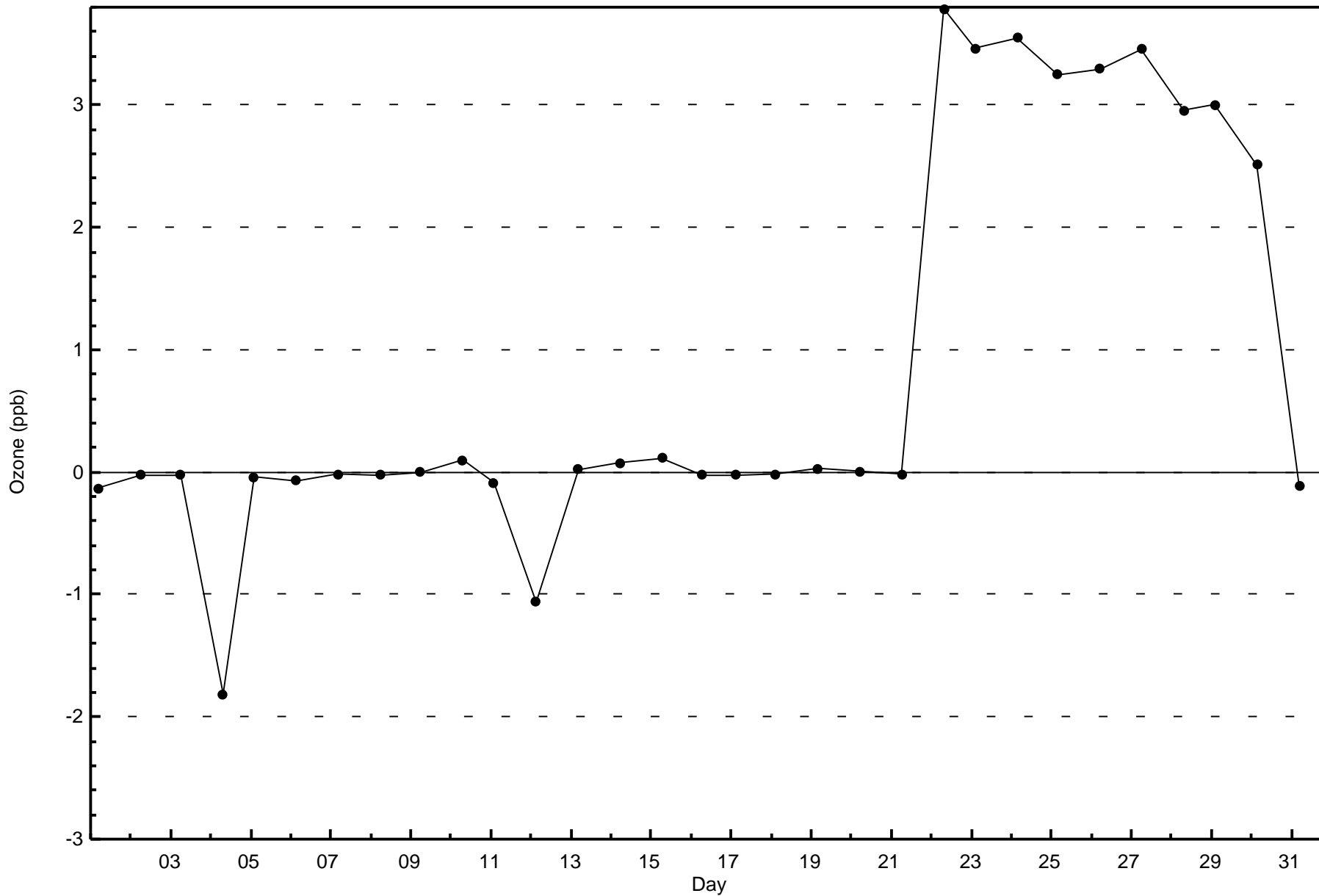


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

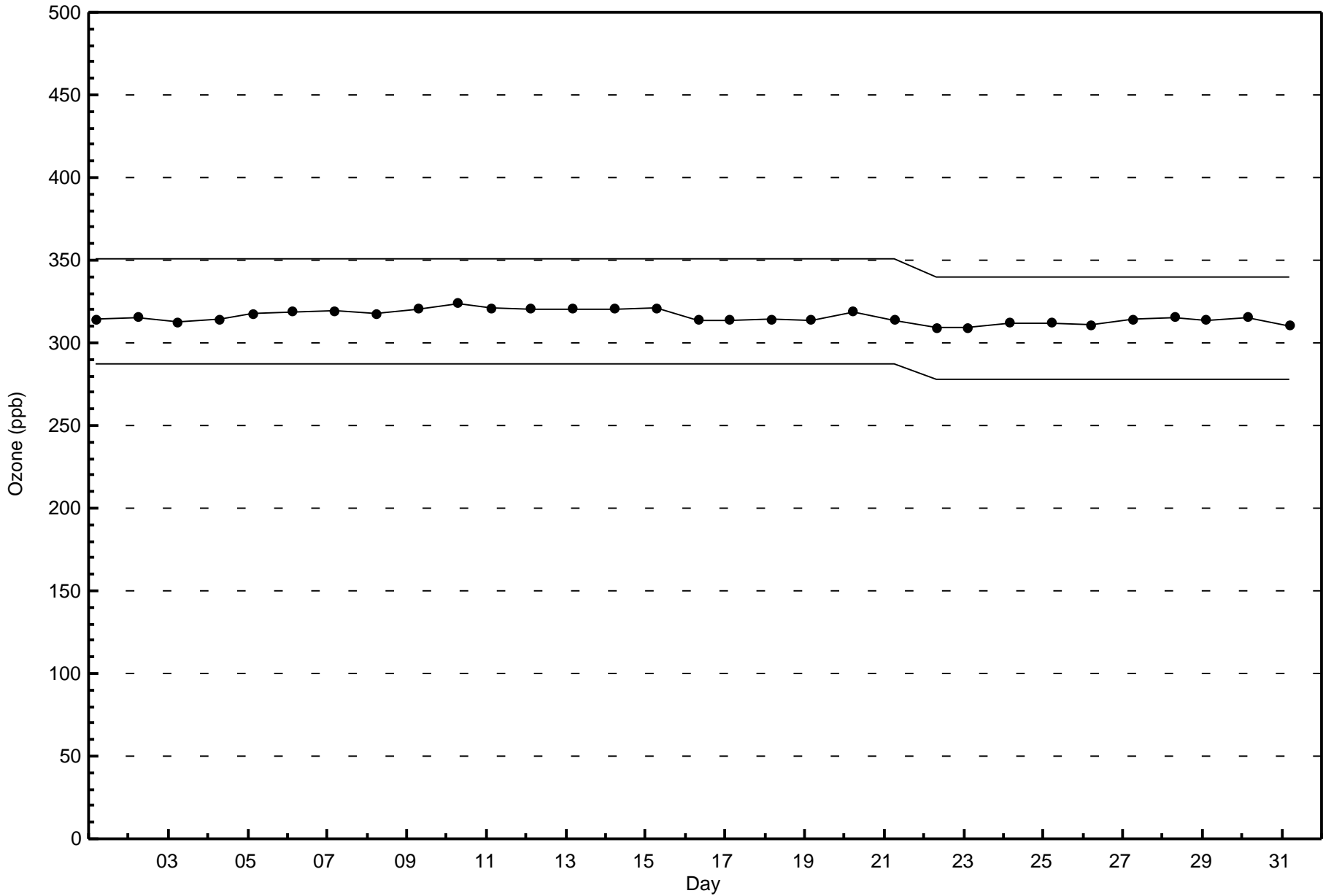
Ozone (O<sub>3</sub>) - ppb  
Athabasca Valley (AMS 7)



Total Number of Valid Hours: 698

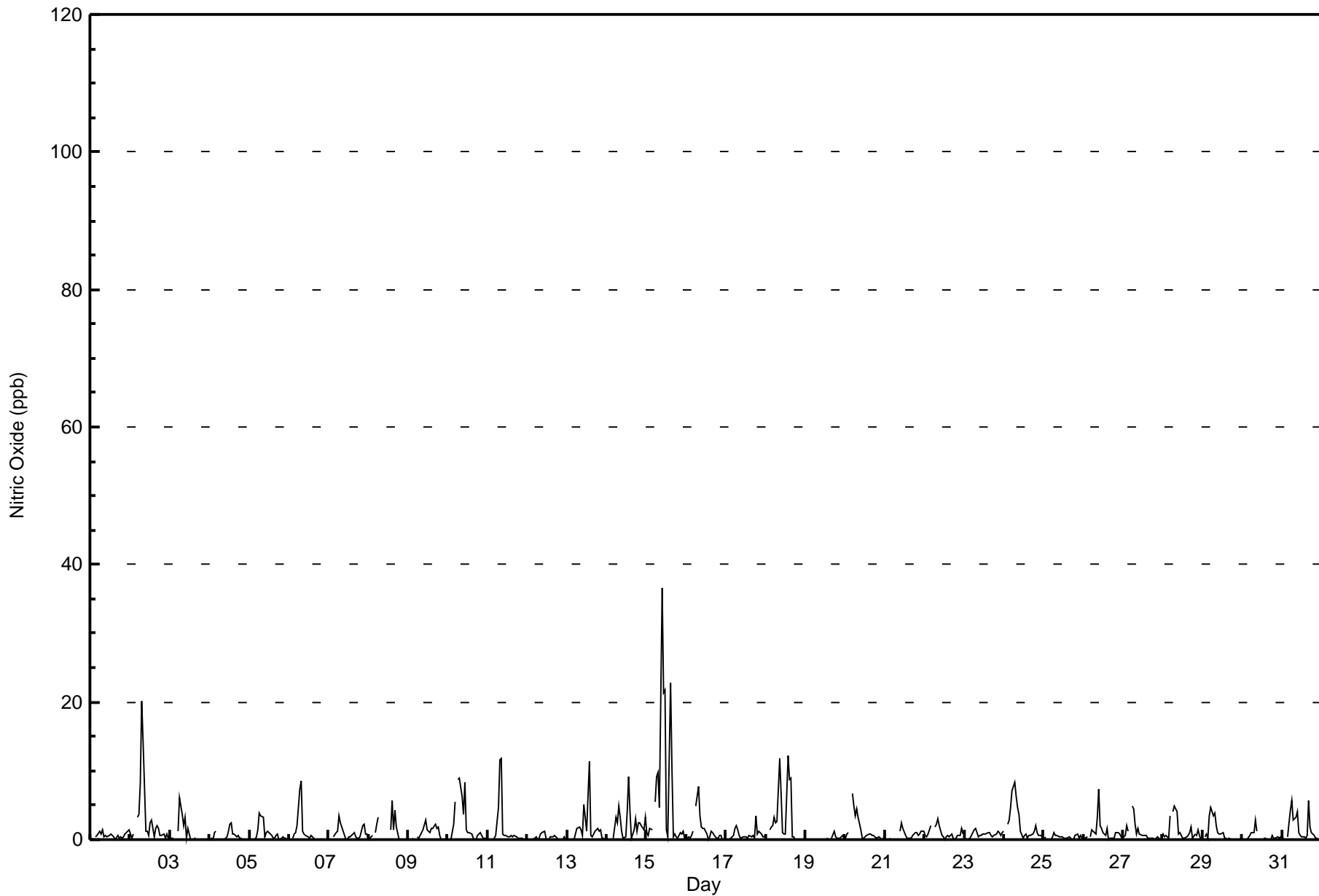








Maximum Value: 37 ppb on Jul 15 10:00																	Maximum Daily Average: 6.7 ppb on Jul 15																	Hours in Service: 744			
Minimum Value: 0 ppb on Jul 3 15:00																	Minimum Daily Average: 0.2 ppb on Jul 19																	Hours of Data: 701			
Maximum Diurnal Average: 4.1 ppb at hour 8																	Minimum Diurnal Average: 0.2 ppb at hour 2																	Hours of Missing Data: 43			
Monthly Average: 1.4 ppb																	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 1 O <sub>3</sub> = 1 P <sub>90</sub> = 3 P <sub>99</sub> = 11																	Hours of Calibration: 37			
																																		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-Jul	0	0	Z	0	1	1	1	2	0	1	0	1	1	1	0	0	1	0	0	0	0	1	1	1	0.6	2											
2-Jul	1	0	1	Z	3	4	8	20	14	1	1	1	3	3	0	2	2	2	1	1	1	0	1	0	3.0	20											
3-Jul	0	0	0	0	Z	1	6	4	2	3	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0.8	6											
4-Jul	0	0	0	1	1	Z	0	0	0	0	0	1	2	2	1	1	0	1	0	0	0	0	0	0	0.5	2											
5-Jul	Z	0	0	0	0	1	4	3	3	0	1	1	1	1	0	0	1	1	0	0	0	0	0	0	0.9	4											
6-Jul	0	Z	0	1	1	2	7	9	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1.1	9											
7-Jul	0	0	Z	0	1	1	4	3	2	1	0	0	0	0	1	1	0	0	0	0	2	2	1	1	0.9	4											
8-Jul	0	0	1	Z	1	2	3	C	C	C	C	C	C	1	6	1	4	2	0	0	0	0	0	0	--	6											
9-Jul	0	0	0	0	Z	0	0	1	1	1	3	1	1	1	2	2	2	2	2	1	0	0	0	0	0.9	3											
10-Jul	0	0	0	2	6	Z	9	9	6	4	8	2	1	1	1	0	0	0	1	1	1	0	0	0	2.2	9											
11-Jul	Z	0	0	0	0	1	5	12	12	1	1	1	0	0	1	0	1	0	0	0	0	0	0	0	1.5	12											
12-Jul	0	Z	0	0	0	0	0	0	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0.3	1											
13-Jul	0	0	Z	0	0	1	2	2	1	1	5	3	1	11	1	0	1	1	2	1	2	0	0	0	1.5	11											
14-Jul	0	0	0	Z	0	3	2	5	3	1	0	0	4	9	4	0	2	3	1	2	2	2	1	3	2.2	9											
15-Jul	1	1	2	1	Z	5	9	10	5	37	21	22	1	0	23	10	0	1	0	0	1	1	1	0	6.7	37											
16-Jul	0	0	0	1	1	Z	5	8	3	2	2	2	1	0	0	1	1	0	0	0	1	1	0	0	1.3	8											
17-Jul	Z	0	0	0	1	2	2	1	1	0	0	0	0	0	1	0	1	0	3	1	1	1	0	0	0.7	3											
18-Jul	1	Z	1	2	2	3	2	3	12	7	1	1	1	12	9	9	0	0	0	0	0	0	0	0	2.9	12											
19-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0.2	1											
20-Jul	0	1	1	Z	7	5	3	4	3	1	0	0	0	1	1	1	1	1	0	0	0	0	0	0	1.4	7											
21-Jul	0	0	0	0	Z	1	M	M	M	1	3	2	1	0	0	0	0	1	1	1	1	1	1	1	0.8	3											
22-Jul	1	0	1	1	2	Z	2	2	3	2	1	0	0	1	1	0	1	0	0	0	1	1	2	1	1.0	3											
23-Jul	Z	0	0	0	1	1	1	2	0	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	0.8	2											
24-Jul	1	Z	2	3	5	7	8	6	5	4	1	0	1	1	0	1	1	1	1	2	1	1	1	0	2.2	8											
25-Jul	0	0	Z	0	0	0	1	1	1	0	1	0	0	0	0	0	0	0	0	1	1	0	1	0	0.3	1											
26-Jul	0	0	0	Z	0	1	1	1	3	7	2	2	1	1	2	0	0	0	0	1	1	1	1	0	1.2	7											
27-Jul	0	1	2	1	Z	5	5	2	1	2	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1.0	5											
28-Jul	1	0	1	0	4	Z	4	5	4	1	1	1	0	0	0	1	1	2	0	1	1	1	1	0	1.2	5											
29-Jul	Z	0	1	0	3	5	3	4	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1.0	5											
30-Jul	0	Z	0	0	1	1	1	1	3	1	M	M	M	0	0	0	0	0	1	0	0	0	0	0	0.5	3											
31-Jul	0	0	Z	0	3	4	6	3	3	4	1	1	0	0	0	1	6	2	1	1	0	0	0	0	1.6	6											
0.3 0.2 0.5 0.6 1.7 2.3 3.5 4.1 3.3 2.9 2.0 1.6 0.9 1.6 1.8 1.1 0.9 0.7 0.6 0.5 0.6 0.5 0.5 0.4																								Diurnal Average													
1 1 2 3 7 7 9 20 14 37 21 22 4 12 23 10 6 3 3 2 2 2 2 2 3																								Diurnal Maximum													
Z - zerospan C - Calibration M - Maintenance																																					





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

**Nitric Oxide (NO) - ppb**  
**Athabasca Valley - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	697	99.43	99.43
21 - 40	4	0.57	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 701

Total Number of Hours: 744



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Athabasca Valley - July 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	41	14	10	17	29	30	118	36	27	29	98	46	25	36	37	103	696
21 - 40	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	4
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	41	14	10	17	29	30	118	36	27	29	102	46	25	36	37	103	700

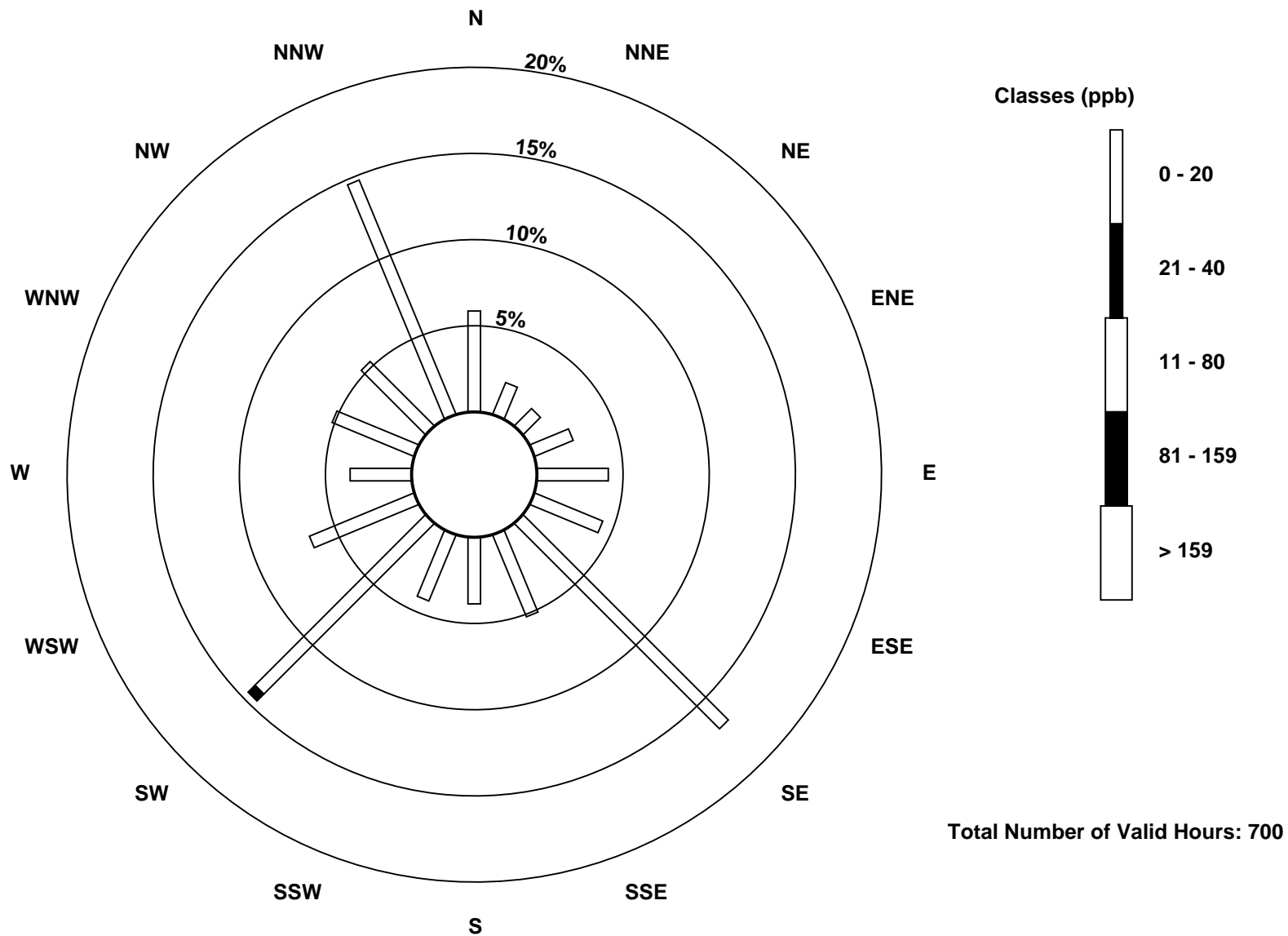
Total Number of Valid Hours: 700

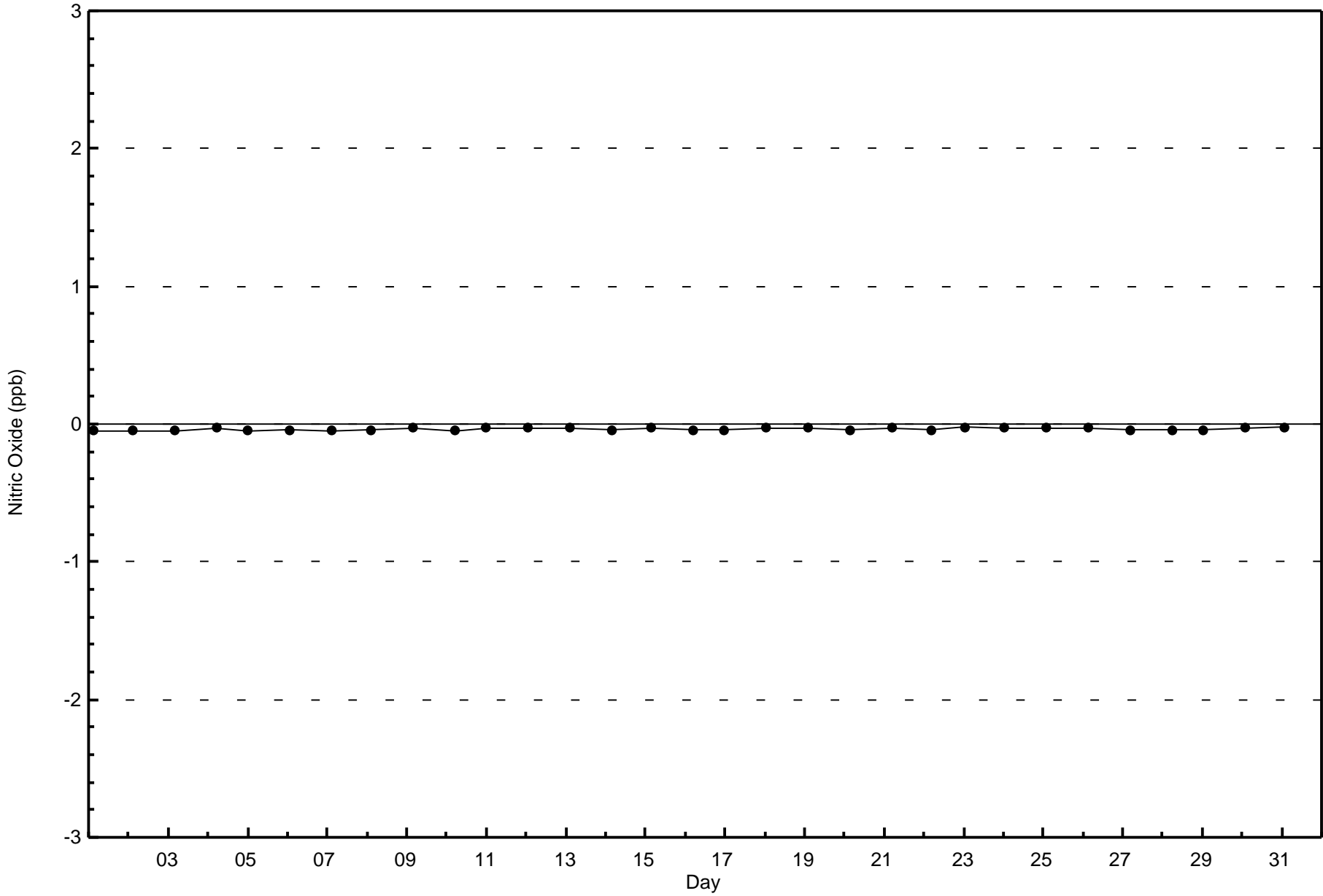
Total Number of Hours: 744

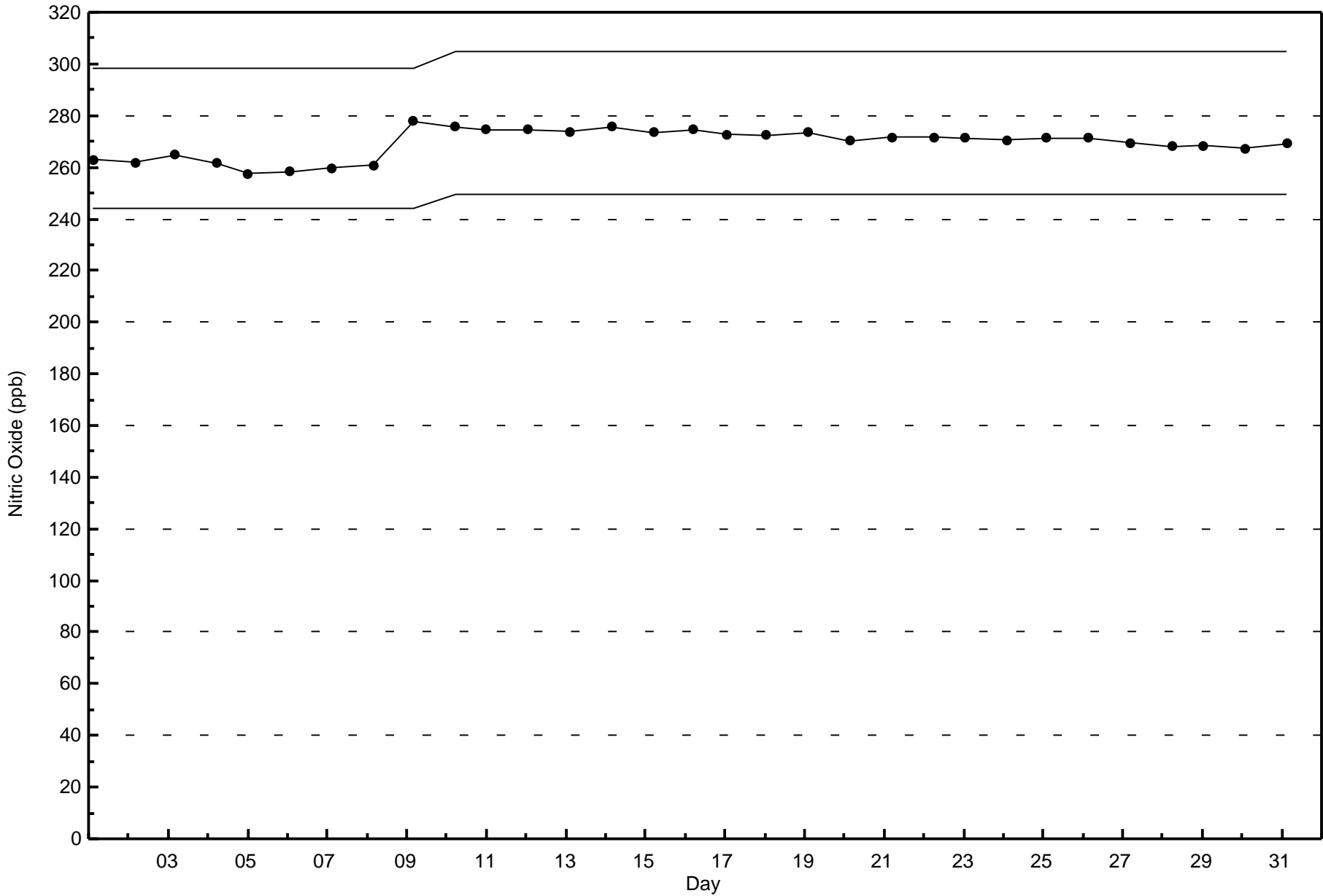


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Nitric Oxide (NO) - ppb  
Athabasca Valley (AMS 7)











Wood Buffalo Environmental Association

Summary of Hour Averages

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

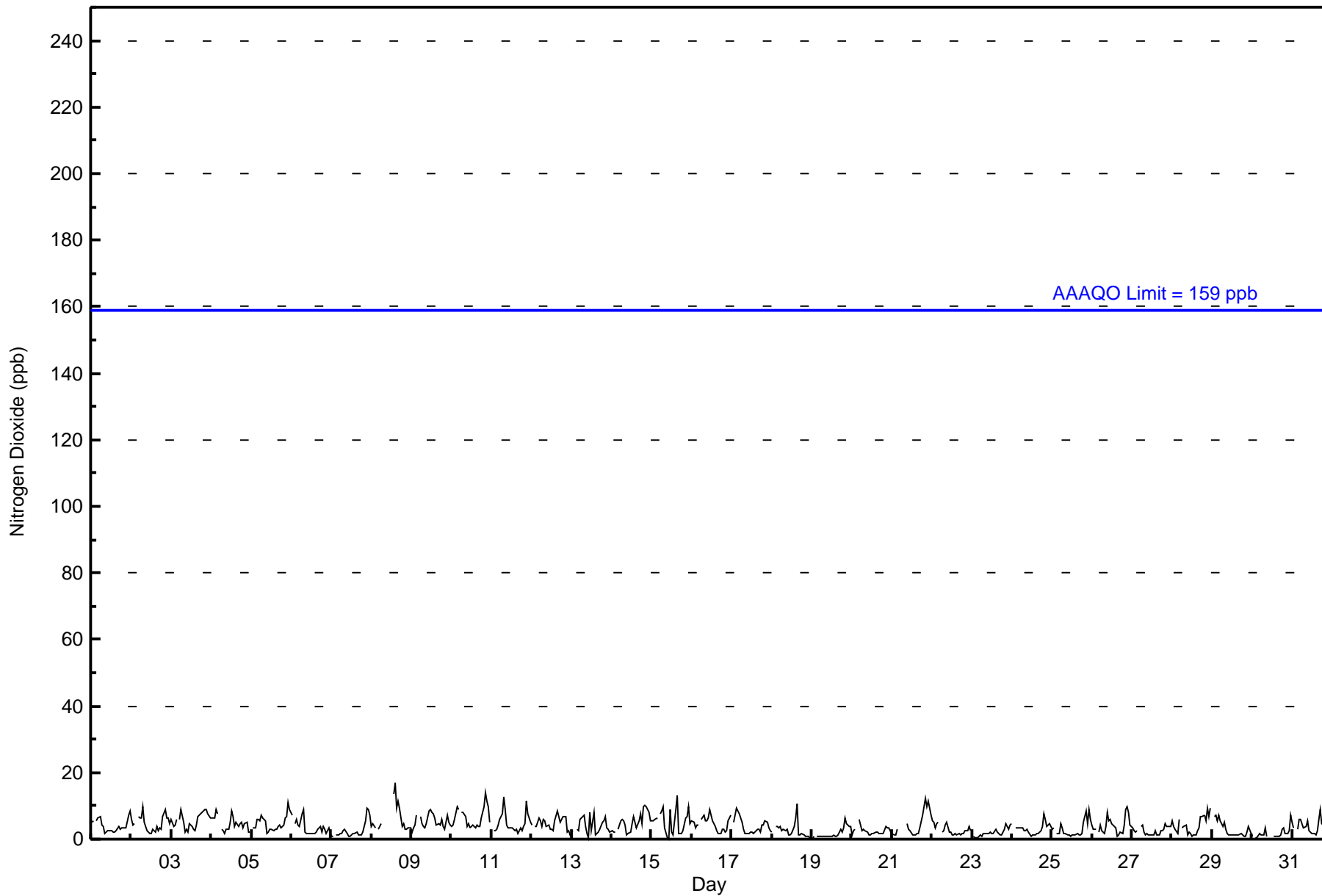
Athabasca Valley - July 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0														Hours in Service: 744												
Maximum Value: 17 ppb on Jul 8 15:00														Maximum Daily Average: 6.4 ppb on Jul 10												
Minimum Value: 0 ppb on Jul 15 11:00														Minimum Daily Average: 1.8 ppb on Jul 30												
Maximum Diurnal Average: 5.6 ppb at hour 21														Minimum Diurnal Average: 2.4 ppb at hour 11												
Monthly Average: 3.9 ppb														Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 2 Median = 3 Q <sub>3</sub> = 5 P <sub>90</sub> = 8 P <sub>99</sub> = 11												
														Hours of Service: 701												
														Hours of Missing Data: 43												
														Hours of Calibration: 37												
														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-Jul	5	5	Z	5	6	7	4	4	2	2	3	2	3	2	2	3	4	3	3	4	3	4	7	8	4.0	8
2-Jul	6	4	5	Z	7	6	7	10	5	3	2	2	2	3	2	4	3	3	3	7	9	6	6	5	4.7	10
3-Jul	6	4	4	6	Z	6	9	5	2	3	2	5	4	3	3	4	7	7	8	8	9	9	8	6	5.6	9
4-Jul	6	6	6	9	8	Z	3	2	2	3	3	5	9	7	4	5	4	5	5	4	5	5	2	2	4.7	9
5-Jul	Z	4	3	6	6	6	7	6	6	2	2	3	3	3	3	4	4	4	4	4	6	7	11	9	4.8	11
6-Jul	7	Z	5	6	4	4	8	9	2	2	2	2	2	2	2	2	3	4	2	4	3	2	3	2	3.4	9
7-Jul	1	1	Z	1	1	2	2	2	3	2	1	1	1	2	2	2	1	1	1	2	6	9	9	7	2.6	9
8-Jul	4	5	3	Z	3	4	5	C	C	C	C	C	C	14	17	10	12	10	4	5	3	3	3	3	--	17
9-Jul	2	4	4	7	Z	7	5	4	3	5	9	9	8	8	7	4	5	4	6	4	3	7	5	4	5.3	9
10-Jul	4	4	6	10	9	Z	8	8	7	4	5	3	4	4	3	4	4	4	6	10	14	11	10	5	6.4	14
11-Jul	Z	3	3	3	4	6	8	13	9	4	4	3	3	3	2	3	2	4	3	4	5	12	8	5	4.8	13
12-Jul	4	Z	4	4	6	6	4	6	6	4	4	3	3	3	6	9	7	5	6	7	7	2	3	1	4.7	9
13-Jul	2	2	Z	3	3	6	6	7	4	2	0	8	3	8	1	2	2	3	5	6	7	4	3	2	3.8	8
14-Jul	2	2	2	Z	3	6	6	5	4	1	2	2	5	7	5	3	5	8	5	10	10	8	6	6	5.0	10
15-Jul	5	5	6	7	Z	8	8	10	3	0	2	9	2	1	9	13	2	2	2	3	7	7	10	5	5.3	13
16-Jul	6	5	3	4	4	Z	6	7	6	6	6	9	6	5	4	3	2	2	3	3	2	3	6	7	4.6	9
17-Jul	Z	5	7	10	8	7	5	3	2	2	2	2	2	2	2	3	3	2	4	4	6	5	4	3	4.0	10
18-Jul	2	Z	4	4	4	4	3	3	2	3	1	1	2	4	7	10	1	1	2	1	1	1	1	1	2.7	10
19-Jul	0	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	2	3	6	5	4	4	1.8	6
20-Jul	1	3	3	Z	6	4	3	3	3	2	1	1	2	2	2	2	2	2	2	2	4	4	4	3	2.5	6
21-Jul	2	1	1	3	Z	5	M	M	M	5	3	2	1	1	1	2	2	4	7	10	12	10	11	7	4.5	12
22-Jul	5	5	3	5	5	Z	2	3	4	5	2	2	1	1	2	1	2	1	2	2	3	3	4	3	2.9	5
23-Jul	Z	1	0	1	1	1	1	2	2	2	2	2	2	2	3	2	2	1	1	3	5	4	3	4	1.9	5
24-Jul	5	Z	4	4	4	3	3	3	3	3	2	1	1	1	1	2	2	2	4	8	6	4	5	4	3.2	8
25-Jul	3	3	Z	2	2	5	3	2	2	1	1	1	1	1	1	2	1	1	2	5	8	5	9	6	2.9	9
26-Jul	4	3	3	Z	2	4	2	2	4	8	5	6	5	4	4	1	1	2	2	4	9	10	8	4	4.2	10
27-Jul	3	3	2	3	Z	4	4	2	1	2	1	1	1	1	3	1	1	2	3	3	5	4	4	4	2.5	5
28-Jul	6	4	3	2	6	Z	4	4	4	1	2	2	1	1	1	3	3	7	7	7	5	9	7	9	4.2	9
29-Jul	Z	7	7	6	7	6	4	5	3	2	1	1	1	1	1	1	1	2	1	1	1	2	4	2	2.9	7
30-Jul	1	Z	0	1	2	1	1	1	3	1	M	M	M	1	1	1	1	1	3	3	2	2	3	7	1.8	7
31-Jul	5	4	Z	3	6	6	5	3	4	5	3	2	2	2	1	2	6	9	5	4	5	3	4	2	3.9	9
														Diurnal Average												
														Diurnal Maximum												
3.8 3.6 3.7 4.3 4.5 4.7 4.5 4.6 3.5 2.8 2.4 3.1 2.7 3.2 3.3 3.4 3.0 3.5 3.6 4.6 5.6 5.4 5.6 4.5																										
7 7 7 10 9 8 9 13 9 8 9 9 9 14 17 13 12 10 8 10 14 12 11 9																										
Z - zerospan C - Calibration M - Maintenance																										
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb																										



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

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Athabasca Valley - July 2015**





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

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Athabasca Valley - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	701	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: 701

Total Number of Hours: 744



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Athabasca Valley - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	41	14	10	17	29	30	118	36	27	29	102	46	25	36	37	103	700
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	41	14	10	17	29	30	118	36	27	29	102	46	25	36	37	103	700

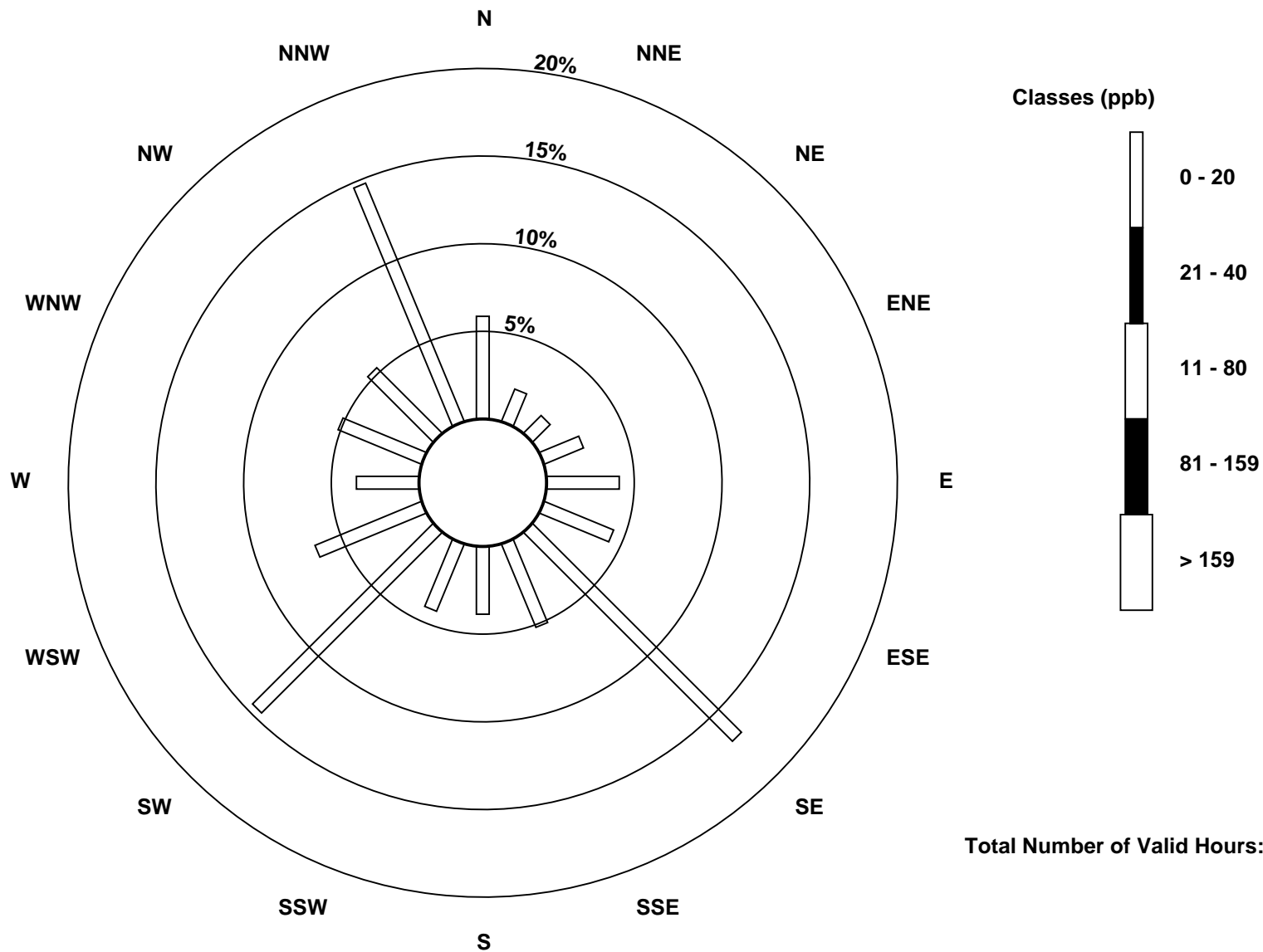
Total Number of Valid Hours: 700

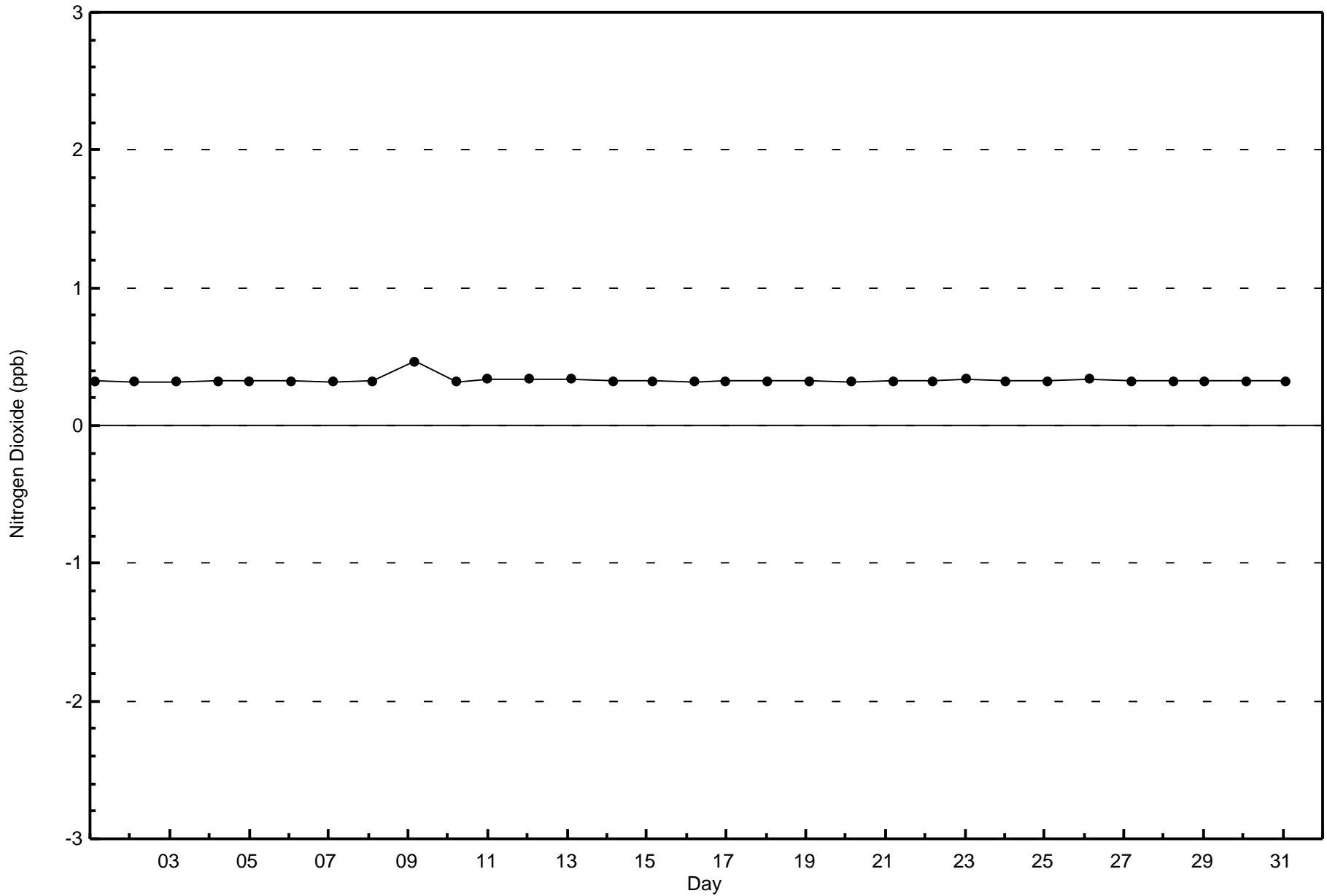
Total Number of Hours: 744

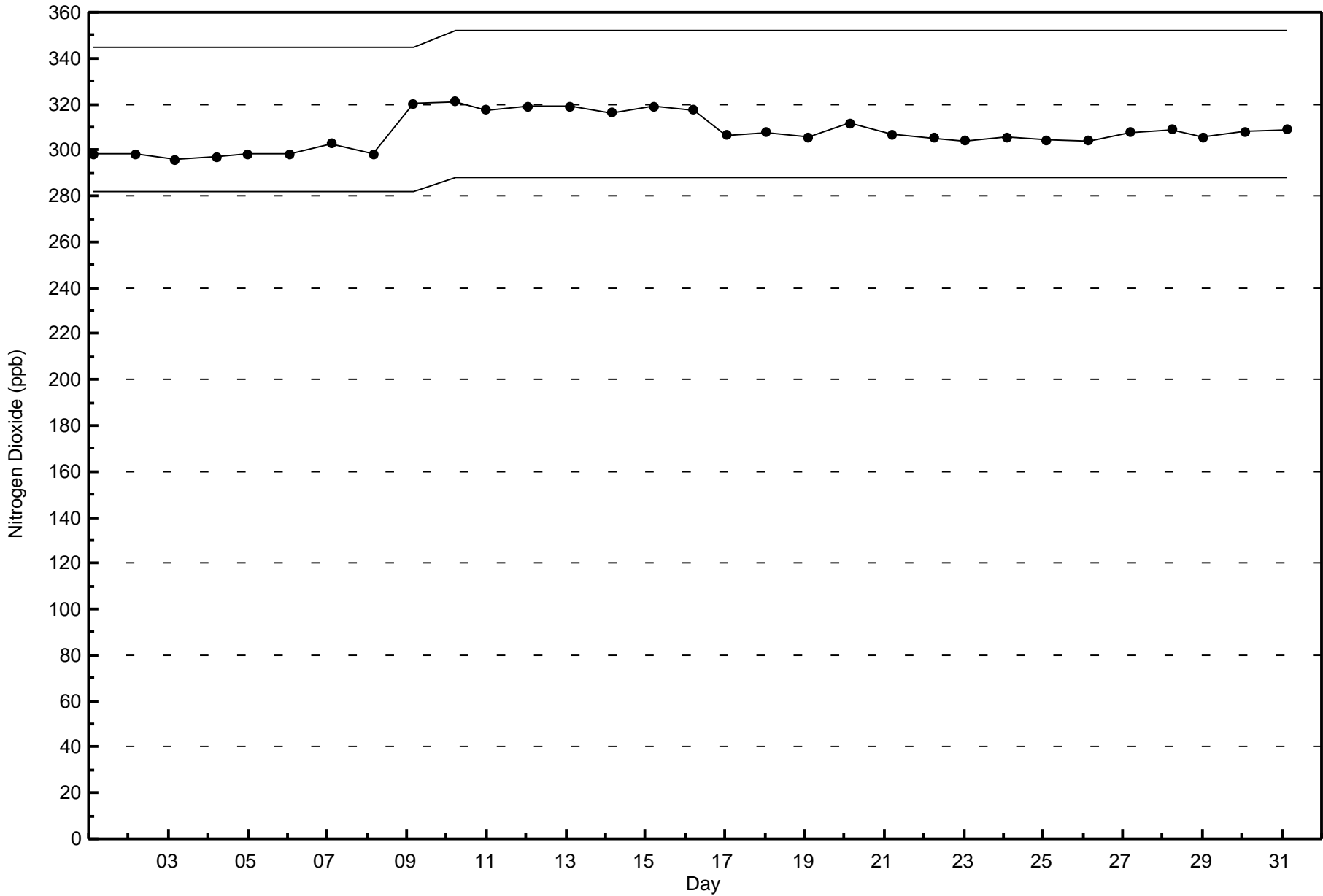


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Athabasca Valley (AMS 7)









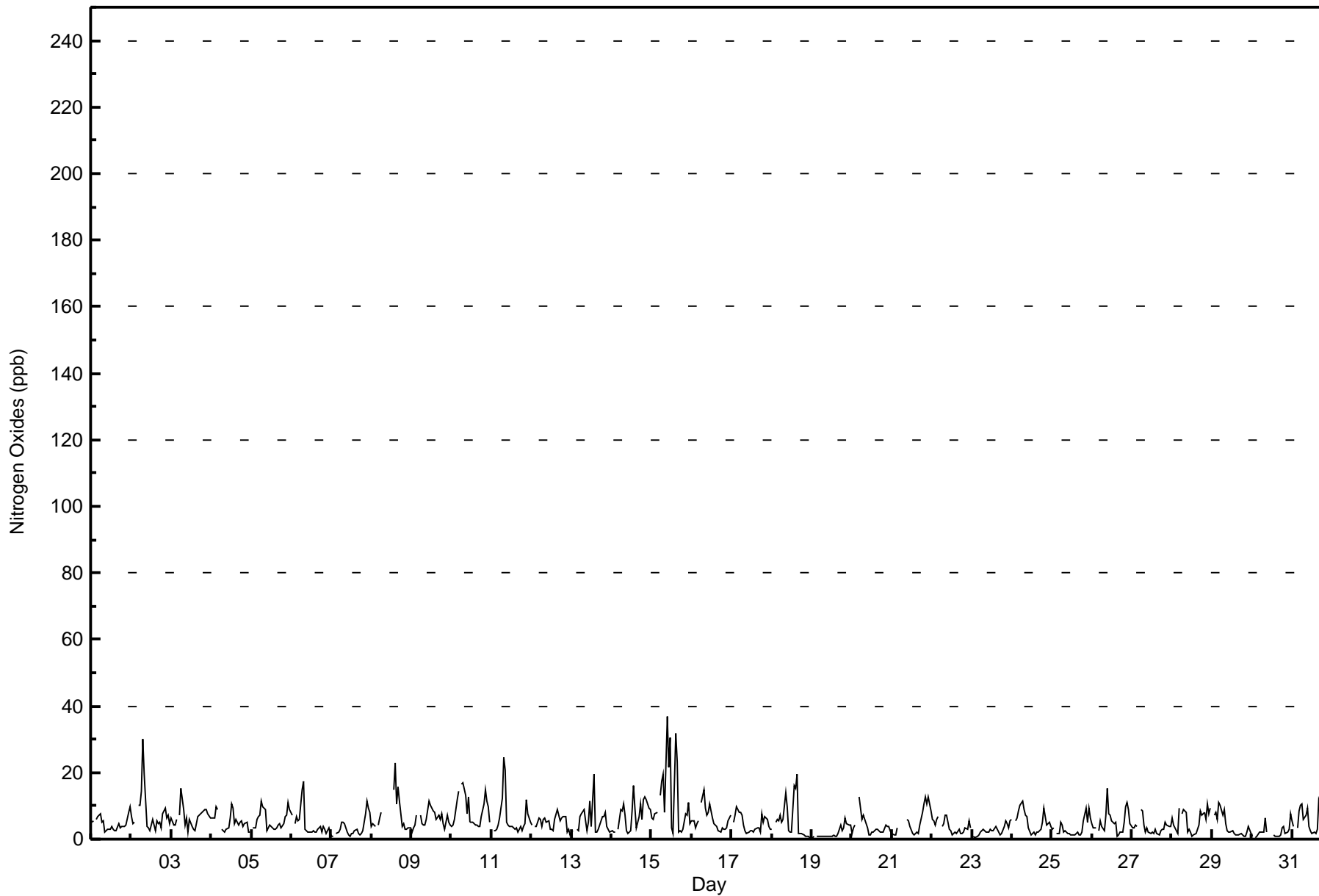
Maximum Value: 37 ppb on Jul 15 10:00														Maximum Daily Average: 12.0 ppb on Jul 15														Hours in Service: 744	
Minimum Value: 0 ppb on Jul 19 01:00														Minimum Daily Average: 2.0 ppb on Jul 19														Hours of Data: 701	
Maximum Diurnal Average: 8.7 ppb at hour 8														Minimum Diurnal Average: 3.5 ppb at hour 13														Hours of Missing Data: 43	
Monthly Average: 5.3 ppb														Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 2 Q <sub>1</sub> = 2 Median = 4 O <sub>3</sub> = 7 P <sub>90</sub> = 10 P <sub>99</sub> = 22														Hours of Calibration: 37	
																												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-Jul	5	5	Z	6	7	8	5	5	2	2	3	3	4	3	3	3	5	3	4	4	4	4	8	10	4.6	10			
2-Jul	7	5	5	Z	10	10	14	30	19	4	3	2	4	6	3	5	5	5	4	7	9	6	7	5	7.7	30			
3-Jul	6	4	4	6	Z	7	15	9	4	6	2	6	4	3	3	5	7	7	8	8	9	9	7	6	6.4	15			
4-Jul	6	7	7	10	9	Z	3	2	2	3	3	6	11	9	5	6	4	5	5	4	5	5	2	2	5.3	11			
5-Jul	Z	4	3	6	7	7	11	10	9	2	3	4	4	3	3	3	4	5	4	5	7	7	11	9	5.7	11			
6-Jul	7	Z	5	7	5	6	15	17	3	3	2	2	2	2	2	2	3	4	2	4	3	2	3	2	4.5	17			
7-Jul	1	1	Z	2	2	3	5	5	5	2	1	1	2	2	2	3	2	1	2	2	8	11	9	8	3.5	11			
8-Jul	4	5	4	Z	4	6	8	C	C	C	C	C	C	15	23	11	16	11	4	5	3	3	3	3	--	23			
9-Jul	2	4	4	7	Z	7	5	4	4	6	11	10	9	9	8	6	7	6	8	5	3	7	5	4	6.2	11			
10-Jul	4	4	6	12	14	Z	17	17	13	7	13	5	5	5	4	4	4	4	7	11	15	12	10	5	8.6	17			
11-Jul	Z	3	3	3	4	6	12	24	21	5	4	4	4	3	3	3	2	4	3	4	5	12	8	5	6.3	24			
12-Jul	4	Z	4	4	6	6	4	6	6	5	6	3	3	3	6	9	7	6	6	7	7	2	3	1	4.9	9			
13-Jul	2	2	Z	3	3	7	8	9	5	3	5	11	4	19	2	2	3	4	7	7	8	4	3	2	5.4	19			
14-Jul	2	2	2	Z	3	9	8	10	7	3	2	2	9	16	9	3	7	11	6	12	13	12	9	9	7.2	16			
15-Jul	6	6	8	8	Z	13	17	19	8	37	21	31	3	2	32	23	2	3	2	3	7	7	11	5	12.0	37			
16-Jul	6	5	4	5	5	Z	11	15	9	7	8	11	6	5	4	4	3	2	3	3	3	3	6	7	5.8	15			
17-Jul	Z	5	7	10	8	8	7	4	2	2	2	2	2	2	3	3	3	2	7	5	7	6	4	3	4.7	10			
18-Jul	3	Z	5	6	6	7	5	6	14	10	2	2	2	16	15	19	2	1	2	1	1	1	1	1	5.6	19			
19-Jul	0	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	2	4	3	4	7	5	4	4	2.0	7			
20-Jul	2	3	4	Z	13	9	6	7	6	4	1	1	2	2	3	3	2	2	2	2	4	4	4	3	3.9	13			
21-Jul	2	1	1	3	Z	7	M	M	M	6	5	4	2	1	1	2	2	4	8	11	13	10	13	8	5.2	13			
22-Jul	6	6	4	6	7	Z	4	5	7	7	3	3	1	2	2	2	3	2	2	2	3	3	6	3	3.8	7			
23-Jul	Z	1	0	1	1	2	3	3	2	2	2	3	2	2	4	3	2	1	2	4	6	5	4	5	2.6	6			
24-Jul	6	Z	6	6	8	10	12	9	7	7	3	1	2	2	1	2	2	3	5	10	7	4	5	4	5.4	12			
25-Jul	3	4	Z	2	2	5	4	2	3	2	2	1	1	1	1	2	1	1	2	5	9	5	9	6	3.2	9			
26-Jul	4	3	3	Z	2	6	4	2	7	15	7	7	6	5	5	1	1	2	2	5	10	11	9	5	5.4	15			
27-Jul	4	3	4	4	Z	9	9	4	2	3	2	2	2	2	3	2	1	3	3	3	5	4	4	4	3.5	9			
28-Jul	6	4	3	2	9	Z	8	9	8	2	3	2	1	1	2	3	4	8	7	8	6	11	7	9	5.5	11			
29-Jul	Z	7	8	6	11	10	7	9	5	2	2	2	2	2	1	1	1	2	1	1	1	2	4	2	3.9	11			
30-Jul	1	Z	1	1	2	2	2	2	6	2	M	M	M	1	1	1	1	1	4	4	2	2	3	8	2.3	8			
31-Jul	6	4	Z	3	8	10	10	6	7	9	4	3	2	2	2	3	12	11	6	4	5	3	4	2	5.5	12			
																								4.0	7				
																								3.8	7				
																								4.2	8				
																								4.9	12				
																								6.1	14				
																								7.0	13				
																								8.0	17				
																								8.7	30				
																								6.8	21				
																								6.8	21				
																								5.7	37				
																								4.4	21				
																								4.7	31				
																								3.5	11				
																								4.8	19				
																								5.1	32				
																								4.5	23				
																								3.9	16				
																								4.2	11				
																								4.2	8				
																								5.1	12				
																								6.2	15				
																								5.9	12				
																								6.0	13				
																								4.9	10				
																								Diurnal Average					
																								Diurnal Maximum					
Z - zerospan                      C - Calibration                      M - Maintenance																													





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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Athabasca Valley - July 2015**





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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Athabasca Valley - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	692	98.72	98.72
21 - 40	9	1.28	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 701

Total Number of Hours: 744



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Athabasca Valley - July 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	41	14	10	17	29	30	115	35	27	29	98	45	25	36	37	103	691
21 - 40	0	0	0	0	0	0	3	1	0	0	4	1	0	0	0	0	9
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	41	14	10	17	29	30	118	36	27	29	102	46	25	36	37	103	700

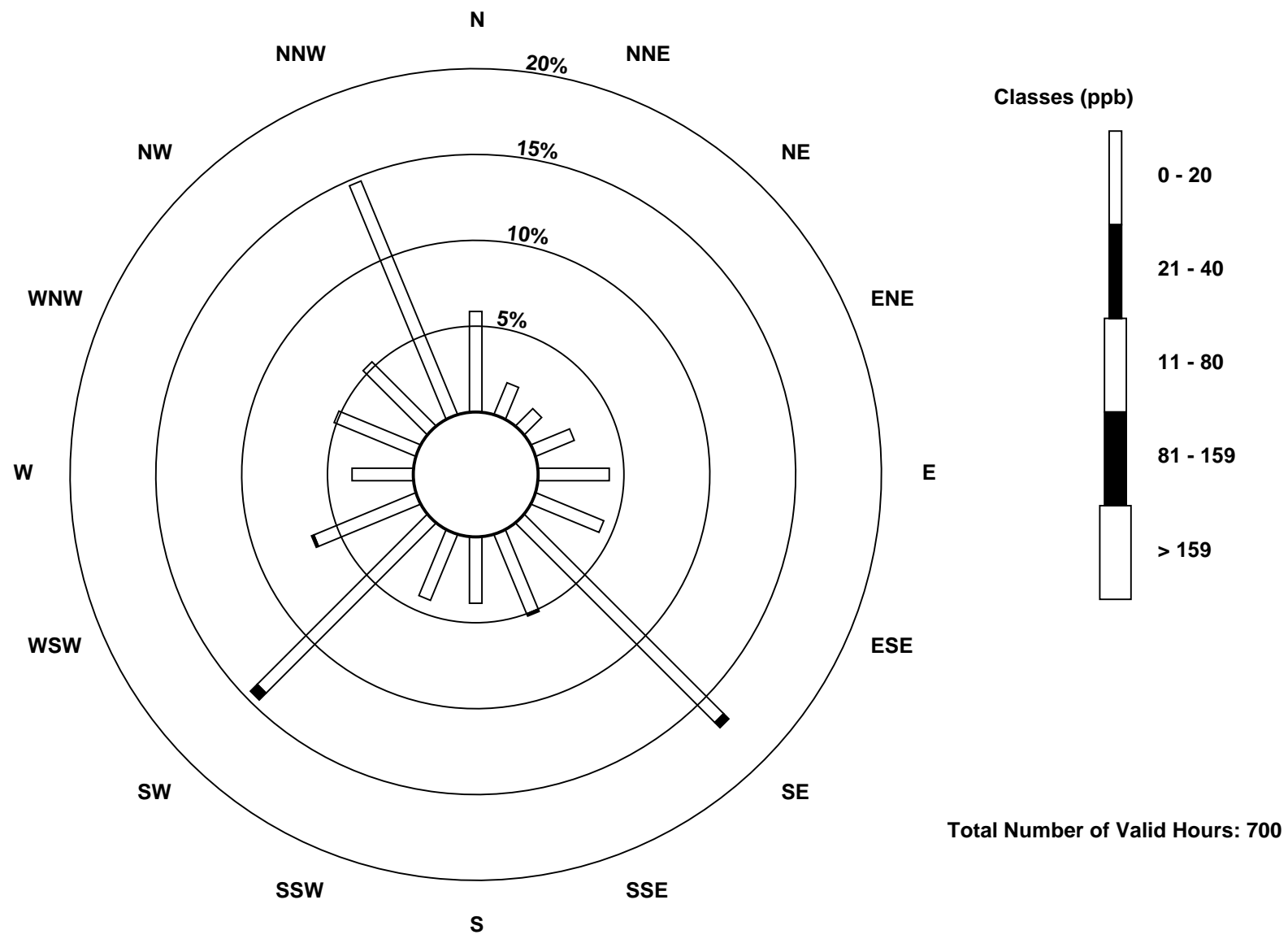
Total Number of Valid Hours: 700

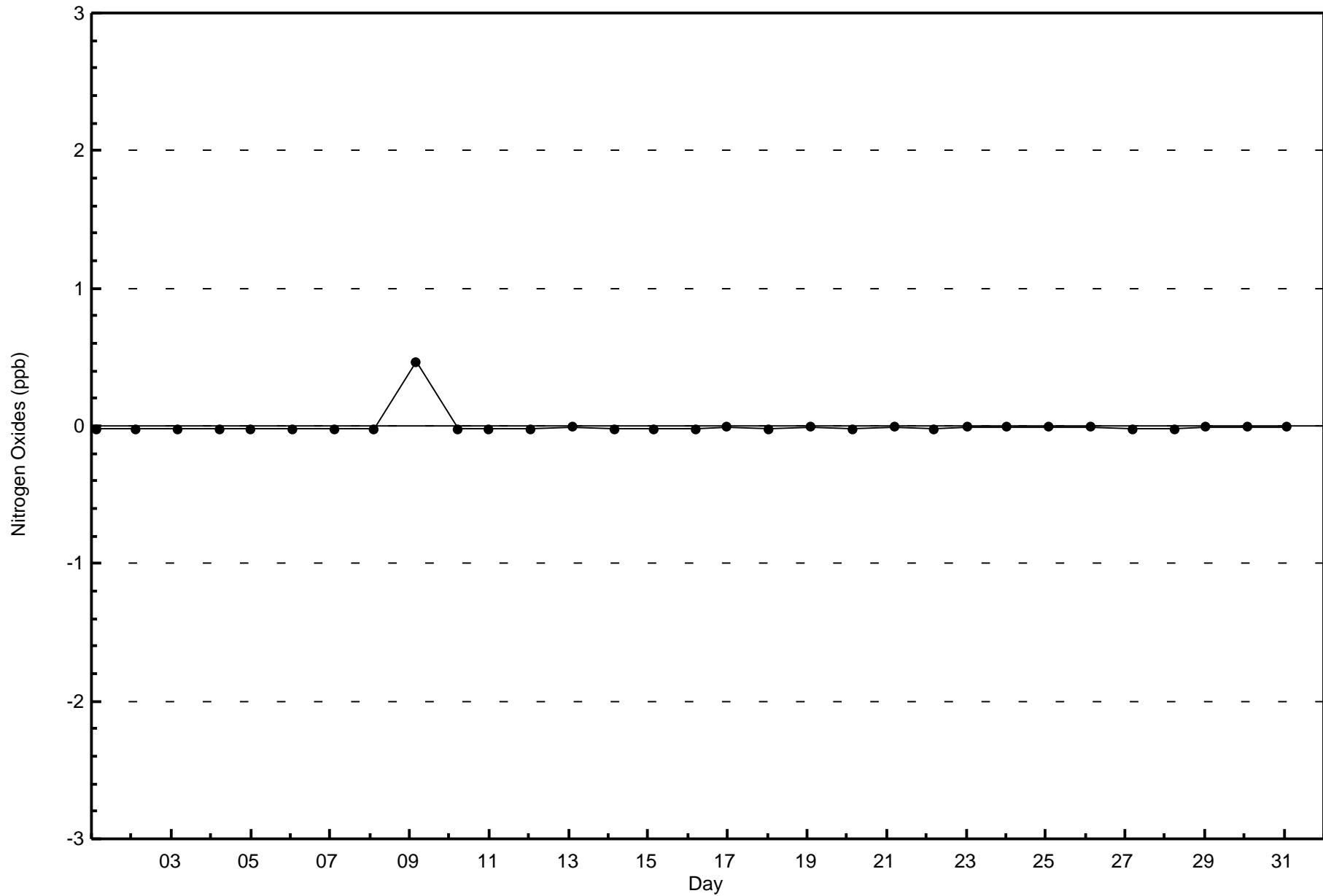
Total Number of Hours: 744

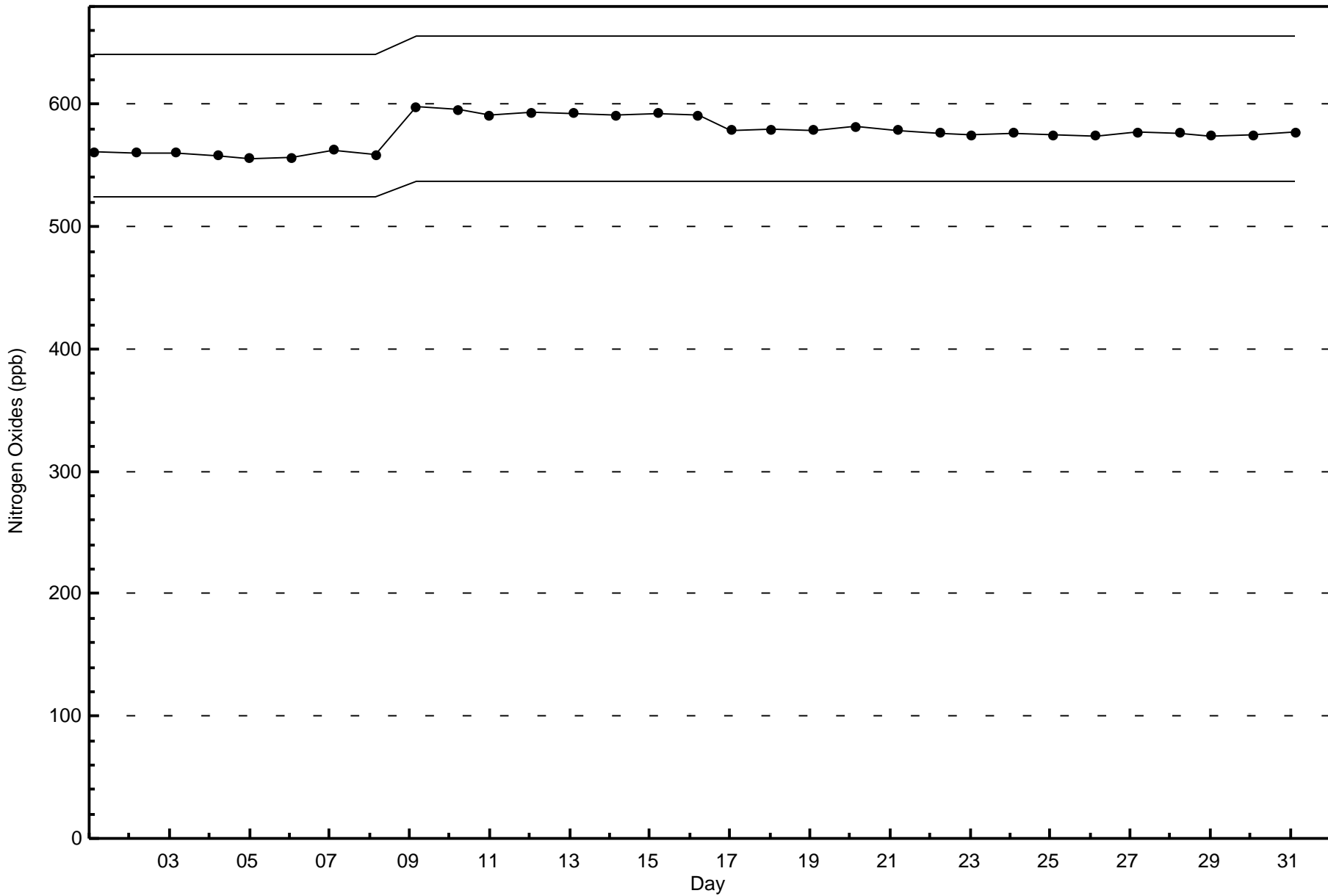


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Athabasca Valley (AMS 7)





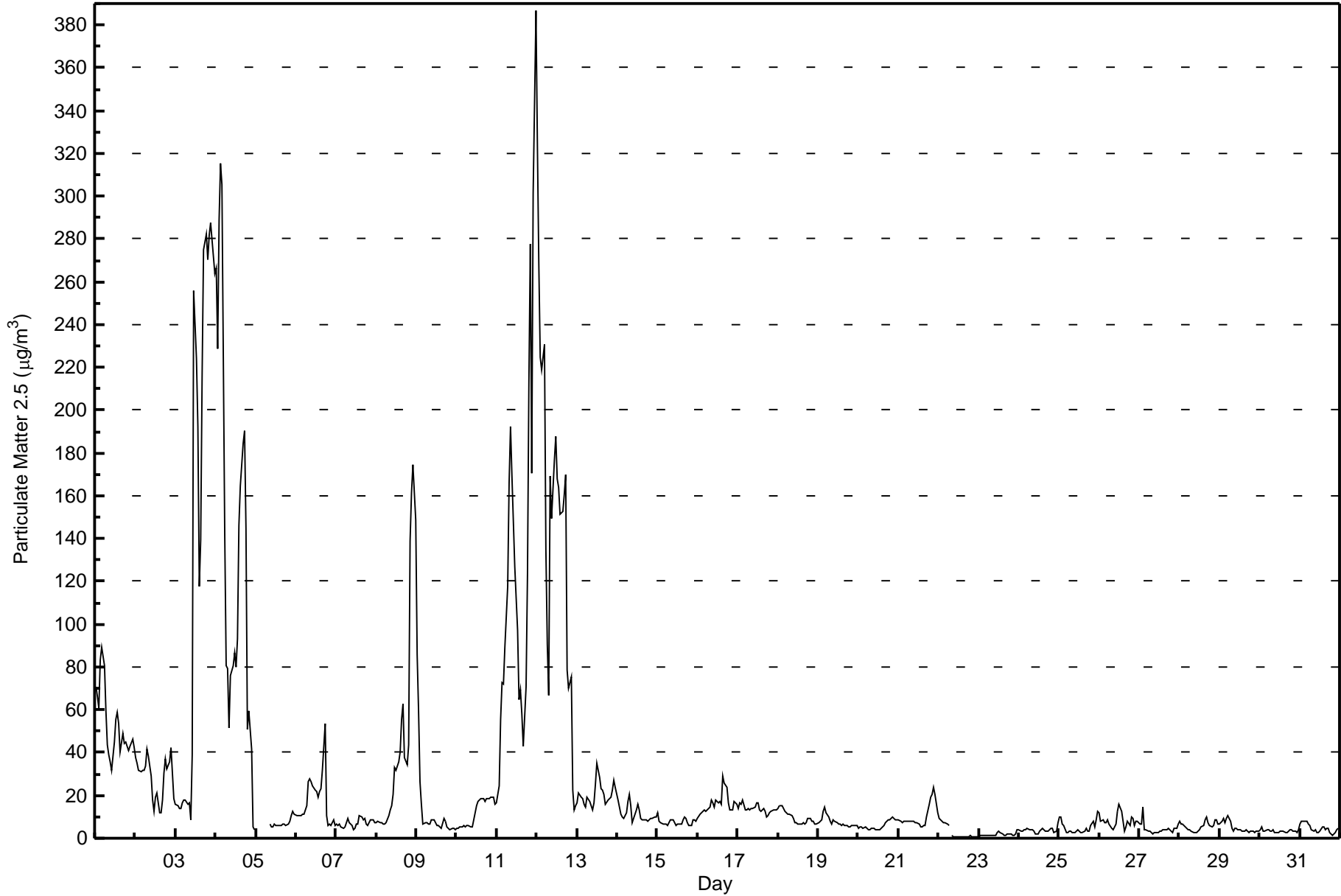




Summary of Hour Averages

Athabasca Valley - July 2015

Number of Exceedences (AAAQO): 24-hr: 6 Maximum Value: 386.9 µg/m <sup>3</sup> on Jul 12 00:00 Maximum Daily Average: 145.1 µg/m <sup>3</sup> on Jul 12		Hours in Service: 744 Hours of Data: 735 Hours of Missing Data: 9 Hours of Calibration: 0 Percent Operational Time: 98.8																																															
Minimum Value: 0.5 µg/m <sup>3</sup> on Jul 22 22:00 Maximum Diurnal Average: 35.5 µg/m <sup>3</sup> at hour 21 Monthly Average: 28.49 µg/m <sup>3</sup>		Minimum Daily Average: 1.8 µg/m <sup>3</sup> on Jul 23 Minimum Diurnal Average: 19.7 µg/m <sup>3</sup> at hour 7 Percentiles: P <sub>1</sub> = 0.8 P <sub>10</sub> = 3.0 Q <sub>1</sub> = 4.8 Median = 8.2 Q <sub>3</sub> = 18.1 P <sub>90</sub> = 72.3 P <sub>99</sub> = 286.6																																															
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-Jul	70.5	66.3	61.0	83.1	89.1	80.7	59.7	43.5	38.9	35.5	31.8	45.1	55.8	58.7	53.3	40.4	48.8	44.4	45.2	43.2	41.1	43.1	46.3	42.3	52.8	89.1																							
2-Jul	37.5	35.0	31.7	31.4	31.8	32.0	33.9	41.6	38.6	28.8	18.0	12.5	19.0	21.4	11.7	12.0	17.6	30.2	37.0	32.5	35.6	42.1	30.4	18.5	28.4	42.1																							
3-Jul	15.8	15.0	14.0	14.1	16.3	17.7	17.9	15.8	16.7	8.3	39.1	255.6	223.8	192.5	117.5	139.4	216.4	275.0	282.3	270.1	281.6	287.7	279.9	264.0	136.5	287.7																							
4-Jul	266.3	229.0	288.9	315.6	305.3	141.7	80.6	79.0	51.5	75.9	80.8	86.7	79.9	93.5	146.1	164.9	184.6	190.2	145.0	50.8	59.3	41.9	5.5	3.7	131.9	315.6																							
5-Jul	AF	AF	AF	AF	AF	AF	AF	AF	6.9	5.2	5.6	6.4	6.2	6.1	5.7	5.9	6.5	6.7	6.0	6.6	8.0	10.7	12.6	11.2	--	12.6																							
6-Jul	10.7	10.6	10.6	10.8	10.9	11.4	15.2	26.1	28.0	26.3	24.4	22.3	21.6	19.1	21.8	22.9	31.6	53.7	10.8	5.8	6.4	6.1	8.4	5.7	17.6	53.7																							
7-Jul	6.4	6.2	6.3	5.6	4.9	5.3	7.1	9.2	7.4	6.2	4.3	4.5	6.9	6.5	10.4	10.2	8.5	9.0	6.8	5.9	8.7	8.9	8.6	7.0	7.1	10.4																							
8-Jul	7.4	7.6	7.1	7.1	6.8	6.8	7.1	10.5	13.0	15.3	20.5	32.7	31.9	35.6	40.2	55.3	62.6	37.8	34.3	43.9	139.0	161.1	174.6	148.7	46.1	174.6																							
9-Jul	86.0	59.8	26.7	15.6	6.9	7.3	7.2	6.7	6.9	8.6	8.7	7.1	6.2	6.0	5.1	4.9	9.1	7.9	5.5	4.8	4.3	4.3	4.4	4.2	13.1	86.0																							
10-Jul	4.4	4.7	5.2	5.3	5.7	5.6	5.7	5.9	5.5	5.4	8.6	12.0	15.1	17.1	18.8	18.5	18.7	17.0	18.2	18.5	19.1	19.1	19.5	16.1	12.1	19.5																							
11-Jul	16.2	24.8	55.5	72.4	72.3	89.5	117.9	165.7	192.7	169.0	147.8	127.1	97.3	65.1	69.3	58.5	42.9	70.5	123.7	213.4	277.3	170.4	301.2	386.9	130.3	386.9																							
12-Jul	323.8	268.4	224.7	219.0	230.9	135.1	90.4	66.6	169.3	149.3	176.8	187.5	168.0	164.1	151.6	152.7	160.8	169.6	78.5	69.9	75.1	22.4	13.3	15.1	145.1	323.8																							
13-Jul	16.4	21.0	19.2	18.7	16.1	14.4	19.2	17.5	14.9	13.2	16.4	24.9	35.1	28.7	23.3	22.2	20.2	15.8	17.7	18.3	19.0	22.7	27.1	23.7	20.2	35.1																							
14-Jul	18.1	14.7	11.4	10.2	9.0	11.6	17.5	20.6	15.0	6.9	9.0	13.4	16.0	13.4	9.5	8.8	8.7	8.6	7.9	8.9	9.1	9.5	10.1	9.6	11.6	20.6																							
15-Jul	11.7	8.2	7.0	6.6	6.6	6.6	6.2	7.3	8.3	8.6	7.0	6.0	6.4	6.5	6.4	8.8	10.2	9.4	7.1	5.9	6.1	8.5	8.5	7.6	7.6	11.7																							
16-Jul	9.2	11.1	11.9	12.6	13.1	12.5	13.4	14.4	17.8	16.3	14.8	17.5	16.2	17.5	16.1	29.2	25.9	24.1	16.7	13.1	13.0	12.9	17.4	16.0	15.9	29.2																							
17-Jul	13.7	16.7	16.2	18.1	13.6	13.3	13.9	13.0	14.1	14.2	14.4	16.3	16.9	13.3	12.4	14.0	12.5	9.8	10.7	11.9	12.6	13.1	13.3	13.3	13.8	18.1																							
18-Jul	14.1	15.3	14.9	13.9	12.8	11.8	11.6	11.1	10.3	9.1	7.6	7.1	6.6	6.4	6.6	7.0	6.6	7.3	9.6	9.2	7.8	8.0	6.7	6.6	9.5	15.3																							
19-Jul	7.0	7.8	8.4	12.6	14.3	11.7	9.6	8.1	6.8	8.9	8.2	7.4	6.7	6.6	6.2	6.3	6.2	6.0	5.5	5.3	5.8	6.0	6.0	5.8	7.6	14.3																							
20-Jul	4.9	5.1	5.1	4.8	5.1	4.4	4.0	4.0	4.8	4.8	4.1	4.2	4.1	3.9	5.4	5.6	7.1	8.2	8.9	8.7	9.9	9.4	8.8	8.6	6.0	9.9																							
21-Jul	8.4	8.1	7.5	7.6	7.8	7.6	7.8	7.7	8.0	8.0	7.4	7.1	6.7	5.5	5.4	5.9	6.0	10.2	15.8	19.0	20.4	23.5	20.5	11.7	10.1	23.5																							
22-Jul	9.1	8.3	8.1	7.5	7.1	6.6	6.2	M	1.0	0.8	0.6	0.8	0.7	0.7	0.7	0.9	0.9	0.9	1.0	1.0	0.9	0.5	0.6	0.7	2.8	9.1																							
23-Jul	0.9	1.1	1.3	1.5	1.5	1.6	1.5	1.5	1.5	1.4	1.3	2.9	3.2	3.0	2.0	1.5	1.1	1.7	1.8	1.9	1.6	1.5	1.8	3.7	1.8	3.7																							
24-Jul	4.3	3.5	3.5	3.8	4.0	4.3	4.0	4.0	4.1	3.6	2.1	2.1	3.0	4.3	4.7	4.0	3.1	3.5	4.0	4.8	4.7	2.8	3.6	6.9	3.9	6.9																							
25-Jul	9.8	10.2	6.5	5.9	2.8	2.5	3.6	3.6	2.8	2.6	3.1	3.7	3.0	2.6	2.8	3.4	4.8	3.2	3.1	6.1	8.0	5.3	8.9	12.5	5.0	12.5																							
26-Jul	12.1	8.0	8.7	7.3	7.3	8.5	6.5	4.8	3.7	5.0	6.8	12.5	15.7	12.8	7.9	3.2	5.5	8.0	5.7	9.6	9.5	5.6	7.8	8.2	7.9	15.7																							
27-Jul	6.8	6.4	14.4	4.2	3.9	3.5	3.0	2.4	2.2	2.5	2.4	2.4	3.0	3.3	4.0	3.9	3.8	4.3	4.1	3.1	2.6	4.9	4.7	6.6	4.3	14.4																							
28-Jul	8.2	6.8	6.4	5.1	4.8	4.2	4.0	3.4	2.9	2.3	2.5	3.0	3.6	5.0	6.1	8.8	10.0	7.1	6.1	5.2	6.1	8.6	8.4	6.8	5.6	10.0																							
29-Jul	6.5	7.9	9.0	7.6	9.2	10.3	8.1	4.3	3.4	4.3	4.3	4.2	3.8	3.3	3.1	3.2	3.8	2.9	3.2	3.1	3.3	2.8	3.2	3.6	4.9	10.3																							
30-Jul	4.2	5.6	3.0	3.1	4.2	4.0	3.3	3.3	3.7	2.8	2.4	2.5	3.0	3.3	3.0	2.8	2.9	3.2	4.1	4.2	3.3	3.1	2.3	4.1	3.4	5.6																							
31-Jul	6.4	7.9	7.6	8.0	8.0	6.6	6.0	3.9	3.5	3.7	2.4	2.5	3.4	5.1	5.6	4.2	4.8	4.6	2.5	1.1	1.7	2.7	4.0	4.4	4.6	8.0																							
																								33.9	30.0	30.1	31.3	31.1	22.6	19.7	20.9	22.7	21.1	22.0	30.3	28.7	26.8	25.2	26.7	30.7	33.9	30.0	29.2	35.5	31.3	34.5	35.0	Diurnal Average	
																								323.8	268.4	288.9	315.6	305.3	141.7	117.9	165.7	192.7	169.0	176.8	255.6	223.8	192.5	151.6	164.9	216.4	275.0	282.3	270.1	281.6	287.7	301.2	386.9	Diurnal Maximum	
M - Maintenance AF - Analyzer Failure																								Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m <sup>3</sup>																									







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

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Athabasca Valley - July 2015**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
1 - 5	195	26.53	26.53
6 - 15	303	41.22	67.76
16 - 25	76	10.34	78.10
26 - 80	78	10.61	88.71
> 81.0	67	9.12	97.82

Total Number of Valid Hours: 735

Total Number of Hours: 744



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

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Athabasca Valley - July 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	10	9	6	6	11	8	19	1	5	11	47	12	7	12	10	20	194
6 - 15	16	3	0	6	9	12	83	27	10	4	29	17	9	17	17	44	303
16 - 25	6	1	1	1	2	3	12	2	5	4	7	9	1	2	3	17	76
26 - 80	3	0	0	0	4	6	11	8	4	7	13	7	2	3	2	8	78
> 81.0	3	1	3	4	4	2	9	2	5	2	4	2	5	3	7	11	67
<b>Totals</b>	<b>38</b>	<b>14</b>	<b>10</b>	<b>17</b>	<b>30</b>	<b>31</b>	<b>134</b>	<b>40</b>	<b>29</b>	<b>28</b>	<b>100</b>	<b>47</b>	<b>24</b>	<b>37</b>	<b>39</b>	<b>100</b>	<b>718</b>

Total Number of Valid Hours: 734

Total Number of Hours: 744

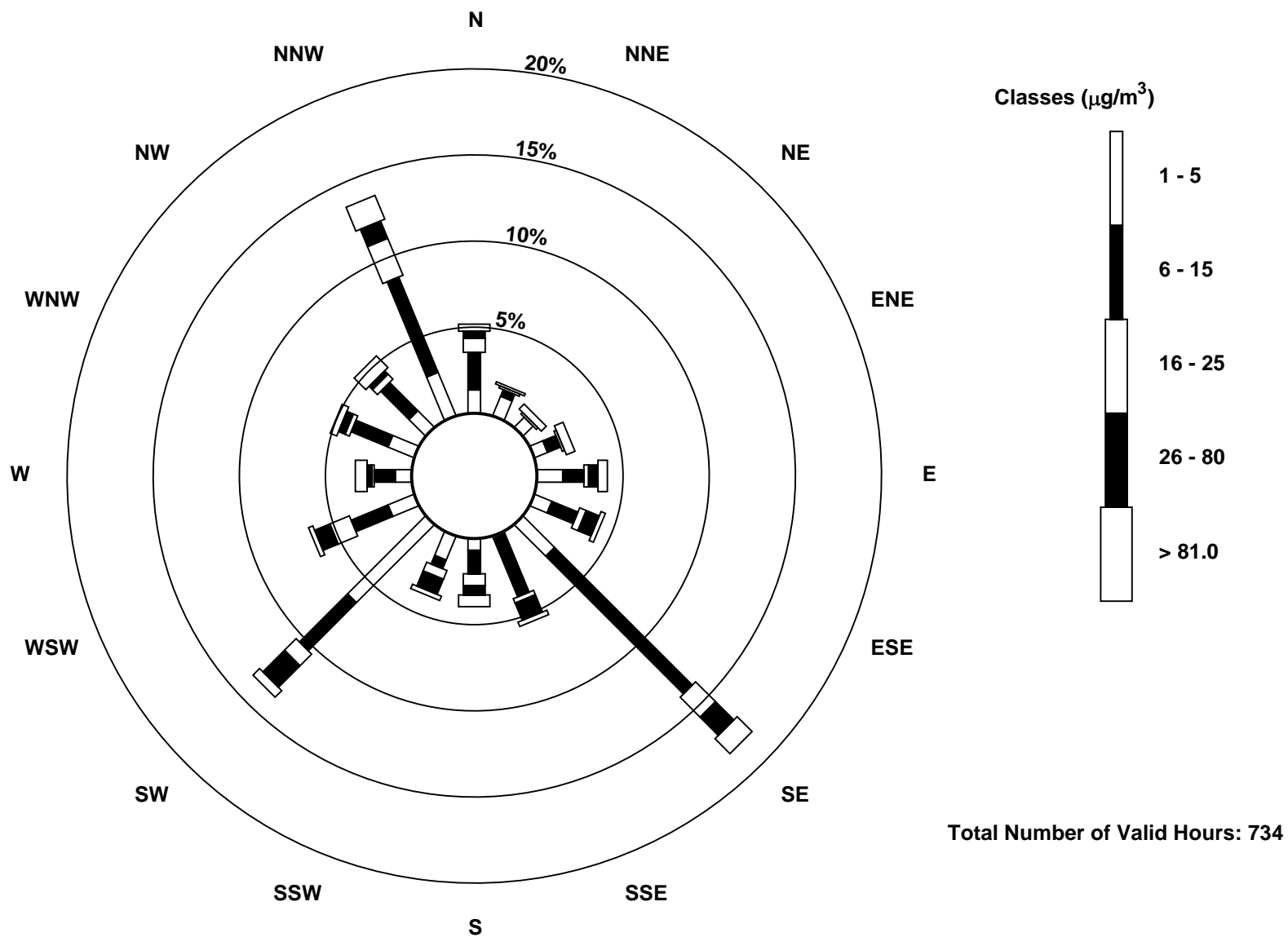


Wood Buffalo Environmental Association

Wind Rose Jul 2015

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

Athabasca Valley (AMS 7)



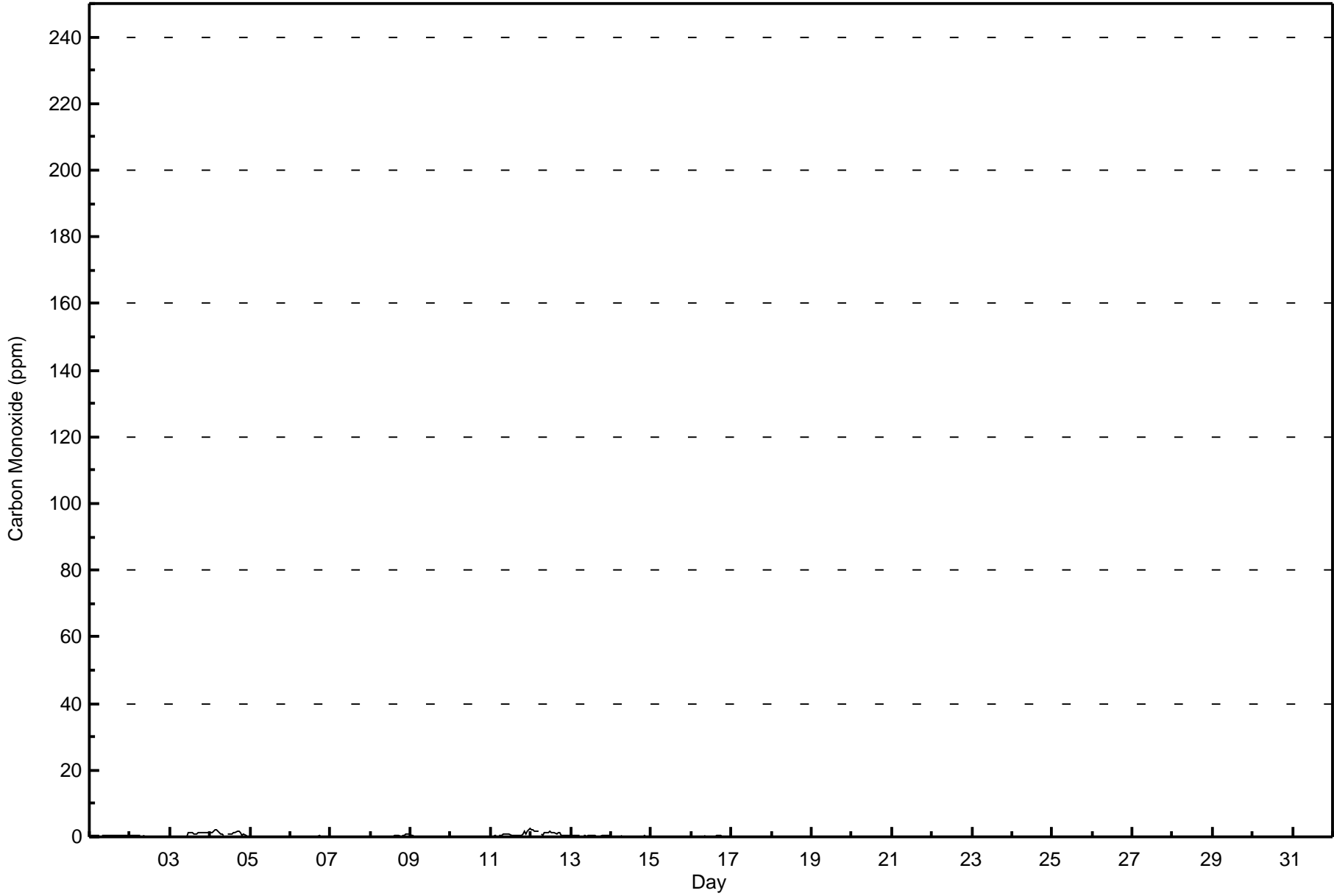


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 2.4 ppm on Jul 12 00:00 Maximum Daily Average: 1.1 ppm on Jul 12												Hours in Service: 744 Hours of Data: 709 Hours of Missing Data: 35 Hours of Calibration: 34 Percent Operational Time: 99.9																																				
Minimum Value: 0.0 ppm on Jul 15 12:00 Minimum Daily Average: 0.0 ppm on Jul 27 Maximum Diurnal Average: 0.2 ppm at hour 21 Minimum Diurnal Average: 0.2 ppm at hour 7 Monthly Average: 0.20 ppm Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.1 Q <sub>3</sub> = 0.2 P <sub>90</sub> = 0.5 P <sub>99</sub> = 1.7																																																
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-Jul	0.4	0.4	0.4	0.5	0.6	0.6	Z	0.4	0.4	0.4	0.3	0.4	0.4	0.5	0.5	0.4	0.4	0.4	0.5	0.5	0.4	0.5	0.5	0.4	0.4	0.6																						
2-Jul	0.4	0.3	0.3	0.3	0.3	0.3	0.3	Z	0.2	0.2	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.4																						
3-Jul	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Z	0.0	0.2	1.2	1.1	1.2	0.8	0.7	1.0	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3																						
4-Jul	1.4	1.2	1.7	2.1	2.2	1.1	0.8	0.8	0.6	Z	0.9	1.0	0.9	1.0	1.2	1.3	1.5	1.6	1.3	0.6	0.7	0.5	0.1	0.0	2.2																							
5-Jul	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.2	0.1	0.2																							
6-Jul	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.3																							
7-Jul	0.0	0.0	0.0	0.0	0.0	0.1	Z	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1																							
8-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	M	0.1	0.1	0.2	0.1	0.2	0.2	0.3	0.4	0.4	0.3	0.2	0.2	0.5	0.7	0.8	0.8	0.8																							
9-Jul	0.6	0.4	0.2	0.1	0.1	0.1	0.0	0.0	Z	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6																							
10-Jul	0.0	0.0	0.1	0.1	0.1	0.1	0.1	C	C	C	C	C	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1																							
11-Jul	0.1	0.1	0.3	0.3	Z	0.4	0.6	0.8	1.0	0.9	0.9	0.8	0.6	0.4	0.4	0.3	0.2	0.3	0.6	1.0	1.5	1.0	1.8	2.4	2.4																							
12-Jul	2.3	2.0	1.8	1.7	1.7	Z	0.7	0.5	1.2	1.2	1.4	1.5	1.3	1.3	1.1	1.0	1.1	1.2	0.6	0.5	0.6	0.4	0.3	0.2	2.3																							
13-Jul	0.2	0.3	0.2	0.2	0.2	0.2	Z	0.3	0.2	0.2	0.2	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.4	0.4	0.2	0.3	0.2	0.4																							
14-Jul	0.2	0.2	0.1	0.1	0.1	0.1	0.2	Z	0.2	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.2	0.1	0.2	0.3	0.2	0.1	0.1	0.3																							
15-Jul	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	Z	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1																							
16-Jul	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3	Z	0.1	0.1	0.1	0.1	0.1	0.3	0.3	0.3	0.1	0.1	0.1	0.1	0.0	0.0	0.3																							
17-Jul	0.0	0.0	0.0	0.0	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.2																							
18-Jul	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.2	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2																							
19-Jul	0.0	0.0	0.0	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.1																							
20-Jul	0.0	0.1	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1																							
21-Jul	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1																							
22-Jul	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1																							
23-Jul	0.0	0.0	0.0	0.0	Z	0.0	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1																							
24-Jul	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.1	0.1	0.1	0.2																							
25-Jul	0.1	0.1	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.2	0.1	0.1	0.2																							
26-Jul	0.1	0.1	0.1	0.0	0.0	0.0	0.0	Z	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1																							
27-Jul	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1																							
28-Jul	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	0.1	0.0	0.1	0.1	0.1	0.1	0.0	0.1																							
29-Jul	0.0	0.0	0.0	0.0	Z	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1																							
30-Jul	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1																							
31-Jul	0.1	0.0	0.0	0.0	0.1	0.1	Z	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	0.1	0.0	0.1																							
																								0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	Diurnal Average
																								2.3	2.0	1.8	2.1	2.2	1.1	0.8	0.8	1.2	1.2	1.4	1.5	1.3	1.3	1.2	1.3	1.5	1.6	1.3	1.3	1.5	1.3	1.8	2.4	Diurnal Maximum
Z - zerospan C - Calibration M - Maintenance																																																
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 13 ppm																																																



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

**Carbon Monoxide (CO) - ppm**  
**Athabasca Valley - July 2015**





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

**Carbon Monoxide (CO) - ppm**  
**Athabasca Valley - July 2015**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.3	605	85.33	85.33
0.4 - 0.5	34	4.80	90.13
0.6 - 0.7	14	1.97	92.10
0.8 - 1.4	42	5.92	98.03
1.5 - 10	12	1.69	99.72
> 10	0	0.00	99.72

Total Number of Valid Hours: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Carbon Monoxide (CO) - ppm  
Athabasca Valley - July 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	37	13	7	13	23	24	114	35	24	22	88	39	19	32	31	83	604
0.4 - 0.5	2	0	0	0	2	2	5	2	2	5	6	3	0	0	0	5	34
0.6 - 0.7	1	0	0	1	0	1	1	1	2	0	0	2	1	0	2	2	14
0.8 - 1.4	2	1	1	0	1	1	8	1	0	1	3	2	4	4	5	8	42
1.5 - 10	0	0	1	3	3	0	0	0	1	1	1	0	1	0	1	0	12
> 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	42	14	9	17	29	28	128	39	29	29	98	46	25	36	39	98	706

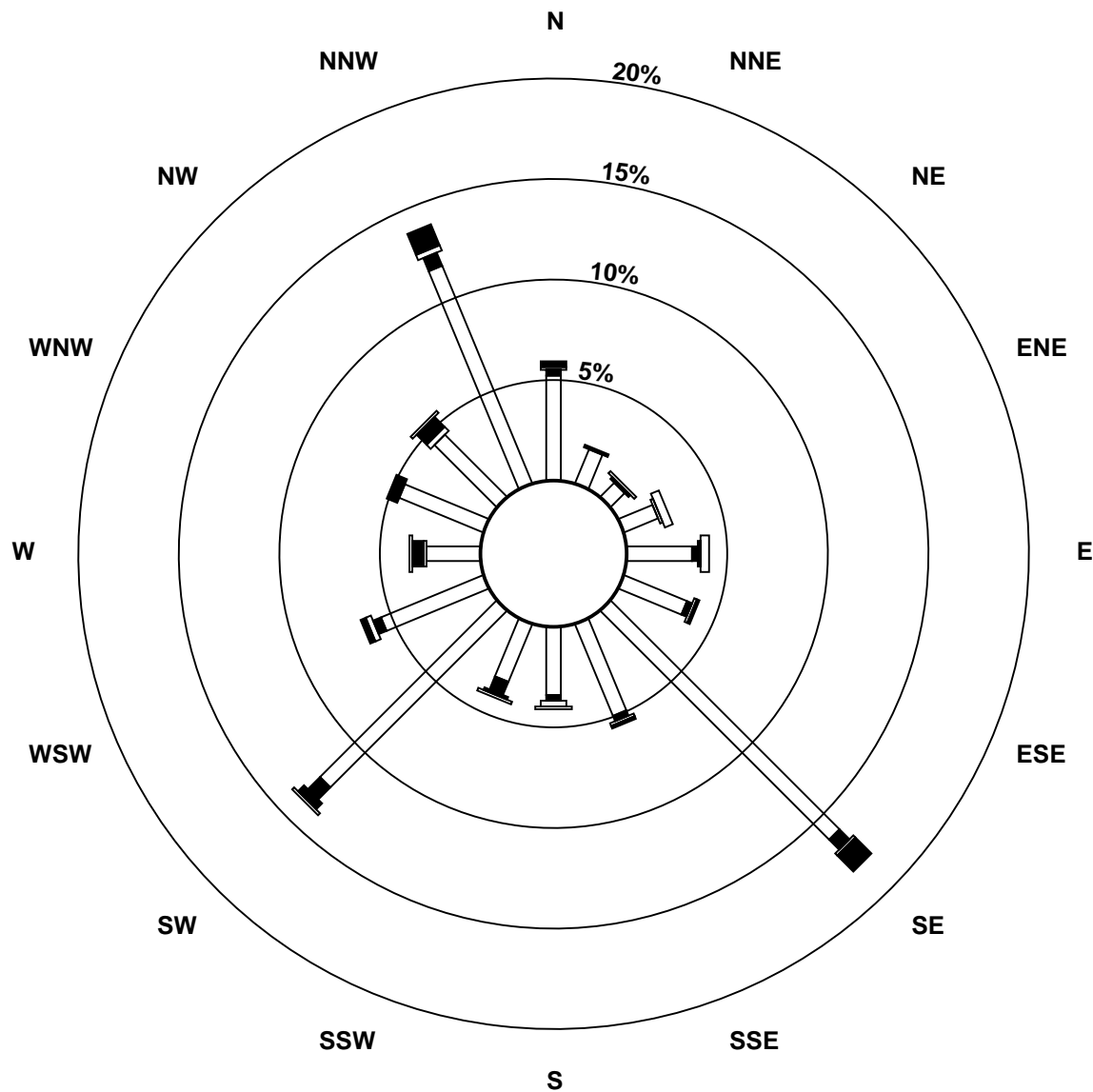
Total Number of Valid Hours: 708

Total Number of Hours: 744

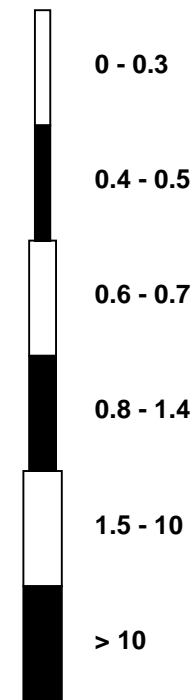


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Carbon Monoxide (CO) - ppm  
Athabasca Valley (AMS 7)

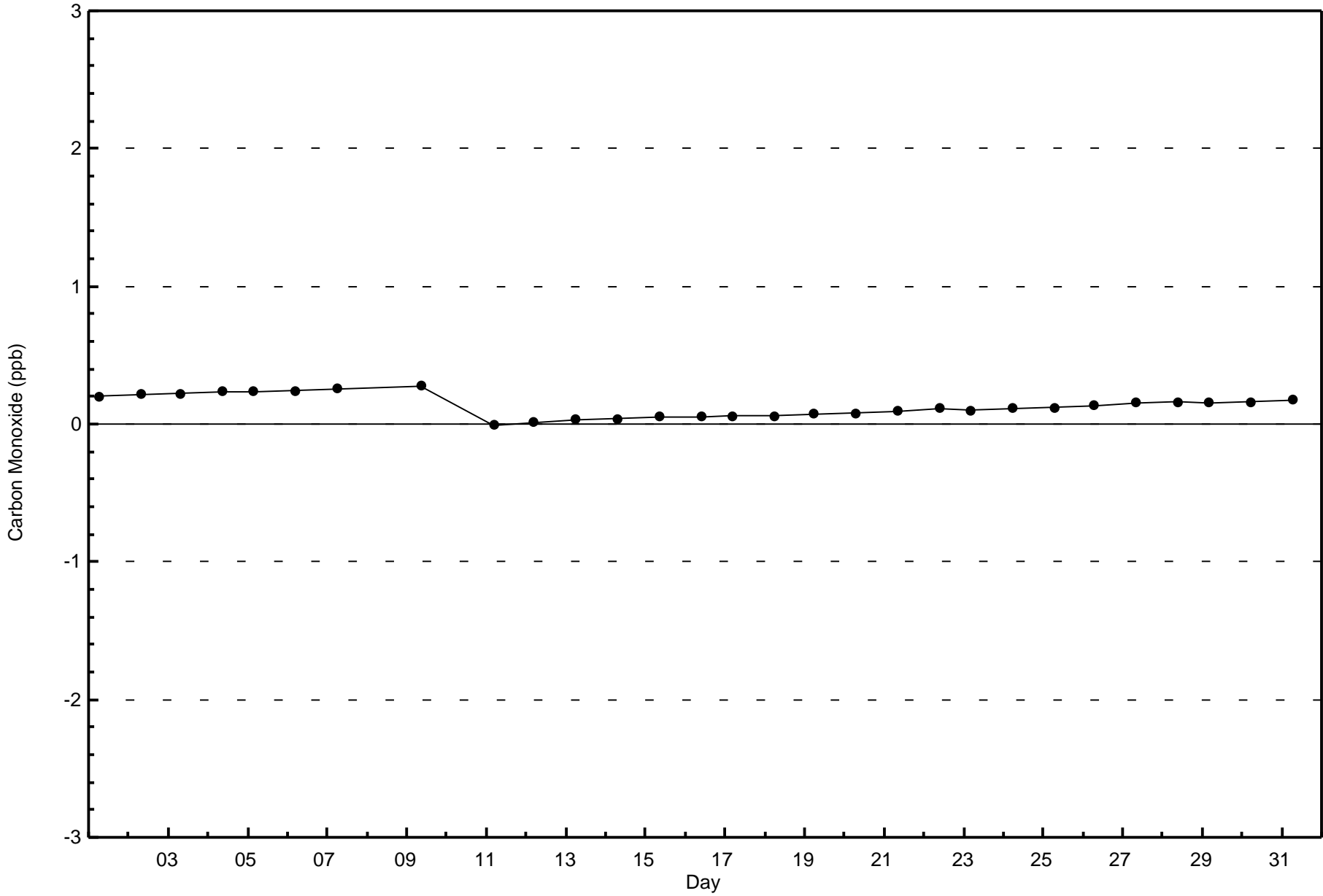


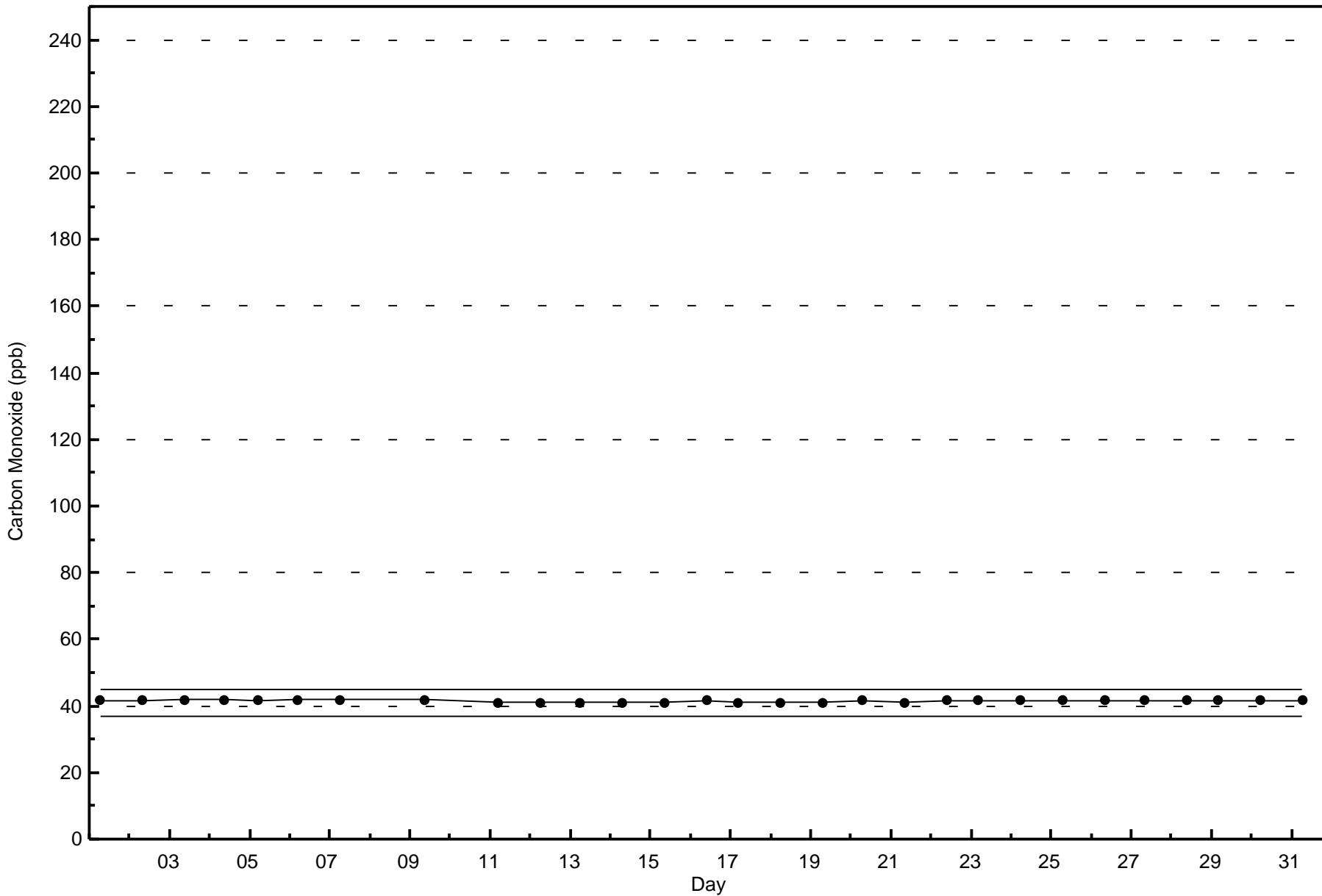
Classes (ppm)



Total Number of Valid Hours: 708







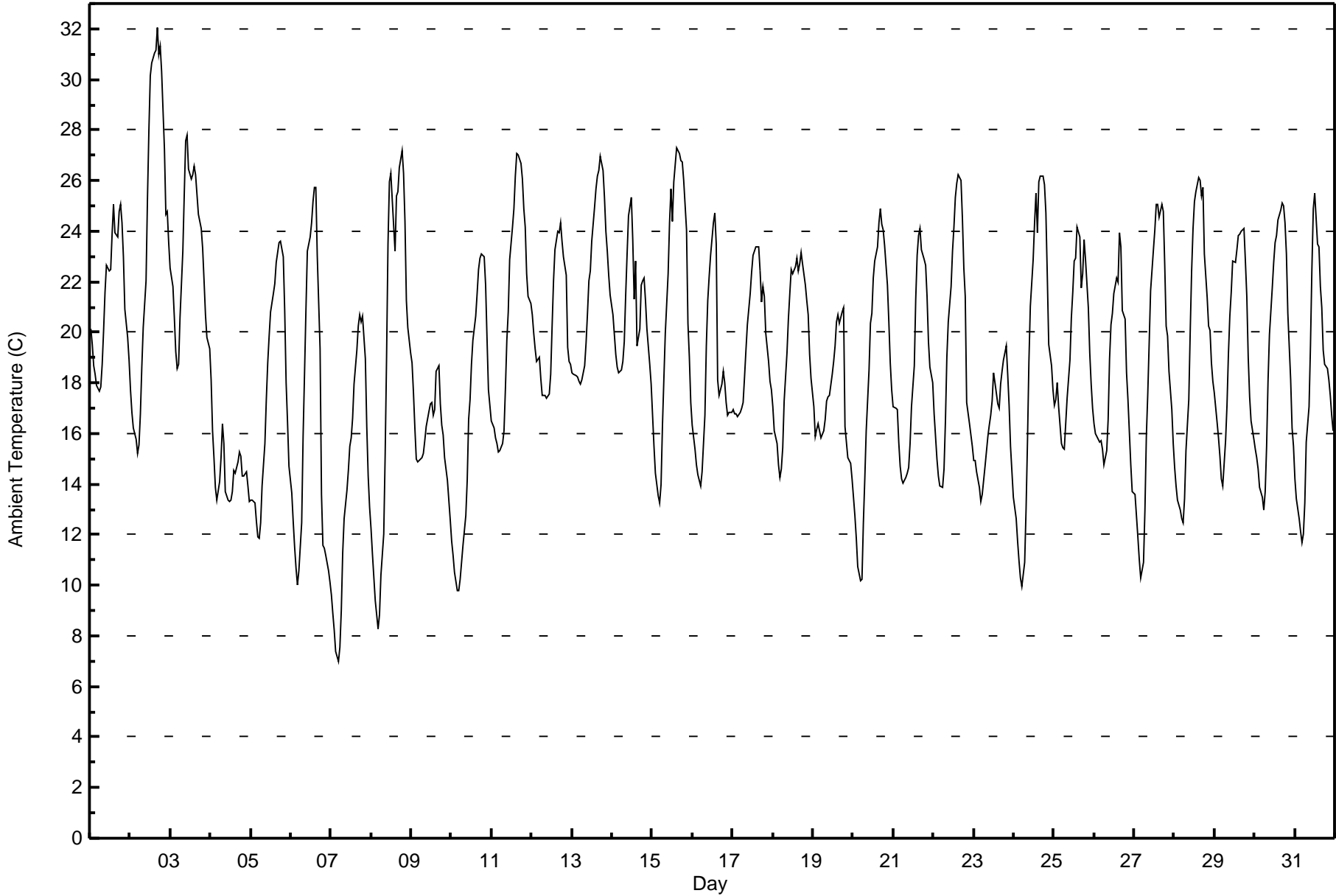


Maximum Value: 32.0 C on Jul 2 17:00		Maximum Daily Average: 24.0 C on Jul 2		Hours in Service: 744																							
Minimum Value: 7.0 C on Jul 7 05:00		Minimum Daily Average: 14.2 C on Jul 7		Hours of Data: 744																							
Maximum Diurnal Average: 23.3 C at hour 16		Minimum Diurnal Average: 13.8 C at hour 5		Hours of Missing Data: 0																							
Monthly Average: 18.92 C		Percentiles: P <sub>1</sub> = 8.9 P <sub>10</sub> = 13.3 Q <sub>1</sub> = 15.6 Median = 18.7 Q <sub>3</sub> = 22.7 P <sub>90</sub> = 24.9 P <sub>99</sub> = 30.0		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-Jul	20.1	19.5	18.7	18.4	17.9	17.7	17.9	18.7	20.1	21.6	22.6	22.4	22.5	23.9	25.1	23.9	23.8	24.8	25.1	24.3	23.0	20.9	19.8	18.9	21.3	25.1	
2-Jul	17.8	16.8	16.2	15.8	15.2	15.5	16.8	18.6	20.2	22.0	25.3	28.0	30.1	30.6	31.1	31.1	32.0	31.0	31.3	30.3	27.2	24.7	24.8	23.6	24.0	32.0	
3-Jul	22.5	21.8	20.6	19.2	18.6	18.7	20.6	23.2	25.4	27.5	27.8	26.4	26.1	26.2	26.5	26.2	25.4	24.7	24.1	23.3	22.0	20.7	19.8	19.4	23.2	27.8	
4-Jul	18.1	16.1	15.1	13.9	13.3	14.1	15.0	16.4	15.6	13.7	13.4	13.3	13.4	13.7	14.5	14.4	14.9	15.2	15.1	14.3	14.3	14.5	14.0	13.3	14.6	18.1	
5-Jul	13.3	13.4	13.2	12.5	11.9	11.9	12.5	13.9	15.6	17.3	18.8	19.8	20.8	21.5	21.9	22.7	23.1	23.5	23.6	23.0	20.9	18.0	16.4	14.7	17.7	23.6	
6-Jul	13.7	12.5	11.5	10.7	10.0	10.6	12.5	15.9	18.3	20.9	23.2	23.8	24.3	25.2	25.8	25.7	23.1	19.4	13.6	11.6	11.5	11.2	10.6	10.1	16.5	25.8	
7-Jul	9.6	8.9	8.2	7.4	7.0	7.5	9.0	11.3	12.6	13.8	14.5	15.5	15.9	16.6	18.0	19.3	20.3	20.7	20.4	20.6	19.0	16.3	14.3	13.1	14.2	20.7	
8-Jul	12.2	11.2	9.4	8.8	8.3	8.8	10.4	12.0	15.2	19.0	23.5	26.0	26.3	24.2	23.2	25.4	25.5	26.5	27.2	26.3	24.4	21.2	20.2	19.2	18.9	27.2	
9-Jul	18.8	17.6	16.2	15.0	14.9	15.0	15.0	15.2	15.7	16.3	16.9	17.2	17.2	16.8	17.0	18.5	18.7	17.2	16.3	15.9	15.0	14.1	13.4	12.6	16.1	18.8	
10-Jul	11.7	11.2	10.5	9.8	9.8	10.2	10.9	11.6	12.8	14.1	16.6	17.3	18.7	19.7	20.6	21.5	22.5	22.9	23.1	23.0	21.9	19.8	17.7	17.1	16.5	23.1	
11-Jul	16.5	16.2	15.8	15.6	15.3	15.3	15.6	16.1	17.8	19.7	20.8	22.9	24.2	24.9	26.2	27.1	27.0	26.7	26.1	24.9	24.1	22.3	21.4	21.1	21.0	27.1	
12-Jul	20.7	20.0	19.3	18.9	19.0	18.2	17.5	17.5	17.5	17.4	17.6	18.4	20.2	22.1	23.3	24.0	23.9	24.3	23.6	23.0	22.3	19.4	18.9	18.7	20.2	24.3	
13-Jul	18.4	18.3	18.3	18.2	18.1	17.9	18.1	18.7	19.6	20.7	22.0	22.4	23.6	24.9	25.7	26.2	26.4	27.0	26.4	25.3	24.0	23.2	22.2	21.5	22.0	27.0	
14-Jul	20.7	19.9	19.1	18.6	18.4	18.5	18.8	19.7	21.5	23.1	24.6	25.3	23.7	21.3	22.8	19.4	20.1	21.8	22.1	22.1	21.3	20.1	18.8	18.0	20.8	25.3	
15-Jul	16.7	15.5	14.4	13.6	13.3	14.0	16.3	18.2	20.0	22.3	24.3	25.7	24.4	26.0	27.3	27.2	27.1	26.8	26.7	26.0	24.1	20.4	19.0	17.2	21.1	27.3	
16-Jul	16.4	15.4	14.7	14.4	14.1	13.9	14.5	16.7	19.5	21.3	22.2	23.0	24.3	24.7	23.5	18.1	17.5	18.0	18.5	18.0	17.2	16.7	16.8	16.8	18.2	24.7	
17-Jul	16.9	16.8	16.8	16.7	16.9	17.0	17.2	18.2	19.3	20.3	21.5	22.4	23.0	23.2	23.4	23.4	22.4	21.2	21.8	21.4	20.0	18.8	18.1	17.7	19.8	23.4	
18-Jul	17.0	16.1	15.6	14.8	14.3	14.6	15.4	17.3	19.2	20.5	21.5	22.5	22.3	22.6	22.9	22.4	22.7	23.2	22.7	21.9	21.3	20.7	19.1	18.2	19.5	23.2	
19-Jul	17.1	15.9	16.2	16.4	16.1	15.8	16.1	16.5	17.3	17.5	17.5	18.4	18.9	19.5	20.4	20.7	20.3	20.8	21.0	16.3	15.7	15.0	14.8	14.2	17.4	21.0	
20-Jul	13.5	12.7	11.9	10.8	10.2	10.2	12.4	14.2	16.1	18.5	20.4	20.7	22.1	22.8	23.4	24.3	24.9	24.3	24.1	23.4	21.9	20.4	18.8	17.7	18.3	24.9	
21-Jul	17.0	17.0	16.9	15.6	14.7	14.2	14.0	14.3	14.4	14.6	15.6	17.1	18.7	21.3	23.1	23.8	24.1	23.3	22.9	22.7	21.4	19.6	18.6	18.0	18.5	24.1	
22-Jul	16.8	15.9	15.0	14.3	13.9	13.8	14.6	16.5	19.0	20.4	21.8	23.2	24.2	25.4	25.9	26.3	26.0	24.5	22.6	21.4	17.2	16.4	16.0	15.5	19.4	26.3	
23-Jul	14.9	14.9	14.5	13.9	13.3	13.6	14.1	14.7	15.9	16.4	16.7	17.3	18.4	18.0	17.2	17.0	18.0	18.5	18.9	19.5	18.3	17.1	15.5	14.5	16.3	19.5	
24-Jul	13.5	12.6	11.8	11.0	10.3	10.0	10.9	13.0	15.7	18.9	21.0	22.9	24.3	25.5	24.0	26.0	26.2	26.2	25.8	24.7	22.2	19.5	18.7	17.7	18.8	26.2	
25-Jul	17.1	17.3	18.0	17.1	15.6	15.4	15.4	16.4	17.4	18.9	20.6	21.6	22.8	23.0	24.2	23.8	21.8	22.3	23.7	22.9	21.0	19.2	18.0	17.0	19.6	24.2	
26-Jul	16.4	16.0	15.8	15.6	15.7	15.4	14.8	15.4	16.6	19.0	20.3	20.7	21.6	22.1	22.0	24.0	23.4	20.9	20.5	18.4	17.3	16.0	14.8	13.7	18.2	24.0	
27-Jul	13.6	12.8	11.9	11.0	10.3	10.9	13.0	15.9	17.6	19.6	21.7	23.3	24.0	25.0	25.1	24.6	25.0	24.8	22.7	20.3	19.9	18.5	16.9	15.6	18.5	25.1	
28-Jul	14.7	13.9	13.4	13.0	12.7	12.5	13.4	15.3	17.4	20.0	22.4	24.1	25.2	25.6	26.1	26.0	25.4	25.7	23.1	21.4	20.2	20.1	18.8	18.1	19.5	26.1	
29-Jul	17.6	16.5	15.8	15.1	14.2	14.0	15.7	17.1	19.1	20.6	21.6	22.8	22.7	23.3	23.8	23.9	24.0	24.1	22.8	21.4	19.0	17.5	16.5	15.8	19.4	24.1	
30-Jul	15.4	15.1	14.6	13.9	13.5	13.0	13.7	15.5	18.1	19.9	21.8	22.8	23.6	23.8	24.4	24.8	25.1	25.0	24.3	23.1	20.7	18.1	16.2	15.5	19.2	25.1	
31-Jul	14.2	13.4	12.7	12.1	11.7	12.0	13.2	15.7	17.0	19.5	22.5	24.9	25.5	23.5	23.4	21.8	21.0	19.3	18.7	18.6	18.1	17.5	16.7	16.1	17.9	25.5	
		16.2	15.5	14.9	14.3	13.8	13.9	14.7	16.1	17.7	19.2	20.7	21.7	22.4	22.8	23.3	23.3	23.3	23.0	22.5	21.6	20.2	18.6	17.6	16.8	Diurnal Average	
		22.5	21.8	20.6	19.2	19.0	18.7	20.6	23.2	25.4	27.5	27.8	28.0	30.1	30.6	31.1	31.1	32.0	31.0	31.3	30.3	27.2	24.7	24.8	23.6	Diurnal Maximum	



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

**Ambient Temperature (AT) - C**  
**Athabasca Valley - July 2015**





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

**Ambient Temperature (AT) - C**  
**Athabasca Valley - July 2015**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	14	1.88	1.88
10 - 20	424	56.99	58.87
> 20	306	41.13	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

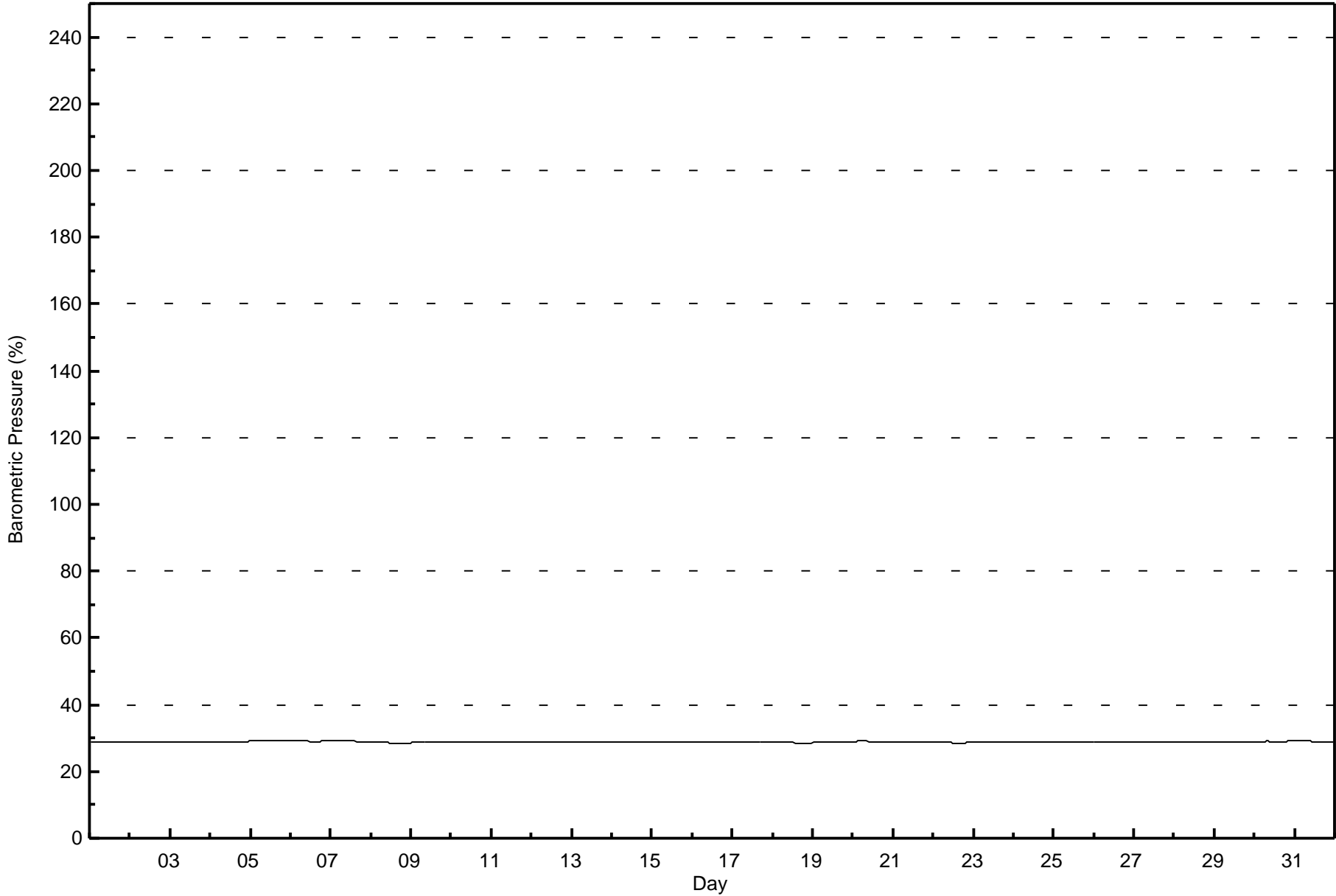


Maximum Value: 29.2 % on Jul 7 07:00		Maximum Daily Average: 29.1 % on Jul 5		Hours in Service: 744																																													
Minimum Value: 28.5 % on Jul 8 18:00		Minimum Daily Average: 28.6 % on Jul 22		Hours of Data: 744																																													
Maximum Diurnal Average: 28.8 % at hour 7		Minimum Diurnal Average: 28.8 % at hour 18		Hours of Missing Data: 0																																													
Monthly Average: 28.82 %		Percentiles: P <sub>1</sub> = 28.5 P <sub>10</sub> = 28.7 Q <sub>1</sub> = 28.7 Median = 28.8 Q <sub>3</sub> = 28.9 P <sub>90</sub> = 29.0 P <sub>99</sub> = 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-Jul	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	29.0	29.0	28.9	29.0																							
2-Jul	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	28.8	28.8	28.8	28.8	28.9	29.0																						
3-Jul	28.8	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.6	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.8	28.7	28.8																							
4-Jul	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	29.0	29.0	29.0	28.9	29.0																							
5-Jul	29.1	29.1	29.1	29.1	29.1	29.1	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.2																							
6-Jul	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.0	29.0	29.0	29.0	29.0	28.9	28.9	28.9	29.0	29.0	29.1	29.1	29.1	29.1	29.1	29.0	29.1																							
7-Jul	29.1	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.1	29.1	29.0	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.9	29.1	29.2																							
8-Jul	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.6	28.6	28.6	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.6	28.6	28.6	28.7	28.9																							
9-Jul	28.6	28.6	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.6	28.6	28.7	28.7	28.7	28.8	28.8	28.8	28.7	28.8																							
10-Jul	28.8	28.8	28.8	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.9																							
11-Jul	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.8	28.8																							
12-Jul	28.7	28.7	28.7	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.8	28.7	28.7	28.7	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.7	28.8																							
13-Jul	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																							
14-Jul	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.8																							
15-Jul	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.8																							
16-Jul	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.6	28.6	28.6	28.6	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7																							
17-Jul	28.7	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8																							
18-Jul	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.6	28.6	28.6	28.6	28.6	28.6	28.5	28.5	28.5	28.5	28.5	28.6	28.6	28.8																							
19-Jul	28.6	28.6	28.7	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.0	29.0	28.8																							
20-Jul	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.8	28.9	29.0																							
21-Jul	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	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.7	28.7	28.7	28.8																							
22-Jul	28.7	28.7	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.7																							
23-Jul	28.6	28.6	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.8	28.8	28.8	28.8	28.7	28.8																							
24-Jul	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.8																							
25-Jul	28.7	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.8																							
26-Jul	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.8																							
27-Jul	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	28.8	28.9																							
28-Jul	28.8	28.8	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9																							
29-Jul	28.8	28.8	28.8	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.0	28.9	29.0																							
30-Jul	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.1	29.1	29.1	29.0	29.1																							
31-Jul	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	29.0	29.0	28.9	29.0	29.1																							
																								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	
																								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	29.1	29.1	29.1	29.1	29.1	Diurnal Maximum



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

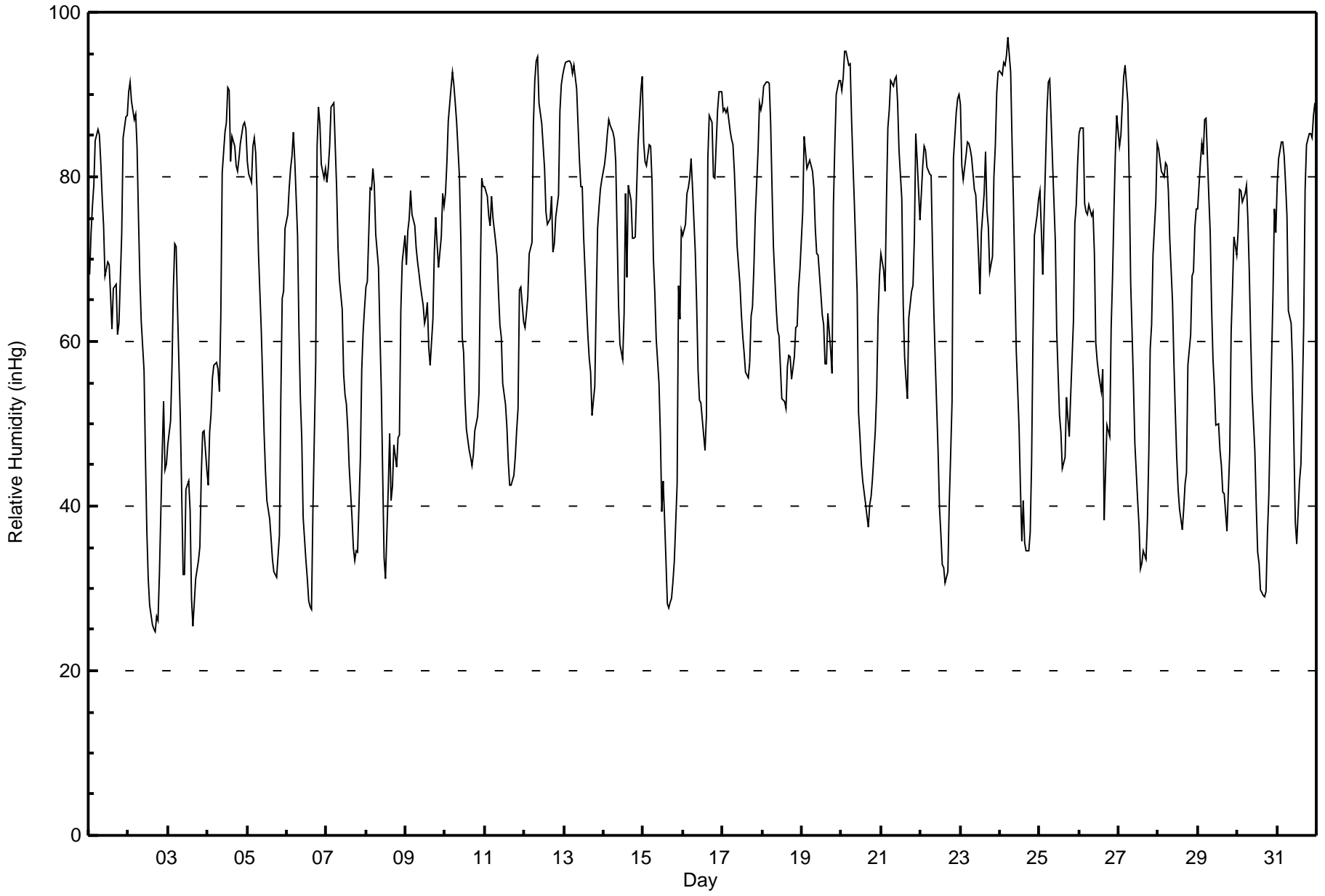
**Barometric Pressure (BP) - %**  
**Athabasca Valley - July 2015**





Maximum Value: 97 inHg on Jul 24 06:00																			Maximum Daily Average: 79.6 inHg on Jul 12						Hours in Service: 744																								
Minimum Value: 25 inHg on Jul 2 17:00																			Minimum Daily Average: 44.9 inHg on Jul 3						Hours of Data: 744																								
Maximum Diurnal Average: 83.4 inHg at hour 5																			Minimum Diurnal Average: 48.2 inHg at hour 15						Hours of Missing Data: 0																								
Monthly Average: 66.4 inHg																			Percentiles: P <sub>1</sub> = 28 P <sub>10</sub> = 39 Q <sub>1</sub> = 52 Median = 70 Q <sub>3</sub> = 82 P <sub>90</sub> = 88 P <sub>99</sub> = 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-Jul	68	73	76	79	84	86	85	82	78	74	68	70	69	66	62	67	67	61	62	68	73	85	87	88	74.0	88																							
2-Jul	90	92	89	87	88	84	75	68	62	56	46	37	31	28	26	25	25	27	26	32	46	53	44	45	53.4	92																							
3-Jul	47	50	57	66	72	71	64	51	41	32	32	42	43	40	29	25	28	31	33	35	44	49	49	44	44.9	72																							
4-Jul	43	49	51	56	57	58	57	54	63	80	85	87	91	91	82	85	84	81	81	82	84	86	87	86	73.2	91																							
5-Jul	82	80	79	84	85	83	78	71	61	55	49	44	41	38	36	34	32	32	31	36	53	65	66	74	57.9	85																							
6-Jul	75	79	81	83	85	82	73	61	53	48	39	33	31	28	28	28	40	57	84	89	87	81	80	81	62.8	89																							
7-Jul	79	81	84	88	89	84	79	71	67	64	56	54	52	49	45	39	35	33	35	34	46	57	61	64	60.2	89																							
8-Jul	67	67	79	79	81	79	73	69	61	54	44	34	31	42	49	41	42	47	45	48	49	64	70	73	57.8	81																							
9-Jul	69	73	75	78	75	74	71	70	68	67	64	62	63	65	59	57	63	71	75	72	69	73	78	76	69.5	78																							
10-Jul	78	82	87	91	93	91	89	87	80	72	60	59	53	49	47	46	45	46	49	51	54	68	80	79	68.1	93																							
11-Jul	79	78	75	74	78	75	72	70	66	62	60	55	52	50	45	42	43	44	46	49	52	66	67	62	60.9	79																							
12-Jul	62	63	65	71	72	87	92	94	95	89	86	84	81	76	74	75	78	71	72	75	78	88	91	92	79.6	95																							
13-Jul	93	94	94	94	94	93	94	91	86	82	79	79	73	65	61	58	56	51	55	65	74	76	78	80	77.6	94																							
14-Jul	81	83	85	87	86	85	85	82	73	65	60	58	63	78	68	79	77	73	72	73	79	84	91	92	77.4	92																							
15-Jul	84	82	81	84	84	80	70	66	60	55	49	39	43	38	28	28	28	29	31	33	43	67	63	74	55.7	84																							
16-Jul	73	74	78	79	80	82	79	71	64	57	53	53	49	47	51	82	87	87	80	80	84	88	90	90	73.2	90																							
17-Jul	88	88	88	88	86	85	84	81	76	72	67	63	61	59	56	56	57	63	64	69	75	83	89	88	74.4	89																							
18-Jul	89	91	92	92	91	87	79	72	64	61	61	57	53	53	52	57	58	58	55	58	62	62	66	69	68.2	92																							
19-Jul	76	85	83	81	81	82	81	79	74	71	70	66	63	62	57	57	63	59	56	77	84	90	92	92	74.2	92																							
20-Jul	91	92	95	95	93	94	87	82	77	66	51	49	45	43	40	39	37	40	41	43	49	54	63	68	64.0	95																							
21-Jul	71	69	66	77	86	88	92	91	92	92	89	83	77	64	58	55	53	63	66	67	73	85	82	75	75.6	92																							
22-Jul	78	81	84	83	81	80	80	71	63	57	47	40	37	33	33	31	32	40	46	53	82	88	89	90	62.5	90																							
23-Jul	89	81	80	82	84	84	83	82	78	78	74	70	66	73	78	83	76	74	68	70	80	84	90	93	79.3	93																							
24-Jul	93	92	94	94	95	97	93	84	77	68	59	50	42	36	41	36	35	35	37	45	61	73	75	77	66.1	97																							
25-Jul	78	74	68	75	88	92	92	87	82	72	61	56	51	49	45	46	53	51	49	53	63	74	77	82	67.4	92																							
26-Jul	85	86	86	77	76	75	77	75	76	71	60	58	56	54	57	38	44	50	48	61	68	76	83	87	67.6	87																							
27-Jul	84	85	89	92	94	89	80	67	61	55	48	41	38	32	33	35	34	38	47	59	62	71	77	84	62.2	94																							
28-Jul	83	82	81	80	82	81	78	72	65	57	51	46	42	40	37	40	43	44	57	61	68	68	74	76	62.9	83																							
29-Jul	76	82	84	83	87	87	78	73	64	58	54	50	50	47	45	42	41	37	42	47	61	67	73	71	62.4	87																							
30-Jul	73	79	78	77	78	79	75	69	60	54	47	40	34	33	30	29	29	30	37	41	50	66	76	73	55.7	79																							
31-Jul	79	82	84	84	83	79	75	64	62	57	47	38	35	43	45	53	62	78	84	85	85	85	87	89	69.5	89																							
																								77.6	79.0	80.3	81.9	83.4	82.9	79.6	74.4	69.4	64.5	58.6	54.6	52.2	50.6	48.2	48.6	49.9	51.6	54.0	58.4	65.7	73.4	76.6	77.9	Diurnal Average	
																								93	94	95	95	95	97	94	94	95	92	89	87	91	91	82	85	87	87	84	89	87	90	92	93	Diurnal Maximum	







Maximum Speed: 31 km/h on Jul 3 12:00	Maximum Daily Speed Average: 12.4 km/h on Jul 17	Hours in Service: 744
Minimum Speed Value: 0 km/h on Jul 10 23:00	Minimum Daily Speed Average: 1.1 km/h on Jul 28	Hours of Data: 743
Maximum Diurnal Speed Average: 6.7 km/h at hour 18	Minimum Diurnal Speed Average: 0.4 km/h at hour 23	Hours of Missing Data: 1
Monthly Average Velocity: 2.2 km/h 275.6 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 3 Q <sub>1</sub> = 5 Median = 7 Q <sub>3</sub> = 11 P <sub>90</sub> = 17 P <sub>99</sub> = 26	Percent Operational Time: 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-Jul	NNW2	SSE2	S8	S5	S2	SSE5	SSE5	SSW6	SW9	SSW6	WSW9	SW12	SW13	SW9	WSW4	N12	WSW4	SW7	SSW6	SSW4	SW3	SSE2	SE3	SE1	SW4.2	SW13
2-Jul	ESE1	ESE1	SE4	SE5	SE5	SE5	SE7	SSE5	SW9	SW11	SW12	SW10	WSW7	SW16	SW17	SW10	SW9	WSW12	SW7	SW5	SSE2	S3	SSE7	SSE7	SSW5.9	SW17
3-Jul	S6	S6	SE3	ESE4	ESE6	SE9	ESE6	SSW12	SW16	WSW25	W31	W31	NNW30	NNW27	NNW29	NNW27	NNW26	NNW21	NNW15	NNW12	NNW5	WSW4	SW9	WSW9	NNW10.2	W31
4-Jul	SW5	SSW7	SSW6	S6	SW9	W8	W17	NNW15	NNW19	NNW11	NE4	ESE5	SE8	SE5	SW6	W4	NNW1	NNW3	W10	WSW9	W7	NNW16	N21	N19	NNW4.8	N21
5-Jul	N17	N16	N15	NNW14	NNW12	NNW11	NNW10	N6	NNW8	N8	N11	N12	N12	NNW13	NNW11	NNW7	N7	N8	NNE6	ENE4	ESE1	E3	SE4	ESE4	N8.1	N17
6-Jul	SE7	SE8	SE7	SE8	SE9	SE10	SE9	S5	SW12	SW13	SW18	WSW14	WSW16	WSW17	WSW17	NNW21	NNW29	NNW25	NNW23	NNW24	NNW20	NW9	NW8	NNW5.6	NNW29	
7-Jul	WNNW10	W9	WSW9	SW10	SW9	SW8	SW7	E4	ENE4	W7	NNW11	NNW13	NNW10	ENE4	E3	SW7	WSW10	WNNW12	WNNW9	WSW7	SW5	SE3	SE6	SE7	W4.2	NNW13
8-Jul	SE7	SSE9	SE11	SE12	SE13	SE15	SE13	SE13	SE12	SE10	SE8	S9	SSE8	SSW5	SE12	SE13	ESE10	WNNW1	NNW11	NNW10	NNW25	N9	NNW7	NNW7	SE4.5	NNW25
9-Jul	NNW9	NNW9	N4	NE4	N7	NNW9	NNW10	NNW7	NNW9	NNW10	NW7	NNW7	N7	N8	NNE5	ENE8	NNW17	NNW24	NNW23	NNW20	NNW16	NNW14	NNW12	NNW11	NNW10.1	NNW24
10-Jul	NNW8	NNW7	N6	NNE4	NNW6	NNW6	NNW8	NNW8	NNW9	WNNW5	W3	NW7	NNW11	NNW9	NNW8	NW6	NNW8	NNW9	NNW11	NNW7	N3	N2	NO	ENE2	NNW6.1	NNW11
11-Jul	E4	E5	ESE8	SE9	E2	SE8	SE10	SE9	SE13	SE15	SE13	SE12	ESE10	E10	E11	ESE10	E13	ESE8	ENE9	E7	E5	N7	ENE6	ENE4	ESE7.6	SE15
12-Jul	ENE3	NE4	E3	E3	W3	S6	S3	NNW6	NNE4	SSE9	SE9	NE7	NNW10	NNW10	NNW12	NNW16	NNW17	N7	NNW8	N5	WSW15	WSW9	N7	NW8	NNW3.6	NNW17
13-Jul	SE2	S6	SW6	SSW4	WSW4	S5	SE8	SSE5	S4	SW5	SSW6	SW7	SW9	SW8	WNNW5	NW1	SE3	S6	S7	SSW2	SE4	SE9	SE8	SE10	S4.0	SE10
14-Jul	SE9	SE10	SSE8	SE9	SE10	SE8	SE10	SE8	SSE5	SW5	WNNW3	ENE6	S10	S5	NNW5	NNW13	SSW5	S5	SSE5	SSE5	SSE5	SSE4	SE2	SSE2	SSE4.2	NNW13
15-Jul	SSE4	SSE5	SSE5	SE5	SSE6	SE5	SE5	S4	SW9	SW6	SW5	SW12	NNE5	N5	SW18	WSW17	WSW17	WSW14	WSW10	WSW8	SW5	ESE4	SE4	SE3	SW5.0	SW18
16-Jul	SE4	SE8	SE5	SE9	SE8	SE8	ESE7	E5	N5	N6	NNW11	NNW14	NNW17	NNW15	NNE1	SSW14	WSW15	W8	WSW8	WSW8	SW13	WNNW8	NNW8	NNW13	NNW2.1	NNW17
17-Jul	NW8	NNW10	NNW16	NNW18	NNW17	NNW18	NNW19	NNW20	NNW24	NNW22	NNW20	NNW20	NNW20	NNW21	N16	NNW18	N16	NNW9	N7	ENE3	SE7	SE6	SE3	S4	NNW12.4	NNW24
18-Jul	SSW5	SSE4	SE5	SE6	SE5	ESE6	SE6	SSE2	SW7	SW10	SW14	SW14	SW14	SW12	WSW15	WSW11	SW14	WSW17	WNNW18	W17	W20	W24	W24	W22	WSW9.3	W24
19-Jul	WNNW18	NW5	NNW7	WNNW15	WNNW22	WNNW18	WNNW12	NW14	NW19	NW20	NW14	NW20	NNW21	NNW15	WNNW20	NW18	NNW14	N10	NNW14	N10	WNNW4	WSW4	WSW7	SW4	NW12.3	WNNW22
20-Jul	SW8	SW3	S2	SE4	SE7	ESE6	SE3	ESE5	ENE5	SW1	SW3	NE4	ENE3	SSW2	SE7	SE6	ESE5	ENE10	E11	E10	ESE6	SE8	SE8	SE8	ESE4.2	E11
21-Jul	ESE6	SE6	SSE8	SE10	SE7	SE8	SE6	S4	S5	SE6	SE8	SSE6	SW5	SW7	SSW2	NNW3	NW5	NNW12	NNW11	NNW6	WNNW3	SE2	SE6	SE6	SSE2.3	NNW12
22-Jul	SSE6	SE5	SE8	SSE5	SSE6	SSE5	SW7	SW7	ENE3	NE3	NNW7	N5	W5	SW8	WSW9	SW12	SW13	WNNW20	NNW13	W8	SSW3	S4	SSE4	S5	SW3.3	WNNW20
23-Jul	SSE4	WSW12	SW14	WSW12	WSW12	SW9	WSW13	WSW10	NNW11	NNW12	N11	N5	N5	NE5	SW4	ENE4	E3	NE3	E2	WSW3	WSW4	SW3	SSW2	SE2	WSW3.3	SW14
24-Jul	SE3	SE4	SE5	SE6	SE7	SE9	SE8	ESE6	E7	E6	NE3	SW4	SW11	SW12	WNNW17	SW8	SW8	SSW6	SW7	S6	ESE4	SW2	SE5	SE6	S3.5	WNNW17
25-Jul	SE5	SSW5	WSW11	W4	E2	SW3	SW7	S4	SSW6	SW11	SW14	SW14	SW12	W11	SW12	WSW11	NNW12	N5	NNE1	SE1	SSE4	ESE2	SE4	ESE4	SW4.4	SW14
26-Jul	SE5	SE6	SE6	SE5	WSW6	SSE5	SSE6	ESE2	E4	NNE5	NNW9	NW6	N3	ESE2	WNNW3	NNW12	NE4	NNW16	E6	SE13	SSE6	SE6	SE8	SE7	ESE1.6	NNW16
27-Jul	SE9	SE9	SE10	SE9	SE10	SE9	SE6	SSW9	SW13	SW13	M	SW15	SW14	SW17	W17	W19	W16	NNW9	NNW13	NNW7	SW4	SSW2	S3	SE2	SW4.6	W19
28-Jul	SE4	SSE6	S5	SSW4	S5	SE9	SE8	E7	NW1	WSW5	NE2	N2	WSW5	NNW4	ESE1	NNE6	E5	SW3	NNW11	E7	N4	SSE7	NNW1	NNW7	ESE1.1	NNW11
29-Jul	WNNW2	SW11	SW4	WNNW6	SSE4	SE8	E5	E5	NNE1	SSW2	SW12	SW13	SW17	W16	WNNW14	NW17	NW14	WNNW18	WNNW29	WNNW21	NNW15	N5	SW4	SW8	W6.8	WNNW29
30-Jul	SW9	SW7	SW12	SW11	SW8	SW14	SW10	SW8	SW8	SW8	NW7	NW18	WNNW22	WNNW26	NW24	NW25	NW23	NW22	NNW12	NNE7	NNE4	E3	E3	SE4	WNNW8.6	WNNW26
31-Jul	SE4	SE5	SE9	SE10	SE7	SE6	SE5	SSW1	ENE4	NNE3	W4	NW2	SW7	NNW7	NW7	NNE6	ESE1	SSE2	SSW2	SW2	WNNW5	WSW5	W6	SW9	S1.3	SE10

S1.0	S2.0	S2.6	SSE2.6	S2.2	SSE3.0	SSE2.4	S1.1	W2.0	W3.2	W3.7	W4.9	NNW5.5	NNW5.6	NNW6.2	NNW5.9	NNW5.4	NNW6.7	NNW6.2	NNW3.1	NNW2.6	NNW1.3	WSW0.4	WSW0.6			Diurnal Average
WNNW18	N16	NNW16	NNW18	WNNW22	NNW18	NNW19	NNW20	NNW24	WSW25	W31	W31	NNW30	NNW27	NNW29	NNW27	NNW26	NNW29	WNNW29	NNW23	NNW25	W24	W24	W22			Diurnal Maximum

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



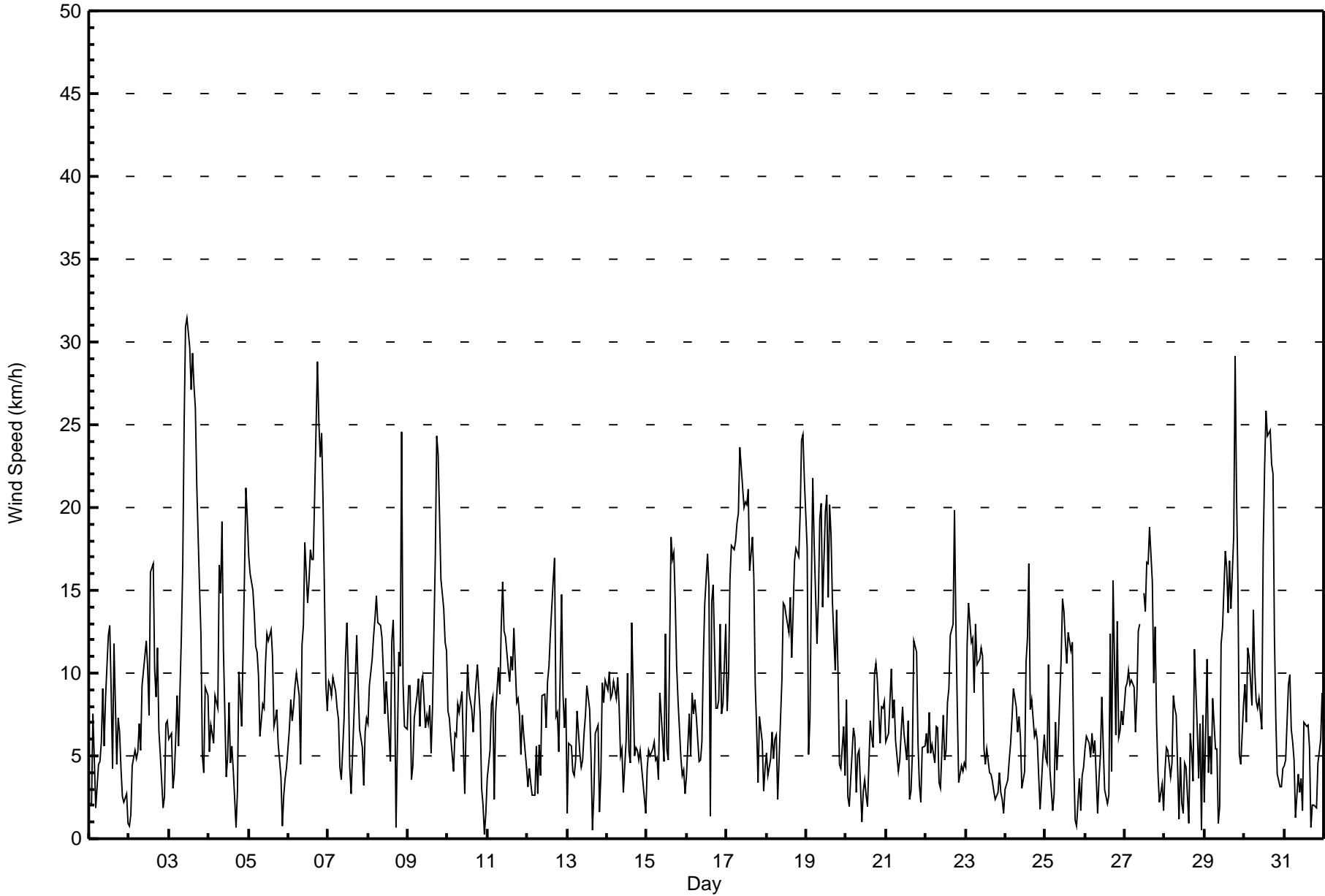
**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

**Wind Speed (WS) - km/h**  
**Athabasca Valley - July 2015**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 13 km/h on Jul 12 21:00	Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9
Minimum Value: 1 km/h on Jul 24 04:00	
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 2 Median = 2 Q <sub>3</sub> = 3 P <sub>90</sub> = 5 P <sub>99</sub> = 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-Jul	1	3	3	2	2	2	2	3	2	2	3	3	3	2	2	4	2	3	2	2	2	2	2	2	4
2-Jul	1	2	1	1	2	1	2	2	3	3	3	2	3	3	4	3	3	4	1	2	2	3	2	1	4
3-Jul	2	2	1	2	2	2	2	4	4	7	8	7	6	5	6	5	5	4	3	4	2	2	2	2	8
4-Jul	3	2	2	2	3	4	3	4	5	5	2	2	2	2	2	3	2	2	3	2	3	3	5	5	5
5-Jul	5	4	4	3	2	2	2	2	3	3	4	4	3	4	3	3	3	2	2	1	1	2	1	2	5
6-Jul	2	2	2	3	2	2	3	3	3	3	4	5	5	5	5	4	8	7	9	5	5	5	3	2	9
7-Jul	2	2	1	3	2	1	1	2	2	4	4	5	4	3	2	3	4	5	3	2	1	2	1	1	5
8-Jul	2	1	2	2	2	3	2	3	2	3	2	2	2	1	4	3	3	2	3	2	8	4	2	2	8
9-Jul	2	3	2	2	2	2	3	2	2	2	2	2	2	2	3	3	4	4	5	5	4	3	3	2	5
10-Jul	3	2	2	2	2	2	2	2	2	2	2	2	3	2	2	1	2	1	2	1	2	2	2	1	3
11-Jul	2	2	2	4	2	2	2	3	4	4	3	3	3	3	4	4	3	3	3	2	3	2	2	2	4
12-Jul	1	2	2	1	3	5	4	4	4	4	3	2	2	2	2	4	3	3	2	1	13	7	3	4	13
13-Jul	3	2	2	2	2	1	2	1	1	2	2	2	2	2	2	1	2	2	1	2	3	2	3	3	3
14-Jul	2	2	2	2	2	2	3	2	2	2	2	2	9	2	9	9	2	2	2	1	2	2	2	2	9
15-Jul	2	2	1	1	2	1	2	2	2	2	3	4	3	4	5	5	4	4	4	2	2	1	3	2	5
16-Jul	2	2	2	2	1	2	2	2	2	2	3	3	3	5	7	6	4	3	2	2	3	3	3	3	7
17-Jul	3	3	3	3	4	3	3	4	5	5	4	4	5	5	5	6	5	5	2	3	2	2	1	2	6
18-Jul	1	1	1	2	1	2	2	2	3	3	3	3	3	3	6	3	3	5	6	3	4	4	5	3	6
19-Jul	3	3	2	7	3	3	3	4	4	4	3	5	4	4	4	5	5	4	5	7	2	2	1	2	7
20-Jul	2	2	2	1	1	1	2	2	2	2	2	2	3	3	3	3	3	4	3	2	2	3	2	2	4
21-Jul	2	2	3	2	2	2	3	2	1	2	3	3	2	2	2	4	3	3	3	2	2	2	2	1	4
22-Jul	2	3	2	3	1	1	2	2	2	1	2	2	3	3	3	4	3	7	6	7	4	2	1	2	7
23-Jul	2	6	4	3	2	3	2	2	3	3	3	2	2	3	3	1	1	1	1	1	1	2	1	6	
24-Jul	2	1	1	1	2	1	1	2	2	2	2	3	4	3	9	2	3	2	4	1	2	1	2	2	9
25-Jul	3	3	5	2	2	3	2	2	3	4	3	4	3	3	4	3	4	2	1	2	2	2	1	2	5
26-Jul	2	2	2	2	2	2	1	2	2	3	3	2	2	4	6	5	4	9	3	4	2	2	2	2	9
27-Jul	3	3	2	2	2	1	2	3	3	2	M	3	5	5	11	7	4	4	12	2	3	2	3	2	12
28-Jul	2	2	2	2	1	2	2	1	2	3	1	2	2	2	2	5	2	2	5	5	2	2	3	3	5
29-Jul	2	3	3	2	2	2	2	1	2	2	3	4	3	4	4	5	5	5	8	5	4	3	2	2	8
30-Jul	3	2	3	4	2	3	2	2	3	4	6	9	6	6	5	5	5	7	6	3	2	1	2	1	9
31-Jul	2	3	2	2	1	1	1	1	1	1	2	3	5	6	5	3	2	2	2	2	2	2	1	3	6
Diurnal Maximum																									

M - Maintenance





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

**Wind Speed (WS) - km/h**  
**Athabasca Valley - July 2015**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	249	33.51	33.51
6 - 11	311	41.86	75.37
12 - 19	138	18.57	93.94
20 - 28	39	5.25	99.19
29 - 38	6	0.81	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 743

Total Number of Hours: 744



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Athabasca Valley - July 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	15	10	10	12	19	16	43	27	20	16	22	11	6	9	7	6	249
6 - 11	18	4	1	5	10	15	78	15	11	11	47	19	8	9	12	48	311
12 - 19	9	0	0	0	1	0	13	0	0	2	35	17	6	11	11	33	138
20 - 28	1	0	0	0	0	0	0	0	0	0	0	1	4	7	9	17	39
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	6
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	43	14	11	17	30	31	134	42	31	29	104	48	26	38	40	105	743

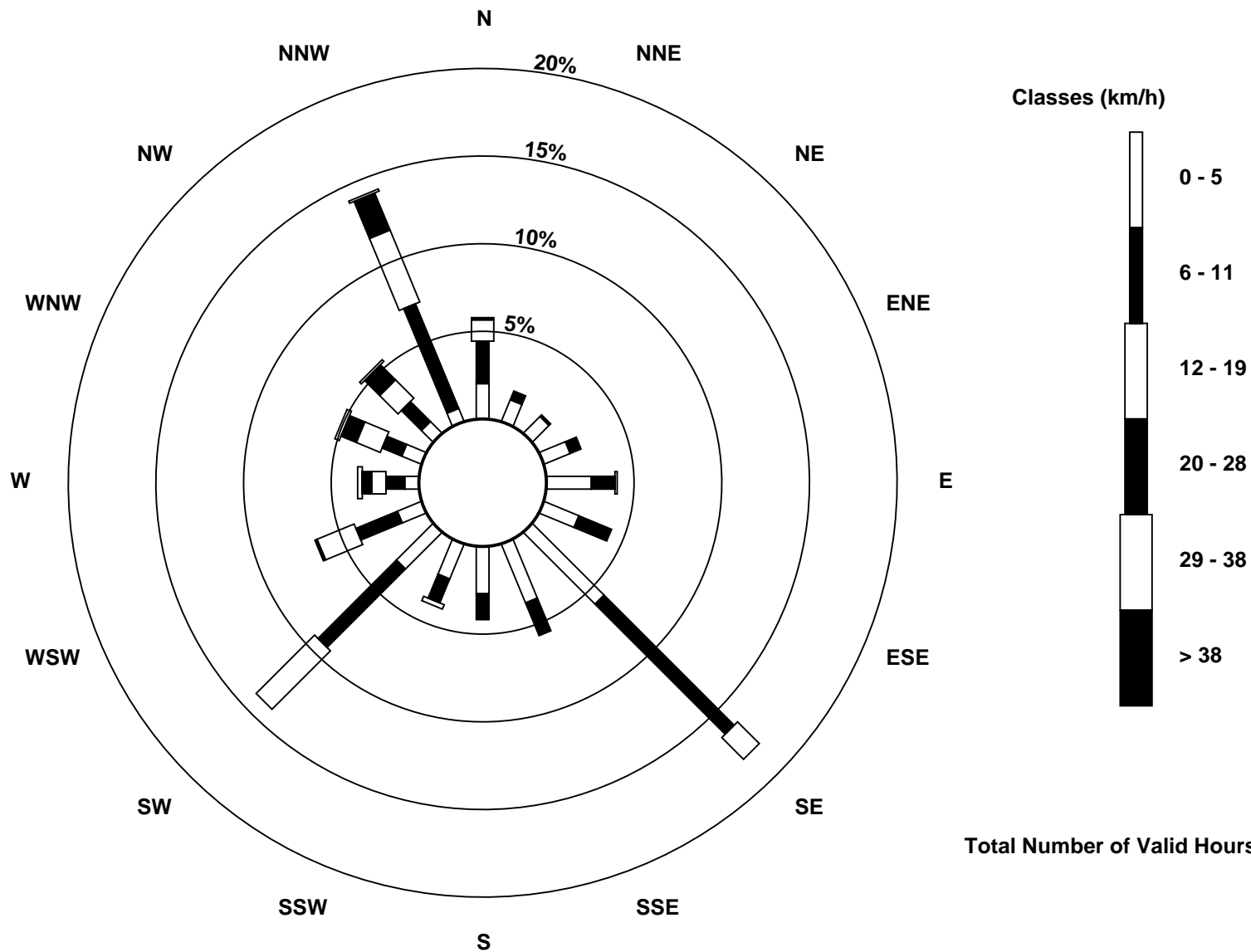
Total Number of Valid Hours: 743

Total Number of Hours: 744



Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Wind Speed (WS) - km/h  
Athabasca Valley (AMS 7)





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

**Wind Direction (WD) - deg**  
**Athabasca Valley - July 2015**

Direction of Maximum Speed: 273 deg on Jul 3 12:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 343.7 deg on Jul 17	Hours of Data: 743
Direction of Minimum Speed: 352 deg on Jul 10 23:00	Hours of Missing Data: 1
Direction of Minimum Daily Speed Average: 1.1 deg on Jul 28	Percent Operational Time: 99.9
Monthly Average Direction: 276.4 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-Jul	342	167	190	170	182	153	163	204	221	210	245	231	221	223	244	351	238	223	213	209	218	152	142	145	215.9
2-Jul	111	107	142	146	141	138	141	159	214	222	221	226	248	227	230	231	228	242	230	218	152	170	166	157	207.3
3-Jul	177	178	135	114	117	124	114	211	223	241	262	273	297	301	310	319	320	316	309	313	341	242	235	237	281.8
4-Jul	230	212	211	188	216	278	275	302	321	329	48	117	136	146	224	274	332	317	281	237	275	328	350	353	294.9
5-Jul	357	357	353	336	330	334	341	351	345	354	351	2	357	345	334	348	3	357	14	74	111	87	136	118	353.1
6-Jul	136	142	131	141	128	130	127	182	216	222	217	248	258	241	239	255	329	338	348	332	331	330	319	304	284.1
7-Jul	288	270	253	230	222	220	217	93	64	277	297	310	329	60	90	223	257	292	295	241	217	127	131	138	260.5
8-Jul	133	147	135	137	137	139	136	137	139	132	134	170	161	204	139	146	122	296	313	304	339	349	348	337	134.9
9-Jul	337	343	357	41	2	323	348	341	346	331	322	329	5	1	30	74	341	338	341	342	346	342	338	330	344.8
10-Jul	339	343	351	19	346	340	342	335	328	294	276	324	334	332	333	325	335	340	340	344	11	355	352	59	337.3
11-Jul	91	100	119	140	81	141	137	131	139	132	134	134	119	97	94	102	88	106	75	87	94	8	67	64	110.6
12-Jul	68	44	87	85	271	177	189	347	25	147	139	35	342	337	339	342	341	1	348	1	249	257	7	313	341.9
13-Jul	144	182	232	211	244	173	137	158	176	229	195	234	221	223	289	310	124	183	183	194	140	128	127	141	183.2
14-Jul	135	133	148	140	136	145	141	130	149	236	303	61	174	184	320	345	206	178	164	165	159	148	142	164	150.4
15-Jul	159	156	149	130	147	132	129	179	224	221	222	230	24	357	234	239	242	241	237	237	216	106	143	138	214.3
16-Jul	126	135	140	136	125	131	122	100	351	2	346	339	340	336	18	205	239	261	252	250	227	300	339	332	293.1
17-Jul	322	322	337	338	341	339	340	345	342	344	348	344	342	346	353	328	352	345	5	77	136	133	138	185	343.7
18-Jul	196	151	141	143	126	123	141	149	214	221	232	232	232	234	254	239	236	241	282	261	259	278	281	281	245.4
19-Jul	284	321	332	298	284	288	301	315	322	315	315	311	328	342	302	325	342	349	337	352	297	239	237	233	312.0
20-Jul	229	216	181	134	135	123	136	108	73	215	224	51	75	203	133	126	103	74	101	98	116	125	133	126	120.4
21-Jul	106	132	154	138	146	134	127	182	184	127	133	148	233	232	195	343	309	341	342	330	285	125	140	137	146.3
22-Jul	150	136	139	149	158	161	215	217	64	49	339	350	271	230	240	227	233	292	323	274	198	189	167	178	232.0
23-Jul	162	244	232	240	237	234	237	238	286	345	356	3	359	51	225	61	84	50	84	237	243	227	207	125	257.7
24-Jul	139	138	139	140	130	133	130	119	84	97	46	221	220	223	290	229	223	205	221	175	121	215	135	133	173.4
25-Jul	139	209	241	271	79	231	216	173	197	231	220	219	232	278	228	238	339	8	14	134	159	109	143	109	227.5
26-Jul	130	125	134	140	241	156	168	119	84	23	342	320	354	113	293	330	46	329	88	139	150	136	130	128	105.9
27-Jul	134	138	137	136	138	133	131	206	224	228	M	222	234	234	263	279	280	348	342	343	231	200	173	134	223.5
28-Jul	128	147	173	213	185	137	124	82	306	245	49	352	258	348	120	18	88	231	347	97	9	149	329	348	102.1
29-Jul	298	225	227	282	147	136	96	82	19	213	225	219	229	270	300	304	314	284	284	296	343	349	236	224	273.5
30-Jul	232	221	231	231	229	236	228	215	224	235	321	308	301	302	307	305	311	310	328	15	17	90	88	136	285.4
31-Jul	127	126	137	139	144	138	135	205	68	19	265	316	235	329	304	18	115	157	193	227	301	253	259	220	187.1

176.0 169.6 173.5 167.1 176.3 160.8 163.3 190.4 266.4 261.1 271.1 276.7 281.8 287.0 282.6 295.5 305.9 310.1 317.6 303.4 292.4 299.9 253.9 248.9  
 Diurnal Average

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

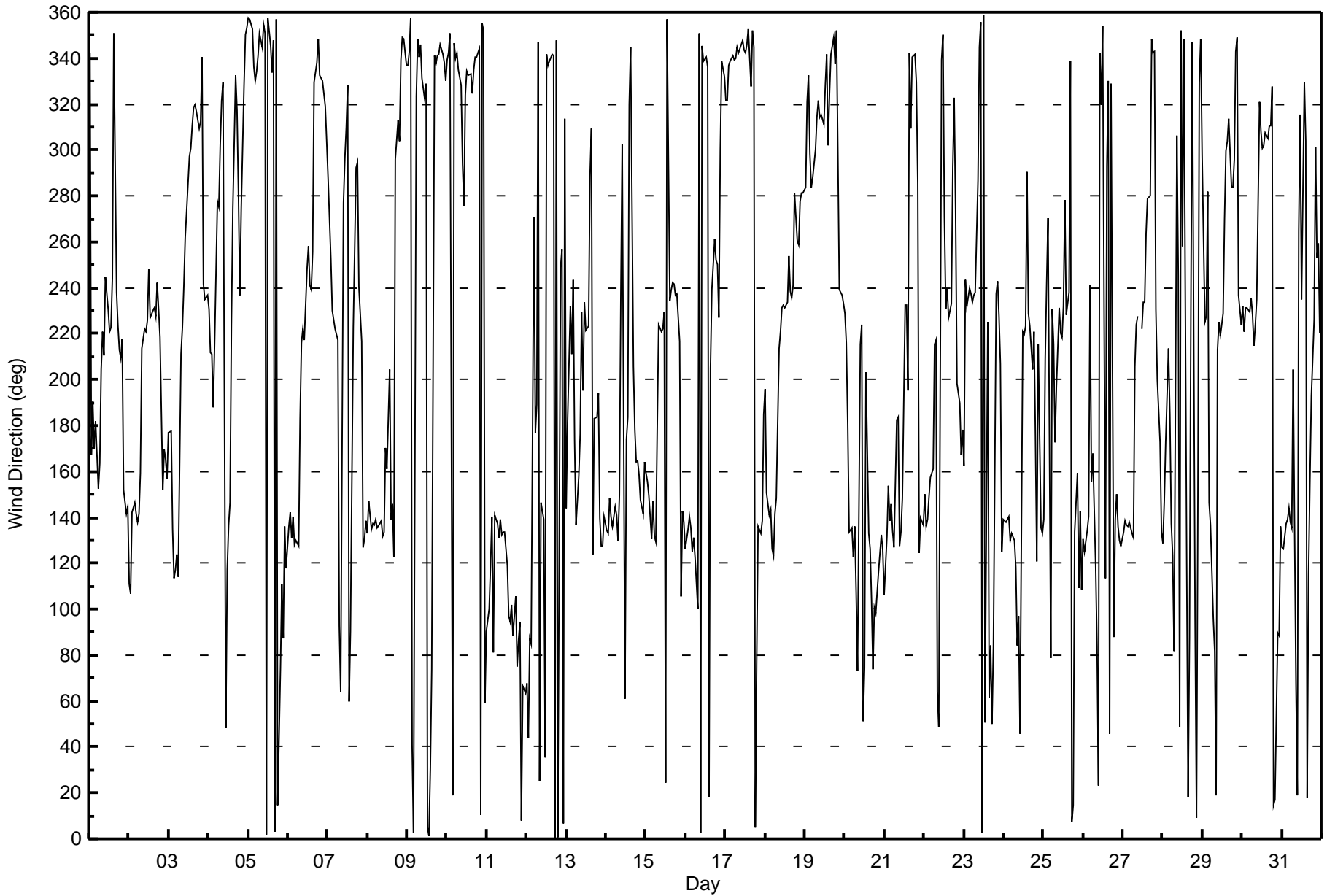




**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

**Wind Direction (WD) - deg**  
**Athabasca Valley - July 2015**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0															Hours in Service: 744										
Maximum Value: 105 deg on Jul 20 10:00															Hours of Data: 743										
Minimum Value: 9 deg on Jul 17 03:00															Hours of Missing Data: 1										
Percentiles: P <sub>1</sub> = 10 P <sub>10</sub> = 13 Q <sub>1</sub> = 16 Median = 25 Q <sub>3</sub> = 43 P <sub>90</sub> = 67 P <sub>99</sub> = 95															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-Jul	67	75	28	26	57	36	44	44	15	43	27	14	11	14	66	19	43	23	17	36	38	57	50	81	81
2-Jul	38	42	21	14	35	21	20	38	25	15	15	12	60	13	13	16	18	14	15	22	58	91	20	21	91
3-Jul	38	30	48	31	25	15	25	25	15	19	18	16	19	17	17	12	14	11	10	19	17	70	15	16	70
4-Jul	43	24	34	38	24	47	12	25	14	25	58	42	16	45	24	64	87	60	15	19	44	11	21	19	87
5-Jul	19	19	20	12	10	11	14	28	23	31	27	25	24	22	16	48	34	30	33	29	92	65	34	32	92
6-Jul	22	17	16	19	12	10	22	64	18	12	13	29	29	19	18	25	36	16	19	15	13	11	21	26	64
7-Jul	18	13	21	12	13	10	10	61	59	47	31	23	31	64	92	48	29	27	42	31	14	45	14	17	92
8-Jul	23	12	11	12	10	11	11	11	13	15	21	21	22	45	19	16	22	94	20	20	13	20	23	19	94
9-Jul	13	19	46	37	27	27	23	30	20	17	28	19	27	27	56	34	14	10	13	14	18	15	14	12	56
10-Jul	18	21	32	36	20	24	16	19	18	28	75	15	15	18	16	11	11	9	12	16	66	59	86	43	86
11-Jul	42	25	23	30	80	21	13	22	19	17	20	22	25	23	27	25	19	29	18	19	38	24	17	30	80
12-Jul	31	38	35	29	84	94	87	68	75	37	26	52	16	10	13	12	12	22	20	20	45	85	41	39	94
13-Jul	82	38	18	53	60	35	16	26	33	39	34	18	14	21	44	100	78	30	13	100	58	17	22	16	100
14-Jul	14	14	19	15	16	17	20	15	50	41	64	36	49	43	90	29	58	62	31	35	29	44	45	82	90
15-Jul	43	20	18	21	20	23	37	72	13	39	72	18	55	84	16	16	17	17	14	13	60	31	43	64	84
16-Jul	44	19	42	15	16	12	21	44	38	26	18	11	10	14	88	45	12	33	25	23	14	41	30	16	88
17-Jul	22	12	9	10	14	12	12	17	15	16	17	17	16	17	20	16	34	18	20	50	23	26	58	45	58
18-Jul	23	35	21	17	26	17	42	87	46	21	13	12	15	19	16	13	11	13	14	12	14	9	11	9	87
19-Jul	18	64	27	18	11	14	19	14	15	14	15	16	14	17	17	21	15	29	31	37	37	38	15	68	68
20-Jul	11	63	65	30	12	16	60	50	32	105	67	71	86	89	35	50	51	26	20	18	29	19	14	17	105
21-Jul	29	33	31	12	18	17	34	34	34	24	22	49	38	37	86	86	56	16	12	20	43	56	31	26	86
22-Jul	29	40	21	38	23	26	21	22	63	51	17	53	45	29	25	23	16	23	29	67	90	51	30	33	90
23-Jul	47	69	13	24	15	17	11	19	16	22	19	42	56	37	60	45	23	37	29	73	34	73	72	67	73
24-Jul	33	26	20	15	14	10	14	26	22	33	72	61	27	17	27	22	18	36	29	29	60	77	40	20	77
25-Jul	43	53	43	54	80	78	22	48	39	19	14	13	27	28	25	15	32	44	77	99	68	86	25	28	99
26-Jul	36	30	28	29	33	31	30	86	55	61	21	21	62	90	88	21	67	74	57	17	28	22	20	19	90
27-Jul	13	14	14	12	12	11	15	34	13	13	M	13	29	20	30	16	26	29	38	29	65	82	58	71	82
28-Jul	46	22	35	61	28	23	23	17	78	48	83	86	64	64	103	66	56	77	28	45	69	31	96	26	103
29-Jul	79	11	67	35	50	16	35	17	84	97	15	16	13	17	30	26	19	26	16	15	15	35	61	12	97
30-Jul	15	24	16	19	18	13	15	20	26	38	66	36	25	20	16	17	14	23	22	33	55	35	65	34	66
31-Jul	37	38	16	13	19	21	23	82	42	59	49	82	72	68	67	49	94	79	75	83	40	29	17	25	94
82 75 67 61 84 94 87 87 84 105 83 86 86 90 103 100 94 94 77 100 92 91 96 82																									
Diurnal Maximum																									
M - Maintenance																									





# Wood Buffalo Environmental Association

## SO2 Calibration Report

### Station Information

Calibration Date	July 8, 2015	Last Calibration	June 2, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Routine		
Start Time (MST)	7:40	End Time (MST)	12:00
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

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		PMT voltage	-681	-681
Analyzer IP address	192.168.1.103		Lamp voltage	812	812
Calculated slope	1.009550	1.007677	Chamber temp	43.5	43.5
Calculated intercept	0.765927	0.602535	Pressure	711.9	700.1
Analyzer Background	10.5	10.5	Flow	0.554	0.547
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	0.5	----
as found span	5000	60.7	607.0	597.4	1.016
calibrator zero	5000	0.0	0.0	0.5	----
high point	5000	60.7	607.0	602.7	1.007
second point	5000	30.4	304.0	299.4	1.015
third point	5000	15.2	152.0	149.9	1.014
as left zero	5000	0.0	0.0	0.8	----
as left span	5000	60.7	607.0	601.5	1.009
Average Correction Factor					1.012

Corrected As found 596.9 Previous response 600.5 % change 0.6%

**Notes:**

No adjustments or maintenance done, filter changed out

Calibration Performed By: Melissa Lemay



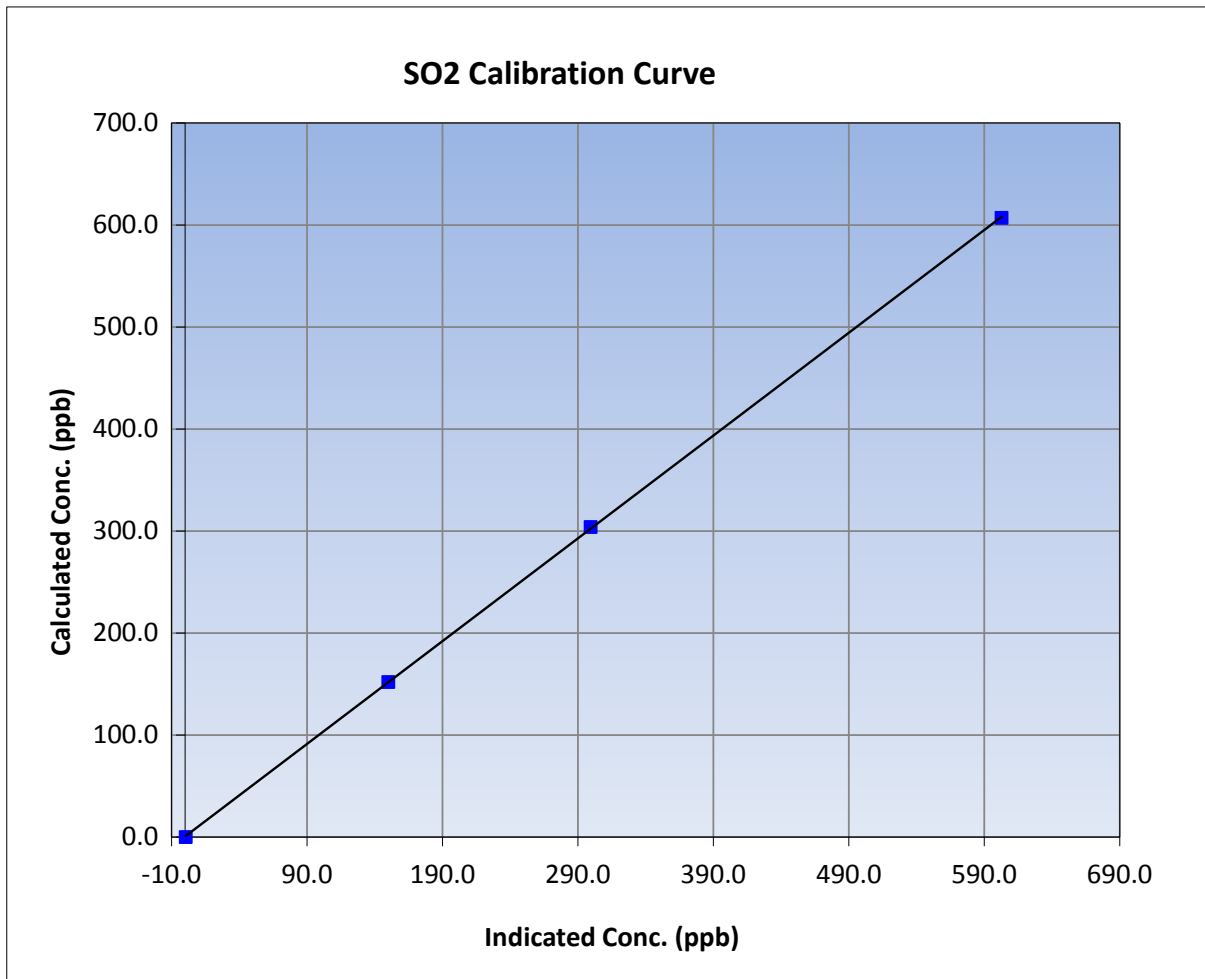
## Wood Buffalo Environmental Association SO2 Calibration Report

### Station Information

Calibration Date	July 8, 2015	Previous Calibration	June 2, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	7:40	End Time (MST)	12:00
Analyzer make	Thermo 43C	Analyzer serial #	6074175781

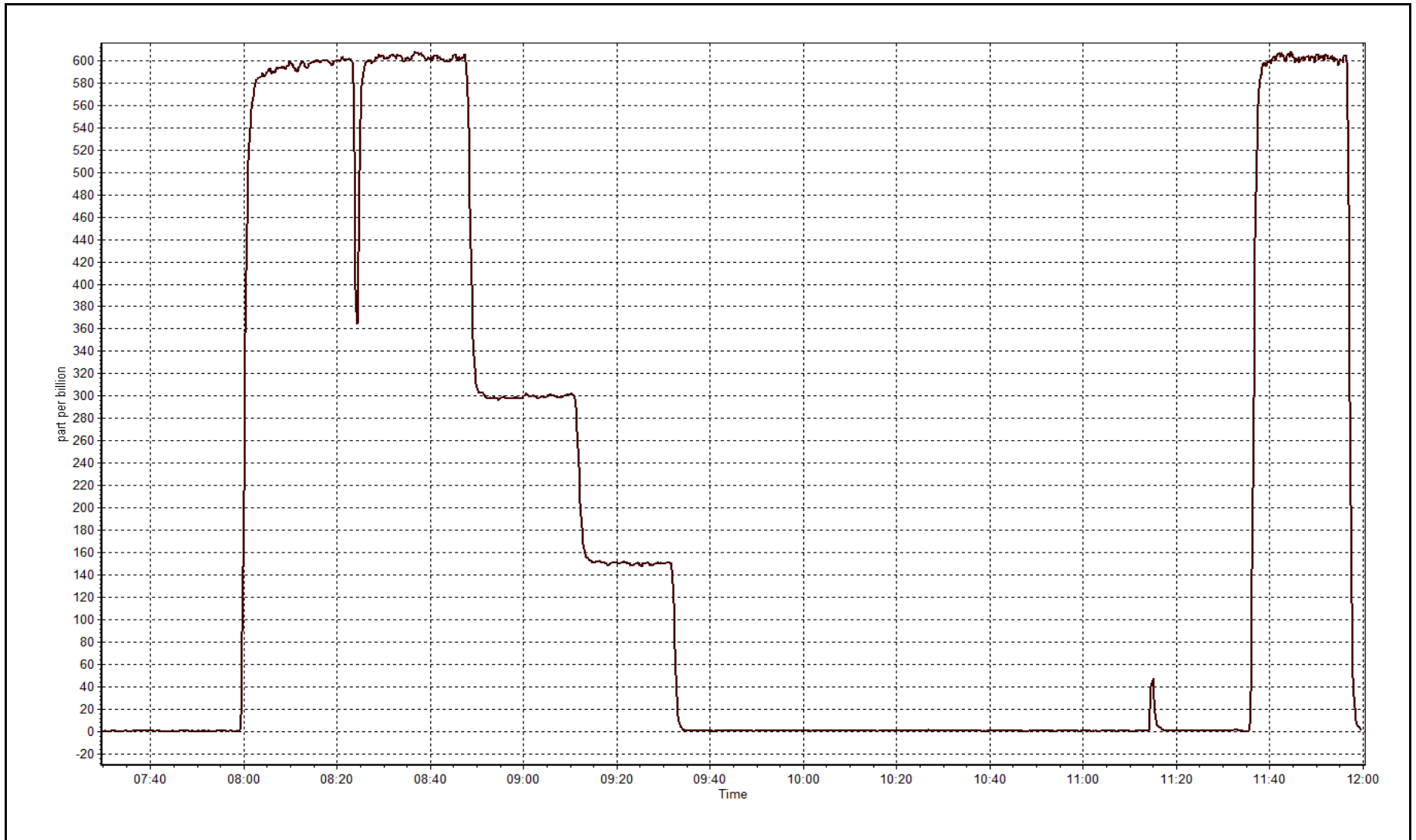
### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.5	----	Correlation Coefficient	0.999975
607.0	602.7	1.0071		
304.0	299.4	1.0154	Slope	1.007677
152.0	149.9	1.0140		
			Intercept	0.602535



SO2 Calibration Plot

Date: July 8, 2015





# Wood Buffalo Environmental Association TRS Calibration Report

## Station Information

Calibration Date	July 23, 2015	Last Calibration	June 3, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Routine		
Start Time (MST)	7:33	End Time (MST)	10:10
Gas Cert Reference	ALMO52589	Station temp.	22 Deg C
Cal Gas Concentration	5.02 ppm	Cal Gas Exp Date	21/12/2012
Calibrator Make/Model	Sabio 4010	Serial Number	8400311
Dil air Make/Model	API 701	Serial Number	1864
DACS make/model	Campbell Scientific CR3000	DACS serial No.	5564
SO2 gas concentration	50.8 ppm	SO2 gas cert/exp	8400311 September 9, 2017

## Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-619	-619
Analyzer IP address	192.168.1.42		Lamp voltage	807	805
Calculated slope	1.017807	1.001072	Chamber temp	44	44
Calculated intercept	-0.033515	0.165241	Pressure	685.1	679.1
Analyzer Background	18.6	19.5	Flow	0.474	0.472
Analyzer Coefficient	1.071	1.108	Intensity	43300	43500
			Converter temp.	800	800

Analyzer make/model	TEI 45C	Analyzer serial #	630718530
Converter make/model	Model 26 Thermal Oxidizer	Converter serial #	20101-14

## Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6000	0.0	0.0	-0.2	----
as found span	6000	89.6	75.0	72.3	1.037
SO2 scrubber check	5000	14.7	149.4	0.7	----
calibrator zero	6000	0.0	0.0	-0.2	----
high point	6000	89.6	75.0	74.6	1.005
second point	6000	50.2	42.0	42.0	1.000
third point	6000	29.9	25.0	24.8	1.009
as left zero	6000	0.0	0.0	-0.3	----
as left span	6000	89.6	75.0	74.2	1.010
Average Correction Factor					1.005

Corrected As found	72.5	Previous response	73.7	% change	1.6%
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Notes:

span adjusted no maintenance done, filter changed out

Calibration Performed By: Melissa Lemay



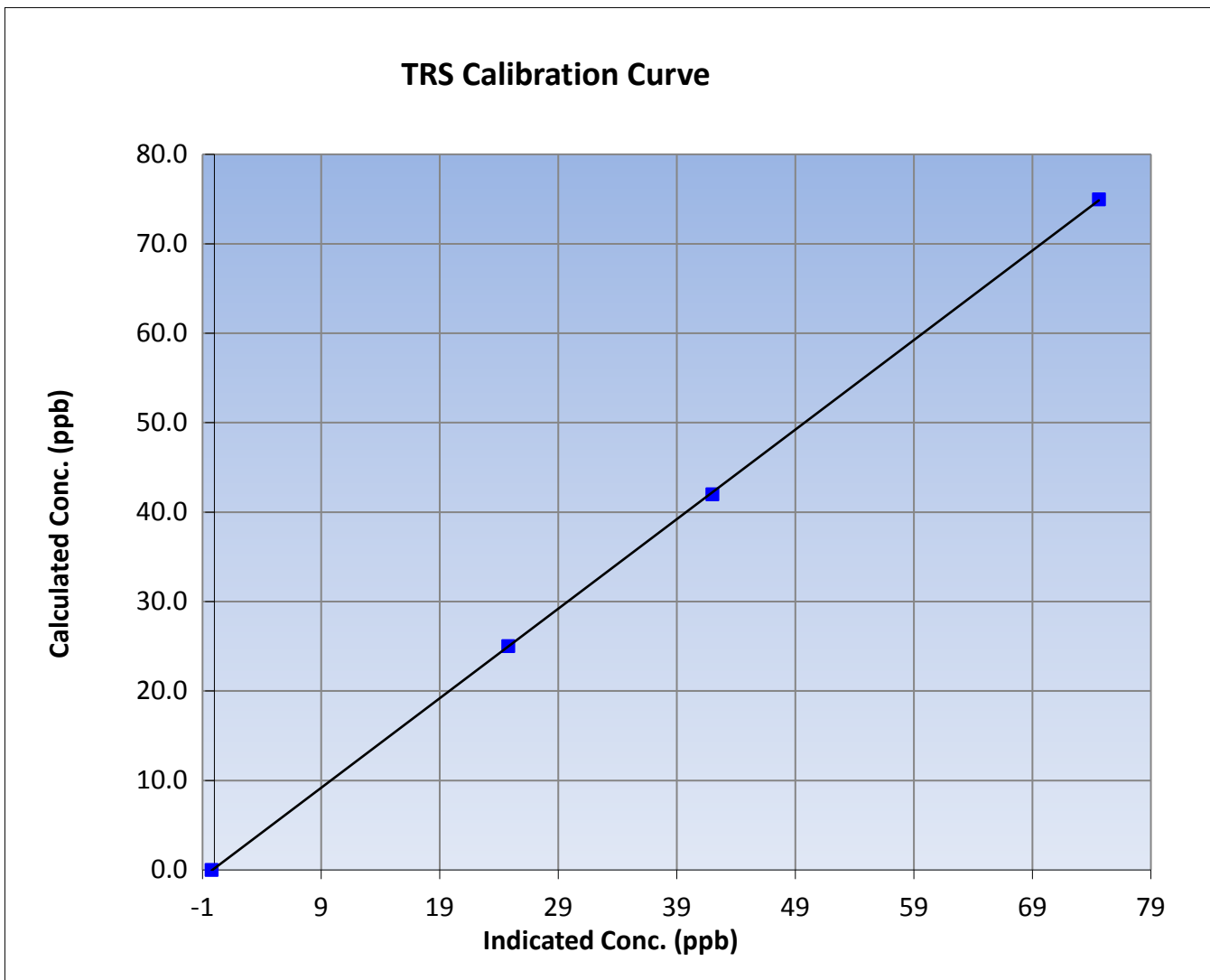
# Wood Buffalo Environmental Association TRS Calibration Report

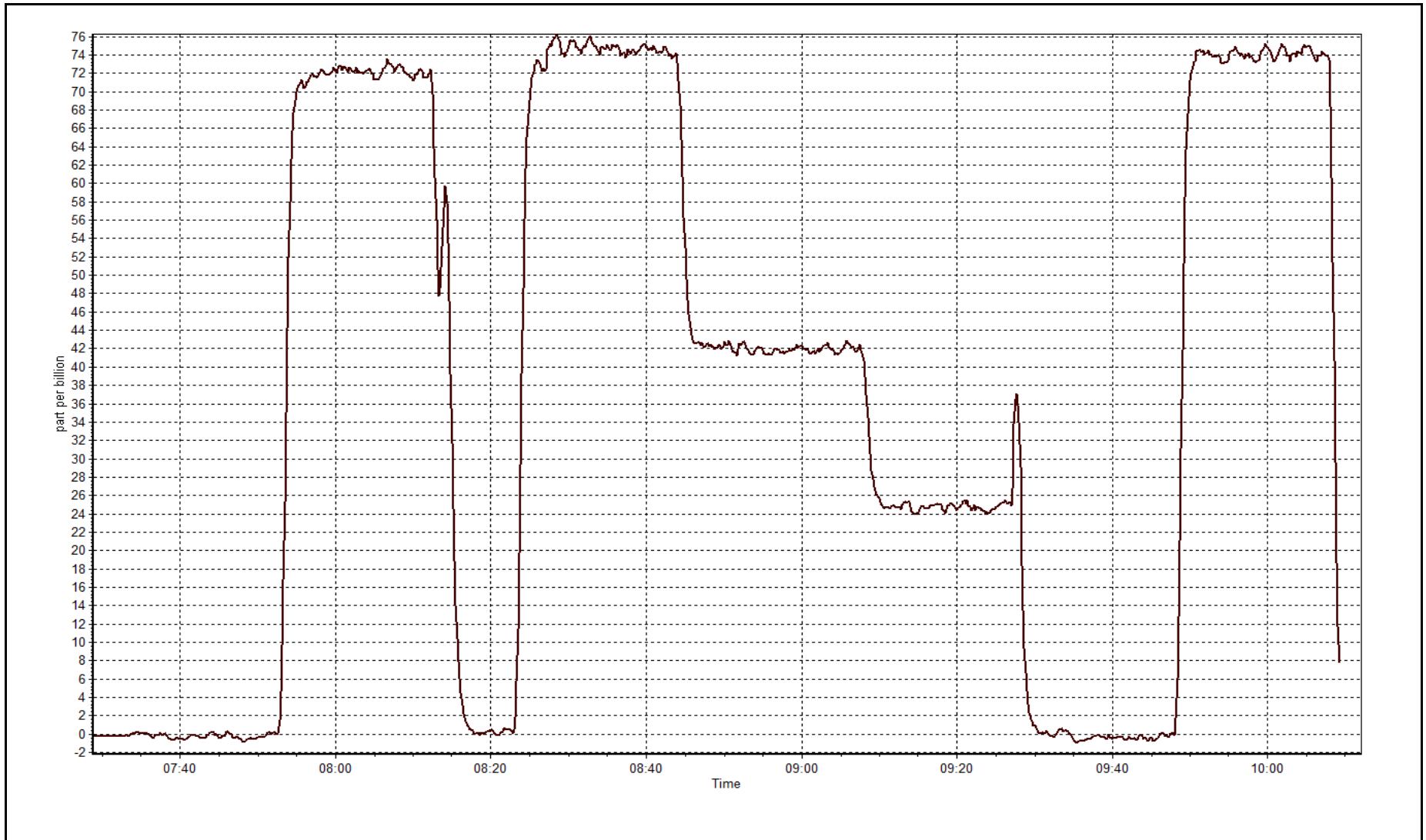
## Station Information

Calibration Date	July 23, 2015	Previous Calibration	June 3, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	7:33	End Time (MST)	10:10
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	-0.2	----	Correlation Coefficient	0.999979
75.0	74.6	1.0048		
42.0	42.0	1.0000	Slope	1.001072
25.0	24.8	1.0087		
			Intercept	0.165241









# Wood Buffalo Environmental Association

## THC / NMHC Calibration Report

### Station Information

Calibration Date	July-08-15	Last Calibration	June-18-15
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Routine		
Start Time (MST)	7:40	End Time (MST)	12:00
Gas Cert Reference	S970259A	Cal Gas Expiry Date	
CH4 Cal Gas Conc.	490.0 ppm	CH4 Equiv Conc.	1040.0 ppm
C3H8 Cal Gas Conc.	200.0 ppm	Station temp.	22 Deg C
Calibrator Model	Sabio 4010	Serial Number	
ZAG make/model	Teledyne API 701	Serial Number	1864
DACS make/model	Campbell Scientific CR3000	Serial Number	5564

### Analyzer Information

	Before	After		Before	After
THC Range (ppm)	0 - 50 ppm		Column Temp	75.0	75.0
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	175.1	175.1
Analyzer IP address	192.168.1.55		Flame Temp	302.0	295.0
THC Calc slope	1.012478	0.998877	Carrier Pressure	36.8	36.8
THC Calc intercept	0.000000	0.006306	Fuel Pressure	42.1	42.1
NMHC Calc slope	1.013202	0.998275	Air Pressure	32.2	32.2
NMHC Calc intercept	0.000000	-0.011678			

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	12.37	1.021
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	60.7	12.63	12.65	0.998
second point	5000	30.4	6.32	6.28	1.007
third point	5000	15.2	3.16	3.18	0.994
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	60.7	12.63	12.61	1.001
Average Correction Factor					1.000

Corrected As found 12.37 Previous response 12.47 % change 0.8%

**Notes:**

Filter changed out Span adjusted

Calibration Performed By: Melissa Lemay



# Wood Buffalo Environmental Association

## THC / NMHC Calibration Report

### NMHC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0	0.00	0.00	----
as found span	5000	60.7	6.68	6.52	1.024
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	60.7	6.68	6.70	0.997
second point	5000	30.4	3.34	3.35	0.998
third point	5000	15.2	1.67	1.71	0.978
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	60.7	6.68	6.67	1.001
Average Correction Factor					0.991

Corrected As found      6.52      Previous response      6.59      % change      1.1%

### CH4 Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0	0.00	0.00	----
as found span	5000	60.7	5.95	5.85	1.017
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	60.7	5.95	5.96	0.998
second point	5000	30.4	2.98	2.94	1.013
third point	5000	15.2	1.49	1.47	1.013
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	60.7	5.95	5.94	1.001
Average Correction Factor					1.008

Corrected As found      5.85      Previous response      5.88      % change      0.5%



# Wood Buffalo Environmental Association

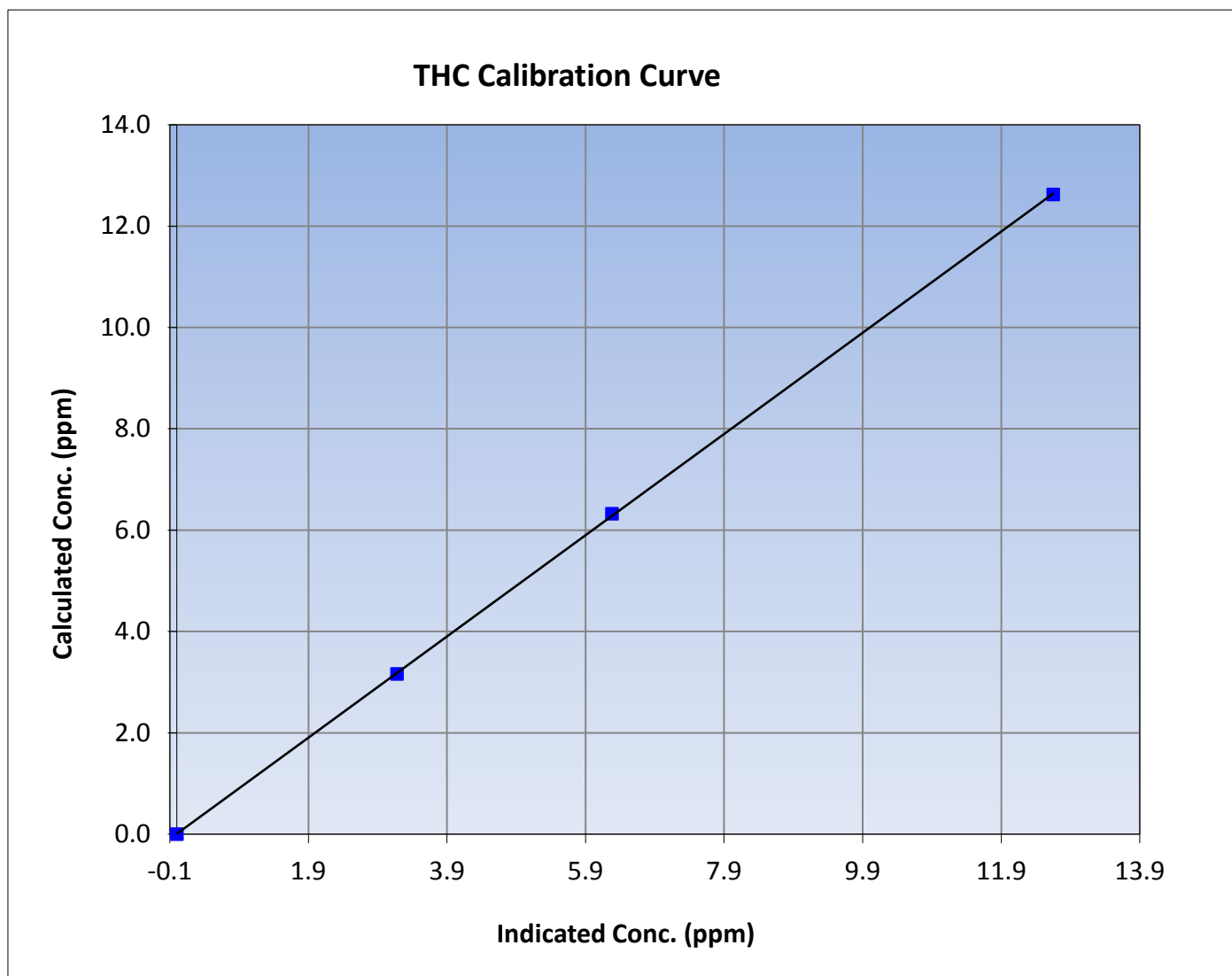
## THC Calibration Summary

### Station Information

Calibration Date	July 8, 2015	Previous Calibration	June 18, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	7:40	End Time (MST)	12:00
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	0.999969
12.63	12.65	0.9981		
6.32	6.28	1.0069	Slope	0.998877
3.16	3.18	0.9942		
			Intercept	0.006306





# Wood Buffalo Environmental Association

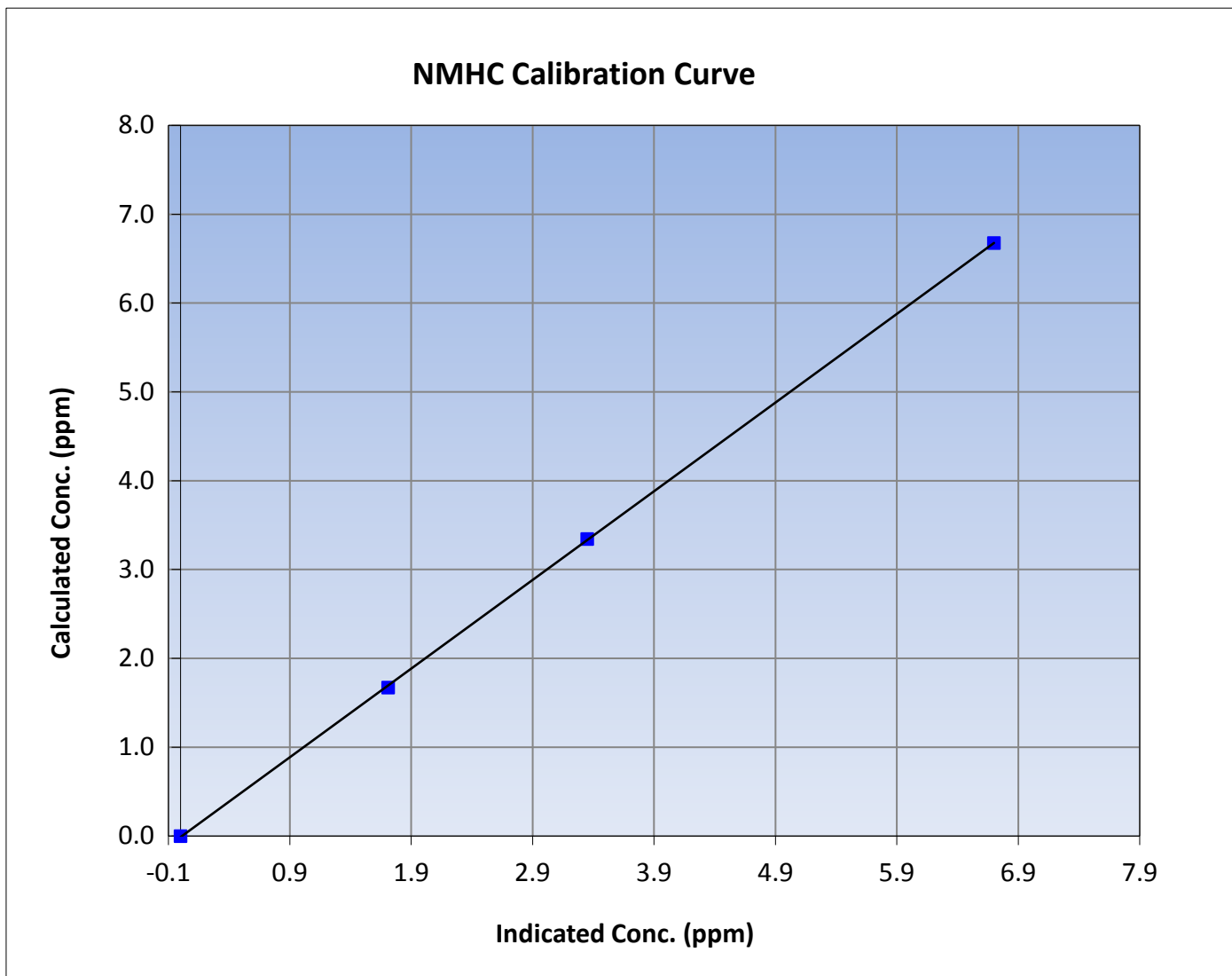
## NMHC Calibration Summary

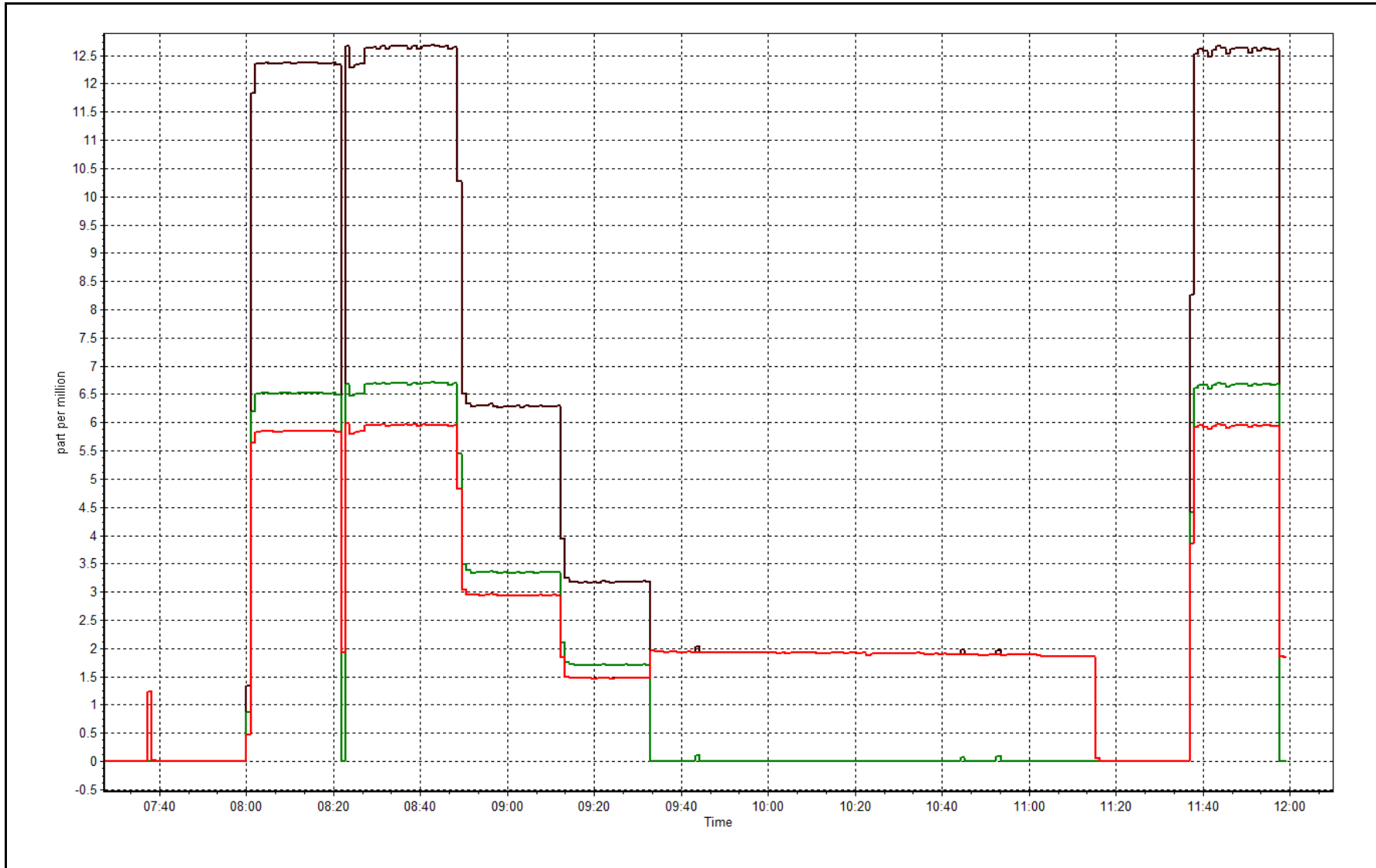
### Station Information

Calibration Date	July 8, 2015	Previous Calibration	June 18, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	7:40	End Time (MST)	12:00
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	0.999967
6.68	6.70	0.9966		
3.34	3.35	0.9982		
1.67	1.71	0.9778		
			Slope	0.998275
			Intercept	-0.011678







# Wood Buffalo Environmental Association

## O<sub>3</sub> Calibration Report

### Station Information

Calibration Date	July 21, 2015	Previous Calibration	June 3, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	removal		
Start Time (MST)	8:40	End Time (MST)	10:10
NO2 GPT Ref date	July-21-15	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	n/a
Analyzer IP address	192.168.1.103		Lamp temp.	70.8	n/a
Calculated slope	1.003209	n/a	Pressure	720.5	n/a
Calculated intercept	-0.419472	n/a	Flow cell A	0.676	n/a
Analyzer Background	0.0	n/a	Flow cell B	0.740	n/a
Analyzer Coefficient	0.984	n/a	Cell A Intensity	109050	n/a
			Cell B Intensity	92028	n/a

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	317.1	321.5	0.986
calibrator zero	5000	0.00	0.0	0.0	----
high point	5000	1.22	317.1	321.5	0.986
second point	5000	0.51	161.1	163.0	0.988
third point	5000	0.43	80.6	82.2	0.981
as left zero					
as left span					
Average Correction Factor					0.985

Corrected As found	321.5	Previous response	316.5	% change	-1.6%
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Notes:

Removed to install 49i

Calibration Performed By:

Melissa Lemay



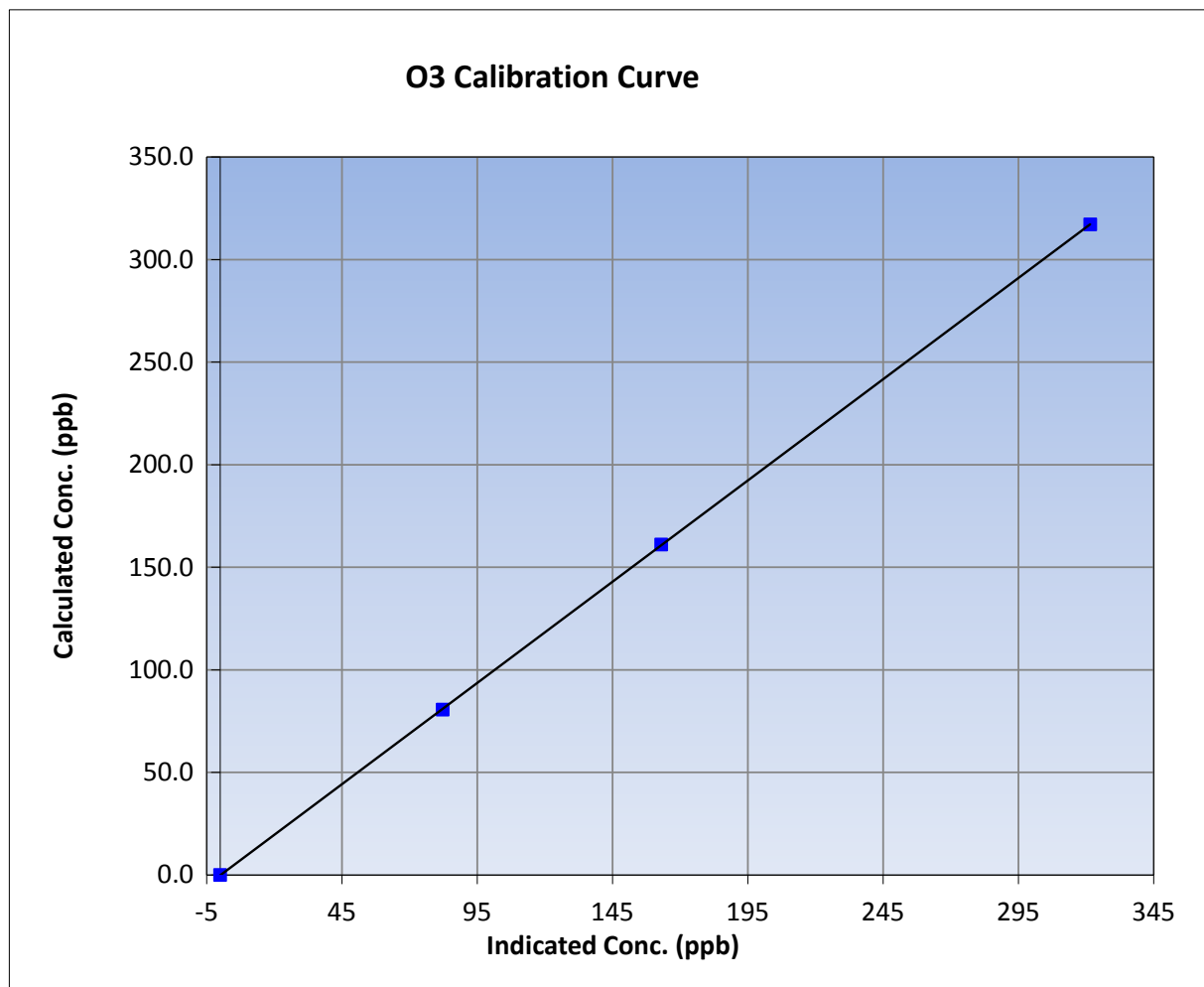
## Wood Buffalo Environmental Association O3 Calibration Report

### Station Information

Calibration Date	July-21-15	Previous Calibration	June 3, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	8:40	End Time (MST)	10:10
Analyzer make	TEI 49C	Analyzer serial #	607415760

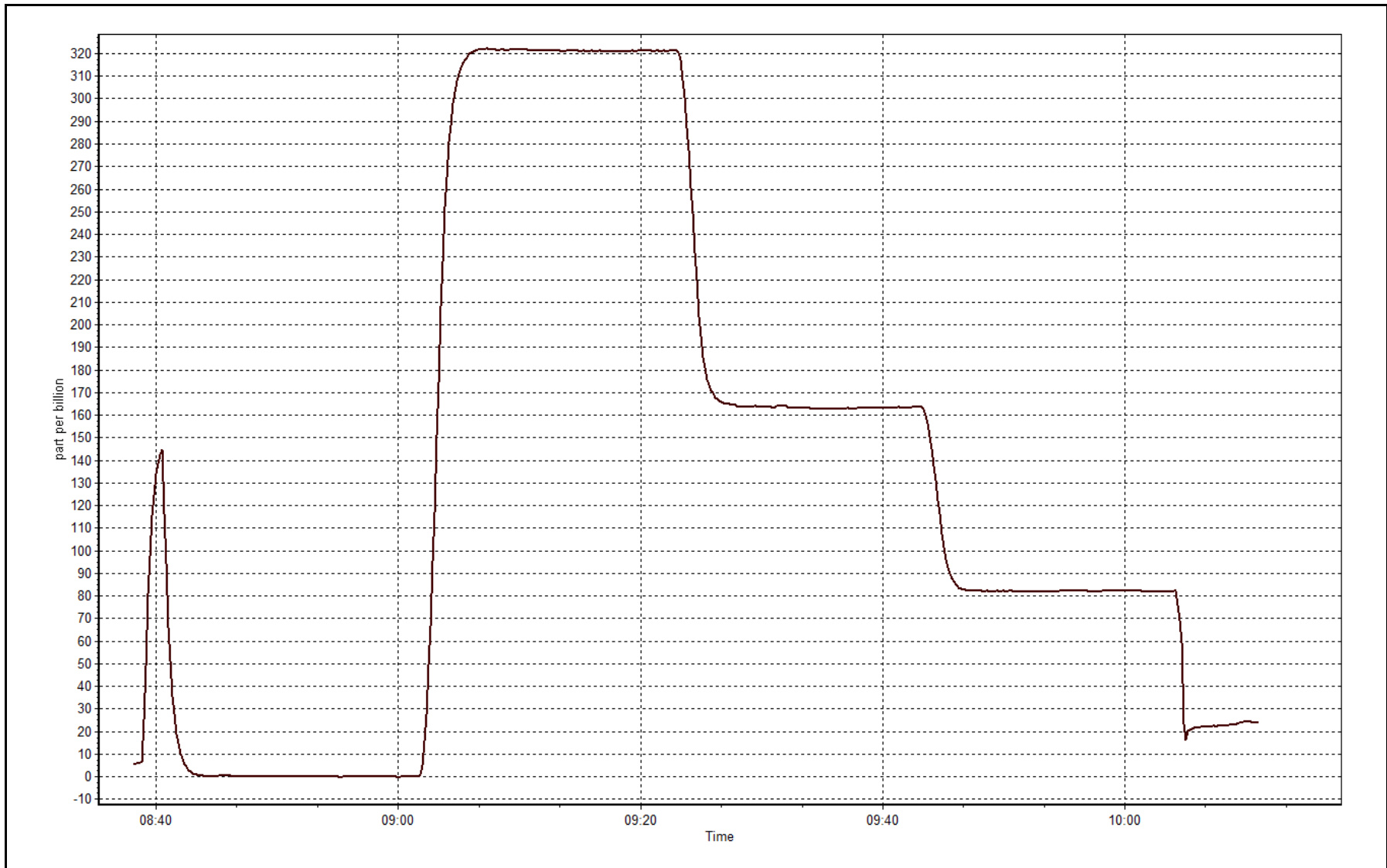
### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999994
317.1	321.5	0.9863		
161.1	163.0	0.9883	Slope	0.986891
80.6	82.2	0.9805		
			Intercept	-0.112779



O3 Calibration Plot

Date: July 21, 2015







# Wood Buffalo Environmental Association

## O<sub>3</sub> Calibration Report

### Station Information

Calibration Date	July 21, 2015	Previous Calibration	n/a
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Install		
Start Time (MST)	10:15	End Time (MST)	13:10
NO2 GPT Ref date	July-21-15	Transfer Standard	Nox GPT
Calibrator Make/Model	Sabio 4010	Station temp.	22 Deg C
ZAG make/model	Teledyne API 701	Serial Number	5564
DACS make/model	Campbell Scientific CR3000	Serial Number	1864
		Serial Number	5564

### Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 500 ppb		Bench temp.	n/a	30.8
Analyzer IP address	192.168.1.49		Lamp temp.	n/a	70.9
Calculated slope	n/a	0.997248	Pressure	n/a	712.5
Calculated intercept	n/a	-0.886968	Flow cell A	n/a	0.672
Analyzer Background	n/a	-1.0	Flow cell B	n/a	0.735
Analyzer Coefficient	n/a	0.952	Cell A Intensity	n/a	107838
			Cell B Intensity	n/a	91103

Analyzer make	TEI 49i	Analyzer serial #	1507964700
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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	5000	0.00	0.0	0.2	----
high point	5000	1.22	317.1	318.5	0.996
second point	5000	0.51	161.1	162.8	0.990
third point	5000	0.43	80.6	82.4	0.978
as left zero	5000	0.00	0.0	-0.5	----
as left span	5000	1.22	317.1	305.5	1.038
Average Correction Factor					0.988

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

Installed for removal of 49c

Calibration Performed By:

Melissa Lemay



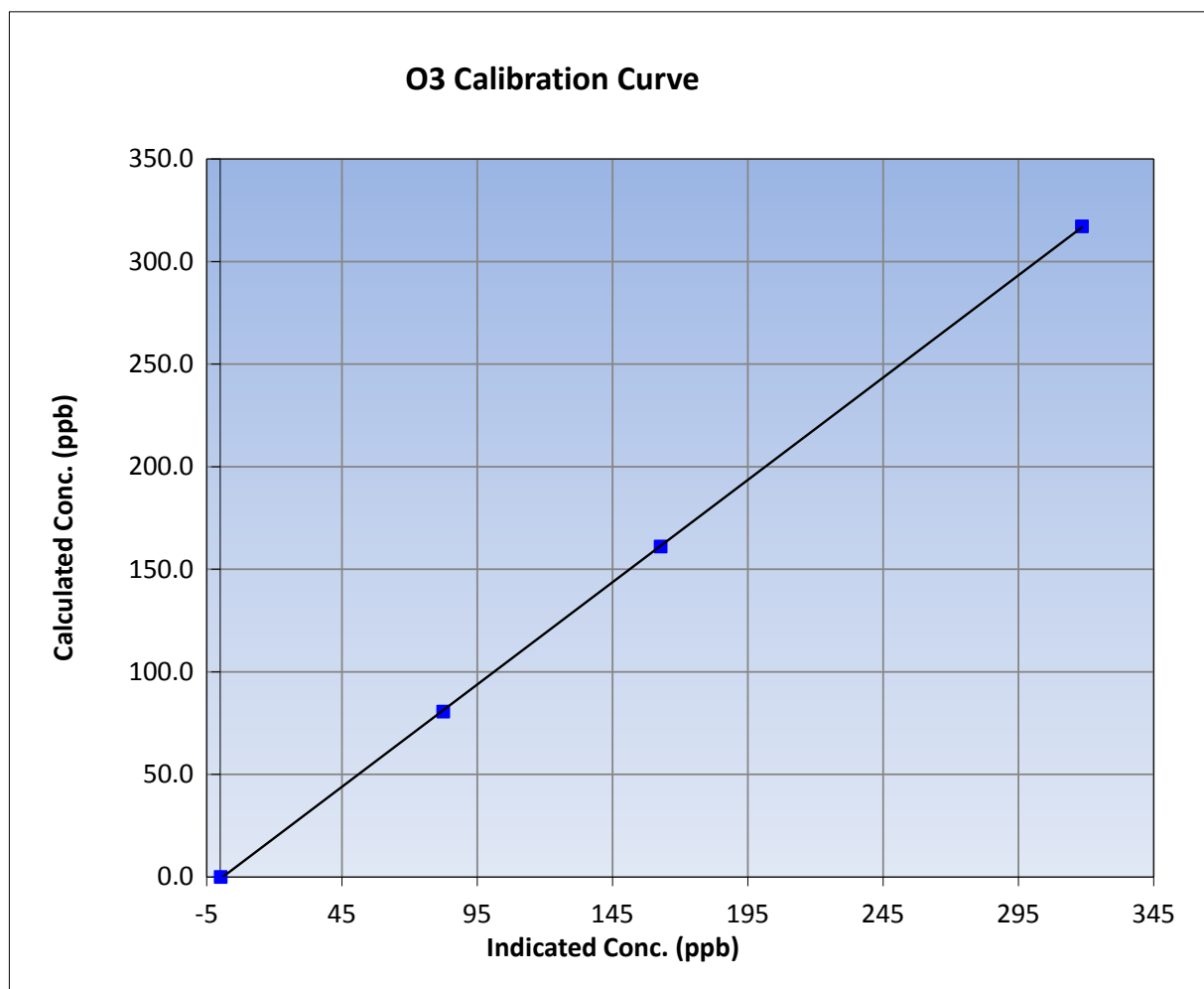
## Wood Buffalo Environmental Association O3 Calibration Report

### Station Information

Calibration Date	July-21-15	Previous Calibration	n/a
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	10:15	End Time (MST)	13:10
Analyzer make	TEI 49i	Analyzer serial #	1507964700

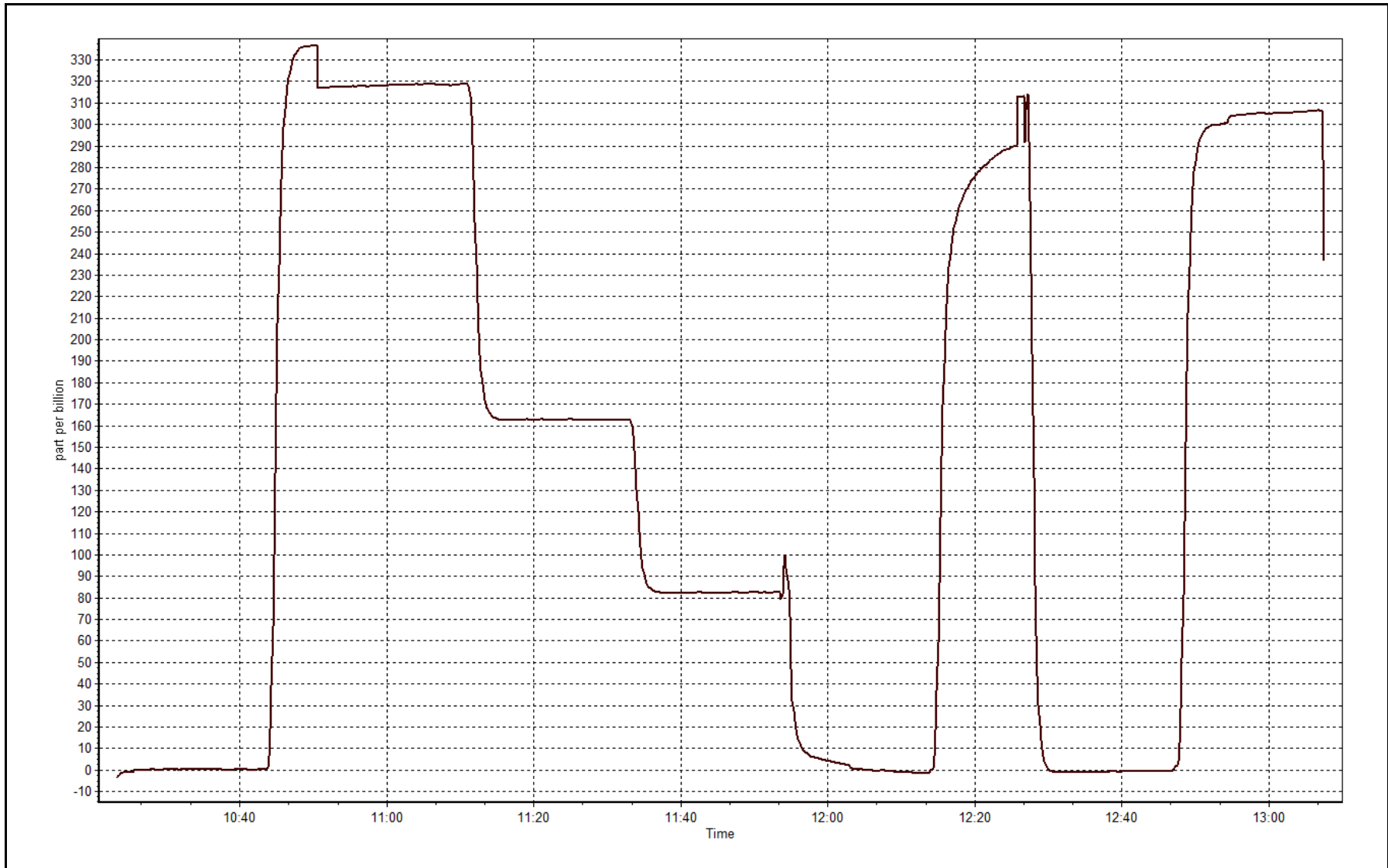
### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	----	Correlation Coefficient	0.999978
317.1	318.5	0.9956		
161.1	162.8	0.9896	Slope	0.997248
80.6	82.4	0.9782		
			Intercept	-0.886968



O3 Calibration Plot

Date: July 21, 2015





# Wood Buffalo Environmental Association

## O<sub>3</sub> Calibration Report

### Station Information

Calibration Date	July 30, 2015	Previous Calibration	July 21, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Repair		
Start Time (MST)	7:55	End Time (MST)	14:20
NO2 GPT Ref date	July-30-15	Transfer Standard	Nox GPT
		Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	5564
ZAG make/model	Teledyne API 701	Serial Number	1864
DACS make/model	Campbell Scientific CR3000	Serial Number	5564

### Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 500 ppb		Bench temp.	30.8	27.1
Analyzer IP address	192.168.1.49		Lamp temp.	70.9	67.8
Calculated slope	0.997248	1.001206	Pressure	712.5	718.6
Calculated intercept	-0.886968	-0.152626	Flow cell A	0.672	0.739
Analyzer Background	-1.0	0.2	Flow cell B	0.735	0.749
Analyzer Coefficient	0.952	0.925	Cell A Intensity	107838	92500
			Cell B Intensity	91103	100557

Analyzer make	TEI 49i	Analyzer serial #	1507964700
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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	1.2	----
as found span	5000	1.22	318.4	332.6	0.957
calibrator zero	5000	0.00	0.0	-0.2	----
high point	5000	1.22	318.4	317.9	1.002
second point	5000	0.51	164.6	165.0	0.998
third point	5000	0.43	81.2	81.4	0.998
as left zero	5000	0.00	0.0	-0.1	----
as left span	5000	1.22	318.4	307.9	1.034
Average Correction Factor					0.999

Corrected As found	331.4	Previous response	320.2	% change	-3.4%
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**Notes:**

internal span bypassed, zero and span adjusted

Calibration Performed By:

Melissa Lemay



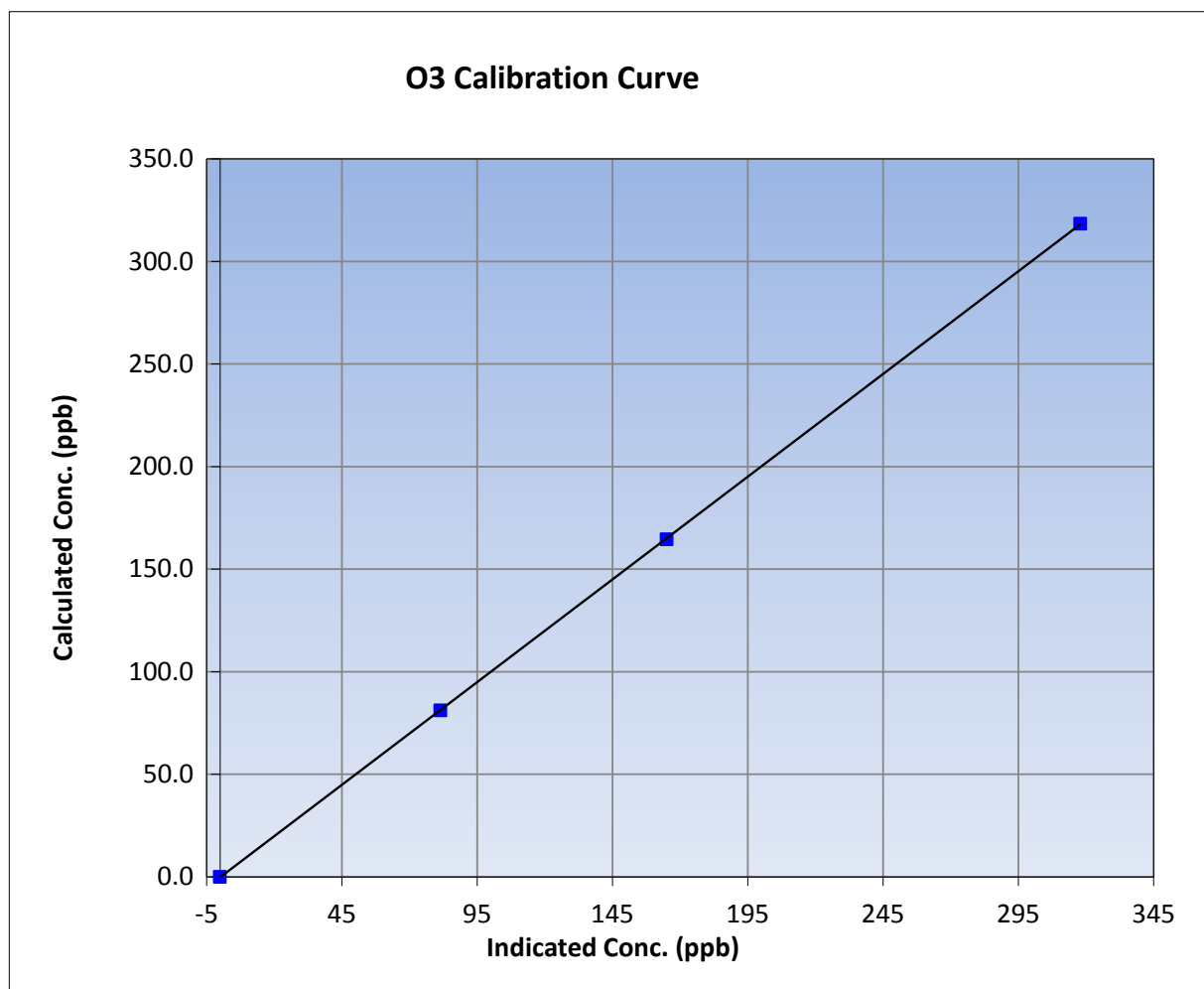
## Wood Buffalo Environmental Association O3 Calibration Report

### Station Information

Calibration Date	July-30-15	Previous Calibration	July 21, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	7:55	End Time (MST)	14:20
Analyzer make	TEI 49i	Analyzer serial #	1507964700

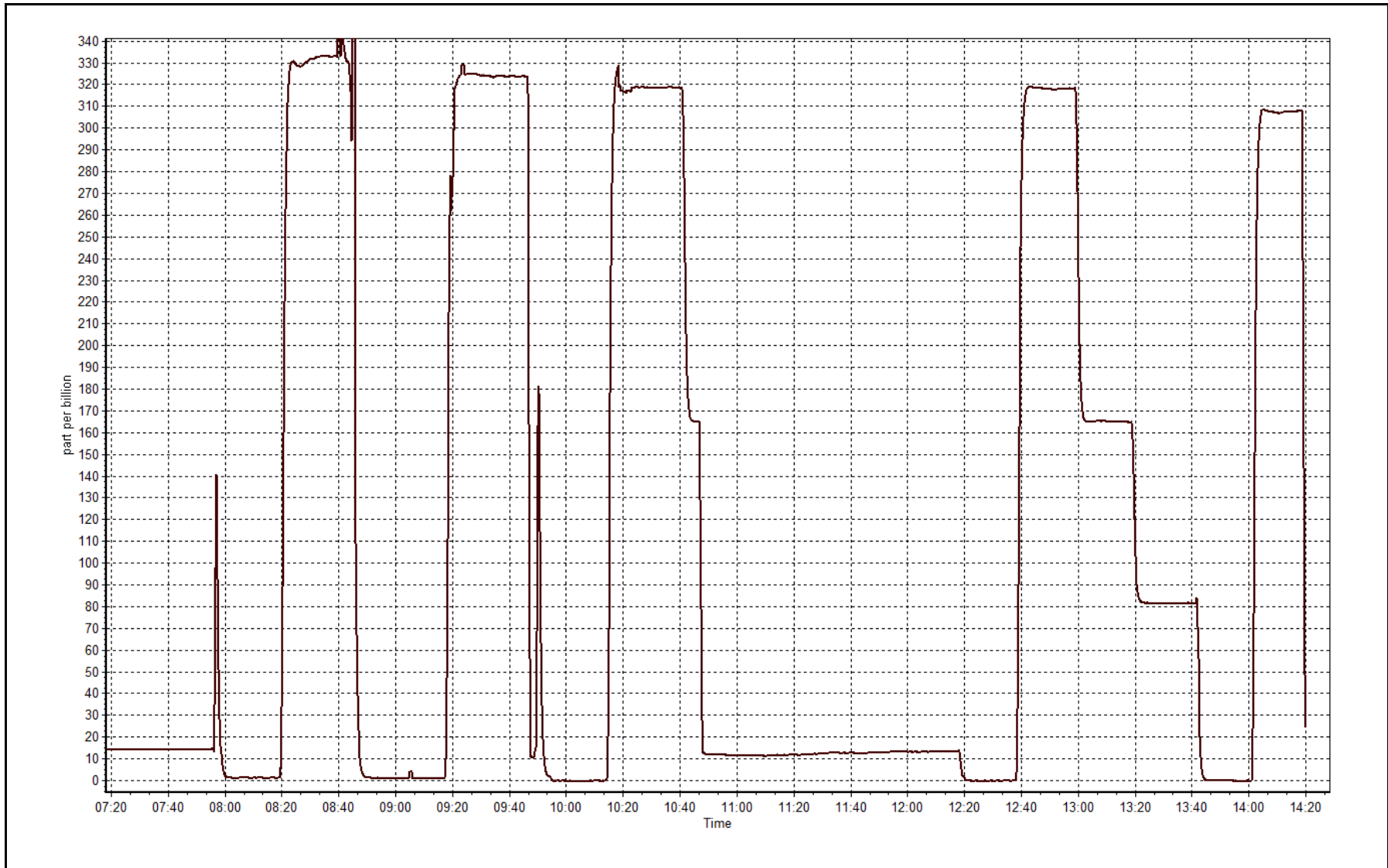
### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	----	Correlation Coefficient	0.999993
318.4	317.9	1.0016		
164.6	165.0	0.9976	Slope	1.001206
81.2	81.4	0.9975		
			Intercept	-0.152626



O3 Calibration Plot

Date: July 30, 2015





## Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

### Station Information

Calibration Date	July 8, 2015	Previous Calibration	June 2, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Routine		
Start Time (MST)	7:41	End Time (MST)	12:00
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	1.013425	1.012713	1.003362
	Data Offset	0.955368	1.096117	0.225410
Current Calibration	Data Slope	1.000504	0.997498	1.006121
	Data Offset	0.934209	1.029621	0.027752

### 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	49.5	Deg C
Moly Temp	323	Deg C	323	Deg C
PMT voltage	-806	V	-805	V
PMT Temp	-3.6	Deg C	-3.6	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	179	mmHg	181.9	mmHg
R Cell Press Nox	179	mmHg	181.9	mmHg
NO sample flow	0.774	lpm	0.755	lpm
Nox sample Flow	0.774	lpm	0.755	lpm

**Notes:**

span adjusted, Flow on pump changed, pump still good, filter changed out



# Wood Buffalo Environmental Association

## NOX-NO-NO2 Calibration Report

### Station Information

Calibration Date:

July 8, 2015

Station Number:

AMS 7

### Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.3	----	----
as found span	5000	60.7	599.7	599.7	0.0	567.6	567.2	0.8	1.0566	1.0573
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	-0.1	0.3	----	----
high point	5000	60.7	599.7	599.7	0.0	599.3	601.0	-1.2	1.0007	0.9979
second point	5000	30.4	300.4	300.4	0.0	297.7	298.6	-0.8	1.0089	1.0059
third point	5000	15.2	150.2	150.2	0.0	149.0	149.2	0.0	1.0079	1.0065
as left zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.3	----	----
as left span	5000	60.7	599.7	275.0	324.7	597.3	282.0	315.5	1.0040	0.9752
Average Correction Factor									1.0058	1.0034

Corrcted As found  
Previous Response

NO<sub>x</sub>= 567.6  
NO<sub>x</sub>= 590.8

NO= 567.3  
NO= 591.1

Percent Change

NO<sub>x</sub>= 4.1%

NO= 4.2%

### GPT Calibration Data

Dilution Flow

5000

ccm

Source Gas Flow

60.70

ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
Cal zero			0.0			0.3			N/A	
1st NO2 (300)	----	275.0	325.0	597.6	275.0	323.1	0.9915	1.0000	1.0059	99.4%
2nd NO2 (200)	----	435.7	164.3	598.8	435.7	163.3	0.9895	1.0000	1.0061	99.4%
3rd NO2 (100)	----	517.3	82.7	598.7	517.3	81.7	0.9897	1.0000	1.0122	98.8%
4th NO2 (0)	600.0	----	-1.6	598.4	600.0	-1.1	0.9902	1.0000	N/A	----
Average Correction Factor							0.9902	1.0000	1.0081	99.2%

Calibration Performed By:

Melissa Lemay





# Wood Buffalo Environmental Association

## NO<sub>x</sub> Calibration Summary

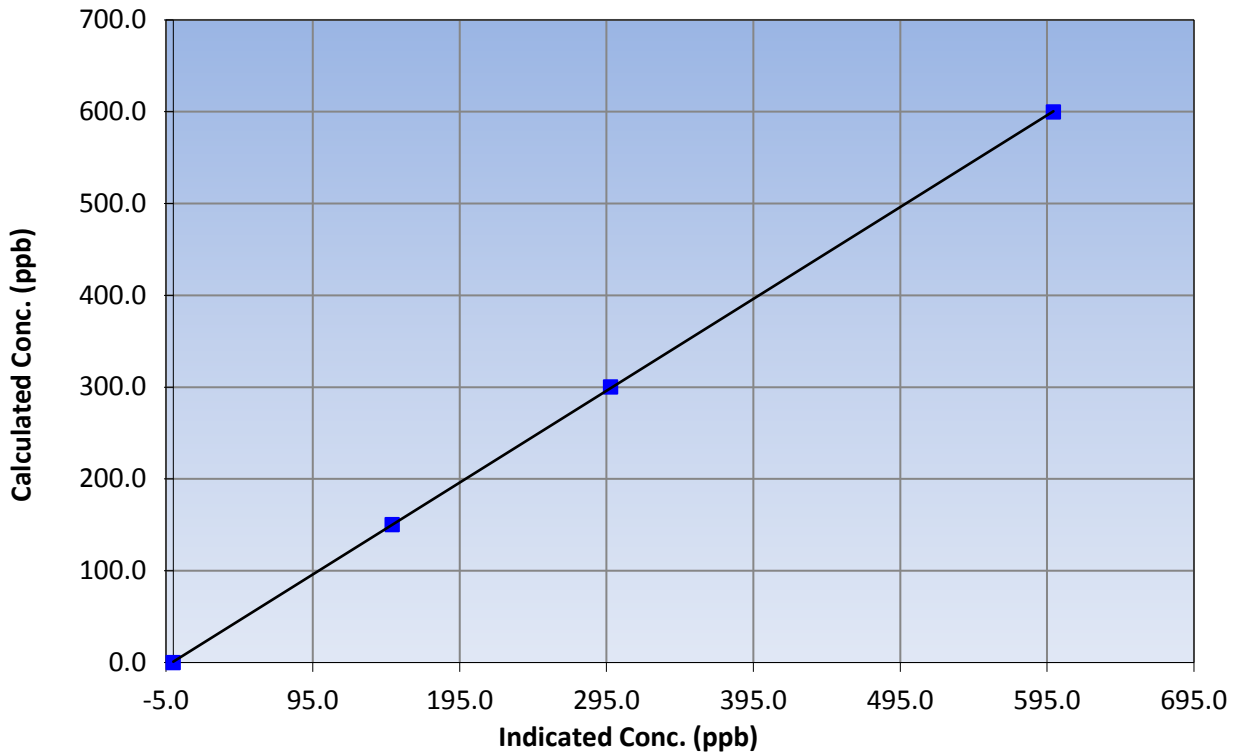
### Station Information

Calibration Date	July 8, 2015	Previous Calibration	June 2, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	7:41	End Time (MST)	12:00
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	0.999980
599.7	599.3	1.0007		
300.4	297.7	1.0089	Slope	1.000504
150.2	149.0	1.0079		
			Intercept	0.934209

### NO<sub>x</sub> Calibration Curve





# Wood Buffalo Environmental Association

## NO Calibration Summary

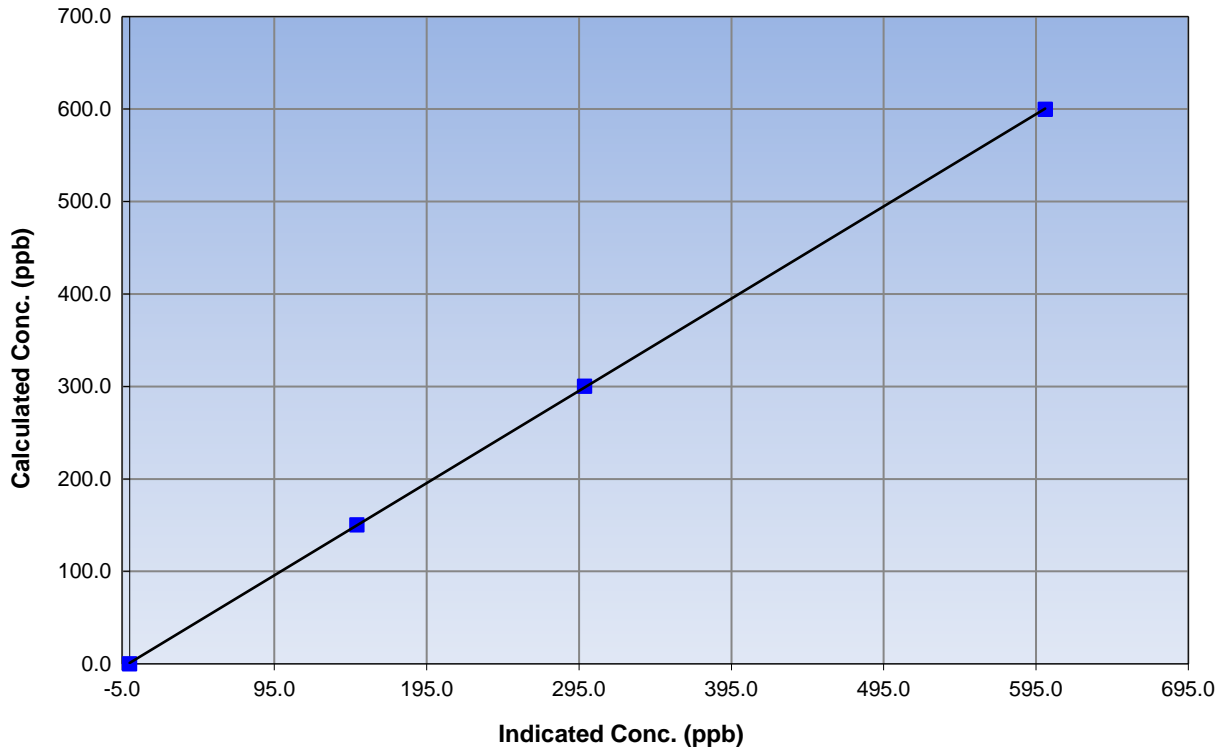
### Station Information

Calibration Date	July 8, 2015	Previous Calibration	June 2, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	7:41	End Time (MST)	12:00
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	0.999980
599.7	601.0	0.9979		
300.4	298.6	1.0059	Slope	0.997498
150.2	149.2	1.0065		
			Intercept	1.029621

### NO Calibration Curve





# Wood Buffalo Environmental Association

## NO<sub>2</sub> Calibration Summary

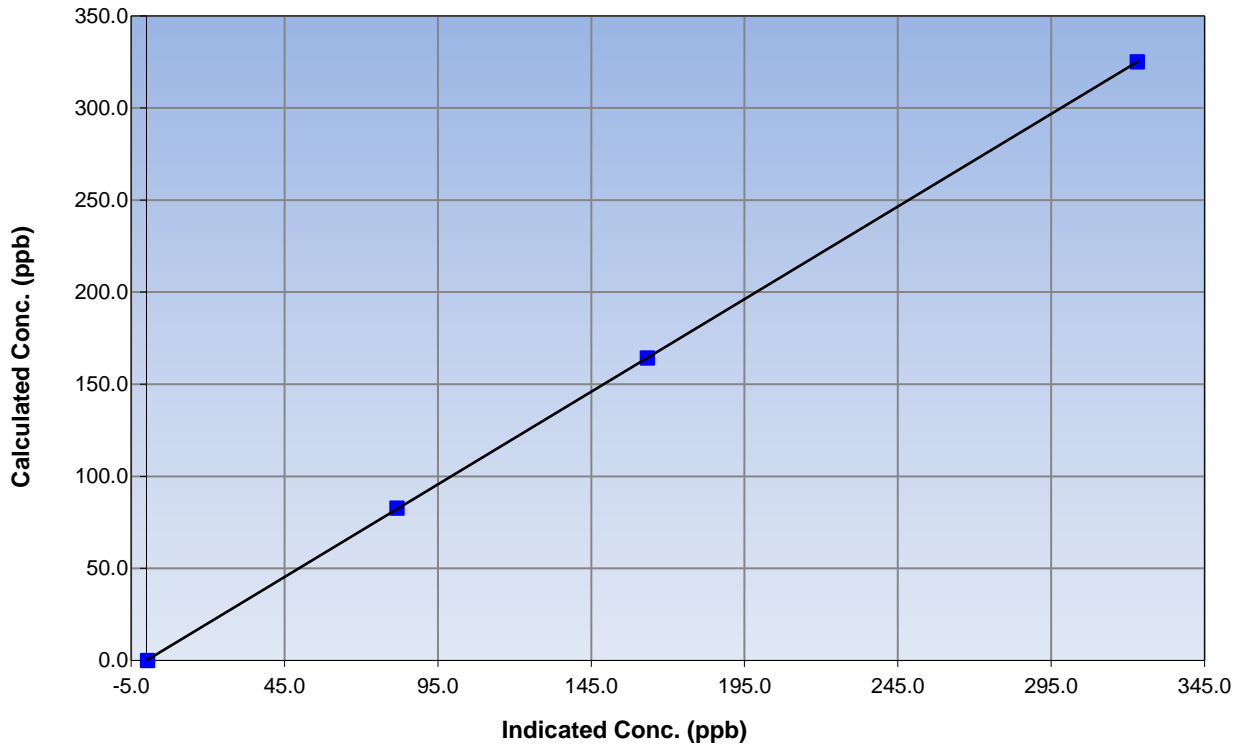
### Station Information

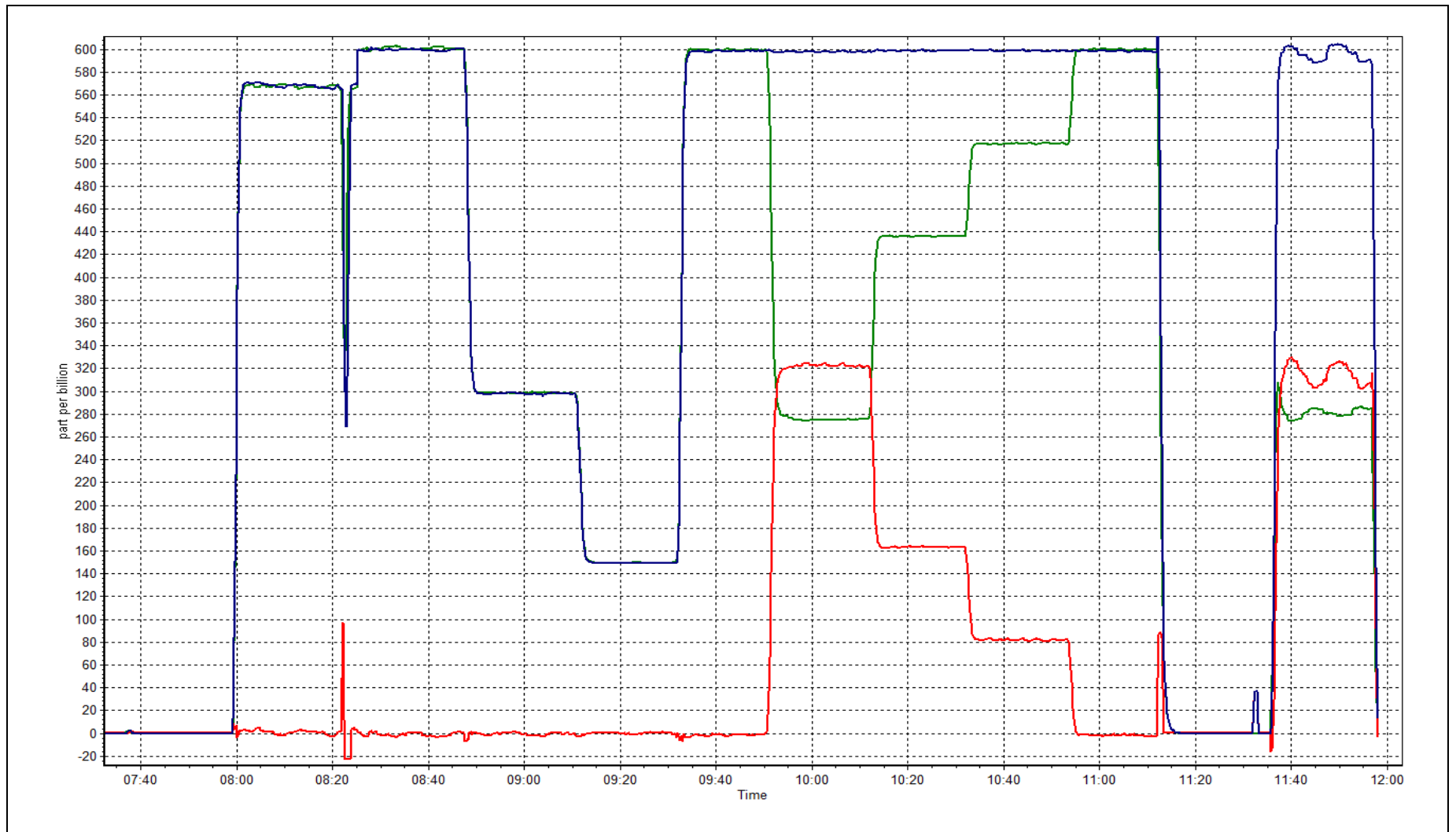
Calibration Date	July 8, 2015	Previous Calibration	June 2, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	7:41	End Time (MST)	12:00
Analyzer make	Thermo 42C	Analyzer serial #	601114773

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.3	N/A	Correlation Coefficient	0.999994
325.0	323.1	1.0059		
164.3	163.3	1.0061	Slope	1.006121
82.7	81.7	1.0122		
			Intercept	0.027752

### NO<sub>2</sub> Calibration Curve







Wood Buffalo Environmental Association

SHARP CONFORMANCE TEST

STATION INFORMATION

Calibration Date:	<u>July 22, 2015</u>	Previous Calibration:	<u>June 8, 2015</u>
Station Name:	<u>Athabasca Valley</u>	Station Number:	<u>AMS 7</u>
Start Time (MST):	<u>6:50</u>	End Time (MST):	<u>7:37</u>
Calibrator Make/Model:	<u>Delta Cal</u>	Calibrator Serial Number:	<u>1097</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	15.0	15.0	0.0	15.0
T2	17.0	na	na	17.0
T3	19.0	na	na	19.0
T4	23.0	na	na	23.0
RH (%)	44.0	na	na	44.0

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	975	971.3	-3.7	975

Main Flow (Lph)

Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
1003	1010	7	1010	1003

Nephelometer Calibration

Parameter	As Found	adjusted (Limit +/- 2.0ug/m3)	As Left
Analog	242		238
Neph	10.3		-0.7
C14	0.6	yes	-1
Indicated Concentration (ug/m3)	2.2		-0.1
Offset 1	242		242.2
Offset 2	33.8		35

Leak Check (Quarterly)

Leak Check Date:	<u>June 22, 2015</u>	Previous Leak Check Date:	
------------------	----------------------	---------------------------	--

	Measured	Difference LPM (Limit +/- 0.42 LPM)
Flow without adaptor (LPM):	16.90	
Flow with adaptor [turn off pump first](LPM):	16.81	0.09

Mass Foil Calibration (Annualy)

Foil Calibration Date:		Previous Foil Calibration:	
Zeroed?:	<u>NO</u>		
Foil Mass:		Mass foil set S/N:	2518
Previous Correction Factor:			
New Correction Factor:			

INSPECTION DATA

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

NOTES:

Heater Control not working properly, changed out, zero adjusted, cyclone head cleaned

Audit Performed By: Melissa Lemay



# Wood Buffalo Environmental Association CO Calibration Report

## Station Information

Calibration Date	July 10, 2015	Last Calibration	June 8, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Routine		
Start Time (MST)	7:36	End Time (MST)	10:50
Gas Cert Reference	CC101396	Station temp.	18 Deg C
Cal Gas Concentration	2970 ppm	Cal Gas Exp Date	02/02/2023
Calibrator Make/Model	Sabio 4010	Serial Number	11021107
ZAG Make/Model	API 701	Serial Number	5564
DACS make/model	Campbell Scientific CR3000	Serial Number	1864

## Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		Chamber temp.	47.9	48.2
Analyzer IP address	192.168.1.48		Pressure	725.6	731.6
Calculated slope	0.998493	1.002558	Flow	0.481	0.485
Calculated intercept	0.076643	0.054480	Intensity	199624	199439
Analyzer Background	2.692	2.956	S/R ratio	1.177884	1.177269
Analyzer Coefficient	1.040	1.040			

Analyzer make Thermo 48i-TLE      Analyzer serial # 1408761381

## Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.3	----
as found span	5000	69.7	41.4	42.1	0.984
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	69.7	41.4	41.3	1.003
second point	5000	35.2	20.9	20.8	1.008
third point	5000	15.2	9.0	8.9	1.010
as left zero	5000	0.0	0.0	0.0	----
as left span	5000	69.7	41.4	41.1	1.008
Average Correction Factor					1.007

Corrected As found    41.8      Previous response    41.4      % change    -1.0%

**Notes:**

Zero adjusted, filter changed out, no maintenance done

Calibration Performed By:

Melissa Lemay



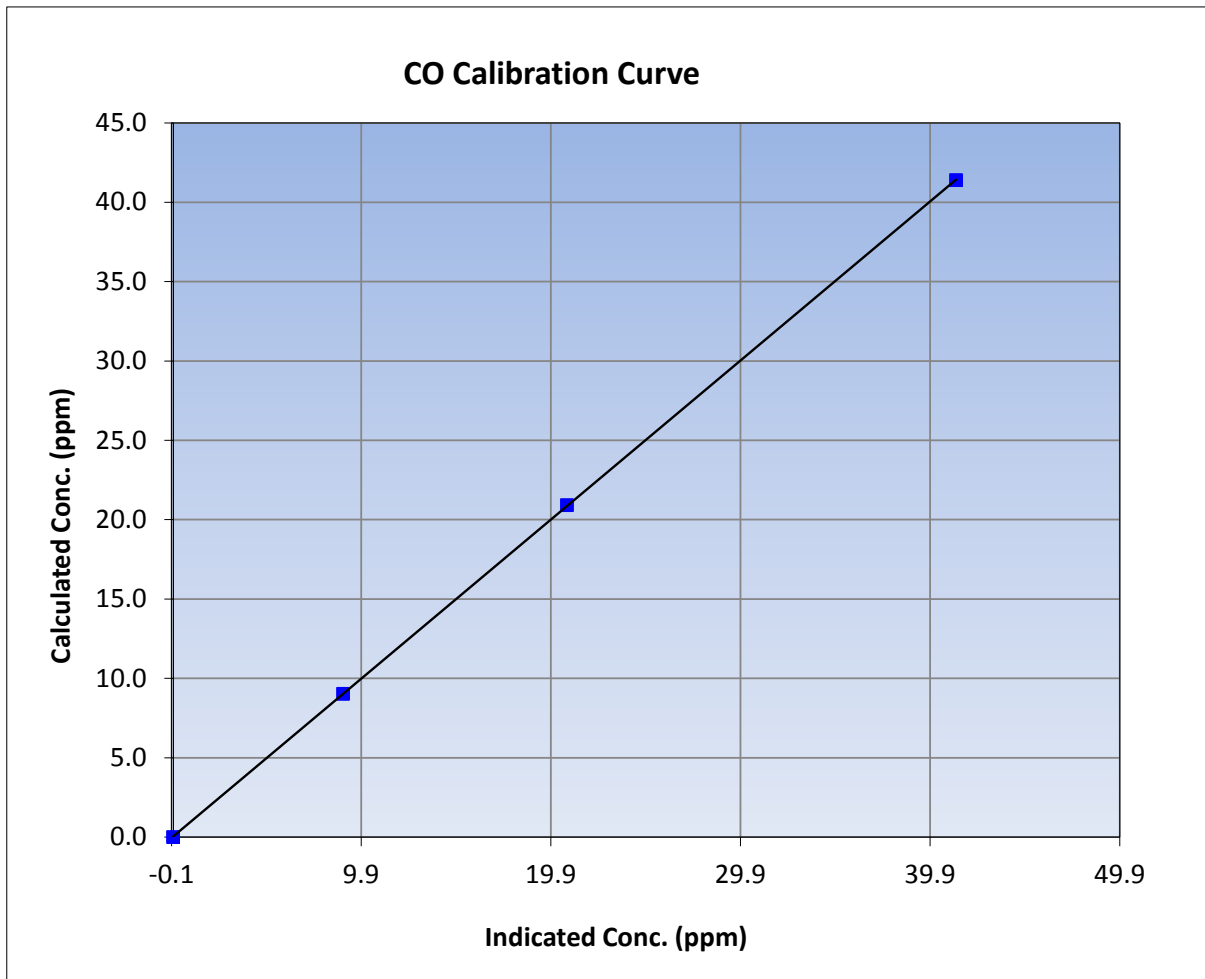
## Wood Buffalo Environmental Association CO Calibration Report

### Station Information

Calibration Date	July 10, 2015	Previous Calibration	June 8, 2015
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	7:36	End Time (MST)	10:50
Analyzer make	Thermo 48i-TLE	Analyzer serial #	1408761381

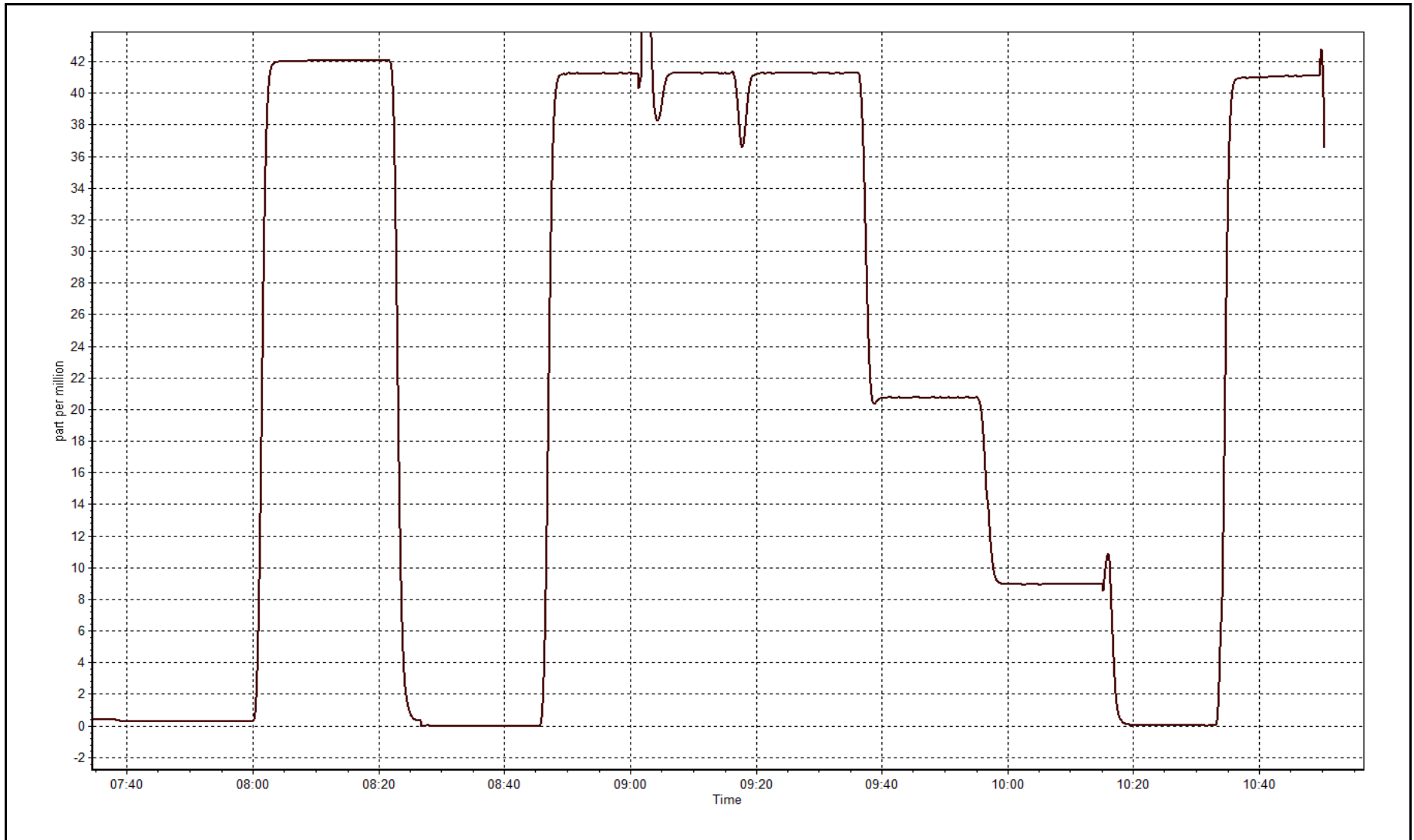
### Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999995
41.4	41.3	1.0032		
20.9	20.8	1.0077	Slope	1.002558
9.0	8.9	1.0099		
			Intercept	0.054480



CO Calibration Plot

Date: July 10, 2015







# Wood Buffalo Environmental Association

## WS/WD Calibration Report

### Station Information

Calibration Date	July-27-15	Previous Calibration	October-09-14
Station Number	AMS 07	Station Location	Athabasca
Reason:	<b>Routine</b> Installation	Removal	Other:
Start Time (MST)	10:20	End Time (MST)	11:02
Barometric Pressure	732 mm Hg	Station Temperature	22 Deg C
WS Calibrator	MetOne 053-120	Serial Number	K13090

### WIND SPEED

Sensor make/model	MetOne 10C-1	Sensor serial #	E5131
DACS make	Campbel Scientific CR3000	DACS serial No.	5664
DACS voltage range	n/a	DACS channel #	P1
	<u>Before</u>		<u>After</u>
DACS slope	0.14391338	DACS slope	0.14391338
DACS intercept	0	DACS intercept	0.0000
Calculated slope	1.001017009	Calculated slope	0.993192
Calculated intercept	0.890499974	Calculated intercept	0.345603

### Wind Speed Calibration Data

Shaft RPM	Actual Speed (K/hr)	Indicated Speed (K/hr)	Correction factor
0	0.96	0.0	n/a
200	20.162	20.3	0.9953
400	39.359	39.4	0.9989
600	58.555	58.5	1.0001
800	77.752	77.8	0.9989
			#DIV/0!
Average Correction Factor			0.9983

### WIND DIRECTION

Sensor make/model	MetOne 020C-1	Sensor serial #	n/a (faded out)
DACS make	Campbel Scientific CR3000	DACS serial No.	5664
DACS voltage range	n/a	DACS channel #	SE24
	<u>Before</u>		<u>After</u>
DACS slope	0.072	DACS slope	0.072
DACS intercept	0	DACS intercept	0
Calculated slope	0.99480922	Calculated slope	0.994581
Calculated intercept	0.459773063	Calculated intercept	1.027725

### Wind Direction Calibration Data

Physical Direction (Degrees)	Indicated Direction (Degrees)	Correction factor
0	0.3	n/a
90	88.2	1.0208
180	179.3	1.0040
270	270.4	0.9987
359	360.6	0.9955
Average Correction Factor		1.0047

#### Notes:

Bearings are good; true North orientation confirmed prior and post maintenance via compass and solar noon method.

Calibration Performed By:

Melissa Lemay, Duygu Uyar, & Shinsie Tiempo



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## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS 8  
FORT CHIPEWYAN  
JULY 2015**

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

August 26, 2015



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS 8)  
 JULY 2015

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	708	35	36	99.87	1	0	0	0
O3(ppb) Average	692	37	52	97.98	62	0	38	-
NO2(ppb) Average	678	33	66	95.56	8	0	3	-
NO(ppb) Average	678	33	66	95.56	1	-	0	-
NOX(ppb) Average	678	33	66	95.56	9	-	3	-
PM2.5(ug/m3) Average	743	0	1	99.87	973.5	-	309.2	8
Wind Speed 10 m (km/h) Average	743	0	1	99.87	31	-	19	-
Wind Direction 10 m (deg) Average	743	0	1	99.87	-	-	-	-
Temperature 2 m (C) Average	744	0	0	100.00	27.5	-	22.2	-
Relative Humidity (%) Average	744	0	0	100.00	99	-	93	-
Precipitation (mm) Total	744	0	0	100.00	6.4	-	14.7	-
Global Solar Radiation (W/m2) Average	0	0	744	0.00	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS 8)  
 JULY 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	708	0.1	0	-	0	0	0	0	0	0	0	1
O3(ppb) Average	692	22.7	8	-	6	15	18	22	26	30	62	
NO2(ppb) Average	678	0.6	1	-	0	0	0	0	1	1	8	
NO(ppb) Average	678	0.1	0	-	0	0	0	0	0	0	1	
NOX(ppb) Average	678	0.6	1	-	0	0	0	0	1	2	9	
PM2.5(ug/m3) Average	743	31.11	88.6	-	0.7	1.9	2.3	3.5	21.1	79.1	973.5	
Wind Speed 10 m (km/h) Average	743	11.6	6	-	1	5	8	11	15	20	31	
Wind Direction 10 m (deg) Average	743	-	-	-	-	-	-	-	-	-	-	
Temperature 2 m (C) Average	744	17.38	3.8	-	5.9	12.7	14.8	17.4	19.9	22.3	27.5	
Relative Humidity (%) Average	744	73.9	16	-	33	50	62	76	88	95	99	
Precipitation (mm) Total	744	-	-	69.85	-	-	-	-	-	-	-	
Global Solar Radiation (W/m2) Average	0	-	-	-	-	-	-	-	-	-	-	

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS 8)  
JULY 2015

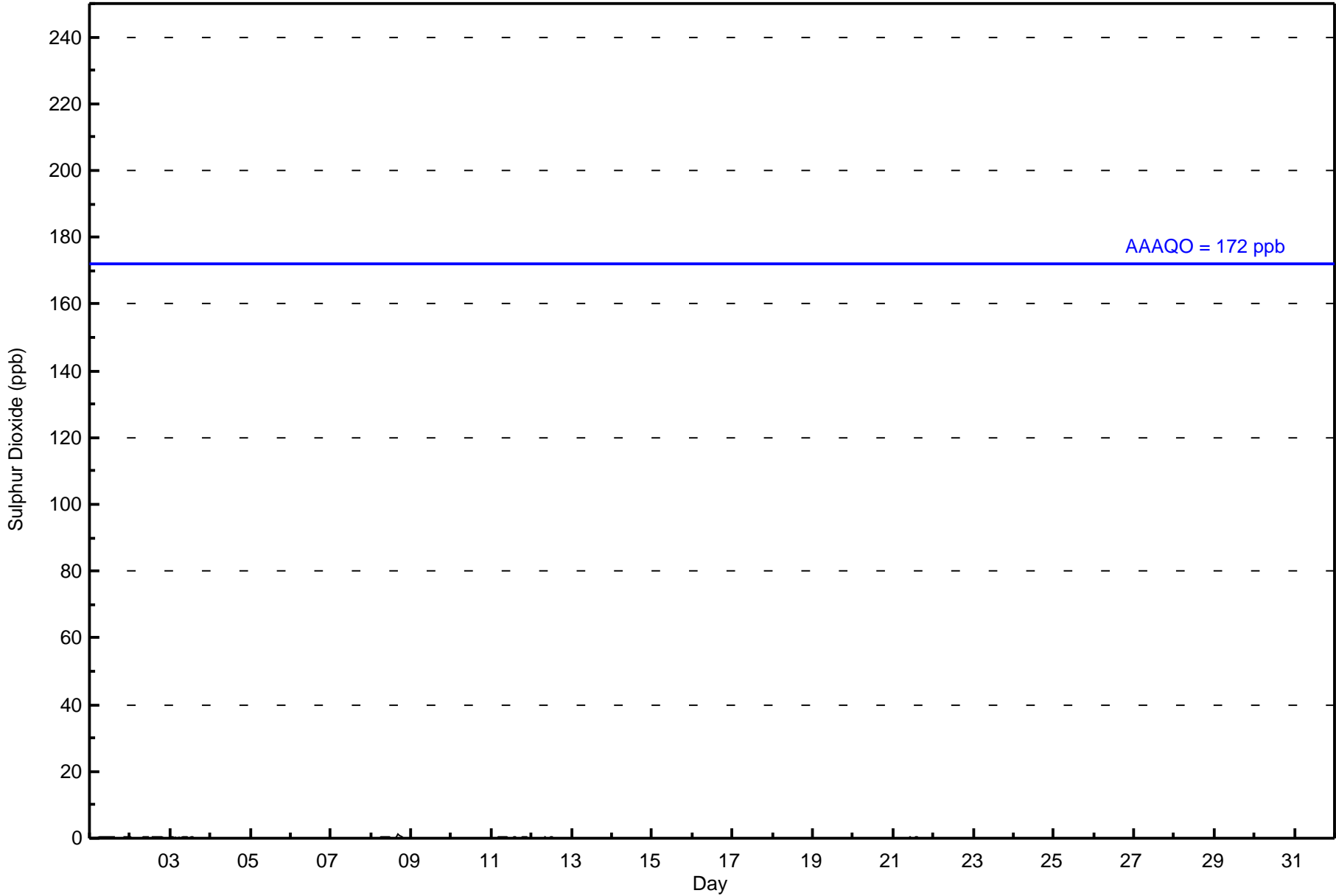
OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2	02 Jul 2015 13:00	02 Jul 2015 13:00	1	Maintenance - cleaned glass manifold
O3	01 Jul 2015 04:00	01 Jul 2015 04:00	1	Unstable Operation - lamp instability
O3	01 Jul 2015 10:00	01 Jul 2015 10:00	1	Unstable Operation - lamp instability
O3	01 Jul 2015 15:00	01 Jul 2015 16:00	2	Unstable Operation - lamp instability
O3	02 Jul 2015 01:00	02 Jul 2015 01:00	1	Unstable Operation - lamp instability
O3	02 Jul 2015 10:00	02 Jul 2015 10:00	1	Unstable Operation - lamp instability
O3	10 Jul 2015 05:00	10 Jul 2015 05:00	1	Unstable Operation - lamp instability
O3	29 Jul 2015 01:00	29 Jul 2015 02:00	2	Unstable Operation - lamp instability
O3	29 Jul 2015 18:00	29 Jul 2015 19:00	2	Unstable Operation - lamp instability
O3	31 Jul 2015 06:00	31 Jul 2015 07:00	2	Unstable Operation - lamp instability
O3	31 Jul 2015 09:00	31 Jul 2015 10:00	2	Unstable Operation - lamp instability
NO2, NO, NOX	01 Jul 2015 01:00	02 Jul 2015 09:00	33	Unstable Operation - inlet filter restricted from forest fire smoke
PM2.5	02 Jul 2015 17:00	02 Jul 2015 17:00	1	Maintenance - Flow and zero check, sample head cleaning
Wind Speed, Wind Direction	31 Jul 2015 04:00	31 Jul 2015 04:00	1	Flat line in sensor output signal
Solar Global Radiation	01 Jul 2015 01:00	01 Aug 2015 00:00	744	Sensor malfunction - removed for service/repair



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																																						
Maximum Value: 1 ppb on Jul 8 17:00										Maximum Daily Average: 0.3 ppb on Jul 8										Hours of Data: 708																												
Minimum Value: 0 ppb on Jul 10 15:00										Minimum Daily Average: 0.0 ppb on Jul 23										Hours of Missing Data: 36																												
Maximum Diurnal Average: 0.1 ppb at hour 10										Minimum Diurnal Average: 0.0 ppb at hour 3										Hours of Calibration: 35																												
Monthly Average: 0.1 ppb										Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 0 P <sub>99</sub> = 1										Percent Operational Time: 99.9																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	C	C	C	C	0	0	0	0	0.3	0																						
2-Jul	0	0	0	Z	0	0	0	0	0	0	1	1	M	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
3-Jul	0	0	0	0	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																						
4-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																						
5-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																						
6-Jul	0	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-Jul	0	0	Z	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-Jul	0	0	0	Z	0	0	0	1	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0.3	1																						
9-Jul	0	0	0	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-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																						
11-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0																						
12-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0																						
13-Jul	0	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-Jul	0	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-Jul	0	0	0	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-Jul	0	0	0	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-Jul	Z	0	0	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-Jul	0	Z	0	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-Jul	0	0	Z	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-Jul	0	0	0	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-Jul	0	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-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																						
23-Jul	Z	0	0	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-Jul	0	Z	0	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-Jul	0	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-Jul	0	0	0	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-Jul	0	0	0	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-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																						
29-Jul	Z	0	0	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-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																						
31-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																						
																								0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	Diurnal Average	
																								0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	1	1	0	0	0	0	0	Diurnal Maximum	
Z - zerospan      C - Calibration      M - Maintenance																																																
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb    24-hr 48 ppb																																																







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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Fort Chipewyan - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	708	100.00	100.00
11 - 20	0	0.00	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Fort Chipewyan - July 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	18	8	27	50	96	40	22	8	18	23	44	57	80	88	78	50	707
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	18	8	27	50	96	40	22	8	18	23	44	57	80	88	78	50	707

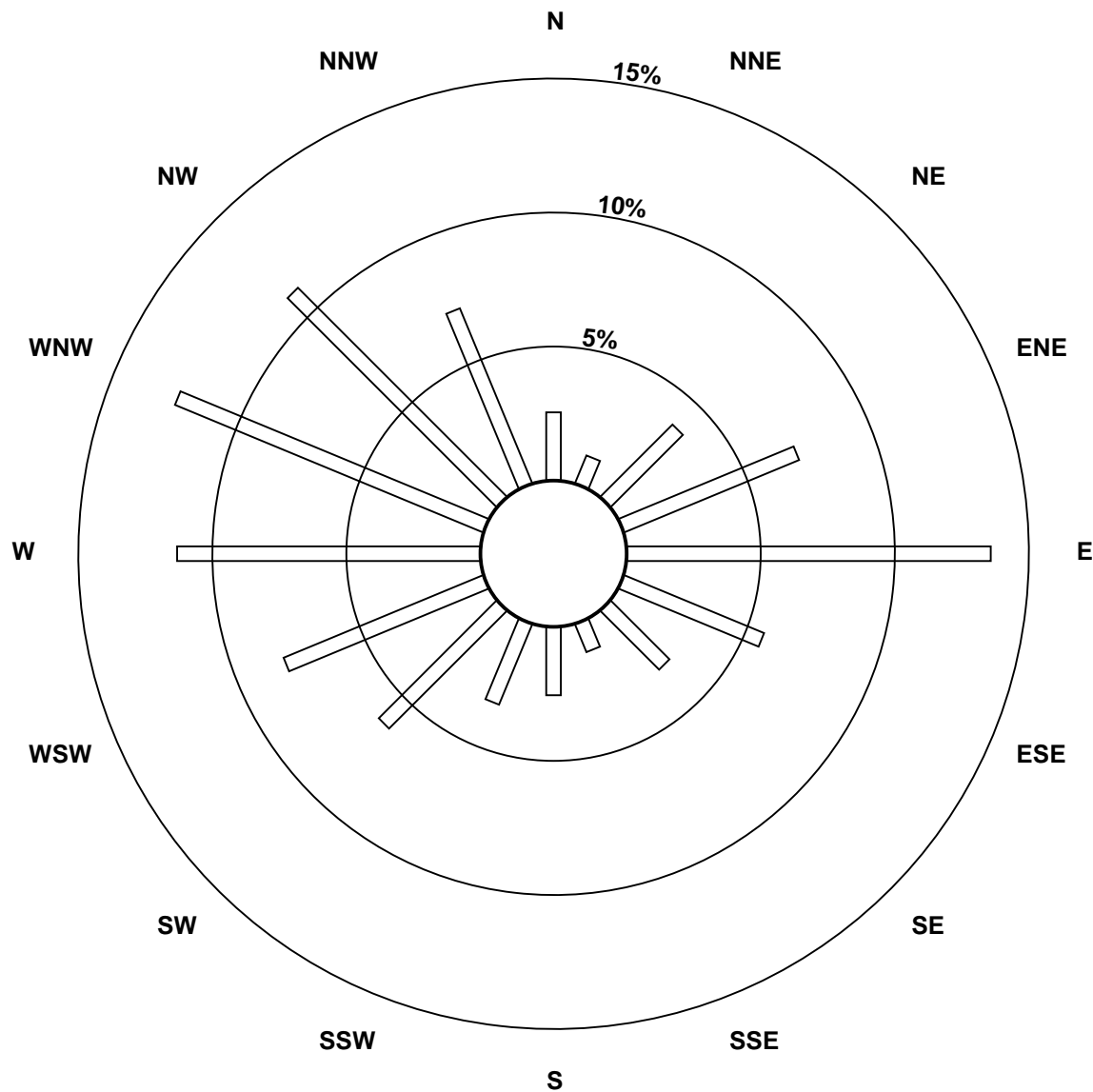
Total Number of Valid Hours: 707

Total Number of Hours: 744

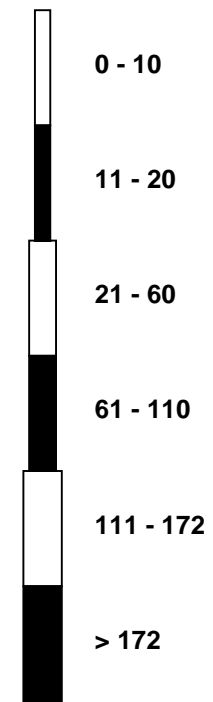


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

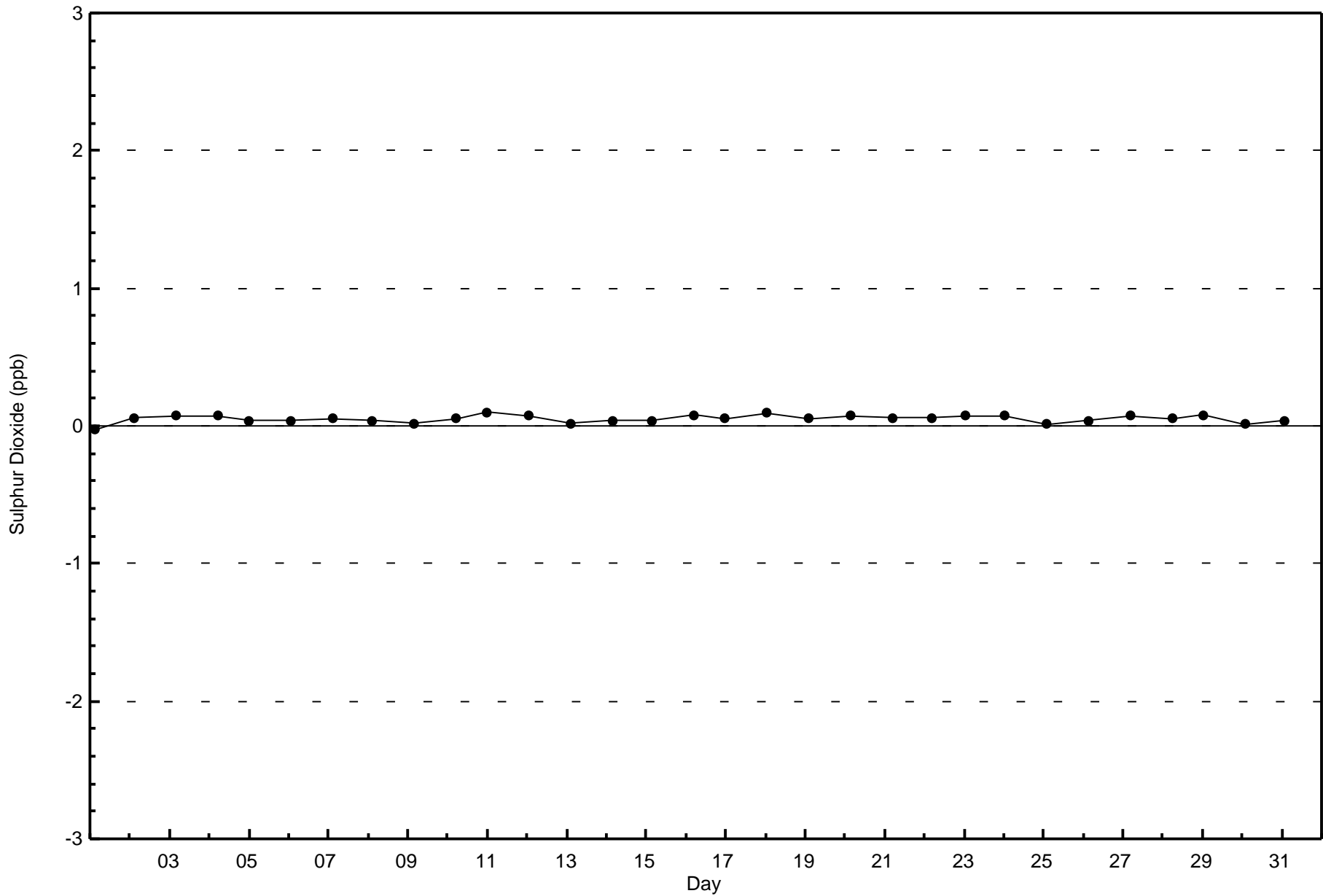
Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Fort Chipewyan (AMS 8)

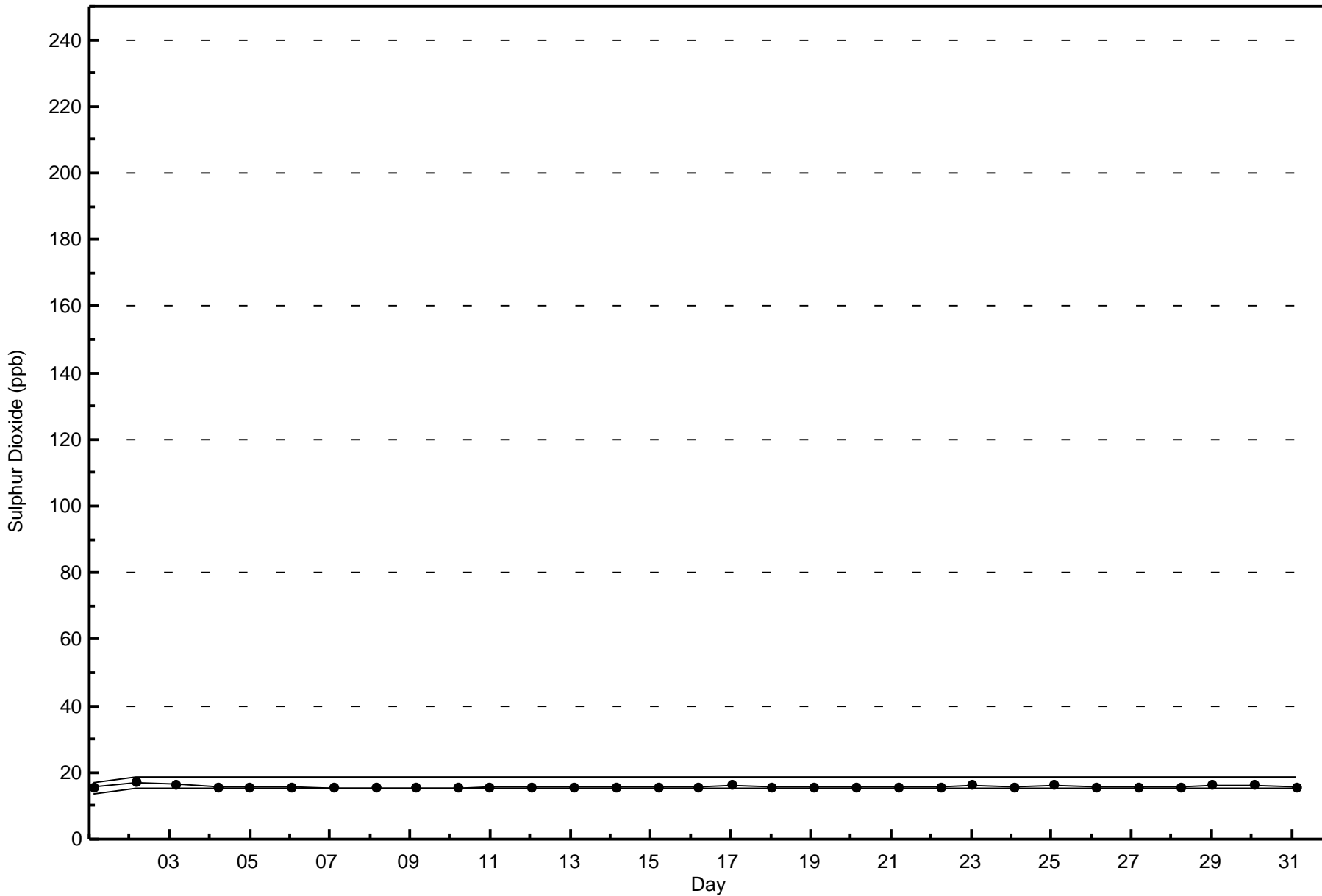


Classes (ppb)



Total Number of Valid Hours: 707







Maximum Value: 1 ppb on Jul 8 08:00																	Maximum Daily Average: 0.3 ppb on Jul 3							Hours in Service: 744		
Minimum Value: 0 ppb on Jul 2 18:00																	Minimum Daily Average: 0.0 ppb on Jul 9							Hours of Data: 678		
Maximum Diurnal Average: 0.2 ppb at hour 8																	Minimum Diurnal Average: 0.0 ppb at hour 1							Hours of Missing Data: 66		
Monthly Average: 0.1 ppb																	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 0 P <sub>99</sub> = 1							Hours of Calibration: 33		
																	Percent Operational Time: 95.6									
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-Jul	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--
2-Jul	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	C	C	C	C	0	0	0	0	0	0	0	0	0	0	--	0
3-Jul	0	0	0	0	Z	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
4-Jul	0	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-Jul	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
6-Jul	0	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-Jul	0	0	Z	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-Jul	0	0	0	Z	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
9-Jul	0	0	0	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-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
11-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
12-Jul	0	Z	0	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-Jul	0	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-Jul	0	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-Jul	0	0	0	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-Jul	0	0	0	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-Jul	Z	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-Jul	0	Z	0	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-Jul	0	0	Z	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-Jul	0	0	0	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-Jul	0	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-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
23-Jul	Z	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-Jul	0	Z	0	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-Jul	0	0	Z	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-Jul	0	0	0	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-Jul	0	0	0	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-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
29-Jul	Z	0	0	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-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
31-Jul	0	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
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan																										
C - Calibration																										
UO - Unstable Operation																										

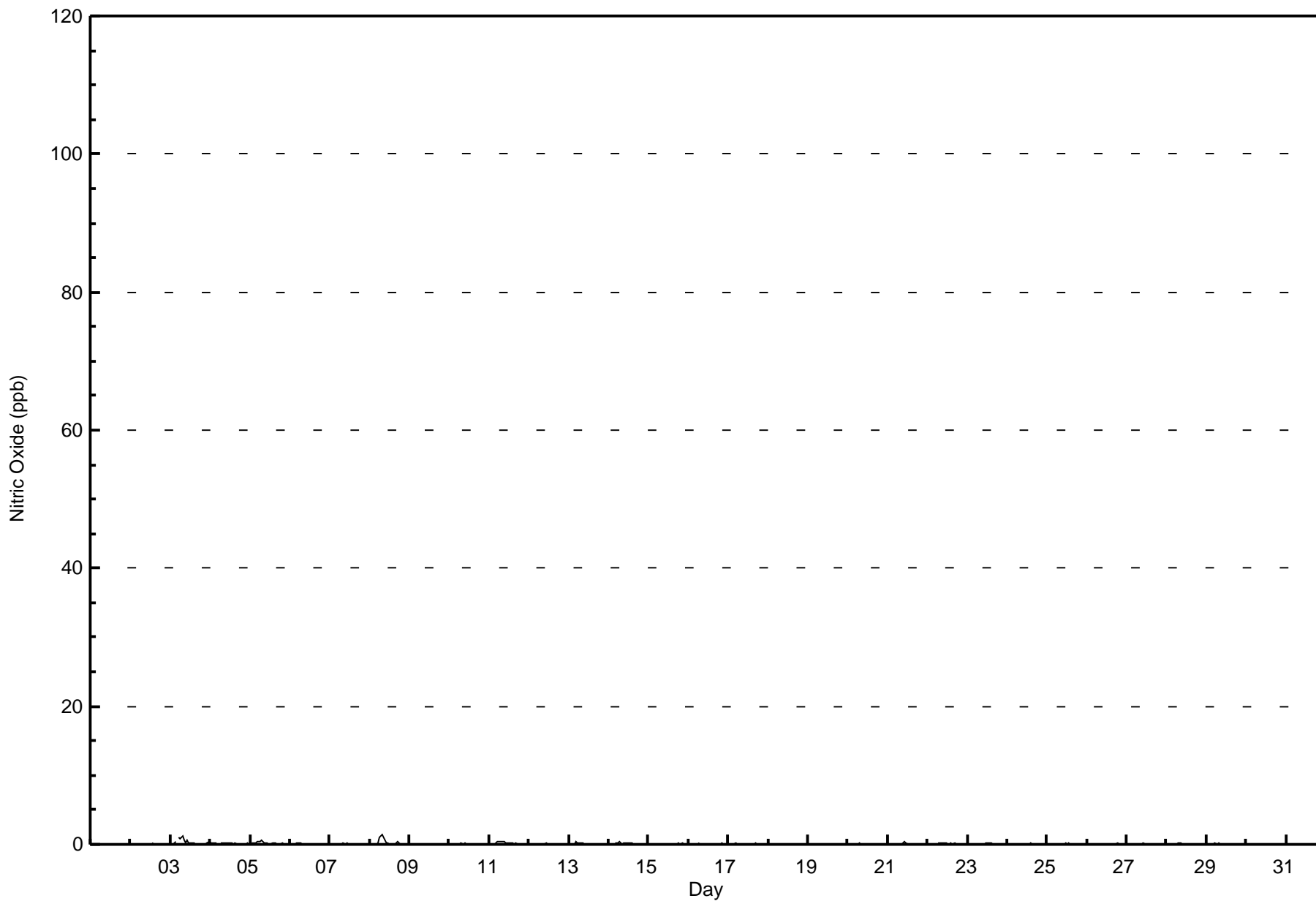


Wood Buffalo Environmental Association

Hourly Averages

Nitric Oxide (NO) - ppb

Fort Chipewyan - July 2015







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

**Nitric Oxide (NO) - ppb**  
**Fort Chipewyan - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	678	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: 678

Total Number of Hours: 744



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Fort Chipewyan - July 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	17	8	26	50	96	40	21	8	18	22	43	53	70	79	77	49	677
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	17	8	26	50	96	40	21	8	18	22	43	53	70	79	77	49	677

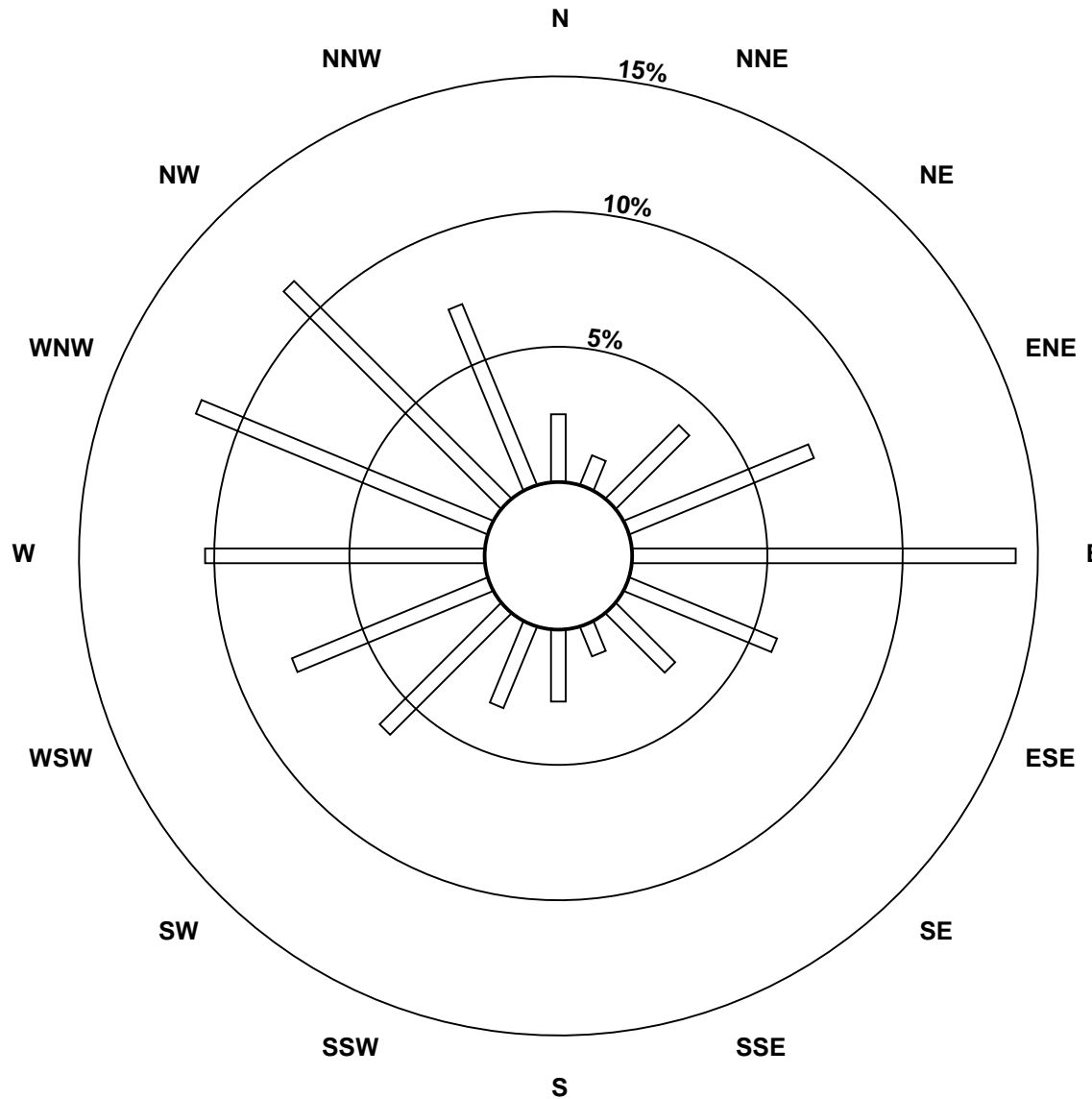
Total Number of Valid Hours: 677

Total Number of Hours: 744

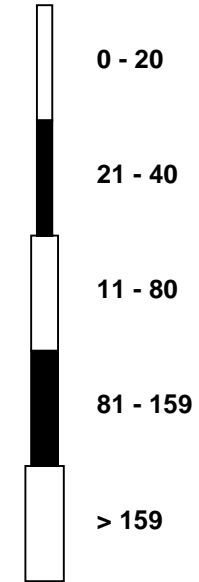


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

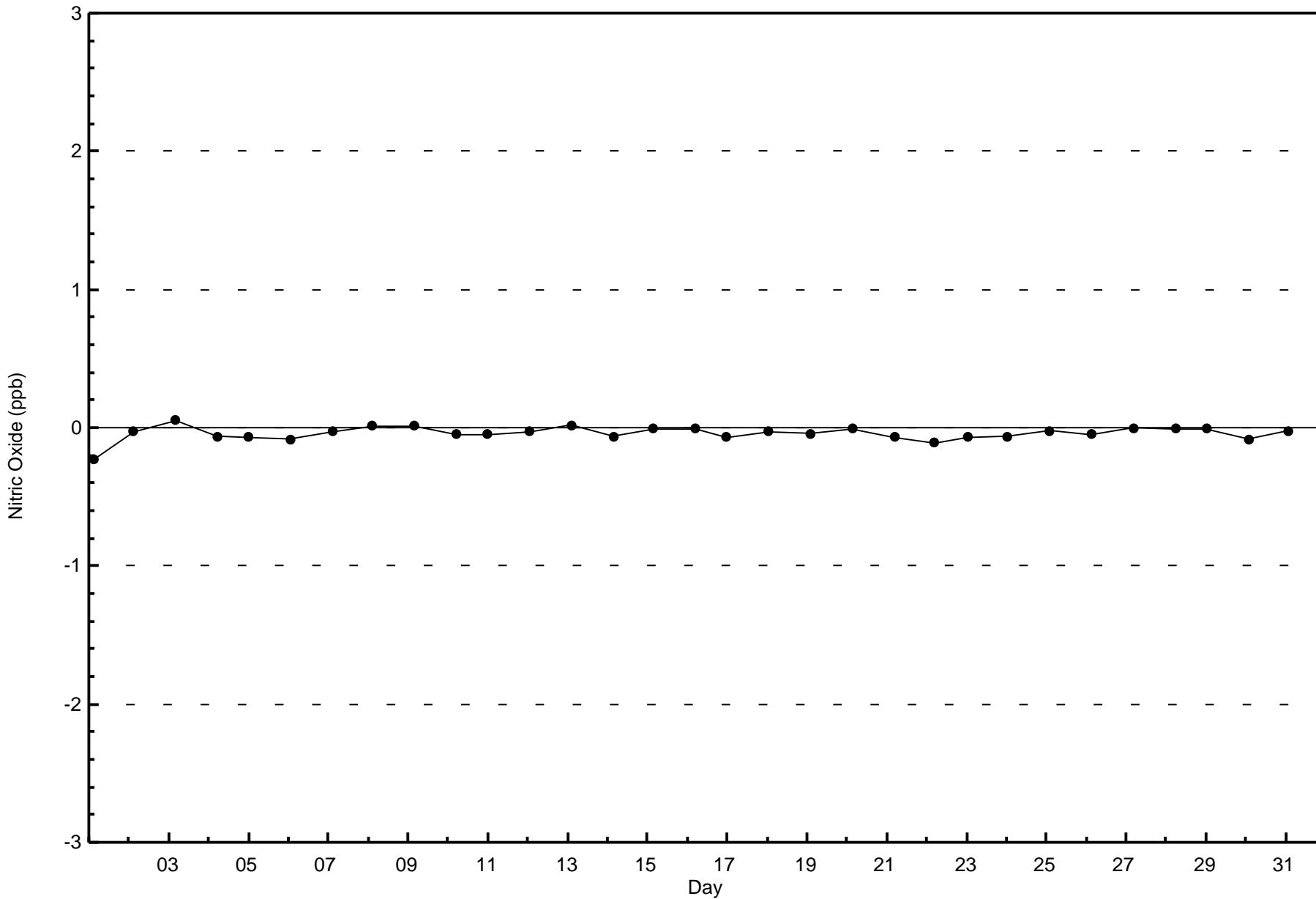
Nitric Oxide (NO) - ppb  
Fort Chipewyan (AMS 8)

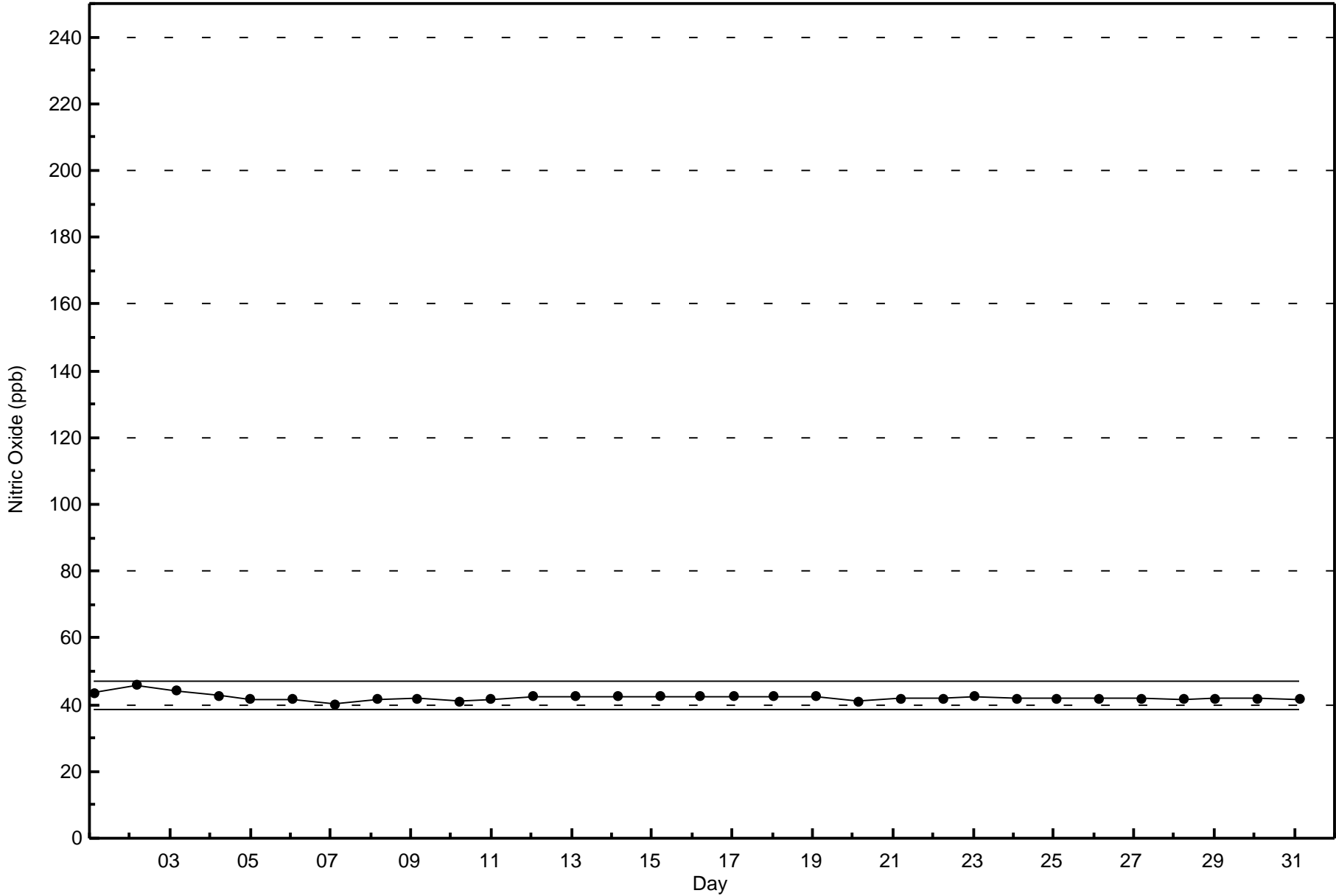


Classes (ppb)



Total Number of Valid Hours: 677







Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 8 ppb on Jul 3 11:00	Maximum Daily Average: 3.0 ppb on Jul 3		Hours of Data:	678
Minimum Value: 0 ppb on Jul 15 17:00	Minimum Daily Average: 0.1 ppb on Jul 23		Hours of Missing Data:	66
Maximum Diurnal Average: 0.8 ppb at hour 11	Minimum Diurnal Average: 0.4 ppb at hour 2		Hours of Calibration:	33
Monthly Average: 0.6 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 1 P <sub>90</sub> = 1 P <sub>99</sub> = 4		Percent Operational Time:	95.6

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-Jul	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--	
2-Jul	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	C	C	C	C	2	2	3	2	2	2	2	1	1	1	1	--	3
3-Jul	1	1	2	2	Z	2	2	3	4	6	8	6	5	5	3	2	2	3	2	2	2	2	2	2	3	3.0	8
4-Jul	2	2	2	2	1	Z	2	2	2	2	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1.0	2
5-Jul	Z	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	0	0	0.5	1
6-Jul	0	Z	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0.5	1
7-Jul	0	0	Z	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0.4	1
8-Jul	0	0	0	Z	0	1	3	4	3	3	3	3	2	2	3	2	4	4	2	1	1	1	0	0	0	1.9	4
9-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0.3	1
10-Jul	0	0	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
11-Jul	Z	0	0	0	2	2	3	4	4	4	2	2	2	2	1	1	1	1	2	1	1	1	1	1	1	1.7	4
12-Jul	1	Z	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0.8	1
13-Jul	0	0	Z	1	1	1	1	2	1	1	0	0	0	0	1	0	1	0	0	1	0	1	1	1	1	0.6	2
14-Jul	1	1	1	Z	1	1	1	1	0	1	0	1	1	0	0	0	0	0	1	0	0	1	0	0	0	0.5	1
15-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	1	0.3	1
16-Jul	0	1	1	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	0	0.4	2
17-Jul	Z	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0.3	1
18-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
19-Jul	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	0.2	1
20-Jul	0	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	3	1	0.5	3
21-Jul	0	0	0	0	Z	0	0	0	0	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1
22-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.2	1
23-Jul	Z	0	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-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.2	1
25-Jul	1	1	Z	1	1	1	1	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0.5	1
26-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0.3	1
27-Jul	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	0.2	1
28-Jul	0	0	2	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0.4	2
29-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.2	1
30-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
31-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0

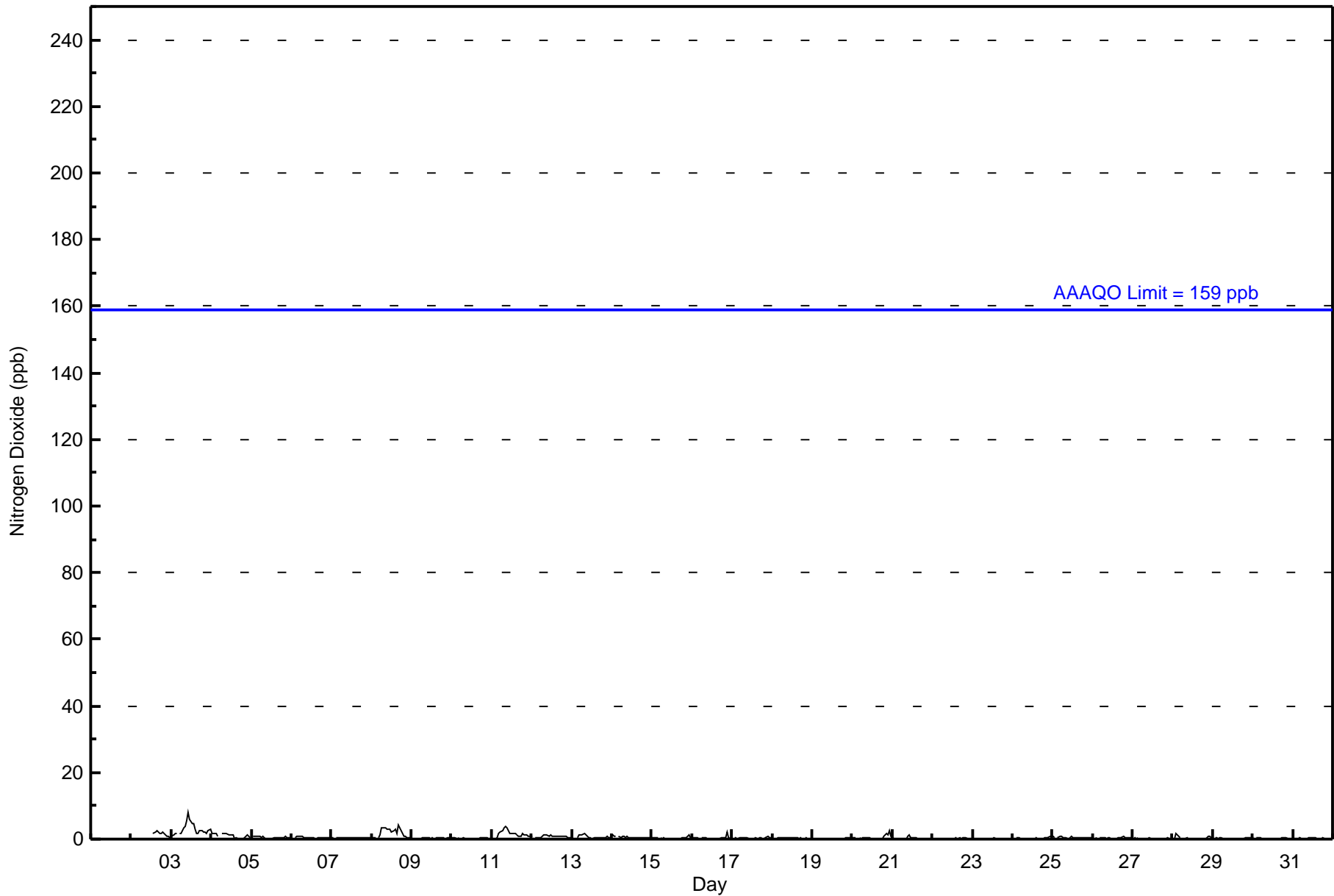
0.4	0.4	0.5	0.5	0.5	0.6	0.6	0.8	0.7	0.8	0.8	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.5	0.5	Diurnal Average
2	2	2	2	2	2	3	4	4	6	8	6	5	5	3	3	4	4	2	2	2	2	3	3	3	3	Diurnal Maximum

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



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

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Fort Chipewyan - July 2015**





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

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Fort Chipewyan - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	678	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: 678

Total Number of Hours: 744





**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Fort Chipewyan - July 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	17	8	26	50	96	40	21	8	18	22	43	53	70	79	77	49	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
<b>Totals</b>	17	8	26	50	96	40	21	8	18	22	43	53	70	79	77	49	677

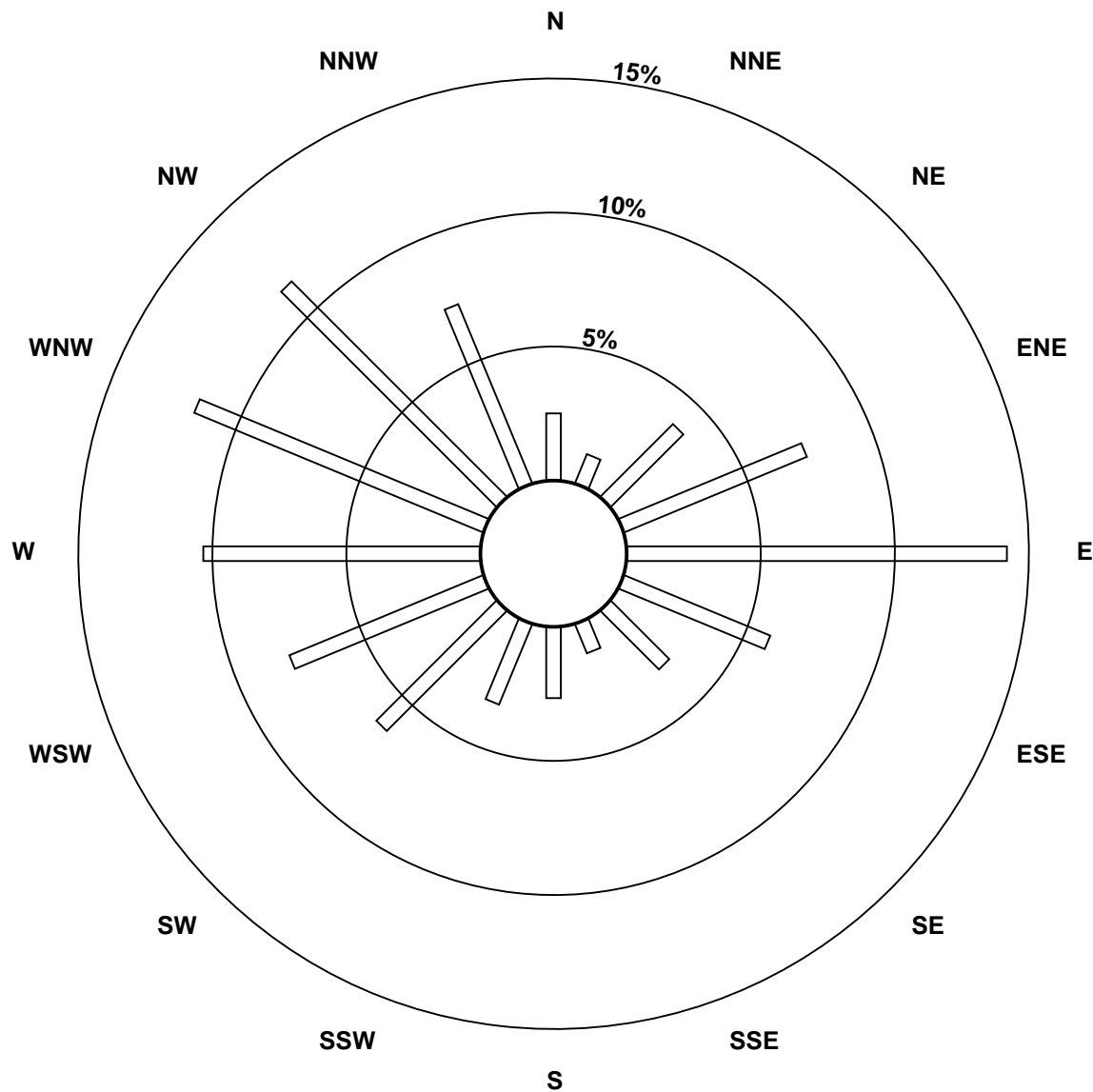
Total Number of Valid Hours: 677

Total Number of Hours: 744

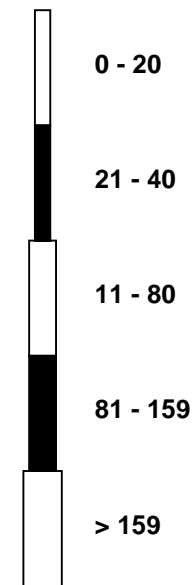


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

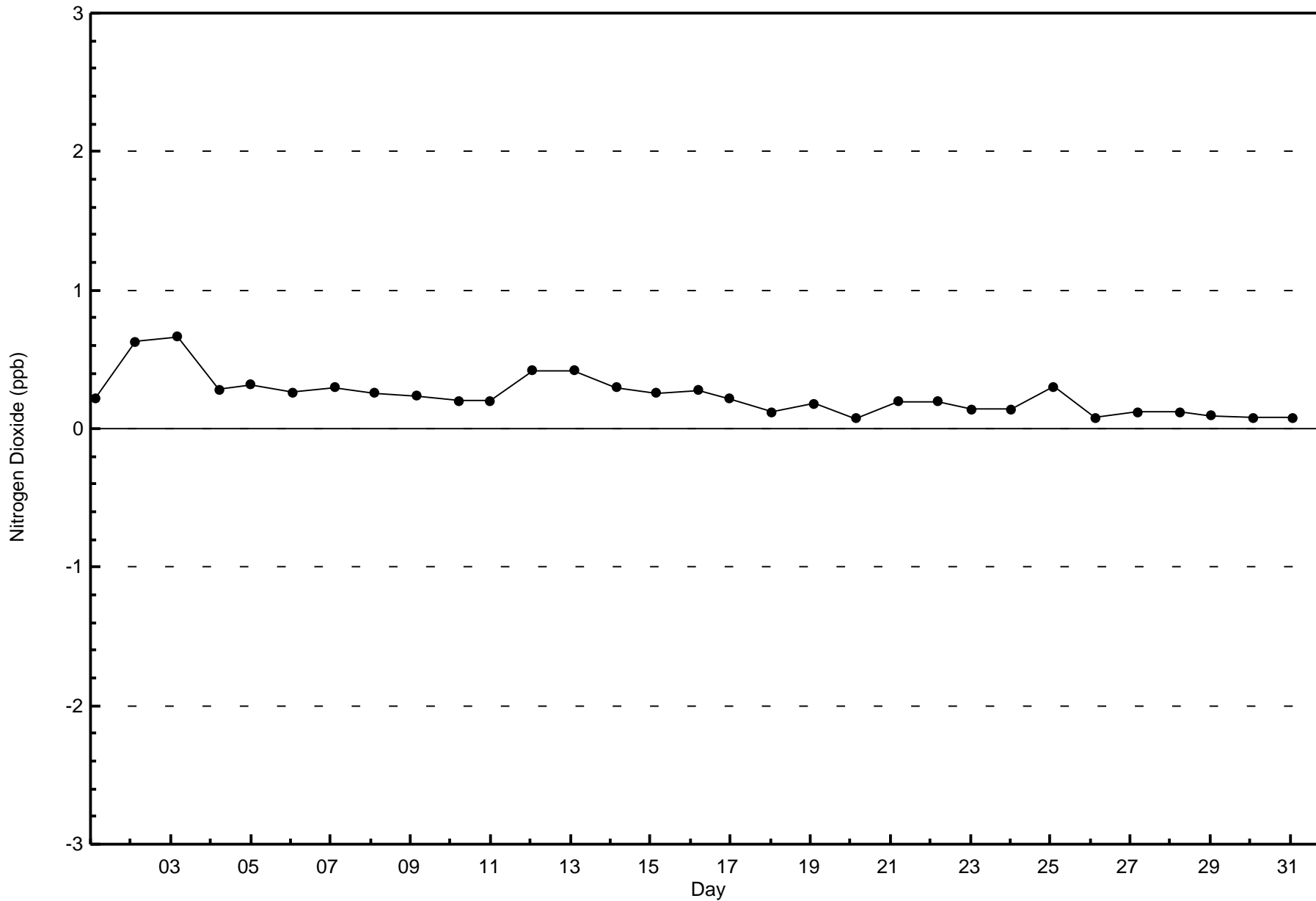
Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Fort Chipewyan (AMS 8)

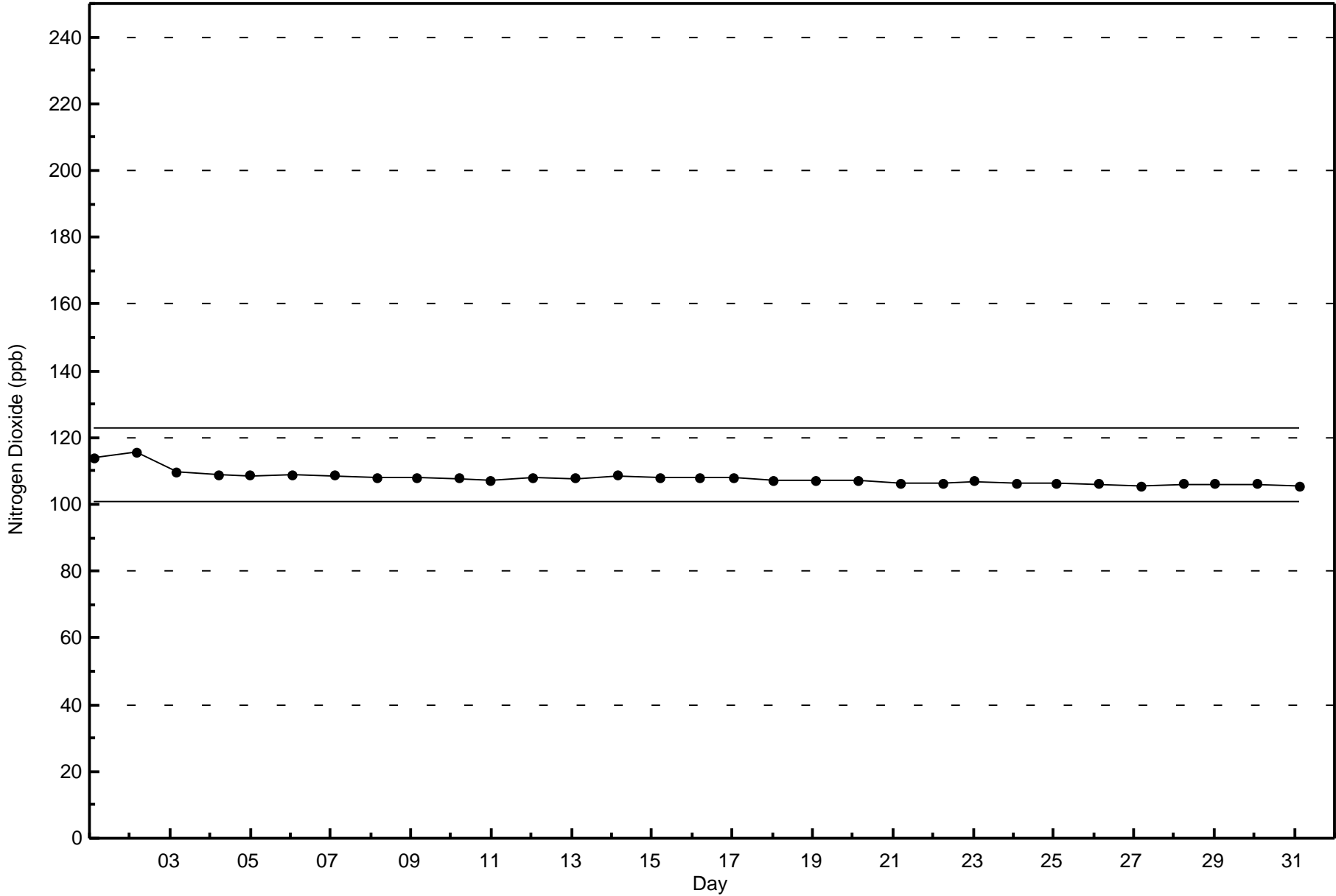


Classes (ppb)



Total Number of Valid Hours: 677





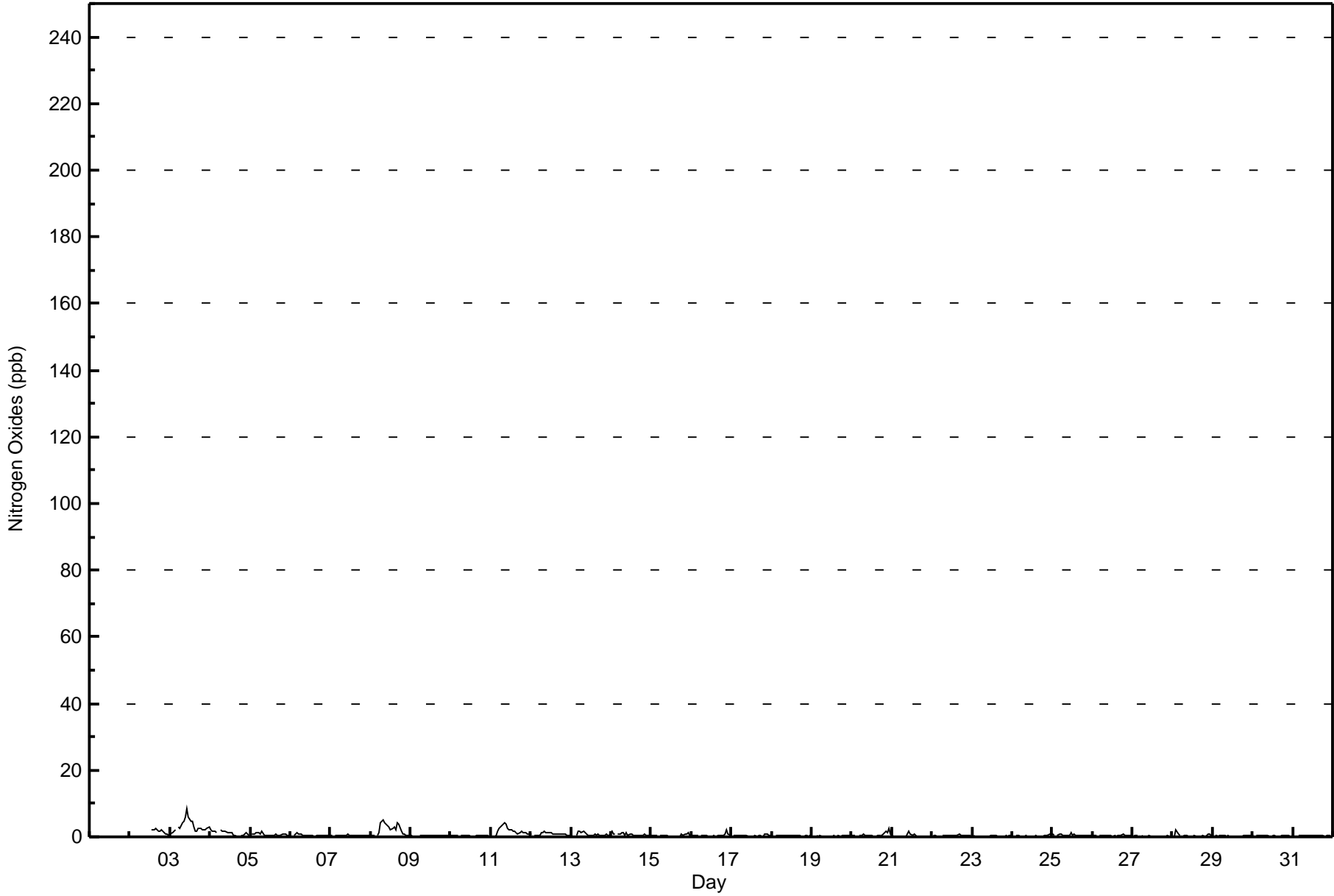


Maximum Value: 9 ppb on Jul 3 11:00														Maximum Daily Average: 3.2 ppb on Jul 3										Hours in Service: 744			
Minimum Value: 0 ppb on Jul 15 17:00														Minimum Daily Average: 0.2 ppb on Jul 27										Hours of Data: 678			
Maximum Diurnal Average: 1.0 ppb at hour 8														Minimum Diurnal Average: 0.4 ppb at hour 2										Hours of Missing Data: 66			
Monthly Average: 0.6 ppb														Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 1 P <sub>90</sub> = 2 P <sub>99</sub> = 4										Hours of Calibration: 33			
														Percent Operational Time: 95.6													
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-Jul	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--	
2-Jul	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	3	
3-Jul	1	1	2	2	Z	3	2	4	4	6	9	6	5	5	3	2	2	3	2	2	2	2	3	3	3.2	9	
4-Jul	2	2	2	2	1	Z	2	2	2	2	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1.1	2
5-Jul	Z	1	1	1	1	1	1	2	0	0	0	0	0	0	1	1	0	0	0	0	1	1	1	0	0.7	2	
6-Jul	0	Z	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0.5	1	
7-Jul	0	0	Z	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1	
8-Jul	0	0	0	Z	0	1	4	5	4	4	3	3	2	2	3	2	4	4	2	1	1	0	0	0	2.1	5	
9-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0.3	1	
10-Jul	0	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-Jul	Z	0	0	0	2	3	3	4	4	4	3	2	2	2	2	1	1	1	2	1	1	1	1	1	1.8	4	
12-Jul	1	Z	1	0	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0.8	2	
13-Jul	0	0	Z	1	2	2	1	2	1	1	0	0	0	0	1	1	1	0	0	1	0	1	0	1	0.7	2	
14-Jul	2	1	1	Z	1	1	1	1	0	1	1	1	1	1	0	0	0	0	1	1	1	1	0	0	0.7	2	
15-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	0.3	1	
16-Jul	0	0	1	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	0	0.4	2	
17-Jul	Z	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0.4	1	
18-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	
19-Jul	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-Jul	0	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	3	0.5	3	
21-Jul	0	0	0	0	Z	0	0	0	0	1	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0.3	2	
22-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.3	1	
23-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
24-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.3	1	
25-Jul	1	1	Z	1	1	1	1	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.5	1	
26-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0.3	1	
27-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.2	1	
28-Jul	0	0	2	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0.4	2	
29-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.3	1	
30-Jul	0	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	
31-Jul	0	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	
														0.5 0.4 0.5 0.5 0.6 0.7 0.8 1.0 0.9 0.9 0.9 0.7 0.6 0.7 0.6 0.5 0.6 0.6 0.6 0.5 0.6 0.7 0.6 0.5										Diurnal Average			
														2 2 2 2 2 3 4 5 4 6 9 6 5 5 3 3 4 4 4 2 2 2 3 3										Diurnal Maximum			
Z - zerospan														C - Calibration										UO - Unstable Operation			



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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Fort Chipewyan - July 2015**





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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Fort Chipewyan - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	678	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: 678

Total Number of Hours: 744



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Fort Chipewyan - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	17	8	26	50	96	40	21	8	18	22	43	53	70	79	77	49	677
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	17	8	26	50	96	40	21	8	18	22	43	53	70	79	77	49	677

Total Number of Valid Hours: 677

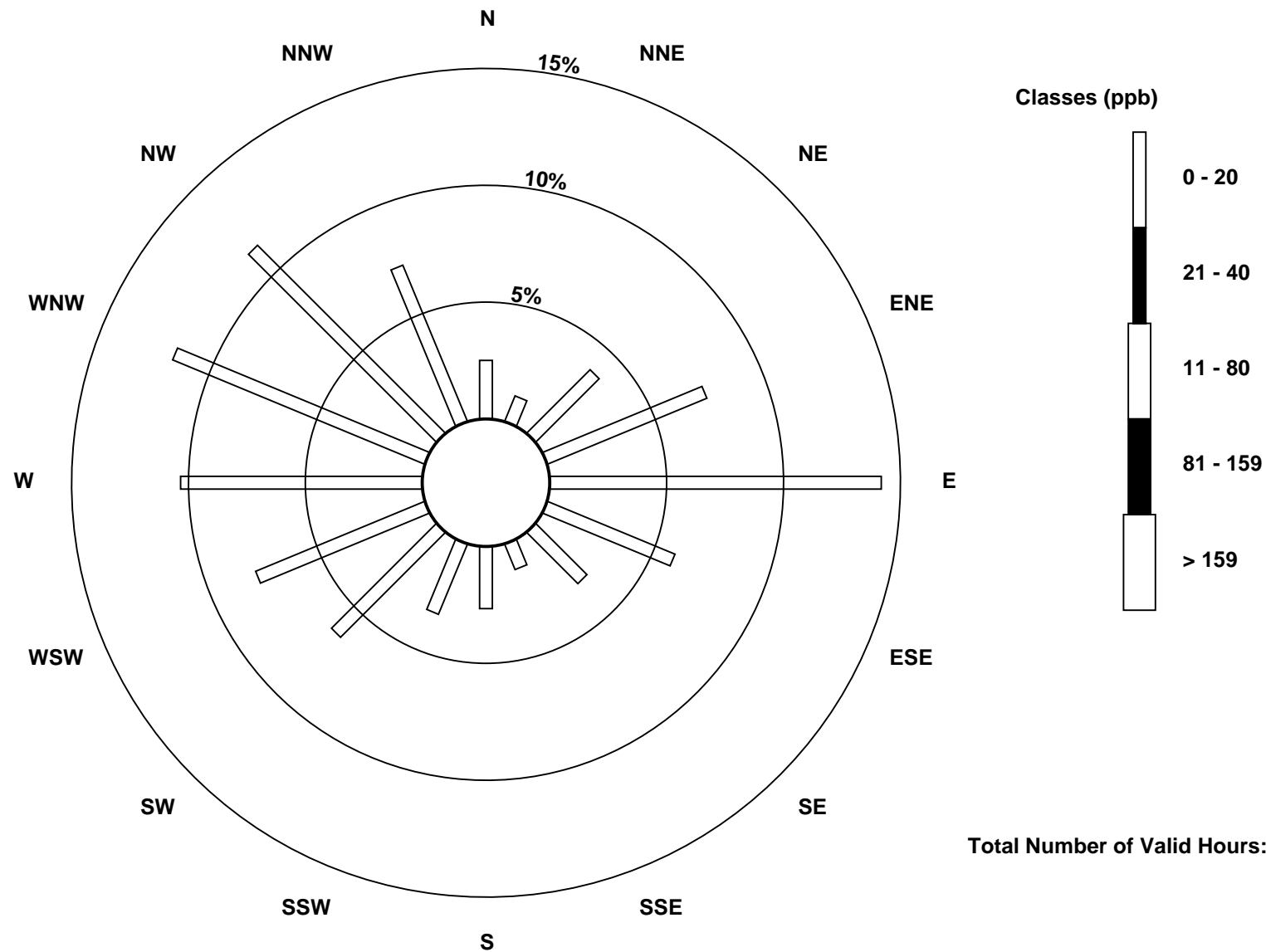
Total Number of Hours: 744

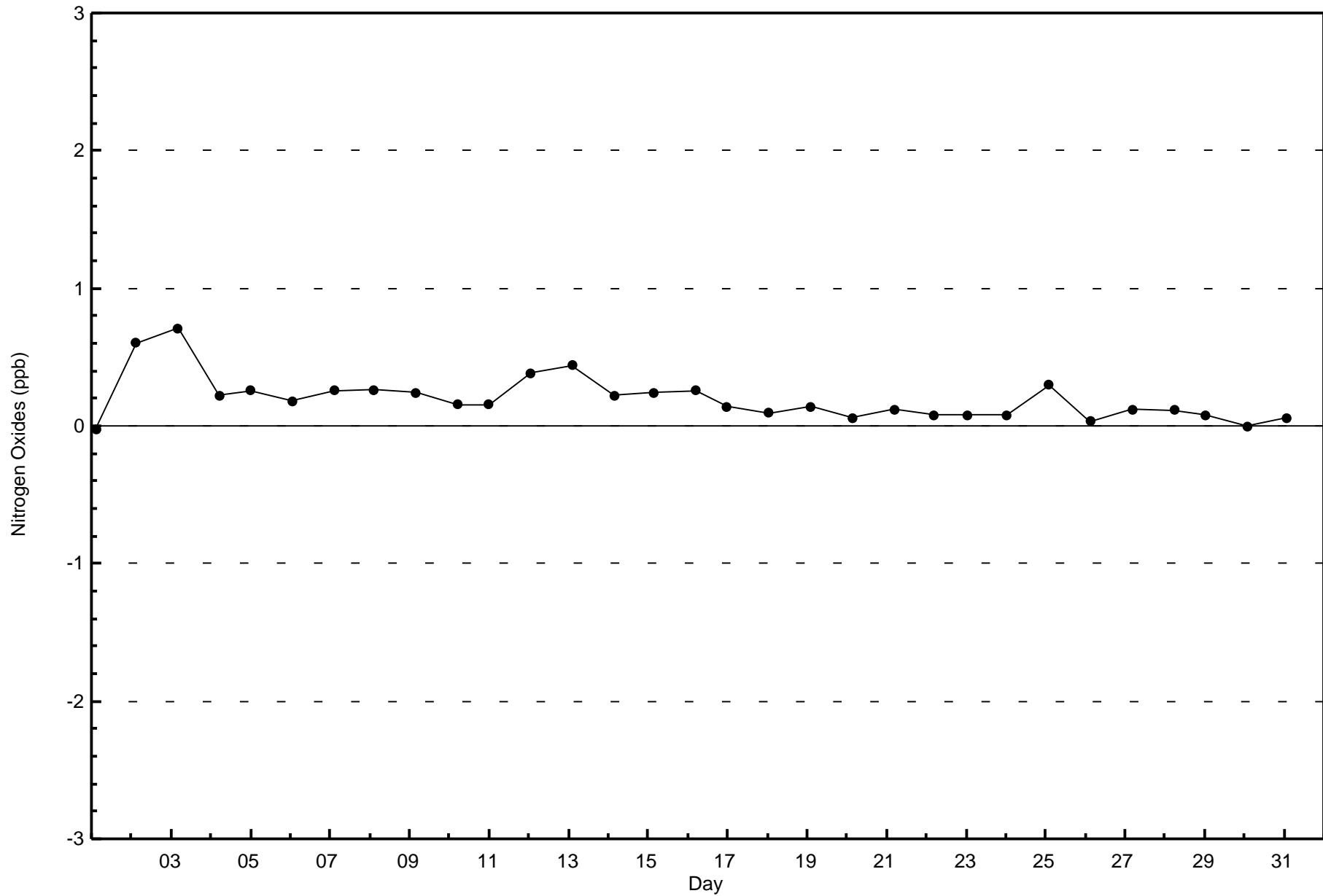


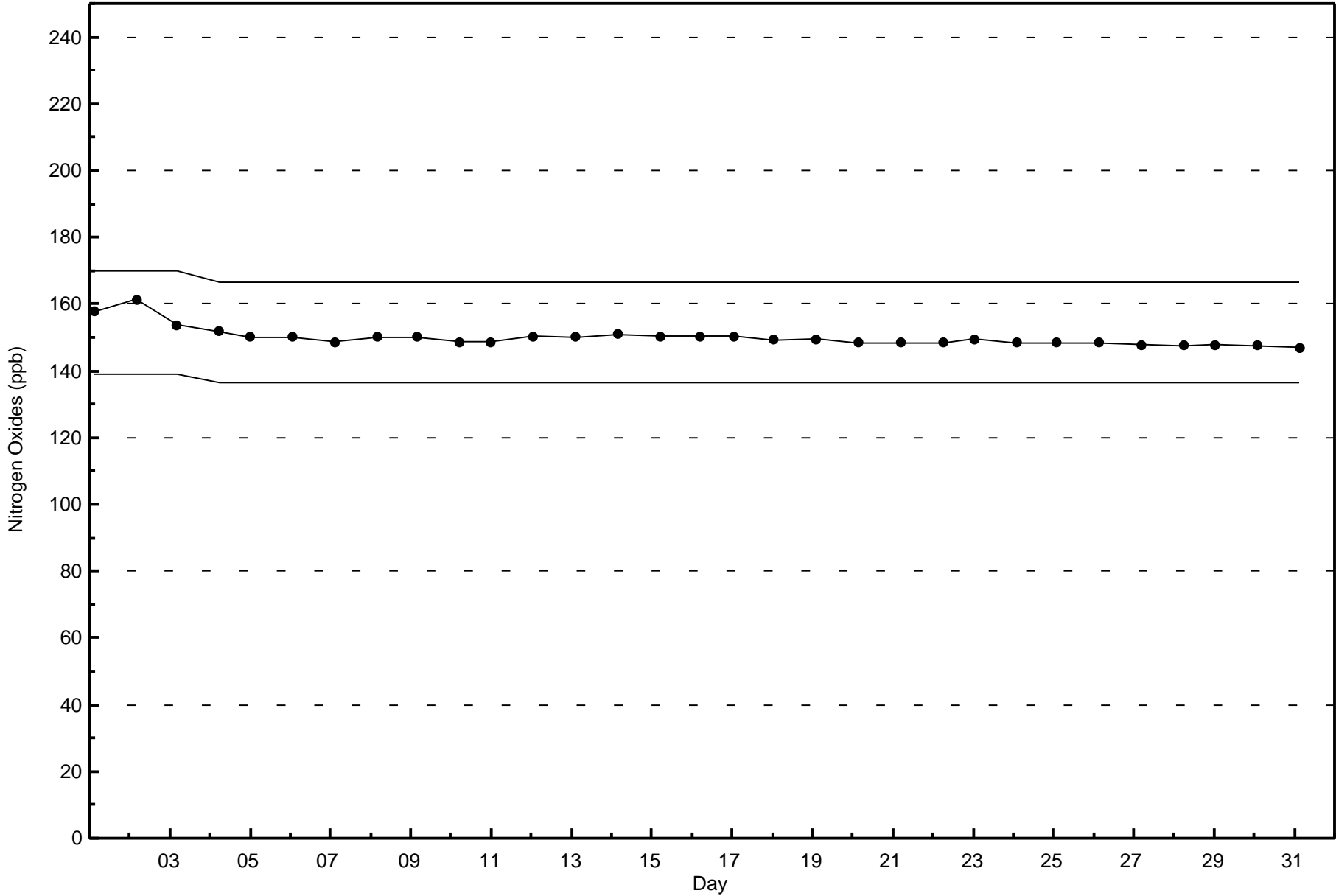


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Fort Chipewyan (AMS 8)

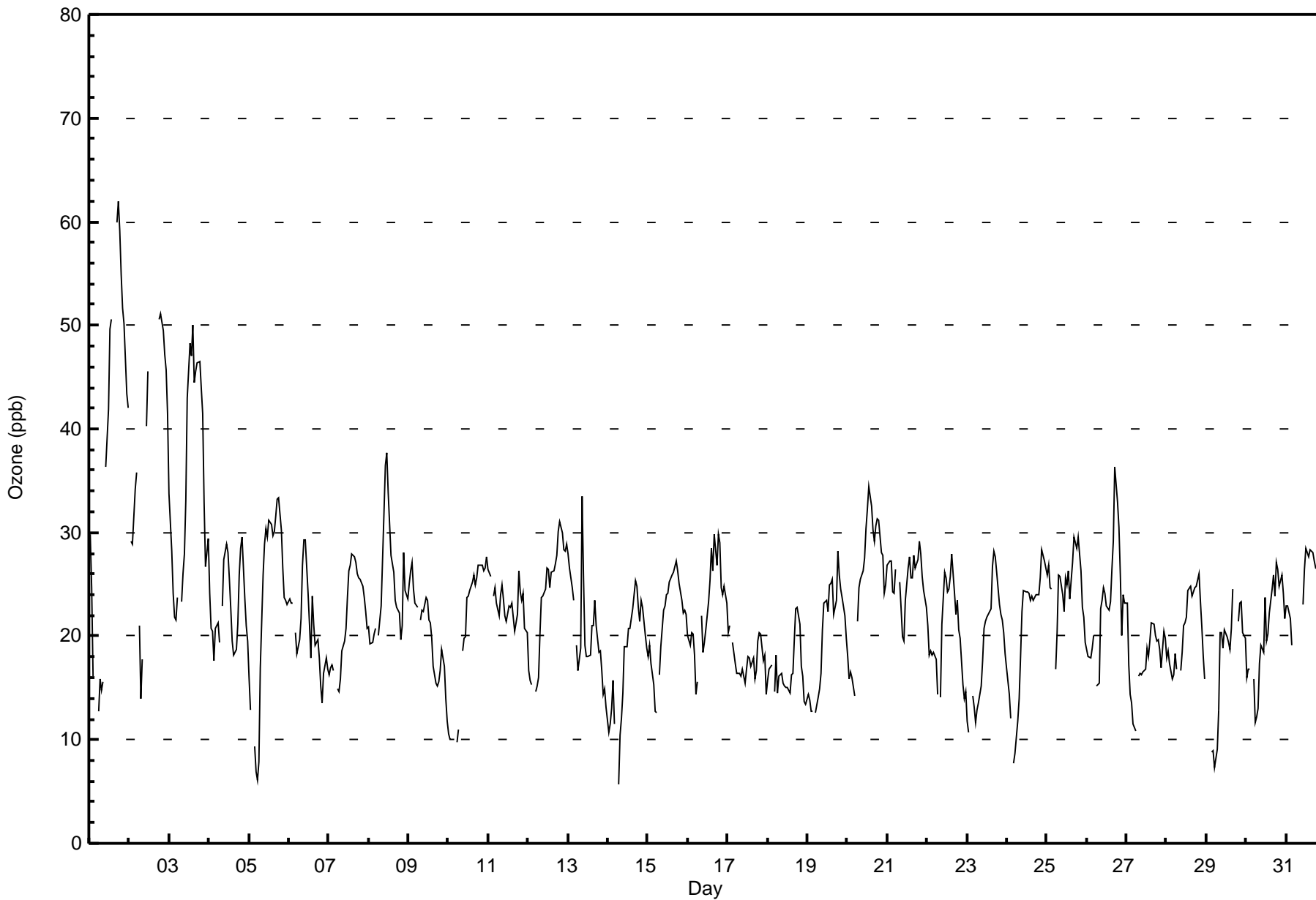








Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 62 ppb on Jul 1 18:00      Maximum Daily Average: 38.5 ppb on Jul 1		Hours in Service: 744 Hours of Data: 692 Hours of Missing Data: 52 Hours of Calibration: 37 Percent Operational Time: 98.0																								
Minimum Value: 6 ppb on Jul 14 07:00 Maximum Diurnal Average: 28.0 ppb at hour 19 Monthly Average: 22.7 ppb		Minimum Daily Average: 16.7 ppb on Jul 18 Minimum Diurnal Average: 15.4 ppb at hour 7 Percentiles: P <sub>1</sub> = 9 P <sub>10</sub> = 15 Q <sub>1</sub> = 18 Median = 22 Q <sub>3</sub> = 26 P <sub>90</sub> = 30 P <sub>99</sub> = 50																								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	30	25	16	UO	Z	13	16	15	16	UO	36	42	50	51	UO	UO	60	62	59	55	52	50	43	42	38.5	62
2-Jul	UO	29	29	34	36	Z	21	14	18	UO	40	46	C	C	C	C	C	C	51	51	49	47	46	42	--	51
3-Jul	34	28	24	22	22	24	Z	23	26	28	33	43	48	47	50	44	46	46	46	44	42	33	27	29	35.2	50
4-Jul	24	21	20	18	21	21	19	Z	23	27	29	28	26	23	20	18	19	21	26	28	30	24	21	19	22.8	30
5-Jul	16	13	Z	9	7	6	8	17	26	29	30	30	31	31	30	30	32	33	33	30	27	24	24	23	23.4	33
6-Jul	24	23	23	Z	20	18	20	22	27	29	29	24	21	18	24	21	19	20	18	15	14	16	18	17	20.9	29
7-Jul	16	17	17	17	Z	15	15	16	19	20	21	24	26	27	28	28	27	26	26	25	25	24	22	21	21.7	28
8-Jul	21	19	19	20	21	Z	20	23	27	32	36	38	34	28	27	26	24	23	22	20	21	28	24	24	25.1	38
9-Jul	25	26	27	25	23	23	Z	22	22	22	24	23	22	21	20	17	15	15	16	17	19	17	14	12	20.3	27
10-Jul	11	10	10	10	UO	10	11	Z	19	20	20	24	24	24	25	26	25	26	27	27	27	26	27	28	20.7	28
11-Jul	26	26	Z	24	25	23	22	24	25	24	22	21	23	23	23	22	20	22	26	24	23	24	21	20	23.2	26
12-Jul	17	16	15	Z	15	15	16	20	24	24	25	27	26	25	26	26	27	28	30	31	30	28	28	29	23.8	31
13-Jul	28	27	25	23	Z	19	17	19	33	26	19	18	18	18	21	21	23	21	18	19	17	14	15	13	20.5	33
14-Jul	11	11	13	16	12	Z	6	10	12	15	19	19	21	21	22	23	25	25	23	21	23	23	20	19	17.8	25
15-Jul	18	19	17	15	13	13	Z	16	19	23	23	24	24	25	26	26	27	27	26	25	23	22	23	22	21.6	27
16-Jul	20	19	20	20	18	14	16	Z	22	19	19	21	23	25	28	26	30	27	30	29	25	24	25	23	22.8	30
17-Jul	20	21	Z	19	17	16	16	16	16	17	16	17	18	18	17	18	16	17	20	20	20	18	18	14	17.7	21
18-Jul	16	17	17	Z	15	18	15	16	16	16	15	15	15	15	16	16	20	23	23	21	17	16	14	13	16.7	23
19-Jul	14	14	13	13	Z	13	14	15	16	21	23	23	22	25	25	25	22	23	28	26	24	24	22	20	20.3	28
20-Jul	18	16	16	16	14	Z	21	25	26	26	28	30	32	34	33	30	29	31	31	31	28	28	24	25	25.8	34
21-Jul	27	27	27	24	24	26	Z	25	23	20	19	23	27	28	26	26	28	27	27	29	28	26	24	23	25.4	29
22-Jul	21	18	19	18	18	18	14	Z	14	21	26	26	24	25	26	28	24	22	23	21	20	15	14	15	20.4	28
23-Jul	12	11	Z	14	13	12	13	14	15	18	21	21	22	22	23	27	28	28	26	23	22	22	20	18	19.3	28
24-Jul	17	14	12	Z	8	9	12	14	18	22	24	24	24	24	24	24	24	24	24	24	26	28	27	27	20.6	28
25-Jul	26	27	25	25	Z	17	20	26	26	24	22	26	25	26	24	27	30	29	29	30	26	23	22	19	24.9	30
26-Jul	19	18	18	19	20	Z	15	16	23	23	25	24	23	23	23	26	29	36	33	31	26	20	24	23	23.3	36
27-Jul	23	17	14	14	12	11	Z	16	16	16	17	17	19	18	20	21	21	20	20	20	19	17	20	20	17.7	23
28-Jul	18	19	17	16	16	18	17	Z	17	18	21	21	22	24	25	24	24	25	25	26	23	21	18	16	20.5	26
29-Jul	UO	UO	Z	9	9	7	9	13	20	20	19	21	20	19	19	21	25	UO	UO	21	23	23	20	20	17.8	25
30-Jul	16	17	17	Z	16	12	12	13	17	19	19	24	20	20	22	25	26	24	27	26	25	26	24	22	20.3	27
31-Jul	23	23	22	19	Z	UO	UO	18	UO	UO	23	26	29	28	28	28	28	27	27	26	26	27	30	24	25.4	30
20.3 19.6 19.0 18.4 17.2 15.6 15.4 18.0 20.7 22.1 24.0 25.5 25.3 25.2 24.8 24.9 26.4 26.8 28.0 27.0 25.8 24.5 23.2 22.0																								Diurnal Average		
34 29 29 34 36 26 22 26 33 32 40 46 50 51 50 44 60 62 59 55 52 50 46 42																								Diurnal Maximum		
Z - zerospan      C - Calibration      UO - Unstable Operation																										
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb																										





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

**Ozone (O<sub>3</sub>) - ppb**  
**Fort Chipewyan - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	275	39.74	39.74
21 - 50	409	59.10	98.84
51 - 82	8	1.16	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 692

Total Number of Hours: 744



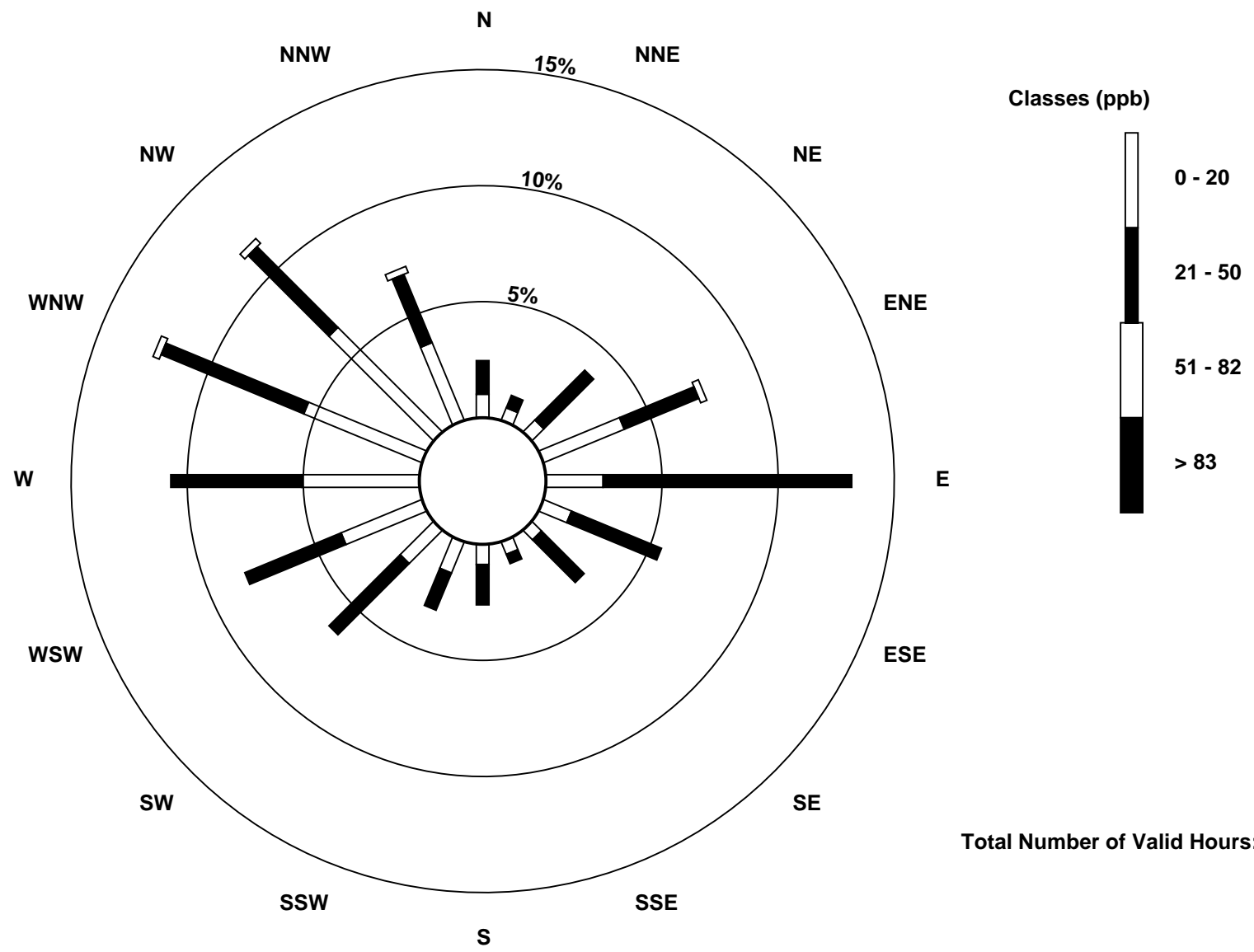
**Wood Buffalo Environmental Association  
Frequency Distribution**

**Ozone (O<sub>3</sub>) - ppb  
Fort Chipewyan - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	7	4	5	26	17	9	4	4	6	10	14	26	35	38	44	25	274
21 - 50	10	4	21	24	74	29	18	3	12	12	30	31	39	46	34	22	409
51 - 82	0	0	0	2	0	0	0	0	0	0	0	0	0	2	2	2	8
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	17	8	26	52	91	38	22	7	18	22	44	57	74	86	80	49	691

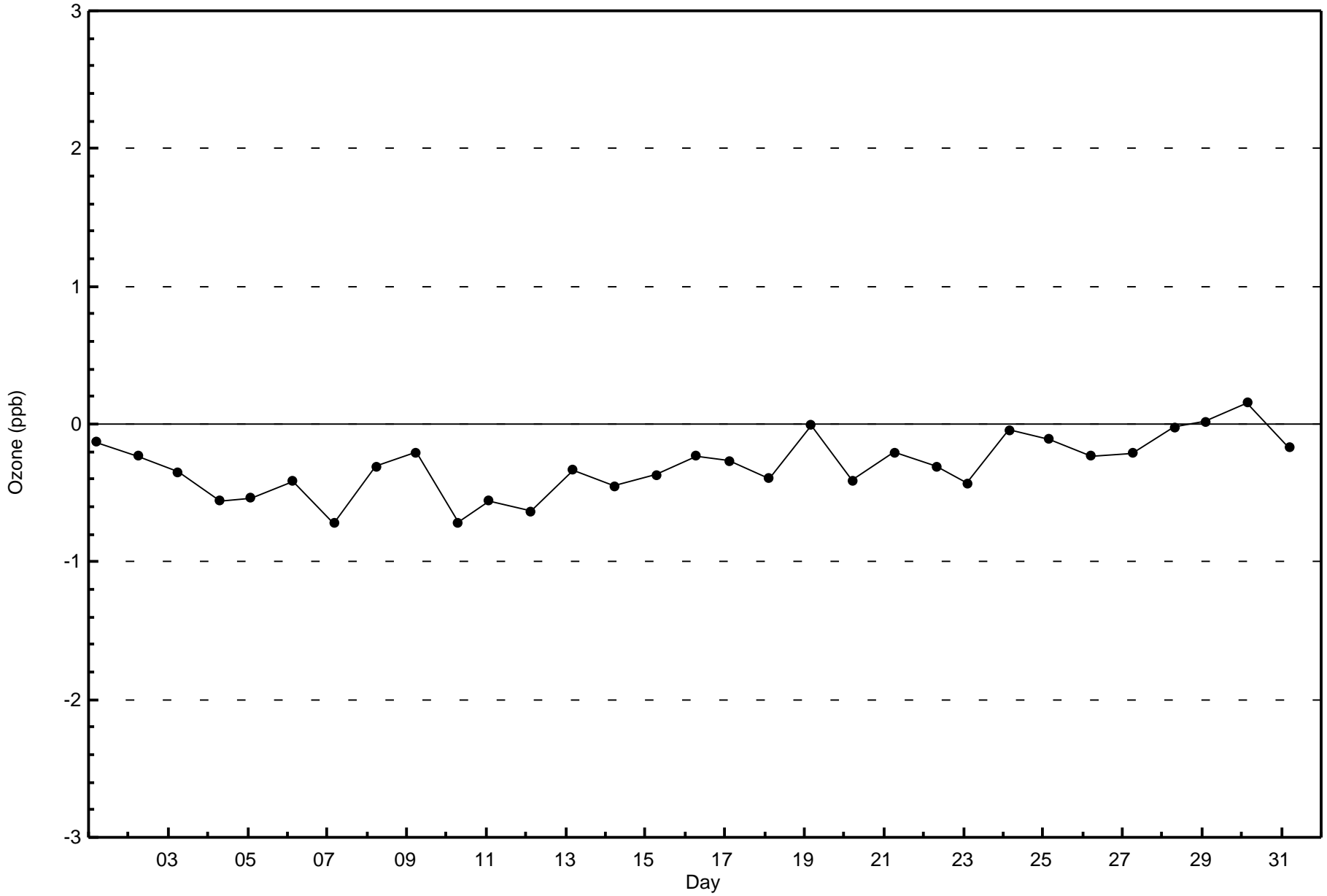
Total Number of Valid Hours: 691

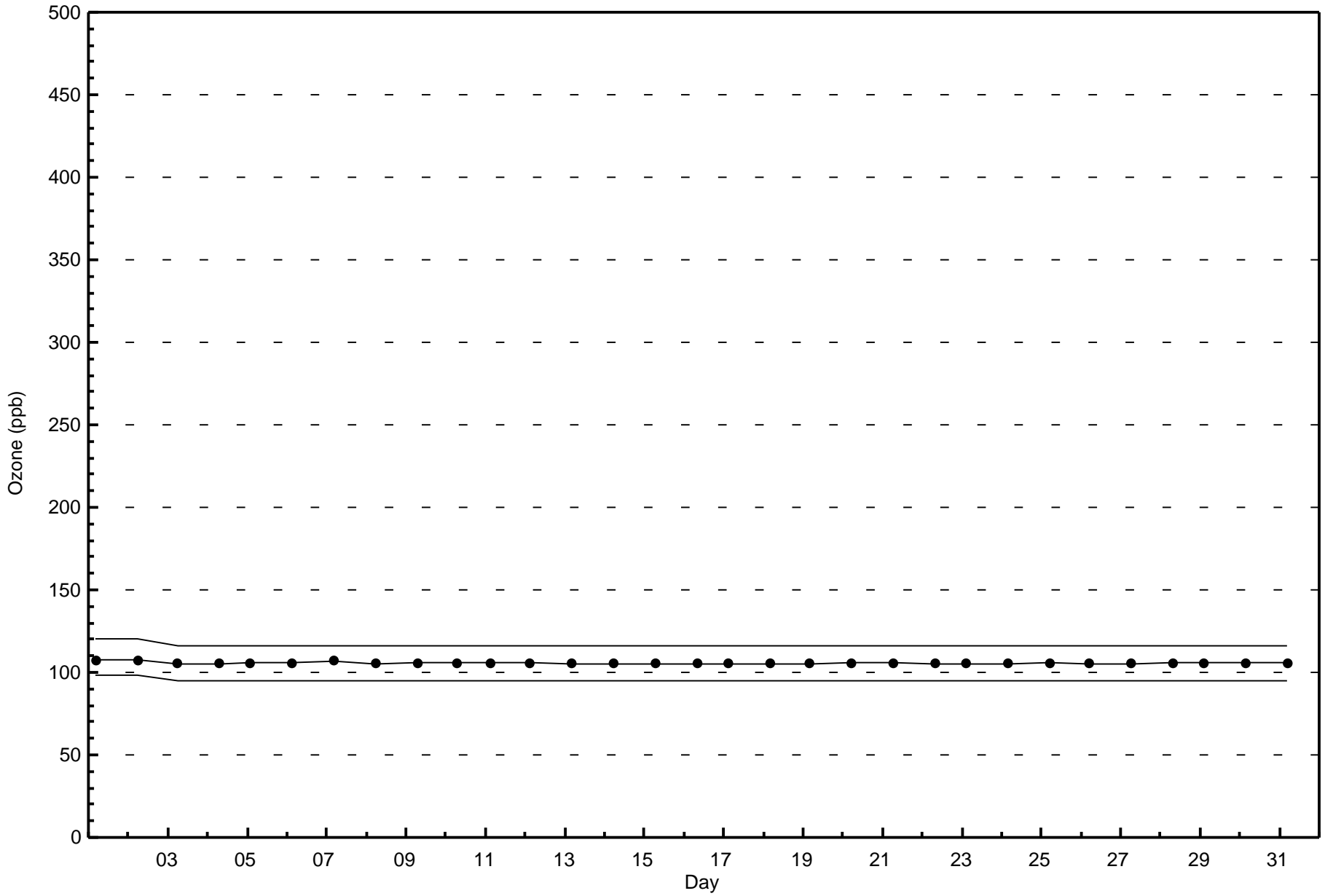
Total Number of Hours: 744



Total Number of Valid Hours: 691









Summary of Hour Averages

Fort Chipewyan - July 2015

Number of Exceedences (AAAQO): 24-hr: 8 Maximum Value: 973.5 µg/m <sup>3</sup> on Jul 1 06:00 Minimum Value: 0.7 µg/m <sup>3</sup> on Jul 4 18:00 Maximum Diurnal Average: 62.6 µg/m <sup>3</sup> at hour 9 Monthly Average: 31.11 µg/m <sup>3</sup>		Maximum Daily Average: 309.2 µg/m <sup>3</sup> on Jul 1 Minimum Daily Average: 2.2 µg/m <sup>3</sup> on Jul 30 Minimum Diurnal Average: 14.3 µg/m <sup>3</sup> at hour 17 Percentiles: P <sub>1</sub> = 1.4 P <sub>10</sub> = 1.9 Q <sub>1</sub> = 2.3 Median = 3.5 Q <sub>3</sub> = 21.1 P <sub>90</sub> = 79.1 P <sub>99</sub> = 339.0		Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	13.6	14.4	38.9	427.1	779.0	973.5	952.6	894.7	824.7	521.9	216.6	225.0	151.6	125.4	113.3	108.5	89.9	99.9	113.2	134.3	142.3	146.2	153.3	160.0	309.2	973.5
2-Jul	167.7	102.1	135.5	200.6	136.7	141.7	129.7	249.1	300.3	218.9	180.6	179.5	191.1	200.8	226.8	235.7	M	193.5	164.2	117.5	113.6	105.2	87.0	59.6	166.8	300.3
3-Jul	21.5	27.2	30.5	44.7	35.2	57.5	59.2	80.5	128.6	375.2	387.3	257.6	198.7	180.1	90.0	75.0	74.5	111.3	86.5	79.9	79.5	77.0	73.9	64.8	112.3	387.3
4-Jul	65.3	53.6	59.9	69.6	55.8	46.5	80.9	101.2	112.0	92.4	54.2	42.8	52.3	51.1	6.1	1.7	0.7	0.7	1.0	1.7	2.3	2.3	2.4	3.6	40.0	112.0
5-Jul	5.8	22.4	34.9	63.3	94.1	87.7	39.6	20.9	4.8	2.0	1.5	2.7	2.8	6.7	9.4	17.7	14.1	11.3	9.6	12.5	18.2	19.7	19.4	16.5	22.4	94.1
6-Jul	17.6	15.8	16.7	30.8	50.6	50.7	37.5	24.6	14.3	11.0	11.8	12.1	12.4	9.7	2.0	2.7	2.6	1.6	1.3	1.5	2.6	2.2	1.3	1.4	14.0	50.7
7-Jul	1.4	1.4	1.4	1.5	1.5	1.6	1.5	1.5	2.3	4.4	4.1	3.5	2.9	3.2	3.1	3.0	4.1	4.6	5.9	8.0	8.1	7.8	7.7	7.1	3.8	8.1
8-Jul	7.2	6.7	6.9	7.2	5.1	3.6	3.4	4.4	6.0	7.9	9.7	11.7	11.0	11.4	13.0	15.6	15.3	15.1	16.2	21.8	28.0	6.0	6.6	4.6	10.2	28.0
9-Jul	6.9	6.3	3.4	2.3	1.9	1.5	1.5	1.6	1.6	1.5	1.5	1.9	2.8	2.4	2.7	2.7	2.9	3.3	3.3	2.6	2.1	2.2	3.6	3.8	2.8	6.9
10-Jul	3.3	3.3	2.6	2.1	2.3	2.8	3.6	2.9	2.6	2.6	4.5	5.2	4.1	3.0	2.6	2.8	3.2	3.6	3.6	3.7	3.6	3.1	2.8	2.3	3.2	5.2
11-Jul	2.2	2.2	4.8	19.6	61.4	103.0	157.6	213.9	292.3	213.4	125.3	87.7	98.6	106.8	106.1	69.0	42.6	73.2	110.8	89.7	85.6	100.0	78.8	82.0	96.9	292.3
12-Jul	52.0	47.6	45.6	44.7	48.8	55.5	66.9	88.3	91.4	74.6	54.8	49.5	42.6	35.4	36.6	41.9	45.2	45.9	51.5	52.3	47.0	41.9	39.5	38.8	51.6	91.4
13-Jul	37.5	41.3	42.0	41.9	64.9	61.1	53.6	48.8	32.9	33.4	29.6	26.5	25.5	27.2	39.9	32.5	36.8	31.9	24.1	24.8	19.0	18.7	25.1	28.5	35.3	64.9
14-Jul	32.4	38.7	57.9	73.8	59.3	51.8	52.6	53.6	51.7	59.7	45.9	72.5	69.8	37.1	32.8	30.7	44.4	51.9	51.1	42.4	9.0	8.2	6.8	5.8	43.3	73.8
15-Jul	5.0	4.4	3.9	3.5	2.1	3.1	5.8	7.6	5.1	3.7	2.6	2.5	2.9	2.4	1.8	1.7	1.6	1.5	1.8	2.4	2.4	2.4	2.6	2.8	3.1	7.6
16-Jul	2.9	3.3	4.2	5.0	5.9	5.9	5.9	7.2	5.4	5.0	5.3	4.3	4.1	4.5	3.9	3.7	6.2	6.1	8.6	7.2	4.3	5.8	6.8	8.2	5.4	8.6
17-Jul	11.0	11.2	10.2	14.0	26.5	21.2	19.6	21.7	21.6	9.7	4.9	4.2	4.4	4.7	5.0	4.1	5.2	5.6	4.0	4.5	4.3	4.6	4.0	4.0	9.6	26.5
18-Jul	4.0	4.1	4.0	4.0	3.8	5.2	5.1	5.8	5.7	5.7	5.3	5.5	7.3	8.5	8.8	12.3	7.2	4.7	4.4	4.3	4.4	4.0	4.2	3.9	5.5	12.3
19-Jul	4.1	5.8	8.1	8.9	9.6	11.0	8.8	7.0	4.9	3.3	3.0	3.5	3.7	3.5	3.6	3.5	3.2	2.0	1.8	1.9	2.5	6.2	2.8	2.5	4.8	11.0
20-Jul	2.7	2.9	3.1	3.1	3.1	3.5	4.2	4.8	3.9	3.4	3.5	3.3	2.3	2.0	2.6	2.6	2.5	2.1	2.3	2.5	3.2	3.5	4.0	2.8	3.1	4.8
21-Jul	2.1	1.9	2.0	2.1	2.7	4.0	3.7	3.9	3.1	3.0	3.6	3.1	2.7	2.7	2.9	2.3	2.7	2.8	2.6	2.2	2.2	2.3	2.2	2.1	2.7	4.0
22-Jul	1.7	1.6	1.5	1.8	1.8	2.6	3.0	2.5	2.3	1.8	1.7	1.9	2.0	2.0	2.4	2.2	2.8	1.8	2.0	2.5	2.6	2.7	2.6	3.4	2.2	3.4
23-Jul	4.1	4.7	3.9	3.3	2.9	2.8	2.1	3.3	3.4	2.5	1.7	1.6	1.8	2.0	2.2	2.1	2.0	2.1	2.2	2.2	2.4	2.3	2.0	1.9	2.6	4.7
24-Jul	1.8	1.8	1.7	1.7	1.7	2.0	2.2	2.6	4.6	3.6	3.0	2.3	1.9	2.0	2.1	1.9	2.1	1.7	1.6	1.8	2.5	2.8	3.0	3.6	2.3	4.6
25-Jul	3.7	3.9	3.7	3.0	3.0	3.1	2.9	1.9	2.1	2.1	1.8	1.8	1.8	2.0	2.0	2.1	1.9	1.9	1.9	2.1	2.4	2.8	2.6	2.3	2.5	3.9
26-Jul	2.0	1.9	1.8	2.6	2.4	2.0	2.1	2.4	2.2	2.3	2.3	2.7	2.7	3.3	2.8	2.5	1.9	1.7	2.0	2.0	2.0	2.3	2.1	1.9	2.3	3.3
27-Jul	2.7	3.0	3.3	3.2	3.4	4.1	3.0	2.2	2.2	2.2	2.1	2.1	1.7	1.7	1.8	2.1	2.6	2.8	3.1	2.9	2.6	2.7	2.9	2.7	2.6	4.1
28-Jul	2.0	1.8	1.6	1.5	1.5	1.7	1.9	1.9	2.0	2.2	2.3	2.3	2.1	1.9	2.2	2.3	2.7	3.1	3.3	3.6	3.6	2.9	2.7	2.9	2.3	3.6
29-Jul	3.0	3.1	2.9	2.9	3.3	3.3	2.5	2.4	2.3	2.5	4.1	2.9	1.9	1.5	1.7	1.7	2.0	2.3	2.7	2.6	2.3	2.4	2.4	2.4	2.5	4.1
30-Jul	1.9	1.8	2.1	2.1	1.9	2.3	2.5	2.1	2.7	2.9	2.7	2.0	1.7	1.5	1.7	1.7	2.1	2.5	1.9	1.8	1.9	2.4	2.7	3.0	2.2	3.0
31-Jul	3.3	3.1	3.0	2.7	2.2	2.0	2.0	1.9	2.0	2.3	2.3	2.3	2.2	2.5	3.5	2.8	2.8	2.1	1.8	1.5	2.6	2.4	2.2	2.3	2.4	3.5
																								Diurnal Average		
																								Diurnal Maximum		
15.9 14.3 17.5 35.3 47.6 55.4 55.4 60.2 62.6 54.1 38.0 33.1 29.5 27.4 23.7 22.3 14.3 22.4 22.3 20.7 19.7 19.2 18.1 17.1																								Diurnal Average		
167.7 102.1 135.5 427.1 779.0 973.5 952.6 894.7 824.7 521.9 387.3 257.6 198.7 200.8 226.8 235.7 89.9 193.5 164.2 134.3 142.3 146.2 153.3 160.0																								Diurnal Maximum		
M - Maintenance Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m <sup>3</sup>																										

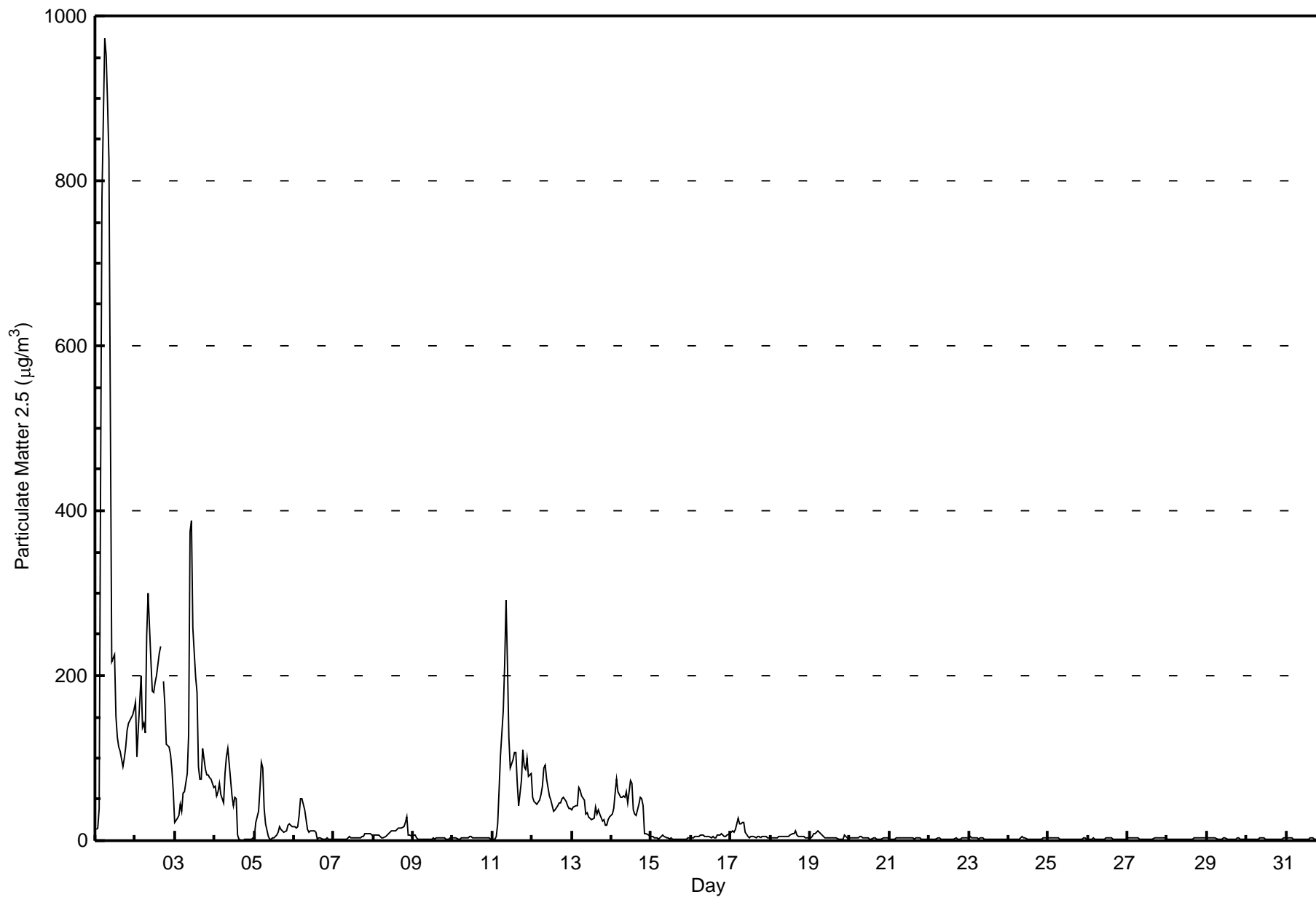


Wood Buffalo Environmental Association

Hourly Averages

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

Fort Chipewyan - July 2015





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

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Fort Chipewyan - July 2015**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
1 - 5	462	62.18	62.18
6 - 15	78	10.50	72.68
16 - 25	26	3.50	76.18
26 - 80	99	13.32	89.50
> 81.0	76	10.23	99.73

Total Number of Valid Hours: 743

Total Number of Hours: 744



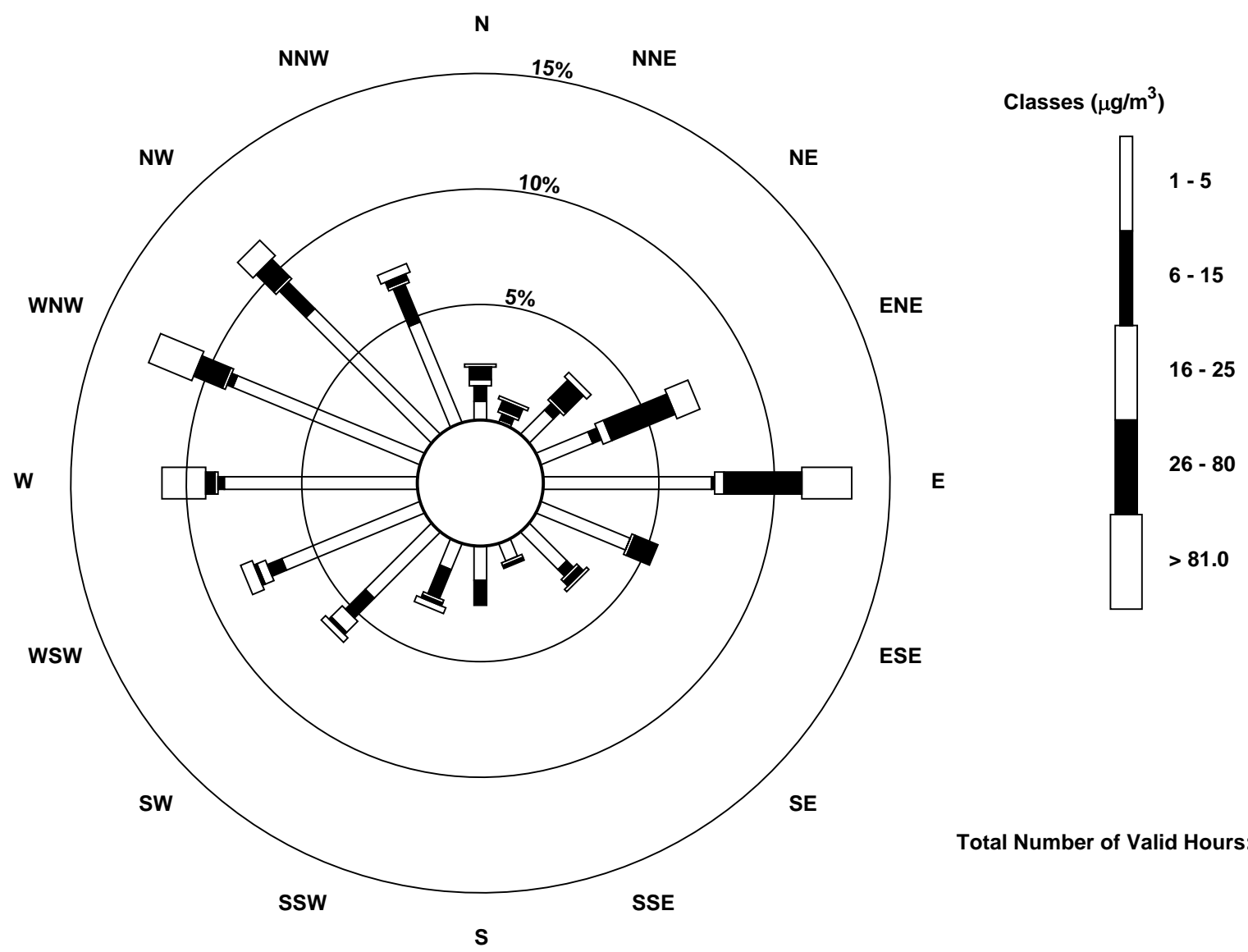
**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Fort Chipewyan - July 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	6	1	11	18	54	31	17	6	11	9	30	48	62	65	57	35	461
6 - 15	5	2	3	3	1	0	3	0	8	10	9	5	2	2	12	13	78
16 - 25	2	1	1	3	3	1	1	1	0	1	5	3	1	1	1	1	26
26 - 80	4	3	8	22	25	8	2	1	0	1	1	1	3	10	8	2	99
> 81.0	1	1	2	8	16	0	1	0	0	2	2	4	14	15	7	3	76
<b>Totals</b>	18	8	25	54	99	40	24	8	19	23	47	61	82	93	85	54	740

Total Number of Valid Hours: 742

Total Number of Hours: 744

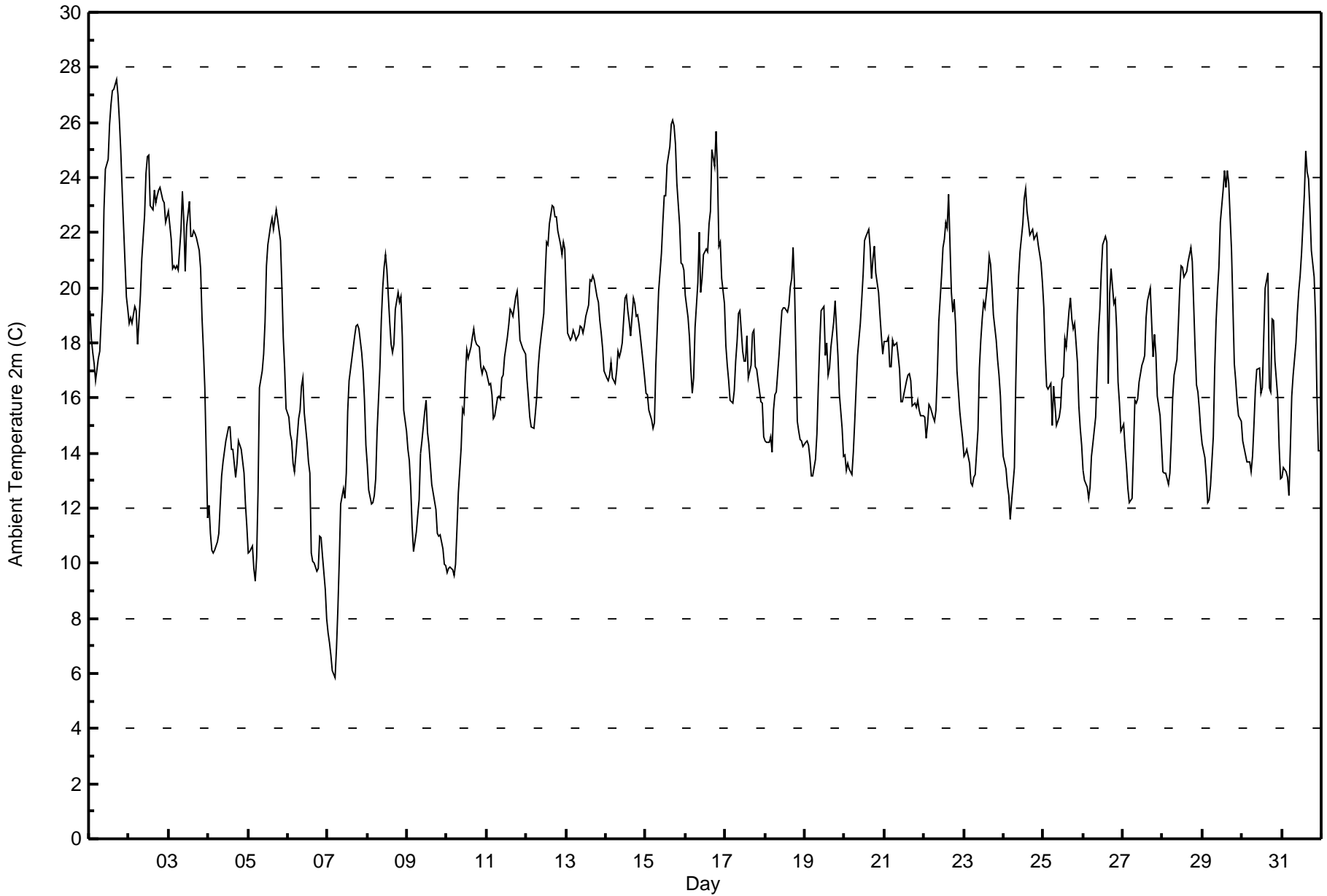


Total Number of Valid Hours: 742



Maximum Value: 27.5 C on Jul 1 17:00		Maximum Daily Average: 22.2 C on Jul 1		Hours in Service: 744																																												
Minimum Value: 5.9 C on Jul 7 05:00		Minimum Daily Average: 12.5 C on Jul 9		Hours of Data: 744																																												
Maximum Diurnal Average: 20.0 C at hour 16		Minimum Diurnal Average: 13.9 C at hour 5		Hours of Missing Data: 0																																												
Monthly Average: 17.38 C		Percentiles: P <sub>1</sub> = 8.3 P <sub>10</sub> = 12.7 Q <sub>1</sub> = 14.8 Median = 17.4 Q <sub>3</sub> = 19.9 P <sub>90</sub> = 22.3 P <sub>99</sub> = 26.1		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-Jul	19.2	18.2	17.7	17.2	16.6	17.4	17.7	18.8	19.9	22.8	24.3	24.6	26.0	26.7	27.2	27.2	27.5	27.0	26.1	25.0	23.5	22.2	19.7	19.2	22.2	27.5																						
2-Jul	18.7	18.9	18.7	19.3	19.2	17.9	18.8	19.7	21.0	22.6	24.2	24.8	24.8	23.0	22.8	23.6	23.1	23.3	23.6	23.6	23.2	23.1	22.4	22.6	21.8	24.8																						
3-Jul	22.8	21.8	20.7	20.8	20.7	20.8	20.6	22.1	23.5	22.4	20.6	22.2	23.1	21.9	21.9	22.1	22.0	21.8	21.4	20.7	18.9	17.7	16.4	11.6	20.8	23.5																						
4-Jul	12.1	11.1	10.5	10.4	10.5	10.8	11.1	12.2	13.2	13.7	14.4	14.7	14.9	14.1	14.2	13.1	13.6	14.4	14.3	14.1	13.3	12.2	11.4	12.9	14.9																							
5-Jul	10.4	10.4	10.6	9.8	9.4	10.2	12.6	16.4	17.0	17.6	18.7	20.8	21.6	22.3	22.5	22.1	22.5	22.8	22.5	21.7	20.1	18.2	17.1	15.6	17.2	22.8																						
6-Jul	15.3	14.7	14.4	13.6	13.3	13.9	15.2	15.6	16.4	16.7	15.5	14.4	13.7	13.3	10.4	10.1	10.0	9.7	9.8	11.0	10.9	10.3	9.1	8.0	12.7	16.7																						
7-Jul	7.5	7.1	6.7	6.1	5.9	6.9	8.3	10.1	12.1	12.7	12.4	13.3	15.5	16.6	17.0	17.8	18.2	18.6	18.7	18.5	17.7	17.0	15.9	14.3	13.1	18.7																						
8-Jul	13.6	12.7	12.2	12.2	12.4	13.1	14.8	17.1	18.8	20.0	20.8	21.2	20.7	18.7	17.9	17.6	18.0	19.2	19.8	19.5	19.7	18.2	15.6	14.8	17.0	21.2																						
9-Jul	14.1	13.7	12.8	11.3	10.4	11.1	11.7	12.3	14.0	14.4	15.5	15.9	14.8	14.3	13.6	12.9	12.2	11.9	11.1	11.0	11.0	10.5	10.0	9.9	12.5	15.9																						
10-Jul	9.7	9.8	9.9	9.8	9.6	10.0	11.3	12.6	14.2	15.6	15.5	16.8	17.8	17.4	17.8	18.2	18.5	18.1	18.0	17.8	17.1	16.9	17.1	17.1	14.8	18.5																						
11-Jul	16.9	16.5	16.5	16.1	15.2	15.3	16.0	16.0	16.0	16.7	16.8	17.5	18.2	18.7	19.2	19.1	19.0	19.7	19.9	19.1	18.1	18.0	17.8	17.6	17.5	19.9																						
12-Jul	16.7	16.0	15.3	15.0	14.9	15.5	16.1	17.1	17.7	18.2	19.0	20.4	21.7	21.6	22.3	23.0	22.9	22.6	22.6	22.1	21.6	21.2	21.7	21.4	19.4	23.0																						
13-Jul	19.8	18.4	18.1	18.2	18.5	18.3	18.1	18.3	18.6	18.5	18.3	18.6	19.0	19.4	20.3	20.3	20.4	20.3	19.7	19.5	18.8	18.4	17.8	17.0	18.9	20.4																						
14-Jul	16.7	16.6	16.8	17.3	16.7	16.5	17.0	17.7	17.5	17.7	18.0	19.7	19.7	19.2	18.8	18.3	19.6	19.4	19.0	19.0	18.6	18.2	17.2	16.7	18.0	19.7																						
15-Jul	16.2	16.1	15.5	15.2	14.9	15.1	17.2	18.5	19.9	21.2	22.4	23.3	23.3	24.5	25.1	25.9	26.1	25.9	25.2	23.8	22.3	20.9	20.8	20.6	20.8	26.1																						
16-Jul	19.7	18.9	18.2	17.0	16.2	16.7	18.6	20.2	22.0	19.8	20.3	21.2	21.4	21.3	22.3	22.8	25.0	24.4	25.7	24.2	21.5	21.6	20.4	19.4	20.8	25.7																						
17-Jul	17.9	17.2	16.6	15.9	15.8	16.3	17.3	18.1	19.1	19.1	17.7	17.4	17.3	18.3	16.7	17.2	18.4	18.5	17.1	17.0	16.6	15.9	15.8	14.6	17.2	19.1																						
18-Jul	14.4	14.4	14.4	14.6	14.0	15.6	16.1	16.2	17.6	18.4	19.1	19.2	19.3	19.1	19.4	20.1	20.4	21.5	20.1	15.2	14.8	14.5	14.4	14.2	17.0	21.5																						
19-Jul	14.4	14.5	14.3	13.8	13.2	13.2	13.8	14.7	16.4	17.9	19.2	19.3	17.5	18.0	16.8	17.1	17.9	18.8	19.5	18.5	17.6	16.2	14.9	13.9	16.3	19.5																						
20-Jul	13.9	13.4	13.6	13.4	13.2	14.0	15.2	16.4	17.5	18.7	19.6	20.5	21.7	21.9	22.1	21.5	20.3	21.1	21.5	20.5	19.8	19.0	18.3	17.6	18.1	22.1																						
21-Jul	18.0	18.1	18.2	17.1	17.2	18.1	17.9	18.0	17.5	17.1	15.8	15.9	16.4	16.6	16.8	16.9	16.6	15.7	15.8	15.7	15.9	15.6	15.3	15.3	16.7	18.2																						
22-Jul	15.3	14.5	15.0	15.8	15.7	15.3	15.1	15.6	16.9	18.7	20.4	21.4	21.8	22.4	22.2	23.4	19.9	19.1	19.6	18.7	17.0	15.5	15.0	14.6	17.9	23.4																						
23-Jul	13.9	14.0	14.1	13.6	12.9	12.8	13.1	13.2	14.9	17.1	18.1	18.9	19.5	19.3	20.3	21.2	20.9	20.0	19.0	18.1	17.4	16.8	16.1	14.7	16.7	21.2																						
24-Jul	13.9	13.4	12.8	12.5	11.6	12.3	13.5	16.6	19.0	20.4	21.3	22.3	23.3	23.6	22.8	22.4	21.9	22.1	21.8	21.9	22.0	21.6	20.9	20.2	18.9	23.6																						
25-Jul	19.3	17.6	16.4	16.3	16.5	15.0	16.4	15.7	15.0	15.3	15.7	16.7	16.8	18.1	17.9	19.1	19.7	18.8	18.5	18.7	17.3	15.7	14.9	14.3	16.9	19.7																						
26-Jul	13.4	13.0	12.7	12.3	12.8	13.9	14.3	15.3	16.9	18.3	19.2	20.6	21.6	21.9	21.7	16.5	19.8	20.7	19.4	19.6	18.5	16.6	15.8	14.8	17.1	21.9																						
27-Jul	15.0	14.2	13.5	12.7	12.2	12.3	14.1	15.9	15.8	16.0	16.6	17.2	17.4	17.6	18.9	19.5	20.0	18.7	17.5	18.3	17.6	16.1	15.4	14.4	16.1	20.0																						
28-Jul	13.3	13.3	13.2	12.9	13.3	14.5	16.0	16.8	17.4	18.6	20.0	20.8	20.8	20.4	20.6	21.0	21.2	21.4	21.0	17.8	16.5	16.2	15.6	14.9	17.4	21.4																						
29-Jul	14.3	13.8	13.2	12.2	12.3	12.8	14.6	17.1	18.8	19.9	20.8	22.4	23.5	24.2	23.6	24.2	23.8	21.3	19.3	17.2	16.6	15.9	15.4	15.1	18.0	24.2																						
30-Jul	14.4	14.2	13.9	13.7	13.7	13.3	13.9	15.0	16.3	17.0	17.1	16.2	16.4	18.2	20.0	20.5	16.4	16.2	18.9	18.8	17.4	16.0	14.2	13.1	16.0	20.5																						
31-Jul	13.1	13.5	13.3	13.1	12.4	14.2	16.1	16.8	18.0	19.1	19.9	20.4	21.3	23.4	24.9	24.2	23.9	22.8	21.4	20.4	18.9	16.1	14.1	14.1	18.1	24.9																						
																								15.3	14.8	14.5	14.2	13.9	14.3	15.2	16.3	17.4	18.1	18.6	19.3	19.7	19.9	19.9	20.0	20.0	19.8	19.6	18.9	18.1	17.2	16.4	15.6	Diurnal Average
																								22.8	21.8	20.7	20.8	20.7	20.8	20.6	22.1	23.5	22.8	24.3	24.8	26.0	26.7	27.2	27.2	27.5	27.0	26.1	25.0	23.5	23.1	22.4	22.6	Diurnal Maximum







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

**Ambient Temperature 2m (AT 2m) - C**  
**Fort Chipewyan - July 2015**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	21	2.82	2.82
10 - 20	545	73.25	76.08
> 20	178	23.92	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Relative Humidity (RH) - %**

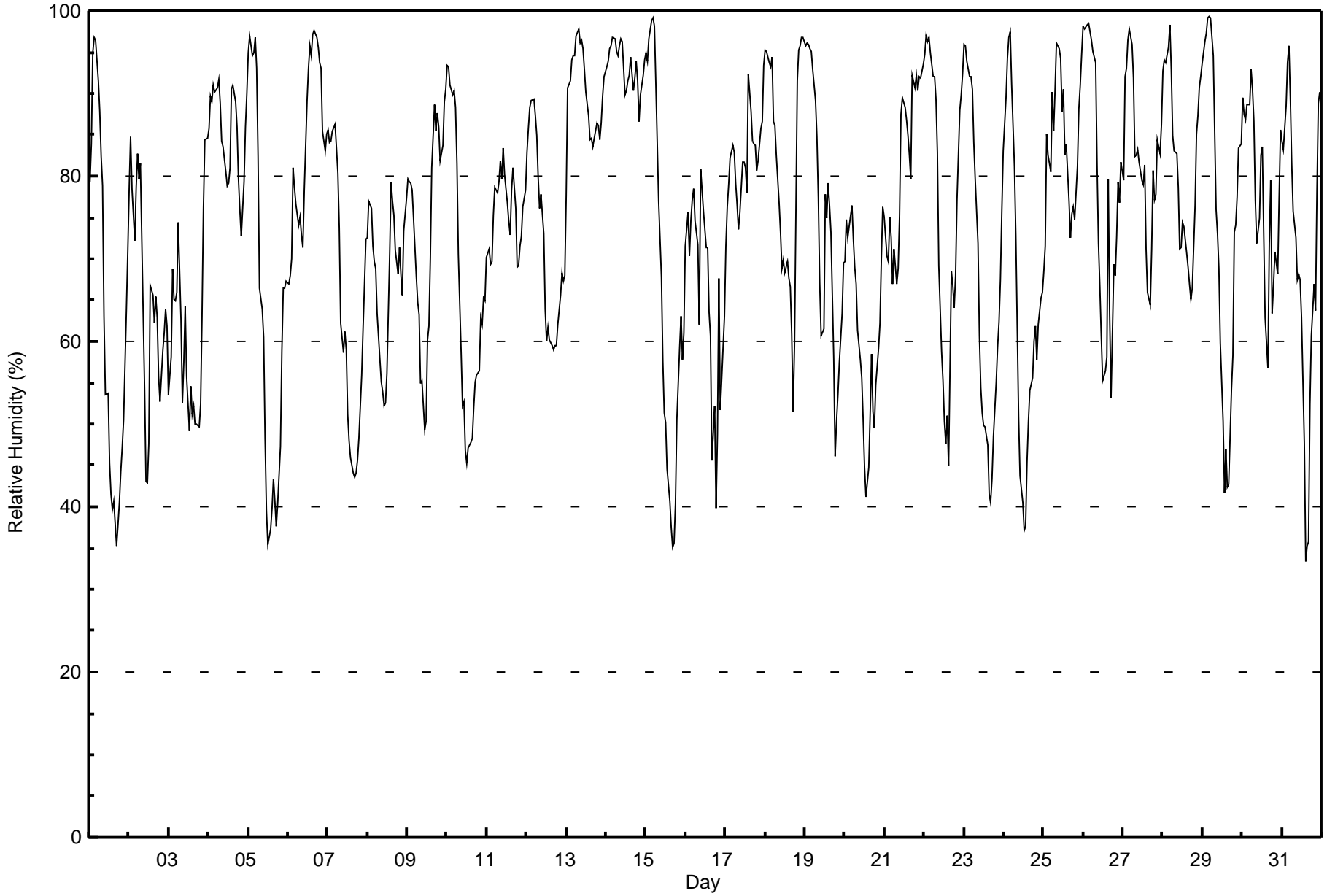
**Fort Chipewyan - July 2015**

Maximum Value: 99 % on Jul 29 05:00      Maximum Daily Average: 93.3 % on Jul 14																	Hours in Service: 744 Hours of Data: 744																									
Minimum Value: 33 % on Jul 31 15:00      Minimum Daily Average: 60.9 % on Jul 3 Maximum Diurnal Average: 87.8 % at hour 5      Minimum Diurnal Average: 63.5 % at hour 17 Monthly Average: 73.9 %      Percentiles: P <sub>1</sub> = 37 P <sub>10</sub> = 50 Q <sub>1</sub> = 62 Median = 76 Q <sub>3</sub> = 88 P <sub>90</sub> = 95 P <sub>99</sub> = 98																	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-Jul	79	84	95	97	96	91	88	82	79	63	53	54	45	42	40	41	35	38	40	44	47	51	64	71	63.3	97																
2-Jul	78	85	78	72	79	83	80	81	72	54	43	43	48	67	66	62	65	63	56	53	59	61	64	62	65.6	85																
3-Jul	54	58	69	65	65	66	74	63	53	58	64	56	49	55	51	52	50	50	50	52	63	76	84	85	60.9	85																
4-Jul	86	90	89	91	90	91	92	89	84	84	81	79	79	81	91	91	89	86	80	76	73	79	86	90	85.2	92																
5-Jul	95	97	95	95	97	93	82	67	64	60	48	39	35	37	40	43	41	38	40	47	59	66	66	67	63.0	97																
6-Jul	67	68	70	81	79	77	74	75	73	71	78	89	93	96	95	97	98	97	96	94	93	85	83	85	83.9	98																
7-Jul	86	84	84	85	86	83	80	74	62	59	61	59	51	48	46	44	43	44	46	48	56	62	67	72	63.8	86																
8-Jul	73	77	76	72	70	69	63	58	55	54	52	53	56	71	79	77	75	71	68	71	68	66	73	77	67.7	79																
9-Jul	80	79	79	78	75	68	65	63	55	55	49	50	60	62	70	81	89	86	88	86	82	84	89	91	73.5	91																
10-Jul	93	93	91	90	90	88	82	71	59	52	53	47	45	47	48	48	52	55	56	56	63	62	65	65	65.5	93																
11-Jul	70	71	69	70	75	79	78	79	82	80	83	80	77	75	73	78	81	76	69	69	72	73	76	78	75.6	83																
12-Jul	83	86	88	89	89	87	85	80	76	78	73	64	60	62	60	59	59	59	60	62	66	68	67	68	72.0	89																
13-Jul	78	91	92	94	95	95	97	98	96	96	96	93	90	87	84	84	84	85	86	86	84	87	90	92	89.9	98																
14-Jul	93	94	95	96	97	97	95	95	96	97	96	90	90	92	92	94	90	92	94	92	87	90	92	94	93.3	97																
15-Jul	95	94	97	99	99	98	91	84	77	68	58	51	50	45	41	37	35	36	40	51	59	63	58	61	66.1	99																
16-Jul	72	76	70	75	77	78	75	72	62	81	78	76	71	71	63	61	46	52	40	49	68	52	55	63	65.9	81																
17-Jul	72	76	79	82	84	83	79	77	74	76	82	82	81	78	92	88	84	84	84	81	82	86	87	93	81.8	93																
18-Jul	95	95	94	93	94	87	86	82	77	73	69	70	68	70	68	67	61	51	60	92	95	96	97	97	80.7	97																
19-Jul	96	96	96	95	95	93	89	85	77	67	61	62	78	75	79	76	73	58	46	50	53	57	63	70	74.7	96																
20-Jul	70	75	73	74	76	72	69	67	61	58	56	51	45	41	45	51	58	52	50	55	59	62	70	76	61.0	76																
21-Jul	75	70	70	75	72	67	71	67	69	75	87	90	88	87	85	83	80	92	91	92	90	92	92	94	81.4	94																
22-Jul	95	97	96	97	95	92	92	89	83	69	59	55	50	48	51	45	69	67	64	68	77	88	90	92	76.2	97																
23-Jul	96	96	94	92	92	91	84	80	72	61	54	51	50	50	47	42	40	43	48	55	59	62	67	76	66.8	96																
24-Jul	83	90	94	97	98	91	81	73	62	51	44	40	37	38	45	50	54	56	60	62	58	62	65	66	64.8	98																
25-Jul	68	72	85	83	81	90	85	90	96	96	94	88	91	83	84	77	72	75	76	75	81	88	91	95	84.0	96																
26-Jul	98	98	98	98	97	96	95	94	81	72	67	61	55	56	58	80	63	53	69	68	73	79	77	82	77.9	98																
27-Jul	79	92	93	96	98	96	92	82	83	83	82	80	79	81	71	66	64	71	81	77	78	84	83	86	82.4	98																
28-Jul	93	94	94	96	98	93	85	83	83	79	71	71	74	74	71	69	67	65	66	76	85	87	91	92	81.5	98																
29-Jul	94	96	97	99	99	99	95	85	76	73	69	60	50	42	47	42	43	54	58	73	74	77	83	84	73.8	99																
30-Jul	90	87	87	89	89	93	90	87	77	72	75	83	83	73	63	57	72	79	63	67	71	68	77	86	78.2	93																
31-Jul	84	83	88	94	96	90	82	76	73	68	68	67	63	48	33	35	36	52	61	67	64	78	89	90	70.2	96																
																	82.8	85.3	86.3	87.4	87.8	86.3	83.1	78.9	73.8	70.4	67.9	65.5	64.3	63.8	63.8	63.8	63.5	63.9	64.0	67.6	70.9	73.9	77.5	80.6	Diurnal Average	
																	98	98	98	99	99	99	97	98	96	97	96	93	93	96	95	97	98	97	96	94	95	96	97	97	Diurnal Maximum	



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

**Relative Humidity (RH) - %**  
**Fort Chipewyan - July 2015**





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

**Relative Humidity (RH) - %**  
**Fort Chipewyan - July 2015**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	17	2.28	2.28
40 - 60	147	19.76	22.04
60 - 80	278	37.37	59.41
80 - 100	302	40.59	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

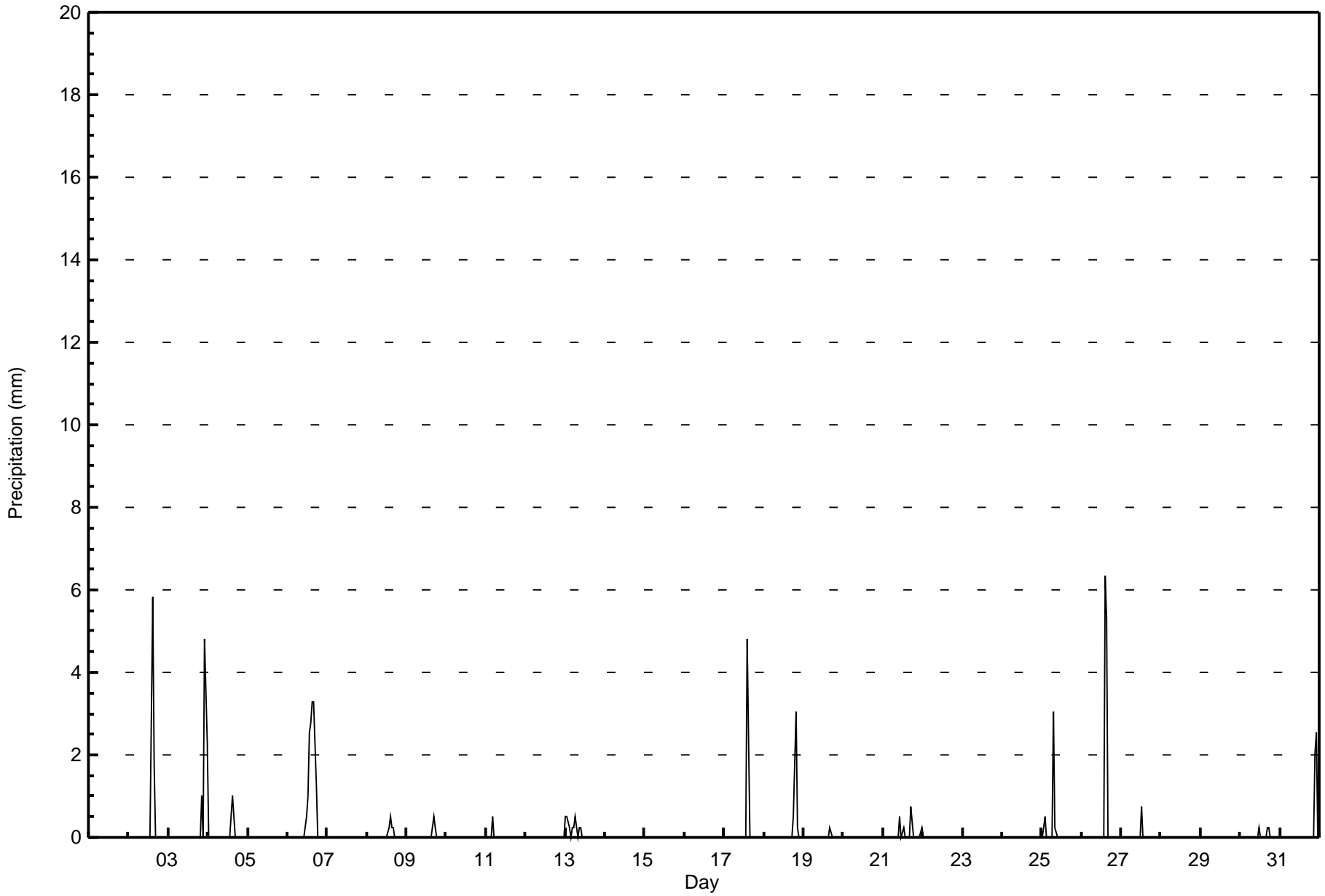


Maximum Value: 6.4 mm on Jul 26 15:00		Maximum Daily Total: 14.7 mm on Jul 6		Hours in Service: 744																								
Minimum Value: 0.0 mm on Jul 1 01:00		Minimum Daily Total: 0.0 mm on Jul 1		Hours of Data: 744																								
Maximum Diurnal Total: 20.8 mm at hour 15		Minimum Diurnal Total: 0.0 mm at hour 4		Hours of Missing Data: 0																								
Monthly Total: 69.85 mm		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 0.0 P <sub>90</sub> = 0.0 P <sub>99</sub> = 3.3		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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	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	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.6	5.8
3-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	4.8	2.3	0.0	8.1	4.8	
4-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	1.0	
5-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.0	2.5	2.8	3.3	3.3	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.7	3.3	
7-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.5	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.5	
9-Jul	0.0	0.0	0.0	0.0	0.0	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.5	
10-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	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	0.5	0.5	0.5
12-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.5	0.5	0.3	0.0	0.3	0.3	0.5	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	2.8	0.5	
14-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17-Jul	0.0	0.0	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.8	4.8	
18-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	3.0	0.3	0.0	0.0	0.0	0.0	3.8	3.0	
19-Jul	0.0	0.0	0.0	0.0	0.0	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	
20-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.3	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.3	0.0	1.8	0.8	
22-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.3	0.5	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	0.0	0.0	0.0	4.1	3.0	
26-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.4	5.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.7	6.4	
27-Jul	0.0	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	0.8	0.8	
28-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	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	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.3	
31-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	2.5	0.0	4.6	2.5		
		0.5	0.8	0.8	0.0	0.8	0.3	0.5	3.0	0.5	0.3	0.5	0.8	2.0	2.8	20.8	11.7	4.6	2.5	0.5	3.0	1.3	2.0	7.4	2.5	Diurnal Average		
		0.5	0.5	0.5	0.0	0.5	0.3	0.5	3.0	0.3	0.3	0.5	0.5	1.0	2.5	6.4	5.3	3.3	1.3	0.5	3.0	1.0	2.0	4.8	2.3	Diurnal Maximum		



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

**Precipitation (PC) - mm**  
**Fort Chipewyan - July 2015**





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

**Precipitation (PC) - mm**  
**Fort Chipewyan - July 2015**

<b>Concentration Ranges (mm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.3	712	95.70	95.70
0.4 - 0.5	11	1.48	97.18
0.6 - 0.7	0	0.00	97.18
0.8 - 1.4	6	0.81	97.98
1.5 - 10	15	2.02	100.00
> 10	0	0.00	100.00

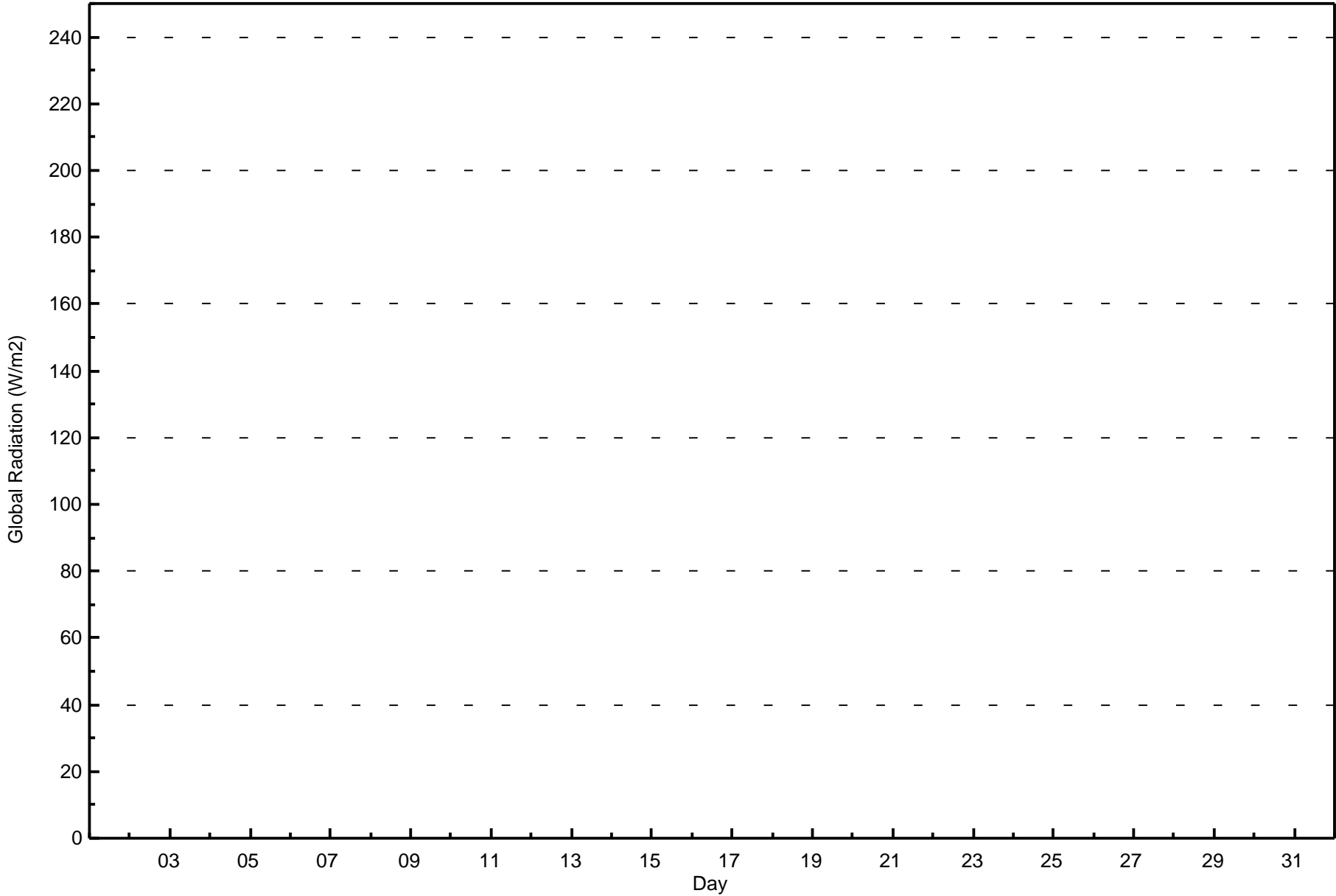
Total Number of Valid Hours: 744

Total Number of Hours: 744





Maximum Value: -- W/m2 on Jul 1 00:00														Maximum Daily Average: -- W/m2 on Jun 30														Hours in Service: 744	
Minimum Value: -- W/m2 on Jul 1 00:00														Minimum Daily Average: -- W/m2 on Jun 30														Hours of Data: 0	
Maximum Diurnal Average: -- W/m2 at hour 0														Minimum Diurnal Average: -- W/m2 at hour 0														Hours of Missing Data: 744	
Monthly Average: -- W/m2														Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 0 P <sub>99</sub> = 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-Jul	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	--	--		
2-Jul	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	--	--	
3-Jul	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	--	--	
4-Jul	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	--	--	
5-Jul	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	--	--	
6-Jul	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	--	--	
7-Jul	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	--	--	
8-Jul	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	--	--	
9-Jul	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	--	--	
10-Jul	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	--	--	
11-Jul	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	--	--	
12-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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	--	--	
18-Jul	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	--	--	
19-Jul	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	--	--	
20-Jul	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	--	--	
21-Jul	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	--	--	
22-Jul	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	--	--	
23-Jul	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	--	--	
24-Jul	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	--	--	
25-Jul	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	--	--	
26-Jul	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	--	--	
27-Jul	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	--	--	
28-Jul	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	--	--	
29-Jul	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	--	--	
30-Jul	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	--	--	
31-Jul	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	--	--	
																								Diurnal Average					
																								Diurnal Maximum					
AF - Analyzer Failure																													





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

**Global Radiation (GR) - W/m2**  
**Fort Chipewyan - July 2015**

<b>Concentration Ranges (W/m2)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
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: 744



Maximum Speed: 31 km/h on Jul 21 18:00	Maximum Daily Speed Average: 18.7 km/h on Jul 11	Hours in Service: 744
Minimum Speed Value: 1 km/h on Jul 16 04:00	Minimum Daily Speed Average: 1.8 km/h on Jul 31	Hours of Data: 743
Maximum Diurnal Speed Average: 4.1 km/h at hour 18	Minimum Diurnal Speed Average: 0.4 km/h at hour 14	Hours of Missing Data: 1
Monthly Average Velocity: 1.3 km/h 342.4 deg	Percentiles: P <sub>1</sub> = 2 P <sub>10</sub> = 5 Q <sub>1</sub> = 8 Median = 11 Q <sub>3</sub> = 15 P <sub>90</sub> = 20 P <sub>99</sub> = 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-Jul	NE3	WSW3	WSW7	W8	NNW10	NNW10	NNW9	NNW8	NNW9	W10	W15	W15	NNW16	NNW17	NNW15	W15	NNW16	NNW12	NW9	NW6	NNW5	NW5	W2	SW6	WNW8.9	WNW17
2-Jul	WSW5	WSW7	N9	E13	SE18	SSW12	WSW9	W10	W11	W12	NNW10	W8	SW6	E16	E18	E17	E19	ENE18	ENE19	ENE25	ENE24	E20	E22	E14	E6.3	ENE25
3-Jul	SE7	SE5	ESE7	ESE7	E8	NE7	SE10	SSW8	WSW15	NNW20	NNW22	NNW23	NNW26	NNW26	NNW22	NNW17	NNW17	NNW13	NW8	NW5	NNW5	SW4	NNW4	NNW12	WNW7.3	WNW26
4-Jul	NNW13	NNW8	NW8	NNW9	NW12	NNW9	W12	NNW10	W11	W13	NNW9	NNW11	NNW11	W11	NNW8	NE19	NE29	NE24	NE23	NE18	NE13	N8	NNW8	NNW9	NNW7.8	NE29
5-Jul	NNW10	NNW10	NW12	NW6	W4	NW5	N5	ESE4	ESE8	ESE9	SE12	SE2	W7	WSW10	SW12	SSW17	SW14	SW11	SW10	SW11	SW8	WSW8	SW11	SW5.1	SSW17	
6-Jul	SW13	SW12	WSW12	W12	NW8	NNW8	NNE2	NW9	NNW12	NNW12	N9	N7	NNW7	N11	NNW19	NNW16	NNW15	NNW12	NNW9	NNW11	NNW11	NNW13	NW10	NW9	NW8.5	NNW19
7-Jul	NNW10	NW11	NW13	NW12	NW11	NW10	NW8	NNW7	WSW9	W11	NNW10	SW14	SW13	WSW14	W13	W14	W15	WSW12	SW11	SSW6	SE9	SE14	SE10	S6	W6.8	W15
8-Jul	SSW8	SW8	SSW9	S8	S7	SSE10	S12	S14	S20	S21	S21	S18	SSW4	NE7	E14	SSE23	SSW18	SW10	WSW12	W16	NNW20	NNW22	NNW23	NNW23	SSW7.2	NW23
9-Jul	NW21	NW18	NNW17	NNW12	NNW12	NW14	NW13	NNW11	NNW10	NNW9	NNW11	W13	WSW13	WSW12	W10	WSW10	NNW11	NNW9	NNW11	NNW12	NNW11	NNW7	NW7	NNW7	WNW10.6	NW21
10-Jul	NNW8	NW8	NW8	NW8	NW8	NW9	NW8	NNW6	SW6	SSW7	WSW9	SW9	S8	SE11	ESE11	ESE9	ESE13	E16	E20	ENE18	ENE18	ENE19	ENE26	E29	ENE4.9	E29
11-Jul	E28	E26	E26	E26	E23	E20	E20	E22	E18	E15	E19	E20	E19	E19	E18	E17	E18	E14	ENE14	NE14	NNE12	NE19	ENE21	ENE16	E18.7	E28
12-Jul	ENE12	ENE11	ENE12	ENE10	ENE8	ENE9	ENE13	ENE15	ENE15	E15	ENE18	ENE20	ENE22	ENE26	NE24	NE21	NE21	NE19	NE17	NE20	ENE24	ENE22	ENE25	ENE24	ENE17.4	ENE26
13-Jul	E24	E20	ENE16	E22	ESE22	ESE18	ESE11	ESE10	ESE11	E17	E20	ENE19	ENE22	E22	E18	E19	E17	E18	E15	E12	NE11	ENE8	ENE9	NNE6	E15.4	E24
14-Jul	ENE4	NE5	NE6	ENE7	NNE5	N4	N3	E6	E10	ENE7	SSE4	SSW2	E7	E18	E22	E21	E16	E15	ESE9	W8	NNE1	S4	W9	SW10	E5.4	E22
15-Jul	WSW11	W9	W10	W8	WSW6	WSW7	WSW12	WSW14	SW15	WSW17	WSW20	WSW18	WSW18	WSW17	W14	WSW13	WSW12	SW13	SSW14	S16	S13	SSW7	SSW4	SE4	WSW10.8	WSW20
16-Jul	S3	SSE3	ESE5	SW1	SW6	SW1	W2	S2	W4	E12	E11	E13	E15	E16	E17	E16	NE12	ENE8	NNW8	NNE5	E6	N10	NNW9	NNW12	ENE4.8	E17
17-Jul	NNW14	NNW14	NNW13	NNW13	N10	N11	NNW12	N12	NNE6	ENE8	E19	E23	E18	E16	ENE11	E14	ENE5	ENE11	E16	E14	ENE12	ENE9	NE5	NNW3	NE8.3	E23
18-Jul	W6	WSW6	WSW8	SW9	SW7	S9	S9	SSW12	SSW13	SSW11	SW13	SW8	WSW9	NNW4	NNW7	N8	NNW4	NNW5	NNW11	NNW10	NNW5	NNW10	NNW10	NNW8	WSW4.6	SW13
19-Jul	NW9	NW13	NW13	NW13	NW13	NW13	NW14	NW15	NW11	NNW13	NNW13	NNW12	WSW17	W19	NNW9	W15	NNW7	N11	NNW12	NW10	NW9	NW8	NW9	NNW8	NW11.0	W19
20-Jul	NNW7	NW7	NW7	NNW5	NW4	W5	NNW5	NNW9	W8	WSW8	SW10	SW12	SW13	SSW13	SW9	WSW11	W8	W5	S2	ESE4	E4	E4	E5	ENE11	W3.9	SSW13
21-Jul	E14	ESE16	SE14	E12	E16	E18	E16	ESE20	ESE16	SSE12	SE15	ESE13	E18	E20	E24	E27	ENE25	ESE31	ESE26	ESE25	ESE26	ESE20	ESE11	ESE16	ESE17.8	ESE31
22-Jul	ESE12	ENE9	ENE11	ESE19	ESE17	SE11	S7	WSW6	WSW9	W8	SW8	WSW5	NNW7	ESE2	ESE9	SSE8	ESE4	NE9	NE12	N8	NNW8	NNW9	NNW12	NNW12	E2.0	ESE19
23-Jul	NNW7	NNW12	NNW14	NNW14	NW12	NW12	NW12	NW13	NW13	NNW13	NNW14	NNW17	NNW15	NNW13	NNW11	W16	W17	W17	W13	W8	W7	W9	W8	W8	WNW11.0	WNW17
24-Jul	WSW6	WSW7	W7	WSW6	SW5	SW4	SW7	SSW8	SW10	SW13	SW15	SW11	SW11	SE6	E15	E19	E21	E19	E15	ESE9	SE8	SE11	SE12	SE12	SSE4.9	E21
25-Jul	SE9	W11	ENE3	NE10	NE5	NNW11	WSW10	WSW12	NW9	N9	NNE6	E2	WSW3	ENE2	NW8	NW7	NW5	NNW7	NNW6	NNW10	NNW7	NW6	NW7	W5	NW4.1	WSW12
26-Jul	NNW8	NNW7	WSW5	W8	W10	NNW5	W5	WSW7	SW10	SW16	WSW15	WSW14	W14	WSW15	SW19	NE4	NNW7	NE5	ESE11	SE9	SSW8	WSW9	NNW11	NNW6	WSW6.5	SW19
27-Jul	NNW4	SSW6	SW7	W10	W12	W12	W11	W15	W15	WSW16	WSW16	WSW19	W20	W20	W21	NNW19	W15	W13	W9	W8	W8	NNW6	NNW8	NNW9	W11.4	W21
28-Jul	NW3	ENE3	ENE4	S2	SE6	SE7	SSE4	ESE5	E7	ESE9	ESE10	ESE14	E19	E24	E24	E24	E23	E20	ENE11	NNW11	N10	WSW3	WSW10	NW9	E7.5	E24
29-Jul	NNW7	NNW8	NNW7	NNW9	NNW8	NNW6	W3	W5	W9	WSW10	SW12	SW11	WSW10	W12	NW8	NNW8	NNW10	NNW13	W14	NNW5	NNW4	W9	NNW9	NNW9	WNW7.3	W14
30-Jul	WSW5	NW8	NW8	NNW8	NW7	NNW6	NNW10	NNW11	NNW13	NNW12	NW11	NNW11	NNW11	NNW12	W16	W15	NNW13	W13	NNW8	NW8	NNW5	W9	NNW9	WNW9.5	W16	
31-Jul	NNW8	W7	NW2	AF	SW4	E5	SE5	ESE5	E7	E8	E10	E14	E14	SSE6	W7	WSW10	W7	E5	ENE14	E15	W14	NNW14	N14	NNW12	NE1.8	E15

NNW1.7	NW2.7	NNW2.8	NNW2.1	NNW1.0	NNW1.6	NNW2.1	W2.3	WSW2.8	WSW3.0	SW2.6	WSW2.2	W2.5	N0.4	NNE2.7	ENE2.1	NNE3.1	NE4.1	NE3.4	NE2.9	NNE2.7	NNE2.6	N3.2	NNW2.8	Diurnal Average
E28	E26	E26	E26	E23	E20	E20	E22	S20	S21	NNW22	NNW23	NNW26	NNW26	E24	E27	NE29	ESE31	ESE26	ESE25	ESE26	NW22	ENE26	E29	Diurnal Maximum

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



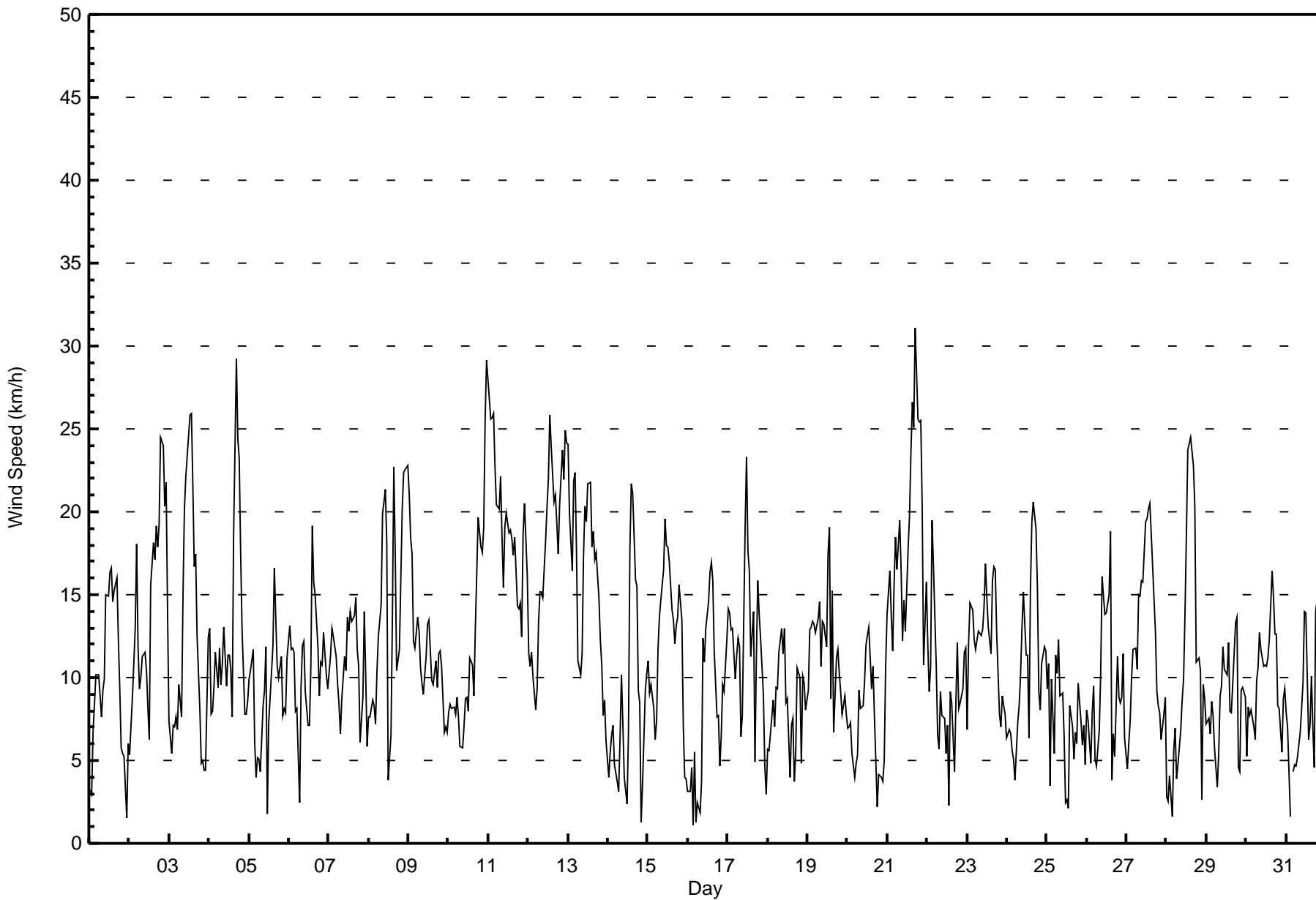
Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Speed (WS) - km/h

Fort Chipewyan - July 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0														Hours in Service: 744											
Maximum Value: 11 km/h on Jul 4 16:00														Hours of Data: 743											
Minimum Value: 1 km/h on Jul 20 21:00														Hours of Missing Data: 1											
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 2 Median = 3 Q <sub>3</sub> = 4 P <sub>90</sub> = 4 P <sub>99</sub> = 7														Hours of Calibration: 0											
														Percent Operational Time: 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-Jul	2	2	1	2	1	2	2	1	2	3	4	4	5	5	5	4	5	5	3	2	1	1	1	2	5
2-Jul	3	2	5	3	3	3	2	2	3	3	3	2	2	4	2	2	3	3	4	3	3	4	3	4	5
3-Jul	2	1	1	2	3	4	8	2	4	7	7	8	7	8	7	6	6	5	3	1	1	1	10	4	10
4-Jul	4	2	1	2	3	2	2	2	4	3	3	3	4	3	4	11	7	5	5	4	3	2	1	1	11
5-Jul	1	1	2	4	2	2	2	2	1	1	2	2	4	4	3	3	4	3	2	2	1	1	2	2	4
6-Jul	2	2	2	2	2	2	3	3	4	4	3	3	2	6	6	5	5	4	3	2	2	3	2	2	6
7-Jul	2	2	3	2	2	2	2	3	4	3	4	4	4	4	5	5	4	3	4	2	2	2	2	2	5
8-Jul	2	2	2	2	2	2	4	3	3	3	3	5	3	3	6	4	9	2	2	4	5	7	7	7	9
9-Jul	7	5	5	3	3	4	4	4	4	3	4	4	3	3	2	2	3	2	3	3	3	3	1	1	7
10-Jul	1	1	2	2	1	2	3	2	2	2	3	3	4	2	2	3	3	3	3	3	3	3	4	4	4
11-Jul	3	3	3	3	3	2	3	3	4	3	2	3	2	2	3	3	2	2	3	4	3	4	4	3	4
12-Jul	2	2	2	2	2	2	2	3	3	3	4	4	4	4	4	4	3	4	3	4	4	4	3	4	4
13-Jul	4	3	3	2	2	3	1	2	1	3	3	3	3	3	3	2	3	3	3	3	2	2	2	2	4
14-Jul	1	1	1	2	2	1	2	3	1	1	2	1	3	2	3	4	2	2	4	3	4	2	2	2	4
15-Jul	2	3	2	1	2	2	3	3	3	4	5	5	5	5	4	4	3	3	3	1	2	2	2	2	5
16-Jul	1	1	3	2	2	2	2	1	2	1	1	2	2	2	2	4	4	3	3	2	1	2	3	4	4
17-Jul	3	3	3	4	3	3	4	3	3	5	3	2	3	4	5	2	3	6	3	2	2	1	2	2	6
18-Jul	1	1	1	1	2	3	3	2	2	2	2	4	2	4	3	2	2	5	4	2	2	2	2	2	5
19-Jul	3	3	3	4	3	4	4	4	4	4	5	5	4	5	4	4	5	5	4	3	2	1	2	1	5
20-Jul	1	1	1	2	1	1	1	2	3	3	3	4	4	4	4	4	3	2	1	1	1	1	1	2	4
21-Jul	4	2	2	2	3	3	2	3	3	2	2	2	2	2	3	3	5	6	4	2	2	3	3	8	8
22-Jul	4	1	3	2	2	4	1	2	3	2	3	2	4	2	4	2	4	3	2	3	2	2	3	3	4
23-Jul	2	4	4	4	3	3	4	4	3	4	4	5	5	4	4	5	4	4	4	1	1	2	2	1	5
24-Jul	1	1	1	1	1	1	1	2	2	3	3	3	4	4	2	2	3	2	2	2	2	2	1	2	4
25-Jul	4	3	4	4	2	2	4	4	3	2	2	2	2	1	3	3	2	2	2	3	2	1	1	1	4
26-Jul	1	1	1	2	2	2	2	2	4	3	4	4	5	4	5	3	2	2	2	2	2	2	2	1	5
27-Jul	2	1	2	2	2	3	2	4	4	4	4	5	6	5	6	5	4	3	2	3	1	1	2	2	6
28-Jul	2	2	3	1	3	2	2	3	1	1	1	3	3	3	3	2	2	2	4	4	6	2	2	2	6
29-Jul	2	2	3	1	1	1	1	2	3	3	2	3	3	3	4	3	4	6	5	2	2	2	1	2	6
30-Jul	2	2	1	2	2	2	2	2	3	3	3	3	3	3	4	7	5	3	3	2	3	2	2	1	7
31-Jul	1	1	2	AF	2	2	1	1	2	1	2	2	2	3	3	3	3	3	7	3	5	4	6	3	7
														Diurnal Maximum											
AF - Analyzer Failure																									





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

**Wind Speed (WS) - km/h**  
**Fort Chipewyan - July 2015**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	92	12.38	12.38
6 - 11	323	43.47	55.85
12 - 19	252	33.92	89.77
20 - 28	73	9.83	99.60
29 - 38	3	0.40	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 743

Total Number of Hours: 744



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Fort Chipewyan - July 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	4	6	6	6	7	4	3	5	3	6	7	10	12	7	3	92
6 - 11	13	3	5	18	10	16	13	3	6	13	25	29	39	56	48	26	323
12 - 19	2	1	9	17	54	10	7	1	5	7	16	24	30	20	24	25	252
20 - 28	0	0	6	13	29	6	0	1	3	0	0	1	3	5	6	0	73
29 - 38	0	0	1	0	1	1	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
<b>Totals</b>	18	8	27	54	100	40	24	8	19	23	47	61	82	93	85	54	743

Total Number of Valid Hours: 743

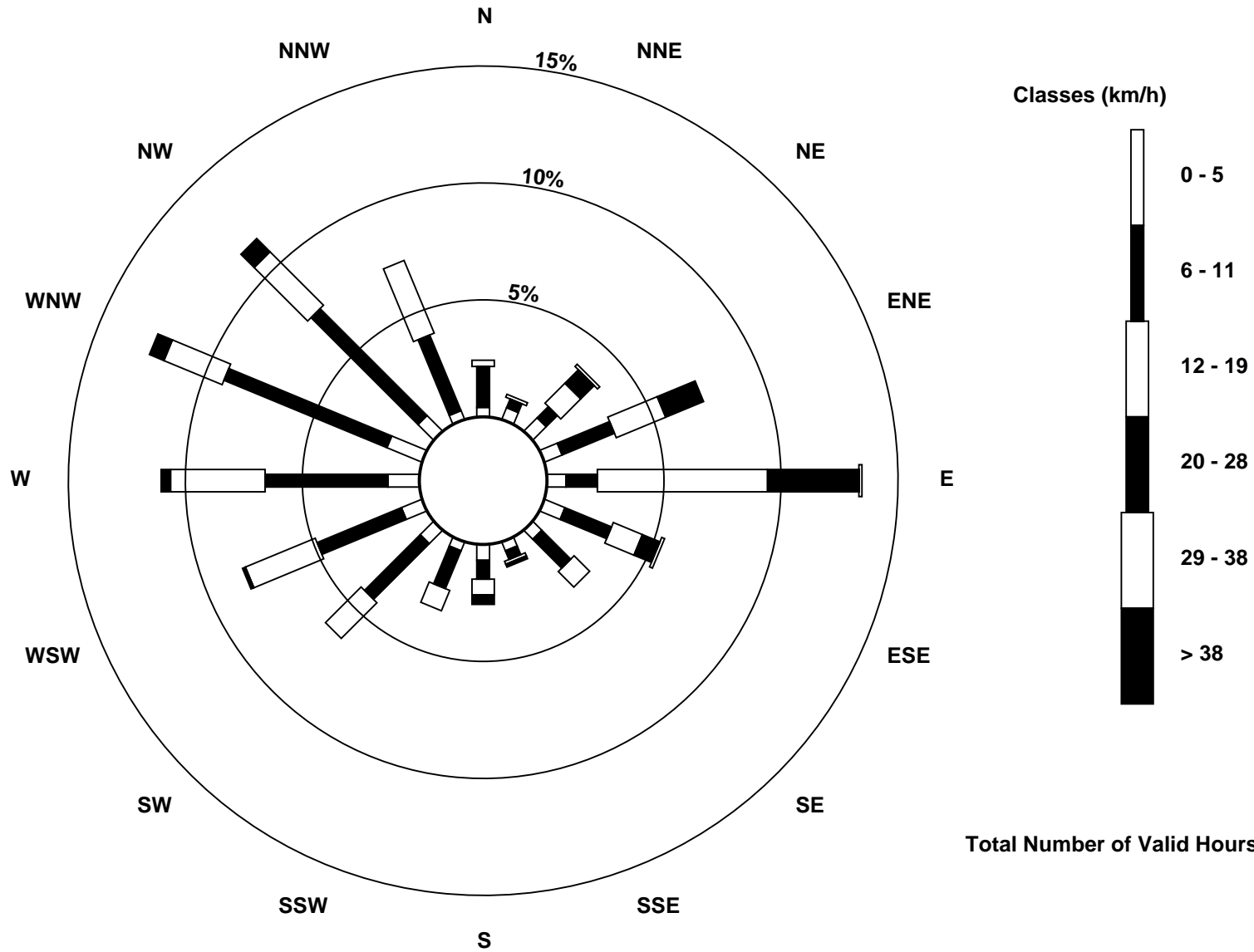
Total Number of Hours: 744





Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Wind Speed (WS) - km/h  
Fort Chipewyan (AMS 8)



Total Number of Valid Hours: 743



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

**Wind Direction (WD) - deg**  
**Fort Chipewyan - July 2015**

Direction of Maximum Speed: 103 deg on Jul 21 18:00 Direction of Maximum Daily Speed Average: 82.2 deg on Jul 11	Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1
Direction of Minimum Speed: 228 deg on Jul 16 04:00 Direction of Minimum Daily Speed Average: 1.8 deg on Jul 31	Percent Operational Time: 99.9
Monthly Average Direction: 288.7 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-Jul	40	243	254	262	295	298	292	297	286	280	280	275	285	293	297	280	302	327	323	322	334	310	264	236	291.5
2-Jul	242	244	357	93	144	204	256	273	267	271	282	267	216	93	85	83	85	73	78	78	77	80	79	99	89.7
3-Jul	131	131	109	105	94	44	136	206	241	285	294	305	293	291	311	330	326	339	325	321	298	227	290	295	300.5
4-Jul	300	297	308	303	311	299	275	296	277	269	302	310	296	279	334	39	45	43	37	34	357	327	285	339.8	
5-Jul	284	289	307	314	267	321	357	121	106	113	124	137	264	240	217	204	226	230	218	214	217	222	237	234	231.1
6-Jul	228	232	243	279	306	330	16	325	338	343	5	4	344	350	344	340	331	328	296	283	283	298	306	306	313.9
7-Jul	304	310	316	322	318	313	311	299	249	267	292	223	233	239	273	270	267	244	234	213	143	135	130	169	264.7
8-Jul	195	214	204	174	170	147	181	173	174	175	173	180	195	40	94	159	192	232	251	268	282	310	311	311	207.3
9-Jul	312	311	306	289	292	304	308	309	336	289	292	262	254	257	265	258	293	308	327	335	339	330	306	303	299.5
10-Jul	303	307	319	323	315	310	321	282	220	201	245	215	186	126	113	102	108	85	80	73	68	70	78	83	77.3
11-Jul	86	82	89	92	96	95	99	96	97	80	84	85	86	88	87	91	90	83	63	44	33	50	61	60	82.2
12-Jul	62	64	61	62	65	57	60	65	73	93	78	59	57	58	54	55	52	48	46	53	61	66	75	75	62.2
13-Jul	85	81	74	85	111	120	115	123	108	84	81	71	73	80	81	89	90	91	84	79	52	72	71	25	85.9
14-Jul	58	55	56	78	25	9	357	92	93	68	147	198	100	93	91	90	87	97	104	265	32	169	261	232	89.5
15-Jul	238	265	271	262	241	241	255	237	233	239	246	244	249	252	274	242	251	234	212	183	175	203	201	128	237.6
16-Jul	178	156	120	228	220	228	269	175	263	91	99	98	95	92	94	93	50	60	348	16	90	9	347	344	75.2
17-Jul	342	343	345	347	0	351	348	353	15	78	95	92	98	87	68	92	62	78	83	83	72	64	44	284	51.0
18-Jul	261	253	241	229	216	183	191	199	199	205	220	219	250	294	340	353	341	300	339	348	297	324	326	299	256.6
19-Jul	304	319	320	321	321	320	323	317	321	309	303	294	257	267	306	277	289	351	327	308	313	312	314	334	307.6
20-Jul	331	318	324	283	306	265	291	289	273	243	225	227	233	213	227	256	276	279	175	102	90	82	86	66	259.8
21-Jul	89	120	130	98	94	94	86	102	121	152	143	107	98	89	84	81	75	103	113	104	104	121	118	110	103.1
22-Jul	120	70	75	110	109	129	190	250	237	273	220	255	282	112	113	161	103	35	47	6	341	330	335	331	79.0
23-Jul	337	331	332	330	320	318	318	316	312	305	286	294	296	310	285	265	268	261	259	270	269	259	271	265	295.4
24-Jul	252	243	261	256	229	225	226	213	215	217	220	225	224	146	91	89	82	85	88	112	139	136	136	127	153.8
25-Jul	126	261	60	34	45	286	240	254	308	351	30	81	247	67	321	326	321	324	297	298	314	315	313	261	310.2
26-Jul	282	297	258	271	280	282	276	254	236	232	238	253	259	238	230	34	346	41	120	134	195	256	282	291	251.9
27-Jul	284	210	236	276	276	281	265	273	261	252	255	258	274	274	276	282	279	276	280	270	269	332	342	347	273.2
28-Jul	308	58	73	180	133	141	147	102	96	110	102	104	85	86	85	87	90	91	75	341	5	239	254	312	86.2
29-Jul	338	337	299	299	301	303	269	263	264	242	227	226	245	280	319	298	302	331	278	283	282	267	282	287	282.8
30-Jul	245	307	309	297	317	283	283	287	288	303	310	313	290	296	289	278	279	283	275	285	326	345	277	284	292.2
31-Jul	289	279	305	AF	216	84	127	106	97	93	96	94	97	160	280	252	269	95	78	96	275	328	3	335	55.4

323.5 315.2 333.5 347.5 336.0 314.0 281.9 269.2 245.1 246.4 234.1 242.0 259.3 1.4 31.3 60.8 26.8 42.9 47.9 39.3 27.4 14.2 0.1 344.7
Diurnal Average

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



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

**Wind Direction (WD) - deg**  
**Fort Chipewyan - July 2015**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 92 deg on Jul 16 04:00	Hours of Data: 743
Minimum Value: 4 deg on Jul 11 17:00	Hours of Missing Data: 1
Percentiles: P <sub>1</sub> = 5 P <sub>10</sub> = 8 Q <sub>1</sub> = 12 Median = 18 Q <sub>3</sub> = 26 P <sub>90</sub> = 39 P <sub>99</sub> = 77	Hours of Calibration: 0
	Percent Operational Time: 99.9

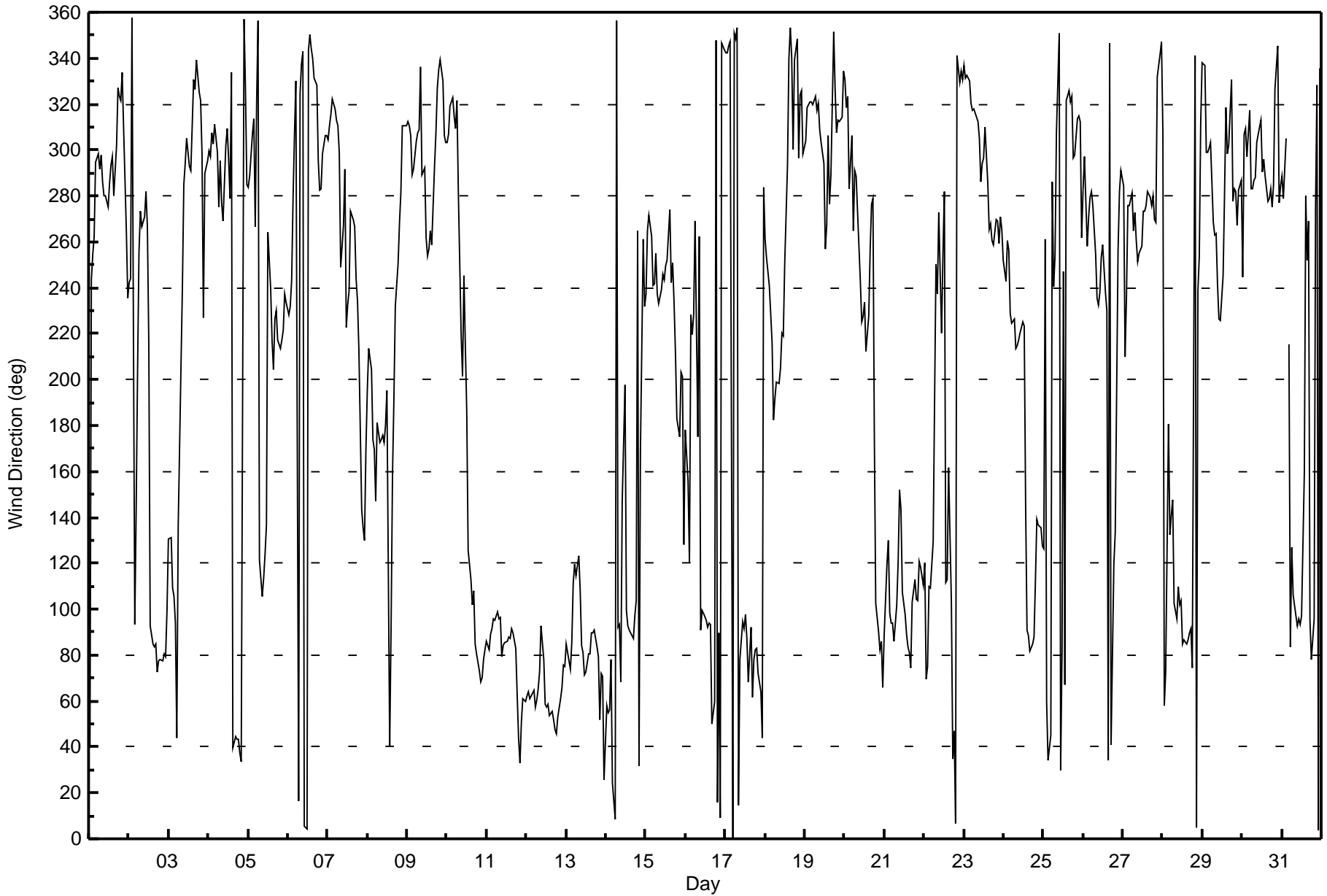
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jul	53	47	15	13	10	11	13	13	16	21	19	20	21	23	24	23	21	25	24	19	13	25	51	10	53
2-Jul	8	13	41	22	15	20	23	15	16	19	19	22	41	36	5	6	7	8	7	6	7	8	7	16	41
3-Jul	26	23	11	22	18	55	66	16	18	27	18	19	18	19	21	29	25	29	29	24	22	35	79	20	79
4-Jul	16	19	14	14	17	19	16	16	16	15	26	19	20	20	29	17	11	12	13	13	17	19	15	7	29
5-Jul	9	10	11	68	56	30	38	30	9	8	21	89	58	35	27	15	23	20	13	10	9	13	12	14	89
6-Jul	11	11	19	12	17	14	87	26	23	24	27	27	27	28	23	25	23	23	20	15	14	16	15	12	87
7-Jul	12	13	14	14	13	12	18	24	32	22	23	15	27	29	25	26	22	23	22	18	18	6	8	29	32
8-Jul	20	18	20	13	25	16	20	11	8	8	8	11	67	50	35	14	29	14	15	15	19	20	20	20	67
9-Jul	21	21	18	18	18	18	19	24	30	28	28	26	18	15	13	15	17	15	19	20	20	24	12	9	30
10-Jul	12	10	16	16	13	15	31	31	45	43	36	37	42	14	12	26	32	9	6	8	8	8	7	6	45
11-Jul	5	6	6	9	8	10	8	8	11	11	7	7	5	6	7	5	4	11	12	16	16	13	10	9	16
12-Jul	9	9	11	10	17	11	10	13	14	10	15	11	12	10	11	11	9	11	11	10	9	9	8	8	17
13-Jul	8	7	9	8	6	5	8	11	14	6	7	9	9	8	15	7	11	10	13	17	19	18	18	23	23
14-Jul	24	23	21	13	36	29	32	26	15	15	37	68	11	5	6	11	9	40	41	80	76	19	12	80	
15-Jul	12	17	12	14	17	16	17	15	15	18	18	19	20	22	25	24	29	22	14	6	6	17	12	40	40
16-Jul	48	43	51	92	24	84	53	73	54	7	8	7	5	6	6	5	33	54	27	52	37	17	15	17	92
17-Jul	17	19	20	22	23	22	25	24	62	63	7	6	8	11	25	10	48	39	9	10	9	7	37	37	63
18-Jul	23	17	14	9	11	13	10	10	10	12	13	23	33	49	30	30	55	44	29	25	45	19	19	20	55
19-Jul	18	17	17	18	18	19	21	18	24	23	31	38	16	16	42	15	52	26	27	17	16	12	10	14	52
20-Jul	17	15	17	29	36	11	23	22	39	41	33	27	28	30	36	38	43	34	70	21	19	31	17	16	70
21-Jul	21	6	8	14	9	9	11	12	11	11	18	22	10	8	7	10	9	11	8	6	8	8	20	25	25
22-Jul	17	14	18	9	10	14	26	38	26	28	31	58	37	84	31	17	88	37	16	27	24	16	19	19	88
23-Jul	23	18	21	21	20	19	20	20	23	24	22	23	27	22	29	26	17	15	14	14	12	15	11	11	29
24-Jul	14	11	14	13	9	17	10	14	17	15	16	32	30	55	8	5	7	8	8	36	8	5	6	11	55
25-Jul	39	24	77	29	57	9	40	32	31	21	29	55	76	72	27	35	70	29	20	22	17	12	10	40	77
26-Jul	9	20	30	20	8	22	22	24	22	15	19	22	25	23	24	77	29	34	9	28	28	19	16	29	77
27-Jul	32	19	23	11	12	13	15	16	17	16	17	17	19	16	18	19	22	15	14	18	18	23	17	19	32
28-Jul	61	58	27	71	37	14	32	32	13	8	9	12	10	7	6	6	6	6	52	22	47	74	24	23	74
29-Jul	19	21	25	13	7	14	25	31	25	30	21	28	30	25	48	40	33	43	26	35	44	15	11	15	48
30-Jul	24	16	14	17	25	26	15	15	16	21	28	24	18	21	28	22	16	13	15	13	37	37	10	12	37
31-Jul	9	8	49	AF	17	15	21	12	14	9	8	6	8	57	53	24	22	72	12	19	15	22	26	19	72
	61	58	77	92	57	84	87	73	62	63	37	89	76	84	53	77	88	72	70	52	80	76	79	40	
	Diurnal Maximum																								

AF - Analyzer Failure



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

**Wind Direction (WD) - deg**  
**Fort Chipewyan - July 2015**





# Wood Buffalo Environmental Association SO2 Calibration Report

## Station Information

Calibration Date	July 1, 2015	Last Calibration	June 3, 2015
Station Name	Fort Chipewyan	Station Number	AMS 8
Reason:	Routine		
Start Time (MST)	16:25	End Time (MST)	19:50
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

	<i>Before</i>	<i>After</i>		<i>Before</i>	<i>After</i>
Analyzer Range	0 - 20 ppb		PMT voltage	-829	-829
Analyzer IP address	192.168.1.43		Lamp voltage	980	980
Calculated slope	0.993623	0.993309	Chamber temp	45.0	45.0
Calculated intercept	-0.000811	-0.030508	Pressure	715.0	715.0
Analyzer Background	1.20	1.15	Flow	0.435	0.435
Analyzer Coefficient	1.035	1.035	Intensity	91	91
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	17.7	1.028
calibrator zero	6000	0.0	0.0	0.0	----
high point	6000	44.6	18.2	18.4	0.991
second point	6000	23.8	9.7	9.8	0.992
third point	6000	11.9	4.9	4.9	0.987
as left zero	6000	0.0	0.0	0.0	----
as left span	6000	44.6	18.2	18.4	0.992
Average Correction Factor					0.990

Corrected As found      17.7      Previous response      18.3      % change      3.8%

**Notes:**

Routine monthly calibration. Inlet filter changed after as founds. No span adjustment required. Slight zero adjustment.

Calibration Performed By:

Zack Eastman



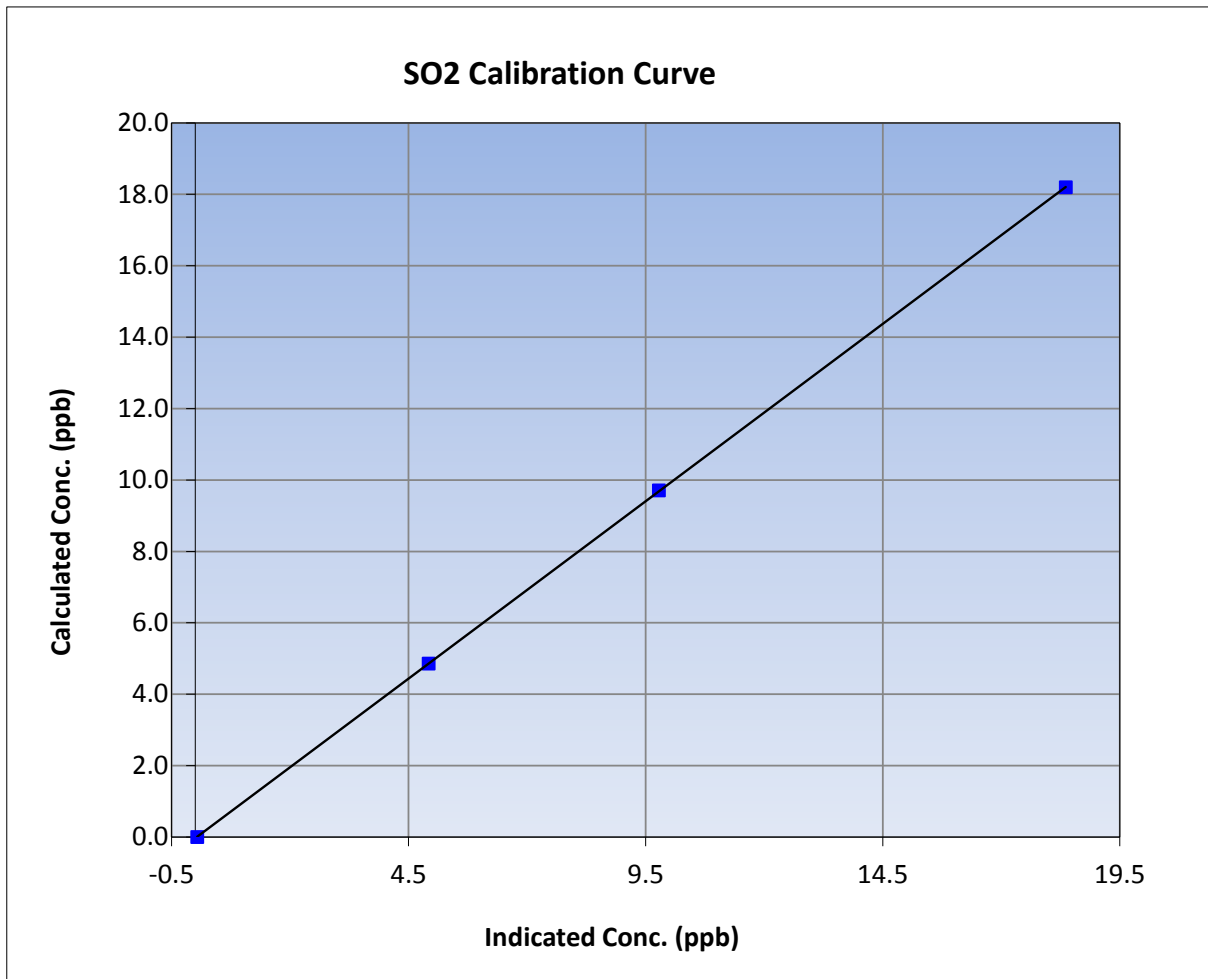
## Wood Buffalo Environmental Association SO2 Calibration Report

### Station Information

Calibration Date	July 1, 2015	Previous Calibration	June 3, 2015
Station Name	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	16:25	End Time (MST)	19:50
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1136451241

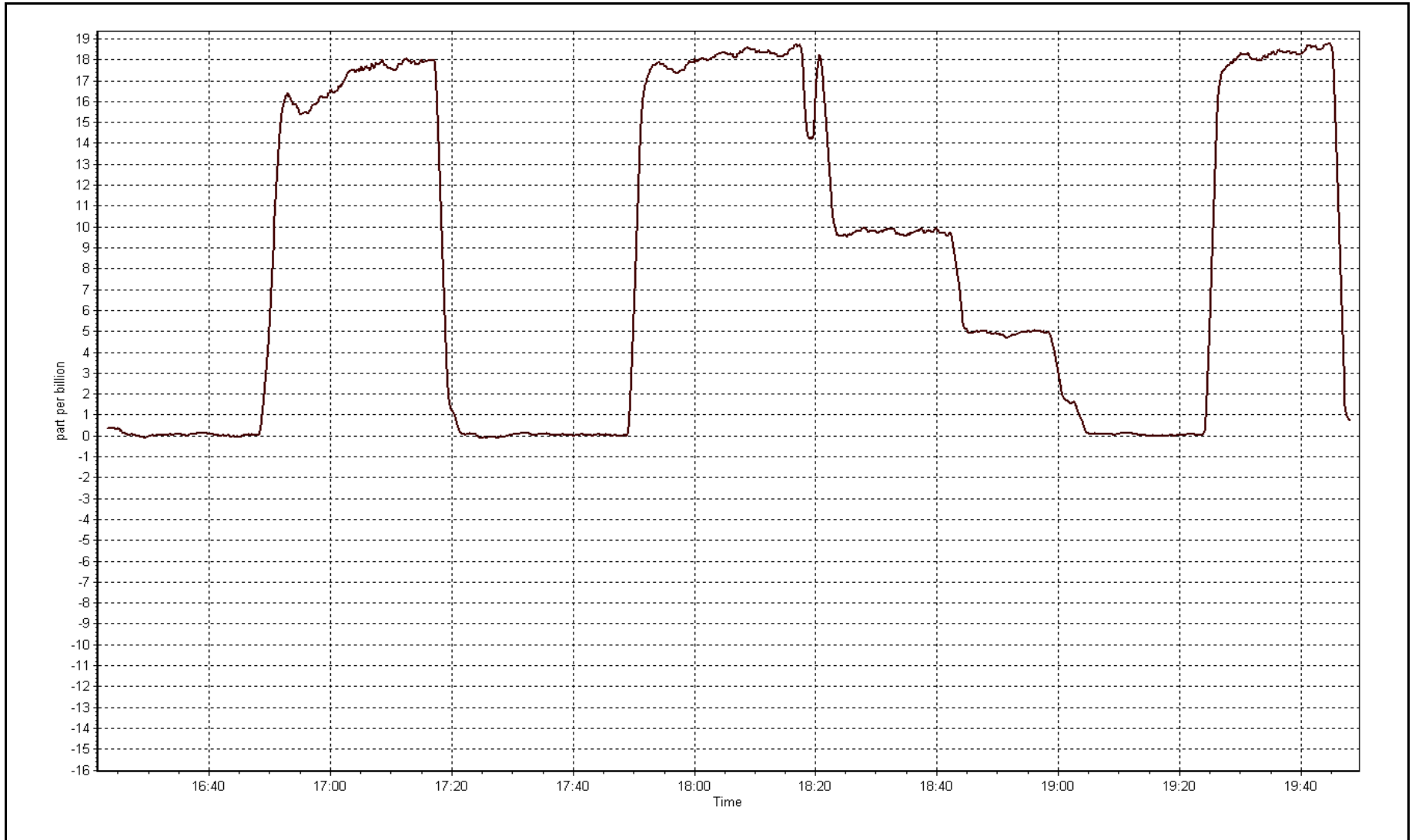
### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999996
18.2	18.4	0.9910		
9.7	9.8	0.9924	Slope	0.993309
4.9	4.9	0.9868		
			Intercept	-0.030508



SO2 Calibration Plot

Date: July 1, 2015





# Wood Buffalo Environmental Association

## O<sub>3</sub> Calibration Report

### Station Information

Calibration Date	July 2, 2015	Previous Calibration	June 3, 2015
Station Name	Fort Chipewyan	Station Number	AMS 8
Reason:	Routine		
Start Time (MST)	12:45	End Time (MST)	17:15
NO2 GPT Ref date	July-02-15	Transfer Standard	NO2
		Station temp.	23 Deg C
Calibrator Make/Model	Teledyne API T700	Serial Number	735
ZAG make/model	Teledyne API 701	Serial Number	4698
DACS make/model	Campbell Scientific CR3000	Serial Number	8205

### Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 500 ppb		Bench temp.	36.0	36.0
Analyzer IP address	192.168.1.48		Lamp temp.	58.0	58.0
Calculated slope	0.997612	1.001479	Pressure	27.3	27.3
Calculated intercept	0.549792	0.058560	Flow cell A	0.775	0.775
Analyzer Background	0.0	na	Flow cell B	0.775	0.775
Analyzer Coefficient	1.026	na	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	-0.4	----
as found span	6000	235.0 - 832.2	106.5	105.7	1.008
calibrator zero	6000	0.00	0.0	0.0	----
high point	6000	235.0 - 832.2	106.5	106.3	1.001
second point	6000	178.2 - 792.9	80.7	80.6	1.001
third point	6000	114.1 - 736.9	54.0	53.6	1.007
as left zero	6000	0.00	0.0	-0.2	----
as left span	6000	235.0 - 832.2	106.5	105.9	1.006
Average Correction Factor					1.003

Corrected As found	106.1	Previous response	106.2	% change	0.1%
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**Notes:**

zero and span adjusted slightly. Lamp stability warning displayed before cal. No issues noted after inlet filter changed. Inlet filter changed after as founds, optical bench checked for debris, no debris detected. Good calibration.

Calibration Performed By: Zack Eastman





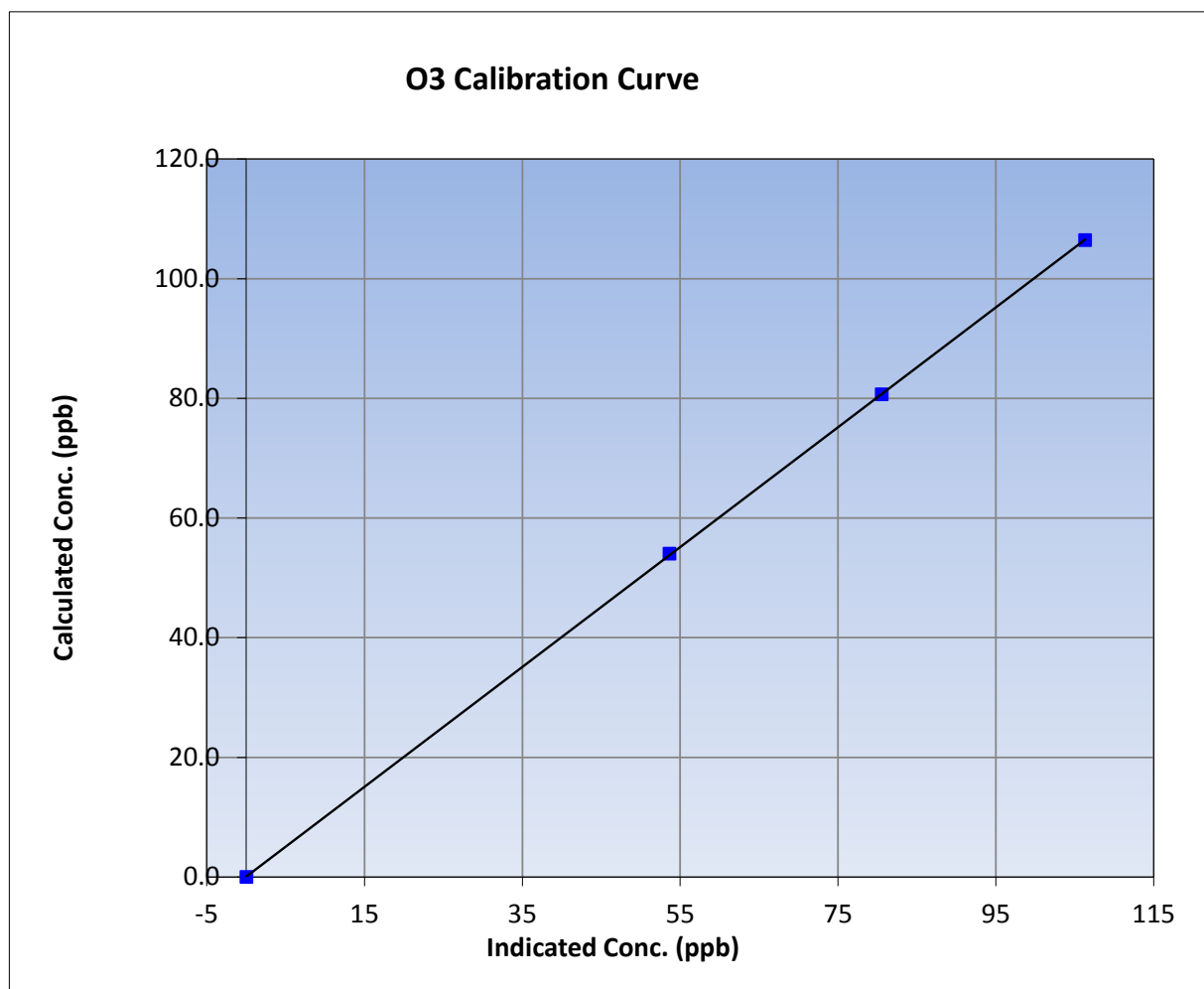
## Wood Buffalo Environmental Association O3 Calibration Report

### Station Information

Calibration Date	July-02-15	Previous Calibration	June 3, 2015
Station Name	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	12:45	End Time (MST)	17:15
Analyzer make	Teledyne API T400	Analyzer serial #	1020

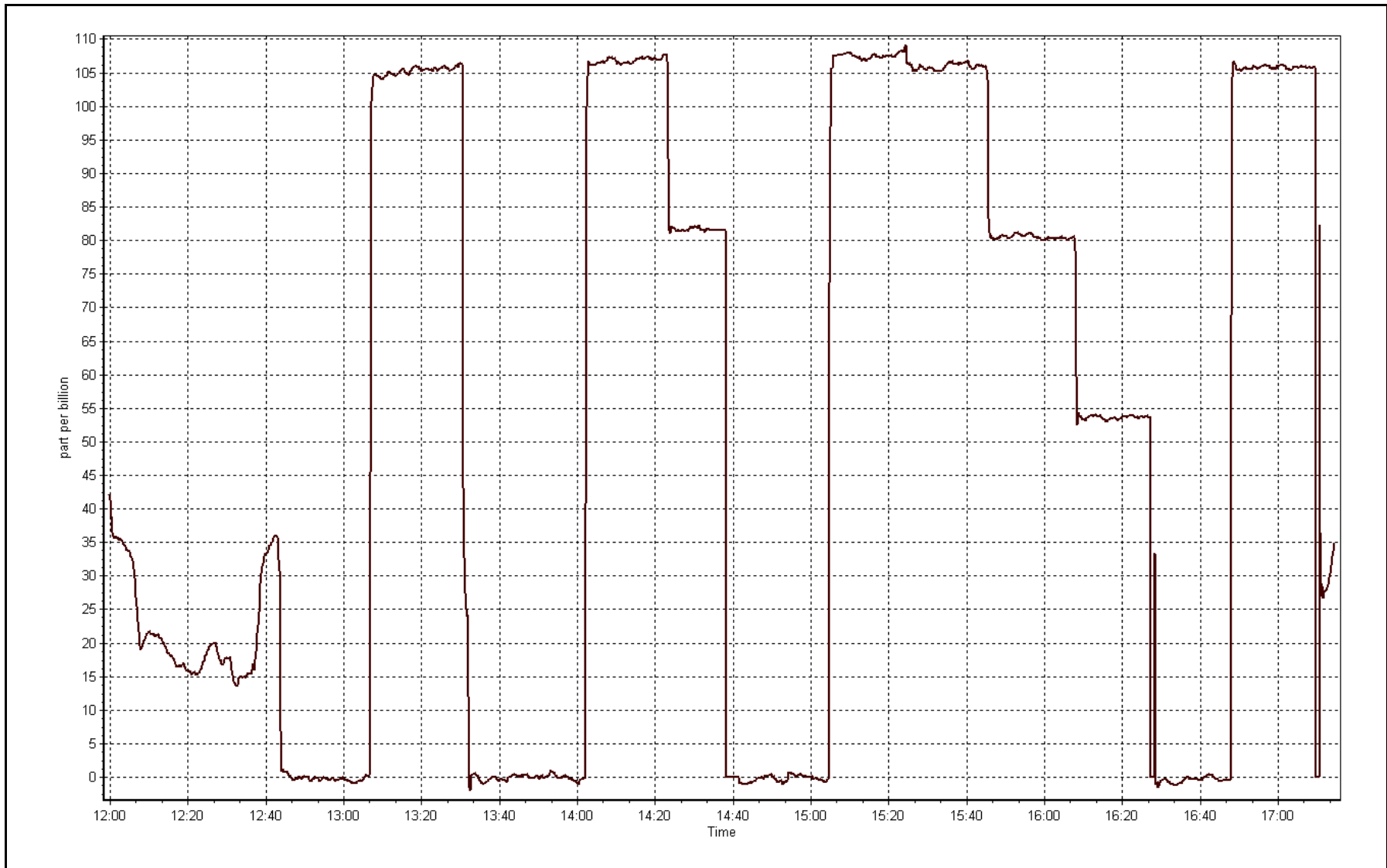
### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999988
106.5	106.3	1.0014		
80.7	80.6	1.0014	Slope	1.001479
54.0	53.6	1.0069		
			Intercept	0.058560



O3 Calibration Plot

Date: July 2, 2015





## Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

### Station Information

Calibration Date	July 1, 2015	Previous Calibration	June 3, 2015
Station Name	Fort Chipewyan	Station Number	AMS 8
Reason:	Routine		
Start Time (MST)	17:20	End Time (MST)	19:50
NO Cal Gas Conc	20.2 ppm	Gas Cert Reference	LL103809
NOx Cal Gas Conc	20.2 ppm	Cal Gas Expiry Date	16-Sep-16
Calibrator	Teledyne API T700	Serial Number	747
Zero air Generator	Teledyne API T701	Serial Number	4698

### DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	8205
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### Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.979151	0.979096	0.998345
	Data Offset	0.800499	1.018313	0.127628
Current Calibration	Data Slope	0.944286	0.949726	
	Data Offset	-0.075543	0.047486	

### Analyzer Information

Analyzer make/model	Teledyne API T200u	Analyzer serial #	172
---------------------	--------------------	-------------------	-----

Test Point	before		after	
Concentration range	0-200	ppb	0-200	ppb
NO coefficient	1.177		1.177	
NOx coefficient	1.194		1.194	
NO2 coefficient	1.000		1.000	
NO bkgnd	0.1		0.1	
NOx bkgnd	0.2		0.2	
Chamber Temp	40	Deg C	40	Deg C
Moly Temp	315.4	Deg C	315.4	Deg C
HVPS	502	V	502	V
PMT Temp	5.1	Deg C	5.1	Deg C
O3 flow	89	ccm	89	ccm
R Cell press NO	5	"Hg	3.8	"Hg
R Cell Press Nox	NA	"Hg	NA	"Hg
NO sample flow	xxxx	ccm	1095	ccm
Nox sample Flow	xxxx	ccm	1118	ccm

**Notes:**

As found zero and span before inlet filter changed. As left zero and span performed after change. Filter plugged due to heavy smoke in area. No adjustments made. Instrument displaying flow error, flow readings on screen xxxx.



# Wood Buffalo Environmental Association

## NOX-NO-NO2 Calibration Report

### Station Information

Calibration Date:

July 1, 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	0.4	0.0	0.4	----	----
as found span	6000	44.6	150.0	150.0	0.0	185.6	184.9	0.8	0.8082	0.8114
z after filter chg	6000	0.0	0.0	0.0	0.0	0.1	-0.1	0.2	----	----
s after filter chg	6000	44.6	150.0	150.0	0.0	159.0	157.9	1.0	0.9438	0.9500
as left zero	6000	0.0	0.0	0.0	0.0	0.1	-0.1	0.2	----	----
as left span	6000	44.6	150.0			159.0	157.9	1.0	0.9438	
Average Correction Factor									0.9438	0.9500

Corrected As found

NO<sub>x</sub>= 185.2

NO= 184.9

Percent Change

NO<sub>x</sub>= -17.7%

NO= -17.7%

Previous Response

NO<sub>x</sub>= 152.4

NO= 152.2

### GPT Calibration Data

Dilution Flow

6000

ccm

Source Gas Flow

44.6

ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
Cal zero			0.0			0.2			N/A	
1st NO2 (100)										
2nd NO2 (75)										
3rd NO2 (50)										
4th NO2 (0)										
Average Correction Factor										

Calibration Performed By:

Zack Eastman



# Wood Buffalo Environmental Association

## NO<sub>x</sub> Calibration Summary

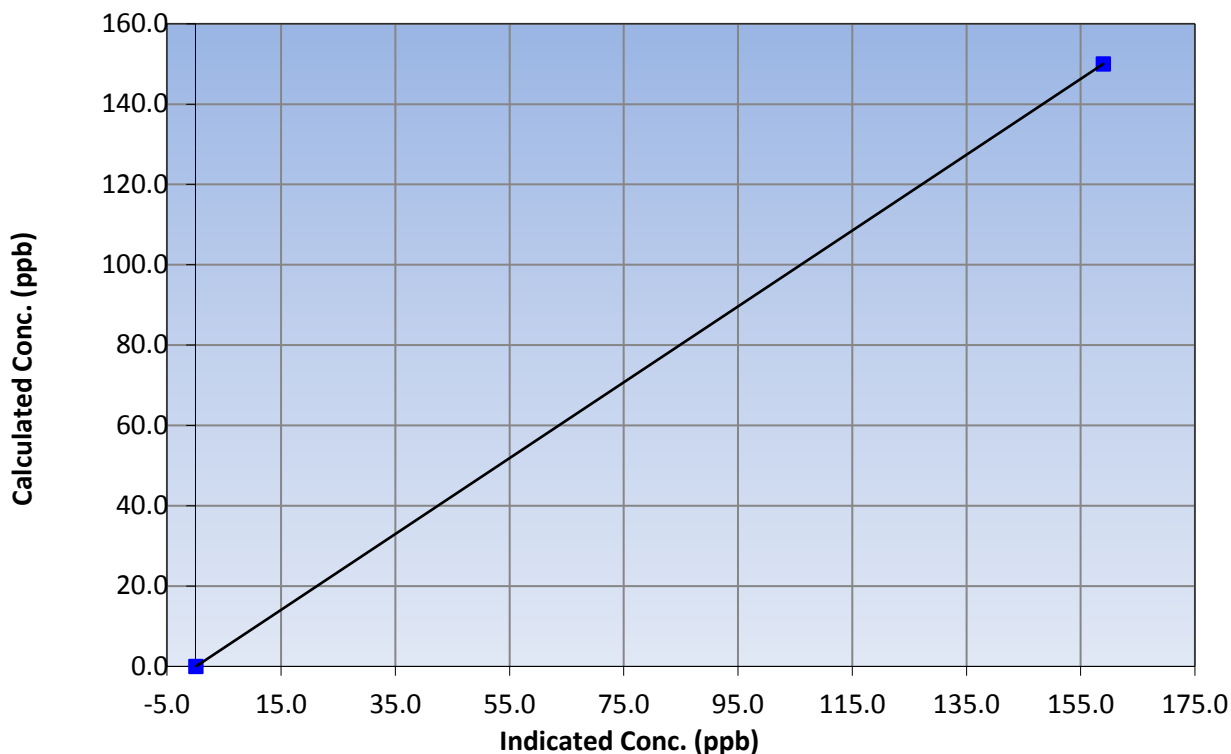
### Station Information

Calibration Date	July 1, 2015	Previous Calibration	June 3, 2015
Station Name	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	17:20	End Time (MST)	19:50
Analyzer make	Teledyne API T200u	Analyzer serial #	172

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	1.000000
150.0	159.0	0.9438		
			Slope	0.944286
			Intercept	-0.075543

### NO<sub>x</sub> Calibration Curve





# Wood Buffalo Environmental Association

## NO Calibration Summary

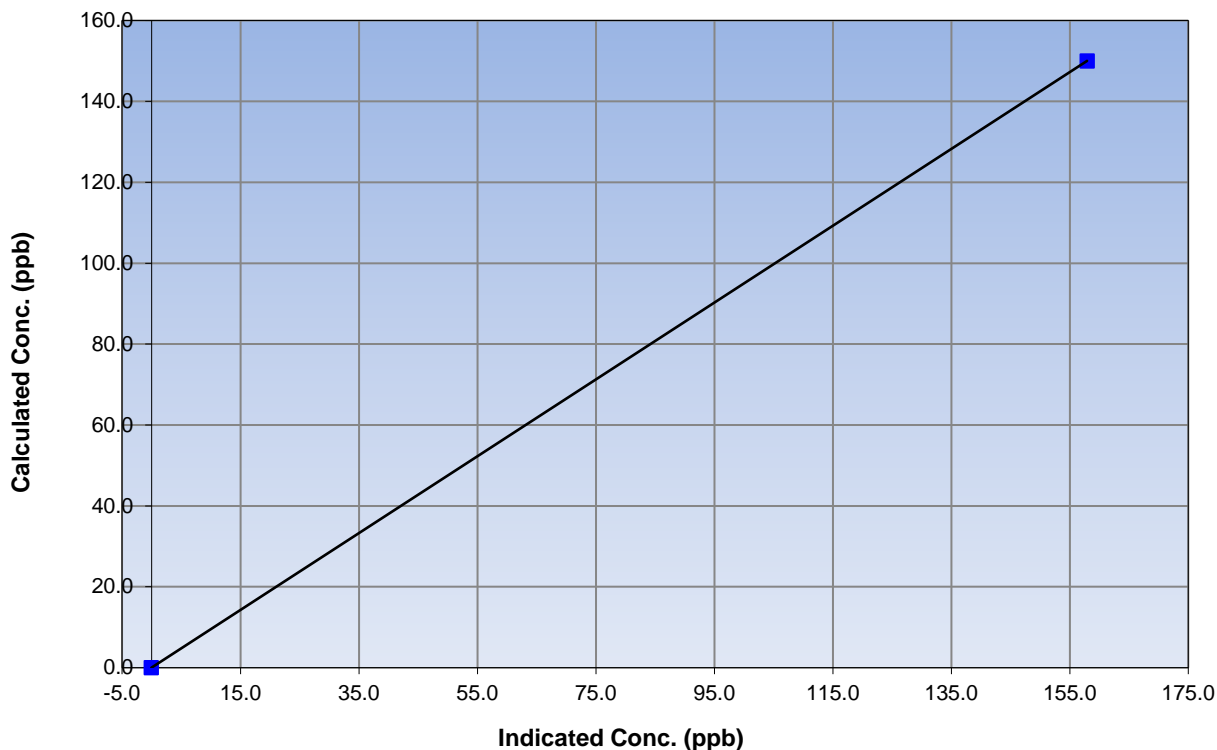
### Station Information

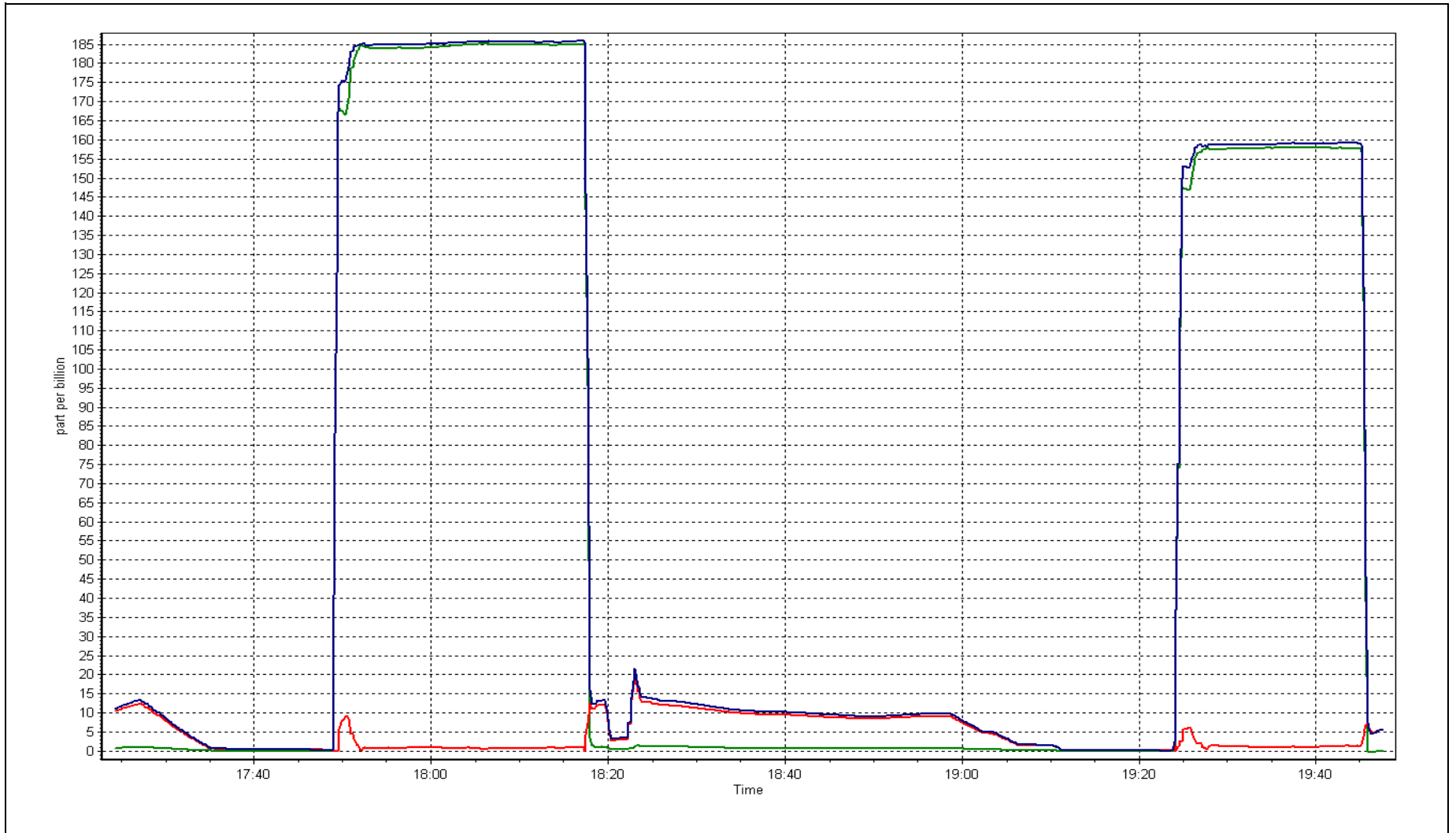
Calibration Date	July 1, 2015	Previous Calibration	June 3, 2015
Station Name	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	17:20	End Time (MST)	19:50
Analyzer make	Teledyne API T200u	Analyzer serial #	172

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	1.000000
150.0	157.9	0.9500		
			Slope	0.949726
			Intercept	0.047486

### NO Calibration Curve







## Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

### Station Information

Calibration Date	July 2, 2015	Previous Calibration	June 3, 2015
Station Name	Fort Chipewyan	Station Number	AMS 8
Reason:	Routine		
Start Time (MST)	8:50	End Time (MST)	12:45
NO Cal Gas Conc	20.2 ppm	Gas Cert Reference	LL103809
NOx Cal Gas Conc	20.2 ppm	Cal Gas Expiry Date	16-Sep-16
Calibrator	Teledyne API T700	Serial Number	747
Zero air Generator	Teledyne API T701	Serial Number	4698

### DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	8205
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### Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.944286	0.949726	0.998345
	Data Offset	-0.075543	0.047486	0.127628
Current Calibration	Data Slope	0.997739	0.999270	0.994208
	Data Offset	-0.095785	0.365032	-0.421354

### Analyzer Information

Analyzer make/model	Teledyne API T200u	Analyzer serial #	172
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Test Point	before		after	
Concentration range	0-200	ppb	0-200	ppb
NO coefficient	1.177		1.123	
NOx coefficient	1.194		1.135	
NO2 coefficient	1.000		1.000	
NO bkgrnd	0.1		0.1	
NOx bkgrnd	0.2		0.2	
Chamber Temp	40	Deg C	40	Deg C
Moly Temp	315.4	Deg C	315.4	Deg C
HVPS	502	V	502	V
PMT Temp	5.1	Deg C	5.1	Deg C
O3 flow	83	ccm	83	ccm
R Cell press NO	3.8	"Hg	3.8	"Hg
R Cell Press Nox	3.8	"Hg	3.8	"Hg
NO sample flow	1122	ccm	1122	ccm
Nox sample Flow	1122	ccm	1122	ccm

**Notes:**

Slight span adjustment, calibration stable, no issues noted with instrument during calibration.





# Wood Buffalo Environmental Association

## NOX-NO-NO2 Calibration Report

### Station Information

Calibration Date: July 2, 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	0.4	0.0	0.4	----	----
as found span	6000	44.6	150.0	150.0	0.0	158.7	157.2	1.5	0.9453	0.9543
calibrator zero	6000	0.0	0.0	0.0	0.0	0.4	0.0	0.4	----	----
high point	6000	44.6	150.0	150.0	0.0	150.6	150.0	0.6	0.9959	0.9999
second point	6000	23.8	80.0	80.0	0.0	80.1	79.3	0.8	0.9993	1.0089
third point	6000	11.9	40.0	40.0	0.0	40.0	39.5	0.5	1.0007	1.0139
as left zero	6000	0.0	0.0	0.0	0.0	0.0	-0.1	0.1	----	----
as left span	6000	44.6	150.0	43.3	106.7	152.5	44.3	108.2	0.9836	0.9772
<b>Average Correction Factor</b>									<b>0.9987</b>	<b>1.0076</b>

Corrced As found    NO<sub>x</sub>= 158.3                      NO= 157.2                      Percent Change            NO<sub>x</sub>= 0.4%                      NO= 0.4%  
 Previous Response    NO<sub>x</sub>= 158.9                      NO= 157.9

### 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			0.4			N/A	
1st NO2 (100)	----	43.3	106.5	150.7	43.3	107.4	0.9881	1.0000	0.9910	100.9%
2nd NO2 (75)	----	69.1	80.7	150.7	69.1	81.6	0.9880	1.0000	0.9884	101.2%
3rd NO2 (50)	----	95.7	54.0	150.6	95.7	54.8	0.9891	1.0000	0.9854	101.5%
4th NO2 (0)	149.7	----	0.2	149.9	149.7	0.2	0.9932	1.0000	N/A	----
<b>Average Correction Factor</b>							<b>0.9896</b>	<b>1.0000</b>	<b>0.9882</b>	<b>101.2%</b>

Calibration Performed By:                     Zack Eastman



# Wood Buffalo Environmental Association

## NO<sub>x</sub> Calibration Summary

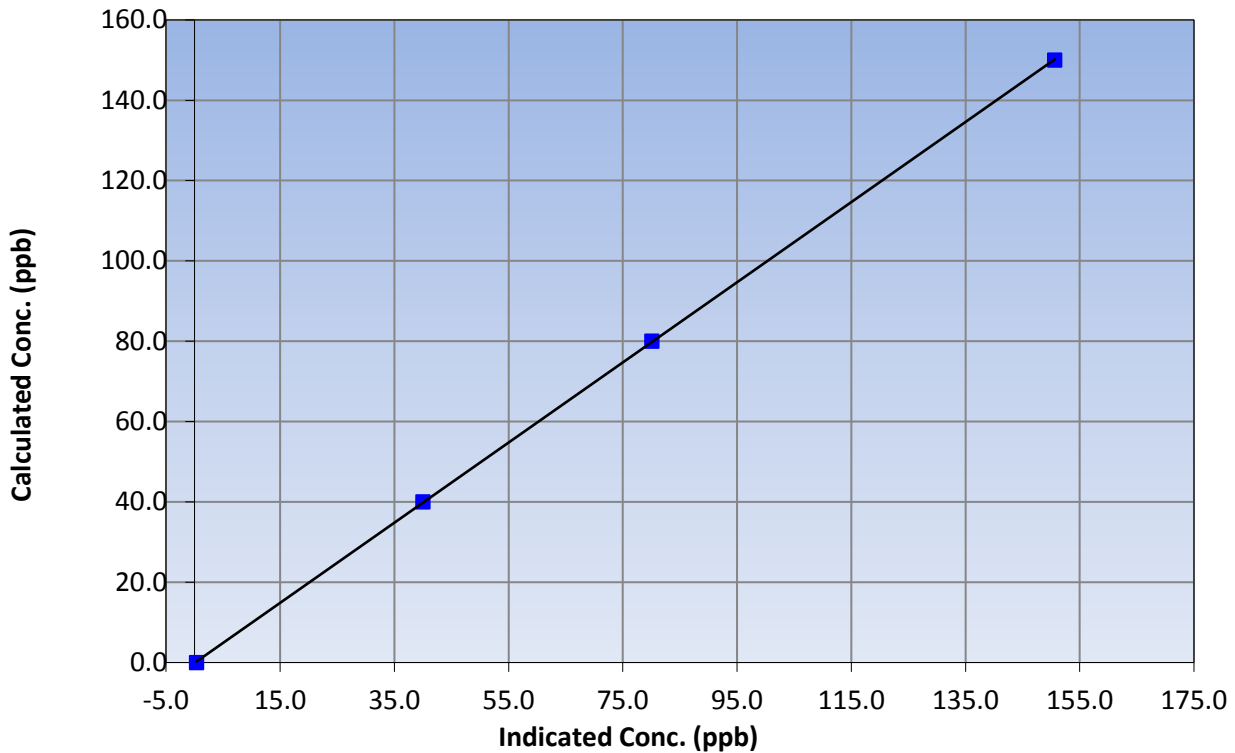
### Station Information

Calibration Date	July 2, 2015	Previous Calibration	June 3, 2015
Station Name	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	8:50	End Time (MST)	12:45
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	0.4	----	Correlation Coefficient	0.999984
150.0	150.6	0.9959		
80.0	80.1	0.9993	Slope	0.997739
40.0	40.0	1.0007		
			Intercept	-0.095785

### NO<sub>x</sub> Calibration Curve





# Wood Buffalo Environmental Association

## NO Calibration Summary

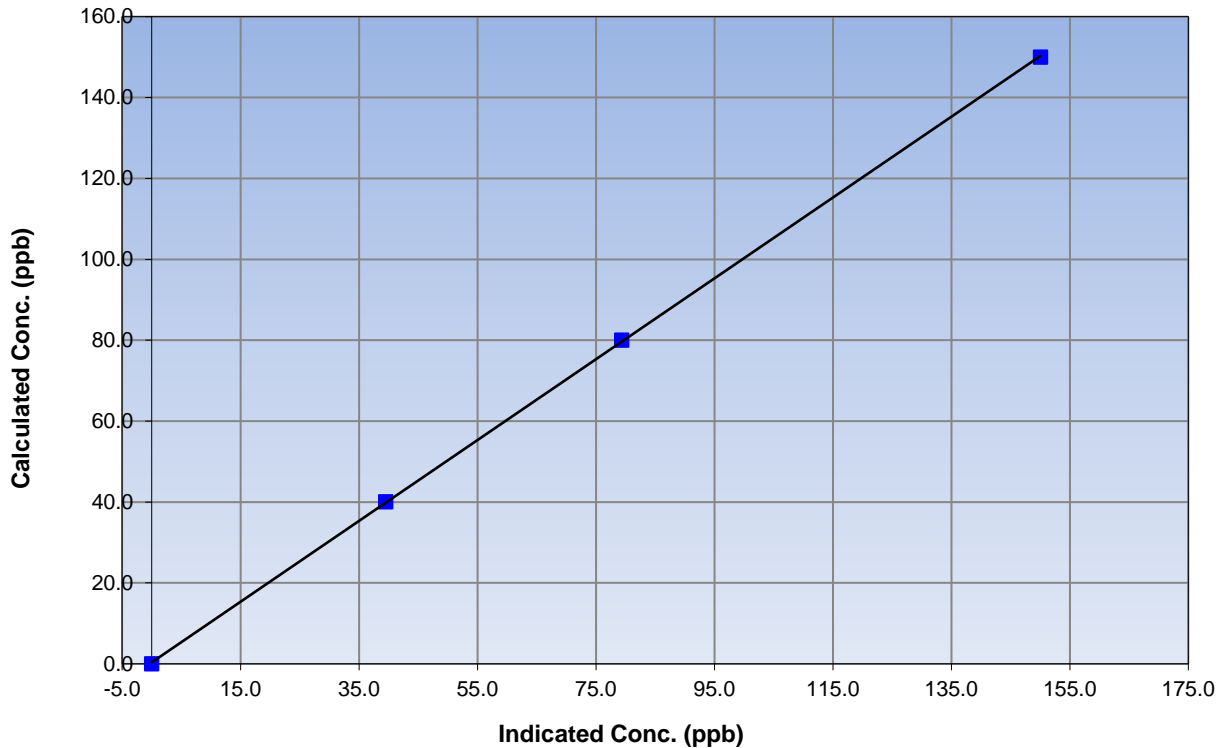
### Station Information

Calibration Date	July 2, 2015	Previous Calibration	June 3, 2015
Station Name	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	8:50	End Time (MST)	12:45
Analyzer make	Teledyne API T200u	Analyzer serial #	172

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999968
150.0	150.0	0.9999		
80.0	79.3	1.0089	Slope	0.999270
40.0	39.5	1.0139		
			Intercept	0.365032

### NO Calibration Curve





# Wood Buffalo Environmental Association

## NO<sub>2</sub> Calibration Summary

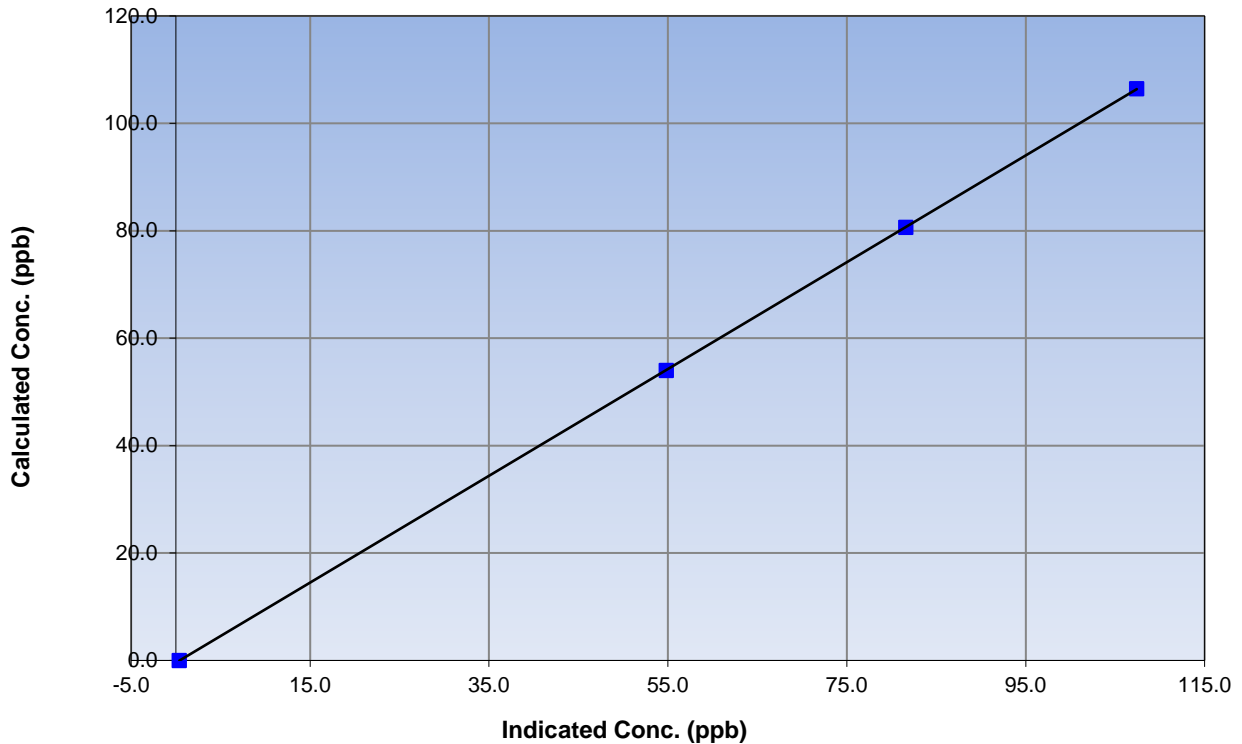
### Station Information

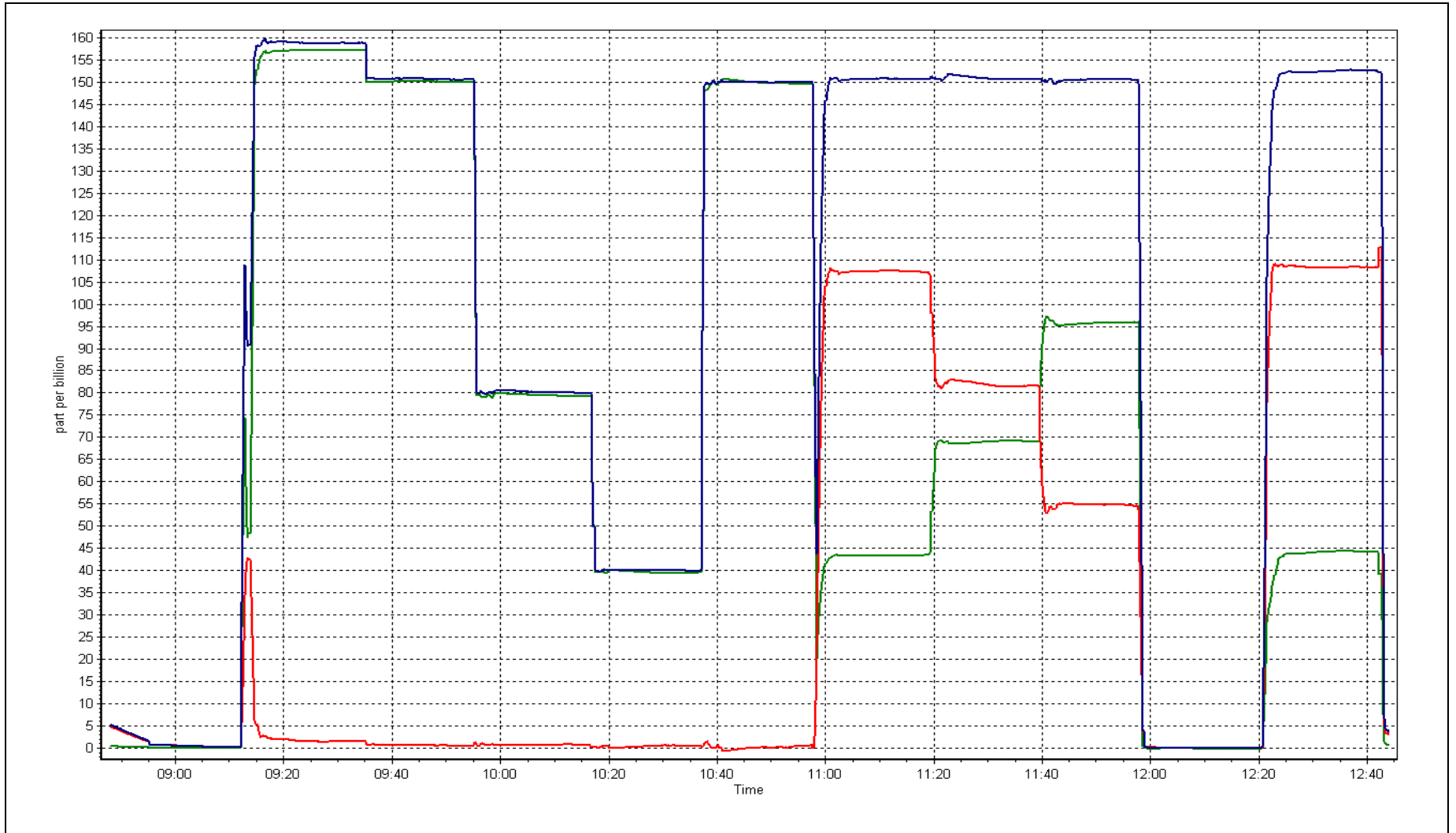
Calibration Date	July 2, 2015	Previous Calibration	June 3, 2015
Station Name	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	8:50	End Time (MST)	12:45
Analyzer make	Teledyne API T200u	Analyzer serial #	172

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.4	N/A	Correlation Coefficient	0.999998
106.5	107.4	0.9910		
80.7	81.6	0.9884	Slope	0.994208
54.0	54.8	0.9854		
			Intercept	-0.421354

### NO<sub>2</sub> Calibration Curve







Wood Buffalo Environmental Association

SHARP CALIBRATION

STATION INFORMATION

Calibration Date:	<u>July 1, 2015</u>	Previous Calibration:	<u>June 3, 2015</u>
Station Name:	<u>Fort Chipewyan</u>	Station Number:	<u>AMS 8</u>
Start Time (MST):	<u>16:00</u>	End Time (MST):	<u>16:44</u>
Calibrator Make/Model:	<u>Delta Cal</u>	Calibrator Serial Number:	<u>1102</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	24.0	24.5	0.5	24.0
T2	36.0	na	na	36.0
T3	29.0	na	na	29.0
T4	61.0	na	na	61.0
RH (%)	36.0	na	na	36.0

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	981	979.0	-2.0	981

Main Flow (Lph)

Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
999	996	-3	996	999

Nephelometer Calibration

Parameter	As Found	Zeroed (Limit +/- 2.0ug/m3)	As Left
Analog	163		163
Neph	1.4		1.4
C14	259.5		259.5
Indicated Concentration (ug/m3)	0.4	no	0.5
Offset 1			
Offset 2			

Leak Check (Quarterly)

Leak Check Date:	<u>May 6, 2015</u>	Previous Leak Check Date:	NA
	<b>Measured</b>	<b>Difference LPM (Limit +/- 0.42 LPM)</b>	
Flow without adaptor (LPM):	16.60	0.10	
Flow with adaptor [turn off pump first](LPM):	16.50		

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>	<b>Mass foil set S/N:</b>	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:

No adjustments made.

Calibration Performed By: Zach Eastman



## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS 9  
BARGE LANDING  
JULY 2015**

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

August 26, 2015



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BARGE LANDING (AMS 9)  
 JULY 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	708	35	36	99.87	2	0	1	0
THC(ppm) Average	710	34	34	100.00	3.4	-	2.6	-
Temperature (C) Average	744	0	0	100.00	32.4	-	23.9	-
Relative Humidity (%) Average	744	0	0	100.00	99	-	86	-
Wind Speed 10 m (km/h) Average	744	0	0	100.00	17	-	9	-
Wind Direction 10 m (deg) Average	744	0	0	100.00	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BARGE LANDING (AMS 9)  
 JULY 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	708	0.3	0	-	0	0	0	0	0	1	2
THC(ppm) Average	710	2.2	0.2	-	2	2	2.1	2.1	2.3	2.5	3.4
Temperature (C) Average	744	18.23	5	-	5.6	12	14.4	18	22.1	24.8	32.4
Relative Humidity (%) Average	744	69.3	20	-	23	41	53	72	87	96	99
Wind Speed 10 m (km/h) Average	744	5.2	3	-	0	2	3	5	7	9	17
Wind Direction 10 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BARGE LANDING (AMS 9)  
JULY 2015

OPERATIONAL NOTES

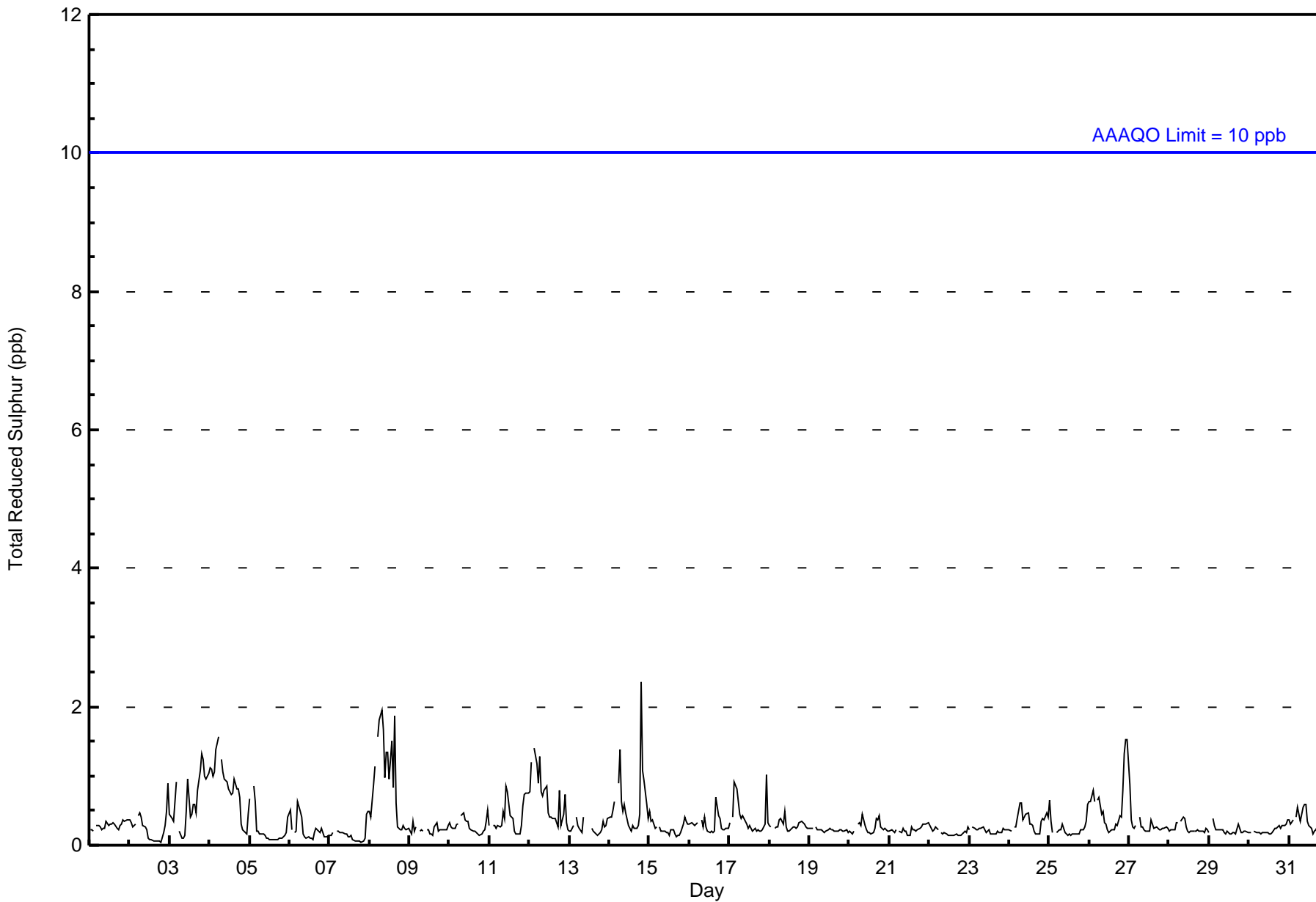
Parameter	Period Start	Period End	Duration (Hours)	Notes
TRS	09 Jul 2015 10:00	09 Jul 2015 10:00	1	Maintenance - sample manifold cleaned



Summary of Hour Averages

Barge Landing - July 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 2 ppb on Jul 14 20:00      Maximum Daily Average: 0.9 ppb on Jul 8																	Hours in Service: 744 Hours of Data: 708									
Minimum Value: 0 ppb on Jul 2 20:00      Minimum Daily Average: 0.2 ppb on Jul 7 Maximum Diurnal Average: 0.5 ppb at hour 6      Minimum Diurnal Average: 0.3 ppb at hour 18 Monthly Average: 0.3 ppb      Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 1 P <sub>99</sub> = 2																	Hours of Missing Data: 36 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-Jul	0	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-Jul	0	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	1
3-Jul	0	0	0	1	1	Z	0	0	0	0	1	0	0	1	1	0	1	1	1	1	1	1	1	1	0.6	1
4-Jul	1	1	1	1	1	2	Z	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0.8	2
5-Jul	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
6-Jul	1	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
7-Jul	0	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-Jul	0	0	1	1	Z	2	2	2	2	1	1	1	1	2	1	2	1	0	0	0	0	0	0	0	0.9	2
9-Jul	0	0	0	0	0	Z	0	0	0	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
10-Jul	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	1
11-Jul	0	Z	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	1	1	0.4	1
12-Jul	1	1	Z	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	0	0	1	0	0.7	1
13-Jul	0	0	0	Z	0	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.3	0
14-Jul	0	0	1	1	Z	1	1	1	1	0	1	0	0	0	0	0	0	0	0	2	1	1	1	0	0.6	2
15-Jul	0	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-Jul	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.3	1
17-Jul	0	Z	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.4	1
18-Jul	0	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-Jul	0	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-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
21-Jul	0	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-Jul	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-Jul	0	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-Jul	0	0	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
25-Jul	1	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
26-Jul	1	1	1	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	2	0.6	2
27-Jul	1	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
28-Jul	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-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
30-Jul	0	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
31-Jul	0	0	0	Z	0	1	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
0.4 0.4 0.4 0.4 0.4 0.5 0.5 0.4 0.4 0.4 0.4 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.4 0.4 0.4																								Diurnal Average		
1 1 1 1 1 2 2 2 2 2 1 1 1 1 2 1 2 1 1 1 2 1 1 2 2																								Diurnal Maximum		
Z - zerospan      C - Calibration      M - Maintenance																										
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb      24-hr 3 ppb																										





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

**Total Reduced Sulphur (TRS) - ppb**  
**Barge Landing - July 2015**

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

Total Number of Valid Hours: 708

Total Number of Hours: 744



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

**Total Reduced Sulphur (TRS) - ppb**  
**Barge Landing - July 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	63	18	19	20	21	11	27	55	60	77	88	63	47	46	37	56	708
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	63	18	19	20	21	11	27	55	60	77	88	63	47	46	37	56	708

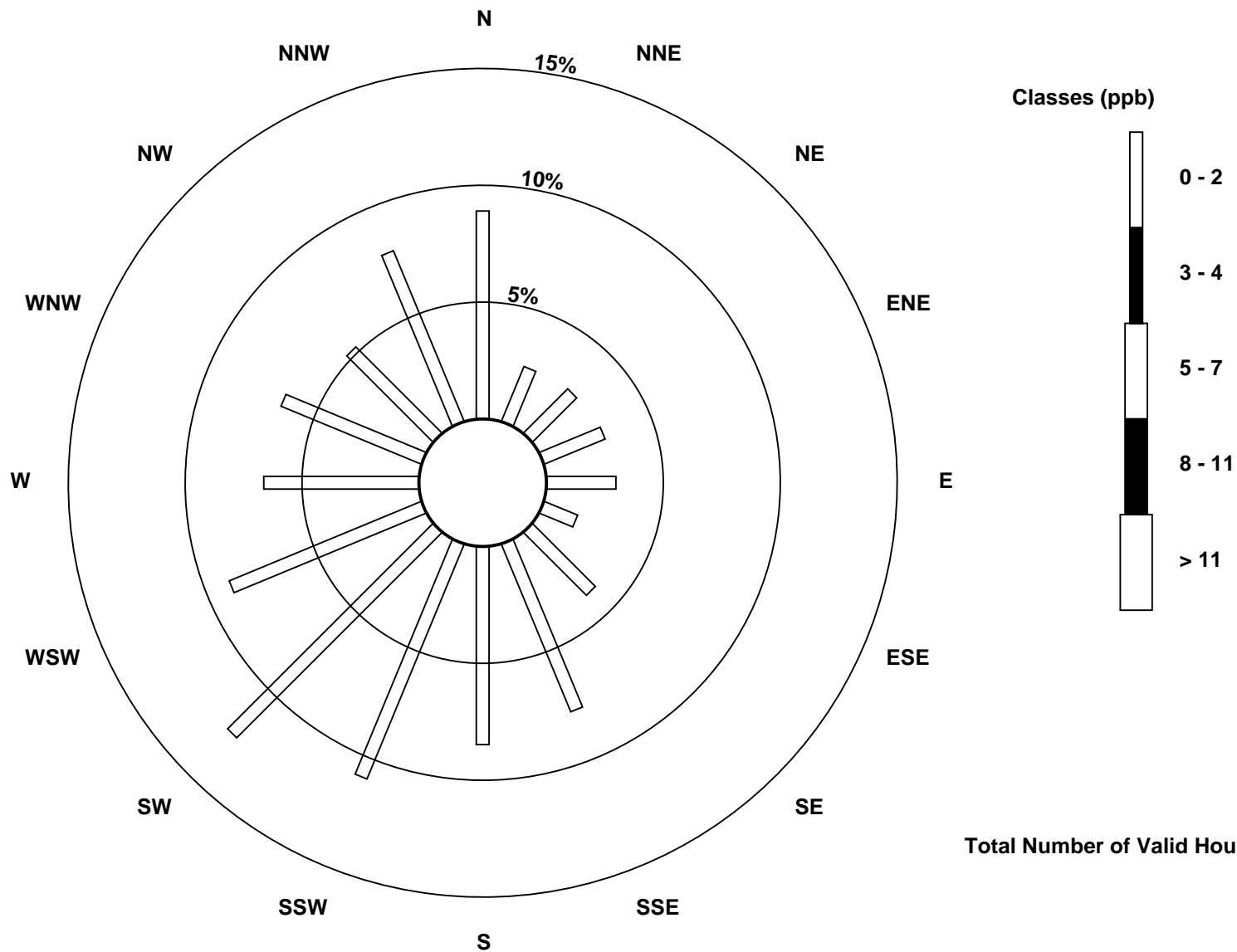
Total Number of Valid Hours: 708

Total Number of Hours: 744

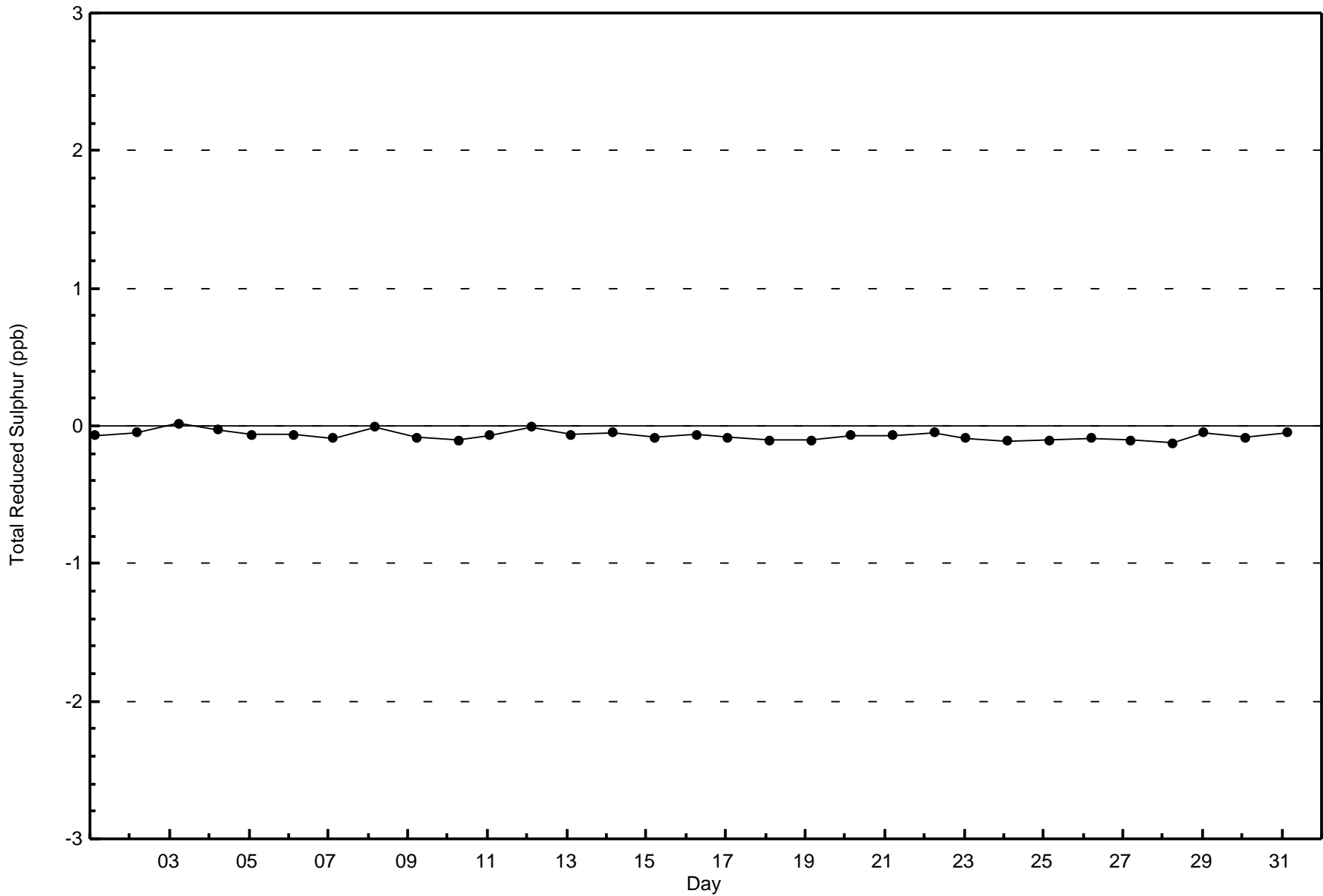


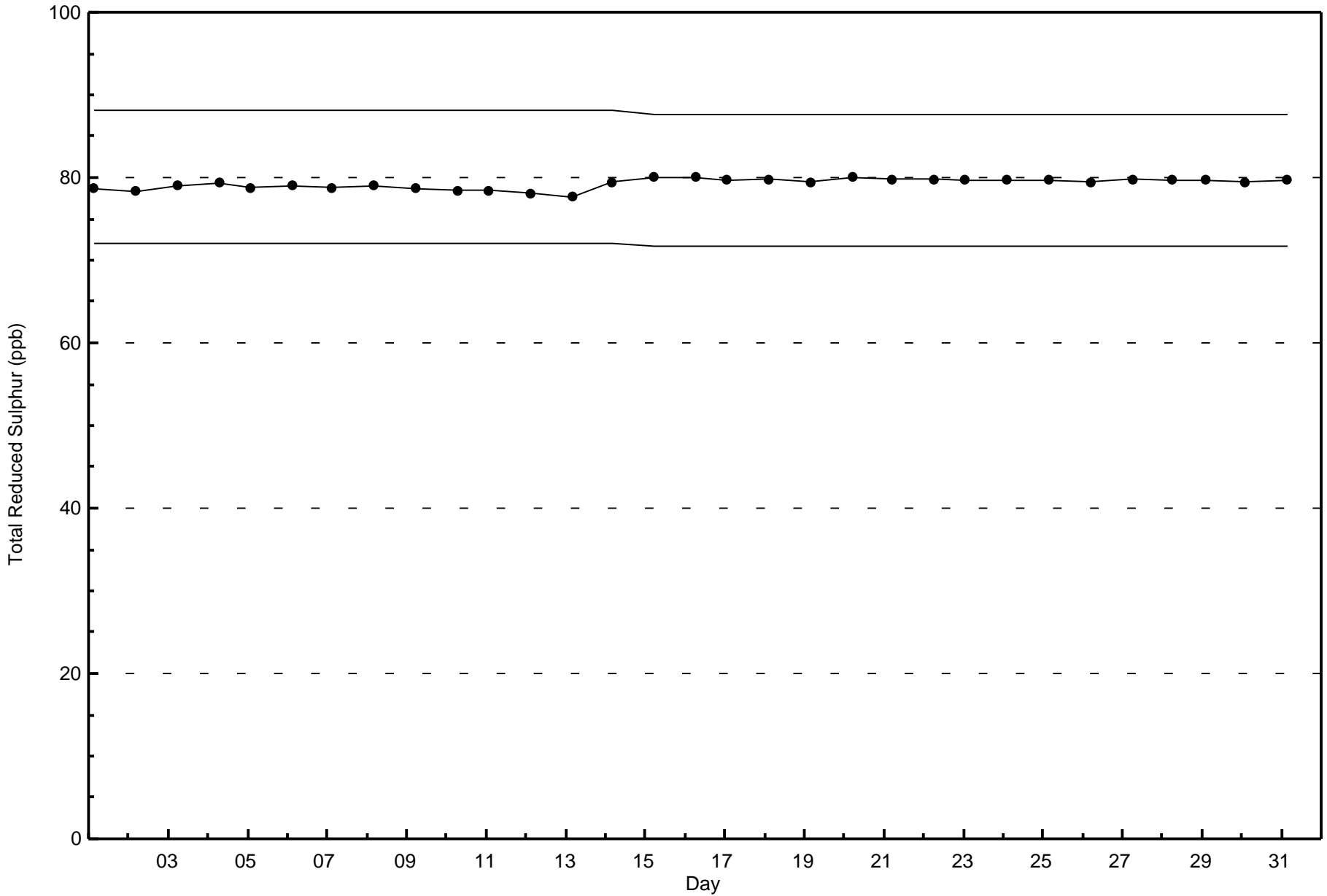
**Wood Buffalo Environmental Association**  
**Wind Rose Jul 2015**

**Total Reduced Sulphur (TRS) - ppb**  
**Barge Landing (AMS 9)**



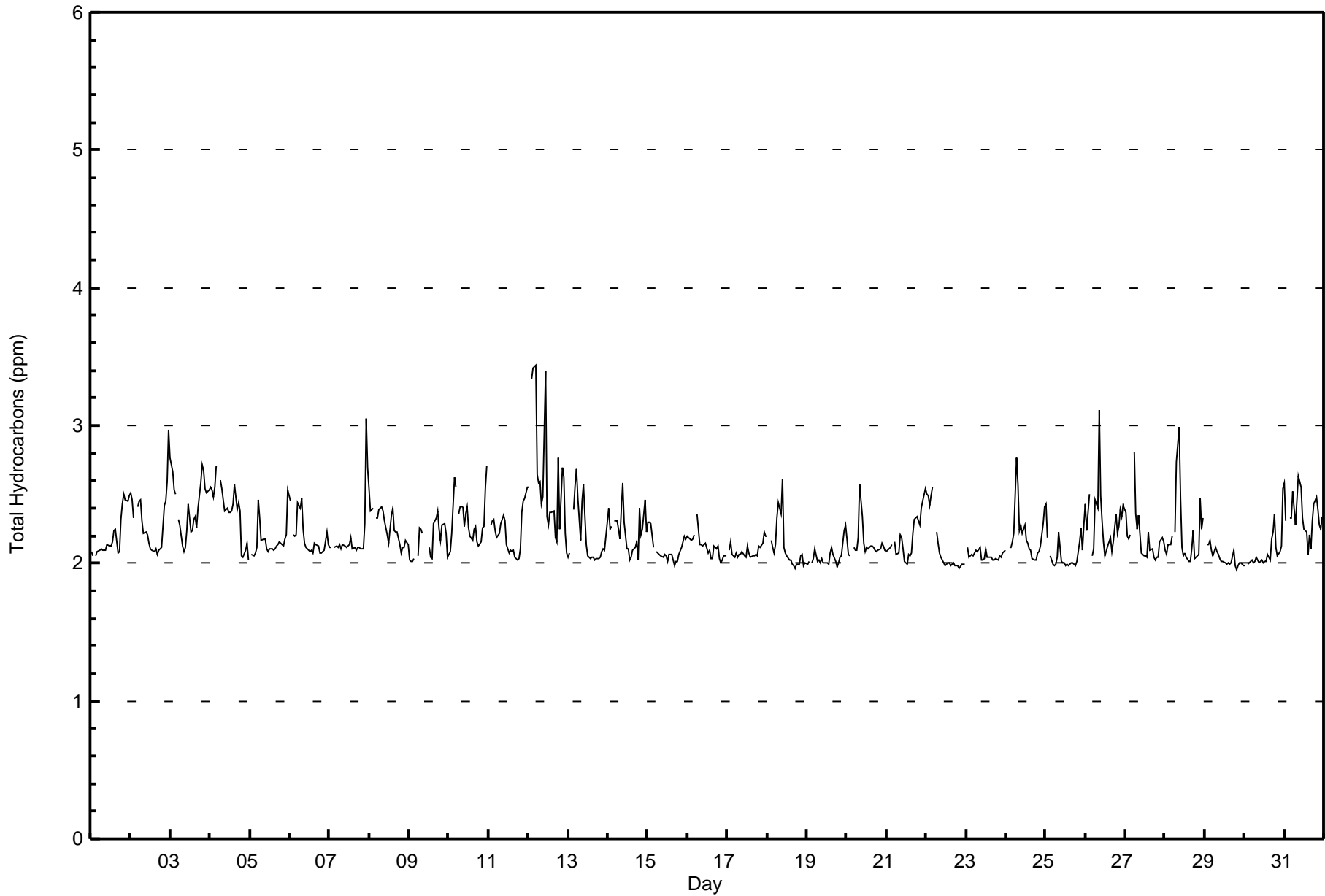








Maximum Value: 3.4 ppm on Jul 12 05:00																	Maximum Daily Average: 2.6 ppm on Jul 12																	Hours in Service: 744															
Minimum Value: 2.0 ppm on Jul 29 20:00																	Minimum Daily Average: 2.0 ppm on Jul 29																	Hours of Data: 710															
Maximum Diurnal Average: 2.3 ppm at hour 9																	Minimum Diurnal Average: 2.1 ppm at hour 13																	Hours of Missing Data: 34															
Monthly Average: 2.20 ppm																	Percentiles: P <sub>1</sub> = 2.0 P <sub>10</sub> = 2.0 Q <sub>1</sub> = 2.1 Median = 2.1 Q <sub>3</sub> = 2.3 P <sub>90</sub> = 2.5 P <sub>99</sub> = 3.0																	Hours of Calibration: 34															
																																		Percent Operational Time: 100.0															
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jul	2.1	2.0	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.3	2.1	2.1	2.3	2.4	2.5	2.5	2.5	2.5	2.2	2.5																							
2-Jul	2.5	2.5	2.3	Z	2.4	2.5	2.5	2.3	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.4	2.5	2.6	3.0	2.3	3.0																							
3-Jul	2.8	2.7	2.5	2.5	Z	2.3	2.3	2.1	2.1	2.1	2.2	2.4	2.2	2.2	2.3	2.3	2.3	2.4	2.6	2.7	2.7	2.5	2.5	2.5	2.4	2.8																							
4-Jul	2.6	2.5	2.5	2.5	2.7	Z	2.3	2.6	2.5	2.5	2.4	2.4	2.4	2.4	2.6	2.4	2.4	2.4	2.4	2.1	2.0	2.1	2.1	2.0	2.4	2.7																							
5-Jul	Z	2.1	2.1	2.1	2.1	2.5	2.3	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.2	2.2	2.5	2.2	2.5																						
6-Jul	2.5	Z	2.2	2.2	2.2	2.4	2.4	2.5	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.5																							
7-Jul	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	3.0	2.7	2.2	3.0																							
8-Jul	2.5	2.4	2.4	Z	2.3	2.3	2.4	2.4	2.4	2.3	2.3	2.2	2.1	2.3	2.4	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.1	2.3	2.5																							
9-Jul	2.0	2.0	2.0	2.0	Z	2.1	2.3	2.2	2.2	Z	Z	Z	2.1	2.0	2.0	2.3	2.3	2.4	2.2	2.2	2.3	2.3	2.2	2.0	2.2	2.4																							
10-Jul	2.1	2.1	2.2	2.6	2.6	Z	2.4	2.4	2.4	2.3	2.4	2.4	2.3	2.2	2.2	2.2	2.3	2.2	2.1	2.2	2.3	2.3	2.5	2.7	2.3	2.7																							
11-Jul	Z	2.3	2.3	2.3	2.2	2.2	2.2	2.3	2.3	2.4	2.3	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.1	2.4	2.4	2.5	2.6	2.2	2.6																							
12-Jul	2.6	Z	3.3	3.4	3.4	2.6	2.6	2.6	2.4	2.5	3.4	2.3	2.3	2.4	2.4	2.4	2.2	2.2	2.8	2.2	2.7	2.6	2.2	2.1	2.6	3.4																							
13-Jul	2.0	2.1	Z	2.4	2.6	2.7	2.5	2.2	2.4	2.6	2.3	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.2	2.2	2.2	2.7																							
14-Jul	2.4	2.2	2.3	Z	2.3	2.3	2.2	2.2	2.4	2.6	2.3	2.1	2.1	2.0	2.0	2.1	2.1	2.2	2.0	2.4	2.2	2.3	2.5	2.2	2.2	2.6																							
15-Jul	2.3	2.3	2.3	2.1	Z	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.2	2.2	2.1	2.3																							
16-Jul	2.2	2.2	2.2	2.2	2.2	Z	2.4	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.4																							
17-Jul	Z	2.1	2.2	2.1	2.0	2.1	2.0	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.2																							
18-Jul	2.2	Z	2.2	2.1	2.1	2.1	2.3	2.4	2.4	2.6	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.1	2.6																							
19-Jul	2.0	2.0	Z	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.3	2.0	2.3																							
20-Jul	2.2	2.1	2.0	Z	2.1	2.1	2.1	2.2	2.6	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.6																							
21-Jul	2.1	2.1	2.1	2.1	Z	2.2	2.1	2.1	2.2	2.2	2.1	2.0	2.0	2.1	2.1	2.1	2.2	2.3	2.3	2.3	2.3	2.4	2.5	2.5	2.2	2.5																							
22-Jul	2.5	2.5	2.4	2.5	2.5	Z	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.5																							
23-Jul	Z	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1	2.1	2.1	2.1																							
24-Jul	2.1	Z	2.1	2.1	2.2	2.2	2.8	2.6	2.2	2.3	2.2	2.3	2.2	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.3	2.4	2.2	2.8																							
25-Jul	2.4	2.2	Z	2.1	2.0	2.0	2.0	2.0	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.3	2.1	2.3	2.1	2.4																							
26-Jul	2.4	2.2	2.5	Z	2.1	2.1	2.5	2.4	3.1	2.5	2.3	2.2	2.1	2.1	2.2	2.2	2.1	2.2	2.4	2.2	2.3	2.4	2.3	2.4	2.3	3.1																							
27-Jul	2.4	2.2	2.2	2.2	Z	2.8	2.4	2.2	2.3	2.2	2.1	2.1	2.1	2.0	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.2	2.2	2.2	2.2	2.8																							
28-Jul	2.1	2.1	2.1	2.1	2.2	Z	2.2	2.7	3.0	2.5	2.1	2.0	2.1	2.0	2.0	2.0	2.1	2.2	2.0	2.1	2.1	2.5	2.3	2.3	2.2	3.0																							
29-Jul	Z	2.1	2.1	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	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2																							
30-Jul	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.2	2.2	2.4	2.1	2.1	2.1	2.1	2.5	2.1	2.5																							
31-Jul	2.6	2.3	Z	2.3	2.3	2.5	2.4	2.3	2.6	2.6	2.6	2.3	2.2	2.2	2.1	2.2	2.1	2.3	2.4	2.5	2.4	2.3	2.3	2.3	2.4	2.6																							
																								2.3	2.2	2.3	2.2	2.3	2.2	2.3	2.2	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.2	2.3	2.3	Diurnal Average	
																								2.8	2.7	3.3	3.4	3.4	2.8	2.8	2.7	3.1	2.6	3.4	2.4	2.4	2.4	2.4	2.6	2.4	2.4	2.8	2.7	2.7	2.6	3.0	3.0	Diurnal Maximum	
Z - zerospan																								C - Calibration																									





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

**Total Hydrocarbons (THC) - ppm**  
**Barge Landing - July 2015**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	151	21.27	21.27
2.1 - 3.0	554	78.03	99.30
3.1 - 10.0	5	0.70	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 710

Total Number of Hours: 744



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

**Total Hydrocarbons (THC) - ppm**  
**Barge Landing - July 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	12	0	2	1	2	4	1	6	3	11	33	20	19	16	8	13	151
2.1 - 3.0	46	18	15	17	20	10	24	51	55	68	57	45	25	31	29	43	554
3.1 - 10.0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1	5
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	59	18	18	19	22	14	25	57	58	79	90	65	44	47	38	57	710

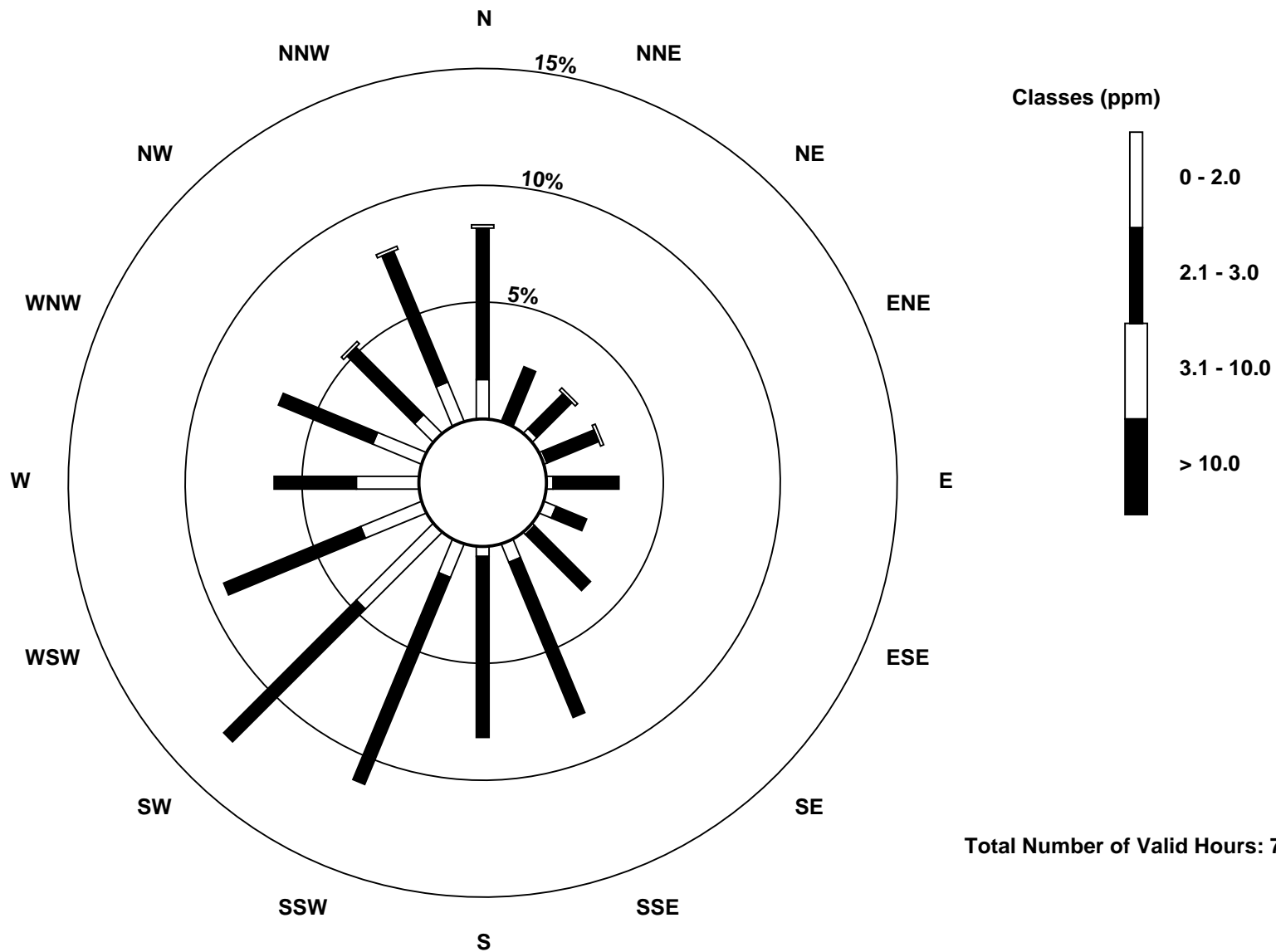
Total Number of Valid Hours: 710

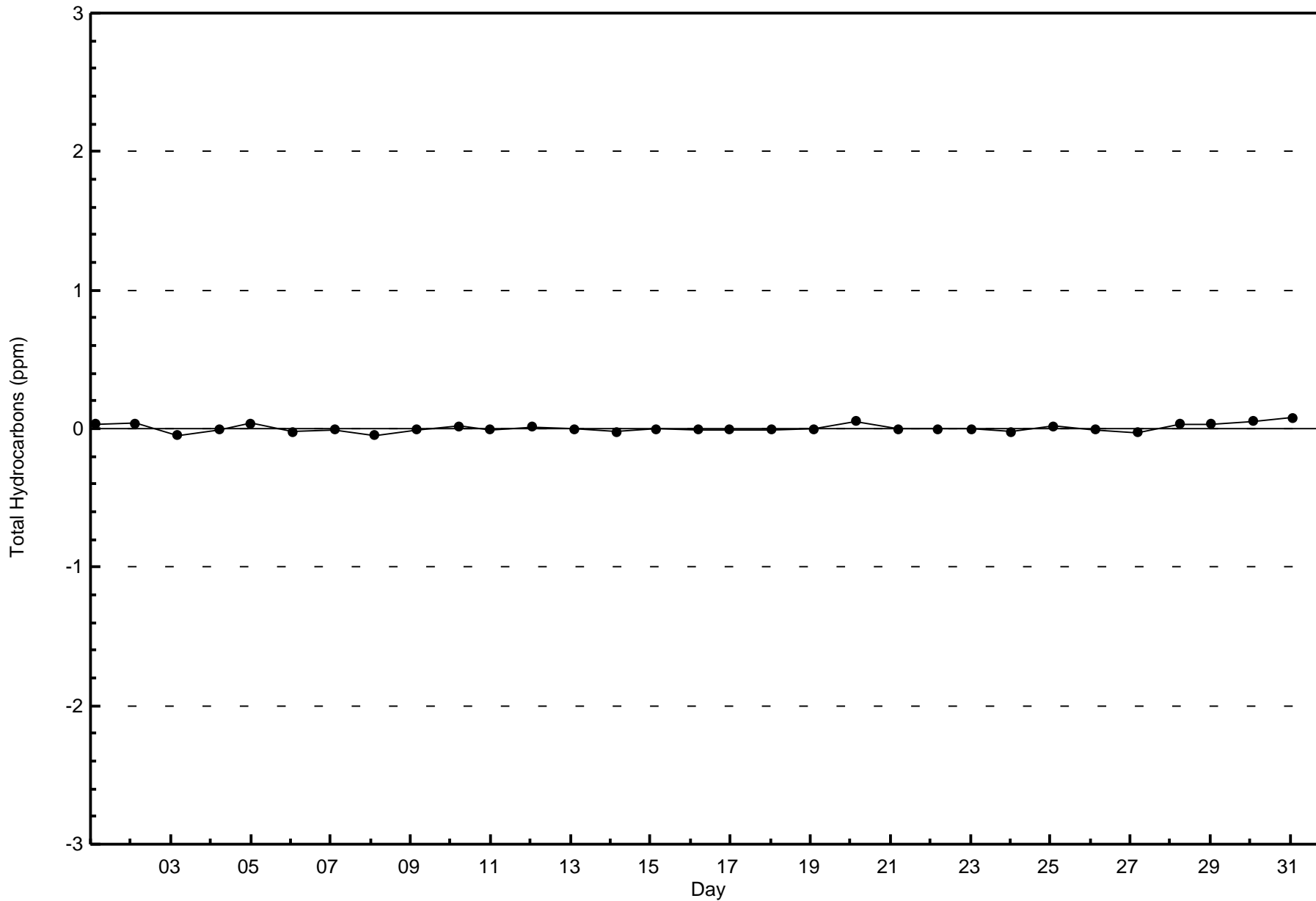
Total Number of Hours: 744



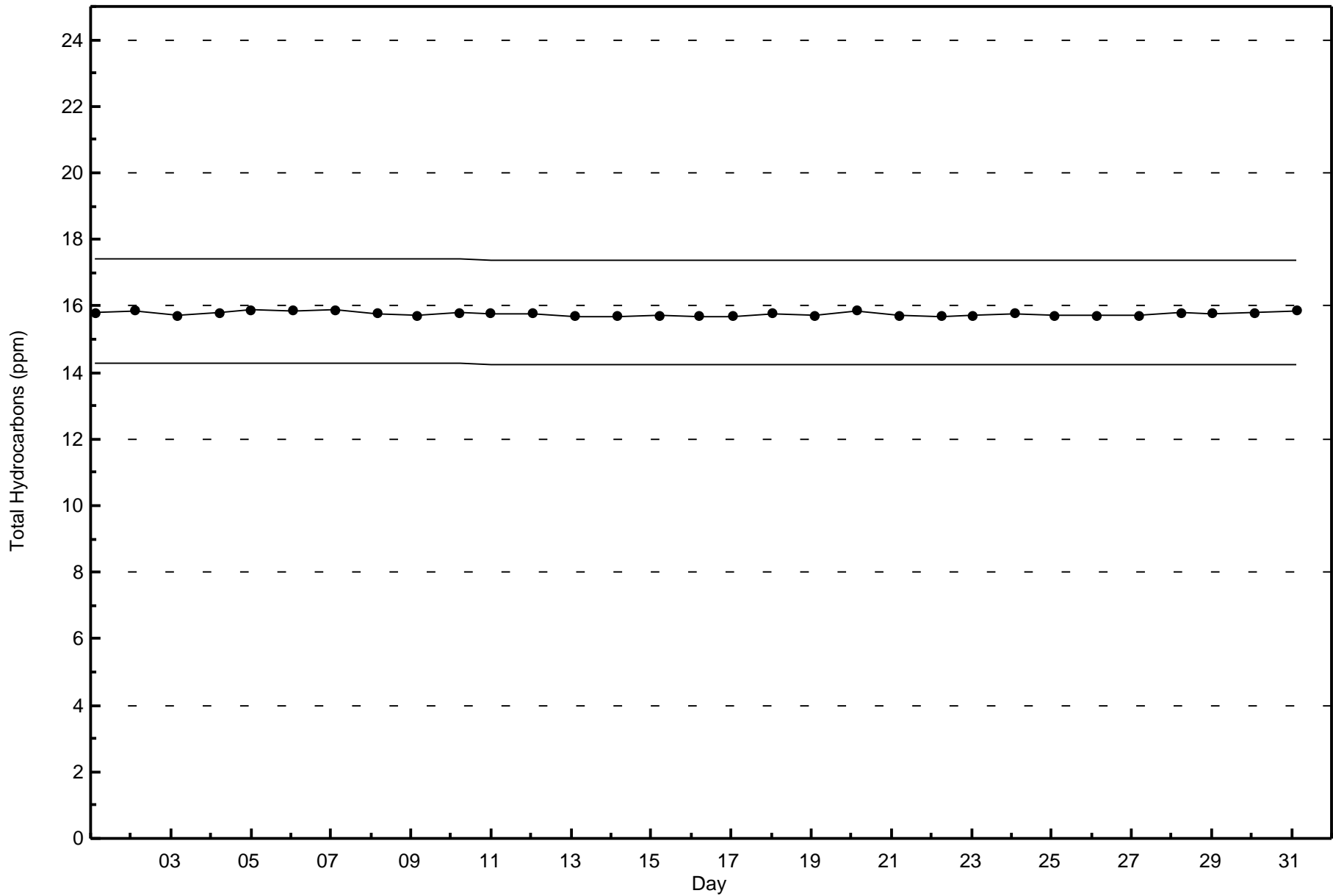
Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Total Hydrocarbons (THC) - ppm  
Barge Landing (AMS 9)



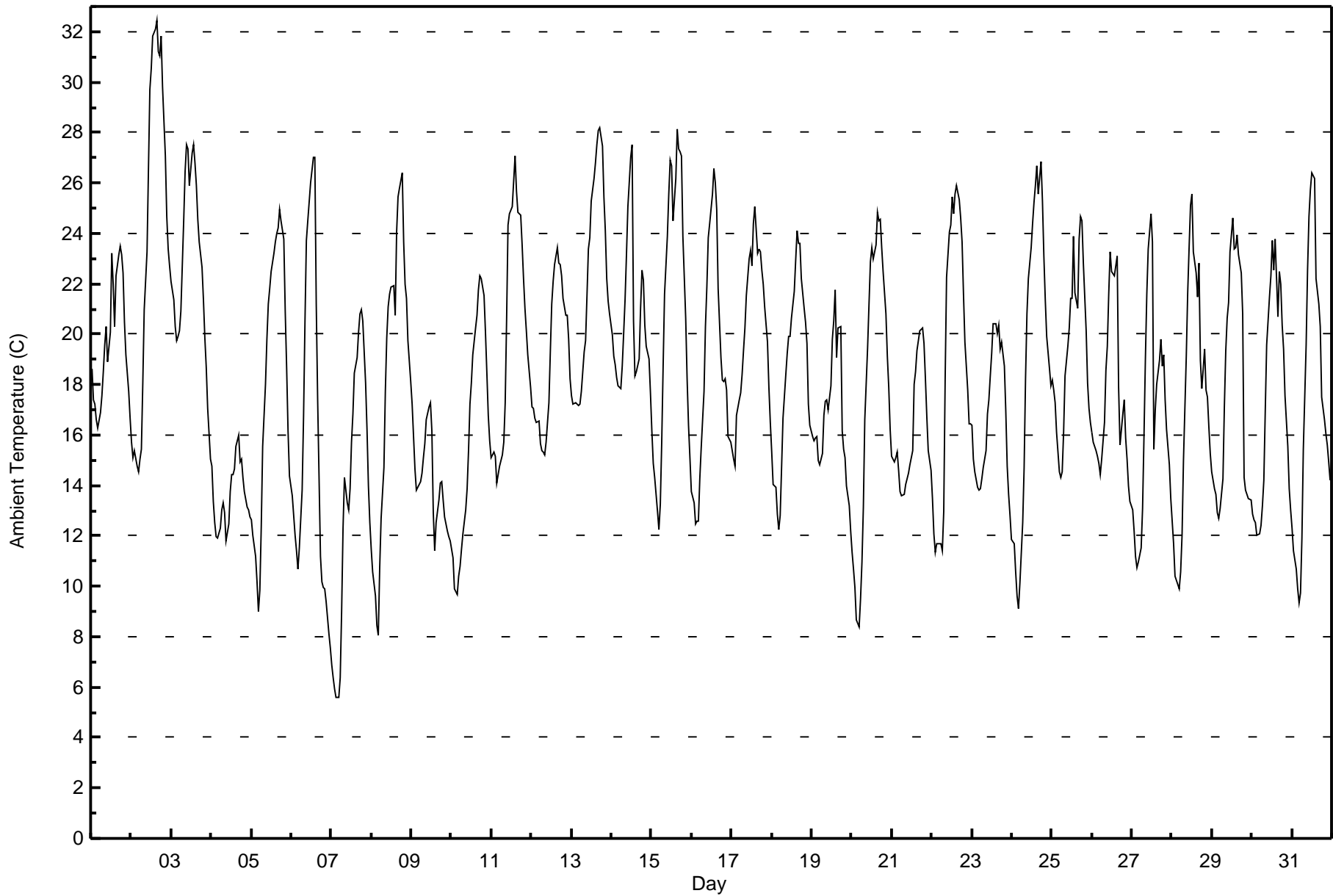








Maximum Value: 32.4 C on Jul 2 16:00		Maximum Daily Average: 23.9 C on Jul 2		Hours in Service: 744																																												
Minimum Value: 5.6 C on Jul 7 04:00		Minimum Daily Average: 13.6 C on Jul 7		Hours of Data: 744																																												
Maximum Diurnal Average: 22.8 C at hour 13		Minimum Diurnal Average: 12.8 C at hour 5		Hours of Missing Data: 0																																												
Monthly Average: 18.23 C		Percentiles: P <sub>1</sub> = 8.1 P <sub>10</sub> = 12.0 Q <sub>1</sub> = 14.4 Median = 18.0 Q <sub>3</sub> = 22.1 P <sub>90</sub> = 24.8 P <sub>99</sub> = 30.0		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-Jul	18.6	17.4	17.2	16.6	16.3	16.9	17.6	18.5	19.6	20.3	18.9	20.1	23.2	22.0	20.3	22.3	23.1	23.5	23.2	22.4	20.5	19.2	17.7	16.6	19.7	23.5																						
2-Jul	15.7	15.1	15.4	14.8	14.5	15.1	15.4	18.0	21.0	23.3	26.5	29.7	30.5	31.8	32.1	32.4	31.2	31.1	31.8	29.8	27.1	24.7	23.4	22.7	23.9	32.4																						
3-Jul	22.1	21.4	20.3	19.7	19.9	20.1	20.9	24.5	26.5	27.5	27.4	25.9	27.2	27.5	26.8	25.9	24.6	23.7	22.7	21.4	19.9	18.7	17.1	15.1	22.8	27.5																						
4-Jul	14.8	13.3	12.5	12.0	11.9	12.3	13.1	13.3	12.9	11.8	12.5	13.8	14.4	14.4	14.7	15.5	16.0	14.9	15.0	14.3	13.8	13.2	13.1	12.7	13.6	16.0																						
5-Jul	12.7	12.0	11.2	10.2	9.0	9.8	12.4	15.5	18.0	19.8	21.2	21.8	22.5	23.2	23.6	24.0	24.2	24.9	24.5	23.8	20.9	18.7	16.2	14.4	18.1	24.9																						
6-Jul	13.6	12.8	12.0	11.4	10.7	11.5	13.8	16.7	20.5	23.7	24.5	26.0	26.5	27.0	27.0	21.2	17.4	11.2	10.2	10.0	9.9	9.4	8.1	7.6	15.9	27.0																						
7-Jul	6.9	6.4	6.0	5.6	5.6	6.4	9.0	12.3	14.3	13.3	13.0	13.9	15.7	16.8	18.5	19.1	20.1	20.8	21.0	20.5	18.0	16.2	14.0	12.5	13.6	21.0																						
8-Jul	11.4	10.6	9.6	8.4	8.1	10.8	12.7	14.7	17.7	19.9	21.1	21.6	21.9	21.9	20.7	24.0	25.5	25.8	26.4	23.7	22.0	21.4	19.7	18.1	18.2	26.4																						
9-Jul	17.2	15.9	14.7	13.8	13.9	14.2	14.5	15.1	15.7	16.6	17.1	17.3	16.2	12.9	11.4	12.5	13.4	14.1	14.1	13.4	12.8	12.2	12.0	11.8	14.3	17.3																						
10-Jul	11.5	11.1	9.9	9.7	10.4	10.8	11.5	12.1	13.0	13.9	15.4	17.2	18.1	19.2	20.3	20.8	21.7	22.3	22.2	21.5	20.1	18.5	16.8	15.7	16.0	22.3																						
11-Jul	15.1	15.3	15.2	14.1	14.4	14.8	15.2	15.7	17.3	20.6	24.3	24.8	25.1	26.0	27.1	25.7	24.9	24.7	23.5	22.2	21.1	20.1	19.2	17.9	20.2	27.1																						
12-Jul	17.1	17.1	16.7	16.5	16.6	15.7	15.4	15.3	15.2	15.7	17.3	19.3	21.2	22.1	22.7	23.5	22.8	22.8	22.3	21.4	20.8	20.7	19.8	18.2	19.0	23.5																						
13-Jul	17.6	17.2	17.3	17.2	17.2	17.2	17.7	19.3	19.8	21.5	23.4	23.8	25.3	26.2	26.8	27.5	28.1	28.2	27.5	25.4	24.1	22.2	21.3	20.8	22.2	28.2																						
14-Jul	20.0	19.1	18.8	18.3	17.9	17.8	18.8	20.0	21.3	23.2	25.1	27.0	27.5	20.5	18.3	18.5	19.0	21.1	22.5	22.1	20.4	19.5	19.0	17.7	20.6	27.5																						
15-Jul	16.2	14.9	14.3	13.0	12.3	13.2	15.7	18.8	21.6	23.9	25.5	26.9	26.7	24.5	26.2	28.2	27.3	27.3	27.1	23.9	20.6	18.2	16.4	15.1	20.7	28.2																						
16-Jul	13.8	13.3	12.5	12.6	12.6	14.3	15.5	17.7	20.3	21.9	23.8	24.4	25.5	26.6	26.0	25.0	21.8	19.1	18.2	18.1	18.3	17.8	16.0	15.7	18.8	26.6																						
17-Jul	15.4	15.1	14.7	16.8	17.4	17.6	18.4	19.3	20.2	21.5	23.0	23.4	22.7	24.4	25.0	23.2	23.4	23.3	22.5	22.0	21.1	19.7	17.9	16.5	20.2	25.0																						
18-Jul	15.3	14.0	13.9	12.9	12.2	12.8	14.7	16.7	18.4	19.3	19.9	19.9	20.6	21.7	22.9	24.1	23.6	23.6	22.2	21.0	20.5	19.6	17.2	16.4	18.5	24.1																						
19-Jul	15.9	15.8	15.9	16.0	15.0	14.8	15.3	16.8	17.4	17.4	17.0	18.0	19.8	20.5	21.8	19.1	20.2	20.3	16.2	15.4	15.1	14.0	13.2	12.2	16.8	21.8																						
20-Jul	11.3	10.7	9.9	8.7	8.4	9.5	11.0	13.1	16.6	19.5	21.2	22.9	23.4	23.0	23.6	24.8	24.5	24.5	23.4	22.5	20.8	19.1	17.9	16.2	17.8	24.8																						
21-Jul	15.2	14.9	15.1	15.3	14.6	13.7	13.6	13.6	14.1	14.3	14.5	14.8	15.4	18.0	18.5	19.3	19.7	20.2	20.3	19.6	18.2	16.7	15.4	14.6	16.2	20.3																						
22-Jul	13.5	12.1	11.3	11.7	11.7	11.7	11.4	13.0	18.2	22.3	24.0	24.4	25.5	24.8	25.5	25.9	25.3	24.6	23.7	21.6	19.7	17.8	16.5	16.5	18.9	25.9																						
23-Jul	16.4	15.0	14.5	13.9	13.8	13.9	14.2	14.7	15.4	16.9	17.4	18.4	19.2	20.4	20.4	20.0	20.4	19.4	19.7	18.7	16.9	14.8	13.7	12.8	16.7	20.4																						
24-Jul	11.9	11.7	10.6	9.6	9.1	10.1	12.5	14.7	18.3	20.8	22.2	23.4	24.4	25.3	25.9	26.7	25.6	26.8	25.3	23.1	21.3	19.9	18.6	18.0	19.0	26.8																						
25-Jul	18.2	17.8	17.3	16.1	14.6	14.3	14.5	16.1	18.4	19.5	20.3	21.4	21.4	23.9	21.7	21.0	23.8	24.7	24.5	22.8	20.1	18.1	17.1	16.5	19.3	24.7																						
26-Jul	16.1	15.7	15.4	15.1	14.9	14.4	15.0	16.5	18.6	19.5	21.6	23.3	22.5	22.3	22.7	23.1	17.9	15.6	16.8	17.4	15.9	15.0	14.0	13.4	17.6	23.3																						
27-Jul	13.1	12.2	11.2	10.7	11.0	11.5	13.1	15.9	19.0	21.6	23.4	24.8	23.7	15.5	17.0	18.0	19.0	19.8	18.7	19.2	17.4	16.2	14.8	13.5	16.7	24.8																						
28-Jul	12.6	11.7	10.4	10.1	9.9	10.6	12.0	15.0	19.1	21.7	23.4	25.1	25.5	23.3	22.5	21.5	22.8	19.0	17.8	19.4	17.8	17.5	16.4	15.3	17.5	25.5																						
29-Jul	14.5	13.9	13.6	12.9	12.7	13.1	14.3	17.1	19.4	20.6	21.3	23.3	24.6	23.4	23.4	24.0	23.2	22.4	20.8	14.3	13.8	13.7	13.5	13.5	17.8	24.6																						
30-Jul	12.9	12.6	12.5	12.0	12.1	12.4	13.2	14.2	16.9	19.6	21.5	22.3	23.7	22.5	23.8	20.7	22.5	22.0	20.4	19.4	17.6	15.6	13.8	13.0	17.4	23.8																						
31-Jul	12.3	11.4	10.7	9.9	9.3	9.7	11.9	15.4	19.6	22.6	24.7	25.7	26.4	26.2	22.2	21.7	21.2	20.3	17.5	16.6	16.0	15.6	15.0	14.2	17.3	26.4																						
																								14.8	14.1	13.6	13.1	12.8	13.3	14.3	16.1	18.2	19.8	21.0	22.1	22.8	22.5	22.6	22.6	22.4	22.0	21.4	20.2	18.8	17.5	16.3	15.3	Diurnal Average
																								22.1	21.4	20.3	19.7	19.9	20.1	20.9	24.5	26.5	27.5	27.4	29.7	30.5	31.8	32.1	32.4	31.2	31.1	31.8	29.8	27.1	24.7	23.4	22.7	Diurnal Maximum





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

**Ambient Temperature (AT) - C**  
**Barge Landing - July 2015**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	29	3.90	3.90
10 - 20	434	58.33	62.23
> 20	281	37.77	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Relative Humidity (RH) - %**

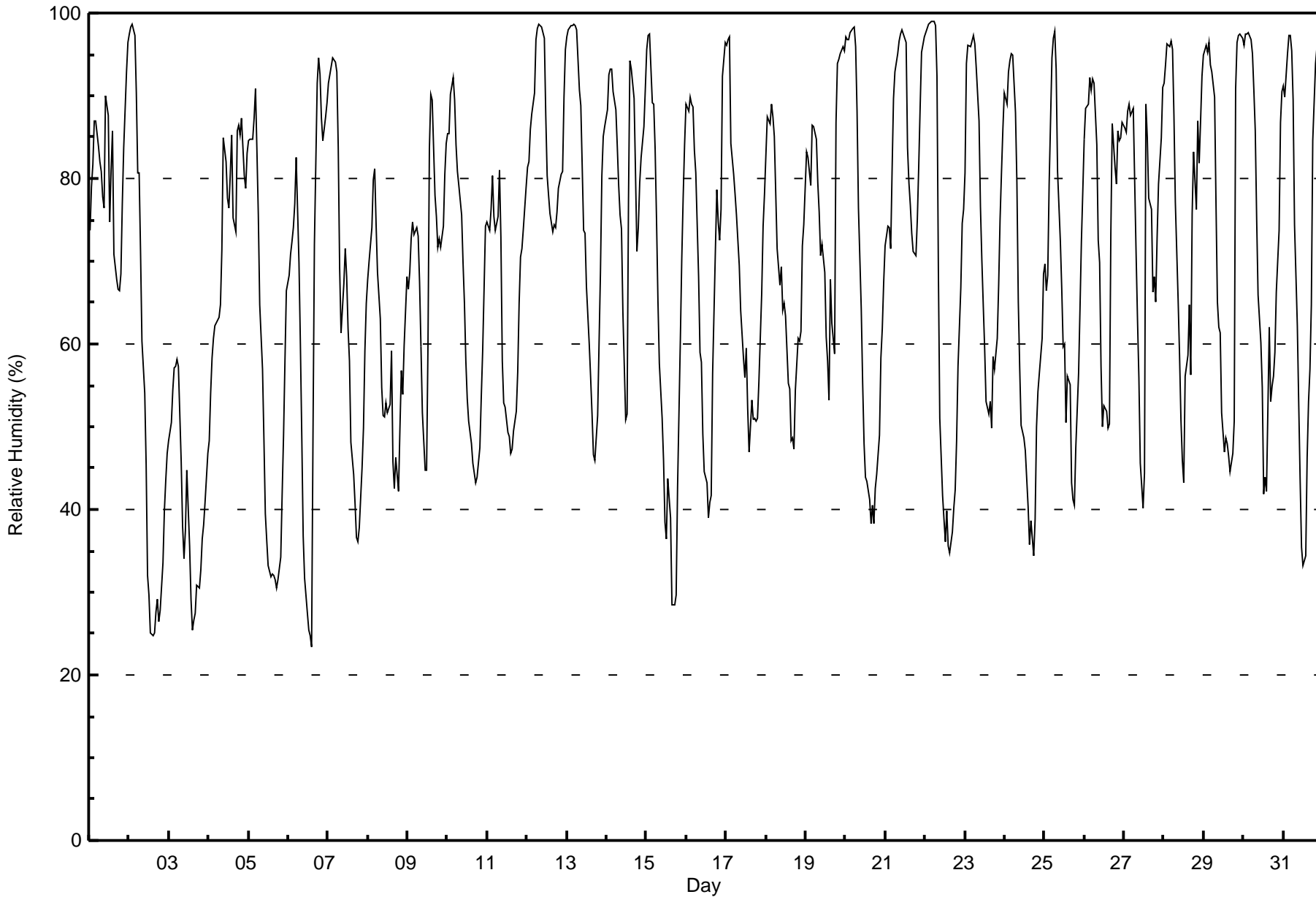
**Barge Landing - July 2015**

Maximum Value: 99 % on Jul 22 06:00																		Maximum Daily Average: 85.8 % on Jul 12																		Hours in Service: 744													
Minimum Value: 23 % on Jul 6 15:00																		Minimum Daily Average: 41.0 % on Jul 3																		Hours of Data: 744													
Maximum Diurnal Average: 87.6 % at hour 5																		Minimum Diurnal Average: 52.2 % at hour 13																		Hours of Missing Data: 0													
Monthly Average: 69.3 %																		Percentiles: P <sub>1</sub> = 26 P <sub>10</sub> = 41 Q <sub>1</sub> = 53 Median = 72 Q <sub>3</sub> = 87 P <sub>90</sub> = 96 P <sub>99</sub> = 99																		Hours of Calibration: 0													
																																				Percent Operational Time: 100.0													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jul	74	79	82	87	87	84	82	81	78	76	90	88	75	81	86	71	68	67	67	68	77	84	93	96	79.9	96																							
2-Jul	98	98	99	97	90	81	81	71	60	54	45	32	30	25	25	25	28	29	27	28	34	40	44	47	53.6	99																							
3-Jul	48	50	54	57	57	58	57	46	38	34	37	45	36	29	25	27	27	31	30	33	36	38	41	47	41.0	58																							
4-Jul	48	54	58	61	62	63	63	65	71	85	82	78	76	80	85	75	74	86	86	85	87	80	79	83	73.7	87																							
5-Jul	85	85	85	87	91	83	76	65	57	48	39	36	33	32	32	32	32	31	32	34	42	49	58	67	54.6	91																							
6-Jul	68	71	72	74	77	82	70	60	49	37	32	27	25	25	23	49	72	91	95	93	87	85	87	89	64.2	95																							
7-Jul	92	93	94	95	94	93	84	69	61	67	72	68	62	58	48	44	41	37	36	38	45	50	59	65	65.1	95																							
8-Jul	68	70	74	80	81	74	69	63	55	51	51	53	52	53	59	46	42	46	42	50	57	54	60	68	59.1	81																							
9-Jul	67	69	73	75	73	74	73	67	60	52	45	45	60	84	90	89	78	75	72	73	72	74	80	84	71.0	90																							
10-Jul	86	85	90	92	89	84	81	79	76	70	65	58	53	51	48	46	44	43	44	47	54	59	67	74	66.1	92																							
11-Jul	75	74	76	80	75	74	75	81	73	58	53	52	49	49	47	47	50	52	57	65	70	72	74	79	64.9	81																							
12-Jul	81	82	86	88	90	97	98	99	99	98	97	88	80	78	76	74	74	74	76	79	81	81	90	96	85.8	99																							
13-Jul	97	98	98	99	99	99	98	91	89	81	74	73	67	60	56	51	47	46	51	60	69	80	85	86	77.3	99																							
14-Jul	88	93	93	90	88	84	79	76	74	64	51	52	77	94	93	90	81	71	74	80	83	86	91	81.0	94																								
15-Jul	96	97	98	89	89	84	75	65	58	51	46	39	37	44	39	29	28	28	30	43	61	70	78	84	60.6	98																							
16-Jul	89	88	90	89	89	83	81	68	59	58	49	45	43	39	41	42	56	72	79	75	73	76	92	96	69.6	96																							
17-Jul	96	97	97	84	80	78	76	72	69	64	58	56	60	52	47	53	51	51	51	51	55	66	74	78	67.4	97																							
18-Jul	83	88	87	89	87	85	78	72	67	69	64	65	63	55	55	48	49	47	54	61	60	62	72	74	68.1	89																							
19-Jul	83	83	81	79	86	86	85	80	76	71	72	69	61	58	53	68	63	59	87	94	94	95	96	95	78.0	96																							
20-Jul	97	97	97	98	98	98	96	88	77	64	55	48	44	43	41	38	40	38	43	44	49	58	62	67	65.9	98																							
21-Jul	72	74	74	72	81	90	93	95	97	98	98	98	96	84	79	77	73	71	71	75	81	89	95	97	84.6	98																							
22-Jul	98	98	99	99	99	99	98	92	69	51	42	39	36	40	36	35	37	40	42	48	57	67	74	76	65.5	99																							
23-Jul	81	94	96	96	97	97	96	93	87	77	70	65	59	53	52	53	50	58	57	61	67	75	81	86	75.0	97																							
24-Jul	90	89	93	94	95	95	88	79	65	57	50	49	47	44	40	36	39	34	39	50	54	56	61	68	63.1	95																							
25-Jul	70	66	68	79	95	97	98	93	81	72	67	60	60	51	56	55	43	41	41	48	57	64	72	78	67.1	98																							
26-Jul	85	88	89	92	91	92	92	84	73	70	57	50	53	52	50	50	73	87	81	79	86	85	85	87	76.2	92																							
27-Jul	86	86	88	89	88	88	80	71	63	56	46	40	44	89	85	78	76	66	68	65	73	79	85	91	74.2	91																							
28-Jul	91	94	96	96	97	96	88	77	65	59	51	46	43	56	59	65	56	76	83	76	87	82	87	92	75.7	97																							
29-Jul	95	96	95	96	94	93	90	77	65	62	61	52	47	49	48	46	45	47	51	91	96	97	98	97	74.5	98																							
30-Jul	96	97	97	98	97	95	91	86	75	66	60	55	42	44	42	62	53	55	56	59	66	74	87	90	72.6	98																							
31-Jul	91	90	95	97	97	95	89	74	62	53	44	35	33	34	46	53	57	65	85	94	96	97	97	96	74.0	97																							
																								83.0	84.6	86.3	87.1	87.6	86.7	83.3	76.9	69.3	64.0	59.2	54.9	52.2	53.8	53.6	53.5	53.4	55.6	58.1	62.6	67.8	71.6	77.3	81.5	Diurnal Average	
																								98	98	99	99	99	99	98	99	99	98	98	98	96	89	94	93	90	91	95	94	96	97	98	97	Diurnal Maximum	



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

**Relative Humidity (RH) - %**  
**Barge Landing - July 2015**





Maximum Speed: 17 km/h on Jul 3 10:00	Maximum Daily Speed Average: 7.6 km/h on Jul 17	Hours in Service: 744
Minimum Speed Value: 0 km/h on Jul 1 16:00	Minimum Daily Speed Average: 0.3 km/h on Jul 26	Hours of Data: 744
Maximum Diurnal Speed Average: 3.7 km/h at hour 12	Minimum Diurnal Speed Average: 0.7 km/h at hour 23	Hours of Missing Data: 0
Monthly Average Velocity: 1.8 km/h 248.0 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 2 Q <sub>1</sub> = 3 Median = 5 Q <sub>3</sub> = 7 P <sub>90</sub> = 9 P <sub>99</sub> = 13	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	SW4	WNW1	W3	SW6	SW4	SW4	SW4	SW4	WSW4	WSW5	SSW3	SSW5	SW5	W3	W5	E0	SW1	N2	E2	SE1	S3	SW3	SW1	S1	SW2.5	SW6
2-Jul	SSE1	S4	S4	SW5	SW6	SSW5	S4	SSW4	SSW5	S6	S5	WSW7	WSW6	WSW10	WSW11	SW12	SW7	SW5	SW6	SSW6	SSE6	SSE6	SSE6	SSE5	SSW5.2	WSW12
3-Jul	S6	S6	SSE6	S6	S6	S6	S7	SW10	WSW16	WSW17	W13	WNW12	WNW13	NW14	NW13	NW11	WNW10	WNW8	NW8	WNW5	WNW5	WNW5	NW4	W3	W5.8	WSW17
4-Jul	WNW5	W4	WSW7	W9	WSW9	W8	WNW5	WSW6	SSW5	S5	SSW5	SW9	SSW3	S2	NE1	ENE4	SSW1	W3	WNW4	NNW7	NNW10	N11	N10	NNW9	WNW3.2	N11
5-Jul	N8	NNW8	NNW8	NNW6	W4	WNW4	WSW4	W5	SW4	NNW5	N8	N8	NNE7	NNW5	NNW6	NNW5	NW4	NNW4	NE1	SSW3	S4	SSE4	SE2	ESE4	NNW2.9	N8
6-Jul	S3	SW5	SW5	SSW4	S4	S4	SSW5	SSW6	SSW8	SW11	WSW14	SW15	WSW15	SW14	WSW13	NNW10	N12	N13	N10	N12	NNW9	NW5	NW5	NW6	W4.4	WSW15
7-Jul	WNW5	NW5	W5	WNW5	WNW3	WNW2	W4	W3	SW4	SW7	SSW5	SSW8	SSW9	SSW7	SW8	SW8	WSW9	W10	WSW9	SW7	S5	S6	S5	SSE6	SW4.9	W10
8-Jul	SSE5	SSE5	SSE4	SE4	SSE5	SSE6	SSE6	SSE8	S9	SSE10	SSE11	SSE9	SSE8	S7	SSE9	S10	S9	SSW6	WNW10	W13	WNW8	NW6	NW6	NNW7	S4.2	W13
9-Jul	N8	NNW9	N6	N6	N5	NW4	WNW4	NNE4	NNE5	NE6	NE4	N2	NW2	NE3	ENE2	N4	N5	N7	N9	N7	N6	N6	N5	NNW6	N4.8	N9
10-Jul	NNW6	N5	NNW3	NNW1	NNW3	N5	NNE5	NNE5	NNE4	NNE4	NE4	ENE3	NNE4	ENE3	N3	NE5	ENE3	ENE4	NE3	NE3	NE4	ENE3	N1	NNE2	NNE3.3	NNW6
11-Jul	ENE3	E3	N2	SE3	SE5	ESE4	ENE1	NNW3	NNE2	ENE1	S10	SSE9	SE13	SE12	SSE8	SE10	ESE9	ESE7	ESE5	E5	ENE5	E4	E3	SSE0	SE4.2	SE13
12-Jul	NNE2	N3	N3	NNW3	NW1	N4	WNW1	NNW2	N2	NNW6	ENE4	ENE4	NNE3	NNW5	NE3	E6	ENE5	ENE5	NNE4	NE3	NNE2	SW7	SW6	NW1	NNE1.7	SW7
13-Jul	SW1	SSE4	S3	SSE4	SSW4	SW3	S2	SSE4	S5	SSW5	SSW5	SW6	SW9	SW9	SW7	SW7	SW6	WSW5	SSW3	NW2	NW4	NNW4	N3	SW3.5	SW9	
14-Jul	SSE1	S2	ESE2	SE2	SE3	SE5	SSE4	SSW5	S5	WSW6	WSW2	WSW4	W5	NW7	NNW3	SSW7	S3	SE7	SSE7	SSE6	SSE6	S2	ENE4	SSE3	S2.5	SSE7
15-Jul	WSW3	SSW3	SW2	SSW4	SSW4	SSW3	SW5	SW6	SW6	SSW6	SSW7	SW8	SW12	SSE10	SSE9	SSW11	SW10	SW9	WSW6	NW5	NNW2	SSW1	SSE3	WNW2	SSW4.7	SW12
16-Jul	SW2	SW2	S3	SSE1	SE3	SSE2	ESE1	W2	WNW3	NW5	NNW7	NNW8	N8	NNE8	N9	N10	SW4	WSW8	SW8	NW7	NW7	NNW1	S5	WNW5	NW2.4	N10
17-Jul	NW5	NW4	NNW4	NNW11	NNW11	NNW10	N10	N11	N10	N10	N12	N12	N10	N10	N9	N11	N9	N9	N7	N5	SW1	WSW3	WSW4	N7.6	N12	
18-Jul	WSW3	WSW4	WSW4	SW3	SSW4	S4	S5	SSW6	SSW6	SSW5	SSW7	SSW6	SW7	SW11	SW10	WSW11	WSW11	W8	N2	W4	NNW4	NNW7	NW6	WNW5	WSW4.4	SW11
19-Jul	WNW6	W6	NW4	NW5	WNW5	WNW5	WNW5	W5	W6	WNW8	W5	WNW7	WNW9	NW9	NW10	NW10	NW11	NNW10	NNW5	E2	SSE1	SW2	WNW5	NW4	WNW5.4	NW11
20-Jul	W4	WSW4	WSW3	SSW3	SSW2	SSW4	SSW3	SSW5	SSE5	S5	S7	SSW7	S8	SSE5	S3	SSW4	S6	SSE6	SE5	SE4	E3	ENE4	E4	E3	S3.3	S8
21-Jul	NE1	ENE1	ESE2	SE6	SE5	ESE5	E3	E4	NE3	E4	ENE4	E4	ESE1	WSW4	NW5	NNW7	N5	NE4	ENE4	E3	NNE1	NNW1	NNW2	WNW2	ENE1.6	NNW7
22-Jul	WSW3	SSW2	SSE2	WSW2	S2	SW2	SSW3	WSW4	SSW1	W3	WSW5	WSW5	SW6	W6	SSW7	SW6	W7	W8	W8	WNW9	W7	WSW6	WNW3	NNW4	WSW3.8	WNW9
23-Jul	NNE4	WSW3	WSW4	SW2	WSW3	WNW2	WSW4	WNW3	NW5	NW6	NW6	W5	W4	WSW5	W3	WNW5	W3	WSW2	SSW4	SW4	WSW2	SW3	SSW2	E1	W2.6	NW6
24-Jul	WSW3	SW4	SSW4	SSW4	SW3	SSW4	SSW5	SW6	SW5	S6	S6	SSW6	S7	S8	S6	S8	SW6	WSW4	SSW5	SE3	ESE4	SE5	SE6	SSW1	S4.1	S8
25-Jul	SSW6	SSW7	SSW6	SW7	SW4	N1	SSE4	SSW4	SSW7	SW8	SW9	SW9	SW7	SW8	W8	W6	SW5	S2	SSE3	S1	NNW4	N4	NNW5	N4	SW3.8	SW9
26-Jul	NNW4	N3	N3	NNW5	NNW4	NNE1	NNW3	NNW3	NE2	WNW2	ESE2	SW5	W5	N7	N5	E6	NNW1	SE6	SE5	S3	SSE5	SSE7	SSE6	SSE6	E0.3	N7
27-Jul	SSE4	SSW2	SSE4	SSE5	S5	SSE4	SSW5	SSW7	S6	SSW8	SW11	SW11	W8	N4	SE3	W2	SSW4	WNW6	WNW2	SSW3	SSW4	SSW3	SSW4	WNW2	SSW3.6	SW11
28-Jul	WNW5	S2	SE3	SSE3	WSW1	W3	SW2	WSW3	SW2	WSW4	WSW5	SW4	W4	SE2	S6	SSE6	NE7	E3	WNW1	W3	NW3	N3	N6	ESE3	SW1.0	NE7
29-Jul	WNW3	W4	W3	SW5	WNW4	NW1	SW5	SW7	WSW4	WSW5	WSW5	SW6	WSW8	WSW12	WSW9	WSW9	NNW9	NNW6	NW7	WNW5	SSW4	SSE3	SSW5	WSW4	WSW4.3	WSW12
30-Jul	W3	SW4	WSW2	SW5	SW7	SW6	SW6	SW6	SW7	SW7	SW7	W6	WNW9	NNW7	N5	NE2	E5	NE5	NE7	E4	S3	SSW2	SW2	NNW2	WSW2.1	WNW9
31-Jul	SE4	SSE3	SSW3	ESE2	SSE3	SE3	S3	SSW5	S5	SSW5	S5	SSE4	SSW5	SSW7	WSW6	E5	SE3	NNE4	N1	NW2	W3	WSW4	SW5	NNW3	SSW2.1	SSW7

W1.4	WSW1.5	WSW1.5	SW1.6	SW1.8	SW1.3	SW2.1	SW2.6	SW2.7	SW3.1	SW2.9	SW3.7	WSW3.6	WSW2.6	WSW2.9	WSW2.1	W1.8	NNW1.5	NNW1.4	NNW1.4	NW0.9	W0.7	W0.7	NW1.2	Diurnal Average
N8	NNW9	NNW8	NNW11	NNW11	NNW10	N10	N11	WSW16	WSW17	WSW14	SW15	WSW15	SW14	NW13	WSW12	N12	N13	N10	W13	NNW10	N11	N10	NNW9	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**  
**Barge Landing - July 2015**

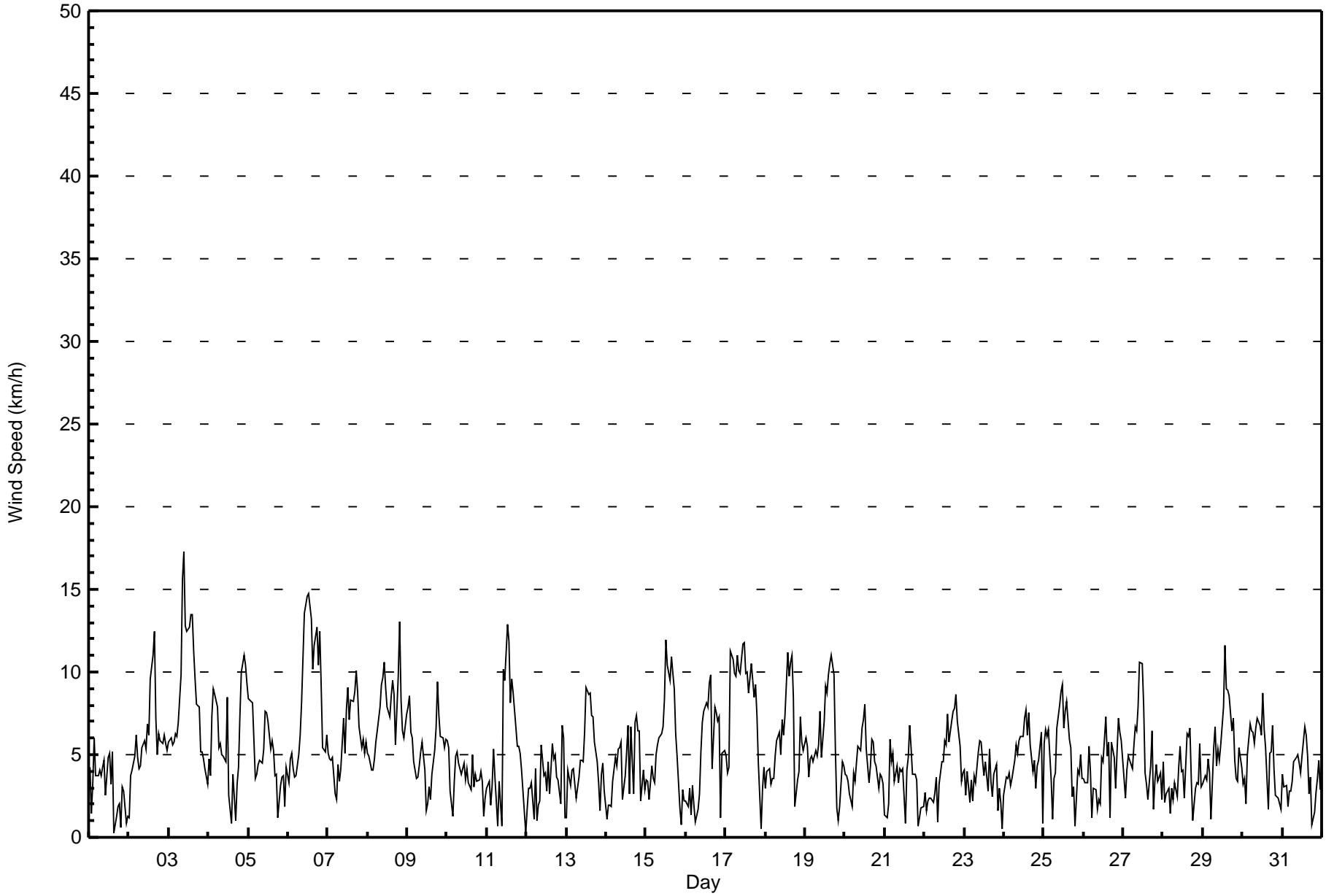
Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 8 km/h on Jul 14 14:00 Minimum Value: 0 km/h on Jul 24 20:00 Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 1 Median = 2 Q <sub>3</sub> = 2 P <sub>90</sub> = 3 P <sub>99</sub> = 5														Hours in Service: 744 Hours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





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

**Wind Speed (WS) - km/h**  
**Barge Landing - July 2015**





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

**Wind Speed (WS) - km/h**  
**Barge Landing - July 2015**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	466	62.63	62.63
6 - 11	255	34.27	96.91
12 - 19	23	3.09	100.00
20 - 28	0	0.00	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Barge Landing - July 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	28	17	17	20	20	12	21	33	37	58	43	39	31	35	23	32	466
6 - 11	31	2	3	0	2	2	5	25	24	25	49	20	15	11	15	26	255
12 - 19	5	0	0	0	0	0	2	0	0	0	3	7	2	2	2	0	23
20 - 28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	64	19	20	20	22	14	28	58	61	83	95	66	48	48	40	58	744

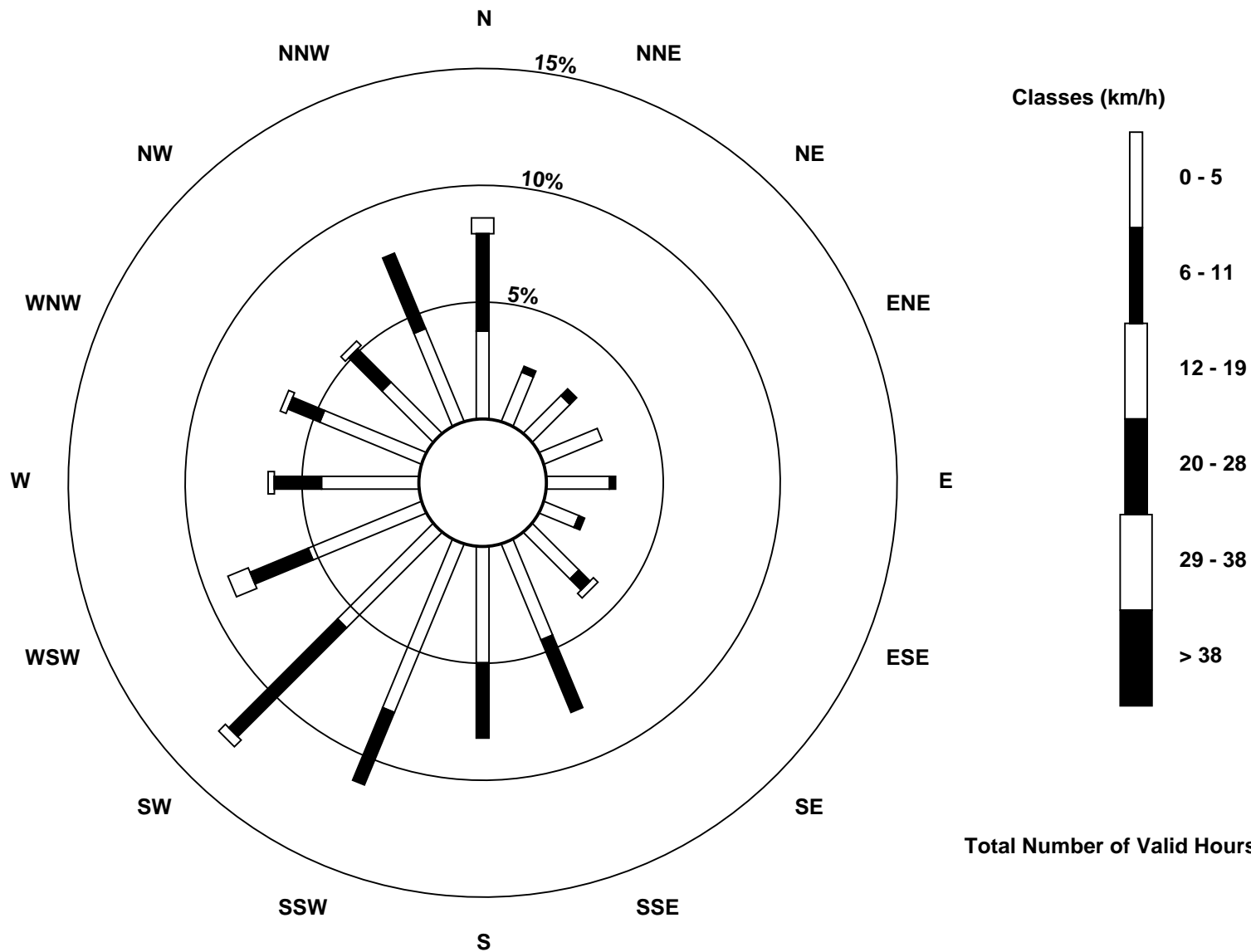
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Wind Speed (WS) - km/h  
Barge Landing (AMS 9)



Total Number of Valid Hours: 744



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

**Wind Direction (WD) - deg**  
**Barge Landing - July 2015**

Direction of Maximum Speed: 239 deg on Jul 3 10:00 Direction of Maximum Daily Speed Average: 352.3 deg on Jul 17	Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0
Direction of Minimum Speed: 96 deg on Jul 1 16:00 Direction of Minimum Daily Speed Average: 0.3 deg on Jul 26	Percent Operational Time: 100.0
Monthly Average Direction: 260.1 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-Jul	223	286	267	228	226	216	229	215	239	238	197	213	222	280	265	96	232	351	93	146	170	214	219	183	228.6
2-Jul	158	171	185	222	223	197	184	192	205	188	189	237	245	245	241	236	223	224	220	196	164	165	159	167	209.2
3-Jul	187	183	168	170	179	171	175	231	238	239	268	302	299	306	305	310	291	295	308	301	302	294	324	279	267.0
4-Jul	301	280	252	261	257	261	292	247	200	185	202	228	203	178	52	76	210	260	302	331	341	358	358	347	286.1
5-Jul	349	343	345	335	279	291	255	264	224	330	1	349	17	348	329	339	319	334	56	195	169	148	128	119	332.9
6-Jul	175	220	220	196	189	188	203	200	210	229	249	232	238	235	249	341	5	3	351	351	346	321	310	310	267.9
7-Jul	293	306	274	295	285	291	271	271	235	223	208	203	199	200	229	225	244	261	250	223	190	189	174	168	231.9
8-Jul	168	148	159	145	148	165	167	168	170	168	159	156	153	176	156	180	182	195	287	272	289	319	316	332	186.1
9-Jul	356	347	356	8	354	309	288	21	25	38	37	360	321	48	57	350	3	1	7	6	356	350	354	348	1.1
10-Jul	345	350	342	335	343	6	29	31	18	19	40	61	16	73	359	40	58	58	43	41	49	65	357	26	25.3
11-Jul	77	92	358	129	130	119	57	332	33	58	175	167	145	143	151	145	122	110	106	84	77	84	99	158	127.1
12-Jul	28	350	353	333	321	357	299	334	351	347	68	71	16	332	46	81	70	66	30	48	14	230	215	308	16.4
13-Jul	228	165	174	147	194	216	186	158	175	202	210	214	232	214	233	230	220	216	245	208	309	322	339	10	215.7
14-Jul	155	177	122	144	132	138	153	198	173	249	246	240	264	326	346	193	171	132	151	164	159	182	76	148	173.4
15-Jul	248	212	214	205	200	208	224	225	226	197	193	229	222	153	156	212	226	227	248	325	335	208	147	303	213.2
16-Jul	217	226	180	160	132	153	103	278	298	322	328	346	356	14	360	355	215	246	225	305	315	332	184	300	312.7
17-Jul	316	312	334	342	345	348	358	360	0	3	359	353	9	350	351	2	6	3	1	2	4	235	250	250	352.3
18-Jul	250	246	258	227	207	177	191	197	193	209	208	208	216	230	225	245	244	274	3	277	329	336	326	286	238.9
19-Jul	285	277	313	323	300	295	284	263	275	300	277	286	297	304	310	305	313	342	336	92	156	234	301	305	301.0
20-Jul	268	255	243	205	200	194	204	200	163	174	188	209	172	160	189	196	181	163	141	130	97	76	86	86	177.0
21-Jul	54	64	115	139	124	119	86	86	51	87	72	98	120	245	314	328	349	50	78	85	19	346	336	284	67.9
22-Jul	242	198	157	253	185	225	208	256	204	271	243	242	231	262	213	226	278	278	276	283	270	252	298	328	254.7
23-Jul	17	247	248	223	244	302	249	300	323	325	322	277	273	250	267	290	267	249	213	229	250	229	196	95	272.3
24-Jul	238	230	196	203	231	204	205	214	215	174	194	187	171	173	189	232	258	208	137	123	126	139	210	190.0	
25-Jul	207	206	211	223	234	3	156	197	208	220	227	234	229	224	263	264	234	191	152	175	336	352	332	352	231.0
26-Jul	348	351	350	339	337	16	339	332	52	290	117	216	270	4	358	90	347	145	138	191	160	159	162	165	80.3
27-Jul	155	206	152	163	181	158	196	195	185	199	228	231	278	358	140	263	198	286	296	213	193	199	212	289	209.9
28-Jul	297	179	141	160	248	259	230	240	233	243	251	221	278	127	187	165	46	93	284	278	325	2	10	114	231.4
29-Jul	283	266	260	229	282	317	229	236	243	241	237	220	241	238	246	258	327	344	325	297	207	167	198	242	254.2
30-Jul	277	222	242	224	233	232	236	234	235	233	233	276	293	339	11	42	82	47	45	86	190	211	229	344	255.9
31-Jul	130	148	209	115	160	126	185	201	185	205	174	168	211	208	250	97	129	13	7	325	268	248	233	329	192.5

279.8 250.1 240.5 230.6 226.4 218.8 220.9 229.4 219.9 234.2 227.1 234.9 245.2 248.1 254.8 257.6 266.9 298.3 303.4 297.1 304.7 272.0 276.1 308.3  
 Diurnal Average

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



**Wood Buffalo Environmental Association**

**Summary of Hour Standard Deviations**

**Wind Direction (WD) - deg**

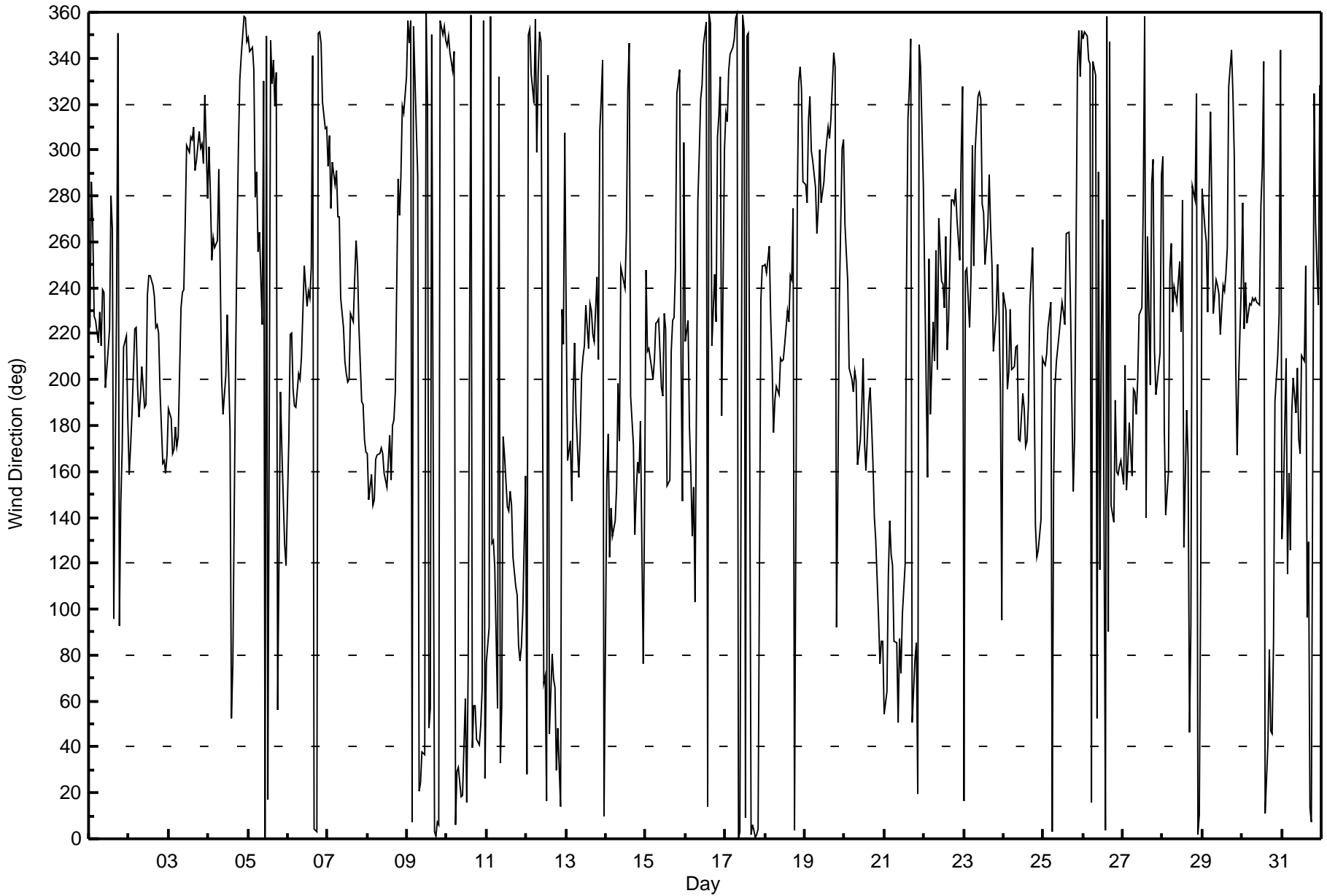
**Barge Landing - July 2015**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 99 deg on Jul 1 16:00 Minimum Value: 10 deg on Jul 24 21:00 Percentiles: P <sub>1</sub> = 13 P <sub>10</sub> = 20 Q <sub>1</sub> = 25 Median = 31 Q <sub>3</sub> = 43 P <sub>90</sub> = 65 P <sub>99</sub> = 87																			Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0						
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jul	37	82	68	20	44	26	26	26	35	23	41	31	31	58	38	99	90	71	64	96	15	32	31	62	99
2-Jul	65	28	21	19	19	24	25	26	30	36	43	38	55	29	28	28	27	28	27	23	17	15	15	17	65
3-Jul	24	24	20	17	23	23	26	28	22	22	39	30	32	31	28	26	32	34	25	28	25	33	33	49	49
4-Jul	34	40	30	36	29	34	34	28	30	25	27	23	66	52	72	34	96	28	32	23	25	26	25	23	96
5-Jul	23	20	20	20	31	25	28	37	48	50	39	40	42	61	59	53	72	56	97	28	23	16	56	11	97
6-Jul	27	16	14	24	22	28	22	28	28	29	28	26	28	29	33	32	25	26	27	25	23	25	22	20	33
7-Jul	20	20	21	24	43	48	31	50	49	30	36	28	33	39	36	32	34	34	31	26	20	20	16	13	50
8-Jul	17	17	22	11	17	24	25	26	28	30	26	24	21	26	21	27	28	34	33	34	39	22	32	20	39
9-Jul	24	22	25	21	24	29	31	39	33	33	57	78	55	59	69	23	24	24	24	26	23	24	23	22	78
10-Jul	22	27	46	81	23	29	29	33	40	47	43	75	62	71	75	41	75	42	35	25	17	23	71	37	81
11-Jul	24	39	52	31	18	23	77	18	50	99	31	29	25	28	31	30	19	21	25	24	22	37	50	87	99
12-Jul	49	20	31	28	82	43	91	70	61	34	39	43	58	28	55	29	29	25	30	27	60	49	28	79	91
13-Jul	68	29	38	18	27	30	37	41	32	49	43	30	32	36	35	35	32	30	32	18	91	18	20	33	91
14-Jul	56	33	31	22	10	27	25	28	37	30	77	59	50	63	74	31	81	17	26	21	17	97	32	55	97
15-Jul	28	27	28	23	32	29	20	24	28	42	40	37	29	27	32	36	26	34	45	22	57	80	18	48	80
16-Jul	38	67	39	63	26	43	74	67	59	27	27	27	31	32	28	24	84	27	48	33	20	86	43	24	86
17-Jul	17	20	47	22	22	24	26	27	27	27	28	30	31	30	30	27	27	26	25	23	36	84	15	17	84
18-Jul	19	19	19	34	24	38	31	32	26	34	35	29	32	20	23	27	21	34	55	57	38	27	23	29	57
19-Jul	31	29	36	27	33	27	30	29	31	29	36	34	34	36	32	29	27	37	44	56	61	33	26	28	61
20-Jul	25	28	21	20	48	25	30	33	37	48	43	41	41	41	67	64	48	45	27	17	19	15	32	23	67
21-Jul	67	39	56	13	16	16	20	20	34	30	25	24	92	50	34	25	40	38	30	23	57	52	56	40	92
22-Jul	14	40	53	37	33	37	24	35	88	54	49	59	52	46	35	51	38	36	34	33	32	23	44	41	88
23-Jul	27	30	25	49	23	44	26	31	25	28	30	47	63	56	69	40	45	32	23	22	33	29	45	78	78
24-Jul	28	34	24	26	20	20	33	26	34	41	43	52	48	45	43	40	51	29	10	10	10	10	10	79	79
25-Jul	28	28	26	44	51	69	46	31	26	29	26	29	31	34	44	38	39	77	36	81	17	15	18	31	81
26-Jul	21	27	39	17	23	57	35	30	75	65	83	72	75	37	61	33	91	24	22	33	18	18	19	19	91
27-Jul	36	73	29	19	25	36	31	29	35	32	28	29	55	44	49	87	29	55	89	36	23	18	33	55	89
28-Jul	26	62	56	45	85	44	24	31	69	48	36	59	62	69	39	32	29	78	84	46	21	71	50	61	85
29-Jul	39	33	26	32	36	65	18	27	28	31	44	40	37	21	27	36	29	25	41	53	35	28	35	42	65
30-Jul	33	31	67	42	18	19	28	24	23	24	35	45	36	46	53	77	38	30	32	25	27	16	84	66	84
31-Jul	18	21	34	41	42	19	35	33	40	37	49	56	65	42	73	27	83	44	89	80	47	23	18	51	89
Diurnal Maximum																									



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

**Wind Direction (WD) - deg**  
**Barge Landing - July 2015**





# Wood Buffalo Environmental Association TRS Calibration Report

### Station Information

Calibration Date	July 13, 2015	Last Calibration	June 16, 2015
Station Name	Barge Landing	Station Number	AMS 9
Reason:	Routine		
Start Time (MST)	9:05	End Time (MST)	12:05
Gas Cert Reference	CC62993	Station temp.	22 Deg C
Cal Gas Concentration	4.77 ppm	Cal Gas Exp Date	10/06/2014
Calibrator Make/Model	Sabio 4010	Serial Number	11071107
Dil air Make/Model	API 701	Serial Number	4888
DACS make/model	Campbell Scientific CR3000	DACS serial No.	6466
SO2 gas concentration	59 ppm	SO2 gas cert/exp	FF54535 July 6, 2014

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-690	-689
Analyzer IP address	192.168.1.42		Lamp voltage	995	984
Calculated slope	0.997888	0.985849	Chamber temp	45	45
Calculated intercept	-0.106668	-0.018761	Pressure	692.1	688.2
Analyzer Background	1.93	1.96	Flow	0.438	0.437
Analyzer Coefficient	1.011	1.033	Intensity	91	90
			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	78.4	1.018
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	81.0	0.986
second point	5000	41.9	40.0	40.6	0.986
third point	5000	21.0	20.0	20.5	0.980
as left zero	6000	0.0	0.0	0.0	----
as left span	5000	83.7	79.8	80.9	0.987
Average Correction Factor					0.984

Corrected As found	78.5	Previous response	80.1	% change	2.1%
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**Notes:**

Changed Inlet filter and performed scrubber check after as founds. Adjusted span.

Calibration Performed By: Evan Magill





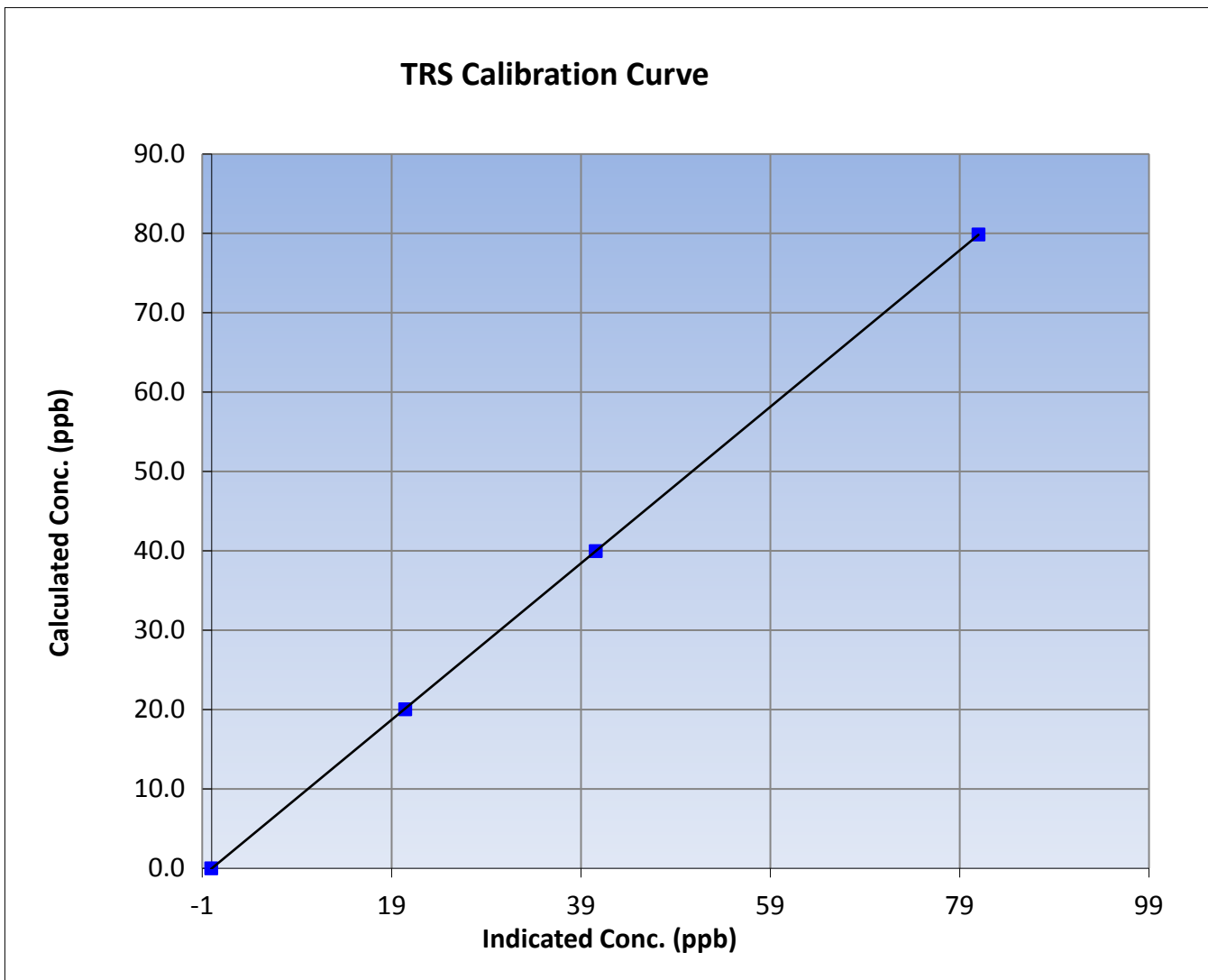
# Wood Buffalo Environmental Association TRS Calibration Report

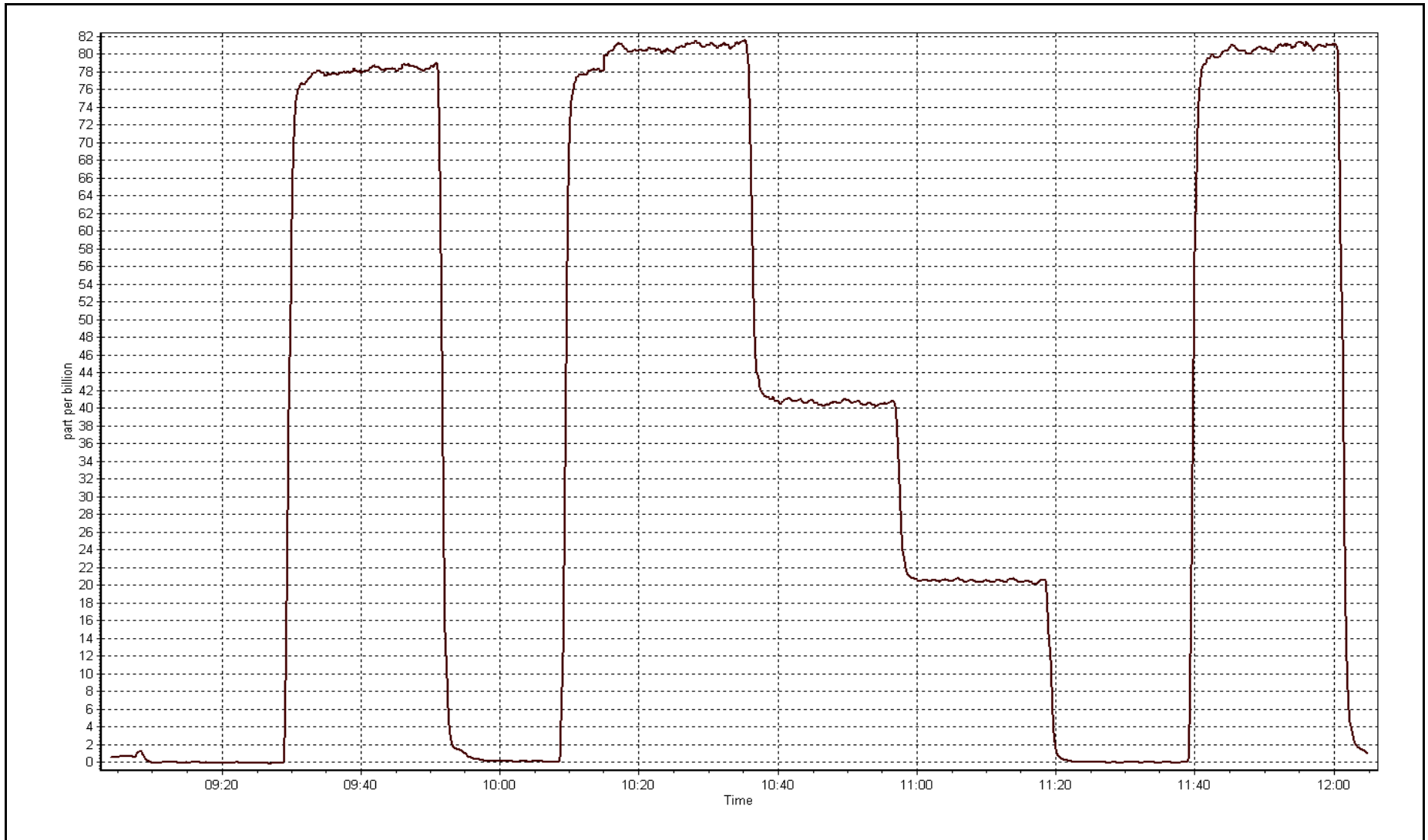
## Station Information

Calibration Date	July 13, 2015	Previous Calibration	June 16, 2015
Station Name	Barge Landing	Station Number	AMS 9
Start Time (MST)	9:05	End Time (MST)	12:05
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1218153461

## Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999995
79.8	81.0	0.9859		
40.0	40.6	0.9855	Slope	0.985849
20.0	20.5	0.9797		
			Intercept	-0.018761







# Wood Buffalo Environmental Association THC Calibration Report

### Station Information

Calibration Date	July-09-15	Last Calibration	June-16-15
Station Name	Barge Landing	Station Number	AMS 9
Reason:	Routine		
Start Time (MST)	9:05	End Time (MST)	11:30
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	9.2	9.1
Analyzer IP address	192.168.1.51		Air or Bypass Press	34.7	34.7
Calculated slope	0.996561	-0.106668	Fuel Pressure	24.1	24.1
Calculated intercept	-0.028364	0.014693	Analyzer Coeff	4.3	4.3
			Analyzer BKG	5.680	5.680

Analyzer make	Thermo 51i-LT	Analyzer serial #	1327059296
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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	6000	0.0	0.00	-0.01	----
as found span	6000	92.0	15.69	15.65	1.003
calibrator zero	6000	0.0	0.00	-0.01	----
high point	6000	92.0	15.69	15.65	1.003
second point	6000	49.2	8.39	8.36	1.004
third point	6000	18.5	3.16	3.13	1.008
as left zero	6000	0.0	0.00	-0.01	----
as left span	6000	92.0	15.69	15.64	1.003
Average Correction Factor					1.005

Corrected As found	15.66	Previous response	15.78	% change	0.7%
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**Notes:**

Changed inlet filter after as founds. No adjustments.

Calibration Performed By:

Evan Magill



## Wood Buffalo Environmental Association THC Calibration Report

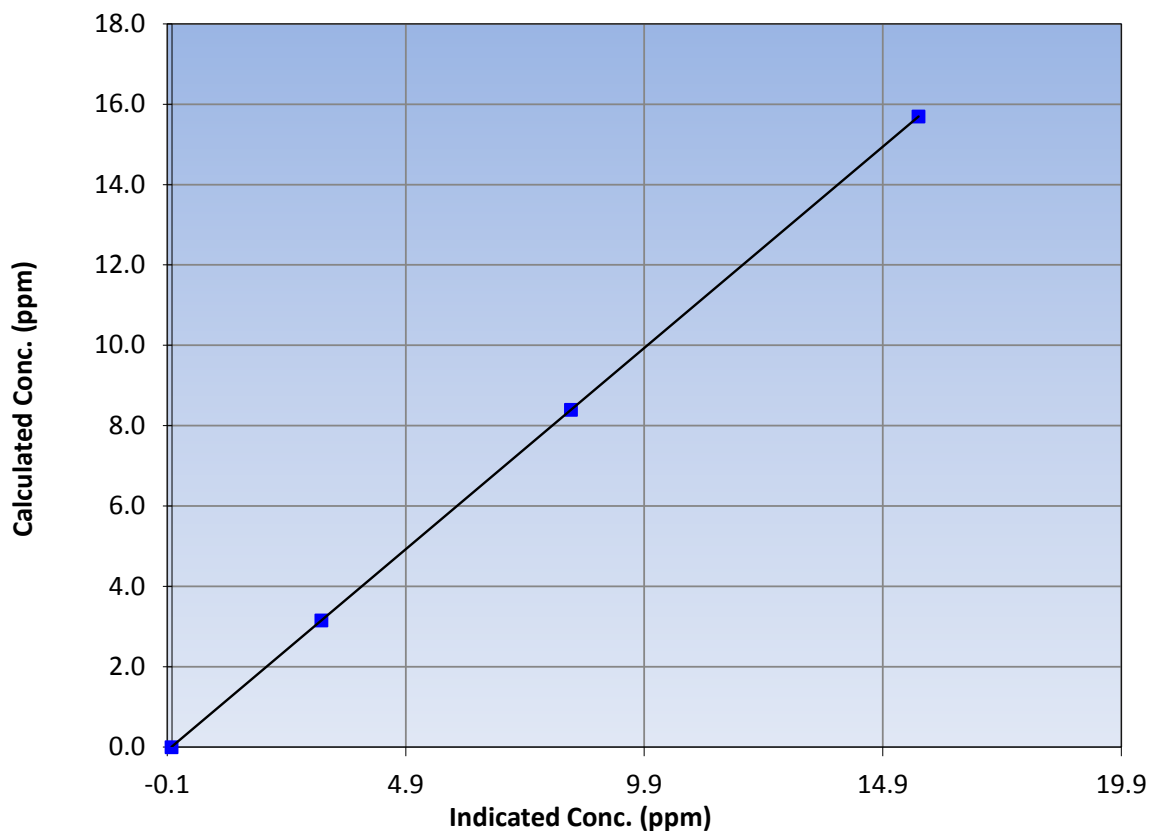
### Station Information

Calibration Date	July 9, 2015	Previous Calibration	June 16, 2015
Station Name	Barge Landing	Station Number	AMS 9
Start Time (MST)	9:05	End Time (MST)	11:30
Analyzer make	Thermo 51i-LT	Analyzer serial #	1327059296

### Calibration Data

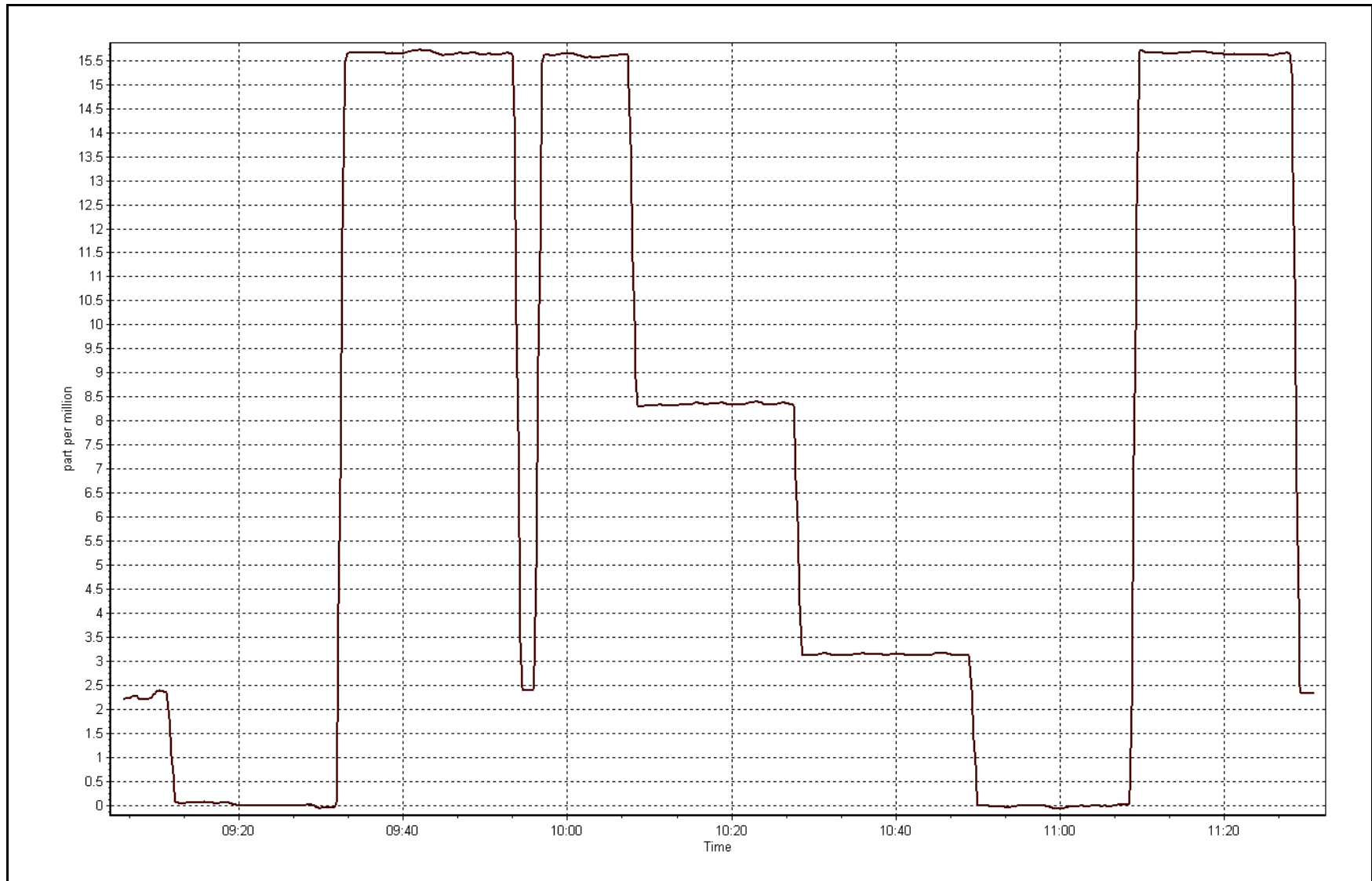
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	-0.01	----	Correlation Coefficient	1.000000
15.69	15.65	1.0028		
8.39	8.36	1.0039	Slope	1.001968
3.16	3.13	1.0082		
			Intercept	0.014693

**THC Calibration Curve**



THC Calibration Plot

Date: July 9, 2015





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## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS 11  
LOWER CAMP  
JULY 2015**

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

August 26, 2015



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP (AMS 11)  
 JULY 2015

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	707	37	37	100.00	38	0	7	0
H2S (ppb) Average	709	35	35	100.00	6	0	2	0
THC (ppm) Average	707	37	37	100.00	4.3	-	2.8	-
Temperature (C) Average	744	0	0	100.00	32.1	-	24.4	-
Relative Humidity (%) Average	744	0	0	100.00	99	-	88	-
Wind Speed 10 m (km/h) Average	744	0	0	100.00	28	-	15	-
Wind Direction 10 m (deg) Average	744	0	0	100.00	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP (AMS 11)  
 JULY 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	707	1.9	4	-	0	0	0	1	2	4	38
H2S (ppb) Average	709	1	1	-	0	0	0	1	1	2	6
THC (ppm) Average	707	2.36	0.3	-	2	2.1	2.1	2.3	2.5	2.8	4.3
Temperature 2 m (C) Average	744	18.69	4.4	-	6.8	13.4	15.4	18.3	22	24.5	32.1
Relative Humidity (%) Average	744	70.4	19	-	23	42	56	74	86	94	99
Wind Speed 10 m (km/h) Average	744	7.5	5	-	0	2	4	6	10	14	28
Wind Direction 10 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP (AMS 11)  
JULY 2015

OPERATIONAL NOTES

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



Summary of Hour Averages

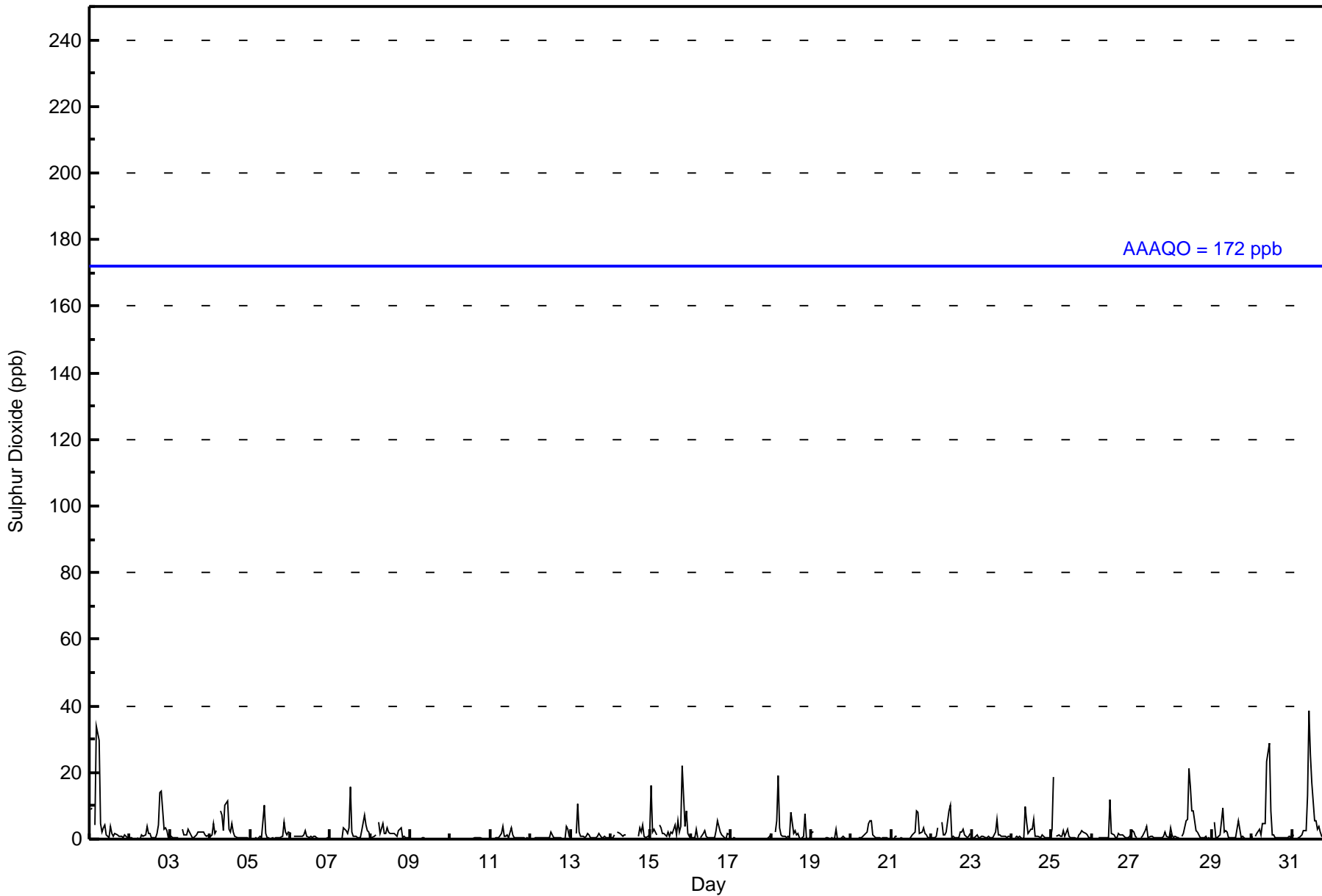
Lower Camp - July 2015

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 38 ppb on Jul 31 11:00	Maximum Daily Average: 6.7 ppb on Jul 31		Hours of Data:	707
Minimum Value: 0 ppb on Jul 19 18:00	Minimum Daily Average: 0.1 ppb on Jul 9		Hours of Missing Data:	37
Maximum Diurnal Average: 4.6 ppb at hour 11	Minimum Diurnal Average: 0.7 ppb at hour 23		Hours of Calibration:	37
Monthly Average: 1.9 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 1 O <sub>3</sub> = 2 P <sub>90</sub> = 4 P <sub>99</sub> = 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-Jul	9	9	Z	4	34	30	5	2	3	4	1	1	4	2	1	2	1	1	1	1	1	1	1	1	5.1	34
2-Jul	0	0	0	Z	0	0	0	1	1	1	4	2	2	0	0	0	2	4	14	14	3	3	2	1	2.5	14
3-Jul	1	1	0	0	0	0	Z	3	1	1	1	3	1	0	1	1	1	2	2	2	2	1	1	1	1.3	3
4-Jul	1	1	5	2	3	Z	8	7	3	10	11	3	2	5	2	1	1	1	0	0	0	0	0	0	2.9	11
5-Jul	Z	0	0	0	0	1	1	1	10	2	0	0	0	0	0	0	0	0	0	1	5	2	1	2	1.3	10
6-Jul	1	Z	1	1	1	1	1	1	1	2	1	0	1	0	1	1	1	0	0	0	0	0	0	0	0.7	2
7-Jul	0	0	Z	0	0	0	0	0	3	3	2	3	16	2	1	1	0	1	1	3	7	4	3	2	2.2	16
8-Jul	1	0	1	1	Z	5	2	5	2	1	4	2	2	2	2	1	1	2	4	0	1	0	0	0	1.7	5
9-Jul	0	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-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.2	1
11-Jul	Z	0	0	0	0	0	2	4	1	1	1	0	3	1	0	0	0	0	0	0	0	0	0	0	0.7	4
12-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	2	1	1	0	0	0	0	0	0	4	3	1	0.7	4
13-Jul	1	1	Z	2	10	2	1	1	1	1	2	1	1	0	0	1	1	2	0	0	1	1	0	0	1.3	10
14-Jul	0	0	1	Z	2	2	1	1	1	1	C	C	C	C	C	C	1	3	2	4	1	0	1	2	--	4
15-Jul	16	2	3	1	Z	4	3	2	2	1	2	1	2	2	4	1	6	2	4	22	4	9	2	1	4.1	22
16-Jul	0	0	1	3	1	Z	1	1	2	1	0	0	0	0	0	3	5	2	1	1	0	0	2	1	1.2	5
17-Jul	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.2	1
18-Jul	2	Z	2	5	19	3	1	1	1	0	1	1	8	2	2	1	2	0	0	1	8	0	0	0	2.6	19
19-Jul	2	2	Z	0	0	0	0	0	0	0	1	0	0	0	0	3	0	0	0	1	0	0	0	0	0.5	3
20-Jul	0	0	0	Z	1	1	0	1	1	2	4	5	5	1	0	0	0	0	0	0	0	0	0	0	1.1	5
21-Jul	0	0	1	1	Z	0	0	0	0	0	0	0	1	2	2	8	8	2	2	3	2	1	1	0	1.5	8
22-Jul	0	0	0	1	4	Z	5	1	1	2	8	10	0	1	0	0	0	2	2	3	1	0	1	2	2.0	10
23-Jul	Z	0	0	1	0	0	1	1	0	0	1	0	0	0	2	6	1	1	1	1	1	1	1	1	1.0	6
24-Jul	0	Z	0	1	0	1	0	0	10	5	2	3	3	6	1	1	1	0	1	1	0	0	0	0	1.6	10
25-Jul	3	18	Z	1	1	1	1	2	1	3	1	0	0	0	0	0	1	2	2	2	2	1	0	0	1.9	18
26-Jul	0	0	0	Z	0	0	0	0	0	0	0	12	2	1	0	0	2	1	1	1	0	1	1	1	1.1	12
27-Jul	2	2	1	0	Z	0	1	2	2	4	0	1	1	0	0	0	0	0	0	1	2	1	1	4	1.1	4
28-Jul	1	0	1	0	0	Z	1	2	6	6	21	16	9	8	3	2	1	0	0	0	1	0	0	0	3.5	21
29-Jul	Z	5	0	0	1	1	9	2	2	2	0	0	0	0	0	3	5	0	1	0	0	0	0	0	1.6	9
30-Jul	1	Z	1	2	3	1	5	5	5	23	29	8	1	1	0	0	0	0	0	0	0	1	1	1	3.8	29
31-Jul	2	1	Z	0	0	1	1	3	3	13	38	25	17	5	6	3	4	2	1	0	0	0	1	27	6.7	38

1.8	1.8	0.8	1.1	3.1	2.1	1.7	1.6	2.1	3.0	4.6	3.4	2.8	1.6	1.1	1.4	1.5	1.1	1.4	2.1	1.4	2.1	1.4	1.1	0.7	1.6	Diurnal Average
16	18	5	5	34	30	9	7	10	23	38	25	17	8	6	8	8	4	14	22	8	9	3	27		Diurnal Maximum	

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





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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Lower Camp - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	687	97.17	97.17
11 - 20	11	1.56	98.73
21 - 60	9	1.27	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Lower Camp - July 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	52	36	20	18	31	49	96	30	11	6	13	66	60	69	65	65	687
11 - 20	0	0	0	0	1	0	0	1	0	3	4	0	1	0	1	0	11
21 - 60	1	0	0	0	0	0	2	0	0	0	3	1	1	1	0	0	9
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	53	36	20	18	32	49	98	31	11	9	20	67	62	70	66	65	707

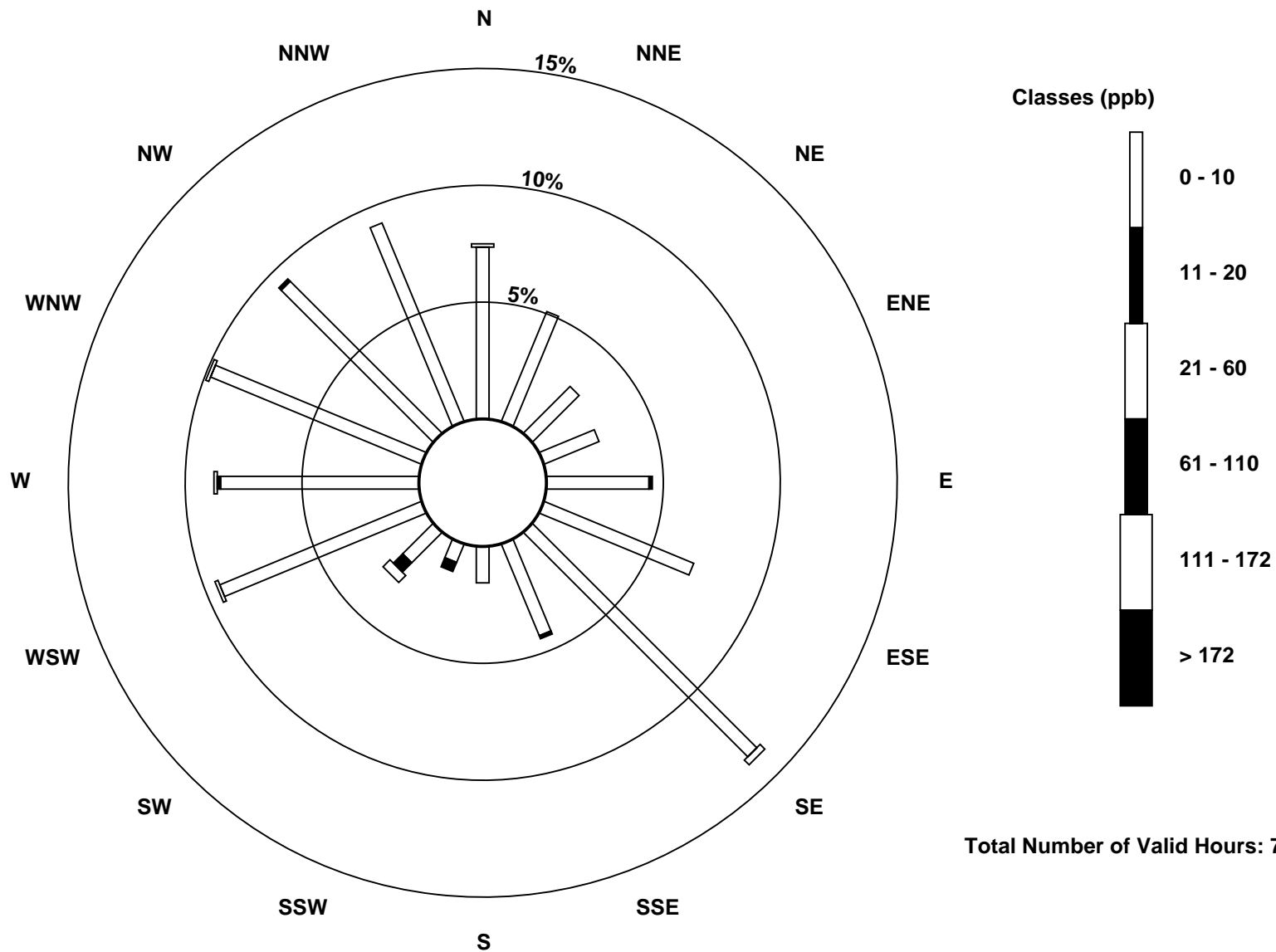
Total Number of Valid Hours: 707

Total Number of Hours: 744



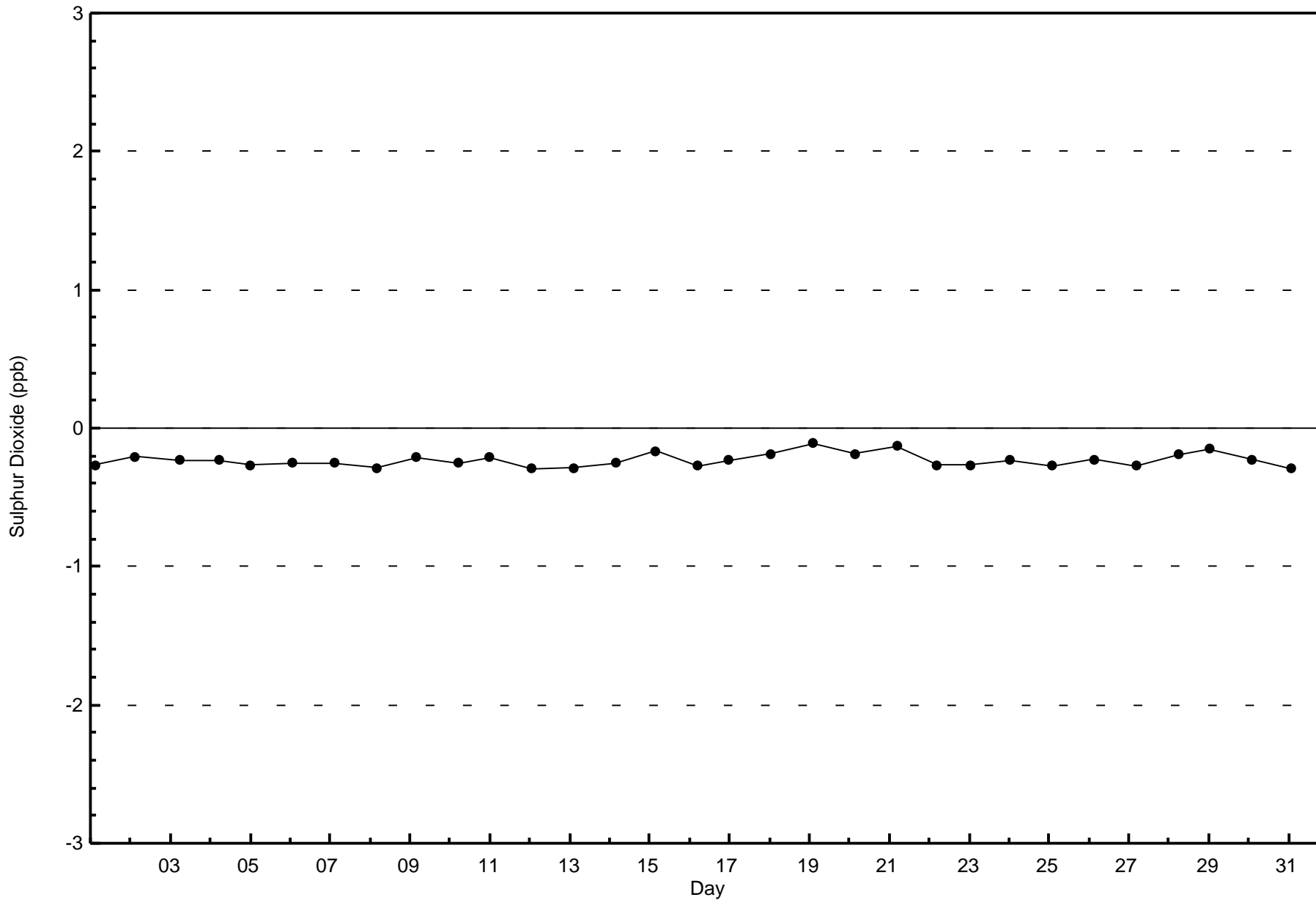
Wood Buffalo Environmental Association  
Wind Rose Jul 2015

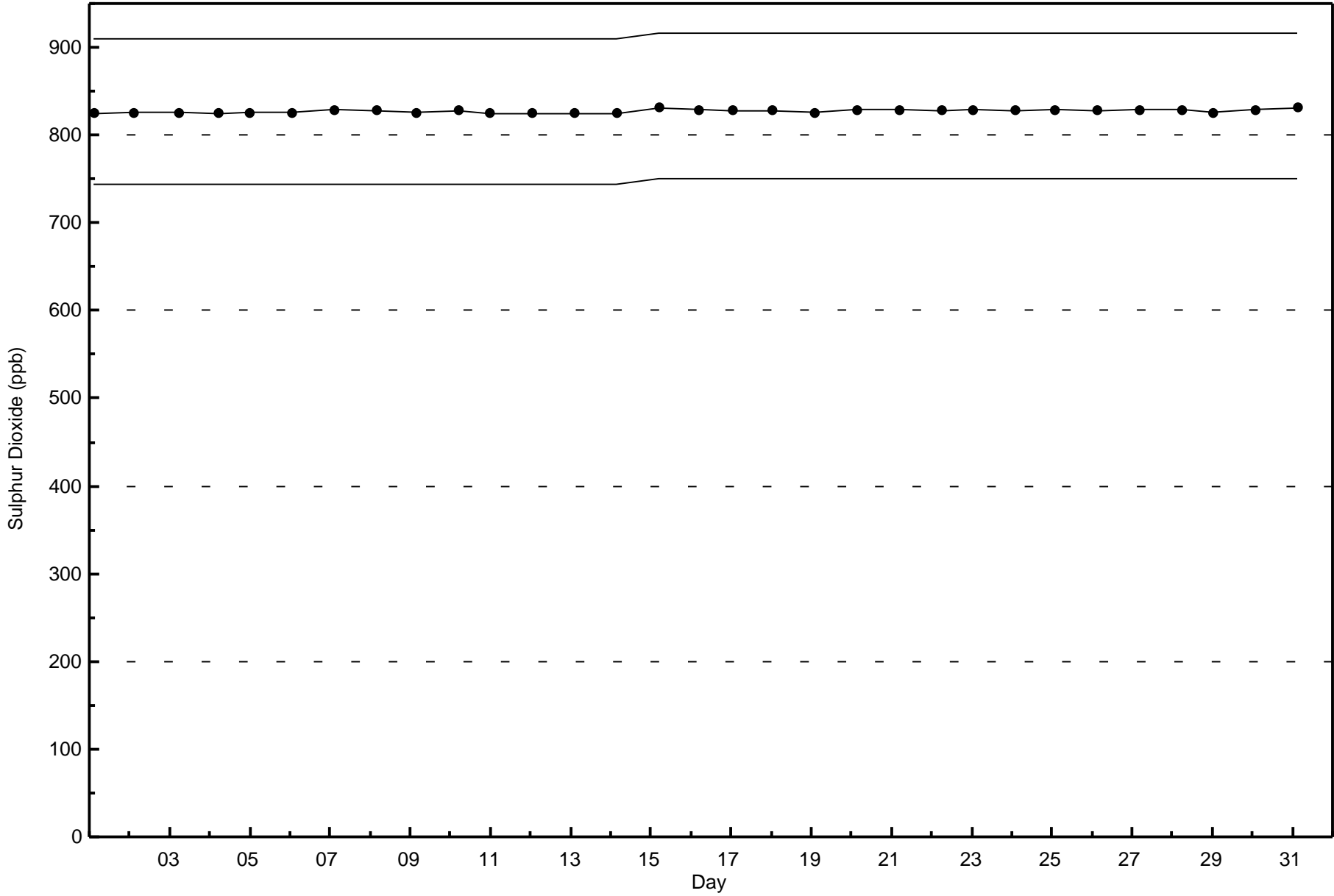
Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Lower Camp (AMS 11)



Total Number of Valid Hours: 707







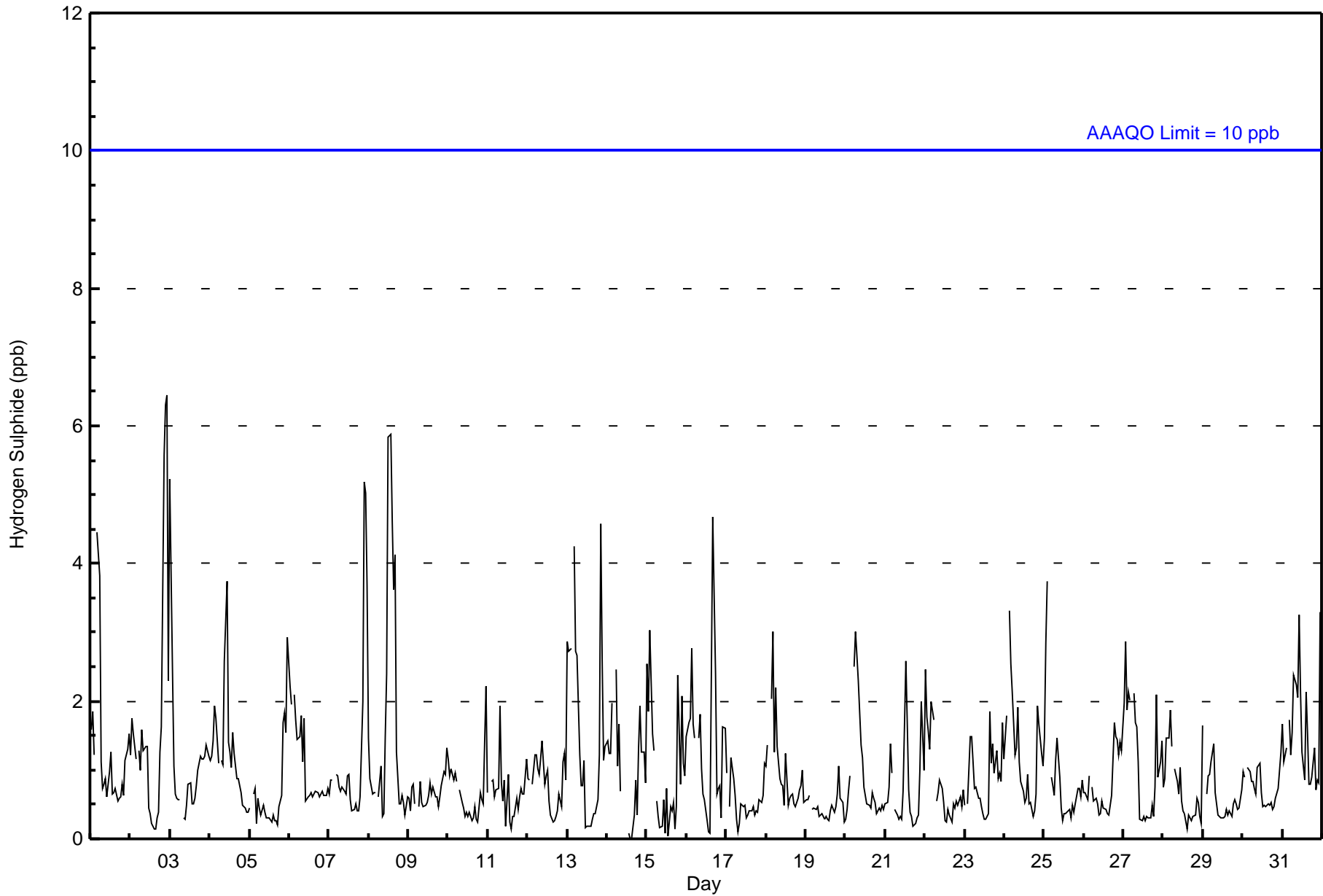


Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 6 ppb on Jul 2 23:00	Maximum Daily Average: 1.7 ppb on Jul 8		Hours of Data:	709
Minimum Value: 0 ppb on Jul 14 15:00	Minimum Daily Average: 0.5 ppb on Jul 19		Hours of Missing Data:	35
Maximum Diurnal Average: 1.5 ppb at hour 5	Minimum Diurnal Average: 0.6 ppb at hour 19		Hours of Calibration:	35
Monthly Average: 1.0 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 1 Q <sub>3</sub> = 1 P <sub>90</sub> = 2 P <sub>99</sub> = 5		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	2	2	1	Z	4	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1.2	4
2-Jul	1	2	2	1	Z	1	1	2	1	1	1	0	0	0	0	0	0	0	1	2	6	6	6	2	1.7	6
3-Jul	5	2	1	1	1	1	1	Z	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1.1	5
4-Jul	1	1	1	2	2	1	1	Z	1	1	3	4	1	1	1	2	1	1	1	1	0	0	0	0	1.2	4
5-Jul	0	Z	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	2	3	0.7	3
6-Jul	2	2	Z	2	2	1	1	2	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.1	2
7-Jul	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	1	2	5	5	4	1.3	5
8-Jul	1	1	1	1	1	Z	1	1	0	0	1	2	6	6	5	4	4	1	1	1	1	1	0	1	1.7	6
9-Jul	1	0	1	1	0	Z	0	1	1	0	0	1	1	1	1	1	1	1	0	1	1	1	1	1	0.7	1
10-Jul	1	1	1	1	1	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1	2	0.7	2
11-Jul	1	Z	1	1	1	1	1	2	1	1	1	0	1	0	0	0	0	1	0	1	1	1	1	1	0.7	2
12-Jul	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	1	0	1	1	1	0.8	1
13-Jul	3	3	3	Z	4	3	3	1	1	1	1	0	0	0	0	0	0	0	1	1	5	3	1	1	1.5	5
14-Jul	1	1	1	2	Z	2	1	2	1	2	1	C	C	C	C	0	0	0	1	0	1	2	1	1	1.0	2
15-Jul	3	2	3	2	1	Z	1	0	0	0	0	1	0	0	0	0	0	1	0	0	2	1	2	1	1.0	3
16-Jul	1	2	2	3	2	1	Z	1	2	1	1	0	0	0	2	5	2	1	1	1	0	2	2	2	1.4	5
17-Jul	1	Z	0	1	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.5	1
18-Jul	1	1	Z	2	3	1	2	1	1	1	1	0	1	0	1	1	1	1	0	1	1	1	1	1	1.0	3
19-Jul	1	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0.5	1
20-Jul	0	0	1	1	Z	3	3	3	2	1	1	1	1	1	0	0	1	1	1	0	0	0	0	0	1.0	3
21-Jul	1	1	1	1	1	Z	0	0	0	0	0	1	3	2	1	0	0	0	0	0	0	1	2	1	0.7	3
22-Jul	2	2	2	1	2	2	Z	1	1	1	1	1	0	0	0	0	0	1	0	1	0	1	0	1	0.8	2
23-Jul	0	Z	1	1	1	1	1	1	1	1	0	0	0	0	2	1	1	1	1	1	1	1	2	2	0.9	2
24-Jul	1	2	Z	3	3	2	1	1	2	1	1	1	1	1	0	1	0	0	0	1	2	2	1	1	1.2	3
25-Jul	1	3	4	Z	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0.9	4
26-Jul	1	1	1	1	Z	1	1	1	1	0	0	1	0	0	0	0	0	1	2	1	1	1	1	1	0.8	2
27-Jul	2	3	2	2	2	Z	2	2	2	1	0	0	0	0	0	0	0	0	0	1	2	1	1	1	1.2	3
28-Jul	1	1	1	1	2	1	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0.7	2
29-Jul	2	Z	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1	1	1	0	0	1	0.6	2
30-Jul	1	1	Z	1	1	1	1	1	1	1	1	1	0	0	0	1	0	1	0	0	1	1	1	1	0.7	1
31-Jul	2	1	1	Z	2	1	2	2	2	2	3	2	1	1	2	2	1	1	1	1	1	1	1	3	1.6	3

1.4	1.4	1.3	1.4	1.5	1.3	1.1	1.1	0.9	0.9	0.9	0.7	0.8	0.6	0.6	0.7	0.7	0.6	0.6	0.8	1.2	1.2	1.3	1.3	Diurnal Average
5	3	4	3	4	4	3	3	2	3	4	2	6	6	5	4	5	2	2	2	6	6	6	4	Diurnal Maximum

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





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

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Lower Camp - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	668	94.22	94.22
3 - 4	30	4.23	98.45
5 - 7	11	1.55	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Lower Camp - July 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	54	36	19	17	33	48	90	17	9	6	13	60	63	74	65	64	668
3 - 4	0	0	0	1	0	2	9	6	0	3	7	2	0	0	0	0	30
5 - 7	0	0	0	0	0	0	0	8	2	0	1	0	0	0	0	0	11
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	54	36	19	18	33	50	99	31	11	9	21	62	63	74	65	64	709

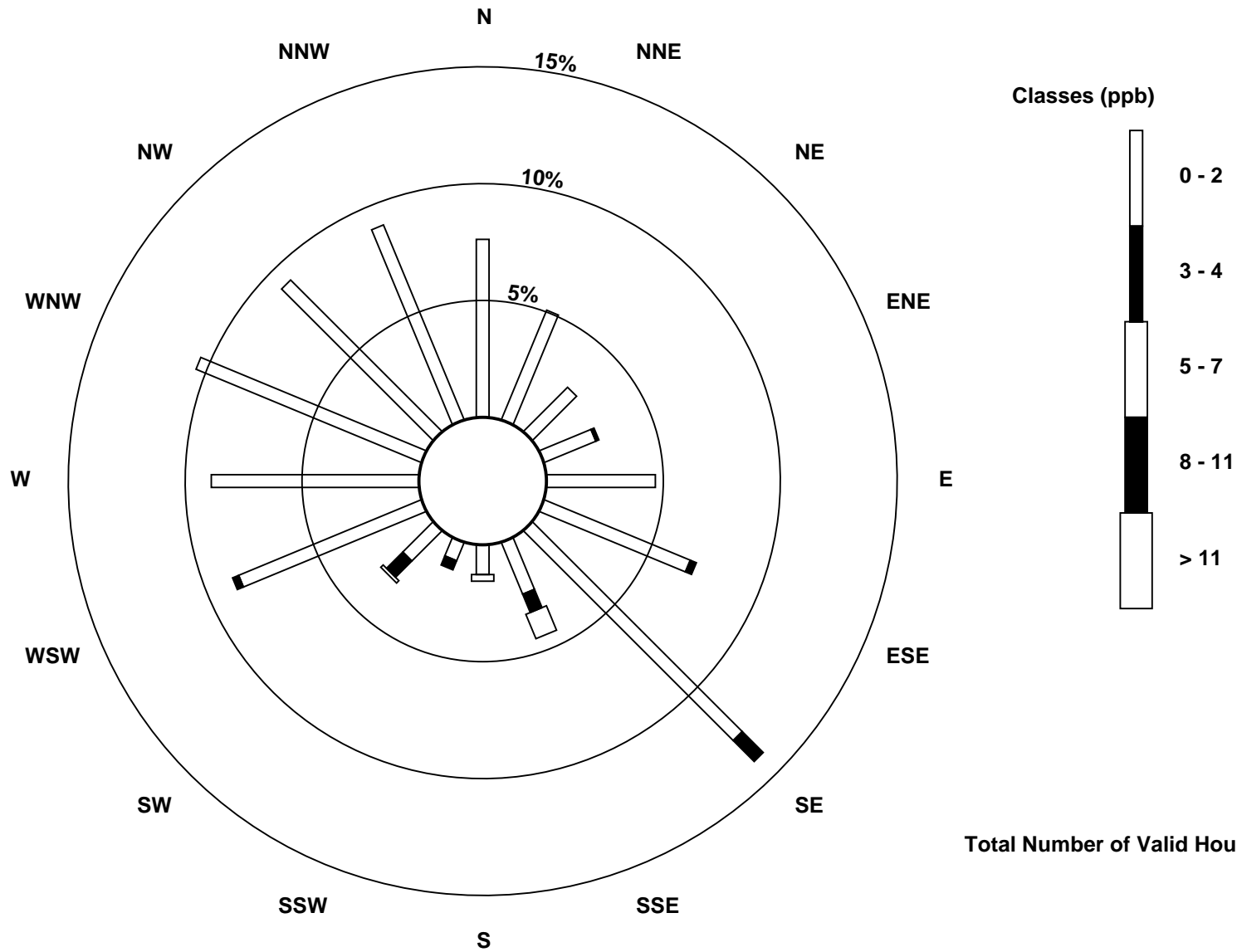
Total Number of Valid Hours: 709

Total Number of Hours: 744

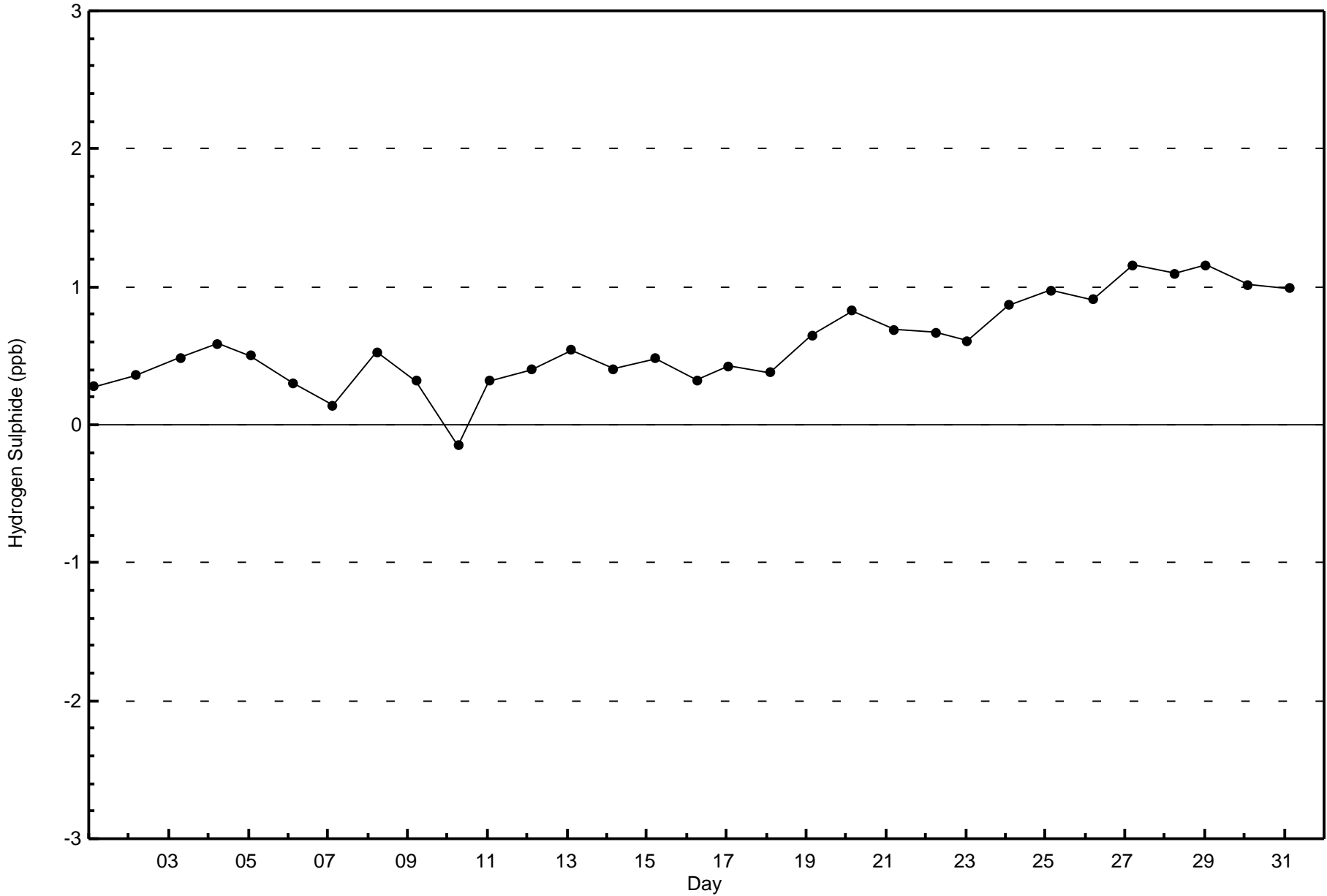


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

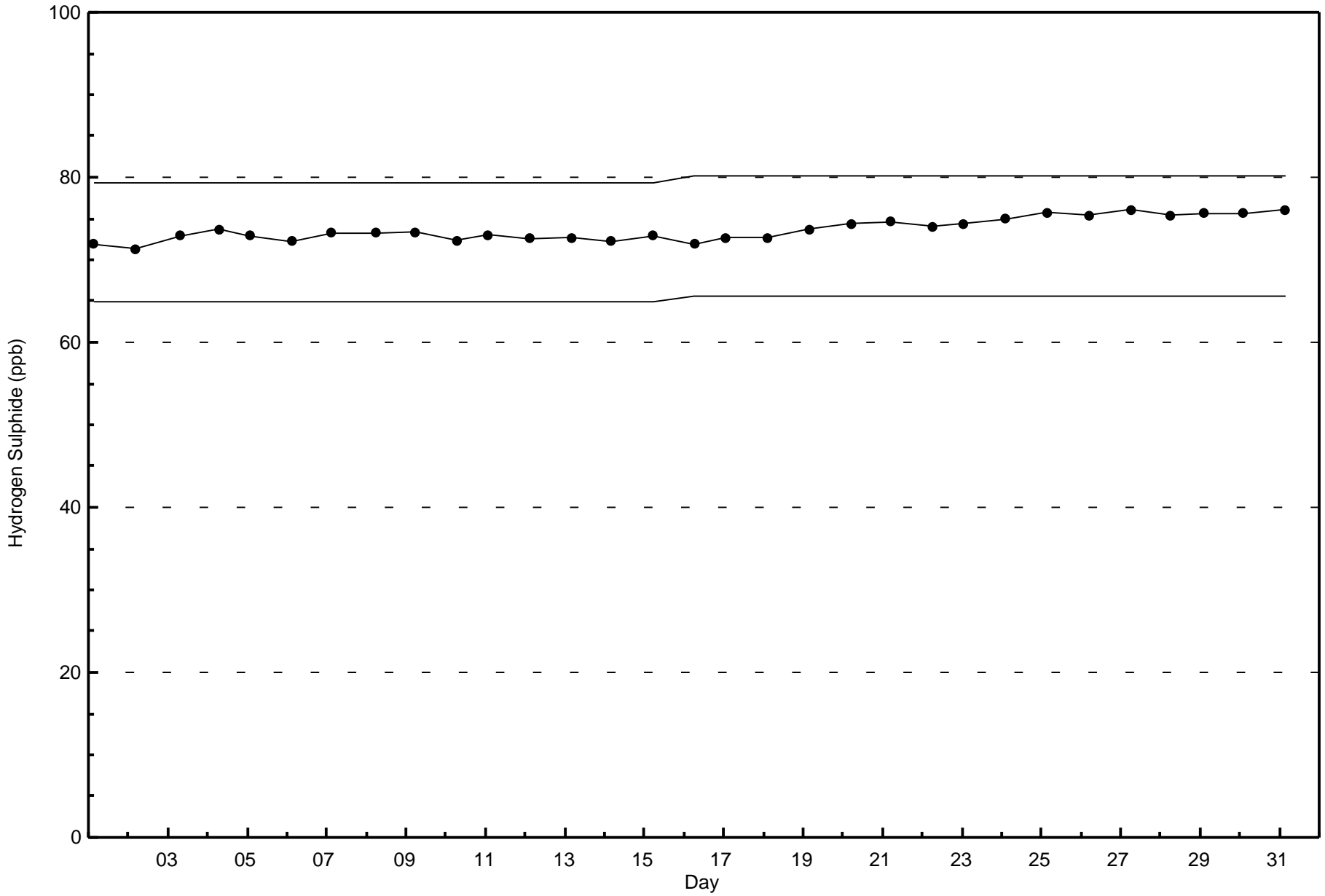
Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Lower Camp (AMS 11)



Total Number of Valid Hours: 709

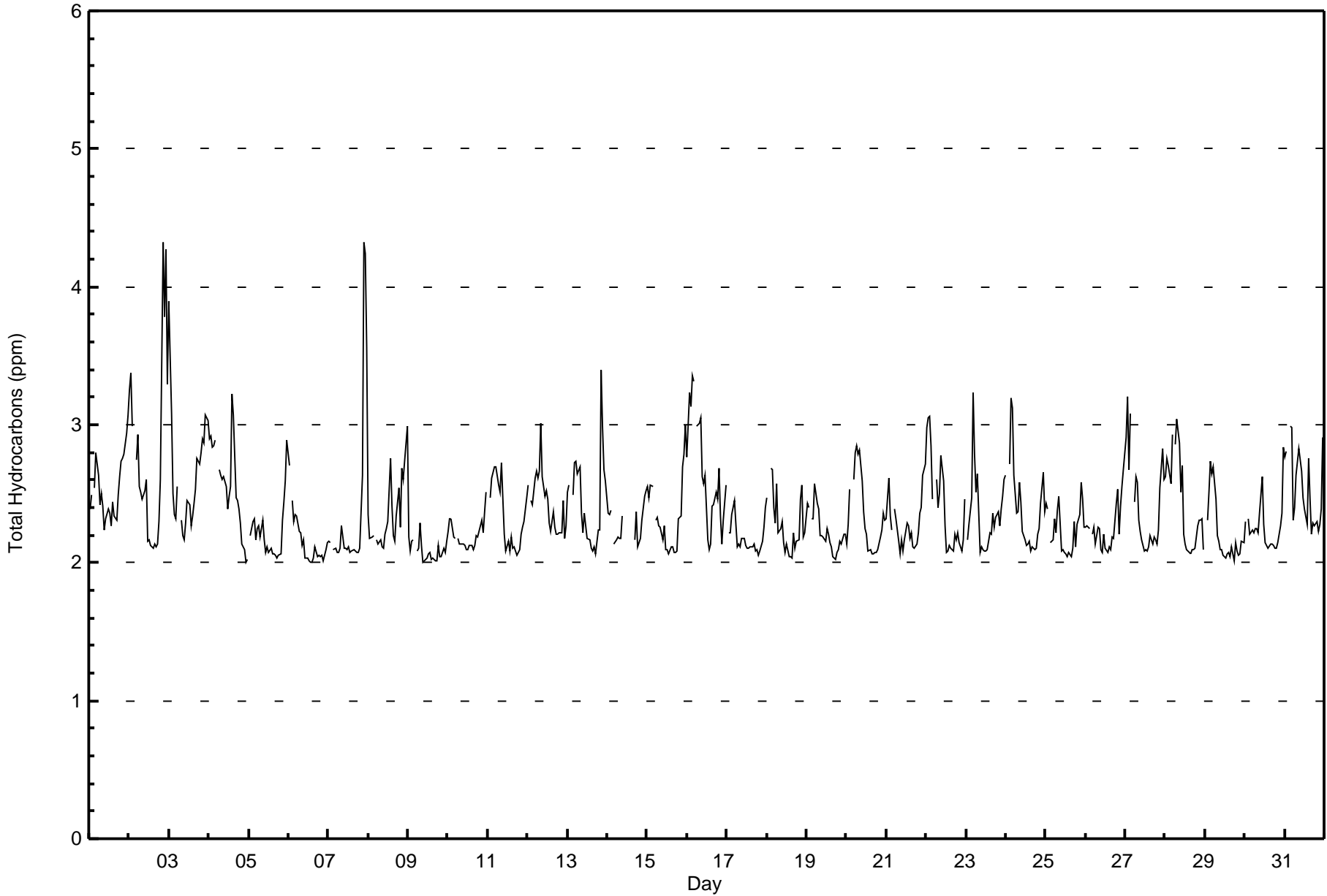








Maximum Value: 4.3 ppm on Jul 7 22:00																			Maximum Daily Average: 2.8 ppm on Jul 2						Hours in Service: 744	
Minimum Value: 2.0 ppm on Jul 4 23:00																			Minimum Daily Average: 2.1 ppm on Jul 9						Hours of Data: 707	
Maximum Diurnal Average: 2.6 ppm at hour 1																			Minimum Diurnal Average: 2.2 ppm at hour 14						Hours of Missing Data: 37	
Monthly Average: 2.36 ppm																			Percentiles: P <sub>1</sub> = 2.0 P <sub>10</sub> = 2.1 Q <sub>1</sub> = 2.1 Median = 2.3 Q <sub>3</sub> = 2.5 P <sub>90</sub> = 2.8 P <sub>99</sub> = 3.4						Hours of Calibration: 37	
																			Percent Operational Time: 100.0							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	2.4	2.5	Z	2.5	2.8	2.6	2.4	2.5	2.4	2.2	2.3	2.4	2.4	2.3	2.4	2.3	2.3	2.5	2.6	2.7	2.8	2.8	2.9	3.1	2.5	3.1
2-Jul	3.3	3.4	3.0	Z	2.7	2.9	2.6	2.5	2.5	2.5	2.6	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.3	2.6	4.3	3.8	4.3	3.3	2.8	4.3
3-Jul	3.9	3.1	2.5	2.4	2.3	2.6	Z	2.3	2.2	2.2	2.3	2.5	2.4	2.3	2.3	2.4	2.5	2.8	2.7	2.8	2.9	2.9	3.1	3.0	2.6	3.9
4-Jul	2.9	2.9	2.8	2.8	2.9	Z	2.7	2.6	2.6	2.6	2.6	2.4	2.5	2.6	3.2	3.1	2.5	2.4	2.4	2.3	2.1	2.1	2.0	2.0	2.6	3.2
5-Jul	Z	2.2	2.3	2.3	2.2	2.2	2.3	2.2	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.3	2.4	2.6	2.2	2.9
6-Jul	2.7	Z	2.5	2.3	2.4	2.3	2.2	2.2	2.1	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1	2.0	2.1	2.0	2.1	2.1	2.2	2.7
7-Jul	2.2	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.6	4.3	4.2	3.6	2.4	4.3
8-Jul	2.3	2.2	2.2	2.2	Z	2.2	2.1	2.2	2.1	2.1	2.2	2.2	2.3	2.8	2.4	2.2	2.2	2.3	2.5	2.3	2.7	2.6	2.7	3.0	2.3	3.0
9-Jul	2.2	2.1	2.2	2.2	Z	2.1	2.1	2.3	2.1	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.1	2.1	2.2	2.1	2.3
10-Jul	2.2	2.3	2.3	2.2	2.2	Z	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.3	2.3	2.2	2.4	2.5	2.2	2.5
11-Jul	Z	2.5	2.6	2.7	2.7	2.7	2.6	2.5	2.7	2.5	2.2	2.1	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.3	2.5	2.3	2.7
12-Jul	2.6	Z	2.4	2.4	2.6	2.7	2.6	2.7	3.0	2.6	2.5	2.5	2.5	2.3	2.2	2.4	2.3	2.2	2.2	2.2	2.2	2.4	2.2	2.3	2.4	3.0
13-Jul	2.5	2.6	Z	2.5	2.7	2.7	2.6	2.7	2.4	2.2	2.4	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.2	3.4	3.0	2.7	2.6	2.5	3.4
14-Jul	2.4	2.4	2.4	Z	2.1	2.2	2.2	2.2	2.2	2.3	C	C	C	C	C	C	2.2	2.4	2.1	2.1	2.2	2.3	2.5	2.5	--	2.5
15-Jul	2.6	2.5	2.6	2.6	Z	2.3	2.3	2.3	2.3	2.2	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.3	2.7	2.8	3.0	2.3	3.0
16-Jul	2.8	3.2	3.1	3.4	3.3	Z	3.0	3.0	3.1	2.6	2.6	2.6	2.2	2.1	2.1	2.4	2.4	2.5	2.5	2.7	2.3	2.1	2.3	2.6	2.6	3.4
17-Jul	Z	2.2	2.2	2.4	2.5	2.3	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.4	2.2	2.5
18-Jul	2.5	Z	2.7	2.7	2.4	2.3	2.6	2.2	2.2	2.3	2.1	2.1	2.1	2.0	2.0	2.0	2.2	2.1	2.2	2.2	2.5	2.6	2.2	2.2	2.3	2.7
19-Jul	2.4	2.4	Z	2.3	2.3	2.6	2.4	2.4	2.2	2.2	2.2	2.2	2.3	2.2	2.1	2.1	2.0	2.0	2.1	2.1	2.2	2.1	2.2	2.2	2.2	2.6
20-Jul	2.1	2.3	2.5	Z	2.6	2.8	2.8	2.8	2.8	2.6	2.4	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.4	2.3	2.3	2.8
21-Jul	2.3	2.6	2.3	2.2	Z	2.4	2.3	2.2	2.1	2.2	2.1	2.2	2.3	2.3	2.2	2.2	2.1	2.1	2.1	2.2	2.4	2.4	2.6	2.7	2.3	2.7
22-Jul	3.0	3.1	3.1	2.8	2.5	Z	2.6	2.4	2.5	2.8	2.6	2.3	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.1	2.2	2.5	2.4	3.1
23-Jul	Z	2.2	2.3	2.5	3.2	2.8	2.5	2.6	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.4	2.3	2.3	2.4	2.3	2.4	2.5	2.6	2.6	2.4	3.2
24-Jul	2.6	Z	2.7	3.2	3.1	2.6	2.4	2.4	2.6	2.4	2.2	2.2	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.4	2.6	2.4	2.4	3.2
25-Jul	2.4	2.4	Z	2.1	2.2	2.3	2.2	2.4	2.5	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.0	2.1	2.3	2.1	2.3	2.3	2.6	2.5	2.2	2.6
26-Jul	2.3	2.3	2.2	Z	2.2	2.3	2.1	2.3	2.2	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.4	2.5	2.2	2.4	2.6	2.7	2.3	2.7
27-Jul	2.9	3.2	2.7	3.1	Z	2.4	2.6	2.6	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.2	2.1	2.2	2.5	2.8	2.6	2.4	3.2
28-Jul	2.6	2.8	2.7	2.6	2.9	Z	2.9	3.0	2.9	2.5	2.7	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.3	2.3	2.3	2.1	2.4	3.0
29-Jul	Z	2.3	2.5	2.7	2.6	2.7	2.5	2.2	2.2	2.1	2.1	2.1	2.0	2.1	2.1	2.0	2.1	2.0	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.7
30-Jul	2.3	Z	2.3	2.2	2.2	2.2	2.3	2.3	2.2	2.4	2.6	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.4	2.8	2.3	2.8
31-Jul	2.8	2.8	Z	3.0	3.0	2.3	2.4	2.6	2.8	2.7	2.7	2.5	2.4	2.3	2.8	2.5	2.2	2.3	2.3	2.3	2.2	2.3	2.4	2.9	2.5	3.0
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration																										





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

**Total Hydrocarbons (THC) - ppm**  
**Lower Camp - July 2015**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	32	4.53	4.53
2.1 - 3.0	647	91.51	96.04
3.1 - 10.0	28	3.96	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



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

**Total Hydrocarbons (THC) - ppm**  
**Lower Camp - July 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	3	1	0	0	0	0	0	0	0	0	7	4	1	2	5	32
2.1 - 3.0	43	32	19	17	28	45	94	24	9	9	20	60	57	69	62	59	647
3.1 - 10.0	1	1	0	1	4	4	4	7	2	0	0	0	1	0	2	1	28
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	53	36	20	18	32	49	98	31	11	9	20	67	62	70	66	65	707

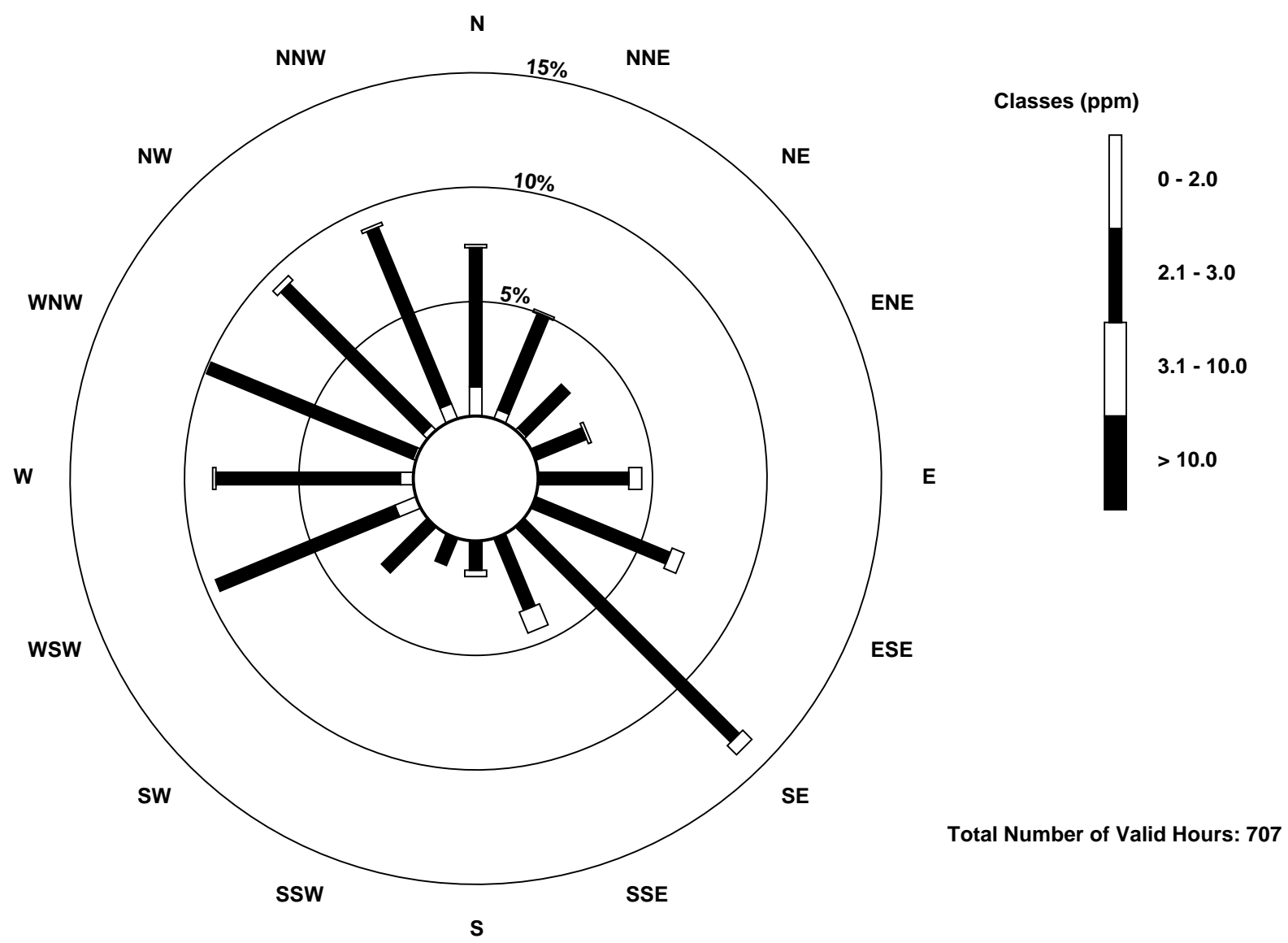
Total Number of Valid Hours: 707

Total Number of Hours: 744



Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Total Hydrocarbons (THC) - ppm  
Lower Camp (AMS 11)



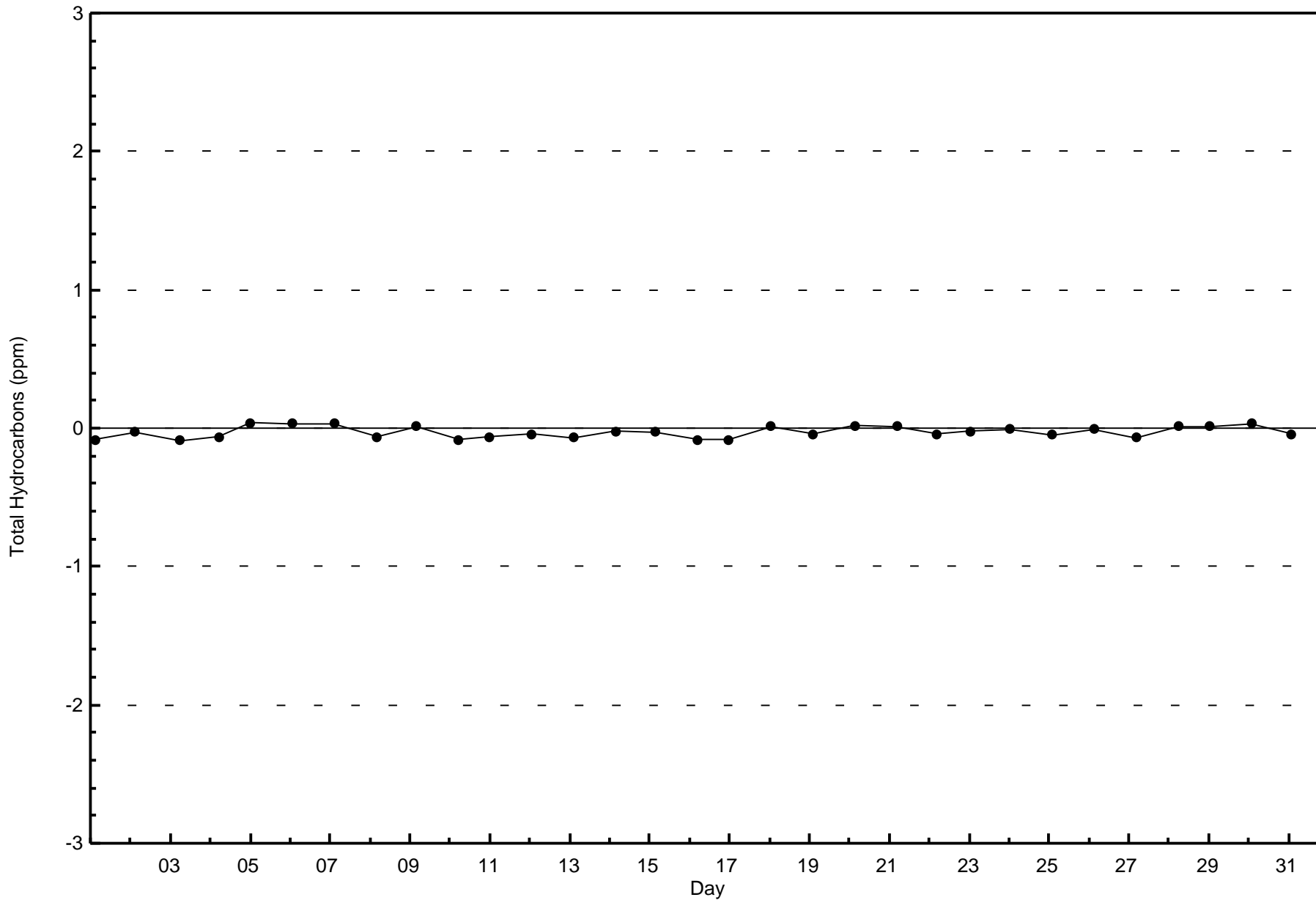


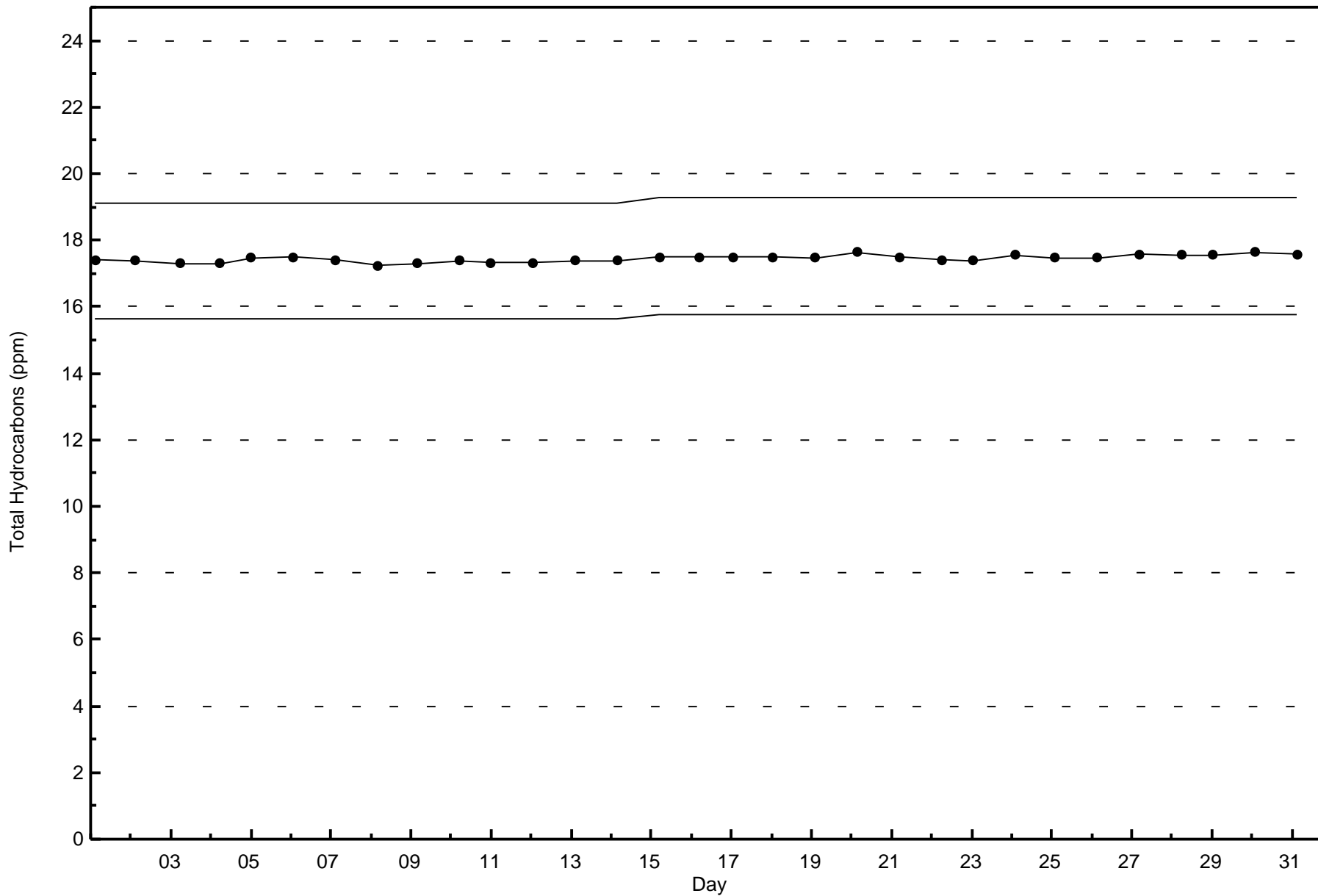
Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Lower Camp - July 2015

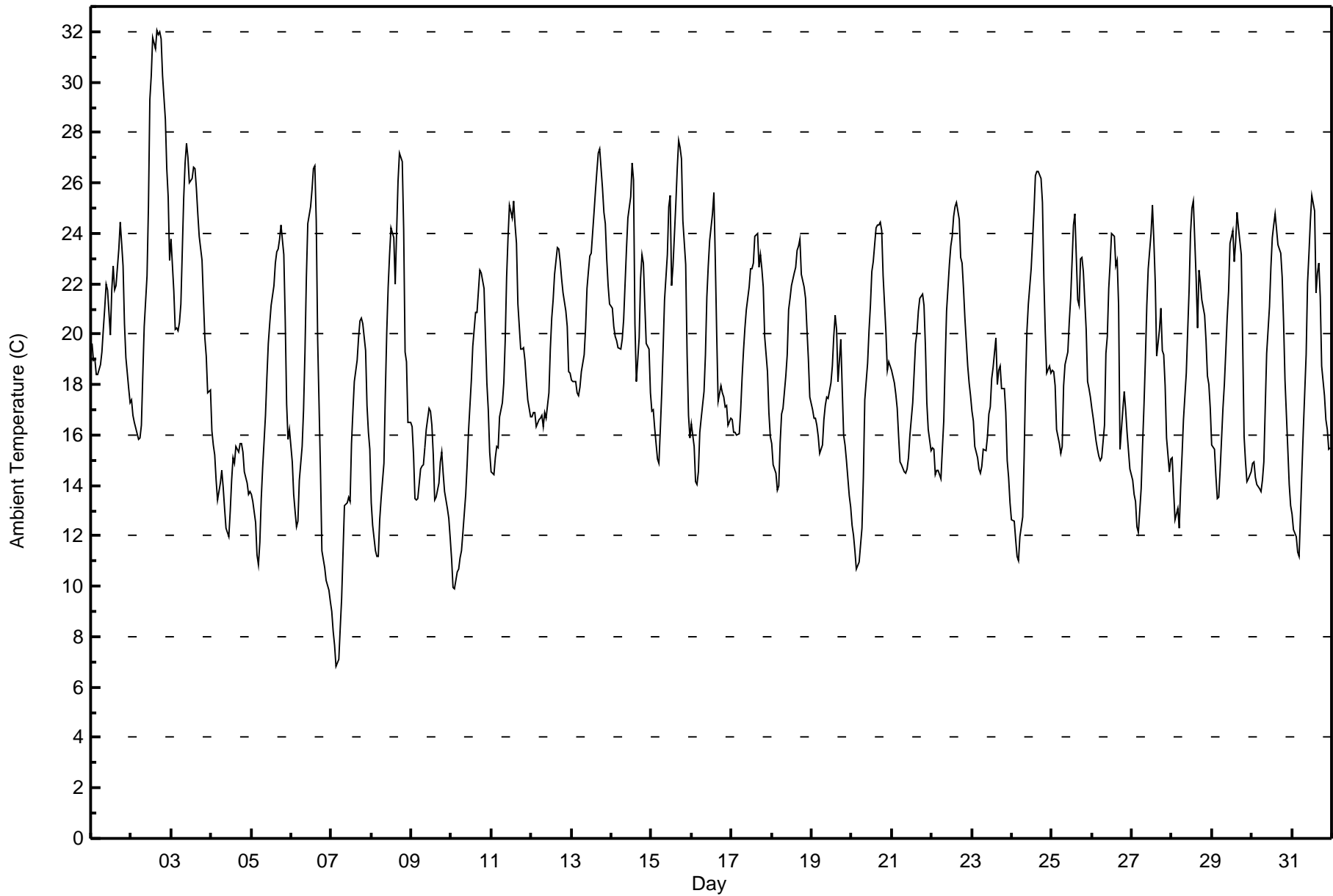








Maximum Value: 32.1 C on Jul 2 16:00		Maximum Daily Average: 24.4 C on Jul 2		Hours in Service: 744																																												
Minimum Value: 6.8 C on Jul 7 04:00		Minimum Daily Average: 14.2 C on Jul 7		Hours of Data: 744																																												
Maximum Diurnal Average: 22.9 C at hour 14		Minimum Diurnal Average: 14.2 C at hour 5		Hours of Missing Data: 0																																												
Monthly Average: 18.69 C		Percentiles: P <sub>1</sub> = 9.5 P <sub>10</sub> = 13.4 Q <sub>1</sub> = 15.4 Median = 18.3 Q <sub>3</sub> = 22.0 P <sub>90</sub> = 24.5 P <sub>99</sub> = 29.3		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-Jul	19.6	18.9	19.0	18.4	18.4	18.8	19.3	20.2	21.0	22.0	21.7	20.0	21.7	22.7	21.7	21.9	23.4	24.4	23.6	22.7	20.4	19.1	17.9	17.3	20.6	24.4																						
2-Jul	17.4	16.8	16.5	16.1	15.8	15.9	16.4	18.4	20.3	22.3	25.1	29.3	30.3	31.8	31.3	32.1	31.9	32.0	31.7	30.2	28.5	26.6	25.5	22.9	24.4	32.1																						
3-Jul	23.8	21.7	20.2	20.2	20.1	20.5	21.2	25.4	26.8	27.6	27.0	26.0	26.2	26.6	26.6	25.8	24.8	23.9	22.9	21.4	19.8	19.1	17.7	17.8	23.0	27.6																						
4-Jul	16.2	15.6	15.2	14.2	13.4	14.1	14.6	13.9	13.1	12.3	12.0	13.0	14.2	15.1	14.9	15.6	15.3	15.6	15.7	15.3	14.5	14.1	13.7	13.7	14.4	16.2																						
5-Jul	13.6	13.4	12.5	11.2	10.8	11.7	13.5	14.7	16.8	18.3	19.6	20.4	21.1	21.9	22.8	23.3	23.4	23.8	24.3	23.2	20.6	17.2	15.8	16.2	17.9	24.3																						
6-Jul	15.0	13.6	13.0	12.3	12.6	14.2	15.5	17.0	19.3	22.2	24.4	25.1	25.7	26.6	26.7	24.5	19.8	14.6	11.4	11.1	10.7	10.2	9.8	9.4	16.9	26.7																						
7-Jul	9.0	8.2	7.6	6.8	7.1	8.4	9.5	11.3	13.2	13.3	13.5	13.4	15.7	16.9	18.1	18.9	19.9	20.6	20.7	20.4	19.4	17.2	16.1	15.4	14.2	20.7																						
8-Jul	13.3	12.4	11.4	11.2	11.2	12.6	13.5	14.9	17.7	20.1	21.9	23.1	24.2	23.9	22.0	24.1	26.1	27.2	26.9	24.2	19.3	18.9	16.5	16.5	18.9	27.2																						
9-Jul	16.3	15.2	13.5	13.4	13.5	14.7	14.8	14.8	15.5	16.2	17.1	17.0	16.4	15.2	13.4	13.5	14.1	14.9	15.3	14.5	13.8	13.1	12.7	11.9	14.6	17.1																						
10-Jul	11.1	10.0	9.9	10.6	10.7	11.1	11.4	12.2	13.6	14.8	16.2	17.2	18.2	19.5	20.9	20.9	21.7	22.5	22.5	21.8	19.9	18.1	17.0	15.3	16.1	22.5																						
11-Jul	14.5	14.4	15.1	15.6	15.5	16.7	17.3	18.0	19.7	22.3	23.8	25.1	24.6	25.3	24.3	23.6	21.2	19.4	19.4	19.5	19.0	18.1	17.4	16.7	19.4	25.3																						
12-Jul	16.7	16.9	16.9	16.3	16.6	16.7	16.8	16.3	16.9	16.7	17.7	19.4	20.6	21.4	22.4	23.4	23.4	22.9	22.2	21.7	20.9	20.3	18.5	18.5	19.2	23.4																						
13-Jul	18.2	18.1	18.1	17.7	17.6	17.9	18.5	19.2	20.2	21.8	22.5	23.1	23.2	24.8	25.7	26.5	27.2	27.3	25.8	24.8	24.4	23.0	21.9	21.2	22.0	27.3																						
14-Jul	21.0	20.3	19.9	19.8	19.5	19.4	19.8	20.6	22.0	23.4	24.6	25.4	26.8	26.1	20.4	18.1	19.8	22.2	23.1	22.8	21.2	19.6	19.4	17.7	21.4	26.8																						
15-Jul	16.9	17.0	16.3	15.1	14.9	16.2	17.7	19.5	21.4	23.1	25.0	25.5	21.9	22.7	25.2	26.6	27.7	27.4	27.0	24.5	22.8	19.2	16.8	15.9	21.1	27.7																						
16-Jul	16.4	15.6	14.2	14.1	14.5	16.1	16.7	17.7	19.2	21.5	22.7	23.7	24.8	25.6	22.9	19.9	17.3	18.0	17.7	17.5	17.1	17.2	16.4	16.6	18.5	25.6																						
17-Jul	16.6	16.1	16.1	16.0	16.1	17.0	18.3	19.3	20.2	21.0	21.9	22.6	22.6	22.8	23.9	24.0	22.7	23.1	22.6	21.9	19.9	18.5	16.9	15.9	19.8	24.0																						
18-Jul	15.7	14.8	14.5	13.8	14.0	15.7	16.9	17.1	18.3	19.2	21.0	21.4	21.9	22.4	22.6	23.3	23.5	23.7	22.4	21.9	21.4	20.2	19.0	17.5	19.3	23.7																						
19-Jul	17.0	16.7	16.7	16.4	15.9	15.3	15.6	16.6	17.2	17.5	17.5	18.1	18.8	19.9	20.8	20.2	18.1	19.8	17.8	16.0	15.6	15.0	13.6	13.1	17.0	20.8																						
20-Jul	12.4	12.1	11.4	10.7	11.0	11.6	12.3	14.3	17.4	18.9	20.1	21.2	22.5	22.9	24.2	24.3	24.3	24.4	24.1	22.3	20.1	18.6	18.9	18.7	18.3	24.4																						
21-Jul	18.6	18.1	17.6	17.0	15.9	15.0	14.8	14.5	14.5	14.6	15.1	16.0	17.3	18.4	19.6	20.1	20.9	21.4	21.6	21.1	19.5	17.3	16.2	15.4	17.5	21.6																						
22-Jul	15.5	15.4	14.4	14.6	14.6	14.3	15.5	16.6	18.8	20.9	22.8	23.5	23.9	24.6	25.1	25.2	24.5	23.0	22.8	21.8	20.6	18.7	18.1	17.6	19.7	25.2																						
23-Jul	16.9	16.5	15.6	15.1	14.7	14.5	14.8	15.5	15.4	15.9	16.8	17.1	18.2	18.7	19.9	18.0	18.6	18.7	17.8	17.8	16.9	15.0	14.3	13.3	16.5	19.9																						
24-Jul	12.6	12.6	11.8	11.2	11.0	12.0	12.7	15.1	18.1	20.1	21.2	22.6	23.7	24.9	26.3	26.5	26.5	26.1	25.2	22.2	20.1	18.5	18.7	18.4	19.1	26.5																						
25-Jul	18.6	18.5	18.0	16.2	15.6	15.3	15.6	18.0	18.8	19.3	20.5	21.4	22.9	24.3	24.8	21.4	21.2	23.0	23.0	22.5	20.2	18.1	17.8	17.5	19.7	24.8																						
26-Jul	17.1	16.6	15.8	15.4	15.2	15.0	15.1	16.4	19.3	19.9	21.8	22.8	24.0	23.9	22.7	22.9	21.1	15.4	17.0	17.7	17.0	16.1	15.4	14.7	18.3	24.0																						
27-Jul	14.2	13.7	13.4	12.4	12.1	13.9	15.6	17.2	19.0	21.1	22.6	24.0	25.1	23.7	22.0	19.1	20.2	21.0	19.4	19.2	18.0	15.9	14.5	15.0	18.0	25.1																						
28-Jul	15.1	13.8	12.6	13.1	12.3	13.9	15.2	16.6	18.5	20.1	21.8	24.0	25.0	25.3	22.2	20.2	22.5	22.1	21.4	20.7	19.7	18.3	18.0	17.1	18.7	25.3																						
29-Jul	15.6	15.5	14.4	13.5	13.5	14.6	17.0	18.0	19.3	20.6	21.7	23.6	24.1	22.9	23.6	24.8	24.2	23.1	19.6	15.9	14.9	14.1	14.2	14.5	18.5	24.8																						
30-Jul	14.9	14.9	14.3	14.0	13.9	13.8	14.2	14.9	17.1	19.3	21.1	22.7	23.8	24.3	24.8	23.5	23.4	23.2	22.3	20.4	18.2	15.4	14.0	13.2	18.4	24.8																						
31-Jul	12.9	12.3	12.0	11.3	11.2	12.9	14.6	16.2	19.2	22.0	23.2	24.5	25.5	24.9	21.6	22.4	22.8	21.5	18.7	17.6	16.6	16.2	15.4	15.5	18.0	25.5																						
																								15.9	15.3	14.8	14.3	14.2	14.8	15.6	16.8	18.3	19.6	20.8	21.7	22.4	22.9	22.7	22.4	22.3	22.1	21.5	20.5	19.1	17.6	16.7	16.2	Diurnal Average
																								23.8	21.7	20.2	20.2	20.1	20.5	21.2	25.4	26.8	27.6	27.0	29.3	30.3	31.8	31.3	32.1	31.9	32.0	31.7	30.2	28.5	26.6	25.5	22.9	Diurnal Maximum





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

**Ambient Temperature (AT) - C**  
**Lower Camp - July 2015**

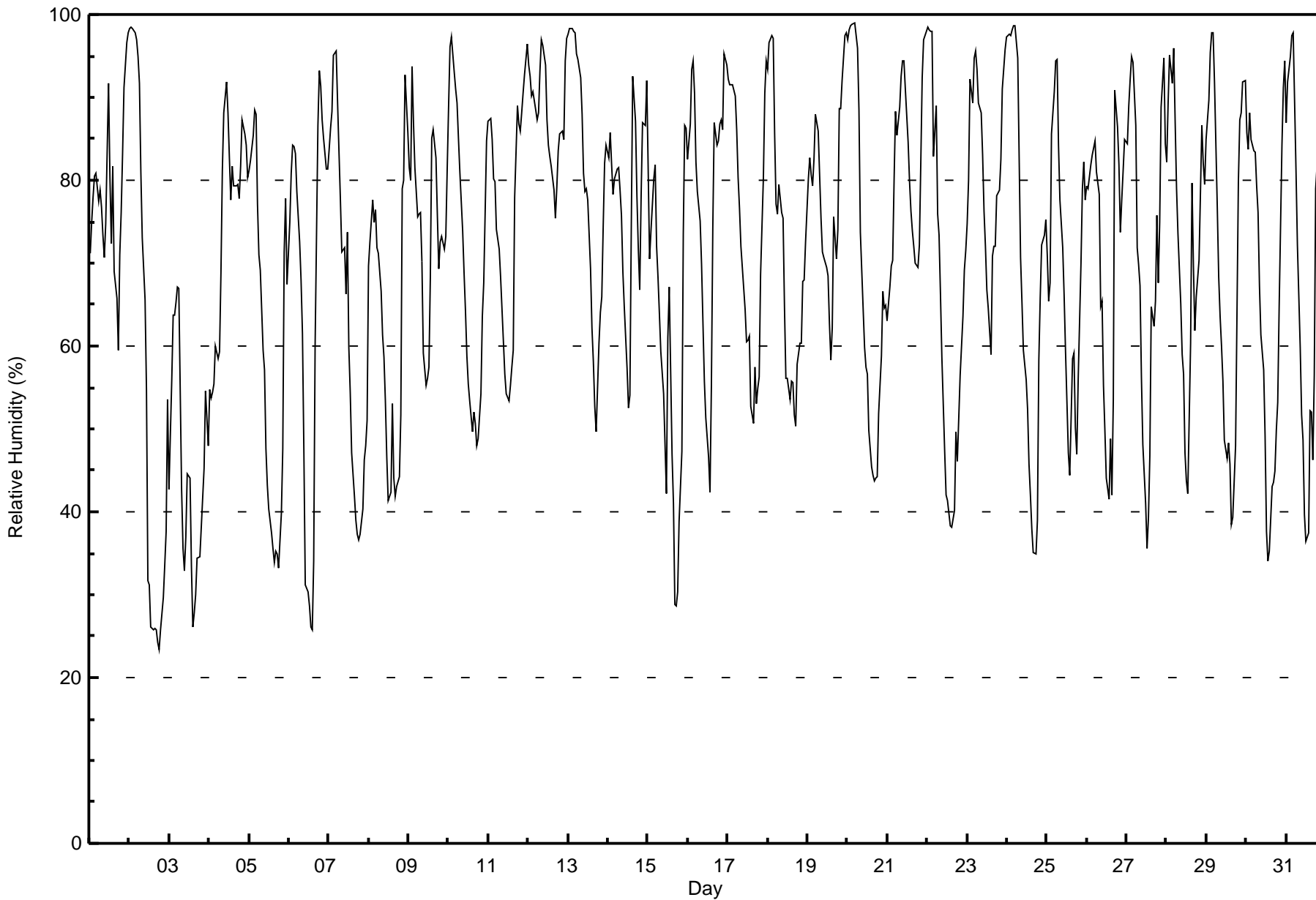
<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	11	1.48	1.48
10 - 20	449	60.35	61.83
> 20	284	38.17	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Maximum Value: 99 % on Jul 20 05:00																		Maximum Daily Average: 88.0 % on Jul 12																		Hours in Service: 744																																																																																					
Minimum Value: 23 % on Jul 2 19:00																		Minimum Daily Average: 44.8 % on Jul 3																		Hours of Data: 744																																																																																					
Maximum Diurnal Average: 87.1 % at hour 4																		Minimum Diurnal Average: 51.9 % at hour 14																		Hours of Missing Data: 0																																																																																					
Monthly Average: 70.4 %																		Percentiles: P <sub>1</sub> = 26 P <sub>10</sub> = 42 Q <sub>1</sub> = 56 Median = 74 Q <sub>3</sub> = 86 P <sub>90</sub> = 94 P <sub>99</sub> = 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-Jul	71	75	78	80	81	78	79	77	73	71	75	92	80	72	82	69	66	59	71	76	83	91	97	98	78.1	98																																																																																															
2-Jul	98	98	98	98	97	95	92	81	73	66	55	32	31	26	26	26	26	24	23	26	30	34	38	54	56.1	98																																																																																															
3-Jul	43	56	64	64	65	67	67	43	36	33	37	45	44	33	26	28	30	34	35	38	42	45	55	48	44.8	67																																																																																															
4-Jul	55	54	54	56	60	58	59	69	81	88	92	88	83	78	82	79	79	79	78	82	87	86	84	80	74.6	92																																																																																															
5-Jul	81	82	86	89	88	77	71	69	60	57	48	43	40	37	36	34	35	35	33	40	48	71	78	67	58.5	89																																																																																															
6-Jul	75	81	84	84	83	79	72	68	61	47	31	30	29	26	26	34	60	87	93	91	87	85	81	81	65.7	93																																																																																															
7-Jul	84	86	88	95	96	89	83	78	71	72	66	74	60	54	47	42	39	37	37	37	40	46	48	51	63.4	96																																																																																															
8-Jul	70	72	78	75	76	72	71	67	61	59	53	47	41	42	53	44	42	43	44	52	79	80	93	86	62.5	93																																																																																															
9-Jul	82	80	94	87	81	76	76	76	70	59	55	56	57	68	85	86	83	76	69	72	73	72	73	81	74.5	94																																																																																															
10-Jul	89	96	97	93	91	89	85	81	74	69	64	59	55	53	50	52	51	48	49	54	64	68	76	85	70.5	97																																																																																															
11-Jul	87	88	85	80	80	74	72	68	64	61	57	54	53	55	57	60	78	89	87	86	88	90	93	96	75.1	96																																																																																															
12-Jul	94	92	90	91	89	87	88	93	97	96	94	87	84	83	82	79	75	79	84	86	86	85	94	97	88.0	97																																																																																															
13-Jul	98	98	98	98	98	95	95	92	88	81	79	79	78	69	62	58	53	50	60	64	66	74	82	84	79.1	98																																																																																															
14-Jul	83	86	82	78	80	81	82	79	76	69	65	57	53	54	74	93	87	78	72	67	78	87	87	92	76.6	93																																																																																															
15-Jul	82	70	74	80	82	72	68	64	59	54	48	42	61	67	47	41	29	29	30	39	47	73	87	86	59.7	87																																																																																															
16-Jul	82	87	93	94	91	82	79	75	70	63	56	51	47	42	55	74	87	84	85	87	87	86	95	94	77.0	95																																																																																															
17-Jul	92	92	92	92	90	86	80	77	72	69	64	60	61	61	53	51	57	53	55	56	69	80	91	94	72.8	94																																																																																															
18-Jul	93	97	98	97	86	77	76	80	76	75	65	56	56	53	56	56	52	50	58	60	60	68	68	72	70.2	98																																																																																															
19-Jul	80	83	81	79	83	88	86	81	75	71	71	70	68	63	58	62	76	70	74	89	89	92	97	98	78.5	98																																																																																															
20-Jul	97	98	99	99	99	97	96	89	74	64	60	57	57	50	45	44	44	44	44	52	59	67	65	65	69.3	99																																																																																															
21-Jul	63	67	70	70	80	88	85	89	92	94	94	91	85	80	76	74	72	70	69	72	82	92	97	98	81.4	98																																																																																															
22-Jul	99	98	98	98	83	89	76	73	66	59	47	42	41	40	38	38	40	50	46	51	56	64	69	71	63.9	99																																																																																															
23-Jul	75	80	92	89	95	96	93	89	88	83	76	72	67	65	59	71	72	72	78	79	83	91	93	96	81.4	96																																																																																															
24-Jul	97	98	97	98	99	99	95	83	71	65	60	56	52	46	42	38	35	35	39	58	66	72	73	75	68.7	99																																																																																															
25-Jul	71	65	68	86	91	94	95	84	78	72	66	59	53	47	44	58	59	50	47	56	70	79	82	78	68.9	95																																																																																															
26-Jul	79	79	82	83	84	85	81	78	65	65	55	50	44	41	49	42	53	91	86	82	74	78	81	85	70.5	91																																																																																															
27-Jul	84	89	92	95	94	87	72	70	67	56	48	41	36	39	47	65	62	65	76	68	75	89	95	84	70.7	95																																																																																															
28-Jul	82	89	95	92	96	87	79	74	65	59	57	47	44	42	60	80	70	62	66	70	79	87	82	80	72.6	96																																																																																															
29-Jul	85	90	96	98	98	92	77	68	64	60	56	49	47	48	46	38	39	48	64	80	87	88	92	92	70.8	98																																																																																															
30-Jul	86	84	88	85	84	83	79	76	67	61	57	49	38	34	35	43	43	45	50	53	65	84	91	94	65.7	94																																																																																															
31-Jul	87	92	95	97	98	90	81	72	60	52	49	40	36	37	52	52	46	57	79	85	87	89	95	90	71.5	98																																																																																															
																		82.1				84.0				86.6				87.1				86.9				84.2				80.3				76.2				70.8				66.2				61.3				57.3				54.2				51.9				53.3				55.2				56.2				57.9				60.7				64.8				70.5				77.2				81.7				82.4				Diurnal Average				Diurnal Maximum			
																		99				98				99				99				99				99				96				93				97				96				94				92				85				83				85				93				87				91				93				91				89				92				97				98											





Maximum Speed: 28 km/h on Jul 3 10:00	Maximum Daily Speed Average: 11.2 km/h on Jul 19	Hours in Service: 744
Minimum Speed Value: 0 km/h on Jul 31 02:00	Minimum Daily Speed Average: 1.0 km/h on Jul 26	Hours of Data: 744
Maximum Diurnal Speed Average: 6.2 km/h at hour 14	Minimum Diurnal Speed Average: 0.5 km/h at hour 2	Hours of Missing Data: 0
Monthly Average Velocity: 2.3 km/h 289.3 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 2 Q <sub>1</sub> = 4 Median = 6 Q <sub>3</sub> = 10 P <sub>90</sub> = 14 P <sub>99</sub> = 23	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	WSW5	S4	WNW3	WSW3	SW2	SW5	WSW5	WSW9	WSW10	WSW10	WNW8	NE1	SW6	WNW6	WNW7	NW4	NNE4	ENE1	NNW3	E1	W4	N1	E0	E1	W3.1	WSW10
2-Jul	SE3	SE3	SE5	SE4	SE5	SE5	SE5	SE5	SE6	SE6	ESE4	WSW10	WSW10	W13	W14	W15	WSW12	SW15	SW12	SSW6	S5	SSE6	SSE4	E3	SSW4.2	W15
3-Jul	SSE7	E7	E8	ESE10	SE10	SE10	SE8	WSW14	WSW20	WSW28	W27	WNW25	WNW21	WNW24	NW25	WNW23	WNW23	WNW17	NW11	WNW7	WNW7	NW6	NNW5	NW7	WNW9.0	WSW28
4-Jul	N5	NNW6	W13	W17	WSW17	W18	W12	W9	W5	SW10	SSW4	WSW9	WSW13	W10	NW5	NNE5	NNE3	W3	NW7	NW11	NW13	N17	N19	N14	WNW7.3	N19
5-Jul	N13	NNW11	NNW10	NW6	WNW6	NW6	NNW3	NNE5	WSW9	NW6	NNW11	NNW11	N11	NNW10	NW9	NW6	NNW6	NNW4	NNE2	SE3	SE4	E2	ENE3	SE5	NNW5.0	N13
6-Jul	E6	SE5	SE6	SE7	SE7	SE9	SE7	SE7	SE8	SSW6	WSW18	W18	WSW17	W17	WSW19	WNW18	NNW20	N23	N16	NNW19	NNW17	NW10	NW9	NW9	WNW5.0	N23
7-Jul	NW8	NNW6	NNW7	NW3	NNW3	N5	NNE6	NNE4	WSW7	WSW11	W8	WSW8	SW3	WSW8	WSW9	W12	WSW10	W14	W12	WSW9	SSW5	S5	S6	SSE7	W4.9	W14
8-Jul	SE8	ESE10	SE8	SE10	SE10	SE9	SE11	SE11	SE12	SE14	SE10	SSE10	SSE11	SSE8	SSE9	SSE10	SSE10	WSW12	W13	NW22	W12	NNW4	SSW1	W6	SSE5.2	NW22
9-Jul	NW5	NW3	NNW2	NW5	WNW7	NNW5	WNW6	NW7	N7	NNE9	NNE5	NW5	NW7	NNE6	NE2	NNW8	N10	N13	N15	N11	N9	NNW8	NNW8	NNW7	NNW6.4	N15
10-Jul	NW4	WNW2	WNW3	NNW8	NNW7	N7	NNE8	ENE6	NNE4	NNW7	NNW8	N7	N7	NNW6	WNW5	N6	NNW6	WNW7	NNW4	NNW4	WNW3	NNE1	N3	WNW2	NNW4.5	NNW8
11-Jul	W4	WNW4	WNW3	S1	ESE4	ESE11	SE12	SE9	ESE7	SE8	SE9	SE12	SSE10	SE12	SE10	ESE10	SE3	WNW2	WSW2	WNW1	NW2	ENE1	N2	WNW3	SE4.0	SE12
12-Jul	W4	W4	NW6	W5	W4	WNW5	E1	SE1	ENE3	NW9	ESE4	NNW3	NNW7	N10	N11	N9	NE9	NNW7	NW7	NW6	WNW6	SW19	WSW8	NNW4	NW3.8	WSW19
13-Jul	SW2	SE4	WSW2	WSW5	SSW2	SSE3	ESE5	ESE7	SE8	SE8	ESE6	SE6	W13	W12	W12	WSW8	WSW5	WSW5	SE3	SSE5	SSE4	SE6	ESE5	SSE2	S2.6	W13
14-Jul	SSE5	SE6	SSE6	SE8	SSE8	SSE7	SE6	SE6	SE7	SE8	ESE6	NNW4	W5	WNW3	NNW7	ESE2	ESE4	ESE7	SE6	SSE6	SE5	SE6	ESE5	ESE1	SE4.0	SE8
15-Jul	SW2	SSE5	SSE6	SSE5	SSE4	SW3	WSW7	WSW8	W9	W7	E1	WSW7	S9	E4	ENE5	SW4	SW14	WSW14	SW11	SW7	WSW7	NNW1	NE2	ESE3	SW4.1	WSW14
16-Jul	SE5	ESE3	E1	SE1	ESE3	ESE7	ESE6	E3	N4	NNW8	NW12	NNW11	NNE14	N13	ENE4	S9	SW13	SSW8	WNW18	NW9	NW7	SE3	WNW6	WNW7	NW2.0	WNW18
17-Jul	NW8	NNW13	NNW12	NW10	NW7	NW9	NNW11	N16	N20	N16	NNW18	N21	NNW18	N17	NNW16	NNW18	NW11	N14	N11	NNE7	NW1	NNE1	NE1	E2	NNW11.0	N21
18-Jul	NE1	E2	E1	SE2	SSW4	S4	SSE5	SE7	SE7	ESE11	WSW4	WSW14	SW11	WSW19	WSW14	WSW17	W17	W23	W21	W19	W17	NW10	NW12	WNW11	WSW7.1	W23
19-Jul	WNW12	WNW14	WNW13	NW9	WNW16	WNW13	WNW14	WNW13	WNW16	WNW19	WNW16	WNW18	WNW17	WNW16	WNW17	WNW16	N8	NNW7	N13	NNW6	NW5	NNE3	W2	W5	WNW11.2	WNW19
20-Jul	NNW1	NNE2	E2	E2	ESE4	SE4	SE6	SE5	ESE5	E4	ESE6	E6	ESE10	ESE6	SE7	SE7	SE8	SE7	SE7	ESE6	SE2	E4	ESE13	ESE15	ESE5.4	ESE15
21-Jul	ESE14	ESE15	ESE12	SE7	SE5	E6	NE3	N5	NNE5	NE4	E11	SE4	SSE4	NNE4	N9	N9	NNW10	NNW9	N7	NE6	WNW4	W1	E2	NW2	ENE3.1	ESE15
22-Jul	SE1	SSE2	W3	N1	S2	SE1	WSW2	W9	W6	NE2	WSW5	W6	NNW8	NW2	WNW5	WNW11	WNW10	WNW12	W14	WNW14	W14	W16	W14	WNW6	W6.0	W16
23-Jul	WNW8	NW5	WNW5	W7	NW5	NW5	WNW5	NW8	NW8	NW8	NW7	NNW6	NNE6	NNE6	W5	WSW5	SE6	E3	ENE3	NNE2	NNW1	NE2	NE2	ESE3	NW3.2	NW8
24-Jul	E3	E2	SE2	ENE1	ESE2	ESE6	ESE9	ESE8	SE6	SE8	SE9	ESE10	ESE9	ESE6	SE7	SE7	WSW10	W11	WSW5	E2	ESE4	SE5	SE6	SE7	SE4.2	W11
25-Jul	SW5	SW6	SW10	WSW16	WNW4	E2	SE4	ESE4	SSW7	SW10	W11	W14	WSW14	W14	W16	NNW15	N6	NNE2	N5	N2	NNE1	WNW3	NW4	NW5	W4.9	W16
26-Jul	NNW5	NW6	NNE3	NW5	N4	NNE3	NE2	N3	N1	NNW3	ENE2	W6	WSW10	WNW15	NW8	NW4	WNW11	E4	ESE5	SE4	SE8	SE9	SE8	SE5	NW1.0	WNW15
27-Jul	SE5	SE6	SE5	SE5	SE5	SE6	S5	SSE5	SE7	SW5	W13	WSW15	WSW17	NW10	NNW11	NNW5	N2	NNW5	NNW5	SSE4	NNE2	ENE2	ENE3	N2	WSW1.4	WSW17
28-Jul	NW4	NNE1	SE5	SE3	NNE1	NNE3	NE4	NNE3	WNW5	NW6	N6	NW6	NW5	N4	N7	SE2	E1	N9	ESE4	E3	NW2	WNW3	N10	NNE5	N2.6	N10
29-Jul	SW6	WNW4	NNE2	ENE2	E2	NE1	WSW7	WSW12	W8	W9	W10	W9	W12	W19	W14	W16	WNW11	N11	WNW18	NW11	ENE4	S1	ENE1	NNW3	W6.3	W19
30-Jul	NW7	NW4	WSW6	WSW10	WSW17	WSW17	WSW15	WSW12	W12	W10	WNW8	WNW11	WNW20	WNW19	NW12	NNE12	NE12	ENE9	NE14	ENE7	NNE2	NE1	NE2	NE2	WNW5.5	WNW20
31-Jul	ENE1	N0	WNW3	NW0	E3	SE7	ESE10	ESE9	SE6	SSE5	SE5	SE5	E5	WSW10	S6	ESE3	WSW10	W4	NNW4	NNW5	NNW3	NNE0	SSE1	WSW5	SSE1.5	ESE10

WNW1.1	N0.5	W0.7	WSW1.6	SW1.5	S1.0	SSE1.0	SW1.1	WSW1.5	W2.5	WNW2.9	WNW4.5	W5.1	WNW6.2	WNW5.5	WNW4.6	WNW3.9	NW4.6	NW4.7	NW3.4	WNW2.9	WNW1.1	N1.2	NNW1.3		Diurnal Average
ESE14	ESE15	WNW13	W17	WSW17	W18	WSW15	N16	WSW20	WSW28	W27	WNW25	WNW21	WNW24	NW25	WNW23	WNW23	N23	W21	NW22	W17	WSW19	N19	ESE15		Diurnal Maximum

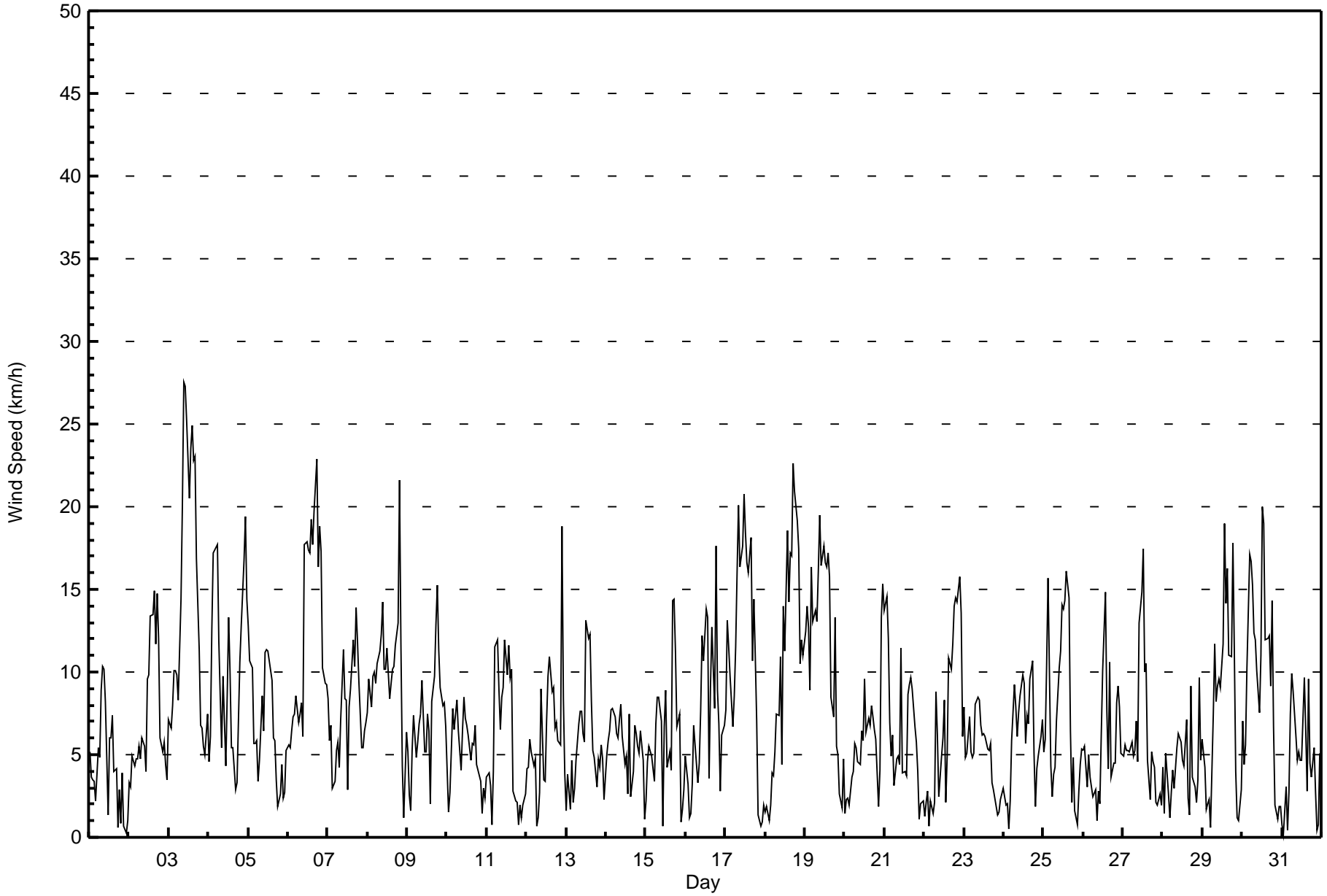
All monthly, daily, and diurnal averages have been calculated using vector methods



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

**Wind Speed (WS) - km/h**  
**Lower Camp - July 2015**

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







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

**Wind Speed (WS) - km/h**  
**Lower Camp - July 2015**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	308	41.40	41.40
6 - 11	296	39.78	81.18
12 - 19	123	16.53	97.72
20 - 28	17	2.28	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Lower Camp - July 2015**

<b>Wind Speed Ranges (km/h)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	17	28	16	15	29	23	40	16	8	5	9	14	14	26	23	25	308
6 - 11	23	7	2	3	6	25	60	16	3	4	9	28	17	21	40	32	296
12 - 19	12	2	2	0	0	5	5	0	0	0	4	24	31	24	4	10	123
20 - 28	3	0	0	0	0	0	0	0	0	0	0	2	3	6	2	1	17
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	55	37	20	18	35	53	105	32	11	9	22	68	65	77	69	68	744

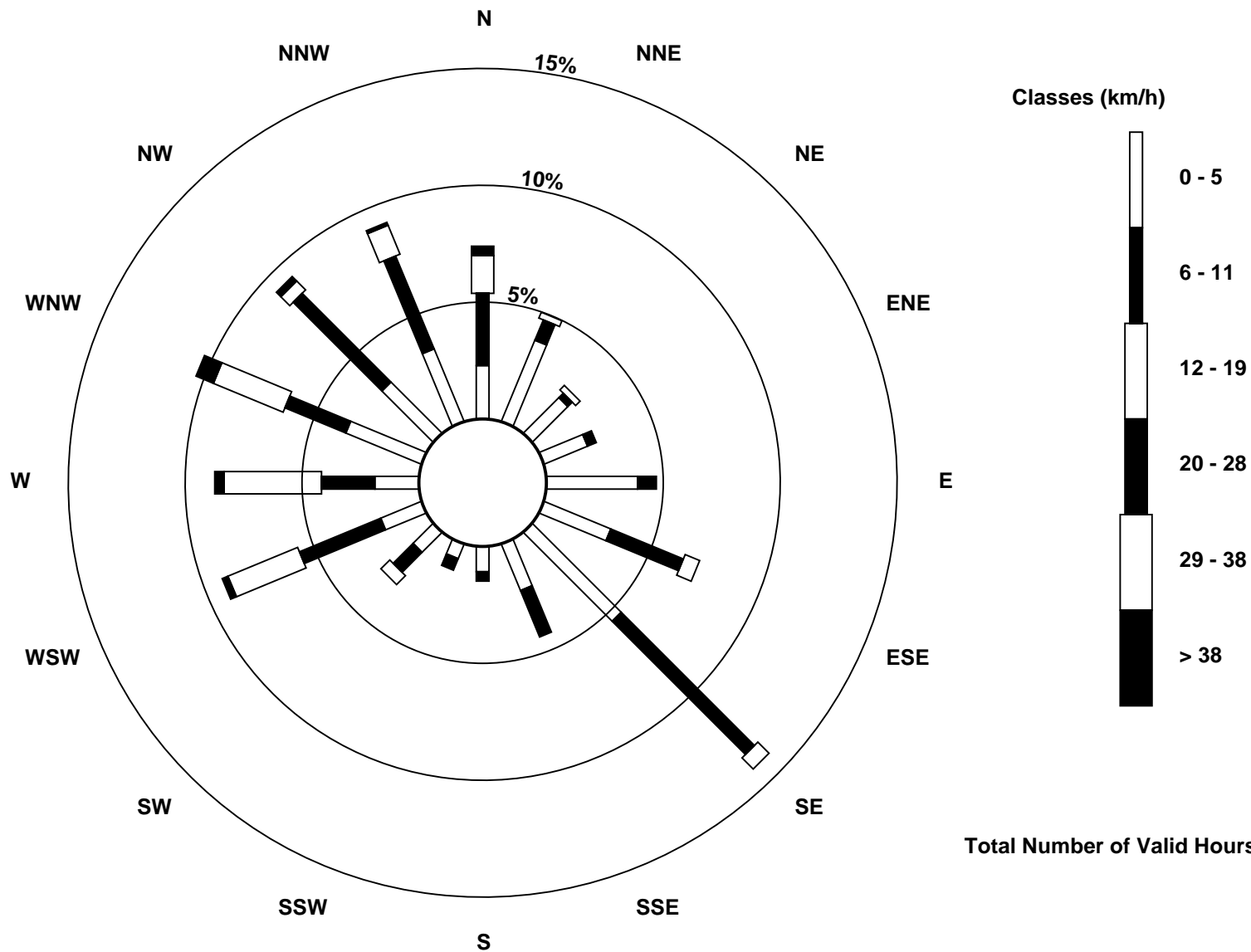
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Wind Speed (WS) - km/h  
Lower Camp (AMS 11)





**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Wind Direction (WD) - deg**

**Lower Camp - July 2015**

Direction of Maximum Speed: 257 deg on Jul 3 10:00		Hours in Service:	744
Direction of Maximum Daily Speed Average: 300.5 deg on Jul 19		Hours of Data:	744
Direction of Minimum Speed: 349 deg on Jul 31 02:00		Hours of Missing Data:	0
Direction of Minimum Daily Speed Average: 1.0 deg on Jul 26		Percent Operational Time:	100.0
Monthly Average Direction: 295.6 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-Jul	241	173	296	239	220	235	251	244	249	247	290	44	228	287	303	315	16	78	340	98	270	7	90	87	263.3
2-Jul	124	131	139	145	140	139	134	145	134	135	102	247	258	262	265	266	250	234	220	202	172	164	159	100	209.5
3-Jul	162	83	99	103	136	135	133	245	258	257	259	288	293	301	308	299	295	295	315	300	297	315	328	324	283.3
4-Jul	0	338	262	259	257	262	278	268	269	230	205	243	251	280	323	15	26	273	307	312	312	353	4	351	292.3
5-Jul	350	338	332	321	290	323	331	20	256	305	337	341	351	329	326	324	347	337	24	132	133	79	58	143	335.3
6-Jul	86	136	144	144	136	130	134	135	134	211	257	263	251	260	255	297	345	356	352	331	329	307	318	324	295.4
7-Jul	306	334	335	306	342	5	28	21	257	251	274	240	230	251	256	263	256	272	261	240	201	179	169	156	263.6
8-Jul	135	121	130	143	138	139	136	138	131	129	145	153	154	165	153	157	147	249	279	307	281	340	195	275	159.0
9-Jul	321	324	334	322	289	341	294	319	8	25	17	312	321	17	54	343	7	4	5	2	350	330	338	327	346.3
10-Jul	322	302	303	342	332	4	17	69	31	336	348	357	356	329	291	353	340	302	331	337	295	16	353	302	343.7
11-Jul	280	294	292	179	107	121	129	144	105	132	144	134	153	130	125	106	130	296	241	293	324	61	1	287	131.9
12-Jul	271	281	305	271	279	300	82	129	76	322	112	327	345	359	357	351	51	336	323	316	302	236	241	348	316.4
13-Jul	218	134	239	243	200	150	103	116	129	125	116	133	264	271	259	255	255	240	142	155	164	141	121	167	190.9
14-Jul	149	141	155	143	147	150	139	145	133	126	102	341	268	288	341	108	112	119	136	157	145	143	115	117	136.4
15-Jul	219	157	151	156	158	229	254	245	259	268	100	253	187	96	64	231	230	239	235	232	251	334	49	116	224.4
16-Jul	138	117	101	132	102	110	116	83	3	346	317	334	16	7	69	170	221	204	286	322	319	141	284	282	325.1
17-Jul	324	332	335	318	307	323	346	355	357	349	345	7	345	355	336	339	321	355	0	15	318	31	45	79	345.4
18-Jul	38	87	87	137	206	179	154	141	135	123	240	238	222	245	250	242	260	267	274	270	281	316	321	296	254.7
19-Jul	289	294	301	306	288	294	296	289	289	289	300	298	293	296	294	286	350	345	5	341	323	17	271	276	300.5
20-Jul	327	28	94	100	122	133	131	137	107	87	110	91	103	117	135	136	127	132	126	121	145	98	109	103	114.6
21-Jul	118	116	123	144	124	98	48	10	30	48	98	128	161	16	357	354	347	340	358	45	299	275	98	319	65.5
22-Jul	133	163	271	358	171	130	241	263	264	39	258	273	329	313	299	295	299	296	275	283	264	261	261	299	278.1
23-Jul	285	322	286	271	313	304	284	320	323	324	323	348	14	14	281	248	134	94	57	24	338	46	47	103	321.2
24-Jul	93	89	135	63	120	106	122	121	136	133	124	113	114	109	129	142	243	260	258	91	118	130	137	137	133.3
25-Jul	226	228	231	257	289	83	125	115	198	222	262	267	257	264	268	338	1	28	358	359	16	289	314	315	267.5
26-Jul	334	325	28	321	4	28	41	8	356	335	70	279	239	287	317	325	297	89	115	132	141	140	140	137	313.4
27-Jul	146	142	135	135	139	144	176	154	134	234	264	253	250	323	334	330	357	334	340	151	30	64	60	352	237.6
28-Jul	326	28	131	125	32	24	44	14	303	315	4	305	309	351	11	130	88	0	105	86	304	295	354	31	359.5
29-Jul	235	285	18	73	96	46	257	251	272	271	271	264	259	260	260	265	283	358	286	309	65	169	77	342	275.2
30-Jul	312	320	254	258	244	243	254	258	262	264	285	299	302	302	322	22	46	68	40	58	25	40	55	47	296.8
31-Jul	70	349	300	304	98	133	122	123	137	147	138	126	79	246	187	112	244	277	330	332	335	26	167	246	163.5
292.1 357.8 261.7 244.8 223.3 169.7 159.7 214.1 250.3 266.1 284.3 283.3 277.8 293.3 295.1 298.3 299.1 305.4 310.6 311.0 292.9 288.1 351.4 331.7																									
Diurnal Average																									

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



**Wood Buffalo Environmental Association**

**Summary of Hour Standard Deviations**

**Wind Direction (WD) - deg**

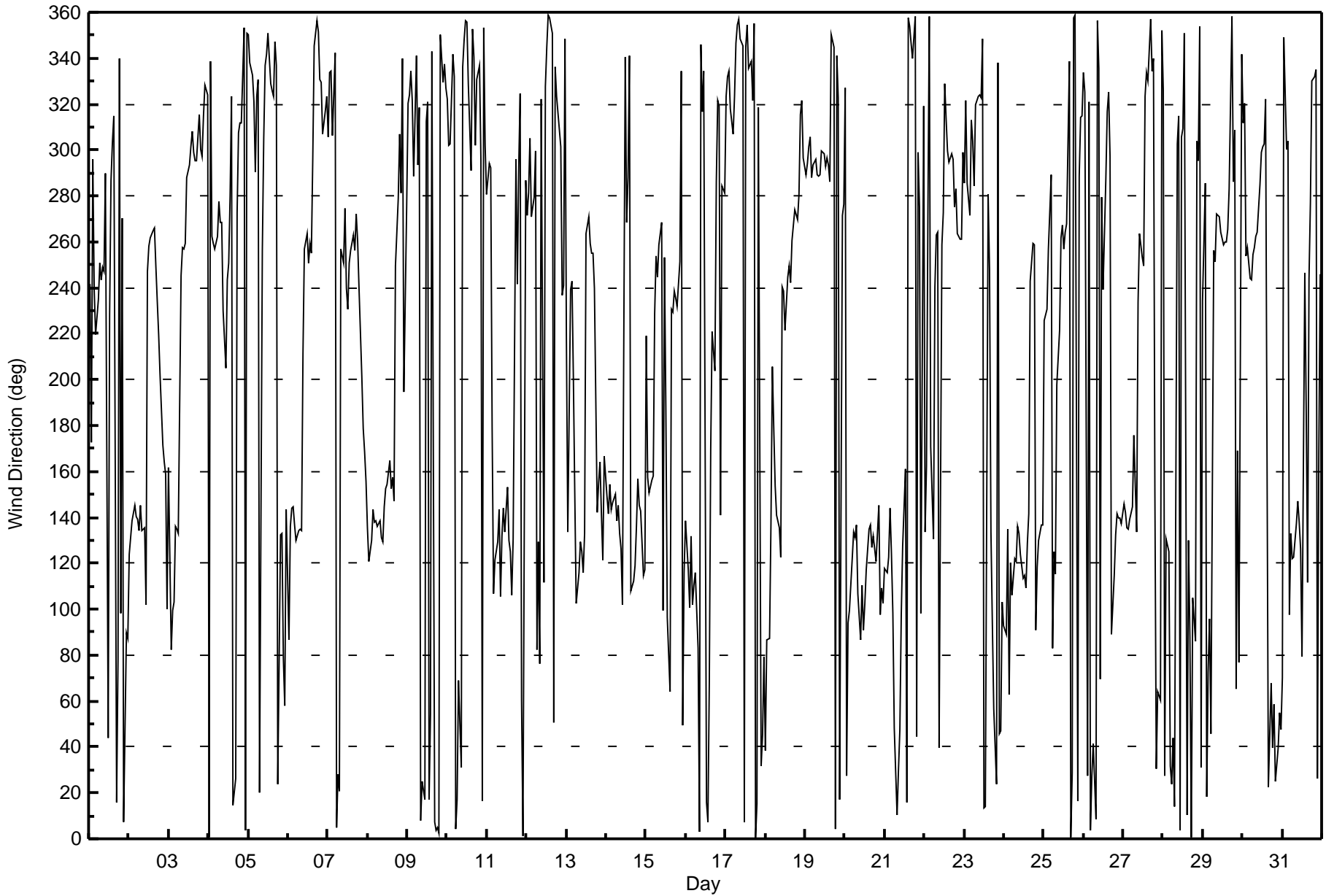
**Lower Camp - July 2015**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0																			Hours in Service: 744						
Maximum Value: 104 deg on Jul 15 11:00																			Hours of Data: 744						
Minimum Value: 9 deg on Jul 25 19:00																			Hours of Missing Data: 0						
Percentiles: P <sub>1</sub> = 11 P <sub>10</sub> = 16 Q <sub>1</sub> = 21 Median = 32 Q <sub>3</sub> = 51 P <sub>90</sub> = 74 P <sub>99</sub> = 95																			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-Jul	26	32	50	78	91	23	49	17	14	17	41	77	45	45	40	64	37	84	66	86	22	61	97	82	97
2-Jul	27	62	19	30	37	54	49	45	30	30	41	31	27	18	16	18	25	17	24	27	25	28	64	71	71
3-Jul	42	65	21	24	28	27	37	47	14	13	13	18	19	17	15	14	12	12	15	14	12	26	26	35	65
4-Jul	36	26	25	12	12	13	24	36	44	21	35	59	13	27	23	37	70	31	16	14	14	25	18	25	70
5-Jul	21	22	17	23	20	15	63	38	23	48	29	26	31	37	32	64	52	51	58	33	21	44	34	25	64
6-Jul	38	33	24	25	34	40	52	42	36	65	16	17	20	17	15	40	23	23	22	19	17	19	16	15	65
7-Jul	17	14	10	40	32	36	22	36	54	16	26	21	86	29	24	18	25	16	16	15	30	29	31	25	86
8-Jul	33	35	38	26	31	37	33	35	30	28	38	29	28	29	32	30	28	33	21	16	36	71	77	34	77
9-Jul	61	72	70	34	19	46	21	20	33	22	43	40	15	39	80	23	19	18	19	22	21	19	20	19	80
10-Jul	33	50	53	22	19	29	27	36	51	35	30	39	36	46	65	35	32	18	23	19	32	85	38	50	85
11-Jul	41	45	62	91	72	31	38	34	43	38	33	34	36	30	32	17	81	84	87	91	79	94	44	36	94
12-Jul	23	31	36	30	34	51	100	95	71	26	67	73	28	13	15	22	21	21	18	18	30	20	68	40	100
13-Jul	95	34	80	28	65	43	28	22	26	24	28	50	14	15	16	23	39	59	45	24	23	31	80	80	95
14-Jul	35	44	37	31	33	37	40	41	29	34	49	74	88	88	70	27	23	31	39	37	32	62	88	88	88
15-Jul	83	29	25	29	32	78	37	20	19	43	104	46	47	51	50	74	19	15	16	15	25	86	51	54	104
16-Jul	26	43	81	85	47	28	26	41	32	27	16	23	22	21	91	73	45	54	35	19	20	83	45	41	91
17-Jul	28	15	15	13	18	19	20	19	19	21	20	22	22	22	19	23	29	20	21	26	68	47	72	46	72
18-Jul	79	52	76	56	38	37	39	40	41	24	95	14	25	13	14	12	13	12	11	12	11	21	15	17	95
19-Jul	18	16	17	30	11	13	14	15	14	13	15	18	15	16	17	32	32	22	30	35	18	71	62	17	71
20-Jul	70	35	45	74	27	40	39	35	55	43	33	36	15	45	52	40	26	30	26	42	73	68	17	11	74
21-Jul	24	16	32	31	36	30	71	54	42	52	24	74	49	46	20	23	24	20	28	24	43	83	52	63	83
22-Jul	74	71	41	90	68	88	76	15	24	71	61	48	29	99	76	25	25	18	14	14	17	12	12	33	99
23-Jul	16	52	26	28	27	29	29	23	16	19	27	32	20	22	48	55	35	63	68	64	42	62	43	38	68
24-Jul	38	41	57	95	83	47	18	21	30	28	19	27	26	38	37	41	60	17	66	37	16	21	27	27	95
25-Jul	60	31	20	16	57	67	56	39	37	26	25	17	20	19	21	23	21	54	9	76	85	61	55	21	85
26-Jul	35	26	44	31	65	59	66	68	89	76	79	58	29	29	48	78	74	72	33	23	32	26	35	32	89
27-Jul	31	27	39	25	30	40	41	52	39	69	16	18	17	50	26	34	63	36	80	29	65	58	38	70	80
28-Jul	43	71	35	83	84	64	29	50	35	21	26	48	64	64	56	95	78	36	60	70	82	75	70	86	95
29-Jul	36	53	79	67	54	90	35	16	21	19	19	23	18	13	15	14	25	23	47	28	70	74	87	68	90
30-Jul	28	40	46	16	9	10	18	16	16	22	25	31	18	19	35	28	15	22	16	33	74	82	32	56	82
31-Jul	95	92	55	84	41	34	22	19	26	31	28	25	36	54	59	64	21	61	61	26	53	92	73	50	95
95 92 81 95 91 90 100 95 89 76 104 77 86 99 91 95 81 84 87 91 85 94 97 88																									
Diurnal Maximum																									



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

**Wind Direction (WD) - deg**  
**Lower Camp - July 2015**





# Wood Buffalo Environmental Association

## SO2 Calibration Report

### Station Information

Calibration Date	July 14, 2015	Last Calibration	June 15, 2015
Station Name	Lower Camp	Station Number	AMS 11
Reason:	Routine		
Start Time (MST)	12:15	End Time (MST)	15:35
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	803	798
Calculated slope	1.001408	0.995354	Chamber temp	45.2	45.2
Calculated intercept	1.304533	0.908864	Pressure	716.9	706.9
Analyzer Background	11.1	11.1	Flow	0.500	0.486
Analyzer Coefficient	1.013	1.013	Intensity	90	90
Analyzer make	TEI 43i		Analyzer serial #	100841398	

### Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.3	----
as found span	5000	80.9	830.0	833.4	0.996
calibrator zero	5000	0.0	0.0	-0.2	----
high point	5000	80.9	830.0	833.4	0.996
second point	5000	40.9	419.6	420.2	0.999
third point	5000	20.4	209.3	208.8	1.002
as left zero	5000	0.0	0.0	0.0	----
as left span	5000	80.9	830.0	836.5	0.992
Average Correction Factor					0.999

Corrected As found	833.7	Previous response	827.6	% change	-0.7%
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**Notes:**

Inlet filter changed after as founds. No adjustments.

Calibration Performed By:

Asad Hidayat



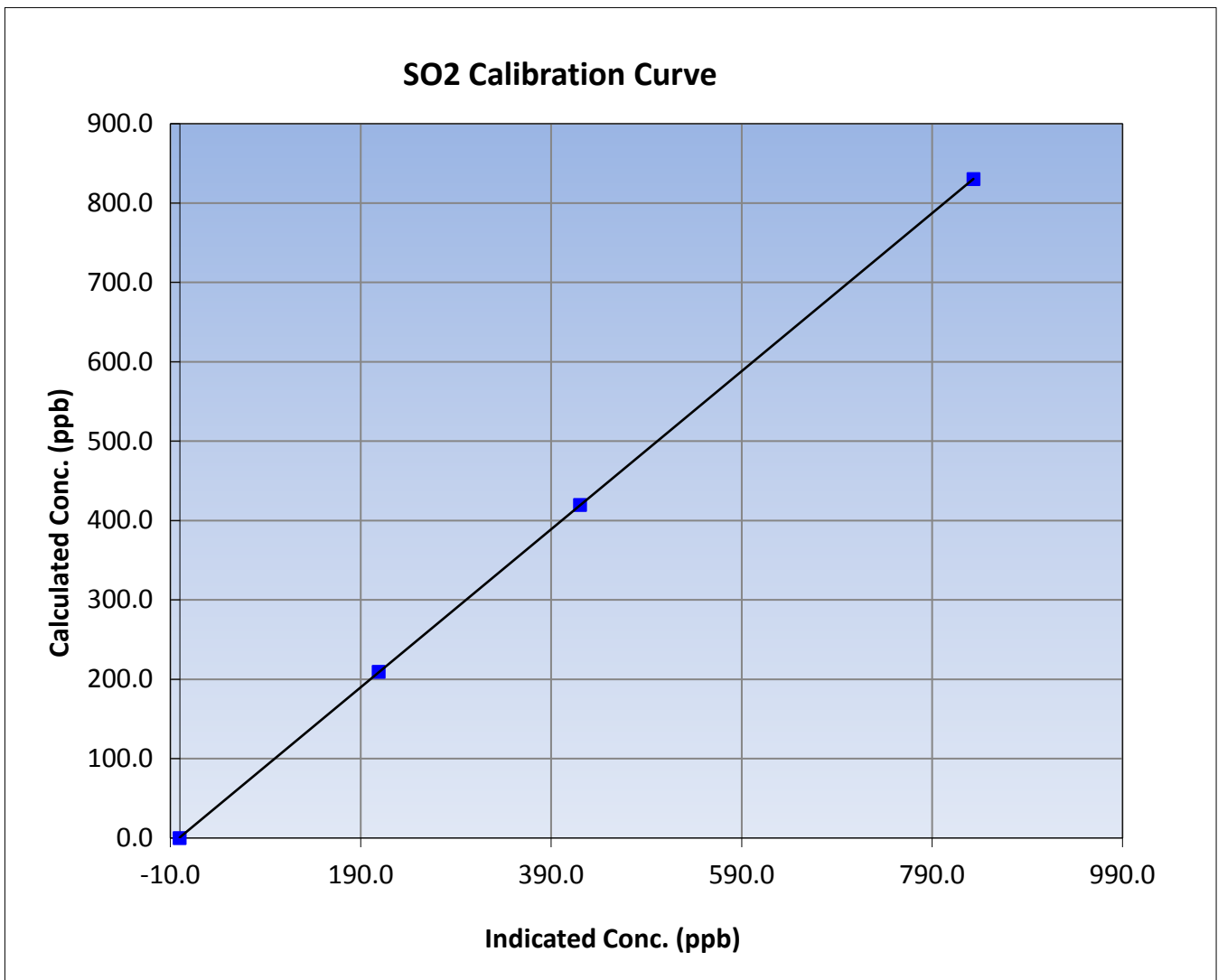
# Wood Buffalo Environmental Association SO2 Calibration Report

## Station Information

Calibration Date	July 14, 2015	Previous Calibration	June 15, 2015
Station Name	Lower Camp	Station Number	AMS 11
Start Time (MST)	12:15	End Time (MST)	15:35
Analyzer make	TEI 43i	Analyzer serial #	100841398

## Calibration Data

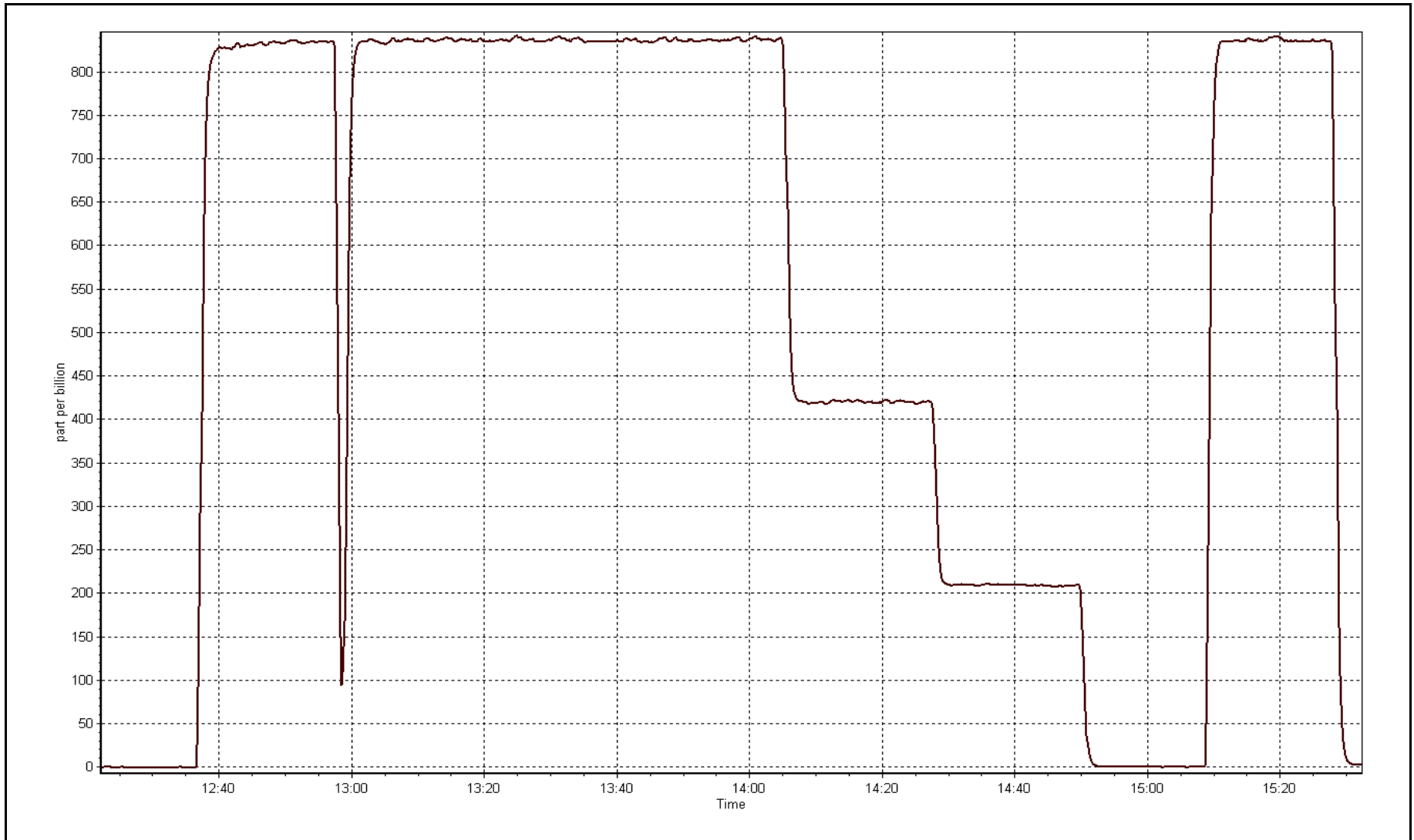
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	----	Correlation Coefficient	0.999997
830.0	833.4	0.9960		
419.6	420.2	0.9988	Slope	0.995354
209.3	208.8	1.0023		
			Intercept	0.908864





SO2 Calibration Plot

Date: July 14, 2015





# Wood Buffalo Environmental Association H2S Calibration Report

### Station Information

Calibration Date	July 14, 2015	Last Calibration	June 17, 2015
Station Name	Lower Camp	Station Number	AMS 11
Reason:	Routine		
Start Time (MST)	9:25	End Time (MST)	12:15
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	881	883
Calculated slope	0.996789	1.002147	Chamber temp	45	45
Calculated intercept	-0.300357	-0.300399	Pressure	574.0	572.5
Analyzer Background	20.6	20.8	Flow	1.114	1.115
Analyzer Coefficient	1.249	1.249	Intensity	61	60
			Converter temp.	338	341

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	0.0	----
as found span	5000	72.8	75.0	73.0	1.027
SO2 scrubber check	5000	20.5	210.7	1.4	----
calibrator zero	5000	0.0	0.0	0.2	----
high point	5000	72.8	75.0	75.0	1.000
second point	5000	38.8	40.0	40.4	0.988
third point	5000	19.4	20.0	20.2	0.989
as left zero	5000	0.0	0.0	0.1	----
as left span	5000	72.8	75.0	76.5	0.980
Average Correction Factor					0.992

Corrected As found	73.0	Previous response	75.5	% change	3.5%
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**Notes:**

Scrubber check and inlet filter replaced after as founds. No adjustments. As found point a bit low due to filthy inlet filter.

Calibration Performed By: Asad Hidayat



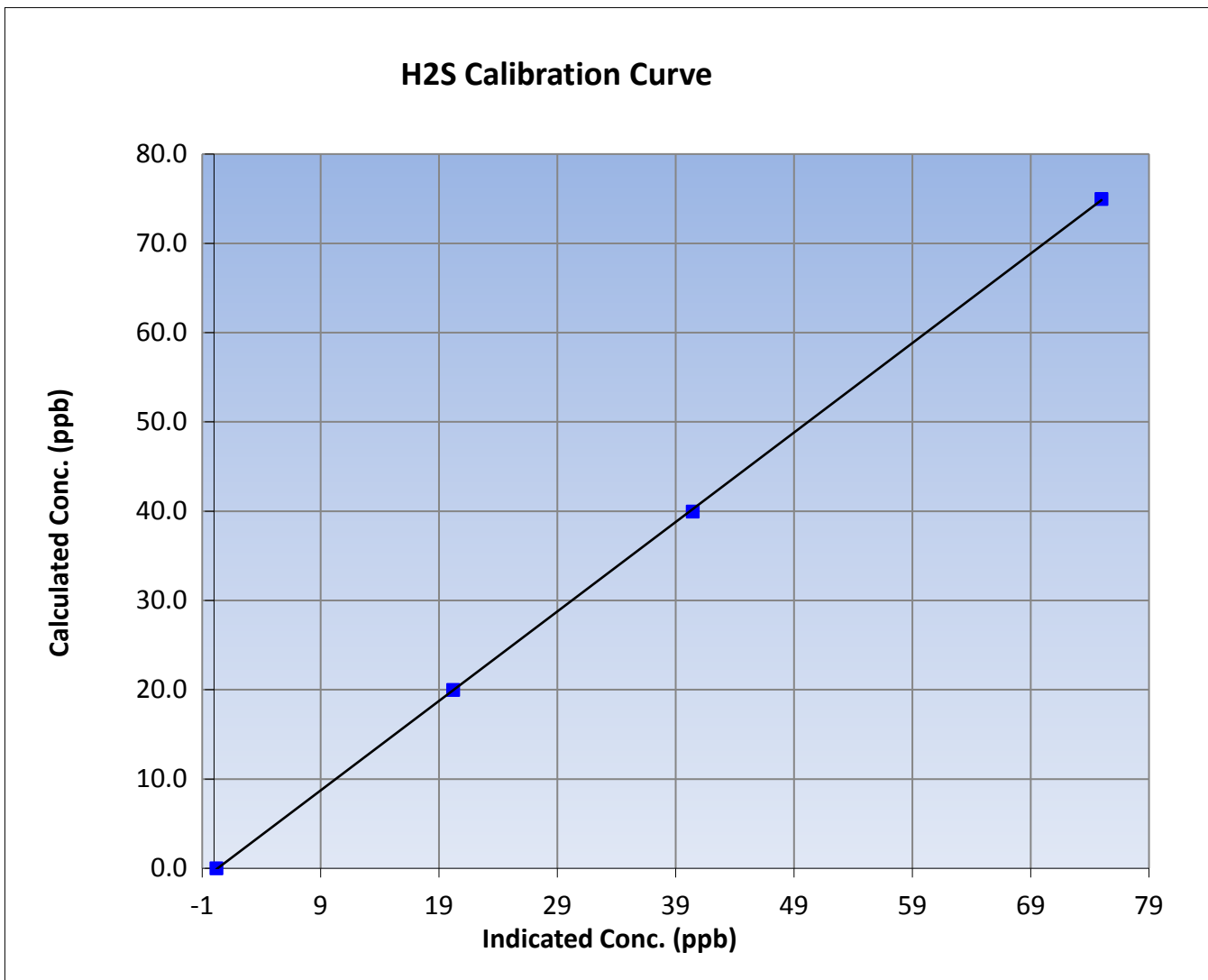
# Wood Buffalo Environmental Association H2S Calibration Report

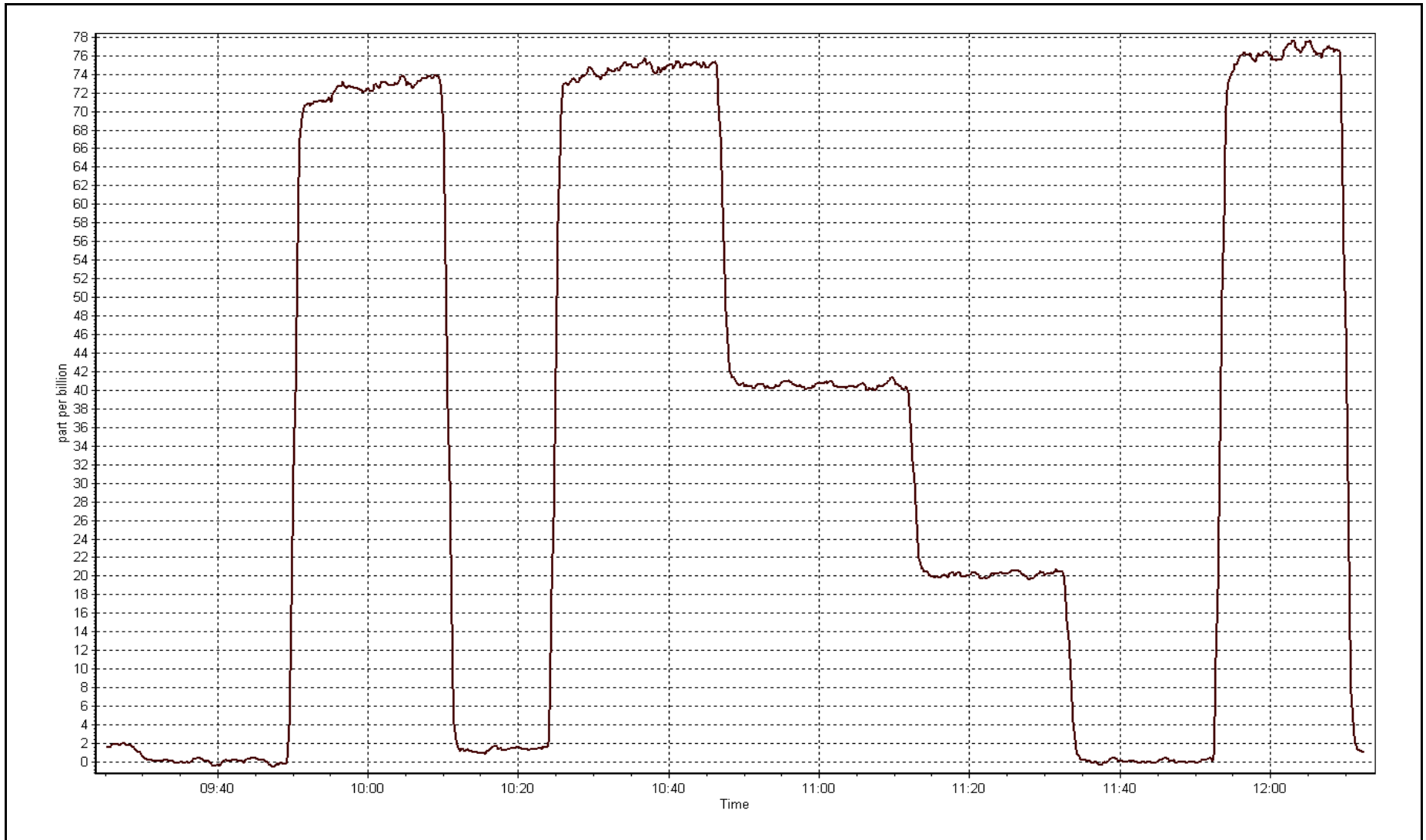
## Station Information

Calibration Date	July 14, 2015	Previous Calibration	June 17, 2015
Station Name	Lower Camp	Station Number	AMS 11
Start Time (MST)	9:25	End Time (MST)	12:15
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	0.999968
75.0	75.0	0.9999		
40.0	40.4	0.9882	Slope	1.002147
20.0	20.2	0.9887		
			Intercept	-0.300399







# Wood Buffalo Environmental Association THC Calibration Report

## Station Information

Calibration Date	July-14-15	Last Calibration	June-15-15
Station Name	Lower Camp	Station Number	AMS 11
Reason:	Routine		
Start Time (MST)	12:15	End Time (MST)	15:35
Gas Cert Reference	LL110099	Cal Gas Expiry Date	25/03/2016
CH4 Cal Gas Conc.	515 ppm	CH4 Equiv Conc.	1070.5 ppm
C3H8 Cal Gas Conc.	202 ppm	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11051107
ZAG make/model	Teledyne API 701	Serial Number	3411
DACS make/model	Campbell Scientific CR3000	Serial Number	3492

## Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 50 ppm		Sample Pressure	8.5	8.5
Analyzer IP address	192.168.1.51		Air or Bypass Press	37.3	37.4
Calculated slope	0.995475	0.996252	Fuel Pressure	24.0	24.0
Calculated intercept	0.038181	0.022304	Analyzer Coeff	4.1	4.2
			Analyzer BKG	6.220	6.290

Analyzer make	51i-LT	Analyzer serial #	1410661326
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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	-0.03	----
as found span	5000	80.9	17.32	17.20	1.007
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	4.39	0.995
as left zero	5000	0.0	0.00	-0.05	----
as left span	5000	80.9	17.32	17.48	0.991
Average Correction Factor					0.998

Corrected As found	17.23	Previous response	17.36	% change	0.8%
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**Notes:**

Inlet filter replaced after as founds. Cut off pressure on zero air adjusted due to a bit fluctuation during high point. Adjusted span.

Calibration Performed By:

Asad Hidayat



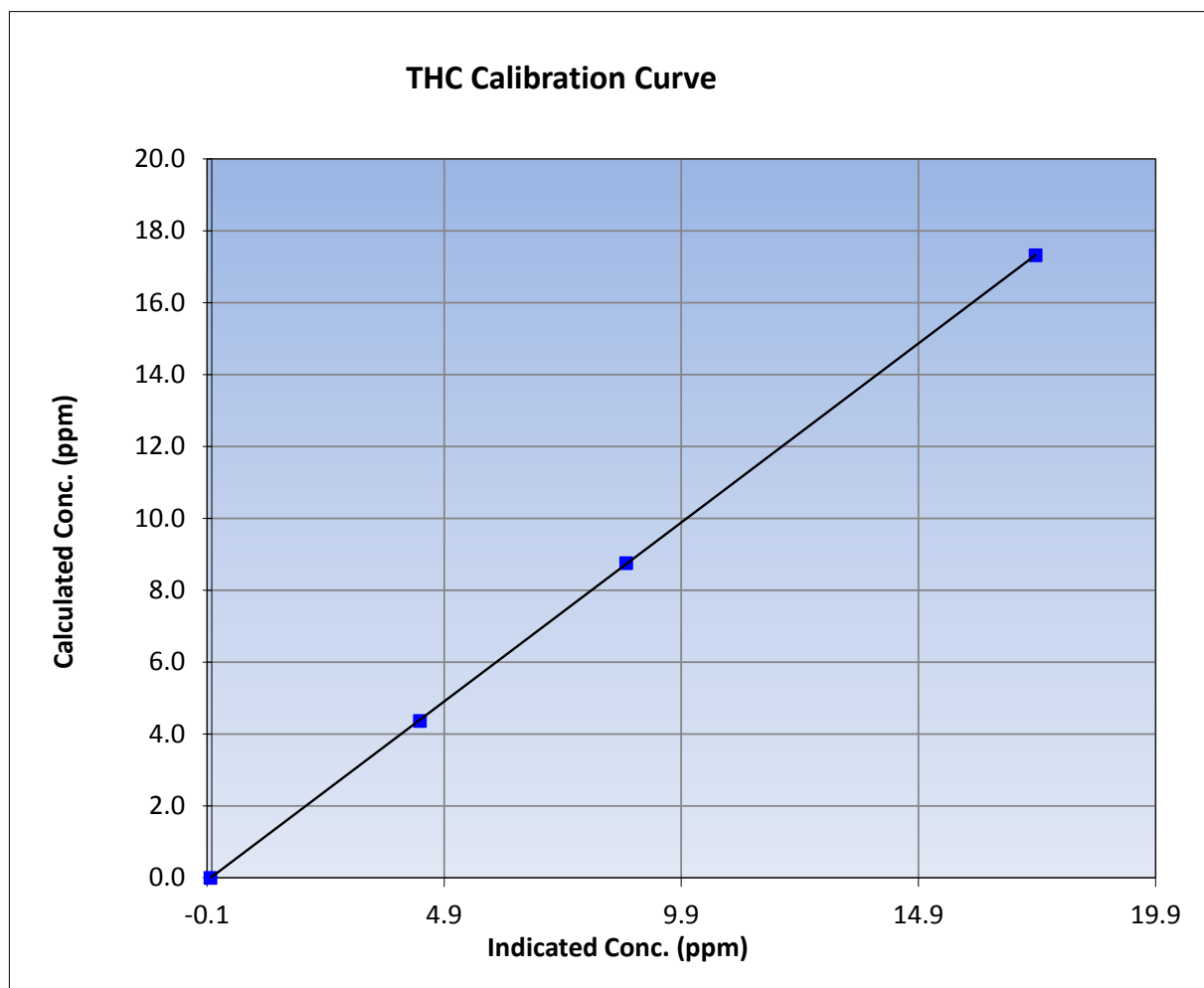
## Wood Buffalo Environmental Association THC Calibration Report

### Station Information

Calibration Date	July 14, 2015	Previous Calibration	June 15, 2015
Station Name	Lower Camp	Station Number	AMS 11
Start Time (MST)	12:15	End Time (MST)	15:35
Analyzer make	51i-LT	Analyzer serial #	1410661326

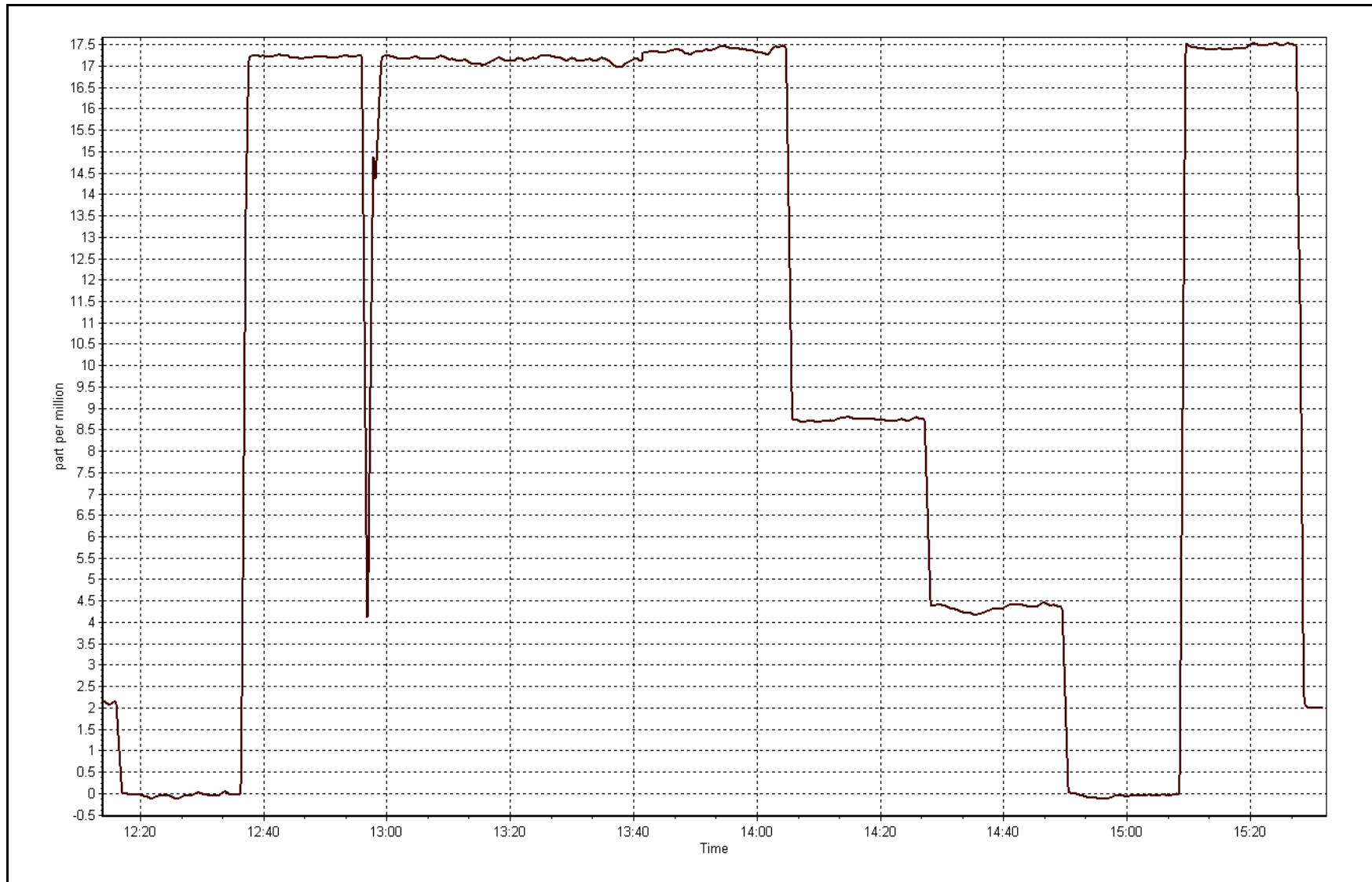
### Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	-0.03	----	Correlation Coefficient	0.999990
17.32	17.37	0.9972		
8.76	8.74	1.0019	Slope	0.996252
4.37	4.39	0.9949		
			Intercept	0.022304



THC Calibration Plot

Date: July 14, 2015





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## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS 12  
MILLENNIUM MINE  
JULY 2015**

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

August 26, 2015



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MILLENNIUM MINE (AMS 12)  
 JULY 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	691	38	53	97.98	26	0	4	0
TRS(ppb) Average	694	35	50	97.98	8	0	1	0
THC(ppm) Average	692	37	52	97.98	4.5	-	2.8	-
NO2(ppb) Average	654	36	90	92.74	28	0	13	-
NO(ppb) Average	654	36	90	92.74	64	-	9	-
NOX(ppb) Average	654	36	90	92.74	92	-	17	-
PM2.5(ug/m3) Average	723	0	21	97.18	446.9	-	161.9	7
Temperature 2 m (C) Average	744	0	0	100.00	31	-	23.3	-
Relative Humidity (%) Average	744	0	0	100.00	99	-	84	-
Wind Speed 10 m (km/h) Average	743	0	1	99.87	31	-	15	-
Wind Direction 10 m (deg) Average	743	0	1	99.87	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MILLENNIUM MINE (AMS 12)  
 JULY 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	691	1.2	3	-	0	0	0	0	1	3	26
TRS(ppb) Average	694	0.6	1	-	0	0	0	0	1	1	8
THC(ppm) Average	692	2.46	0.4	-	2	2.1	2.2	2.3	2.6	3	4.5
NO2(ppb) Average	654	7.3	6	-	0	1	3	6	10	15	28
NO(ppb) Average	654	3.4	6	-	0	0	0	1	3	10	64
NOX(ppb) Average	654	10.7	10	-	0	2	3	7	15	25	92
PM2.5(ug/m3) Average	723	27.49	59.1	-	0.1	2.8	3.9	7.2	14.9	76.6	446.9
Temperature 2 m (C) Average	744	18.17	4.4	-	6.6	12.5	14.7	17.9	21.8	23.9	31
Relative Humidity (%) Average	744	68.8	18	-	25	42	55	71	84	91	99
Wind Speed 10 m (km/h) Average	743	7.1	4	-	0	3	5	6	9	12	31
Wind Direction 10 m (deg) Average	743	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION -MILLENNIUM MINE (AMS 12)  
JULY 2015

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2, TRS, THC	13 Jul 2015 12:00	13 Jul 2015 12:00	1	Maintenance - manifold cleaning
AIR QUALITY ANALYZERS	17 Jul 2015 08:00	17 Jul 2015 21:00	14	Station power failure
NO2, NO, NOX	13 Jul 2015 12:00	14 Jul 2015 10:00	23	Replacement of analyzer and stabilization time
NO2, NO, NOX	15 Jul 2015 10:00	15 Jul 2015 14:00	5	Maintenance - adjusting drift in new analyzer
NO2, NO, NOX	20 Jul 2015 12:00	20 Jul 2015 16:00	5	Maintenance - adjusting drift in new analyzer



Summary of Hour Averages

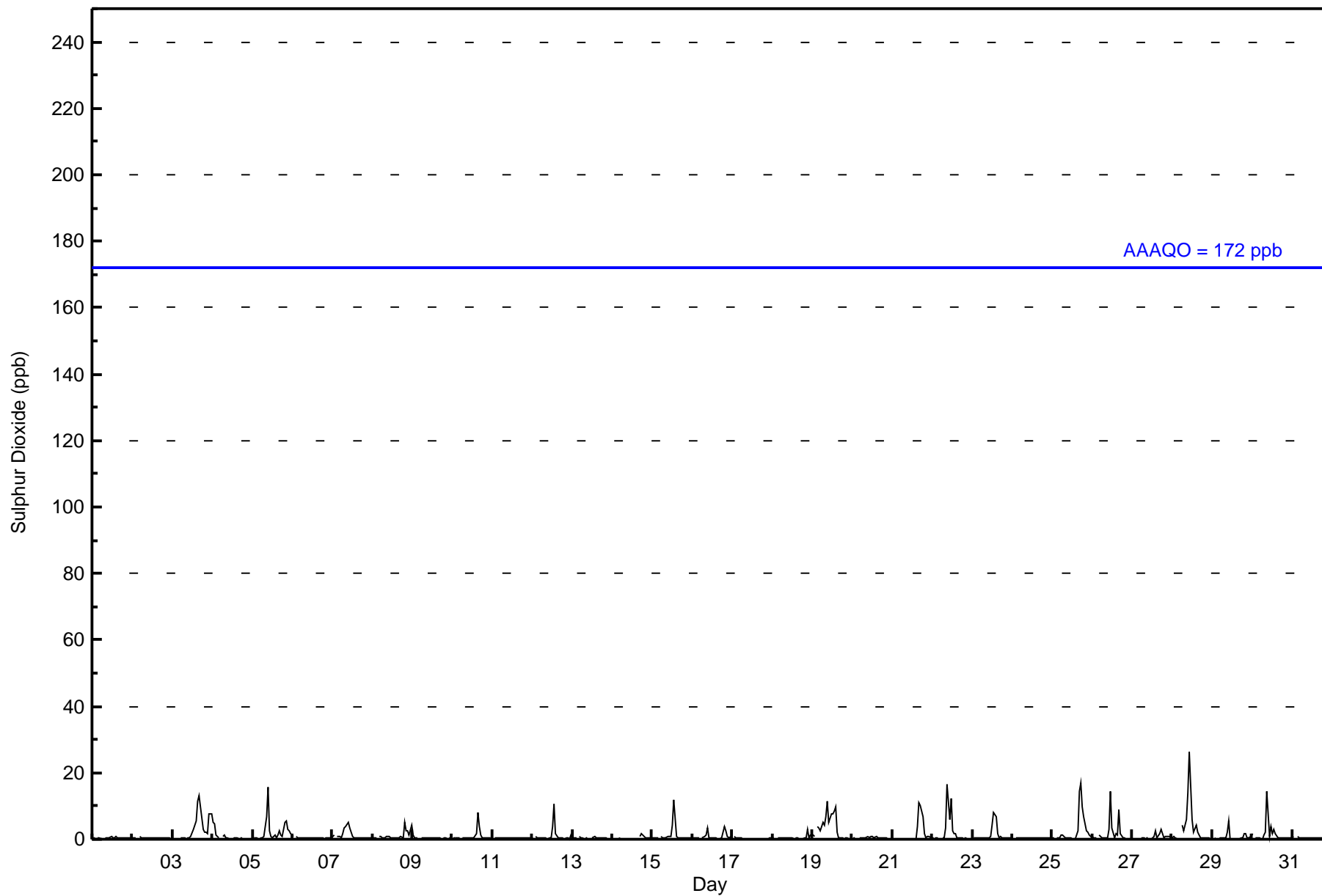
Millennium - July 2015

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 26 ppb on Jul 28 11:00	Maximum Daily Average: 3.9 ppb on Jul 28		Hours of Data:	691
Minimum Value: 0 ppb on Jul 14 07:00	Minimum Daily Average: 0.3 ppb on Jul 24		Hours of Missing Data:	53
Maximum Diurnal Average: 3.1 ppb at hour 10	Minimum Diurnal Average: 0.4 ppb at hour 3		Hours of Calibration:	38
Monthly Average: 1.2 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 O <sub>3</sub> = 1 P <sub>90</sub> = 3 P <sub>99</sub> = 14		Percent Operational Time:	98.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	1	0	Z	0	0	0	0	0	0	0	1	1	1	0	1	1	1	0	0	1	0	1	0	0	0.4	1
2-Jul	0	0	0	Z	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
3-Jul	0	0	0	0	Z	0	0	0	0	0	0	1	3	4	5	11	13	10	3	2	2	2	8	8	3.2	13
4-Jul	5	5	1	1	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	5
5-Jul	Z	0	0	0	0	0	0	1	7	16	3	1	0	1	1	1	3	1	1	5	6	3	2	2	2.3	16
6-Jul	1	Z	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.4	1
7-Jul	1	1	Z	1	1	1	2	3	4	5	3	2	1	1	0	0	0	0	0	0	0	1	1	1	1.3	5
8-Jul	0	0	0	Z	1	1	0	1	1	1	1	1	0	1	0	0	1	1	0	5	3	3	1	4	1.1	5
9-Jul	1	1	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
10-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	2	8	4	1	1	0	0	0	0	0	0.9	8
11-Jul	Z	1	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.4	1
12-Jul	1	Z	1	1	0	0	0	0	0	0	0	0	4	10	2	1	0	0	0	0	0	0	0	1	1.0	10
13-Jul	1	0	0	Z	1	0	0	0	0	0	0	M	1	1	1	0	0	1	0	0	0	0	0	0	0.4	1
14-Jul	0	0	0	Z	0	0	0	0	0	0	C	C	C	C	C	C	C	1	2	1	1	1	0	0	--	2
15-Jul	0	0	0	0	Z	1	0	0	0	1	1	C	4	12	1	1	1	0	0	0	0	0	0	0	1.1	12
16-Jul	0	0	0	0	0	Z	1	1	1	3	1	0	0	0	0	0	0	0	2	4	3	1	0	1	0.9	4
17-Jul	Z	1	1	0	0	0	0	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	0	--	1
18-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	1	0.5	3
19-Jul	1	1	Z	4	3	2	5	4	7	12	5	8	8	8	10	2	1	0	0	0	0	0	0	0	3.6	12
20-Jul	0	0	0	Z	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0.4	1
21-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	4	11	10	7	2	1	1	1	1	1	1.6	11
22-Jul	0	0	0	0	0	Z	0	0	3	16	6	12	3	2	2	1	0	0	0	0	0	0	0	0	2.1	16
23-Jul	Z	0	0	0	0	0	0	0	0	0	0	1	4	8	7	2	0	1	0	0	0	0	0	0	1.2	8
24-Jul	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
25-Jul	0	0	Z	0	0	1	1	1	0	0	0	0	0	0	0	3	14	17	10	7	3	2	1	1	2.8	17
26-Jul	1	0	1	Z	1	1	1	0	0	0	3	14	3	1	2	1	9	2	0	0	0	0	0	0	1.8	14
27-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	1	2	1	2	3	2	0	1	1	1	0	0	0.7	3
28-Jul	1	1	0	0	0	Z	4	3	6	14	26	16	6	2	4	2	1	1	0	0	0	1	0	0	3.9	26
29-Jul	Z	0	0	0	0	0	0	0	0	2	6	0	0	0	0	0	0	1	0	2	2	0	0	1	0.7	6
30-Jul	2	Z	0	0	0	0	0	1	2	15	1	4	2	3	2	1	1	0	0	0	0	0	1	0	1.5	15
31-Jul	0	1	Z	1	1	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1

0.7	0.6	0.4	0.5	0.5	0.5	0.7	0.8	1.3	3.1	2.1	2.3	1.5	2.0	1.5	1.5	2.2	1.8	1.1	1.2	0.8	0.7	0.7	0.8	Diurnal Average	
5	5	1	4	3	2	5	4	7	16	26	16	8	12	10	11	14	17	10	7	6	3	8	8	Diurnal Maximum	

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





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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Millennium - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	676	97.83	97.83
11 - 20	14	2.03	99.86
21 - 60	1	0.14	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 691

Total Number of Hours: 744





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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Millennium - July 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	71	35	18	11	10	12	35	55	64	89	53	45	58	43	45	32	676
11 - 20	2	1	1	1	0	0	0	0	0	0	0	2	1	3	2	1	14
21 - 60	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	73	36	19	12	10	12	35	55	64	90	53	47	59	46	47	33	691

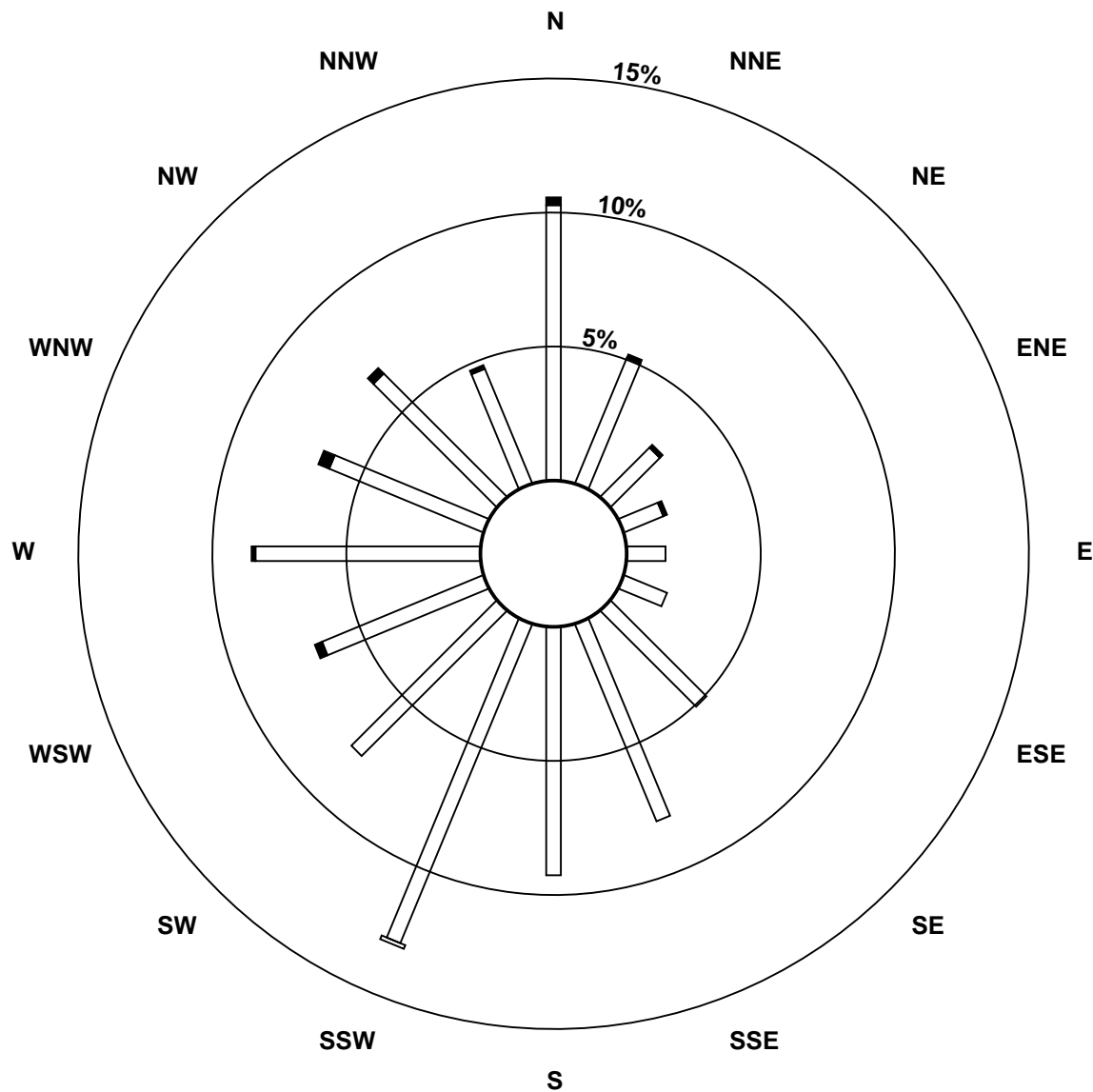
Total Number of Valid Hours: 691

Total Number of Hours: 744

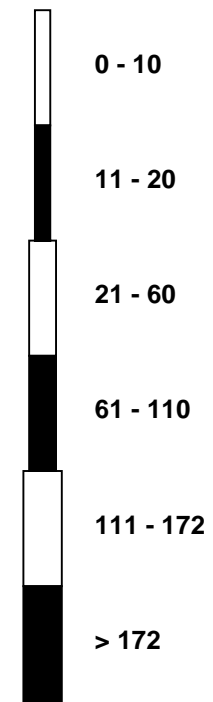


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

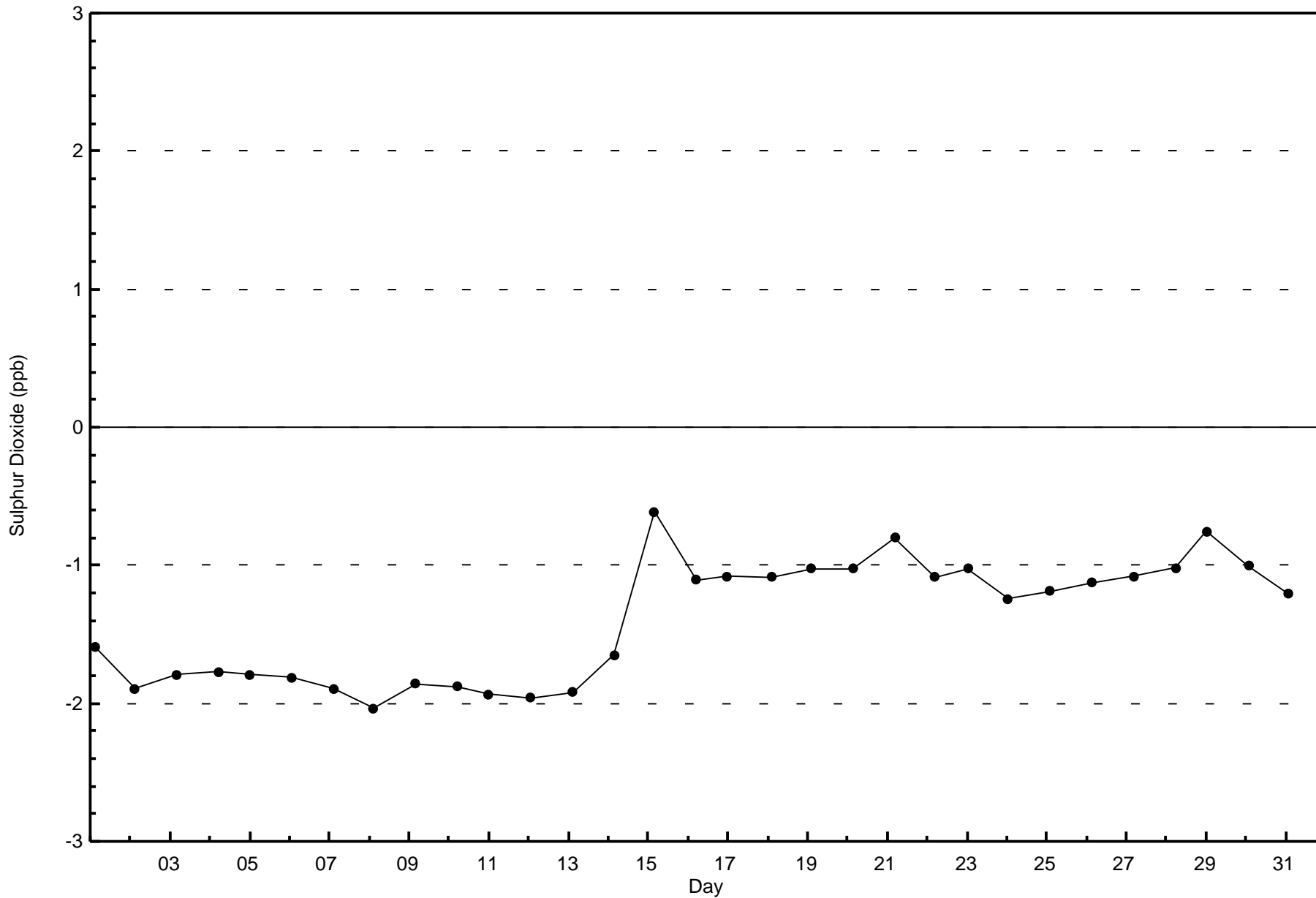
Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Millennium (AMS 12)

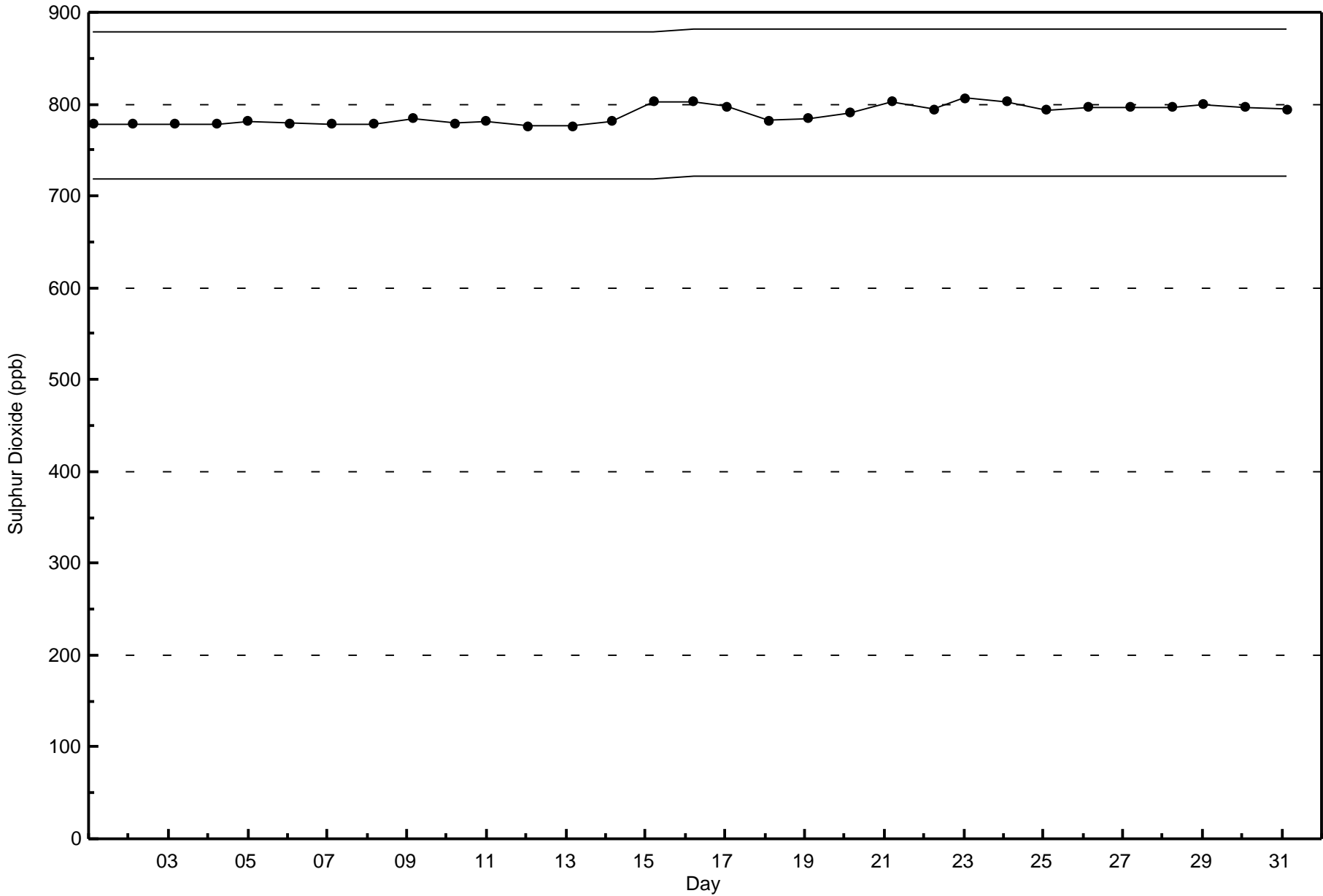


Classes (ppb)



Total Number of Valid Hours: 691



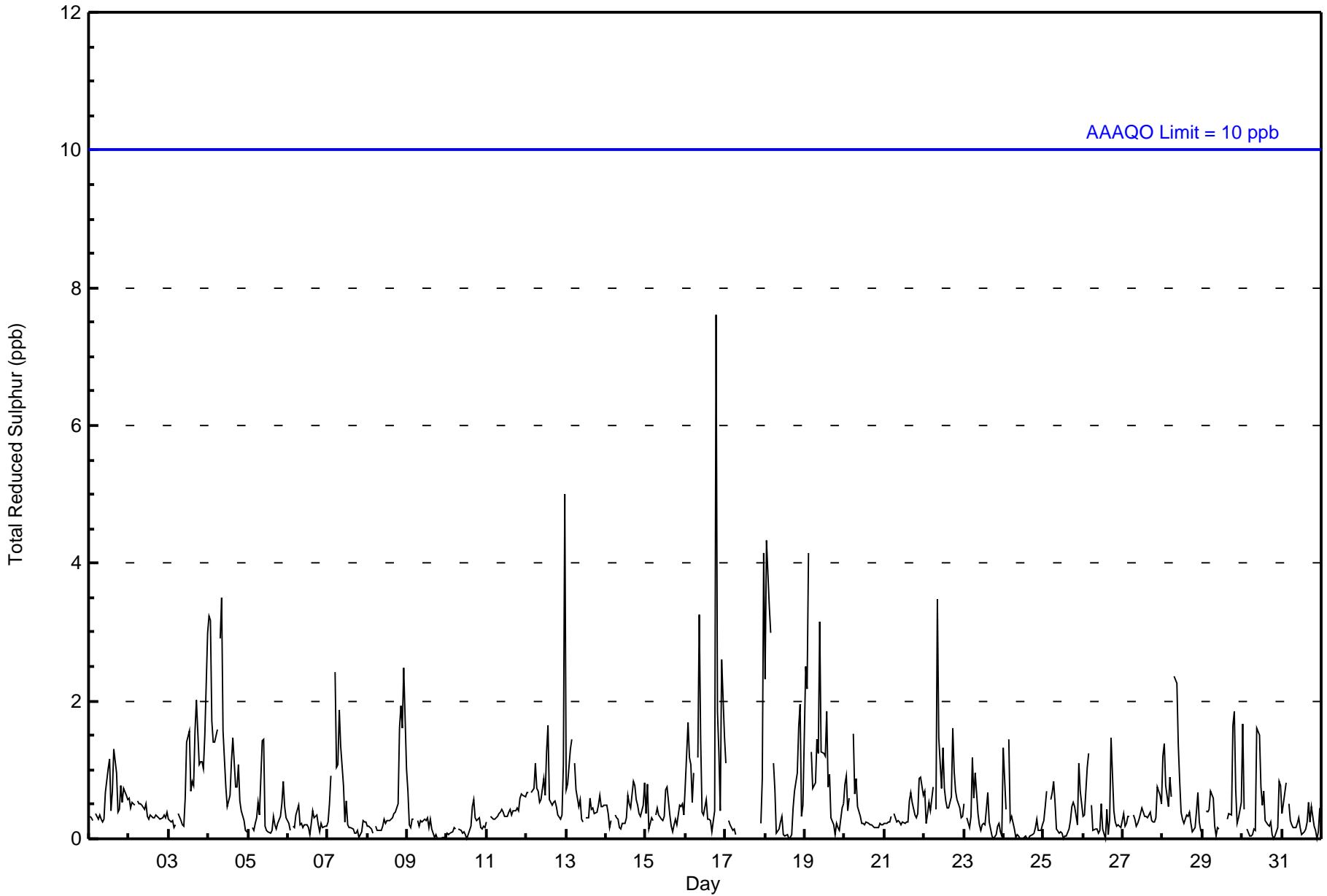




Summary of Hour Averages

Millennium - July 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																
Maximum Value: 8 ppb on Jul 16 19:00										Maximum Daily Average: 1.3 ppb on Jul 16										Hours of Data: 694						
Minimum Value: 0 ppb on Jul 9 20:00										Minimum Daily Average: 0.2 ppb on Jul 10										Hours of Missing Data: 50						
Maximum Diurnal Average: 0.8 ppb at hour 2										Minimum Diurnal Average: 0.4 ppb at hour 15										Hours of Calibration: 35						
Monthly Average: 0.6 ppb										Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 1 P <sub>90</sub> = 1 P <sub>99</sub> = 3										Percent Operational Time: 98.0						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	0	0	0	Z	0	0	0	0	0	0	1	1	1	0	1	1	1	0	0	1	1	1	1	1	0.6	1
2-Jul	1	0	1	0	Z	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
3-Jul	0	0	0	0	0	Z	0	0	0	0	1	1	2	1	1	1	2	2	1	1	1	1	2	3	0.9	3
4-Jul	3	3	2	1	1	2	Z	3	3	2	1	0	1	1	1	1	1	1	1	1	0	0	0	0	1.3	3
5-Jul	0	Z	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0.4	1
6-Jul	0	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-Jul	0	1	1	Z	2	1	1	2	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.6	2
8-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	2	2	1	0.6	2
9-Jul	1	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
10-Jul	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.2	1
11-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.4	1
12-Jul	1	1	Z	1	1	1	1	1	1	1	1	1	1	2	1	0	1	1	0	0	0	0	1	5	0.9	5
13-Jul	1	1	1	1	Z	1	1	0	1	0	0	M	0	0	1	0	0	0	0	0	1	0	0	0	0.6	1
14-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	0	0	1	1	1	0	0	0	0	1	0.4	1
15-Jul	0	1	0	0	0	Z	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	0.4	1
16-Jul	1	2	1	1	1	1	Z	1	3	1	0	0	1	0	0	0	0	0	8	2	1	0	3	1	1.3	8
17-Jul	1	Z	0	0	0	0	0	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	0	--	4
18-Jul	2	4	3	3	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	2	2	0	0	1.0	4
19-Jul	3	2	4	Z	1	1	1	1	1	3	1	1	1	2	1	1	0	0	0	0	0	0	0	1	1.2	4
20-Jul	1	1	0	1	Z	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2
21-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	1	1	1	0.4	1
22-Jul	1	0	0	1	0	1	Z	0	3	1	1	1	1	1	0	0	1	2	1	1	1	0	0	0	0.8	3
23-Jul	1	Z	0	0	0	1	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.3	1
24-Jul	1	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
25-Jul	0	0	1	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	1	0.4	1
26-Jul	0	0	1	1	Z	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0.4	1
27-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.3	1
28-Jul	1	1	1	0	1	1	Z	2	2	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0.7	2
29-Jul	0	Z	0	0	0	1	1	0	0	0	0	C	C	C	C	0	0	0	2	2	1	0	0	1	0.5	2
30-Jul	2	0	Z	0	0	0	0	0	0	2	2	1	0	1	0	0	0	0	0	0	0	0	0	1	0.5	2
31-Jul	0	1	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.3	1
0.7 0.8 0.8 0.6 0.5 0.6 0.4 0.6 0.7 0.6 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.5 0.7 0.5 0.5 0.5 0.6 0.8																								Diurnal Average		
3 4 4 3 2 2 1 3 3 3 2 1 2 2 1 1 2 2 8 2 2 2 3 5																								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**  
**Millennium - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	677	97.55	97.55
3 - 4	15	2.16	99.71
5 - 7	1	0.14	99.86
8 - 11	1	0.14	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 694

Total Number of Hours: 744



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

**Total Reduced Sulphur (TRS) - ppb**  
**Millennium - July 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	71	34	19	13	9	13	34	56	66	92	47	49	53	41	45	35	677
3 - 4	0	1	0	0	0	0	0	0	0	2	2	0	2	6	2	0	15
5 - 7	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	72	35	19	13	9	13	34	56	66	94	49	49	55	48	47	35	694

Total Number of Valid Hours: 694

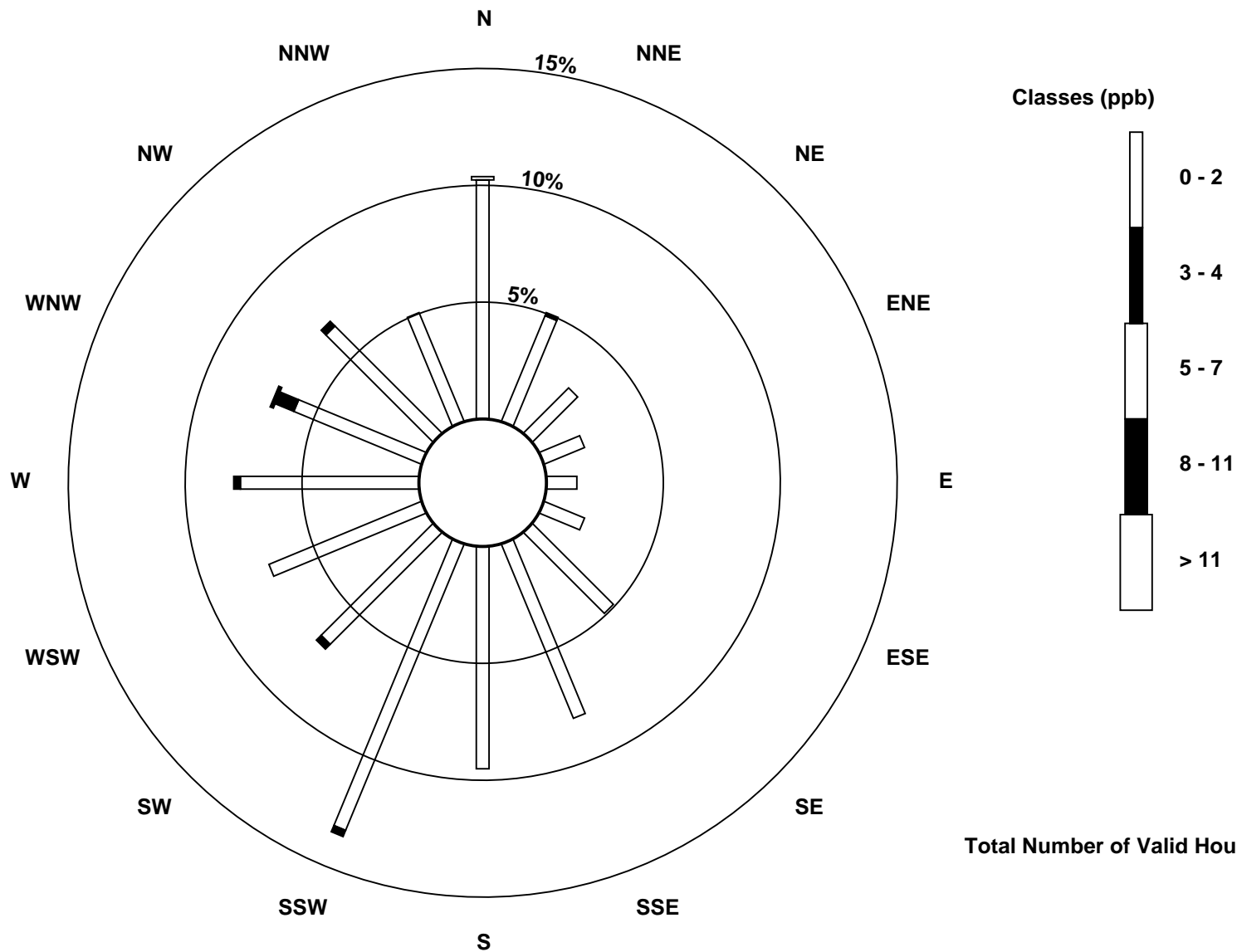
Total Number of Hours: 744

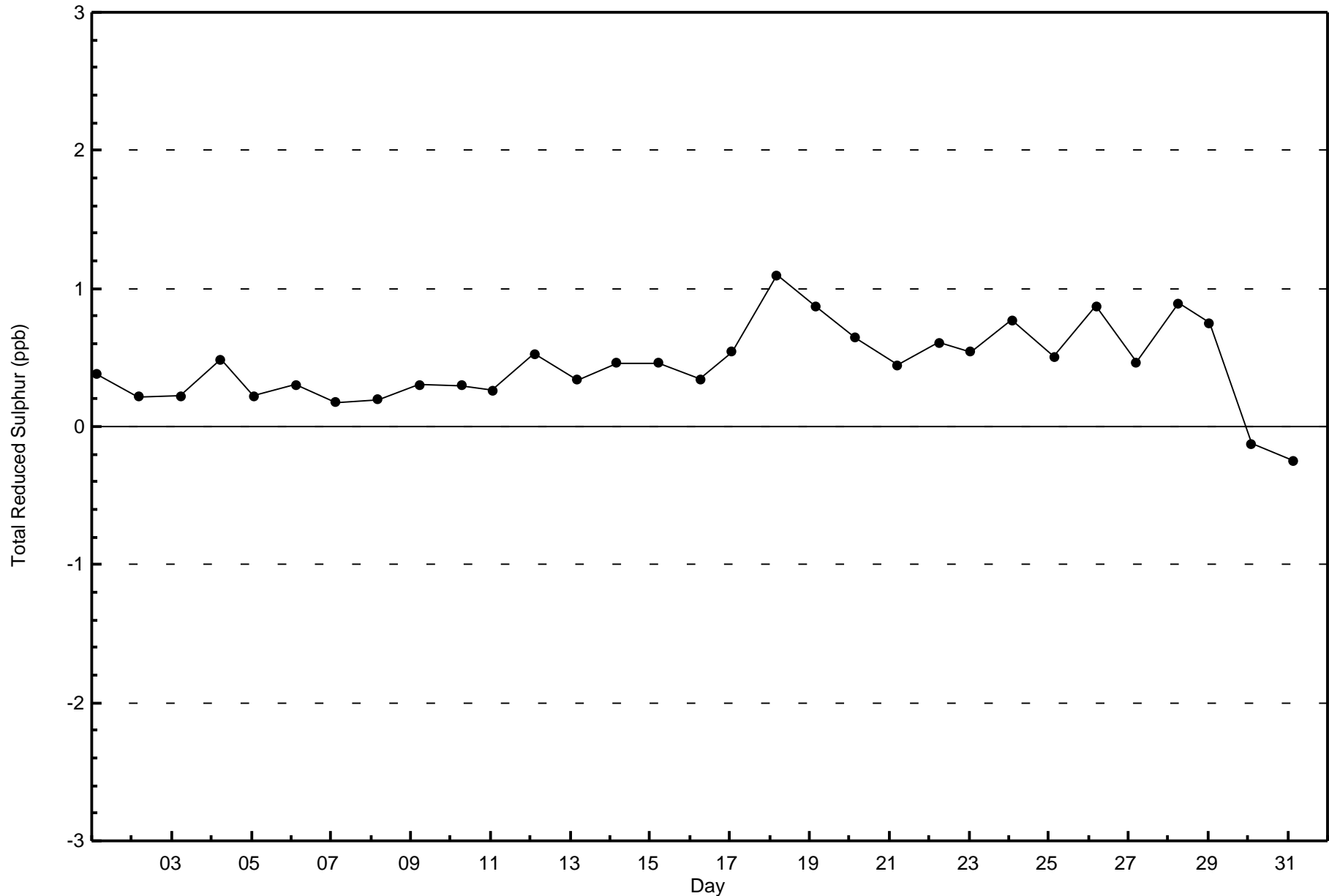


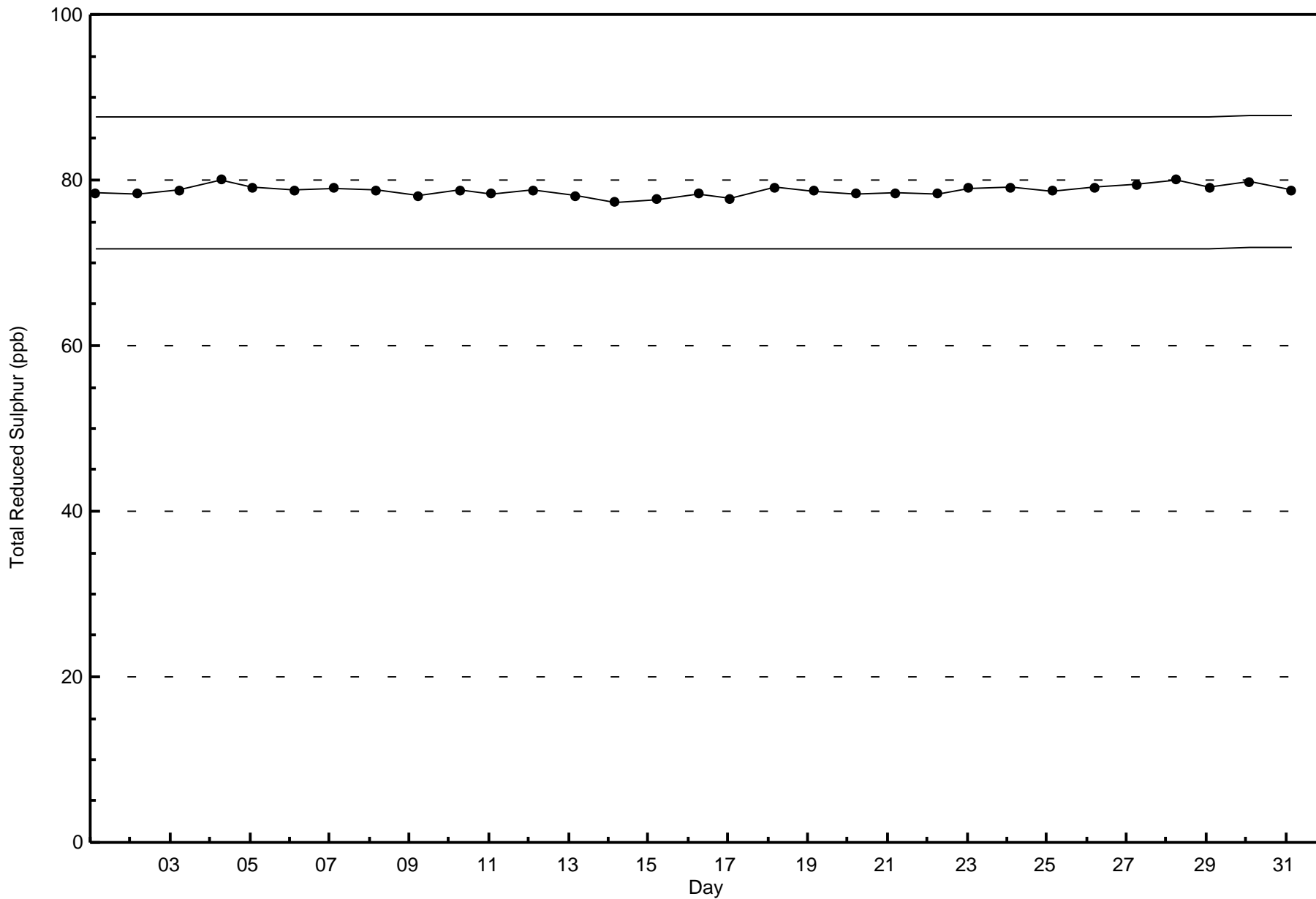


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Total Reduced Sulphur (TRS) - ppb  
Millennium (AMS 12)

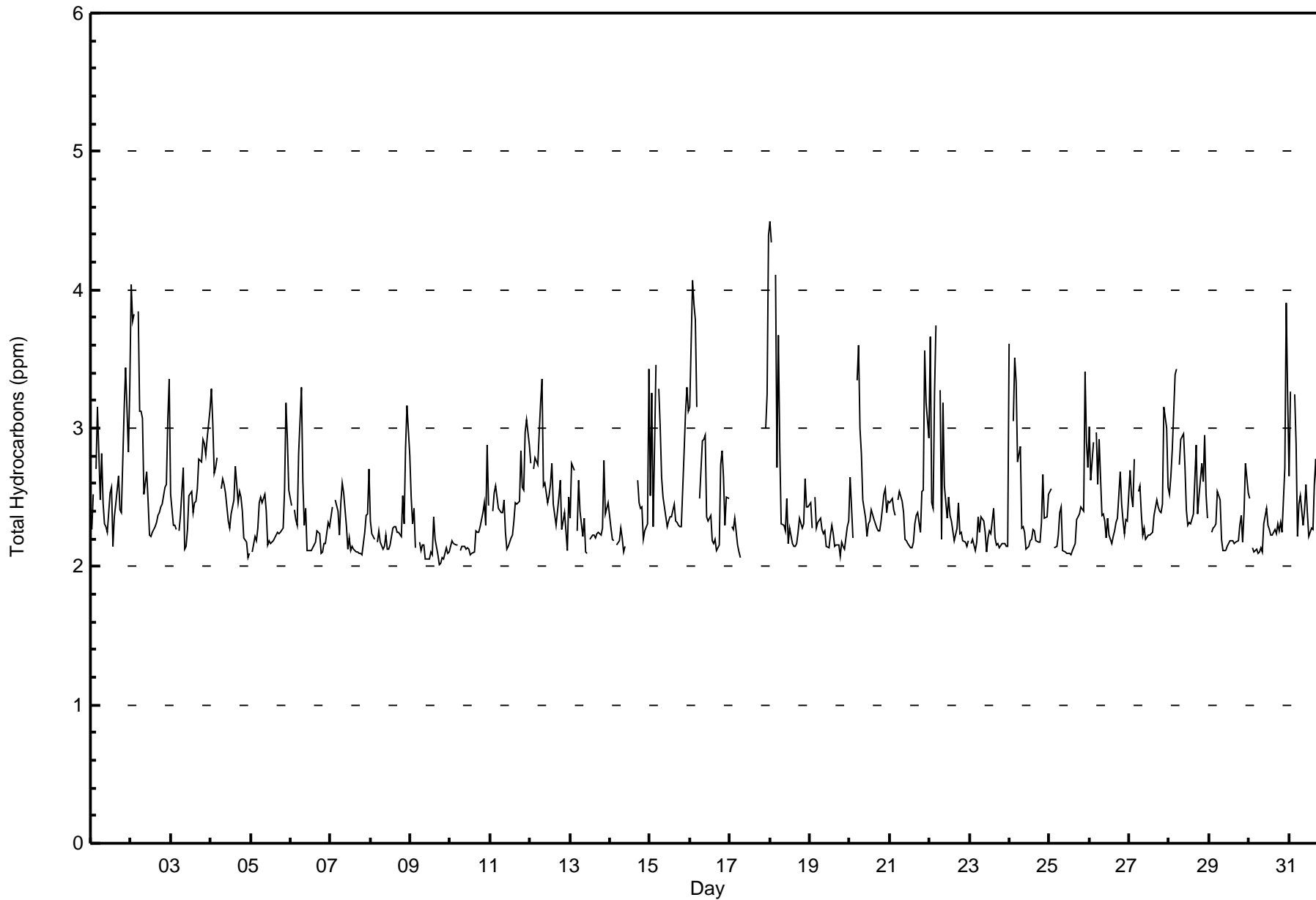








Maximum Value: 4.5 ppm on Jul 18 01:00		Maximum Daily Average: 2.8 ppm on Jul 2		Hours in Service: 744																									
Minimum Value: 2.0 ppm on Jul 9 18:00		Minimum Daily Average: 2.2 ppm on Jul 9		Hours of Data: 692																									
Maximum Diurnal Average: 2.8 ppm at hour 1		Minimum Diurnal Average: 2.2 ppm at hour 11		Hours of Missing Data: 52																									
Monthly Average: 2.46 ppm		Percentiles: P <sub>1</sub> = 2.1 P <sub>10</sub> = 2.1 Q <sub>1</sub> = 2.2 Median = 2.3 Q <sub>3</sub> = 2.6 P <sub>90</sub> = 3.0 P <sub>99</sub> = 3.8		Hours of Calibration: 37																									
				Percent Operational Time: 98.0																									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Jul	2.3	2.5	Z	2.7	3.2	2.5	2.8	2.5	2.3	2.3	2.2	2.5	2.6	2.2	2.4	2.4	2.6	2.4	2.4	2.8	3.1	3.4	2.8	3.3	2.6	3.4			
2-Jul	4.0	3.8	3.8	Z	3.8	3.1	3.1	3.1	2.5	2.7	2.5	2.2	2.2	2.2	2.3	2.3	2.4	2.4	2.4	2.5	2.6	2.6	3.1	3.4	2.8	4.0			
3-Jul	2.5	2.3	2.3	2.3	Z	2.3	2.4	2.7	2.1	2.1	2.3	2.5	2.5	2.4	2.5	2.5	2.6	2.8	2.8	2.9	2.9	2.8	2.9	3.1	2.5	3.1			
4-Jul	3.3	3.0	2.7	2.7	2.8	Z	2.6	2.6	2.6	2.5	2.3	2.3	2.4	2.4	2.5	2.7	2.5	2.5	2.5	2.4	2.2	2.2	2.1	2.1	2.5	3.3			
5-Jul	Z	2.1	2.2	2.2	2.3	2.5	2.5	2.5	2.5	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.6	3.2	2.9	2.6	2.4	3.2			
6-Jul	2.4	Z	2.4	2.3	2.3	2.8	3.3	2.6	2.3	2.4	2.1	2.1	2.1	2.1	2.2	2.2	2.3	2.2	2.1	2.1	2.2	2.2	2.3	2.3	2.3	3.3			
7-Jul	2.4	2.4	Z	2.5	2.4	2.2	2.5	2.6	2.5	2.3	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.4	2.4	2.7	2.3	2.7			
8-Jul	2.3	2.2	2.2	Z	2.2	2.3	2.2	2.1	2.1	2.2	2.1	2.1	2.2	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.5	2.3	2.9	3.2	2.3	3.2			
9-Jul	2.5	2.3	2.4	2.1	Z	2.2	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.4	2.2	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.2	2.5			
10-Jul	2.1	2.2	2.2	2.2	2.2	Z	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.2	2.2	2.3	2.4	2.5	2.3	2.9	2.4	2.2	2.9			
11-Jul	Z	2.4	2.5	2.6	2.5	2.4	2.4	2.4	2.5	2.2	2.1	2.1	2.2	2.2	2.3	2.5	2.4	2.5	2.8	2.6	2.6	3.0	3.1	2.9	2.5	3.1			
12-Jul	2.7	Z	2.7	2.8	2.7	3.0	3.2	3.4	2.6	2.6	2.5	2.5	2.6	2.7	2.5	2.3	2.4	2.5	2.6	2.3	2.4	2.3	2.1	2.5	2.6	3.4			
13-Jul	2.3	2.7	2.7	Z	2.3	2.6	2.4	2.2	2.3	2.1	2.1	M	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.8	2.4	2.4	2.5	2.4	2.8			
14-Jul	2.3	2.2	2.2	Z	2.2	2.2	2.3	2.2	2.1	2.1	C	C	C	C	C	C	C	2.6	2.5	2.4	2.2	2.3	2.3	3.4	--	3.4			
15-Jul	2.5	3.3	2.3	3.5	Z	3.3	3.0	2.6	2.5	2.4	2.3	2.3	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.8	3.1	3.3	3.1	2.7	3.5			
16-Jul	3.2	4.1	3.9	3.8	3.2	Z	2.5	2.9	2.9	3.0	2.4	2.3	2.4	2.2	2.2	2.2	2.1	2.2	2.7	2.8	2.6	2.3	2.5	2.5	2.7	4.1			
17-Jul	Z	2.3	2.3	2.3	2.2	2.1	2.1	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	3.0	3.2	4.4	--	4.4		
18-Jul	4.5	4.3	Z	4.1	2.7	3.7	2.9	2.3	2.3	2.3	2.5	2.2	2.3	2.2	2.1	2.1	2.2	2.2	2.3	2.3	2.3	2.6	2.4	2.4	2.7	4.5			
19-Jul	2.5	2.3	Z	2.5	2.3	2.3	2.3	2.3	2.2	2.3	2.1	2.1	2.2	2.3	2.2	2.1	2.2	2.2	2.1	2.2	2.1	2.1	2.3	2.3	2.2	2.5			
20-Jul	2.6	2.4	2.2	Z	3.3	3.6	3.0	2.8	2.5	2.3	2.2	2.3	2.3	2.3	2.4	2.3	2.3	2.3	2.3	2.3	2.5	2.6	2.4	2.5	2.5	3.6			
21-Jul	2.5	2.5	2.4	2.4	Z	2.5	2.5	2.5	2.4	2.2	2.2	2.2	2.1	2.1	2.2	2.3	2.4	2.4	2.2	2.5	2.6	3.6	3.2	2.9	2.5	3.6			
22-Jul	3.7	2.5	2.4	3.3	3.7	Z	3.3	2.2	3.2	2.6	2.3	2.5	2.4	2.3	2.3	2.2	2.3	2.5	2.2	2.2	2.2	2.1	2.2	2.2	2.6	3.7			
23-Jul	Z	2.2	2.2	2.1	2.2	2.4	2.3	2.4	2.3	2.2	2.1	2.2	2.3	2.2	2.4	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.1	2.1	2.2	2.4			
24-Jul	3.6	Z	3.0	3.5	3.3	2.8	2.9	2.3	2.3	2.2	2.1	2.1	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.3	2.7	2.4	2.4	2.5	3.6			
25-Jul	2.5	2.6	Z	2.1	2.2	2.2	2.4	2.4	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.4	2.4	2.4	2.4	3.4	2.9	2.7	2.4	3.4			
26-Jul	3.0	2.6	2.9	Z	3.0	2.6	2.9	2.4	2.4	2.3	2.2	2.3	2.2	2.2	2.2	2.3	2.3	2.3	2.7	2.4	2.3	2.2	2.3	2.3	2.5	3.0			
27-Jul	2.7	2.5	2.4	2.8	Z	2.5	2.6	2.4	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.4	2.5	2.4	2.4	2.4	2.4	3.2	3.0	2.6	2.5	3.2			
28-Jul	2.5	2.7	2.8	3.4	3.4	Z	2.7	2.9	3.0	2.7	2.4	2.3	2.3	2.3	2.4	2.6	2.9	2.4	2.5	2.7	2.6	2.9	2.5	2.3	2.7	3.4			
29-Jul	Z	2.3	2.3	2.3	2.3	2.5	2.5	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.2	2.4	2.7	2.5	2.3	2.7		
30-Jul	2.5	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.4	2.3	2.3	2.2	2.2	2.3	2.2	2.3	2.3	2.3	2.3	2.7	3.9	3.2	2.4	3.9		
31-Jul	2.7	3.3	Z	3.2	2.9	2.2	2.5	2.5	2.3	2.4	2.6	2.4	2.2	2.3	2.3	2.6	2.8	2.5	2.4	2.3	2.5	2.4	2.4	2.6	2.5	3.3			
																								Diurnal Average					
																								Diurnal Maximum					
2.8 2.7 2.5 2.7 2.7 2.6 2.6 2.5 2.4 2.3 2.2 2.3 2.3 2.2 2.3 2.3 2.3 2.3 2.4 2.4 2.4 2.6 2.7 2.7																													
4.5 4.3 3.9 4.1 3.8 3.7 3.3 3.4 3.2 3.0 2.6 2.5 2.6 2.7 2.5 2.7 2.9 2.8 2.8 2.9 3.1 3.6 3.9 4.4																													
Z - zerospan			C - Calibration			M - Maintenance			PF - Power Failure																				





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

**Total Hydrocarbons (THC) - ppm**  
**Millennium - July 2015**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	2	0.29	0.29
2.1 - 3.0	631	91.18	91.47
3.1 - 10.0	59	8.53	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 692

Total Number of Hours: 744



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

**Total Hydrocarbons (THC) - ppm**  
**Millennium - July 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	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
2.1 - 3.0	73	33	19	12	7	11	35	51	58	63	42	45	59	43	47	33	631
3.1 - 10.0	0	1	0	0	3	1	0	5	6	27	11	2	0	3	0	0	59
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	73	36	19	12	10	12	35	56	64	90	53	47	59	46	47	33	692

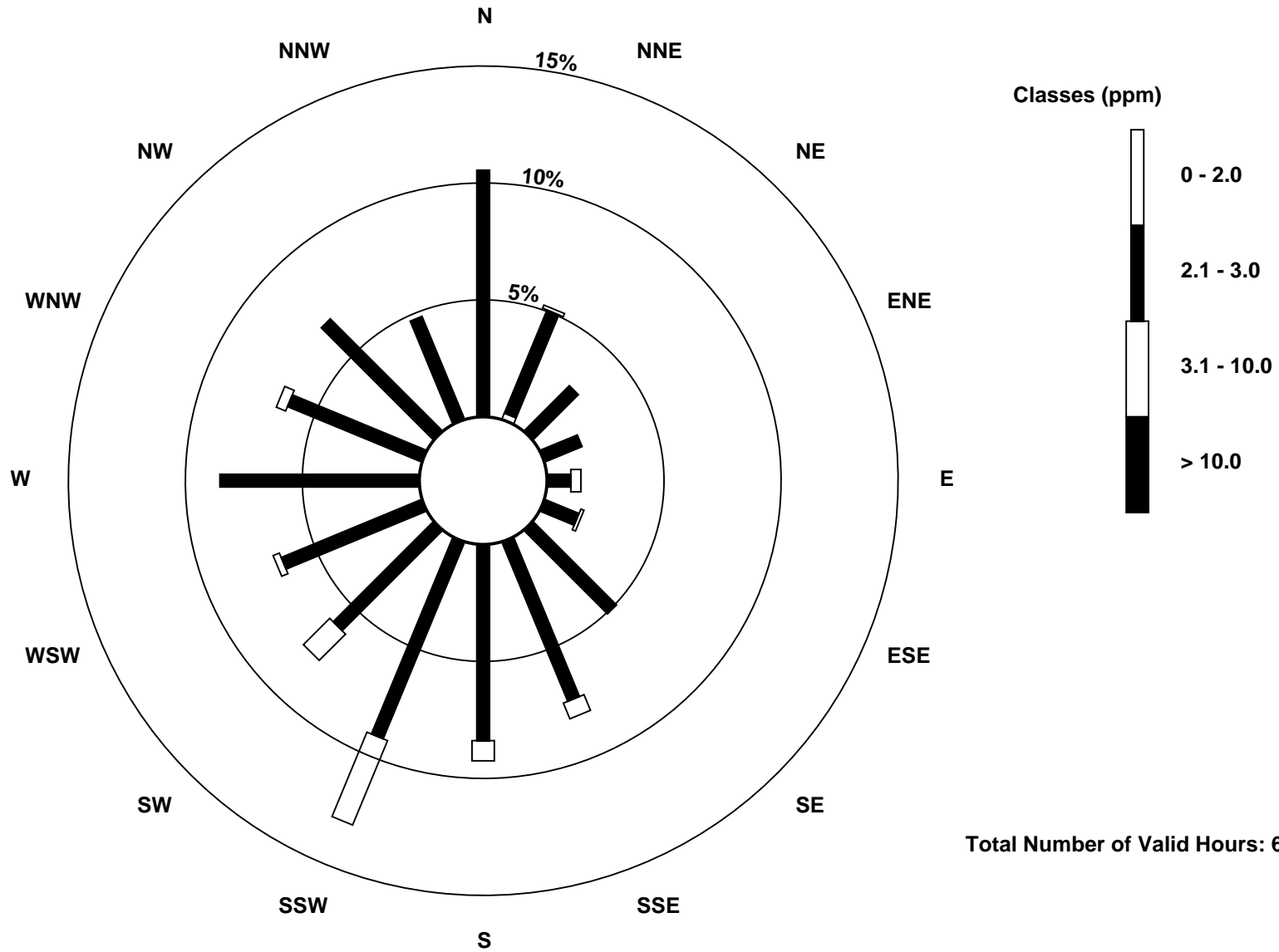
Total Number of Valid Hours: 692

Total Number of Hours: 744

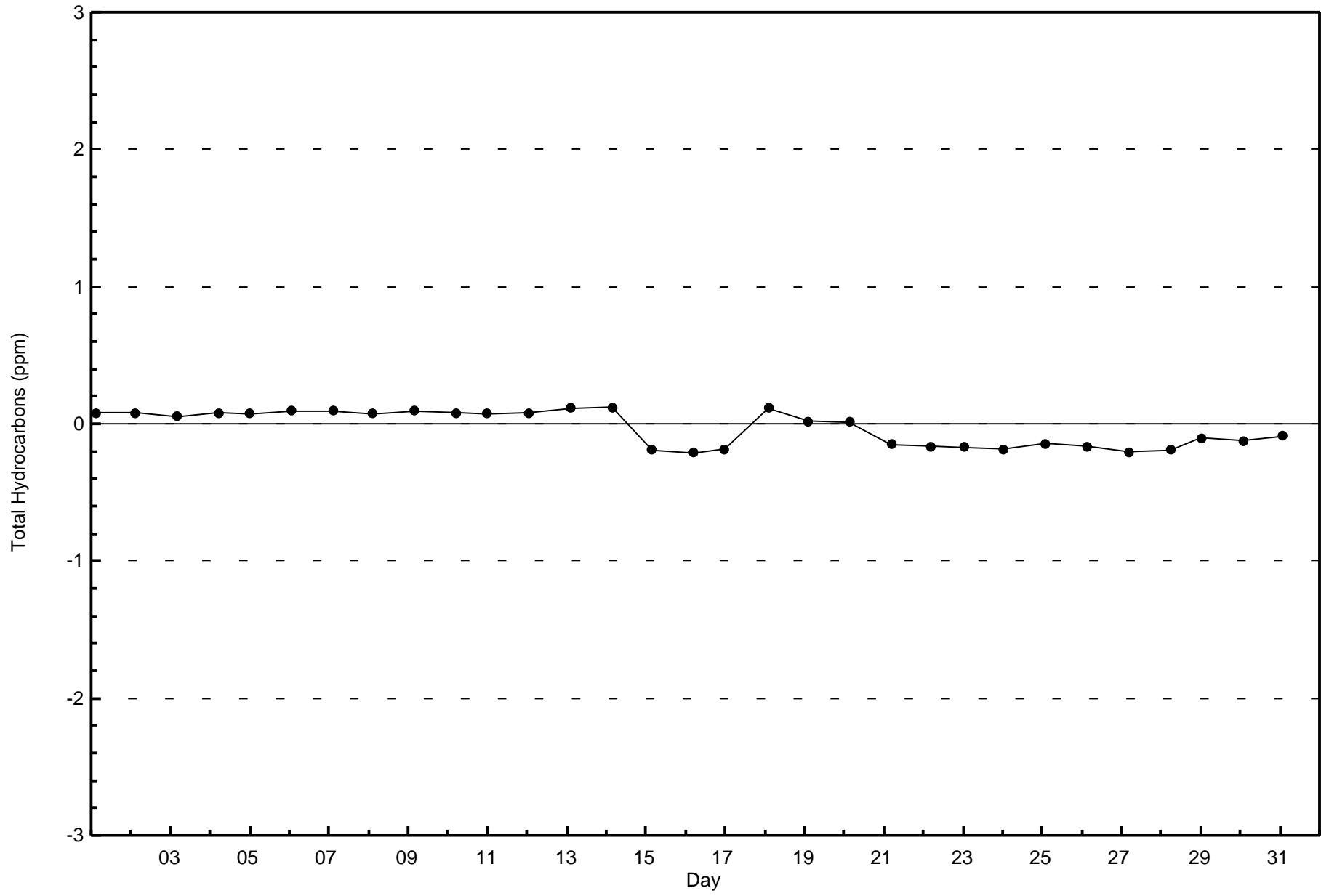


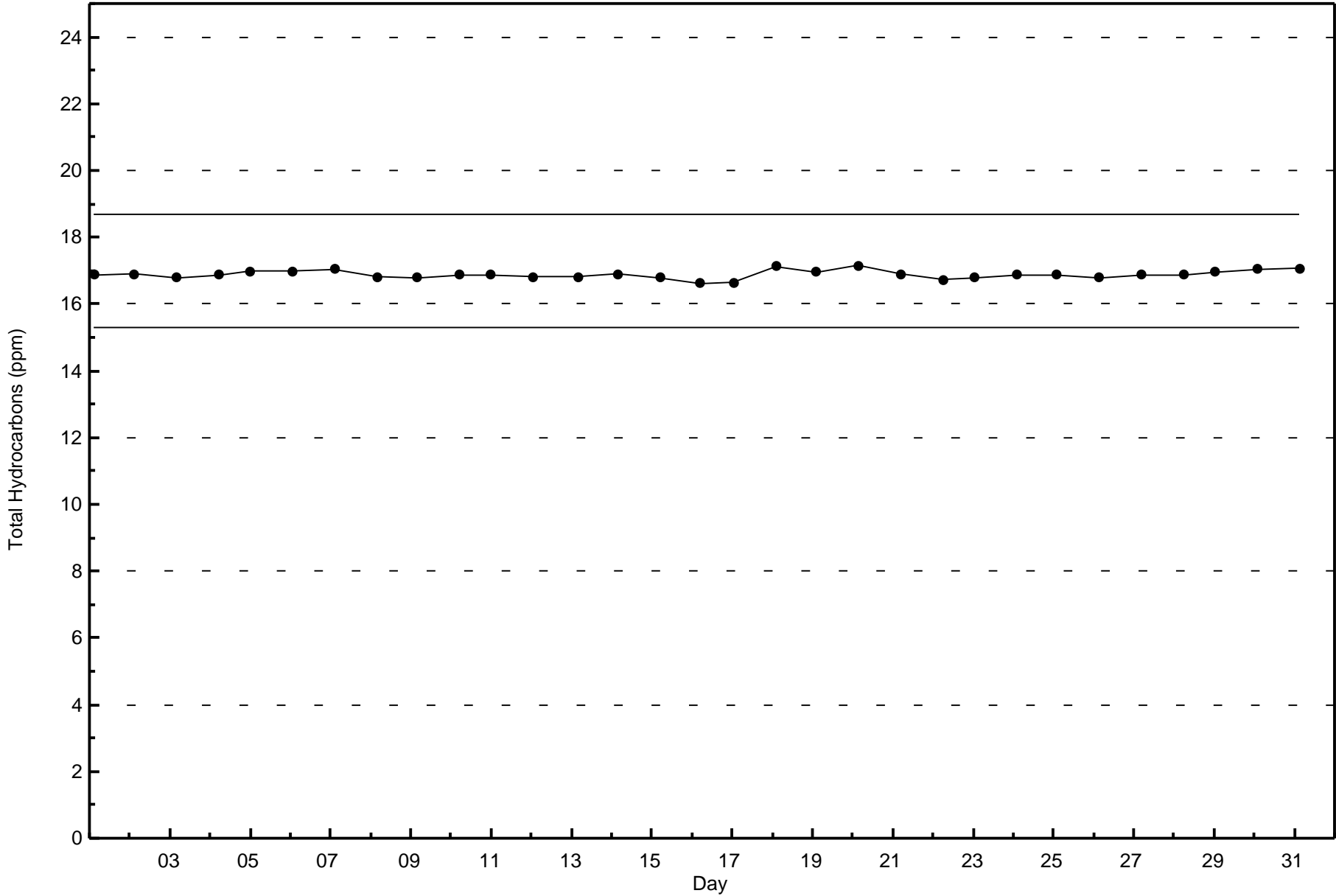
Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Total Hydrocarbons (THC) - ppm  
Millennium (AMS 12)











# Wood Buffalo Environmental Association

## Summary of Hour Averages

Nitric Oxide (NO) - ppb

Millennium - July 2015

Maximum Value: 64 ppb on Jul 1 22:00		Maximum Daily Average: 8.5 ppb on Jul 2		Hours in Service: 744																							
Minimum Value: 0 ppb on Jul 4 05:00		Minimum Daily Average: 0.4 ppb on Jul 4		Hours of Data: 654																							
Maximum Diurnal Average: 7.9 ppb at hour 7		Minimum Diurnal Average: 0.7 ppb at hour 14		Hours of Missing Data: 90																							
Monthly Average: 3.4 ppb		Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 1 Q <sub>3</sub> = 3 P <sub>90</sub> = 10 P <sub>99</sub> = 29		Hours of Calibration: 36																							
				Percent Operational Time: 92.7																							
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-Jul	0	0	Z	0	2	1	3	1	1	1	1	2	1	0	2	2	0	1	3	7	64	10	10	5.0	64		
2-Jul	21	12	Z	Z	29	33	36	12	7	6	2	0	0	0	0	0	0	0	0	1	1	5	3	8.5	36		
3-Jul	3	1	1	1	Z	1	2	2	1	0	0	1	1	1	1	1	1	0	0	0	0	1	1	0.9	3		
4-Jul	1	1	0	0	0	Z	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0.4	1		
5-Jul	Z	0	0	0	1	6	6	4	4	5	0	1	0	0	0	0	0	0	0	1	10	9	2	2.2	10		
6-Jul	4	Z	0	1	3	16	13	8	8	2	0	1	0	0	0	0	0	0	0	1	1	1	0	2.7	16		
7-Jul	0	1	Z	4	2	2	8	9	6	5	2	1	1	1	0	1	1	0	1	0	0	11	10	12	3.4	12	
8-Jul	10	1	0	Z	1	1	2	1	2	2	1	1	0	1	2	3	1	0	0	1	1	0	1	1.4	10		
9-Jul	0	0	0	0	Z	1	0	0	1	1	1	0	0	1	2	4	3	2	1	1	1	0	0	0.8	4		
10-Jul	0	2	3	3	6	Z	1	2	2	2	1	0	0	0	3	1	1	1	0	0	1	1	8	10	2.1	10	
11-Jul	Z	1	8	13	15	3	3	1	6	1	0	0	0	1	1	3	8	23	2	4	1	1	0	4.3	23		
12-Jul	0	Z	1	6	10	5	29	30	7	3	2	3	2	1	1	1	3	3	1	0	0	0	0	4.7	30		
13-Jul	0	1	5	Z	0	1	6	2	3	0	0	M	M	M	M	M	M	M	M	M	M	M	M	--	6		
14-Jul	M	M	M	M	M	M	M	M	M	M	C	C	C	C	C	C	C	2	1	1	1	0	1	4	8		
15-Jul	3	0	0	18	Z	6	6	1	1	M	M	M	M	M	3	1	0	0	0	0	0	3	1	10	3.0	18	
16-Jul	22	18	21	14	27	Z	9	6	5	5	1	1	0	0	0	0	0	1	1	1	0	0	0	5.8	27		
17-Jul	Z	0	0	1	0	0	1	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	5	13	12	--	13
18-Jul	21	9	Z	13	1	17	17	5	10	8	8	1	1	0	1	1	1	0	1	0	0	1	0	5.0	21		
19-Jul	0	0	Z	0	0	1	1	2	1	3	1	2	2	3	2	1	1	0	0	0	0	0	0	1.0	3		
20-Jul	2	1	0	Z	6	12	12	15	13	9	3	M	M	M	M	M	2	2	1	0	5	5	0	5.0	15		
21-Jul	1	1	4	3	Z	16	8	6	6	1	1	1	1	1	1	2	3	2	1	2	0	7	5	18	3.9	18	
22-Jul	17	2	10	14	12	Z	7	4	3	7	4	4	1	0	1	0	0	1	1	0	0	0	0	3.8	17		
23-Jul	Z	0	0	0	0	0	1	2	1	1	1	1	2	2	1	0	0	0	0	0	0	0	0	0.6	2		
24-Jul	5	Z	1	10	13	6	11	6	8	6	1	1	1	1	2	2	0	0	0	0	1	0	0	3.4	13		
25-Jul	2	0	Z	0	0	0	3	4	1	0	0	0	0	0	0	0	2	5	2	2	1	7	1	2	1.4	7	
26-Jul	18	7	15	Z	19	20	22	10	10	9	2	2	1	0	1	1	1	2	7	6	0	0	1	0	6.7	22	
27-Jul	0	0	5	13	Z	17	14	12	5	5	0	0	0	0	0	1	1	1	0	0	0	1	7	1	3.6	17	
28-Jul	0	0	3	19	6	Z	3	3	7	11	M	M	M	M	M	M	M	1	4	1	6	2	4	1	--	19	
29-Jul	Z	0	0	0	0	3	5	1	1	2	1	0	0	0	0	0	0	0	0	0	0	9	21	4	2.1	21	
30-Jul	0	Z	0	0	0	0	1	2	2	5	0	2	1	1	1	2	1	3	3	0	0	9	38	9	3.5	38	
31-Jul	13	57	Z	18	10	3	8	8	6	10	8	3	0	3	1	5	5	2	1	0	1	0	0	7.0	57		
5.8 4.4 4.4 6.0 6.6 7.0 7.9 5.5 4.4 4.0 1.6 1.1 0.8 0.7 0.9 1.2 1.3 1.3 1.8 0.8 1.1 4.7 4.6 3.6																								Diurnal Average			
22 57 27 19 29 33 36 30 13 11 8 4 2 3 3 5 5 8 8 23 6 7 64 38 18																								Diurnal Maximum			
Z - zerspan C - Calibration M - Maintenance PF - Power Failure																											

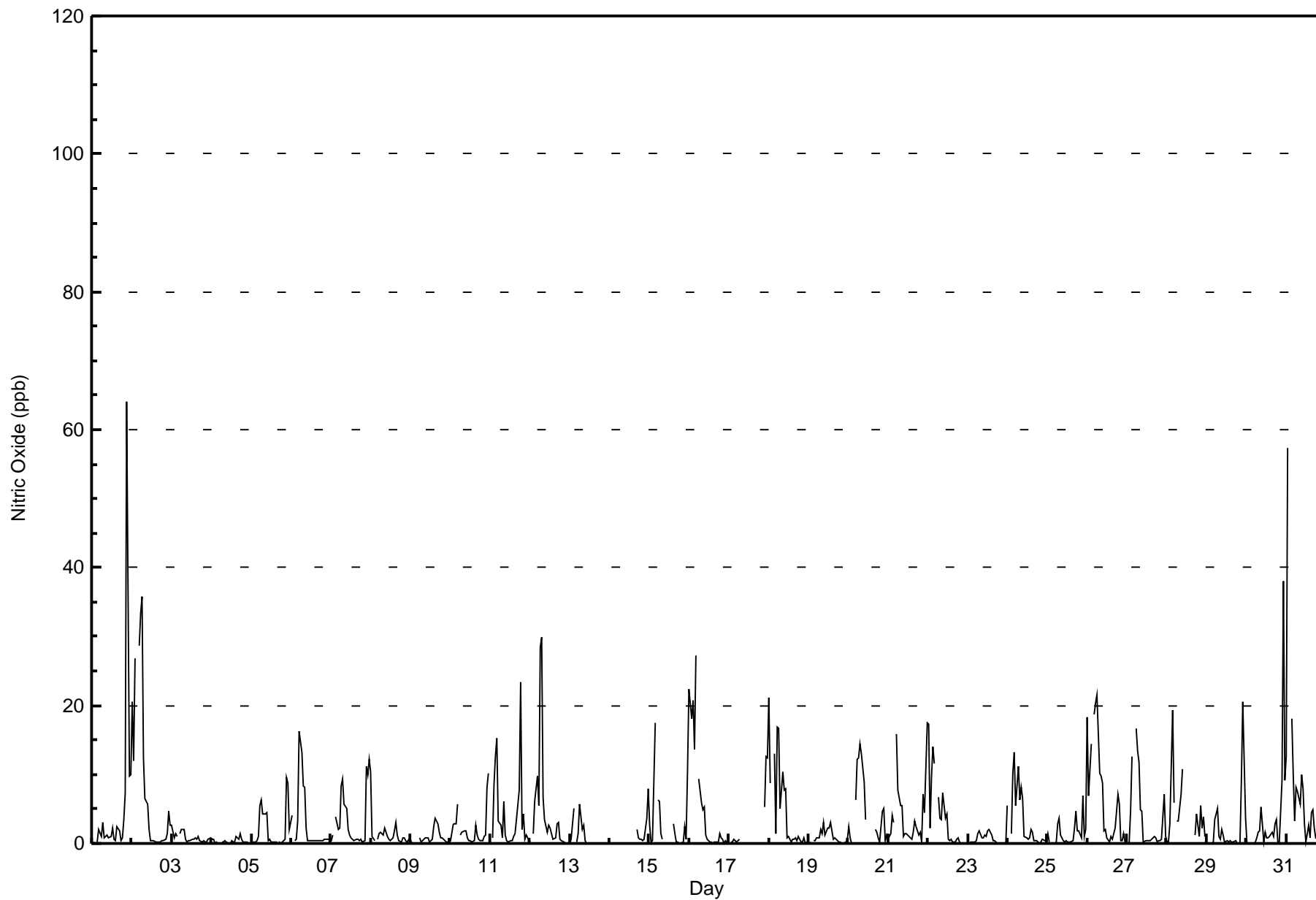


Wood Buffalo Environmental Association

Hourly Averages

Nitric Oxide (NO) - ppb

Millennium - July 2015





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Millennium - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	637	97.40	97.40
21 - 40	15	2.29	99.69
41 - 80	2	0.31	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 654

Total Number of Hours: 744



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Millennium - July 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	73	35	16	11	8	10	32	42	51	82	51	46	57	43	47	33	637
21 - 40	0	0	1	0	1	2	0	1	3	5	2	0	0	0	0	0	15
11 - 80	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	73	35	17	11	9	12	32	45	54	87	53	46	57	43	47	33	654

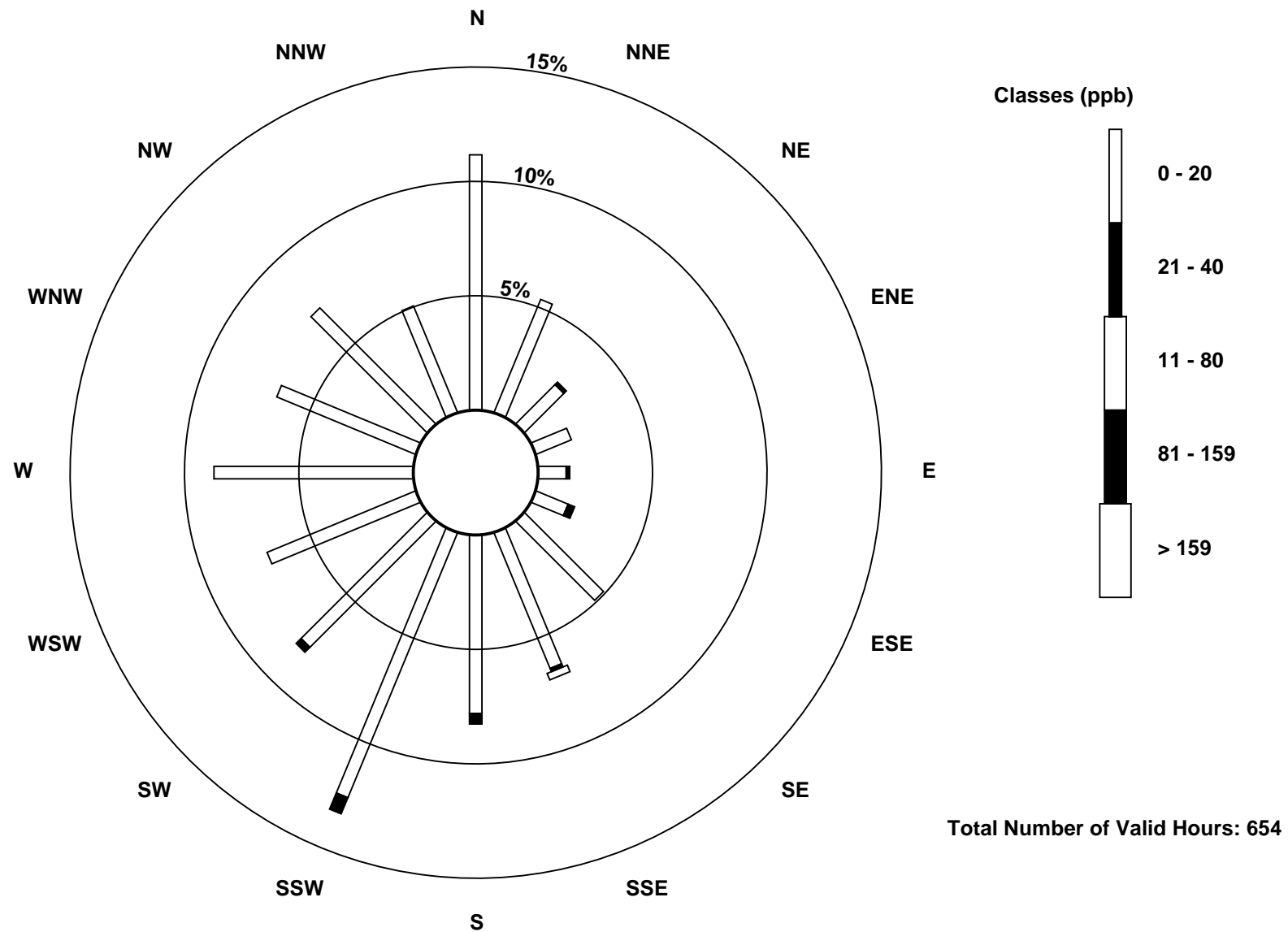
Total Number of Valid Hours: 654

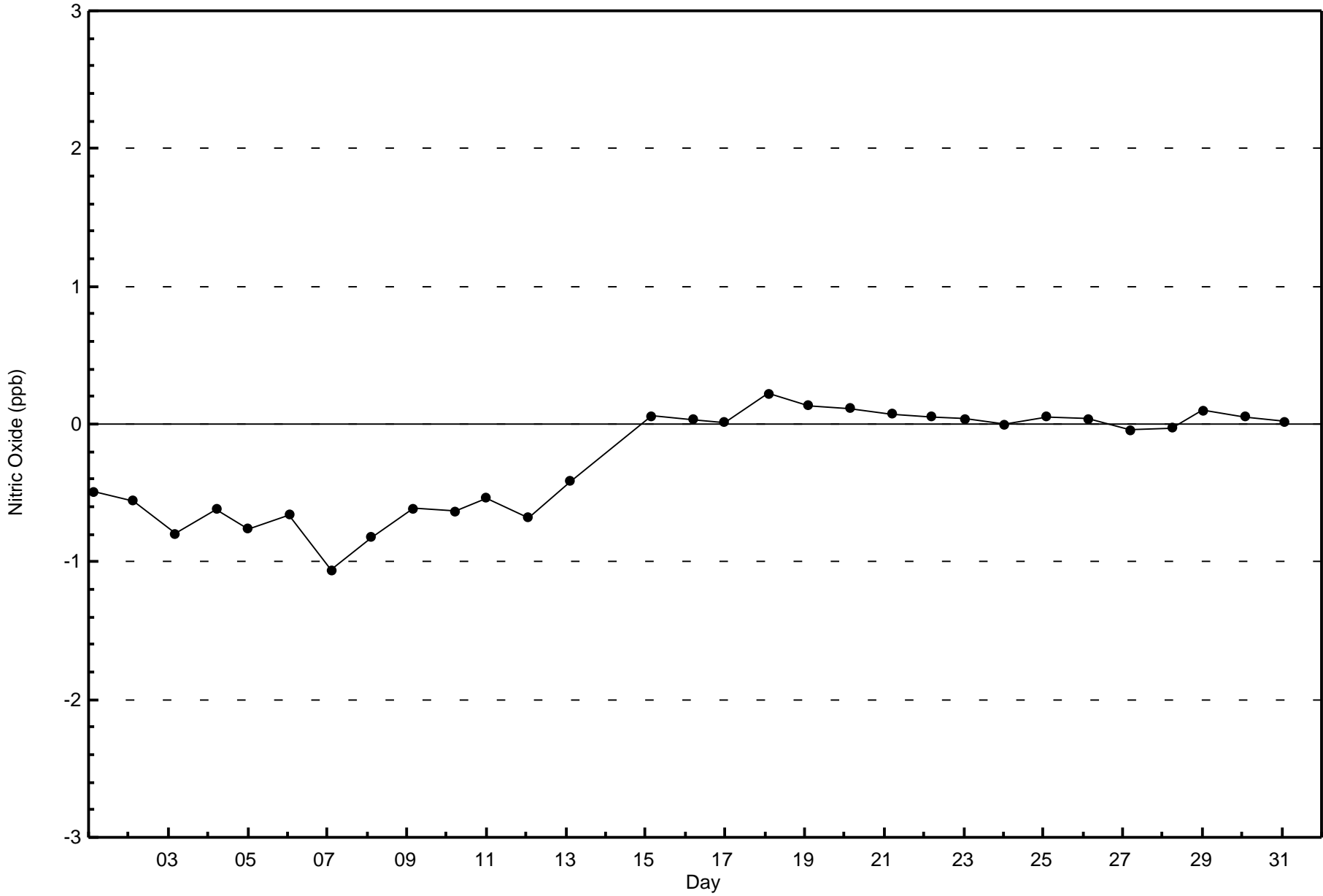
Total Number of Hours: 744



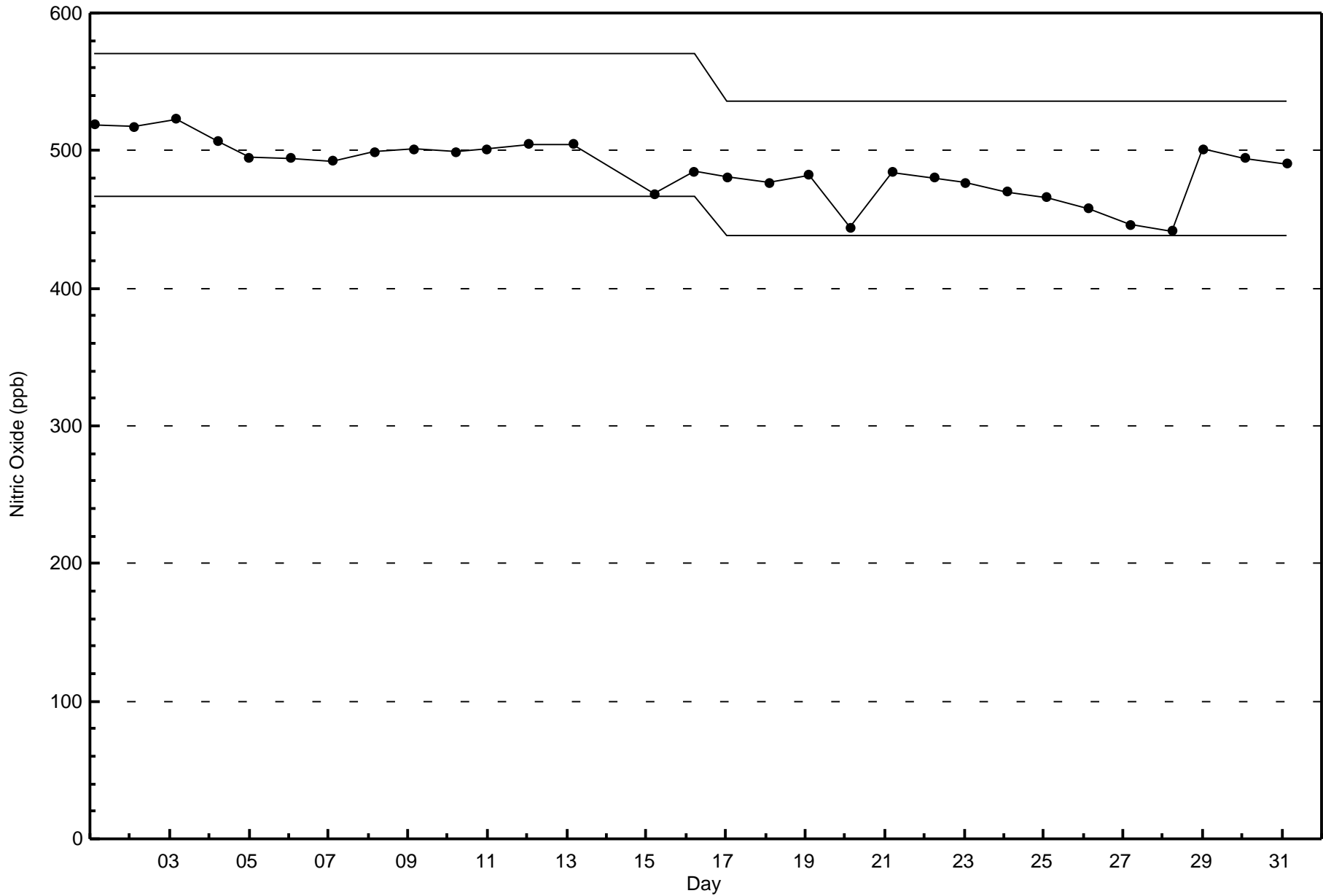
Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Nitric Oxide (NO) - ppb  
Millennium (AMS 12)











# Wood Buffalo Environmental Association

## Summary of Hour Averages

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

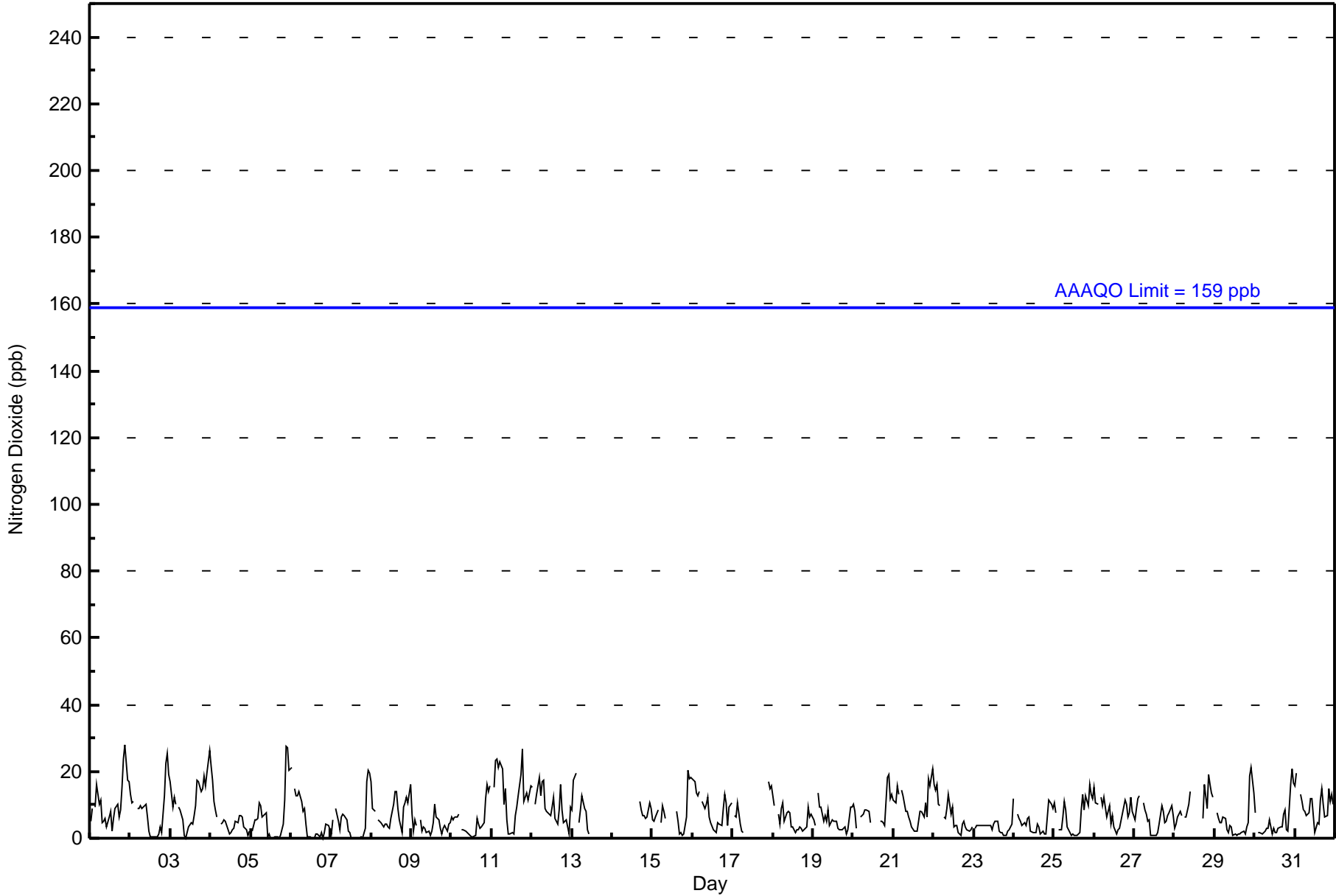
## Millennium - July 2015

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 28 ppb on Jul 1 22:00	Maximum Daily Average: 13.2 ppb on Jul 11		Hours of Data:	654
Minimum Value: 0 ppb on Jul 6 14:00	Minimum Daily Average: 3.2 ppb on Jul 23		Hours of Missing Data:	90
Maximum Diurnal Average: 12.4 ppb at hour 23	Minimum Diurnal Average: 2.7 ppb at hour 13		Hours of Calibration:	36
Monthly Average: 7.3 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 1 Q <sub>1</sub> = 3 Median = 6 Q <sub>3</sub> = 10 P <sub>90</sub> = 15 P <sub>99</sub> = 24		Percent Operational Time:	92.7

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-Jul	5	9	Z	9	16	10	11	5	5	6	4	7	8	2	6	9	10	6	8	15	24	28	17	17	10.3	28			
2-Jul	13	10	11	Z	9	9	10	9	10	10	6	2	1	1	1	1	1	1	3	2	13	22	26	19	8.1	26			
3-Jul	17	9	12	10	Z	9	9	5	1	0	2	4	5	4	7	10	18	17	14	15	19	16	19	26	10.7	26			
4-Jul	22	17	11	8	6	Z	4	5	6	5	3	1	2	2	3	5	5	7	7	3	3	1	2	2	5.8	22			
5-Jul	Z	2	6	6	6	11	10	7	7	8	0	1	0	0	0	1	1	0	1	4	11	28	27	21	6.8	28			
6-Jul	21	Z	15	13	13	14	11	8	9	4	1	1	0	0	0	1	1	1	2	0	2	4	4	3	5.5	21			
7-Jul	1	6	Z	9	5	3	6	7	7	5	2	2	0	0	0	0	0	0	0	0	3	17	21	20	4.9	21			
8-Jul	17	9	8	Z	6	5	5	3	4	4	3	3	6	10	14	14	9	6	2	9	11	12	11	16	8.1	17			
9-Jul	7	2	6	4	Z	6	2	3	3	2	2	1	2	5	10	7	5	3	1	3	4	2	4	5	3.8	10			
10-Jul	7	6	7	6	7	Z	3	3	2	2	1	1	1	1	1	6	4	3	3	5	12	16	14	16	5.4	16			
11-Jul	Z	15	24	24	21	23	21	10	15	5	1	1	2	1	7	9	13	19	27	11	12	14	12	16	13.2	27			
12-Jul	15	Z	10	13	18	13	17	18	9	8	7	7	9	12	6	4	9	16	8	5	5	4	1	9	9.7	18			
13-Jul	9	18	20	Z	5	8	13	9	8	2	1	M	M	M	M	M	M	M	M	M	M	M	M	M	--	20			
14-Jul	M	M	M	M	M	M	M	M	M	M	C	C	C	C	C	C	C	C	C	11	8	7	7	6	6	11	9	--	11
15-Jul	6	5	6	9	Z	5	10	8	6	M	M	M	M	M	M	8	5	1	2	1	1	6	20	18	18	7.4	20		
16-Jul	18	17	14	13	14	Z	11	9	10	12	6	5	3	2	2	5	4	4	9	13	11	4	9	11	8.9	18			
17-Jul	Z	7	7	10	4	2	2	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	17	15	16	--	17
18-Jul	13	10	Z	7	4	9	10	5	8	8	8	3	3	2	3	2	4	3	2	3	4	9	6	7	5.8	13			
19-Jul	6	4	Z	13	9	10	5	7	5	9	4	5	5	5	5	3	2	3	3	3	1	2	9	9	5.6	13			
20-Jul	10	8	3	Z	6	7	7	9	9	8	5	M	M	M	M	M	5	5	5	4	18	19	12	13	8.4	19			
21-Jul	11	11	16	13	Z	15	13	8	8	6	5	3	2	2	2	5	8	8	6	11	6	18	16	21	9.3	21			
22-Jul	16	14	16	10	10	Z	6	6	9	13	7	9	3	4	4	2	1	4	5	3	2	2	3	3	6.7	16			
23-Jul	Z	3	4	4	4	4	4	4	4	4	4	3	4	5	5	2	2	2	1	1	2	3	3	4	3.2	5			
24-Jul	12	Z	7	6	5	4	5	4	6	6	2	2	2	2	4	3	1	2	1	1	7	11	10	9	4.9	12			
25-Jul	10	8	Z	3	2	7	11	8	3	2	1	1	1	1	1	1	2	8	13	9	13	10	16	13	12	6.7	16		
26-Jul	15	11	10	Z	12	10	12	7	8	10	4	7	3	1	3	3	5	7	11	10	7	8	12	8	8.0	15			
27-Jul	6	9	12	13	Z	10	8	7	5	5	1	1	1	1	2	4	10	8	5	5	7	8	10	7	6.3	13			
28-Jul	3	4	6	8	7	Z	6	6	10	14	M	M	M	M	M	M	M	6	16	9	19	16	14	12	--	19			
29-Jul	Z	8	6	5	5	6	6	3	2	4	3	1	1	1	1	1	2	2	1	3	5	19	21	14	5.2	21			
30-Jul	8	Z	2	2	1	2	2	3	3	6	1	3	2	2	3	4	4	7	9	3	2	16	21	17	5.2	21			
31-Jul	16	19	Z	13	11	9	8	7	8	12	12	7	2	5	4	12	15	10	7	7	15	11	13	10	10.0	19			

11.3	9.2	9.9	9.2	8.3	8.3	8.3	6.6	6.5	6.4	3.6	3.1	2.7	2.8	3.8	4.6	5.6	6.0	6.0	5.9	8.5	12.4	12.4	12.3	Diurnal Average	
22	19	24	24	21	23	21	18	15	14	12	9	9	12	14	14	18	19	19	27	15	24	28	27	26	Diurnal Maximum

Z - zeronpan      C - Calibration      M - Maintenance      PF - Power Failure  
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb





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

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Millennium - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	634	96.94	96.94
21 - 40	20	3.06	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: 654

Total Number of Hours: 744



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Millennium - July 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	73	35	16	11	8	12	27	43	53	79	53	46	57	41	47	33	634
21 - 40	0	0	1	0	1	0	5	2	1	8	0	0	0	2	0	0	20
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	73	35	17	11	9	12	32	45	54	87	53	46	57	43	47	33	654

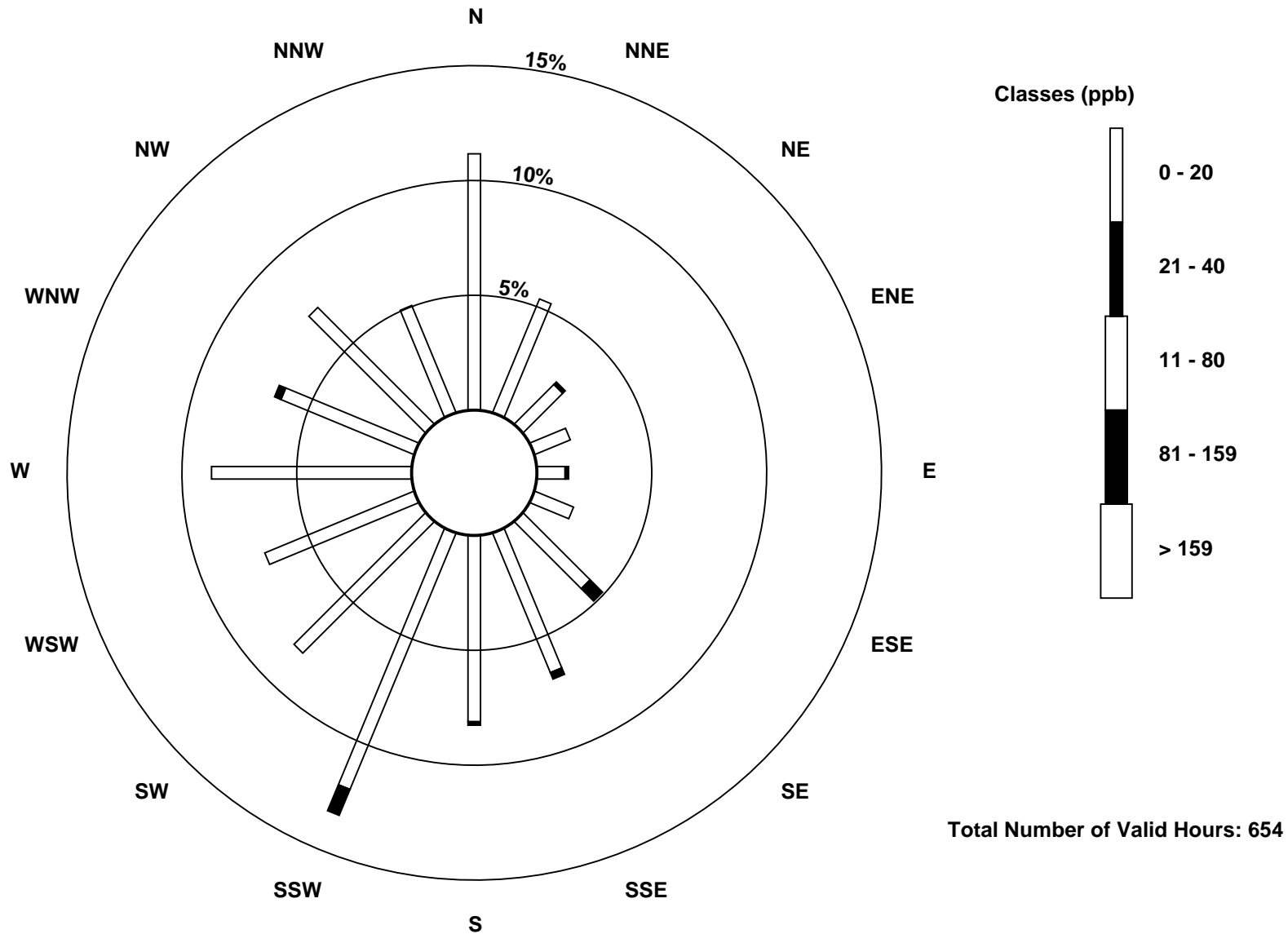
Total Number of Valid Hours: 654

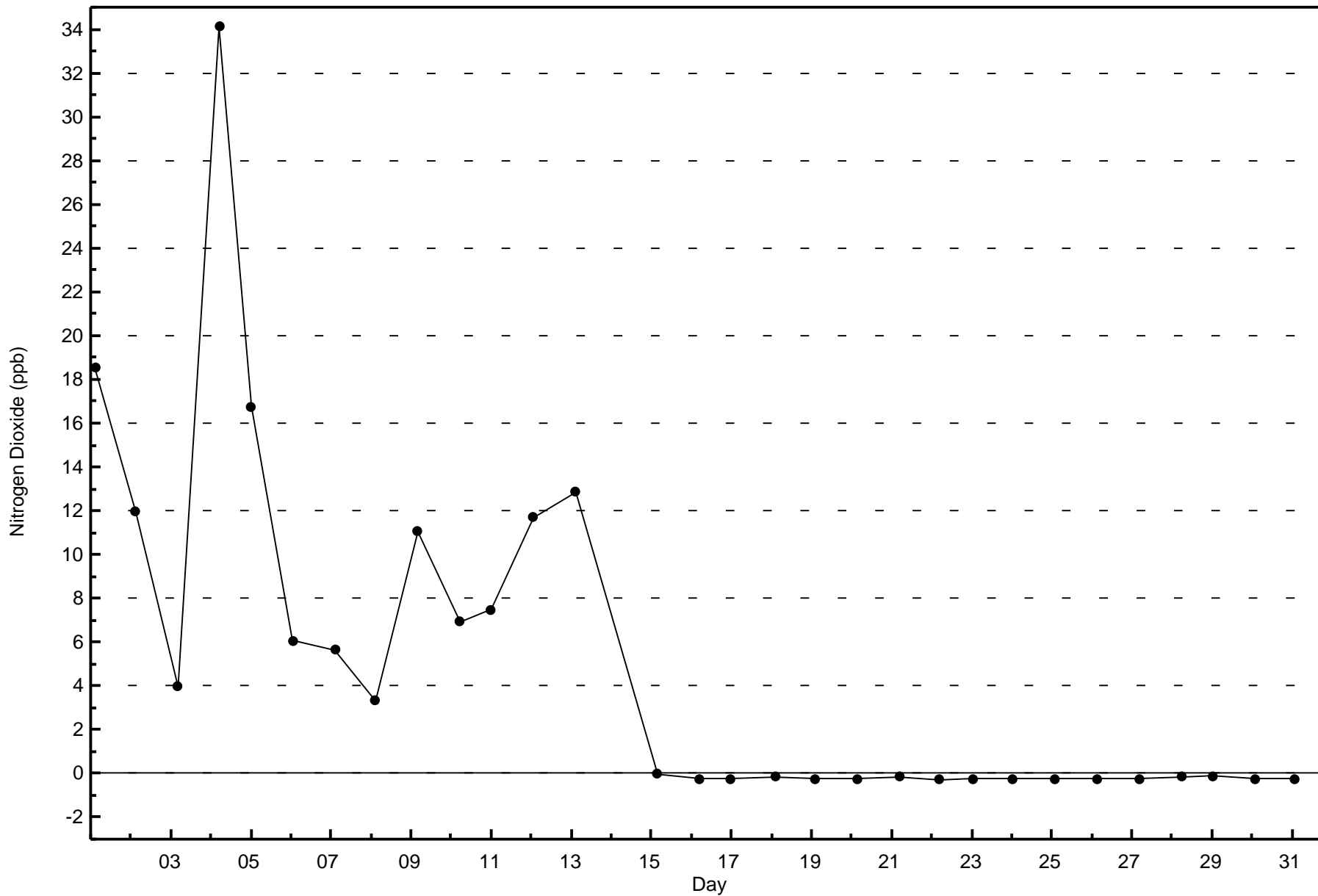
Total Number of Hours: 744

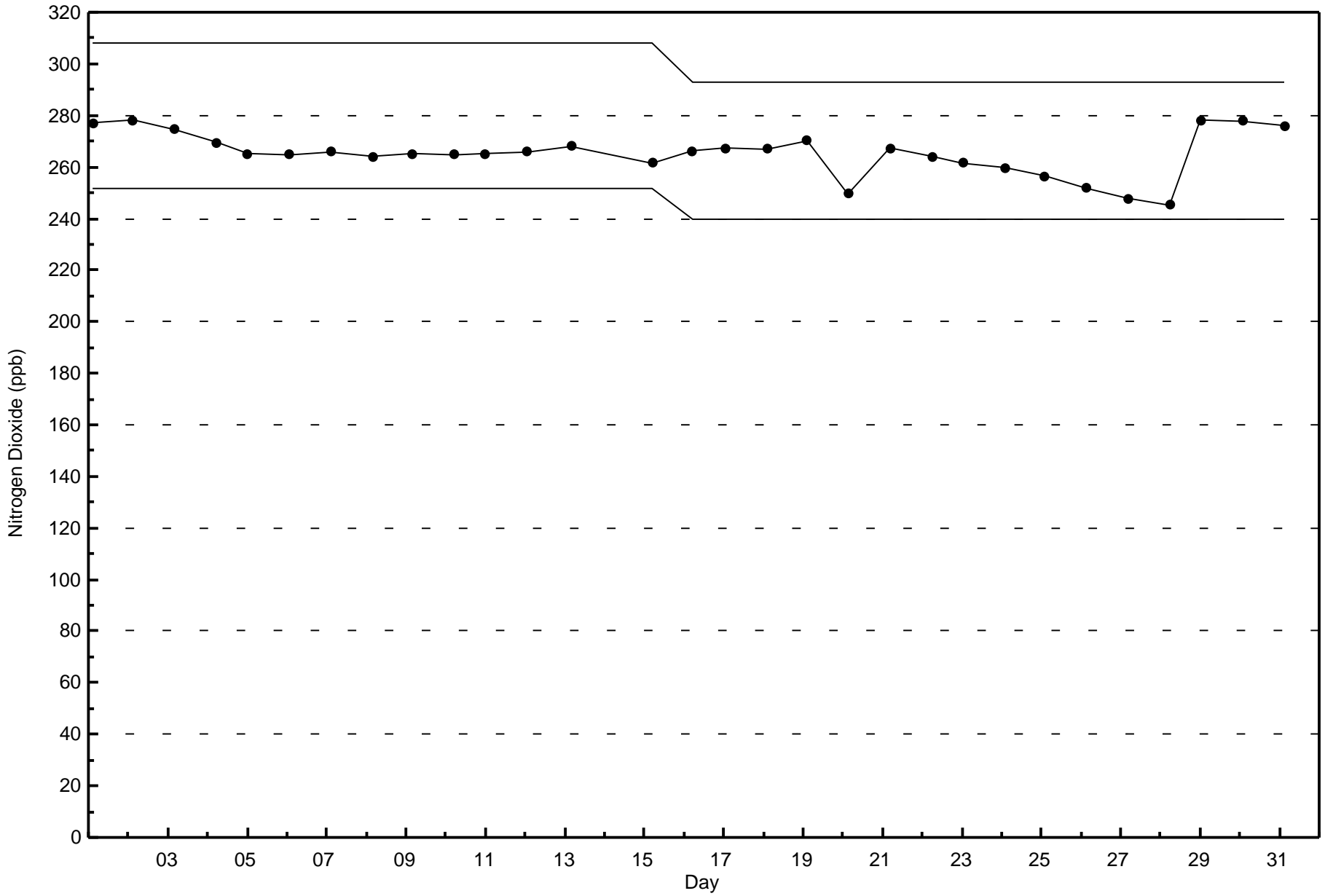


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Millennium (AMS 12)











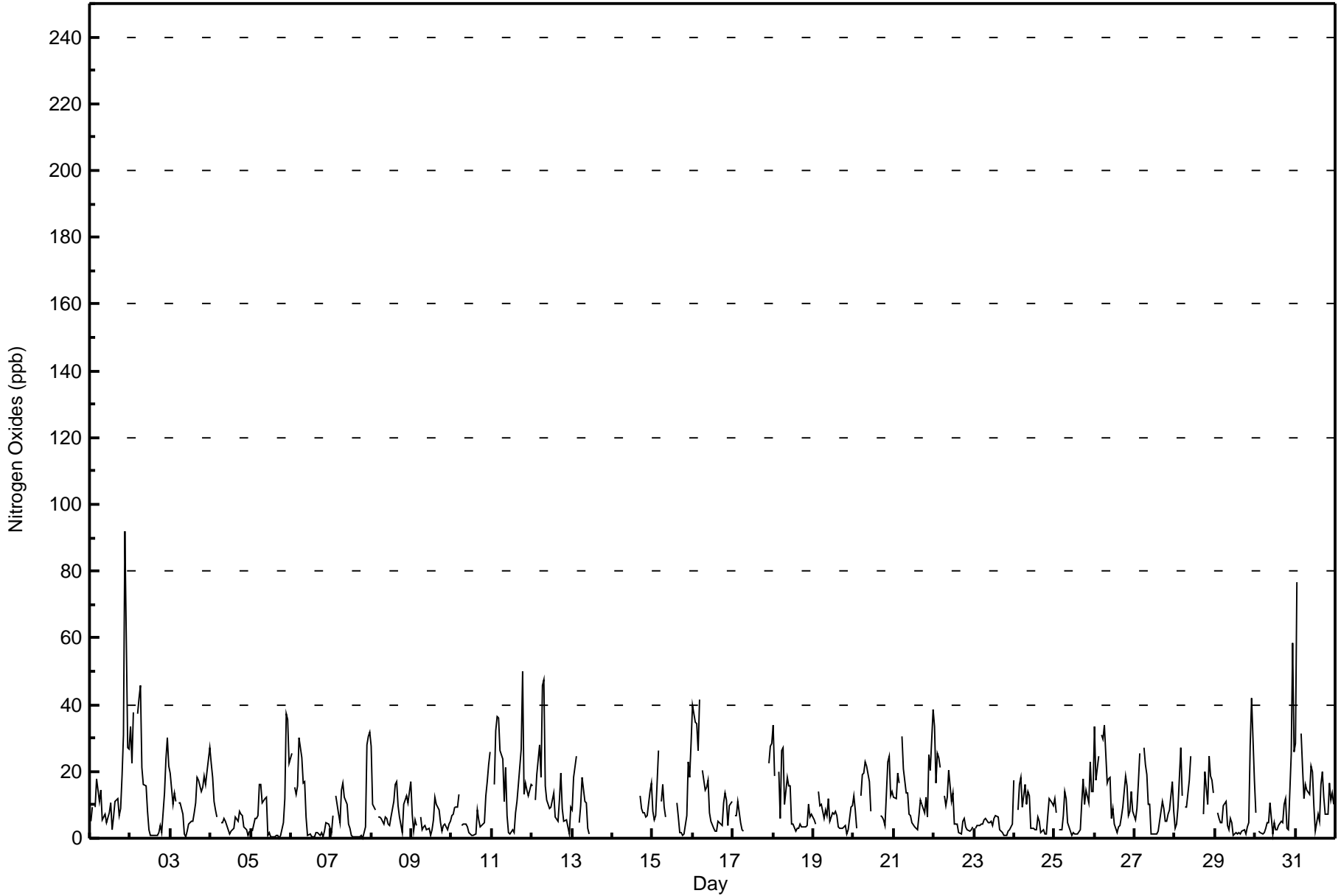
# Wood Buffalo Environmental Association

## Summary of Hour Averages

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

## Millennium - July 2015

Maximum Value: 92 ppb on Jul 1 22:00														Maximum Daily Average: 17.4 ppb on Jul 11														Hours in Service: 744	
Minimum Value: 0 ppb on Jul 5 18:00														Minimum Daily Average: 3.9 ppb on Jul 23														Hours of Data: 654	
Maximum Diurnal Average: 17.1 ppb at hour 1														Minimum Diurnal Average: 3.5 ppb at hour 13														Hours of Missing Data: 90	
Monthly Average: 10.7 ppb														Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 2 Q <sub>1</sub> = 3 Median = 7 Q <sub>3</sub> = 15 P <sub>90</sub> = 25 P <sub>99</sub> = 46														Hours of Calibration: 36	
																												Percent Operational Time: 92.7	
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-Jul	5	9	Z	9	18	11	14	5	6	7	5	8	11	3	6	11	12	7	9	19	31	92	27	27	15.3	92			
2-Jul	34	22	38	Z	37	42	46	21	16	16	8	2	1	1	1	1	1	2	4	2	13	24	30	22	16.6	46			
3-Jul	20	10	14	11	Z	11	11	7	1	0	2	4	5	5	8	10	18	17	14	15	19	16	20	27	11.6	27			
4-Jul	22	18	11	8	6	Z	5	5	6	5	3	1	2	3	3	6	5	8	7	7	3	3	1	2	6.2	22			
5-Jul	Z	2	6	6	7	16	16	11	12	12	1	2	1	0	0	1	1	0	1	5	12	37	36	22	9.0	37			
6-Jul	25	Z	15	13	16	30	24	16	17	6	1	1	1	0	0	2	2	1	2	0	2	5	4	3	8.2	30			
7-Jul	2	7	Z	13	7	5	15	17	12	10	4	3	1	1	0	1	1	0	1	0	4	28	31	32	8.4	32			
8-Jul	28	10	8	Z	6	6	6	4	7	6	4	4	6	11	16	17	10	6	2	10	11	13	11	17	9.5	28			
9-Jul	7	2	6	4	Z	6	3	4	4	3	3	1	3	5	12	10	8	4	2	4	4	2	4	5	4.6	12			
10-Jul	7	7	9	9	13	Z	4	4	4	3	2	1	1	1	1	9	6	3	4	5	13	17	22	26	7.4	26			
11-Jul	Z	16	32	36	36	26	24	11	21	7	2	1	2	2	8	11	16	27	50	13	16	14	13	16	17.4	50			
12-Jul	16	Z	12	19	28	18	46	47	16	11	9	9	12	13	6	5	11	19	9	5	6	3	1	9	14.4	47			
13-Jul	9	18	25	Z	5	10	18	11	11	3	1	M	M	M	M	M	M	M	M	M	M	M	M	M	--	25			
14-Jul	M	M	M	M	M	M	M	M	M	M	M	C	C	C	C	C	C	13	9	7	8	6	7	14	17	--	17		
15-Jul	8	5	7	26	Z	11	16	9	6	M	M	C	C	M	11	6	2	2	1	1	7	23	18	29	10.4	29			
16-Jul	40	35	34	26	41	Z	20	15	15	18	8	5	3	2	2	5	5	4	11	14	11	4	10	11	14.7	41			
17-Jul	Z	7	7	11	5	2	2	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	--	28			
18-Jul	34	19	Z	20	6	26	27	10	18	16	15	4	4	2	3	3	4	3	3	3	4	10	6	7	10.8	34			
19-Jul	6	4	Z	14	10	10	6	9	7	12	5	8	7	8	7	3	3	3	3	4	1	2	9	10	6.6	14			
20-Jul	13	9	3	Z	13	19	19	23	22	17	8	M	M	M	M	M	7	6	6	4	23	24	13	14	13.4	24			
21-Jul	12	12	19	16	Z	30	21	14	14	7	7	5	3	3	3	7	11	10	7	12	6	25	20	38	13.2	38			
22-Jul	33	17	25	24	21	Z	13	10	12	21	11	13	4	4	4	2	1	5	6	3	2	2	2	3	10.5	33			
23-Jul	Z	3	4	4	4	4	5	6	5	5	5	4	6	7	6	3	2	2	1	1	2	3	3	4	3.9	7			
24-Jul	17	Z	9	16	18	9	16	10	14	13	3	3	3	3	6	5	2	3	1	1	7	12	11	10	8.3	18			
25-Jul	12	8	Z	2	2	7	14	12	4	2	1	2	1	1	1	2	11	18	10	14	11	23	14	14	8.1	23			
26-Jul	33	18	25	Z	31	30	34	17	18	18	6	9	4	2	3	4	6	9	19	16	7	8	14	8	14.7	34			
27-Jul	6	9	17	25	Z	27	22	19	10	10	1	1	1	1	2	5	11	9	5	5	7	8	17	8	9.9	27			
28-Jul	3	4	9	27	13	Z	9	10	17	25	M	M	M	M	M	M	M	7	20	10	25	19	17	13	--	27			
29-Jul	Z	8	6	5	5	10	11	4	2	6	4	1	2	1	2	1	2	2	1	3	5	27	42	17	7.3	42			
30-Jul	7	Z	2	2	1	2	3	5	5	11	1	5	3	2	4	5	5	10	12	3	2	25	59	26	8.6	59			
31-Jul	28	77	Z	31	21	12	16	14	13	22	20	10	2	7	5	16	20	12	7	7	16	11	13	10	17.0	77			
17.1														13.7														Diurnal Average	
40														77														Diurnal Maximum	
Z - zerospan			C - Calibration			M - Maintenance			PF - Power Failure																				





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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Millennium - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	565	86.39	86.39
21 - 40	79	12.08	98.47
41 - 80	9	1.38	99.85
81 - 159	1	0.15	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 654

Total Number of Hours: 744



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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Millennium - July 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	71	35	12	9	7	8	22	38	39	56	48	43	57	40	47	33	565
21 - 40	2	0	4	2	1	3	10	4	14	28	5	3	0	3	0	0	79
11 - 80	0	0	1	0	1	1	0	2	1	3	0	0	0	0	0	0	9
81 - 159	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	73	35	17	11	9	12	32	45	54	87	53	46	57	43	47	33	654

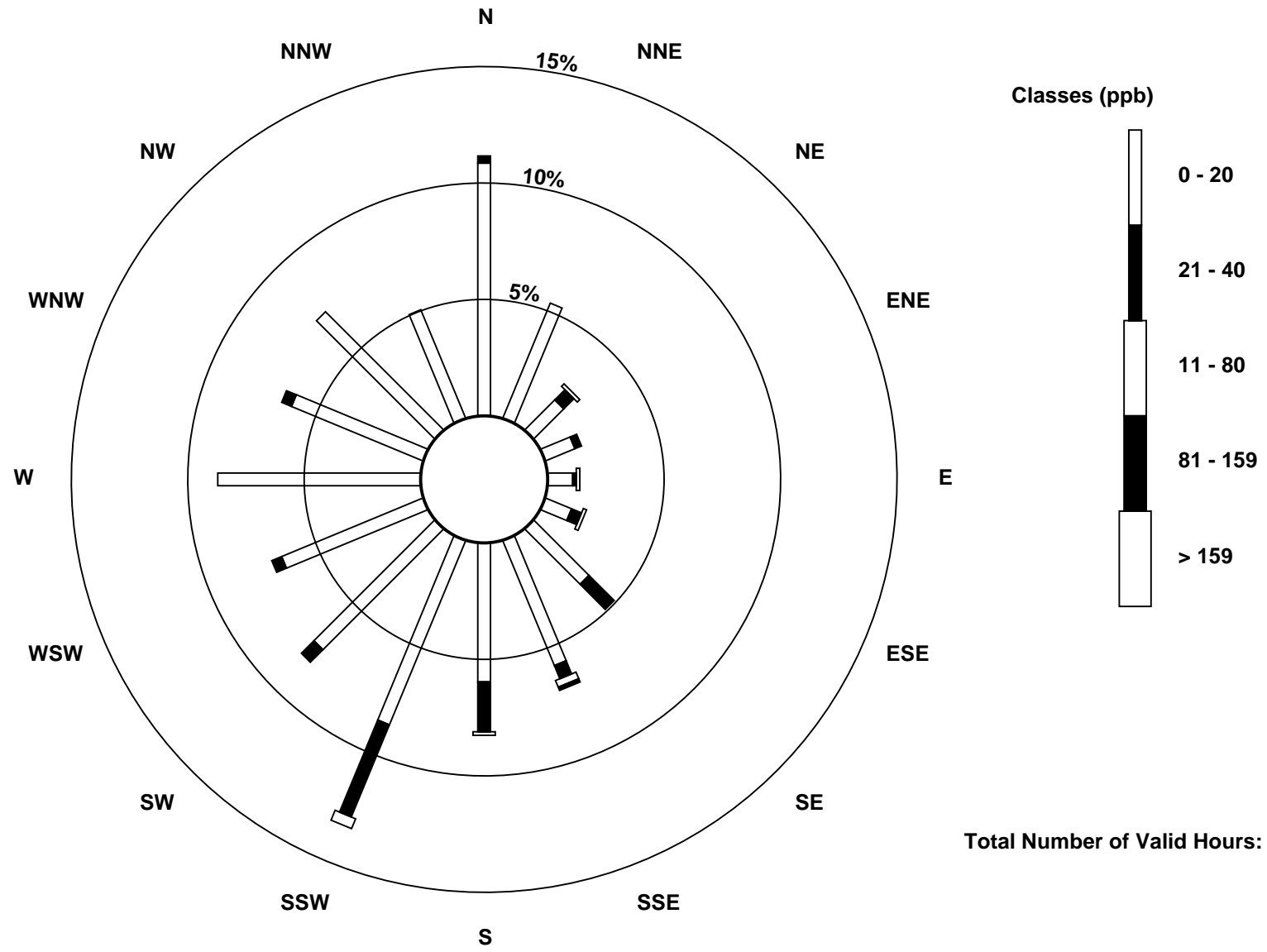
Total Number of Valid Hours: 654

Total Number of Hours: 744

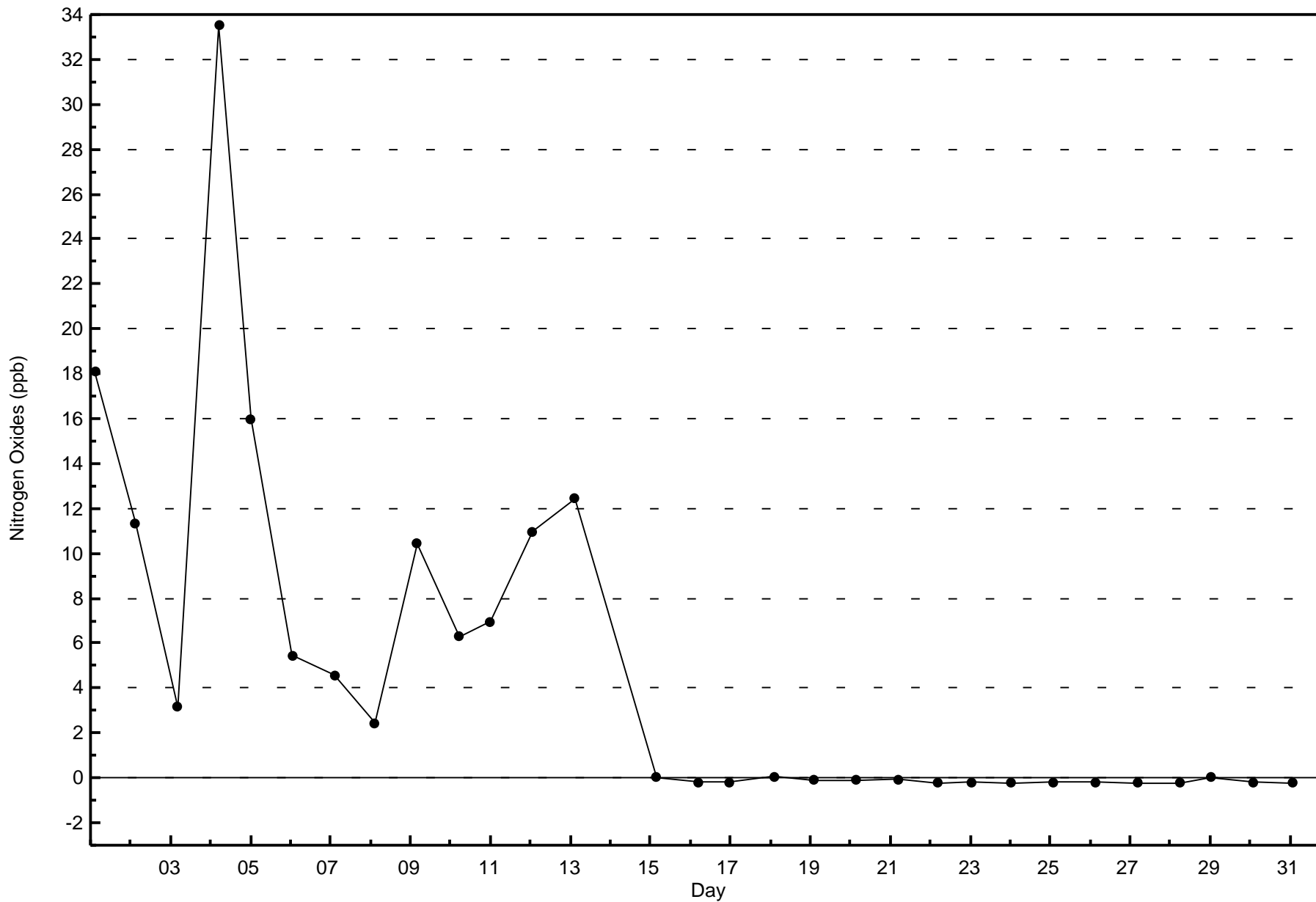


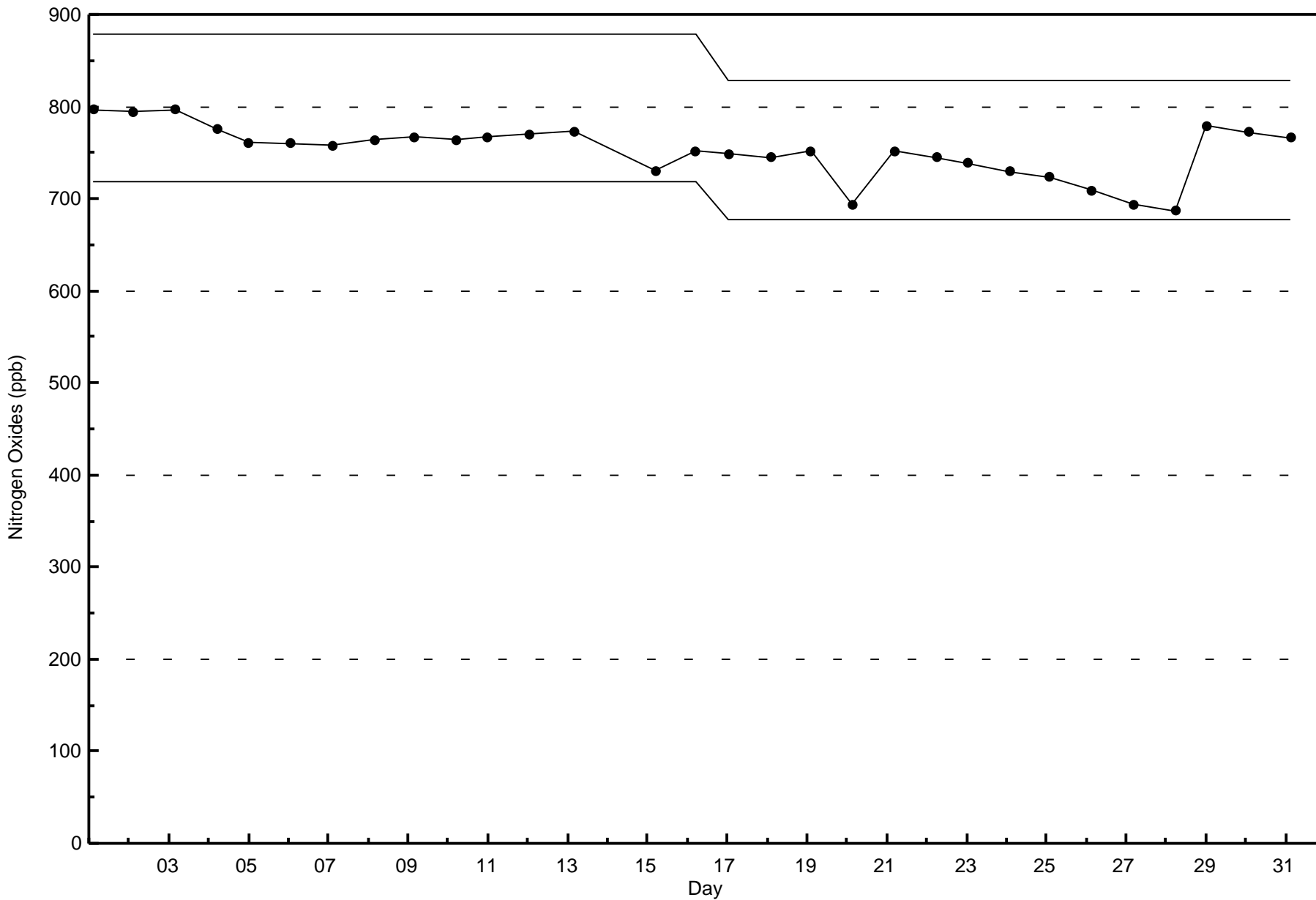
Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Millennium (AMS 12)



Total Number of Valid Hours: 654





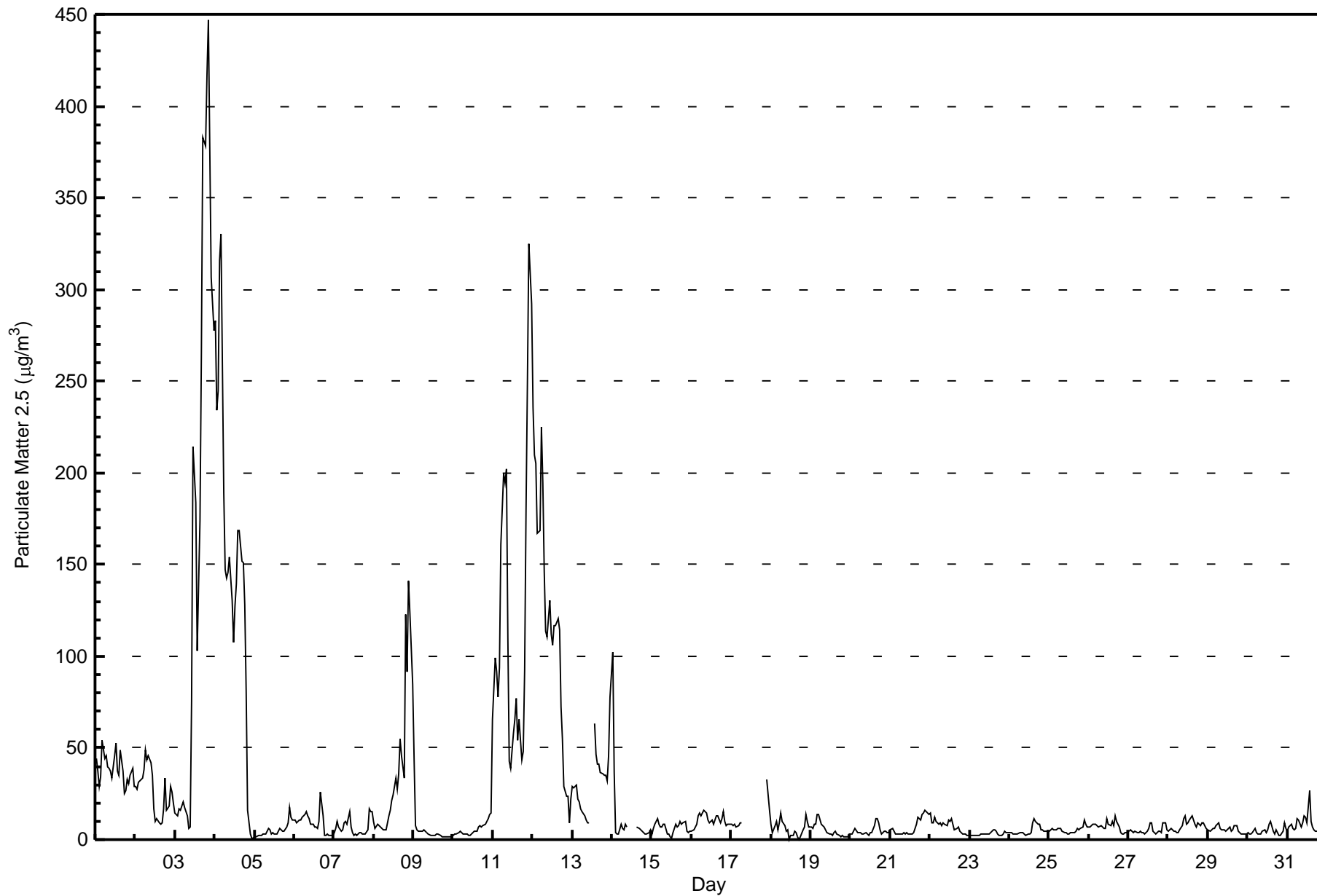


Summary of Hour Averages

Millennium - July 2015

Number of Exceedences (AAAQO): 24-hr: 7		Hours in Service: 744																																															
Maximum Value: 446.9 µg/m <sup>3</sup> on Jul 3 21:00		Maximum Daily Average: 161.9 µg/m <sup>3</sup> on Jul 3																																															
Minimum Value: 0.1 µg/m <sup>3</sup> on Jul 18 18:00		Hours of Data: 723																																															
Maximum Diurnal Average: 34.9 µg/m <sup>3</sup> at hour 22		Hours of Missing Data: 21																																															
Monthly Average: 27.49 µg/m <sup>3</sup>		Hours of Calibration: 0																																															
Minimum Daily Average: 3.1 µg/m <sup>3</sup> on Jul 23		Percent Operational Time: 97.2																																															
Minimum Diurnal Average: 20.3 µg/m <sup>3</sup> at hour 11		Percentiles: P <sub>1</sub> = 1.2 P <sub>10</sub> = 2.8 Q <sub>1</sub> = 3.9 Median = 7.2 Q <sub>3</sub> = 14.9 P <sub>90</sub> = 76.6 P <sub>99</sub> = 321.1																																															
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-Jul	44.0	37.4	28.8	34.3	54.3	44.1	45.8	39.8	38.9	37.5	33.7	46.1	52.7	37.4	34.8	48.5	37.4	25.4	26.5	32.6	30.6	35.4	38.8	28.7	38.1	54.3																							
2-Jul	29.0	27.5	31.2	32.7	33.7	38.4	48.7	43.2	45.8	41.8	35.1	16.4	9.9	11.4	9.3	8.3	8.8	16.9	33.3	16.0	18.6	29.2	25.6	19.6	26.3	48.7																							
3-Jul	14.8	13.1	16.6	16.4	18.2	20.8	17.2	13.0	6.2	7.2	75.6	214.7	183.8	103.0	139.1	174.1	265.8	382.8	378.4	417.2	446.9	376.5	306.8	277.9	161.9	446.9																							
4-Jul	282.8	234.1	244.5	315.5	330.5	189.3	147.3	142.5	145.7	153.8	130.6	107.9	127.6	139.9	168.5	168.5	151.8	150.9	128.2	80.9	15.8	3.3	1.1	1.0	148.4	330.5																							
5-Jul	1.2	1.7	1.9	2.2	2.7	3.1	3.3	3.1	6.2	5.6	3.2	3.7	2.7	3.1	4.8	5.9	5.2	4.5	4.7	6.7	8.9	17.9	12.5	10.7	5.2	17.9																							
6-Jul	10.5	9.4	10.2	10.8	10.5	12.2	13.9	15.5	13.1	11.4	8.1	8.4	6.9	6.5	6.4	9.7	25.9	13.3	2.3	2.1	3.0	2.4	2.0	2.5	9.0	25.9																							
7-Jul	3.6	6.2	9.8	6.8	4.7	5.4	9.0	10.0	8.7	15.0	6.9	3.9	2.3	2.9	2.5	3.5	3.7	3.3	3.3	3.2	5.0	16.9	14.9	14.9	6.9	16.9																							
8-Jul	9.7	5.9	8.3	7.7	6.5	5.9	5.5	5.5	8.9	12.6	15.6	21.2	24.1	33.8	27.2	35.7	55.0	46.0	33.7	122.9	91.4	141.4	123.5	84.9	38.9	141.4																							
9-Jul	44.4	7.3	5.3	4.5	4.5	4.9	5.0	4.8	4.0	2.7	2.4	2.2	2.1	2.1	2.8	2.8	2.2	1.8	1.5	1.4	1.5	1.6	1.5	2.0	4.8	44.4																							
10-Jul	2.6	2.7	3.2	3.7	4.2	4.1	3.2	3.2	2.7	2.2	2.2	2.9	3.8	4.2	4.6	6.5	7.2	7.0	7.3	8.1	9.6	11.3	13.9	14.7	5.6	14.7																							
11-Jul	65.4	99.4	91.2	77.8	94.0	161.0	200.2	194.5	202.2	110.3	42.7	38.9	57.7	65.3	77.1	54.4	65.6	43.5	48.3	92.5	180.1	250.2	325.1	292.4	122.1	325.1																							
12-Jul	235.5	209.7	205.3	167.3	168.8	225.3	194.5	146.3	113.6	110.6	130.5	112.0	105.9	116.7	116.8	120.6	114.7	72.2	54.8	29.1	23.7	23.4	9.0	22.4	117.9	235.5																							
13-Jul	29.2	28.3	29.8	22.4	20.7	16.5	15.2	13.2	10.3	9.1	9.4	M	M	63.4	46.7	40.8	41.2	36.6	35.8	34.8	35.0	31.7	46.0	78.1	31.6	78.1																							
14-Jul	102.0	36.8	3.5	3.0	3.1	8.5	6.0	5.2	8.4	7.1	M	M	M	M	M	6.7	6.2	5.2	4.8	4.2	3.3	3.2	3.5	5.5	11.9	102.0																							
15-Jul	2.7	6.4	8.1	11.3	8.8	7.0	7.2	8.2	8.0	2.9	2.9	1.9	1.0	3.8	8.4	7.2	7.4	9.7	8.2	9.0	9.8	4.9	4.0	4.2	6.4	11.3																							
16-Jul	4.3	5.5	7.2	8.4	13.2	14.4	12.7	16.2	14.9	14.4	10.5	8.9	10.4	8.6	11.0	12.6	12.7	9.3	11.3	15.3	10.2	7.9	8.6	8.1	10.7	16.2																							
17-Jul	8.0	7.6	8.2	7.0	7.5	9.4	9.0	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	32.5	24.6	15.7	--	32.5																							
18-Jul	8.5	3.9	7.7	9.5	5.6	9.3	14.7	10.1	7.4	4.6	5.2	0.3	2.3	2.1	4.3	4.0	1.2	0.1	1.2	5.2	6.9	13.8	9.9	6.9	6.0	14.7																							
19-Jul	6.7	6.3	8.0	8.2	14.1	13.8	8.6	7.9	6.8	5.1	3.8	3.3	2.7	2.5	3.8	4.6	3.3	2.1	1.8	2.0	1.6	1.4	1.9	3.1	5.1	14.1																							
20-Jul	3.4	3.2	4.9	6.2	4.0	4.0	3.7	3.2	2.9	3.9	3.0	2.5	3.5	4.1	7.9	11.8	11.8	9.0	5.4	3.4	4.8	4.4	4.0	3.6	4.9	11.8																							
21-Jul	5.3	5.8	4.6	3.0	3.0	3.1	3.2	3.3	3.5	3.4	3.5	2.8	2.8	3.1	3.9	5.9	8.2	12.3	10.6	13.7	14.3	16.4	14.9	13.6	6.8	16.4																							
22-Jul	14.3	9.1	9.0	12.4	10.0	8.7	9.2	8.0	9.0	8.7	7.6	10.4	10.0	11.6	8.2	5.5	6.1	6.6	4.8	3.8	3.0	2.8	2.6	2.6	7.7	14.3																							
23-Jul	2.1	1.9	2.0	2.1	2.1	2.5	2.7	3.0	2.9	2.8	3.0	2.8	3.1	3.8	5.3	5.3	4.3	2.9	2.4	2.6	2.9	4.3	4.0	3.4	3.1	5.3																							
24-Jul	4.0	3.6	3.3	3.2	3.1	3.3	4.0	3.4	3.5	2.9	2.5	2.8	2.9	3.6	8.9	11.6	10.3	8.7	8.1	5.6	5.3	4.6	4.3	4.2	4.9	11.6																							
25-Jul	4.7	5.6	6.1	5.0	5.2	5.8	6.2	5.8	4.6	3.9	3.5	3.2	3.2	4.1	4.2	4.1	4.7	6.3	5.5	6.3	7.0	10.5	8.1	7.2	5.5	10.5																							
26-Jul	6.9	7.2	8.2	8.1	8.1	7.5	7.1	7.4	6.8	6.2	6.1	11.1	8.0	7.7	10.1	7.7	12.9	10.1	7.1	3.8	2.8	3.0	3.7	4.1	7.2	12.9																							
27-Jul	4.8	5.3	4.5	4.1	4.3	4.1	4.1	4.2	3.6	3.9	3.3	4.3	6.0	8.9	9.2	4.7	3.2	3.5	4.6	4.7	3.7	9.0	8.9	5.4	5.1	9.2																							
28-Jul	4.4	5.5	6.1	4.8	4.2	3.8	4.0	5.3	7.4	11.5	13.2	8.3	9.2	10.9	13.3	10.9	8.5	7.2	8.9	7.3	9.3	9.4	7.5	5.8	7.8	13.3																							
29-Jul	5.0	4.8	5.7	6.0	6.4	7.7	9.1	5.7	5.1	5.2	5.0	4.9	5.8	6.6	4.9	5.6	7.6	7.6	4.6	3.5	3.0	2.9	3.1	3.4	5.4	9.1																							
30-Jul	3.7	2.9	3.0	4.0	5.9	3.9	2.8	3.0	3.0	4.9	5.2	4.1	5.6	8.6	9.7	4.8	3.3	5.1	3.7	2.6	2.7	4.5	8.8	5.8	4.6	9.7																							
31-Jul	4.4	7.0	8.7	6.2	5.4	6.2	11.8	10.5	7.2	9.4	12.9	12.4	9.5	26.8	10.1	7.2	5.0	4.3	4.7	4.7	4.9	4.7	5.1	5.5	8.1	26.8																							
																								31.2	26.2	25.6	26.3	28.0	27.6	26.9	24.8	23.7	20.7	20.3	23.7	23.8	24.4	26.3	26.6	30.0	30.5	28.5	31.5	32.2	34.9	33.8	30.9	Diurnal Average	
																								282.8	234.1	244.5	315.5	330.5	225.3	200.2	194.5	202.2	153.8	130.6	214.7	183.8	139.9	168.5	174.1	265.8	382.8	378.4	417.2	446.9	376.5	325.1	292.4	Diurnal Maximum	
M - Maintenance PF - Power Failure																								Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m <sup>3</sup>																									







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

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Millennium - July 2015**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
1 - 5	285	39.42	39.42
6 - 15	261	36.10	75.52
16 - 25	27	3.73	79.25
26 - 80	77	10.65	89.90
> 81.0	69	9.54	99.45

Total Number of Valid Hours: 723

Total Number of Hours: 744



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

**Particulate Matter 2.5 (PM<sub>2.5</sub>) - μg/m<sup>3</sup>**  
**Millennium - July 2015**

Concentration Ranges (μg/m <sup>3</sup> )	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	49	15	8	2	2	3	17	20	22	27	26	21	30	14	14	15	285
6 - 15	20	15	5	7	2	4	6	24	29	44	15	21	16	23	22	8	261
16 - 25	1	0	0	0	0	0	0	3	6	5	5	4	1	0	0	2	27
26 - 80	2	4	4	1	3	1	7	9	8	22	3	4	5	1	1	2	77
> 81.0	2	2	2	3	3	5	7	3	0	0	4	2	7	11	10	8	69
<b>Totals</b>	74	36	19	13	10	13	37	59	65	98	53	52	59	49	47	35	719

Total Number of Valid Hours: 723

Total Number of Hours: 744



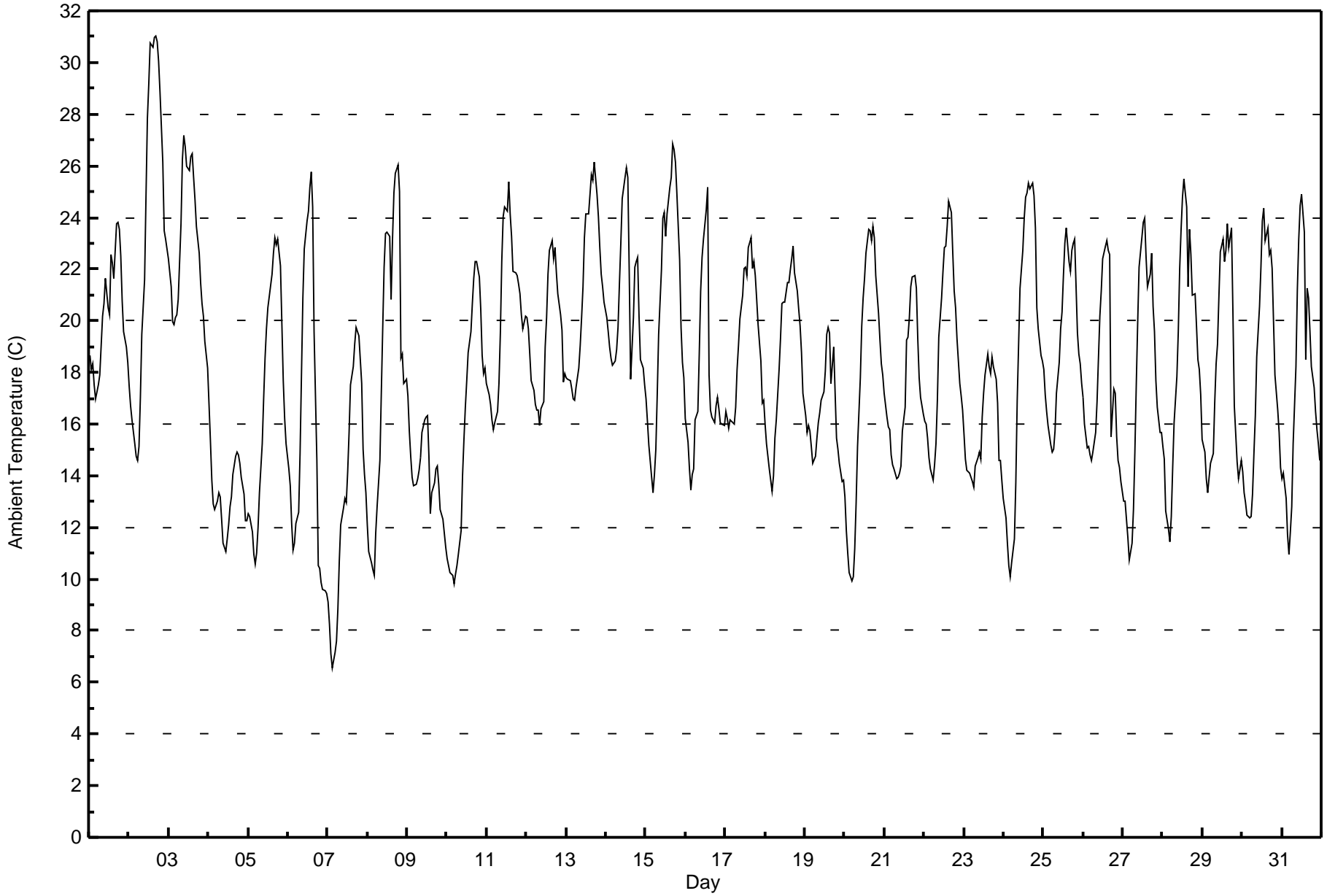


Maximum Value: 31.0 C on Jul 2 17:00		Maximum Daily Average: 23.3 C on Jul 2		Hours in Service: 744																																												
Minimum Value: 6.6 C on Jul 7 04:00		Minimum Daily Average: 13.3 C on Jul 7		Hours of Data: 744																																												
Maximum Diurnal Average: 22.4 C at hour 14		Minimum Diurnal Average: 13.5 C at hour 5		Hours of Missing Data: 0																																												
Monthly Average: 18.17 C		Percentiles: P <sub>1</sub> = 9.5 P <sub>10</sub> = 12.5 Q <sub>1</sub> = 14.7 Median = 17.9 Q <sub>3</sub> = 21.8 P <sub>90</sub> = 23.9 P <sub>99</sub> = 28.4		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-Jul	18.6	18.1	18.3	17.5	17.0	17.5	17.9	19.0	20.2	20.7	21.7	20.5	20.2	22.6	22.2	21.6	23.7	23.8	23.5	22.5	20.8	19.6	19.0	18.4	20.2	23.8																						
2-Jul	17.4	16.7	16.2	15.3	14.8	14.6	15.1	17.0	19.5	21.6	24.8	27.8	29.2	30.8	30.6	31.0	31.0	30.8	30.1	28.8	26.1	23.5	23.2	22.8	23.3	31.0																						
3-Jul	22.4	21.3	19.9	19.9	20.1	20.3	20.8	23.8	26.3	27.2	26.7	26.0	25.8	26.3	26.5	25.6	24.7	23.7	22.6	21.5	20.7	20.2	19.2	18.2	22.9	27.2																						
4-Jul	16.8	15.3	13.8	12.9	12.7	13.0	13.4	13.2	12.3	11.4	11.0	11.6	12.1	12.8	13.2	14.0	14.7	14.9	14.8	14.5	13.9	13.3	12.3	12.3	13.3	16.8																						
5-Jul	12.5	12.4	11.8	11.0	10.6	11.0	12.0	13.4	15.3	17.0	18.6	19.7	20.5	21.3	21.8	22.6	23.2	22.9	23.2	22.1	19.9	17.7	16.2	15.2	17.2	23.2																						
6-Jul	14.3	13.6	12.1	11.1	11.4	12.1	12.6	14.8	17.9	20.9	22.8	23.9	24.2	25.2	25.8	24.4	19.6	14.6	10.5	10.4	9.9	9.6	9.6	9.5	15.9	25.8																						
7-Jul	9.1	8.3	7.1	6.6	7.1	7.6	8.8	10.7	12.1	12.8	13.1	12.9	14.2	15.6	17.5	18.2	19.1	19.7	19.6	19.4	17.6	15.0	14.0	13.3	13.3	19.7																						
8-Jul	12.1	11.0	10.6	10.4	10.2	11.8	12.8	14.6	17.2	19.7	22.1	23.4	23.4	23.3	20.8	23.1	24.9	25.7	26.0	25.0	18.6	18.7	17.6	17.7	18.4	26.0																						
9-Jul	17.1	15.7	14.8	13.9	13.6	13.7	13.9	14.2	14.7	15.7	16.1	16.3	16.3	14.7	12.5	13.3	13.7	14.2	14.4	13.7	12.7	12.3	11.8	11.2	14.2	17.1																						
10-Jul	10.8	10.5	10.2	10.1	9.8	10.2	10.5	11.0	11.9	14.0	15.4	16.6	17.7	18.7	19.6	20.7	21.6	22.3	22.3	21.7	20.4	18.7	17.9	18.1	15.9	22.3																						
11-Jul	17.6	17.1	16.7	16.2	15.8	16.1	16.5	17.6	19.5	22.3	24.0	24.4	24.2	25.4	24.1	23.3	21.9	21.9	21.8	21.4	21.0	20.2	19.7	20.2	20.4	25.4																						
12-Jul	20.1	19.7	18.7	17.7	17.3	16.7	16.5	16.5	16.0	16.6	16.8	19.0	20.1	21.8	22.7	23.1	22.4	22.8	21.9	21.0	20.3	19.6	17.6	17.9	19.3	23.1																						
13-Jul	17.8	17.7	17.7	17.3	17.0	16.9	17.4	18.1	19.0	20.1	21.3	23.2	24.1	24.1	24.9	25.6	25.4	26.1	24.9	24.0	22.8	21.8	21.3	20.7	21.2	26.1																						
14-Jul	20.1	19.6	19.0	18.5	18.3	18.5	18.9	19.7	21.4	23.0	24.8	25.5	26.0	25.6	21.9	17.7	20.1	22.1	22.3	22.4	20.2	18.5	18.2	17.5	20.8	26.0																						
15-Jul	17.0	16.1	15.2	14.0	13.4	14.0	15.0	17.2	19.4	22.0	24.0	24.2	23.3	24.2	25.2	25.6	26.8	26.6	26.1	25.0	22.3	19.8	18.4	17.8	20.5	26.8																						
16-Jul	16.2	15.3	14.3	13.5	14.0	14.2	16.2	16.5	18.7	21.2	22.5	23.2	24.3	25.2	17.9	16.5	16.2	16.0	16.7	17.0	16.6	16.0	16.0	15.9	17.5	25.2																						
17-Jul	16.5	16.2	15.8	16.2	16.0	16.0	16.6	18.1	19.0	20.1	21.0	22.0	22.1	21.8	22.8	23.2	22.0	22.3	21.8	20.9	19.9	18.4	16.8	16.9	19.3	23.2																						
18-Jul	16.0	15.2	14.3	13.9	13.4	14.0	15.5	16.1	18.1	19.3	20.6	20.7	20.7	21.5	21.5	21.9	22.4	22.9	21.9	21.2	20.5	19.8	18.8	17.2	18.6	22.9																						
19-Jul	16.3	15.7	15.9	15.7	15.1	14.5	14.7	15.5	16.1	16.4	16.9	17.2	18.1	19.5	19.7	19.5	17.6	19.0	17.2	15.5	15.0	14.5	13.8	13.9	16.4	19.7																						
20-Jul	13.2	11.9	11.0	10.3	9.9	10.1	11.1	13.0	15.1	17.8	19.8	20.9	21.7	22.6	23.5	23.5	23.1	23.7	23.2	21.8	20.3	19.2	18.4	17.9	17.6	23.7																						
21-Jul	17.2	16.2	15.9	15.8	14.8	14.4	14.3	13.9	13.9	14.1	14.4	15.7	16.6	19.2	19.4	20.1	21.3	21.7	21.7	21.2	19.3	17.8	17.1	16.4	17.2	21.7																						
22-Jul	16.1	16.0	15.5	14.7	14.3	13.8	14.4	15.3	16.9	19.4	20.9	21.9	22.8	22.9	23.7	24.6	24.2	22.6	21.2	20.5	19.3	17.6	17.1	16.6	18.8	24.6																						
23-Jul	15.6	14.6	14.2	14.1	14.0	13.8	13.6	14.4	14.7	14.9	14.7	16.3	17.2	17.9	18.7	18.2	18.0	18.6	18.2	17.7	16.8	14.6	14.6	13.8	15.8	18.7																						
24-Jul	13.1	12.4	11.4	10.5	10.1	10.7	11.6	13.7	16.9	19.1	21.2	22.7	24.0	24.8	25.0	25.3	25.1	25.3	24.8	23.6	20.5	19.7	18.7	18.4	18.7	25.3																						
25-Jul	18.1	17.1	16.5	15.9	15.2	14.9	15.0	15.7	17.2	18.4	19.7	20.3	21.8	23.0	23.6	22.3	21.9	22.7	23.0	23.2	19.5	18.7	18.3	17.6	19.2	23.6																						
26-Jul	17.0	16.0	15.1	15.2	14.8	14.6	14.9	15.7	16.9	18.6	20.2	21.2	22.4	22.9	23.1	22.7	22.5	15.5	17.4	17.2	15.5	14.6	14.3	13.8	17.6	23.1																						
27-Jul	13.0	13.0	12.3	11.6	10.7	11.4	12.7	14.9	17.5	19.9	22.0	23.2	23.8	24.0	22.4	21.3	21.8	22.6	20.6	19.6	17.7	16.7	15.7	15.7	17.7	24.0																						
28-Jul	15.1	14.7	12.7	11.9	11.4	12.4	14.3	16.0	17.9	19.6	22.0	23.6	24.8	25.5	24.4	21.3	23.5	22.6	21.0	21.1	19.8	18.5	18.1	17.1	18.7	25.5																						
29-Jul	15.4	14.9	13.9	13.3	13.9	14.5	14.9	16.8	18.3	19.1	21.0	22.7	23.2	22.3	22.7	23.7	22.8	23.6	20.3	16.7	15.6	14.5	13.9	14.6	18.0	23.7																						
30-Jul	14.2	13.4	13.0	12.5	12.4	12.4	13.3	14.9	16.3	18.6	20.6	22.1	23.9	24.3	23.1	23.6	22.6	22.7	22.0	19.9	17.9	16.5	15.7	14.3	17.9	24.3																						
31-Jul	13.9	14.1	13.1	11.7	11.0	11.8	12.8	15.3	18.2	21.2	23.2	24.4	24.9	23.4	18.5	21.3	20.9	19.6	18.2	17.4	16.5	15.8	15.2	14.6	17.4	24.9																						
																								15.8	15.2	14.4	13.8	13.5	13.8	14.5	15.7	17.2	18.8	20.1	21.1	21.7	22.4	21.9	21.9	21.9	21.7	21.1	20.3	18.6	17.5	16.7	16.3	Diurnal Average
																								22.4	21.3	19.9	19.9	20.1	20.3	20.8	23.8	26.3	27.2	26.7	27.8	29.2	30.8	30.6	31.0	31.0	30.8	30.1	28.8	26.1	23.5	23.2	22.8	Diurnal Maximum



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

**Ambient Temperature (AT) - C**  
**Millennium - July 2015**





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

**Ambient Temperature (AT) - C**  
**Millennium - July 2015**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	13	1.75	1.75
10 - 20	465	62.50	64.25
> 20	266	35.75	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



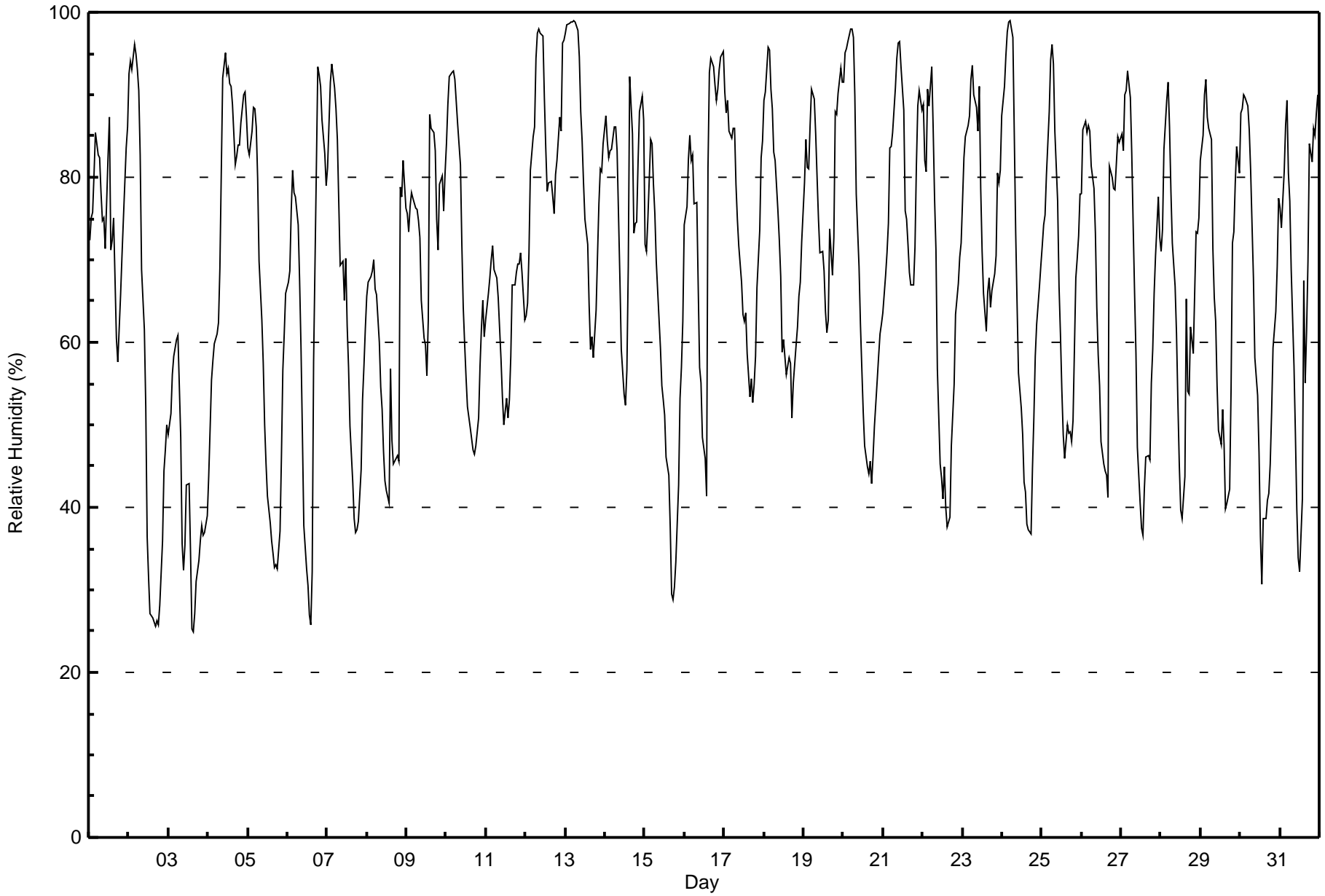
Maximum Value: 99 % on Jul 24 06:00														Maximum Daily Average: 84.4 % on Jul 12														Hours in Service: 744																				
Minimum Value: 25 % on Jul 3 16:00														Minimum Daily Average: 41.5 % on Jul 3														Hours of Data: 744																				
Maximum Diurnal Average: 85.3 % at hour 5														Minimum Diurnal Average: 51.6 % at hour 14														Hours of Missing Data: 0																				
Monthly Average: 68.8 %														Percentiles: P <sub>1</sub> = 27 P <sub>10</sub> = 42 Q <sub>1</sub> = 55 Median = 71 Q <sub>3</sub> = 84 P <sub>90</sub> = 91 P <sub>99</sub> = 99														Hours of Calibration: 0																				
																												Percent Operational Time: 100.0																				
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jul	72	75	76	80	85	83	82	78	75	75	71	82	87	71	72	75	61	58	62	66	70	75	84	86	75.1	87																						
2-Jul	93	94	93	96	95	93	90	83	69	62	52	36	32	27	27	26	26	26	26	28	36	44	47	50	56.3	96																						
3-Jul	49	51	56	58	59	60	61	48	36	32	35	43	43	35	25	25	27	31	34	36	38	37	37	39	41.5	61																						
4-Jul	44	49	55	58	60	61	62	69	81	92	95	93	93	91	91	89	82	83	84	84	87	90	90	87	77.9	95																						
5-Jul	84	83	86	88	88	86	80	70	63	57	50	45	41	38	36	34	33	33	33	37	46	57	61	66	58.1	88																						
6-Jul	67	69	76	81	78	78	74	67	59	49	38	33	30	27	26	32	58	81	93	92	91	87	83	79	64.5	93																						
7-Jul	81	86	92	94	91	88	85	77	69	70	65	70	62	57	50	43	39	37	37	38	45	53	57	62	64.5	94																						
8-Jul	66	67	68	69	70	66	66	60	55	52	47	43	42	40	57	48	45	46	46	46	79	78	82	76	58.9	82																						
9-Jul	76	73	76	78	78	76	76	75	73	65	60	60	56	63	88	86	86	83	75	71	79	80	76	80	74.5	88																						
10-Jul	84	89	92	93	93	92	89	87	81	72	64	60	56	52	50	48	47	46	47	51	57	62	65	61	68.2	93																						
11-Jul	63	66	68	70	72	69	68	65	62	58	53	50	53	51	53	58	67	67	68	70	69	71	69	63	63.4	72																						
12-Jul	63	65	71	81	85	86	94	97	98	97	97	90	84	78	79	79	78	76	80	82	87	86	96	97	84.4	98																						
13-Jul	97	98	99	99	99	99	99	98	95	88	84	79	75	72	65	59	61	58	64	71	77	81	81	84	82.5	99																						
14-Jul	87	84	82	83	83	86	86	83	76	68	59	54	52	57	69	92	85	73	74	75	82	88	90	87	77.4	92																						
15-Jul	72	71	75	85	84	79	76	70	66	59	55	53	51	46	44	38	30	29	30	33	43	53	57	63	56.7	85																						
16-Jul	74	77	82	85	82	83	77	77	67	57	55	48	46	41	81	93	94	93	91	89	91	93	95	95	77.8	95																						
17-Jul	90	88	89	86	85	86	86	79	75	72	67	63	62	64	59	53	56	53	55	58	67	74	82	84	72.2	90																						
18-Jul	89	90	96	95	91	88	83	82	76	72	68	59	60	56	57	58	57	51	55	60	62	66	67	72	71.3	96																						
19-Jul	79	85	81	81	86	91	89	85	80	75	71	71	69	64	61	63	74	68	73	88	88	90	93	92	79.0	93																						
20-Jul	91	95	96	97	98	98	97	90	78	69	62	57	52	47	45	44	46	43	46	50	55	58	61	62	68.2	98																						
21-Jul	64	68	71	74	84	84	85	91	94	96	97	93	88	76	75	72	68	67	67	72	81	89	91	88	80.6	97																						
22-Jul	89	82	81	91	89	93	86	78	71	57	45	44	41	45	40	38	39	47	51	55	63	67	70	72	63.9	93																						
23-Jul	77	82	85	86	87	92	93	90	88	86	91	79	71	66	61	66	68	64	66	68	70	80	79	81	78.3	93																						
24-Jul	87	91	95	98	99	99	97	85	73	65	56	52	49	43	42	38	37	37	45	51	58	62	67	69	66.5	99																						
25-Jul	72	74	75	80	88	94	96	94	86	77	67	61	54	49	46	50	49	49	48	51	68	70	73	78	68.7	96																						
26-Jul	78	86	87	86	86	86	81	79	73	64	58	55	48	45	44	44	41	81	80	79	78	82	85	84	71.3	87																						
27-Jul	85	83	90	91	93	90	83	74	66	59	47	40	37	37	42	46	46	46	55	59	66	70	78	73	64.9	93																						
28-Jul	71	74	83	89	91	86	78	72	67	61	53	45	40	39	44	65	54	54	62	59	66	73	73	75	65.6	91																						
29-Jul	82	85	90	92	87	86	85	71	65	63	55	49	48	52	48	40	41	42	54	72	73	79	84	80	67.6	92																						
30-Jul	88	88	90	90	89	86	81	74	68	58	54	47	36	31	39	39	41	42	45	52	59	64	69	77	62.7	90																						
31-Jul	76	74	81	86	89	80	77	69	57	49	40	34	32	41	67	55	61	70	84	82	86	85	88	90	68.9	90																						
																								77.1	78.8	81.8	84.5	85.3	84.6	82.7	78.0	72.3	67.0	61.7	57.7	54.6	51.6	54.3	54.7	54.6	55.9	59.1	62.0	68.3	72.4	75.1	75.9	Diurnal Average
																								97	98	99	99	99	99	99	98	98	97	97	93	93	91	91	93	94	93	93	92	91	93	96	97	Diurnal Maximum





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

**Relative Humidity (RH) - %**  
**Millennium - July 2015**





Maximum Speed: 31 km/h on Jul 6 18:00	Maximum Daily Speed Average: 14.5 km/h on Jul 17	Hours in Service: 744
Minimum Speed Value: 0 km/h on Jul 21 21:00	Minimum Daily Speed Average: 0.7 km/h on Jul 26	Hours of Data: 744
Maximum Diurnal Speed Average: 4.0 km/h at hour 18	Minimum Diurnal Speed Average: 0.5 km/h at hour 22	Hours of Missing Data: 0
Monthly Average Velocity: 1.5 km/h 286.0 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 3 Q <sub>1</sub> = 5 Median = 6 Q <sub>3</sub> = 9 P <sub>90</sub> = 12 P <sub>99</sub> = 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-Jul	SSW3	S3	WSW3	SSW4	SSW5	SW5	SSW5	SSW5	SSW3	SW5	W6	NW3	WSW2	WSW5	NNW6	W2	SSW3	W1	ENE1	E3	E3	SSE5	S3	SSW4	SW2.3	W6	
2-Jul	SSW6	SSW5	S4	SSW6	SSW6	S4	SSW5	SSW4	SSW5	SSW6	SSW4	WSW6	W6	WNW7	W7	WSW8	SSW10	SW12	SSW11	SW8	S4	SSE4	SSW8	SSW10	SSW5.7	SW12	
3-Jul	SSW10	SSW10	S6	S7	S8	SSE6	SSE4	SSW6	WSW11	WSW16	W15	NNW16	NNW16	NW14	NW17	NW17	NNW16	NNW13	NNW10	NNW6	NNW6	NW9	NW10	NNW10	W7.0	NW17	
4-Jul	WNW9	W7	WSW5	W6	W9	WNW9	W8	W10	W8	SW5	SW3	SW5	SW6	WSW6	W3	NNE4	N4	W3	WNW4	NNW7	NNW12	N19	N23	N18	NW5.2	N23	
5-Jul	N16	N17	N15	N14	N10	N8	NNW6	NNW6	NW5	NW5	NNW8	N9	N9	N8	N6	NNW6	NW7	N6	NW2	SW5	SSW5	SSW5	SSW7	SSW7	NNW5.7	N17	
6-Jul	S6	SSE5	SSE4	SSE4	SSE4	SSW5	SSW5	SSW6	S6	SSW7	W10	W11	W12	WSW12	WSW12	WNW12	N25	N31	N21	N20	N17	NNW11	NW10	NW12	NW5.0	N31	
7-Jul	NW11	NW7	WNW5	W5	WNW6	WSW3	W2	NW2	N2	WSW7	WSW7	WNW5	SW3	SSW4	SW5	W7	W8	W8	W9	SW6	SSW6	SSW6	SSW8	SSW9	WSW4.5	NW11	
8-Jul	S7	SSE6	SSE7	SSE7	SSE8	S8	S9	S9	S11	S11	S13	S10	S9	S10	SSE10	SSE8	SSE8	SW6	W8	NW15	NW11	NW10	WNW7	NW11	SSW4.9	NW15	
9-Jul	N10	N14	N10	NNE13	NNW8	N9	N6	NNW7	NNE8	NNE8	N6	NW5	NNW6	NNE10	ENE6	NNE9	NNE13	NNE18	NNE20	NNE15	NNE11	N10	N13	N10	N9.7	NNE20	
10-Jul	N8	N7	N9	N11	NNE12	N11	NNE9	N7	N6	N6	N6	N6	N6	NNW5	N5	NNW6	NNW5	NNW5	NNW5	N6	NNE7	ENE8	ESE6	SE10	N5.8	NNE12	
11-Jul	SE11	SE10	SE10	SE10	SE9	SE9	SE12	SE11	SE12	SSE10	SSE10	SSE11	SSE10	SE11	ESE9	E7	NNE10	NE10	NE8	ENE8	NE6	ENE4	E6	ESE7	ESE7.2	SE12	
12-Jul	ESE6	ESE9	E4	N5	WNW2	NNW5	ESE4	E3	ESE5	NW3	ENE3	SSE2	NNW5	NNW5	NNW8	NNE12	NE14	NNE5	NNW5	NNE7	NNW5	SW14	WNW4	N7	NNE2.8	SW14	
13-Jul	NNE1	SE4	SSW4	WSW4	SW4	SSW3	SSE3	S3	S4	S5	SSE5	SE6	S7	WSW5	W6	WNW3	NE4	S1	S5	S5	SSW4	SE8	SE8	SE8	S3.1	SE8	
14-Jul	SSE4	SSE5	SSE7	SSE6	SSE5	S5	SSE5	S5	SSE6	SSE6	SSE4	W3	N2	SSW7	NNW8	ENE5	SSW5	SW6	S4	SSW7	S6	SSE6	SSW3	SSW5	S3.8	NNW8	
15-Jul	SSW6	SSW6	S5	S4	S5	SSW6	SSW5	SSW6	SSW6	SSW6	S5	SSE6	S6	S3	NE6	SE5	SSW4	SW10	SW10	SW9	SW7	SSW6	SSW3	S3	SSE4	SSW4.6	SW10
16-Jul	S2	SSE3	SW4	SSW5	SSE3	SSW5	SE2	WSW3	NW5	NW8	NW9	N12	N16	NNE15	NW6	SSE11	SW8	W5	WNW5	NW5	NW5	N2	NW6	WNW7	NW2.7	N16	
17-Jul	NNW9	N15	N15	NNE17	NNE20	NNE19	NNE17	N22	N22	N18	N19	N18	N19	N21	N18	N19	N15	N17	NNE15	NNE11	NNE7	NE5	WSW3	SW6	N14.5	N22	
18-Jul	SW6	SW5	SSW3	SSW5	SW6	SSW5	S4	SSE6	SSE5	SSE6	SW4	SW6	SSW9	WSW9	WSW9	SW10	WSW8	W13	W12	W12	WNW12	NW11	NW8	NW9	WSW5.6	W13	
19-Jul	WNW11	WNW11	WNW12	WNW10	NW9	WNW11	WNW11	NW9	NW10	WNW12	WNW14	WNW13	WNW12	WNW11	NW10	W11	NNW9	NNW8	N16	N8	NNW5	N9	NNW4	NW6	NW9.0	N16	
20-Jul	WNW6	WSW4	WSW5	SW6	SW6	SW6	SSW6	SSW5	SSW7	S5	SSE4	SSE3	SSW4	S5	SSE6	SSE5	S5	SE5	SE6	SE9	SE10	SE11	SE13	SE13	SSE4.7	SE13	
21-Jul	ESE12	SE10	SE8	SE9	SE8	SE7	ESE7	E6	SE7	SE8	SE10	SE9	SSW6	S4	N7	N7	N7	N7	NNE6	NE5	S0	SW5	SSW5	SSW4	ESE3.6	ESE12	
22-Jul	S4	SSE4	S2	SW4	SSW6	SSW6	SW6	W4	NNE4	N4	N4	NNE5	NNE6	NNW2	N7	NW5	NW4	WNW7	W8	W8	W7	W6	W6	W5	W2.7	W8	
23-Jul	W5	WSW5	WSW4	WSW5	W6	W4	W4	WSW4	NW5	NW6	NE3	N3	N6	N7	NNW5	SW8	SW3	SW3	SW4	SW5	W3	SW1	W4	SW4	W3.0	SW8	
24-Jul	SW5	SSW6	SSW3	SW6	SSW6	SSW7	S5	SSE4	S6	SSE5	SE7	SE6	S4	S7	S7	SW8	W7	WSW2	S3	SSE3	SSE5	SSE4	S5	S5	S4.4	SW8	
25-Jul	SSW6	SW5	SSW6	SW6	WNW4	NE2	SSW2	SSW6	SSW8	SSW8	SW8	W6	WSW7	W8	W7	NW10	NNW6	ENE4	NE4	ENE3	ENE3	WSW2	SSW4	NNW2	WSW2.7	NW10	
26-Jul	ENE2	WNW3	S1	WSW1	N3	NE4	ESE7	WSW1	NNE4	N3	NNE5	WSW2	WSW7	WSW9	NW9	N7	NW9	WNW6	ESE3	SSE6	SSE6	SSE6	SSE6	S4	W0.7	WSW9	
27-Jul	S3	SSE3	SE3	S4	SSW5	S5	S6	S5	S6	SSW7	WSW7	WSW9	WSW10	WNW7	N11	N8	N5	N2	N9	ESE5	SW3	SSW5	SSW7	SW6	SW2.2	N11	
28-Jul	WNW6	WNW5	S5	SSW8	SSW6	WSW2	NNW3	W2	WNW2	WSW4	SSW3	W4	WNW8	WNW7	NNE9	ENE7	E4	NNE12	E3	ESE7	SSW4	NW1	NNE10	NE16	NNW1.4	NE16	
29-Jul	SSW2	W5	WSW3	W4	W4	NE1	SW7	WSW8	WSW6	WSW5	WSW4	W7	W8	WSW11	W9	W11	W8	WNW7	NW11	NW10	N5	NE4	SSW2	W5	W5.0	WSW11	
30-Jul	WNW6	WSW5	WSW5	WSW5	WSW7	WSW9	W7	W7	W7	WNW8	WNW9	NW10	NNW12	NNW15	N10	NNE12	NNE12	NE9	NNE14	NE12	E4	SSE3	SSW6	SSW6	NW3.7	WNW15	
31-Jul	ENE5	SSE4	S3	SSW6	SSW6	S5	S5	S4	S4	S4	SSE2	SE2	W2	SSW12	SW7	SSW4	SW5	SW4	N2	N5	NE6	NE4	SW5	SW5	SSW2.7	SSW12	

WSW1.3	SW1.2	SSW1.0	SW1.5	SW1.6	SW1.2	SSW1.6	SW1.8	SW1.3	WSW2.5	WSW2.0	NNW2.5	NNW3.3	NNW3.5	NW3.4	NW2.9	NW3.4	NNW4.0	NNW3.5	NNW2.2	NNW1.6	NNW0.5	W1.0	W1.3	Diurnal Average
N16	N17	N15	NNE17	NNE20	NNE19	NNE17	N22	N22	N18	N19	N18	N19	N21	N18	N19	N25	N31	N21	N20	N17	N19	N23	N18	Diurnal Maximum

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



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

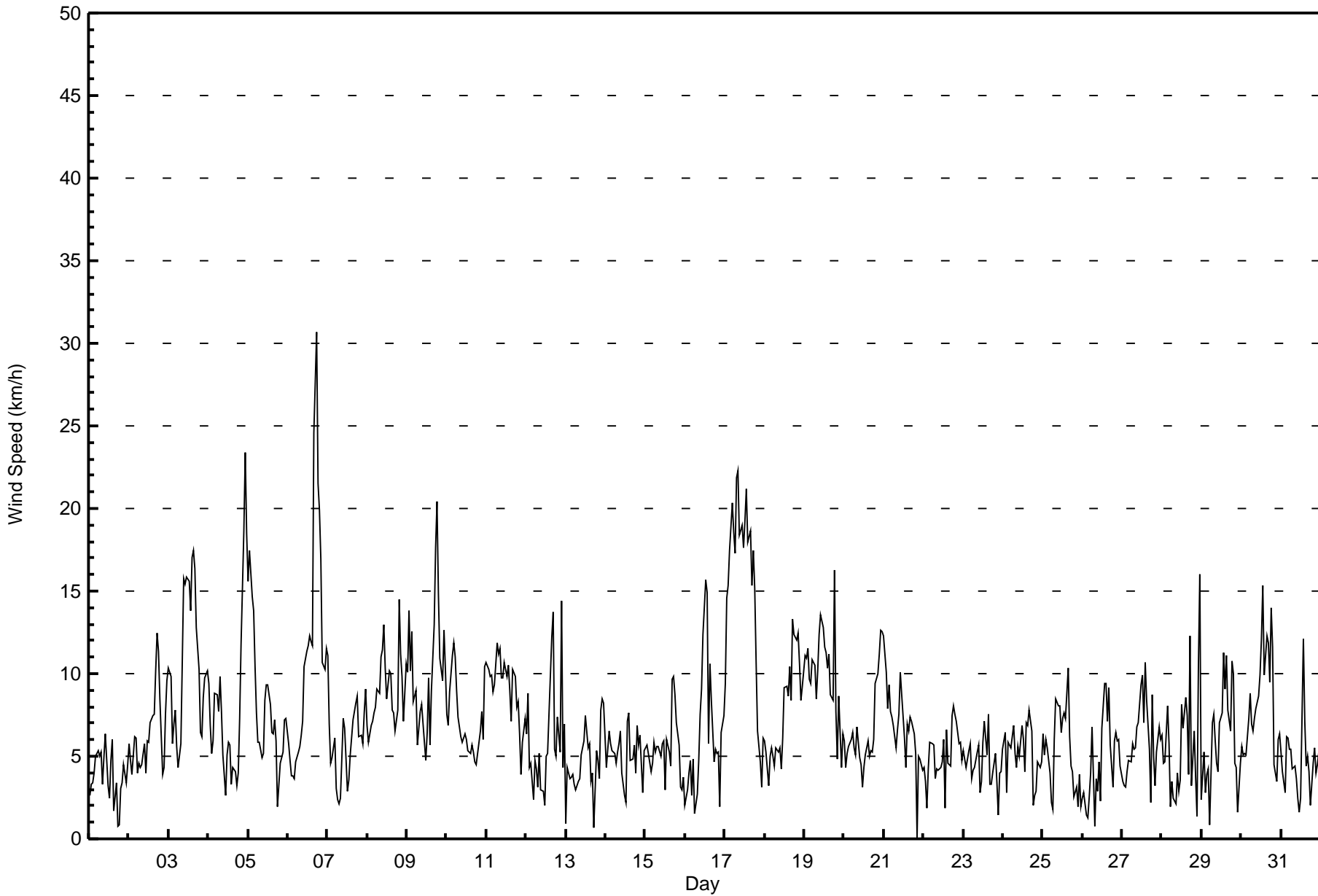
**Wind Speed (WS) - km/h**  
**Millennium - July 2015**

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



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

**Wind Speed (WS) - km/h**  
**Millennium - July 2015**





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

**Wind Speed (WS) - km/h**  
**Millennium - July 2015**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	300	40.32	40.32
6 - 11	358	48.12	88.44
12 - 19	76	10.22	98.66
20 - 28	9	1.21	99.87
29 - 38	1	0.13	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Millennium - July 2015**

<b>Wind Speed Ranges (km/h)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 5	16	7	10	9	7	4	6	32	46	46	27	28	22	11	14	15	300
6 - 11	41	15	6	4	3	8	28	28	20	52	25	21	34	25	28	20	358
12 - 19	22	15	3	0	0	1	4	0	1	1	2	3	5	13	5	1	76
20 - 28	7	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
29 - 38	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>87</b>	<b>39</b>	<b>19</b>	<b>13</b>	<b>10</b>	<b>13</b>	<b>38</b>	<b>60</b>	<b>67</b>	<b>99</b>	<b>54</b>	<b>52</b>	<b>61</b>	<b>49</b>	<b>47</b>	<b>36</b>	<b>744</b>

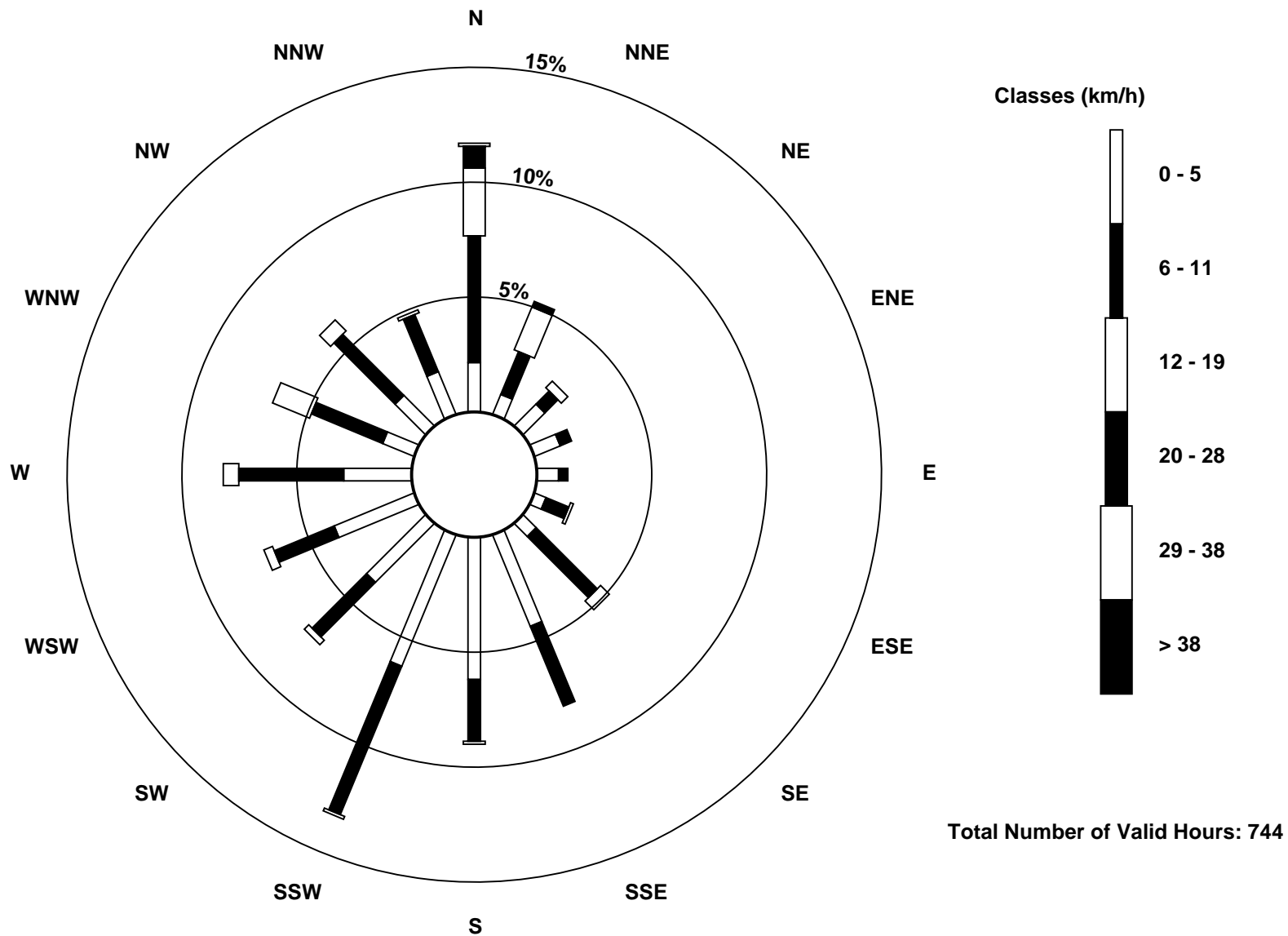
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Wind Speed (WS) - km/h  
Millennium (AMS 12)





**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Wind Direction (WD) - deg**

**Millennium - July 2015**

Direction of Maximum Speed: 9 deg on Jul 6 18:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 6.4 deg on Jul 17	Hours of Data: 744
Direction of Minimum Speed: 182 deg on Jul 21 21:00	Direction of Minimum Daily Speed Average: 0.7 deg on Jul 26
Direction of Minimum Speed: 182 deg on Jul 21 21:00	Hours of Missing Data: 0
Monthly Average Direction: 257.0 deg	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jul	194	190	254	203	203	218	208	198	204	215	271	317	238	244	336	269	206	263	70	80	97	150	173	198	215.3
2-Jul	203	196	179	204	199	188	195	196	196	204	195	249	266	282	262	255	210	216	207	214	175	167	194	201	212.9
3-Jul	194	201	170	170	174	166	163	204	240	258	263	285	299	314	309	313	303	299	330	337	332	319	305	297	280.7
4-Jul	294	281	254	276	277	284	279	274	275	217	215	235	222	239	266	26	358	263	294	333	345	4	6	6	310.4
5-Jul	6	7	359	3	1	358	328	335	313	318	339	354	356	356	354	333	319	350	316	223	211	202	208	207	343.5
6-Jul	186	168	151	157	161	196	204	192	181	203	259	273	265	244	254	302	2	9	1	354	350	336	323	323	315.9
7-Jul	322	306	284	279	291	245	277	317	354	247	243	287	219	210	219	281	259	272	264	232	207	192	197	199	256.2
8-Jul	186	153	151	152	153	169	173	173	182	184	176	169	169	183	154	162	167	232	275	311	313	307	291	311	193.4
9-Jul	349	3	7	12	344	358	0	346	12	23	359	324	340	20	74	24	26	21	23	26	19	1	2	1	10.4
10-Jul	1	357	3	10	21	10	18	3	2	349	351	360	350	346	2	346	338	338	334	354	32	58	116	133	9.4
11-Jul	132	130	125	128	126	132	136	137	130	154	158	163	158	141	117	86	30	44	49	67	44	59	90	118	118.3
12-Jul	105	116	82	358	298	343	102	88	109	321	65	158	340	329	341	21	39	17	336	12	337	230	283	10	17.2
13-Jul	27	136	206	253	228	195	165	175	182	191	149	146	180	253	272	288	48	172	185	184	194	135	132	140	176.2
14-Jul	168	161	150	163	167	171	163	187	155	158	168	261	353	198	335	74	202	220	190	194	178	147	201	207	177.2
15-Jul	208	201	186	174	182	202	203	206	204	190	164	175	172	47	143	197	233	235	224	221	209	208	182	168	198.8
16-Jul	170	158	221	202	164	199	135	252	326	317	311	359	7	19	320	152	236	267	291	323	324	357	306	296	314.1
17-Jul	331	356	3	12	16	14	16	10	6	4	5	5	4	4	4	5	356	8	14	23	28	40	241	226	6.4
18-Jul	231	221	199	211	222	201	186	165	160	165	224	233	213	242	238	231	250	272	270	281	286	310	326	318	248.5
19-Jul	287	288	296	299	311	303	302	310	305	295	298	303	300	298	306	280	337	347	9	8	339	5	335	324	311.9
20-Jul	298	254	237	214	219	221	203	196	207	179	162	148	192	171	166	168	169	142	131	128	133	124	126	125	166.0
21-Jul	122	127	137	141	129	125	114	84	127	130	125	136	199	174	4	4	352	353	20	38	182	224	201	195	119.3
22-Jul	169	154	181	214	213	210	218	268	16	355	352	14	20	347	360	304	308	287	280	268	270	271	268	272	281.2
23-Jul	266	237	241	245	265	261	264	247	312	313	50	6	0	5	330	231	234	226	218	222	264	233	259	227	269.1
24-Jul	220	212	200	214	204	205	209	190	155	174	155	146	136	173	171	185	224	275	251	187	159	150	154	178	188.4
25-Jul	203	218	204	233	300	44	207	205	198	206	223	280	257	279	266	315	327	60	51	71	73	258	198	341	246.0
26-Jul	78	282	191	239	351	51	120	240	22	352	17	243	245	257	305	350	317	286	105	163	162	156	156	170	262.5
27-Jul	181	162	142	177	194	186	191	185	172	197	245	255	246	298	6	4	358	3	358	118	216	213	206	232	227.5
28-Jul	301	283	188	212	207	241	342	280	292	238	206	267	298	302	12	77	87	16	87	115	192	324	17	40	345.7
29-Jul	213	261	240	261	270	51	232	238	238	256	240	265	278	258	262	274	268	296	310	305	356	47	197	275	270.1
30-Jul	283	240	243	246	237	251	274	264	268	288	293	307	286	301	5	20	31	34	33	46	82	154	209	204	308.7
31-Jul	78	150	181	212	194	169	182	184	175	180	151	130	273	205	214	198	218	227	7	358	36	53	225	234	192.8

250.5 223.5 212.1 228.0 235.1 225.9 204.7 225.2 223.5 237.5 255.2 283.1 286.2 288.1 314.9 323.5 325.2 328.9 341.0 346.4 336.9 330.5 262.6 259.8  
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**

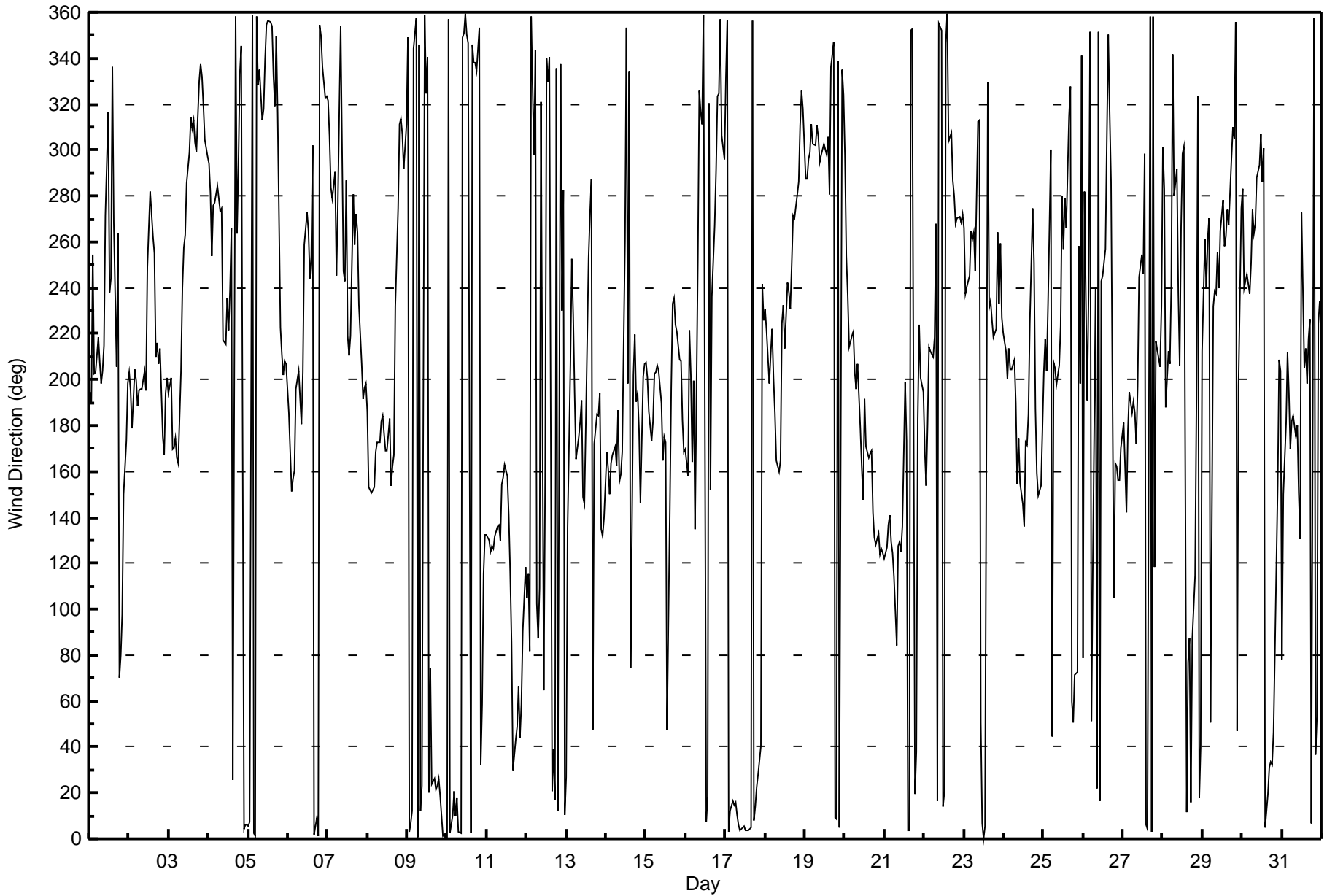
**Millennium - July 2015**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 103 deg on Jul 13 18:00 Minimum Value: 9 deg on Jul 17 22:00 Percentiles: P <sub>1</sub> = 12 P <sub>10</sub> = 16 Q <sub>1</sub> = 20 Median = 29 Q <sub>3</sub> = 39 P <sub>90</sub> = 55 P <sub>99</sub> = 91																			Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0						
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jul	33	26	48	22	17	17	17	31	40	21	40	66	51	34	38	88	57	83	85	32	30	11	17	20	88
2-Jul	11	24	17	13	12	17	17	25	23	25	49	42	48	47	43	37	27	21	19	17	17	14	16	16	49
3-Jul	20	19	23	21	20	21	21	28	32	32	34	32	34	35	36	30	30	31	34	37	36	31	26	26	37
4-Jul	21	27	27	35	29	35	35	27	29	30	84	23	23	27	29	53	38	45	37	29	28	23	16	17	84
5-Jul	19	17	19	17	17	23	28	34	47	56	34	37	31	33	42	52	42	38	62	16	11	14	12	14	62
6-Jul	18	17	18	13	14	25	22	23	24	30	40	35	36	34	39	44	21	16	19	24	28	28	31	30	44
7-Jul	31	28	24	23	26	34	56	75	79	40	41	46	79	59	58	47	44	36	34	25	13	12	12	14	79
8-Jul	17	18	15	14	16	21	19	18	24	23	21	20	20	21	21	27	21	42	26	31	31	23	19	25	42
9-Jul	33	17	15	16	27	19	21	27	22	31	43	37	36	24	38	16	15	16	16	18	18	21	18	18	43
10-Jul	17	18	18	17	14	16	20	21	25	38	44	33	46	51	47	42	40	40	31	15	27	14	21	16	51
11-Jul	17	17	17	17	18	19	17	16	18	26	26	22	25	26	30	33	17	16	14	18	23	46	39	32	46
12-Jul	33	26	43	18	57	52	48	70	40	73	60	91	37	37	30	16	19	39	30	18	36	27	56	23	91
13-Jul	94	36	25	22	19	28	29	31	35	33	33	32	34	61	49	78	41	103	20	19	26	15	16	16	103
14-Jul	20	20	18	20	19	31	28	29	28	30	71	95	89	75	65	46	27	23	28	19	22	20	68	16	95
15-Jul	21	22	20	21	14	17	19	22	30	41	34	40	91	44	41	51	31	29	23	16	12	58	28	20	91
16-Jul	70	33	61	20	30	28	64	45	40	30	32	23	17	20	49	25	31	61	30	27	25	78	28	22	78
17-Jul	31	21	15	14	14	13	13	15	18	18	19	18	20	19	19	19	22	18	15	15	15	9	48	12	48
18-Jul	16	16	25	16	14	28	24	22	23	22	52	29	21	29	28	25	32	30	33	30	27	29	34	30	52
19-Jul	28	27	28	25	26	25	28	33	30	31	31	32	35	34	31	34	37	32	26	17	30	21	35	29	37
20-Jul	28	19	13	12	13	16	22	25	23	35	50	73	65	64	46	42	33	33	37	18	17	18	18	19	73
21-Jul	20	19	23	16	18	18	27	26	28	25	21	29	34	64	24	19	28	24	22	16	93	14	18	22	93
22-Jul	30	45	68	46	14	14	29	33	33	37	45	49	26	90	43	62	51	29	29	29	32	29	30	30	90
23-Jul	21	19	21	23	23	27	37	29	46	44	46	55	30	21	50	35	50	46	23	21	18	54	23	22	55
24-Jul	12	10	22	16	12	19	17	32	42	32	47	37	41	69	36	34	34	35	54	70	10	16	29	17	70
25-Jul	30	15	18	25	45	56	77	37	26	32	37	41	44	48	48	39	39	29	27	26	31	57	23	64	77
26-Jul	70	28	61	72	40	28	22	96	47	65	51	86	52	40	52	39	75	74	52	20	19	16	16	21	96
27-Jul	32	16	63	25	16	19	20	27	31	30	46	38	34	58	32	20	29	34	43	38	39	12	12	26	63
28-Jul	21	36	14	15	14	45	43	66	84	64	72	73	44	53	50	36	32	22	50	25	33	72	32	20	84
29-Jul	76	25	39	27	39	84	24	26	36	38	49	58	42	32	32	32	33	52	51	34	52	21	91	30	91
30-Jul	30	22	21	20	18	23	29	31	35	35	37	39	38	35	35	22	17	18	17	15	20	40	12	15	40
31-Jul	43	30	46	35	19	17	19	32	36	44	76	86	67	31	52	36	22	52	64	43	19	33	20	22	86
94 45 68 72 57 84 77 96 84 73 84 95 91 90 65 88 75 103 85 70 93 78 91 64																									
Diurnal Maximum																									



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

**Wind Direction (WD) - deg**  
**Millennium - July 2015**





# Wood Buffalo Environmental Association

## SO2 Calibration Report

### Station Information

Calibration Date	July 14, 2015	Last Calibration	June 24, 2015
Station Name	Millennium	Station Number	AMS 12
Reason:	Routine		
Start Time (MST)	10:00	End Time (MST)	15:20
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	-666
Analyzer IP address	192.168.1.43		Lamp voltage	780	776
Calculated slope	1.000364	0.992004	Chamber temp	45.0	44.9
Calculated intercept	0.373952	-0.070334	Pressure	705.2	703.0
Analyzer Background	10.5	9.8	Flow	0.427	0.428
Analyzer Coefficient	1.239	1.261	Intensity	91	91
Analyzer make	Thermo 43i		Analyzer serial #	1118148499	

### Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6000	0.0	0.0	-1.8	----
as found span	5000	82.8	799.8	786.8	1.017
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	82.8	799.8	806.0	0.992
second point	5000	41.4	399.9	404.1	0.990
third point	5000	20.7	200.0	201.2	0.994
as left zero	5000	0.0	0.0	-0.4	----
as left span	5000	82.8	799.8	802.0	0.997
Average Correction Factor					0.992

Corrected As found      788.6      Previous response      799.2      % change      1.3%

**Notes:**

Filter changed after as founds. Zero and span adjusted.

Calibration Performed By:

\_\_\_\_\_  
Devin Russell



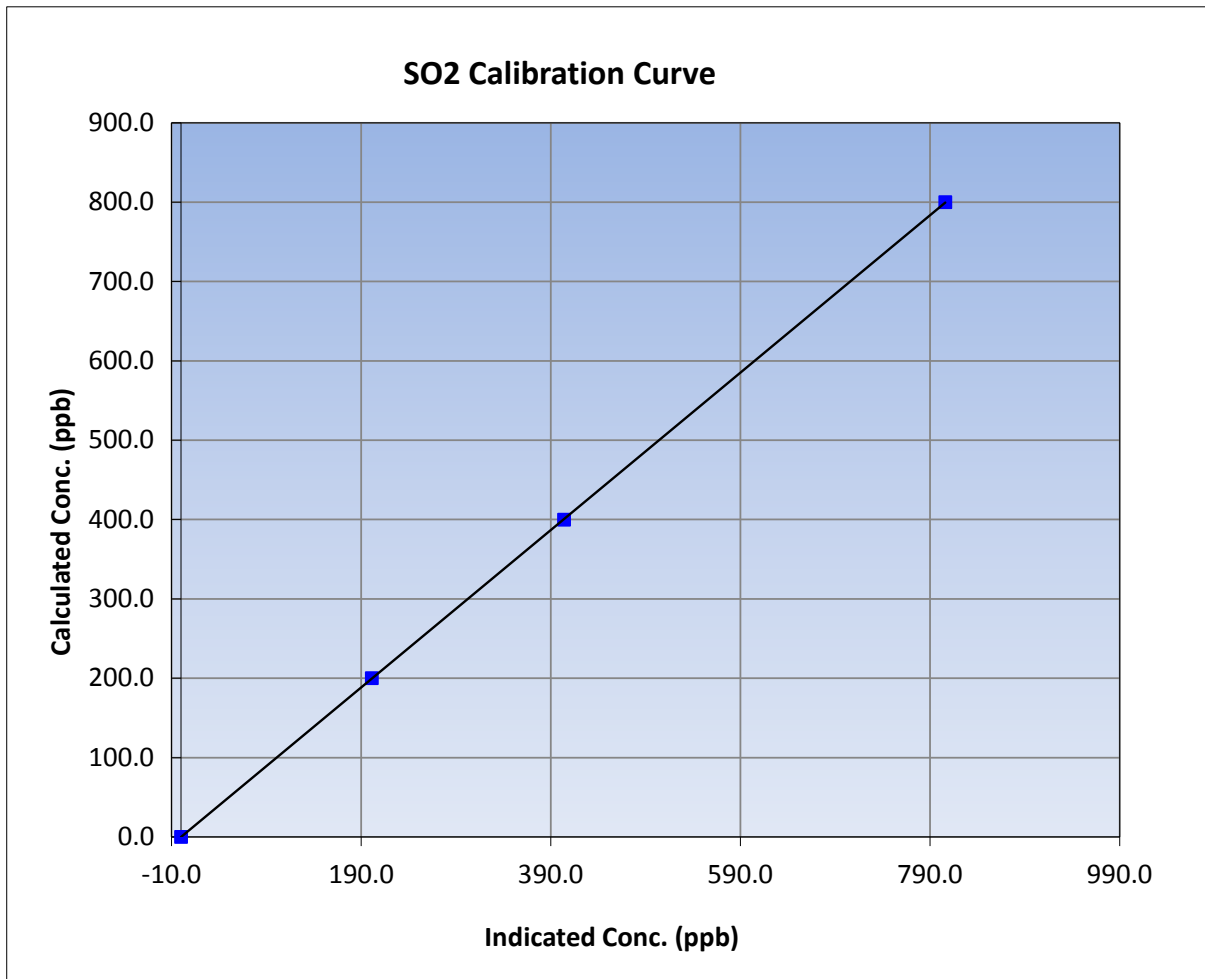
## Wood Buffalo Environmental Association SO2 Calibration Report

### Station Information

Calibration Date	July 14, 2015	Previous Calibration	June 24, 2015
Station Name	Millennium	Station Number	AMS 12
Start Time (MST)	10:00	End Time (MST)	15:20
Analyzer make	Thermo 43i	Analyzer serial #	1118148499

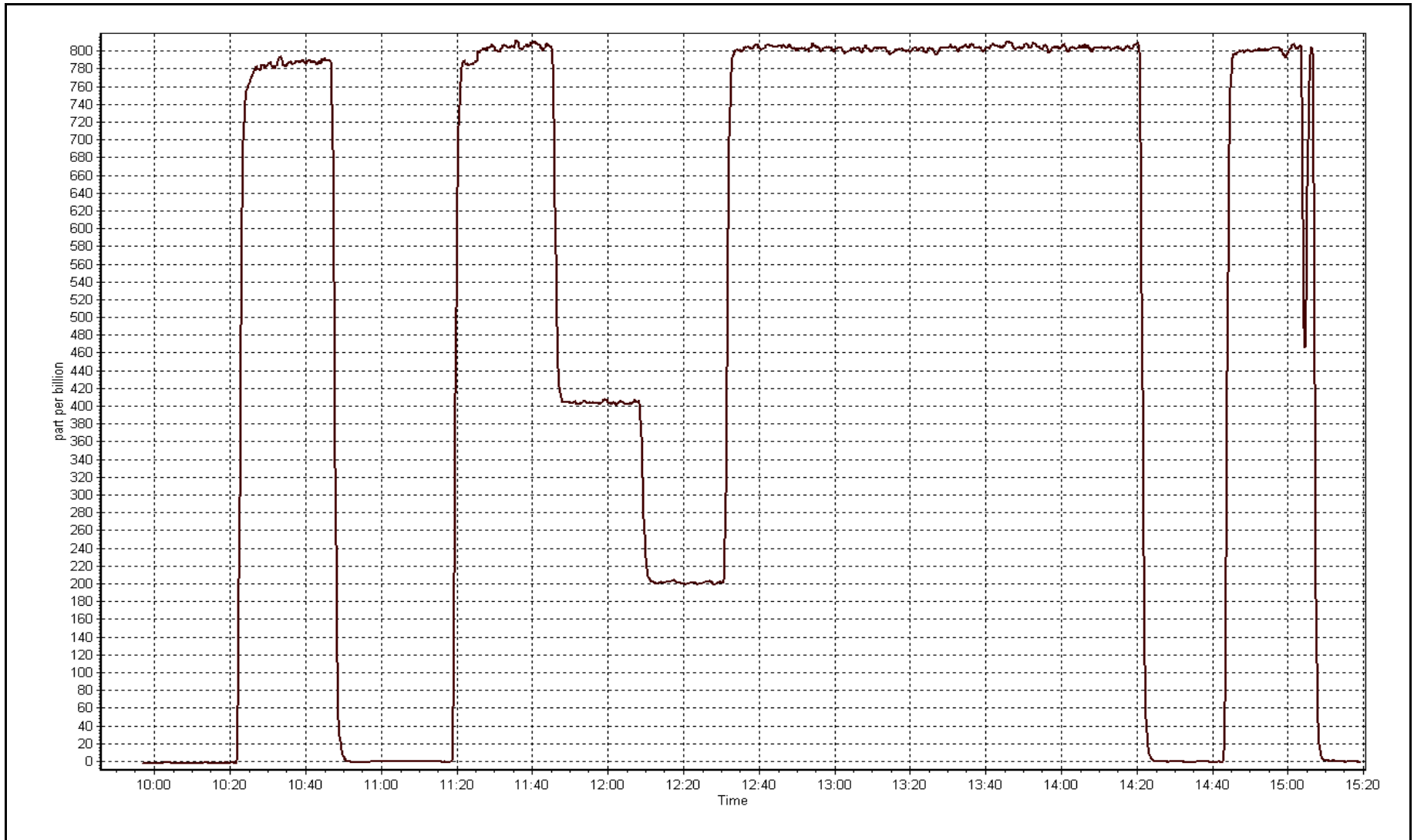
### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999997
799.8	806.0	0.9923		
399.9	404.1	0.9897	Slope	0.992004
200.0	201.2	0.9939		
			Intercept	-0.070334



SO2 Calibration Plot

Date: July 14, 2015





# Wood Buffalo Environmental Association

## TRS Calibration Report

### Station Information

Calibration Date	July 29, 2015	Last Calibration	June 15, 2015
Station Name	Millenium Mine	Station Number	AMS 12
Reason:	Routine		
Start Time (MST)	10:50	End Time (MST)	14:50
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	883	877
Calculated slope	0.999062	1.001416	Chamber temp	44	44
Calculated intercept	-0.053579	0.056584	Pressure	689.0	682.2
Analyzer Background	19.6	20.7	Flow	0.606	0.604
Analyzer Coefficient	0.665	0.665	Intensity	46xxx	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	0.7	----
as found span	5000	38.4	79.9	80.0	0.999
SO2 scrubber check	5000	20.7	200.0	0.5	----
calibrator zero	5000	0.0	0.0	-0.1	----
high point	5000	38.5	80.1	79.9	1.002
second point	5000	19.2	39.9	39.8	1.003
third point	5000	9.6	20.0	20.0	1.001
as left zero	5000	0.0	0.0	-0.1	----
as left span	5000	38.5	80.1	80.6	0.994
Average Correction Factor					1.002

Corrected As found	79.3	Previous response	80.0	% change	0.9%
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**Notes:**

Filter changed after as founds. Scrubber check completed after as founds. Zero was adjusted.

Calibration Performed By: Devin Russell



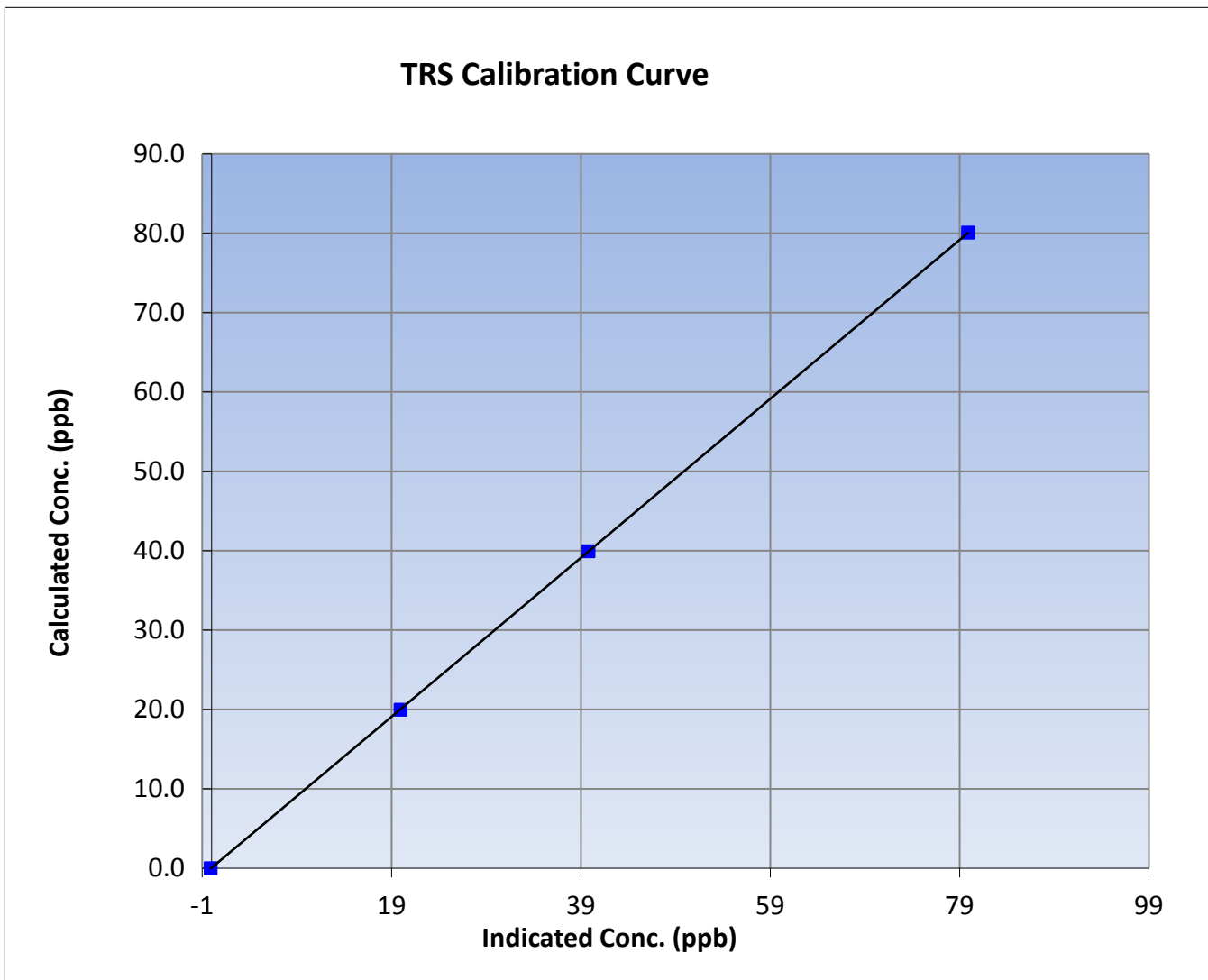
# Wood Buffalo Environmental Association TRS Calibration Report

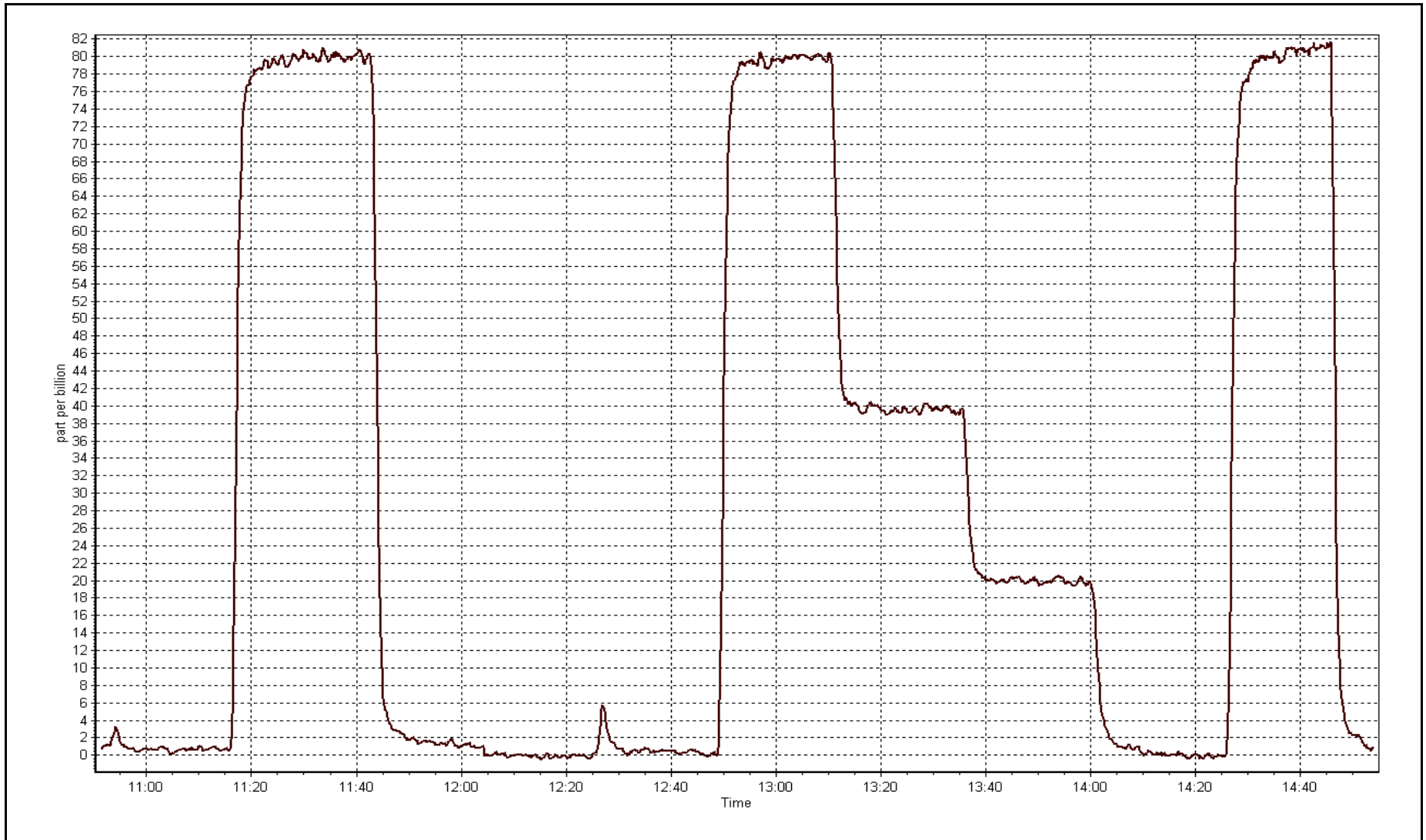
## Station Information

Calibration Date	July 29, 2015	Previous Calibration	June 15, 2015
Station Name	Millenium Mine	Station Number	AMS 12
Start Time (MST)	10:50	End Time (MST)	14:50
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	-0.1	----	Correlation Coefficient	0.999998
80.1	79.9	1.0023		
39.9	39.8	1.0032	Slope	1.001416
20.0	20.0	1.0009		
			Intercept	0.056584









# Wood Buffalo Environmental Association THC Calibration Report

## Station Information

Calibration Date	July-14-15	Last Calibration	June-12-15
Station Name	Millennium	Station Number	AMS 12
Reason:	Routine		
Start Time (MST)	10:00	End Time (MST)	15:20
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

	<i>Before</i>	<i>After</i>		<i>Before</i>	<i>After</i>
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	0.998715	Fuel Pressure	19.3	19.3
Calculated intercept	0.028383	-0.029814	Analyzer Coeff	2.3	2.3
			Analyzer BKG	3.820	4.070

Analyzer make	Thermo 51i-LT	Analyzer serial #	1317958296
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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	0.16	----
as found span	5000	82.8	16.84	16.91	0.996
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	82.8	16.84	16.87	0.998
second point	5000	41.4	8.42	8.50	0.991
third point	5000	20.7	4.21	4.26	0.988
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	16.75	Previous response	16.83	% change	0.5%
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**Notes:**

Filter changed after as founds. Zero and span adjusted.

Calibration Performed By:

Devin Russell



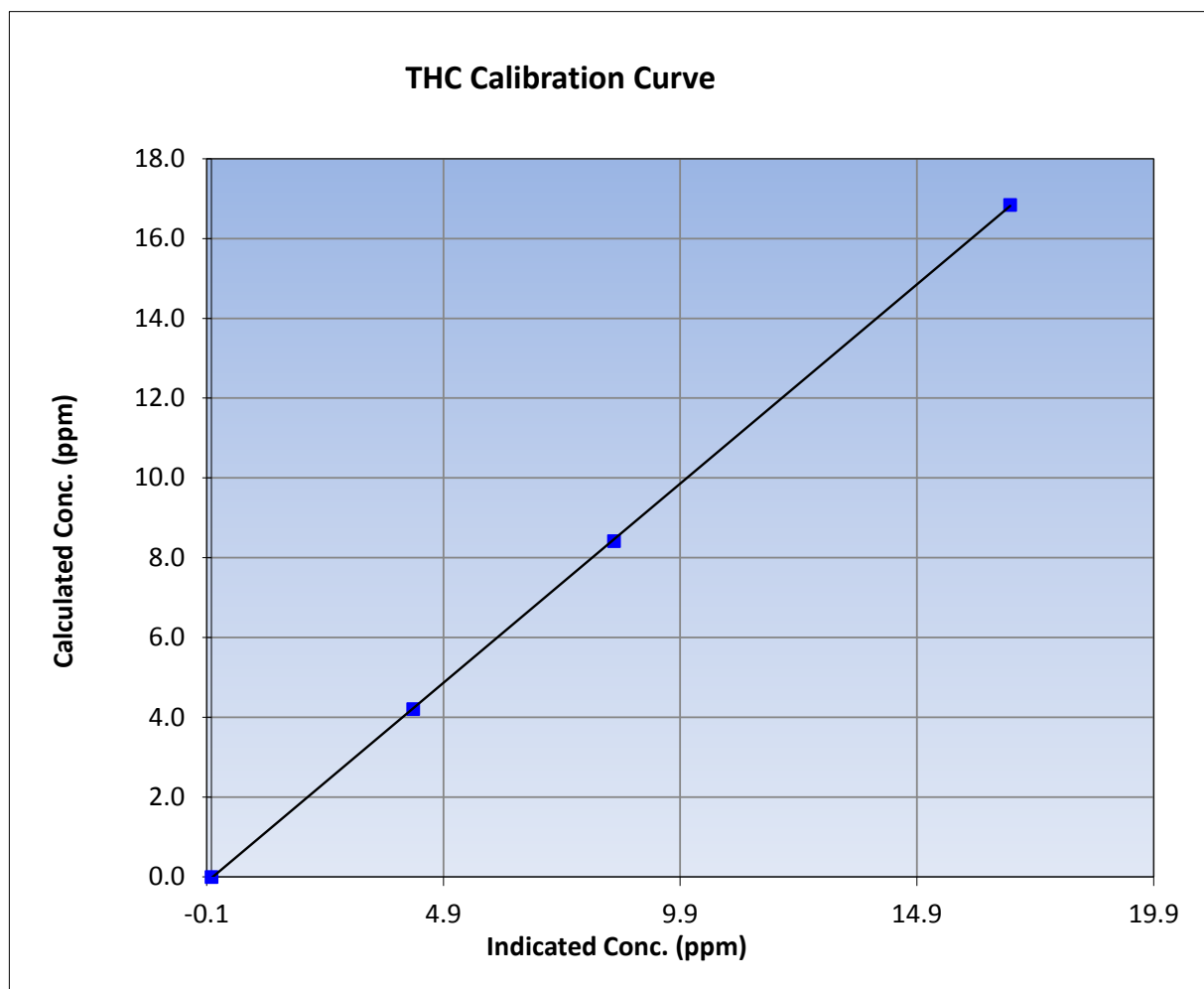
## Wood Buffalo Environmental Association THC Calibration Report

### Station Information

Calibration Date	July 14, 2015	Previous Calibration	June 12, 2015
Station Name	Millennium	Station Number	AMS 12
Start Time (MST)	10:00	End Time (MST)	15:20
Analyzer make	Thermo 51i-LT	Analyzer serial #	1317958296

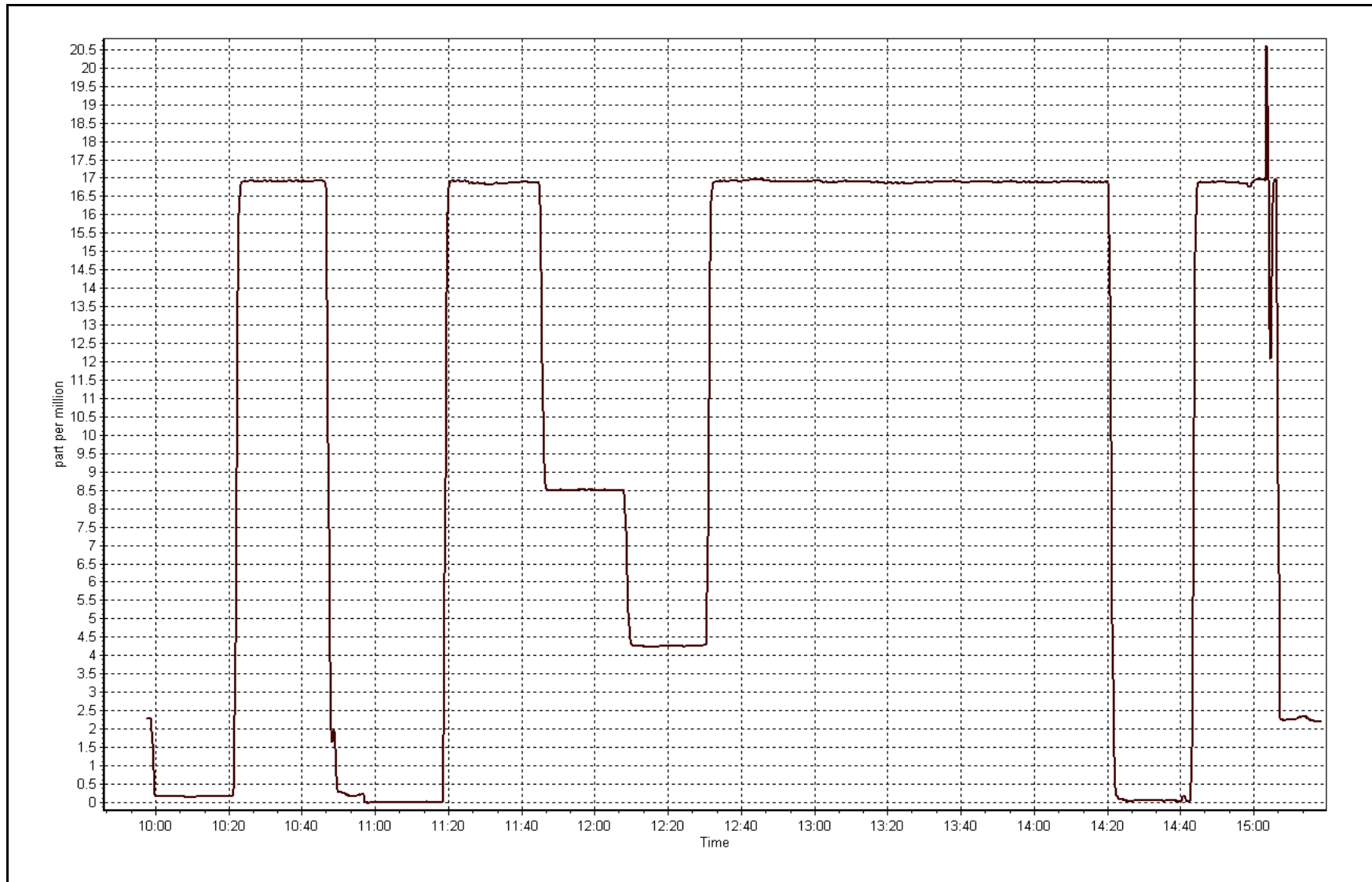
### Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	----	Correlation Coefficient	0.999980
16.84	16.87	0.9983		
8.42	8.50	0.9907	Slope	0.998715
4.21	4.26	0.9884		
			Intercept	-0.029814



THC Calibration Plot

Date: July 14, 2015





# Wood Buffalo Environmental Association

## NOX-NO-NO2 Calibration Report

### Station Information

Calibration Date	July 13, 2015	Previous Calibration	June 24, 2015
Station Name	Millennium	Station Number	AMS 12
Reason:	Removal		
Start Time (MST)	10:50	End Time (MST)	14:25
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	0.995054	0.997129	1.001597
	Data Offset	0.694281	-0.495019	-0.552856
Current Calibration	Data Slope	1.049066	1.046547	1.019752
	Data Offset	-3.027320	-0.146832	-5.556159

### Analyzer Information

Analyzer make/model	API T200	Analyzer serial #	723
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Test Point	before		after	
Concentration range	0-1000	ppb	NA	ppb
NO coefficient	1.164		NA	
NOx coefficient	1.164		NA	
NO2 coefficient	1.000		NA	
NO bkgrnd	0.9		NA	
NOx bkgrnd	5.4		NA	
Chamber Temp	50	Deg C	NA	Deg C
Moly Temp	315.6	Deg C	NA	Deg C
HVPS voltage	803	V	NA	V
PMT Temp	6.9	Deg C	NA	Deg C
O3 flow	86	ccm	NA	ccm
R Cell press NO	2.9	mmHg	NA	mmHg
R Cell Press Nox	2.9	mmHg	NA	mmHg
NO sample flow	494	lpm	NA	lpm
Nox sample Flow	499.000	lpm	NA	lpm

**Notes:**

Removal calibration due to failing moly converter - common with API units. To be replaced with a Thermo 42i.



# Wood Buffalo Environmental Association

## NOX-NO-NO2 Calibration Report

### Station Information

Calibration Date:

July 13, 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	4.7	-0.7	5.4	----	----
as found span	5000	82.8	799.8	799.8	0.0	765.6	763.4	2.3	1.0447	1.0478
calibrator zero	5000	0.0	0.0	0.0	0.0	4.7	-0.7	5.4	----	----
high point	5000	82.8	799.8	799.8	0.0	765.6	763.4	2.3	1.0447	1.0478
second point	5000	41.4	399.9	399.9	0.0	385.0	384.6	0.4	1.0388	1.0399
third point	5000	20.7	200.0	200.0	0.0	190.5	190.8	-0.5	1.0499	1.0480
as left zero										
as left span										
Average Correction Factor									1.0445	1.0452

Corrected As found      NO<sub>x</sub>= 760.9                      NO= 764.1                      Percent Change              NO<sub>x</sub>= 5.6%                      NO= 5.1%  
 Previous Response      NO<sub>x</sub>= 803.1                      NO= 802.6

### 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			5.4			N/A	
1st NO2 (300)	----	495.6	271.9	767.5	495.6	271.9	1.0252	1.0000	1.0001	100.0%
2nd NO2 (200)	----	589.8	177.7	770.0	589.8	180.1	1.0218	1.0000	0.9869	101.3%
3rd NO2 (100)	----	681.0	86.5	771.1	681.0	90.2	1.0204	1.0000	0.9592	104.3%
4th NO2 (0)	767.5	----	0.8	768.2	767.5	0.8	1.0242	1.0000	N/A	----
Average Correction Factor							1.0229	1.0000	0.9821	101.9%

Calibration Performed By: Devin Russell



# Wood Buffalo Environmental Association

## NO<sub>x</sub> Calibration Summary

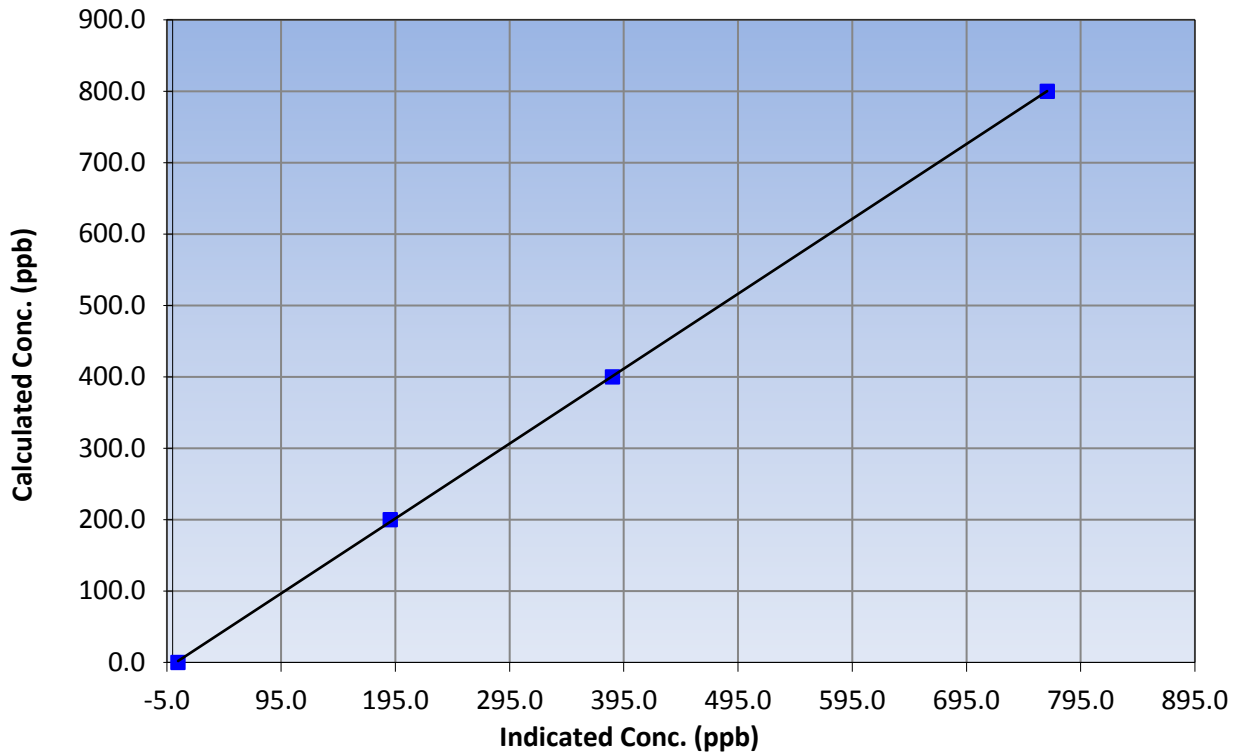
### Station Information

Calibration Date	July 13, 2015	Previous Calibration	June 24, 2015
Station Name	Millennium	Station Number	AMS 12
Start Time (MST)	10:50	End Time (MST)	14:25
Analyzer make	API T200	Analyzer serial #	723

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	4.7	----	Correlation Coefficient	0.999957
799.8	765.6	1.0447		
399.9	385.0	1.0388	Slope	1.049066
200.0	190.5	1.0499		
			Intercept	-3.027320

### NO<sub>x</sub> Calibration Curve





# Wood Buffalo Environmental Association

## NO Calibration Summary

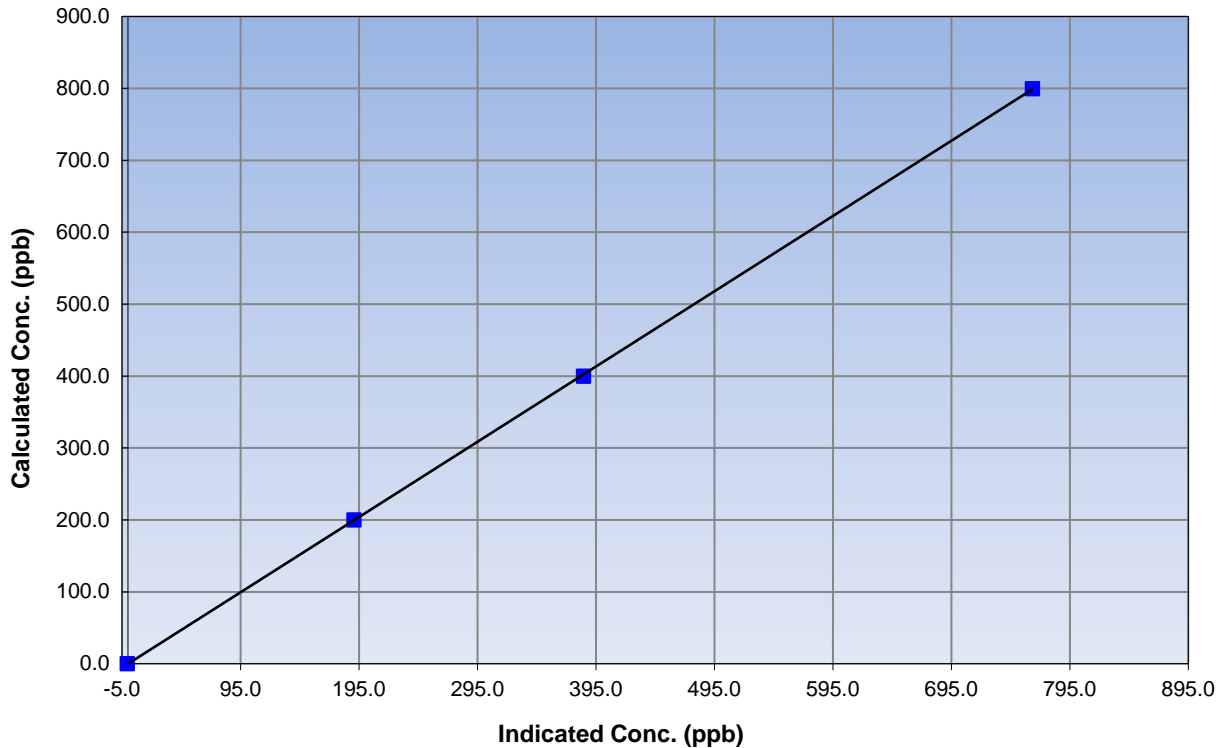
### Station Information

Calibration Date	July 13, 2015	Previous Calibration	June 24, 2015
Station Name	Millennium	Station Number	AMS 12
Start Time (MST)	10:50	End Time (MST)	14:25
Analyzer make	API T200	Analyzer serial #	723

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.7	N/A	Correlation Coefficient	0.999977
799.8	763.4	1.0478		
399.9	384.6	1.0399	Slope	1.046547
200.0	190.8	1.0480		
			Intercept	-0.146832

### NO Calibration Curve





# Wood Buffalo Environmental Association

## NO<sub>2</sub> Calibration Summary

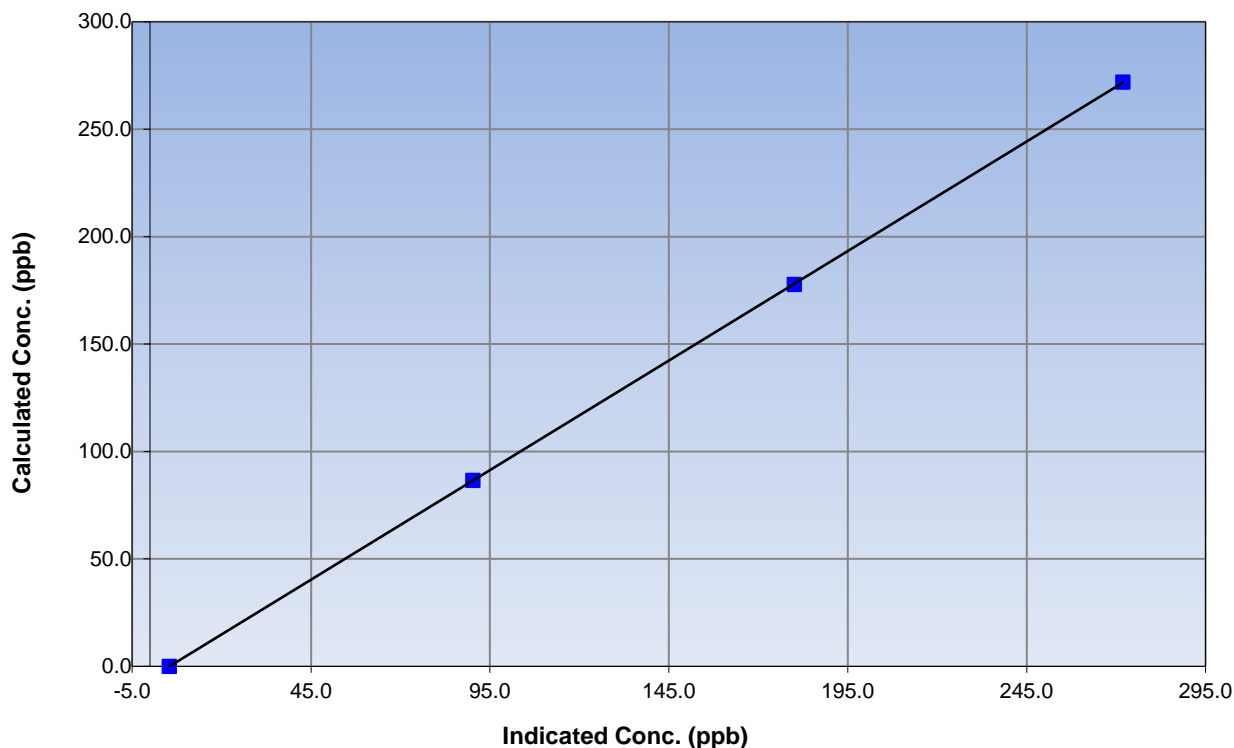
### Station Information

Calibration Date	July 13, 2015	Previous Calibration	June 24, 2015
Station Name	Millennium	Station Number	AMS 12
Start Time (MST)	10:50	End Time (MST)	14:25
Analyzer make	API T200	Analyzer serial #	723

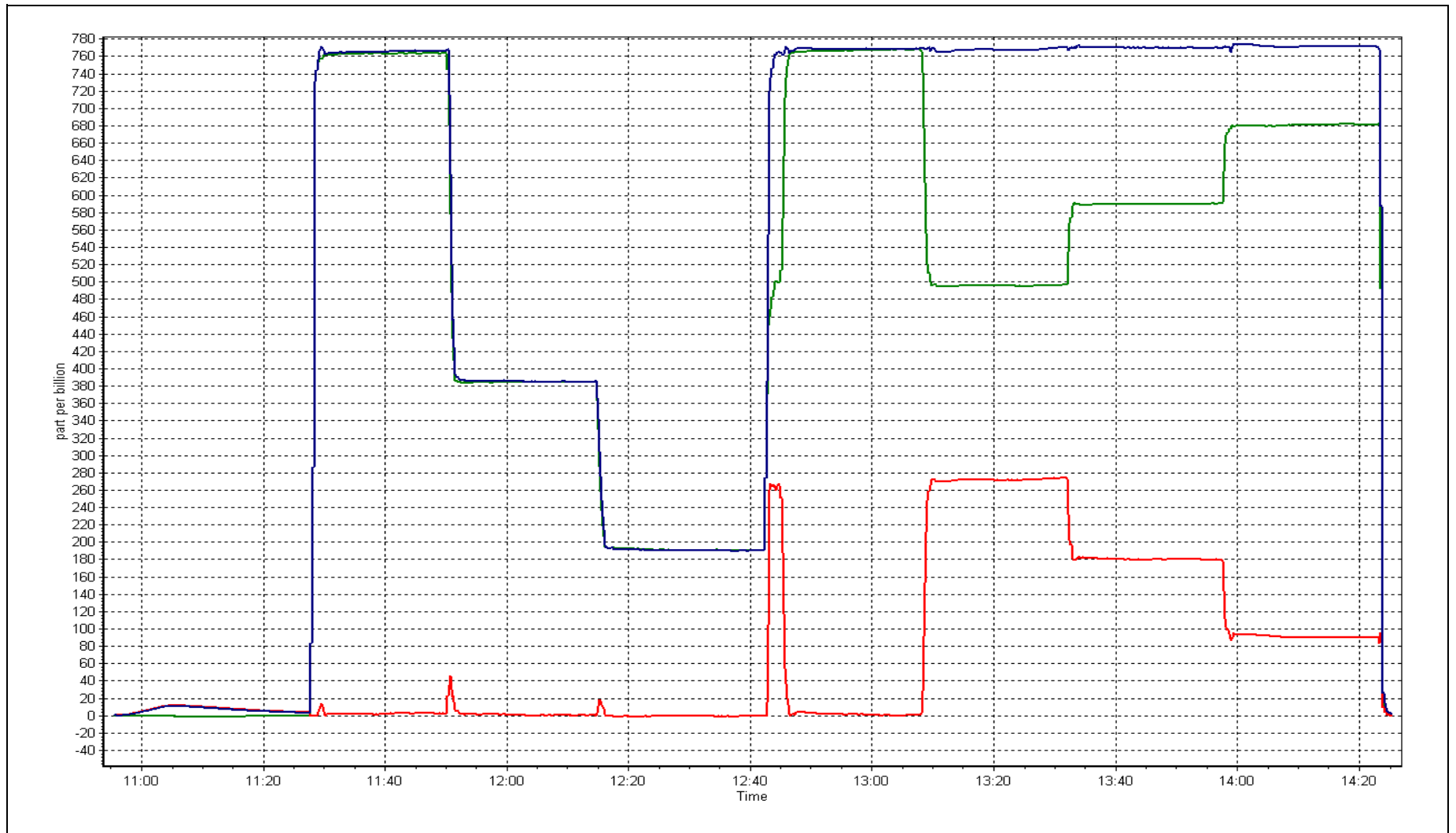
### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	5.4	N/A	Correlation Coefficient	0.999995
271.9	271.9	1.0001		
177.7	180.1	0.9869	Slope	1.019752
86.5	90.2	0.9592		
			Intercept	-5.556159

### NO<sub>2</sub> Calibration Curve









## Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

### Station Information

Calibration Date	July 14, 2015	Previous Calibration	NA
Station Name	Millennium	Station Number	AMS 12
Reason:	Install		
Start Time (MST)	10:00	End Time (MST)	15:20
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	NA	NA	NA
	Data Offset	NA	NA	NA
Current Calibration	Data Slope	0.997470	0.999059	1.016728
	Data Offset	-1.540138	-1.602900	-0.587340

### Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1501663732
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Test Point	before		after	
Concentration range	NA	ppb	0-1000	ppb
NO coefficient	NA		0.798	
NOx coefficient	NA		0.999	
NO2 coefficient	NA		1.000	
NO bkgrnd	NA		5.4	
NOx bkgrnd	NA		5.6	
Chamber Temp	NA	Deg C	50.6	Deg C
Moly Temp	NA	Deg C	325.3	Deg C
HVPS voltage	NA	V	-797.4	V
PMT Temp	NA	Deg C	-2.8	Deg C
O3 flow	NA	ccm	ok	ccm
R Cell press NO	NA	mmHg	159.6	mmHg
R Cell Press Nox	NA	mmHg	159.9	mmHg
NO sample flow	NA	lpm	0.771	lpm
Nox sample Flow	NA	lpm	0.772	lpm

**Notes:**

Install calibration. New filter before calibration started. Span adjusted. Second high NO point used for GPT portion. Nox was 3.6% low during as left span



# Wood Buffalo Environmental Association

## NOX-NO-NO2 Calibration Report

### Station Information

Calibration Date:

July 14, 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										
as found span										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	0.2	-0.1	----	----
high point	5000	82.8	799.8	799.8	0.0	801.9	800.7	1.2	0.9975	0.9989
second point	5000	41.4	399.9	399.9	0.0	405.6	404.9	0.6	0.9861	0.9876
third point	5000	20.7	200.0	200.0	0.0	202.0	201.7	0.3	0.9901	0.9915
as left zero	5000	0.0	0.0	0.0	0.0	0.2	0.2	-0.1	----	----
as left span	5000	82.8	799.8	505.6	294.2	771.8	497.8	273.8	1.0364	1.0157
Average Correction Factor									0.9912	0.9927

Corrected As found  
Previous Response

NO<sub>x</sub>=  
NO<sub>x</sub>=

NA  
NA

NO=  
NO=

NA  
NA

Percent Change

NO<sub>x</sub>=

N/A

NO=

N/A

### 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)	----	505.6	293.5	793.2	505.6	287.6	0.9919	1.0000	1.0204	98.0%
2nd NO2 (200)	----	607.3	191.8	799.1	607.3	191.8	0.9846	1.0000	1.0000	100.0%
3rd NO2 (100)	----	701.5	97.6	798.1	701.5	96.3	0.9859	1.0000	1.0135	98.7%
4th NO2 (0)	799.1	----	1.1	800.2	799.1	1.1	0.9833	1.0000	N/A	----
Average Correction Factor							0.9864	1.0000	1.0113	98.9%

Calibration Performed By:

Devin Russell



# Wood Buffalo Environmental Association

## NO<sub>x</sub> Calibration Summary

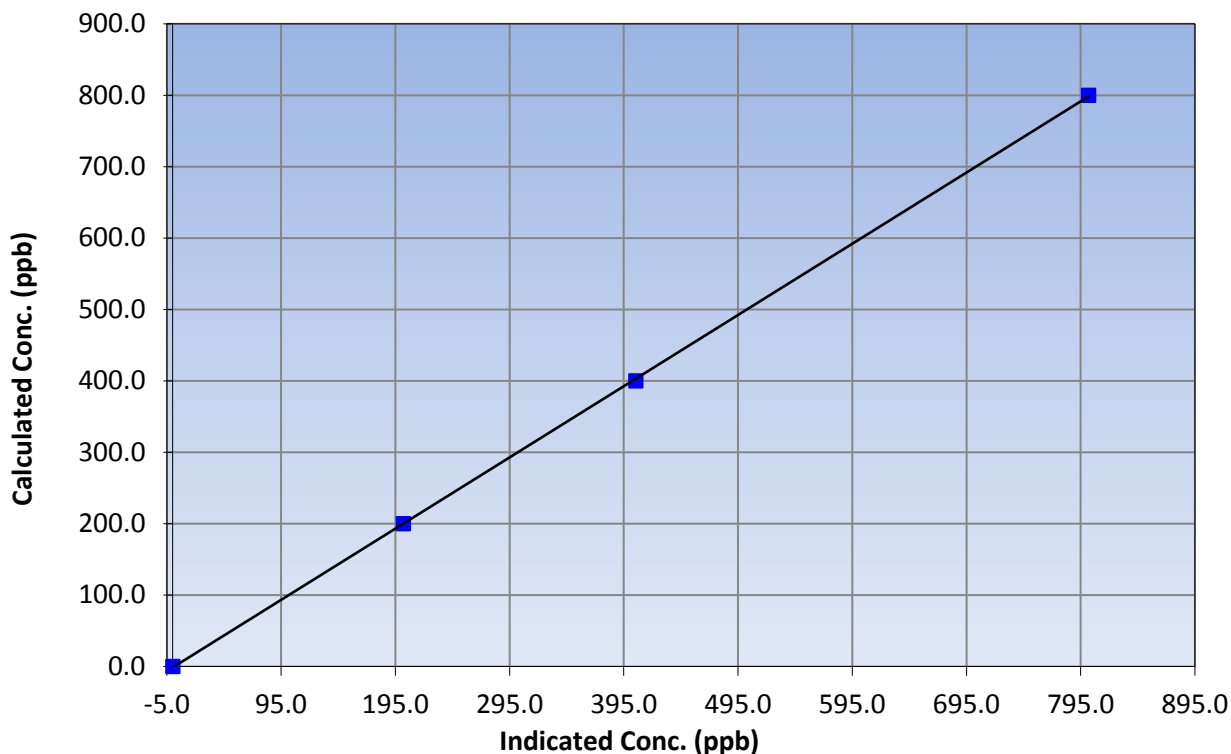
### Station Information

Calibration Date	July 14, 2015	Previous Calibration	NA
Station Name	Millennium	Station Number	AMS 12
Start Time (MST)	10:00	End Time (MST)	15:20
Analyzer make	Thermo 42i	Analyzer serial #	1501663732

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	0.999960
799.8	801.9	0.9975		
399.9	405.6	0.9861	Slope	0.997470
200.0	202.0	0.9901		
			Intercept	-1.540138

### NO<sub>x</sub> Calibration Curve





# Wood Buffalo Environmental Association

## NO Calibration Summary

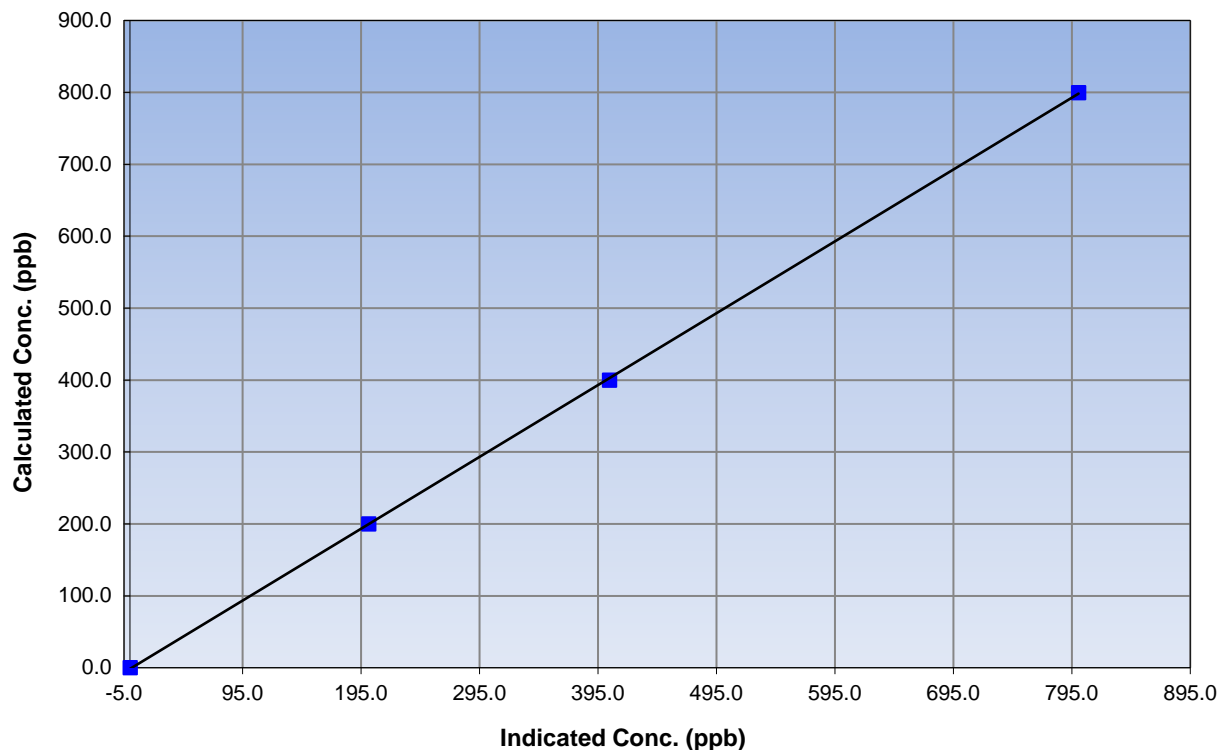
### Station Information

Calibration Date	July 14, 2015	Previous Calibration	
Station Name	Millennium	Station Number	AMS 12
Start Time (MST)	10:00	End Time (MST)	15:20
Analyzer make	Thermo 42i	Analyzer serial #	1501663732

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	N/A	Correlation Coefficient	0.999961
799.8	800.7	0.9989		
399.9	404.9	0.9876	Slope	0.999059
200.0	201.7	0.9915		
			Intercept	-1.602900

### NO Calibration Curve





# Wood Buffalo Environmental Association

## NO<sub>2</sub> Calibration Summary

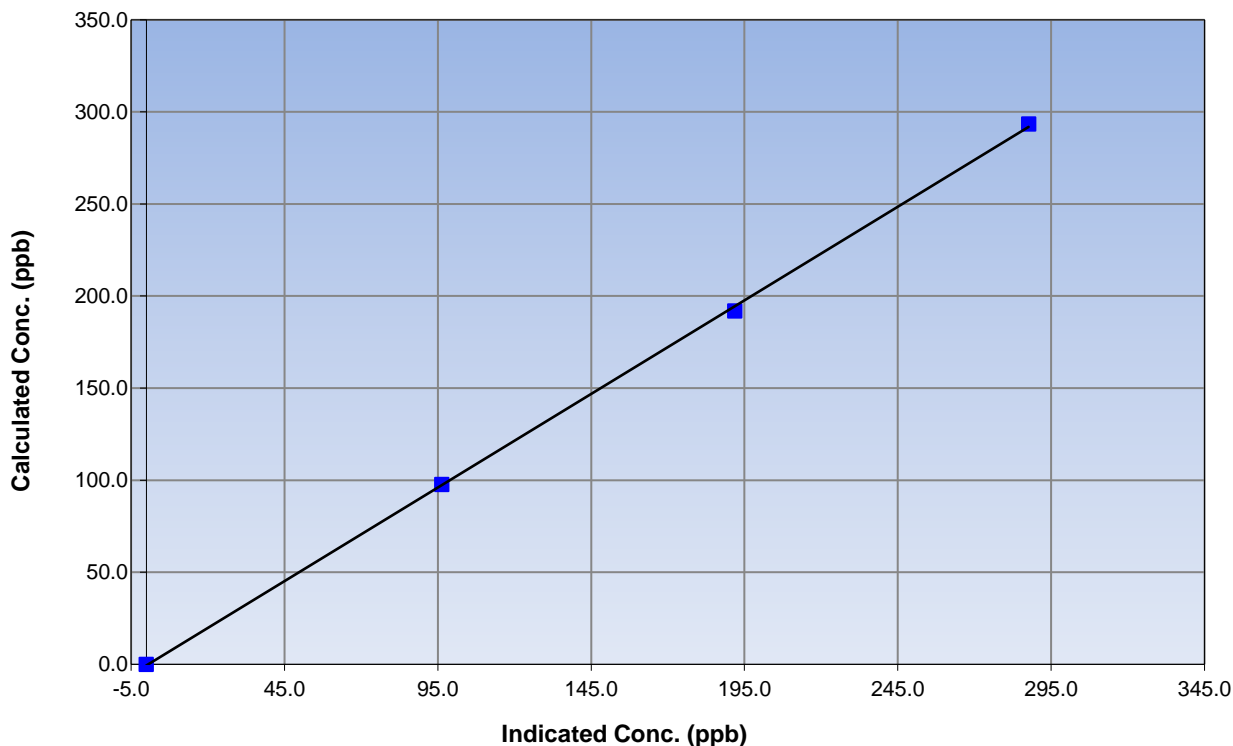
### Station Information

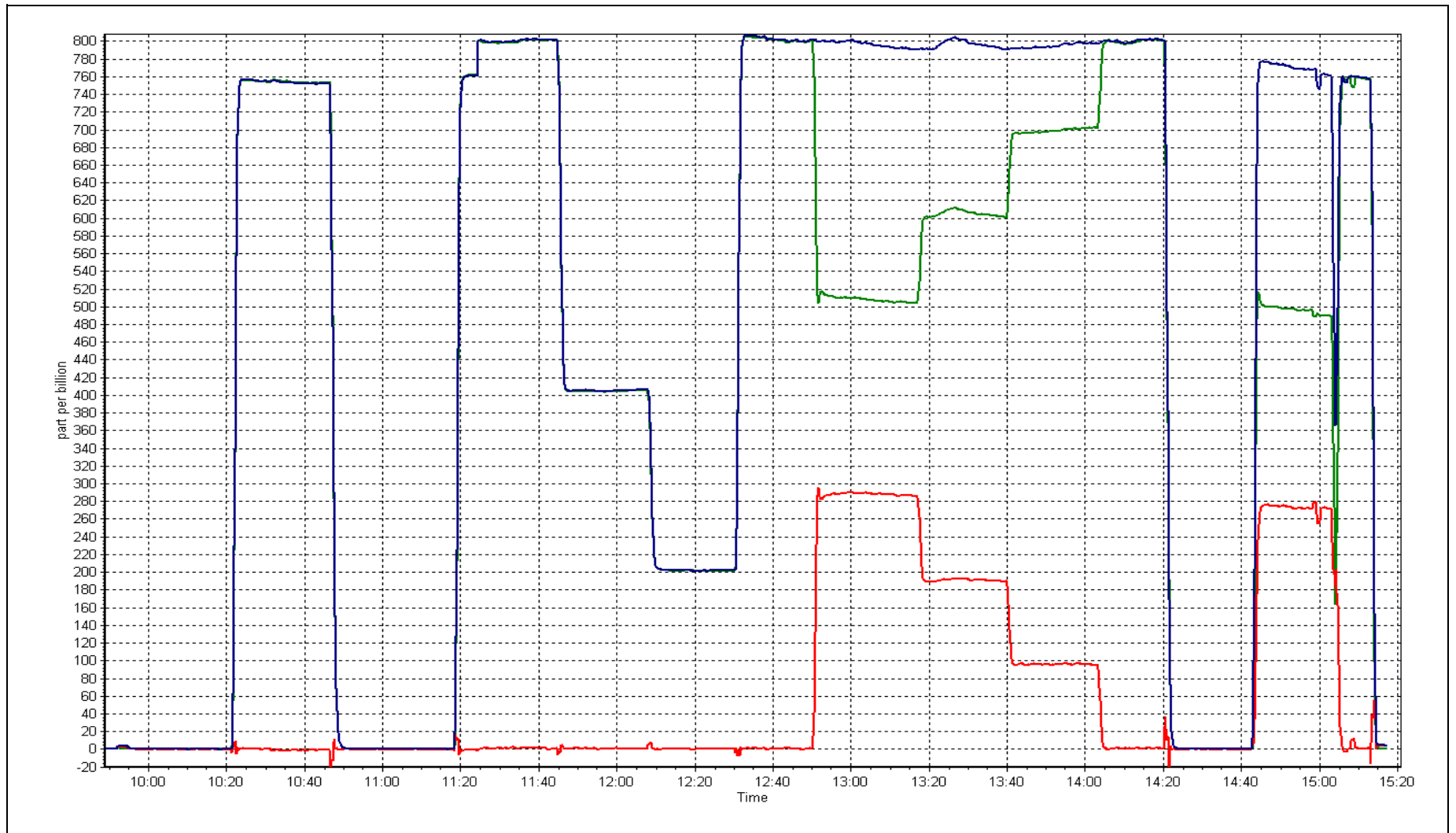
Calibration Date	July 14, 2015	Previous Calibration	NA
Station Name	Millennium	Station Number	AMS 12
Start Time (MST)	10:00	End Time (MST)	15:20
Analyzer make	Thermo 42i	Analyzer serial #	1501663732

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999786
293.5	287.6	1.0204		
191.8	191.8	1.0000	Slope	1.016728
97.6	96.3	1.0135		
			Intercept	-0.587340

### NO<sub>2</sub> Calibration Curve







## Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

### Station Information

Calibration Date	July 15, 2015	Previous Calibration	July 14, 2015
Station Name	Millennium	Station Number	AMS 12
Reason:	<input type="checkbox"/> Other: <input type="checkbox"/> Maintenance		
Start Time (MST)	9:00	End Time (MST)	13:45
NO Cal Gas Conc	48.3 ppm	Gas Cert Reference	LL104223
NOx Cal Gas Conc	48.3 ppm	Cal Gas Expiry Date	12/02/2018
Calibrator	Sabio 4010	Serial Number	11091107
Zero air Generator	Teledyne API T701	Serial Number	4889

### DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	2581
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### Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.997470	0.999059	1.016728
	Data Offset	-1.540138	-1.602900	-0.587340
Current Calibration	Data Slope	0.995137	0.995801	1.009047
	Data Offset	-1.720665	-1.634040	0.063712

### Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1501663732
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Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
NO coefficient	0.798		0.855	
NOx coefficient	0.999		0.999	
NO2 coefficient	1		1.000	
NO bkgrnd	5.4		5.8	
NOx bkgrnd	5.6		6.0	
Chamber Temp	50.6	Deg C	50.4	Deg C
Moly Temp	325.3	Deg C	326.3	Deg C
HVPS voltage	-797.4	V	-797.7	V
PMT Temp	-2.8	Deg C	-2.7	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	159.6	mmHg	164.8	mmHg
R Cell Press Nox	159.9	mmHg	164.8	mmHg
NO sample flow	0.771	lpm	0.73	lpm
Nox sample Flow	0.772	lpm	0.730	lpm

**Notes:**

Recalibration. Flow dropped since last calibration. Scrubber replaced; fittings in flow path tightened. Span adjusted.





# Wood Buffalo Environmental Association

## NOX-NO-NO2 Calibration Report

### Station Information

Calibration Date:

July 15, 2015

Station Number:

AMS 12

### Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1	----	----
as found span	5000	82.8	799.8	799.8	0.0	762.9	761.5	1.5	1.0484	1.0504
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	0.1	-0.1	----	----
high point	5000	82.8	799.8	799.8	0.0	803.9	803.4	0.6	0.9950	0.9956
second point	5000	41.4	399.9	399.9	0.0	406.7	406.2	0.5	0.9834	0.9846
third point	5000	20.7	200.0	200.0	0.0	202.9	202.5	0.4	0.9855	0.9873
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.3	-0.1	----	----
as left span	5000	82.8	799.8	508.9	290.9	813.1	526.2	286.9	0.9838	0.9671
Average Correction Factor									0.9880	0.9892

Corrected As found      NO<sub>x</sub>= 763.0                      NO= 761.5                      Percent Change              NO<sub>x</sub>= 5.3%                      NO= 5.4%  
 Previous Response      NO<sub>x</sub>= 803.4                      NO= 802.2

### 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)	----	508.9	286.9	795.0	508.9	286.0	0.9898	1.0000	1.0031	99.7%
2nd NO2 (200)	----	601.4	194.4	790.4	601.4	189.0	0.9955	1.0000	1.0286	97.2%
3rd NO2 (100)	----	700.8	95.0	796.8	700.8	96.0	0.9875	1.0000	0.9900	101.0%
4th NO2 (0)	795.8	----	0.4	796.2	795.8	0.5	0.9883	1.0000	N/A	----
Average Correction Factor							0.9903	1.0000	1.0072	99.3%

Calibration Performed By: Devin Russell



# Wood Buffalo Environmental Association

## NO<sub>x</sub> Calibration Summary

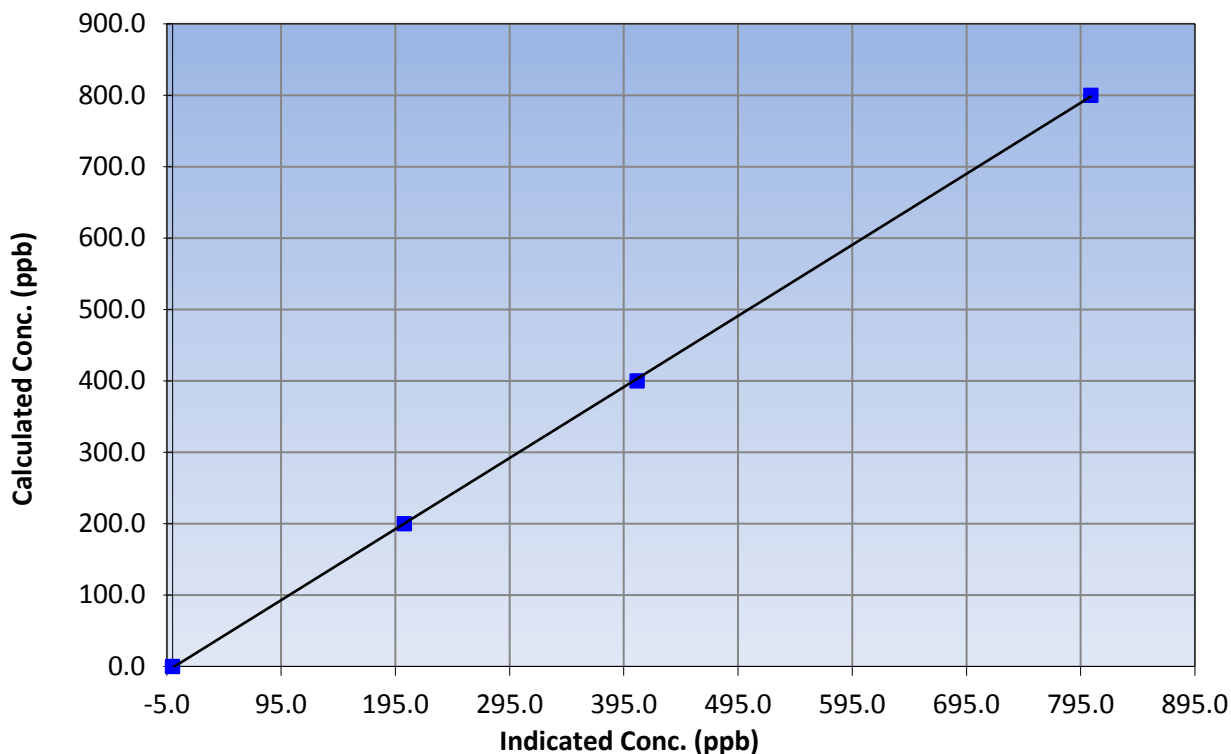
### Station Information

Calibration Date	July 15, 2015	Previous Calibration	July 14, 2015
Station Name	Millennium	Station Number	AMS 12
Start Time (MST)	9:00	End Time (MST)	13:45
Analyzer make	Thermo 42i	Analyzer serial #	1501663732

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999958
799.8	803.9	0.9950		
399.9	406.7	0.9834	Slope	0.995137
200.0	202.9	0.9855		
			Intercept	-1.720665

### NO<sub>x</sub> Calibration Curve





# Wood Buffalo Environmental Association

## NO Calibration Summary

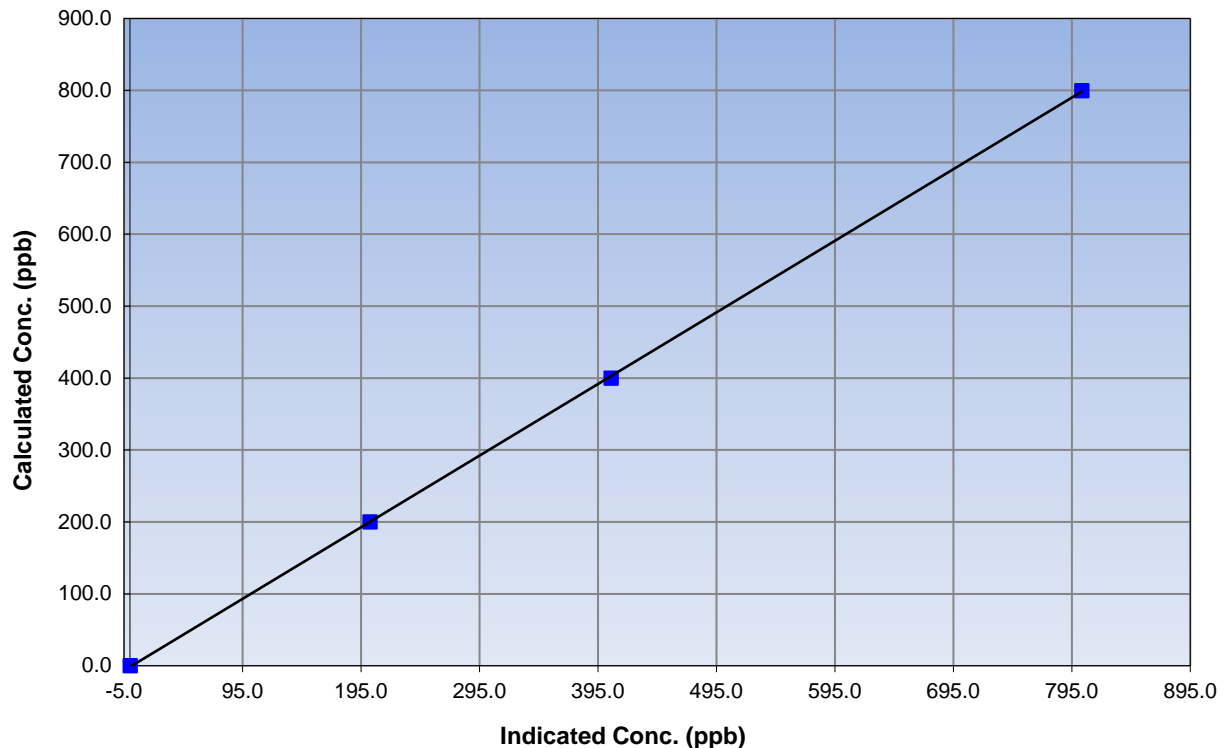
### Station Information

Calibration Date	July 15, 2015	Previous Calibration	July 14, 2015
Station Name	Millennium	Station Number	AMS 12
Start Time (MST)	9:00	End Time (MST)	13:45
Analyzer make	Thermo 42i	Analyzer serial #	1501663732

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	N/A	Correlation Coefficient	0.999963
799.8	803.4	0.9956		
399.9	406.2	0.9846	Slope	0.995801
200.0	202.5	0.9873		
			Intercept	-1.634040

### NO Calibration Curve





# Wood Buffalo Environmental Association

## NO<sub>2</sub> Calibration Summary

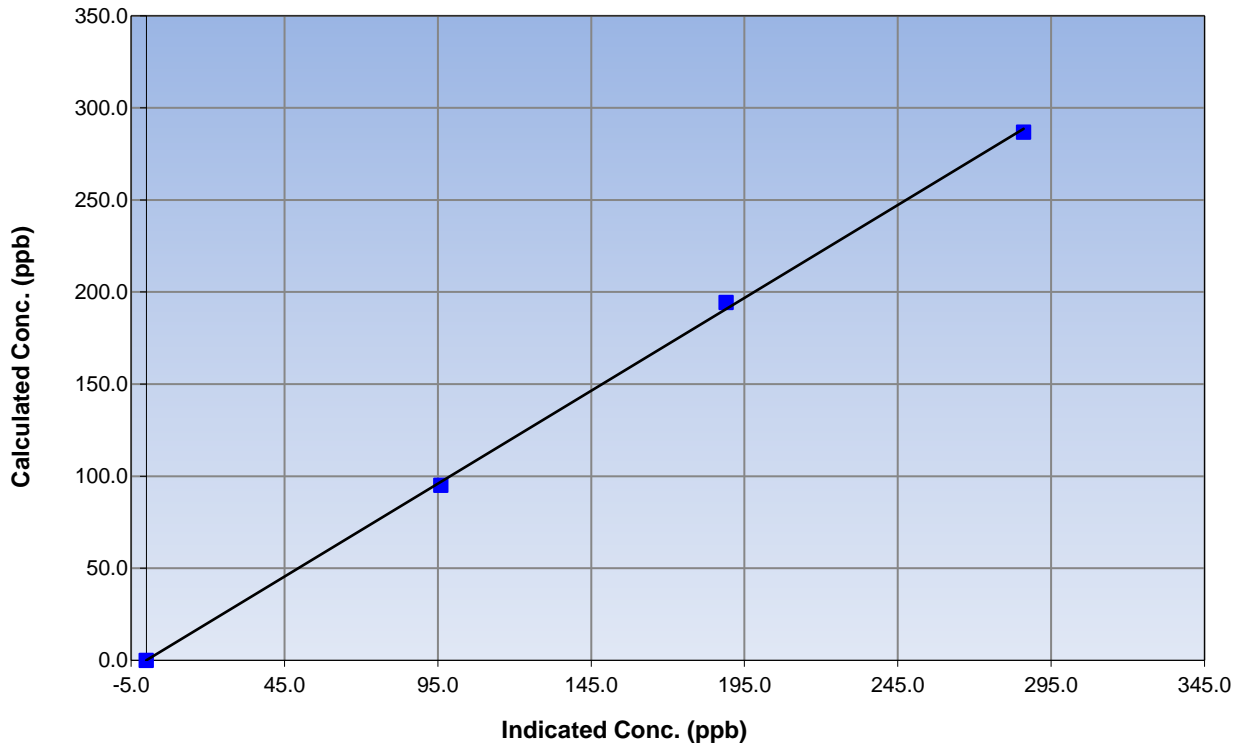
### Station Information

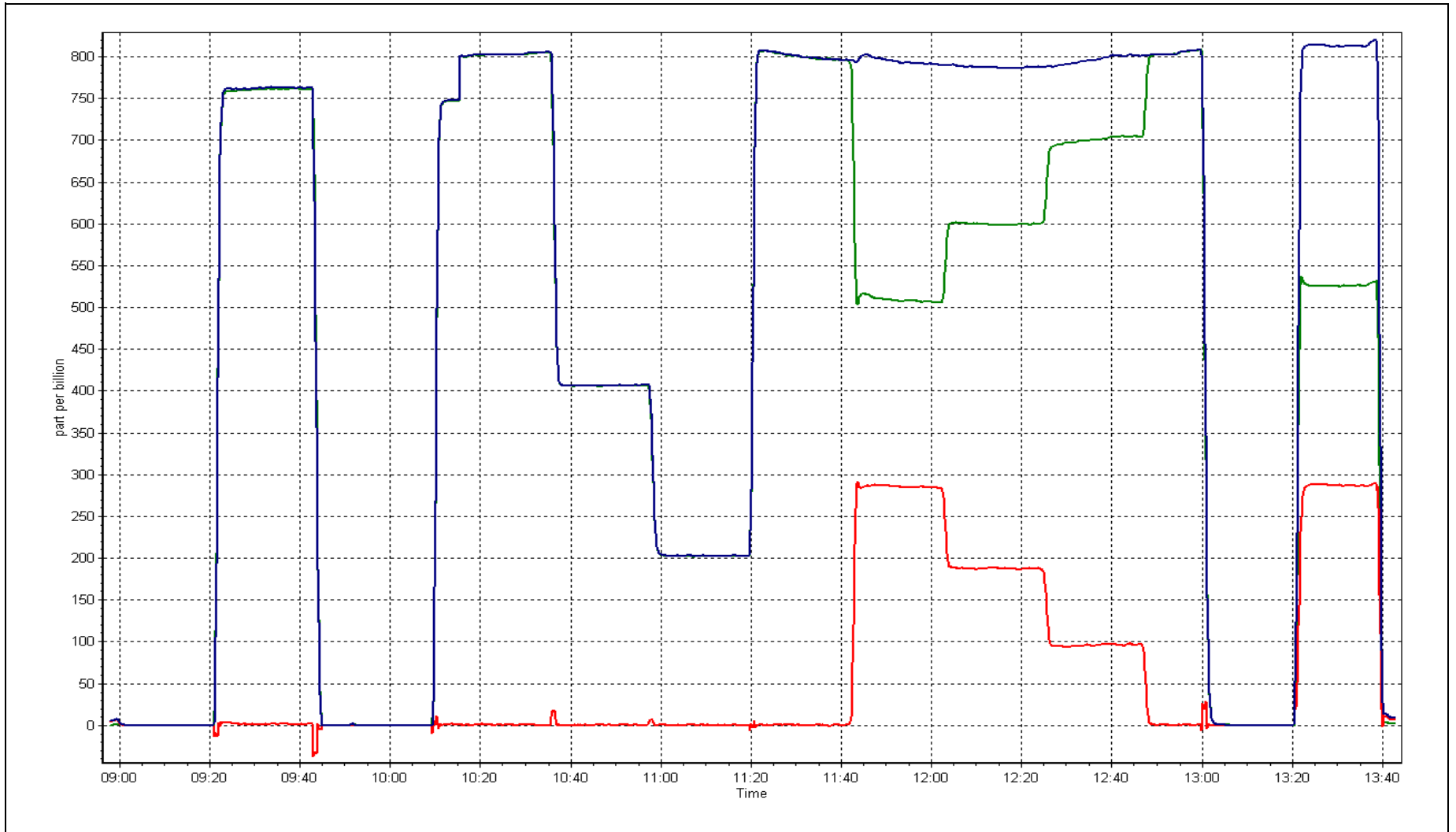
Calibration Date	July 15, 2015	Previous Calibration	July 14, 2015
Station Name	Millennium	Station Number	AMS 12
Start Time (MST)	9:00	End Time (MST)	13:45
Analyzer make	Thermo 42i	Analyzer serial #	1501663732

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999570
286.9	286.0	1.0031		
194.4	189.0	1.0286	Slope	1.009047
95.0	96.0	0.9900		
			Intercept	0.063712

### NO<sub>2</sub> Calibration Curve







## Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

### Station Information

Calibration Date	July 20, 2015	Previous Calibration	July 15, 2015
Station Name	Millennium	Station Number	AMS 12
Reason:	<input type="checkbox"/> Other: <input checked="" type="checkbox"/> Maintenance		
Start Time (MST)	10:40	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	0.995137	0.995801	1.009047
	Data Offset	-1.720665	-1.634040	0.063712
Current Calibration	Data Slope	0.997757	0.996903	0.990101
	Data Offset	-2.052871	-1.903357	-0.132397

### Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1501663732
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Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
NO coefficient	0.855		0.904	
NOx coefficient	0.999		0.997	
NO2 coefficient	1		1.000	
NO bkgrnd	5.8		6.1	
NOx bkgrnd	6		6.1	
Chamber Temp	50.4	Deg C	50.4	Deg C
Moly Temp	326.3	Deg C	321.8	Deg C
HVPS voltage	-797.7	V	-797.4	V
PMT Temp	-2.7	Deg C	-3	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	164.8	mmHg	176	mmHg
R Cell Press Nox	730164.8	mmHg	176	mmHg
NO sample flow	0.73	lpm	0.696	lpm
Nox sample Flow	0.73	lpm	0.696	lpm

**Notes:**

Recalibration. Flow dropped since last calibration. Exhaust line from analyzer to scrubber replaced. Span adjusted. Second high GPT point used for GPT portion of calibration.



# Wood Buffalo Environmental Association

## NOX-NO-NO2 Calibration Report

### Station Information

Calibration Date:

July 20, 2015

Station Number:

AMS 12

### Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	0.0	0.1	-0.1	----	----
as found span	5000	82.8	799.8	799.8	0.0	759.4	758.5	0.8	1.0533	1.0545
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	0.2	-0.2	----	----
high point	5000	82.8	799.8	799.8	0.0	801.7	802.5	-0.8	0.9978	0.9967
second point	5000	41.4	399.9	399.9	0.0	406.9	406.7	0.3	0.9828	0.9835
third point	5000	20.7	200.0	200.0	0.0	202.5	202.4	0.1	0.9877	0.9881
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.3	-0.2	----	----
as left span	5000	82.8	799.8	508.0	291.9	798.8	512.2	286.6	1.0013	0.9918
Average Correction Factor									0.9894	0.9894

Corrected As found  
Previous Response

NO<sub>x</sub>= 759.4  
NO<sub>x</sub>= 805.5

NO= 758.5  
NO= 804.9

Percent Change

NO<sub>x</sub>= 6.1%

NO= 6.1%

### 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			-0.2			N/A	
1st NO2 (300)	----	508.0	290.1	800.7	508.0	292.7	0.9827	1.0000	0.9910	100.9%
2nd NO2 (200)	----	606.7	191.3	801.0	606.7	193.9	0.9823	1.0000	0.9867	101.3%
3rd NO2 (100)	----	703.8	94.3	799.3	703.8	95.5	0.9844	1.0000	0.9869	101.3%
4th NO2 (0)	798.0	----	-0.5	797.5	798.0	-0.5	0.9866	1.0000	N/A	----
Average Correction Factor							0.9840	1.0000	0.9882	101.2%

Calibration Performed By:

Devin Russell



# Wood Buffalo Environmental Association

## NO<sub>x</sub> Calibration Summary

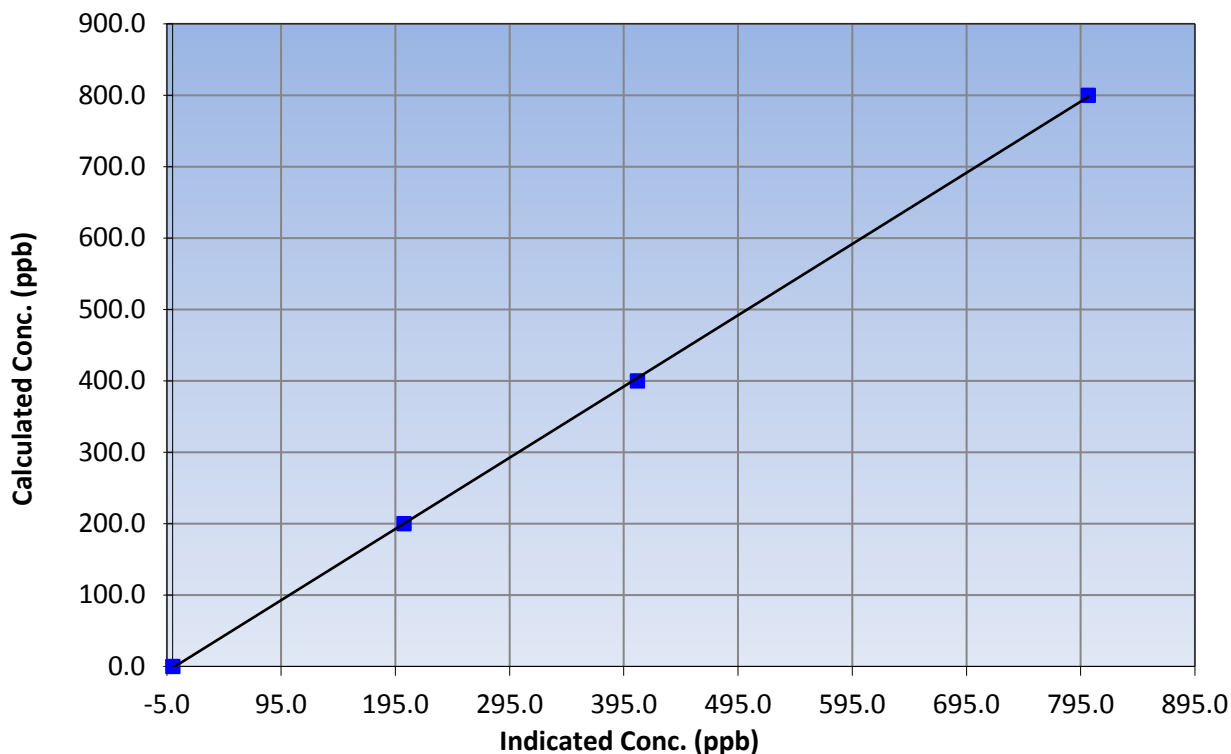
### Station Information

Calibration Date	July 20, 2015	Previous Calibration	July 15, 2015
Station Name	Millennium	Station Number	AMS 12
Start Time (MST)	10:40	End Time (MST)	15:50
Analyzer make	Thermo 42i	Analyzer serial #	1501663732

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	----	Correlation Coefficient	0.999930
799.8	801.7	0.9978		
399.9	406.9	0.9828	Slope	0.997757
200.0	202.5	0.9877		
			Intercept	-2.052871

### NO<sub>x</sub> Calibration Curve







# Wood Buffalo Environmental Association

## NO Calibration Summary

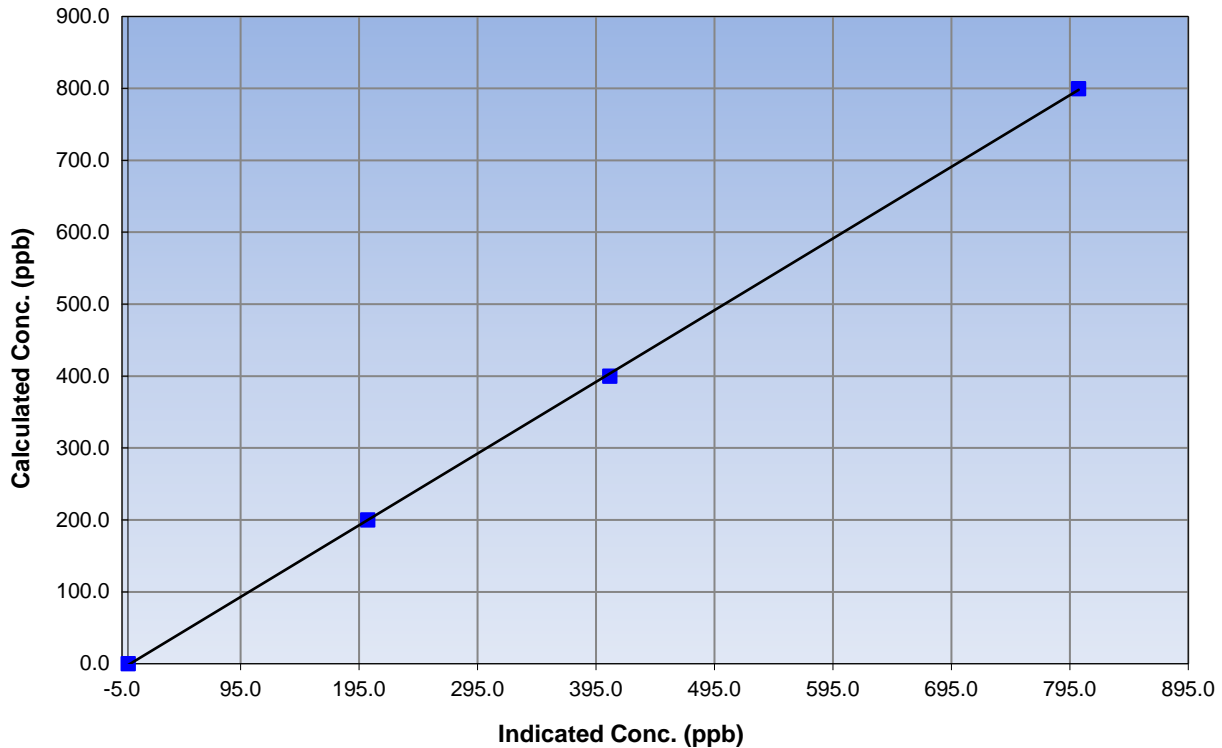
### Station Information

Calibration Date	July 20, 2015	Previous Calibration	July 15, 2015
Station Name	Millennium	Station Number	AMS 12
Start Time (MST)	10:40	End Time (MST)	15:50
Analyzer make	Thermo 42i	Analyzer serial #	1501663732

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	N/A	Correlation Coefficient	0.999947
799.8	802.5	0.9967		
399.9	406.7	0.9835	Slope	0.996903
200.0	202.4	0.9881		
			Intercept	-1.903357

### NO Calibration Curve





# Wood Buffalo Environmental Association

## NO<sub>2</sub> Calibration Summary

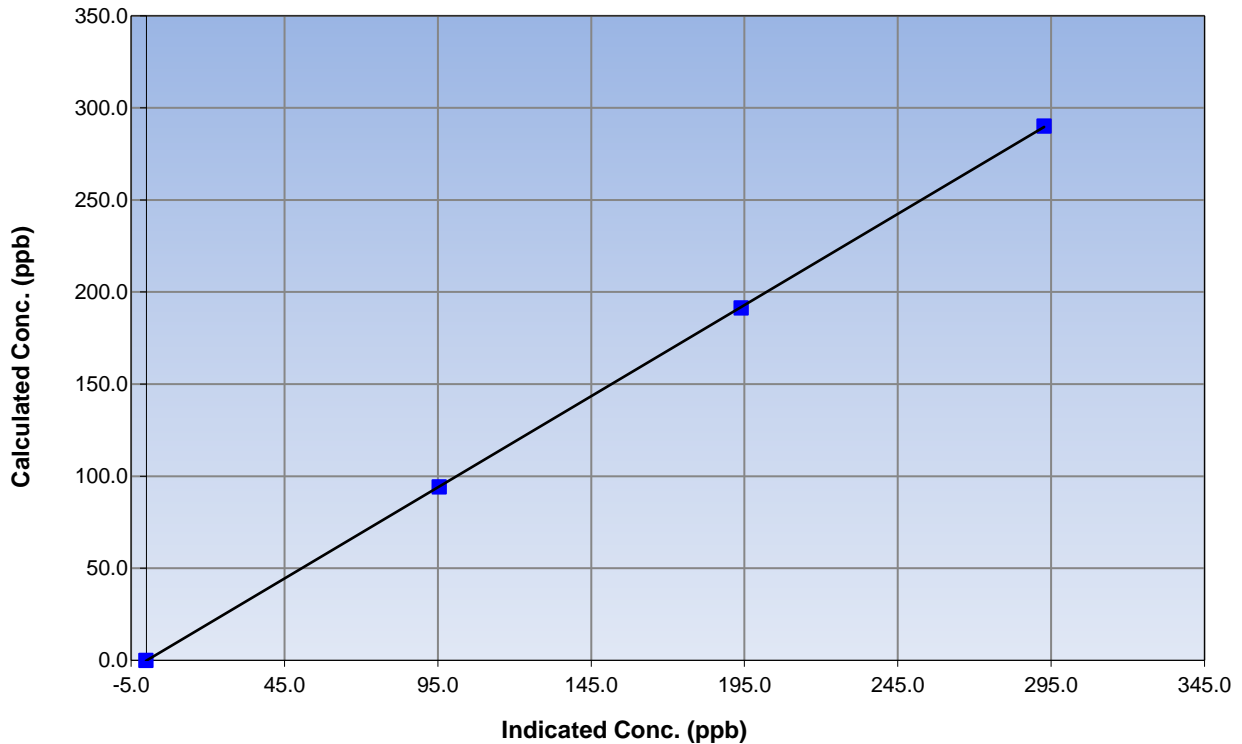
### Station Information

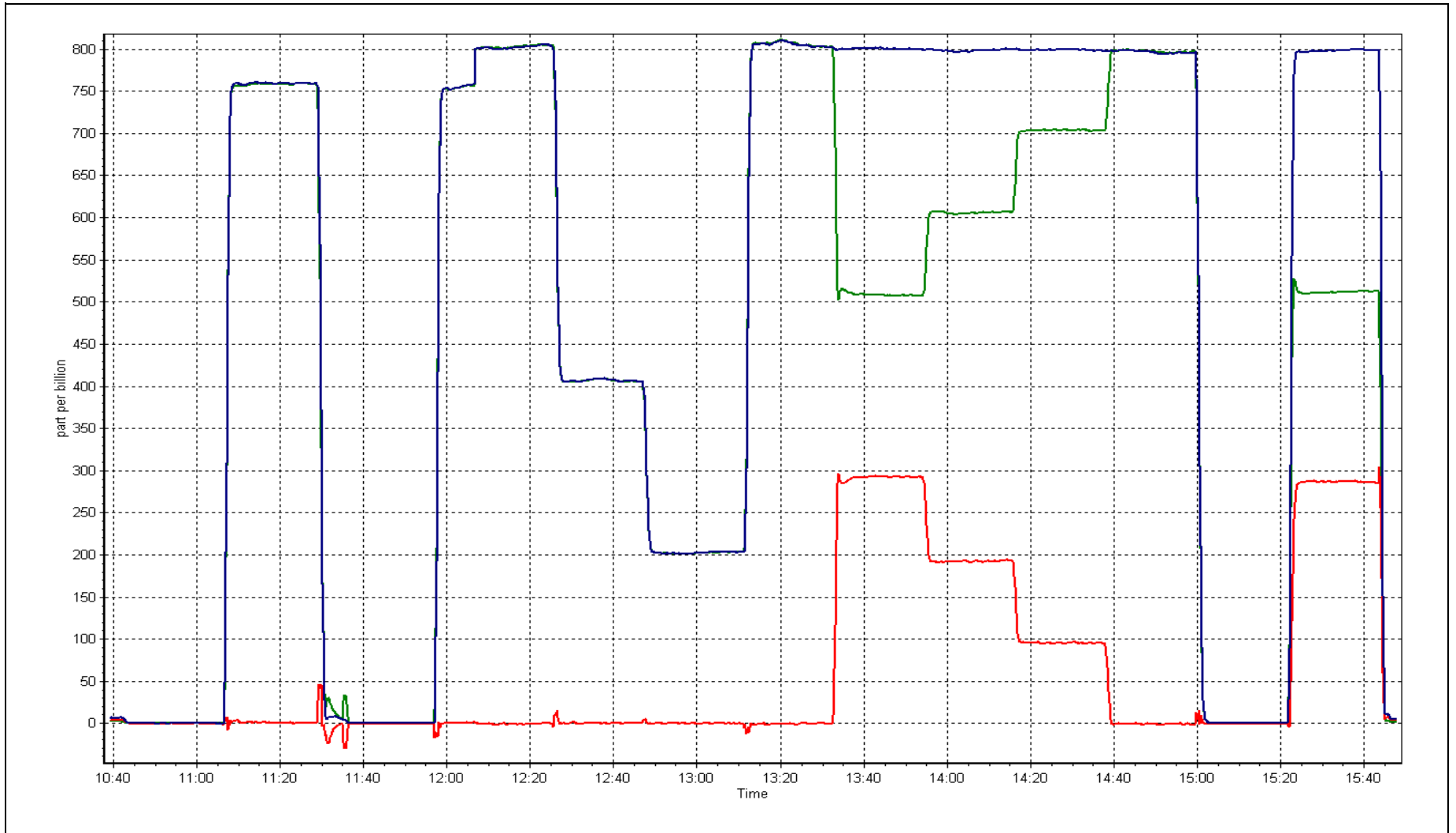
Calibration Date	July 20, 2015	Previous Calibration	July 15, 2015
Station Name	Millennium	Station Number	AMS 12
Start Time (MST)	10:40	End Time (MST)	15:50
Analyzer make	Thermo 42i	Analyzer serial #	1501663732

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	N/A	Correlation Coefficient	0.999988
290.1	292.7	0.9910		
191.3	193.9	0.9867	Slope	0.990101
94.3	95.5	0.9869		
			Intercept	-0.132397

### NO<sub>2</sub> Calibration Curve







## Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

### Station Information

Calibration Date	July 28, 2015	Previous Calibration	July 20, 2015
Station Name	Millennium	Station Number	AMS 12
Reason:	<input type="checkbox"/> Other: <input checked="" type="checkbox"/> Maintenance		
Start Time (MST)	10:00	End Time (MST)	16:15
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	0.997757	0.996903	0.990101
	Data Offset	-2.052871	-1.903357	-0.132397
Current Calibration	Data Slope	0.994716	0.995340	0.994486
	Data Offset	-1.091704	-0.886379	1.341318

### Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1501663732
---------------------	------------	-------------------	------------

Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
NO coefficient	0.904		0.975	
NOx coefficient	0.997		0.999	
NO2 coefficient	1		1.000	
NO bkgnd	6.1		6.6	
NOx bkgnd	6.1		6.9	
Chamber Temp	50.4	Deg C	50.6	Deg C
Moly Temp	321.8	Deg C	325.3	Deg C
HVPS voltage	-797.4	V	-797.7	V
PMT Temp	-3	Deg C	-2.8	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	176	mmHg	191.2	mmHg
R Cell Press Nox	176	mmHg	191.2	mmHg
NO sample flow	0.696	lpm	0.661	lpm
Nox sample Flow	0.696	lpm	0.661	lpm

**Notes:**

Recalibration. Flow dropped since last calibration. Drier replaced. Internal valves checked. All fitting and connections tightened. Span adjusted. First portion of as left span is with zero/span valve on, second portion of as left span is with zero/span valve off.



# Wood Buffalo Environmental Association

## NOX-NO-NO2 Calibration Report

### Station Information

Calibration Date:

July 28, 2015

Station Number:

AMS 12

### Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
as found span	5000	82.8	799.8	799.8	0.0	718.2	718.2	-0.1	1.1137	1.1137
calibrator zero	5000	0.0	0.0	0.0	0.0	0.2	0.1	0.1	----	----
high point	5000	82.8	799.8	799.8	0.0	804.2	803.6	0.6	0.9946	0.9954
second point	5000	41.4	399.9	399.9	0.0	405.3	404.7	0.6	0.9868	0.9883
third point	5000	20.7	200.0	200.0	0.0	202.0	201.5	0.4	0.9901	0.9922
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.2	-0.2	----	----
as left span	5000	82.8	799.8	513.6	286.2	824.0	525.0	300.0	0.9707	0.9783
Average Correction Factor									0.9905	0.9920

Corrected As found  
Previous Response

NO<sub>x</sub>= 718.1  
NO<sub>x</sub>= 803.7

NO= 718.2  
NO= 804.2

Percent Change

NO<sub>x</sub>= 11.9%

NO= 12.0%

### 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)	----	513.6	292.2	806.4	513.6	292.8	0.9757	1.0000	0.9981	100.2%
2nd NO2 (200)	----	612.1	193.7	806.4	612.1	194.3	0.9758	1.0000	0.9972	100.3%
3rd NO2 (100)	----	704.7	101.2	802.5	704.7	97.9	0.9805	1.0000	1.0339	96.7%
4th NO2 (0)	805.8	----	0.8	806.6	805.8	0.8	0.9755	1.0000	N/A	----
Average Correction Factor							0.9769	1.0000	1.0097	99.1%

Calibration Performed By:

Devin Russell



# Wood Buffalo Environmental Association

## NO<sub>x</sub> Calibration Summary

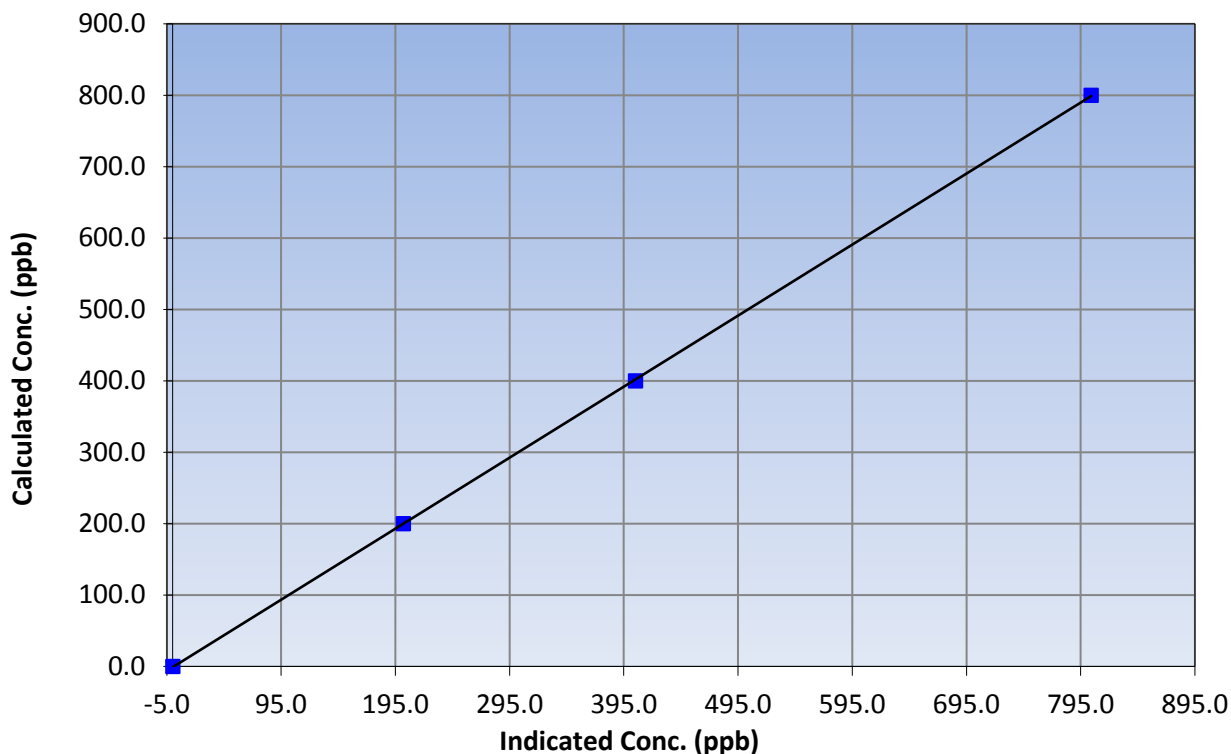
### Station Information

Calibration Date	July 28, 2015	Previous Calibration	July 20, 2015
Station Name	Millennium	Station Number	AMS 12
Start Time (MST)	10:00	End Time (MST)	16:15
Analyzer make	Thermo 42i	Analyzer serial #	1501663732

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	----	Correlation Coefficient	0.999982
799.8	804.2	0.9946		
399.9	405.3	0.9868	Slope	0.994716
200.0	202.0	0.9901		
			Intercept	-1.091704

### NO<sub>x</sub> Calibration Curve





# Wood Buffalo Environmental Association

## NO Calibration Summary

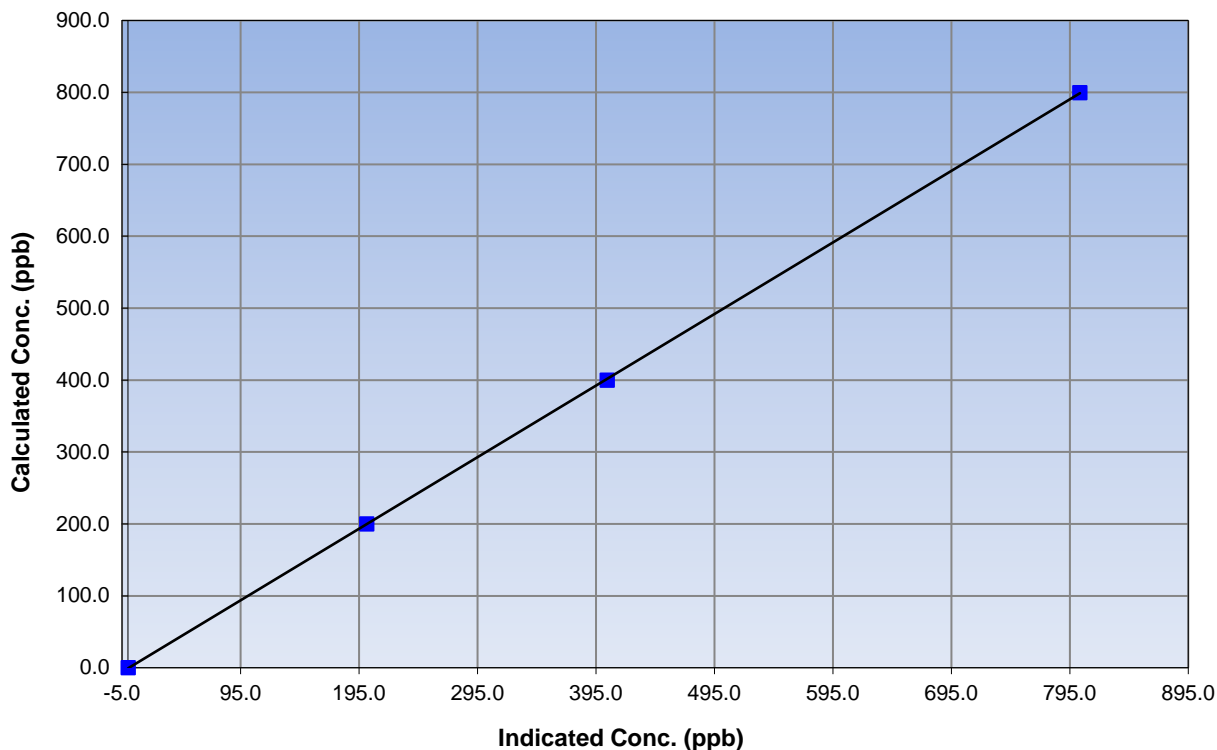
### Station Information

Calibration Date	July 28, 2015	Previous Calibration	July 20, 2015
Station Name	Millennium	Station Number	AMS 12
Start Time (MST)	10:00	End Time (MST)	16:15
Analyzer make	Thermo 42i	Analyzer serial #	1501663732

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	N/A	Correlation Coefficient	0.999984
799.8	803.6	0.9954		
399.9	404.7	0.9883	Slope	0.995340
200.0	201.5	0.9922		
			Intercept	-0.886379

### NO Calibration Curve





# Wood Buffalo Environmental Association

## NO<sub>2</sub> Calibration Summary

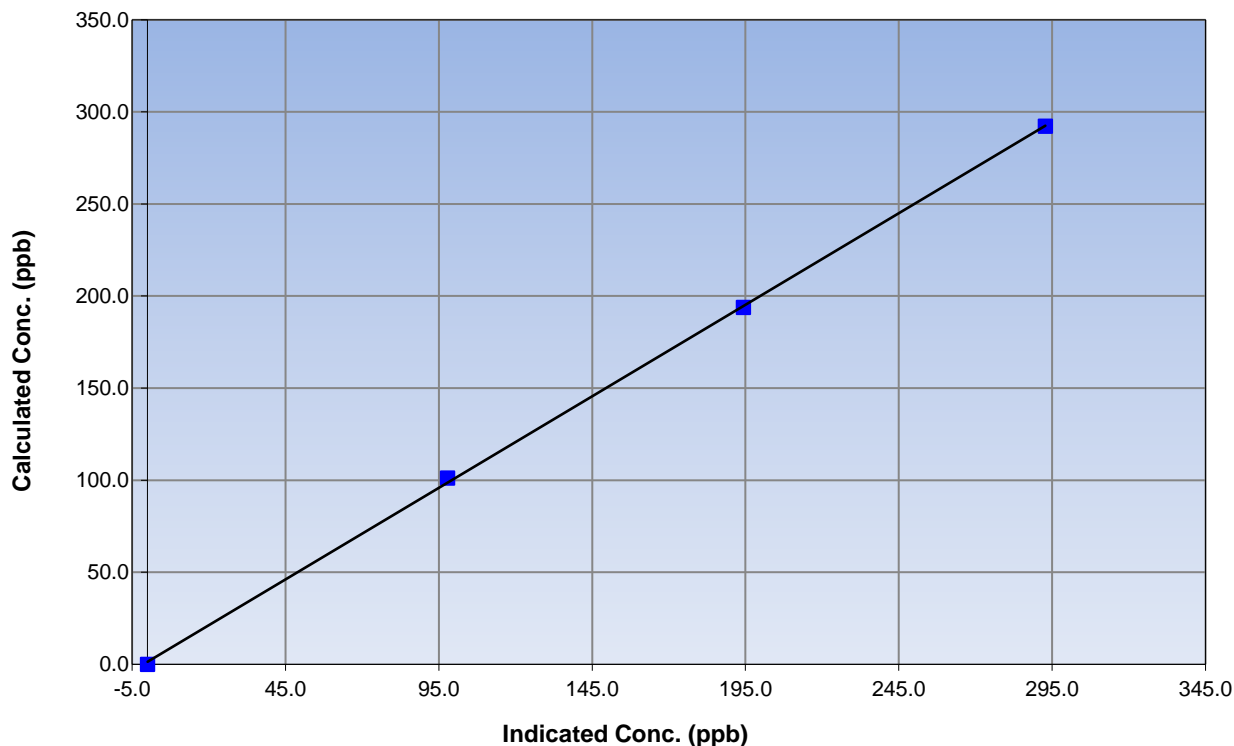
### Station Information

Calibration Date	July 28, 2015	Previous Calibration	July 20, 2015
Station Name	Millennium	Station Number	AMS 12
Start Time (MST)	10:00	End Time (MST)	16:15
Analyzer make	Thermo 42i	Analyzer serial #	1501663732

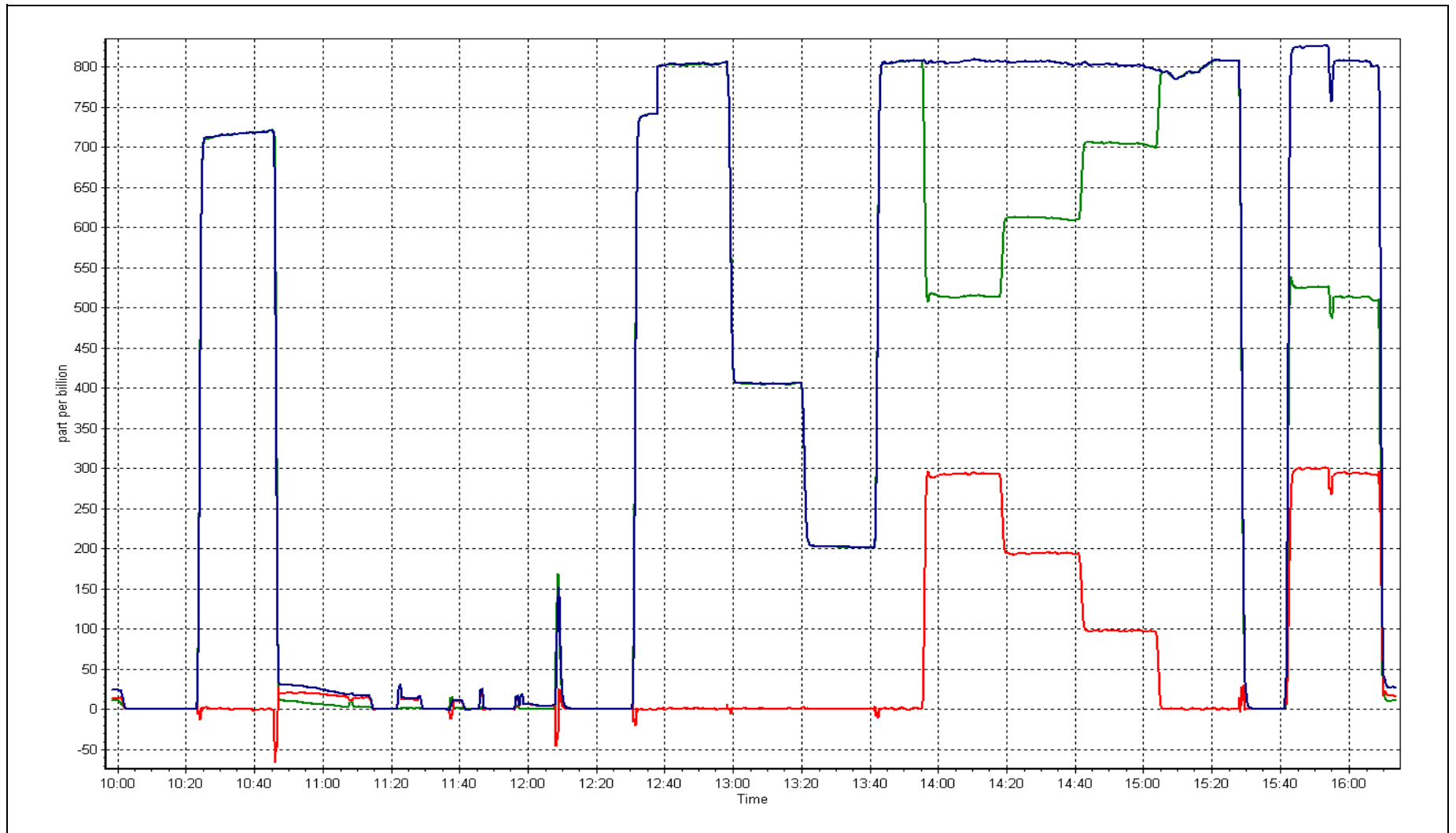
### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	N/A	Correlation Coefficient	0.999807
292.2	292.8	0.9981		
193.7	194.3	0.9972	Slope	0.994486
101.2	97.9	1.0339		
			Intercept	1.341318

### NO<sub>2</sub> Calibration Curve









Wood Buffalo Environmental Association

SHARP CONFORMANCE TEST

STATION INFORMATION

Calibration Date:	<u>July 14, 2015</u>	Previous Calibration:	<u>June 24, 2015</u>
Station Name:	<u>Millennium</u>	Station Number:	<u>AMS 12</u>
Start Time (MST):	<u>10:00</u>	End Time (MST):	<u>10:40</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	28.0	28.1	0.1	28.0
T2	31.0	na	na	31.0
T3	29.0	na	na	29.0
T4	39.0	na	na	39.0
RH (%)	38.0	na	na	38.0

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	966	965.9	-0.1	966

Main Flow (Lph)

Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
1000	964	-36	964	1000

Nephelometer Calibration

Parameter	As Found	adjusted (Limit +/- 2.0ug/m3)	As Left
Analog	227		227
Neph	1.3		1.3
C14	30.9	no	30.9
Indicated Concentration (ug/m3)	0.2		0.2
Offset 1			225.8
Offset 2			34.1

Leak Check (Quarterly)

Leak Check Date: June 24, 2015 Previous Leak Check Date:

	Measured	Difference LPM (Limit +/- 0.42 LPM)
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	24/06/2015
Pump	Good	NA
Filter Tape	Good	NA
Mass Foil Cal Set	Good	NA
HEPA filter	Good	NA

NOTES:

Removal Conformance Test.

Audit Performed By: Devin Russell



Wood Buffalo Environmental Association

SHARP CONFORMANCE TEST

STATION INFORMATION

Calibration Date:	<u>July 14, 2015</u>	Previous Calibration:	
Station Name:	<u>Millennium</u>	Station Number:	<u>AMS 12</u>
Start Time (MST):	<u>10:40</u>	End Time (MST):	<u>14:20</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-509</u>
Source SN:	<u>3634</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	28.0	26.6	-1.4	28.0
T2	28.0	na	na	28.0
T3	26.0	na	na	26.0
T4	36.0	na	na	36.0
RH (%)	64.0	na	na	64.0

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	968	965.9	-2.1	968

Main Flow (Lph)

Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
1000	965	-35	998	1000

Nephelometer Calibration

Parameter	As Found	adjusted (Limit +/- 2.0ug/m3)	As Left
Analog	361		360
Neph	12.7		-0.1
C14	-96	yes	-92.9
Indicated Concentration (ug/m3)	10.6		-0.1
Offset 1			360.4
Offset 2			46.6

Leak Check (Quarterly)

Leak Check Date:	<u>July 14, 2015</u>	Previous Leak Check Date:	June 24, 2015
------------------	----------------------	---------------------------	---------------

Measured

Difference LPM (Limit +/- 0.42 LPM)

Flow without adaptor (LPM):	16.64	
Flow with adaptor [turn off pump first](LPM):	16.62	0.02

Mass Foil Calibration (Annualy)

Foil Calibration Date:	<u>NA</u>	Previous Foil Calibration:	March 27, 2015
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/cleaned	24/06/2015
Pump	Good	NA
Filter Tape	Good	NA
Mass Foil Cal Set	Good	NA
HEPA filter	Good	NA

NOTES:

Install conformace test. Neph Zero adjusted. Flow adjusted. Leak check completed. Cyclone head cleaned.

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  
JULY 2015**

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

August 26, 2015



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT MCKAY SOUTH (AMS 13)  
 JULY 2015

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	708	36	36	100.00	12	0	2	0
TRS(ppb) Average	680	36	64	96.24	3	0	1	0
THC(ppm) Average	705	36	39	99.60	3.3	-	2.5	-
O3(ppb) Average	708	35	36	99.87	56	0	27	-
NO2(ppb) Average	708	36	36	100.00	27	0	6	-
NO(ppb) Average	708	36	36	100.00	34	-	5	-
NOX(ppb) Average	708	36	36	100.00	41	-	10	-
PM2.5(ug/m3) Average	730	0	14	98.12	422.3	-	158.2	5
ET(C) Average	744	0	0	100.00	31.5	-	21.8	-
RH(%) Average	744	0	0	100.00	98	-	89	-
WS(km/h) Average	744	0	0	100.00	15	-	8	-
WD(deg) Average	744	0	0	100.00	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT MCKAY SOUTH (AMS 13)  
 JULY 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	708	0.6	1	-	0	0	0	0	0	1	12
TRS(ppb) Average	680	0.2	0	-	0	0	0	0	0	0	3
THC(ppm) Average	705	2.23	0.2	-	2	2	2.1	2.2	2.3	2.5	3.3
O3(ppb) Average	708	14.3	11	-	0	1	4	13	22	30	56
NO2(ppb) Average	708	2.2	3	-	0	0	0	1	3	6	27
NO(ppb) Average	708	0.9	3	-	0	0	0	0	0	2	34
NOX(ppb) Average	708	3.1	5	-	0	0	0	1	3	8	41
PM2.5(ug/m3) Average	730	24.72	58.7	-	0	1.7	3.1	6	12.8	54.1	422.3
Temperature 2 m (C) Average	744	17.16	5.6	-	3.6	10	13.2	16.9	21.5	24.3	31.5
Relative Humidity (%) Average	744	73.9	21	-	25	42	56	78	93	97	98
Wind Speed 10 m (km/h) Average	744	4.5	3	-	0	1	2	4	6	8	15
Wind Direction 10 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION -FORT McKAY SOUTH (AMS 13)  
JULY 2015

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
TRS	13 Jul 2015 05:00	14 Jul 2015 08:00	28	Unstable Operation - daily span below target
THC	14 Jul 2015 14:00	14 Jul 2015 16:00	3	Maintenance - site operator on site
O3	01 Jul 2015 14:00	01 Jul 2015 14:00	1	Unstable operation - baseline drift
PM2.5	14 Jul 2015 08:00	14 Jul 2015 13:00	6	Maintenance - Flow and zero check, sample head cleaning
PM2.5	15 Jul 2015 03:00	15 Jul 2015 04:00	2	Unstable operation - baseline drift
PM2.5	15 Jul 2015 13:00	15 Jul 2015 13:00	1	Unstable operation - baseline drift
PM2.5	15 Jul 2015 16:00	15 Jul 2015 16:00	1	Unstable operation - baseline drift
PM2.5	18 Jul 2015 23:00	18 Jul 2015 23:00	1	Unstable operation - baseline drift
PM2.5	19 Jul 2015 13:00	19 Jul 2015 15:00	3	Unstable operation - baseline drift



Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 12 ppb on Jul 24 11:00	Maximum Daily Average: 1.8 ppb on Jul 8		Hours of Data:	708
Minimum Value: 0 ppb on Jul 11 22:00	Minimum Daily Average: 0.2 ppb on Jul 27		Hours of Missing Data:	36
Maximum Diurnal Average: 1.2 ppb at hour 11	Minimum Diurnal Average: 0.3 ppb at hour 22		Hours of Calibration:	36
Monthly Average: 0.6 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 O <sub>3</sub> = 0 P <sub>90</sub> = 1 P <sub>99</sub> = 6		Percent Operational Time:	100.0

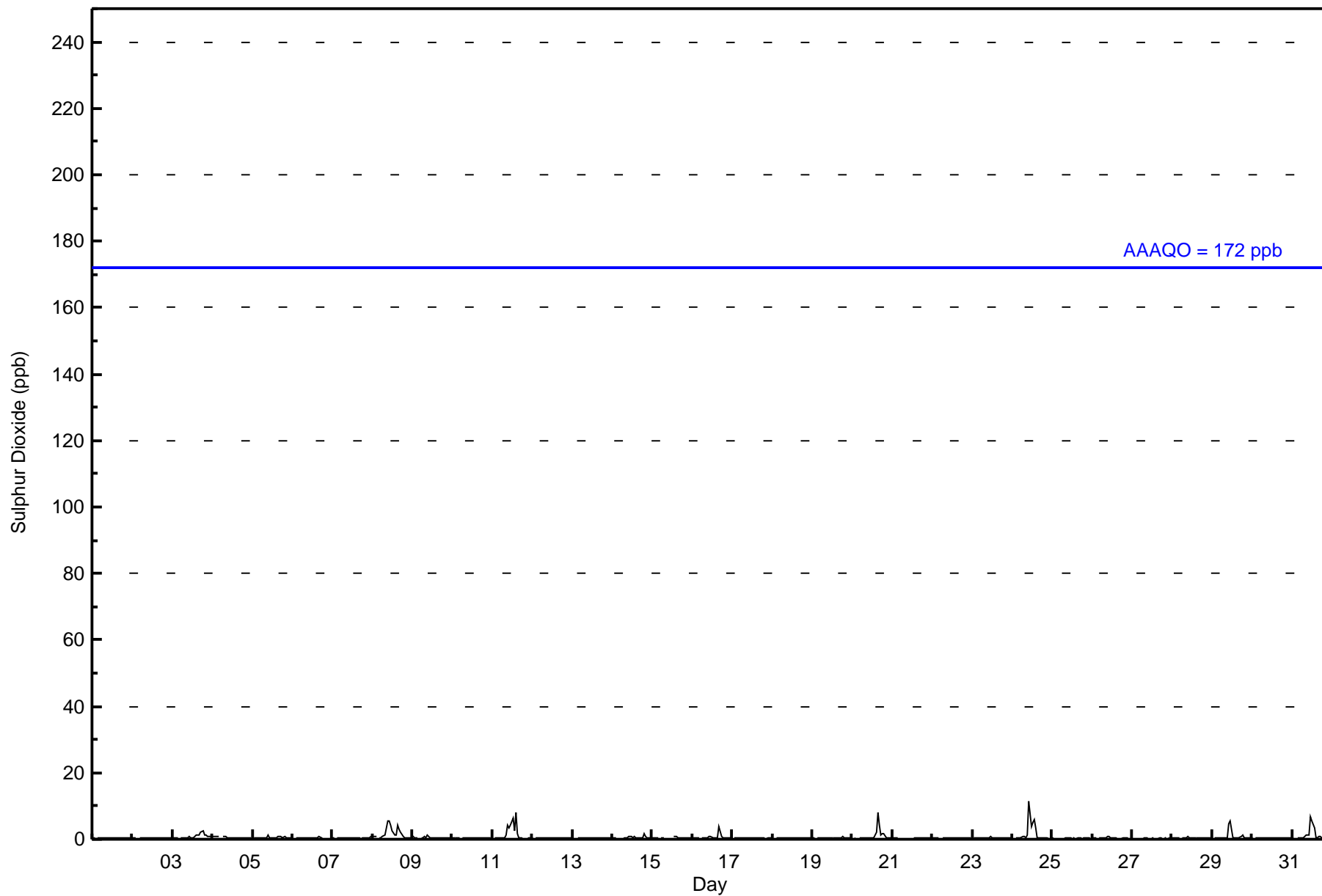
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
2-Jul	0	0	0	Z	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
3-Jul	0	0	0	0	Z	0	1	1	1	1	1	0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

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



Wood Buffalo Environmental Association  
Hourly Averages

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Fort McKay South - July 2015





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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Fort McKay South - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	707	99.86	99.86
11 - 20	1	0.14	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Fort McKay South - July 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	36	16	9	5	8	21	32	61	73	94	92	58	50	45	42	707
11 - 20	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	65	36	16	9	5	8	21	33	61	73	94	92	58	50	45	42	708

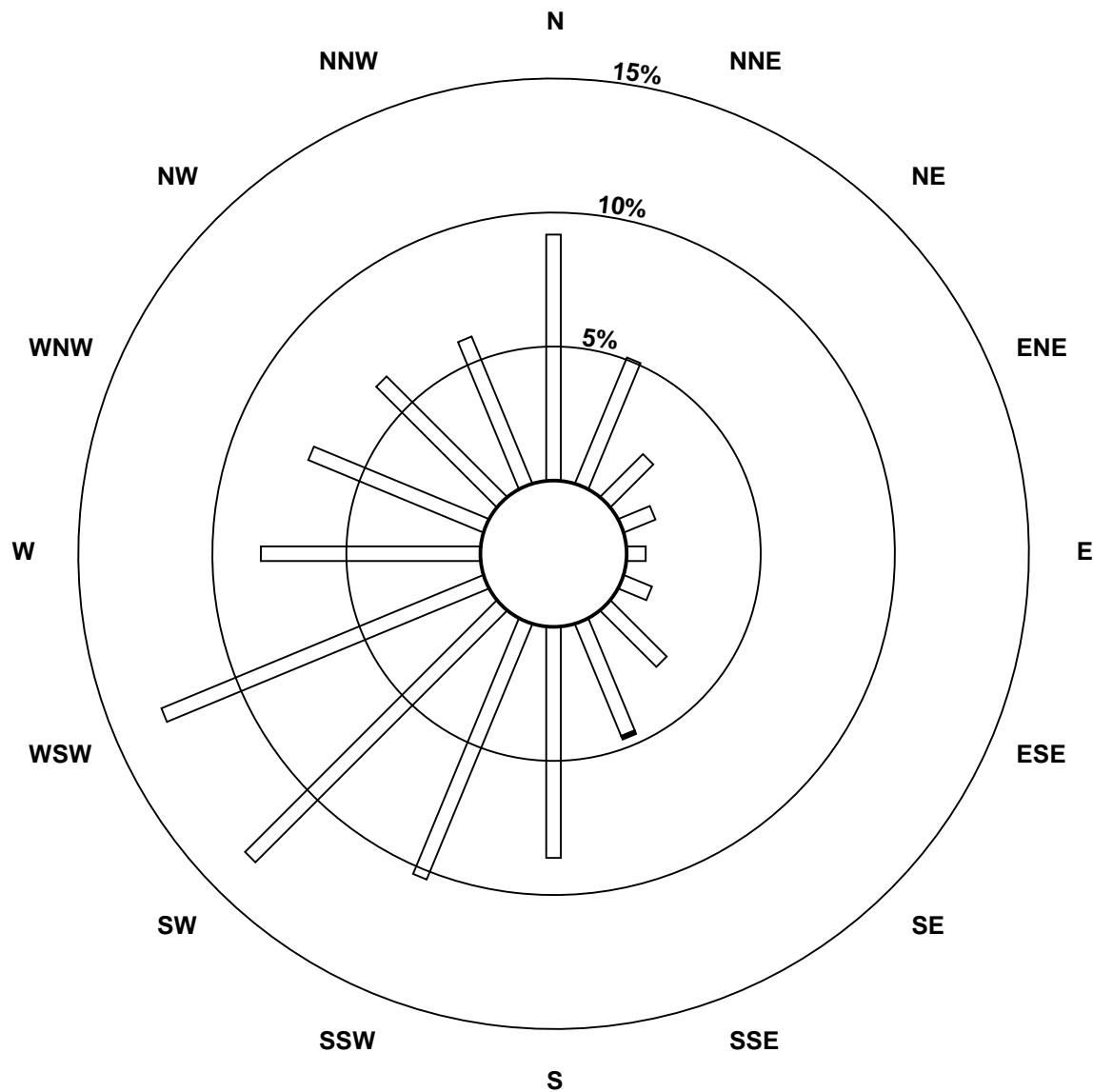
Total Number of Valid Hours: 708

Total Number of Hours: 744

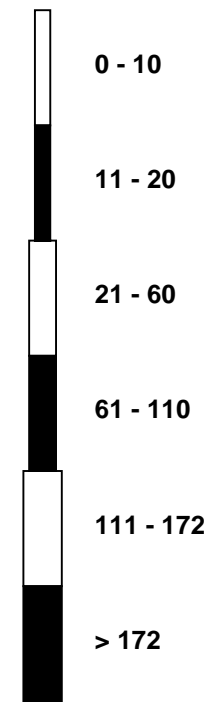


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

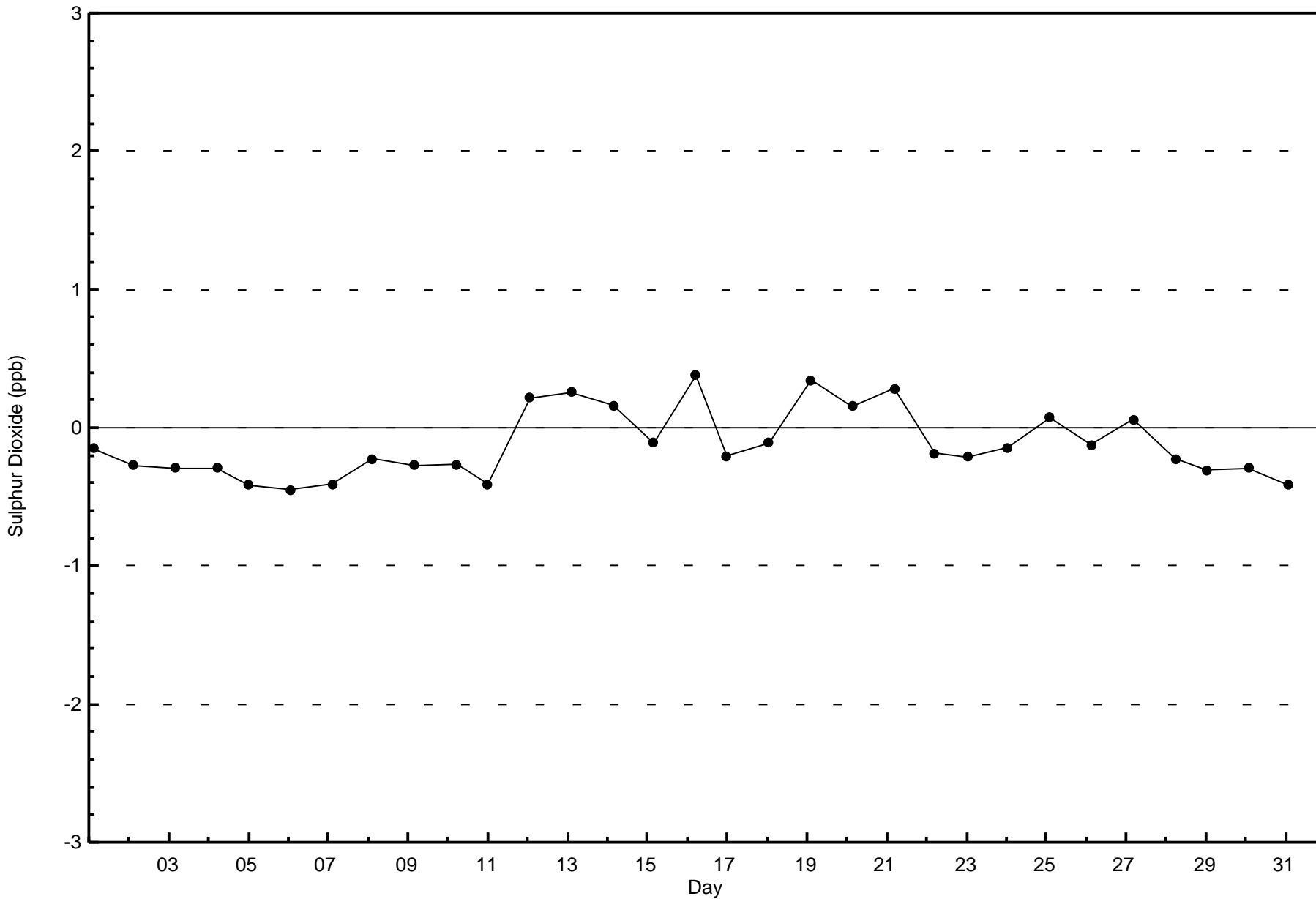
Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Fort McKay South (AMS 13)

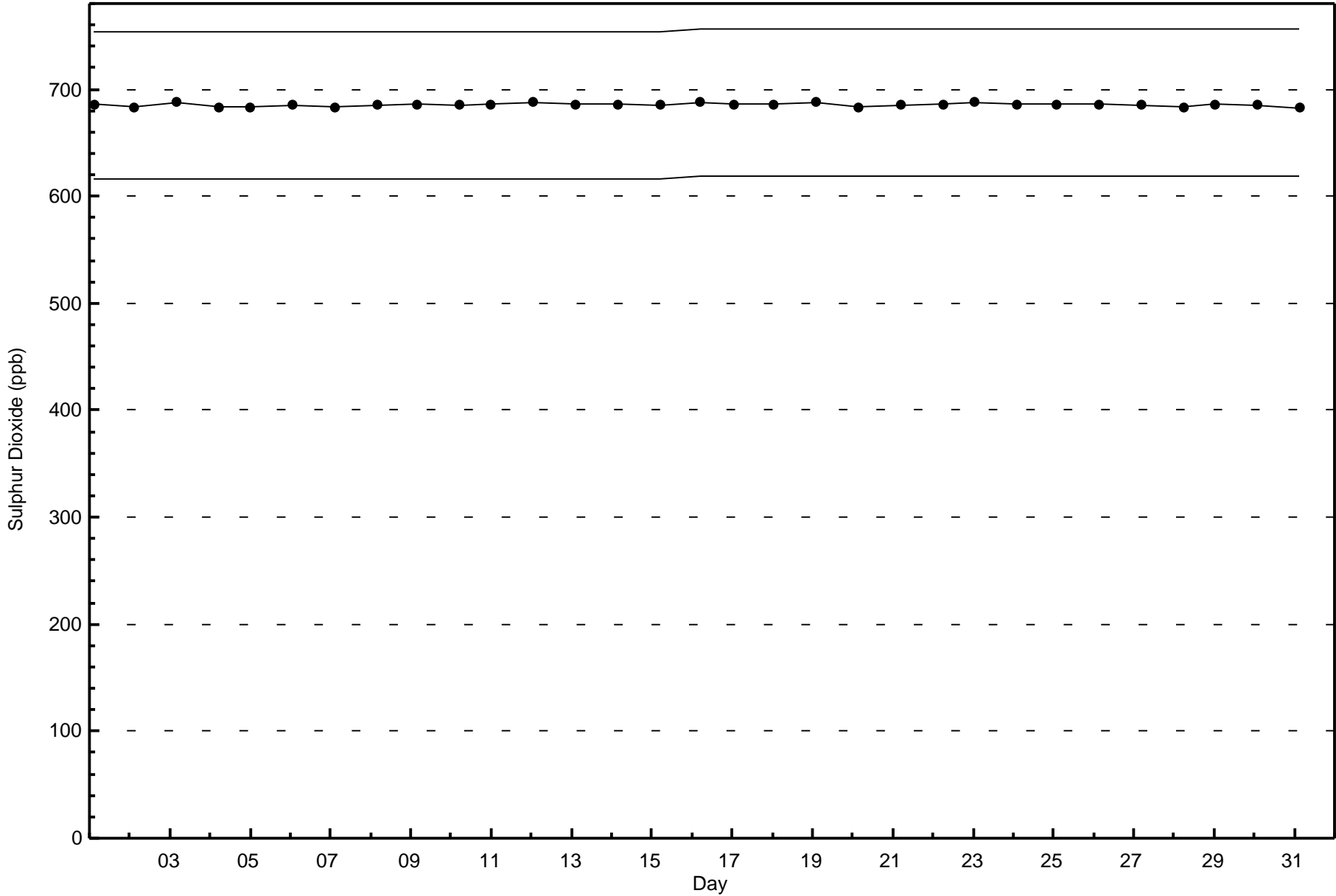


Classes (ppb)



Total Number of Valid Hours: 708









Summary of Hour Averages

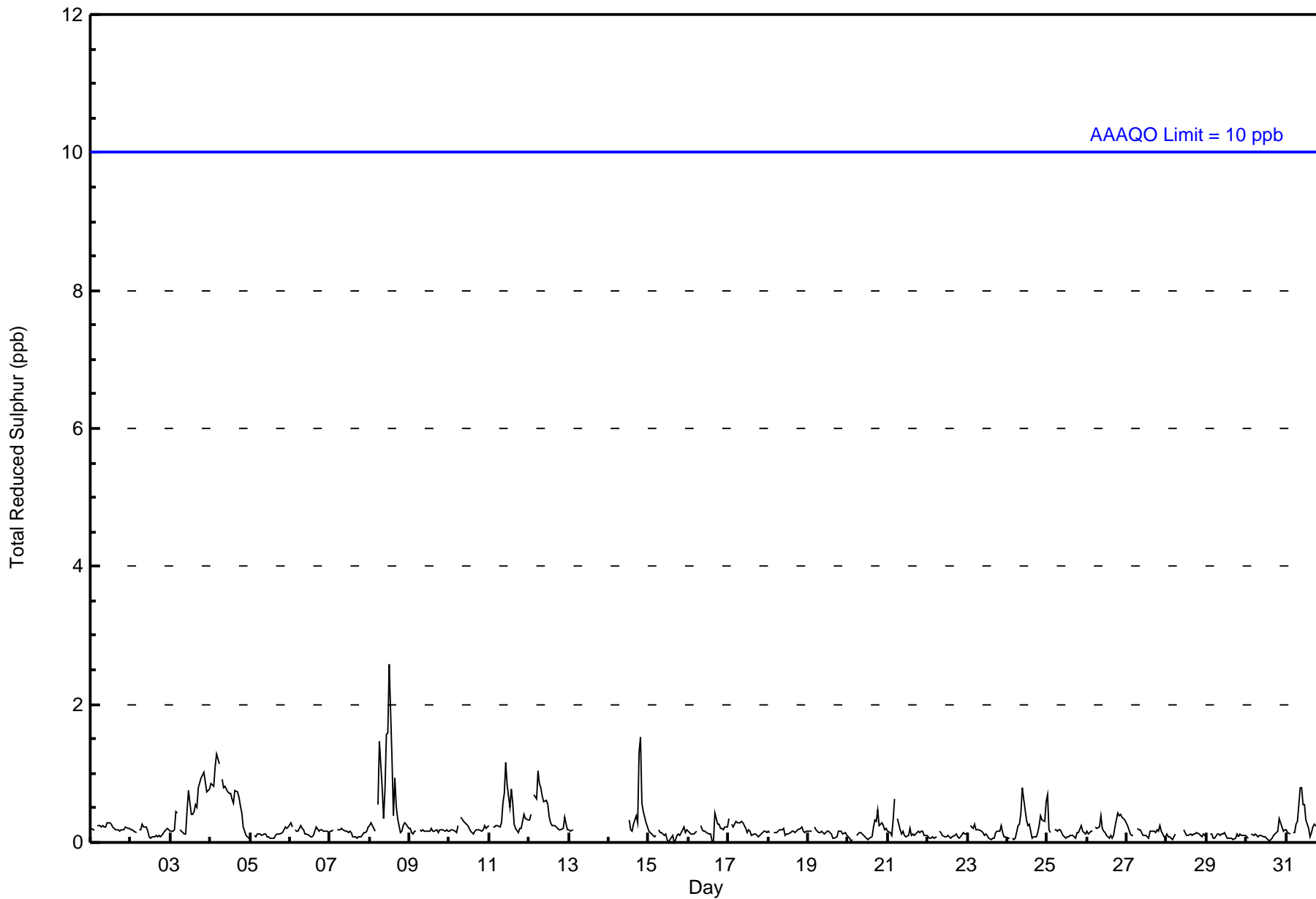
Fort McKay South - July 2015

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 3 ppb on Jul 8 13:00	Maximum Daily Average: 0.7 ppb on Jul 4		Hours of Data:	680
Minimum Value: 0 ppb on Jul 15 13:00	Minimum Daily Average: 0.1 ppb on Jul 29		Hours of Missing Data:	64
Maximum Diurnal Average: 0.3 ppb at hour 11	Minimum Diurnal Average: 0.2 ppb at hour 15		Hours of Calibration:	36
Monthly Average: 0.2 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 0 P <sub>99</sub> = 1		Percent Operational Time:	96.2

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-Jul	0	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-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
3-Jul	0	0	0	0	0	Z	0	0	0	0	1	0	0	0	1	1	1	1	1	1	1	1	1	1	0.5	1
4-Jul	1	1	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0.7	1
5-Jul	0	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-Jul	0	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-Jul	0	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-Jul	0	0	0	0	Z	1	1	1	0	1	2	2	3	1	0	1	1	0	0	0	0	0	0	0	0.7	3
9-Jul	0	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-Jul	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-Jul	0	Z	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0.4	1
12-Jul	0	0	Z	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
13-Jul	0	0	0	Z	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	0
14-Jul	UO	UO	UO	UO	UO	UO	UO	UO	C	C	C	C	0	0	0	0	0	0	1	2	1	0	0	0	--	2
15-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
16-Jul	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-Jul	0	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-Jul	0	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-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
20-Jul	0	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-Jul	0	0	0	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
22-Jul	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
23-Jul	0	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
24-Jul	0	0	Z	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0.3	1
25-Jul	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
26-Jul	0	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-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
28-Jul	0	0	0	0	0	0	Z	0	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
29-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
30-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
31-Jul	0	0	0	Z	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1

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	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	Diurnal Average
1	1	1	1	1	1	1	1	1	1	1	2	2	3	1	1	1	1	1	1	1	2	1	1	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**

**Total Reduced Sulphur (TRS) - ppb**  
**Fort McKay South - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	679	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: 680

Total Number of Hours: 744



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

**Total Reduced Sulphur (TRS) - ppb**  
**Fort McKay South - July 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	63	35	16	9	4	6	22	28	57	70	88	90	57	50	40	44	679
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
<b>Totals</b>	63	35	16	9	4	6	22	29	57	70	88	90	57	50	40	44	680

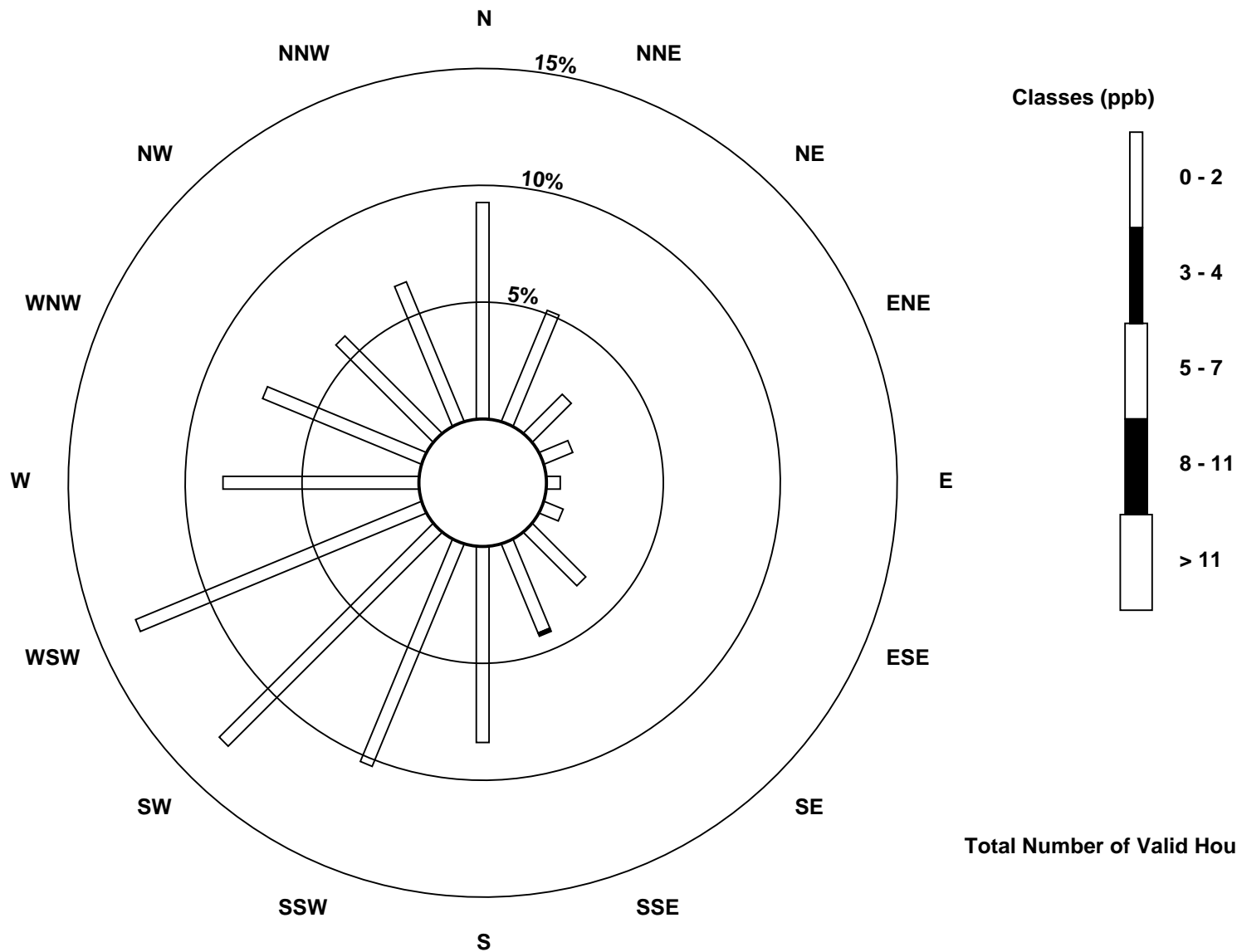
Total Number of Valid Hours: 680

Total Number of Hours: 744

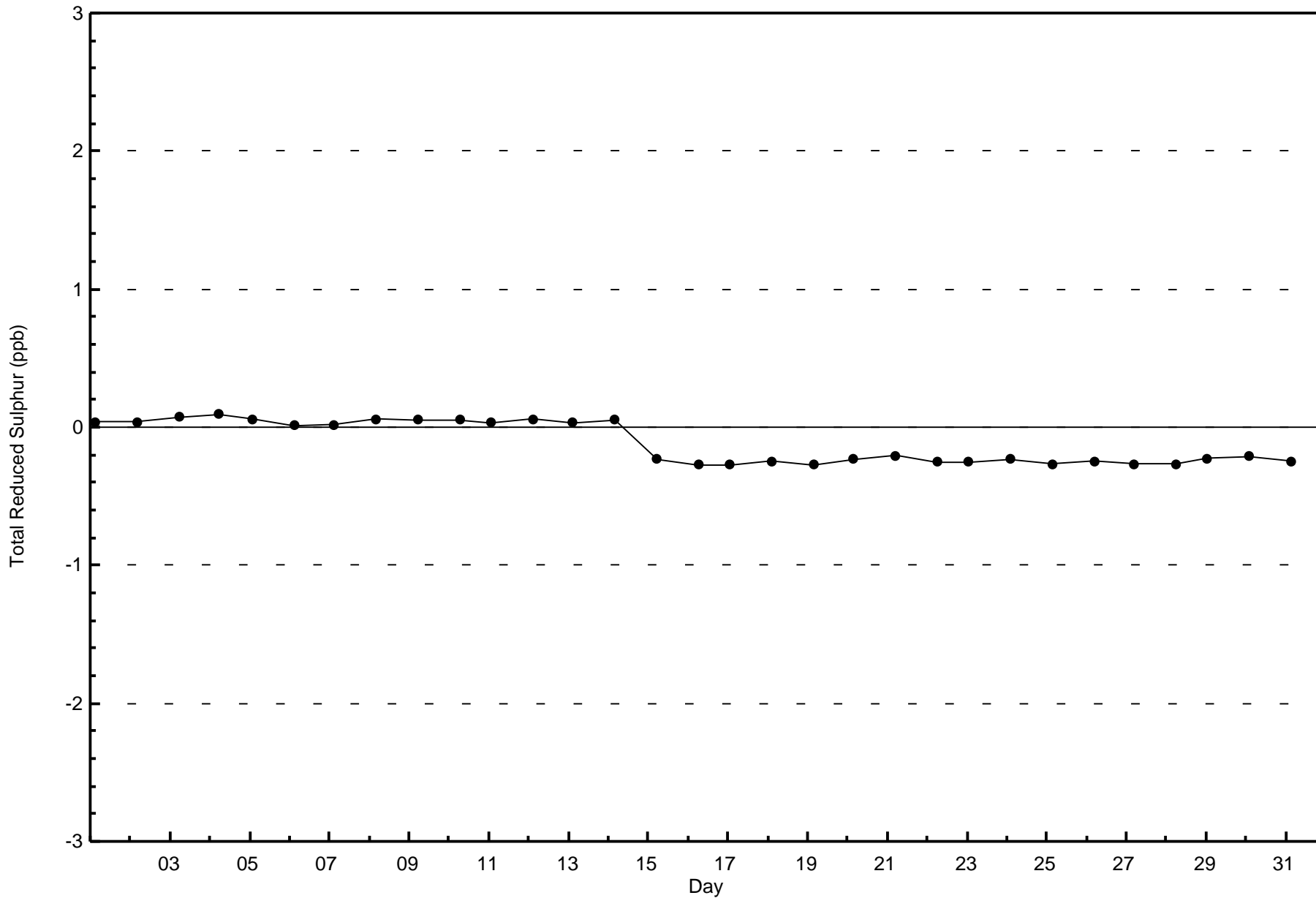


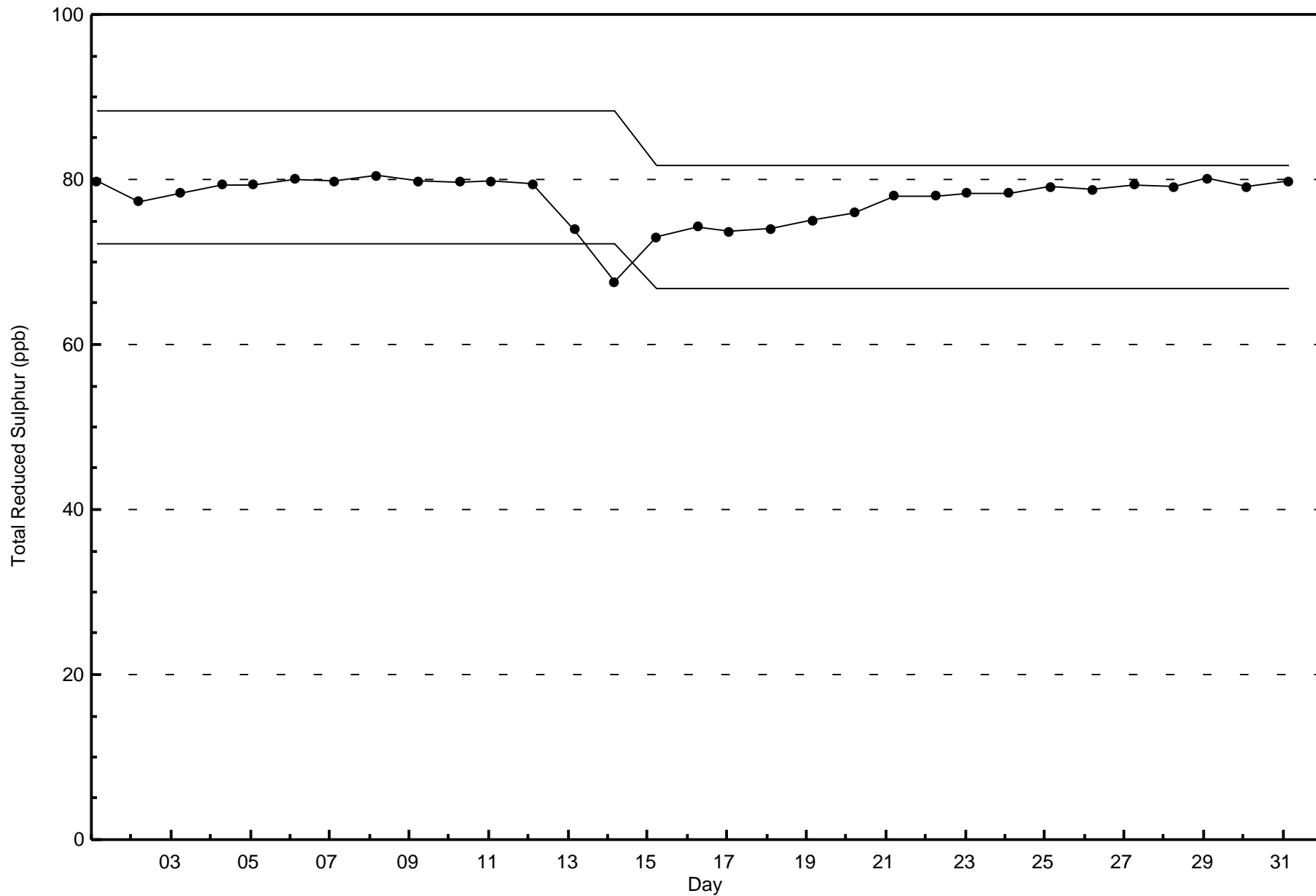
Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Total Reduced Sulphur (TRS) - ppb  
Fort McKay South (AMS 13)



Total Number of Valid Hours: 680

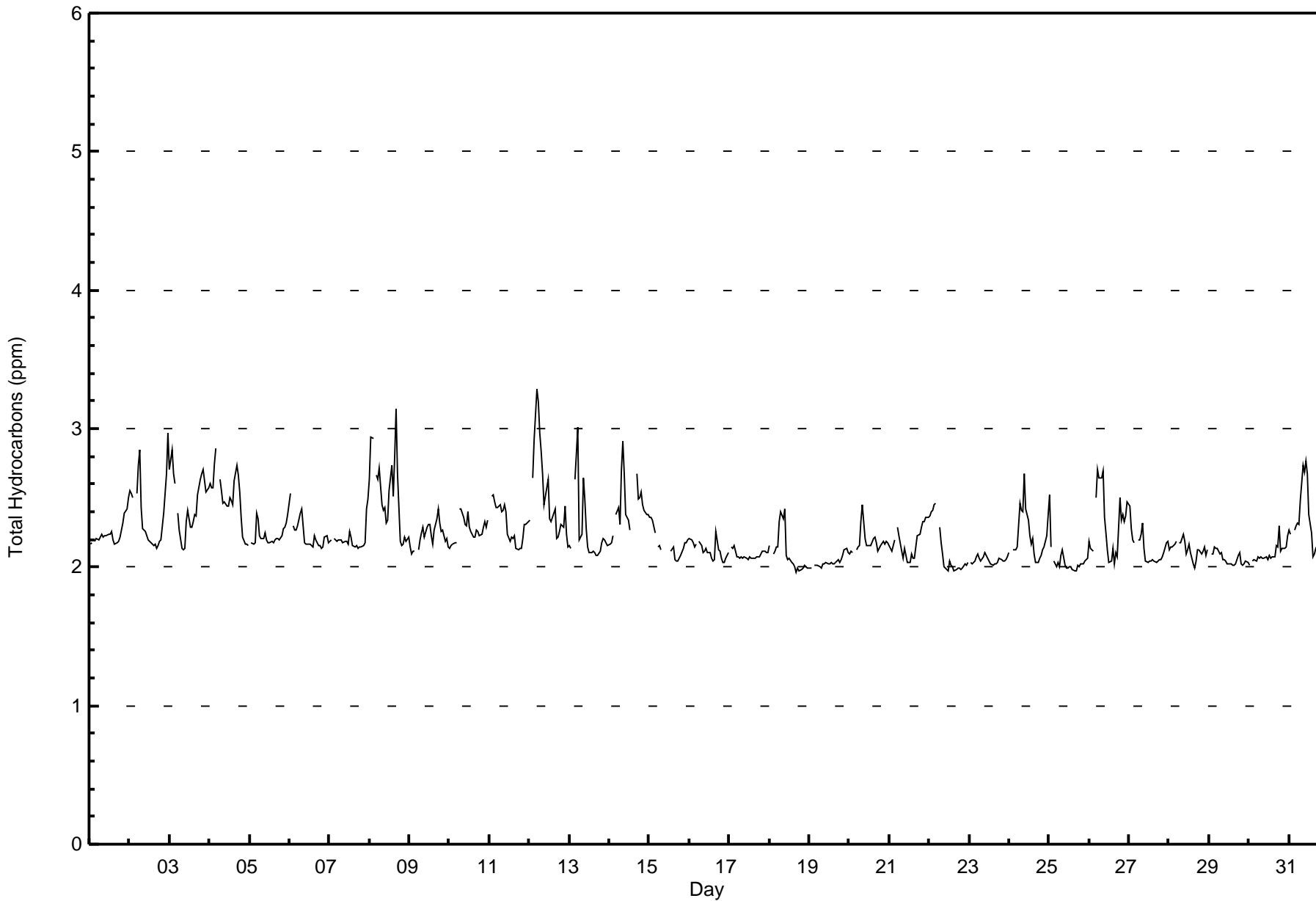






Maximum Value: 3.3 ppm on Jul 12 05:00		Maximum Daily Average: 2.5 ppm on Jul 12		Hours in Service: 744																																													
Minimum Value: 2.0 ppm on Jul 18 17:00		Minimum Daily Average: 2.0 ppm on Jul 19		Hours of Data: 705																																													
Maximum Diurnal Average: 2.3 ppm at hour 5		Minimum Diurnal Average: 2.1 ppm at hour 15		Hours of Missing Data: 39																																													
Monthly Average: 2.23 ppm		Percentiles: P <sub>1</sub> = 2.0 P <sub>10</sub> = 2.0 Q <sub>1</sub> = 2.1 Median = 2.2 Q <sub>3</sub> = 2.3 P <sub>90</sub> = 2.5 P <sub>99</sub> = 2.9		Hours of Calibration: 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-Jul	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.4	2.4	2.5	2.2	2.5																						
2-Jul	2.6	2.5	2.5	Z	2.5	2.7	2.9	2.4	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.4	2.5	2.7	3.0	2.4	3.0																						
3-Jul	2.7	2.8	2.7	2.6	Z	2.4	2.3	2.1	2.1	2.1	2.3	2.4	2.3	2.3	2.3	2.4	2.4	2.5	2.6	2.7	2.7	2.6	2.5	2.6	2.5	2.8																							
4-Jul	2.6	2.6	2.6	2.7	2.9	Z	2.4	2.6	2.6	2.5	2.5	2.4	2.4	2.5	2.5	2.6	2.7	2.7	2.5	2.4	2.2	2.2	2.2	2.2	2.5	2.9																							
5-Jul	Z	2.2	2.2	2.2	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.4	2.2	2.4																						
6-Jul	2.5	Z	2.3	2.3	2.3	2.3	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.5																						
7-Jul	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.4	2.5	2.2	2.5																							
8-Jul	2.6	2.9	2.9	Z	2.7	2.6	2.7	2.5	2.4	2.4	2.3	2.3	2.6	2.7	2.5	2.8	3.1	2.7	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.5	3.1																						
9-Jul	2.1	2.1	2.1	2.1	Z	2.1	2.2	2.3	2.3	2.2	2.3	2.3	2.3	2.2	2.2	2.3	2.3	2.4	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.4																						
10-Jul	2.1	2.2	2.2	2.2	2.2	Z	2.4	2.4	2.4	2.3	2.3	2.4	2.3	2.3	2.2	2.2	2.3	2.3	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.4																						
11-Jul	Z	2.5	2.5	2.5	2.4	2.4	2.4	2.4	2.4	2.5	2.4	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.3	2.3	2.3	2.5																						
12-Jul	2.3	Z	2.6	2.9	3.3	3.2	3.0	2.8	2.7	2.5	2.6	2.6	2.4	2.3	2.4	2.4	2.2	2.2	2.3	2.3	2.3	2.4	2.2	2.1	2.5	3.3																							
13-Jul	2.2	2.1	Z	2.6	2.8	3.0	2.2	2.2	2.6	2.5	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.3	3.0																							
14-Jul	2.2	2.2	2.2	Z	2.4	2.4	2.3	2.7	2.9	2.7	2.4	2.3	2.3	Z	M	M	M	2.7	2.5	2.5	2.5	2.4	2.4	2.4	2.4	2.9																							
15-Jul	2.4	2.4	2.3	2.3	Z	2.1	2.2	2.1	C	C	C	C	C	C	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.4																						
16-Jul	2.2	2.2	2.2	2.1	2.2	Z	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.3	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.3	2.3																						
17-Jul	Z	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2																						
18-Jul	2.2	Z	2.1	2.1	2.1	2.1	2.3	2.4	2.4	2.4	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	2.4																						
19-Jul	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.0	2.1																						
20-Jul	2.1	2.1	2.1	Z	2.1	2.1	2.2	2.3	2.4	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	2.4																						
21-Jul	2.2	2.1	2.2	2.2	Z	2.3	2.2	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.3	2.3	2.3	2.4	2.4	2.2	2.4																						
22-Jul	2.4	2.4	2.4	2.5	2.5	Z	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	2.1	2.5																						
23-Jul	Z	2.0	2.0	2.0	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	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.1																						
24-Jul	2.1	Z	2.1	2.1	2.1	2.1	2.5	2.4	2.4	2.7	2.4	2.3	2.2	2.2	2.2	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.2	2.4	2.2	2.7																						
25-Jul	2.5	2.1	Z	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.5																						
26-Jul	2.2	2.1	2.1	Z	2.5	2.7	2.6	2.6	2.7	2.4	2.3	2.1	2.0	2.0	2.1	2.0	2.1	2.1	2.1	2.5	2.3	2.4	2.3	2.4	2.5	2.3	2.7																						
27-Jul	2.4	2.3	2.2	2.2	Z	2.2	2.2	2.2	2.3	2.1	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.4																						
28-Jul	2.1	2.1	2.1	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.2																						
29-Jul	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.1																						
30-Jul	2.0	Z	2.0	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.3	2.1	2.1	2.1	2.1	2.2	2.1	2.3																						
31-Jul	2.3	2.2	Z	2.3	2.3	2.3	2.3	2.5	2.7	2.7	2.8	2.7	2.4	2.2	2.1	2.1	2.1	2.1	2.2	2.3	2.4	2.3	2.2	2.3	2.3	2.3	2.8																						
																								2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	Diurnal Average	
																								2.7	2.9	2.9	2.9	3.3	3.2	3.0	2.8	2.9	2.7	2.8	2.7	2.6	2.7	2.5	2.8	3.1	2.7	2.6	2.7	2.7	2.6	2.7	3.0	Diurnal Maximum	
Z - zerospan		C - Calibration				M - Maintenance																																											







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

**Total Hydrocarbons (THC) - ppm**  
**Fort McKay South - July 2015**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	110	15.60	15.60
2.1 - 3.0	592	83.97	99.57
3.1 - 10.0	3	0.43	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 705

Total Number of Hours: 744



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm  
Fort McKay South - July 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	3	1	0	0	2	1	0	1	1	9	19	25	15	18	9	6	110
2.1 - 3.0	59	35	16	9	3	7	21	32	58	64	75	67	43	32	36	35	592
3.1 - 10.0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	3
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	63	36	16	9	5	8	21	33	60	73	94	92	58	50	45	42	705

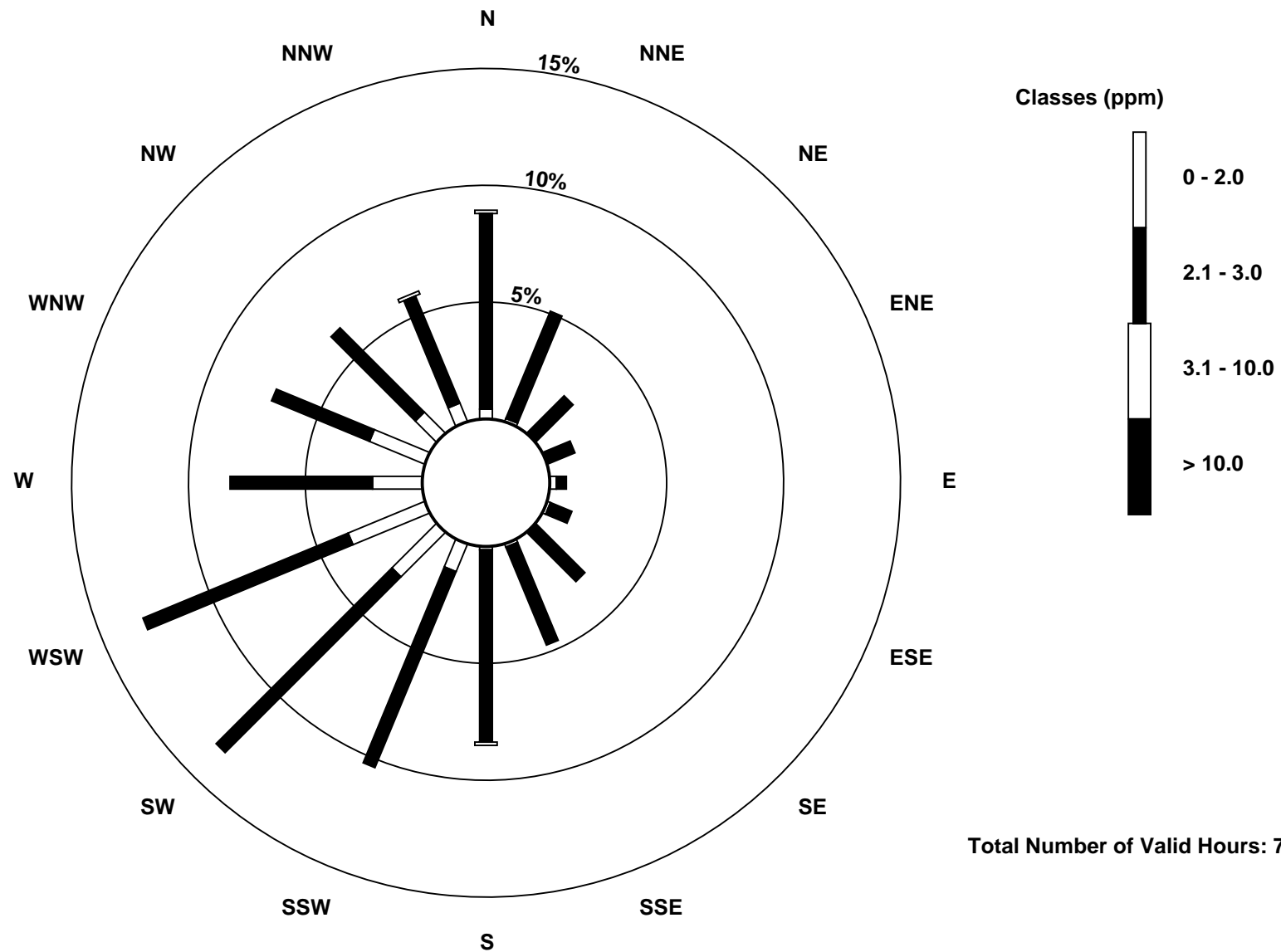
Total Number of Valid Hours: 705

Total Number of Hours: 744



Wood Buffalo Environmental Association  
Wind Rose Jul 2015

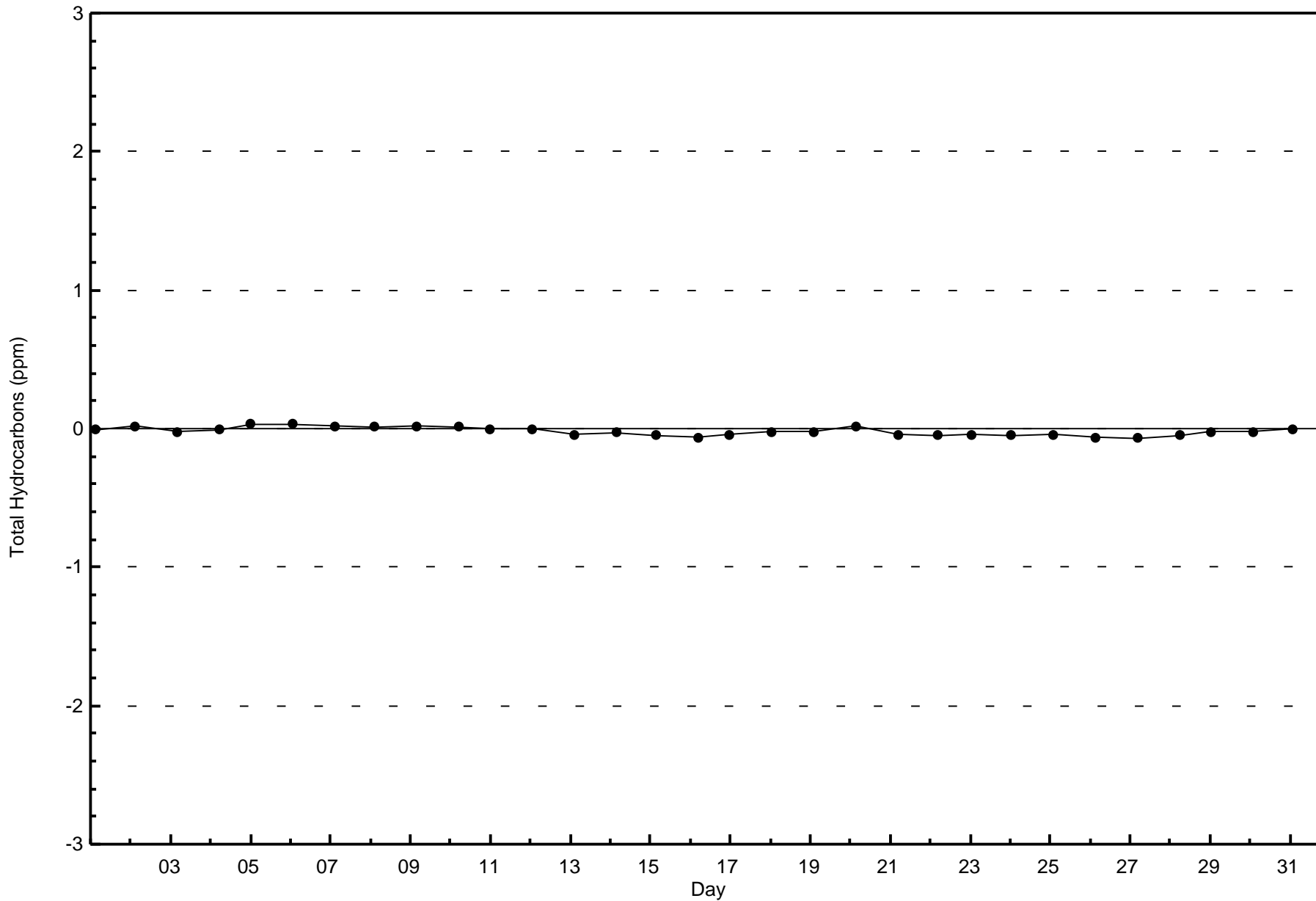
Total Hydrocarbons (THC) - ppm  
Fort McKay South (AMS 13)

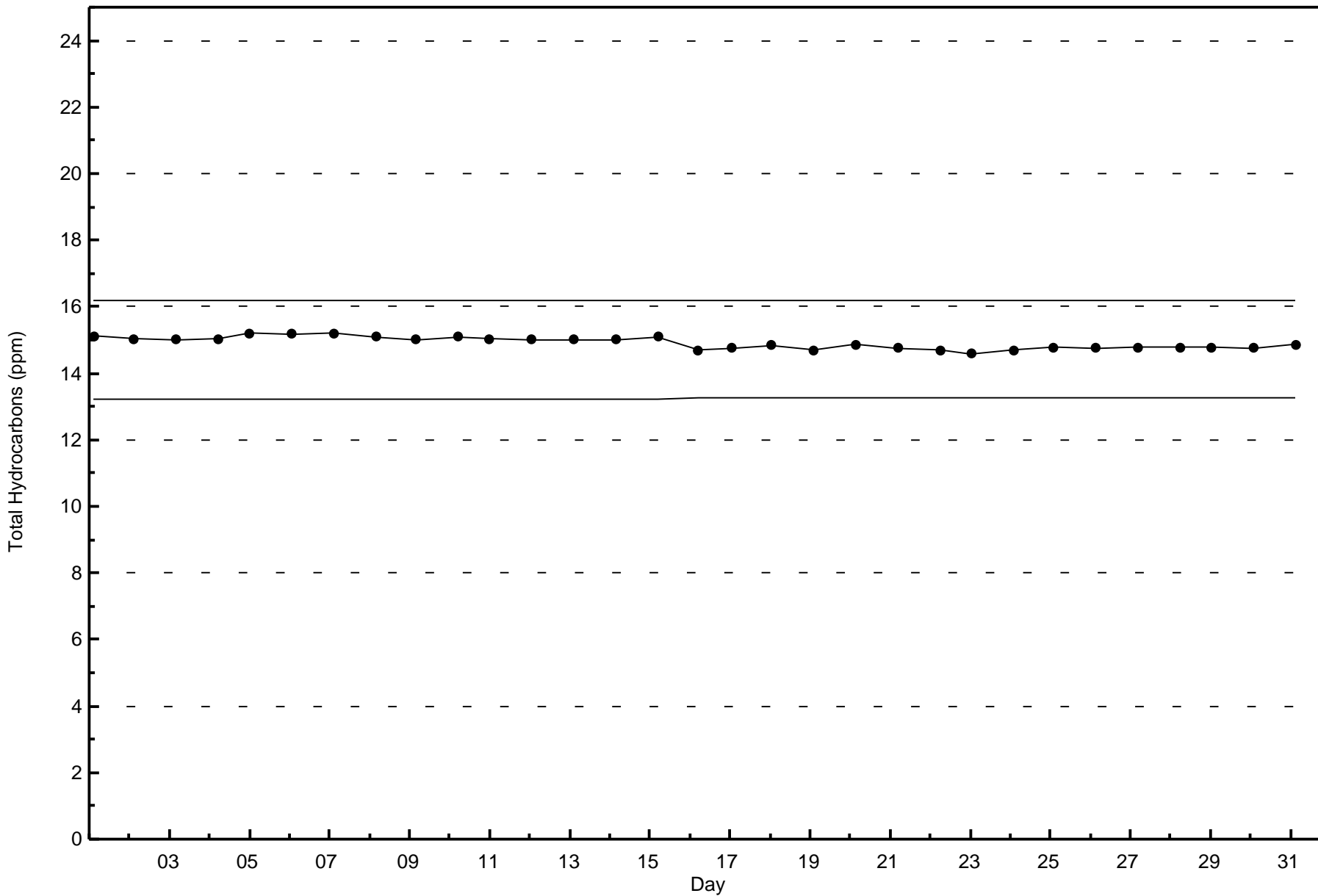




Wood Buffalo Environmental Association  
Zero Responses

Total Hydrocarbons (THC) - ppm  
Fort McKay South - July 2015







Summary of Hour Averages

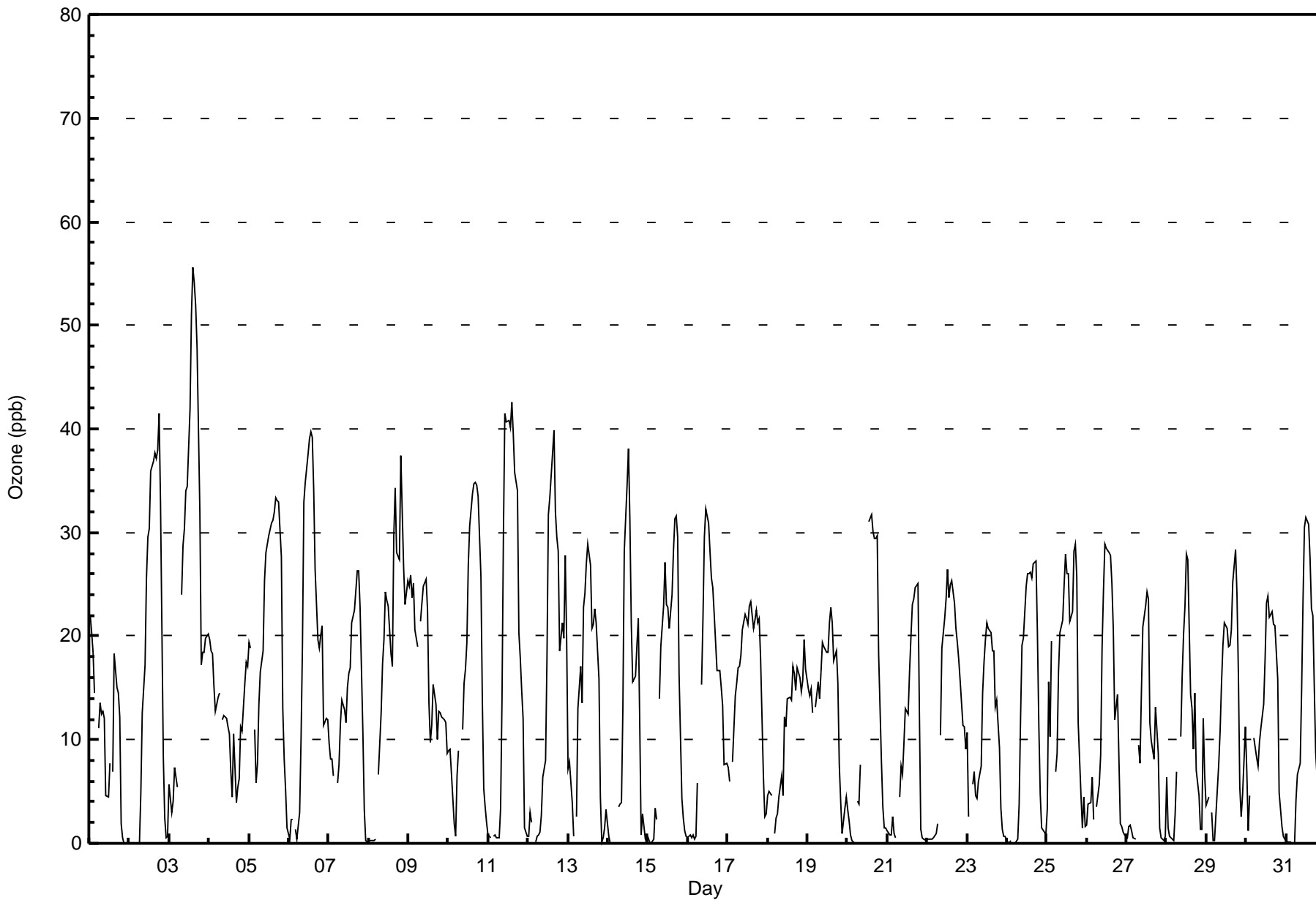
Fort McKay South - July 2015

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 56 ppb on Jul 3 15:00	Maximum Daily Average: 26.6 ppb on Jul 3		Hours of Data:	708
Minimum Value: 0 ppb on Jul 1 22:00	Minimum Daily Average: 8.5 ppb on Jul 27		Hours of Missing Data:	36
Maximum Diurnal Average: 25.9 ppb at hour 14	Minimum Diurnal Average: 3.6 ppb at hour 5		Hours of Calibration:	35
Monthly Average: 14.3 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 1 Q <sub>1</sub> = 4 Median = 13 Q <sub>3</sub> = 22 P <sub>90</sub> = 30 P <sub>99</sub> = 41		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-Jul	22	20	18	14	Z	11	14	12	13	12	5	5	8	UO	7	18	15	15	12	2	1	0	0	0	10.2	22
2-Jul	0	0	0	0	0	Z	0	5	13	17	26	30	30	36	37	38	37	38	41	33	8	2	1	1	17.1	41
3-Jul	6	3	4	7	6	5	Z	24	29	30	34	34	42	51	56	54	52	48	32	17	18	18	20	20	26.6	56
4-Jul	20	19	18	15	13	14	15	Z	12	12	12	11	11	7	4	11	4	5	6	11	11	16	18	17	12.2	20
5-Jul	19	19	Z	11	6	8	13	17	19	25	28	29	30	31	31	32	33	33	33	28	13	8	5	2	20.5	33
6-Jul	0	2	2	Z	1	0	3	10	19	33	35	38	39	40	39	34	26	20	19	20	21	11	12	12	19.0	40
7-Jul	10	8	8	7	Z	6	8	11	14	13	12	15	16	17	21	22	24	26	26	23	11	3	0	0	13.1	26
8-Jul	0	0	0	0	0	Z	7	13	17	20	24	23	23	18	17	30	34	28	27	37	32	27	23	25	18.6	37
9-Jul	25	26	24	25	21	19	Z	21	23	25	26	22	14	10	11	15	13	10	13	13	12	12	12	9	17.4	26
10-Jul	9	9	7	2	1	7	9	Z	11	16	17	19	27	31	34	35	35	35	34	26	14	5	3	2	16.7	35
11-Jul	1	1	Z	1	1	0	1	3	14	30	41	41	41	40	43	40	36	34	20	18	15	12	1	1	18.8	43
12-Jul	1	3	2	Z	0	1	1	1	3	6	8	18	32	33	35	40	32	30	28	19	21	20	28	20	16.5	40
13-Jul	7	8	4	1	Z	3	13	17	14	23	24	27	29	27	21	21	23	21	16	4	0	1	1	3	13.4	29
14-Jul	1	0	0	0	0	Z	4	4	4	13	28	35	38	31	21	16	16	19	22	12	1	3	0	0	11.6	38
15-Jul	1	0	0	0	3	2	Z	14	19	23	27	23	23	21	24	28	31	32	30	16	4	2	1	1	14.2	32
16-Jul	0	1	1	1	0	1	6	Z	15	22	30	32	31	28	26	25	22	17	17	17	15	13	8	8	14.5	32
17-Jul	7	6	Z	8	14	15	17	17	18	21	22	22	21	23	23	21	22	23	21	22	18	7	3	3	16.2	23
18-Jul	5	5	5	Z	1	2	3	4	7	5	12	11	14	14	14	17	16	15	17	16	15	16	20	17	10.8	20
19-Jul	15	14	15	13	Z	13	16	14	16	19	19	18	18	21	23	21	18	19	16	8	4	1	3	4	14.3	23
20-Jul	3	2	1	0	0	Z	4	4	8	C	C	C	C	31	32	30	29	29	30	18	8	4	2	1	12.4	32
21-Jul	1	1	1	3	1	1	Z	4	7	7	10	13	13	17	20	23	24	25	25	13	1	1	0	0	9.1	25
22-Jul	0	0	0	0	1	1	2	Z	10	19	22	24	26	24	25	25	23	21	19	18	16	11	11	9	13.4	26
23-Jul	11	3	Z	6	7	5	4	6	7	15	18	20	21	21	20	19	19	13	14	9	3	1	1	1	10.5	21
24-Jul	0	0	0	Z	0	0	0	4	12	19	20	25	26	26	26	26	27	27	20	11	5	2	1	1	12.1	27
25-Jul	3	16	10	19	Z	7	9	17	20	22	25	28	26	26	21	22	28	29	26	12	5	1	4	2	16.4	29
26-Jul	2	4	4	6	2	Z	4	6	9	19	24	29	29	28	28	25	21	12	14	8	2	2	1	1	12.1	29
27-Jul	0	2	2	1	0	0	Z	9	8	15	21	23	24	24	12	10	8	13	11	9	1	0	0	1	8.5	24
28-Jul	6	1	1	0	0	3	7	Z	10	16	20	23	28	27	14	13	9	14	7	5	1	1	12	7	9.9	28
29-Jul	4	4	Z	3	0	0	5	8	11	15	19	21	21	19	19	21	25	28	24	16	5	3	5	11	12.6	28
30-Jul	7	1	5	Z	10	9	8	7	10	11	13	18	23	24	22	22	21	21	18	16	5	2	1	0	12.0	24
31-Jul	0	0	0	0	Z	0	4	7	8	15	24	31	31	31	27	23	22	15	9	4	3	4	3	4	11.5	31

6.0	5.7	5.1	5.5	3.6	5.1	6.7	10.0	12.9	17.9	21.5	23.6	25.1	25.9	24.3	25.0	24.1	23.0	20.9	15.4	9.3	6.7	6.5	5.9	Diurnal Average
25	26	24	25	21	19	17	24	29	33	41	41	42	51	56	54	52	48	41	37	32	27	28	25	Diurnal Maximum

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







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

**Ozone (O<sub>3</sub>) - ppb**  
**Fort McKay South - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	494	69.77	69.77
21 - 50	210	29.66	99.44
51 - 82	4	0.56	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



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

**Ozone (O<sub>3</sub>) - ppb**  
**Fort McKay South - July 2015**

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	39	15	8	6	4	2	10	22	44	60	69	67	53	36	33	26	494
21 - 50	26	21	7	3	0	6	12	11	12	15	28	24	4	13	11	17	210
51 - 82	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	65	36	15	9	4	8	22	33	56	75	97	91	57	53	44	43	708

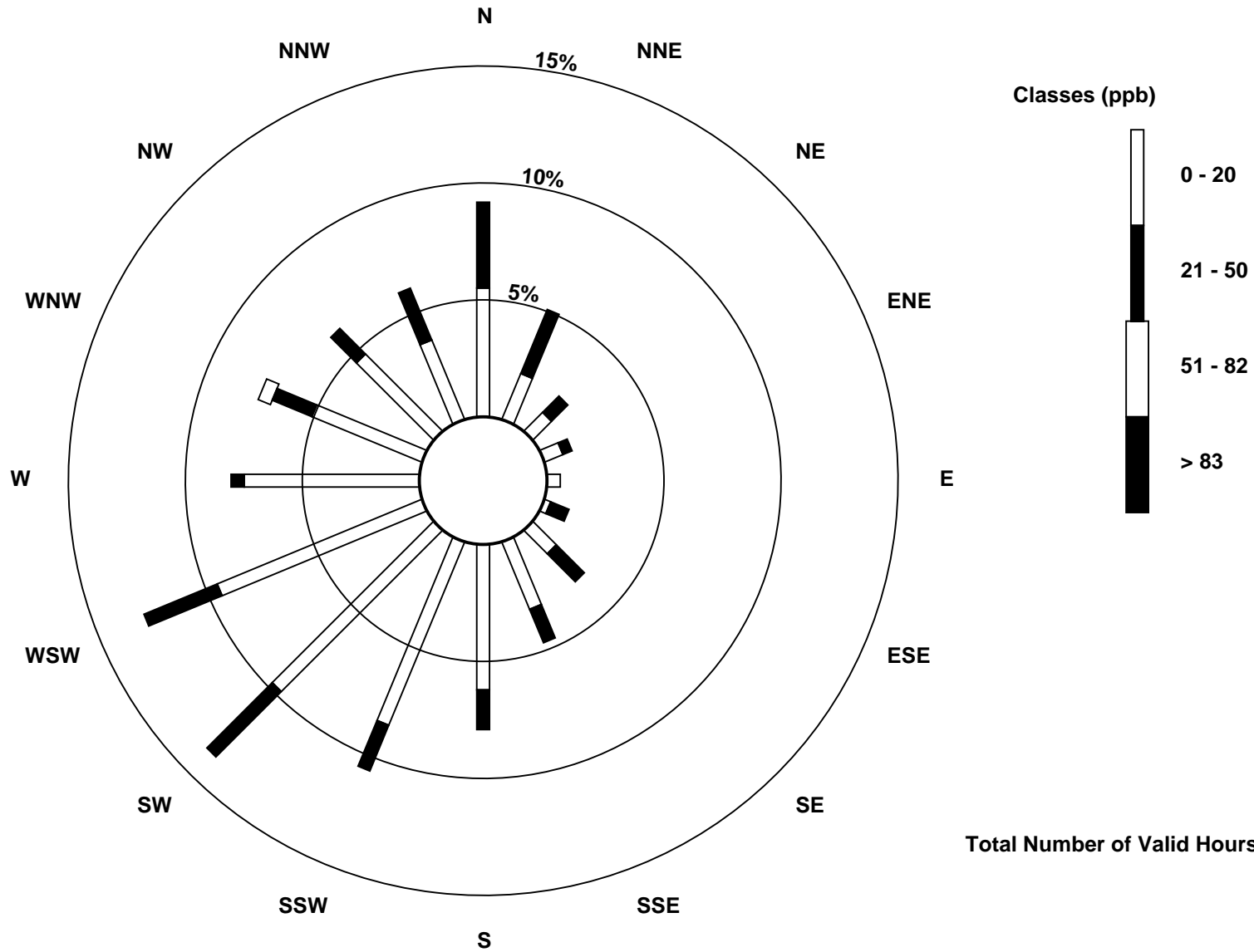
Total Number of Valid Hours: 708

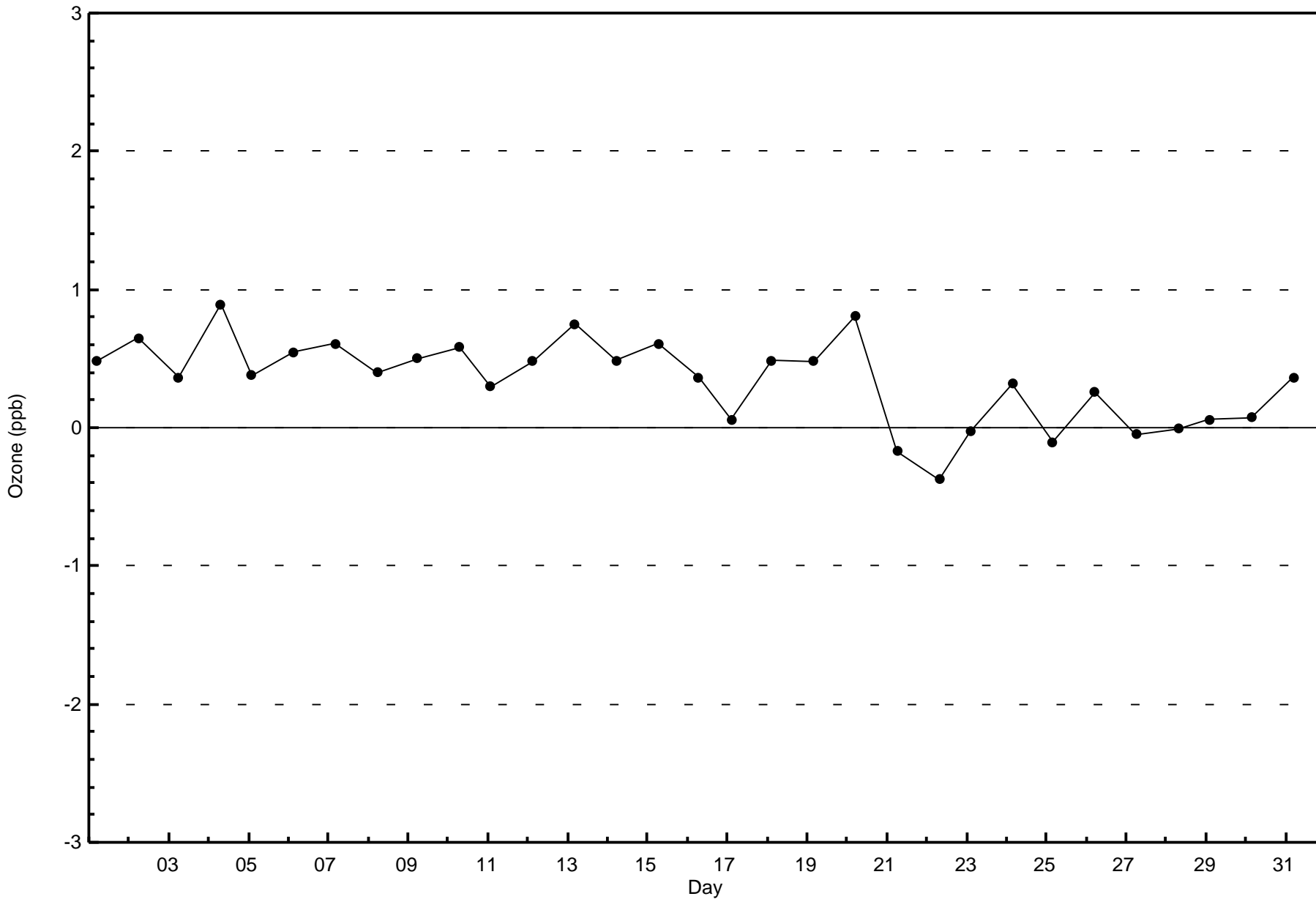
Total Number of Hours: 744

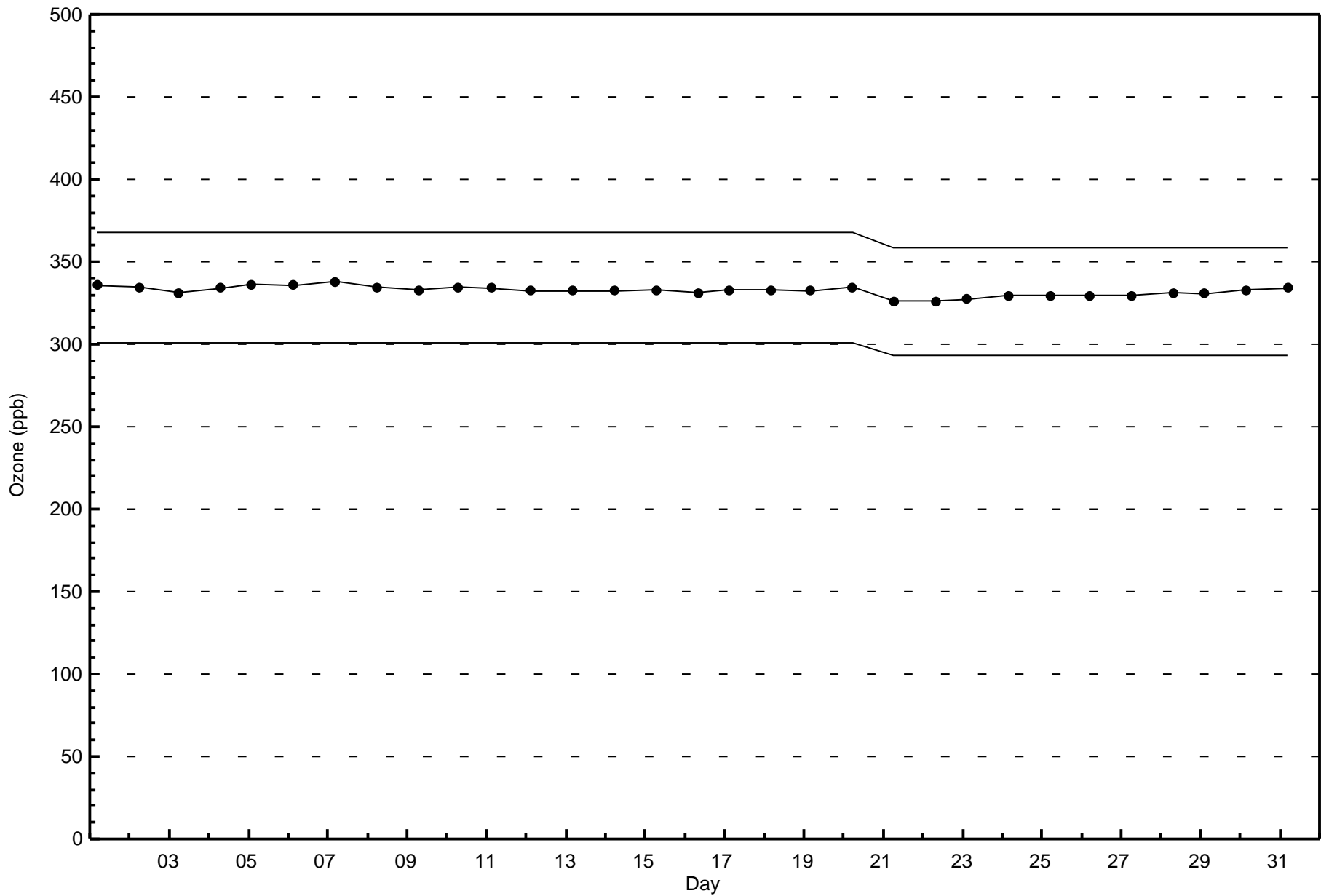


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Ozone (O<sub>3</sub>) - ppb  
Fort McKay South (AMS 13)









Maximum Value: 34 ppb on Jul 8 02:00																	Maximum Daily Average: 5.0 ppb on Jul 8																	Hours in Service: 744			
Minimum Value: 0 ppb on Jul 1 01:00																	Minimum Daily Average: 0.0 ppb on Jul 19																	Hours of Data: 708			
Maximum Diurnal Average: 3.3 ppb at hour 8																	Minimum Diurnal Average: 0.1 ppb at hour 21																	Hours of Missing Data: 36			
Monthly Average: 0.9 ppb																	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 2 P <sub>99</sub> = 18																	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-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.1	2											
2-Jul	2	1	1	Z	4	16	21	3	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	9	2.7	21											
3-Jul	2	4	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	4												
4-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0.1	1												
5-Jul	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1												
6-Jul	2	Z	0	0	0	0	3	8	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	8												
7-Jul	0	0	Z	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	12	18	1.4	18											
8-Jul	24	34	31	Z	8	3	2	2	3	3	1	0	0	1	1	0	0	0	0	0	0	0	0	5.0	34												
9-Jul	0	0	0	0	Z	0	0	0	1	1	1	1	0	0	1	1	2	4	1	0	0	0	0	0.6	4												
10-Jul	0	0	0	0	0	Z	3	4	4	3	3	5	2	1	0	0	0	0	0	0	0	0	0	1.1	5												
11-Jul	Z	0	0	0	0	1	1	1	3	2	1	1	0	0	1	0	0	0	0	0	0	0	0	0.5	3												
12-Jul	0	Z	0	2	6	4	2	1	1	1	4	3	0	0	0	0	0	0	0	0	0	0	0	1.1	6												
13-Jul	0	0	Z	1	5	14	0	1	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	1.2	14												
14-Jul	0	0	0	Z	0	1	1	18	21	8	1	0	0	0	0	0	0	1	0	1	1	0	0	2.4	21												
15-Jul	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												
16-Jul	0	0	0	0	0	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1												
17-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0												
18-Jul	0	Z	0	0	0	0	9	13	6	8	0	0	0	0	0	0	0	0	0	0	0	0	0	1.6	13												
19-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0												
20-Jul	0	0	0	Z	0	0	0	10	11	4	2	1	1	0	0	1	0	0	0	0	0	0	0	1.4	11												
21-Jul	0	0	0	0	Z	1	1	0	0	1	0	0	1	1	0	0	1	1	1	0	0	0	0	0.5	1												
22-Jul	0	0	0	0	1	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.2	1												
23-Jul	Z	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1												
24-Jul	0	Z	0	0	0	1	20	19	5	2	5	1	1	1	1	0	0	0	0	0	0	0	0	2.4	20												
25-Jul	1	0	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1												
26-Jul	0	0	0	Z	0	2	3	5	9	4	2	1	0	0	0	0	0	0	1	1	0	0	0	1.3	9												
27-Jul	0	0	0	0	Z	2	4	3	9	3	0	0	0	0	0	0	0	0	0	0	0	0	0	1.0	9												
28-Jul	0	0	0	0	1	Z	1	0	2	1	0	2	1	0	0	0	0	0	0	0	0	0	0	0.4	2												
29-Jul	Z	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1												
30-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0.1	1												
31-Jul	0	0	Z	0	0	2	1	9	15	7	5	2	1	1	0	0	0	0	0	0	0	0	0	2.0	15												
1.3 1.6 1.4 0.2 1.1 1.9 2.3 3.3 3.3 1.8 1.0 0.6 0.4 0.2 0.2 0.2 0.2 0.3 0.2 0.1 0.1 0.1 0.1 0.6 1.0																								Diurnal Average													
24 34 31 2 8 16 21 19 21 8 5 5 2 1 1 1 1 2 4 1 1 1 1 12 18																								Diurnal Maximum													
Z - zerospan C - Calibration																																					

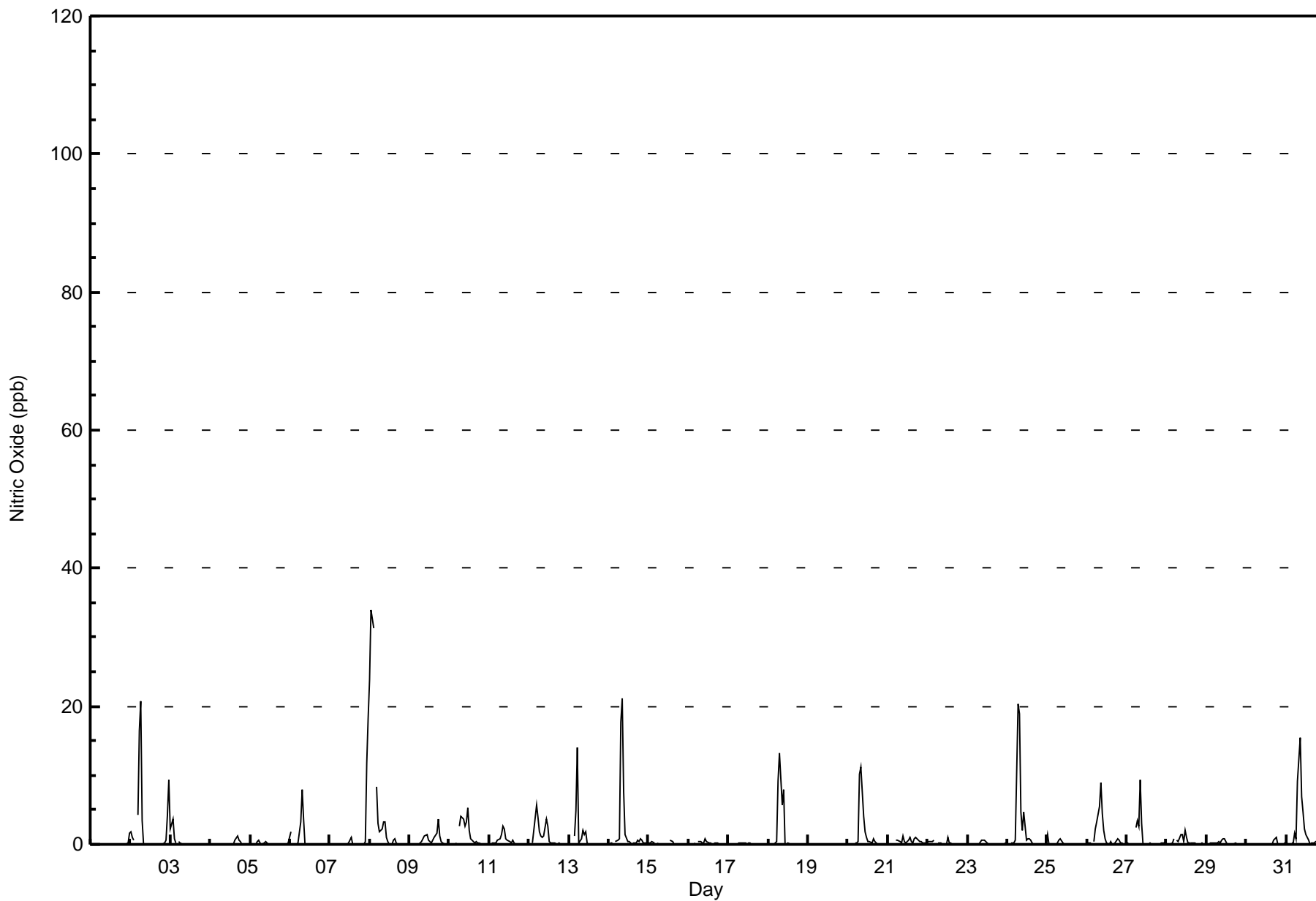


Wood Buffalo Environmental Association

Hourly Averages

Nitric Oxide (NO) - ppb

Fort McKay South - July 2015





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

**Nitric Oxide (NO) - ppb**  
**Fort McKay South - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	703	99.29	99.29
21 - 40	5	0.71	100.00
11 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744





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

**Nitric Oxide (NO) - ppb**  
**Fort McKay South - July 2015**

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	65	36	16	9	5	8	21	33	59	72	92	92	58	50	45	42	703
21 - 40	0	0	0	0	0	0	0	0	2	1	2	0	0	0	0	0	5
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	65	36	16	9	5	8	21	33	61	73	94	92	58	50	45	42	708

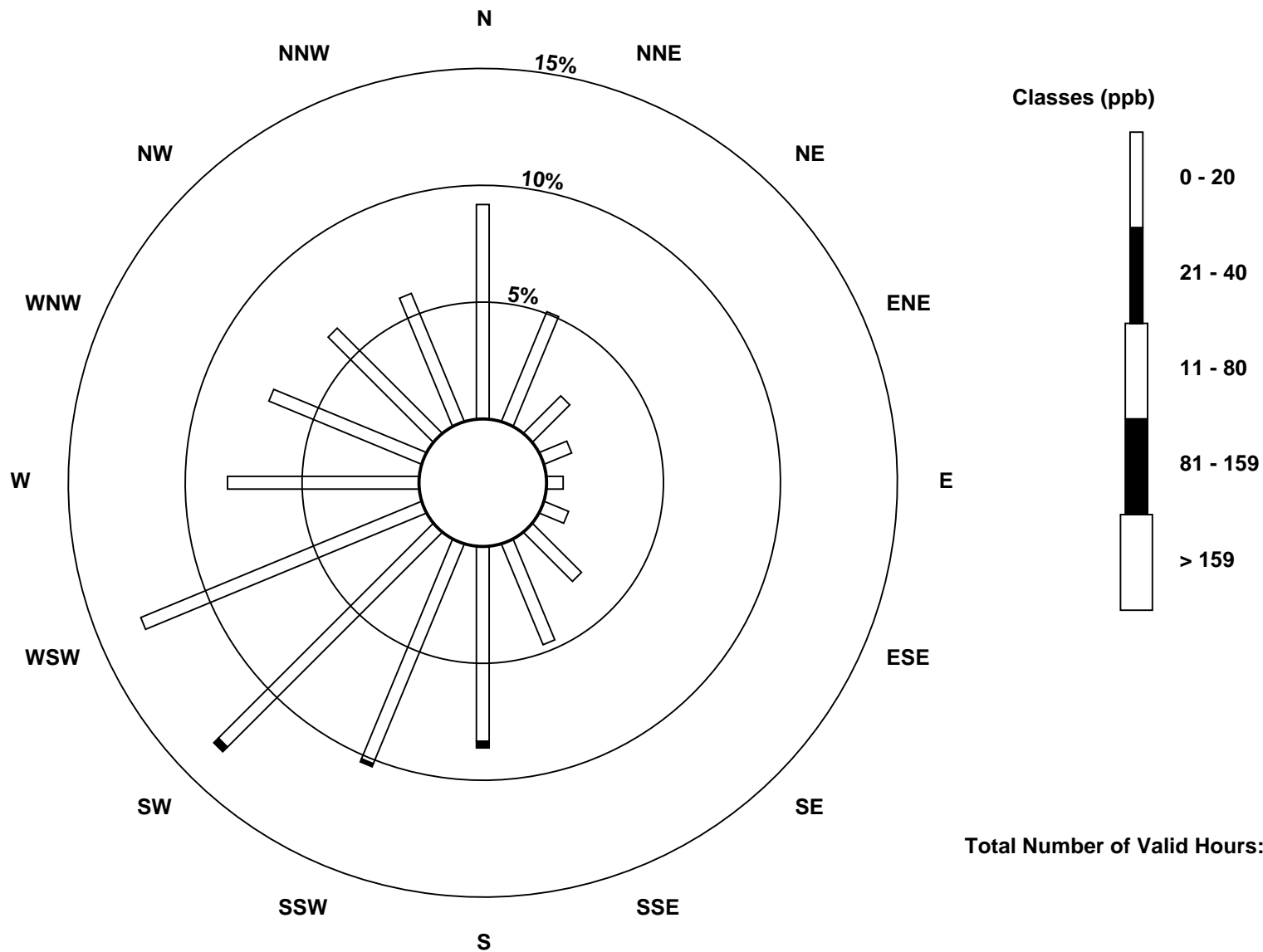
Total Number of Valid Hours: 708

Total Number of Hours: 744

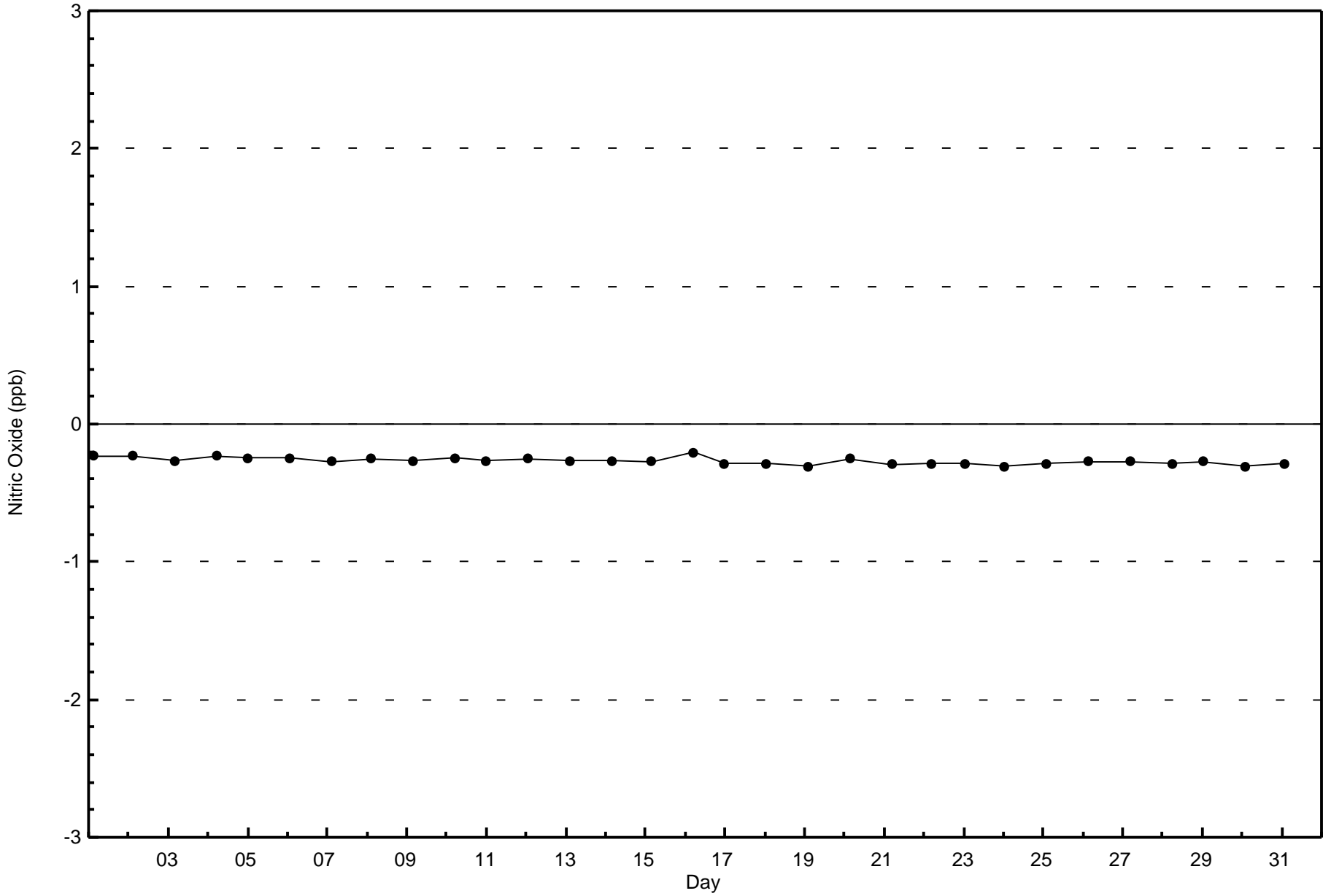


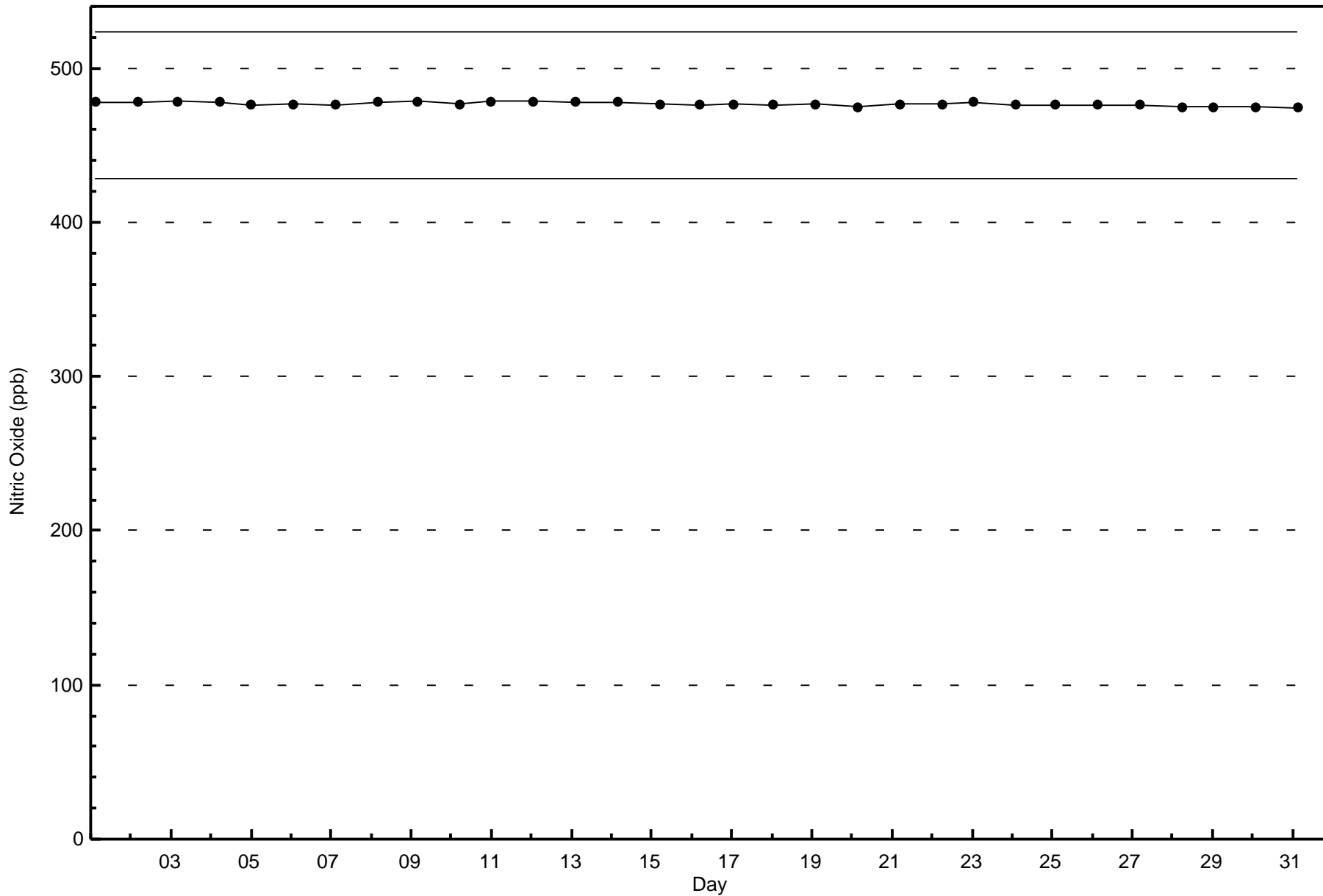
Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Nitric Oxide (NO) - ppb  
Fort McKay South (AMS 13)



Total Number of Valid Hours: 708







Wood Buffalo Environmental Association

Summary of Hour Averages

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

Fort McKay South - July 2015

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 27 ppb on Jul 3 00:00	Maximum Daily Average: 6.4 ppb on Jul 3		Hours of Data:	708
Minimum Value: 0 ppb on Jul 20 03:00	Minimum Daily Average: 0.3 ppb on Jul 19		Hours of Missing Data:	36
Maximum Diurnal Average: 3.9 ppb at hour 9	Minimum Diurnal Average: 1.5 ppb at hour 21		Hours of Calibration:	36
Monthly Average: 2.2 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 1 Q <sub>3</sub> = 3 P <sub>90</sub> = 6 P <sub>99</sub> = 14		Percent Operational Time:	100.0

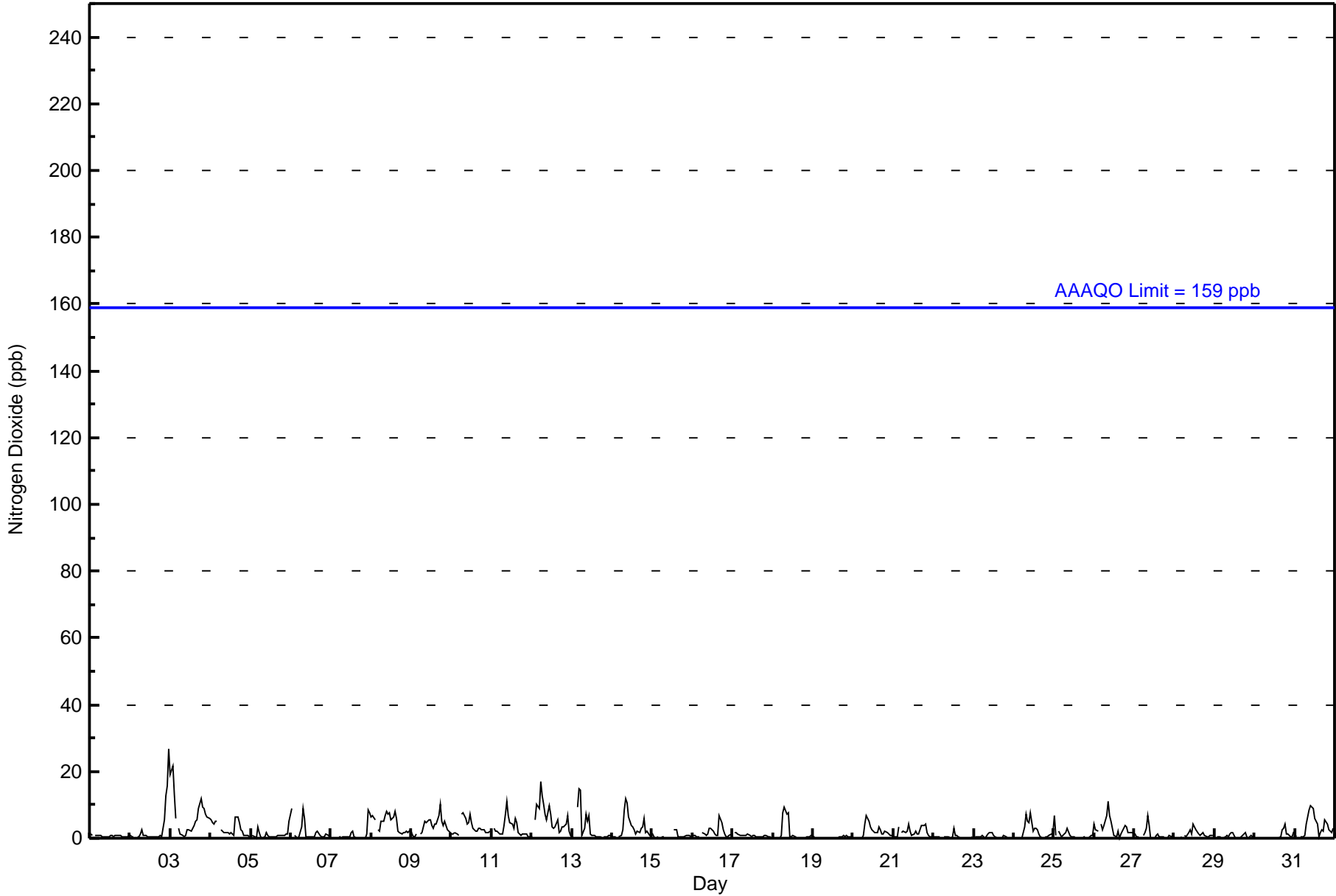
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0.7	1	
2-Jul	1	1	0	Z	0	1	1	2	1	1	1	0	0	0	0	1	1	1	1	1	6	13	16	27	3.2	27
3-Jul	19	22	13	6	Z	3	1	1	1	1	2	3	2	3	4	5	5	9	12	9	9	7	6	6	6.4	22
4-Jul	6	5	4	5	5	Z	3	2	2	2	2	1	2	1	1	6	7	5	3	2	1	1	1	1	2.8	7
5-Jul	Z	1	1	0	3	2	0	0	1	2	1	0	0	0	1	1	1	1	1	1	1	1	1	5	1.0	5
6-Jul	9	Z	1	0	0	0	4	9	6	1	0	1	1	0	0	2	2	1	1	1	0	1	1	0	1.7	9
7-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	1	8	8	1.1	8
8-Jul	7	7	6	Z	3	2	5	5	7	8	7	8	6	7	8	6	2	2	1	2	2	2	2	3	4.5	8
9-Jul	1	0	1	1	Z	1	2	3	5	5	5	5	4	3	4	4	7	10	5	4	5	3	2	2	3.5	10
10-Jul	1	1	2	1	1	Z	7	8	6	4	5	7	5	3	2	2	3	3	3	2	2	2	2	2	3.2	8
11-Jul	Z	3	2	2	2	1	1	4	7	11	7	5	4	3	6	5	2	1	1	1	1	1	1	1	3.1	11
12-Jul	1	Z	6	10	9	17	13	10	7	5	10	7	4	3	3	5	2	2	4	3	4	7	2	1	5.9	17
13-Jul	1	1	Z	9	15	15	1	3	7	5	7	1	1	1	0	0	0	0	0	0	1	1	1	1	3.0	15
14-Jul	0	0	1	Z	1	1	3	8	12	11	6	4	4	3	1	2	2	3	4	6	2	2	1	1	3.3	12
15-Jul	1	0	0	0	Z	0	0	0	C	C	C	C	C	C	3	2	1	1	1	1	1	1	1	1	0.8	3
16-Jul	1	1	0	0	0	Z	2	1	1	1	3	3	2	1	1	1	7	5	3	1	0	0	1	1	1.6	7
17-Jul	Z	2	2	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	0	0.8	2
18-Jul	0	Z	0	0	0	1	8	9	7	8	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1.7	9
19-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1	0	0.3	1
20-Jul	0	0	0	Z	0	0	1	4	7	5	3	3	2	2	2	4	2	1	1	2	2	1	1	1	1.9	7
21-Jul	1	0	0	3	Z	2	2	2	2	4	2	1	1	2	1	1	2	4	4	4	2	1	1	1	1.9	4
22-Jul	0	0	0	0	1	Z	0	0	0	0	0	0	3	1	1	1	0	0	0	0	0	0	0	0	0.5	3
23-Jul	Z	0	0	0	1	1	0	0	1	2	2	1	0	0	0	0	0	1	0	0	0	0	0	0	0.5	2
24-Jul	0	Z	0	0	0	0	3	7	5	5	8	2	3	3	2	1	0	0	0	1	1	1	2	2	2.0	8
25-Jul	7	1	Z	2	0	1	1	2	3	1	0	1	0	0	0	0	0	0	0	0	0	0	1	1	1.0	7
26-Jul	4	3	2	Z	4	2	4	7	11	7	5	3	1	1	2	0	1	2	4	3	2	2	2	2	3.2	11
27-Jul	1	1	0	0	Z	1	2	3	7	4	0	0	0	1	1	1	0	0	0	0	0	1	0	1	1.1	7
28-Jul	0	0	0	0	0	Z	1	1	2	2	1	4	4	3	1	1	1	2	1	1	1	1	1	1	1.2	4
29-Jul	Z	1	0	1	0	0	0	1	0	1	2	2	0	0	0	0	0	1	2	0	0	0	1	0	0.6	2
30-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	4	1	1	1	0	2	0.7	4
31-Jul	1	1	Z	0	0	1	1	4	9	10	9	9	6	4	1	2	3	2	6	4	3	2	2	3	3.5	10
	2.4	2.0	1.7	1.8	1.8	2.0	2.2	3.2	3.9	3.5	3.0	2.5	2.0	1.7	1.5	1.7	1.8	2.0	2.0	1.7	1.5	1.7	1.8	2.3	Diurnal Average	
	19	22	13	10	15	17	13	10	12	11	10	9	6	7	8	6	7	10	12	9	9	13	16	27	Diurnal Maximum	

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



Wood Buffalo Environmental Association  
Hourly Averages

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Fort McKay South - July 2015





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

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Fort McKay South - July 2015**

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

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Fort McKay South - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	65	36	16	9	5	8	21	33	61	71	94	92	58	50	45	42	706
21 - 40	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	65	36	16	9	5	8	21	33	61	73	94	92	58	50	45	42	708

Total Number of Valid Hours: 708

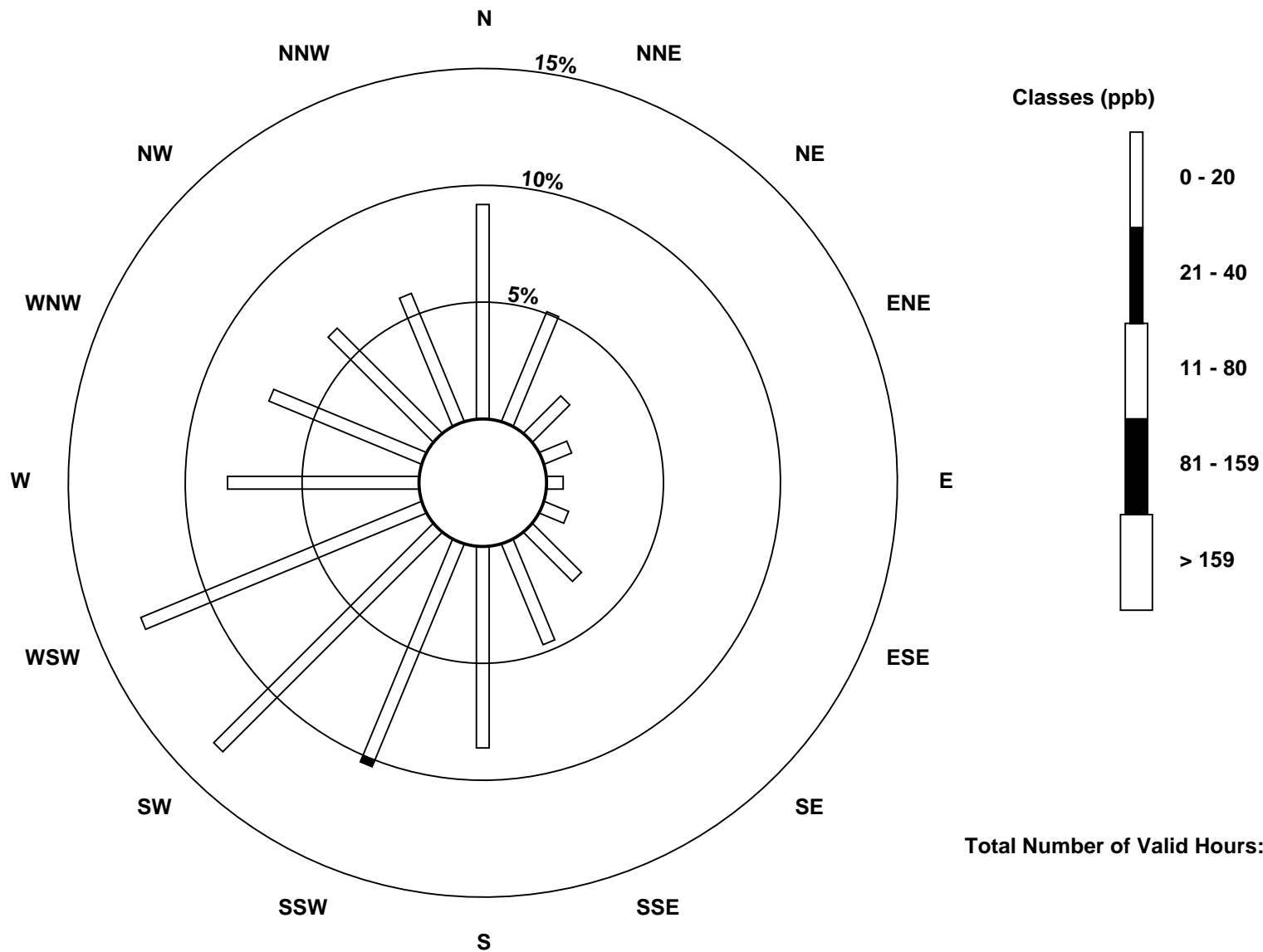
Total Number of Hours: 744

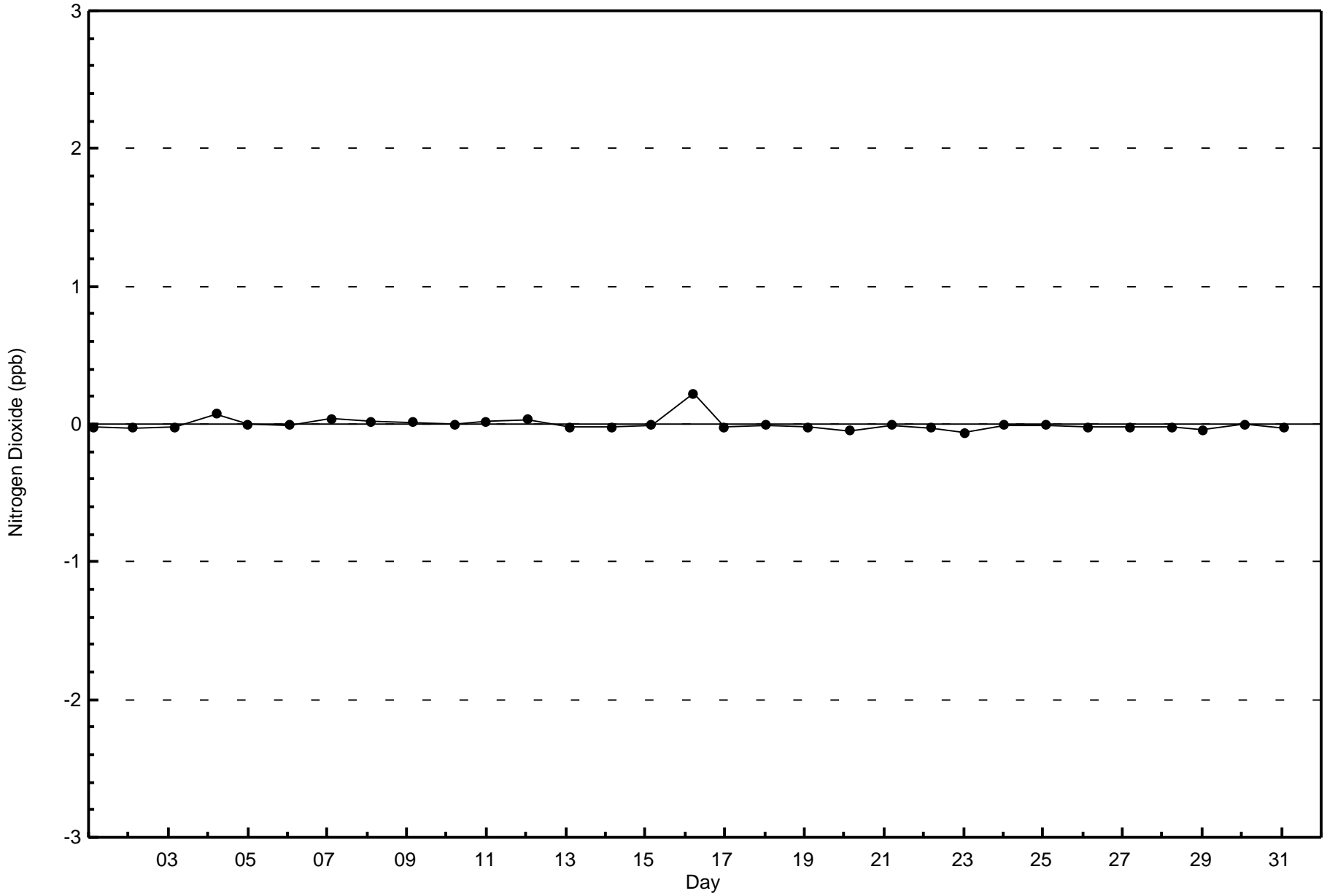




Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Fort McKay South (AMS 13)

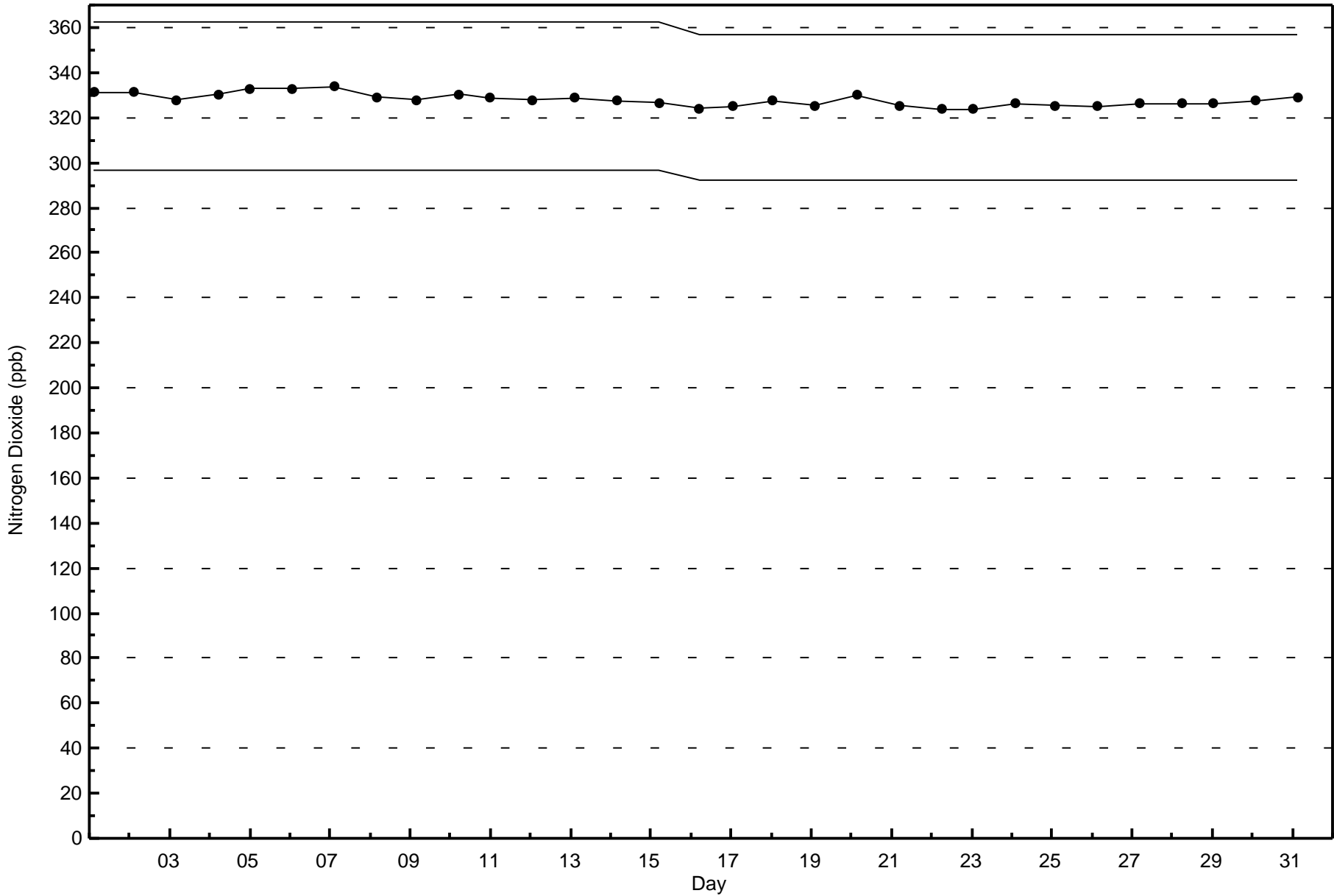






Wood Buffalo Environmental Association  
Span Responses

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Fort McKay South - July 2015



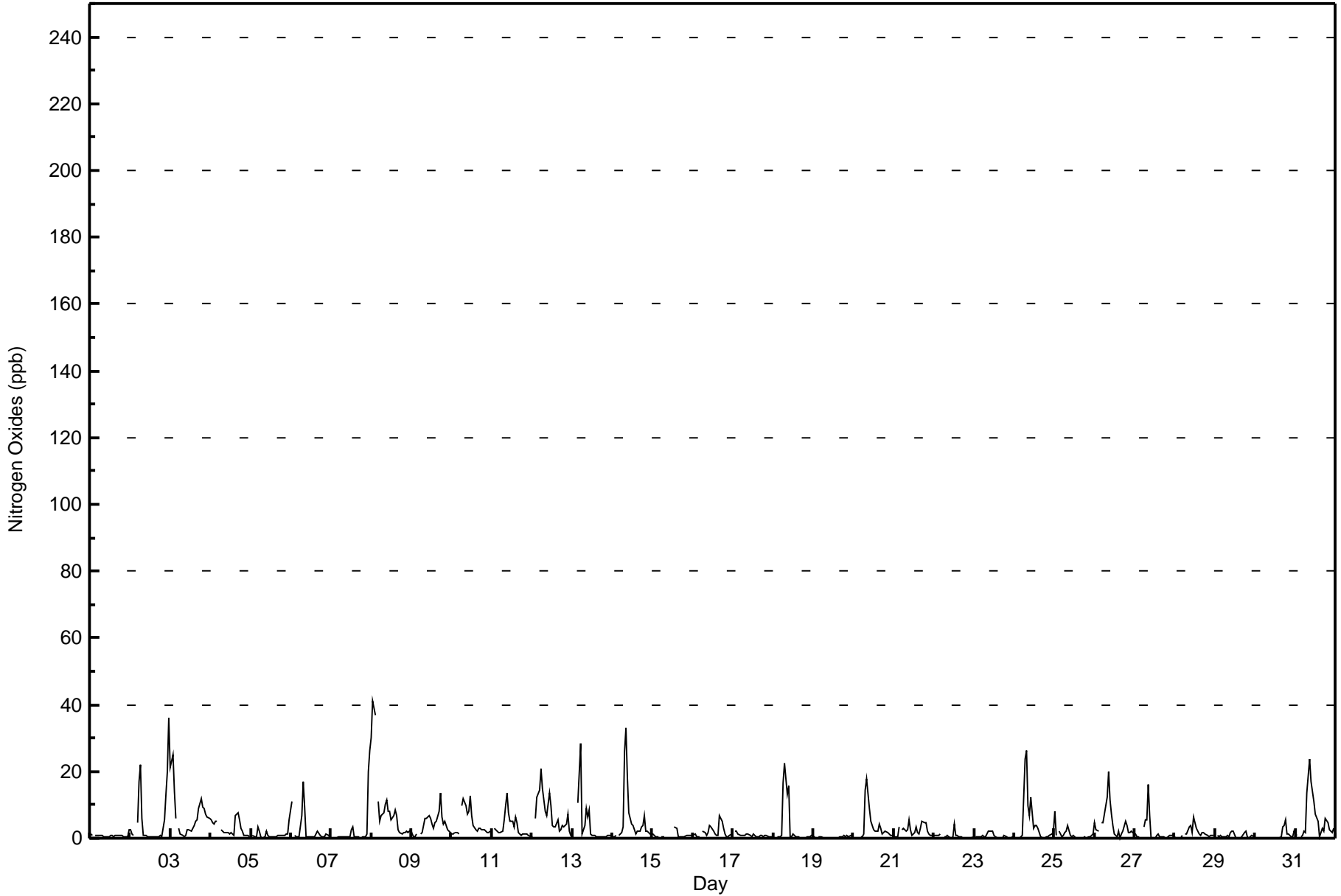


Maximum Value: 41 ppb on Jul 8 02:00		Maximum Daily Average: 9.5 ppb on Jul 8		Hours in Service: 744																						
Minimum Value: 0 ppb on Jul 30 13:00		Minimum Daily Average: 0.3 ppb on Jul 19		Hours of Data: 708																						
Maximum Diurnal Average: 7.2 ppb at hour 9		Minimum Diurnal Average: 1.6 ppb at hour 21		Hours of Missing Data: 36																						
Monthly Average: 3.1 ppb		Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 1 Q <sub>3</sub> = 3 P <sub>90</sub> = 8 P <sub>99</sub> = 25		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-Jul	1	1	Z	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	0	0	2	0.8	2	
2-Jul	3	1	1	Z	5	17	22	6	1	1	1	0	0	0	0	0	0	0	1	1	6	13	20	36	5.9	36
3-Jul	21	25	14	6	Z	3	1	1	1	1	2	3	2	3	4	5	5	9	12	9	9	7	6	6	6.7	25
4-Jul	5	5	4	5	5	Z	3	2	2	2	2	1	2	1	1	7	8	5	3	2	1	1	1	1	3.0	8
5-Jul	Z	1	0	0	4	2	0	0	1	2	1	0	0	0	0	1	1	1	1	1	1	1	1	5	1.1	5
6-Jul	11	Z	1	0	0	0	7	17	9	0	0	0	0	0	0	1	2	1	1	0	0	1	1	0	2.4	17
7-Jul	0	0	Z	0	0	0	0	0	0	0	0	1	2	3	0	0	0	0	0	0	0	1	20	26	2.5	26
8-Jul	30	41	37	Z	11	5	7	7	10	11	8	8	6	7	9	7	2	2	1	2	2	2	2	3	9.5	41
9-Jul	1	0	1	1	Z	1	2	4	6	6	7	6	4	3	5	5	8	14	6	4	5	3	2	2	4.1	14
10-Jul	1	1	2	2	1	Z	10	12	10	7	8	13	7	4	2	2	3	3	3	2	2	2	2	2	4.3	13
11-Jul	Z	3	3	2	2	2	2	6	10	13	8	5	5	3	7	5	2	1	1	1	1	1	1	1	3.7	13
12-Jul	1	Z	6	12	15	21	15	11	8	7	13	10	4	3	3	6	2	2	4	3	4	7	2	1	7.0	21
13-Jul	1	1	Z	11	19	28	1	4	9	6	9	1	1	1	0	0	0	0	0	0	1	1	1	1	4.2	28
14-Jul	0	0	1	Z	1	2	3	26	33	18	8	4	4	3	1	2	2	3	4	7	2	2	1	1	5.7	33
15-Jul	1	1	1	0	Z	0	0	0	C	C	C	C	C	3	3	1	1	0	0	1	1	1	1	1	0.9	3
16-Jul	1	1	0	0	0	Z	2	2	1	2	4	3	2	1	1	1	7	5	3	1	0	0	1	1	1.8	7
17-Jul	Z	2	2	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	0	0	0.9	2
18-Jul	0	Z	0	0	0	1	17	23	13	16	1	0	1	0	0	0	0	0	0	0	1	0	1	0	3.3	23
19-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	1	0	0.3	1
20-Jul	0	0	0	Z	0	0	1	15	18	9	5	4	3	2	2	4	3	1	2	2	2	1	1	1	3.3	18
21-Jul	1	0	0	3	Z	2	3	2	2	5	3	1	2	3	2	1	3	5	5	5	2	1	1	1	2.4	5
22-Jul	1	1	1	1	1	Z	1	0	1	0	0	0	4	1	1	0	0	0	0	0	0	0	0	0	0.6	4
23-Jul	Z	1	0	0	1	1	0	0	2	2	2	2	1	0	0	0	0	0	1	0	0	0	0	0	0.7	2
24-Jul	0	Z	0	0	0	1	24	26	10	7	12	3	4	4	3	2	0	0	0	0	1	1	2	4.4	26	
25-Jul	8	1	Z	2	0	1	2	2	4	1	1	1	0	0	0	0	0	0	0	0	0	0	1	1	1.1	8
26-Jul	5	3	2	Z	5	5	7	12	20	11	7	4	1	1	2	0	1	2	5	4	2	2	2	2	4.5	20
27-Jul	1	1	0	0	Z	3	5	5	16	7	0	0	0	1	1	1	1	0	0	0	0	1	1	1	2.0	16
28-Jul	0	0	0	0	1	Z	1	1	3	4	2	6	5	3	1	1	2	2	1	1	1	1	1	1	1.6	6
29-Jul	Z	1	0	1	0	0	1	1	1	2	2	2	0	0	0	0	0	2	2	0	0	0	1	0	0.8	2
30-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	4	5	1	1	1	0	2	0.9	5
31-Jul	1	1	Z	0	1	2	2	13	24	17	14	11	7	5	0	2	3	2	6	5	3	2	2	3	5.4	24
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration																										



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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Fort McKay South - July 2015**





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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Fort McKay South - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	692	97.74	97.74
21 - 40	15	2.12	99.86
41 - 80	1	0.14	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Fort McKay South - July 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	64	36	16	9	5	8	20	32	56	67	92	92	58	50	45	42	692
21 - 40	1	0	0	0	0	0	1	1	5	6	1	0	0	0	0	0	15
11 - 80	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	65	36	16	9	5	8	21	33	61	73	94	92	58	50	45	42	708

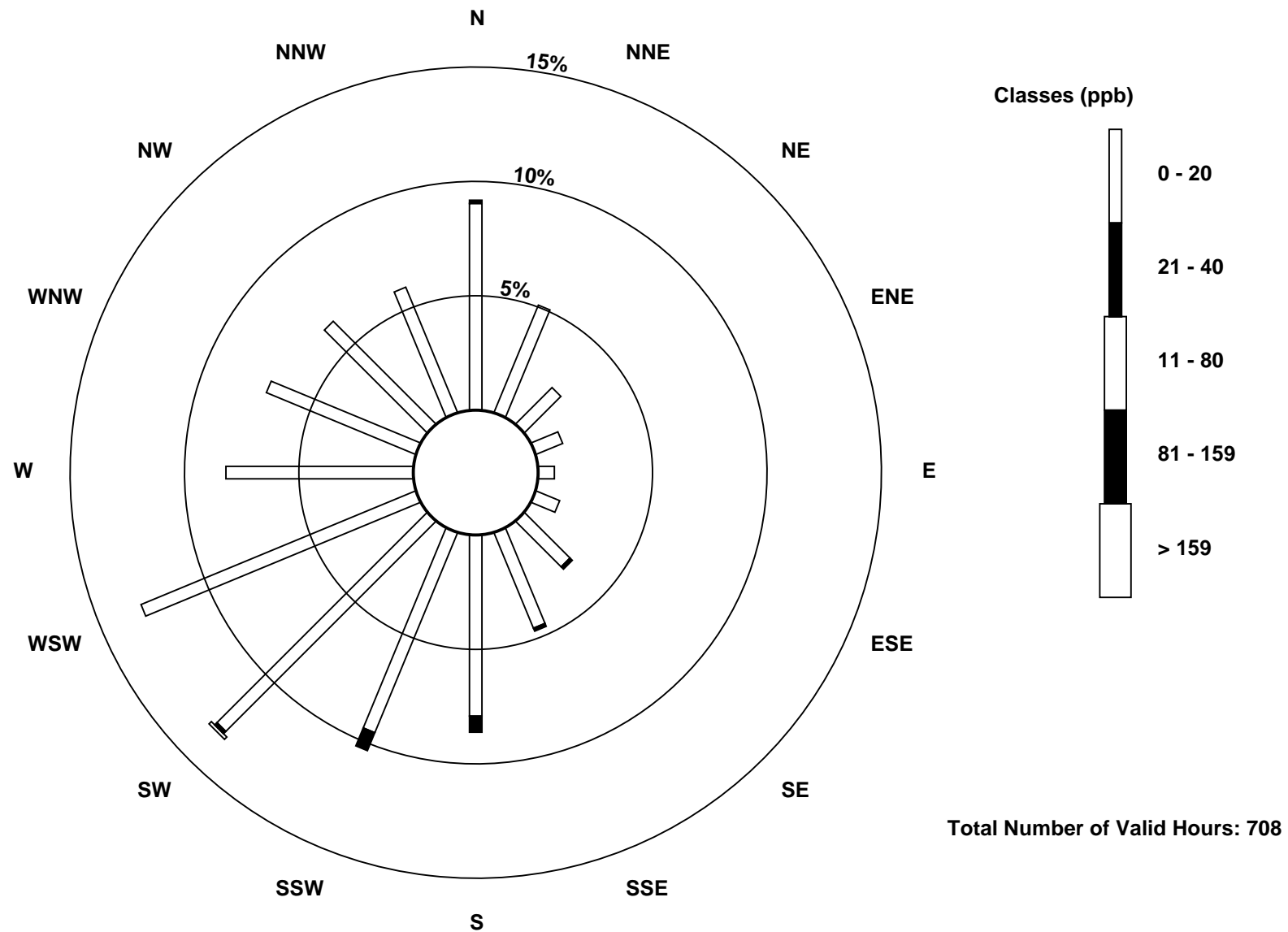
Total Number of Valid Hours: 708

Total Number of Hours: 744

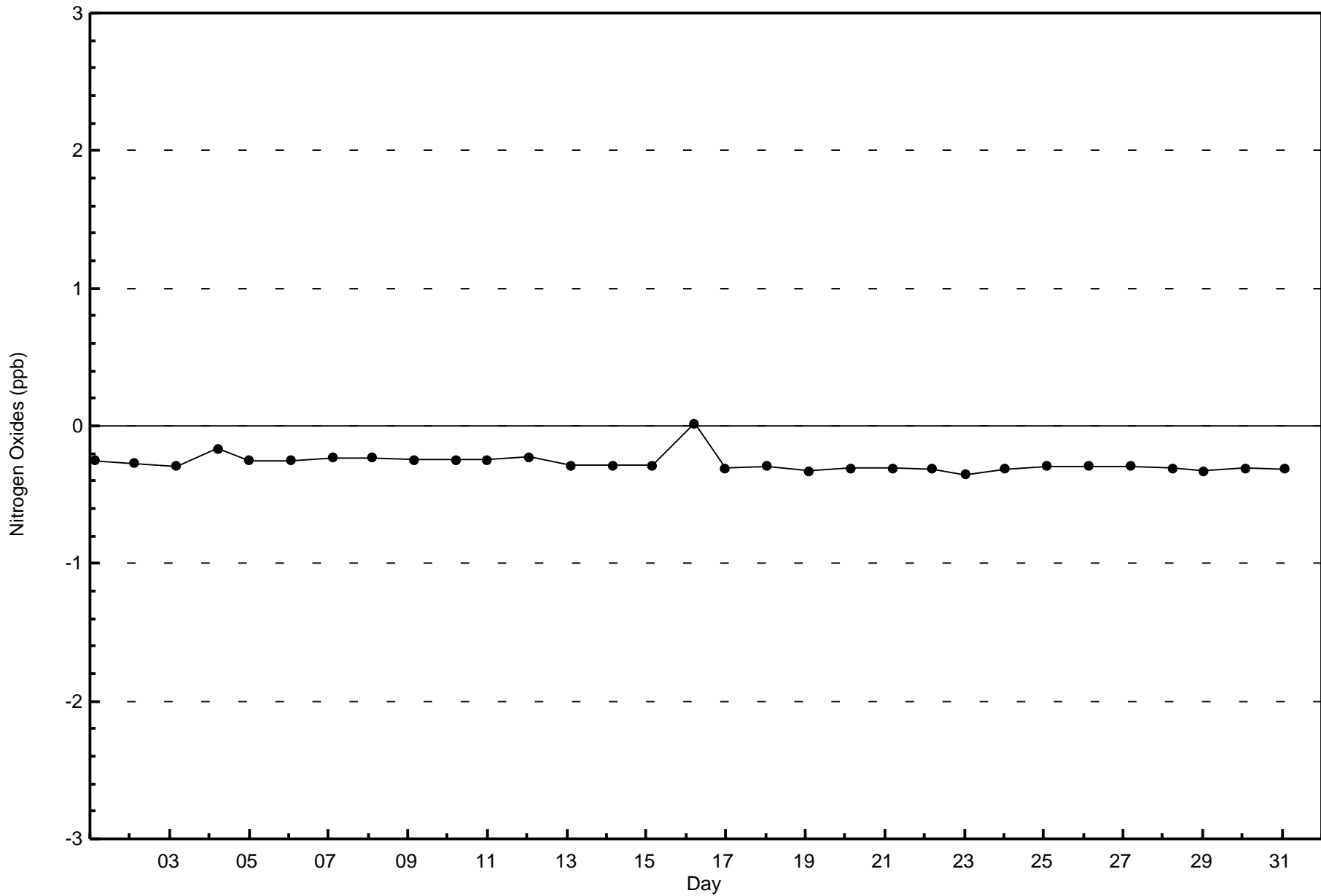


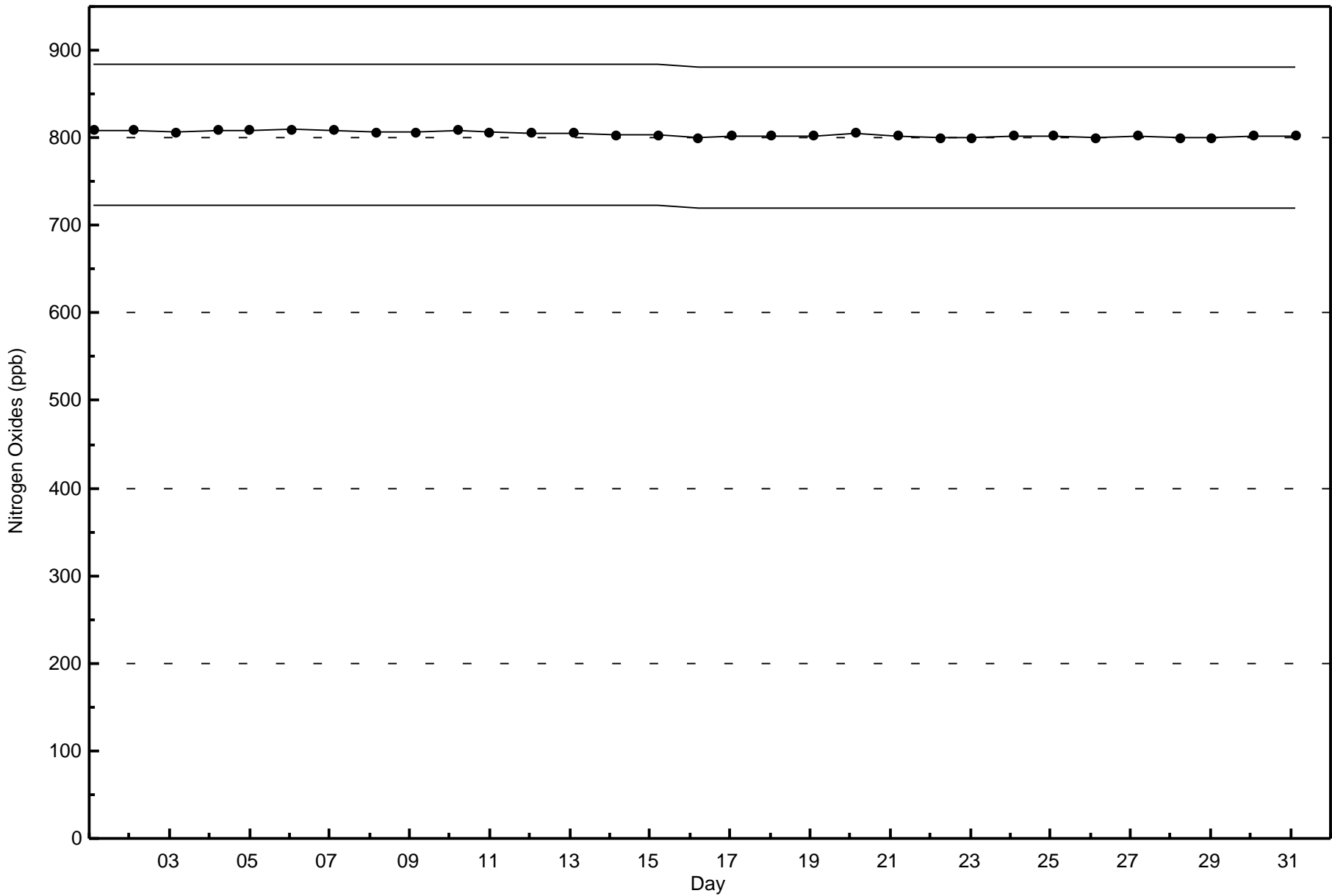
Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Fort McKay South (AMS 13)











Summary of Hour Averages

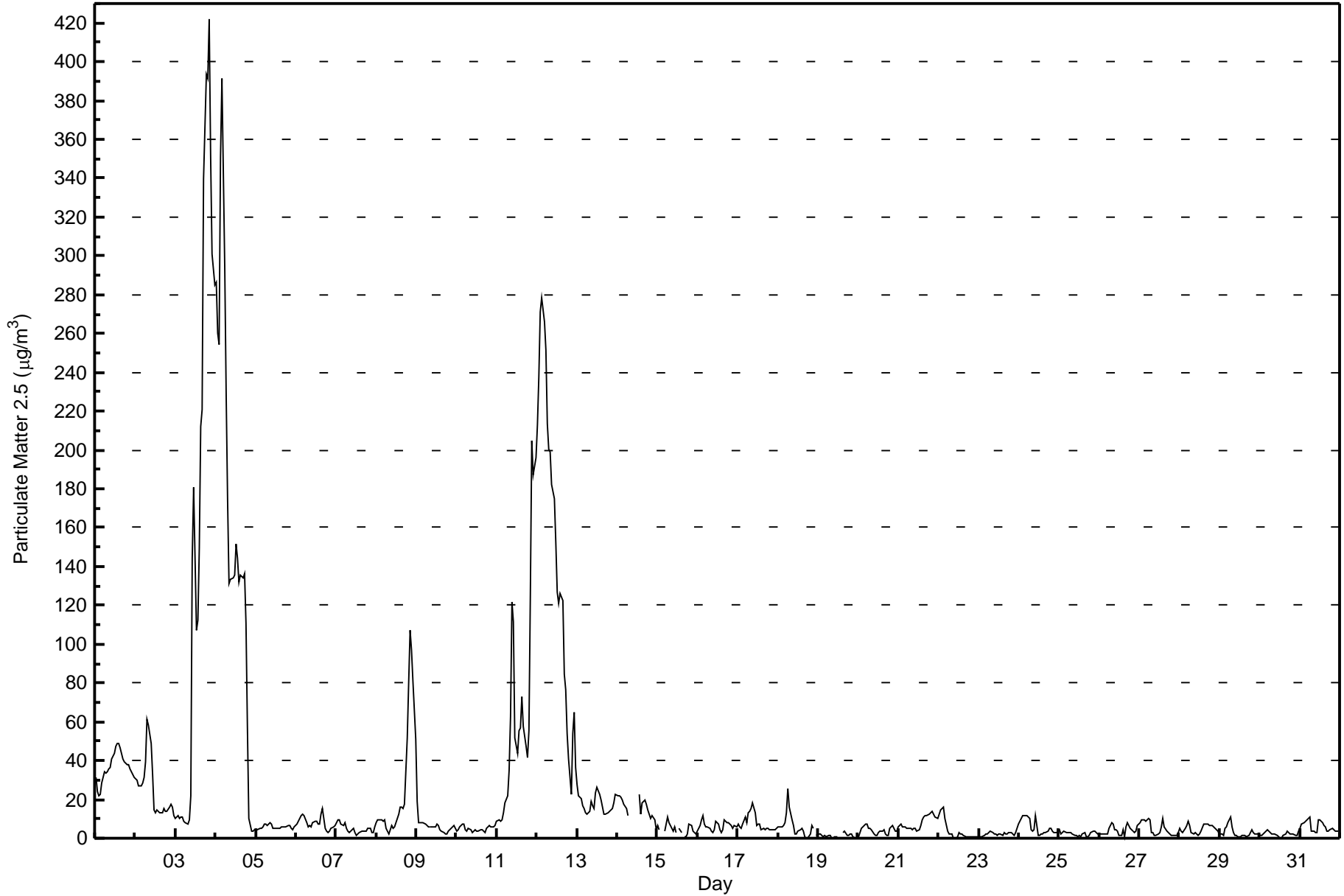
Fort McKay South - July 2015

Number of Exceedences (AAAQO):	24-hr: 5	Hours in Service:	744
Maximum Value: 422.3 µg/m <sup>3</sup> on Jul 3 21:00	Maximum Daily Average: 158.2 µg/m <sup>3</sup> on Jul 4	Hours of Data:	730
Minimum Value: 0.0 µg/m <sup>3</sup> on Jul 22 10:00	Minimum Daily Average: 1.4 µg/m <sup>3</sup> on Jul 19	Hours of Missing Data:	14
Maximum Diurnal Average: 29.9 µg/m <sup>3</sup> at hour 5	Minimum Diurnal Average: 20.7 µg/m <sup>3</sup> at hour 9	Hours of Calibration:	0
Monthly Average: 24.72 µg/m <sup>3</sup>	Percentiles: P <sub>1</sub> = 0.3 P <sub>10</sub> = 1.7 Q <sub>1</sub> = 3.1 Median = 6.0 Q <sub>3</sub> = 12.8 P <sub>90</sub> = 54.1 P <sub>99</sub> = 330.3	Percent Operational Time:	98.1

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-Jul	31.6	24.3	21.8	22.7	28.1	33.9	33.7	34.6	35.5	36.3	40.6	44.0	47.1	48.6	49.1	46.4	40.7	39.1	38.6	38.1	37.6	35.4	32.8	31.2	36.3	49.1
2-Jul	30.3	29.7	27.2	27.1	28.7	31.3	39.1	61.5	58.0	48.7	32.5	14.4	13.3	14.3	13.4	13.4	13.0	15.2	14.0	13.8	15.9	17.4	15.8	11.6	25.0	61.5
3-Jul	10.0	11.3	10.5	11.0	10.7	9.0	8.4	7.3	9.4	21.9	144.3	180.5	107.3	112.5	149.4	212.0	220.8	339.5	393.5	391.3	422.3	352.3	300.9	285.1	155.1	422.3
4-Jul	286.1	260.1	254.1	351.0	391.3	293.4	228.0	173.8	131.5	133.5	134.2	135.6	151.9	144.6	132.0	135.4	133.9	136.5	110.6	57.6	10.5	3.5	3.7	4.2	158.2	391.3
5-Jul	4.4	4.5	4.8	5.2	5.8	7.1	7.1	6.5	7.7	6.9	5.3	4.8	4.9	5.2	5.4	6.0	6.2	6.1	6.2	6.6	6.3	5.1	4.6	6.0	5.8	7.7
6-Jul	7.6	9.0	10.3	11.5	12.1	11.4	7.9	5.9	6.2	6.1	8.3	8.8	8.4	7.5	7.4	12.6	15.2	5.2	3.7	3.0	3.5	4.7	5.7	6.9	7.9	15.2
7-Jul	7.9	9.5	9.4	7.1	6.9	7.7	4.9	3.4	3.3	4.1	5.3	2.9	1.6	2.0	2.7	3.7	3.7	3.9	5.0	4.9	2.8	3.2	5.8	4.8	9.5	
8-Jul	8.3	9.2	9.2	9.5	8.9	9.8	5.3	2.4	4.2	6.3	5.2	5.6	8.1	12.3	16.2	16.3	15.5	17.5	51.5	80.3	106.9	96.7	81.1	50.9	26.5	106.9
9-Jul	18.8	8.2	8.1	8.4	7.8	7.1	6.7	6.2	5.9	6.2	5.7	6.1	7.2	6.5	4.7	3.4	2.7	2.5	2.5	3.6	4.7	6.0	6.2	4.9	6.3	18.8
10-Jul	3.6	4.1	5.8	7.1	7.3	4.4	3.6	4.7	4.2	2.8	3.6	4.3	3.4	3.3	4.2	4.7	3.5	3.2	5.0	6.4	6.2	6.0	6.2	6.8	4.8	7.3
11-Jul	8.9	9.6	8.6	9.8	12.9	18.0	21.9	35.2	62.6	121.5	111.4	51.4	44.0	55.7	56.7	73.0	57.4	47.7	41.4	55.0	125.1	204.8	187.4	196.1	67.3	204.8
12-Jul	213.0	237.9	271.0	278.2	266.1	251.2	213.3	200.4	198.9	182.1	175.0	152.1	126.7	120.6	126.1	122.8	84.8	76.7	54.1	41.1	22.8	54.1	65.2	36.1	148.8	278.2
13-Jul	27.9	22.2	20.7	16.8	15.0	12.8	12.1	13.7	18.7	16.9	15.4	23.4	26.0	22.5	19.4	15.8	12.6	12.3	13.0	14.1	14.5	15.2	18.1	22.7	17.6	27.9
14-Jul	21.7	21.7	21.3	19.4	17.5	15.5	11.8	M	M	M	M	M	M	22.4	12.7	18.5	19.6	17.7	14.9	12.5	9.9	11.5	9.2	4.7	15.7	22.4
15-Jul	6.7	4.0	UO	UO	3.9	7.5	10.7	7.7	6.5	3.9	5.9	2.9	UO	5.0	3.2	UO	0.5	1.0	2.3	7.2	6.9	3.7	2.7	2.2	4.7	10.7
16-Jul	3.3	6.6	9.8	11.4	7.1	5.5	5.9	4.7	3.5	3.3	4.0	9.0	7.2	4.7	3.0	4.2	9.7	7.9	8.1	7.6	6.3	5.2	6.6	5.5	6.3	11.4
17-Jul	7.0	6.1	5.3	7.0	10.6	8.0	13.3	13.8	15.7	17.9	13.3	6.4	7.2	7.6	4.2	4.8	4.2	4.9	5.5	4.7	4.1	4.2	4.5	5.0	7.7	17.9
18-Jul	5.9	6.1	5.7	6.5	8.1	13.0	25.7	16.2	9.4	6.7	2.5	2.5	3.7	4.0	5.4	3.6	0.9	0.2	0.3	2.0	6.2	5.2	UO	1.7	6.1	25.7
19-Jul	2.4	2.1	1.5	0.8	1.4	0.7	1.3	1.7	0.2	0.3	0.8	0.6	UO	UO	UO	2.6	3.3	1.7	1.7	2.5	2.1	0.9	0.2	0.3	1.4	3.3
20-Jul	1.0	3.0	4.8	6.1	7.1	7.6	4.7	4.9	4.2	2.4	1.6	1.7	2.8	3.4	3.7	4.7	2.5	1.3	1.6	5.2	6.2	4.8	3.9	3.9	3.9	7.6
21-Jul	5.9	7.4	6.0	6.0	5.7	5.4	5.5	4.9	4.5	5.4	4.8	4.0	4.1	6.6	9.3	10.9	11.7	11.7	12.1	13.5	13.9	12.2	10.9	10.4	8.0	13.9
22-Jul	12.3	14.9	14.9	16.2	9.9	4.0	2.1	2.3	1.9	0.0	0.0	0.5	2.8	2.5	1.8	1.1	1.0	0.9	0.8	0.5	0.6	0.6	0.6	0.6	3.9	16.2
23-Jul	0.8	0.9	1.1	1.6	2.0	2.4	2.8	3.4	2.9	2.5	1.9	1.7	2.3	2.1	1.7	2.6	1.9	2.5	2.7	2.8	2.5	1.6	3.0	5.0	2.3	5.0
24-Jul	7.3	10.5	11.3	11.4	11.3	11.7	10.0	4.1	3.7	4.5	11.5	1.5	1.5	1.9	2.3	2.7	3.0	3.9	4.9	5.3	3.8	3.1	3.1	3.5	5.7	11.7
25-Jul	4.0	2.2	2.6	3.4	3.3	3.0	3.0	3.0	1.9	1.3	1.2	1.0	1.2	0.8	1.9	2.6	1.0	0.6	1.2	3.1	3.7	3.6	2.7	2.1	2.3	4.0
26-Jul	2.1	1.9	1.9	2.5	2.3	2.1	5.1	7.8	7.6	4.0	4.0	3.7	1.6	1.4	4.2	1.1	6.1	8.0	5.3	4.4	3.6	3.1	3.8	6.2	3.9	8.0
27-Jul	8.0	9.2	9.6	9.5	8.8	10.0	9.5	2.9	2.6	1.7	1.2	2.0	2.6	6.1	10.5	5.5	3.8	2.8	2.1	1.7	1.5	1.2	1.5	2.9	4.9	10.5
28-Jul	4.8	3.6	3.2	5.0	6.6	8.5	6.7	2.6	2.2	2.6	2.2	1.8	2.3	3.5	7.5	7.0	7.6	6.9	6.2	6.2	5.8	5.2	4.5	3.6	4.8	8.5
29-Jul	2.5	2.1	1.7	5.1	5.7	8.4	11.0	6.1	2.7	1.8	1.3	0.8	0.6	1.3	1.5	1.4	0.8	1.7	3.2	4.6	3.2	2.0	1.9	1.8	3.0	11.0
30-Jul	1.4	1.2	1.9	2.7	4.7	4.0	2.6	1.8	1.9	2.1	1.8	0.9	0.0	0.2	1.1	2.4	3.6	3.1	2.5	2.1	2.2	1.7	1.7	3.8	2.1	4.7
31-Jul	5.2	7.0	8.0	8.4	9.2	10.3	10.7	3.9	3.9	3.2	3.2	9.8	9.3	8.3	6.4	6.0	3.8	3.6	4.5	5.0	4.4	3.9	3.5	3.7	6.0	10.7

24.5	24.2	25.7	29.6	29.9	26.6	23.7	21.6	20.7	21.9	24.9	22.8	21.4	21.3	22.2	24.9	22.4	25.3	26.4	26.0	28.0	28.3	26.5	23.7	Diurnal Average	
286.1	260.1	271.0	351.0	391.3	293.4	228.0	200.4	198.9	182.1	175.0	180.5	151.9	144.6	149.4	212.0	220.8	339.5	393.5	391.3	422.3	352.3	300.9	285.1	Diurnal Maximum	

M - Maintenance      UO - Unstable Operation  
 Alberta Ambient Air Quality Objectives (AAAQO):    24-hr 30 µg/m<sup>3</sup>





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

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Fort McKay South - July 2015**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
1 - 5	311	42.60	42.60
6 - 15	230	31.51	74.11
16 - 25	39	5.34	79.45
26 - 80	56	7.67	87.12
> 81.0	59	8.08	95.21

Total Number of Valid Hours: 730

Total Number of Hours: 744



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

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Fort McKay South - July 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	13	5	5	4	4	11	16	24	35	39	41	18	15	22	20	311
6 - 15	19	11	7	0	1	1	3	13	26	30	34	31	21	11	10	12	230
16 - 25	2	1	0	0	0	0	1	2	7	7	6	6	3	0	1	3	39
26 - 80	2	7	1	2	0	1	6	1	6	4	10	8	2	2	1	3	56
> 81.0	4	5	3	2	0	1	0	2	0	1	5	5	9	13	5	4	59
<b>Totals</b>	66	37	16	9	5	7	21	34	63	77	94	91	53	41	39	42	695

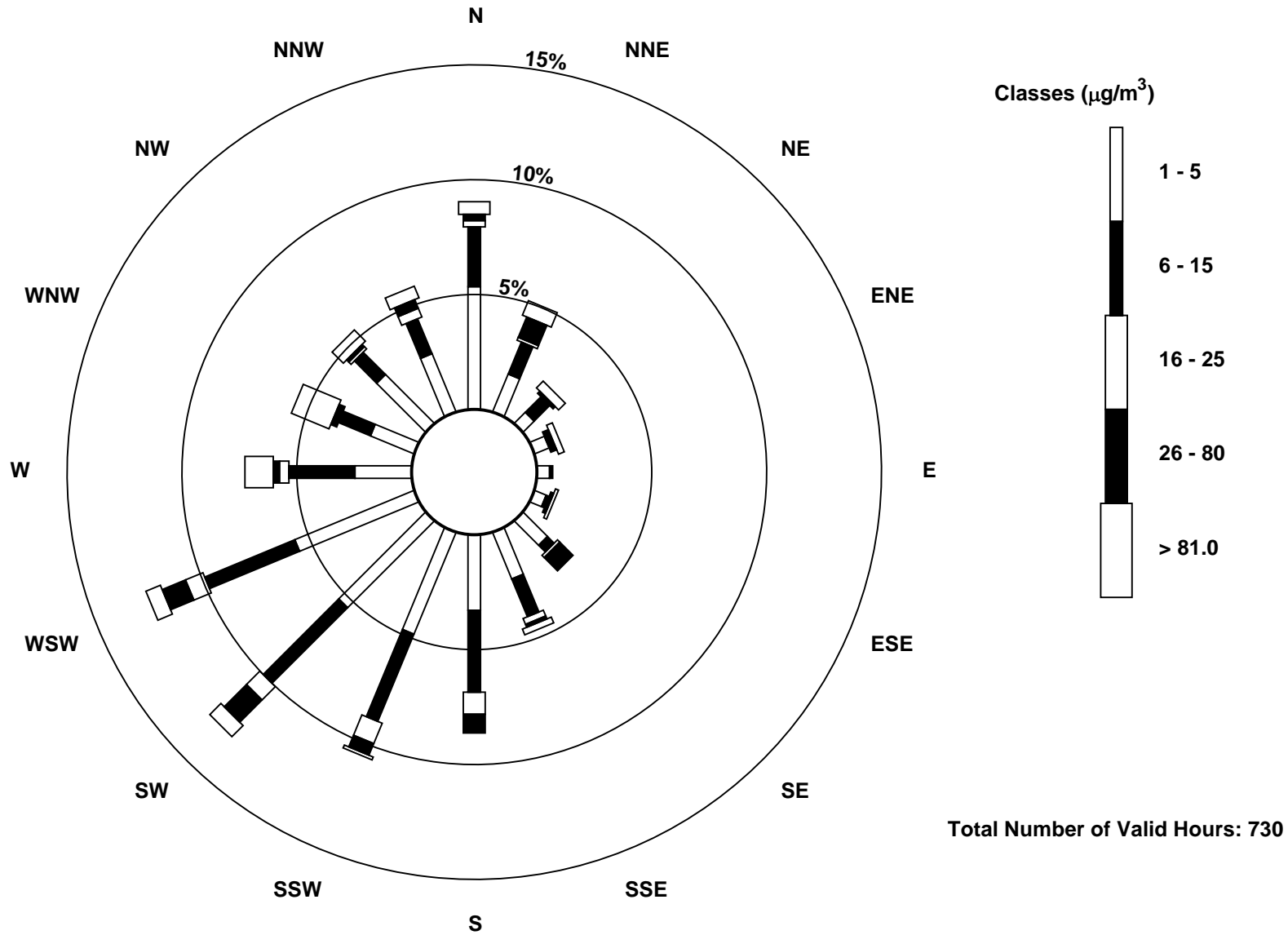
Total Number of Valid Hours: 730

Total Number of Hours: 744



Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
Fort McKay South (AMS 13)





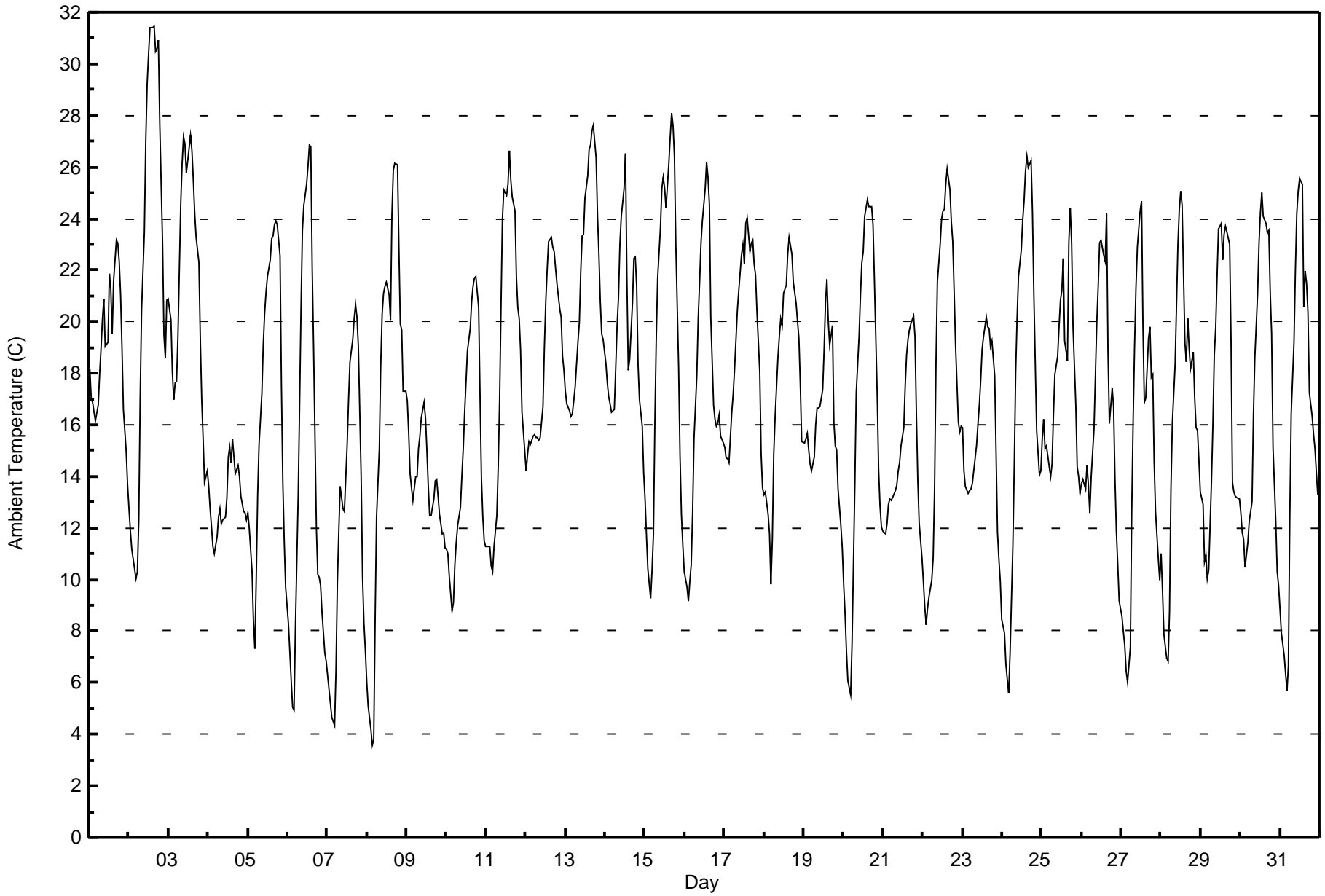
Maximum Value: 31.5 C on Jul 2 16:00		Maximum Daily Average: 21.8 C on Jul 2		Hours in Service: 744																																												
Minimum Value: 3.6 C on Jul 8 04:00		Minimum Daily Average: 12.4 C on Jul 7		Hours of Data: 744																																												
Maximum Diurnal Average: 22.5 C at hour 14		Minimum Diurnal Average: 10.7 C at hour 5		Hours of Missing Data: 0																																												
Monthly Average: 17.16 C		Percentiles: P <sub>1</sub> = 5.1 P <sub>10</sub> = 10.0 Q <sub>1</sub> = 13.2 Median = 16.9 Q <sub>3</sub> = 21.5 P <sub>90</sub> = 24.3 P <sub>99</sub> = 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-Jul	18.1	17.0	16.9	16.5	16.2	16.8	17.9	18.9	20.1	20.9	19.0	19.2	21.9	21.2	19.5	21.6	23.2	23.0	22.3	21.1	19.0	16.6	15.0	13.6	19.0	23.2																						
2-Jul	12.8	11.9	11.1	10.4	10.0	10.3	12.3	17.0	20.5	23.5	27.0	29.2	30.4	31.4	31.4	31.5	30.5	30.6	30.9	27.7	23.0	19.5	18.6	20.8	21.8	31.5																						
3-Jul	20.9	20.1	18.0	17.0	17.6	17.7	19.4	24.6	26.1	27.2	26.9	25.8	26.8	27.2	26.6	25.5	24.2	23.3	22.3	19.3	17.0	15.4	13.8	14.2	21.5	27.2																						
4-Jul	13.6	12.7	12.0	11.3	11.0	11.7	12.4	12.7	12.2	12.3	12.4	13.2	14.7	15.1	14.5	15.4	14.1	14.2	14.4	14.0	13.2	12.7	12.6	12.3	13.1	15.4																						
5-Jul	12.6	12.0	10.3	8.3	7.3	10.1	13.3	15.3	17.2	19.1	20.4	21.1	21.7	22.4	23.2	23.3	23.8	23.9	23.8	22.6	17.5	13.8	11.5	9.7	16.8	23.9																						
6-Jul	8.3	7.2	6.1	5.1	4.9	8.1	13.3	16.8	20.5	23.5	24.5	25.3	26.0	26.9	26.8	22.1	19.0	12.0	10.2	10.1	9.7	8.7	7.2	6.9	14.6	26.9																						
7-Jul	6.3	5.8	5.2	4.7	4.3	6.5	9.9	11.8	13.6	12.7	12.7	13.9	15.3	17.0	18.5	19.3	20.1	20.7	20.2	19.0	14.0	10.1	8.3	7.3	12.4	20.7																						
8-Jul	6.0	5.1	4.2	3.6	3.8	8.5	12.4	15.1	18.3	20.3	21.1	21.3	21.5	21.0	20.1	24.2	25.9	26.2	26.1	22.9	19.9	19.7	17.3	17.3	16.7	26.2																						
9-Jul	16.9	15.7	14.1	13.5	13.0	14.0	14.0	15.1	15.6	16.3	16.8	16.3	15.0	13.6	12.4	12.5	13.1	13.9	13.9	13.2	12.5	11.8	11.8	11.3	14.0	16.9																						
10-Jul	11.2	11.0	10.1	8.8	9.1	10.6	11.4	12.1	12.8	14.0	15.1	16.5	17.7	18.9	19.7	20.8	21.4	21.7	21.7	20.5	17.1	14.0	12.4	11.5	15.0	21.7																						
11-Jul	11.3	11.3	11.3	10.5	10.3	11.3	12.5	14.4	17.0	20.5	24.0	25.1	24.9	25.4	26.6	25.5	24.8	24.3	21.8	20.6	20.1	18.9	16.5	15.0	18.5	26.6																						
12-Jul	14.2	14.8	15.4	15.2	15.6	15.6	15.5	15.5	15.4	15.5	16.7	19.0	20.8	22.0	23.1	23.3	22.9	22.7	22.1	21.5	20.5	20.2	18.7	18.1	18.5	23.3																						
13-Jul	17.3	16.8	16.5	16.3	16.5	16.9	17.5	19.2	19.9	21.9	23.3	23.4	24.8	25.7	26.7	26.9	27.4	27.6	26.4	24.1	22.6	20.8	19.5	19.3	21.6	27.6																						
14-Jul	18.4	17.6	17.1	16.8	16.5	16.6	18.2	19.9	21.0	23.0	24.1	25.2	26.5	21.7	18.1	18.5	20.7	22.4	22.5	21.4	18.4	17.0	16.0	14.2	19.7	26.5																						
15-Jul	13.1	11.7	10.4	9.3	10.4	11.8	16.1	19.3	21.7	23.7	25.2	25.6	25.2	24.4	26.1	27.2	28.1	27.6	26.4	23.0	18.2	14.8	12.5	11.3	19.3	28.1																						
16-Jul	10.3	9.7	9.2	9.9	10.6	12.6	15.5	17.9	20.1	21.5	23.1	23.9	25.2	26.2	25.6	24.6	20.2	16.8	16.2	15.9	16.0	16.4	15.5	15.3	17.4	26.2																						
17-Jul	15.1	14.7	14.7	14.5	16.5	17.2	18.2	19.3	20.4	21.2	22.6	23.0	22.2	23.8	24.0	22.7	23.1	23.1	22.3	21.8	20.4	18.0	14.9	13.6	19.5	24.0																						
18-Jul	13.3	13.4	12.6	11.8	9.8	11.6	14.9	16.3	18.6	19.4	20.1	19.9	21.1	21.4	22.6	23.3	22.9	22.6	21.5	20.7	20.0	19.4	17.6	15.4	17.9	23.3																						
19-Jul	15.3	15.5	15.7	15.0	14.5	14.2	14.8	16.0	16.7	16.6	16.7	17.3	18.9	20.7	21.6	20.0	19.1	19.9	16.1	15.2	15.0	13.5	12.1	11.2	16.3	21.6																						
20-Jul	9.8	8.7	7.2	6.1	5.6	7.6	10.6	13.7	17.2	19.4	21.0	22.3	22.7	24.1	24.7	24.5	24.4	24.5	23.8	21.6	17.2	14.3	12.9	12.0	16.5	24.7																						
21-Jul	11.9	11.8	12.2	12.9	13.1	13.1	13.2	13.5	13.7	14.2	14.5	15.2	15.9	17.5	18.7	19.3	19.7	19.9	20.2	19.4	16.5	13.9	12.2	10.8	15.1	20.2																						
22-Jul	9.9	9.0	8.2	8.9	9.3	10.0	10.9	13.5	18.3	21.5	23.0	24.0	24.3	24.4	25.3	25.9	25.1	23.9	23.1	21.1	19.1	16.1	15.7	15.9	17.8	25.9																						
23-Jul	15.9	14.2	13.6	13.3	13.5	13.5	13.7	14.2	15.2	16.0	16.8	17.7	18.9	19.4	20.2	19.8	19.8	19.1	19.2	17.9	14.9	11.8	10.8	9.9	15.8	20.2																						
24-Jul	8.5	7.9	6.7	6.1	5.6	7.1	11.3	14.5	18.0	20.1	21.8	22.8	23.9	24.7	25.8	26.4	26.0	26.2	24.2	21.0	18.4	15.8	14.1	14.2	17.1	26.4																						
25-Jul	15.5	16.2	15.1	15.2	14.4	14.0	14.5	16.4	18.0	18.7	19.8	20.8	21.2	22.5	19.3	18.5	23.0	24.4	23.1	19.8	16.7	14.3	14.0	13.3	17.9	24.4																						
26-Jul	13.7	13.9	13.5	14.4	13.7	12.6	14.0	15.8	17.9	20.0	21.4	23.1	23.1	22.6	22.3	24.2	18.9	16.1	17.4	16.7	14.0	11.9	10.6	9.2	16.7	24.2																						
27-Jul	8.6	8.0	7.4	6.5	6.0	7.4	12.7	16.2	19.0	21.3	22.9	24.3	24.7	19.9	16.8	17.0	19.3	19.8	17.8	17.9	14.6	12.6	10.8	10.0	15.1	24.7																						
28-Jul	11.0	9.5	7.8	7.0	6.8	8.8	13.4	16.1	18.3	20.7	23.0	24.3	25.1	24.5	19.2	18.4	20.1	19.0	18.2	18.8	17.1	15.9	15.8	14.6	16.4	25.1																						
29-Jul	13.4	12.9	10.7	10.9	10.0	10.4	13.8	16.0	18.7	19.8	21.8	23.6	23.8	22.4	23.4	23.7	23.5	23.0	19.2	13.8	13.4	13.2	13.2	13.1	17.0	23.8																						
30-Jul	12.6	11.8	11.6	10.4	11.4	12.2	12.6	13.0	16.4	18.6	21.1	23.1	24.3	25.0	24.1	23.8	23.4	23.5	21.1	19.5	15.1	12.2	10.3	9.8	17.0	25.0																						
31-Jul	8.8	7.9	7.0	6.3	5.7	6.7	12.4	16.5	19.2	22.0	24.2	25.1	25.6	25.3	20.6	21.9	21.5	20.3	17.2	16.3	15.6	15.1	14.1	13.3	16.2	25.6																						
																								12.7	12.1	11.4	10.9	10.7	11.8	14.0	16.0	18.0	19.5	20.7	21.6	22.4	22.5	22.2	22.3	22.2	21.8	20.8	19.3	17.0	15.1	13.7	13.1	Diurnal Average
																								20.9	20.1	18.0	17.0	17.6	17.7	19.4	24.6	26.1	27.2	27.0	29.2	30.4	31.4	31.4	31.5	30.5	30.6	30.9	27.7	23.0	20.8	19.5	20.8	Diurnal Maximum





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

**Ambient Temperature (AT) - C**  
**Fort McKay South - July 2015**





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

**Ambient Temperature (AT) - C**  
**Fort McKay South - July 2015**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	74	9.95	9.95
10 - 20	422	56.72	66.67
> 20	248	33.33	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

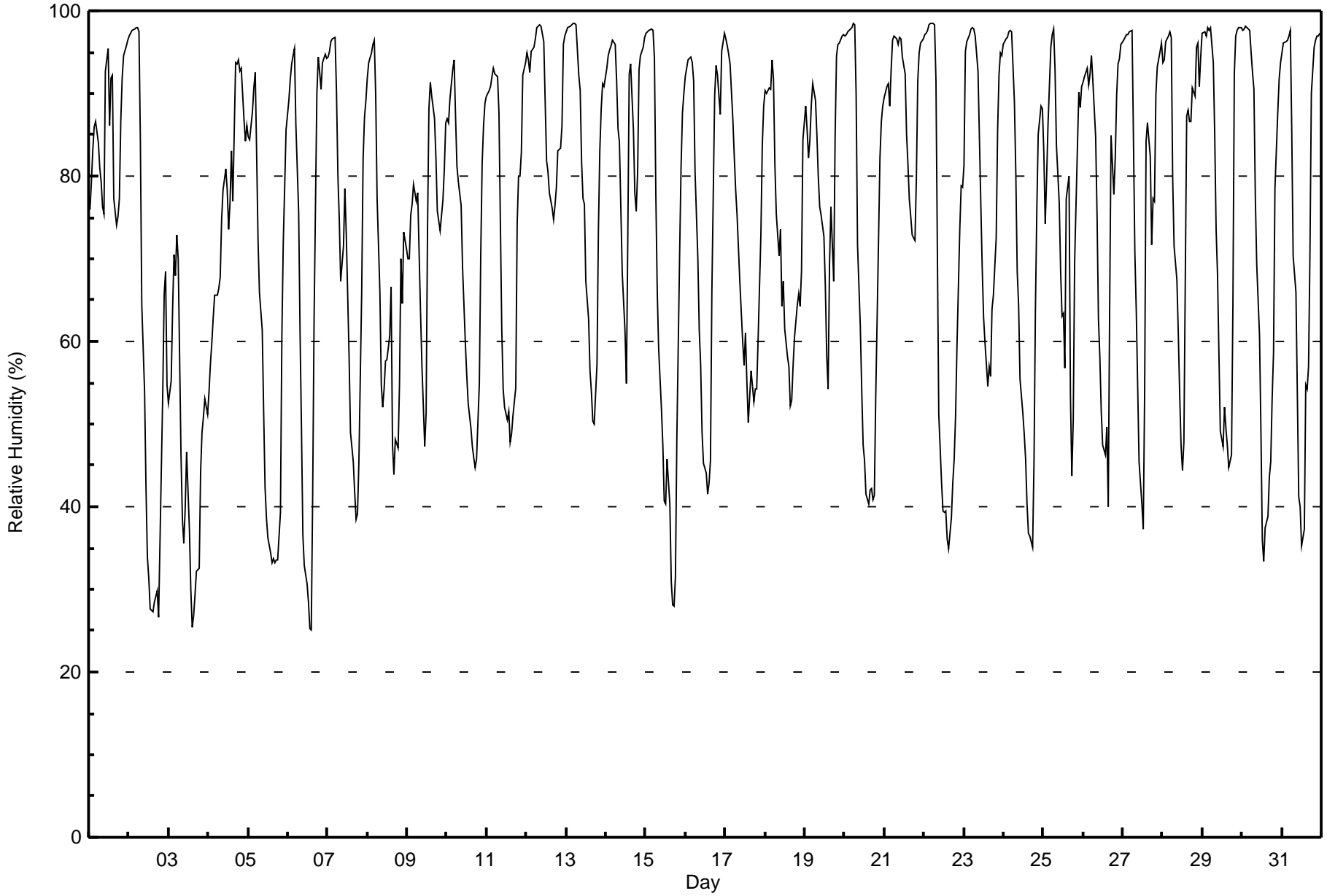


**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Relative Humidity (RH) - %  
Fort McKay South - July 2015**

Maximum Value: 98 % on Jul 13 06:00																	Maximum Daily Average: 89.2 % on Jul 21																	Hours in Service: 744	
Minimum Value: 25 % on Jul 6 15:00																	Minimum Daily Average: 46.7 % on Jul 3																	Hours of Data: 744	
Maximum Diurnal Average: 92.8 % at hour 5																	Minimum Diurnal Average: 53.9 % at hour 14																	Hours of Missing Data: 0	
Monthly Average: 73.9 %																	Percentiles: P <sub>1</sub> = 28 P <sub>10</sub> = 42 Q <sub>1</sub> = 56 Median = 78 Q <sub>3</sub> = 93 P <sub>90</sub> = 97 P <sub>99</sub> = 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-Jul	76	79	83	86	87	84	81	79	76	75	93	95	86	92	92	77	74	75	77	87	92	95	96	96	84.8	96									
2-Jul	97	97	98	98	98	98	98	84	64	54	42	34	31	28	27	28	29	30	27	36	54	66	68	55	60.0	98									
3-Jul	53	55	64	71	68	73	70	46	38	36	40	47	37	30	25	27	29	32	33	44	49	51	53	51	46.7	73									
4-Jul	54	57	60	63	66	66	66	68	75	78	81	78	74	77	83	77	94	94	94	93	93	87	84	86	76.9	94									
5-Jul	85	84	88	91	92	83	72	66	61	52	42	39	36	34	33	34	33	34	34	39	60	72	79	86	59.5	92									
6-Jul	89	92	94	95	95	86	76	61	49	37	33	31	29	25	25	41	63	90	94	93	90	94	95	94	69.6	95									
7-Jul	94	95	96	97	97	90	80	75	67	71	78	73	66	58	49	45	42	38	39	45	66	82	87	89	71.7	97									
8-Jul	92	94	95	96	96	90	77	66	55	52	54	58	58	61	67	47	44	48	47	55	70	65	73	71	67.9	96									
9-Jul	70	70	75	77	79	77	78	71	64	57	47	51	74	88	91	90	87	82	76	75	73	77	81	86	74.8	91									
10-Jul	87	86	89	93	94	87	81	79	76	69	64	60	56	52	50	47	46	45	46	55	71	82	86	89	70.5	94									
11-Jul	90	90	91	92	93	92	92	88	75	62	54	52	51	52	48	49	51	54	74	80	80	83	92	94	74.1	94									
12-Jul	95	94	93	95	96	97	98	98	98	98	96	89	82	80	78	76	75	77	79	83	83	86	96	97	89.1	98									
13-Jul	97	98	98	98	98	98	98	92	90	82	77	77	67	63	57	54	50	50	57	73	83	88	91	91	80.4	98									
14-Jul	93	95	95	96	96	91	86	84	76	68	61	55	73	92	94	86	78	76	81	93	95	96	97	97	85.5	97									
15-Jul	97	98	98	98	98	94	78	66	59	52	48	41	40	46	40	31	28	28	32	48	71	81	88	90	64.5	98									
16-Jul	92	94	94	94	94	91	81	70	61	57	49	45	44	42	43	46	66	90	93	92	90	88	95	97	75.4	97									
17-Jul	97	96	95	94	87	82	78	75	71	67	60	57	61	55	50	56	55	53	54	54	60	73	84	89	70.9	97									
18-Jul	90	90	91	91	94	92	81	75	70	74	64	67	61	58	57	52	53	57	61	64	66	64	69	84	71.9	94									
19-Jul	89	86	82	84	89	91	89	85	80	76	75	73	67	58	54	69	76	67	85	95	96	96	97	97	81.5	97									
20-Jul	97	97	97	98	98	98	98	90	72	62	54	47	46	42	40	42	42	41	41	53	72	82	87	88	70.3	98									
21-Jul	89	91	91	89	93	96	97	97	96	97	97	94	92	85	81	77	75	73	72	80	92	95	96	97	89.2	97									
22-Jul	97	97	98	98	98	98	98	91	71	51	43	39	39	40	36	35	39	43	46	51	60	74	79	79	66.7	98									
23-Jul	81	95	96	97	98	98	98	97	93	85	77	69	63	60	55	57	56	64	66	73	85	92	95	95	80.9	98									
24-Jul	96	97	97	97	98	97	89	80	69	64	55	51	49	46	40	37	36	35	46	64	76	85	89	88	70.0	98									
25-Jul	83	74	80	86	96	97	98	93	84	77	68	63	63	57	77	80	53	44	50	70	84	90	88	91	76.9	98									
26-Jul	91	92	93	91	92	95	91	85	75	63	58	51	47	46	50	40	64	85	78	82	90	94	94	96	76.8	96									
27-Jul	96	97	97	97	98	98	84	71	64	55	45	40	37	54	84	86	82	72	77	77	90	93	95	96	78.6	98									
28-Jul	94	94	96	97	97	97	80	72	67	61	54	47	44	48	87	88	87	87	91	90	96	96	91	94	81.4	97									
29-Jul	97	97	97	98	98	98	94	85	74	68	59	49	47	52	49	47	45	46	64	92	97	98	98	98	77.0	98									
30-Jul	98	98	98	98	98	95	92	91	78	69	61	49	36	33	37	39	44	45	53	59	78	88	92	94	71.7	98									
31-Jul	95	96	96	97	97	98	86	70	66	54	41	40	35	37	55	54	57	71	90	96	97	97	97	97	75.7	98									
	88.7	89.5	90.8	91.9	92.8	91.4	86.2	79.1	71.7	65.5	60.6	57.1	54.0	53.9	56.6	55.6	56.8	58.9	63.0	70.2	79.2	84.1	87.4	88.8	Diurnal Average										
	98	98	98	98	98	98	98	98	98	98	97	95	92	92	92	94	94	94	94	94	96	97	98	98	98	Diurnal Maximum									





Maximum Speed: 15 km/h on Jul 6 18:00	Maximum Daily Speed Average: 7.4 km/h on Jul 17	Hours in Service: 744
Minimum Speed Value: 0 km/h on Jul 21 06:00	Minimum Daily Speed Average: 0.1 km/h on Jul 28	Hours of Data: 744
Maximum Diurnal Speed Average: 2.7 km/h at hour 15	Minimum Diurnal Speed Average: 1.2 km/h at hour 9	Hours of Missing Data: 0
Monthly Average Velocity: 1.7 km/h 265.5 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 2 Median = 4 Q <sub>3</sub> = 6 P <sub>90</sub> = 8 P <sub>99</sub> = 12	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	SW5	WSW3	WSW4	WSW6	WSW5	WSW5	WSW6	SW4	WSW3	W2	WSW2	SW5	N2	NNW2	WSW5	ENE1	NNE1	NNE2	NNE3	W1	SW2	SW2	SW2	SW2	WSW2.3	WSW6
2-Jul	WSW1	SSW2	SSW2	SW3	S2	S3	S2	SE2	S2	SSW5	SSW3	WSW6	WSW7	WSW10	WSW9	WSW9	SW7	SW5	SSW7	SSW5	SSW3	S3	SSW5	SSW6	SW4.2	WSW10
3-Jul	SSW7	SSW6	S5	S5	S5	SSE3	S4	SW9	WSW14	WSW15	W11	NNW11	NNW12	NNW12	NNW13	NNW12	NNW8	NW7	NW6	WNW3	WNW4	WNW4	W5	W6	W5.9	WSW15
4-Jul	W7	W7	WSW7	W7	W8	WSW8	WNW4	WSW4	SW4	SW5	SW5	WSW7	WSW7	WNW1	NW1	NE1	SSW2	SW2	NW3	NW6	NNW9	N13	N12	NNW9	WNW4.0	N13
5-Jul	N10	N7	NNW6	NW4	NW3	ESE1	W2	WSW4	W3	NW5	N8	NNE9	NNE9	NNE8	NNE7	NE7	NE6	NE3	SE4	SE2	SW3	SSW1	N1	SW2	N3.0	N10
6-Jul	WSW1	W1	WSW2	WSW2	SW2	WSW1	S1	S5	SSW6	WSW9	WSW11	SW12	SW12	WSW12	SW11	NNW14	N13	N15	N13	N12	NNW8	NNW5	NNW6	W7	WNW3.7	N15
7-Jul	W5	W5	W6	W6	W3	NW2	NW1	NW2	SSW4	SW6	SW5	SSW6	S7	S7	WSW6	SW6	W6	WSW8	SW7	SSW5	SSW3	SSW4	SSW5	S4	SW4.0	WSW8
8-Jul	S2	SW2	SW3	SW3	WSW3	S3	S3	SSE5	SSE8	SSE8	SSE7	SSE6	SSE5	SSW6	S6	S8	S7	SW4	WNW6	WNW11	W7	WNW4	NW4	NNW7	SSW3.0	WNW11
9-Jul	NNW9	NNW6	NNW6	N6	NNW3	WNW3	W3	N4	NNE6	NNE7	N6	N3	W2	NE1	N4	N5	N5	N6	N11	N9	N7	N6	N6	NNW5	N5.1	N11
10-Jul	NNW6	NNW6	NNW4	NW2	WNW1	N5	NNE7	N5	NNE4	N6	N5	ENE4	N5	NNE4	NNE5	NNW4	NNE5	N7	NNW4	NNW3	NW2	WNW2	WNW2	WSW2	N3.7	N7
11-Jul	W1	WNW1	W2	SW2	WSW1	W1	NW2	NNW2	NNE3	ESE3	SSE9	SSE7	SE9	SE8	SE8	SE7	SE5	ESE4	ENE1	NE3	NE2	NNE1	W1	NNW2	SE2.0	SSE9
12-Jul	NNW2	NNE4	N5	N4	NNW2	N3	SW2	NNE1	NNW4	N5	ENE2	SSE1	NNE3	NNW4	NNE5	ENE6	NE4	NNE4	NNE4	NNE2	NNW3	SW7	WSW6	N2	N2.1	SW7
13-Jul	S2	S3	SSW2	S2	SSW3	S2	SSW2	SSE3	SSE4	S4	SSW5	WSW7	SW9	SW7	SW8	SW7	WSW5	SW3	WSW4	SW2	NW1	NW2	NNW2	W1	SW3.0	SW9
14-Jul	SW2	S2	SSW2	W1	WSW1	SSW2	S2	SSW4	SSW5	S3	N3	ESE3	SE6	N7	N2	S5	SSW2	SE5	SSE5	S5	SSW3	NE1	WSW2	WSW2	S1.6	N7
15-Jul	SW2	W1	WNW1	SW3	SSW4	SSW3	SSW3	SW4	SW5	SSW6	SSW4	SW7	SW10	SSE6	SSE7	SW8	WSW9	SW9	SSW6	WNW3	WSW1	SW2	SSW3	SW1	SW4.0	SW10
16-Jul	SW2	S1	SW2	SW2	SW1	SSW2	N1	W1	NW3	NW5	N7	N10	NNE10	N11	N12	N10	S11	W6	SW5	W8	WNW8	WSW2	SSW4	W3	NW2.5	N12
17-Jul	WNW4	NW3	NW6	NNW6	N8	N10	N11	N11	N12	NNE11	N14	N14	NNE12	N10	N10	N9	N8	N10	N8	N4	SW2	SW2	WSW2	WSW3	N7.4	N14
18-Jul	WSW6	WSW4	SW1	SSW1	SSE2	SSE3	S3	SSE4	SSE4	SW1	SW6	SSW7	SW8	SW8	SW8	WSW7	SW7	WSW6	WSW7	W7	WNW5	NNW7	NW6	W6	WSW3.9	SW8
19-Jul	W6	W7	WNW5	W4	W5	W4	WNW5	W4	WNW6	W7	NW2	WNW7	WNW9	NW10	WNW11	NW7	NW5	N7	NNW5	NNW2	NW1	W2	W4	WNW4	WNW4.9	WNW11
20-Jul	WSW3	S1	S2	SSE1	SSE1	S3	SSE3	S3	SSW3	SSW5	S6	S8	SSE5	S6	S7	SSE6	SE6	ESE7	SE5	SE1	W2	WSW2	NW1	N3	S2.9	S8
21-Jul	NW2	W1	SSW2	S4	WSW1	NW0	NNE1	NE1	NNE3	NE3	NE3	E3	E1	NNE1	NNW4	NNW6	NNE7	NNE5	NE4	N2	W1	SW2	WSW1	SSW2	N1.2	NNE7
22-Jul	SW2	S2	SSW2	SW2	SSW3	SE1	SSE1	NE0	ENE2	NW4	WNW2	WSW3	SSW4	WSW4	SW6	SW6	WNW6	W7	W6	WNW8	W5	WSW5	W5	NNW4	WSW2.8	WNW8
23-Jul	NNW3	WSW1	WSW5	WSW5	W4	WSW3	W4	WNW4	NNW4	NNW5	NW6	WNW3	WNW3	NNW3	W4	WNW4	WNW2	WSW1	SSE1	WSW3	WSW2	WSW3	WSW3	SW2	WNW2.6	NW6
24-Jul	SSW1	WNW1	SW4	SW3	SW2	SSW2	S3	S4	SE3	SE5	SSE6	S7	S6	SSE5	S6	SSW6	SW7	SW7	WSW3	SW2	SW2	SW2	SSW2	SSW1	SSW3.2	SW7
25-Jul	SW4	SSW5	S4	SW6	WSW1	SSE1	SSW3	SSE3	SSW6	SW7	SW8	SW8	SW3	WNW3	WNW6	WSW5	WNW2	NW0	ESE4	SW1	WNW2	W2	NW3	NW3	SW2.6	SW8
26-Jul	NNW3	NNW3	NW4	NNW4	NW2	WSW1	NW4	N1	N2	W4	SE3	S8	WSW6	N8	N3	SSW5	NNW3	S4	SE3	SSW1	SW2	SSW3	WSW2	S3	W1.1	N8
27-Jul	E0	WSW1	S1	SSW3	SSW2	S2	S5	S6	S6	SSW8	SW9	SW10	WSW8	NNE6	W1	WSW2	S2	NW5	SSW2	S3	SW1	SSW1	WSW2	WNW1	SW2.6	SW10
28-Jul	W4	S1	W1	SW2	SW1	WSW0	NNE1	E2	E3	ESE4	SE4	SSW3	SSE3	ENE4	SSW4	SW3	NNW3	NNE4	SW2	W2	NW1	NW2	N7	WNW1	SW0.1	N7
29-Jul	WSW4	W4	S2	SW4	SSW1	SW2	WSW6	WSW5	S2	SE3	SSW4	SSW5	SW7	WSW9	WSW7	WSW8	NNW8	NNE7	NW7	NW2	SSW2	SSW2	SW2	WSW5	WSW2.9	WSW9
30-Jul	SW1	SSW2	SSW2	WSW4	WSW7	WSW8	WSW9	WSW10	WSW7	WSW7	W5	W7	WNW11	NW9	NW8	NNW5	NE5	ENE4	NNE9	ENE3	WSW2	SW2	SSW2	N2	W3.2	WNW11
31-Jul	SW2	SSW2	S2	SW1	SW2	S2	SSE3	SSE3	SE4	SSE4	S3	SE4	S4	SSW7	WSW8	NE2	ESE2	WNW1	NNW2	NW1	WSW2	WNW2	WSW4	WNW3	SSW1.6	WSW8

W2.2	W1.7	WSW1.7	WSW2.1	WSW1.9	WSW1.3	WSW1.4	SW1.5	SW1.2	WSW1.8	WSW1.7	SW2.6	WSW2.6	NNW2.0	W2.7	W2.1	WNW1.3	NW1.6	NW1.9	WNW1.9	WNW2.1	W1.8	W2.1	W2.1	Diurnal Average
N10	N7	WSW7	W7	W8	N10	N11	N11	WSW14	WSW15	N14	N14	SW12	WNW12	WNW13	NNW14	N13	N15	N13	N12	NNW9	N13	N12	NNW9	Diurnal Maximum

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

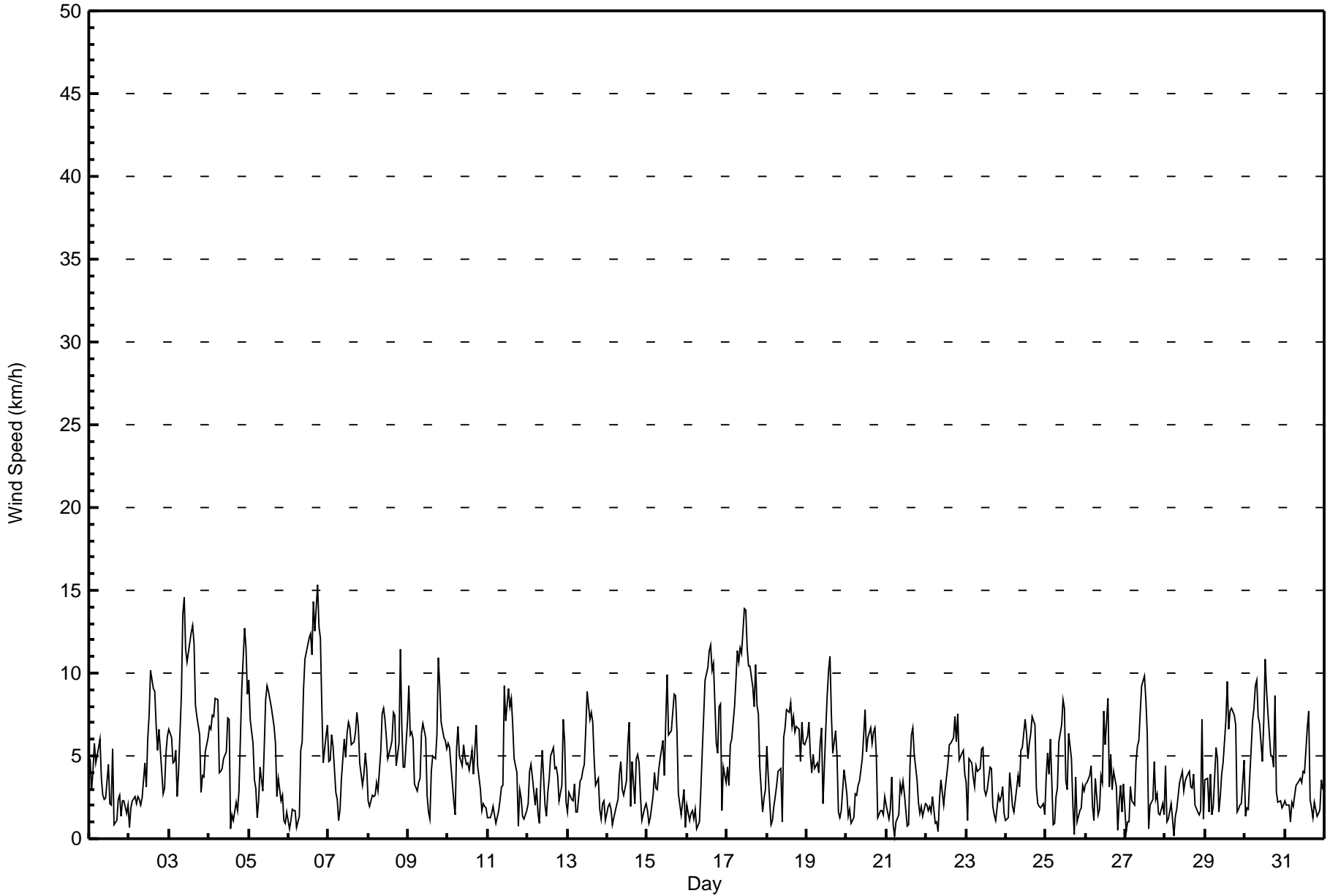


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 6 km/h on Jul 16 17:00 Minimum Value: 0 km/h on Jul 23 22:00 Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 1 Median = 2 Q <sub>3</sub> = 3 P <sub>90</sub> = 3 P <sub>99</sub> = 5																	Hours in Service: 744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



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

**Wind Speed (WS) - km/h**  
**Fort McKay South - July 2015**





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

**Wind Speed (WS) - km/h**  
**Fort McKay South - July 2015**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	502	67.47	67.47
6 - 11	221	29.70	97.18
12 - 19	21	2.82	100.00
20 - 28	0	0.00	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744





**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Fort McKay South - July 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	26	22	14	8	5	7	16	24	48	66	66	60	41	35	34	30	502
6 - 11	31	14	2	1	0	1	6	10	16	14	31	35	21	14	11	14	221
12 - 19	10	1	0	0	0	0	0	0	0	0	2	3	0	4	0	1	21
20 - 28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	67	37	16	9	5	8	22	34	64	80	99	98	62	53	45	45	744

Total Number of Valid Hours: 744

Total Number of Hours: 744





**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Wind Direction (WD) - deg  
Fort McKay South - July 2015**

Direction of Maximum Speed: 5 deg on Jul 6 18:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 360.0 deg on Jul 17	Hours of Data: 744
Direction of Minimum Speed: 326 deg on Jul 21 06:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 0.1 deg on Jul 28	Percent Operational Time: 100.0
Monthly Average Direction: 260.0 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-Jul	225	250	243	246	242	243	244	232	253	277	239	221	358	339	256	71	23	29	14	268	217	224	223	223	248.5
2-Jul	249	195	205	223	185	188	173	144	180	194	213	248	242	244	237	245	214	214	210	203	200	187	199	203	217.1
3-Jul	210	204	186	189	182	165	182	233	244	242	261	287	298	298	302	293	290	304	321	285	296	286	259	260	264.6
4-Jul	266	262	253	262	260	257	286	249	222	219	235	245	255	296	310	50	201	234	307	319	340	354	354	344	284.0
5-Jul	355	351	343	315	305	105	273	255	277	324	4	21	20	22	25	45	48	55	134	144	235	212	351	218	3.4
6-Jul	239	273	248	242	230	253	174	189	201	237	245	226	217	240	235	335	4	5	357	359	343	298	283	278	284.9
7-Jul	278	278	265	262	269	321	308	324	201	228	224	201	182	188	249	232	261	252	234	203	205	211	211	191	232.9
8-Jul	184	232	226	234	238	184	172	164	161	156	151	160	165	196	170	175	182	224	282	285	274	291	312	327	205.9
9-Jul	346	343	348	356	331	301	269	359	22	27	4	6	281	36	359	357	352	354	4	6	359	349	358	344	354.9
10-Jul	348	348	347	323	292	4	15	2	26	356	7	59	5	30	33	345	15	1	344	329	305	290	290	246	359.0
11-Jul	261	282	264	216	239	278	311	332	20	122	160	151	144	145	145	146	135	111	65	43	41	19	264	301	143.0
12-Jul	335	15	5	350	334	353	232	25	344	355	59	166	17	348	26	68	56	23	24	26	343	230	237	9	2.7
13-Jul	188	190	203	189	199	187	193	151	151	173	195	237	220	224	226	218	247	236	253	233	324	307	336	273	217.0
14-Jul	220	191	213	266	248	193	189	207	211	185	9	122	143	350	2	180	194	124	157	176	193	40	246	246	182.9
15-Jul	223	261	287	215	204	208	210	229	230	195	203	235	216	161	167	222	241	231	210	292	248	231	194	230	216.6
16-Jul	219	189	215	215	220	194	4	279	309	324	1	6	15	3	353	354	191	268	229	280	282	238	197	266	314.9
17-Jul	296	325	317	344	4	7	8	6	6	17	4	2	17	11	350	354	9	11	4	5	351	234	234	241	360.0
18-Jul	252	256	229	207	162	167	183	168	165	223	219	213	221	227	218	239	235	251	257	261	290	330	326	274	238.7
19-Jul	271	277	282	276	273	278	291	276	283	276	310	295	295	308	296	304	310	350	344	338	308	259	277	287	294.0
20-Jul	255	186	171	156	151	178	168	184	203	201	189	183	165	188	177	149	131	119	141	142	263	255	326	354	172.8
21-Jul	313	281	207	190	240	326	15	35	20	51	35	82	100	24	336	342	18	32	44	5	266	223	242	201	8.4
22-Jul	225	190	200	235	208	140	158	38	64	313	287	244	194	242	228	234	282	275	276	289	272	252	262	339	258.4
23-Jul	327	252	248	252	273	253	261	295	330	334	324	302	293	348	275	301	295	253	149	253	254	237	240	229	283.4
24-Jul	194	297	216	228	222	213	182	188	136	140	165	176	175	151	172	208	228	226	245	236	226	234	206	207	195.1
25-Jul	219	208	179	231	240	165	192	166	193	217	219	216	236	290	296	251	291	325	122	223	293	266	326	321	228.6
26-Jul	336	333	326	342	317	241	324	358	353	270	142	191	256	356	351	194	331	186	136	208	236	200	241	178	276.5
27-Jul	92	237	176	200	198	189	182	188	175	207	230	225	243	16	262	249	187	306	207	188	216	208	240	294	217.7
28-Jul	271	177	260	231	233	240	32	81	87	109	145	205	154	59	196	219	334	28	215	276	326	318	359	299	222.5
29-Jul	254	268	171	226	194	223	239	251	181	142	210	210	232	239	255	257	333	26	309	323	205	192	234	249	250.2
30-Jul	227	198	202	242	246	243	254	252	248	246	276	276	289	315	318	346	34	60	26	59	251	214	194	354	278.2
31-Jul	226	213	182	219	223	182	159	155	133	156	191	135	173	212	244	39	105	285	331	318	252	282	238	300	202.7

275.2 270.1 258.4 253.4 247.7 243.2 245.1 232.6 226.4 237.7 239.9 230.1 239.2 286.4 270.8 276.1 291.0 323.8 310.6 302.3 291.1 273.9 275.5 280.3  
Diurnal Average

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

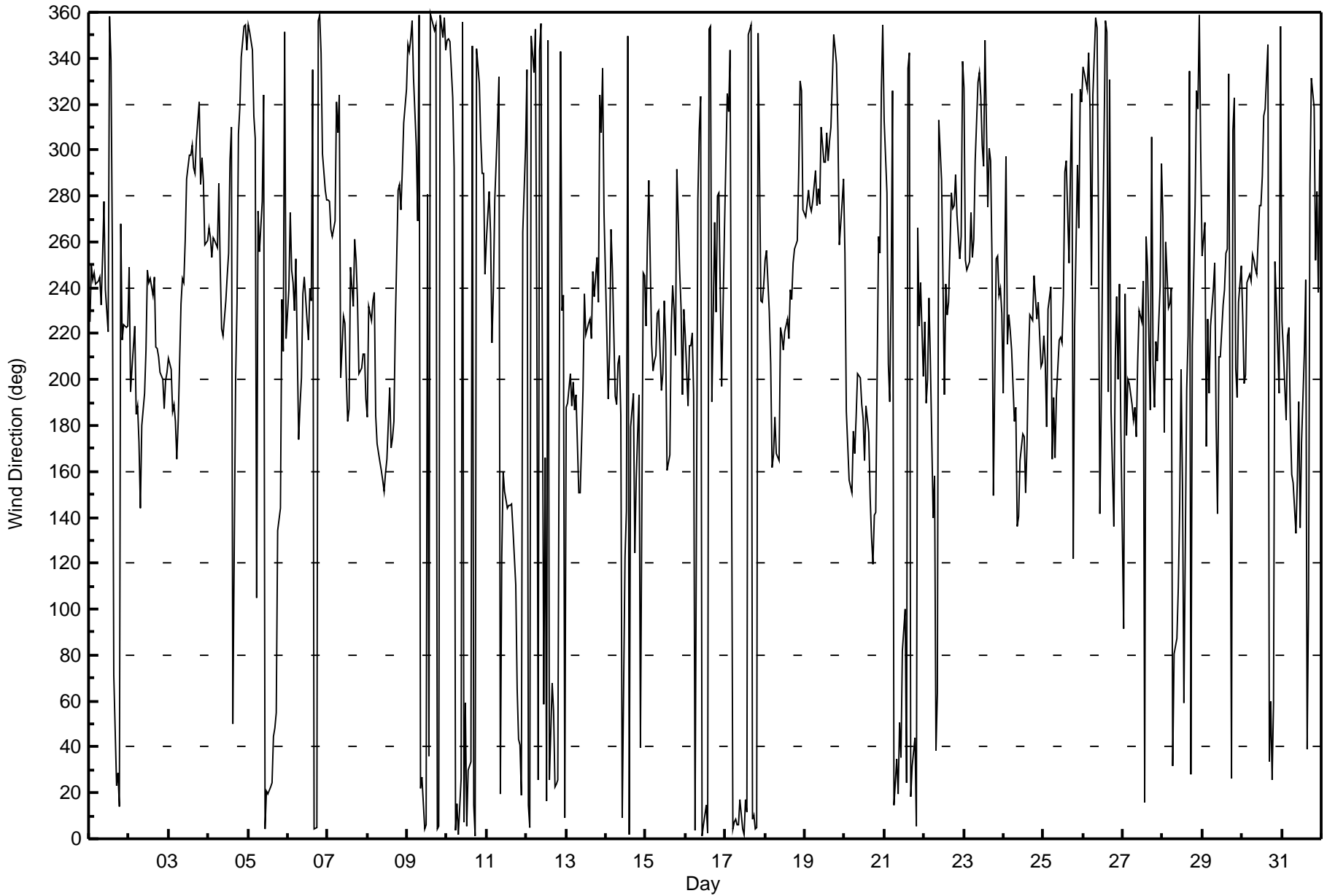


Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg  
Fort McKay South - July 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 109 deg on Jul 18 03:00 Minimum Value: 9 deg on Jul 23 22:00 Percentiles: P <sub>1</sub> = 13 P <sub>10</sub> = 23 Q <sub>1</sub> = 29 Median = 38 Q <sub>3</sub> = 56 P <sub>90</sub> = 74 P <sub>99</sub> = 100		Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																							
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jul	28	55	57	35	37	44	35	68	82	73	51	29	74	75	31	98	89	70	64	53	23	20	57	55	98
2-Jul	87	34	24	20	31	19	28	43	62	36	71	44	39	37	30	32	28	27	25	15	15	17	12	15	87
3-Jul	17	17	14	16	15	35	24	36	32	31	42	39	44	40	39	37	38	38	30	20	20	22	19	19	44
4-Jul	21	22	22	26	24	29	52	46	23	29	36	28	37	74	60	91	36	47	29	32	31	27	27	28	91
5-Jul	26	25	22	32	48	72	74	42	73	50	52	40	40	51	52	45	52	74	41	55	16	45	86	35	86
6-Jul	80	55	33	29	24	62	82	35	43	36	38	39	36	39	33	35	31	28	27	29	31	27	26	27	82
7-Jul	45	46	23	23	69	68	100	78	73	27	37	35	29	40	47	44	45	36	37	22	13	9	11	16	100
8-Jul	29	20	22	17	19	32	21	25	28	33	33	27	26	23	23	31	26	36	36	40	33	38	35	25	40
9-Jul	25	30	24	35	39	41	46	53	36	35	42	62	57	81	52	27	32	29	27	27	27	25	28	25	81
10-Jul	26	24	22	23	40	26	25	40	42	46	60	76	70	76	60	70	54	29	32	26	34	34	44	33	76
11-Jul	42	57	44	53	44	57	38	32	50	68	34	39	36	34	34	31	34	55	93	53	50	75	58	52	93
12-Jul	51	29	16	22	61	76	93	97	43	39	82	89	61	63	46	43	58	32	27	48	58	38	42	57	97
13-Jul	72	38	39	42	34	50	51	40	41	54	49	35	30	43	44	41	43	73	29	19	70	37	35	69	73
14-Jul	32	28	23	38	42	36	41	34	37	74	77	47	44	76	92	30	61	33	27	24	27	101	53	41	101
15-Jul	65	71	50	31	36	36	69	53	43	34	80	45	30	35	42	41	34	29	26	29	61	20	15	81	81
16-Jul	34	78	58	51	67	60	97	89	60	43	43	31	30	30	28	26	64	61	65	32	27	86	36	56	97
17-Jul	56	48	32	25	27	24	26	26	28	28	28	31	29	34	36	47	62	28	26	25	23	58	13	29	62
18-Jul	18	50	109	88	36	21	42	34	31	100	37	23	31	27	26	35	25	29	26	26	32	35	34	28	109
19-Jul	30	34	32	29	26	35	42	44	39	34	72	42	38	41	39	44	43	39	75	74	69	41	23	27	75
20-Jul	52	80	57	60	49	27	34	36	55	51	52	40	56	64	50	54	38	33	30	74	26	52	54	35	80
21-Jul	28	28	50	18	60	97	63	68	42	37	30	48	91	95	51	39	35	36	42	42	29	38	54	34	97
22-Jul	25	28	65	33	32	60	58	100	63	71	90	92	83	59	52	49	46	39	37	32	33	16	35	38	100
23-Jul	56	73	22	26	29	31	30	37	38	34	38	65	80	72	52	45	52	55	76	14	10	9	13	56	80
24-Jul	72	64	15	23	26	53	18	35	62	44	54	46	50	58	56	38	32	34	21	17	19	15	30	52	72
25-Jul	48	20	32	42	99	76	34	40	31	31	36	38	77	75	32	31	71	105	25	69	41	37	26	16	105
26-Jul	21	18	22	33	42	61	27	62	76	60	87	39	62	42	72	48	95	30	35	88	40	16	42	20	95
27-Jul	94	81	89	37	29	38	23	30	31	35	34	44	58	36	93	76	40	54	63	39	46	59	29	72	94
28-Jul	66	74	66	30	59	107	48	65	57	58	61	91	85	55	43	88	50	57	68	59	66	70	38	78	107
29-Jul	26	26	46	33	60	34	22	30	68	62	55	62	42	26	35	42	35	31	54	93	69	60	69	19	93
30-Jul	61	36	63	46	20	20	22	21	38	36	64	57	39	47	40	57	50	50	36	40	40	16	70	51	70
31-Jul	41	36	32	38	26	20	22	37	46	60	58	52	74	46	28	69	66	72	44	33	56	45	35	53	74
Diurnal Maximum																									





# Wood Buffalo Environmental Association

## SO2 Calibration Report

### Station Information

Calibration Date	July 15, 2015	Last Calibration	June 9, 2015
Station Name	Fort McKay South	Station Number	AMS 13
Reason:	Routine		
Start Time (MST)	7:55	End Time (MST)	12:23
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	1859	1817
Calculated slope	0.997351	1.000984	Chamber temp	50.0	50.0
Calculated intercept	0.896989	0.410578	Pressure	26.2	26.1
Analyzer Background	24.2	24.2	Flow	688	685
Analyzer Coefficient	1.770	1.770	Intensity	62.8	61.4
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	-0.3	----
as found span	5000	70.3	703.0	699.0	1.006
calibrator zero	5000	0.0	0.0	-0.3	----
high point	5000	70.3	703.0	701.8	1.002
second point	5000	35.1	351.0	350.7	1.001
third point	5000	17.6	176.0	174.9	1.006
as left zero	5000	0.0	0.0	-0.1	----
as left span	5000	70.3	703.0	696.1	1.010
Average Correction Factor					1.003

Corrected As found      699.3      Previous response      704.0      % change      0.7%

**Notes:**

No adjustments or maintenance Done, Filter changed out

Calibration Performed By:

\_\_\_\_\_  
Melissa Lemay



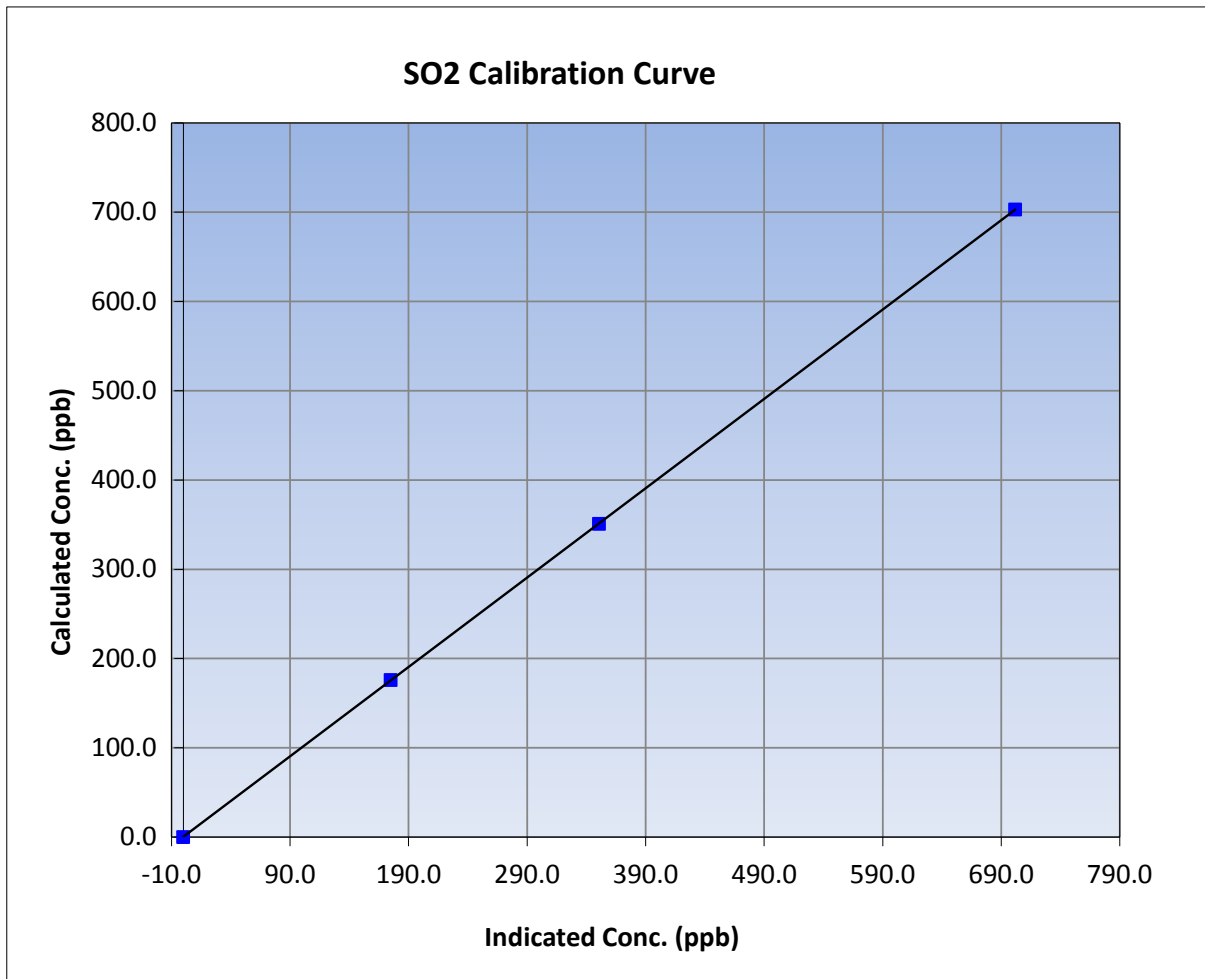
## Wood Buffalo Environmental Association SO2 Calibration Report

### Station Information

Calibration Date	July 15, 2015	Previous Calibration	June 9, 2015
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	7:55	End Time (MST)	12:23
Analyzer make	API T100	Analyzer serial #	599

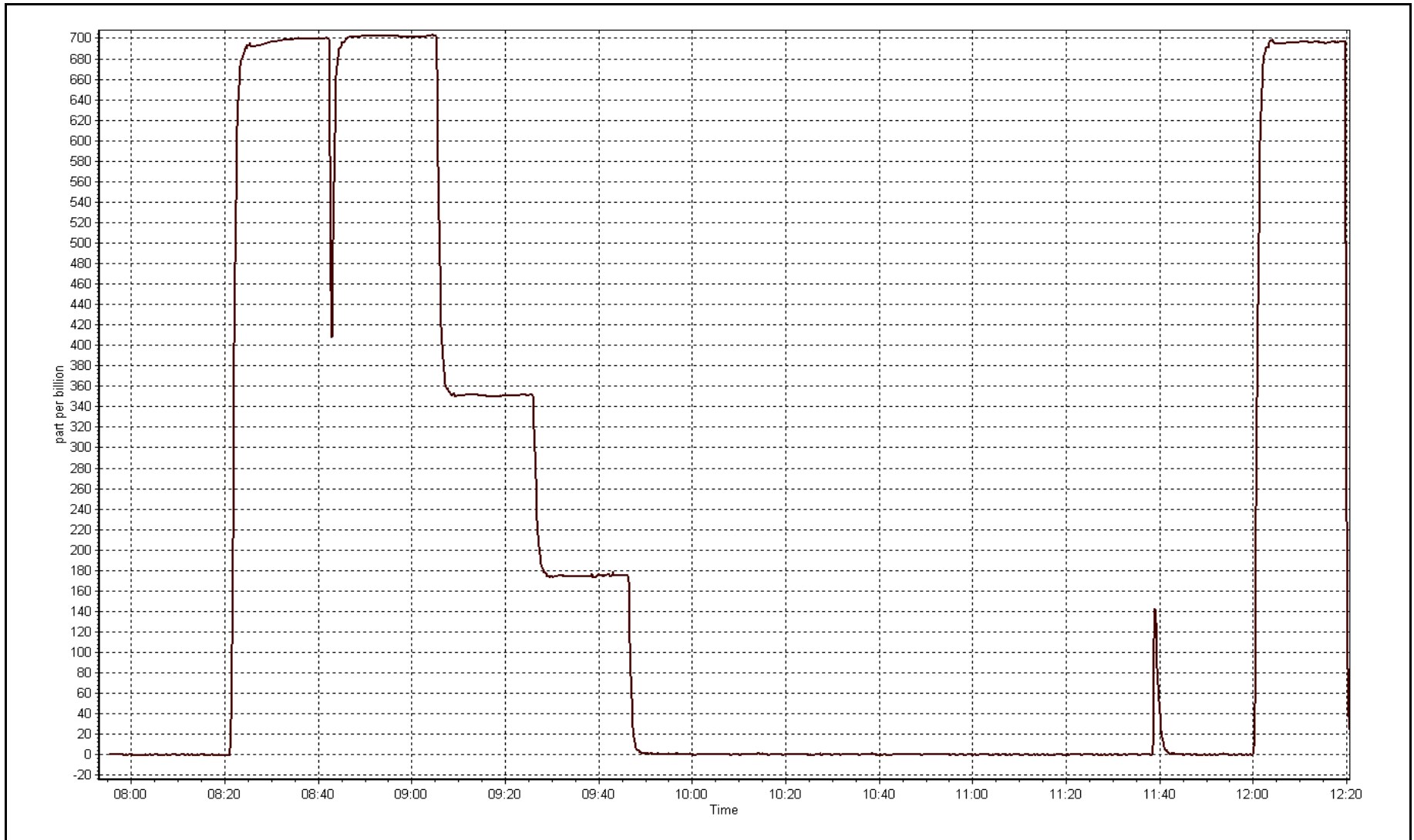
### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.3	----	Correlation Coefficient	0.999998
703.0	701.8	1.0017		
351.0	350.7	1.0009	Slope	1.000984
176.0	174.9	1.0063	Intercept	0.410578



SO2 Calibration Plot

Date: July 15, 2015







# Wood Buffalo Environmental Association TRS Calibration Report

## Station Information

Calibration Date	July 14, 2015	Last Calibration	June 12, 2015
Station Name	Fort McKay South	Station Number	AMS 13
Reason:	Routine		
Start Time (MST)	7:25	End Time (MST)	11:55
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 26/09/2017

## 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	1002	996
Calculated slope	0.990359	0.984571	Chamber temp	45	45
Calculated intercept	0.025796	0.291656	Pressure	682.0	683.5
Analyzer Background	1.81	1.08	Flow	0.438	0.440
Analyzer Coefficient	1.044	2.240	Intensity	89	90
			Converter temp.	800	800

Analyzer make/model	Thermo 43i-TLE	Analyzer serial #	1218153359
Converter make/model	CDN-101	Converter serial #	456

## Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.0	----
as found span	5000	78.9	80.0	70.0	1.143
SO2 scrubber check	5000	17.6	179.9	0.6	----
calibrator zero	5000	0.0	0.0	-0.3	----
high point	5000	78.9	80.0	80.9	0.989
second point	5000	39.4	40.0	40.5	0.986
third point	5000	19.7	20.0	19.8	1.009
as left zero	5000	0.0	0.0	-0.2	----
as left span	5000	78.9	80.0	81.7	0.979
Average Correction Factor					0.995

Corrected As found	70.0	Previous response	80.8	% change	15.4%
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**Notes:**

filter changed out, scrubber checked before the calibrator zero, zero and span adjusted, leak check done, no leak, changed out pump flow and pressure similar to last month during as founds, optic span test was good,

Calibration Performed By: Melissa Lemay



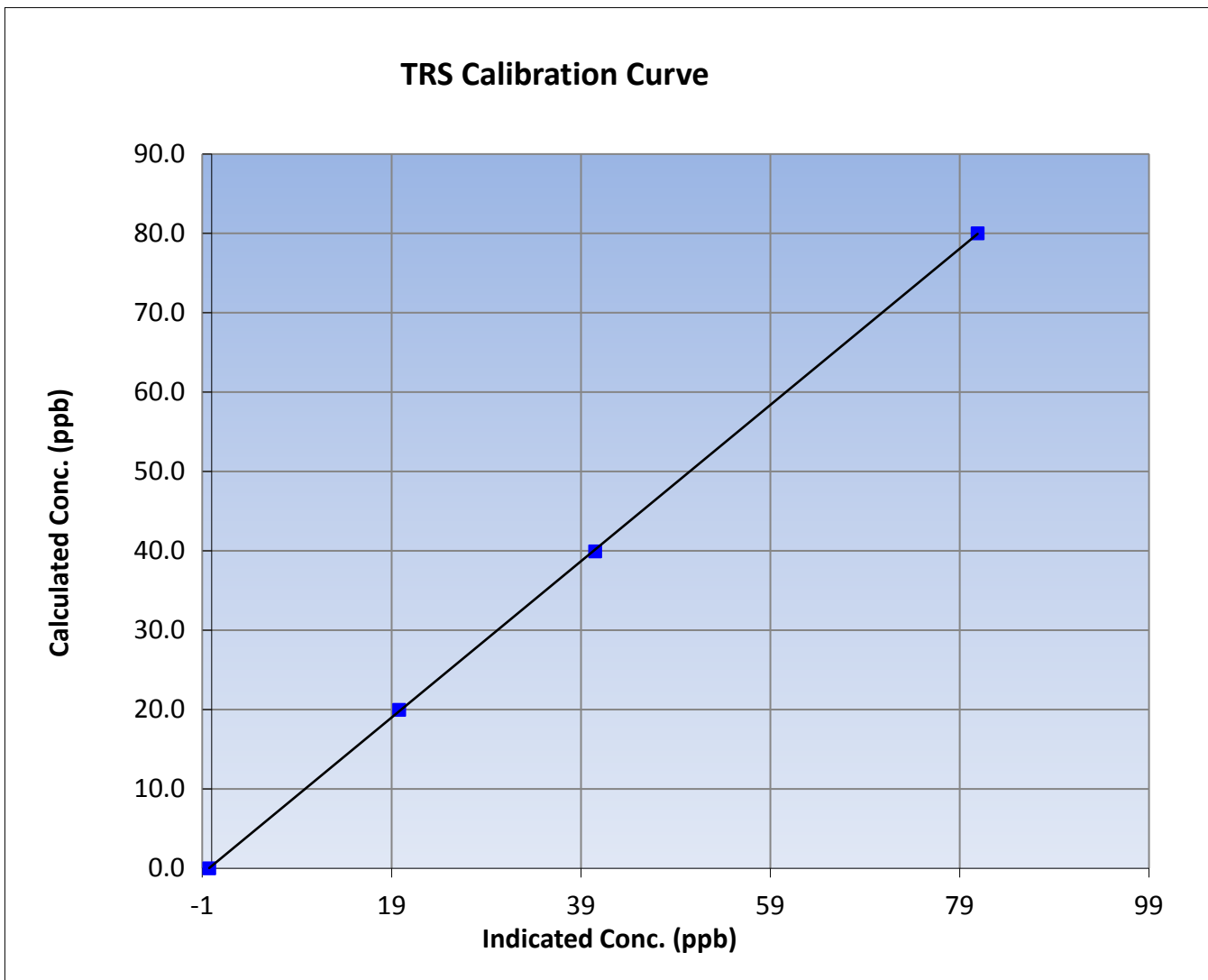
# Wood Buffalo Environmental Association TRS Calibration Report

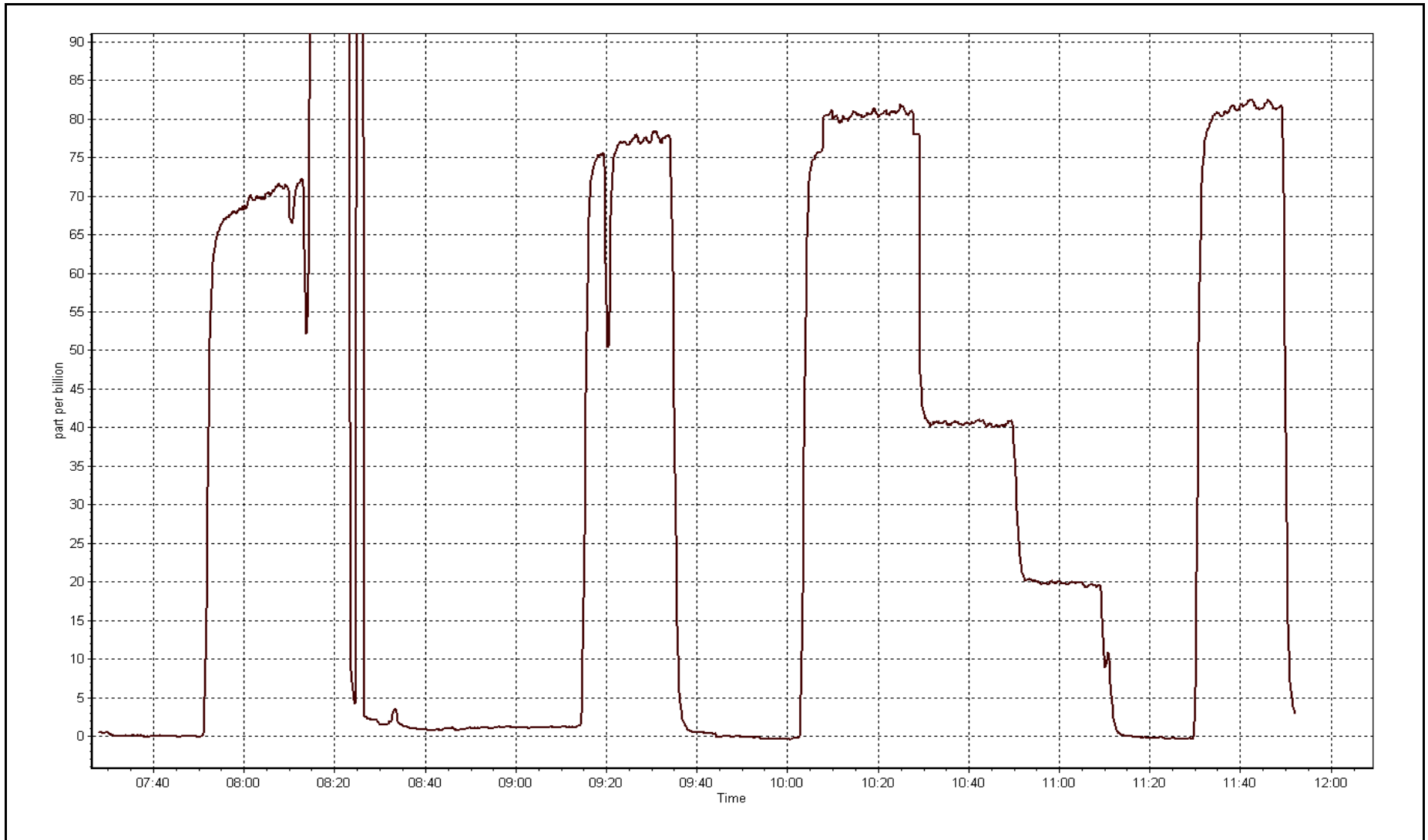
## Station Information

Calibration Date	July 14, 2015	Previous Calibration	June 12, 2015
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	7:25	End Time (MST)	11:55
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1218153359

## Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.3	----	Correlation Coefficient	0.999975
80.0	80.9	0.9889		
40.0	40.5	0.9865	Slope	0.984571
20.0	19.8	1.0089		
			Intercept	0.291656







# Wood Buffalo Environmental Association THC Calibration Report

## Station Information

Calibration Date	July-15-15	Last Calibration	June-16-15
Station Name	Fort McKay South	Station Number	AMS 13
Reason:	Routine		
Start Time (MST)	7:55	End Time (MST)	12:24
Gas Cert Reference	S980455A	Cal Gas Expiry Date	26/09/2017
CH4 Cal Gas Conc.	497 ppm	CH4 Equiv Conc.	1033.3 ppm
C3H8 Cal Gas Conc.	195 ppm	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11041107
ZAG make/model	Teledyne API 701	Serial Number	3410/5613
DACS make/model	Campbell Scientific CR3000	Serial Number	1850

## Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 50 ppm		Sample Pressure	9.2	9.2
Analyzer IP address	192.168.1.51		Air or Bypass Press	23.1	23.1
Calculated slope	1.008246	0.995854	Fuel Pressure	34.2	34.2
Calculated intercept	-0.030356	0.035605	Analyzer Coeff	3.055	2.998
			Analyzer BKG	1.530	1.500

Analyzer make	51i-LT	Analyzer serial #	1505164380
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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	70.3	14.53	14.89	0.976
calibrator zero	5000	0.0	0.00	-0.06	----
high point	5000	70.3	14.53	14.54	0.999
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	14.65	0.992
Average Correction Factor					0.999

Corrected As found	14.95	Previous response	14.44	% change	-3.4%
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**Notes:**

span adjusted, filter changed out, no maintenance done

Calibration Performed By:

Melissa Lemay



## Wood Buffalo Environmental Association THC Calibration Report

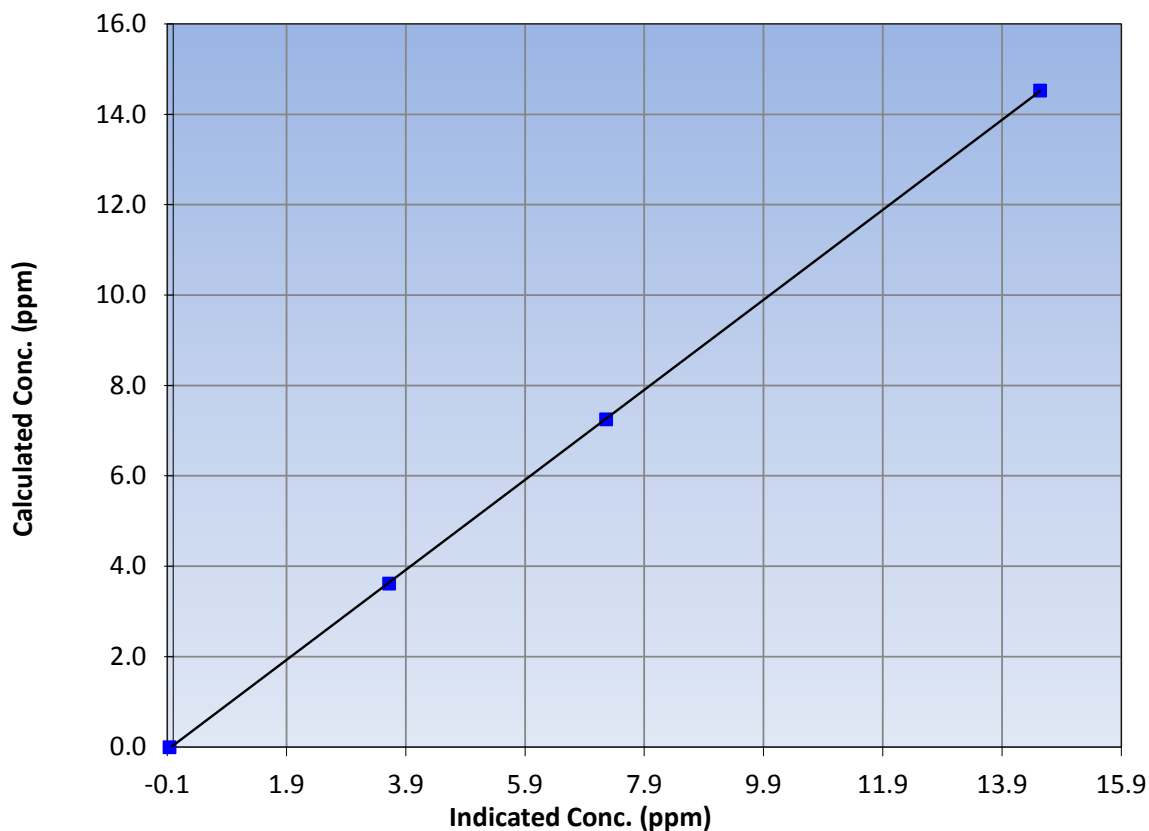
### Station Information

Calibration Date	July 15, 2015	Previous Calibration	June 16, 2015
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	7:55	End Time (MST)	12:24
Analyzer make	51i-LT	Analyzer serial #	1505164380

### Calibration Data

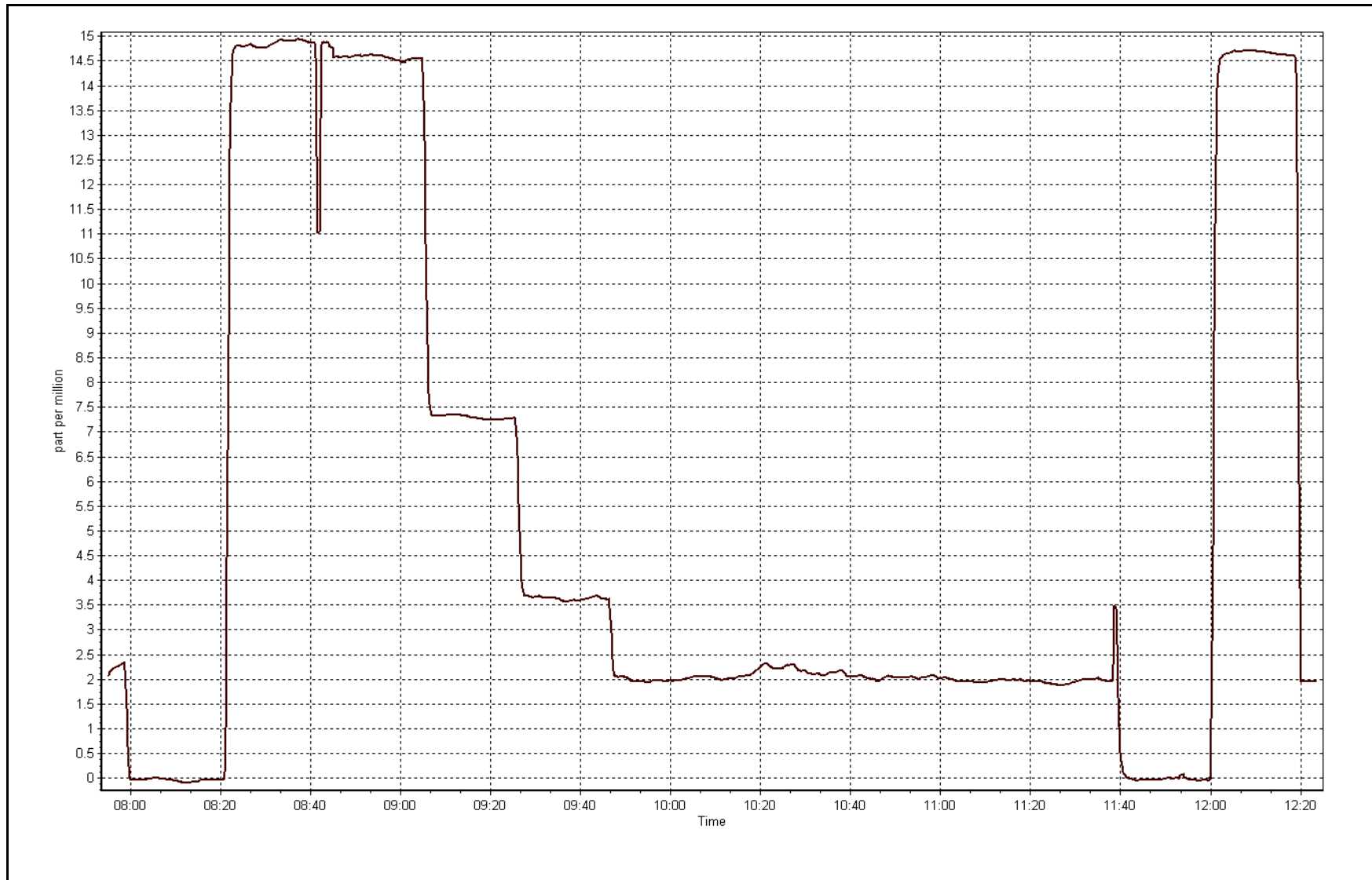
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	-0.06	----	Correlation Coefficient	0.999987
14.53	14.54	0.9991		
7.25	7.26	0.9991	Slope	0.995854
3.62	3.62	0.9990		
			Intercept	0.035605

**THC Calibration Curve**



THC Calibration Plot

Date: July 15, 2015





# Wood Buffalo Environmental Association

## O<sub>3</sub> Calibration Report

### Station Information

Calibration Date	July 20, 2015	Previous Calibration	June 12, 2015
Station Name	Fort McKay South	Station Number	AMS 13
Reason:	Routine		
Start Time (MST)	9:04	End Time (MST)	12:15
NO2 GPT Ref date	July-15-15	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.	25.2	24.2
Analyzer IP address	192.168.1.79		Lamp temp.	58.0	58.0
Calculated slope	1.002426	1.001313	Pressure	26.3	26.6
Calculated intercept	-0.567147	-0.097425	Flow	742	752
Analyzer Background	-0.1	0.2	Intensity	2897.9	2834.0
Analyzer Coefficient	0.935	0.934			

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	0.7	----
as found span	5000	0.90	316.3	323.2	0.979
calibrator zero	5000	0.00	0.0	0.0	----
high point	5000	0.90	316.3	316.0	1.001
second point	5000	0.58	187.1	186.8	1.002
third point	5000	0.36	98.5	98.7	0.998
as left zero	5000	0.00	0.0	0.1	----
as left span	5000	0.89	316.3	328.2	0.964
Average Correction Factor					1.000

Corrected As found	322.5	Previous response	316.1	% change	-2.0%
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**Notes:**

replaced the scrubber past two months the spans have been high, zero and span adjusted, filter changed out

Calibration Performed By:

Melissa Lemay



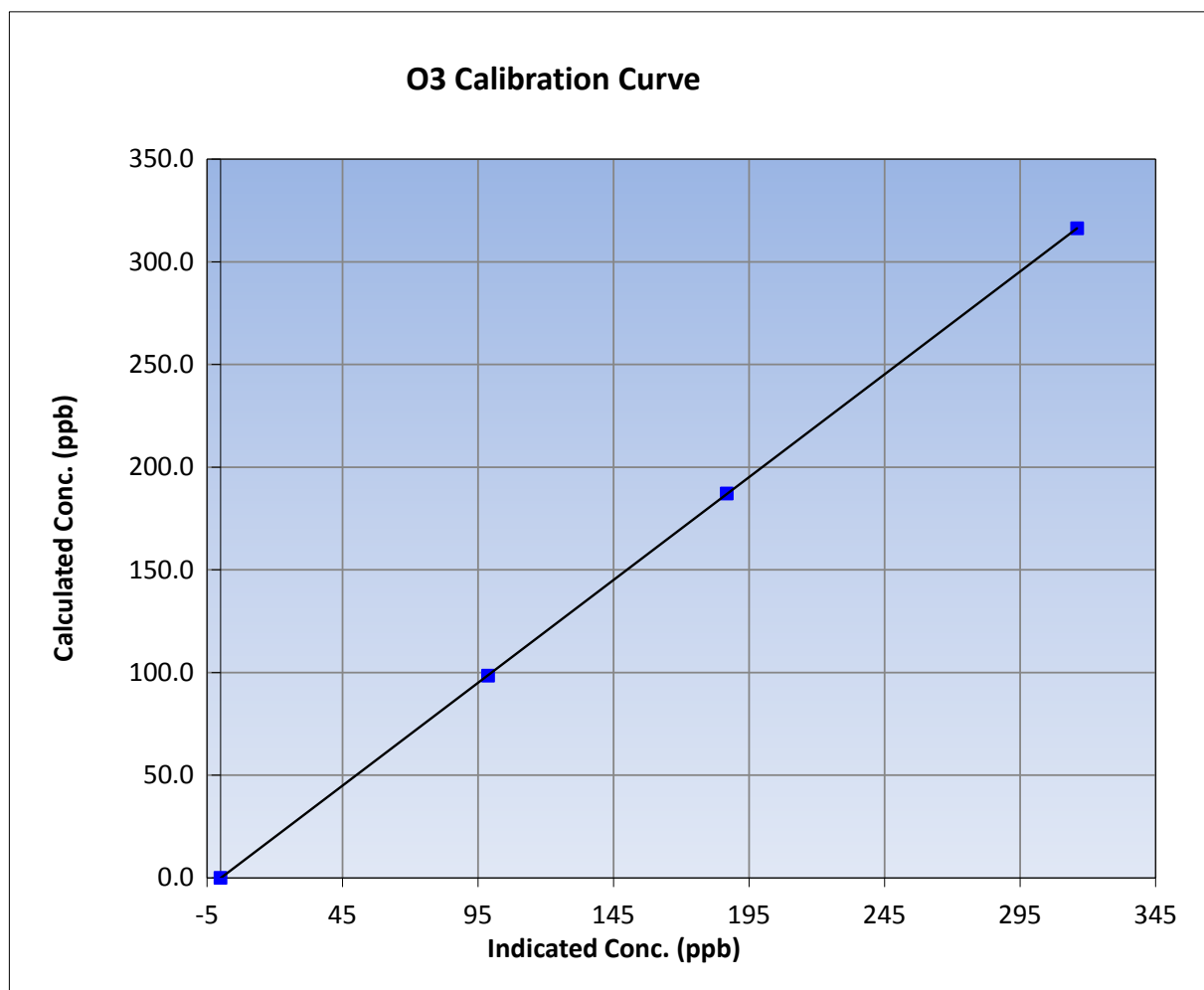
## Wood Buffalo Environmental Association O3 Calibration Report

### Station Information

Calibration Date	July 20, 2015	Previous Calibration	June 12, 2015
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	9:04	End Time (MST)	12:15
Analyzer make	API T400	Analyzer serial #	825

### Calibration Data

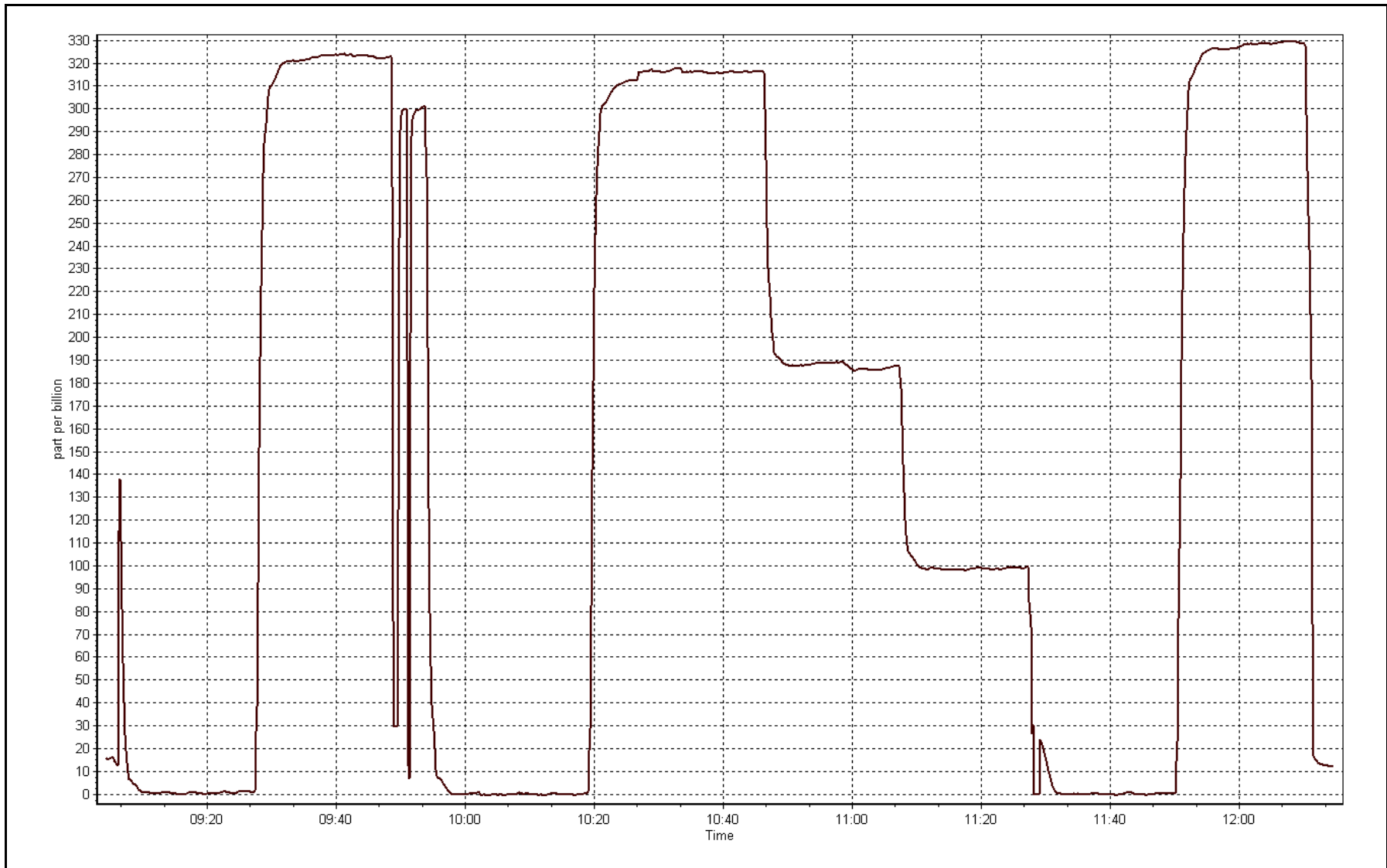
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	0.999998
316.3	316.0	1.0009		
187.1	186.8	1.0016	Slope	1.001313
98.5	98.7	0.9980		
			Intercept	-0.097425





O3 Calibration Plot

Date: July 20, 2015





## Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

### Station Information

Calibration Date	July 15, 2015	Previous Calibration	June 9, 2015
Station Name	Fort McKay South	Station Number	AMS 13
Reason:	Routine		
Start Time (MST)	7:55	End Time (MST)	12:24
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	0.998004	0.998693	0.999529
	Data Offset	0.129613	0.157613	-0.506591
Current Calibration	Data Slope	1.001310	1.002249	0.996890
	Data Offset	0.117337	0.027170	-0.568842

### 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	0.726		0.726	
NOx coefficient	0.998		0.998	
NO2 coefficient	0.999		0.999	
NO bkgrnd	6.4		6.4	
NOx bkgrnd	6.5		6.5	
Chamber Temp	50.6	Deg C	50.4	Deg C
Moly Temp	325	Deg C	324	Deg C
PMT voltage	-846.6	V	-846.6	V
PMT Temp	-3	Deg C	-3.1	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	181.2	mmHg	178.8	mmHg
R Cell Press Nox	180.6	mmHg	179.4	mmHg
NO sample flow	0.888	lpm	0.884	lpm
Nox sample Flow	0.885	lpm	0.885	lpm

**Notes:**

No maintenance or adjustments done, filter changed out,



# Wood Buffalo Environmental Association

## NOX-NO-NO2 Calibration Report

### Station Information

Calibration Date:

July 15, 2015

Station Number:

AMS 13

### Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.3	0.1	----	----
as found span	5000	70.3	800.0	800.0	0.0	796.8	795.7	1.1	1.0040	1.0054
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.3	0.1	----	----
high point	5000	70.3	800.0	800.0	0.0	798.4	797.7	0.7	1.0020	1.0029
second point	5000	35.1	399.4	399.4	0.0	400.0	399.7	0.2	0.9986	0.9993
third point	5000	17.6	200.3	200.3	0.0	199.3	199.4	-0.1	1.0050	1.0045
as left zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.2	0.0	----	----
as left span	5000	70.3	800.0	480.8	319.2	807.7	481.5	326.2	0.9905	0.9985
Average Correction Factor									1.0019	1.0022

Corrected As found  
Previous Response

NO<sub>x</sub>= 797.1  
NO<sub>x</sub>= 801.5

NO= 796.0  
NO= 800.9

Percent Change

NO<sub>x</sub>= 0.6%

NO= 0.6%

### 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)	----	480.8	316.3	798.2	480.8	317.4	0.9884	1.0000	0.9965	100.3%
2nd NO2 (200)	----	610.0	187.1	798.8	610.0	188.8	0.9876	1.0000	0.9910	100.9%
3rd NO2 (100)	----	698.6	98.5	798.4	698.6	99.8	0.9881	1.0000	0.9870	101.3%
4th NO2 (0)	797.1	----	0.5	797.6	797.1	0.5	0.9891	1.0000	N/A	----
Average Correction Factor							0.9883	1.0000	0.9915	100.9%

Calibration Performed By:

Melissa Lemay



# Wood Buffalo Environmental Association

## NO<sub>x</sub> Calibration Summary

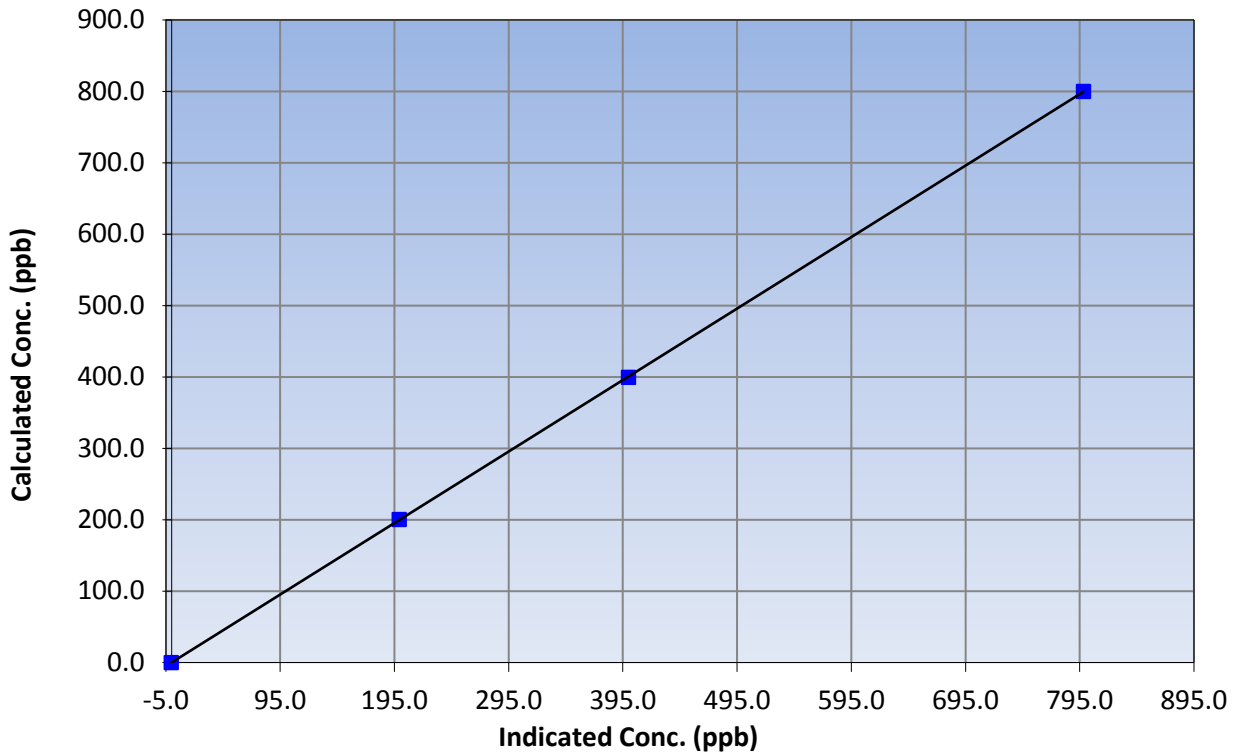
### Station Information

Calibration Date	July 15, 2015	Previous Calibration	June 9, 2015
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	7:55	End Time (MST)	12:24
Analyzer make	42i	Analyzer serial #	1410661329

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.3	----	Correlation Coefficient	0.999994
800.0	798.4	1.0020		
399.4	400.0	0.9986	Slope	1.001310
200.3	199.3	1.0050		
			Intercept	0.117337

### NO<sub>x</sub> Calibration Curve





# Wood Buffalo Environmental Association

## NO Calibration Summary

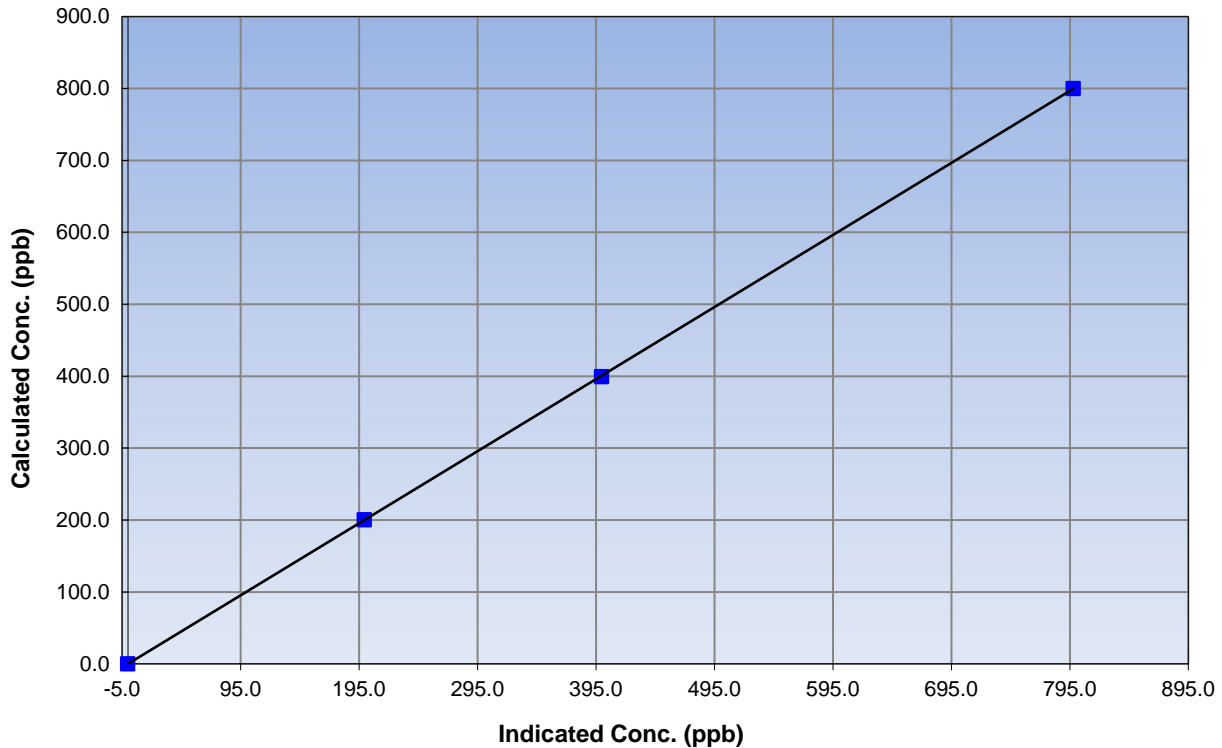
### Station Information

Calibration Date	July 15, 2015	Previous Calibration	June 9, 2015
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	7:55	End Time (MST)	12:24
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	0.999995
800.0	797.7	1.0029		
399.4	399.7	0.9993	Slope	1.002249
200.3	199.4	1.0045		
			Intercept	0.027170

### NO Calibration Curve





# Wood Buffalo Environmental Association

## NO<sub>2</sub> Calibration Summary

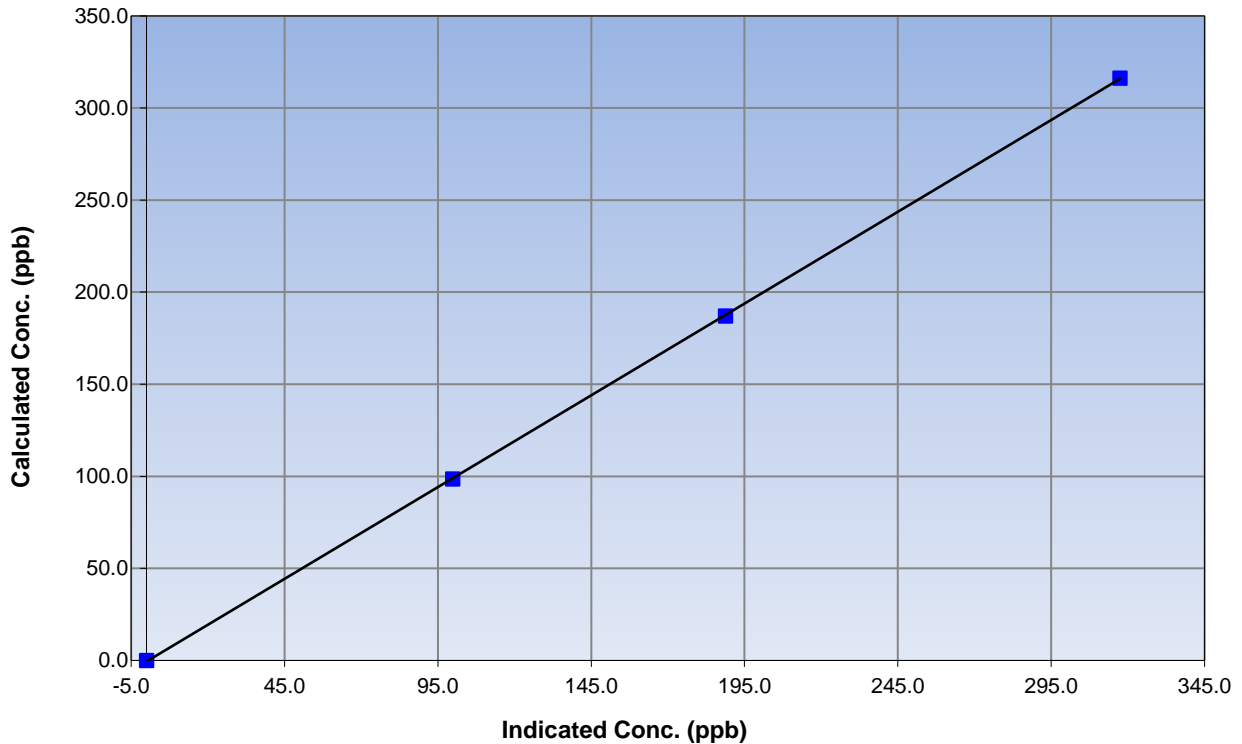
### Station Information

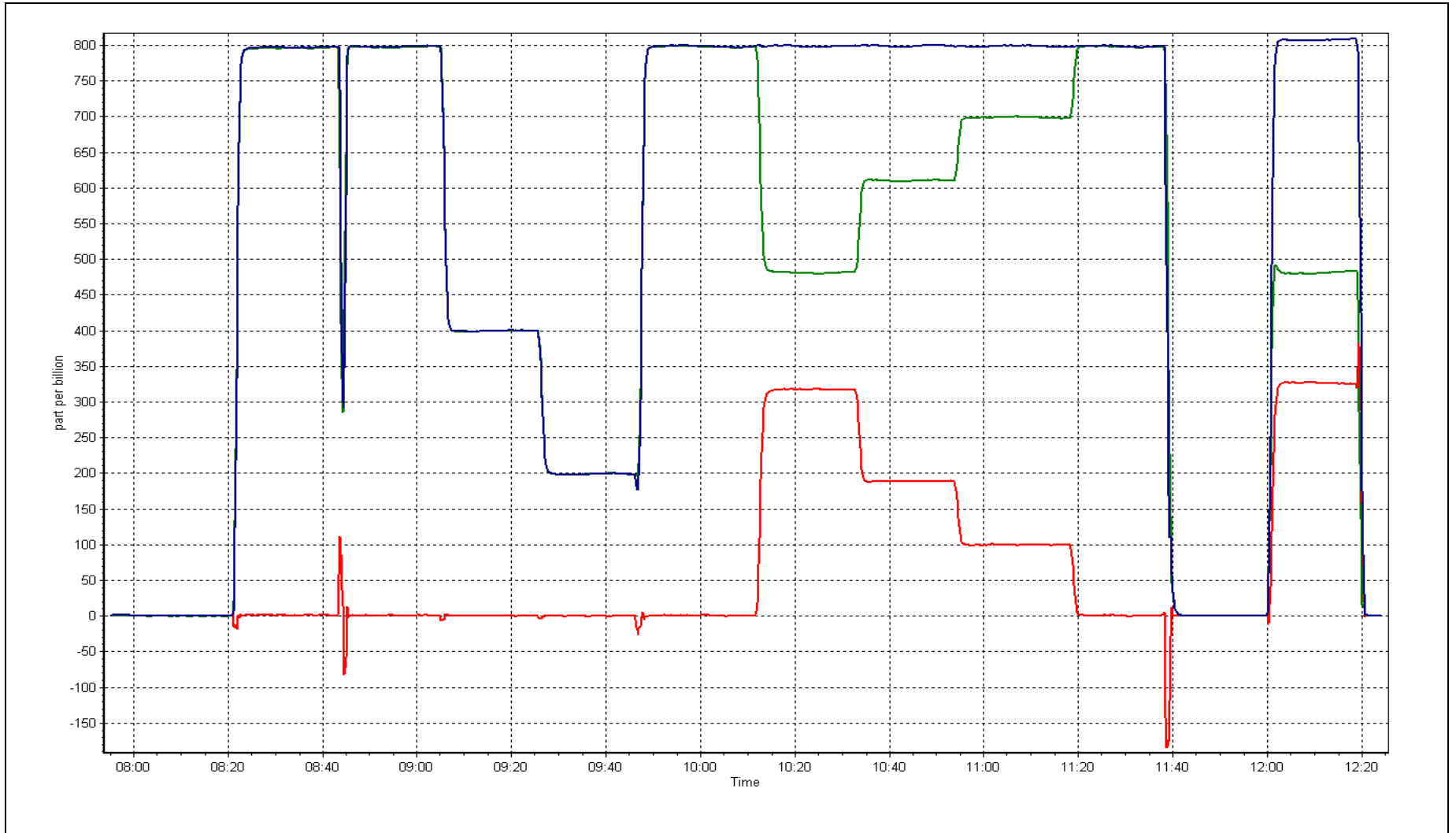
Calibration Date	July 15, 2015	Previous Calibration	June 9, 2015
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	7:55	End Time (MST)	12:24
Analyzer make	42i	Analyzer serial #	1410661329

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	N/A	Correlation Coefficient	0.999983
316.3	317.4	0.9965		
187.1	188.8	0.9910	Slope	0.996890
98.5	99.8	0.9870		
			Intercept	-0.568842

### NO<sub>2</sub> Calibration Curve







Wood Buffalo Environmental Association

SHARP CONFORMANCE TEST

STATION INFORMATION

Calibration Date:	<u>June 16, 2015</u>	Previous Calibration:	<u>June 16, 2015</u>
Station Name:	<u>Fort McKay South</u>	Station Number:	<u>AMS 13</u>
Start Time (MST):	<u>7:30</u>	End Time (MST):	<u>12:21</u>
Calibrator Make/Model:	<u>Delta Cal</u>	Calibrator Serial Number:	<u>1097</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, Foil</u>

AUDIT DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	19.0	20.0	1.0	19.0
T2	30.0	na	na	30.0
T3	27.0	na	na	27.0
T4	49.0	na	na	49.0
RH (%)	54.0	na	na	54.0

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	972	972.5	0.5	972

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	396		403
Neph	30.8		-0.8
C14	97.9	yes	94.6
Indicated Concentration (ug/m3)	27.4		-0.8
Offset 1	405		404
Offset 2	53		52.5

Leak Check (Quarterly)

Leak Check Date: July 14, 2015 Previous Leak Check Date:

Measured

Difference LPM (Limit +/- 0.42 LPM)

Flow without adaptor (LPM):	<u>16.80</u>	
Flow with adaptor [turn off pump first](LPM):	<u>16.70</u>	<u>0.10</u>

Mass Foil Calibration (Annualy)

Foil Calibration Date:	<u>July 14, 2015</u>	Previous Foil Calibration:
Zeroed?:	<u>Yes</u>	
Foil Mass:	<u>1337</u>	<u>Mass foil set S/N:</u>
Previous Correction Factor:	<u>6970</u>	
New Correction Factor:	<u>7080</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 adjusted, sample head cleaned, checked zero on July 15,2015 @ -0.5

Audit Performed By: Melissa Lemay





## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

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

**AMS 14  
ANZAC  
JULY 2015**

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

August 26, 2015



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ANZAC (AMS 14)  
 JULY 2015

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	707	37	37	100.00	8	0	1	0
TRS(ppb) Average	708	35	36	99.87	3	0	1	0
THC(ppm) Average	706	37	38	99.87	3.2	-	2.2	-
NMHC(ppm) Average	706	37	38	99.87	0.354	-	0.242	-
CH4(ppm) Average	706	37	38	99.87	3.2	-	2	-
NO2(ppb) Average	707	37	37	100.00	17	0	3	-
NO(ppb) Average	707	37	37	100.00	13	-	1	-
NOX(ppb) Average	707	37	37	100.00	22	-	3	-
O3(ppb) Average	707	35	37	99.73	65	0	43	-
PM2.5(ug/m3) Average	724	0	20	97.31	337	-	145.2	5
AT 2m(C) Average	744	0	0	100.00	29.9	-	22.9	-
RH(%) Average	744	0	0	100.00	99	-	83	-
LW(% of range) Average	744	0	0	100.00	69	-	19	-
WS(km/h) Average	743	0	1	99.87	18	-	10	-
WD(deg) Average	743	0	1	99.87	-	-	-	-
PC(mm) Total	744	0	0	100.00	29.2	-	47	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ANZAC (AMS 14)  
 JULY 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	707	0.3	1	-	0	0	0	0	0	1	8
TRS(ppb) Average	708	0.3	0	-	0	0	0	0	0	1	3
THC(ppm) Average	706	1.94	0.2	-	1.8	1.8	1.9	1.9	2	2.1	3.2
NMHC (ppm) Average	706	0.059	0.068	-	0	0	0	0	0.1	0.1	0.354
CH4(ppm) Average	706	1.88	0.1	-	1.8	1.8	1.8	1.8	1.9	1.9	3.2
NO2(ppb) Average	707	1.2	1	-	0	0	0	1	2	3	17
NO(ppb) Average	707	0.2	1	-	0	0	0	0	0	0	13
NOX(ppb) Average	707	1.4	2	-	0	0	0	1	2	3	22
O3(ppb) Average	707	25.7	10	-	5	13	19	26	32	38	65
PM2.5(ug/m3) Average	724	21.86	46.6	-	0.6	1.8	3.1	6.4	12.4	53.5	337
Temperature 2 m (C) Average	744	17.54	4.9	-	5.5	11.1	14.1	17	21.6	24	29.9
Relative Humidity (%) Average	744	68.3	20	-	27	40	53	69	86	95	99
Surface Wetness (% of range) Average	744	4.8	11	-	0	0	0	0	4	15	69
Wind Speed 20 m (km/h) Average	743	6.9	3	-	0	3	5	7	9	11	18
Wind Direction 20 m (deg) Average	743	-	-	-	-	-	-	-	-	-	-
Precipitation (mm) Total	744	-	-	85.34	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ANZAC (AMS 14)  
JULY 2015

OPERATIONAL NOTES

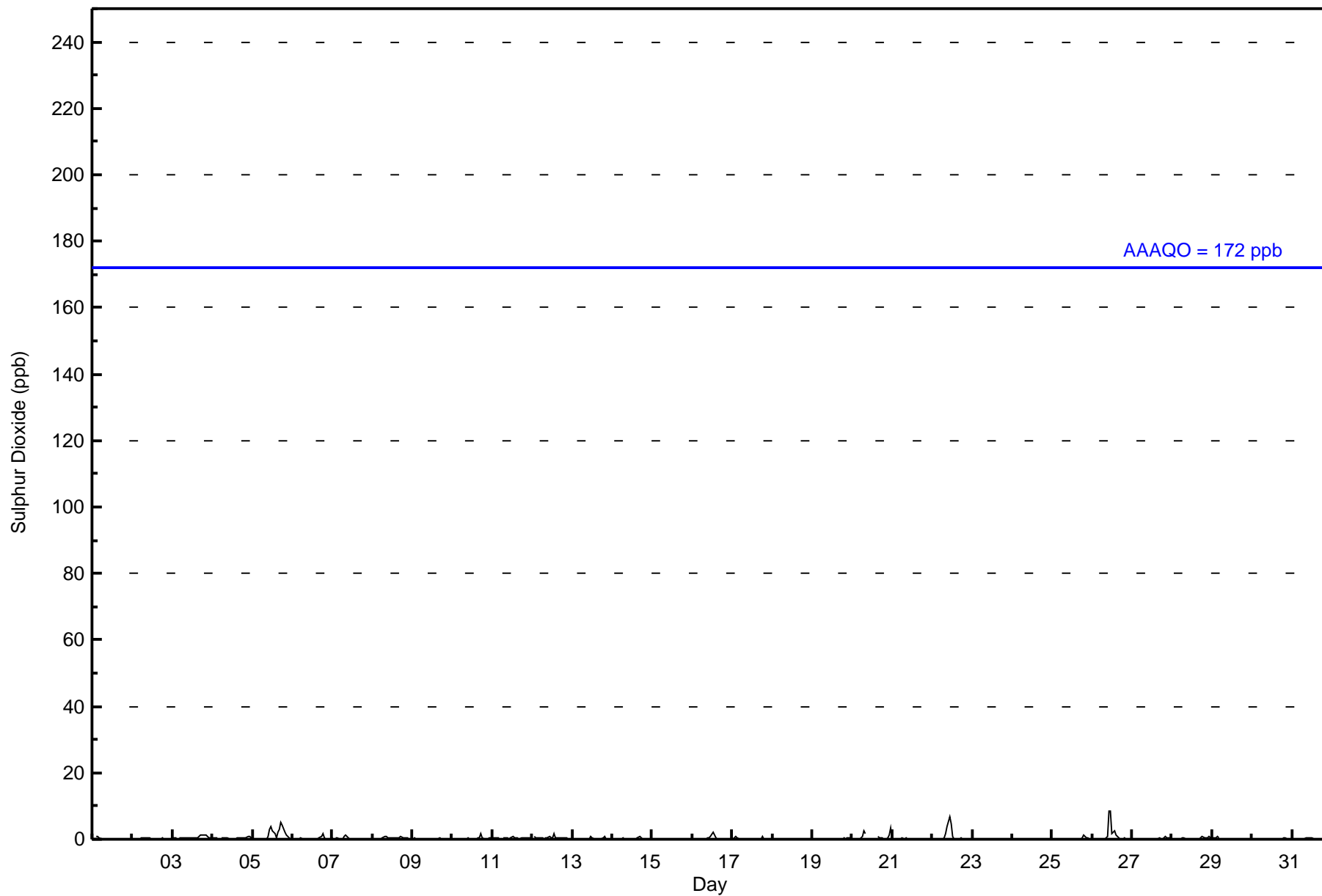
Parameter	Period Start	Period End	Duration (Hours)	Notes
PM2.5	04 Jul 2015 14:00	04 Jul 2015 18:00	5	Tape failed to advance
PM2.5	05 Jul 2015 09:00	05 Jul 2015 09:00	1	Unstable Operation - baseline drift
PM2.5	12 Jul 2015 01:00	12 Jul 2015 12:00	12	Tape failed to advance
PM2.5	21 Jul 2015 14:00	21 Jul 2015 15:00	2	Maintenance - Flow and zero check, sample head cleaning
TRS	20 Jul 2015 11:00	20 Jul 2015 11:00	1	Maintenance - cleaned glass manifold
O3	20 Jul 2015 11:00	20 Jul 2015 12:00	2	Maintenance - cleaned glass manifold
CH4, NMHC, THC	26 Jul 2015 12:00	26 Jul 2015 12:00	1	Station power interruption
Wind Speed, Wind Direction	25 Jul 2015 21:00	25 Jul 2015 21:00	1	Flat line in sensor output signal



Summary of Hour Averages

Anzac - July 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 8 ppb on Jul 26 11:00      Maximum Daily Average: 1.4 ppb on Jul 5																	Hours in Service: 744 Hours of Data: 707 Hours of Missing Data: 37 Hours of Calibration: 37 Percent Operational Time: 100.0									
Minimum Value: 0 ppb on Jul 16 17:00      Minimum Daily Average: 0.1 ppb on Jul 23 Maximum Diurnal Average: 0.8 ppb at hour 11      Minimum Diurnal Average: 0.2 ppb at hour 5 Monthly Average: 0.3 ppb      Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 1 P <sub>99</sub> = 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-Jul	3	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	3
2-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
3-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0.5	1	
4-Jul	0	0	0	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.3	1	
5-Jul	0	0	0	0	0	Z	0	0	0	1	3	4	3	2	0	2	3	5	4	2	1	1	0	1.4	5	
6-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0.3	2	
7-Jul	0	Z	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
8-Jul	0	0	Z	0	0	0	0	1	1	1	0	0	0	0	0	0	1	1	1	0	0	0	0	0.4	1	
9-Jul	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-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	2	1	0	0	0	0	0.3	2	
11-Jul	0	0	0	0	0	Z	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0.4	1	
12-Jul	Z	1	0	0	0	0	0	0	0	0	1	0	1	2	0	1	1	0	0	0	0	0	0	0.5	2	
13-Jul	0	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0.2	1	
14-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.2	1	
15-Jul	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-Jul	0	0	0	0	Z	0	0	0	0	0	1	1	2	1	0	0	0	0	0	0	0	0	0	0.3	2	
17-Jul	0	1	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.2	1	
18-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
19-Jul	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-Jul	0	0	Z	0	0	0	1	2	2	C	C	C	C	C	C	1	0	0	0	0	0	0	1	3	--	3
21-Jul	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-Jul	0	0	0	0	Z	0	0	0	2	4	7	5	1	0	0	0	0	0	0	0	0	0	0	0.8	7	
23-Jul	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-Jul	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-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0.2	1	
26-Jul	0	0	Z	0	0	0	0	0	0	1	8	8	2	2	1	1	0	0	0	0	0	0	0	1.2	8	
27-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.2	1	
28-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0.3	1	
29-Jul	0	0	1	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
30-Jul	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	
31-Jul	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	
																								Diurnal Average	Diurnal Maximum	
																								0.2	0.3	
																								3	8	
Z - zerospan      C - Calibration Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb      24-hr 48 ppb																										





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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Anzac - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	707	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: 707

Total Number of Hours: 744





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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Anzac - July 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	25	13	7	12	9	23	24	28	40	32	42	41	92	165	82	71	706
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	25	13	7	12	9	23	24	28	40	32	42	41	92	165	82	71	706

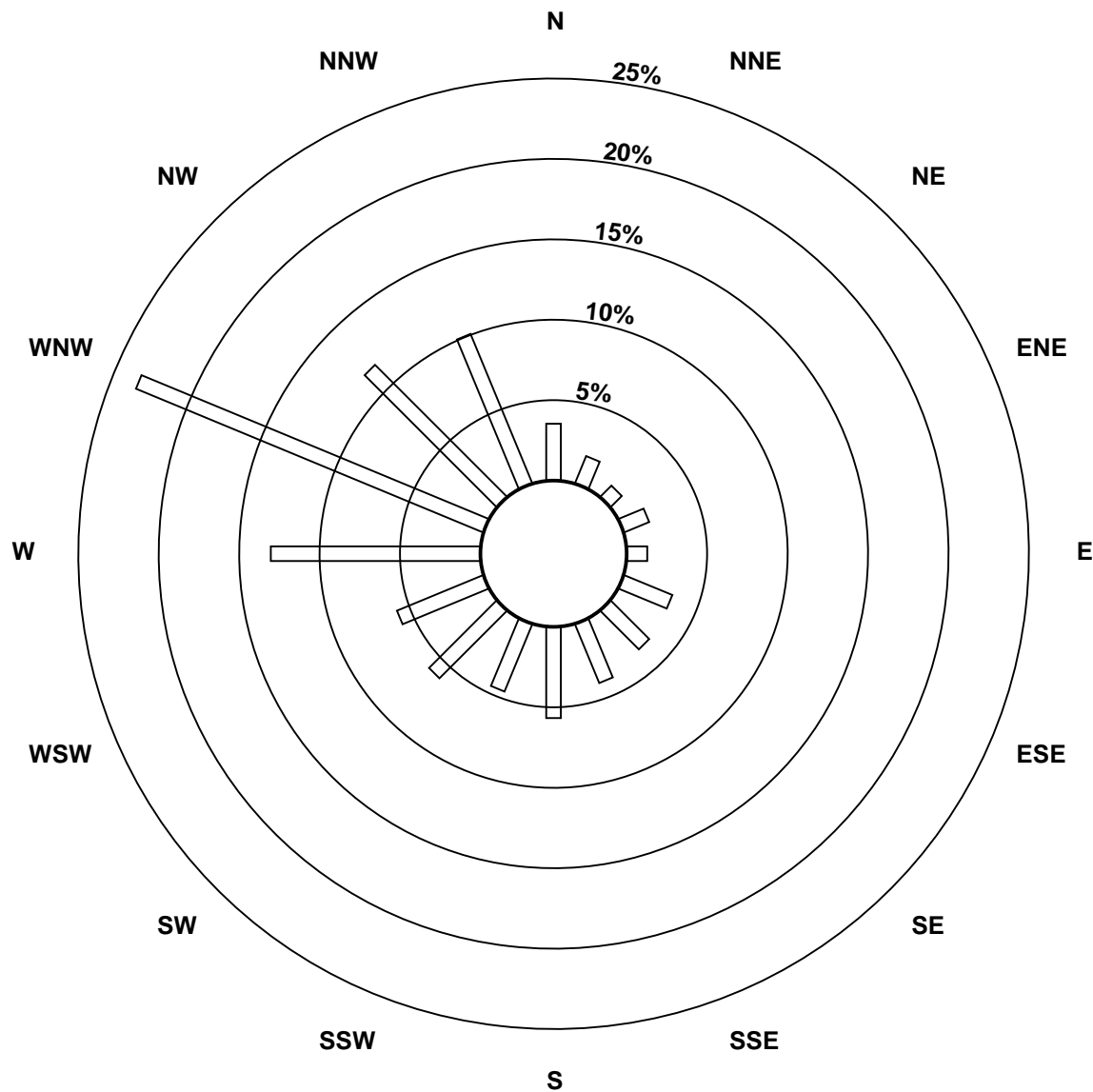
Total Number of Valid Hours: 706

Total Number of Hours: 744

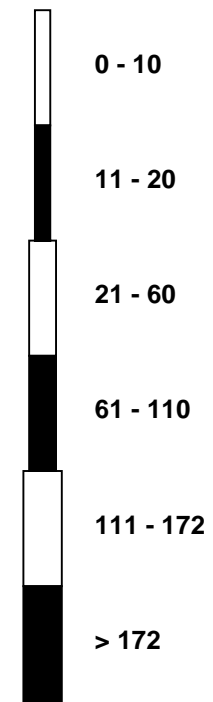


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

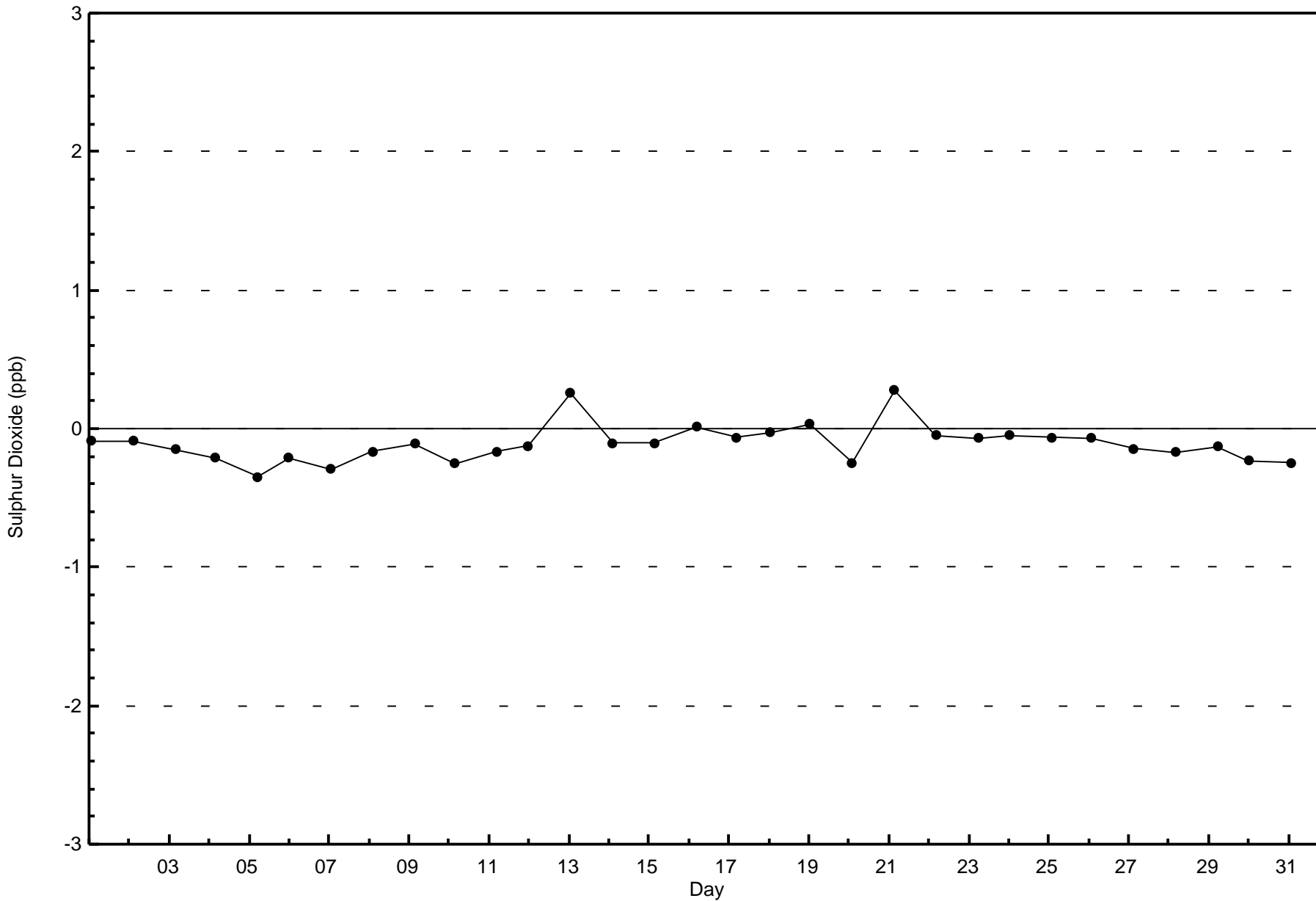
Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Anzac (AMS 14)

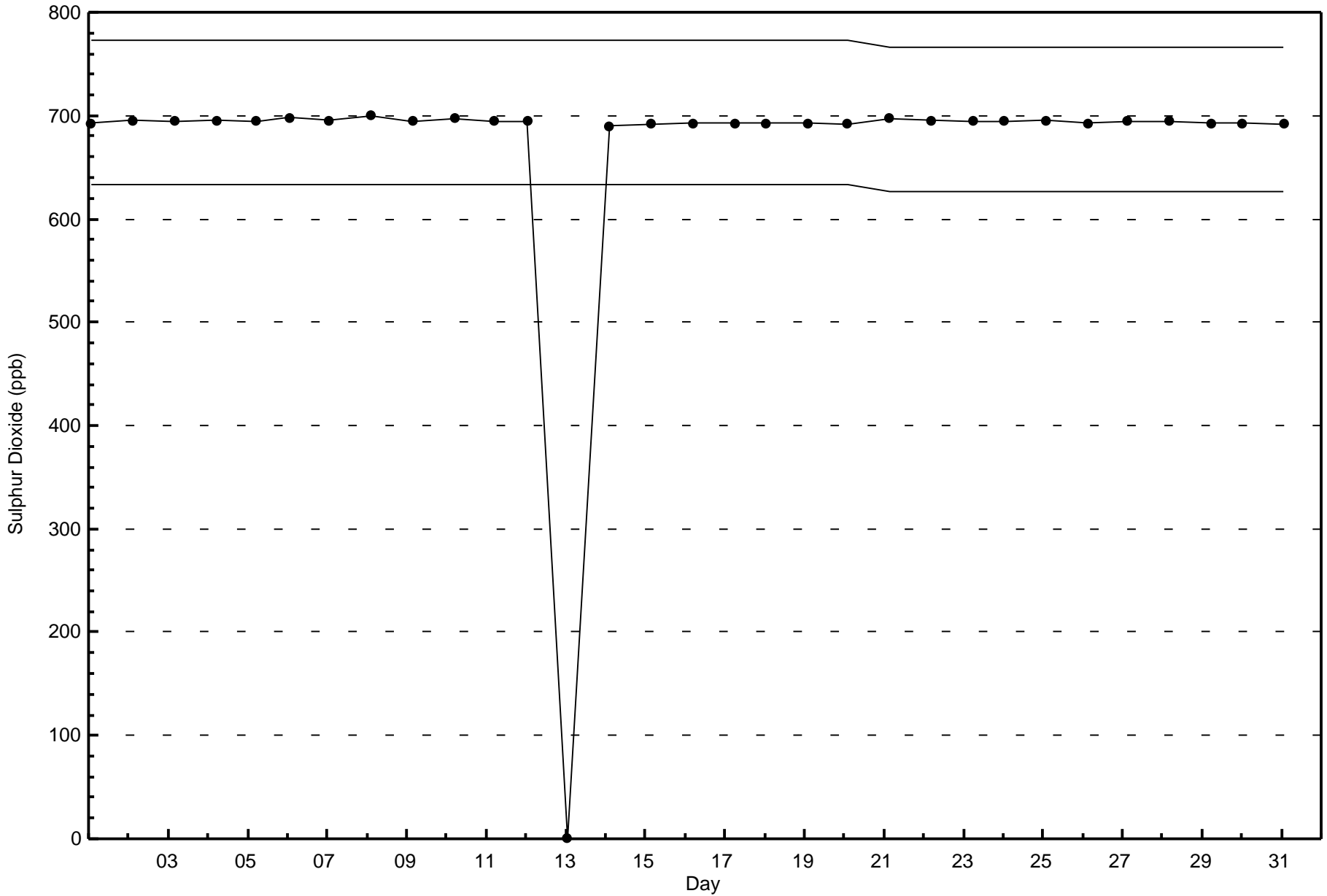


Classes (ppb)



Total Number of Valid Hours: 706







Summary of Hour Averages

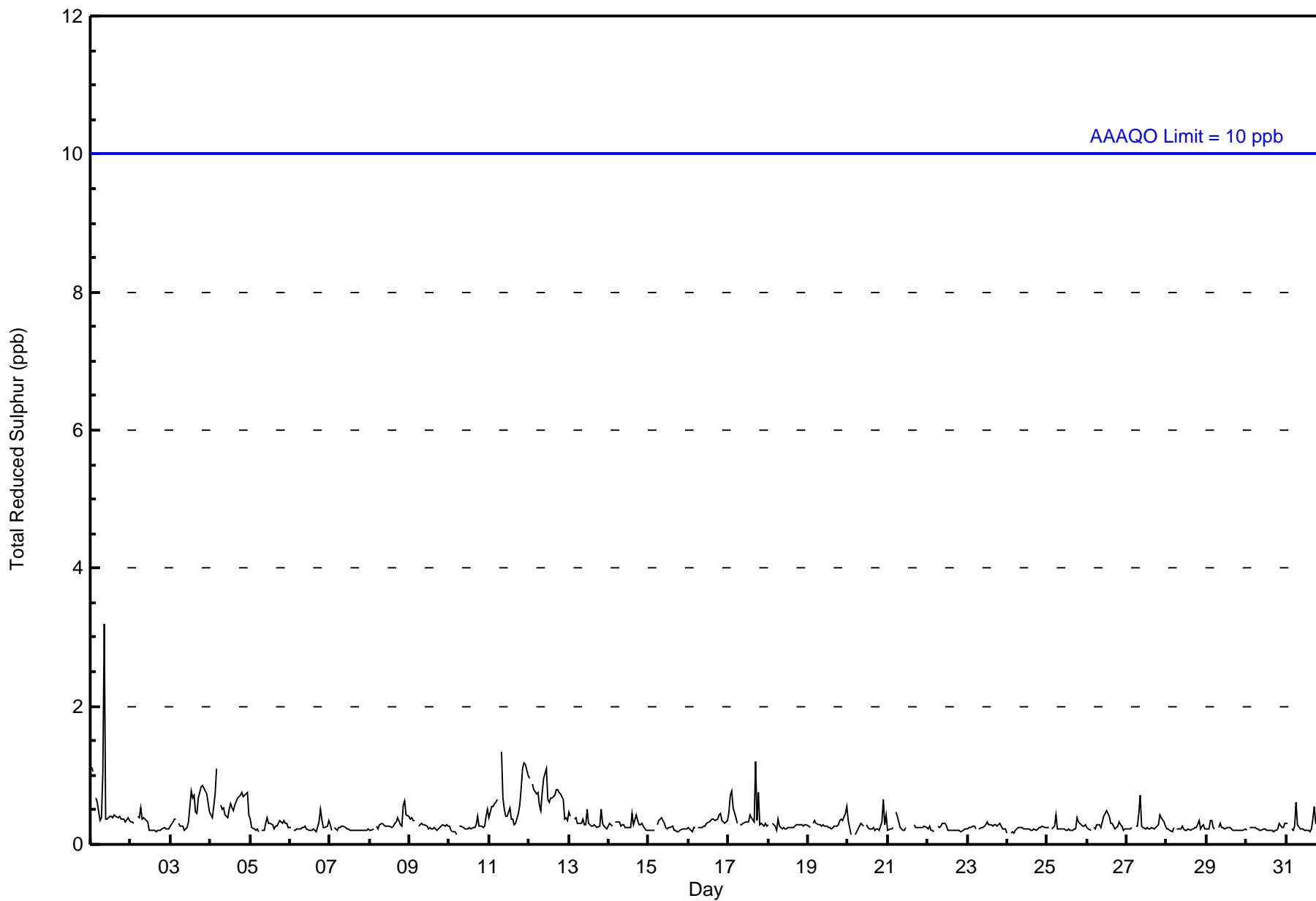
Anzac - July 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0		Hours in Service: 744	
Maximum Value: 3 ppb on Jul 1 09:00		Maximum Daily Average: 0.7 ppb on Jul 12	
Minimum Value: 0 ppb on Jul 20 05:00		Hours of Data: 708	
Maximum Diurnal Average: 0.4 ppb at hour 9		Hours of Missing Data: 36	
Monthly Average: 0.3 ppb		Hours of Calibration: 35	
Minimum Daily Average: 0.2 ppb on Jul 24		Percent Operational Time: 99.9	
Minimum Diurnal Average: 0.3 ppb at hour 16		Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 1 P <sub>99</sub> = 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-Jul	1	1	Z	1	1	0	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	3
2-Jul	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
3-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	1	1	1	0	0	1	1	1	1	1	1	0	0.5	1
4-Jul	0	0	1	1	1	Z	1	1	1	0	0	1	1	1	0	1	1	1	1	1	1	1	1	0	0.6	1
5-Jul	0	0	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
6-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.3	1
7-Jul	0	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-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0.3	1
9-Jul	0	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-Jul	0	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-Jul	0	1	1	1	1	1	Z	1	1	1	0	0	1	0	0	0	0	0	1	1	1	1	1	1	0.6	1
12-Jul	1	Z	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0.7	1
13-Jul	0	0	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0.3	1
14-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
15-Jul	0	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-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
17-Jul	0	1	1	1	0	0	Z	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0.4	1
18-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
19-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.3	1
20-Jul	0	0	0	Z	0	0	0	0	0	0	M	0	0	0	0	0	0	0	0	0	0	1	0	0	0.3	1
21-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0.3	0
22-Jul	0	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-Jul	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
24-Jul	0	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-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
26-Jul	0	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-Jul	0	0	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
28-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
29-Jul	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
30-Jul	0	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
31-Jul	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.3	1
0.3																								Diurnal Average		
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**  
**Anzac - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	707	99.86	99.86
3 - 4	1	0.14	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



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

**Total Reduced Sulphur (TRS) - ppb**  
**Anzac - July 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	25	13	7	13	9	23	24	30	42	31	43	38	96	160	82	70	706
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	25	13	7	13	9	23	24	30	42	31	43	38	96	161	82	70	707

Total Number of Valid Hours: 707

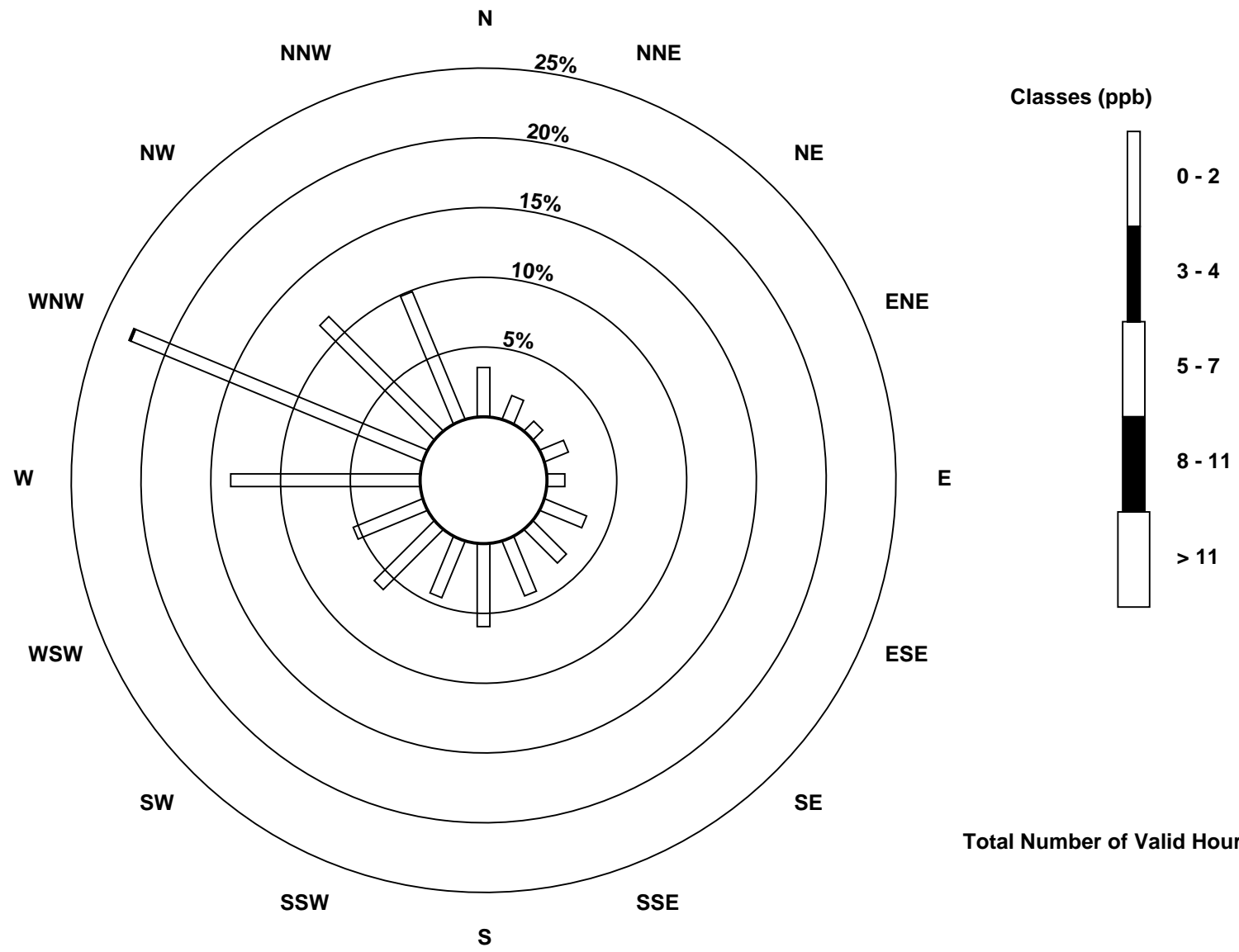
Total Number of Hours: 744



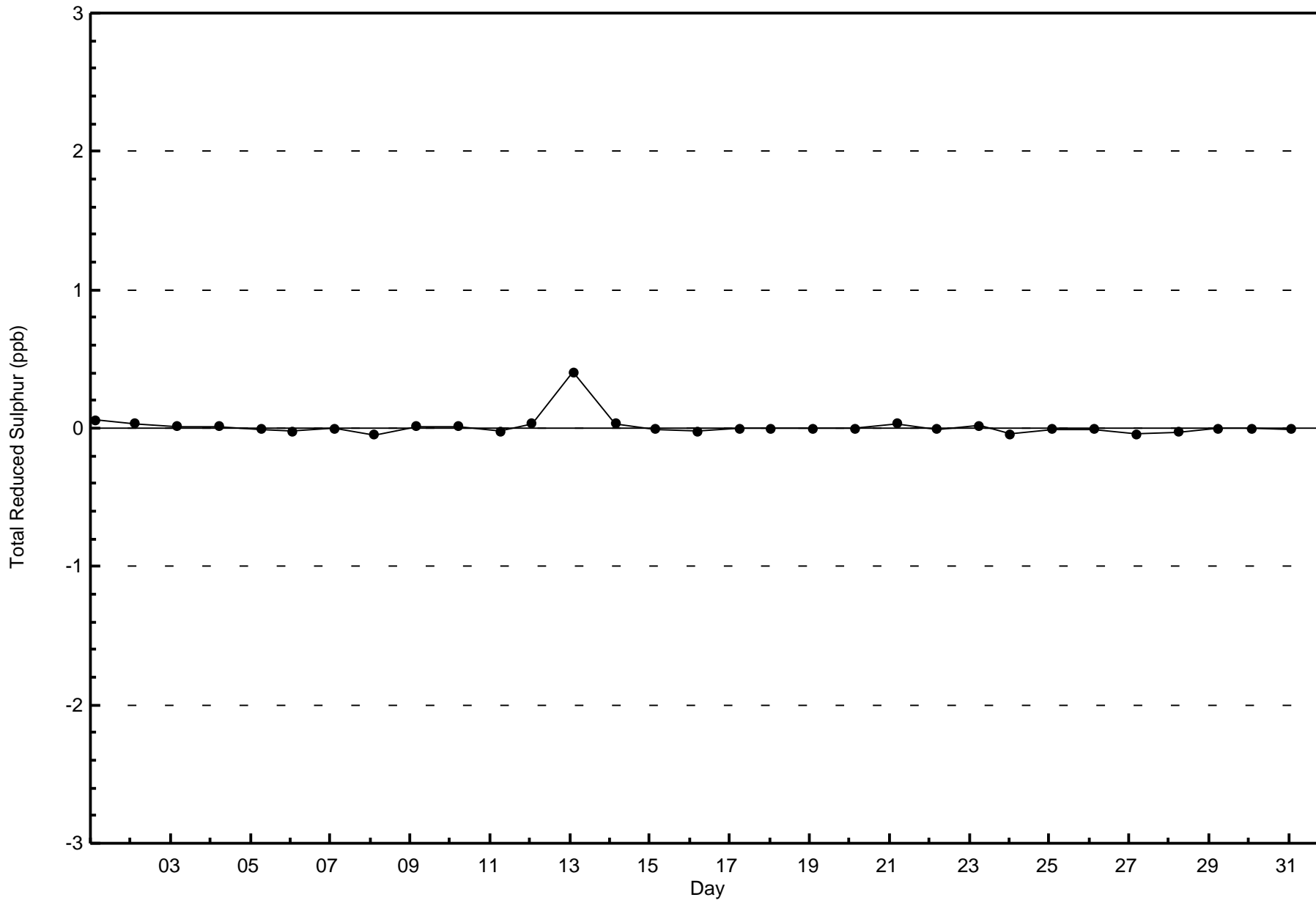


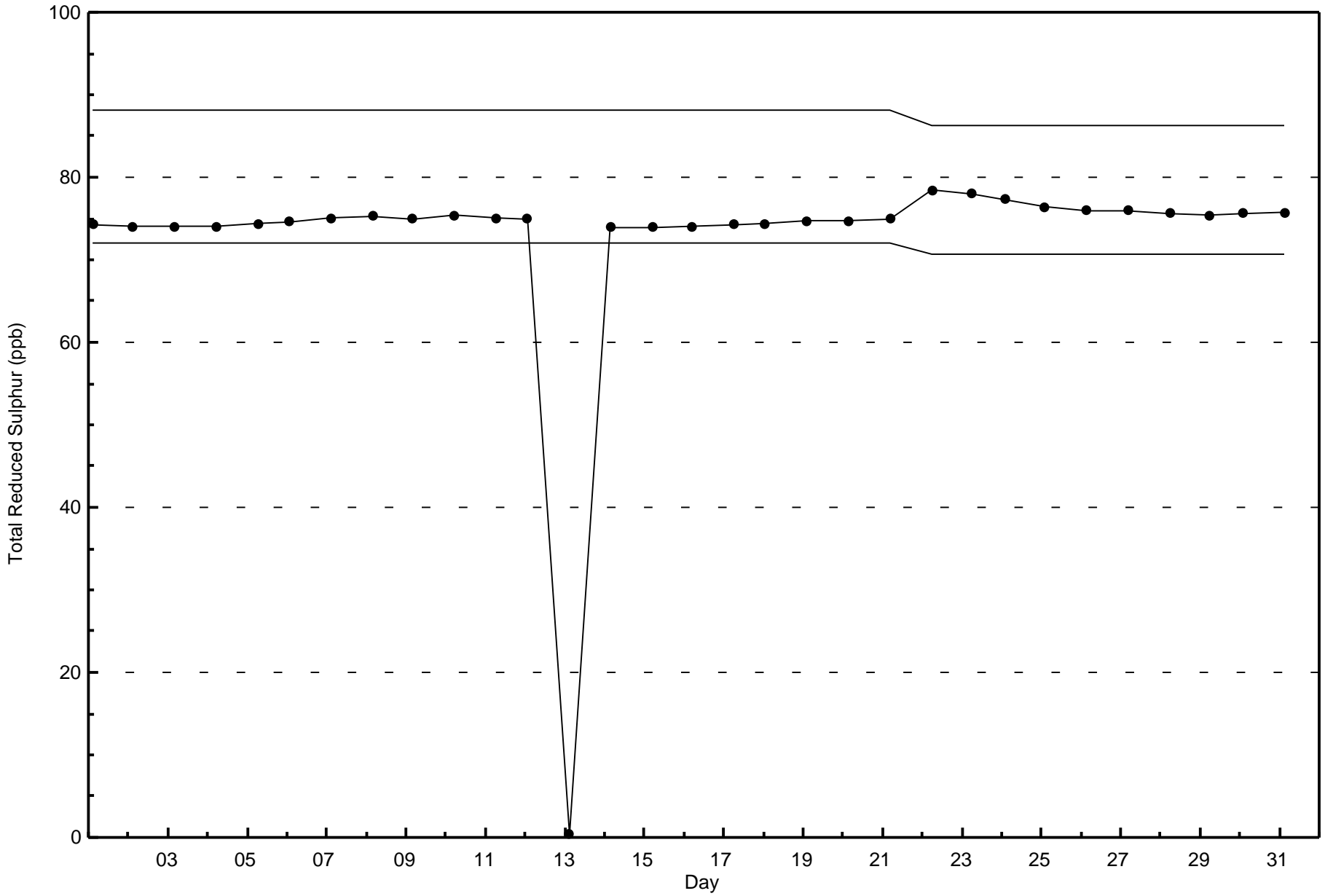
Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Total Reduced Sulphur (TRS) - ppb  
Anzac (AMS 14)

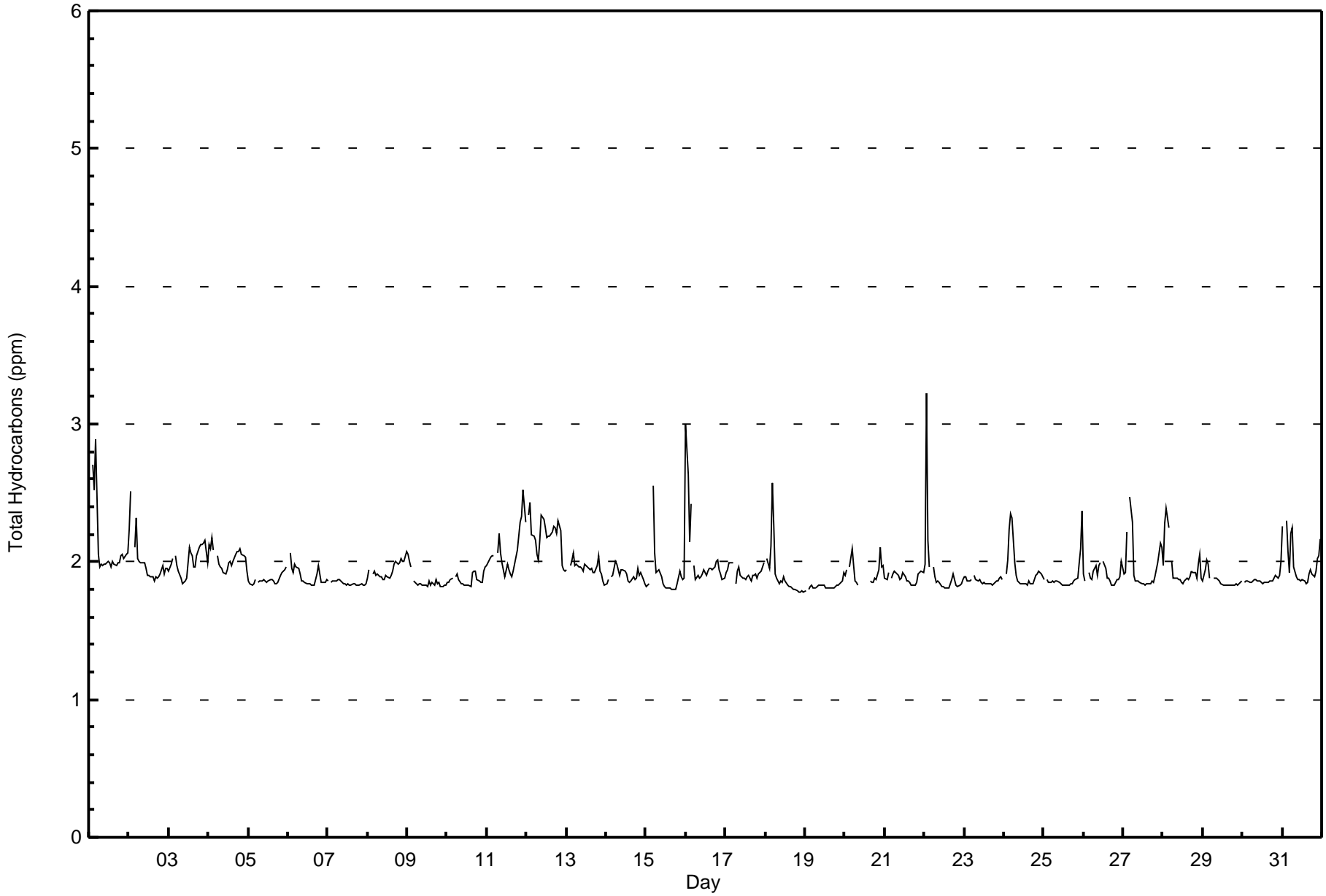


Total Number of Valid Hours: 707











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

**Total Hydrocarbons (THC) - ppm**  
**Anzac - July 2015**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	613	86.83	86.83
2.1 - 3.0	92	13.03	99.86
3.1 - 10.0	1	0.14	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 706

Total Number of Hours: 744



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

**Total Hydrocarbons (THC) - ppm**  
**Anzac - July 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	21	9	7	8	4	18	18	26	35	29	32	30	80	157	72	66	612
2.1 - 3.0	4	3	0	4	5	5	6	2	5	3	9	11	12	8	10	5	92
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	25	12	7	12	9	23	24	28	40	32	42	41	92	165	82	71	705

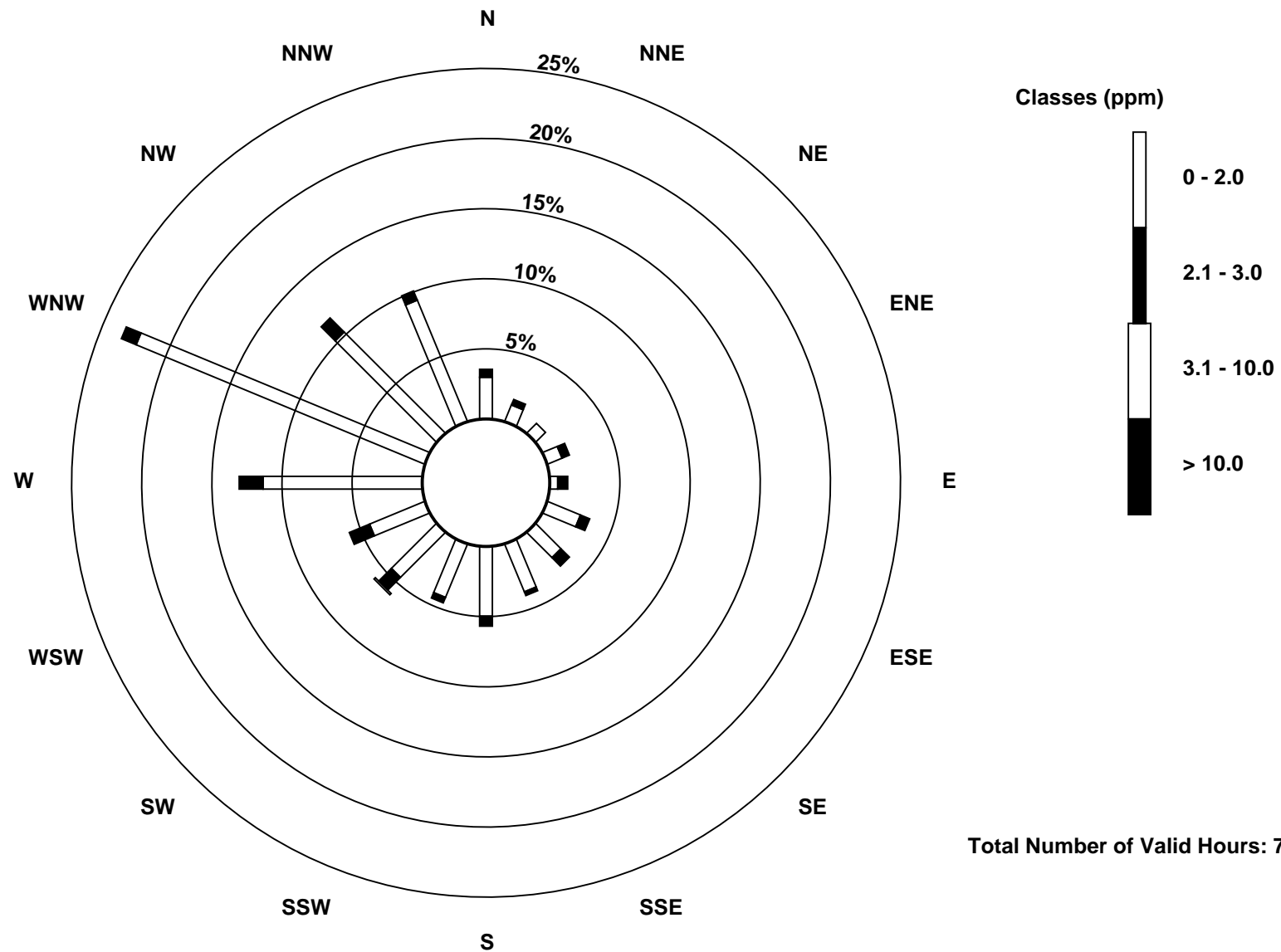
Total Number of Valid Hours: 705

Total Number of Hours: 744

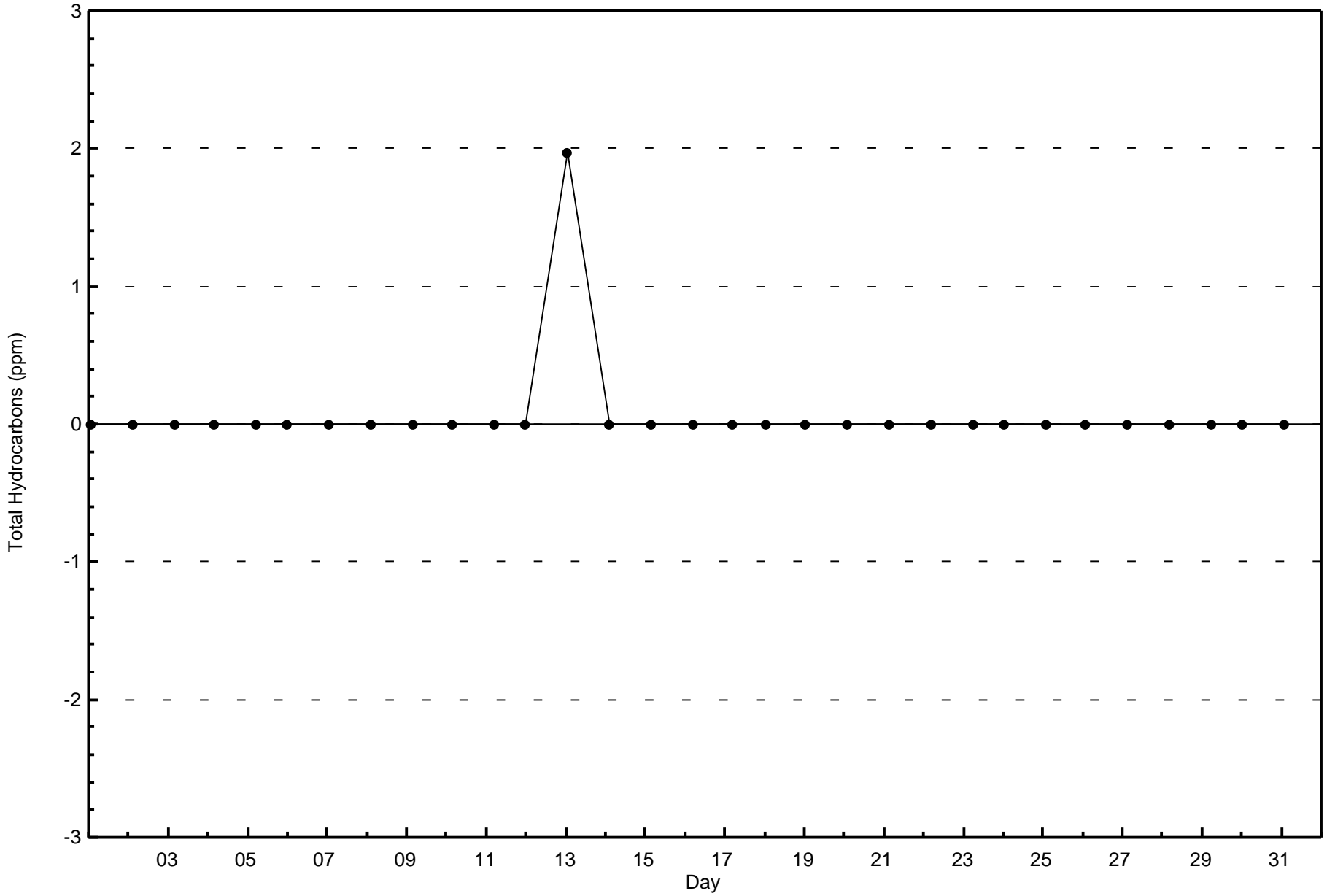


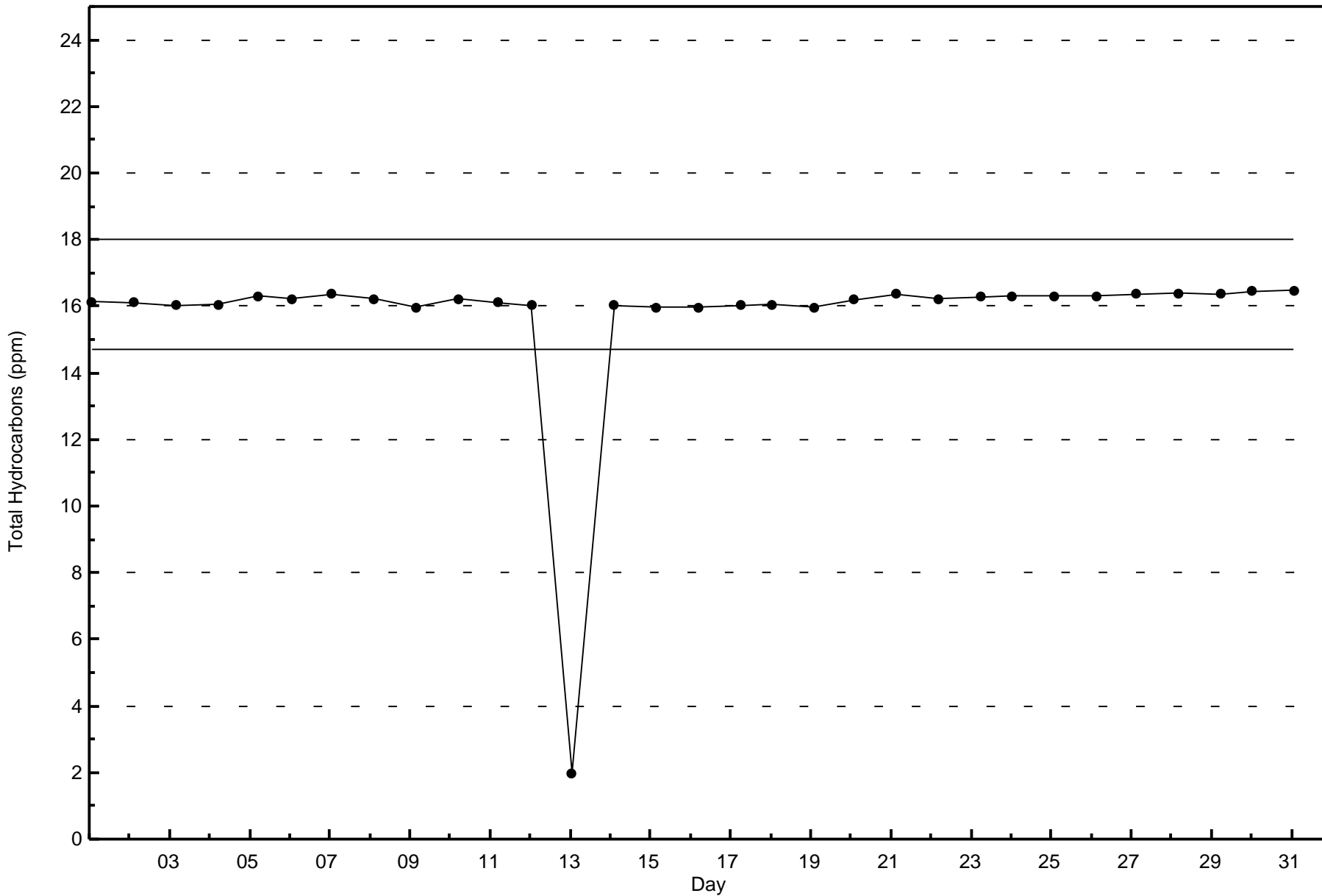
Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Total Hydrocarbons (THC) - ppm  
Anzac (AMS 14)







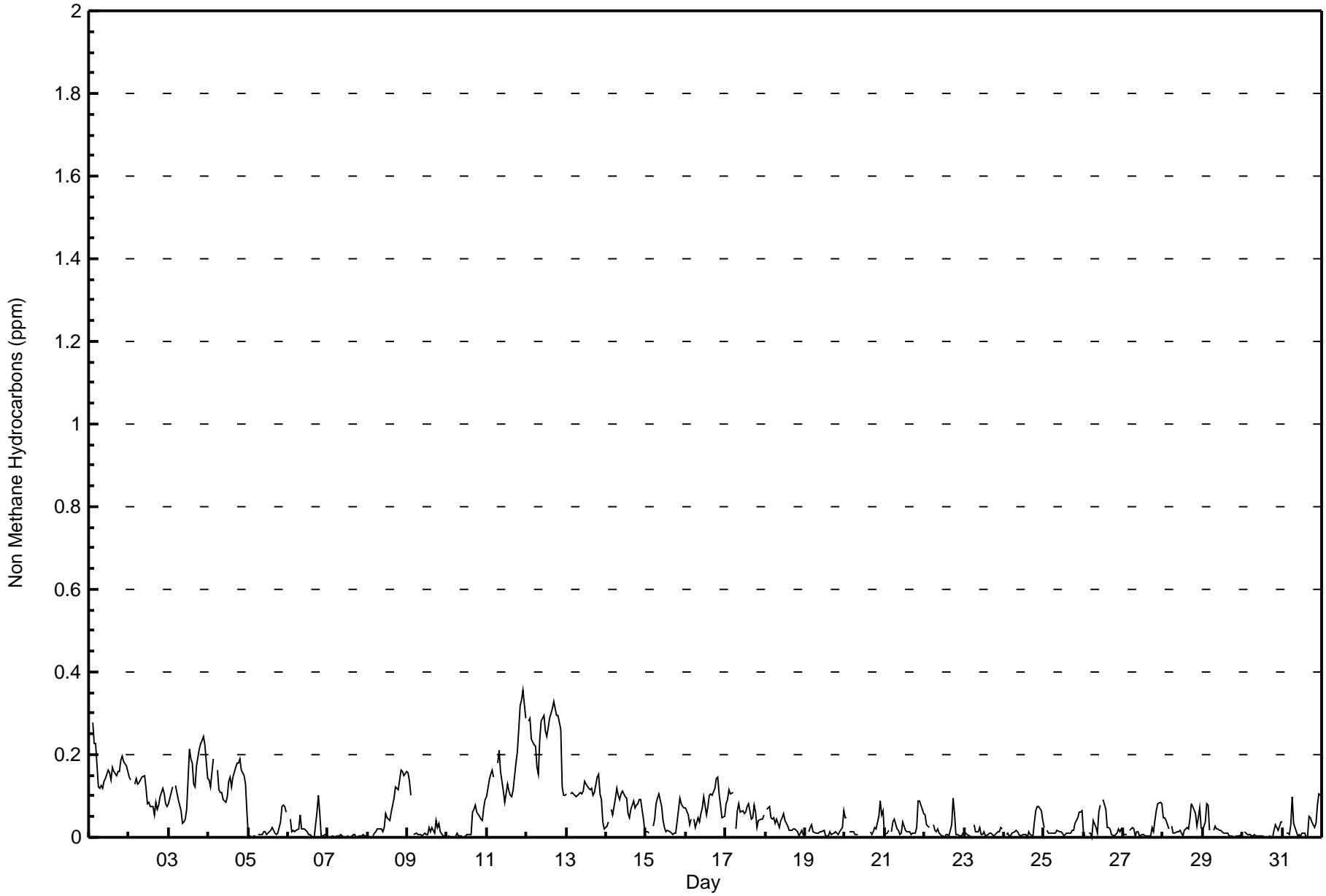




Summary of Hour Averages

Anzac - July 2015

Maximum Value: 0.354 ppm on Jul 11 23:00		Maximum Daily Average: 0.242 ppm on Jul 12		Hours in Service:	744																								
Minimum Value: 0.000 ppm on Jul 5 03:00		Minimum Daily Average: 0.003 ppm on Jul 7		Hours of Data:	706																								
Maximum Diurnal Average: 0.080 ppm at hour 21		Minimum Diurnal Average: 0.048 ppm at hour 9		Hours of Missing Data:	38																								
Monthly Average: 0.059 ppm		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 0.1 P <sub>90</sub> = 0.1 P <sub>99</sub> = 0.3		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-Jul	0.344	Z	0.279	0.226	0.226	0.122	0.118	0.126	0.119	0.135	0.141	0.161	0.158	0.138	0.169	0.158	0.149	0.160	0.158	0.187	0.197	0.184	0.173	0.159	0.173	0.344			
2-Jul	0.147	0.138	Z	0.128	0.142	0.128	0.132	0.139	0.145	0.150	0.118	0.082	0.084	0.074	0.076	0.056	0.086	0.068	0.079	0.099	0.119	0.105	0.081	0.074	0.106	0.150			
3-Jul	0.081	0.108	0.120	Z	0.124	0.109	0.091	0.065	0.034	0.037	0.045	0.068	0.213	0.189	0.180	0.128	0.122	0.173	0.212	0.227	0.233	0.243	0.225	0.142	0.138	0.243			
4-Jul	0.138	0.123	0.156	0.191	Z	0.164	0.117	0.109	0.110	0.090	0.083	0.099	0.136	0.146	0.123	0.147	0.168	0.178	0.179	0.191	0.162	0.148	0.129	0.060	0.137	0.191			
5-Jul	0.004	0.003	0.000	0.003	0.005	Z	0.007	0.006	0.008	0.014	0.013	0.007	0.011	0.016	0.025	0.018	0.009	0.008	0.009	0.037	0.075	0.078	0.076	0.060	0.021	0.078			
6-Jul	Z	0.042	0.013	0.016	0.015	0.019	0.022	0.054	0.019	0.021	0.019	0.013	0.006	0.008	0.003	0.001	0.001	0.061	0.102	0.058	0.002	0.002	0.006	0.008	0.022	0.102			
7-Jul	0.001	Z	0.000	0.003	0.001	0.002	0.004	0.003	0.006	0.001	0.000	0.000	0.005	0.002	0.000	0.007	0.006	0.002	0.001	0.002	0.003	0.005	0.004	0.002	0.003	0.007			
8-Jul	0.003	0.003	Z	0.003	0.011	0.012	0.020	0.021	0.022	0.013	0.025	0.059	0.047	0.040	0.062	0.077	0.095	0.123	0.117	0.138	0.162	0.161	0.149	0.159	0.066	0.162			
9-Jul	0.156	0.135	0.103	Z	0.006	0.010	0.008	0.008	0.008	0.003	0.010	0.006	0.008	0.025	0.012	0.022	0.010	0.040	0.022	0.035	0.012	0.003	0.004	0.001	0.028	0.156			
10-Jul	0.000	0.004	0.001	0.001	Z	0.002	0.012	0.002	0.003	0.001	0.001	0.004	0.005	0.007	0.007	0.062	0.068	0.077	0.061	0.049	0.043	0.040	0.072	0.093	0.027	0.093			
11-Jul	0.100	0.140	0.152	0.163	0.146	Z	0.179	0.209	0.160	0.137	0.113	0.086	0.129	0.113	0.102	0.098	0.116	0.178	0.208	0.260	0.318	0.334	0.354	0.289	0.178	0.354			
12-Jul	Z	0.280	0.287	0.238	0.223	0.220	0.169	0.152	0.237	0.283	0.296	0.257	0.245	0.263	0.289	0.312	0.330	0.311	0.295	0.295	0.262	0.123	0.103	0.101	0.242	0.330			
13-Jul	0.103	Z	0.106	0.108	0.104	0.101	0.099	0.105	0.109	0.105	0.110	0.135	0.128	0.120	0.117	0.118	0.103	0.109	0.146	0.153	0.104	0.093	0.038	0.021	0.106	0.153			
14-Jul	0.026	0.039	Z	0.067	0.056	0.096	0.119	0.100	0.093	0.105	0.112	0.100	0.093	0.058	0.048	0.069	0.087	0.071	0.079	0.082	0.090	0.093	0.044	0.015	0.076	0.119			
15-Jul	0.014	0.014	0.010	Z	0.026	0.045	0.082	0.095	0.106	0.074	0.040	0.024	0.012	0.017	0.014	0.009	0.006	0.010	0.010	0.039	0.095	0.082	0.073	0.072	0.042	0.106			
16-Jul	0.072	0.053	0.030	0.045	Z	0.043	0.023	0.049	0.038	0.056	0.071	0.098	0.055	0.075	0.100	0.105	0.101	0.119	0.143	0.145	0.104	0.080	0.046	0.051	0.074	0.145			
17-Jul	0.083	0.093	0.114	0.107	0.110	Z	0.019	0.065	0.083	0.061	0.064	0.058	0.060	0.075	0.081	0.045	0.046	0.077	0.062	0.023	0.042	0.046	0.044	0.054	0.066	0.114			
18-Jul	Z	0.069	0.074	0.046	0.045	0.046	0.034	0.043	0.025	0.042	0.046	0.058	0.040	0.026	0.017	0.016	0.016	0.021	0.020	0.015	0.004	0.012	0.017	0.006	0.032	0.074			
19-Jul	0.009	Z	0.013	0.022	0.030	0.014	0.010	0.010	0.011	0.014	0.013	0.017	0.004	0.003	0.004	0.012	0.008	0.010	0.015	0.012	0.008	0.013	0.024	0.065	0.015	0.065			
20-Jul	0.047	0.048	Z	0.015	0.014	0.014	0.007	0.007	0.006	C	C	C	C	C	C	0.012	0.006	0.013	0.024	0.021	0.050	0.090	0.055	0.066	--	0.090			
21-Jul	0.007	0.010	0.016	Z	0.014	0.036	0.044	0.022	0.018	0.007	0.010	0.036	0.017	0.013	0.015	0.015	0.008	0.009	0.010	0.022	0.087	0.089	0.077	0.056	0.028	0.089			
22-Jul	0.054	0.030	0.027	0.025	Z	0.032	0.018	0.012	0.020	0.010	0.002	0.004	0.001	0.007	0.005	0.004	0.032	0.094	0.057	0.006	0.008	0.003	0.004	0.010	0.020	0.094			
23-Jul	0.010	0.011	0.006	0.004	0.000	Z	0.031	0.013	0.013	0.024	0.007	0.006	0.014	0.003	0.007	0.011	0.011	0.006	0.002	0.009	0.013	0.015	0.023	0.021	0.011	0.031			
24-Jul	Z	0.007	0.009	0.002	0.005	0.011	0.012	0.018	0.012	0.008	0.003	0.007	0.006	0.006	0.001	0.012	0.005	0.005	0.037	0.065	0.076	0.076	0.063	0.041	0.021	0.076			
25-Jul	0.025	Z	0.017	0.012	0.011	0.010	0.009	0.010	0.016	0.014	0.015	0.011	0.005	0.008	0.009	0.012	0.011	0.018	0.017	0.035	0.046	0.061	0.061	0.066	0.022	0.066			
26-Jul	0.013	0.004	Z	0.011	0.010	0.001	0.042	0.025	0.010	0.061	0.077	PF	0.092	0.067	0.023	0.025	0.019	0.006	0.004	0.007	0.009	0.021	0.013	0.020	0.025	0.092			
27-Jul	0.006	0.006	0.006	Z	0.017	0.024	0.019	0.004	0.012	0.012	0.005	0.006	0.006	0.004	0.005	0.003	0.002	0.022	0.014	0.039	0.064	0.080	0.086	0.081	0.023	0.086			
28-Jul	0.046	0.048	0.042	0.021	Z	0.026	0.009	0.009	0.014	0.013	0.017	0.009	0.004	0.018	0.024	0.022	0.043	0.081	0.073	0.058	0.028	0.047	0.070	0.023	0.032	0.081			
29-Jul	0.017	0.037	0.082	0.077	0.018	Z	0.018	0.028	0.021	0.019	0.018	0.017	0.010	0.009	0.011	0.010	0.003	0.005	0.001	0.000	0.004	0.002	0.002	0.006	0.018	0.082			
30-Jul	Z	0.013	0.009	0.008	0.006	0.002	0.004	0.006	0.005	0.004	0.005	0.005	0.003	0.001	0.002	0.001	0.003	0.001	0.001	0.016	0.031	0.018	0.027	0.036	0.009	0.036			
31-Jul	0.039	Z	0.011	0.009	0.006	0.031	0.098	0.032	0.015	0.005	0.008	0.005	0.011	0.009	0.000	0.003	0.050	0.046	0.037	0.022	0.034	0.079	0.104	0.101	0.033	0.104			
		0.059	0.058	0.065	0.060	0.053	0.051	0.051	0.050	0.048	0.051	0.050	0.050	0.054	0.051	0.051	0.051	0.055	0.068	0.071	0.076	0.080	0.078	0.072	0.063	Diurnal Average			
		0.344	0.280	0.287	0.238	0.226	0.220	0.179	0.209	0.237	0.283	0.296	0.257	0.245	0.263	0.289	0.312	0.330	0.311	0.295	0.295	0.318	0.334	0.354	0.289	Diurnal Maximum			
Z - zerospan		C - Calibration			PF - Power Failure																								





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

**Non Methane Hydrocarbons (NMHC) - ppm**  
**Anzac - July 2015**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.005	104	14.73	14.73
0.006 - 0.05	326	46.18	60.91
0.06 - 0.1	207	29.32	90.23
> 0.1	69	9.77	100.00

Total Number of Valid Hours: 706

Total Number of Hours: 744



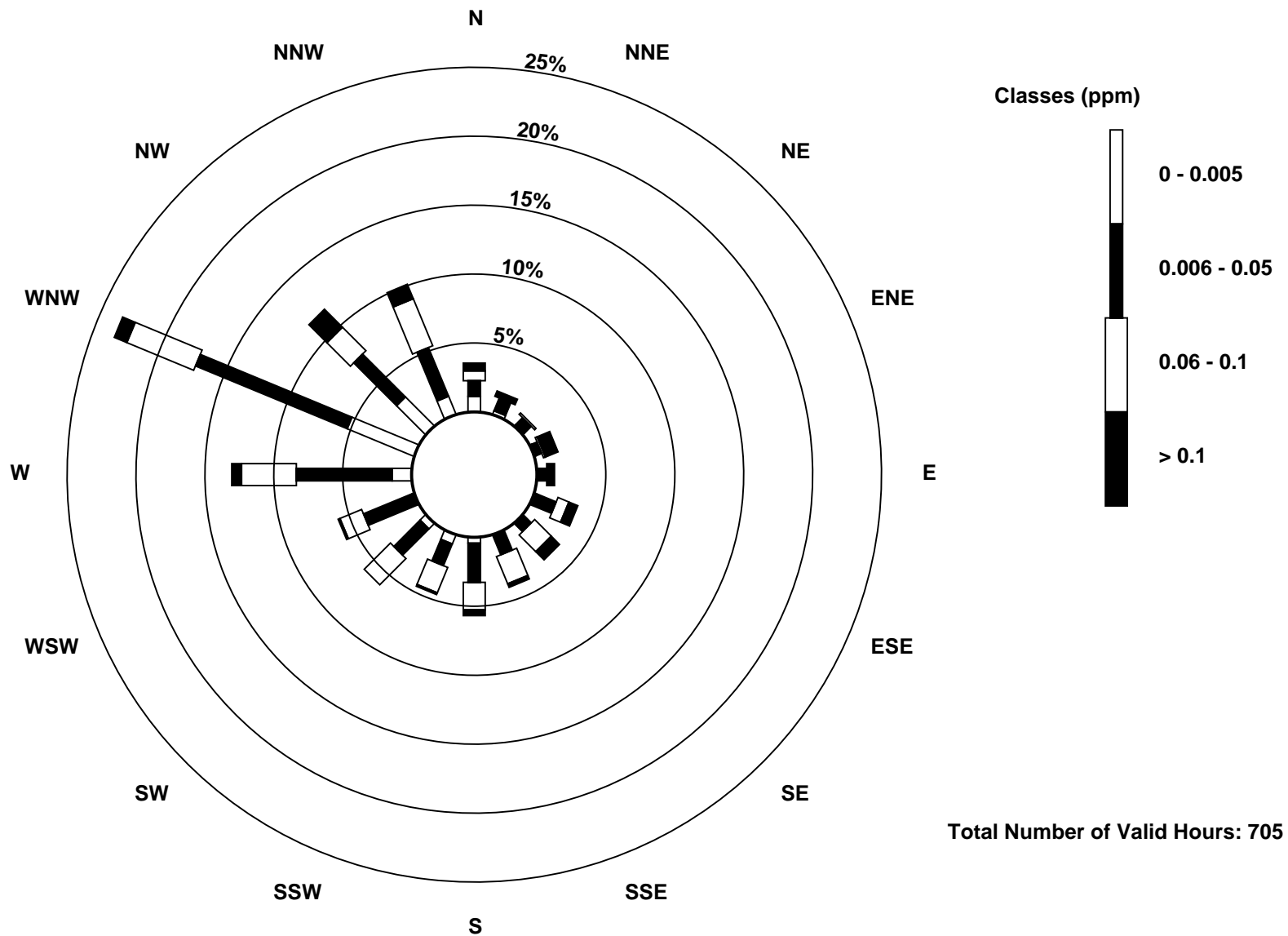
**Wood Buffalo Environmental Association**  
**Frequency Distribution**

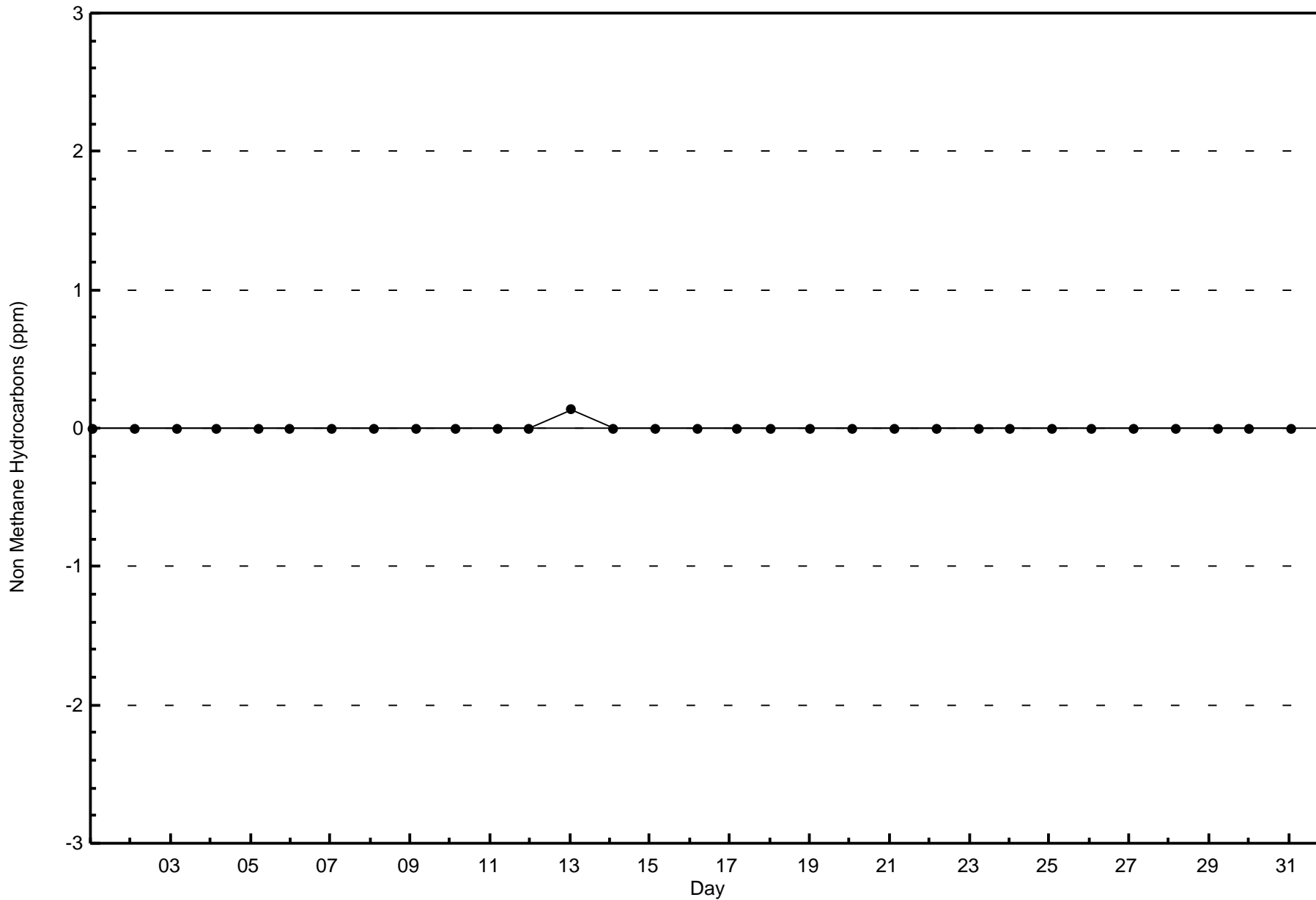
**Non Methane Hydrocarbons (NMHC) - ppm**  
**Anzac - July 2015**

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	8	2	1	1	0	1	0	0	3	5	4	1	10	37	21	10	104
0.006 - 0.05	8	7	5	3	5	11	6	11	20	12	19	27	49	84	31	27	325
0.06 - 0.1	5	0	1	1	0	6	12	15	14	14	19	12	28	37	17	26	207
> 0.1	4	3	0	7	4	5	6	2	3	1	0	1	5	7	13	8	69
<b>Totals</b>	25	12	7	12	9	23	24	28	40	32	42	41	92	165	82	71	705

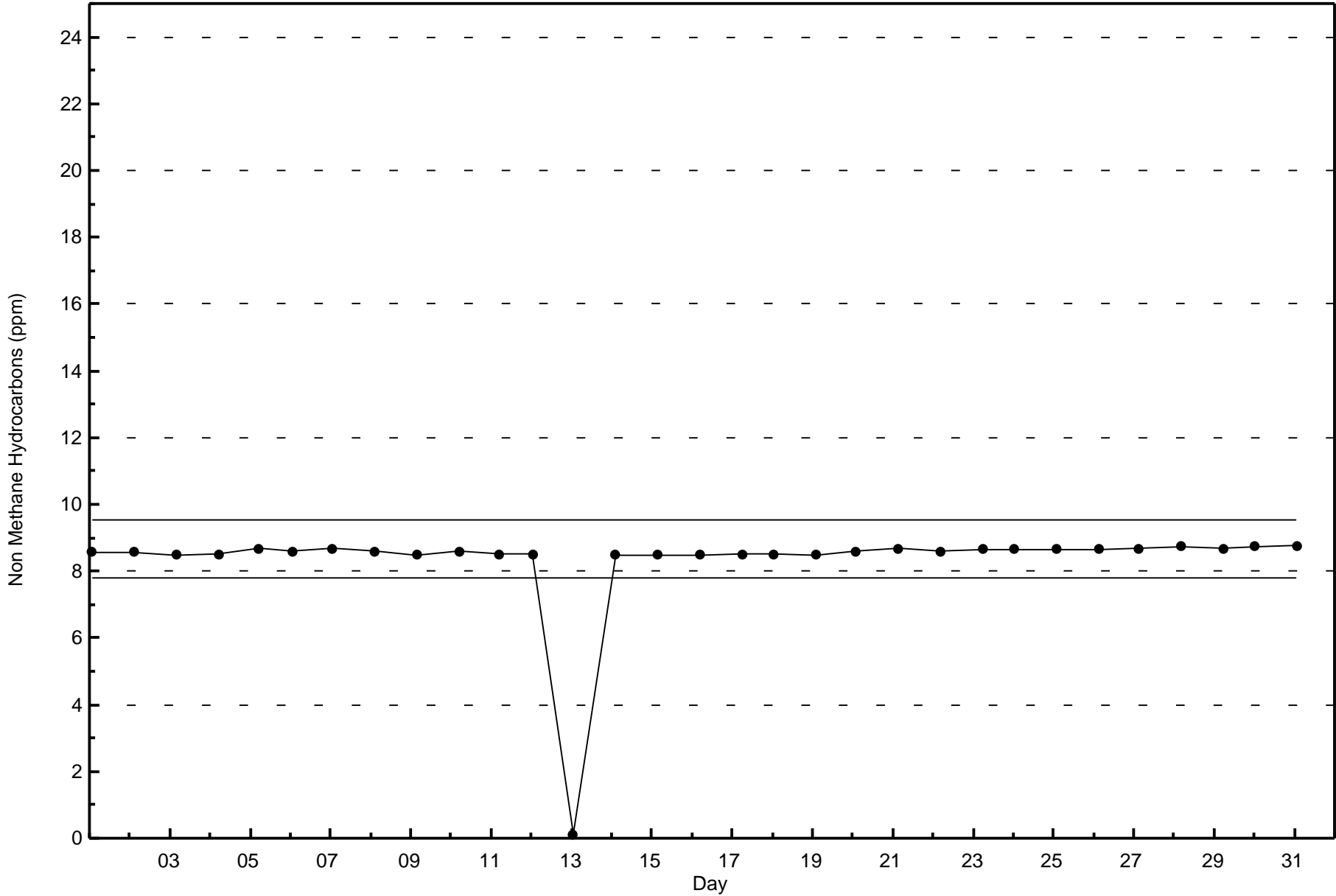
Total Number of Valid Hours: 705

Total Number of Hours: 744



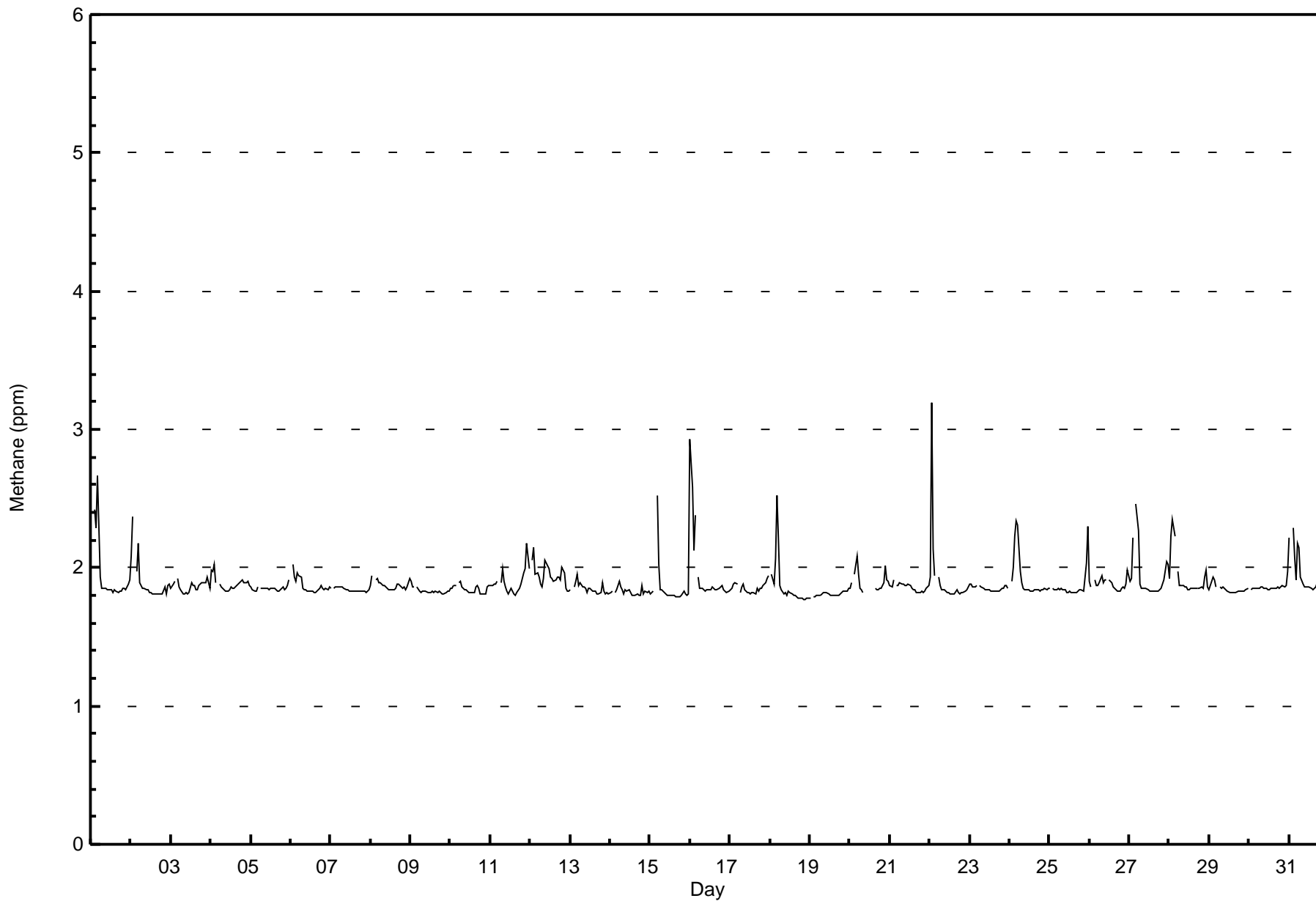








Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 3.2 ppm on Jul 22 02:00 Maximum Daily Average: 2.0 ppm on Jul 16																	Hours in Service: 744 Hours of Data: 706 Hours of Missing Data: 38 Hours of Calibration: 37 Percent Operational Time: 99.9									
Minimum Value: 1.8 ppm on Jul 18 22:00 Minimum Daily Average: 1.8 ppm on Jul 19 Maximum Diurnal Average: 2.0 ppm at hour 5 Minimum Diurnal Average: 1.8 ppm at hour 15 Monthly Average: 1.88 ppm Percentiles: P <sub>1</sub> = 1.8 P <sub>10</sub> = 1.8 Q <sub>1</sub> = 1.8 Median = 1.8 Q <sub>3</sub> = 1.9 P <sub>90</sub> = 1.9 P <sub>99</sub> = 2.4																										
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-Jul	2.4	Z	2.4	2.3	2.7	1.9	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	1.9	1.9	1.8	1.9	1.9	2.0	2.7
2-Jul	2.1	2.4	Z	2.0	2.2	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.8	1.9	1.9	1.9	2.4
3-Jul	1.8	1.9	1.9	Z	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	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	
4-Jul	2.0	2.0	2.0	1.9	Z	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.9	1.9	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	
5-Jul	1.9	1.8	1.8	1.8	1.9	Z	1.8	1.9	1.9	1.9	1.9	1.8	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.9	1.8	1.9	1.9	1.9	1.9	
6-Jul	Z	2.0	1.9	1.9	2.0	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.8	1.8	1.8	1.9	2.0	
7-Jul	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	
8-Jul	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.9	1.9	1.9	
9-Jul	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	1.8	1.9	
10-Jul	1.9	1.9	1.9	1.9	Z	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	1.8	1.8	1.8	1.9	1.9	1.8	1.9	
11-Jul	1.9	1.9	1.9	1.9	1.9	Z	1.9	2.0	1.9	1.9	1.8	1.8	1.9	1.8	1.8	1.8	1.8	1.9	1.9	1.9	2.0	2.0	2.2	1.9	2.2	
12-Jul	Z	2.1	2.1	2.0	2.0	1.9	1.9	1.9	1.9	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	1.8	1.9	2.1	
13-Jul	1.8	Z	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.8	1.8	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.8	1.8	1.8	1.8	2.0	
14-Jul	1.8	1.8	Z	1.8	1.8	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	
15-Jul	1.8	1.8	1.8	Z	2.5	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	1.9	2.5	
16-Jul	2.9	2.6	2.1	2.4	Z	1.9	1.8	1.9	1.8	1.8	1.8	1.8	1.8	1.9	1.8	1.8	1.8	1.8	1.9	1.9	1.8	1.8	1.8	2.0	2.9	
17-Jul	1.8	1.9	1.9	1.9	1.9	Z	1.8	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.8	1.8	1.9	1.9	1.9	1.9	1.9	
18-Jul	Z	2.0	1.9	2.1	2.5	2.2	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.5	
19-Jul	1.8	Z	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.8	1.9	
20-Jul	1.9	1.9	Z	2.0	2.1	2.0	1.9	1.8	1.8	C	C	C	C	C	C	C	1.9	1.8	1.8	1.9	1.9	2.0	1.9	--	2.1	
21-Jul	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	
22-Jul	1.9	3.2	2.1	1.9	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	1.8	1.8	1.9	1.9	3.2	
23-Jul	1.9	1.9	1.9	1.9	1.9	Z	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	1.8	1.9	1.9	1.9	1.9	
24-Jul	Z	1.9	2.0	2.2	2.3	2.3	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	1.9	2.3	
25-Jul	1.8	Z	1.9	1.8	1.8	1.9	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	1.9	2.0	1.9	2.3	
26-Jul	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.9	1.8	1.9	1.9	2.0	
27-Jul	1.9	1.9	2.2	Z	2.5	2.3	1.9	1.9	1.8	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	2.0	1.9	2.5	
28-Jul	1.9	2.2	2.3	2.2	Z	2.0	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.9	1.8	1.8	1.9	1.8	1.9	1.9	2.0	1.9	1.9	2.3	
29-Jul	1.8	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	1.8	1.9	
30-Jul	Z	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.0	
31-Jul	2.2	Z	2.3	2.1	1.9	2.2	2.1	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	2.1	2.0	2.3	
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan      C - Calibration      PF - Power Failure																										





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

**Methane (CH<sub>4</sub>) - ppm**  
**Anzac - July 2015**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	668	94.62	94.62
2.1 - 3.0	37	5.24	99.86
3.1 - 10.0	1	0.14	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 706

Total Number of Hours: 744



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

**Methane (CH<sub>4</sub>) - ppm**  
**Anzac - July 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	25	12	7	11	8	22	22	27	37	30	33	33	85	164	81	70	667
2.1 - 3.0	0	0	0	1	1	1	2	1	3	2	8	8	7	1	1	1	37
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	25	12	7	12	9	23	24	28	40	32	42	41	92	165	82	71	705

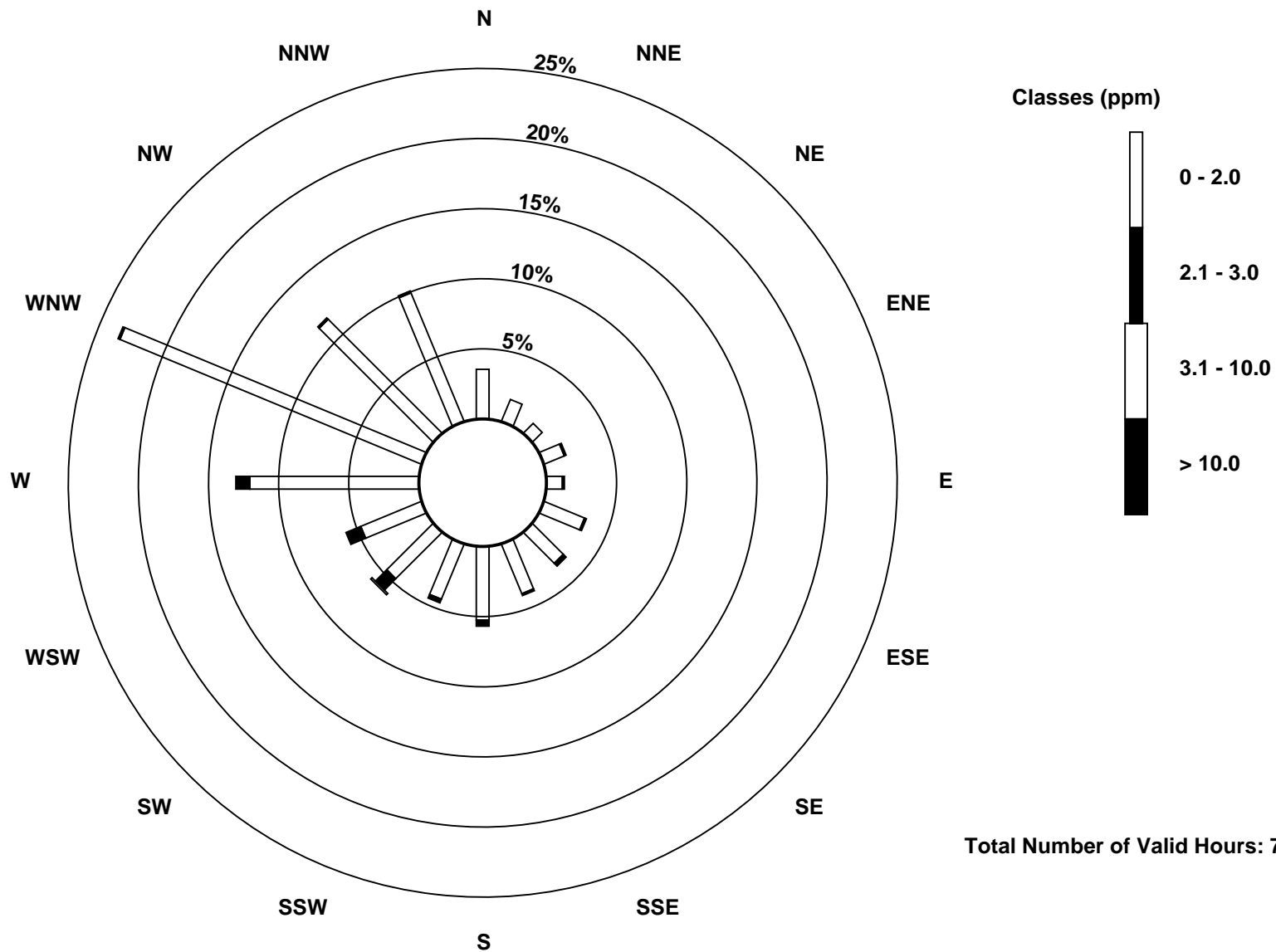
Total Number of Valid Hours: 705

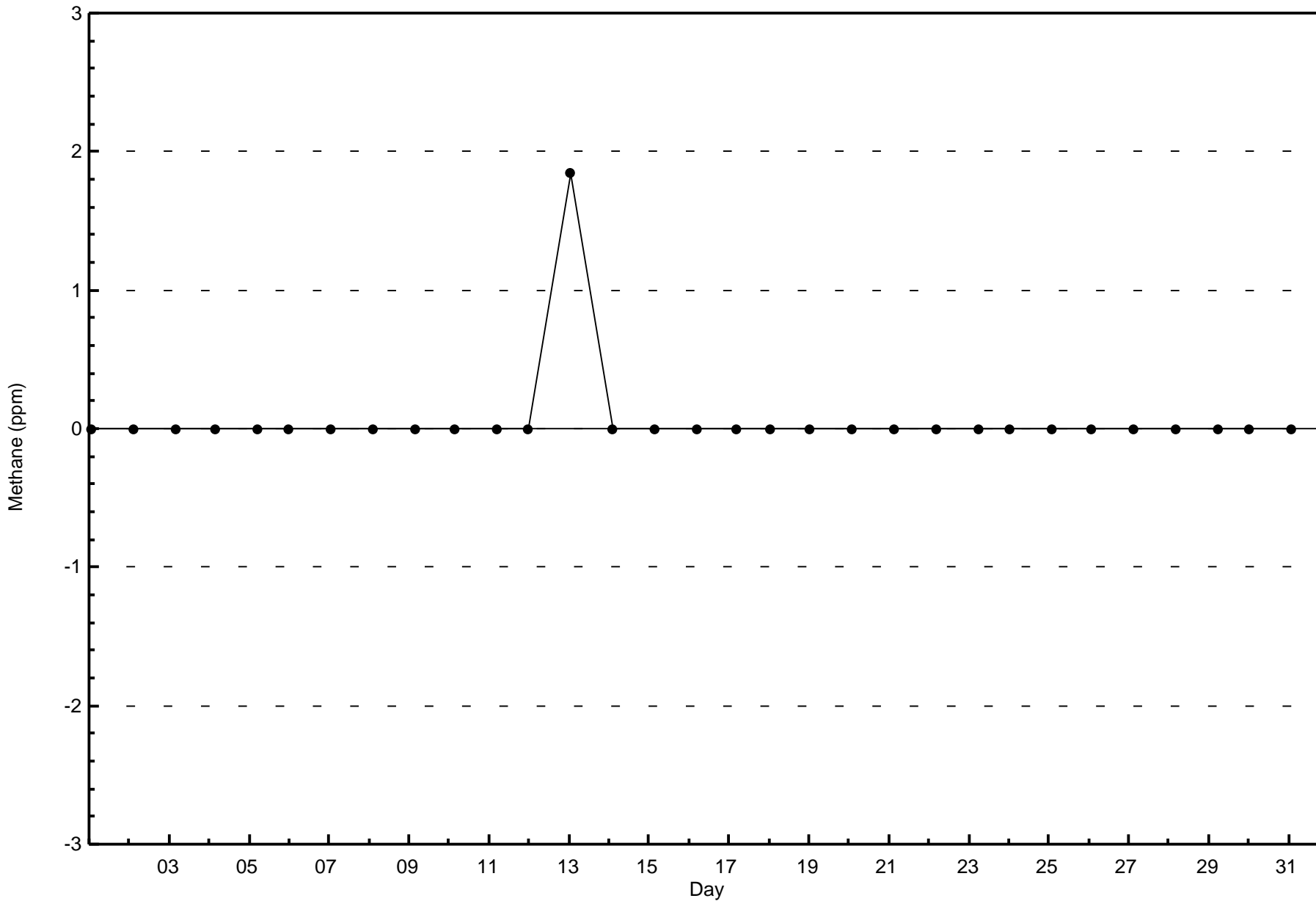
Total Number of Hours: 744

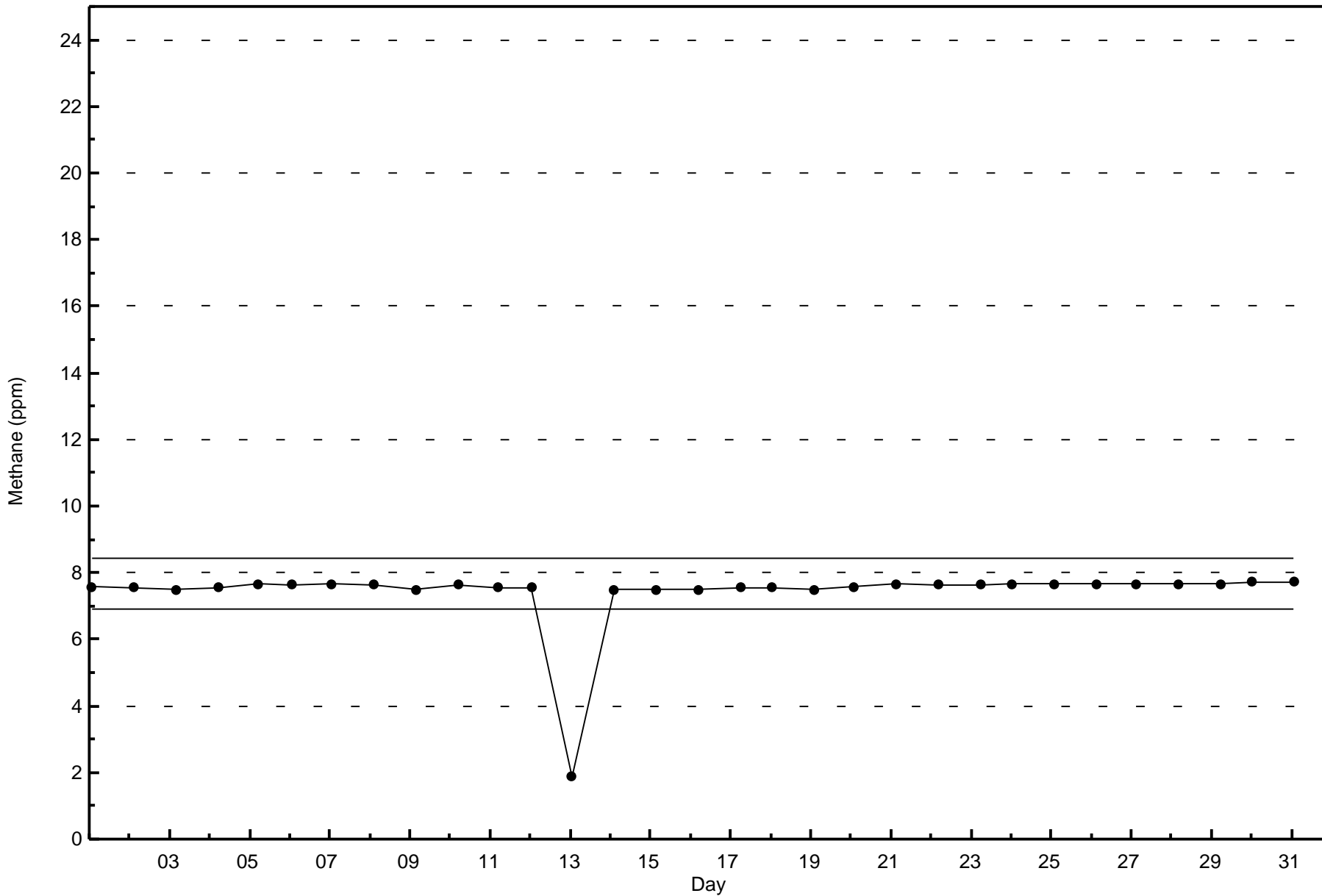


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Methane (CH<sub>4</sub>) - ppm  
Anzac (AMS 14)



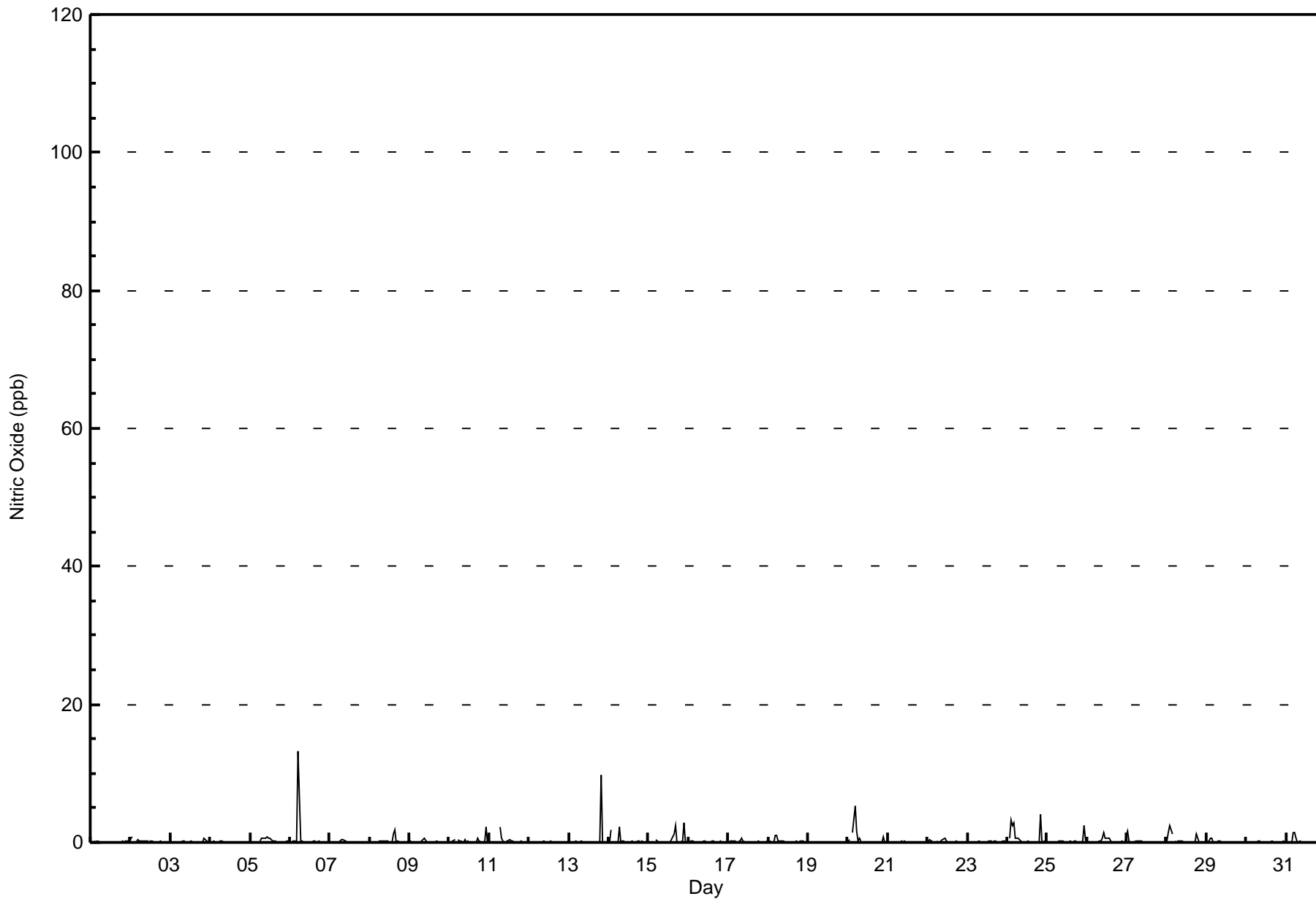








Maximum Value: 13 ppb on Jul 6 06:00		Maximum Daily Average: 0.7 ppb on Jul 24		Hours in Service: 744																						
Minimum Value: 0 ppb on Jul 9 19:00		Minimum Daily Average: 0.0 ppb on Jul 21		Hours of Data: 707																						
Maximum Diurnal Average: 0.8 ppb at hour 6		Minimum Diurnal Average: 0.1 ppb at hour 24		Hours of Missing Data: 37																						
Monthly Average: 0.2 ppb		Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 0 P <sub>99</sub> = 3		Hours of Calibration: 37																						
				Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	0	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-Jul	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
3-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.1	1
4-Jul	0	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-Jul	0	0	0	0	0	Z	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1
6-Jul	Z	0	0	0	0	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	13
7-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
8-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0.2	2
9-Jul	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
10-Jul	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2	0	0.2	2
11-Jul	0	0	0	0	0	Z	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2
12-Jul	Z	0	0	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-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0.5	10
14-Jul	0	2	Z	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2
15-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	3	0	0	0	0	3	0	0	0.4	3
16-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
17-Jul	0	0	0	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
18-Jul	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
19-Jul	0	Z	0	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-Jul	0	0	Z	2	5	2	0	1	0	C	C	C	C	C	C	0	0	0	0	0	0	1	0	0	--	5
21-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
22-Jul	0	0	0	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
23-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
24-Jul	Z	1	3	2	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0.7	4
25-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0.2	2
26-Jul	0	0	Z	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.2	1
27-Jul	2	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	2
28-Jul	0	1	2	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.3	2
29-Jul	0	0	1	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
30-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
31-Jul	0	Z	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
		0.1	0.3	0.3	0.3	0.5	0.8	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.4	0.2	0.2	0.2	0.1	Diurnal Average
		2	2	3	2	5	13	2	1	1	1	1	1	1	1	1	2	3	1	1	10	4	3	2	0	Diurnal Maximum
Z - zerospan		C - Calibration																								





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

**Nitric Oxide (NO) - ppb**  
**Anzac - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	707	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



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

**Nitric Oxide (NO) - ppb**  
**Anzac - July 2015**

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	25	13	7	12	9	23	24	28	40	32	42	41	92	165	82	71	706
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	25	13	7	12	9	23	24	28	40	32	42	41	92	165	82	71	706

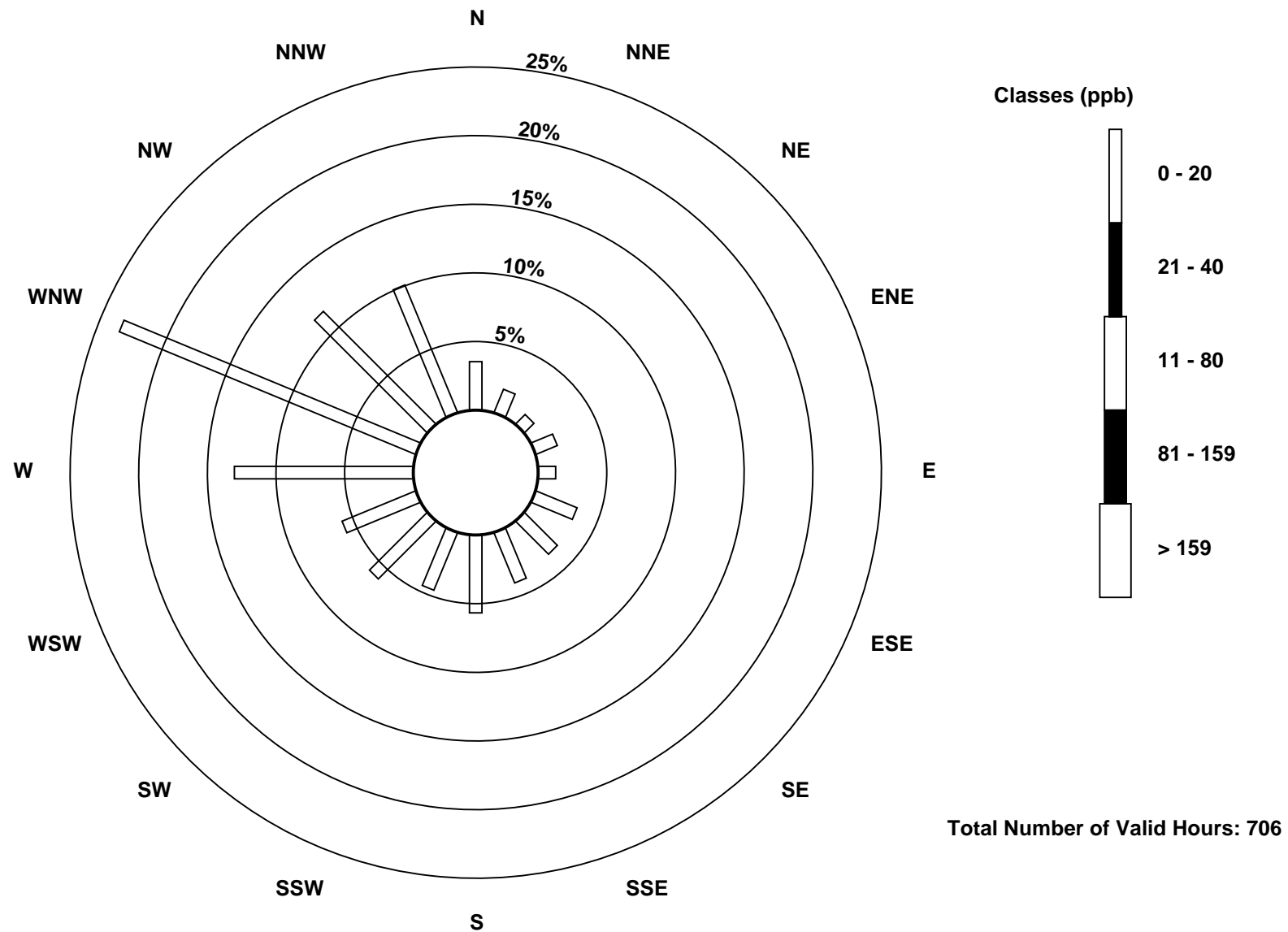
Total Number of Valid Hours: 706

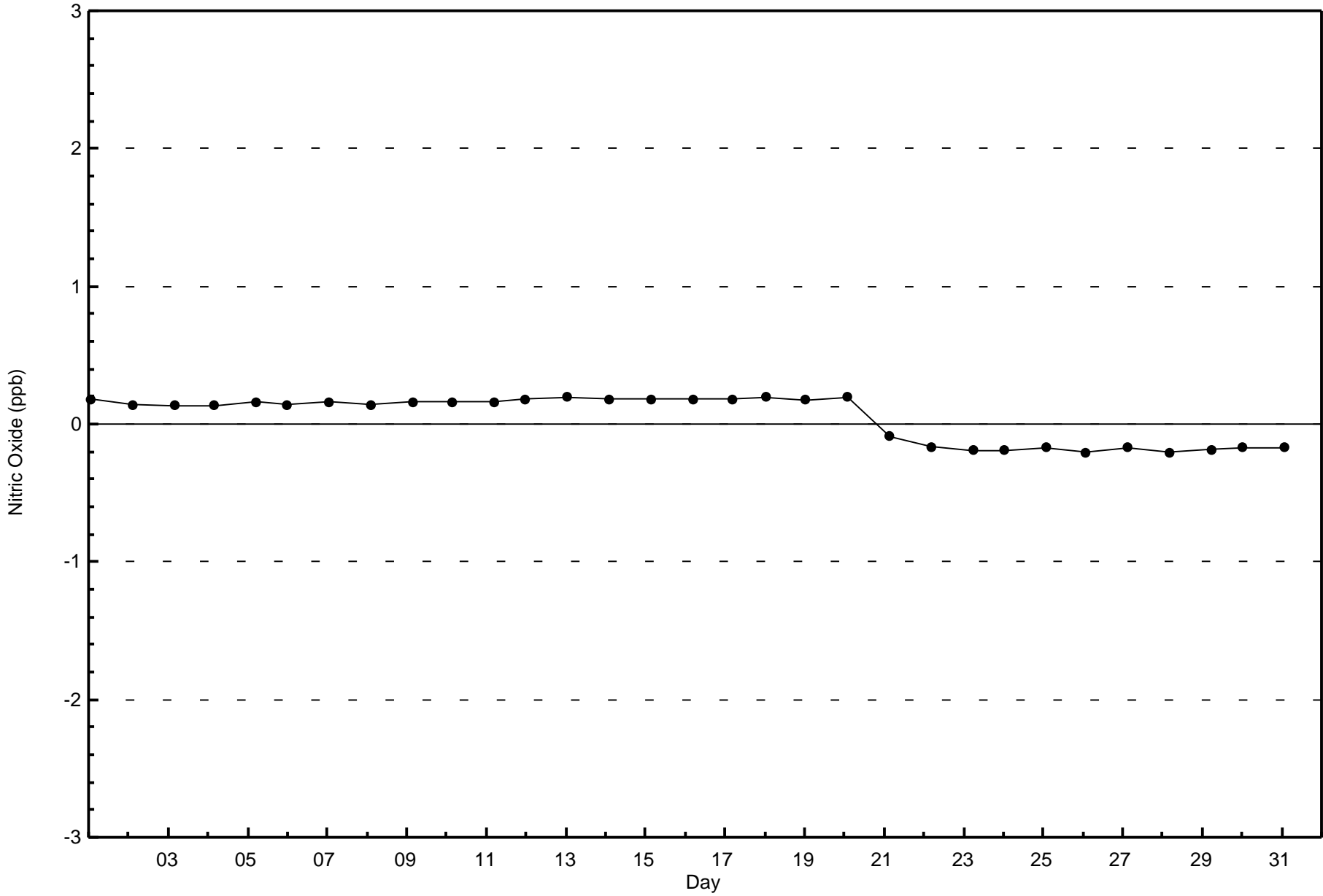
Total Number of Hours: 744

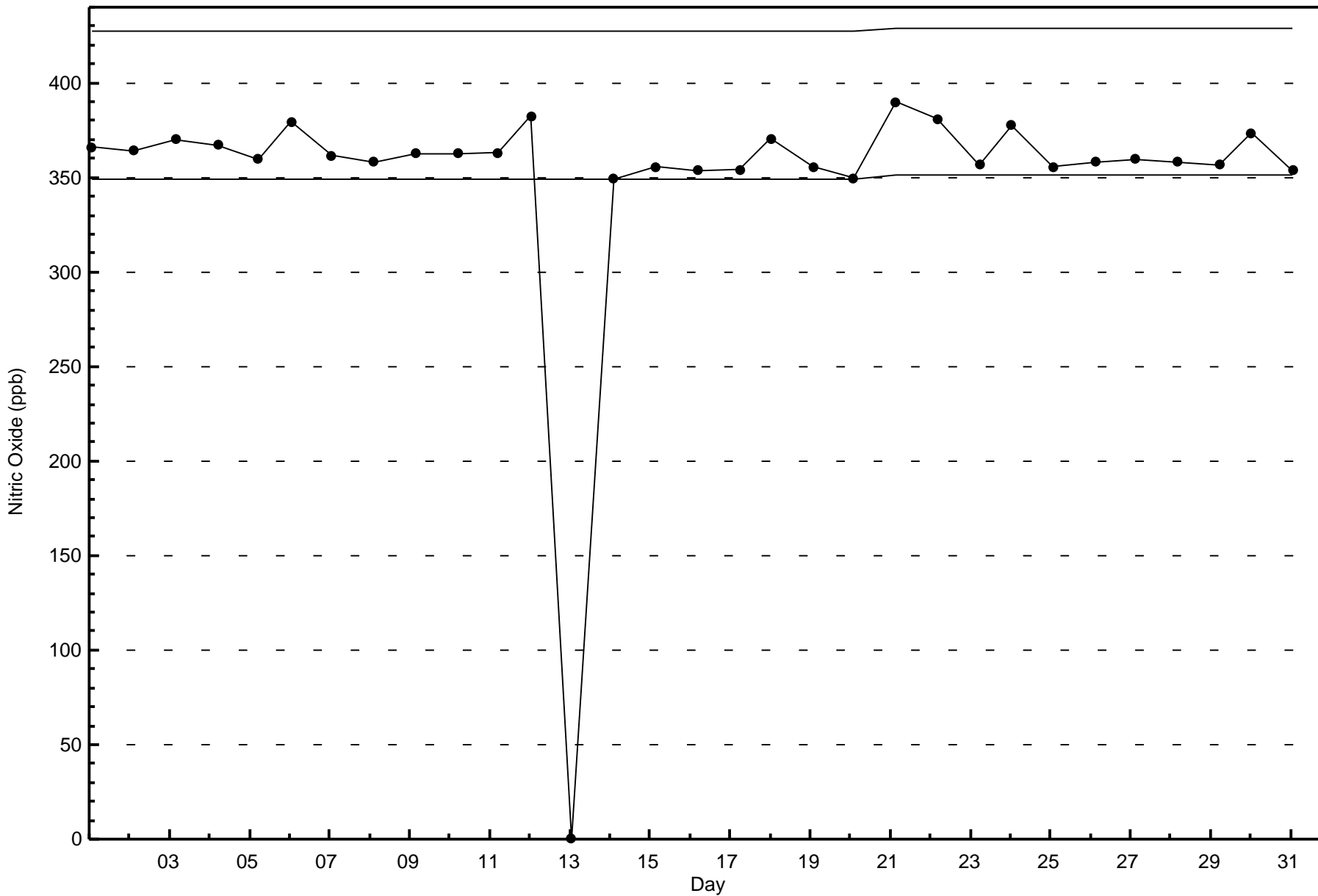


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Nitric Oxide (NO) - ppb  
Anzac (AMS 14)









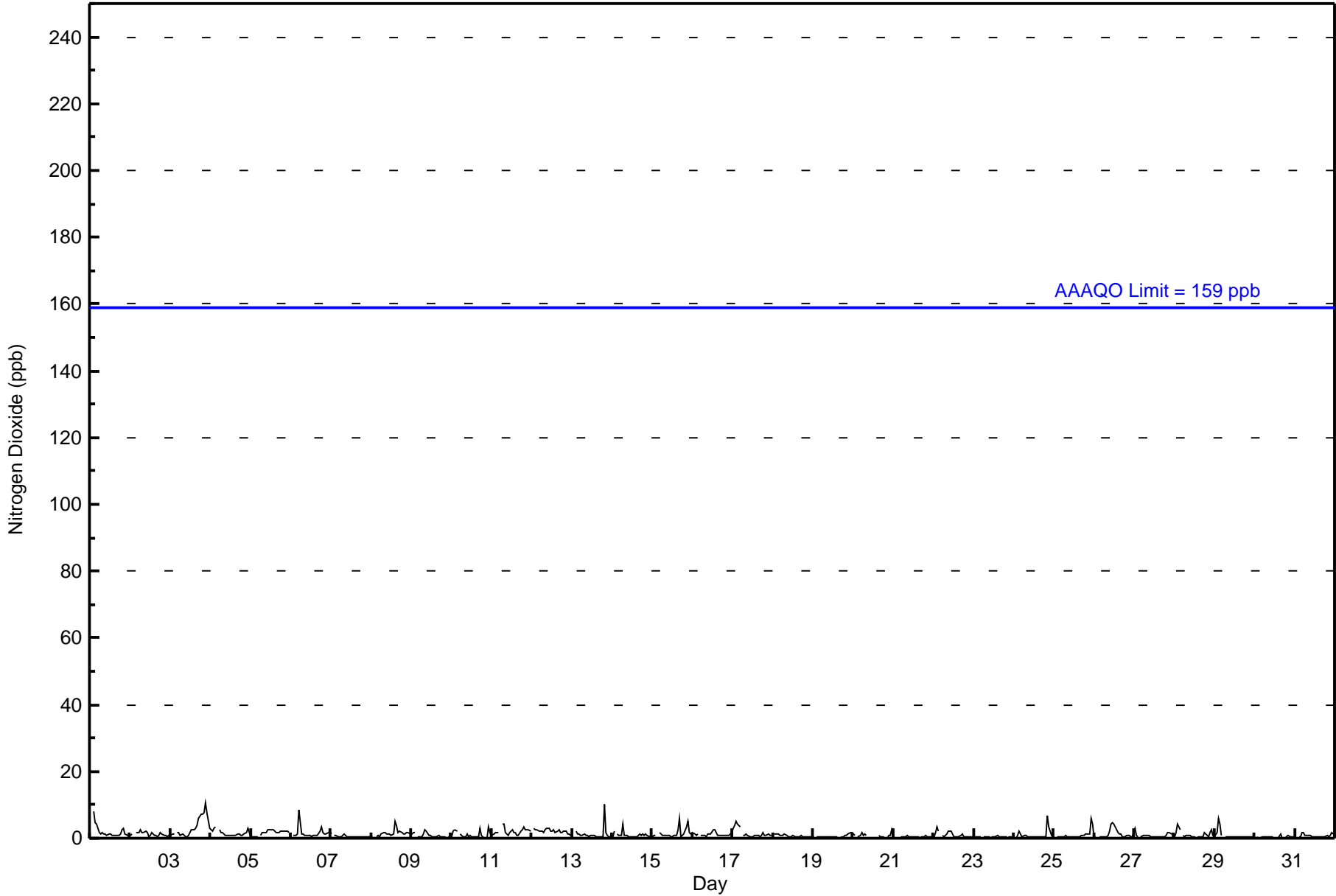
Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0		Hours in Service: 744	
Maximum Value: 17 ppb on Jul 1 01:00		Maximum Daily Average: 3.3 ppb on Jul 3	
Minimum Value: 0 ppb on Jul 20 20:00		Hours of Data: 707	
Maximum Diurnal Average: 1.9 ppb at hour 3		Hours of Missing Data: 37	
Monthly Average: 1.2 ppb		Hours of Calibration: 37	
Minimum Daily Average: 0.4 ppb on Jul 30		Percent Operational Time: 100.0	
Minimum Diurnal Average: 0.9 ppb at hour 12		Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 1 Q <sub>3</sub> = 2 P <sub>90</sub> = 3 P <sub>99</sub> = 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-Jul	17	Z	8	5	4	2	1	2	1	1	1	1	1	1	1	1	1	1	1	3	3	1	1	1	2.6	17
2-Jul	1	1	Z	2	2	2	2	2	2	2	2	1	1	2	1	1	1	1	2	1	1	1	1	1	1.3	2
3-Jul	1	1	1	Z	2	2	1	1	1	1	1	1	3	3	3	3	4	6	7	7	8	11	8	3	3.3	11
4-Jul	3	2	3	3	Z	3	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	2	3	2	1.6	3
5-Jul	0	0	0	1	1	Z	1	2	2	2	2	3	3	2	2	2	2	2	2	2	2	2	2	2	1.6	3
6-Jul	Z	1	1	1	1	8	1	1	1	1	1	1	1	1	1	1	1	2	3	2	1	1	2	2	1.5	8
7-Jul	1	Z	1	1	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.5	1
8-Jul	0	1	Z	1	1	1	1	2	2	1	1	1	1	1	5	4	2	2	2	1	1	2	2	1	1.5	5
9-Jul	1	2	2	Z	0	0	1	1	2	2	1	1	1	1	1	0	1	1	0	0	0	0	0	0	0.8	2
10-Jul	0	2	2	2	Z	1	1	0	0	1	1	1	0	0	0	0	1	3	1	0	0	0	4	2	1.0	4
11-Jul	1	1	2	2	2	Z	4	4	2	1	1	2	2	2	2	1	1	2	3	3	3	3	3	2	2.0	4
12-Jul	Z	3	2	2	2	2	2	2	3	3	3	2	2	3	2	2	3	2	2	2	2	1	1	1	2.1	3
13-Jul	1	Z	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	10	2	1	0	0	1.3	10
14-Jul	1	2	Z	1	1	1	4	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1.0	4
15-Jul	1	1	1	Z	2	1	1	1	1	1	1	1	1	1	1	3	6	1	1	1	3	5	2	1	1.5	6
16-Jul	2	1	1	1	Z	1	1	1	1	1	1	2	3	2	1	1	1	1	1	1	1	1	1	2	1.1	3
17-Jul	3	4	5	4	4	Z	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1.5	5
18-Jul	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0.7	1
19-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	2	2	0.5	2
20-Jul	1	1	Z	1	1	2	1	1	1	C	C	C	C	C	C	1	0	0	0	0	0	1	1	3	--	3
21-Jul	0	0	0	Z	0	0	1	0	1	0	1	0	0	0	0	0	0	0	0	1	1	1	1	1	0.4	1
22-Jul	1	2	3	2	Z	1	1	1	1	2	2	1	1	1	1	1	1	1	0	1	0	1	1	1	1.0	3
23-Jul	1	1	0	0	0	Z	0	0	0	0	0	0	0	1	1	0	1	1	0	0	0	0	0	0	0.4	1
24-Jul	Z	0	1	2	1	1	1	1	1	0	1	0	1	0	0	0	0	0	0	0	7	4	1	0	1.0	7
25-Jul	1	Z	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1	1	1	1	1	6	4	1.0	6
26-Jul	0	0	Z	0	0	0	0	1	1	2	4	5	4	3	2	1	1	1	1	1	1	1	0	1	1.3	5
27-Jul	3	1	1	Z	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1	2	2	1	1	0.8	3
28-Jul	0	2	4	3	Z	1	1	1	1	1	0	0	0	0	0	0	0	1	2	1	1	2	3	1	1.0	4
29-Jul	1	2	6	4	1	Z	1	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.9	6
30-Jul	Z	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0	0	1	1	0	1	0	0.4	1
31-Jul	0	Z	0	0	2	2	1	1	1	1	1	1	1	1	0	0	0	0	0	1	1	1	2	1	0.7	2
1.6 1.3 1.9 1.6 1.1 1.3 1.1 1.1 1.0 1.0 1.0 0.9 1.0 1.0 1.0 0.9 1.0 1.1 1.2 1.5 1.5 1.5 1.5 1.2																								Diurnal Average		
17 4 8 5 4 8 4 4 3 3 4 5 4 3 5 4 6 6 6 7 10 8 11 8 4																								Diurnal Maximum		

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







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

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Anzac - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	707	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



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

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Anzac - July 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	25	13	7	12	9	23	24	28	40	32	42	41	92	165	82	71	706
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	25	13	7	12	9	23	24	28	40	32	42	41	92	165	82	71	706

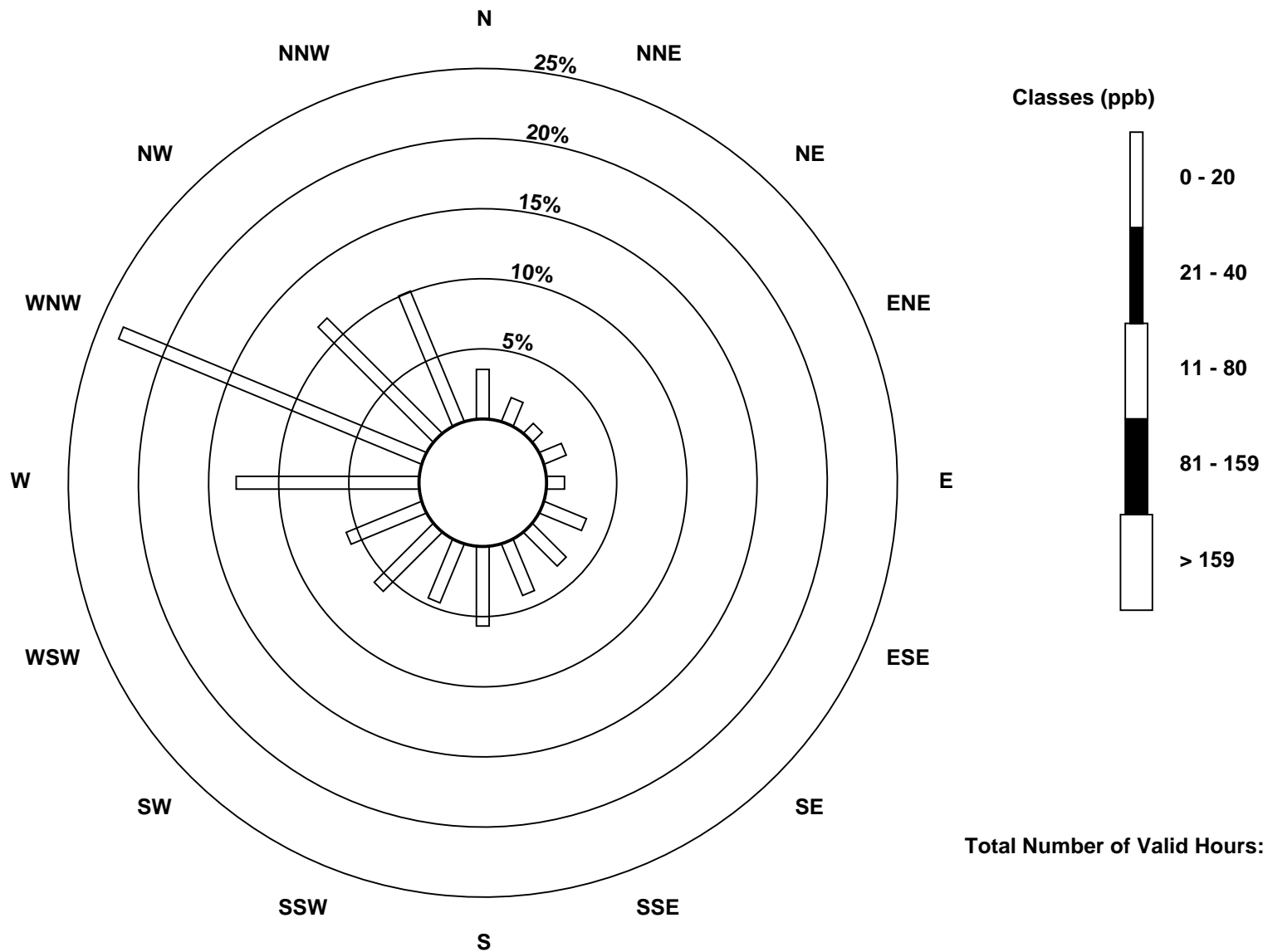
Total Number of Valid Hours: 706

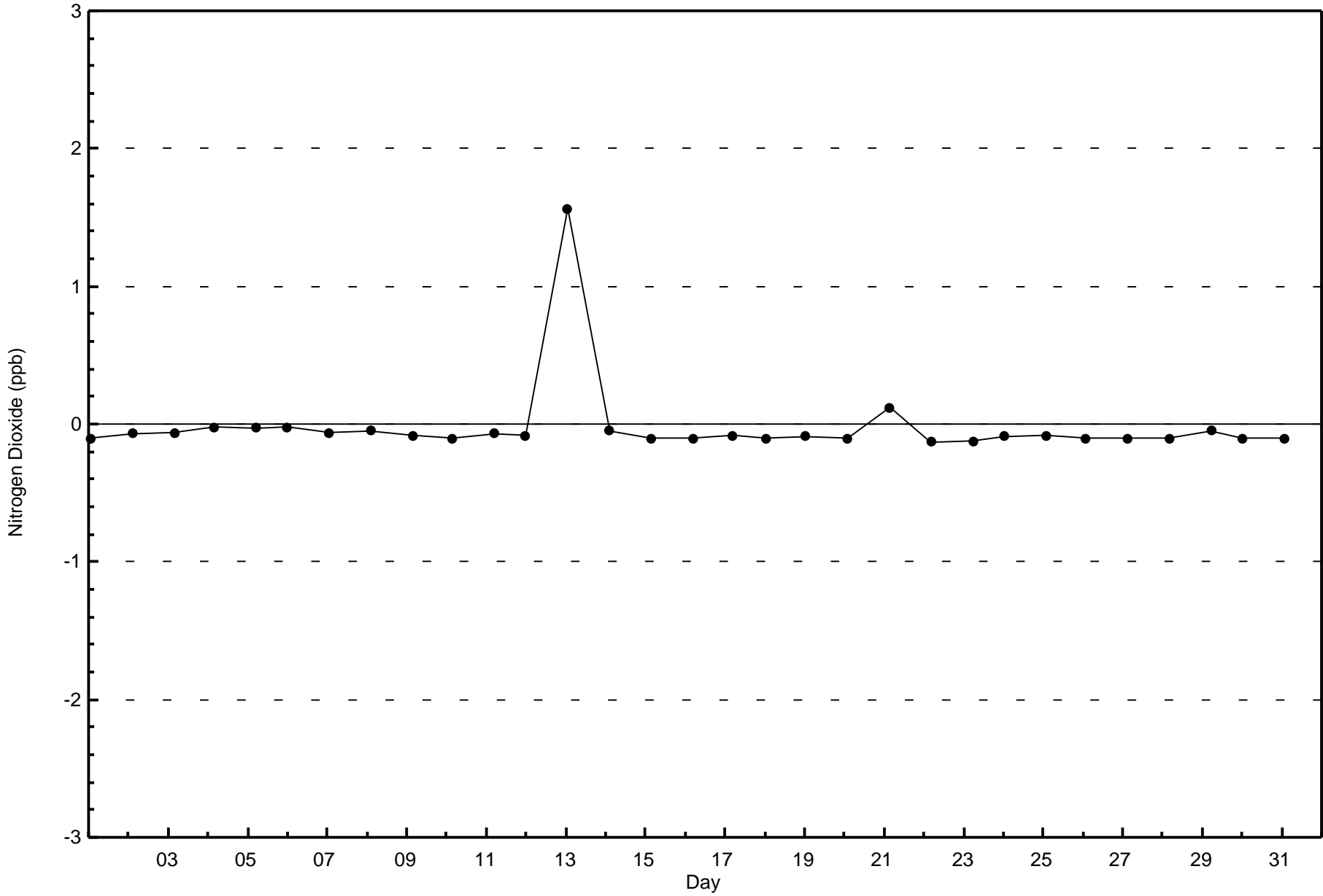
Total Number of Hours: 744

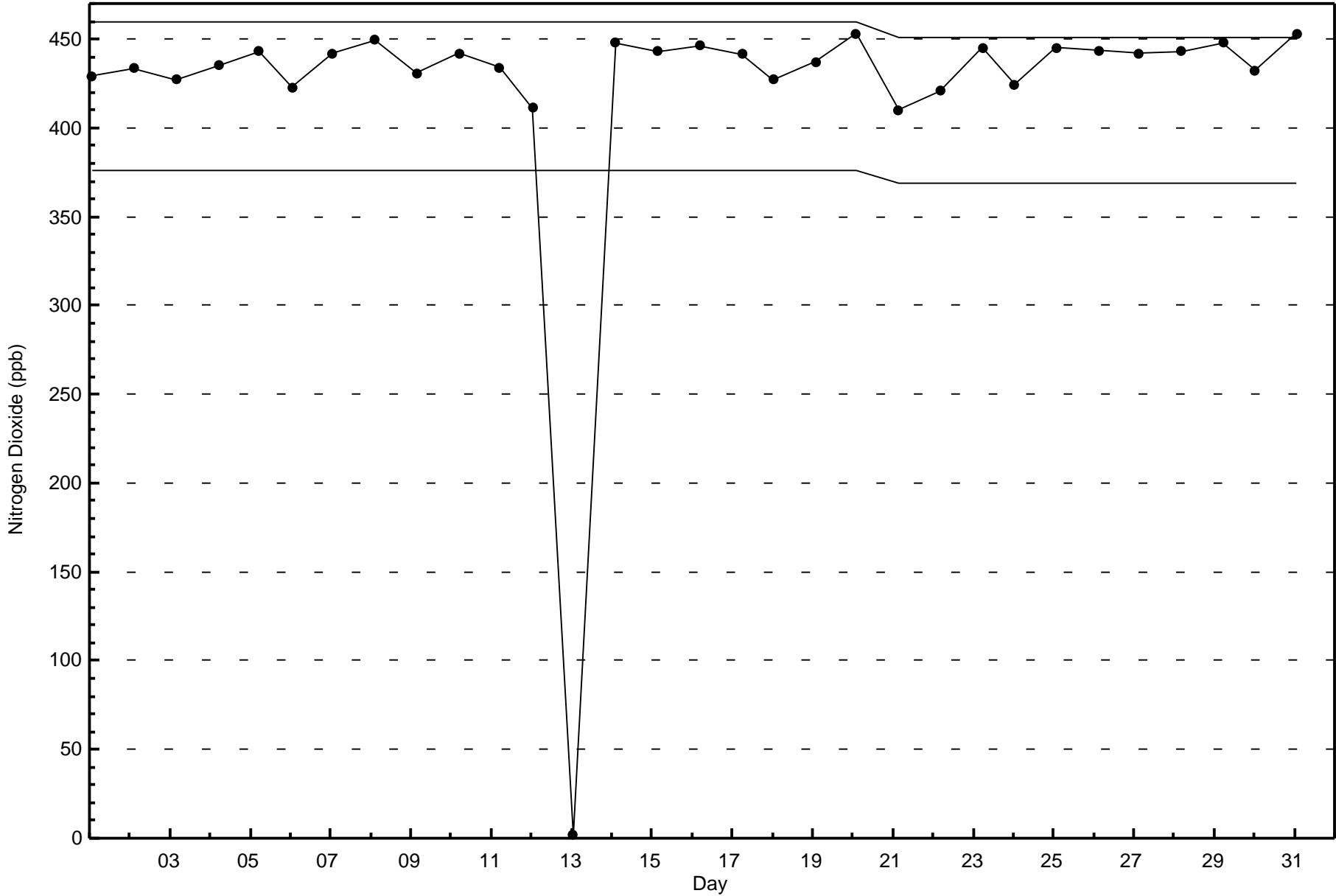


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Anzac (AMS 14)

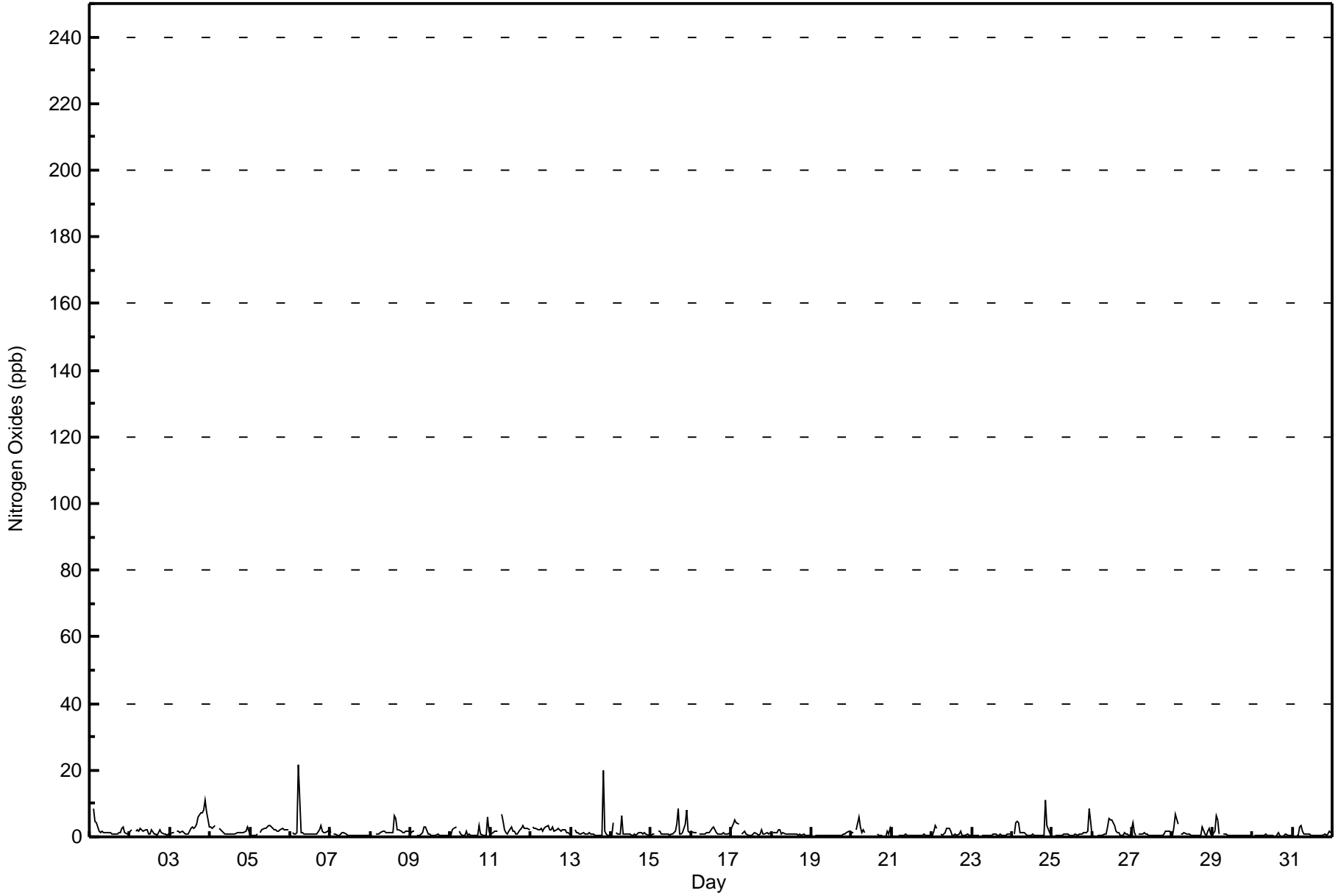








Maximum Value: 22 ppb on Jul 6 06:00														Maximum Daily Average: 3.4 ppb on Jul 3														Hours in Service: 744	
Minimum Value: 0 ppb on Jul 20 20:00														Minimum Daily Average: 0.4 ppb on Jul 21														Hours of Data: 707	
Maximum Diurnal Average: 2.2 ppb at hour 3														Minimum Diurnal Average: 1.0 ppb at hour 12														Hours of Missing Data: 37	
Monthly Average: 1.4 ppb														Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 1 Q <sub>3</sub> = 2 P <sub>90</sub> = 3 P <sub>99</sub> = 8														Hours of Calibration: 37	
																												Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Jul	17	Z	8	5	4	2	1	2	1	1	1	1	1	1	1	1	1	1	1	3	3	1	1	1	2.6	17			
2-Jul	2	2	Z	2	2	2	3	2	2	2	2	1	1	2	1	1	1	1	2	1	1	1	1	1	1.4	3			
3-Jul	1	1	1	Z	2	2	1	1	1	1	1	1	3	3	3	3	4	6	7	7	8	11	8	3	3.4	11			
4-Jul	3	2	3	3	Z	3	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	2	3	2	1.7	3			
5-Jul	0	0	0	1	1	Z	1	2	2	2	3	3	3	3	2	2	2	2	2	2	2	2	2	2	1.9	3			
6-Jul	Z	1	1	1	1	22	1	1	1	1	1	1	1	1	1	1	1	2	3	2	1	1	2	2	2.2	22			
7-Jul	1	Z	1	1	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0.6	1			
8-Jul	0	1	Z	1	1	1	1	2	2	1	1	1	1	1	6	6	2	2	2	1	1	2	2	2	1.7	6			
9-Jul	1	2	2	Z	0	0	1	1	3	3	1	1	1	1	0	0	1	1	0	0	0	0	0	0	0.9	3			
10-Jul	0	2	3	3	Z	2	1	1	0	2	1	1	0	0	0	0	1	3	1	0	0	0	6	2	1.3	6			
11-Jul	1	1	2	2	2	Z	7	5	2	1	1	2	3	2	2	1	1	2	2	4	3	3	2	2	2.2	7			
12-Jul	Z	3	2	2	2	2	2	2	3	3	3	2	2	3	2	2	2	2	2	2	2	1	1	1	2.2	3			
13-Jul	1	Z	2	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	20	2	1	0	0	0	1.7	20			
14-Jul	1	4	Z	1	1	1	6	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1.2	6			
15-Jul	1	1	1	Z	2	2	1	1	1	1	1	1	1	1	2	4	8	1	1	1	4	8	2	1	1.9	8			
16-Jul	2	1	1	1	Z	1	1	1	1	1	1	1	2	3	2	1	1	1	1	1	1	1	1	1	1.3	3			
17-Jul	3	4	5	4	4	Z	1	1	2	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1.6	5			
18-Jul	Z	1	1	1	2	2	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	0	0	0.9	2			
19-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	2	2	0.5	2		
20-Jul	1	1	Z	2	6	3	1	2	1	C	C	C	C	C	C	1	0	0	0	0	0	2	1	2	--	6			
21-Jul	0	0	0	Z	0	0	1	0	1	0	1	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0.4	1		
22-Jul	1	2	3	3	Z	1	1	1	1	2	3	2	1	1	1	1	1	2	0	0	0	1	1	1	1.2	3			
23-Jul	1	0	0	0	0	Z	0	1	0	0	0	0	0	1	1	0	1	1	0	0	0	1	1	1	0.5	1			
24-Jul	Z	1	4	5	4	1	1	1	1	0	1	0	1	0	0	0	0	0	0	0	11	4	1	0	1.7	11			
25-Jul	0	Z	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1	1	1	1	2	8	5	1.2	8			
26-Jul	0	0	Z	0	0	0	0	1	1	3	6	5	5	3	2	1	1	1	0	1	1	1	1	1	1.6	6			
27-Jul	4	1	0	Z	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1	2	2	2	1	0.9	4			
28-Jul	1	3	7	4	Z	1	1	1	1	1	1	0	0	0	0	0	0	1	3	1	1	2	3	1	1.3	7			
29-Jul	0	2	6	5	1	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.0	6			
30-Jul	Z	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0	0	1	1	0	1	0	0.4	1			
31-Jul	1	Z	1	0	3	3	2	1	1	1	1	0	1	1	0	0	0	0	0	1	1	1	2	1	0.9	3			
1.7 1.5 2.2 1.9 1.6 2.0 1.4 1.3 1.2 1.2 1.1 1.0 1.1 1.0 1.1 1.1 1.1 1.2 1.3 1.8 1.7 1.7 1.7 1.2																								Diurnal Average					
17 4 8 5 6 22 7 5 3 3 6 5 5 3 6 6 6 8 6 7 20 11 11 8 5																								Diurnal Maximum					
Z - zerospan C - Calibration																													







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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Anzac - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	706	99.86	99.86
21 - 40	1	0.14	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Anzac - July 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	25	13	7	12	9	23	24	28	40	32	41	41	92	165	82	71	705
21 - 40	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	25	13	7	12	9	23	24	28	40	32	42	41	92	165	82	71	706

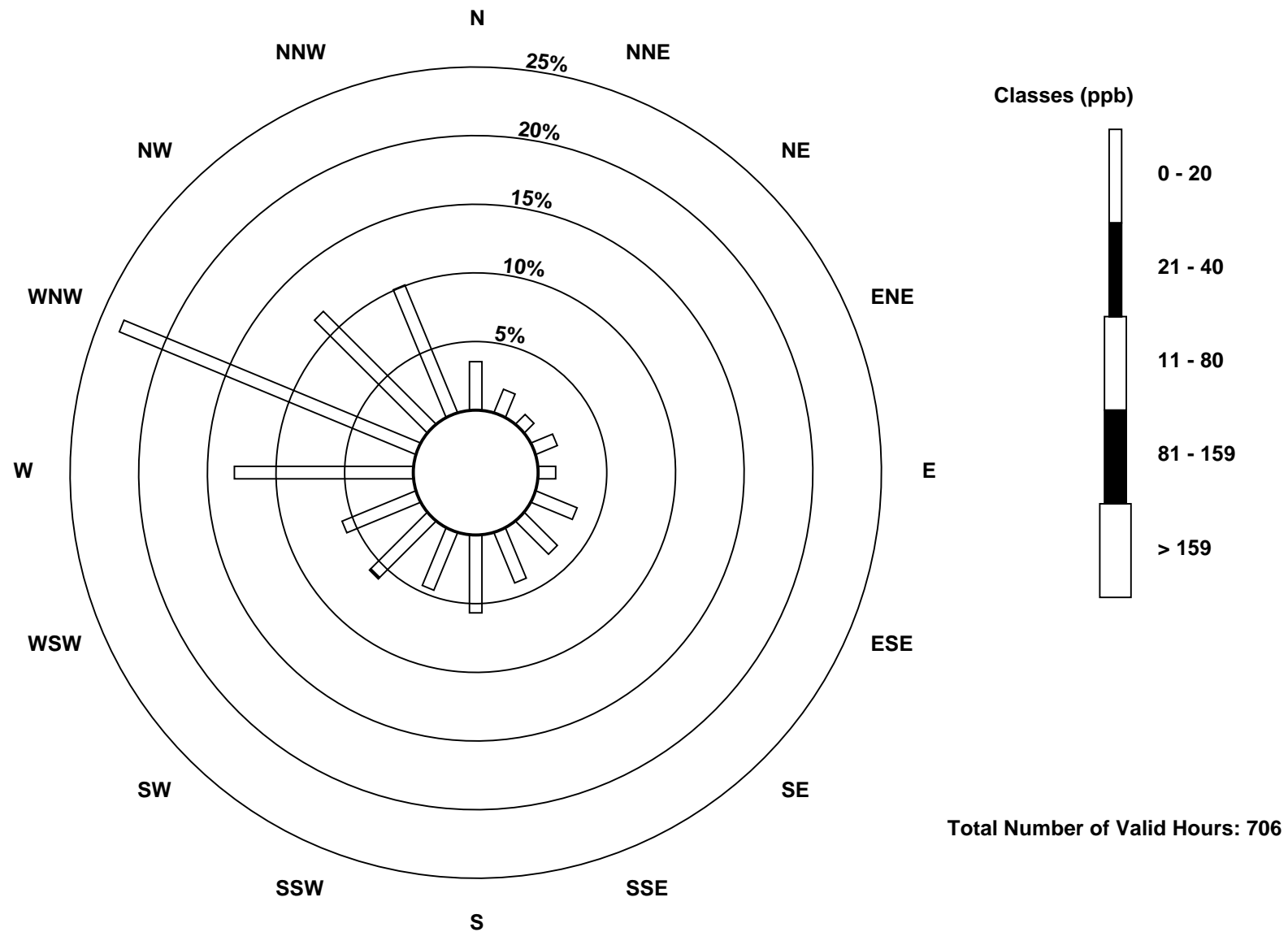
Total Number of Valid Hours: 706

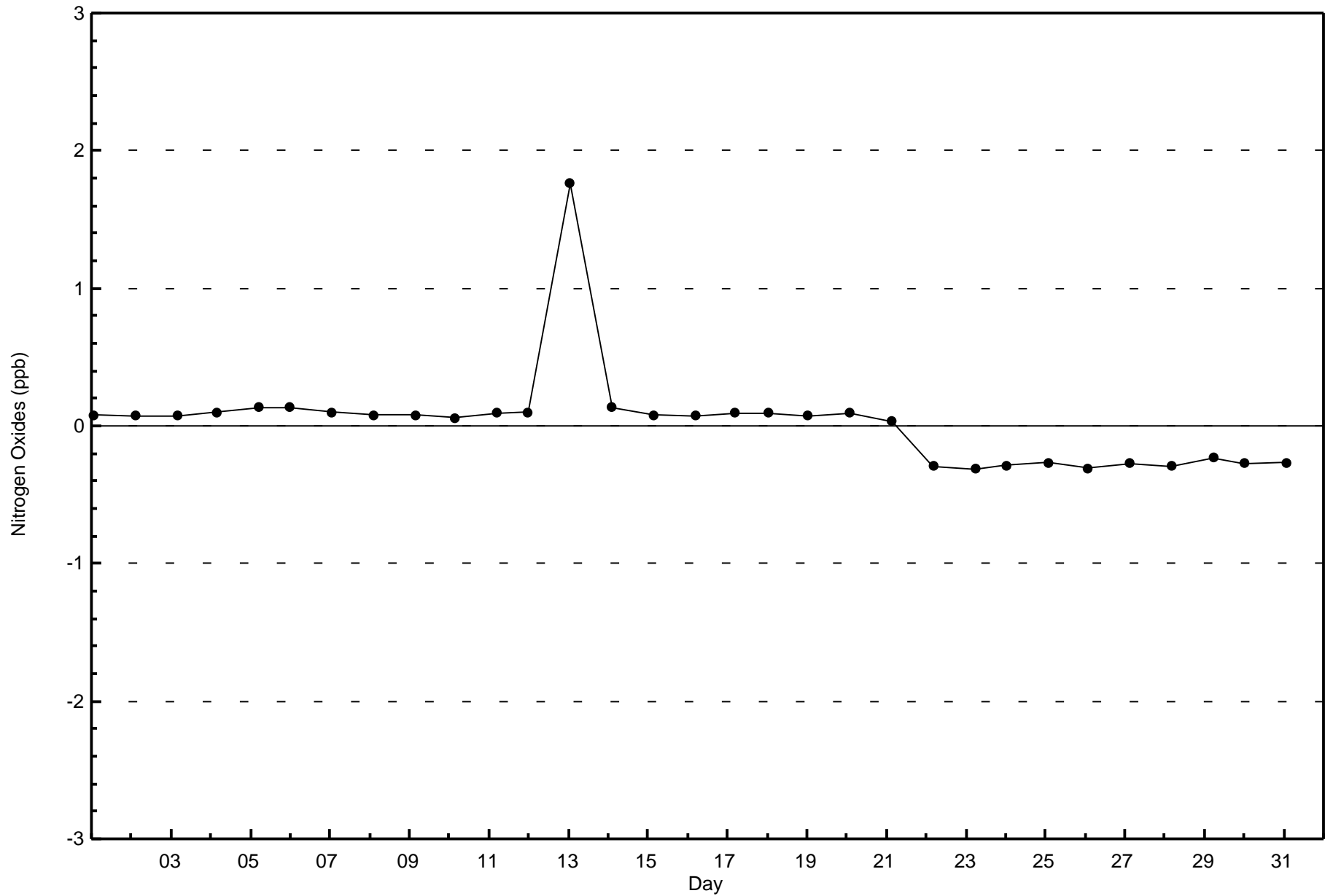
Total Number of Hours: 744

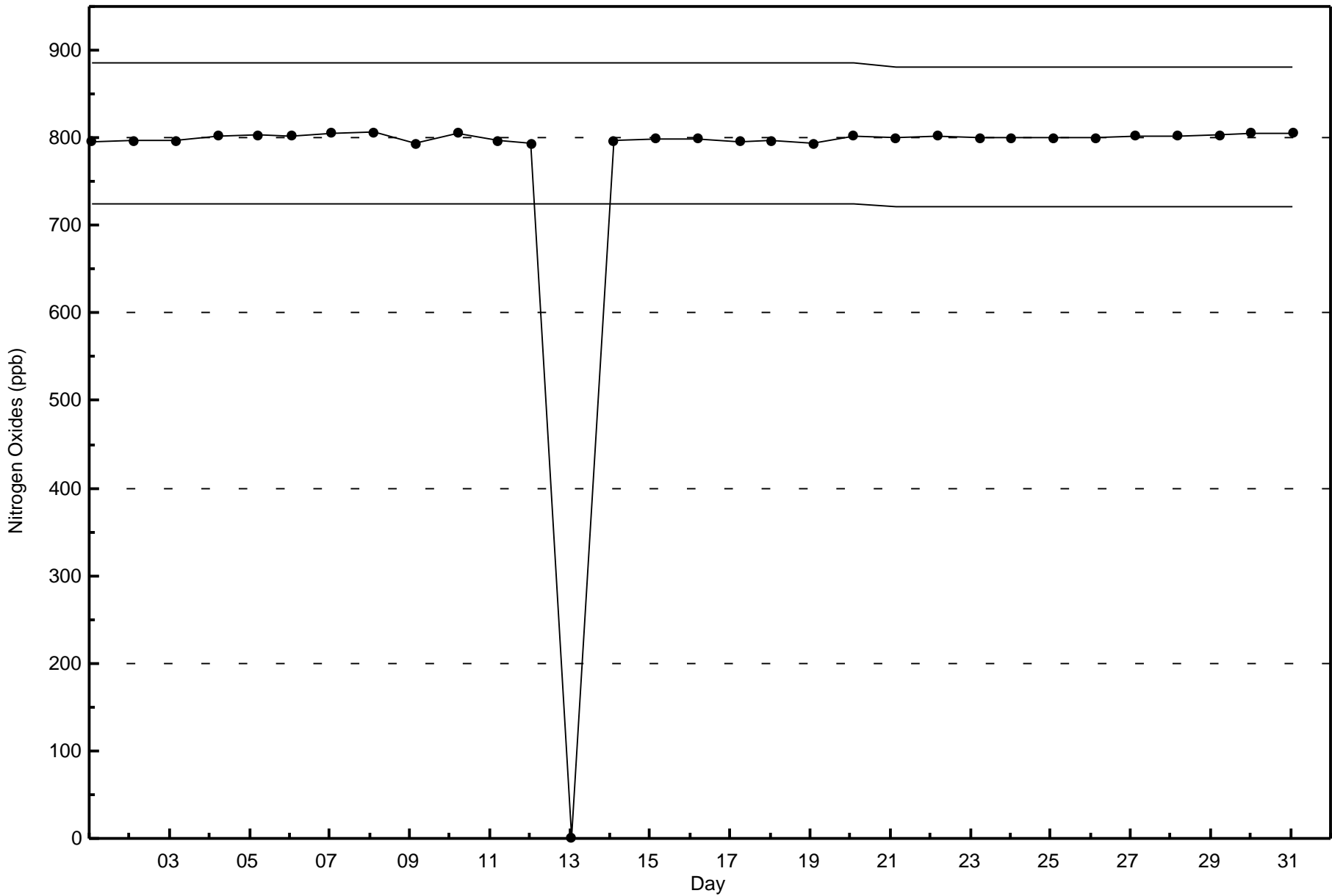


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Anzac (AMS 14)









# Wood Buffalo Environmental Association

## Summary of Hour Averages

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

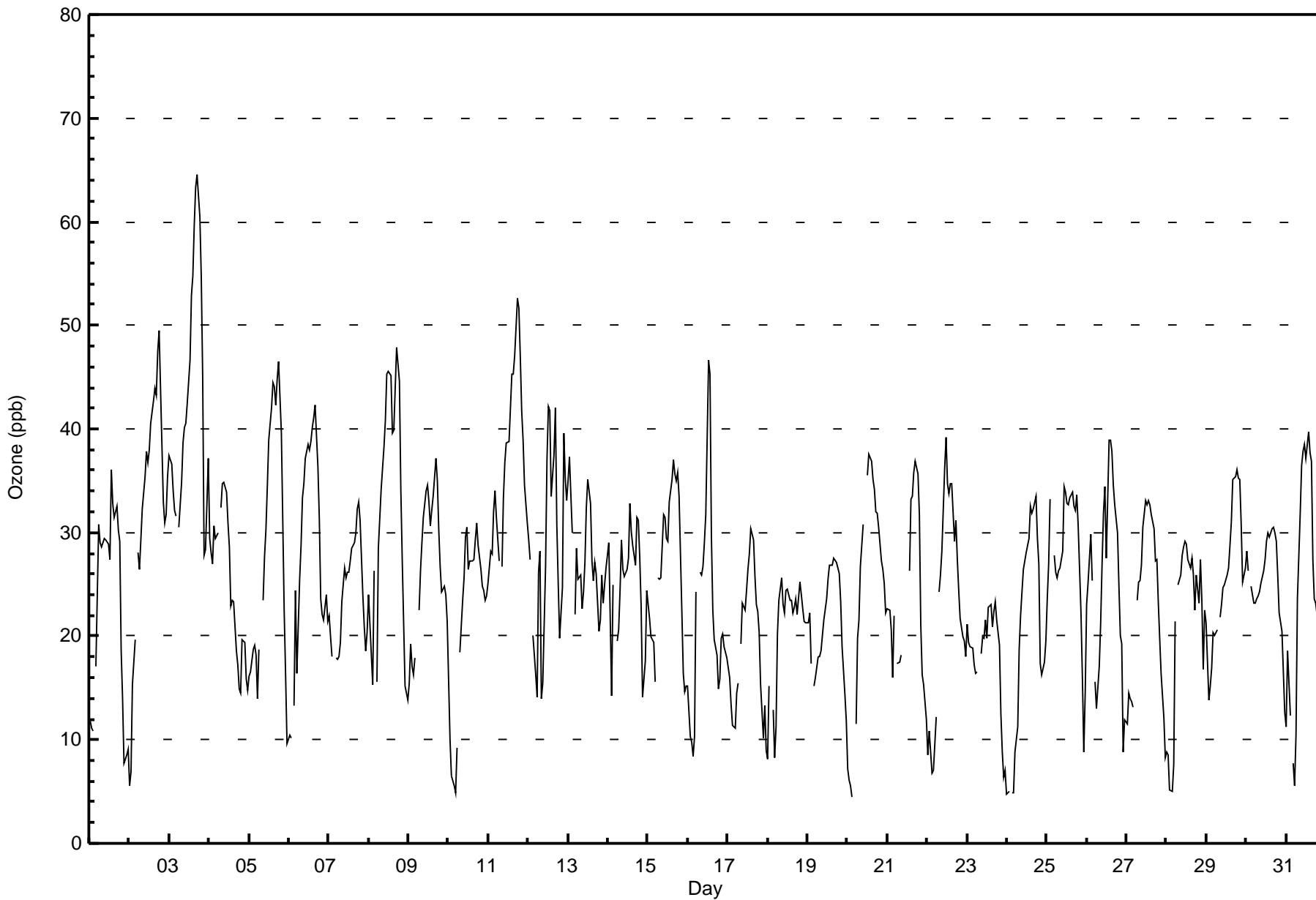
Anzac - July 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																																						
Maximum Value: 65 ppb on Jul 3 18:00										Maximum Daily Average: 43.2 ppb on Jul 3										Hours of Data: 707																												
Minimum Value: 5 ppb on Jul 20 04:00										Minimum Daily Average: 18.1 ppb on Jul 23										Hours of Missing Data: 37																												
Maximum Diurnal Average: 33.8 ppb at hour 14										Minimum Diurnal Average: 17.1 ppb at hour 5										Hours of Calibration: 35																												
Monthly Average: 25.7 ppb										Percentiles: P <sub>1</sub> = 5 P <sub>10</sub> = 13 Q <sub>1</sub> = 19 Median = 26 Q <sub>3</sub> = 32 P <sub>90</sub> = 38 P <sub>99</sub> = 52										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-Jul	12	11	11	Z	17	31	29	29	29	29	29	29	27	36	33	31	32	30	29	19	14	8	9	9	23.2	36																						
2-Jul	6	7	15	20	Z	28	26	29	32	35	38	37	38	41	43	44	43	47	50	44	33	31	32	35	32.8	50																						
3-Jul	37	37	34	32	32	Z	31	35	39	40	41	42	47	53	55	60	63	65	60	55	45	28	28	37	43.2	65																						
4-Jul	29	28	27	31	29	30	Z	32	35	35	34	31	29	23	23	23	19	17	15	14	20	19	16	15	25.0	35																						
5-Jul	16	17	19	19	18	14	19	Z	23	28	30	34	39	42	44	44	42	45	46	40	31	22	16	10	28.7	46																						
6-Jul	10	10	Z	13	24	16	25	29	33	35	37	39	38	39	40	41	42	36	31	24	22	22	24	21	28.4	42																						
7-Jul	22	20	18	Z	18	18	18	19	23	27	26	26	26	27	28	29	30	32	33	31	24	21	19	20	24.2	33																						
8-Jul	24	21	15	26	Z	16	28	34	36	38	41	45	46	45	40	40	44	48	45	34	27	21	15	14	32.3	48																						
9-Jul	15	19	17	16	18	Z	23	26	29	31	34	35	33	31	32	34	37	35	30	27	24	25	24	21	26.8	37																						
10-Jul	16	10	6	6	5	9	Z	18	24	26	30	31	26	27	27	27	29	31	29	26	25	24	24	24	21.7	31																						
11-Jul	25	28	28	32	34	31	27	Z	27	33	37	39	39	42	45	45	47	53	52	47	42	39	35	31	37.3	53																						
12-Jul	29	27	Z	20	16	14	26	28	14	15	27	37	42	42	33	38	42	31	25	20	25	40	35	33	28.7	42																						
13-Jul	35	37	30	Z	22	28	25	26	23	24	27	32	35	33	27	25	27	26	20	22	26	23	25	27	27.3	37																						
14-Jul	29	22	14	25	Z	20	21	24	29	26	26	26	28	33	30	29	27	32	31	28	23	14	18	24	25.1	33																						
15-Jul	23	22	20	19	16	Z	26	25	26	32	31	29	29	33	35	37	36	35	36	33	22	16	15	15	26.6	37																						
16-Jul	15	10	10	8	10	24	Z	26	26	27	29	32	47	45	30	23	20	18	15	16	20	20	19	18	22.0	47																						
17-Jul	17	16	13	11	11	14	15	Z	19	23	22	24	26	28	30	29	26	23	22	20	15	10	13	9	19.2	30																						
18-Jul	8	15	Z	13	8	11	20	23	26	23	22	24	25	24	24	22	23	24	22	25	24	23	21	21	20.5	26																						
19-Jul	21	22	17	Z	15	16	18	18	19	20	22	24	25	27	27	27	28	27	27	26	23	19	14	12	21.5	28																						
20-Jul	7	6	6	5	Z	11	20	22	27	31	M	M	36	38	37	35	34	32	32	31	27	26	25	22	24.2	38																						
21-Jul	23	23	21	16	22	Z	17	17	18	C	C	C	C	26	33	34	36	37	36	32	21	16	15	12	23.9	37																						
22-Jul	9	11	9	7	7	12	Z	24	26	28	36	39	35	34	35	35	29	31	27	24	22	20	20	18	23.3	39																						
23-Jul	21	19	19	19	17	16	Z	18	20	20	22	20	23	23	21	22	23	22	19	12	9	6	7	18.1	23																							
24-Jul	5	5	Z	5	5	9	11	19	22	24	26	28	29	29	33	32	32	33	29	27	17	16	18	20	20.6	33																						
25-Jul	24	27	33	Z	28	26	26	26	27	28	34	34	33	33	33	34	33	32	34	31	22	16	9	14	27.7	34																						
26-Jul	23	25	30	25	Z	16	13	17	21	27	32	34	27	39	39	38	35	33	30	25	20	19	9	12	25.6	39																						
27-Jul	12	14	14	14	13	Z	23	25	25	27	30	33	33	33	33	32	30	27	27	23	20	16	12	8	22.9	33																						
28-Jul	9	9	5	5	8	21	Z	25	26	28	29	29	29	27	27	28	26	22	26	23	27	23	17	22	21.3	29																						
29-Jul	21	14	15	17	20	20	21	Z	22	23	25	25	26	27	29	31	35	35	36	35	35	31	25	27	25.8	36																						
30-Jul	28	26	Z	25	23	23	24	24	24	25	26	27	29	30	30	30	31	30	29	26	22	21	17	13	25.3	31																						
31-Jul	11	19	12	Z	8	6	10	24	32	37	38	39	37	40	38	37	27	24	23	21	18	14	15	11	23.4	40																						
																								18.8	18.6	17.7	17.2	17.1	18.6	21.5	24.9	25.8	28.2	30.3	32.0	32.6	33.8	33.4	33.4	33.1	32.7	31.3	28.0	24.2	21.1	19.0	18.8	Diurnal Average
																								37	37	34	32	34	31	31	35	39	40	41	45	47	53	55	60	63	65	60	55	45	40	35	37	Diurnal Maximum
Z - zerospan      C - Calibration      M - Maintenance																																																
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb																																																



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

**Ozone (O<sub>3</sub>) - ppb**  
**Anzac - July 2015**





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

**Ozone (O<sub>3</sub>) - ppb**  
**Anzac - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	207	29.28	29.28
21 - 50	491	69.45	98.73
51 - 82	9	1.27	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744





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

**Ozone (O<sub>3</sub>) - ppb**  
**Anzac - July 2015**

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	7	1	0	3	2	3	4	5	17	15	27	21	23	22	33	24	207
21 - 50	19	12	7	7	6	21	18	24	25	18	17	17	69	141	47	42	490
51 - 82	0	0	0	2	0	0	0	0	0	0	0	0	0	1	3	3	9
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	26	13	7	12	8	24	22	29	42	33	44	38	92	164	83	69	706

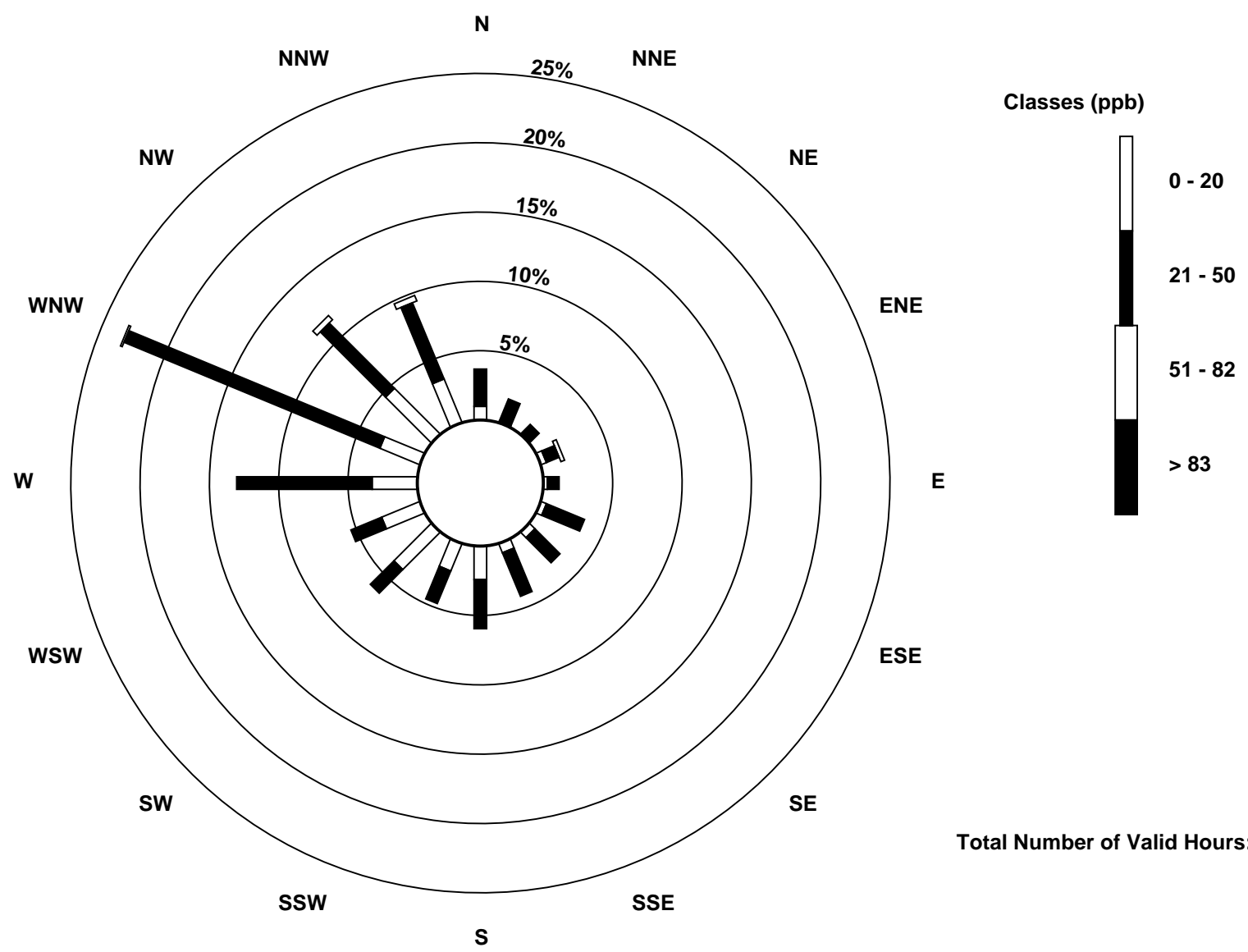
Total Number of Valid Hours: 706

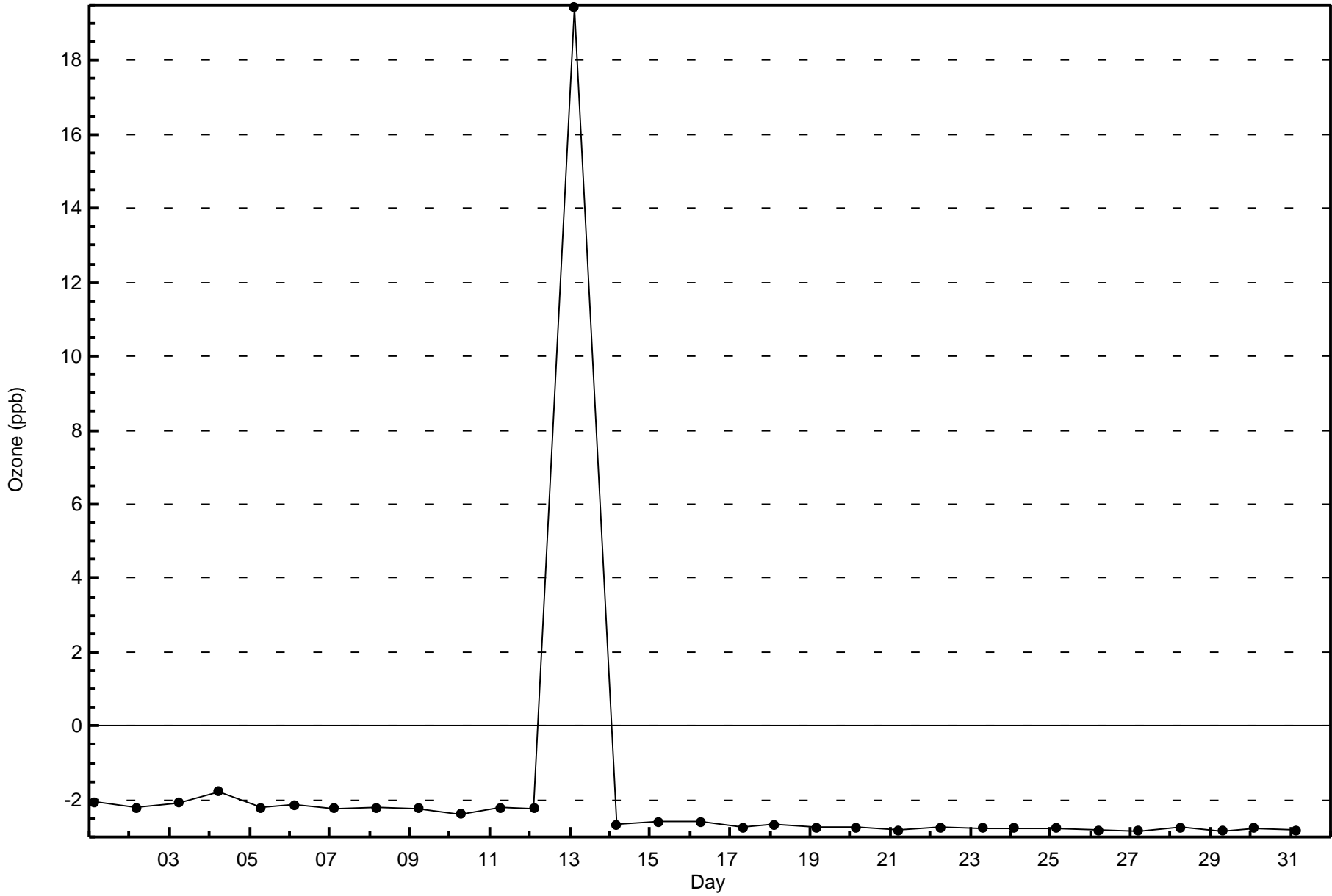
Total Number of Hours: 744

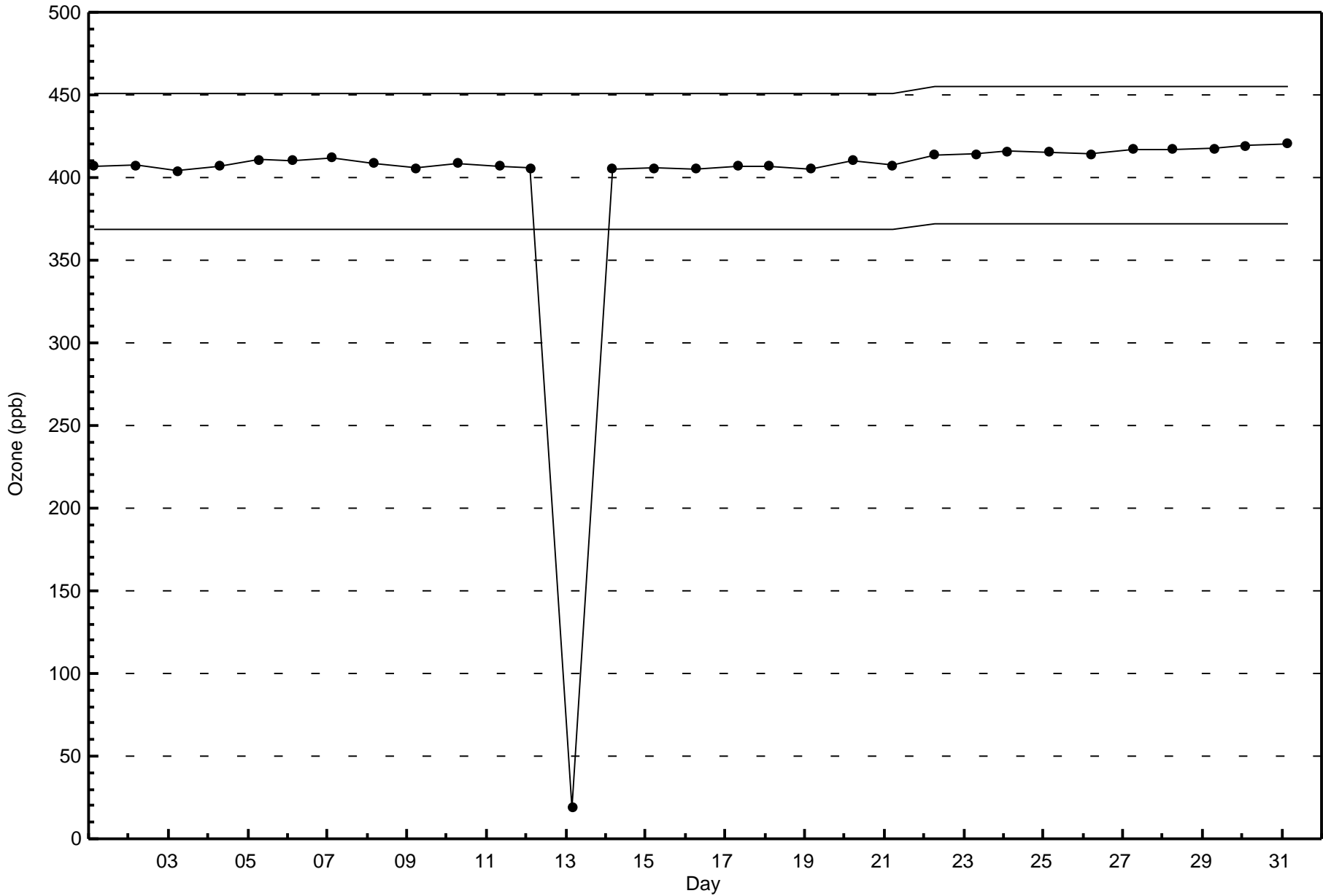


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Ozone (O<sub>3</sub>) - ppb  
Anzac (AMS 14)









Summary of Hour Averages

Anzac - July 2015

Number of Exceedences (AAAQO): 24-hr: 5	Hours in Service: 744
Maximum Value: 337.0 µg/m <sup>3</sup> on Jul 11 22:00	Maximum Daily Average: 145.2 µg/m <sup>3</sup> on Jul 11
Minimum Value: 0.6 µg/m <sup>3</sup> on Jul 27 15:00	Hours of Data: 724
Maximum Diurnal Average: 34.3 µg/m <sup>3</sup> at hour 20	Hours of Missing Data: 20
Monthly Average: 21.86 µg/m <sup>3</sup>	Hours of Calibration: 0
Minimum Daily Average: 3.3 µg/m <sup>3</sup> on Jul 30	Percent Operational Time: 97.3
Minimum Diurnal Average: 9.7 µg/m <sup>3</sup> at hour 12	
Percentiles: P <sub>1</sub> = 0.9 P <sub>10</sub> = 1.8 O <sub>1</sub> = 3.1 Median = 6.4 O <sub>3</sub> = 12.4 P <sub>90</sub> = 53.5 P <sub>99</sub> = 273.3	

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	182.9	158.5	142.7	121.6	103.4	33.5	27.9	38.1	30.6	29.6	30.9	41.9	37.9	31.4	45.7	39.4	43.7	43.0	30.2	29.1	30.8	31.6	33.9	34.1	57.2	182.9
2-Jul	40.3	66.8	61.7	79.9	84.0	86.2	90.3	96.2	89.0	47.4	32.1	7.1	9.0	11.0	10.2	10.2	8.3	12.8	19.4	16.1	11.9	10.0	8.3	9.8	38.2	96.2
3-Jul	22.0	42.4	46.8	46.4	39.0	25.2	12.0	6.6	4.2	3.8	4.4	25.8	149.3	132.6	120.4	92.5	121.2	209.4	271.5	282.2	282.8	277.1	252.1	119.4	107.9	282.8
4-Jul	101.7	89.9	141.0	189.4	251.7	125.1	72.8	57.5	47.5	36.5	31.7	38.1	66.7	AF	AF	AF	AF	AF	122.9	113.4	68.7	56.2	42.5	12.4	87.7	251.7
5-Jul	3.4	2.5	1.5	2.0	2.5	2.5	2.4	1.8	UO	2.7	2.5	3.4	3.3	3.5	3.8	4.2	3.9	4.7	5.6	6.6	7.9	9.5	12.6	11.9	4.6	12.6
6-Jul	12.7	13.2	14.7	16.5	14.0	12.8	11.4	13.2	10.7	12.4	8.7	6.6	5.7	4.5	3.4	2.9	3.9	13.8	32.9	14.3	1.8	1.7	2.3	2.1	9.8	32.9
7-Jul	2.8	2.7	5.4	6.8	5.7	7.5	8.4	9.9	7.6	3.3	2.1	1.3	0.8	1.0	1.0	1.1	1.6	2.4	2.4	2.7	3.2	4.1	4.6	4.9	3.9	9.9
8-Jul	9.7	14.5	16.3	15.6	20.1	17.0	20.7	17.9	11.5	9.4	11.6	23.0	20.9	20.9	23.7	20.7	21.0	25.2	16.1	15.2	31.7	68.6	71.4	89.5	25.5	89.5
9-Jul	92.7	77.0	44.8	15.0	5.6	3.7	4.0	4.6	5.1	4.9	4.4	4.3	4.1	3.9	3.1	2.9	3.1	4.4	5.3	4.9	2.4	1.8	1.8	2.1	12.7	92.7
10-Jul	2.9	2.2	2.2	2.6	4.4	4.2	4.1	2.1	1.4	1.6	2.7	3.0	1.9	2.7	2.6	2.7	3.4	4.2	3.8	4.1	6.6	8.9	15.4	28.1	4.9	28.1
11-Jul	54.4	110.9	122.2	145.2	132.1	151.2	166.1	160.0	119.3	92.5	69.7	42.7	56.6	47.6	49.4	46.8	54.8	184.5	226.0	290.7	329.5	337.0	291.8	204.1	145.2	337.0
12-Jul	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	121.9	124.5	136.4	151.0	170.8	177.6	168.5	168.9	146.0	17.4	8.2	7.6	--	177.6
13-Jul	7.9	7.9	8.8	10.5	10.3	8.2	7.9	8.5	9.5	8.5	9.0	18.8	22.0	13.7	13.5	13.9	9.9	10.0	10.8	15.1	8.2	7.5	4.4	3.6	10.3	22.0
14-Jul	4.2	3.5	3.7	5.2	8.6	27.3	47.4	28.0	16.7	19.9	14.3	4.3	5.5	5.2	3.5	2.6	4.0	2.8	2.1	2.5	3.3	3.1	2.3	1.9	9.2	47.4
15-Jul	1.9	2.8	2.9	3.4	6.0	22.8	57.9	49.5	40.3	15.9	8.4	5.8	5.6	5.1	5.6	4.0	3.1	2.6	3.1	6.0	8.9	13.2	17.6	21.4	13.1	57.9
16-Jul	23.2	24.2	24.4	22.5	21.5	11.9	6.3	5.3	4.8	6.4	7.5	15.0	9.3	9.2	11.9	8.1	5.4	7.7	19.5	24.2	13.4	9.4	6.2	6.0	12.6	24.4
17-Jul	5.6	5.6	8.2	7.4	6.3	6.5	6.9	6.8	7.3	6.9	6.2	7.0	7.4	11.5	12.2	8.9	12.3	10.2	6.8	6.4	7.1	7.7	7.6	8.3	7.8	12.3
18-Jul	9.7	11.6	10.0	9.2	9.0	8.5	9.0	12.4	5.6	4.7	3.6	4.1	4.3	4.2	3.9	3.9	4.1	5.6	3.7	3.4	1.7	1.7	2.2	3.6	5.8	12.4
19-Jul	4.1	3.2	4.8	10.4	14.5	10.0	9.2	9.5	8.2	13.3	10.0	6.0	4.0	3.2	1.8	1.6	3.1	4.5	5.9	5.4	3.4	3.5	4.8	5.8	6.3	14.5
20-Jul	6.6	7.5	6.9	6.8	7.5	10.3	6.7	2.7	3.1	2.8	2.7	2.9	2.7	2.5	2.5	2.6	3.6	6.7	7.1	7.4	8.4	9.1	9.4	9.1	5.7	10.3
21-Jul	8.8	8.6	8.1	6.3	2.9	1.9	1.9	2.5	3.4	2.0	1.7	1.7	1.9	M	M	1.7	1.4	2.3	4.3	5.9	7.2	7.1	6.6	7.4	4.3	8.8
22-Jul	9.2	9.9	9.9	10.5	9.4	7.6	6.7	6.0	6.9	7.4	6.4	5.0	3.9	3.2	2.9	2.6	2.8	2.9	2.5	3.1	3.1	3.7	3.7	3.5	5.5	10.5
23-Jul	4.1	5.7	6.1	6.0	7.0	9.0	8.1	7.1	7.8	6.7	4.6	2.6	2.5	1.8	1.7	1.5	1.6	1.6	1.4	1.6	3.0	4.6	6.9	7.5	4.6	9.0
24-Jul	8.6	9.6	9.3	8.9	8.6	7.6	4.5	1.8	1.8	1.9	1.9	2.0	2.3	2.4	2.6	2.5	2.6	2.7	2.6	3.6	7.0	6.4	5.7	5.2	4.7	9.6
25-Jul	5.8	6.9	6.3	5.7	4.5	1.9	1.6	1.7	1.8	1.7	1.3	1.1	1.3	1.3	1.3	1.3	1.3	2.1	5.1	8.1	9.7	8.9	9.5	7.2	4.1	9.7
26-Jul	4.8	5.4	5.2	5.2	5.8	5.9	5.6	4.8	4.4	7.5	8.6	10.2	16.5	7.5	2.7	2.1	1.5	2.0	3.5	6.7	6.4	8.6	8.9	8.3	6.2	16.5
27-Jul	8.7	8.9	7.0	7.3	6.9	6.8	5.8	4.9	50.1	1.4	0.9	0.7	0.6	0.6	0.6	0.6	0.7	1.4	1.8	2.9	5.8	8.0	10.0	8.4	6.3	50.1
28-Jul	7.3	9.8	9.8	9.3	9.1	9.2	4.3	3.8	2.9	2.5	1.5	1.4	1.4	1.4	1.5	1.4	1.3	1.6	2.1	1.8	2.9	4.7	6.7	4.4	4.3	9.8
29-Jul	4.9	7.3	9.4	7.4	4.6	3.9	3.7	3.6	3.1	2.1	1.8	1.5	1.5	1.5	1.6	1.5	1.6	2.7	3.5	4.2	4.7	5.8	6.6	6.5	4.0	9.4
30-Jul	5.2	4.2	3.5	3.0	2.8	3.0	3.1	3.2	2.2	1.9	1.8	1.7	1.8	1.8	2.0	1.9	1.9	1.9	1.9	2.4	5.0	6.2	8.5	9.0	3.3	9.0
31-Jul	8.2	5.6	5.5	4.9	6.1	6.4	5.8	3.6	2.0	1.8	2.0	2.1	2.3	2.9	3.0	3.3	3.2	2.8	2.8	3.1	3.5	4.8	8.6	9.0	4.3	9.0

22.1	24.3	25.0	26.4	27.1	21.3	20.7	19.1	17.5	12.0	9.8	9.7	18.6	15.9	16.4	14.7	16.7	25.2	32.1	34.3	33.4	30.6	28.4	21.4	Diurnal Average	
182.9	158.5	142.7	189.4	251.7	151.2	166.1	160.0	119.3	92.5	69.7	42.7	149.3	132.6	136.4	151.0	170.8	209.4	271.5	290.7	329.5	337.0	291.8	204.1	Diurnal Maximum	

M - Maintenance      AF - Analyzer Failure      UO - Unstable Operation  
 Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m<sup>3</sup>

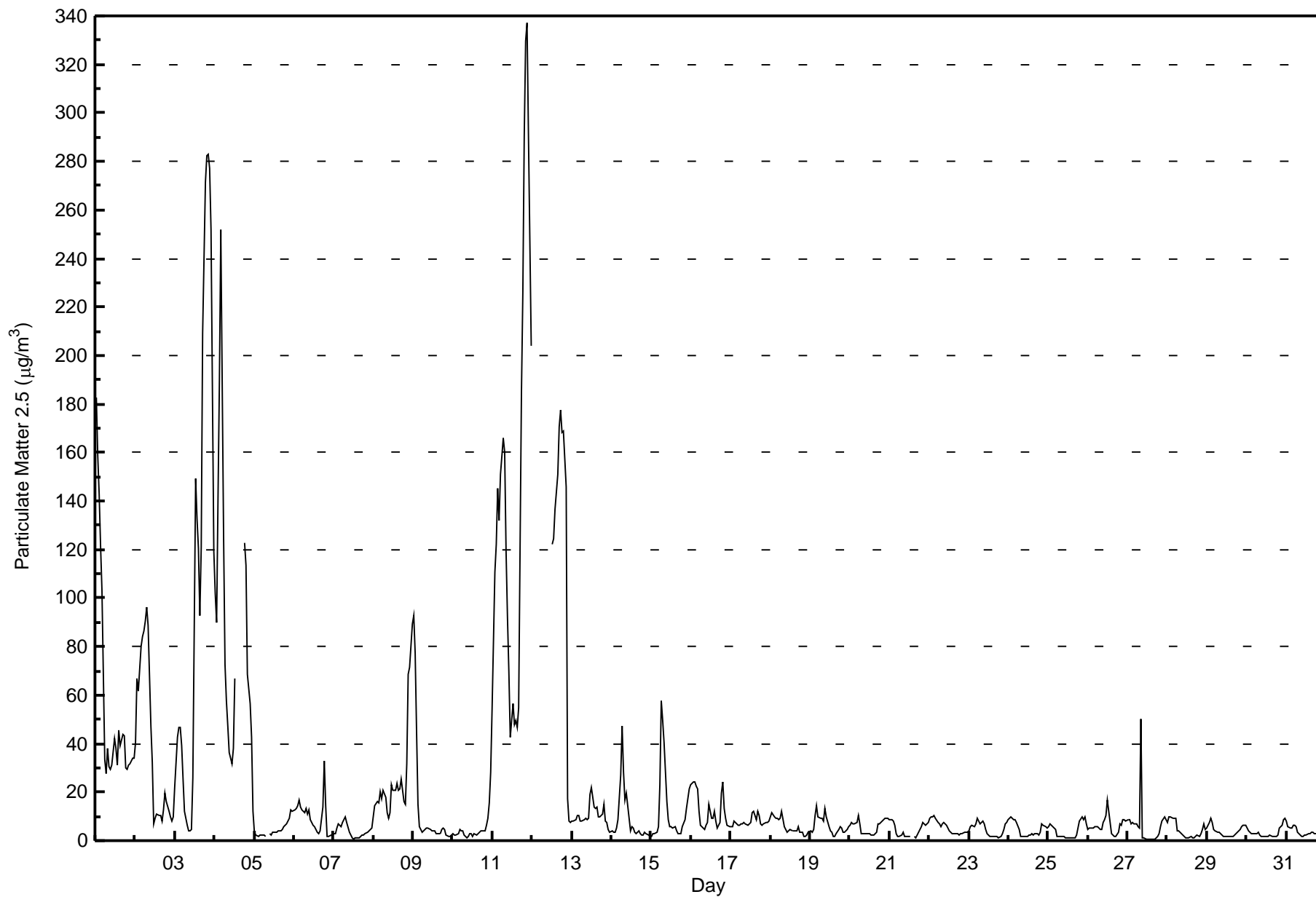


Wood Buffalo Environmental Association

Hourly Averages

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

Anzac - July 2015





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

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Anzac - July 2015**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
1 - 5	307	42.40	42.40
6 - 15	252	34.81	77.21
16 - 25	36	4.97	82.18
26 - 80	62	8.56	90.75
> 81.0	57	7.87	98.62

Total Number of Valid Hours: 724

Total Number of Hours: 744



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

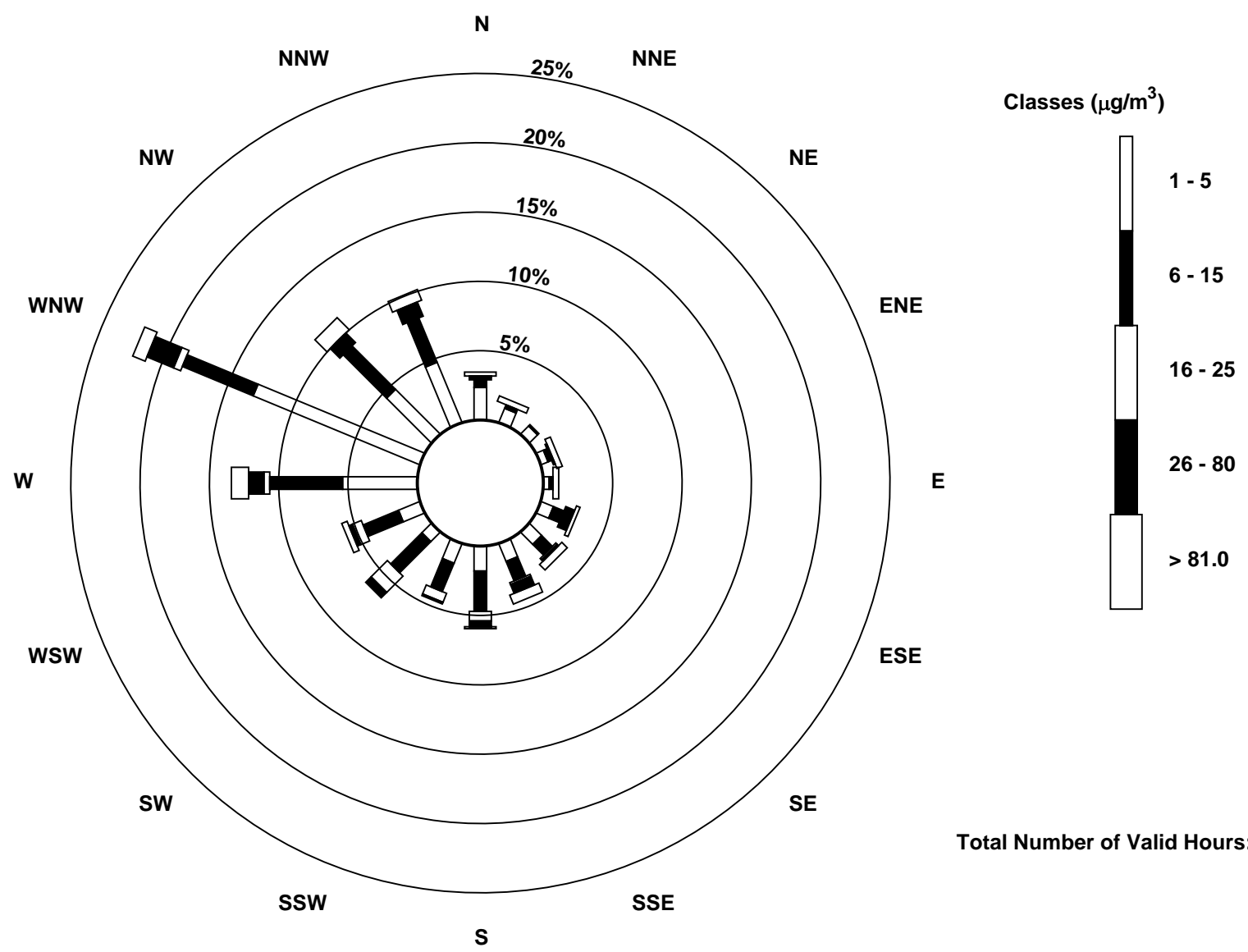
**Particulate Matter 2.5 (PM<sub>2.5</sub>) - μg/m<sup>3</sup>**  
**Anzac - July 2015**

Concentration Ranges (μg/m <sup>3</sup> )	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	17	8	6	4	3	7	9	10	13	11	7	12	39	94	33	34	307
6 - 15	4	2	1	2	2	6	8	11	21	16	23	20	38	40	32	25	251
16 - 25	0	0	0	0	0	0	1	1	5	5	12	5	3	4	0	0	36
26 - 80	2	0	0	1	0	5	1	5	3	1	4	2	8	15	7	8	62
> 81.0	2	3	0	3	3	2	4	5	1	0	0	3	9	7	9	6	57
<b>Totals</b>	25	13	7	10	8	20	23	32	43	33	46	42	97	160	81	73	713

Total Number of Valid Hours: 723

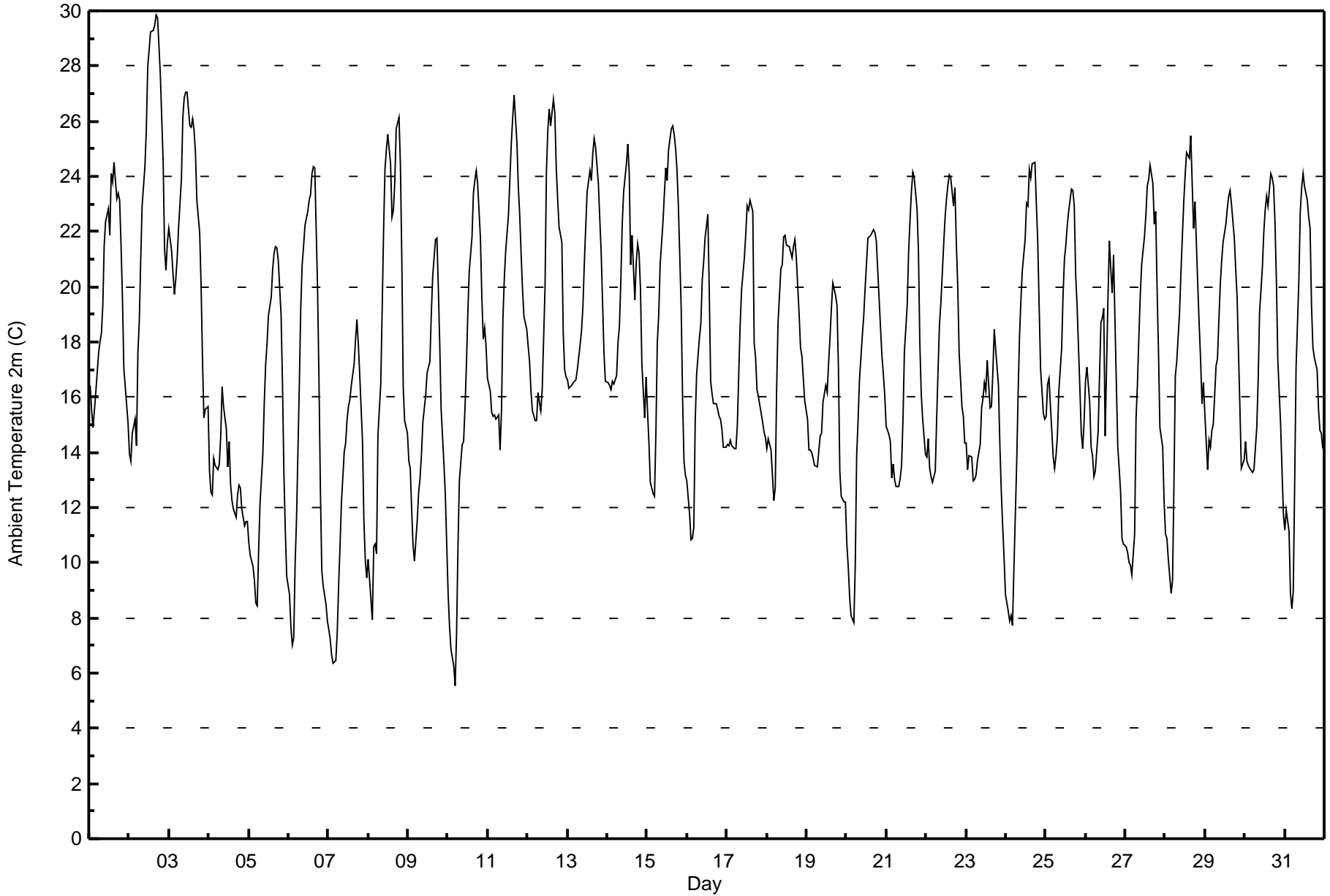
Total Number of Hours: 744







Maximum Value: 29.9 C on Jul 2 17:00		Maximum Daily Average: 22.9 C on Jul 2		Hours in Service: 744																																												
Minimum Value: 5.5 C on Jul 10 05:00		Minimum Daily Average: 12.5 C on Jul 7		Hours of Data: 744																																												
Maximum Diurnal Average: 22.5 C at hour 16		Minimum Diurnal Average: 12.3 C at hour 5		Hours of Missing Data: 0																																												
Monthly Average: 17.54 C		Percentiles: P <sub>1</sub> = 7.2 P <sub>10</sub> = 11.1 Q <sub>1</sub> = 14.1 Median = 17.0 Q <sub>3</sub> = 21.6 P <sub>90</sub> = 24.0 P <sub>99</sub> = 28.4		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-Jul	16.4	15.5	14.9	15.5	16.2	17.6	18.0	18.3	19.3	21.5	22.4	22.8	21.9	24.1	23.8	24.5	23.2	23.4	23.1	21.5	19.6	17.0	15.7	15.1	19.6	24.5																						
2-Jul	13.9	13.7	14.7	15.2	14.2	17.6	18.8	21.0	22.9	24.3	25.7	28.0	28.6	29.2	29.3	29.5	29.9	29.7	28.7	27.6	24.5	21.4	20.6	21.6	22.9	29.9																						
3-Jul	22.1	21.3	20.5	19.7	20.3	21.1	22.2	23.9	26.1	26.9	27.1	27.0	25.8	25.8	26.1	25.7	24.9	23.2	21.9	20.1	17.4	15.3	15.5	15.7	22.3	27.1																						
4-Jul	13.3	12.6	12.5	13.8	13.5	13.4	13.6	14.6	16.4	15.7	14.8	13.5	14.4	12.9	12.3	12.0	11.7	12.4	12.8	12.7	12.0	11.3	11.5	11.5	13.1	16.4																						
5-Jul	10.8	10.3	9.9	9.3	8.6	8.5	10.4	12.2	13.9	15.8	17.2	18.0	18.9	19.6	20.6	21.2	21.5	21.4	20.9	19.0	16.5	13.3	11.2	9.5	14.9	21.5																						
6-Jul	8.8	7.7	7.0	7.3	10.0	11.6	16.5	19.2	20.8	21.4	22.2	22.8	23.2	23.4	24.1	24.4	24.3	19.9	16.6	12.7	9.7	9.1	8.5	7.9	15.8	24.4																						
7-Jul	7.6	7.2	6.7	6.4	6.4	7.5	9.2	10.6	12.2	14.1	14.3	15.2	15.7	15.9	16.4	17.2	18.0	18.8	18.0	16.8	14.4	11.5	10.1	9.5	12.5	18.8																						
8-Jul	10.1	9.4	8.0	10.6	10.7	10.3	14.6	16.5	19.2	22.0	24.2	25.0	25.5	24.5	22.5	22.8	23.8	25.7	26.1	24.4	21.0	16.4	15.2	14.7	18.5	26.1																						
9-Jul	13.7	13.4	12.0	10.6	10.1	11.5	12.5	13.1	13.9	15.1	16.0	16.9	17.1	17.3	19.0	20.4	21.7	21.8	20.0	17.9	15.6	13.6	12.4	10.6	15.3	21.8																						
10-Jul	8.9	7.7	6.9	6.2	5.5	7.4	10.6	13.0	14.3	14.4	15.6	17.1	19.0	20.5	21.8	23.4	23.8	24.2	23.8	21.8	19.6	18.1	18.5	17.9	15.8	24.2																						
11-Jul	16.7	16.2	15.5	15.3	15.3	15.2	15.4	14.1	15.5	18.8	20.3	21.3	22.6	24.0	25.2	26.1	26.9	25.2	23.6	22.6	21.1	19.9	18.9	18.5	19.8	26.9																						
12-Jul	17.8	17.3	16.2	15.5	15.1	15.2	16.2	15.8	15.5	16.3	19.9	24.2	25.7	26.4	25.8	26.8	26.3	24.3	23.2	22.2	21.6	18.3	17.0	16.7	20.0	26.8																						
13-Jul	16.6	16.3	16.4	16.5	16.6	16.6	17.0	17.9	18.4	19.3	20.8	22.1	23.4	24.2	23.9	24.8	25.3	25.1	23.7	22.5	21.2	19.4	17.6	16.6	20.1	25.3																						
14-Jul	16.5	16.4	16.3	16.6	16.5	16.8	18.0	18.6	20.2	22.3	23.4	24.5	25.2	24.1	20.8	21.9	19.5	20.9	21.6	21.2	20.0	17.2	15.2	16.7	19.6	25.2																						
15-Jul	15.5	14.4	12.9	12.5	12.4	14.8	18.0	19.0	20.8	22.3	23.3	24.3	23.8	25.0	25.7	25.8	25.5	25.0	24.3	22.9	19.2	15.9	13.7	13.2	19.6	25.8																						
16-Jul	13.0	11.8	10.8	10.9	11.3	15.1	16.8	18.1	18.7	20.2	20.9	21.8	22.6	19.8	16.6	16.1	15.7	15.8	15.5	15.3	15.2	14.9	14.2	14.2	16.1	22.6																						
17-Jul	14.3	14.2	14.4	14.2	14.1	14.1	15.0	16.8	18.6	19.9	21.1	21.9	22.9	22.8	23.1	22.7	18.0	17.4	16.3	16.0	15.7	15.1	14.8	14.6	17.4	23.1																						
18-Jul	14.1	14.5	14.1	13.2	12.3	12.7	16.3	18.7	20.7	20.8	21.8	21.9	21.5	21.5	21.3	21.1	21.5	21.7	21.0	19.0	17.8	17.5	16.7	15.8	18.2	21.9																						
19-Jul	15.2	14.1	14.1	14.0	13.8	13.5	13.5	14.0	14.6	14.7	15.8	16.4	16.2	17.3	18.2	19.2	20.1	19.7	19.3	17.1	13.3	12.4	12.2	12.2	15.5	20.1																						
20-Jul	10.7	9.8	8.8	8.1	7.8	9.9	13.9	15.1	16.7	18.2	18.9	19.9	20.8	21.7	21.9	22.0	22.1	21.9	21.6	20.6	18.5	17.5	16.8	16.1	16.6	22.1																						
21-Jul	14.9	14.6	14.4	13.1	13.6	13.0	12.8	12.8	13.1	13.5	15.2	17.6	19.3	21.2	22.4	23.4	24.2	24.0	22.9	21.3	17.9	16.1	15.2	13.9	17.1	24.2																						
22-Jul	13.8	14.5	13.4	13.1	12.9	13.3	15.3	17.1	18.7	19.4	21.5	22.5	23.2	23.7	24.0	24.0	23.0	23.6	21.6	20.0	17.6	15.7	15.3	14.3	18.4	24.0																						
23-Jul	14.3	13.4	13.9	13.8	12.9	13.0	13.2	13.7	14.3	15.6	15.9	16.5	16.2	17.3	15.6	15.7	16.9	18.4	17.7	16.4	14.3	12.6	11.3	10.2	14.7	18.4																						
24-Jul	8.9	8.3	7.9	8.1	7.7	9.8	13.6	16.1	18.2	19.5	20.6	21.7	23.1	23.0	24.3	23.9	24.5	24.5	23.0	21.6	19.3	17.1	15.4	15.2	17.3	24.5																						
25-Jul	15.3	16.5	16.7	15.7	13.8	13.4	13.9	14.6	16.2	17.7	19.7	21.0	21.5	22.2	22.8	23.5	23.5	22.9	20.5	19.3	16.3	14.7	14.2	15.1	18.0	23.5																						
26-Jul	16.6	17.1	15.8	14.2	13.9	13.1	13.3	14.7	16.8	18.7	18.8	19.2	14.6	19.6	21.7	20.6	19.8	21.2	16.4	14.2	13.4	12.5	10.9	10.7	16.2	21.7																						
27-Jul	10.6	10.4	10.0	9.9	9.6	11.0	15.2	16.5	18.2	19.7	20.8	21.8	22.6	23.6	23.9	24.4	23.7	22.3	22.7	19.9	17.6	14.9	14.2	12.2	17.3	24.4																						
28-Jul	11.1	10.9	10.1	8.9	9.3	12.8	16.8	17.3	19.1	20.6	21.8	23.1	24.1	24.8	24.6	25.5	23.7	22.1	23.1	20.0	18.6	17.4	15.8	16.5	18.2	25.5																						
29-Jul	15.4	13.4	14.4	14.2	14.8	15.0	17.1	17.4	18.7	20.1	21.0	21.6	22.3	22.8	23.3	23.5	23.0	21.8	20.6	19.6	17.6	15.6	13.4	13.7	18.3	23.5																						
30-Jul	14.4	13.7	13.5	13.4	13.3	13.4	14.1	14.9	16.7	19.1	20.7	22.0	22.8	23.3	22.9	24.1	24.0	23.6	22.3	20.2	17.3	15.0	13.3	11.7	17.9	24.1																						
31-Jul	11.2	11.9	11.1	8.9	8.4	9.0	12.9	17.1	20.3	22.7	23.6	24.1	23.7	23.1	22.5	22.1	19.3	17.8	17.4	17.0	15.6	14.8	14.7	14.2	16.8	24.1																						
																								13.6	13.2	12.7	12.4	12.3	13.1	15.0	16.2	17.7	19.1	20.2	21.2	21.5	22.1	22.1	22.5	22.2	21.9	21.0	19.5	17.4	15.5	14.5	14.1	Diurnal Average
																								22.1	21.3	20.5	19.7	20.3	21.1	22.2	23.9	26.1	26.9	27.1	28.0	28.6	29.2	29.3	29.5	29.9	29.7	28.7	27.6	24.5	21.4	20.6	21.6	Diurnal Maximum





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

**Ambient Temperature 2m (AT 2m) - C**  
**Anzac - July 2015**

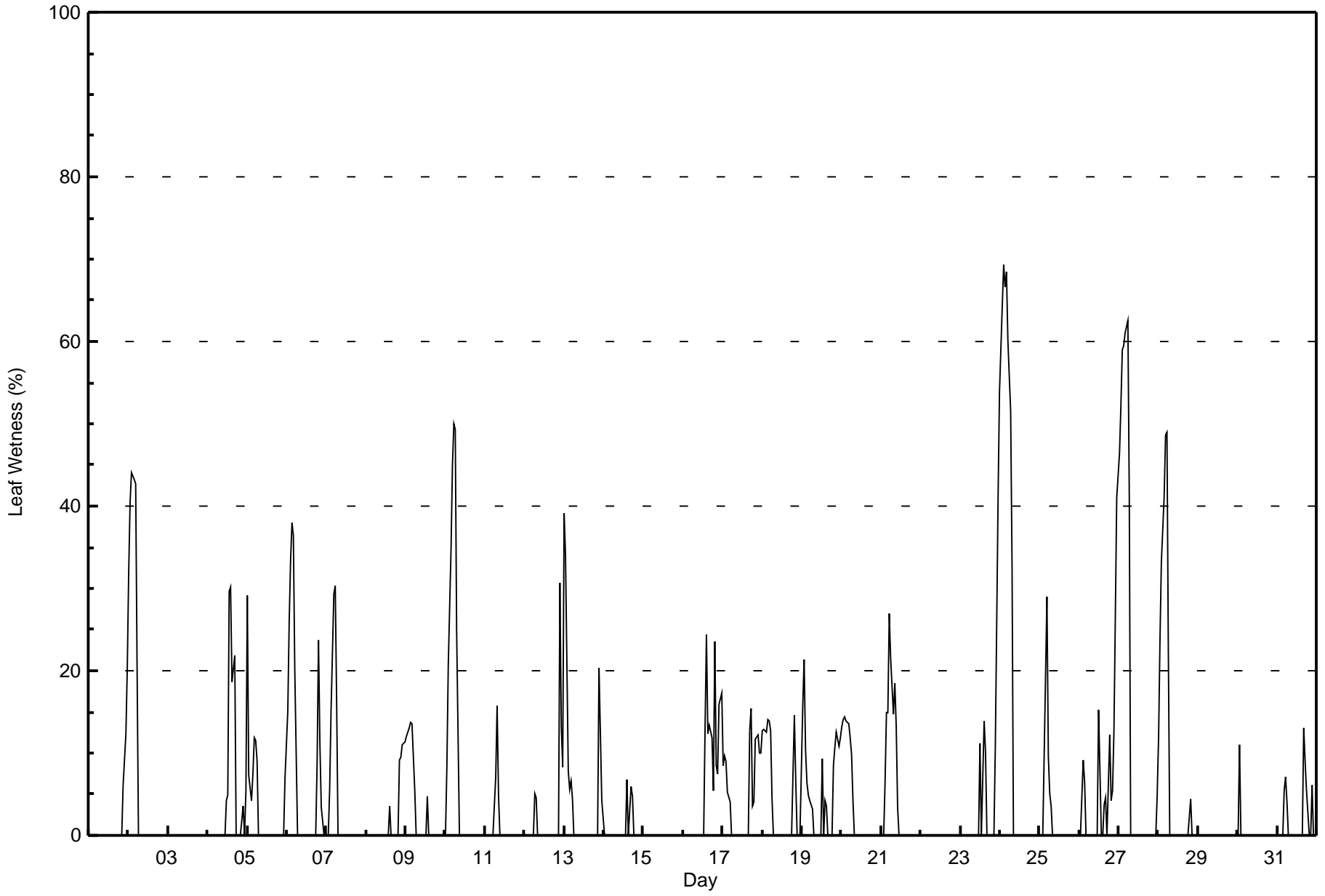
<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	48	6.45	6.45
10 - 20	442	59.41	65.86
> 20	254	34.14	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Maximum Value: 69 % on Jul 24 03:00														Maximum Daily Average: 19.5 % on Jul 24														Hours in Service: 744																				
Minimum Value: 0 % on Jul 1 01:00														Minimum Daily Average: 0.0 % on Jul 3														Hours of Data: 744																				
Maximum Diurnal Average: 14.5 % at hour 5														Minimum Diurnal Average: 0.1 % at hour 11														Hours of Missing Data: 0																				
Monthly Average: 4.8 %														Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 4 P <sub>90</sub> = 15 P <sub>99</sub> = 59														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-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	12	21	1.6	21																						
2-Jul	32	41	44	43	43	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.3	44																						
3-Jul	0	0	0	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-Jul	0	0	0	0	0	0	0	0	0	0	0	4	5	30	30	19	22	0	0	0	0	4	0	5	4.9	30																						
5-Jul	29	7	4	7	12	12	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	3.6	29																						
6-Jul	15	26	33	38	36	20	0	0	0	0	0	0	0	0	0	0	0	0	9	24	11	3	0	0	9.0	38																						
7-Jul	0	0	6	15	29	30	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.0	30																						
8-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	9	9	11	11	1.9	11																						
9-Jul	12	13	13	14	14	5	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	3.1	14																						
10-Jul	0	8	21	35	45	50	49	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.7	50																						
11-Jul	0	0	0	0	0	0	7	16	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.2	16																						
12-Jul	0	0	0	0	0	0	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	31	13	8	2.6	31																						
13-Jul	39	34	8	6	7	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	12	4	5.6	39																						
14-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	6	5	0	0	0	0	0	0	0	0.7	7																						
15-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																						
16-Jul	0	0	0	0	0	0	0	0	0	0	0	0	13	24	12	13	12	5	23	8	7	16	17	6.4	24																							
17-Jul	9	10	9	5	4	0	0	0	0	0	0	0	0	0	0	13	15	3	4	12	12	10	10	4.8	15																							
18-Jul	13	13	13	14	14	13	4	0	0	0	0	0	0	0	0	0	0	0	15	7	0	0	0	4.3	15																							
19-Jul	16	21	11	6	5	4	3	0	0	0	0	9	0	4	4	0	0	0	8	11	13	11	12	5.7	21																							
20-Jul	13	14	14	14	14	12	10	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.0	14																							
21-Jul	0	0	7	15	15	27	21	15	18	13	3	0	0	0	0	0	0	0	0	0	0	0	0	5.6	27																							
22-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
23-Jul	0	0	0	0	0	0	0	0	0	0	0	11	0	14	10	0	0	0	0	0	0	11	26	41	4.7	41																						
24-Jul	54	64	69	67	69	60	52	33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19.5	69																							
25-Jul	0	0	0	10	29	10	5	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.4	29																							
26-Jul	0	0	9	6	0	0	0	0	0	0	0	15	0	0	4	5	0	12	4	5	12	26	41	5.9	41																							
27-Jul	46	52	59	60	61	62	41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	16.1	62																							
28-Jul	12	24	33	41	49	49	22	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	9.8	49																							
29-Jul	0	0	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-Jul	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	11																							
31-Jul	0	0	0	0	5	7	4	0	0	0	0	0	0	0	0	13	9	5	0	0	6	0	0	2.1	13																							
																								9.3	10.9	11.4	12.8	14.5	12.5	8.1	3.2	0.8	0.4	0.1	0.1	1.3	1.5	2.7	1.6	2.3	1.3	1.1	2.7	2.0	4.4	4.4	5.9	Diurnal Average
																								54	64	69	67	69	62	52	33	18	13	3	4	15	30	30	19	22	15	12	24	12	31	26	41	Diurnal Maximum





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

**Leaf Wetness (SW) - %**  
**Anzac - July 2015**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.3	546	73.39	73.39
0.4 - 0.5	0	0.00	73.39
0.6 - 0.7	0	0.00	73.39
0.8 - 1.4	0	0.00	73.39
1.5 - 10	75	10.08	83.47
> 10	123	16.53	100.00

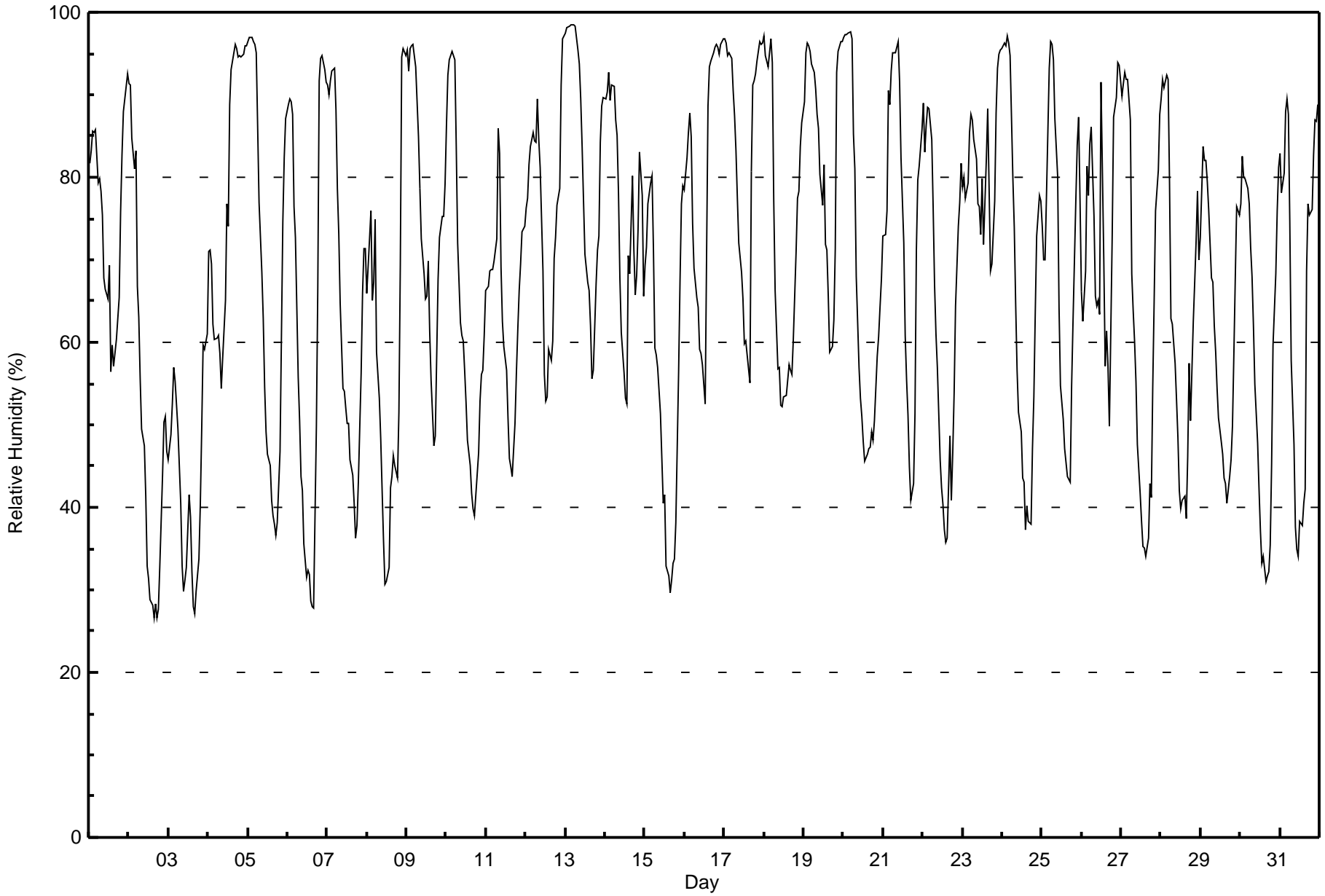
Total Number of Valid Hours: 744

Total Number of Hours: 744



Maximum Value: 99 % on Jul 13 05:00																	Maximum Daily Average: 83.5 % on Jul 19																	Hours in Service: 744								
Minimum Value: 27 % on Jul 2 16:00																	Minimum Daily Average: 42.9 % on Jul 3																	Hours of Data: 744								
Maximum Diurnal Average: 85.9 % at hour 5																	Minimum Diurnal Average: 50.0 % at hour 16																	Hours of Missing Data: 0								
Monthly Average: 68.3 %																	Percentiles: P <sub>1</sub> = 28 P <sub>10</sub> = 40 Q <sub>1</sub> = 53 Median = 69 Q <sub>3</sub> = 86 P <sub>90</sub> = 95 P <sub>99</sub> = 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-Jul	82	83	86	85	86	79	80	78	75	68	66	65	69	56	60	57	60	63	65	76	83	88	91	93	74.8	93																
2-Jul	91	91	85	81	83	67	63	56	49	47	41	33	31	29	28	27	28	27	28	33	44	50	51	47	50.4	91																
3-Jul	46	49	53	57	55	52	49	41	33	30	31	33	41	39	32	28	27	30	34	40	50	60	59	61	42.9	61																
4-Jul	71	71	70	62	60	61	61	59	54	58	65	77	74	89	93	94	96	96	94	95	95	95	96	96	78.4	96																
5-Jul	96	97	97	97	96	95	86	77	69	63	55	49	46	45	41	39	38	37	38	47	61	75	82	87	67.2	97																
6-Jul	89	90	89	88	76	73	56	50	44	42	36	31	32	32	29	28	28	50	67	92	94	95	93	92	62.2	95																
7-Jul	91	90	92	93	93	88	79	73	65	54	54	52	50	50	46	44	40	36	38	43	56	66	71	71	64.0	93																
8-Jul	66	69	76	65	67	75	59	53	48	42	36	31	31	33	42	44	46	45	44	52	69	95	96	95	57.4	96																
9-Jul	95	93	96	96	96	93	89	85	79	72	68	65	66	70	61	55	47	49	58	68	73	75	75	79	75.2	96																
10-Jul	86	92	94	95	95	94	84	72	62	61	60	57	53	48	45	42	40	39	42	47	53	56	57	61	63.9	95																
11-Jul	66	67	69	69	69	70	73	86	83	69	63	60	57	51	46	45	44	50	56	62	66	69	73	74	64.0	86																
12-Jul	76	77	82	84	85	84	84	90	85	81	69	56	53	53	59	58	60	70	73	77	79	91	97	97	75.8	97																
13-Jul	97	98	98	98	99	98	98	95	94	90	84	77	71	67	66	62	56	57	67	71	73	84	89	90	82.5	99																
14-Jul	89	90	93	89	91	91	87	85	78	68	61	56	53	52	70	68	80	71	66	68	74	83	78	66	75.4	93																
15-Jul	69	72	77	79	80	71	59	58	57	51	46	40	41	33	32	30	31	33	34	38	56	68	77	79	54.7	80																
16-Jul	79	82	86	88	85	74	69	65	64	59	59	57	52	71	89	93	94	95	96	96	96	95	96	97	80.7	97																
17-Jul	97	96	95	95	94	91	87	83	78	72	69	65	60	60	58	55	81	91	92	93	94	96	96	96	83.1	97																
18-Jul	97	95	93	95	97	94	77	66	57	57	52	52	53	54	55	57	57	56	60	71	77	78	84	87	71.8	97																
19-Jul	89	95	96	96	95	94	93	91	88	86	80	77	82	72	71	66	59	60	63	71	93	95	96	96	83.5	96																
20-Jul	97	97	97	97	98	97	85	81	68	57	53	51	48	46	46	47	47	49	48	50	58	61	64	68	67.2	98																
21-Jul	73	73	76	91	89	93	95	95	96	96	92	82	72	61	55	51	45	41	43	51	71	80	81	86	74.5	96																
22-Jul	89	83	86	88	88	85	76	67	61	57	46	42	40	37	36	36	49	41	47	54	64	74	77	82	62.7	89																
23-Jul	79	80	77	79	85	88	87	85	82	77	76	73	80	72	82	88	79	69	69	77	88	93	95	95	81.5	95																
24-Jul	96	96	96	97	96	95	80	74	65	57	52	49	44	43	37	40	38	38	47	53	64	73	78	77	66.0	97																
25-Jul	74	70	70	78	93	96	96	94	87	80	64	55	53	51	47	44	43	43	55	63	77	84	87	77	70.1	96																
26-Jul	66	63	69	81	78	84	86	75	66	64	65	63	92	70	57	61	57	50	73	87	88	90	94	93	73.9	94																
27-Jul	90	91	93	92	92	87	68	64	60	55	48	42	38	35	35	34	36	43	41	55	65	76	81	88	62.8	93																
28-Jul	89	92	91	92	92	79	63	62	57	53	48	42	40	41	41	39	46	57	51	63	67	72	78	70	63.6	92																
29-Jul	73	84	82	82	80	76	68	67	62	59	54	51	48	46	44	43	40	44	46	50	59	68	76	75	61.5	84																
30-Jul	77	83	80	80	79	77	71	68	62	55	48	42	37	33	34	31	32	32	35	45	60	68	76	81	57.8	83																
31-Jul	83	78	81	88	90	88	75	58	48	38	35	34	38	38	40	42	69	77	75	76	83	87	87	89	66.4	90																
																	82.6	83.5	84.6	85.7	85.9	83.5	76.9	72.7	66.9	61.9	57.3	53.6	53.1	50.9	51.0	50.0	51.4	52.8	56.2	63.3	71.9	78.7	81.6	82.1	Diurnal Average	
																	97	98	98	98	99	98	98	95	96	96	92	82	92	89	93	94	96	96	96	96	96	96	97	97	Diurnal Maximum	







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

**Relative Humidity (RH) - %**  
**Anzac - July 2015**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	70	9.41	9.41
40 - 60	198	26.61	36.02
60 - 80	229	30.78	66.80
80 - 100	247	33.20	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Maximum Speed: 18 km/h on Jul 3 10:00	Maximum Daily Speed Average: 10.0 km/h on Jul 18	Hours in Service: 744
Minimum Speed Value: 0 km/h on Jul 13 03:00	Minimum Daily Speed Average: 1.7 km/h on Jul 13	Hours of Data: 743
Maximum Diurnal Speed Average: 5.5 km/h at hour 14	Minimum Diurnal Speed Average: 1.3 km/h at hour 22	Hours of Missing Data: 1
Monthly Average Velocity: 3.6 km/h 283.4 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 3 Q <sub>1</sub> = 5 Median = 7 Q <sub>3</sub> = 9 P <sub>90</sub> = 11 P <sub>99</sub> = 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-Jul	NNW4	NW3	NW2	WSW2	W5	WNW7	WNW7	W7	WNW9	WNW8	WNW8	NW7	WNW8	WNW9	NW6	NW8	NNW5	W4	W3	SSW2	S2	ENE1	N2	S3	WNW4.3	WNW9	
2-Jul	SW3	W5	W7	WSW6	W7	W8	W6	W5	W5	WNW7	W7	WNW9	WNW8	WNW9	W7	NW2	W2	W9	WSW7	SW7	SW6	S6	SSW7	SSW9	W5.7	W9	
3-Jul	SW12	SW10	SW8	SW8	WSW8	WSW7	SW8	WSW10	W14	W18	W16	WNW16	WNW16	WNW15	NW14	NW13	NW11	NNW11	NNW9	NNW6	NNW2	NNW1	WNW7	WSW7	W8.3	W18	
4-Jul	WSW5	W6	WNW7	WNW8	WNW9	WNW10	WNW11	WNW10	WNW11	NW10	NNW8	N8	NNW8	NW6	NW6	WNW7	NW5	NW6	NW5	NW6	NW6	NW6	NNW8	NNW9	NW6.9	WNW11	
5-Jul	N10	NNW7	NNW8	NNW8	N7	NNW5	NNW6	NNW6	NNW7	NNW9	NNW10	NNW10	N8	NNW8	NNW8	NNW7	NNW7	NW6	NW5	NW3	SW1	S2	SSW3	SSW4	NNW5.6	NNW10	
6-Jul	SSW3	SW4	WSW5	WSW5	SW6	SW5	SW5	W5	WNW9	W10	W12	W13	WNW11	W12	W14	W13	W14	NNW13	NNW12	NNW10	NNW14	NNW11	NNW11	NW7	WNW7.6	NNW14	
7-Jul	NW8	NW7	NW7	NW7	NW8	NW7	NW7	NW6	NW8	NW10	NW10	WNW9	NW9	WNW10	WNW8	WNW7	W7	W7	WNW7	WNW4	SSW3	S5	S6	S6	WNW5.7	NW10	
8-Jul	SSW7	SSW7	SW7	SW11	SW10	SSW4	S6	S8	S7	S9	S9	SSW13	SSW12	SSW10	S7	S11	SSW11	SW10	W9	NW5	NNW6	NNW4	W5	W6	SSW6.2	SSW13	
9-Jul	NW6	NW6	NNW6	N5	N6	NNW5	NNW4	NNW4	N5	NNE3	ESE2	SSE2	NE3	E3	NE5	ESE11	ESE11	ENE8	NNE7	NNE7	NNE6	N6	N5	N5	NNE3.5	ESE11	
10-Jul	NNW4	NNW3	NW2	WNW1	NW3	NNW4	NNW3	NNW3	N5	N6	N4	NE3	ENE5	NE4	NNE4	SSE2	ESE4	SE6	SE8	ESE8	ESE6	ESE7	SE11	SSE11	E2.0	SE11	
11-Jul	SSE10	SSE12	S9	SSE10	SSE9	SSE8	SSE9	SE9	SE10	SE10	SSE10	SE11	ESE8	ESE12	ESE12	ESE10	SE10	ENE9	ENE10	E9	E9	E6	SE7	ESE6	SE8.3	ESE12	
12-Jul	ESE6	ESE7	ENE8	E8	ENE5	N4	NW5	ENE7	ESE4	SE5	SE6	ESE10	ESE13	ENE6	NNE8	NNE8	N8	N8	N5	NW2	W8	WNW8	NNW8	N5	NE3.0	ESE13	
13-Jul	NW4	ENE4	S0	W2	NW3	NW3	W2	SSE4	NW3	W3	SE5	SE7	S5	WNW8	WNW6	NW4	WNW5	WNW4	SE3	SE6	S7	SSE9	S7	S9	SSW1.7	SSE9	
14-Jul	S10	S5	S5	SSE8	S6	S4	SSE6	SSE7	SSE7	SW4	WNW4	W8	WNW9	NNW10	NNW8	NNW9	N6	SW3	SSW4	S5	S6	SW5	WSW6	W6	SW2.3	NNW10	
15-Jul	W5	WSW5	WSW4	WSW6	WSW7	W8	W11	WNW9	WNW7	WNW7	WNW8	W8	WSW11	W10	WSW13	SW14	SW11	WSW9	WSW6	SW3	SSW3	SW3	SW4	WSW6.8	SW14		
16-Jul	SW5	SW5	SW3	SW4	W5	WNW8	WNW9	WNW10	NW7	NW8	WNW9	WNW8	WNW6	W6	SSW9	W9	WNW10	WNW9	WNW8	WNW8	WNW9	NW8	NW5	NNW8	WNW6.4	WNW10	
17-Jul	NNW8	NNW7	NNW8	NNW6	NNW6	NNW8	NNW6	NNW7	NNW8	NNW11	NNW11	NNW13	NNW13	NNW13	NNW13	NNW13	NNW13	NNW8	NE4	S7	S5	SW3	SW3	WSW6	W4	NNW6.2	NNW13
18-Jul	W6	W8	W7	W6	WSW6	WNW6	W7	W6	W10	W8	WSW10	W12	W10	WSW11	W13	W12	W15	W15	WNW12	WNW14	WNW12	WNW14	WNW14	WNW12	W10.0	W15	
19-Jul	WNW12	NW10	NW10	NW10	NW10	NW10	NW10	NW10	NW8	NW9	NW10	NW11	NW9	NW8	NW9	NW10	NNW12	NNW10	NNW8	N8	WNW4	NW6	NW5	NW4	NW8.6	WNW12	
20-Jul	NNW3	WNW3	WNW3	W4	W4	W6	WNW5	WNW5	W3	WNW2	NNW1	SE4	S3	SSE5	SSE6	ESE7	SE7	ESE7	ESE7	SE7	ESE6	SE9	SE10	SE10	SSE2.2	SE10	
21-Jul	SSE10	SSE10	S6	SSE5	SE9	SE8	SE7	ESE7	SE6	SSE6	S7	WSW4	WNW8	WNW7	WNW6	WNW6	WNW8	W8	WSW7	W4	SSW1	SW3	SW3	SW4	SSW3.0	SSE10	
22-Jul	WSW4	SW4	SSE1	WSW3	WNW2	NW5	NW6	WNW6	WNW6	W4	WSW6	WNW7	WNW7	WSW5	W5	SSW3	S4	W8	NW9	WNW7	NW7	NW5	WNW6	WNW5	WNW4.5	NW9	
23-Jul	W6	WSW6	WSW9	W12	W12	WNW12	WNW12	WNW11	WNW10	WNW10	WNW10	W10	NNW5	WNW5	WNW5	WNW4	NW3	NNW3	NNE3	ENE1	SSW2	SW3	SW4	W5.9	W12		
24-Jul	SW3	SW2	SW3	SW5	SW4	SW5	SW4	W4	WNW5	WNW5	NW6	WNW6	WNW7	WNW6	WNW5	WNW10	SW6	SSW6	SSE5	SSE5	S5	S5	SSE7	WSW3.1	WNW10		
25-Jul	SSE8	W7	WNW8	WNW8	NW5	WNW1	W3	SSW4	S4	WNW2	WNW6	WNW9	WNW9	WNW8	WNW8	WNW7	WNW7	N5	NNE3	AF	SSW4	SSW4	WSW6	WNW4.2	WNW9		
26-Jul	W7	WNW8	W6	SSW4	SSE5	ESE1	E3	SSW3	WNW5	WNW6	NNW4	NNE4	WSW1	SSE5	SSW3	N5	W5	WNW5	N8	E4	S6	S6	SSW4	WSW7	W1.7	NNE8	
27-Jul	WSW5	SW6	SW6	SW6	WSW6	W6	W8	WNW10	WNW9	WNW9	W9	WNW8	WNW9	WNW10	WNW10	WNW9	WNW8	NW4	NW5	NNW2	N1	SSW3	WSW4	WNW4	W5.8	WNW10	
28-Jul	WNW2	S4	WSW4	W3	W5	WNW6	WNW7	WNW7	W6	W7	W7	WNW8	WNW9	NW9	WNW8	W9	N3	ENE4	SE5	N4	E6	SSW4	W5	WNW7	WNW4.0	WNW9	
29-Jul	WNW5	W5	W8	W7	WNW9	WNW5	WNW4	WNW8	WNW8	WNW7	WNW9	WNW7	WNW10	WNW13	WNW10	NW9	WNW11	W9	WNW12	WNW13	WNW12	NW6	NW4	WNW6	WNW8.1	WNW13	
30-Jul	WNW11	WNW8	WNW9	W10	W10	WNW10	WNW11	WNW11	WNW9	WNW11	WNW11	WNW11	WNW13	WNW14	NW12	WNW14	WNW15	WNW11	NW8	NNW4	NE4	ENE7	S4	S5	WNW8.3	WNW15	
31-Jul	S5	S6	SSW5	E3	SSE4	S3	SSW3	WNW3	WNW5	WNW5	W7	W6	W7	WNW9	NW6	WNW6	NNW3	N4	NE3	NNE3	SW3	W1	SW3	WSW1	W2.1	WNW9	

WSW2.8	WSW2.9	W3.3	W3.4	W3.7	WNW3.9	W4.2	WNW3.9	WNW4.4	WNW5.0	WNW5.0	WNW5.1	WNW5.3	WNW5.5	WNW5.2	WNW4.8	WNW4.0	WNW3.9	NW2.9	NW1.8	WNW1.4	WSW1.3	WSW2.1	WSW2.5	Diurnal Average	
WNW12	SSE12	NW10	W12	W12	WNW12	WNW12	WNW11	W14	W18	W16	WNW16	WNW16	WNW15	NW14	WNW14	W15	W15	NNW12	WNW14	WNW14	WNW14	WNW14	WNW14	WNW12	Diurnal Maximum

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

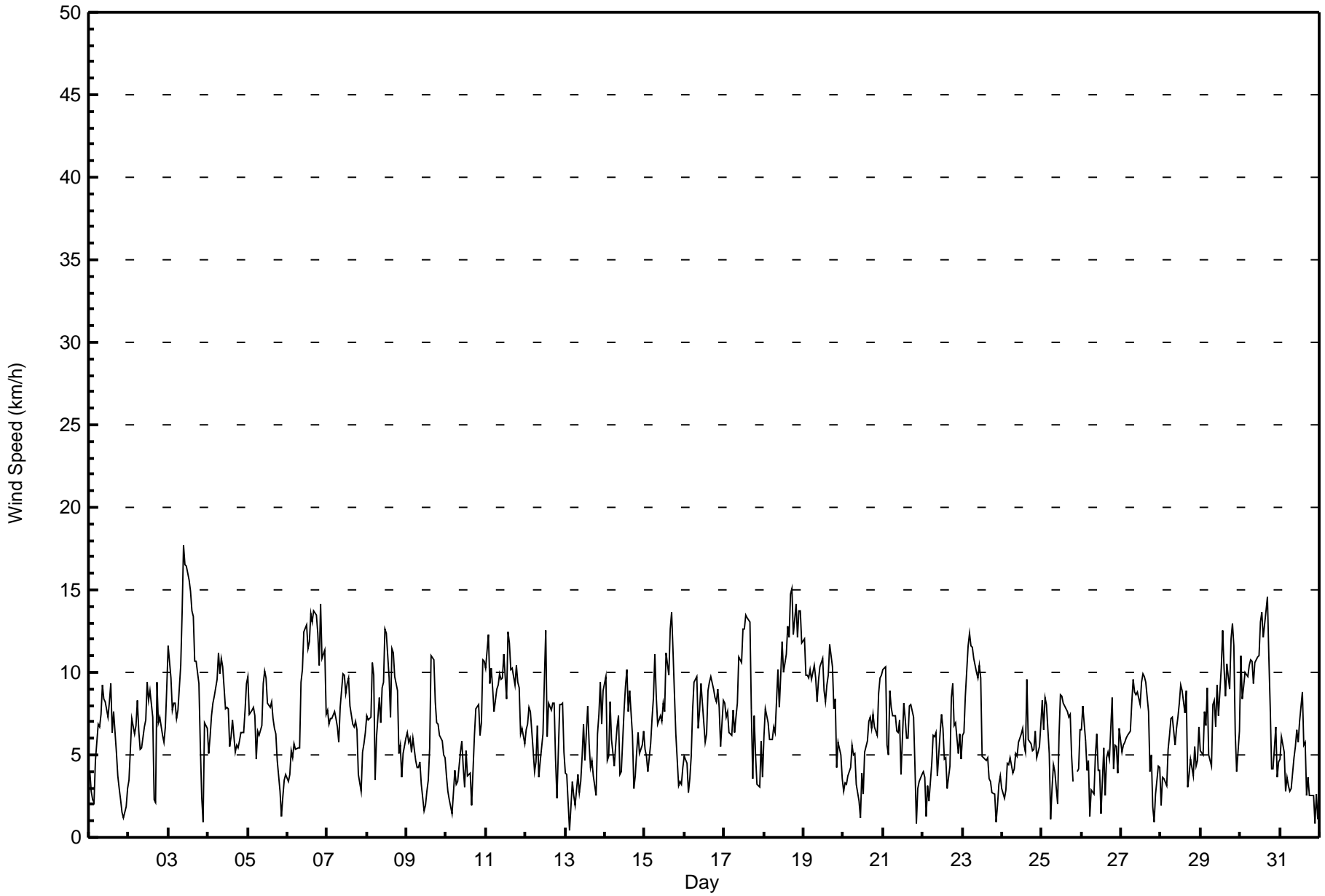


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 7 km/h on Jul 3 10:00 Minimum Value: 0 km/h on Jul 5 23:00 Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 2 Median = 2 Q <sub>3</sub> = 4 P <sub>90</sub> = 5 P <sub>99</sub> = 6																	Hours in Service: 744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



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

**Wind Speed (WS) - km/h**  
**Anzac - July 2015**





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

**Wind Speed (WS) - km/h**  
**Anzac - July 2015**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	259	34.86	34.86
6 - 11	427	57.47	92.33
12 - 19	57	7.67	100.00
20 - 28	0	0.00	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 743

Total Number of Hours: 744



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

**Wind Speed (WS) - km/h**  
**Anzac - July 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	15	7	7	6	4	4	5	11	21	23	29	17	29	31	28	22	259
6 - 11	11	6	0	7	5	17	20	20	22	8	15	24	53	121	55	43	427
12 - 19	0	0	0	0	0	3	0	1	0	2	2	1	16	20	3	9	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
<b>Totals</b>	26	13	7	13	9	24	25	32	43	33	46	42	98	172	86	74	743

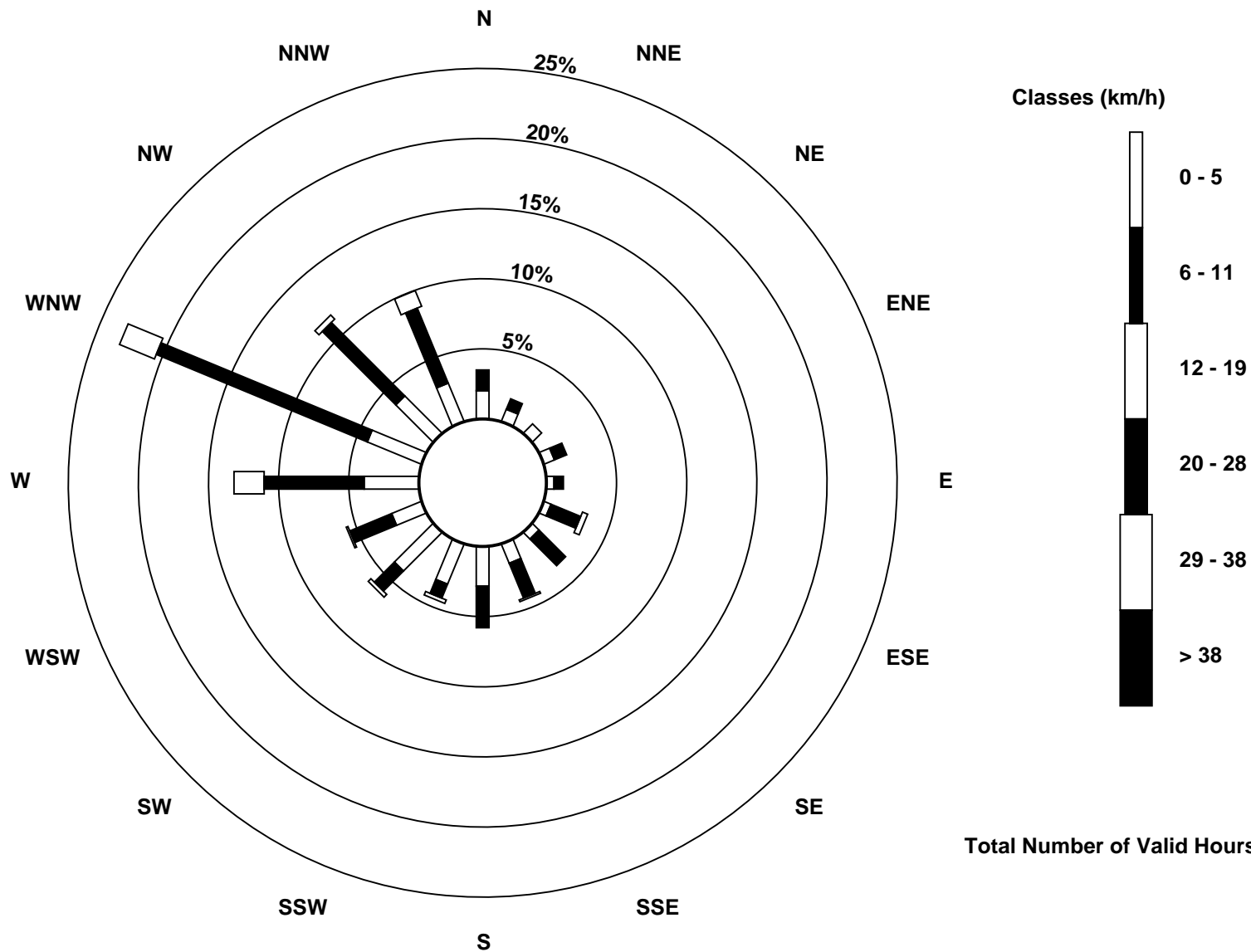
Total Number of Valid Hours: 743

Total Number of Hours: 744



Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Wind Speed (WS) - km/h  
Anzac (AMS 14)







Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Anzac - July 2015

Direction of Maximum Speed: 263 deg on Jul 3 10:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 274.9 deg on Jul 18	Hours of Data: 743
Direction of Minimum Speed: 191 deg on Jul 13 03:00	Direction of Minimum Daily Speed Average: 1.7 deg on Jul 13
Direction of Minimum Speed: 191 deg on Jul 13 03:00	Hours of Missing Data: 1
Monthly Average Direction: 286.1 deg	Percent Operational Time: 99.9

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jul	342	317	320	237	274	284	291	272	287	293	297	313	296	282	312	321	336	274	279	194	182	65	9	174	294.3
2-Jul	223	270	272	255	264	263	272	264	272	293	279	295	286	283	278	304	274	267	243	231	217	190	200	211	259.9
3-Jul	218	215	228	232	238	237	236	246	264	263	274	286	295	298	305	315	320	331	330	334	335	331	291	237	276.2
4-Jul	255	262	298	301	286	295	299	301	303	323	347	7	347	319	304	303	305	308	313	312	315	320	327	345	311.4
5-Jul	357	348	343	344	350	330	334	330	329	334	346	348	351	330	325	341	327	318	325	317	218	187	210	212	335.0
6-Jul	213	222	246	249	232	217	230	270	284	281	279	266	283	271	261	271	263	333	332	337	333	335	331	326	287.4
7-Jul	319	316	316	314	314	309	305	309	323	323	322	298	313	300	295	284	272	281	286	290	203	179	176	186	298.7
8-Jul	195	210	219	235	235	198	185	174	172	171	188	211	201	193	170	171	194	236	262	319	335	327	269	268	210.0
9-Jul	313	320	341	354	353	340	340	341	6	14	121	158	49	95	39	104	116	76	32	18	13	355	5	3	22.6
10-Jul	338	331	321	299	316	344	346	345	357	4	352	36	70	49	20	155	119	131	131	115	113	111	134	149	80.1
11-Jul	155	155	169	153	148	165	150	128	146	135	152	136	111	119	119	104	124	67	69	81	79	100	134	118	127.0
12-Jul	116	121	77	83	63	9	307	78	106	141	128	110	122	60	18	15	0	4	11	310	270	296	335	357	51.4
13-Jul	305	57	191	260	305	318	272	165	311	278	137	144	183	292	289	321	282	286	135	138	169	161	169	175	204.7
14-Jul	172	170	170	159	171	178	161	162	151	233	284	273	292	342	346	348	3	227	206	178	174	230	251	267	218.1
15-Jul	262	245	240	249	243	264	278	284	298	297	302	294	273	244	268	246	233	231	252	241	231	201	224	222	257.6
16-Jul	218	234	219	236	280	298	298	300	309	308	286	289	299	271	203	281	295	302	302	295	293	308	322	337	289.6
17-Jul	333	328	331	328	329	342	334	331	338	341	337	339	338	337	329	345	345	44	170	188	219	236	256	264	330.1
18-Jul	273	273	270	263	253	288	273	262	276	261	249	265	261	256	274	271	274	277	296	283	282	285	291	300	274.9
19-Jul	301	306	308	305	309	311	314	311	321	308	311	304	321	321	309	318	332	341	347	355	296	311	326	316	316.4
20-Jul	342	287	295	265	277	273	284	288	265	282	348	127	190	150	155	118	134	123	114	126	105	124	134	144	148.7
21-Jul	147	147	169	164	145	146	133	122	131	159	169	243	294	292	300	293	282	259	248	264	204	228	222	236	196.1
22-Jul	244	228	147	258	290	304	306	299	298	280	256	284	289	242	265	204	181	277	307	291	313	306	300	298	282.1
23-Jul	261	253	250	263	272	296	290	285	286	294	283	265	334	292	288	314	288	311	329	19	63	204	214	219	280.4
24-Jul	216	219	224	218	221	231	229	278	293	292	306	297	294	301	294	285	224	194	156	159	160	187	172	163	237.5
25-Jul	166	275	301	300	322	292	268	209	175	290	296	300	286	295	287	295	295	296	2	27	AF	200	203	256	283.1
26-Jul	280	288	267	209	164	112	98	195	291	297	341	24	258	158	210	2	265	296	11	93	191	185	212	243	261.1
27-Jul	240	223	222	230	237	262	263	284	294	288	280	286	283	287	286	287	299	318	308	340	7	212	241	288	274.9
28-Jul	298	184	243	259	279	290	294	290	276	280	274	287	287	313	297	278	354	60	146	7	83	210	267	295	285.5
29-Jul	303	274	268	280	300	292	285	300	293	291	289	293	290	291	299	304	295	268	290	299	295	317	321	298	292.8
30-Jul	300	300	282	281	278	292	292	290	289	293	284	297	301	296	308	298	293	300	318	334	45	76	173	185	295.3
31-Jul	180	177	194	93	167	178	204	299	284	293	269	280	279	282	307	295	335	1	54	33	228	259	227	252	264.2

254.7 253.2 266.1 262.2 268.8 281.8 281.1 281.5 289.5 292.1 286.5 288.9 294.0 291.0 295.2 300.4 287.5 298.0 309.8 313.0 281.8 252.2 253.6 250.0

Diurnal Average

AF - Analyzer Failure

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



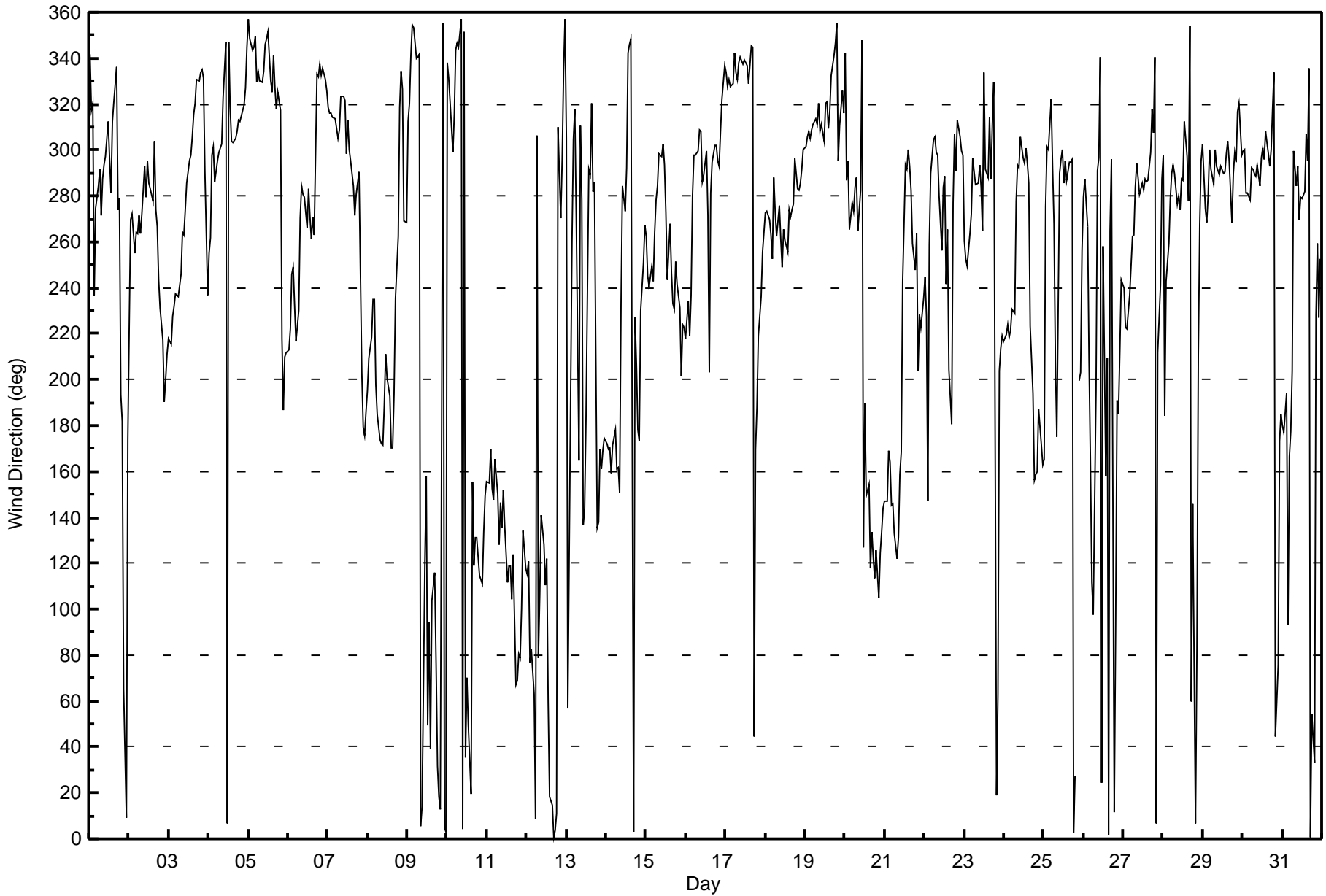
Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg

Anzac - July 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 105 deg on Jul 20 13:00 Minimum Value: 8 deg on Jul 23 23:00 Percentiles: P <sub>1</sub> = 11 P <sub>10</sub> = 19 Q <sub>1</sub> = 24 Median = 30 Q <sub>3</sub> = 37 P <sub>90</sub> = 53 P <sub>99</sub> = 89																			Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9						
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jul	26	40	64	79	31	27	31	27	26	30	29	35	30	35	32	31	30	46	41	32	44	48	50	17	79
2-Jul	34	15	20	17	18	19	22	32	38	33	38	34	34	38	39	85	91	36	33	19	18	18	20	21	91
3-Jul	17	18	23	17	19	26	20	27	34	33	33	32	30	33	30	26	27	24	24	18	16	76	28	19	76
4-Jul	20	18	28	29	30	31	29	30	30	28	29	29	33	27	31	29	25	24	25	24	23	20	21	25	33
5-Jul	25	23	20	21	22	19	24	25	33	30	32	33	35	42	38	51	39	35	38	33	40	24	10	11	51
6-Jul	19	26	24	21	25	13	16	36	33	35	33	36	35	34	33	34	34	39	23	23	22	21	21	22	39
7-Jul	23	23	24	24	25	27	27	32	34	31	33	41	32	36	51	50	42	42	32	44	39	12	14	19	51
8-Jul	21	23	23	19	16	36	47	26	31	27	36	28	34	32	43	27	26	29	28	21	29	52	23	26	52
9-Jul	22	21	18	17	19	25	27	35	47	77	93	90	51	66	43	30	31	38	29	25	26	26	28	25	93
10-Jul	18	34	38	40	51	25	56	59	43	35	76	80	67	79	72	102	68	42	28	22	21	20	20	21	102
11-Jul	20	19	19	22	23	24	17	20	22	31	31	31	33	25	28	32	27	26	22	23	21	30	24	33	33
12-Jul	25	26	28	25	43	59	52	38	54	58	37	32	28	54	27	29	24	25	28	36	32	62	24	44	62
13-Jul	73	81	98	91	43	39	58	49	32	35	43	24	54	31	35	49	53	60	64	23	16	21	31	17	98
14-Jul	17	32	24	18	24	27	19	21	31	65	87	42	33	39	34	26	34	71	28	16	20	27	23	28	87
15-Jul	27	21	26	17	11	24	27	32	34	34	34	34	42	35	41	34	28	25	32	21	25	17	20	10	42
16-Jul	14	17	20	19	32	24	27	26	29	35	31	37	41	32	46	30	31	27	26	25	29	26	28	20	46
17-Jul	21	20	22	20	21	22	27	29	28	24	26	25	26	25	24	27	32	74	25	26	51	63	18	21	74
18-Jul	19	19	19	17	18	25	27	35	32	32	31	33	35	32	32	30	33	29	31	30	32	33	32	26	35
19-Jul	27	28	27	29	27	27	26	27	25	28	30	36	24	28	27	29	24	25	25	30	48	23	23	24	48
20-Jul	24	24	26	22	23	22	32	39	60	86	94	75	105	67	43	30	38	25	25	24	24	27	20	20	105
21-Jul	17	18	25	30	19	21	25	24	31	21	30	64	34	40	42	40	41	38	28	34	70	24	16	19	70
22-Jul	14	44	20	29	68	24	27	28	32	58	49	37	40	50	46	77	30	45	28	33	27	30	27	27	77
23-Jul	27	22	25	29	31	32	32	33	29	35	32	35	50	54	53	38	49	52	54	37	33	49	8	11	54
24-Jul	11	14	11	12	8	9	11	45	48	59	40	40	45	42	47	30	53	40	20	18	15	21	15	15	59
25-Jul	16	54	28	30	32	80	37	32	38	69	33	33	35	33	37	34	35	37	33	32	AF	18	21	20	80
26-Jul	26	29	77	35	52	91	48	56	43	45	62	58	96	30	76	43	49	48	50	62	22	22	28	22	96
27-Jul	37	18	17	14	15	20	25	27	31	33	37	43	36	35	32	37	35	38	35	88	83	62	19	20	88
28-Jul	38	18	37	37	27	22	26	29	38	37	38	39	39	38	35	40	66	36	30	80	56	46	43	33	80
29-Jul	30	26	20	31	28	30	35	29	31	36	32	37	34	30	32	36	28	39	34	29	31	23	24	29	39
30-Jul	28	30	27	29	28	31	30	32	35	32	35	34	33	34	31	29	30	31	25	26	22	23	37	16	37
31-Jul	14	17	23	29	19	16	20	56	45	40	41	49	35	34	37	45	54	21	40	37	49	68	33	87	87
73 81 98 91 68 91 58 59 60 86 94 90 105 79 76 102 91 74 64 88 83 76 50 87																									
Diurnal Maximum																									
AF - Analyzer Failure																									



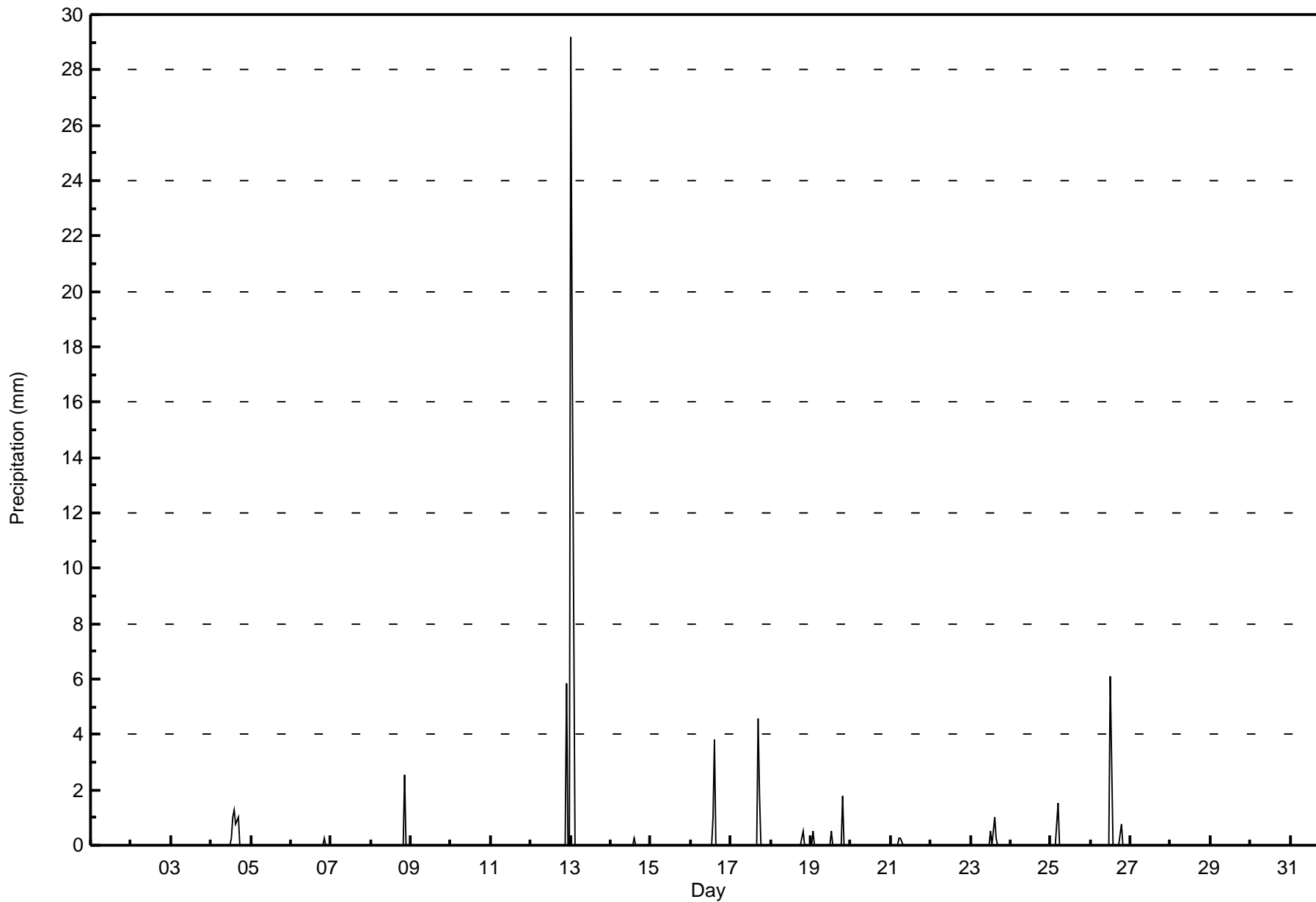


Maximum Value: 29.2 mm on Jul 13 01:00      Maximum Daily Total: 47.0 mm on Jul 13		Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																										
Minimum Value: 0.0 mm on Jul 1 01:00 Maximum Diurnal Total: 29.2 mm at hour 1 Monthly Total: 85.34 mm		Minimum Daily Total: 0.0 mm on Jul 1 Minimum Diurnal Total: 0.0 mm at hour 3 Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 0.0 P <sub>90</sub> = 0.0 P <sub>99</sub> = 1.3																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
1-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.0	1.3	0.8	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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
7-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.0	0.0	0.0	0.0	0.0
13-Jul	29.2	17.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14-Jul	0.0	0.0	0.0	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
15-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	3.8	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
17-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.6	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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
19-Jul	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	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	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	0.0	0.0	0.0	0.0	0.0
22-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23-Jul	0.0	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	1.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	1.5	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
26-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.1	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
27-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		29.2	18.3	0.0	0.0	1.5	0.3	0.3	0.0	0.0	0.0	0.0	7.4	2.0	6.4	1.0	5.6	1.8	0.8	2.3	2.8	5.8	0.0	0.0			Diurnal Average	
		29.2	17.8	0.0	0.0	1.5	0.3	0.3	0.0	0.0	0.0	0.0	6.1	1.0	3.8	0.8	4.6	1.8	0.8	1.8	2.5	5.8	0.0	0.0			Diurnal Maximum	



Wood Buffalo Environmental Association  
Hourly Averages

Precipitation (PC) - mm  
Anzac - July 2015





# Wood Buffalo Environmental Association SO2 Calibration Report

## Station Information

Calibration Date	July 20, 2015	Last Calibration	June 15, 2015
Station Name	Anzac	Station Number	AMS 14
Reason:	Routine		
Start Time (MST)	9:05	End Time (MST)	14:25
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	2935	2833
Calculated slope	0.995556	0.995802	Chamber temp	50.0	50.0
Calculated intercept	-0.209621	0.087364	Pressure	25.2	25.2
Analyzer Background	19.5	19.5	Flow	660	656
Analyzer Coefficient	1.011	1.011	Intensity	72	70.0
Analyzer make	API T100		Analyzer serial #	723	

## Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.2	----
as found span	5000	74.9	707.1	707.1	1.000
calibrator zero	5000	0.0	0.0	0.3	----
high point	5000	74.9	707.1	710.8	0.995
second point	5000	37.5	354.0	353.3	1.002
third point	5000	18.7	176.5	178.1	0.991
as left zero	5000	0.0	0.0	0.1	----
as left span	5000	74.9	707.1	702.4	1.007
Average Correction Factor					0.996

Corrected As found      707.3      Previous response      710.4      % change      0.4%

**Notes:**

Filter changed after As Finds. No adjustments

Calibration Performed By:

\_\_\_\_\_  
Ryan Power



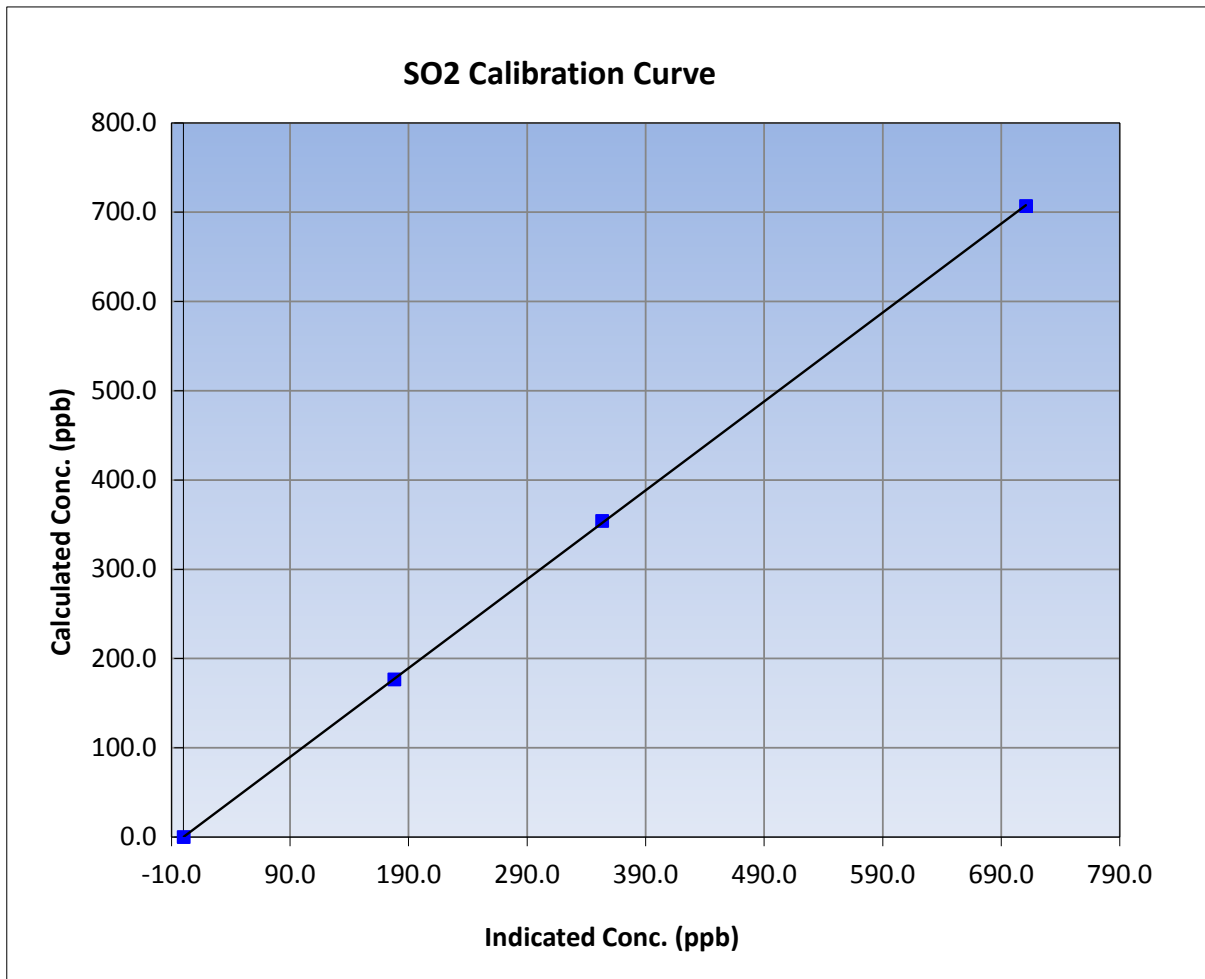
## Wood Buffalo Environmental Association SO2 Calibration Report

### Station Information

Calibration Date	July 20, 2015	Previous Calibration	June 15, 2015
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	9:05	End Time (MST)	14:25
Analyzer make	API T100	Analyzer serial #	723

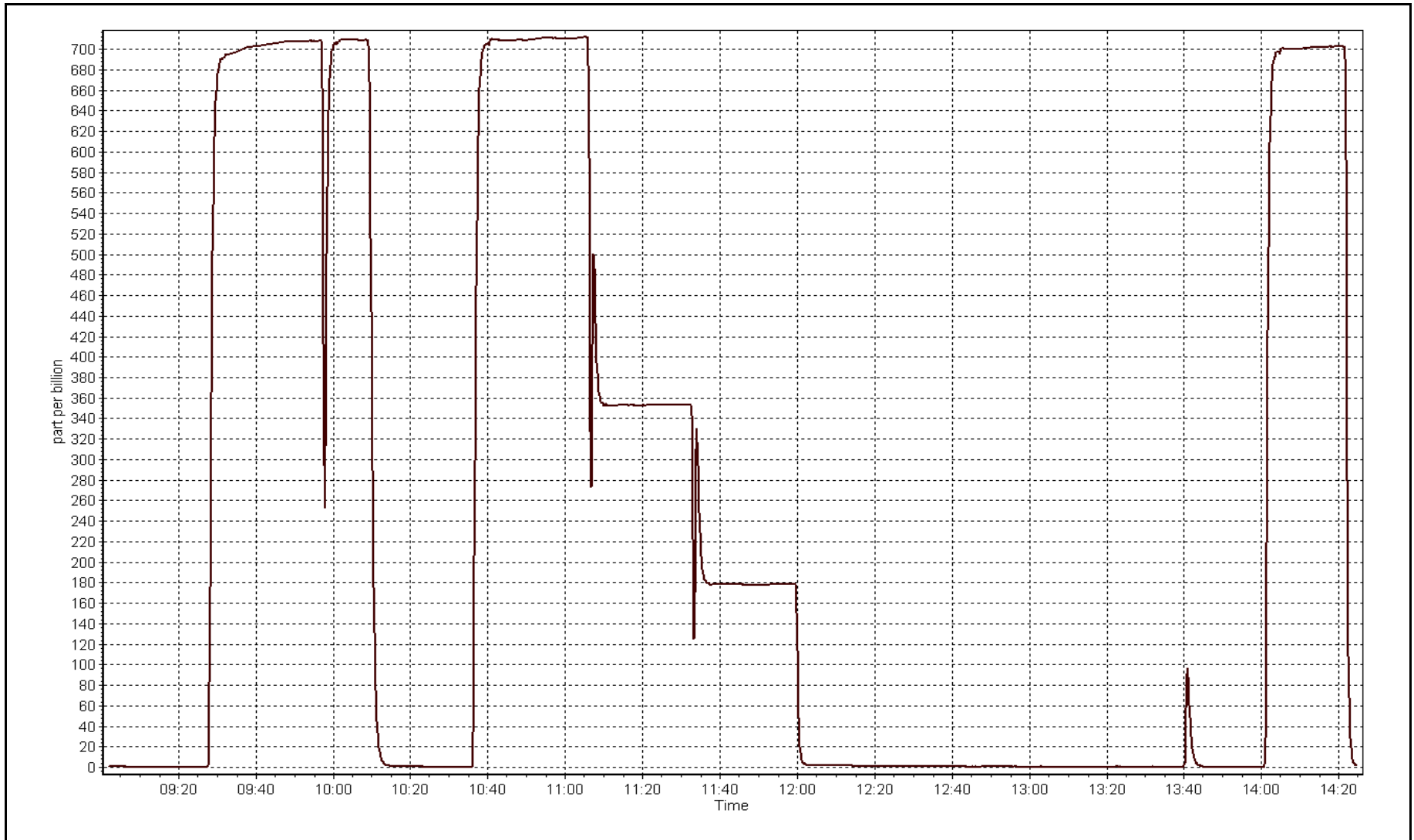
### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.3	----	Correlation Coefficient	0.999977
707.1	710.8	0.9947		
354.0	353.3	1.0021	Slope	0.995802
176.5	178.1	0.9914		
			Intercept	0.087364



SO2 Calibration Plot

Date: July 20, 2015







# Wood Buffalo Environmental Association TRS Calibration Report

## Station Information

Calibration Date	July 21, 2015	Last Calibration	June 17, 2015
Station Name	Anzac	Station Number	AMS 14
Reason:	<input type="text" value="Routine"/>		
Start Time (MST)	12:10	End Time (MST)	15:18
Gas Cert Reference	56532297-003	Station temp.	22 Deg C
Cal Gas Concentration	5.05 ppm	Cal Gas Exp Date	09/09/2017
Calibrator Make/Model	Sabio 4010	Serial Number	8400311
Dil air Make/Model	API 701	Serial Number	4764
DACS make/model	Campbell Scientific CR3000	DACS serial No.	8790
SO2 gas concentration	47.2 ppm	SO2 gas cert/exp	SA130026A December-12-16

## Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-731	-731
Analyzer IP address	192.168.1.42		Lamp voltage	985	976
Calculated slope	0.999489	0.996959	Chamber temp	45	45
Calculated intercept	-0.188390	0.084481	Pressure	662.0	655.3
Analyzer Background	1.76	1.78	Flow	0.391	0.390
Analyzer Coefficient	1.225	1.225	Intensity	98	98
			Converter temp.	800	800

Analyzer make/model	Thermo 43i-TLE	Analyzer serial #	1300156232
Converter make/model	CDN-101	Converter serial #	510

## Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.0	----
as found span	5000	74.3	75.0	75.3	0.997
SO2 scrubber check	5000	18.7	176.5	0.5	----
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	74.3	75.0	75.3	0.997
second point	5000	39.6	40.0	39.8	1.004
third point	5000	19.8	20.0	20.0	0.999
as left zero	5000	0.0	0.0	0.0	----
as left span	5000	74.3	75.0	75.8	0.989
Average Correction Factor					1.000

Corrected As found	75.3	Previous response	75.3	% change	0.0%
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**Notes:**

No adjustments, filter changed after As Found. Scrubber check after third point

Calibration Performed By: Ryan Power



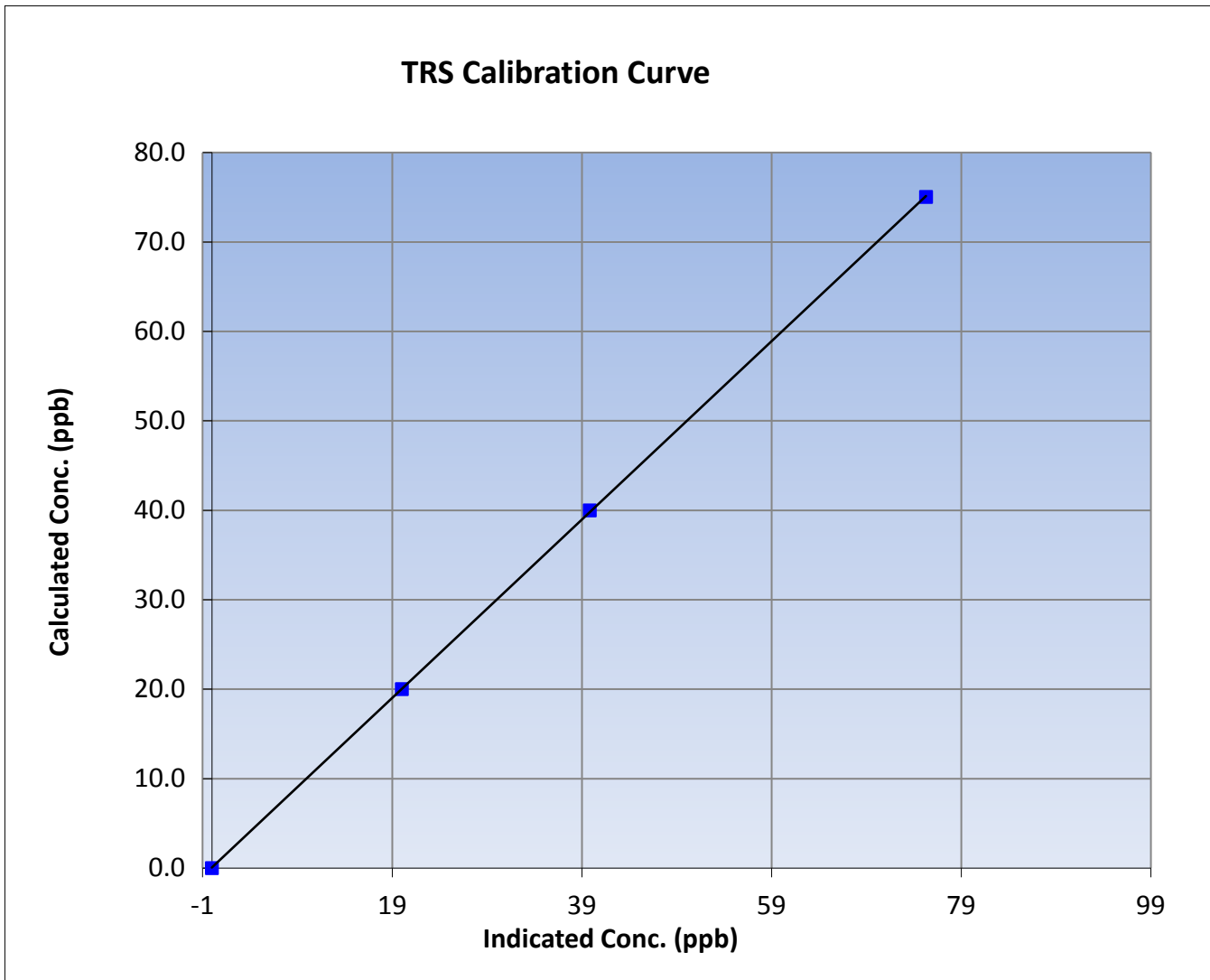
# Wood Buffalo Environmental Association TRS Calibration Report

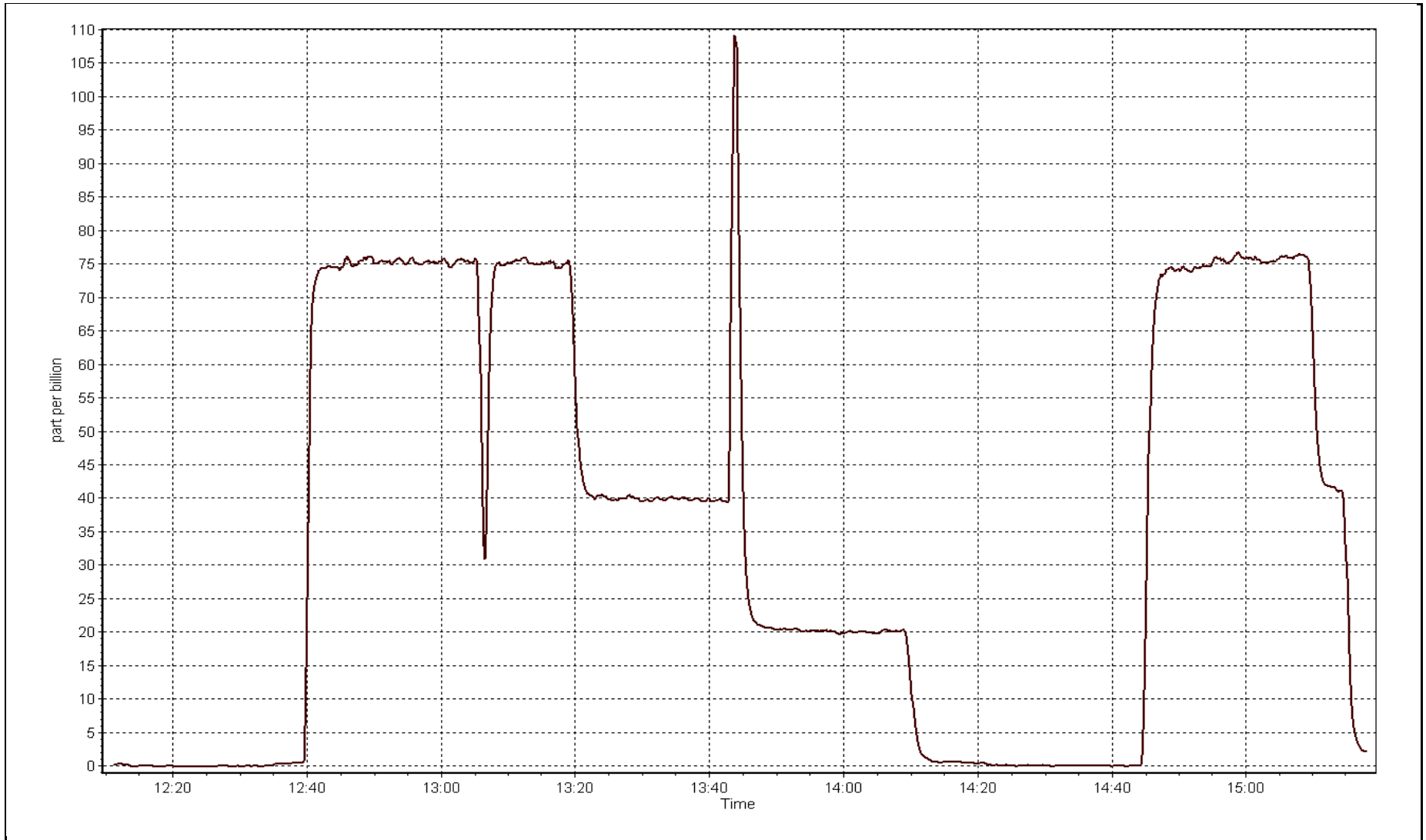
## Station Information

Calibration Date	July 21, 2015	Previous Calibration	June 17, 2015
Station Name	AMS 14	Station Number	AMS 14
Start Time (MST)	12:10	End Time (MST)	15:18
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	0.999983
75.0	75.3	0.9969		
40.0	39.8	1.0039	Slope	0.996959
20.0	20.0	0.9994		
			Intercept	0.084481







# Wood Buffalo Environmental Association THC / NMHC Calibration Report

## Station Information

Calibration Date	July-20-15	Last Calibration	June-15-15
Station Name	Anzac	Station Number	AMS 14
Reason:	Routine		
Start Time (MST)	9:05	End Time (MST)	14:25
Gas Cert Reference	SA130026A	Cal Gas Expiry Date	December-12-16
CH4 Cal Gas Conc.	512.0 ppm	CH4 Equiv Conc.	1092.3 ppm
C3H8 Cal Gas Conc.	211.0 ppm	Station temp.	20 Deg C
Calibrator Model	Sabio 4010	Serial Number	8400311
ZAG make/model	Teledyne API 701	Serial Number	4764
DACS make/model	Campbell Scientific CR3000	Serial Number	8790

## Analyzer Information

	Before	After		Before	After
THC Range (ppm)	0 - 50 ppm		Column Temp	75.1	75.1
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	175.1	175.0
Analyzer IP address	192.168.1.55		Flame Temp	398.0	395.0
THC Calc slope	1.000912	0.999729	Carrier Pressure	31.8	31.8
THC Calc intercept	0.008186	0.004141	Fuel Pressure	41.4	41.4
NMHC Calc slope	1.002887	1.000645	Air Pressure	32.4	32.6
NMHC Calc intercept	-0.009938	-0.013921			

Analyzer make Thermo 55i Analyzer serial # 1218153355

## THC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	0.00	----
as found span	5000	74.9	16.36	16.13	1.014
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	74.9	16.36	16.38	0.999
second point	5000	37.5	8.19	8.14	1.006
third point	5000	18.7	4.09	4.11	0.994
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	74.9	16.36	16.37	1.000
Average Correction Factor					1.000

Corrected As found    16.13    Previous response    16.34    % change    1.3%

**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	8.56	1.015
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	74.9	8.69	8.70	0.999
second point	5000	37.5	4.35	4.35	1.000
third point	5000	18.7	2.17	2.21	0.982
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	74.9	8.69	8.69	1.000
Average Correction Factor					0.994

Corrected As found      8.56      Previous response      8.68      % change      1.4%

### CH4 Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0	0.00	0.00	----
as found span	5000	74.9	7.67	7.57	1.013
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	74.9	7.67	7.69	0.997
second point	5000	37.5	3.84	3.79	1.013
third point	5000	18.7	1.91	1.90	1.008
as left zero	5000	0.0	0.00	0.00	----
as left span	5000	74.9	7.67	7.68	0.999
Average Correction Factor					1.006

Corrected As found      7.57      Previous response      7.66      % change      1.2%



# Wood Buffalo Environmental Association

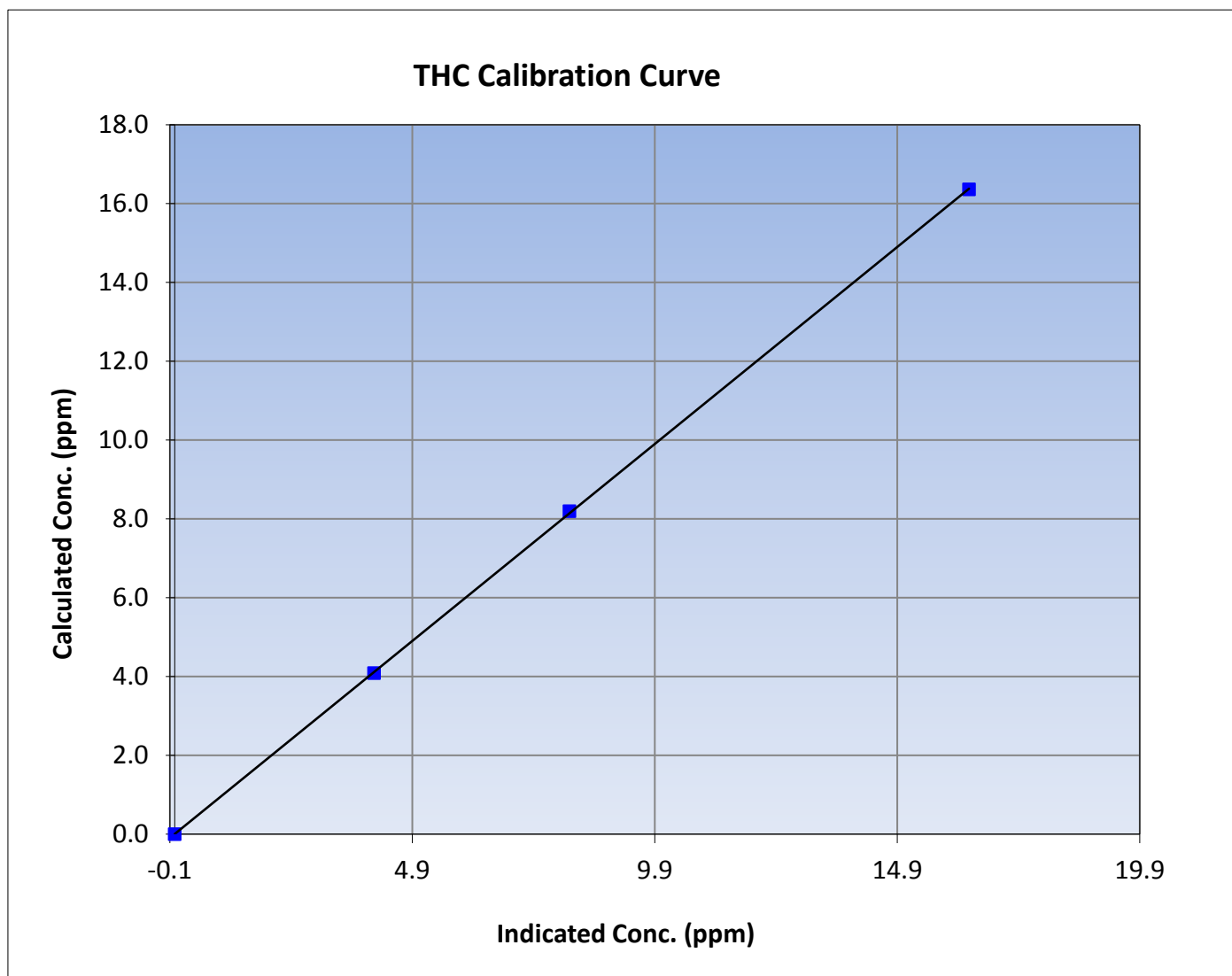
## THC Calibration Summary

### Station Information

Calibration Date	July 20, 2015	Previous Calibration	June 15, 2015
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	9:05	End Time (MST)	14:25
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	0.999975
16.36	16.38	0.9989		
8.19	8.14	1.0064	Slope	0.999729
4.09	4.11	0.9939		
			Intercept	0.004141





# Wood Buffalo Environmental Association

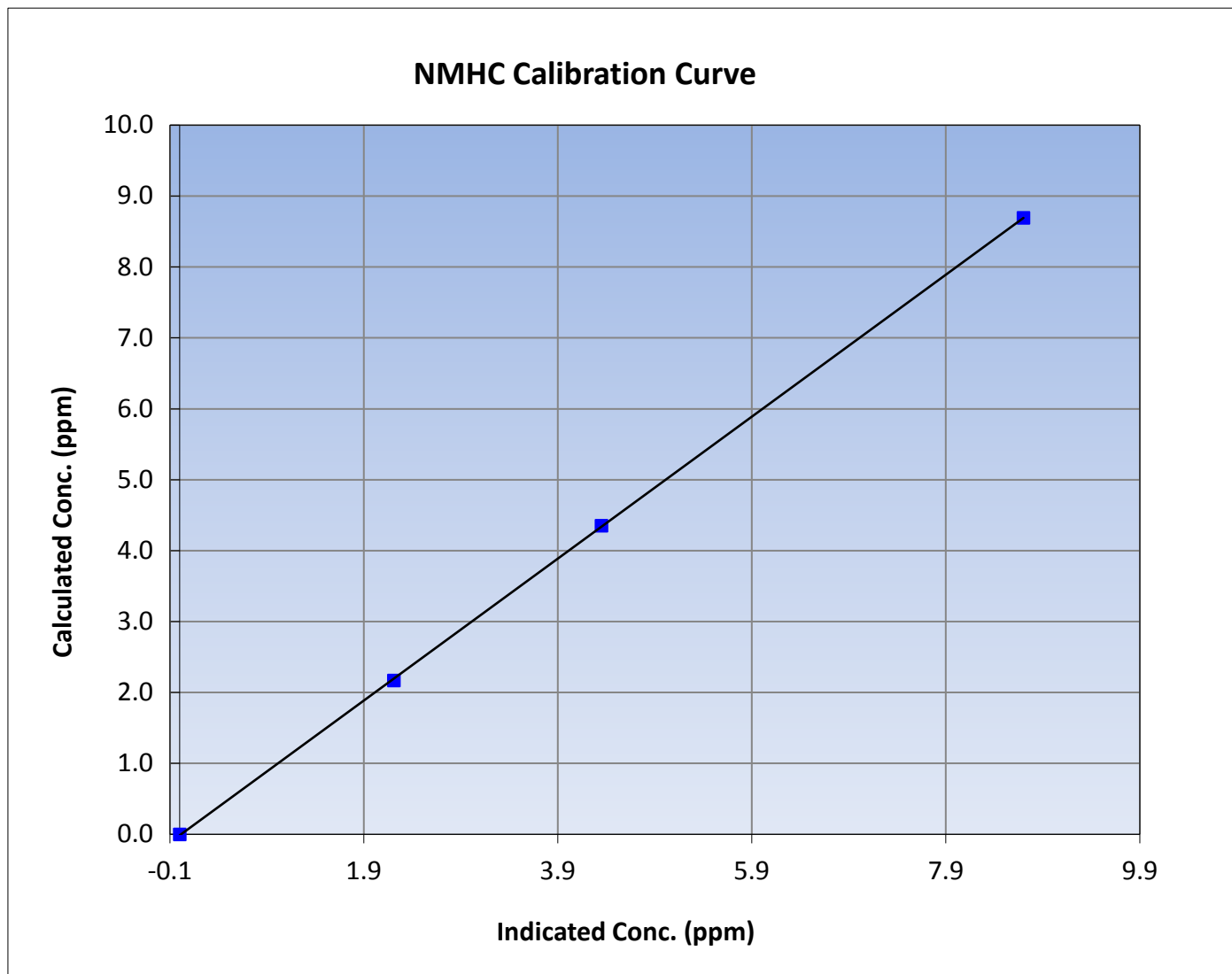
## NMHC Calibration Summary

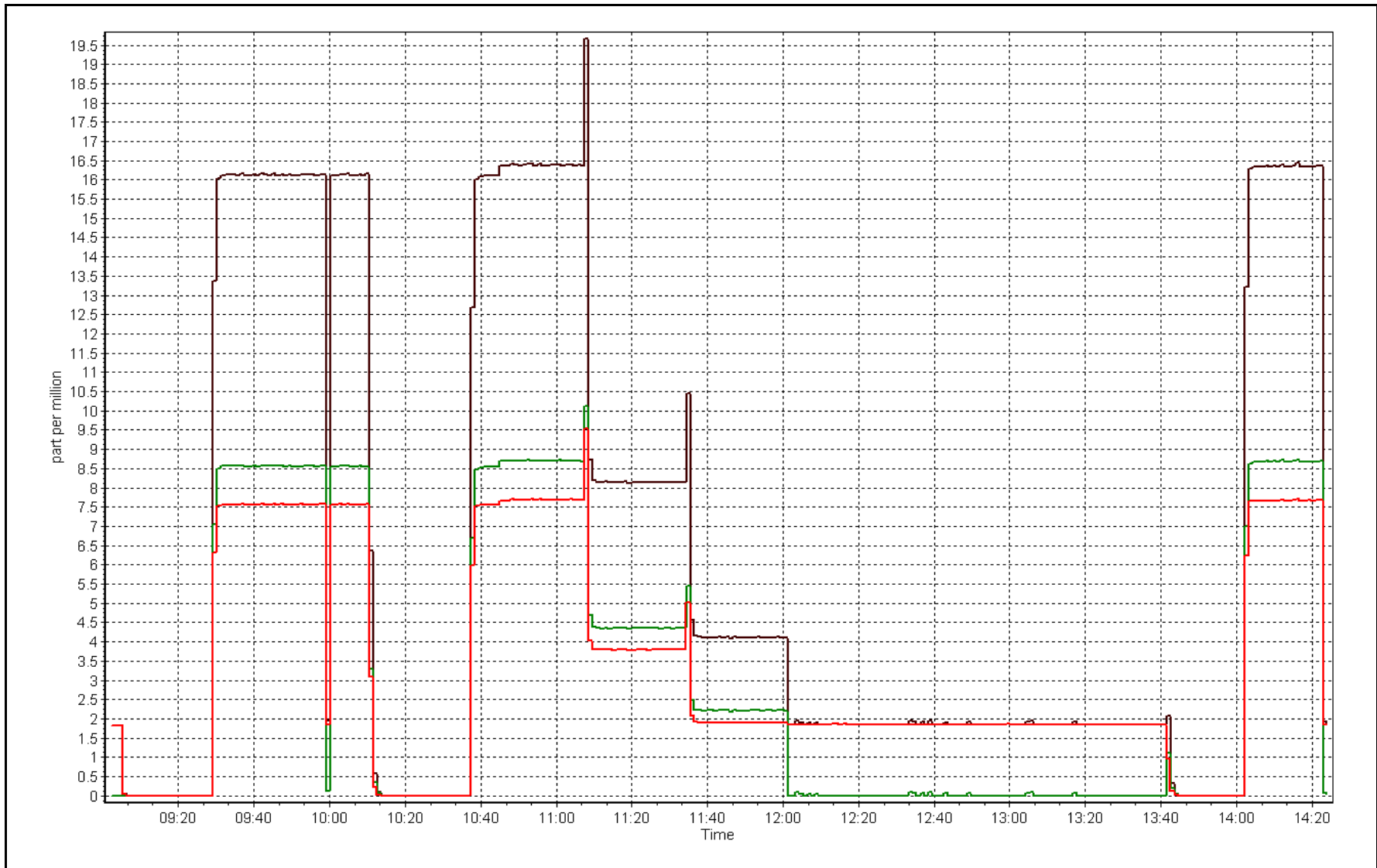
### Station Information

Calibration Date	July 20, 2015	Previous Calibration	June 15, 2015
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	9:05	End Time (MST)	14:25
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	0.999973
8.69	8.70	0.9991		
4.35	4.35	1.0004	Slope	1.000645
2.17	2.21	0.9820		
			Intercept	-0.013921









# Wood Buffalo Environmental Association

## O<sub>3</sub> Calibration Report

### Station Information

Calibration Date	July 21, 2015	Previous Calibration	June 16, 2015
Station Name	Anzac	Station Number	AMS 14
Reason:	Routine		
Start Time (MST)	9:00	End Time (MST)	12:10
NO2 GPT Ref date	July-20-15	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	1.002518	0.993650	Pressure	657.4	649.8
Calculated intercept	-0.932870	-0.289569	Flow cell A	0.703	0.698
Analyzer Background	-1.0	-1.0	Flow cell B	0.704	0.701
Analyzer Coefficient	0.970	0.988	Cell A Intensity	130300	128500
			Cell B Intensity	132900	130400

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	-0.6	----
as found span	5000	1.190	406.9	401.1	1.014
calibrator zero	5000	0.00	0.0	-0.6	----
high point	5000	1.190	406.9	409.1	0.995
second point	5000	0.847	279.4	281.8	0.991
third point	5000	0.505	145.3	147.8	0.983
as left zero	5000	0.00	0.0	-0.2	----
as left span	5000	1.190	406.9	415.0	0.980
Average Correction Factor					0.990

Corrected As found	401.7	Previous response	406.8	% change	1.3%
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Notes:

span adjusted.

Calibration Performed By:

Ryan Power



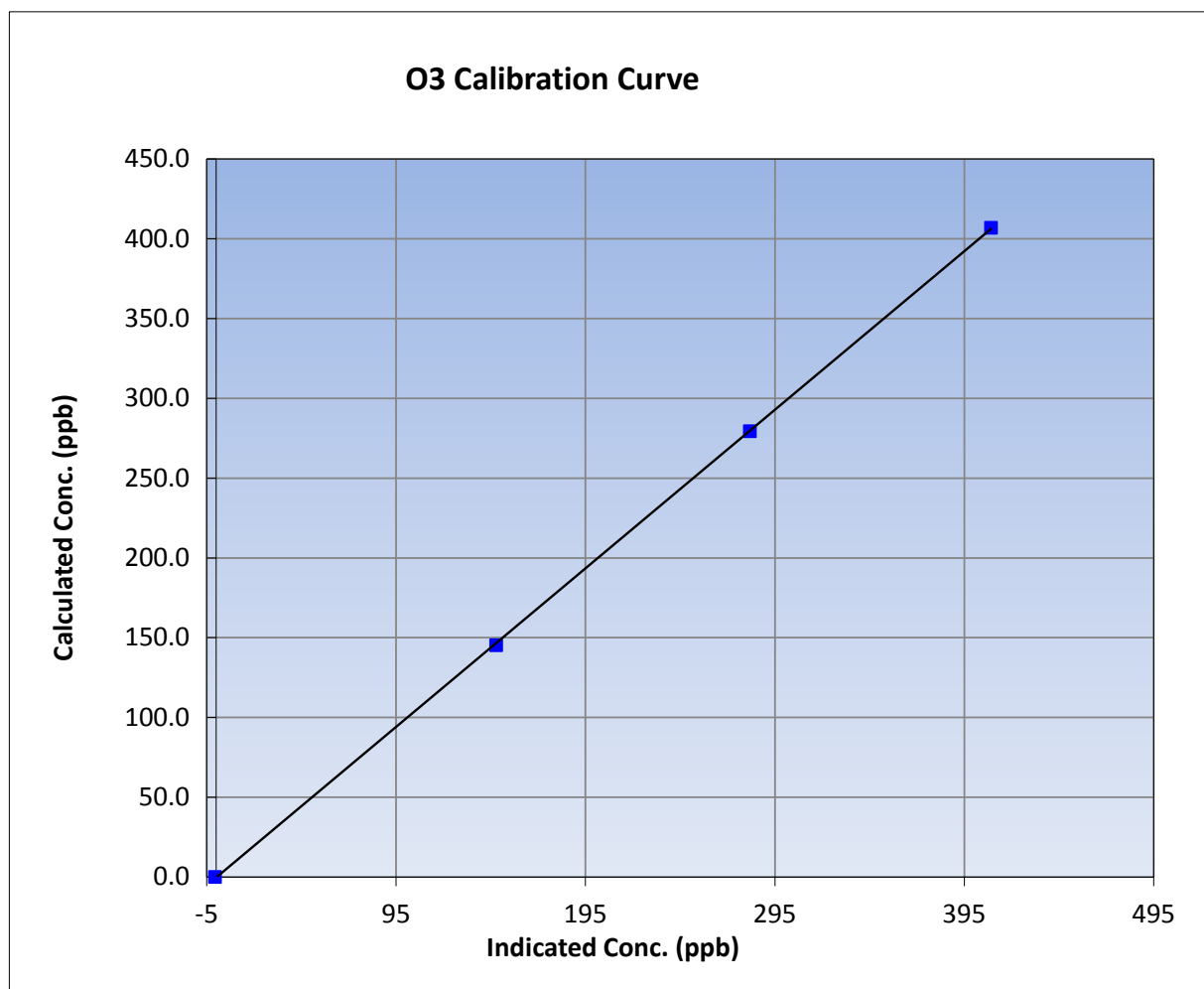
## Wood Buffalo Environmental Association O3 Calibration Report

### Station Information

Calibration Date	July-21-15	Previous Calibration	June 16, 2015
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	9:05	End Time (MST)	12:10
Analyzer make	Thermo 49i	Analyzer serial #	1426262596

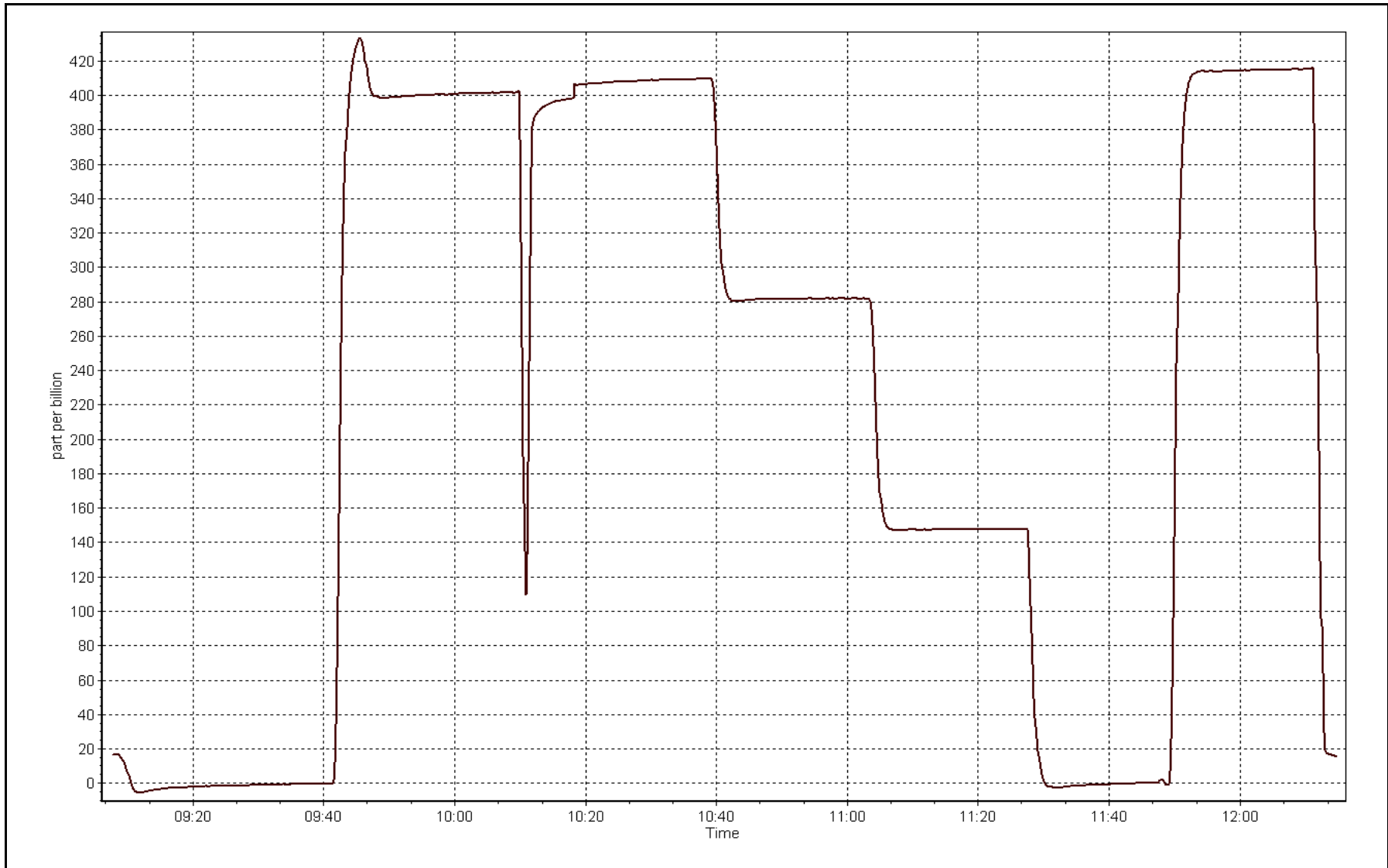
### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.6	----	Correlation Coefficient	0.999969
406.9	409.1	0.9946		
279.4	281.8	0.9915	Slope	0.993650
145.3	147.8	0.9834		
			Intercept	-0.289569



O3 Calibration Plot

Date: July 21, 2015





## Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

### Station Information

Calibration Date	July 20, 2015	Previous Calibration	June 15, 2015
Station Name	Anzac	Station Number	AMS 14
Reason:	Routine		
Start Time (MST)	9:05	End Time (MST)	14:25
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	0.997531	1.001039	0.993927
	Data Offset	-0.211174	-0.394079	-1.156336
Current Calibration	Data Slope	0.998033	1.000059	0.996745
	Data Offset	-0.255067	-0.193525	-0.940555

### 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	0.679		1.000	
NOx coefficient	1.001		1.000	
NO2 coefficient	1.000		1.000	
NO bkgrnd	3.0		3.4	
NOx bkgrnd	3.2		3.6	
Chamber Temp	50.3	Deg C	50.3	Deg C
Moly Temp	325	Deg C	328	Deg C
PMT voltage	-845.1	V	-802.9	V
PMT Temp	-3.1	Deg C	-3	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	157.9	mmHg	156.4	mmHg
R Cell Press Nox	158.2	mmHg	156.7	mmHg
NO sample flow	0.83	lpm	0.818	lpm
Nox sample Flow	0.832	lpm	0.820	lpm

**Notes:**

Filter changed after As Finds. PMT adjustment after As Finds to bring NO coefficient closer to 1



# Wood Buffalo Environmental Association

## NOX-NO-NO2 Calibration Report

### Station Information

Calibration Date: July 20, 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	0.1	0.2	0.0	----	----
as found span	5000	74.9	799.9	799.9	0.0	798.3	795.6	2.7	1.0021	1.0055
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
high point	5000	74.9	799.9	799.9	0.0	801.8	800.2	1.6	0.9977	0.9997
second point	5000	37.5	400.5	400.5	0.0	401.2	400.1	1.1	0.9984	1.0011
third point	5000	18.7	199.7	199.7	0.0	201.1	200.7	0.5	0.9931	0.9953
as left zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
as left span	5000	74.9	799.9	394.9	405.0	806.1	392.1	414.0	0.9923	1.0071
<b>Average Correction Factor</b>									<b>0.9964</b>	<b>0.9987</b>

Corrcctd As found NO<sub>x</sub>= 798.2 NO= 795.4 Percent Change NO<sub>x</sub>= 0.5% NO= 0.5%  
 Previous Response NO<sub>x</sub>= 802.1 NO= 799.5

### GPT Calibration Data

Dilution Flow 5000 ccm Source Gas Flow 74.9 ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
Cal zero			0.0			0.0			N/A	
1st NO2 (300)	----	394.9	406.9	803.3	394.9	408.4	0.9811	1.0000	0.9963	100.4%
2nd NO2 (200)	----	522.4	279.4	804.1	522.4	281.7	0.9801	1.0000	0.9919	100.8%
3rd NO2 (100)	----	656.5	145.3	804.6	656.5	148.1	0.9796	1.0000	0.9814	101.9%
4th NO2 (0)	801.8	----	1.6	803.4	801.8	1.6	0.9810	1.0000	N/A	----
<b>Average Correction Factor</b>							<b>0.9805</b>	<b>1.0000</b>	<b>0.9899</b>	<b>101.0%</b>

Calibration Performed By: Ryan Power



# Wood Buffalo Environmental Association

## NO<sub>x</sub> Calibration Summary

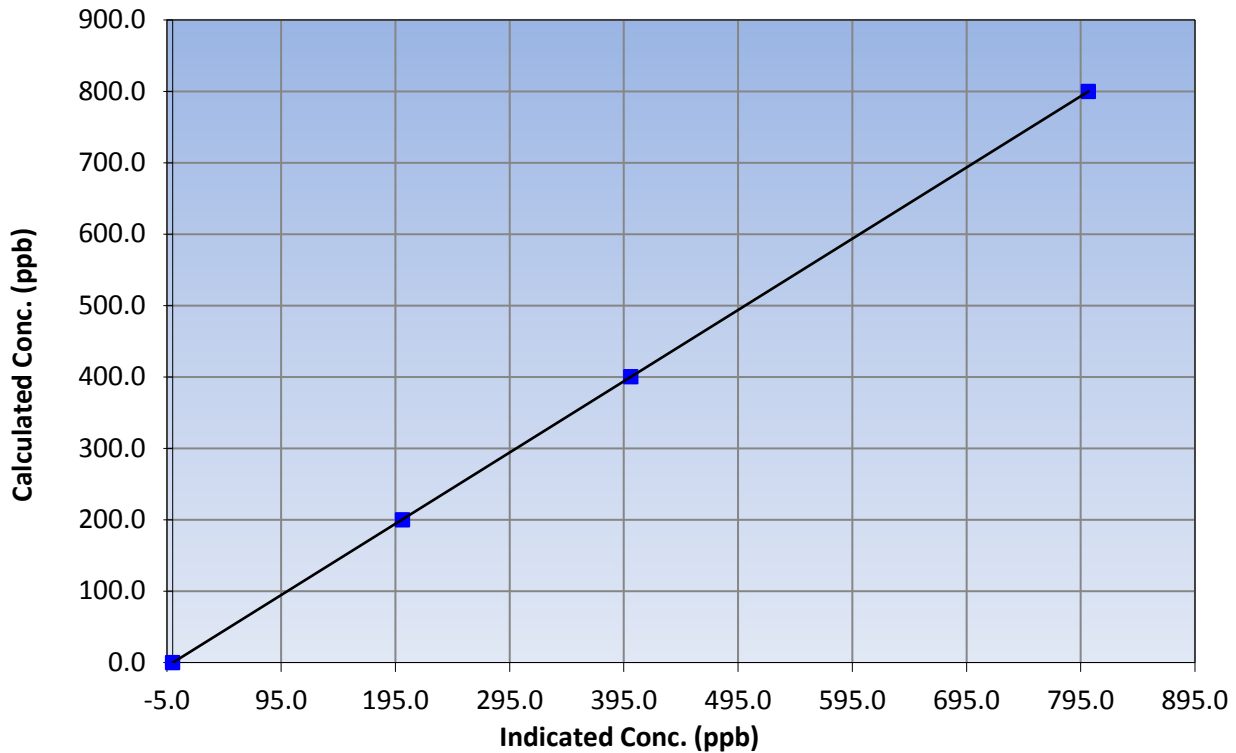
### Station Information

Calibration Date	July 20, 2015	Previous Calibration	June 15, 2015
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	9:05	End Time (MST)	14:25
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	801.8	0.9977		
400.5	401.2	0.9984	Slope	0.998033
199.7	201.1	0.9931		
			Intercept	-0.255067

### NO<sub>x</sub> Calibration Curve





# Wood Buffalo Environmental Association

## NO Calibration Summary

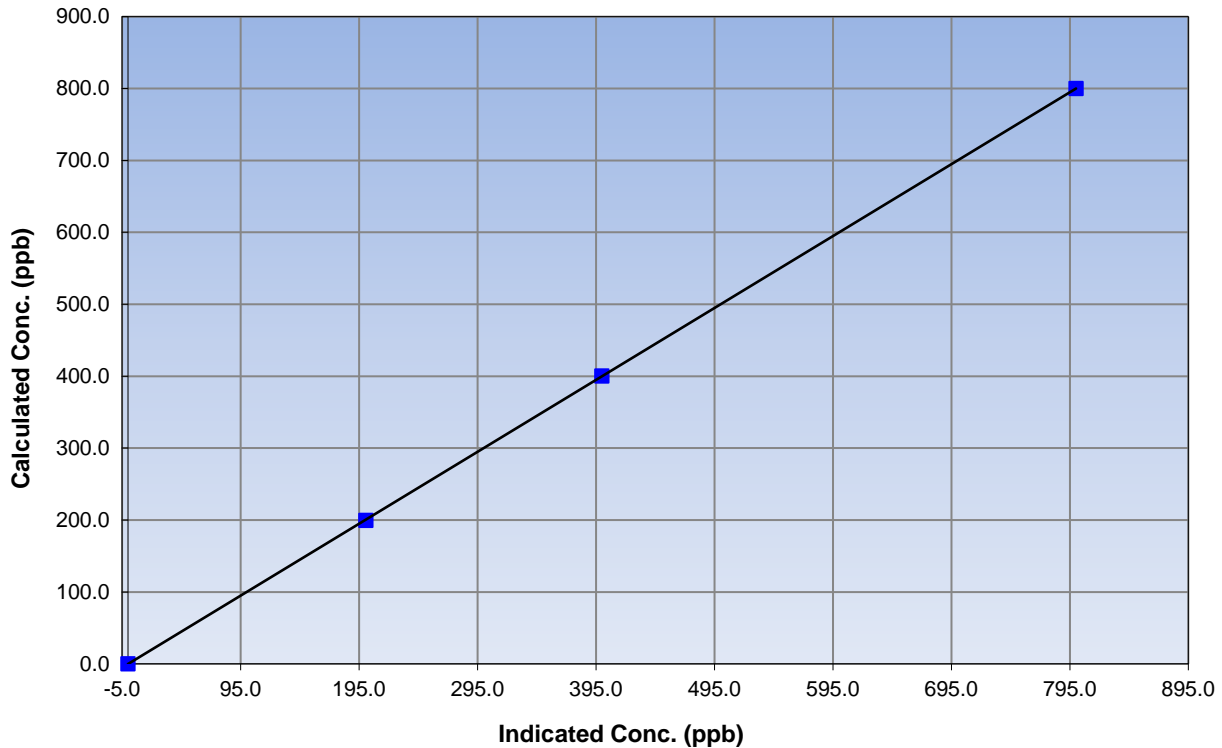
### Station Information

Calibration Date	July 20, 2015	Previous Calibration	June 15, 2015
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	9:05	End Time (MST)	14:25
Analyzer make	Thermo 42i	Analyzer serial #	1426262592

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999997
799.9	800.2	0.9997		
400.5	400.1	1.0011	Slope	1.000059
199.7	200.7	0.9953		
			Intercept	-0.193525

### NO Calibration Curve





# Wood Buffalo Environmental Association

## NO<sub>2</sub> Calibration Summary

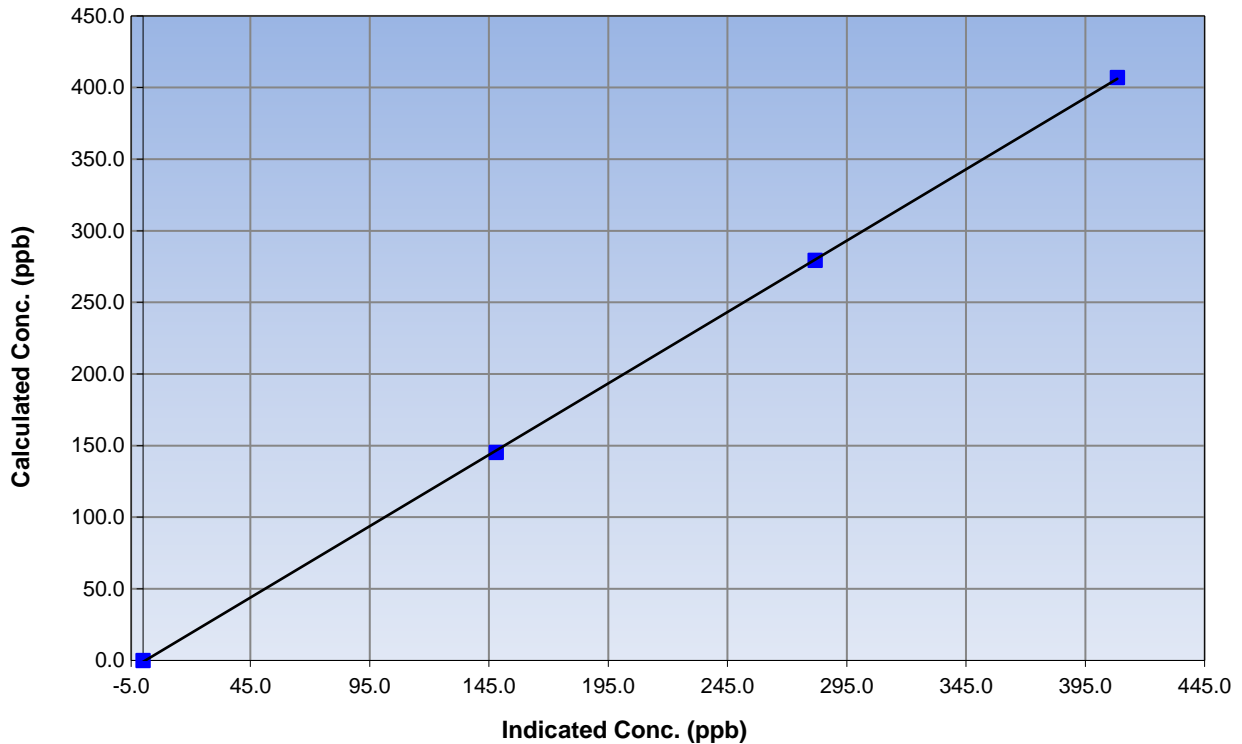
### Station Information

Calibration Date	July 20, 2015	Previous Calibration	June 15, 2015
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	9:05	End Time (MST)	14:25
Analyzer make	Thermo 42i	Analyzer serial #	1426262592

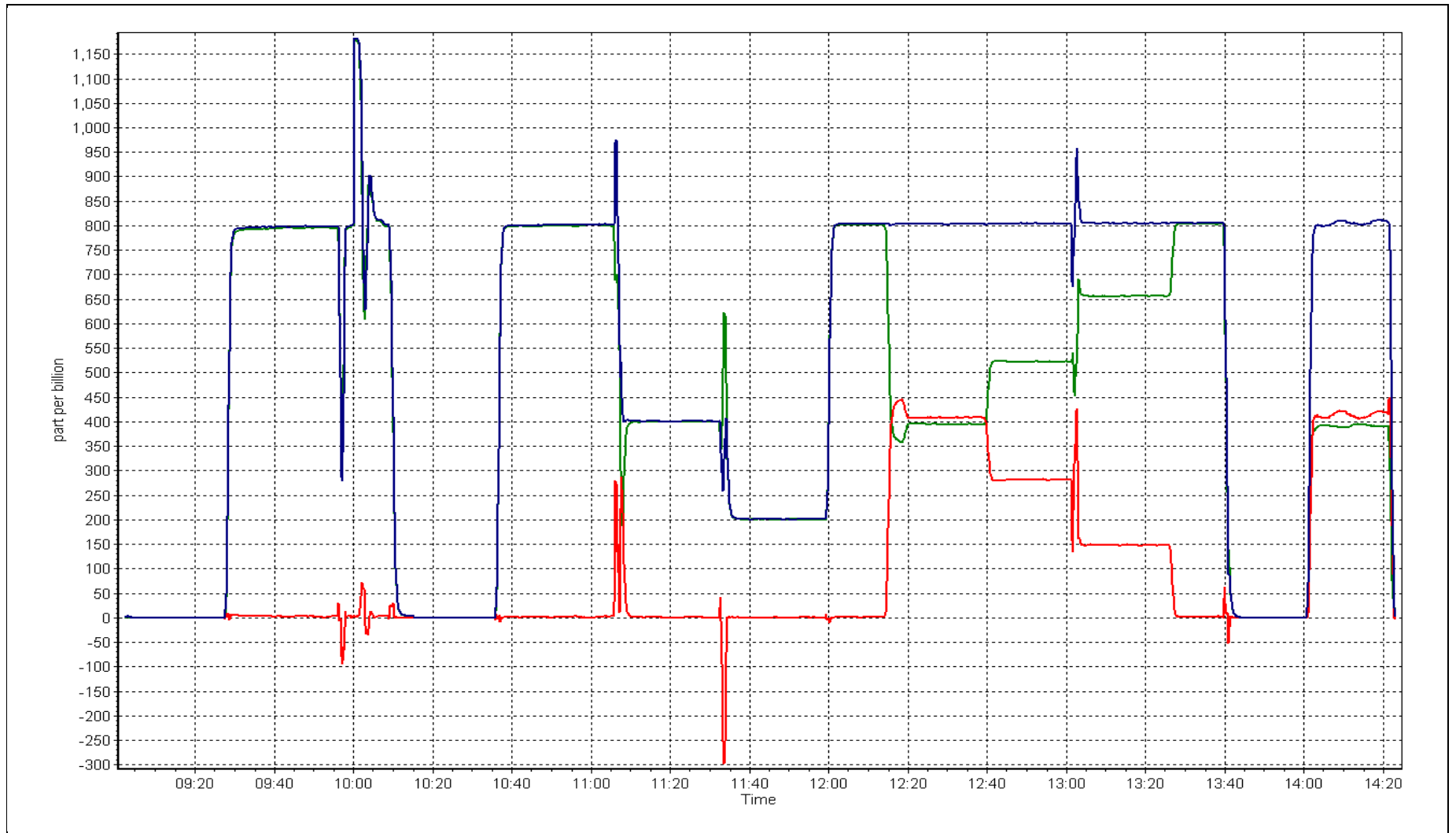
### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999962
406.9	408.4	0.9963		
279.4	281.7	0.9919	Slope	0.996745
145.3	148.1	0.9814		
			Intercept	-0.940555

### NO<sub>2</sub> Calibration Curve









## Wood Buffalo Environmental Association

### SHARP CALIBRATION

#### STATION INFORMATION

Calibration Date:	<u>July 21, 2015</u>	Previous Calibration:	<u>June 17, 2015</u>
Station Name:	<u>Anzac</u>	Station Number:	<u>AMS 14</u>
Start Time (MST):	<u>13:20</u>	End Time (MST):	<u>13:55</u>
Calibrator Make/Model:	<u>Delta Cal</u>	Calibrator Serial Number:	<u>1212</u>

#### SHARP INFORMATION

Particulate Fraction:	PM2.5
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	23.0	21.7	-1.3	23.0
T2	36.0	na	na	36.0
T3	30.0	na	na	30.0
T4	36.0	na	na	36.0
RH (%)	32.0	na	na	32.0

##### Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	947	946.0	-1.0	947

##### 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	188		188
Neph	0.5		0.5
C14	-1.8		-1.8
<b>Indicated Concentration (ug/m3)</b>	<b>0.1</b>	<b>no</b>	<b>0.1</b>
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
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##### 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>	<b>Mass foil set S/N:</b>	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; cyclone head replaced with cleaned one.

Calibration Performed By:

Ryan Power



## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS 15  
CNRL HORIZON  
JULY 2015**

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

August 26, 2015



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CNRL HORIZON (AMS 15)  
 JULY 2015

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	707	37	37	100.00	14	0	2	0
TRS (ppb) Average	708	34	36	99.73	2	0	1	0
THC (ppm) Average	707	37	37	100.00	5	-	2.7	-
NO2 (ppb) Average	707	37	37	100.00	36	0	11	-
NO (ppb) Average	707	37	37	100.00	49	-	4	-
NOX (ppb) Average	707	37	37	100.00	70	-	13	-
PM2.5 (ug/m3) Average	742	0	2	99.73	470.3	-	175.7	5
Temperature 2 m (C) Average	744	0	0	100.00	31.8	-	23.1	-
Wind Speed 10 m (km/h) Average	743	1	1	100.00	22	-	13	-
Wind Direction 10 m (deg) Average	743	1	1	100.00	-	-	-	-
Precipitation (mm) Total	744	0	0	100.00	15.7	-	18.5	-
Relative Humidity (%) Average	744	0	0	100.00	99	-	87	-
Global Solar Radiation (W/m2) Average	744	0	0	100.00	886	-	337	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CNRL HORIZON (AMS 15)  
 JULY 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	707	0.5	1	-	0	0	0	0	0	1	14
TRS (ppb) Average	708	0.2	0	-	0	0	0	0	0	0	2
THC (ppm) Average	707	2.15	0.4	-	1.8	1.9	2	2	2.2	2.5	5
NO2 (ppb) Average	707	3.3	5	-	0	0	1	2	4	8	36
NO (ppb) Average	707	1	4	-	0	0	0	0	0	1	49
NOX (ppb) Average	707	4.3	7	-	0	0	1	2	5	10	70
PM2.5 (ug/m3) Average	742	25.22	59.5	-	0.2	1.8	3	6.1	13.1	56	470.3
Temperature 2 m (C) Average	744	17.81	5.1	-	5.4	10.8	13.8	17.6	21.9	24.5	31.8
Wind Speed 10 m (km/h) Average	743	7.7	4	-	0	3	5	7	10	13	22
Wind Direction 10 m (deg) Average	743	-	-	-	-	-	-	-	-	-	-
Precipitation (mm) Total	744	-	-	71.88	-	-	-	-	-	-	-
Relative Humidity (%) Average	744	68.6	20	-	23	41	52	70	85	95	99
Global Solar Radiation (W/m2) Average	744	209.2	247	-	0	0	0	90	367	634	886

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CNRL HORIZON (AMS 15)  
JULY 2015

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
TRS	30 Jul 2015 11:00	30 Jul 2015 12:00	2	Maintenance - cleaned glass manifold
PM2.5	29 Jul 2015 12:00	29 Jul 2015 13:00	2	Maintenance - Flow and zero check, sample head cleaning



Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 14 ppb on Jul 5 03:00	Maximum Daily Average: 2.2 ppb on Jul 11		Hours of Data:	707
Minimum Value: 0 ppb on Jul 1 02:00	Minimum Daily Average: 0.0 ppb on Jul 22		Hours of Missing Data:	37
Maximum Diurnal Average: 1.1 ppb at hour 11	Minimum Diurnal Average: 0.1 ppb at hour 5		Hours of Calibration:	37
Monthly Average: 0.5 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 1 P <sub>99</sub> = 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-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1	0	0	0	0	0.1	1
2-Jul	0	0	0	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-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	1	1	1	3	2	3	2	1	1	1	0.9	3
4-Jul	1	1	0	0	0	Z	0	0	0	0	0	0	0	0	5	0	0	0	0	10	1	0	1	0	1.0	10
5-Jul	Z	0	14	1	0	0	0	0	2	2	0	0	1	2	1	2	1	1	1	1	0	0	0	0	1.3	14
6-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	10	0	0	0	0.9	10
7-Jul	0	0	Z	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	5
8-Jul	0	0	0	Z	0	0	0	0	0	0	0	2	2	1	0	0	0	0	0	0	0	0	0	2	0.3	2
9-Jul	5	5	0	0	Z	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	5
10-Jul	0	0	0	0	0	Z	0	0	0	0	1	1	2	0	1	1	1	1	1	0	0	0	0	0	0.3	2
11-Jul	Z	0	0	0	0	1	0	1	2	4	10	3	5	7	4	6	4	0	0	0	0	0	0	1	2.2	10
12-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	4	1	1	1	0	0	0	0	0	0	0.4	4
13-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1	0	0.1	2
14-Jul	0	0	0	Z	0	0	0	0	0	3	12	10	2	1	1	0	1	1	0	4	3	2	0	0	1.8	12
15-Jul	0	0	0	0	Z	0	0	0	0	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0.2	1
16-Jul	0	0	0	0	0	Z	0	0	1	2	4	0	0	0	0	0	0	3	1	0	0	0	0	0	0.5	4
17-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	0	5	4	1	0	0	0	0	0	0	0	0	0.5	5
18-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.1	1
19-Jul	0	0	Z	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0.3	2
20-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	2	5	6	5	2	1	1	0	1.0	6
21-Jul	0	0	0	1	Z	0	0	0	0	0	0	0	0	1	1	3	10	4	1	0	0	0	0	0	1.0	10
22-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
23-Jul	Z	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
24-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.1	1
25-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0.1	1
26-Jul	0	0	0	Z	0	0	4	0	4	2	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0.7	4
27-Jul	0	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-Jul	0	0	0	0	0	Z	0	1	2	1	1	0	0	0	0	0	0	0	0	0	3	1	1	0	0.5	3
29-Jul	Z	0	0	0	0	0	1	2	2	1	1	0	0	0	0	1	4	6	0	0	0	0	0	0	0.8	6
30-Jul	0	Z	0	0	0	0	0	0	C	C	C	C	C	C	1	0	0	0	0	0	0	0	0	0	--	1
31-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.1	1
	0.3	0.3	0.7	0.2	0.1	0.1	0.1	0.4	0.4	0.7	1.1	0.6	0.5	0.7	0.8	0.8	0.5	1.0	0.8	0.9	0.7	0.3	0.2	0.2	Diurnal Average	
	5	5	14	2	0	1	1	5	2	4	12	10	5	7	5	9	4	10	6	10	10	2	1	2	Diurnal Maximum	

Z - zerospan C - Calibration

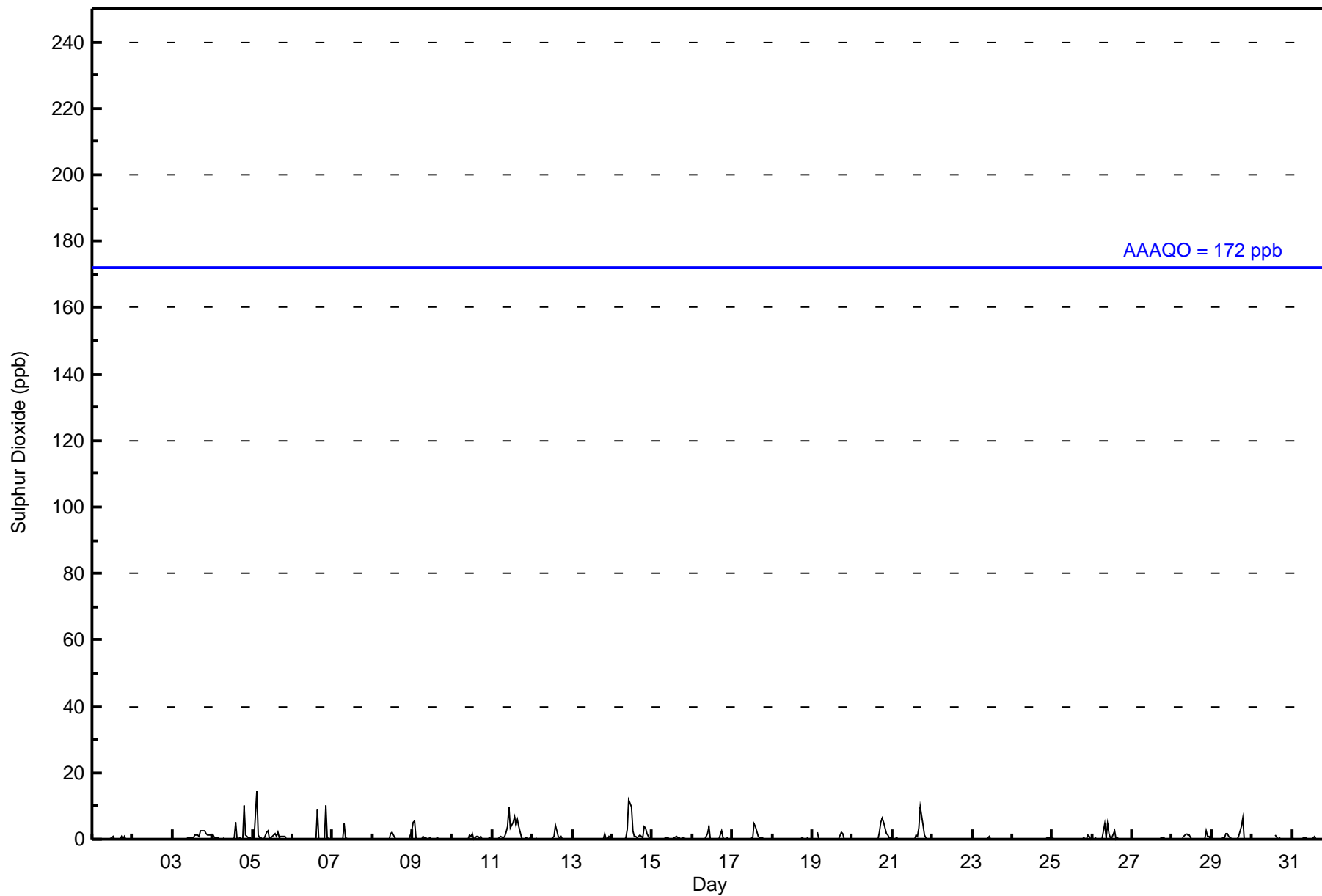
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb





Wood Buffalo Environmental Association  
Hourly Averages

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
CNRL Horizon - July 2015





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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**CNRL Horizon - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	705	99.72	99.72
11 - 20	2	0.28	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**CNRL Horizon - July 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	73	45	26	22	10	10	16	30	85	110	85	42	32	54	36	28	704
11 - 20	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	2
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	73	45	27	22	10	10	16	30	85	110	85	42	32	54	36	29	706

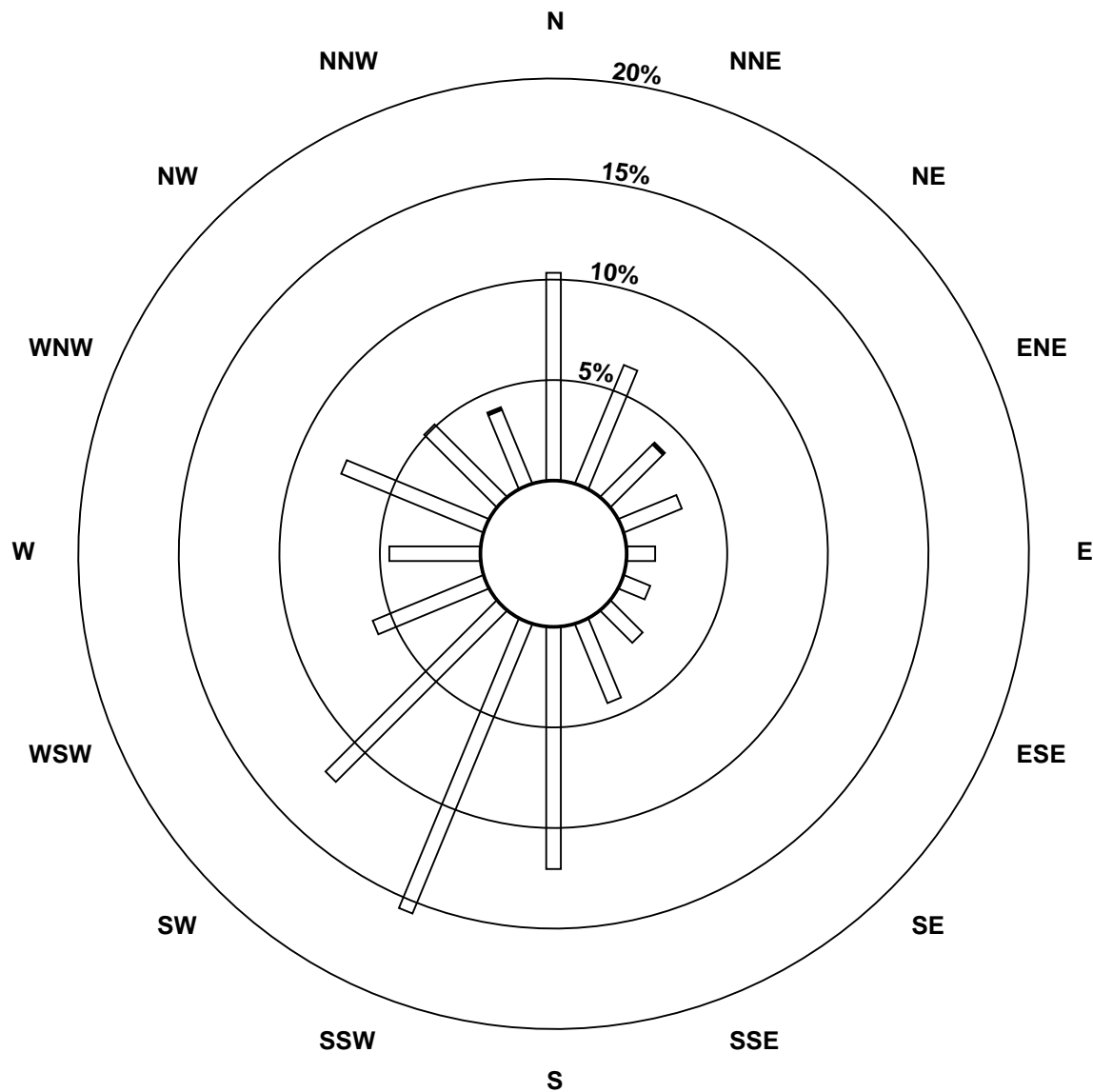
Total Number of Valid Hours: 706

Total Number of Hours: 744

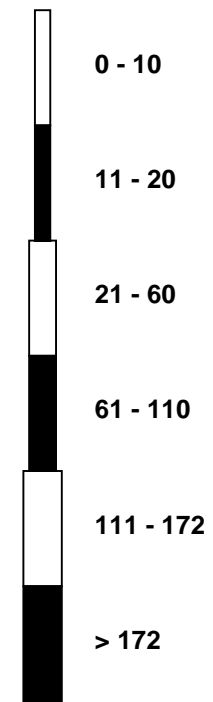


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

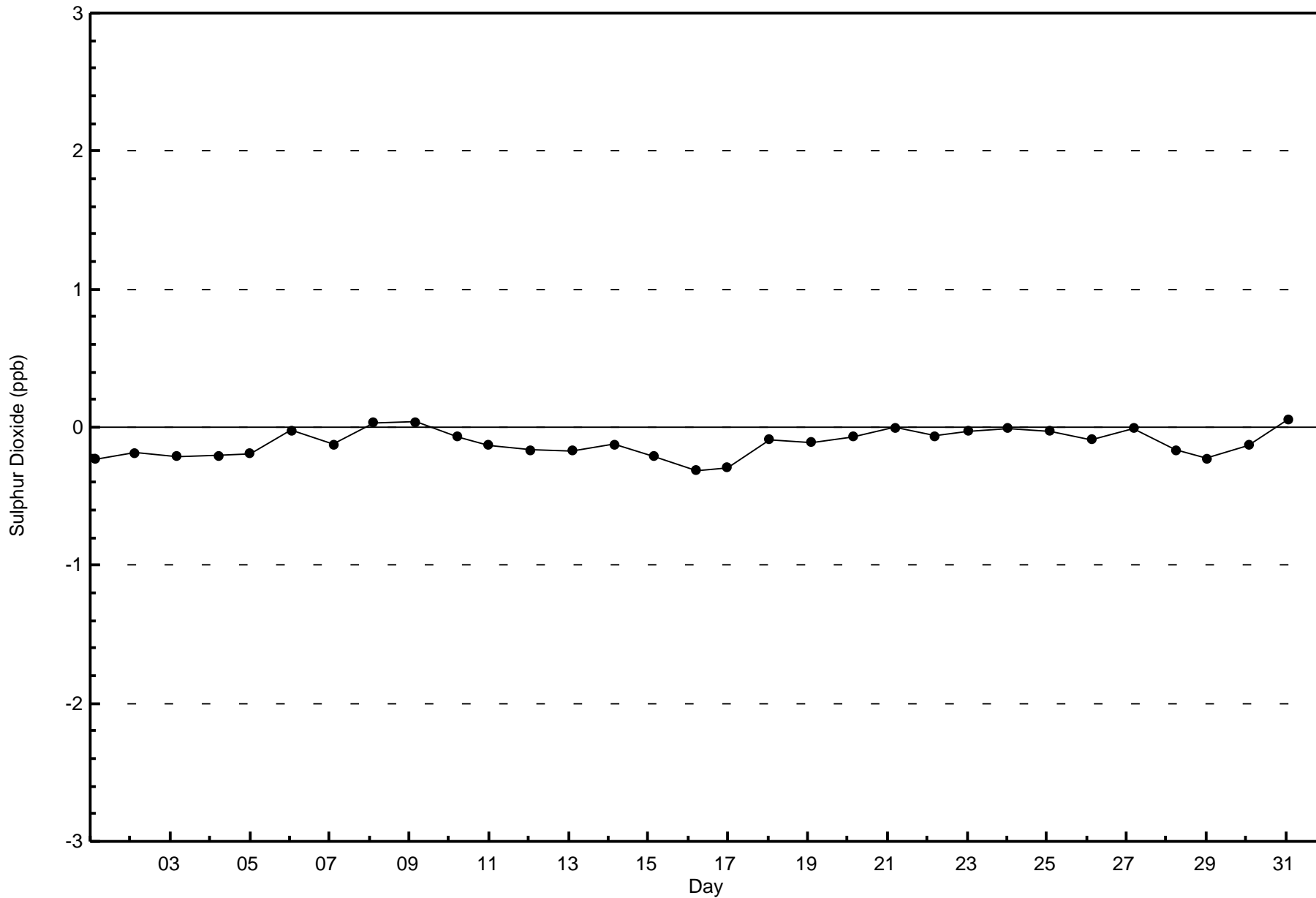
Sulphur Dioxide (SO<sub>2</sub>) - ppb  
CNRL Horizon (AMS 15)

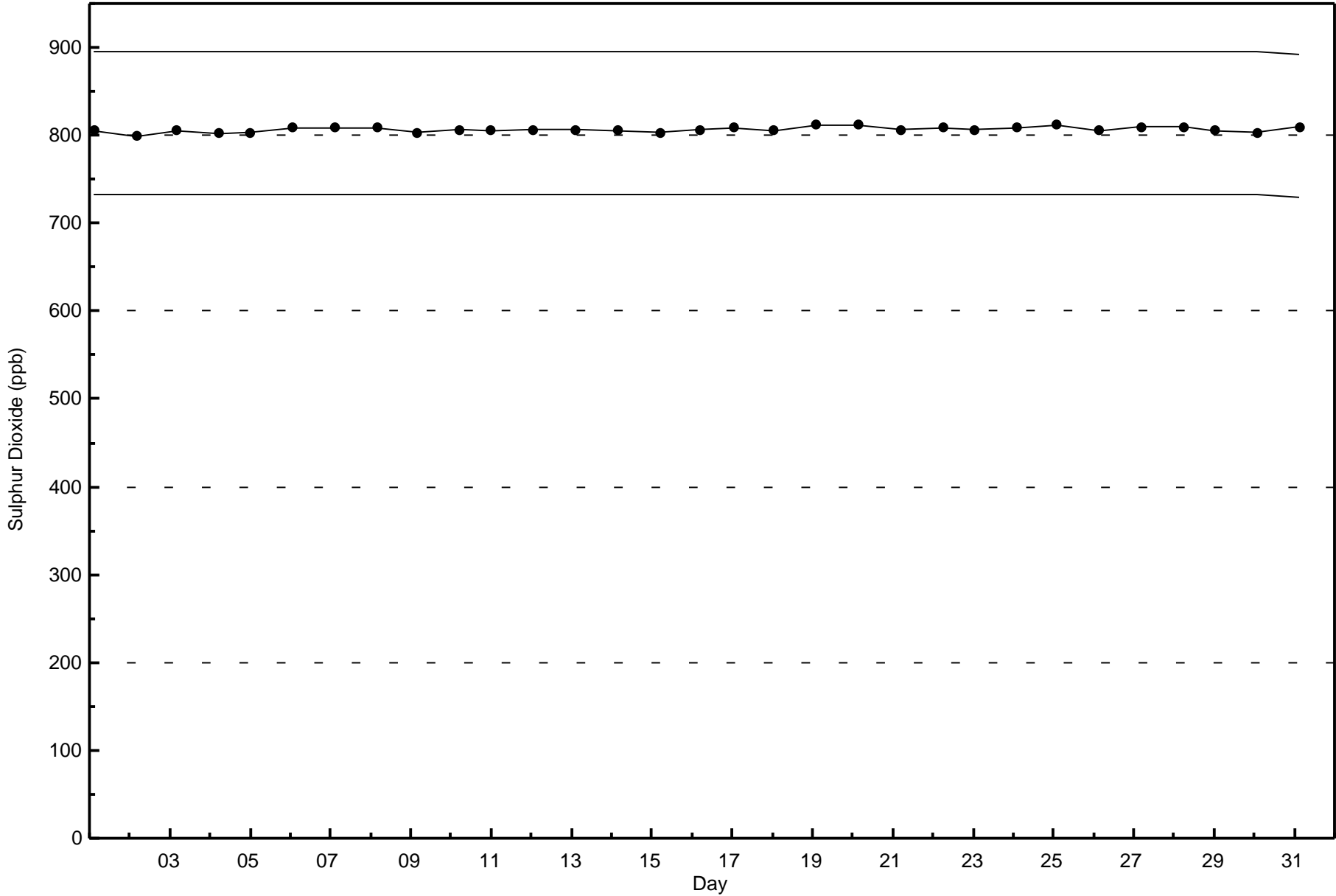


Classes (ppb)



Total Number of Valid Hours: 706







Summary of Hour Averages

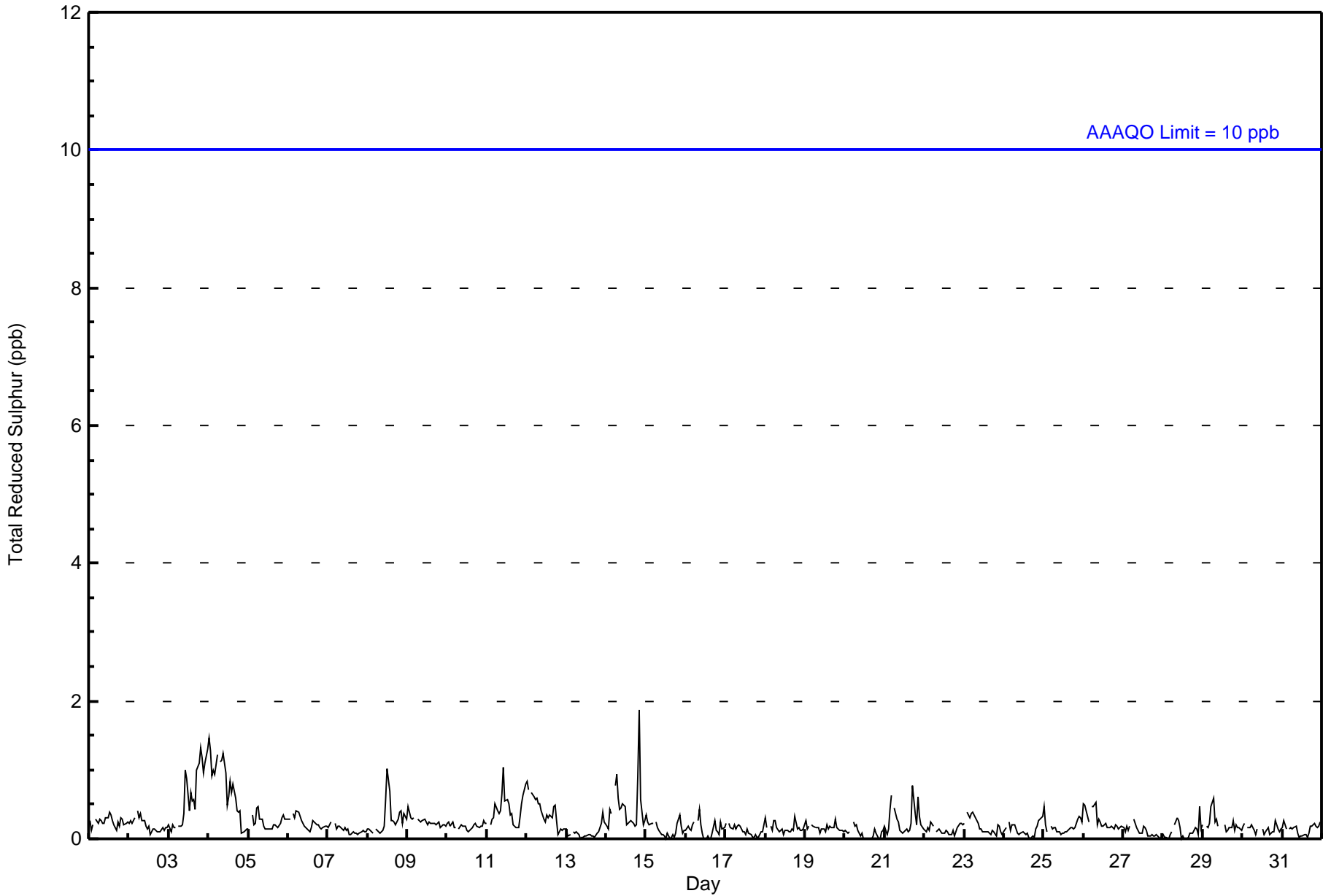
CNRL Horizon - July 2015

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 2 ppb on Jul 14 21:00	Maximum Daily Average: 0.7 ppb on Jul 4		Hours of Data:	708
Minimum Value: 0 ppb on Jul 15 13:00	Minimum Daily Average: 0.1 ppb on Jul 20		Hours of Missing Data:	36
Maximum Diurnal Average: 0.3 ppb at hour 6	Minimum Diurnal Average: 0.2 ppb at hour 17		Hours of Calibration:	34
Monthly Average: 0.2 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 0 P <sub>99</sub> = 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-Jul	0	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-Jul	0	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-Jul	0	0	0	0	0	Z	0	0	0	0	1	1	0	1	1	1	0	1	1	1	1	1	1	1	0.6	1
4-Jul	1	1	1	1	1	1	Z	1	1	1	1	0	1	1	1	1	1	0	0	0	0	0	0	0	0.7	1
5-Jul	0	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-Jul	0	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-Jul	0	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-Jul	0	0	0	0	Z	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0.3	1
9-Jul	0	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-Jul	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-Jul	0	Z	0	0	0	1	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	0.4	1
12-Jul	1	1	Z	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
13-Jul	0	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-Jul	0	0	0	0	Z	1	1	1	0	1	0	0	0	0	0	0	0	0	0	1	2	1	0	0	0.5	2
15-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
16-Jul	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
17-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
18-Jul	0	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-Jul	0	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-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
21-Jul	0	0	0	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0.3	1
22-Jul	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
23-Jul	0	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-Jul	0	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-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
26-Jul	1	0	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
27-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
28-Jul	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-Jul	0	Z	0	0	0	0	1	0	0	0	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.2	1
30-Jul	0	0	Z	0	0	0	0	0	0	0	M	M	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
31-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0

0.3	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.2	Diurnal Average
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	Diurnal Maximum

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







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

**Total Reduced Sulphur (TRS) - ppb**  
**CNRL Horizon - July 2015**

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

Total Number of Valid Hours: 708

Total Number of Hours: 744



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

**Total Reduced Sulphur (TRS) - ppb**  
**CNRL Horizon - July 2015**

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	74	43	27	22	9	10	17	28	84	108	87	44	35	56	36	28	708
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	74	43	27	22	9	10	17	28	84	108	87	44	35	56	36	28	708

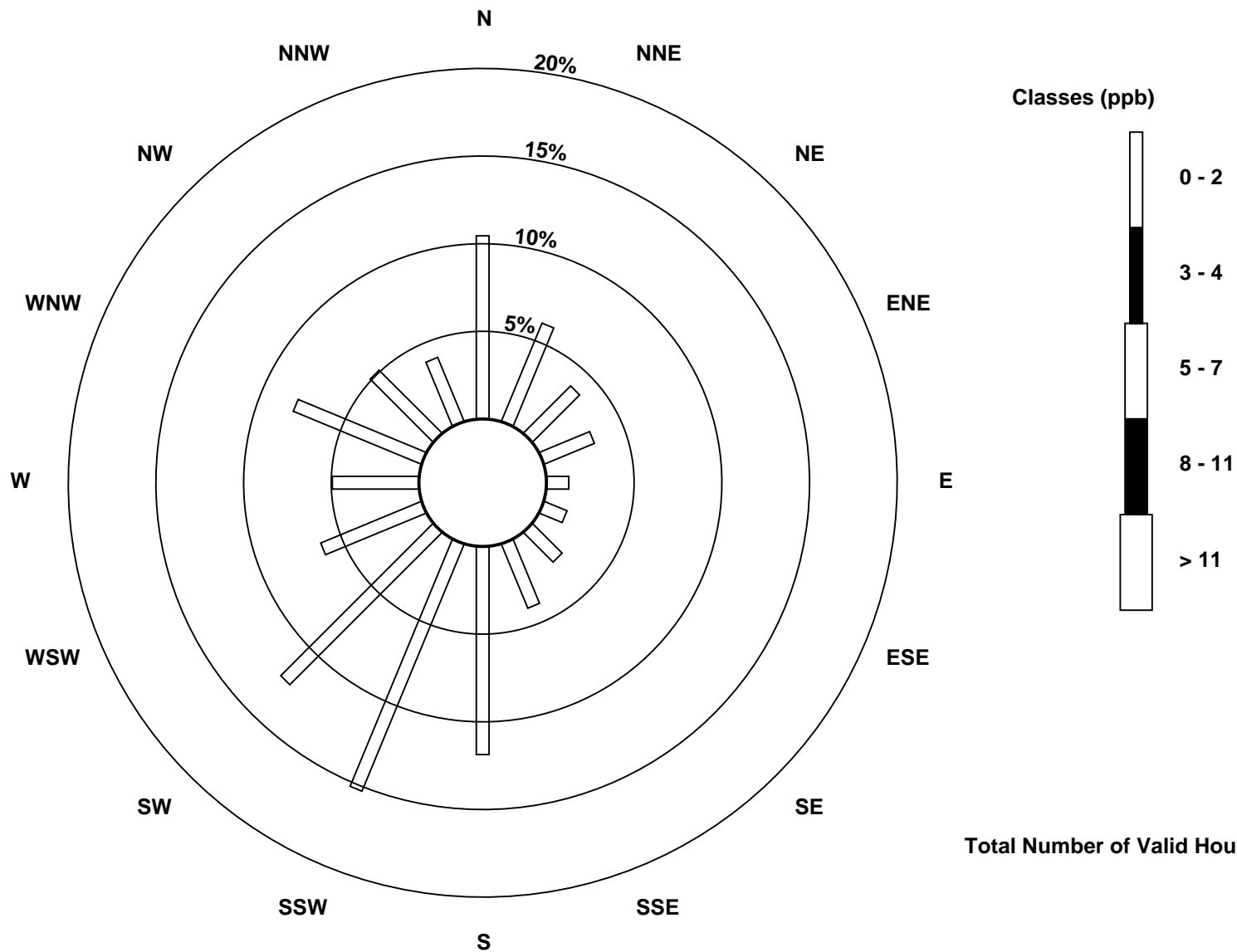
Total Number of Valid Hours: 708

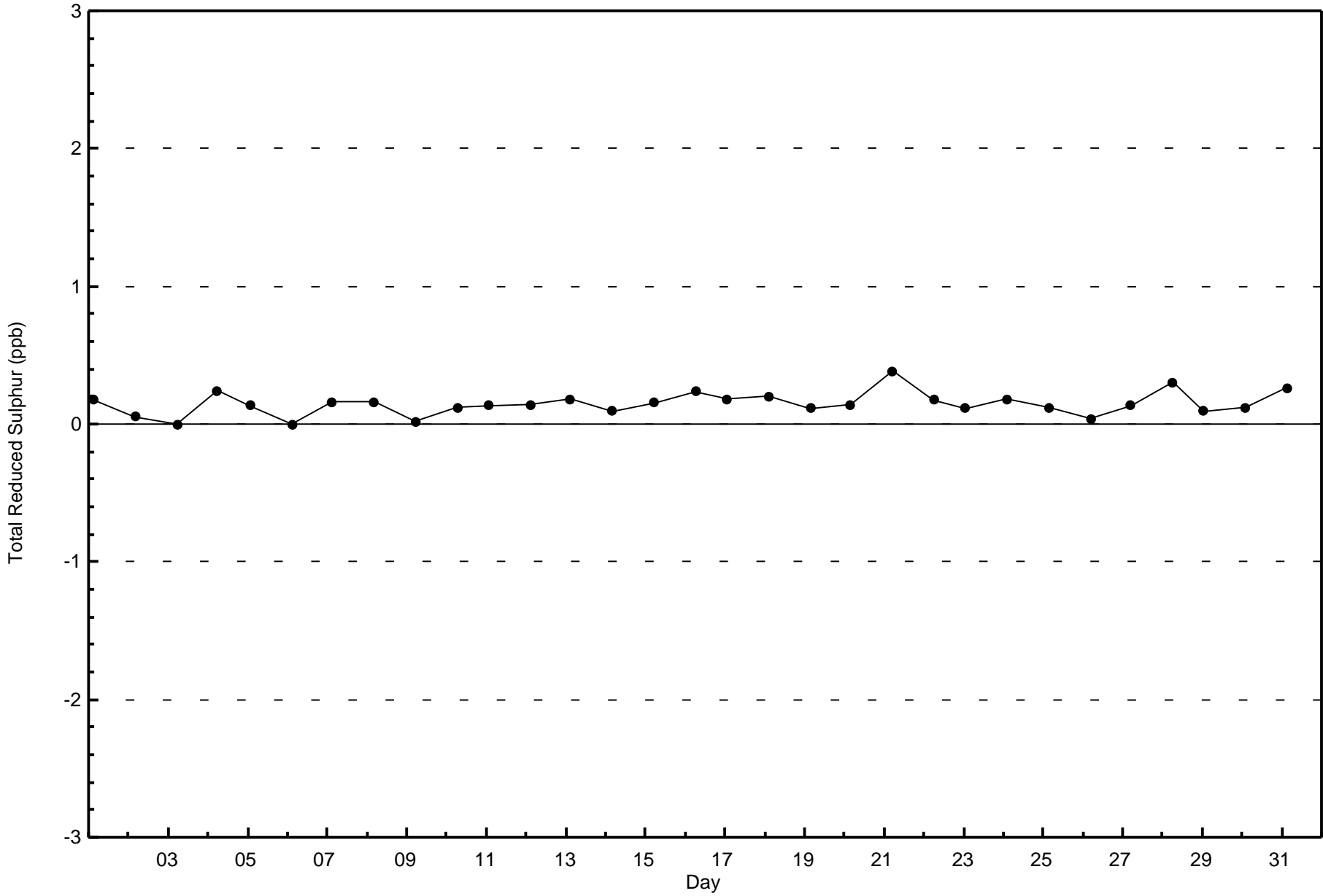
Total Number of Hours: 744

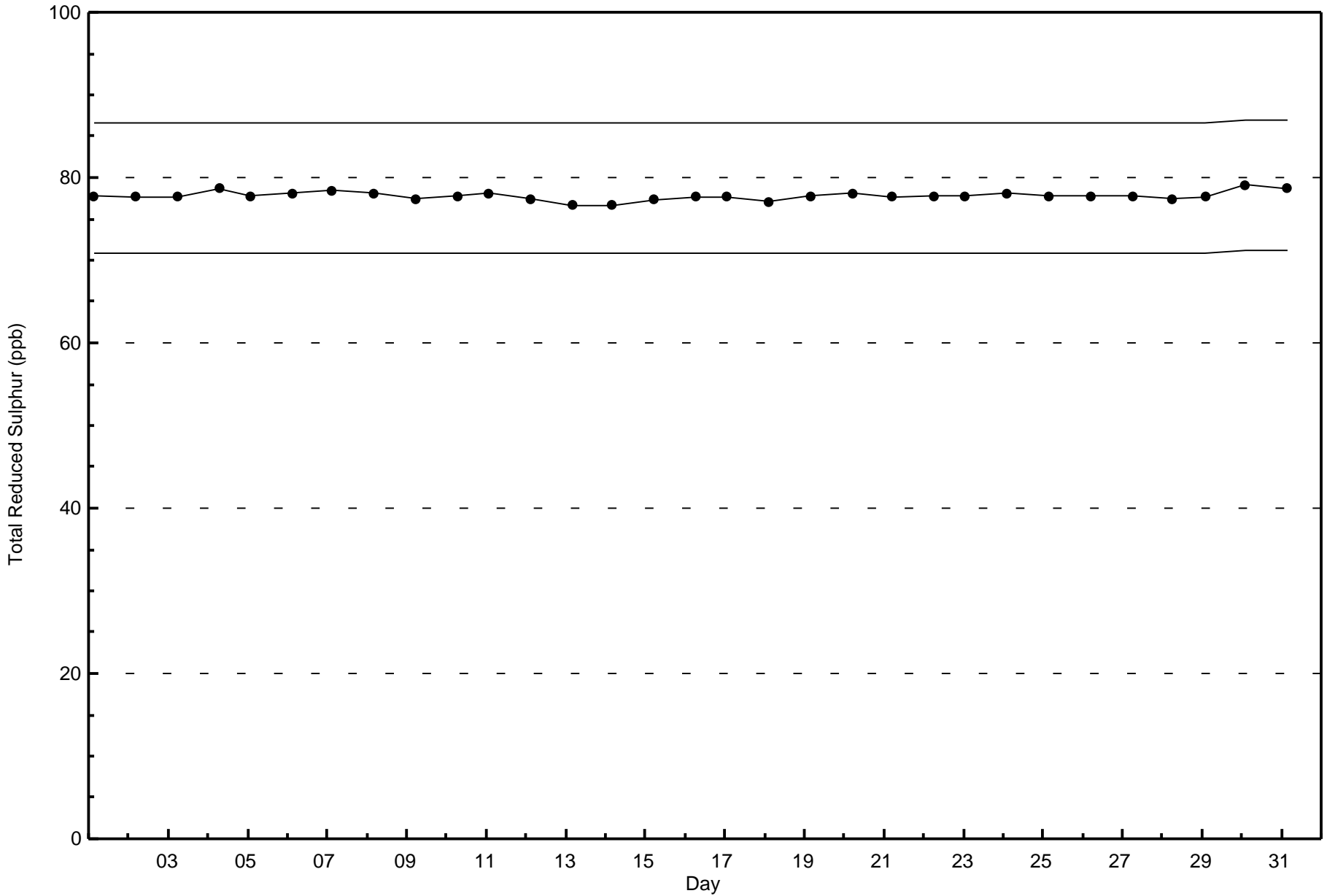


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

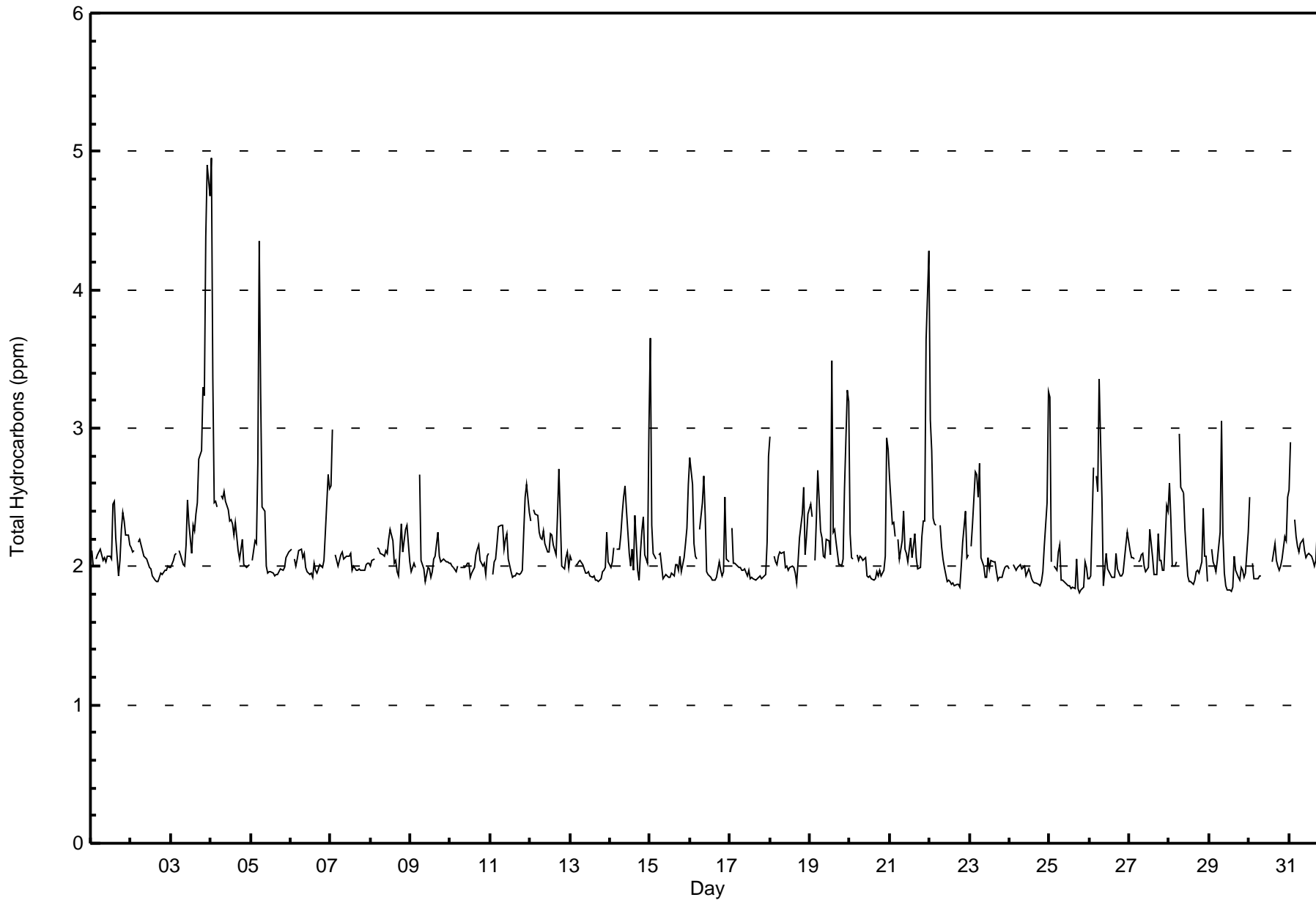
Total Reduced Sulphur (TRS) - ppb  
CNRL Horizon (AMS 15)













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

**Total Hydrocarbons (THC) - ppm**  
**CNRL Horizon - July 2015**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	359	50.78	50.78
2.1 - 3.0	329	46.53	97.31
3.1 - 10.0	19	2.69	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744





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

**Total Hydrocarbons (THC) - ppm**  
**CNRL Horizon - July 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	53	27	13	8	5	7	12	16	44	63	48	22	7	6	11	16	358
2.1 - 3.0	20	18	14	13	5	3	4	14	41	46	36	18	21	42	21	13	329
3.1 - 10.0	0	0	0	1	0	0	0	0	0	1	1	2	4	6	4	0	19
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	73	45	27	22	10	10	16	30	85	110	85	42	32	54	36	29	706

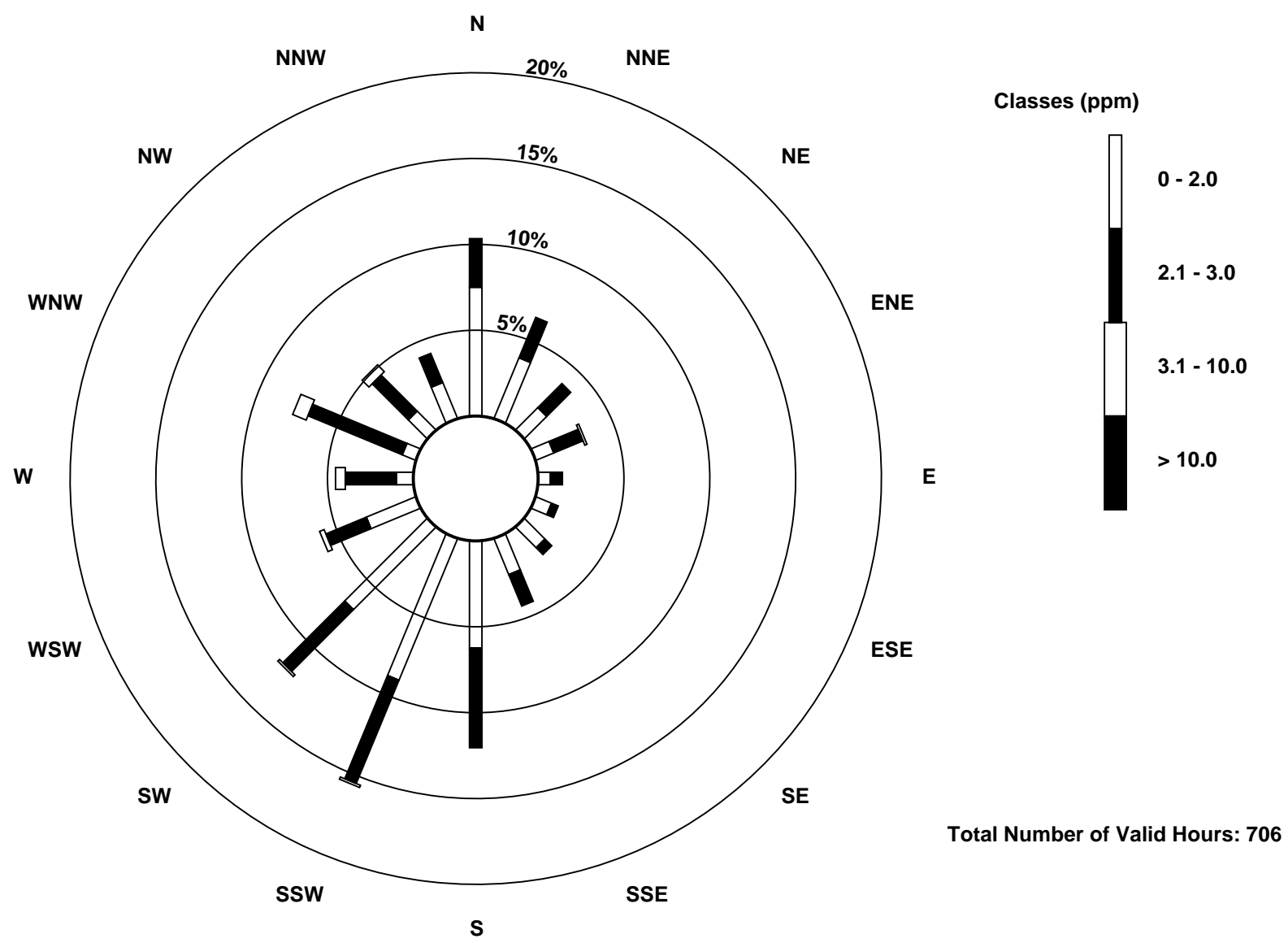
Total Number of Valid Hours: 706

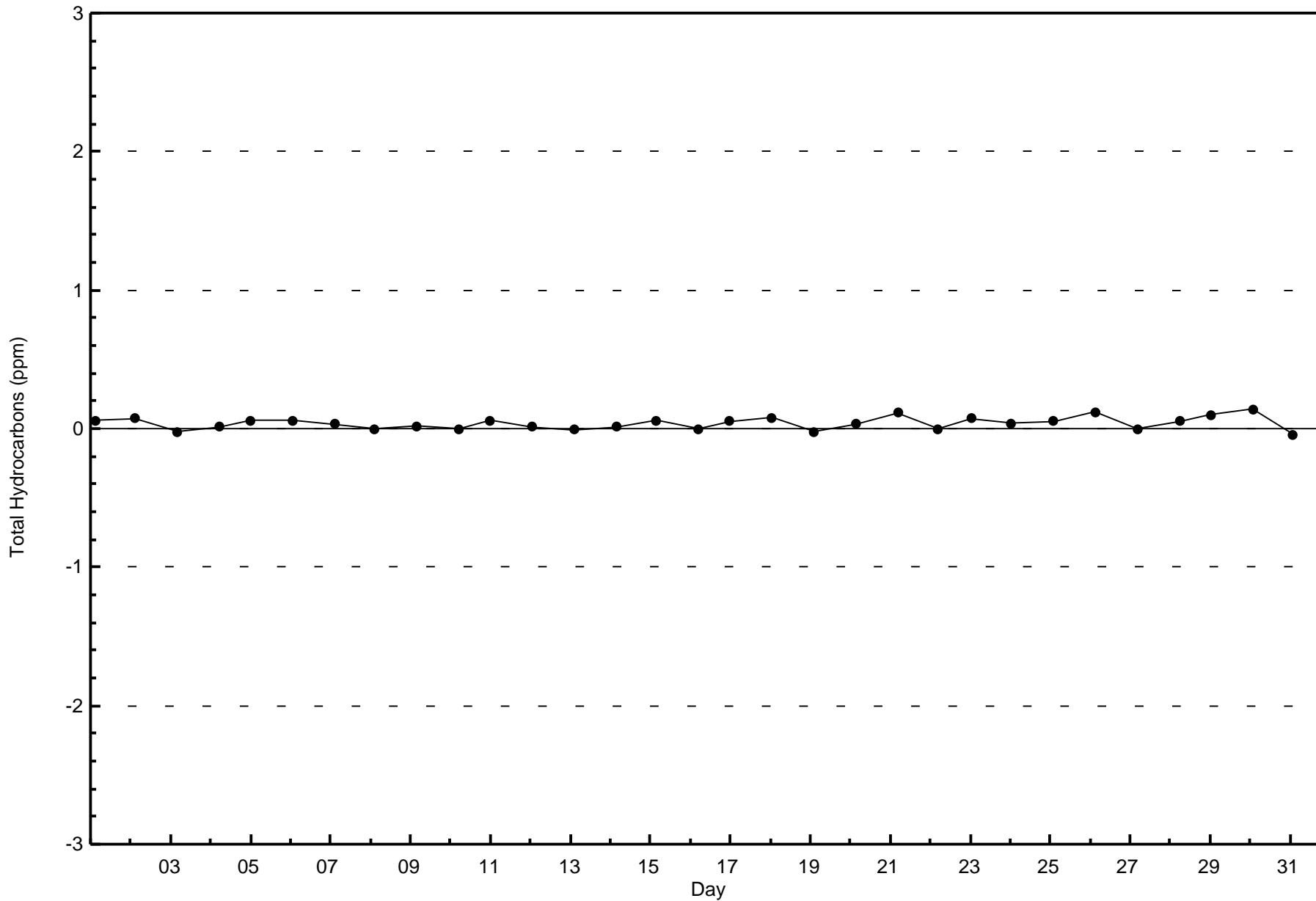
Total Number of Hours: 744

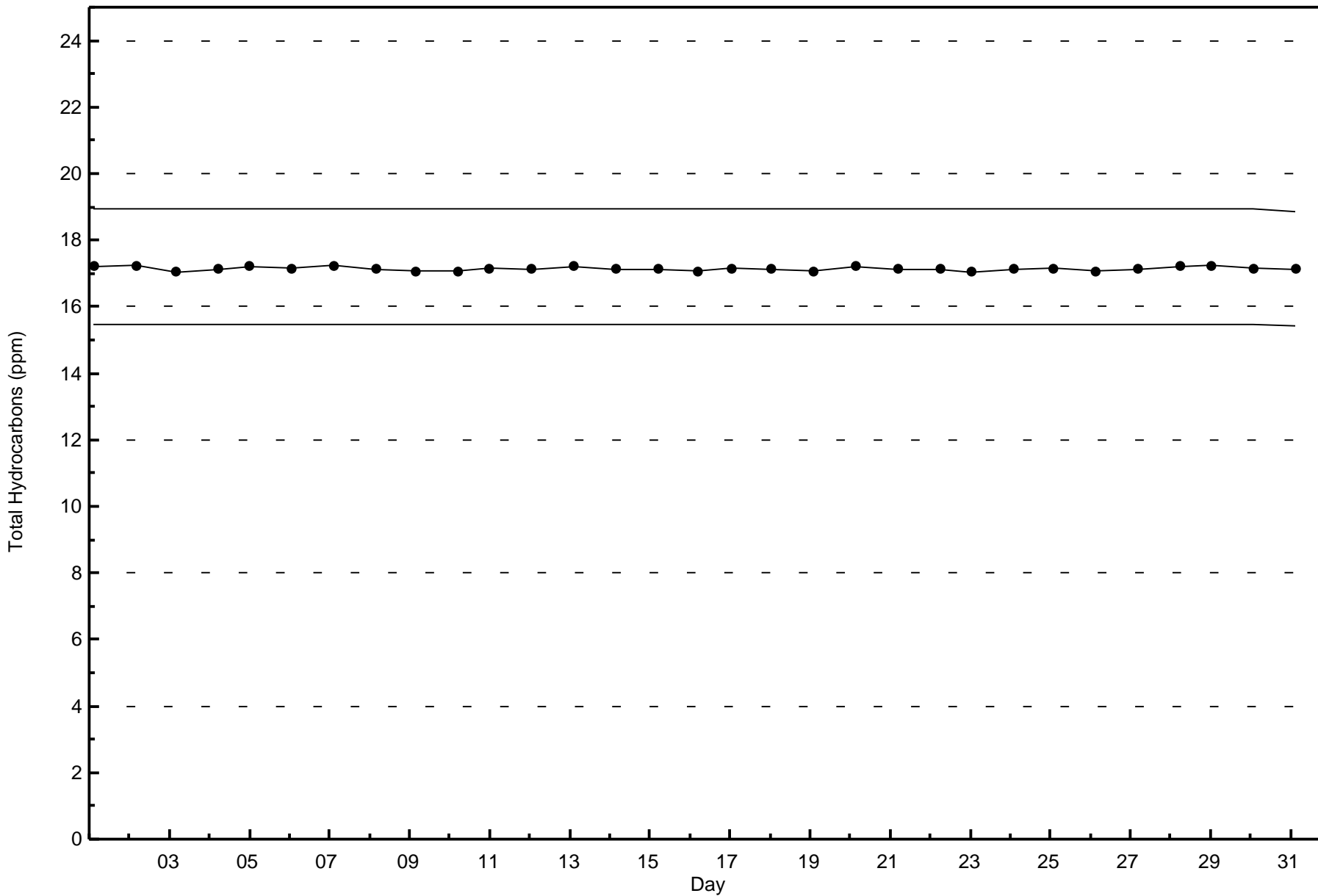


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Total Hydrocarbons (THC) - ppm  
CNRL Horizon (AMS 15)

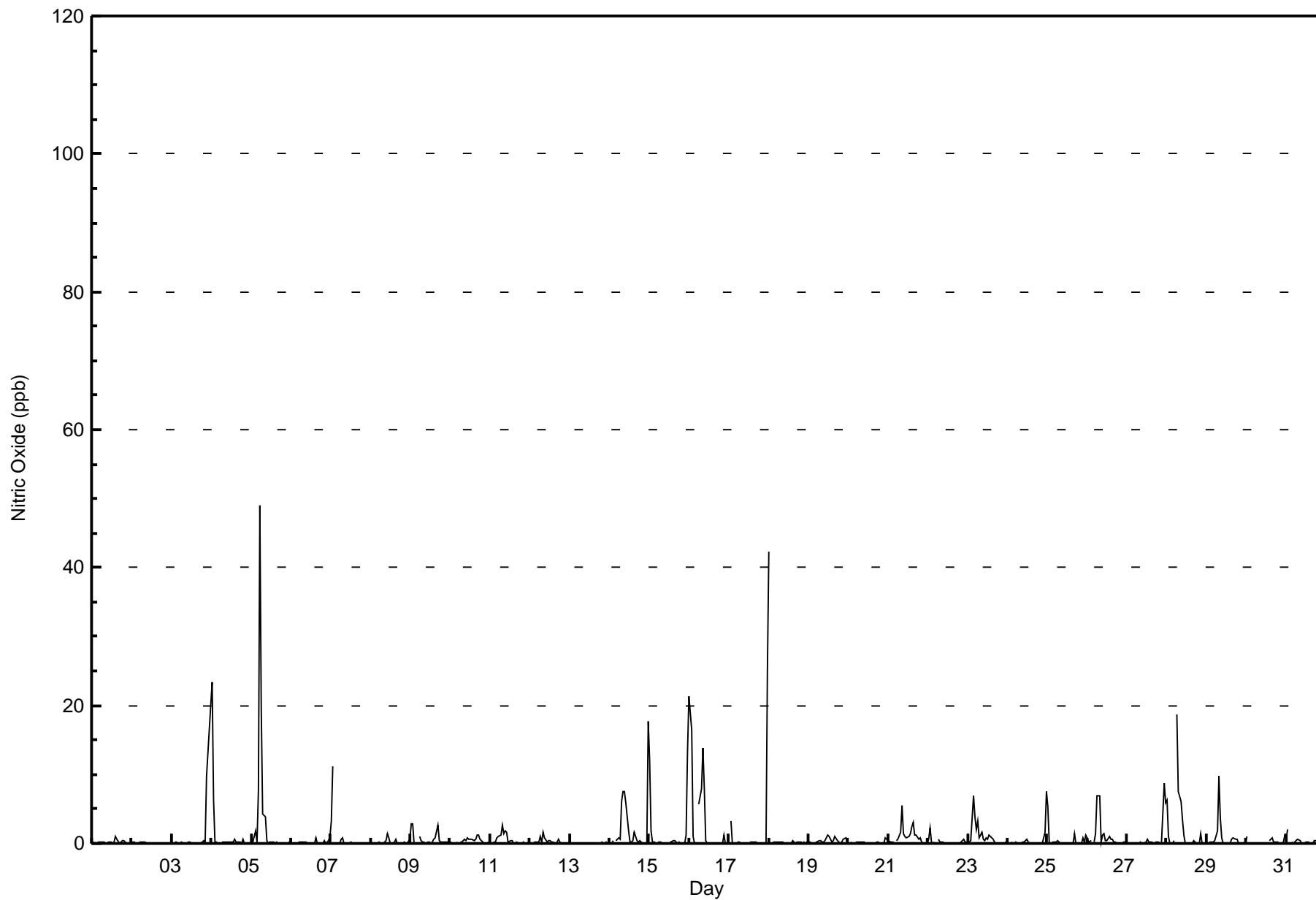








Maximum Value: 49 ppb on Jul 5 06:00														Maximum Daily Average: 3.8 ppb on Jul 5														Hours in Service: 744			
Minimum Value: 0 ppb on Jul 2 13:00														Minimum Daily Average: 0.0 ppb on Jul 13														Hours of Data: 707			
Maximum Diurnal Average: 4.7 ppb at hour 1														Minimum Diurnal Average: 0.1 ppb at hour 21														Hours of Missing Data: 37			
Monthly Average: 1.0 ppb														Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 1 P <sub>99</sub> = 20														Hours of Calibration: 37			
																												Percent Operational Time: 100.0			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24							
1-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0.2	1					
2-Jul	0	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-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	13	20	2.0	20					
4-Jul	23	6	0	0	0	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	1.5	23					
5-Jul	Z	0	2	0	8	49	20	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.8	49					
6-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0.1	1					
7-Jul	3	11	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	11					
8-Jul	0	0	0	Z	0	0	0	0	0	0	1	1	0	0	0	1	0	0	0	0	0	0	0	1	0.2	1					
9-Jul	3	3	0	0	Z	1	0	0	0	0	0	0	0	0	1	1	3	0	0	0	0	0	0	0	0.6	3					
10-Jul	0	0	0	0	0	Z	0	0	1	0	1	1	1	1	0	1	1	1	1	1	0	0	0	0	0.4	1					
11-Jul	Z	0	0	0	1	1	1	3	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	3					
12-Jul	0	Z	0	0	0	0	1	0	2	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.3	2					
13-Jul	0	0	Z	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-Jul	0	0	0	Z	0	1	1	6	8	8	6	2	0	0	0	2	0	0	0	0	0	0	18	18	2.3	18					
15-Jul	12	2	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	13	1.3	13					
16-Jul	21	16	1	0	0	Z	6	8	14	8	0	0	0	0	0	0	0	0	0	0	0	1	0	0	3.3	21					
17-Jul	Z	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	1.3	25					
18-Jul	42	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	42					
19-Jul	0	0	Z	0	0	0	0	0	0	0	0	1	1	1	0	0	1	0	0	0	0	1	1	0	0.4	1					
20-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.1	1					
21-Jul	0	0	0	0	Z	0	1	2	6	1	1	1	1	1	3	3	1	1	1	1	0	0	0	0	1.1	6					
22-Jul	1	2	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.3	2					
23-Jul	Z	0	0	7	4	2	3	1	2	1	0	1	1	1	1	1	0	0	0	0	0	0	0	0	1.1	7					
24-Jul	0	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	7	0	0.5	7					
25-Jul	5	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1	0.4	5					
26-Jul	1	0	0	Z	0	1	7	7	0	1	1	0	0	1	1	1	0	0	0	0	0	0	0	0	1.0	7					
27-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	9	6	0.7	9					
28-Jul	6	1	0	0	0	Z	19	8	6	3	1	0	0	0	0	0	0	0	0	0	1	0	0	0	2.0	19					
29-Jul	Z	0	0	0	0	0	2	10	4	1	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0.9	10					
30-Jul	1	Z	0	0	0	0	0	0	C	C	C	C	C	C	1	1	0	0	0	0	0	0	0	1	--	1					
31-Jul	1	2	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	5	0.5	5					
																								Diurnal Average							
																								Diurnal Maximum							
4.7 1.9 0.3 0.4 0.6 2.3 2.1 1.7 1.6 0.9 0.5 0.3 0.2 0.2 0.3 0.4 0.4 0.2 0.2 0.1 0.1 0.4 0.9 3.2																															
42 16 2 7 8 49 20 10 14 8 6 2 1 1 3 3 3 1 1 1 1 10 13 25																															
Z - zerospan C - Calibration																															





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

**Nitric Oxide (NO) - ppb**  
**CNRL Horizon - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	702	99.29	99.29
21 - 40	3	0.42	99.72
41 - 80	2	0.28	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



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

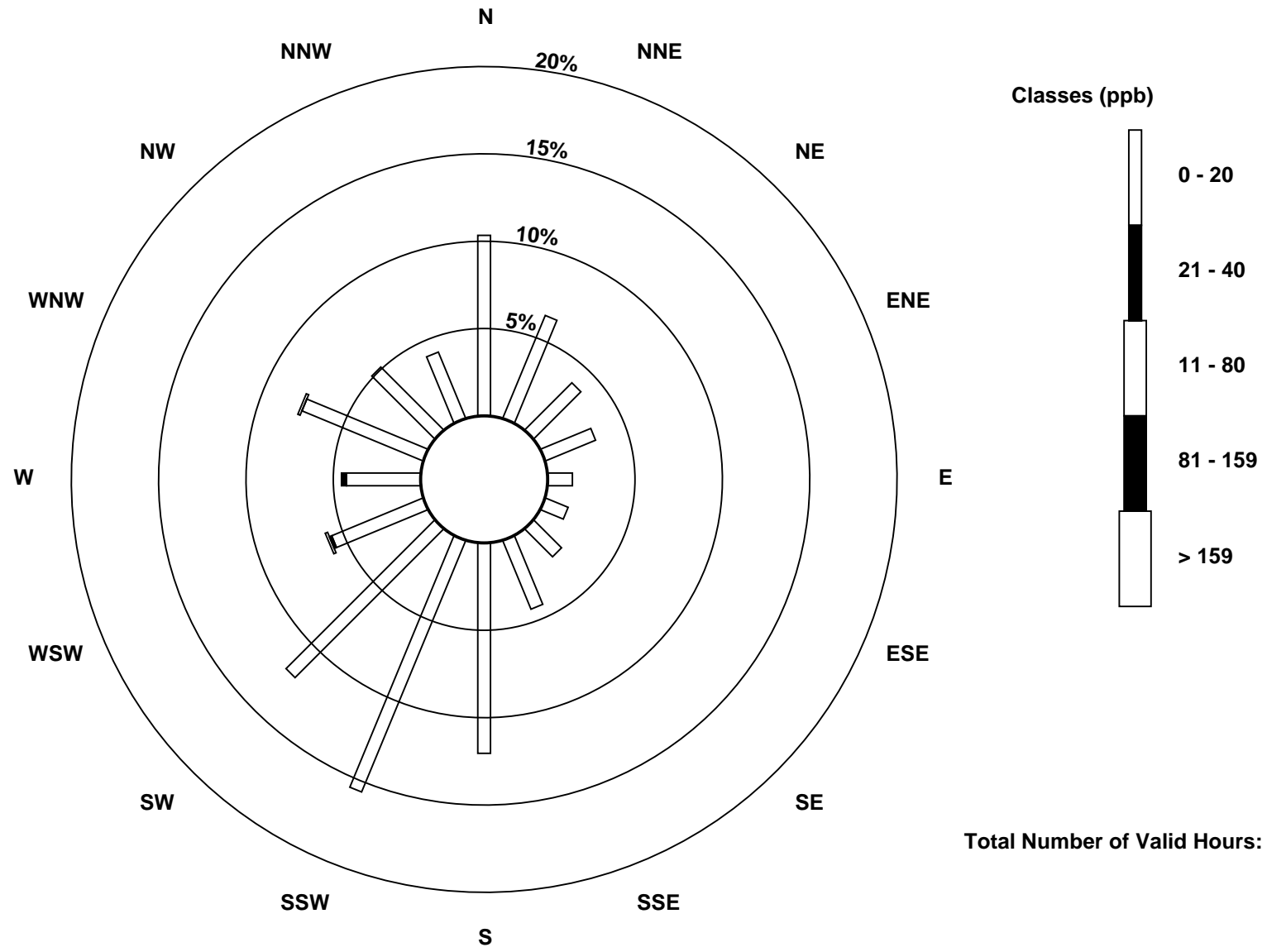
**Nitric Oxide (NO) - ppb**  
**CNRL Horizon - July 2015**

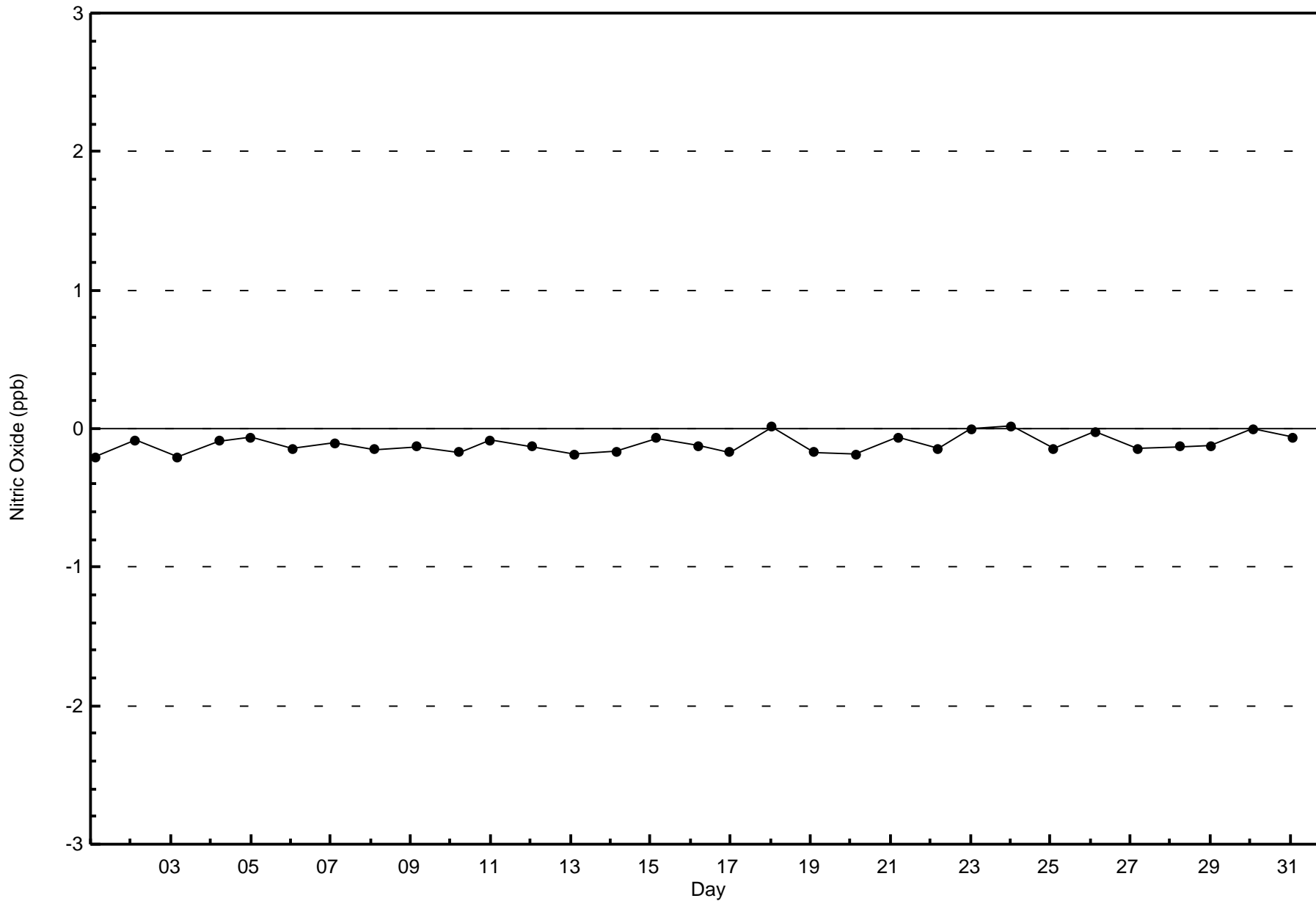
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	73	45	27	22	10	10	16	30	85	110	85	40	30	53	36	29	701
21 - 40	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	3
11 - 80	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	2
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	73	45	27	22	10	10	16	30	85	110	85	42	32	54	36	29	706

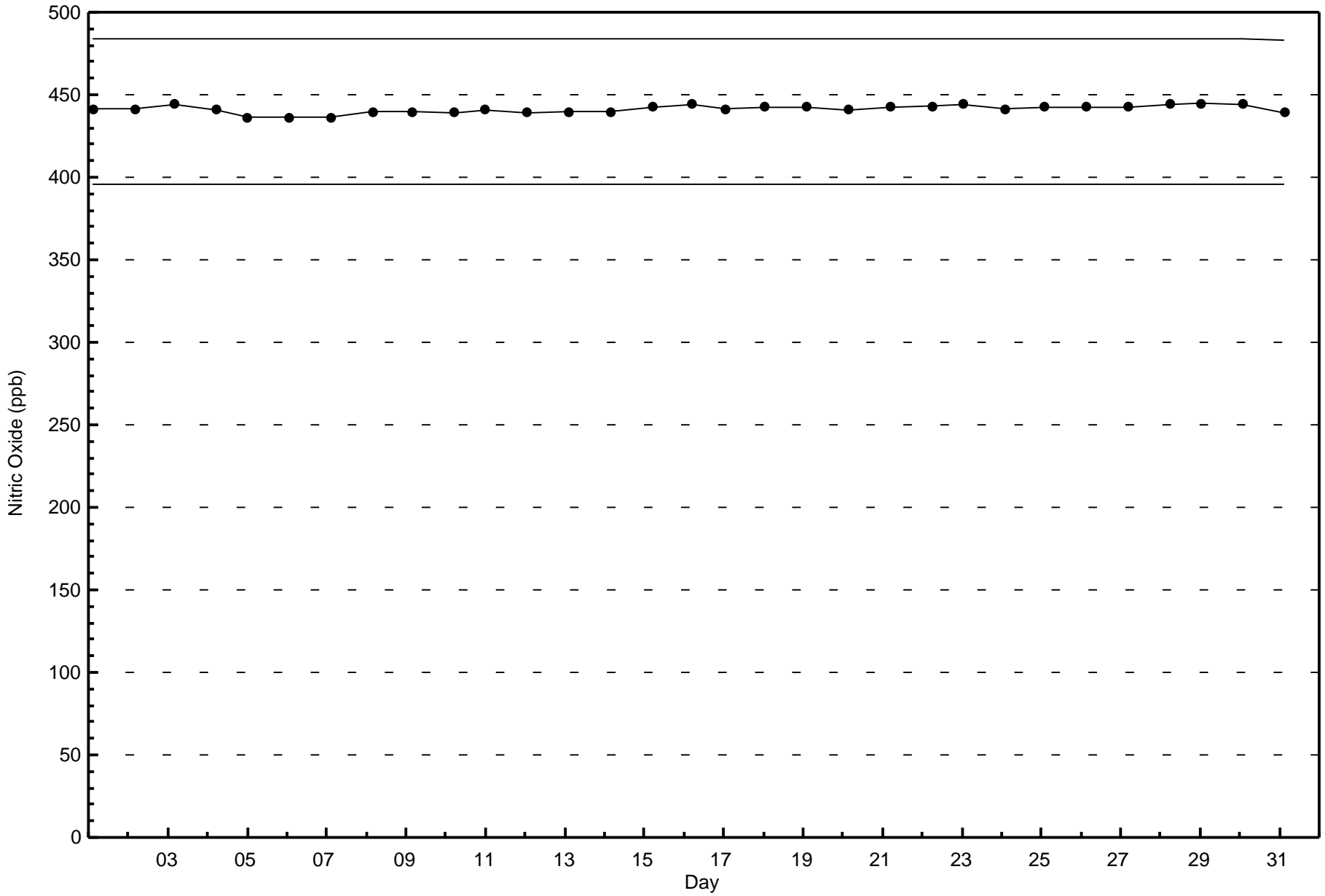
Total Number of Valid Hours: 706

Total Number of Hours: 744







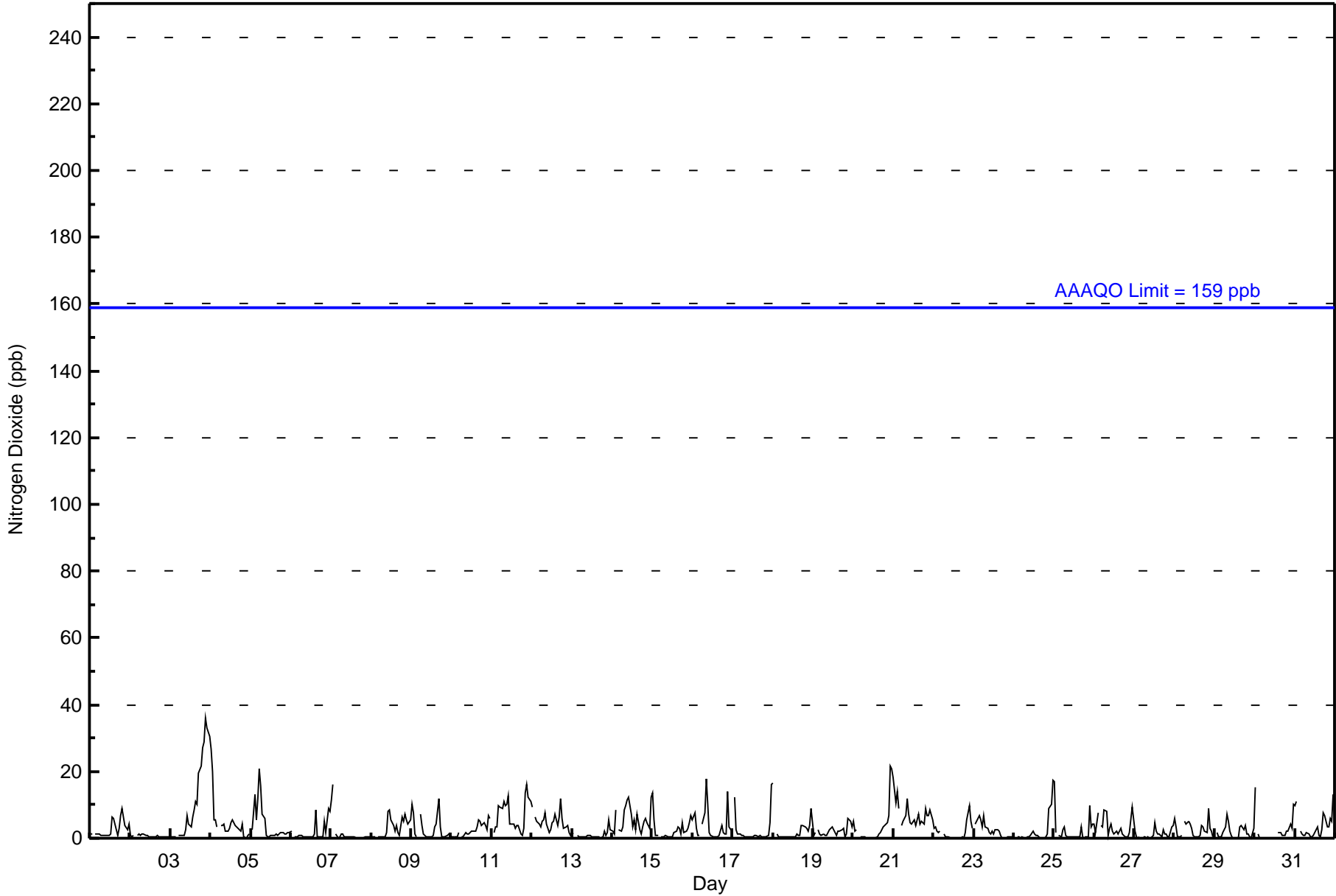




Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 36 ppb on Jul 3 22:00	Maximum Daily Average: 11.1 ppb on Jul 3		Hours of Data:	707
Minimum Value: 0 ppb on Jul 29 14:00	Minimum Daily Average: 0.7 ppb on Jul 2		Hours of Missing Data:	37
Maximum Diurnal Average: 7.1 ppb at hour 1	Minimum Diurnal Average: 1.8 ppb at hour 13		Hours of Calibration:	37
Monthly Average: 3.3 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 1 Median = 2 Q <sub>3</sub> = 4 P <sub>90</sub> = 8 P <sub>99</sub> = 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-Jul	1	1	Z	1	1	1	1	1	1	1	1	1	1	6	6	4	1	3	7	9	6	4	3	4	2.8	9																							
2-Jul	1	1	1	Z	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	0.7	1																							
3-Jul	1	1	1	1	Z	1	1	1	1	3	7	4	3	7	8	11	10	19	21	27	29	36	33	31	11.1	36																							
4-Jul	27	20	6	6	3	Z	4	4	4	2	2	3	5	5	5	4	3	3	2	4	0	0	1	1	4.9	27																							
5-Jul	Z	3	13	5	12	21	16	7	6	1	0	1	1	1	1	1	1	1	2	2	1	1	2	2	4.3	21																							
6-Jul	2	Z	1	0	1	1	1	1	1	1	1	1	1	1	8	1	0	0	0	0	5	2	9	8	1.9	9																							
7-Jul	12	16	Z	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1.6	16																							
8-Jul	1	1	0	Z	1	1	1	1	1	2	8	8	6	4	2	4	2	1	6	5	7	6	4	6	3.2	8																							
9-Jul	10	8	1	1	Z	7	4	1	1	0	1	1	0	1	3	4	12	3	0	0	1	1	1	1	2.7	12																							
10-Jul	1	0	0	0	2	Z	0	1	2	1	1	2	2	2	2	3	5	5	4	5	4	2	7	6	2.5	7																							
11-Jul	Z	2	3	3	10	9	9	11	10	10	13	4	4	4	3	4	4	1	1	3	14	16	12	11	7.0	16																							
12-Jul	9	Z	6	5	4	4	5	5	8	4	2	3	5	5	7	4	7	12	6	3	3	4	2	1	4.9	12																							
13-Jul	2	1	Z	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	2	1	2	6	3	1.1	6																							
14-Jul	2	1	8	Z	2	2	4	8	10	11	12	7	4	6	3	7	3	1	3	5	6	5	3	12	5.5	12																							
15-Jul	14	5	1	1	Z	1	1	1	1	1	0	0	0	2	2	3	3	1	5	2	2	3	5	7	2.5	14																							
16-Jul	6	8	3	1	1	Z	4	8	18	10	2	1	1	0	1	1	1	4	2	1	1	14	4	2	3.9	18																							
17-Jul	Z	12	3	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1	0	0	1	1	5	16	2.1	16																							
18-Jul	17	Z	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1	4	4	3	3	2	4	9	2.3	17																							
19-Jul	1	2	Z	3	1	1	1	1	1	2	3	3	2	2	1	2	2	3	3	0	1	6	5	4	2.1	6																							
20-Jul	5	2	3	Z	0	0	0	0	0	0	0	0	0	0	0	1	2	3	3	4	5	7	22	21	3.4	22																							
21-Jul	18	11	14	9	Z	4	5	7	12	7	5	4	6	4	6	7	4	5	4	9	7	7	8	6	7.3	18																							
22-Jul	3	3	2	2	2	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	2	5	10	5	3	1.8	10																							
23-Jul	Z	4	5	7	5	3	7	3	3	2	1	2	1	2	3	2	1	0	0	0	1	1	0	0	2.3	7																							
24-Jul	1	Z	1	0	0	0	0	0	0	0	1	2	1	1	1	1	0	0	0	0	1	9	10	17	2.1	17																							
25-Jul	17	2	Z	1	1	2	4	1	1	1	1	0	0	0	0	0	4	0	0	1	1	10	3	4	2.3	17																							
26-Jul	4	2	8	Z	4	4	9	8	1	3	4	2	1	2	1	2	3	1	1	1	1	2	5	9	3.4	9																							
27-Jul	2	0	0	0	Z	0	0	0	0	0	0	1	5	2	1	1	0	3	1	1	1	0	4	4	1.2	5																							
28-Jul	6	3	0	0	1	Z	5	4	5	4	3	1	0	0	1	1	4	3	2	2	9	3	2	1	2.6	9																							
29-Jul	Z	2	0	0	0	2	3	7	5	2	1	0	0	0	0	3	4	3	4	1	1	0	0	3	1.8	7																							
30-Jul	15	Z	1	0	0	0	0	0	C	C	C	C	C	C	2	2	1	1	1	2	2	4	3	10	--	15																							
31-Jul	10	11	Z	2	1	1	1	2	1	1	0	1	2	3	1	0	2	8	7	4	4	6	5	13	3.7	13																							
																								7.1	4.7	3.3	2.0	2.1	2.6	2.9	2.8	3.1	2.4	2.4	1.8	1.8	2.1	2.1	2.7	2.6	2.9	2.9	3.2	3.9	5.3	5.6	6.9	Diurnal Average	
																								27	20	14	9	12	21	16	11	18	11	13	8	6	7	8	11	12	19	21	27	29	36	33	31	Diurnal Maximum	

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





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

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**CNRL Horizon - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	697	98.59	98.59
21 - 40	10	1.41	100.00
11 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



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

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**CNRL Horizon - July 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	73	45	26	21	10	10	16	30	85	110	85	42	28	50	36	29	696
21 - 40	0	0	1	1	0	0	0	0	0	0	0	0	4	4	0	0	10
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	73	45	27	22	10	10	16	30	85	110	85	42	32	54	36	29	706

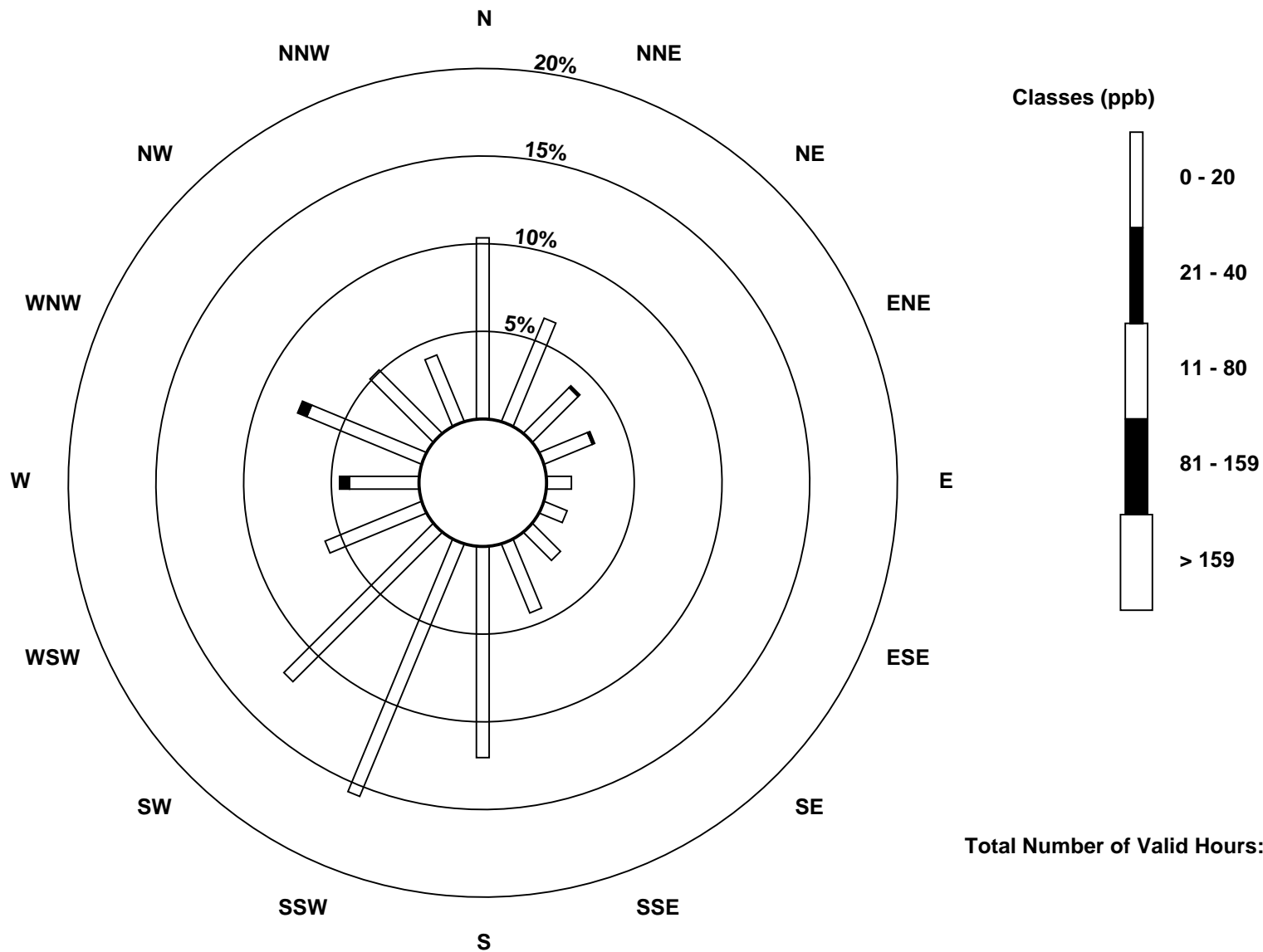
Total Number of Valid Hours: 706

Total Number of Hours: 744



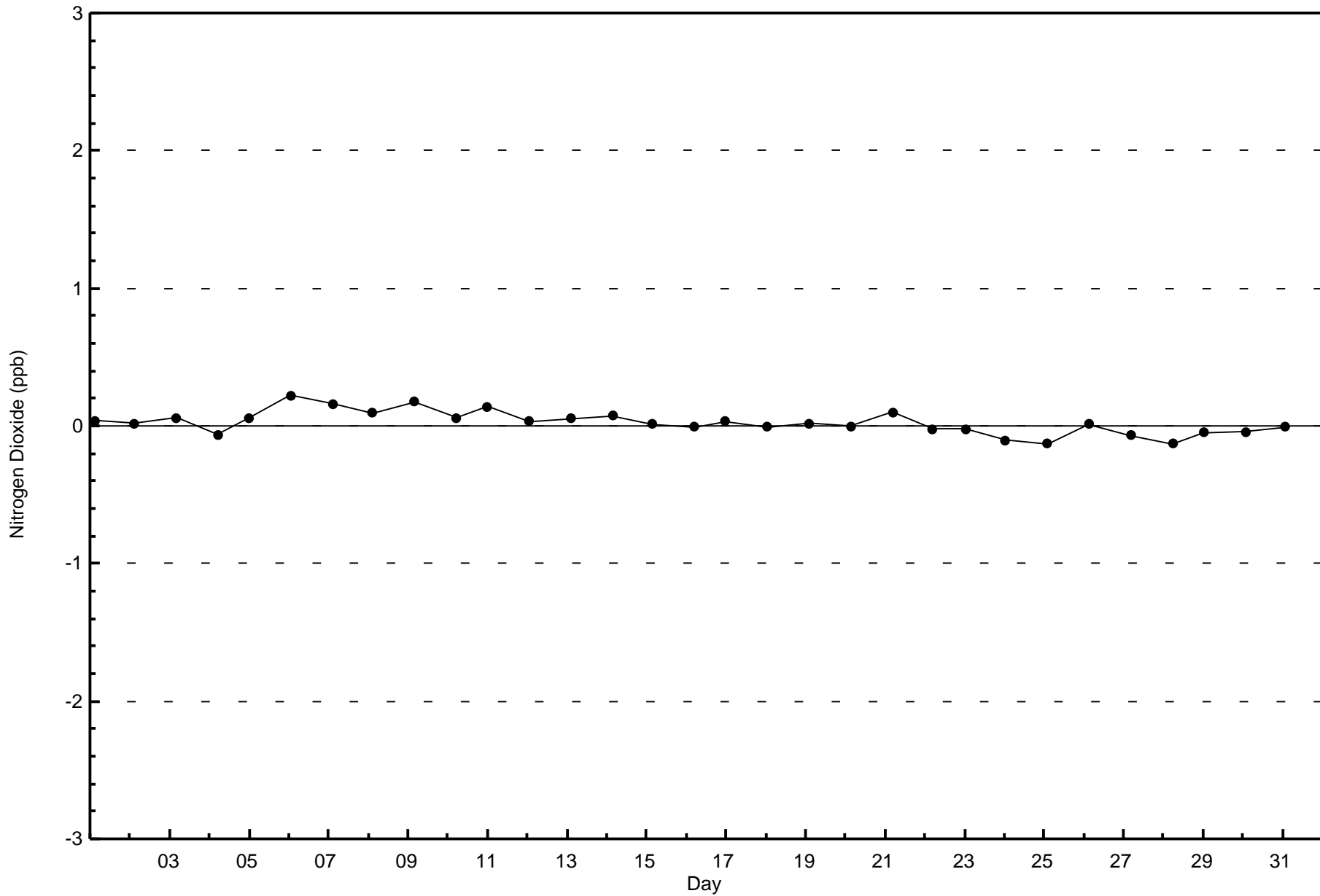
Wood Buffalo Environmental Association  
Wind Rose Jul 2015

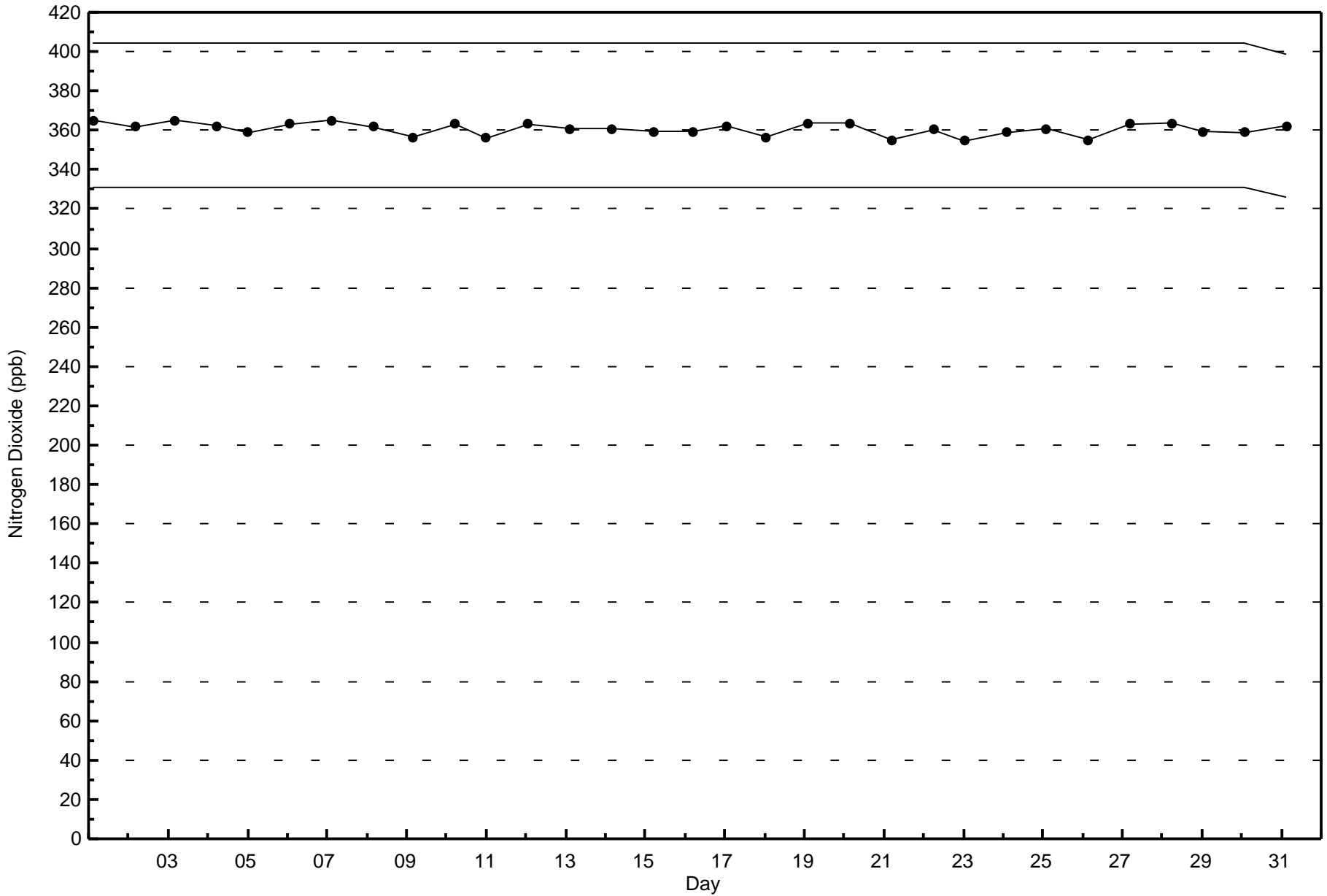
Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
CNRL Horizon (AMS 15)



Total Number of Valid Hours: 706







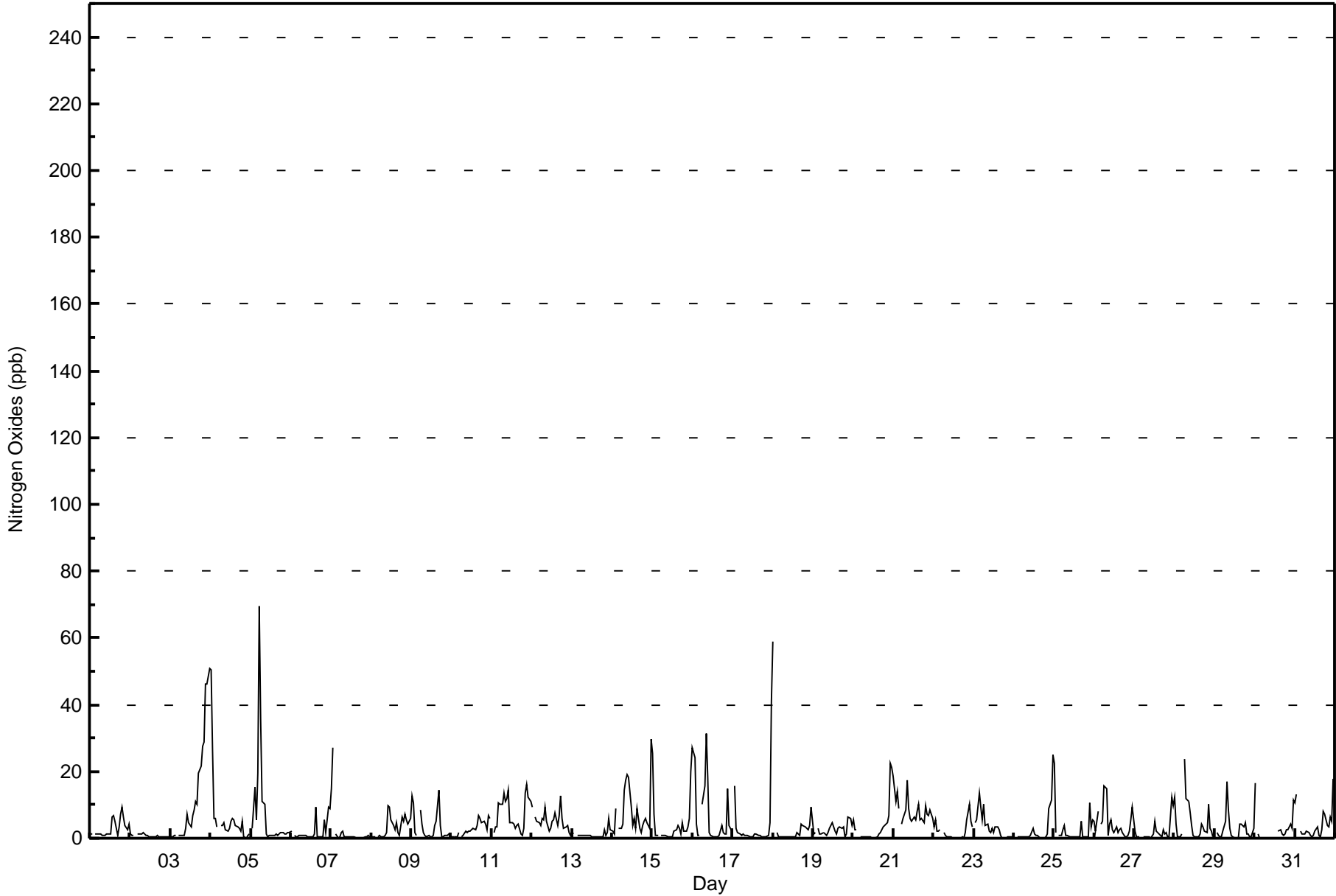


Maximum Value: 70 ppb on Jul 5 06:00																		Maximum Daily Average: 13.1 ppb on Jul 3						Hours in Service: 744		
Minimum Value: 0 ppb on Jul 29 14:00																		Minimum Daily Average: 0.8 ppb on Jul 2						Hours of Data: 707		
Maximum Diurnal Average: 11.8 ppb at hour 1																		Minimum Diurnal Average: 2.0 ppb at hour 13						Hours of Missing Data: 37		
Monthly Average: 4.3 ppb																		Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 1 Median = 2 Q <sub>3</sub> = 5 P <sub>90</sub> = 10 P <sub>99</sub> = 38						Hours of Calibration: 37		
																		Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	1	1	Z	1	1	1	1	1	1	1	1	1	6	7	5	1	3	7	9	6	4	3	4	3.0	9	
2-Jul	1	1	1	Z	1	1	1	1	2	1	1	0	0	0	0	1	1	1	1	1	1	1	1	0.8	2	
3-Jul	1	1	1	1	Z	1	1	1	1	3	7	5	3	7	8	11	10	20	22	28	29	46	46	13.1	51	
4-Jul	50	26	6	6	3	Z	4	4	5	2	2	3	5	6	6	4	3	3	2	5	1	0	1	6.4	50	
5-Jul	Z	3	15	5	20	70	36	11	10	1	0	1	1	1	1	1	1	1	2	2	1	1	2	8.1	70	
6-Jul	2	Z	1	0	1	1	1	1	1	1	1	1	0	1	9	1	0	0	0	6	2	9	9	2.0	9	
7-Jul	15	27	Z	1	0	0	2	2	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	2.3	27	
8-Jul	1	1	0	Z	1	1	1	1	1	2	10	9	6	4	2	4	2	1	6	5	7	6	4	3.4	10	
9-Jul	13	11	2	1	Z	8	4	2	1	0	1	1	0	1	4	5	15	4	1	1	1	1	1	3.3	15	
10-Jul	1	1	0	0	2	Z	1	1	2	2	2	2	3	3	3	4	7	6	5	5	4	2	7	2.9	7	
11-Jul	Z	2	3	3	11	10	10	14	11	12	15	5	5	4	3	4	4	1	1	3	14	16	12	7.5	16	
12-Jul	9	Z	6	5	4	4	6	6	9	5	2	3	5	5	7	4	7	13	6	3	3	4	2	5.2	13	
13-Jul	2	1	Z	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	2	1	2	6	1.1	6	
14-Jul	2	1	9	Z	3	3	4	14	17	19	18	9	4	6	3	9	3	2	4	5	6	5	3	7.8	30	
15-Jul	25	7	1	1	Z	1	1	1	1	1	0	0	0	2	2	4	3	1	5	2	2	3	6	3.9	25	
16-Jul	27	24	4	1	1	Z	10	16	31	18	2	1	0	0	1	1	1	4	2	1	1	15	4	7.2	31	
17-Jul	Z	16	3	2	1	1	1	1	1	1	0	0	0	1	1	1	1	0	0	0	0	1	5	3.4	41	
18-Jul	59	Z	2	1	0	1	1	1	1	0	0	0	0	2	1	1	4	4	3	3	2	4	9	4.3	59	
19-Jul	1	2	Z	3	1	1	2	1	1	2	3	4	3	2	1	3	3	3	3	0	1	6	6	2.5	6	
20-Jul	5	2	3	Z	0	1	0	0	0	0	0	0	0	0	0	1	2	3	3	4	5	7	23	3.6	23	
21-Jul	18	11	14	9	Z	4	6	8	17	9	6	5	7	5	8	10	6	6	5	10	7	7	8	8.4	18	
22-Jul	3	6	2	2	2	Z	2	1	1	0	0	0	0	0	0	0	0	0	0	2	5	10	5	2.0	10	
23-Jul	Z	5	6	14	9	5	10	4	4	2	2	3	2	4	3	3	1	0	0	0	1	1	0	3.4	14	
24-Jul	1	Z	1	0	0	0	0	0	0	0	1	3	1	1	1	0	0	0	0	0	1	9	12	2.5	25	
25-Jul	22	2	Z	1	1	3	4	1	1	1	0	0	0	0	0	0	5	0	0	1	1	11	3	2.7	22	
26-Jul	5	2	8	Z	4	5	15	15	1	4	6	3	2	3	2	3	3	2	1	1	1	2	5	4.4	15	
27-Jul	2	1	0	0	Z	0	0	0	0	0	0	1	5	2	2	1	0	3	1	2	1	0	12	2.0	12	
28-Jul	12	4	1	0	1	Z	24	12	11	8	4	1	0	0	1	1	4	3	2	2	10	3	2	4.7	24	
29-Jul	Z	2	1	0	0	2	5	17	9	3	1	0	0	0	0	4	4	3	5	1	1	0	0	2.7	17	
30-Jul	16	Z	1	0	0	0	0	0	C	C	C	C	C	C	C	2	3	1	1	1	2	2	4	--	16	
31-Jul	10	13	Z	2	1	1	1	2	2	1	0	1	2	3	1	0	2	8	7	4	4	6	5	4.2	18	
																		Diurnal Average								
																		Diurnal Maximum								
Z - zerospan																		C - Calibration								



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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**CNRL Horizon - July 2015**





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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**CNRL Horizon - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	684	96.75	96.75
21 - 40	16	2.26	99.01
41 - 80	7	0.99	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**CNRL Horizon - July 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	73	45	26	20	10	10	16	29	85	109	84	38	25	48	36	29	683
21 - 40	0	0	1	2	0	0	0	1	0	1	1	2	3	5	0	0	16
11 - 80	0	0	0	0	0	0	0	0	0	0	0	2	4	1	0	0	7
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	73	45	27	22	10	10	16	30	85	110	85	42	32	54	36	29	706

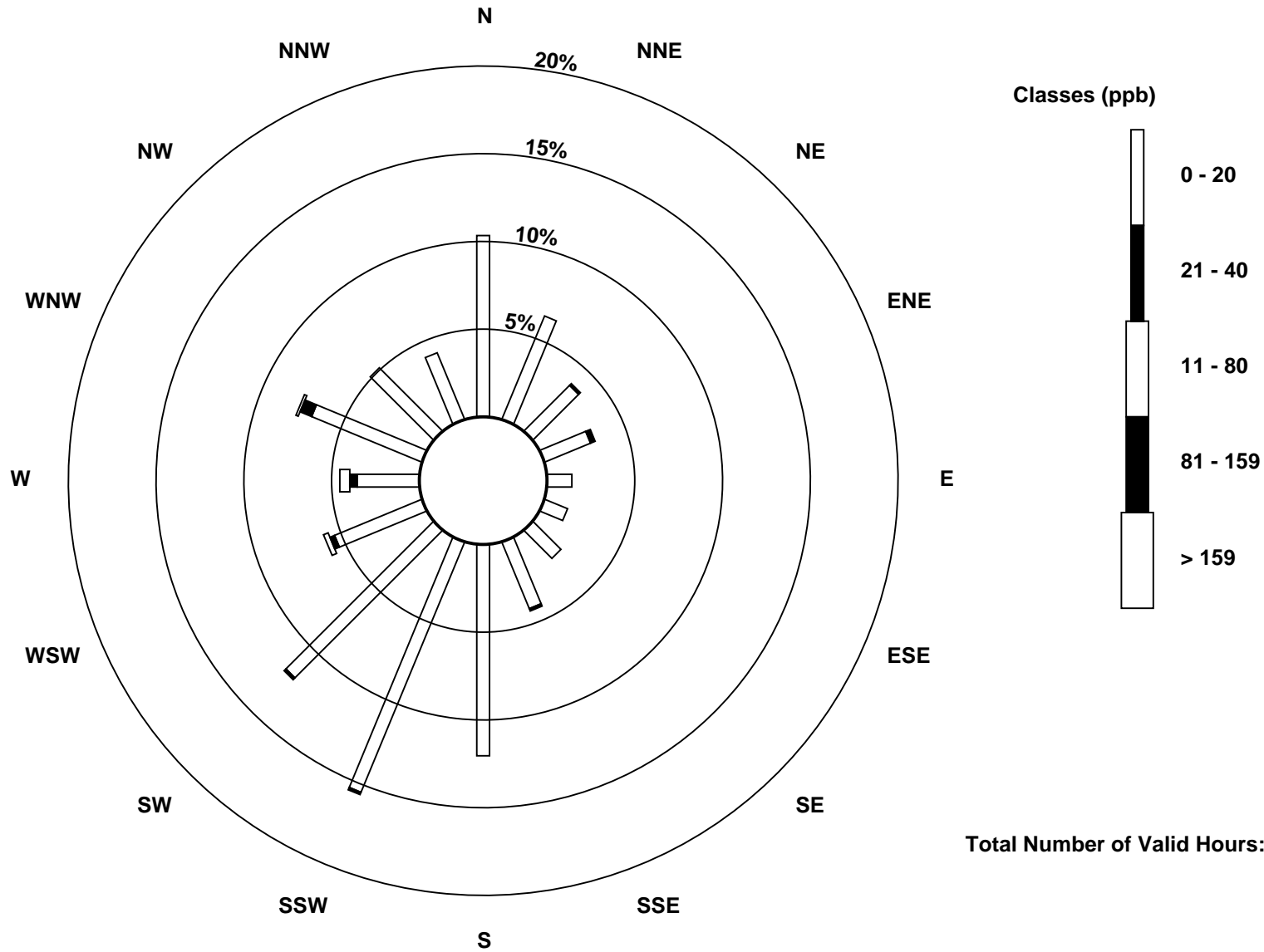
Total Number of Valid Hours: 706

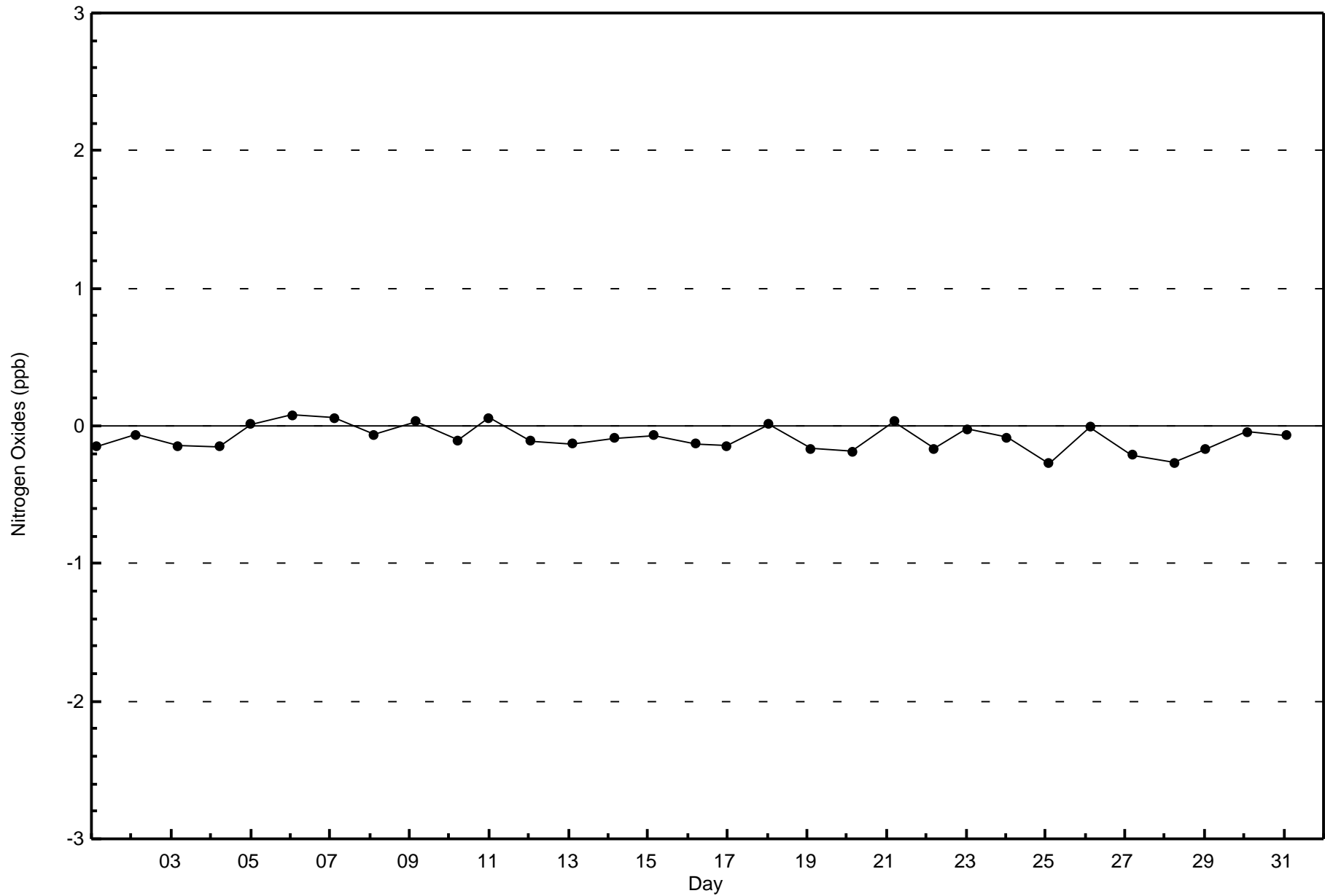
Total Number of Hours: 744



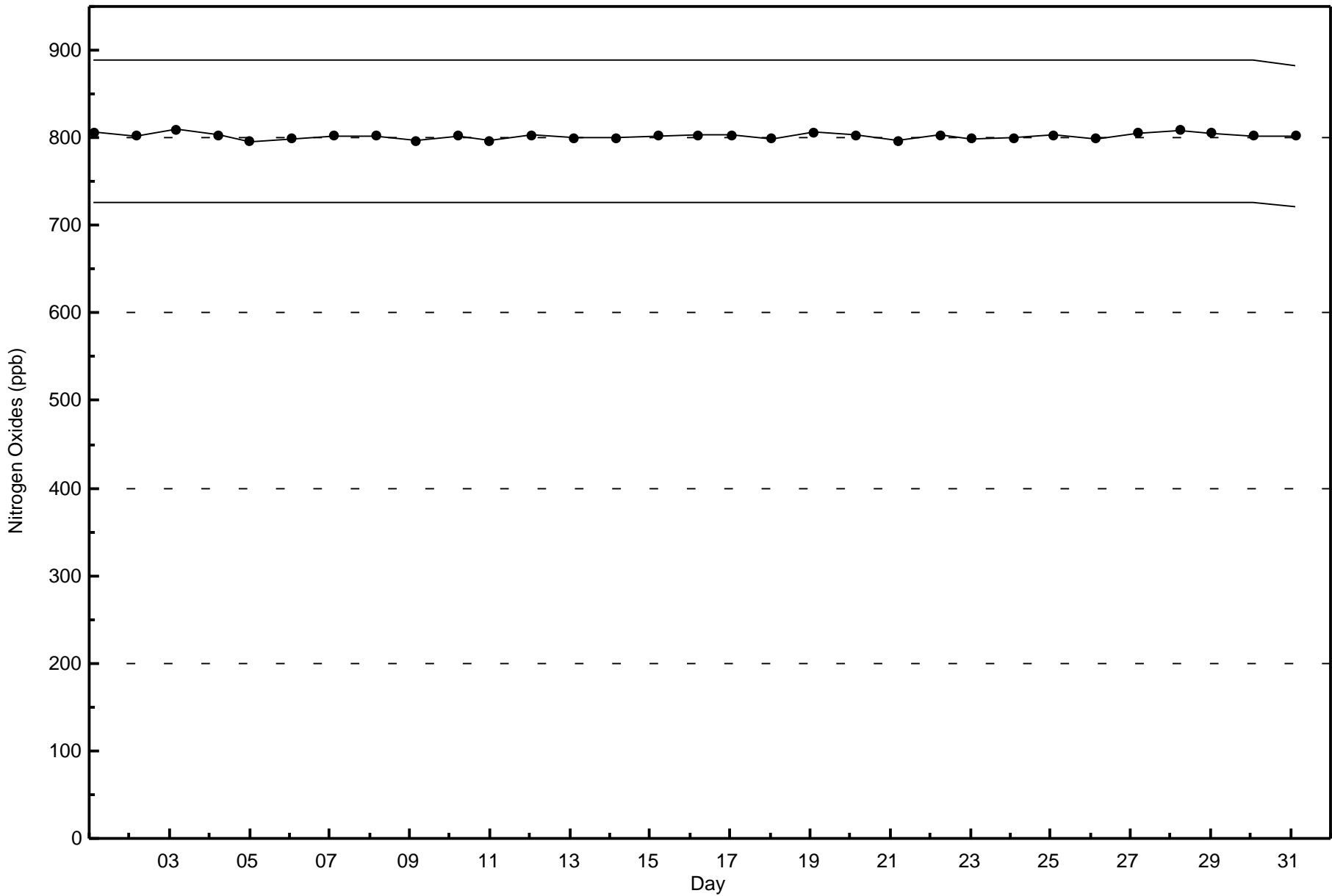
Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
CNRL Horizon (AMS 15)







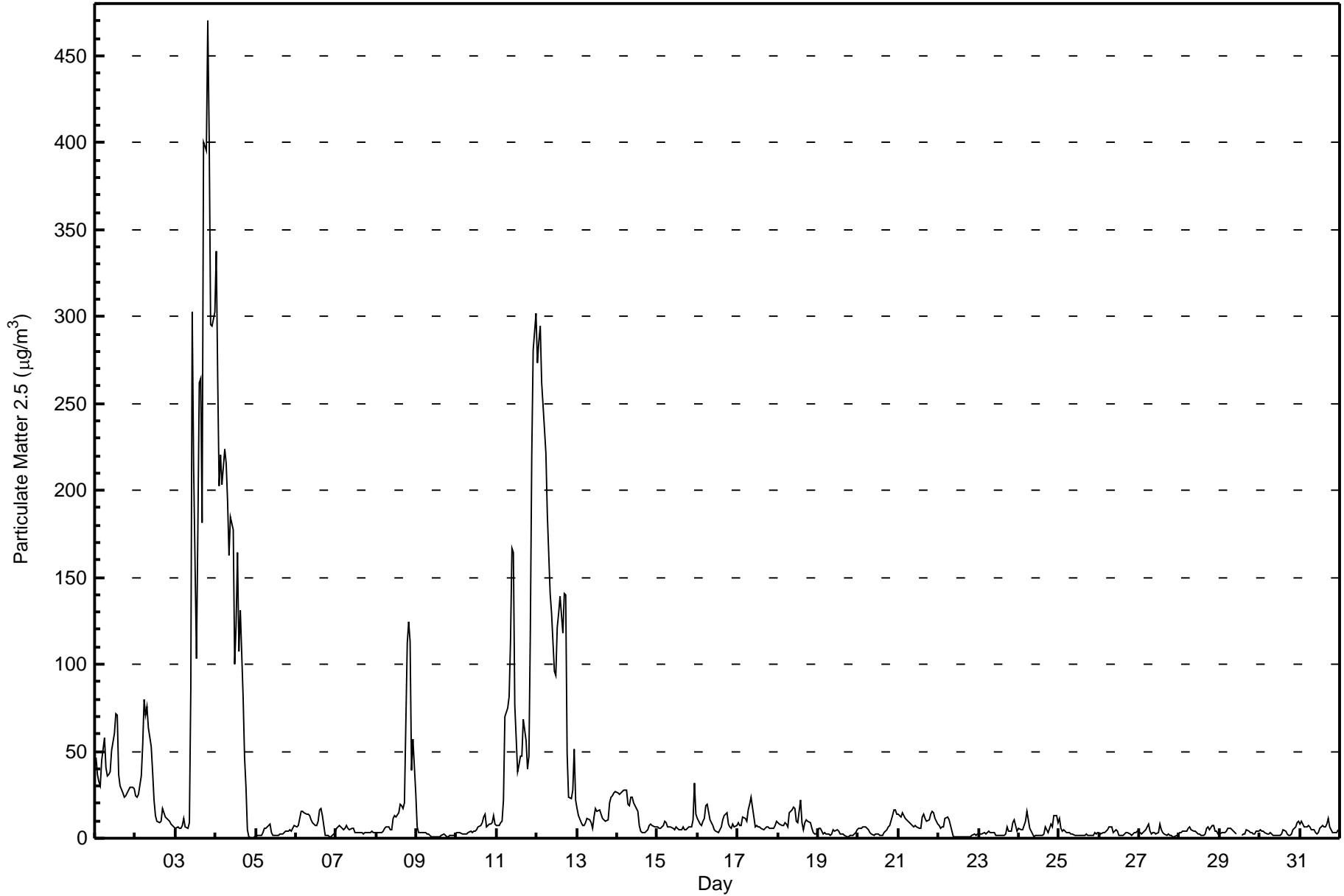




Summary of Hour Averages

CNRL Horizon - July 2015

Number of Exceedences (AAAQO): 24-hr: 5 Maximum Value: 470.3 µg/m <sup>3</sup> on Jul 3 20:00 Maximum Daily Average: 175.7 µg/m <sup>3</sup> on Jul 3		Hours in Service: 744 Hours of Data: 742 Hours of Missing Data: 2 Hours of Calibration: 0 Percent Operational Time: 99.7																								
Minimum Value: 0.2 µg/m <sup>3</sup> on Jul 4 22:00 Maximum Diurnal Average: 31.2 µg/m <sup>3</sup> at hour 11 Monthly Average: 25.22 µg/m <sup>3</sup>		Minimum Daily Average: 2.0 µg/m <sup>3</sup> on Jul 9 Minimum Diurnal Average: 19.8 µg/m <sup>3</sup> at hour 13 Percentiles: P <sub>1</sub> = 0.7 P <sub>10</sub> = 1.8 Q <sub>1</sub> = 3.0 Median = 6.1 Q <sub>3</sub> = 13.1 P <sub>90</sub> = 56.0 P <sub>99</sub> = 301.6																								
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-Jul	46.5	36.5	32.6	29.9	44.6	58.1	41.0	35.5	36.9	37.9	50.4	60.2	71.4	70.8	36.4	30.4	26.1	23.8	24.8	26.1	27.8	29.5	29.7	28.7	39.0	71.4
2-Jul	24.2	23.5	24.9	35.9	53.6	80.1	71.0	75.5	63.5	52.7	38.4	21.7	13.0	9.5	9.0	10.1	17.3	14.4	12.5	11.5	9.6	8.0	7.1	6.2	28.9	80.1
3-Jul	5.8	6.5	5.4	6.0	7.5	11.2	6.4	5.4	8.9	86.6	302.3	213.6	103.7	178.9	261.8	264.7	181.2	400.5	395.4	470.3	401.8	295.1	294.1	303.0	175.7	470.3
4-Jul	337.6	265.1	202.6	220.4	203.5	223.5	215.3	193.3	162.9	184.3	177.5	100.0	123.0	164.2	107.5	130.9	80.5	46.0	29.4	5.2	1.0	0.2	0.2	0.5	132.3	337.6
5-Jul	1.0	1.4	1.8	1.8	2.9	5.3	5.9	6.8	8.1	3.4	1.9	1.6	1.7	2.0	2.2	2.5	2.6	3.1	3.7	4.4	4.7	4.4	5.8	6.9	3.6	8.1
6-Jul	6.5	7.7	11.4	15.2	15.5	15.0	13.7	14.2	12.9	10.5	8.9	7.2	7.0	10.0	16.2	17.1	13.1	1.6	1.5	1.7	1.2	1.0	2.4	3.0	8.9	17.1
7-Jul	5.3	6.6	7.0	6.6	4.6	5.9	7.4	5.9	4.5	5.4	5.7	3.1	3.5	3.2	3.4	3.2	2.8	2.9	3.0	3.2	3.4	3.9	3.4	3.0	4.5	7.4
8-Jul	3.5	3.0	3.0	3.4	3.8	5.5	6.1	6.7	5.1	5.3	11.6	13.0	12.2	14.8	19.8	18.8	17.0	20.1	111.9	124.2	113.1	38.7	56.9	25.8	26.8	124.2
9-Jul	6.1	3.6	2.9	3.1	3.2	3.0	2.4	2.1	1.7	1.2	1.1	1.0	0.5	0.7	0.9	1.7	2.2	1.4	0.8	0.8	1.3	1.7	1.8	2.3	2.0	6.1
10-Jul	2.9	3.4	3.1	2.3	2.2	2.3	2.7	3.0	3.7	3.3	4.4	4.4	5.2	6.6	7.0	8.8	12.4	13.8	6.9	8.4	8.0	9.0	12.9	8.3	6.0	13.8
11-Jul	7.1	7.2	9.2	9.5	22.0	69.6	75.0	81.0	114.2	166.6	164.3	76.7	38.3	41.9	47.1	47.1	68.4	55.9	40.1	47.0	119.9	220.7	280.8	301.5	88.0	301.5
12-Jul	273.3	285.2	294.3	262.1	235.5	221.0	186.2	163.7	141.1	129.5	96.1	93.3	120.8	129.6	139.5	117.8	141.1	139.6	48.6	23.7	22.9	27.3	51.6	22.1	140.2	294.3
13-Jul	17.0	13.2	9.3	7.0	7.4	9.2	11.4	10.9	8.6	6.1	12.5	17.2	15.7	16.4	13.8	11.6	10.4	10.0	10.9	20.4	23.4	24.7	26.4	26.6	14.2	26.6
14-Jul	25.9	25.4	26.4	27.1	28.0	28.0	19.2	18.6	23.9	23.5	20.4	17.4	15.8	7.6	3.9	3.6	3.6	3.8	4.9	7.7	8.5	7.0	6.6	6.3	15.1	28.0
15-Jul	6.1	5.3	5.6	7.2	10.1	9.2	6.9	6.4	6.6	5.6	5.2	6.1	5.6	5.1	4.6	6.6	5.1	5.0	5.7	6.4	6.4	10.8	31.6	14.2	7.8	31.6
16-Jul	11.6	8.0	7.4	9.5	11.8	19.0	19.8	10.5	9.0	7.6	4.5	3.8	3.6	4.9	6.2	10.3	12.9	14.6	7.9	6.5	6.1	7.9	6.5	7.6	9.1	19.8
17-Jul	9.2	7.1	7.5	12.5	11.8	9.5	16.2	19.4	23.9	18.2	6.8	7.1	6.9	6.6	5.7	5.3	5.6	6.4	6.3	5.6	5.5	5.6	7.5	9.4	9.4	23.9
18-Jul	9.2	7.9	7.0	7.1	9.1	8.0	6.4	14.6	16.4	17.7	17.4	9.5	9.0	22.0	9.3	4.5	9.1	10.6	9.6	8.8	5.9	3.4	2.1	2.7	9.5	22.0
19-Jul	5.7	5.9	3.7	2.5	3.0	2.6	2.8	1.9	2.6	4.6	4.2	4.7	4.0	2.3	2.1	2.3	1.4	1.2	0.9	1.4	1.5	1.5	3.3	5.0	3.0	5.9
20-Jul	5.9	5.8	5.7	6.1	6.4	5.8	4.6	3.6	2.1	1.9	2.4	2.3	2.1	1.7	2.0	3.0	3.9	4.9	6.8	7.5	13.2	16.0	16.0	13.7	6.0	16.0
21-Jul	13.4	11.9	14.8	13.2	11.0	10.2	9.6	8.0	7.2	6.7	7.1	6.6	5.9	6.0	12.2	14.1	11.2	10.1	10.7	13.6	15.8	14.3	11.3	8.3	10.5	15.8
22-Jul	7.4	5.6	6.8	6.2	11.5	12.5	10.9	7.2	3.8	0.8	0.8	0.8	0.7	0.7	0.8	0.9	0.7	0.8	0.5	0.7	1.4	2.2	1.8	2.2	3.7	12.5
23-Jul	2.1	2.6	2.6	3.0	2.8	3.0	3.8	3.0	3.4	2.9	2.0	1.8	1.9	1.7	1.4	1.4	2.3	6.9	3.9	4.0	8.9	10.4	7.2	4.2	3.6	10.4
24-Jul	5.5	4.7	5.3	7.1	9.9	15.4	5.8	3.8	2.2	1.1	1.3	1.9	1.9	1.6	2.0	2.4	6.2	3.5	5.6	7.9	6.8	13.1	13.0	9.3	5.7	15.4
25-Jul	11.4	5.5	4.2	4.6	3.2	3.2	3.3	2.5	2.1	1.9	1.5	1.3	1.4	1.5	1.6	1.7	2.2	1.4	1.3	1.8	1.5	3.1	2.2	3.0	2.8	11.4
26-Jul	3.3	2.4	3.6	3.6	4.3	5.1	6.7	6.6	2.9	4.4	4.9	3.8	1.8	1.7	1.4	2.2	3.4	3.5	2.4	2.0	2.6	3.1	3.6	3.8	3.5	6.7
27-Jul	2.9	2.8	3.2	4.2	5.0	7.9	4.1	2.4	3.0	2.9	2.4	3.0	8.3	4.9	3.0	2.8	1.9	2.3	1.5	1.3	1.0	1.1	1.9	1.9	3.2	8.3
28-Jul	3.2	3.6	4.0	4.0	4.1	6.0	6.7	4.7	4.1	3.7	3.3	2.2	2.4	1.9	1.6	2.5	5.4	6.3	4.7	7.3	7.6	4.4	4.4	2.8	4.2	7.6
29-Jul	2.7	3.2	3.3	3.5	4.0	5.5	6.0	4.9	3.8	3.2	2.6	M	M	1.3	2.1	2.5	5.0	4.0	3.7	3.0	2.7	2.6	3.7	4.4	3.5	6.0
30-Jul	4.8	4.2	3.7	3.1	2.7	2.7	3.0	2.2	1.6	1.7	1.6	1.4	1.6	2.2	4.7	4.0	2.3	2.0	2.0	2.6	4.9	6.6	8.8	9.5	3.5	9.5
31-Jul	8.2	9.7	6.9	6.4	6.5	7.4	6.6	5.3	5.2	3.6	2.8	3.7	5.4	7.7	6.4	6.4	8.2	11.8	6.8	3.6	3.2	3.3	3.5	5.0	6.0	11.8
																								Diurnal Average		
																								Diurnal Maximum		
28.2 25.3 23.5 23.7 24.2 28.1 25.4 23.5 22.4 26.0 31.2 23.0 19.8 23.5 23.7 23.9 21.5 26.8 25.0 27.0 27.1 25.2 29.3 27.5 337.6 285.2 294.3 262.1 235.5 223.5 215.3 193.3 162.9 184.3 302.3 213.6 123.0 178.9 261.8 264.7 181.2 400.5 395.4 470.3 401.8 295.1 294.1 303.0																										
M - Maintenance Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m <sup>3</sup>																										





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

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**CNRL Horizon - July 2015**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
1 - 5	310	41.78	41.78
6 - 15	245	33.02	74.80
16 - 25	46	6.20	81.00
26 - 80	57	7.68	88.68
> 81.0	61	8.22	96.90

Total Number of Valid Hours: 742

Total Number of Hours: 744



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

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**CNRL Horizon - July 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	30	20	9	5	3	4	8	14	51	35	33	18	13	34	17	16	310
6 - 15	22	16	7	8	3	5	4	9	27	53	38	13	8	11	14	7	245
16 - 25	8	1	5	3	1	0	1	2	5	10	5	2	1	1	0	1	46
26 - 80	2	1	1	0	1	1	2	5	3	15	11	4	3	2	3	3	57
> 81.0	11	4	4	5	2	0	1	0	1	1	3	7	7	10	4	1	61
<b>Totals</b>	73	42	26	21	10	10	16	30	87	114	90	44	32	58	38	28	719

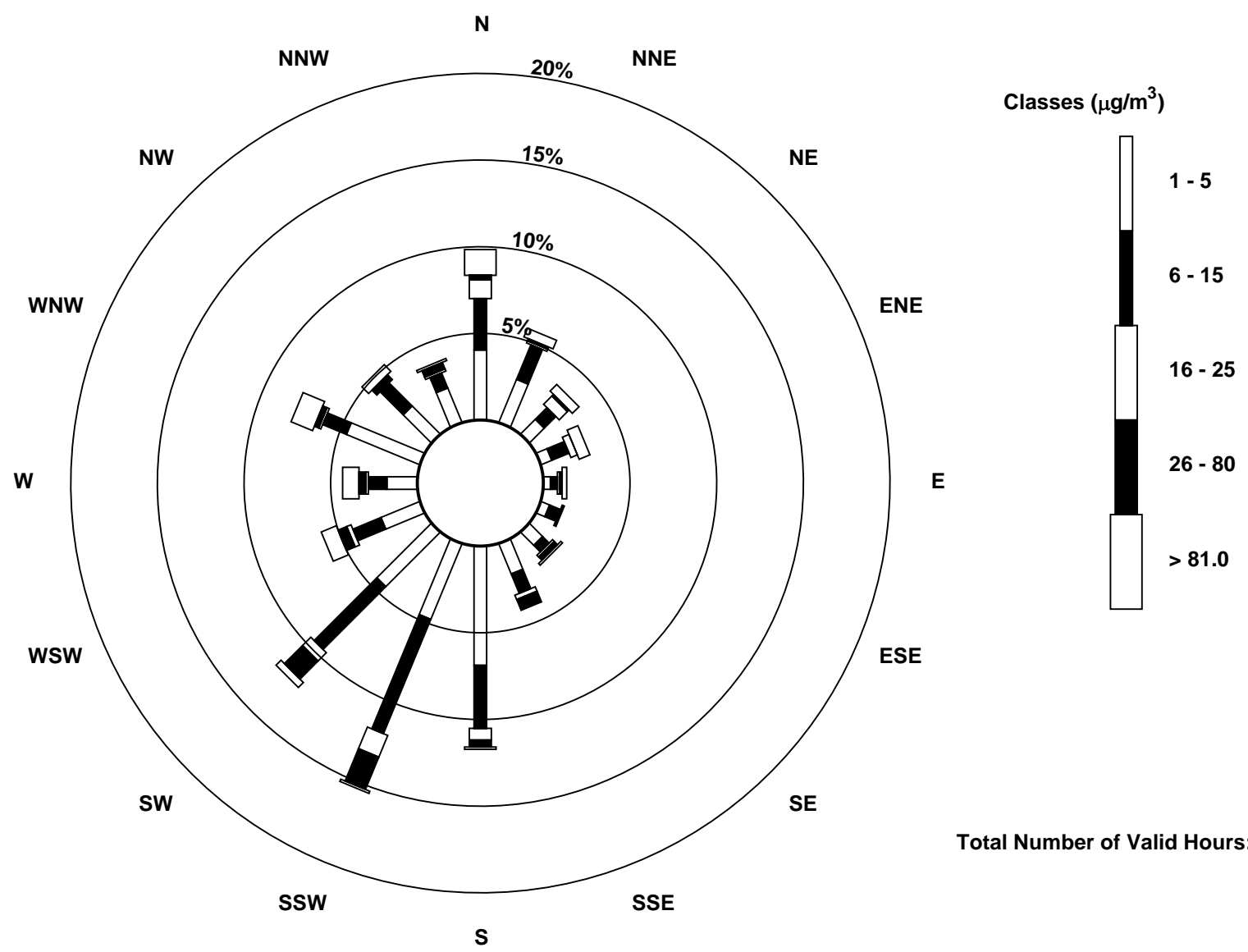
Total Number of Valid Hours: 742

Total Number of Hours: 744



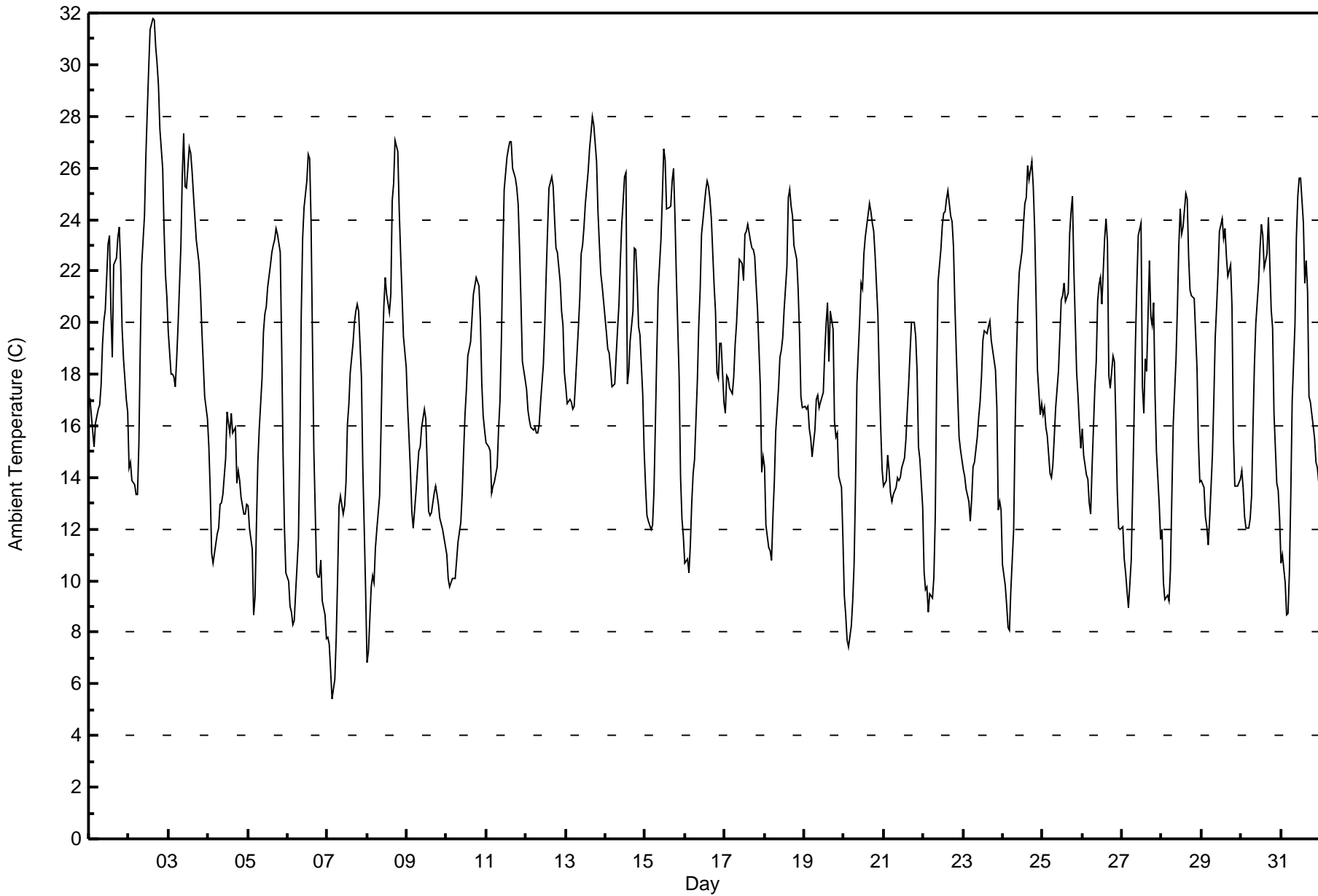
Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
CNRL Horizon (AMS 15)





Maximum Value: 31.8 C on Jul 2 15:00		Maximum Daily Average: 23.1 C on Jul 2		Hours in Service: 744																																													
Minimum Value: 5.4 C on Jul 7 04:00		Minimum Daily Average: 13.4 C on Jul 7		Hours of Data: 744																																													
Maximum Diurnal Average: 22.5 C at hour 16		Minimum Diurnal Average: 12.1 C at hour 5		Hours of Missing Data: 0																																													
Monthly Average: 17.81 C		Percentiles: P <sub>1</sub> = 7.7 P <sub>10</sub> = 10.8 Q <sub>1</sub> = 13.8 Median = 17.6 Q <sub>3</sub> = 21.9 P <sub>90</sub> = 24.5 P <sub>99</sub> = 28.6		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-Jul	17.1	16.4	15.8	15.2	16.1	16.6	16.8	17.6	19.1	20.1	20.5	23.0	23.4	20.5	18.7	22.2	22.5	23.3	23.7	22.2	19.8	18.6	17.0	16.5	19.3	23.7																							
2-Jul	14.4	14.6	13.9	13.7	13.3	13.4	15.3	19.1	22.2	24.1	26.5	28.2	29.8	31.3	31.8	31.7	30.7	30.1	29.2	27.5	26.0	23.6	21.9	21.0	23.1	31.8																							
3-Jul	19.6	18.0	18.0	17.9	17.5	18.6	19.9	22.9	25.7	27.3	25.3	25.2	26.8	26.6	25.9	24.9	24.1	23.2	22.3	21.2	19.7	18.4	17.1	16.3	21.8	27.3																							
4-Jul	15.2	13.5	11.1	10.7	11.1	11.8	12.0	13.0	13.0	13.4	14.8	16.5	16.1	15.7	16.5	15.7	16.0	13.8	14.3	13.9	13.2	12.6	12.6	13.0	13.7	16.5																							
5-Jul	12.9	12.1	11.3	8.7	9.4	12.2	14.6	15.9	17.9	19.6	20.4	20.6	21.4	22.3	22.7	23.0	23.2	23.6	23.4	22.7	19.1	14.9	12.0	10.3	17.3	23.6																							
6-Jul	10.0	9.0	8.8	8.3	8.5	9.6	11.6	15.2	20.3	23.3	24.5	25.5	26.5	26.4	23.9	19.4	15.1	10.3	10.1	10.2	10.8	9.2	8.7	7.8	14.7	26.5																							
7-Jul	7.8	7.5	6.5	5.4	6.2	7.8	10.1	12.9	13.3	12.6	12.9	13.8	16.1	16.8	18.1	19.2	20.0	20.5	20.7	20.5	17.9	14.4	12.0	9.6	13.4	20.7																							
8-Jul	6.9	7.3	9.8	10.2	9.9	11.3	12.0	13.3	15.9	18.8	20.6	21.7	21.1	20.4	21.1	24.7	25.4	27.0	26.7	24.4	22.6	21.1	19.5	18.3	17.9	27.0																							
9-Jul	16.8	15.5	14.3	12.7	12.0	13.4	14.3	15.0	15.2	15.9	16.7	16.3	14.5	12.7	12.5	12.6	13.4	13.7	13.3	12.9	12.4	12.0	11.6	11.3	13.8	16.8																							
10-Jul	11.0	10.1	9.8	10.1	10.1	10.1	10.8	11.5	12.3	13.4	15.0	16.5	17.4	18.7	19.3	20.2	21.1	21.4	21.8	21.4	20.0	17.6	16.4	15.8	15.5	21.8																							
11-Jul	15.4	15.2	15.0	13.4	13.7	13.8	14.4	15.9	17.0	19.3	22.6	25.1	26.4	26.8	27.0	27.0	26.0	25.6	25.2	24.6	22.8	20.8	18.5	17.8	20.4	27.0																							
12-Jul	17.4	16.6	16.2	15.9	15.8	15.9	15.7	15.7	16.1	16.9	18.4	19.9	21.9	23.6	25.2	25.6	25.3	24.0	22.9	22.7	21.6	20.4	19.9	18.1	19.7	25.6																							
13-Jul	17.5	16.9	17.0	16.9	16.7	16.8	17.7	19.8	21.0	22.7	23.0	23.7	24.6	25.9	26.7	27.3	28.0	27.7	26.2	24.3	23.0	21.9	21.4	20.8	22.0	28.0																							
14-Jul	19.6	19.0	18.8	18.3	17.5	17.6	18.7	19.7	20.7	22.4	23.8	25.7	25.8	17.6	18.1	19.3	20.4	22.9	22.8	21.6	19.9	19.5	17.2	15.0	20.1	25.8																							
15-Jul	13.7	12.5	12.3	12.0	12.2	13.5	16.0	18.8	21.3	23.2	24.9	26.7	26.3	24.4	24.4	24.5	25.5	26.0	24.1	21.8	17.9	14.1	12.4	11.7	19.2	26.7																							
16-Jul	10.7	10.8	10.3	11.4	13.0	14.2	14.7	17.7	19.9	21.3	23.5	24.0	25.1	25.5	25.3	24.8	24.0	21.4	20.4	18.0	17.8	19.2	19.2	16.9	18.7	25.5																							
17-Jul	16.5	17.9	17.9	17.5	17.2	17.9	19.1	20.0	21.1	22.5	22.3	21.7	23.5	23.5	23.8	23.2	22.9	22.9	22.6	21.5	20.5	17.5	14.2	14.8	20.1	23.8																							
18-Jul	14.4	12.1	11.3	11.2	10.8	12.5	13.8	15.8	17.5	18.6	19.0	19.4	20.5	22.2	24.8	25.2	24.5	24.2	23.0	22.4	21.3	19.6	17.2	16.7	18.3	25.2																							
19-Jul	16.8	16.7	16.8	15.9	15.5	14.8	15.8	17.0	17.2	16.7	16.9	17.3	18.8	20.0	20.8	18.5	20.5	19.7	16.1	15.6	15.7	14.1	13.6	11.6	16.8	20.8																							
20-Jul	9.4	8.7	7.7	7.5	8.3	9.2	10.7	13.7	17.6	20.1	21.5	21.3	22.7	23.3	24.2	24.6	24.3	23.8	23.5	22.6	20.3	17.9	15.9	14.3	17.2	24.6																							
21-Jul	13.7	13.9	14.9	14.2	13.4	13.1	13.3	13.6	14.0	13.9	14.0	14.4	14.7	15.4	16.6	17.6	18.9	20.0	20.0	19.4	18.1	15.2	14.7	12.8	15.4	20.0																							
22-Jul	10.4	9.6	9.8	8.8	9.5	9.4	10.2	12.5	17.8	21.6	22.9	23.7	24.2	24.3	24.8	25.1	24.1	23.9	22.9	20.7	18.9	15.6	15.1	14.7	17.5	25.1																							
23-Jul	14.3	14.0	13.5	13.1	12.3	13.2	14.4	14.6	15.6	16.3	16.9	17.9	19.3	19.7	19.6	19.8	20.0	19.3	18.9	18.2	16.7	12.8	13.1	12.8	16.1	20.0																							
24-Jul	10.6	9.8	9.0	8.2	8.1	9.7	12.0	15.8	18.7	20.7	22.0	22.8	23.8	24.6	24.9	26.1	25.5	26.2	25.3	23.6	21.0	18.2	16.4	16.8	18.3	26.2																							
25-Jul	16.4	16.7	15.9	15.6	14.2	14.0	14.5	15.6	16.7	18.1	19.5	20.9	21.0	21.6	20.8	21.2	23.4	24.3	24.9	22.1	18.0	17.2	16.0	15.1	18.5	24.9																							
26-Jul	15.9	14.9	14.1	13.9	13.0	12.6	14.4	17.4	18.5	20.8	21.5	21.8	20.7	23.3	24.0	23.2	17.9	17.5	18.7	18.5	16.2	13.5	12.1	12.0	17.3	24.0																							
27-Jul	12.1	10.8	10.3	9.6	8.9	10.8	13.4	16.3	19.2	21.5	23.4	23.9	17.5	16.5	18.6	18.1	22.4	20.2	19.9	20.8	17.2	15.0	13.0	11.6	16.3	23.9																							
28-Jul	12.0	9.9	9.3	9.4	9.2	10.4	13.2	16.1	18.6	20.6	23.0	24.4	23.4	23.7	25.0	24.8	22.6	21.3	21.0	20.9	19.6	18.2	15.4	13.8	17.7	25.0																							
29-Jul	13.9	13.6	12.4	12.1	11.4	12.4	14.9	17.0	19.4	20.6	21.9	23.5	24.0	23.3	23.7	22.6	21.8	22.2	20.6	15.5	13.7	13.6	13.7	13.9	17.6	24.0																							
30-Jul	14.3	13.6	12.5	12.0	12.0	12.4	13.3	16.0	18.4	20.0	21.6	22.9	23.8	23.4	22.1	22.7	24.1	22.3	20.5	19.8	16.5	13.8	13.5	12.4	17.7	24.1																							
31-Jul	10.7	11.0	9.9	8.7	8.7	10.3	13.4	17.0	19.9	23.3	24.9	25.6	25.6	23.9	21.5	22.4	21.2	17.1	16.9	16.0	15.5	14.6	14.4	13.8	16.9	25.6																							
																								13.8	13.2	12.7	12.2	12.1	12.9	14.2	16.2	18.1	19.7	20.8	21.7	22.2	22.1	22.3	22.5	22.4	21.9	21.4	20.2	18.5	16.6	15.3	14.4	Diurnal Average	
																								19.6	19.0	18.8	18.3	17.5	18.6	19.9	22.9	25.7	27.3	26.5	28.2	29.8	31.3	31.8	31.7	30.7	30.1	29.2	27.5	26.0	23.6	21.9	21.0	Diurnal Maximum	







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

**Ambient Temperature (AT) - C**  
**CNRL Horizon - July 2015**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	48	6.45	6.45
10 - 20	429	57.66	64.11
> 20	267	35.89	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

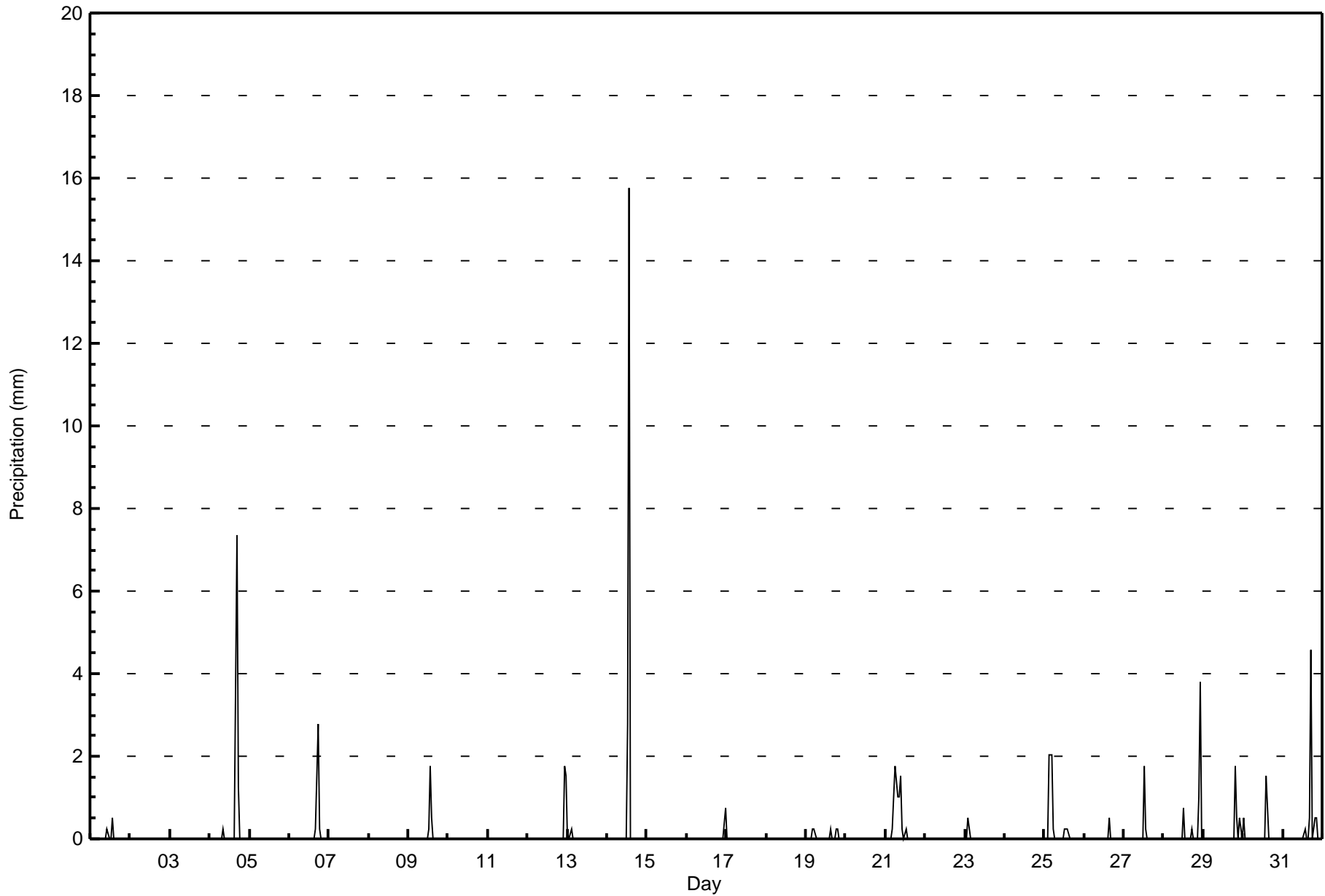


Maximum Value: 15.7 mm on Jul 14 14:00		Maximum Daily Total: 18.5 mm on Jul 14		Hours in Service: 744																							
Minimum Value: 0.0 mm on Jul 1 01:00		Minimum Daily Total: 0.0 mm on Jul 2		Hours of Data: 744																							
Maximum Diurnal Total: 18.8 mm at hour 14		Minimum Diurnal Total: 0.0 mm at hour 2		Hours of Missing Data: 0																							
Monthly Total: 71.88 mm		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 0.0 P <sub>90</sub> = 0.0 P <sub>99</sub> = 1.3		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-Jul	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	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.5	
2-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	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	7.4	1.3	0.0	0.0	0.0	0.0	0.0	0.0	8.9	7.4	
5-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	2.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	3.3	2.8	
7-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.8	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	1.8	
10-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	1.5	3.3	1.8	
13-Jul	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	
14-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	15.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.5	15.7	
15-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.8	0.8	
17-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	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	0.3	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	1.3	0.3	
20-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.3	1.0	1.8	1.0	1.0	1.5	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.1	1.8	
22-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23-Jul	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	0.5	0.5	
24-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	2.0	2.0	0.3	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.1	2.0	
26-Jul	0.0	0.0	0.0	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	0.5	0.5	
27-Jul	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	1.8	
28-Jul	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	0.3	0.0	0.0	0.0	1.0	3.8	0.0	5.8	3.8		
29-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.5	0.0	0.5	0.0	2.8	1.8		
30-Jul	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	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	1.5		
31-Jul	0.0	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	0.5	4.6	0.0	0.5	0.5	0.0	0.0	0.0	6.4	4.6		
																								Diurnal Average			
																								Diurnal Maximum			



Wood Buffalo Environmental Association  
Hourly Averages

Precipitation (PC) - mm  
CNRL Horizon - July 2015





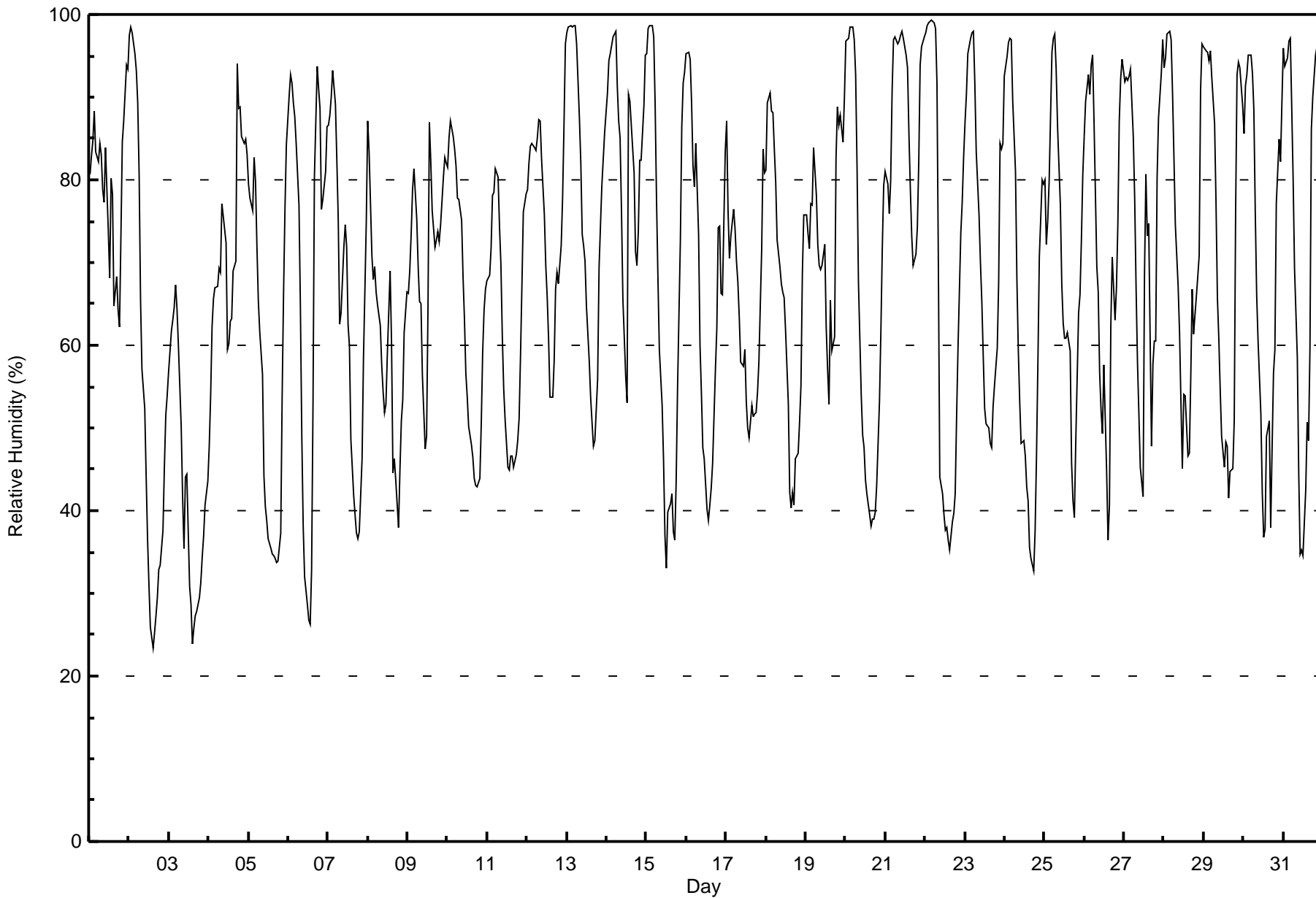
**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Relative Humidity (RH) - %**

**CNRL Horizon - July 2015**

Maximum Value: 99 % on Jul 22 05:00																	Maximum Daily Average: 87.4 % on Jul 21																	Hours in Service: 744	
Minimum Value: 23 % on Jul 2 15:00																	Minimum Daily Average: 43.1 % on Jul 3																	Hours of Data: 744	
Maximum Diurnal Average: 88.1 % at hour 5																	Minimum Diurnal Average: 50.4 % at hour 16																	Hours of Missing Data: 0	
Monthly Average: 68.6 %																	Percentiles: P <sub>1</sub> = 27 P <sub>10</sub> = 41 Q <sub>1</sub> = 52 Median = 70 Q <sub>3</sub> = 85 P <sub>90</sub> = 95 P <sub>99</sub> = 99																	Hours of Calibration: 0	
																																		Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24											
1-Jul	81	83	85	88	83	82	84	83	79	77	84	74	68	80	78	65	68	64	62	73	85	87	94	93	79.2	94									
2-Jul	97	99	98	95	93	89	81	66	57	52	44	37	31	26	23	25	27	30	33	33	38	45	52	54	55.2	99									
3-Jul	57	62	63	65	67	64	60	50	42	35	44	44	31	29	24	26	27	28	29	31	34	37	41	44	43.1	67									
4-Jul	48	54	62	66	67	67	69	69	77	76	72	59	60	63	63	69	70	94	89	89	85	84	85	83	71.7	94									
5-Jul	79	78	76	83	80	72	65	62	56	44	40	39	37	35	35	35	34	34	34	37	54	66	76	84	55.7	84									
6-Jul	90	93	92	89	88	84	77	65	49	38	32	29	27	26	33	53	80	94	91	89	76	78	81	87	68.3	94									
7-Jul	87	88	90	93	89	82	75	63	64	72	75	72	63	60	49	42	39	37	37	37	46	58	67	75	65.0	93									
8-Jul	87	83	71	68	70	66	65	62	58	54	52	53	59	69	60	45	46	44	38	45	51	53	62	66	59.5	87									
9-Jul	66	69	73	79	81	75	69	65	65	56	47	49	64	87	82	76	72	73	74	73	75	80	83	82	71.5	87									
10-Jul	81	85	87	85	84	82	78	78	75	68	63	57	54	50	48	47	44	43	43	44	50	59	64	67	64.0	87									
11-Jul	68	68	72	78	79	81	80	74	70	61	55	51	45	45	47	47	45	47	48	51	59	67	76	78	62.2	81									
12-Jul	79	82	84	84	84	84	85	87	87	82	76	70	66	61	54	54	58	67	69	67	72	78	87	96	75.5	96									
13-Jul	98	98	99	98	99	99	96	88	82	73	72	70	65	58	54	51	48	48	56	69	74	79	83	86	76.8	99									
14-Jul	91	94	95	96	97	98	91	87	85	76	66	56	53	90	89	87	81	71	70	74	82	82	89	95	83.2	98									
15-Jul	95	98	99	99	97	89	77	68	59	53	46	37	33	40	41	42	38	36	44	55	73	86	92	93	66.2	99									
16-Jul	95	95	95	89	82	79	84	73	60	54	48	46	40	39	41	43	46	57	62	74	74	66	66	83	66.4	95									
17-Jul	87	76	71	73	76	74	70	68	63	58	58	59	53	50	49	53	51	52	52	54	58	72	84	81	64.3	87									
18-Jul	81	89	90	88	88	84	80	73	69	67	67	66	62	53	42	40	42	41	46	47	51	55	69	76	65.3	90									
19-Jul	76	74	72	77	77	84	78	72	70	69	70	72	62	57	53	65	59	61	83	89	87	88	85	90	73.7	90									
20-Jul	97	97	97	98	99	97	93	82	68	54	49	48	44	42	39	38	39	39	40	43	53	62	72	79	65.3	99									
21-Jul	81	79	76	80	91	97	97	97	97	97	98	97	95	94	86	79	73	70	71	74	82	94	96	97	87.4	98									
22-Jul	98	99	99	99	99	99	98	92	70	44	42	40	38	38	36	35	39	40	42	51	60	74	77	83	66.3	99									
23-Jul	87	90	95	97	98	98	92	83	76	70	65	59	52	50	48	48	53	55	60	68	84	84	84	84	72.8	98									
24-Jul	93	95	97	97	97	90	81	68	59	53	48	48	47	43	41	36	34	33	38	47	58	71	80	80	63.8	97									
25-Jul	80	72	75	80	96	97	98	93	87	77	67	63	61	61	61	59	46	41	39	48	64	66	73	81	70.2	98									
26-Jul	85	90	93	90	94	95	87	70	66	57	52	49	58	45	36	41	63	71	63	67	75	87	92	95	71.6	95									
27-Jul	92	92	92	93	93	85	78	67	58	52	45	42	68	81	73	75	48	58	60	61	80	88	93	97	73.7	97									
28-Jul	94	95	98	98	97	90	83	75	67	62	53	45	54	54	47	47	56	67	61	66	68	71	91	96	72.2	98									
29-Jul	96	96	95	94	96	92	87	77	66	61	55	49	45	48	48	42	45	45	51	76	93	94	94	89	72.2	96									
30-Jul	86	91	93	95	95	93	89	76	66	60	52	42	37	38	49	51	38	47	57	60	77	85	82	89	68.7	95									
31-Jul	96	94	95	97	97	89	80	69	58	45	35	35	34	42	51	48	59	86	90	95	96	97	96	93	74.1	97									
	84.7	85.8	86.4	87.6	88.1	85.8	81.6	74.2	67.9	61.3	57.1	53.4	51.8	53.4	51.0	50.4	50.5	53.8	55.7	60.6	67.7	74.0	79.4	83.1	Diurnal Average										
	98	99	99	99	99	99	98	97	97	97	97	97	98	97	95	94	89	87	81	94	91	95	96	97	96	97	Diurnal Maximum								





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

**Relative Humidity (RH) - %**  
**CNRL Horizon - July 2015**

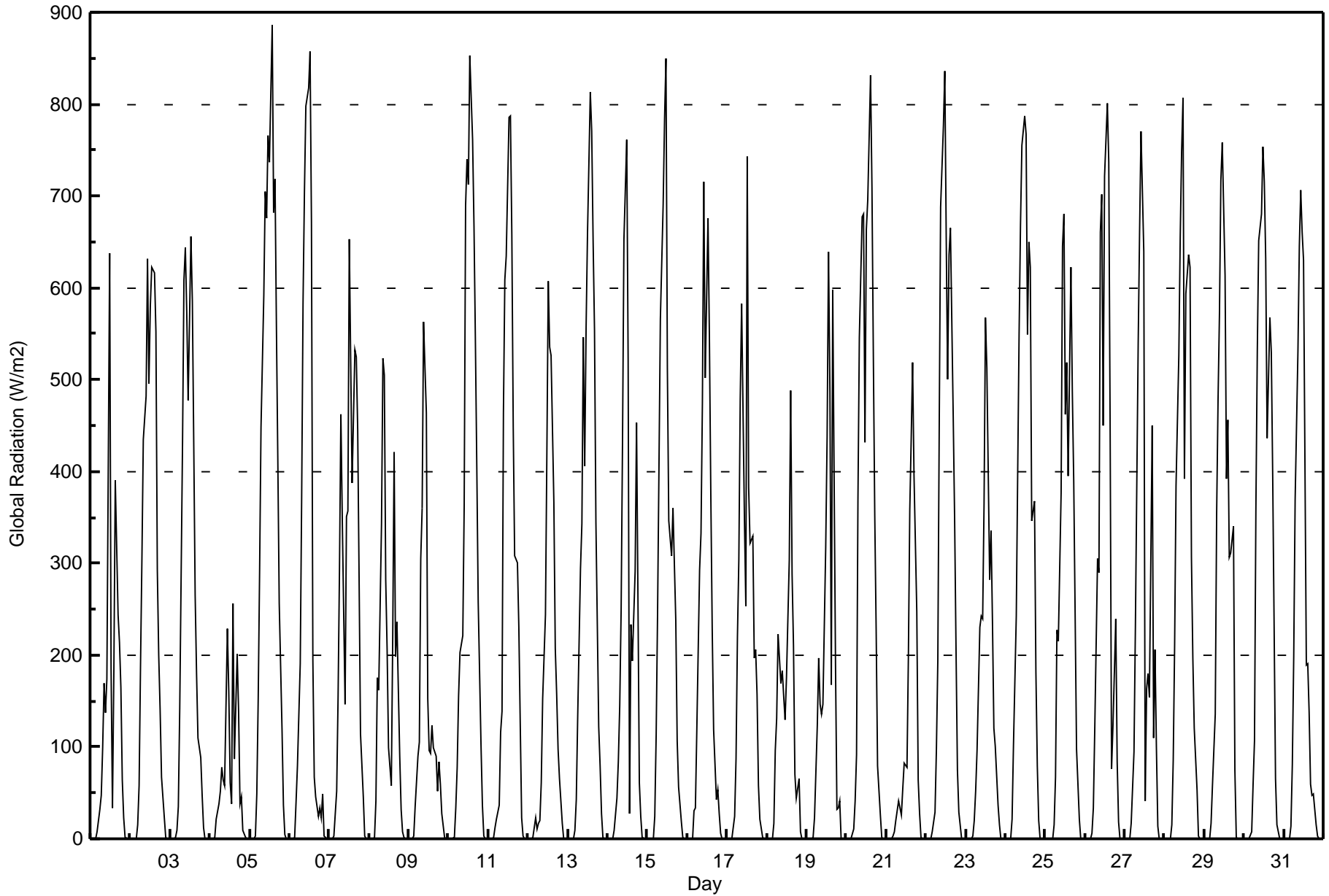
<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	71	9.54	9.54
40 - 60	189	25.40	34.95
60 - 80	224	30.11	65.05
80 - 100	260	34.95	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Maximum Value: 886 W/m2 on Jul 5 14:00																			Maximum Daily Average: 337.2 W/m2 on Jul 5						Hours in Service: 744	
Minimum Value: 0 W/m2 on Jul 1 01:00																			Minimum Daily Average: 65.7 W/m2 on Jul 4						Hours of Data: 744	
Maximum Diurnal Average: 531.7 W/m2 at hour 12																			Minimum Diurnal Average: 0.0 W/m2 at hour 1						Hours of Missing Data: 0	
Monthly Average: 209.2 W/m2																			Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 90 Q <sub>3</sub> = 367 P <sub>90</sub> = 634 P <sub>99</sub> = 804						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-Jul	0	0	0	0	7	32	47	98	170	138	174	637	186	33	184	391	244	214	165	64	23	2	0	0	117.0	637
2-Jul	0	0	0	1	15	58	188	303	435	482	631	496	580	622	616	552	292	200	140	66	23	2	0	0	237.6	631
3-Jul	0	0	0	1	10	35	142	432	608	644	573	478	657	586	430	266	180	110	88	47	13	0	0	0	220.8	657
4-Jul	0	0	0	1	22	38	51	77	63	58	230	160	61	38	257	86	201	138	39	46	9	2	0	0	65.7	257
5-Jul	0	0	0	3	49	153	291	449	592	705	676	765	737	886	682	719	557	411	256	119	37	4	0	0	337.2	886
6-Jul	0	0	0	2	40	79	190	370	584	704	798	817	858	671	195	67	46	25	33	24	48	3	0	0	231.4	858
7-Jul	0	0	0	3	52	153	292	462	347	146	351	357	654	520	388	532	525	446	284	114	45	3	0	0	236.5	654
8-Jul	0	0	0	2	41	175	162	343	523	505	282	206	99	59	220	422	198	237	90	32	7	1	0	0	150.2	523
9-Jul	0	0	0	3	35	90	105	304	360	563	463	152	96	93	123	100	90	51	84	60	27	2	0	0	116.7	563
10-Jul	0	0	0	1	33	78	155	203	222	364	689	740	712	852	761	667	541	405	258	102	37	3	0	0	284.3	852
11-Jul	0	0	0	1	12	21	37	116	139	464	608	634	785	787	657	448	308	301	230	124	24	3	0	0	237.5	787
12-Jul	0	0	0	1	23	11	17	21	61	152	244	420	607	536	526	367	207	158	98	66	17	0	0	0	147.0	607
13-Jul	0	0	0	0	9	43	132	294	343	545	406	556	659	812	771	651	553	345	122	79	27	2	0	0	264.6	812
14-Jul	0	0	0	0	9	45	84	146	248	435	654	761	522	27	233	194	291	452	263	60	24	2	0	0	185.5	761
15-Jul	0	0	0	0	25	113	246	404	567	691	784	850	512	346	308	360	299	238	107	57	18	1	0	0	247.0	850
16-Jul	0	0	0	1	30	34	118	293	333	475	715	503	675	544	375	228	120	42	53	28	6	0	0	0	190.5	715
17-Jul	0	0	0	1	25	87	220	304	479	583	348	253	742	383	322	330	197	205	157	58	21	1	0	0	196.5	742
18-Jul	0	0	0	1	17	96	130	223	170	182	155	129	176	304	488	288	211	70	44	65	8	0	0	0	114.9	488
19-Jul	0	0	0	0	1	23	124	197	147	136	146	318	438	639	487	168	598	188	33	33	41	1	0	0	154.9	639
20-Jul	0	0	0	0	10	41	92	368	546	677	680	432	664	696	831	709	525	353	227	80	27	1	0	0	290.0	831
21-Jul	0	0	0	0	3	8	20	41	33	26	55	83	78	199	358	435	518	396	248	64	28	1	0	0	108.0	518
22-Jul	0	0	0	0	8	29	98	194	447	687	776	837	655	501	636	665	460	348	206	75	29	0	0	0	277.1	837
23-Jul	0	0	0	0	4	20	52	95	231	243	239	365	567	513	283	336	237	120	100	37	15	1	0	0	144.1	567
24-Jul	0	0	0	0	22	102	243	398	549	669	755	787	768	548	649	622	347	368	182	79	20	0	0	0	296.1	787
25-Jul	0	0	0	0	0	16	66	227	214	377	645	681	462	518	395	622	487	389	244	97	21	0	0	0	227.7	681
26-Jul	0	0	0	0	6	33	119	305	290	660	702	450	721	800	736	439	77	124	240	85	18	0	0	0	241.9	800
27-Jul	0	0	0	0	17	95	230	386	540	662	771	639	42	163	180	155	450	110	207	99	14	0	0	0	198.3	771
28-Jul	0	0	0	0	15	85	211	384	527	656	749	807	393	593	636	622	306	198	121	53	4	0	0	0	265.0	807
29-Jul	0	0	0	0	17	57	136	355	479	571	718	758	614	392	456	306	311	340	75	2	0	0	0	0	232.8	758
30-Jul	0	0	0	0	7	60	106	360	530	651	680	753	715	632	436	568	529	393	231	66	15	0	0	0	280.6	753
31-Jul	0	0	0	0	13	80	198	369	531	645	706	660	630	189	191	138	60	48	49	15	4	0	0	0	188.6	706
																			0.0 0.0 0.0 0.7 18.7 64.3 138.7 274.9 364.8 467.7 529.2 531.7 518.3 467.2 445.5 401.6 321.4 239.4 150.8 64.4 21.0 1.1 0.0 0.0						Diurnal Average	
																			0 0 0 3 52 175 292 462 608 705 798 850 858 886 831 719 598 452 284 124 48 4 0 0						Diurnal Maximum	







Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

CNRL Horizon - July 2015

Maximum Speed: 22 km/h on Jul 4 21:00	Maximum Daily Speed Average: 11.6 km/h on Jul 17	Hours in Service: 744
Minimum Speed Value: 0 km/h on Jul 21 06:00	Minimum Daily Speed Average: 0.7 km/h on Jul 14	Hours of Data: 743
Maximum Diurnal Speed Average: 4.1 km/h at hour 5	Minimum Diurnal Speed Average: 1.3 km/h at hour 19	Hours of Missing Data: 1
Monthly Average Velocity: 2.5 km/h 251.8 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 3 Q <sub>1</sub> = 5 Median = 7 Q <sub>3</sub> = 10 P <sub>90</sub> = 13 P <sub>99</sub> = 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-Jul	SW8	SW10	SSW6	SSW10	SW9	SW8	SSW9	SSW9	SW7	SW5	SSW5	SSW8	WSW5	W9	W7	WSW8	W4	WNNW3	S4	SSW4	S6	SW6	WSW7	WSW5	SW6.0	SW10
2-Jul	SSW4	SSW6	SSW7	SSW9	SSW9	SSW8	SSW9	SW6	SW7	S7	SSW9	SSW7	SSW6	SW11	SW13	SW14	SSW9	SSE3	SE4	S8	S9	S9	SSW7	SSW7	SSW7.5	SW14
3-Jul	SSW6	SSW6	S8	S7	SSW6	SSW7	SSW10	SW13	SW16	WSW16	WNNW19	WNNW17	WNNW20	WNNW21	NW21	WNNW18	W14	WNNW18	WNNW11	WNNW9	WNNW8	W9	W11	W10	W9.9	NW21
4-Jul	W10	WSW9	WSW8	WSW10	WSW10	WSW12	SW4	SSW5	WSW9	SW7	SW8	WNNW13	NW12	NW11	N9	ENE7	E6	SSW3	WNNW5	WNNW12	N22	N19	N15	N15	NW5.3	N22
5-Jul	N13	N12	WNNW10	WNNW7	WNNW8	WNNW4	WNNW5	WNNW7	NW6	N10	N11	NNE10	N9	NNE6	N7	NE5	NNE5	ENE5	E4	SE3	S5	SSW5	S2	SSW5	NNW3.8	N13
6-Jul	SW7	SSW7	SSW8	SSW10	SSW9	S7	S8	S10	SSW9	SW13	SW16	SW15	SW15	SSW17	W13	WNNW17	NNE19	N20	N21	N15	WNNW14	WNNW11	WNNW10	WNNW7	W4.9	N21
7-Jul	WNNW10	W8	WSW8	WSW7	WSW9	WSW8	WSW8	SSW5	S8	SSW8	S11	S12	S13	S12	SW9	SW10	WSW11	SW12	SW10	SSW8	S8	S9	SSW8	SSW6	SW7.7	S13
8-Jul	S6	S9	S11	S12	S11	S9	S10	S11	S14	S13	S11	SSE8	SSE5	S5	S8	S13	SSW8	WSW9	W17	W15	NW14	WNNW13	NW12	NW14	SSW6.5	W17
9-Jul	WNNW14	WNNW12	N11	NNE6	W5	WNNW5	WNNW6	N6	NE7	NE7	NE4	NE7	NNE5	SE4	ENE5	NNE4	NNE7	N11	NNE16	NNE14	N11	N11	N9	N8	N7.1	NNE16
10-Jul	N8	NNE6	NNE6	N7	N6	N5	NNE6	NNE6	NNE3	ENE2	NNE3	ENE4	NE4	ESE6	ENE4	NE5	ESE4	ENE6	ESE5	NE4	NNE5	NNE6	N7	WNNW7	NNE4.3	N8
11-Jul	N6	N6	N4	NNE4	NNE2	SSW1	NW3	NE3	NE3	SE7	S12	S13	SSE13	SSE13	SSE10	SSE10	SE10	SE9	SE8	ESE7	E5	ENE5	NNE4	N5	SE3.7	S13
12-Jul	N5	N5	N6	N8	N4	N6	N7	WNNW1	N3	N8	NNE11	NE6	ENE3	NE3	NNE4	NE7	ENE7	ENE7	NE6	NE5	NE3	SSW6	SW11	SW3	NNE3.5	NNE11
13-Jul	SW3	S7	S7	SSE5	SSW6	SW6	SSW5	SSW5	S7	SSW9	SW8	WSW9	SW10	SW10	SSW9	SSW7	S7	SW8	SW4	N9	N8	N6	WNNW7	N5	SW4.0	SSW10
14-Jul	NNE4	N4	WNNW4	N3	WNNW1	E1	SSE2	S3	SSE2	ENE1	NE3	SE3	NE4	WNNW8	WNNW5	SSW7	S9	SE8	SE9	SSE5	SSE4	NNE11	NW4	W5	E0.7	NNE11
15-Jul	WSW4	SSW7	SSW7	SW7	SW9	SSW7	SSW7	SSW8	S9	S9	S9	SSW12	SW13	NW8	ENE8	ENE8	E4	S5	WNNW8	N5	NW2	WSW3	SW5	W5	SSW3.9	SW13
16-Jul	W5	SW6	SSW7	SW7	SW7	SW4	E2	SSE0	WNNW3	N6	N8	NNE11	N15	N16	N16	N17	N17	WSW7	SW12	SW14	WSW10	NW7	SSE6	WSW10	NW3.4	N17
17-Jul	WNNW9	NW9	N12	N13	N10	N12	N15	N20	N18	N18	N18	N15	NNE14	N15	N15	N17	N16	N14	NNE13	NNE10	NNE7	NW3	W5	WSW8	N11.6	N20
18-Jul	WSW8	SW5	SSW7	SSW8	SSW8	SSW10	S11	S10	S8	SSW9	SSW10	SSW11	SSW11	SW14	W14	WSW13	WSW14	WNNW16	NW9	WNNW12	WNNW14	WNNW15	NW8	WNNW9	WSW7.4	WNNW16
19-Jul	WNNW12	WNNW10	NW11	NW6	WNNW11	WNNW9	NW9	WNNW10	NW9	NW7	WNNW7	WNNW8	WNNW12	WNNW16	WNNW18	WNNW19	WNNW16	WNNW16	WNNW8	NNE2	N2	WNNW8	NW10	W4	WNNW9.5	WNNW19
20-Jul	SSW5	SW6	SW5	SSW6	S6	SSW7	S7	S8	SSE7	S9	S9	S6	S6	SSE8	S8	SSE8	SE9	ESE8	SE6	E4	ENE6	ENE6	ENE5	NE5	SSE4.7	S9
21-Jul	NNE5	NE4	NNE5	ENE2	SE1	NNE0	NNE2	NE5	NNE5	NNE5	NNE7	NE7	ENE4	WNNW4	NW5	WNNW5	N5	ESE3	E6	E4	NE2	N4	NW5	NW3	NNE3.0	NE7
22-Jul	SW3	SW6	SSW6	S6	SSW7	SSW4	S5	SW7	SW7	WSW7	SSW6	SSW7	SSW8	S8	SSW9	SW10	W10	W10	W10	W11	W7	WSW6	SW2	NE1	SW5.9	W11
23-Jul	W3	SW2	W3	W2	WSW1	WNNW2	W4	NW10	WNNW1	NW8	NW6	W6	WSW4	WNNW7	WNNW7	WNNW6	SW6	SSW7	WSW6	WSW5	WSW4	SW5	SW6	SW6	W4.1	NW11
24-Jul	SSW5	SSW5	SSW7	SSW7	SSW8	SSW8	SSW9	SSW6	S7	SSE7	S8	S8	SSE8	SSE9	SSE8	S12	SW12	SW6	S7	S5	WNNW2	NW4	WNNW3	ENE2	SSW5.6	SW12
25-Jul	SSW6	SW10	SSW7	SSW9	WSW7	NNE1	SSE5	S7	S8	SSW8	S9	S11	SW9	SW7	WSW14	WSW10	W6	SW5	SSW4	NNE8	N3	WNNW8	NNE5	N6	SW4.4	WSW14
26-Jul	WNNW9	N4	NW5	NW4	N0	SW2	NW2	NE3	SSE2	SSW3	N3	WSW4	WNNW9	WNNW13	NW11	WNNW11	WSW7	SE6	S7	S7	S8	S7	S7	SSW8	W2.0	WNNW13
27-Jul	SW8	SW7	SSW8	SSW9	S7	SSW9	SSW10	SSW10	SSW9	SSW10	WSW7	NW9	SSE2	SSE3	S10	SW10	WNNW10	NE1	S5	SSW8	SSW7	WNNW6	SW5	SSW6.2	S10	
28-Jul	W6	SW3	SSW6	S7	SW4	SW1	SSE5	S4	SSE4	ESE4	S5	SE8	S6	SE7	SSE9	ESE4	NE13	SE4	ESE3	SW3	W4	N7	NE7	SSW4	SSE2.4	NE13
29-Jul	W7	SW7	SW7	WSW8	S4	N5	W3	SW7	SW4	S6	S5	C	SSW10	SW13	SW12	WNNW13	WNNW9	WNNW10	NW8	WSW7	SSW8	SSW8	SW8	W10	WSW5.2	WNNW13
30-Jul	WNNW9	WSW6	SW3	SSW8	SSW8	SW9	SW9	SW7	SW7	SSW6	W6	WNNW14	WNNW15	WNNW10	WNNW6	NW10	NNE8	NE10	ENE11	E6	SSW5	SW7	SW6	WNNW4	W3.7	WNNW15
31-Jul	SSW6	SW7	SW7	SSW6	SSW7	SSW7	SSW6	S7	S7	S6	S4	SSE7	SE9	ESE3	SW9	SSW6	NW1	ENE6	NNE4	W2	WNNW1	SSW6	WSW7	WNNW4	SSW3.7	SW9

W3.8WSW3.3WSW3.0 SW3.7 SW4.1 SW3.5 SW3.2 SW3.2SSW3.1SSW2.8 SW2.9 SW2.9WSW3.0WSW3.1 W3.5 W3.2WNNW2.0 NW1.7 NW1.3 NW1.6WNNW2.0WNNW2.7WNNW3.3WNNW3.4	Diurnal Average
NNW14 NNW12 N12 N13WNNW11 N12 N15 N20 N18 N18WNNW19WNNW17WNNW20WNNW21 NW21WNNW19 NNE19 N20 N21 W15 N22 N19 N15 N15	Diurnal Maximum

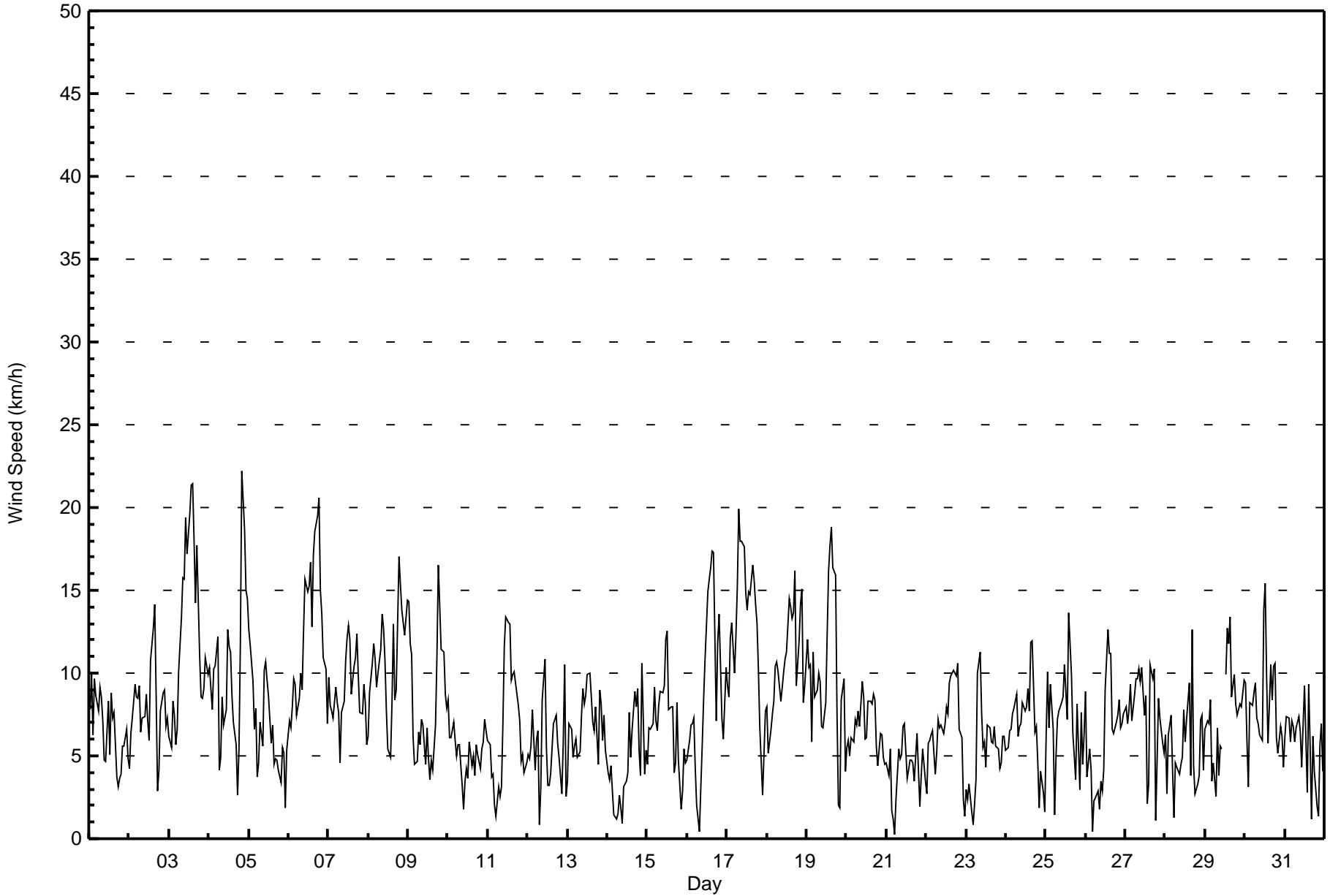
C - Calibration  
 All monthly, daily, and diurnal averages have been calculated using vector methods



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

**Wind Speed (WS) - km/h**  
**CNRL Horizon - July 2015**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 9 km/h on Jul 26 16:00 Minimum Value: 1 km/h on Jul 22 02:00 Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 2 Median = 2 Q <sub>3</sub> = 3 P <sub>90</sub> = 4 P <sub>99</sub> = 6														Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1 Hours of Calibration: 1 Percent Operational Time: 100.0													
Day	Hourly Period Ending At (MST)																								Daily Maximum		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jul	2	2	2	2	2	2	2	2	2	1	2	3	2	3	3	2	3	3	1	1	1	2	1	2	3		
2-Jul	2	1	1	2	2	2	2	2	2	2	3	3	3	4	5	5	4	2	2	2	1	2	1	1	5		
3-Jul	1	1	1	2	1	2	3	4	5	6	6	6	5	6	6	5	4	6	3	3	2	2	3	2	6		
4-Jul	2	2	2	2	3	4	2	1	3	2	3	5	3	3	3	3	3	1	5	5	6	5	4	4	6		
5-Jul	3	3	3	1	1	2	2	2	2	4	4	4	5	3	4	3	2	3	3	1	1	1	1	2	5		
6-Jul	1	1	2	2	2	1	2	3	3	5	5	5	6	6	7	5	8	6	5	4	4	3	3	2	8		
7-Jul	2	2	2	1	2	2	2	2	2	2	3	3	4	4	3	4	4	4	3	2	1	1	1	1	4		
8-Jul	1	2	2	2	2	2	2	3	3	3	3	2	2	2	4	3	3	6	5	5	4	3	4	6			
9-Jul	4	5	3	2	2	2	2	2	2	2	2	2	2	2	1	2	3	5	4	3	3	2	2	5			
10-Jul	2	1	1	2	2	1	2	2	1	2	2	3	2	3	3	3	3	3	3	1	1	1	1	1	3		
11-Jul	1	1	1	1	1	2	2	1	1	2	3	4	4	4	3	3	3	3	2	3	2	2	1	1	4		
12-Jul	1	1	1	2	3	2	2	2	2	3	3	3	3	2	3	3	2	2	1	1	1	4	4	2	4		
13-Jul	1	2	2	1	1	1	2	2	2	3	3	3	4	4	3	4	3	2	3	2	1	2	1	4			
14-Jul	1	1	1	1	1	1	2	2	2	2	2	3	7	5	2	3	2	2	3	2	3	5	1	1	7		
15-Jul	1	1	1	2	2	3	2	2	2	3	4	4	4	4	3	2	3	4	3	1	2	1	1	1	4		
16-Jul	1	2	2	2	2	2	1	1	1	2	3	3	4	4	4	4	5	3	4	4	3	2	5	4	5		
17-Jul	2	2	3	3	3	3	4	5	5	5	5	4	4	4	5	4	4	4	4	3	2	1	1	2	5		
18-Jul	2	2	2	2	2	2	2	2	2	3	3	3	3	5	5	5	5	6	4	4	3	6	2	2	6		
19-Jul	3	3	3	3	3	2	2	3	3	4	4	4	4	5	4	8	5	6	5	2	2	2	2	1	8		
20-Jul	1	1	1	1	1	2	2	2	2	3	4	3	3	3	4	4	3	3	2	3	2	1	1	1	4		
21-Jul	1	1	1	1	1	1	1	1	1	2	2	2	3	1	2	2	2	2	2	2	1	1	1	1	3		
22-Jul	1	1	1	1	2	1	1	2	2	2	3	3	4	3	3	4	4	4	3	4	2	1	2	1	4		
23-Jul	2	2	1	2	1	2	2	3	3	2	2	3	2	3	3	3	3	2	2	1	1	1	1	1	3		
24-Jul	1	1	1	2	1	2	2	2	2	2	3	4	4	5	4	4	5	3	3	1	2	1	3	1	5		
25-Jul	1	3	2	3	2	1	2	2	2	3	3	4	3	4	5	4	3	3	3	4	2	2	2	3	5		
26-Jul	2	1	1	2	2	1	2	1	2	2	3	6	6	4	4	9	4	2	2	2	1	2	1	1	9		
27-Jul	2	3	2	2	1	2	2	3	3	3	4	4	6	2	3	3	4	7	2	2	2	2	1	1	7		
28-Jul	2	2	1	1	2	2	1	1	2	2	3	3	3	2	3	5	5	3	3	2	3	3	3	1	5		
29-Jul	1	2	2	2	2	2	2	2	2	2	3	C	4	4	4	4	3	3	5	6	2	2	2	3	6		
30-Jul	2	1	2	2	2	2	2	2	2	3	3	4	5	4	6	5	3	7	3	2	1	1	1	3	7		
31-Jul	2	1	2	1	1	1	1	2	2	2	3	3	3	4	4	2	3	3	2	2	2	2	2	2	4		
														Diurnal Maximum													
C - Calibration																											





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h  
CNRL Horizon - July 2015**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	213	28.67	28.67
6 - 11	423	56.93	85.60
12 - 19	100	13.46	99.06
20 - 28	7	0.94	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 743

Total Number of Hours: 744



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
CNRL Horizon - July 2015**

<b>Wind Speed Ranges (km/h)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	19	21	19	12	7	7	6	14	14	19	22	9	13	10	12	9	213
6 - 11	31	19	7	10	3	3	11	14	64	98	53	31	18	28	21	12	423
12 - 19	24	5	1	0	0	0	0	2	10	2	16	5	5	18	4	8	100
20 - 28	4	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	7
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	78	45	27	22	10	10	17	30	88	119	91	45	36	58	38	29	743

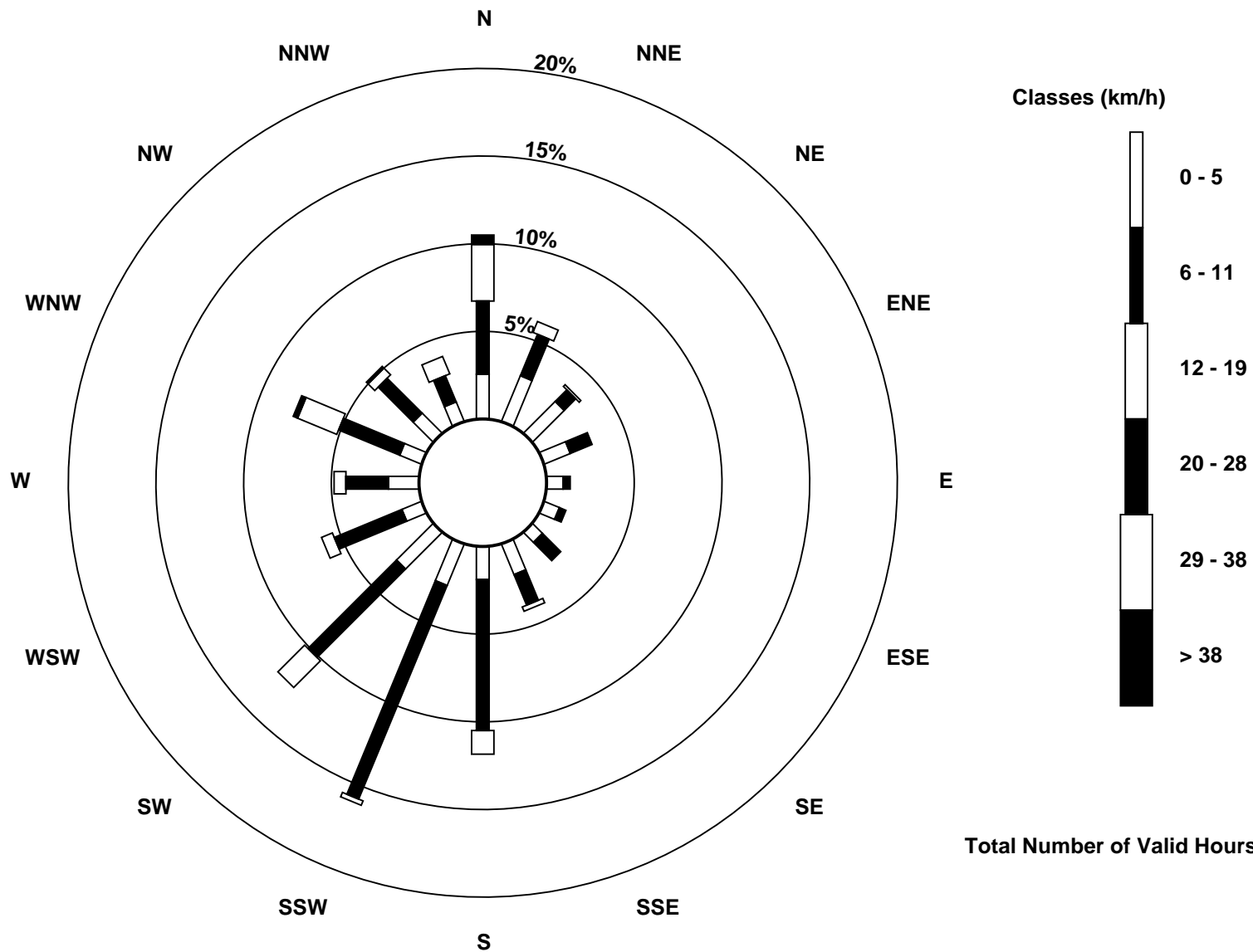
Total Number of Valid Hours: 743

Total Number of Hours: 744



Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Wind Speed (WS) - km/h  
CNRL Horizon (AMS 15)





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

CNRL Horizon - July 2015

Direction of Maximum Speed: 359 deg on Jul 4 21:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 357.6 deg on Jul 17	Hours of Data: 743
Direction of Minimum Speed: 19 deg on Jul 21 06:00	Direction of Minimum Daily Speed Average: 0.7 deg on Jul 14
Direction of Minimum Speed: 19 deg on Jul 21 06:00	Hours of Missing Data: 1
Monthly Average Direction: 248.9 deg	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jul	222	215	213	212	224	220	212	208	217	215	209	198	238	267	275	254	261	284	179	194	188	226	252	240	224.9
2-Jul	212	209	205	203	196	205	208	214	214	188	195	213	213	224	223	219	210	166	137	178	180	188	196	197	203.1
3-Jul	213	197	178	184	196	194	197	220	229	250	284	297	302	293	305	289	273	297	288	295	284	276	271	269	268.8
4-Jul	269	251	249	245	244	248	233	195	238	233	215	294	324	321	4	63	83	206	302	340	359	7	354	355	306.5
5-Jul	356	354	337	297	290	291	284	294	323	5	356	13	7	19	354	46	27	71	84	130	175	204	182	192	348.4
6-Jul	214	212	206	209	198	186	191	186	194	223	224	218	220	211	275	335	16	5	359	359	339	300	288	290	262.3
7-Jul	287	270	248	237	253	251	258	213	174	200	180	186	185	182	233	231	241	229	219	210	186	184	193	202	217.1
8-Jul	191	184	182	181	182	182	186	182	180	181	180	164	168	179	172	183	202	244	279	264	309	296	313	325	212.9
9-Jul	346	347	357	12	280	284	345	11	49	39	43	52	25	131	71	24	12	5	12	12	9	7	3	359	8.9
10-Jul	4	18	18	11	9	7	12	32	30	65	12	57	50	107	74	52	117	68	110	41	22	14	352	348	30.8
11-Jul	7	11	359	30	16	211	320	42	48	132	170	174	161	158	153	162	146	129	126	113	98	71	23	353	131.2
12-Jul	6	356	0	4	357	6	3	346	10	354	29	39	71	52	13	34	71	77	40	34	49	208	220	219	22.0
13-Jul	223	180	170	164	197	223	197	213	189	192	222	240	223	214	209	201	188	219	226	357	356	350	336	8	217.3
14-Jul	21	2	340	2	336	83	150	186	148	71	46	126	41	340	348	194	181	137	144	147	163	20	324	266	83.3
15-Jul	239	209	197	219	220	206	201	197	185	178	186	207	225	320	75	59	87	179	301	358	304	252	226	262	211.3
16-Jul	260	217	207	215	216	234	87	165	297	1	350	14	5	5	2	4	1	239	222	229	249	316	147	243	309.5
17-Jul	289	324	353	356	359	355	358	4	10	4	4	4	13	356	356	6	7	3	12	13	15	316	267	250	357.6
18-Jul	251	228	208	210	210	198	191	188	188	200	210	206	207	219	262	256	255	287	305	296	302	346	309	288	244.8
19-Jul	295	300	322	315	302	298	304	297	312	315	295	283	284	290	293	299	292	336	343	32	3	290	308	281	302.9
20-Jul	212	221	223	196	188	203	190	189	159	184	190	177	187	168	177	163	138	115	133	85	73	60	63	44	165.8
21-Jul	28	42	23	59	127	19	14	50	31	25	30	46	65	346	320	335	359	104	93	94	40	360	311	306	26.5
22-Jul	233	214	206	191	205	213	191	219	227	241	212	203	194	189	203	229	263	264	259	270	273	255	224	55	227.8
23-Jul	261	215	259	274	247	287	270	313	319	324	316	278	238	297	290	286	219	206	239	238	239	226	227	226	269.0
24-Jul	213	203	206	207	207	196	196	194	183	168	178	171	154	164	148	182	226	232	191	169	340	314	297	71	191.5
25-Jul	204	225	206	211	238	18	164	183	186	204	191	190	215	222	242	239	275	217	208	14	6	334	14	349	222.9
26-Jul	347	11	305	317	357	234	316	42	159	199	358	256	296	340	309	330	252	138	174	186	187	181	186	202	271.0
27-Jul	232	223	213	209	184	198	193	196	195	202	211	244	309	165	149	186	227	288	53	177	192	208	285	233	213.7
28-Jul	262	228	204	182	223	227	168	179	149	121	181	126	180	141	162	103	45	125	115	220	277	5	37	199	156.8
29-Jul	261	231	229	243	184	350	264	225	217	175	173	C	197	215	222	286	331	340	319	258	206	199	219	263	241.3
30-Jul	295	253	227	209	211	216	216	228	221	209	267	298	296	300	331	304	22	34	58	80	194	220	235	347	268.7
31-Jul	204	227	215	209	207	201	192	173	174	174	173	152	137	119	234	212	306	69	31	261	285	209	251	332	196.2

276.1 248.5 239.0 223.8 225.8 228.2 218.6 214.9 208.5 210.7 222.9 226.8 244.1 254.3 271.1 274.3 291.5 307.5 314.3 305.8 301.4 302.0 284.8 284.9

Diurnal Average

C - Calibration

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 - July 2015**

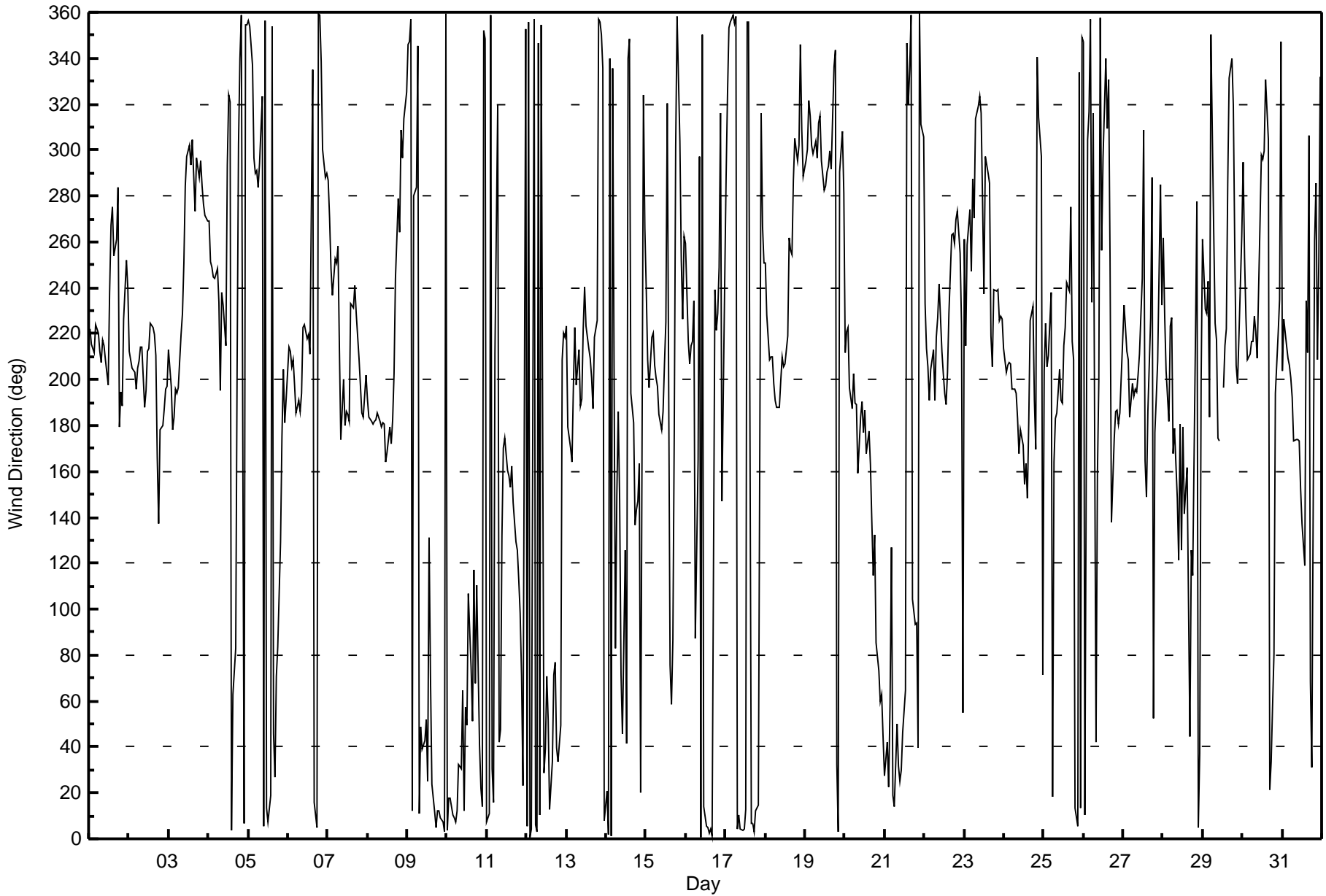
Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 98 deg on Jul 26 05:00 Minimum Value: 7 deg on Jul 5 21:00 Percentiles: P <sub>1</sub> = 11 P <sub>10</sub> = 14 Q <sub>1</sub> = 18 Median = 25 Q <sub>3</sub> = 36 P <sub>90</sub> = 57 P <sub>99</sub> = 87																	Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1 Hours of Calibration: 1 Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jul	17	19	23	14	17	19	16	19	25	26	31	28	29	28	35	30	48	51	22	17	17	15	13	30	51
2-Jul	38	13	11	12	14	14	18	24	22	33	28	33	40	31	29	27	23	34	28	11	11	13	14	15	40
3-Jul	16	20	10	15	15	17	20	25	24	33	23	25	22	19	19	20	20	17	17	17	16	16	17	18	33
4-Jul	17	19	18	20	20	23	50	34	26	20	25	29	18	19	32	26	44	62	56	21	21	20	19	20	62
5-Jul	20	17	20	12	10	46	42	23	37	30	35	42	43	66	46	71	64	63	55	34	7	16	69	28	71
6-Jul	14	11	14	12	15	16	17	17	26	30	28	28	29	27	42	23	22	23	22	21	23	16	17	21	42
7-Jul	17	20	18	14	19	20	20	53	31	26	19	21	22	23	32	30	31	25	25	22	14	11	12	14	53
8-Jul	12	12	14	13	14	18	18	18	18	20	19	22	32	32	20	21	23	28	21	21	32	22	18	18	32
9-Jul	20	20	19	20	40	29	21	30	30	43	54	30	62	53	22	20	19	19	19	20	20	20	18	18	62
10-Jul	19	16	17	17	18	22	25	29	51	81	74	84	86	60	71	56	71	44	38	22	10	16	14	12	86
11-Jul	13	14	17	31	66	76	26	36	34	35	20	24	25	28	33	24	25	26	23	27	24	16	17	12	76
12-Jul	14	17	13	17	62	30	31	89	51	21	23	55	81	67	45	29	35	23	23	19	56	25	22	58	89
13-Jul	38	16	24	22	16	27	26	26	24	30	36	36	32	33	38	39	51	30	33	20	19	17	26	16	51
14-Jul	20	20	16	15	56	68	47	43	70	88	53	73	68	61	46	33	18	28	24	22	51	30	35	15	88
15-Jul	29	12	14	18	14	21	23	21	22	25	33	32	34	42	27	19	52	29	31	16	54	26	19	27	54
16-Jul	25	17	16	13	17	59	71	96	49	34	27	24	22	23	22	21	21	53	28	20	21	32	74	27	96
17-Jul	20	23	17	18	19	19	20	20	21	23	21	22	27	26	23	23	22	21	21	19	16	35	15	14	35
18-Jul	13	19	17	17	13	15	16	18	20	26	21	21	23	22	35	28	25	24	32	18	17	30	31	18	35
19-Jul	16	19	22	42	17	17	17	21	22	44	29	24	25	21	20	19	22	33	38	35	62	16	16	46	62
20-Jul	18	22	28	17	15	19	17	21	34	33	42	41	58	42	49	48	36	33	26	41	16	12	14	19	58
21-Jul	16	29	22	37	58	30	24	12	18	29	22	18	44	28	35	42	47	63	29	26	42	19	14	32	63
22-Jul	52	11	19	17	22	34	24	22	25	36	50	52	48	39	27	40	32	25	25	22	17	11	82	84	84
23-Jul	47	70	27	78	57	35	26	17	19	30	45	46	66	46	36	37	39	22	22	19	13	11	11	13	78
24-Jul	11	11	11	12	13	18	20	30	35	32	42	57	45	34	57	28	25	33	29	14	68	30	66	74	74
25-Jul	25	19	20	33	23	66	27	21	21	26	31	33	30	42	24	31	43	41	41	52	62	16	40	31	66
26-Jul	16	38	19	34	98	60	54	47	80	81	80	82	41	31	30	43	42	32	27	17	13	10	12	14	98
27-Jul	22	32	16	12	14	15	17	20	24	29	32	54	49	70	65	22	29	47	88	15	17	23	21	39	88
28-Jul	14	61	18	15	42	90	20	32	48	45	58	39	47	27	27	71	25	42	60	60	77	44	37	46	90
29-Jul	19	23	17	20	58	23	49	25	44	37	46	C	30	24	26	25	25	25	50	73	18	18	22	31	73
30-Jul	18	23	64	13	15	16	17	28	31	43	61	23	26	38	90	39	37	77	21	25	13	11	14	43	90
31-Jul	28	12	13	13	12	16	23	21	24	30	60	44	38	82	30	30	79	32	47	79	69	26	36	32	82
52 70 64 78 98 90 71 96 80 88 80 84 86 82 90 71 79 77 88 79 77 44 82 84																									
Diurnal Maximum																									
C - Calibration																									





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

**Wind Direction (WD) - deg**  
**CNRL Horizon - July 2015**





# Wood Buffalo Environmental Association SO2 Calibration Report

## Station Information

Calibration Date	July 30, 2015	Last Calibration	June 18, 2015
Station Name	CNRL Horizon	Station Number	AMS 15
Reason:	Routine		
Start Time (MST)	8:30	End Time (MST)	13:28
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	840	836
Calculated slope	0.993887	0.991550	Chamber temp	45.3	45.1
Calculated intercept	0.850101	1.798384	Pressure	703.3	711.2
Analyzer Background	18.1	17.9	Flow	0.431	0.425
Analyzer Coefficient	0.995	0.989	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	821.9	0.995
calibrator zero	5000	0.0	0.0	0.4	----
high point	5000	81.8	818.0	824.5	0.992
second point	5000	40.9	409.0	408.8	1.000
third point	5000	20.4	204.0	202.2	1.009
as left zero	5000	0.0	0.0	2.0	----
as left span	5000	81.8	818.0	820.6	0.997
Average Correction Factor					1.000

Corrected As found 821.9 Previous response 822.2 % change 0.0%

**Notes:**

Filter changed after As Found. Span adjusted

Calibration Performed By: Ryan Power



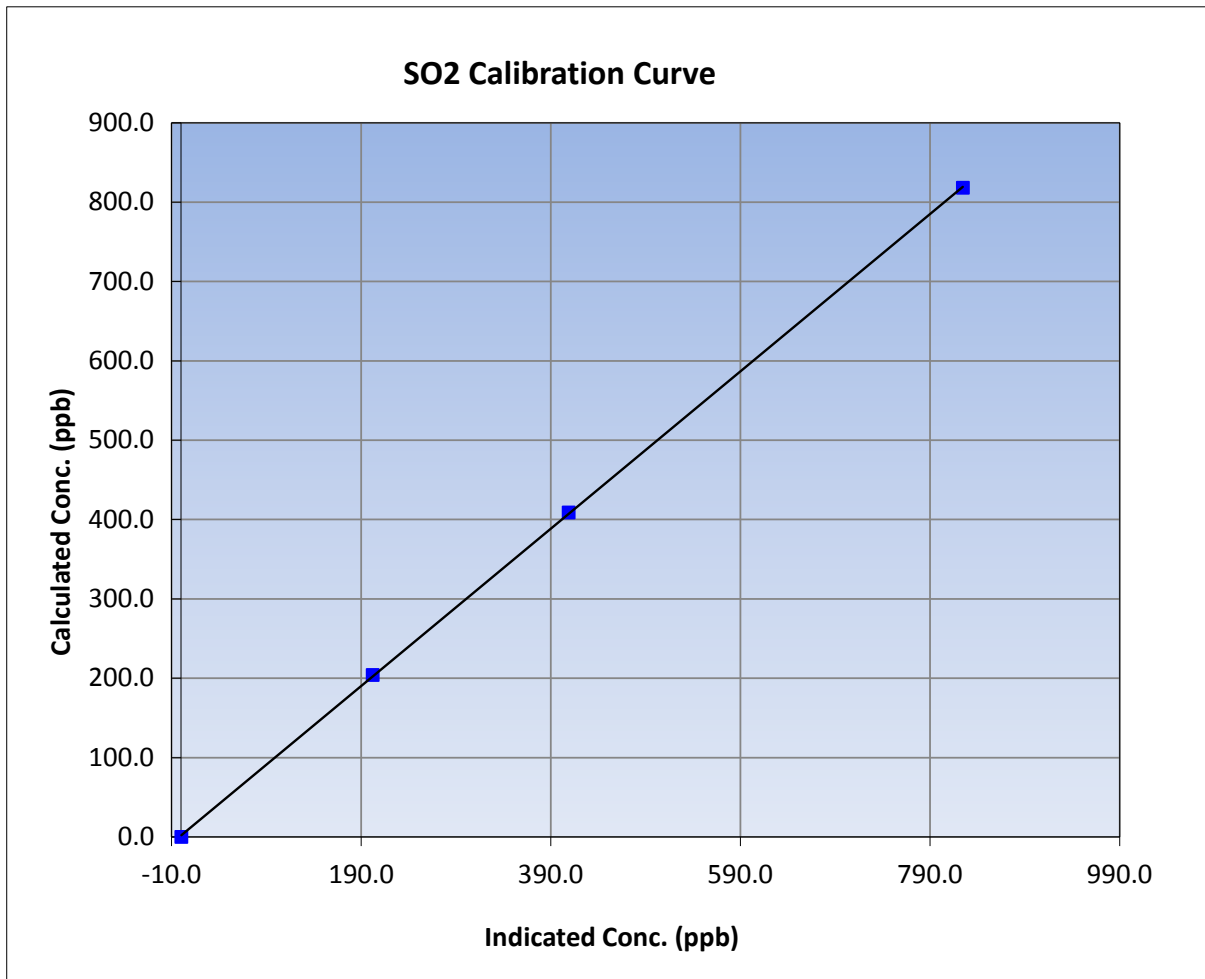
## Wood Buffalo Environmental Association SO2 Calibration Report

### Station Information

Calibration Date	July 30, 2015	Previous Calibration	June 18, 2015
Station Name	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	8:30	End Time (MST)	13:28
Analyzer make	Thermo 43i	Analyzer serial #	10710321322

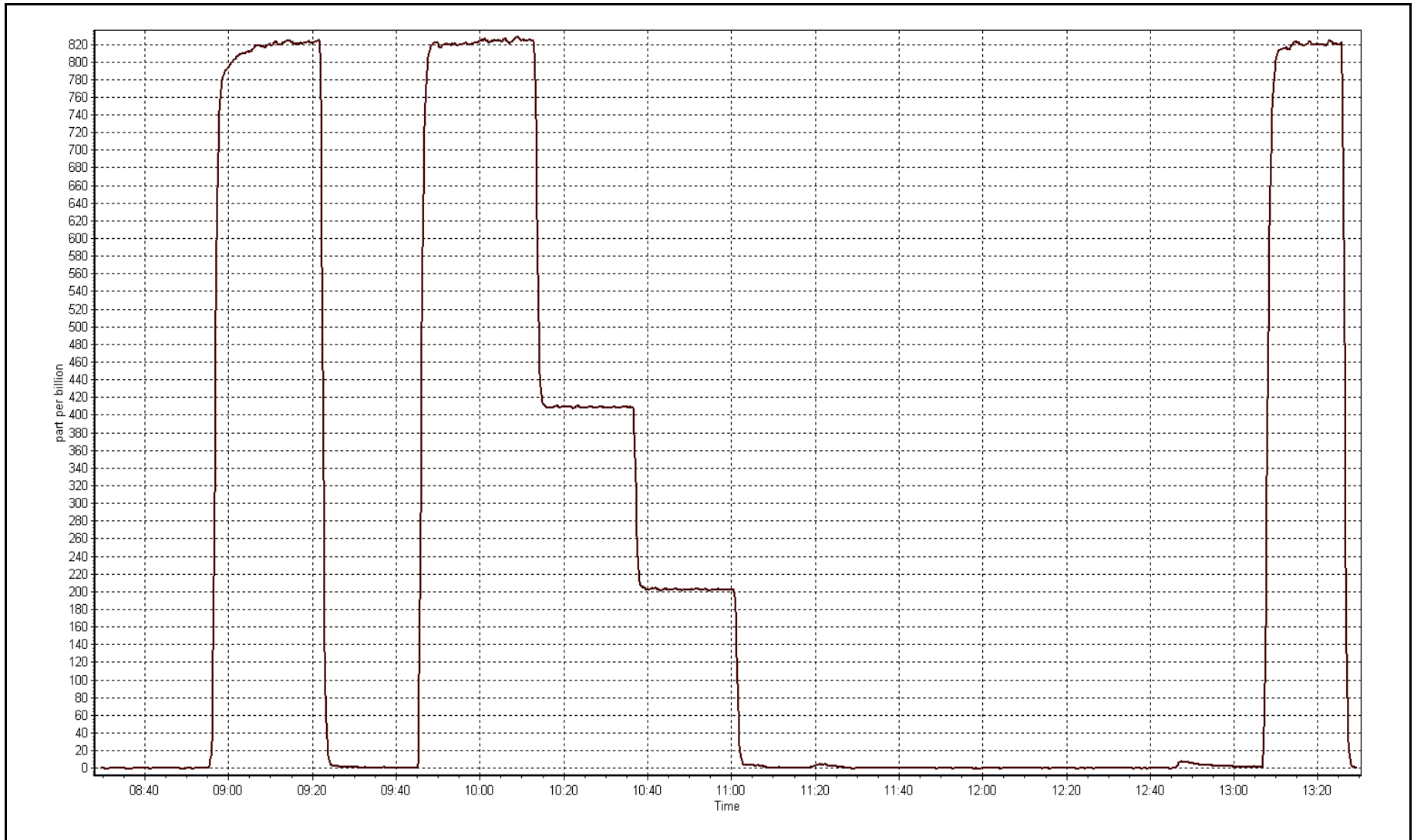
### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.4	----	Correlation Coefficient	0.999965
818.0	824.5	0.9921		
409.0	408.8	1.0004	Slope	0.991550
204.0	202.2	1.0088		
			Intercept	1.798384



SO2 Calibration Plot

Date: July 30, 2015





# Wood Buffalo Environmental Association

## TRS Calibration Report

### Station Information

Calibration Date	July 29, 2015	Last Calibration	June 22, 2015
Station Name	CNRL Horizon	Station Number	AMS 15
Reason:	Routine		
Start Time (MST)	9:52	End Time (MST)	13:02
Gas Cert Reference	LL155297	Station temp.	21 Deg C
Cal Gas Concentration	10.4 ppm	Cal Gas Exp Date	30/05/2013
Calibrator Make/Model	API T700	Serial Number	1223
Dil air Make/Model	API 701	Serial Number	1004
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2580
SO2 gas concentration	50 ppm	SO2 gas cert/exp	S0002486 September-26-17

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-672	-672
Analyzer IP address	192.168.1.42		Lamp voltage	757	752
Calculated slope	1.008501	0.994005	Chamber temp	45	46
Calculated intercept	-0.175789	0.009436	Pressure	686.4	693.6
Analyzer Background	9.2	9.3	Flow	0.418	0.422
Analyzer Coefficient	0.910	0.917	Intensity	90	90
			Converter temp.	809	809
Analyzer make/model	Thermo 43i		Analyzer serial #	0710321323	
Converter make/model	CDN-101		Converter serial #	363	

### Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6000	0.0	0.0	0.1	----
as found span	6000	46.2	80.1	79.4	1.009
SO2 scrubber check	6000	24.5	204.2	1.0	----
calibrator zero	6000	0.0	0.0	0.1	----
high point	6000	46.2	80.1	80.6	0.993
second point	6000	23.1	40.0	40.1	0.999
third point	6000	11.5	19.9	20.1	0.993
as left zero	6000	0.0	0.0	0.1	----
as left span	6000	46.2	80.1	80.3	0.997
Average Correction Factor					0.995

Corrected As found	79.3	Previous response	79.6	% change	0.3%
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Notes:

Inlet filter changed after as founds. Scrubber check done after third point. Adjusted span.

Calibration Performed By: Ryan Power



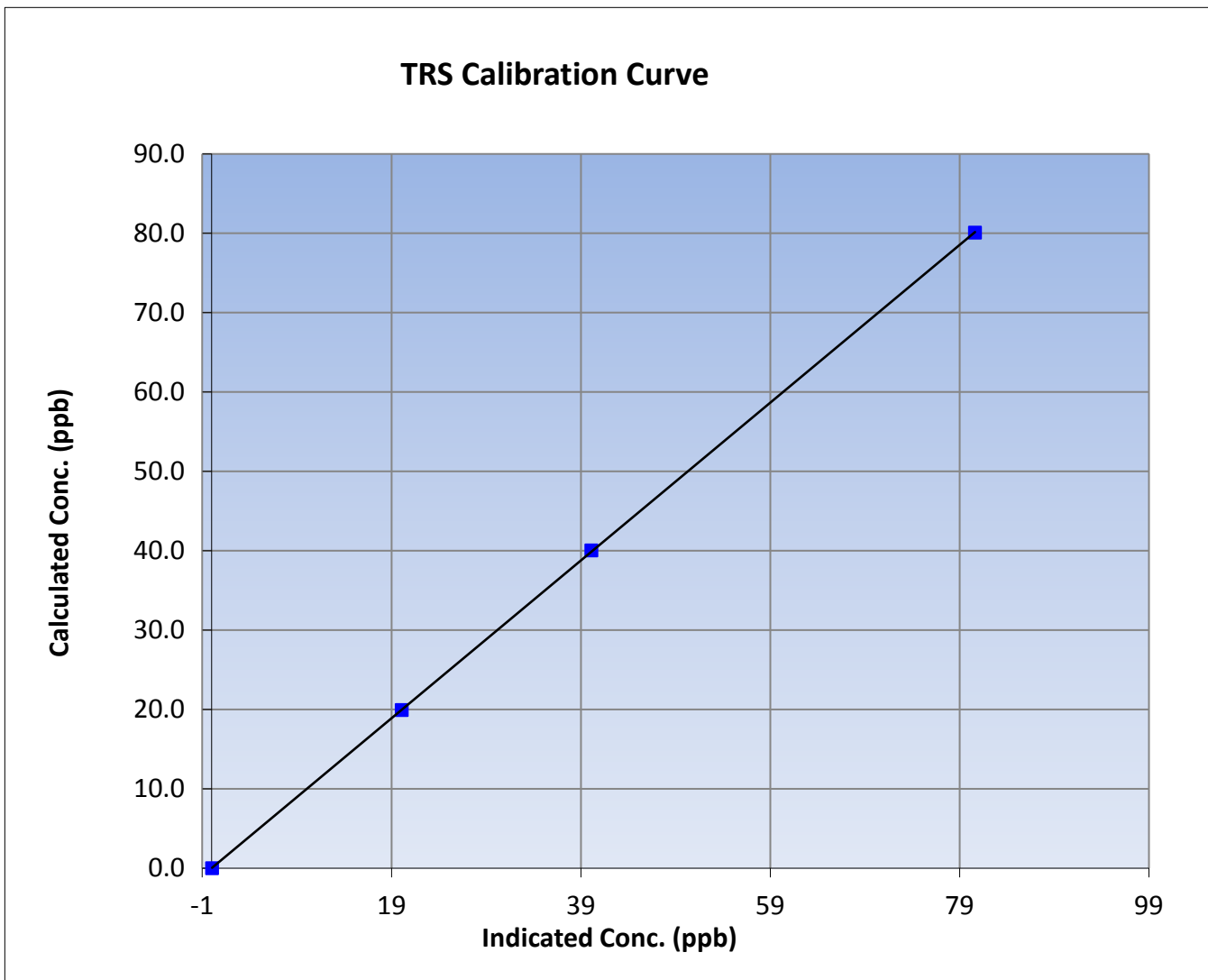
# Wood Buffalo Environmental Association TRS Calibration Report

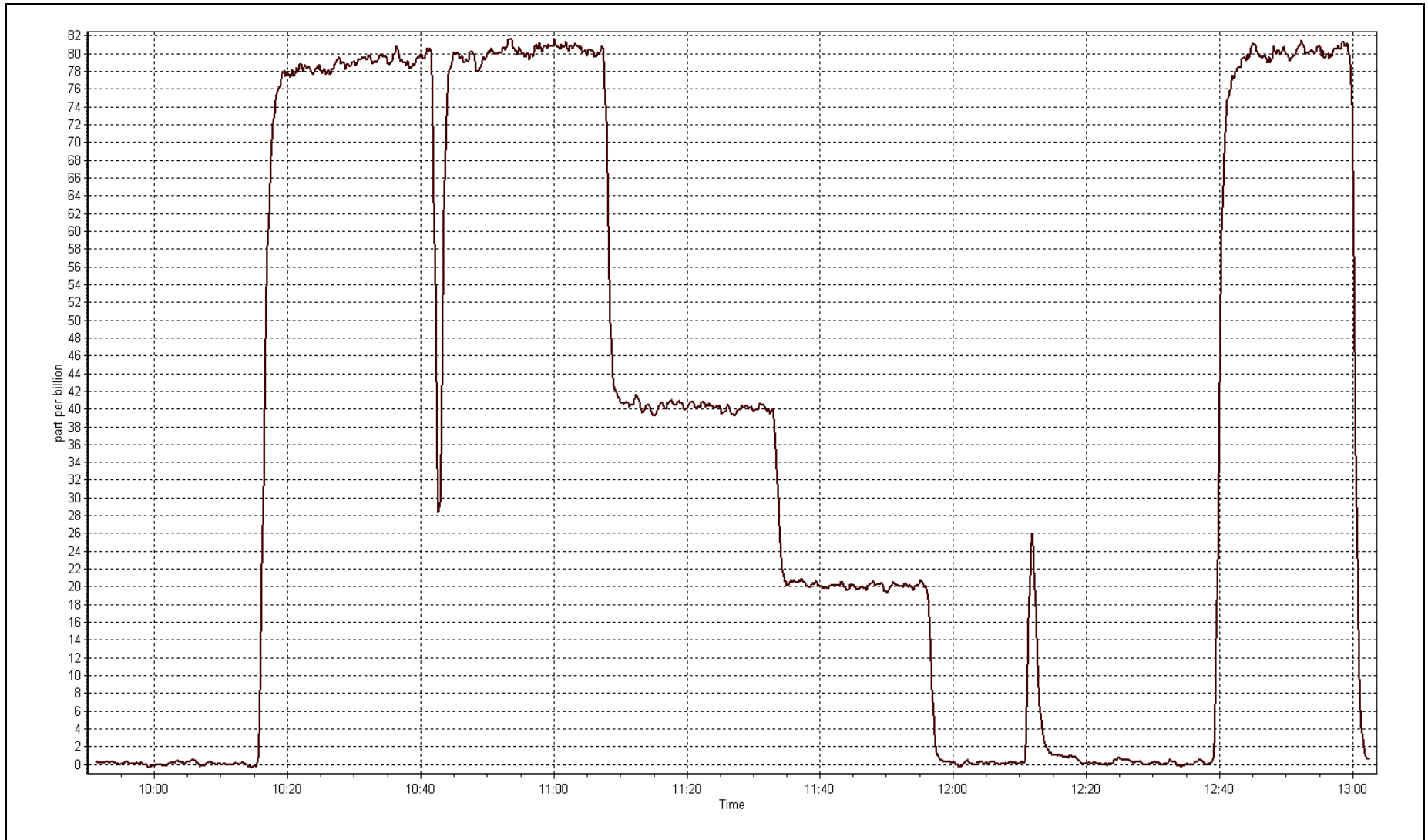
## Station Information

Calibration Date	July 29, 2015	Previous Calibration	June 22, 2015
Station Name	AMS 15	Station Number	AMS 15
Start Time (MST)	9:52	End Time (MST)	13:02
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	0.1	----	Correlation Coefficient	0.999989
80.1	80.6	0.9932		
40.0	40.1	0.9985	Slope	0.994005
19.9	20.1	0.9927		
			Intercept	0.009436







# Wood Buffalo Environmental Association THC Calibration Report

### Station Information

Calibration Date	July-30-15	Last Calibration	June-18-15
Station Name	CNRL Horizon	Station Number	AMS 15
Reason:	Routine		
Start Time (MST)	8:30	End Time (MST)	13:27
Gas Cert Reference	S0002486	Cal Gas Expiry Date	26/09/2017
CH4 Cal Gas Conc.	505 ppm	CH4 Equiv Conc.	1046.8 ppm
C3H8 Cal Gas Conc.	197 ppm	Station temp.	22 Deg C
Calibrator Make/Model	Teledyne API T700	Serial Number	1223
ZAG make/model	Teledyne API 701	Serial Number	1004
DACS make/model	Campbell Scientific CR3000	Serial Number	2580

### Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 50 ppm		Sample Pressure	8.7	8.8
Analyzer IP address	192.168.1.51		Air or Bypass Press	38.0	37.1
Calculated slope	1.010796	1.000398	Fuel Pressure	26.3	26.3
Calculated intercept	0.012131	0.054035	Analyzer Coeff	3.007	3.017
			Analyzer BKG	0.02	0.080

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	0.11	----
as found span	5000	81.8	17.12	17.04	1.005
calibrator zero	5000	0.0	0.00	-0.03	----
high point	5000	81.8	17.12	17.09	1.002
second point	5000	40.9	8.56	8.45	1.013
third point	5000	20.4	4.27	4.22	1.012
as left zero	5000	0.0	0.00	-0.06	----
as left span	5000	81.8	17.12	17.06	1.004
Average Correction Factor					1.009

Corrected As found	16.93	Previous response	16.93	% change	0.0%
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**Notes:**

Filter changed after As Found. Span and Zero with slight adjustments

Calibration Performed By:

\_\_\_\_\_  
Ryan Power





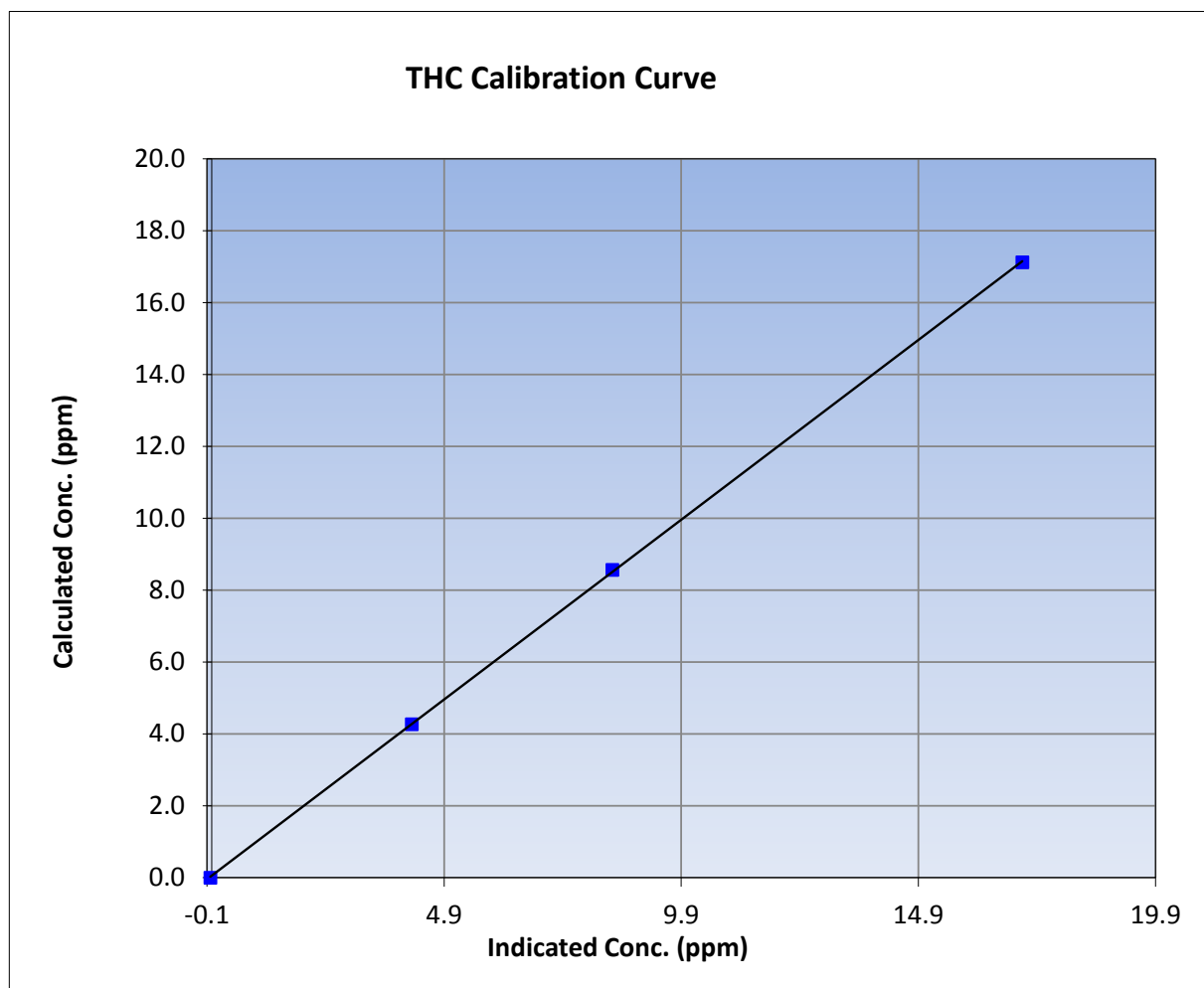
## Wood Buffalo Environmental Association THC Calibration Report

### Station Information

Calibration Date	July 30, 2015	Previous Calibration	June 18, 2015
Station Name	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	8:30	End Time (MST)	13:27
Analyzer make	Thermo 51i-LT	Analyzer serial #	1327059295

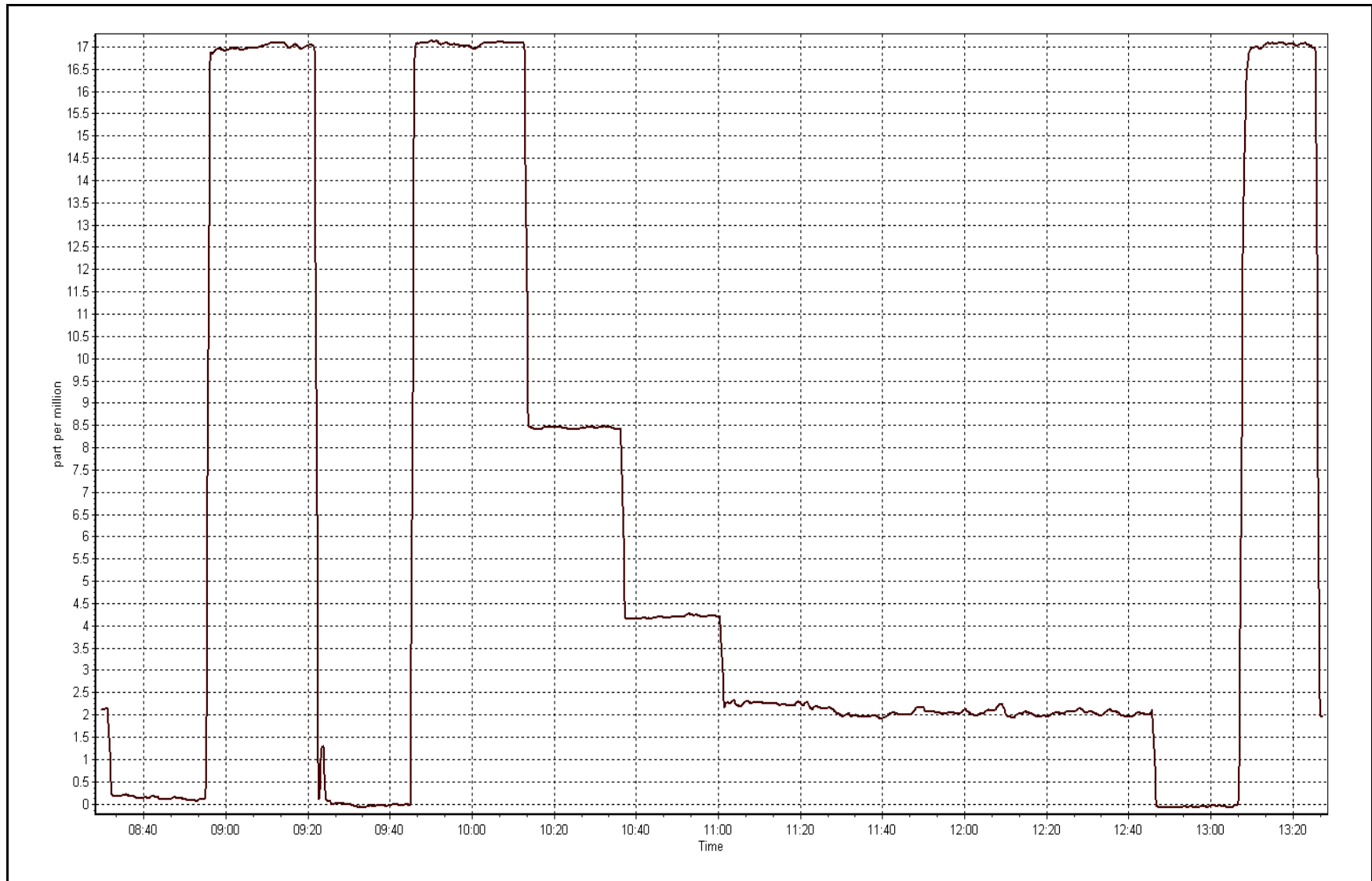
### Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	-0.03	----	Correlation Coefficient	0.999973
17.12	17.09	1.0020		
8.56	8.45	1.0133	Slope	1.000398
4.27	4.22	1.0120		
			Intercept	0.054035



THC Calibration Plot

Date: July 30, 2015





# Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

## Station Information

Calibration Date	July 30, 2015	Previous Calibration	June 18, 2015
Station Name	CNRL Horizon	Station Number	AMS 15
Reason:	Routine		
Start Time (MST)	8:30	End Time (MST)	13:27
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	0.994468	0.996606	0.990817
	Data Offset	0.391128	0.501754	-0.763788
Current Calibration	Data Slope	0.998297	0.997120	0.998895
	Data Offset	1.169430	1.279034	0.170953

## 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	0.779		0.776	
NOx coefficient	1.002		0.999	
NO2 coefficient	1.000		1.000	
NO bkgrnd	9.8		9.7	
NOx bkgrnd	10.0		9.9	
Chamber Temp	49.8	Deg C	50	Deg C
Moly Temp	324.2	Deg C	323.7	Deg C
PMT voltage	-786	V	-784.4	V
PMT Temp	-3	Deg C	-3.1	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	159.3	mmHg	162.6	mmHg
R Cell Press Nox	159.6	mmHg	162.9	mmHg
NO sample flow	0.677	lpm	0.694	lpm
Nox sample Flow	0.678	lpm	0.696	lpm

**Notes:**

Filter changed after As Finds. Span adjusted.



# Wood Buffalo Environmental Association

## NOX-NO-NO2 Calibration Report

### Station Information

Calibration Date:

July 30, 2015

Station Number:

AMS 15

### Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1	----	----
as found span	5000	81.8	800.0	800.0	0.0	805.2	802.6	2.6	0.9936	0.9968
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1	----	----
high point	5000	81.8	800.0	800.0	0.0	800.7	801.7	-1.0	0.9991	0.9978
second point	5000	40.9	400.0	400.0	0.0	398.9	399.0	-0.1	1.0027	1.0024
third point	5000	20.4	199.5	199.5	0.0	197.6	197.6	0.0	1.0095	1.0096
as left zero	5000	0.0	0.0	0.0	0.0	3.3	3.3	0.0	----	----
as left span	5000	81.8	800.0	443.3	356.8	803.5	444.9	358.6	0.9956	0.9962
Average Correction Factor									1.0037	1.0033

Corrected As found  
Previous Response

NO<sub>x</sub>= 805.3  
NO<sub>x</sub>= 804.1

NO= 802.6  
NO= 802.2

Percent Change

NO<sub>x</sub>= -0.2%

NO= 0.0%

### GPT Calibration Data

Dilution Flow

5000

ccm

Source Gas Flow

81.80

ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
Cal zero			0.0			-0.1			N/A	
1st NO2 (300)	----	443.3	355.8	799.3	443.3	356.0	0.9848	1.0000	0.9993	100.1%
2nd NO2 (200)	----	555.2	243.8	799.1	555.2	243.9	0.9850	1.0000	0.9997	100.0%
3rd NO2 (100)	----	671.3	127.7	798.9	671.3	127.6	0.9853	1.0000	1.0006	99.9%
4th NO2 (0)	799.0	----	1.1	800.1	799.0	1.1	0.9837	1.0000	N/A	----
Average Correction Factor							0.9847	1.0000	0.9999	100.0%

Calibration Performed By:

Ryan Power



# Wood Buffalo Environmental Association

## NO<sub>x</sub> Calibration Summary

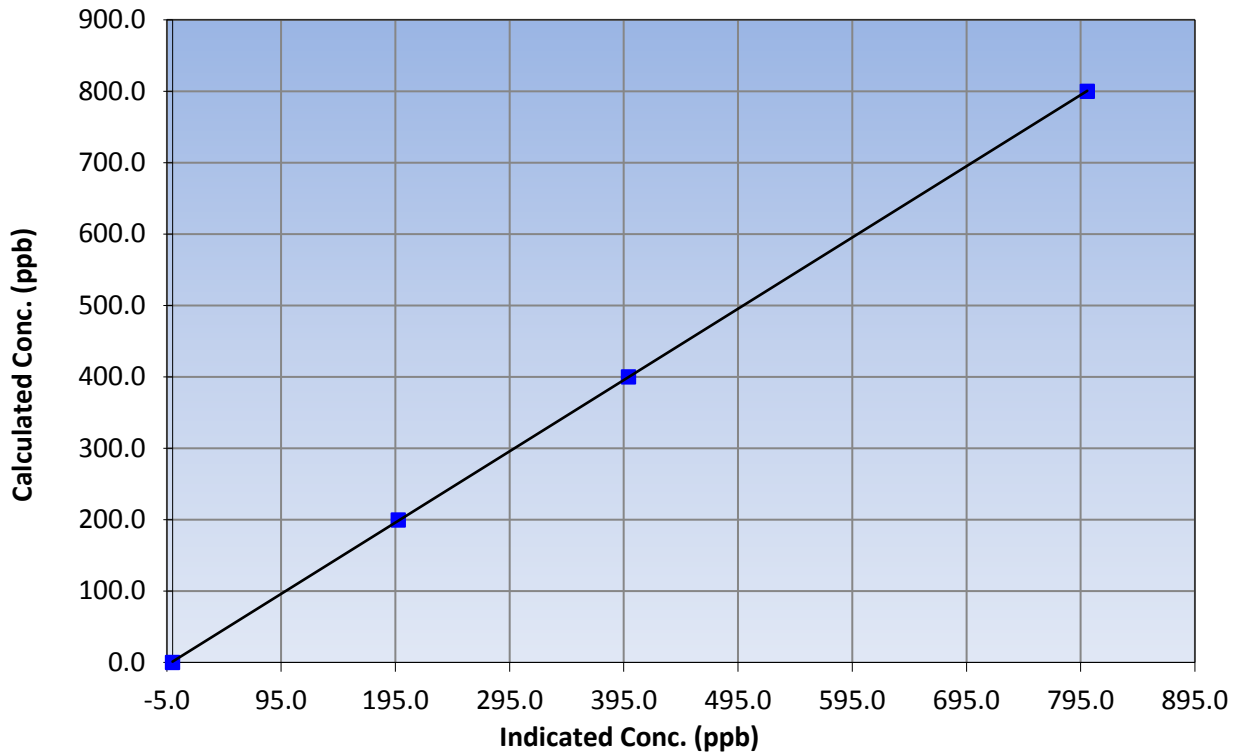
### Station Information

Calibration Date	July 30, 2015	Previous Calibration	June 18, 2015
Station Name	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	8:30	End Time (MST)	13:27
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	----	Correlation Coefficient	0.999992
800.0	800.7	0.9991		
400.0	398.9	1.0027	Slope	0.998297
199.5	197.6	1.0095		
			Intercept	1.169430

### NO<sub>x</sub> Calibration Curve





# Wood Buffalo Environmental Association

## NO Calibration Summary

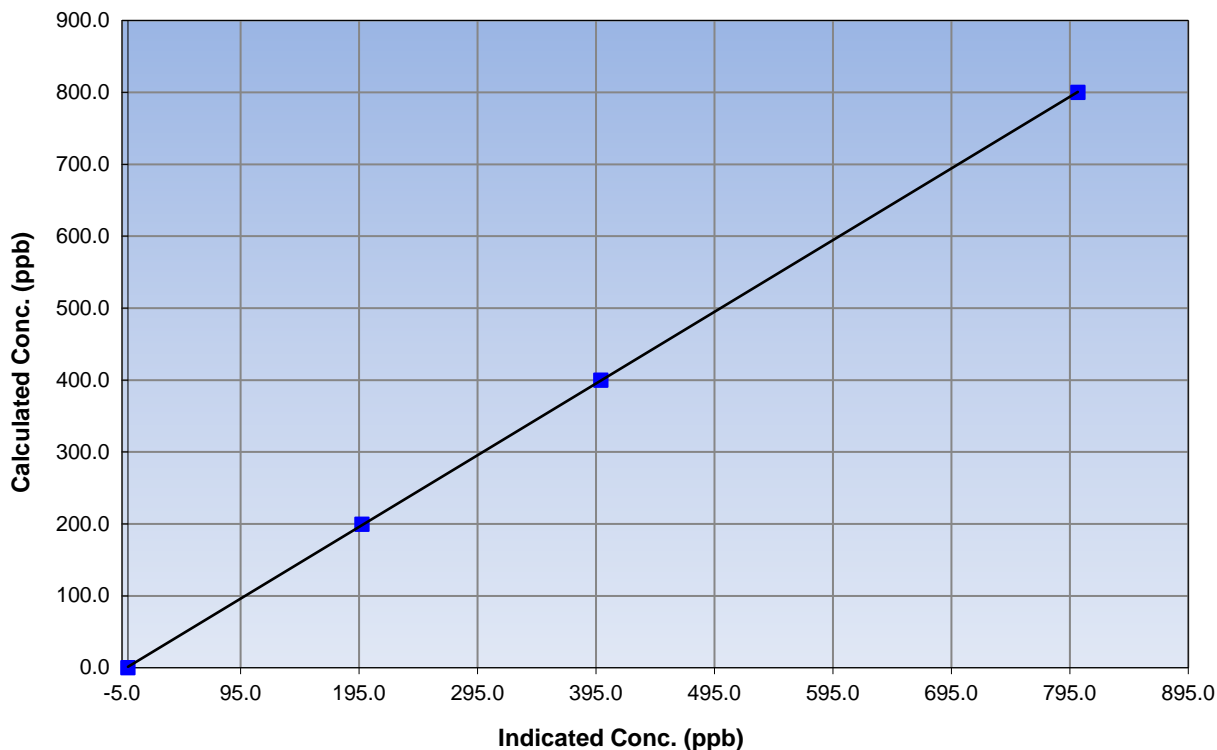
### Station Information

Calibration Date	July 30, 2015	Previous Calibration	June 18, 2015
Station Name	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	8:30	End Time (MST)	13:27
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	0.999988
800.0	801.7	0.9978		
400.0	399.0	1.0024	Slope	0.997120
199.5	197.6	1.0096		
			Intercept	1.279034

### NO Calibration Curve





# Wood Buffalo Environmental Association

## NO<sub>2</sub> Calibration Summary

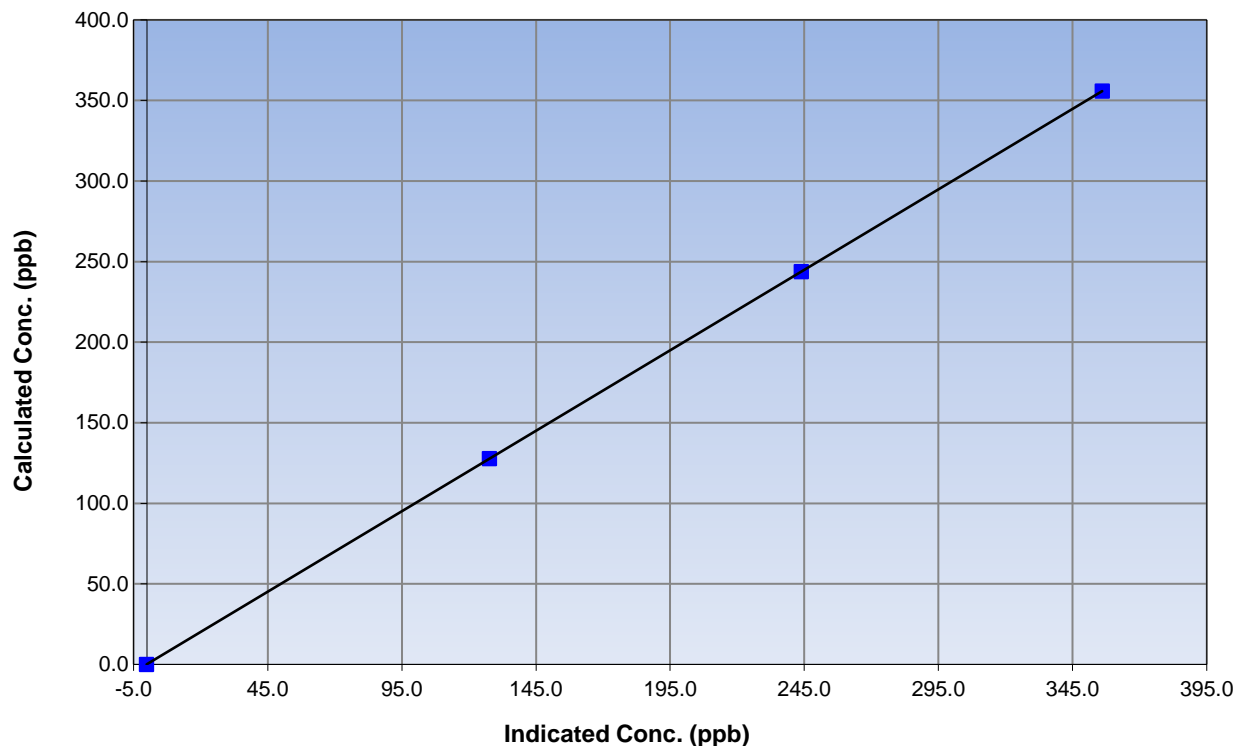
### Station Information

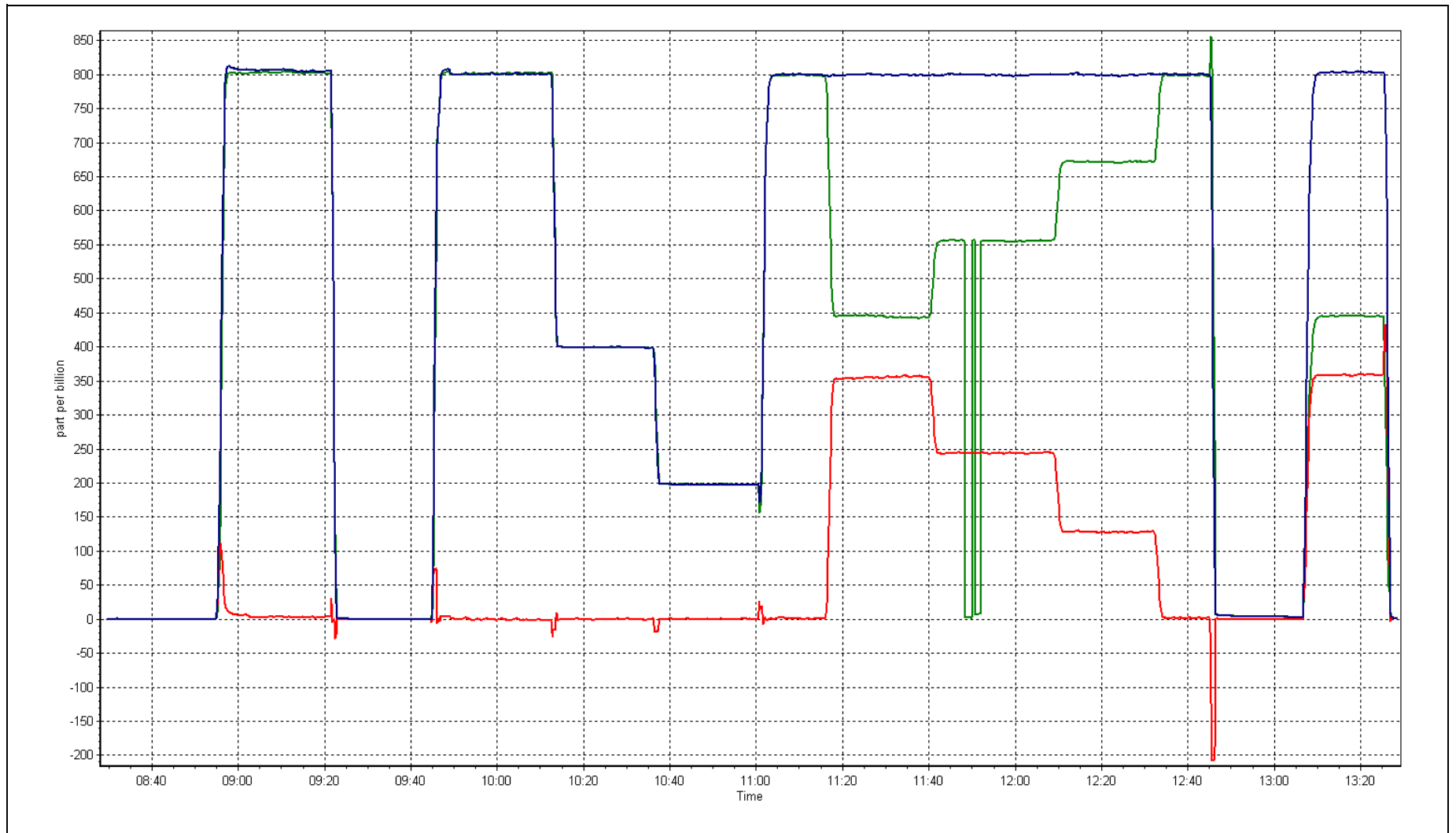
Calibration Date	July 30, 2015	Previous Calibration	June 18, 2015
Station Name	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	8:30	End Time (MST)	13:27
Analyzer make	Termo 42i	Analyzer serial #	710321429

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	1.000000
355.8	356.0	0.9993		
243.8	243.9	0.9997	Slope	0.998895
127.7	127.6	1.0006		
			Intercept	0.170953

### NO<sub>2</sub> Calibration Curve









## Wood Buffalo Environmental Association

### SHARP CALIBRATION

#### STATION INFORMATION

Calibration Date:	<u>July 29, 2015</u>	Previous Calibration:	<u>June 22, 2015</u>
Station Name:	<u>CNRL Horizon</u>	Station Number:	<u>AMS 15</u>
Start Time (MST):	<u>11:35</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-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	23.0	23.2	0.2	23.0
T2	31.0	na	na	31.0
T3	27.0	na	na	27.0
T4	36.0	na	na	36.0
RH (%)	35.0	na	na	35.0

##### Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	972	975.0	3.0	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	167
Neph	-0.2	-0.2	-0.2
C14	10.8	10.8	10.8
Indicated Concentration (ug/m3)	-0.2	no	-0.2
Offset 1	NA	NA	NA
Offset 2	NA	NA	NA

#### Leak Check (Quarterly)

Leak Check Date:	<u>May 14, 2015</u>	Previous Leak Check Date:	NA
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##### 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	29/07/2015
Pump	Good	09/06/2014
Filter Tape	Good	09/06/2014
Mass Foil Cal Set	Good	NA
HEPA filter	Good	09/06/2014

#### NOTES:

No adjustments.

Calibration Performed By:

Ryan Power & Evan Magill



# Wood Buffalo Environmental Association

## WS/WD Calibration Report

### Station Information

Calibration Date	July-29-15	Previous Calibration	August-27-14
Station Number	AMS 15	Station Location	CNRL Horizon
Reason:	<input checked="" type="checkbox"/> Routine	<input type="checkbox"/> Installation	<input type="checkbox"/> Removal
	<input type="text"/> Other:		
Start Time (MST)	10:45	End Time (MST)	11:32
Barometric Pressure	731 mm Hg	Station Temperature	22 Deg C
WS Calibrator	MetOne 053	Serial Number	K13090

### WIND SPEED

Sensor make/model	Met One 010C-1	Sensor serial #	J4337
DACS make	Campbel Scientific CR3000	DACS serial No.	2632
DACS voltage range		DACS channel #	
	<u>Before</u>		<u>After</u>
DACS slope		DACS slope	
DACS intercept		DACS intercept	
Calculated slope	1.006373538	Calculated slope	0.998819
Calculated intercept	-0.523842538	Calculated intercept	0.039299

### Wind Speed Calibration Data

Shaft RPM	Actual Speed (K/hr)	Indicated Speed (K/hr)	Correction factor
0	0	0.0	n/a
200	20.16	20.1	1.0025
400	39.3	39.1	1.0049
600	58.5	58.8	0.9944
800	77.7	77.7	1.0001
1000	96.95	97.0	0.9997
Average Correction Factor			1.0003

### WIND DIRECTION

Sensor make/model	Met One 020C-1	Sensor serial #	J2732
DACS make	Campbel Scientific CR3000	DACS serial No.	2632
DACS voltage range		DACS channel #	
	<u>Before</u>		<u>After</u>
DACS slope		DACS slope	
DACS intercept		DACS intercept	
Calculated slope	1.002665856	Calculated slope	1.012220
Calculated intercept	0.560913116	Calculated intercept	0.999085

### Wind Direction Calibration Data

Physical Direction (Degrees)	Indicated Direction (Degrees)	Correction factor
0	1.0	n/a
90	86.0	1.0465
180	175.2	1.0274
270	267.0	1.0112
360	355.0	1.0141
Average Correction Factor		1.0248

Notes:

Looking good

Calibration Performed By:

Ryan Power & Evan Magill



## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

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

**AMS 16  
SHELL MUSKEG RIVER  
JULY 2015**

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

August 26, 2015



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SHELL MUSKEG RIVER (AMS 16)  
 JULY 2015

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	707	37	37	100.00	10	0	3	0
THC (ppm) Average	707	37	37	100.00	5.2	-	2.9	-
NO2 (ppb) Average	707	37	37	100.00	32	0	12	-
NO (ppb) Average	707	37	37	100.00	59	-	15	-
NOX (ppb) Average	707	37	37	100.00	91	-	27	-
PM2.5 (ug/m3) Average	743	0	1	99.87	466.8	-	171.2	6
Temperature 2 m (C) Average	744	0	0	100.00	31	-	22	-
Relative Humidity (%) Average	744	0	0	100.00	100	-	86	-
Barometric Pressure (inHg) Average	744	0	0	100.00	29.1	-	29	-
Wind Speed 10 m (km/h) Average	741	0	3	99.60	28	-	16	-
Wind Direction 10 m (deg) Average	741	0	3	99.60	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SHELL MUSKEG RIVER (AMS 16)  
 JULY 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	707	0.7	1	-	0	0	0	0	1	1	10
THC (ppm) Average	707	2.38	0.4	-	1.8	2	2.2	2.3	2.5	2.8	5.2
NO2 (ppb) Average	707	6	5	-	0	1	2	4	8	14	32
NO (ppb) Average	707	3.5	7	-	0	0	0	1	4	11	59
NOX (ppb) Average	707	9.5	11	-	0	1	2	5	13	25	91
PM2.5 (ug/m3) Average	743	27.31	63.6	-	0.7	2.3	3.9	6.9	14.5	53.6	466.8
Temperature 2 m (C) Average	744	17.69	4.8	-	5.6	11.4	14.1	17.7	21.3	24.1	31
Relative Humidity (%) Average	744	71.4	19	-	27	44	56	73	88	95	100
Barometric Pressure (inHg) Average	744	28.73	0.1	-	28.4	28.6	28.6	28.7	28.8	28.9	29.1
Wind Speed 10 m (km/h) Average	741	8.7	5	-	0	3	5	8	11	16	28
Wind Direction 10 m (deg) Average	741	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SHELL MUSKEG RIVER (AMS 16)  
JULY 2015

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
PM2.5	28 Jul 2015 11:00	28 Jul 2015 11:00	1	Maintenance - Flow and zero check, sample head cleaning
Wind Speed, Wind Direction	01 Jul 2015 17:00	01 Jul 2015 18:00	2	Flat line in sensor output signal
Wind Speed, Wind Direction	25 Jul 2015 19:00	25 Jul 2015 20:00	2	Flat line in sensor output signal

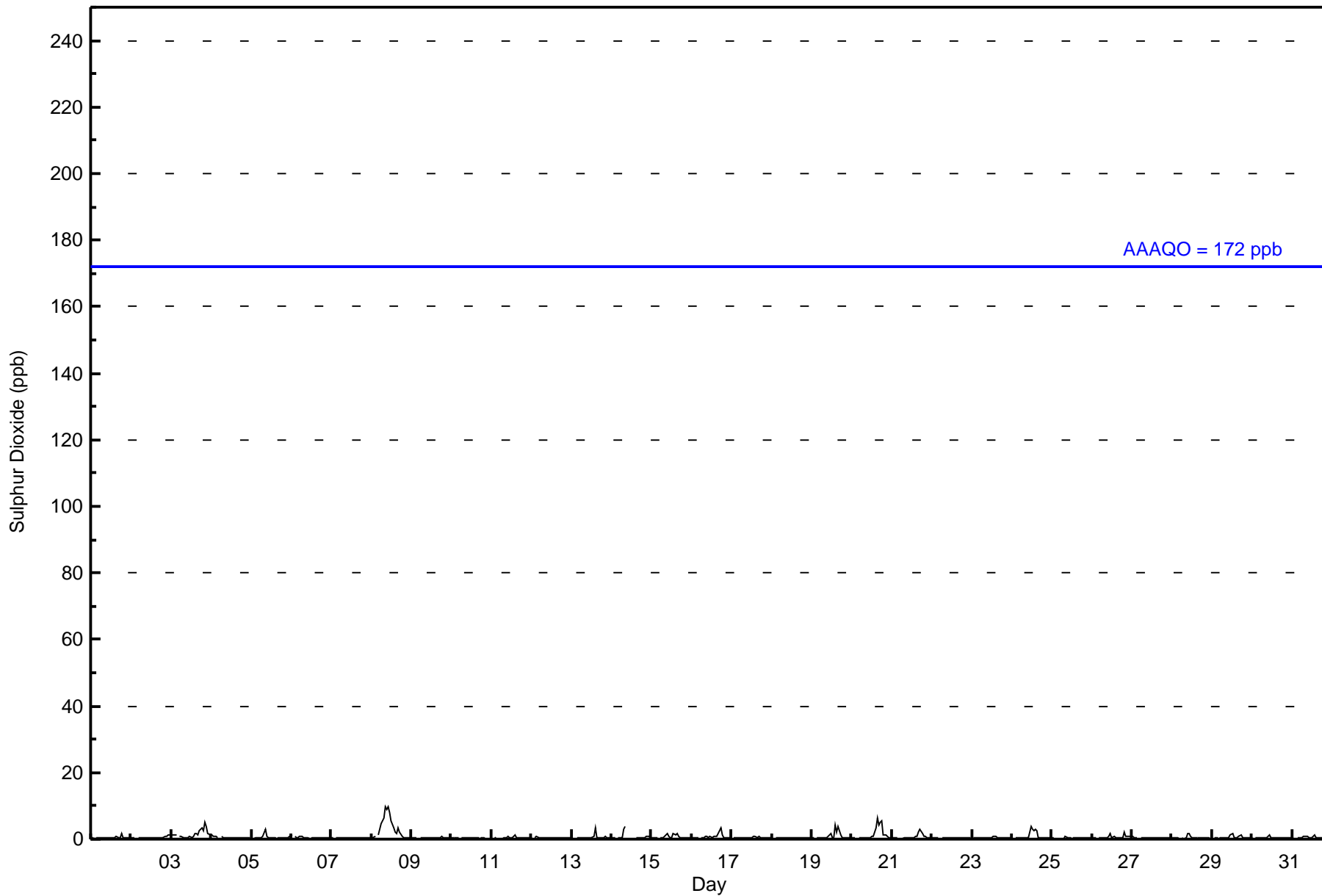


Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 10 ppb on Jul 8 09:00	Maximum Daily Average: 3.2 ppb on Jul 8		Hours of Data:	707
Minimum Value: 0 ppb on Jul 11 04:00	Minimum Daily Average: 0.3 ppb on Jul 10		Hours of Missing Data:	37
Maximum Diurnal Average: 1.0 ppb at hour 15	Minimum Diurnal Average: 0.4 ppb at hour 4		Hours of Calibration:	37
Monthly Average: 0.7 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 1 P <sub>90</sub> = 1 P <sub>99</sub> = 5		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	2	1	0	0	0	0	0.4	2
2-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.5	1
3-Jul	1	1	1	1	Z	1	1	0	0	0	1	1	1	1	2	2	1	3	3	3	5	4	2	1	1.6	5
4-Jul	1	1	1	1	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1
5-Jul	Z	0	0	0	0	0	0	1	3	1	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0.5	3
6-Jul	1	Z	1	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.4	1
7-Jul	0	0	Z	0	0	0	0	1	1	1	0	0	0	1	0	0	0	0	0	0	0	0	1	1	0.4	1
8-Jul	1	1	1	Z	1	3	5	6	10	9	10	8	5	3	2	2	3	2	1	0	1	0	0	0	3.2	10
9-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0.4	1
10-Jul	0	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-Jul	Z	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	1	1	0.4	1
12-Jul	0	Z	0	1	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0.5	1
13-Jul	0	0	Z	0	0	0	0	0	0	0	1	0	0	1	3	0	0	0	0	0	1	0	0	0	0.6	3
14-Jul	0	0	0	Z	0	0	0	3	4	C	C	C	C	C	C	0	0	0	0	0	1	1	0	0	--	4
15-Jul	0	0	0	0	Z	0	0	0	1	2	1	0	0	2	1	2	1	0	0	0	0	0	0	0	0.7	2
16-Jul	0	0	0	0	0	Z	0	0	1	1	1	1	1	1	1	1	2	3	1	0	0	0	0	0	0.7	3
17-Jul	Z	0	0	0	0	0	0	1	0	0	1	1	0	1	1	1	1	1	0	1	1	0	0	0	0.5	1
18-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.4	1
19-Jul	0	0	Z	0	0	0	1	0	0	0	1	2	1	0	4	2	4	1	1	0	0	0	0	0	0.9	4
20-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	1	1	4	6	4	5	5	1	1	1	1	0	1.5	6
21-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	1	1	2	3	2	1	1	1	0	0	0.6	3
22-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0
23-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0.4	1
24-Jul	0	Z	0	0	0	0	0	0	0	0	1	4	3	2	3	2	0	0	0	0	0	0	0	0	0.9	4
25-Jul	1	0	Z	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
26-Jul	0	0	0	Z	1	0	0	0	0	0	1	2	0	1	0	0	0	0	1	2	1	1	1	1	0.6	2
27-Jul	1	1	0	0	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
28-Jul	0	0	0	0	0	Z	0	0	0	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2
29-Jul	Z	0	0	0	0	0	0	0	1	1	1	1	2	0	0	0	1	1	1	0	0	0	0	0	0.5	2
30-Jul	0	Z	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0.4	1
31-Jul	0	0	Z	0	0	0	0	1	1	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0.4	1

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







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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Shell Muskeg River - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	707	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: 707

Total Number of Hours: 744



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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Shell Muskeg River - July 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	44	40	44	24	19	18	11	32	88	116	82	50	43	37	29	27	704
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	44	40	44	24	19	18	11	32	88	116	82	50	43	37	29	27	704

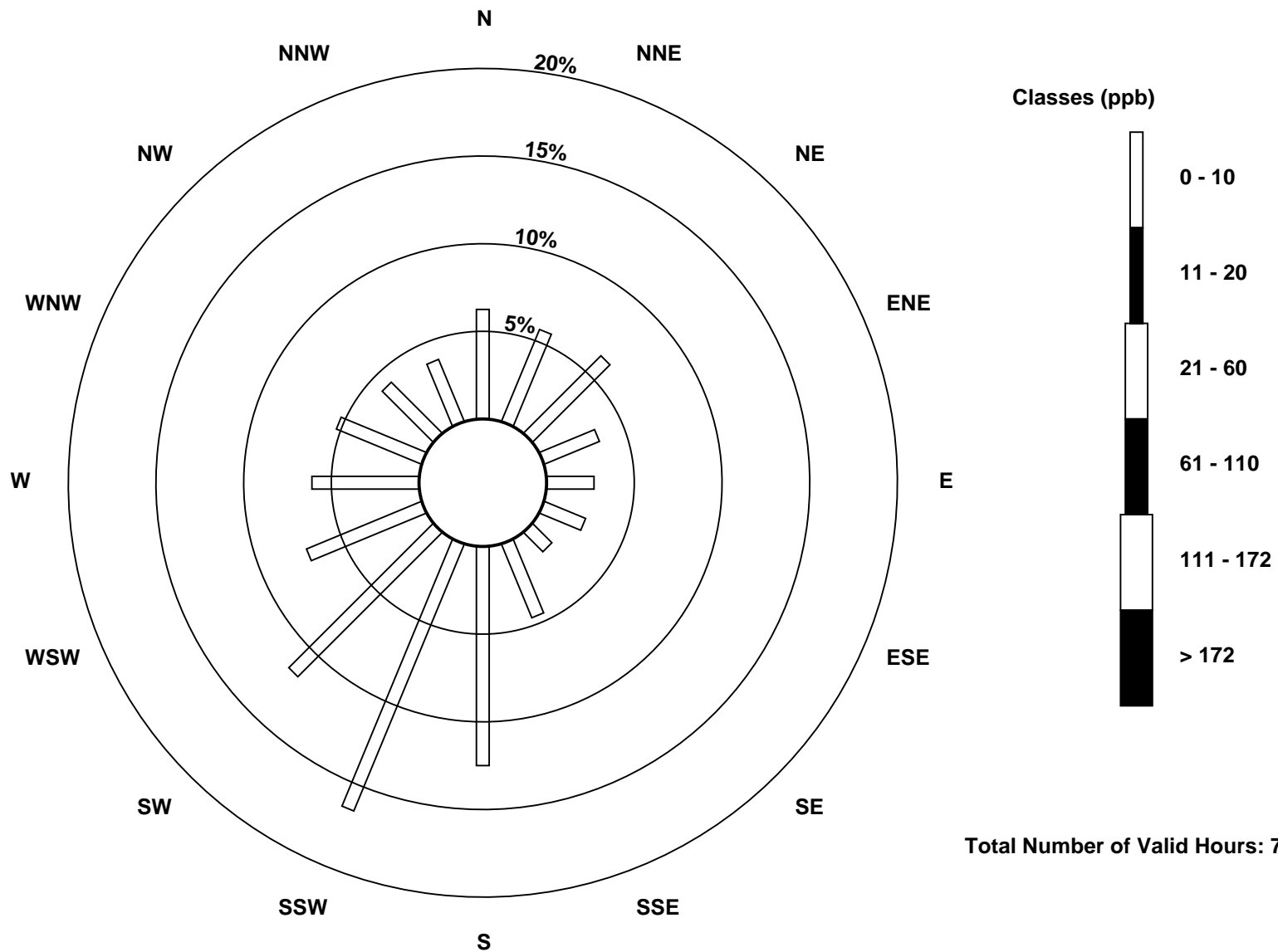
Total Number of Valid Hours: 704

Total Number of Hours: 744

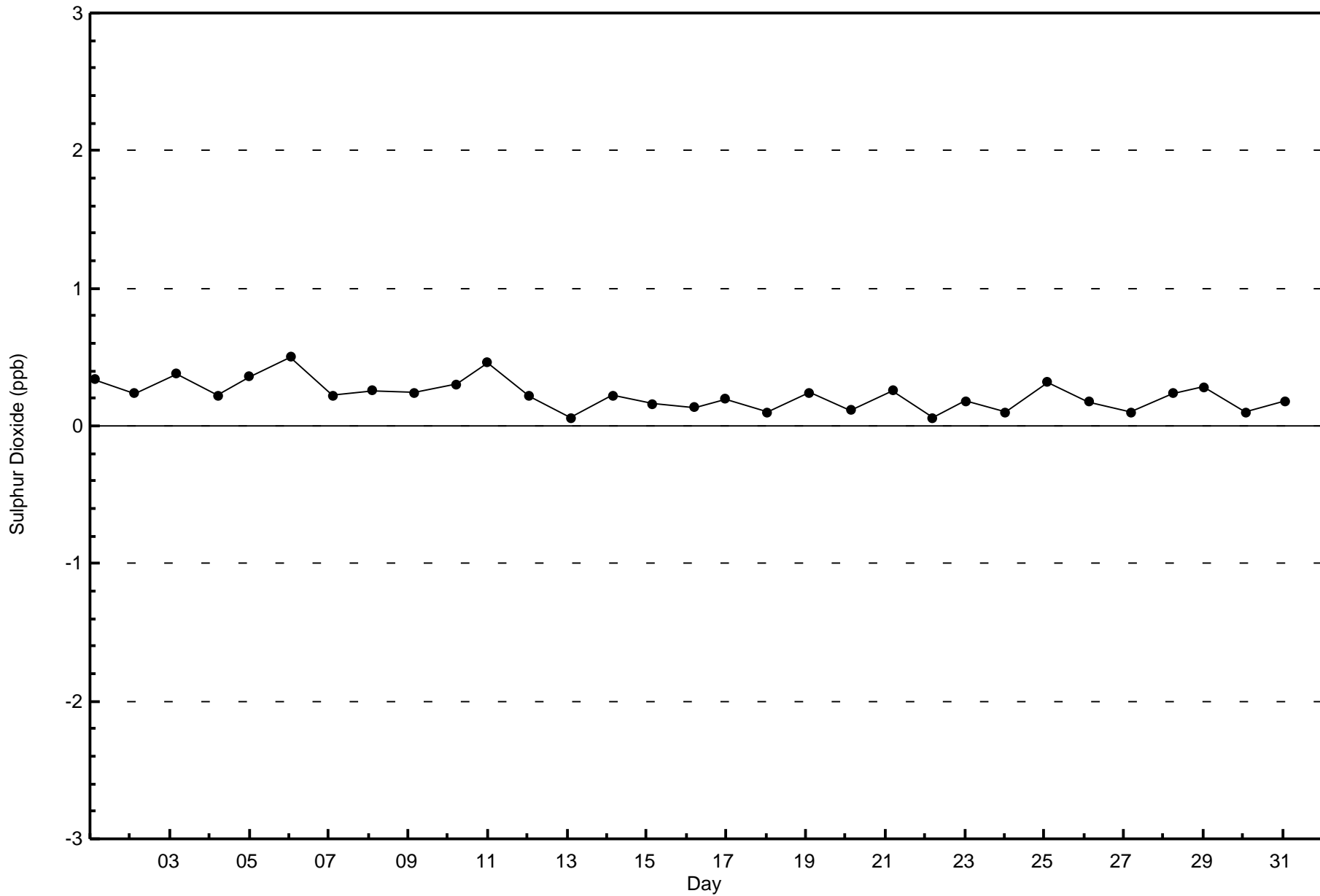


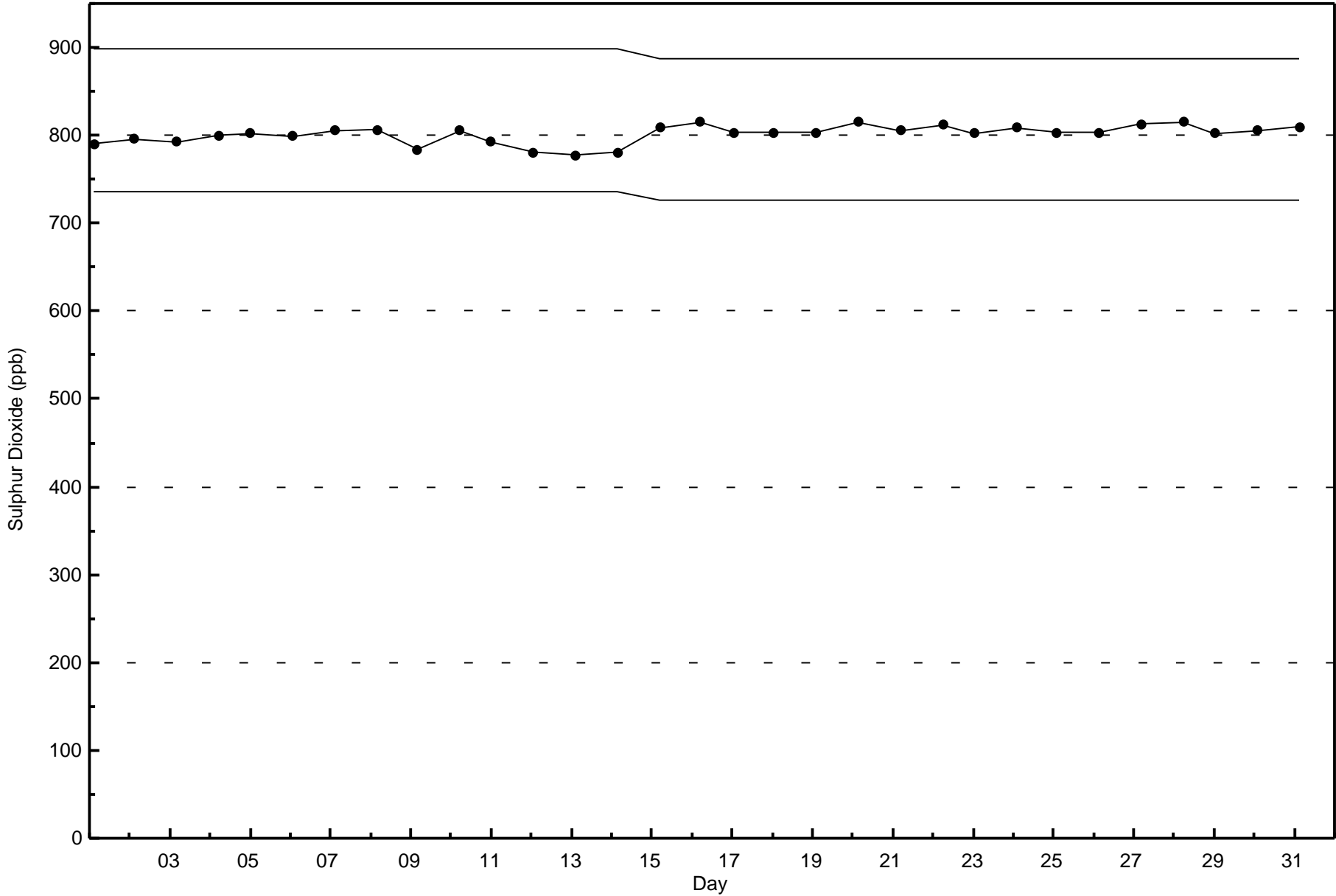
Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Shell Muskeg River (AMS 16)



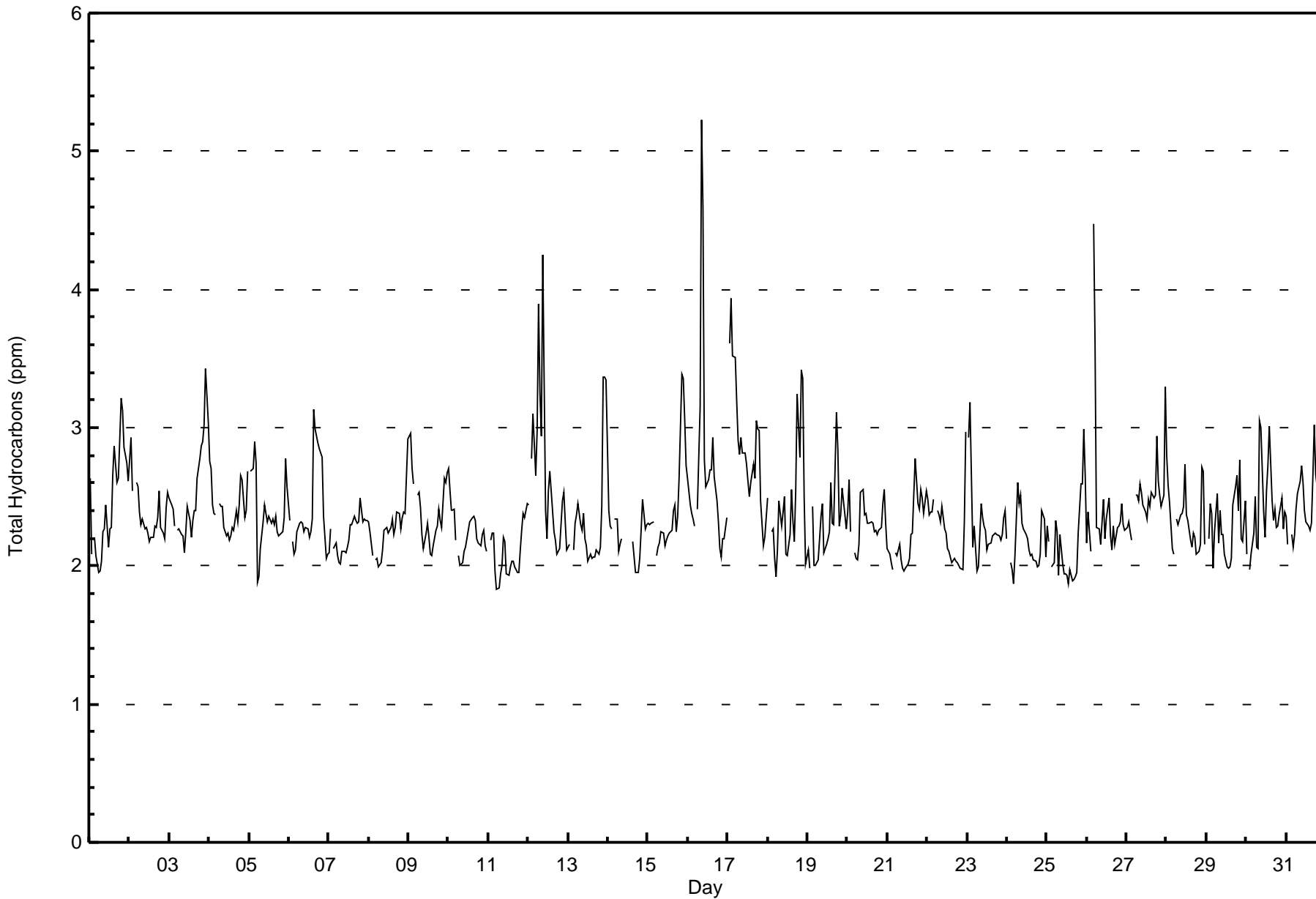
Total Number of Valid Hours: 704







Maximum Value: 5.2 ppm on Jul 16 09:00		Maximum Daily Average: 2.9 ppm on Jul 17		Hours in Service: 744																						
Minimum Value: 1.8 ppm on Jul 11 06:00		Minimum Daily Average: 2.1 ppm on Jul 11		Hours of Data: 707																						
Maximum Diurnal Average: 2.5 ppm at hour 22		Minimum Diurnal Average: 2.2 ppm at hour 13		Hours of Missing Data: 37																						
Monthly Average: 2.38 ppm		Percentiles: P <sub>1</sub> = 1.9 P <sub>10</sub> = 2.0 Q <sub>1</sub> = 2.2 Median = 2.3 Q <sub>3</sub> = 2.5 P <sub>90</sub> = 2.8 P <sub>99</sub> = 3.5		Hours of Calibration: 37																						
				Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	2.6	2.1	Z	2.2	2.1	2.0	2.0	2.0	2.2	2.3	2.4	2.1	2.3	2.3	2.7	2.9	2.6	2.6	2.9	3.2	3.1	2.9	2.7	2.6	2.5	3.2
2-Jul	2.8	2.9	2.5	Z	2.6	2.6	2.4	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.5	2.3	2.2	2.2	2.4	2.5	2.4	2.9
3-Jul	2.5	2.4	2.4	2.3	Z	2.3	2.3	2.2	2.2	2.1	2.2	2.4	2.3	2.2	2.3	2.4	2.4	2.6	2.8	2.9	2.9	3.0	3.4	3.0	2.5	3.4
4-Jul	2.8	2.7	2.4	2.4	2.4	Z	2.4	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.4	2.3	2.4	2.7	2.6	2.3	2.4	2.7	2.4	2.8
5-Jul	Z	2.7	2.7	2.9	2.7	1.9	1.9	2.1	2.3	2.4	2.4	2.3	2.4	2.3	2.3	2.3	2.4	2.3	2.2	2.2	2.3	2.3	2.8	2.6	2.4	2.9
6-Jul	2.3	Z	2.2	2.1	2.1	2.2	2.3	2.3	2.3	2.2	2.3	2.3	2.2	2.2	2.3	3.1	3.0	2.9	2.8	2.8	2.8	2.4	2.0	2.1	2.4	3.1
7-Jul	2.1	2.3	Z	2.1	2.2	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.2	2.3	2.3	2.4	2.3	2.3	2.3	2.5	2.3	2.3	2.3	2.3	2.2	2.5
8-Jul	2.3	2.2	2.1	Z	2.0	2.1	2.0	2.0	2.1	2.3	2.3	2.3	2.2	2.3	2.3	2.2	2.3	2.4	2.4	2.3	2.3	2.4	2.4	2.9	2.3	2.9
9-Jul	2.9	3.0	2.7	2.6	Z	2.5	2.5	2.4	2.2	2.1	2.2	2.3	2.2	2.1	2.1	2.2	2.3	2.3	2.4	2.3	2.3	2.6	2.6	2.7	2.4	3.0
10-Jul	2.7	2.5	2.4	2.4	2.2	Z	2.1	2.0	2.0	2.1	2.1	2.2	2.3	2.3	2.4	2.4	2.3	2.2	2.2	2.1	2.2	2.3	2.1	2.1	2.2	2.7
11-Jul	Z	2.2	2.2	2.2	2.0	1.8	1.8	1.9	2.0	2.2	2.2	1.9	1.9	2.0	2.0	2.0	2.0	2.0	1.9	2.1	2.3	2.4	2.4	2.4	2.1	2.4
12-Jul	2.4	Z	2.8	3.1	2.7	3.0	3.9	3.3	2.9	4.2	2.4	2.2	2.5	2.7	2.5	2.2	2.2	2.1	2.1	2.1	2.5	2.5	2.3	2.1	2.6	4.2
13-Jul	2.1	2.2	Z	2.1	2.3	2.4	2.4	2.3	2.3	2.4	2.2	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.4	3.4	3.4	3.3	2.3	3.4
14-Jul	2.4	2.3	2.3	Z	2.3	2.3	2.1	2.2	2.2	C	C	C	C	C	C	2.2	1.9	2.0	2.0	2.1	2.3	2.5	2.3	2.3	--	2.5
15-Jul	2.3	2.3	2.3	2.3	Z	2.1	2.1	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.3	2.4	2.4	2.2	2.4	2.6	3.4	3.4	3.1	2.7	2.4	3.4
16-Jul	2.6	2.4	2.4	2.3	2.3	Z	2.4	3.1	5.2	4.6	2.8	2.6	2.6	2.7	2.7	2.9	2.6	2.5	2.3	2.1	2.1	2.2	2.2	2.4	2.7	5.2
17-Jul	Z	3.6	3.9	3.5	3.5	3.2	2.9	2.8	2.9	2.8	2.8	2.7	2.6	2.5	2.6	2.7	2.6	3.1	3.0	3.0	2.5	2.1	2.2	2.4	2.9	3.9
18-Jul	2.5	Z	2.2	2.3	2.1	1.9	2.1	2.5	2.3	2.4	2.5	2.1	2.1	2.2	2.5	2.3	2.2	2.5	3.2	2.8	3.4	3.4	2.5	2.0	2.4	3.4
19-Jul	2.1	2.0	Z	2.4	2.0	2.0	2.0	2.2	2.4	2.4	2.1	2.2	2.2	2.2	2.6	2.3	2.3	3.1	2.8	2.3	2.4	2.6	2.4	2.3	2.3	3.1
20-Jul	2.4	2.6	2.3	Z	2.1	2.1	2.0	2.2	2.5	2.5	2.4	2.4	2.3	2.3	2.3	2.3	2.2	2.3	2.2	2.3	2.3	2.4	2.6	2.3	2.3	2.6
21-Jul	2.1	2.1	2.0	2.0	Z	2.1	2.1	2.2	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.2	2.5	2.8	2.5	2.4	2.5	2.5	2.4	2.5	2.2	2.8
22-Jul	2.5	2.4	2.4	2.4	2.5	Z	2.4	2.4	2.3	2.4	2.3	2.2	2.1	2.1	2.1	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.3	3.0	2.3	3.0
23-Jul	Z	2.9	3.2	2.1	2.3	2.1	2.0	2.0	2.4	2.3	2.3	2.3	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4	2.4	2.3	3.2
24-Jul	2.2	Z	2.0	2.0	1.9	2.1	2.6	2.5	2.5	2.3	2.3	2.2	2.2	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.4	2.3	2.1	2.2	2.6
25-Jul	2.3	2.2	Z	2.0	2.0	2.3	2.2	1.9	2.2	2.0	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	2.2	2.6	2.6	3.0	2.7	2.2	3.0
26-Jul	2.2	2.4	2.1	Z	4.5	3.6	2.3	2.3	2.2	2.3	2.5	2.2	2.3	2.5	2.2	2.1	2.3	2.2	2.3	2.3	2.3	2.4	2.3	2.3	2.4	4.5
27-Jul	2.3	2.3	2.2	2.2	Z	2.5	2.5	2.5	2.6	2.5	2.4	2.4	2.3	2.5	2.4	2.5	2.5	2.5	2.9	2.6	2.5	2.4	2.5	3.3	2.5	3.3
28-Jul	2.8	2.6	2.5	2.1	2.1	Z	2.3	2.3	2.4	2.4	2.4	2.7	2.4	2.3	2.2	2.1	2.2	2.2	2.1	2.1	2.2	2.7	2.7	2.2	2.3	2.8
29-Jul	Z	2.2	2.5	2.4	2.0	2.2	2.5	2.2	2.4	2.2	2.2	2.1	2.0	2.0	2.0	2.0	2.4	2.6	2.6	2.4	2.8	2.2	2.2	2.5	2.3	2.8
30-Jul	2.1	Z	2.0	2.1	2.2	2.5	2.1	2.1	3.1	3.0	2.4	2.2	2.5	2.7	3.0	2.5	2.3	2.4	2.3	2.3	2.4	2.5	2.3	2.4	2.4	3.1
31-Jul	2.4	2.2	Z	2.2	2.1	2.2	2.4	2.5	2.6	2.7	2.6	2.4	2.3	2.3	2.3	2.3	2.6	3.0	2.7	2.5	3.1	2.9	3.1	3.2	2.5	3.2
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration																										







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

**Total Hydrocarbons (THC) - ppm**  
**Shell Muskeg River - July 2015**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	78	11.03	11.03
2.1 - 3.0	594	84.02	95.05
3.1 - 10.0	35	4.95	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



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

**Total Hydrocarbons (THC) - ppm**  
**Shell Muskeg River - July 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	2	3	2	2	2	10	9	8	8	8	12	6	6	0	78
2.1 - 3.0	32	38	40	21	17	15	8	20	78	106	72	41	31	29	22	21	591
3.1 - 10.0	12	2	2	0	0	1	1	2	1	2	2	1	0	2	1	6	35
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	44	40	44	24	19	18	11	32	88	116	82	50	43	37	29	27	704

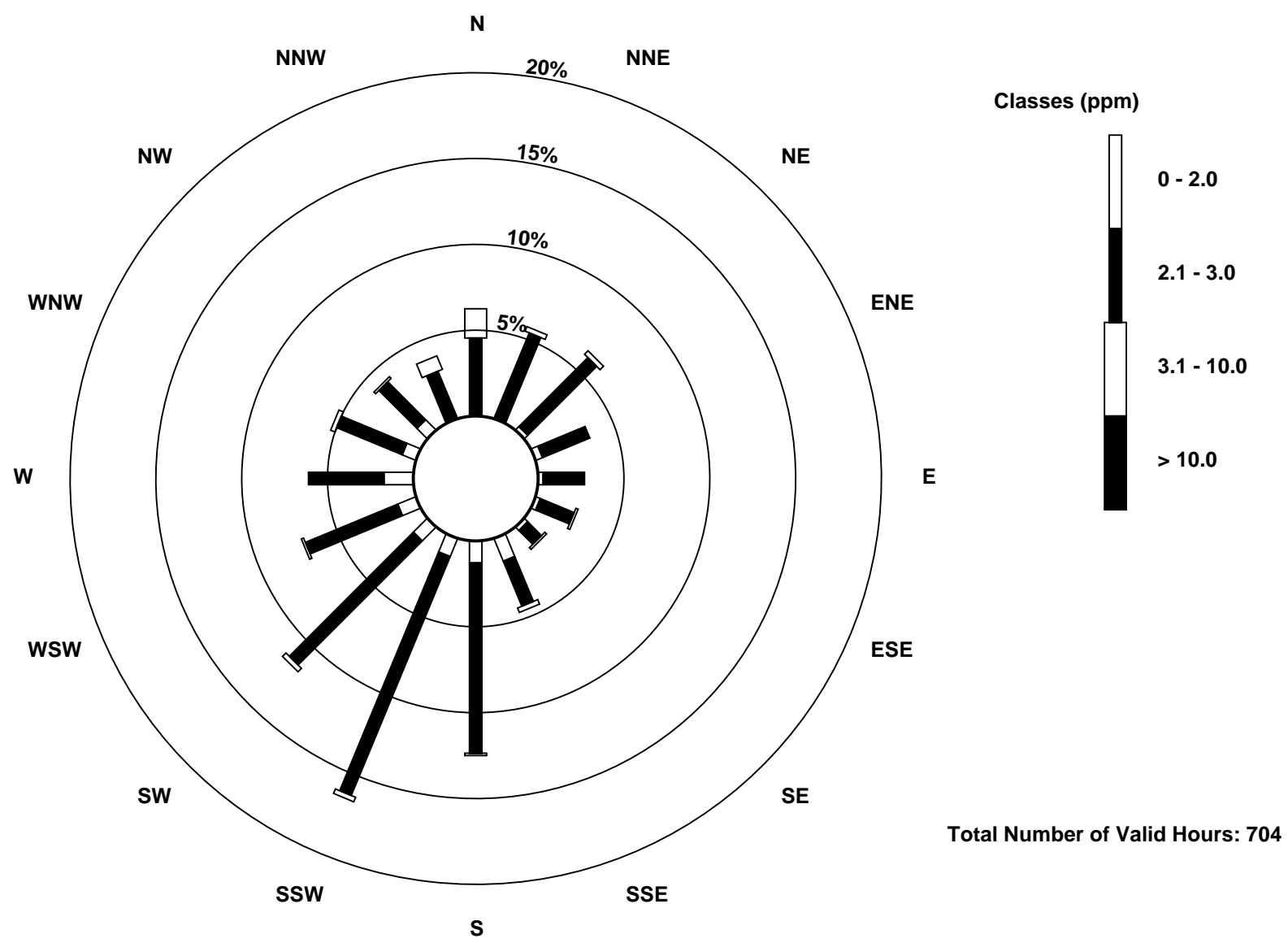
Total Number of Valid Hours: 704

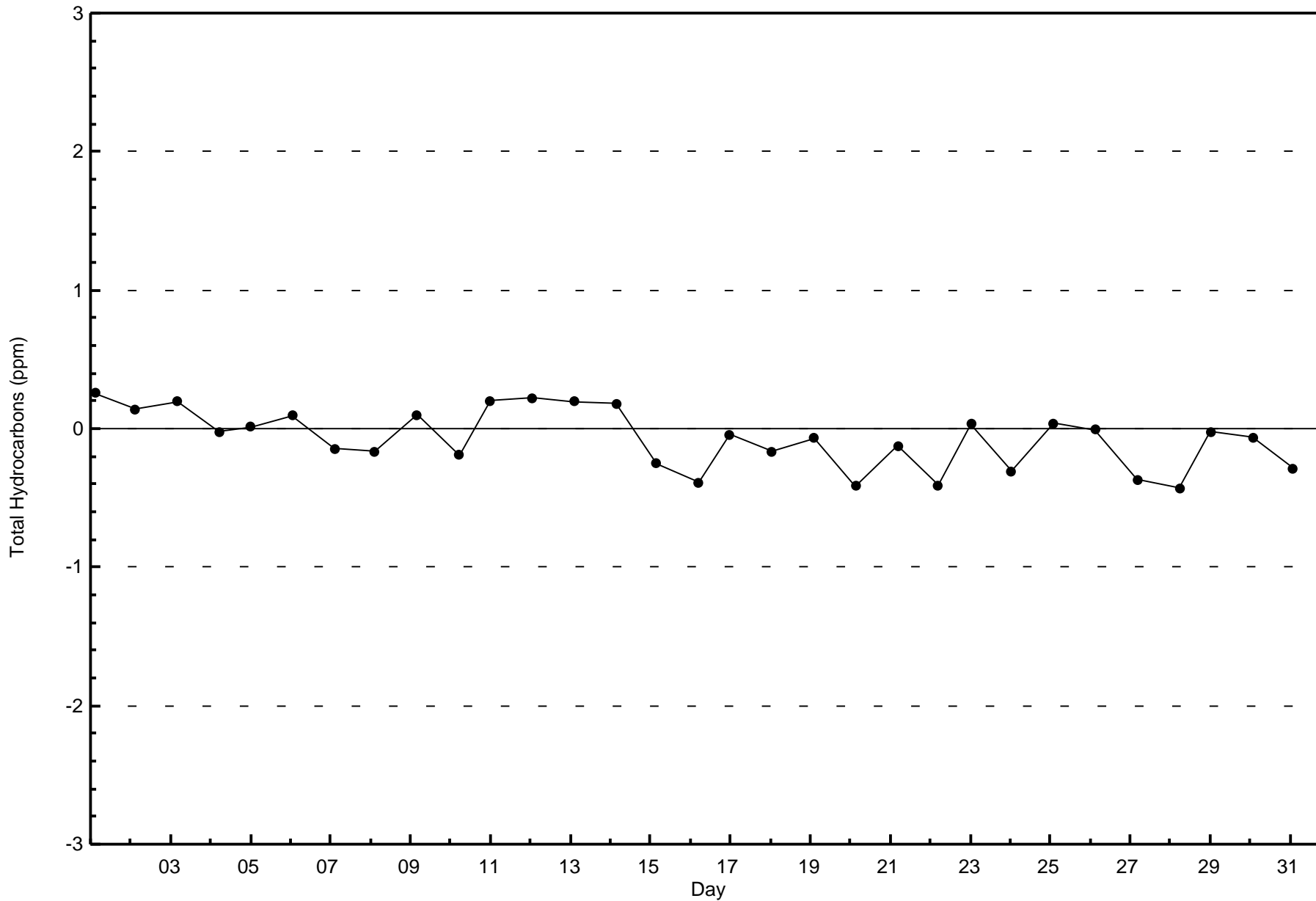
Total Number of Hours: 744

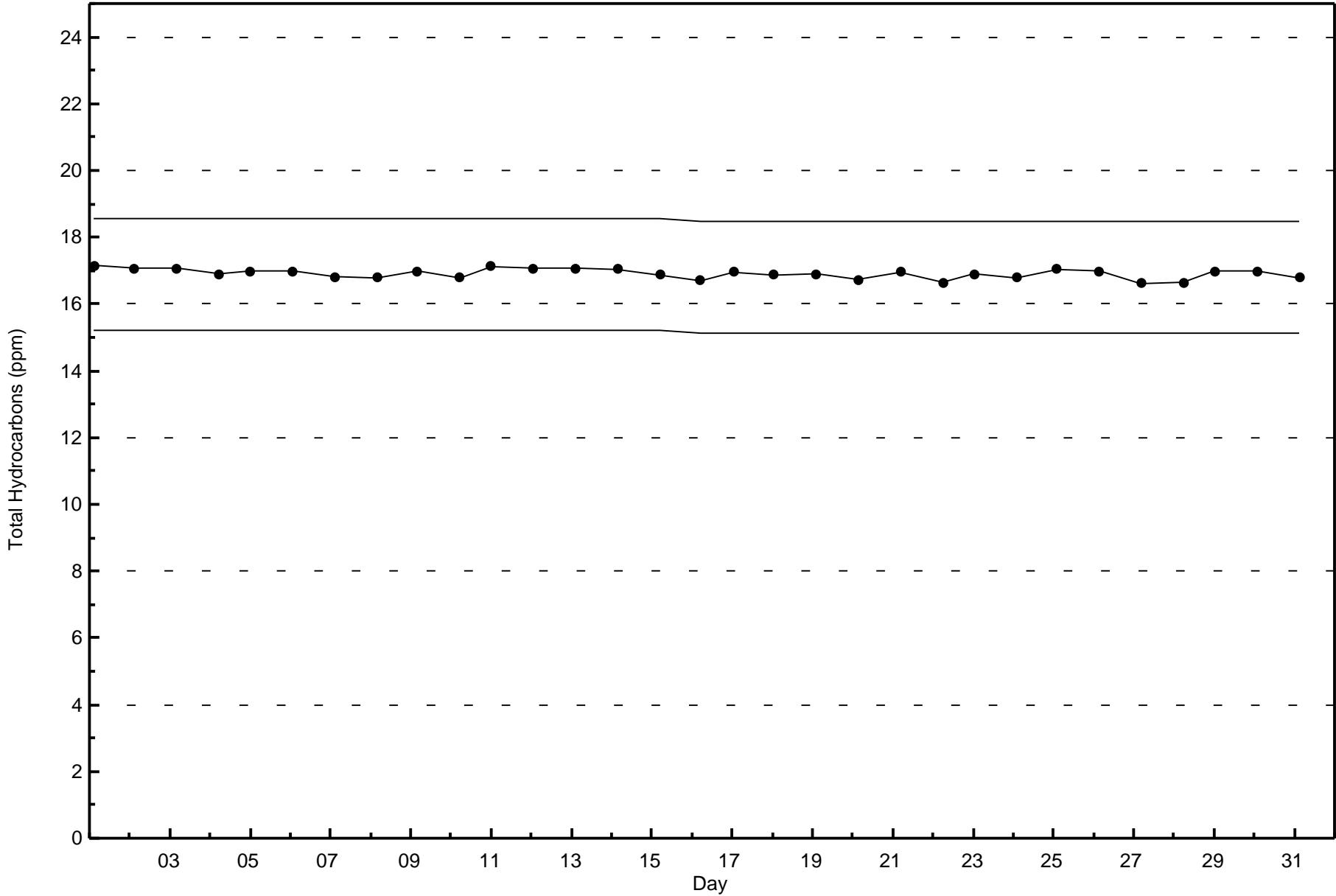


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Total Hydrocarbons (THC) - ppm  
Shell Muskeg River (AMS 16)









Maximum Value: 59 ppb on Jul 16 09:00																		Maximum Daily Average: 14.9 ppb on Jul 17						Hours in Service: 744																								
Minimum Value: 0 ppb on Jul 8 03:00																		Minimum Daily Average: 0.2 ppb on Jul 3						Hours of Data: 707																								
Maximum Diurnal Average: 6.5 ppb at hour 9																		Minimum Diurnal Average: 1.6 ppb at hour 1						Hours of Missing Data: 37																								
Monthly Average: 3.5 ppb																		Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 1 O <sub>3</sub> = 4 P <sub>90</sub> = 11 P <sub>99</sub> = 30						Hours of Calibration: 37																								
																		Percent Operational Time: 100.0																														
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jul	0	0	Z	0	0	0	0	0	1	0	0	1	0	0	1	2	1	1	2	3	1	0	0	0	0.7	3																						
2-Jul	0	6	4	Z	3	4	3	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	6																						
3-Jul	0	0	0	0	Z	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																						
4-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	5	4	1	2	7	10	19	16	13	3.4	19																						
5-Jul	Z	12	19	42	17	1	1	2	2	4	10	7	6	5	3	2	2	1	0	0	0	1	0	6.0	42																							
6-Jul	0	Z	0	0	1	2	5	6	3	1	0	0	0	0	1	13	15	17	11	6	6	2	0	3.8	17																							
7-Jul	0	0	Z	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0.3	1																							
8-Jul	0	0	0	Z	1	2	2	3	5	3	2	1	0	0	0	1	1	0	0	0	0	0	0	1.1	5																							
9-Jul	8	8	9	6	Z	3	4	5	11	9	6	4	3	0	0	3	5	19	23	19	17	4	5	7.7	23																							
10-Jul	8	7	11	12	16	Z	5	3	6	8	5	6	11	7	5	8	9	2	1	0	0	1	2	5.8	16																							
11-Jul	Z	3	4	2	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0.6	4																							
12-Jul	0	Z	5	18	6	11	26	19	34	45	2	1	4	1	1	0	1	1	1	1	3	1	0	7.9	45																							
13-Jul	0	0	Z	0	0	2	5	3	1	1	1	1	0	0	1	0	0	0	0	0	2	10	7	1.7	10																							
14-Jul	1	0	0	Z	1	1	1	2	3	C	C	C	C	C	C	1	0	0	0	0	0	4	0	--	4																							
15-Jul	0	3	1	1	Z	1	1	1	1	1	1	0	0	0	0	2	1	0	0	6	13	8	8	2.4	13																							
16-Jul	6	2	1	1	1	Z	5	21	59	44	10	16	14	18	24	23	11	0	0	0	0	0	0	11.2	59																							
17-Jul	Z	29	16	10	20	13	21	23	14	7	19	17	16	22	18	22	27	11	19	12	4	0	0	14.9	29																							
18-Jul	0	Z	0	0	0	1	4	4	2	1	1	0	0	0	0	0	0	4	19	8	22	29	4	4.4	29																							
19-Jul	0	0	Z	2	0	0	1	3	3	3	0	0	1	0	0	1	1	7	6	0	0	0	0	1.3	7																							
20-Jul	0	0	0	Z	0	1	1	12	12	4	2	1	0	0	0	0	0	0	0	0	0	0	2	1.6	12																							
21-Jul	0	0	0	0	Z	0	0	5	1	0	1	1	1	0	1	1	3	5	1	1	1	0	0	1.0	5																							
22-Jul	0	0	0	0	3	Z	8	1	1	1	0	0	0	0	0	0	0	0	0	0	0	6	19	1.8	19																							
23-Jul	Z	15	26	1	0	1	1	1	6	4	3	3	0	0	0	0	0	0	0	0	0	0	0	2.8	26																							
24-Jul	0	Z	0	0	0	3	13	13	5	1	0	1	1	0	0	0	0	0	0	0	0	0	0	1.8	13																							
25-Jul	1	0	Z	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	2	6	6	19	2.3	19																							
26-Jul	7	6	0	Z	58	40	2	13	1	2	1	1	3	10	3	0	0	0	0	1	0	0	0	6.6	58																							
27-Jul	0	0	0	0	Z	19	12	7	4	3	1	0	0	0	1	1	1	1	5	1	0	0	1	3.6	23																							
28-Jul	9	5	3	0	0	Z	5	5	7	5	2	1	0	0	0	1	2	0	0	0	0	7	7	2.6	9																							
29-Jul	Z	0	0	0	0	4	9	3	1	1	0	0	0	0	0	0	2	4	10	2	3	0	0	1.8	10																							
30-Jul	0	Z	0	0	0	0	0	1	0	0	0	0	5	5	9	3	3	8	4	0	0	0	0	1.8	9																							
31-Jul	1	1	Z	4	5	11	19	19	14	4	2	0	0	0	1	1	10	3	1	1	8	2	0	5.2	19																							
																								1.6	3.8	4.1	4.0	5.2	4.7	5.1	5.8	6.5	5.1	2.4	2.1	2.3	2.5	2.4	2.9	3.3	2.8	3.5	2.3	3.2	3.0	2.6	3.3	Diurnal Average
																								9	29	26	42	58	40	26	23	59	45	19	17	16	22	24	23	27	19	23	19	22	29	19	23	Diurnal Maximum
Z - zerospan C - Calibration																																																

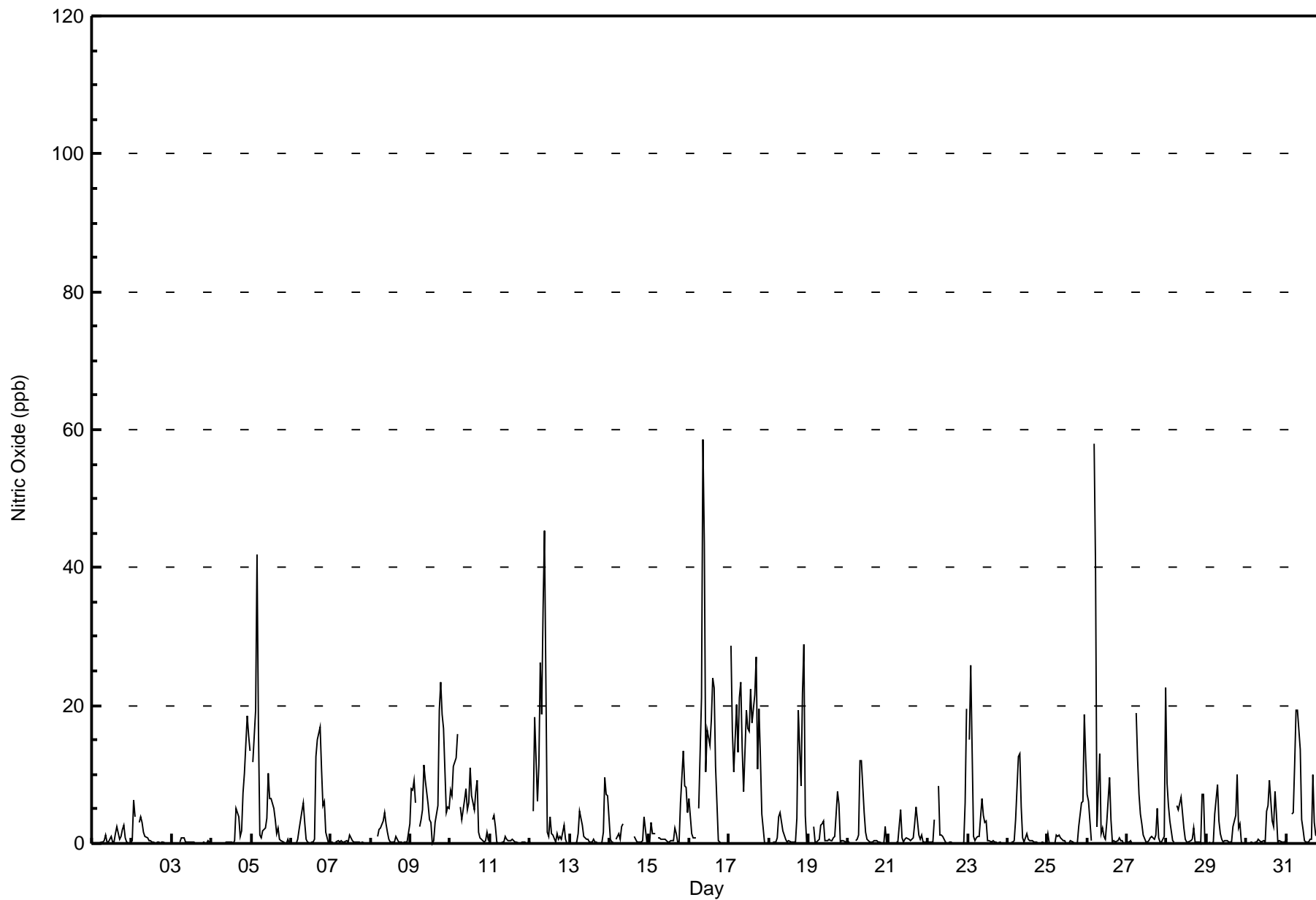


Wood Buffalo Environmental Association

Hourly Averages

Nitric Oxide (NO) - ppb

Shell Muskeg River - July 2015





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

**Nitric Oxide (NO) - ppb**  
**Shell Muskeg River - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	685	96.89	96.89
21 - 40	17	2.40	99.29
41 - 80	5	0.71	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744





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

**Nitric Oxide (NO) - ppb**  
**Shell Muskeg River - July 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	41	31	43	24	19	17	11	32	88	116	82	49	43	36	28	22	682
21 - 40	1	8	1	0	0	1	0	0	0	0	0	1	0	1	1	3	17
41 - 80	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	5
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	44	40	44	24	19	18	11	32	88	116	82	50	43	37	29	27	704

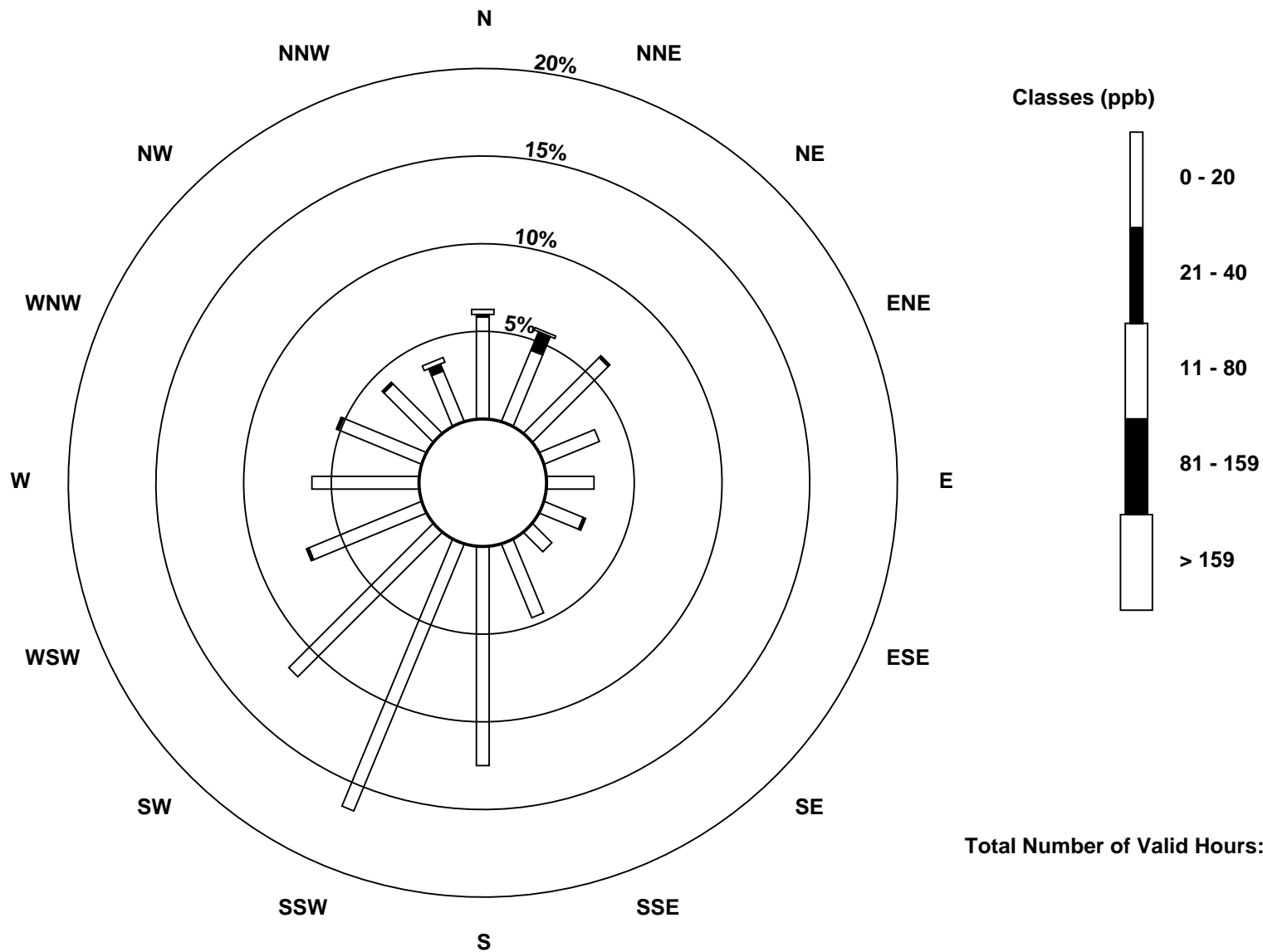
Total Number of Valid Hours: 704

Total Number of Hours: 744



Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Nitric Oxide (NO) - ppb  
Shell Muskeg River (AMS 16)



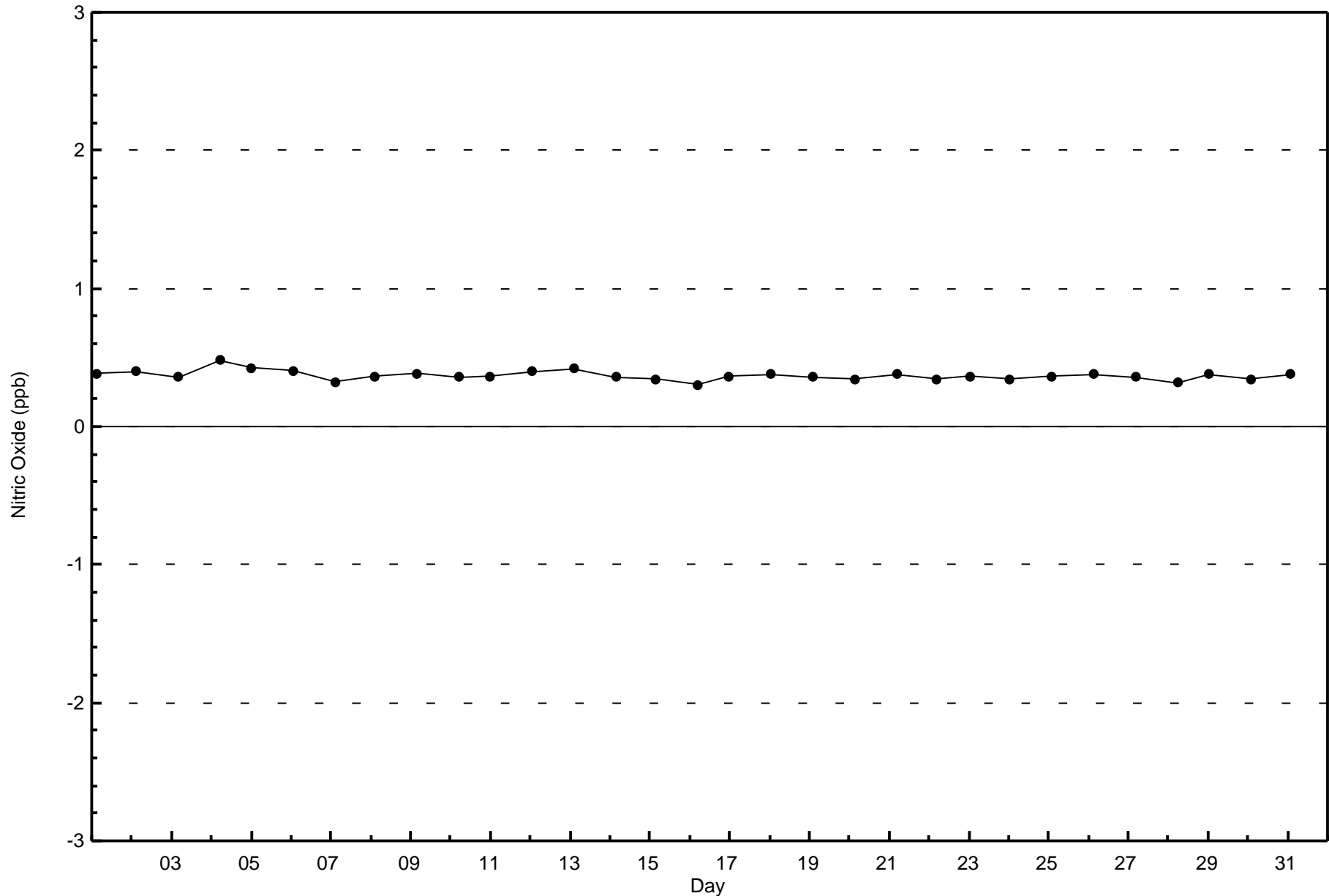
Total Number of Valid Hours: 704

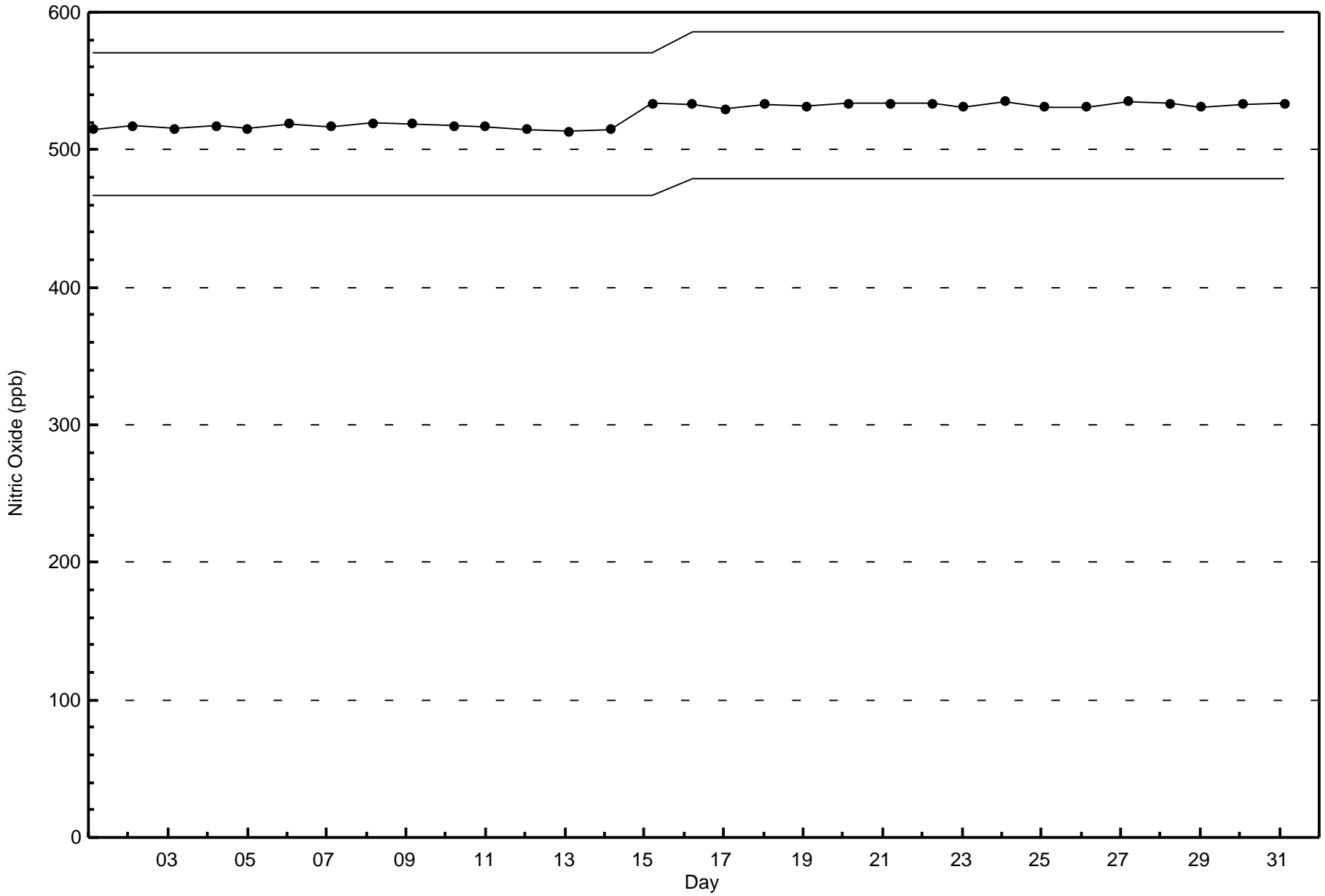


Wood Buffalo Environmental Association

Zero Responses

Nitric Oxide (NO) - ppb  
Shell Muskeg River - July 2015







Wood Buffalo Environmental Association

Summary of Hour Averages

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

Shell Muskeg River - July 2015

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 32 ppb on Jul 16 09:00	Maximum Daily Average: 12.2 ppb on Jul 17		Hours of Data:	707
Minimum Value: 0 ppb on Jul 22 19:00	Minimum Daily Average: 1.4 ppb on Jul 7		Hours of Missing Data:	37
Maximum Diurnal Average: 9.0 ppb at hour 22	Minimum Diurnal Average: 3.2 ppb at hour 13		Hours of Calibration:	37
Monthly Average: 6.0 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 1 Q <sub>1</sub> = 2 Median = 4 O <sub>3</sub> = 8 P <sub>90</sub> = 14 P <sub>99</sub> = 23		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	3	3	Z	2	2	1	2	3	5	1	1	2	1	1	8	9	6	8	21	24	19	14	9	7	6.5	24
2-Jul	8	9	7	Z	7	10	10	6	4	4	3	3	1	1	0	1	1	1	1	1	2	1	3	5	3.9	10
3-Jul	5	3	4	4	Z	5	6	3	1	1	3	4	4	4	6	7	6	11	13	13	14	15	20	13	7.0	20
4-Jul	8	8	4	4	4	Z	3	4	3	3	2	2	2	2	3	8	13	8	9	13	13	15	18	22	7.3	22
5-Jul	Z	20	24	25	19	4	2	3	4	5	8	6	6	6	5	3	6	3	3	2	3	3	13	9	7.9	25
6-Jul	8	Z	4	6	8	8	10	11	7	2	0	0	0	1	2	19	14	13	13	14	17	10	1	2	7.4	19
7-Jul	3	5	Z	2	2	1	1	0	1	1	1	2	1	1	1	0	0	0	0	1	1	4	2	2	1.4	5
8-Jul	2	3	5	Z	9	7	7	7	8	7	8	7	7	8	4	6	6	3	3	3	5	7	8	21	6.5	21
9-Jul	23	21	24	22	Z	13	13	11	12	8	7	6	5	1	3	5	6	12	13	13	13	9	9	10	11.2	24
10-Jul	11	10	11	11	11	Z	4	3	5	6	4	4	8	6	6	9	12	3	3	3	5	5	4	8	6.6	12
11-Jul	Z	10	12	8	5	2	2	4	4	7	5	3	3	4	3	2	1	1	1	6	15	15	7	12	5.6	15
12-Jul	9	Z	16	22	16	16	19	16	18	25	5	4	11	12	14	5	10	4	3	5	11	13	4	4	11.4	25
13-Jul	2	3	Z	3	5	13	16	8	5	4	4	2	1	3	0	0	0	0	1	10	23	18	14	6.0	23	
14-Jul	6	4	5	Z	5	6	4	8	6	C	C	C	C	C	C	5	1	1	1	2	7	12	5	6	--	12
15-Jul	4	7	6	6	Z	3	2	1	2	3	2	1	0	1	1	5	6	1	1	9	19	18	16	11	5.4	19
16-Jul	9	8	6	5	5	Z	7	15	32	31	14	15	10	12	14	18	14	6	4	2	1	5	5	2	10.5	32
17-Jul	Z	19	19	18	18	15	15	14	11	9	12	11	10	13	12	14	16	12	17	16	7	1	2	3	12.2	19
18-Jul	5	Z	5	3	2	3	7	8	4	4	2	1	2	1	1	1	1	7	17	13	21	19	11	2	6.0	21
19-Jul	2	1	Z	11	2	2	3	6	7	7	1	1	1	1	1	3	2	14	11	0	4	8	4	2	4.0	14
20-Jul	3	4	3	Z	3	3	2	7	8	5	3	2	1	1	2	3	3	2	3	2	2	8	13	3	3.6	13
21-Jul	1	1	1	2	Z	1	1	10	3	2	2	3	3	1	2	2	6	12	6	5	17	5	2	4	3.9	17
22-Jul	4	5	5	5	5	Z	6	2	2	2	1	0	0	1	1	0	0	0	0	0	0	0	8	17	2.7	17
23-Jul	Z	16	15	5	4	3	3	4	9	6	6	5	1	1	1	1	1	1	0	0	0	0	2	3	3.8	16
24-Jul	6	Z	4	4	3	4	8	8	5	2	1	3	2	2	2	2	1	0	0	0	2	7	5	4	3.2	8
25-Jul	12	5	Z	3	1	10	8	3	3	2	1	0	0	0	1	0	0	0	0	5	14	11	20	16	5.0	20
26-Jul	8	12	4	Z	21	15	4	9	2	4	3	2	5	9	3	1	5	1	1	4	5	11	7	7	6.2	21
27-Jul	7	6	7	5	Z	10	9	7	5	4	2	0	1	2	2	3	2	3	10	4	3	6	9	14	5.2	14
28-Jul	9	7	5	1	1	Z	4	4	5	5	4	2	0	1	1	2	4	2	1	2	1	12	12	5	3.9	12
29-Jul	Z	5	4	3	1	4	5	3	2	2	1	1	1	0	0	1	7	13	16	7	17	3	2	1	4.3	17
30-Jul	4	Z	1	3	0	0	0	1	0	0	0	0	6	9	13	7	4	7	3	2	8	8	6	4	3.8	13
31-Jul	6	6	Z	8	9	8	9	11	11	7	5	2	1	2	2	3	12	10	10	8	19	12	5	17	7.9	19

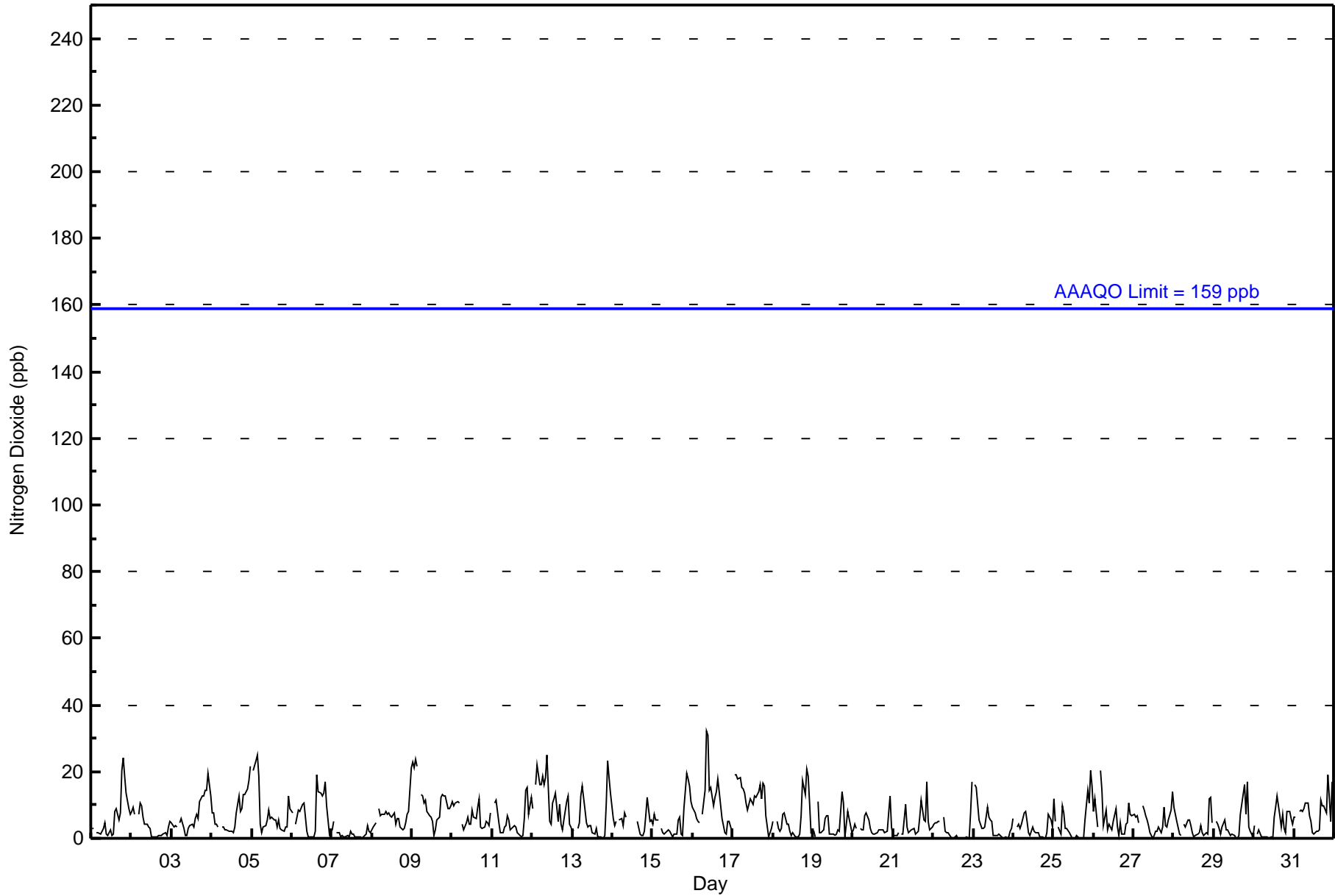
6.4	7.7	7.9	7.3	6.4	6.4	6.2	6.3	6.2	5.6	3.7	3.3	3.2	3.4	3.9	4.6	5.3	5.2	5.8	5.8	8.9	9.0	8.1	7.9	Diurnal Average	
23	21	24	25	21	16	19	16	32	31	14	15	11	13	14	19	16	14	21	24	21	23	20	22	Diurnal Maximum	

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



Wood Buffalo Environmental Association  
Hourly Averages

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Shell Muskeg River - July 2015





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

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Shell Muskeg River - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	690	97.60	97.60
21 - 40	17	2.40	100.00
11 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



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

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Shell Muskeg River - July 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	34	38	44	24	19	18	11	32	86	116	82	50	43	37	29	24	687
21 - 40	10	2	0	0	0	0	0	0	2	0	0	0	0	0	0	3	17
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	44	40	44	24	19	18	11	32	88	116	82	50	43	37	29	27	704

Total Number of Valid Hours: 704

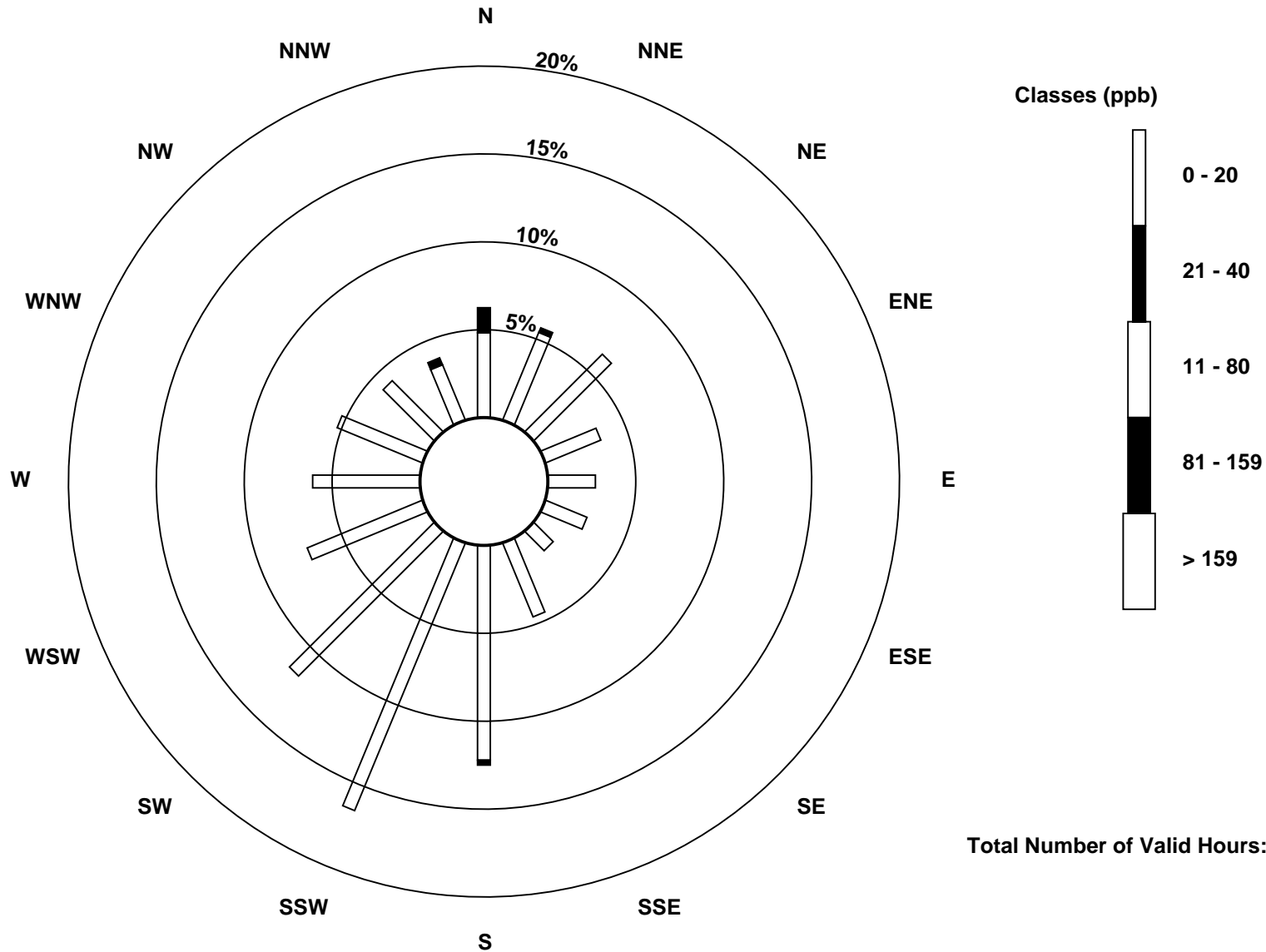
Total Number of Hours: 744

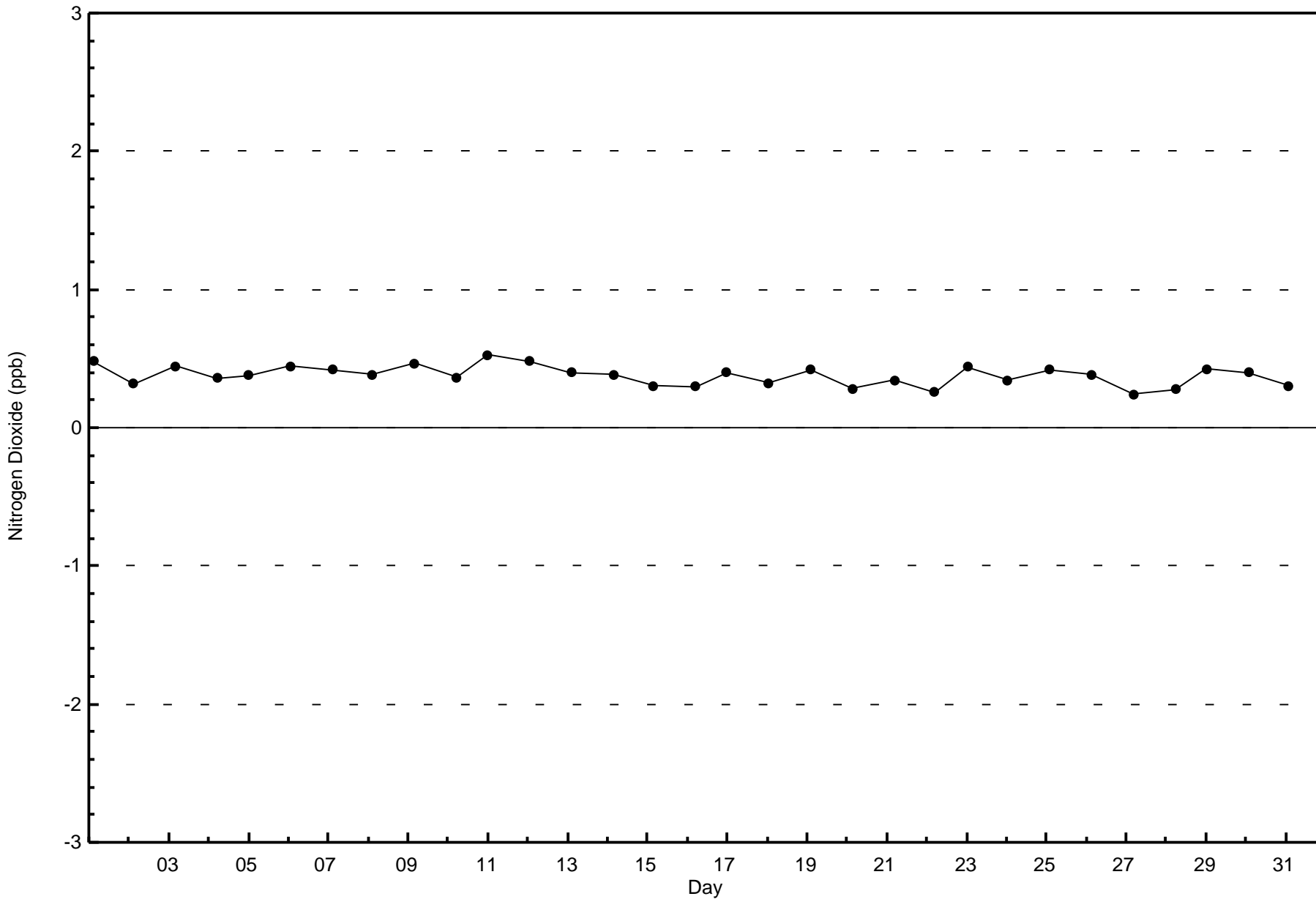


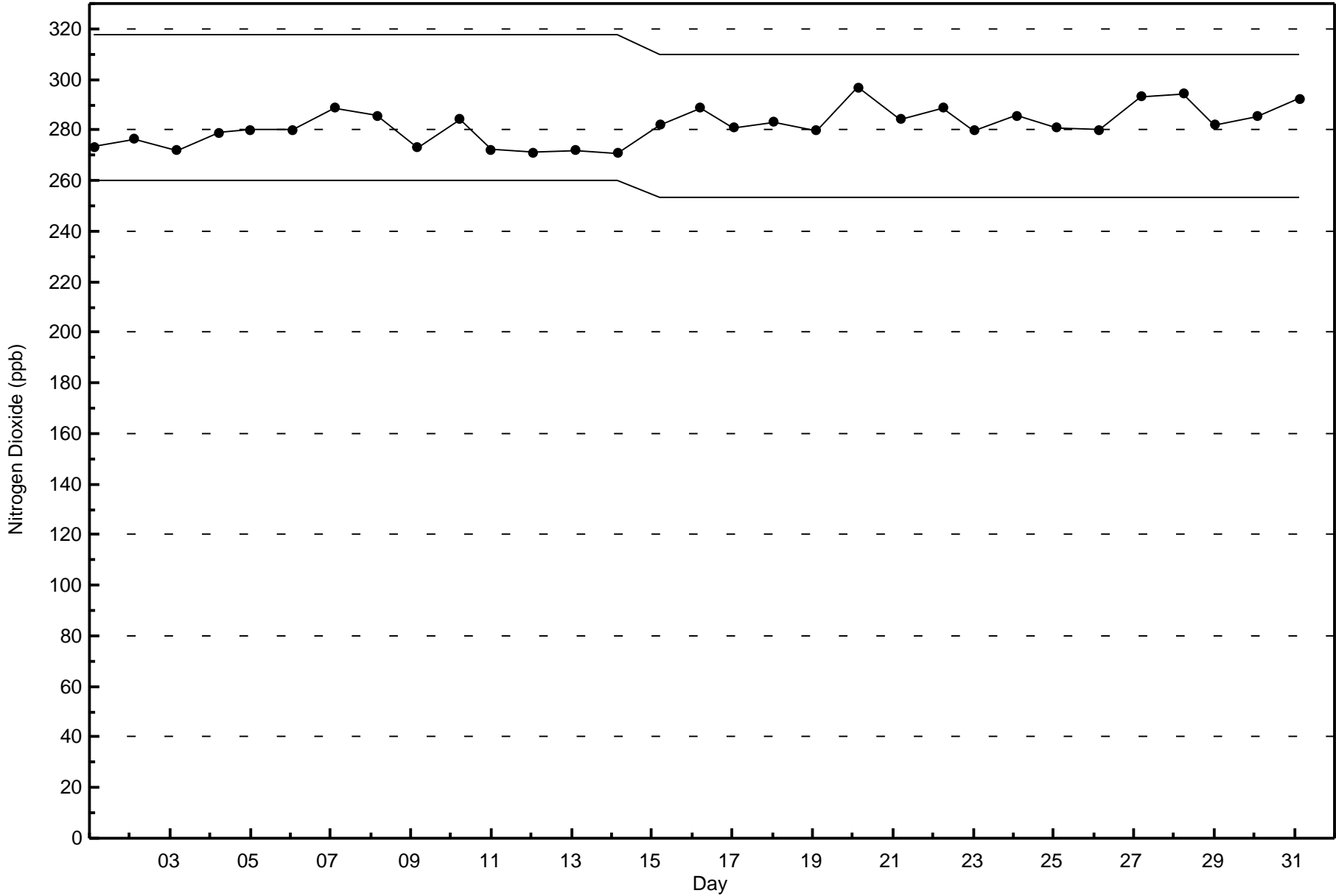


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Shell Muskeg River (AMS 16)

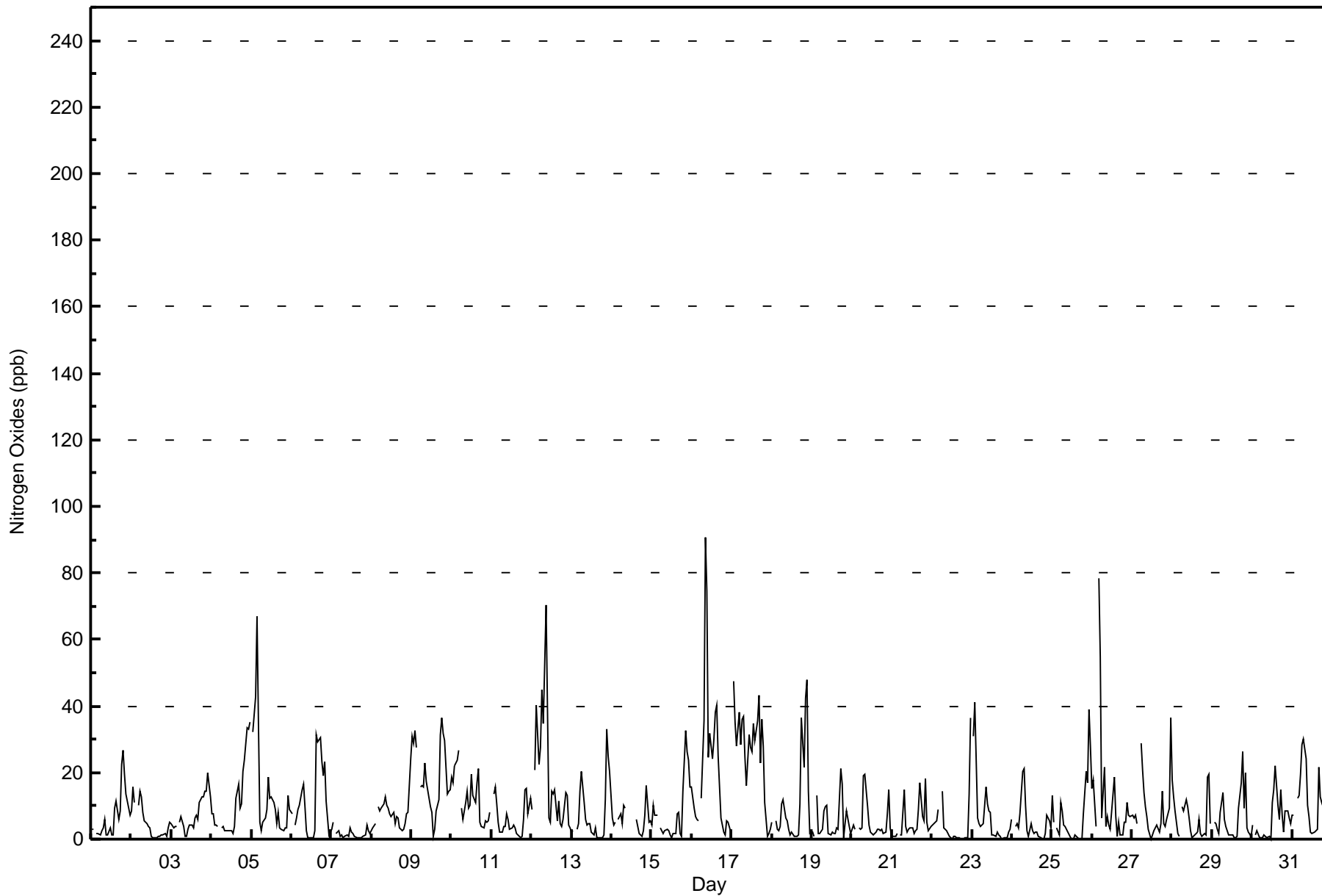








Maximum Value: 91 ppb on Jul 16 09:00																		Maximum Daily Average: 27.1 ppb on Jul 17						Hours in Service: 744		
Minimum Value: 0 ppb on Jul 22 20:00																		Minimum Daily Average: 1.6 ppb on Jul 7						Hours of Data: 707		
Maximum Diurnal Average: 12.7 ppb at hour 9																		Minimum Diurnal Average: 5.4 ppb at hour 12						Hours of Missing Data: 37		
Monthly Average: 9.5 ppb																		Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 1 Q <sub>1</sub> = 2 Median = 5 O <sub>3</sub> = 13 P <sub>90</sub> = 25 P <sub>99</sub> = 51						Hours of Calibration: 37		
																		Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	3	3	Z	2	2	1	2	3	6	1	1	4	1	1	9	12	6	9	23	27	20	14	9	7	7.2	27
2-Jul	8	16	11	Z	10	14	13	8	5	5	4	3	1	1	0	1	1	1	1	1	2	1	3	5	5.0	16
3-Jul	5	3	4	4	Z	5	7	4	1	1	3	4	4	4	6	7	6	11	13	13	14	15	20	13	7.2	20
4-Jul	8	8	4	4	4	Z	3	4	3	3	2	2	2	2	4	12	16	9	11	21	24	33	33	35	10.8	35
5-Jul	Z	32	43	67	35	5	3	5	6	9	19	12	13	11	9	5	8	4	3	2	3	3	13	9	13.9	67
6-Jul	8	Z	4	6	9	10	15	17	10	3	1	0	0	1	3	31	29	30	23	19	23	12	1	2	11.2	31
7-Jul	3	5	Z	2	2	1	1	1	1	1	1	3	2	2	1	0	0	0	0	1	1	4	2	2	1.6	5
8-Jul	2	3	4	Z	10	9	9	11	13	10	9	8	7	8	5	7	6	3	3	3	5	8	8	24	7.6	24
9-Jul	31	29	33	28	Z	16	16	16	23	17	12	10	8	1	3	8	12	31	36	32	30	13	14	15	18.9	36
10-Jul	19	17	22	24	26	Z	9	6	11	14	9	10	19	13	11	17	21	5	4	4	5	5	6	8	12.5	26
11-Jul	Z	14	16	11	5	2	2	4	4	8	6	3	4	4	3	2	1	1	1	6	15	15	7	12	6.3	16
12-Jul	9	Z	21	40	22	28	45	35	52	70	6	5	14	13	15	5	12	5	4	6	14	13	4	4	19.2	70
13-Jul	2	3	Z	3	5	14	20	11	6	4	5	5	2	1	3	0	0	1	0	1	12	33	25	20	7.7	33
14-Jul	7	4	5	Z	6	8	5	10	9	C	C	C	C	C	C	6	2	1	1	2	7	16	5	6	--	16
15-Jul	4	10	7	7	Z	4	2	2	2	3	3	1	0	2	2	8	8	2	1	15	33	26	24	16	7.8	33
16-Jul	16	9	7	6	6	Z	12	36	91	75	25	32	24	30	38	40	25	6	4	2	1	5	5	2	21.6	91
17-Jul	Z	48	35	28	38	29	36	37	24	16	31	28	26	35	30	36	43	23	36	28	11	1	2	3	27.1	48
18-Jul	5	Z	6	3	3	4	11	12	6	5	3	1	2	1	1	1	1	10	37	22	43	48	14	2	10.4	48
19-Jul	2	1	Z	13	2	2	3	8	10	10	2	1	2	2	2	3	3	21	16	0	5	8	4	2	5.3	21
20-Jul	3	4	3	Z	3	3	4	19	20	10	4	2	2	1	2	3	3	3	3	2	2	8	15	3	5.3	20
21-Jul	1	1	1	2	Z	1	1	15	4	2	3	4	4	2	2	3	9	17	7	6	18	5	2	4	4.9	18
22-Jul	4	5	5	5	9	Z	14	3	3	3	1	0	0	1	1	0	0	0	0	0	0	0	13	36	4.6	36
23-Jul	Z	31	41	6	5	4	4	5	16	10	9	8	1	1	1	2	1	1	0	0	0	0	2	3	6.6	41
24-Jul	6	Z	4	5	4	8	21	21	10	3	1	5	3	2	2	2	1	0	0	0	2	7	6	4	4.9	21
25-Jul	13	5	Z	3	1	11	9	4	4	2	1	0	0	0	1	0	0	0	0	8	20	17	39	28	7.3	39
26-Jul	15	18	4	Z	79	55	6	22	4	7	4	3	8	18	7	1	5	1	1	5	5	11	7	7	12.7	79
27-Jul	7	6	7	5	Z	29	21	14	10	7	3	0	1	2	3	4	2	5	15	4	4	6	9	36	8.7	36
28-Jul	18	13	8	2	1	Z	10	8	12	10	6	2	0	1	2	2	6	2	1	2	1	19	19	5	6.5	19
29-Jul	Z	5	5	3	2	8	14	6	4	2	1	1	1	0	0	1	9	17	26	10	20	4	2	1	6.2	26
30-Jul	4	Z	1	3	0	0	1	1	1	1	1	0	11	15	22	10	6	15	7	2	8	8	6	5	5.6	22
31-Jul	7	7	Z	12	13	20	28	30	24	10	7	2	2	2	3	3	22	13	11	9	27	14	5	29	13.1	30
8.1 11.5 12.0 11.2 11.6 11.1 11.2 12.1 12.7 10.7 6.1 5.4 5.5 5.9 6.4 7.6 8.6 8.0 9.3 8.1 12.1 12.0 10.6 11.2																								Diurnal Average		
31 48 43 67 79 55 45 37 91 75 31 32 26 35 38 40 43 31 37 32 43 48 39 36																								Diurnal Maximum		
Z - zerospan		C - Calibration																								





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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Shell Muskeg River - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	610	86.28	86.28
21 - 40	83	11.74	98.02
41 - 80	13	1.84	99.86
81 - 159	1	0.14	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Shell Muskeg River - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	14	11	36	24	19	16	10	31	83	111	82	48	43	36	27	16	607
21 - 40	26	27	7	0	0	1	1	1	5	5	0	2	0	1	1	6	83
11 - 80	4	1	1	0	0	1	0	0	0	0	0	0	0	0	1	5	13
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
<b>Totals</b>	44	40	44	24	19	18	11	32	88	116	82	50	43	37	29	27	704

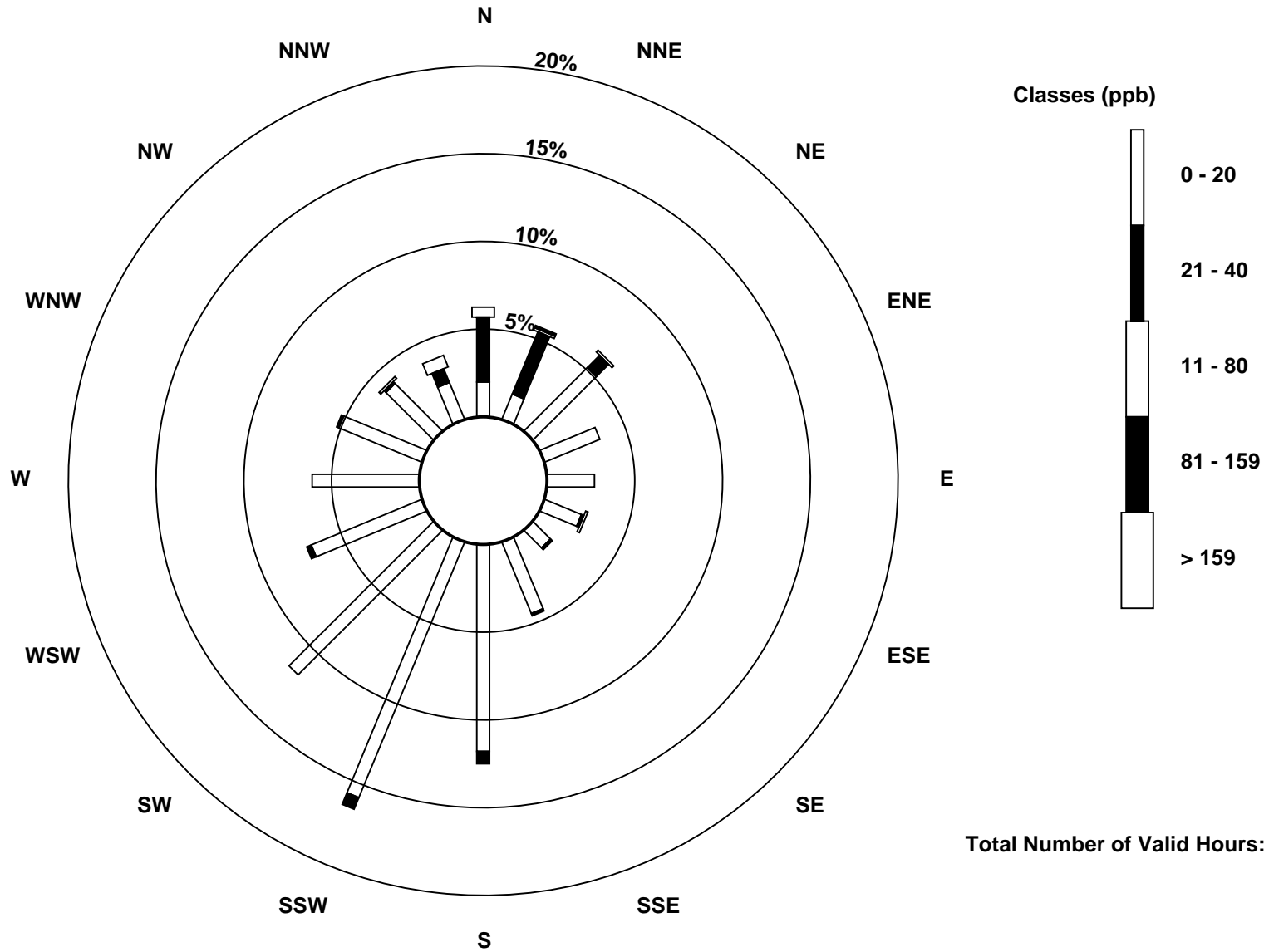
Total Number of Valid Hours: 704

Total Number of Hours: 744

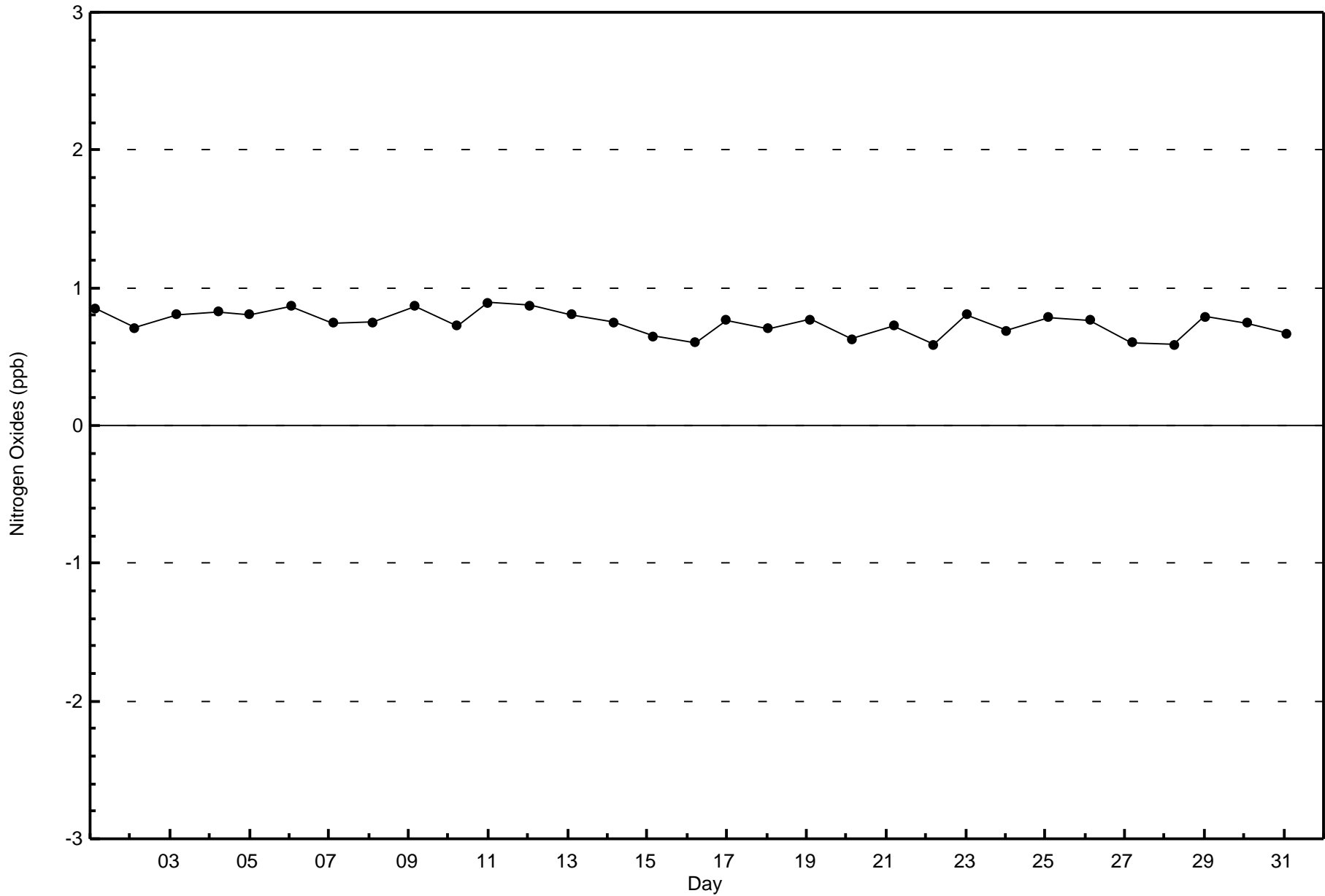


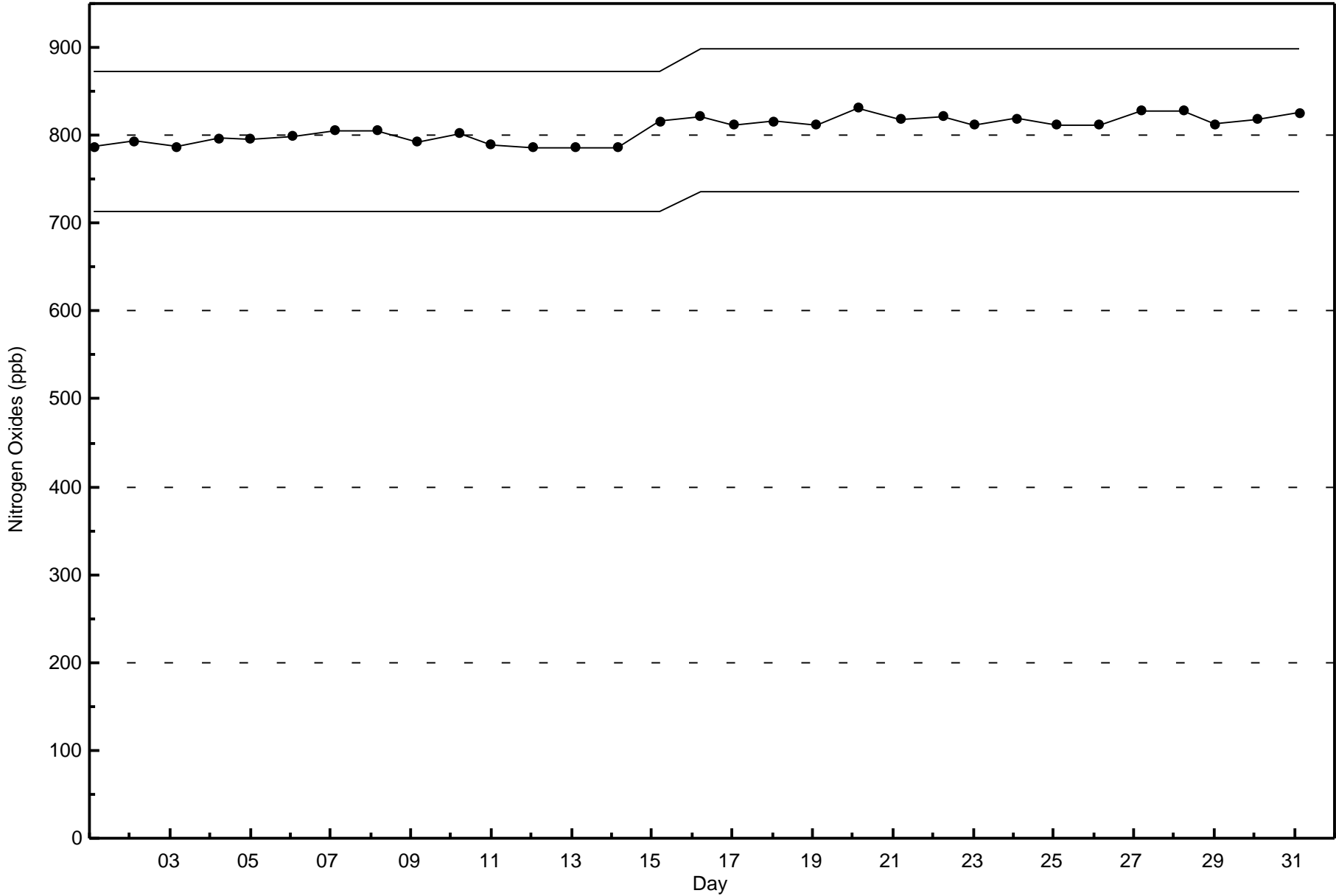
Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Shell Muskeg River (AMS 16)









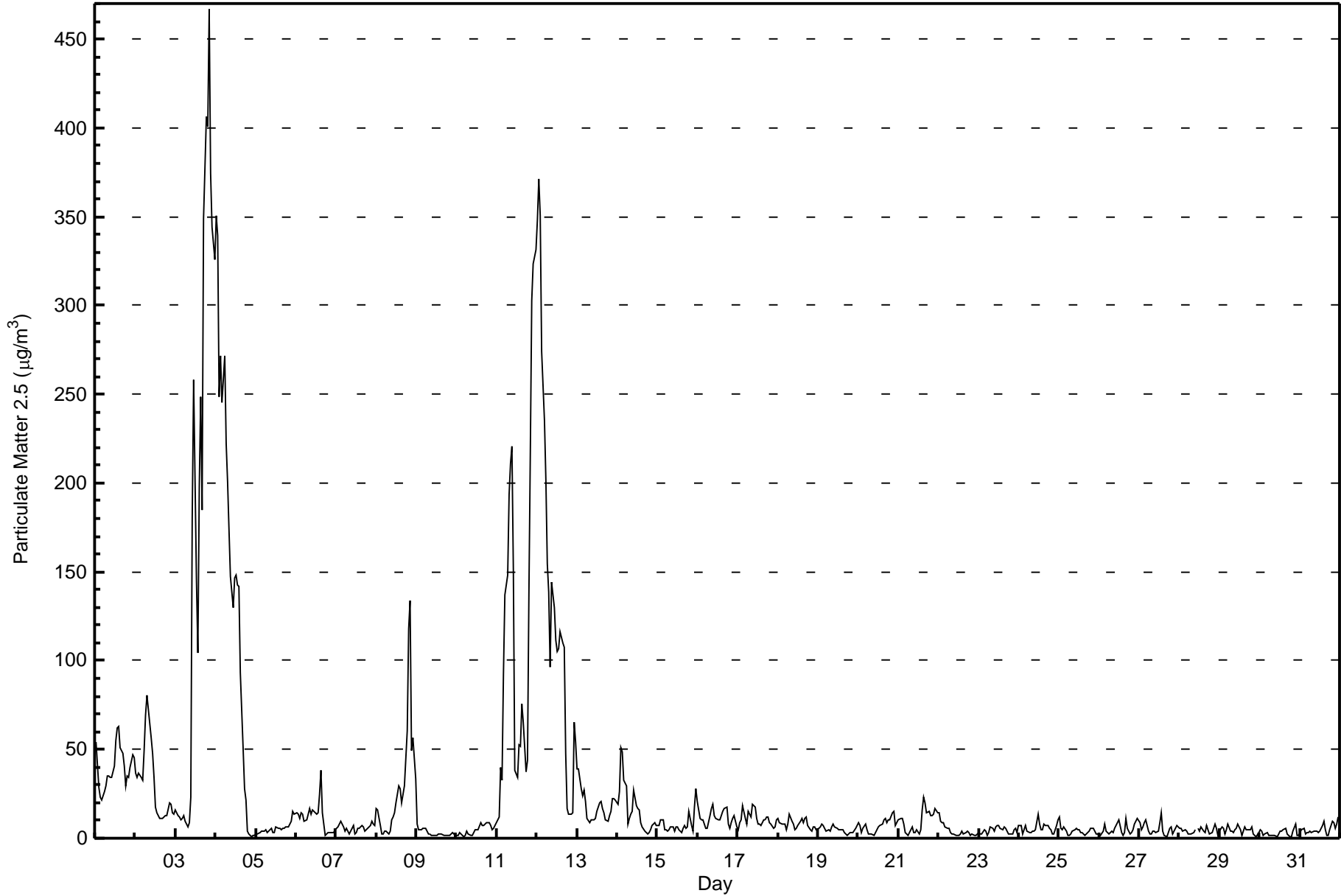


Number of Exceedences (AAAQO): 24-hr: 6		Hours in Service: 744																																															
Maximum Value: 466.8 µg/m <sup>3</sup> on Jul 3 21:00		Maximum Daily Average: 171.2 µg/m <sup>3</sup> on Jul 3																																															
Minimum Value: 0.7 µg/m <sup>3</sup> on Jul 30 19:00		Hours of Data: 743																																															
Maximum Diurnal Average: 33.9 µg/m <sup>3</sup> at hour 1		Hours of Missing Data: 1																																															
Monthly Average: 27.31 µg/m <sup>3</sup>		Hours of Calibration: 0																																															
Minimum Daily Average: 2.8 µg/m <sup>3</sup> on Jul 30		Percent Operational Time: 99.9																																															
Minimum Diurnal Average: 21.7 µg/m <sup>3</sup> at hour 17		Percentiles: P <sub>1</sub> = 1.2 P <sub>10</sub> = 2.3 Q <sub>1</sub> = 3.9 Median = 6.9 Q <sub>3</sub> = 14.5 P <sub>90</sub> = 53.6 P <sub>99</sub> = 349.7																																															
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-Jul	53.8	41.4	28.8	23.3	21.3	26.2	29.1	34.8	34.9	34.6	34.4	40.5	55.1	62.1	62.8	51.2	48.1	40.5	29.3	34.8	34.0	39.6	46.9	45.3	39.7	62.8																							
2-Jul	36.6	34.1	36.5	34.0	32.8	49.4	69.3	80.7	72.7	56.8	47.8	34.6	17.2	14.5	10.8	11.1	11.0	12.0	13.0	12.5	19.8	18.8	14.5	13.8	31.4	80.7																							
3-Jul	16.0	12.6	11.8	10.2	11.2	13.0	9.6	6.4	8.7	22.9	179.8	257.9	145.2	104.2	198.2	248.7	185.1	349.1	406.3	400.7	466.8	374.5	343.9	325.8	171.2	466.8																							
4-Jul	350.3	339.0	248.8	271.8	245.3	272.0	221.9	201.0	174.0	147.5	129.6	146.5	148.0	142.2	141.6	93.6	50.0	28.0	21.3	3.9	2.6	1.0	1.2	2.0	141.0	350.3																							
5-Jul	2.3	2.3	3.0	4.1	4.1	4.0	4.4	3.3	4.9	5.7	3.4	3.5	6.4	5.6	5.3	4.6	5.6	5.8	6.1	6.2	7.9	9.3	14.8	13.3	5.7	14.8																							
6-Jul	14.7	13.5	11.5	14.2	13.6	9.2	10.5	13.6	16.6	13.6	16.0	14.3	13.5	14.5	24.5	38.3	14.1	1.8	2.2	3.3	3.5	3.0	3.1	5.0	12.0	38.3																							
7-Jul	5.3	6.6	8.1	9.2	6.5	4.0	5.3	4.2	2.7	5.5	6.9	2.4	3.2	5.2	5.5	7.1	6.3	4.2	5.0	5.8	6.9	9.7	8.0	7.3	5.9	9.7																							
8-Jul	16.8	15.8	7.1	2.5	2.6	3.8	4.0	2.2	4.3	10.0	11.8	14.5	19.7	29.1	28.1	19.7	24.5	29.1	60.7	117.7	133.8	49.2	56.4	33.7	29.0	133.8																							
9-Jul	7.6	4.8	4.6	5.1	5.8	5.3	3.7	2.2	2.2	2.0	1.7	1.9	1.8	2.2	2.2	2.2	1.7	1.4	1.6	1.4	1.8	3.1	2.5	1.1	2.9	7.6																							
10-Jul	1.2	1.8	3.2	1.4	1.1	2.0	3.7	2.6	1.6	1.9	3.6	4.6	4.9	4.8	8.9	7.1	7.4	7.6	9.1	8.7	7.0	4.9	5.9	7.2	4.7	9.1																							
11-Jul	8.9	11.8	40.0	32.8	92.1	136.8	148.5	193.3	211.5	220.6	151.0	37.9	34.4	52.2	52.1	75.4	65.2	37.1	43.8	138.0	217.4	302.3	323.6	331.6	123.3	331.6																							
12-Jul	348.0	371.3	350.9	274.4	235.0	201.4	154.3	138.8	96.4	144.4	130.1	111.4	104.9	106.4	116.2	110.1	107.7	48.1	16.4	13.5	13.3	14.7	65.3	54.3	138.6	371.3																							
13-Jul	39.1	38.9	27.5	24.1	27.0	20.7	11.1	8.5	10.6	10.0	10.6	11.3	15.5	20.0	20.9	16.4	14.3	10.3	9.9	12.6	14.9	22.1	22.2	21.9	18.4	39.1																							
14-Jul	18.7	26.6	50.9	48.3	32.8	29.4	7.7	10.8	13.9	15.4	26.9	18.2	16.7	15.9	9.0	6.4	4.2	3.0	2.4	3.0	4.9	6.8	8.9	7.0	16.2	50.9																							
15-Jul	7.2	6.9	10.3	10.0	5.1	5.1	3.9	4.4	6.7	6.1	4.3	6.4	6.0	4.4	3.3	5.4	7.4	5.8	6.3	14.8	7.3	3.7	17.3	27.7	7.7	27.7																							
16-Jul	20.8	11.2	10.6	10.3	8.0	5.3	5.2	12.7	16.5	19.0	12.4	11.0	10.3	10.5	12.9	15.1	16.3	17.9	8.3	5.9	8.9	11.5	12.9	6.1	11.6	20.8																							
17-Jul	4.8	8.7	10.2	18.4	10.8	8.3	14.7	13.9	12.1	19.1	17.6	11.5	8.1	7.9	7.6	10.0	10.8	11.8	11.6	9.0	8.3	5.8	6.4	10.4	10.7	19.1																							
18-Jul	11.1	8.6	8.2	8.3	8.3	4.5	8.2	13.6	9.7	8.2	4.9	5.5	7.0	9.9	10.8	8.4	10.8	12.2	7.0	5.0	4.3	6.6	6.5	5.0	8.0	13.6																							
19-Jul	5.4	6.6	7.6	7.0	5.4	4.2	4.6	4.0	6.6	8.1	6.2	5.9	4.8	4.4	4.5	4.9	2.9	1.7	2.8	2.9	3.2	3.4	5.8	6.9	5.0	8.1																							
20-Jul	9.1	6.9	3.2	5.3	7.6	4.5	2.3	2.5	2.2	1.9	3.0	4.9	6.5	7.3	7.8	10.2	11.2	8.6	10.3	10.3	14.6	14.8	7.3	8.5	7.1	14.8																							
21-Jul	10.3	11.3	10.8	7.9	3.3	2.4	1.8	5.1	6.1	3.2	3.6	4.8	2.5	5.2	15.6	22.9	19.8	14.5	15.3	12.7	13.0	13.5	16.4	14.5	9.9	22.9																							
22-Jul	14.2	9.3	8.5	8.8	6.7	5.7	5.3	2.8	2.2	2.2	1.5	1.7	1.9	2.7	3.8	2.5	3.2	3.8	2.8	1.7	2.5	1.6	1.6	2.7	4.2	14.2																							
23-Jul	3.5	2.0	2.3	5.1	4.0	1.6	3.5	6.2	5.3	4.2	6.1	7.3	6.9	5.2	4.6	6.3	5.5	4.3	2.2	2.4	2.7	4.5	5.3	3.3	4.3	7.3																							
24-Jul	7.3	6.8	2.7	4.6	7.1	4.1	3.4	3.2	4.1	4.3	4.6	13.3	8.2	4.5	4.8	7.7	7.1	6.9	5.5	5.1	2.3	2.7	7.6	10.5	5.8	13.3																							
25-Jul	12.1	5.8	4.7	6.0	3.6	1.4	1.3	2.6	4.0	4.5	5.6	4.6	4.4	2.9	3.1	1.7	2.7	3.3	3.7	5.8	5.8	4.4	2.7	2.1	4.1	12.1																							
26-Jul	1.5	1.9	4.1	7.7	3.7	2.8	2.6	4.3	2.9	5.6	7.4	8.9	10.0	3.4	1.6	3.2	10.9	5.6	2.1	3.0	4.7	7.7	9.8	11.0	5.3	11.0																							
27-Jul	8.5	4.6	6.6	8.5	10.2	4.0	2.4	2.3	4.0	3.8	3.3	4.4	8.8	14.1	3.7	1.4	1.2	2.9	5.3	6.2	2.4	4.0	7.2	6.5	5.3	14.1																							
28-Jul	5.4	5.6	4.1	5.1	4.0	2.3	2.3	2.1	3.4	4.7	M	5.4	4.2	6.6	3.8	2.8	7.3	4.6	2.1	2.8	5.9	8.0	5.8	1.8	4.4	8.0																							
29-Jul	3.9	6.2	5.8	2.7	4.7	8.3	3.9	3.8	3.1	4.6	5.8	7.9	4.9	1.6	3.9	6.0	5.1	5.0	5.1	6.6	2.8	1.3	1.1	3.0	4.5	8.3																							
30-Jul	4.9	4.1	1.2	2.6	3.0	1.4	1.5	1.6	1.5	1.3	1.0	2.5	4.0	3.8	4.8	5.9	2.4	1.5	0.7	0.9	4.2	7.8	1.8	1.7	2.8	7.8																							
31-Jul	3.0	4.6	5.7	2.8	3.0	3.1	3.6	3.6	3.7	4.2	3.8	3.0	4.3	7.3	9.3	4.6	1.9	1.7	4.9	9.3	8.7	5.5	8.3	12.3	5.1	12.3																							
																								33.9	33.3	30.3	28.3	26.8	27.3	24.3	25.5	24.2	25.7	28.2	26.1	22.2	22.0	25.5	26.2	21.7	22.3	23.3	28.0	33.4	31.1	33.6	32.4	Diurnal Average	
																								350.3	371.3	350.9	274.4	245.3	272.0	221.9	201.0	211.5	220.6	179.8	257.9	148.0	142.2	198.2	248.7	185.1	349.1	406.3	400.7	466.8	374.5	343.9	331.6	Diurnal Maximum	
M - Maintenance																																																	
Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m <sup>3</sup>																																																	



Wood Buffalo Environmental Association  
Hourly Averages

Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
Shell Muskeg River - July 2015





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

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Shell Muskeg River - July 2015**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
1 - 5	301	40.51	40.51
6 - 15	268	36.07	76.58
16 - 25	42	5.65	82.23
26 - 80	67	9.02	91.25
> 81.0	62	8.34	99.60

Total Number of Valid Hours: 743

Total Number of Hours: 744



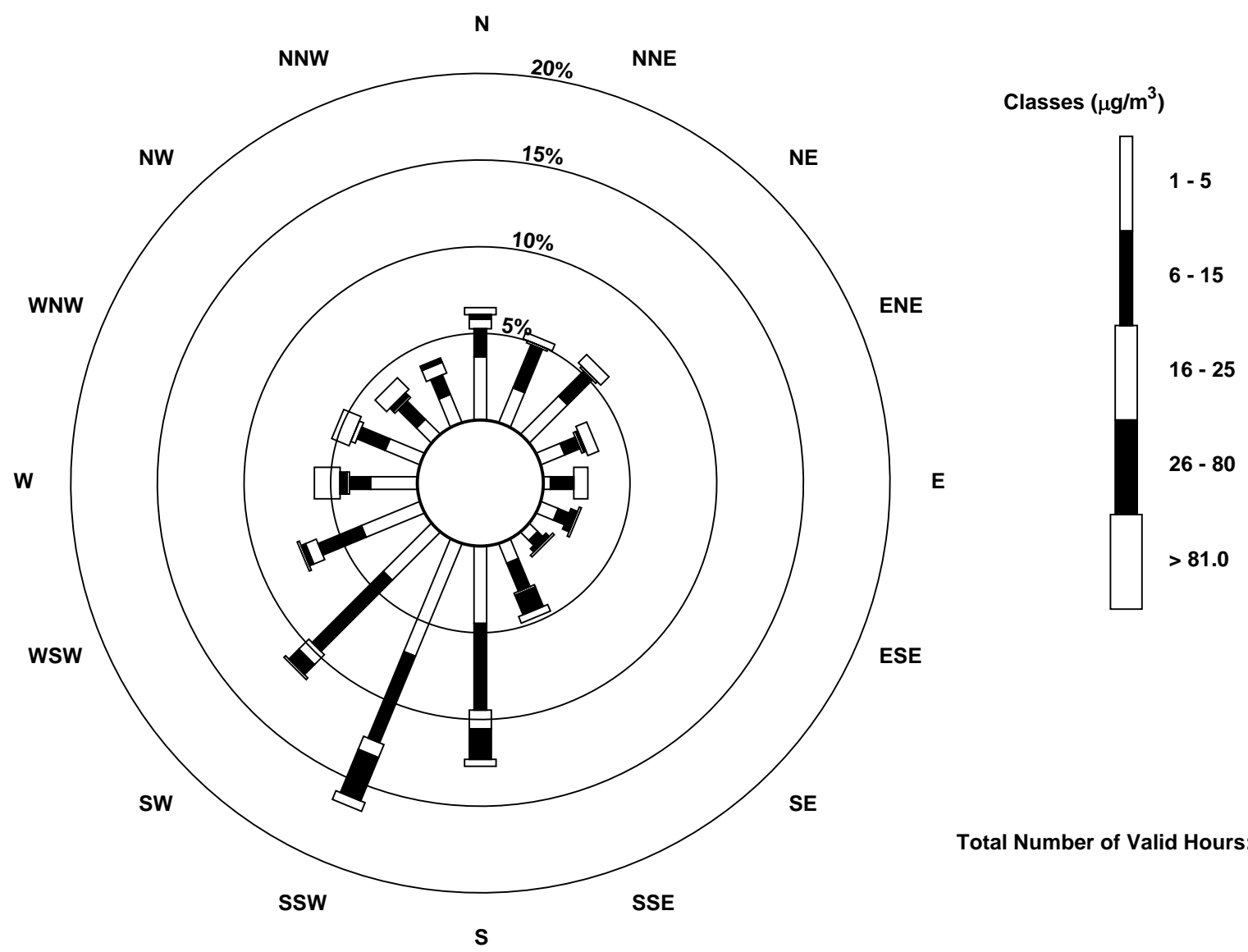
**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) - μg/m<sup>3</sup>**  
**Shell Muskeg River - July 2015**

Concentration Ranges (μg/m <sup>3</sup> )	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	27	16	23	11	3	8	5	9	33	52	29	27	20	16	9	13	301
6 - 15	12	20	15	7	10	5	3	13	37	40	43	20	9	13	11	9	267
16 - 25	4	1	1	1	0	0	0	1	8	6	6	5	1	2	1	5	42
26 - 80	2	0	0	1	0	3	2	9	13	20	6	2	3	0	2	2	65
> 81.0	3	3	5	5	6	1	1	3	3	4	1	1	11	8	7	0	62
<b>Totals</b>	48	40	44	25	19	17	11	35	94	122	85	55	44	39	30	29	737

Total Number of Valid Hours: 740

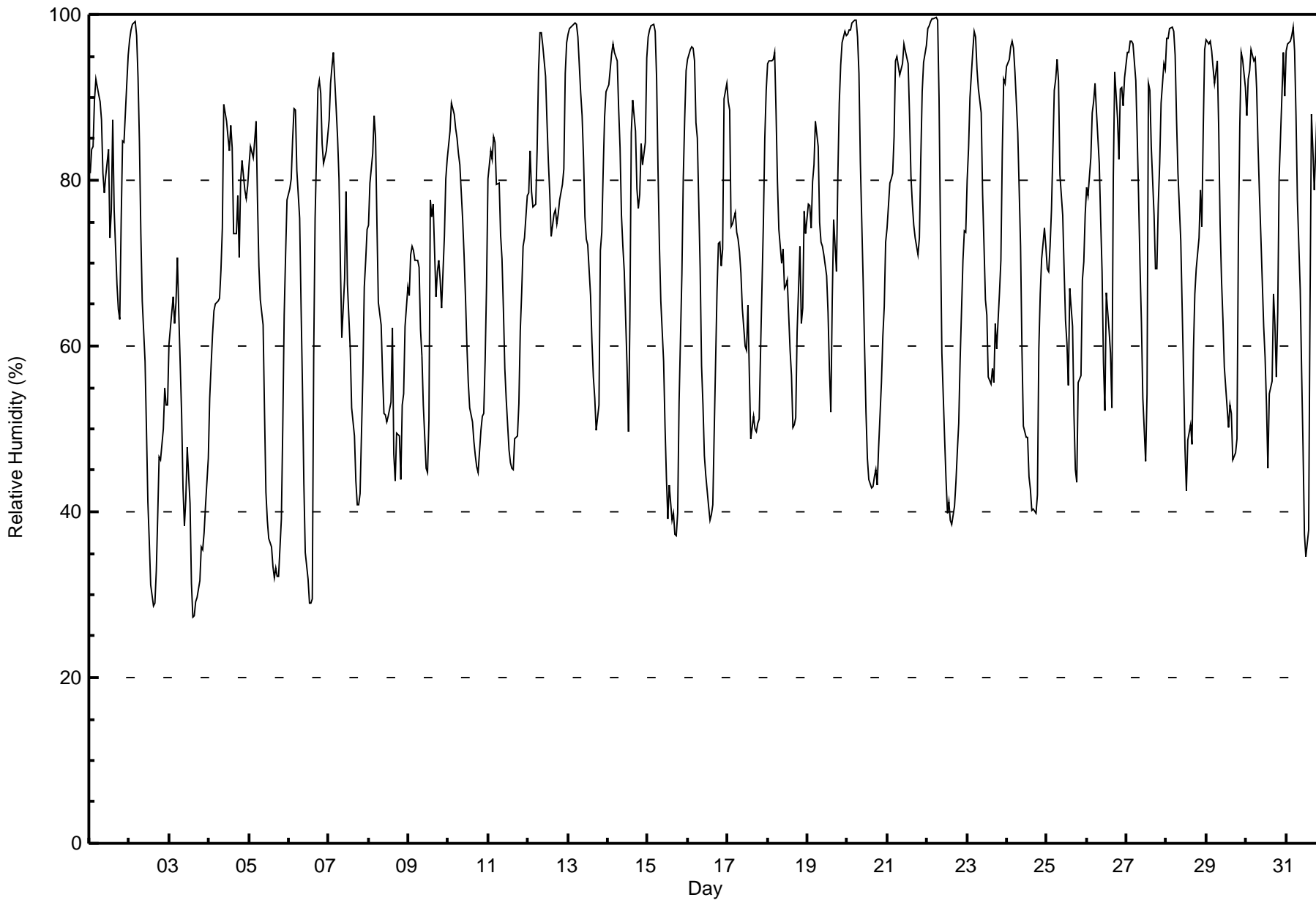
Total Number of Hours: 744





Maximum Value: 100 % on Jul 22 06:00																		Maximum Daily Average: 85.7 % on Jul 21																		Hours in Service: 744			
Minimum Value: 27 % on Jul 3 15:00																		Minimum Daily Average: 45.4 % on Jul 3																		Hours of Data: 744			
Maximum Diurnal Average: 89.3 % at hour 5																		Minimum Diurnal Average: 55.0 % at hour 13																		Hours of Missing Data: 0			
Monthly Average: 71.4 %																		Percentiles: P <sub>1</sub> = 29 P <sub>10</sub> = 44 Q <sub>1</sub> = 56 Median = 73 Q <sub>3</sub> = 88 P <sub>90</sub> = 95 P <sub>99</sub> = 99																		Hours of Calibration: 0			
																																				Percent Operational Time: 100.0			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24															
1-Jul	81	84	84	90	92	90	89	87	81	78	81	84	73	76	87	77	67	64	63	75	85	85	92	95	81.7	95													
2-Jul	97	98	99	99	97	92	85	73	65	58	50	41	36	31	29	29	33	39	47	46	50	55	53	53	60.7	99													
3-Jul	60	64	66	63	65	71	64	52	43	38	42	48	41	31	27	27	29	30	32	36	35	37	41	46	45.4	71													
4-Jul	54	58	61	64	65	65	66	69	74	89	87	85	83	87	84	74	74	78	71	80	82	79	78	79	74.4	89													
5-Jul	82	84	83	85	87	78	70	66	63	52	42	39	37	36	33	32	33	32	32	39	50	64	71	78	56.9	87													
6-Jul	79	80	85	89	88	81	75	65	55	43	35	32	29	29	29	59	75	91	92	91	84	82	84	85	68.3	92													
7-Jul	87	92	94	95	89	85	80	70	61	68	79	67	64	60	53	49	44	41	41	42	57	67	70	74	67.8	95													
8-Jul	75	80	83	88	85	75	65	63	57	52	52	51	52	53	62	47	44	49	49	44	53	54	62	67	60.9	88													
9-Jul	66	71	72	72	70	70	69	62	59	53	45	45	51	78	76	77	66	69	70	68	65	73	80	82	67.1	82													
10-Jul	84	86	89	88	86	85	83	82	75	71	66	60	56	53	51	48	47	45	45	50	52	52	58	67	65.8	89													
11-Jul	80	84	83	85	85	79	80	73	70	64	57	54	47	46	45	45	49	49	53	62	67	72	73	78	65.9	85													
12-Jul	78	83	79	77	77	84	93	98	98	96	93	87	82	78	73	76	76	75	76	78	79	81	93	97	83.7	98													
13-Jul	98	98	99	99	99	99	97	91	88	83	76	73	72	66	61	56	54	50	53	72	74	81	88	91	79.8	99													
14-Jul	91	93	95	96	96	94	89	84	76	72	69	58	50	63	86	90	86	79	77	78	84	82	85	95	81.9	96													
15-Jul	97	98	99	99	98	92	81	72	65	58	50	44	39	43	39	40	37	37	40	53	69	80	87	93	67.2	99													
16-Jul	94	96	96	96	94	87	85	69	58	53	47	44	41	39	40	41	50	67	72	72	70	72	90	92	69.3	96													
17-Jul	89	88	74	75	76	74	73	71	69	65	60	59	65	57	49	52	50	50	51	51	59	75	85	91	67.0	91													
18-Jul	94	94	94	95	95	88	80	74	70	72	67	67	68	59	56	50	50	51	62	72	63	65	76	74	72.4	95													
19-Jul	77	77	74	80	82	87	84	75	73	72	71	68	64	57	52	66	75	69	81	89	94	97	98	97	77.5	98													
20-Jul	98	98	98	99	99	99	97	93	82	68	60	52	46	44	43	43	44	45	43	48	56	61	65	72	68.9	99													
21-Jul	74	80	80	81	85	94	95	93	93	94	97	96	94	88	81	77	75	73	71	73	83	91	94	96	85.7	97													
22-Jul	98	99	99	99	100	100	99	90	74	59	49	44	40	41	39	38	41	44	47	51	58	70	74	74	67.7	100													
23-Jul	80	84	90	96	98	97	93	91	88	78	72	66	64	56	55	57	56	63	60	66	70	83	92	92	77.0	98													
24-Jul	94	95	96	97	96	93	86	79	72	60	50	49	44	43	40	40	40	42	60	66	71	74	72	72	67.0	97													
25-Jul	69	69	72	76	91	92	95	92	81	76	69	63	60	55	67	62	52	45	44	56	56	68	70	76	69.0	95													
26-Jul	79	78	83	88	89	92	88	82	75	69	58	52	66	62	59	53	80	93	87	82	91	91	89	92	78.4	93													
27-Jul	95	95	97	97	96	92	85	78	70	63	54	46	54	92	91	84	76	69	69	77	82	89	94	93	80.8	97													
28-Jul	97	97	98	99	98	95	87	81	73	65	56	48	43	49	51	48	59	66	69	73	79	74	86	96	74.4	99													
29-Jul	97	96	97	96	94	92	94	86	75	68	63	57	53	50	53	52	46	47	49	73	86	95	95	91	75.2	97													
30-Jul	88	92	93	96	94	95	91	84	78	73	62	59	53	45	54	56	66	63	56	64	80	90	96	90	75.8	96													
31-Jul	96	96	97	98	99	96	88	78	67	57	48	37	35	38	65	88	84	79	84	94	95	97	96	91	79.1	99													
																		84.9																		Diurnal Average			
																		98																		Diurnal Maximum			







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

**Relative Humidity (RH) - %**  
**Shell Muskeg River - July 2015**

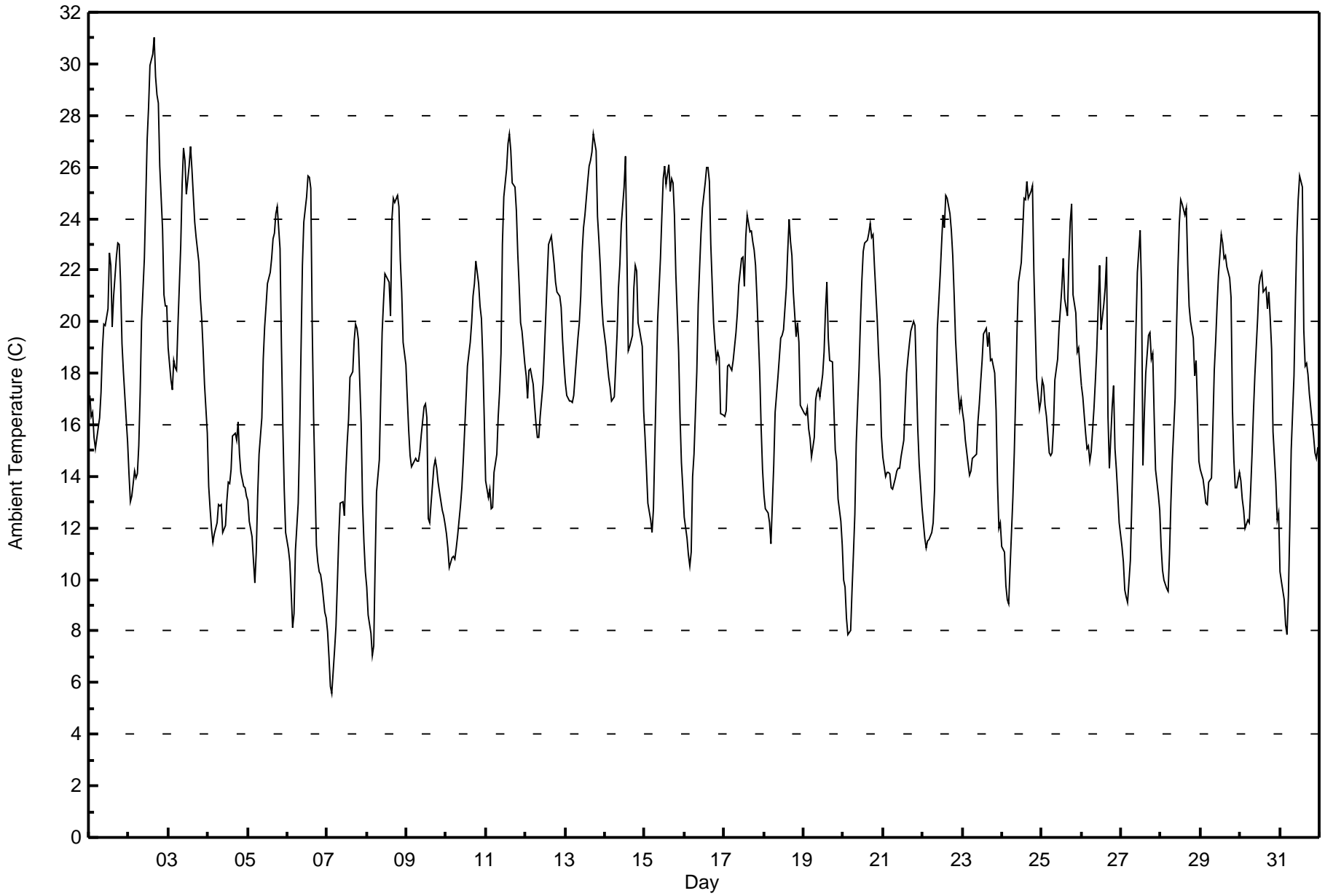
<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	45	6.05	6.05
40 - 60	175	23.52	29.57
60 - 80	239	32.12	61.69
80 - 100	285	38.31	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Maximum Value: 31.0 C on Jul 2 16:00		Maximum Daily Average: 22.0 C on Jul 2		Hours in Service: 744																																												
Minimum Value: 5.6 C on Jul 7 04:00		Minimum Daily Average: 13.0 C on Jul 7		Hours of Data: 744																																												
Maximum Diurnal Average: 22.0 C at hour 16		Minimum Diurnal Average: 12.5 C at hour 5		Hours of Missing Data: 0																																												
Monthly Average: 17.69 C		Percentiles: P <sub>1</sub> = 7.8 P <sub>10</sub> = 11.4 Q <sub>1</sub> = 14.1 Median = 17.7 Q <sub>3</sub> = 21.3 P <sub>90</sub> = 24.1 P <sub>99</sub> = 28.1		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-Jul	17.2	16.3	16.5	15.5	15.1	15.9	16.3	17.2	18.9	19.9	19.9	20.5	22.7	22.2	19.8	21.0	22.5	23.0	23.0	21.5	19.1	18.1	16.2	15.4	18.9	23.0																						
2-Jul	14.1	13.0	13.2	14.2	13.9	14.1	15.2	17.2	20.0	22.5	24.7	27.1	28.3	29.9	30.4	31.0	29.5	28.8	28.5	26.0	23.6	21.0	20.6	20.6	22.0	31.0																						
3-Jul	19.0	17.8	17.4	18.5	18.2	18.1	19.8	22.9	25.4	26.7	26.2	25.0	26.0	26.8	25.9	24.9	23.9	23.3	22.3	21.0	20.1	18.9	17.6	15.7	21.7	26.8																						
4-Jul	13.6	12.7	12.0	11.4	11.8	12.2	12.9	12.9	12.9	11.8	12.1	13.1	13.8	13.7	14.2	15.5	15.7	15.4	16.1	14.9	14.2	13.6	13.5	13.2	13.5	16.1																						
5-Jul	13.0	12.2	11.7	10.7	9.9	11.1	13.2	14.8	16.3	18.5	19.8	20.6	21.5	21.9	22.4	23.2	23.4	24.2	24.5	22.8	19.1	16.0	13.5	11.8	17.3	24.5																						
6-Jul	11.2	10.7	9.5	8.1	8.7	11.1	13.0	15.5	18.9	22.2	23.9	24.8	25.6	25.6	25.2	19.9	16.3	11.3	10.7	10.3	10.2	9.8	8.7	8.5	15.0	25.6																						
7-Jul	8.0	7.0	5.8	5.6	7.2	8.2	9.9	11.7	13.0	13.0	12.5	14.1	15.3	16.2	17.9	18.1	19.2	19.9	19.7	19.3	16.1	13.0	11.5	10.3	13.0	19.9																						
8-Jul	9.7	8.6	7.9	7.1	7.4	10.6	13.4	14.6	17.1	19.6	20.8	21.9	21.8	21.5	20.2	24.0	24.8	24.6	24.9	24.5	22.4	21.2	19.2	18.3	17.8	24.9																						
9-Jul	17.0	15.8	14.8	14.4	14.5	14.7	14.6	14.6	15.0	15.6	16.7	16.8	16.3	12.3	12.2	13.0	14.4	14.6	14.3	13.8	13.4	12.7	12.5	12.2	14.4	17.0																						
10-Jul	11.8	11.2	10.5	10.9	10.9	10.8	11.2	11.7	12.9	13.6	14.6	15.8	17.0	18.3	19.2	20.0	21.0	21.5	22.4	21.5	20.6	20.1	18.5	16.3	15.9	22.4																						
11-Jul	13.8	13.2	13.5	12.7	12.8	14.2	14.9	16.3	17.3	18.8	23.0	24.9	25.9	26.9	27.3	26.6	25.4	25.2	24.3	22.6	21.4	20.0	19.6	18.4	20.0	27.3																						
12-Jul	17.9	17.0	18.1	18.2	17.6	16.8	16.1	15.5	15.5	16.3	17.6	18.8	20.2	21.6	23.0	23.3	22.8	22.2	21.5	21.1	21.0	20.5	19.3	18.4	19.2	23.3																						
13-Jul	17.6	17.1	16.9	16.9	16.9	17.2	17.9	19.3	19.9	21.0	22.7	23.7	24.1	25.4	26.0	26.3	26.6	27.3	26.6	24.1	23.1	22.1	20.8	19.9	21.6	27.3																						
14-Jul	19.0	18.4	17.9	17.5	16.9	17.1	18.3	19.5	21.3	22.2	23.7	25.2	26.4	22.7	18.9	19.0	19.5	21.3	22.2	21.9	19.9	19.7	19.1	16.6	20.2	26.4																						
15-Jul	15.5	14.3	12.9	12.3	11.8	12.8	15.3	17.6	20.1	22.5	24.1	25.6	26.1	25.3	26.1	25.0	25.5	25.4	24.1	21.9	18.8	16.3	14.5	13.6	19.5	26.1																						
16-Jul	12.4	11.6	10.9	10.5	11.0	14.0	14.8	18.1	20.7	22.1	23.4	24.4	25.4	26.0	26.0	25.4	23.0	20.0	19.2	18.5	18.8	18.6	16.4	16.4	18.7	26.0																						
17-Jul	16.3	16.5	18.3	18.3	18.1	18.5	19.0	19.6	20.3	21.4	22.5	22.5	21.4	23.2	24.1	23.5	23.5	23.1	22.8	22.2	20.9	18.0	15.9	14.3	20.2	24.1																						
18-Jul	13.3	12.7	12.6	12.2	11.4	12.9	14.4	16.5	17.9	18.6	19.4	19.5	19.7	21.3	22.8	24.0	23.1	22.6	21.2	19.4	19.9	19.2	16.8	16.7	17.8	24.0																						
19-Jul	16.4	16.4	16.7	15.8	15.4	14.8	15.5	17.0	17.3	17.4	17.1	17.9	18.8	20.4	21.6	19.4	18.5	18.4	16.7	15.0	14.6	13.1	12.2	11.3	16.6	21.6																						
20-Jul	10.0	9.7	8.5	7.8	8.0	9.6	11.0	12.5	15.3	18.2	20.0	21.6	22.7	23.1	23.2	23.4	23.8	23.3	23.3	22.2	20.1	18.7	17.7	15.6	17.1	23.8																						
21-Jul	14.8	14.0	14.2	14.1	14.1	13.6	13.5	13.9	14.2	14.3	14.3	14.8	15.4	16.8	18.0	18.6	19.2	19.6	20.0	19.8	17.8	15.8	14.5	12.8	15.8	20.0																						
22-Jul	12.2	11.6	11.2	11.5	11.5	11.8	12.2	13.5	16.9	19.8	21.8	23.0	24.1	23.6	24.9	24.8	24.2	23.5	22.6	21.0	19.3	17.3	16.6	17.0	18.2	24.9																						
23-Jul	16.5	16.1	15.4	14.5	14.0	14.2	14.7	14.8	14.8	16.1	16.8	17.7	18.5	19.5	19.7	19.1	19.6	18.5	18.5	18.0	16.5	13.8	12.0	12.2	16.3	19.7																						
24-Jul	11.3	11.1	9.8	9.2	9.1	10.5	13.2	14.9	17.2	19.7	21.5	22.3	23.5	24.8	24.7	25.4	24.8	25.0	25.3	21.9	19.8	17.8	16.6	16.9	18.2	25.4																						
25-Jul	17.7	17.5	16.8	16.3	14.9	14.8	14.9	15.9	17.7	18.6	19.8	20.5	21.3	22.4	20.9	20.2	22.3	23.9	24.6	21.0	20.4	18.8	19.0	18.2	19.1	24.6																						
26-Jul	17.5	17.1	15.7	15.1	15.2	14.6	15.0	16.6	17.7	18.9	20.6	22.2	19.7	20.7	21.3	22.5	16.3	14.3	16.7	17.5	15.1	14.2	13.3	12.2	17.1	22.5																						
27-Jul	11.3	10.7	9.6	9.3	9.1	10.7	12.9	15.2	17.4	19.7	21.9	23.5	21.2	14.4	16.4	18.0	19.5	19.6	18.5	18.8	16.4	14.3	13.3	12.7	15.6	23.5																						
28-Jul	11.3	10.4	10.0	9.7	9.6	11.0	13.0	14.6	17.0	19.8	22.0	23.8	24.7	24.6	24.1	24.4	22.2	20.6	20.0	19.4	17.9	18.5	16.7	14.6	17.5	24.7																						
29-Jul	14.3	13.9	13.5	13.0	12.9	13.8	14.0	16.0	18.1	19.3	20.6	21.8	23.4	23.0	22.5	22.6	22.1	21.7	20.9	16.6	14.7	13.5	13.6	14.2	17.5	23.4																						
30-Jul	13.9	13.1	12.7	12.0	12.3	12.2	13.5	14.9	16.5	17.9	20.1	21.4	21.8	21.9	21.1	21.3	20.5	21.2	20.1	18.9	15.7	13.8	12.3	12.6	16.7	21.9																						
31-Jul	10.3	9.9	9.2	8.3	7.9	9.4	12.1	15.0	17.9	20.8	23.3	24.7	25.7	25.2	19.7	18.3	18.4	18.0	17.2	16.1	15.6	14.9	14.7	15.1	16.1	25.7																						
																								14.1	13.5	13.0	12.6	12.5	13.3	14.4	15.8	17.5	18.9	20.2	21.3	21.9	22.0	21.9	22.0	21.7	21.3	21.1	19.8	18.3	16.9	15.7	14.9	Diurnal Average
																								19.0	18.4	18.3	18.5	18.2	18.5	19.8	22.9	25.4	26.7	26.2	27.1	28.3	29.9	30.4	31.0	29.5	28.8	28.5	26.0	23.6	22.1	20.8	20.6	Diurnal Maximum





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C  
Shell Muskeg River - July 2015**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	39	5.24	5.24
10 - 20	469	63.04	68.28
> 20	236	31.72	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

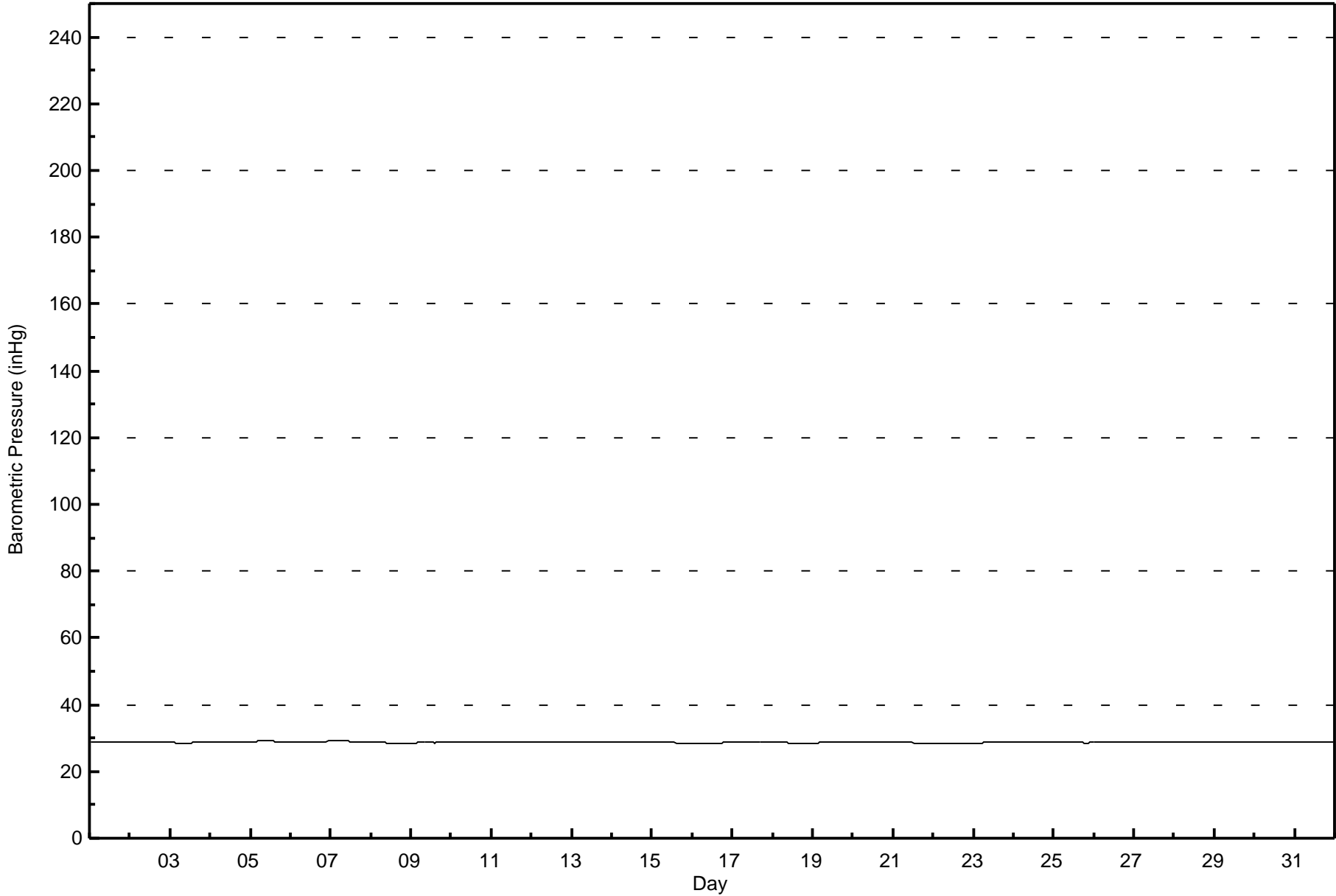


Maximum Value: 29.1 inHg on Jul 5 08:00      Maximum Daily Average: 29.0 inHg on Jul 5																						Hours in Service:	744								
Minimum Value: 28.4 inHg on Jul 8 18:00      Minimum Daily Average: 28.5 inHg on Jul 22																						Hours of Data:	744								
Maximum Diurnal Average: 28.8 inHg at hour 8      Minimum Diurnal Average: 28.7 inHg at hour 19																						Hours of Missing Data:	0								
Monthly Average: 28.73 inHg      Percentiles: P <sub>1</sub> = 28.4 P <sub>10</sub> = 28.6 Q <sub>1</sub> = 28.6 Median = 28.7 Q <sub>3</sub> = 28.8 P <sub>90</sub> = 28.9 P <sub>99</sub> = 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-Jul	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	28.8	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.9				
2-Jul	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	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.6	28.7			
3-Jul	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.5	28.5	28.5	28.5	28.6	28.6	28.6	28.6	28.6	28.6	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.6	28.7		
4-Jul	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.8	28.7	28.8	28.7	28.8	28.7	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.9	29.0	29.0	28.8	28.9		
5-Jul	29.0	29.0	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.1	29.1	29.0	29.0	29.0	29.0	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	
6-Jul	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	28.9	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	
7-Jul	29.0	29.0	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.0	29.0	29.0	29.0	29.0	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	
8-Jul	28.8	28.8	28.7	28.7	28.7	28.7	28.7	28.6	28.6	28.6	28.5	28.5	28.5	28.5	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.5	28.5	28.5	28.5	28.5	
9-Jul	28.5	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	
10-Jul	28.7	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	
11-Jul	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	
12-Jul	28.7	28.7	28.7	28.6	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.6	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	
13-Jul	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	
14-Jul	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	
15-Jul	28.6	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	
16-Jul	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.5	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	
17-Jul	28.6	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.7	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	
18-Jul	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.6	28.6	28.6	28.5	28.5	28.5	28.5	28.5	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.5	28.5	28.5	28.5	
19-Jul	28.5	28.5	28.6	28.6	28.6	28.6	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.8	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	
20-Jul	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.7	28.9	
21-Jul	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	
22-Jul	28.6	28.6	28.5	28.5	28.5	28.5	28.6	28.6	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	
23-Jul	28.5	28.5	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.7	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	
24-Jul	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	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.7
25-Jul	28.6	28.6	28.6	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6
26-Jul	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	28.6	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
27-Jul	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7
28-Jul	28.7	28.7	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7
29-Jul	28.7	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8
30-Jul	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	28.9	28.9	28.9	28.9	28.9
31-Jul	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	28.9	28.9	28.9	28.9	28.9	28.9	28.9
																								Diurnal Average	28.7						
																								Diurnal Maximum	29.0						



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

**Barometric Pressure (BP) - inHg**  
**Shell Muskeg River - July 2015**





Maximum Speed: 28 km/h on Jul 3 10:00	Maximum Daily Speed Average: 13.9 km/h on Jul 17	Hours in Service: 744
Minimum Speed Value: 0 km/h on Jul 25 19:00	Minimum Daily Speed Average: 1.3 km/h on Jul 28	Hours of Data: 741
Maximum Diurnal Speed Average: 4.1 km/h at hour 14	Minimum Diurnal Speed Average: 0.9 km/h at hour 23	Hours of Missing Data: 3
Monthly Average Velocity: 2.1 km/h 260.9 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 3 Q <sub>1</sub> = 5 Median = 8 Q <sub>3</sub> = 11 P <sub>90</sub> = 16 P <sub>99</sub> = 24	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-Jul	SSE4	SSW3	SW7	SW7	S5	S6	S5	S5	SSW3	SSW4	SW7	SSW6	SW9	W11	NW8	SSW3	AF	AF	S1	S2	SSW6	SW5	SSW6	S4	SSW4.4	W11	
2-Jul	S4	SSW6	SSW7	SSW9	SSW8	SSW9	SSW11	SSW9	SSW5	S6	SSW6	SSW4	W3	WSW7	SW15	SW19	SW14	SW3	SW1	SSW6	S7	SSW8	SSW9	S9	SSW7.3	SW19	
3-Jul	S8	S8	S9	S10	S8	SSE6	S8	SW17	WSW25	WSW28	W24	WNW25	NW16	NW22	NW27	WNW24	WNW20	WNW22	WNW14	NW10	NW14	WNW13	WNW15	W13	W11.9	WSW28	
4-Jul	W11	W11	W13	W18	W16	W14	W13	WSW10	SW10	S7	SSW8	SSW6	S5	S2	E6	NE11	N5	W7	NNW12	NNW13	N18	NNE21	N18	N14	NNW5.5	NNE21	
5-Jul	N13	N13	N13	NNW11	NNW7	NW8	WNW5	WSW7	WSW6	NNW7	NNE14	NNE11	NNE10	NE10	NNE7	NNW8	NW4	NW4	ESE1	ESE4	SSE3	S3	S6	SSE5	N4.5	NNE14	
6-Jul	S7	S7	SSW7	SSW7	S8	SSW7	SSW8	SSW10	SSW9	SW17	WSW23	SW23	SW21	WSW23	WSW17	N21	NNE24	NNE24	N19	N20	N16	NNW10	NW10	WNW9	W5.4	NNE24	
7-Jul	WNW9	WNW9	WSW8	W5	WNW7	WSW5	WSW9	W7	W5	SSW8	SW10	SSW11	SSW13	SW13	SW14	WSW15	WSW15	W17	WSW16	WSW15	SSW7	SSW8	S9	S9	WSW8.9	W17	
8-Jul	S9	S7	SSW6	SSW6	SSW6	SSW7	S10	S11	S11	S12	S13	S14	S12	SSW12	S11	S12	SSW13	SSW8	W15	W23	WNW16	NW12	NNW8	NNW13	SW6.8	W23	
9-Jul	N14	N12	N13	N14	N12	N8	N9	N11	NE14	NE13	NE9	NE10	ENE7	E10	ENE11	ENE7	NE16	NNE19	NNE22	NNE20	NNE22	N14	NNE13	N13	NNE12.1	NNE22	
10-Jul	N12	N11	NNE10	NNE12	NE14	NE15	NE10	NE8	NE4	NE8	NE10	NE10	NE8	NNE5	NE8	NE7	NE6	ENE9	E3	NE8	NE13	NE16	NE14	ENE8	NE9.1	NE16	
11-Jul	ENE2	E4	SSE3	SSE6	SSE8	SSE8	SSE5	W2	E3	E4	S9	S11	SSE14	SSE14	SSE10	SSE11	SE9	ESE8	ESE8	E9	E8	ENE7	ENE9	NE8	SE5.5	SSE14	
12-Jul	ENE8	NNE6	NE12	NNE14	NE9	N3	NE7	NW1	NW3	N8	E9	ENE3	NNE4	N2	SE2	ESE6	E7	ENE12	NE13	NE13	NE15	WSW4	SW9	S1	NE5.2	NE15	
13-Jul	WSW1	SSE6	SSW5	SSW5	S6	SW7	SSW4	S5	S7	SSW7	SW8	SSW7	SW12	SW13	SW9	SW9	SSW8	SW8	SSW3	SW3	NNW1	N3	NNW2	SSE2	SSW5.1	SW13	
14-Jul	S5	SE3	ESE2	SSW3	SSE3	S6	S7	SSW6	SSW7	SSW7	SW6	WSW6	WSW4	WSW3	WNW18	N9	SSW8	S4	S7	SSE6	SSE6	S8	NE6	E8	SSE4	SSW3.0	WNW18
15-Jul	SSW4	SSW6	SSW6	S5	S7	SSW7	SSW7	SW8	SW10	SSW8	SSW9	SW13	SW16	S15	S11	ESE3	WNW2	WSW7	WSW11	WNW7	NE2	SSE2	SSW5	SW4	SSW5.9	SW16	
16-Jul	SSW4	SSW6	SSE5	S5	S7	S4	SSW4	WSW1	NNE1	NNW6	NNE11	NNE13	NNE15	NNE16	NNE21	NNE19	NNW4	SW8	SW15	WNW15	NW17	WNW4	S9	WNW11	NNW3.1	NNE21	
17-Jul	NW14	NNW8	N15	N17	N18	N21	NNE20	NNE18	N18	N15	N19	N20	NNE15	NNE17	NNE17	NNE20	NNE19	N18	NNE16	NNE15	NE10	E3	WSW4	WSW6	N13.9	N21	
18-Jul	WSW5	S3	SW5	SW6	SSW7	SSW7	SSW8	SSW7	SSW8	SSW8	SW13	SW10	SW11	SW18	SW22	WSW22	WSW21	NW10	NNW3	WSW2	N8	NNW13	NW10	WNW15	WSW7.2	SW22	
19-Jul	WNW13	NW14	NNW11	NNW9	NW12	WNW10	NW6	NW6	NNW7	NW7	W11	W11	WNW14	WNW16	NW17	NW18	WNW13	N14	NNE11	E4	W4	W6	W5	WNW6	NW8.8	NW18	
20-Jul	SW6	SW6	SSW6	SSW7	SSW6	SSW8	SSW5	S5	S7	SW8	SSW10	SSW8	S7	SSW4	S5	S3	SE5	ESE5	ESE6	ESE7	ENE9	E9	E8	SE4	S4.3	SSW10	
21-Jul	E5	SSE2	SSE1	SSE6	SSE6	SE5	ESE5	ENE9	ENE12	ENE11	ENE11	E7	SE2	SW3	WNW8	NW7	NNW7	NE5	E6	E4	E4	ENE5	ENE4	SSE2	E3.1	ENE12	
22-Jul	S6	S6	S6	SW3	S6	SSW6	SSW6	WSW6	SSW3	WSW2	WSW6	WSW5	SW7	W6	SW9	W7	W11	WNW13	W15	W17	W13	W11	NW8	N9	WSW5.9	W17	
23-Jul	N9	N7	NNW4	W4	WSW4	W6	WNW7	NW9	NNW7	NNW8	NW6	NW5	W8	WNW5	WSW7	W10	WSW8	WSW8	WSW9	WSW6	W9	WSW6	SSW6	SW5	W5.0	W10	
24-Jul	SW6	SW7	SSW7	SSW7	SSW8	SSW7	SSW6	SSW7	SSW7	SSW6	SSW8	SSW9	SSW8	SSW8	SSW8	SW8	SW12	W9	W2	S4	SE4	SSE4	SSE5	SW5	SSW6.2	SW12	
25-Jul	SSW10	SSW9	SW10	WSW14	WSW11	NNW5	SSE4	SSW4	SSW7	SW11	SW13	SW15	SW14	WSW7	WNW11	W14	WSW6	WSW3	SSW0	AF	NNE11	NE11	NNE12	NNE15	WSW4.6	NNE15	
26-Jul	NE16	NE11	ENE8	NNW6	N4	ESE3	ENE7	NE7	ESE3	WSW6	SW5	SW6	WNW7	NE14	NE14	E7	ENE2	SSW6	S6	SSW7	S9	SSW9	S10	S9	E1.5	NE16	
27-Jul	S6	SSW5	S7	S8	S9	S7	SSW7	SSW9	S9	SSW9	SW14	SW16	WNW13	N3	ESE5	SW5	SSW8	WNW10	N9	SSE3	SSW7	SSW6	SSW4	WNW3	SSW5.1	SW16	
28-Jul	W2	SSE2	S7	S5	SSW5	SSE3	S5	S5	S3	SSW1	SW4	SW4	W3	SSW3	SSW7	S5	NE21	SSE5	S3	WSW6	WNW7	NE16	NNE11	ESE7	SSE1.3	NE21	
29-Jul	WNW8	W11	SW7	S6	W6	N1	S5	SW8	SW6	SW8	SW9	WSW8	SW9	WSW17	WSW19	W15	NNW12	NNW9	N13	NW14	SE1	SSE6	SSW7	WSW15	WSW6.4	WSW19	
30-Jul	WNW13	WSW7	SW5	SW8	SW7	SW7	SW9	SW9	SW10	SW9	SW5	SW7	NNW5	NNW12	N7	NNE3	NE8	NE8	NE17	ESE6	SSW3	SW6	S5	ENE4	WSW2.2	NE17	
31-Jul	SSW7	S5	SSE6	S7	S6	SSW6	S6	S6	SSW6	SSW4	S3	SSW2	SSW3	SW7	WNW12	SE5	ESE7	NE7	ENE3	WSW4	SE0	SW6	SW8	N6	SSW3.1	WNW12	

W2.2	WSW1.8	SW1.9	SW2.6	SW2.6	SW2.3	SSW2.6	SW3.2	SW3.2	SW3.4	SW4.1	SW4.1	WSW4.0	W4.1	W3.6	W3.4	WNW2.4	WNW3.3	WNW2.7	NW2.6	N2.6	N1.8	WNW0.9	WNW2.0	Diurnal Average
NE16	NW14	N15	W18	N18	N21	NNE20	NNE18	WSW25	WSW28	W24	WNW25	SW21	WSW23	NW27	WNW24	NNE24	NNE24	NNE22	W23	NNE22	NNE21	NNE18	WSW15	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**

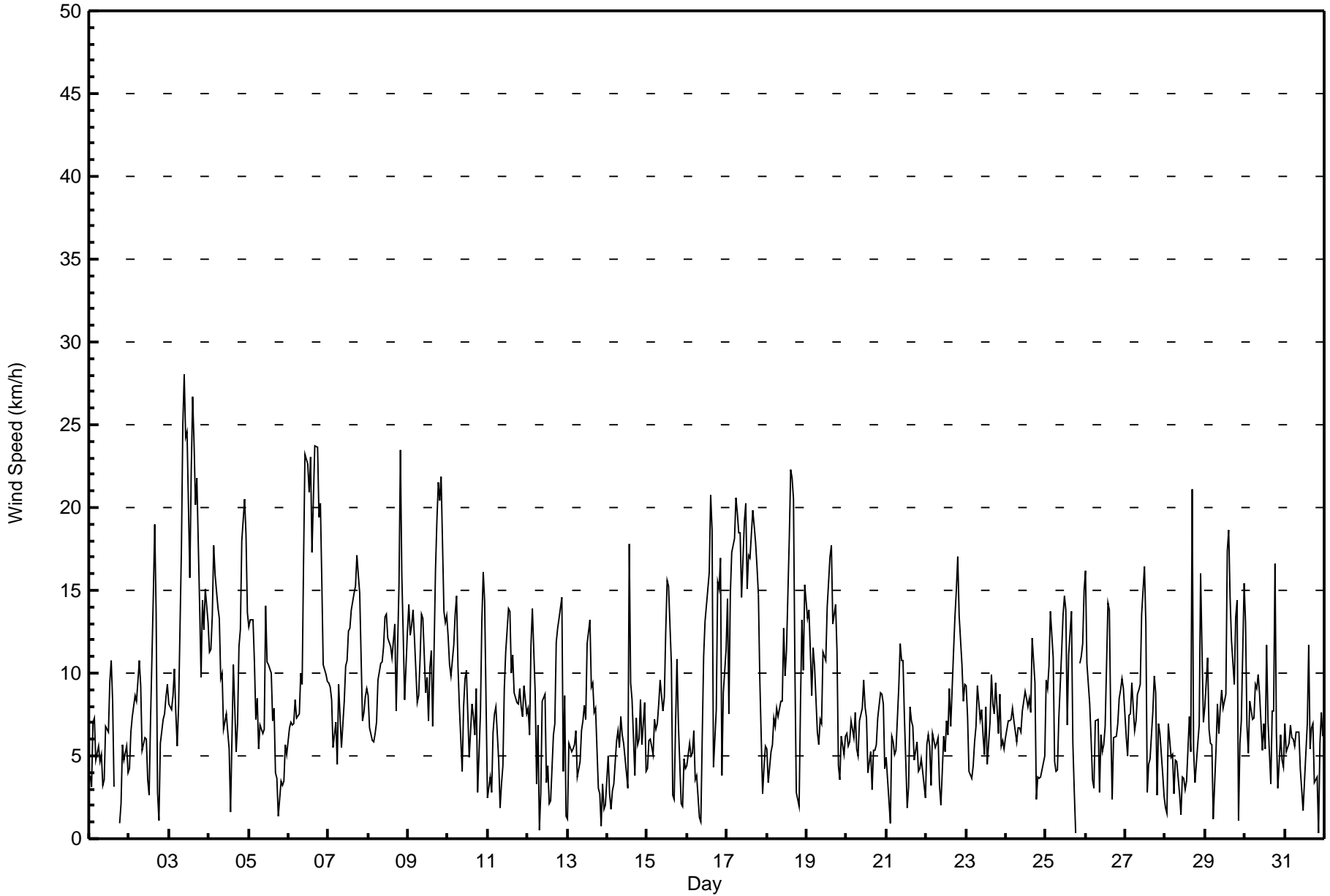
**Wind Speed (WS) - km/h**  
**Shell Muskeg River - July 2015**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 14 km/h on Jul 14 14:00	Hours of Data: 741
Minimum Value: 0 km/h on Jul 30 23:00	Hours of Missing Data: 3
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 2 Median = 3 Q <sub>3</sub> = 4 P <sub>90</sub> = 5 P <sub>99</sub> = 8	Hours of Calibration: 0
	Percent Operational Time: 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-Jul	2	2	3	2	1	2	1	1	2	2	2	3	4	3	4	4	AF	AF	3	2	2	1	1	2	4
2-Jul	1	1	1	1	2	3	2	3	3	2	3	3	3	6	5	5	6	3	2	2	2	2	2	2	6
3-Jul	2	2	2	3	2	2	3	7	5	6	6	6	9	7	6	5	6	4	2	3	3	3	3	9	
4-Jul	2	2	3	3	3	3	3	3	4	2	2	3	2	2	3	2	3	2	4	5	7	6	6	5	7
5-Jul	4	4	4	3	2	3	3	2	2	4	5	6	4	4	3	4	5	3	3	3	1	1	2	1	6
6-Jul	1	2	2	1	1	2	2	3	3	5	5	6	7	5	6	6	8	8	6	7	6	4	3	3	8
7-Jul	3	2	2	1	2	2	4	2	3	4	3	4	4	4	4	4	5	4	3	4	2	1	1	2	5
8-Jul	2	1	1	1	1	3	3	3	4	4	5	4	4	3	3	5	5	2	7	7	5	4	4	5	7
9-Jul	5	3	4	5	4	3	3	4	4	4	3	3	3	3	3	5	3	4	5	5	5	4	4	4	5
10-Jul	4	4	3	3	3	3	3	3	2	3	3	3	3	4	4	4	3	3	3	4	3	1	3	3	4
11-Jul	2	2	1	2	2	2	2	2	2	2	6	5	5	6	4	4	4	3	3	2	2	2	2	1	6
12-Jul	2	3	2	3	3	2	5	2	2	4	4	3	2	2	2	3	3	2	2	3	3	5	4	2	5
13-Jul	2	2	2	2	1	2	1	2	2	3	3	3	4	3	4	4	3	3	3	3	2	3	2	2	4
14-Jul	1	1	2	2	2	3	2	2	3	3	3	3	4	14	4	3	3	3	2	2	2	7	3	1	14
15-Jul	1	1	2	1	2	2	3	2	3	3	4	5	5	6	4	4	3	3	4	3	2	2	1	2	6
16-Jul	3	2	1	2	1	2	1	2	2	4	4	5	5	5	6	6	6	4	6	4	4	4	3	3	6
17-Jul	4	3	5	5	5	6	6	5	6	5	6	6	5	6	6	6	6	5	5	5	4	3	2	1	6
18-Jul	2	1	2	2	1	2	2	3	3	2	5	4	3	5	4	4	3	6	3	2	3	7	4	4	7
19-Jul	3	3	4	3	3	3	2	2	3	3	2	4	4	4	6	6	3	5	4	2	2	1	1	1	6
20-Jul	2	1	1	1	1	1	2	2	2	3	4	4	4	3	3	3	3	4	3	2	3	2	2	2	4
21-Jul	2	2	2	2	1	1	1	1	2	2	2	3	2	2	3	3	3	3	2	2	1	2	3	2	3
22-Jul	1	1	1	2	1	1	1	2	2	2	3	4	4	3	5	4	4	3	3	4	3	1	3	4	5
23-Jul	3	4	2	2	1	2	2	2	3	4	2	3	3	3	4	2	3	2	2	2	1	1	1	1	4
24-Jul	1	2	1	1	2	2	2	3	2	3	3	3	4	5	4	4	4	4	3	1	1	1	2	2	5
25-Jul	3	3	4	7	6	2	2	2	3	4	4	4	5	5	9	5	4	3	1	AF	4	3	3	3	9
26-Jul	3	3	3	4	3	2	4	3	2	2	3	4	5	5	4	3	8	3	2	2	2	2	2	2	8
27-Jul	2	2	2	1	2	2	2	3	3	3	4	5	8	6	2	3	2	8	4	2	2	1	2	2	8
28-Jul	2	3	1	1	1	2	1	2	2	2	2	3	4	3	4	5	4	5	3	4	3	4	5	3	5
29-Jul	2	2	2	3	3	2	2	3	2	2	3	3	3	4	3	4	6	4	5	6	4	2	4	4	6
30-Jul	5	2	3	2	2	3	2	2	2	2	3	4	8	6	4	6	4	9	5	2	2	2	0	4	9
31-Jul	2	1	1	1	1	1	2	2	2	3	3	2	3	4	9	2	2	4	3	2	2	2	4	2	9
	5	4	5	7	6	6	6	7	6	6	6	6	8	14	9	6	8	9	7	7	7	7	6	5	

Diurnal Maximum

AF - Analyzer Failure





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

**Wind Speed (WS) - km/h**  
**Shell Muskeg River - July 2015**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	187	25.24	25.24
6 - 11	377	50.88	76.11
12 - 19	146	19.70	95.82
20 - 28	31	4.18	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 741

Total Number of Hours: 744



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

**Wind Speed (WS) - km/h**  
**Shell Muskeg River - July 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	4	3	7	8	10	10	20	31	30	16	14	10	5	5	7	187
6 - 11	13	9	24	16	11	8	1	13	57	89	47	26	19	15	13	16	377
12 - 19	24	19	17	2	0	0	0	2	6	3	20	9	13	15	10	6	146
20 - 28	4	9	1	0	0	0	0	0	0	0	3	6	2	4	2	0	31
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	48	41	45	25	19	18	11	35	94	122	86	55	44	39	30	29	741

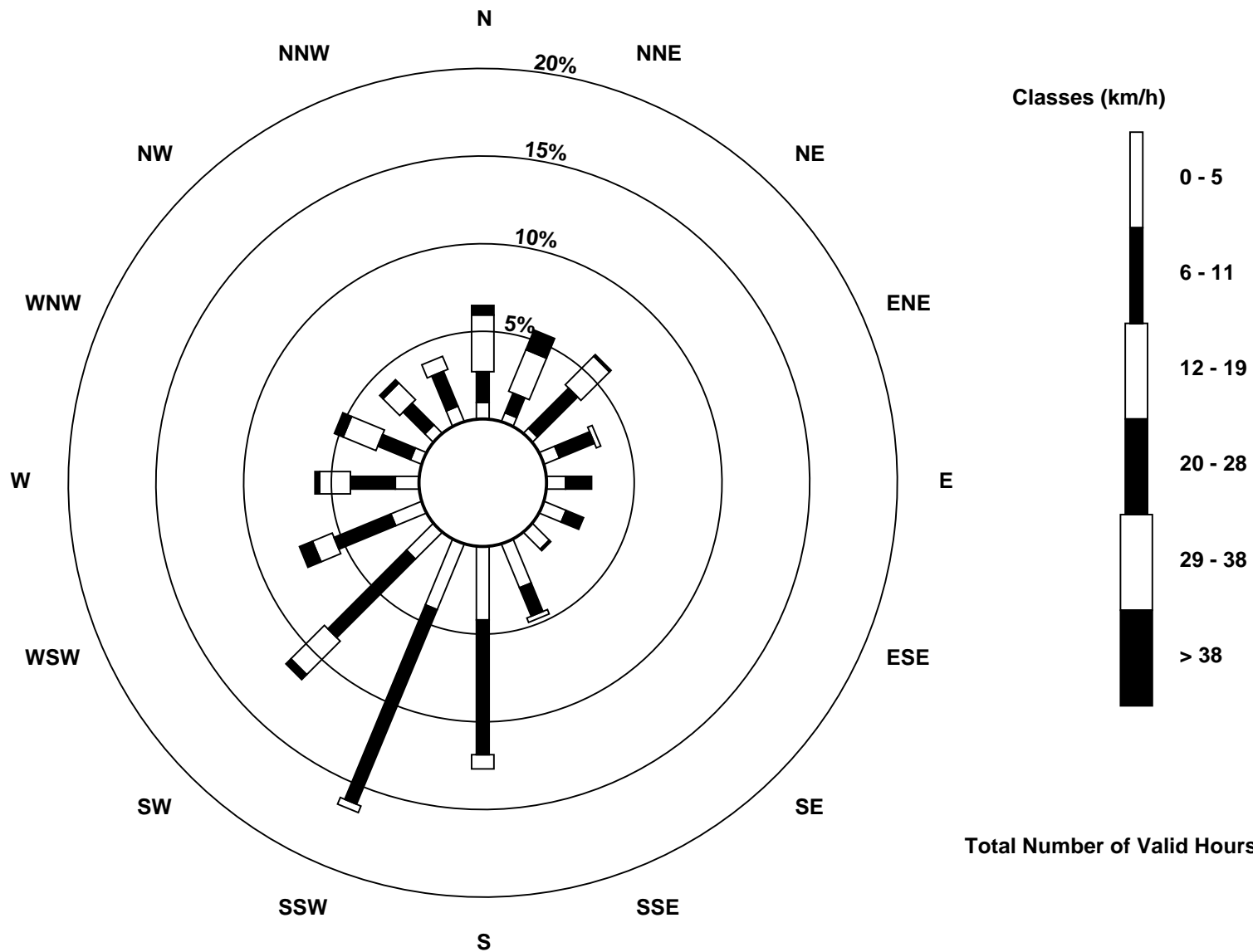
Total Number of Valid Hours: 741

Total Number of Hours: 744



Wood Buffalo Environmental Association  
Wind Rose Jul 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 - July 2015**

Direction of Maximum Speed: 243 deg on Jul 3 10:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 9.2 deg on Jul 17	Hours of Data: 741
Direction of Minimum Speed: 195 deg on Jul 25 19:00	Hours of Missing Data: 3
Direction of Minimum Daily Speed Average: 1.3 deg on Jul 28	Percent Operational Time: 99.6
Monthly Average Direction: 239.0 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-Jul	167	197	226	214	174	175	169	177	213	208	228	207	224	264	305	208	AF	AF	187	183	206	215	208	176	212.6
2-Jul	178	192	202	207	198	207	211	204	198	184	202	211	260	245	235	234	231	219	217	197	184	195	193	184	209.8
3-Jul	178	181	184	188	188	158	187	229	242	243	274	294	325	305	308	299	283	297	302	310	313	301	291	280	275.3
4-Jul	277	274	263	263	270	275	279	254	227	180	202	201	191	180	83	47	6	280	342	343	360	15	11	356	303.0
5-Jul	1	358	357	346	331	313	295	257	249	336	31	19	12	35	23	333	312	304	123	106	151	185	182	167	352.2
6-Jul	189	181	203	194	176	198	201	208	206	234	237	231	232	240	258	10	12	12	11	355	358	332	304	295	274.3
7-Jul	297	286	258	265	302	257	256	271	261	211	224	205	210	220	231	240	242	260	252	237	205	194	188	184	238.5
8-Jul	180	181	194	196	195	194	189	188	189	188	186	183	179	195	178	189	194	204	273	280	296	324	330	341	215.1
9-Jul	358	8	358	1	4	354	355	7	39	48	45	56	64	82	59	58	40	32	31	30	31	7	12	5	25.6
10-Jul	6	8	20	31	37	41	43	48	43	50	51	51	47	33	47	35	38	59	98	54	51	47	53	70	42.2
11-Jul	69	85	160	157	162	167	168	265	88	79	186	185	168	168	165	159	136	122	117	98	88	78	61	51	137.9
12-Jul	63	27	45	33	53	354	47	326	315	8	79	75	32	10	136	112	100	62	47	45	46	242	223	181	49.7
13-Jul	252	162	197	203	191	222	195	176	181	201	223	198	226	235	225	231	210	228	210	233	348	350	332	168	213.7
14-Jul	184	138	118	208	159	173	174	200	206	216	239	244	257	295	7	200	190	172	163	160	181	50	94	165	193.0
15-Jul	210	210	212	172	186	204	207	220	233	197	209	232	225	173	174	113	297	254	241	303	40	160	199	227	212.2
16-Jul	194	200	167	173	186	179	206	245	26	331	17	26	20	21	21	14	329	235	234	285	304	301	188	301	328.6
17-Jul	315	339	2	5	6	9	12	14	9	358	9	11	23	23	14	14	21	9	15	19	54	87	252	257	9.2
18-Jul	256	182	221	220	200	197	205	203	195	210	223	214	217	228	235	249	248	319	345	244	351	347	324	298	243.8
19-Jul	297	309	328	327	308	299	305	310	331	315	276	277	282	289	307	310	299	353	29	101	277	262	276	289	306.2
20-Jul	232	233	202	204	194	199	195	182	184	214	195	213	178	201	175	170	146	119	111	103	77	83	93	128	170.7
21-Jul	92	162	166	167	159	143	114	74	67	73	62	86	139	227	282	311	333	37	84	100	86	72	78	166	83.9
22-Jul	185	183	189	228	177	201	204	240	201	253	239	237	235	271	227	263	272	290	276	277	278	271	311	357	255.9
23-Jul	359	351	348	259	244	280	301	304	344	334	322	312	263	301	243	268	244	239	244	251	269	252	211	219	280.9
24-Jul	231	214	206	202	207	203	195	200	213	194	197	207	204	199	205	214	226	266	260	190	145	147	162	222	207.8
25-Jul	211	209	218	237	243	334	154	200	204	223	224	233	232	240	291	269	254	250	195	AF	29	35	18	25	247.1
26-Jul	39	38	57	339	8	121	57	44	123	243	230	221	288	35	55	98	66	195	185	199	190	192	191	187	94.2
27-Jul	179	202	188	179	185	169	198	200	191	203	232	231	285	353	113	232	210	290	9	153	213	201	192	293	213.6
28-Jul	262	162	176	185	201	157	170	188	184	206	232	224	270	196	204	191	51	160	187	257	286	38	17	120	162.6
29-Jul	289	266	230	191	265	3	190	227	228	233	227	242	221	249	248	266	328	340	10	306	130	168	202	252	256.7
30-Jul	286	240	236	215	220	215	221	236	224	222	222	227	337	334	7	26	51	36	46	109	195	214	190	71	247.1
31-Jul	201	190	162	175	189	194	185	179	205	196	180	199	193	219	286	134	104	45	68	240	127	221	228	351	195.1

281.1 252.6 233.8 229.1 220.0 222.0 211.7 226.2 220.3 229.5 234.6 235.8 244.1 261.5 274.2 280.2 301.2 322.6 345.2 317.1 350.3 352.3 297.4 299.9  
 Diurnal Average

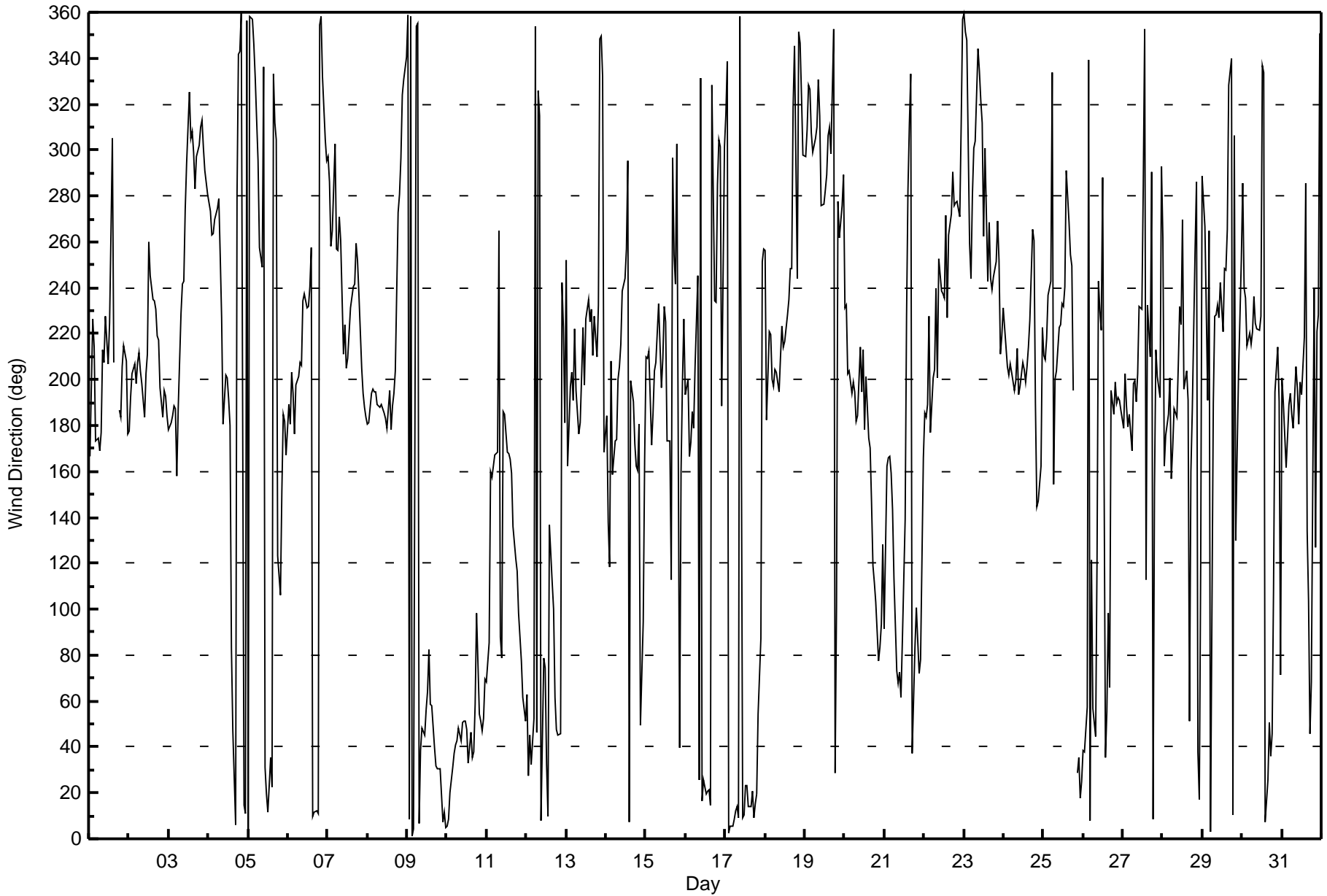
AF - Analyzer Failure  
 All monthly, daily, and diurnal averages have been calculated using vector methods



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

**Wind Direction (WD) - deg**  
**Shell Muskeg River - July 2015**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 96 deg on Jul 30 13:00 Minimum Value: 5 deg on Jul 10 22:00 Percentiles: P <sub>1</sub> = 10 P <sub>10</sub> = 15 Q <sub>1</sub> = 18 Median = 24 O <sub>3</sub> = 34 P <sub>90</sub> = 55 P <sub>99</sub> = 82		Hours in Service: 744 Hours of Data: 741 Hours of Missing Data: 3 Hours of Calibration: 0 Percent Operational Time: 99.6																							
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jul	44	48	27	19	30	19	18	15	28	24	26	25	18	18	38	69	AF	AF	74	69	14	16	14	53	74
2-Jul	21	19	16	16	16	17	16	22	33	26	26	49	50	56	20	17	18	21	30	19	16	18	18	17	56
3-Jul	17	15	17	20	20	20	24	21	11	12	25	17	33	24	17	16	14	17	14	19	14	13	10	10	33
4-Jul	10	11	10	10	12	13	15	16	26	20	23	34	28	70	59	26	50	21	33	32	26	21	22	25	70
5-Jul	24	22	22	19	19	13	33	21	37	52	31	42	41	37	48	44	71	56	85	20	17	16	14	15	85
6-Jul	13	18	18	17	10	16	19	19	26	19	15	18	21	16	42	21	20	21	22	24	24	26	17	18	42
7-Jul	16	15	14	32	18	35	21	29	47	24	23	27	30	22	22	20	22	15	14	15	18	16	16	16	47
8-Jul	15	16	20	14	18	21	21	23	25	24	22	22	19	21	20	24	21	21	25	15	33	25	32	29	33
9-Jul	22	22	23	22	24	29	30	27	23	16	27	30	46	14	18	55	14	13	13	12	12	22	23	22	55
10-Jul	22	23	21	18	16	15	27	32	49	31	27	22	40	68	44	36	35	24	47	27	14	5	14	17	68
11-Jul	44	44	55	16	17	17	30	35	48	31	33	25	23	26	28	24	22	23	22	20	18	16	16	14	55
12-Jul	16	19	7	11	35	53	68	94	61	31	27	72	36	64	72	23	22	17	12	11	13	82	26	77	94
13-Jul	67	17	35	27	22	20	24	27	23	29	32	33	23	20	29	24	29	30	28	39	93	33	65	66	93
14-Jul	17	32	50	21	24	21	20	26	27	29	36	59	83	32	37	28	27	21	19	22	17	83	24	25	83
15-Jul	16	16	25	28	21	17	22	18	16	28	32	25	23	23	25	70	74	28	27	34	50	71	12	51	74
16-Jul	48	18	21	29	19	53	28	38	50	35	32	26	25	25	21	21	85	43	30	17	13	84	34	27	85
17-Jul	16	29	23	21	22	20	21	21	21	26	25	24	23	22	28	22	20	21	21	21	36	66	14	25	66
18-Jul	13	48	26	20	18	21	23	25	23	21	26	22	20	16	11	15	10	51	47	80	31	26	26	15	80
19-Jul	15	14	31	29	17	16	17	35	32	38	17	24	18	24	24	25	16	30	36	47	69	12	15	12	69
20-Jul	22	22	16	15	17	16	23	28	23	30	33	41	38	67	42	64	28	20	19	16	15	13	17	36	67
21-Jul	28	59	82	17	16	18	21	10	8	12	20	21	40	65	28	31	39	57	20	20	16	17	38	51	82
22-Jul	14	14	23	20	21	19	19	23	43	59	26	40	44	38	32	45	33	16	14	13	12	8	34	26	59
23-Jul	31	30	60	69	32	21	18	17	34	34	32	47	28	60	32	17	23	16	10	20	9	29	13	17	69
24-Jul	15	13	14	15	18	18	26	27	27	35	35	31	39	39	32	34	23	18	43	17	18	14	16	41	43
25-Jul	21	20	21	31	32	38	36	31	31	24	23	21	18	53	48	20	31	61	74	AF	16	19	20	12	74
26-Jul	13	20	44	51	61	44	27	19	60	32	43	45	56	33	23	33	78	27	17	19	17	20	20	18	78
27-Jul	31	57	17	14	14	18	23	24	27	28	23	19	47	66	44	63	22	55	43	43	17	15	65	41	66
28-Jul	69	76	19	32	19	39	19	34	42	68	49	47	69	40	24	50	12	61	68	41	30	26	47	37	76
29-Jul	26	17	25	65	42	83	17	25	26	18	20	20	32	17	11	29	34	35	34	47	86	22	30	21	86
30-Jul	12	36	63	17	22	26	16	16	18	21	52	55	96	31	37	66	42	49	21	19	36	16	12	59	96
31-Jul	19	19	25	15	12	16	20	23	27	36	35	42	36	24	65	21	24	51	63	67	75	19	68	40	75
	69	76	82	69	61	83	68	94	61	68	52	72	96	70	72	70	85	61	85	80	93	84	68	77	
	Diurnal Maximum																								
AF - Analyzer Failure																									







# Wood Buffalo Environmental Association SO2 Calibration Report

## Station Information

Calibration Date	July 14, 2015	Last Calibration	June 17, 2015
Station Name	Shell Muskeg River	Station Number	AMS 16
Reason:	Routine		
Start Time (MST)	9:30	End Time (MST)	14:15
Gas Cert Reference	LL104193	Station temp.	22 Deg C
Cal Gas Concentration	48.3 ppm	Cal Gas Exp Date	12-Feb-18
Calibrator Make/Model	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	807	787
Calculated slope	0.982540	0.997950	Chamber temp	44.8	45.0
Calculated intercept	1.065515	1.619135	Pressure	709.6	708.4
Analyzer Background	5.9	6.1	Flow	0.449	0.443
Analyzer Coefficient	1.210	1.243	Intensity	89	92
Analyzer make	Thermo 43i		Analyzer serial #	1118148498	

## Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.1	----
as found span	5000	82.8	799.8	782.7	1.022
calibrator zero	5000	0.0	0.0	-0.1	----
high point	5000	82.8	799.8	800.8	0.999
second point	5000	41.4	399.9	397.9	1.005
third point	5000	20.7	200.0	197.5	1.012
as left zero	5000	0.0	0.0	0.2	----
as left span	5000	82.8	799.8	800.4	0.999
Average Correction Factor					1.005

Corrected As found      782.6      Previous response      813.0      % change      3.9%

Notes:

Changed inlet filter after as founds. Adjusted span.

Calibration Performed By:

\_\_\_\_\_  
Michael Martineau



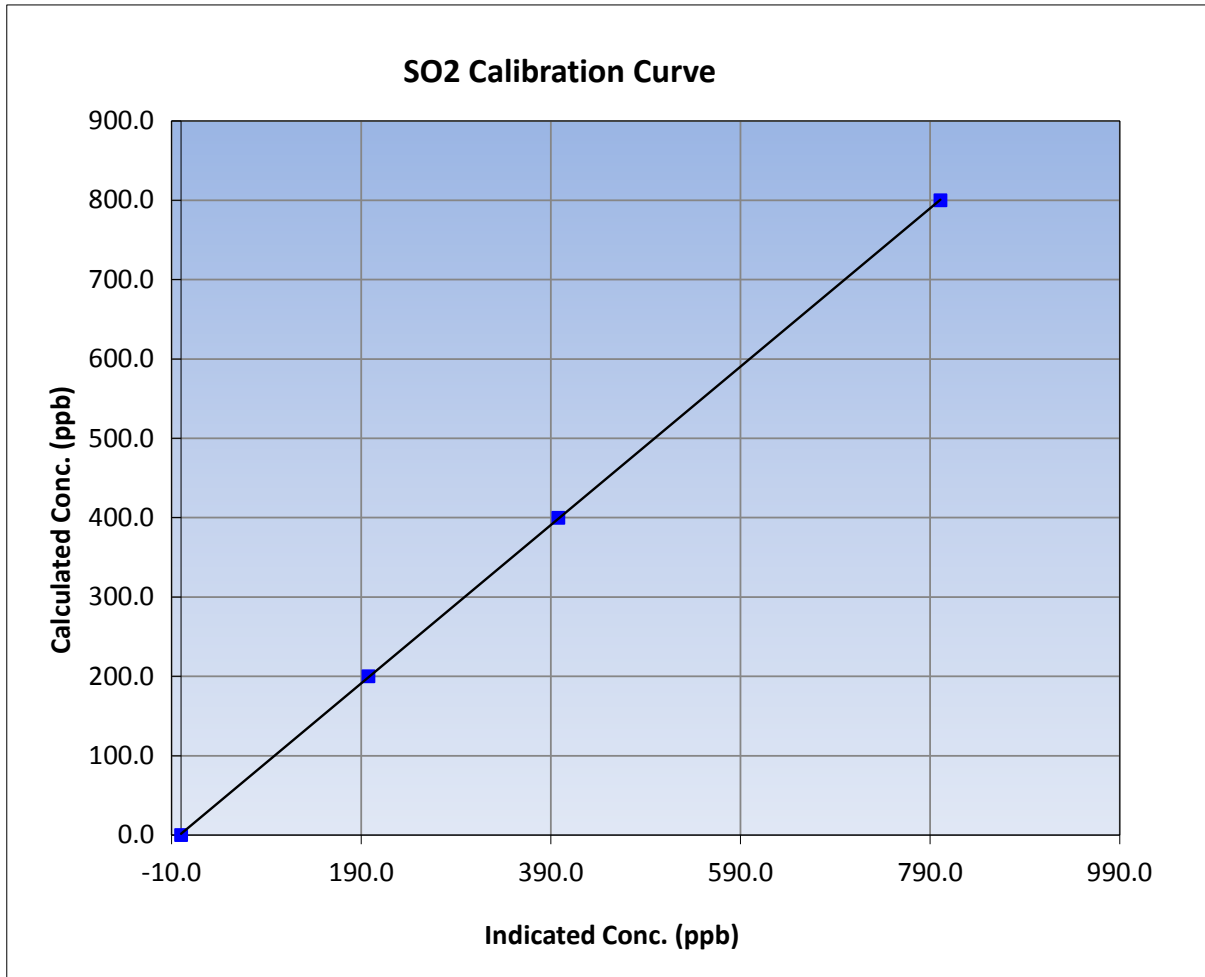
## Wood Buffalo Environmental Association SO2 Calibration Report

### Station Information

Calibration Date	July 14, 2015	Previous Calibration	June 17, 2015
Station Name	Shell Muskeg River	Station Number	AMS 16
Start Time (MST)	9:30	End Time (MST)	14:15
Analyzer make	Thermo 43i	Analyzer serial #	1118148498

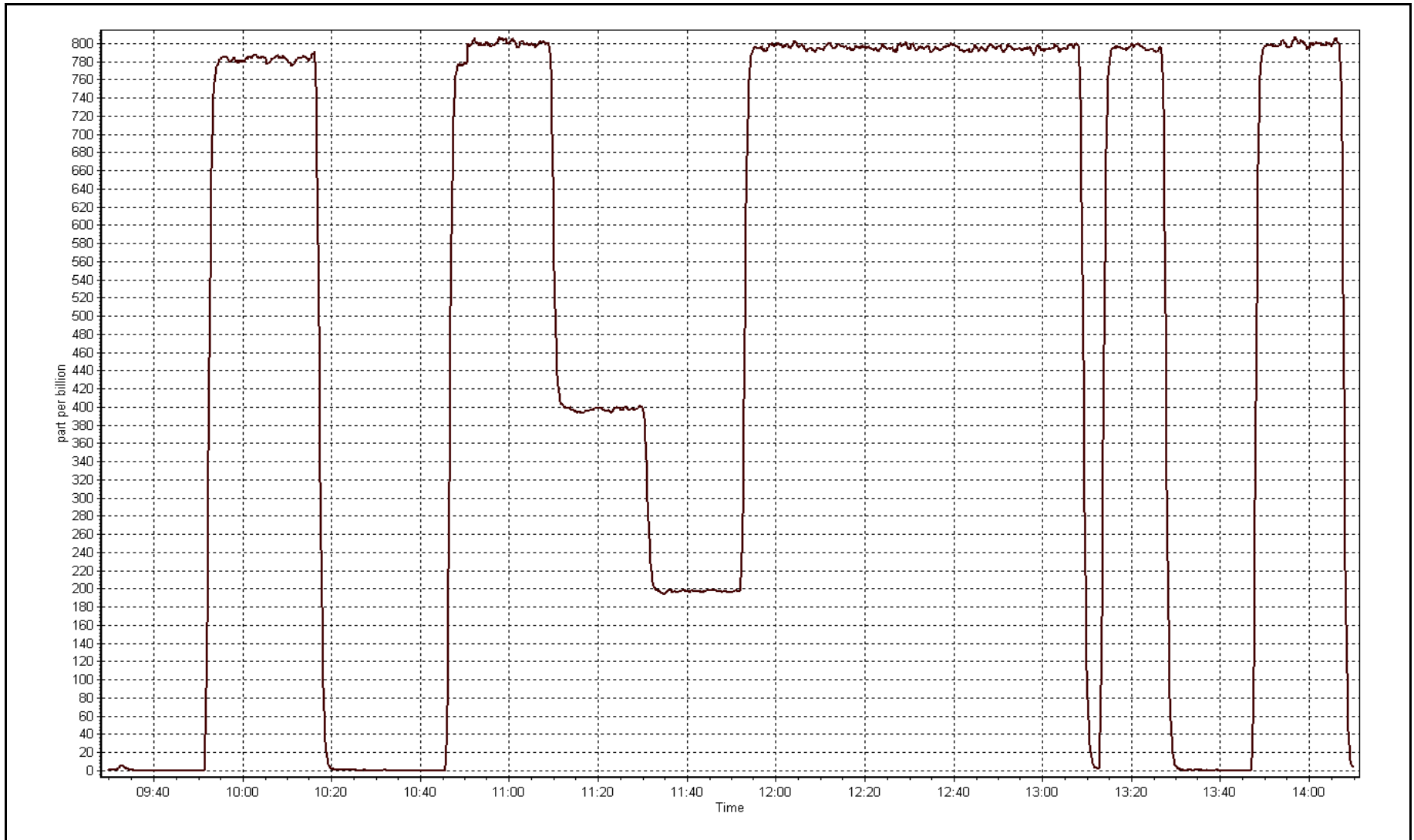
### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999982
799.8	800.8	0.9988		
399.9	397.9	1.0052	Slope	0.997950
200.0	197.5	1.0125	Intercept	1.619135



SO2 Calibration Plot

Date: July 14, 2015





# Wood Buffalo Environmental Association THC Calibration Report

### Station Information

Calibration Date	July-14-15	Last Calibration	June-17-15
Station Name	Shell Muskeg River	Station Number	AMS 16
Reason:	Routine		
Start Time (MST)	9:30	End Time (MST)	14:10
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

	<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	34.8	34.9
Calculated slope	0.998926	1.004334	Fuel Pressure	24.2	24.2
Calculated intercept	-0.000974	-0.076048	Analyzer Coeff	4.317	4.355
			Analyzer BKG	2.70	2.920

Analyzer make	Thermo 51i-LT	Analyzer serial #	1218153458
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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	0.15	----
as found span	5000	82.8	16.85	16.87	0.999
calibrator zero	5000	0.0	0.00	0.03	----
high point	5000	82.8	16.85	16.84	1.001
second point	5000	41.4	8.43	8.47	0.995
third point	5000	20.7	4.21	4.33	0.973
as left zero	5000	0.0	0.00	0.21	----
as left span	5000	82.8	16.85	17.03	0.990
Average Correction Factor					0.990

Corrected As found	16.72	Previous response	16.87	% change	0.9%
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**Notes:**

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

Calibration Performed By:

Michael Martineau



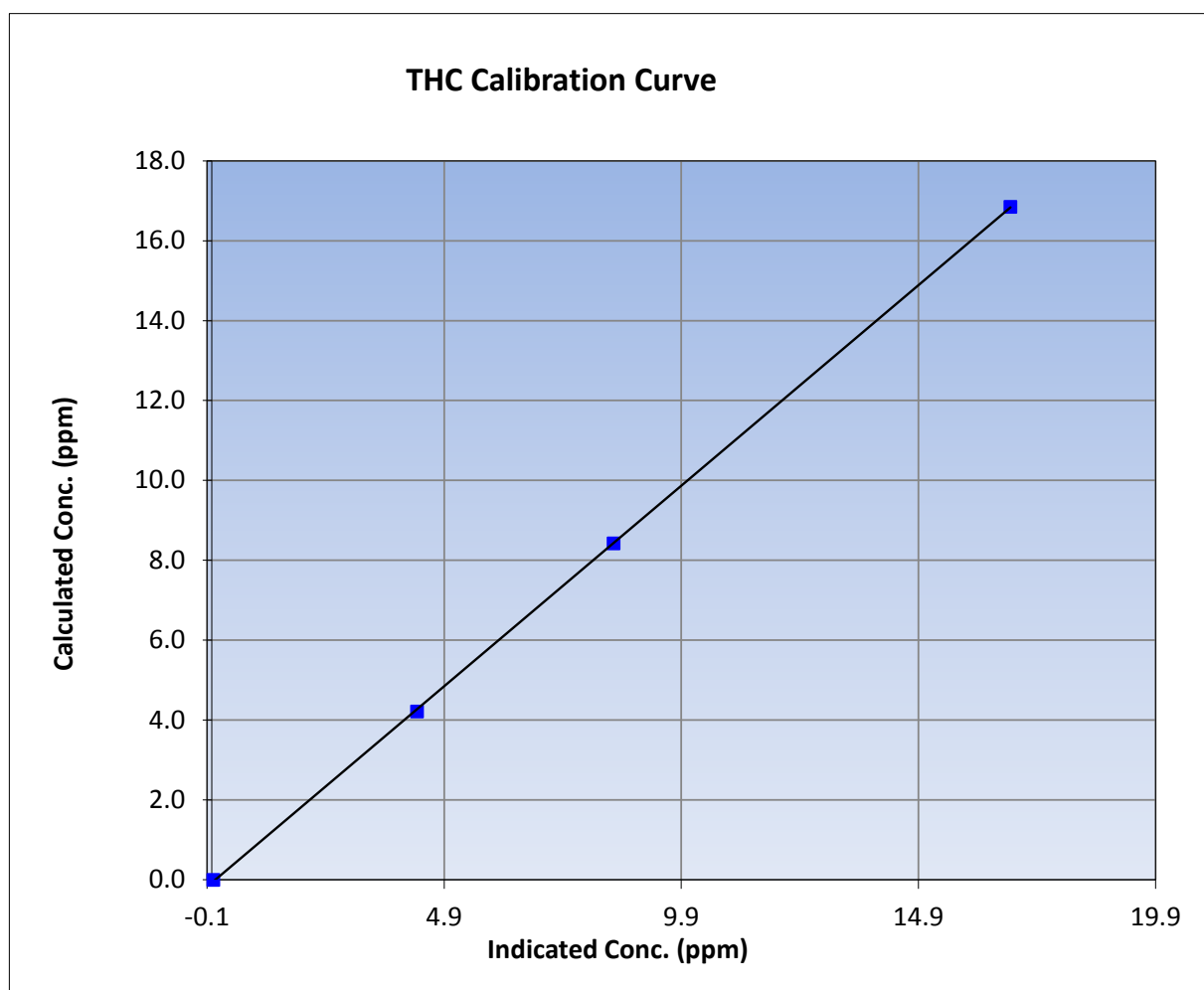
## Wood Buffalo Environmental Association THC Calibration Report

### Station Information

Calibration Date	July 14, 2015	Previous Calibration	June 17, 2015
Station Name	Shell Muskeg River	Station Number	AMS 16
Start Time (MST)	9:30	End Time (MST)	14:10
Analyzer make	Thermo 51i-LT	Analyzer serial #	1218153458

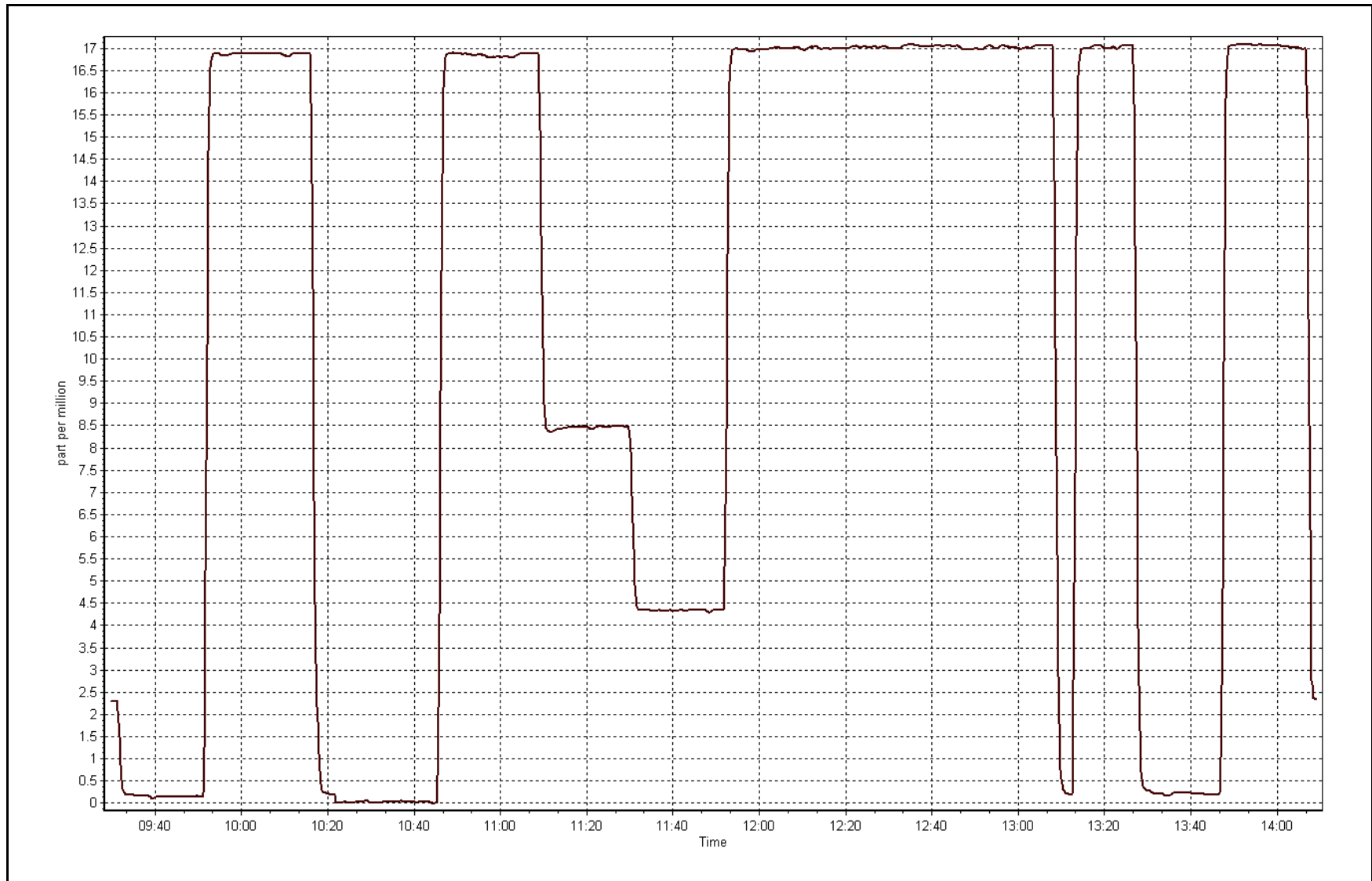
### Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.03	----	Correlation Coefficient	0.999962
16.85	16.84	1.0008		
8.43	8.47	0.9949	Slope	1.004334
4.21	4.33	0.9731		
			Intercept	-0.076048



THC Calibration Plot

Date: July 14, 2015





## Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

### Station Information

Calibration Date	July 14, 2015	Previous Calibration	June 17, 2015
Station Name	Shell Muskeg River	Station Number	AMS 16
Reason:	Routine		
Start Time (MST)	9:30	End Time (MST)	14:15
NO Cal Gas Conc	48 ppm	Gas Cert Reference	LL104193
NOx Cal Gas Conc	48 ppm	Cal Gas Expiry Date	February 12, 2018
Calibrator	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	0.997525	0.996273	1.006495
	Data Offset	0.152627	0.628448	1.473270
Current Calibration	Data Slope	0.999778	1.000043	1.004033
	Data Offset	0.132105	1.057735	0.863684

### Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1426262593
---------------------	------------	-------------------	------------

Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
NO coefficient	0.767		0.788	
NOx coefficient	0.996		0.997	
NO2 coefficient	1.000		1.000	
NO bkgrnd	8.0		8.3	
NOx bkgrnd	8.0		8.3	
Chamber Temp	50	Deg C	50.5	Deg C
Moly Temp	324.7	Deg C	325	Deg C
PMT voltage	-774	V	-774	V
PMT Temp	-3.2	Deg C	-3	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	174	mmHg	174	mmHg
R Cell Press Nox	174	mmHg	174	mmHg
NO sample flow	0.863	lpm	0.864	lpm
Nox sample Flow	0.865	lpm	0.867	lpm

**Notes:**

Changed inlet filter after as founds. Adjusted span.



# Wood Buffalo Environmental Association

## NOX-NO-NO2 Calibration Report

### Station Information

Calibration Date:

July 14, 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	0.8	0.4	0.5	----	----
as found span	5000	82.8	794.9	794.9	0.0	775.5	774.5	1.0	1.0250	1.0263
calibrator zero	5000	0.0	0.0	0.0	0.0	0.8	0.4	0.4	----	----
high point	5000	82.8	794.9	794.9	0.0	795.4	794.6	0.8	0.9993	1.0003
second point	5000	41.4	397.4	397.4	0.0	396.9	395.3	1.6	1.0014	1.0054
third point	5000	20.7	198.7	198.7	0.0	197.8	196.4	1.4	1.0049	1.0119
as left zero	5000	0.0	0.0	0.0	0.0	1.0	0.5	0.5	----	----
as left span	5000	82.8	794.9	522.3	272.6	797.3	532.4	265.0	0.9969	0.9810
Average Correction Factor									1.0019	1.0059

Corrected As found  
Previous Response

NO<sub>x</sub>= 774.7  
NO<sub>x</sub>= 796.7

NO= 774.2  
NO= 797.2

Percent Change

NO<sub>x</sub>= 2.8%

NO= 3.0%

### 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			0.4			N/A	
1st NO2 (300)	----	522.3	268.9	790.0	522.3	267.7	0.9898	1.0000	1.0043	99.6%
2nd NO2 (200)	----	604.3	186.8	789.3	604.3	185.0	0.9907	1.0000	1.0099	99.0%
3rd NO2 (100)	----	691.9	99.2	788.1	691.9	96.2	0.9922	1.0000	1.0317	96.9%
4th NO2 (0)	791.1	----	0.3	791.5	791.1	0.3	0.9879	1.0000	N/A	----
Average Correction Factor							0.9901	1.0000	1.0153	98.5%

Calibration Performed By:

Michael Martineau





# Wood Buffalo Environmental Association

## NO<sub>x</sub> Calibration Summary

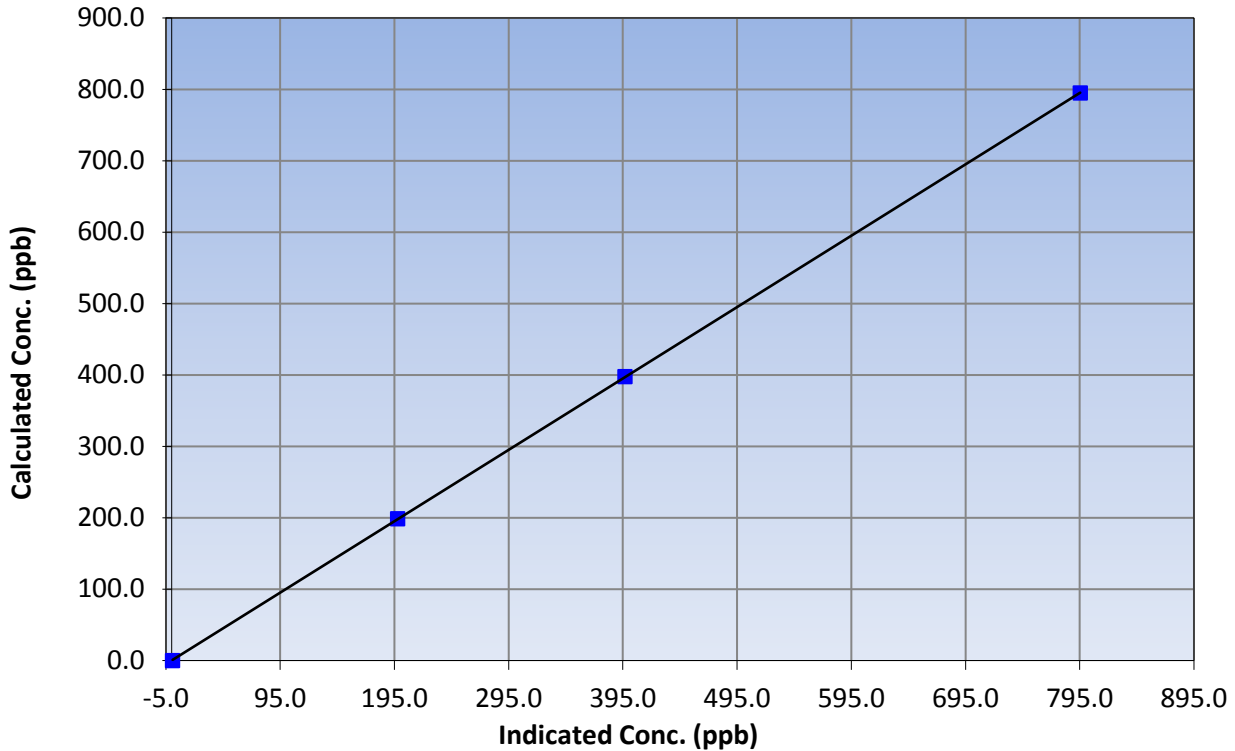
### Station Information

Calibration Date	July 14, 2015	Previous Calibration	June 17, 2015
Station Name	Shell Muskeg River	Station Number	AMS 16
Start Time (MST)	9:30	End Time (MST)	14:15
Analyzer make	Thermo 42i	Analyzer serial #	1426262593

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.8	----	Correlation Coefficient	0.999994
794.9	795.4	0.9993		
397.4	396.9	1.0014	Slope	0.999778
198.7	197.8	1.0049		
			Intercept	0.132105

### NO<sub>x</sub> Calibration Curve





# Wood Buffalo Environmental Association

## NO Calibration Summary

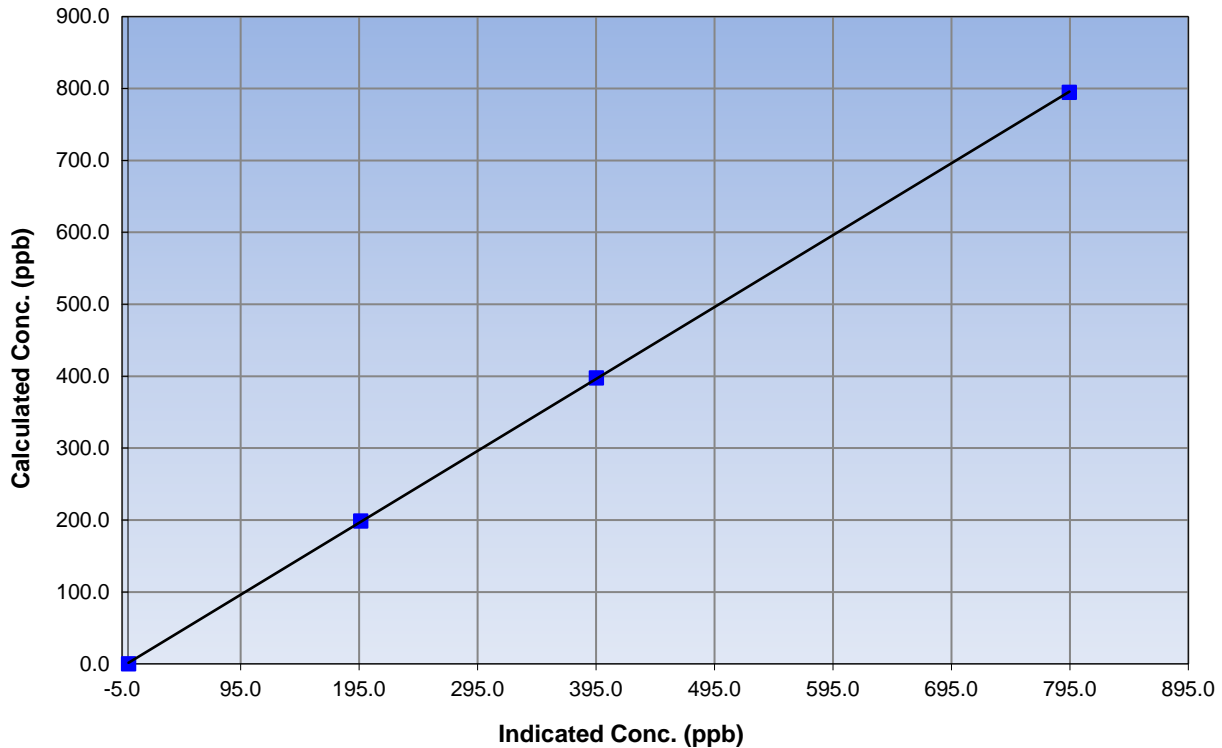
### Station Information

Calibration Date	July 14, 2015	Previous Calibration	June 17, 2015
Station Name	Shell Muskeg River	Station Number	AMS 16
Start Time (MST)	9:30	End Time (MST)	14:15
Analyzer make	Thermo 42i	Analyzer serial #	1426262593

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.4	N/A	Correlation Coefficient	0.999984
794.9	794.6	1.0003		
397.4	395.3	1.0054	Slope	1.000043
198.7	196.4	1.0119		
			Intercept	1.057735

### NO Calibration Curve





# Wood Buffalo Environmental Association

## NO<sub>2</sub> Calibration Summary

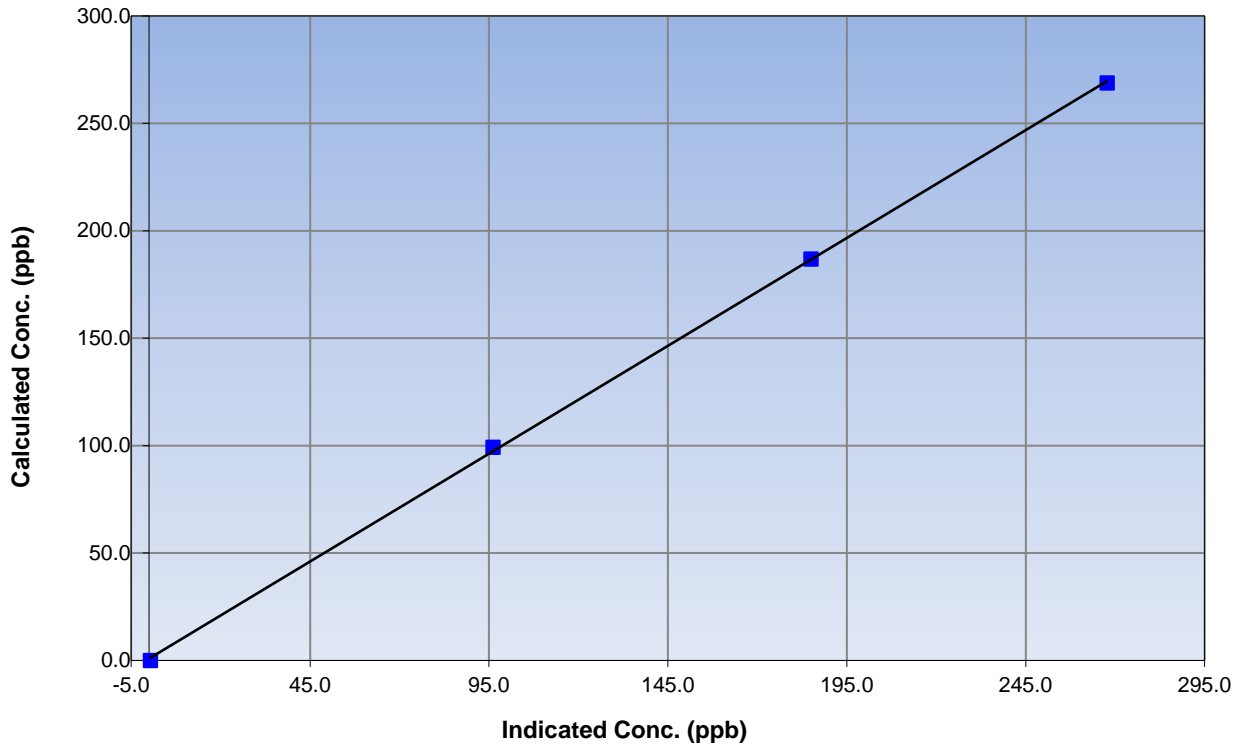
### Station Information

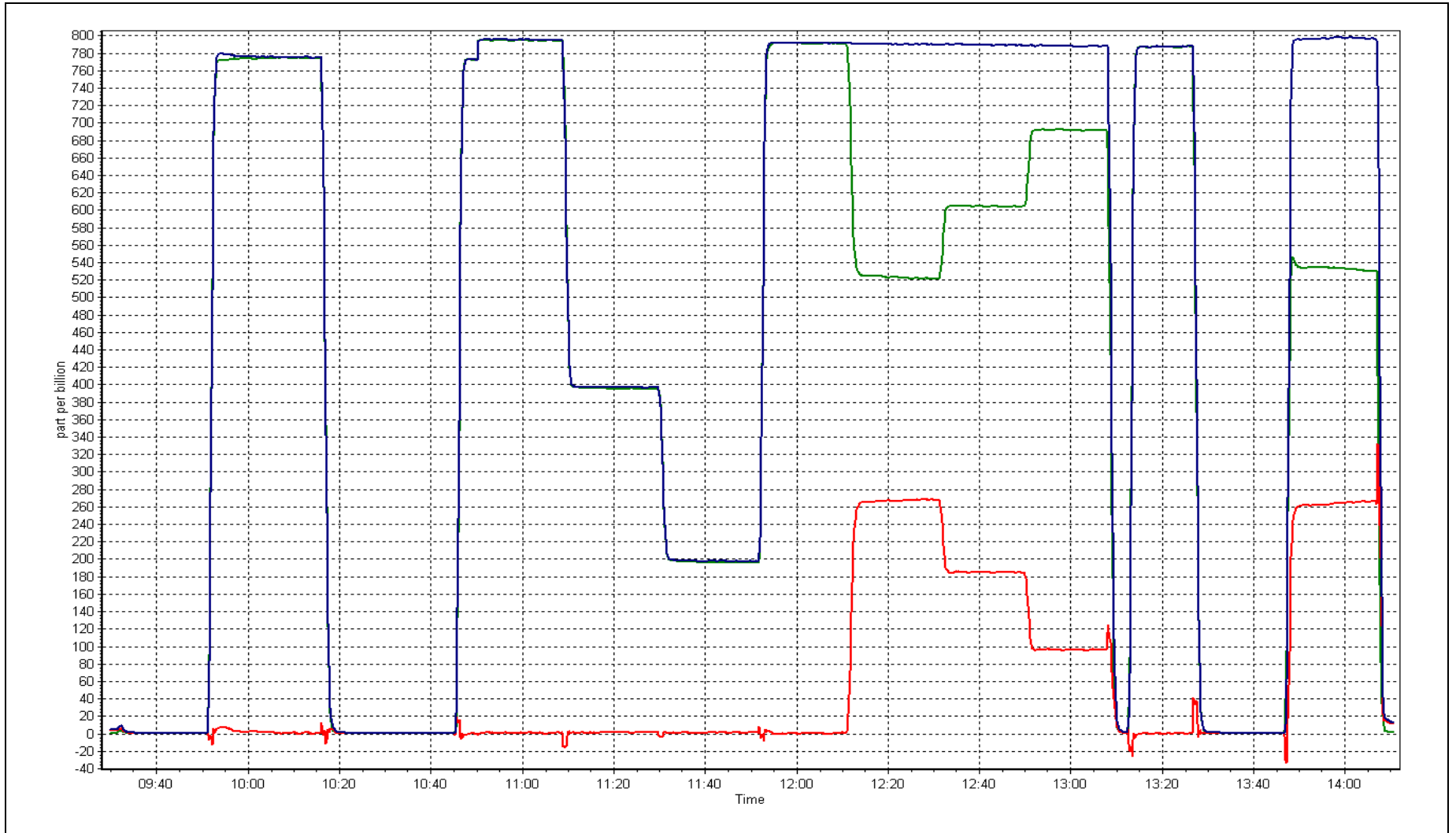
Calibration Date	July 14, 2015	Previous Calibration	June 17, 2015
Station Name	Shell Muskeg River	Station Number	AMS 16
Start Time (MST)	9:30	End Time (MST)	14:15
Analyzer make	Thermo 42i	Analyzer serial #	1426262593

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.4	N/A	Correlation Coefficient	0.999864
268.9	267.7	1.0043		
186.8	185.0	1.0099	Slope	1.004033
99.2	96.2	1.0317		
			Intercept	0.863684

### NO<sub>2</sub> Calibration Curve







Wood Buffalo Environmental Association

SHARP CONFORMANCE TEST

STATION INFORMATION

Calibration Date:	<u>July 28, 2015</u>	Previous Calibration:	<u>June 22, 2015</u>
Station Name:	<u>Shell Muskeg River</u>	Station Number:	<u>AMS 16</u>
Start Time (MST):	<u>10:27</u>	End Time (MST):	<u>10:47</u>
Calibrator Make/Model:	<u>Delta Cal</u>	Calibrator Serial Number:	<u>1097</u>

SHARP INFORMATION

Particulate Fraction:	<u>PM2.5</u>
Make/Model:	<u>Thermo / SHARP 5030</u>
Serial Number:	<u>E-798</u>
Source SN:	<u>4142</u>
HEPA PN:	<u>12144</u>
Time Correct (MST):	<u>Yes</u>
Parameters Checked:	<u>T1, P3, Main Flow, Beta, Neph</u>

AUDIT DATA

Temperature (°C)

Sensor	Indicated	Measured	Difference (Limit +/- 2.0°C)	Final Indicated
T1	21.0	21.1	0.1	21.0
T2	30.0	na	na	30.0
T3	29.0	na	na	29.0
T4	36.0	na	na	36.0
RH (%)	39.0	na	na	39.0

Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	973	973.0	0.0	973

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	adjusted (Limit +/- 2.0ug/m3)	As Left
Analog	536		530
Neph	2.7		-0.7
C14	17.5	Yes	16.3
Indicated Concentration (ug/m3)	1		-0.3
Offset 1	537		535.7
Offset 2	68		68.1

Leak Check (Quarterly)

Leak Check Date:	<u>May 25, 2015</u>	Previous Leak Check Date:	<u>May 6, 2015</u>
------------------	---------------------	---------------------------	--------------------

Measured

Difference LPM (Limit +/- 0.42 LPM)

Flow without adaptor (LPM):	<u>16.80</u>	
Flow with adaptor [turn off pump first](LPM):	<u>16.72</u>	<u>0.08</u>

Mass Foil Calibration (Annualy)

Foil Calibration Date:	<u>May 25, 2015</u>	Previous Foil Calibration:	<u>n/a</u>
Zeroed?:	<u>Yes</u>		
Foil Mass:	<u>1337</u>		
Previous Correction Factor:	<u>7029</u>	Mass foil set S/N:	<u>2518</u>
New Correction Factor:	<u>7067</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 adjusted, sample head cleaned

Mass Foil Cal Set

Melissa Lemay



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## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

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

**AMS 17  
WAPASU  
JULY 2015**

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

August 26, 2015



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WAPASU (AMS 17)  
 JULY 2015

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	707	37	37	100.00	15	0	3	0
H2S (ppb) Average	678	35	66	95.83	1	0	1	0
THC (ppm) Average	707	37	37	100.00	3.2	-	2.4	-
O3 (ppb) Average	707	35	37	99.73	63	0	35	-
NO2 (ppb) Average	707	37	37	100.00	19	0	7	-
NO (ppb) Average	707	37	37	100.00	11	-	2	-
NOX (ppb) Average	707	37	37	100.00	22	-	9	-
PM2.5 (ug/m3) Average	742	0	2	99.73	503.1	-	203.5	8
Temperature 2 m (C) Average	744	0	0	100.00	29.5	-	21.9	-
Relative Humidity (%) Average	744	0	0	100.00	99	-	86	-
Wind Speed 10 m (km/h) Average	744	0	0	100.00	20	-	12	-
Wind Direction 10 m (deg) Average	744	0	0	100.00	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WAPASU (AMS 17)  
 JULY 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	707	1.1	2	-	0	0	0	0	1	3	15
H2S (ppb) Average	678	0.3	0	-	0	0	0	0	0	1	1
THC (ppm) Average	707	2.11	0.2	-	1.9	2	2	2.1	2.2	2.3	3.2
O3 (ppb) Average	707	21.9	11	-	0	9	14	21	29	36	63
NO2 (ppb) Average	707	2.8	3	-	0	0	1	2	4	7	19
NO (ppb) Average	707	0.7	1	-	0	0	0	0	1	2	11
NOX (ppb) Average	707	3.5	4	-	0	1	1	2	5	9	22
PM2.5 (ug/m3) Average	742	31.48	69.7	-	1.1	2.6	4.2	6.8	15.7	88.2	503.1
Temperature 2 m (C) Average	744	16.56	4.7	-	-0.4	10.5	13.1	16.7	20.1	22.8	29.5
Relative Humidity (%) Average	744	70.6	20	-	26	43	55	73	88	95	99
Wind Speed 10 m (km/h) Average	744	7.2	3	-	1	3	5	7	9	12	20
Wind Direction 10 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WAPASU (AMS 17)  
JULY 2015

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
H2S	07 Jul 2015 23:00	08 Jul 2015 02:00	4	Intermittent unstable operation - excessive baseline drift
H2S	15 Jul 2015 11:00	15 Jul 2015 18:00	8	Intermittent unstable operation - excessive baseline drift
H2S	20 Jul 2015 06:00	20 Jul 2015 07:00	2	Intermittent unstable operation - excessive baseline drift
H2S	24 Jul 2015 09:00	24 Jul 2015 11:00	3	Intermittent unstable operation - excessive baseline drift
H2S	24 Jul 2015 14:00	24 Jul 2015 14:00	1	Intermittent unstable operation - excessive baseline drift
H2S	24 Jul 2015 19:00	24 Jul 2015 19:00	1	Intermittent unstable operation - excessive baseline drift
H2S	25 Jul 2015 02:00	25 Jul 2015 02:00	1	Intermittent unstable operation - excessive baseline drift
H2S	25 Jul 2015 14:00	25 Jul 2015 15:00	2	Intermittent unstable operation - excessive baseline drift
H2S	30 Jul 2015 11:00	30 Jul 2015 13:00	3	Intermittent unstable operation - excessive baseline drift
H2S	30 Jul 2015 19:00	30 Jul 2015 20:00	2	Intermittent unstable operation - excessive baseline drift
H2S	31 Jul 2015 12:00	31 Jul 2015 14:00	3	Intermittent unstable operation - excessive baseline drift
H2S	23 Jul 2015 10:00	23 Jul 2015 10:00	1	Maintenance - Station operator on site
O3	23 Jul 2015 10:00	23 Jul 2015 11:00	2	Maintenance - Station operator on site
PM2.5	28 Jul 2015 13:00	28 Jul 2015 14:00	2	Maintenance - Flow and zero check, sample head cleaning



Summary of Hour Averages

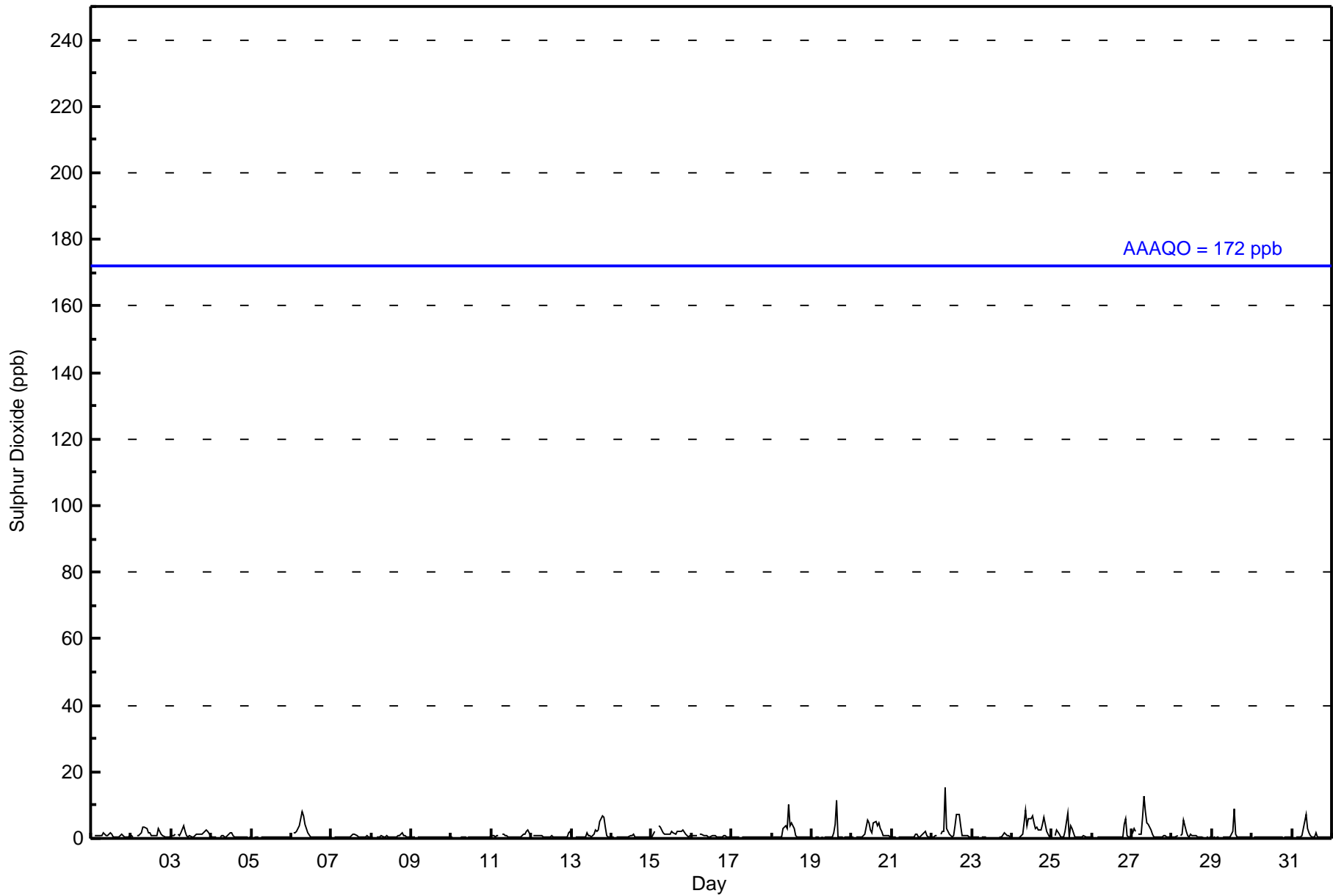
Wapasu - July 2015

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 15 ppb on Jul 22 09:00	Maximum Daily Average: 3.1 ppb on Jul 24		Hours of Data:	707
Minimum Value: 0 ppb on Jul 23 16:00	Minimum Daily Average: 0.3 ppb on Jul 17		Hours of Missing Data:	37
Maximum Diurnal Average: 2.2 ppb at hour 9	Minimum Diurnal Average: 0.5 ppb at hour 24		Hours of Calibration:	37
Monthly Average: 1.1 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 O <sub>3</sub> = 1 P <sub>90</sub> = 3 P <sub>99</sub> = 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-Jul	3	Z	1	1	1	1	1	2	1	1	1	2	1	1	0	0	1	1	1	1	1	0	1	1	1.0	3
2-Jul	1	1	Z	1	1	1	2	3	3	3	2	2	1	1	1	1	3	2	1	1	1	1	1	1	1.4	3
3-Jul	1	1	1	Z	1	1	2	4	2	1	0	1	1	1	1	1	1	1	1	2	2	2	2	1	1.4	4
4-Jul	1	1	0	1	Z	1	1	1	1	1	1	2	2	1	0	0	0	0	0	0	0	0	0	0	0.6	2
5-Jul	0	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-Jul	Z	2	2	2	3	4	8	7	4	3	2	1	0	1	0	1	1	0	0	0	0	0	0	0	1.8	8
7-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	1	1	0.5	1
8-Jul	0	0	Z	0	0	0	1	1	1	1	1	1	1	1	0	0	1	1	2	1	1	0	0	0	0.6	2
9-Jul	0	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
10-Jul	0	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
11-Jul	1	1	1	1	1	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	2	3	0.9	3
12-Jul	Z	1	1	1	1	1	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	2	2	0.6	2
13-Jul	1	Z	0	0	0	0	0	0	1	2	1	1	0	1	2	2	2	5	7	6	3	1	0	0	1.6	7
14-Jul	0	0	Z	0	0	0	0	0	0	0	1	1	1	1	1	0	0	1	1	0	0	1	1	0	0.5	1
15-Jul	1	1	2	Z	4	3	3	2	1	1	1	1	2	2	1	2	2	2	2	2	1	1	1	1	1.7	4
16-Jul	1	1	1	1	Z	1	1	1	1	1	1	0	1	1	1	0	1	1	0	1	1	1	0	0	0.7	1
17-Jul	0	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
18-Jul	Z	0	0	0	0	1	1	3	4	3	10	4	4	3	1	0	0	0	0	0	0	0	0	0	1.6	10
19-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	2	4	11	0	0	0	0	0	0	0	0	1.0	11
20-Jul	0	0	Z	0	0	0	0	1	1	5	5	2	2	5	5	4	5	3	2	1	1	1	1	1	2.0	5
21-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	2	2	1	1	0	0.7	2
22-Jul	1	0	1	1	Z	1	2	2	15	3	1	1	1	1	4	7	7	4	1	1	1	1	1	0	2.4	15
23-Jul	0	0	0	0	0	Z	0	0	0	C	C	C	C	C	C	0	0	0	1	2	1	1	1	0	--	2
24-Jul	Z	0	0	0	0	1	1	5	9	4	6	6	7	5	3	3	3	3	4	6	4	2	1	0	3.1	9
25-Jul	1	Z	1	2	1	0	0	0	2	8	0	4	3	2	0	0	0	0	0	1	0	0	0	0	1.3	8
26-Jul	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	6	1	1	1	0.8	6
27-Jul	2	3	2	Z	1	1	6	13	8	5	4	3	1	1	0	0	0	0	1	1	1	1	1	1	2.4	13
28-Jul	1	1	1	1	Z	1	1	5	2	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0.8	5
29-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	2	9	1	0	0	0	0	0	0	0	0	0	0.8	9
30-Jul	Z	0	0	0	0	0	0	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1
31-Jul	0	Z	0	0	0	1	1	3	7	3	2	1	0	0	2	0	0	0	0	0	0	0	0	0	1.0	7

0.6	0.6	0.7	0.6	0.8	0.9	1.2	1.9	2.2	1.6	1.4	1.2	1.2	1.3	1.2	1.4	1.1	1.0	1.0	1.2	1.0	0.7	0.6	0.5	Diurnal Average
3	3	2	2	4	4	8	13	15	8	10	6	7	9	5	11	7	5	7	6	6	2	3	2	Diurnal Maximum

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





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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Wapasu - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	704	99.58	99.58
11 - 20	3	0.42	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Wapasu - July 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	27	20	9	14	12	49	78	84	60	35	70	61	44	48	45	48	704
11 - 20	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	0	3
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	27	20	9	14	12	49	78	84	60	36	70	62	44	49	45	48	707

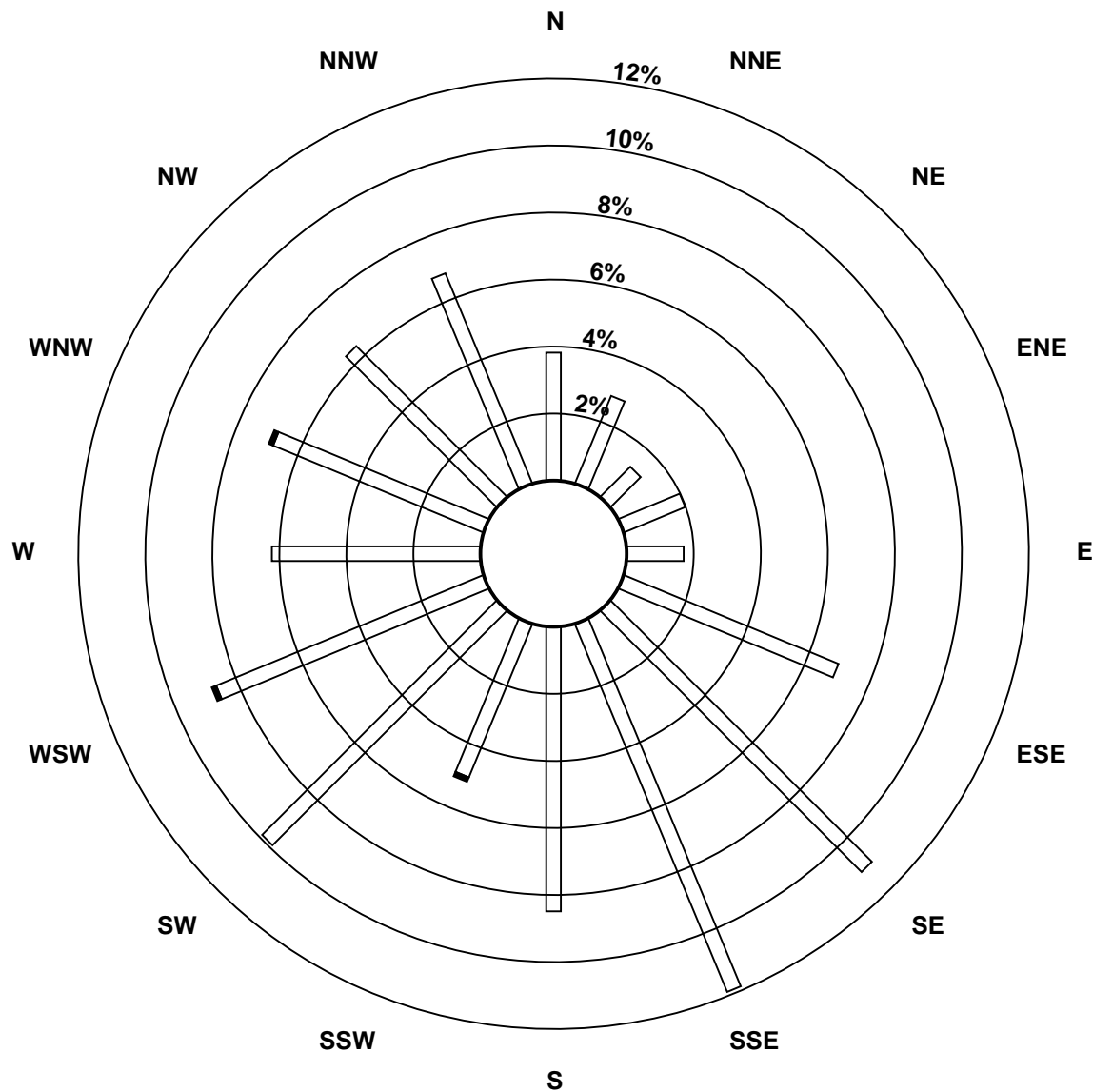
Total Number of Valid Hours: 707

Total Number of Hours: 744

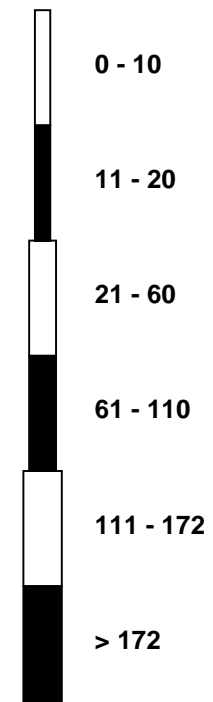


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Wapasu (AMS 17)

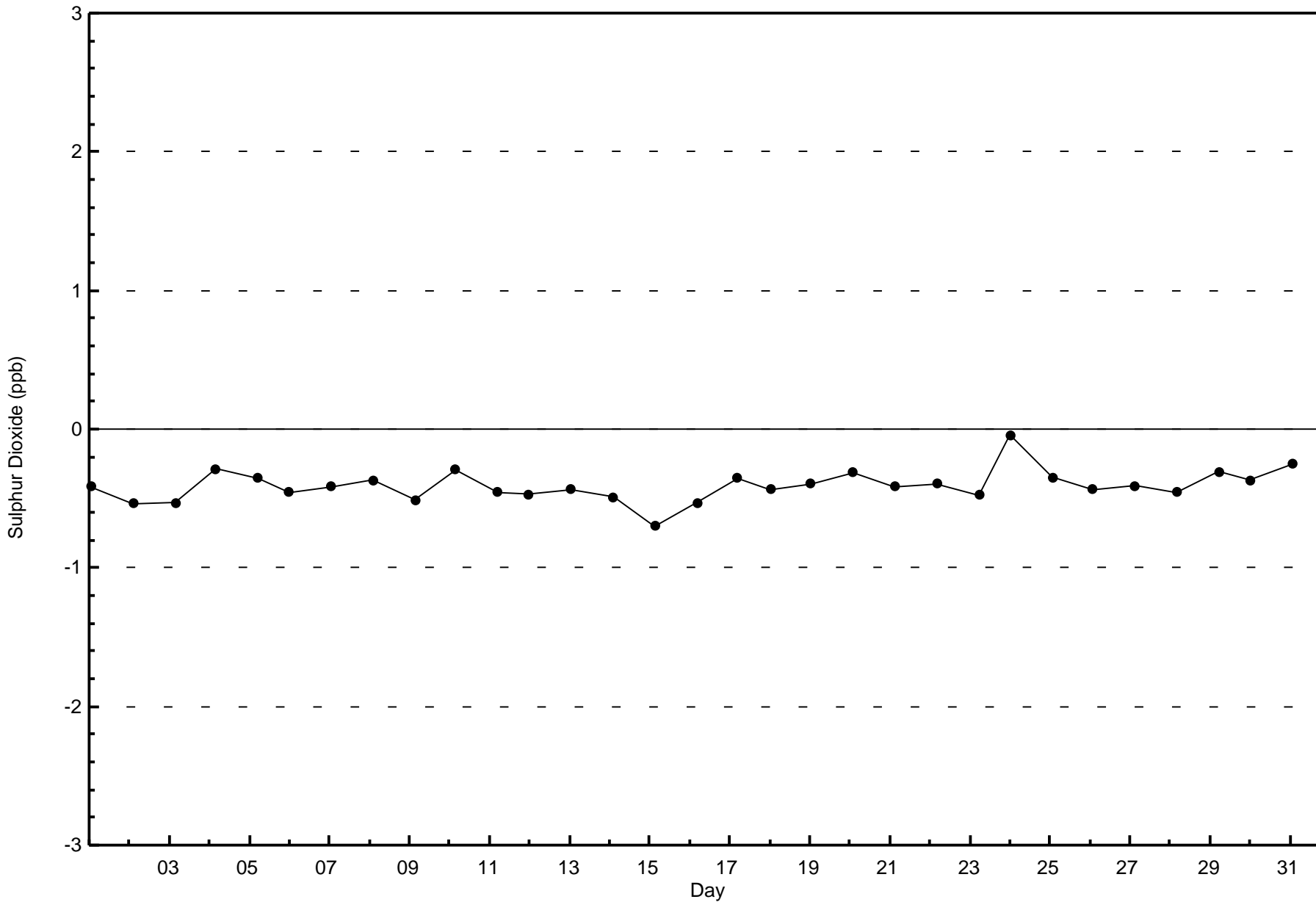


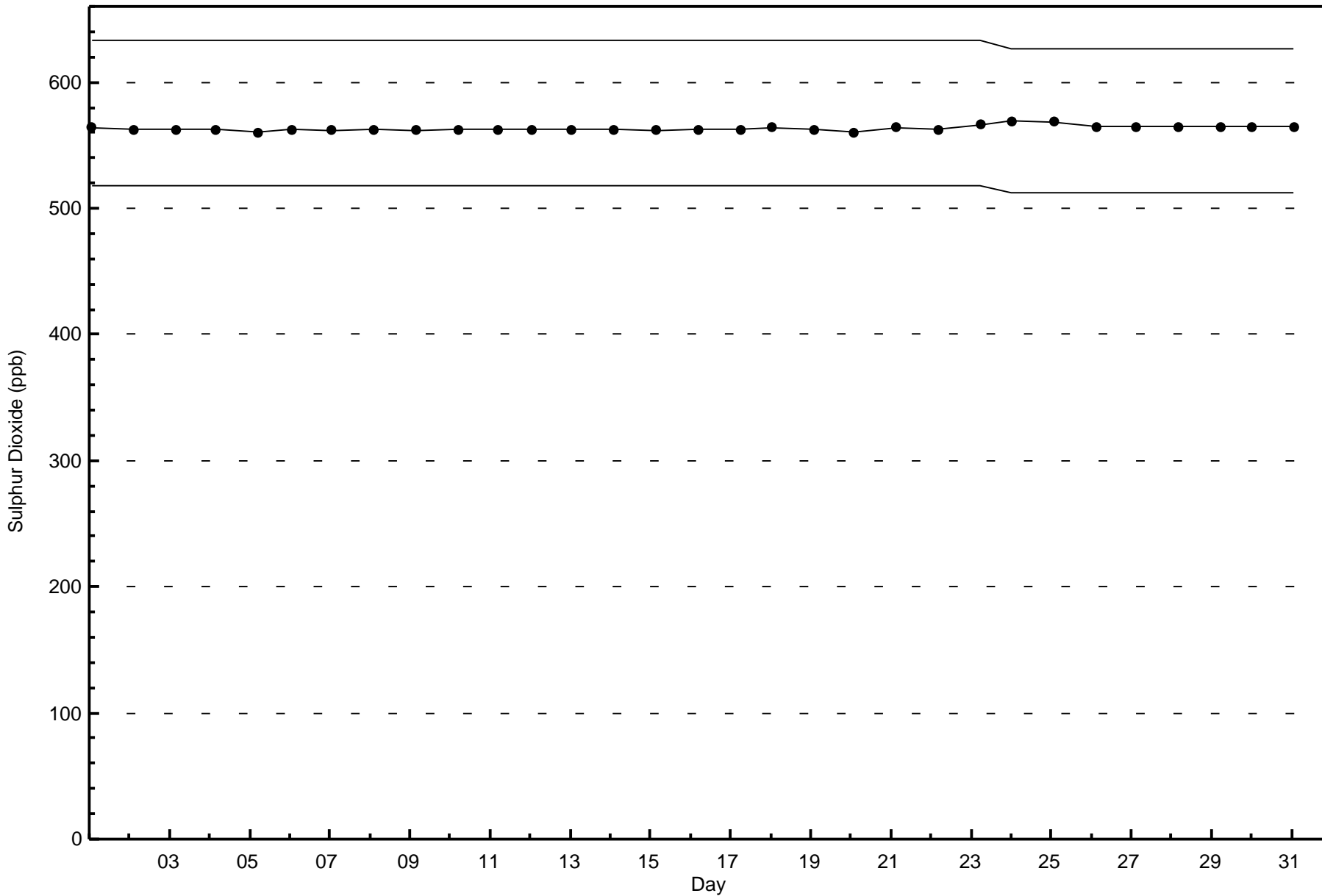
Classes (ppb)



Total Number of Valid Hours: 707







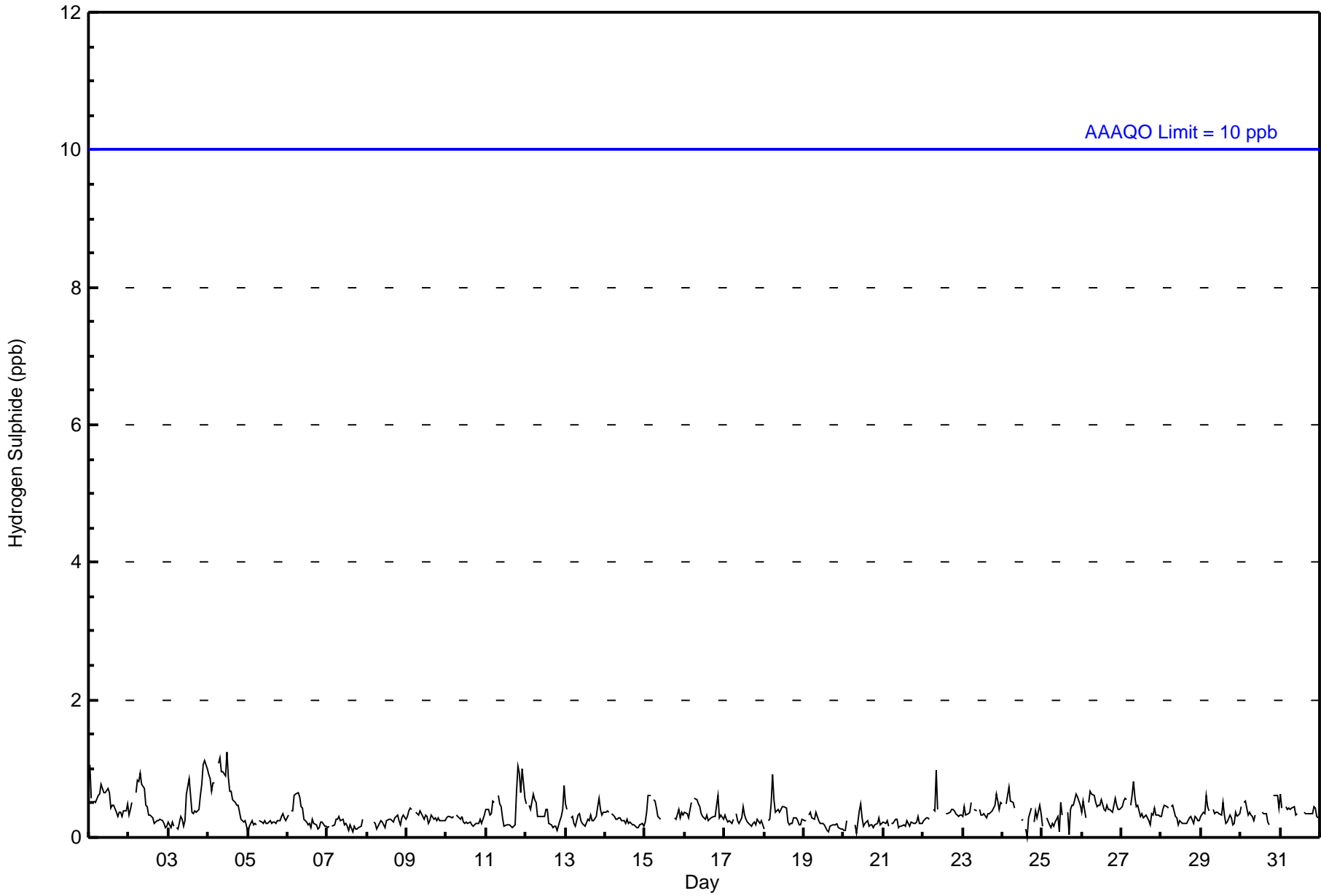


Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 1 ppb on Jul 4 12:00	Maximum Daily Average: 0.7 ppb on Jul 4		Hours of Data:	678
Minimum Value: 0 ppb on Jul 24 16:00	Minimum Daily Average: 0.2 ppb on Jul 7		Hours of Missing Data:	66
Maximum Diurnal Average: 0.4 ppb at hour 7	Minimum Diurnal Average: 0.2 ppb at hour 17		Hours of Calibration:	35
Monthly Average: 0.3 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 1 P <sub>99</sub> = 1		Percent Operational Time:	95.8

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-Jul	1	1	Z	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1
2-Jul	0	0	1	Z	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
3-Jul	0	0	0	0	Z	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	1	1	1	1	1	0.5	1
4-Jul	1	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0.7	1
5-Jul	0	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	0
6-Jul	0	Z	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
7-Jul	0	0	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-Jul	UO	UO	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
9-Jul	0	0	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
10-Jul	0	0	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
11-Jul	0	0	0	0	1	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0.5	1
12-Jul	0	Z	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.3	1
13-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.3	1
14-Jul	0	0	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-Jul	0	0	1	1	Z	1	1	0	0	0	UO	UO	UO	UO	UO	UO	UO	UO	0	0	0	0	0	0	0	--	1
16-Jul	0	0	0	0	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.4	1
17-Jul	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
18-Jul	0	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
19-Jul	0	0	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-Jul	0	0	0	Z	0	UO	UO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
21-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
22-Jul	0	0	0	0	0	Z	0	0	1	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.4	1
23-Jul	0	0	0	0	0	1	Z	0	0	0	M	0	0	0	0	0	0	0	0	0	1	1	0	1	0.4	1	
24-Jul	0	Z	0	1	1	1	1	0	UO	UO	UO	0	0	UO	0	0	0	0	UO	0	0	0	0	0	0	0.4	1
25-Jul	0	UO	Z	0	0	0	0	0	0	0	0	1	0	UO	UO	0	0	0	0	0	0	1	1	1	0	0.3	1
26-Jul	0	1	0	Z	1	1	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0.5	1
27-Jul	0	1	1	1	Z	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
28-Jul	0	0	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
29-Jul	0	0	0	1	0	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1
30-Jul	0	Z	1	1	0	0	0	0	0	0	UO	UO	UO	0	0	0	0	0	0	UO	UO	1	1	1	0	0.4	1
31-Jul	1	0	Z	0	0	0	0	0	0	0	0	UO	UO	UO	0	0	0	0	0	0	0	0	0	0	0	0.4	1

0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.3	Diurnal Average		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	Diurnal Maximum	

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





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

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Wapasu - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	678	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: 678

Total Number of Hours: 744



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

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Wapasu - July 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	25	20	7	16	11	48	81	78	55	34	66	56	36	51	46	48	678
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	25	20	7	16	11	48	81	78	55	34	66	56	36	51	46	48	678

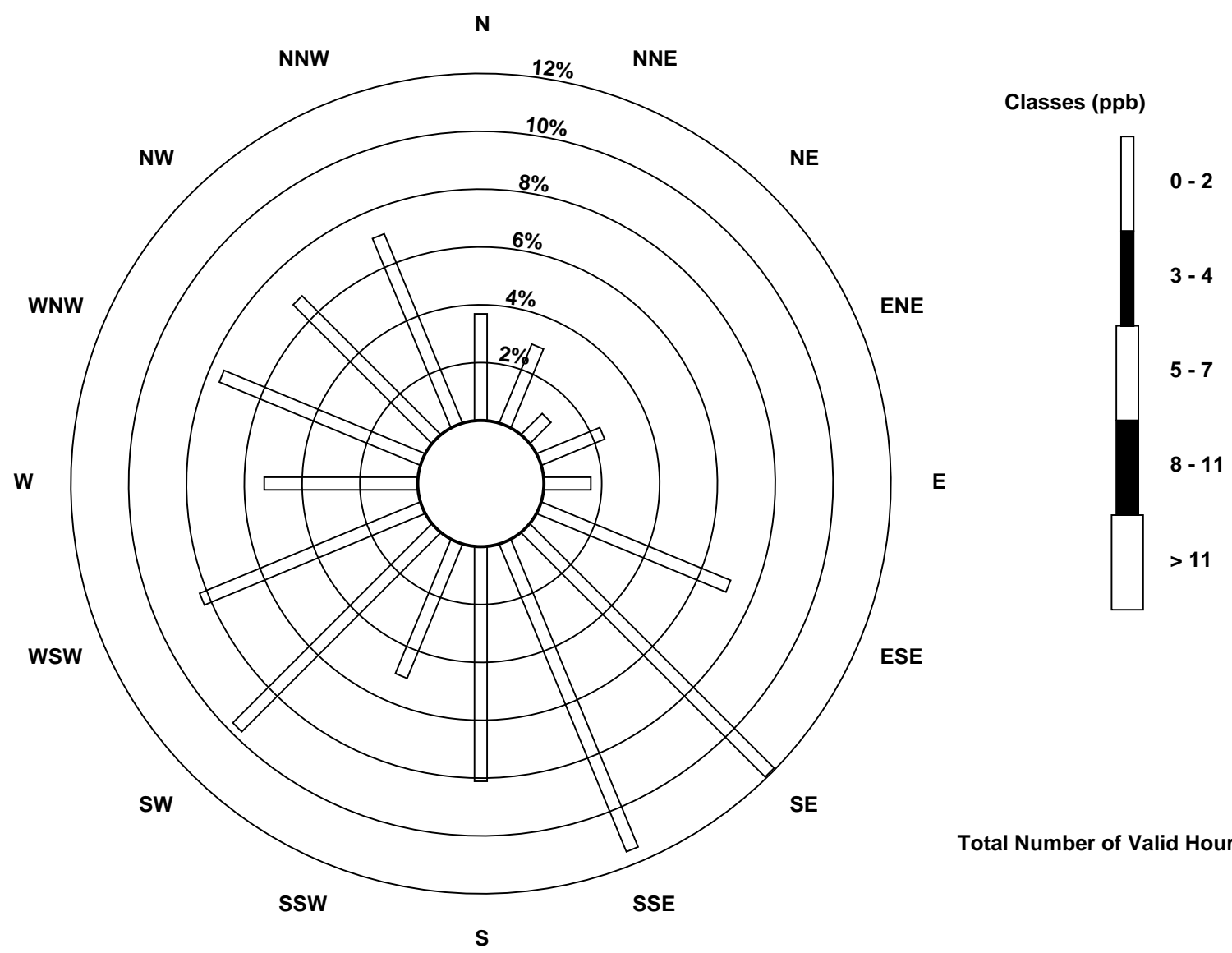
Total Number of Valid Hours: 678

Total Number of Hours: 744

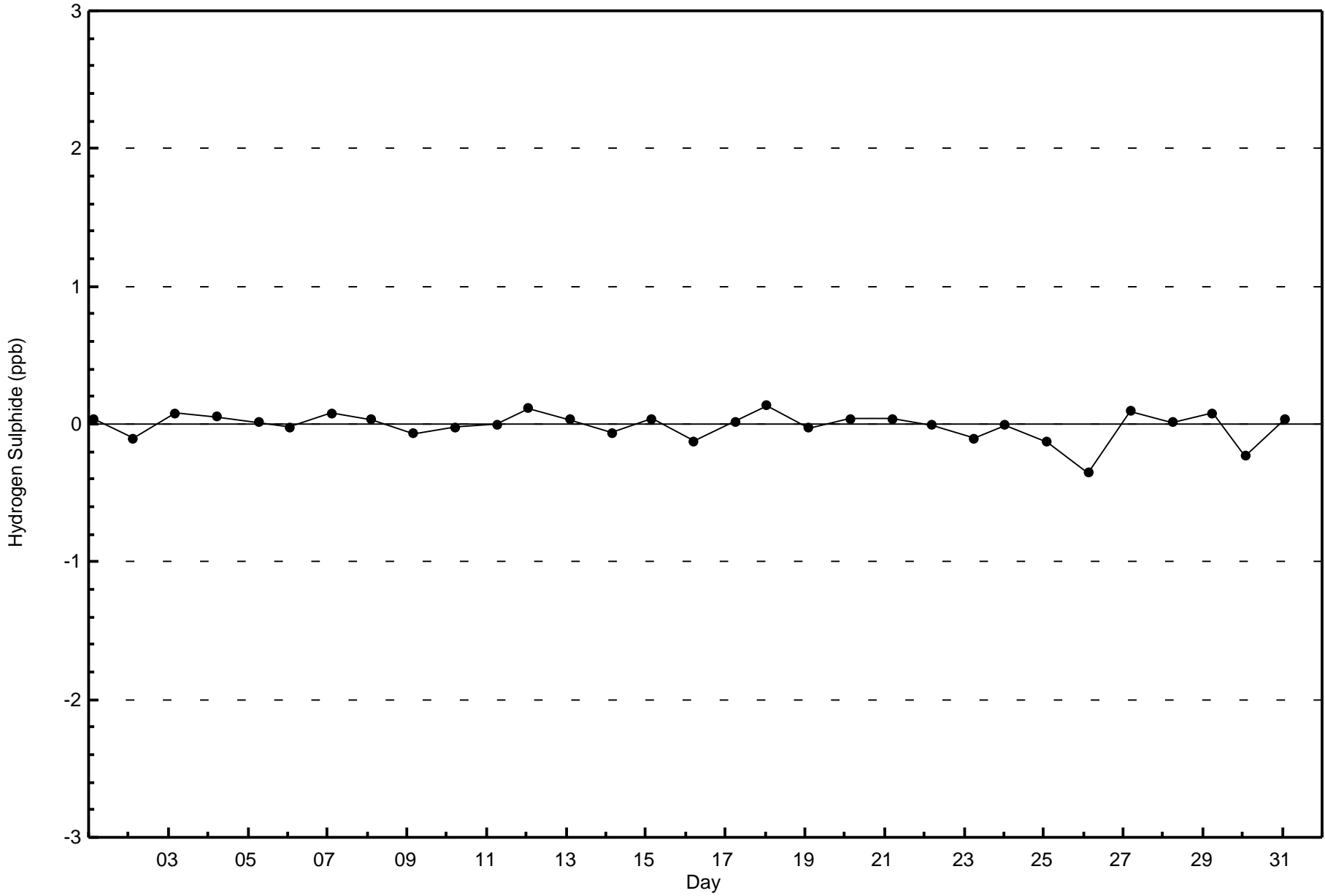


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

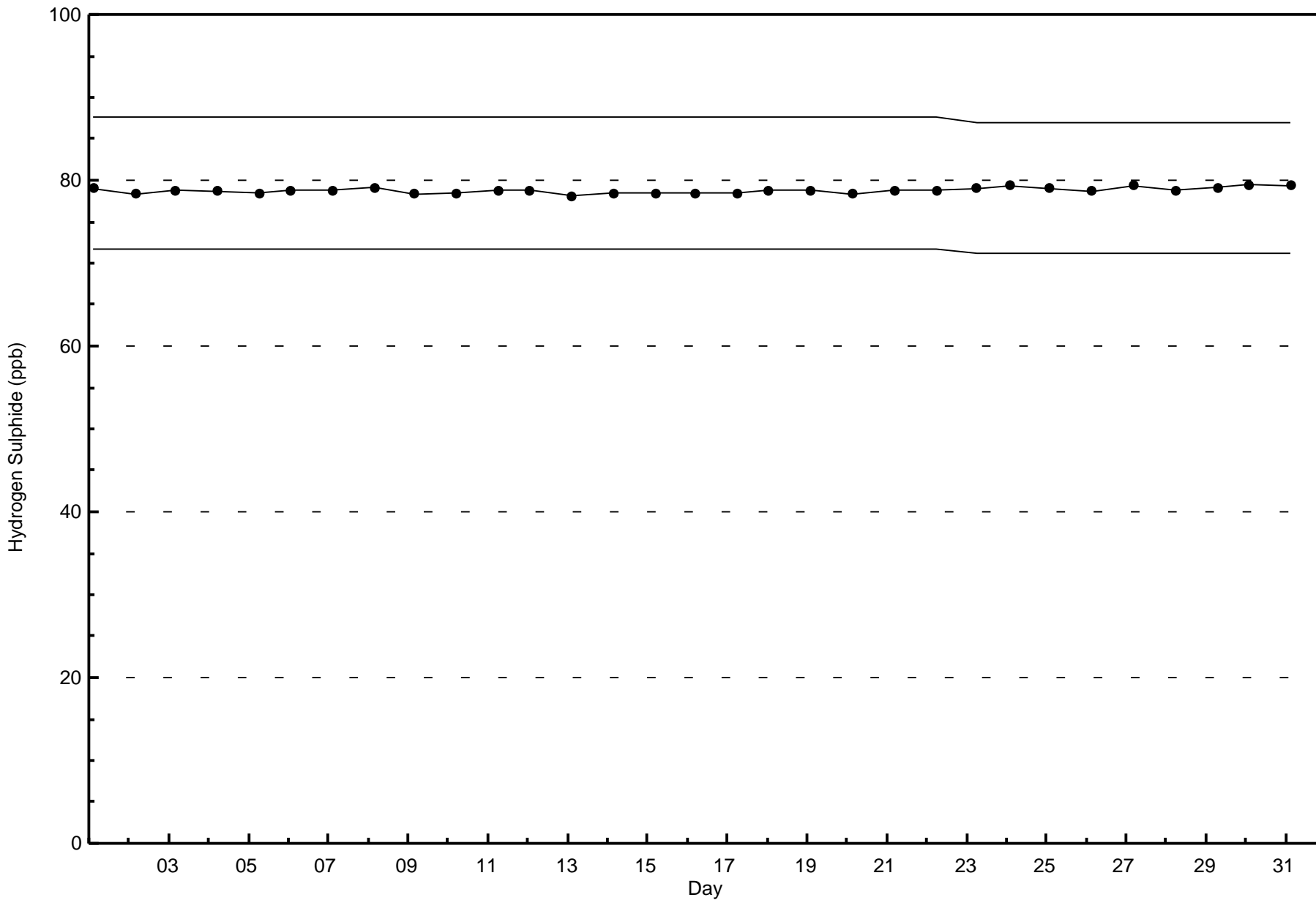
Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Wapasu (AMS 17)



Total Number of Valid Hours: 678

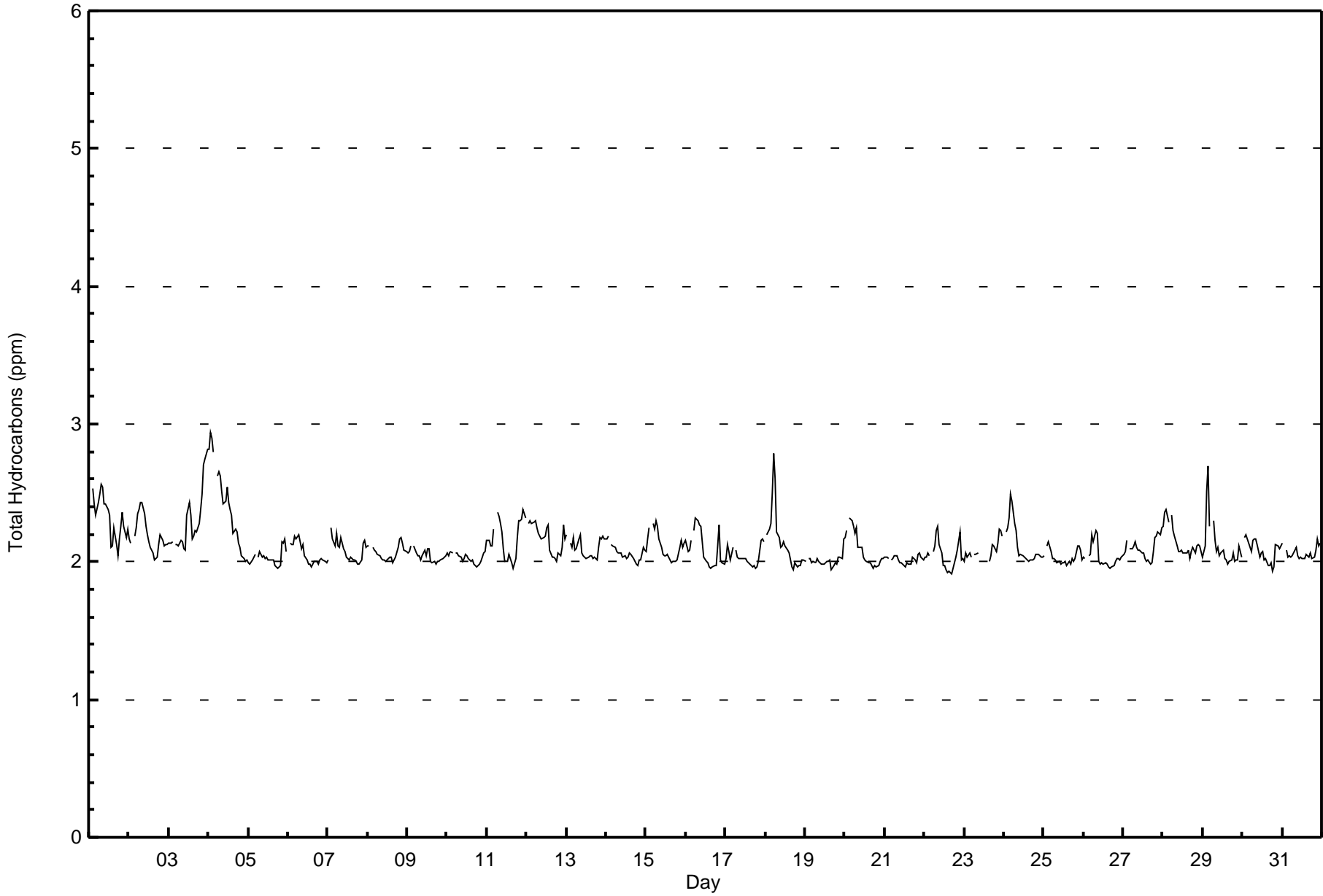








Maximum Value: 3.2 ppm on Jul 1 01:00																		Maximum Daily Average: 2.4 ppm on Jul 4																		Hours in Service: 744	
Minimum Value: 1.9 ppm on Jul 22 17:00																		Minimum Daily Average: 2.0 ppm on Jul 19																		Hours of Data: 707	
Maximum Diurnal Average: 2.2 ppm at hour 6																		Minimum Diurnal Average: 2.0 ppm at hour 17																		Hours of Missing Data: 37	
Monthly Average: 2.11 ppm																		Percentiles: P <sub>1</sub> = 1.9 P <sub>10</sub> = 2.0 Q <sub>1</sub> = 2.0 Median = 2.1 Q <sub>3</sub> = 2.2 P <sub>90</sub> = 2.3 P <sub>99</sub> = 2.8																		Hours of Calibration: 37	
																																				Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24													
1-Jul	3.2	Z	2.5	2.4	2.3	2.4	2.5	2.6	2.5	2.4	2.4	2.4	2.3	2.1	2.1	2.2	2.1	2.0	2.2	2.3	2.4	2.3	2.2	2.2	2.4	2.4	3.2										
2-Jul	2.2	2.1	Z	2.2	2.2	2.3	2.4	2.4	2.4	2.3	2.3	2.2	2.1	2.1	2.1	2.0	2.0	2.0	2.1	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.4										
3-Jul	2.1	2.1	2.2	Z	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.3	2.4	2.3	2.2	2.2	2.2	2.3	2.4	2.5	2.7	2.7	2.8	2.3	2.8	2.8											
4-Jul	2.8	2.9	2.9	2.8	Z	2.6	2.7	2.6	2.5	2.4	2.4	2.5	2.4	2.4	2.3	2.2	2.2	2.2	2.1	2.1	2.0	2.0	2.0	2.4	2.9	2.9											
5-Jul	2.0	2.0	2.0	2.0	2.1	Z	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.1	2.0	2.2											
6-Jul	Z	2.1	2.1	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2											
7-Jul	2.0	Z	2.3	2.2	2.1	2.2	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	2.1	2.2	2.1	2.1	2.3											
8-Jul	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.2											
9-Jul	2.1	2.1	2.1	Z	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1											
10-Jul	2.1	2.0	2.1	2.1	Z	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.1											
11-Jul	2.2	2.2	2.1	2.1	2.2	Z	2.4	2.3	2.3	2.2	2.1	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.2	2.3	2.3	2.3	2.4	2.3	2.2	2.4											
12-Jul	Z	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.1	2.0	2.0	2.0	2.0	2.1	2.0	2.1	2.3	2.2	2.2	2.3											
13-Jul	2.2	Z	2.1	2.1	2.2	2.1	2.1	2.2	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.2	2.2	2.2	2.1	2.2											
14-Jul	2.2	2.2	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.2											
15-Jul	2.1	2.2	2.3	Z	2.3	2.2	2.3	2.3	2.2	2.1	2.1	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.1	2.1	2.1	2.3											
16-Jul	2.2	2.1	2.1	2.2	Z	2.2	2.3	2.3	2.3	2.3	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.3	2.0	2.0	2.0	2.1	2.3											
17-Jul	2.0	2.1	2.1	2.0	2.1	Z	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.2	2.2	2.1	2.0	2.2											
18-Jul	Z	2.2	2.2	2.3	2.5	2.8	2.6	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.8											
19-Jul	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.0	2.2											
20-Jul	2.2	2.2	Z	2.3	2.3	2.3	2.2	2.2	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.3											
21-Jul	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.1											
22-Jul	2.0	2.0	2.1	2.0	Z	2.1	2.1	2.2	2.3	2.1	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.1	2.2	2.0	2.0	2.0	2.3											
23-Jul	2.0	2.1	2.0	2.1	2.0	Z	2.1	2.1	2.1	C	C	C	C	C	C	2.0	2.0	2.1	2.1	2.1	2.1	2.2	2.2	2.2	--	2.2											
24-Jul	Z	2.2	2.2	2.3	2.5	2.4	2.3	2.2	2.1	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.1	2.5											
25-Jul	2.0	Z	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.0	2.1											
26-Jul	2.0	2.0	Z	2.0	2.1	2.2	2.2	2.2	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2											
27-Jul	2.1	2.1	2.2	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.2	2.2	2.2	2.2	2.1	2.2											
28-Jul	2.3	2.4	2.4	2.3	Z	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.4											
29-Jul	2.0	2.1	2.5	2.7	2.3	Z	2.3	2.2	2.1	2.1	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.1	2.0	2.7											
30-Jul	Z	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.1	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.1	2.1	2.1	2.1	2.1	2.2											
31-Jul	2.1	Z	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.1	2.0	2.0	2.1	2.2	2.1	2.1	2.1	2.2											
																								Diurnal Average													
																								Diurnal Maximum													
Z - zerospan																								C - Calibration													





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

**Total Hydrocarbons (THC) - ppm**  
**Wapasu - July 2015**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	324	45.83	45.83
2.1 - 3.0	382	54.03	99.86
3.1 - 10.0	1	0.14	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



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

**Total Hydrocarbons (THC) - ppm**  
**Wapasu - July 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	18	17	7	6	7	23	15	17	22	8	29	42	22	28	32	31	324
2.1 - 3.0	9	3	2	8	5	26	63	66	38	28	41	20	22	21	13	17	382
3.1 - 10.0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	27	20	9	14	12	49	78	84	60	36	70	62	44	49	45	48	707

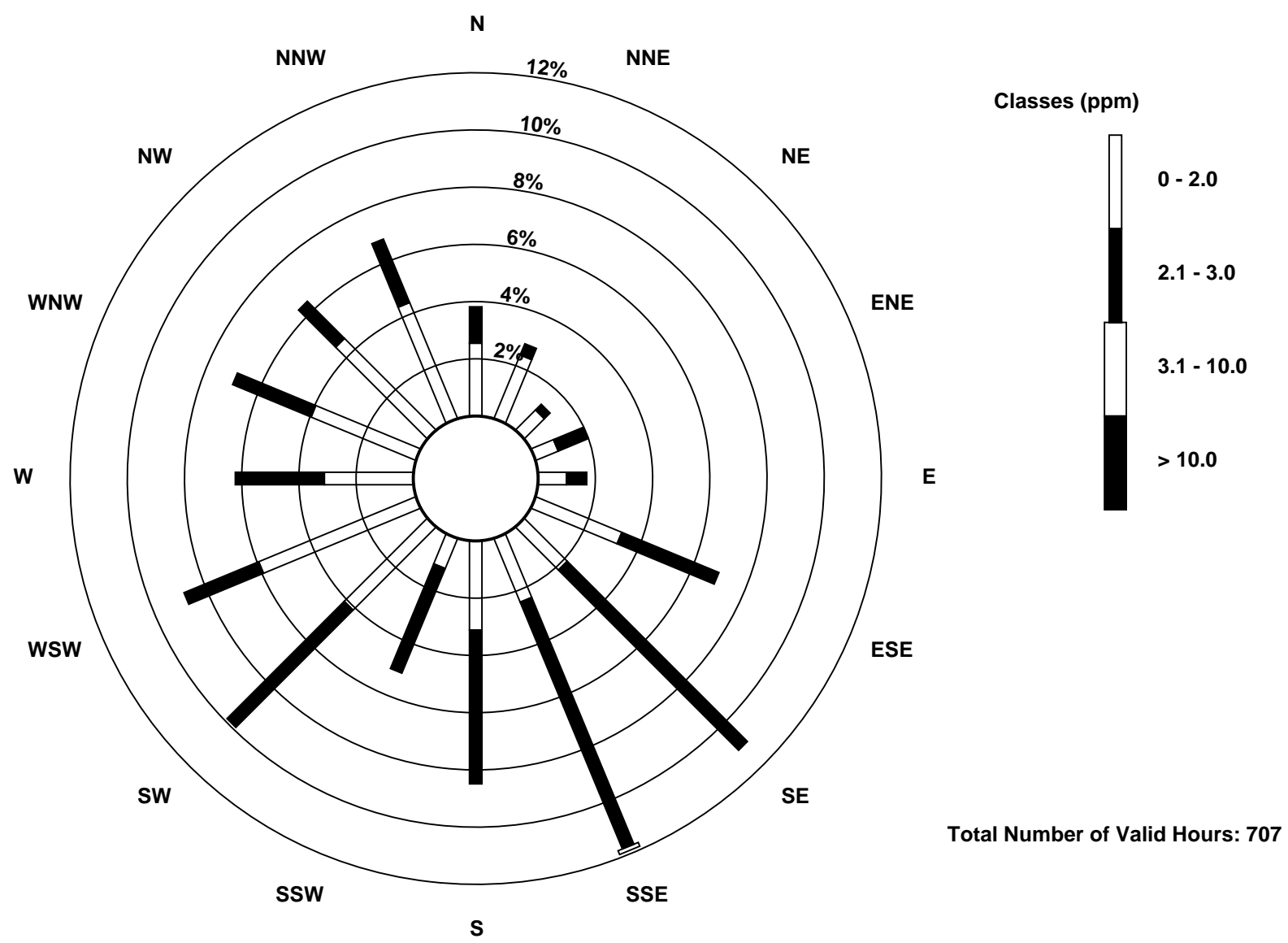
Total Number of Valid Hours: 707

Total Number of Hours: 744



Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Total Hydrocarbons (THC) - ppm  
Wapasu (AMS 17)



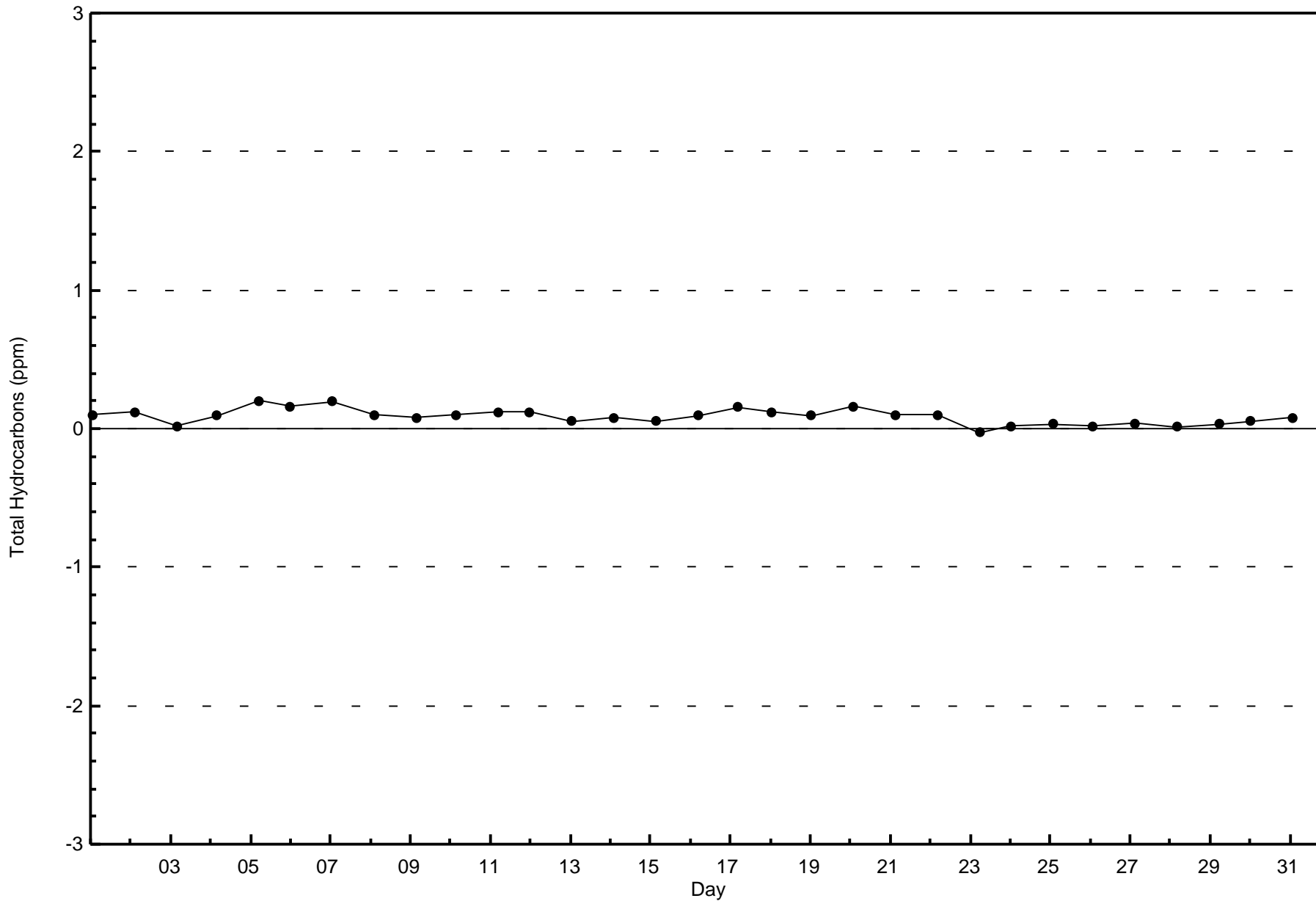


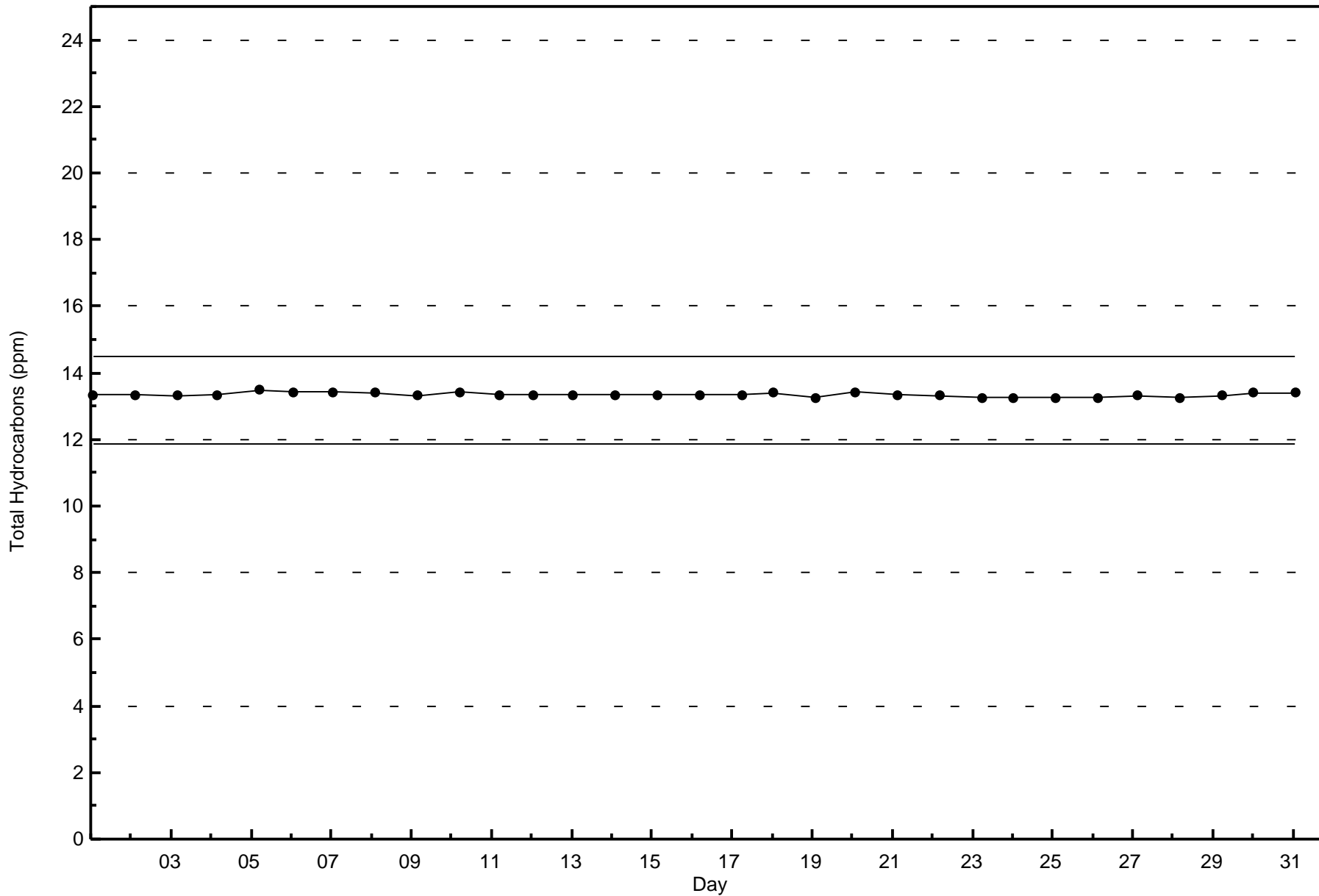
Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Wapasu - July 2015









# Wood Buffalo Environmental Association

## Summary of Hour Averages

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

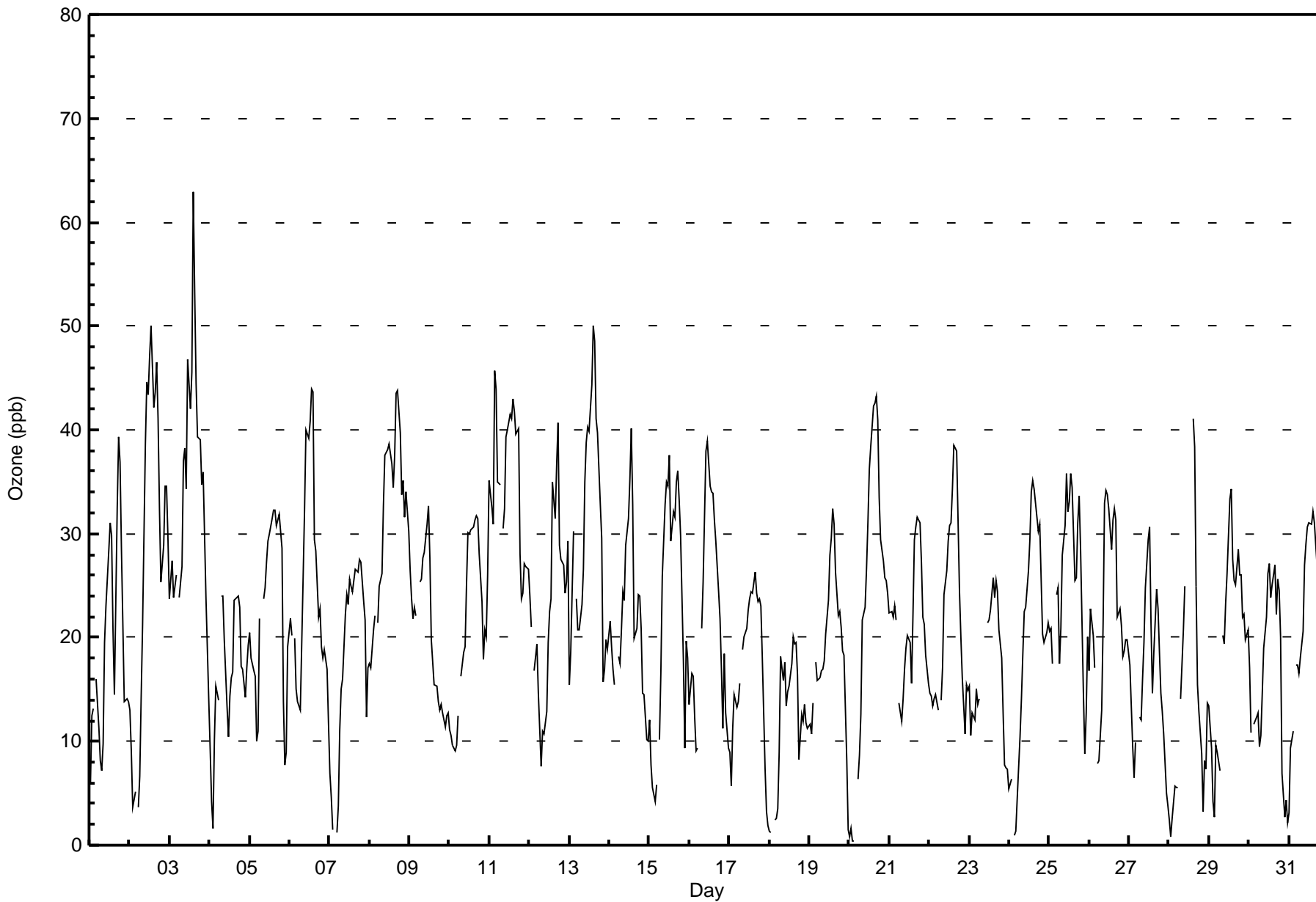
Wapasu - July 2015

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																																							
Maximum Value: 63 ppb on Jul 3 15:00										Maximum Daily Average: 35.0 ppb on Jul 11										Hours of Data: 707																													
Minimum Value: 0 ppb on Jul 20 03:00										Minimum Daily Average: 12.1 ppb on Jul 18										Hours of Missing Data: 37																													
Maximum Diurnal Average: 32.1 ppb at hour 15										Minimum Diurnal Average: 13.0 ppb at hour 6										Hours of Calibration: 35																													
Monthly Average: 21.9 ppb										Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 9 Q <sub>1</sub> = 14 Median = 21 O <sub>3</sub> = 29 P <sub>90</sub> = 36 P <sub>99</sub> = 47										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-Jul	6	12	13	Z	16	11	8	7	10	20	23	28	31	30	21	15	33	39	37	28	21	14	14	14	19.6	39																							
2-Jul	13	9	4	5	Z	4	7	14	21	39	45	43	47	50	42	44	47	41	32	25	29	35	35	30	28.7	50																							
3-Jul	24	27	24	25	26	Z	24	27	37	38	34	47	42	46	63	53	45	39	39	35	36	30	24	14	34.7	63																							
4-Jul	9	4	2	10	15	14	Z	24	24	20	13	10	14	16	17	24	24	24	23	17	17	14	17	19	16.2	24																							
5-Jul	20	18	17	16	10	11	22	Z	24	25	27	29	30	31	32	32	31	31	32	29	14	8	9	19	22.5	32																							
6-Jul	22	20	Z	20	15	14	13	19	26	32	40	39	41	44	44	29	28	22	23	19	18	19	17	12	25.0	44																							
7-Jul	7	5	2	Z	1	4	11	15	16	22	24	23	26	25	24	27	26	26	27	27	23	22	12	17	18.0	27																							
8-Jul	17	17	21	22	Z	21	25	26	33	38	38	38	39	37	34	38	43	44	40	34	35	32	34	30	32.0	44																							
9-Jul	26	24	22	23	22	Z	25	26	28	28	31	33	28	20	18	16	15	14	13	14	13	11	12	13	20.6	33																							
10-Jul	11	11	10	9	10	13	Z	16	19	19	25	30	30	30	31	31	32	31	28	24	18	21	20	26	21.5	32																							
11-Jul	35	33	31	46	44	35	35	Z	31	32	39	40	42	41	43	42	40	40	28	24	24	27	27	27	35.0	46																							
12-Jul	24	21	Z	17	19	15	11	8	11	11	13	20	23	24	35	31	37	41	29	28	27	24	25	29	22.7	41																							
13-Jul	15	19	30	Z	24	21	21	23	27	35	39	40	40	44	50	49	41	40	33	30	16	17	20	19	30.0	50																							
14-Jul	22	19	17	15	Z	18	17	21	24	24	29	31	35	40	33	20	21	24	24	21	15	14	10	10	22.0	40																							
15-Jul	12	8	6	4	6	Z	10	17	26	33	35	35	38	29	32	32	35	36	33	30	18	9	20	18	22.6	38																							
16-Jul	14	17	16	12	9	9	Z	21	25	32	38	39	35	34	34	31	29	24	22	17	11	18	13	9	22.2	39																							
17-Jul	9	6	11	14	13	14	16	Z	19	20	21	23	24	24	24	26	24	24	24	23	18	7	3	2	16.9	26																							
18-Jul	1	1	Z	2	3	4	9	18	16	18	13	15	15	17	20	19	20	16	8	13	12	14	12	11	12.1	20																							
19-Jul	12	11	14	Z	18	16	16	17	17	18	20	24	28	30	32	31	26	22	22	21	19	18	8	2	19.2	32																							
20-Jul	1	2	0	0	Z	6	9	13	22	23	27	31	36	38	42	43	43	41	34	29	27	26	25	24	23.6	43																							
21-Jul	22	22	22	23	22	Z	14	12	14	17	19	20	19	16	22	29	31	32	31	27	22	21	18	16	21.4	32																							
22-Jul	15	14	13	14	15	13	Z	14	17	24	26	29	31	31	34	39	38	31	25	20	16	11	15	15	21.8	39																							
23-Jul	15	11	13	12	15	14	14	Z	15	M	M	21	22	23	26	24	25	24	21	18	13	8	7	7	16.6	26																							
24-Jul	5	6	Z	1	1	4	10	14	18	23	23	26	29	34	35	34	33	30	31	26	20	20	21	21	20.4	35																							
25-Jul	21	21	18	Z	24	25	18	21	28	31	36	32	33	36	34	26	26	31	34	28	15	9	13	20	25.1	36																							
26-Jul	17	23	20	17	Z	8	8	13	21	33	34	34	32	28	31	32	31	22	23	21	18	19	20	20	22.9	34																							
27-Jul	17	13	9	7	10	Z	12	12	16	20	25	29	31	21	15	19	25	23	19	15	13	11	5	4	16.0	31																							
28-Jul	2	1	3	6	6	6	Z	14	21	25	C	C	C	C	41	38	25	15	13	9	3	8	7	14	13.5	41																							
29-Jul	13	9	4	3	10	9	7	Z	20	19	23	26	33	34	27	25	25	28	26	26	22	22	20	21	19.8	34																							
30-Jul	17	11	Z	12	12	13	9	11	15	19	22	26	27	24	25	27	22	26	25	20	7	3	4	2	16.4	27																							
31-Jul	3	9	11	Z	17	17	17	18	21	27	29	31	31	31	32	31	29	27	21	11	6	9	10	8	19.4	32																							
																								14.5	13.7	13.5	13.5	14.7	13.0	14.9	16.9	21.3	25.4	28.0	29.8	31.0	31.0	32.1	30.8	30.6	29.3	26.4	22.8	18.3	16.8	16.1	15.9	Diurnal Average	
																								35	33	31	46	44	35	35	27	37	39	45	47	47	50	63	53	47	44	40	35	36	35	35	30	Diurnal Maximum	
Z - zerospan      C - Calibration      M - Maintenance																																																	
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb																																																	



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

**Ozone (O<sub>3</sub>) - ppb**  
**Wapasu - July 2015**





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

**Ozone (O<sub>3</sub>) - ppb**  
**Wapasu - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	326	46.11	46.11
21 - 50	379	53.61	99.72
51 - 82	2	0.28	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Ozone (O<sub>3</sub>) - ppb  
Wapasu - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	17	13	6	11	8	21	62	54	25	21	22	9	8	14	23	12	326
21 - 50	11	8	1	5	4	27	21	30	30	14	50	53	35	36	20	34	379
51 - 82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	28	21	7	16	12	48	83	84	55	35	72	62	43	50	45	46	707

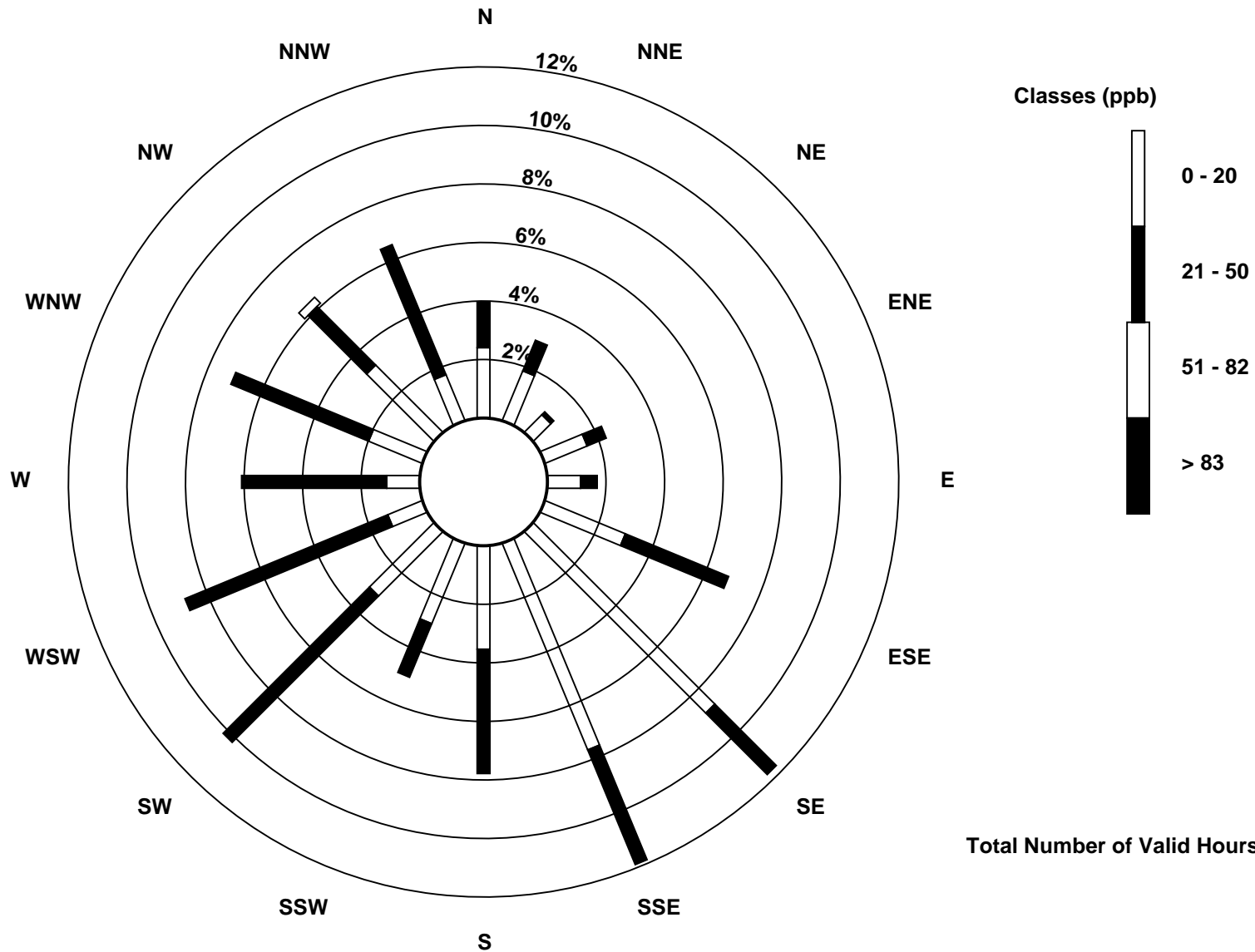
Total Number of Valid Hours: 707

Total Number of Hours: 744

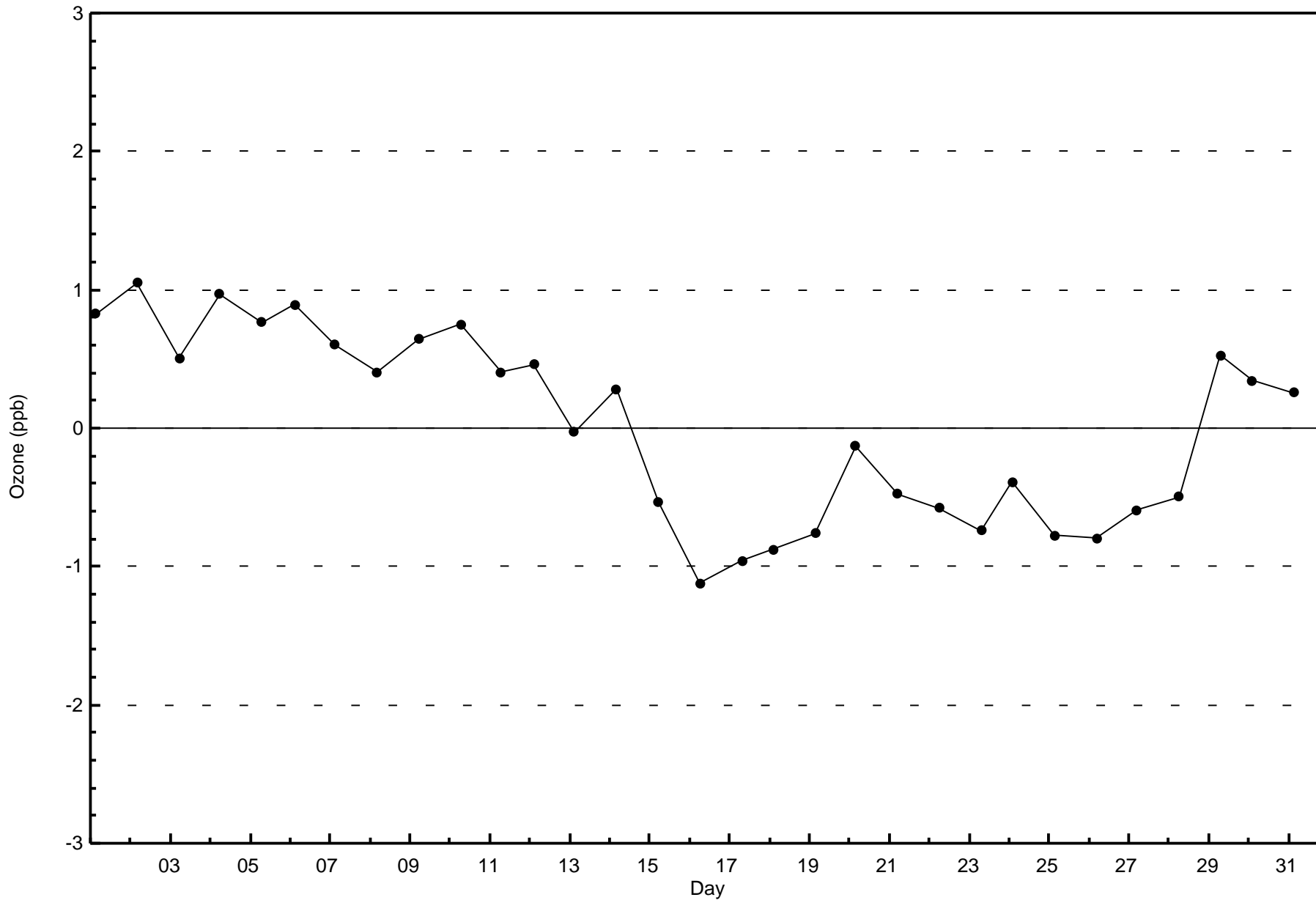


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Ozone (O<sub>3</sub>) - ppb  
Wapasu (AMS 17)



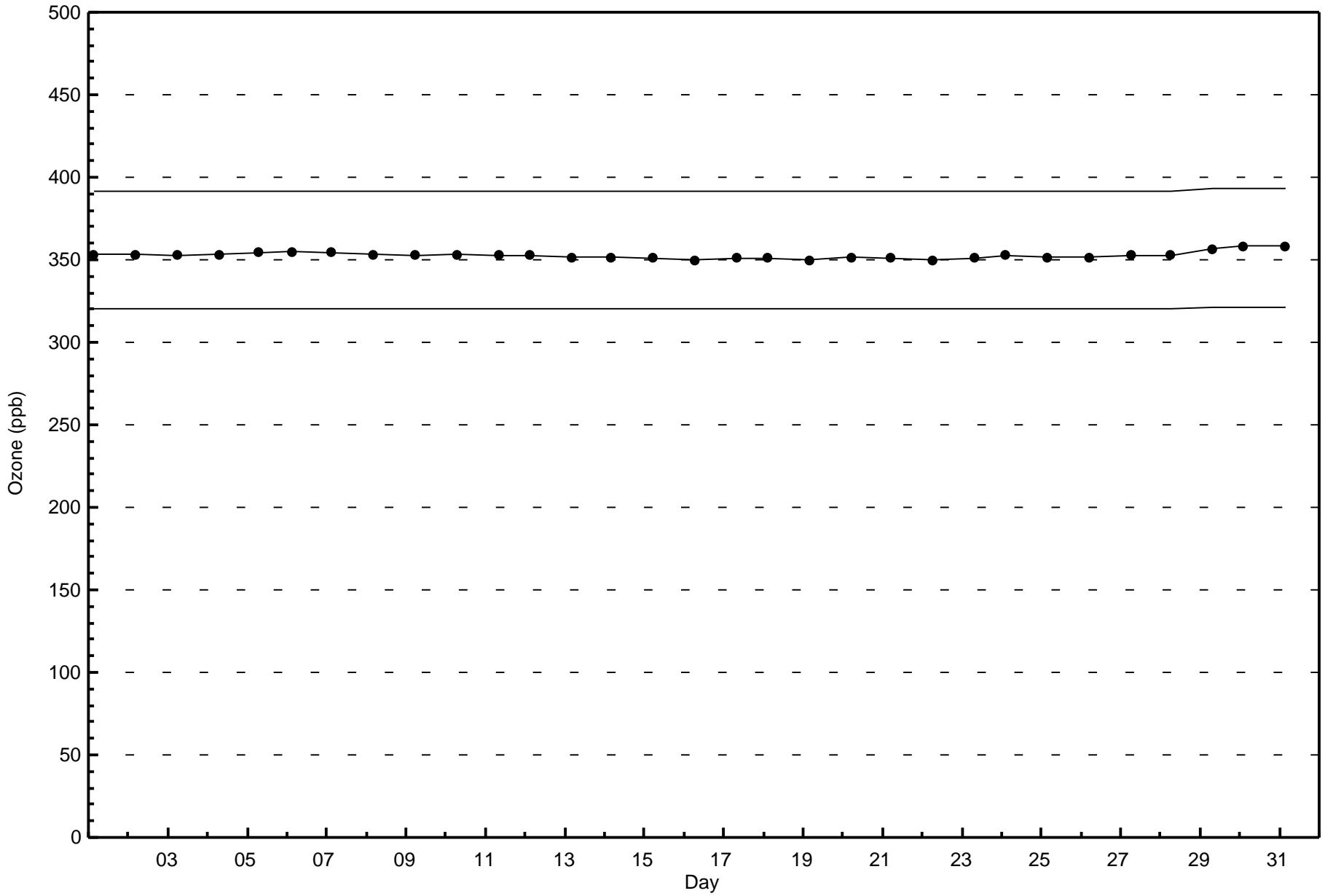
Total Number of Valid Hours: 707





Wood Buffalo Environmental Association  
Span Responses

Ozone (O<sub>3</sub>) - ppb  
Wapasu - July 2015





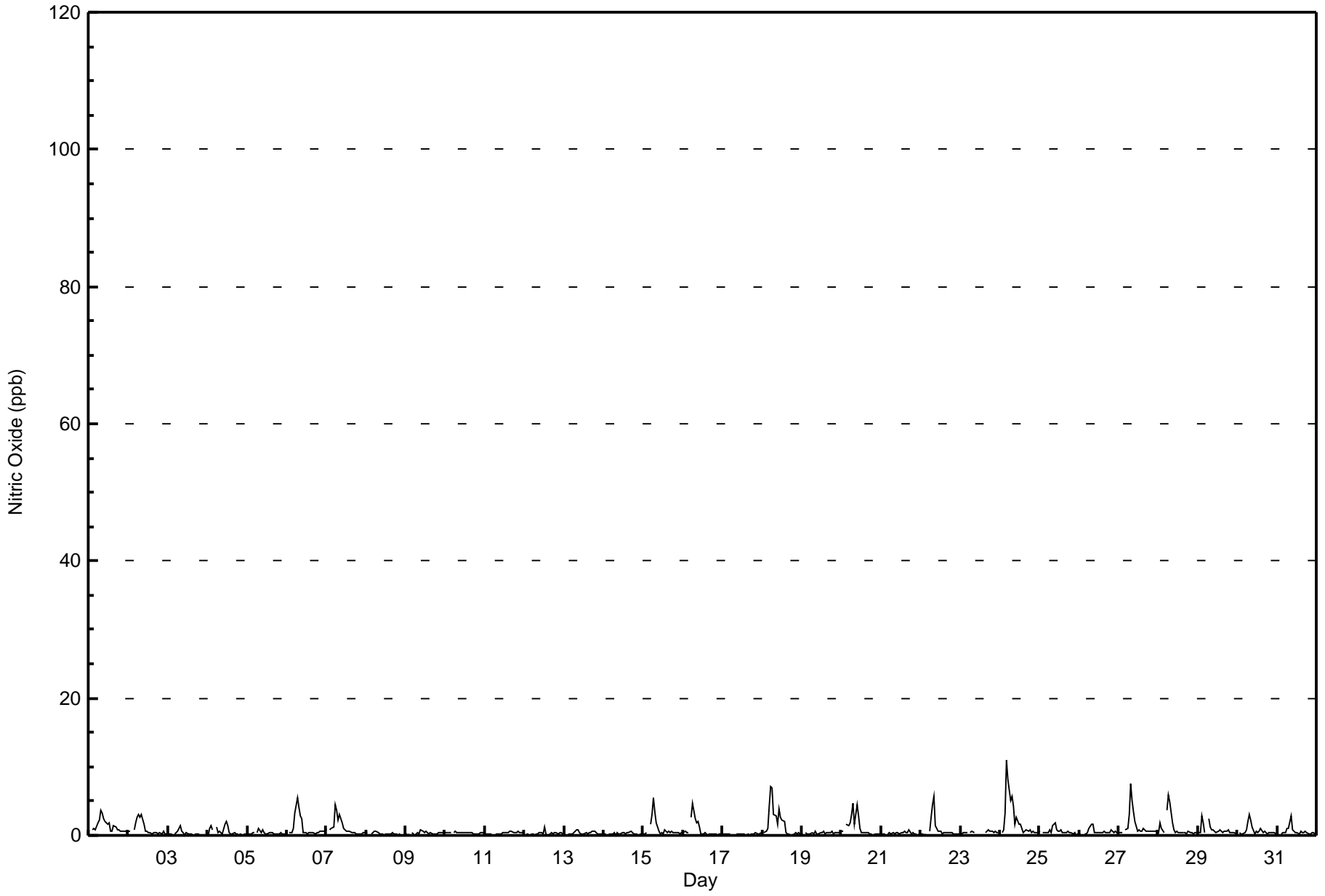
Maximum Value: 11 ppb on Jul 24 05:00																	Maximum Daily Average: 2.3 ppb on Jul 24																	Hours in Service: 744	
Minimum Value: 0 ppb on Jul 3 20:00																	Minimum Daily Average: 0.2 ppb on Jul 17																	Hours of Data: 707	
Maximum Diurnal Average: 2.0 ppb at hour 7																	Minimum Diurnal Average: 0.3 ppb at hour 22																	Hours of Missing Data: 37	
Monthly Average: 0.7 ppb																	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 O <sub>3</sub> = 1 P <sub>90</sub> = 2 P <sub>99</sub> = 6																	Hours of Calibration: 37	
																																		Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24											
1-Jul	1	Z	1	1	1	2	2	4	3	2	2	2	2	1	1	1	1	1	1	1	1	1	1	0	1.4	4									
2-Jul	1	1	Z	1	2	3	3	3	3	2	1	1	0	0	0	0	0	0	0	0	0	1	0	0	1.0	3									
3-Jul	0	0	0	Z	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1									
4-Jul	0	1	1	1	Z	1	0	1	0	0	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0.6	2									
5-Jul	0	0	0	0	1	Z	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1									
6-Jul	Z	0	0	0	1	3	5	4	3	3	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1.2	5									
7-Jul	1	Z	1	1	1	4	4	2	3	2	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1.1	4									
8-Jul	0	0	Z	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1									
9-Jul	0	0	0	Z	0	0	0	0	0	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0.3	1									
10-Jul	0	0	0	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1									
11-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0	0	0	0	0.3	1									
12-Jul	Z	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1								
13-Jul	0	Z	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0.3	1									
14-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0.3	1									
15-Jul	0	0	0	Z	2	3	6	4	2	1	0	0	0	1	0	1	0	1	1	1	1	1	0	0	1.0	6									
16-Jul	0	1	0	0	Z	3	5	2	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	5									
17-Jul	0	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									
18-Jul	Z	0	1	1	4	7	7	3	3	2	4	3	2	2	0	0	0	0	0	0	0	0	0	0	1.8	7									
19-Jul	0	Z	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0.3	1									
20-Jul	1	1	Z	2	1	2	3	5	2	4	3	1	0	0	0	0	0	0	0	0	0	0	0	0	1.2	5									
21-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0.3	1									
22-Jul	0	0	0	0	Z	1	3	4	6	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0.9	6									
23-Jul	0	0	0	0	0	Z	0	1	0	C	C	C	C	C	C	0	1	1	1	1	0	1	0	0	--	1									
24-Jul	Z	0	1	3	11	8	5	6	4	2	3	2	2	1	1	1	1	1	1	0	1	0	0	0	2.3	11									
25-Jul	1	Z	1	0	0	0	1	0	1	2	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0.6	2									
26-Jul	0	0	Z	0	0	0	1	2	2	0	0	0	0	0	1	0	0	0	0	1	1	0	1	0	0.5	2									
27-Jul	0	0	0	Z	1	1	3	8	5	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1.4	8									
28-Jul	0	2	1	0	Z	4	6	5	2	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	1.2	6									
29-Jul	0	0	3	2	0	Z	2	1	1	1	1	0	1	1	1	0	1	1	1	0	0	0	0	0	0.8	3									
30-Jul	Z	0	0	0	0	1	2	3	2	1	0	1	0	1	1	0	1	0	0	0	0	0	0	0	0.7	3									
31-Jul	0	Z	0	0	0	0	1	1	3	1	1	0	0	0	1	0	0	1	0	0	0	0	0	0	0.6	3									
																								Diurnal Average											
																								Diurnal Maximum											
Z - zerospan C - Calibration																																			





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

**Nitric Oxide (NO) - ppb**  
**Wapasu - July 2015**





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

**Nitric Oxide (NO) - ppb**  
**Wapasu - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	707	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Wapasu - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	27	20	9	14	12	49	78	84	60	36	70	62	44	49	45	48	707
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	27	20	9	14	12	49	78	84	60	36	70	62	44	49	45	48	707

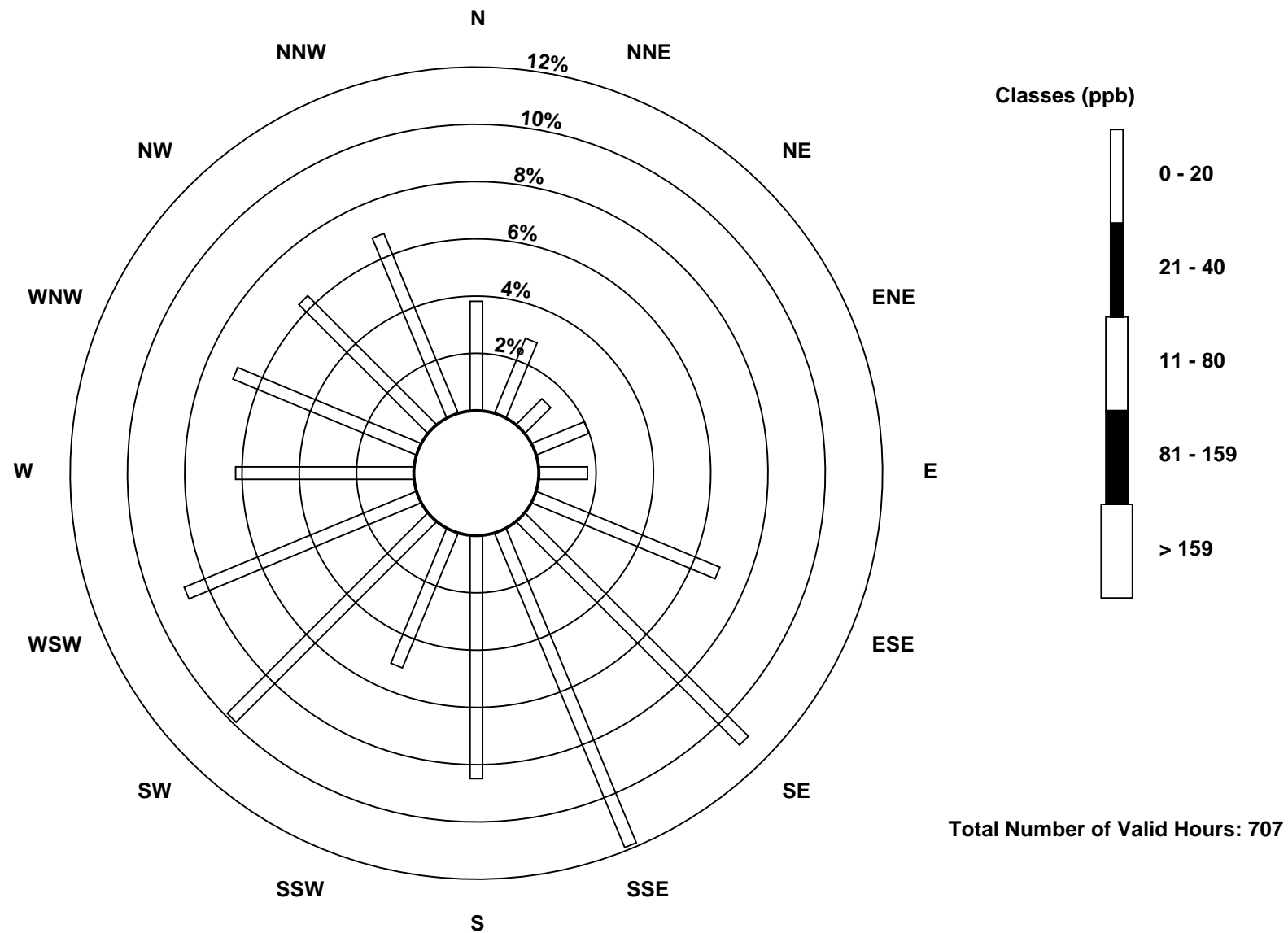
Total Number of Valid Hours: 707

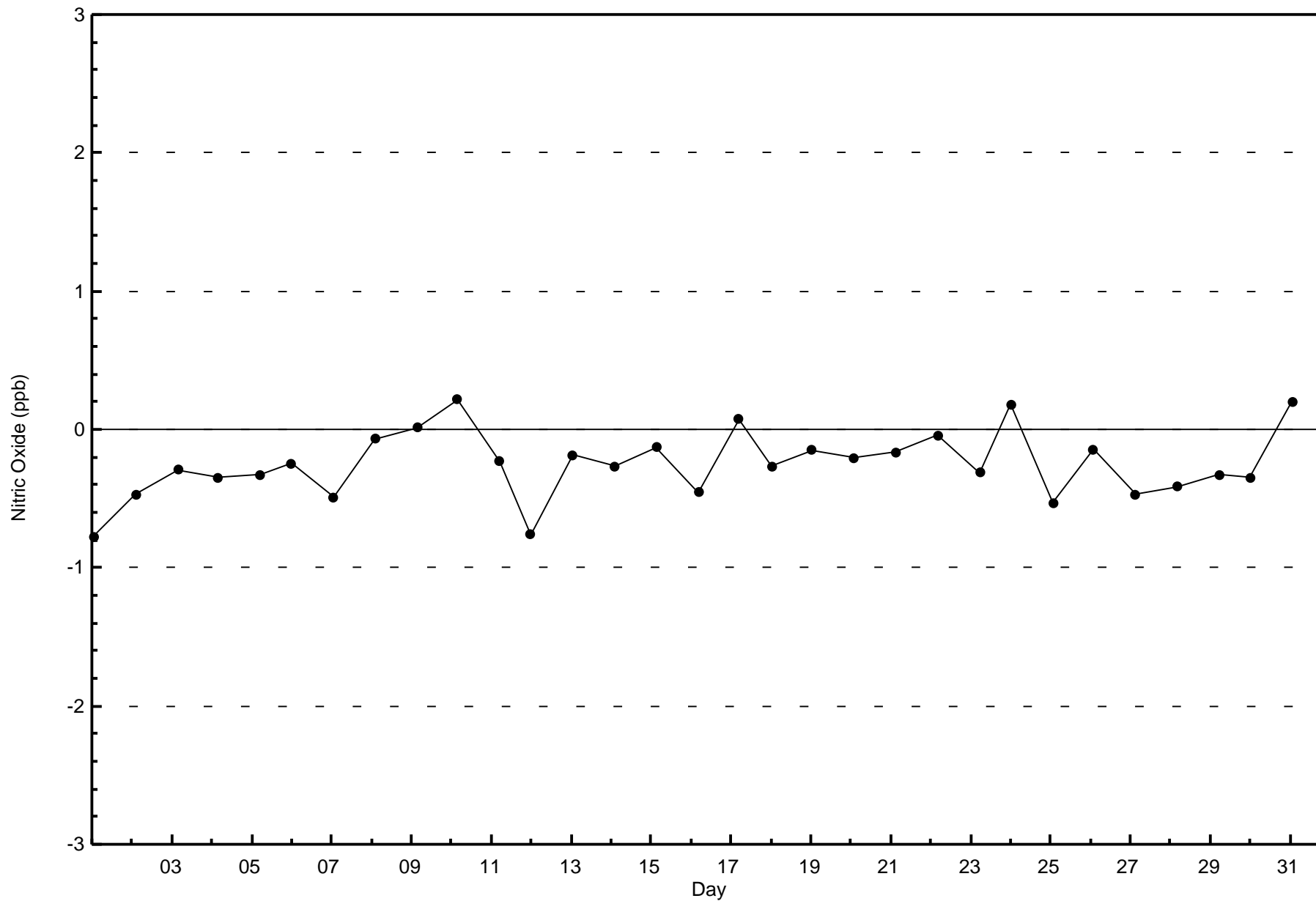
Total Number of Hours: 744

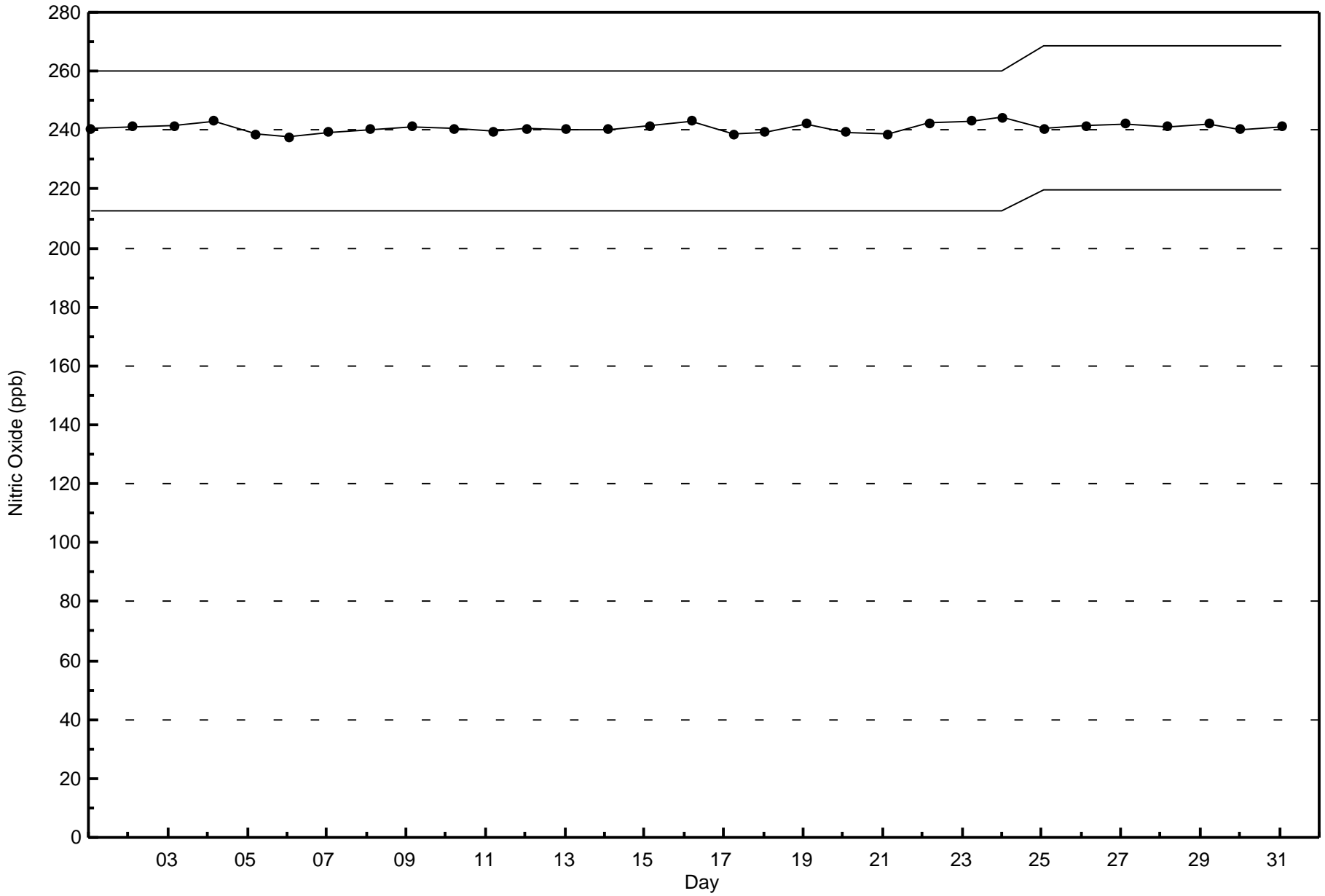


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Nitric Oxide (NO) - ppb  
Wapasu (AMS 17)









Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 19 ppb on Jul 1 01:00	Maximum Daily Average: 7.4 ppb on Jul 1		Hours of Data:	707
Minimum Value: 0 ppb on Jul 20 01:00	Minimum Daily Average: 0.5 ppb on Jul 10		Hours of Missing Data:	37
Maximum Diurnal Average: 4.5 ppb at hour 6	Minimum Diurnal Average: 1.3 ppb at hour 15		Hours of Calibration:	37
Monthly Average: 2.8 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 1 Median = 2 Q <sub>3</sub> = 4 P <sub>90</sub> = 7 P <sub>99</sub> = 11		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	19	Z	9	11	7	9	11	14	12	9	9	6	6	2	2	4	4	3	6	6	7	6	5	6	7.4	19
2-Jul	5	6	Z	6	8	10	10	10	11	9	5	3	2	2	1	1	2	2	3	6	8	6	4	6	5.5	11
3-Jul	8	3	4	Z	3	5	5	6	3	2	1	4	4	3	4	7	8	7	8	9	11	13	12	9	6.0	13
4-Jul	10	13	11	10	Z	9	6	8	6	3	7	11	6	4	3	2	3	3	2	1	1	0	0	0	5.2	13
5-Jul	0	0	0	0	0	Z	1	2	1	2	1	1	1	1	1	1	1	1	0	1	1	1	2	1	0.8	2
6-Jul	Z	10	10	10	11	11	14	10	9	7	3	1	1	1	1	2	2	2	0	1	3	2	0	0	4.7	14
7-Jul	0	Z	0	0	1	3	4	3	4	2	2	2	1	1	1	1	1	1	1	1	2	2	11	6	2.2	11
8-Jul	6	7	Z	2	4	3	2	2	2	1	1	1	1	2	2	2	2	3	5	5	5	4	2	2	2.9	7
9-Jul	3	4	5	Z	7	2	2	2	1	2	2	1	3	3	1	1	0	0	0	0	0	0	0	0	1.7	7
10-Jul	0	0	0	0	Z	0	0	0	0	0	0	1	1	0	1	1	1	1	1	0	0	0	1	1	0.5	1
11-Jul	3	3	2	3	4	Z	5	5	4	2	2	1	1	1	1	1	0	1	3	5	7	3	4	3	2.7	7
12-Jul	Z	3	3	3	4	4	2	2	2	1	1	2	8	4	2	1	1	1	0	1	1	2	9	7	2.7	9
13-Jul	4	Z	2	1	3	2	3	4	5	2	2	1	1	1	2	2	2	3	4	4	4	3	1	1	2.5	5
14-Jul	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	3	2	2	1	1	1	1	4	1	1.2	4
15-Jul	1	6	9	Z	11	10	9	6	5	2	1	1	2	4	2	1	1	2	2	3	3	2	2	5	3.9	11
16-Jul	9	6	3	3	Z	7	11	7	5	6	6	2	1	1	1	0	1	3	1	4	7	2	2	2	3.7	11
17-Jul	3	7	5	1	2	Z	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	1.2	7
18-Jul	Z	1	3	6	10	10	10	8	8	5	9	8	7	4	2	1	1	0	0	1	1	0	1	1	4.1	10
19-Jul	1	Z	1	0	1	1	0	0	1	0	0	0	1	1	1	1	1	2	1	0	2	3	0	0	0.8	3
20-Jul	0	1	Z	4	3	3	4	6	3	7	5	3	1	2	2	2	2	1	1	1	0	0	0	0	2.3	7
21-Jul	0	0	1	Z	2	0	1	1	1	1	0	0	0	1	1	1	2	3	3	3	3	2	1	1	1.1	3
22-Jul	2	3	4	4	Z	3	6	7	9	5	2	2	1	1	1	2	2	2	1	2	3	6	1	1	2.9	9
23-Jul	0	3	1	3	1	Z	0	0	1	C	C	C	C	C	C	1	1	3	3	3	4	6	6	6	--	6
24-Jul	Z	5	8	10	11	9	7	7	5	2	3	2	3	2	1	2	1	2	2	3	3	2	0	0	3.9	11
25-Jul	1	Z	3	5	3	1	1	1	2	5	2	1	1	1	0	1	1	1	1	1	2	1	1	0	1.5	5
26-Jul	0	0	Z	1	0	2	3	5	4	0	0	0	1	0	0	1	0	1	0	3	5	1	1	1	1.3	5
27-Jul	2	4	6	Z	6	2	4	8	6	4	3	1	1	1	0	1	0	0	3	3	4	4	7	5	3.2	8
28-Jul	3	6	9	7	Z	7	7	6	3	1	1	1	1	1	1	0	0	2	1	1	1	1	1	1	2.7	9
29-Jul	0	1	12	10	4	Z	3	1	1	1	1	0	2	3	1	0	1	2	4	1	1	0	2	2	2.3	12
30-Jul	Z	4	2	3	2	2	4	3	2	1	0	1	1	1	1	0	1	0	0	0	0	0	1	0	1.3	4
31-Jul	0	Z	0	1	0	1	1	1	5	1	1	1	0	0	1	1	1	1	1	0	0	2	1	2	1.0	5

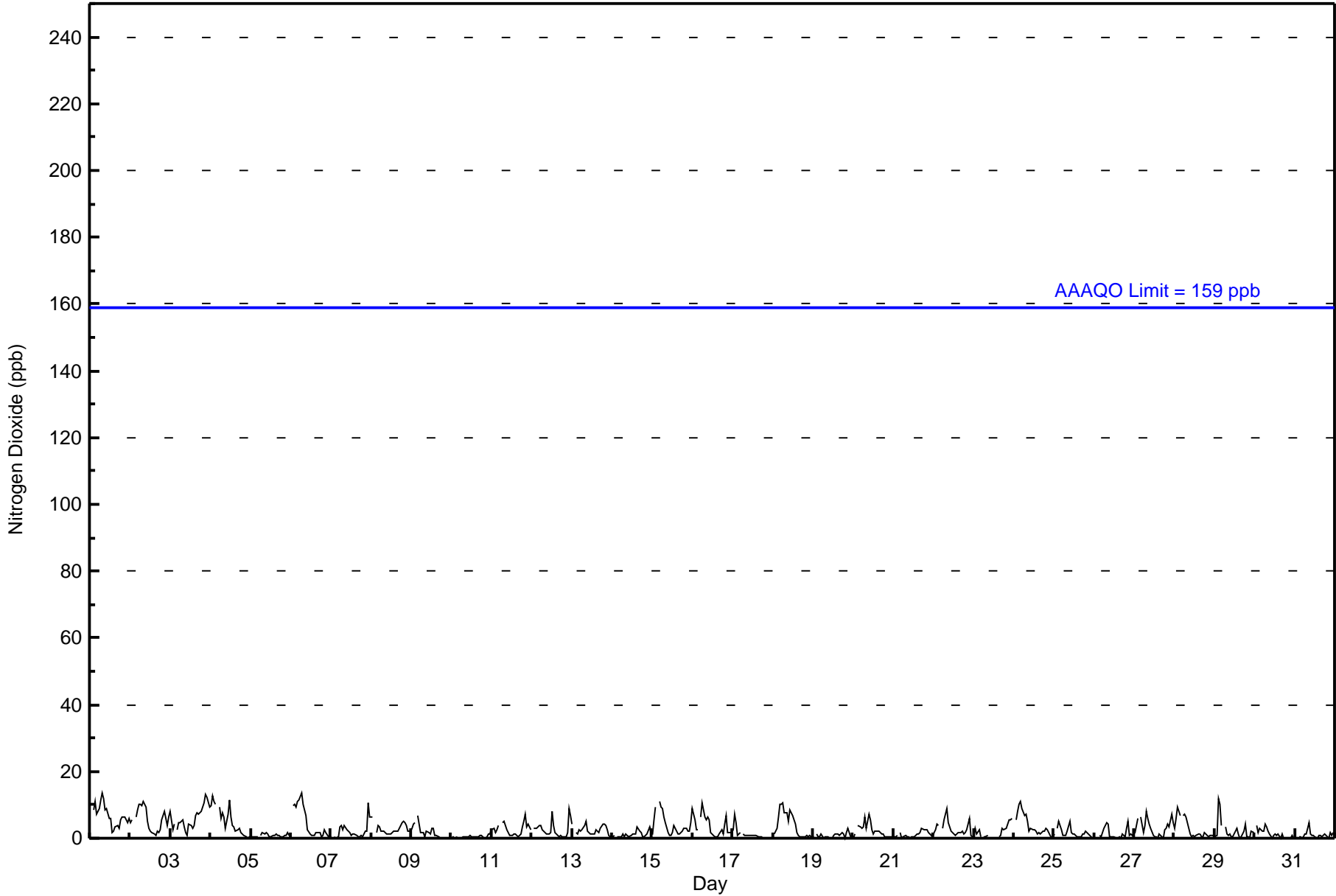
3.2	3.8	4.4	4.0	4.1	4.5	4.4	4.4	3.9	2.9	2.3	2.0	2.0	1.7	1.3	1.4	1.4	1.7	1.9	2.2	2.7	2.4	2.6	2.2	Diurnal Average
19	13	12	11	11	11	14	14	12	9	9	11	8	4	4	7	8	7	8	9	11	13	12	9	Diurnal Maximum

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



Wood Buffalo Environmental Association  
Hourly Averages

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Wapasu - July 2015







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

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Wapasu - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	707	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



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

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Wapasu - July 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	27	20	9	14	12	49	78	84	60	36	70	62	44	49	45	48	707
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	27	20	9	14	12	49	78	84	60	36	70	62	44	49	45	48	707

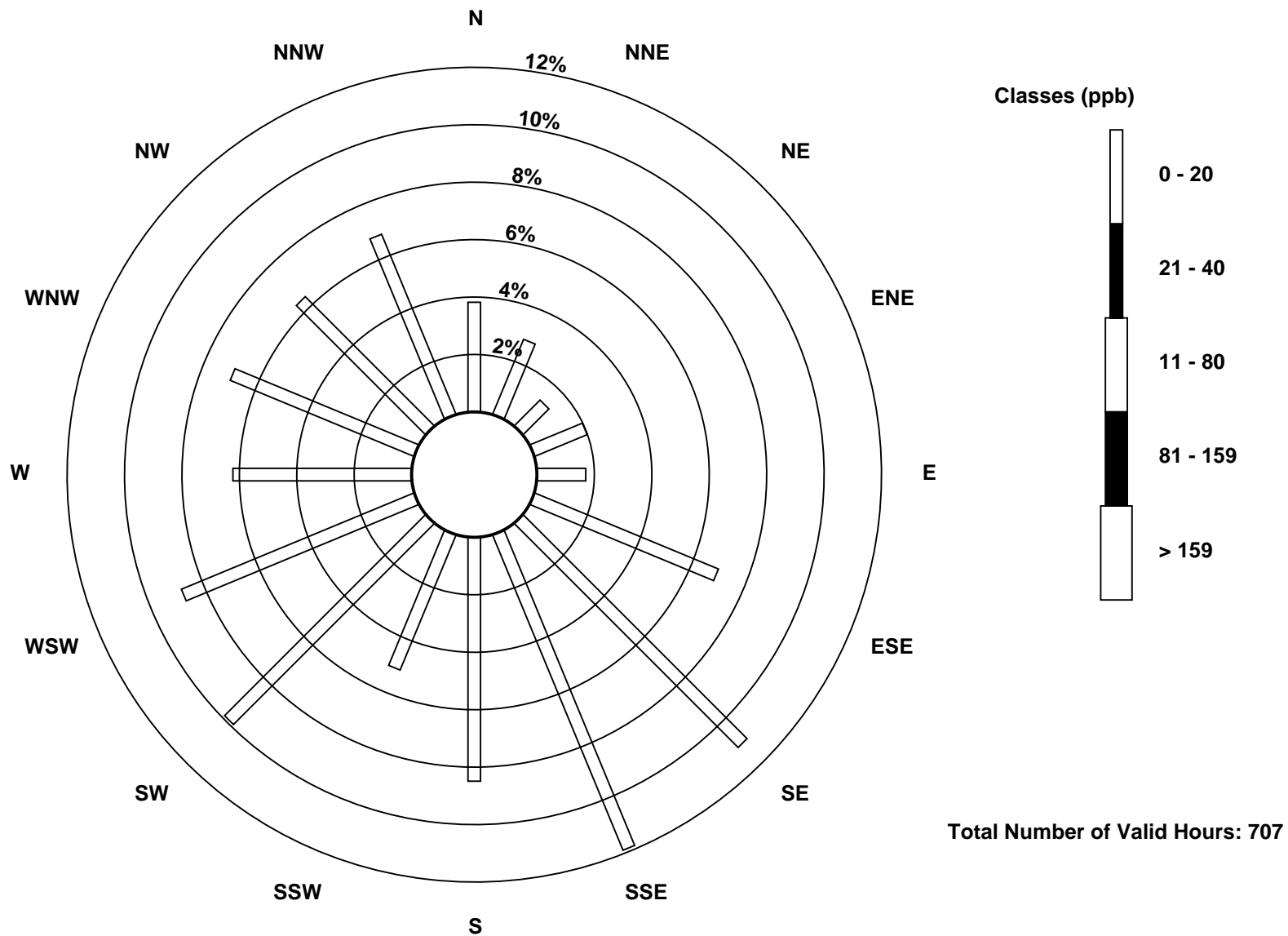
Total Number of Valid Hours: 707

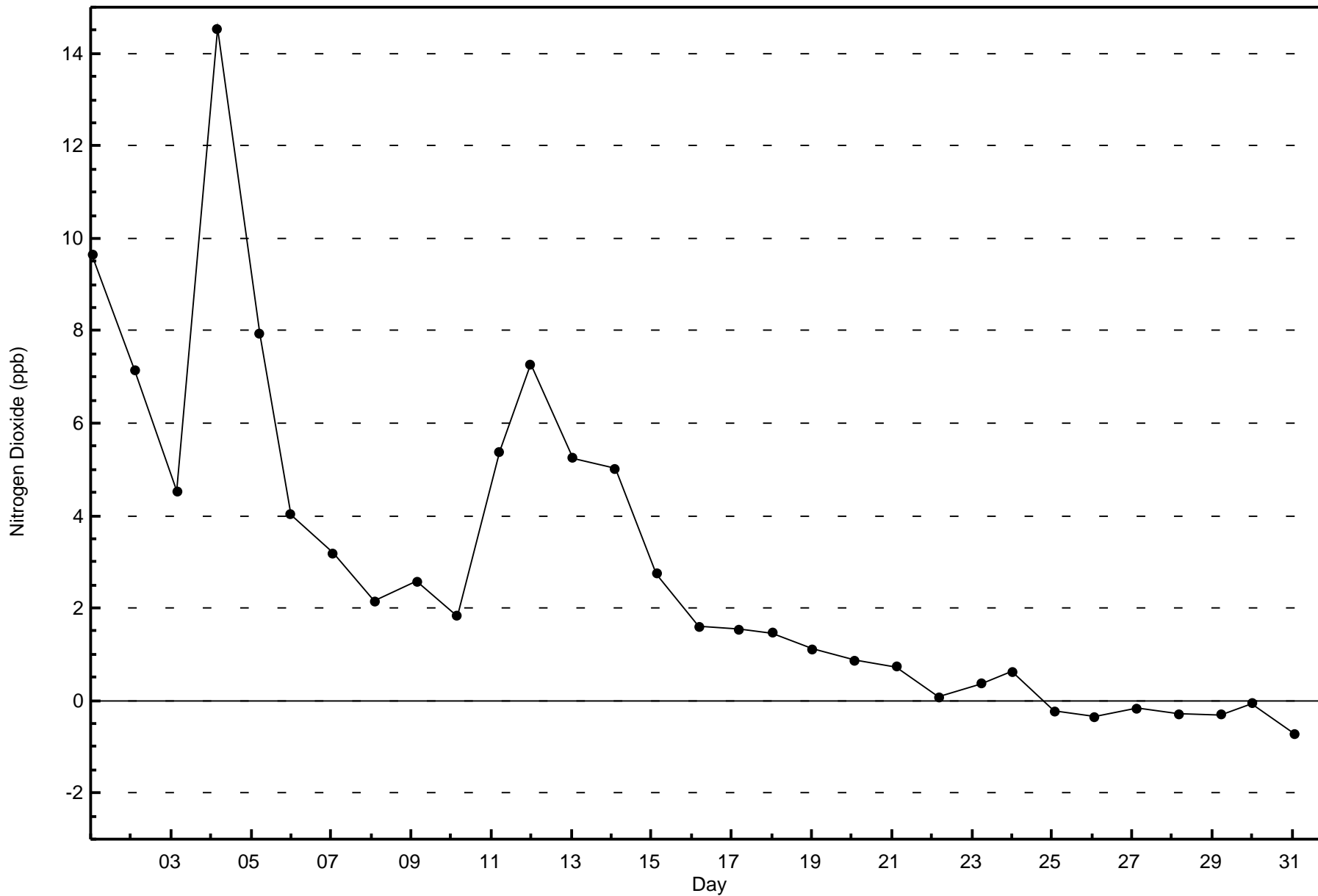
Total Number of Hours: 744

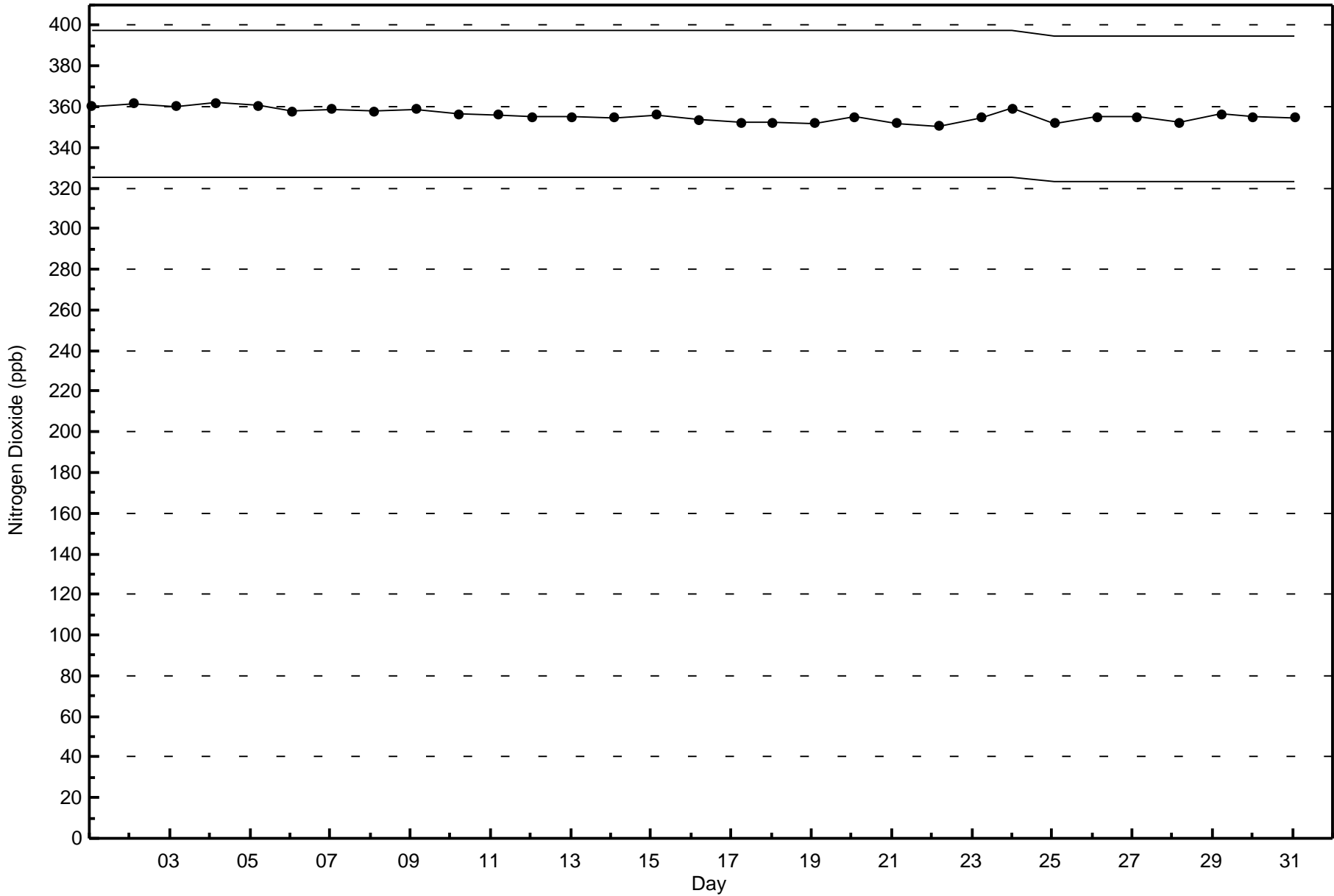


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Wapasu (AMS 17)

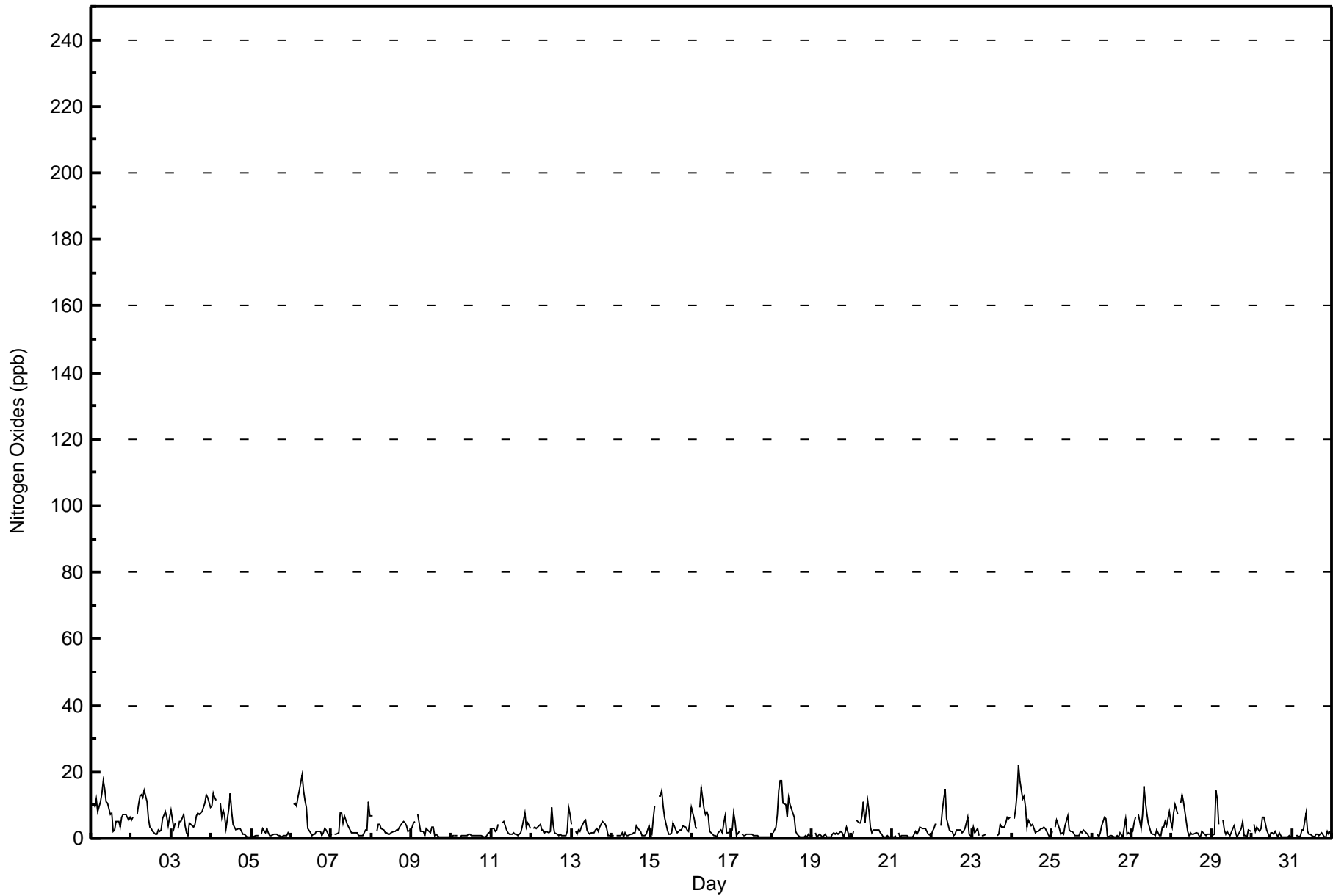








Maximum Value: 22 ppb on Jul 24 05:00																		Maximum Daily Average: 8.7 ppb on Jul 1						Hours in Service: 744		
Minimum Value: 0 ppb on Jul 30 19:00																		Minimum Daily Average: 0.8 ppb on Jul 10						Hours of Data: 707		
Maximum Diurnal Average: 6.5 ppb at hour 7																		Minimum Diurnal Average: 1.7 ppb at hour 15						Hours of Missing Data: 37		
Monthly Average: 3.5 ppb																		Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 1 Q <sub>1</sub> = 1 Median = 2 O <sub>3</sub> = 5 P <sub>90</sub> = 9 P <sub>99</sub> = 17						Hours of Calibration: 37		
																		Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	21	Z	9	12	8	11	14	17	15	11	11	7	8	2	3	5	5	4	6	7	7	7	5	6	8.7	21
2-Jul	5	6	Z	7	10	13	13	12	14	11	6	4	3	2	1	1	3	2	3	6	8	6	4	6	6.4	14
3-Jul	8	3	5	Z	3	5	5	7	4	2	1	4	4	3	4	7	8	7	8	9	11	13	12	9	6.2	13
4-Jul	10	14	12	11	Z	11	6	8	7	3	9	13	8	4	3	2	3	3	2	1	1	0	0	0	5.8	14
5-Jul	0	1	1	1	1	Z	1	3	2	3	2	1	1	1	1	1	1	1	1	1	1	2	1	1.2	3	
6-Jul	Z	10	11	10	12	15	19	14	11	9	3	2	1	1	1	2	2	2	1	2	3	3	1	1	5.9	19
7-Jul	1	Z	1	1	2	8	8	5	7	4	3	3	2	2	2	2	1	1	1	1	2	2	11	7	3.3	11
8-Jul	7	7	Z	2	4	4	3	3	2	2	1	1	2	2	2	2	3	3	5	5	5	4	2	2	3.2	7
9-Jul	3	5	5	Z	7	2	2	2	1	3	2	2	4	3	1	1	0	0	0	0	1	1	1	1	2.0	7
10-Jul	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	2	2	0.8	2
11-Jul	3	3	2	3	4	Z	5	5	4	2	2	1	1	2	1	1	1	2	4	5	8	4	5	3	3.1	8
12-Jul	Z	3	3	3	4	4	2	2	2	2	2	2	9	4	2	1	1	1	1	1	2	9	7	3.0	9	
13-Jul	4	Z	2	1	3	2	3	5	6	3	2	1	2	2	3	3	2	4	5	5	4	3	1	1	2.8	6
14-Jul	1	1	Z	1	1	1	2	1	2	1	1	1	1	2	2	4	3	2	1	1	1	4	1	1.5	4	
15-Jul	1	6	10	Z	13	13	15	10	7	2	1	1	2	5	3	2	2	2	3	4	4	2	2	5	4.9	15
16-Jul	9	6	3	3	Z	9	15	9	7	8	7	2	1	1	1	1	1	3	2	4	7	2	2	2	4.6	15
17-Jul	3	7	5	1	2	Z	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	1	1.4	7
18-Jul	Z	2	3	7	14	17	17	10	10	7	12	10	9	6	2	1	1	1	0	1	1	1	1	1	5.9	17
19-Jul	1	Z	2	1	1	1	1	1	1	1	0	1	1	2	1	2	1	2	2	0	2	3	1	0	1.1	3
20-Jul	1	2	Z	6	5	5	7	11	4	11	8	4	2	3	3	2	2	2	1	1	1	1	1	1	3.5	11
21-Jul	1	1	1	Z	2	1	1	1	1	1	1	1	1	1	2	1	2	4	3	3	3	2	1	1	1.4	4
22-Jul	2	3	4	4	Z	4	8	12	15	6	3	2	2	1	1	2	2	3	2	2	3	6	1	1	3.9	15
23-Jul	0	3	2	3	1	Z	1	1	1	C	C	C	C	C	C	1	1	4	3	4	4	6	6	6	--	6
24-Jul	Z	6	9	13	22	17	12	13	10	4	6	4	4	3	2	2	2	3	3	3	3	2	0	0	6.2	22
25-Jul	2	Z	4	5	3	1	2	1	4	7	2	2	2	2	1	1	1	2	2	2	2	1	1	0	2.1	7
26-Jul	0	0	Z	1	1	2	4	6	6	1	1	1	1	1	1	1	1	2	1	4	6	1	2	1	1.8	6
27-Jul	2	5	7	Z	7	3	7	16	11	8	5	2	1	1	1	2	1	1	3	3	5	4	8	5	4.6	16
28-Jul	3	8	10	7	Z	10	13	11	5	2	1	2	1	1	2	2	1	0	2	1	1	1	1	1	3.8	13
29-Jul	1	1	15	12	4	Z	6	3	1	2	1	1	3	4	2	0	1	3	5	1	1	0	2	2	3.1	15
30-Jul	Z	4	2	3	2	3	6	6	5	3	1	2	2	1	2	1	2	1	0	0	0	0	1	0	2.1	6
31-Jul	1	Z	1	1	0	1	2	2	8	2	1	1	1	0	1	1	1	1	1	0	0	2	1	2	1.5	8
3.5																								Diurnal Average		
21																								Diurnal Maximum		
Z - zerospan C - Calibration																										





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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Wapasu - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	705	99.72	99.72
21 - 40	2	0.28	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744





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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Wapasu - July 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	27	20	9	14	12	49	77	83	60	36	70	62	44	49	45	48	705
21 - 40	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	2
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	27	20	9	14	12	49	78	84	60	36	70	62	44	49	45	48	707

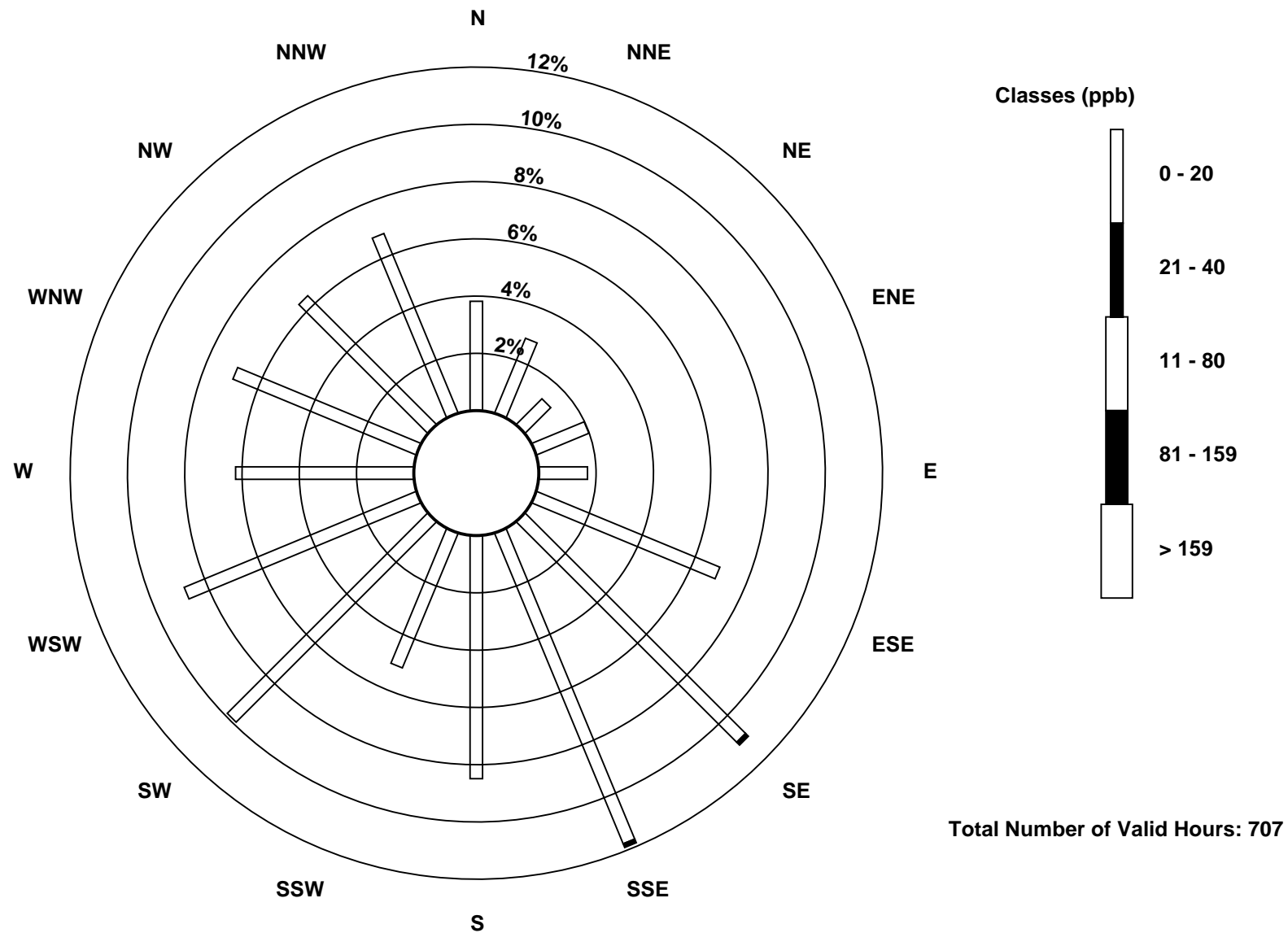
Total Number of Valid Hours: 707

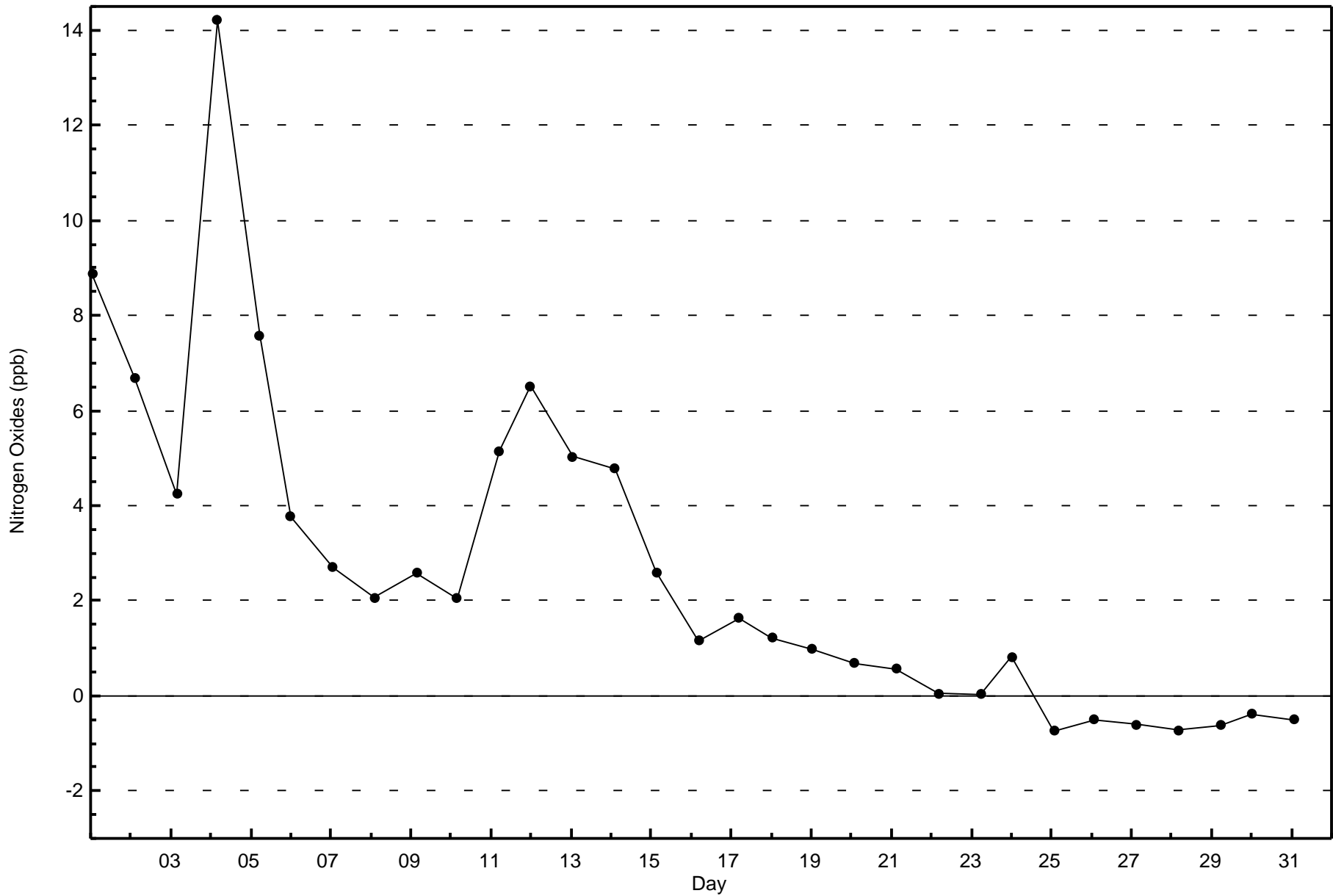
Total Number of Hours: 744

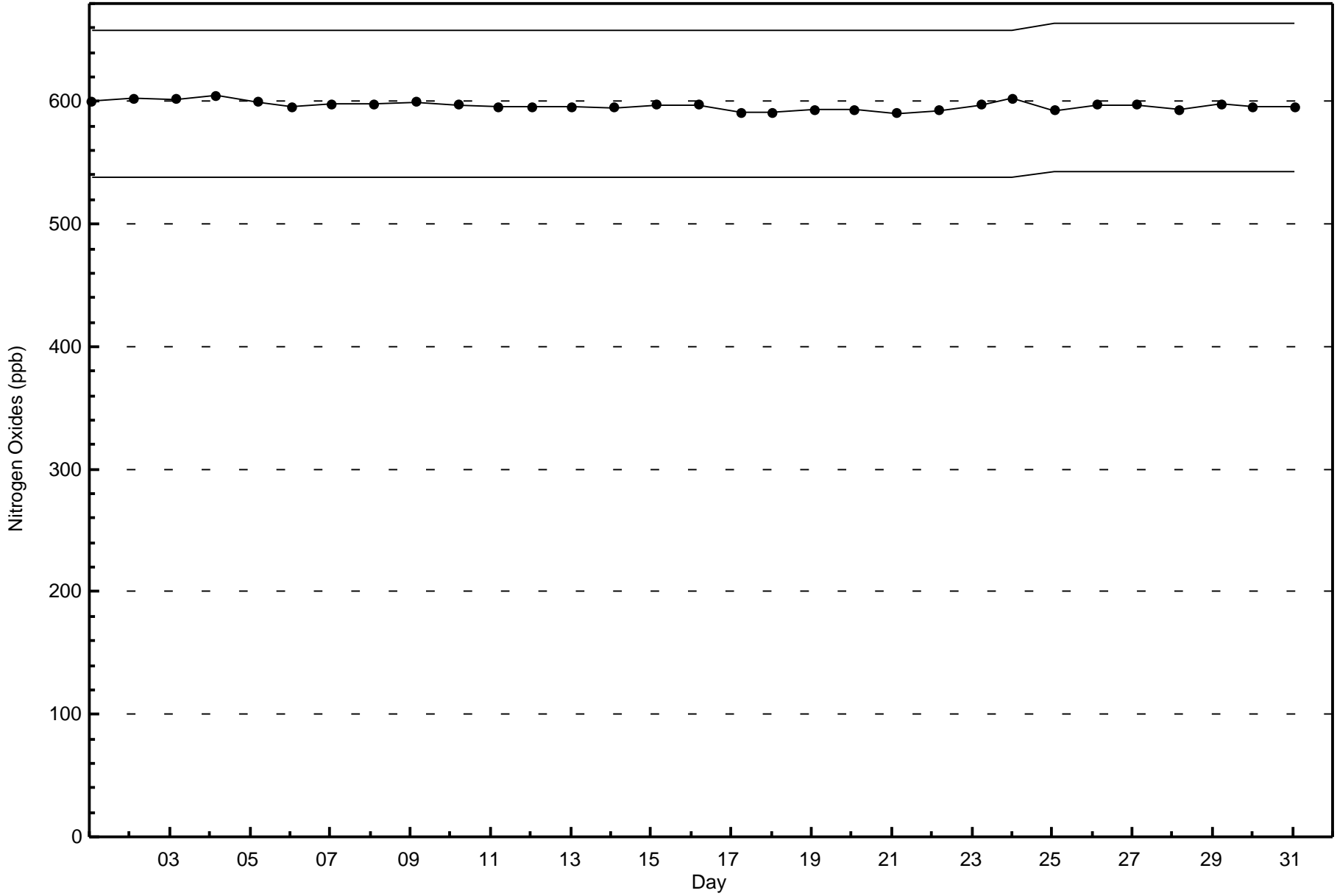


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Wapasu (AMS 17)





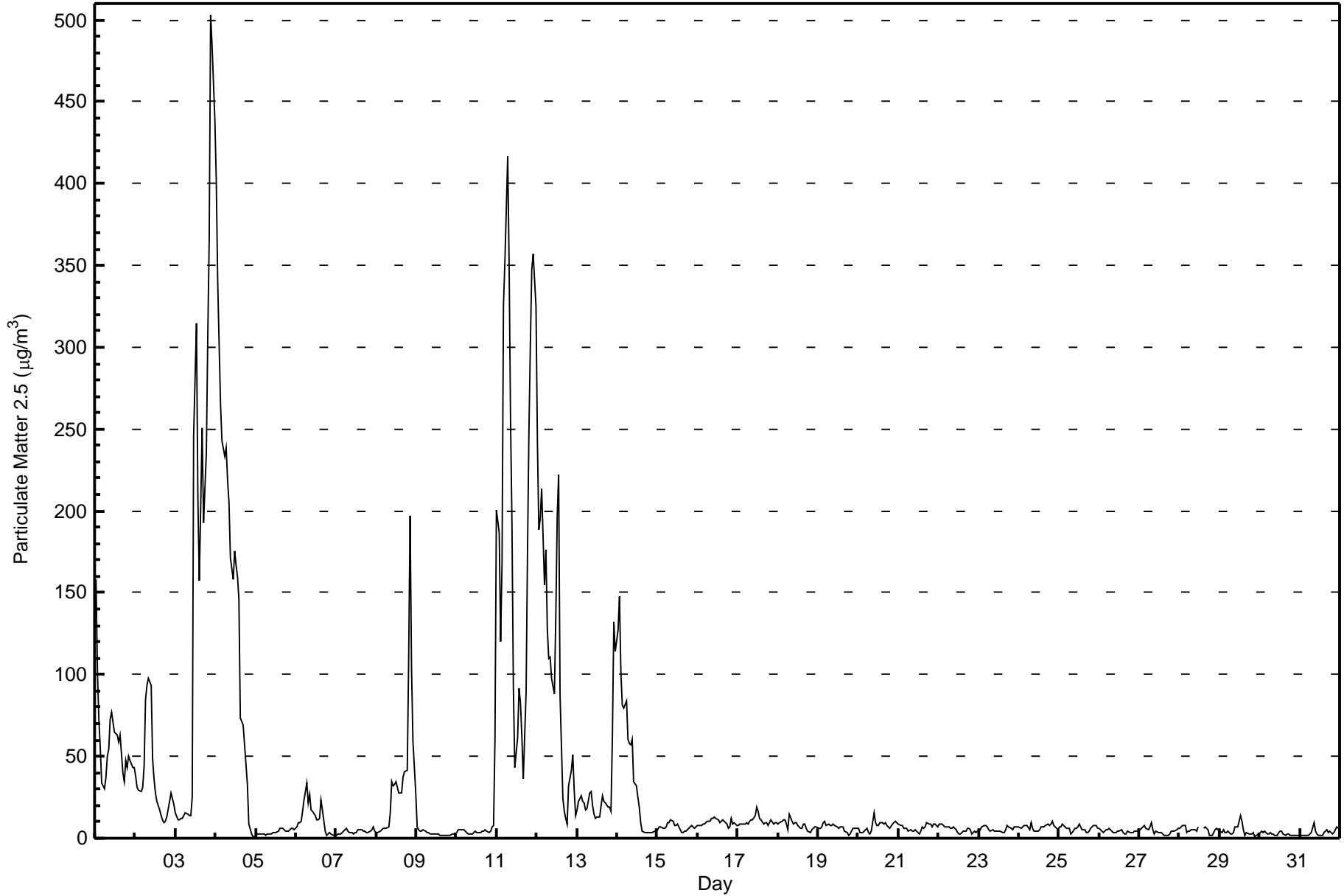




Summary of Hour Averages

Wapasu - July 2015

Number of Exceedences (AAAQO): 24-hr: 8 Maximum Value: 503.1 µg/m <sup>3</sup> on Jul 3 22:00 Minimum Value: 1.1 µg/m <sup>3</sup> on Jul 4 23:00 Maximum Diurnal Average: 42.9 µg/m <sup>3</sup> at hour 1 Monthly Average: 31.48 µg/m <sup>3</sup>		Maximum Daily Average: 203.5 µg/m <sup>3</sup> on Jul 11 Minimum Daily Average: 2.7 µg/m <sup>3</sup> on Jul 30 Minimum Diurnal Average: 18.6 µg/m <sup>3</sup> at hour 18 Percentiles: P <sub>1</sub> = 1.4 P <sub>10</sub> = 2.6 Q <sub>1</sub> = 4.2 Median = 6.8 Q <sub>3</sub> = 15.7 P <sub>90</sub> = 88.2 P <sub>99</sub> = 348.8		Hours in Service: 744 Hours of Data: 742 Hours of Missing Data: 2 Hours of Calibration: 0 Percent Operational Time: 99.7																																													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jul	157.9	101.6	73.0	55.1	33.8	30.7	37.4	50.4	54.8	73.0	76.7	65.2	64.3	62.9	58.8	62.8	40.0	34.8	47.3	42.9	49.8	47.7	43.2	42.8	58.6	157.9																							
2-Jul	37.8	31.4	29.2	28.1	31.0	44.4	84.4	93.6	97.9	93.2	48.8	36.5	27.6	22.5	17.2	13.4	11.0	9.8	10.6	12.9	22.4	27.4	24.1	20.8	36.5	97.9																							
3-Jul	15.8	11.0	11.0	12.4	12.2	13.6	15.2	14.3	13.7	13.8	24.8	246.5	314.3	207.7	157.7	203.2	250.4	192.6	236.3	306.7	365.9	503.1	484.6	438.9	169.4	503.1																							
4-Jul	401.9	340.9	302.7	265.7	243.3	233.3	238.6	218.9	204.6	170.9	158.0	175.9	167.2	160.1	145.7	73.0	69.4	56.6	45.0	32.8	8.7	2.2	1.1	1.1	154.9	401.9																							
5-Jul	1.9	2.2	2.3	2.4	2.4	2.4	2.1	2.2	2.3	2.6	3.6	3.4	3.8	4.5	5.9	6.0	6.2	5.3	4.0	3.9	5.1	5.7	5.6	5.5	3.8	6.2																							
6-Jul	7.0	9.3	9.4	10.3	16.4	23.4	33.3	21.3	26.5	17.0	16.7	14.2	11.3	11.0	11.9	23.0	17.6	4.0	1.7	2.3	3.3	2.5	2.1	2.1	12.4	33.3																							
7-Jul	1.9	2.4	2.4	2.8	4.4	5.2	5.8	4.3	3.8	3.0	2.5	3.1	3.1	5.4	5.4	5.0	4.5	3.9	3.7	3.7	4.4	4.9	6.7	4.1	4.0	6.7																							
8-Jul	3.7	3.6	4.7	5.5	5.9	6.4	6.2	7.0	15.9	34.9	32.1	32.6	34.7	27.5	28.0	27.7	37.3	40.2	41.7	110.1	197.3	104.8	59.8	27.9	37.3	197.3																							
9-Jul	7.2	5.1	4.3	4.3	4.8	4.0	3.7	3.2	2.8	2.5	2.3	2.6	2.7	2.8	2.0	1.9	1.6	1.6	1.6	1.8	2.1	2.2	2.6	2.9	3.0	7.2																							
10-Jul	3.8	5.2	5.4	5.3	5.1	4.3	3.3	2.8	2.3	2.6	3.5	4.6	3.8	3.6	3.9	4.0	4.4	5.0	4.2	3.9	4.1	7.2	7.5	60.9	6.7	60.9																							
11-Jul	200.3	187.1	120.1	168.9	325.7	351.9	417.0	350.2	255.9	193.2	92.3	43.0	61.5	91.9	83.2	61.9	36.1	88.9	175.9	249.1	300.4	347.2	357.0	325.1	203.5	417.0																							
12-Jul	242.5	188.6	195.7	213.2	154.8	176.1	127.5	109.9	110.6	97.8	88.5	136.0	197.5	221.7	86.9	24.5	16.3	12.2	8.4	31.7	41.4	51.2	29.0	14.0	107.3	242.5																							
13-Jul	16.9	22.8	25.8	22.1	21.8	17.7	17.7	28.0	28.4	19.5	15.1	12.2	12.6	13.1	19.7	25.7	22.6	21.6	18.9	18.8	16.5	62.3	132.2	113.9	30.2	132.2																							
14-Jul	126.8	147.9	101.4	81.4	79.4	84.1	60.1	57.8	57.4	60.4	34.8	32.2	24.8	19.2	9.7	4.4	3.7	3.2	3.3	3.8	3.6	3.6	4.4	4.5	42.2	147.9																							
15-Jul	4.9	6.6	6.6	6.1	6.1	7.1	9.3	9.9	10.8	10.1	8.2	7.8	8.9	6.5	3.3	3.8	4.1	4.7	5.6	6.0	8.0	6.8	6.0	7.2	6.9	10.8																							
16-Jul	7.8	7.4	7.5	8.3	9.0	9.4	10.6	10.6	11.7	12.4	13.0	12.1	10.9	9.7	10.1	11.1	10.2	8.7	6.1	7.2	11.7	8.7	9.4	8.1	9.7	13.0																							
17-Jul	7.6	8.5	8.8	8.3	8.3	9.3	8.8	10.7	11.1	11.3	13.6	18.7	16.2	12.2	11.0	8.8	9.9	9.4	8.1	9.9	10.9	9.0	9.1	9.3	10.4	18.7																							
18-Jul	8.9	9.2	10.2	11.3	11.4	8.3	5.1	14.7	10.6	8.8	9.8	9.3	7.7	6.0	6.1	8.8	8.3	6.4	4.0	3.3	4.8	5.7	7.0	7.2	8.0	14.7																							
19-Jul	6.4	6.3	7.2	9.3	9.9	7.7	8.3	8.0	8.1	8.4	7.8	6.7	6.2	6.5	6.8	6.6	4.7	3.4	1.8	2.8	4.6	6.4	6.0	6.1	6.5	9.9																							
20-Jul	6.2	3.5	3.8	3.7	5.2	6.0	3.6	2.4	4.2	15.7	9.3	8.0	7.6	9.2	9.4	9.0	9.3	8.1	6.6	6.5	8.3	9.9	10.1	9.4	7.3	15.7																							
21-Jul	8.8	8.2	8.0	6.5	6.0	6.1	4.6	4.8	4.7	4.4	5.3	4.3	2.5	4.7	6.7	6.3	6.7	9.4	8.7	8.2	7.3	9.0	8.6	7.3	6.5	9.4																							
22-Jul	8.3	8.3	8.5	7.4	6.6	6.5	7.3	5.7	6.3	6.9	4.9	3.2	2.7	2.9	3.8	4.4	4.6	6.3	5.7	5.1	3.0	4.0	3.6	4.1	5.4	8.5																							
23-Jul	4.5	5.3	7.1	7.6	7.8	6.7	5.5	4.4	4.9	4.4	4.0	4.3	4.4	4.2	3.4	3.4	5.3	7.4	7.3	5.9	5.2	7.0	7.3	7.3	5.6	7.8																							
24-Jul	7.1	6.5	6.8	7.6	8.1	7.7	4.8	9.6	6.4	4.5	4.4	4.2	5.0	6.9	6.7	7.2	8.1	8.7	8.1	9.0	10.4	7.9	5.9	5.1	7.0	10.4																							
25-Jul	6.6	7.2	8.4	7.5	5.8	6.2	5.7	3.0	3.7	6.1	6.4	6.6	8.4	6.9	5.1	5.2	3.8	3.4	4.5	6.5	7.5	7.5	7.4	6.0	6.1	8.4																							
26-Jul	6.3	4.8	3.1	4.5	5.2	5.5	5.9	4.0	3.4	3.4	3.9	4.3	4.5	5.0	3.5	2.4	2.9	4.5	3.6	3.9	3.6	4.4	4.5	4.8	4.2	6.3																							
27-Jul	5.0	6.0	6.7	7.6	5.8	5.4	6.7	9.4	5.3	2.8	4.0	3.9	3.7	3.8	2.6	1.5	1.3	1.4	2.9	4.2	4.3	4.2	5.2	6.0	4.6	9.4																							
28-Jul	6.2	6.8	7.9	7.4	3.7	4.1	4.3	5.2	5.2	4.9	4.7	6.5	M	M	6.3	7.2	6.0	5.0	2.0	1.9	3.4	5.2	6.4	4.9	5.2	7.9																							
29-Jul	4.0	3.7	5.6	3.4	3.6	4.3	2.4	2.5	3.8	6.5	6.8	7.2	13.5	10.7	4.9	1.8	3.9	2.9	2.6	3.0	3.3	1.2	1.5	2.4	4.4	13.5																							
30-Jul	3.6	4.0	3.9	4.7	2.7	2.9	3.5	2.7	2.4	2.1	2.1	3.5	4.3	4.5	2.4	1.4	2.6	2.6	1.5	1.5	1.6	2.0	1.8	1.4	2.7	4.7																							
31-Jul	1.6	1.5	1.5	1.5	1.3	1.7	2.4	3.8	9.8	4.2	2.5	2.1	1.7	1.8	3.5	4.6	4.8	3.4	4.2	2.6	3.3	5.3	6.9	6.4	3.4	9.8																							
																								42.9	37.5	32.2	31.9	33.8	35.6	37.1	34.7	31.9	29.1	22.9	29.7	34.6	31.8	23.6	20.3	19.9	18.6	22.1	29.4	36.3	41.2	40.9	37.7	Diurnal Average	
																								401.9	340.9	302.7	265.7	325.7	351.9	417.0	350.2	255.9	193.2	158.0	246.5	314.3	221.7	157.7	203.2	250.4	192.6	236.3	306.7	365.9	503.1	484.6	438.9	Diurnal Maximum	
M - Maintenance																																																	
Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m <sup>3</sup>																																																	





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

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Wapasu - July 2015**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
1 - 5	287	38.68	38.68
6 - 15	269	36.25	74.93
16 - 25	35	4.72	79.65
26 - 80	72	9.70	89.35
> 81.0	79	10.65	100.00

Total Number of Valid Hours: 742

Total Number of Hours: 744



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

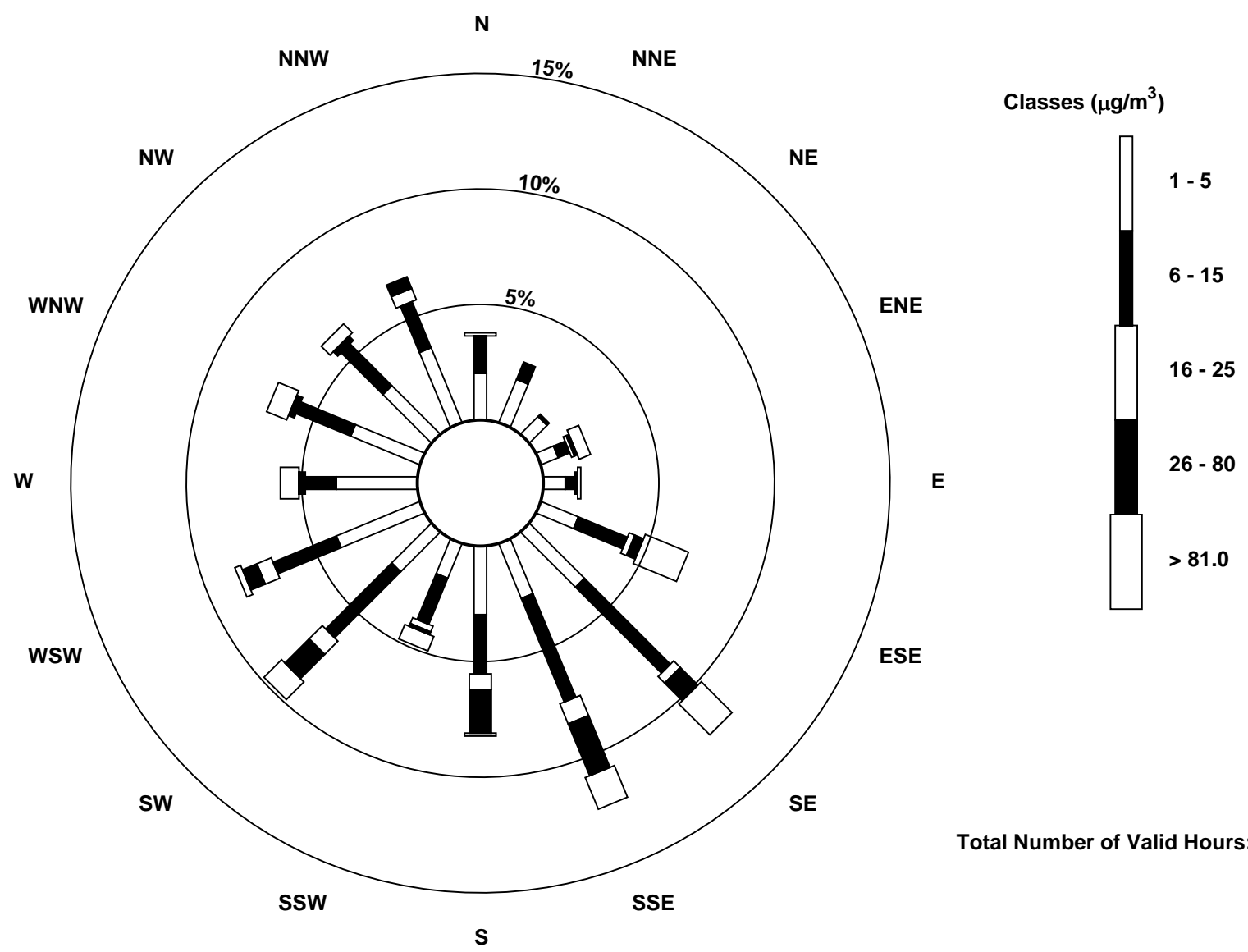
**Particulate Matter 2.5 (PM<sub>2.5</sub>) - μg/m<sup>3</sup>**  
**Wapasu - July 2015**

Concentration Ranges (μg/m <sup>3</sup> )	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	15	15	8	6	7	13	25	19	22	12	18	29	26	24	22	26	287
6 - 15	12	6	1	4	3	17	39	36	19	16	30	22	10	19	19	16	269
16 - 25	0	0	0	1	0	2	3	7	5	2	6	5	0	0	0	4	35
26 - 80	0	0	0	1	1	3	8	18	14	1	11	5	2	2	2	4	72
> 81.0	1	0	0	4	1	15	14	11	1	5	8	2	6	7	4	0	79
<b>Totals</b>	28	21	9	16	12	50	89	91	61	36	73	63	44	52	47	50	742

Total Number of Valid Hours: 742

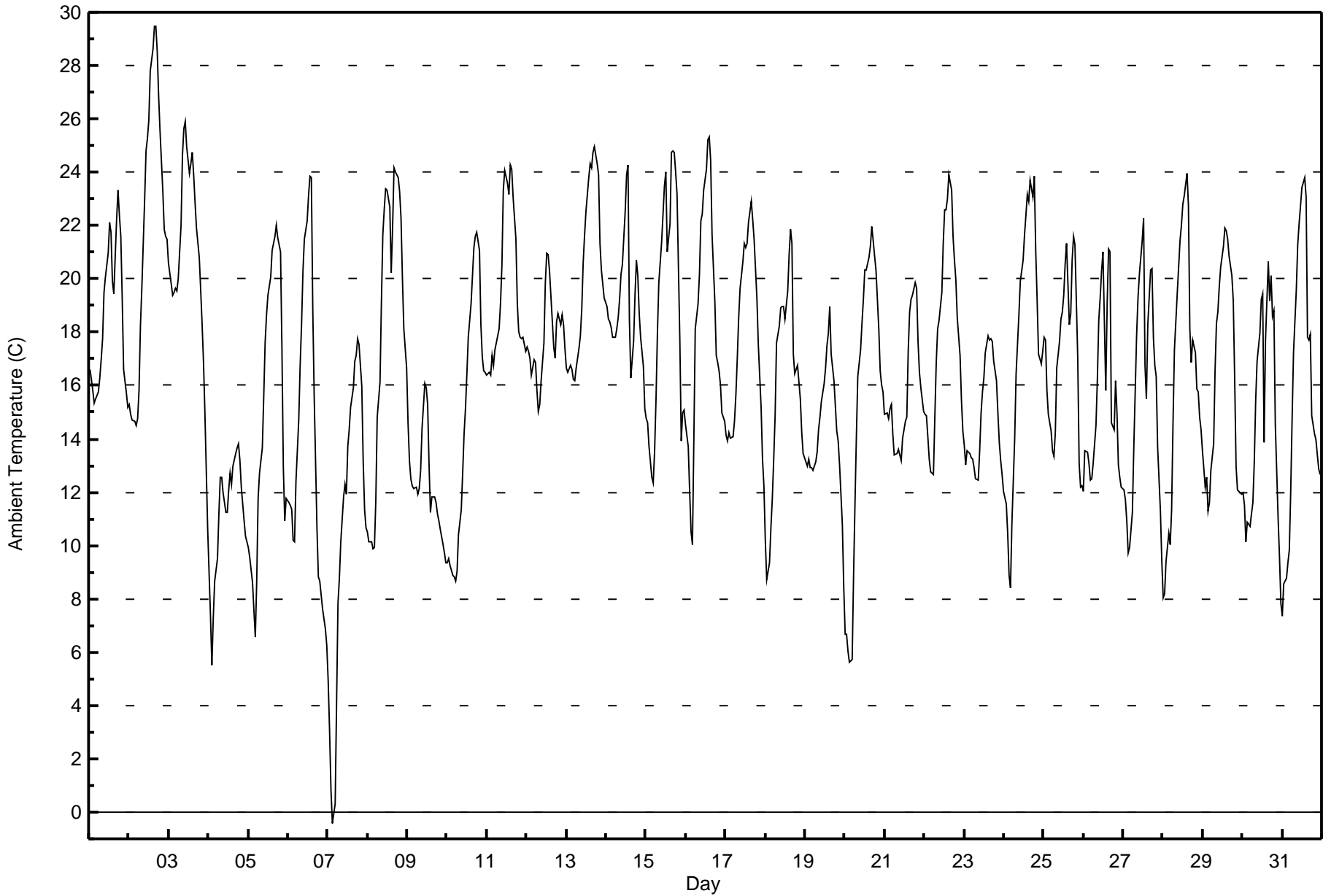
Total Number of Hours: 744







Maximum Value: 29.5 C on Jul 2 17:00		Maximum Daily Average: 21.9 C on Jul 2		Hours in Service: 744																							
Minimum Value: -0.4 C on Jul 7 04:00		Minimum Daily Average: 10.6 C on Jul 7		Hours of Data: 744																							
Maximum Diurnal Average: 20.5 C at hour 16		Minimum Diurnal Average: 11.9 C at hour 5		Hours of Missing Data: 0																							
Monthly Average: 16.56 C		Percentiles: P <sub>1</sub> = 5.6 P <sub>10</sub> = 10.5 Q <sub>1</sub> = 13.1 Median = 16.7 Q <sub>3</sub> = 20.1 P <sub>90</sub> = 22.8 P <sub>99</sub> = 25.1		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-Jul	16.6	16.2	15.8	15.3	15.5	15.8	16.3	17.0	17.8	19.5	20.1	21.0	22.1	21.8	19.9	19.5	22.2	23.3	22.4	21.6	19.3	16.6	15.7	15.2	18.6	23.3	
2-Jul	15.3	14.9	14.7	14.7	14.5	14.8	15.8	18.2	19.7	22.9	24.8	25.3	26.0	27.8	28.6	29.5	29.5	28.5	26.9	25.5	23.3	21.8	21.6	21.5	21.9	29.5	
3-Jul	20.6	19.8	19.4	19.5	19.6	19.5	20.0	22.0	24.6	25.7	25.9	24.9	23.9	24.3	24.7	23.9	22.8	21.9	20.8	19.6	18.3	16.9	15.1	10.6	21.0	25.9	
4-Jul	9.0	7.3	5.5	7.3	8.7	9.5	11.2	12.5	12.6	12.0	11.3	11.3	12.1	12.7	12.3	13.0	13.4	13.7	13.8	13.2	12.2	10.9	10.3	10.1	11.1	13.8	
5-Jul	9.9	9.6	8.6	7.6	6.5	8.7	11.8	12.7	13.7	15.5	17.6	18.7	19.4	20.1	21.1	21.3	21.6	22.0	21.5	21.0	17.4	12.9	10.9	11.7	15.1	22.0	
6-Jul	11.6	11.5	11.3	10.2	10.1	12.4	14.7	16.8	18.3	20.3	21.5	22.1	23.1	23.9	23.8	18.9	15.6	10.7	8.8	8.7	8.1	7.6	6.9	6.2	14.3	23.9	
7-Jul	4.9	3.1	0.8	-0.4	0.3	4.1	7.8	8.8	10.2	11.8	12.3	11.9	13.7	14.4	15.2	15.9	16.9	17.1	17.8	17.6	16.0	13.1	11.3	10.7	10.6	17.8	
8-Jul	10.5	10.1	10.1	9.9	9.9	11.6	14.8	16.1	19.1	21.6	22.6	23.4	23.3	22.7	20.2	22.0	24.1	24.0	23.8	23.3	22.3	20.0	18.1	16.6	18.4	24.1	
9-Jul	14.6	13.2	12.5	12.2	12.1	12.2	11.9	12.1	12.8	14.4	16.1	15.9	15.3	13.0	11.3	11.8	11.8	11.6	11.2	10.9	10.6	10.1	9.7	9.4	12.4	16.1	
10-Jul	9.4	9.5	9.2	8.9	8.8	8.7	9.0	10.4	11.3	12.7	14.2	15.2	16.5	17.8	19.0	20.1	21.2	21.6	21.8	21.1	18.3	17.1	16.5	16.5	14.8	21.8	
11-Jul	16.4	16.5	16.4	17.1	16.8	17.3	17.9	18.1	19.1	20.5	23.3	24.1	23.6	23.1	24.3	24.1	23.1	21.5	19.1	18.0	17.8	17.8	17.8	17.3	19.6	24.3	
12-Jul	17.4	17.3	17.0	16.4	17.0	16.9	15.8	15.0	15.3	16.2	17.6	19.8	21.0	20.9	20.3	18.4	17.4	17.0	18.4	18.7	18.3	18.6	18.3	17.4	17.8	21.0	
13-Jul	16.6	16.5	16.8	16.6	16.3	16.2	16.7	17.4	17.8	18.8	20.6	21.6	22.5	23.8	24.3	24.2	24.8	25.0	24.3	23.9	21.3	20.4	19.8	19.3	20.2	25.0	
14-Jul	19.0	18.5	18.4	18.2	17.8	17.8	18.1	18.6	19.2	20.2	20.5	22.5	23.9	24.3	18.5	16.3	17.7	19.4	20.7	20.1	18.7	17.8	16.7	15.1	19.1	24.3	
15-Jul	14.8	14.6	13.7	12.5	12.4	13.5	15.5	18.0	19.9	21.4	22.5	23.5	24.0	21.0	22.0	24.7	24.8	24.7	24.0	23.2	17.7	13.9	15.0	15.1	18.9	24.8	
16-Jul	14.6	13.7	12.0	10.5	10.1	14.0	18.1	19.1	20.2	22.1	22.4	23.4	24.1	25.2	25.3	24.4	21.7	19.1	17.1	16.9	16.5	16.0	15.0	14.6	18.2	25.3	
17-Jul	14.2	13.9	14.2	14.0	14.1	14.6	15.7	17.0	18.5	19.6	20.7	21.3	21.2	21.3	22.1	22.9	22.2	21.5	20.4	19.3	17.6	15.2	13.2	12.2	17.8	22.9	
18-Jul	10.2	8.7	9.4	10.6	11.8	13.2	14.9	17.6	18.2	18.9	19.0	19.0	18.5	19.5	20.9	21.9	21.4	17.2	16.5	16.8	16.1	15.5	14.3	13.4	16.0	21.9	
19-Jul	13.1	13.0	13.2	12.9	12.9	12.8	13.1	13.5	14.3	14.8	15.4	16.1	16.7	17.5	18.0	19.0	17.2	16.2	15.2	14.3	13.9	13.0	10.8	8.4	14.4	19.0	
20-Jul	6.7	6.7	6.1	5.6	5.7	8.9	11.5	14.1	16.3	17.3	18.3	19.2	20.4	20.3	20.8	21.2	22.0	21.4	20.8	20.3	18.1	16.5	16.0	15.8	15.4	22.0	
21-Jul	14.9	15.0	14.8	15.1	15.3	14.2	13.4	13.4	13.6	13.4	13.2	14.0	14.7	14.8	17.3	18.8	19.2	19.4	19.9	19.7	17.6	16.5	15.9	15.1	15.8	19.9	
22-Jul	14.9	14.9	14.1	13.3	12.7	12.7	14.8	16.9	18.1	18.4	19.5	21.3	22.6	22.6	23.0	23.9	23.3	21.6	20.7	20.0	18.5	17.1	15.4	14.3	18.1	23.9	
23-Jul	13.8	13.0	13.6	13.4	13.3	13.2	12.9	12.5	12.4	13.6	15.0	15.8	16.3	17.2	17.8	17.7	17.8	17.7	16.9	16.2	15.0	13.8	13.2	12.6	14.8	17.8	
24-Jul	12.1	11.5	10.5	8.9	8.4	10.8	14.0	16.4	17.5	18.6	19.9	20.7	21.6	22.4	23.2	22.9	23.7	23.0	23.9	21.1	19.2	17.2	16.8	17.3	17.6	23.9	
25-Jul	17.8	17.7	15.8	14.9	14.3	13.6	13.4	14.2	16.7	17.6	18.5	18.7	19.4	20.5	21.3	18.3	18.7	20.7	21.6	21.3	17.0	13.1	12.2	12.2	17.1	21.6	
26-Jul	12.0	13.6	13.5	13.1	12.5	12.5	13.1	14.5	16.2	18.4	19.3	20.3	21.0	15.8	19.1	21.1	21.0	14.6	14.4	16.2	15.0	13.1	12.5	12.2	15.6	21.1	
27-Jul	12.1	11.7	10.9	9.7	9.9	11.2	13.7	15.8	17.9	19.3	20.2	21.4	22.3	16.7	15.5	18.3	20.3	20.4	17.8	16.8	16.3	13.7	11.3	9.4	15.5	22.3	
28-Jul	8.0	8.2	9.4	10.5	10.0	11.3	14.6	17.3	19.4	20.4	21.4	22.0	22.8	23.1	24.0	22.7	18.1	16.8	17.7	17.3	15.9	15.8	14.8	14.3	16.5	24.0	
29-Jul	13.5	12.2	12.6	11.3	11.6	12.8	13.8	16.5	18.3	18.7	19.7	20.4	21.2	21.9	21.8	21.5	20.8	20.1	19.2	16.3	13.0	12.1	12.0	11.9	16.4	21.9	
30-Jul	12.0	11.5	10.2	10.9	10.7	11.2	11.6	13.1	15.4	16.9	18.0	19.3	19.5	13.8	17.7	20.6	19.2	20.1	18.6	18.8	14.5	11.0	9.5	7.8	14.7	20.6	
31-Jul	7.4	8.5	8.8	9.3	9.8	12.0	14.7	17.2	19.6	21.3	22.1	22.7	23.4	23.8	23.1	17.8	17.7	17.9	14.9	14.2	14.0	13.4	12.9	12.7	15.8	23.8	
		13.0	12.7	12.2	11.9	11.9	12.8	14.2	15.6	16.9	18.2	19.1	19.9	20.5	20.3	20.5	20.5	20.4	19.7	19.1	18.4	16.7	15.1	14.2	13.5	Diurnal Average	
		20.6	19.8	19.4	19.5	19.6	19.5	20.0	22.0	24.6	25.7	25.9	25.3	26.0	27.8	28.6	29.5	29.5	28.5	26.9	25.5	23.3	21.8	21.6	21.5	Diurnal Maximum	





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

**Ambient Temperature (AT) - C**  
**Wapasu - July 2015**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	1	0.13	0.13
0 - 10	60	8.06	8.20
10 - 20	492	66.13	74.33
> 20	191	25.67	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



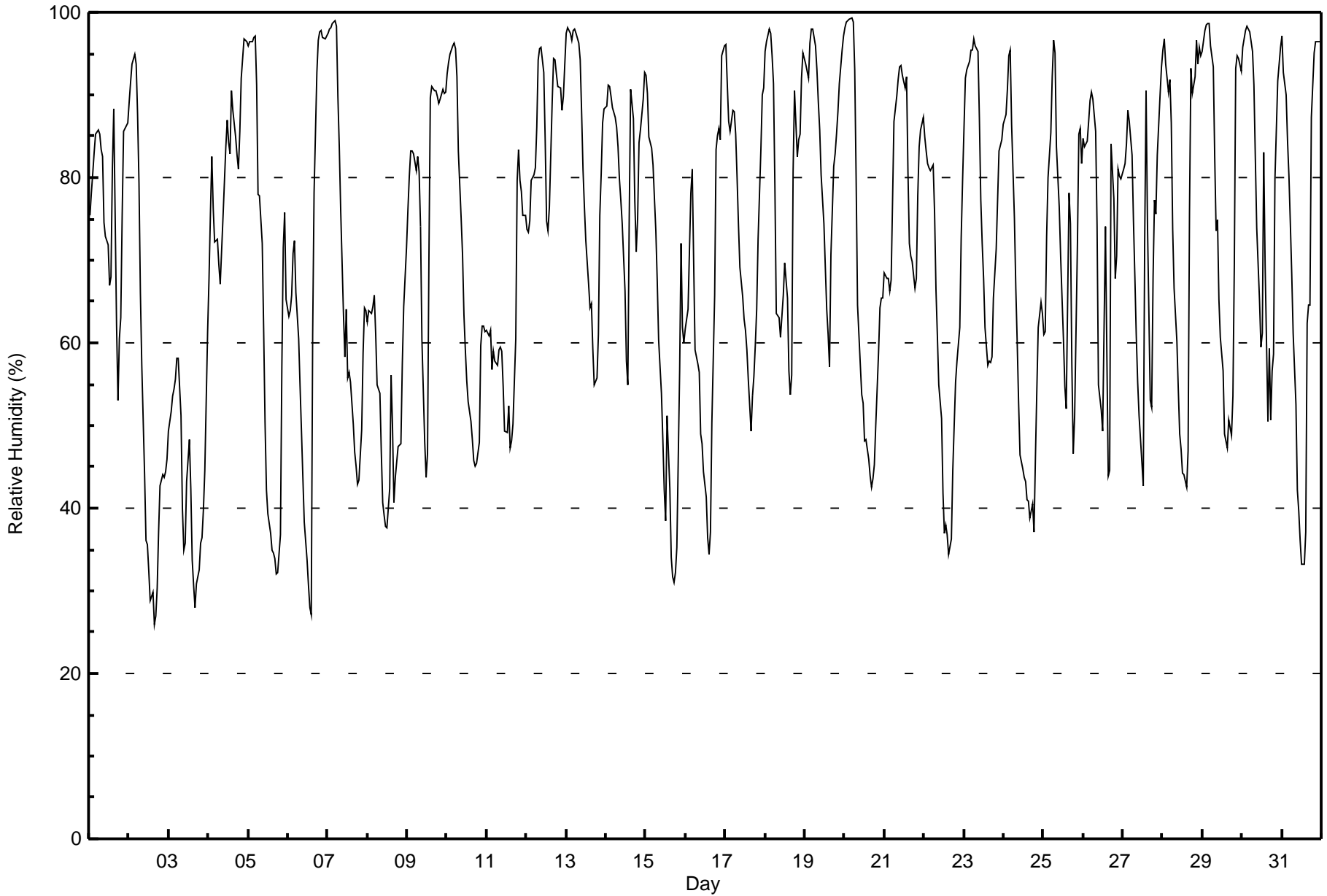
**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Relative Humidity (RH) - %**

**Wapasu - July 2015**

Maximum Value: 99 % on Jul 20 05:00      Maximum Daily Average: 85.9 % on Jul 12																			Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0							
Minimum Value: 26 % on Jul 2 16:00      Minimum Daily Average: 43.8 % on Jul 3 Maximum Diurnal Average: 85.7 % at hour 5      Minimum Diurnal Average: 53.8 % at hour 13 Monthly Average: 70.6 %      Percentiles: P <sub>1</sub> = 30 P <sub>10</sub> = 43 Q <sub>1</sub> = 55 Median = 73 Q <sub>3</sub> = 88 P <sub>90</sub> = 95 P <sub>99</sub> = 99																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	75	78	80	83	85	86	85	83	83	75	73	72	67	68	81	88	62	53	60	63	75	86	86	87	76.5	88
2-Jul	89	92	94	95	94	88	79	66	57	44	36	36	32	29	30	26	27	30	37	43	44	44	44	46	54.2	95
3-Jul	49	52	54	54	56	58	58	51	40	35	36	43	48	42	34	31	28	31	33	36	37	40	45	61	43.8	61
4-Jul	68	76	82	76	72	73	69	67	71	75	84	87	84	83	90	88	85	83	81	86	92	97	97	96	81.8	97
5-Jul	96	96	96	97	97	91	78	78	72	62	50	42	39	37	35	35	34	32	32	37	57	71	76	65	62.8	97
6-Jul	63	64	66	71	72	66	60	55	49	44	38	34	31	28	27	61	78	93	97	98	98	97	97	97	66.0	98
7-Jul	97	98	98	99	99	98	90	84	76	63	58	64	56	56	55	50	47	45	43	43	49	59	64	64	69.0	99
8-Jul	63	64	64	64	66	61	55	54	47	41	39	38	38	42	56	50	41	44	47	48	48	57	64	72	52.6	72
9-Jul	76	80	83	83	83	81	83	81	74	60	48	44	47	70	90	91	91	91	90	89	90	91	90	90	78.9	91
10-Jul	93	94	95	96	96	96	92	83	75	71	63	59	55	53	50	48	46	45	45	48	60	62	62	61	68.7	96
11-Jul	61	61	61	57	59	58	57	59	60	59	55	49	49	52	47	48	50	61	80	83	80	78	75	75	61.5	83
12-Jul	74	73	75	80	80	81	86	94	96	96	93	85	75	74	76	89	94	94	92	91	91	88	90	94	85.9	96
13-Jul	97	98	97	97	98	98	97	96	94	88	81	76	72	67	64	65	59	55	56	61	75	81	87	88	81.2	98
14-Jul	89	91	91	90	88	87	86	84	80	77	74	66	58	55	75	91	87	77	71	75	84	86	90	93	81.0	93
15-Jul	92	90	85	84	82	78	74	68	60	54	48	42	39	51	42	34	32	31	32	35	57	72	62	60	58.4	92
16-Jul	62	64	71	78	81	70	59	57	56	49	48	44	41	36	34	37	50	66	83	85	86	85	95	96	64.0	96
17-Jul	96	91	87	86	88	88	85	80	74	69	66	63	62	59	56	49	54	56	60	64	73	83	90	91	73.7	96
18-Jul	95	97	98	98	95	91	79	63	63	61	63	66	70	65	57	54	56	81	90	83	85	85	92	95	78.4	98
19-Jul	94	93	92	96	98	98	96	93	89	86	80	74	69	64	61	57	71	81	83	85	88	91	95	97	84.7	98
20-Jul	98	99	99	99	99	99	93	80	65	57	54	53	48	48	46	44	42	44	45	50	59	64	65	65	67.3	99
21-Jul	69	68	68	66	68	77	87	90	92	93	94	92	91	92	81	72	70	70	67	68	78	84	86	87	79.5	94
22-Jul	85	83	82	81	81	82	76	66	61	55	51	42	37	38	37	34	36	45	50	55	58	62	73	80	60.3	85
23-Jul	86	92	93	94	96	95	97	96	95	87	77	72	68	62	57	58	58	58	66	71	77	83	84	85	79.5	97
24-Jul	86	88	91	95	95	86	75	67	60	53	46	45	44	43	41	41	39	40	37	46	54	62	65	64	60.9	95
25-Jul	61	61	73	80	86	92	97	95	84	76	70	65	61	55	52	78	74	57	47	51	72	85	86	82	72.5	97
26-Jul	85	84	84	87	89	90	89	86	74	55	53	52	49	74	59	44	45	84	77	68	71	81	80	80	72.5	90
27-Jul	81	82	84	88	87	83	75	68	61	55	51	46	43	72	91	74	53	52	68	77	76	83	90	93	72.2	93
28-Jul	95	97	94	90	92	87	74	67	60	54	49	47	44	44	42	47	76	93	90	92	97	94	96	95	75.6	97
29-Jul	95	98	99	99	99	96	93	82	74	75	65	61	57	49	48	47	51	49	53	70	93	95	94	93	76.4	99
30-Jul	96	97	98	98	98	96	95	91	82	74	65	59	61	83	69	50	59	51	57	59	80	92	94	96	79.2	98
31-Jul	97	93	90	84	80	74	68	61	53	42	40	36	33	33	37	62	64	65	87	95	96	96	96	97	70.1	97
																			Diurnal Average							
																			Diurnal Maximum							





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

**Relative Humidity (RH) - %**  
**Wapasu - July 2015**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	57	7.66	7.66
40 - 60	180	24.19	31.85
60 - 80	205	27.55	59.41
80 - 100	302	40.59	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Maximum Speed: 20 km/h on Jul 3 10:00	Maximum Daily Speed Average: 10.4 km/h on Jul 11	Hours in Service: 744
Minimum Speed Value: 1 km/h on Jul 29 08:00	Minimum Daily Speed Average: 0.8 km/h on Jul 28	Hours of Data: 744
Maximum Diurnal Speed Average: 5.4 km/h at hour 12	Minimum Diurnal Speed Average: 0.5 km/h at hour 21	Hours of Missing Data: 0
Monthly Average Velocity: 1.9 km/h 219.4 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 3 Q <sub>1</sub> = 5 Median = 7 Q <sub>3</sub> = 9 P <sub>90</sub> = 12 P <sub>99</sub> = 16	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jul	SSE5	SSE6	SSE4	S4	S5	SSE4	SSE4	S4	SSE5	SW5	SW6	SW9	SW9	W9	WSW6	SW4	WSW6	WNNW7	W5	SW3	S4	SE5	SE6	SE6	SSW3.8	W9	
2-Jul	SE7	SSE6	SE6	SSE7	SSE6	SSE6	SSE5	S7	SSW7	SW6	WSW8	SW9	WSW8	SW8	SW8	WSW9	SW13	SW8	SSE4	SSE5	SSE6	SSE7	SSE8	SSE8	SSW5.4	SW13	
3-Jul	SSE8	SSE8	SSE8	SSE9	S9	S8	SSE10	SSW10	SW15	SW20	WSW18	W17	WNNW16	WNNW15	NW16	NW17	NW12	WNNW8	WNNW10	W8	W7	W6	WNNW4	SSW3	WSW6.6	SW20	
4-Jul	SW3	SSW3	SSE4	SSW6	SW5	SW6	WSW7	W8	WSW9	SW10	SW9	SSW7	SW8	SW6	WNNW6	NW7	WNNW7	WNNW6	WNNW5	NW7	WNNW10	N11	N11	N10	W3.5	N11	
5-Jul	N9	WNNW6	N6	NNE5	NNE3	ENE2	N4	WNNW6	WNNW8	WNNW8	WNNW11	N10	WNNW10	NW8	N8	NW7	WNNW9	WNNW9	NW8	W4	SSE2	SE5	SE6	SE7	WNNW4.3	WNNW11	
6-Jul	SSE7	SSE7	SSE7	SSE7	SSE7	SSE6	S6	SSW6	SW9	SW12	WSW13	WSW14	WSW14	SW15	WSW16	WNNW18	WNNW17	WNNW17	N13	WNNW14	WNNW14	NW12	NW7	NW3	W4.8	WNNW18	
7-Jul	WSW2	WSW3	SW3	SE3	SE2	WNNW3	WNNW5	W7	W7	W7	W9	WSW9	WSW11	WSW9	WSW10	WSW10	WSW12	WSW10	WSW10	SW8	SSW5	S6	SSE7	SSE8	WSW5.6	WSW12	
8-Jul	SSE8	SSE8	SSE9	SSE9	SSE10	SSE11	S12	S12	S13	S13	S14	S14	S13	S12	S12	SSE15	S15	SW10	SW9	W12	WNNW13	NW9	WNNW9	WNNW15	S7.6	S15	
9-Jul	WNNW17	WNNW11	WNNW9	WNNW10	NW10	WNNW9	NW8	NW8	NW8	NW8	WNNW6	WNNW6	WNNW8	WNNW7	WNNW3	E5	NNE5	NE6	NNE7	NNE7	NNE8	NNE7	N5	NNE5	NNE5	WNNW6.6	WNNW17
10-Jul	NNE4	N5	N4	NNE4	NNE5	N6	NE7	NE7	N4	NE3	N7	NW5	NW3	WNNW2	W6	WNNW4	NNE4	NNE6	N7	WNNW5	ENE3	ESE8	ESE8	ESE11	NNE3.1	ESE11	
11-Jul	ESE13	SE15	SE12	SE11	SE12	SE14	SE13	SSE11	SSE9	SE10	SSE10	S12	SSE13	SSE11	SSE13	SE11	ESE9	ESE11	ESE9	ESE8	ESE9	ESE10	ESE10	ESE9	SE10.4	SE15	
12-Jul	ESE10	ESE10	ESE9	NE4	ESE7	ESE5	ESE6	SSE5	SE5	N6	ENE7	ESE7	E2	ENE7	ENE4	ENE4	ESE9	ESE9	ENE7	E7	ENE7	SE8	SSW11	SSW5	ESE5.0	SSW11	
13-Jul	ESE3	SE5	ESE11	SE4	S4	SE5	S4	SW5	S6	S6	S6	S6	SW7	SW7	SW7	WSW6	WSW8	SW8	SW5	SSW3	SSE2	SE8	SE9	SE9	S4.6	ESE11	
14-Jul	SE10	SE9	SSE8	SE8	SSE7	SE10	SSE7	SSE8	SSE10	SSE12	SSE9	S6	WSW5	W12	SSW5	SE3	ESE5	SE7	SE7	SSE8	S3	ENE3	ESE7	SSE6.1	W12		
15-Jul	SE8	SSE7	SSE6	SSE6	SSE6	S6	S5	SSW5	SW5	WSW7	WSW9	WSW11	SW10	SSW14	S7	SW10	SW11	SW11	SW8	SW6	SSE3	SE6	SE8	SE7	SSW5.9	SSW14	
16-Jul	SE7	SE7	SE6	SE7	SE4	SE2	SW2	WNNW4	WNNW7	N10	WNNW9	N9	NNE10	NNE10	NNE11	N10	WSW2	S6	W5	WNNW6	E2	ESE7	W1	WNNW3	NNE1.9	NNE11	
17-Jul	WNNW4	N6	N7	N7	WNNW9	N10	N11	WNNW12	WNNW12	WNNW13	WNNW13	WNNW16	WNNW17	WNNW15	WNNW15	WNNW15	WNNW14	WNNW12	NNE11	NNE7	NNE3	SE2	SE3	SE3	WNNW9.0	WNNW17	
18-Jul	SE4	SE5	SE6	SE6	S5	S5	S7	SSW8	SW8	SW8	SW10	SSW9	SSW9	SW11	SW15	WSW14	WSW9	N4	S1	NW5	WNNW4	NW8	NW4	W3	SW4.7	SW15	
19-Jul	W3	NW3	NW9	WNNW9	NW9	WNNW8	WNNW11	NW10	NW9	WNNW9	WNNW9	WNNW11	WNNW11	WNNW11	WNNW10	WNNW9	W8	NW7	WNNW8	WNNW4	NW6	NW6	NW2	SE2	NW7.0	WNNW11	
20-Jul	SE3	SSE4	SE4	SE5	SE5	SSE5	S4	SSW5	SW7	WSW8	WSW9	WSW7	SSW6	WSW5	S5	SSW2	SSE5	SSE5	SE2	ESE9	ESE8	ESE9	ESE11	ESE11	SSE3.8	ESE11	
21-Jul	ESE11	ESE11	SE12	SE12	SSE10	ESE5	E5	ENE5	E7	ESE10	ESE12	ESE15	ESE14	SSE8	SW8	W8	WNNW9	NW7	NW3	E4	ESE5	SE8	ESE8	SE6	SE5.6	ESE15	
22-Jul	SSE6	SE6	SSE5	SE6	SE6	SE5	S4	SW6	WSW8	WNNW6	W6	W8	WNNW6	SSW2	WSW9	WSW8	W8	WNNW6	WNNW5	W3	W6	W6	WNNW5	WNNW4	WSW3.4	WSW9	
23-Jul	WNNW4	NW5	NW6	NW7	NW8	NW10	NW9	NW10	WNNW9	WNNW10	NW10	WNNW8	WNNW8	WNNW7	WNNW6	NW7	WNNW5	W5	SW5	SW5	S3	S3	SSE4	S4	WNNW5.2	NW10	
24-Jul	SSE4	SSE4	SSE5	SE5	SE5	SSE4	S5	SSW6	SW8	WSW9	WSW7	WSW9	WSW9	WSW8	SW7	SW7	SSW4	SW8	SW7	S4	SSE4	SE7	SE8	SE9	SSW4.7	WSW9	
25-Jul	SSE8	S8	S7	SSW8	SW10	WSW4	E2	ESE3	S5	SW9	SSW10	SW10	SW12	WSW12	W10	W6	WSW5	WSW7	W5	WNNW3	ESE3	ENE4	ENE5	NE4	SW4.2	SW12	
26-Jul	ENE5	E5	ENE4	NE4	NE1	SSW1	ESE3	ENE4	SE2	NE1	WSW3	SW7	SW9	WNNW9	WNNW10	NW10	NW8	S6	S7	S6	SSE6	SSE7	SSE7	SSE7	SSW1.1	WNNW10	
27-Jul	SSE8	SSE6	SSE6	SE6	SSE7	SSE8	S7	SSW8	SSW9	SW10	SW13	SW12	SW13	NW7	ESE4	SSW5	SW7	W6	NW6	ESE4	SSE5	SSE4	SE4	SE4	SSW4.7	SW13	
28-Jul	ESE3	SE7	SE7	SE6	SE5	SE4	SE4	S2	WNNW4	W7	WNNW6	W9	WNNW6	NW6	W7	WNNW5	N4	ESE3	S3	ESE3	SE2	WNNW4	NW1	E2	SW0.8	W9	
29-Jul	SE4	WSW3	SW5	S4	S4	SW3	E4	S1	W3	WSW5	WSW6	W7	WSW9	WSW10	WSW13	WSW11	WNNW9	WNNW7	N7	W5	NW3	ESE3	SSW5	SW6	WSW3.7	WSW13	
30-Jul	SW5	S3	S2	SSW5	S4	SSW6	SSW5	SSW6	WSW6	WSW7	W9	W10	WNNW6	SW3	SSW4	WSW6	SW6	WNNW6	NNE8	NE4	SSE3	SE4	ESE4	SE4	SW2.7	W10	
31-Jul	SE6	SE7	SE7	SE8	SE7	SE6	SSE6	S6	SSW6	WSW6	W6	W7	W7	W7	WSW11	WSW13	WNNW6	WSW4	W1	E2	S1	SSE4	SSE3	N2	SSW2.9	WSW13	

SE3.3	SE3.6	SE3.5	SE3.2	SSE3.0	SSE2.6	S2.3	SSW2.6	SW3.7	WSW4.3	WSW4.6	WSW5.4	WSW5.2	WSW4.8	WSW4.9	W4.8	W4.1	W2.8	WNNW1.9	WNNW0.7	SE0.5	ESE1.9	SE2.4	SE2.7	Diurnal Average
WNNW17	SE15	SE12	SE12	SE12	SE14	SE13	S12	SW15	SW20	WSW18	W17	WNNW17	SW15	WSW16	WNNW18	WNNW17	WNNW17	N13	WNNW14	WNNW14	NW12	N11	WNNW15	Diurnal Maximum

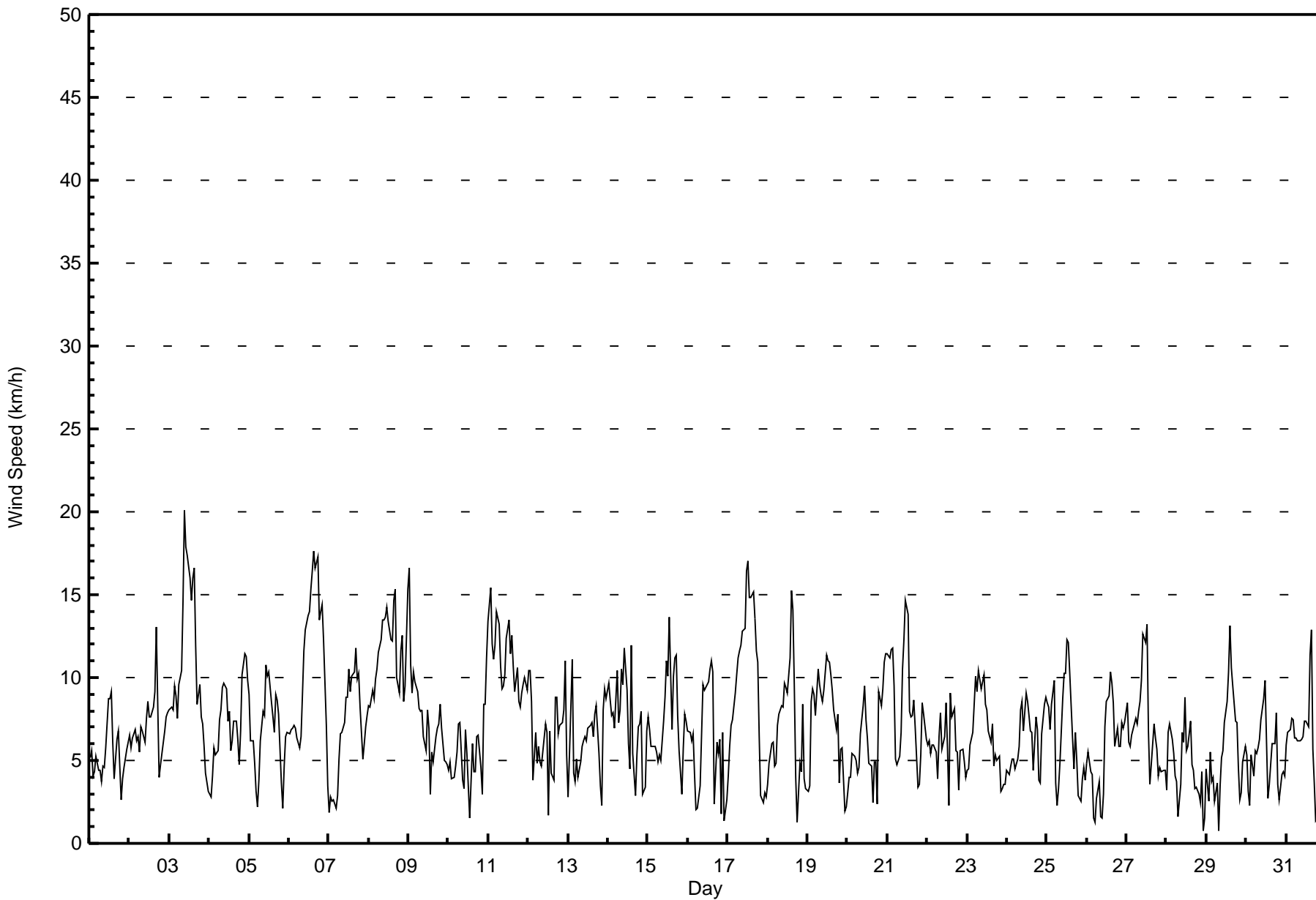
All monthly, daily, and diurnal averages have been calculated using vector methods





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

**Wind Speed (WS) - km/h**  
**Wapasu - July 2015**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h  
Wapasu - July 2015**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	243	32.66	32.66
6 - 11	425	57.12	89.79
12 - 19	75	10.08	99.87
20 - 28	1	0.13	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Wapasu - July 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	10	6	12	10	15	35	29	29	17	16	11	11	17	11	7	243
6 - 11	20	11	3	4	2	31	47	58	21	18	47	42	30	33	33	25	425
12 - 19	1	0	0	0	0	4	7	4	11	1	9	10	3	3	4	18	75
20 - 28	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	28	21	9	16	12	50	89	91	61	36	73	63	44	53	48	50	744

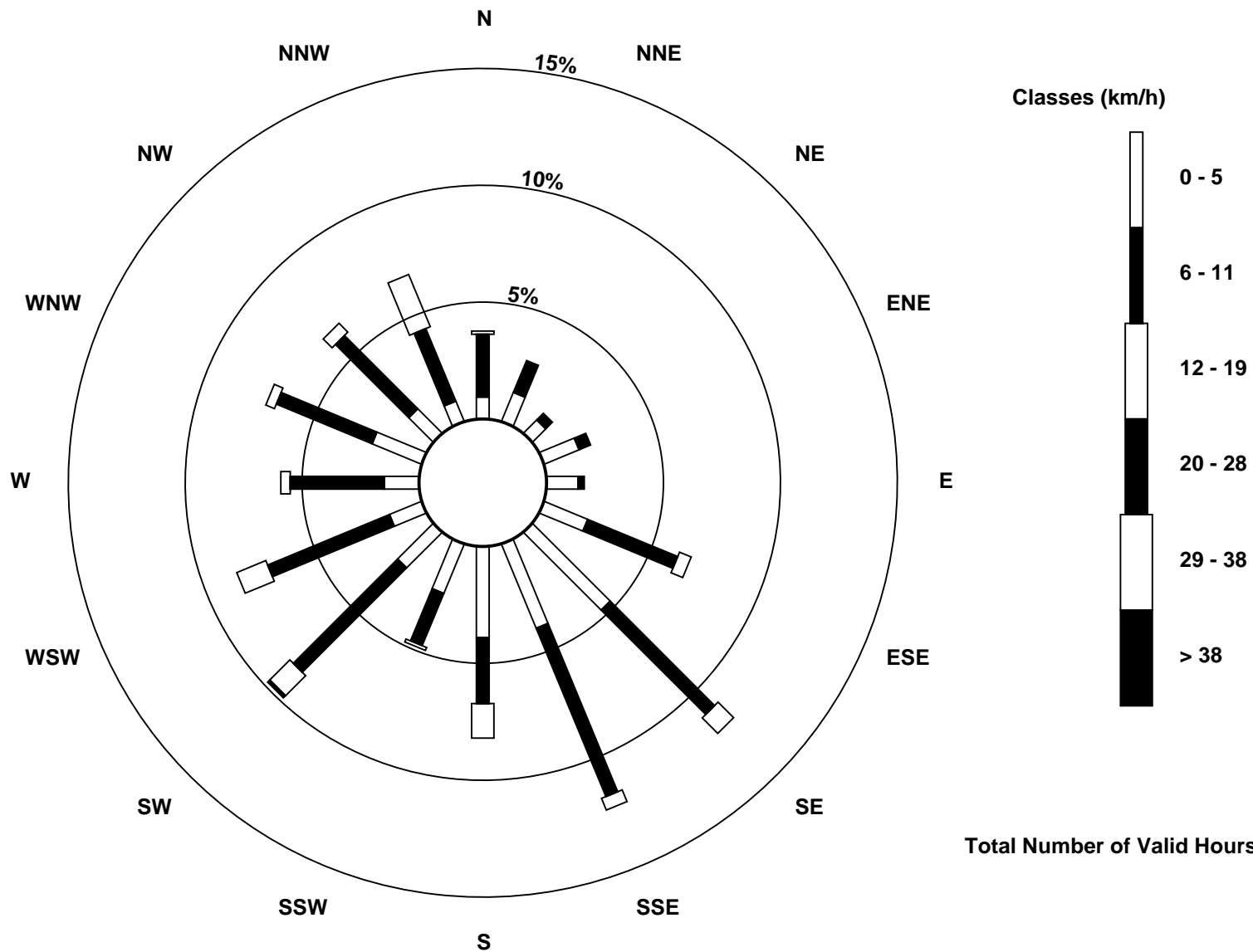
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Wind Speed (WS) - km/h  
Wapasu (AMS 17)





Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Speed (WS) - km/h

Wapasu - July 2015

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



**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Wind Direction (WD) - deg**

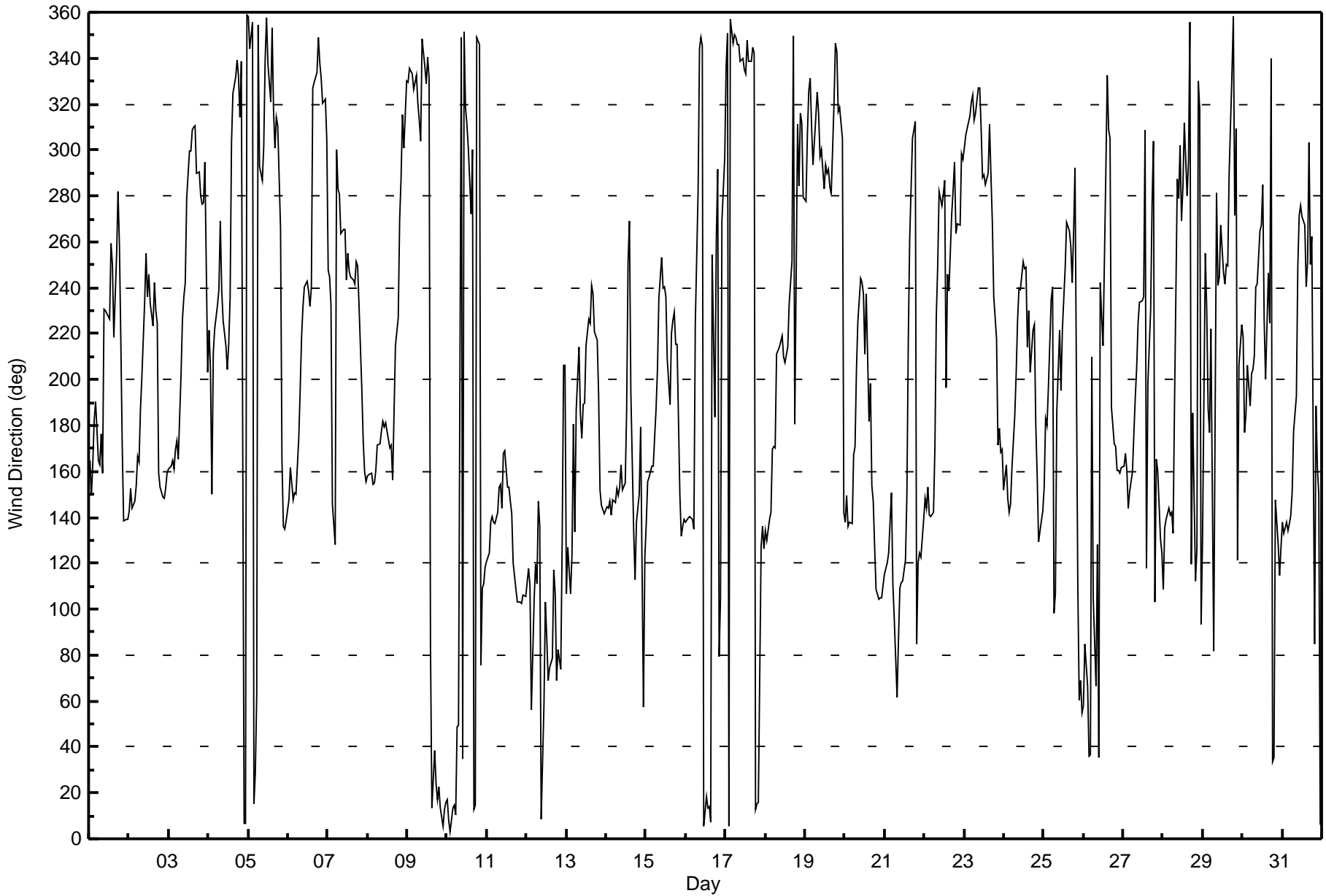
**Wapasu - July 2015**

Direction of Maximum Speed: 236 deg on Jul 3 10:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 133.9 deg on Jul 11	Hours of Data: 744
Direction of Minimum Speed: 184 deg on Jul 29 08:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 0.8 deg on Jul 28	Percent Operational Time: 100.0
Monthly Average Direction: 248.1 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-Jul	165	149	163	182	190	165	163	177	159	231	230	227	226	260	250	218	255	282	259	217	171	138	139	139	203.6
2-Jul	143	153	144	147	153	166	164	187	201	234	255	236	246	233	223	242	230	225	159	153	149	148	152	159	192.7
3-Jul	161	162	165	161	169	173	165	203	227	236	242	279	299	300	309	310	311	290	290	280	277	277	295	203	254.4
4-Jul	222	204	150	212	222	233	239	269	239	226	215	204	215	236	303	325	332	340	332	315	338	7	7	359	278.5
5-Jul	358	344	356	15	29	63	355	293	287	302	339	358	338	321	353	318	301	314	311	265	165	136	135	138	332.5
6-Jul	148	162	155	148	151	150	174	195	219	232	240	243	238	232	241	327	329	334	349	338	331	320	322	304	270.4
7-Jul	248	245	233	146	128	300	283	281	264	265	265	243	255	247	245	243	242	251	250	233	196	173	160	156	240.2
8-Jul	158	159	159	154	155	160	171	172	178	182	180	181	178	170	171	156	185	215	227	269	287	315	301	330	187.7
9-Jul	330	336	334	333	326	333	321	313	304	348	336	329	340	331	85	14	39	24	17	22	14	6	13	16	346.6
10-Jul	17	8	3	13	14	10	49	49	349	35	351	318	311	301	272	300	13	15	349	346	75	109	111	119	21.7
11-Jul	121	125	138	141	138	137	142	153	154	144	168	169	153	153	147	142	120	109	103	103	103	103	106	106	133.9
12-Jul	112	118	110	56	105	120	111	147	136	8	58	103	87	69	74	78	117	106	69	82	74	130	206	206	105.4
13-Jul	107	127	107	124	181	134	187	214	185	175	189	189	215	226	224	241	237	221	217	193	152	145	144	142	179.9
14-Jul	145	144	147	141	147	146	152	149	153	163	152	155	187	251	269	195	135	113	138	144	150	179	57	122	154.2
15-Jul	137	156	157	162	162	175	188	205	236	253	240	241	236	209	189	220	226	230	216	215	149	132	136	139	199.7
16-Jul	138	140	140	140	139	135	225	282	344	349	346	6	18	13	14	7	255	184	261	291	79	105	269	297	14.7
17-Jul	336	351	5	357	347	350	349	346	346	339	340	335	333	348	339	339	345	342	13	15	16	128	136	127	347.3
18-Jul	134	130	139	142	169	171	170	211	214	217	219	210	207	214	233	243	251	350	181	311	284	316	312	279	219.6
19-Jul	278	307	326	331	310	294	314	325	316	297	300	283	293	290	291	284	281	320	347	343	317	319	305	142	305.9
20-Jul	138	149	136	138	137	167	171	204	225	244	242	237	211	238	182	198	154	147	127	109	104	105	105	110	159.1
21-Jul	115	120	125	138	150	111	96	62	87	109	111	112	122	149	216	261	283	305	312	85	120	124	123	139	124.7
22-Jul	148	144	153	141	140	142	170	228	250	282	276	281	287	197	246	239	272	282	295	264	268	267	298	296	243.2
23-Jul	301	306	309	315	321	324	313	316	327	327	309	288	289	285	290	311	289	268	236	218	171	179	168	169	298.6
24-Jul	152	163	148	142	146	161	184	203	226	240	239	251	248	249	214	230	203	222	224	180	158	130	138	143	198.4
25-Jul	153	183	180	196	235	240	98	107	186	222	195	222	236	249	268	265	258	243	264	292	110	60	69	55	218.9
26-Jul	58	85	66	36	37	210	105	67	128	36	242	227	215	291	332	309	305	188	172	171	161	160	159	162	193.3
27-Jul	162	168	161	144	152	160	177	192	205	225	234	234	236	309	118	199	231	276	304	103	166	160	131	124	197.6
28-Jul	109	135	139	144	141	142	133	188	288	279	302	269	284	312	280	295	355	120	185	112	126	330	318	93	228.6
29-Jul	130	255	231	187	177	222	81	184	281	241	245	267	247	242	250	249	290	333	358	271	309	122	206	224	250.8
30-Jul	218	177	185	206	188	203	204	210	240	242	265	267	285	226	200	247	224	340	33	36	148	128	115	127	225.8
31-Jul	138	133	138	134	137	141	151	178	193	249	272	276	271	267	241	251	303	250	262	85	188	161	150	6	206.2

136.0 141.8 139.8 145.1 158.0 161.6 169.2 213.6 229.5 245.7 248.1 248.4 250.2 255.4 256.4 270.1 270.4 280.5 297.4 285.0 136.8 120.7 132.2 133.2  
Diurnal Average

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





Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 98 deg on Jul 10 14:00 Minimum Value: 4 deg on Jul 5 23:00 Percentiles: P <sub>1</sub> = 7 P <sub>10</sub> = 16 Q <sub>1</sub> = 23 Median = 31 Q <sub>3</sub> = 39 P <sub>90</sub> = 56 P <sub>99</sub> = 88																			Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0						
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jul	22	28	26	26	32	26	19	30	25	37	26	29	36	27	25	66	29	32	40	37	18	13	5	8	66
2-Jul	8	11	13	10	12	21	24	33	33	34	32	25	28	44	42	40	26	30	23	14	12	13	17	21	44
3-Jul	22	23	25	24	28	38	29	38	27	25	28	30	28	27	23	23	22	27	25	27	28	27	46	39	46
4-Jul	30	44	19	25	28	22	26	31	28	28	33	36	31	28	29	34	30	29	39	24	36	40	39	37	44
5-Jul	38	35	30	27	26	36	29	32	32	44	37	45	44	49	51	60	37	37	29	27	25	10	4	7	60
6-Jul	10	15	13	9	12	19	30	35	29	29	32	27	31	29	28	34	27	31	36	33	26	22	24	30	36
7-Jul	41	25	29	17	41	44	28	38	43	44	31	37	33	40	35	31	32	32	28	28	32	22	16	15	44
8-Jul	19	19	22	22	23	25	30	30	35	34	33	36	33	34	32	27	36	39	26	26	32	31	24	28	39
9-Jul	29	31	31	28	28	32	27	29	34	55	57	35	31	65	37	32	26	32	32	34	32	32	29	27	65
10-Jul	29	34	36	41	35	42	28	37	59	79	54	83	86	98	61	70	70	48	39	45	59	16	16	17	98
11-Jul	18	18	18	20	18	19	22	25	28	28	38	37	29	30	28	25	23	22	19	17	19	19	17	18	38
12-Jul	19	21	20	33	31	27	25	38	60	61	32	28	97	37	68	72	35	33	27	19	21	53	35	49	97
13-Jul	58	19	18	53	41	16	35	35	37	37	39	49	42	46	38	38	29	35	37	60	45	21	19	18	60
14-Jul	21	21	23	18	22	22	30	25	25	34	28	36	56	81	43	39	63	23	20	19	20	88	52	22	88
15-Jul	14	17	16	20	20	30	37	43	49	37	38	37	41	38	31	41	33	26	33	29	35	5	7	7	49
16-Jul	8	7	8	10	34	70	59	51	38	37	38	42	42	42	42	38	82	44	36	26	73	32	75	76	82
17-Jul	48	24	23	26	32	33	35	36	34	32	34	31	30	36	34	34	39	38	37	36	31	55	10	14	55
18-Jul	10	5	6	12	23	27	29	37	32	32	32	33	35	38	25	26	45	79	79	40	32	21	40	39	79
19-Jul	33	36	22	29	23	25	23	29	26	26	32	27	26	31	28	33	29	33	37	37	20	20	19	58	58
20-Jul	33	11	17	6	8	25	28	33	42	32	39	48	60	66	52	87	59	43	74	22	15	16	18	18	87
21-Jul	18	19	18	23	23	26	22	20	26	21	22	21	20	31	49	42	34	33	56	34	13	14	14	16	56
22-Jul	16	12	17	12	12	12	41	38	29	28	32	36	68	96	32	50	33	24	28	39	27	27	32	37	96
23-Jul	27	24	23	19	25	24	21	22	27	30	29	34	32	52	50	33	56	30	27	28	25	21	15	20	56
24-Jul	12	17	12	9	10	17	29	39	33	39	49	42	47	53	63	32	64	27	35	21	25	10	16	17	64
25-Jul	24	31	33	34	23	57	73	46	45	34	37	36	30	29	33	41	45	26	38	62	57	22	12	20	73
26-Jul	16	17	39	25	66	81	46	35	63	94	89	46	48	58	32	39	47	44	31	30	17	20	22	22	94
27-Jul	20	30	21	11	17	20	31	36	36	34	28	31	29	82	43	42	34	35	40	40	19	16	15	9	82
28-Jul	20	8	11	12	13	20	20	65	59	35	50	38	79	73	52	57	62	42	44	16	44	69	88	86	88
29-Jul	30	71	29	26	38	47	16	79	47	39	47	42	38	32	27	29	39	34	35	67	66	57	32	26	79
30-Jul	32	56	38	30	30	29	31	34	37	32	31	33	68	88	52	39	30	67	31	32	49	25	31	18	88
31-Jul	11	10	9	6	8	14	21	33	36	44	48	43	51	42	38	25	32	51	81	68	66	18	51	79	81
Diurnal Maximum																									





# Wood Buffalo Environmental Association

## SO2 Calibration Report

### Station Information

Calibration Date	July 23, 2015	Last Calibration	June 9, 2015
Station Name	Wapasu	Station Number	AMS 17
Reason:	Routine		
Start Time (MST)	9:20	End Time (MST)	14:25
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	871	861
Calculated slope	0.994227	0.998345	Chamber temp	45.2	44.9
Calculated intercept	0.922427	0.552734	Pressure	690.4	686.2
Analyzer Background	8.5	8.5	Flow	0.453	0.450
Analyzer Coefficient	0.808	0.808	Intensity	83	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	-0.6	----
as found span	5000	60.4	577.4	575.8	1.003
calibrator zero	5000	0.0	0.0	-0.4	----
high point	5000	60.4	577.4	577.6	1.000
second point	5000	30.2	288.7	289.4	0.998
third point	5000	15.2	145.3	144.3	1.007
as left zero	5000	0.0	0.0	-0.3	----
as left span	5000	60.4	577.4	577.2	1.000
Average Correction Factor					1.001

Corrected As found 576.3 Previous response 579.9 % change 0.6%

**Notes:**

Filter changed after as founds. No adjustments made.

Calibration Performed By:

Devin Russell



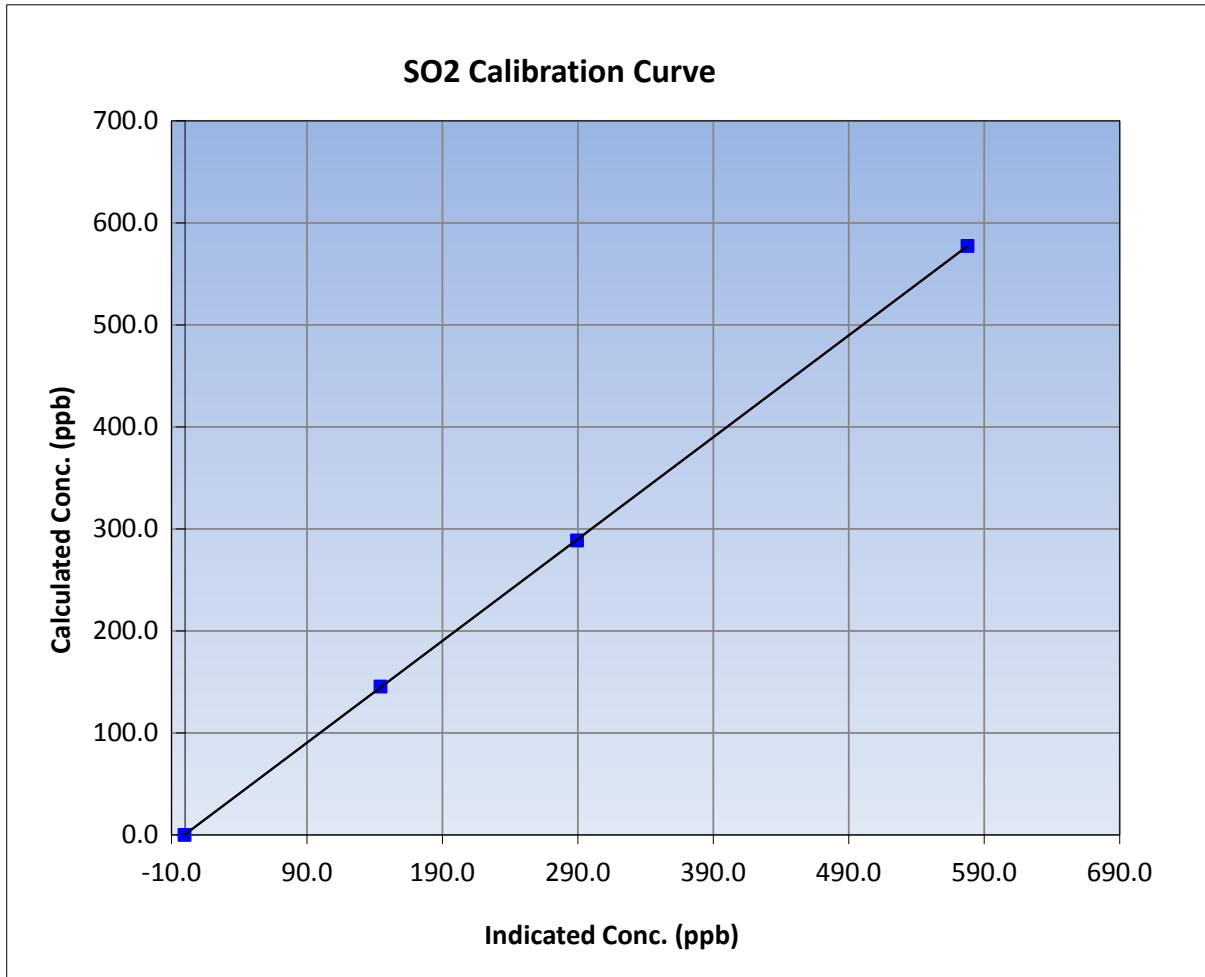
## Wood Buffalo Environmental Association SO2 Calibration Report

### Station Information

Calibration Date	July 23, 2015	Previous Calibration	June 9, 2015
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	9:20	End Time (MST)	14:25
Analyzer make	Thermo 43i	Analyzer serial #	1218153459

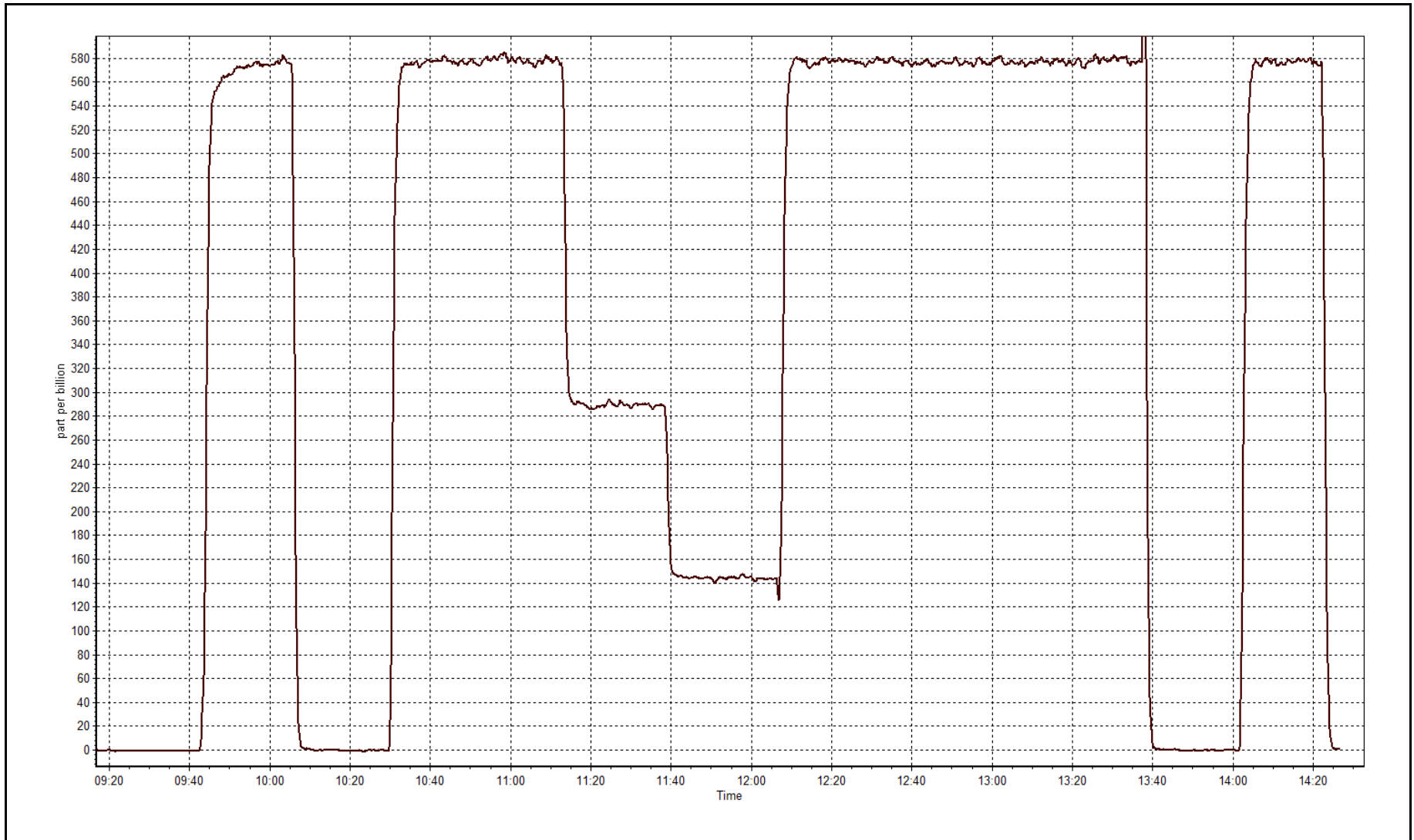
### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.4	----	Correlation Coefficient	0.999994
577.4	577.6	0.9997		
288.7	289.4	0.9976	Slope	0.998345
145.3	144.3	1.0067		
			Intercept	0.552734



SO2 Calibration Plot

Date: July 23, 2015





# Wood Buffalo Environmental Association H2S Calibration Report

## Station Information

Calibration Date	July 22, 2015	Last Calibration	June 10, 2015
Station Name	Wapasu	Station Number	AMS 17
Reason:	<input type="text" value="Routine"/>		
Start Time (MST)	10:00	End Time (MST)	13:25
Gas Cert Reference	CC107167	Station temp.	23 Deg C
Cal Gas Concentration	5.1 ppm	Cal Gas Exp Date	09-Sep-17
Calibrator Make/Model	API T700	Serial Number	997
ZAG air Make/Model	API 701	Serial Number	4227
DACS make/model	Campbell Scientific CR3000	Serial Number	6894
SO2 gas concentration	47.8 ppm	SO2 gas cert/exp	SA130010A December-12-16

## Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-651	-651
Analyzer IP address	192.168.1.42		Lamp voltage	808	808
Calculated slope	1.002091	1.001819	Chamber temp	45	45
Calculated intercept	-0.208606	-0.279169	Pressure	554.3	546.5
Analyzer Background	11.6	11.7	Flow	0.995	0.996
Analyzer Coefficient	0.842	0.842	Intensity	92	91
			Converter temp.	339	341

Analyzer make/model	Thermo 450i	Analyzer serial #	1218153583
Converter make/model	n/a	Converter serial #	n/a

## Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.1	----
as found span	5000	78.5	80.1	80.0	1.001
SO2 scrubber check	5000	20.9	199.8	1.9	----
calibrator zero	5000	0.0	0.0	0.2	----
high point	5000	78.5	80.1	80.1	1.000
second point	5000	39.3	40.1	40.5	0.990
third point	5000	19.7	20.1	20.3	0.988
as left zero	5000	0.0	0.0	0.1	----
as left span	5000	78.5	80.1	80.2	0.999
Average Correction Factor					0.993

Corrected As found	80.0	Previous response	80.1	% change	0.1%
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**Notes:**

Filter changed after as founds. Scrubber check completed after third point. No adjustments made.

Calibration Performed By: Devin Russell



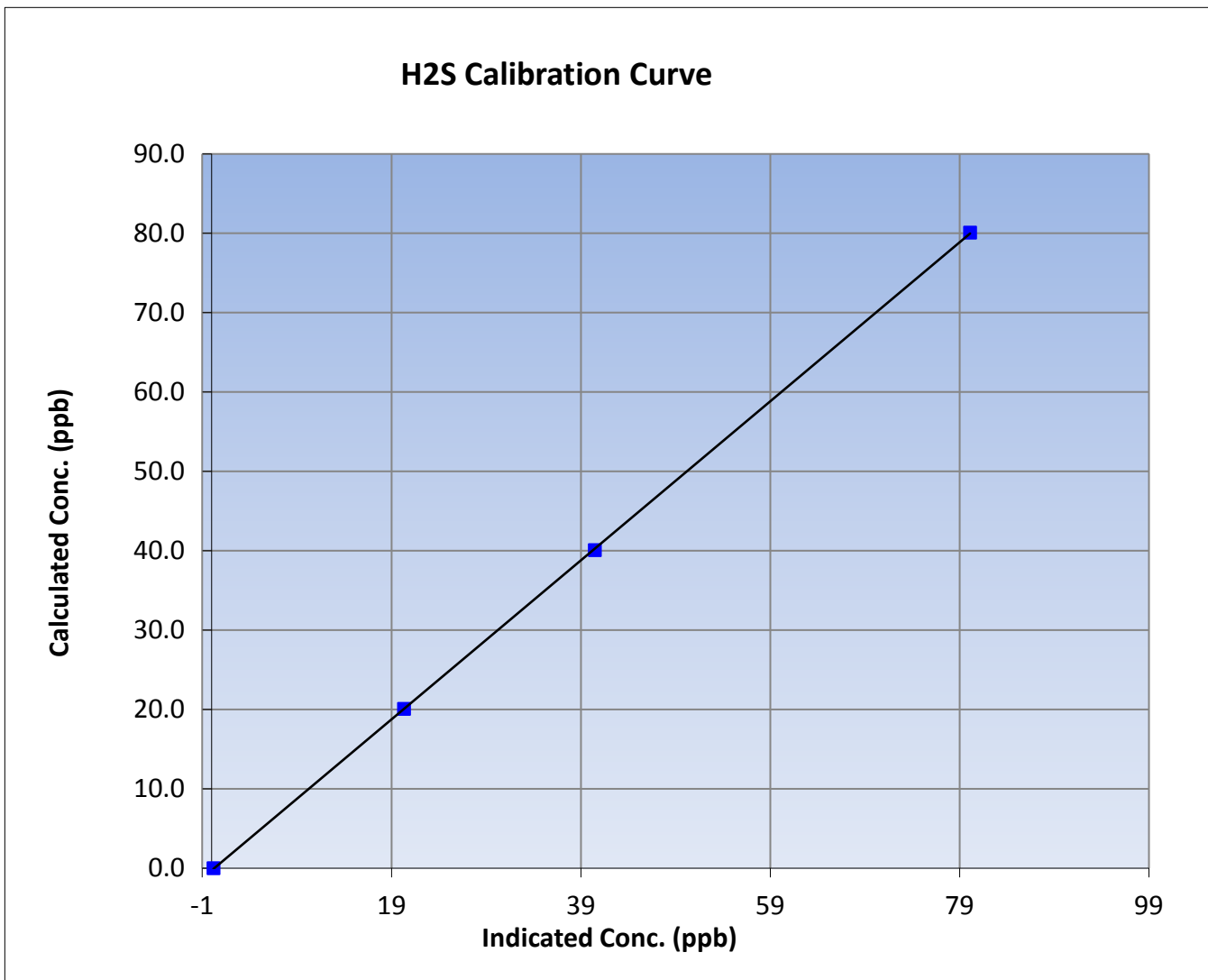
# Wood Buffalo Environmental Association H2S Calibration Report

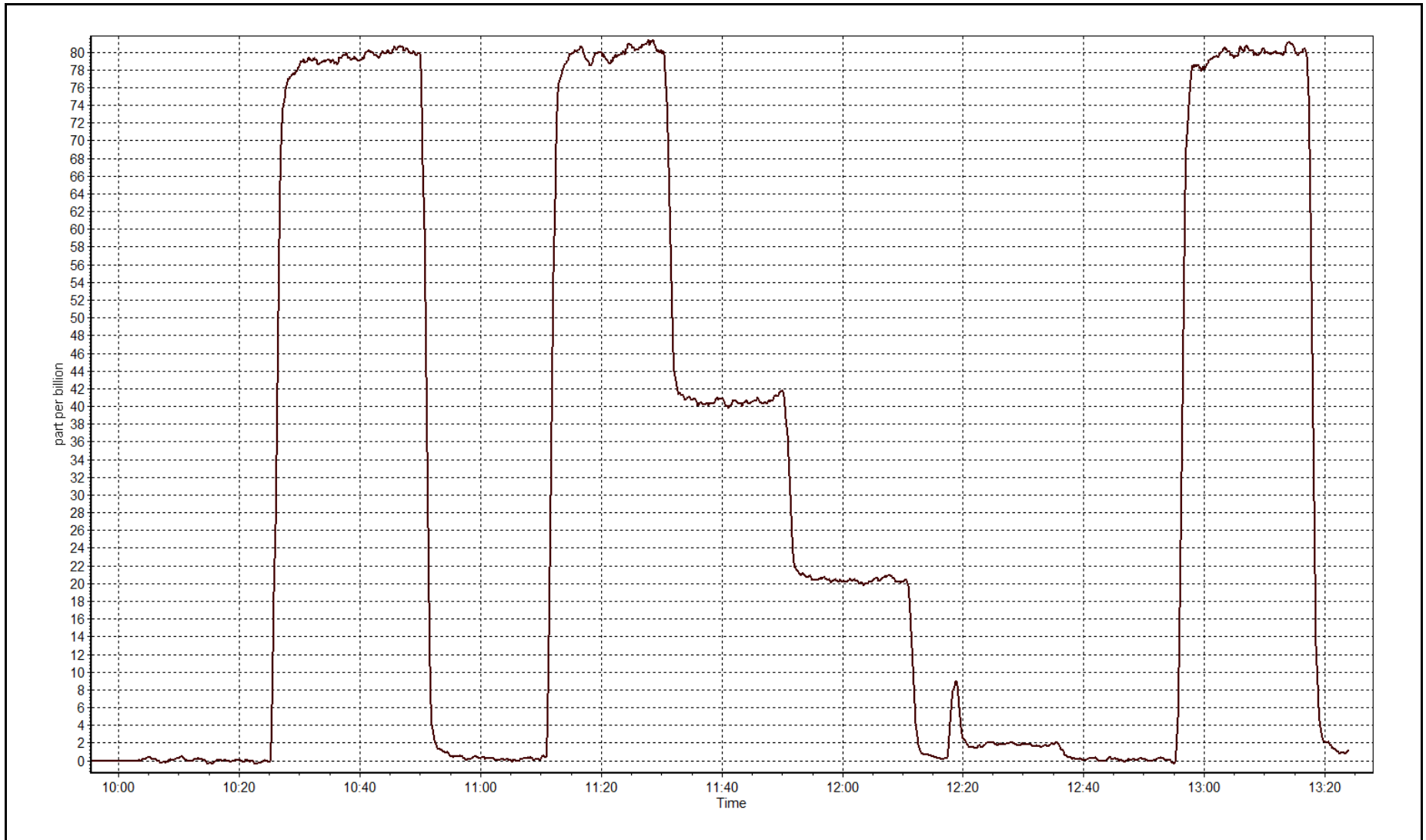
## Station Information

Calibration Date	July 22, 2015	Previous Calibration	June 10, 2015
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	10:00	End Time (MST)	13:25
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	0.2	----	Correlation Coefficient	0.999985
80.1	80.1	0.9995		
40.1	40.5	0.9903	Slope	1.001819
20.1	20.3	0.9884		
			Intercept	-0.279169







# Wood Buffalo Environmental Association THC Calibration Report

### Station Information

Calibration Date	July-23-15	Last Calibration	June-09-15
Station Name	Wapasu	Station Number	AMS 17
Reason:	Routine		
Start Time (MST)	9:20	End Time (MST)	14:25
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	40.9	41.1
Calculated slope	0.992204	1.000524	Fuel Pressure	24.8	24.8
Calculated intercept	0.030659	-0.055054	Analyzer Coeff	4.2	4.2
			Analyzer BKG	2.560	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	-0.03	----
as found span	5000	60.4	13.19	13.24	0.997
calibrator zero	5000	0.0	0.00	0.02	----
high point	5000	60.4	13.19	13.22	0.998
second point	5000	30.2	6.60	6.68	0.988
third point	5000	15.2	3.32	3.40	0.977
as left zero	5000	0.0	0.00	0.03	----
as left span	5000	60.4	13.19	13.13	1.005
Average Correction Factor					0.987

Corrected As found	13.27	Previous response	13.27	% change	0.0%
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**Notes:**

Filter changed after as founds. No adjustments made.

Calibration Performed By:

Devin Russell



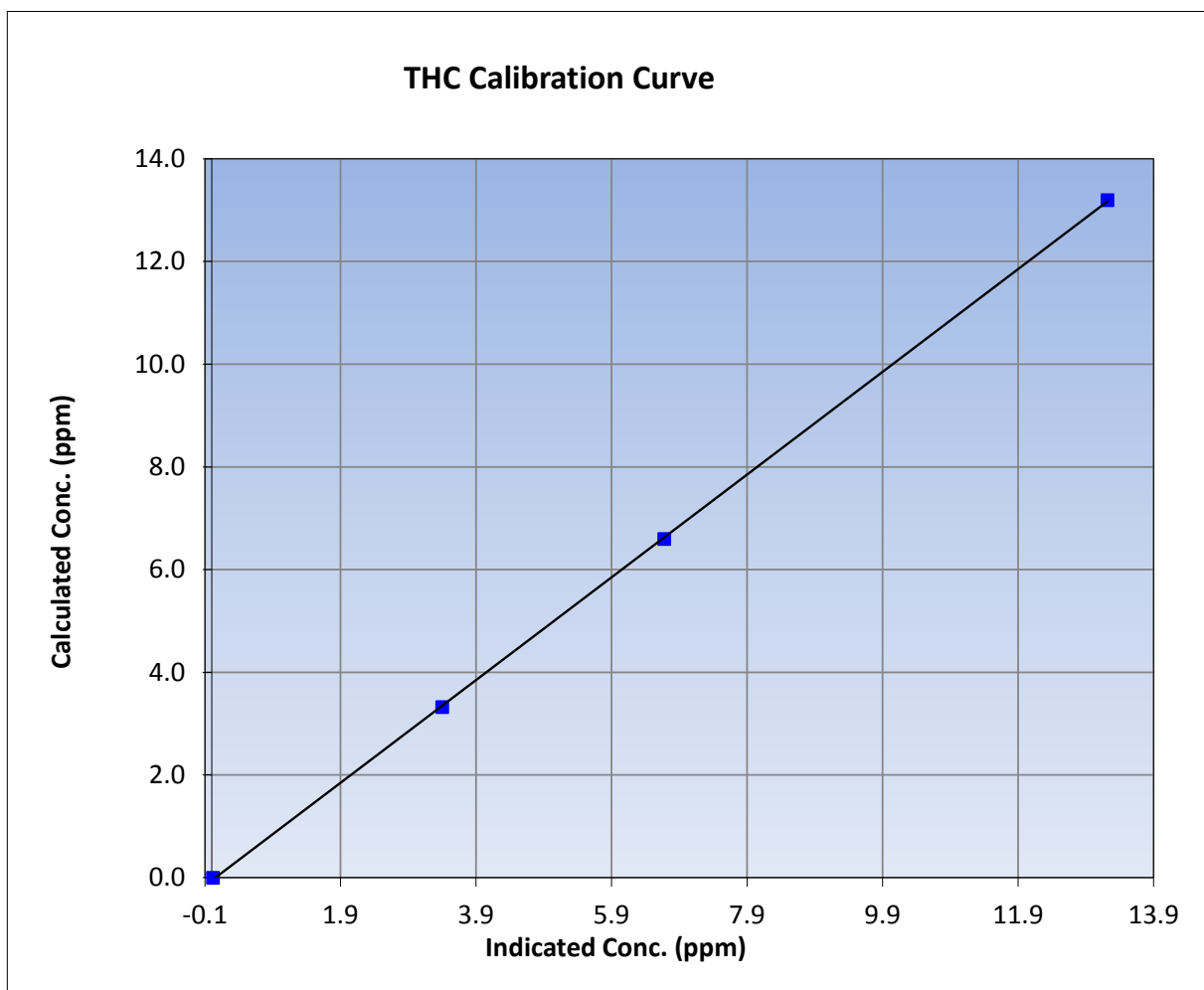
## Wood Buffalo Environmental Association THC Calibration Report

### Station Information

Calibration Date	July 23, 2015	Previous Calibration	June 9, 2015
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	9:20	End Time (MST)	14:25
Analyzer make	Thermo 51i-LT	Analyzer serial #	1218153352

### Calibration Data

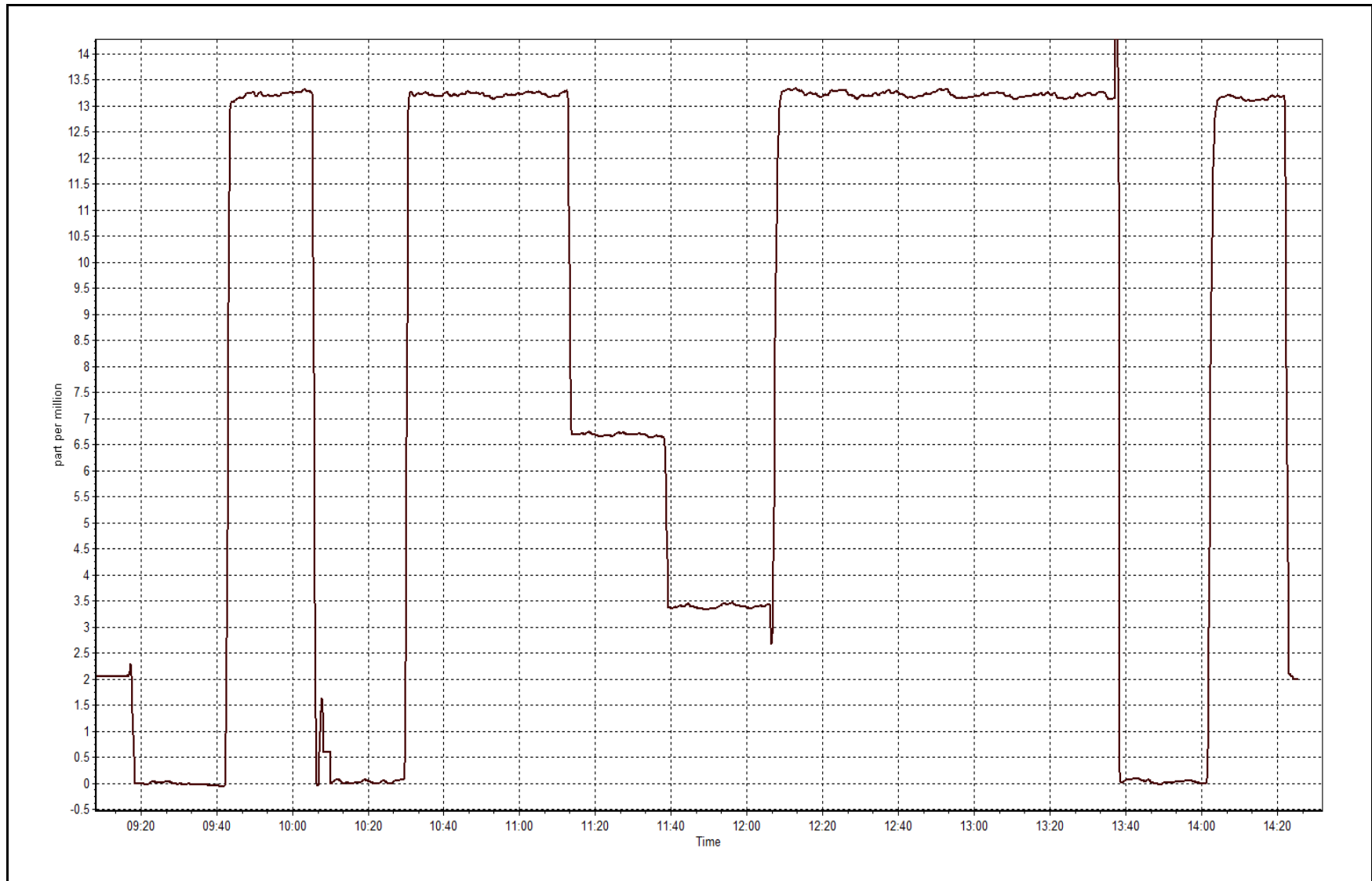
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.02	----	Correlation Coefficient	0.999964
13.19	13.22	0.9981		
6.60	6.68	0.9876	Slope	1.000524
3.32	3.40	0.9766		
			Intercept	-0.055054





THC Calibration Plot

Date: July 23, 2015





# Wood Buffalo Environmental Association

## O<sub>3</sub> Calibration Report

### Station Information

Calibration Date	July 28, 2015	Previous Calibration	June 10, 2015
Station Name	Wapasu	Station Number	AMS 17
Reason:	Routine		
Start Time (MST)	10:21	End Time (MST)	13:40
NO2 GPT Ref date	July-23-15	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.	25.8	26.8
Analyzer IP address	192.168.1.48		Lamp temp.	58.0	58.0
Calculated slope	0.996118	0.987170	Pressure	35.7	26.0
Calculated intercept	-0.248534	-0.459576	Flow cell A	723	709
Analyzer Background	5.4	4.5	Flow cell B	733	721
Analyzer Coefficient	0.960	0.971	Cell A Intensity		
			Cell B Intensity		

Analyzer make	Teledyne API T400	Analyzer serial #	824
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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	197.0/800	0.0	-0.6	----
as found span	5000	713.2/1081.4	351.7	350.3	1.004
calibrator zero	5000	195.9/800	0.0	0.6	----
high point	5000	713.2/1081.4	351.7	357.0	0.985
second point	5000	495.5/973.5	238.2	241.4	0.987
third point	5000	261.2/846.7	122.4	124.4	0.984
as left zero	5000	195.9/800	0.0	0.7	----
as left span	5000	713.9/1083.6	351.7	357.8	0.983
Average Correction Factor					0.985

Corrected As found	351.0	Previous response	353.3	% change	0.7%
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**Notes:**

Changed filter after as founds. Adjusted both zero and span.

Calibration Performed By:

Asad Hidayat



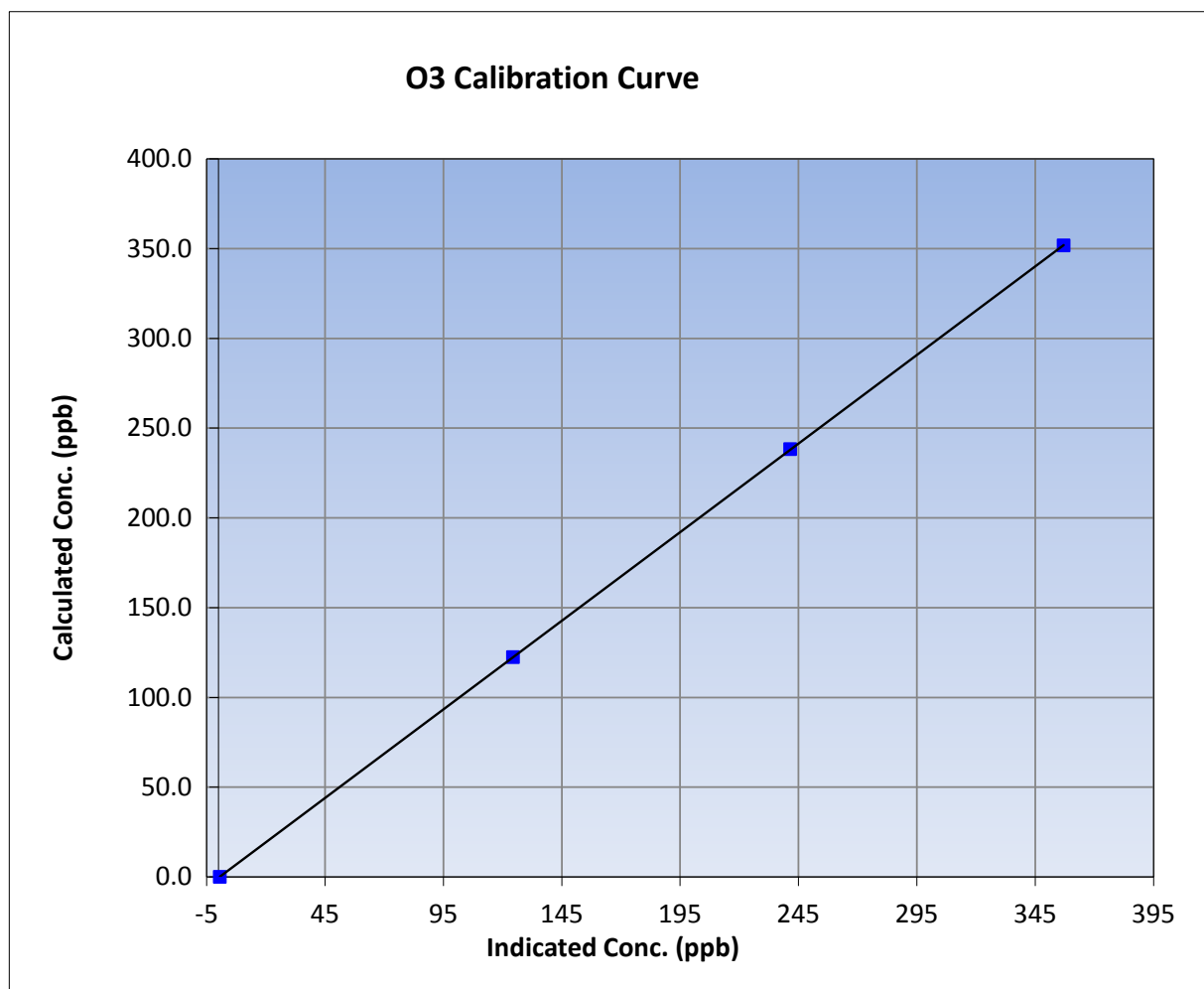
## Wood Buffalo Environmental Association O3 Calibration Report

### Station Information

Calibration Date	July-28-15	Previous Calibration	June 10, 2015
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	10:21	End Time (MST)	13:40
Analyzer make	Teledyne API T400	Analyzer serial #	824

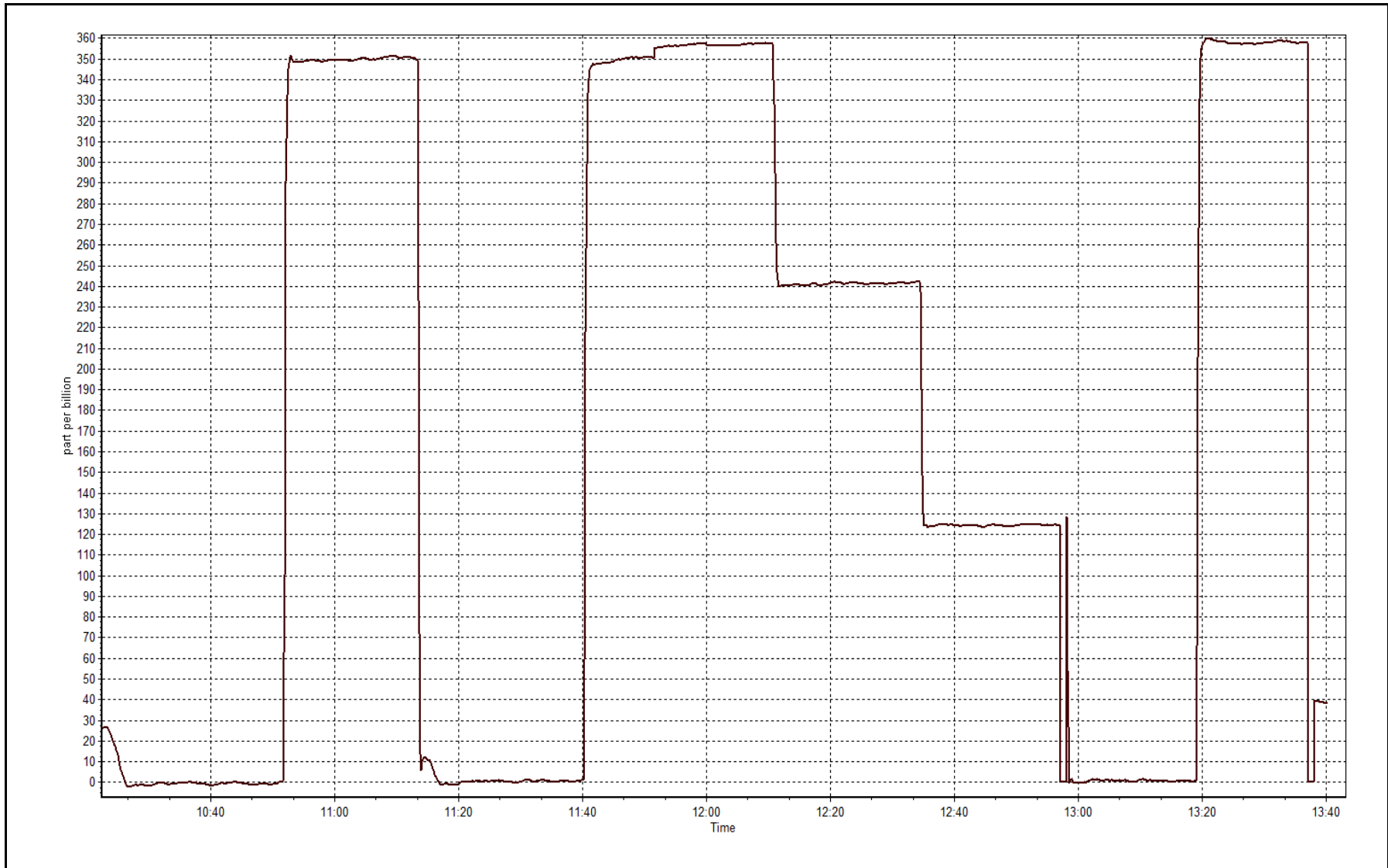
### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.6	----	Correlation Coefficient	0.999997
351.7	357.0	0.9852		
238.2	241.4	0.9867	Slope	0.987170
122.4	124.4	0.9837		
			Intercept	-0.459576



O3 Calibration Plot

Date: July 28, 2015





# Wood Buffalo Environmental Association

## NOX-NO-NO2 Calibration Report

### Station Information

Calibration Date	July 23, 2015	Previous Calibration	June 9, 2015
Station Name	Wapasu	Station Number	AMS 17
Reason:	Routine		
Start Time (MST)	9:20	End Time (MST)	14:25
NO Cal Gas Conc	49.7 ppm	Gas Cert Reference	SA130010A
NOx Cal Gas Conc	49.7 ppm	Cal Gas Expiry Date	December 12, 2016
Calibrator	API T700	Serial Number	997
Zero air Generator	Teledyne API T701	Serial Number	4427

### DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	6894
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### Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.997293	1.004264	0.993375
	Data Offset	1.487535	0.775034	0.256954
Current Calibration	Data Slope	0.998977	1.000462	1.000070
	Data Offset	2.204958	1.099697	1.562714

### Analyzer Information

Analyzer make/model	API T200	Analyzer serial #	833
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Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
NO coefficient	0.883		0.901	
NOX coefficient	0.886		0.901	
NO2 coefficient	1.000		1.000	
NO bkgrnd	0.0		0.0	
NOX bkgrnd	2.9		2.9	
Chamber Temp	50	Deg C	50	Deg C
Moly Temp	316.5	Deg C	316.5	Deg C
PMT voltage	781	V	781	mV
PMT Temp	7	Deg C	7	Deg C
O3 flow	71	ccm	71	ccm
R Cell press NO	3.9	mmHg	4.4	mmHg
R Cell Press Nox	3.9	mmHg	4.4	mmHg
NO sample flow	0.444	lpm	0.44	lpm
Nox sample Flow	0.445	lpm	0.440	lpm

**Notes:**

Filter changed after as founds. Span adjusted.



# Wood Buffalo Environmental Association

## NOX-NO-NO2 Calibration Report

### Station Information

Calibration Date:

July 23, 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	-0.6	-0.1	-0.6	----	----
as found span	5000	60.4	600.4	600.4	0.0	596.8	594.0	2.8	1.0061	1.0108
calibrator zero	5000	0.0	0.0	0.0	0.0	-1.2	-0.1	-1.0	----	----
high point	5000	60.4	600.4	600.4	0.0	599.0	599.3	-0.4	1.0023	1.0017
second point	5000	30.2	300.2	300.2	0.0	298.7	298.9	-0.2	1.0048	1.0044
third point	5000	15.2	151.1	151.1	0.0	147.4	148.7	-1.3	1.0252	1.0161
as left zero	5000	0.0	0.0	0.0	0.0	-1.2	-0.1	-1.1	----	----
as left span	5000	60.4	600.4	246.0	354.3	594.7	245.1	349.6	1.0096	1.0040
Average Correction Factor									1.0108	1.0074

Corrected As found  
Previous Response

NO<sub>x</sub>= 597.4  
NO<sub>x</sub>= 600.5

NO= 594.1  
NO= 597.1

Percent Change

NO<sub>x</sub>= 0.5%

NO= 0.5%

### GPT Calibration Data

Dilution Flow

5000

ccm

Source Gas Flow

60.40

ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
Cal zero			0.0			-1.0			N/A	
1st NO2 (300)	----	246.0	351.7	596.8	246.0	350.7	0.9941	1.0000	1.0027	99.7%
2nd NO2 (200)	----	359.5	238.2	595.4	359.5	235.9	0.9963	1.0000	1.0097	99.0%
3rd NO2 (100)	----	475.3	122.4	595.7	475.3	120.4	0.9958	1.0000	1.0168	98.3%
4th NO2 (0)	597.7	----	0.0	597.7	597.7	-0.1	0.9925	1.0000	N/A	----
Average Correction Factor							0.9947	1.0000	1.0097	99.0%

Calibration Performed By:

Devin Russell



# Wood Buffalo Environmental Association

## NO<sub>x</sub> Calibration Summary

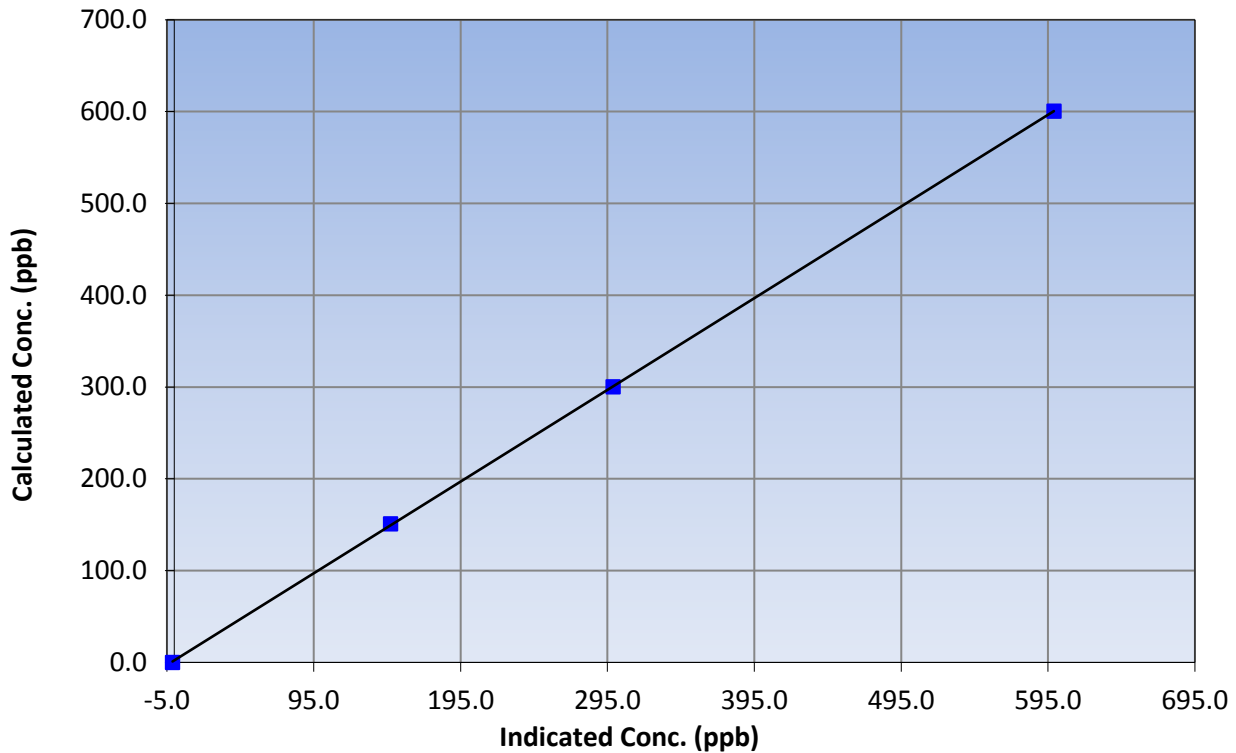
### Station Information

Calibration Date	July 23, 2015	Previous Calibration	June 9, 2015
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	9:20	End Time (MST)	14:25
Analyzer make	API T200	Analyzer serial #	833

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-1.2	----	Correlation Coefficient	0.999979
600.4	599.0	1.0023		
300.2	298.7	1.0048	Slope	0.998977
151.1	147.4	1.0252		
			Intercept	2.204958

### NO<sub>x</sub> Calibration Curve





# Wood Buffalo Environmental Association

## NO Calibration Summary

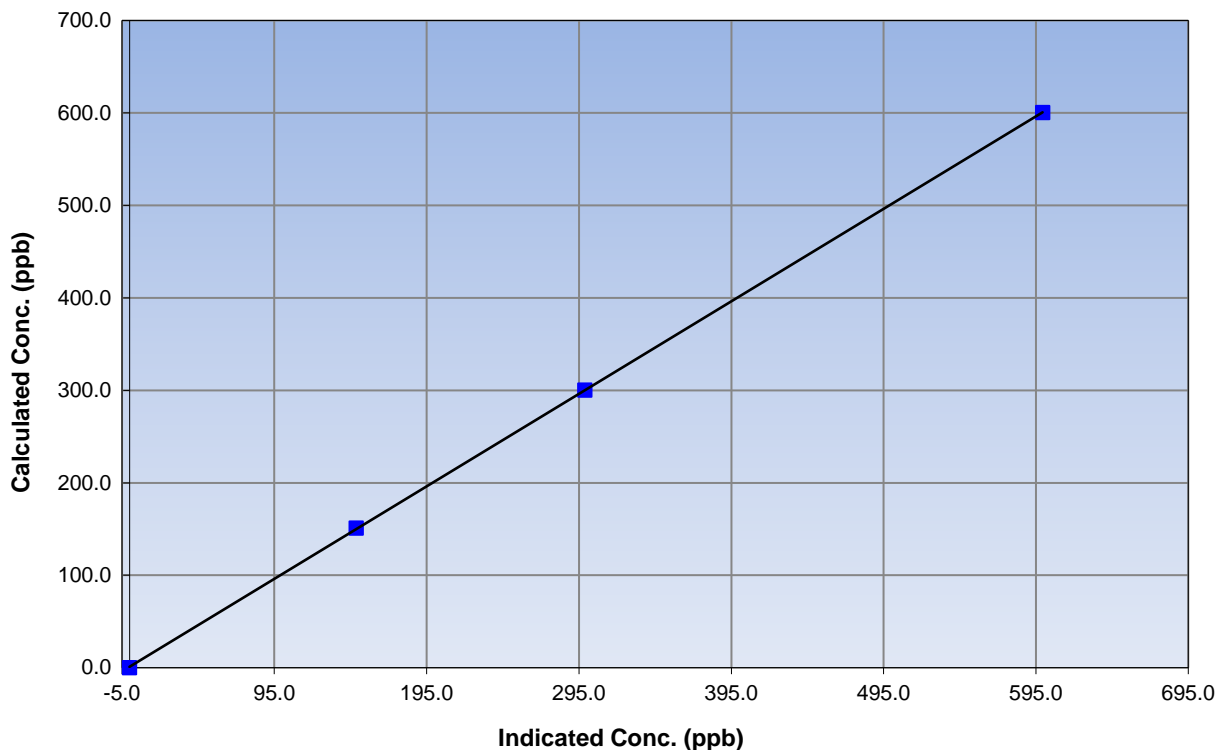
### Station Information

Calibration Date	July 23, 2015	Previous Calibration	June 9, 2015
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	9:20	End Time (MST)	14:25
Analyzer make	API T200	Analyzer serial #	833

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999987
600.4	599.3	1.0017		
300.2	298.9	1.0044	Slope	1.000462
151.1	148.7	1.0161		
			Intercept	1.099697

### NO Calibration Curve







# Wood Buffalo Environmental Association

## NO<sub>2</sub> Calibration Summary

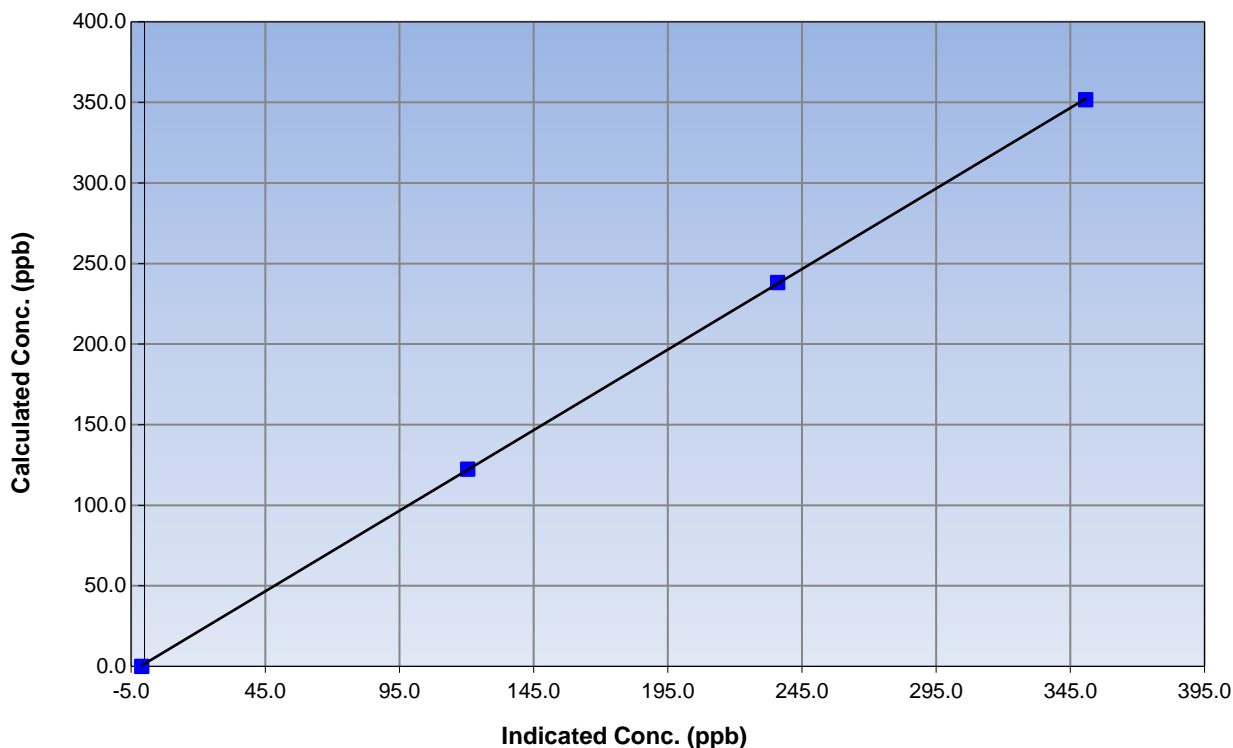
### Station Information

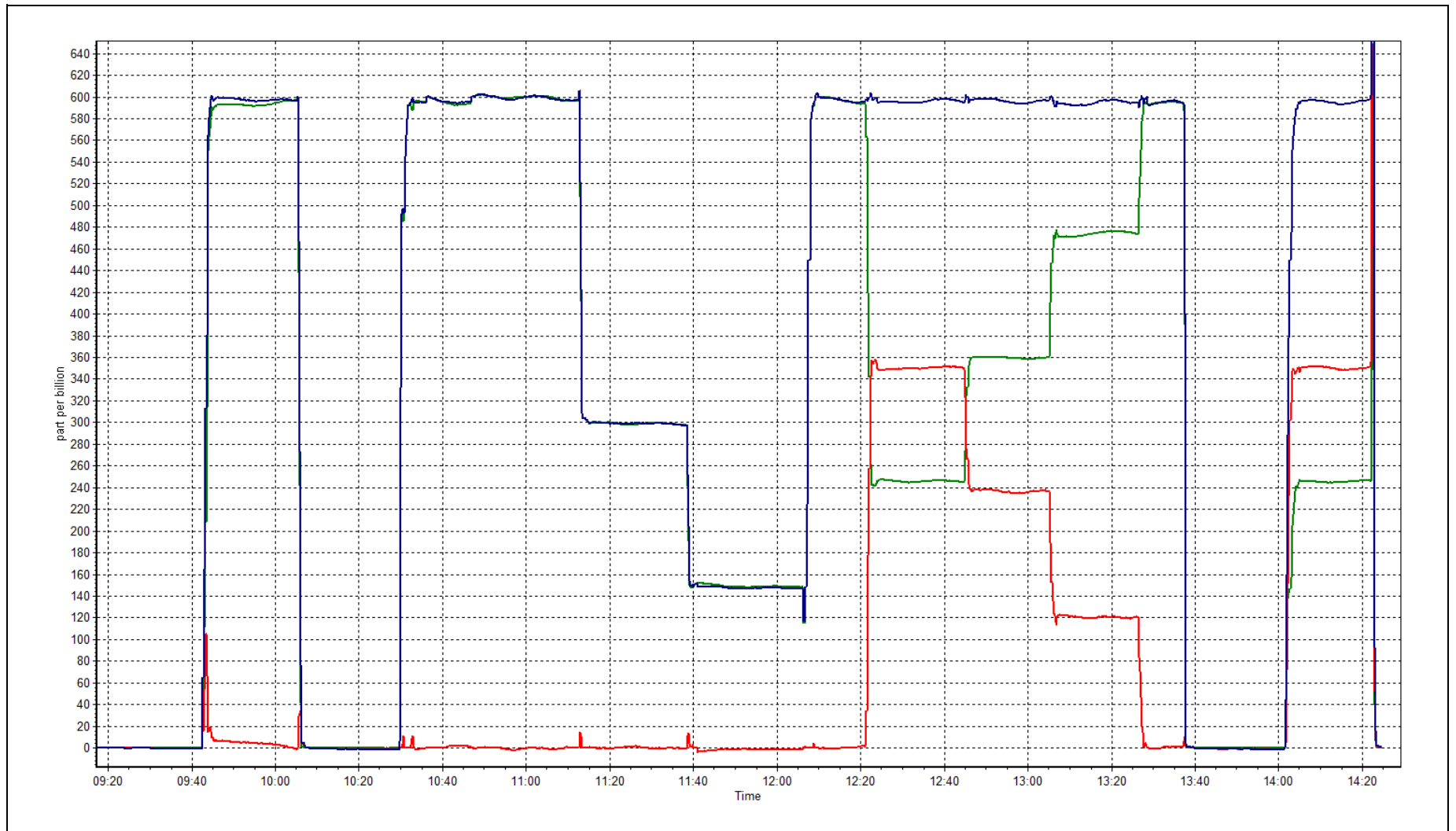
Calibration Date	July 23, 2015	Previous Calibration	June 9, 2015
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	9:20	End Time (MST)	14:25
Analyzer make	API T200	Analyzer serial #	833

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-1.0	N/A	Correlation Coefficient	0.999980
351.7	350.7	1.0027		
238.2	235.9	1.0097	Slope	1.000070
122.4	120.4	1.0168		
			Intercept	1.562714

### NO<sub>2</sub> Calibration Curve







## Wood Buffalo Environmental Association

### SHARP CONFORMANCE TEST

#### STATION INFORMATION

Calibration Date:	<u>July 28, 2015</u>	Previous Calibration:	<u>June 10, 2015</u>
Station Name:	<u>Wapasu</u>	Station Number:	<u>AMS 17</u>
Start Time (MST):	<u>12:00</u>	End Time (MST):	<u>13:15</u>
Calibrator Make/Model:	<u>Delta Cal</u>	Calibrator Serial Number:	<u>1451</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	21.9	23.2	1.3	21.9
T2	25.0	na	na	25.0
T3	24.0	na	na	24.0
T4	27.0	na	na	27.0
RH (%)	33.0	na	na	33.0

##### Pressure (Hpa)

Sensor	Indicated	Measured	Difference (Limit +/- 13.33 hPa)	Final Indicated
P3	948	949.9	1.9	948

##### Main Flow (Lph)

Indicated	Measured	Difference LPH (Limit +/- 7% or 70 Lph)	Final Measured	Final Indicated
999	994	-5	994	999

#### Nephelometer Calibration

Parameter	As Found	adjusted (Limit +/- 2.0ug/m3)	As Left
Analog	197		196
Neph	3.4		-0.9
C14	25.8		24.5
Indicated Concentration (ug/m3)	2.3	yes	-0.7
Offset 1	193.6		197.2
Offset 2	31.8		32

#### Leak Check (Quarterly)

Leak Check Date:	<u>June 10, 2015</u>	Previous Leak Check Date:	
------------------	----------------------	---------------------------	--

	Measured	Difference LPM (Limit +/- 0.42 LPM)
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.

<b>Audit Performed By:</b>	<u>Asad Hidayat</u>
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## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS 19  
SUNCOR FIREBAG  
JULY 2015**

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

August 26, 2015



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FIREBAG (AMS 19)

JULY 2015

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	707	37	37	100.00	12	0	3	0
H2S (ppb) Average	709	35	35	100.00	3	0	1	0
THC (ppm) Average	706	38	38	100.00	3.1	-	2.4	-
NO2 (ppb) Average	705	39	39	100.00	23	0	7	-
NO (ppb) Average	705	39	39	100.00	16	-	2	-
NOX (ppb) Average	705	39	39	100.00	32	-	9	-
Temperature 2 m (C) Average	744	0	0	100.00	28.1	-	21.9	-
Relative Humidity (%) Average	744	0	0	100.00	99	-	87	-
Wind Speed 10 m (km/h) Average	742	0	2	99.73	30	-	21	-
Wind Direction 10 m (deg) Average	742	0	2	99.73	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FIREBAG (AMS 19)  
 JULY 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	707	1	2	-	0	0	0	0	1	3	12
H2S (ppb) Average	709	0.3	0	-	0	0	0	0	0	1	3
THC (ppm) Average	706	2.17	0.1	-	2	2.1	2.1	2.1	2.2	2.4	3.1
NO2 (ppb) Average	705	3	3	-	0	1	1	2	4	6	23
NO (ppb) Average	705	0.6	1	-	0	0	0	0	0	1	16
NOX (ppb) Average	705	3.6	4	-	0	1	1	2	4	8	32
Temperature 2 m (C) Average	744	16.39	4.1	-	4.7	11.3	13.2	16.4	19.5	21.8	28.1
Relative Humidity (%) Average	744	69.5	19	-	28	43	55	71	86	94	99
Wind Speed 10 m (km/h) Average	742	11.7	5	-	1	5	8	11	15	19	30
Wind Direction 10 m (deg) Average	742	-	-	-	-	-	-	-	-	-	-



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FIREBAG (AMS 19)  
JULY 2015

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
Wind Speed, Wind Direction	16 Jul 2015 06:00	16 Jul 2015 06:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	25 Jul 2015 21:00	25 Jul 2015 21:00	1	Flat line in sensor output signal



Summary of Hour Averages

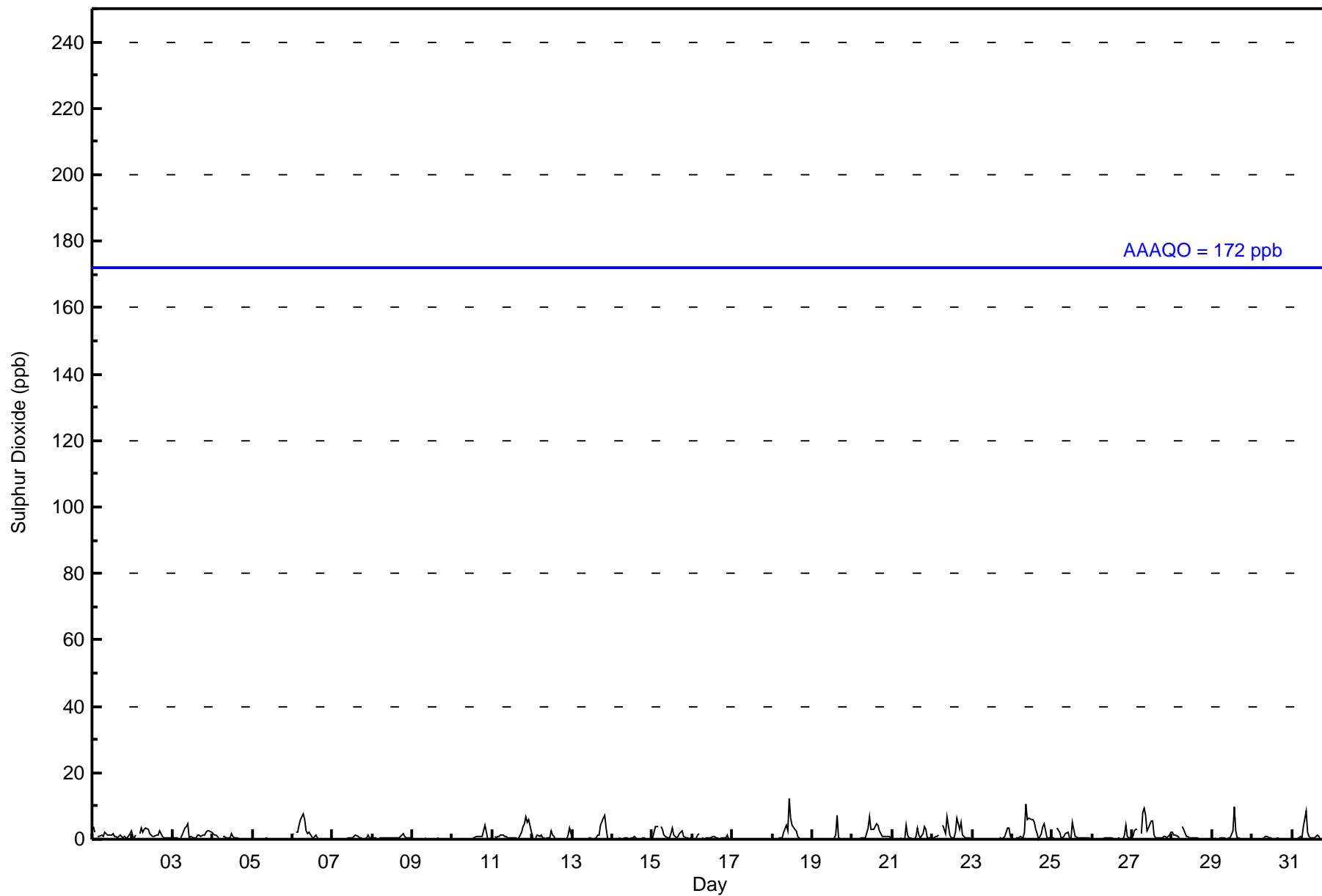
Firebag - July 2015

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 12 ppb on Jul 18 11:00	Maximum Daily Average: 2.7 ppb on Jul 24		Hours of Data:	707
Minimum Value: 0 ppb on Jul 5 14:00	Minimum Daily Average: 0.1 ppb on Jul 5		Hours of Missing Data:	37
Maximum Diurnal Average: 1.8 ppb at hour 9	Minimum Diurnal Average: 0.5 ppb at hour 24		Hours of Calibration:	37
Monthly Average: 1.0 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 O <sub>3</sub> = 1 P <sub>90</sub> = 3 P <sub>99</sub> = 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-Jul	4	2	Z	1	1	1	1	2	2	1	1	1	2	1	1	0	1	1	1	1	0	0	2	2	1.3	4
2-Jul	1	0	1	Z	2	3	2	3	4	3	2	1	1	1	1	1	3	2	1	0	0	0	0	0	1.4	4
3-Jul	0	0	0	0	Z	0	1	3	4	5	0	1	0	0	0	1	1	1	1	1	2	2	2	2	1.4	5
4-Jul	1	1	1	1	0	Z	1	1	1	0	0	2	1	1	0	0	0	0	0	0	0	0	0	0	0.6	2
5-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
6-Jul	2	Z	2	2	4	6	7	6	3	2	2	1	0	1	1	0	0	0	0	0	0	0	0	0	1.7	7
7-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	1	0	0	0.4	1
8-Jul	0	0	0	Z	0	0	0	0	1	0	0	1	0	1	1	0	1	1	2	1	1	0	0	0	0.5	2
9-Jul	0	0	0	0	Z	0	0	0	0	C	C	C	C	C	C	0	0	0	0	0	0	0	0	0	--	0
10-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	1	1	1	1	1	4	2	0	0	0.5	4
11-Jul	Z	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	2	4	5	7	5	6	2	1.7	7
12-Jul	1	Z	1	1	1	1	0	0	0	0	0	3	1	1	0	0	0	0	0	0	0	1	3	2	0.8	3
13-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	4	6	7	3	0	0	0	1.2	7
14-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0	0	0	0	0	0.3	1
15-Jul	0	2	4	4	Z	4	3	1	1	0	0	2	3	1	0	1	2	2	3	1	0	0	0	0	1.5	4
16-Jul	0	0	0	1	2	Z	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0.4	2
17-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
18-Jul	0	Z	0	0	0	1	0	2	4	3	12	6	4	3	3	1	0	0	0	0	0	0	0	0	1.8	12
19-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	7	0	0	0	0	0	0	0	0	0.5	7
20-Jul	0	0	0	Z	0	0	0	0	0	4	7	3	3	3	4	4	3	2	1	1	1	1	1	0	1.7	7
21-Jul	0	0	0	0	Z	0	0	0	4	1	0	0	0	0	1	4	1	0	2	4	3	1	0	0	1.0	4
22-Jul	0	0	1	1	1	Z	4	3	2	7	1	1	0	0	2	6	3	5	1	1	0	1	0	0	1.8	7
23-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	3	3	1	0.5	3
24-Jul	0	Z	0	0	1	1	0	2	11	6	7	6	6	5	3	2	0	2	4	5	2	0	0	0	2.7	11
25-Jul	0	0	Z	4	2	0	0	1	2	2	1	0	5	3	1	0	1	0	0	0	0	0	0	0	1.1	5
26-Jul	0	0	0	Z	0	0	0	0	0	1	1	0	0	0	0	0	1	0	0	1	4	1	0	0	0.5	4
27-Jul	1	3	3	3	Z	2	8	10	7	3	4	5	5	1	0	0	0	0	0	1	1	0	1	2	2.6	10
28-Jul	2	1	1	1	1	Z	4	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	4
29-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	2	10	3	0	0	0	0	0	0	0	0	0	0.8	10
30-Jul	0	Z	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
31-Jul	0	0	Z	0	0	1	1	4	9	2	1	1	0	0	1	1	1	0	0	0	0	0	0	0	1.0	9

0.6	0.5	0.7	0.8	0.7	0.9	1.2	1.5	1.8	1.4	1.4	1.2	1.3	1.2	1.0	1.2	0.7	0.8	0.9	1.2	1.0	0.7	0.7	0.5	Diurnal Average	
4	3	4	4	4	6	8	10	11	7	12	6	6	10	4	7	3	5	6	7	7	5	6	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 (SO<sub>2</sub>) - ppb**  
**Firebag - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	705	99.72	99.72
11 - 20	2	0.28	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Firebag - July 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	48	36	14	8	8	26	23	15	47	64	87	85	71	60	64	48	704
11 - 20	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	48	36	14	8	8	26	23	15	47	64	87	87	71	60	64	48	706

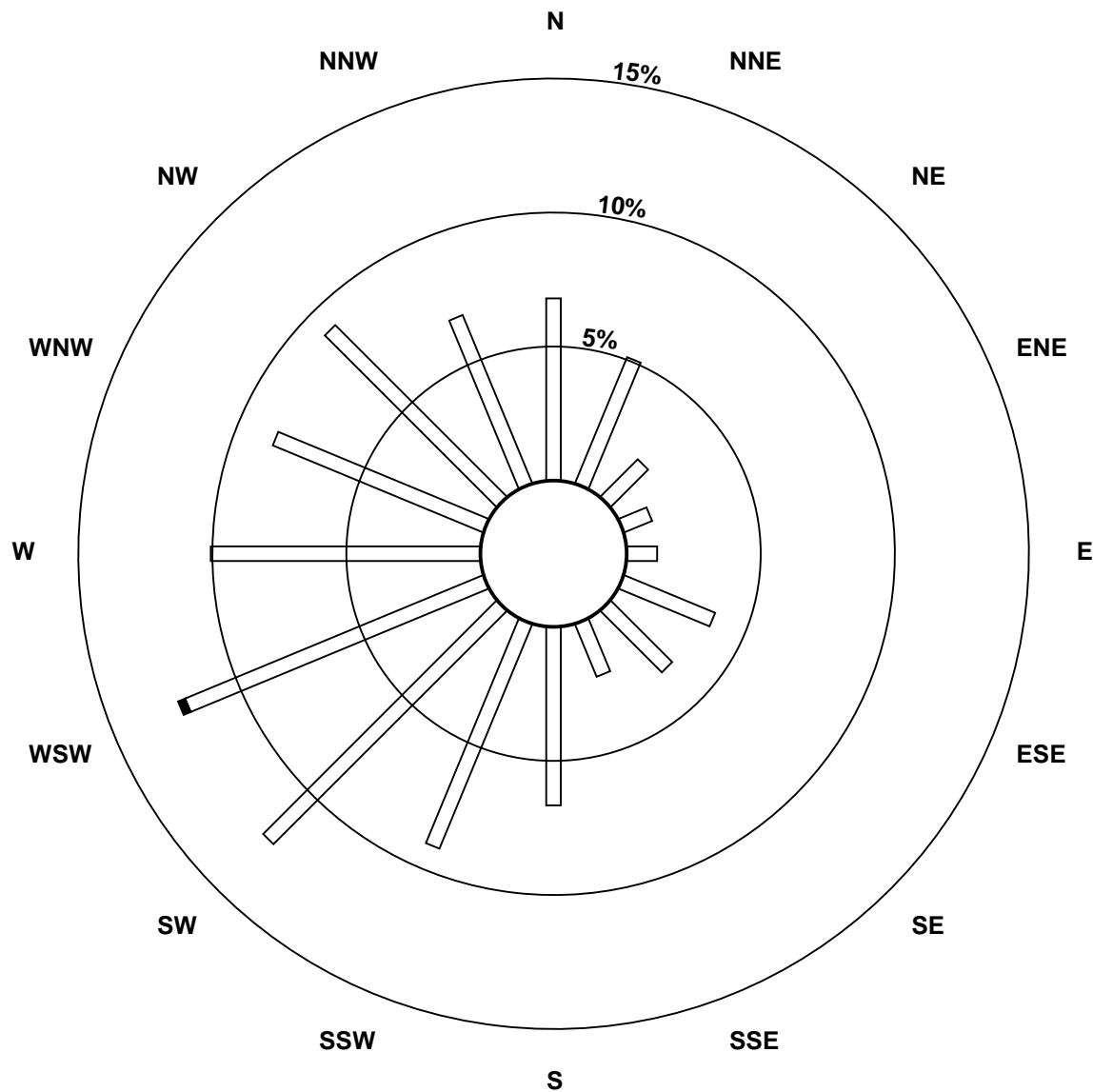
Total Number of Valid Hours: 706

Total Number of Hours: 744

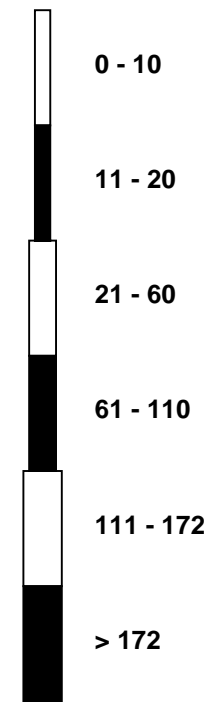


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

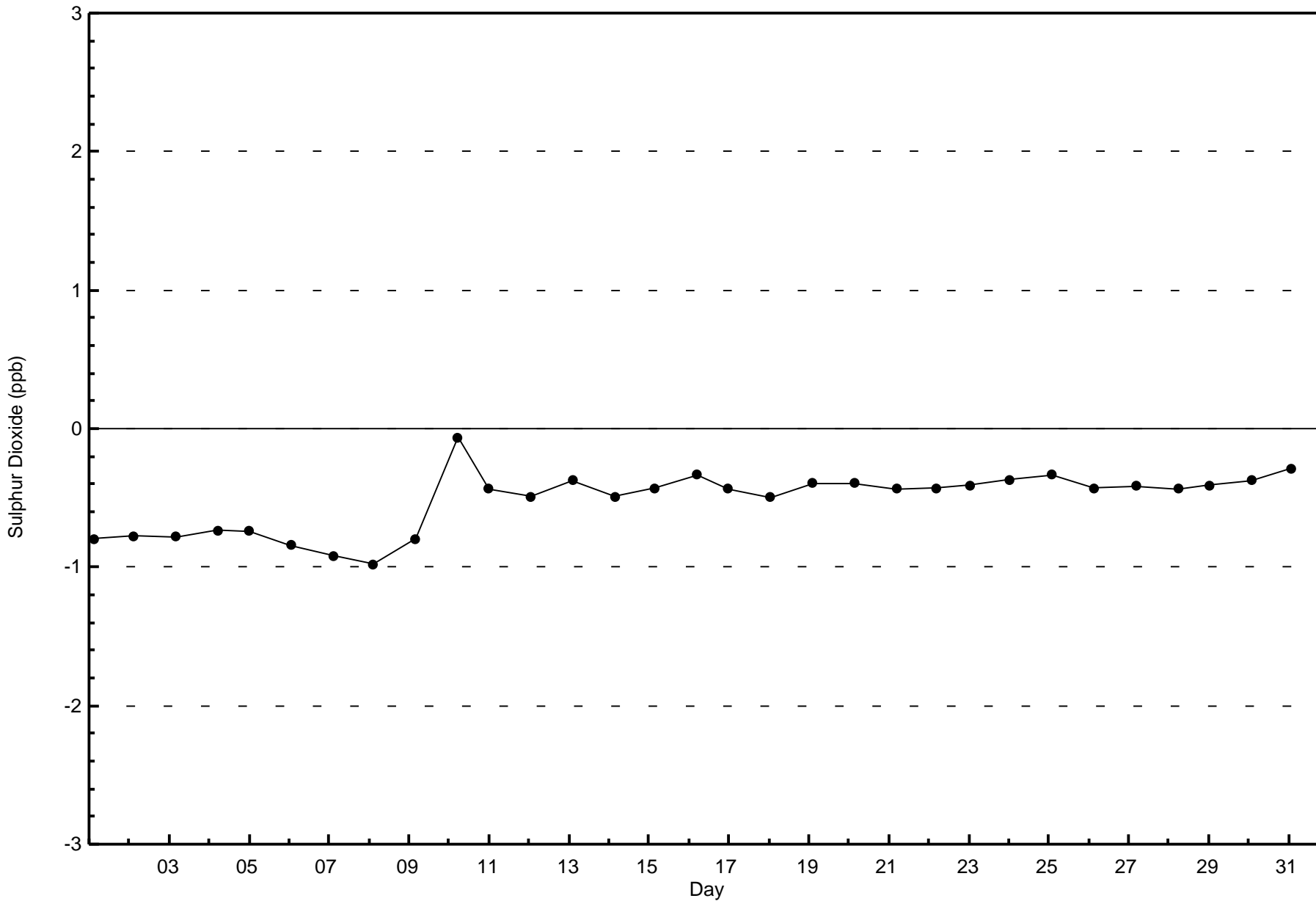
Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Firebag (AMS 19)

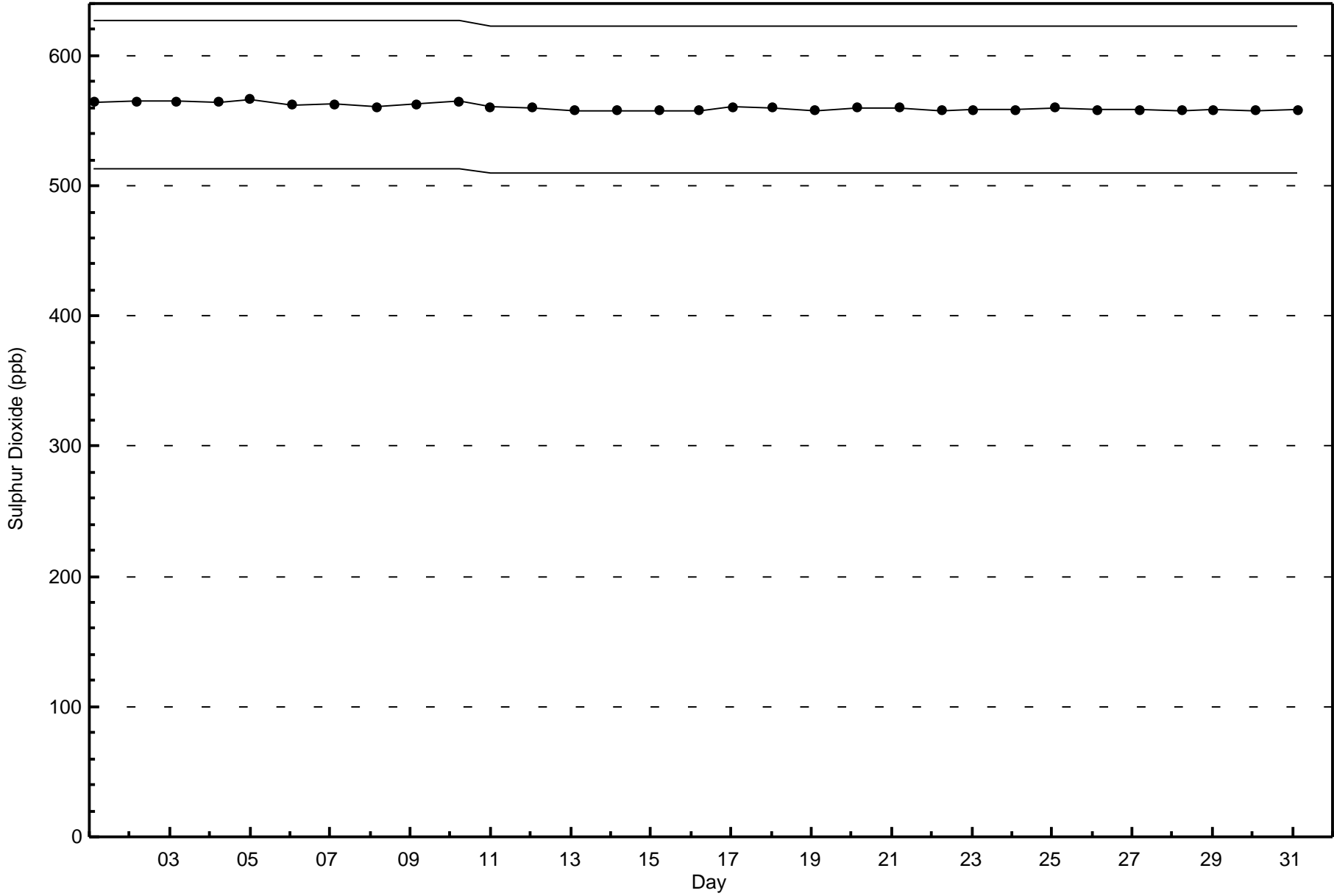


Classes (ppb)



Total Number of Valid Hours: 706

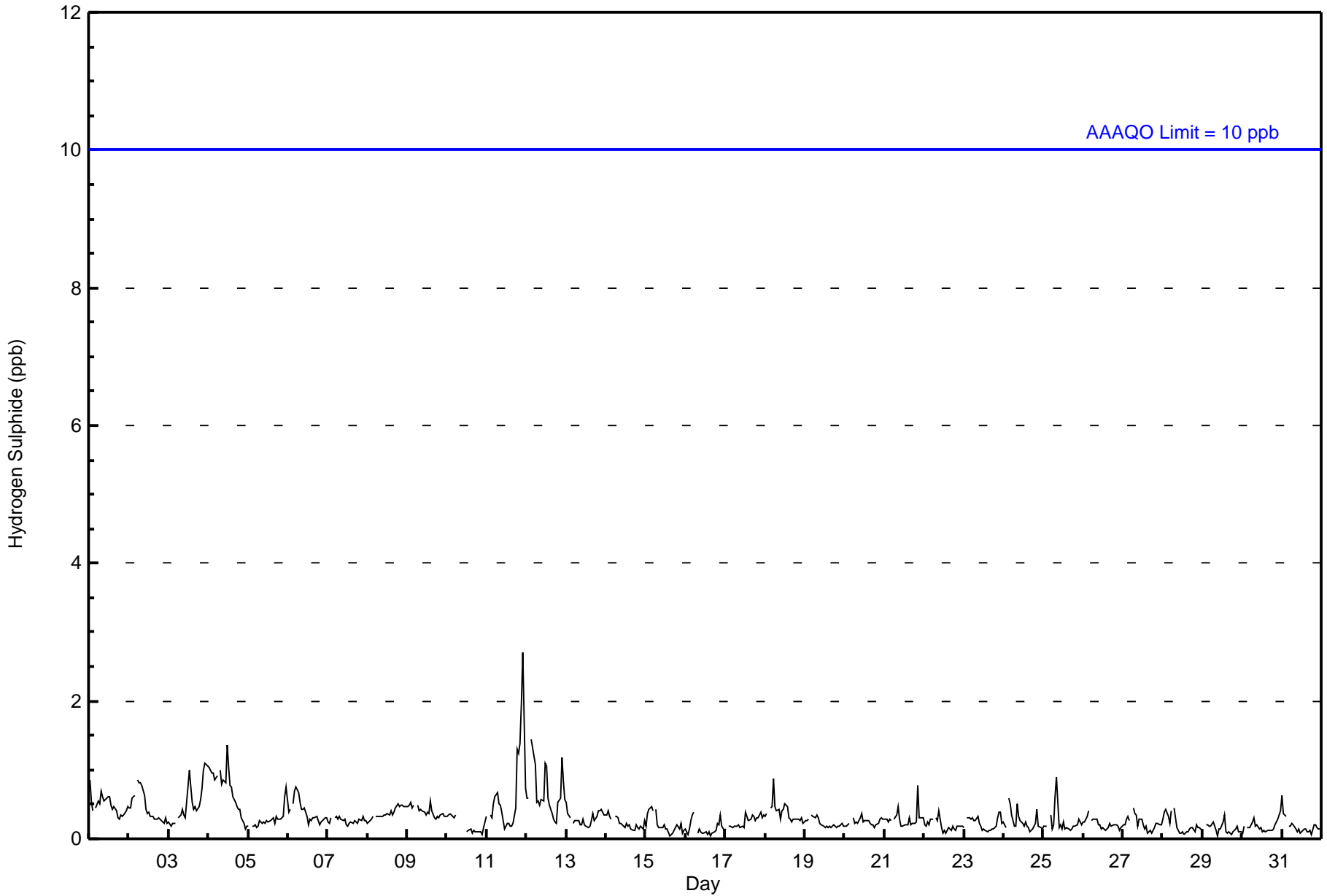








Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																
Maximum Value: 3 ppb on Jul 11 23:00										Maximum Daily Average: 0.7 ppb on Jul 4										Hours of Data: 709						
Minimum Value: 0 ppb on Jul 29 10:00										Minimum Daily Average: 0.1 ppb on Jul 29										Hours of Missing Data: 35						
Maximum Diurnal Average: 0.4 ppb at hour 6										Minimum Diurnal Average: 0.2 ppb at hour 17										Hours of Calibration: 35						
Monthly Average: 0.3 ppb										Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 1 P <sub>99</sub> = 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-Jul	1	1	0	Z	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1
2-Jul	0	0	1	1	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
3-Jul	0	0	0	0	0	Z	0	0	0	0	1	1	1	1	0	0	0	0	0	1	1	1	1	1	0.5	1
4-Jul	1	1	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0.7	1
5-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.3	1
6-Jul	0	0	Z	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
7-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
8-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.4	1
9-Jul	0	0	1	0	0	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.4	1
10-Jul	0	0	0	0	0	0	Z	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
11-Jul	0	Z	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	1	1	2	3	1	0.7	3
12-Jul	1	1	Z	1	1	1	1	1	0	1	1	1	1	1	0	0	0	0	0	1	1	1	1	1	0.7	1
13-Jul	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
14-Jul	0	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-Jul	0	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-Jul	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-Jul	0	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-Jul	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
19-Jul	0	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-Jul	0	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-Jul	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
22-Jul	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-Jul	0	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-Jul	0	0	Z	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
25-Jul	0	0	0	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
26-Jul	0	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-Jul	0	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-Jul	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-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
30-Jul	0	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
31-Jul	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
0.3 0.3 0.3 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.3 0.3 0.3 0.3 0.3 0.2 0.2 0.2 0.2 0.3 0.3 0.3 0.4 0.4 0.3																								Diurnal Average		
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 2 3 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**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Firebag - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	708	99.86	99.86
3 - 4	1	0.14	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



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

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Firebag - July 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	46	34	15	8	8	26	21	15	51	65	87	86	71	58	64	51	706
3 - 4	0	0	0	0	0	1	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
<b>Totals</b>	46	34	15	8	8	27	21	15	51	65	87	86	71	58	64	51	707

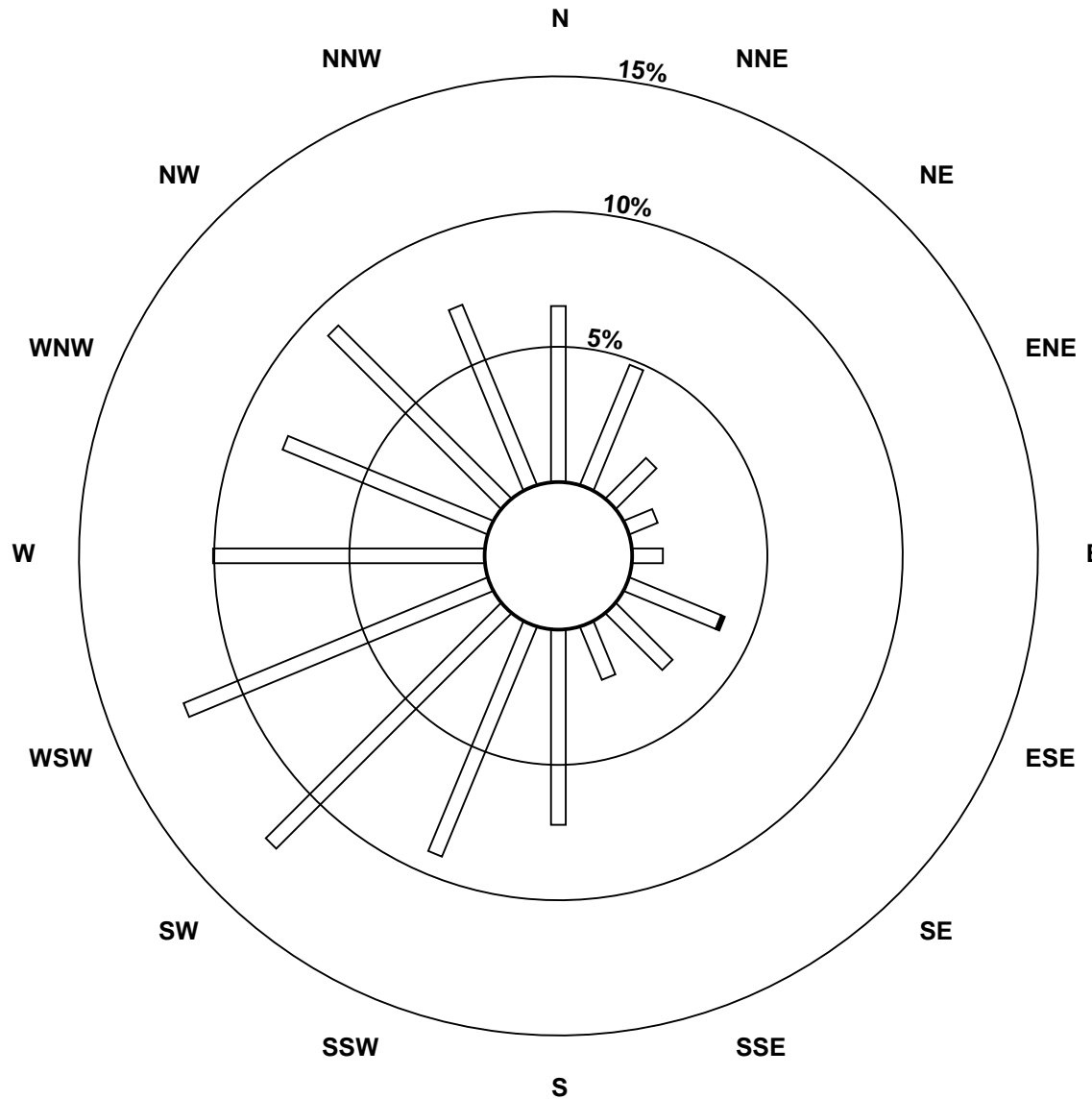
Total Number of Valid Hours: 707

Total Number of Hours: 744

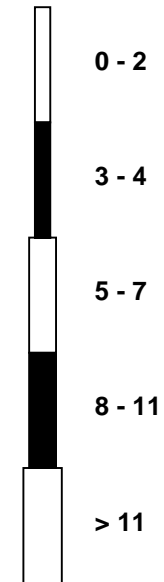


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

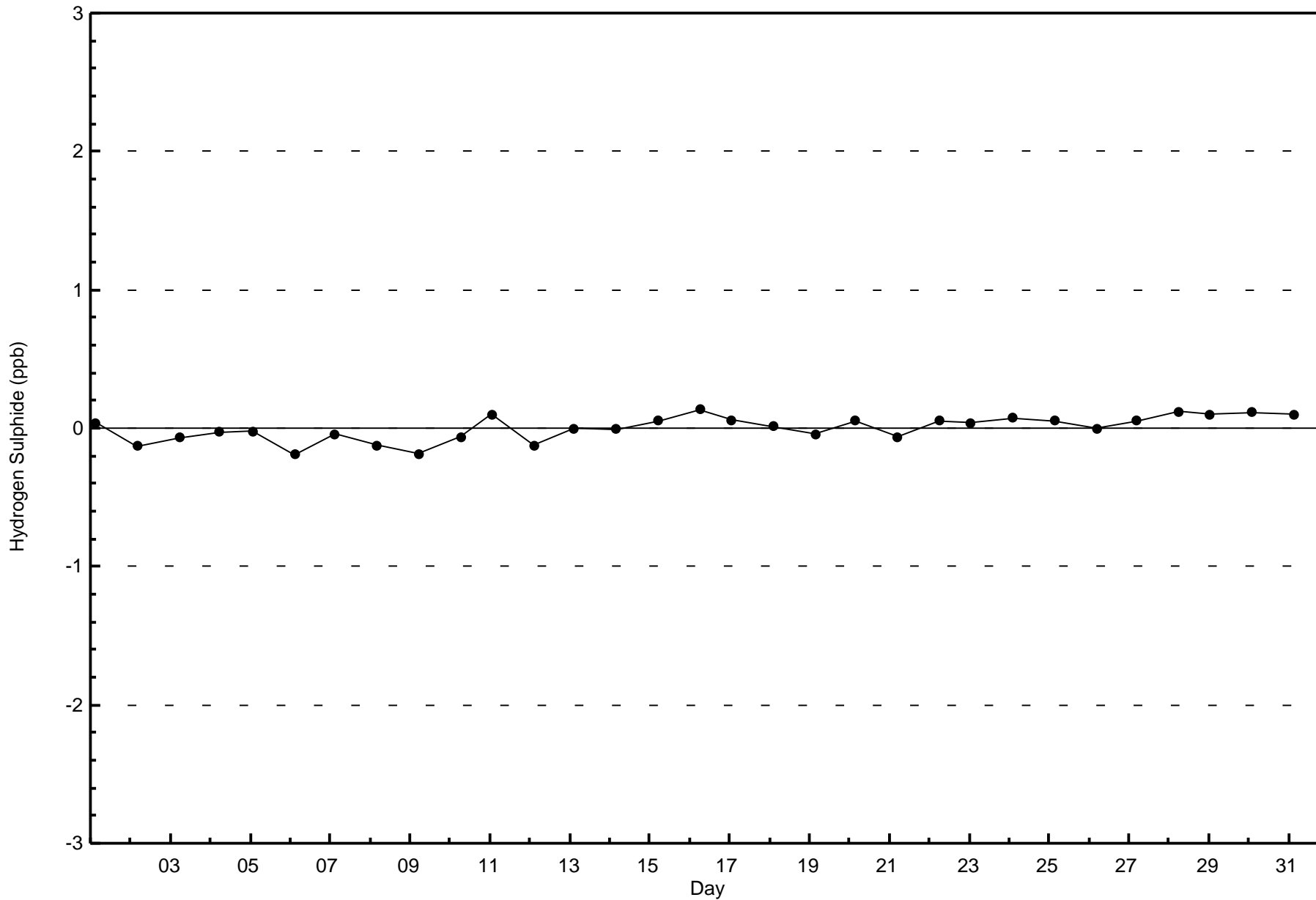
Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Firebag (AMS 19)

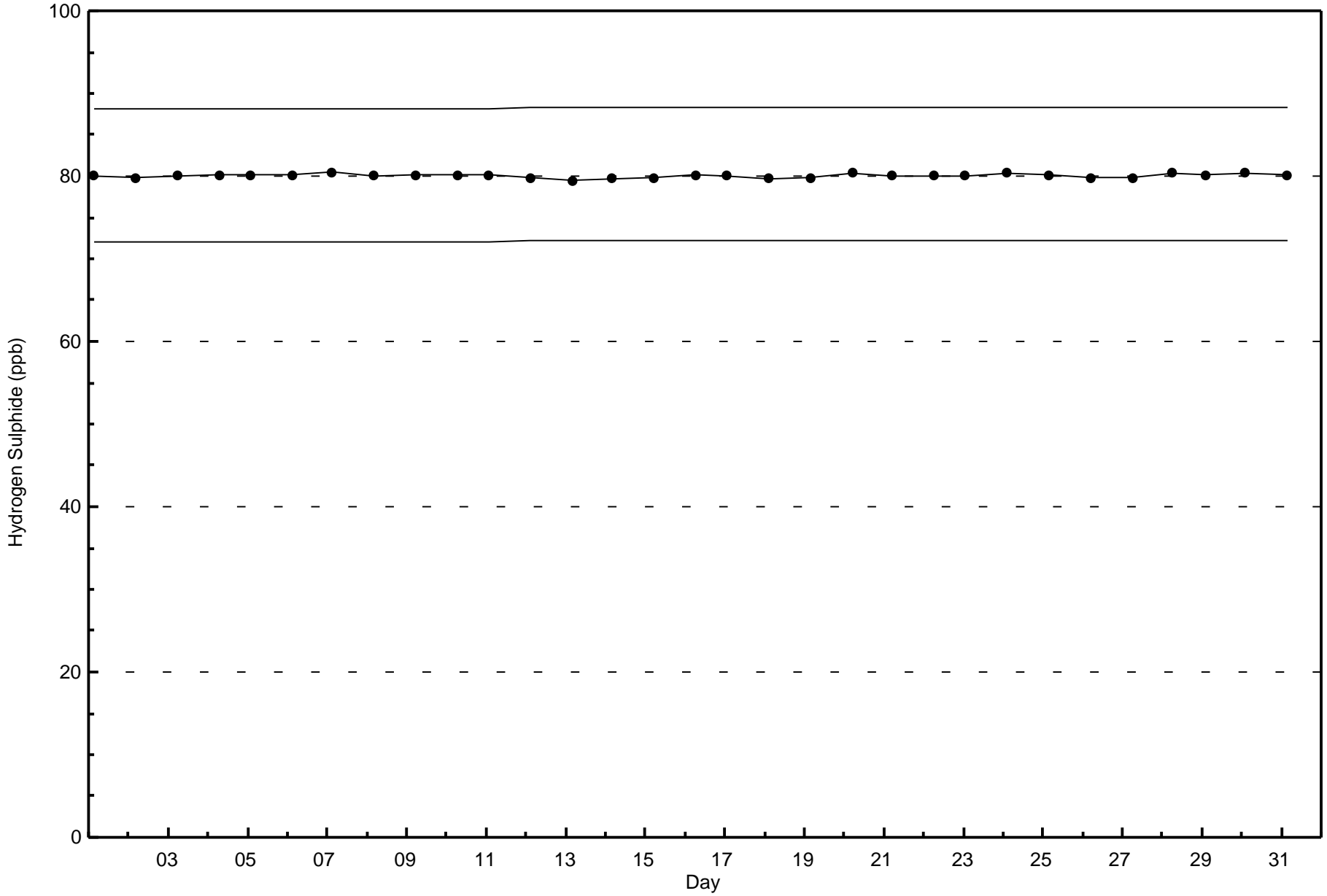


Classes (ppb)



Total Number of Valid Hours: 707

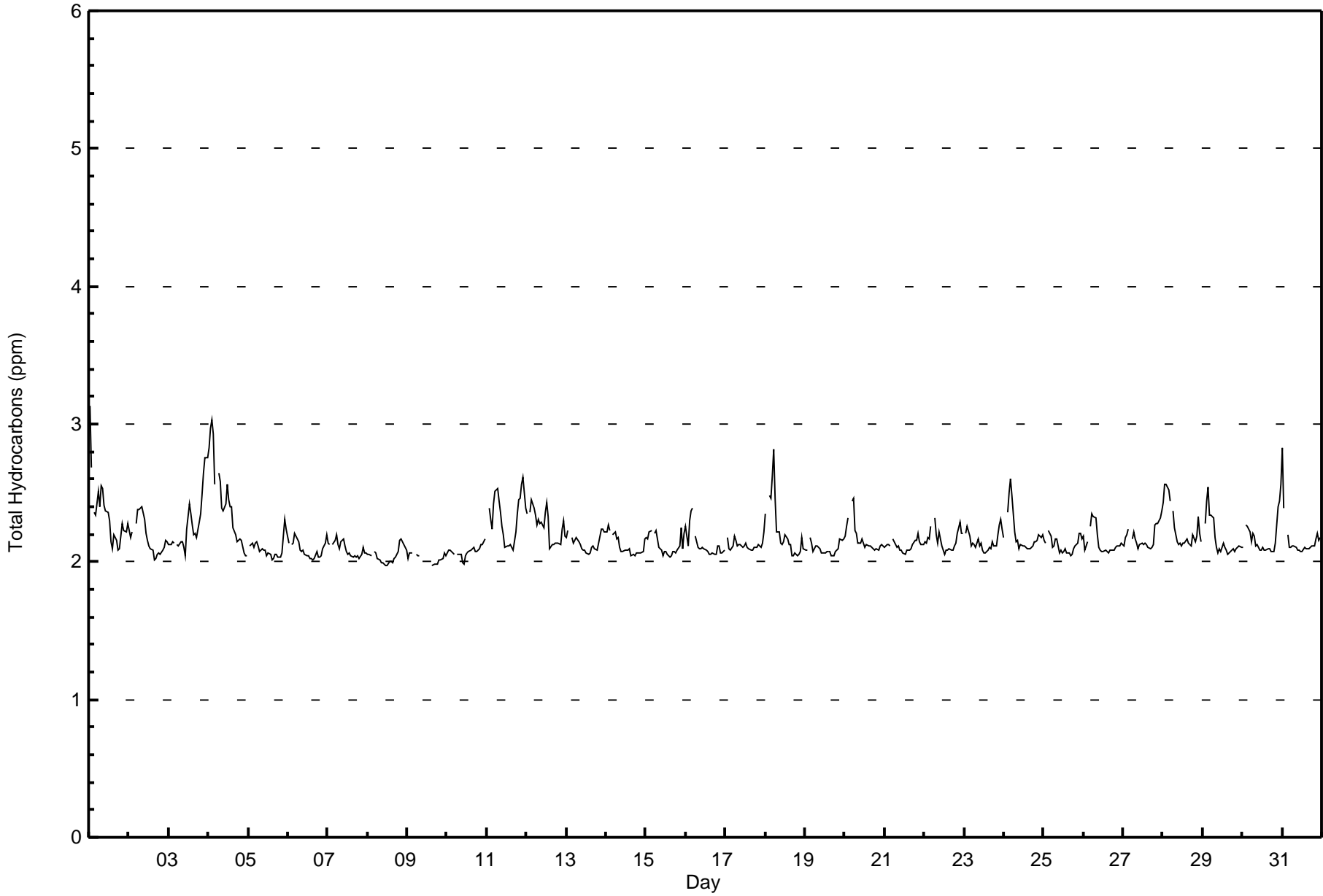






Maximum Value: 3.1 ppm on Jul 1 01:00																	Maximum Daily Average: 2.4 ppm on Jul 4																	Hours in Service: 744	
Minimum Value: 2.0 ppm on Jul 8 12:00																	Minimum Daily Average: 2.0 ppm on Jul 8																	Hours of Data: 706	
Maximum Diurnal Average: 2.3 ppm at hour 5																	Minimum Diurnal Average: 2.1 ppm at hour 17																	Hours of Missing Data: 38	
Monthly Average: 2.17 ppm																	Percentiles: P <sub>1</sub> = 2.0 P <sub>10</sub> = 2.1 Q <sub>1</sub> = 2.1 Median = 2.1 Q <sub>3</sub> = 2.2 P <sub>90</sub> = 2.4 P <sub>99</sub> = 2.8																	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-Jul	3.1	2.7	Z	2.4	2.3	2.5	2.4	2.6	2.5	2.4	2.4	2.4	2.3	2.1	2.1	2.2	2.2	2.1	2.1	2.2	2.3	2.2	2.2	2.3	2.3	3.1									
2-Jul	2.2	2.2	2.2	Z	2.3	2.4	2.4	2.4	2.4	2.3	2.2	2.2	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.4									
3-Jul	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.0	2.2	2.4	2.3	2.3	2.2	2.2	2.2	2.3	2.3	2.5	2.6	2.8	2.8	2.3	2.8									
4-Jul	2.8	3.0	3.0	2.9	2.6	Z	2.6	2.6	2.4	2.4	2.4	2.6	2.4	2.4	2.4	2.2	2.2	2.1	2.2	2.2	2.2	2.1	2.0	2.0	2.4	3.0									
5-Jul	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.0	2.0	2.1	2.1	2.0	2.0	2.1	2.2	2.3	2.2	2.1	2.3									
6-Jul	2.1	Z	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.1	2.1	2.2	2.1	2.2									
7-Jul	2.1	2.1	Z	2.1	2.2	2.2	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.2									
8-Jul	2.1	2.1	2.0	Z	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.2	2.1	2.1	2.1	2.0	2.2									
9-Jul	2.0	2.1	2.1	2.1	Z	2.0	2.0	2.0	C	C	C	C	C	C	C	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	--	2.1									
10-Jul	2.1	2.1	2.1	2.1	2.1	Z	2.0	2.1	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2									
11-Jul	Z	2.4	2.3	2.2	2.4	2.5	2.5	2.4	2.4	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.4	2.4	2.5	2.6	2.6	2.4	2.3	2.6									
12-Jul	2.4	Z	2.4	2.5	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.2	2.3	2.5									
13-Jul	2.2	2.2	Z	2.2	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.1	2.2									
14-Jul	2.2	2.3	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.0	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.3									
15-Jul	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.1	2.1	2.0	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.1	2.2									
16-Jul	2.3	2.1	2.3	2.4	2.4	Z	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.4									
17-Jul	Z	2.2	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2									
18-Jul	2.4	Z	2.5	2.5	2.6	2.8	2.5	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.0	2.0	2.1	2.0	2.1	2.1	2.2	2.1	2.2	2.8									
19-Jul	2.1	2.1	Z	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.2									
20-Jul	2.2	2.3	2.3	Z	2.4	2.5	2.2	2.2	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.5									
21-Jul	2.1	2.1	2.1	2.1	Z	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.2									
22-Jul	2.2	2.1	2.2	2.2	2.3	Z	2.3	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.2	2.2	2.2	2.3									
23-Jul	Z	2.2	2.3	2.2	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.3	2.2	2.1	2.3									
24-Jul	2.2	Z	2.4	2.5	2.6	2.5	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.6									
25-Jul	2.2	2.1	Z	2.2	2.2	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.2									
26-Jul	2.2	2.1	2.1	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	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3									
27-Jul	2.1	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.3	2.3	2.3	2.4	2.2	2.4									
28-Jul	2.4	2.6	2.6	2.5	2.4	Z	2.4	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.2	2.1	2.2	2.3	2.2	2.1	2.2	2.6									
29-Jul	Z	2.3	2.4	2.5	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	2.1	2.2	2.5									
30-Jul	2.1	Z	2.3	2.3	2.2	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.4	2.4	2.6	2.2	2.6									
31-Jul	2.8	2.4	Z	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.8									
																								Diurnal Average											
																								Diurnal Maximum											
2.3 2.2 2.3 2.3 2.3 2.3 2.2 2.2 2.2 2.1 2.1 2.1 2.1 2.1 2.1 2.1 2.1 2.1 2.1 2.1 2.1 2.2 2.2 2.2 2.2																								2.2											
																								3.1 3.0 3.0 2.9 2.6 2.8 2.6 2.6 2.5 2.4 2.4 2.6 2.4 2.4 2.4 2.2 2.2 2.2 2.4 2.4 2.5 2.6 2.8 2.8		2.8									
Z - zerospan C - Calibration																																			







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

**Total Hydrocarbons (THC) - ppm**  
**Firebag - July 2015**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	65	9.21	9.21
2.1 - 3.0	640	90.65	99.86
3.1 - 10.0	1	0.14	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 706

Total Number of Hours: 744



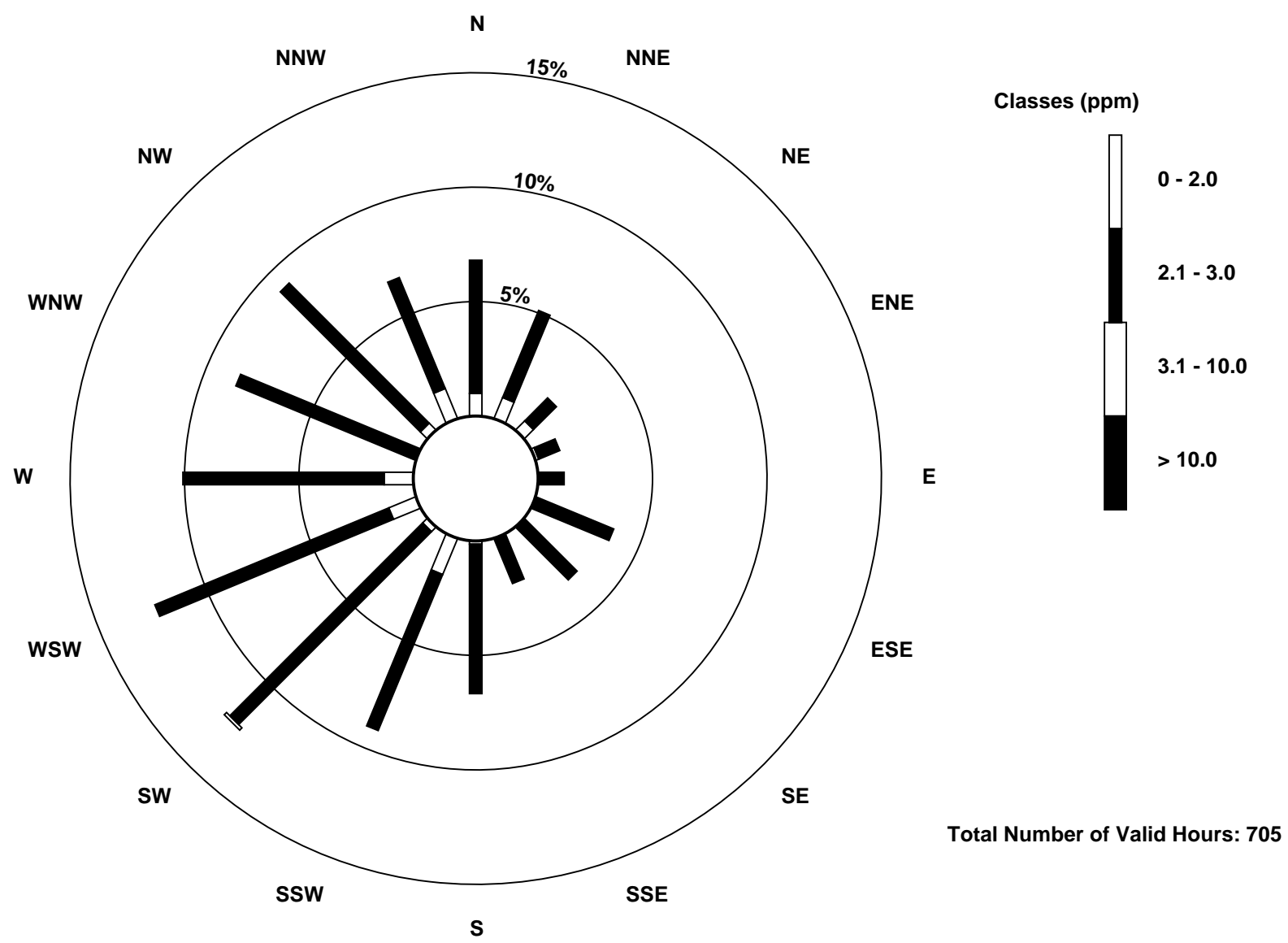
**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Firebag - July 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	7	4	1	0	0	0	0	1	12	2	9	9	0	3	10	65
2.1 - 3.0	41	29	10	7	8	26	23	15	46	52	84	78	62	60	61	37	639
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	48	36	14	8	8	26	23	15	47	64	87	87	71	60	64	47	705

Total Number of Valid Hours: 705

Total Number of Hours: 744



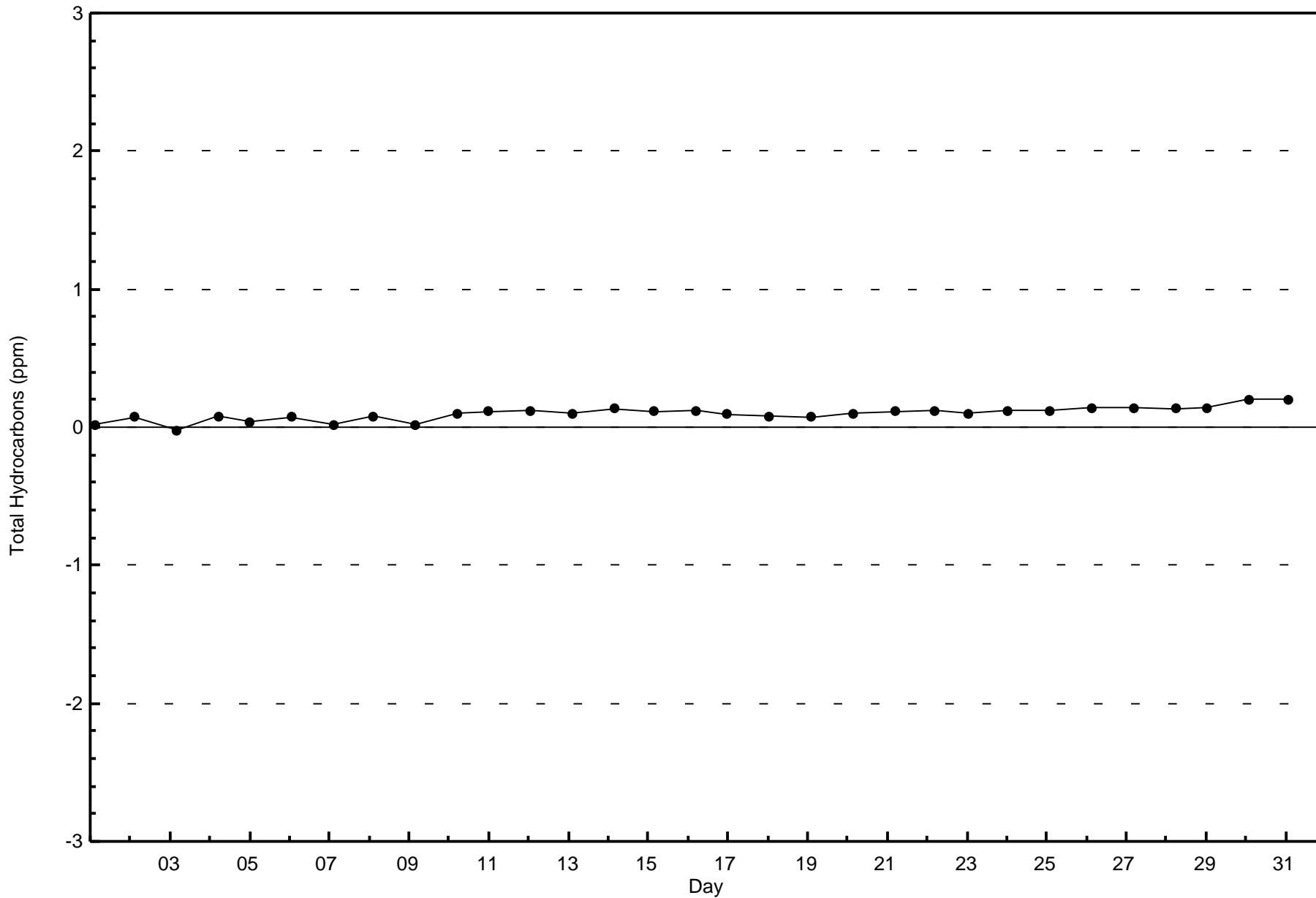


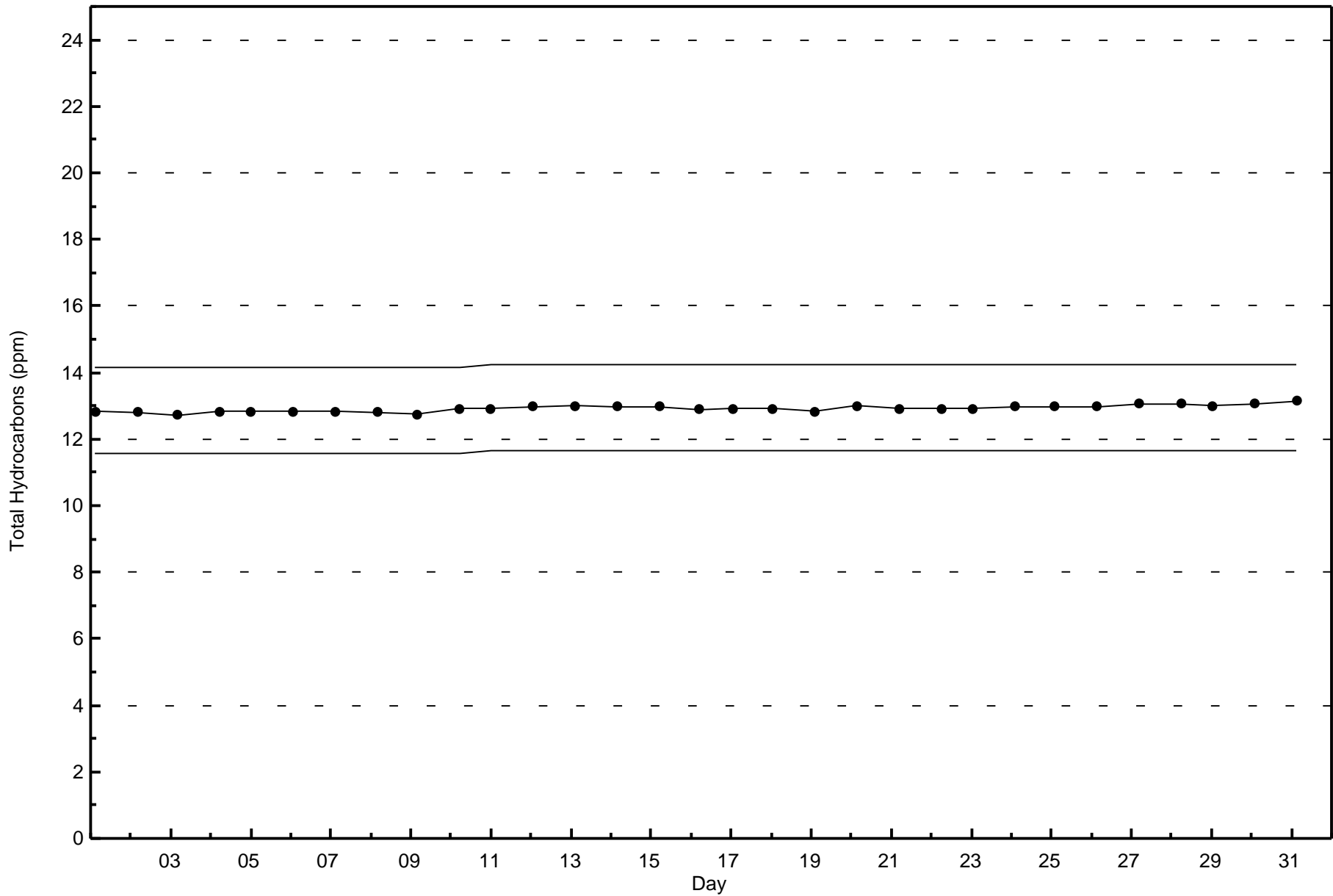
Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Firebag - July 2015







Maximum Value: 16 ppb on Jul 28 03:00																		Maximum Daily Average: 1.7 ppb on Jul 11																		Hours in Service: 744			
Minimum Value: 0 ppb on Jul 9 23:00																		Minimum Daily Average: 0.1 ppb on Jul 17																		Hours of Data: 705			
Maximum Diurnal Average: 1.7 ppb at hour 6																		Minimum Diurnal Average: 0.2 ppb at hour 2																		Hours of Missing Data: 39			
Monthly Average: 0.6 ppb																		Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 O <sub>3</sub> = 0 P <sub>90</sub> = 1 P <sub>99</sub> = 6																		Hours of Calibration: 39			
																																				Percent Operational Time: 100.0			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24															
1-Jul	0	0	Z	0	0	1	1	1	1	1	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0.4	1													
2-Jul	0	0	0	Z	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1													
3-Jul	0	0	0	0	Z	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1													
4-Jul	0	0	0	0	0	Z	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1													
5-Jul	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1													
6-Jul	0	Z	0	0	0	2	2	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2													
7-Jul	0	0	Z	0	1	2	1	0	1	2	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0.5	2													
8-Jul	0	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1													
9-Jul	0	0	0	0	Z	0	0	0	C	C	C	C	C	C	C	C	0	0	0	0	0	0	0	0	--	0													
10-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	1	2	1	1	0	0	0	0	0	0	0	0.3	2													
11-Jul	Z	0	7	5	3	9	7	0	0	1	0	0	1	1	1	2	1	0	0	0	0	0	0	0	1.7	9													
12-Jul	0	Z	1	0	1	4	5	8	2	1	1	1	0	1	1	0	0	0	1	1	1	0	0	0	1.4	8													
13-Jul	0	1	Z	1	0	6	3	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0.7	6													
14-Jul	0	0	0	Z	9	0	0	4	1	1	1	0	1	0	0	0	0	0	2	1	0	0	1	5	1.2	9													
15-Jul	2	0	0	0	Z	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2													
16-Jul	0	0	0	0	4	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.4	4													
17-Jul	Z	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-Jul	0	Z	1	1	2	6	3	2	2	1	2	2	2	2	1	0	0	0	0	0	0	0	0	0	1.3	6													
19-Jul	0	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-Jul	0	0	0	Z	0	1	1	1	1	2	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0.7	3													
21-Jul	0	0	0	4	Z	3	1	0	0	0	0	0	1	2	0	1	0	0	0	0	0	0	1	4	0.9	4													
22-Jul	0	0	0	0	3	Z	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	3													
23-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0													
24-Jul	0	Z	0	1	5	3	1	1	4	2	1	1	1	1	0	0	0	0	0	0	1	1	0	0	1.1	5													
25-Jul	0	0	Z	0	0	0	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.4	3													
26-Jul	0	1	2	Z	0	0	3	1	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0.6	3													
27-Jul	0	0	0	0	Z	0	3	3	2	1	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0.7	3													
28-Jul	0	0	16	6	0	Z	3	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1.4	16													
29-Jul	Z	0	1	0	0	1	2	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0.4	2													
30-Jul	0	Z	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.4	1													
31-Jul	0	0	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1													
																								Diurnal Average															
																								Diurnal Maximum															
0.2 0.2 1.2 0.8 1.2 1.7 1.5 1.3 1.0 0.7 0.6 0.5 0.4 0.4 0.4 0.3 0.3 0.2 0.3 0.2 0.2 0.2 0.2 0.5																																							
2 1 16 6 9 9 7 8 4 2 3 2 2 2 2 2 1 1 2 1 1 1 1 5																																							
Z - zerospan C - Calibration																																							

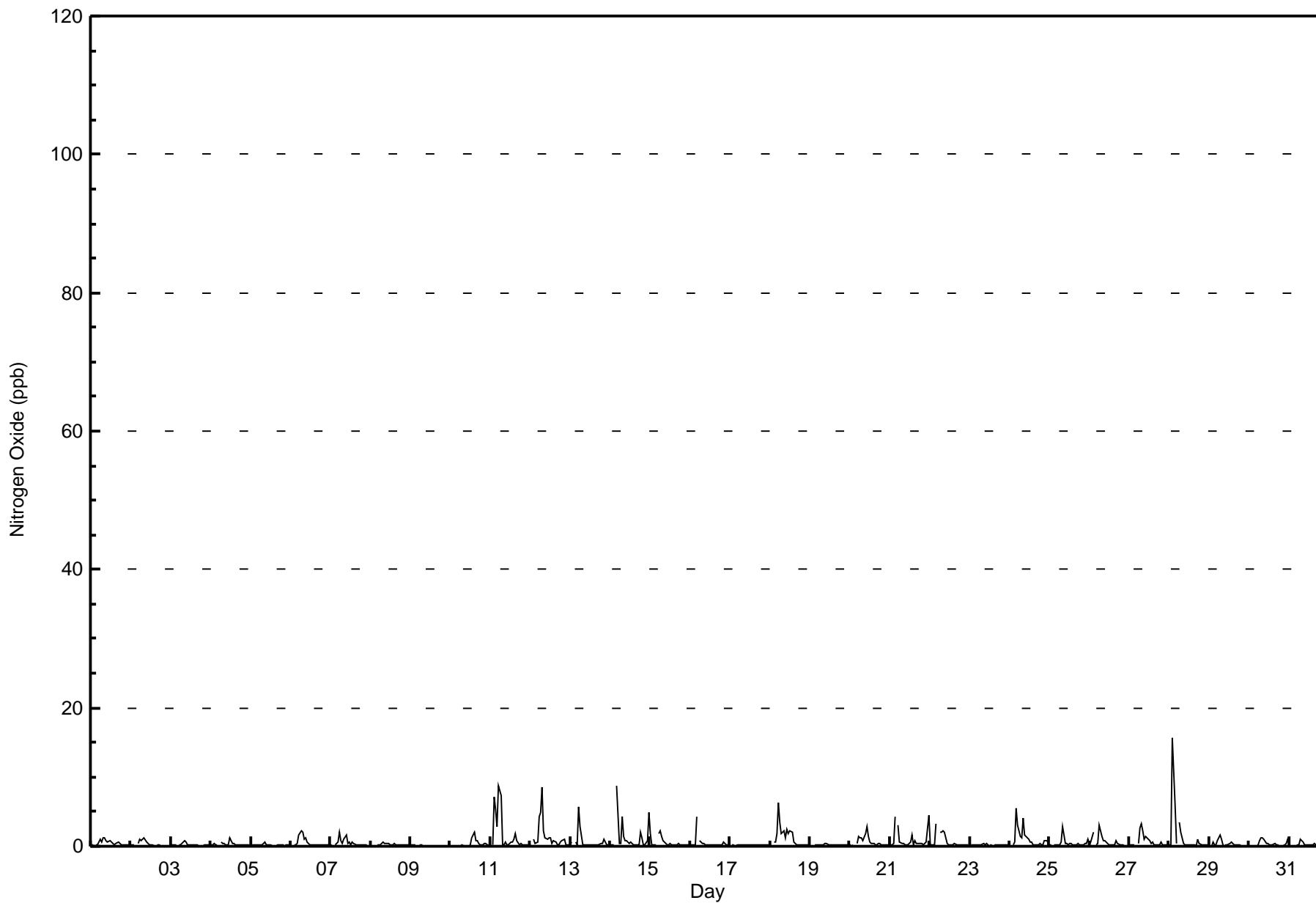


Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Oxide (NO) - ppb

Firebag - July 2015







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

**Nitrogen Oxide (NO) - ppb**  
**Firebag - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	705	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 705

Total Number of Hours: 744



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

**Nitrogen Oxide (NO) - ppb**  
**Firebag - July 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	48	36	14	7	8	26	23	15	47	64	87	87	71	60	64	47	704
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	48	36	14	7	8	26	23	15	47	64	87	87	71	60	64	47	704

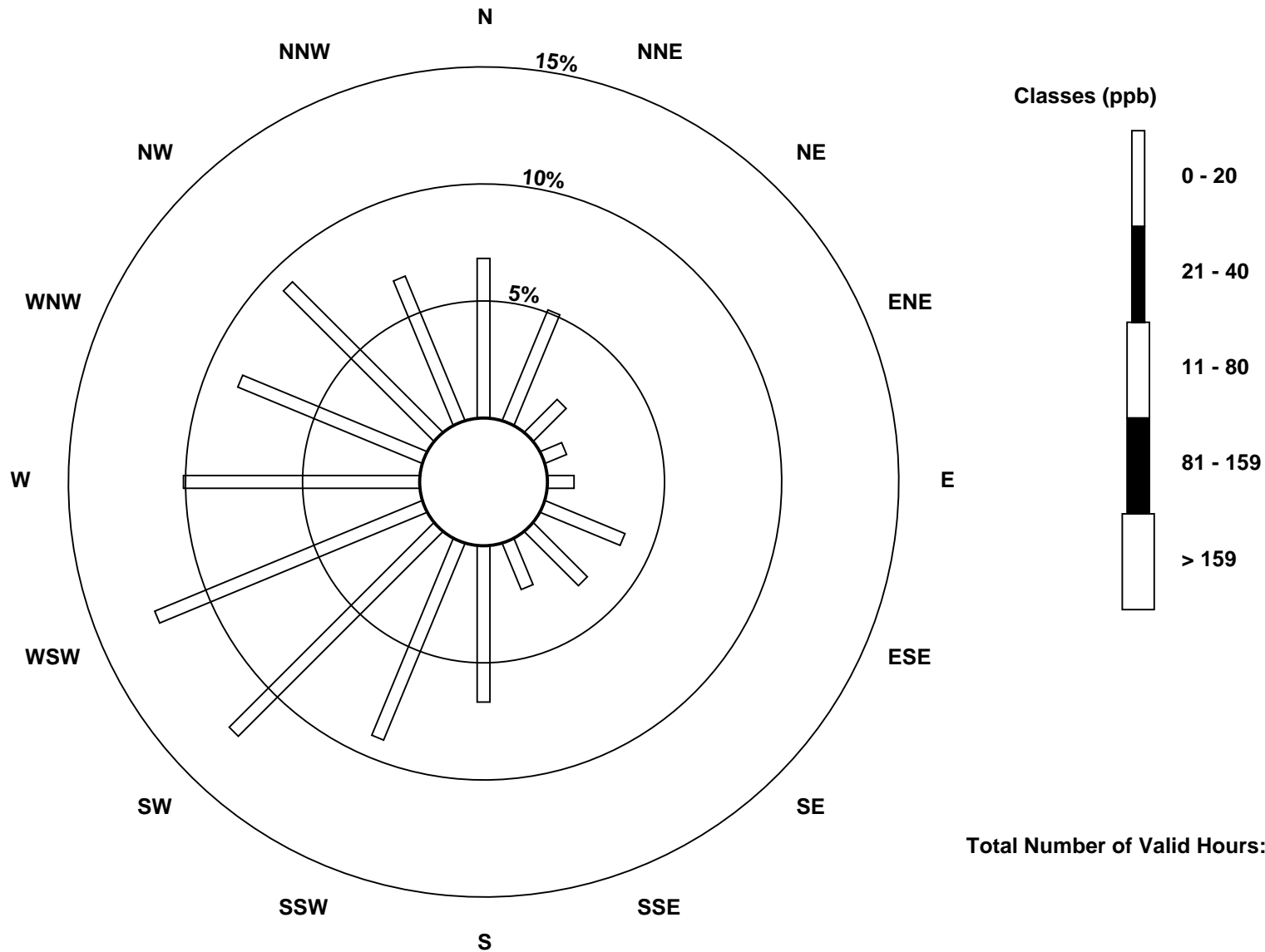
Total Number of Valid Hours: 704

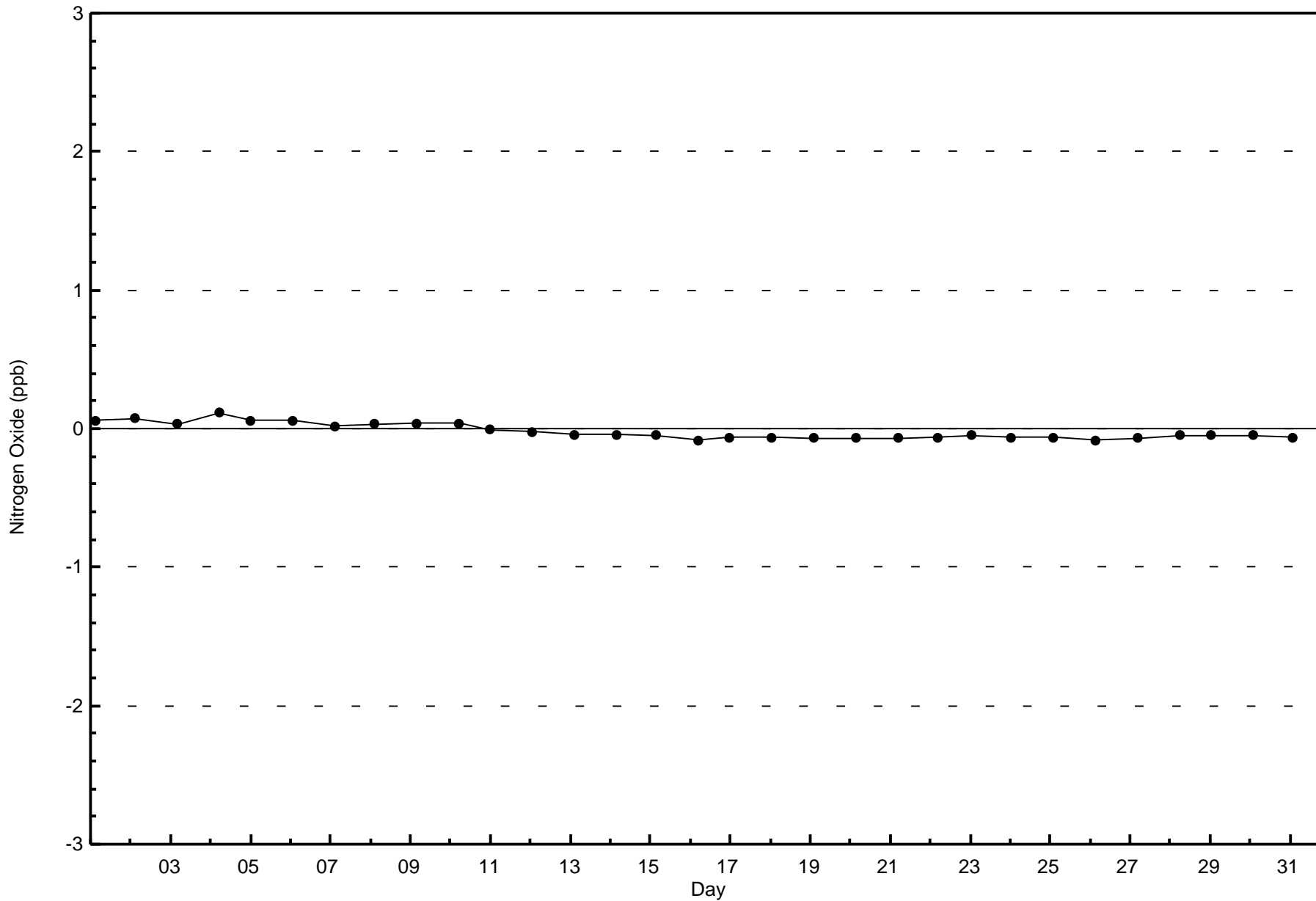
Total Number of Hours: 744

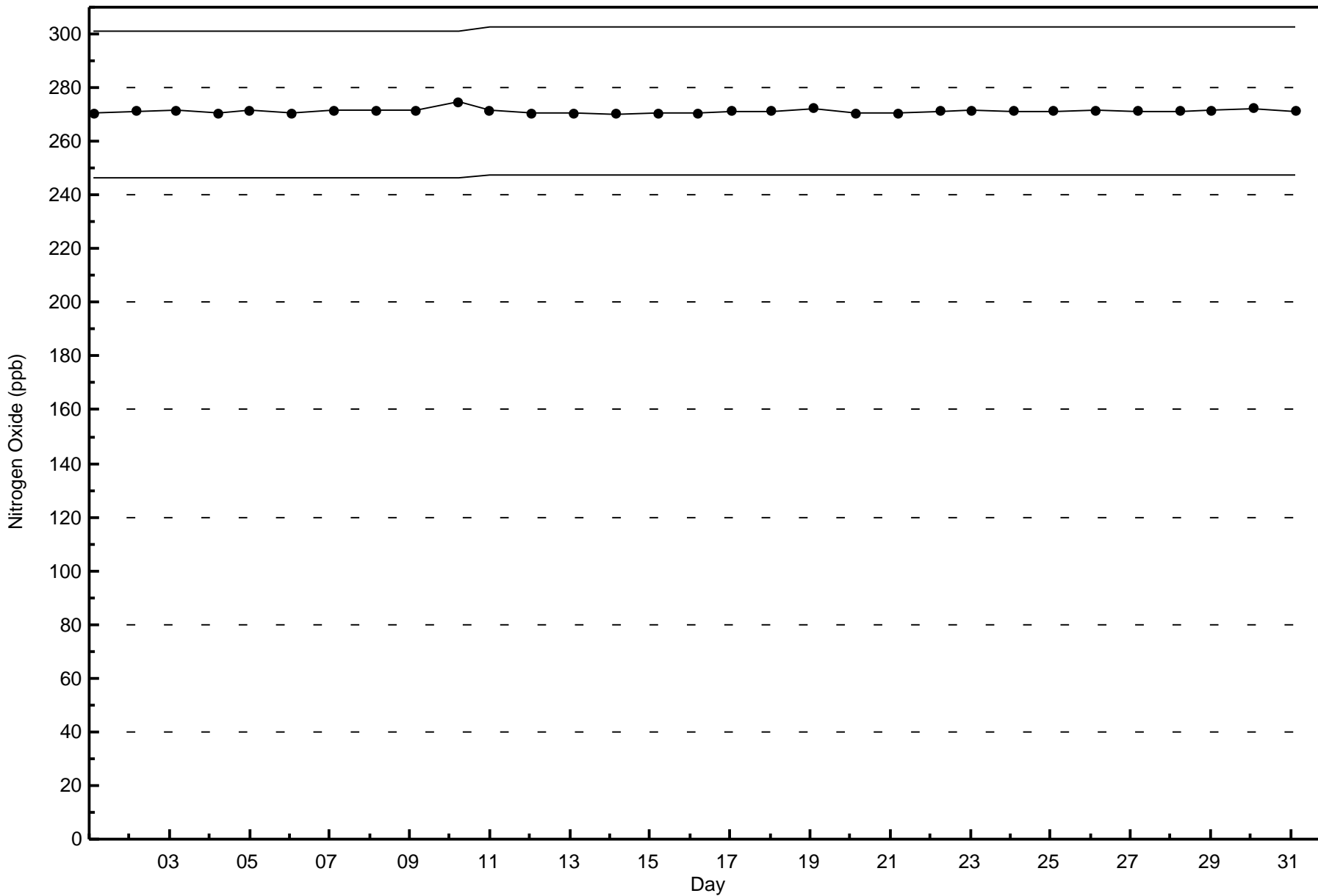


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Nitrogen Oxide (NO) - ppb  
Firebag (AMS 19)





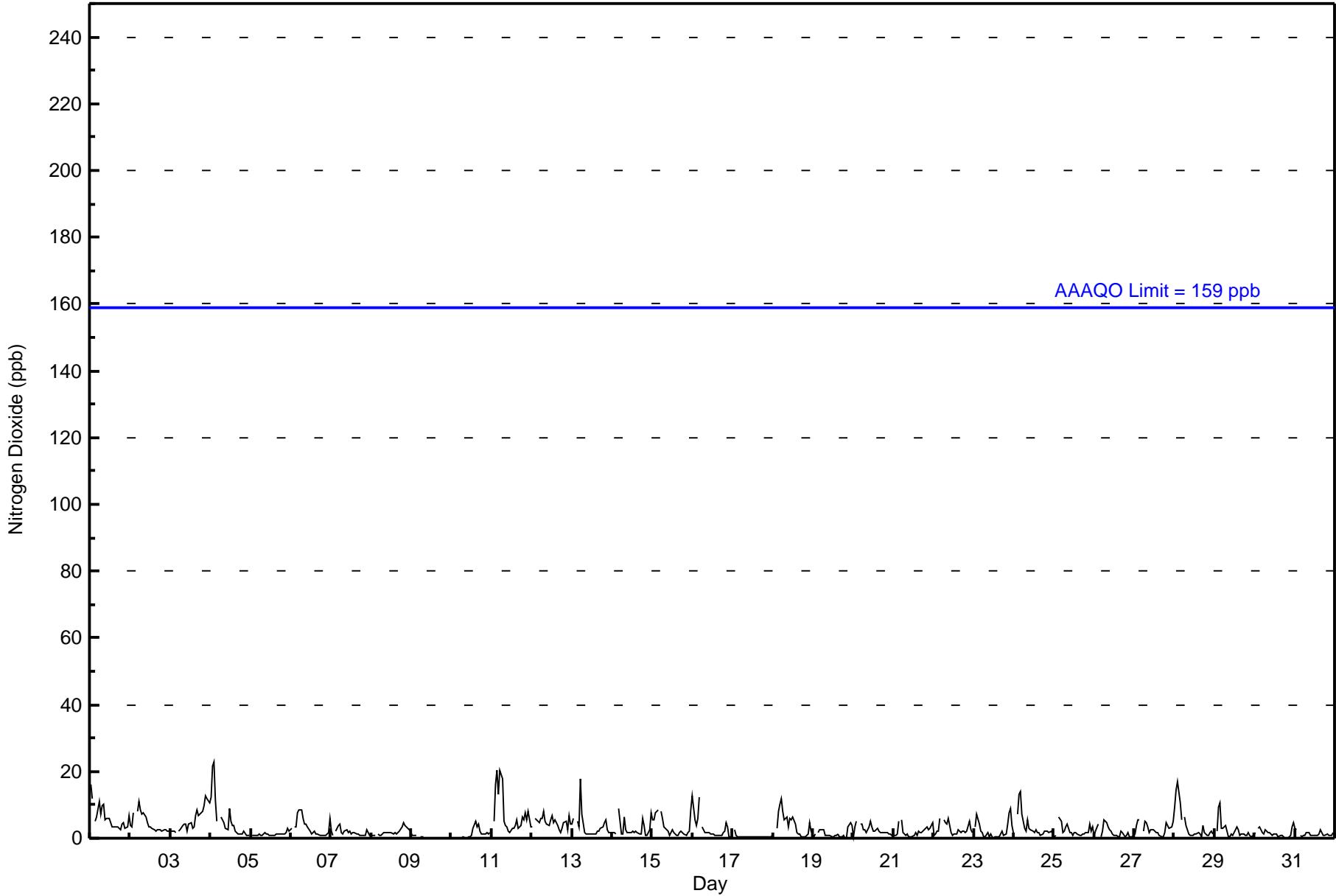




Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 23 ppb on Jul 4 03:00	Maximum Daily Average: 7.3 ppb on Jul 11		Hours of Data:	705
Minimum Value: 0 ppb on Jul 9 18:00	Minimum Daily Average: 0.5 ppb on Jul 17		Hours of Missing Data:	39
Maximum Diurnal Average: 5.6 ppb at hour 3	Minimum Diurnal Average: 1.7 ppb at hour 17		Hours of Calibration:	39
Monthly Average: 3.0 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 1 Q <sub>1</sub> = 1 Median = 2 Q <sub>3</sub> = 4 P <sub>90</sub> = 6 P <sub>99</sub> = 16		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jul	16	12	Z	5	6	11	7	10	10	6	6	6	5	4	3	4	3	3	3	4	5	3	4	7	6.1	16																						
2-Jul	4	4	8	Z	8	11	8	7	8	6	5	3	3	3	3	2	3	3	2	2	2	3	2	2	4.4	11																						
3-Jul	2	2	2	2	Z	2	3	4	4	4	2	4	5	3	4	7	8	7	8	8	10	13	12	11	5.4	13																						
4-Jul	12	22	23	12	5	Z	6	6	5	3	3	9	5	4	4	2	1	1	1	1	2	1	1	1	5.6	23																						
5-Jul	Z	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	2	3	2	1.3	3																						
6-Jul	3	Z	4	4	8	8	8	6	4	4	3	2	1	2	2	1	1	1	1	1	1	1	2	6	3.2	8																						
7-Jul	2	1	Z	2	4	4	2	1	2	3	2	2	1	2	2	1	1	1	1	1	1	3	2	1	1.8	4																						
8-Jul	1	1	1	Z	1	1	1	2	2	2	2	2	2	1	2	1	2	2	3	5	4	4	3	2	1.9	5																						
9-Jul	1	1	1	1	Z	1	1	1	C	C	C	C	C	C	C	C	C	0	0	0	0	0	0	0	--	1																						
10-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	1	3	5	3	4	2	1	1	1	2	1	2	1.2	5																						
11-Jul	Z	5	16	21	13	20	18	5	4	4	2	2	3	3	4	5	3	4	6	6	8	6	8	4	7.3	21																						
12-Jul	3	Z	6	5	5	6	6	8	5	4	4	6	7	5	6	4	2	2	3	5	5	3	7	4	4.7	8																						
13-Jul	4	6	Z	5	3	18	7	2	1	1	1	1	1	1	2	2	3	4	5	5	3	2	2	3.5	18																							
14-Jul	2	2	1	Z	9	1	1	6	3	2	2	2	2	2	2	2	1	1	6	4	1	1	3	8	2.7	9																						
15-Jul	6	5	8	9	Z	8	6	3	3	2	1	2	3	2	1	1	2	2	2	1	1	2	2	9	3.5	9																						
16-Jul	13	5	4	6	12	Z	3	2	2	2	2	1	1	1	1	1	1	1	2	2	5	3	1	1	3.0	13																						
17-Jul	Z	3	1	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.5	3																						
18-Jul	1	Z	3	8	10	12	8	5	6	4	6	5	7	4	2	1	1	1	1	0	1	1	5	2	4.1	12																						
19-Jul	0	1	Z	2	2	2	2	1	1	1	1	0	0	1	1	1	0	1	1	0	0	4	5	4	1.4	5																						
20-Jul	1	3	5	Z	4	4	3	3	2	4	5	4	2	2	3	2	2	2	2	2	2	1	1	1	2.5	5																						
21-Jul	1	1	1	5	Z	6	2	1	1	1	1	1	1	2	1	2	2	2	3	3	4	3	3	5	2.0	6																						
22-Jul	1	1	2	2	6	Z	5	5	4	6	2	1	1	1	3	2	2	2	2	2	2	5	3	2	2.6	6																						
23-Jul	Z	3	7	4	2	2	0	1	2	1	1	0	0	0	1	1	2	1	1	4	8	9	4	2.4	9																							
24-Jul	2	Z	7	13	14	7	3	2	6	3	3	2	2	3	2	2	1	1	2	2	2	2	2	1	3.6	14																						
25-Jul	1	1	Z	7	5	2	2	3	4	2	2	1	2	2	1	1	1	1	1	2	2	4	2	4	2.2	7																						
26-Jul	1	2	4	Z	1	2	5	5	3	3	2	1	1	1	1	1	2	2	1	1	2	1	1	1	1.8	5																						
27-Jul	1	4	5	6	Z	2	5	5	3	2	3	3	2	2	2	1	1	0	2	5	4	3	4	5	2.9	6																						
28-Jul	10	14	17	10	5	Z	6	4	1	1	1	1	1	1	2	1	1	4	2	1	1	2	2	1	3.9	17																						
29-Jul	Z	2	10	11	3	3	4	2	1	0	1	1	3	3	2	1	1	1	1	1	2	1	1	1	2.3	11																						
30-Jul	2	Z	3	3	2	1	2	2	2	2	1	1	1	1	1	1	1	1	0	0	0	1	4	5	1.5	5																						
31-Jul	3	2	Z	1	1	1	1	2	2	1	1	1	1	1	1	3	2	1	1	1	1	1	1	2	1.2	3																						
																								3.5	4.0	5.6	5.5	5.0	5.3	4.1	3.3	3.1	2.4	2.1	2.2	2.1	2.0	1.9	1.9	1.7	1.7	2.0	2.2	2.5	2.6	3.0	3.1	Diurnal Average
																								16	22	23	21	14	20	18	10	10	6	6	9	7	5	6	7	8	7	8	8	10	13	12	11	Diurnal Maximum

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





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

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Firebag - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	702	99.57	99.57
21 - 40	3	0.43	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 705

Total Number of Hours: 744





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

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Firebag - July 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	48	36	14	7	8	26	23	14	47	64	87	86	70	60	64	47	701
21 - 40	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	3
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	48	36	14	7	8	26	23	15	47	64	87	87	71	60	64	47	704

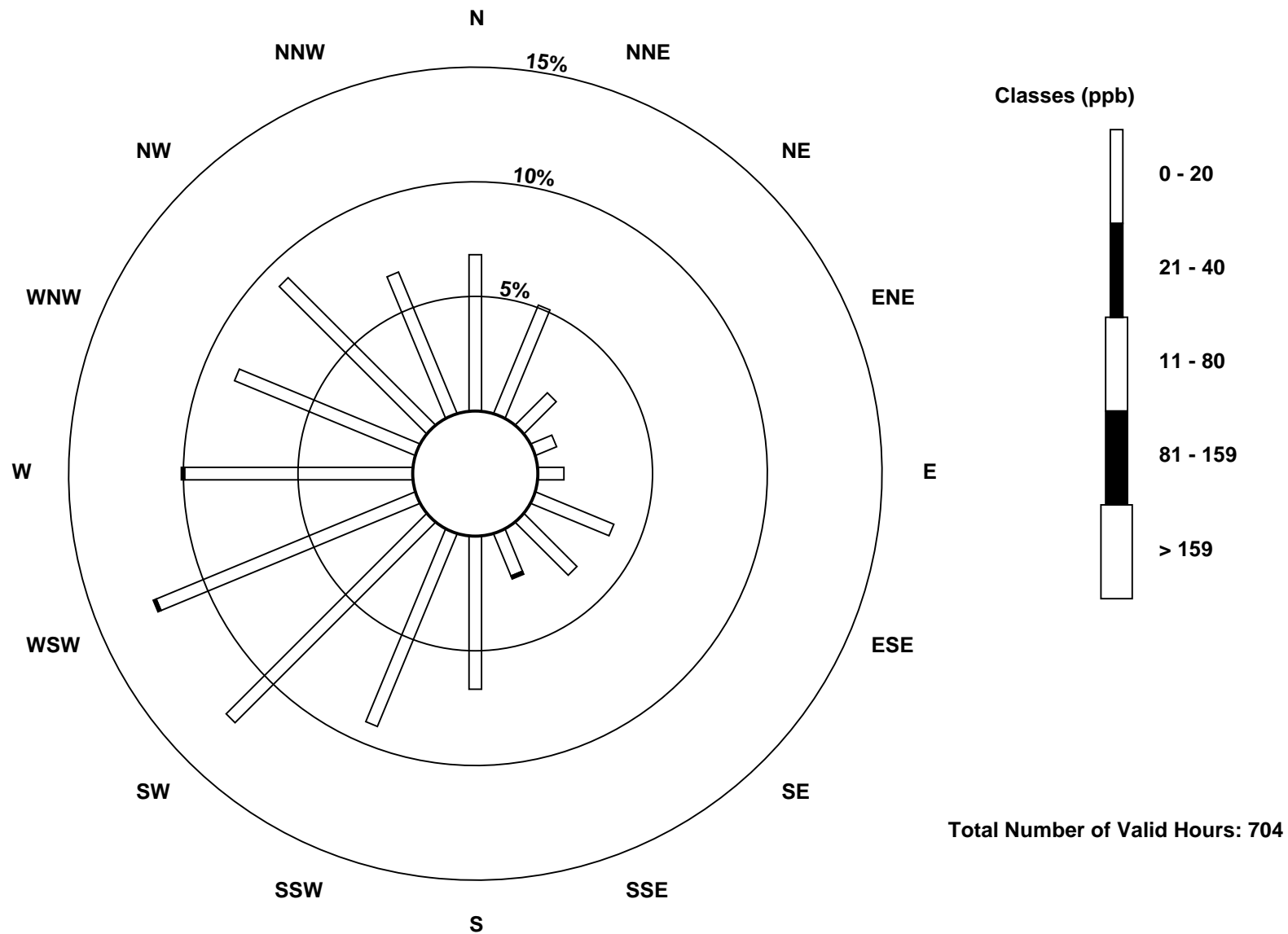
Total Number of Valid Hours: 704

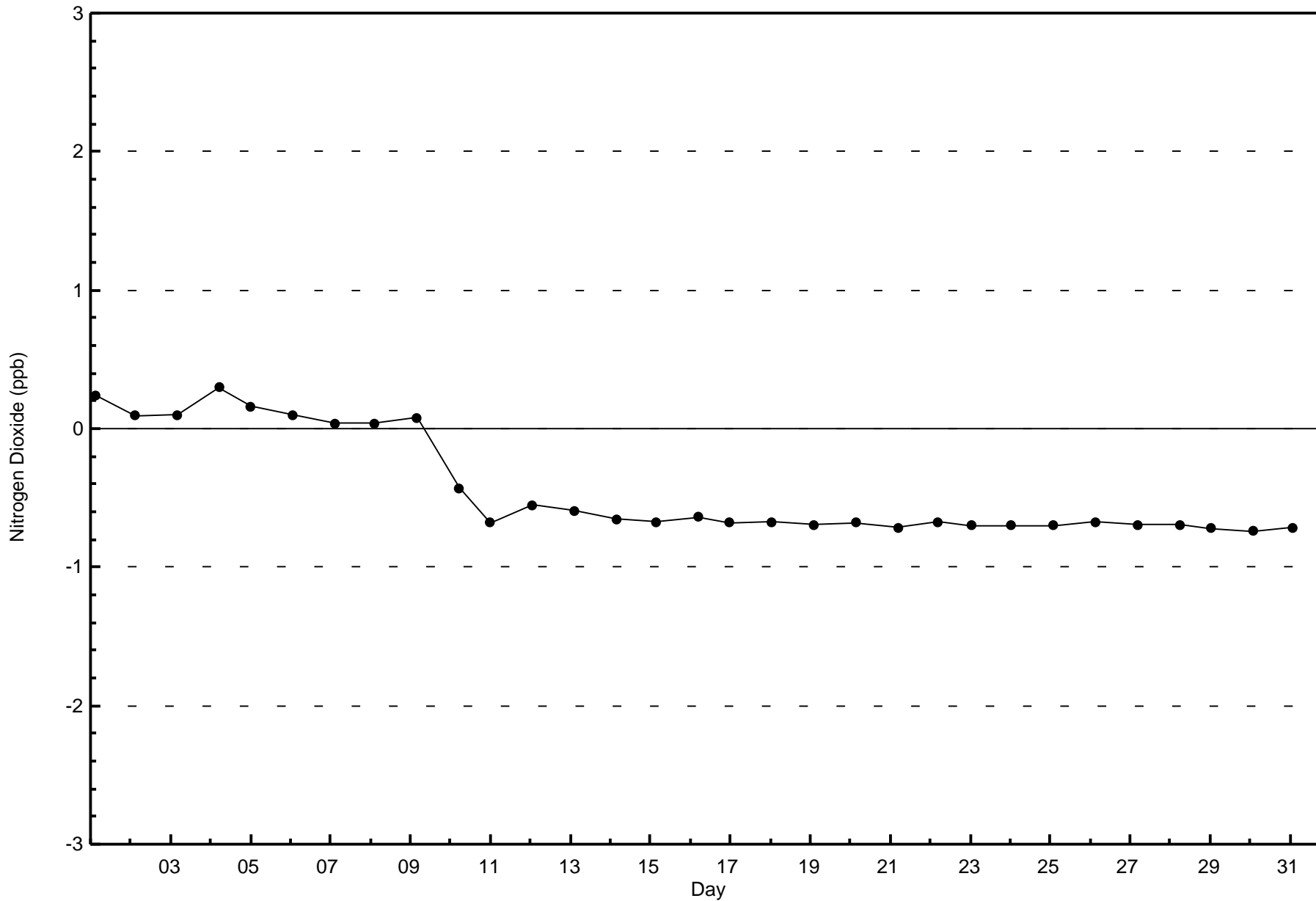
Total Number of Hours: 744

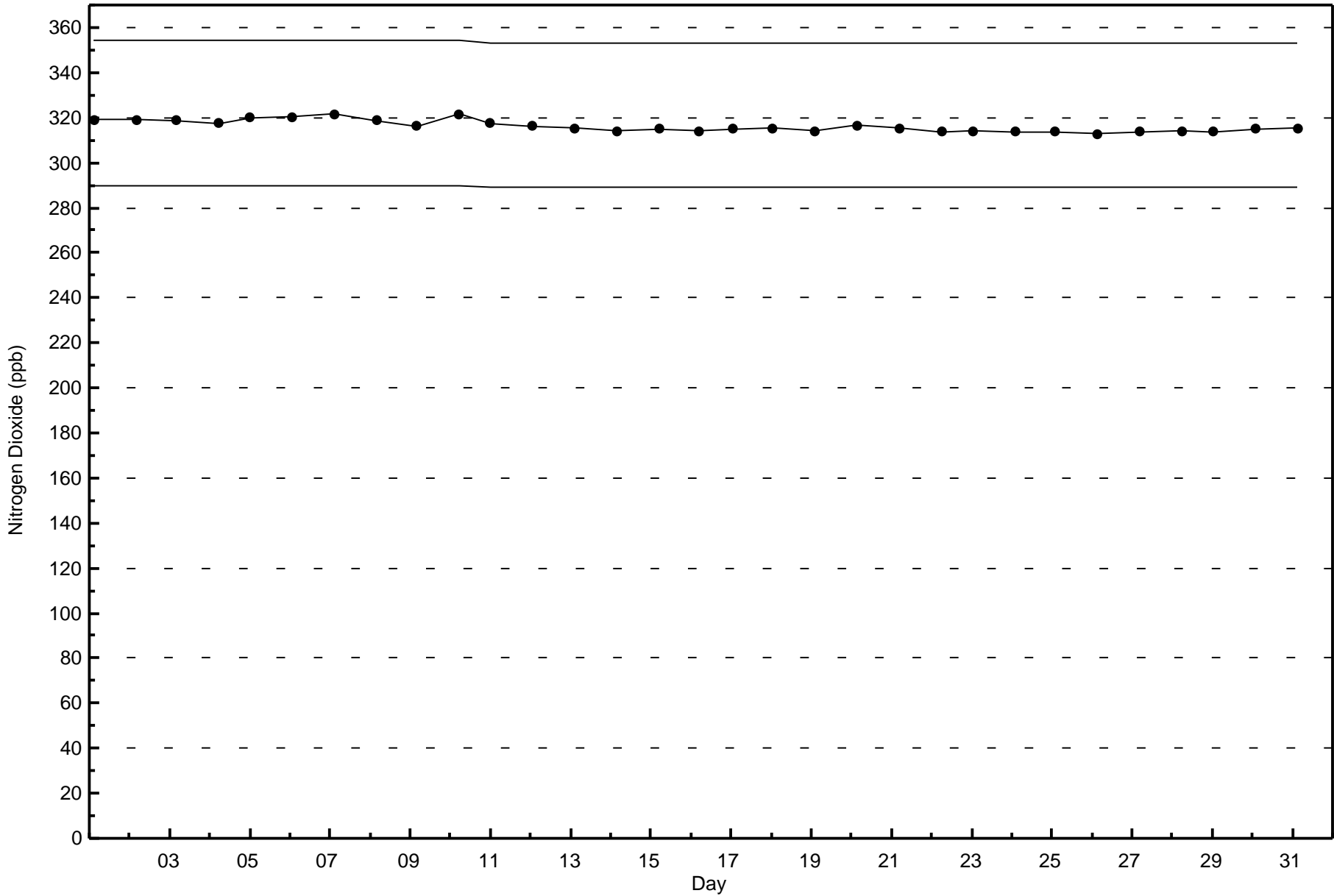


Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Firebag (AMS 19)

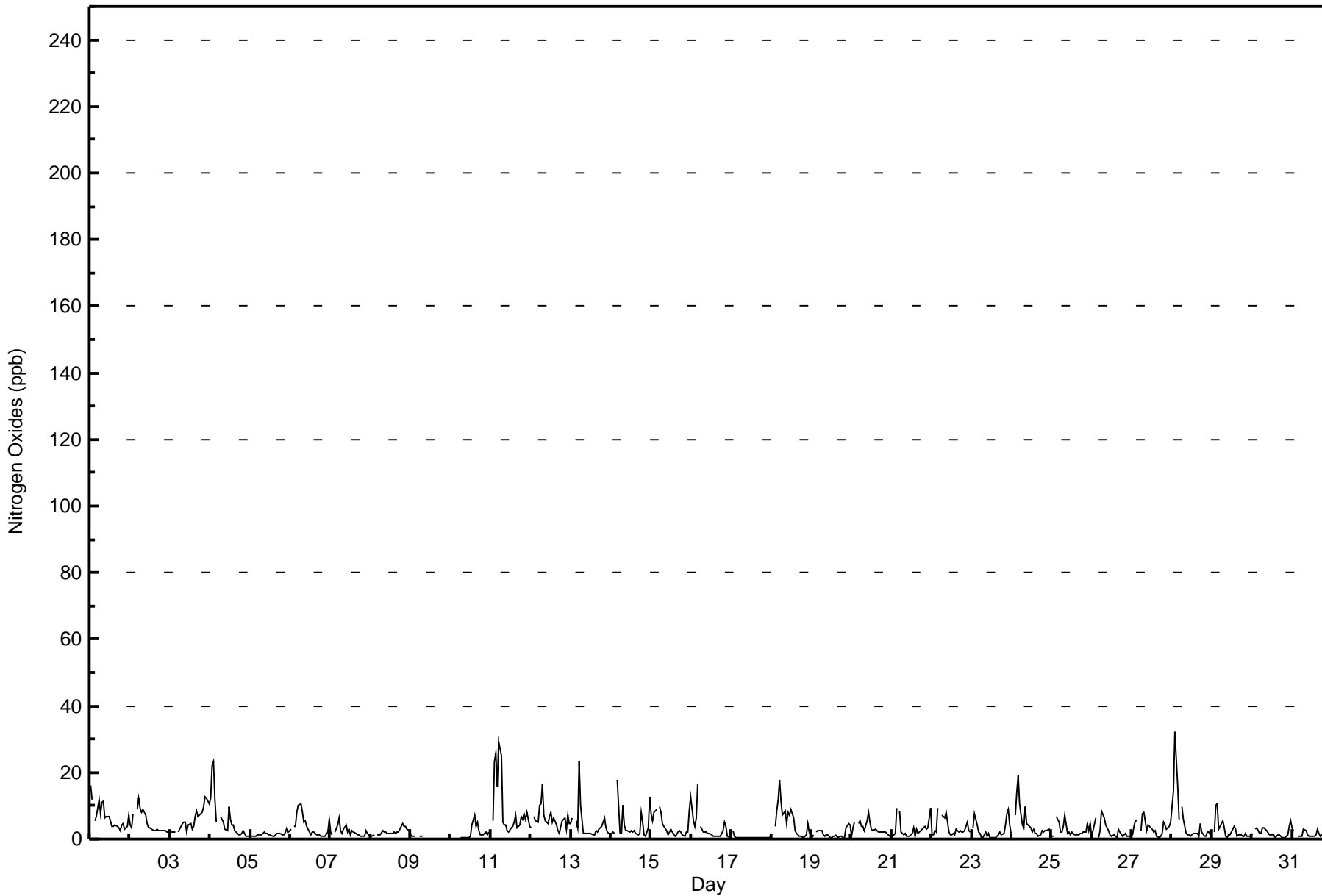








Maximum Value: 32 ppb on Jul 28 03:00																		Maximum Daily Average: 9.0 ppb on Jul 11						Hours in Service: 744		
Minimum Value: 0 ppb on Jul 9 20:00																		Minimum Daily Average: 0.6 ppb on Jul 17						Hours of Data: 705		
Maximum Diurnal Average: 7.0 ppb at hour 6																		Minimum Diurnal Average: 2.0 ppb at hour 18						Hours of Missing Data: 39		
Monthly Average: 3.6 ppb																		Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 1 Q <sub>1</sub> = 1 Median = 2 O <sub>3</sub> = 4 P <sub>90</sub> = 8 P <sub>99</sub> = 23						Hours of Calibration: 39		
																		Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	16	12	Z	5	7	12	7	11	11	6	7	7	5	4	4	4	4	3	3	4	5	3	4	7	6.6	16
2-Jul	4	4	8	Z	9	12	9	8	9	7	5	4	3	3	3	2	3	3	2	2	2	3	2	2	4.8	12
3-Jul	2	2	2	2	Z	2	3	4	5	5	2	4	5	3	4	7	8	7	8	8	10	13	12	11	5.6	13
4-Jul	12	22	23	12	5	Z	7	6	5	3	3	10	6	4	4	3	2	1	1	2	2	1	1	1	5.9	23
5-Jul	Z	1	1	1	1	1	1	1	2	2	2	1	1	1	1	1	2	2	2	1	1	2	3	2	1.5	3
6-Jul	3	Z	4	4	8	10	11	8	5	5	4	2	1	2	2	2	1	1	1	1	1	1	2	6	3.7	11
7-Jul	2	1	Z	2	4	6	2	2	3	4	2	3	1	2	2	2	1	1	1	1	1	3	2	1	2.2	6
8-Jul	1	1	1	Z	1	1	1	2	2	2	2	2	2	2	2	2	2	2	4	5	4	4	3	2	2.2	5
9-Jul	1	1	1	1	Z	1	1	1	C	C	C	C	C	C	C	C	C	0	0	0	0	0	0	0	--	1
10-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	1	4	7	4	5	2	1	1	2	2	1	2	1.6	7
11-Jul	Z	5	23	26	16	29	25	5	4	4	3	2	3	4	5	7	4	4	7	6	8	6	8	4	9.0	29
12-Jul	4	Z	7	6	5	10	11	16	7	5	5	7	8	5	6	4	3	2	4	6	6	3	7	4	6.1	16
13-Jul	4	6	Z	6	4	23	10	2	2	2	2	2	2	1	1	2	2	3	4	5	6	3	2	2	4.2	23
14-Jul	2	2	2	Z	18	2	2	10	4	3	3	2	3	2	3	2	1	2	8	5	1	1	3	13	4.0	18
15-Jul	8	5	8	9	Z	10	8	5	4	3	1	2	3	2	1	1	2	3	2	1	1	2	2	9	4.0	10
16-Jul	13	5	4	6	17	Z	4	2	2	2	2	2	1	1	1	1	1	1	2	3	5	4	1	1	3.4	17
17-Jul	Z	3	1	0	0	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0.6	3
18-Jul	1	Z	4	9	12	18	12	7	9	5	8	7	9	6	3	2	1	1	1	1	1	1	5	2	5.3	18
19-Jul	0	1	Z	2	3	3	3	1	1	1	1	1	0	1	1	1	1	1	1	0	0	4	5	4	1.6	5
20-Jul	1	3	5	Z	5	6	4	4	2	5	8	5	3	2	3	3	2	2	2	2	2	2	1	1	3.2	8
21-Jul	1	1	2	9	Z	9	2	1	2	1	1	1	2	3	1	3	2	2	3	3	4	3	4	9	2.9	9
22-Jul	1	1	2	2	9	Z	7	7	7	8	2	1	1	2	1	3	2	2	2	2	2	5	3	2	3.3	9
23-Jul	Z	3	8	4	2	2	0	1	2	1	2	1	0	0	0	1	1	2	1	2	4	8	9	4	2.5	9
24-Jul	2	Z	7	14	19	10	4	4	10	4	4	3	2	3	2	2	1	1	2	2	2	3	3	1	4.6	19
25-Jul	1	1	Z	7	5	2	2	4	7	2	2	1	2	2	1	1	1	2	2	2	2	5	3	5	2.6	7
26-Jul	1	3	6	Z	1	2	8	6	4	3	3	1	1	1	1	1	3	2	1	1	2	1	1	1	2.3	8
27-Jul	1	4	5	6	Z	3	8	8	6	3	4	3	3	2	2	1	1	1	2	5	4	3	4	5	3.6	8
28-Jul	10	14	32	16	6	Z	10	6	2	1	1	1	1	2	2	1	1	5	2	1	1	2	2	1	5.2	32
29-Jul	Z	2	10	11	3	4	5	3	1	0	1	1	3	4	3	1	1	1	1	1	2	1	1	1	2.7	11
30-Jul	2	Z	3	3	2	2	3	3	3	3	3	1	1	1	1	1	1	1	0	0	0	1	4	5	1.9	5
31-Jul	3	3	Z	1	1	1	1	3	2	1	1	1	1	1	1	3	2	1	1	1	1	1	1	2	1.5	3
3.7 4.2 6.8 6.3 6.2 7.0 5.6 4.6 4.1 3.1 2.7 2.6 2.6 2.4 2.3 2.2 2.0 2.0 2.3 2.4 2.7 2.8 3.2 3.6																								Diurnal Average		
16 22 32 26 19 29 25 16 11 8 8 10 9 6 7 7 8 7 8 8 8 10 13 12 13																								Diurnal Maximum		
Z - zerospan C - Calibration																										





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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Firebag - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	697	98.87	98.87
21 - 40	8	1.13	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 705

Total Number of Hours: 744



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Firebag - July 2015**

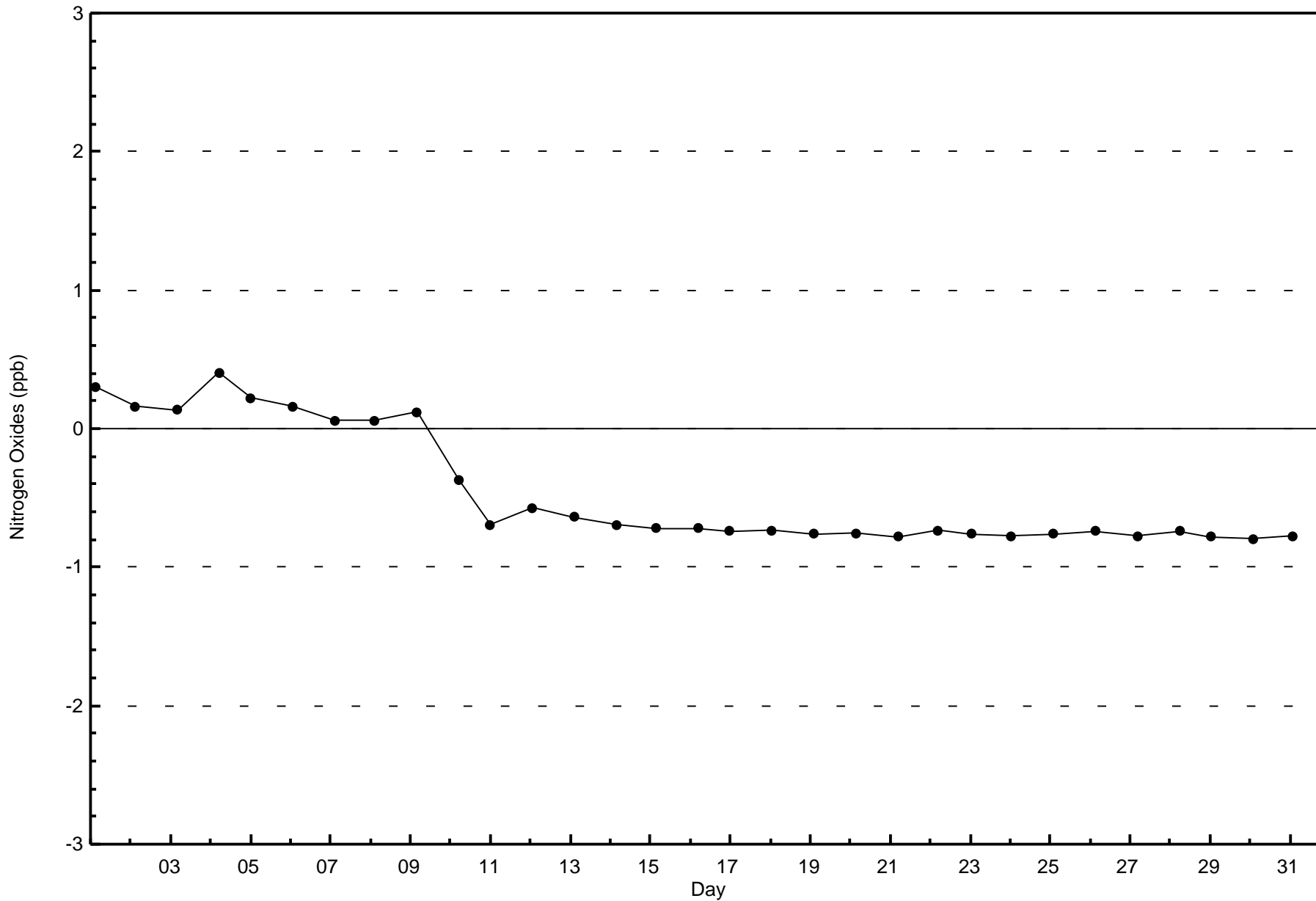
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	48	36	14	7	8	26	23	9	47	64	87	86	70	60	64	47	696
21 - 40	0	0	0	0	0	0	0	6	0	0	0	1	1	0	0	0	8
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	48	36	14	7	8	26	23	15	47	64	87	87	71	60	64	47	704

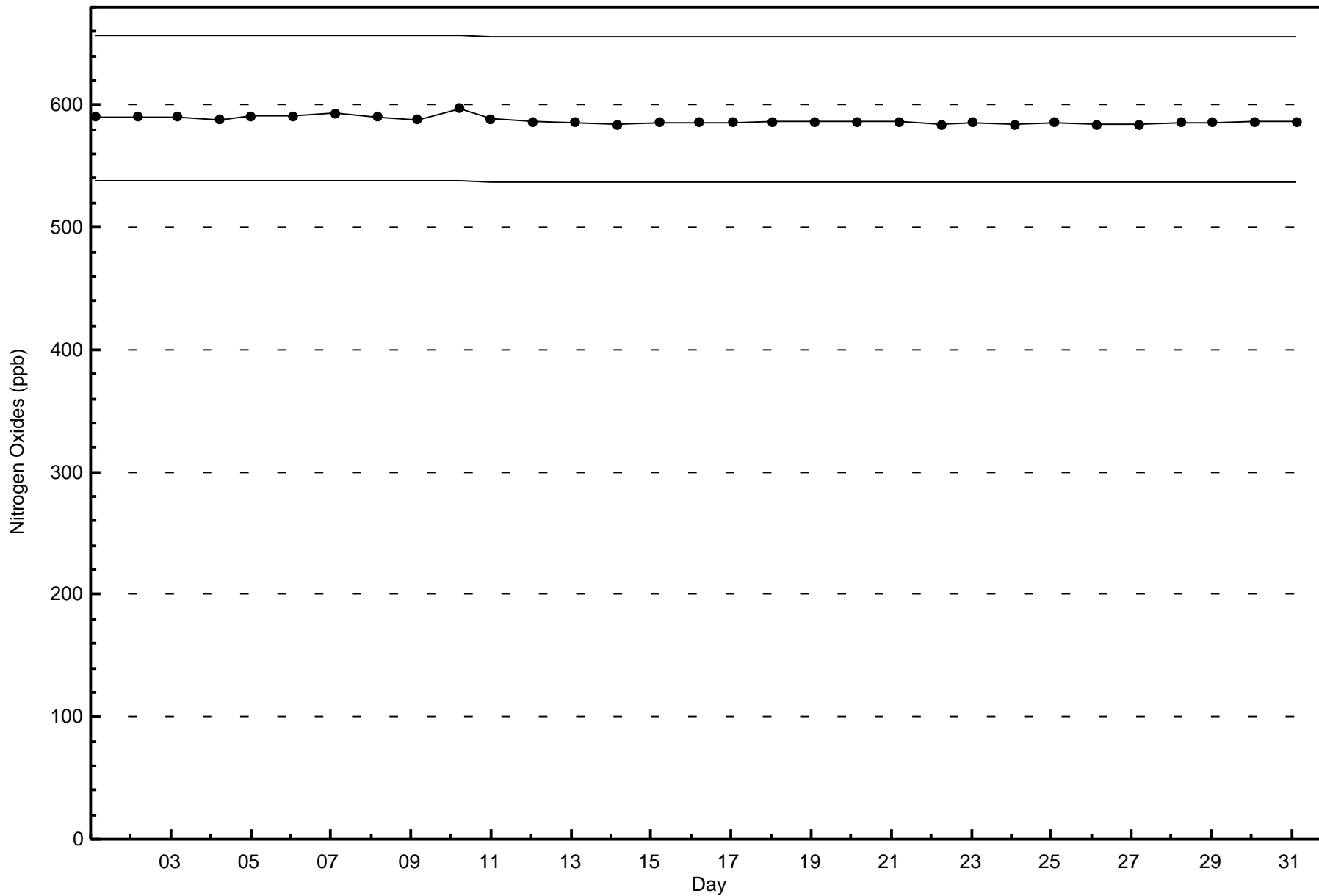
Total Number of Valid Hours: 704

Total Number of Hours: 744









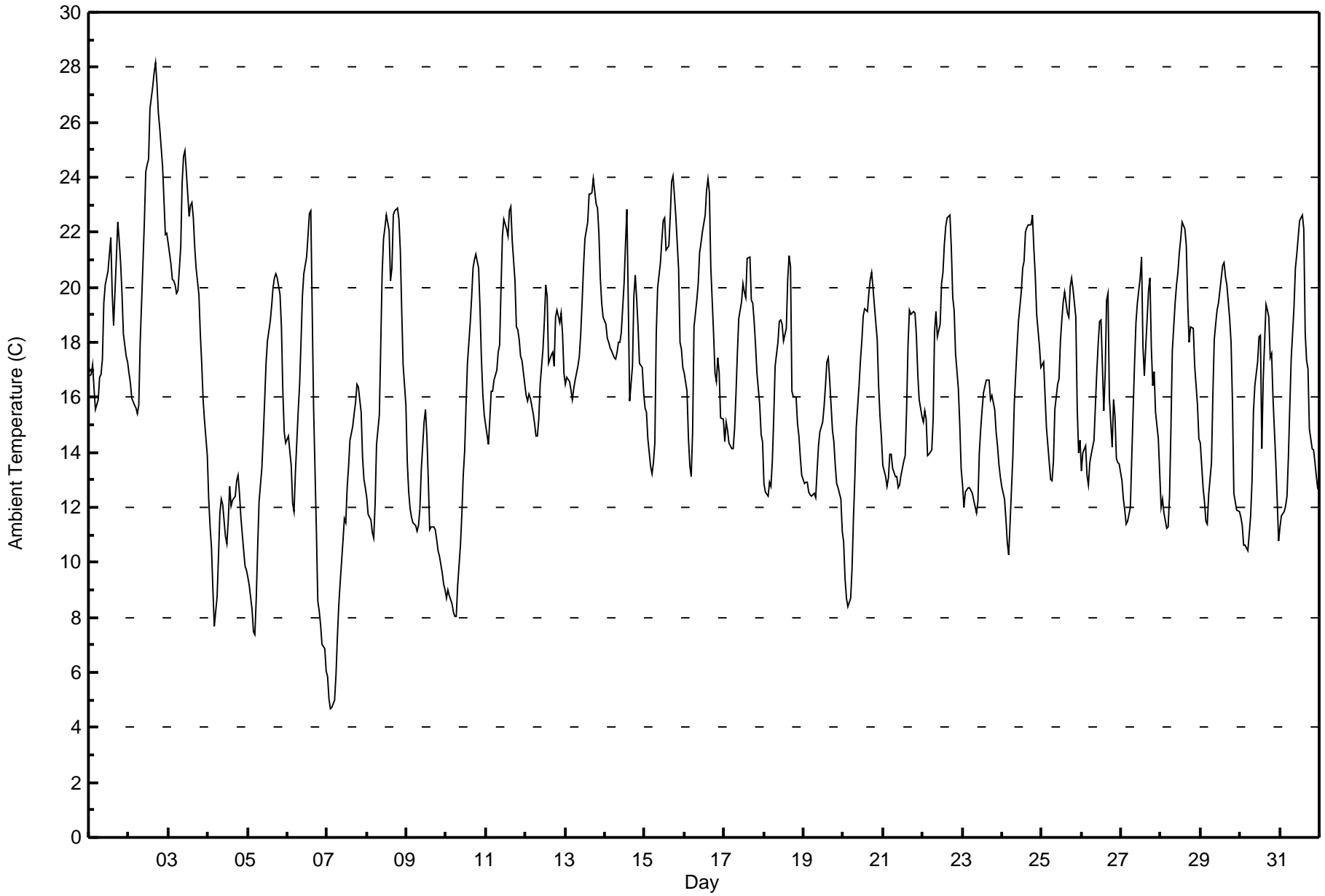


Maximum Value: 28.1 C on Jul 2 17:00		Maximum Daily Average: 21.9 C on Jul 2		Hours in Service: 744																																													
Minimum Value: 4.7 C on Jul 7 03:00		Minimum Daily Average: 11.0 C on Jul 7		Hours of Data: 744																																													
Maximum Diurnal Average: 19.6 C at hour 16		Minimum Diurnal Average: 12.5 C at hour 5		Hours of Missing Data: 0																																													
Monthly Average: 16.39 C		Percentiles: P <sub>1</sub> = 6.9 P <sub>10</sub> = 11.3 Q <sub>1</sub> = 13.2 Median = 16.4 Q <sub>3</sub> = 19.5 P <sub>90</sub> = 21.8 P <sub>99</sub> = 25.3		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-Jul	16.8	16.8	17.2	16.3	15.6	15.9	16.8	16.8	17.4	19.4	20.1	20.6	21.2	21.8	19.8	18.6	21.1	22.4	21.7	20.9	19.8	18.3	17.5	17.3	18.8	22.4																							
2-Jul	16.9	16.5	16.0	15.7	15.6	15.4	15.7	18.0	19.4	22.4	24.2	24.5	24.7	26.5	27.3	27.8	28.1	27.4	26.3	25.8	24.4	23.2	21.9	22.0	21.9	28.1																							
3-Jul	21.6	20.8	20.3	20.2	20.1	19.8	19.9	21.4	23.8	24.7	25.0	24.2	22.6	23.0	23.1	22.5	21.5	20.7	19.7	18.3	17.2	15.9	15.1	13.9	20.6	25.0																							
4-Jul	12.3	11.3	10.5	9.0	7.7	8.7	10.2	11.8	12.3	12.1	10.9	10.7	11.5	12.8	12.1	12.2	12.4	13.0	13.1	12.5	11.7	10.4	9.9	9.7	11.2	13.1																							
5-Jul	9.5	9.2	8.3	7.5	7.4	8.7	10.5	12.2	13.4	14.6	15.9	17.2	18.1	18.8	19.3	20.0	20.4	20.5	20.3	19.7	18.6	16.2	14.7	14.4	14.8	20.5																							
6-Jul	14.6	14.0	13.5	12.2	11.8	13.3	15.5	16.5	18.0	19.7	20.5	21.1	21.9	22.7	22.8	19.2	15.6	11.2	8.6	8.2	7.7	7.0	6.9	6.1	14.5	22.8																							
7-Jul	5.9	5.0	4.7	4.7	5.0	5.9	7.3	8.5	9.3	10.8	11.6	11.4	12.7	13.5	14.4	14.9	15.4	15.8	16.5	16.4	15.4	13.8	13.0	12.7	11.0	16.5																							
8-Jul	12.3	11.8	11.5	11.1	10.9	12.2	14.3	15.4	17.8	20.5	21.8	22.2	22.6	22.1	20.2	20.7	22.6	22.8	22.9	22.5	21.3	19.2	17.2	15.7	18.0	22.9																							
9-Jul	13.6	12.6	12.0	11.7	11.4	11.4	11.2	11.4	12.0	13.4	15.1	15.5	14.6	13.0	11.2	11.3	11.3	11.2	10.8	10.4	10.2	9.6	9.2	9.0	11.8	15.5																							
10-Jul	8.7	9.0	8.8	8.5	8.2	8.0	8.0	9.1	10.6	11.7	13.1	14.0	15.7	17.2	18.7	19.6	20.7	21.0	21.2	20.7	19.2	17.4	16.1	15.3	14.2	21.2																							
11-Jul	15.0	14.3	15.2	16.2	16.2	16.6	17.0	17.6	17.9	20.0	21.9	22.5	22.1	21.8	22.8	22.9	21.7	20.2	18.6	18.5	18.1	17.5	17.4	16.5	18.7	22.9																							
12-Jul	16.1	15.9	16.1	16.0	15.4	15.1	14.6	14.6	15.2	16.5	17.7	18.7	20.1	19.7	17.2	17.6	17.6	17.1	18.9	19.2	18.7	19.1	18.3	16.9	17.2	20.1																							
13-Jul	16.5	16.7	16.6	16.3	15.9	16.3	16.6	17.2	17.5	18.3	19.5	20.8	21.8	22.4	23.4	23.4	23.9	23.0	22.9	22.0	22.0	20.3	19.4	18.9	19.7	23.9																							
14-Jul	18.7	18.2	18.0	17.8	17.7	17.4	17.4	17.7	18.0	18.3	20.1	21.6	22.8	19.5	15.9	17.1	19.7	20.4	19.6	18.6	17.2	17.1	16.2	16.2	18.5	22.8																							
15-Jul	15.6	15.5	14.5	13.5	13.2	13.6	14.4	18.3	20.0	20.9	21.7	22.4	22.5	21.4	21.5	22.6	23.9	24.1	23.3	22.6	20.6	18.0	17.7	17.1	19.1	24.1																							
16-Jul	16.9	16.2	14.5	13.5	13.1	14.7	18.6	19.6	20.1	21.2	21.6	22.0	22.6	23.5	23.9	23.4	20.8	18.3	16.9	16.6	17.5	16.9	15.3	15.2	18.5	23.9																							
17-Jul	14.4	15.1	14.8	14.3	14.1	14.1	14.9	16.1	17.6	18.9	19.5	20.2	19.8	19.6	21.1	21.1	19.5	19.4	18.8	17.9	16.9	15.7	14.7	14.4	17.2	21.1																							
18-Jul	12.9	12.5	12.4	12.9	12.8	13.7	15.3	17.1	18.0	18.7	18.8	18.7	18.0	18.5	20.3	21.2	20.7	16.2	16.0	16.0	15.1	14.6	13.9	13.2	16.1	21.2																							
19-Jul	12.9	12.9	12.9	12.5	12.5	12.4	12.5	12.4	13.3	14.2	14.8	15.1	15.7	16.4	17.3	17.4	16.6	14.8	14.4	13.5	12.9	12.7	12.3	11.2	13.9	17.4																							
20-Jul	10.7	9.4	8.7	8.4	8.7	9.8	11.6	13.1	14.9	16.4	17.3	18.1	19.0	19.2	19.1	19.8	20.3	20.5	20.0	19.3	18.1	16.4	15.3	14.5	15.4	20.5																							
21-Jul	13.5	13.1	12.8	13.1	13.9	13.9	13.4	13.1	13.1	12.7	12.8	13.2	13.7	13.9	15.5	17.9	19.2	19.0	19.1	19.1	18.3	16.8	15.9	15.3	15.1	19.2																							
22-Jul	15.1	15.5	15.2	13.9	13.9	14.1	15.2	18.4	19.1	18.2	18.7	20.1	20.5	21.6	22.2	22.5	22.6	21.4	19.6	19.2	17.6	16.3	15.1	13.4	17.9	22.6																							
23-Jul	12.8	12.0	12.5	12.7	12.7	12.6	12.5	12.2	11.8	12.2	14.0	14.8	15.6	16.2	16.6	16.7	16.6	15.9	16.0	15.5	14.7	14.3	13.6	13.1	14.1	16.7																							
24-Jul	12.8	12.3	11.6	10.7	10.3	11.4	13.9	15.8	16.9	17.8	18.8	19.8	20.7	20.9	22.0	22.2	22.3	22.3	22.6	21.4	20.5	19.0	17.8	17.1	17.5	22.6																							
25-Jul	17.2	17.3	16.1	14.9	13.7	13.0	13.0	13.7	15.5	16.5	16.7	18.0	18.8	19.5	19.8	19.1	18.9	20.0	20.3	19.9	18.9	15.6	14.0	14.4	16.9	20.3																							
26-Jul	13.3	14.0	14.2	13.2	12.8	13.6	13.9	14.5	15.7	16.9	17.9	18.7	18.8	15.5	16.9	19.5	19.8	16.0	14.2	15.9	15.3	13.8	13.6	13.6	15.5	19.8																							
27-Jul	13.0	12.3	11.9	11.4	11.5	12.0	13.8	15.6	17.2	18.7	19.4	20.3	21.1	17.9	16.8	17.8	19.9	20.4	17.8	16.4	16.9	15.5	14.5	13.2	16.1	21.1																							
28-Jul	12.0	12.3	11.8	11.2	11.3	12.4	14.8	17.7	19.4	20.1	20.5	21.2	21.8	22.4	22.1	21.5	19.5	18.0	18.6	18.5	17.1	16.4	15.7	14.5	17.1	22.4																							
29-Jul	14.4	12.7	12.2	11.5	11.4	12.5	13.6	16.1	18.1	18.7	19.2	19.4	20.3	20.8	20.9	20.4	20.1	18.9	18.0	15.8	12.5	12.2	11.9	11.8	16.0	20.9																							
30-Jul	11.6	11.3	10.7	10.6	10.4	11.0	11.7	13.0	15.5	16.4	17.3	18.2	18.3	14.1	16.7	19.4	19.2	18.9	17.4	17.6	16.0	13.6	12.3	10.8	14.7	19.4																							
31-Jul	11.3	11.7	11.8	12.0	12.4	13.8	15.7	17.4	19.3	20.7	21.2	21.8	22.4	22.6	22.1	18.3	17.3	17.0	14.9	14.1	14.1	13.6	13.1	12.6	16.3	22.6																							
																								13.8	13.5	13.1	12.7	12.5	13.0	14.0	15.2	16.4	17.5	18.3	18.9	19.4	19.4	19.6	19.6	19.6	19.0	18.4	17.9	17.0	15.7	14.9	14.2	Diurnal Average	
																								21.6	20.8	20.3	20.2	20.1	19.8	19.9	21.4	23.8	24.7	25.0	24.5	24.7	26.5	27.3	27.8	28.1	27.4	26.3	25.8	24.4	23.2	21.9	22.0	Diurnal Maximum	



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

**Ambient Temperature (AT) - C**  
**Firebag - July 2015**





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

**Ambient Temperature (AT) - C**  
**Firebag - July 2015**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	42	5.65	5.65
10 - 20	547	73.52	79.17
> 20	155	20.83	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



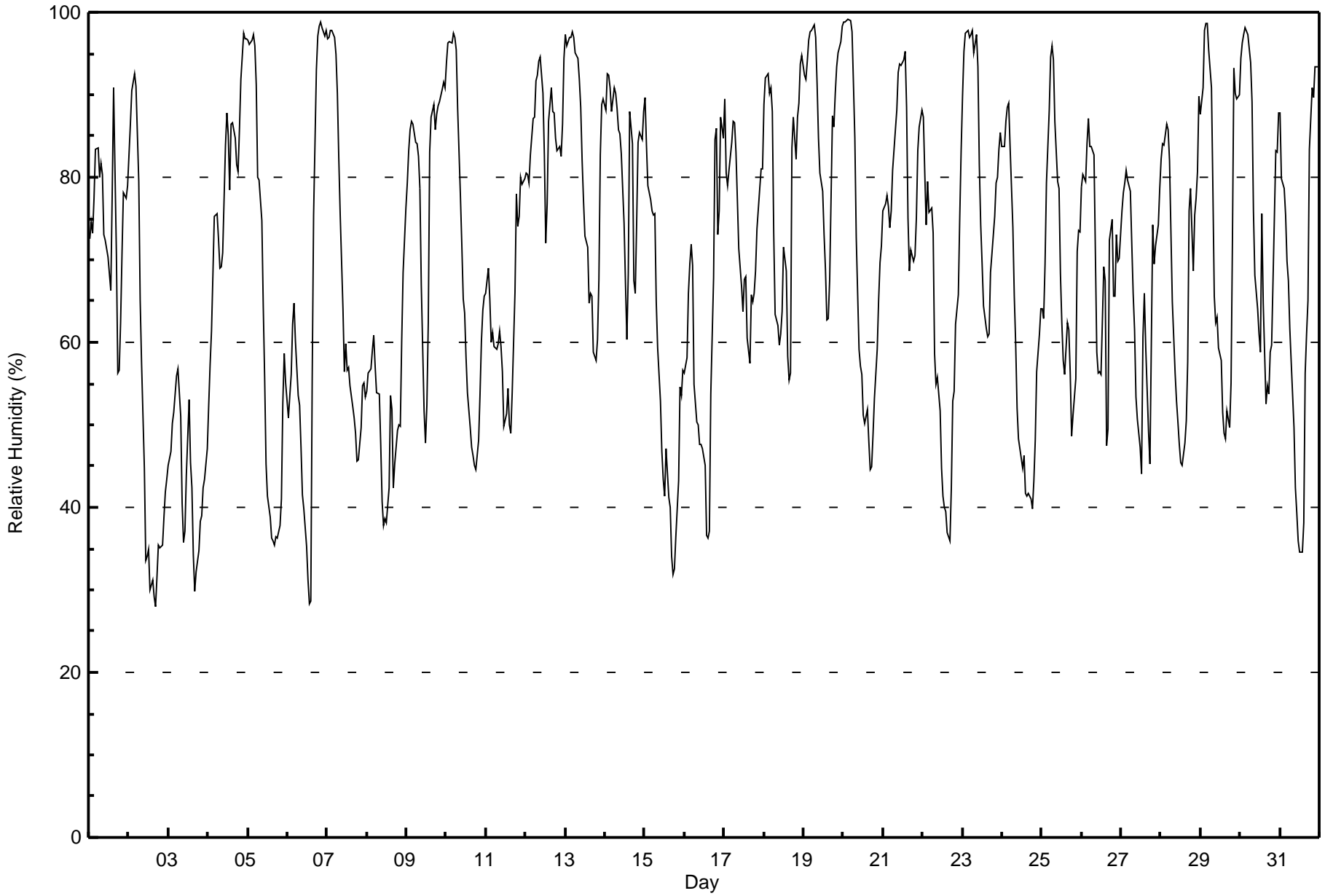
**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Relative Humidity (RH) - %**

**Firebag - July 2015**

Maximum Value: 99 % on Jul 20 04:00      Maximum Daily Average: 86.8 % on Jul 19																		Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Minimum Value: 28 % on Jul 2 17:00      Minimum Daily Average: 43.8 % on Jul 3 Maximum Diurnal Average: 83.9 % at hour 5      Minimum Diurnal Average: 56.2 % at hour 13 Monthly Average: 69.5 %      Percentiles: P <sub>1</sub> = 31 P <sub>10</sub> = 43 Q <sub>1</sub> = 55 Median = 71 Q <sub>3</sub> = 86 P <sub>90</sub> = 94 P <sub>99</sub> = 99																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	73	75	73	77	83	84	80	82	80	73	72	70	68	66	78	91	71	56	57	62	71	78	77	79	74.1	91
2-Jul	83	86	91	93	91	85	80	65	58	45	34	34	35	30	31	29	28	32	35	35	35	39	42	43	52.4	93
3-Jul	45	47	50	51	54	56	57	51	41	36	37	44	53	45	42	34	30	32	35	38	39	42	43	47	43.8	57
4-Jul	52	57	61	68	75	76	72	69	69	71	84	88	85	78	87	87	85	82	81	86	92	97	97	97	79.0	97
5-Jul	97	96	97	97	96	91	80	80	75	64	56	45	41	39	36	36	35	36	36	38	41	53	59	55	61.6	97
6-Jul	51	54	56	62	65	60	54	52	47	42	40	35	31	28	29	56	75	93	97	98	99	98	97	98	63.2	99
7-Jul	97	97	98	98	97	95	90	82	76	64	56	60	57	57	55	52	51	49	46	46	50	55	55	53	68.1	98
8-Jul	54	56	57	59	61	57	54	54	48	41	38	39	38	42	53	52	42	45	49	50	50	60	69	76	51.9	76
9-Jul	79	83	86	87	86	84	84	82	79	67	52	48	52	62	83	87	89	86	88	89	89	91	92	91	79.8	92
10-Jul	94	96	96	96	97	97	95	88	78	72	65	64	58	54	50	47	46	45	45	48	54	60	64	66	69.8	97
11-Jul	66	69	65	60	61	59	59	60	61	59	56	50	51	54	50	49	54	66	78	74	75	80	79	80	63.2	80
12-Jul	81	80	79	83	87	87	92	92	94	95	90	83	72	77	87	91	88	88	85	83	84	82	86	94	85.8	95
13-Jul	97	96	97	97	98	97	95	94	92	88	82	77	73	72	65	66	66	59	58	60	68	83	89	89	81.5	98
14-Jul	88	93	92	91	88	91	90	88	86	85	83	74	67	60	68	88	84	67	66	75	84	85	85	88	82.0	93
15-Jul	90	84	79	77	76	75	76	65	59	53	47	43	41	47	41	40	34	32	33	36	43	55	54	57	55.7	90
16-Jul	56	58	66	69	72	69	55	50	50	48	48	47	45	37	36	37	54	68	85	86	73	76	87	85	60.7	87
17-Jul	89	81	79	81	84	87	87	83	77	71	67	64	68	68	60	57	66	65	66	69	74	79	81	81	74.3	89
18-Jul	89	92	93	90	91	88	73	63	62	60	61	64	71	69	58	56	56	84	87	82	87	89	94	95	77.2	95
19-Jul	92	92	94	97	98	98	99	97	91	85	80	78	73	69	63	63	68	88	86	90	93	95	96	98	86.8	99
20-Jul	99	99	99	99	99	98	91	85	73	59	57	56	51	50	52	48	45	45	49	53	59	65	70	72	69.7	99
21-Jul	76	77	78	76	74	76	81	86	88	93	94	94	94	95	88	75	69	71	70	70	75	83	86	88	81.5	95
22-Jul	87	80	74	80	76	76	73	59	55	56	52	45	41	40	39	37	36	42	53	54	62	66	75	83	60.1	87
23-Jul	90	95	97	98	97	97	98	95	97	93	81	74	69	64	62	61	61	68	71	75	79	80	83	85	82.2	98
24-Jul	84	84	87	89	89	84	74	66	60	52	48	46	45	46	42	41	42	41	40	43	48	56	61	64	59.6	89
25-Jul	64	63	69	79	88	94	96	94	87	79	68	62	58	56	62	61	56	49	51	56	71	74	73	70.5	96	
26-Jul	79	80	80	84	87	84	84	83	71	59	56	56	56	69	68	47	50	72	75	66	66	73	70	70	70.2	87
27-Jul	76	78	79	81	80	78	72	66	61	53	51	47	44	61	66	59	49	45	60	74	70	72	74	79	65.7	81
28-Jul	82	84	84	86	86	82	73	65	56	53	50	48	45	45	48	51	58	76	79	69	76	77	81	90	68.4	90
29-Jul	88	91	98	99	99	95	91	79	66	62	63	59	58	51	49	48	52	50	55	72	93	90	90	90	74.5	99
30-Jul	94	96	97	98	97	96	94	89	76	68	64	61	59	76	65	53	55	54	59	60	68	83	83	88	76.3	98
31-Jul	88	80	79	76	70	67	62	58	50	42	39	36	35	35	38	56	61	65	83	91	90	93	93	93	65.8	93
																		80.0 80.6 81.6 83.2 83.9 82.7 79.3 74.9 69.7 64.1 60.7 58.0 56.2 56.3 56.3 56.7 56.7 59.9 63.0 65.3 69.1 74.4 76.9 79.0						Diurnal Average		
																		99 99 99 99 99 98 99 97 97 95 94 94 94 95 88 91 89 93 97 98 99 98 97 98						Diurnal Maximum		







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

**Relative Humidity (RH) - %**  
**Firebag - July 2015**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	53	7.12	7.12
40 - 60	201	27.02	34.14
60 - 80	229	30.78	64.92
80 - 100	261	35.08	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

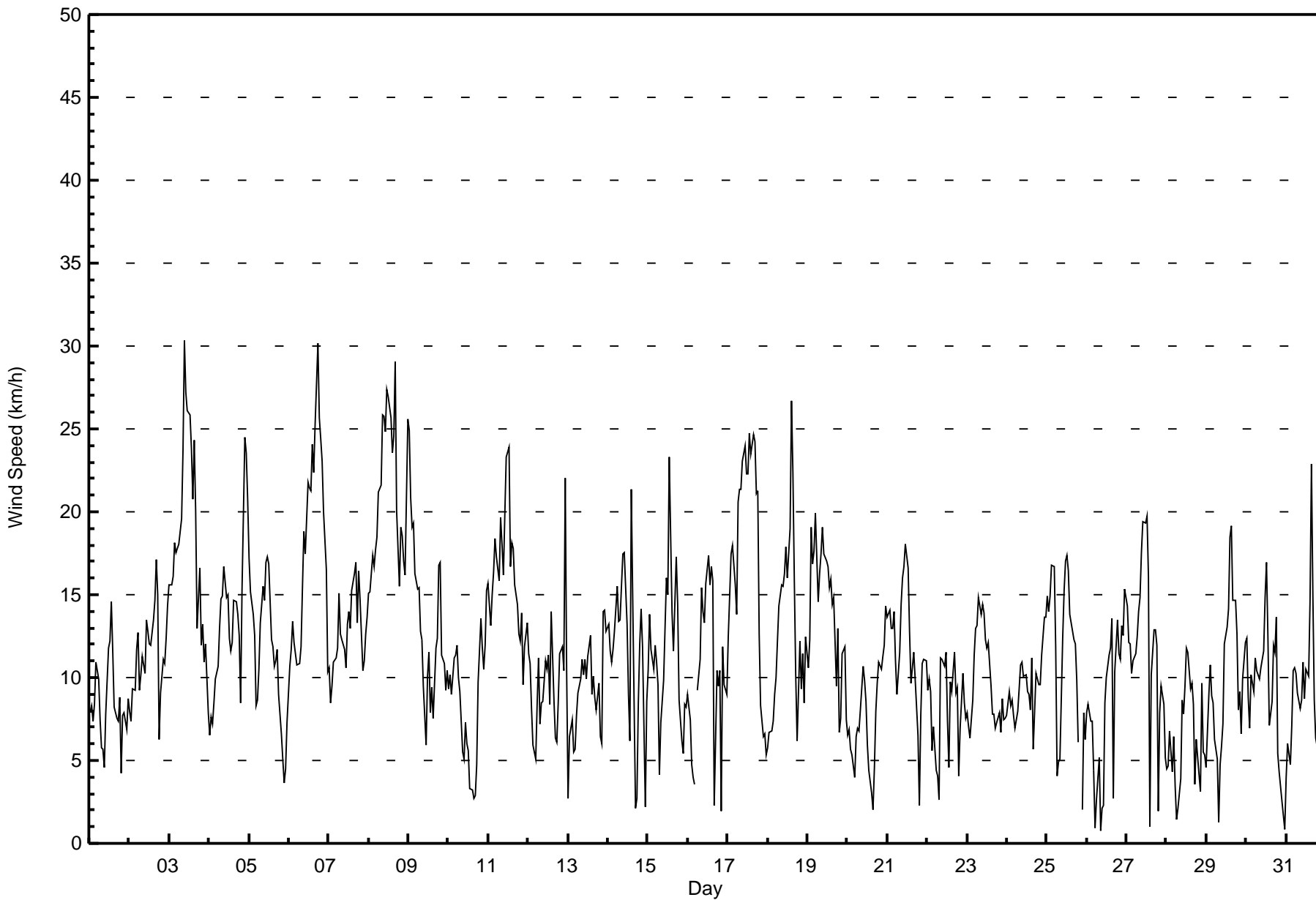


Maximum Speed: 30 km/h on Jul 3 10:00	Maximum Daily Speed Average: 17.4 km/h on Jul 17	Hours in Service: 744
Minimum Speed Value: 1 km/h on Jul 26 09:00	Minimum Daily Speed Average: 3.0 km/h on Jul 20	Hours of Data: 742
Maximum Diurnal Speed Average: 7.8 km/h at hour 14	Minimum Diurnal Speed Average: 1.3 km/h at hour 22	Hours of Missing Data: 2
Monthly Average Velocity: 4.5 km/h 266.9 deg	Percentiles: P <sub>1</sub> = 2 P <sub>10</sub> = 5 Q <sub>1</sub> = 8 Median = 11 Q <sub>3</sub> = 15 P <sub>90</sub> = 19 P <sub>99</sub> = 27	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-Jul	SW8	S8	SW7	WSW8	WSW11	SW10	SW7	WSW6	SW6	W5	W8WSW12	WSW12	WNW15	WNW12	WSW8	W8	WNW7	WNW9	W4	SW8	SW8	SW7	SW9	WSW7.5	WNW15	
2-Jul	SW8	SSW7	SW9	SSW9	SW12	SW13	SW9	SW10	WSW11	W10	WNW14	W13	W12	WSW12	WSW13	WSW15	WSW17	WSW15	SW6	SSW9	SSW11	S11	S12	SSW14	SW10.0	WSW17
3-Jul	SSW16	SW16	SSW16	SSW18	SW18	SSW18	SSW18	SW20	WSW24	WSW30	W27	WNW26	NW26	NW24	NW21	NNW24	NW20	NW13	NW17	WNW12	WNW13	WNW11	NW12	WNW8	W13.2	WSW30
4-Jul	WNW6	W8	WSW7	WSW8	WSW10	W11	W13	WNW15	W15	WSW17	WSW15	WSW15	WSW12	WNW12	NW12	NNW15	N15	N14	N13	NW9	N15	NNE24	NNE24	NNE21	NW8.5	NNE24
5-Jul	NNE17	N15	N14	NNE13	NNE8	N9	N11	N13	NNW16	NNW15	N17	N17	N12	N12	NNW11	NW11	NW12	NW9	NW7	WSW5	SSW4	S4	SSW7	N9.3	N17	
6-Jul	SSW11	SSW12	SSW13	SW12	SW11	SW11	SW11	SW12	WSW15	WSW19	W17	WSW22	WSW21	WSW21	WSW24	NNW22	N25	NNW30	N26	N24	N23	NNW20	NNW16	NW10	WNW10.3	NNW30
7-Jul	NW11	WNW8	NW9	NW11	NW11	NW12	NW15	NW13	WNW12	WNW12	WNW11	W13	W14	W13	W15	W16	W17	W13	W16	WSW15	SW10	SW11	SSW13	SSW14	W10.8	W17
8-Jul	SSW15	SSW15	SSW17	SSW17	SSW18	SSW18	SSW21	SSW22	SSW26	SSW26	SSW25	SSW27	SSW27	SSW26	SSW24	S25	SSW29	SW20	WSW16	WNW19	WNW19	NW17	NW16	NNW26	SW16.2	SSW29
9-Jul	NNW25	N21	N19	N19	NNW16	N15	NNW15	NNW13	NNW12	NNW9	N6	NNW10	N12	N8	ESE9	ENE8	NE12	NE12	NNE17	NNE17	NE11	NNE11	NNE9	NNE10	N11.8	NNW25
10-Jul	NNE9	NNE10	NNE9	NNE11	NNE11	NE12	NNE10	NNE9	N5	NNW5	N7	NE6	SW6	SSW3	WNW3	NW3	NNW3	ESE5	ESE10	ESE14	ESE12	SE10	SE12	SE15	ENE4.3	SE15
11-Jul	SE16	SE13	SSE15	SSE16	SSE18	SSE17	SSE16	S20	S18	S16	S20	S23	S24	S17	S18	SSE18	SE16	ESE14	ESE13	ESE12	ESE14	ESE10	ESE12	ESE13	SSE14.5	S24
12-Jul	ESE11	SE11	SE8	ESE6	ENE5	ESE8	SE11	SSE7	S8	ENE9	ENE11	ESE11	E11	ENE8	E14	NE9	N6	NW6	ENE8	E11	E12	SE10	SW22	WSW10	ESE5.5	SW22
13-Jul	WNW3	SSE6	SSE7	SE6	SSW6	SSE8	S9	SSW10	SSW11	SW10	SSW11	SW10	SSW11	SW13	WSW9	WSW10	WSW9	W8	WSW10	SW6	S6	S14	S14	S13	SSW7.5	S14
14-Jul	S13	S12	S11	S12	S13	S16	S13	SSE13	S16	S17	S18	S13	SE9	S6	W21	WSW15	W2	SSW3	S8	S12	S14	SSW12	NNE2	SE9	S9.8	W21
15-Jul	S10	SSW14	SW12	SW11	SW12	WSW11	WSW10	W4	W7	W10	WSW13	WSW16	W15	SW23	SW14	W12	WSW15	WSW17	SW14	SW9	SW6	SSW5	SSW8	SSW8	SW10.7	SW23
16-Jul	SSW9	SSW7	SSW5	S4	S4	AF	NNE9	NNE11	NNE15	NNE14	NNE13	NNE16	NNE17	NE16	NE17	NE16	W2	WSW10	WNW9	NW10	ESE2	ESE12	NNW10	NNW9	NNE5.4	NNE17
17-Jul	NNW12	N15	NNE17	NNE18	N16	N14	N21	N21	N21	N23	N24	N22	N22	N25	N23	N25	NNE24	NNE21	NNE21	N13	N8	N6	NNW7	NW5	N17.4	N25
18-Jul	W6	WSW7	SW7	SW7	SW9	SW10	SW12	WSW14	WSW16	WSW16	WSW16	WSW18	SW16	SW19	WSW27	W22	W16	NNW10	W6	NNW12	WNW9	NW11	NW8	NW12	W10.9	WSW27
19-Jul	NW11	NW12	NNW19	NNW17	NNW18	NNW20	NNW15	NNW16	NNW17	NNW19	NNW17	NW17	NW17	WNW15	WNW16	NW14	NW15	NNW10	N13	N7	NW8	NNW11	NNW12	NW7	NW13.9	NNW20
20-Jul	WNW7	WSW7	W6	WSW5	WSW4	WSW6	WSW7	WSW7	W8	W11	WSW10	WSW9	WSW6	W4	NW3	NW2	S5	SSE8	ESE10	SE11	SE11	SE11	SE12	ESE14	SSW3.0	ESE14
21-Jul	ESE14	SE14	SE13	SSE13	S14	SE11	SE9	ESE12	ESE14	ESE16	ESE17	SE18	SE17	S13	SSW10	WSW11	W12	NW10	NNW7	NNE2	ESE8	SE11	SE11	SSE11	SE8.2	SE18
22-Jul	S9	SSW10	SSW9	SSW6	S7	S4	SW4	WSW3	WNW11	WNW11	WNW12	WNW7	NNW5	W10	W9	W11	WNW9	NW9	NE4	W7	WNW10	WNW8	W8	W5.6	WNW12	
23-Jul	WNW8	WNW7	NW6	NNW9	NNW11	NNW13	NNW13	NNW15	NNW14	NNW14	NW14	NW12	NW12	NW12	NW10	NW8	NW8	WSW7	SW7	SW8	SW7	SW9	SW7	SW8	NW7.7	NNW15
24-Jul	SW8	SW9	SW8	SW9	SW8	SW7	WSW8	WSW9	WSW11	WSW11	W10	WSW10	W9	W9	WSW8	SW11	SW6	SW10	WSW10	SW10	S10	S11	S14	S14	SW8.2	S14
25-Jul	S15	SSW14	SW15	SW17	WSW17	W12	WNW4	E5	SSW5	SW12	SW15	SW17	WSW17	W16	W14	WNW13	W12	WNW12	WNW10	NW6	AF	E2	NE8	NE6	WSW8.0	WSW17
26-Jul	NE8	ENE8	SE7	NE7	N4	NE1	SSW3	NE5	NNE1	SW2	SW2	S8	SW10	W11	NNW12	NNW14	W3	SW10	SW13	SW11	SW11	SW13	SW13	SW15	SW3.2	SW15
27-Jul	SW14	SW12	SW12	SW10	SSW11	SW11	SW12	WSW14	WSW15	WSW18	W19	WSW19	WSW20	NW16	E1	WSW10	W13	WNW13	NW12	N2	SSW8	SW9	SW8	SW5	WSW10.3	WSW20
28-Jul	W4	SSW5	SSE7	S4	SW6	WSW3	W1	NNW2	WNW4	NW9	NW8	NW9	NW12	WNW12	NNW9	NW10	N8	S4	SW6	SW4	WNW3	NW10	NNW6	WNW5	WNW4.1	NW12
29-Jul	S5	WNW9	W11	WSW9	WSW8	W6	N5	NE1	NNW5	NW6	WNW7	W12	W13	W14	W18	W19	WNW15	NNW15	N13	NW8	WNW9	NW7	W10	WSW12	WNW8.1	W19
30-Jul	W12	W9	WNW7	WSW10	WSW9	WSW11	WSW10	WSW10	WNW10	WNW11	WNW12	NW15	NW17	WNW13	W7	WNW9	W12	N12	NNE14	NNE5	WSW4	SSW3	S2	E1	WNW7.3	NW17
31-Jul	SSW4	SSW6	S5	SSW7	SSW10	SSW11	SSW10	SW9	WSW8	W9	WNW11	WNW9	W11	W10	W15	W23	WNW15	WNW9	WNW6	NNE5	NW1	SW8	SW8	N5	WSW6.6	W23

SW3.1 SW3.7 SW3.9 SW3.6	WSW4.8 WSW4.5 WSW3.8	W4.0 W6.1 W6.8 W6.9 W7.5 W7.6 W7.8 W7.4	NNW7.7 NNW7.1 NNW6.1	NW4.5 NW2.6	WSW1.7 SW1.3	WSW2.1 SW2.2	Diurnal Average
NNW25 N21 NNW19 N19	SSE18 NNW20 SSW21 SSW22 SSW26	WSW30 W27 SSW27 SSW27 SSW26	WSW27 N25 SSW29 NNW30	N26 N24 N23	NNE24 NNE24 NNW26		Diurnal Maximum

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





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

**Wind Speed (WS) - km/h**  
**Firebag - July 2015**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	77	10.38	10.38
6 - 11	317	42.72	53.10
12 - 19	284	38.27	91.37
20 - 28	61	8.22	99.60
29 - 38	3	0.40	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 742

Total Number of Hours: 744



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

**Wind Speed (WS) - km/h**  
**Firebag - July 2015**

<b>Wind Speed</b> <b>Ranges (km/h)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	5	5	4	1	4	2	0	0	9	11	5	6	9	6	5	5	77
6 - 11	10	13	6	7	2	10	15	7	13	27	59	43	29	31	32	13	317
12 - 19	22	13	6	0	2	15	10	9	24	21	24	33	31	23	24	27	284
20 - 28	14	6	0	0	0	0	0	0	5	9	4	7	4	1	4	7	61
29 - 38	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1	3
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	51	37	16	8	8	27	25	16	51	69	92	90	73	61	65	53	742

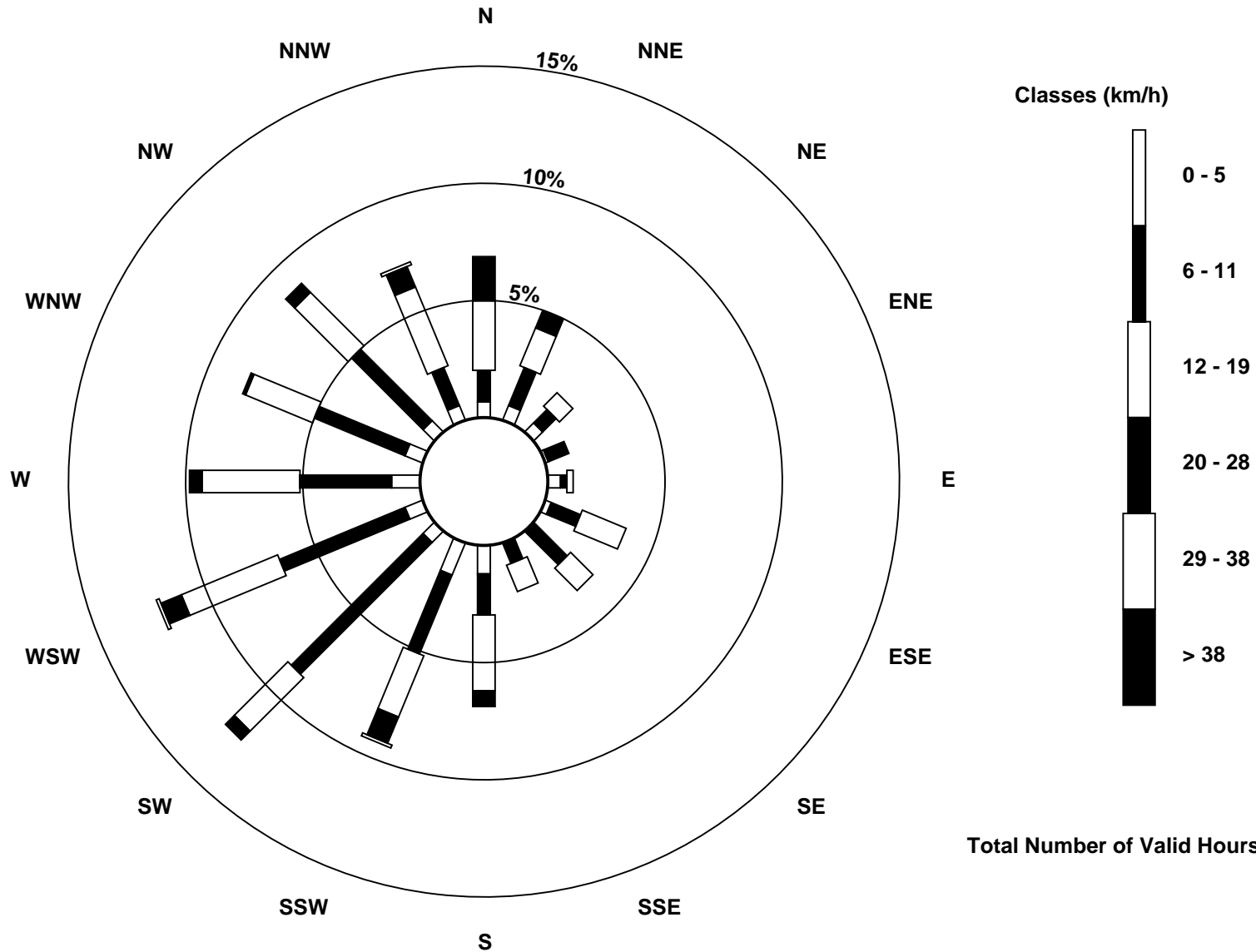
Total Number of Valid Hours: 742

Total Number of Hours: 744



Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Wind Speed (WS) - km/h  
Firebag (AMS 19)





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

**Wind Speed (WS) - km/h**  
**Firebag - July 2015**

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



# Wood Buffalo Environmental Association

## Summary of Hour Averages

Wind Direction (WD) - deg

Firebag - July 2015

Direction of Maximum Speed: 249 deg on Jul 3 10:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 4.1 deg on Jul 17	Hours of Data: 742
Direction of Minimum Speed: 14 deg on Jul 26 09:00	Direction of Minimum Daily Speed Average: 3.0 deg on Jul 20
Direction of Minimum Speed: 14 deg on Jul 26 09:00	Hours of Missing Data: 2
Monthly Average Direction: 269.0 deg	Percent Operational Time: 99.7

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jul	224	191	228	246	244	232	236	250	230	264	275	252	247	285	283	257	278	294	294	259	226	222	220	218	249.4
2-Jul	214	211	216	209	224	223	229	233	248	277	288	277	275	253	247	240	241	251	220	203	197	186	180	198	232.9
3-Jul	208	214	212	207	214	209	207	231	244	249	263	284	309	326	323	333	323	313	306	297	296	303	316	293	270.9
4-Jul	282	276	253	240	257	270	275	288	277	258	243	239	250	295	319	341	355	352	326	2	17	22	19	311.2	
5-Jul	18	11	11	15	18	6	1	350	338	343	354	9	1	350	3	341	318	313	315	310	257	210	189	197	350.8
6-Jul	207	210	213	217	217	220	225	236	248	256	264	257	258	248	252	338	349	346	2	356	352	344	337	321	289.1
7-Jul	315	298	305	306	313	313	320	319	297	289	301	274	259	270	269	272	269	272	270	254	229	214	212	213	277.0
8-Jul	209	208	206	206	204	209	213	209	206	212	213	205	205	195	201	190	208	221	245	282	300	325	317	344	220.3
9-Jul	346	352	349	352	345	350	347	342	333	347	358	347	351	360	102	68	48	39	25	28	36	24	22	22	5.1
10-Jul	21	24	17	24	30	35	31	33	359	346	7	48	225	211	284	311	336	114	122	117	120	129	130	135	62.2
11-Jul	139	135	156	158	166	156	160	179	179	174	187	188	177	173	171	148	125	119	108	113	115	108	112	122	153.9
12-Jul	122	132	130	104	74	119	139	165	189	57	74	106	94	76	97	49	356	305	58	82	87	125	229	249	109.6
13-Jul	294	167	153	127	202	155	181	212	209	226	207	221	212	230	240	251	255	262	253	229	186	172	175	174	206.7
14-Jul	181	179	187	173	169	182	176	165	179	181	181	177	141	190	279	244	268	203	171	173	185	205	26	137	185.6
15-Jul	179	213	225	226	230	240	254	268	271	259	255	248	259	231	235	261	246	246	231	229	216	202	197	196	235.6
16-Jul	194	199	203	183	173	AF	26	22	21	33	21	19	21	38	42	35	277	248	302	313	103	115	334	332	17.8
17-Jul	342	0	12	12	11	2	5	2	3	3	8	1	352	2	355	2	19	14	22	9	6	355	336	319	4.1
18-Jul	275	245	234	223	233	235	234	246	249	246	241	240	230	229	252	266	277	337	268	333	300	324	308	304	259.1
19-Jul	315	326	339	341	330	330	332	336	331	327	331	313	314	297	301	309	308	335	351	351	325	331	332	321	325.7
20-Jul	297	256	268	245	241	256	246	255	265	280	256	254	257	263	319	314	186	152	121	131	124	125	125	121	210.4
21-Jul	123	125	130	147	170	141	124	117	114	121	122	124	134	185	198	257	277	321	338	31	122	135	144	166	140.3
22-Jul	183	199	204	197	187	190	214	258	296	302	308	300	296	342	272	269	280	303	321	43	280	288	287	273	273.3
23-Jul	297	294	317	327	335	336	340	339	327	342	326	309	304	313	314	310	319	248	229	233	227	221	226	221	306.5
24-Jul	223	220	218	215	220	230	239	252	251	246	261	253	272	272	257	233	224	234	245	234	191	175	169	173	228.3
25-Jul	181	208	220	236	258	280	299	98	195	218	219	220	247	265	276	292	276	287	288	306	AF	84	56	52	247.6
26-Jul	49	78	135	49	9	40	200	34	14	223	232	188	226	278	348	336	260	232	220	225	219	215	214	218	233.1
27-Jul	217	222	226	219	213	221	227	241	244	256	267	249	253	308	87	247	259	289	320	4	201	215	223	236	246.2
28-Jul	264	209	161	186	218	238	272	339	286	304	304	310	323	302	305	323	6	180	222	222	297	317	347	301	293.0
29-Jul	171	294	278	257	255	268	352	42	333	312	291	277	259	259	276	263	295	342	1	306	284	324	262	255	284.6
30-Jul	266	262	282	253	252	251	257	258	287	295	302	305	311	284	265	284	268	353	30	19	256	208	185	87	285.4
31-Jul	206	202	191	199	204	203	208	219	245	278	293	301	279	273	262	270	296	299	292	19	325	224	223	356	256.7

226.7 224.4 228.9 231.4 237.3 241.3 251.5 264.3 265.6 271.6 273.3 264.3 268.5 273.3 276.8 289.5 292.6 300.5 314.5 308.3 254.2 235.2 242.5 233.5  
Diurnal Average

AF - Analyzer Failure

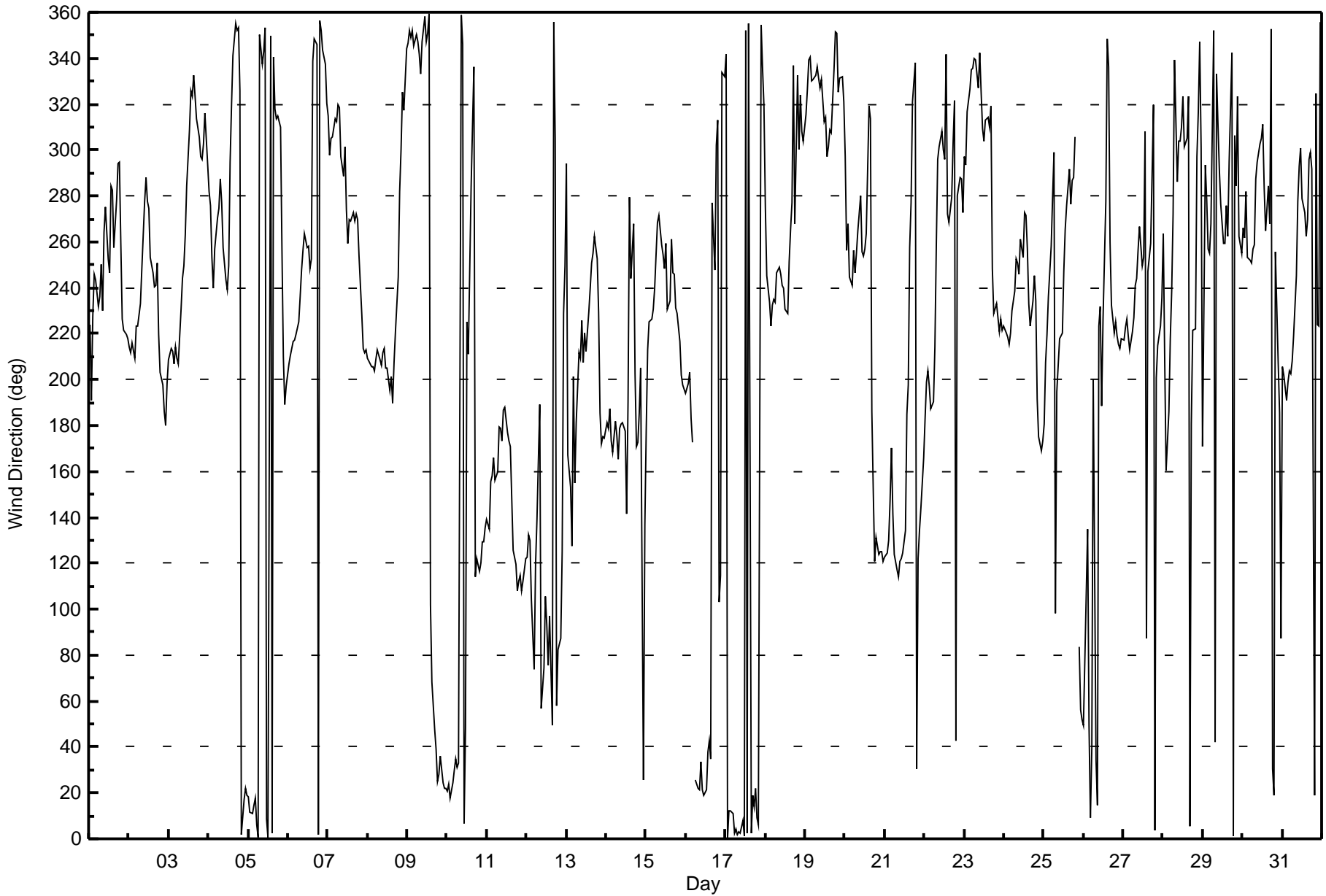
All monthly, daily, and diurnal averages have been calculated using vector methods





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

**Wind Direction (WD) - deg**  
**Firebag - July 2015**





Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg

Firebag - July 2015

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 90 deg on Jul 27 15:00			Hours of Data:	742
Minimum Value: 3 deg on Jul 16 00:00			Hours of Missing Data:	2
Percentiles: P <sub>1</sub> = 6 P <sub>10</sub> = 9 Q <sub>1</sub> = 11 Median = 15 Q <sub>3</sub> = 22 P <sub>90</sub> = 37 P <sub>99</sub> = 80			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-Jul	19	15	13	15	42	15	11	14	22	28	16	14	18	16	12	20	21	20	18	18	6	8	9	9	42
2-Jul	9	10	10	12	7	7	10	10	15	21	14	16	17	24	15	17	16	13	14	8	5	6	8	10	24
3-Jul	8	8	9	8	9	9	9	15	13	13	16	20	16	17	16	14	12	14	13	10	10	11	9	14	20
4-Jul	17	10	11	13	8	10	15	16	19	14	10	10	16	23	14	20	15	16	15	13	25	12	12	11	25
5-Jul	11	12	11	9	8	12	14	16	18	19	20	22	24	29	32	44	26	23	23	12	17	18	11	6	44
6-Jul	6	9	9	8	8	9	9	18	13	17	22	18	16	19	18	34	13	14	17	15	15	14	12	12	34
7-Jul	11	8	9	9	14	12	11	17	19	26	30	23	22	23	21	19	16	16	14	12	12	9	9	9	30
8-Jul	8	9	7	8	6	9	10	9	9	11	11	11	10	8	8	8	21	16	11	15	16	15	11	14	21
9-Jul	12	15	14	13	14	14	13	17	20	28	42	25	16	34	30	35	10	16	9	11	12	13	10	10	42
10-Jul	10	11	12	15	13	14	19	29	46	50	46	59	42	76	77	51	58	46	15	11	9	11	10	12	77
11-Jul	11	12	11	10	10	10	11	9	8	11	12	12	12	11	14	17	13	12	14	11	14	10	12	10	17
12-Jul	10	17	39	31	46	40	25	26	66	27	13	13	16	88	40	47	82	51	20	12	10	37	11	32	88
13-Jul	66	33	25	26	29	10	16	19	15	14	19	15	18	21	25	16	21	22	10	15	18	8	8	8	66
14-Jul	9	8	8	8	11	9	9	11	12	12	14	22	31	58	15	18	69	74	18	10	7	47	86	23	86
15-Jul	19	10	8	10	9	11	10	29	26	25	24	18	19	15	15	20	22	17	13	10	11	11	3	3	29
16-Jul	6	7	12	19	17	AF	23	14	16	15	21	18	20	22	19	17	78	42	17	12	85	25	35	12	85
17-Jul	14	13	9	8	12	14	14	14	14	16	16	16	16	16	17	17	13	14	16	13	11	8	11	13	17
18-Jul	15	9	10	8	6	9	10	13	12	13	14	13	12	13	10	14	34	26	31	14	10	10	15	12	34
19-Jul	10	15	12	12	11	12	11	14	13	14	14	19	16	21	19	19	17	17	15	20	11	11	10	10	21
20-Jul	13	12	18	10	24	12	13	12	26	27	29	37	51	51	51	43	65	39	16	11	11	11	11	9	65
21-Jul	10	10	11	17	10	14	13	11	9	11	12	12	14	21	25	24	22	22	19	40	17	11	10	15	40
22-Jul	8	9	16	10	7	18	24	54	15	15	16	25	39	73	40	26	28	28	31	38	13	12	11	20	73
23-Jul	14	18	14	13	13	12	11	14	13	13	20	18	20	21	25	30	25	23	14	10	10	7	7	9	30
24-Jul	7	9	10	9	11	7	13	19	23	30	33	33	39	39	44	37	34	14	18	15	14	8	7	7	44
25-Jul	9	19	12	14	14	20	50	17	41	16	13	16	19	19	24	24	21	19	15	12	AF	38	16	26	50
26-Jul	6	19	16	13	31	81	75	13	75	47	53	37	29	51	17	24	79	45	10	9	8	9	8	9	81
27-Jul	8	11	10	9	9	10	10	13	13	16	17	21	16	38	90	16	18	20	14	71	16	9	9	20	90
28-Jul	21	19	14	18	12	16	51	24	56	23	48	34	33	29	22	32	48	48	19	10	23	39	37	82	82
29-Jul	42	16	11	7	10	13	34	21	34	37	41	17	21	20	16	14	26	17	17	55	28	30	10	9	55
30-Jul	11	15	18	9	8	10	12	13	17	22	31	23	27	35	16	21	21	56	13	33	15	47	75	74	75
31-Jul	14	14	15	6	4	6	7	12	23	32	21	29	31	28	25	13	14	20	16	20	45	12	14	42	45
	66	33	39	31	46	81	75	54	75	50	53	59	51	88	90	51	82	74	31	71	85	47	86	82	

Diurnal Maximum

AF - Analyzer Failure



# Wood Buffalo Environmental Association SO2 Calibration Report

## Station Information

Calibration Date	July 9, 2015	Last Calibration	June 16, 2015
Station Name	Firebag	Station Number	AMS 19
Reason:	Routine		
Start Time (MST)	8:55	End Time (MST)	14:05
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	790	788
Calculated slope	0.996119	0.997818	Chamber temp	45.0	45.0
Calculated intercept	-0.336761	-0.574874	Pressure	688.9	683.7
Analyzer Background	8.4	8.0	Flow	0.451	0.448
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	-0.7	----
as found span	5000	58.3	574.8	570.4	1.008
calibrator zero	5000	0.0	0.0	-0.1	----
high point	5000	58.3	574.8	576.0	0.998
second point	5000	29.2	287.9	290.5	0.991
third point	5000	14.7	144.9	145.8	0.994
as left zero	5000	0.0	0.0	-0.1	----
as left span	5000	58.3	574.8	569.5	1.009
Average Correction Factor					0.994

Corrected As found	571.1	Previous response	577.4	% change	1.1%
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**Notes:**

Filter changed after as founds. Zero adjusted.

Calibration Performed By:

Devin Russell



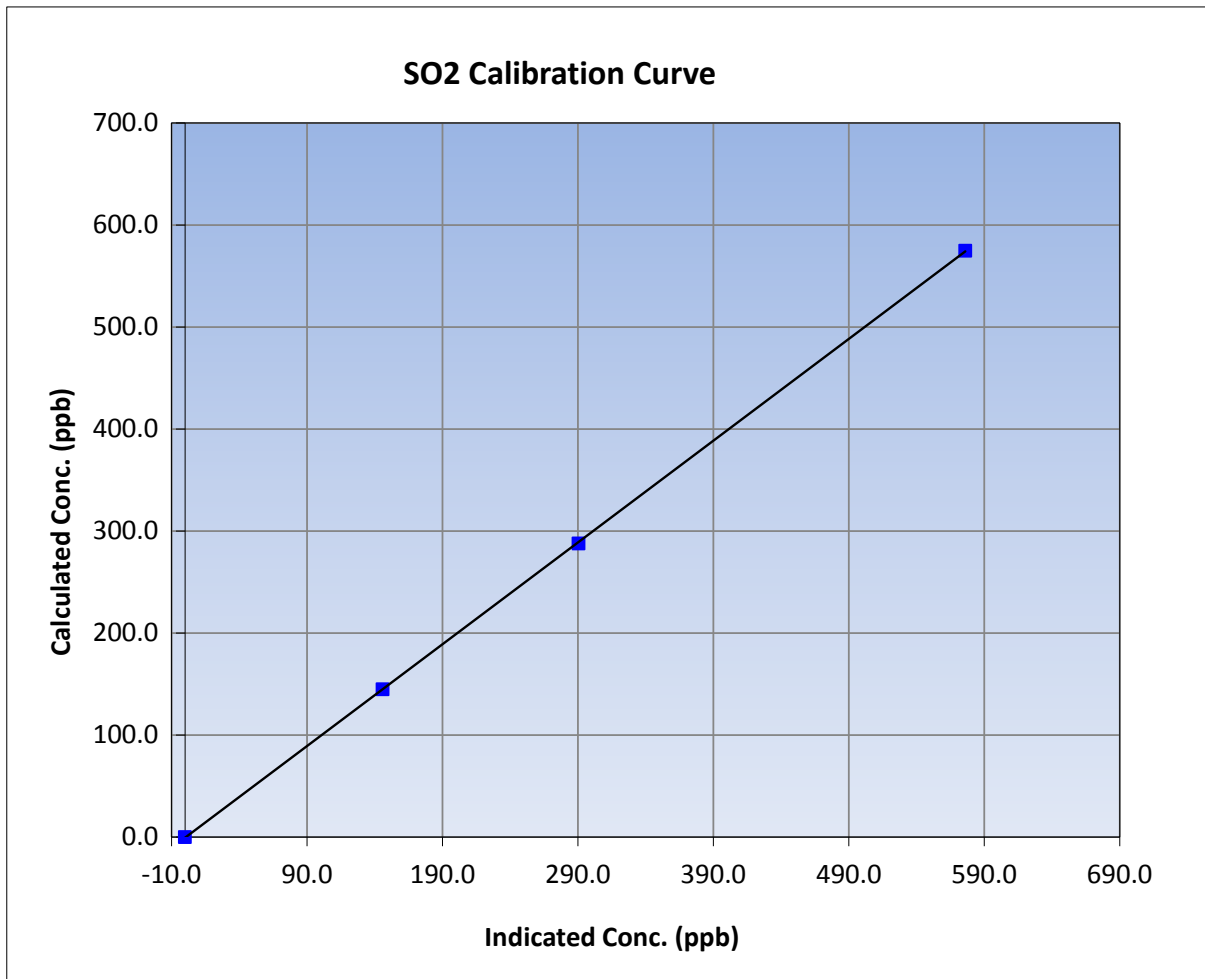
## Wood Buffalo Environmental Association SO2 Calibration Report

### Station Information

Calibration Date	July 9, 2015	Previous Calibration	June 16, 2015
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	8:55	End Time (MST)	14:05
Analyzer make	Thermo 43i	Analyzer serial #	1410661308

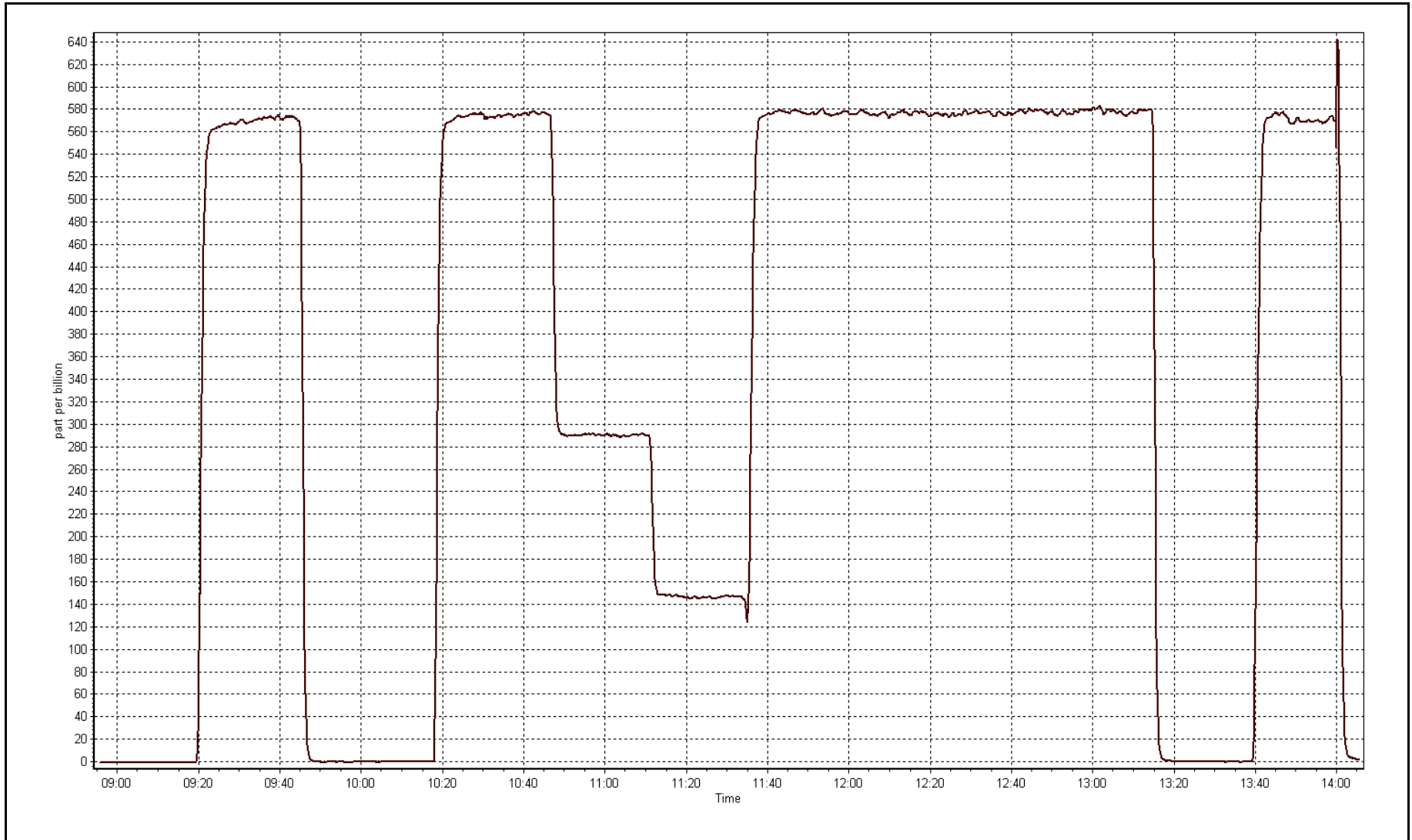
### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	----	Correlation Coefficient	0.999984
574.8	576.0	0.9980		
287.9	290.5	0.9911	Slope	0.997818
144.9	145.8	0.9939		
			Intercept	-0.574874



SO2 Calibration Plot

Date: July 9, 2015





# Wood Buffalo Environmental Association H2S Calibration Report

## Station Information

Calibration Date	July 10, 2015	Last Calibration	June 11, 2015
Station Name	Firebag	Station Number	AMS 19
Reason:	<input type="text" value="Routine"/>		
Start Time (MST)	8:50	End Time (MST)	11:50
Gas Cert Reference	ALM066720	Station temp.	22 Deg C
Cal Gas Concentration	4.85 ppm	Cal Gas Exp Date	10/06/2014
Calibrator Make/Model	API T700	Serial Number	996
ZAG air Make/Model	API 701	Serial Number	4891
DACS make/model	Campbell Scientific CR3000	Serial Number	9037
SO2 gas concentration	49.3 ppm	SO2 gas cert/exp	SA130123A December-12-16

## Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	-574	-574
Analyzer IP address	192.168.1.42		Lamp voltage	921	923
Calculated slope	0.995167	0.990716	Chamber temp	45	45
Calculated intercept	0.014391	-0.035374	Pressure	539.5	534.6
Analyzer Background	12.1	12.1	Flow	0.958	0.949
Analyzer Coefficient	1.073	1.073	Intensity	86	86
			Converter temp.	337	333

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	0.0	----
as found span	5000	83.3	80.8	81.1	0.996
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	81.6	0.990
second point	5000	41.7	40.4	40.9	0.989
third point	5000	21.0	20.4	20.5	0.993
as left zero	5000	0.0	0.0	0.2	----
as left span	5000	83.3	80.8	81.7	0.989
Average Correction Factor					0.991

Corrected As found	81.1	Previous response	81.2	% change	0.1%
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**Notes:**

Filter changed after as founds. Scrubber check completed after as founds.

Calibration Performed By: Devin Russell



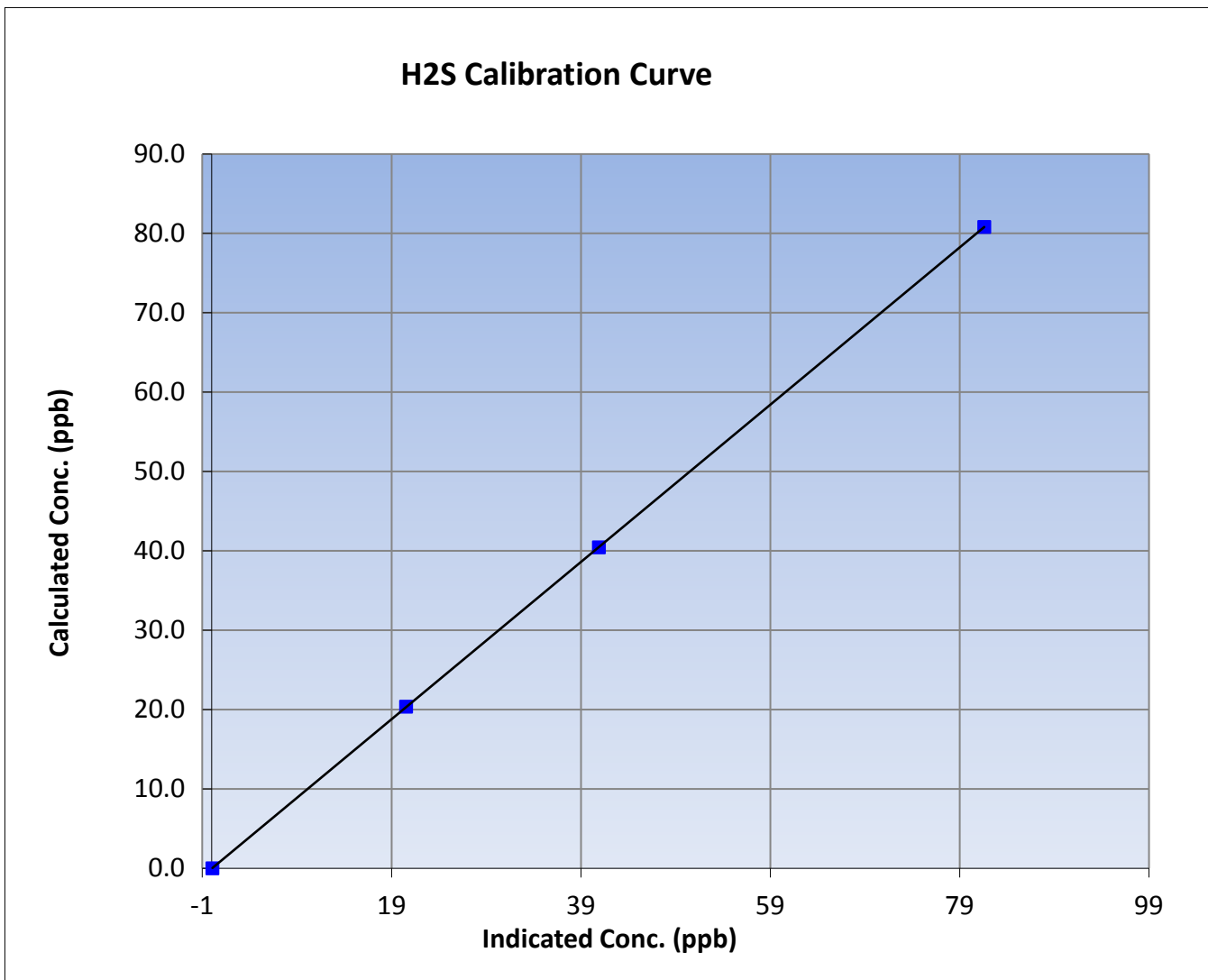
# Wood Buffalo Environmental Association H2S Calibration Report

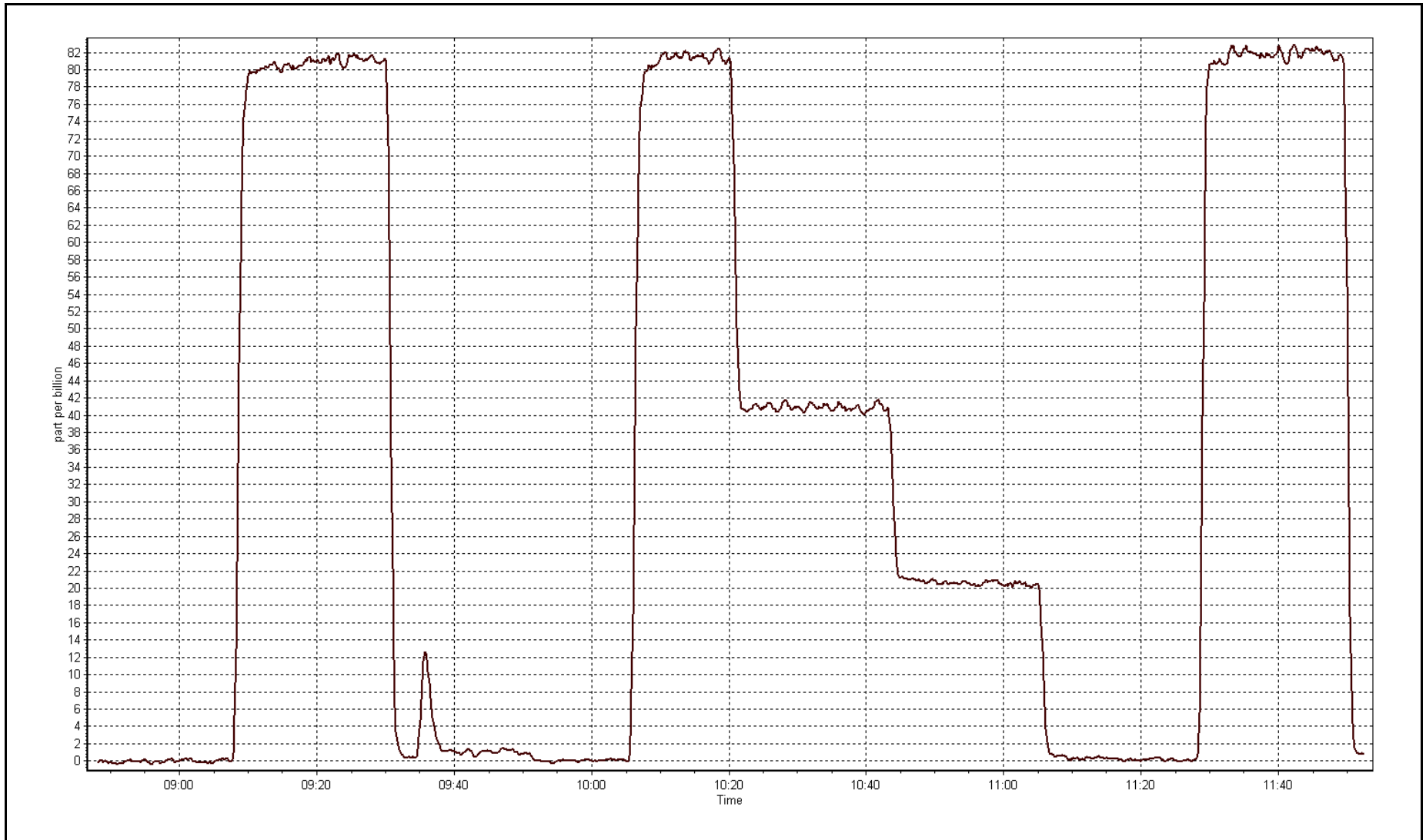
## Station Information

Calibration Date	July 10, 2015	Previous Calibration	June 11, 2015
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	8:50	End Time (MST)	11:50
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	0.999998
80.8	81.6	0.9902		
40.4	40.9	0.9892	Slope	0.990716
20.4	20.5	0.9927		
			Intercept	-0.035374









# Wood Buffalo Environmental Association THC Calibration Report

## Station Information

Calibration Date	July-09-15	Last Calibration	June-16-15
Station Name	Firebag	Station Number	AMS 19
Reason:	Routine		
Start Time (MST)	8:55	End Time (MST)	14:05
Gas Cert Reference		Cal Gas Expiry Date	12/12/2016
CH4 Cal Gas Conc.	512 ppm	CH4 Equiv Conc.	1092.3 ppm
C3H8 Cal Gas Conc.	211 ppm	Station temp.	22 Deg C
Calibrator Make/Model	API T700	Serial Number	996
ZAG make/model	Teledyne API 701	Serial Number	4891
DACS make/model	Campbell Scientific CR3000	Serial Number	9037

## Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 50 ppm		Sample Pressure	8.5	8.6
Analyzer IP address	192.168.1.51		Air or Bypass Press	34.9	34.9
Calculated slope	0.999302	0.997359	Fuel Pressure	23.0	23.0
Calculated intercept	-0.014696	0.021123	Analyzer Coeff	3.6	3.6
			Analyzer BKG	4.730	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	-0.03	----
as found span	5000	58.3	12.74	12.65	1.007
calibrator zero	5000	0.0	0.00	-0.03	----
high point	5000	58.3	12.74	12.74	1.000
second point	5000	29.2	6.38	6.39	0.998
third point	5000	14.7	3.21	3.20	1.004
as left zero	5000	0.0	0.00	-0.04	----
as left span	5000	58.3	12.74	12.73	1.000
Average Correction Factor					1.000

Corrected As found    12.68      Previous response    12.76      % change    0.6%

**Notes:**

Filter changed after as founds. Zero and span adjusted.

Calibration Performed By:

Devin Russell



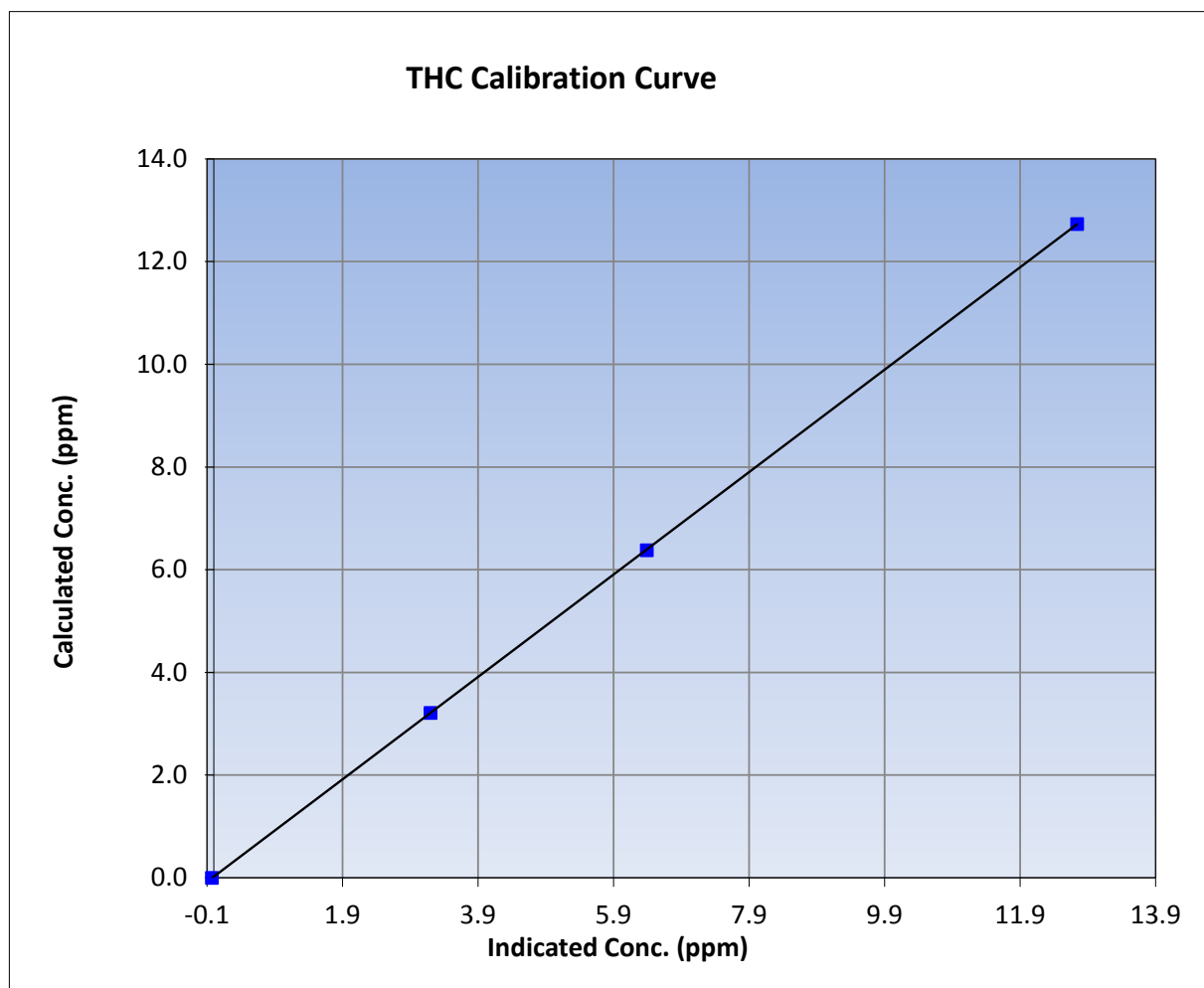
## Wood Buffalo Environmental Association THC Calibration Report

### Station Information

Calibration Date	July 9, 2015	Previous Calibration	June 16, 2015
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	8:55	End Time (MST)	14:05
Analyzer make	Thermo 51i-LT	Analyzer serial #	1336160089

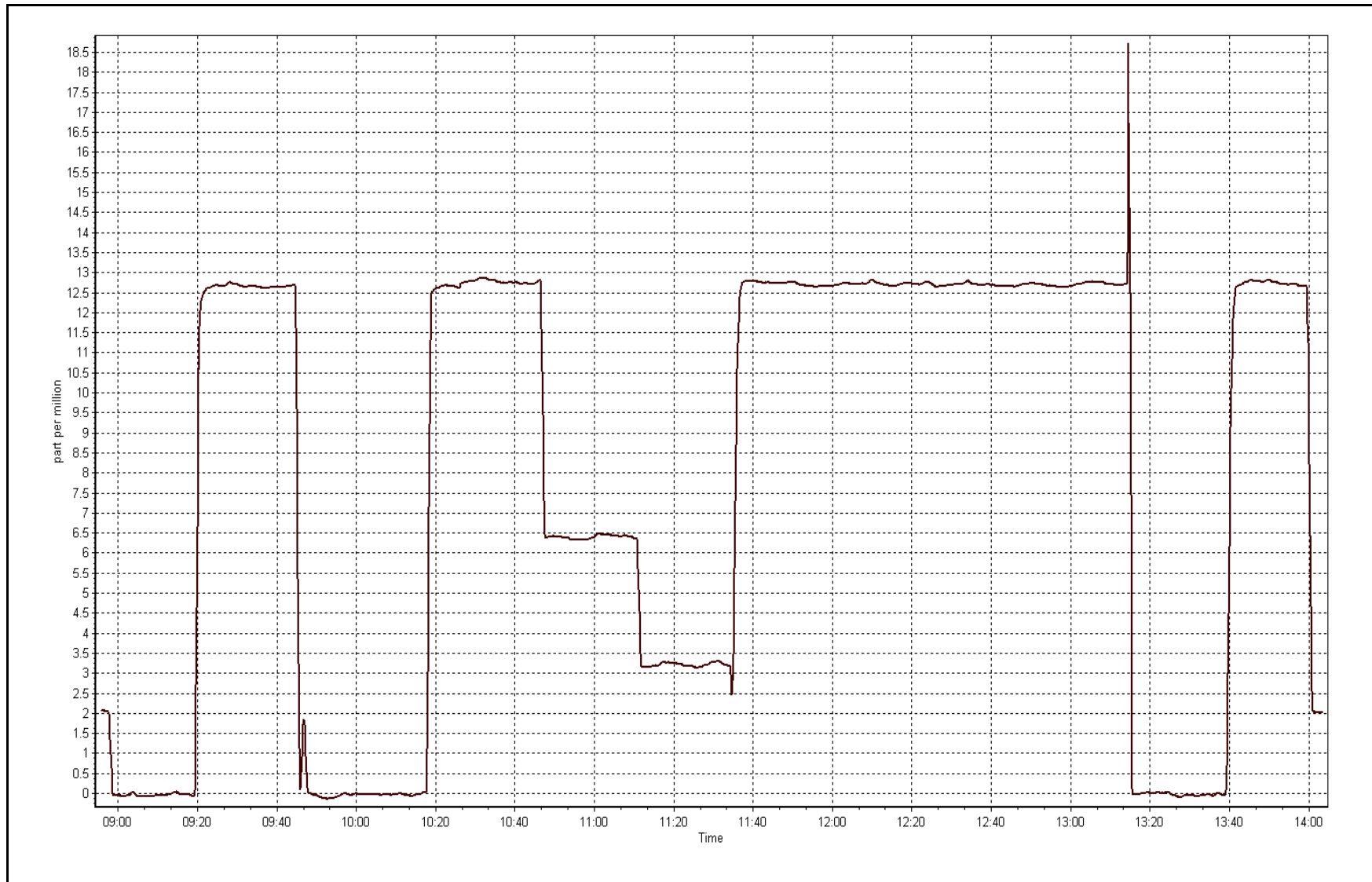
### Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	-0.03	----	Correlation Coefficient	0.999996
12.74	12.74	0.9997		
6.38	6.39	0.9982	Slope	0.997359
3.21	3.20	1.0035		
			Intercept	0.021123



THC Calibration Plot

Date: July 9, 2015





## Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

### Station Information

Calibration Date	July 9, 2015	Previous Calibration	June 16, 2015
Station Name	Firebag	Station Number	AMS 19
Reason:	Routine		
Start Time (MST)	8:55	End Time (MST)	14:05
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	0.999940	0.999670	0.996253
	Data Offset	-1.294125	-1.067892	-0.372093
Current Calibration	Data Slope	0.996846	0.998743	0.993402
	Data Offset	-0.794965	-0.922701	-0.374095

### Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1410661309
---------------------	------------	-------------------	------------

Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
NO coefficient	0.847		0.850	
NOx coefficient	1.000		1.002	
NO2 coefficient	1.000		1.000	
NO bkgrnd	3.6		3.7	
NOx bkgrnd	3.7		4.5	
Chamber Temp	50.8	Deg C	50.6	Deg C
Moly Temp	326.8	Deg C	327.6	Deg C
PMT voltage	-780	V	-780	V
PMT Temp	-2.9	Deg C	-2.8	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	158.6	mmHg	156.8	mmHg
R Cell Press Nox	158.6	mmHg	156.8	mmHg
NO sample flow	0.649	lpm	0.639	lpm
Nox sample Flow	0.651	lpm	0.641	lpm

**Notes:**

Filter changed after as founds. Zero and Span adjusted.



# Wood Buffalo Environmental Association

## NOX-NO-NO2 Calibration Report

### Station Information

Calibration Date: July 9, 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	0.5	0.0	0.5	----	----
as found span	5000	58.3	600.5	600.5	0.0	596.0	594.8	1.2	1.0075	1.0096
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.2	0.0	-0.2	----	----
high point	5000	58.3	600.5	600.5	0.0	602.4	601.5	0.9	0.9968	0.9983
second point	5000	29.2	300.8	300.8	0.0	303.8	303.1	0.6	0.9901	0.9921
third point	5000	14.7	151.4	151.4	0.0	153.2	153.1	0.2	0.9881	0.9892
as left zero	5000	0.0	0.0	0.0	0.0	-0.7	0.0	-0.7	----	----
as left span	5000	58.3	600.5	283.2	317.3	602.0	281.2	320.8	0.9976	1.0070
<b>Average Correction Factor</b>									<b>0.9917</b>	<b>0.9932</b>

Corrced As found NO<sub>x</sub>= 595.5 NO= 594.7 Percent Change NO<sub>x</sub>= 1.1% NO= 1.2%  
 Previous Response NO<sub>x</sub>= 601.8 NO= 601.8

### 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			-0.2			N/A	
1st NO2 (300)	----	283.2	318.3	603.6	283.2	320.4	0.9835	1.0000	0.9934	100.7%
2nd NO2 (200)	----	387.3	214.1	603.3	387.3	216.0	0.9838	1.0000	0.9913	100.9%
3rd NO2 (100)	----	491.9	109.6	603.4	491.9	111.6	0.9837	1.0000	0.9822	101.8%
4th NO2 (0)	601.5	----	2.3	603.7	601.5	2.3	0.9832	1.0000	N/A	----
<b>Average Correction Factor</b>							<b>0.9835</b>	<b>1.0000</b>	<b>0.9889</b>	<b>101.1%</b>

Calibration Performed By: Devin Russell



# Wood Buffalo Environmental Association

## NO<sub>x</sub> Calibration Summary

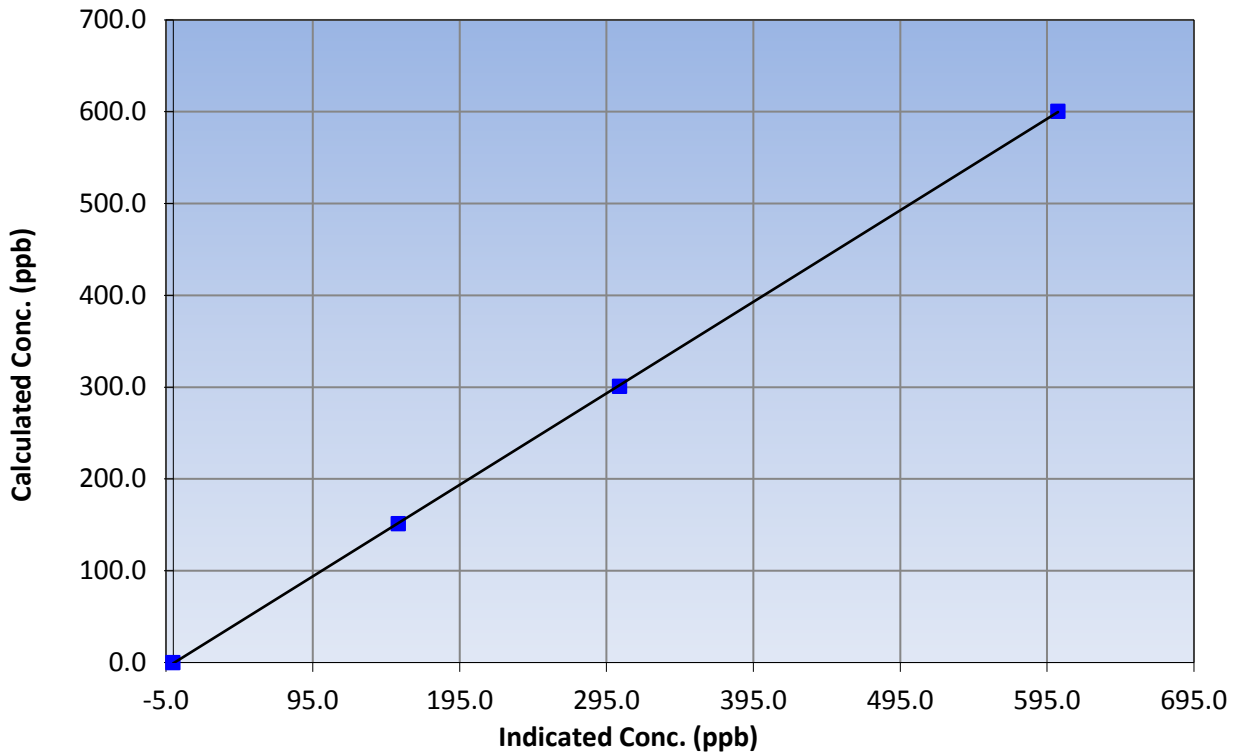
### Station Information

Calibration Date	July 9, 2015	Previous Calibration	June 16, 2015
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	8:55	End Time (MST)	14:05
Analyzer make	Thermo 42i	Analyzer serial #	1410661309

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	----	Correlation Coefficient	0.999982
600.5	602.4	0.9968		
300.8	303.8	0.9901	Slope	0.996846
151.4	153.2	0.9881		
			Intercept	-0.794965

### NO<sub>x</sub> Calibration Curve





# Wood Buffalo Environmental Association

## NO Calibration Summary

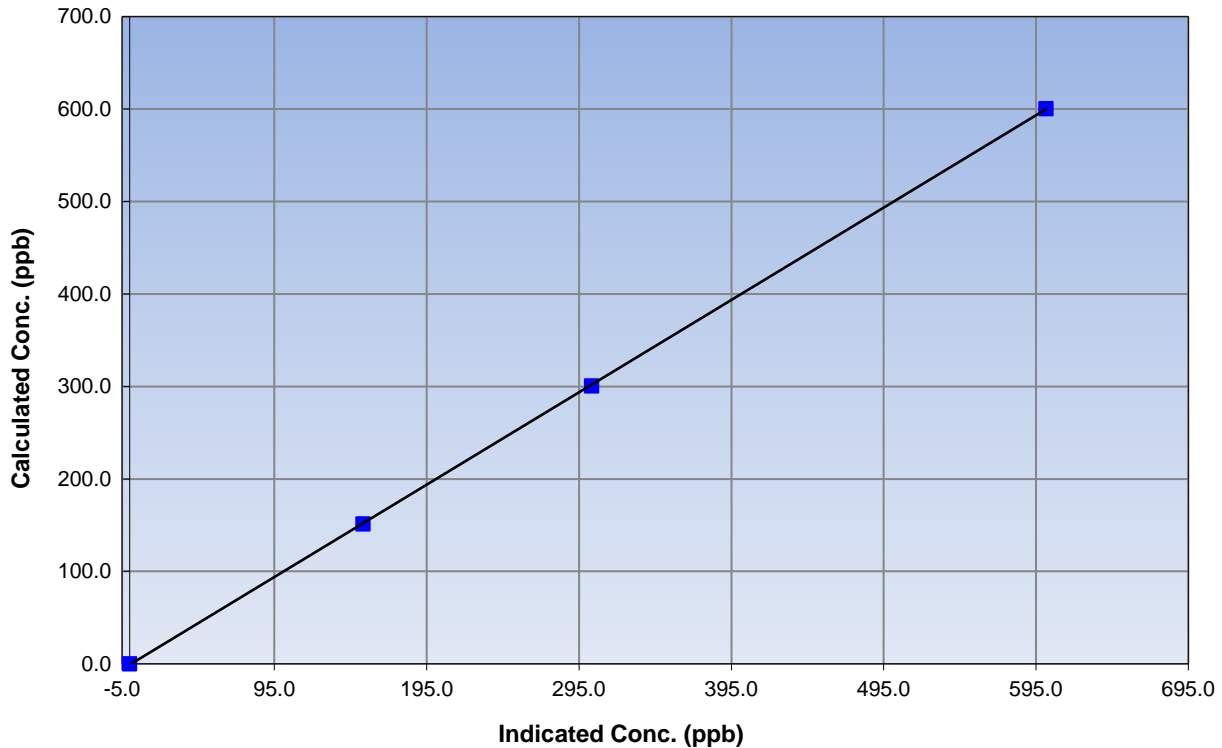
### Station Information

Calibration Date	July 9, 2015	Previous Calibration	June 16, 2015
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	8:55	End Time (MST)	14:05
Analyzer make	Thermo 42i	Analyzer serial #	1410661309

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999986
600.5	601.5	0.9983		
300.8	303.1	0.9921	Slope	0.998743
151.4	153.1	0.9892		
			Intercept	-0.922701

### NO Calibration Curve





# Wood Buffalo Environmental Association

## NO<sub>2</sub> Calibration Summary

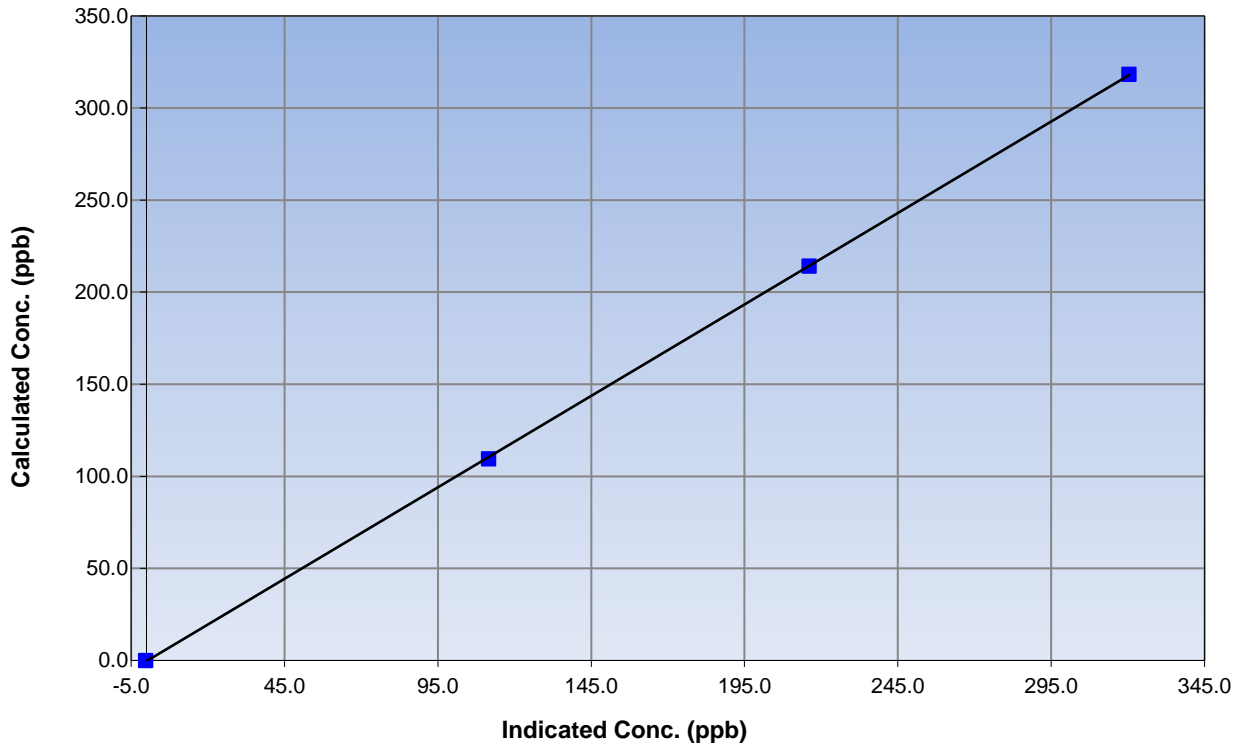
### Station Information

Calibration Date	July 9, 2015	Previous Calibration	June 16, 2015
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	8:55	End Time (MST)	14:05
Analyzer make	Thermo 42i	Analyzer serial #	1410661309

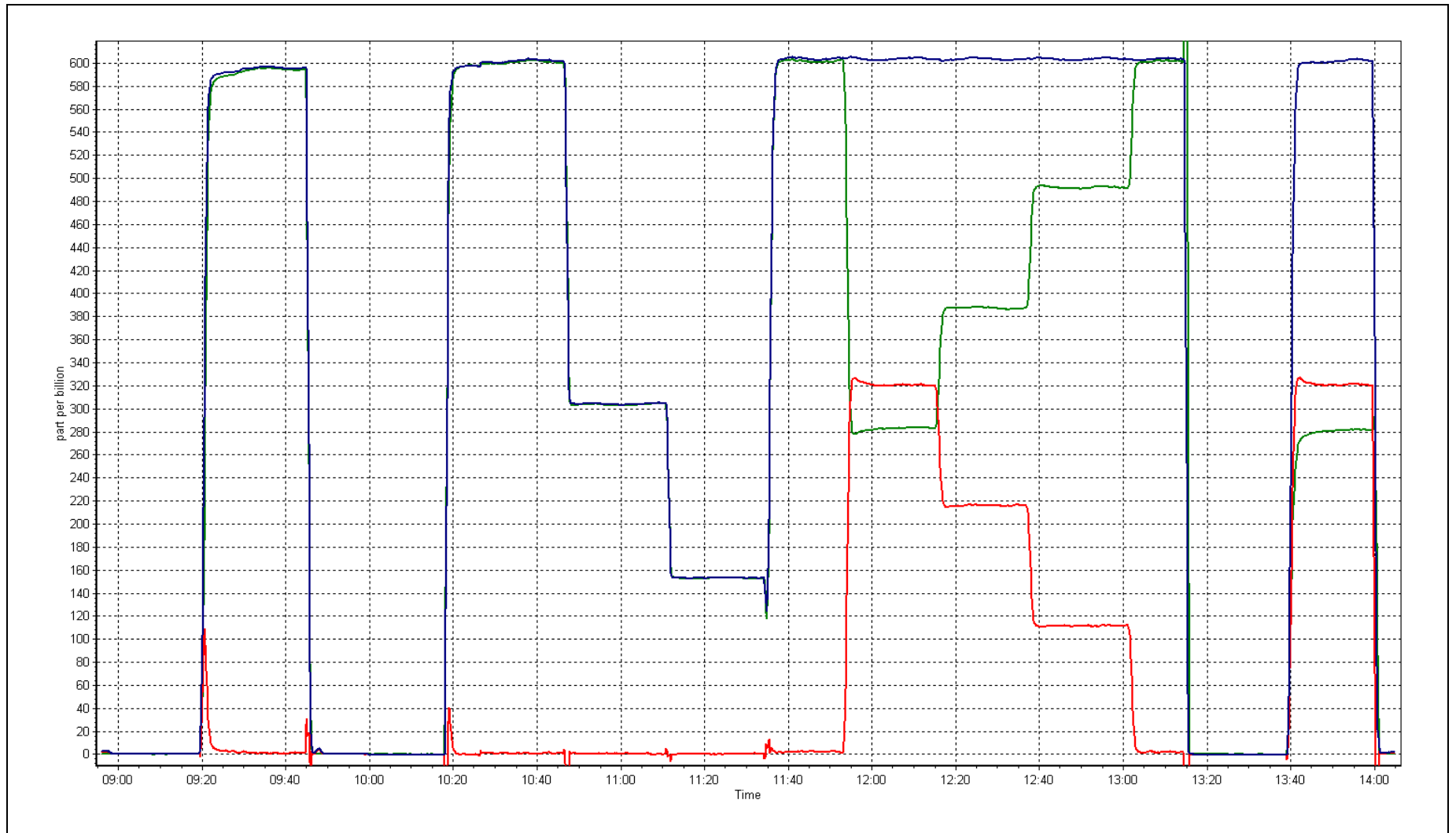
### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	N/A	Correlation Coefficient	0.999977
318.3	320.4	0.9934		
214.1	216.0	0.9913	Slope	0.993402
109.6	111.6	0.9822		
			Intercept	-0.374095

### NO<sub>2</sub> Calibration Curve









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## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS 502  
CONOCOPHILLIPS  
SURMONT  
JULY 2015**

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

August 26, 2015



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONOCOPHILLIPS SURMONT (AMS 502)  
 JULY 2015

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	707	37	37	100.00	8	0	3	0
H2S (ppb) Average	706	35	38	99.60	6	0	2	0
NO2 (ppb) Average	708	36	36	100.00	21	0	5	-
NO (ppb) Average	708	36	36	100.00	15	-	5	-
NOX (ppb) Average	708	36	36	100.00	33	-	7	-
Temperature 2 m (C) Average	744	0	0	100.00	28.9	-	23.6	-
Relative Humidity (%) Average	744	0	0	100.00	98	-	83	-
Wind Speed 10 m (km/h) Average	744	0	0	100.00	31	-	20	-
Wind Direction 10 m (deg) Average	744	0	0	100.00	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONOCOPHILLIPS SURMONT (AMS 502)  
 JULY 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	707	0.9	1	-	0	0	0	0	1	2	8
H2S (ppb) Average	706	0.6	1	-	0	0	0	0	1	1	6
NO2 (ppb) Average	708	1.4	2	-	0	0	0	1	2	4	21
NO (ppb) Average	708	1.7	2	-	0	0	1	1	2	4	15
NOX (ppb) Average	708	3.2	3	-	0	1	1	2	4	7	33
Temperature 2 m (C) Average	744	17.62	4.1	-	6.5	12.4	14.7	17.3	20.8	22.9	28.9
Relative Humidity (%) Average	744	63.4	18	-	25	39	50	62	78	89	98
Wind Speed 10 m (km/h) Average	744	13	5	-	1	6	9	12	17	21	31
Wind Direction 10 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONOCOPHILLIPS SURMONT (AMS 502)  
JULY 2015

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
H2S	22 Jul 2015 10:00	22 Jul 2015 11:00	2	Maintenance - sample manifold cleaned
H2S	31 Jul 2015 11:00	31 Jul 2015 11:00	1	Unstable operation - excessive baseline drift



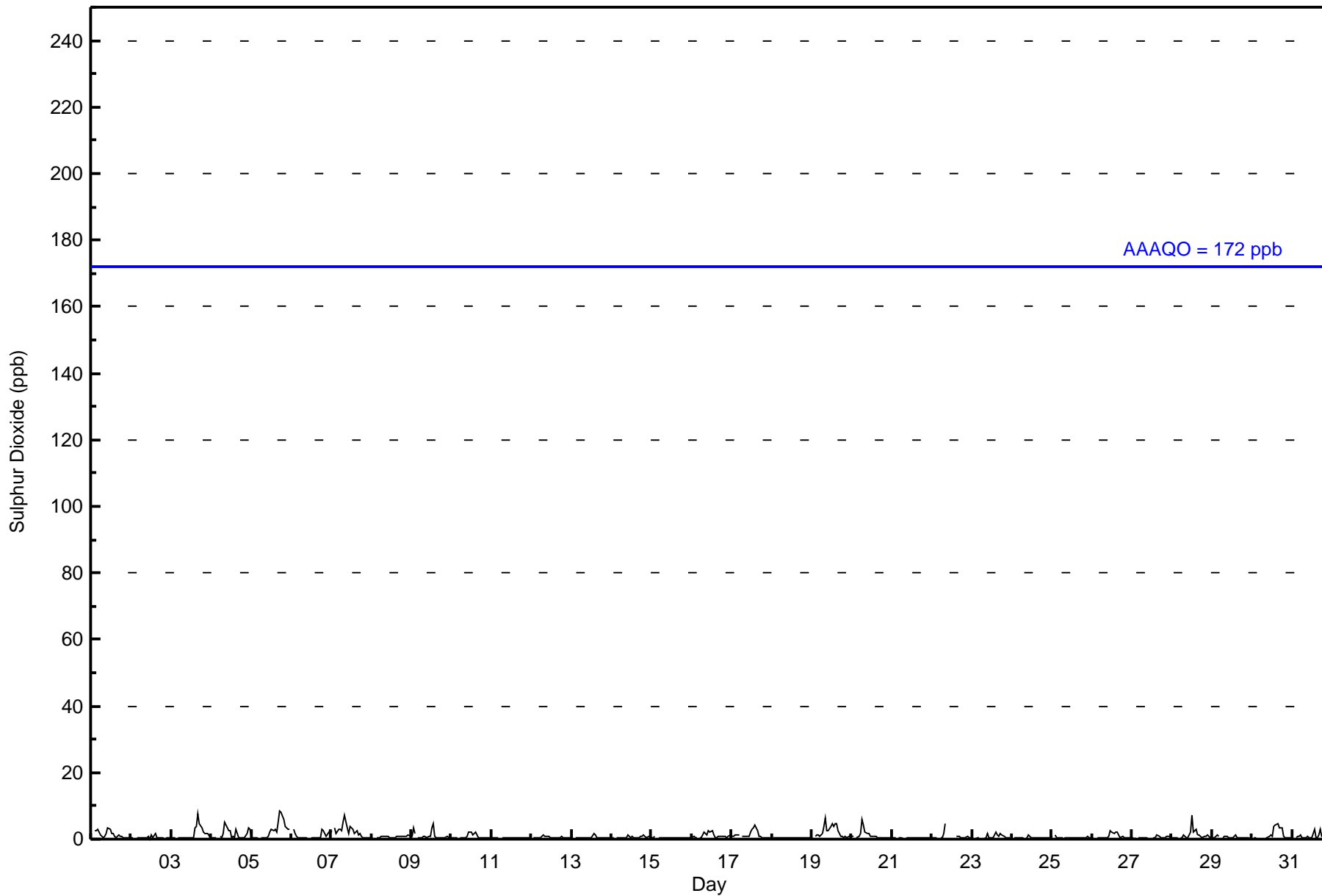
Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 8 ppb on Jul 5 18:00	Maximum Daily Average: 2.5 ppb on Jul 5		Hours of Data:	707
Minimum Value: 0 ppb on Jul 2 12:00	Minimum Daily Average: 0.3 ppb on Jul 21		Hours of Missing Data:	37
Maximum Diurnal Average: 1.4 ppb at hour 15	Minimum Diurnal Average: 0.6 ppb at hour 1		Hours of Calibration:	37
Monthly Average: 0.9 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 1 P <sub>90</sub> = 2 P <sub>99</sub> = 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-Jul	2	Z	3	3	3	1	1	1	1	2	4	3	2	2	1	0	1	1	1	0	0	0	0	0	1.4	4
2-Jul	1	0	Z	0	0	0	0	0	0	0	1	0	1	1	2	0	0	0	0	0	0	0	0	0	0.5	2
3-Jul	0	0	1	Z	1	1	1	0	1	0	0	1	1	4	4	8	5	3	2	2	2	2	0	1.6	8	
4-Jul	0	0	0	0	Z	1	0	2	5	4	3	2	1	1	1	3	0	0	0	0	2	3	3	1.5	5	
5-Jul	1	0	0	0	0	Z	1	0	0	0	1	2	3	3	3	2	5	8	8	6	4	4	3	2.5	8	
6-Jul	Z	3	2	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	3	3	2	1	2	1.0	3	
7-Jul	3	Z	3	2	3	3	2	5	7	3	2	4	3	3	2	2	1	2	1	0	0	0	0	2.3	7	
8-Jul	0	0	Z	0	0	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	0.7	1	
9-Jul	1	3	2	Z	1	0	0	1	1	0	1	1	3	5	1	0	0	0	0	0	0	1	1	1.0	5	
10-Jul	0	0	0	0	Z	0	1	0	0	1	2	2	2	1	2	1	1	0	0	0	0	0	0	0.8	2	
11-Jul	0	0	0	1	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1	
12-Jul	Z	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	1	1	0	0	0	0.6	1	
13-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0.5	2	
14-Jul	0	0	Z	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1	1	1	1	1	1	0.6	1	
15-Jul	1	1	1	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1	
16-Jul	0	1	0	0	Z	0	1	2	2	1	2	2	3	1	1	1	1	1	1	1	1	1	1	1.0	3	
17-Jul	1	1	1	1	1	Z	1	1	1	1	1	2	3	3	4	2	1	1	1	1	0	0	0	1.3	4	
18-Jul	Z	1	1	0	0	0	0	0	1	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0.5	1	
19-Jul	0	Z	1	1	1	1	2	4	6	2	2	4	4	4	5	5	3	1	1	1	1	0	1	2.2	6	
20-Jul	1	1	Z	1	1	2	6	4	2	2	1	1	1	1	1	1	0	1	0	1	1	0	0	1.2	6	
21-Jul	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-Jul	0	0	0	0	Z	0	0	2	5	C	C	C	C	C	C	1	1	1	0	0	0	1	1	--	5	
23-Jul	0	0	0	0	0	Z	0	0	0	2	0	0	0	0	2	1	1	2	1	1	0	0	0	0.6	2	
24-Jul	Z	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0.4	1	
25-Jul	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.4	1	
26-Jul	0	0	Z	0	0	0	0	1	1	0	1	2	2	2	2	2	1	1	1	1	0	0	0	0.8	2	
27-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	1	0.4	1	
28-Jul	0	0	0	0	Z	0	1	1	1	1	1	2	7	2	3	1	1	1	1	1	1	1	0	1.2	7	
29-Jul	1	0	1	1	1	Z	1	1	1	1	0	0	0	1	1	0	1	0	0	0	0	0	0	0.6	1	
30-Jul	Z	0	0	0	0	0	0	0	0	0	1	1	1	4	4	5	3	3	3	1	0	0	0	1.3	5	
31-Jul	0	Z	0	1	1	1	0	0	0	1	1	0	0	3	1	0	1	3	1	1	1	1	0	0.8	3	

0.6	0.6	0.8	0.7	0.7	0.6	0.7	1.0	1.2	0.9	1.0	1.2	1.4	1.4	1.4	1.2	1.2	1.1	1.0	0.8	0.7	0.7	0.8	0.7	Diurnal Average
3	3	3	3	3	3	6	5	7	4	4	4	7	5	5	5	8	8	8	6	4	4	3	3	Diurnal Maximum

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







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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**ConocoPhillips - Surmont - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	707	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: 707

Total Number of Hours: 744



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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**ConocoPhillips - Surmont - July 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	13	12	12	12	24	36	11	16	19	29	100	167	104	42	75	35	707
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	13	12	12	12	24	36	11	16	19	29	100	167	104	42	75	35	707

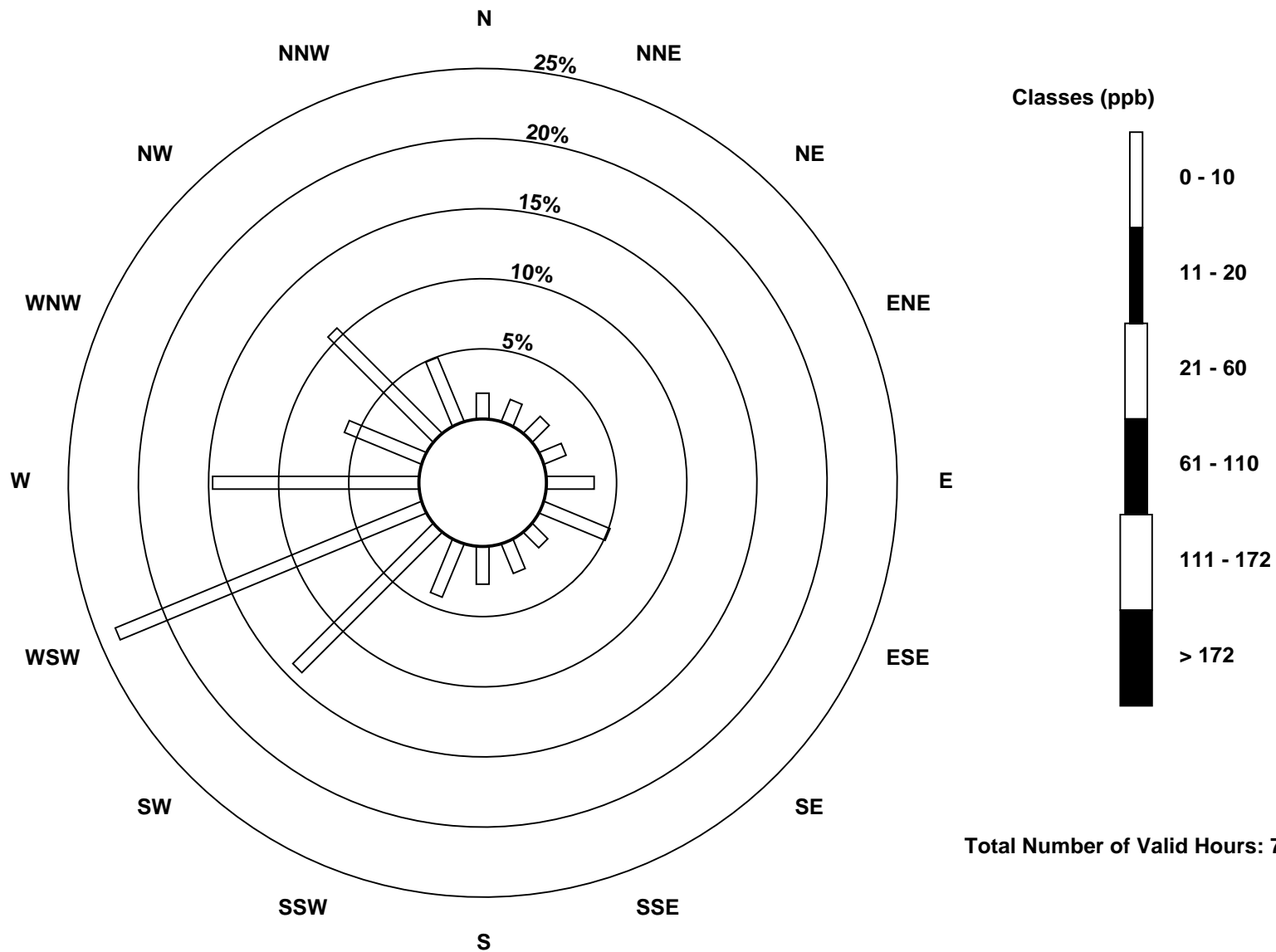
Total Number of Valid Hours: 707

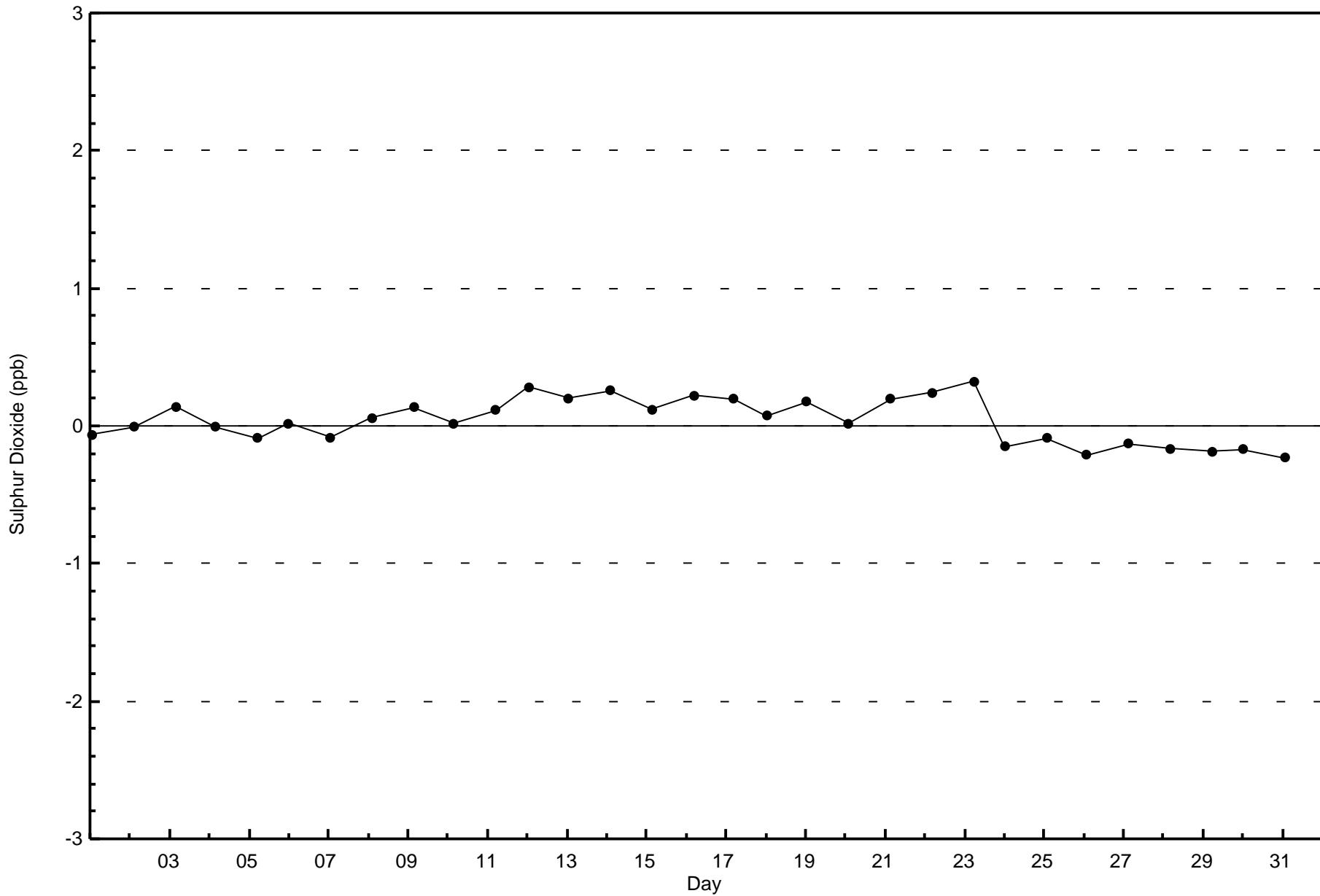
Total Number of Hours: 744



Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
ConocoPhillips - Surmont (AMS502)





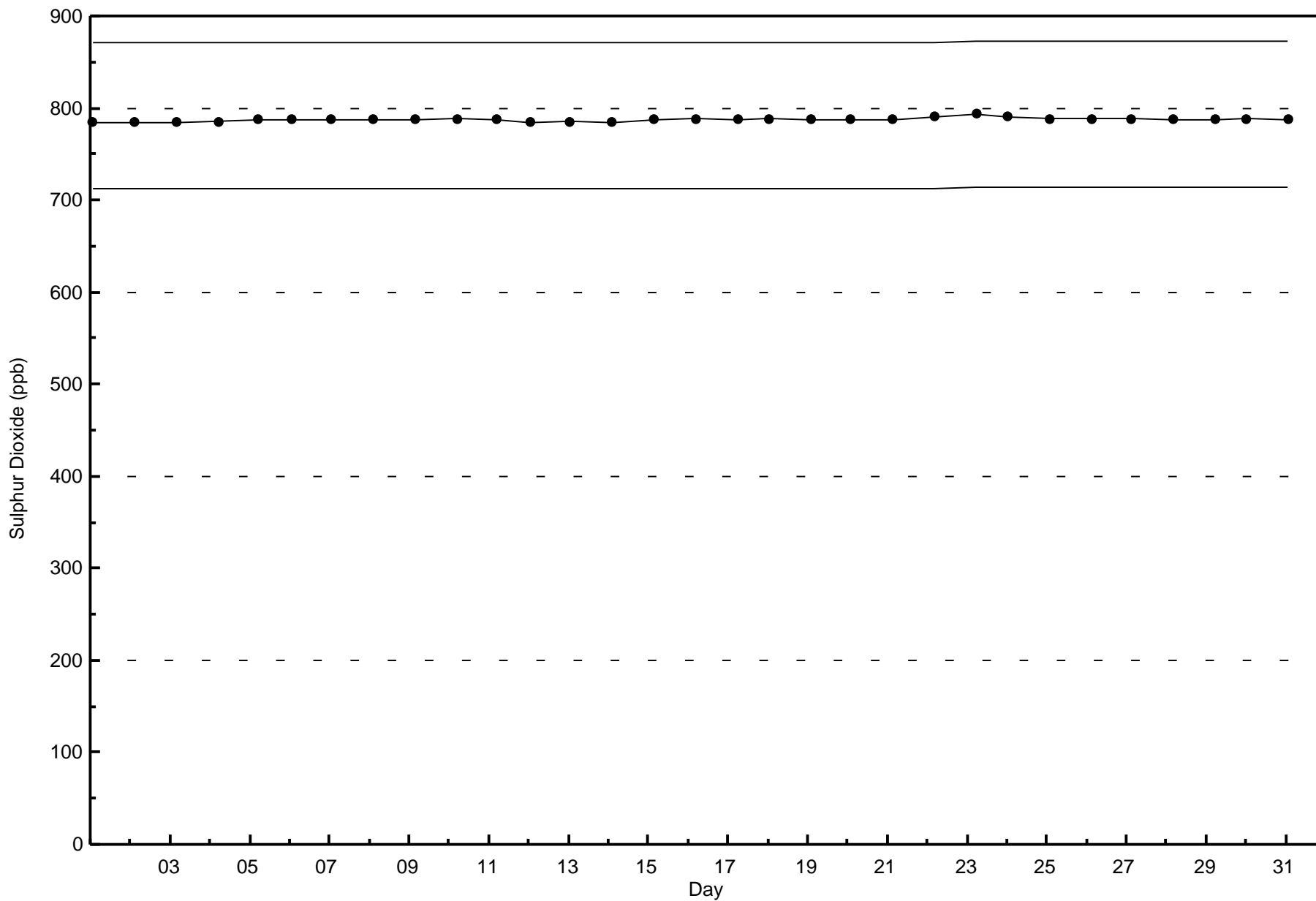


Wood Buffalo Environmental Association

Span Responses

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

ConocoPhillips - Surmont - July 2015



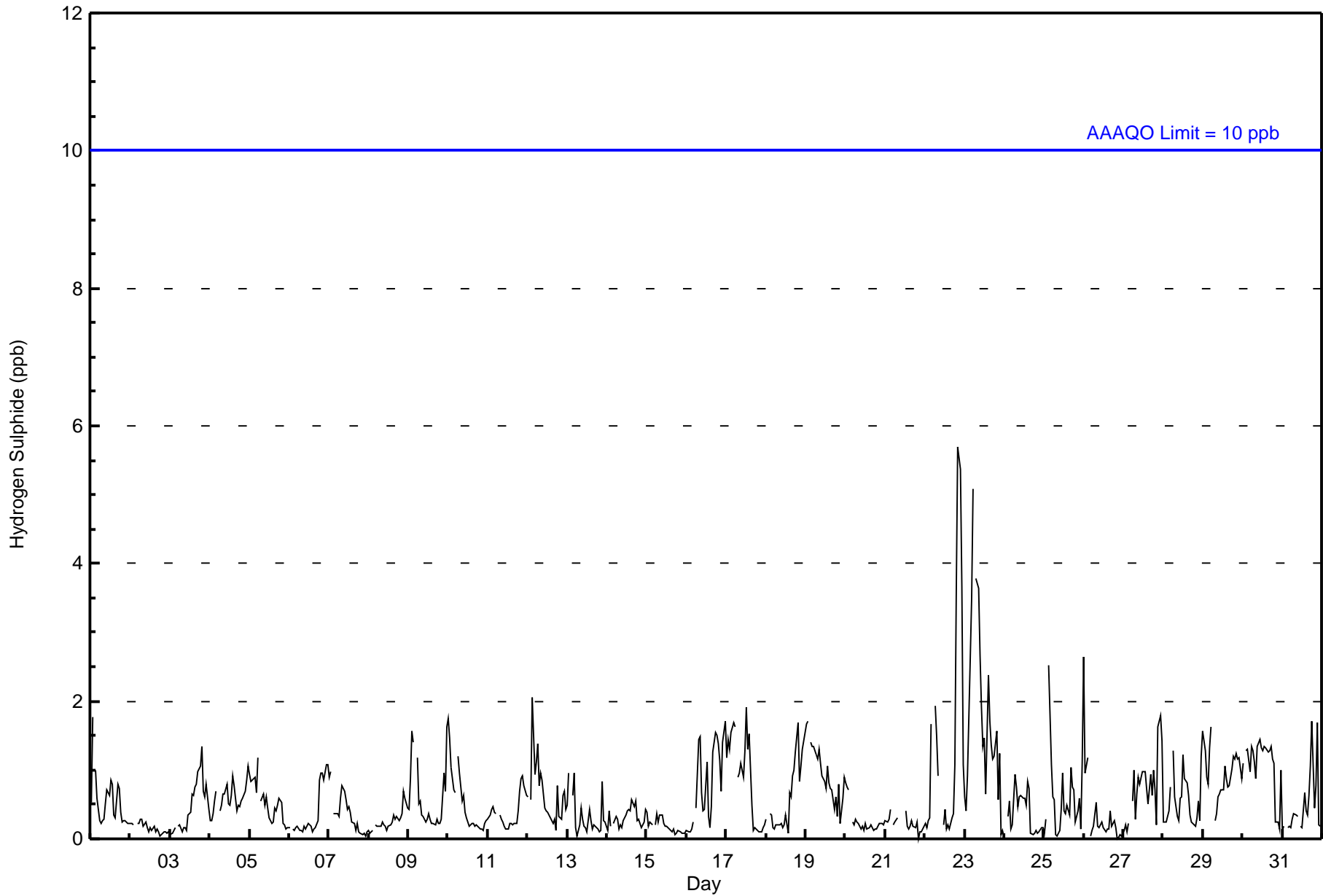


Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 6 ppb on Jul 22 21:00	Maximum Daily Average: 1.7 ppb on Jul 23		Hours of Data:	706
Minimum Value: 0 ppb on Jul 26 21:00	Minimum Daily Average: 0.2 ppb on Jul 2		Hours of Missing Data:	38
Maximum Diurnal Average: 0.8 ppb at hour 4	Minimum Diurnal Average: 0.5 ppb at hour 16		Hours of Calibration:	35
Monthly Average: 0.6 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 1 P <sub>90</sub> = 1 P <sub>99</sub> = 4		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-Jul	1	2	Z	1	1	0	0	0	0	1	1	1	1	1	0	0	1	1	0	0	0	0	0	0	0.5	2
2-Jul	0	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-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0.5	1	
4-Jul	0	0	0	1	1	Z	0	0	1	1	1	0	1	1	1	0	0	0	0	1	1	1	1	0.6	1	
5-Jul	1	1	1	1	1	1	Z	1	1	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0.5	1	
6-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0.4	1	
7-Jul	1	1	Z	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1	
8-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.3	1	
9-Jul	0	1	2	1	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.6	2	
10-Jul	2	1	1	1	1	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2	
11-Jul	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.4	1	
12-Jul	1	Z	1	2	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	0	0	1	1	0.6	2	
13-Jul	0	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.3	1	
14-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0.3	1	
15-Jul	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-Jul	0	0	0	0	0	Z	0	1	1	1	0	0	1	0	0	0	1	2	1	1	1	1	1	0.8	2	
17-Jul	1	1	1	2	2	2	Z	1	1	1	1	1	2	1	2	0	0	0	0	0	0	0	0	0.9	2	
18-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	2	1	1	1	0.6	2	
19-Jul	2	2	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	0	1	1.0	2	
20-Jul	1	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
21-Jul	0	0	0	0	Z	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
22-Jul	0	0	0	0	2	Z	2	1	1	M	M	0	0	0	0	0	0	0	1	4	6	5	4	1.4	6	
23-Jul	1	0	1	3	3	5	Z	4	4	3	2	1	1	1	2	2	1	1	1	2	1	1	0	1.7	5	
24-Jul	0	Z	0	1	0	0	1	1	0	1	1	1	1	0	1	1	0	0	0	0	0	0	0	0.4	1	
25-Jul	0	0	Z	3	1	1	1	1	0	0	0	1	0	0	0	0	1	1	1	0	0	1	0	0.6	3	
26-Jul	3	1	1	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	3	
27-Jul	0	0	0	0	Z	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0	2	2	0.8	2	
28-Jul	0	0	0	0	1	Z	1	1	0	0	1	1	1	1	1	0	0	0	0	0	0	1	0	0.5	1	
29-Jul	2	1	1	1	1	2	Z	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.0	2	
30-Jul	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1.1	1	
31-Jul	0	0	Z	0	0	0	0	0	0	0	UO	0	0	1	0	0	1	1	2	0	1	2	0	0.5	2	

0.6	0.6	0.6	0.8	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.7	0.6	0.6	Diurnal Average	
3	2	2	3	3	5	2	4	4	3	2	1	2	1	2	2	1	2	2	1	2	2	4	6	5	4	2	Diurnal Maximum

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







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
ConocoPhillips - Surmont - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	694	98.30	98.30
3 - 4	9	1.27	99.58
5 - 7	3	0.42	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 706

Total Number of Hours: 744



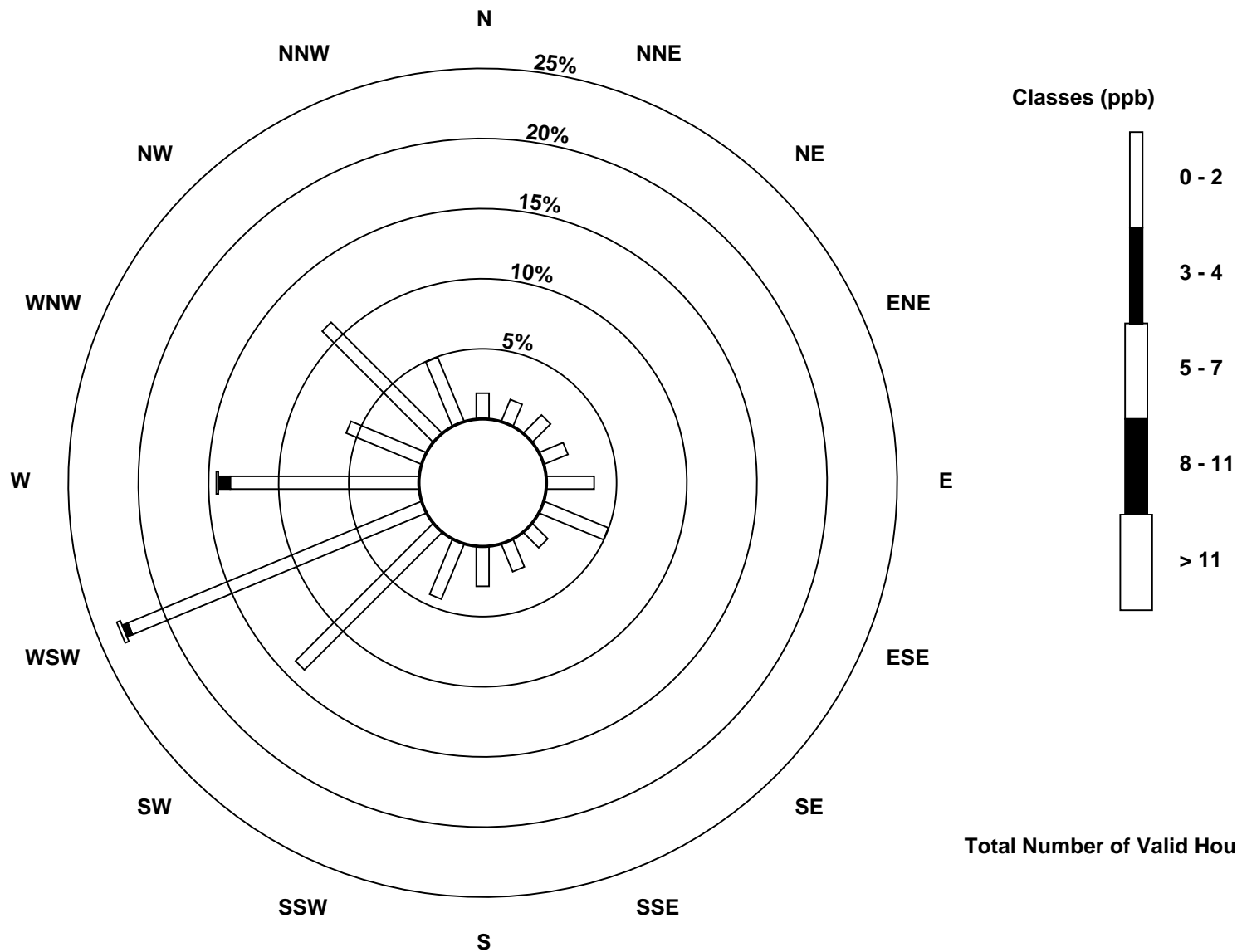
**Wood Buffalo Environmental Association  
Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
ConocoPhillips - Surmont - July 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	13	12	13	13	24	35	11	15	20	30	98	160	95	41	79	35	694
3 - 4	0	0	0	0	0	0	0	0	0	0	0	3	6	0	0	0	9
5 - 7	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	3
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	13	12	13	13	24	35	11	15	20	30	98	165	102	41	79	35	706

Total Number of Valid Hours: 706

Total Number of Hours: 744

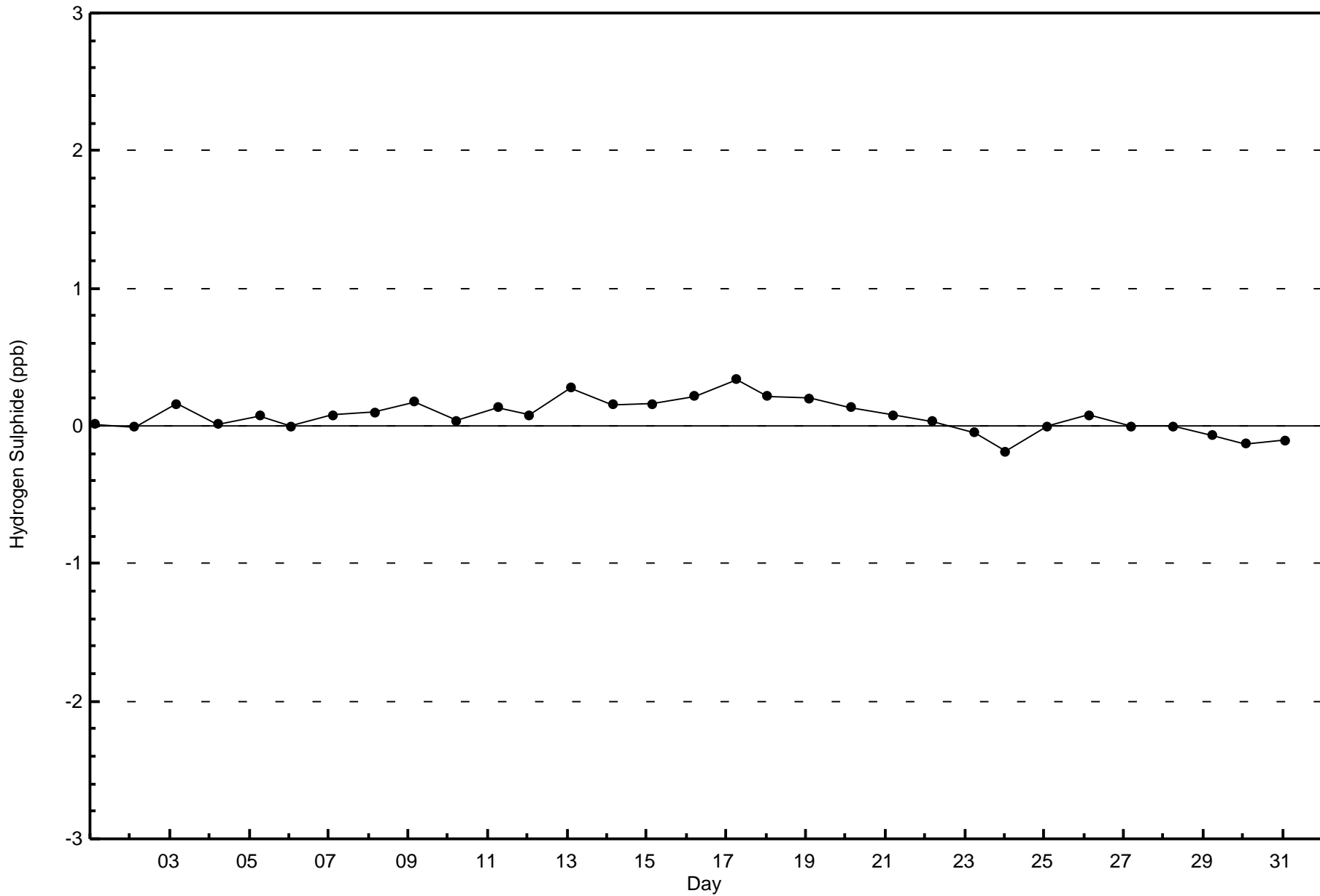


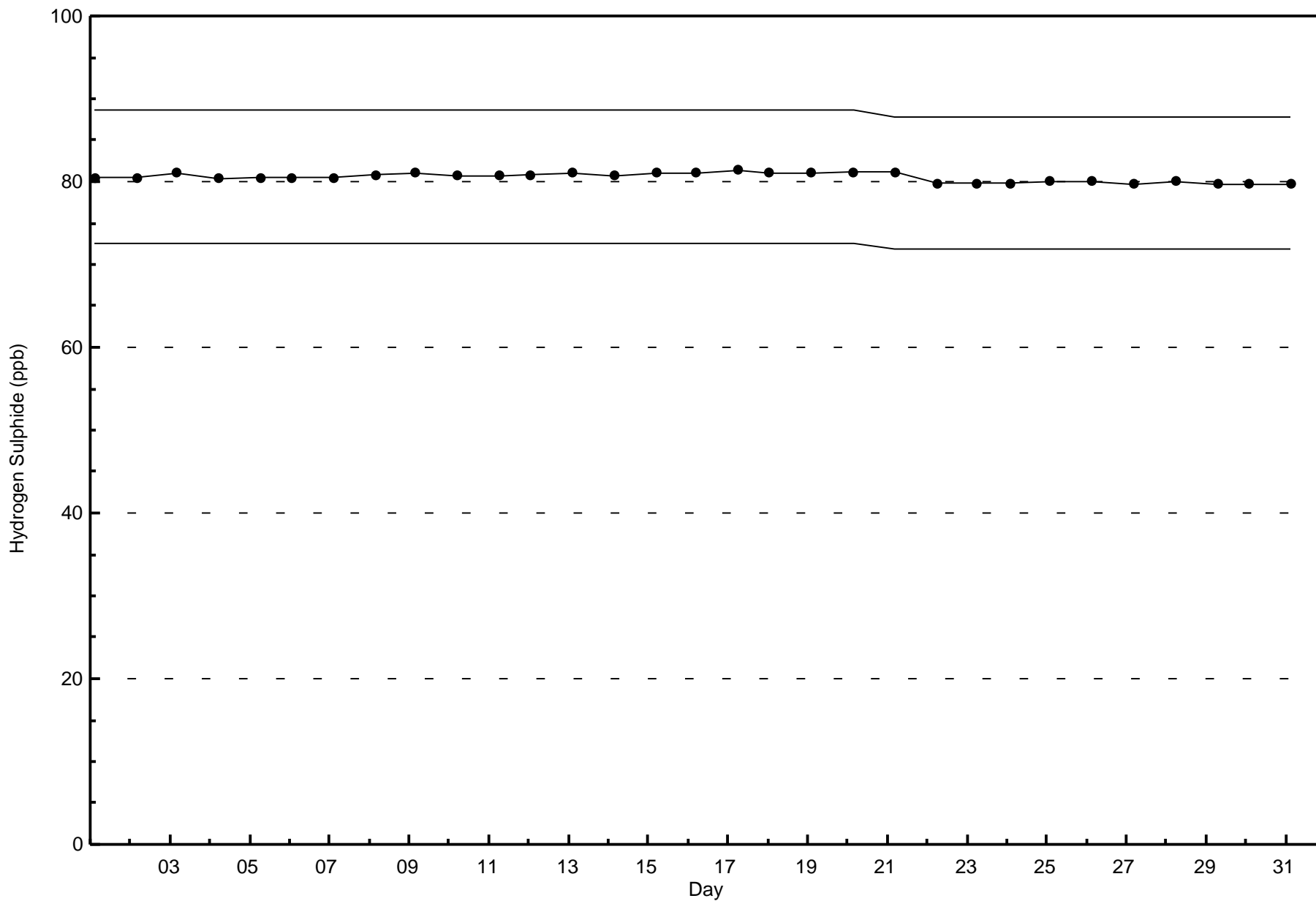
Total Number of Valid Hours: 706



Wood Buffalo Environmental Association  
Zero Responses

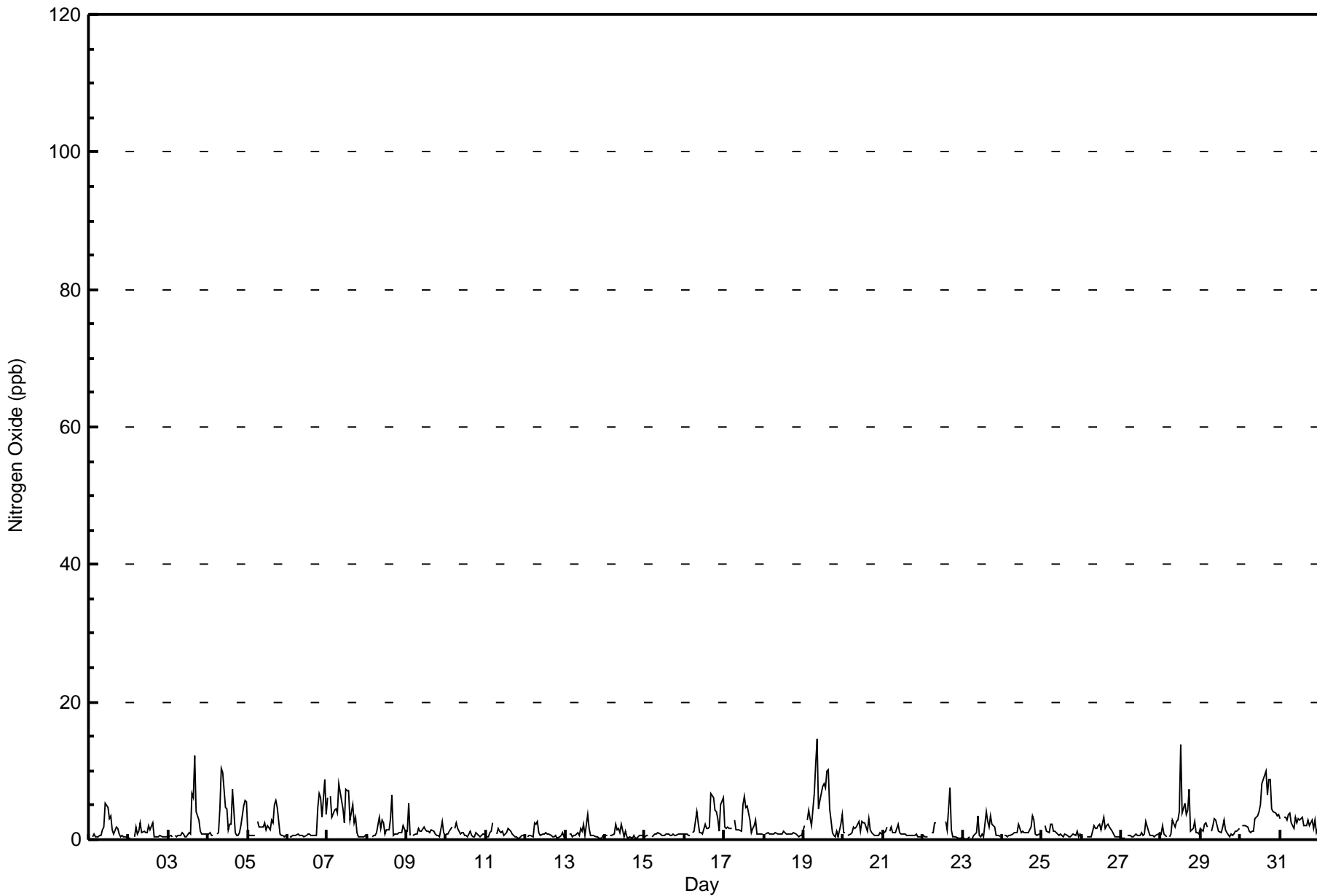
Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
ConocoPhillips - Surrmont - July 2015







Maximum Value: 15 ppb on Jul 19 09:00																	Maximum Daily Average: 5.0 ppb on Jul 19																	Hours in Service: 744			
Minimum Value: 0 ppb on Jul 23 03:00																	Minimum Daily Average: 0.7 ppb on Jul 27																	Hours of Data: 708			
Maximum Diurnal Average: 2.6 ppb at hour 16																	Minimum Diurnal Average: 0.9 ppb at hour 2																	Hours of Missing Data: 36			
Monthly Average: 1.7 ppb																	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 1 Median = 1 O <sub>3</sub> = 2 P <sub>90</sub> = 4 P <sub>99</sub> = 10																	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-Jul	2	Z	0	1	1	0	1	1	1	2	5	5	3	3	1	1	2	2	1	0	1	0	0	0	1.5	5											
2-Jul	0	0	Z	0	2	1	1	2	1	1	1	1	2	1	2	0	0	0	0	1	0	0	0	0	0.9	2											
3-Jul	0	1	0	Z	1	1	1	1	1	1	0	0	1	1	7	6	12	4	3	1	1	1	1	1	1.9	12											
4-Jul	1	1	1	1	Z	1	1	4	10	10	5	5	1	2	2	7	1	1	1	2	5	6	5	3.2	10												
5-Jul	1	1	1	1	1	Z	3	2	2	2	2	1	2	1	3	2	5	6	5	1	1	0	1	1.8	6												
6-Jul	Z	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5	7	6	3	9	4	1.9	9											
7-Jul	6	Z	6	3	4	4	4	8	7	4	2	7	7	7	3	5	2	3	1	1	0	0	0	1	3.9	8											
8-Jul	0	0	Z	0	1	1	1	3	2	3	2	1	1	1	3	6	1	1	1	1	1	2	1	1.5	6												
9-Jul	1	5	1	Z	1	1	1	2	1	1	2	1	1	1	2	1	1	1	1	1	0	3	1	1	1.3	5											
10-Jul	1	1	1	2	Z	2	2	2	1	1	1	1	0	1	1	0	0	1	1	1	1	1	1	1	1.0	2											
11-Jul	0	0	1	1	2	Z	1	2	1	1	1	1	2	1	1	1	0	0	0	0	0	1	1	0.9	2												
12-Jul	Z	0	1	1	0	2	2	3	1	1	1	1	1	1	1	0	0	1	0	0	1	1	0	0.8	3												
13-Jul	1	Z	1	1	0	1	1	1	1	2	1	2	1	4	2	1	1	1	0	0	0	0	1	0.9	4												
14-Jul	1	1	Z	1	1	1	2	1	2	1	2	1	1	0	0	0	1	0	0	1	1	0	1	0.8	2												
15-Jul	0	1	1	Z	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1												
16-Jul	1	1	1	1	Z	1	1	4	2	1	1	1	2	2	2	2	7	6	4	4	3	1	5	6	2.5	7											
17-Jul	2	2	2	2	2	Z	3	1	1	1	1	5	6	5	5	3	1	2	2	3	1	1	1	1	2.2	6											
18-Jul	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0.8	1											
19-Jul	2	Z	3	4	3	2	7	11	15	4	6	8	8	7	10	10	5	1	1	0	1	0	2	4	5.0	15											
20-Jul	1	1	Z	1	1	1	2	2	2	3	1	3	2	2	1	3	1	1	1	1	1	1	1	1	1.4	3											
21-Jul	1	1	2	Z	1	2	1	1	2	2	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1.0	2											
22-Jul	1	0	0	0	Z	1	1	2	2	C	C	C	C	C	3	1	7	1	0	0	0	0	0	1.3	7												
23-Jul	0	0	0	0	0	Z	0	1	1	3	1	0	1	0	4	3	2	3	2	2	1	1	0	1.2	4												
24-Jul	Z	1	1	0	1	1	1	1	1	1	2	1	1	1	1	1	1	2	4	3	1	1	1	1	1.2	4											
25-Jul	1	Z	2	1	1	2	2	1	1	1	1	1	1	0	1	1	0	0	1	1	1	1	0	1	0.9	2											
26-Jul	0	0	Z	0	0	0	0	2	2	2	2	2	1	3	2	2	2	2	1	1	0	0	1	0	1.2	3											
27-Jul	0	0	0	Z	1	1	0	0	1	1	1	1	1	1	1	3	1	1	1	1	0	1	1	1	0.7	3											
28-Jul	1	2	1	0	Z	0	1	3	2	3	3	4	14	4	5	4	4	7	1	2	3	1	1	1	2.9	14											
29-Jul	2	1	2	2	2	Z	1	2	3	3	2	1	1	2	3	1	1	0	1	1	1	1	1	2	1.6	3											
30-Jul	Z	2	2	2	2	1	1	1	1	3	3	4	5	8	9	10	7	9	9	4	4	4	3	4	4.3	10											
31-Jul	3	Z	3	3	3	4	4	2	2	3	2	3	3	3	2	2	2	3	2	3	2	3	1	2	2.6	4											
1.1																								Diurnal Average													
6																								Diurnal Maximum													
Z - zerospan																																					
C - Calibration																																					





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

**Nitrogen Oxide (NO) - ppb**  
**ConocoPhillips - Surmont - July 2015**

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

Total Number of Valid Hours: 708

Total Number of Hours: 744





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

**Nitrogen Oxide (NO) - ppb**  
**ConocoPhillips - Surmont - July 2015**

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	13	12	12	12	24	37	11	16	19	29	100	167	104	42	75	35	708
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	13	12	12	12	24	37	11	16	19	29	100	167	104	42	75	35	708

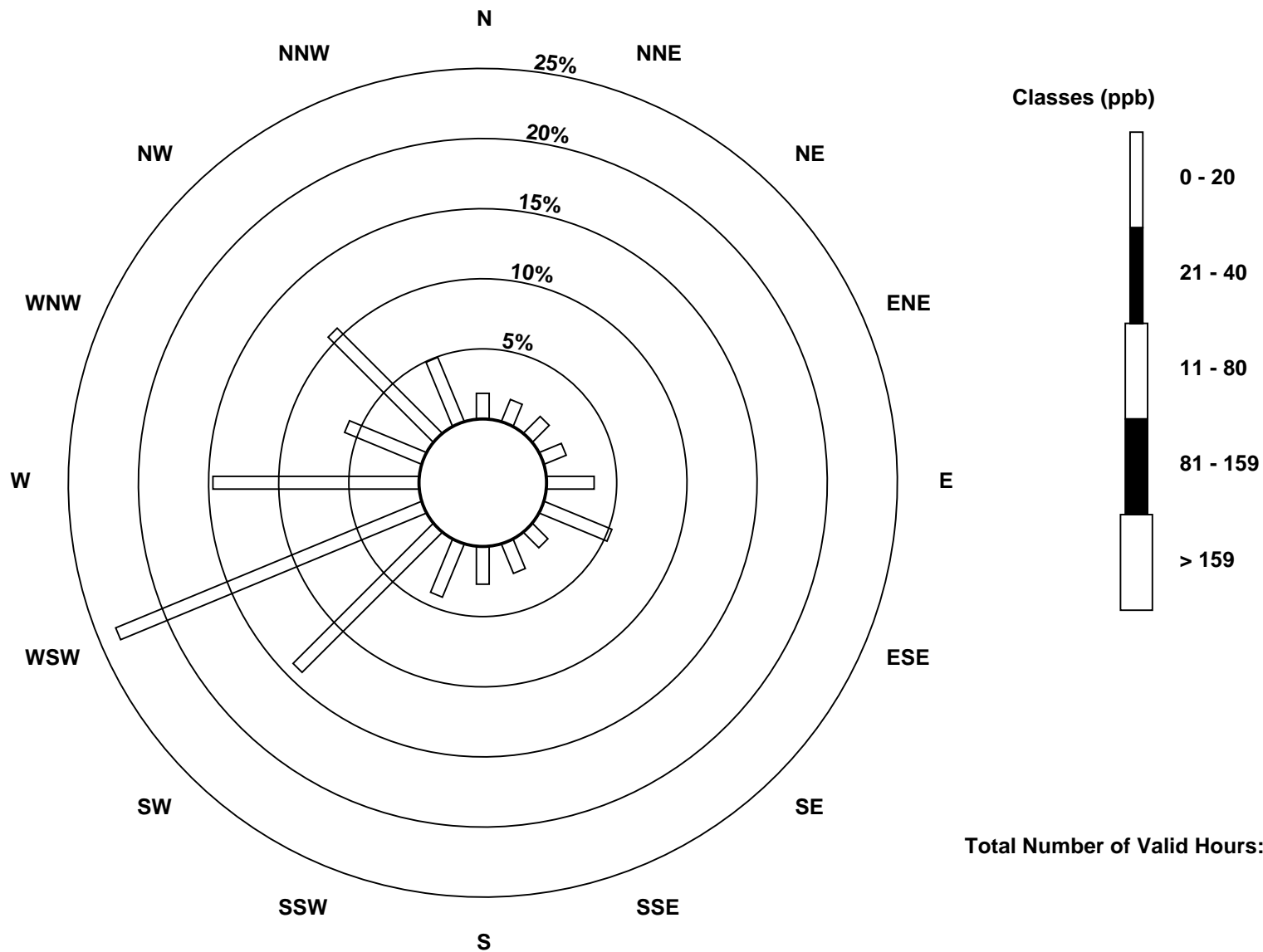
Total Number of Valid Hours: 708

Total Number of Hours: 744



Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Nitrogen Oxide (NO) - ppb  
ConocoPhillips - Surmont (AMS502)

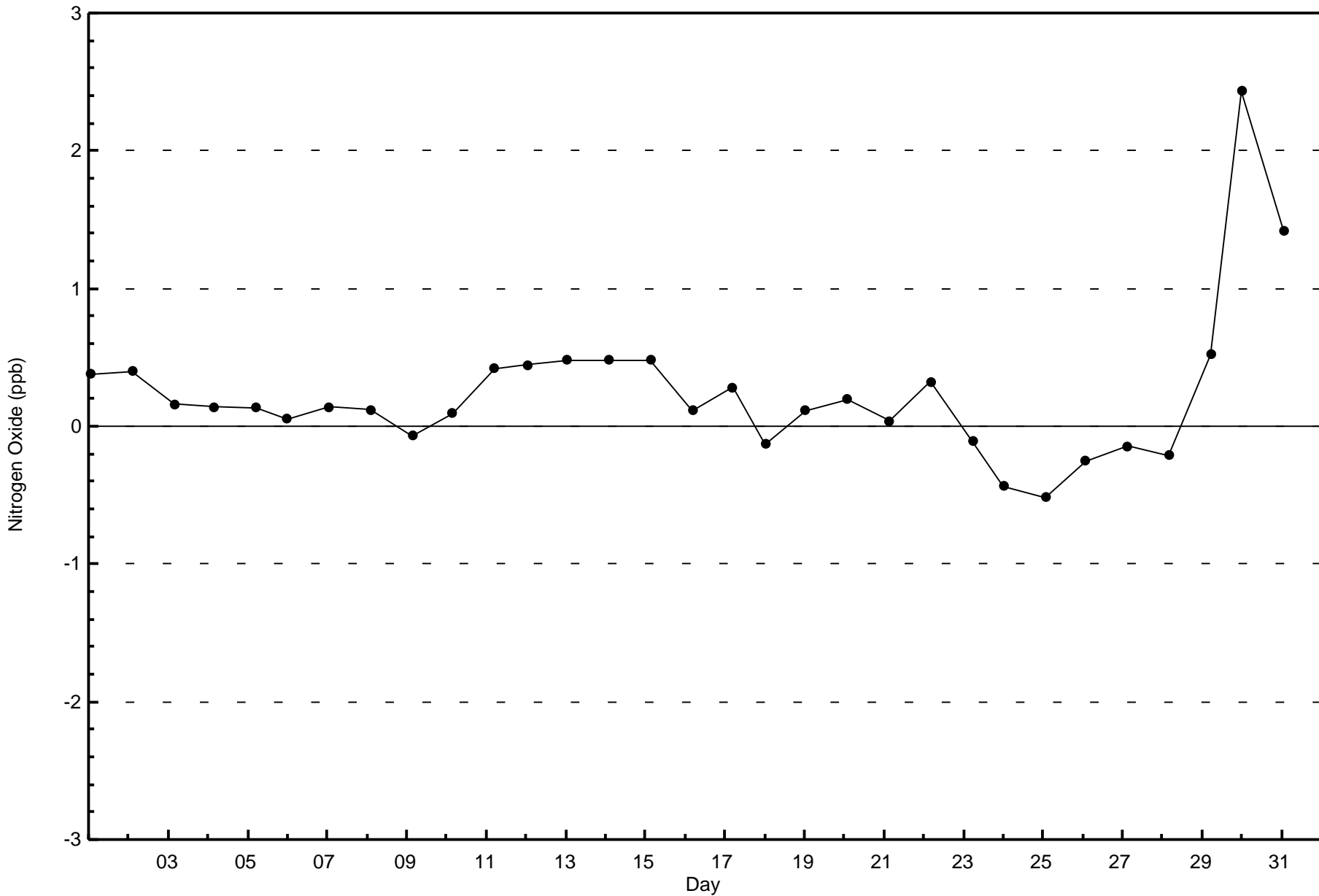


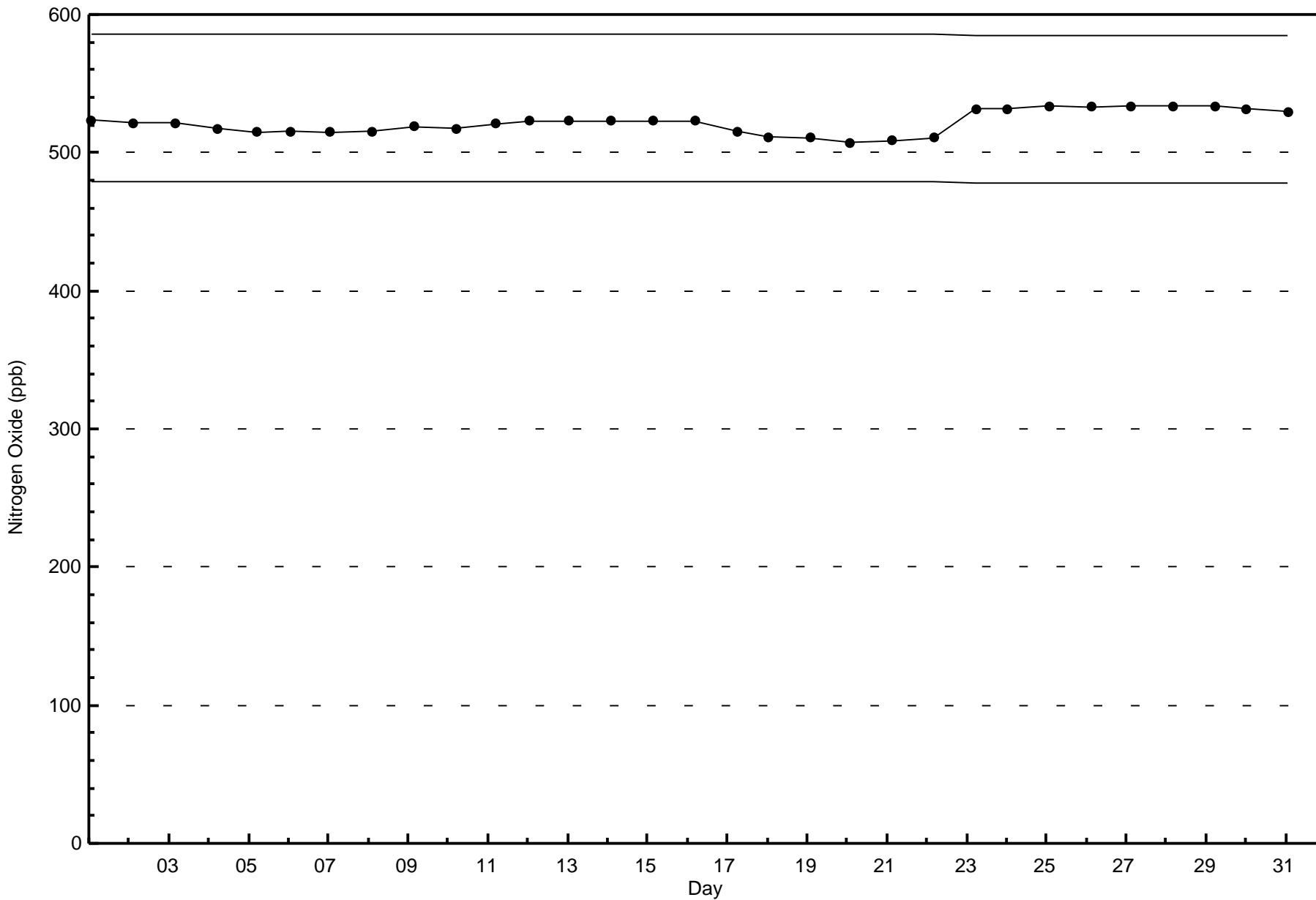
Total Number of Valid Hours: 708



Wood Buffalo Environmental Association  
Zero Responses

Nitrogen Oxide (NO) - ppb  
ConocoPhillips - Surmont - July 2015







Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 21 ppb on Jul 3 17:00	Maximum Daily Average: 4.7 ppb on Jul 3		Hours of Data:	708
Minimum Value: 0 ppb on Jul 3 10:00	Minimum Daily Average: 0.1 ppb on Jul 18		Hours of Missing Data:	36
Maximum Diurnal Average: 2.0 ppb at hour 16	Minimum Diurnal Average: 1.0 ppb at hour 22		Hours of Calibration:	36
Monthly Average: 1.4 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 1 Q <sub>3</sub> = 2 P <sub>90</sub> = 4 P <sub>99</sub> = 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-Jul	5	Z	7	8	7	3	2	2	2	3	5	5	4	3	1	2	2	2	1	2	1	0	0	0	2.8	8
2-Jul	0	0	Z	1	2	1	1	3	1	2	1	1	2	1	2	1	0	0	1	0	0	0	1	1	1.0	3
3-Jul	1	1	2	Z	1	1	1	1	1	0	0	1	1	3	7	10	21	12	11	10	8	8	7	3	4.7	21
4-Jul	2	2	2	2	Z	4	1	3	7	5	4	4	2	3	2	5	1	1	1	1	2	4	6	5	2.8	7
5-Jul	1	1	1	1	1	Z	2	2	2	2	2	2	3	4	4	6	7	5	2	1	2	3	1	2.4	7	
6-Jul	Z	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	5	4	4	2	4	3	1.4	5
7-Jul	5	Z	3	1	3	3	2	3	4	3	1	3	3	4	1	3	1	1	1	0	0	0	1	1	1.9	5
8-Jul	1	1	Z	1	1	1	2	6	3	2	4	2	3	4	6	7	2	2	1	1	1	2	4	2	2.5	7
9-Jul	2	5	3	Z	1	1	1	2	2	1	2	2	2	2	1	2	0	0	0	0	0	2	1	1	1.4	5
10-Jul	0	0	1	3	Z	2	2	1	1	1	2	1	1	1	2	1	0	0	1	1	1	2	4	1	1.4	4
11-Jul	2	2	4	7	9	Z	4	4	2	2	2	2	3	2	3	3	2	2	3	3	3	3	3	3	3.0	9
12-Jul	Z	2	4	4	3	4	5	6	4	4	3	2	3	2	2	2	1	1	2	1	1	1	1	1	2.5	6
13-Jul	2	Z	2	2	2	2	0	2	2	3	2	3	1	3	2	1	1	1	1	1	1	1	1	1	1.4	3
14-Jul	0	1	Z	1	1	1	2	2	2	1	2	0	1	0	0	0	0	2	1	2	1	0	0	0	0.9	2
15-Jul	0	0	0	Z	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
16-Jul	0	1	1	0	Z	1	1	2	2	2	2	2	5	2	1	1	6	4	3	2	2	1	4	4	2.1	6
17-Jul	2	2	4	5	4	Z	3	1	1	1	1	3	4	3	4	2	0	0	0	0	0	0	0	0	1.7	5
18-Jul	Z	1	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
19-Jul	0	Z	1	1	1	1	1	5	5	2	2	2	4	4	3	4	2	0	0	0	1	0	1	3	1.8	5
20-Jul	1	1	Z	1	1	1	2	2	2	2	2	0	1	1	1	3	1	1	0	0	2	0	1	1	1.1	3
21-Jul	0	2	4	Z	1	1	0	0	0	1	0	1	0	1	0	0	0	0	0	0	1	0	0	0	0.6	4
22-Jul	0	2	1	0	Z	1	1	2	3	C	C	C	C	C	2	3	6	2	0	0	0	0	0	0	1.3	6
23-Jul	0	0	0	0	0	Z	0	0	0	1	0	0	0	0	2	1	1	1	0	0	0	0	0	0	0.2	2
24-Jul	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2	5	6	1	1	4	5	1.1	6
25-Jul	3	Z	2	1	2	4	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.7	4
26-Jul	0	0	Z	0	0	0	0	1	1	1	2	3	2	2	3	4	2	2	1	2	1	0	1	0	1.1	4
27-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0.1	1
28-Jul	0	1	0	0	Z	0	0	1	1	0	1	2	6	1	3	1	2	0	0	2	0	0	0	0	1.1	6
29-Jul	0	0	2	3	0	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.3	3
30-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	0	2	2	3	2	4	3	0	0	0	0	0	0.6	4
31-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	1	1	0	0	0	0.3	1

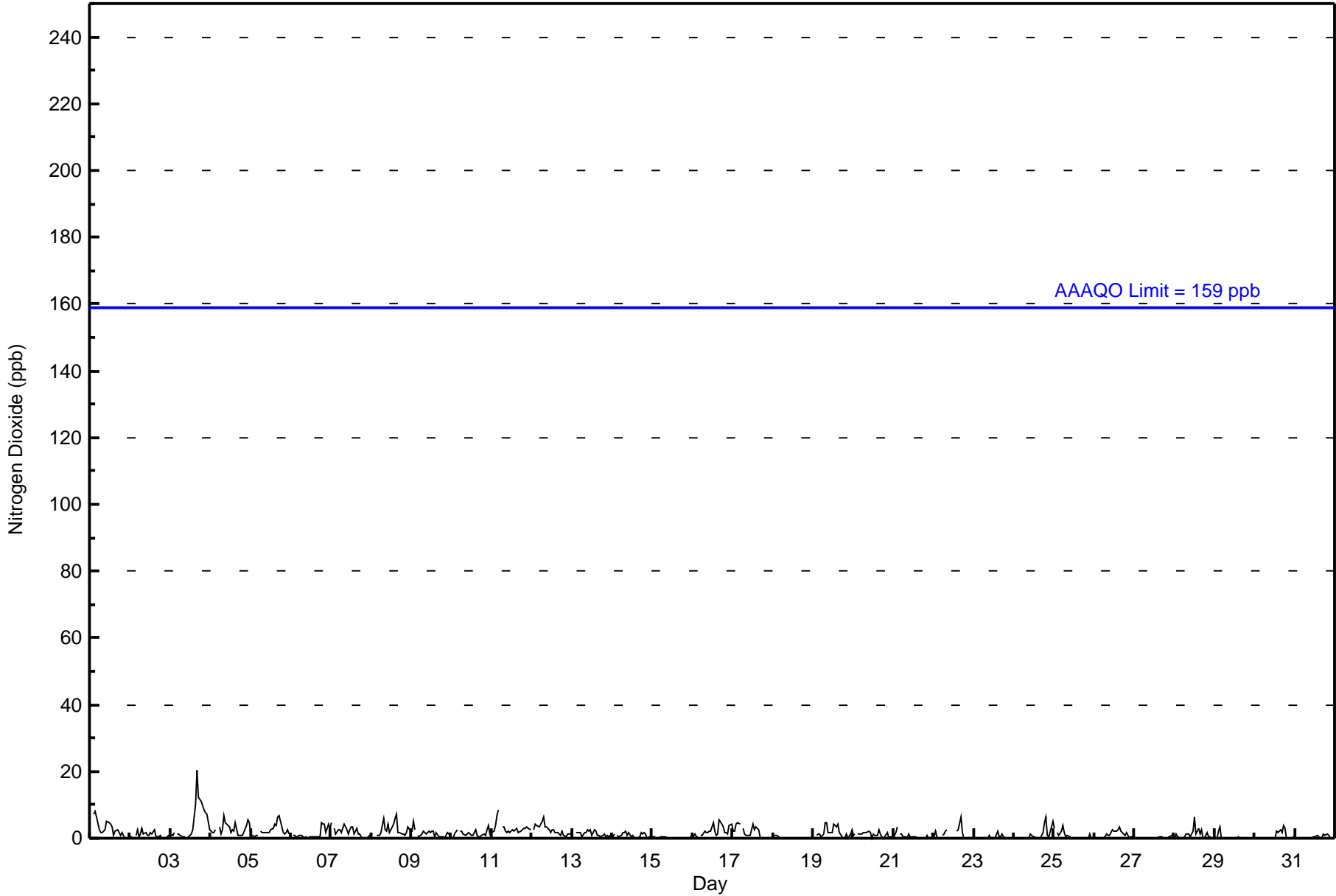
1.1	1.1	1.7	1.7	1.6	1.2	1.2	1.6	1.5	1.2	1.3	1.3	1.7	1.6	1.7	2.0	1.9	1.5	1.5	1.3	1.1	1.0	1.5	1.2	Diurnal Average	
5	5	7	8	9	4	5	6	7	5	5	5	6	4	7	10	21	12	11	10	8	8	7	5	Diurnal Maximum	

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



Wood Buffalo Environmental Association  
Hourly Averages

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
ConocoPhillips - Surmont - July 2015





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

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**ConocoPhillips - Surmont - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	707	99.86	99.86
21 - 40	1	0.14	100.00
11 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



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

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**ConocoPhillips - Surmont - July 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	13	12	12	12	24	37	11	16	19	29	100	167	104	42	74	35	707
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	13	12	12	12	24	37	11	16	19	29	100	167	104	42	75	35	708

Total Number of Valid Hours: 708

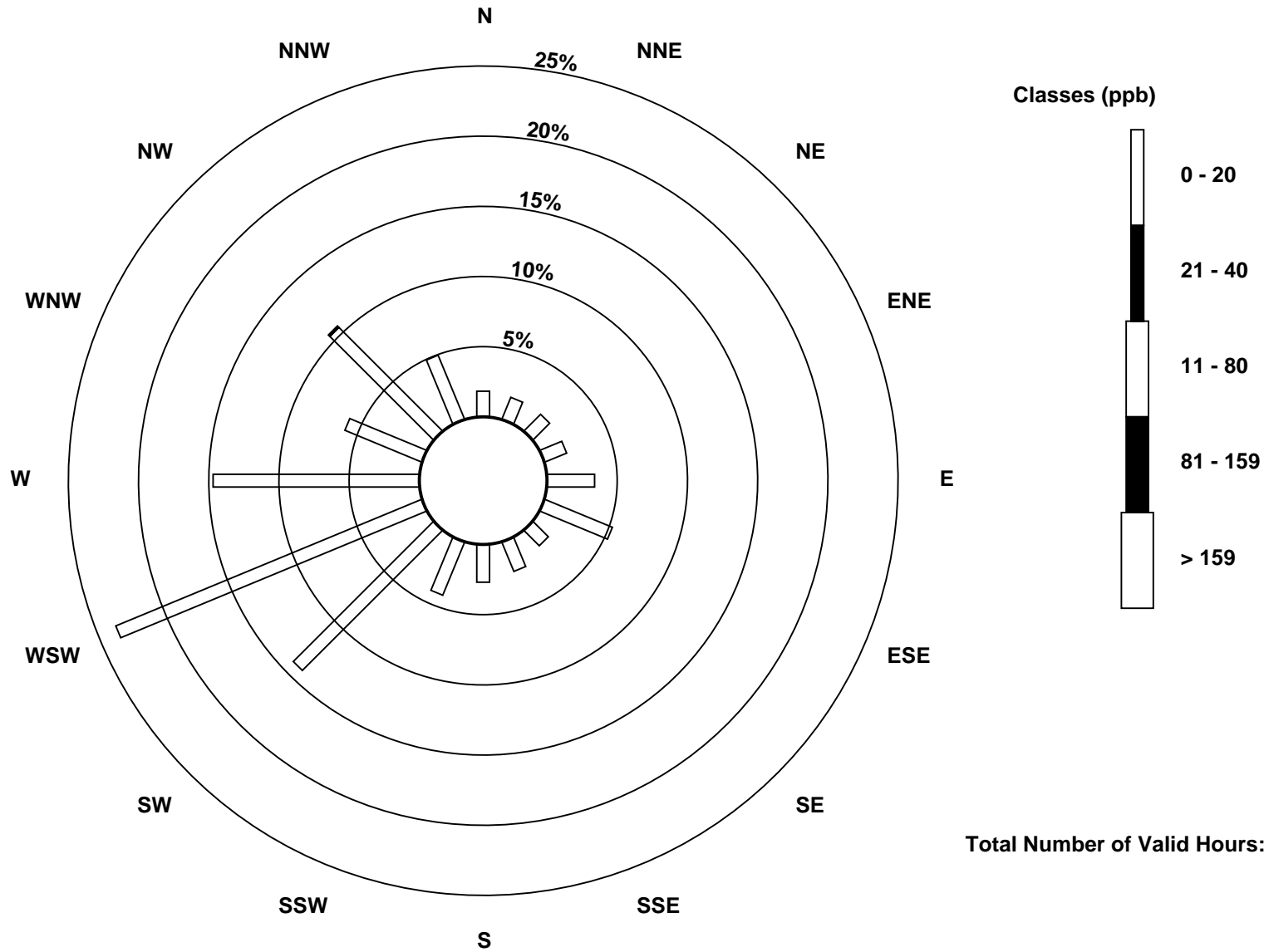
Total Number of Hours: 744



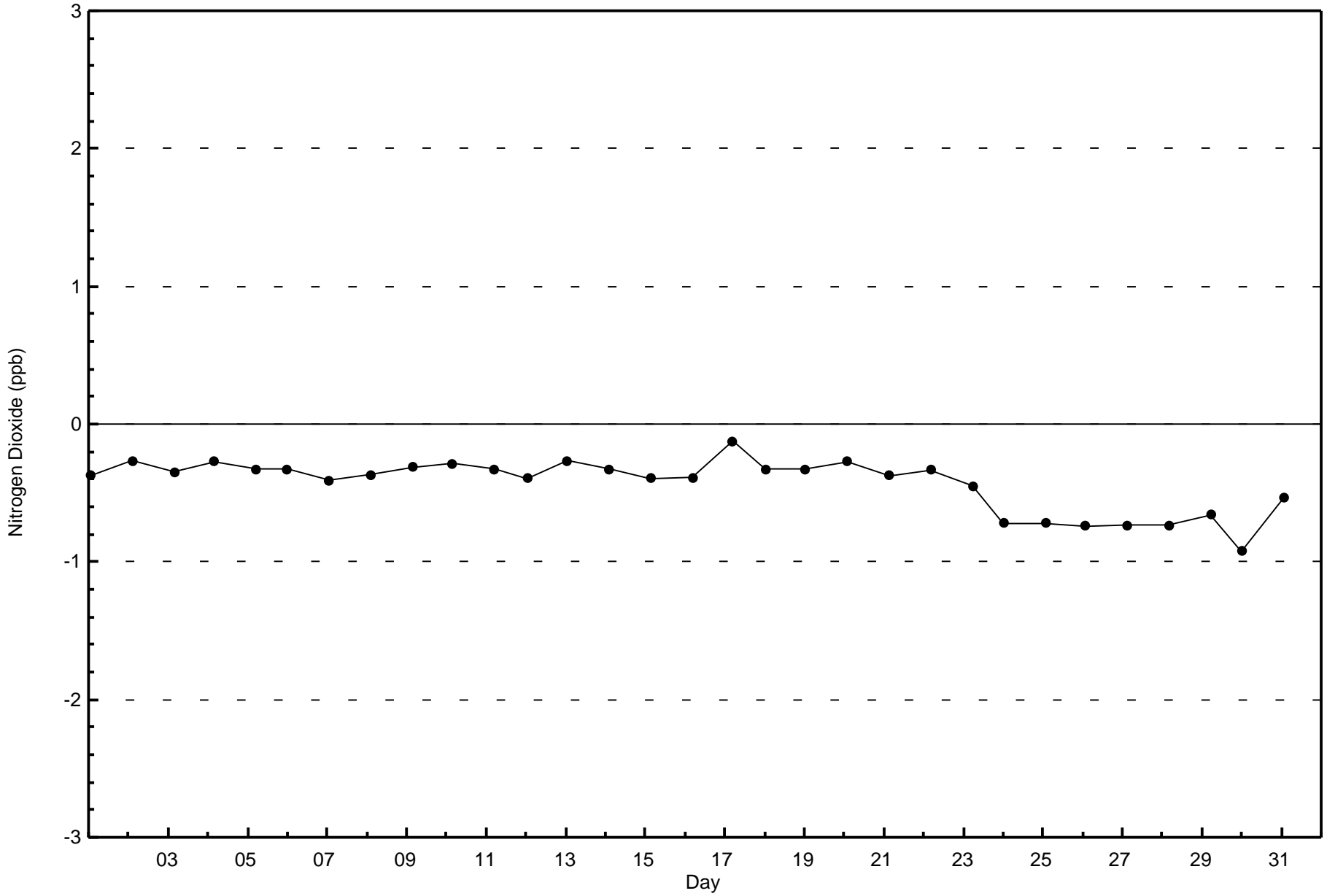


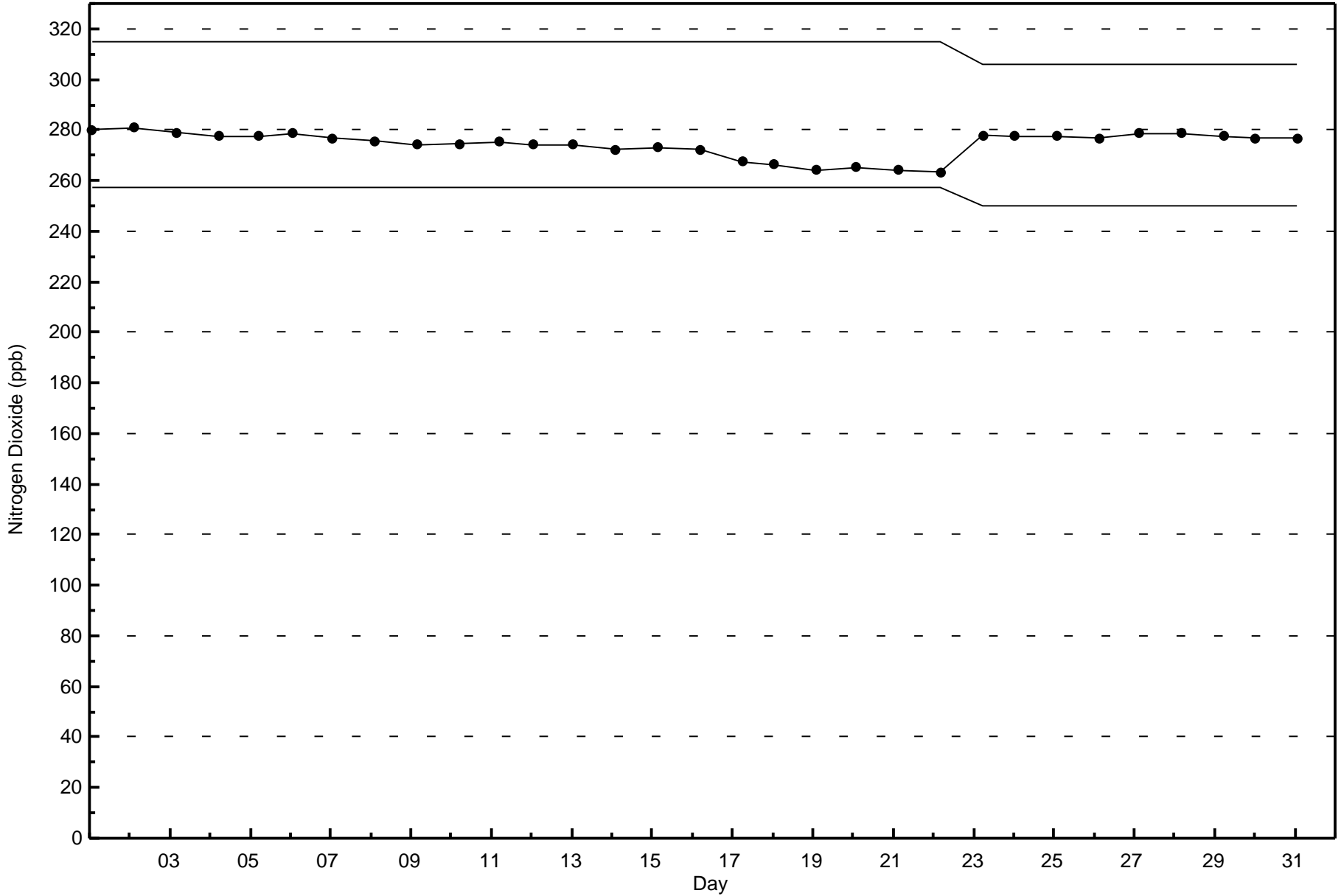
Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
ConocoPhillips - Surmont (AMS502)



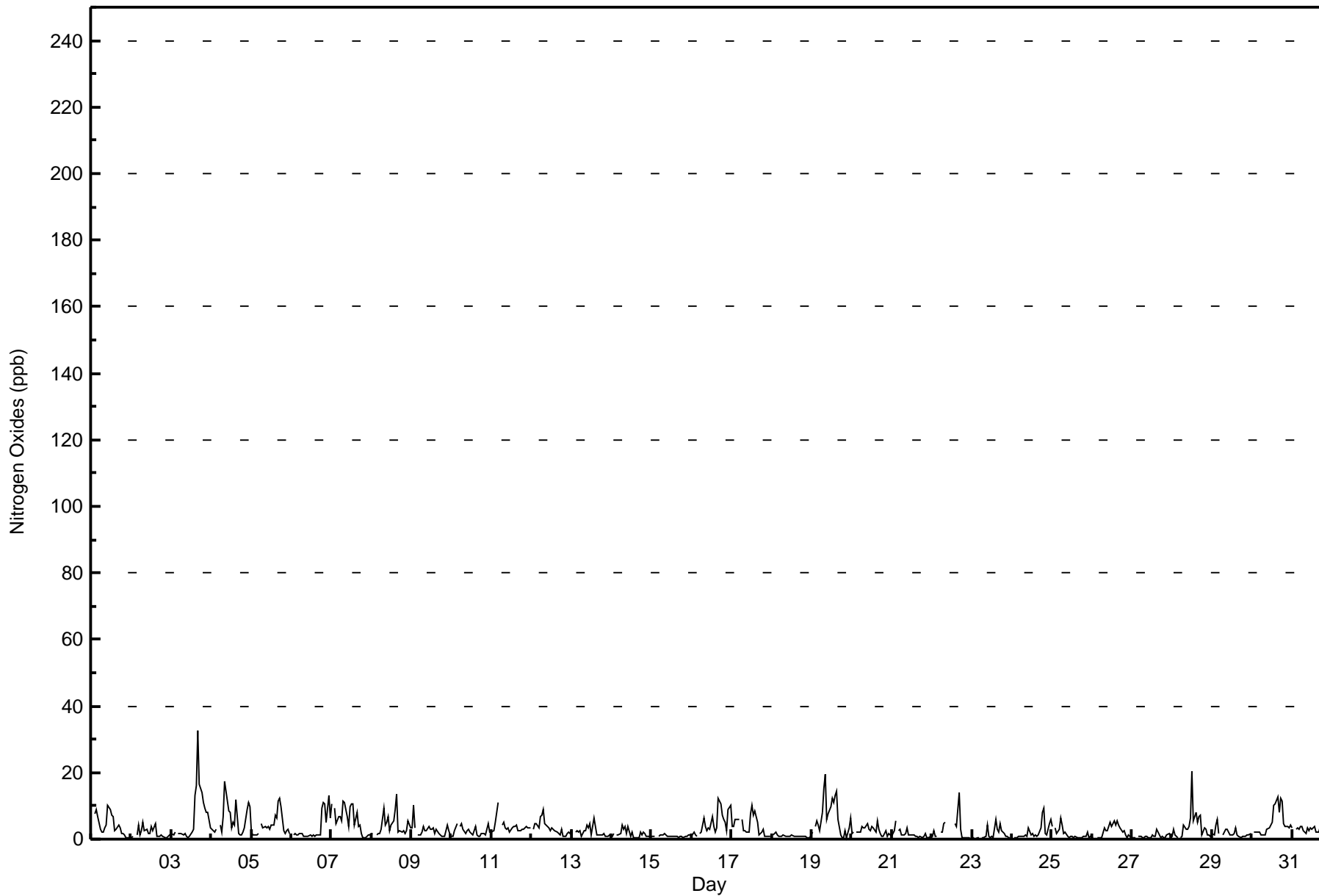
Total Number of Valid Hours: 708







Maximum Value: 33 ppb on Jul 3 17:00																	Maximum Daily Average: 6.8 ppb on Jul 19																	Hours in Service: 744			
Minimum Value: 0 ppb on Jul 23 03:00																	Minimum Daily Average: 0.8 ppb on Jul 27																	Hours of Data: 708			
Maximum Diurnal Average: 4.6 ppb at hour 16																	Minimum Diurnal Average: 2.0 ppb at hour 2																	Hours of Missing Data: 36			
Monthly Average: 3.2 ppb																	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 1 Q <sub>1</sub> = 1 Median = 2 Q <sub>3</sub> = 4 P <sub>90</sub> = 7 P <sub>99</sub> = 15																	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-Jul	6	Z	8	9	7	3	2	2	3	4	10	9	7	7	3	3	4	3	2	2	1	1	1	0	4.3	10											
2-Jul	1	1	Z	1	4	1	3	5	2	3	2	2	4	3	5	1	1	1	1	1	1	1	1	1	1.9	5											
3-Jul	1	1	2	Z	2	2	2	1	2	1	1	1	2	3	13	16	33	16	14	11	9	8	8	4	6.7	33											
4-Jul	3	3	2	3	Z	4	2	7	17	14	9	8	3	5	4	12	2	1	1	2	4	9	11	10	6.0	17											
5-Jul	2	1	1	1	2	Z	5	3	4	4	4	3	4	4	7	6	11	12	10	3	2	2	3	2	4.2	12											
6-Jul	Z	1	2	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	10	11	10	5	13	6	3.3	13											
7-Jul	11	Z	9	4	7	7	6	11	11	7	4	10	10	11	4	8	4	4	2	1	0	1	1	1	5.8	11											
8-Jul	2	2	Z	1	2	2	3	9	4	5	7	2	4	5	9	14	2	3	2	2	2	3	5	3	4.0	14											
9-Jul	3	10	3	Z	1	1	2	4	3	2	4	3	3	3	2	3	2	1	1	1	1	4	2	1	2.7	10											
10-Jul	1	1	3	5	Z	4	5	3	2	2	3	2	2	1	4	1	1	1	2	2	1	3	5	2	2.3	5											
11-Jul	2	3	5	8	11	Z	4	5	4	3	3	2	4	4	4	4	2	3	3	3	3	4	3	3	3.9	11											
12-Jul	Z	3	5	5	3	7	7	9	5	4	3	3	3	3	2	2	2	1	3	1	1	2	2	2	3.4	9											
13-Jul	3	Z	2	3	2	2	1	3	2	4	3	5	1	6	4	1	1	1	1	2	1	1	1	1	2.3	6											
14-Jul	1	2	Z	1	1	2	4	3	4	2	4	1	2	0	0	0	1	2	1	2	2	1	1	1	1.6	4											
15-Jul	1	1	1	Z	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.9	2											
16-Jul	1	2	1	1	Z	2	2	6	4	2	3	3	7	4	2	3	12	11	7	6	5	2	9	10	4.6	12											
17-Jul	4	4	6	6	6	Z	6	3	2	2	2	8	10	7	9	5	1	2	2	3	1	1	1	1	4.0	10											
18-Jul	Z	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0.9	2											
19-Jul	2	Z	4	6	4	3	8	15	19	6	7	10	12	11	13	15	6	1	1	0	3	0	3	6	6.8	19											
20-Jul	2	2	Z	2	2	2	4	3	3	5	3	3	4	3	2	5	3	2	1	1	3	1	2	1	2.5	5											
21-Jul	1	3	5	Z	2	3	1	1	2	3	1	1	1	1	1	1	1	1	1	1	2	0	0	1	1.5	5											
22-Jul	1	3	1	1	Z	2	2	5	5	C	C	C	C	C	5	4	14	3	0	0	0	0	0	0	2.6	14											
23-Jul	0	0	0	0	0	Z	0	1	1	4	1	0	1	0	6	3	2	5	3	2	1	1	1	0	1.4	6											
24-Jul	Z	1	1	0	1	1	1	1	1	1	3	1	2	1	1	1	1	3	8	9	2	1	5	6	2.3	9											
25-Jul	4	Z	3	2	3	6	4	2	2	1	1	1	0	1	1	1	0	1	1	1	2	1	1	1	1.6	6											
26-Jul	0	0	Z	0	0	0	0	3	2	2	4	5	4	5	4	6	4	3	2	3	1	1	1	1	2.3	6											
27-Jul	0	0	0	Z	1	1	0	1	1	1	1	1	1	1	1	3	1	1	1	1	0	1	1	1	0.8	3											
28-Jul	1	3	1	0	Z	0	1	4	3	3	4	6	20	5	8	5	7	7	1	4	3	1	1	1	4.0	20											
29-Jul	2	1	4	6	2	Z	1	2	3	3	2	1	1	2	3	1	1	0	1	1	1	1	1	2	1.9	6											
30-Jul	Z	2	2	2	2	1	1	1	1	3	3	4	5	10	11	13	8	12	12	4	4	4	3	4	4.9	13											
31-Jul	3	Z	3	3	3	4	4	2	2	3	2	3	3	4	2	2	2	4	3	4	3	3	1	2	2.9	4											
																								Diurnal Average													
																								Diurnal Maximum													
2.2 2.0 3.0 2.8 2.8 2.4 2.7 3.9 3.8 3.3 3.2 3.3 4.2 3.8 4.3 4.6 4.3 3.5 3.1 2.7 2.2 2.1 2.9 2.5																																					
11 10 9 9 11 7 8 15 19 14 10 10 20 11 13 16 33 16 14 11 10 9 13 10																																					
Z - zerospan C - Calibration																																					





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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**ConocoPhillips - Surmont - July 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	707	99.86	99.86
21 - 40	1	0.14	100.00
11 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**ConocoPhillips - Surmont - July 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	13	12	12	12	24	37	11	16	19	29	100	167	104	42	74	35	707
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	13	12	12	12	24	37	11	16	19	29	100	167	104	42	75	35	708

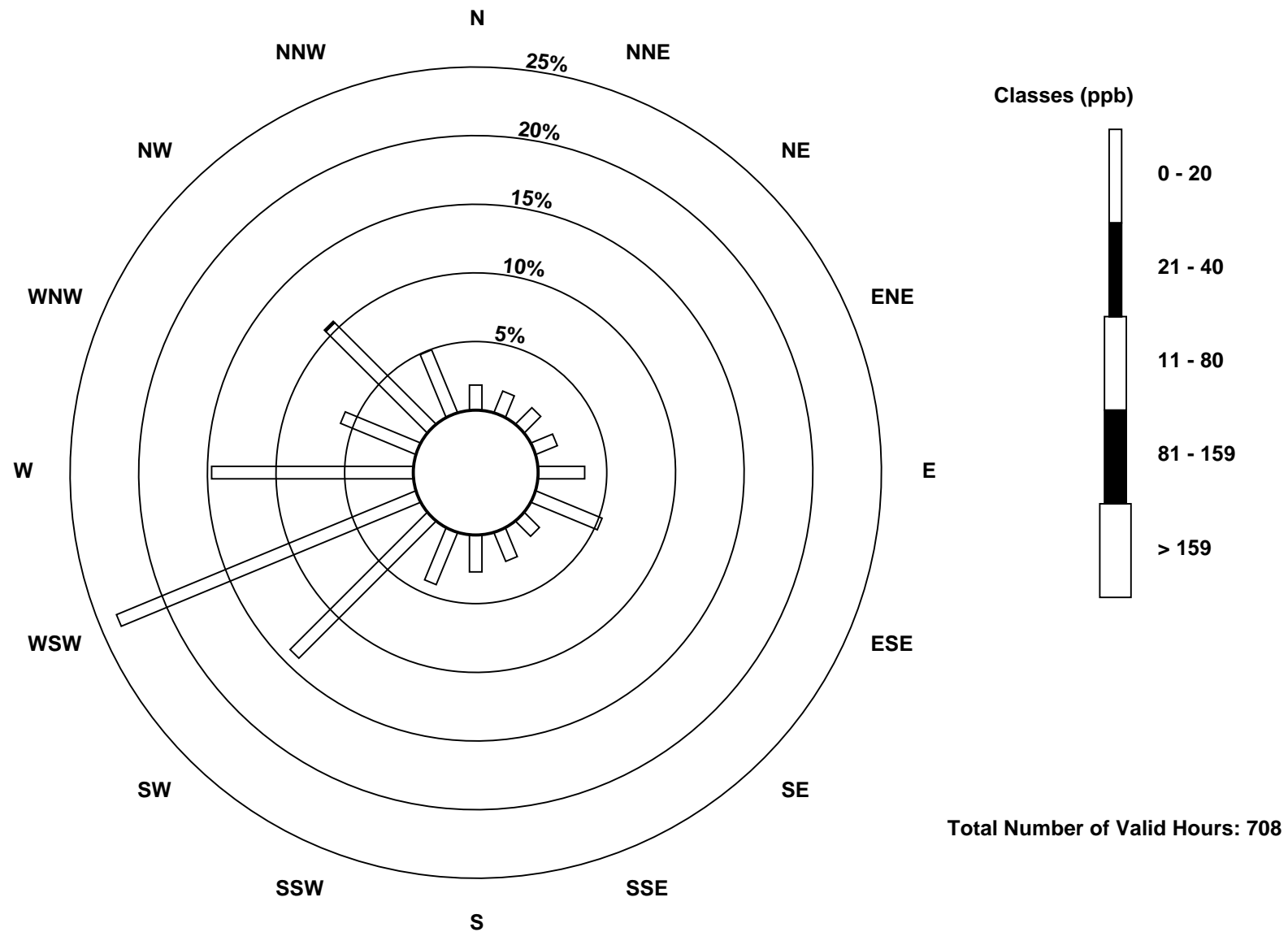
Total Number of Valid Hours: 708

Total Number of Hours: 744

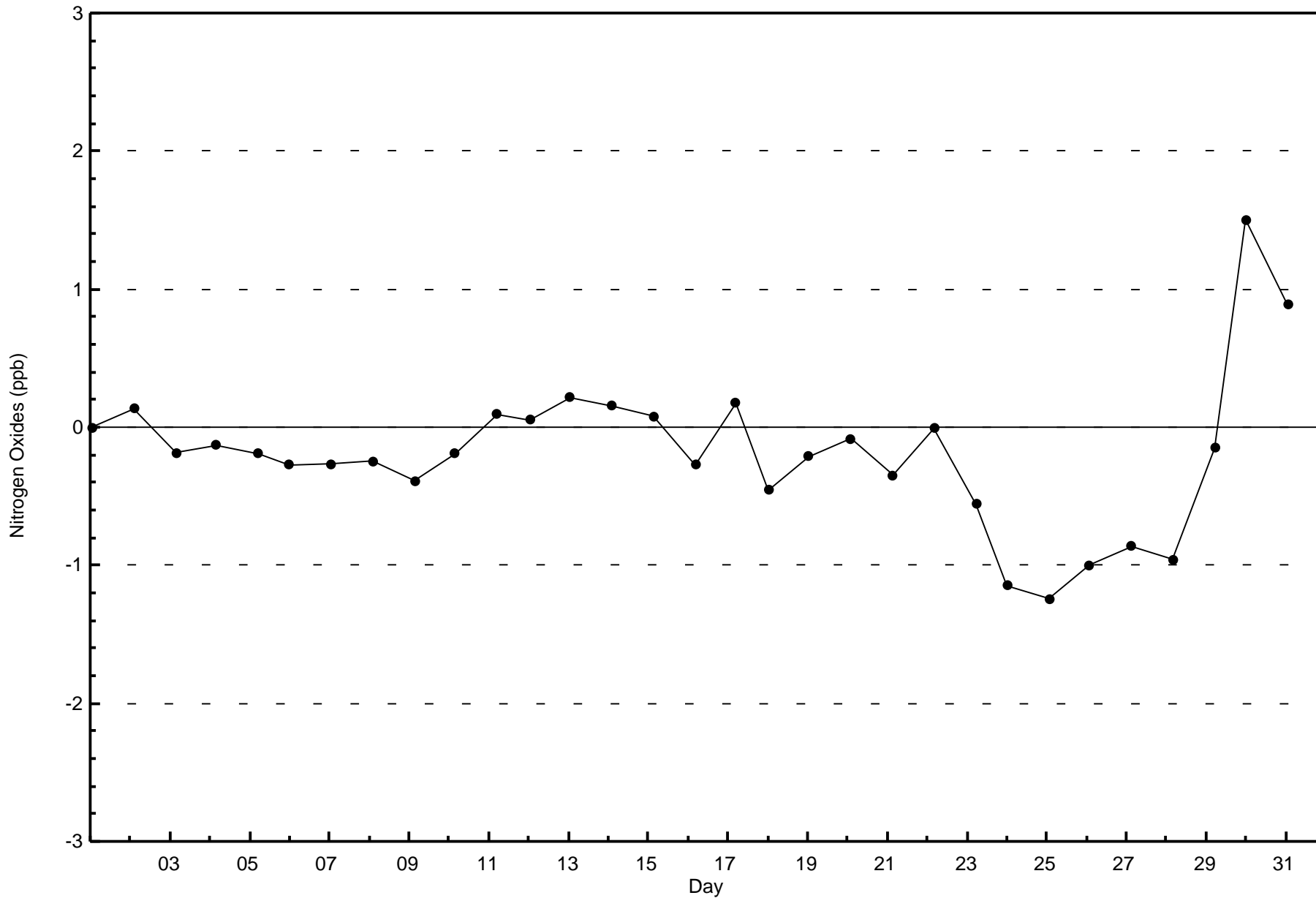


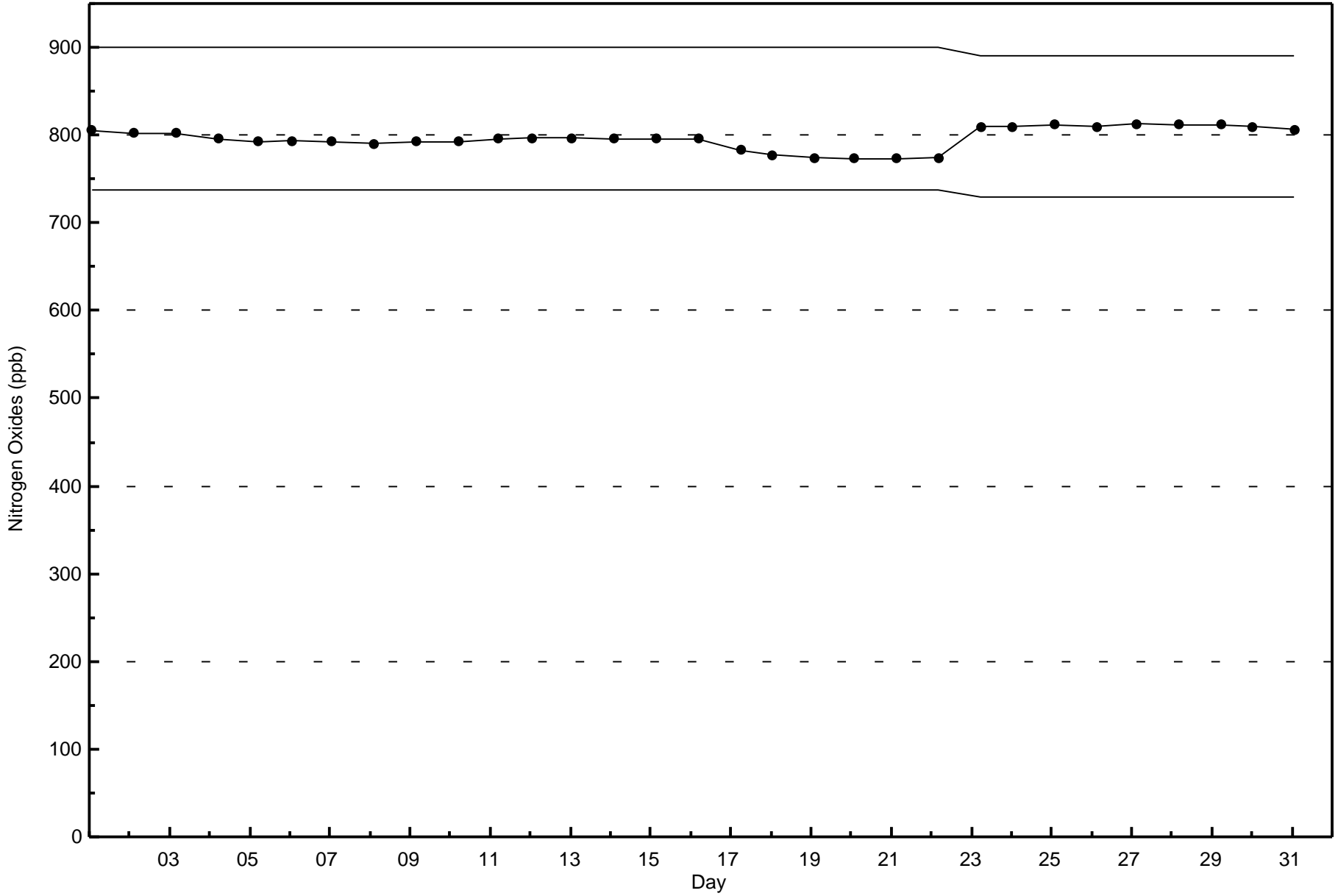
Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
ConocoPhillips - Surmont (AMS502)



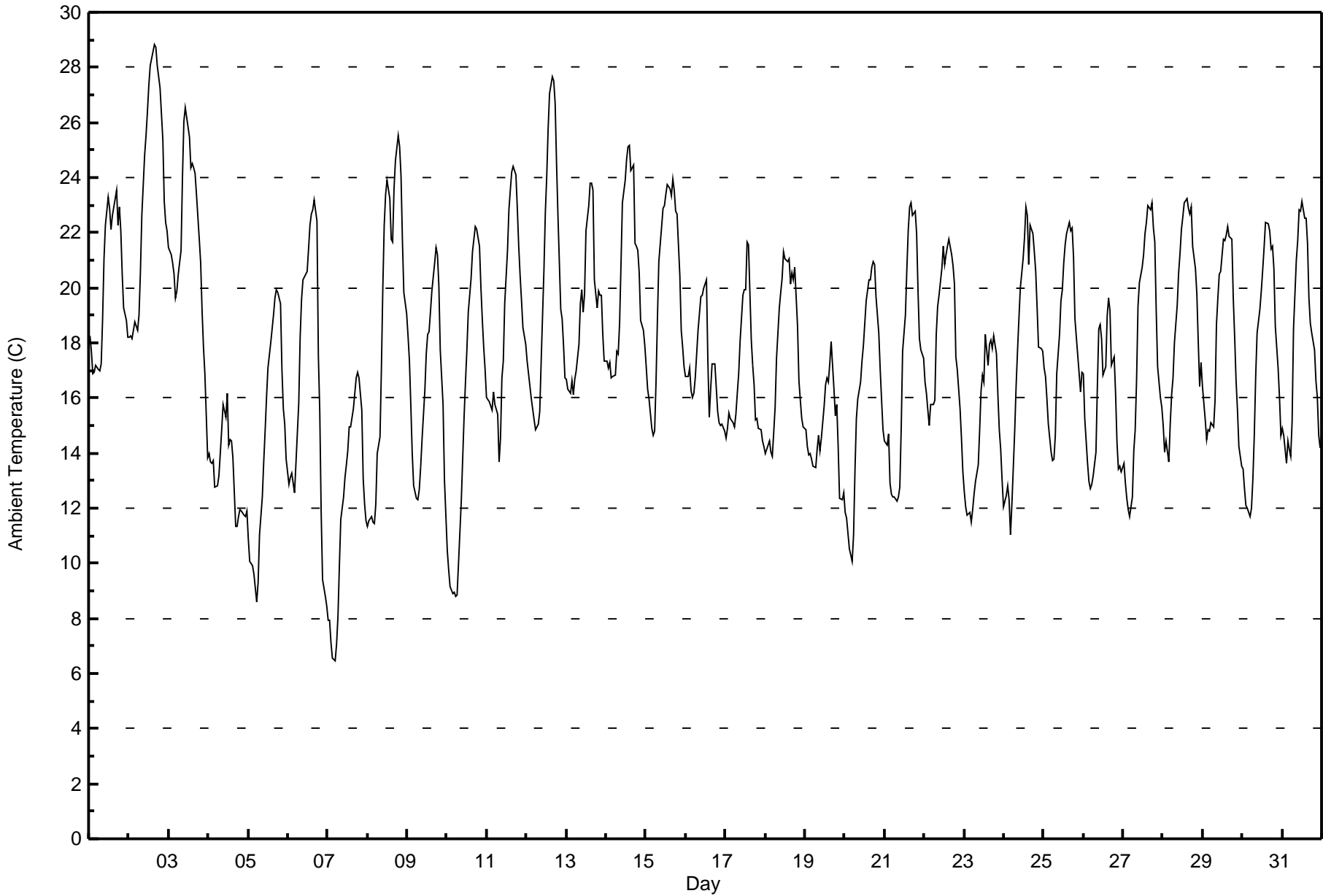








Maximum Value: 28.9 C on Jul 2 16:00		Maximum Daily Average: 23.6 C on Jul 2		Hours in Service: 744																																												
Minimum Value: 6.5 C on Jul 7 05:00		Minimum Daily Average: 12.1 C on Jul 7		Hours of Data: 744																																												
Maximum Diurnal Average: 21.5 C at hour 17		Minimum Diurnal Average: 13.6 C at hour 5		Hours of Missing Data: 0																																												
Monthly Average: 17.62 C		Percentiles: P <sub>1</sub> = 8.4 P <sub>10</sub> = 12.4 Q <sub>1</sub> = 14.7 Median = 17.3 Q <sub>3</sub> = 20.8 P <sub>90</sub> = 22.9 P <sub>99</sub> = 27.6		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-Jul	18.3	17.7	16.9	16.9	17.2	17.0	17.0	17.2	18.9	21.0	22.3	23.3	22.9	22.1	22.6	23.0	23.5	22.3	23.0	22.0	20.5	19.3	18.8	18.2	20.1	23.5																						
2-Jul	18.2	18.3	18.1	18.8	18.6	18.4	19.0	20.6	22.6	24.8	25.5	26.4	27.3	28.0	28.6	28.9	28.7	28.1	27.7	27.3	25.4	23.1	22.4	22.1	23.6	28.9																						
3-Jul	21.5	21.2	20.9	20.5	19.6	19.9	20.5	21.4	24.0	26.1	26.5	26.2	25.5	24.3	24.5	24.4	24.2	23.4	21.8	20.9	19.2	17.8	16.9	13.8	21.9	26.5																						
4-Jul	14.0	13.7	13.6	13.8	12.8	12.8	13.2	14.0	14.9	15.7	15.3	16.2	14.3	14.5	14.5	13.8	11.4	11.3	11.7	12.0	11.9	11.7	11.7	11.9	13.4	16.2																						
5-Jul	10.9	10.1	9.9	9.6	9.1	8.6	9.3	11.0	12.4	13.7	14.8	16.0	17.1	18.0	18.5	19.0	19.6	19.9	19.8	19.4	17.0	15.6	15.1	13.8	14.5	19.9																						
6-Jul	12.9	13.1	13.3	12.9	12.6	13.6	15.8	18.2	19.6	20.3	20.4	20.6	21.4	22.3	22.7	22.9	23.2	22.4	17.5	15.5	11.8	9.4	8.8	8.4	16.6	23.2																						
7-Jul	7.9	7.9	7.1	6.5	6.5	7.1	8.1	9.9	11.6	12.4	13.1	13.6	14.1	14.9	14.9	15.6	16.2	16.8	16.9	16.7	15.6	13.0	12.1	11.6	12.1	16.9																						
8-Jul	11.3	11.5	11.7	11.5	11.4	12.2	14.0	14.6	17.1	20.0	22.3	23.4	23.9	23.2	21.8	21.6	23.6	24.6	25.5	25.1	24.0	21.7	19.8	19.1	19.0	25.5																						
9-Jul	18.3	17.4	15.7	14.0	12.8	12.4	12.3	12.7	13.5	14.5	16.3	17.6	18.3	18.4	19.1	19.9	20.9	21.5	21.2	20.1	17.7	15.8	13.0	11.7	16.5	21.5																						
10-Jul	10.5	9.8	9.2	8.9	8.9	8.8	8.9	10.0	12.2	13.8	15.3	16.6	17.7	19.1	20.4	21.3	21.8	22.2	22.1	21.5	20.0	18.9	17.8	17.0	15.5	22.2																						
11-Jul	16.0	15.9	15.7	15.6	16.2	15.7	15.4	13.7	14.5	16.7	17.3	19.4	21.3	22.8	23.5	24.2	24.4	24.1	22.9	21.5	20.4	19.5	18.6	18.0	18.9	24.4																						
12-Jul	17.3	16.9	16.4	15.9	15.2	14.8	15.0	15.0	15.5	17.3	20.7	22.7	24.0	25.8	27.0	27.6	27.5	26.7	24.5	22.6	19.2	18.9	17.9	16.7	20.1	27.6																						
13-Jul	16.7	16.3	16.2	16.6	16.1	16.7	17.0	18.0	19.4	19.9	19.1	19.8	22.1	23.0	23.8	23.8	23.6	20.3	19.3	19.9	19.7	19.7	18.3	17.4	19.3	23.8																						
14-Jul	17.3	17.1	17.3	16.7	16.8	16.8	17.7	17.6	18.7	20.9	23.1	23.9	24.7	25.1	25.2	24.2	24.4	21.6	21.5	21.4	20.5	18.8	18.5	17.9	20.3	25.2																						
15-Jul	17.2	16.3	16.0	14.9	14.6	14.8	16.6	18.9	21.0	22.2	22.9	23.0	23.4	23.8	23.6	23.3	23.9	23.6	22.8	22.7	20.4	18.5	17.8	17.1	20.0	23.9																						
16-Jul	16.8	16.8	17.1	16.3	16.0	16.2	16.7	18.5	19.0	19.7	19.7	20.0	20.3	17.4	15.3	16.3	17.2	17.2	16.4	15.5	15.1	15.0	15.0	14.8	17.0	20.3																						
17-Jul	14.6	14.9	15.4	15.3	15.1	14.9	15.4	16.2	16.9	18.1	19.7	19.9	19.9	21.6	21.6	18.1	17.2	16.5	15.2	15.2	14.9	14.9	14.5	14.2	16.7	21.6																						
18-Jul	14.0	14.1	14.5	14.0	13.9	14.7	15.7	17.5	19.3	19.8	20.3	21.3	21.1	20.9	21.0	20.1	20.5	20.3	20.8	18.6	16.6	15.9	15.3	14.9	17.7	21.3																						
19-Jul	14.8	14.2	13.9	14.0	13.8	13.5	13.5	14.1	14.7	14.1	14.5	15.7	16.5	16.7	16.6	17.2	18.1	16.3	15.4	15.8	14.2	12.4	12.3	12.5	14.8	18.1																						
20-Jul	11.8	11.7	11.1	10.5	10.1	11.0	13.4	15.3	16.0	16.6	17.4	17.9	18.7	19.5	20.3	20.3	20.7	21.0	20.8	19.7	18.4	17.0	15.9	14.9	16.2	21.0																						
21-Jul	14.5	14.3	14.7	12.9	12.5	12.4	12.4	12.2	12.4	12.8	14.9	17.7	19.0	20.6	22.1	22.9	23.1	22.6	22.8	22.0	19.9	18.2	17.8	17.4	17.2	23.1																						
22-Jul	16.6	16.2	15.6	15.0	15.8	15.8	15.9	18.3	19.3	19.7	20.7	21.5	20.8	21.2	21.5	21.8	21.2	20.8	20.1	17.5	17.0	15.6	14.6	13.3	18.2	21.8																						
23-Jul	12.6	12.0	11.8	11.8	11.5	12.0	12.5	13.0	13.6	14.8	16.3	16.8	16.6	18.3	17.2	18.0	18.1	17.8	18.3	17.6	16.1	14.9	14.1	13.0	14.9	18.3																						
24-Jul	12.1	12.5	12.8	12.3	11.0	12.1	14.8	16.4	17.7	18.9	20.0	21.1	21.8	22.9	22.6	20.9	22.2	22.0	21.3	20.6	19.3	17.9	17.8	17.7	17.9	22.9																						
25-Jul	17.1	16.8	16.0	15.1	14.0	13.7	13.8	14.7	16.9	18.3	19.5	19.9	20.9	21.6	21.9	22.4	22.1	22.2	22.1	18.9	17.5	16.9	16.2	16.9	18.1	22.4																						
26-Jul	16.9	15.3	13.6	13.0	12.7	12.8	13.2	14.0	16.4	18.5	18.7	18.2	16.8	17.2	18.9	19.6	19.2	17.2	17.5	16.1	14.4	13.4	13.5	13.3	15.9	19.6																						
27-Jul	13.6	12.9	12.4	12.0	11.7	12.4	14.1	14.9	16.7	19.3	20.2	20.7	21.2	22.0	22.4	23.0	22.8	23.1	22.2	21.7	19.2	17.2	16.0	15.7	17.8	23.1																						
28-Jul	15.0	14.0	14.4	13.7	15.1	16.1	16.7	18.0	19.4	20.6	21.3	22.1	22.6	23.1	23.2	22.9	22.7	22.9	21.5	20.7	19.8	18.0	16.4	17.3	19.1	23.2																						
29-Jul	16.4	15.2	14.5	14.8	14.8	15.1	14.9	15.9	18.6	19.6	20.5	20.6	21.7	21.7	21.9	22.2	21.9	21.8	19.6	18.2	16.6	15.6	14.2	13.5	17.9	22.2																						
30-Jul	13.4	12.7	12.1	12.0	11.7	12.0	13.0	14.6	16.8	18.4	19.2	19.9	20.6	21.5	22.4	22.3	22.1	21.4	21.5	20.7	18.6	17.1	16.0	14.6	17.3	22.4																						
31-Jul	14.9	14.6	13.6	14.4	14.1	13.9	15.2	18.5	21.0	21.7	22.8	22.8	23.2	22.5	22.5	21.6	19.6	18.7	18.3	17.7	16.6	16.0	14.6	14.2	18.1	23.2																						
																								14.9	14.6	14.2	13.9	13.6	13.8	14.5	15.6	17.1	18.4	19.4	20.1	20.6	21.1	21.4	21.4	21.5	21.0	20.4	19.5	18.0	16.7	15.9	15.3	Diurnal Average
																								21.5	21.2	20.9	20.5	19.6	19.9	20.5	21.4	24.0	26.1	26.5	26.4	27.3	28.0	28.6	28.9	28.7	28.1	27.7	27.3	25.4	23.1	22.4	22.1	Diurnal Maximum





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C  
ConocoPhillips - Surmont - July 2015**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	23	3.09	3.09
10 - 20	496	66.67	69.76
> 20	225	30.24	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



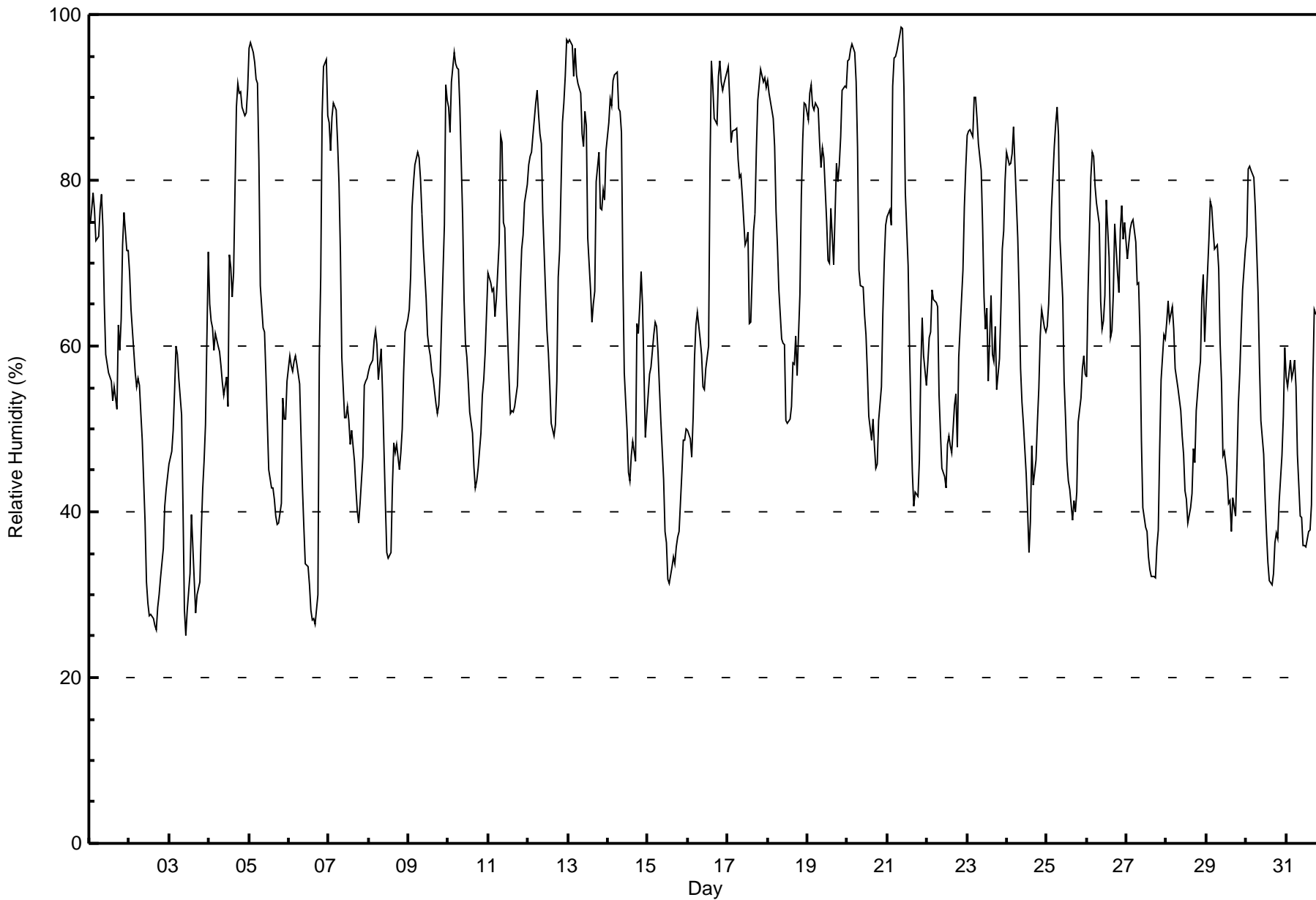
**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Relative Humidity (RH) - %**

**ConocoPhillips - Surmont - July 2015**

Maximum Value: 98 % on Jul 21 09:00																		Maximum Daily Average: 83.1 % on Jul 19																		Hours in Service: 744							
Minimum Value: 25 % on Jul 3 11:00																		Minimum Daily Average: 41.9 % on Jul 2																		Hours of Data: 744							
Maximum Diurnal Average: 77.3 % at hour 5																		Minimum Diurnal Average: 49.1 % at hour 14																		Hours of Missing Data: 0							
Monthly Average: 63.4 %																		Percentiles: P <sub>1</sub> = 27 P <sub>10</sub> = 39 Q <sub>1</sub> = 50 Median = 62 Q <sub>3</sub> = 78 P <sub>90</sub> = 89 P <sub>99</sub> = 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-Jul	75	76	78	76	73	73	76	78	74	65	59	57	56	56	53	55	52	62	60	63	72	76	72	72	67.1	78																	
2-Jul	69	64	62	57	55	56	55	52	49	39	32	29	27	28	27	26	26	28	30	32	36	41	43	44	41.9	69																	
3-Jul	46	47	50	55	60	59	56	52	41	28	25	28	33	40	36	32	28	30	32	38	43	46	50	71	42.6	71																	
4-Jul	65	63	62	60	61	60	59	58	56	54	56	53	71	70	66	69	89	92	91	91	89	88	88	91	70.8	92																	
5-Jul	96	97	95	94	92	92	82	67	62	62	57	51	45	43	43	41	39	39	39	41	54	51	51	56	62.0	97																	
6-Jul	59	58	57	58	59	58	55	49	43	38	34	33	31	28	27	27	26	30	59	68	88	94	95	88	52.6	95																	
7-Jul	87	84	88	89	88	85	80	71	59	51	51	53	51	48	50	46	43	40	39	41	47	55	56	56	60.7	89																	
8-Jul	57	58	58	61	62	60	56	60	54	48	41	35	34	35	43	48	47	48	45	47	50	57	62	63	51.2	63																	
9-Jul	64	68	77	80	82	83	83	80	76	72	66	61	60	59	57	56	53	52	53	56	63	75	92	90	69.0	92																	
10-Jul	89	86	92	95	94	94	93	89	75	66	60	59	56	52	49	45	43	44	45	50	54	56	59	64	67.0	95																	
11-Jul	69	68	67	67	64	66	73	85	85	75	74	66	56	52	52	52	53	55	61	67	72	73	77	79	67.0	85																	
12-Jul	82	83	83	85	89	91	88	86	84	76	67	62	59	55	51	49	51	56	68	72	87	89	93	97	75.1	97																	
13-Jul	97	97	96	93	96	93	92	91	86	84	88	87	73	67	63	65	67	80	83	77	76	79	78	84	82.9	97																	
14-Jul	87	90	89	92	93	93	89	88	86	69	57	50	45	44	47	48	46	63	61	65	69	65	49	52	68.1	93																	
15-Jul	54	57	57	61	63	62	59	55	51	44	38	36	32	31	33	35	34	36	37	38	45	49	49	50	46.1	63																	
16-Jul	50	49	47	51	59	63	64	61	59	55	55	57	60	81	94	91	87	87	93	94	92	91	92	93	71.9	94																	
17-Jul	94	90	85	86	86	86	82	80	81	78	72	73	74	63	63	74	76	84	90	91	93	92	92	91	82.3	94																	
18-Jul	92	91	89	87	84	76	72	67	61	60	60	51	51	51	53	58	58	61	56	66	78	85	89	89	70.2	92																	
19-Jul	87	91	91	89	88	89	89	85	82	84	83	75	70	70	77	73	70	82	80	82	85	91	91	91	83.1	91																	
20-Jul	94	95	96	96	95	92	84	69	67	67	64	61	57	51	49	51	48	45	46	51	55	64	70	75	68.4	96																	
21-Jul	76	76	75	91	95	95	96	97	98	98	91	78	70	60	51	45	41	42	42	46	57	63	59	55	70.8	98																	
22-Jul	58	61	62	67	66	65	65	54	50	45	44	43	48	49	48	47	53	54	48	59	62	69	77	82	57.3	82																	
23-Jul	85	86	86	85	90	90	88	84	81	74	66	62	65	56	66	59	58	62	55	58	64	72	74	80	72.8	90																	
24-Jul	83	82	82	83	86	82	73	66	57	53	51	45	40	35	39	48	43	46	51	55	61	64	62	62	60.4	86																	
25-Jul	62	65	71	77	84	87	89	85	73	66	56	51	46	44	43	39	41	40	42	51	54	57	59	57	59.9	89																	
26-Jul	56	66	80	83	83	79	77	75	65	62	63	66	78	71	61	62	66	75	69	66	74	77	73	75	71.0	83																	
27-Jul	70	72	74	75	75	73	67	68	61	49	40	38	38	35	33	32	32	32	36	38	48	56	61	61	52.7	75																	
28-Jul	63	65	63	65	62	57	56	55	52	49	47	43	42	39	41	42	48	46	52	57	58	66	69	61	54.0	69																	
29-Jul	65	73	77	77	74	72	72	69	60	56	47	47	44	41	41	38	42	40	46	53	57	62	67	72	57.9	77																	
30-Jul	73	81	82	81	80	77	72	66	58	51	47	42	37	34	32	31	33	36	37	37	41	47	51	60	53.6	82																	
31-Jul	56	55	58	56	57	58	55	47	40	39	36	36	36	38	38	41	56	64	64	64	74	76	81	80	54.4	81																	
																		72.9	74.0	75.1	76.6	77.3	76.3	74.1	70.6	65.3	59.9	55.7	52.5	51.1	49.1	49.2	49.3	49.9	53.3	55.1	58.5	64.5	68.6	70.3	72.2	Diurnal Average	
																		97	97	96	96	96	95	96	97	98	98	91	87	81	81	94	91	89	92	93	94	93	94	95	97	Diurnal Maximum	





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

**Relative Humidity (RH) - %**  
**ConocoPhillips - Surmont - July 2015**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	80	10.75	10.75
40 - 60	264	35.48	46.24
60 - 80	227	30.51	76.75
80 - 100	173	23.25	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



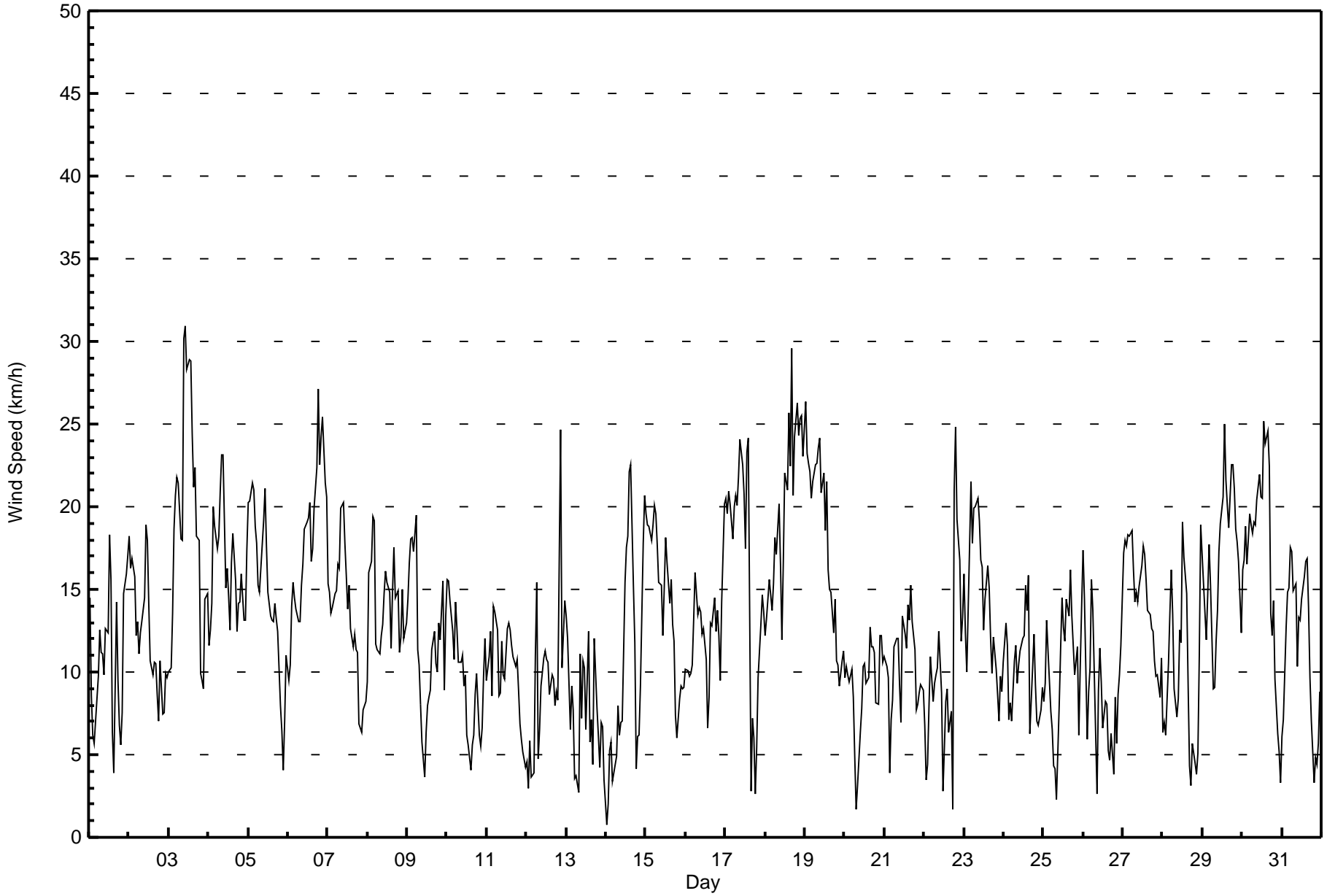


Maximum Speed: 31 km/h on Jul 3 11:00	Maximum Daily Speed Average: 19.6 km/h on Jul 18	Hours in Service: 744
Minimum Speed Value: 1 km/h on Jul 14 01:00	Minimum Daily Speed Average: 1.4 km/h on Jul 13	Hours of Data: 744
Maximum Diurnal Speed Average: 10.4 km/h at hour 6	Minimum Diurnal Speed Average: 5.3 km/h at hour 18	Hours of Missing Data: 0
Monthly Average Velocity: 8.1 km/h 262.7 deg	Percentiles: P <sub>1</sub> = 3 P <sub>10</sub> = 6 Q <sub>1</sub> = 9 Median = 12 Q <sub>3</sub> = 17 P <sub>90</sub> = 21 P <sub>99</sub> = 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-Jul	WNW14	NW9	W6	WNW6	W7	WSW10	WSW13	WSW11	WSW11	WNW10	NW13	NW12	NW18	WNW16	SW6	N4	NW14	WNW9	WSW7	S6	SSW8	SW15	SW16	SW17	W8.4	NW18
2-Jul	SW18	WSW16	WSW17	WSW16	WSW12	WSW13	WSW11	WSW12	WSW13	WSW15	W19	WSW18	W14	SW11	WSW10	SW11	SW10	SW9	SSW7	SW11	SSW7	SSW8	SSW10	SW10	WSW11.8	W19
3-Jul	SW10	SSW10	SW14	SW19	SW21	SW22	SW21	SW18	SW18	WSW30	WSW31	W28	W29	W29	W24	NW21	NW22	NW18	NW18	NW10	WNW9	W9	W14	WSW15	WSW16.4	WSW31
4-Jul	WSW12	WSW13	WSW14	W20	W19	W17	W18	W21	WNW23	WNW23	NW15	W16	NNW15	NNW13	NNW17	WNW18	WSW16	WSW13	W14	W14	W16	WNW13	WNW13	NW17	W14.5	WNW23
5-Jul	NNW20	NNW20	NW21	NW21	NNW19	NW18	NW15	NNW15	NNW18	NNW19	NW21	NNW18	NNW15	NNW13	NW13	NW13	WNW14	NW13	WNW12	W8	WSW6	SW4	SSW7	SW11	NW13.2	NW21
6-Jul	SSW9	SW10	SW14	SW15	SW15	SW14	SW13	SW13	SW15	WSW17	WSW19	WSW19	WSW19	WSW20	SW17	WSW17	WSW20	W22	NW27	NW23	NW24	NW25	NW21	NW21	W14.3	NW27
7-Jul	NW15	NW15	WNW14	W14	W15	W15	WNW17	NW16	NW20	NW20	NW18	WNW16	WNW14	WNW15	WNW13	WNW12	WSW12	W11	WSW11	SW7	SSW6	SSW8	SSW8	SSW8	WNW11.4	NW20
8-Jul	SSW9	SW16	SW17	SW19	SW19	SSW12	S11	SSE11	SSE12	SSE13	SSE15	S16	S15	SSE15	SSE11	SSE15	S18	SSW14	SW15	WSW11	WSW12	NW15	WNW12	W13	SSW10.5	SW19
9-Jul	W14	NW17	NW18	NW18	NW17	NW20	NNW11	NNW10	N8	N6	E4	NE6	NNE8	ENE8	NE9	ENE11	E12	ENE11	NNE10	N13	N12	NW16	NNW9	NW13	N8.5	NW20
10-Jul	NW16	NW16	NW14	NW12	NW11	NW14	NW13	NNW11	N11	NNW11	NNE9	N10	NNW6	N6	NE4	NNE6	E6	E9	ESE10	ESE6	ENE6	ESE7	ESE10	ESE12	N5.4	NW16
11-Jul	ESE9	SE11	SE12	SE9	SE14	SSE14	SSE13	ESE9	ESE9	ESE12	ESE10	E10	E13	E13	E13	E12	ENE11	NE10	NE11	NNE9	NE7	NE6	ENE5	ENE4	E8.1	SSE14
12-Jul	E5	E3	ESE6	N4	WNW4	NW11	NW15	NE5	NNW7	NNW9	NNE11	NE11	E11	E11	E9	ENE10	ENE10	ENE8	NW9	WSW8	SW25	WSW10	NW12	NNW14	N3.4	SW25
13-Jul	NW13	NW12	WNW7	NW9	WNW8	WSW4	SSW4	W3	W11	SSE7	ESE11	SE10	SW7	W12	NNW6	N7	ENE4	E12	E8	SE6	S4	NW7	NNE7	NE3	NW1.4	NW13
14-Jul	ESE1	W2	SE5	SE6	SW3	SW4	ESE5	ESE8	S6	SW7	WSW7	WSW15	W18	WSW18	WSW22	WSW23	W15	NNW12	NNE4	ESE6	SSE6	SSW9	WSW18	WSW21	WSW6.7	WSW23
15-Jul	WSW20	WSW19	WSW19	SW18	SW19	SW20	WSW20	SW18	WSW15	WSW12	WSW15	SW18	SW17	SW14	SSW16	SW13	SW12	SSW7	SW6	SW8	SW9	SSW9	SSW9	SSW9	WSW14.1	SW20
16-Jul	SSW10	SW10	SW10	SW10	WSW10	W13	W16	WNW14	NW14	NNW14	NNW12	NNW13	NW11	SSE7	SW9	W13	NW13	NW15	WNW12	WNW14	W12	W9	NW14	NW20	WNW9.4	NW20
17-Jul	NW21	NW20	NW21	NW20	NW18	NW20	NW21	NNW20	NW22	NW24	NW23	NW21	NW17	NW23	NW24	ESE3	S7	E6	NNE3	SW5	SW10	WSW13	WSW15	WSW14	NW13.1	NW24
18-Jul	WSW12	WSW13	WSW16	WSW15	WSW14	WSW15	WSW18	WSW17	WSW20	SW16	SSW12	SW17	WSW22	WSW21	WSW26	WSW22	WSW30	WSW21	WSW24	W26	WSW24	WSW25	WSW26	W23	WSW19.6	WSW30
19-Jul	W26	WNW23	W23	W22	W21	W21	W23	WNW23	WNW24	W24	W21	WNW22	WNW19	WNW22	WNW16	WNW15	WNW15	W12	WSW14	WSW11	WNW10	WSW9	W11	W11	W17.9	W26
20-Jul	W10	W10	W10	WSW9	WSW10	SW8	SW5	W2	ESE3	E6	E8	ESE10	ESE11	SE9	SE10	ESE13	ESE11	ESE12	ESE11	ESE8	ESE8	ESE12	ESE12	ESE11	SE4.7	ESE13
21-Jul	SE11	ESE10	SSE10	SSW4	ESE7	ESE8	E12	E12	ESE12	SSE9	SSW7	SW13	WSW12	SW11	SW14	SW13	WSW15	WSW13	SW11	WSW8	S8	SW9	SW9	SW9	SSW5.9	WSW15
22-Jul	SW7	E3	SW4	WSW8	W11	W8	W9	NW10	NNW10	NNW12	NNW9	NE3	NW5	ENE8	ESE9	E6	ESE8	WSW2	WSW21	WSW25	WSW19	WSW17	W12	WSW13	W5.5	WSW25
23-Jul	SW16	SW12	SW10	WSW18	WSW22	W18	W20	W20	W21	W19	W17	WSW16	WSW13	SW14	WNW16	W15	WNW12	W10	W12	W10	WSW9	WSW7	SW10	SW9	WSW13.7	WSW22
24-Jul	SW11	SW13	SW12	SW7	SW8	SW7	WSW11	WSW12	WSW9	WSW10	W11	WSW12	WSW12	WSW15	WSW14	WSW16	S6	SE10	SSE12	SSE9	S7	S7	S8	S9	SW8.3	WSW16
25-Jul	S8	SSW9	W13	W11	NNW8	NNW7	NW4	SSW4	SSW2	SW8	WSW11	W15	WSW13	WSW12	WSW14	WSW13	W16	WSW13	WSW12	WSW10	WSW12	W6	WSW10	WSW14	WSW9.0	WSW16
26-Jul	W17	SW14	SW6	SSW9	SSW10	SW16	SW14	W6	S3	N9	NNE11	NNE9	NNE7	E8	ESE8	ESE5	ENE5	E6	W4	N8	S6	S9	S10	SW12	SW2.7	W17
27-Jul	SW17	SW18	SW18	SW18	SW18	SW19	WSW16	SW14	WSW15	WSW14	WSW15	WSW16	WSW18	WSW17	WSW16	WSW14	WSW13	WSW13	WSW12	WSW10	W10	W8	W11	W11	WSW14.3	SW19
28-Jul	SW6	SW7	WSW6	WSW11	W14	W16	W13	WNW9	NNW7	NNW8	NNW13	NW12	WNW19	NW17	NW15	NW9	NNW4	WSW3	NE6	SE5	WNW4	W5	WSW11	W19	WNW7.7	WNW19
29-Jul	W17	W14	WSW12	WSW15	WSW18	W15	WSW9	WSW9	W12	W14	WSW17	WSW19	WSW21	W25	W22	WSW20	W19	WSW23	WSW23	W21	W19	WSW18	WSW17	WSW12	W16.9	W25
30-Jul	WSW16	WSW17	WSW19	WSW17	WSW20	WSW19	WSW18	WSW19	WSW19	W20	W22	W21	W20	W25	W24	W25	W22	WNW14	W12	W14	WSW10	W6	SW5	W3	W16.7	W25
31-Jul	SSW6	S7	SW13	SW15	SW15	SW18	SW17	WSW15	WSW15	WSW10	WSW13	WSW13	WSW14	W16	WSW17	WSW17	W14	W10	NNW7	NE3	N5	NW4	SSW6	SW9	WSW10.0	SW18

WSW8.7	WSW8.3	WSW9.0	WSW10.0	WSW10.3	W10.4	W9.8	W8.0	W8.3	W8.7	W7.8	W8.7	W9.2	W8.7	W8.5	W6.9	W7.0	W5.3	W6.4	W6.1	WSW7.0	WSW7.0	WSW7.2	WSW8.2	Diurnal Average
W26	WNW23	W23	W22	WSW22	SW22	W23	WNW23	WNW24	WSW30	WSW31	W28	W29	W29	WSW26	W25	WSW30	WSW23	NW27	W26	SW25	NW25	WSW26	W23	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 - July 2015**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	53	7.12	7.12
6 - 11	265	35.62	42.74
12 - 19	325	43.68	86.42
20 - 28	96	12.90	99.33
29 - 38	5	0.67	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



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

**Wind Speed (WS) - km/h**  
**ConocoPhillips - Surmont - July 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	2	5	4	4	5	2	0	2	4	7	3	6	2	3	1	53
6 - 11	8	10	8	9	13	25	9	8	15	24	40	36	26	8	10	16	265
12 - 19	2	0	0	0	8	7	1	9	3	4	54	104	47	26	43	17	325
20 - 28	0	0	0	0	0	0	0	0	0	0	5	25	29	7	27	3	96
29 - 38	0	0	0	0	0	0	0	0	0	0	0	3	2	0	0	0	5
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	13	12	13	13	25	37	12	17	20	32	106	171	110	43	83	37	744

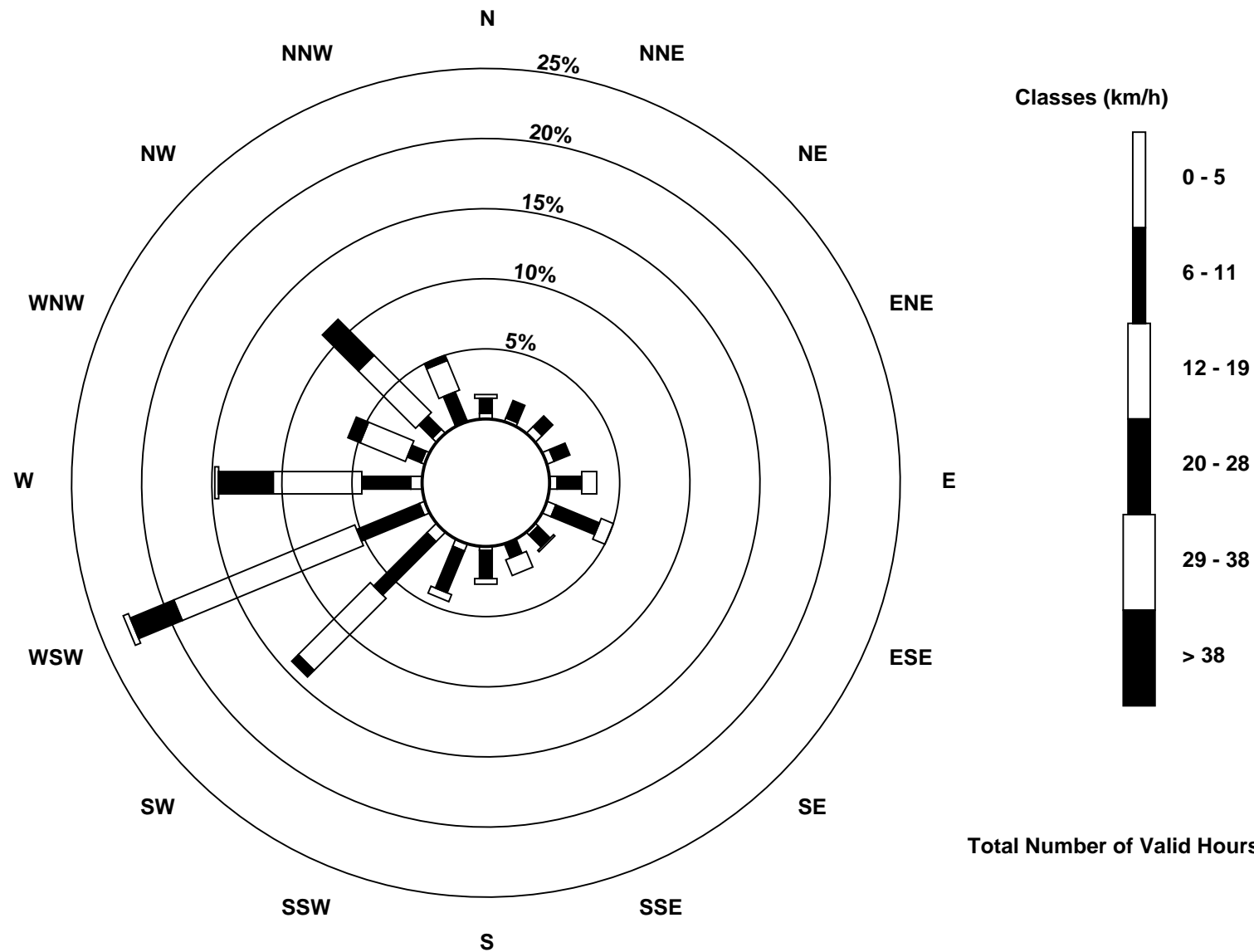
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association  
Wind Rose Jul 2015

Wind Speed (WS) - km/h  
ConocoPhillips - Surmont (AMS502)





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



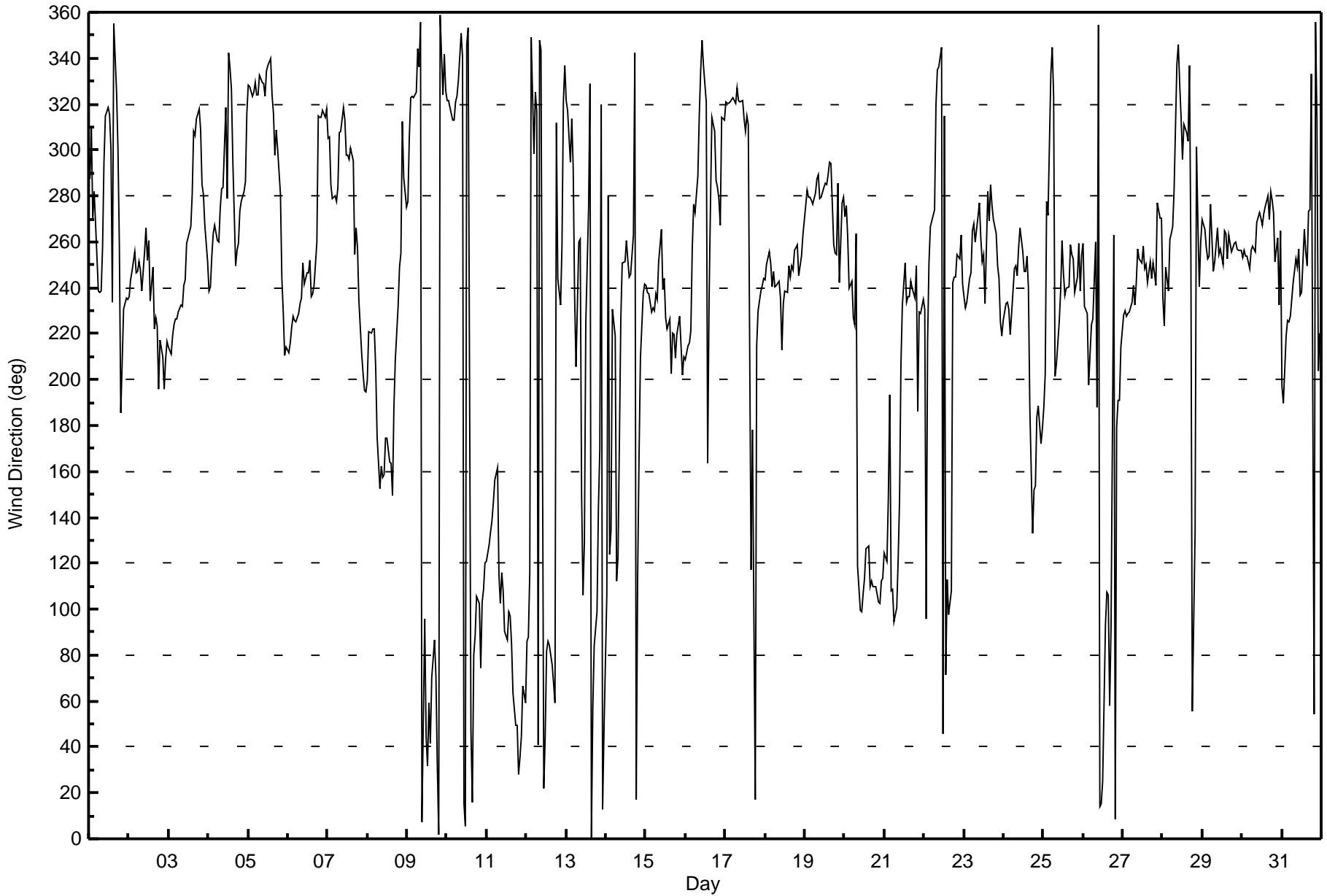
Direction of Maximum Speed: 244 deg on Jul 3 11:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 246.6 deg on Jul 18	Hours of Data: 744
Direction of Minimum Speed: 106 deg on Jul 14 01:00	Direction of Minimum Daily Speed Average: 1.4 deg on Jul 13
Direction of Minimum Speed: 106 deg on Jul 14 01:00	Hours of Missing Data: 0
Monthly Average Direction: 265.9 deg	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jul	287	310	270	282	268	239	238	239	258	294	315	318	315	300	234	355	325	300	258	186	207	231	236	235	272.5		
2-Jul	236	244	247	256	247	247	252	248	239	256	266	252	261	234	249	222	227	223	196	217	210	196	208	216	239.8		
3-Jul	214	211	219	224	226	226	229	233	232	241	244	260	264	267	281	308	306	314	318	309	285	281	267	251	257.9		
4-Jul	239	240	254	263	267	261	260	274	283	284	318	279	342	336	327	295	250	256	259	273	278	282	286	316	279.7		
5-Jul	328	328	323	325	329	324	324	333	329	329	324	335	337	340	324	316	298	309	300	281	244	230	211	214	318.8		
6-Jul	212	216	223	228	226	225	229	233	235	251	241	247	246	252	236	237	241	260	315	314	314	318	314	318	261.7		
7-Jul	305	306	285	279	280	278	283	308	308	318	313	298	298	296	301	296	255	266	258	234	211	203	195	194	285.8		
8-Jul	199	221	220	222	222	205	175	153	162	157	159	174	174	164	164	149	188	209	232	249	255	312	288	275	202.4		
9-Jul	278	306	323	323	323	325	344	336	356	8	96	45	32	59	41	70	87	70	31	2	359	324	342	326	350.3		
10-Jul	322	321	318	313	313	321	323	330	351	340	15	6	346	353	47	16	80	88	106	103	74	103	109	120	357.6		
11-Jul	121	128	134	138	146	156	161	114	103	116	108	91	87	99	97	85	64	50	49	28	35	45	67	59	101.2		
12-Jul	86	88	116	349	298	325	316	41	348	344	22	45	82	86	84	75	68	59	312	244	232	258	321	337	0.6		
13-Jul	322	317	295	314	292	237	206	260	261	150	106	129	225	275	329	1	57	84	99	144	170	320	13	48	313.7		
14-Jul	106	280	124	134	231	219	112	122	174	226	251	251	261	252	245	246	263	342	17	114	166	209	238	242	237.7		
15-Jul	241	238	237	230	231	230	237	235	251	265	239	244	227	222	227	203	220	220	209	220	228	215	202	210	230.6		
16-Jul	209	215	216	222	257	276	273	289	315	334	348	337	321	164	234	276	315	308	287	283	279	267	314	313	287.0		
17-Jul	321	321	321	321	323	322	320	327	322	321	322	321	322	314	308	315	311	117	178	97	17	215	230	238	241	244	309.5
18-Jul	243	250	256	251	240	247	240	241	243	235	213	233	239	238	250	244	250	248	256	259	245	250	254	263	246.6		
19-Jul	276	282	279	280	278	277	281	288	289	279	280	284	286	285	289	295	294	259	255	255	286	242	277	279	279.8		
20-Jul	271	276	262	240	243	227	224	263	119	100	99	107	114	126	127	110	113	110	110	110	103	102	112	113	130.9		
21-Jul	125	121	149	194	108	109	94	101	122	148	207	233	251	234	236	236	243	240	236	250	186	229	229	235	198.7		
22-Jul	230	96	216	251	266	272	274	320	335	336	345	46	315	72	113	97	108	242	245	245	255	252	263	242	265.2		
23-Jul	236	231	234	244	246	265	268	260	271	277	262	251	255	233	282	269	285	276	270	264	249	244	225	219	256.8		
24-Jul	226	233	233	231	220	229	248	250	245	258	266	256	247	247	254	240	188	133	152	154	183	189	172	179	225.2		
25-Jul	188	202	278	271	333	345	323	201	207	225	239	261	247	237	240	240	259	254	253	238	245	259	238	255	249.8		
26-Jul	259	232	229	197	211	224	226	260	188	355	14	15	25	93	108	106	58	92	263	8	180	191	191	214	220.1		
27-Jul	228	230	228	229	229	233	241	232	242	257	253	251	258	248	250	242	251	244	251	246	241	277	270	270	244.0		
28-Jul	236	223	249	239	261	264	267	282	337	346	329	314	296	311	307	304	337	254	55	133	301	268	241	260	284.1		
29-Jul	270	266	258	253	254	276	247	252	259	266	254	257	250	265	264	253	263	256	258	259	260	257	256	256	258.9		
30-Jul	254	256	254	254	248	256	258	257	256	268	273	270	268	272	275	280	270	282	278	273	251	262	233	265	264.6		
31-Jul	197	190	219	226	225	228	235	242	252	249	257	237	238	265	256	250	273	274	333	54	356	312	204	220	244.3		

257.2 257.4 255.0 256.3 255.8 259.3 259.6 265.5 272.1 279.3 279.8 271.5 270.8 265.2 266.1 260.5 261.5 264.9 268.9 259.6 252.1 258.2 252.7 257.1

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**

**ConocoPhillips - Surmont - July 2015**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 102 deg on Jul 22 18:00 Minimum Value: 5 deg on Jul 23 21:00 Percentiles: P <sub>1</sub> = 7 P <sub>10</sub> = 9 Q <sub>1</sub> = 11 Median = 16 Q <sub>3</sub> = 23 P <sub>90</sub> = 37 P <sub>99</sub> = 81																		Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0							
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jul	18	33	18	31	15	15	11	10	13	30	23	27	18	23	35	72	16	31	25	15	18	8	8	8	72
2-Jul	8	8	8	8	8	9	10	9	10	16	14	16	23	42	36	33	19	14	24	20	13	13	15	15	42
3-Jul	15	16	14	11	9	9	9	8	12	13	15	15	16	12	18	18	16	15	14	18	14	12	17	15	18
4-Jul	13	6	10	8	10	10	11	13	13	15	21	26	32	24	16	24	12	10	9	10	9	10	14	15	32
5-Jul	17	12	10	11	12	10	14	16	15	16	16	23	27	25	36	28	28	23	24	29	13	28	11	8	36
6-Jul	12	14	11	7	8	8	8	10	19	21	16	17	16	20	19	20	17	20	13	13	13	13	14	13	21
7-Jul	17	18	12	9	9	9	16	19	18	19	25	25	28	24	33	32	25	24	15	21	13	10	12	14	33
8-Jul	18	13	14	12	11	22	19	18	19	17	23	20	22	18	27	17	22	19	13	10	8	31	18	8	31
9-Jul	9	18	9	10	9	10	18	20	24	48	86	52	38	25	35	30	21	23	21	18	16	19	22	10	86
10-Jul	7	7	17	17	20	12	10	15	22	22	35	39	62	63	73	57	39	23	16	12	9	12	10	10	73
11-Jul	10	12	14	23	16	14	21	38	15	16	18	22	19	21	26	21	21	16	14	13	15	23	23	29	38
12-Jul	14	9	10	60	47	45	20	35	32	24	22	20	26	32	35	30	22	15	58	18	14	25	29	13	60
13-Jul	25	21	29	31	30	38	30	61	11	52	17	20	45	21	64	32	63	18	31	28	23	86	33	42	86
14-Jul	81	65	29	30	32	39	33	20	28	47	48	20	18	18	16	14	38	20	52	22	32	22	8	7	81
15-Jul	7	8	7	7	8	9	9	10	16	17	28	18	18	20	17	23	30	17	19	24	9	15	7	7	30
16-Jul	6	7	7	17	13	9	11	18	21	19	21	17	25	67	27	14	16	16	19	14	17	17	25	14	67
17-Jul	12	11	10	11	10	9	12	13	11	11	13	15	18	15	17	89	47	69	72	21	14	8	8	8	89
18-Jul	9	8	8	7	7	8	8	10	10	11	18	17	12	12	11	10	11	10	10	10	10	10	9	10	18
19-Jul	11	10	10	10	10	11	11	13	14	11	13	15	16	15	18	18	27	12	13	10	35	15	12	11	35
20-Jul	10	11	11	20	9	12	14	76	84	38	44	33	29	38	38	22	16	16	12	10	11	12	11	10	84
21-Jul	10	10	26	58	17	16	12	12	14	22	36	18	21	23	19	22	17	13	12	15	22	12	17	23	58
22-Jul	38	58	48	37	8	11	9	22	19	17	36	76	53	37	21	22	16	102	11	11	9	9	13	9	102
23-Jul	7	9	13	10	10	15	12	13	13	15	18	18	20	23	23	17	27	23	19	12	5	32	8	8	32
24-Jul	7	7	11	22	13	9	10	13	27	24	24	21	26	24	22	18	41	22	14	13	19	15	14	16	41
25-Jul	15	30	21	15	30	19	51	36	88	37	24	20	22	23	20	19	17	18	9	9	7	29	9	10	88
26-Jul	9	25	56	15	15	12	12	58	77	59	28	29	64	28	38	67	68	34	71	34	39	15	15	16	77
27-Jul	9	8	8	9	8	9	9	8	13	17	24	21	18	18	23	25	22	20	9	13	19	15	6	7	25
28-Jul	33	63	68	19	10	10	10	31	29	33	24	39	19	27	26	38	70	90	61	53	71	43	21	9	90
29-Jul	10	9	10	9	11	22	22	20	17	18	20	15	16	17	16	17	14	12	11	13	10	9	9	10	22
30-Jul	13	10	8	9	10	9	10	11	13	15	14	17	17	20	19	15	16	18	15	10	9	44	15	34	44
31-Jul	20	20	13	7	8	8	9	10	13	23	22	20	18	21	14	13	12	13	23	31	43	63	19	11	63
81 65 68 60 47 45 51 76 88 59 86 76 64 67 73 89 70 102 72 53 71 86 33 42																									
Diurnal Maximum																									



# Wood Buffalo Environmental Association

## SO2 Calibration Report

### Station Information

Calibration Date	July 22, 2015	Last Calibration	June 25, 2015
Station Name	ConocoPhillips - Surmont	Station Number	AMS 502
Reason:	Routine		
Start Time (MST)	9:00	End Time (MST)	13:45
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	761	731
Analyzer IP address	192.168.1.43		Lamp voltage	2468	2414
Calculated slope	1.003998	0.999243	Chamber temp	50.0	50.0
Calculated intercept	-0.064523	-0.041966	Pressure	22.3	21.9
Analyzer Background	18.5	19.3	Flow	0.560	0.548
Analyzer Coefficient	1.014	1.015	Intensity	61	60
Analyzer make	API T100		Analyzer serial #	598	

### Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.3	----
as found span	5000	83.2	803.7	799.8	1.005
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	83.2	803.7	804.4	0.999
second point	5000	41.6	401.9	402.2	0.999
third point	5000	20.8	200.9	201.2	0.999
as left zero	5000	0.0	0.0	0.4	----
as left span	6000	99.8	803.4	799.3	1.005
Average Correction Factor					0.999

Corrected As found	799.5	Previous response	800.6	% change	0.1%
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Notes:

Inlet filter replaced after as founds. Adjusted zero.

Calibration Performed By:

Asad Hidayat



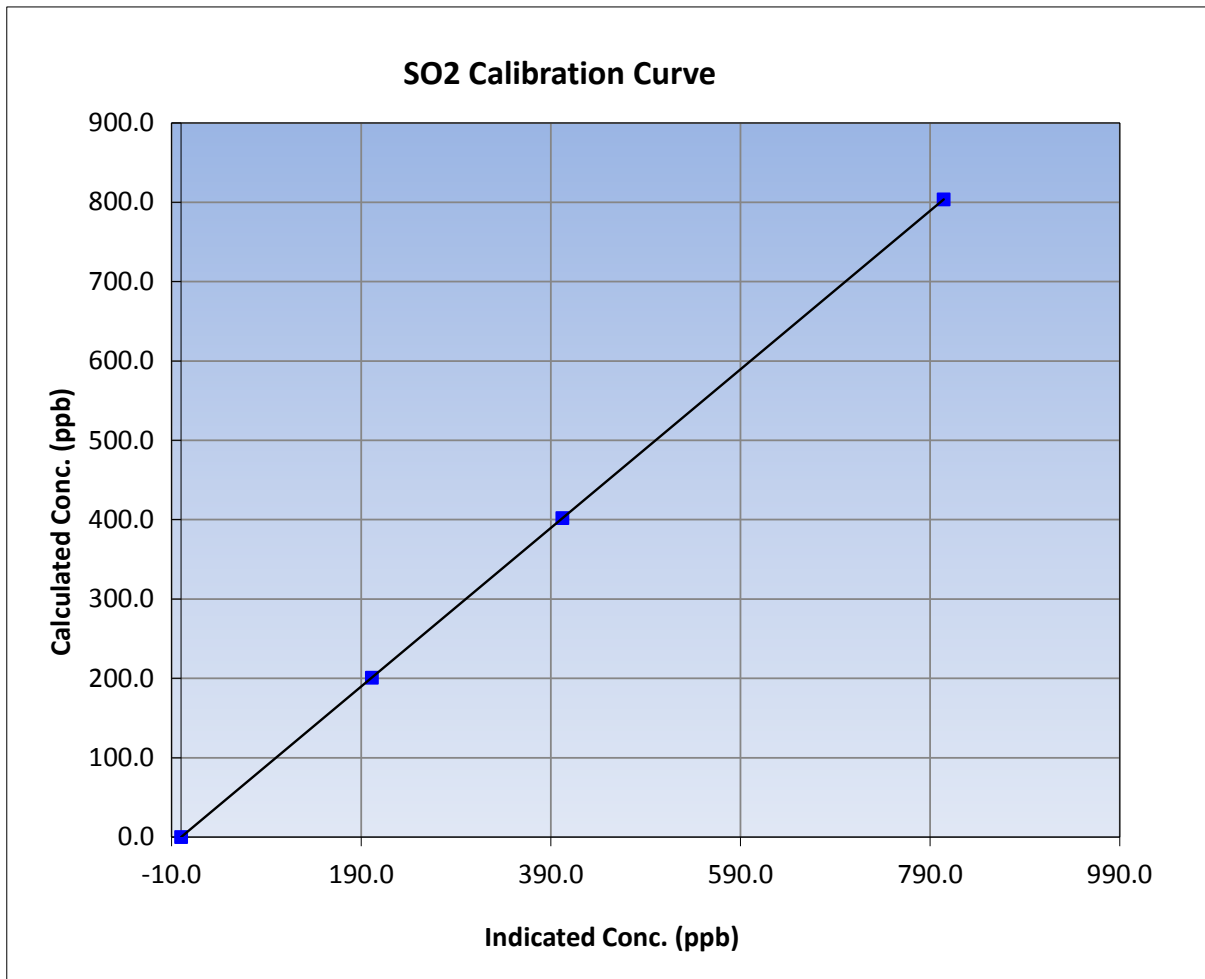
## Wood Buffalo Environmental Association SO2 Calibration Report

### Station Information

Calibration Date	July 22, 2015	Previous Calibration	June 25, 2015
Station Name	ConocoPhillips - Surmont	Station Number	AMS 502
Start Time (MST)	9:00	End Time (MST)	13:45
Analyzer make	API T100	Analyzer serial #	598

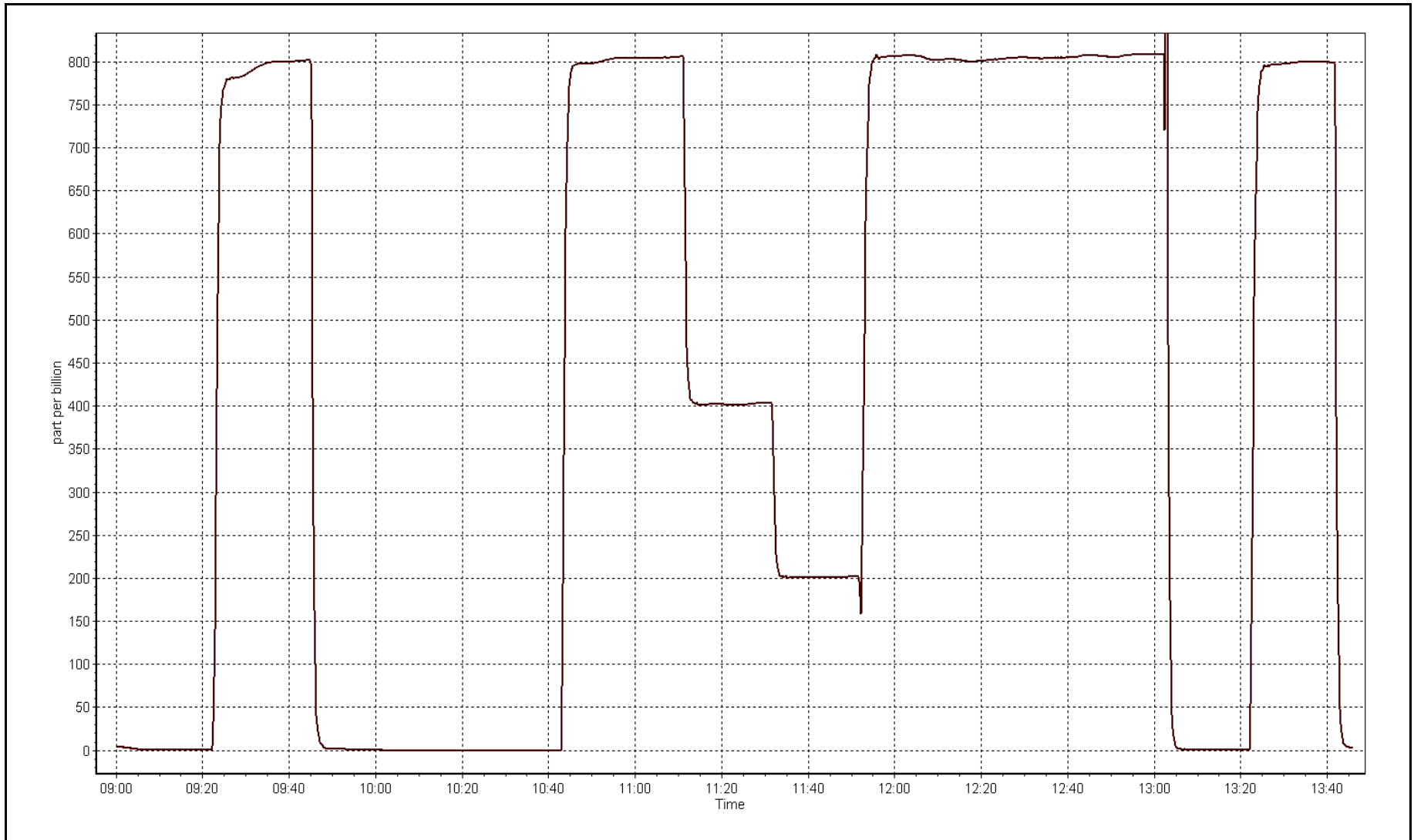
### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	----	Correlation Coefficient	1.000000
803.7	804.4	0.9992		
401.9	402.2	0.9992	Slope	0.999243
200.9	201.2	0.9988		
			Intercept	-0.041966



SO2 Calibration Plot

Date: July 22, 2015





# Wood Buffalo Environmental Association H2S Calibration Report

## Station Information

Calibration Date	July 21, 2015	Last Calibration	June 24, 2015
Station Name	ConocoPhillips-Surmont	Station Number	AMS 502
Reason:	Routine		
Start Time (MST)	8:40	End Time (MST)	12:00
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	84	81
Analyzer IP address	192.168.1.75		Lamp voltage	2404	2337
Calculated slope	0.999914	0.999826	Chamber temp	50	50
Calculated intercept	-0.091368	0.021809	Pressure	22.9	22.6
Analyzer Background	20.1	20.6	Flow	0.567	0.560
Analyzer Coefficient	0.942	0.93	Intensity	53	52
			Converter temp.	316	317

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	0.3	----
as found span	5000	38.5	80.1	81.5	0.983
SO2 scrubber check	5000	19.6	200.3	3.6	----
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	40.1	1.001
third point	5000	12.1	25.2	25.1	1.001
as left zero	5000	0.0	0.0	0.0	----
as left span	5000	38.5	80.1	79.7	1.005
Average Correction Factor					1.001

Corrected As found	81.2	Previous response	80.2	% change	-1.3%
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**Notes:**

Inlet filter replaced and scrubber check done after as founds. Adjusted zero and span.

Calibration Performed By: Asad Hidayat



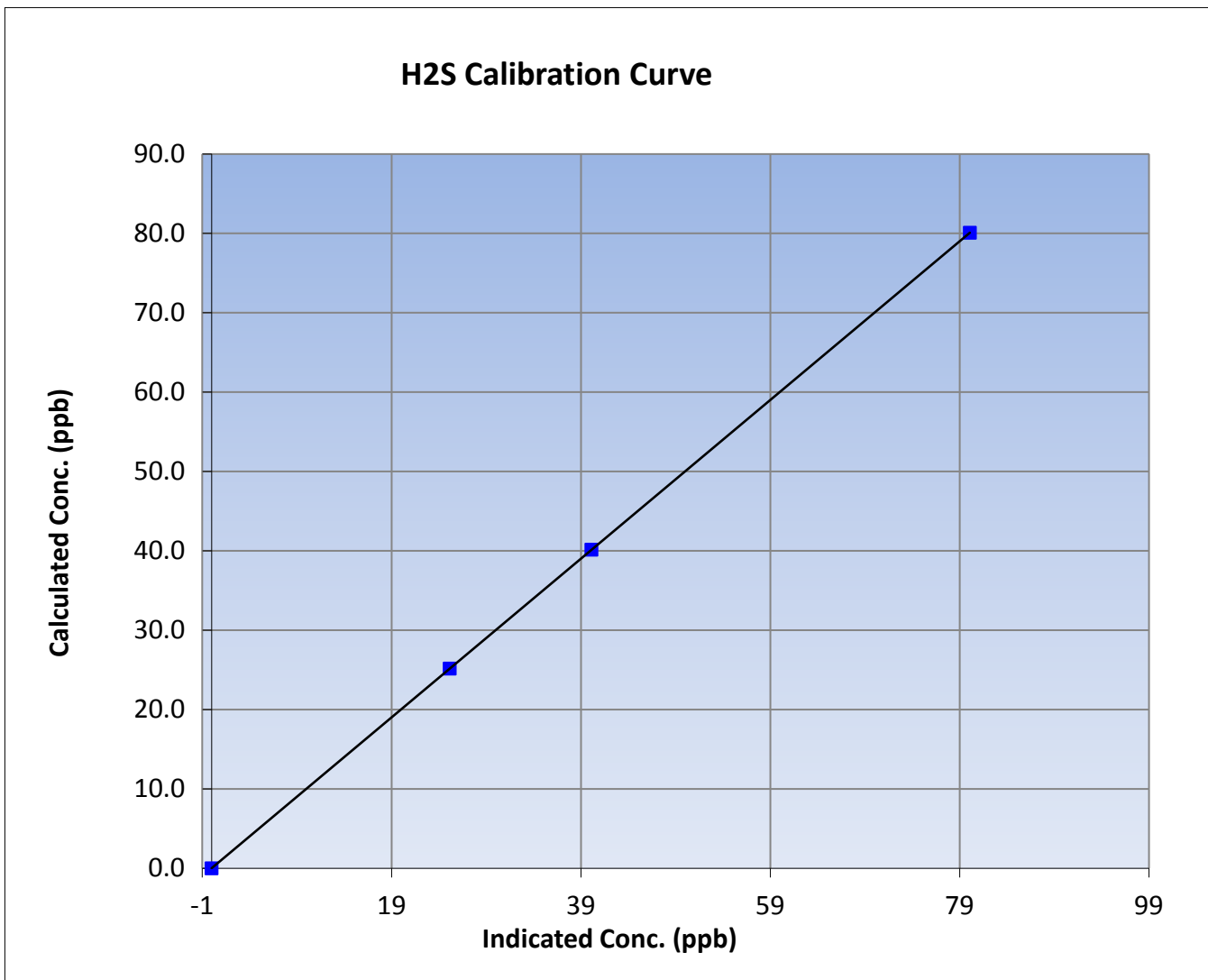
# Wood Buffalo Environmental Association H2S Calibration Report

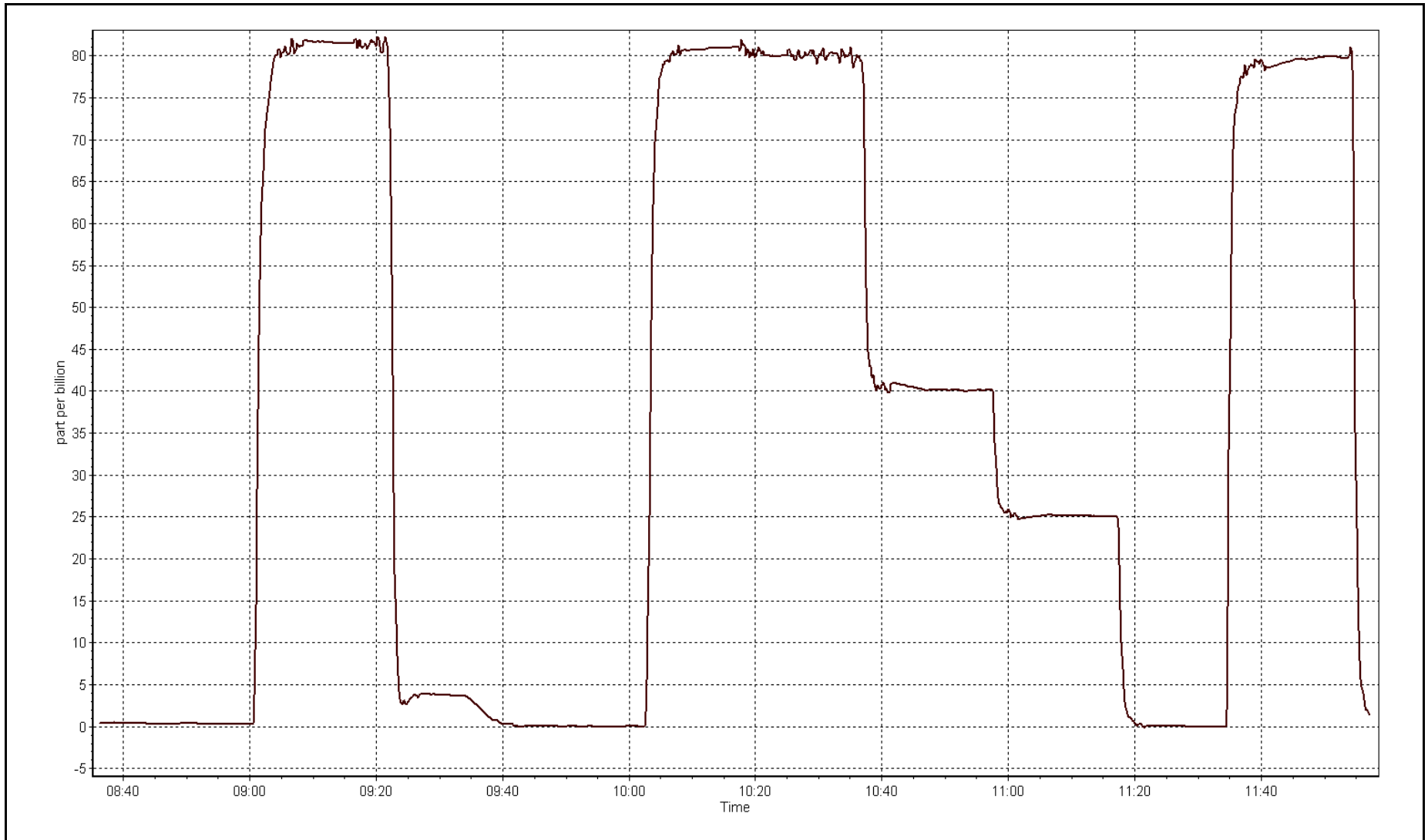
## Station Information

Calibration Date	July 21, 2015	Previous Calibration	June 24, 2015
Station Name	ConocoPhillips-Surmont	Station Number	AMS 502
Start Time (MST)	8:40	End Time (MST)	12:00
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	1.000000
80.1	80.1	1.0000		
40.1	40.1	1.0006	Slope	0.999826
25.2	25.1	1.0011		
			Intercept	0.021809







## Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

### Station Information

Calibration Date	July 22, 2015	Previous Calibration	June 25, 2015
Station Name	ConocoPhillips - Surmont	Station Number	AMS 502
Reason:	Routine		
Start Time (MST)	9:00	End Time (MST)	13:45
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	1.000582	0.998670	0.986045
	Data Offset	-0.290343	-0.240349	0.576412
Current Calibration	Data Slope	0.996816	0.997023	1.001108
	Data Offset	0.572223	0.394891	0.071697

### 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	0.736		0.769	
NOx coefficient	0.999		1.001	
NO2 coefficient	1.000		1.000	
NO bkgrnd	4.4		5.1	
NOx bkgrnd	4.9		6.1	
Chamber Temp	50.1	Deg C	50.6	Deg C
Moly Temp	325	Deg C	325	Deg C
PMT voltage	-941.3	V	-941.9	V
PMT Temp	-3	Deg C	-2.8	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	207.9	mmHg	210	mmHg
R Cell Press Nox	207.9	mmHg	210	mmHg
NO sample flow	0.493	lpm	0.472	lpm
Nox sample Flow	0.493	lpm	0.472	lpm

**Notes:**

Inlet filter replaced after as founds. Adjusted both zero and span on NO and NOX.





# Wood Buffalo Environmental Association

## NOX-NO-NO2 Calibration Report

### Station Information

Calibration Date: July 22, 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	1.1	0.3	0.8	----	----
as found span	5000	83.2	800.4	800.4	0.0	766.0	766.1	-0.1	1.0449	1.0448
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.5	-0.2	-0.2	----	----
high point	5000	83.2	800.4	800.4	0.0	802.5	802.5	0.0	0.9974	0.9974
second point	5000	41.6	400.2	400.2	0.0	400.7	400.9	-0.2	0.9987	0.9981
third point	5000	20.8	200.1	200.1	0.0	200.1	200.1	0.0	0.9999	0.9999
as left zero	5000	0.0	0.0	0.0	0.0	-1.0	-0.3	-0.6	----	----
as left span	6000	99.8	800.1	515.2	284.9	815.8	536.7	279.2	0.9807	0.9600
<b>Average Correction Factor</b>									<b>0.9987</b>	<b>0.9985</b>

Corrcctd As found NO<sub>x</sub>= 764.9 NO= 765.8 Percent Change NO<sub>x</sub>= 4.6% NO= 4.7%  
 Previous Response NO<sub>x</sub>= 800.2 NO= 801.7

### GPT Calibration Data

Dilution Flow 5000 ccm Source Gas Flow 83.20 ccm

O3 Setpoint (ppb)	Indicated NO high point (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
Cal zero			0.0			-0.2			N/A	
1st NO2 (300)	N/A	515.2	277.1	805.1	528.1	277.1	0.9779	0.9757	1.0000	100.0%
2nd NO2 (200)	N/A	599.5	192.8	805.0	613.7	191.6	0.9780	0.9769	1.0063	99.4%
3rd NO2 (100)	N/A	690.0	102.3	805.0	702.2	102.8	0.9780	0.9826	0.9951	100.5%
4th NO2 (0)	792.3	N/A	11.7	804.0	803.0	0.8	0.9792	0.9867	N/A	----
<b>Average Correction Factor</b>							<b>0.9783</b>	<b>0.9805</b>	<b>1.0005</b>	<b>100.0%</b>

Calibration Performed By: Asad Hidayat



# Wood Buffalo Environmental Association

## NO<sub>x</sub> Calibration Summary

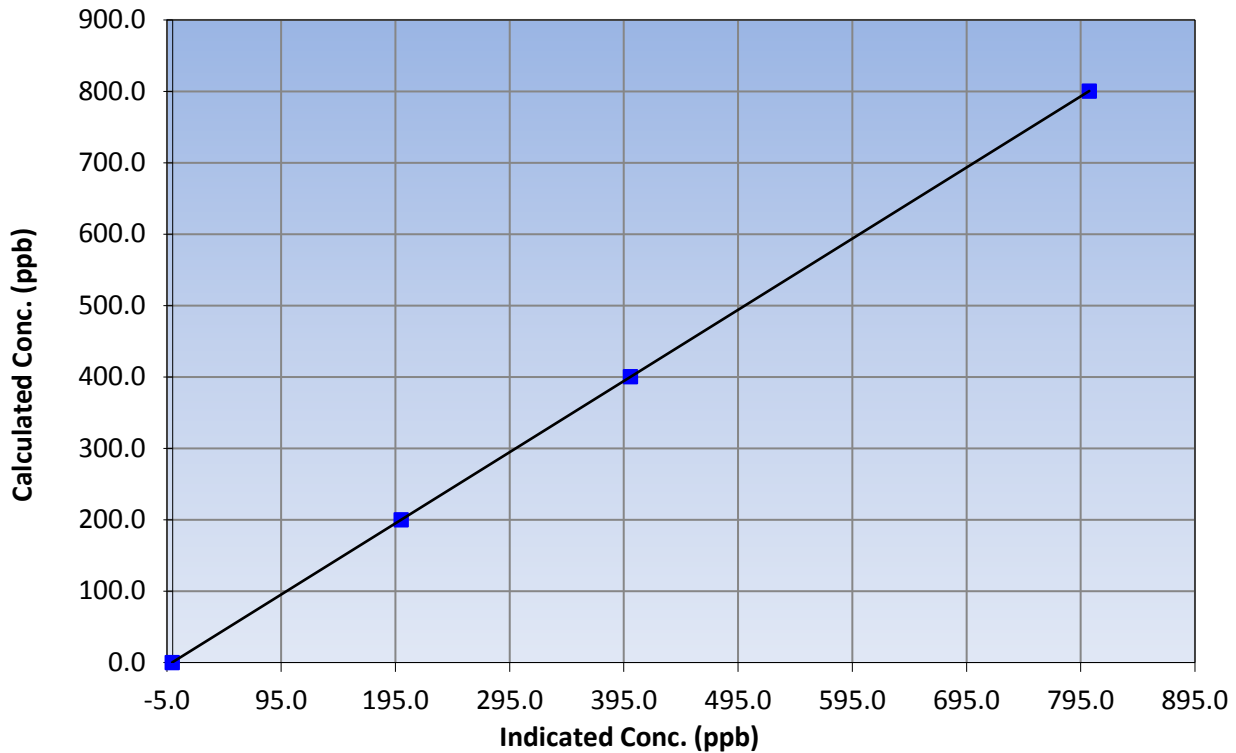
### Station Information

Calibration Date	July 22, 2015	Previous Calibration	June 25, 2015
Station Name	ConocoPhillips - Surmont	Station Number	AMS 502
Start Time (MST)	9:00	End Time (MST)	13:45
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	----	Correlation Coefficient	1.000000
800.4	802.5	0.9974		
400.2	400.7	0.9987	Slope	0.996816
200.1	200.1	0.9999		
			Intercept	0.572223

### NO<sub>x</sub> Calibration Curve





# Wood Buffalo Environmental Association

## NO Calibration Summary

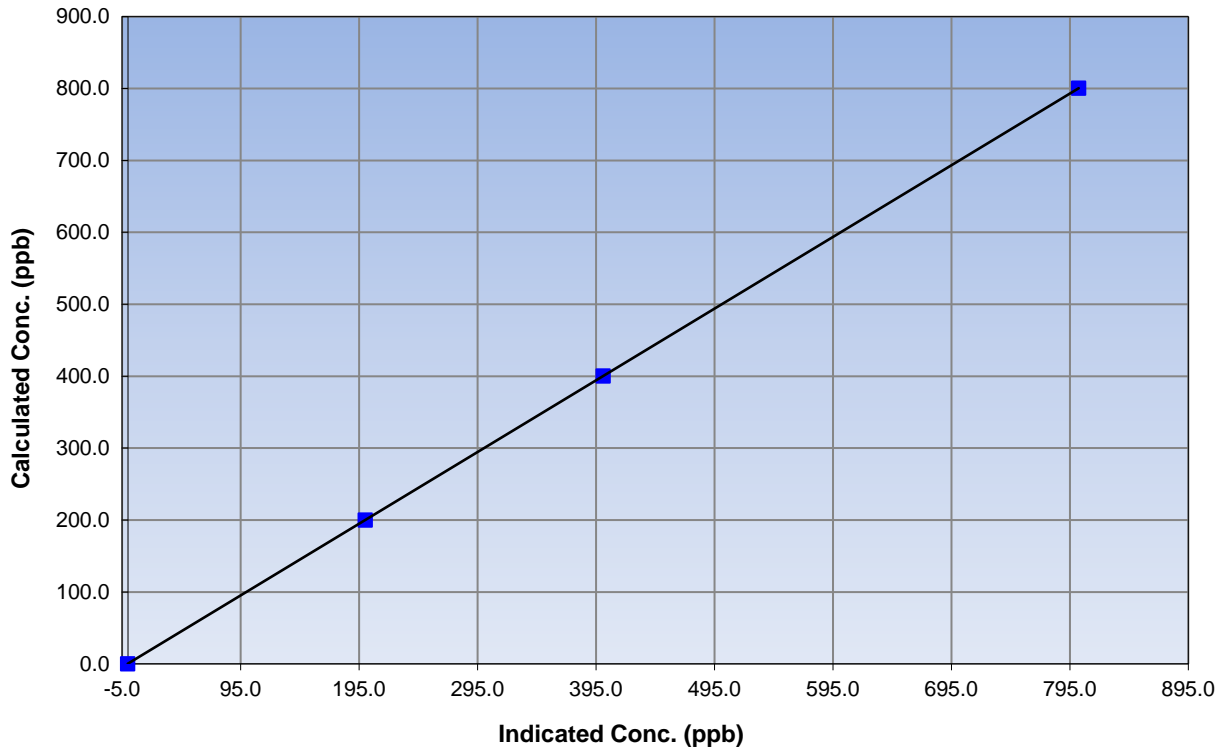
### Station Information

Calibration Date	July 22, 2015	Previous Calibration	June 25, 2015
Station Name	ConocoPhillips - Surmont	Station Number	AMS 502
Start Time (MST)	9:00	End Time (MST)	13:45
Analyzer make	Thermo 42i	Analyzer serial #	1218153356

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	N/A	Correlation Coefficient	1.000000
800.4	802.5	0.9974		
400.2	400.9	0.9981	Slope	0.997023
200.1	200.1	0.9999		
			Intercept	0.394891

### NO Calibration Curve





# Wood Buffalo Environmental Association

## NO<sub>2</sub> Calibration Summary

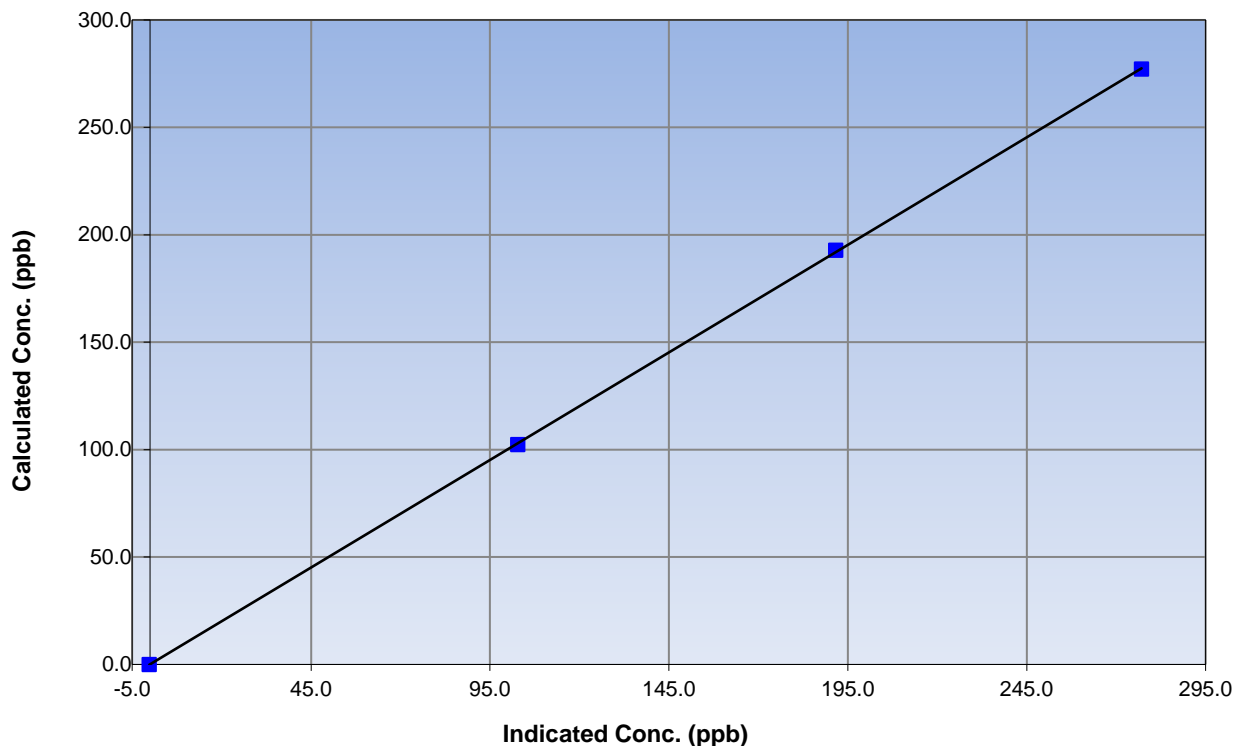
### Station Information

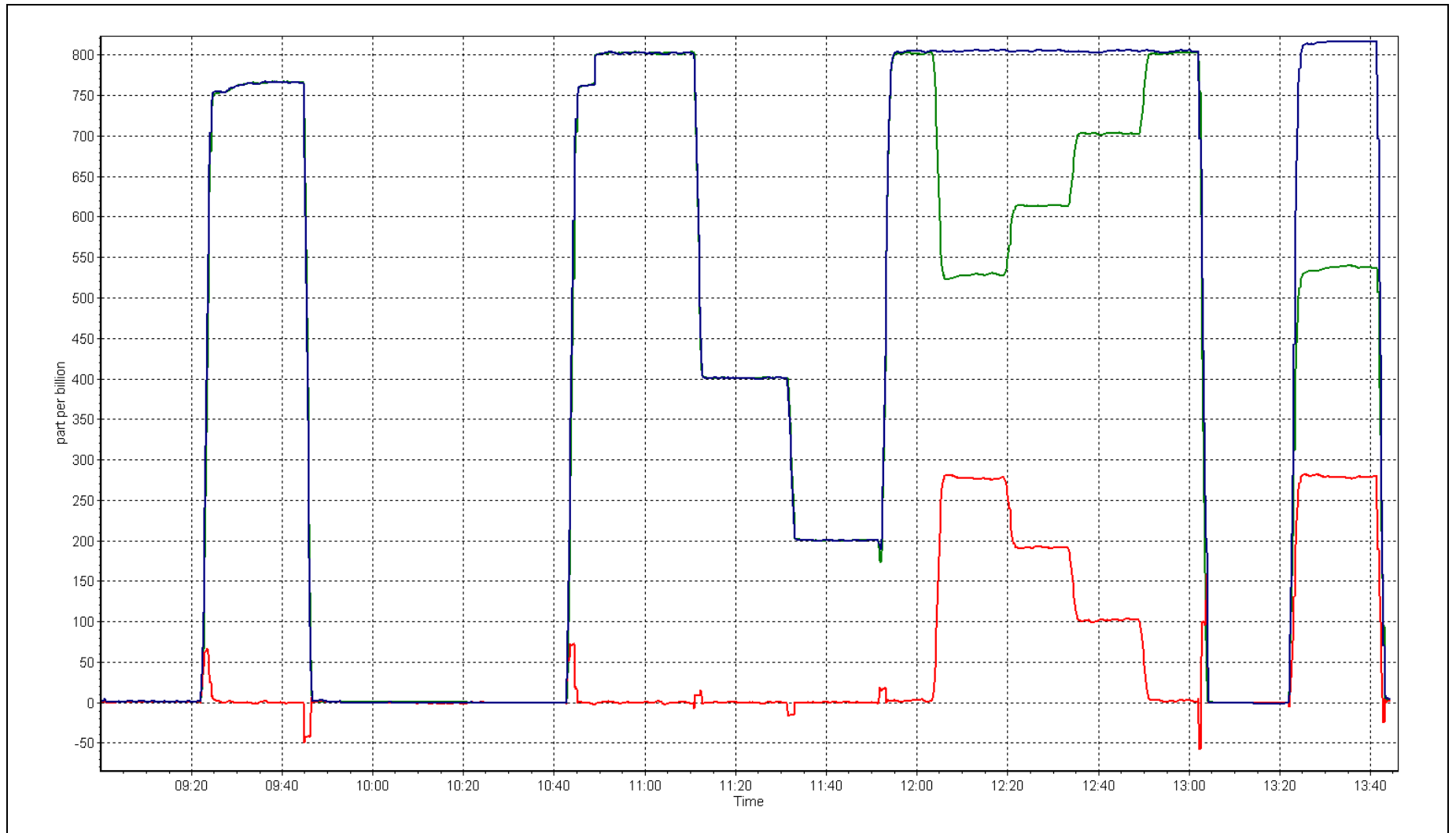
Calibration Date	July 22, 2015	Previous Calibration	June 25, 2015
Station Name	ConocoPhillips - Surmont	Station Number	AMS 502
Start Time (MST)	9:00	End Time (MST)	13:45
Analyzer make	Thermo 42i	Analyzer serial #	1218153356

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	N/A	Correlation Coefficient	0.999965
277.1	277.1	1.0000		
192.8	191.6	1.0063	Slope	1.001108
102.3	102.8	0.9951		
			Intercept	0.071697

### NO<sub>2</sub> Calibration Curve







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## **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  
Revision 1 – August 28, 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	629	34	91	92.08	13	0	5	-
NO(ppb) Average	629	34	91	92.08	7	-	1	-
NOX(ppb) Average	629	34	91	92.08	15	-	6	-
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	629	1	1	-	0	0	0	0	1	2	13	13
NO(ppb) Average	629	0.2	0	-	0	0	0	0	0	0	7	7
NOX(ppb) Average	629	1.1	2	-	0	0	0	1	1	3	15	15
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	-	-	-	-	0	0	0	0	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
NO2, NO, NOX	29 Jun 2015 02:00	01 Jul 2015 00:00	47	Unstable Operation - inlet filter restricted from forest fire smoke
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

Summary of Hour Averages

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

Fort Chipewyan - June 2015

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 5 ppb on Jun 18 03:00	Maximum Daily Average: 0.7 ppb on Jun 28		Hours of Data:	678
Minimum Value: 0 ppb on Jun 2 00:00	Minimum Daily Average: 0.0 ppb on Jun 9		Hours of Missing Data:	42
Maximum Diurnal Average: 0.3 ppb at hour 3	Minimum Diurnal Average: 0.1 ppb at hour 2		Hours of Calibration:	35
Monthly Average: 0.2 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 0 P <sub>99</sub> = 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	0.0	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	0.0	0
3-Jun	0	0	0	0	Z	0	0	0	0	1	1	1	1	C	C	C	C	C	0	0	0	0	0	0	0	0.2	1
4-Jun	0	0	1	1	1	Z	0	1	1	1	1	0	0	0	0	1	1	0	1	1	1	1	0	0	0	0.6	1
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	0	0.1	0
6-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0.2	1
7-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1
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	0.0	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	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	0.0	0
11-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	0.1	1
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	0	Z	0	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	Z	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	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
16-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	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	0
18-Jun	0	Z	5	4	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	5
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	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	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	0.1	0
22-Jun	0	0	0	0	0	Z	0	0	PF	PF	PF	PF	PF	PF	PF	PF	0	0	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	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	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	0.1	0
26-Jun	0	0	0	Z	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
27-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0.3	1
28-Jun	0	0	0	0	0	Z	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1
29-Jun	Z	1	0	1	2	1	0	0	0	0	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0.5	2
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	0.1	0

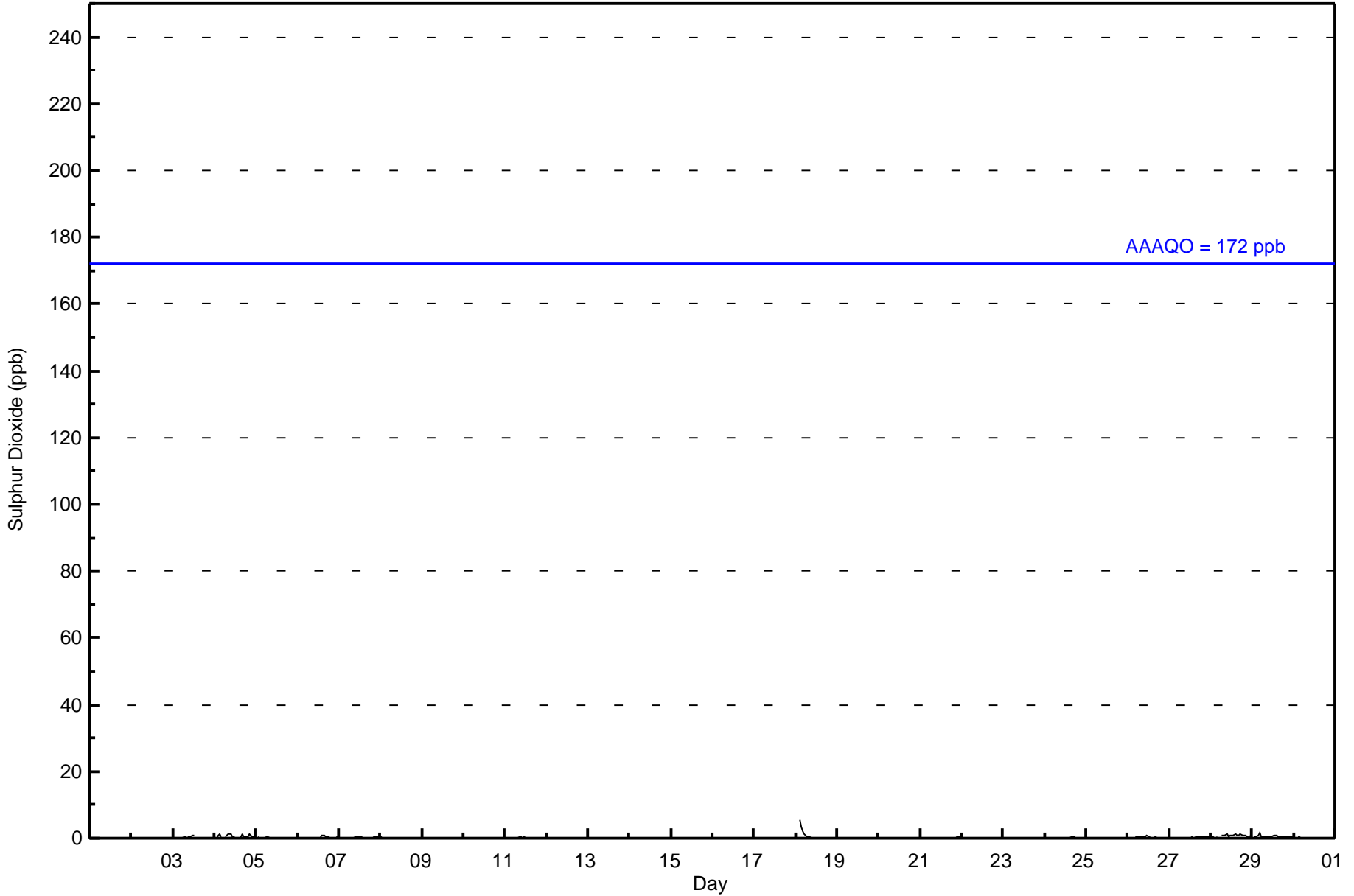
0.1	0.1	0.3	0.3	0.2	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	Diurnal Average
0	1	5	4	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Diurnal Maximum

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



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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Fort Chipewyan - June 2015**





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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Fort Chipewyan - June 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
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 (SO<sub>2</sub>) - 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
<b>Totals</b>	31	13	13	60	79	33	12	15	23	43	45	71	76	53	70	39	676

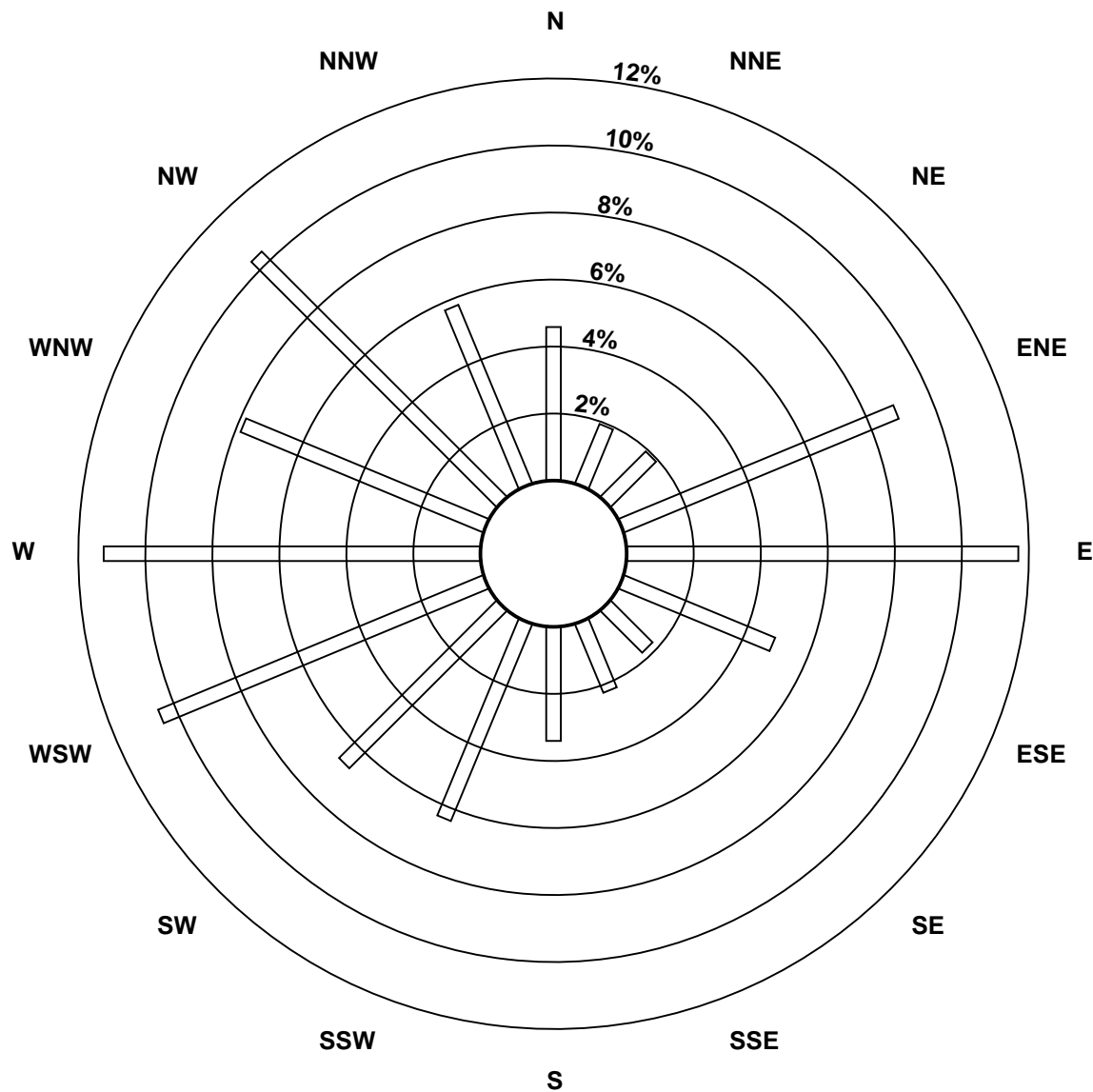
Total Number of Valid Hours: 676

Total Number of Hours: 720

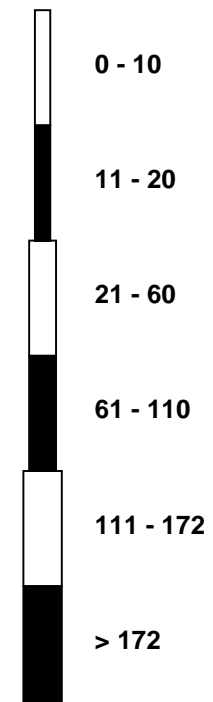


Wood Buffalo Environmental Association  
Wind Rose Jun 2015

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Fort Chipewyan (AMS 8)



Classes (ppb)



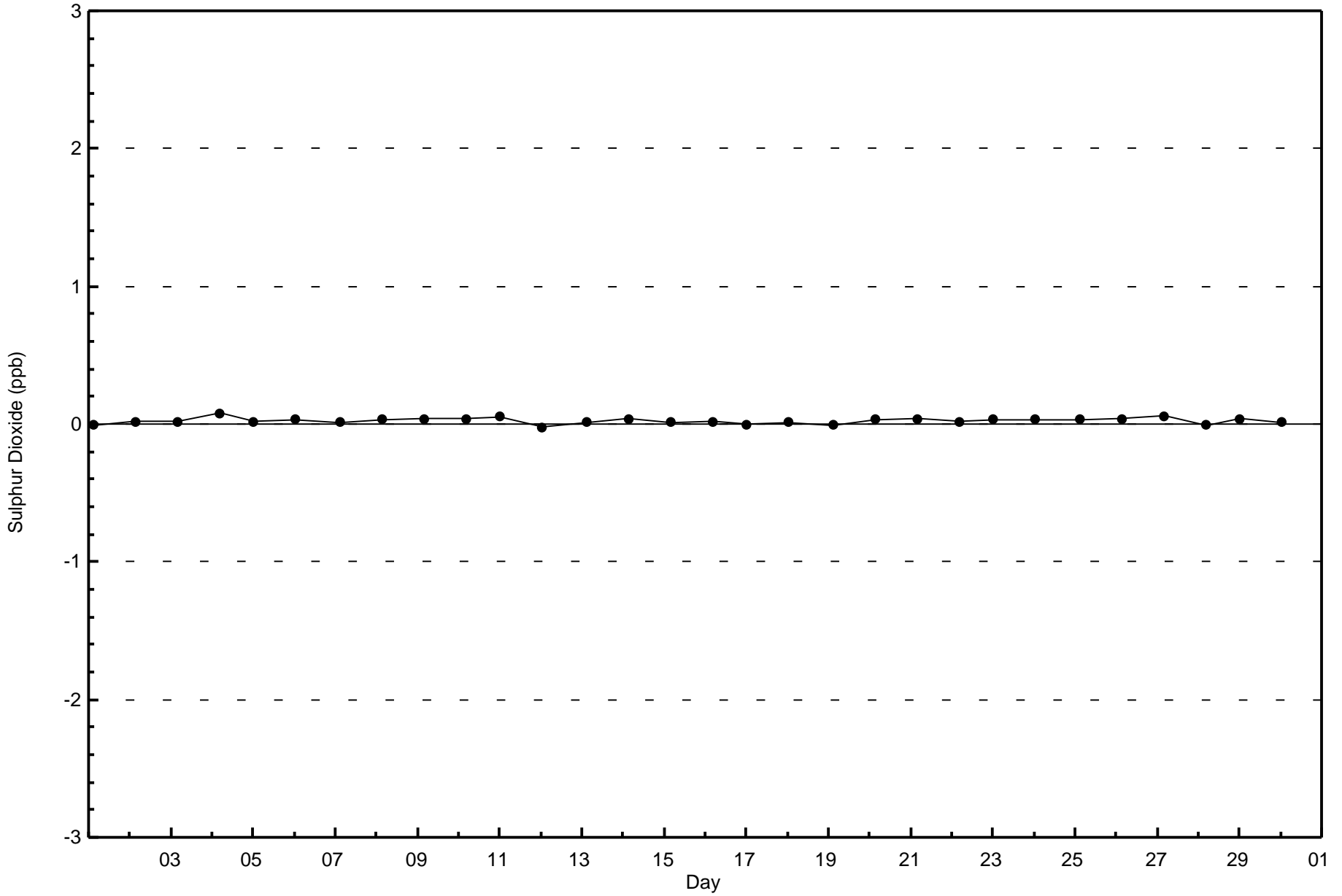
Total Number of Valid Hours: 676





Wood Buffalo Environmental Association  
Zero Responses

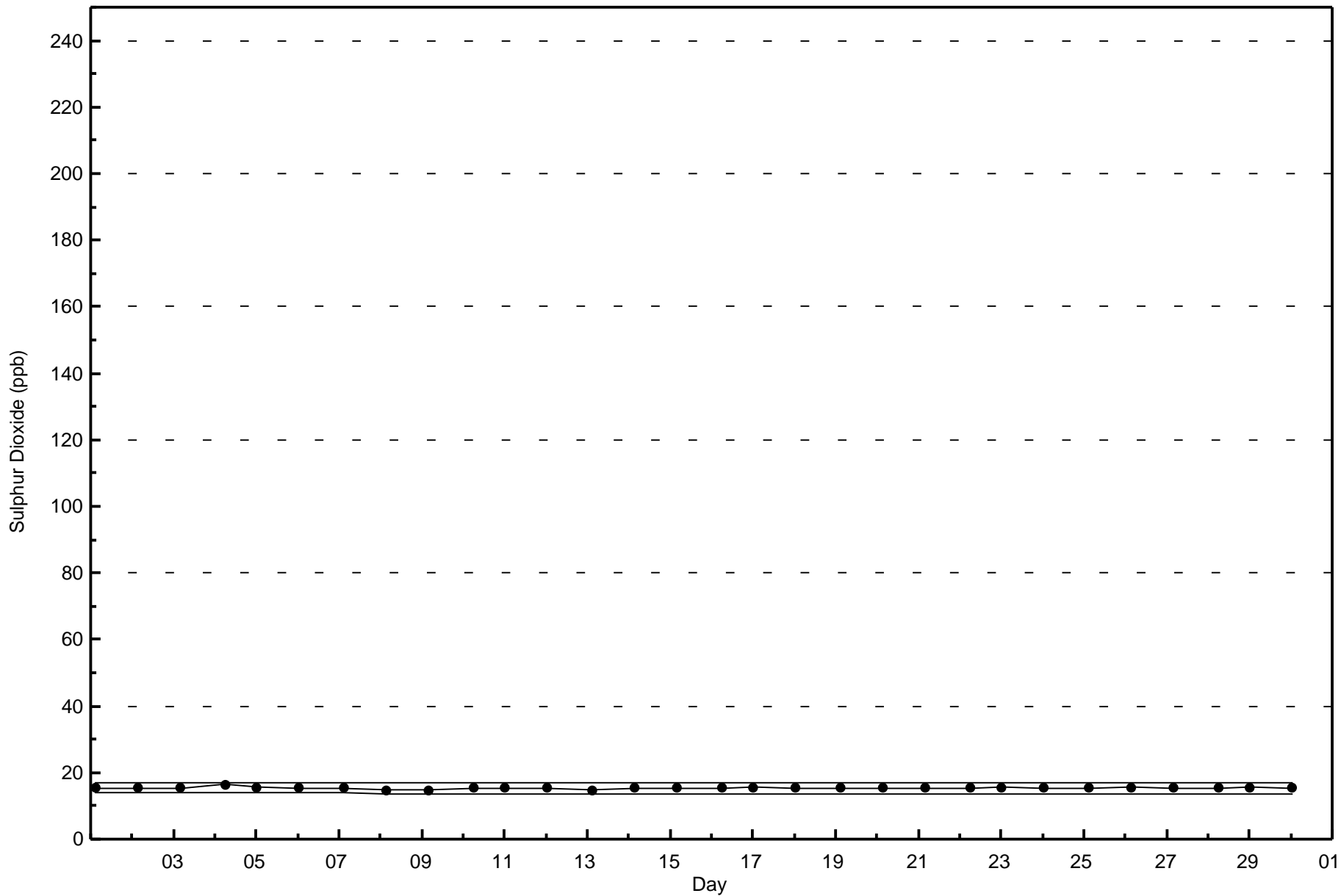
Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Fort Chipewyan - June 2015





Wood Buffalo Environmental Association  
Span Responses

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Fort Chipewyan - June 2015



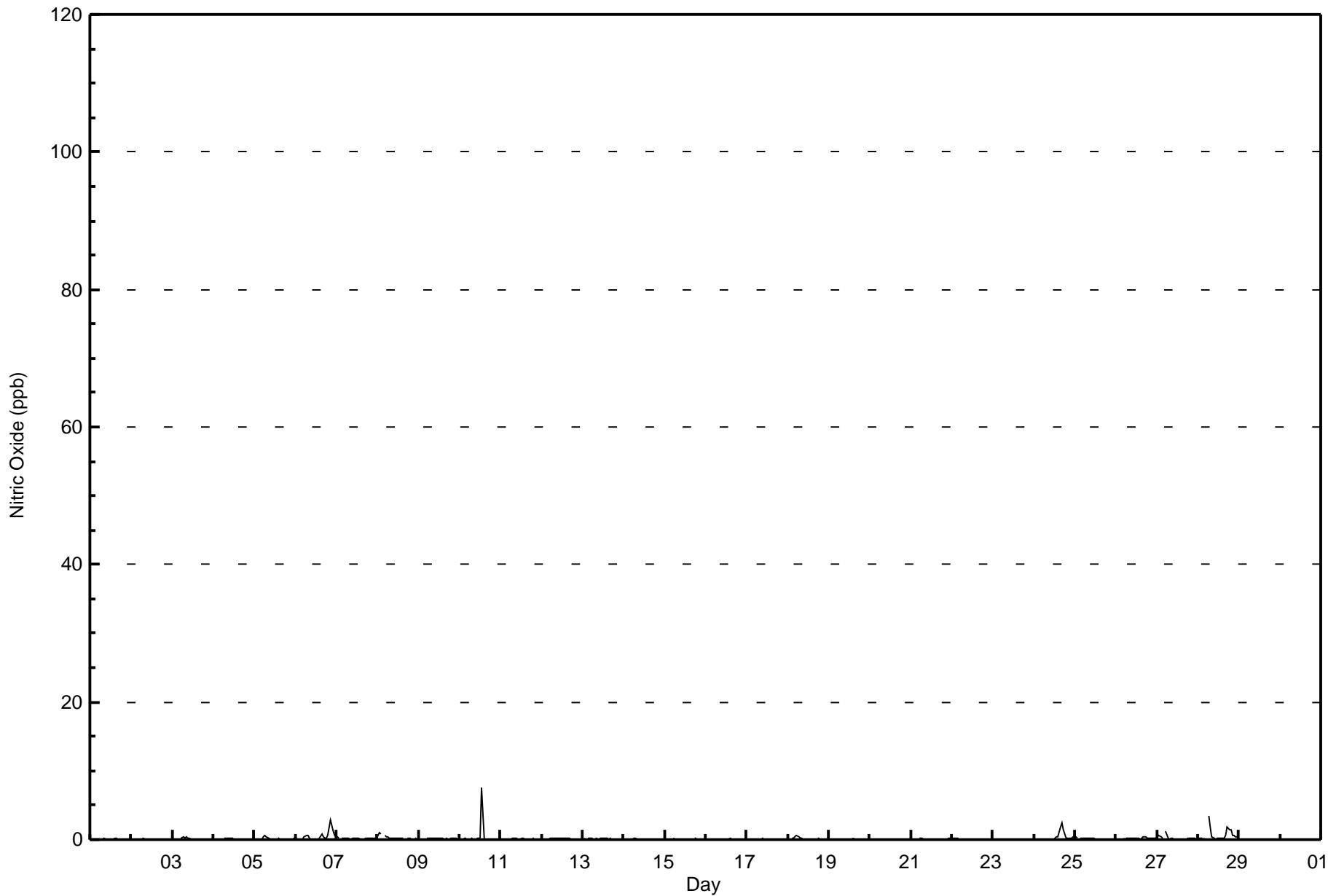


Maximum Value: 7 ppb on Jun 10 14:00														Maximum Daily Average: 0.6 ppb on Jun 28										Hours in Service: 720			
Minimum Value: 0 ppb on Jun 1 06:00														Minimum Daily Average: 0.0 ppb on Jun 23										Hours of Data: 629			
Maximum Diurnal Average: 0.4 ppb at hour 14														Minimum Diurnal Average: 0.1 ppb at hour 4										Hours of Missing Data: 91			
Monthly Average: 0.2 ppb														Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 0 P <sub>99</sub> = 2										Hours of Calibration: 34			
																								Percent Operational Time: 92.1			
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	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	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	0.1	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	0.1	1		
6-Jun	0	Z	0	0	0	0	1	1	0	0	0	0	0	0	1	0	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	0.2	0		
8-Jun	1	1	1	Z	1	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	0.1	0		
10-Jun	0	0	0	0	0	Z	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	0.1	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	0.1	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	0.1	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		
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		
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		
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	1	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	0.1	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		
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	0	Z	0	0	PF	PF	PF	PF	PF	PF	PF	PF	PF	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		
24-Jun	0	Z	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	0.1	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	0.2	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	0.2	1		
28-Jun	0	0	0	0	0	Z	3	2	0	0	0	0	0	0	0	1	2	1	1	1	1	1	0	0.6	3		
29-Jun	Z	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--		
30-Jun	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--		
														Diurnal Average													
														Diurnal Maximum													
Z - zerospan														C - Calibration										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**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	629	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: 629

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	45	66	32	12	15	23	42	40	66	73	50	69	39	628
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	30	13	13	45	66	32	12	15	23	42	40	66	73	50	69	39	628

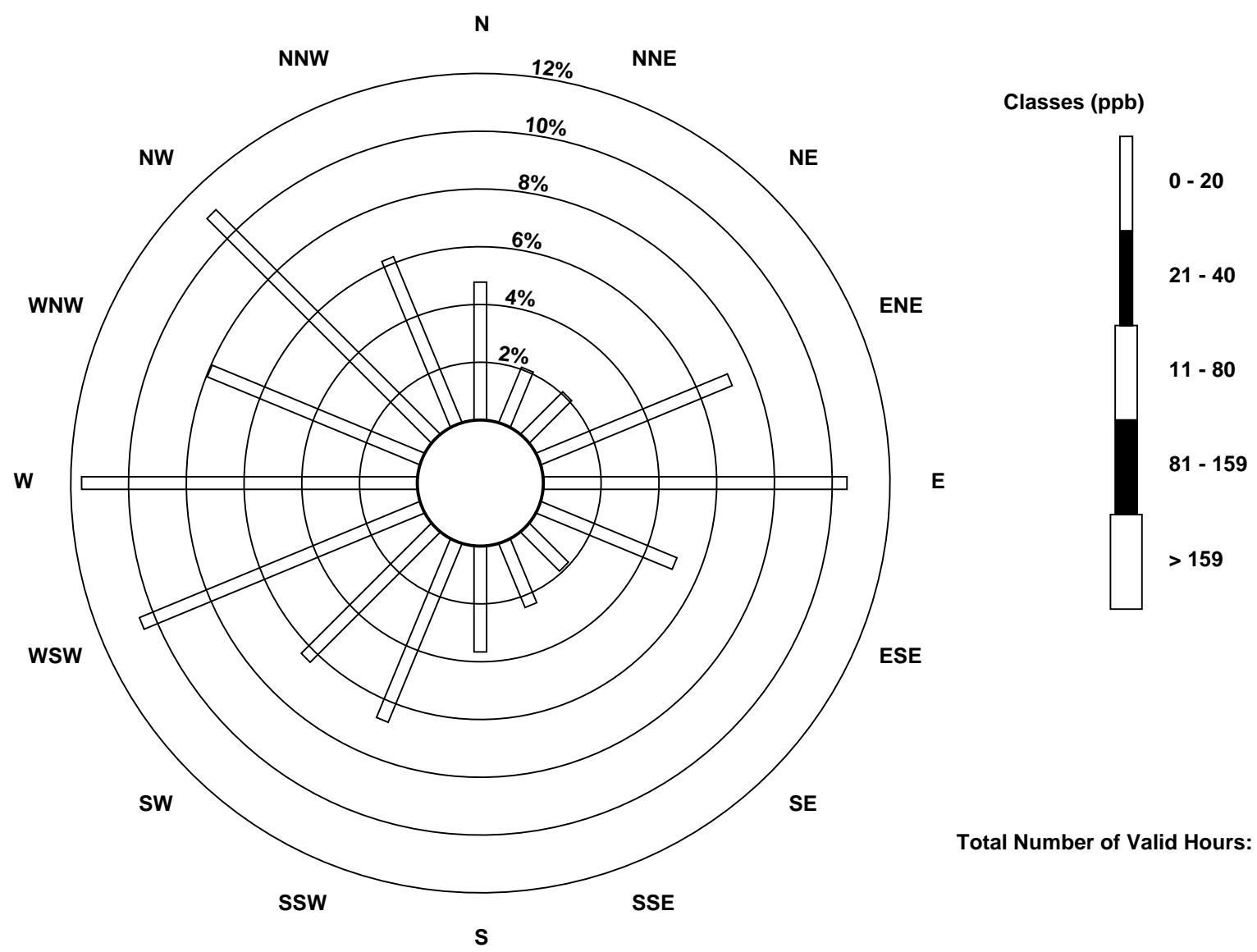
Total Number of Valid Hours: 628

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Jun 2015

Nitric Oxide (NO) - ppb  
Fort Chipewyan (AMS 8)

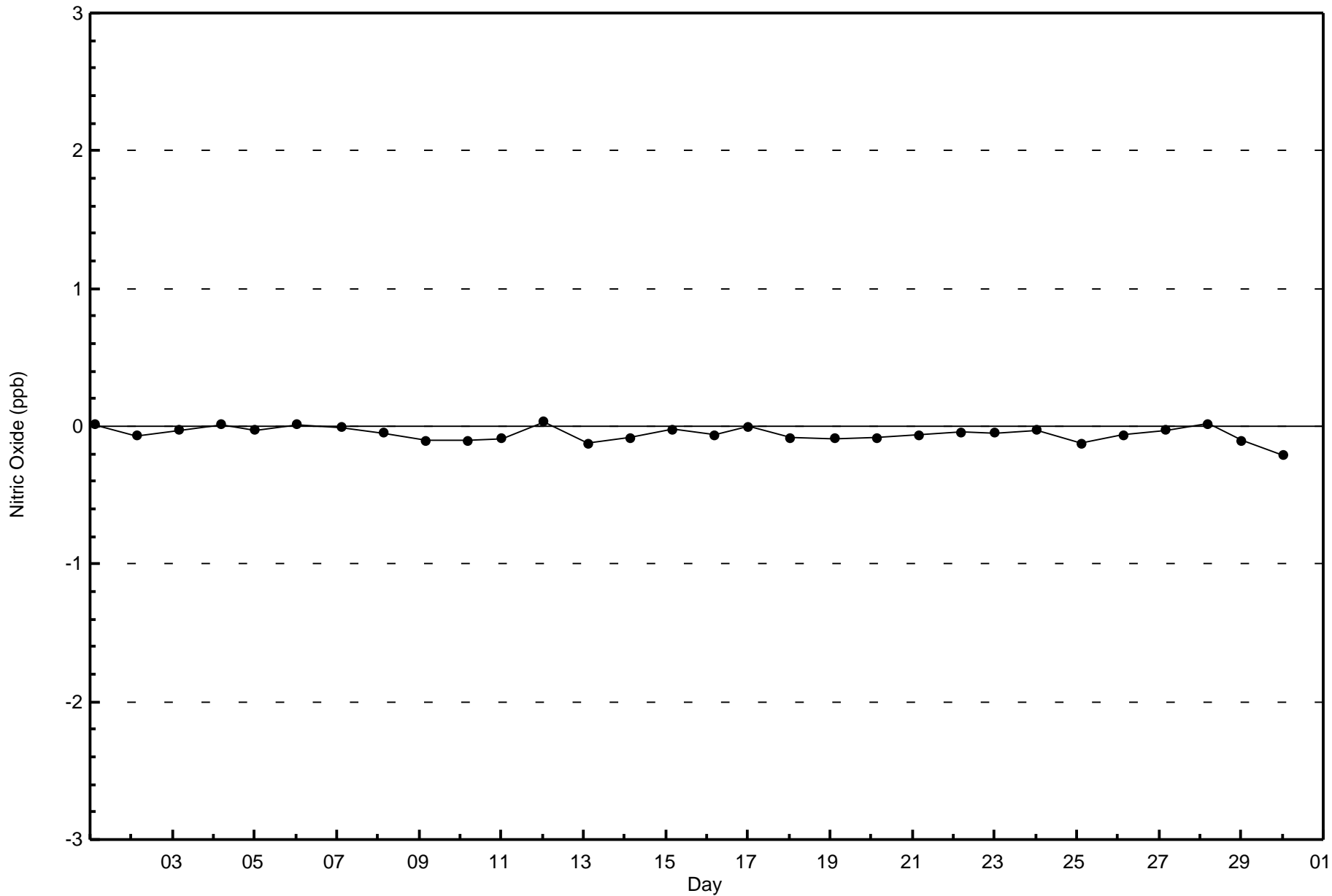


Total Number of Valid Hours: 628

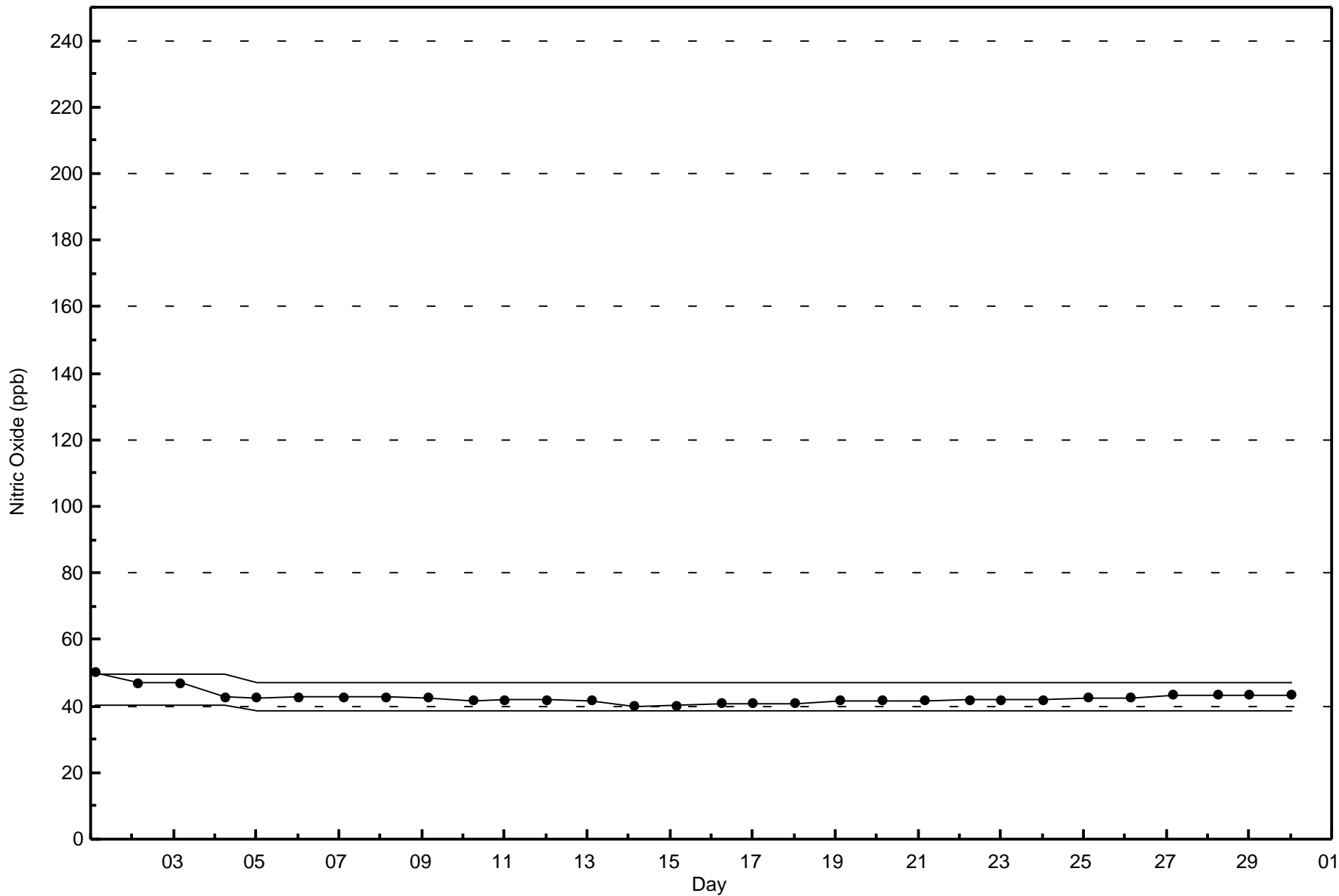


Wood Buffalo Environmental Association  
Zero Responses

Nitric Oxide (NO) - ppb  
Fort Chipewyan - June 2015









Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 13 ppb on Jun 28 08:00	Maximum Daily Average: 5.5 ppb on Jun 28		Hours of Data:	629
Minimum Value: 0 ppb on Jun 1 23:00	Minimum Daily Average: 0.1 ppb on Jun 2		Hours of Missing Data:	91
Maximum Diurnal Average: 1.3 ppb at hour 22	Minimum Diurnal Average: 0.6 ppb at hour 13		Hours of Calibration:	34
Monthly Average: 1.0 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 1 P <sub>90</sub> = 2 P <sub>99</sub> = 7		Percent Operational Time:	92.1

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	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	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	1.0	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	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	1.2	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	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	0.6	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	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	0.6	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	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	0.4	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	0.1	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	0.1	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	0.1	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	1.4	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	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	0.3	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	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	--	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	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	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	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	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	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	13	
29-Jun	Z	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--	
30-Jun	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--	

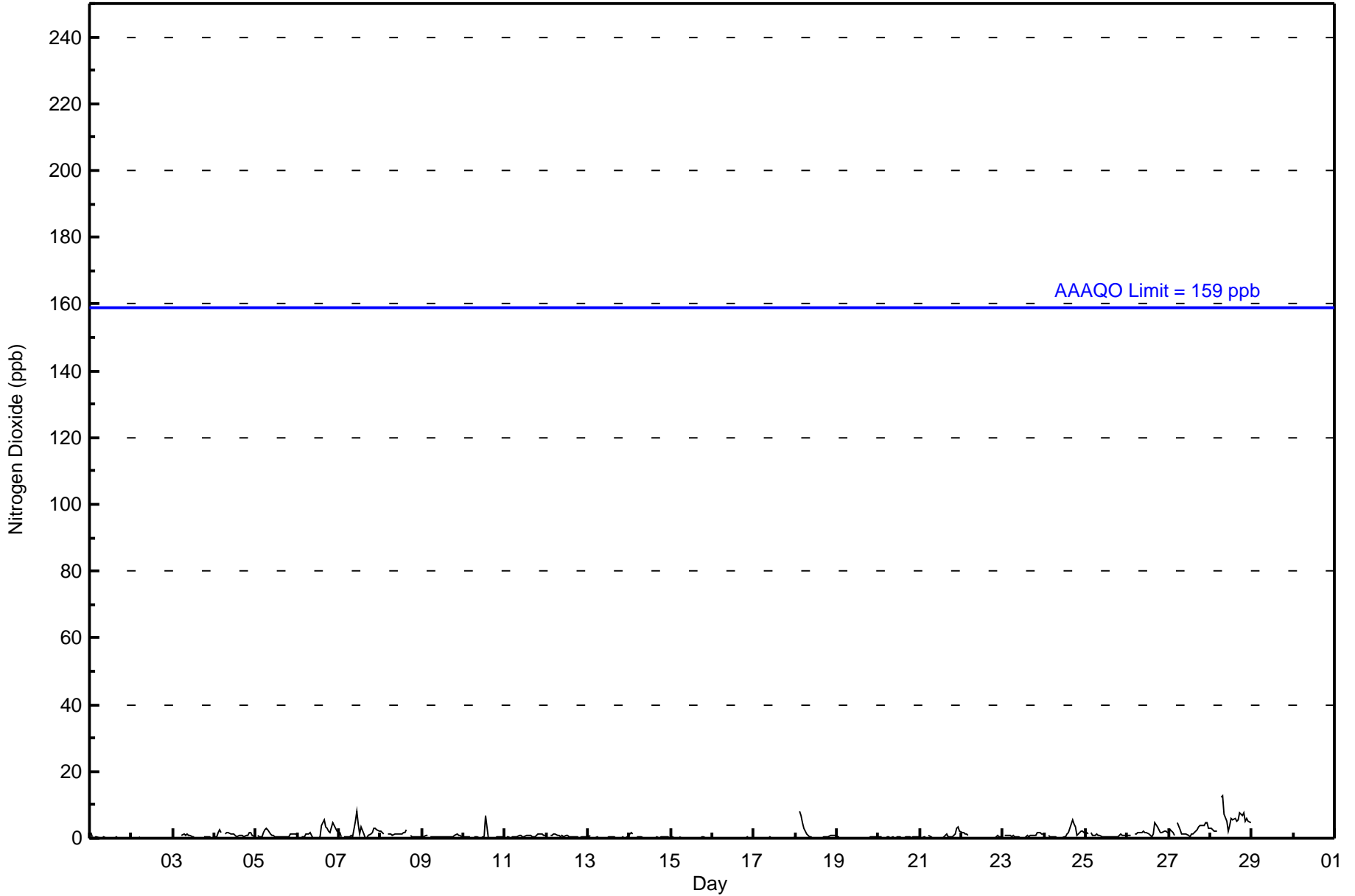
0.9	0.8	1.0	0.9	0.8	0.9	1.2	1.1	0.8	0.8	0.8	0.7	0.6	1.0	0.9	1.1	1.1	1.1	1.0	1.0	1.3	1.3	1.2	1.0	Diurnal Average
3	3	8	7	5	5	12	13	7	5	8	4	6	7	6	5	5	8	7	8	5	6	5	5	Diurnal Maximum

Z - zeronspan      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 (NO<sub>2</sub>) - ppb  
Fort Chipewyan - June 2015





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

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Fort Chipewyan - June 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	629	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: 629

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Fort Chipewyan - June 2015**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	30	13	13	45	66	32	12	15	23	42	40	66	73	50	69	39	628
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>30</b>	<b>13</b>	<b>13</b>	<b>45</b>	<b>66</b>	<b>32</b>	<b>12</b>	<b>15</b>	<b>23</b>	<b>42</b>	<b>40</b>	<b>66</b>	<b>73</b>	<b>50</b>	<b>69</b>	<b>39</b>	<b>628</b>

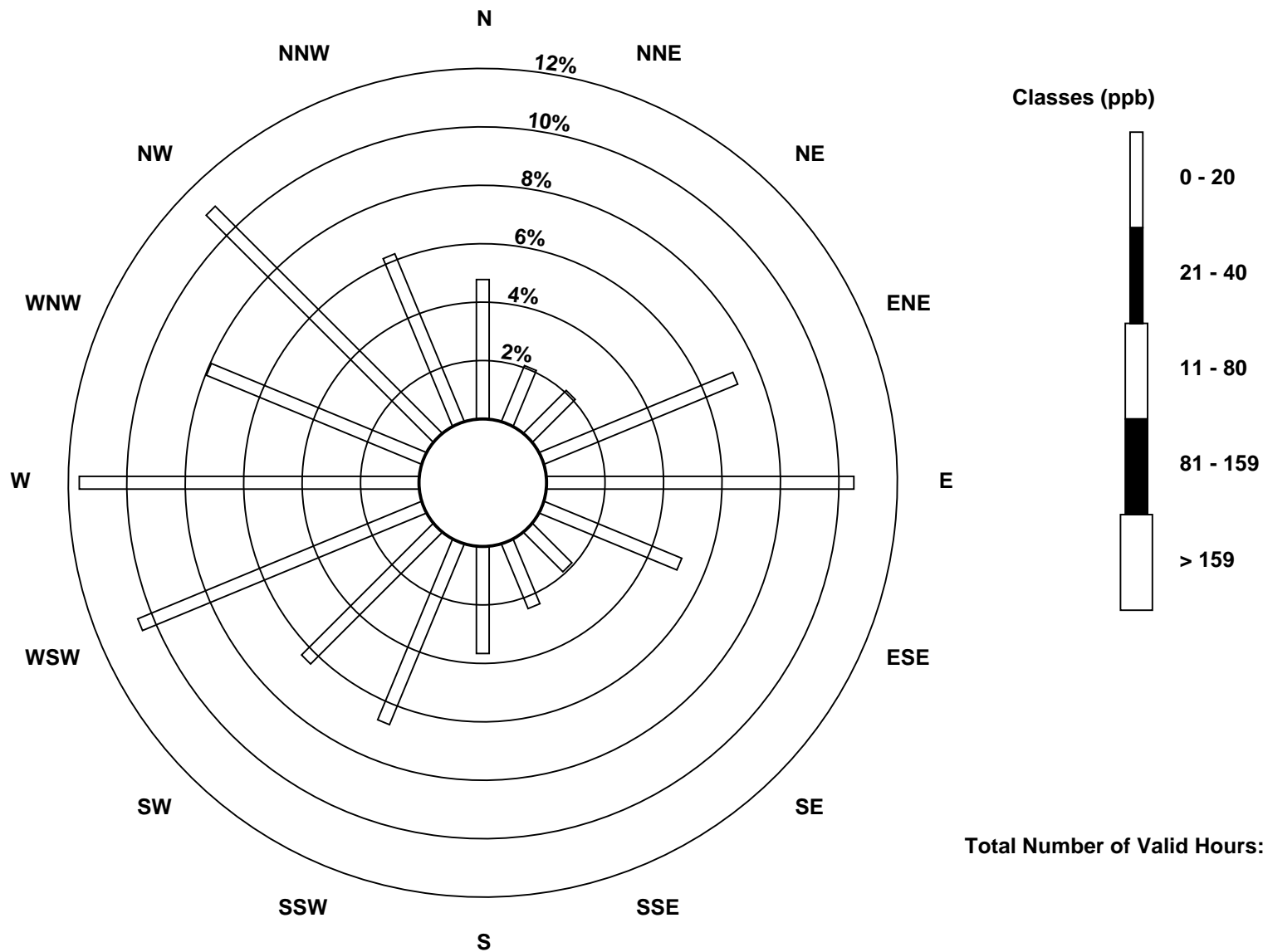
Total Number of Valid Hours: 628

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Jun 2015

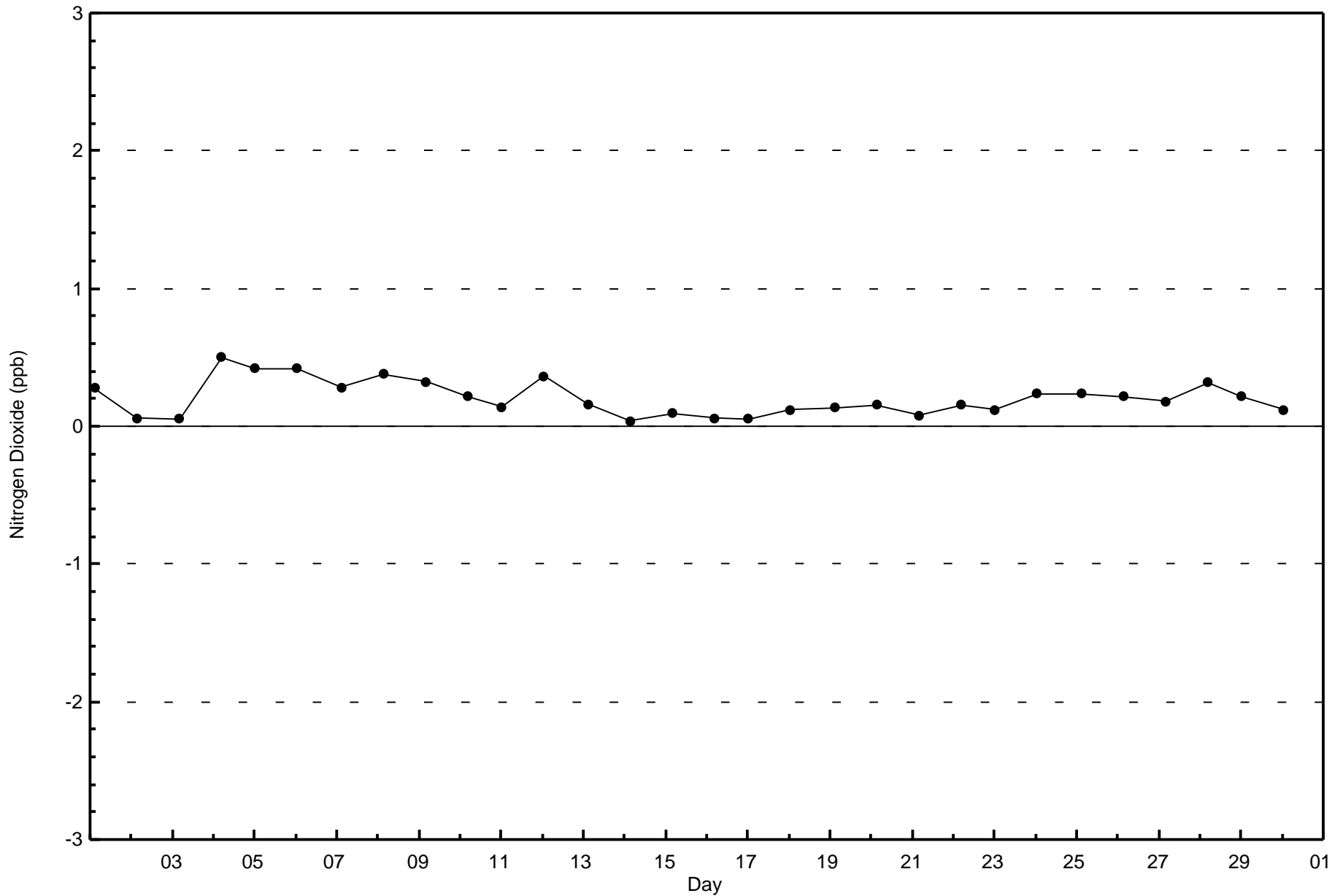
Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Fort Chipewyan (AMS 8)

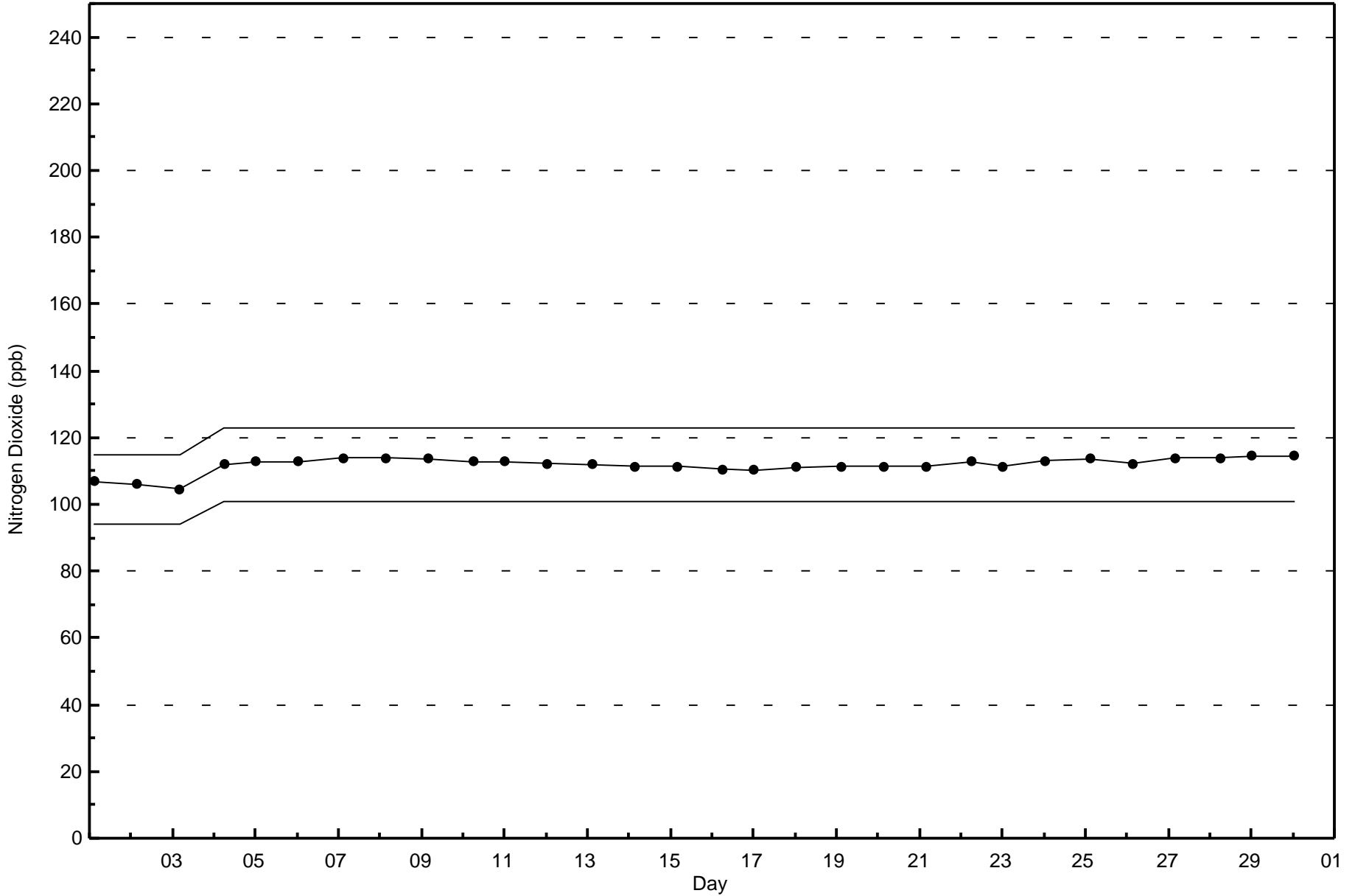




Wood Buffalo Environmental Association  
Zero Responses

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Fort Chipewyan - June 2015









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

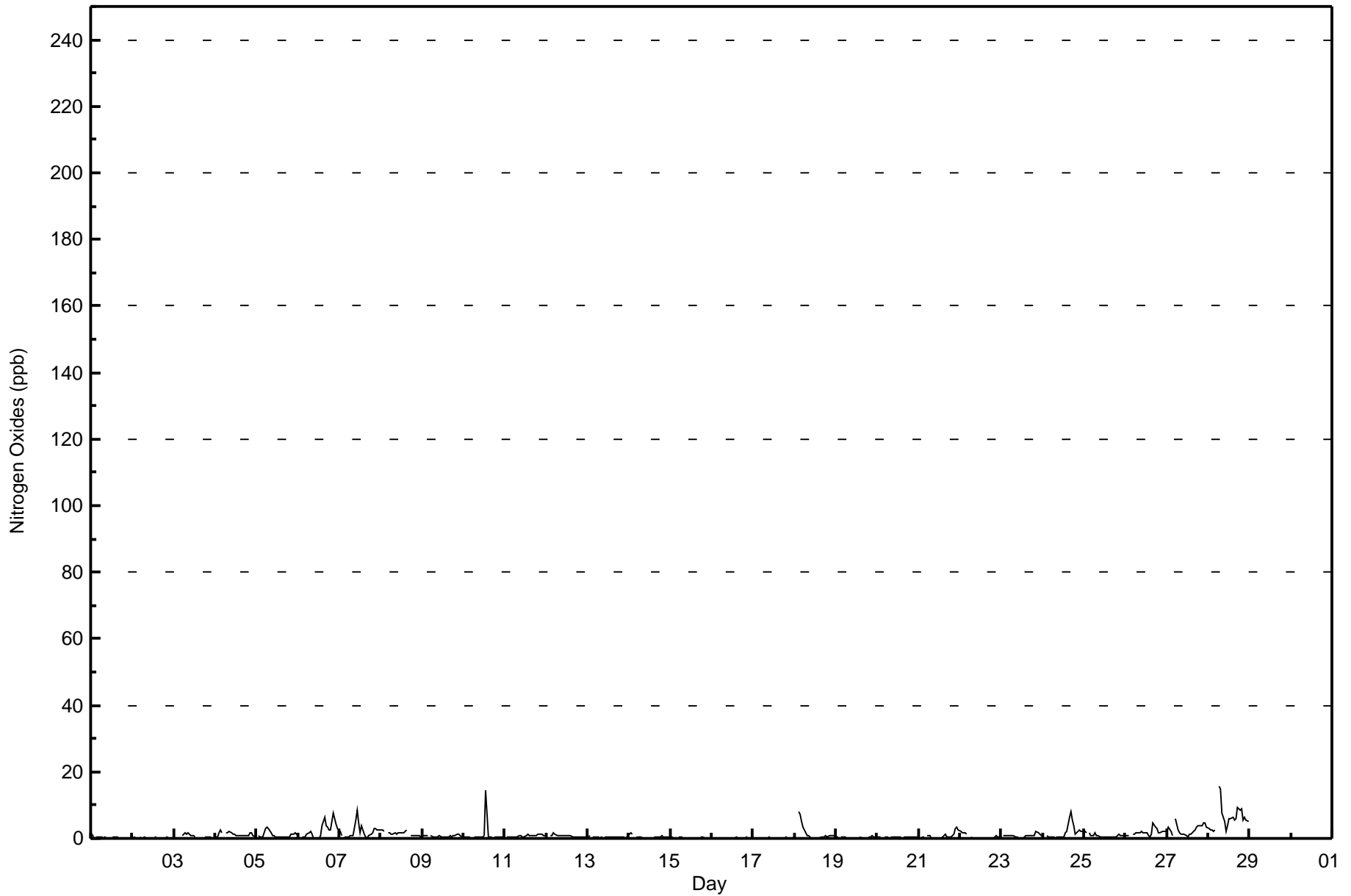
**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Fort Chipewyan - June 2015**

Maximum Value: 15 ppb on Jun 28 07:00														Maximum Daily Average: 6.1 ppb on Jun 28														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: 629	
Maximum Diurnal Average: 1.5 ppb at hour 22														Minimum Diurnal Average: 0.7 ppb at hour 13														Hours of Missing Data: 91	
Monthly Average: 1.1 ppb														Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 1 Q <sub>3</sub> = 1 P <sub>90</sub> = 3 P <sub>99</sub> = 8														Hours of Calibration: 34	
																												Percent Operational Time: 92.1	
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	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	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	0.2	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	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--			
30-Jun	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--			
																												Diurnal Average	
1.0														0.9														Diurnal Maximum	
3														8															
Z - zerospan														C - Calibration														UO - Unstable Operation	
																												PF - Power Failure	



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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Fort Chipewyan - June 2015**





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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Fort Chipewyan - June 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	629	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: 629

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - 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	45	66	32	12	15	23	42	40	66	73	50	69	39	628
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	30	13	13	45	66	32	12	15	23	42	40	66	73	50	69	39	628

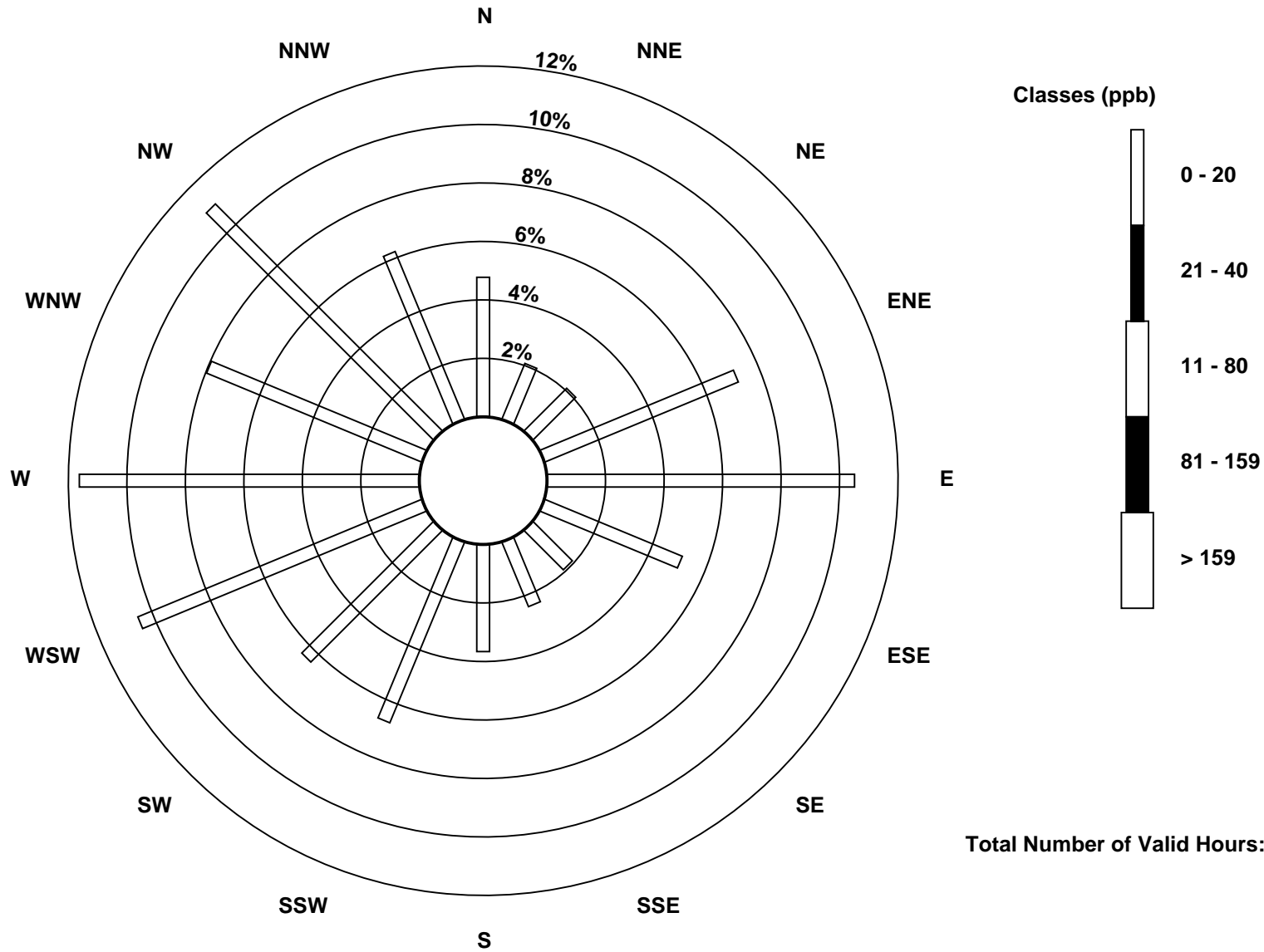
Total Number of Valid Hours: 628

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Jun 2015

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Fort Chipewyan (AMS 8)

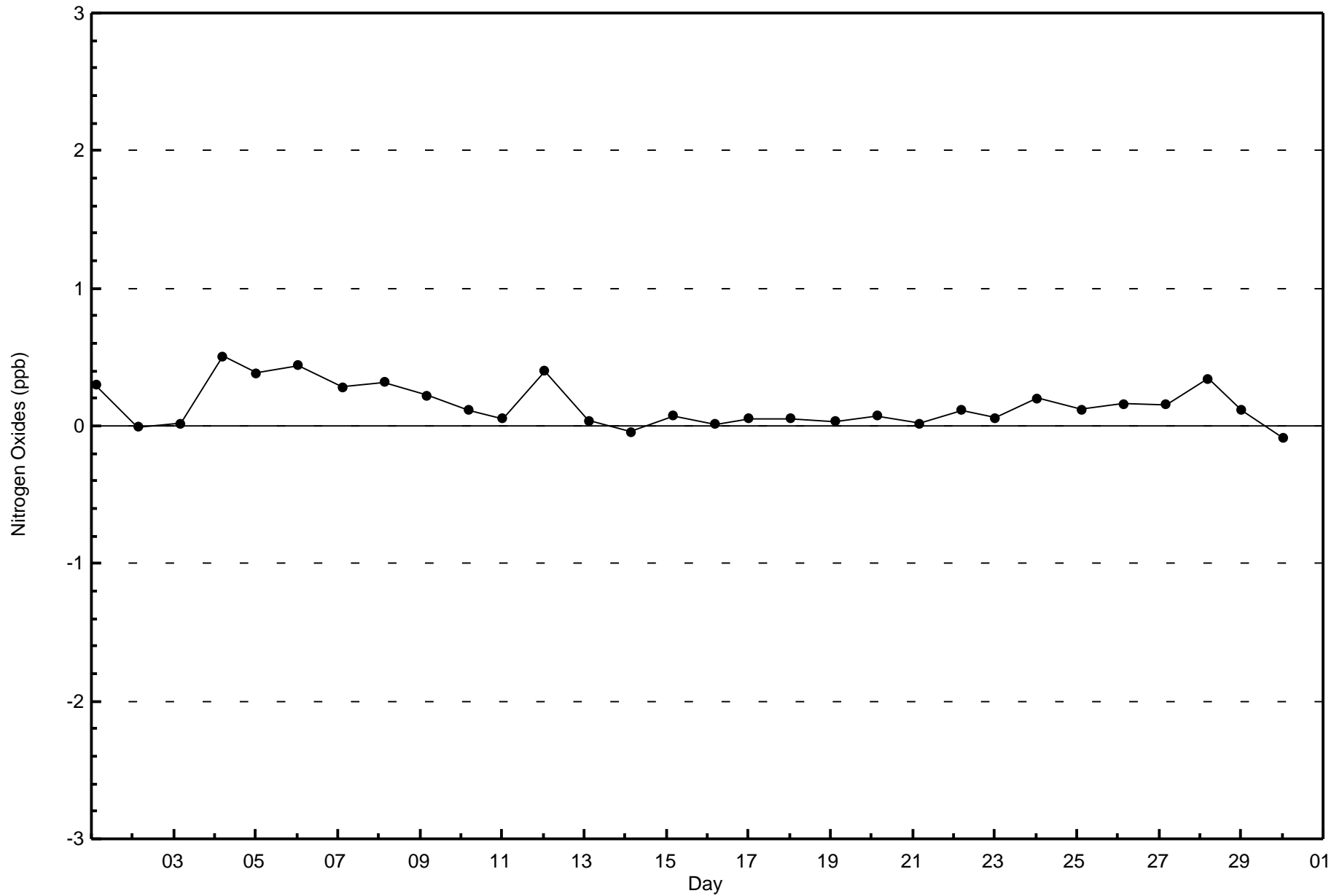


Total Number of Valid Hours: 628



Wood Buffalo Environmental Association  
Zero Responses

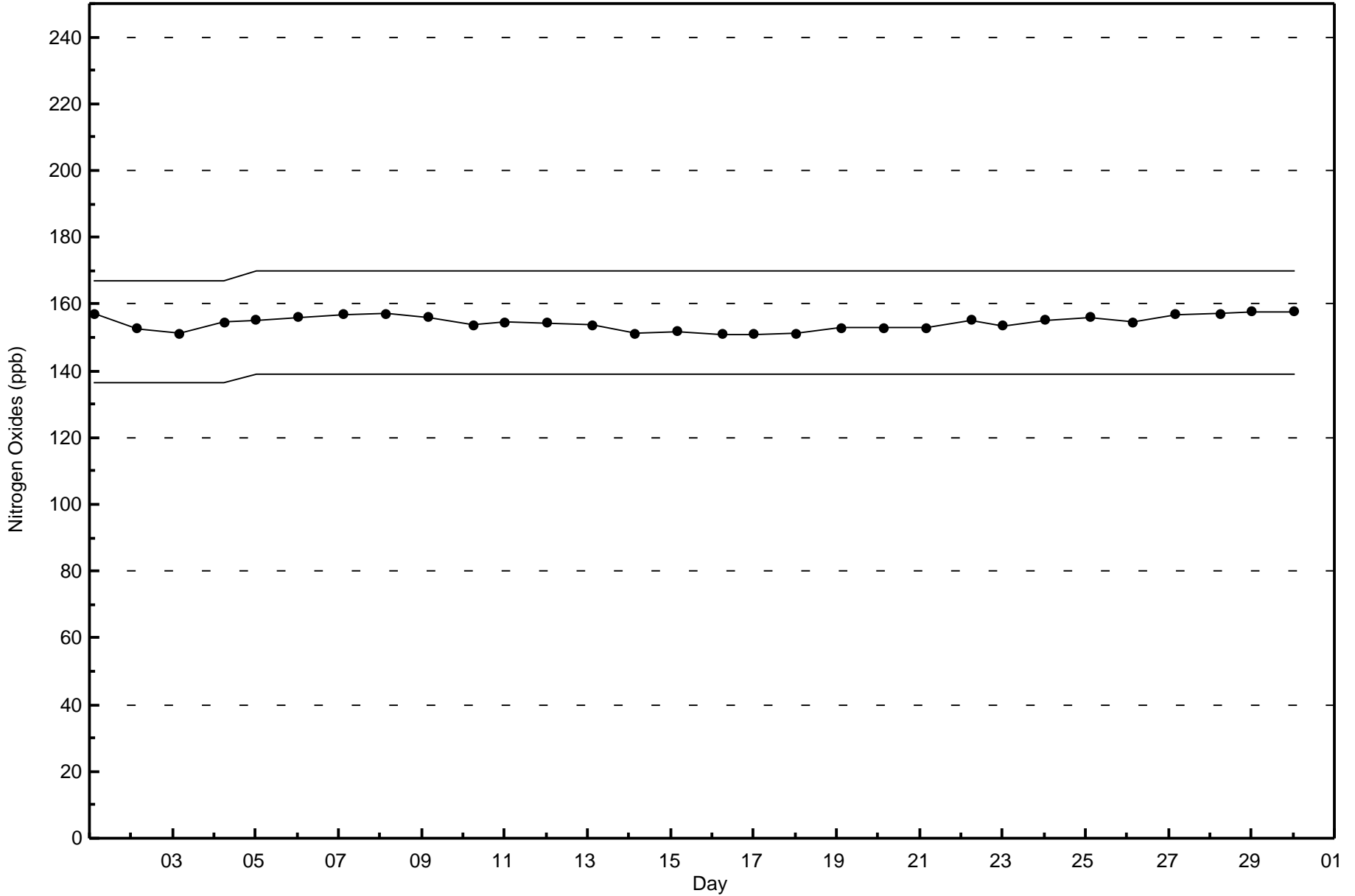
Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Fort Chipewyan - June 2015





**Wood Buffalo Environmental Association**  
**Span Responses**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Fort Chipewyan - June 2015**





Wood Buffalo Environmental Association

Summary of Hour Averages

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

Fort Chipewyan - June 2015

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		Hours of Data:	675
Minimum Value: 14 ppb on Jun 10 03:00	Minimum Daily Average: 22.7 ppb on Jun 9		Hours of Missing Data:	45
Maximum Diurnal Average: 40.8 ppb at hour 17	Minimum Diurnal Average: 25.4 ppb at hour 6		Hours of Calibration:	34
Monthly Average: 33.8 ppb	Percentiles: P <sub>1</sub> = 16 P <sub>10</sub> = 22 Q <sub>1</sub> = 28 Median = 33 Q <sub>3</sub> = 39 P <sub>90</sub> = 44 P <sub>99</sub> = 65		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	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		

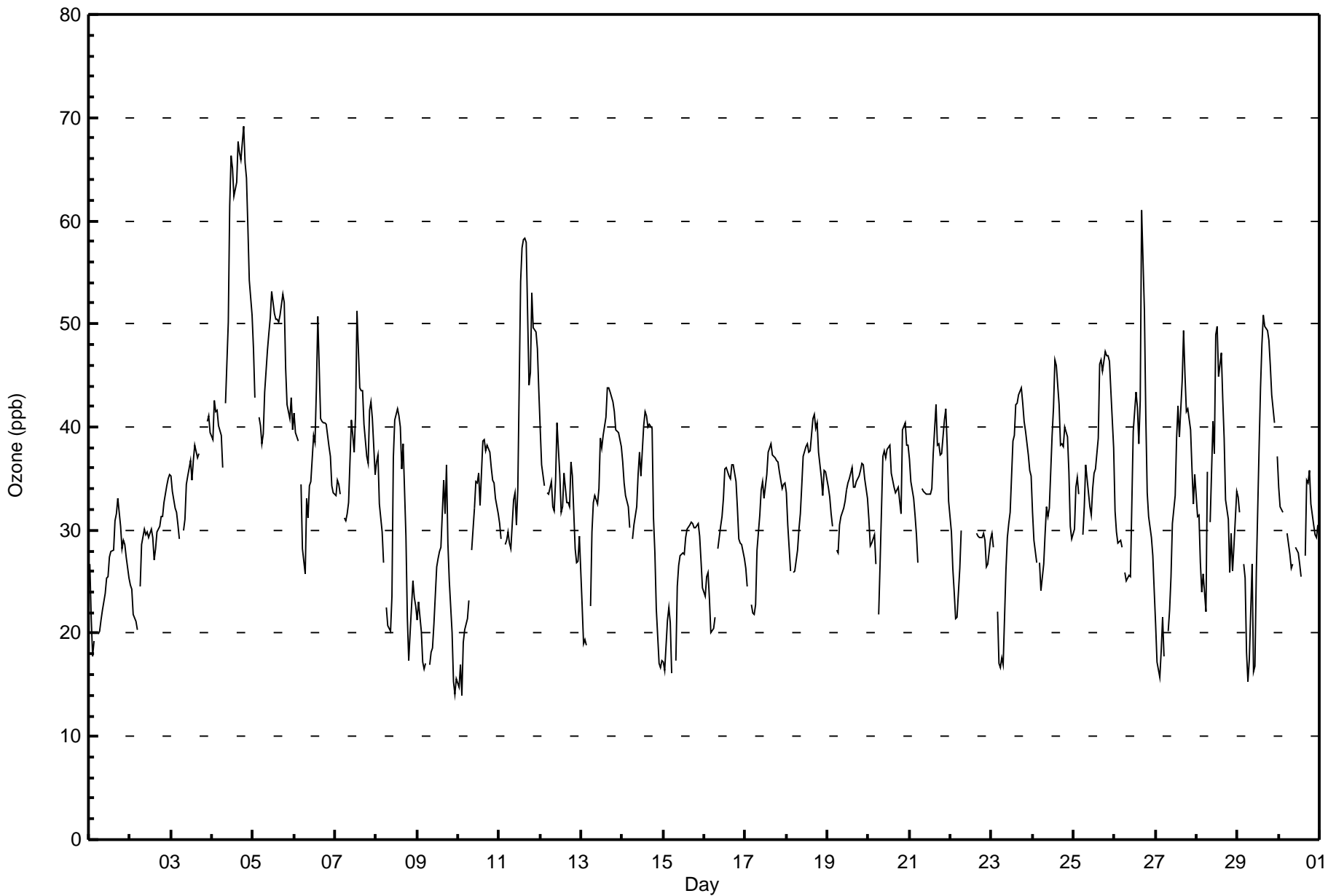
Z - zeronspan      C - Calibration      UO - Unstable Operation      PF - Power Failure  
 Alberta Ambient Air Quality Objectives (AAQO): 1-hr 82 ppb





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

**Ozone (O<sub>3</sub>) - ppb**  
**Fort Chipewyan - June 2015**





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

**Ozone (O<sub>3</sub>) - ppb**  
**Fort Chipewyan - June 2015**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
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 (O<sub>3</sub>) - ppb  
Fort Chipewyan - June 2015**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>	
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW		
0 - 20	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
<b>Totals</b>	31	13	13	56	81	33	11	14	23	44	44	71	76	53	66	45	674	

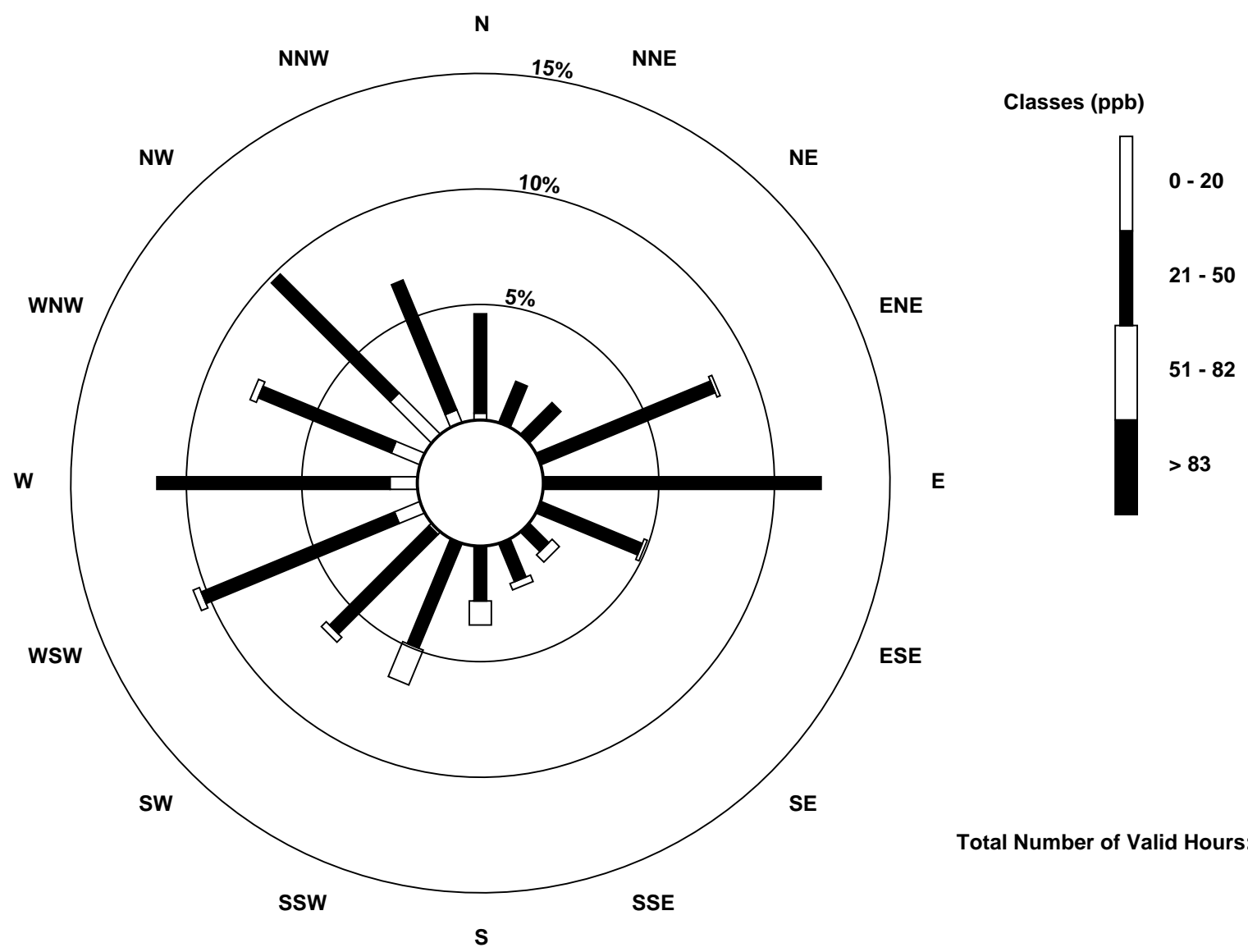
Total Number of Valid Hours: 674

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Jun 2015

Ozone (O<sub>3</sub>) - ppb  
Fort Chipewyan (AMS 8)

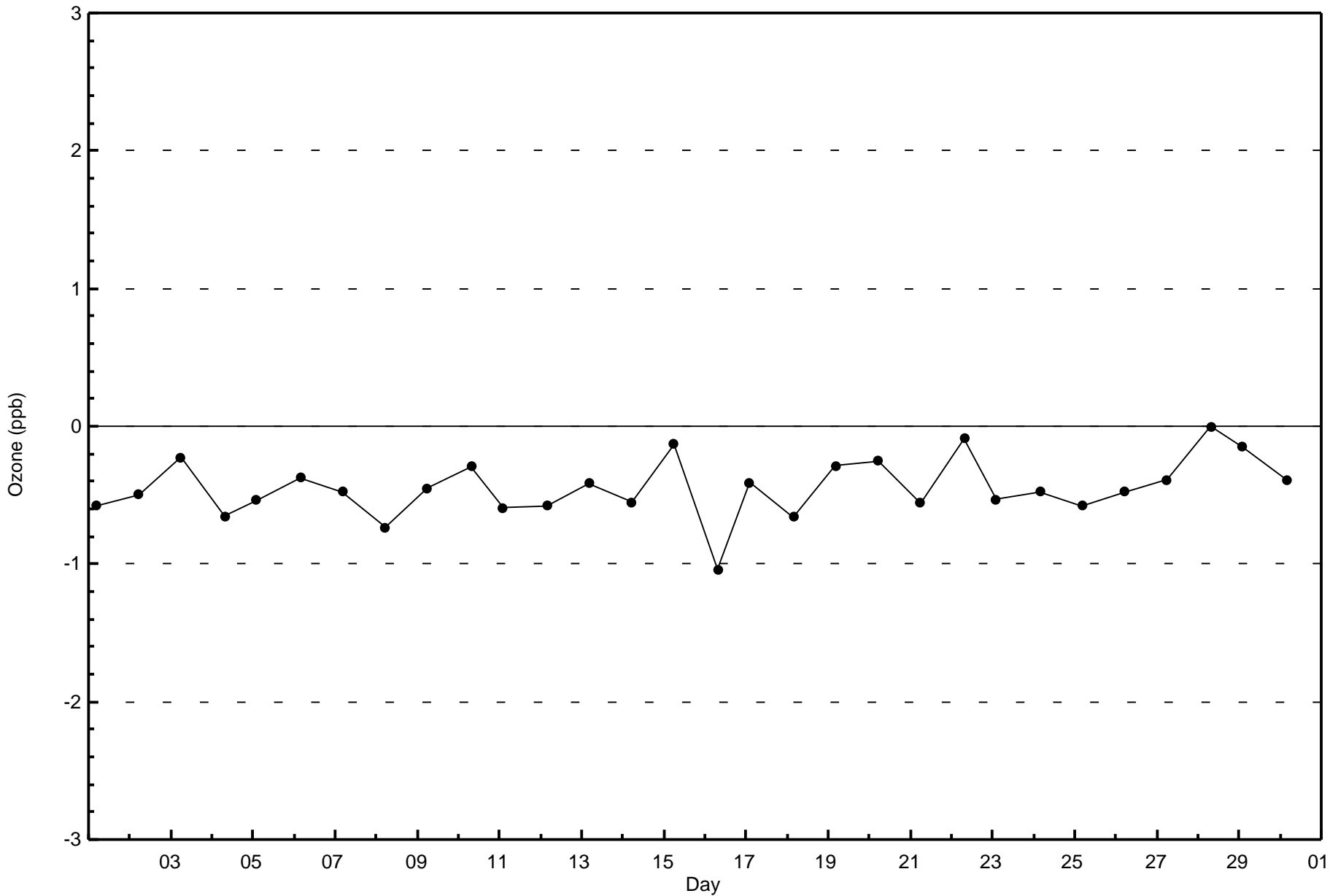


Total Number of Valid Hours: 674



Wood Buffalo Environmental Association  
Zero Responses

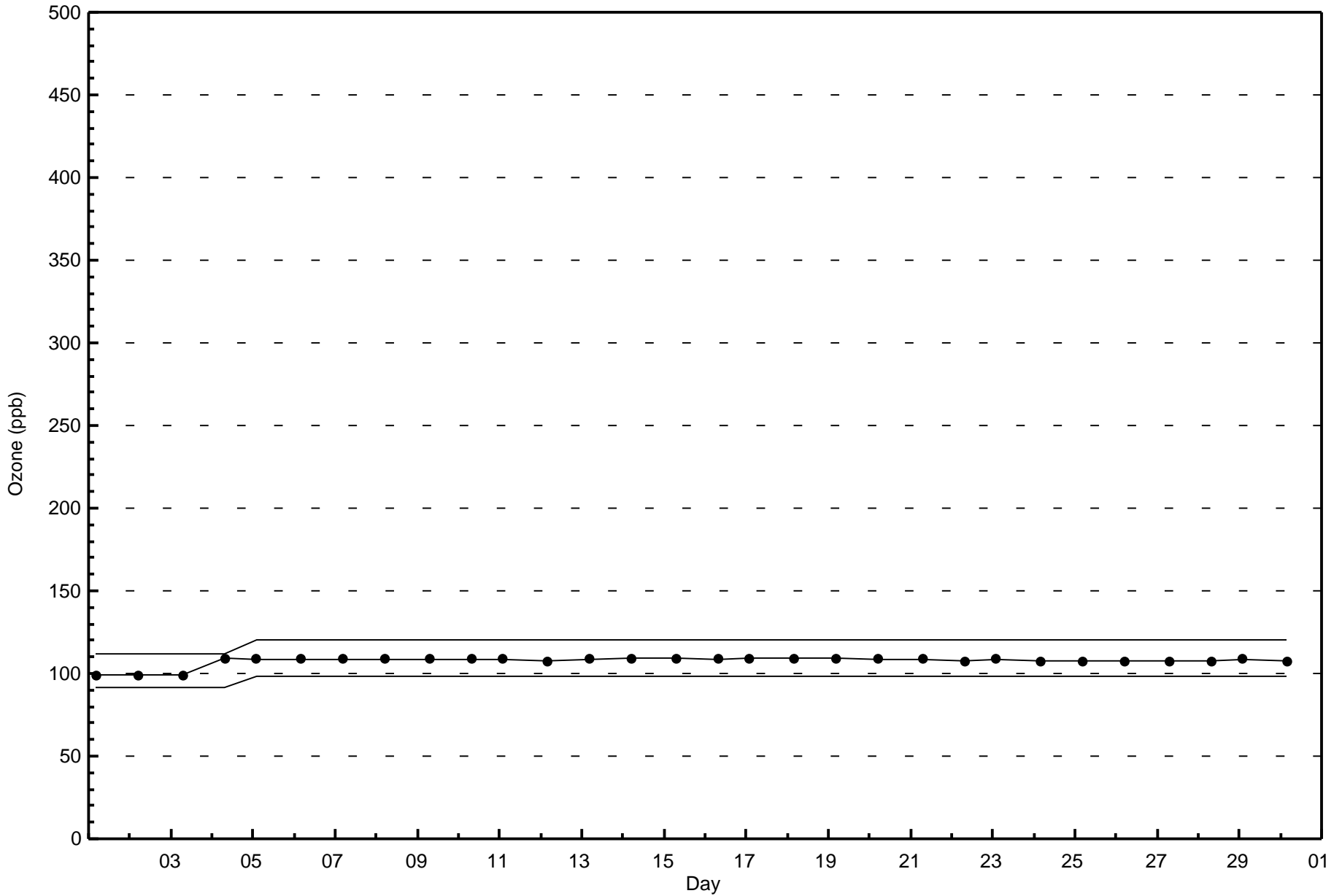
Ozone (O<sub>3</sub>) - ppb  
Fort Chipewyan - June 2015





Wood Buffalo Environmental Association  
Span Responses

Ozone (O<sub>3</sub>) - ppb  
Fort Chipewyan - June 2015





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 <sup>3</sup> on Jun 29 09:00	Maximum Daily Average: 397.3 µg/m <sup>3</sup> on Jun 29	Hours of Data:	684
Minimum Value: 0.4 µg/m <sup>3</sup> on Jun 1 10:00	Minimum Daily Average: 1.1 µg/m <sup>3</sup> on Jun 2	Hours of Missing Data:	36
Maximum Diurnal Average: 79.3 µg/m <sup>3</sup> at hour 10	Minimum Diurnal Average: 22.4 µg/m <sup>3</sup> at hour 17	Hours of Calibration:	0
Monthly Average: 38.91 µg/m <sup>3</sup>	Percentiles: P <sub>1</sub> = 0.5 P <sub>10</sub> = 1.9 Q <sub>1</sub> = 3.3 Median = 6.6 Q <sub>3</sub> = 22.6 P <sub>90</sub> = 77.3 P <sub>99</sub> = 720.1	Percent Operational Time:	95.0

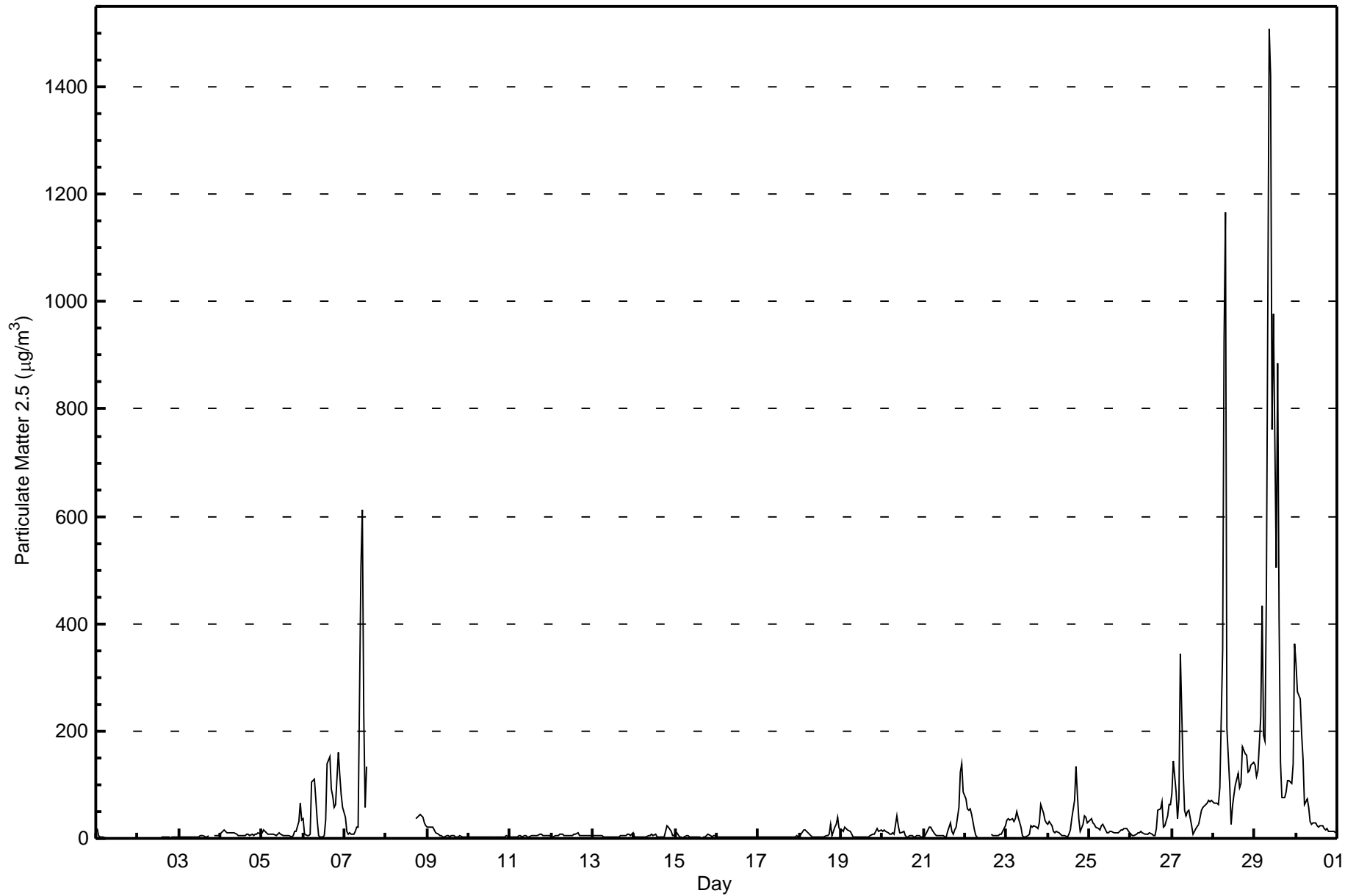
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jun	17.7	6.0	2.8	1.7	1.9	0.6	0.7	0.4	0.5	0.4	0.4	0.5	0.4	0.5	1.0	1.2	1.2	1.3	1.2	1.2	0.6	0.6	0.6	0.6	1.8	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	4.1	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<sup>3</sup>



Wood Buffalo Environmental Association  
Hourly Averages

Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
Fort Chipewyan - June 2015







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

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Fort Chipewyan - June 2015**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
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<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**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
<b>Totals</b>	<b>33</b>	<b>13</b>	<b>13</b>	<b>61</b>	<b>81</b>	<b>33</b>	<b>12</b>	<b>15</b>	<b>19</b>	<b>40</b>	<b>42</b>	<b>68</b>	<b>74</b>	<b>42</b>	<b>65</b>	<b>46</b>	<b>657</b>

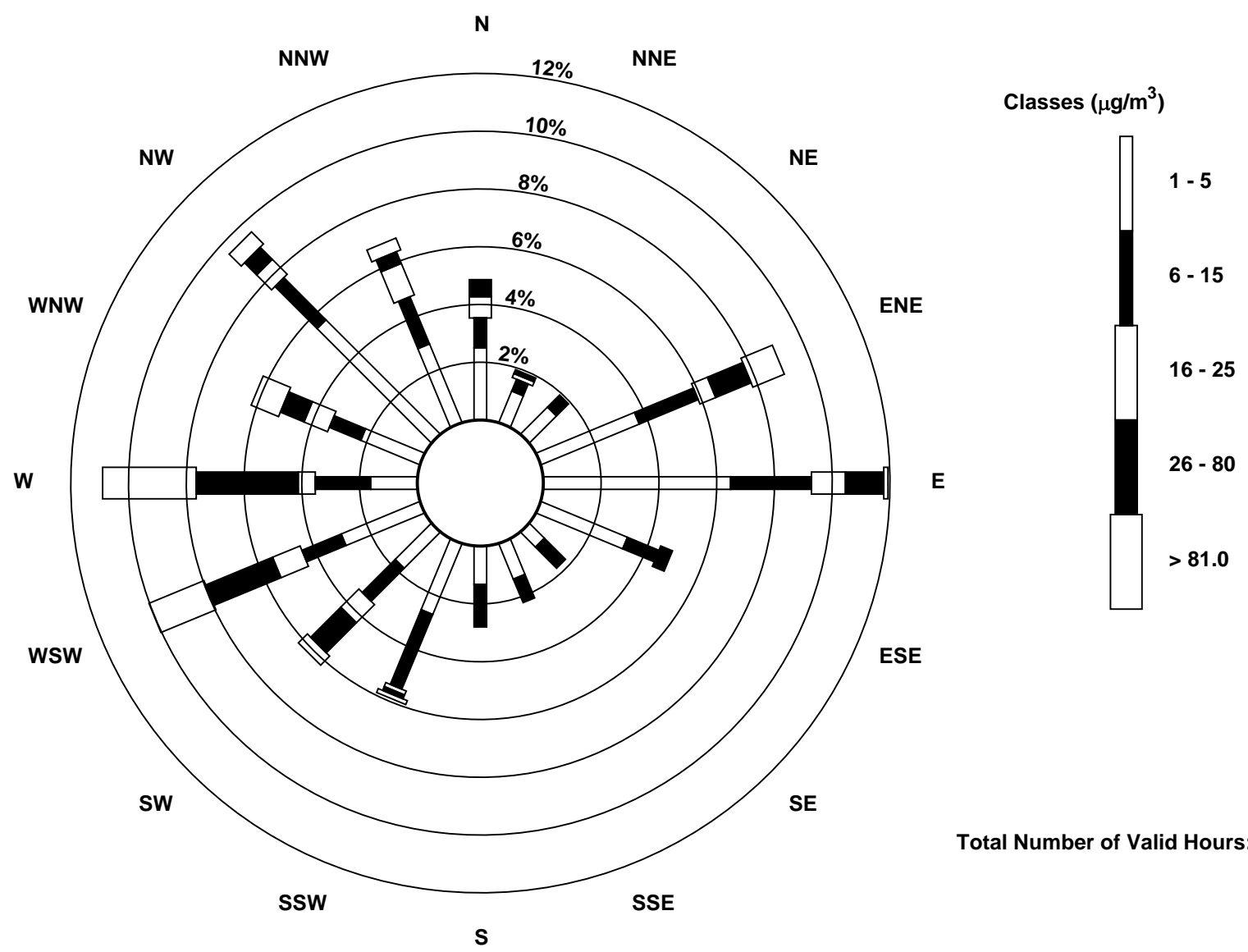
Total Number of Valid Hours: 682

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Jun 2015

Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
Fort Chipewyan (AMS 8)



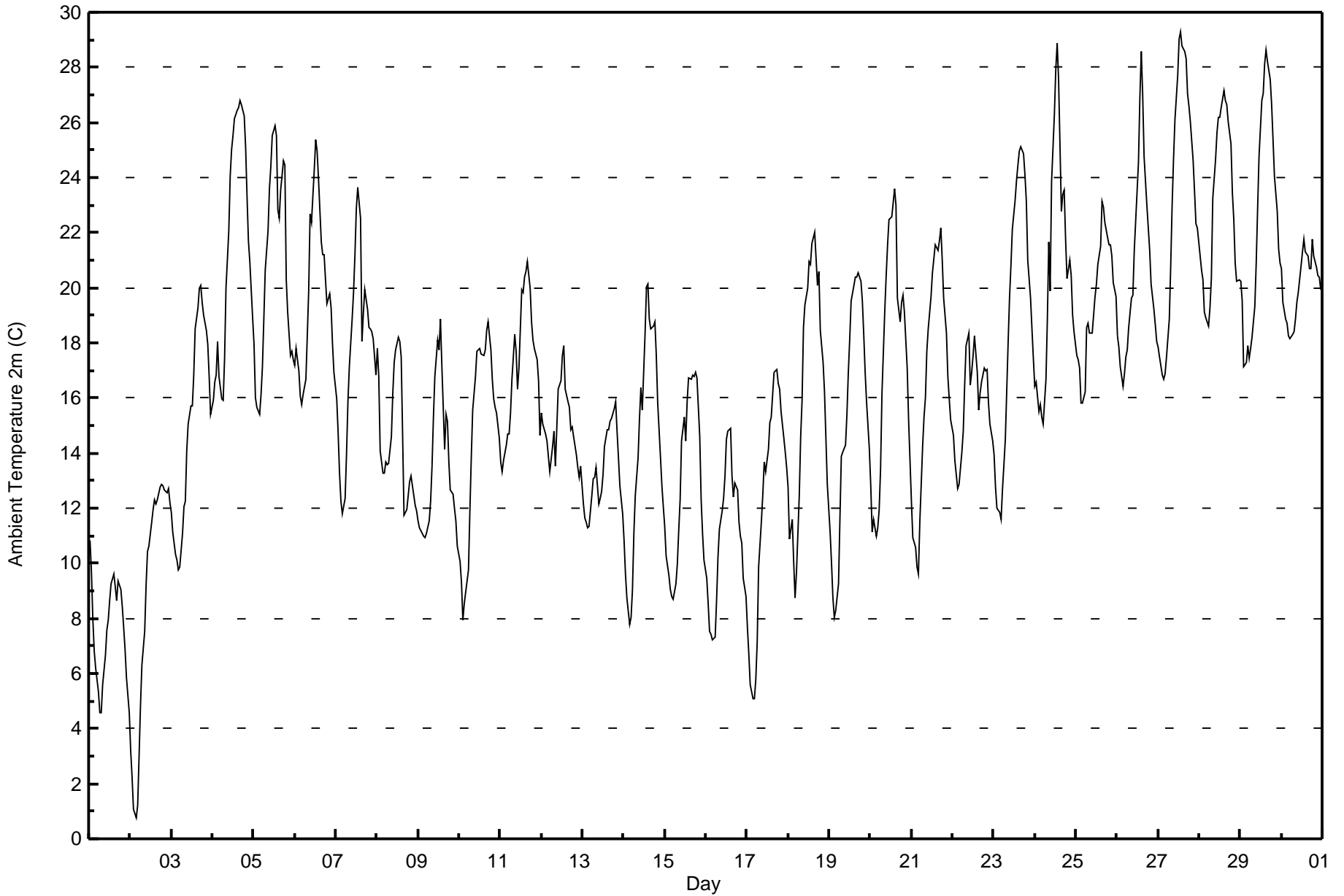


Maximum Value: 29.3 C on Jun 27 14:00      Maximum Daily Average: 23.4 C on Jun 27																						Hours in Service: 720 Hours of Data: 720																										
Minimum Value: 0.7 C on Jun 2 04:00      Minimum Daily Average: 7.5 C on Jun 1 Maximum Diurnal Average: 20.6 C at hour 14      Minimum Diurnal Average: 12.1 C at hour 5 Monthly Average: 16.65 C      Percentiles: P <sub>1</sub> = 4.6 P <sub>10</sub> = 9.8 Q <sub>1</sub> = 12.9 Median = 16.8 Q <sub>3</sub> = 20.2 P <sub>90</sub> = 23.6 P <sub>99</sub> = 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**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-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



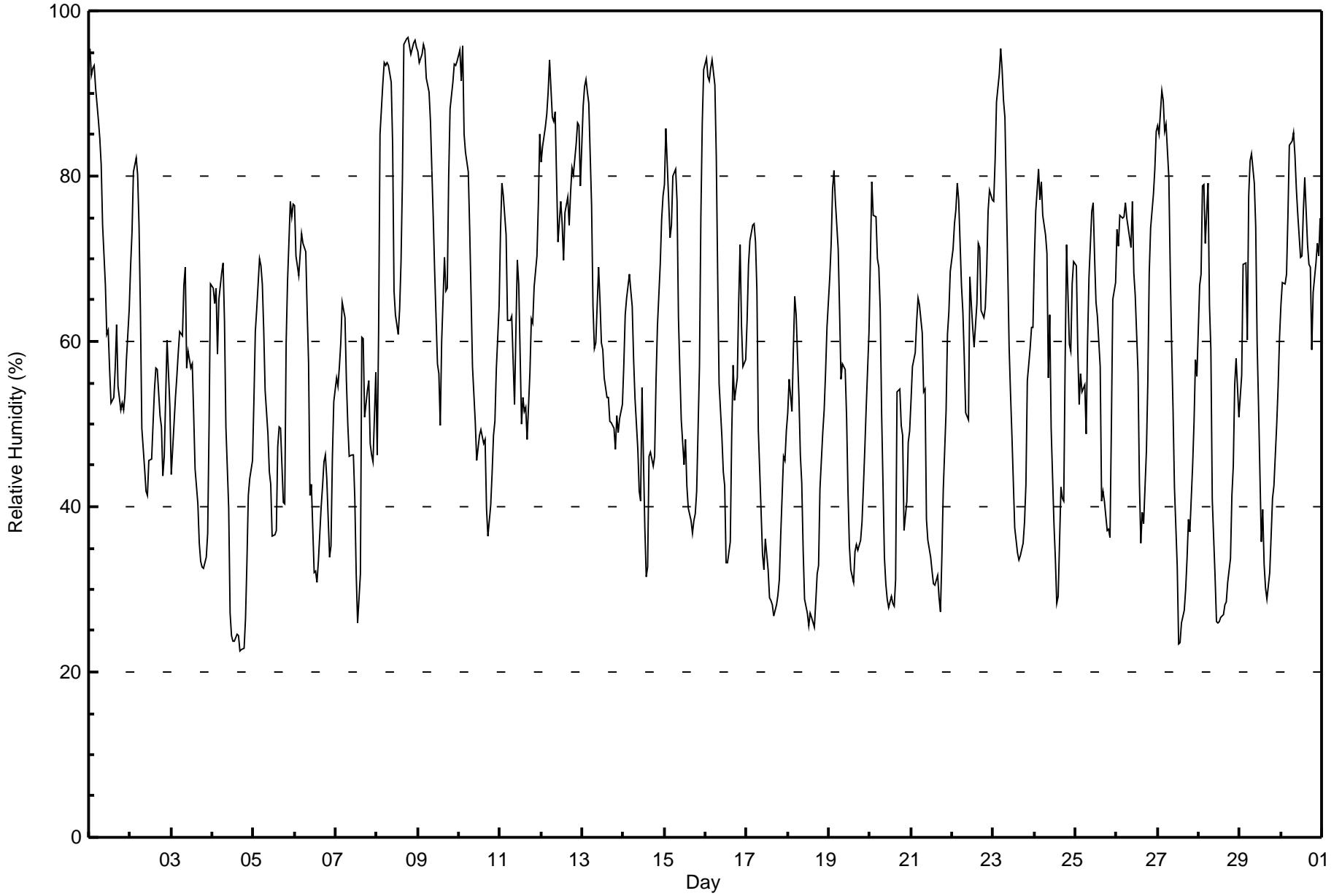
**Wood Buffalo Environmental Association**

**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 Hours of Data: 720								
Minimum Value: 23 % on Jun 4 17:00      Minimum Daily Average: 42.4 % on Jun 4 Maximum Diurnal Average: 76.1 % at hour 4      Minimum Diurnal Average: 42.1 % at hour 14 Monthly Average: 58.8 %      Percentiles: P <sub>1</sub> = 24 P <sub>10</sub> = 33 Q <sub>1</sub> = 45 Median = 59 Q <sub>3</sub> = 73 P <sub>90</sub> = 85 P <sub>99</sub> = 96																		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	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**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
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 <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 0.0 P <sub>90</sub> = 0.0 P <sub>99</sub> = 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	1.0
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			

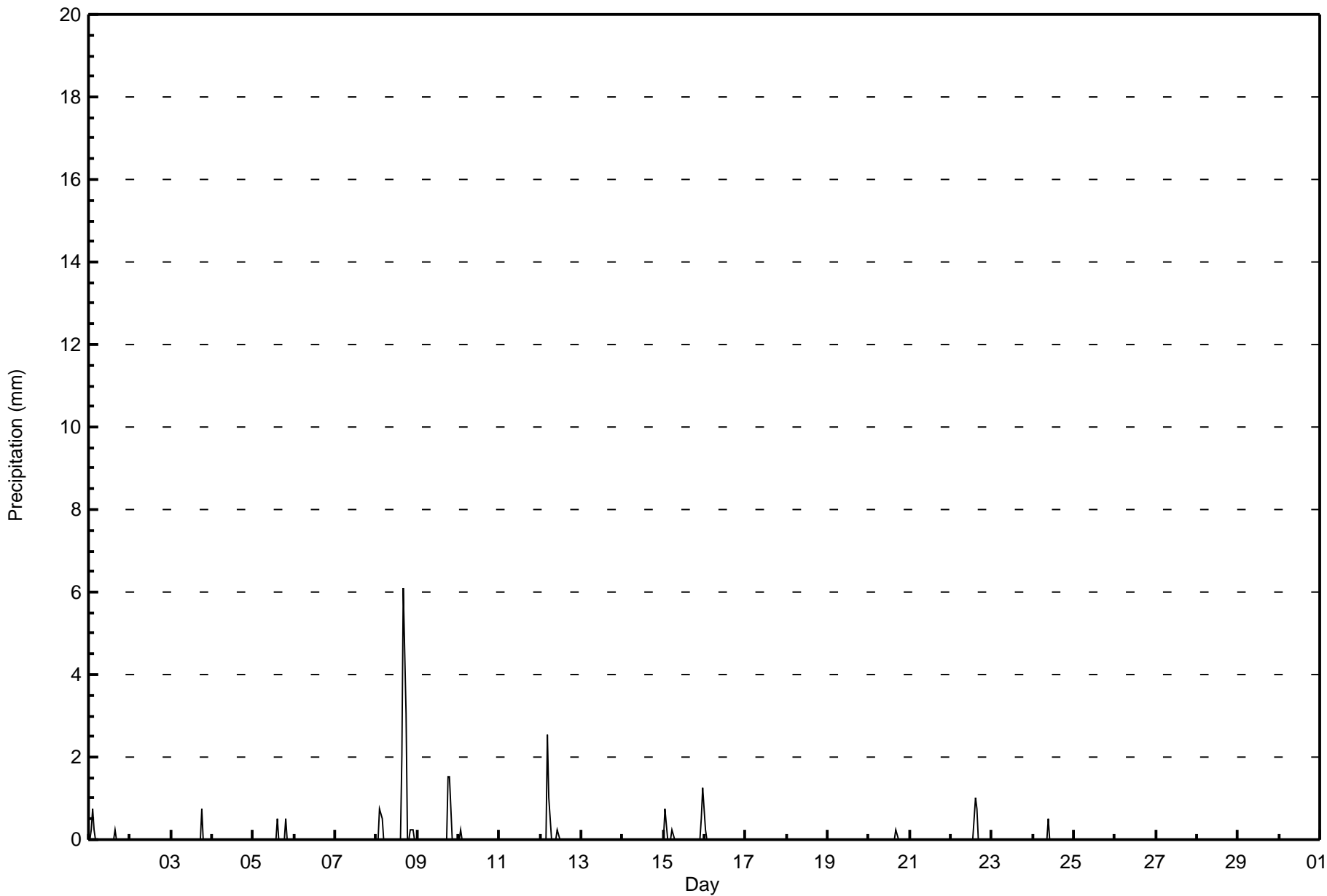


Wood Buffalo Environmental Association

Hourly Averages

Precipitation (PC) - mm

Fort Chipewyan - June 2015





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

**Precipitation (PC) - mm**  
**Fort Chipewyan - June 2015**

<b>Concentration Ranges (mm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.3	701	97.36	97.36
0.4 - 0.5	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 <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 0 Q <sub>3</sub> = 0 P <sub>90</sub> = 0 P <sub>99</sub> = 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

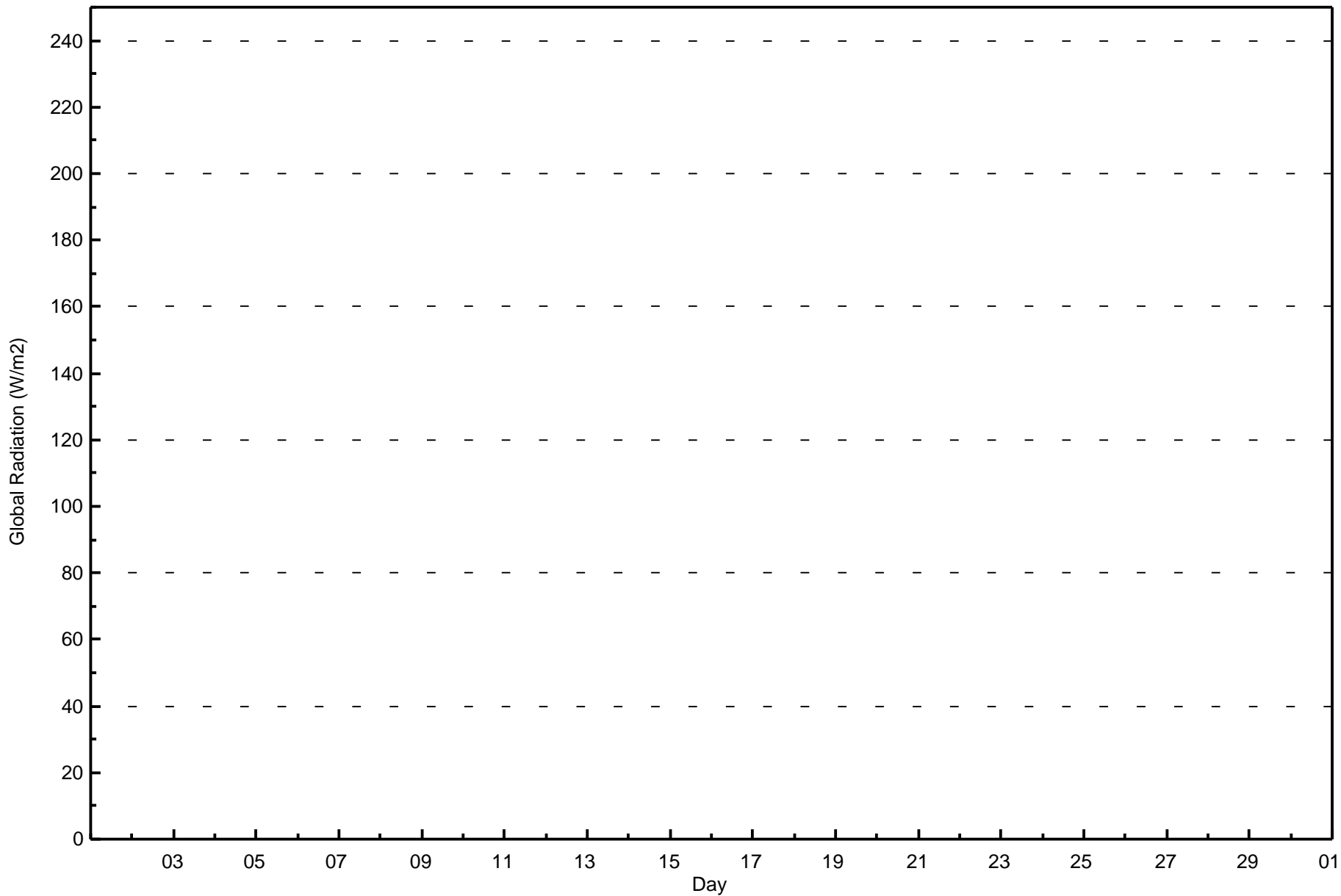


Wood Buffalo Environmental Association

Hourly Averages

Global Radiation (GR) - W/m<sup>2</sup>

Fort Chipewyan - June 2015





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

**Global Radiation (GR) - W/m2**  
**Fort Chipewyan - June 2015**

<b>Concentration Ranges (W/m2)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
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 <sub>1</sub> = 2 P <sub>10</sub> = 6 Q <sub>1</sub> = 9 Median = 12 Q <sub>3</sub> = 18 P <sub>90</sub> = 22 P <sub>99</sub> = 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 <sub>1</sub> = 1 P <sub>10</sub> = 2 Q <sub>1</sub> = 2 Median = 3 Q <sub>3</sub> = 4 P <sub>90</sub> = 5 P <sub>99</sub> = 8	Hours of Calibration: 0
	Percent Operational Time: 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

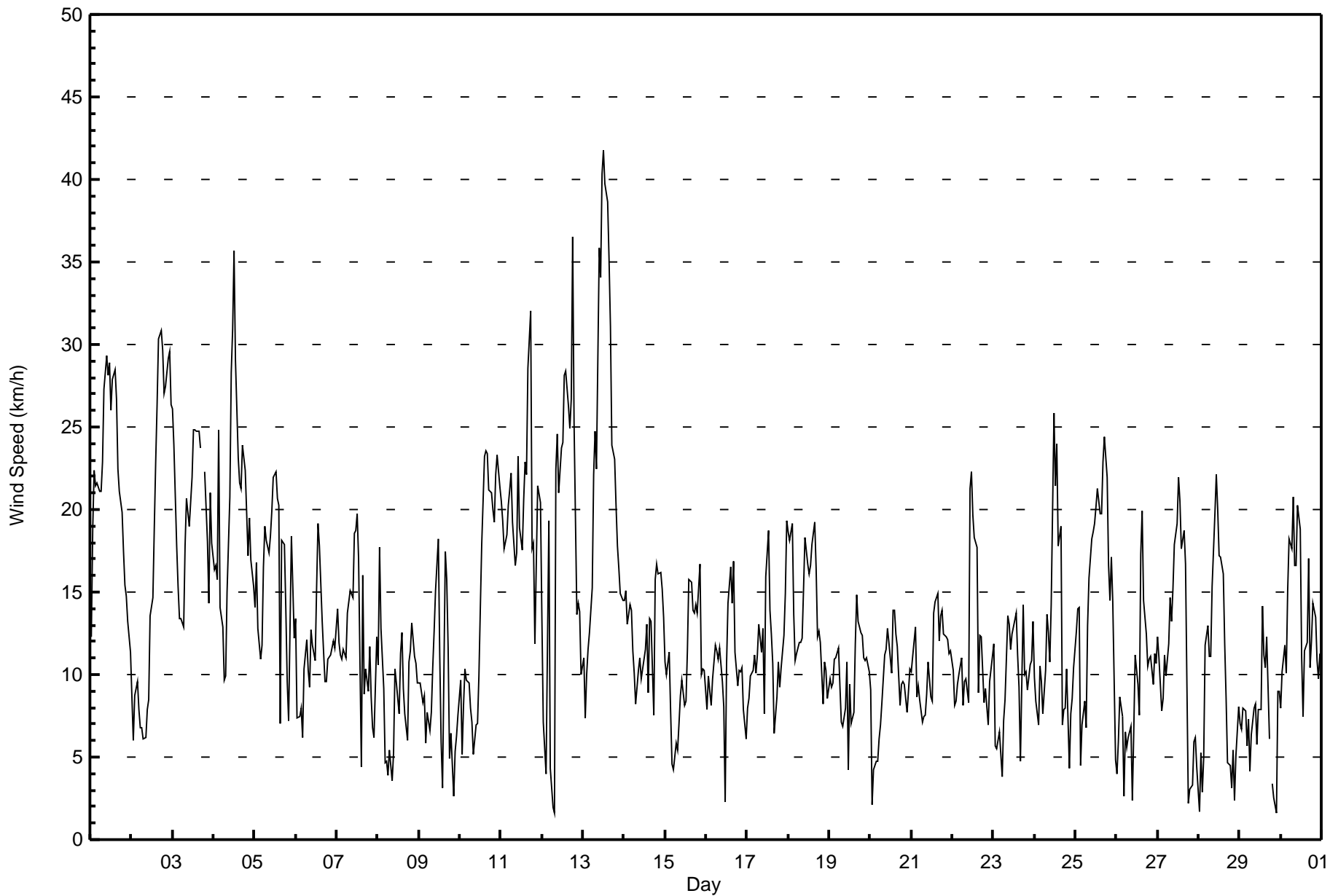
5	6	7	6	7	7	6	7	8	8	9	8	8	8	10	8	8	8	6	10	7	7	5	5	5	
Diurnal Maximum																									

M - Maintenance      AF - Analyzer Failure



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

**Wind Speed (WS) - km/h**  
**Fort Chipewyan - June 2015**





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

**Wind Speed (WS) - km/h**  
**Fort Chipewyan - June 2015**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
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
<b>Totals</b>	35	14	13	63	88	34	13	16	23	45	46	73	81	54	73	46	717

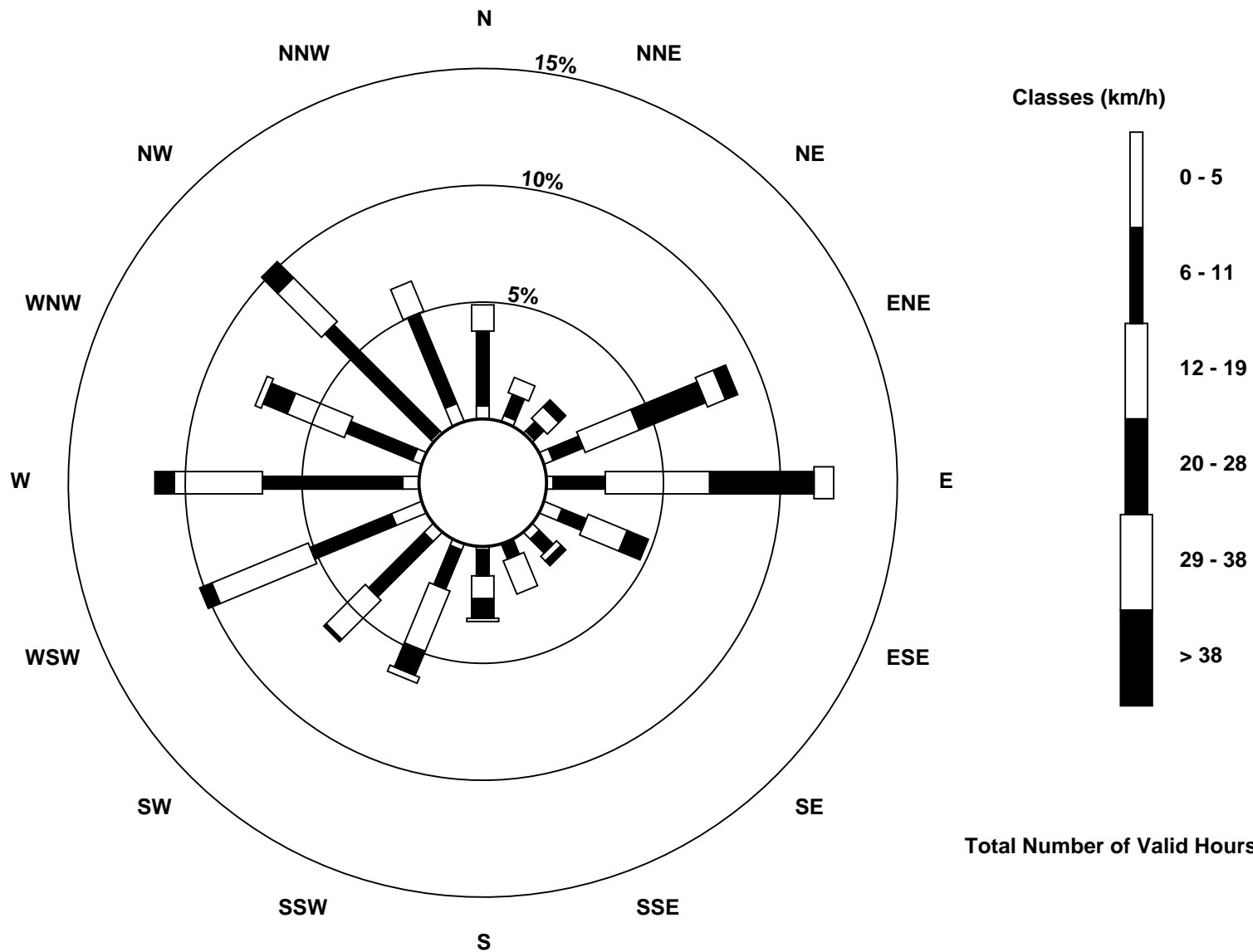
Total Number of Valid Hours: 717

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	Hours in Service: 720
Direction of Maximum Daily Speed Average: 58.7 deg on Jun 13	Hours of Data: 717
Direction of Minimum Speed: 96 deg on Jun 29 22:00	Hours of Missing Data: 3
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 <sub>1</sub> = 4 P <sub>10</sub> = 8 Q <sub>1</sub> = 11 Median = 16 Q <sub>3</sub> = 25 P <sub>90</sub> = 38 P <sub>99</sub> = 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

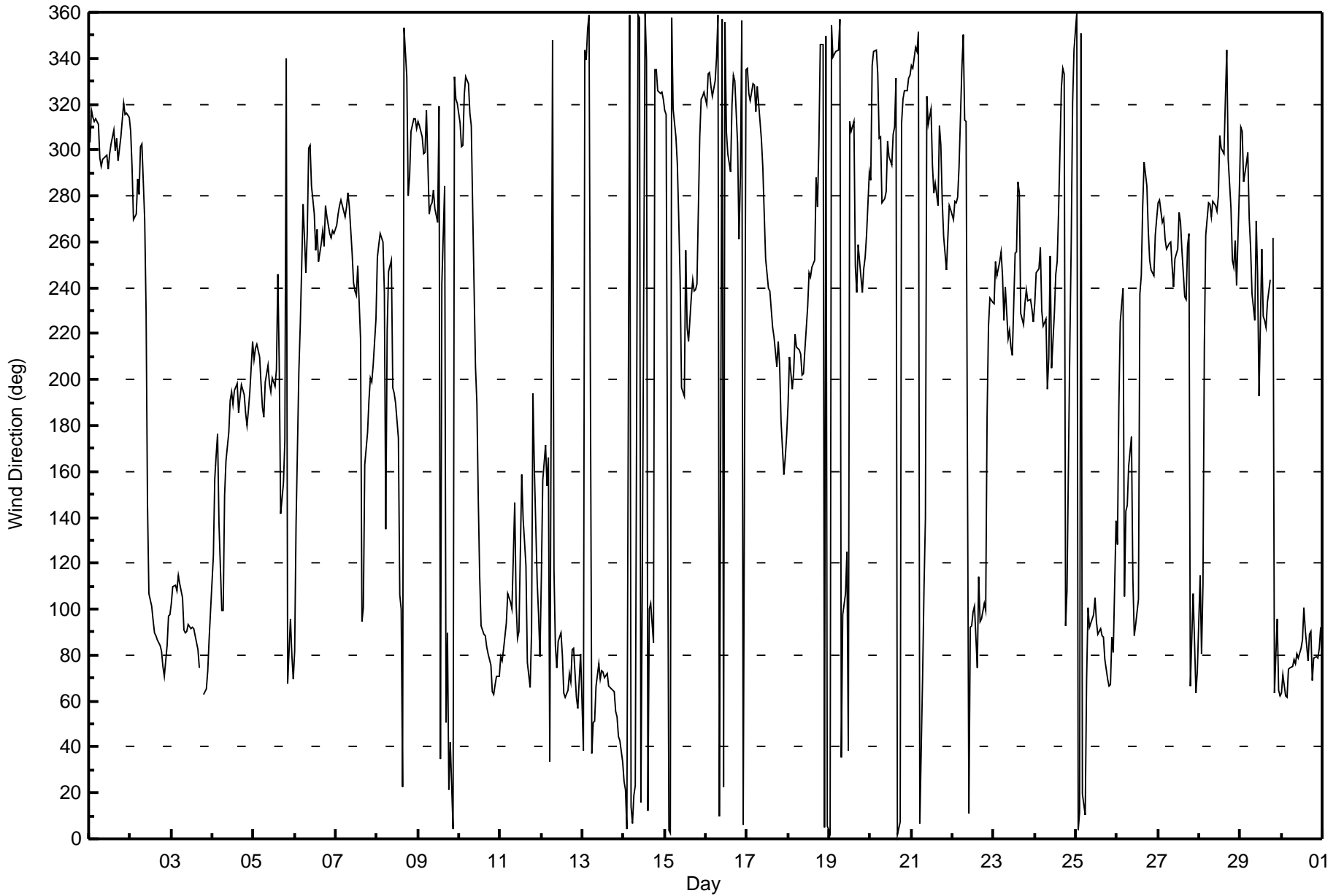
77	80	74	56	67	52	81	88	53	75	64	95	59	73	90	61	72	50	92	57	58	69	34	35	
Diurnal Maximum																								

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



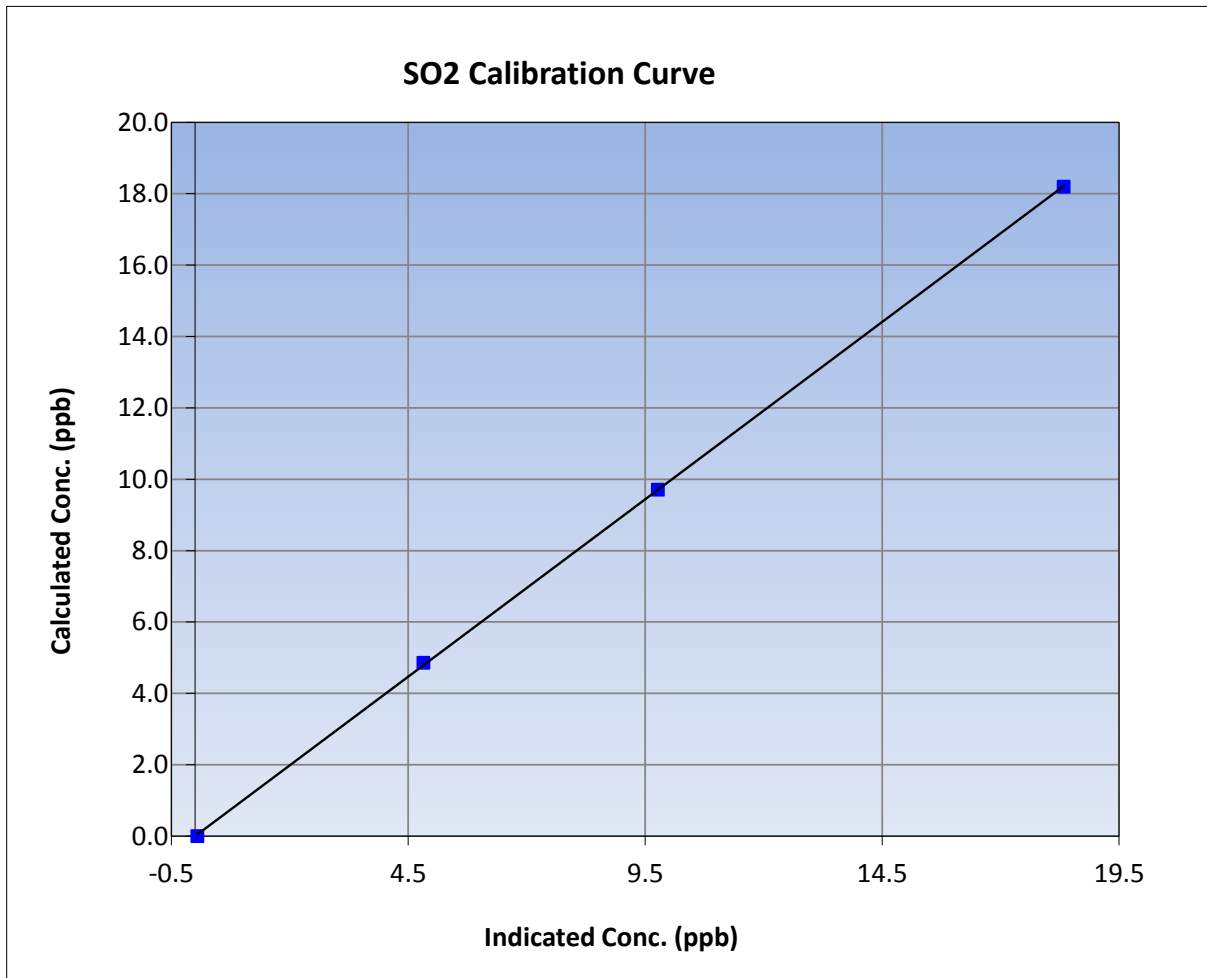
## Wood Buffalo Environmental Association SO2 Calibration Report

### 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

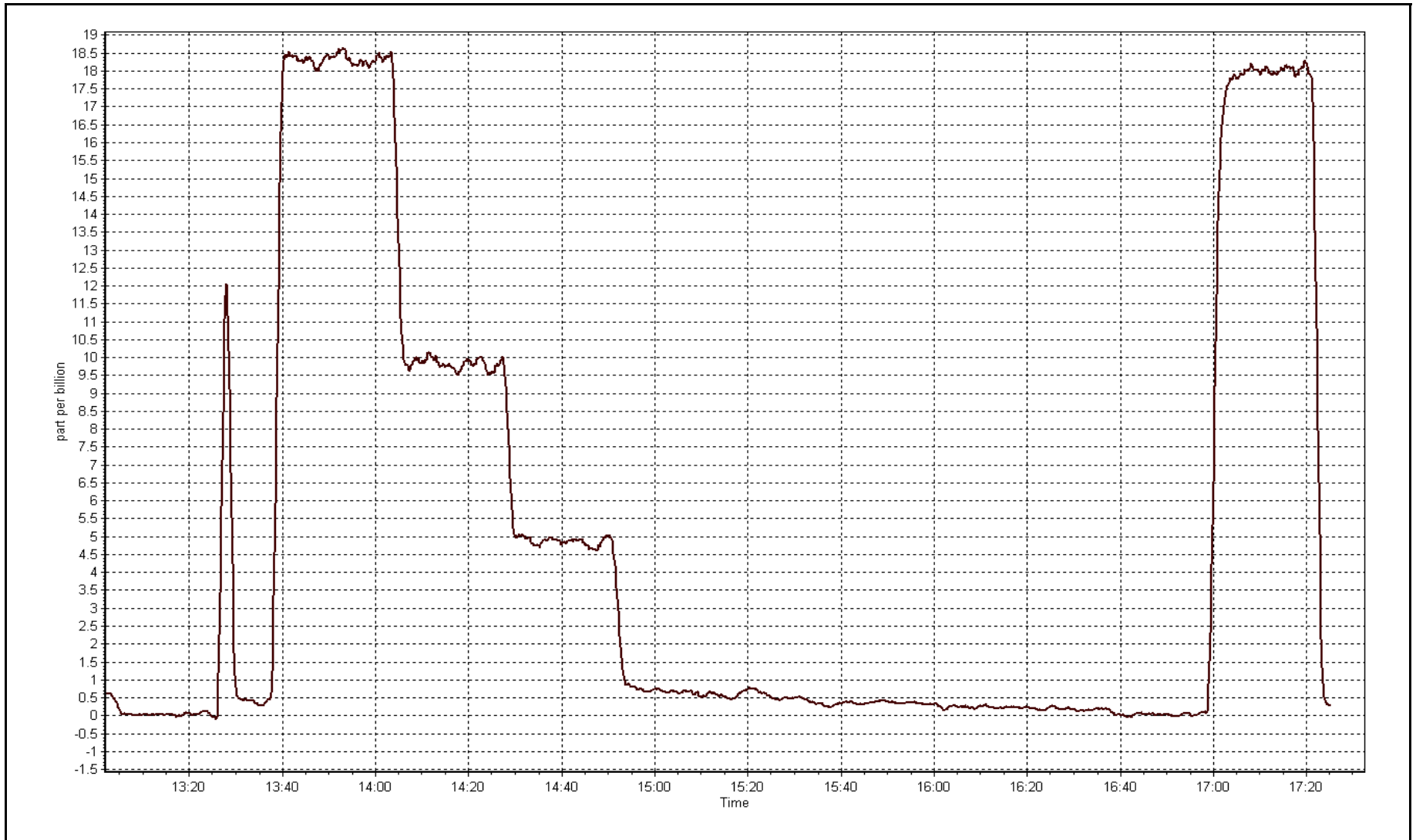
### Calibration Data

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

## O<sub>3</sub> 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



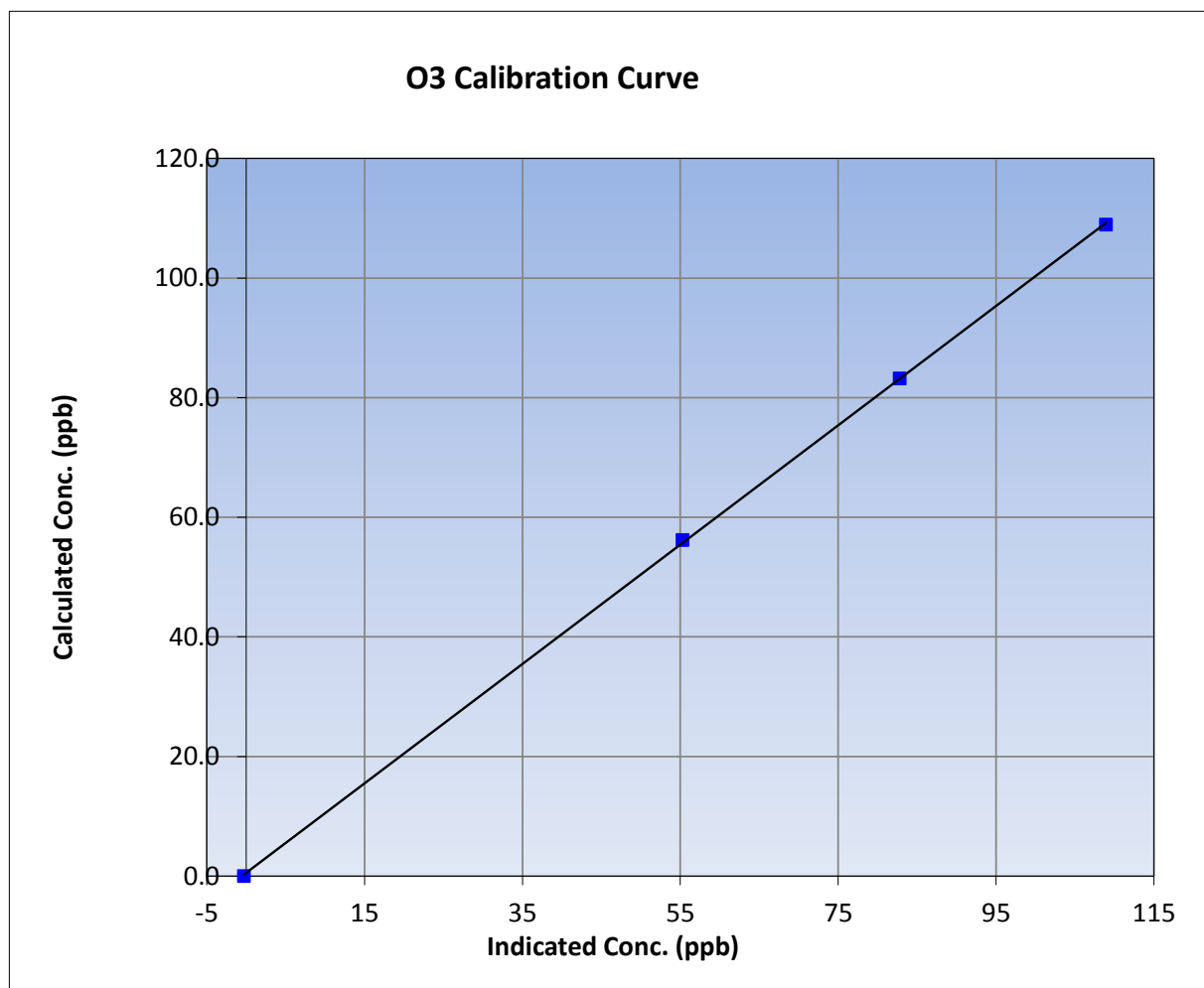
## Wood Buffalo Environmental Association O3 Calibration Report

### 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

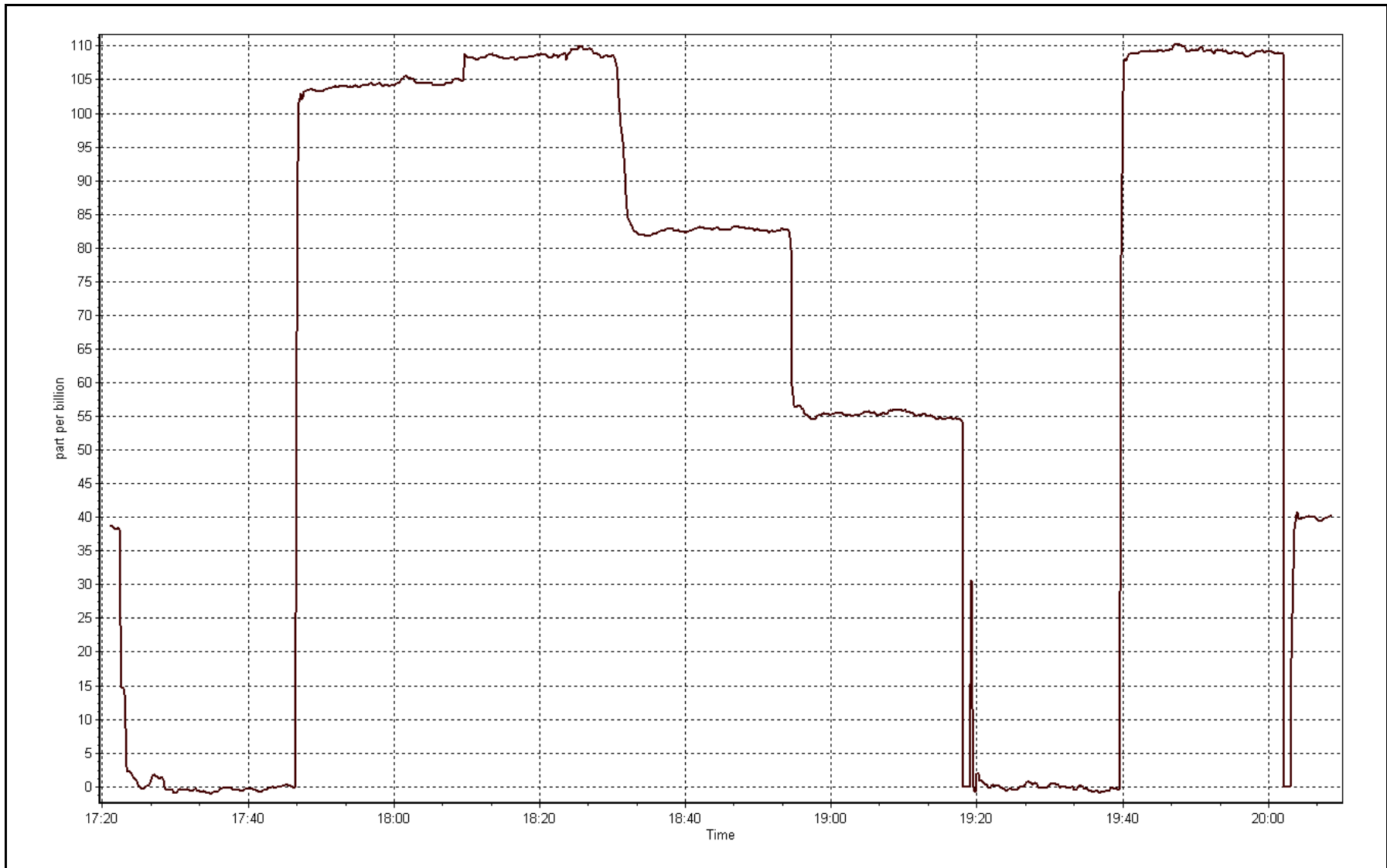
### Calibration Data

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	
Concentration range	0-200	ppb	0-200	ppb
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<sub>x</sub>= 153.7

NO= 152.9

Percent Change

NO<sub>x</sub>= -2.4%

NO= -2.5%

Previous Response

NO<sub>x</sub>= 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<sub>x</sub> Calibration Summary

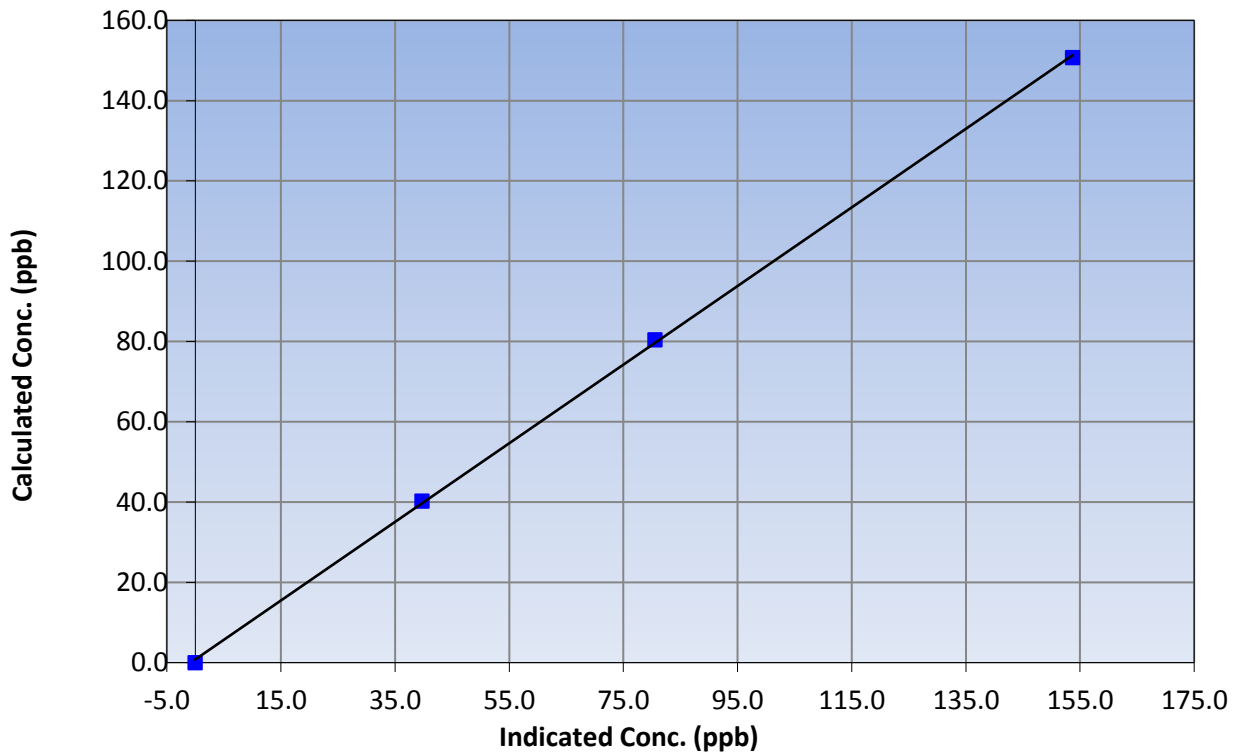
### Station Information

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<sub>x</sub> Calibration Curve





# Wood Buffalo Environmental Association

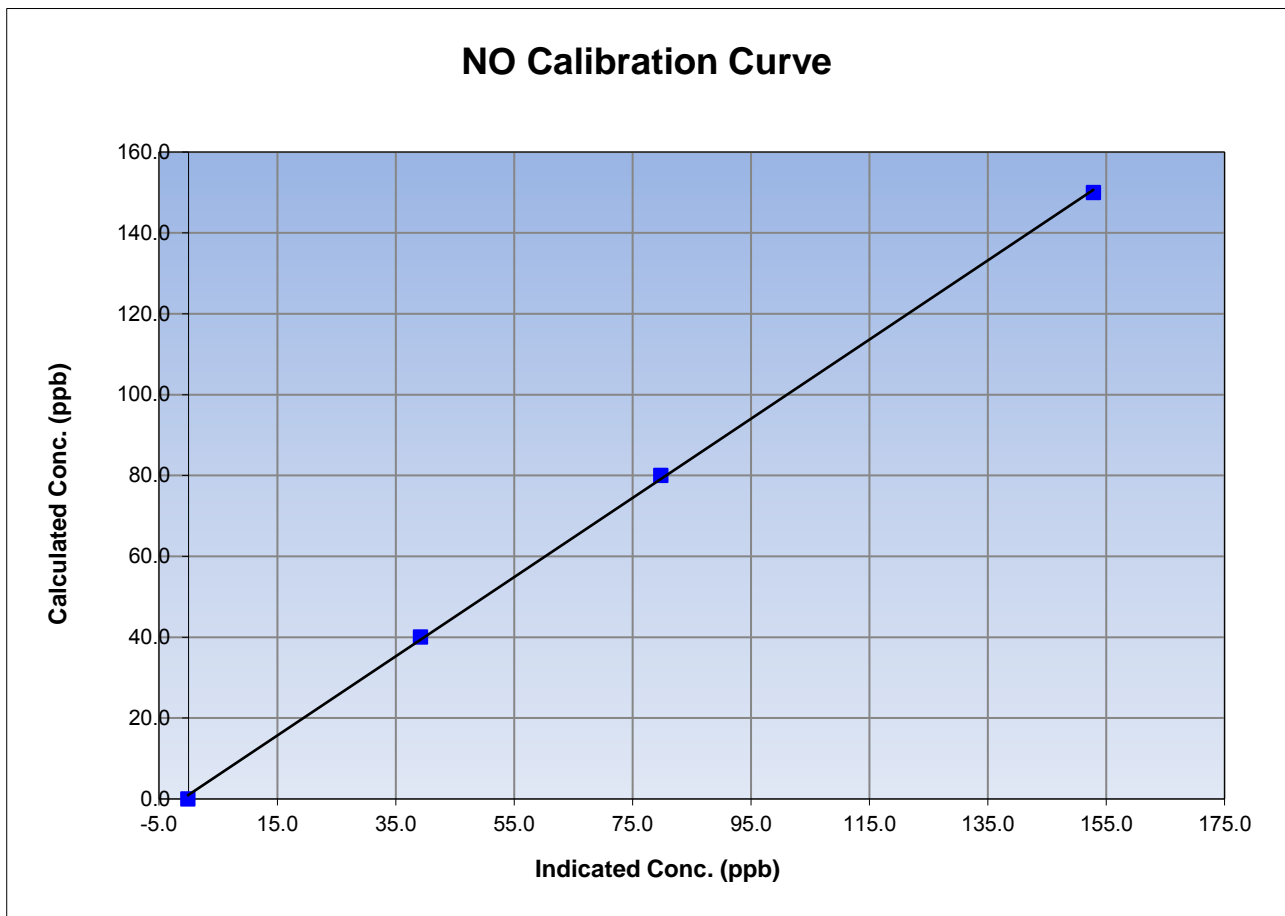
## NO Calibration Summary

### 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

## NO<sub>2</sub> Calibration Summary

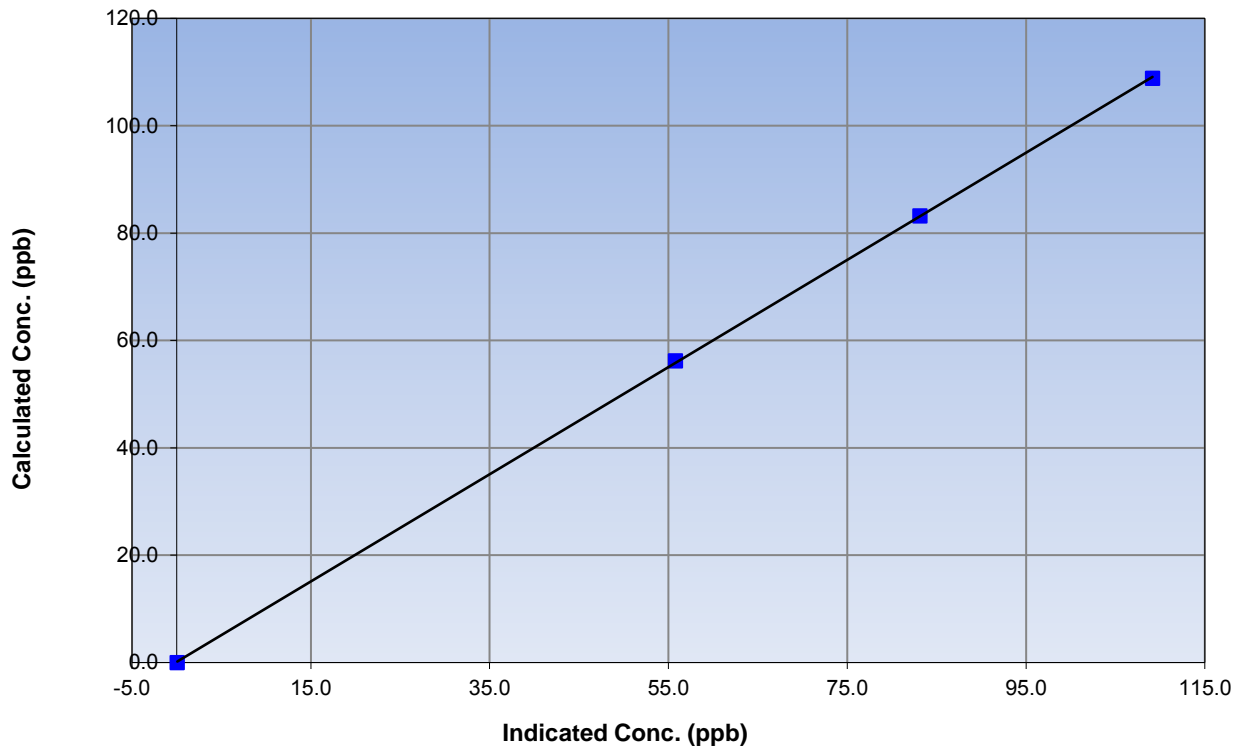
### Station Information

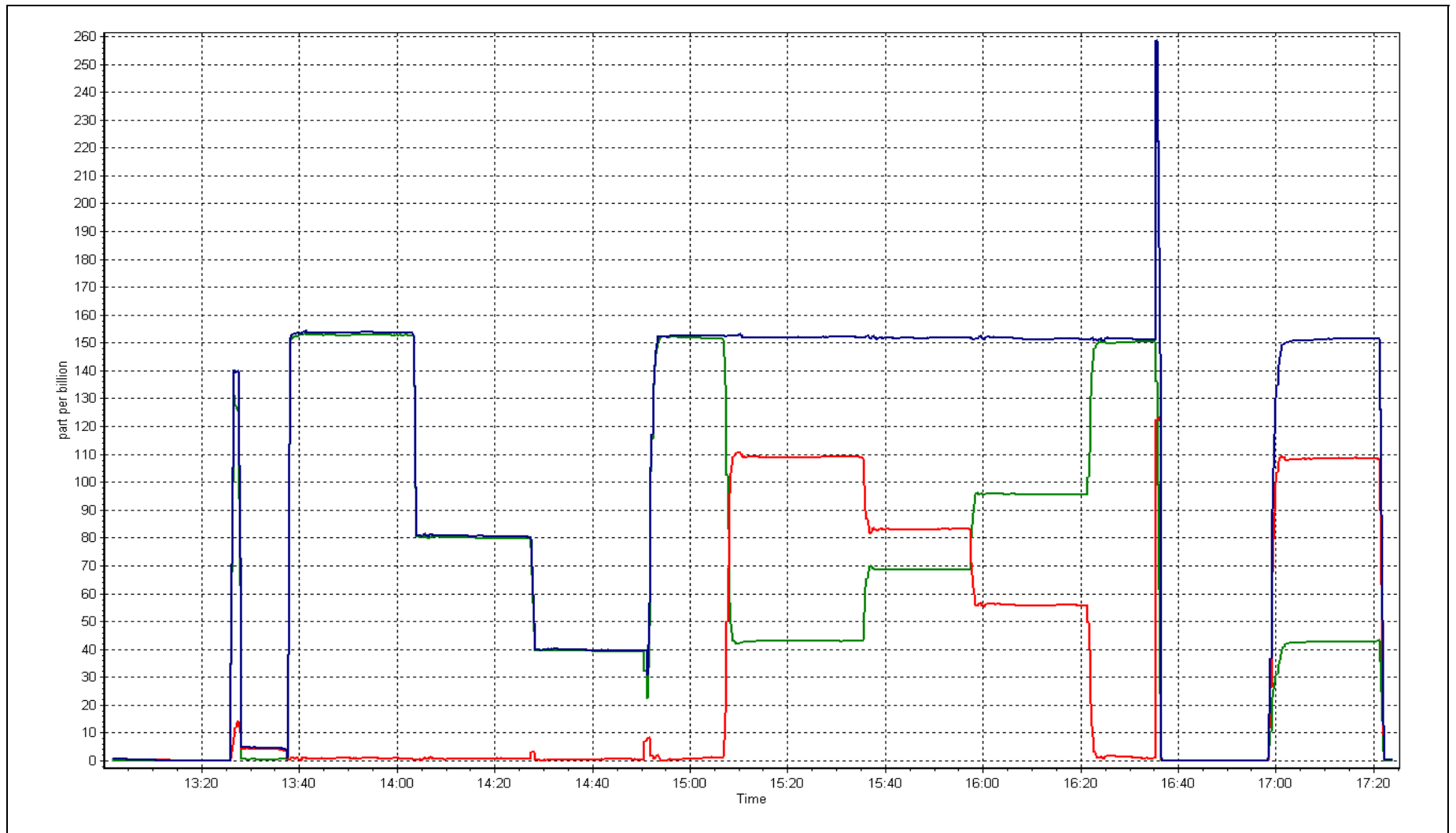
Calibration Date	June 3, 2015	Previous Calibration	May 6, 2015
Station Name	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	13:00	End Time (MST)	17:20
Analyzer make	Teledyne API T200u	Analyzer serial #	172

### 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

### NO<sub>2</sub> 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
	<b>Measured</b>	<b>Difference LPM (Limit +/- 0.42 LPM)</b>	
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>	<b>Mass foil set S/N:</b>	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  
MONTHLY AIR MONITORING SUMMARY  
for AMD SECTION III.B.1(c)

JUNE 2015 rev.1

page 1 of 2

prepared 27Aug15 11:31

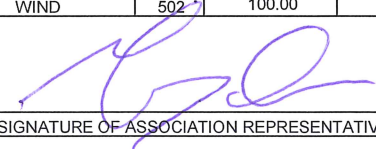
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	MONTH	YEAR					
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254465-00-00							
149968-00-01							
48522-01-00							
240008-00-03	CONTINUOUS AMBIENT MONITORING						
48263-00-00							
224816-00-03							
189942-00-02				ONE-HOUR AVERAGE		24-HOUR AVERAGE	
206355-00-00	PARAMETER	STN. NO.	% TIME OPERATIONAL	MAXIMUM CONCENTRATION	NO. READINGS > REGULATION	MAXIMUM CONCENTRATION	NO. READINGS > REGULATION
46586-00-00	SO2(ppm)	1	99.86	0.037	0	0.006	0
216466-00-04	SO2(ppm)	2	100.00	0.038	0	0.009	0
137467-00-00	SO2(ppm)	4	99.86	0.030	0	0.005	0
20809-01-00	SO2(ppm)	5	100.00	0.062	0	0.009	0
241311-00-00	SO2(ppm)	6	100.00	0.021	0	0.004	0
094-02-00	SO2(ppm)	7	99.86	0.021	0	0.004	0
305529-00-00	SO2(ppm)	8	99.03	0.005	0	0.001	0
026-02-00	SO2(ppm)	11	99.86	0.066	0	0.011	0
228044-00-00	SO2(ppm)	12	99.86	0.038	0	0.006	0
73203-01-00	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 rev. 1

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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	CONTINUOUS AMBIENT MONITORING						
224816-00-03	CONTINUOUS AMBIENT MONITORING						
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	NO2(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	92.08	0.013	0	0.005	-
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 <sup>3</sup> )	1	99.72	194.3	-	137.8	3
	PM2.5(ug/m <sup>3</sup> )	6	99.72	1331.6	-	221.2	2
	PM2.5(ug/m <sup>3</sup> )	7	99.86	434.7	-	130.7	2
	PM2.5(ug/m <sup>3</sup> )	8	95.00	1507.5	-	397.3	5
	PM2.5(ug/m <sup>3</sup> )	12	97.08	222.7	-	157.1	5
	PM2.5(ug/m <sup>3</sup> )	13	99.31	155	-	123.6	2
	PM2.5(ug/m <sup>3</sup> )	14	95.69	257.2	-	80.8	2
	PM2.5(ug/m <sup>3</sup> )	15	99.72	352.2	-	163.6	5
	PM2.5(ug/m <sup>3</sup> )	16	99.58	192.7	-	152.3	5
	PM2.5(ug/m <sup>3</sup> )	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			