



*WOOD BUFFALO*  
*ENVIRONMENTAL*  
*ASSOCIATION*

**MAY 2014**

**MONTHLY REPORT**



CONTINUOUS MONITORING  
INTEGRATED MONITORING  
June 27, 2014

Operations and Data Collection by:  
Wood Buffalo Environmental Association  
Fort McMurray, Alberta

QA/QC, Data Validation and Reporting by:  
Aurora Atmospheric Inc  
Calgary, Alberta

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June 27, 2014

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

**RE: Monthly Ambient Air Quality Monitoring Report May 2014  
Wood Buffalo Environmental Association**

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Enclosed is the May 2014 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 500 – Cenovus Christina Lake  
MAMS – WBEA Mobile

In early January 2014, WBEA commissioned a portable air monitoring station at the Cenovus Energy Christina Lake facility. The survey at this location will be conducted from January to June, 2014 to fulfill Alberta Environment's Environmental Protection and Enhancement Act facility approval number 48522-01-00. This station is equipped with ambient air quality analyzers for SO<sub>2</sub>, H<sub>2</sub>S, NO, NO<sub>2</sub>, NO<sub>x</sub> and meteorological sensors for ambient temperature, relative humidity, and wind speed and direction.

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>, PM<sub>2.5</sub> and O<sub>3</sub>.

A total reduced sulphur (TRS) ambient ground level concentration approaching the 1-hour H<sub>2</sub>S air quality objective was conservatively reported to Alberta Environment in real time. After data processing to account for analyzer drift with baseline correction, this incident was found not to be in exceedance of the ambient air quality objective.

The reported and final concentrations and status after data processing are summarized as follows:

<u>Site</u>	<u>para-meter</u>	<u>date/time</u>	<u>reference</u>	<u>period</u>	<u>concentration (ppb)</u>		<u>status*</u>
					<u>reported</u>	<u>final</u>	
AMS 15 CNRL Horizon	TRS	07May14:01:00	283663	1-hour	10	10	nae

\*status legend:

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

Concentrations reported in near real-time were estimates, and 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 the 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.

## **2.0 Operational Status**

### **2.1 Continuous Monitoring**

In May 2014, there was one incident resulting in a compliance monitoring instrument operating less than 90 % of the time.

The total hydrocarbon (THC) analyzer at AMS 5, Mannix, operated less than 90% of the time during this reporting period. There were three operational issues and two data quality control measures applied to this parameter, resulting in 241 hours of invalid data.

- On May 5, the analyzer developed a flow controller board problem resulting in a new analyzer being deployed and calibrated at the station on May 6, 2014.
- A follow-up maintenance on May 29 to verify analyzer performance indicated instrument failure to meet operational specifications as specified in the Air Monitoring Directive (AMD).
- On June 3 a second follow-up visit to repair the analyzer revealed that the analyzer output settings were configured to provide analyzer drift values above zero (0 ppm). The analyzer settings were reconfigured and recalibrated before resuming routine operations.
- During data validation and processing for reporting, periods of data between May 5 to 6 and May 29 to June 3 were flagged as invalid.
- For May 6 to 29, the period when negative analyzer drift was not recorded, baseline correction was not applied to the data and values below the background threshold (1.8 ppm) were flagged as unstable operation.

After flagging and processing for monthly reports, data was available for only 68% of the time in May and final data availability for June cannot be completed at this time. This incident was reported to Alberta Environment and Sustainable Resource Department on June 26<sup>th</sup>, 2014 (Megan, reference number 285850).

There were three incidents of monitoring instruments not required for air quality compliance operating less than 90 % of the time in May 2014.

The shelter at AMS 8, Fort Chipewyan was replaced from March 11 to March 13 resulting in air quality analyzers and meteorological sensors not being in operation during this period. Reinstallation of the analog type sensors such as solar radiation sensors and the precipitation collector in the new shelter were accompanied by upgrades to the communications equipment for digital polling and the data acquisition system programming. The additional work resulted in a downtime greater than what would be required for a normal shelter swap. These sensors were not in service until May 15 and 27, 2014 respectively. The leaf wetness sensor was not in service during this reporting period.

## **2.2 Intermittent Monitoring**

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

The May 2014 results for PAH sampling are included with this monthly report.

## **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 continuous monitoring stations are provided on a station by station basis.

### ***Station 1, Fort McKay***

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 one hour following the daily spans have been reported as invalid for a total of 30 hours this month.

A power failure at the station on May 15 affected the normal operations of all parameters for 10 hours this month. Additional periods of data to allow for the analyzers to stabilize to ambient conditions were invalidated for the THC, TRS and NH<sub>3</sub> parameters for 1, 4 and 15 hours, respectively.

There were two issues associated with operation of the PM<sub>2.5</sub> analyzer resulting in 44 hours of invalid data. The normal operation of the analyzer was interrupted on May 13 for 16 hours due to contamination of the detector chamber and the resulting maintenance period to clean and recalibrate the analyzer. Replacement of the sample pump on May 22 and subsequent recalibration of the analyzer resulted in 28 hours of downtime.

Maintenance and audit checks of the ambient temperature and relative humidity sensors on May 13 and 14 interrupted the normal operation of the sensors for 5 hours this month.

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

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

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

A power spike at the station on May 20 affected the normal operations of all air quality analyzers for 1 hour.

The raw maximum instantaneous and 5-minute average THC concentrations were greater than the 25 ppm operating range of the analyzer in 2 1-hour periods (7 5-minute periods total for the month). The range maximum value of 25 ppm was substituted for the final 5-minute average values during data processing to calculate final 1-hour values. The highest 1-hour and 24-hour average values of THC in the month did occur in an hour of and on days associated with range exceedance.

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

Flat-line in the output signals of the 20 and 45m elevation wind sensors on May 5 resulted in 8 and 6 hours of invalid data, respectively.

Flat-line in the output signals of the 100 m elevation temperature and relative humidity sensors on May 17 resulted in 8 hours of invalid data this reporting period.

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

No operational issues to report.

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

The total hydrocarbon (THC) analyzer at AMS 5, Mannix, operated less than 90% of the time in May 2014. There were three operational issues and two data quality control measures applied to this parameter, resulting in 241 hours of invalid data.

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

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 one hour following the daily span have been reported as invalid for a total of 31 hours this month.

Maintenance and replacement of the in-situ calibrator at the station on May 1<sup>st</sup> affected the normal operation of the SO<sub>2</sub>, NO<sub>2</sub>, THC and NH<sub>3</sub> analyzers for 2 to 5 hours.

Maintenance and cleaning of the sample manifold on May 2<sup>nd</sup> interrupted the normal operations of the O<sub>3</sub>, TRS and NH<sub>3</sub> analyzers for 1 hour.

Maintenance on the daily zero and span systems and verification of analyzers responses on May 5 interrupted the normal operations of the O<sub>3</sub> and NO<sub>2</sub> analyzers for 2 to 3 hours.

Maintenance to the sample inlet and flow and zero reference checks on May 9 interrupted the normal operations of the PM<sub>2.5</sub> analyzer for 2 hours. The PM<sub>2.5</sub> analyzer experienced 4 episodes of intermittent unstable operations this month, resulting in 14 hours of invalid data.

A power spike at the station on May 20 affected the normal operations of the O<sub>3</sub> and NH<sub>3</sub> analyzers for 1 hour.

Station operator activities on May 23, 27 and 29 affected the normal operations of the PM<sub>2.5</sub>, O<sub>3</sub> and NO<sub>2</sub> analyzer for 1, 3 and 14 hours respectively.

Replacement of the pressure sensor on the fuel cylinder gauge for the THC analyzer on May 30 interrupted the normal operation of the analyzer for 2 hours.

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

A power failure at the station on May 9 affected the normal operations of all air quality analyzers for 1 hour.

An audit of the CO analyzer performance for an inter-laboratory comparison on May 22 interrupted the normal operation of the analyzer for 2 hours.

Maintenance to the sample inlet and flow and zero reference checks on May 22 interrupted the normal operations of the PM<sub>2.5</sub> analyzer for 2 hours.

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

A new data collection program and revision uploads to the data logger on May 27 interrupted the normal data collection of all parameters for 1 hour.

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

Maintenance and audit checks of the solar radiation sensor on May 15 interrupted the normal operation of the sensors for 5 hours this month.

Reinstallation of the analog type sensors such as solar radiation sensors and the precipitation collector in the new shelter were accompanied by upgrades to the communications equipment for digital polling and the data acquisition system programming. The additional work resulted in a downtime greater than what would be required for a normal shelter swap. These sensors were not in service until May 15 and 27, 2014 respectively.



The leaf wetness sensor was not in service during this reporting period.

Maintenance to the sample inlet and flow and zero reference checks on May 15 interrupted the normal operations of the PM<sub>2.5</sub> analyzer for 1 hour. The PM<sub>2.5</sub> analyzer experienced nine instances of unstable operations this month, resulting in 31 hours of invalid data.

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

A power failure at the station on May 15 affected the normal operations of all air quality analyzers for 9 hours.

Maintenance and cleaning of the sample manifold on May 1<sup>st</sup> and 2<sup>nd</sup> interrupted the normal operations of the TRS and THC analyzers for 1 to 3 hours.

Depletion and replacement of the span gas cylinder at the station on May 6 affected the normal operations of the TRS analyzer for 1 hour.

Flat-line in the output signals of the wind sensor resulted in 6 hours of invalid data this reporting period.

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

No operational issues to report.

The raw maximum instantaneous and 5-minute average THC concentrations were greater than the 25 ppm operating range of the analyzer in 1 1-hour period (1 5-minute period for the month). The range maximum value of 25 ppm was substituted for the final 5-minute average values during data processing to calculate final 1-hour values. The highest 1-hour and 24-hour average values of THC in the month did occur in an hour of and on days associated with range exceedance.

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

Depletion and replacement of the fuel cylinder at the station on May 28 affected the normal operations of the THC analyzer for 1 hour.

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

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

### ***Station 13, Syncrude UE 1***

A power failure at the station on May 15 affected the normal operations of all air quality analyzers for 10 hours.

Maintenance and cleaning of the sample manifold on May 21 interrupted the normal operations of all air quality analyzers for 1 hour.

Maintenance to the sample inlet and flow audits and zero reference checks on May 21 interrupted the normal operation of the PM<sub>2.5</sub> analyzer for 1 hour.

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

Maintenance and replacement of the NO<sub>2</sub> analyzer and subsequent calibrations between May 21 and 22 interrupted the normal operations of the analyzer for 26 hours.

Maintenance to the sample inlet, flow audits and zero reference checks on May 29 interrupted the normal operations of the PM<sub>2.5</sub> analyzer for 2 hours. The PM<sub>2.5</sub> analyzer experienced two instances of unstable operations this month, resulting in 2 hours of invalid data.

Maintenance on the in-situ calibrator and confirmation of O<sub>3</sub> analyzer response to the daily span target on May 29 interrupted the normal operations of the analyzer for 2 hours.

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

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

Maintenance to the sample inlet, flow audits and zero reference checks on May 9 interrupted the normal operations of the PM<sub>2.5</sub> analyzer for 1 hour.

Electrical interference in the output signal of the precipitation collector on May 11 and 12 resulted in 26 hours of invalid data.

Maintenance on the in-situ calibrator and confirmation of TRS analyzer response to the daily span target on May 15 interrupted the normal operations of the analyzer for 1 hour.

The SO<sub>2</sub> analyzer experienced two instances of unstable operations this month, resulting in 2 hours of invalid data.

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

### ***Station 16, Albian Muskeg River***

A power spike at the station on May 15 affected the normal operations of the SO<sub>2</sub> and NO<sub>2</sub> analyzers for 1 hour.

A power failure at the station on May 17 affected the normal operations of all air quality analyzers for 2 hours.

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

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

Station operator activities on May 15 interrupted the normal operations of all parameters for 1 hour.

There were three issues associated with operation of the PM<sub>2.5</sub> analyzer resulting in 31 hours of invalid data. The normal operation of the analyzer was interrupted on May 18 for 19 hours due to contamination of the detector chamber and resulting maintenance period to clean and recalibrate the analyzer. Maintenance to the sample inlet, flow audits and zero reference checks on May 16 interrupted the normal operations of the PM<sub>2.5</sub> analyzer for 2 hours. The PM<sub>2.5</sub> analyzer experienced three instances of unstable operations resulting in 10 hours of invalid data.

Flat-lines in the output signals of the wind sensor resulted in 10 hours of invalid data this reporting period.

### ***Station 500, Cenovus Christina Lake***

The SO<sub>2</sub> analyzer experienced two episodes of extended stabilization periods after daily span checks on May 13 and 26 resulting in 2 hours of invalid data.

Maintenance, replacement and calibration of the H<sub>2</sub>S converter between May 4 and 6 affected the normal operations of the H<sub>2</sub>S analyzer for 46 hours.

The H<sub>2</sub>S analyzer experienced six instances of unstable operations this month, resulting in 7 hours of invalid data.

A power spike at the station on May 12 affected the normal operations of the NO<sub>2</sub> analyzer for 2 hours.

Flat-lines in the output signals of the wind sensor resulted in 21 hours of invalid data this reporting period.

***Station 101, Portable***

Not in operation during this reporting period.

***Station 102, Portable***

Not in operation during this reporting period.

If additional information is required, please contact either Sanjay Prasad at (403) 703 8931 or the Wood Buffalo Environmental Association at (780) 799 4420.

Yours sincerely,

**Aurora Atmospheric Inc.**

Sanjay Prasad  
Air Quality Scientist

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

MAY 2014

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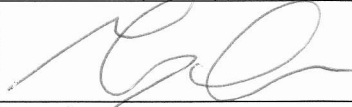
APPROVAL NUMBERS	REPORT DATE						
	MONTH	YEAR					
289664-00-00	5	2014					
254465-00-00							
149968-00-01							
48522-01-00							
240008-00-03	CONTINUOUS AMBIENT MONITORING						
48263-00-00	CONTINUOUS AMBIENT MONITORING						
224816-00-03	CONTINUOUS AMBIENT MONITORING						
189942-00-02	CONTINUOUS AMBIENT MONITORING						
206355-00-00	CONTINUOUS AMBIENT MONITORING						
46586-00-00	CONTINUOUS AMBIENT MONITORING						
216466-00-04	CONTINUOUS AMBIENT MONITORING						
137467-00-00	CONTINUOUS AMBIENT MONITORING						
20809-01-00	CONTINUOUS AMBIENT MONITORING						
241311-00-00	CONTINUOUS AMBIENT MONITORING						
094-02-00	CONTINUOUS AMBIENT MONITORING						
305529-00-00	CONTINUOUS AMBIENT MONITORING						
026-02-00	CONTINUOUS AMBIENT MONITORING						
228044-00-00	CONTINUOUS AMBIENT MONITORING						
73203-01-00	CONTINUOUS AMBIENT MONITORING						
				ONE-HOUR AVERAGE	24-HOUR AVERAGE		
	PARAMETER	STN. NO.	% TIME OPERATIONAL	MAXIMUM CONCENTRATION	NO. READINGS > REGULATION	MAXIMUM CONCENTRATION	NO. READINGS > REGULATION
	SO2(ppb)	1	98.66	0.053	0	0.006	0
	SO2(ppb)	2	99.87	0.065	0	0.007	0
	SO2(ppb)	4	100.00	0.008	0	0.002	0
	SO2(ppb)	5	100.00	0.074	0	0.010	0
	SO2(ppb)	6	99.33	0.026	0	0.004	0
	SO2(ppb)	7	99.87	0.012	0	0.003	0
	SO2(ppb)	8	99.87	0.001	0	0.000	0
	SO2(ppb)	11	100.00	0.039	0	0.006	0
	SO2(ppb)	12	100.00	0.054	0	0.017	0
	SO2(ppb)	13	98.52	0.053	0	0.006	0
	SO2(ppb)	14	100.00	0.008	0	0.002	0
	SO2(ppb)	15	99.73	0.036	0	0.005	0
	SO2(ppb)	16	99.60	0.014	0	0.002	0
	SO2(ppb)	17	100.00	0.008	0	0.001	0
	SO2(ppb)	500	99.73	0.010	0	0.002	0
	H2S(ppb)	2	99.87	0.008	0	0.001	0
	H2S(ppb)	4	100.00	0.001	0	0.000	0
	H2S(ppb)	5	100.00	0.005	0	0.001	0
	H2S(ppb)	11	100.00	0.007	0	0.001	0
	H2S(ppb)	17	100.00	0.001	0	0.000	0
	H2S(ppb)	500	92.88	0.002	0	0.000	0
	TRS(ppb)	1	98.12	0.002	0	0.001	0
	TRS(ppb)	6	99.87	0.001	0	0.000	0
	TRS(ppb)	7	99.87	0.003	0	0.001	0
	TRS(ppb)	9	98.25	0.002	0	0.000	0
	TRS(ppb)	12	100.00	0.003	0	0.001	0
	TRS(ppb)	13	97.98	0.002	0	0.001	0
	TRS(ppb)	14	100.00	0.001	0	0.000	0
	TRS(ppb)	15	99.87	0.010	0	0.001	0
	THC(ppm)	1	98.39	2.6	-	1.9	-
	THC(ppm)	2	99.87	14.7	-	3.5	-
	THC(ppm)	4	100.00	3.3	-	2.5	-
	THC(ppm)	5	67.61	5.5	-	2.6	-
	THC(ppm)	6	99.06	2.3	-	2.0	-
	THC(ppm)	7	99.87	2.2	-	1.9	-
	THC(ppm)	9	98.66	6.7	-	2.5	-
	THC(ppm)	11	100.00	15.9	-	2.9	-
	THC(ppm)	12	99.73	6.6	-	2.8	-
	THC(ppm)	13	98.52	2.9	-	2.3	-
	THC(ppm)	14	100.00	2.1	-	1.9	-
	THC(ppm)	15	100.00	4.1	-	2.5	-
	THC(ppm)	16	99.73	3.6	-	2.6	-
	THC(ppm)	17	99.87	2.4	-	2.2	-
	O3(ppb)	1	98.39	0.1	0	0.0	-
	O3(ppb)	6	98.92	0.056	0	0.041	-
	O3(ppb)	7	99.87	0.055	0	0.041	-
	O3(ppb)	8	99.87	0.052	0	0.045	-
	O3(ppb)	13	98.66	0.055	0	0.035	-

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

MAY 2014

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APPROVAL NUMBERS	REPORT DATE						
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289664-00-00	5	2014					
254465-00-00							
149968-00-01							
48522-01-00							
240008-00-03	CONTINUOUS AMBIENT MONITORING						
48263-00-00							
224816-00-03				ONE-HOUR AVERAGE		24-HOUR AVERAGE	
189942-00-02	PARAMETER	STN. NO.	% TIME OPERATIONAL	MAXIMUM CONCENTRATION	NO. READINGS > REGULATION	MAXIMUM CONCENTRATION	NO. READINGS > REGULATION
206355-00-00	O3(ppb)	14	99.73	0.058	0	0.043	-
46586-00-00	O3(ppb)	17	99.87	0.057	0	0.047	-
216466-00-04	NO2(ppb)	1	98.66	0.026	0	0.009	-
137467-00-00	NO2(ppb)	6	97.18	0.017	0	0.007	-
20809-01-00	NO2(ppb)	7	99.87	0.052	0	0.011	-
241311-00-02	NO2(ppb)	8	99.87	0.004	0	0.001	-
094-02-00	NO2(ppb)	12	100.00	0.041	0	0.019	-
305529-00-00	NO2(ppb)	13	98.52	0.028	0	0.007	-
026-02-00	NO2(ppb)	14	96.51	0.014	0	0.003	-
228044-00-00	NO2(ppb)	15	100.00	0.032	0	0.009	-
73203-01-00	NO2(ppb)	16	99.60	0.047	0	0.019	-
	NO2(ppb)	17	100.00	0.012	0	0.002	-
	NO2(ppb)	500	99.73	0.016	0	0.005	-
	CO(ppm)	7	99.60	0.300	0	0.200	-
	NH3(ppb)	1	92.74	0.000	0	0.000	-
	NH3(ppb)	6	95.30	0.000	0	0.000	-
	PM2.5(ug/m3)	1	92.74	25.3	-	12.2	0
	PM2.5(ug/m3)	6	97.72	23.8	-	9.6	0
	PM2.5(ug/m3)	7	99.60	22.8	-	10.9	0
	PM2.5(ug/m3)	8	95.56	16.4	-	5.7	0
	PM2.5(ug/m3)	12	99.87	54.9	-	15.2	0
	PM2.5(ug/m3)	13	98.52	29.7	-	11.1	0
	PM2.5(ug/m3)	14	99.46	16.5	-	9.1	0
	PM2.5(ug/m3)	15	99.87	36	-	12.3	0
	PM2.5(ug/m3)	16	99.60	25.3	-	7.8	0
	PM2.5(ug/m3)	17	95.70	23.4	-	10	0
	WIND	1	99.60	-	-	-	-
	WIND	2	100.00	-	-	-	-
	WIND	4	100.00	-	-	-	-
	WIND	5	100.00	-	-	-	-
	WIND	6	100.00	-	-	-	-
	WIND	7	100.00	-	-	-	-
	WIND	8	99.73	-	-	-	-
	WIND	9	97.98	-	-	-	-
	WIND	11	100.00	-	-	-	-
	WIND	12	99.73	-	-	-	-
	WIND	13	100.00	-	-	-	-
	WIND	14	99.46	-	-	-	-
	WIND	15	99.87	-	-	-	-
	WIND	16	100.00	-	-	-	-
	WIND	17	98.52	-	-	-	-
	WIND	500	97.18	-	-	-	-
							
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**  
**MAY 2014**

Operations and Data Collection by:  
Wood Buffalo Environmental Association  
Fort McMurray, Alberta

QA/QC, Data Validation and Reporting by:  
Aurora Atmospherics Inc.  
Calgary, Alberta

June 27, 2014

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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT McKAY - BERTHA GANTER (AMS 1)  
MAY 2014

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	697	37	47	98.66	53	0	6	0
TRS(ppb) Average	696	34	48	98.12	2	0	1	0
THC(ppm) Average	695	37	49	98.39	2.6	-	1.9	-
NMHC(ppm) Average	695	37	49	98.39	0.413	-	0.011	-
CH4(ppm) Average	695	37	49	98.39	2.2	-	1.9	-
O3 (ppb) Average	698	34	46	98.39	51	0	33	-
NO2 (ppb) Average	697	37	47	98.66	26	0	9	-
NO (ppb) Average	697	37	47	98.66	38	-	3	-
NOX (ppb) Average	697	37	47	98.66	63	-	11	-
NH3 (ppb) Average	653	37	91	92.74	0	0	0	-
PM2.5 (ug/m3) Average	690	0	54	92.74	25.3	-	12.2	0
Wind Speed 10 m (km/h) Average	741	0	3	99.60	21	-	-	-
Wind Direction 10 m (deg) Average	741	0	3	99.60	-	-	-	-
Temperature 2 m (C) Average	739	0	5	99.33	33.3	-	22.9	-
Temperature 10 m (C) Average	739	0	5	99.33	30.1	-	22.4	-
Relative Humidity (%) Average	739	0	5	99.33	100	-	-	-
Precipitation (mm) Total	744	0	0	100.00	5.1	-	-	-
Surface Wetness (% of range) Average	744	0	0	100.00	46	-	-	-
Global Solar Radiation (W/m2) Average	744	0	0	100.00	543	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BERTHA GANTER FORT McKAY (AMS 1)  
MAY 2014

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	697	1.2	3	-	0	0	0	1	1	1	53
TRS (ppb) Average	696	0.2	0	-	0	0	0	0	0	0	2
THC (ppm) Average	695	1.85	0.1	-	1.7	1.8	1.8	1.9	1.9	1.9	2.6
NMHC(ppm) Average	695	0.002	0.02	-	0	0	0	0	0	0	0.413
CH4(ppm) Average	695	1.85	0.1	-	1.7	1.8	1.8	1.9	1.9	1.9	2.2
O3 (ppb) Average	698	25.2	11	-	0	10	16	26	34	41	51
NO2 (ppb) Average	697	4.1	5	-	0	0	1	3	5	10	26
NO (ppb) Average	697	1	3	-	0	0	0	0	1	3	38
NOX (ppb) Average	697	5.2	7	-	0	0	1	3	6	13	63
NH3 (ppb) Average	653	0	0	-	0	0	0	0	0	0	0
PM2.5 (ug/m3) Average	690	4.27	3.7	-	0.1	1.4	1.9	3.1	5.3	8.7	25.3
Wind Speed 10 m (km/h) Average	741	7.1	4	-	0	2	4	7	10	13	21
Wind Direction 10 m (deg) Average	741	-	-	-	-	-	-	-	-	-	-
Temperature 2 m (C) Average	739	12.54	6.2	-	-2.2	5.2	8.3	11.6	16.9	21	33.3
Temperature 10 m (C) Average	739	12.55	5.5	-	-0.6	5.9	9	11.7	16.6	20	30.1
Relative Humidity (%) Average	739	65.1	22	-	22	36	46	65	84	95	100
Precipitation (mm) Total	744	-	-	96.27	0	0	0	0	0	0.3	5.1
Surface Wetness (% of range) Average	744	4.5	10	-	0	0	0	0	0	20	46
Global Solar Radiation (W/m2) Average	744	123.3	149	-	0	0	0	56	208	369	543

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BERTHA GANTER Fort McKay (AMS 1)  
MAY 2014

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
AIR QUALITY ANALYZERS	15 May 2014 03:00	15 May 2014 12:00	10	Station power failure
TRS	15 May 2014 13:00	15 May 2014 16:00	4	Stabilization period following power failure
NMHC, CH4, THC	15 May 2014 13:00	15 May 2014 13:00	1	Stabilization period following power failure
NMHC, CH4, THC	20 May 2014 15:00	20 May 2014 15:00	1	Power spike
O3	15 May 2014 13:00	15 May 2014 14:00	2	Stabilization period following power failure
NH3	01 May 2014 03:00	31 May 2014 03:00	30	Stabilization after daily span
NH3	15 May 2014 12:00	16 May 2014 02:00	15	Stabilization period following power failure
PM2.5	13 May 2014 00:00	13 May 2014 12:00	13	Analyzer failure - Foreign material in detection chamber
PM2.5	13 May 2014 13:00	13 May 2014 15:00	3	Maintenance - cleaned detection chamber and follow-up cal.
PM2.5	22 May 2014 08:00	23 May 2014 11:00	28	Analyzer Failure - sample pump failure
Wind Speed, Wind Direction	14 May 2014 11:00	14 May 2014 13:00	3	Maintenance - replaced and calibration of sensors
Temperature 2 m, 10 m	13 May 2014 11:00	13 May 2014 11:00	1	Maintenance and calibration on met sesnors
Temperature 2 m, 10 m	13 May 2014 14:00	13 May 2014 14:00	1	Maintenance and calibration on met sesnors
Temperature 2 m, 10 m	14 May 2014 11:00	14 May 2014 13:00	3	Maintenance and calibration on met sesnors
Relative Humidity	13 May 2014 11:00	13 May 2014 11:00	1	Maintenance and calibration on met sesnors
Relative Humidity	13 May 2014 14:00	13 May 2014 14:00	1	Maintenance and calibration on met sesnors
Relative Humidity	14 May 2014 11:00	14 May 2014 13:00	3	Maintenance and calibration on met sesnors

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Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 53 ppb on May 23 13:00	Maximum Daily Average: 6.1 ppb on May 23		Hours of Data:	697
Minimum Value: 0 ppb on May 24 04:00	Minimum Daily Average: 0.3 ppb on May 24		Hours of Missing Data:	47
Maximum Diurnal Average: 3.0 ppb at hour 10	Minimum Diurnal Average: 0.6 ppb at hour 5		Hours of Calibration:	37
Monthly Average: 1.2 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> = 1 P <sub>99</sub> = 13		Percent Operational Time:	98.7

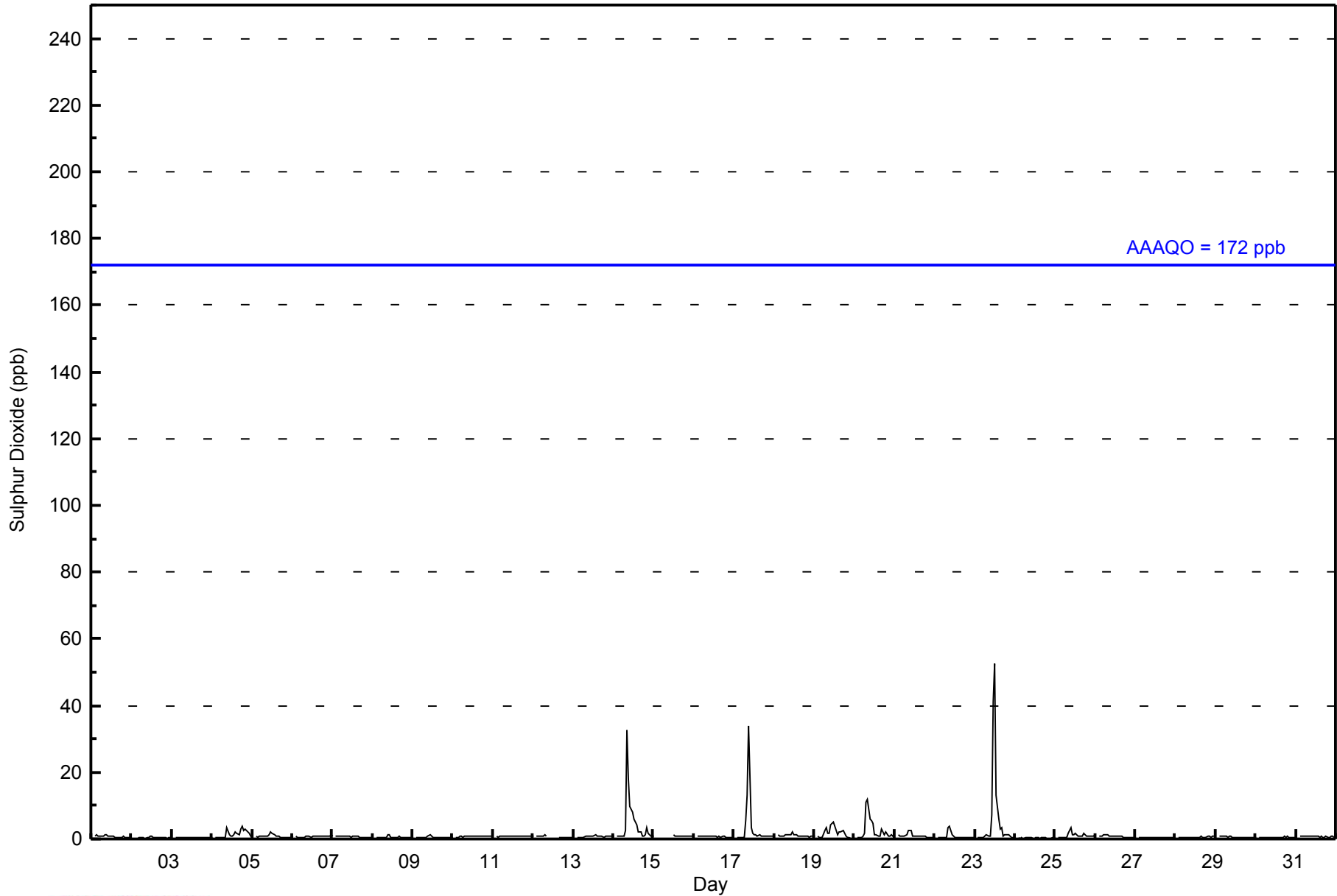
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-May	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	0	0	1	0	0.7	1
2-May	0	Z	0	0	0	0	0	0	0	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0.3	1
3-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	1	0	0	0.4	1
4-May	0	Z	0	0	0	0	0	0	1	3	1	1	1	1	2	2	1	3	4	3	3	2	2	1	1.4	4
5-May	1	Z	1	1	1	1	1	1	1	1	1	2	2	1	1	1	1	0	1	1	1	1	1	1	0.9	2
6-May	1	Z	1	0	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1
7-May	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0.7	1
8-May	0	Z	0	0	0	0	0	1	0	1	1	1	1	1	0	0	1	1	0	0	0	1	0	0	0.5	1
9-May	1	Z	1	0	1	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0	1	0	1	0	0.5	1
10-May	0	Z	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1
11-May	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.8	1
12-May	1	Z	1	1	1	1	1	1	1	C	C	C	C	C	C	0	0	0	0	0	0	0	0	0	--	1
13-May	0	Z	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	0.7	1
14-May	1	Z	1	1	1	1	1	2	33	18	10	8	6	5	4	2	2	1	1	1	3	2	1	1	4.6	33
15-May	1	Z	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	1	1	1	1	1	1	1	1	1	1	1	1	--	1
16-May	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0.7	1
17-May	0	Z	0	0	0	0	1	5	13	34	3	2	1	1	1	1	1	1	1	1	1	1	1	1	3.1	34
18-May	1	Z	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1.0	2
19-May	1	Z	1	1	1	0	2	3	2	1	4	5	4	3	1	2	2	2	2	2	1	0	0	0	1.7	5
20-May	0	Z	0	1	0	1	2	11	12	6	5	5	1	1	1	1	3	2	1	2	1	1	1	1	2.6	12
21-May	1	Z	1	1	1	1	1	1	3	3	3	1	1	1	1	1	1	1	1	1	0	0	1	0	1.1	3
22-May	1	Z	0	0	0	0	0	1	3	4	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0.7	4
23-May	1	Z	0	1	0	1	1	1	1	7	41	53	13	6	3	4	1	1	1	1	1	1	0	0	6.1	53
24-May	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
25-May	0	Z	0	0	0	0	0	1	2	3	1	1	2	1	1	1	1	2	1	1	1	1	1	1	1.0	3
26-May	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0.8	1
27-May	0	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
28-May	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	1	1	1	1	1	1	1	0.5	1
29-May	1	Z	1	1	1	1	1	1	1	1	1	0	0	1	1	0	0	1	0	1	0	0	0	0	0.5	1
30-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0.4	1
31-May	0	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
																								Diurnal Average		
																								Diurnal Maximum		

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



WBEA  
Hourly Averages

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Fort McKay - Bertha Ganter - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Fort McKay - Bertha Ganter - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	688	98.71	98.71
11 - 20	5	0.72	99.43
21 - 60	4	0.57	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: 697

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Fort McKay - Bertha Ganter - May 2014**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	83	83	54	43	29	24	23	47	46	37	12	24	19	39	57	65	685
11 - 20	0	0	0	0	0	0	0	3	2	0	0	0	0	0	0	0	5
21 - 60	0	0	0	0	0	0	0	3	1	0	0	0	0	0	0	0	4
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	83	83	54	43	29	24	23	53	49	37	12	24	19	39	57	65	694

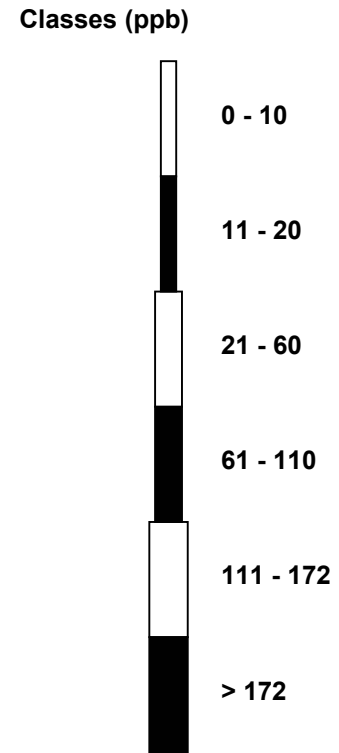
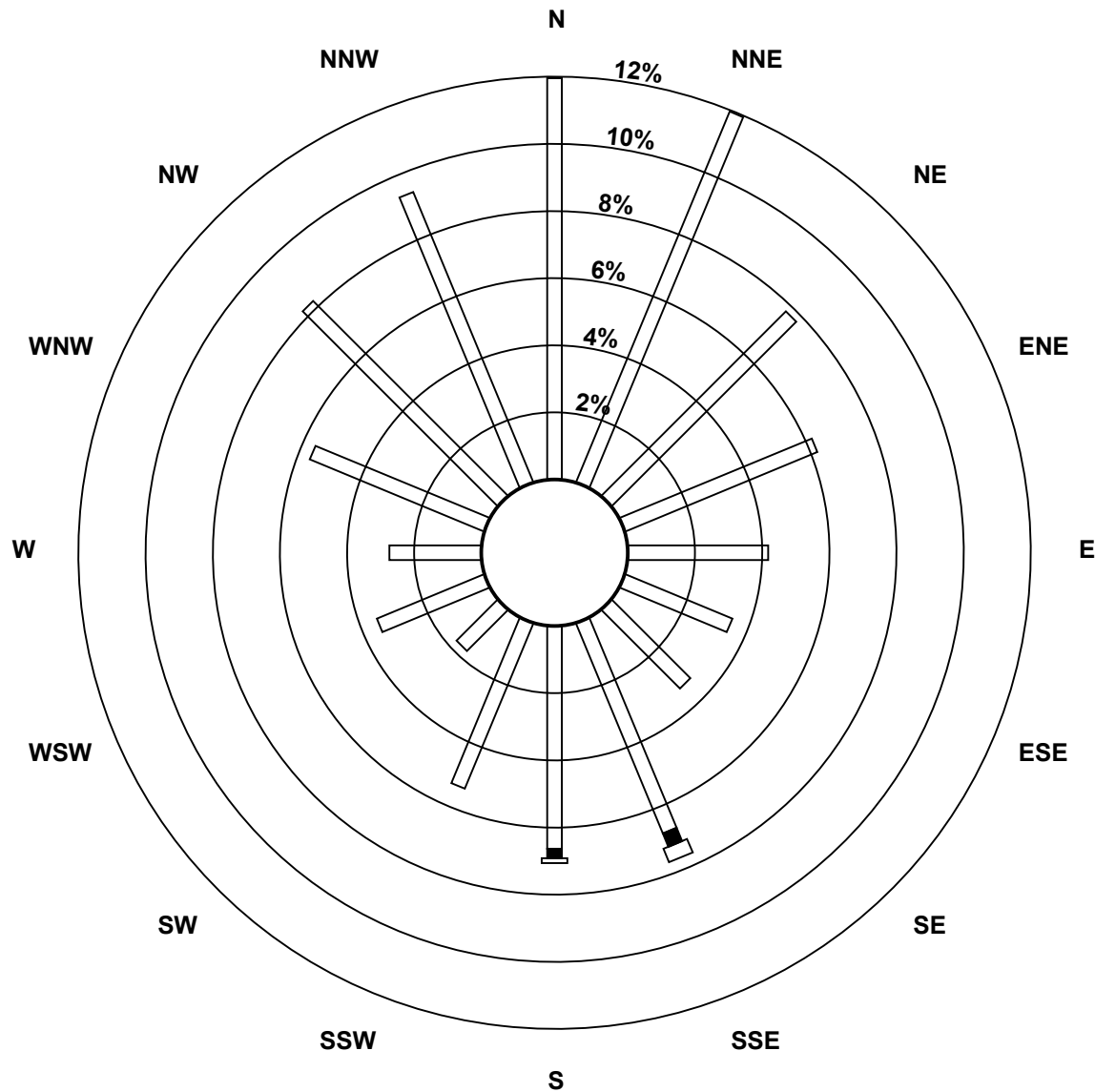
Total Number of Valid Hours: 694

Total Number of Hours: 744



**Wood Buffalo Environmental Association  
Wind Rose May 2014**

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

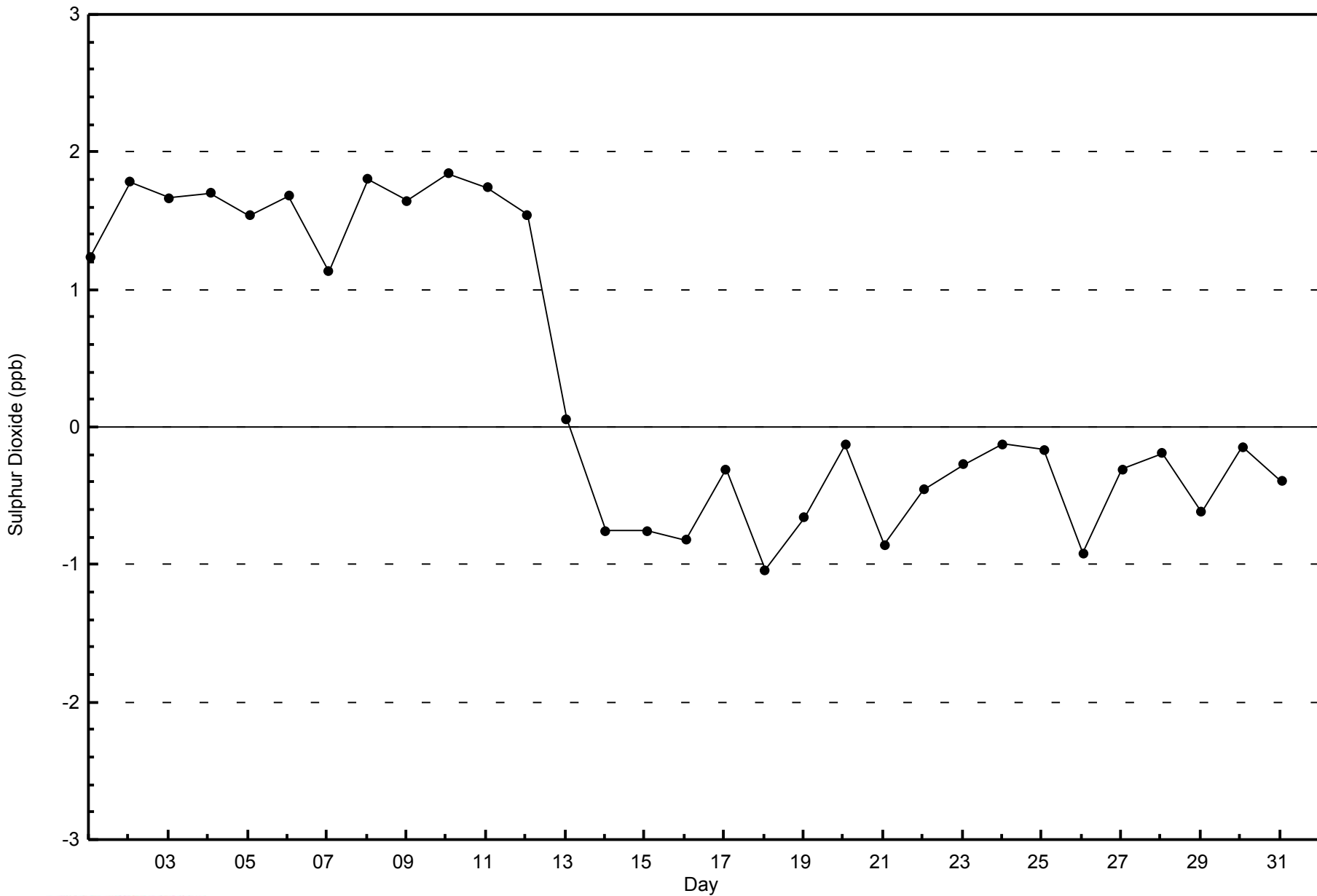


**Total Number of Valid Hours: 694**



WBEA  
Zero Responses

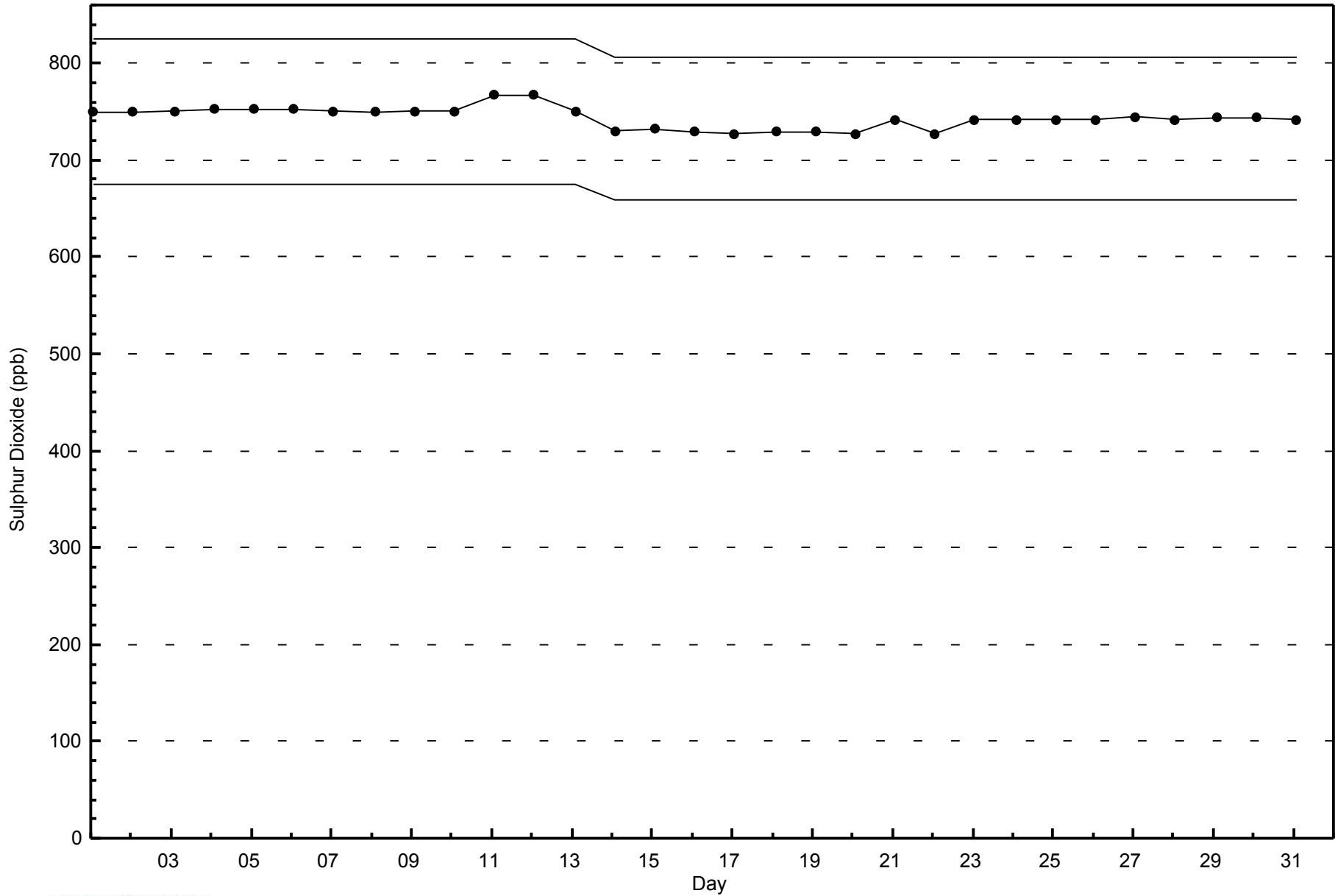
Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Fort McKay - Bertha Ganter - May 2014





WBEA  
Span Responses

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Fort McKay - Bertha Ganter - May 2014





Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 2 ppb on May 23 13:00	Maximum Daily Average: 0.6 ppb on May 23		Hours of Data:	696
Minimum Value: 0 ppb on May 28 04:00	Minimum Daily Average: 0.1 ppb on May 28		Hours of Missing Data:	48
Maximum Diurnal Average: 0.3 ppb at hour 9	Minimum Diurnal Average: 0.2 ppb at hour 18		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:	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-May	0	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-May	0	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-May	0	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
4-May	0	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
5-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
6-May	0	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-May	0	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-May	0	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-May	0	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
10-May	0	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
11-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
12-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
13-May	0	0	Z	0	0	0	0	1	1	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0.3	1
14-May	0	0	Z	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
15-May	0	0	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	0	0	0	0	0	0	0	0	0	--	0
16-May	0	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
17-May	0	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
18-May	0	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-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
20-May	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
21-May	0	1	Z	2	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2
22-May	0	0	Z	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
23-May	0	0	Z	0	0	1	1	1	1	1	1	1	2	1	0	0	0	0	0	0	0	0	0	0	0.6	2
24-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
25-May	0	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
26-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
27-May	0	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
28-May	0	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
29-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
30-May	0	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-May	0	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

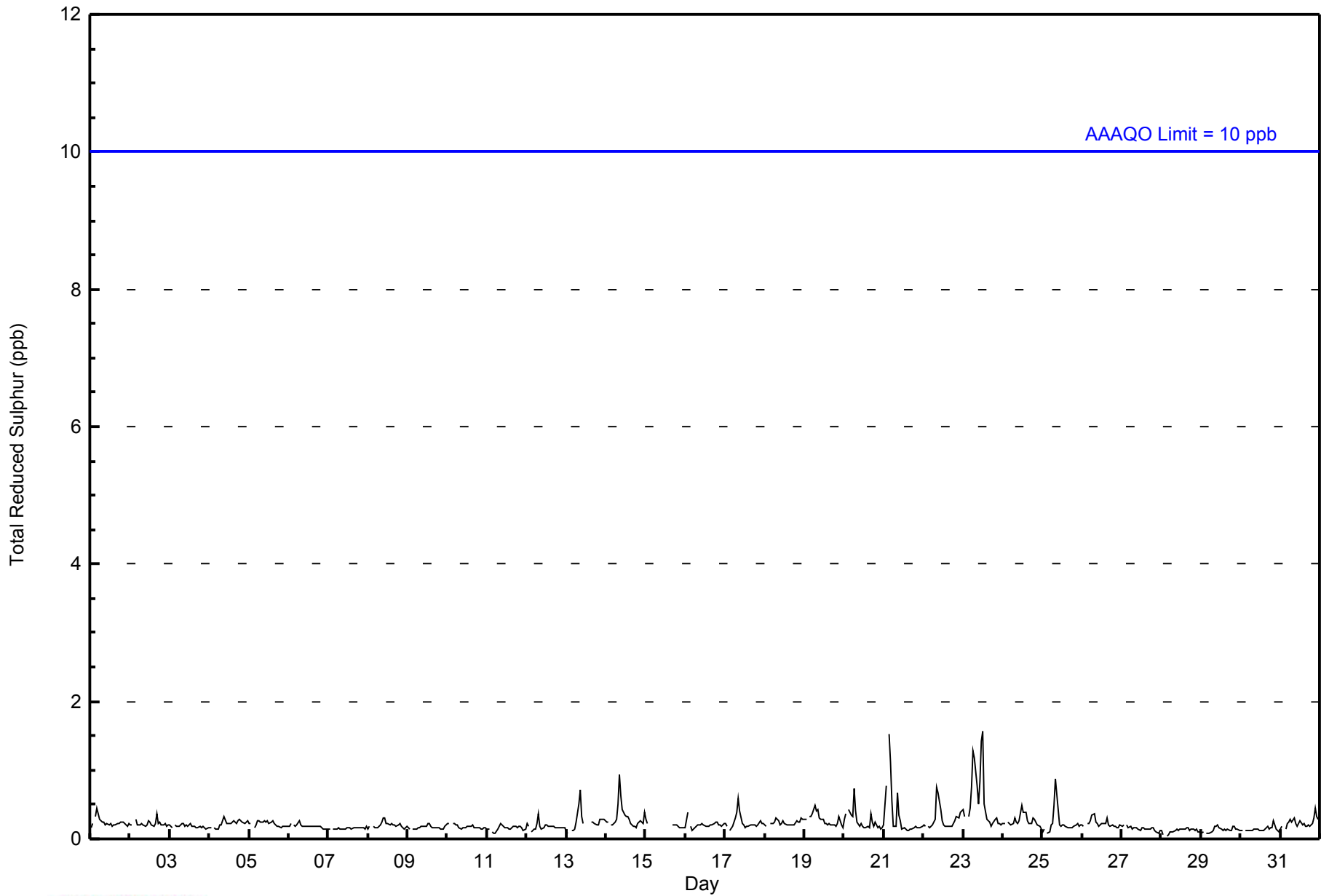
0.2	0.2	--	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	Diurnal Average
0	1	--	2	1	1	1	1	1	1	1	1	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	Diurnal Maximum

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



**WBEA**  
**Hourly Averages**

**Total Reduced Sulphur (TRS) - ppb**  
**Fort McKay - Bertha Ganter - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb**  
**Fort McKay - Bertha Ganter - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	696	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: 696

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb**  
**Fort McKay - Bertha Ganter - May 2014**

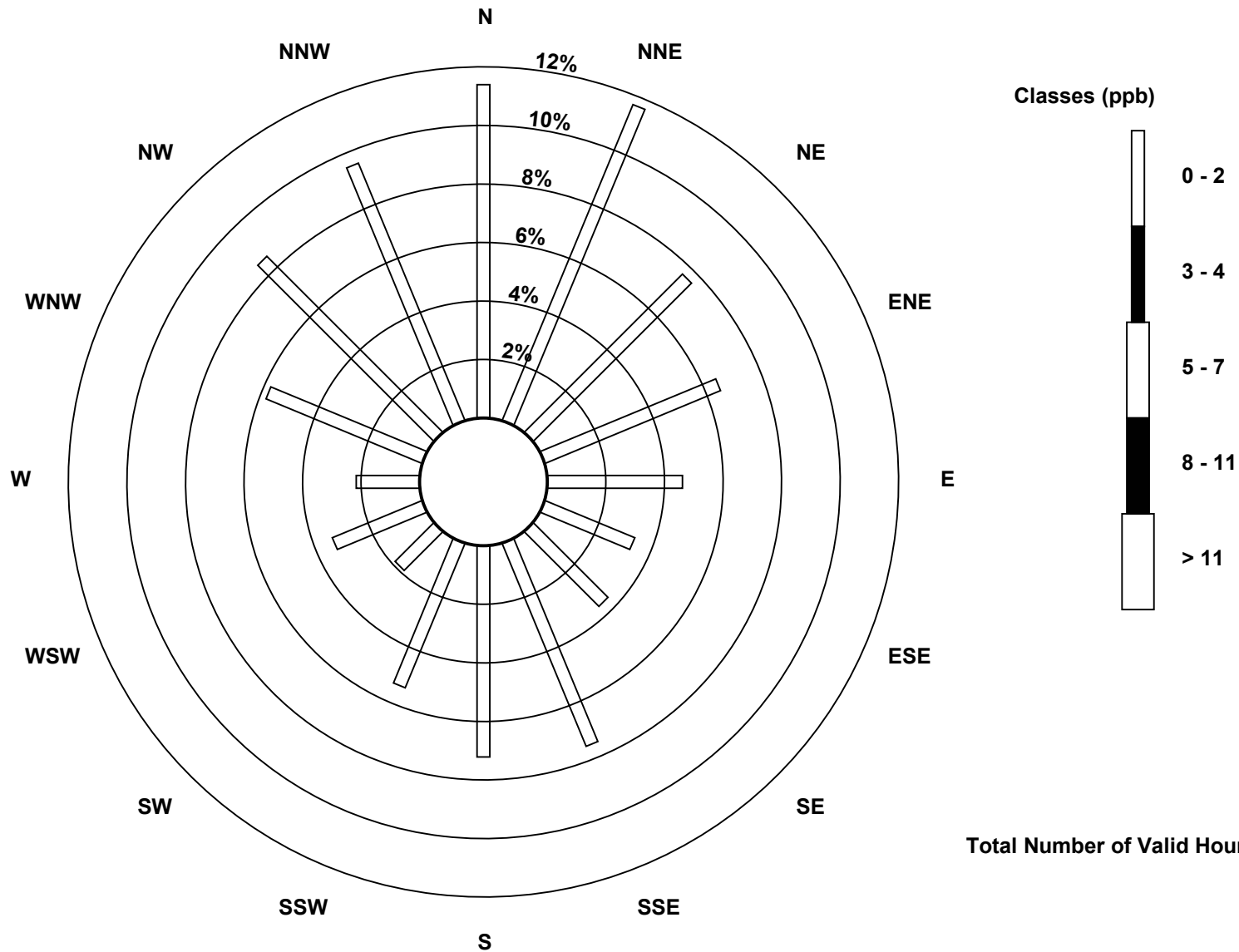
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	79	81	53	45	32	23	25	52	50	37	13	23	15	40	59	66	693
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	79	81	53	45	32	23	25	52	50	37	13	23	15	40	59	66	693

Total Number of Valid Hours: 693

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

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



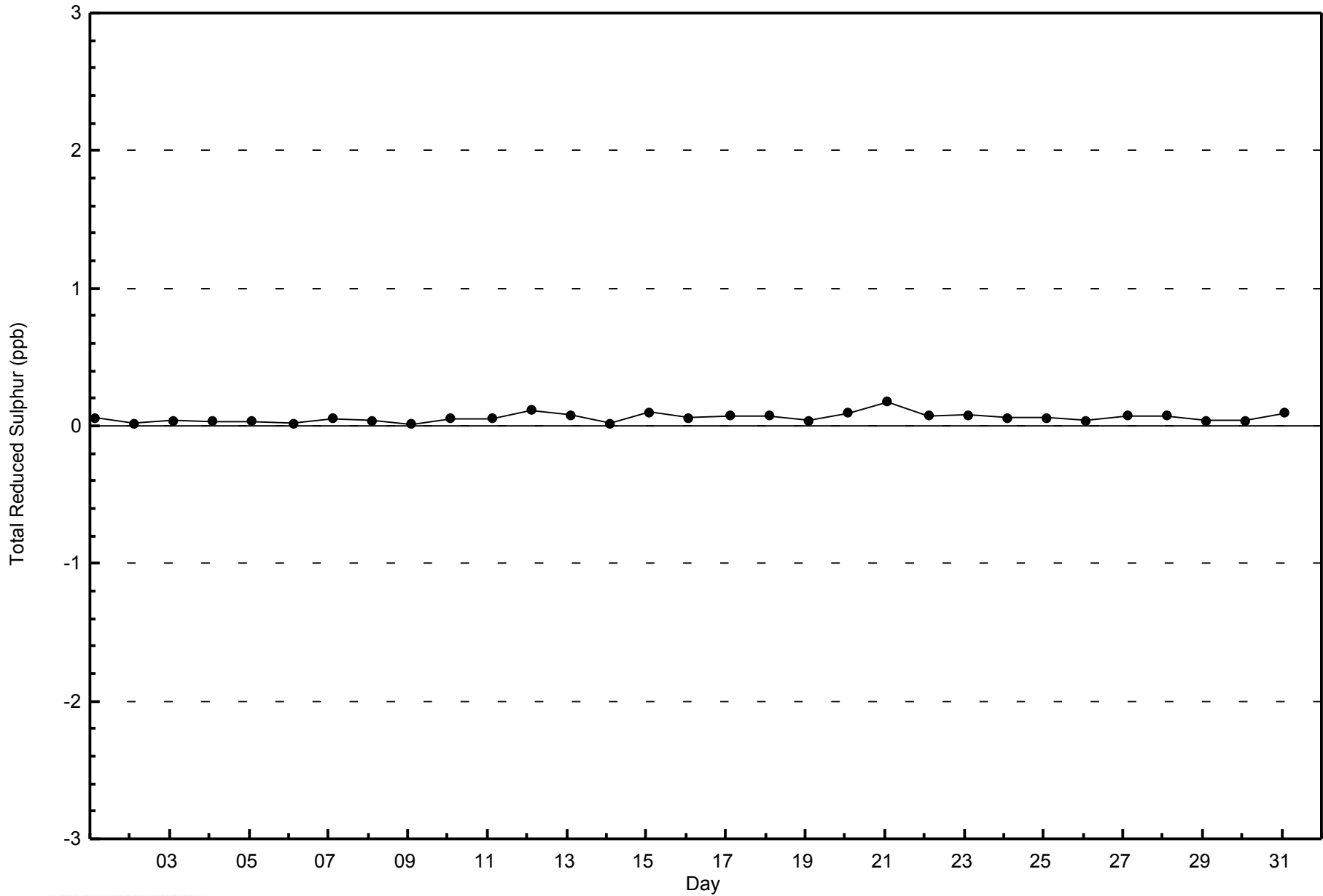
**Total Number of Valid Hours: 693**





WBEA  
Zero Responses

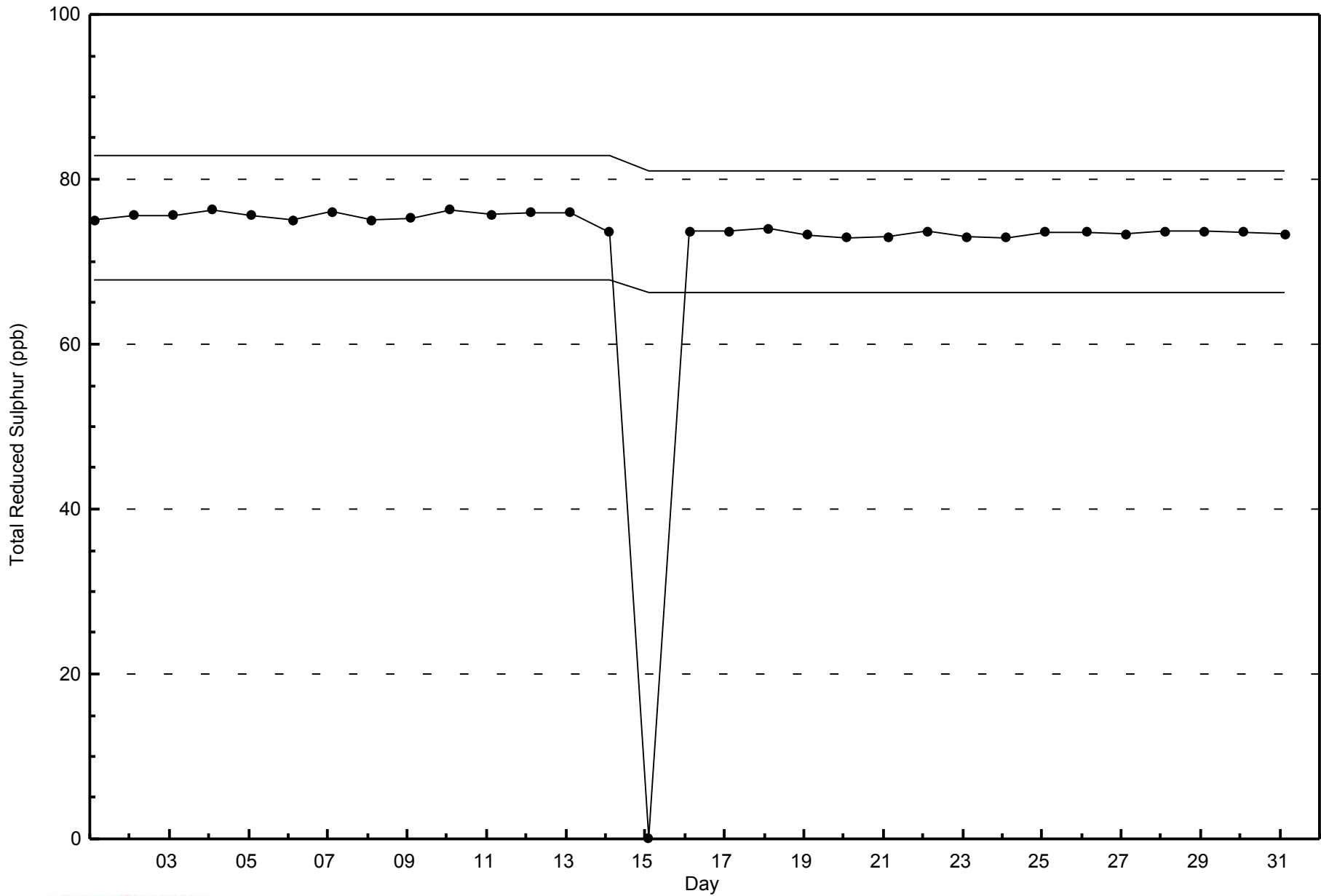
Total Reduced Sulphur (TRS) - ppb  
Fort McKay - Bertha Ganter - May 2014





WBEA  
Span Responses

Total Reduced Sulphur (TRS) - ppb  
Fort McKay - Bertha Ganter - May 2014



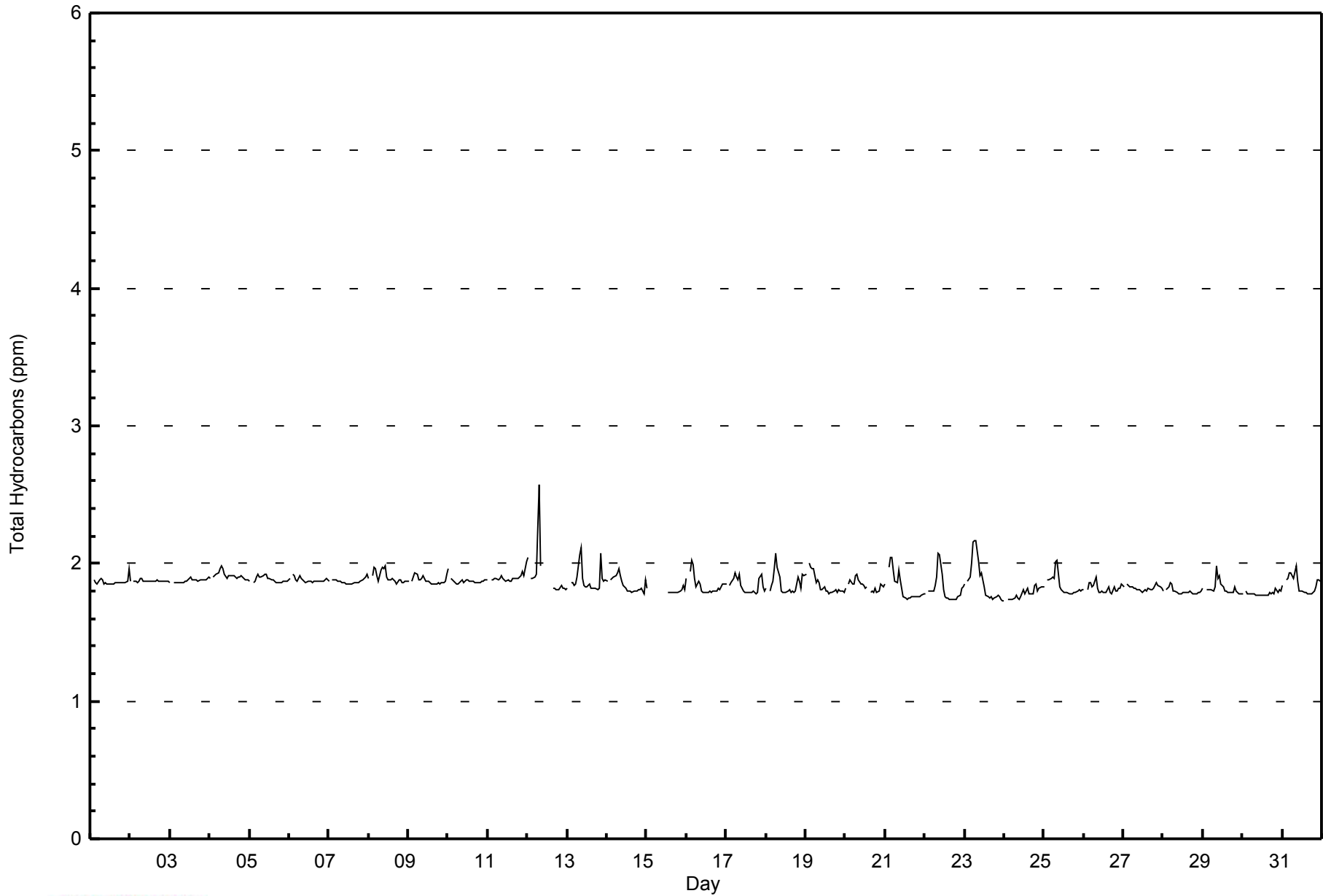


Maximum Value: 2.6 ppm on May 12 08:00																		Maximum Daily Average: 1.9 ppm on May 4						Hours in Service: 744																							
Minimum Value: 1.7 ppm on May 24 00:00																		Minimum Daily Average: 1.8 ppm on May 24						Hours of Data: 695																							
Maximum Diurnal Average: 1.9 ppm at hour 8																		Minimum Diurnal Average: 1.8 ppm at hour 18						Hours of Missing Data: 49																							
Monthly Average: 1.85 ppm																		Percentiles: P <sub>1</sub> = 1.7 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> = 2.1						Hours of Calibration: 37																							
																								Percent Operational Time: 98.4																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																							
1-May	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.0																					
2-May	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																					
3-May	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																					
4-May	1.9	Z	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9																					
5-May	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9																					
6-May	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9																					
7-May	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9																					
8-May	1.9	Z	1.9	2.0	2.0	1.9	1.9	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0																					
9-May	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																					
10-May	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	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0																					
11-May	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	2.0	1.9	2.0																					
12-May	2.0	Z	1.9	1.9	1.9	1.9	2.3	2.6	2.0	C	C	C	C	C	C	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.6																					
13-May	1.8	Z	1.9	1.9	1.8	1.9	1.9	2.1	2.1	1.9	1.8	1.8	1.8	1.9	1.8	1.8	1.8	1.8	1.8	1.8	2.1	1.9	1.9	1.9	1.9	2.1																					
14-May	1.9	Z	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.0																					
15-May	1.8	Z	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8																					
16-May	1.9	Z	1.9	2.0	2.0	1.9	1.8	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.0																					
17-May	1.9	Z	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.8	1.8	1.9																					
18-May	1.8	Z	1.8	1.8	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	1.8	1.8	1.9	1.9	1.8	1.9	1.9	1.9	2.1																					
19-May	1.9	Z	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.0																					
20-May	1.8	Z	1.8	1.9	1.8	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	PF	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.8	1.8	1.8	1.9																					
21-May	1.9	Z	2.0	2.0	2.0	2.0	1.9	1.9	2.0	1.9	1.8	1.8	1.7	1.7	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.0																					
22-May	1.8	Z	1.8	1.8	1.8	1.8	1.8	1.9	2.1	2.1	1.9	1.8	1.8	1.8	1.7	1.7	1.7	1.7	1.7	1.7	1.8	1.8	1.8	1.8	1.8	2.1																					
23-May	1.8	Z	1.9	1.9	2.0	2.2	2.2	2.2	2.0	1.9	1.9	1.8	1.8	1.8	1.7	1.8	1.7	1.7	1.8	1.8	1.8	1.7	1.7	1.7	1.7	2.2																					
24-May	1.7	Z	1.7	1.7	1.7	1.7	1.7	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	1.8	1.8																					
25-May	1.8	Z	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.0																					
26-May	1.8	Z	1.8	1.9	1.9	1.8	1.8	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9																					
27-May	1.8	Z	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.8	1.8	1.8	1.9																					
28-May	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	1.8	1.8	1.9																					
29-May	1.8	Z	1.8	1.8	1.8	1.8	1.8	1.8	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	2.0																					
30-May	1.8	Z	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8																					
31-May	1.8	Z	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.8	2.0																					
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	Diurnal Average
2.0																								--	2.0	2.0	2.0	2.2	2.3	2.6	2.1	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1	1.9	1.9	2.0	Diurnal Maximum
Z - zerospan			C - Calibration					PF - Power Failure																																							



WBEA  
Hourly Averages

Total Hydrocarbons (THC) - ppm  
Fort McKay - Bertha Ganter - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Fort McKay - Bertha Ganter - May 2014**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	684	98.42	98.42
2.1 - 3.0	11	1.58	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 695

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Fort McKay - Bertha Ganter - May 2014**

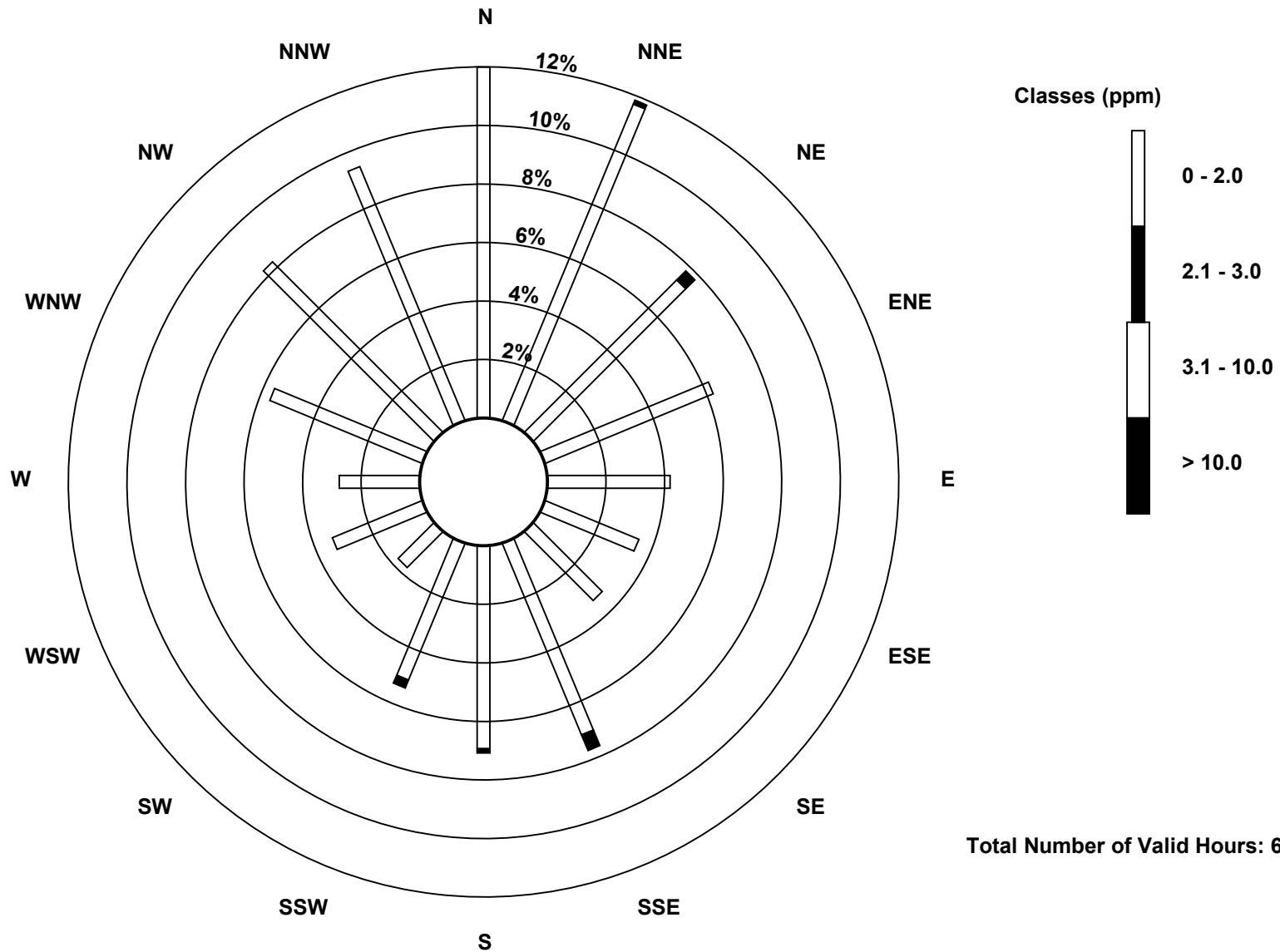
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	83	81	51	43	29	24	23	49	48	35	12	23	19	39	57	65	681
2.1 - 3.0	0	1	3	0	0	0	0	4	1	2	0	0	0	0	0	0	11
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	83	82	54	43	29	24	23	53	49	37	12	23	19	39	57	65	692

Total Number of Valid Hours: 692

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

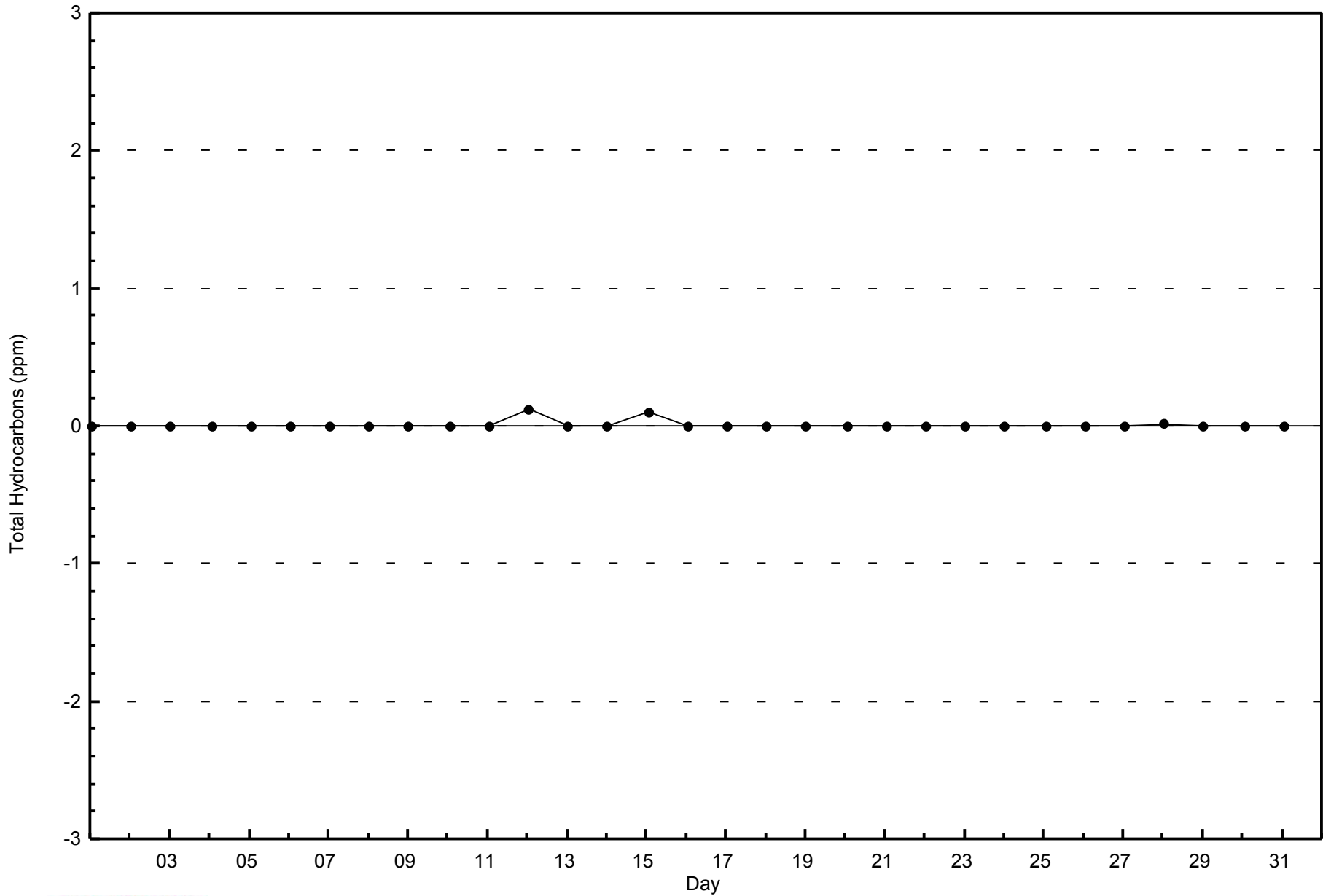
**Total Hydrocarbons (THC) - ppm  
Fort McKay - Bertha Ganter (AMS 1)**





WBEA  
Zero Responses

Total Hydrocarbons (THC) - ppm  
Fort McKay - Bertha Ganter - May 2014

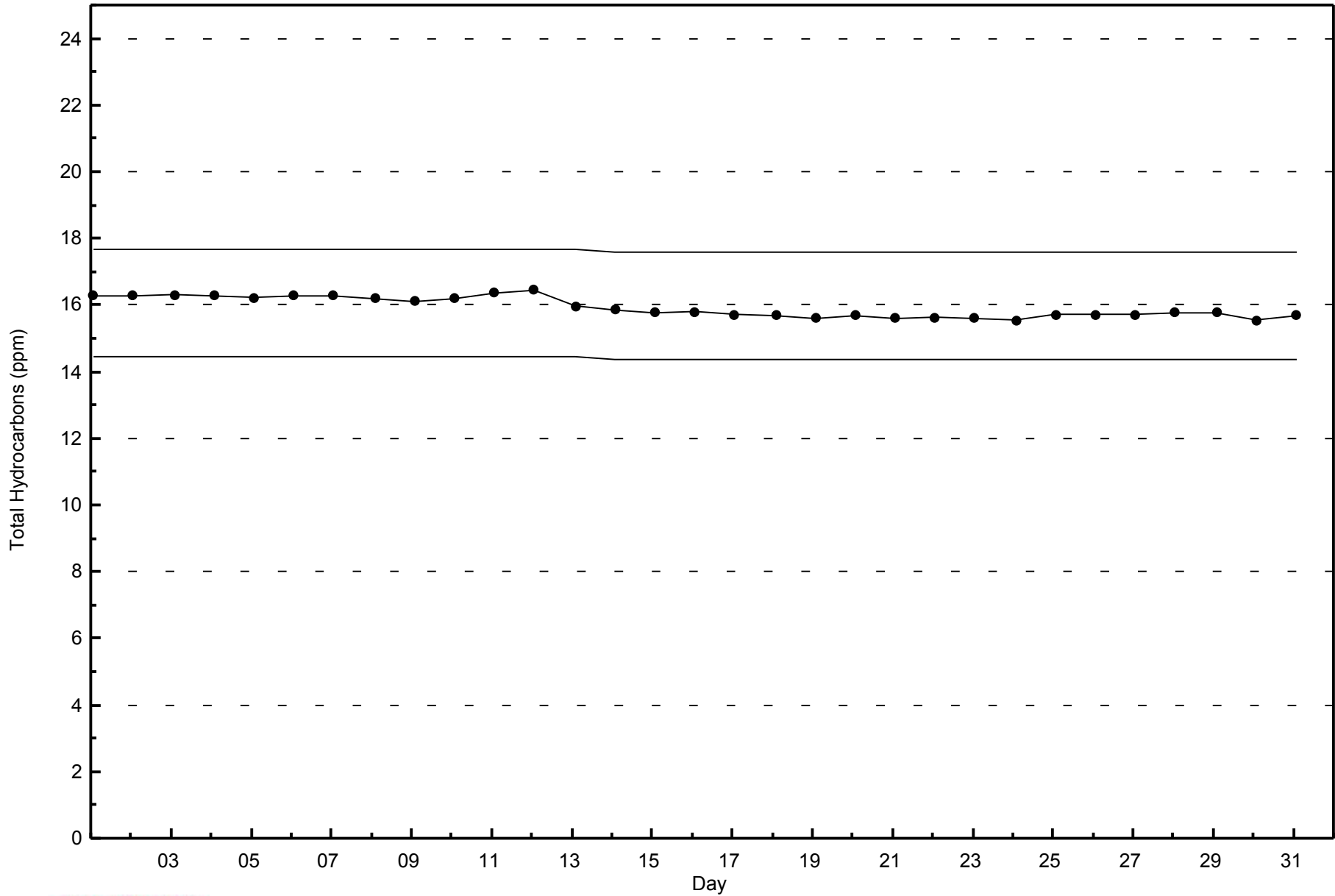






WBEA  
Span Responses

Total Hydrocarbons (THC) - ppm  
Fort McKay - Bertha Ganter - May 2014

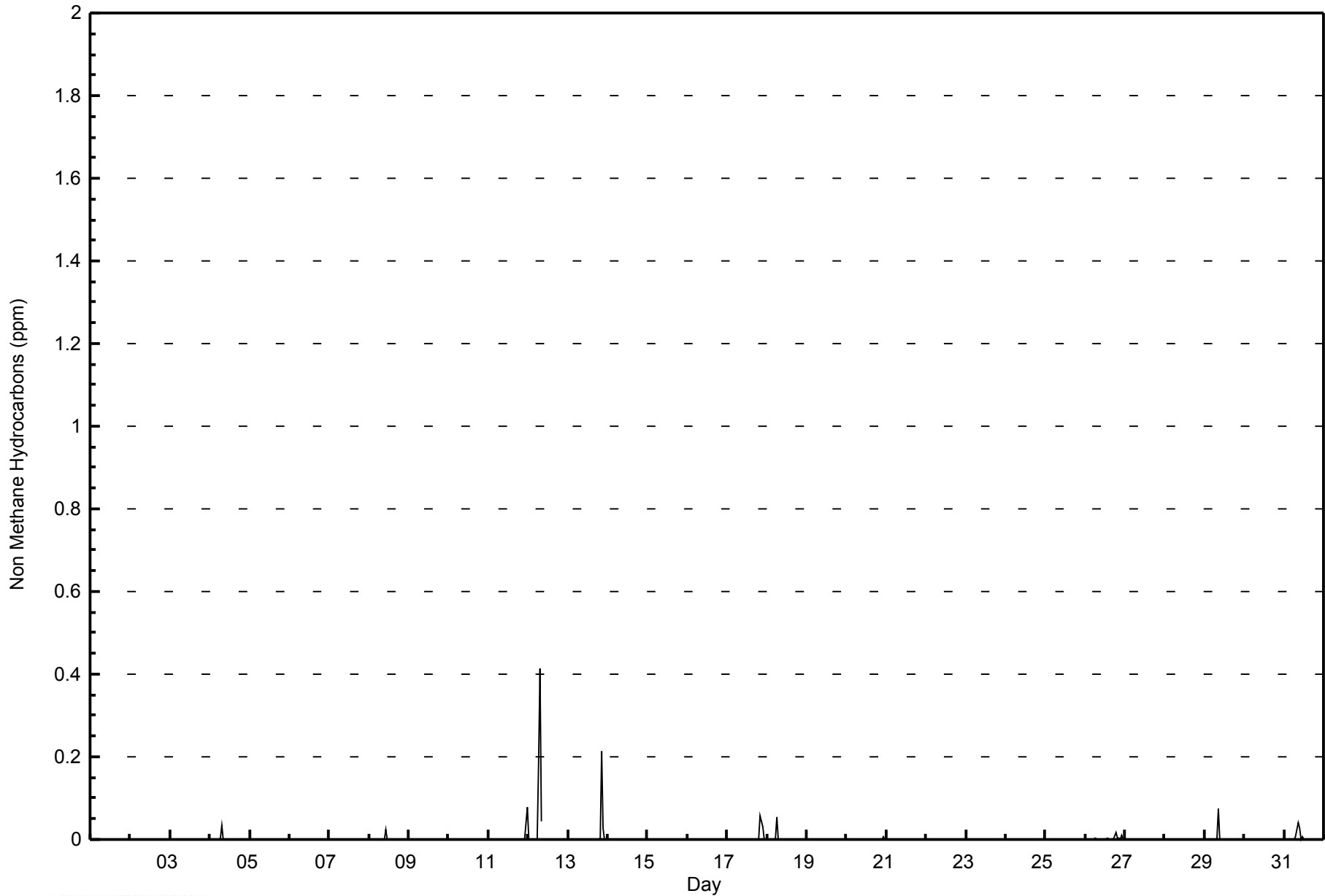






WBEA  
Hourly Averages

Non Methane Hydrocarbons (NMHC) - ppm  
Fort McKay - Bertha Ganter - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm**  
**Fort McKay - Bertha Ganter - May 2014**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.005	676	97.27	97.27
0.006 - 0.05	13	1.87	99.14
0.06 - 0.1	3	0.43	99.57
> 0.1	3	0.43	100.00

Total Number of Valid Hours: 695

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm**  
**Fort McKay - Bertha Ganter - May 2014**

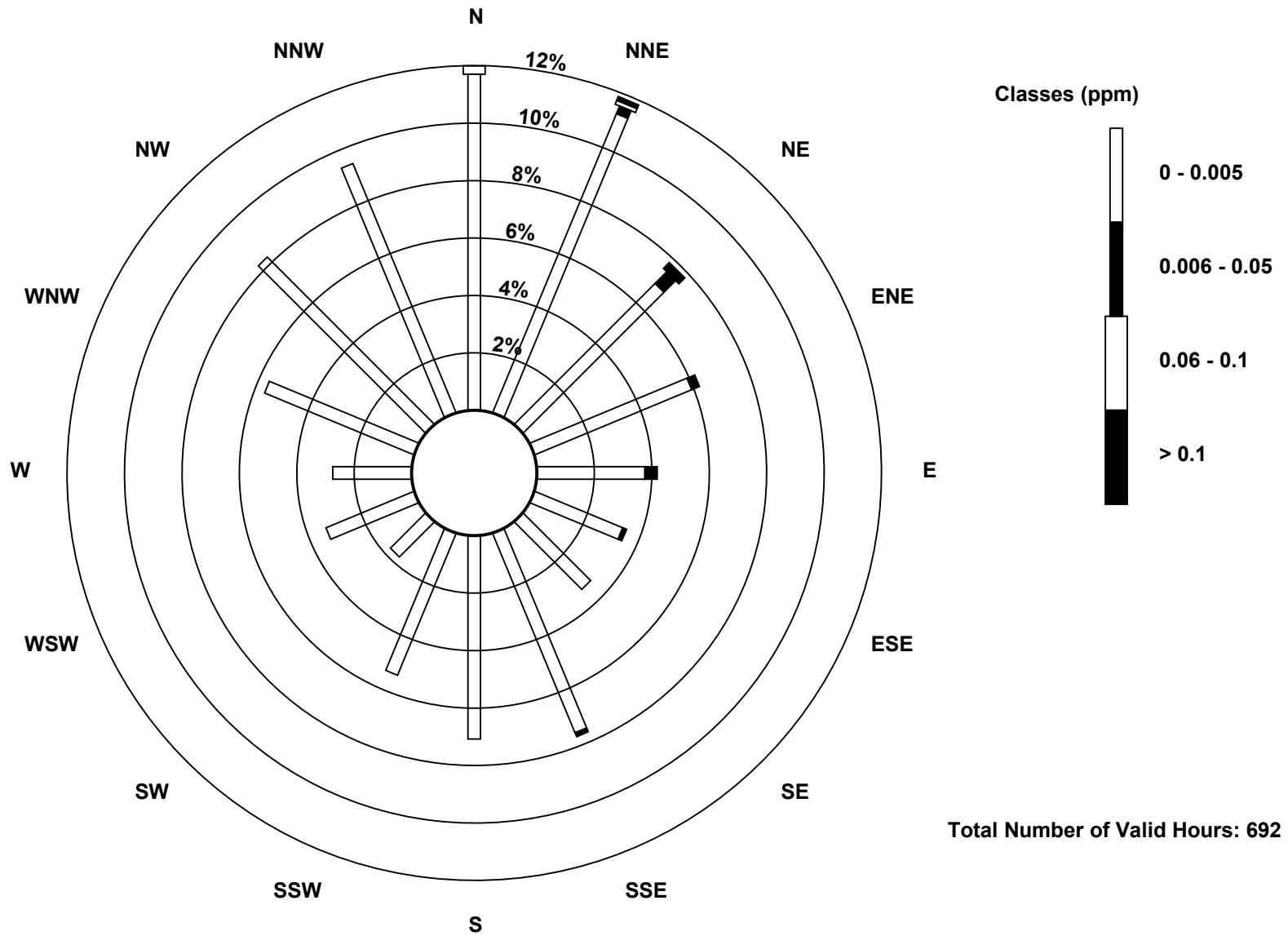
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	81	78	48	41	26	23	23	52	49	37	12	23	19	39	57	65	673
0.006 - 0.05	0	2	4	2	3	1	0	1	0	0	0	0	0	0	0	0	13
0.06 - 0.1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
> 0.1	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	3
<b>Totals</b>	83	82	54	43	29	24	23	53	49	37	12	23	19	39	57	65	692

Total Number of Valid Hours: 692

Total Number of Hours: 744

Wood Buffalo Environmental Association  
Wind Rose May 2014

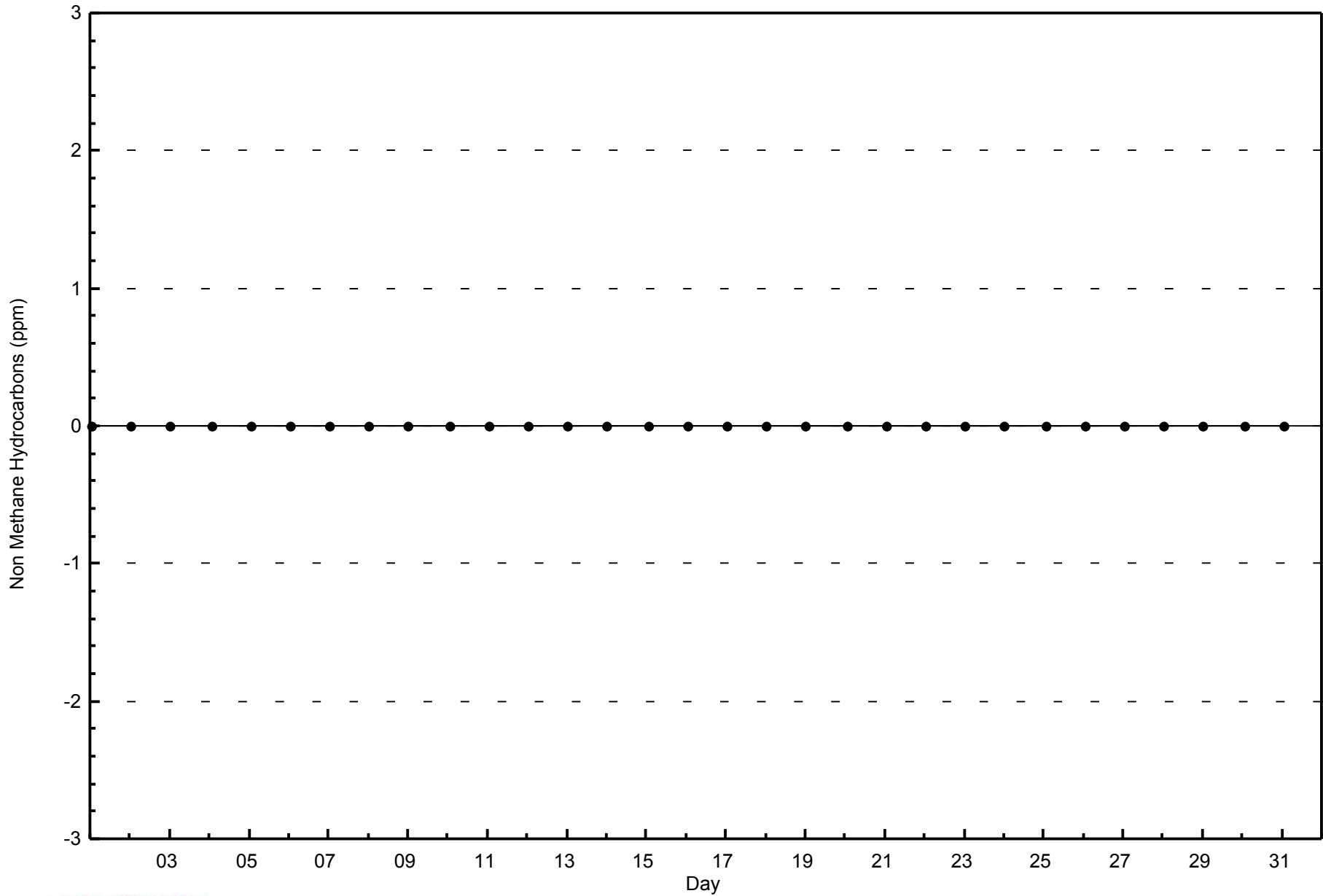
Non Methane Hydrocarbons (NMHC) - ppm  
Fort McKay - Bertha Ganter (AMS 1)





WBEA  
Zero Responses

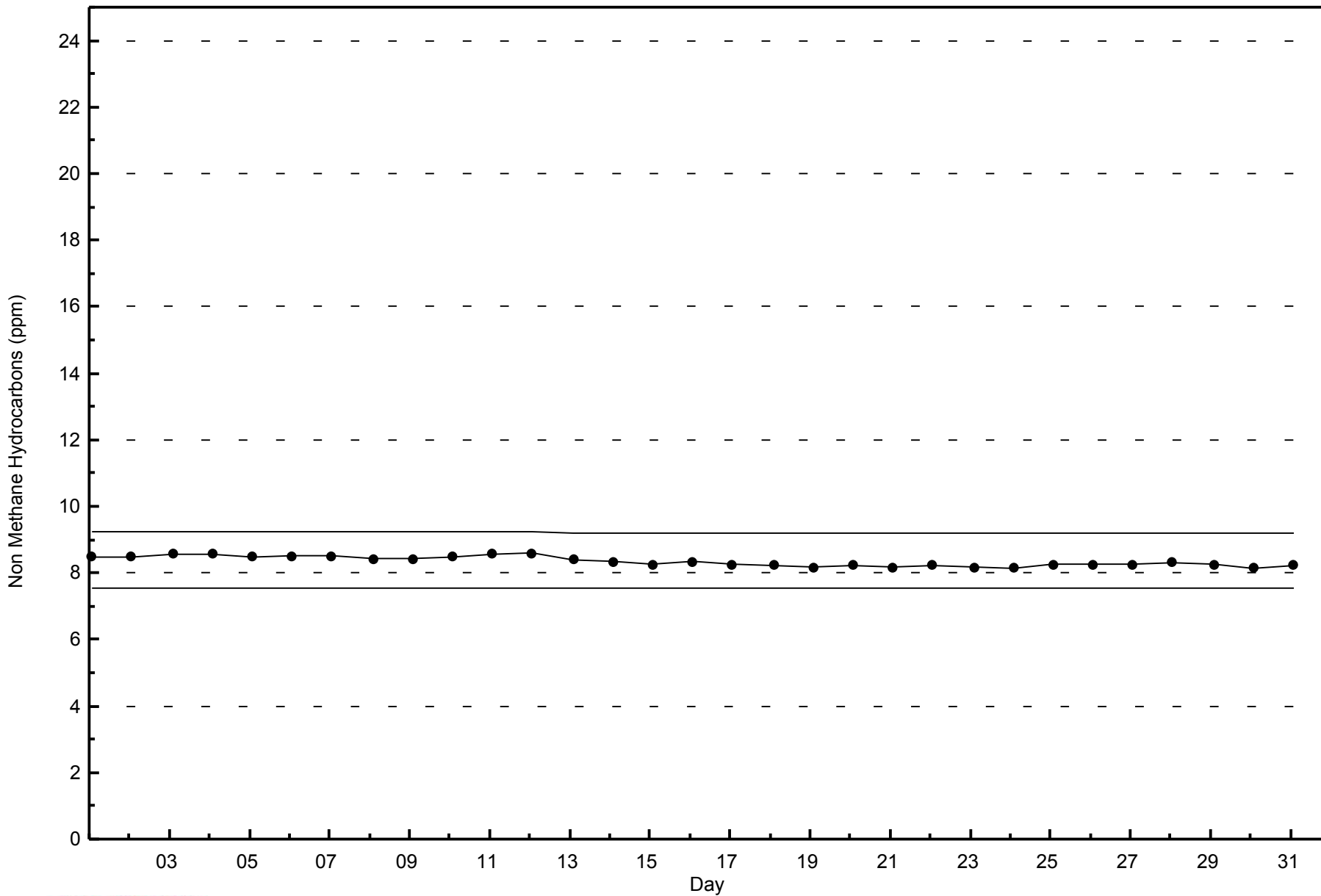
Non Methane Hydrocarbons (NMHC) - ppm  
Fort McKay - Bertha Ganter - May 2014





WBEA  
Span Responses

Non Methane Hydrocarbons (NMHC) - ppm  
Fort McKay - Bertha Ganter - May 2014







Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 2.2 ppm on May 23 08:00	Maximum Daily Average: 1.9 ppm on May 4		Hours of Data:	695
Minimum Value: 1.7 ppm on May 24 00:00	Minimum Daily Average: 1.8 ppm on May 24		Hours of Missing Data:	49
Maximum Diurnal Average: 1.9 ppm at hour 8	Minimum Diurnal Average: 1.8 ppm at hour 18		Hours of Calibration:	37
Monthly Average: 1.85 ppm	Percentiles: P <sub>1</sub> = 1.7 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> = 2.1		Percent Operational Time:	98.4

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

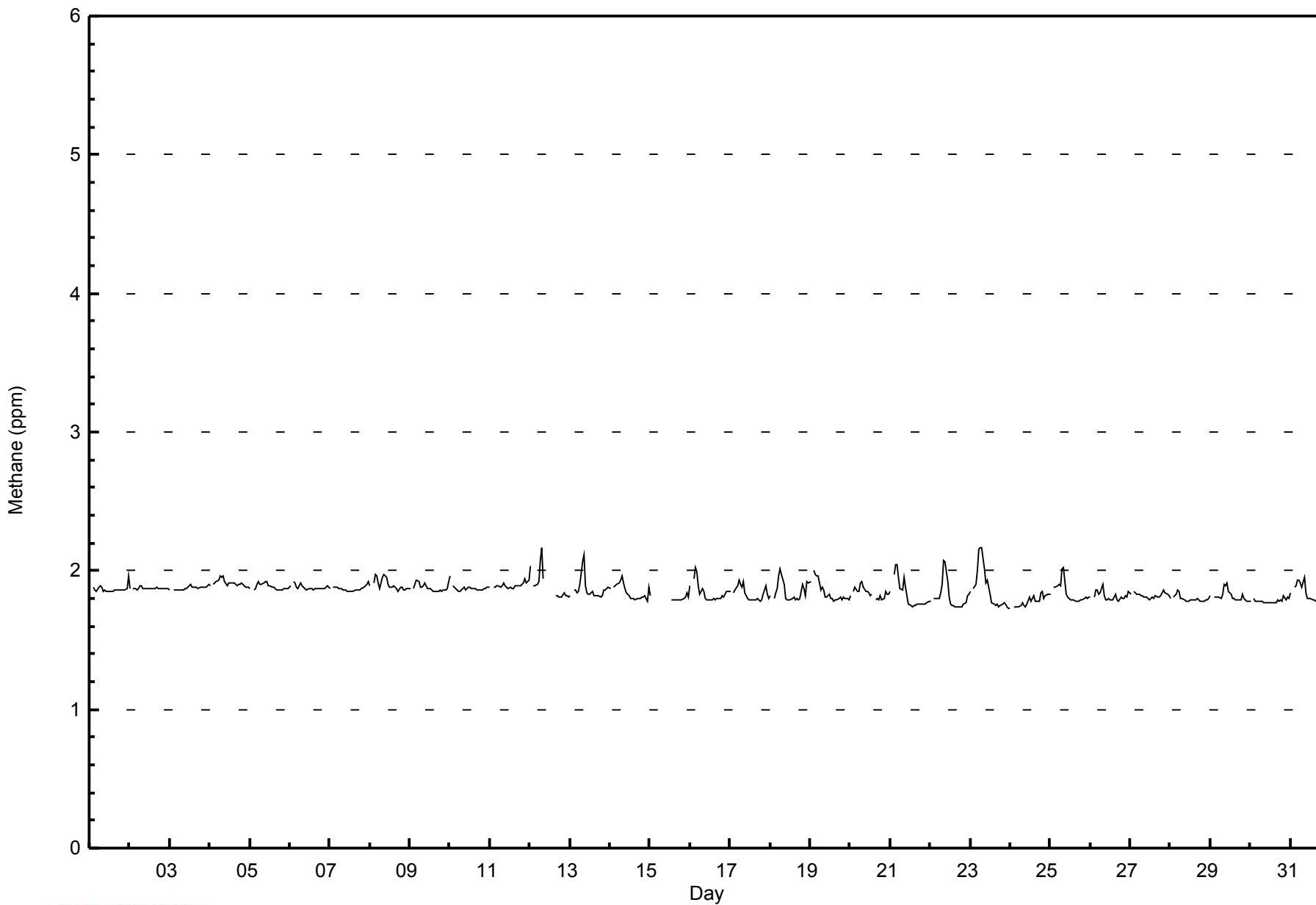
1.9	--	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	Diurnal Average
2.0	--	2.0	2.0	2.0	2.2	2.2	2.2	2.1	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	Diurnal Maximum	

Z - zerospan      C - Calibration      PF - Power Failure



WBEA  
Hourly Averages

Methane (CH<sub>4</sub>) - ppm  
Fort McKay - Bertha Ganter - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Methane (CH<sub>4</sub>) - ppm**  
**Fort McKay - Bertha Ganter - May 2014**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	686	98.71	98.71
2.1 - 3.0	9	1.29	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 695

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Methane (CH<sub>4</sub>) - ppm**  
**Fort McKay - Bertha Ganter - May 2014**

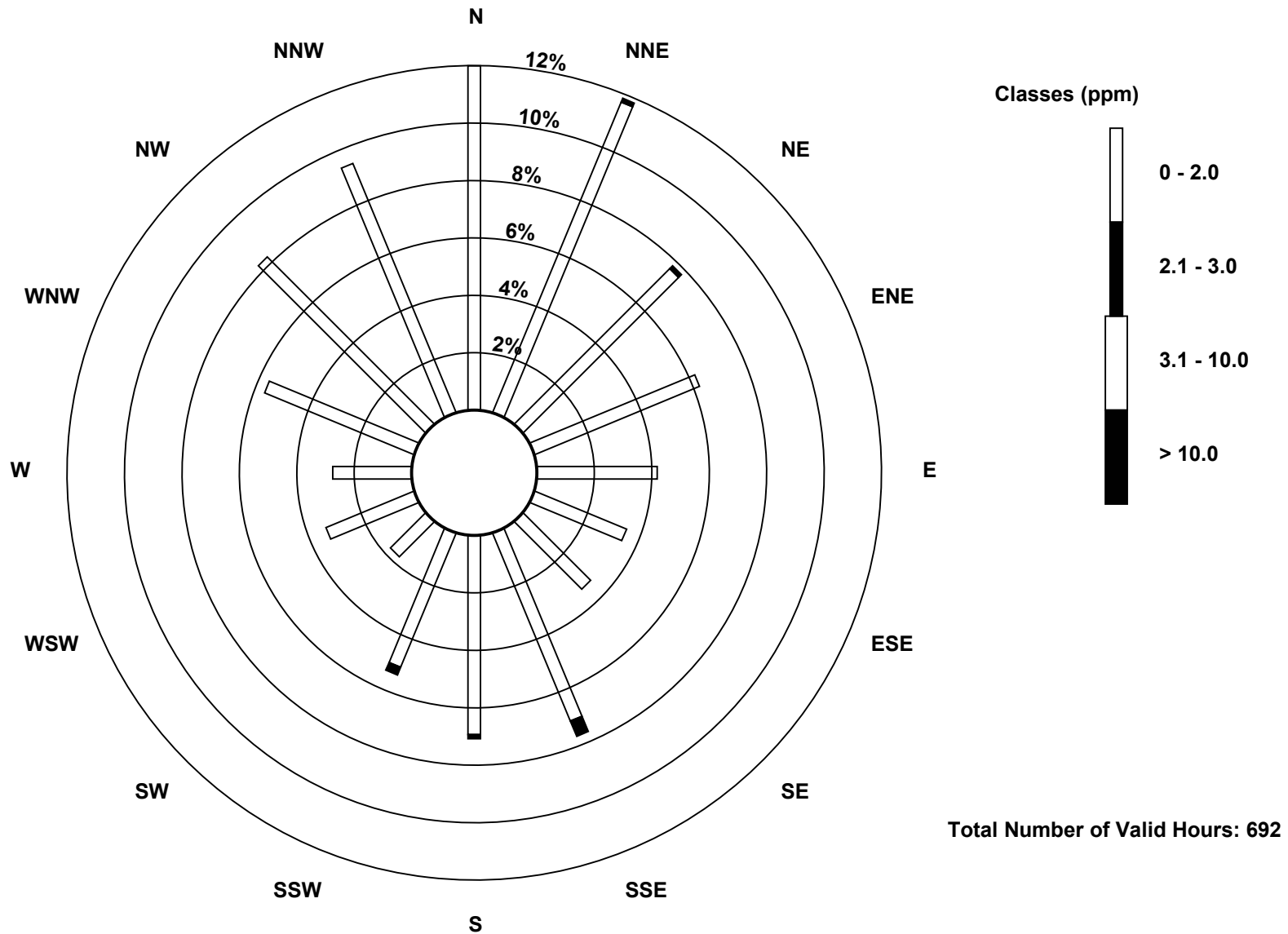
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	83	81	53	43	29	24	23	49	48	35	12	23	19	39	57	65	683
2.1 - 3.0	0	1	1	0	0	0	0	4	1	2	0	0	0	0	0	0	9
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	83	82	54	43	29	24	23	53	49	37	12	23	19	39	57	65	692

Total Number of Valid Hours: 692

Total Number of Hours: 744

Wood Buffalo Environmental Association  
 Wind Rose May 2014

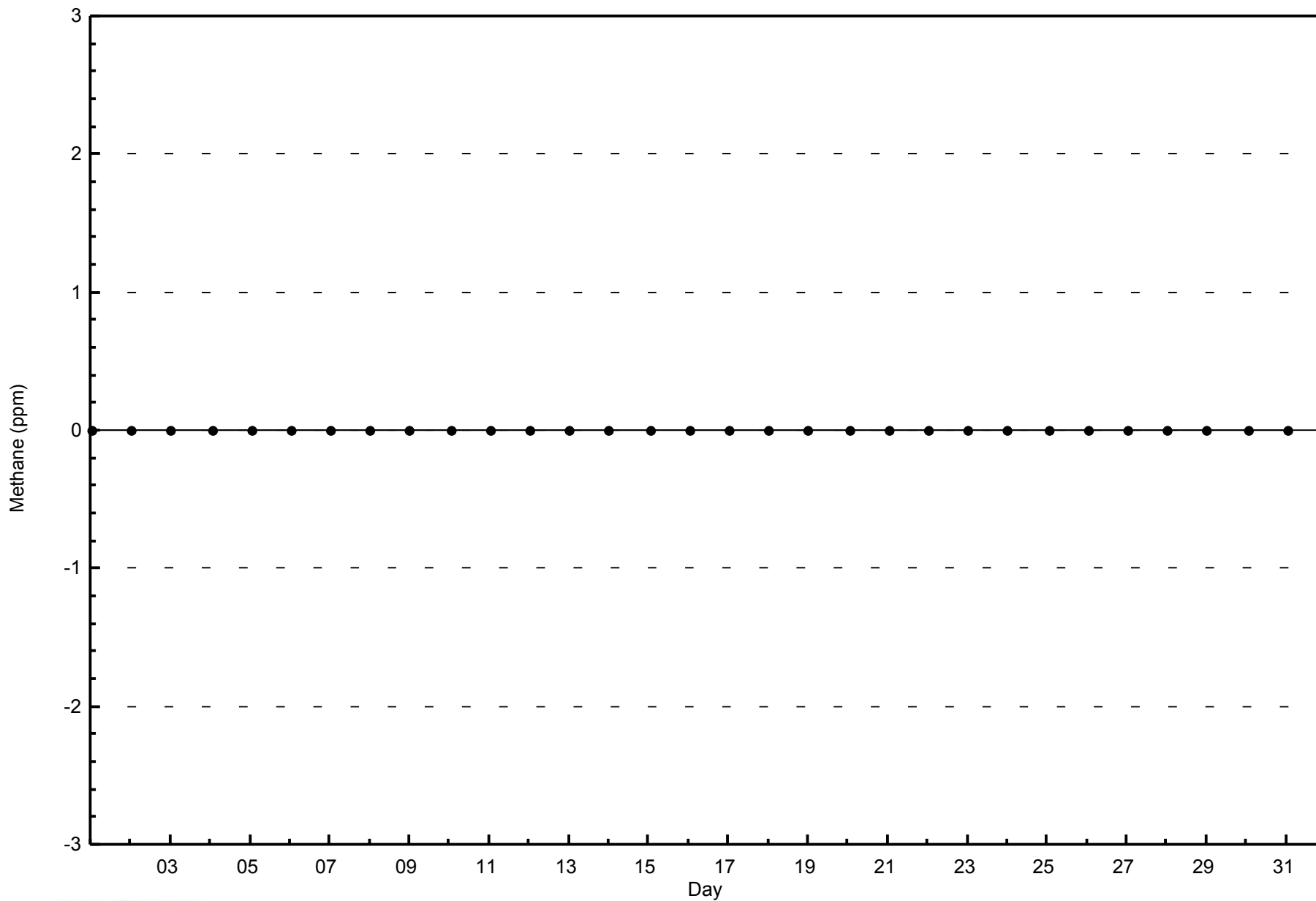
Methane (CH<sub>4</sub>) - ppm  
 Fort McKay - Bertha Ganter (AMS 1)





WBEA  
Zero Responses

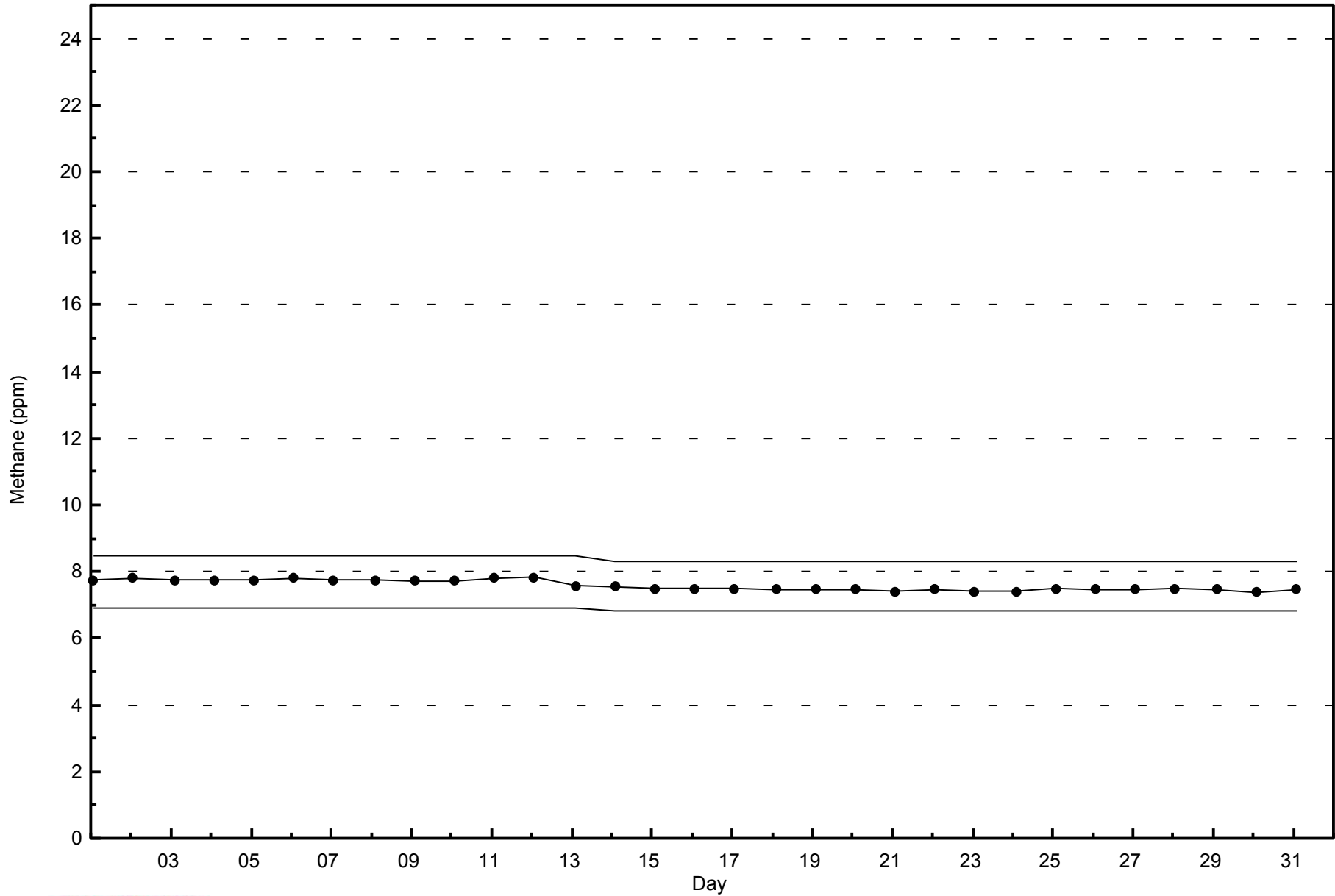
Methane (CH<sub>4</sub>) - ppm  
Fort McKay - Bertha Ganter - May 2014





WBEA  
Span Responses

Methane (CH<sub>4</sub>) - ppm  
Fort McKay - Bertha Ganter - May 2014





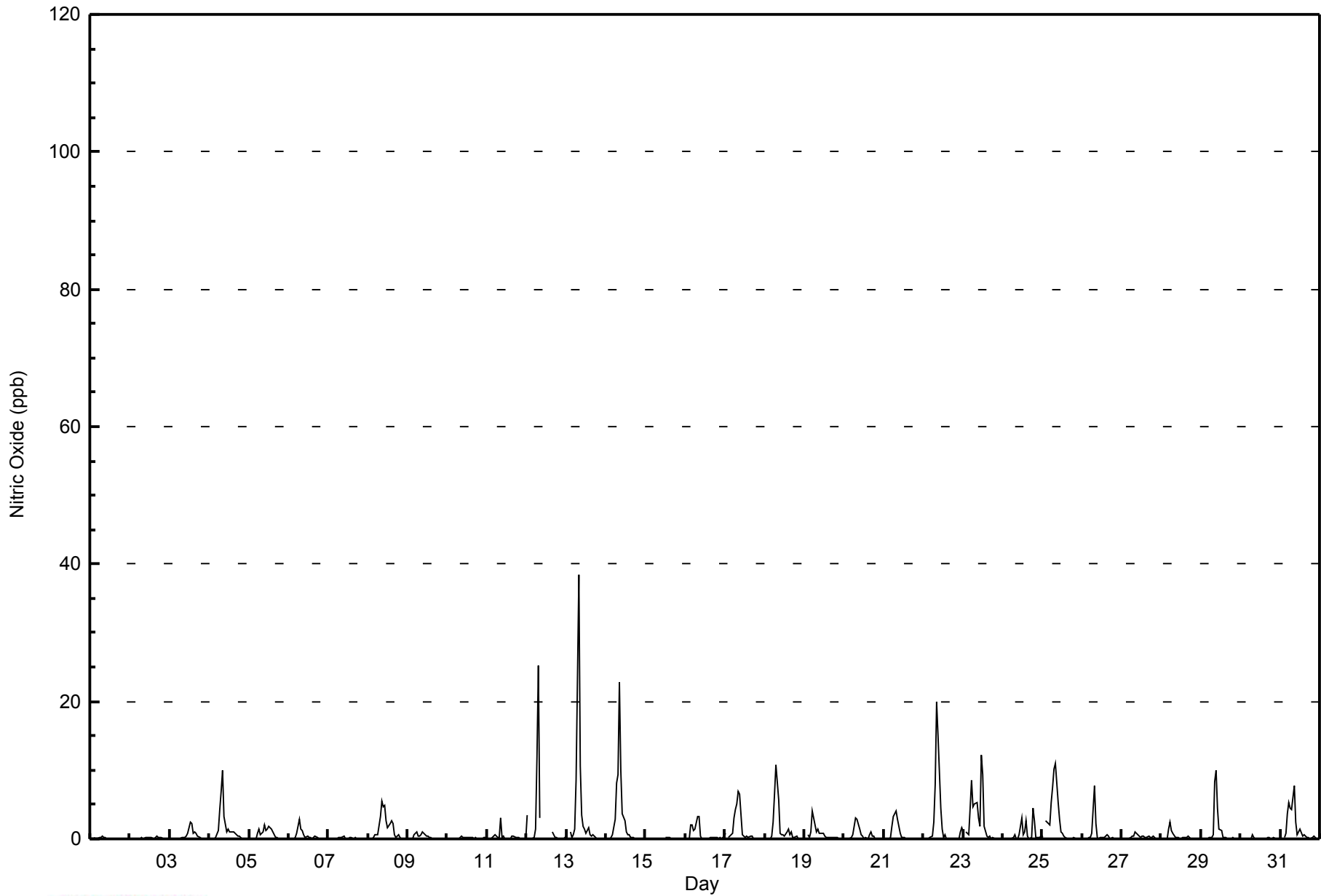
Maximum Value: 38 ppb on May 13 08:00													Maximum Daily Average: 3.1 ppb on May 13													Hours in Service: 744																							
Minimum Value: 0 ppb on May 1 12:00													Minimum Daily Average: 0.1 ppb on May 30													Hours of Data: 697																							
Maximum Diurnal Average: 5.1 ppb at hour 8													Minimum Diurnal Average: 0.0 ppb at hour 22													Hours of Missing Data: 47																							
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> = 3 P <sub>99</sub> = 12													Hours of Calibration: 37																							
																										Percent Operational Time: 98.7																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-May	0	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-May	0	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																							
3-May	0	Z	0	0	0	0	0	0	0	0	0	1	2	2	1	1	1	0	0	0	0	0	0	0	0.4	2																							
4-May	0	Z	0	0	0	1	4	7	10	3	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1.5	10																							
5-May	0	Z	0	0	0	1	1	1	1	2	1	1	2	2	1	1	0	0	0	0	0	0	0	0	0.6	2																							
6-May	0	Z	0	0	0	1	3	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	3																							
7-May	0	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-May	0	Z	0	0	1	1	1	3	5	5	5	3	2	2	3	2	1	0	1	0	0	0	0	0	1.5	5																							
9-May	0	Z	0	0	1	1	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																							
10-May	0	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																							
11-May	0	Z	0	0	0	1	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	3																							
12-May	3	Z	0	0	0	1	12	25	3	C	C	C	C	C	C	1	1	0	0	0	0	0	0	0	--	25																							
13-May	0	Z	1	0	1	1	9	38	11	4	2	1	1	2	1	0	1	0	0	0	0	0	0	0	3.1	38																							
14-May	0	Z	0	0	1	3	8	9	23	10	4	3	1	1	1	0	0	0	0	0	0	0	0	0	2.7	23																							
15-May	0	Z	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	0	0	0	0	0	0	0	0	0	0	--	0																							
16-May	0	Z	0	2	2	1	1	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	3																							
17-May	1	Z	0	0	1	3	4	5	7	6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.3	7																							
18-May	0	Z	0	0	0	3	7	11	6	1	1	1	0	1	1	1	1	0	0	0	0	0	0	0	1.5	11																							
19-May	0	Z	1	0	1	4	2	1	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.7	4																							
20-May	0	Z	0	0	0	1	2	3	3	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0.6	3																							
21-May	0	Z	0	0	0	2	3	4	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	4																							
22-May	0	Z	0	0	0	0	2	8	20	15	5	1	0	1	0	0	0	0	0	0	0	0	1	2	2.4	20																							
23-May	1	Z	1	1	5	9	5	5	5	3	2	12	9	2	0	0	0	0	0	0	0	0	0	0	2.6	12																							
24-May	0	Z	0	0	0	0	0	1	0	0	1	3	1	1	3	0	0	0	4	3	0	0	0	1	0.8	4																							
25-May	0	Z	3	2	2	5	7	10	11	5	3	1	1	0	0	0	0	0	0	0	0	0	0	0	2.3	11																							
26-May	0	Z	0	0	0	0	1	8	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.6	8																							
27-May	0	Z	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0.3	1																							
28-May	0	Z	0	0	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2																							
29-May	0	Z	0	0	0	0	0	1	8	10	4	1	1	0	0	0	0	0	0	0	0	0	0	0	1.2	10																							
30-May	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1																							
31-May	0	Z	0	1	4	5	5	4	8	2	1	1	1	0	1	0	0	0	0	0	0	0	0	0	1.5	8																							
																								0.2	--	0.2	0.3	0.7	1.6	2.7	5.1	4.6	2.6	1.2	1.2	0.9	0.6	0.5	0.4	0.3	0.2	0.3	0.2	0.1	0.0	0.1	0.1	Diurnal Average	
																								3	--	3	2	5	9	12	38	23	15	5	12	9	2	3	2	1	0	4	3	0	0	1	2	Diurnal Maximum	
Z - zerospan			C - Calibration					PF - Power Failure																																									





**WBEA**  
**Hourly Averages**

**Nitric Oxide (NO) - ppb**  
**Fort McKay - Bertha Ganter - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb**  
**Fort McKay - Bertha Ganter - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	694	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: 697

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Nitric Oxide (NO) - ppb**  
**Fort McKay - Bertha Ganter - May 2014**

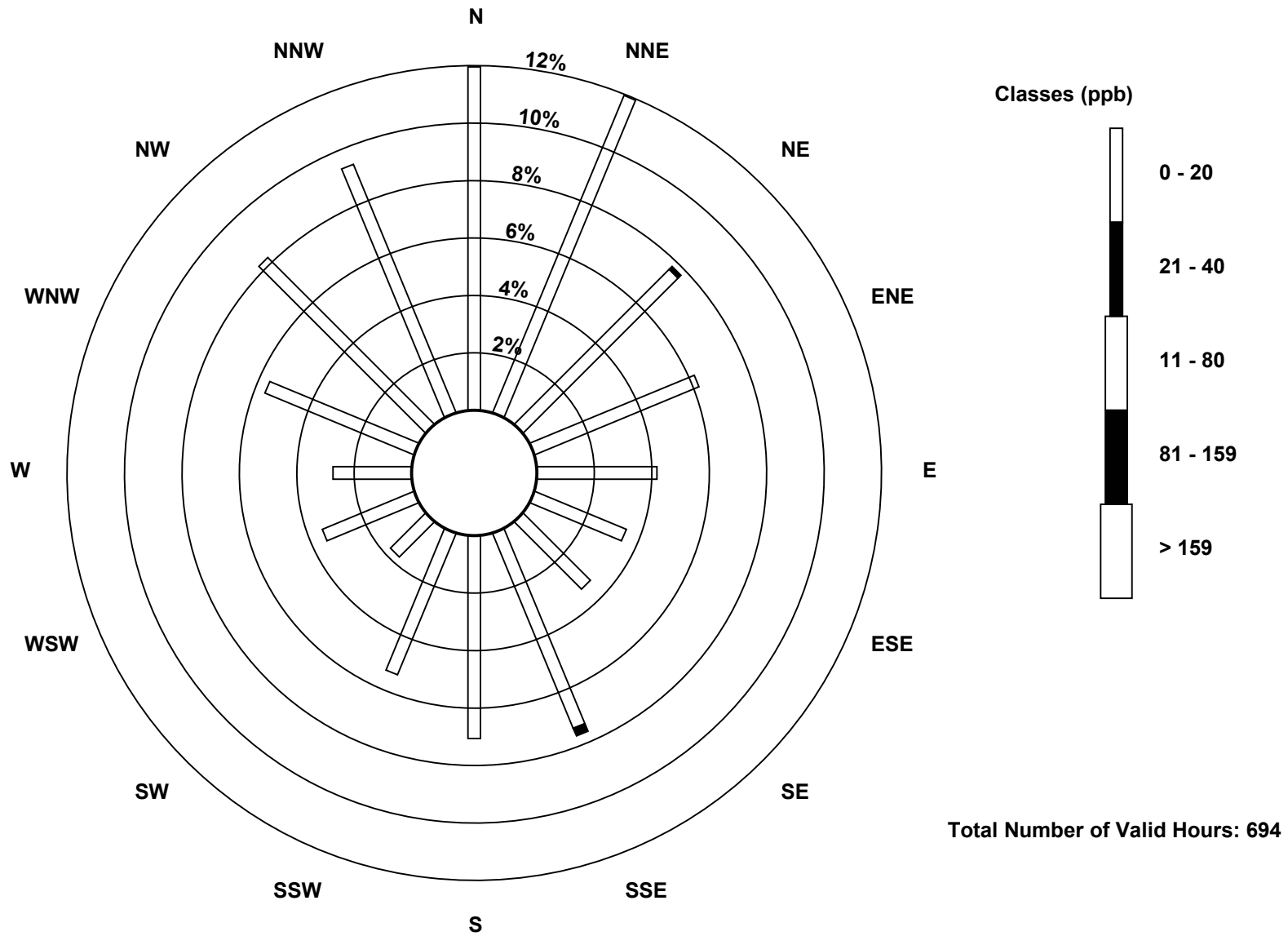
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	83	83	53	43	29	24	23	51	49	37	12	24	19	39	57	65	691
21 - 40	0	0	1	0	0	0	0	2	0	0	0	0	0	0	0	0	3
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	83	83	54	43	29	24	23	53	49	37	12	24	19	39	57	65	694

Total Number of Valid Hours: 694

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

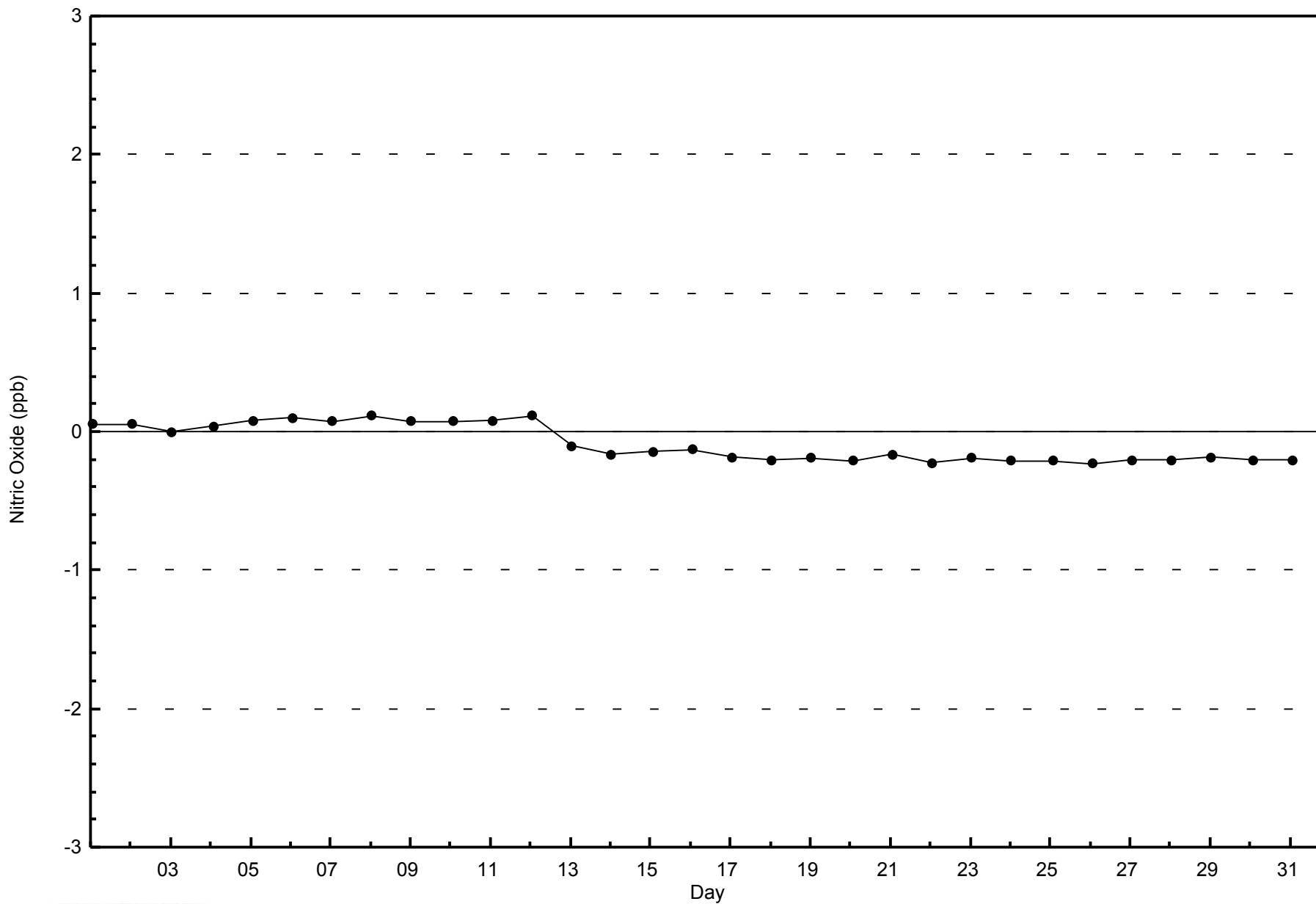
**Nitric Oxide (NO) - ppb  
Fort McKay - Bertha Ganter (AMS 1)**





WBEA  
Zero Responses

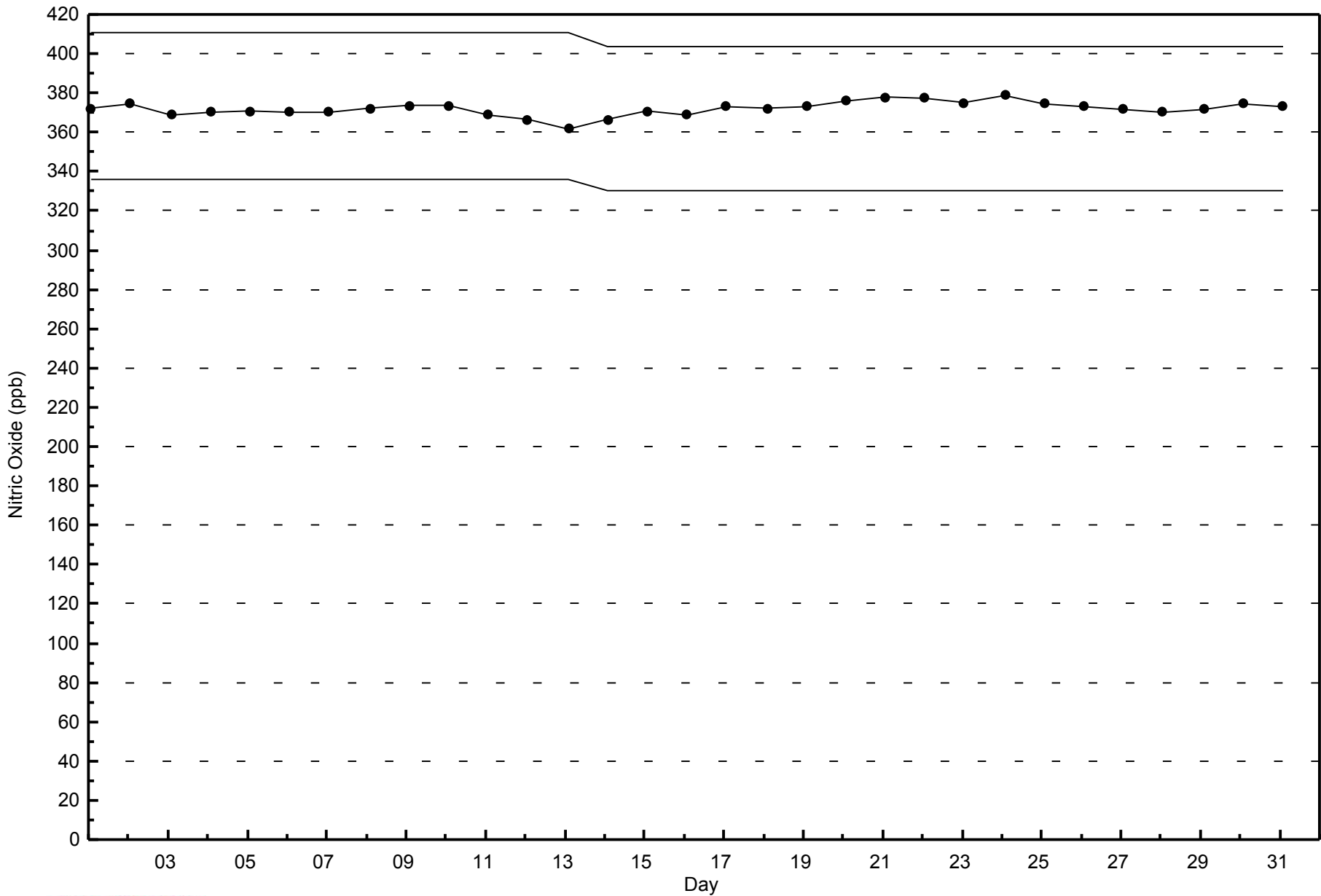
Nitric Oxide (NO) - ppb  
Fort McKay - Bertha Ganter - May 2014





WBEA  
Span Responses

Nitric Oxide (NO) - ppb  
Fort McKay - Bertha Ganter - May 2014





# Wood Buffalo Environmental Association

## Summary of Hour Averages

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

## Fort McKay - Bertha Ganter - May 2014

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 26 ppb on May 12 08:00	Maximum Daily Average: 9.4 ppb on May 18		Hours of Data:	697
Minimum Value: 0 ppb on May 1 12:00	Minimum Daily Average: 0.7 ppb on May 2		Hours of Missing Data:	47
Maximum Diurnal Average: 7.9 ppb at hour 8	Minimum Diurnal Average: 1.4 ppb at hour 18		Hours of Calibration:	37
Monthly Average: 4.1 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 1 Median = 3 Q <sub>3</sub> = 5 P <sub>90</sub> = 10 P <sub>99</sub> = 20		Percent Operational Time:	98.7

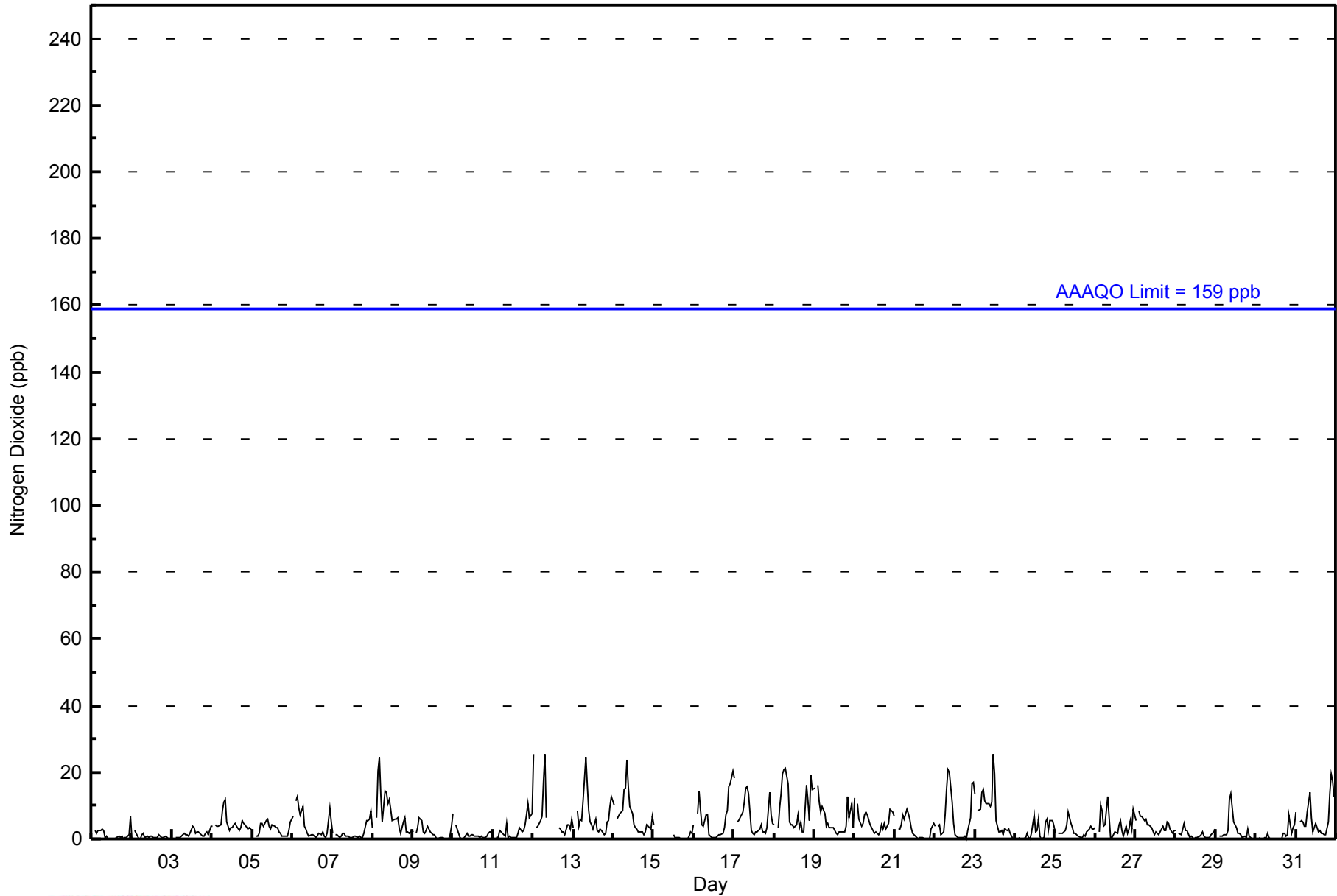
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-May	0	Z	3	2	3	3	3	2	1	1	0	0	0	0	0	0	1	0	1	0	1	1	1	7	1.2	7																							
2-May	0	Z	3	1	0	0	1	2	0	1	1	1	1	1	0	0	1	1	1	1	1	0	0	0	0.7	3																							
3-May	0	Z	0	0	0	1	1	2	1	1	1	2	4	4	2	2	2	2	1	1	2	2	1	4	1.6	4																							
4-May	4	Z	4	4	4	4	8	11	12	5	2	3	3	4	5	4	3	4	5	5	4	3	4	3	4.7	12																							
5-May	3	Z	1	1	2	5	5	4	5	6	4	3	4	4	3	3	2	2	1	1	1	1	2	5	2.9	6																							
6-May	7	Z	11	13	10	7	10	4	3	2	1	1	1	1	0	1	2	1	2	1	1	2	9	5	4.1	13																							
7-May	2	Z	1	1	1	1	2	2	1	1	0	1	0	1	1	1	1	1	1	1	2	5	5	6	8	1.8	8																						
8-May	4	Z	7	21	24	13	5	14	14	11	12	9	5	6	6	7	3	2	5	7	2	2	2	2	7.9	24																							
9-May	2	Z	2	3	6	6	2	2	2	4	2	2	1	1	0	0	0	1	0	0	0	0	1	4	1.8	6																							
10-May	8	Z	4	2	1	0	0	1	2	1	1	1	1	1	1	1	0	1	0	0	1	2	2	2	1.4	8																							
11-May	1	Z	0	0	3	2	1	1	5	1	1	0	0	0	1	2	4	2	3	4	7	10	6	8	2.7	10																							
12-May	25	Z	3	4	5	7	17	26	6	C	C	C	C	C	C	4	3	2	2	1	4	4	3	6	--	26																							
13-May	4	Z	9	4	6	6	11	24	16	9	5	4	3	6	3	2	3	3	1	2	5	6	10	13	6.6	24																							
14-May	10	Z	6	7	8	9	15	15	24	16	10	8	4	3	3	2	2	2	1	2	4	4	3	7	7.2	24																							
15-May	4	Z	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	1	1	1	0	0	0	0	0	0	1	2	2	--	4																							
16-May	4	Z	8	14	9	4	4	7	7	1	1	1	1	1	1	1	1	2	3	7	8	16	17	20	6.0	20																							
17-May	18	Z	5	6	7	8	11	15	16	14	3	2	1	2	2	3	4	2	2	2	3	14	7	5	6.6	18																							
18-May	4	Z	3	9	14	20	21	21	17	5	4	4	3	4	7	4	5	2	2	16	11	6	19	15	9.4	21																							
19-May	15	Z	16	11	8	10	8	4	5	3	3	4	3	2	1	2	2	2	2	4	13	6	11	4	6.0	16																							
20-May	12	Z	11	6	4	5	7	8	7	4	3	3	2	2	1	2	4	3	5	3	5	9	9	8	5.3	12																							
21-May	7	Z	3	3	4	7	6	9	8	6	4	2	1	0	0	0	0	0	0	0	0	0	3	5	3.0	9																							
22-May	4	Z	4	4	1	2	7	15	21	20	11	5	1	1	0	0	0	0	1	0	3	6	17	17	6.1	21																							
23-May	13	Z	9	9	14	15	12	10	11	10	11	26	19	5	2	2	3	1	3	3	3	2	1	0	7.9	26																							
24-May	0	Z	1	0	0	0	1	2	0	0	2	7	2	2	6	1	0	0	5	6	3	6	6	4	2.3	7																							
25-May	2	Z	2	2	2	2	2	4	8	5	3	2	2	1	1	0	0	1	1	2	3	4	3	3	2.4	8																							
26-May	3	Z	2	10	9	4	4	13	6	1	0	1	2	2	4	5	3	1	4	2	3	5	3	9	4.2	13																							
27-May	5	Z	9	7	7	5	6	4	4	4	4	1	2	2	1	2	4	3	2	5	5	3	2	2	3.9	9																							
28-May	2	Z	2	1	3	5	3	3	1	1	1	0	1	1	1	1	2	1	1	0	1	1	2	2	1.4	5																							
29-May	3	Z	1	1	1	1	1	3	12	13	10	5	4	2	2	1	1	1	0	3	1	1	0	0	2.8	13																							
30-May	0	Z	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2	2	1	1	7	2	3	4	1.1	7																							
31-May	8	Z	5	5	5	4	4	8	14	6	2	3	5	2	2	2	2	1	1	5	14	19	17	13	6.4	19																							
																								5.7	--	4.4	5.0	5.3	5.2	5.9	7.9	7.6	5.2	3.5	3.4	2.6	2.0	1.9	1.8	2.0	1.4	1.9	2.8	3.8	4.6	5.5	6.0	Diurnal Average	
																								25	--	16	21	24	20	21	26	24	20	12	26	19	6	7	7	5	4	5	16	14	19	19	20	Diurnal Maximum	

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



**WBEA**  
**Hourly Averages**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Fort McKay - Bertha Ganter - May 2014**







**WBEA**  
**Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Fort McKay - Bertha Ganter - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	687	98.57	98.57
21 - 40	10	1.43	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: 697

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Fort McKay - Bertha Ganter - May 2014**

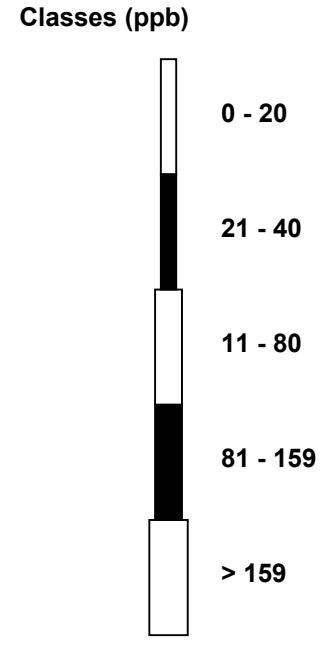
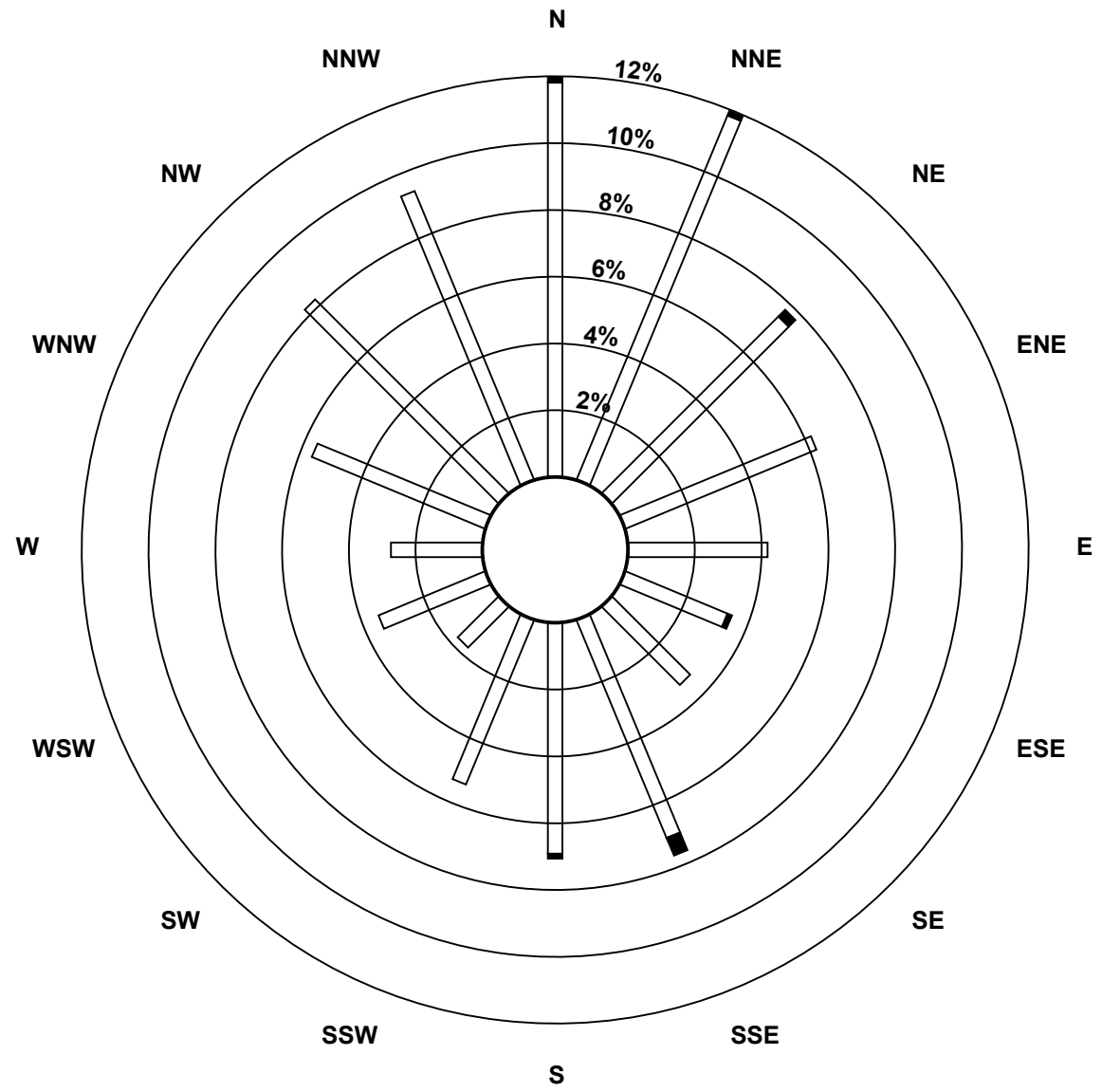
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	82	82	52	43	29	23	23	49	48	37	12	24	19	39	57	65	684
21 - 40	1	1	2	0	0	1	0	4	1	0	0	0	0	0	0	0	10
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>83</b>	<b>83</b>	<b>54</b>	<b>43</b>	<b>29</b>	<b>24</b>	<b>23</b>	<b>53</b>	<b>49</b>	<b>37</b>	<b>12</b>	<b>24</b>	<b>19</b>	<b>39</b>	<b>57</b>	<b>65</b>	<b>694</b>

Total Number of Valid Hours: 694

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

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

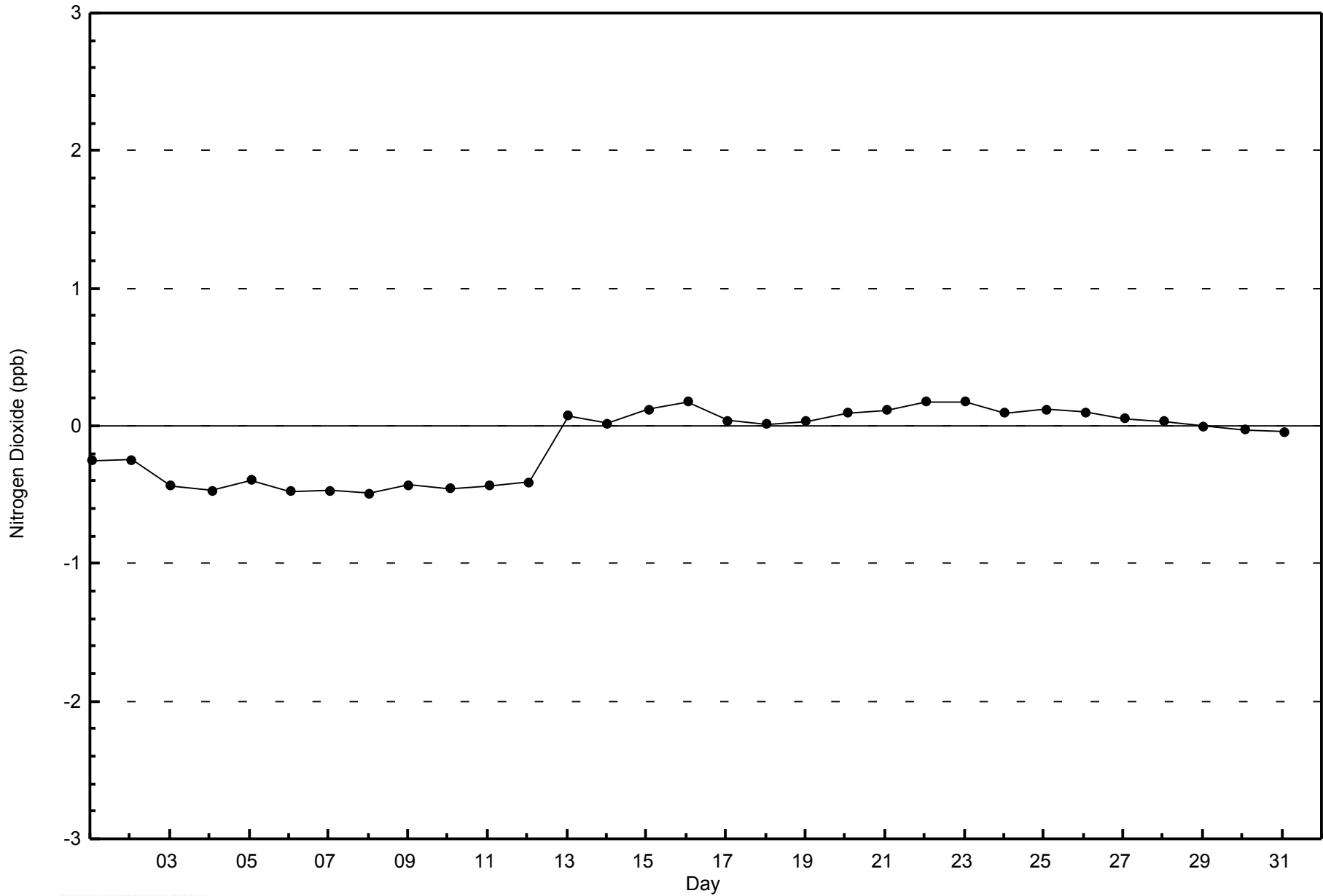


**Total Number of Valid Hours: 694**



WBEA  
Zero Responses

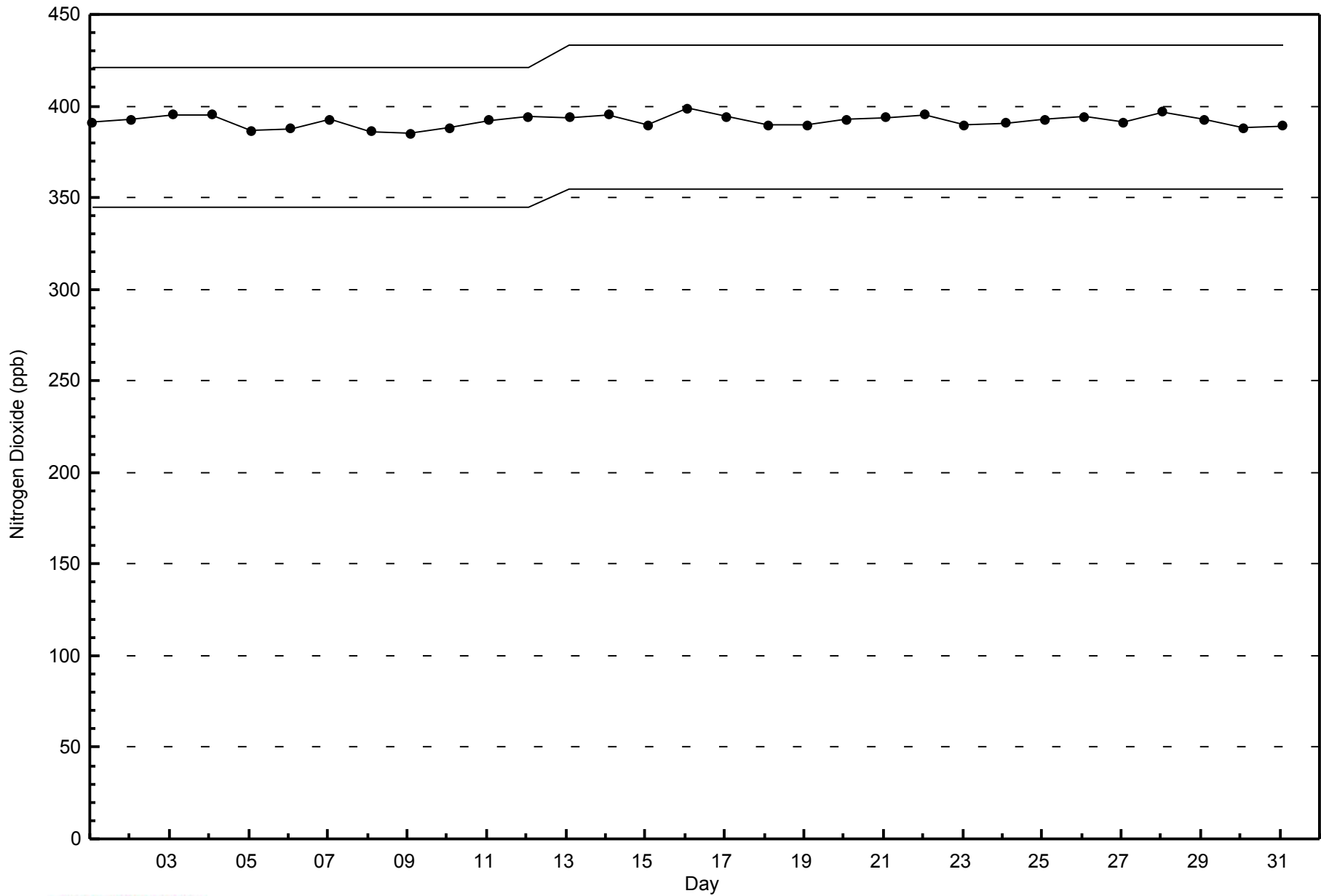
Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Fort McKay - Bertha Ganter - May 2014





WBEA  
Span Responses

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Fort McKay - Bertha Ganter - May 2014





Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO<sub>x</sub>) - ppb

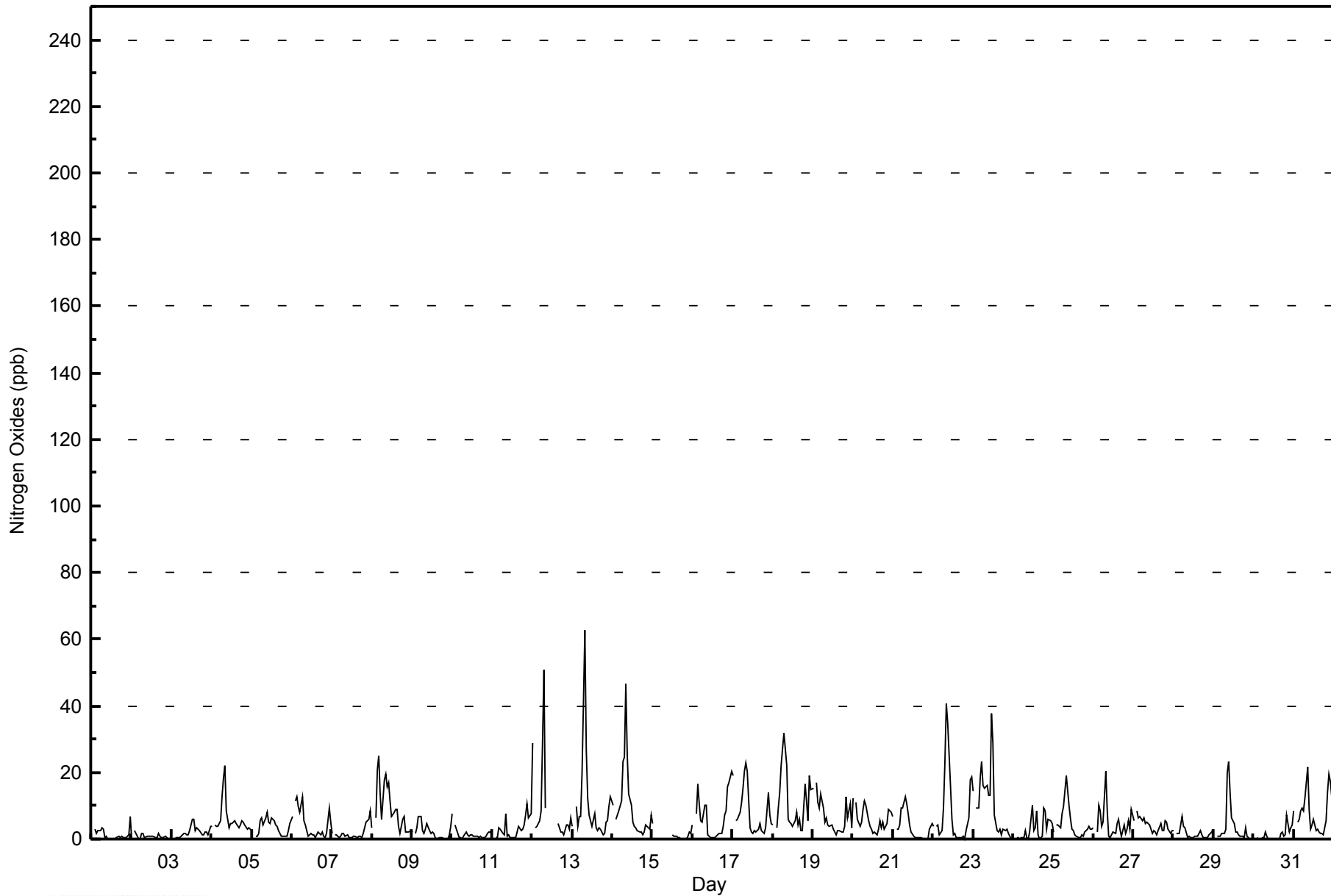
Fort McKay - Bertha Ganter - May 2014

Maximum Value: 63 ppb on May 13 08:00																		Maximum Daily Average: 10.9 ppb on May 18						Hours in Service: 744																									
Minimum Value: 0 ppb on May 1 12:00																		Minimum Daily Average: 0.8 ppb on May 2						Hours of Data: 697																									
Maximum Diurnal Average: 12.9 ppb at hour 8																		Minimum Diurnal Average: 1.6 ppb at hour 18						Hours of Missing Data: 47																									
Monthly Average: 5.2 ppb																		Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 1 Median = 3 Q <sub>3</sub> = 6 P <sub>90</sub> = 13 P <sub>99</sub> = 30						Hours of Calibration: 37																									
																		Percent Operational Time: 98.7																															
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-May	0	Z	3	2	3	3	3	3	1	1	0	0	0	0	0	0	1	1	1	0	1	1	1	7	1.3	7																							
2-May	0	Z	3	1	0	0	2	2	1	1	1	1	1	0	1	2	1	1	1	1	1	0	0	0	0.8	3																							
3-May	0	Z	0	0	0	0	1	2	2	1	1	3	6	6	2	3	3	2	1	1	2	2	1	4	2.0	6																							
4-May	4	Z	4	4	4	6	13	18	22	8	3	5	4	5	6	5	3	4	6	5	4	3	3	3	6.2	22																							
5-May	3	Z	1	1	2	6	6	4	6	8	5	4	6	6	4	4	2	2	1	1	1	1	2	5	3.5	8																							
6-May	7	Z	11	13	10	8	13	5	4	3	1	2	1	1	1	2	1	2	1	1	2	9	5	4.5	13																								
7-May	2	Z	1	1	0	1	2	2	1	1	0	1	1	1	1	1	1	1	1	2	5	5	6	8	1.9	8																							
8-May	4	Z	7	21	25	14	6	18	19	16	17	11	7	8	9	9	4	2	6	7	2	2	2	2	9.4	25																							
9-May	2	Z	2	3	7	7	2	2	3	5	3	2	2	2	1	0	0	1	1	0	0	0	1	4	2.1	7																							
10-May	8	Z	4	2	1	0	0	1	2	1	1	1	1	1	1	1	0	1	0	0	1	2	2	2	1.5	8																							
11-May	1	Z	0	0	3	3	2	1	8	1	1	0	0	0	1	2	4	2	3	4	7	10	6	7	3.0	10																							
12-May	29	Z	3	4	5	8	29	51	9	C	C	C	C	C	C	5	4	2	2	1	4	4	3	6	--	51																							
13-May	4	Z	10	4	7	7	20	63	27	12	7	6	4	7	3	2	3	3	1	2	5	5	10	13	9.8	63																							
14-May	10	Z	6	7	8	11	23	24	46	26	13	10	5	4	4	3	2	2	1	2	4	4	3	7	9.9	46																							
15-May	4	Z	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	1	1	1	0	0	0	0	0	0	1	2	2	--	4																							
16-May	4	Z	8	16	11	6	5	10	10	1	1	1	0	1	1	1	2	2	4	7	8	16	17	20	6.6	20																							
17-May	19	Z	5	6	8	11	15	20	23	20	3	2	2	2	3	5	2	2	2	3	14	7	5	5	8.0	23																							
18-May	4	Z	3	9	14	22	27	32	22	6	5	5	4	5	8	4	6	3	2	17	12	6	19	15	10.9	32																							
19-May	15	Z	17	11	9	14	9	5	6	4	4	4	3	2	1	2	3	2	2	4	13	6	11	4	6.6	17																							
20-May	12	Z	11	6	4	5	9	11	10	6	4	3	2	2	1	3	5	3	5	3	5	9	8	8	5.9	12																							
21-May	7	Z	3	3	4	9	9	13	10	8	4	2	1	0	0	0	0	0	0	0	0	0	3	5	3.6	13																							
22-May	4	Z	4	4	1	3	9	23	41	35	16	6	1	1	0	0	0	0	1	0	3	6	18	19	8.5	41																							
23-May	14	Z	9	9	18	23	16	15	16	13	13	38	29	7	3	2	3	1	3	3	3	2	1	0	10.5	38																							
24-May	0	Z	1	0	0	1	2	1	0	2	10	3	3	9	1	0	1	9	9	3	6	6	5	5	3.1	10																							
25-May	2	Z	4	4	4	8	10	14	19	10	6	3	3	1	1	0	0	1	1	2	3	4	3	3	4.7	19																							
26-May	3	Z	2	10	9	4	5	20	9	1	0	1	2	2	5	6	3	1	4	2	3	5	3	9	4.7	20																							
27-May	5	Z	9	7	7	6	7	5	5	5	4	2	2	2	1	3	4	3	3	6	5	3	2	2	4.1	9																							
28-May	2	Z	2	1	4	7	4	3	1	1	1	0	1	1	1	2	3	1	0	0	1	1	2	2	1.8	7																							
29-May	3	Z	1	1	1	2	2	3	20	23	14	7	5	2	2	1	1	1	0	3	1	1	0	0	4.0	23																							
30-May	0	Z	0	0	0	0	0	2	1	0	0	0	0	0	0	0	2	2	1	1	7	2	3	4	1.2	7																							
31-May	8	Z	5	6	9	9	8	12	22	9	3	4	6	3	3	2	2	2	1	5	14	19	17	13	7.9	22																							
																								5.9	--	4.7	5.3	5.9	6.7	8.6	12.9	12.2	7.7	4.7	4.6	3.4	2.6	2.4	2.2	2.3	1.6	2.1	2.9	3.9	4.6	5.6	6.1	Diurnal Average	
																								29	--	17	21	25	23	29	63	46	35	17	38	29	8	9	9	6	4	9	17	14	19	19	20	Diurnal Maximum	
Z - zerospan			C - Calibration				PF - Power Failure																																										



WBEA  
Hourly Averages

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Fort McKay - Bertha Ganter - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Fort McKay - Bertha Ganter - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	672	96.41	96.41
21 - 40	21	3.01	99.43
41 - 80	4	0.57	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 697  
Total Number of Hours: 744





**WBEA**  
**Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Fort McKay - Bertha Ganter - May 2014**

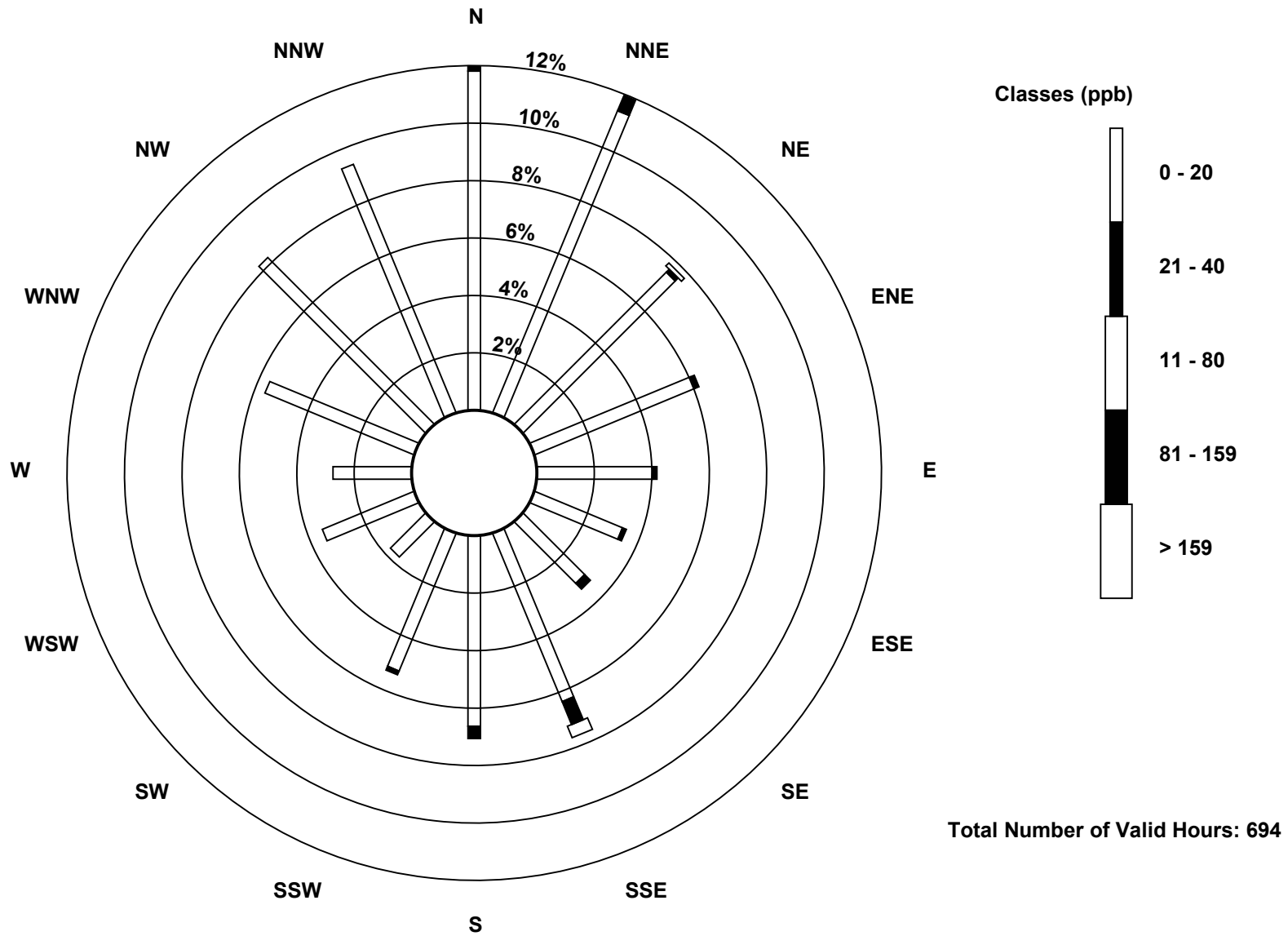
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	82	79	52	42	28	23	21	44	46	36	12	24	19	39	57	65	669
21 - 40	1	4	1	1	1	1	2	6	3	1	0	0	0	0	0	0	21
11 - 80	0	0	1	0	0	0	0	3	0	0	0	0	0	0	0	0	4
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>83</b>	<b>83</b>	<b>54</b>	<b>43</b>	<b>29</b>	<b>24</b>	<b>23</b>	<b>53</b>	<b>49</b>	<b>37</b>	<b>12</b>	<b>24</b>	<b>19</b>	<b>39</b>	<b>57</b>	<b>65</b>	<b>694</b>

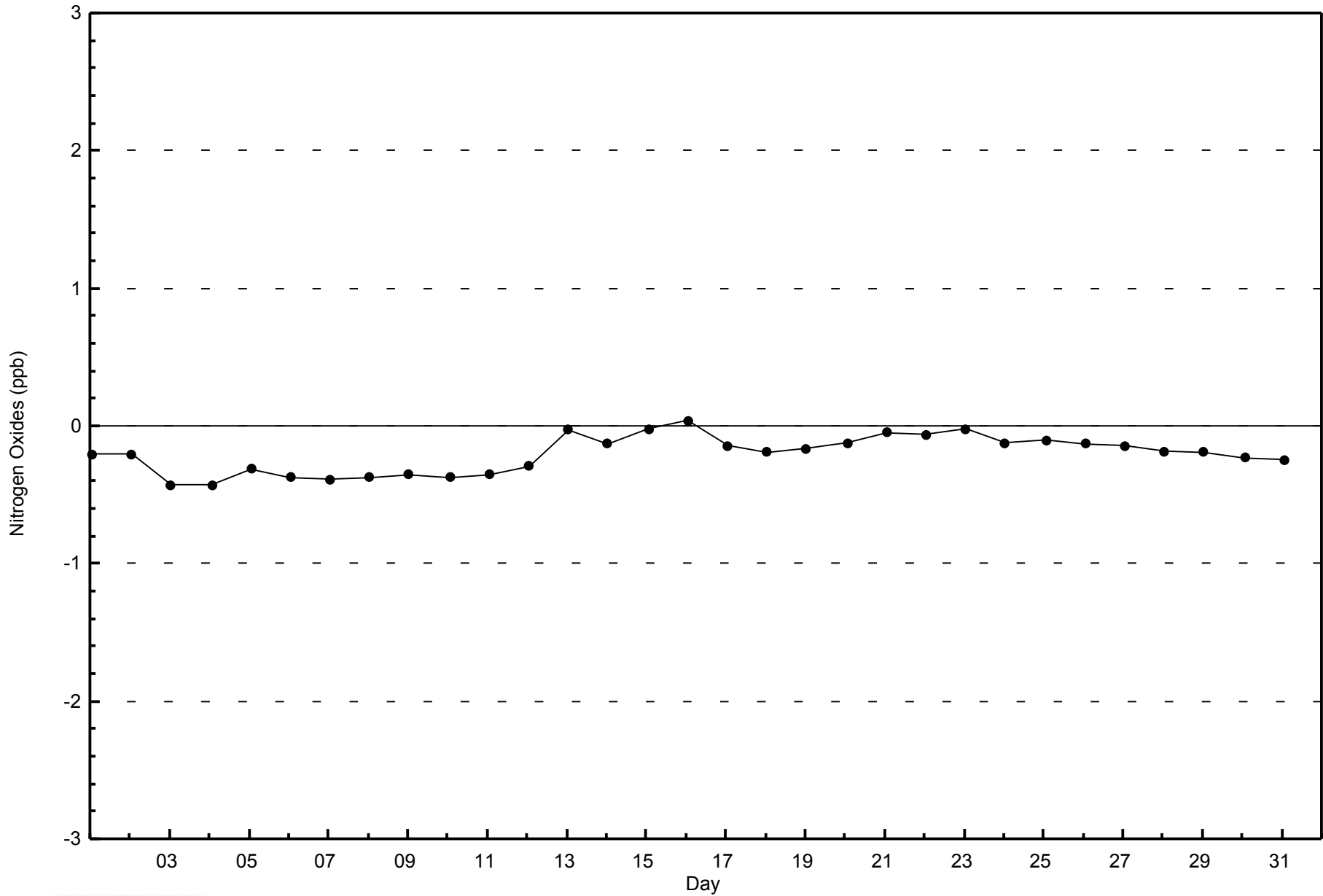
Total Number of Valid Hours: 694

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

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

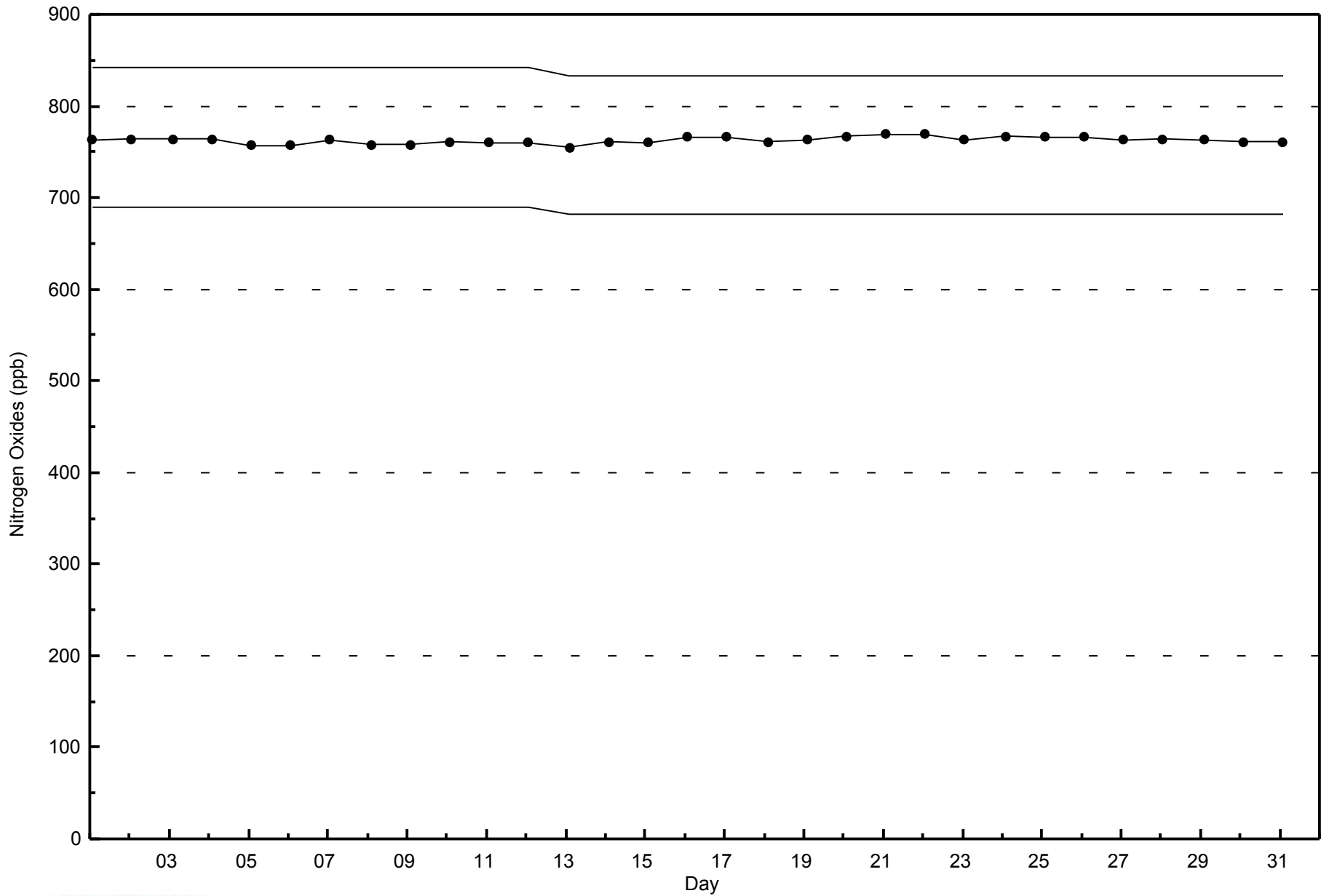






WBEA  
Span Responses

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Fort McKay - Bertha Ganter - May 2014





Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 51 ppb on May 17 16:00	Maximum Daily Average: 33.0 ppb on May 1		Hours of Data:	698
Minimum Value: 0 ppb on May 25 03:00	Minimum Daily Average: 10.6 ppb on May 29		Hours of Missing Data:	46
Maximum Diurnal Average: 34.2 ppb at hour 16	Minimum Diurnal Average: 12.8 ppb at hour 5		Hours of Calibration:	34
Monthly Average: 25.2 ppb	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 10 Q <sub>1</sub> = 16 Median = 26 Q <sub>3</sub> = 34 P <sub>90</sub> = 41 P <sub>99</sub> = 49		Percent Operational Time:	98.4

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-May	32	Z	15	23	23	20	24	26	33	38	39	40	41	40	40	39	39	39	39	39	37	35	30	28	33.0	41			
2-May	37	Z	30	30	32	31	29	30	32	32	33	32	31	30	29	26	23	22	22	22	21	23	26	27	28.3	37			
3-May	29	Z	31	31	31	30	29	28	28	28	28	27	27	29	31	31	32	33	32	34	32	26	22	16	29.0	34			
4-May	14	Z	10	8	6	7	11	14	18	28	34	34	35	35	36	38	38	35	32	34	36	33	28	28	26.1	38			
5-May	27	Z	17	14	14	16	24	27	25	24	29	33	34	35	37	37	37	36	35	35	32	31	30	28	28.5	37			
6-May	26	Z	17	16	19	21	21	28	31	33	34	34	35	35	35	34	33	34	34	32	27	26	18	22	28.0	35			
7-May	22	Z	24	22	23	25	27	28	28	29	32	35	36	36	35	35	34	34	34	32	28	24	21	18	28.7	36			
8-May	22	Z	22	8	4	14	23	16	17	20	20	24	29	28	27	27	30	31	27	26	26	21	18	17	21.7	31			
9-May	16	Z	16	12	9	10	20	23	25	24	28	30	30	30	31	31	30	28	24	29	30	29	25	22	23.9	31			
10-May	17	Z	19	23	23	24	24	24	26	26	27	27	26	25	25	25	26	24	23	21	15	11	11	10	21.9	27			
11-May	9	Z	11	8	5	9	16	18	21	25	33	36	36	36	35	35	33	36	35	32	28	21	22	20	24.3	36			
12-May	4	Z	22	20	14	14	12	11	30	35	34	34	36	35	34	35	37	38	40	37	34	34	27	28.3	40				
13-May	21	Z	10	11	11	10	11	7	21	C	C	C	40	39	43	43	42	41	44	45	36	31	23	17	27.2	45			
14-May	16	Z	8	9	6	9	14	18	15	24	35	38	42	43	44	44	43	42	41	37	34	30	25	17	27.6	44			
15-May	22	Z	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	28	27	30	31	34	28	19	16	25	25	--	34
16-May	19	Z	14	4	3	10	19	23	28	37	41	44	45	46	47	47	48	48	46	41	35	24	20	15	30.6	48			
17-May	11	Z	10	6	5	7	17	24	25	30	45	47	48	49	50	51	49	49	47	44	38	26	31	30	32.1	51			
18-May	29	Z	25	21	17	12	14	15	24	37	32	34	38	40	40	42	40	43	41	25	25	29	15	15	28.5	43			
19-May	13	Z	5	4	4	8	23	31	31	37	42	44	47	48	48	47	46	47	45	41	31	38	33	37	32.7	48			
20-May	22	Z	19	25	28	27	26	27	29	35	39	41	42	39	34	41	37	40	36	39	34	20	18	12	30.8	42			
21-May	9	Z	19	21	19	11	14	23	30	32	34	36	37	37	44	50	50	45	45	43	45	44	34	23	32.4	50			
22-May	24	Z	14	15	14	10	12	13	13	19	34	41	39	34	33	33	34	34	31	27	21	16	6	3	22.7	41			
23-May	3	Z	3	2	1	3	13	18	23	27	28	14	21	36	42	45	44	42	41	35	33	36	34	34	25.3	45			
24-May	35	Z	25	23	23	20	22	27	31	34	29	16	16	14	11	19	19	18	10	9	10	4	1	0	18.1	35			
25-May	1	Z	0	0	0	1	2	4	9	13	16	20	23	25	28	28	27	26	24	21	18	12	20	18	14.7	28			
26-May	17	Z	21	13	10	14	11	11	18	21	21	20	18	22	19	13	17	17	17	23	22	21	21	14	17.5	23			
27-May	16	Z	14	15	14	16	17	20	21	21	20	21	20	21	22	21	19	19	17	12	8	7	6	12	16.5	22			
28-May	12	Z	6	2	2	9	17	19	25	27	28	29	29	30	30	30	28	29	28	27	25	21	13	13	20.9	30			
29-May	7	Z	7	7	6	9	12	12	6	4	6	10	9	10	10	12	14	13	13	14	17	15	15	14	10.6	17			
30-May	13	Z	12	14	15	15	15	14	18	24	26	26	26	28	32	33	28	28	28	27	22	20	14	12	21.3	33			
31-May	6	Z	3	1	1	3	6	19	22	32	36	39	39	42	43	43	42	42	43	37	26	17	12	12	24.6	43			

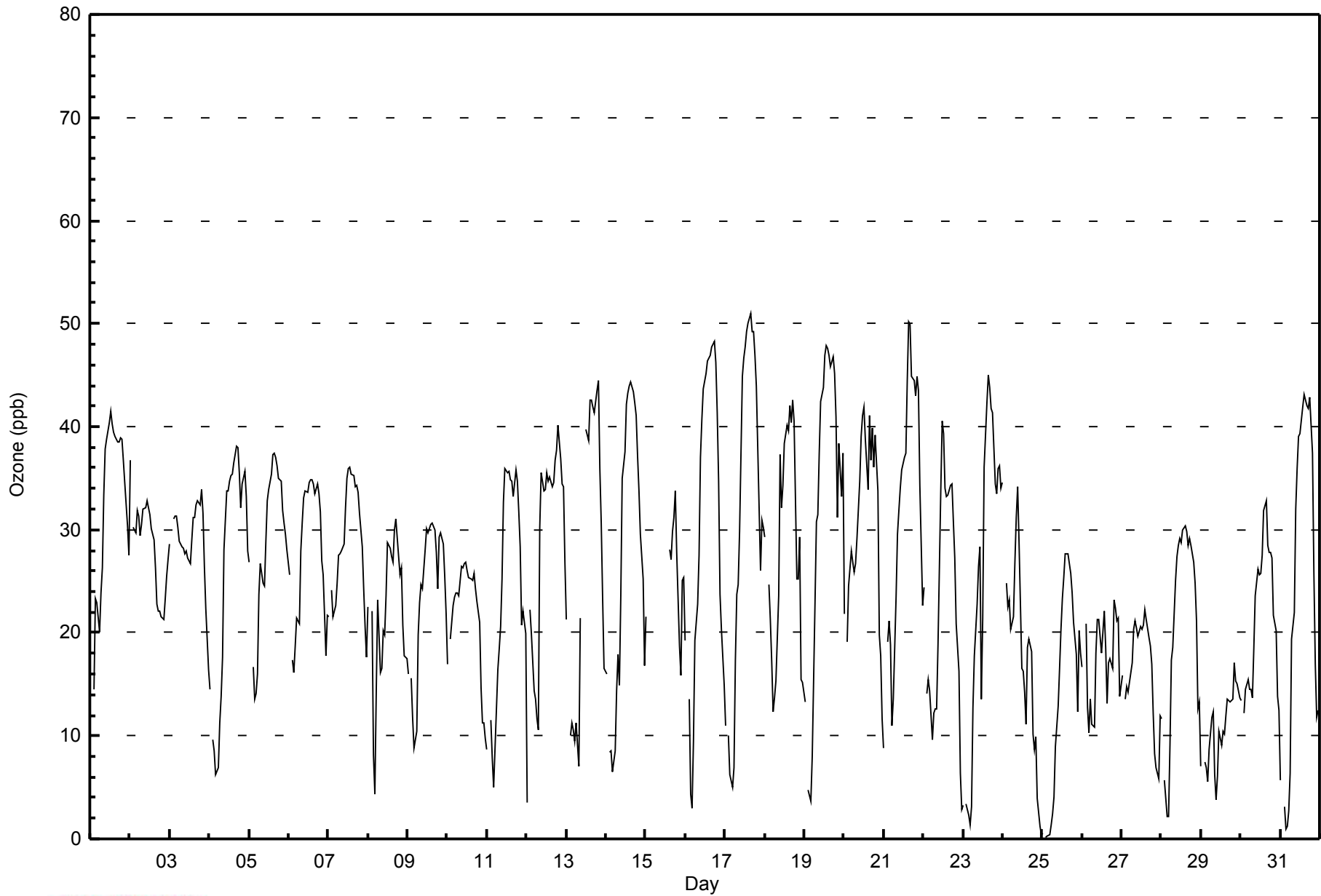
17.7	--	15.0	13.6	12.8	13.8	17.5	19.9	23.4	27.5	30.4	31.2	32.5	33.3	33.7	34.2	33.8	33.8	32.5	30.5	27.3	24.0	21.3	18.9	Diurnal Average	
37	--	31	31	32	31	29	31	33	38	45	47	48	49	50	51	50	49	47	45	45	44	36	37	Diurnal Maximum	

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



WBEA  
Hourly Averages

Ozone (O<sub>3</sub>) - ppb  
Fort McKay - Bertha Ganter - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Ozone (O<sub>3</sub>) - ppb**  
**Fort McKay - Bertha Ganter - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	240	34.38	34.38
21 - 50	457	65.47	99.86
51 - 82	1	0.14	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 698

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Ozone (O<sub>3</sub>) - ppb**  
**Fort McKay - Bertha Ganter - May 2014**

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	23	10	5	9	10	8	15	12	19	7	13	13	23	22	17	240
21 - 50	48	59	44	40	22	14	13	38	37	18	5	11	6	16	35	48	454
51 - 82	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	82	82	54	46	31	24	21	53	49	37	12	24	19	39	57	65	695

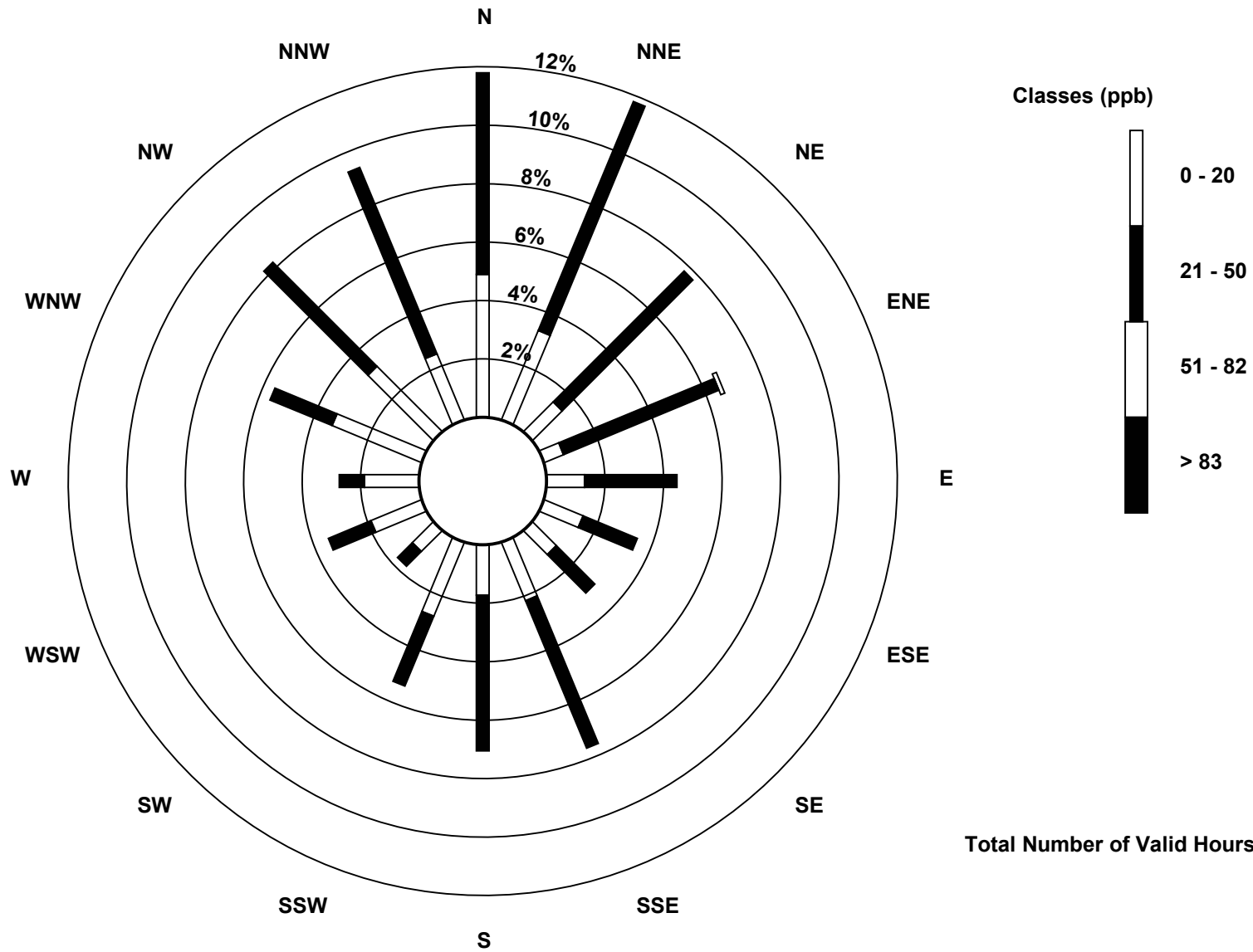
Total Number of Valid Hours: 695

Total Number of Hours: 744



**Wood Buffalo Environmental Association  
Wind Rose May 2014**

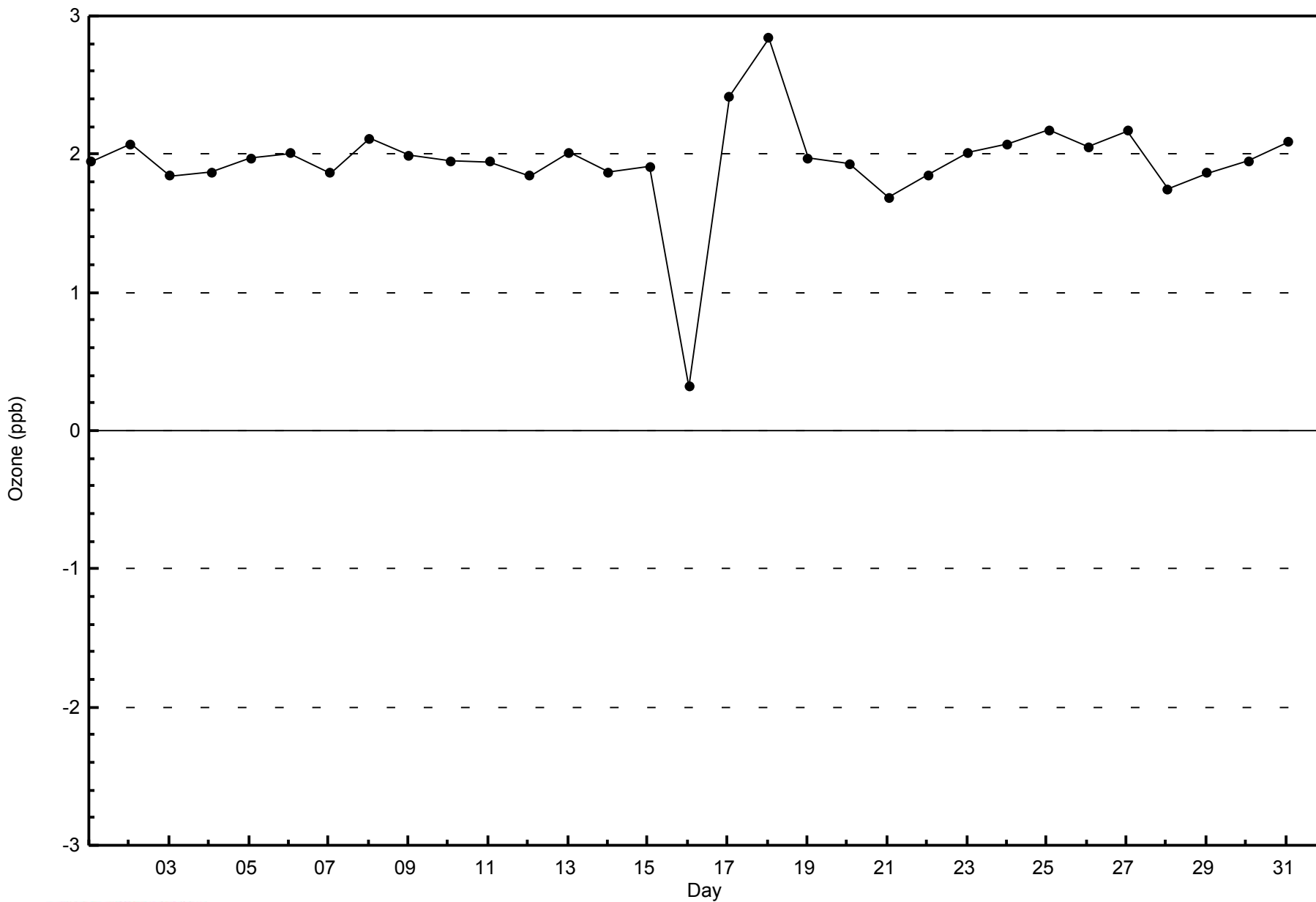
**Ozone (O<sub>3</sub>) - ppb  
Fort McKay - Bertha Ganter (AMS 1)**





WBEA  
Zero Responses

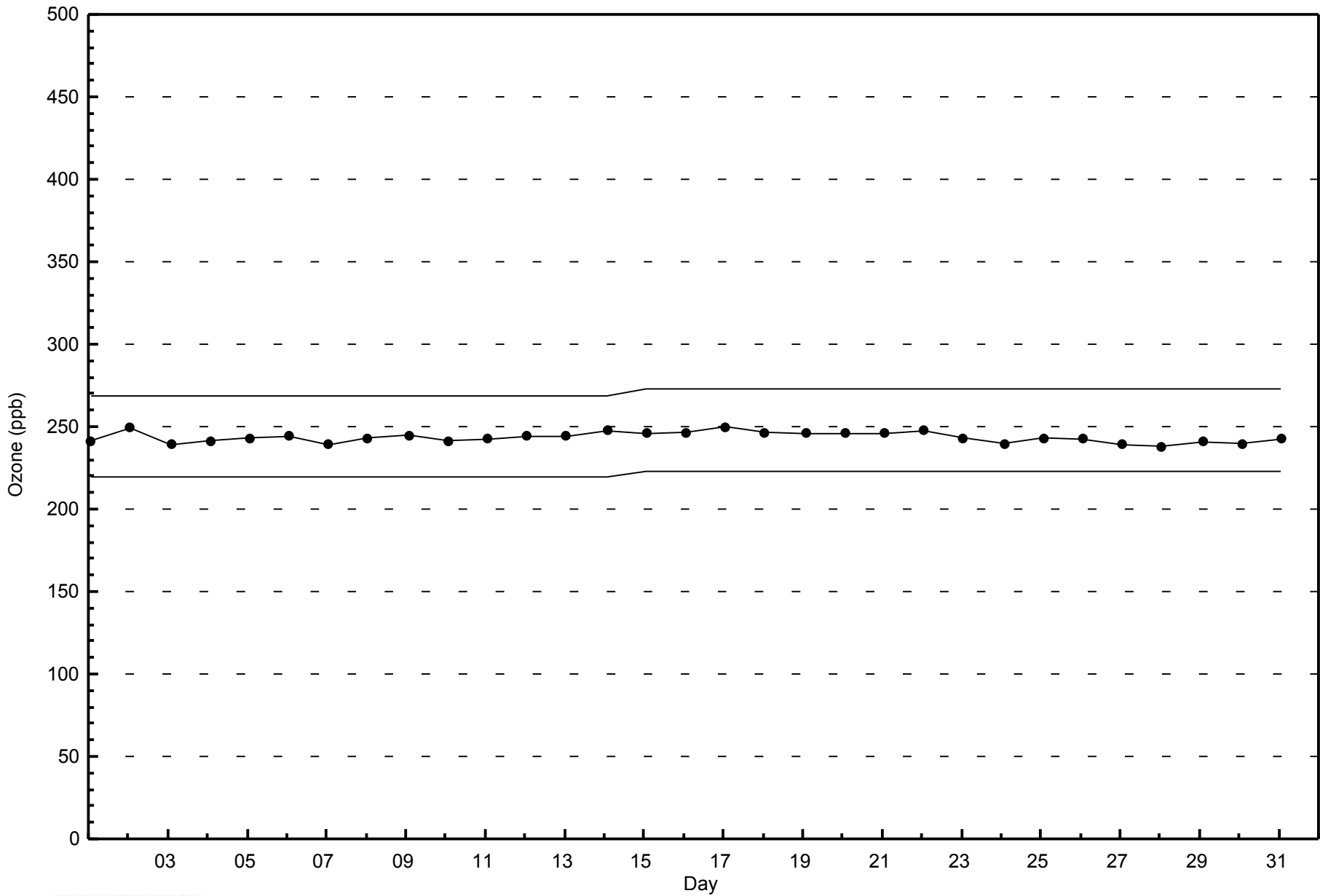
Ozone (O<sub>3</sub>) - ppb  
Fort McKay - Bertha Ganter - May 2014





**WBEA**  
**Span Responses**

**Ozone (O<sub>3</sub>) - ppb**  
**Fort McKay - Bertha Ganter - May 2014**





Number of Exceedences (AAAQO): 24-hr: 0	Hours in Service: 744
Maximum Value: 25.3 μg/m <sup>3</sup> on May 20 08:00	Maximum Daily Average: 12.2 μg/m <sup>3</sup> on May 19
Minimum Value: 0.1 μg/m <sup>3</sup> on May 24 14:00	Hours of Data: 690
Maximum Diurnal Average: 5.6 μg/m <sup>3</sup> at hour 6	Hours of Missing Data: 54
Monthly Average: 4.27 μg/m <sup>3</sup>	Hours of Calibration: 0
Minimum Daily Average: 1.5 μg/m <sup>3</sup> on May 24	Percent Operational Time: 92.7
Minimum Diurnal Average: 2.6 μg/m <sup>3</sup> at hour 14	
Percentiles: P <sub>1</sub> = 0.4 P <sub>10</sub> = 1.4 Q <sub>1</sub> = 1.9 Median = 3.1 Q <sub>3</sub> = 5.3 P <sub>90</sub> = 8.7 P <sub>99</sub> = 18.7	

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-May	3.0	3.8	4.2	2.3	1.5	2.7	3.0	3.4	2.7	1.8	1.8	1.7	1.6	1.4	1.4	1.3	1.6	2.3	2.4	2.6	3.1	3.4	3.8	4.6	2.6	4.6	
2-May	2.3	1.8	1.7	1.8	1.9	1.9	2.0	2.1	2.2	2.4	2.6	2.4	2.2	1.9	1.9	2.5	3.0	2.9	2.5	2.4	2.5	2.4	2.7	3.5	2.3	3.5	
3-May	3.5	3.5	4.0	4.4	4.3	4.8	5.3	5.2	4.5	3.8	3.4	2.4	2.6	2.7	2.1	2.3	2.1	2.0	1.6	1.6	2.0	3.4	2.9	6.8	3.4	6.8	
4-May	7.6	8.5	8.5	9.0	9.6	11.0	14.6	12.1	7.7	7.6	2.2	1.9	1.8	2.1	2.8	2.5	2.2	3.2	5.2	5.2	4.8	5.2	4.4	4.0	6.0	14.6	
5-May	3.2	2.9	3.0	3.3	5.3	8.2	6.0	4.6	5.1	5.3	4.9	4.3	3.4	2.4	2.5	2.8	2.6	2.8	3.5	3.6	3.2	3.0	3.0	2.8	3.8	8.2	
6-May	3.5	4.4	4.4	4.5	4.2	4.7	4.4	3.3	2.8	2.1	2.0	2.2	1.9	1.9	1.8	1.7	2.8	1.7	1.8	1.8	2.2	3.6	5.5	4.3	3.1	5.5	
7-May	3.9	4.3	4.9	5.2	5.3	5.7	5.4	4.2	3.1	2.5	2.1	2.0	1.9	2.5	2.5	2.1	1.7	1.4	1.6	1.6	2.4	2.8	3.5	3.7	3.2	5.7	
8-May	3.2	2.9	2.3	3.0	3.2	2.8	2.2	3.0	3.6	4.6	3.7	2.1	1.6	1.5	1.3	1.1	1.0	1.1	1.2	1.4	1.5	1.7	2.0	1.9	2.2	4.6	
9-May	2.1	2.7	3.0	3.2	4.0	3.8	2.6	2.0	1.9	1.9	2.0	1.7	1.8	2.2	1.7	1.5	1.6	1.4	1.7	2.0	1.9	1.9	2.0	2.4	2.2	4.0	
10-May	3.8	5.4	4.9	4.5	4.0	3.6	3.6	3.3	2.9	1.8	1.6	1.7	1.6	1.6	1.7	1.5	1.5	1.5	1.5	1.5	1.6	1.8	2.1	2.4	2.6	5.4	
11-May	2.1	1.9	1.7	1.7	2.4	2.2	2.4	2.6	2.9	2.6	2.6	2.5	2.1	1.5	1.5	1.8	2.8	3.1	2.5	3.5	3.2	4.7	4.1	4.5	2.6	4.7	
12-May	9.7	5.7	3.9	4.1	4.8	4.8	6.0	7.2	2.8	1.9	2.7	3.3	2.8	3.0	2.2	2.2	1.8	1.5	1.7	1.8	3.6	5.4	4.4	AF	3.8	9.7	
13-May	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	M	3.1	3.2	2.6	2.8	2.1	5.3	5.2	8.4	9.6	--	9.6	
14-May	7.0	5.3	6.0	5.8	7.8	7.9	9.7	7.9	8.8	6.2	1.5	2.6	3.1	3.6	3.6	3.8	4.3	6.5	5.9	6.7	11.8	5.4	1.5	0.8	5.6	11.8	
15-May	0.5	0.4	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	1.0	0.5	0.5	0.7	0.5	0.3	0.3	0.4	0.7	0.9	1.1	1.0	--	1.1
16-May	1.2	1.1	1.3	1.8	1.9	1.7	1.6	1.3	1.1	0.8	1.0	1.1	1.0	1.2	1.5	1.5	1.7	1.9	2.2	5.1	6.7	5.6	5.7	7.6	2.4	7.6	
17-May	9.9	6.9	6.8	7.1	7.4	7.8	6.2	4.0	4.3	4.2	2.5	2.5	2.9	3.2	3.5	4.8	6.3	5.5	6.0	6.7	5.8	9.6	4.5	3.1	5.5	9.9	
18-May	3.1	3.3	3.5	4.3	4.2	5.5	7.3	7.1	5.8	4.5	4.4	5.0	4.9	4.5	5.1	5.5	6.0	4.7	4.1	10.6	7.9	6.8	9.5	8.7	5.7	10.6	
19-May	9.5	13.0	20.3	17.1	15.4	18.8	17.1	11.1	9.8	8.0	9.5	11.2	9.7	8.4	8.3	10.1	12.0	13.2	15.4	10.8	16.4	11.0	9.8	7.8	12.2	20.3	
20-May	12.0	14.7	14.6	12.6	10.2	10.8	10.8	25.3	19.2	23.8	13.6	8.0	5.5	4.0	5.0	3.6	4.8	2.0	2.1	2.4	3.6	4.2	3.0	4.6	9.2	25.3	
21-May	9.6	6.5	5.9	6.7	5.9	5.3	4.3	4.8	7.3	5.7	4.9	3.3	3.1	2.1	1.6	1.7	2.2	2.4	1.4	2.0	1.4	1.6	4.3	6.2	4.2	9.6	
22-May	5.6	11.2	7.3	6.6	5.6	5.4	8.1	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	11.2	
23-May	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	15.8	15.1	7.9	6.1	4.5	6.2	7.9	15.2	12.6	20.3	9.2	11.3	2.1	--	20.3	
24-May	1.6	2.7	4.0	1.9	1.7	2.4	3.3	1.8	1.3	1.4	2.0	1.4	0.3	0.1	0.5	0.4	0.3	0.9	1.4	1.2	0.9	1.4	1.3	2.0	1.5	4.0	
25-May	2.4	6.1	4.2	3.8	3.0	3.2	2.7	3.8	3.7	1.4	1.2	1.0	1.3	1.1	1.7	1.7	2.8	3.8	5.8	6.1	7.0	7.2	7.1	5.6	3.7	7.2	
26-May	5.2	4.5	3.9	4.5	4.7	5.0	5.2	5.8	8.4	6.5	7.1	9.4	7.3	3.0	4.8	7.7	8.4	8.7	10.2	14.5	18.1	23.3	20.6	11.8	8.7	23.3	
27-May	10.9	9.1	5.2	4.3	4.8	4.2	3.1	2.7	2.6	2.0	1.4	1.6	1.7	1.4	1.8	2.5	1.4	1.6	2.1	1.8	2.5	3.7	3.6	2.2	3.3	10.9	
28-May	3.1	4.0	4.7	5.7	6.9	5.8	2.5	1.6	1.7	1.7	1.9	1.6	2.5	2.5	2.0	2.7	2.5	2.3	2.4	2.3	3.2	5.2	4.9	4.7	3.3	6.9	
29-May	3.7	4.4	3.5	3.2	3.3	3.5	2.6	2.8	3.3	3.5	1.8	1.4	1.6	2.2	1.5	0.7	0.7	0.7	0.9	0.9	0.8	1.0	0.8	1.0	2.1	4.4	
30-May	1.1	1.0	1.8	1.8	2.1	2.0	1.8	2.0	1.2	0.5	0.5	0.9	0.9	1.1	1.4	2.2	2.7	2.8	3.0	3.1	2.8	2.9	9.8	7.2	2.4	9.8	
31-May	6.6	17.1	12.1	11.6	13.7	11.8	3.5	1.1	1.7	2.2	2.4	2.7	3.4	3.8	4.4	3.6	3.2	4.7	2.6	3.9	7.3	5.6	8.1	6.2	6.0	17.1	

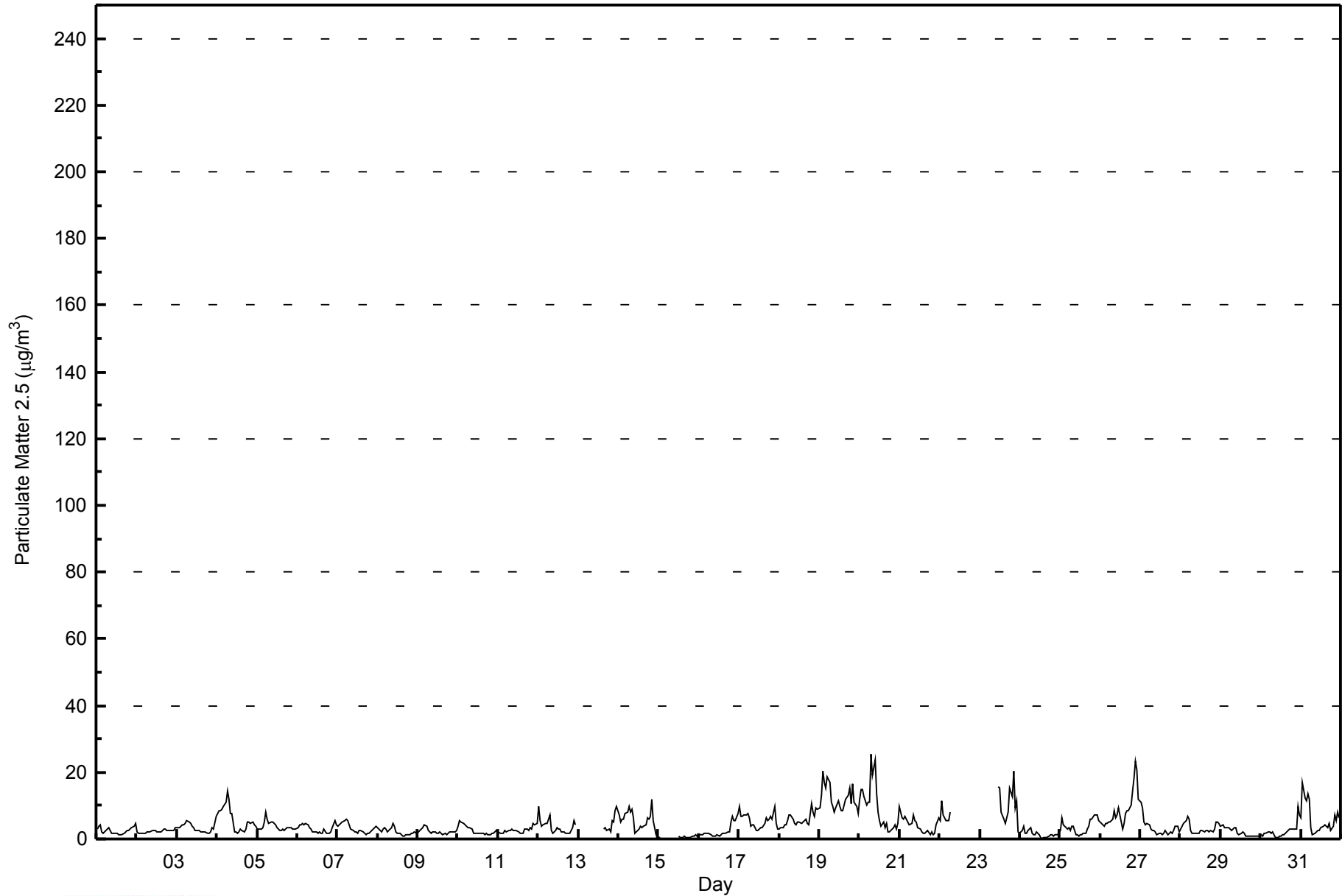
4.9	5.5	5.4	5.2	5.3	5.6	5.3	5.0	4.5	4.1	3.2	3.5	3.1	2.6	2.6	2.8	3.1	3.2	3.7	4.1	5.2	5.0	5.2	4.6	Diurnal Average	
12.0	17.1	20.3	17.1	15.4	18.8	17.1	25.3	19.2	23.8	13.6	15.8	15.1	8.4	8.3	10.1	12.0	13.2	15.4	14.5	20.3	23.3	20.6	11.8	Diurnal Maximum	

M - Maintenance      AF - Analyzer Failure      PF - Power Failure  
 Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 μg/m<sup>3</sup>



**WBEA**  
**Hourly Averages**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Fort McKay - Bertha Ganter - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Fort McKay - Bertha Ganter - May 2014**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
1 - 5	498	72.17	72.17
6 - 15	145	21.01	93.19
16 - 25	14	2.03	95.22
26 - 80	0	0.00	95.22
> 81.0	0	0.00	95.22

Total Number of Valid Hours: 690

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) - μg/m<sup>3</sup>**  
**Fort McKay - Bertha Ganter - May 2014**

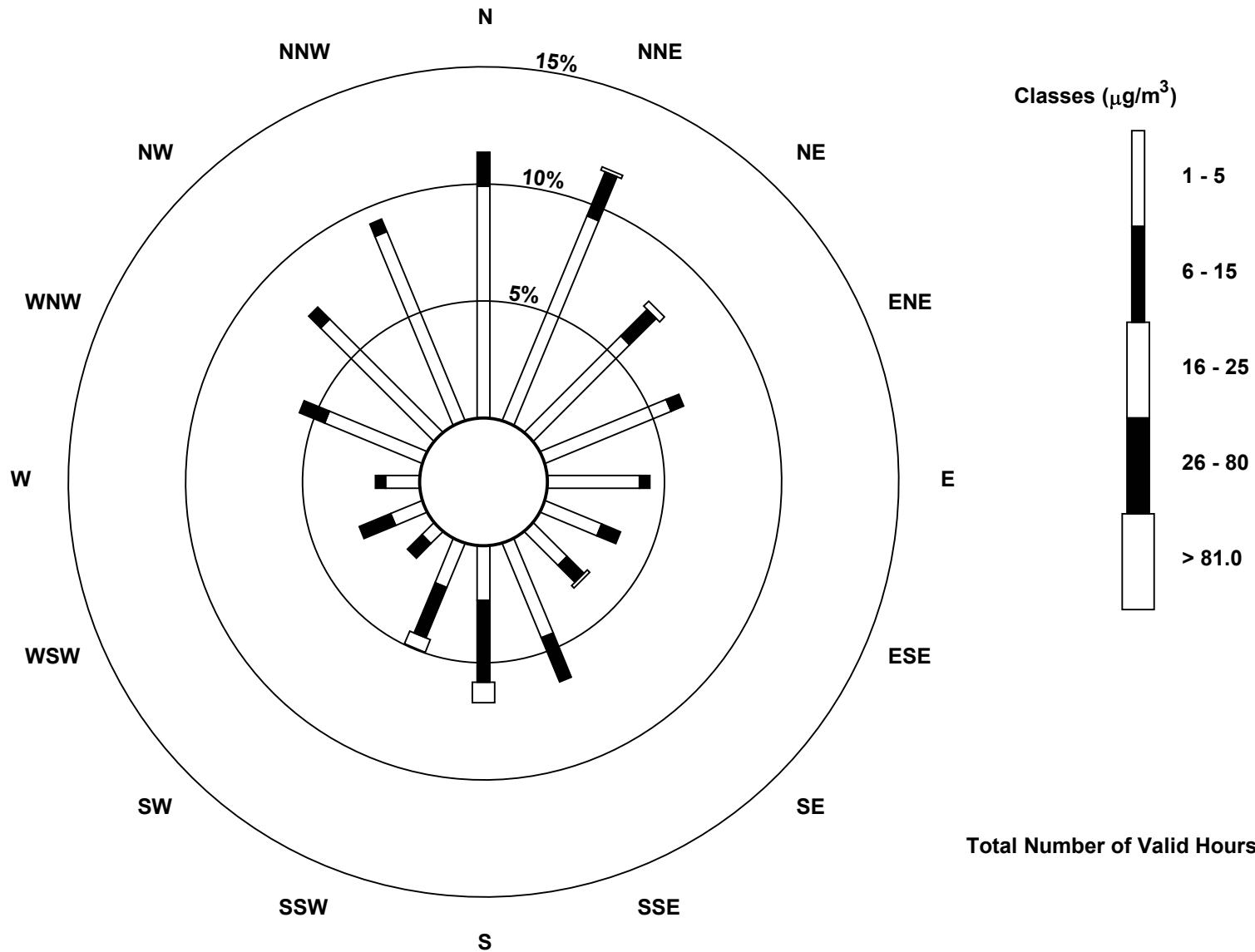
Concentration Ranges (μg/m <sup>3</sup> )	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	68	65	40	40	27	18	14	30	16	14	5	10	10	31	47	60	495
6 - 15	10	14	11	4	3	6	7	14	24	16	6	10	3	8	5	4	145
16 - 25	0	1	2	0	0	0	1	0	6	4	0	0	0	0	0	0	14
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	78	80	53	44	30	24	22	44	46	34	11	20	13	39	52	64	654

Total Number of Valid Hours: 687

Total Number of Hours: 744

Wood Buffalo Environmental Association  
Wind Rose May 2014

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: 0 ppb on May 1 01:00	Maximum Daily Average: 0.0 ppb on May 1	Hours in Service: 744
Minimum Value: 0 ppb on May 1 01:00	Maximum Diurnal Average: 0.0 ppb at hour 1	Minimum Daily Average: 0.0 ppb on May 1	Hours of Data: 653
Monthly Average: 0.0 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> = 0 P <sub>99</sub> = 0		Hours of Missing Data: 91
			Hours of Calibration: 37
			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-May	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2-May	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3-May	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
4-May	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
5-May	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
6-May	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
7-May	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
8-May	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
9-May	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
10-May	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
11-May	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
12-May	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
13-May	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
14-May	0	Z	RE	0	0	0	0	0	0	C	C	C	C	C	C	C	0	0	0	0	0	0	0	0	--	0
15-May	0	Z	PF	PF	PF	PF	PF	PF	PF	PF	PF	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	0
16-May	UO	UO	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
17-May	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
18-May	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
19-May	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
20-May	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
21-May	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
22-May	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
23-May	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
24-May	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
25-May	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
26-May	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
27-May	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
28-May	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
29-May	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
30-May	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
31-May	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0

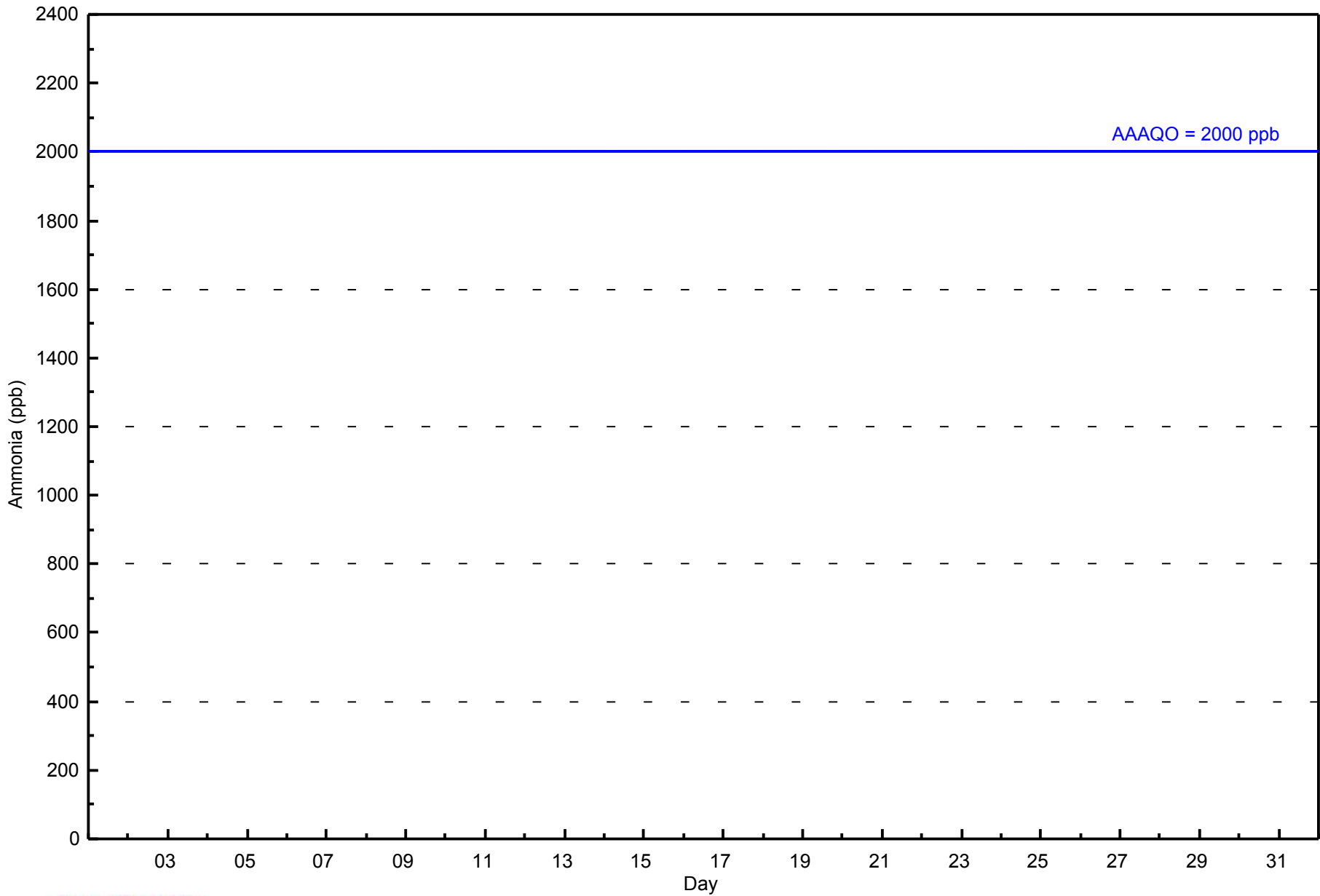
0.0	--	--	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Diurnal Average
0	--	--	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Diurnal Maximum

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



**WBEA**  
**Hourly Averages**

**Ammonia (NH<sub>3</sub>) - ppb**  
**Fort McKay - Bertha Ganter - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Ammonia (NH<sub>3</sub>) - ppb**  
**Fort McKay - Bertha Ganter - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	653	100.00	100.00
6 - 10	0	0.00	100.00
11 - 15	0	0.00	100.00
16 - 20	0	0.00	100.00
21 - 25	0	0.00	100.00
> 26	0	0.00	100.00

Total Number of Valid Hours: 653

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Ammonia (NH<sub>3</sub>) - ppb**  
**Fort McKay - Bertha Ganter - May 2014**

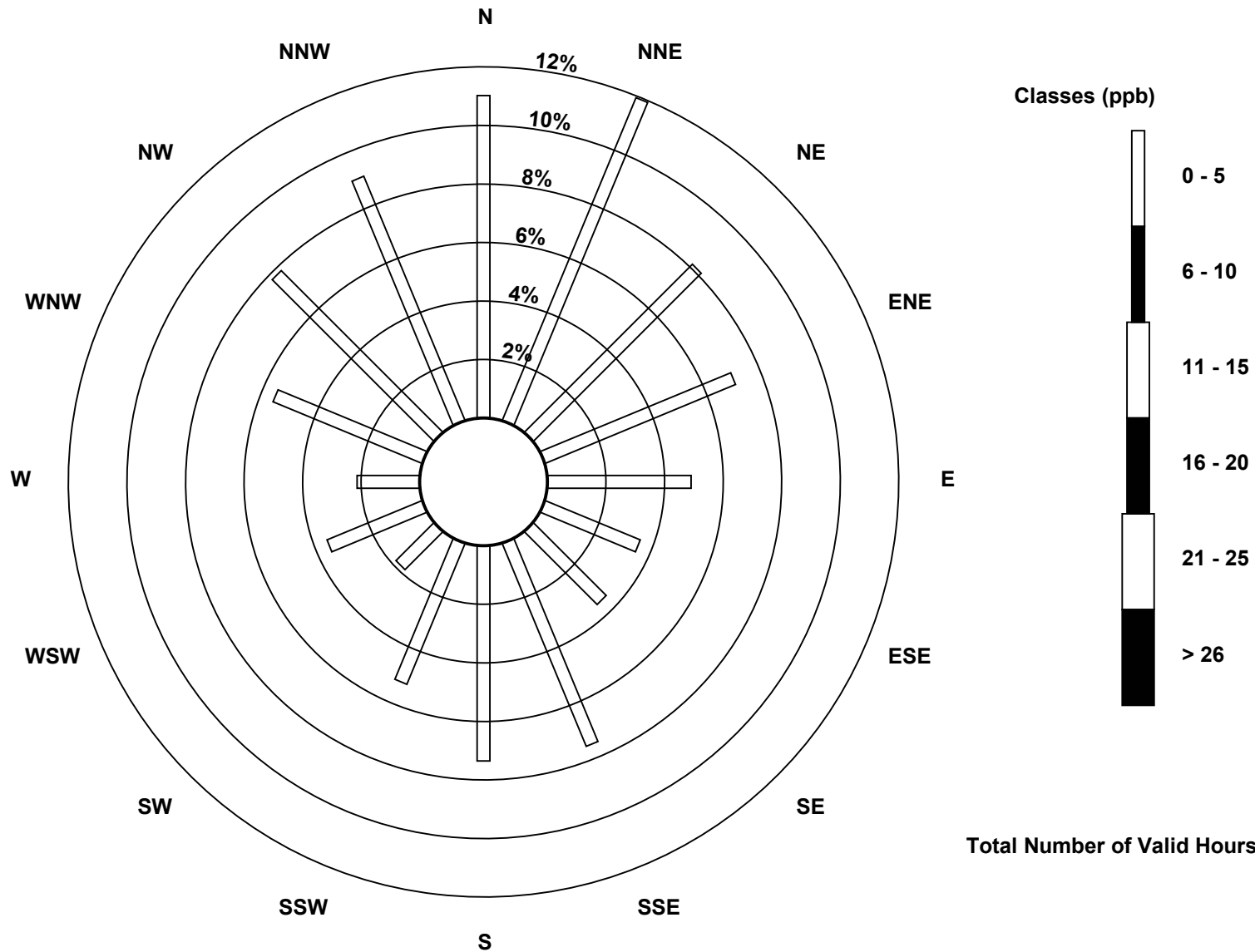
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	72	78	53	46	32	23	23	49	48	34	12	23	14	36	51	59	653
6 - 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	72	78	53	46	32	23	23	49	48	34	12	23	14	36	51	59	653

Total Number of Valid Hours: 653

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

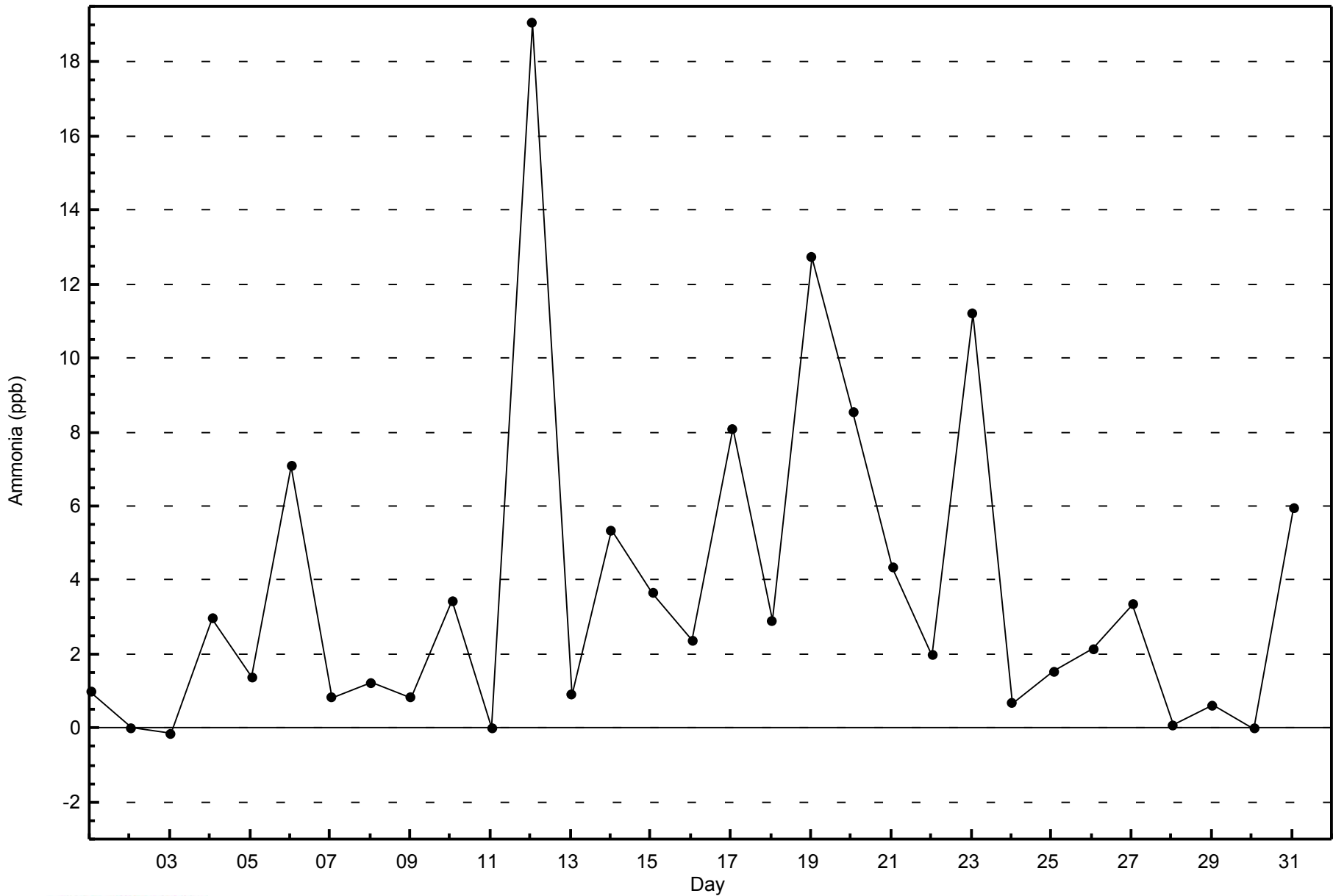
**Ammonia (NH<sub>3</sub>) - ppb  
Fort McKay - Bertha Ganter (AMS 1)**





WBEA  
Zero Responses

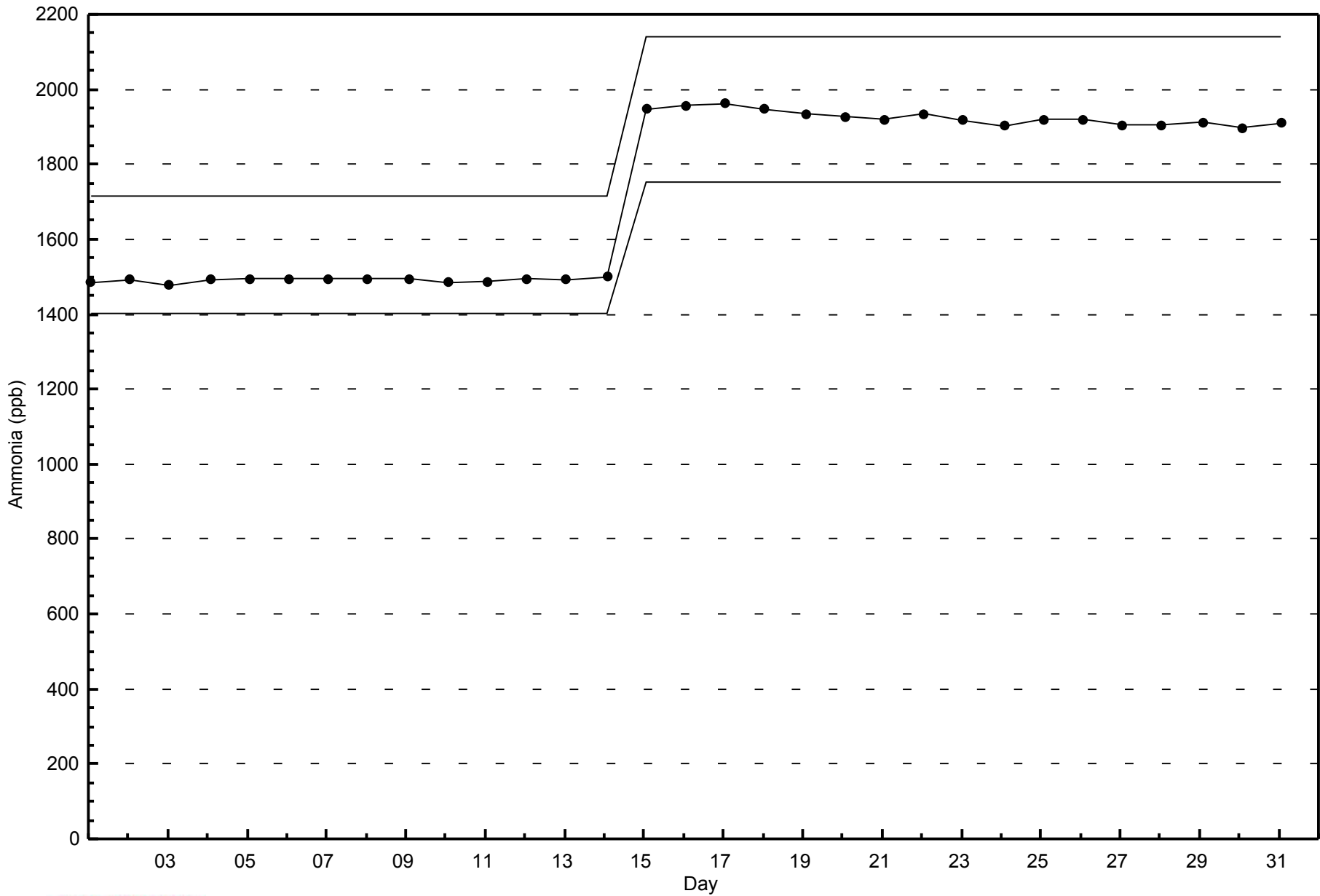
Ammonia (NH<sub>3</sub>) - ppb  
Fort McKay - Bertha Ganter - May 2014





WBEA  
Span Responses

Ammonia (NH<sub>3</sub>) - ppb  
Fort McKay - Bertha Ganter - May 2014





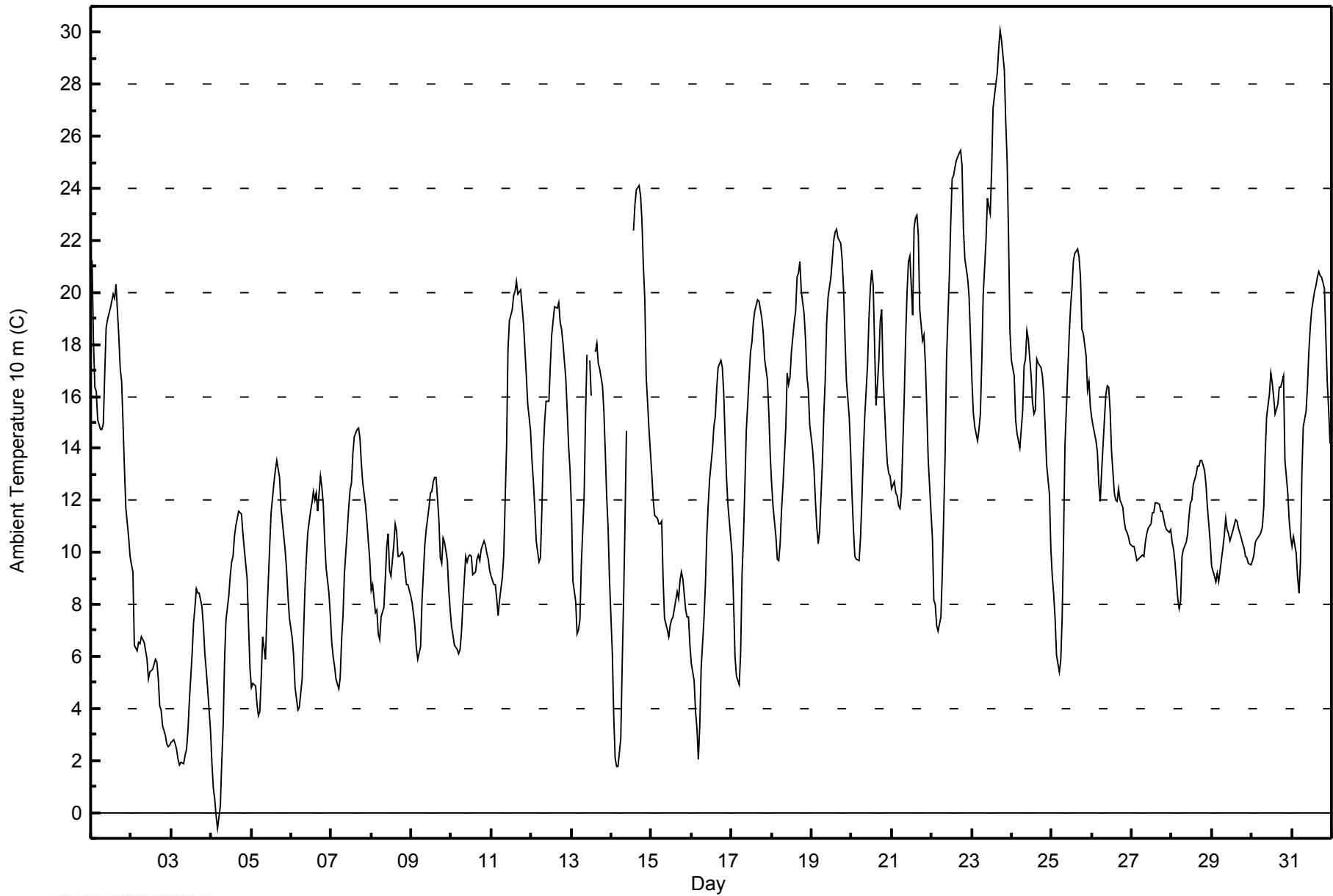
Maximum Value: 30.1 C on May 23 18:00		Maximum Daily Average: 22.4 C on May 23		Hours in Service:	744																																											
Minimum Value: -0.6 C on May 4 05:00		Minimum Daily Average: 4.7 C on May 3		Hours of Data:	739																																											
Maximum Diurnal Average: 16.3 C at hour 16		Minimum Diurnal Average: 7.7 C at hour 5		Hours of Missing Data:	5																																											
Monthly Average: 12.55 C		Percentiles: P <sub>1</sub> = 1.8 P <sub>10</sub> = 5.9 Q <sub>1</sub> = 9.0 Median = 11.7 Q <sub>3</sub> = 16.6 P <sub>90</sub> = 20.0 P <sub>99</sub> = 26.3		Hours of Calibration:	0																																											
				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-May	21.2	18.2	16.3	16.2	15.1	14.7	14.7	14.9	16.8	18.6	19.0	19.4	19.7	19.9	19.8	20.3	18.3	17.1	16.6	14.9	13.2	11.7	10.6	9.9	16.6	21.2																						
2-May	9.5	9.2	6.4	6.2	6.5	6.5	6.8	6.7	6.6	5.9	5.2	5.4	5.5	5.5	5.9	5.8	5.1	4.1	3.9	3.3	2.9	2.6	2.5	2.6	5.4	9.5																						
3-May	2.7	2.8	2.6	2.4	2.0	1.8	1.9	1.9	2.2	2.4	3.1	4.3	6.1	7.3	7.9	8.6	8.4	8.5	7.9	7.1	6.1	5.4	4.8	3.2	4.7	8.6																						
4-May	2.0	1.0	0.5	-0.1	-0.6	0.2	1.9	3.3	5.8	7.4	8.3	9.1	9.6	9.9	10.6	11.0	11.6	11.5	11.5	10.7	10.1	9.0	7.2	5.6	6.5	11.6																						
5-May	4.8	5.0	4.9	4.2	3.7	3.9	5.2	6.8	5.9	7.6	8.9	10.3	11.6	12.7	13.1	13.6	13.2	12.9	11.8	10.6	10.1	9.3	8.3	7.5	8.6	13.6																						
6-May	6.7	6.0	4.8	4.4	3.9	4.1	5.1	6.9	8.6	9.8	10.8	11.6	11.9	12.3	12.0	12.3	11.6	13.0	12.5	11.9	10.5	9.4	8.4	7.6	9.0	13.0																						
7-May	6.6	6.0	5.6	5.1	4.7	5.2	6.7	7.6	9.2	10.8	11.7	12.4	12.7	13.8	14.4	14.7	14.8	14.4	13.4	12.7	11.8	11.1	10.4	9.7	10.2	14.8																						
8-May	8.6	8.8	7.7	7.8	6.8	6.6	7.5	7.9	9.0	10.2	10.7	9.3	9.1	10.3	11.1	10.8	9.9	9.8	10.0	9.8	9.2	8.8	8.8	8.3	9.0	11.1																						
9-May	8.0	7.7	7.1	6.3	5.9	6.4	8.1	9.2	10.3	10.9	11.7	12.3	12.3	12.7	12.9	12.9	11.2	9.8	9.6	10.6	10.4	9.7	8.5	7.8	9.7	12.9																						
10-May	7.1	6.8	6.4	6.3	6.1	6.3	6.9	8.0	9.9	9.6	9.8	9.9	9.8	9.2	9.3	9.7	9.9	9.7	10.1	10.4	10.3	10.0	9.7	9.3	8.8	10.4																						
11-May	9.1	8.8	8.8	8.2	7.6	8.1	9.1	9.9	12.0	14.1	17.8	18.9	19.3	19.9	20.0	20.4	19.9	20.1	19.5	18.8	17.8	16.8	15.7	14.7	14.8	20.4																						
12-May	13.5	12.7	11.7	10.5	9.6	9.8	11.6	13.9	15.1	15.8	15.8	17.2	18.3	18.9	19.4	19.4	19.6	18.9	18.6	18.1	16.7	15.4	14.1	13.1	15.3	19.6																						
13-May	11.7	8.9	8.1	6.9	7.0	7.4	9.5	12.2	15.3	17.6	UO	17.4	16.0	M	17.7	18.1	17.3	17.1	16.4	15.4	13.9	12.1	10.9	8.9	13.0	18.1																						
14-May	6.1	3.7	2.1	1.8	1.8	2.9	5.7	8.2	11.2	14.7	M	M	M	22.4	23.4	23.9	24.1	23.7	22.8	21.0	19.8	16.8	14.7	13.9	13.6	24.1																						
15-May	13.0	12.0	11.4	11.3	11.1	11.1	11.2	9.0	7.5	7.0	6.8	7.2	7.4	7.5	8.2	8.5	8.2	8.9	9.2	9.0	7.8	7.5	7.5	6.4	8.9	13.0																						
16-May	5.8	5.1	3.9	3.2	2.1	3.3	5.6	7.5	8.8	10.6	11.8	12.8	14.0	14.8	15.2	16.3	17.1	17.4	17.1	16.1	14.4	12.8	11.8	10.6	10.8	17.4																						
17-May	9.9	8.1	6.0	5.3	4.9	6.2	9.2	10.6	12.6	14.7	16.8	17.7	18.1	18.9	19.3	19.7	19.7	19.4	19.0	18.5	17.4	16.6	15.3	13.7	14.1	19.7																						
18-May	12.6	11.7	10.6	9.7	9.7	10.3	11.6	12.6	14.8	16.9	16.4	16.7	17.7	18.8	19.3	20.6	20.8	21.2	20.0	19.2	18.2	16.8	16.2	14.9	15.7	21.2																						
19-May	14.0	13.2	12.0	11.0	10.4	10.8	13.5	15.4	16.7	18.8	19.8	20.6	21.3	22.0	22.3	22.4	22.1	21.9	21.2	20.1	18.3	16.7	15.2	13.9	17.2	22.4																						
20-May	12.2	10.9	9.8	9.7	9.7	10.6	12.1	13.8	15.2	17.2	19.0	20.2	20.9	20.3	15.7	16.4	17.4	18.9	19.3	16.9	14.4	13.4	13.1	12.9	15.0	20.9																						
21-May	12.5	12.7	12.3	12.2	11.8	11.7	12.3	15.9	18.3	20.0	21.2	21.4	19.1	22.5	22.9	23.0	22.2	19.4	18.1	18.4	17.3	15.6	13.6	11.6	16.9	23.0																						
22-May	10.5	8.2	8.0	7.2	7.0	7.5	9.2	11.4	13.8	17.4	20.6	22.7	24.4	24.5	24.8	25.1	25.3	25.5	24.9	22.5	21.3	20.5	19.8	18.3	17.5	25.5																						
23-May	16.6	15.4	14.8	14.3	14.7	15.3	17.4	19.9	22.0	23.6	23.3	23.0	24.7	27.1	28.0	28.5	29.4	30.1	29.7	28.5	26.5	25.1	22.1	18.5	22.4	30.1																						
24-May	17.4	16.8	15.1	14.6	14.3	14.0	15.4	17.2	17.5	18.5	18.2	16.8	15.8	15.3	15.5	17.4	17.3	17.1	16.8	16.1	14.8	13.3	12.2	10.1	15.7	18.5																						
25-May	9.1	8.4	7.5	6.1	5.4	5.8	7.5	10.5	14.1	16.9	18.4	19.4	20.2	21.2	21.5	21.6	21.4	20.6	18.6	18.4	17.6	16.3	16.6	15.6	14.9	21.6																						
26-May	15.1	14.8	14.3	13.9	12.6	11.9	13.1	15.1	16.1	16.4	16.4	15.5	13.9	12.3	12.0	12.0	12.4	12.0	11.7	11.2	10.9	10.8	10.6	10.3	13.1	16.4																						
27-May	10.2	10.2	10.0	9.7	9.7	9.8	9.9	9.9	10.4	10.7	11.0	11.1	11.5	11.5	11.9	11.9	11.8	11.6	11.6	11.3	11.0	10.9	10.8	10.9	10.8	11.9																						
28-May	10.4	10.1	9.6	8.2	7.8	8.1	9.9	10.1	10.4	10.7	11.4	11.9	12.0	12.6	13.0	13.3	13.3	13.5	13.6	13.2	12.6	11.7	11.1	10.4	11.2	13.6																						
29-May	9.5	9.1	8.9	9.2	8.9	9.3	10.2	10.7	11.3	10.9	10.7	10.5	10.8	11.1	11.3	11.2	10.9	10.6	10.3	10.2	9.9	9.8	9.6	9.5	10.2	11.3																						
30-May	9.7	9.9	10.4	10.5	10.7	10.8	11.0	11.7	13.8	15.2	16.1	16.9	16.5	16.0	15.3	15.7	16.3	16.3	16.6	16.8	13.6	12.3	11.3	10.6	13.5	16.9																						
31-May	10.2	10.6	10.0	9.1	8.5	9.6	13.0	14.8	15.5	16.4	17.7	18.7	19.3	20.0	20.3	20.6	20.8	20.6	20.6	20.2	18.3	16.6	15.5	14.2	15.9	20.8																						
																								10.2	9.4	8.6	8.1	7.7	8.1	9.4	10.7	12.1	13.5	14.1	14.7	15.0	15.7	15.9	16.3	16.2	16.0	15.6	14.9	13.8	12.7	11.8	10.8	Diurnal Average
																								21.2	18.2	16.3	16.2	15.1	15.3	17.4	19.9	22.0	23.6	23.3	23.0	24.7	27.1	28.0	28.5	29.4	30.1	29.7	28.5	26.5	25.1	22.1	18.5	Diurnal Maximum
M - Maintenance																								UO - Unstable Operation																								





**WBEA**  
**Hourly Averages**

**Ambient Temperature 10 m (AT 10m) - C**  
**Fort McKay - Bertha Ganter - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Ambient Temperature 10 m (AT 10m) - C**  
**Fort McKay - Bertha Ganter - May 2014**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	2	0.27	0.27
0 - 10	256	34.64	34.91
10 - 20	407	55.07	89.99
> 20	74	10.01	100.00

Total Number of Valid Hours: 739

Total Number of Hours: 744



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

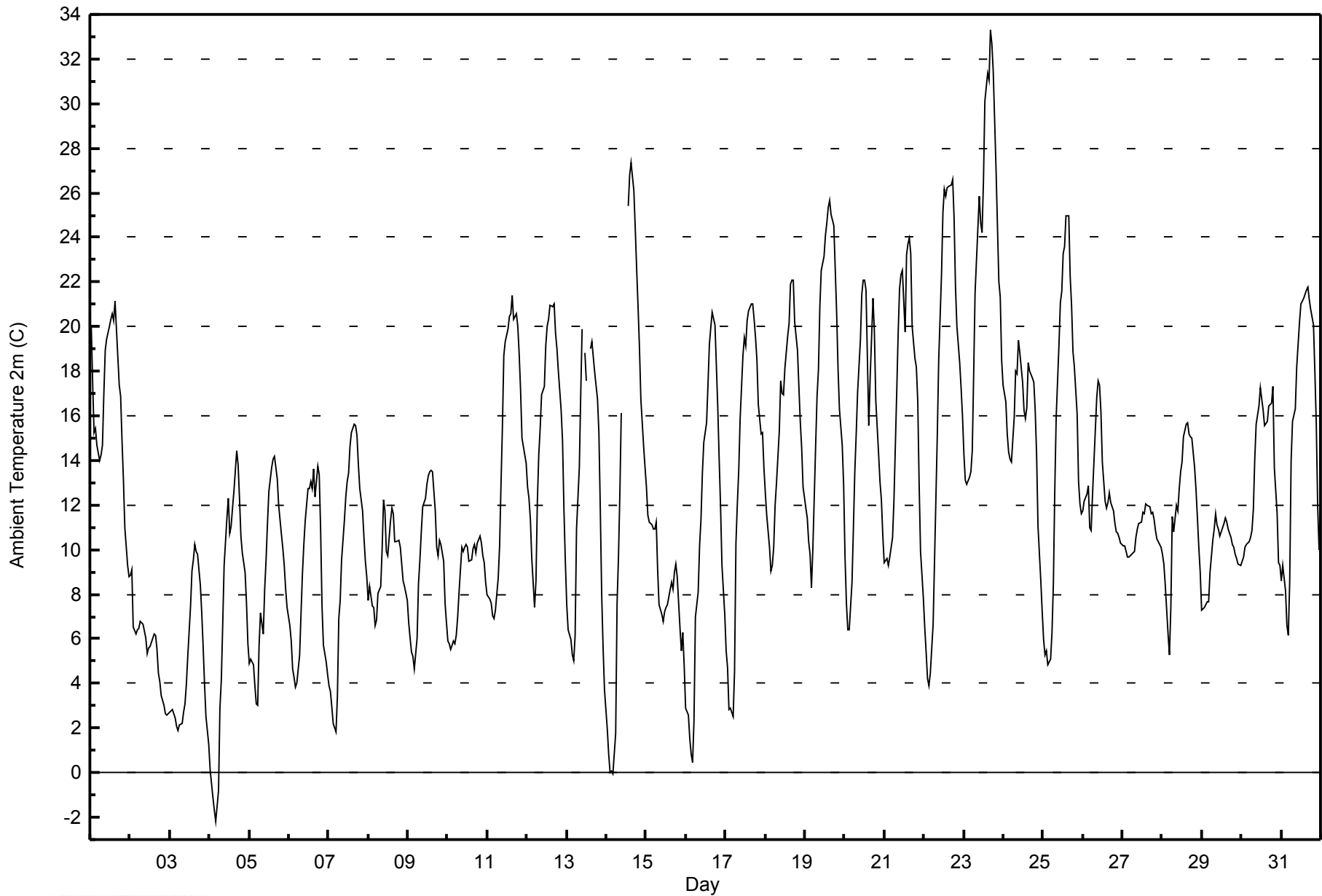
**Ambient Temperature 2m (AT 2m) - C**  
**Fort McKay - Bertha Ganter - May 2014**

Maximum Value: 33.3 C on May 23 17:00		Maximum Daily Average: 22.9 C on May 23		Hours in Service: 744																																													
Minimum Value: -2.2 C on May 4 05:00		Minimum Daily Average: 5.0 C on May 3		Hours of Data: 739																																													
Maximum Diurnal Average: 17.6 C at hour 16		Minimum Diurnal Average: 6.6 C at hour 5		Hours of Missing Data: 5																																													
Monthly Average: 12.54 C		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 5.2 Q <sub>1</sub> = 8.3 Median = 11.6 Q <sub>3</sub> = 16.9 P <sub>90</sub> = 21.0 P <sub>99</sub> = 24.9		Hours of Calibration: 0																																													
				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-May	20.0	17.4	15.2	15.5	14.7	14.0	14.3	14.7	17.0	18.9	19.5	20.0	20.3	20.6	20.2	21.1	18.7	17.4	16.9	14.9	13.1	11.0	9.3	8.8	16.4	21.1																							
2-May	8.9	9.1	6.6	6.2	6.4	6.5	6.8	6.7	6.7	6.0	5.3	5.6	5.7	5.8	6.2	6.1	5.5	4.5	4.1	3.5	3.0	2.7	2.6	2.6	5.5	9.1																							
3-May	2.7	2.8	2.7	2.5	2.1	1.9	2.1	2.2	2.7	3.1	3.9	5.2	7.5	9.0	9.5	10.2	9.9	9.8	8.4	7.1	5.7	4.0	2.5	1.2	5.0	10.2																							
4-May	0.1	-0.5	-1.1	-1.7	-2.2	-0.8	2.9	4.1	6.6	9.3	11.4	12.3	10.7	11.0	11.9	12.6	14.4	13.8	12.3	10.6	9.8	9.0	7.6	5.8	7.1	14.4																							
5-May	4.9	5.1	4.9	3.9	3.1	3.0	5.7	7.1	6.2	8.2	9.6	11.2	12.6	13.7	14.0	14.2	13.7	13.2	12.0	10.7	10.1	9.3	8.2	7.4	8.8	14.2																							
6-May	6.6	5.9	4.6	4.2	3.8	4.0	5.3	7.1	8.9	10.3	11.3	12.7	12.8	13.1	12.8	13.6	12.4	13.7	13.3	10.9	7.5	5.7	5.0	4.4	8.7	13.7																							
7-May	3.9	3.6	3.0	2.2	1.8	3.4	6.9	7.7	9.6	11.3	12.4	13.1	13.4	14.6	15.2	15.6	15.6	15.1	13.8	12.8	11.7	10.6	9.5	8.8	9.8	15.6																							
8-May	7.7	8.4	7.5	7.4	6.6	6.8	8.0	8.4	10.1	12.2	11.7	9.9	9.7	11.3	11.9	11.6	10.3	10.3	10.4	10.1	9.4	8.6	8.3	7.7	9.4	12.2																							
9-May	6.7	6.0	5.4	5.2	4.6	6.1	8.5	9.6	10.8	11.9	12.3	12.9	13.3	13.5	13.6	13.5	11.7	10.1	9.7	10.4	10.3	9.5	7.6	6.7	9.6	13.6																							
10-May	5.9	5.8	5.5	5.9	5.8	6.2	7.0	8.1	10.1	9.9	10.1	10.2	10.1	9.5	9.5	10.1	10.3	9.9	10.3	10.6	10.3	9.8	9.4	8.5	8.7	10.6																							
11-May	8.0	7.8	7.6	7.0	6.9	7.3	8.7	10.2	12.9	15.5	18.7	19.3	19.9	20.4	20.6	21.4	20.3	20.6	20.0	18.7	17.1	15.0	14.6	13.9	14.7	21.4																							
12-May	12.8	12.3	11.3	9.6	7.4	8.6	12.2	14.3	15.5	16.9	17.3	19.2	20.0	20.3	21.0	20.9	21.0	19.7	19.0	18.0	16.3	14.8	11.8	9.5	15.4	21.0																							
13-May	7.5	6.4	6.0	5.3	5.1	6.2	10.9	13.7	16.9	19.9	UO	18.8	17.6	M	19.0	19.4	18.6	17.9	16.8	15.2	11.8	8.0	5.6	3.7	12.3	19.9																							
14-May	2.0	0.8	0.0	0.1	0.0	1.7	7.6	9.7	12.6	16.1	M	M	M	25.4	26.8	27.3	26.1	24.4	22.6	20.9	19.1	16.7	14.7	13.7	13.7	27.3																							
15-May	12.8	11.6	11.2	11.1	10.9	10.9	11.2	9.1	7.6	7.1	6.8	7.2	7.4	7.5	8.2	8.5	8.2	9.0	9.4	8.8	6.5	5.5	6.3	4.8	8.7	12.8																							
16-May	2.9	2.6	1.5	0.8	0.5	2.3	6.9	8.1	10.2	11.4	13.5	14.8	15.7	17.4	19.2	20.0	20.6	20.1	18.3	16.4	14.1	11.9	9.3	7.1	11.1	20.6																							
17-May	5.5	4.7	2.8	2.9	2.5	4.5	10.3	12.0	13.5	15.9	18.7	19.5	19.2	20.3	20.7	21.0	21.0	20.3	19.5	18.5	16.5	15.2	15.2	13.7	13.9	21.0																							
18-May	12.5	11.6	10.1	9.1	9.3	10.1	12.0	13.0	15.3	17.6	17.0	17.0	18.1	19.5	20.1	21.9	22.1	22.1	20.2	18.9	17.3	15.8	14.6	12.8	15.8	22.1																							
19-May	11.9	11.5	10.4	9.8	8.3	10.0	14.7	16.9	18.1	20.9	22.5	23.1	24.1	24.7	25.4	25.7	25.0	24.5	22.6	20.6	18.2	16.3	14.7	12.9	18.0	25.7																							
20-May	9.6	7.6	6.4	6.4	8.6	11.0	13.5	15.2	17.1	19.4	21.4	22.1	22.1	21.6	15.6	17.8	19.5	21.3	19.8	16.7	14.3	13.1	12.2	10.6	15.1	22.1																							
21-May	9.4	9.6	9.3	9.7	10.1	10.6	12.2	17.1	19.7	21.7	22.4	22.5	19.7	23.2	23.7	23.9	23.3	20.0	18.6	18.2	16.7	12.9	9.9	7.8	16.3	23.9																							
22-May	6.6	5.4	4.2	3.9	4.4	6.7	9.5	12.3	15.2	18.5	22.3	25.1	26.1	25.9	26.2	26.3	26.4	26.6	24.9	21.8	20.0	18.4	17.3	16.0	17.1	26.6																							
23-May	14.3	13.1	12.9	13.2	13.5	14.4	17.9	21.5	24.4	25.8	24.6	24.2	26.6	30.1	31.4	31.0	33.3	32.7	31.4	27.0	24.5	22.0	21.3	18.5	22.9	33.3																							
24-May	17.4	16.6	15.2	14.4	14.1	13.9	16.0	18.0	17.9	19.4	18.8	17.5	16.2	15.9	16.4	18.4	18.0	17.7	17.5	16.2	14.2	11.1	8.6	7.2	15.7	19.4																							
25-May	6.0	5.3	5.5	4.8	5.1	6.3	8.5	12.7	15.9	19.2	21.1	21.6	23.2	23.6	25.0	25.0	22.3	20.9	18.9	18.2	16.1	13.1	12.1	11.6	15.1	25.0																							
26-May	11.7	12.2	12.5	12.9	11.0	10.9	12.5	15.4	16.8	17.6	17.4	16.2	13.9	12.2	11.9	12.1	12.5	12.1	11.8	11.2	10.8	10.7	10.6	10.3	12.8	17.6																							
27-May	10.2	10.2	9.9	9.7	9.6	9.8	9.9	9.9	10.6	10.9	11.2	11.3	11.7	11.6	12.0	12.0	11.9	11.6	11.7	11.3	10.8	10.5	10.2	10.1	10.8	12.0																							
28-May	9.8	9.3	8.4	6.2	5.3	7.4	11.5	10.8	12.0	11.8	12.7	13.5	13.9	15.0	15.6	15.7	15.2	15.0	15.0	13.7	12.7	11.4	10.1	9.0	11.7	15.7																							
29-May	7.3	7.4	7.5	7.6	7.7	8.9	10.5	10.9	11.6	11.1	10.9	10.6	11.0	11.2	11.4	11.2	10.9	10.6	10.3	10.1	9.8	9.6	9.3	9.3	9.9	11.6																							
30-May	9.5	9.7	10.1	10.2	10.4	10.6	10.8	11.8	14.1	15.6	16.4	17.3	16.8	16.3	15.6	15.8	16.4	16.5	16.6	17.3	13.7	11.6	9.4	9.3	13.4	17.3																							
31-May	8.6	9.3	8.1	6.6	6.2	8.6	14.0	15.7	16.3	18.2	19.2	20.2	21.0	21.3	21.5	21.7	21.8	21.2	20.7	20.1	18.0	15.6	11.9	10.0	15.7	21.8																							
																								8.5	8.0	7.3	6.9	6.6	7.5	10.0	11.4	13.0	14.6	15.2	15.8	16.0	16.9	17.2	17.6	17.3	16.9	16.0	14.8	13.2	11.6	10.3	9.2	Diurnal Average	
																								20.0	17.4	15.2	15.5	14.7	14.4	17.9	21.5	24.4	25.8	24.6	25.1	26.6	30.1	31.4	31.0	33.3	32.7	31.4	27.0	24.5	22.0	21.3	18.5	Diurnal Maximum	
M - Maintenance																								UO - Unstable Operation																									



**WBEA**  
**Hourly Averages**

**Ambient Temperature 2m (AT 2m) - C**  
**Fort McKay - Bertha Ganter - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Ambient Temperature 2m (AT 2m) - C**  
**Fort McKay - Bertha Ganter - May 2014**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	6	0.81	0.81
0 - 10	262	35.45	36.27
10 - 20	372	50.34	86.60
> 20	99	13.40	100.00

Total Number of Valid Hours: 739

Total Number of Hours: 744

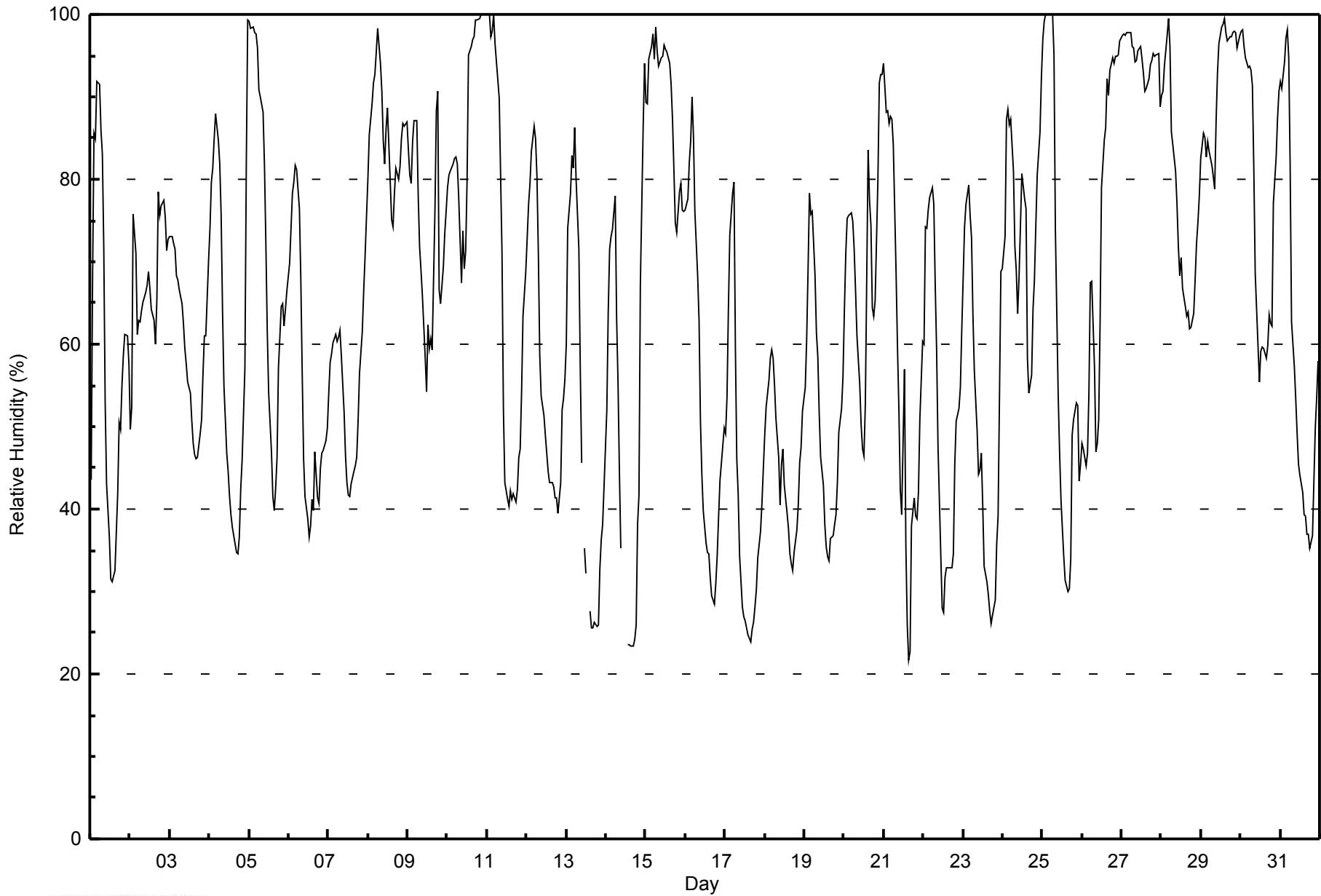


Maximum Value: 100 % on May 10 21:00														Maximum Daily Average: 94.9 % on May 27														Hours in Service: 744	
Minimum Value: 22 % on May 21 16:00														Minimum Daily Average: 41.8 % on May 17														Hours of Data: 739	
Maximum Diurnal Average: 83.4 % at hour 5														Minimum Diurnal Average: 50.7 % at hour 16														Hours of Missing Data: 5	
Monthly Average: 65.1 %														Percentiles: P <sub>1</sub> = 24 P <sub>10</sub> = 36 Q <sub>1</sub> = 46 Median = 65 Q <sub>3</sub> = 84 P <sub>90</sub> = 95 P <sub>99</sub> = 100														Hours of Calibration: 0	
																												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-May	43	68	86	85	92	91	86	83	72	53	43	37	32	31	32	33	42	50	50	55	59	61	61	58	58.4	92			
2-May	50	52	76	71	61	63	63	64	65	66	67	69	67	64	63	60	65	78	76	77	77	75	71	73	67.3	78			
3-May	73	73	72	72	68	68	67	65	62	60	58	55	54	51	48	47	46	46	49	51	56	61	61	70	59.7	73			
4-May	74	80	81	85	88	85	82	76	64	55	47	44	42	39	38	37	35	35	37	42	46	57	82	99	60.4	99			
5-May	99	98	98	98	98	96	91	90	88	82	72	62	54	47	42	40	43	46	57	64	65	62	64	67	71.8	99			
6-May	70	74	78	80	82	81	76	68	57	46	42	39	37	38	41	40	47	41	41	45	47	47	48	50	54.8	82			
7-May	54	58	59	60	61	60	61	62	59	52	46	43	42	42	43	45	45	46	51	57	62	66	71	75	54.9	75			
8-May	80	86	89	92	93	95	98	94	91	85	82	86	89	80	75	74	78	81	80	82	85	87	86	87	85.6	98			
9-May	84	80	79	85	87	87	78	72	69	66	58	54	62	60	61	59	76	88	91	67	65	69	73	76	72.8	91			
10-May	79	81	81	82	82	83	82	78	67	74	69	71	80	95	96	97	97	99	99	99	100	100	100	100	87.2	100			
11-May	100	100	97	98	100	97	92	90	80	71	52	43	41	40	42	41	42	41	42	46	47	54	63	69	66.2	100			
12-May	73	77	79	83	87	85	80	71	59	54	51	49	47	45	43	43	43	41	41	39	43	52	53	56	58.1	87			
13-May	60	74	78	83	81	86	80	71	57	46	UO	35	32	M	28	26	26	26	26	26	33	36	38	43	49.6	86			
14-May	52	64	71	73	74	78	63	56	45	35	M	M	M	24	24	23	23	24	26	38	42	67	86	94	51.5	94			
15-May	89	89	95	96	98	95	99	96	94	95	95	96	96	95	94	91	87	81	75	74	78	80	76	76	89.1	99			
16-May	76	78	82	84	90	85	76	68	63	51	44	40	36	35	35	32	29	29	31	34	39	43	46	50	53.2	90			
17-May	49	54	64	73	78	80	60	46	42	34	28	27	26	26	25	24	25	26	28	30	34	37	41	45	41.8	80			
18-May	49	52	56	58	59	58	55	51	46	41	45	47	43	40	38	35	33	33	35	38	41	46	47	52	45.7	59			
19-May	55	61	69	78	76	76	68	61	58	52	46	43	38	35	34	34	37	37	38	39	43	49	52	56	51.5	78			
20-May	64	71	75	76	76	75	72	66	61	55	50	47	46	53	84	77	74	64	63	65	80	92	93	93	69.7	93			
21-May	94	88	88	87	88	87	84	69	60	52	42	39	57	36	26	22	23	38	41	39	39	42	51	60	56.3	94			
22-May	60	74	74	76	78	79	77	67	59	48	34	28	27	32	33	33	33	33	34	45	51	52	55	62	51.9	79			
23-May	68	74	77	79	76	73	64	57	49	44	45	47	40	33	31	30	28	26	27	29	36	39	54	69	49.8	79			
24-May	69	73	87	88	87	87	81	72	69	64	68	81	79	78	76	58	54	56	64	68	74	80	86	92	74.7	92			
25-May	97	99	100	100	100	100	100	95	74	54	47	41	38	34	31	30	30	34	49	51	53	53	43	45	62.4	100			
26-May	48	47	45	47	54	67	68	57	47	48	51	63	79	85	86	92	90	93	95	94	95	95	95	97	72.4	97			
27-May	97	98	98	98	98	98	96	96	94	94	96	96	95	93	91	91	92	94	94	95	95	95	95	89	94.9	98			
28-May	90	91	94	97	99	96	86	84	81	77	72	68	71	67	65	63	64	62	62	64	68	72	75	78	76.9	99			
29-May	83	86	85	83	85	83	82	80	79	87	93	97	98	99	99	98	97	97	97	98	98	98	96	97	91.4	99			
30-May	98	98	96	95	94	94	93	91	81	69	60	55	59	60	59	58	60	64	63	62	77	83	88	91	77.0	98			
31-May	92	91	94	97	98	95	82	63	57	53	49	46	44	42	39	39	37	37	35	37	43	50	54	58	59.7	98			
	73.2	77.0	80.8	82.6	83.4	83.3	78.7	72.9	66.1	60.0	57.0	55.0	55.0	53.2	52.3	50.7	51.7	53.2	54.7	56.5	60.3	64.6	67.9	71.8		Diurnal Average			
	100	100	100	100	100	100	100	96	94	95	96	97	98	99	99	98	97	99	99	99	100	100	100	100		Diurnal Maximum			
M - Maintenance		UO - Unstable Operation																											



**WBEA**  
**Hourly Averages**

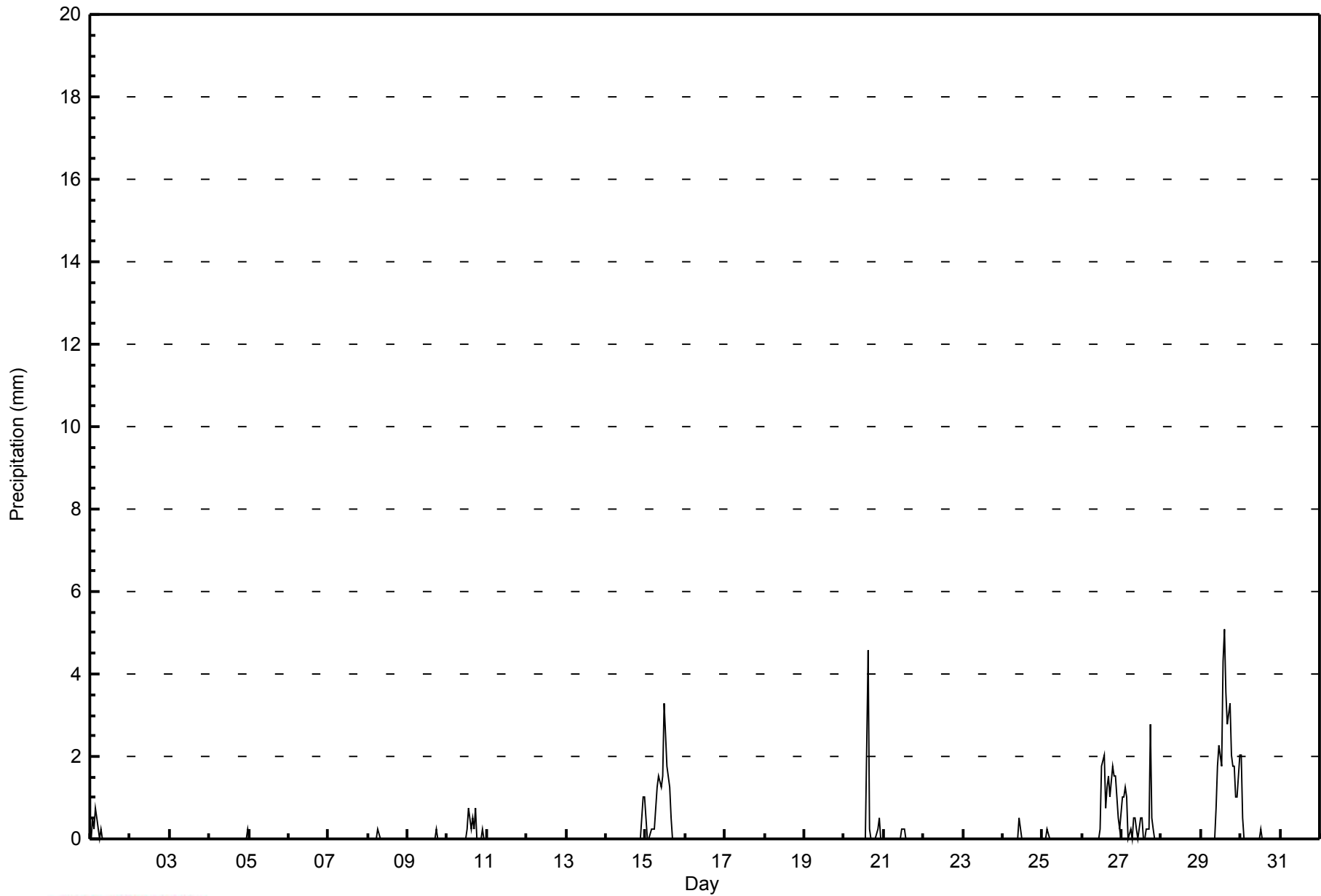
**Relative Humidity (RH) - %**  
**Fort McKay - Bertha Ganter - May 2014**





Maximum Value: 5.1 mm on May 29 15:00		Maximum Daily Total: 35.3 mm on May 29		Hours in Service: 744																							
Minimum Value: 0.0 mm on May 1 01:00		Minimum Daily Total: 0.0 mm on May 2		Hours of Data: 744																							
Maximum Diurnal Total: 11.9 mm at hour 15		Minimum Diurnal Total: 0.5 mm at hour 6		Hours of Missing Data: 0																							
Monthly Total: 96.27 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> = 0.3 P <sub>99</sub> = 2.3		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-May	0.0	0.5	0.3	0.8	0.5	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	0.8	
2-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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
5-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3
9-May	0.0	0.0	0.0	0.0	0.0	0.0	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	0.3	0.3	0.3
10-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.8	0.3	0.5	0.3	0.8	0.0	0.0	0.0	0.3	0.0	0.0	3.0	0.8	0.8
11-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	2.0	1.0	1.0
15-May	0.5	0.0	0.0	0.3	0.3	0.3	0.8	1.3	1.5	1.3	1.5	3.3	2.5	1.8	1.3	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.0	3.3	3.3
16-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	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	0.3	0.0	0.0	0.0	0.0	0.0	0.3	0.5	0.0	5.6	4.6	4.6
21-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.3	0.3
22-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.5
25-May	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3
26-May	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	2.0	0.8	1.3	1.5	1.0	1.8	1.5	1.5	1.0	0.5	0.3	15.2	2.0	2.0
27-May	1.0	1.0	1.3	1.0	0.0	0.3	0.0	0.5	0.5	0.3	0.0	0.5	0.5	0.0	0.0	0.3	0.3	2.8	0.5	0.3	0.0	0.0	0.0	10.9	2.8	2.8	
28-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	1.8	2.3	1.8	4.3	5.1	3.6	2.8	3.3	2.0	1.8	1.8	1.0	1.0	2.0	35.3	5.1	5.1
30-May	2.0	0.5	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	2.8	2.0	2.0	
31-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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			







**WBEA**  
**Cumulative Frequency Distribution**

**Precipitation (PC) - mm**  
**Fort McKay - Bertha Ganter - May 2014**

<b>Concentration Ranges (mm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.3	684	91.94	91.94
0.4 - 0.5	14	1.88	93.82
0.6 - 0.7	0	0.00	93.82
0.8 - 1.4	20	2.69	96.51
1.5 - 10	26	3.49	100.00
> 10	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

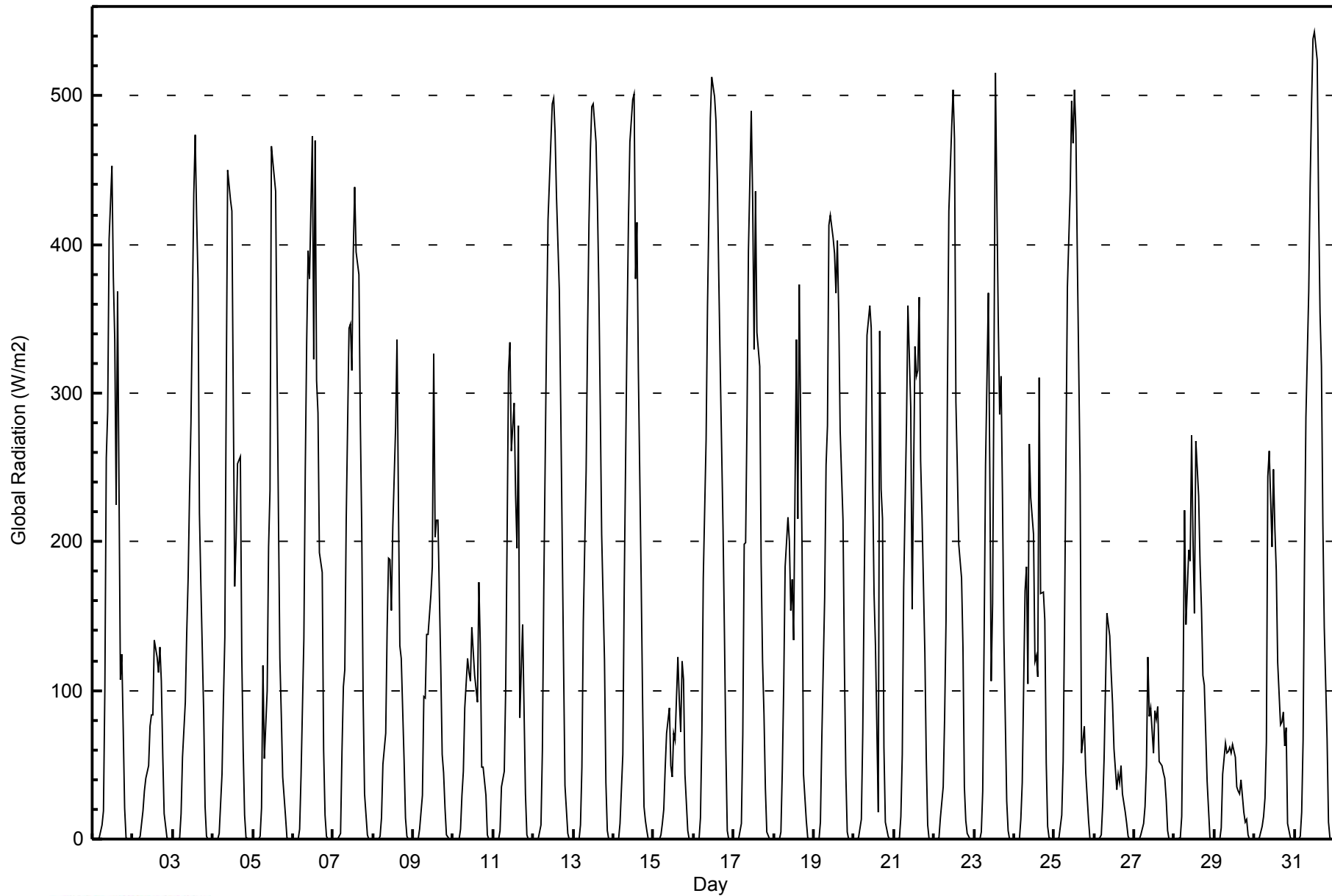


Maximum Value: 543 W/m2 on May 31 13:00		Maximum Daily Average: 208.3 W/m2 on May 31		Hours in Service: 744																						
Minimum Value: 0 W/m2 on May 23 23:00		Minimum Daily Average: 27.3 W/m2 on May 29		Hours of Data: 744																						
Maximum Diurnal Average: 298.8 W/m2 at hour 14		Minimum Diurnal Average: 0.0 W/m2 at hour 24		Hours of Missing Data: 0																						
Monthly Average: 123.3 W/m2		Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 56 Q <sub>3</sub> = 208 P <sub>90</sub> = 369 P <sub>99</sub> = 503		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-May	0	0	0	0	1	9	19	101	257	288	404	452	378	336	225	369	107	125	74	21	1	0	0	0	131.9	452
2-May	0	0	0	0	2	10	19	32	41	50	76	83	84	134	122	112	129	106	57	17	1	0	0	0	44.8	134
3-May	0	0	0	0	1	17	55	92	138	175	233	280	433	474	420	376	219	172	85	22	2	0	0	0	133.2	474
4-May	0	0	0	0	4	43	93	136	301	450	430	423	294	170	202	253	258	123	60	16	1	0	0	0	135.7	450
5-May	0	0	0	0	2	21	117	54	99	197	234	466	456	436	317	216	122	83	42	15	1	0	0	0	119.9	466
6-May	0	0	0	0	7	43	134	248	335	396	377	473	323	470	308	287	193	179	60	16	2	0	0	0	160.5	473
7-May	0	0	0	0	4	59	103	114	214	344	347	315	394	439	395	380	280	209	94	30	3	0	0	0	155.2	439
8-May	0	0	0	0	2	15	51	71	142	189	188	153	209	277	336	226	130	121	53	14	2	0	0	0	90.8	336
9-May	0	0	0	0	7	29	96	95	138	138	164	183	326	203	215	215	116	57	44	21	2	0	0	0	85.4	326
10-May	0	0	0	0	6	30	45	88	121	112	106	143	126	110	92	173	131	48	49	29	3	0	0	0	58.9	173
11-May	0	0	0	0	6	35	45	101	203	314	334	261	293	231	195	278	82	145	87	31	3	0	0	0	110.2	334
12-May	0	0	0	0	9	60	169	256	345	417	468	494	499	474	432	369	291	204	119	36	4	0	0	0	193.7	499
13-May	0	0	0	0	9	48	146	248	339	414	463	492	495	468	429	371	291	205	120	38	5	0	0	0	190.9	495
14-May	0	0	0	0	10	57	170	258	343	416	468	497	501	377	415	315	174	93	22	13	6	0	0	0	172.3	501
15-May	0	0	0	0	3	11	20	47	71	89	49	41	71	66	123	94	72	120	108	43	6	0	0	0	43.1	123
16-May	0	0	0	0	14	71	175	269	359	422	485	513	499	484	442	376	318	209	138	60	5	0	0	0	201.6	513
17-May	0	0	0	0	11	70	198	200	284	396	490	429	329	436	341	318	186	120	84	34	5	0	0	0	163.8	490
18-May	0	0	0	0	5	46	103	184	216	200	154	174	134	336	216	373	280	194	44	12	1	0	0	0	111.4	373
19-May	0	0	0	0	11	68	162	252	278	413	419	404	394	367	403	352	275	214	117	44	5	0	0	0	174.2	419
20-May	0	0	0	1	13	71	170	246	339	359	343	241	165	130	18	342	235	215	61	11	2	0	0	0	123.5	359
21-May	0	0	0	1	15	57	170	280	359	324	290	155	331	311	315	364	254	218	125	54	9	0	0	0	151.4	364
22-May	0	0	0	1	15	35	81	147	303	422	478	504	471	294	250	198	176	129	35	12	4	0	0	0	148.1	504
23-May	0	0	0	0	5	32	136	251	367	249	106	158	321	516	349	285	311	230	135	25	6	0	0	0	145.1	516
24-May	0	0	0	0	13	38	167	183	104	266	230	205	120	123	109	310	165	166	147	52	8	1	0	0	100.3	310
25-May	0	0	0	1	16	52	150	261	371	437	497	468	504	477	394	244	57	67	76	44	12	0	0	0	172.1	504
26-May	0	0	0	1	3	23	54	152	144	137	112	91	61	33	44	38	50	30	18	11	2	0	0	0	41.8	152
27-May	0	0	0	0	3	11	22	49	122	83	88	58	86	81	89	52	50	44	40	26	5	0	0	0	37.9	122
28-May	0	0	0	1	15	105	221	144	195	187	272	201	152	268	231	186	155	110	103	39	20	1	0	0	108.6	272
29-May	0	0	0	0	8	44	65	58	59	62	58	64	55	36	32	30	40	18	11	13	3	0	0	0	27.3	65
30-May	0	0	0	1	8	15	27	66	244	261	197	249	209	181	119	77	79	86	63	75	10	1	0	0	81.9	261
31-May	0	0	0	2	18	67	188	284	369	440	495	538	543	524	426	354	318	212	143	67	11	1	0	0	208.3	543
		0.0	0.0	0.0	0.4	8.0	41.6	108.7	160.2	232.2	278.9	292.1	297.1	298.6	298.8	258.2	255.9	178.8	137.2	77.9	30.4	4.9	0.2	0.0	0.0	Diurnal Average
		0	0	0	2	18	105	221	284	371	450	497	538	543	524	442	380	318	230	147	75	20	1	0	0	Diurnal Maximum



WBEA  
Hourly Averages

Global Radiation (GR) - W/m<sup>2</sup>  
Fort McKay - Bertha Ganter - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Global Radiation (GR) - W/m2**  
**Fort McKay - Bertha Ganter - May 2014**

<b>Concentration Ranges (W/m2)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	304	40.86	40.86
21 - 100	133	17.88	58.74
101 - 300	186	25.00	83.74
301 - 600	121	16.26	100.00
601 - 900	0	0.00	100.00
> 900	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



# Wood Buffalo Environmental Association

## Summary of Hour Averages

# Wind Speed (WS) - km/h

## Fort McKay - Bertha Ganter - May 2014

Maximum Speed: 21 km/h on May 30 14:00	Maximum Daily Speed Average: 11.9 km/h on May 2	Hours in Service: 744
Minimum Speed Value: 0 km/h on May 26 16:00	Minimum Daily Speed Average: 1.6 km/h on May 16	Hours of Data: 741
Maximum Diurnal Speed Average: 3.7 km/h at hour 19	Minimum Diurnal Speed Average: 0.9 km/h at hour 8	Hours of Missing Data: 3
Monthly Average Velocity: 2.0 km/h 12.0 deg	Percentiles: $P_1 = 1$ $P_{10} = 2$ $Q_1 = 4$ Median = 7 $Q_3 = 10$ $P_{90} = 13$ $P_{99} = 19$	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-May	WNW9	NNW8	NNW4	NNW9	NNW6	WNW8	NW9	NW9	NW13	NNW17	NNW19	NNW17	NNW14	NNW17	NW16	NNW19	NW19	NNW15	NNW13	N10	N9	NNW7	NW7	NW12	NNW11.4	NNW19
2-May	NW10	NW16	N8	NW10	NW16	NW13	NW12	NNW16	NNW15	NNW16	NNW16	N15	N14	NNW14	N12	N11	NNE11	NNE11	NNE10	NNE10	NNE11	N13	N12	N12	NNW11.9	NNW16
3-May	N13	N12	N11	N10	N10	N7	N7	NNE7	NE7	NE8	NE7	NE6	ENE11	E11	ENE11	ENE10	ENE10	ENE9	NE8	ENE8	ENE6	NE3	N4	WSW3	NE6.8	N13
4-May	WSW3	NW3	WNW4	WNW3	WNW4	W2	SSE2	SSE2	SE5	SE7	SE8	SE8	E3	ESE2	E6	E6	SE7	SSE5	SSW4	W3	SSW7	SSE10	SSE10	ESE3	SSE2.7	SSE10
5-May	E2	E2	N1	NW1	NW2	SSW3	S2	NW1	NNE2	NNE3	ENE6	ENE8	NE7	NNE8	NNE9	NNE9	ENE11	NE11	NE13	ENE12	ENE11	NE10	NE9	NE10	NE5.6	ENE13
6-May	NE8	N8	N7	N9	N8	N9	N8	NNE10	NNE11	NNE12	NNE11	ENE13	NE9	NNE12	NNE13	NE11	ENE11	NE8	NE6	NW3	NW6	NNW6	NNW6	NNW5	NNE7.8	ENE13
7-May	NW5	NNW6	NNW7	NNW6	NNW6	N5	N9	N9	N10	NNE12	N12	N12	NNE12	NNE13	NNE12	NNE14	NNE12	NNE11	NNE11	NNE8	NNE4	NNE2	NNE1	NNE1	N8.1	NNE14
8-May	ESE3	E5	ESE4	ESE3	SSE2	SE2	E2	ENE3	SSW1	S4	NE5	NE9	ENE10	NE9	NNE11	NE11	NNE11	NNE8	NE6	E4	E1	NW2	NNW2	NW4	NE3.8	NNE11
9-May	NNW5	NW5	NW3	WNW3	W2	W2	WNW4	NW6	ENE4	ENE2	NNW5	NNW6	NNE7	N8	N10	N10	NNW7	NNW7	WNW4	NNW8	NNW9	NNW9	NW8	NW9	NNW5.2	N10
10-May	NW8	NW8	NW8	WNW8	WNW8	WNW8	WNW9	WNW10	NNW13	NNW10	NNW15	NNW15	NNW11	NNW6	NNW7	N7	N7	NNW4	NW3	WNW3	WNW3	WNW3	WSW2	SSW2	NW6.8	NNW15
11-May	NW1	NW4	NW4	NW3	WSW1	SW2	WSW3	SSW6	SSW9	SSW10	NW12	NNW16	NNW13	N9	NNE8	NE9	NE5	NE8	ENE8	ENE6	N5	NE4	NNE4	N5	N2.9	NNW16
12-May	N5	N5	N6	N4	N3	N4	NNE5	NE5	ENE7	E7	E9	E11	ENE11	ENE11	ENE12	ENE13	ENE12	NE12	NNE10	NNE9	NNE7	E7	SE3	SW3	NE6.1	ENE13
13-May	W4	W2	W4	W3	SSW3	SW3	SSE5	SSE8	SSE10	SE10	SE10	E9	E11	ENE7	ENE11	NE11	ENE13	NE11	NNE11	NNE7	NE3	NNE2	NNE1	NNW2	E3.3	ENE13
14-May	NNW4	WNW3	WSW3	SW2	SW2	S2	SSE7	SE7	SSE5	SSE5	M	M	M	S10	SSE9	SSE10	SSE12	SE14	SSE12	WSW3	S5	SW12	SSW5	SSE5	S5.2	SE14
15-May	SE5	NNE1	NNE2	NE2	NNE4	NE3	N6	NNE14	NNE14	NNE15	NNE12	NNE10	NNE13	N15	N14	NNE13	N13	N13	N13	NNW8	NW7	NW8	NW9	NNW7	N8.2	NNE15
16-May	NNW7	NNW7	NNW5	WNW3	W3	W3	SSW2	WSW1	SSE6	WNW3	SE5	ESE7	ESE6	S6	SSE11	SSE7	S5	SSE4	E8	ENE8	NE5	NE4	NE2	SE1	ESE1.6	SSE11
17-May	SW2	WNW1	WNW2	NW3	N2	NNW2	ESE3	SSE4	SSE3	SSE4	SSE5	ESE4	ENE3	E4	NE4	ENE5	E5	ESE7	E7	ENE4	NNE3	NNE5	NNE9	NNE8	ENE2.3	NNE9
18-May	N6	N6	N6	N5	NNE5	NNE4	NE4	NNE7	ENE8	NE4	NW9	NE4	N6	NE8	NE8	NE8	ENE9	NE7	NE7	N5	NW6	NNW5	N3	NW3	NNE4.9	NW9
19-May	N5	ENE0	SSW2	SSW3	WSW3	S5	S11	SSW14	SSW11	S13	S14	S13	S15	S16	S19	S17	S18	S16	S15	SSW16	SSW13	SSW12	SSW12	SSW6	S10.5	S19
20-May	S3	S3	SSW3	S6	S9	S10	S12	S15	S16	S17	S16	S17	SSW15	SW10	WSW5	S13	SSE11	SSE12	SSE11	N8	N6	NNE5	ENE3	S2	S7.3	S17
21-May	SSW3	SSW5	SSW5	SSW7	SSW7	SSW4	W2	SSW8	S9	SSE12	SSW11	WSW11	SSW3	WSW12	WSW16	WSW17	W15	NNW18	NNW12	NW7	NW10	WNW4	SW2	SW3	WSW5.3	NNW18
22-May	WSW4	SSW3	W3	SW2	WSW2	NW1	WSW0	S2	SSE4	S4	SSE5	S7	WSW8	WSW10	WSW9	W8	W6	SSW6	WNW2	NE3	NNE2	NNW2	NNW2	WSW2	SW2.6	WSW10
23-May	WNW2	WNW2	W3	SSW2	SSW3	SSW4	S4	SSE5	SSE9	SSE9	S10	S9	SSE7	SSE10	SSE11	SSE10	SSE8	S7	SSE8	ESE3	SE6	ESE2	WNW17	NW20	S4.0	NW20
24-May	NW11	WNW5	W6	WNW8	WNW9	WNW7	WNW5	NNW2	NNW6	WNW8	NNW10	NNE7	NNE10	ENE6	E5	NW11	NW12	N7	ENE7	ENE6	E5	E1	NNW2	WNW3	NNW4.2	NW12
25-May	NW3	NW1	WNW3	W2	NW3	WSW3	SSE3	SE4	S5	SSE9	S8	S3	S7	ESE6	SSE10	SSE10	SE6	ENE5	N7	NNE4	N5	NNW2	S4	ESE3	SSE2.0	SSE10
26-May	SSE4	SE4	SSE6	S4	N5	N3	N2	NE3	ESE7	SE10	SSE11	SSE7	E7	NE8	N4	N0	SE6	NE3	NE6	NE7	NNE8	NE9	NE8	NNE8	E3.4	SSE11
27-May	NNE8	NNE7	NNE6	N7	N7	N7	NNE8	NNE9	NNE9	NNE7	N8	N8	NNE7	NNE9	NNE9	NNE8	NNE6	NNE4	N4	NNW4	NNW4	NNW4	NNE4	E5	NNE6.3	NNE9
28-May	ESE4	NNE1	NNE3	WNW2	NE2	ESE4	ESE4	E4	ESE6	E6	E6	ESE6	S8	S8	S9	S10	S10	SSE10	SSE8	SE8	SSE8	SE6	SE3	SE3	SE4.5	SSE10
29-May	ESE2	SE1	NE3	ESE3	E3	ESE2	N2	N4	N5	N4	N5	N7	N7	N6	N6	N9	N8	N6	NNW8	NNW8	NW9	NW9	NW9	WNW6	NNW4.4	N9
30-May	WNW4	SW3	W7	WNW9	WNW7	WNW5	WNW7	W7	NW9	NW13	NW14	NW17	NW19	NW21	NW19	NNW11	N6	N6	NNW4	SSE2	ENE6	SSE2	WSW5	SW4	NW7.1	NW21
31-May	SSW4	SSW2	NNE2	W1	WSW3	SSW2	E2	E6	E6	ESE8	E8	E11	E10	ENE9	ENE10	ENE8	NE10	NE9	NE7	NNE7	NNE6	NNE5	NNE3	NE4	ENE4.5	E11

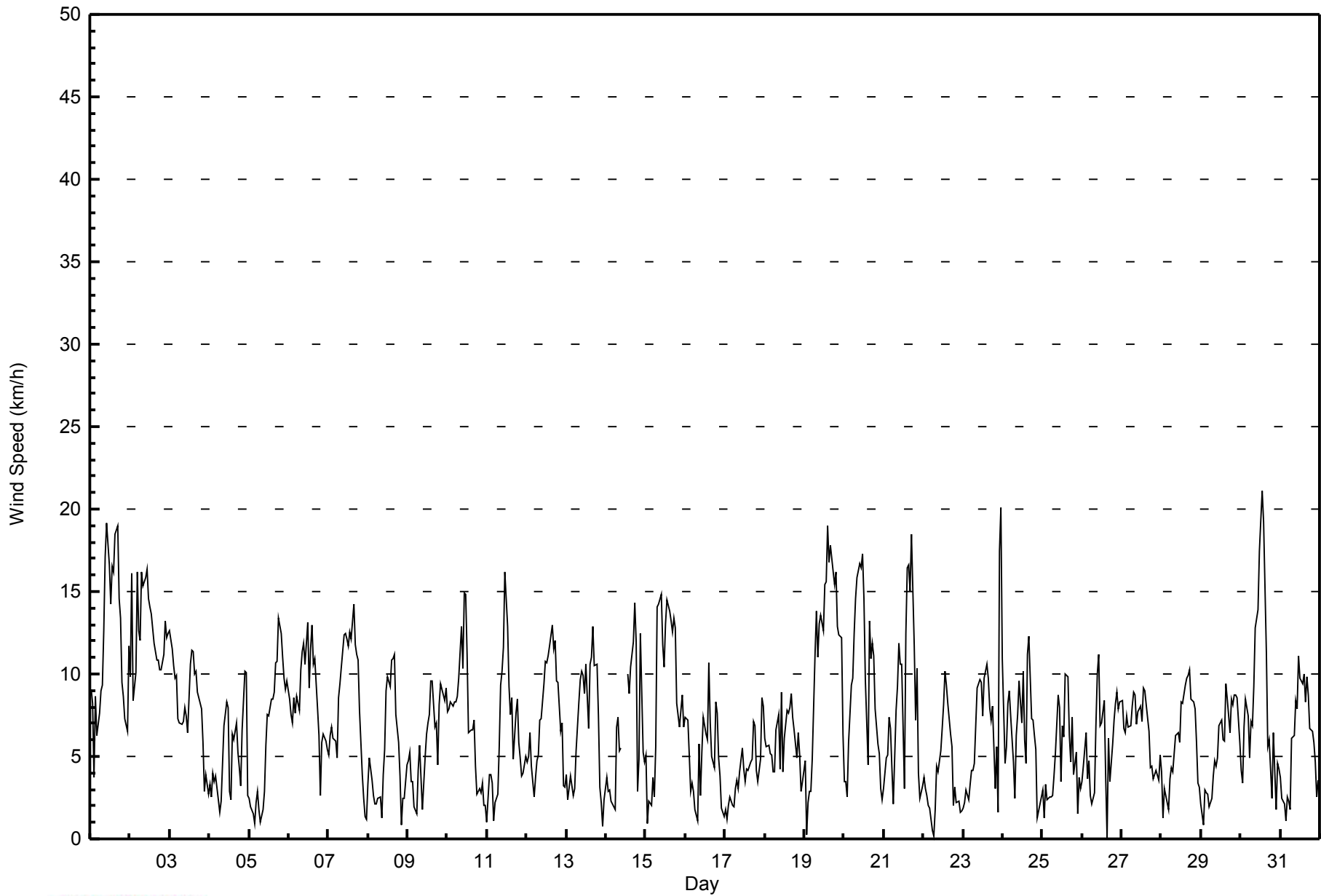
NNW2.4	NNW2.6	NNW2.5	NW2.5	NW2.5	NNW1.5	NNW1.0	N0.9	ENE1.3	E1.6	NNE1.6	NE2.9	NNE3.6	NNE3.2	NE3.0	NE3.2	NE3.1	NE3.7	NE3.7	NNE3.5	NNE2.8	N2.0	NNW2.0	NNW2.3		Diurnal Average
N13	NW16	N11	NW10	NW16	NW13	S12	NNW16	S16	NNW17	NNW19	NW17	NW19	NW21	NW19	NNW19	NW19	NNW18	S15	SSW16	SSW13	N13	WNW17	NW20		Diurnal Maximum

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



**WBEA**  
**Hourly Averages**

**Wind Speed (WS) - km/h**  
**Fort McKay - Bertha Ganter - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h**  
**Fort McKay - Bertha Ganter - May 2014**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	294	39.68	39.68
6 - 11	338	45.61	85.29
12 - 19	107	14.44	99.73
20 - 28	2	0.27	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 741

Total Number of Hours: 744





**WBEA**  
**Frequency Distribution**

**Wind Speed (WS) - km/h**  
**Fort McKay - Bertha Ganter - May 2014**

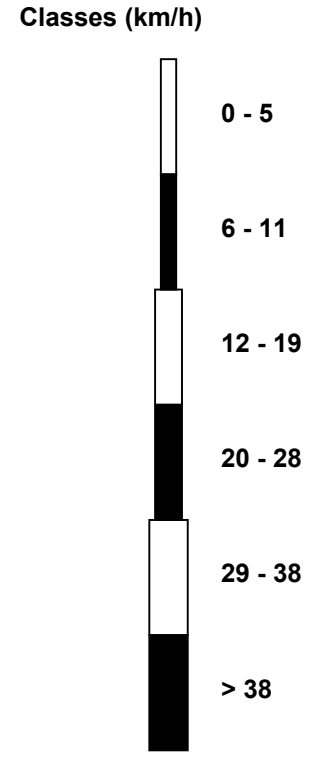
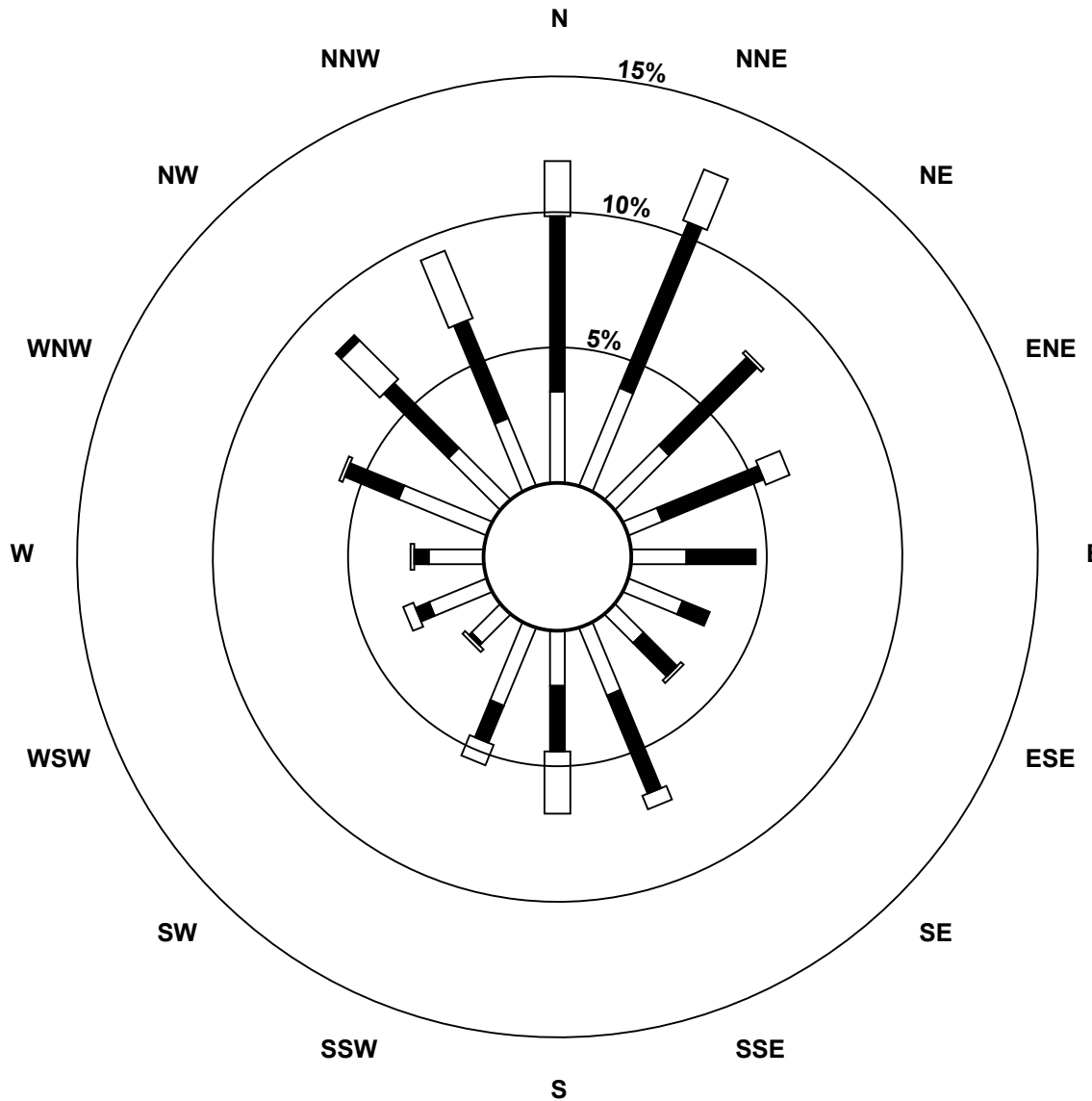
Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	25	29	21	10	15	16	11	20	15	23	11	17	15	26	20	20	294
6 - 11	48	49	34	30	19	8	13	29	18	11	1	4	4	16	25	29	338
12 - 19	15	15	1	7	0	0	1	4	17	6	1	3	1	1	15	20	107
20 - 28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	88	93	56	47	34	24	25	53	50	40	13	24	20	43	62	69	741

Total Number of Valid Hours: 741

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

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



**Total Number of Valid Hours: 741**



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

**Wind Speed (WS) - km/h**  
**Fort McKay - Bertha Ganter - May 2014**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 9 km/h on May 23 23:00																	Hours in Service: 744 Hours of Data: 741 Hours of Missing Data: 3 Hours of Calibration: 0 Percent Operational Time: 99.6								
Minimum Value: 1 km/h on May 22 01:00																									
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 1 Median = 2 Q <sub>3</sub> = 4 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-May	2	4	1	3	3	2	2	3	5	6	7	7	5	6	6	7	7	6	4	4	3	2	1	4	7
2-May	3	5	5	6	4	4	4	5	5	6	5	5	5	5	4	4	4	4	4	4	4	5	5	5	6
3-May	4	4	4	4	3	3	3	3	3	3	3	3	4	4	4	4	3	3	3	3	2	1	1	1	4
4-May	1	1	1	1	1	1	1	1	2	3	3	3	2	2	3	3	3	3	3	2	2	4	3	2	4
5-May	1	1	2	1	2	1	1	1	1	2	2	3	3	4	4	4	4	5	6	5	4	4	4	4	6
6-May	3	3	2	2	2	3	3	4	4	5	5	5	4	5	5	5	5	3	3	1	1	1	1	1	5
7-May	1	1	1	1	1	2	3	3	4	5	5	5	4	5	5	5	4	5	4	3	2	1	1	1	5
8-May	1	2	2	1	1	2	1	1	1	2	3	3	3	4	4	5	4	3	3	2	2	1	2	1	5
9-May	1	1	1	1	1	1	2	2	2	2	2	4	3	3	4	4	4	4	2	3	3	2	2	2	4
10-May	2	1	2	2	2	2	2	4	5	4	5	5	5	3	2	3	3	2	1	1	1	1	1	1	5
11-May	1	1	2	2	1	1	1	2	3	3	6	5	5	4	3	4	2	3	3	2	2	1	1	1	6
12-May	1	1	2	2	2	1	1	2	2	3	3	4	4	4	4	4	4	5	4	4	3	3	1	2	5
13-May	1	1	1	1	1	1	2	2	2	2	3	3	3	5	4	5	5	4	4	4	1	1	2	1	5
14-May	1	2	1	1	1	1	2	1	2	2	M	M	M	3	4	3	3	3	4	3	2	4	2	1	4
15-May	2	1	1	1	1	1	3	6	5	6	5	4	5	5	5	5	4	5	5	3	1	2	2	2	6
16-May	1	1	1	1	1	1	1	1	2	2	3	2	2	3	3	2	2	2	3	3	2	2	1	1	3
17-May	1	1	1	1	1	1	1	1	1	2	2	3	2	2	3	2	2	2	2	2	1	2	3	3	3
18-May	2	2	1	1	1	2	2	3	3	2	3	2	2	3	3	3	3	3	2	2	2	1	1	2	3
19-May	1	1	1	1	1	2	3	4	3	4	4	4	4	5	5	4	5	4	4	5	4	3	3	2	5
20-May	1	1	1	2	2	2	3	3	3	4	4	4	4	4	7	3	4	4	5	4	2	2	2	1	7
21-May	1	1	1	1	2	2	1	3	2	3	3	6	2	7	7	7	7	6	6	2	4	2	1	1	7
22-May	1	1	1	1	1	1	1	1	1	2	3	3	4	5	4	3	4	2	2	1	1	1	1	1	5
23-May	1	1	1	2	2	1	1	2	1	2	2	2	3	3	4	2	3	3	2	2	2	1	9	7	9
24-May	4	2	2	3	2	2	1	2	3	3	4	3	5	3	2	6	4	3	2	2	2	2	1	1	6
25-May	1	1	1	1	1	1	1	1	2	3	3	3	3	3	4	4	2	3	3	2	2	2	1	1	4
26-May	1	2	2	2	2	2	1	2	3	3	3	4	3	3	2	1	3	1	2	3	3	3	3	3	4
27-May	3	2	2	2	2	2	3	3	4	3	3	3	3	3	4	3	3	2	1	1	1	1	1	2	4
28-May	1	1	1	1	1	1	1	2	2	2	3	2	2	3	3	2	2	3	2	3	2	1	1	1	3
29-May	1	1	1	1	1	1	1	2	2	1	2	2	2	2	2	3	3	3	3	3	2	2	2	2	3
30-May	2	1	3	3	2	2	2	3	4	4	5	6	7	7	7	5	2	3	3	1	4	1	1	1	7
31-May	1	1	2	1	1	1	1	2	3	3	3	4	4	4	4	3	4	3	3	2	2	2	1	1	4
																	Diurnal Maximum								
M - Maintenance																									



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

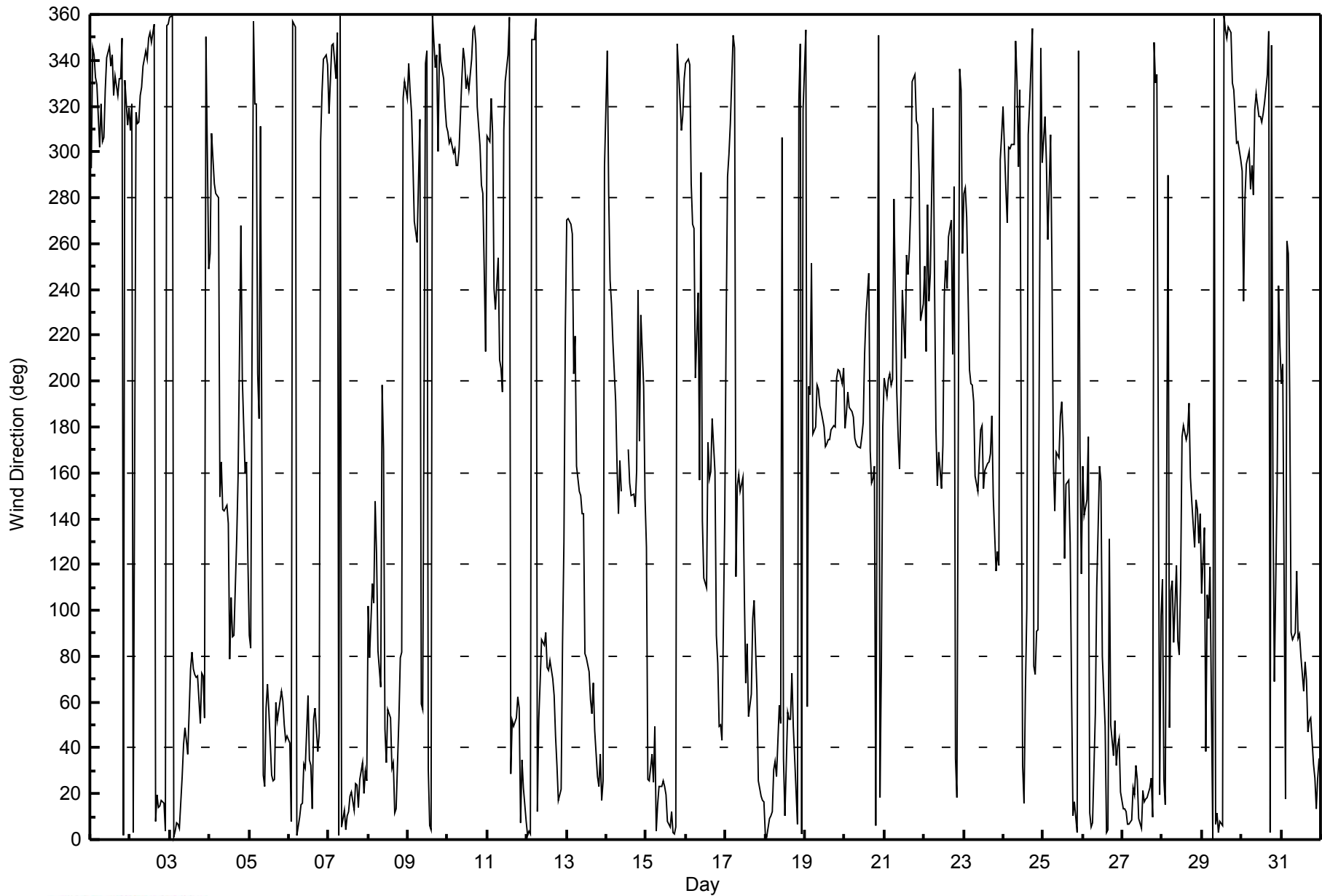
Fort McKay - Bertha Ganter - May 2014

Direction of Maximum Speed: 316 deg on May 30 14:00																				Hours in Service: 744					
Direction of Maximum Daily Speed Average: 345.9 deg on May 2																				Hours of Data: 741					
Direction of Minimum Speed: 4 deg on May 26 16:00										Direction of Minimum Daily Speed Average: 1.6 deg on May 16										Hours of Missing Data: 3					
Monthly Average Direction: 306.0 deg																				Percent Operational Time: 99.6					
Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-May	293	345	342	333	330	302	321	305	306	327	341	346	338	342	325	333	325	332	332	350	2	331	312	319	329.8
2-May	310	321	3	317	313	313	325	329	338	344	341	349	352	348	356	8	20	14	15	17	16	3	355	356	345.9
3-May	359	359	1	3	7	7	5	27	41	49	43	37	74	81	74	72	71	71	51	73	72	53	350	249	39.5
4-May	256	308	297	286	282	280	150	165	144	143	146	138	79	106	88	89	131	159	213	268	202	160	165	122	157.5
5-May	89	84	357	321	321	203	183	311	28	23	58	68	56	28	26	26	60	52	56	64	61	50	44	45	49.3
6-May	42	8	357	356	355	2	10	15	16	33	31	63	34	33	13	52	57	38	46	304	326	340	343	338	20.6
7-May	317	332	346	347	332	352	2	359	6	13	4	10	12	19	20	13	24	24	14	26	33	20	30	26	8.2
8-May	102	79	112	103	148	124	82	67	198	170	48	34	57	53	31	34	12	14	53	79	82	323	331	324	46.7
9-May	339	326	317	295	270	261	287	314	59	57	339	344	30	6	5	359	337	342	300	347	339	332	320	311	338.6
10-May	309	304	306	300	301	294	294	301	332	346	340	328	332	327	340	353	355	347	320	303	286	282	248	213	319.7
11-May	307	304	324	308	241	231	254	209	206	195	309	331	342	359	29	52	50	53	62	57	7	35	22	8	354.1
12-May	2	3	3	349	349	358	12	52	69	87	85	90	75	74	78	70	63	45	32	17	22	86	130	223	54.9
13-May	270	271	269	264	203	220	163	152	150	142	142	81	79	73	61	55	68	48	28	23	37	17	26	293	83.2
14-May	344	282	244	234	217	191	163	142	165	152	M	M	M	170	155	150	151	145	161	240	174	229	198	149	170.3
15-May	127	26	26	37	25	49	4	15	23	23	25	23	19	8	5	12	3	3	5	347	322	309	316	332	7.7
16-May	339	341	338	286	269	266	201	239	157	291	139	114	110	173	157	160	184	160	89	77	49	50	43	142	123.5
17-May	224	289	299	312	351	346	115	154	159	152	158	108	68	85	54	63	96	105	84	65	26	19	17	17	70.4
18-May	3	1	9	10	12	31	34	28	58	51	307	35	10	55	52	53	73	50	35	7	323	347	2	319	23.4
19-May	353	58	198	194	251	177	180	198	197	189	187	180	171	173	174	174	179	181	180	201	205	204	199	206	187.0
20-May	179	186	196	189	187	184	175	173	172	171	176	182	212	229	247	170	156	157	163	6	351	18	77	180	178.3
21-May	201	193	201	203	198	201	279	195	176	162	195	240	210	255	247	257	277	331	334	313	312	290	227	234	246.4
22-May	250	213	277	235	247	319	244	179	154	169	153	172	237	252	240	263	271	212	285	36	18	336	327	256	234.7
23-May	282	284	271	205	199	198	191	158	152	166	179	180	153	161	164	165	168	185	150	117	126	120	296	307	185.2
24-May	320	284	269	302	302	303	303	348	331	294	327	33	16	65	100	308	321	354	76	72	91	91	345	296	335.6
25-May	305	316	296	262	308	248	165	143	169	167	185	191	175	123	155	157	129	64	10	16	3	344	171	116	155.3
26-May	163	141	148	176	11	6	7	55	110	136	163	156	80	49	3	4	131	50	36	52	32	41	44	21	80.4
27-May	13	14	12	7	7	8	23	20	32	26	9	5	21	16	17	18	23	27	10	348	330	333	19	98	15.5
28-May	113	26	15	290	49	109	113	86	120	86	81	113	176	180	175	178	190	158	147	128	148	144	129	142	142.0
29-May	108	136	39	107	96	119	0	358	7	11	3	8	6	359	353	350	355	352	330	327	316	304	304	296	347.1
30-May	292	235	280	295	300	284	294	281	318	325	315	315	313	316	322	334	353	3	347	154	69	155	242	215	312.4
31-May	199	208	17	261	256	193	90	87	90	117	88	90	80	64	78	69	47	52	53	33	27	13	27	35	69.5
330.4	330.6	331.0	311.8	313.1	302.0	329.8	7.9	69.6	85.5	23.2	35.5	31.4	27.6	34.3	37.0	45.2	42.8	41.4	26.7	12.1	354.8	333.8	330.1		
Diurnal Average																									
M - Maintenance																									
All monthly, daily, and diurnal averages have been calculated using vector methods																									



**WBEA**  
**Hourly Averages**

**Wind Direction (WD) - deg**  
**Fort McKay - Bertha Ganter - May 2014**





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

**Wind Direction (WD) - deg**  
**Fort McKay - Bertha Ganter - May 2014**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 108 deg on May 26 16:00	Hours of Data: 741
Minimum Value: 8 deg on May 13 01:00	Hours of Missing Data: 3
	Hours of Calibration: 0
	Percent Operational Time: 99.6
Percentiles: P <sub>1</sub> = 11 P <sub>10</sub> = 17 Q <sub>1</sub> = 24 Median = 34 Q <sub>3</sub> = 44 P <sub>90</sub> = 60 P <sub>99</sub> = 86	

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-May	15	27	19	21	27	18	19	15	17	24	27	32	30	30	24	27	23	29	27	27	31	19	20	18	32
2-May	18	22	43	27	18	18	21	22	25	25	24	27	26	26	30	37	40	38	33	35	34	30	30	28	43
3-May	27	29	31	31	29	35	39	38	47	44	44	57	32	31	33	37	33	34	40	29	28	31	13	58	
4-May	35	51	24	30	15	32	79	42	33	48	43	47	88	82	41	41	47	39	42	51	33	19	17	32	
5-May	23	24	49	72	61	35	68	92	64	75	46	49	51	52	48	44	41	45	37	35	37	45	42	43	
6-May	41	31	20	23	24	27	35	40	40	45	50	38	52	46	39	47	45	47	57	55	15	9	9	13	
7-May	10	14	12	12	18	19	29	32	34	40	41	42	37	42	44	39	39	41	36	42	50	33	87	76	
8-May	25	23	37	33	42	68	40	61	92	37	73	40	36	45	43	46	35	44	49	39	77	52	36	14	
9-May	15	10	22	15	34	27	44	27	68	89	61	57	60	50	36	34	41	39	20	26	23	19	15	13	
10-May	13	12	12	13	12	17	19	20	27	34	25	23	25	27	30	31	32	38	37	29	21	23	39	51	
11-May	81	23	43	30	52	44	54	25	22	26	69	27	31	40	47	41	48	41	37	38	25	35	37	21	
12-May	17	18	19	46	44	19	28	46	37	42	35	32	32	31	30	32	39	41	43	34	40	34	53	38	
13-May	8	42	13	11	31	32	18	16	17	17	25	38	27	56	43	40	31	40	42	39	38	51	80	49	
14-May	37	42	34	35	40	77	19	16	39	46	M	M	M	29	43	25	24	15	27	76	38	23	33	23	
15-May	31	89	34	28	18	40	25	35	36	37	41	38	34	30	28	30	27	27	26	24	15	13	15	20	
16-May	10	11	14	31	12	37	58	88	26	92	80	41	51	74	23	43	57	64	29	36	44	52	63	53	
17-May	58	68	34	29	36	68	39	36	59	52	48	82	70	70	82	65	55	26	29	45	33	35	33	34	
18-May	35	35	21	24	24	39	57	42	39	60	20	52	40	43	46	48	36	50	40	50	30	29	50	35	
19-May	21	97	39	31	21	22	16	21	22	27	26	24	19	23	19	17	18	18	16	18	20	16	16	17	
20-May	24	20	27	14	14	17	16	16	16	16	18	20	24	48	68	24	15	15	19	49	37	40	55	33	
21-May	33	13	15	11	15	32	71	33	22	15	36	44	82	43	38	41	47	24	22	22	18	22	41	42	
22-May	12	26	32	39	54	88	100	69	33	53	67	63	58	46	44	40	52	43	68	42	68	47	37	55	
23-May	49	17	47	72	65	22	26	40	11	16	14	17	22	35	25	20	28	41	18	14	29	69	61	20	
24-May	24	41	40	22	15	15	40	81	54	40	39	45	42	56	66	40	26	46	36	36	24	75	48	40	
25-May	21	84	12	28	46	44	38	24	37	30	40	84	56	64	33	26	26	57	32	44	25	72	28	24	
26-May	30	25	16	68	28	87	59	59	35	19	15	44	35	41	59	108	30	45	38	49	42	46	45	35	
27-May	28	34	33	26	28	29	36	35	41	39	32	29	41	33	32	35	39	38	29	25	12	15	18	23	
28-May	24	66	42	22	38	34	45	53	34	43	50	43	28	28	25	21	19	23	24	18	16	14	14	39	
29-May	39	70	29	30	20	60	64	32	33	30	29	25	26	26	26	24	27	27	24	22	17	16	17	25	
30-May	34	36	40	30	25	32	30	40	33	22	25	23	23	20	21	27	26	36	73	74	42	59	13	28	
31-May	29	71	50	78	59	35	61	40	46	29	46	31	41	46	40	45	44	47	47	41	43	37	52	25	
	81	97	50	78	65	88	100	92	92	92	80	84	88	82	82	108	57	64	73	76	77	75	87	76	
	Diurnal Maximum																								

M - Maintenance



# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Report

### Station Information

Calibration Date	May 12, 2014	Previous Calibration	April 9, 2014
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	Routine		
Start Time (MST)	9:20	End Time (MST)	14:00
Barometric Pressure	n/a mmHg	Station temp.	21 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11571008
Cal Gas Concentration	51 ppm	Cal Gas Expiry Date	May 29th 2014
Gas Cert Reference	LL107923		
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2403
DACS voltage range		DACS channel #	SE1

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	1000	1000	PMT voltage	-689	-689
Analyzer Range (mv)	5000	5000	Lamp voltage	731	732
Calculated slope	0.998894	0.994438	Chamber temp.	43.0	42.9
Calculated intercept	-1.272917	1.076576	Pressure (mmHg)	701.5	714.2
Analyzer Background	37.1	37.9	Flow (lpm)	0.493	0.500
Analyzer Coefficient	0.780	0.757	Intensity	35750	35750

Analyzer make	Thermo 43C	Analyzer serial #	50911
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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	5500	0.0	0.0	2.1	NA
as found span	5500	81.5	755.7	780.7	0.968
calibrator zero	5500	0.0	0.0	0.4	NA
high point	5500	81.5	755.7	760.0	0.994
second point	5500	45.7	423.8	423.6	1.000
third point	5500	22.8	211.4	210.4	1.005
calibrator zero	5500	0.0	0.0	0.4	NA
as left zero	5500	0.0	0.0	0.2	NA
as left span	5500	81.5	755.7	760.0	0.994
Average Correction Factor					1.000

Corrected As found	778.6	Previous response	757.8	% change	-2.7%
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#### Notes:

adjusted zero and span after as founds.

Calibration Performed By: Michael Martineau



# Wood Buffalo Environmental Association

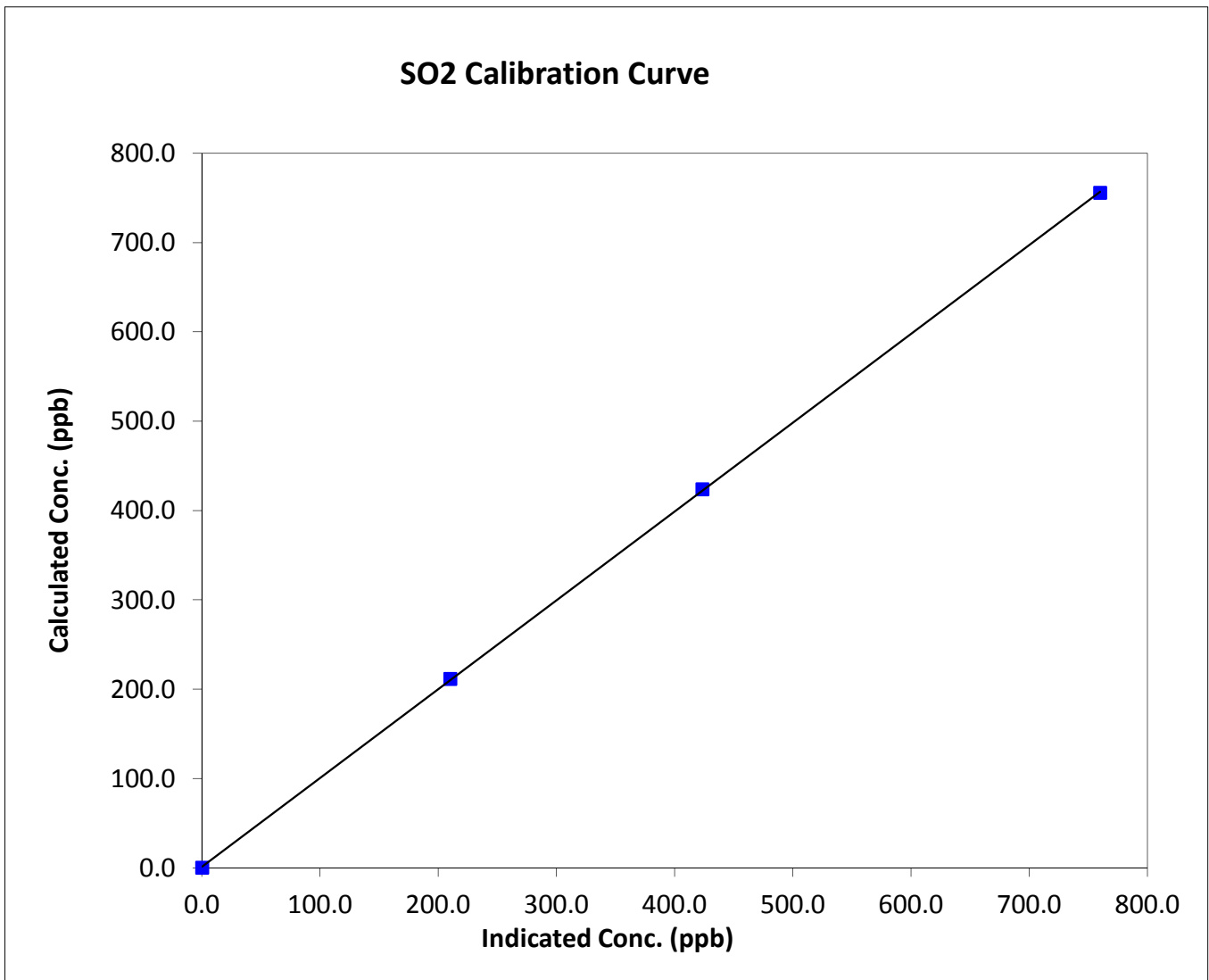
## SO<sub>2</sub> Calibration Summary

### Station Information

Calibration Date	May 12, 2014	Previous Calibration	April 9, 2014
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:20	End Time (MST)	14:00
Analyzer make	Thermo 43C	Analyzer serial #	50911

### Calibration Data

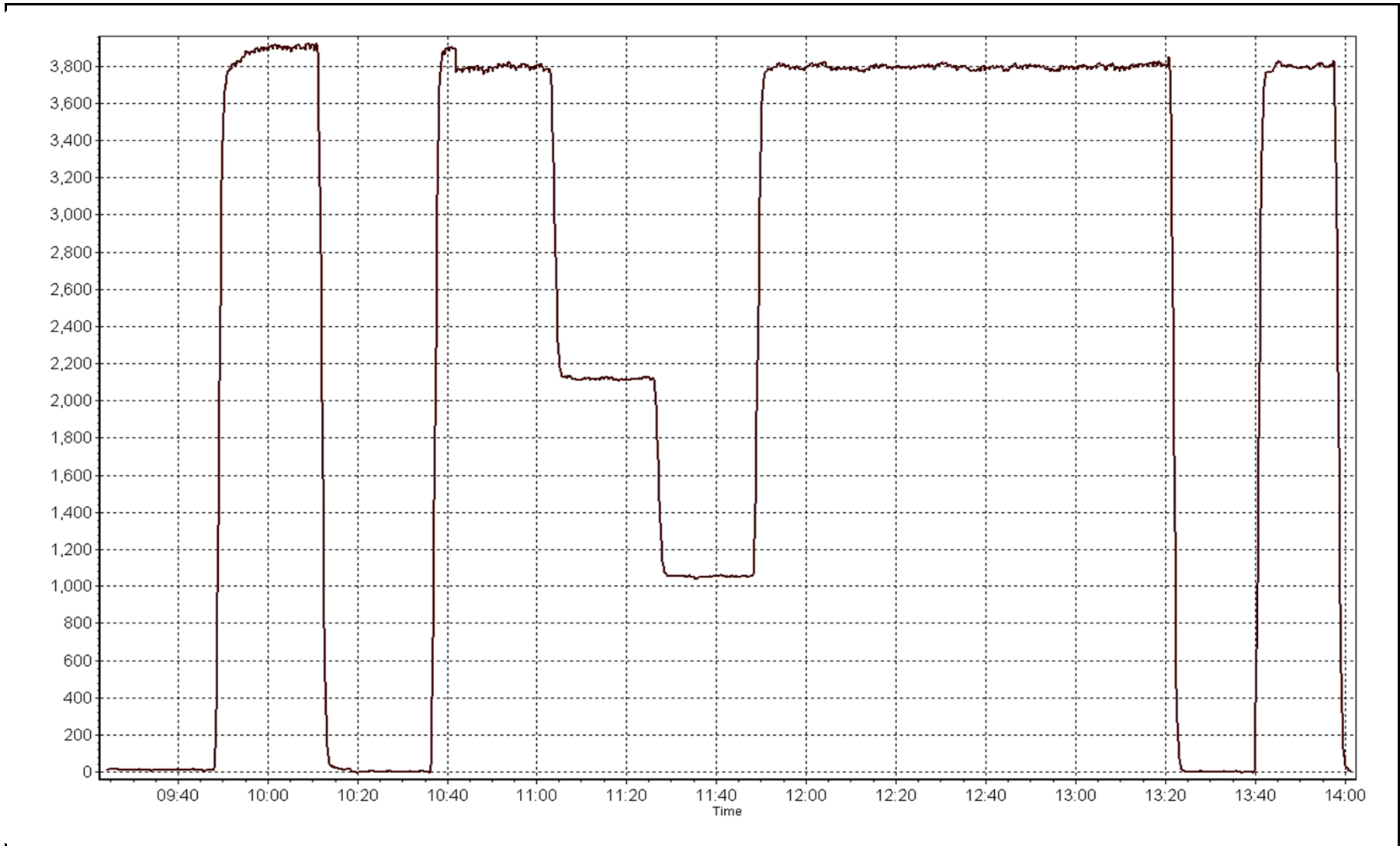
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.4	N/A	Correlation Coefficient	0.999978
755.7	760.0	0.9944		
423.8	423.6	1.0004	Slope	0.994438
211.4	210.4	1.0050		
			Intercept	1.076576





SO2 Calibration Plot

Date: May 12, 2014





# Wood Buffalo Environmental Association

## TRS Calibration Report

### Station Information

Calibration Date	May 13, 2014	Previous Calibration	April 10, 2014
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	Routine		
Start Time (MST)	11:10	End Time (MST)	14:15
Barometric Pressure	n/a mmHg	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial number	11571008
Cal Gas Concentration	10.6 ppm H2S	Cal Gas Expiry Date	Dec 21 2012
Gas Cert Reference	LL27480	SO2 gas conc.	51.0 ppm SO2
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2403
DACS voltage range	5000	DACS channel #	2

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	100	100	PMT voltage	-859	-859
Analyzer Range (input)	5000	5000	Lamp voltage	1173	1159
Calculated slope	0.992978	1.000346	Chamber temp.	45	45
Calculated intercept	0.015244	0.010104	Pressure	665.7	690.5
Analyzer Background	1.86	1.78	Flow	0.415	0.434
Analyzer Coefficient	1.021	0.989	Intensity	78	80
			Converter temp.	800	800

Analyzer make/model	Thermo 43i-TLE	Analyzer serial #	1218153461
Converter make/model	CDN-101	Converter serial #	305

### Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6500	0.0	0.0	0.0	NA
as found span	6500	46.0	75.0	77.2	0.971
SO2 scrubber check	5500	22.8	211.4	0.5	NA
calibrator zero	6500	0.0	0.0	0.0	NA
high point	6500	46.0	75.0	75.1	0.999
second point	6500	24.6	40.1	39.8	1.009
third point	6500	12.3	20.1	20.2	0.994
calibrator zero	6500	0.0	0.0	0.0	NA
as left zero	6500	0.0	0.0	0.2	NA
as left span	6500	46.0	75.0	75.4	0.994
Average Correction Factor					1.000

Corrected As found	77.2	Previous response	75.5	% change	-2.1%
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#### Notes:

Adjusted span.

Calibration Performed By:

Devin Russell



# Wood Buffalo Environmental Association

## TRS Calibration Summary

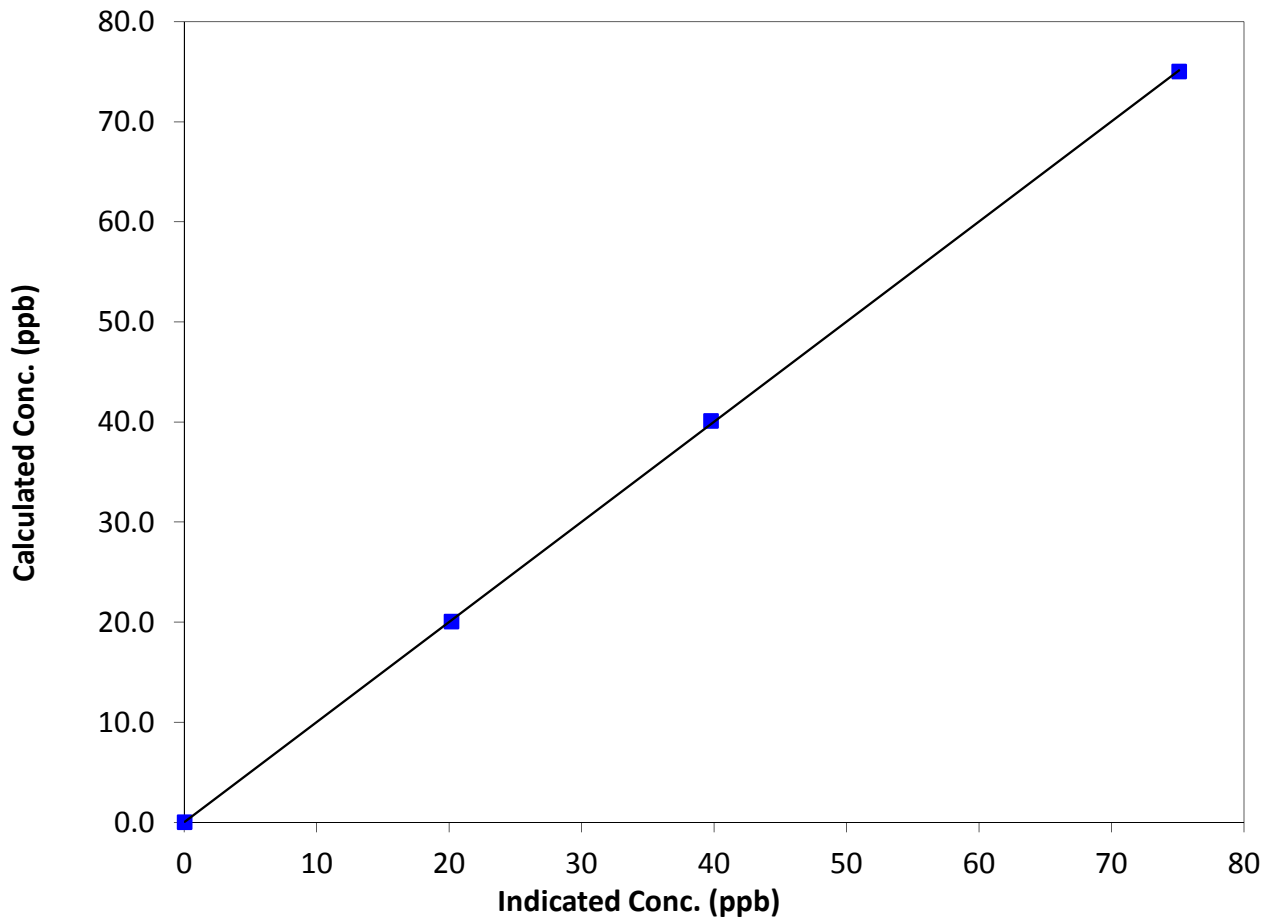
### Station Information

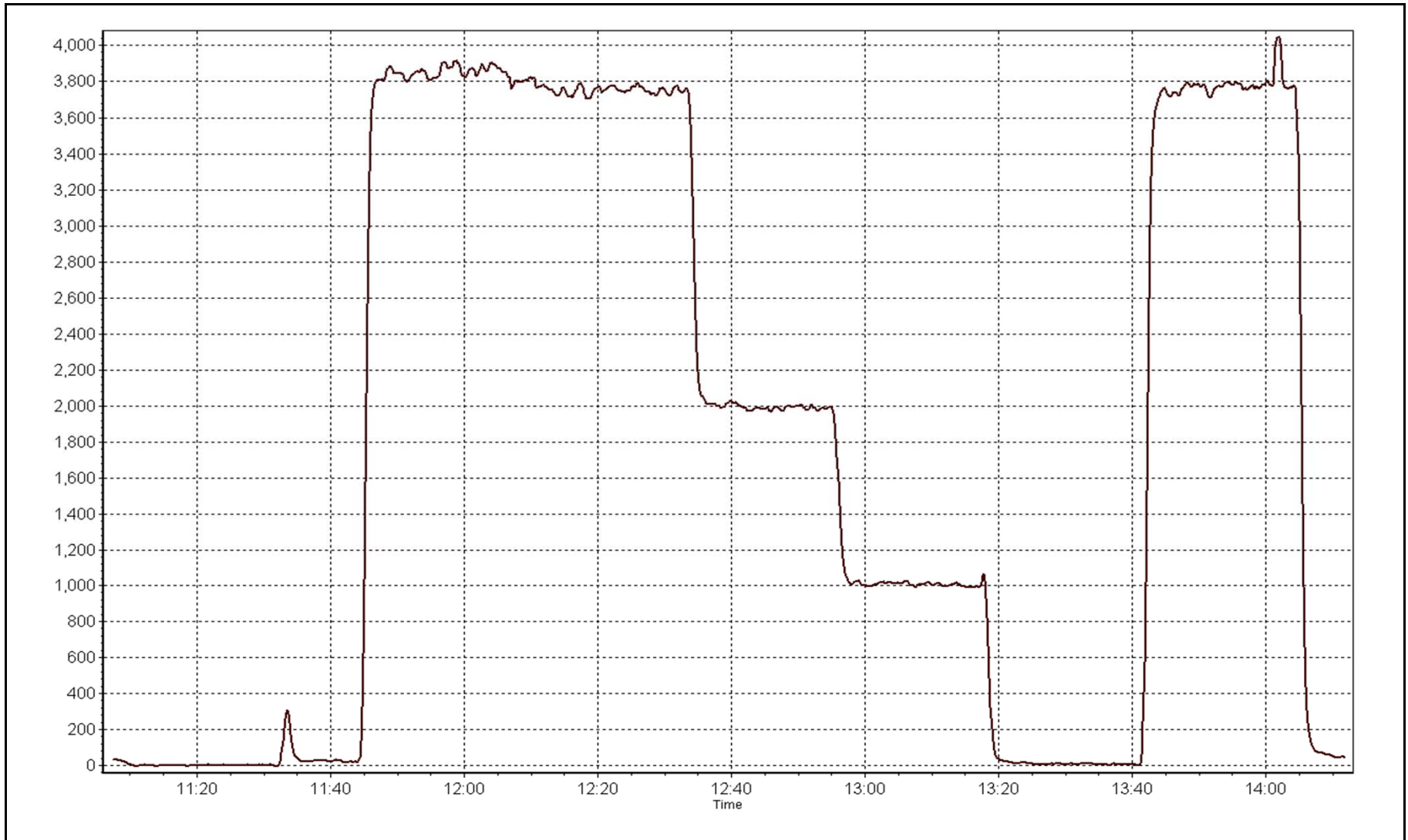
Calibration Date	May 13, 2014	Previous Calibration	April 10, 2014
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	11:10	End Time (MST)	14:15
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1218153461

### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999952
75.0	75.1	0.9987		
40.1	39.8	1.0088	Slope	1.000346
20.1	20.2	0.9938		
			Intercept	0.010104

TRS Calibration Curve







# Wood Buffalo Environmental Association

## THC / NMHC Calibration Report

### Station Information

Calibration Date	Monday, May 12, 2014	Prev Calibration	Wednesday, April 09, 2014
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	Routine		
Start Time (MST)	9:20	End Time (MST)	14:00
Barometric Pressure	n/a mmHg	Station temp.	21 Deg C
Calibrator Model	Sabio 4010	Serial Number	11571108
Gas Cert Reference	LL107923	Cal Gas Expiry Date	May 29th 2014
CH4 Cal Gas Conc.	510.0 ppm	CH4 Equiv Conc.	1076.5 ppm
C3H8 Cal Gas Conc.	206.0 ppm		
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2403

### Analyzer Information

	Before	After		Before	After
THC Range (ppm)	50	50	Internal Temp	33.8	32.9
THC Range (input)	50	50	Flame Temp	405.0	405.0
NMHC Range (ppm)	50	50	Carrier Pressure	40.4	40.4
NMHC Range (input)	50	50	Fuel Pressure	42.2	42.2
THC Calc slope	0.998549	1.000578	Air Pressure	32.2	32.2
THC Calc intercept	0.007926	0.025548			
NMHC Calc slope	1.011348	1.000389			
NMHC Calc intercept	-0.005904	0.011002			

Analyzer make Thermo 55i Analyzer serial # 1331259520

### THC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5500	0.0	0.00	0.00	N/A
as found span	5500	81.5	15.95	16.46	0.969
calibrator zero	5500	0.0	0.00	0.00	N/A
high point	5500	81.5	15.95	15.94	1.001
second point	5500	45.7	8.94	8.88	1.007
third point	5500	22.8	4.46	4.42	1.010
calibrator zero	5500	0.0	0.00	0.00	N/A
as left zero	5500	0.0	0.00	0.00	N/A
as left span	5500	81.5	15.95	15.94	1.001
Average Correction Factor					1.006

Corrected As found 16.46 Previous response 15.97 % change -3.0%

**Notes:**

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	N/A
as found span	5500	81.5	8.39	8.63	0.973
calibrator zero	5500	0.0	0.00	0.00	N/A
high point	5500	81.5	8.39	8.39	1.001
second point	5500	45.7	4.71	4.68	1.006
third point	5500	22.8	2.35	2.33	1.008
calibrator zero	5500	0.0	0.00	0.00	N/A
as left zero	5500	0.0	0.00	0.00	N/A
as left span	5500	81.5	8.39	8.37	1.003
Average Correction Factor					1.005

Corrected As found      8.63      Previous response      8.31      % change      -3.8%

### 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	5500	0	0.00	0.00	N/A
as found span	5500	81.5	7.56	7.83	0.965
calibrator zero	5500	0.0	0.00	0.00	N/A
high point	5500	81.5	7.56	7.55	1.001
second point	5500	45.7	4.24	4.20	1.009
third point	5500	22.8	2.11	2.08	1.016
calibrator zero	5500	0.0	0.00	0.00	N/A
as left zero	5500	0.0	0.00	0.00	N/A
as left span	5500	81.5	7.56	7.57	0.998
Average Correction Factor					

Corrected As found      7.83      Previous response      7.66      % change      -2.2%



# Wood Buffalo Environmental Association

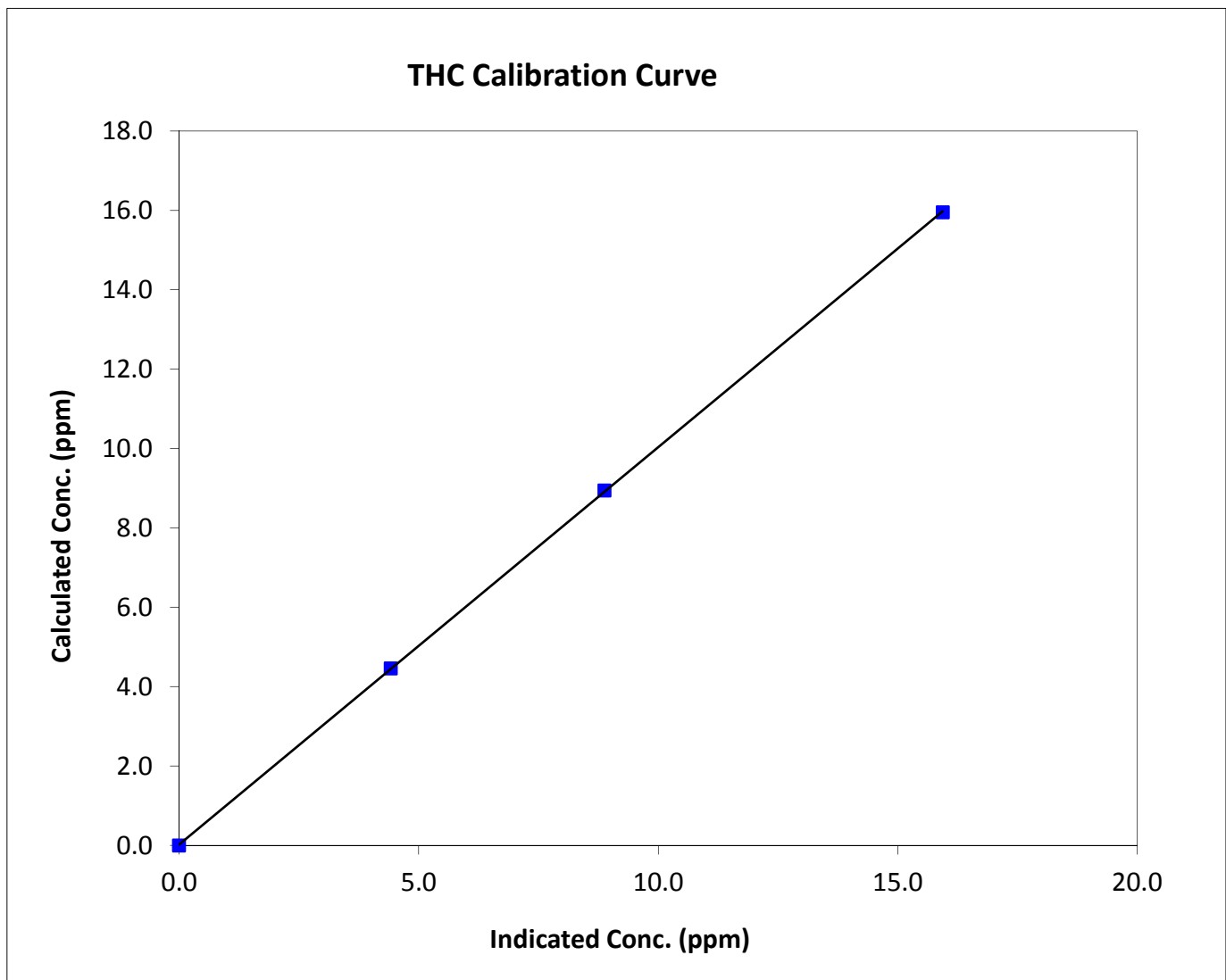
## THC Calibration Summary

### Station Information

Calibration Date	May 12, 2014	Previous Calibration	April 9, 2014
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:20	End Time (MST)	14:00
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	N/A	Correlation Coefficient	0.999982
15.95	15.94	1.0007		
8.94	8.88	1.0073	Slope	1.000578
4.46	4.42	1.0096		
			Intercept	0.025548





# Wood Buffalo Environmental Association

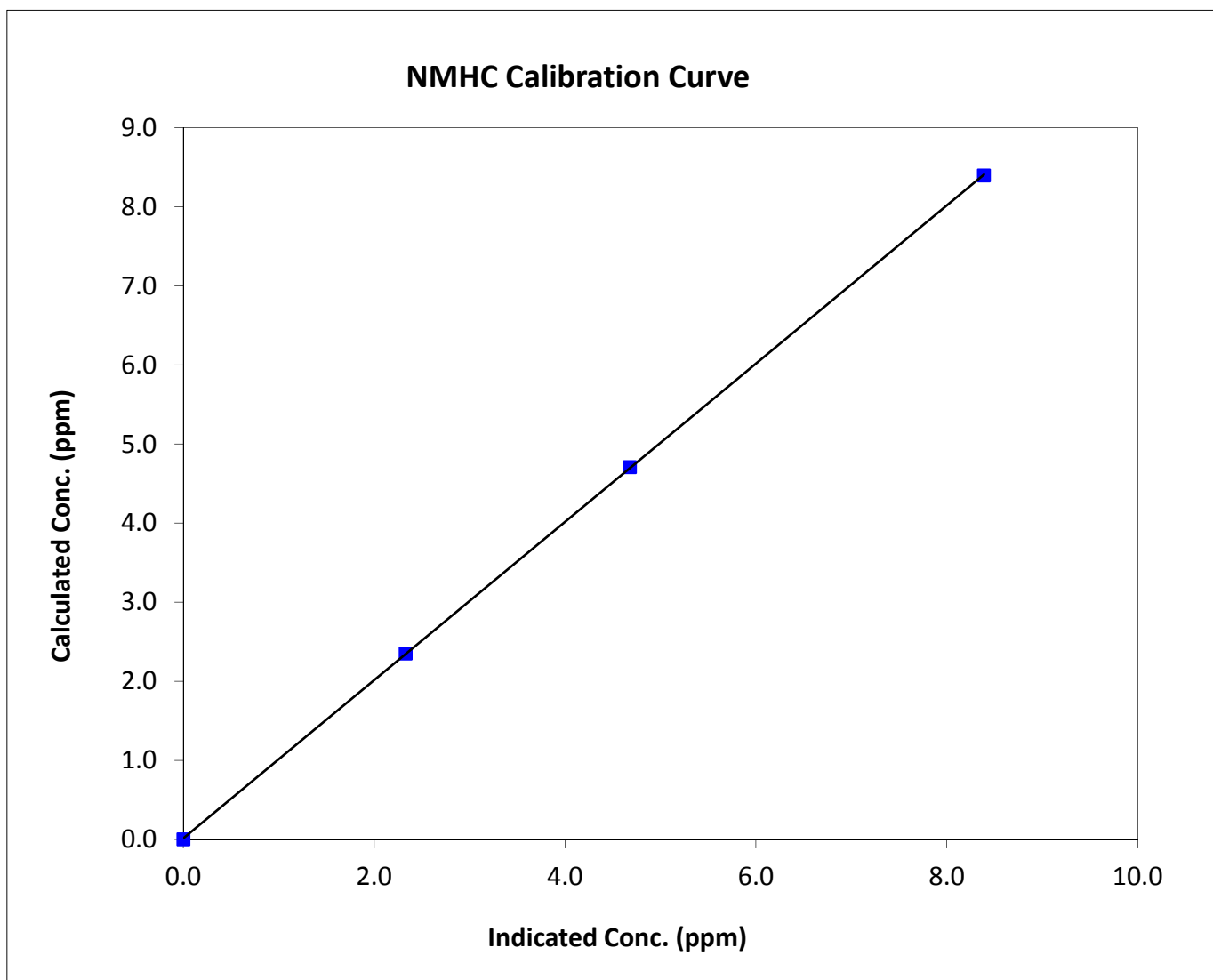
## NMHC Calibration Summary

### Station Information

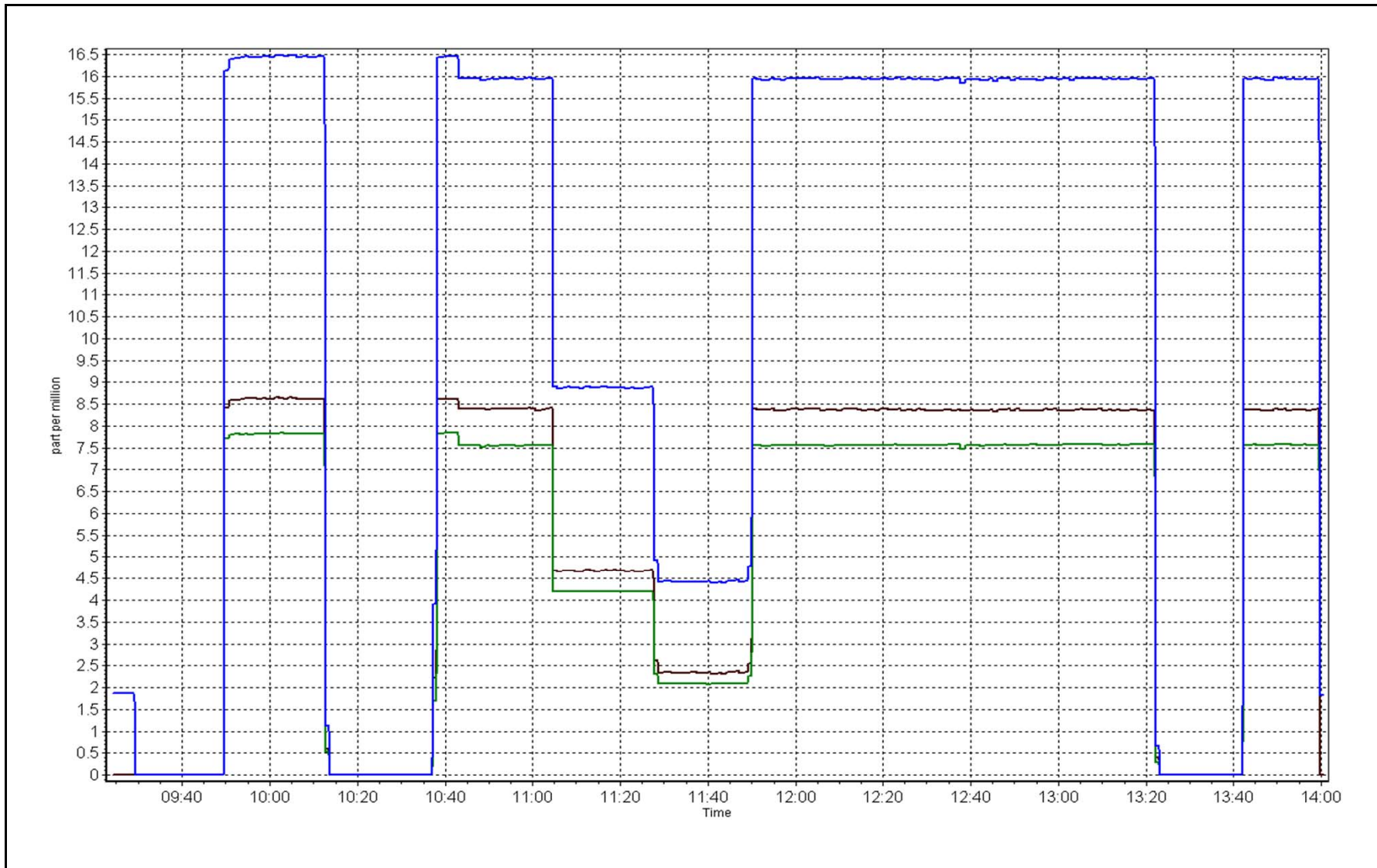
Calibration Date	May 12, 2014	Previous Calibration	April 9, 2014
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:20	End Time (MST)	14:00
Analyzer make	Thermo 55i	Analyzer serial #	1331259520

### Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	N/A	Correlation Coefficient	0.999988
8.39	8.39	1.0005		
4.71	4.68	1.0058	Slope	1.000389
2.35	2.33	1.0079		
			Intercept	0.011002









# Wood Buffalo Environmental Association

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

### Station Information

Calibration Date	May 13, 2014	Previous Calibration	April 10, 2014
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	Routine		
Start Time (MST)	9:30	End Time (MST)	12:00
Barometric Pressure	N/A mmHg	Station temp.	23 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11571008
NO2 calibration used	Monday, May 12, 2014	Transfer Standard	NA
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2403
DACS voltage range	5000	DACS channel #	Diff 7

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	500	500	Bench temp.	27.8	28.6
Analyzer Range (input)	5000	5000	Lamp temp.	56.7	56.7
Calculated slope	1.013059	1.015891	Pressure	706.7	697.4
Calculated intercept	-2.113683	-1.360809	Flow cell A	0.877	0.878
Analyzer Background	-1.5	-1.5	Flow cell B	0.747	0.748
Analyzer Coefficient	1.127	1.127	Cell A Intensity	48250	47770
			Cell B Intensity	53025	52588

Analyzer make Thermo 49C Analyzer serial # 49C-60861-328

### 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	5500	0.00	0.0	0.5	N/A
as found span	5000	0.98	395.3	389.5	1.015
calibrator zero	5500	0.00	0.0	0.5	N/A
high point	5000	1.10	395.3	389.5	1.015
second point	5000	0.60	202.7	202.8	1.000
third point	5000	0.35	106.5	106.1	1.004
calibrator zero	5500	0.00	0.0	1.7	N/A
as left zero	N/A	0.00	0.0	1.7	N/A
as left span	N/A	Level 1	N/A	247.9	
Average Correction Factor					1.006

Corrected As found 389.0 Previous response 392.3 % change 0.9%

#### Notes:

no adjustments required.

Calibration Performed By:

Michael Martineau



## Wood Buffalo Environmental Association

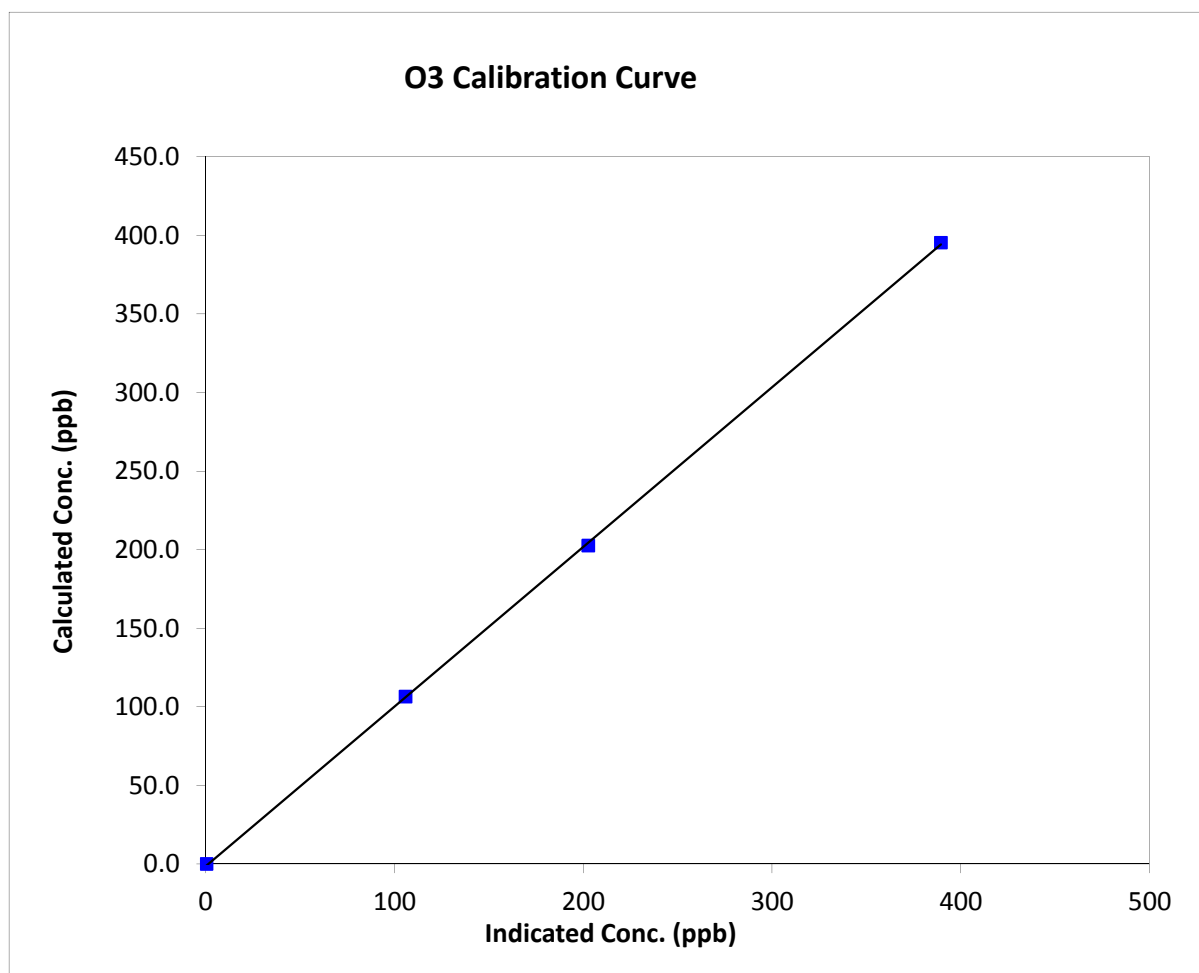
### O<sub>3</sub> Calibration Summary

#### Station Information

Calibration Date	Tuesday, May 13, 2014	Previous Calibration	April 10, 2014
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:30	End Time (MST)	12:00
Analyzer make	Thermo 49C	Analyzer serial #	49C-60861-328

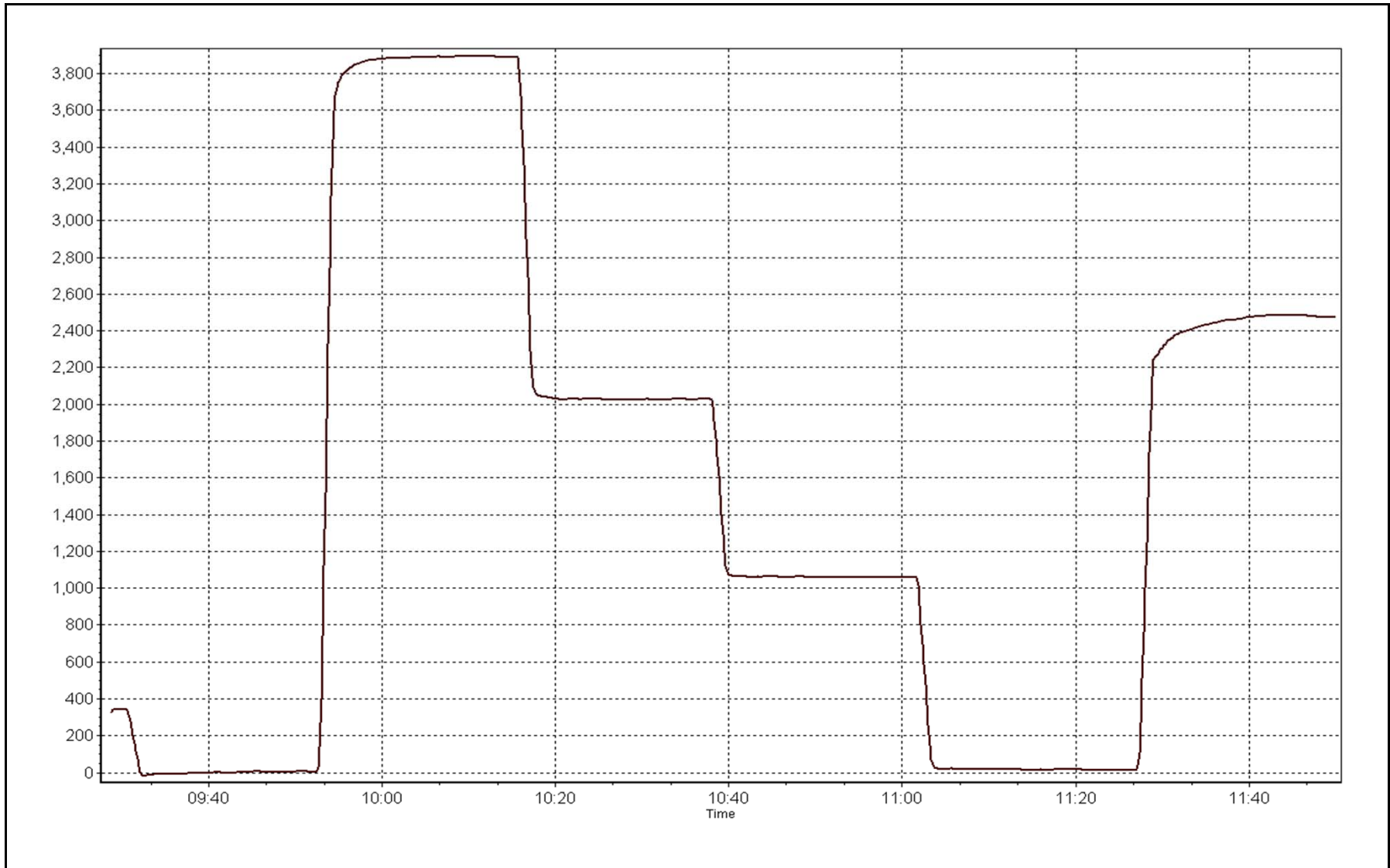
#### Calibration Data

Calculated concentration (ppb) (C <sub>c</sub> )	Indicated concentration (ppb) (I <sub>c</sub> )	Correction factor (C <sub>c</sub> /I <sub>c</sub> )	Statistical Evaluation	
0.0	0.5	N/A	Correlation Coefficient	0.999936
395.3	389.5	1.0149		
202.7	202.8	0.9996	Slope	1.015891
106.5	106.1	1.0042		
			Intercept	-1.360809



O3 Calibration Plot

Date: May 13, 2014





# Wood Buffalo Environmental Association

## NO<sub>x</sub>-NO-NO<sub>2</sub> Calibration Report

### Station Information

Calibration Date	May 12, 2014	Previous Calibration	April 9, 2014
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	<input type="text" value="Routine"/>		
Start Time (MST)	9:20	End Time (MST)	14:00
Barometric Pressure	n/a mmHg	Station Temperature	21.0 Deg C
Calibrator	SABIO 4010	Serial Number	11571108
NO Cal Gas Conc	50.6 ppm	Cal Gas Expiry Date	May 29th 2014
NOx Cal Gas Conc	50.6 ppm	Cal Gas Serial #	LL107923

### DACS Information

DACS make & model Campbell Scientific CR3000      DACS serial No. 2403

Parameter		NOx	NO	NO2
MV conversion	Analyzer Range (ppb)	5000	5000	5000
	Analyzer Range (mv)	5000	5000	5000
Before	Data Slope	1.007124	1.008879	1.000824
	Data Offset	0.476982	-0.013047	-0.215957
After	Data Slope	0.992808	0.993542	1.000236
	Data Offset	0.523692	0.522704	0.371052
Channel #				
Voltage Range		0-5000mv	0-5000mv	0-5000mv

### Analyzer Information

Analyzer make/model Thermo 42i NO/NO2/NOx Analyzer      Analyzer serial # 1218153357

Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
NO coefficient	0.866	ppb	0.866	ppb
NOX coefficient	0.999	ppb	0.999	ppb
NO2 coefficient	1.000	ppb	1.000	ppb
NO bkgrnd	5.9		6.0	
NOX bkgrnd	6.5		6.2	
Nt coefficient				
Chamber Temp	50.3	Deg C	50.6	Deg C
Moly Temp	322.6	Deg C	326.0	Deg C
PMT Temp	-2.8	Deg C	-3.0	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell Press	198.1	mmHg	205.5	mmHg
Sample Flow	0.482	ccm	0.505	ccm

Notes:

adjusted zero



# Wood Buffalo Environmental Association

## NO<sub>x</sub>-NO-NO<sub>2</sub> Calibration Report

### Station Information

Calibration Date:

May 12, 2014

Station Number:

AMS 1

### 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 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
as found zero	5500	0.0	0.0	0.0	0.0	-0.5	0.0	-0.5	N/A	N/A
as found span	5500	81.5	749.8	749.8	0.0	757.0	755.8	1.3	0.9904	0.9921
calibrator zero	5500	0.0	0.0	0.0	0.0	-0.2	-0.1	-0.1	N/A	N/A
high point	5500	81.5	749.8	749.8	0.0	755.1	754.7	0.5	0.9930	0.9935
second point	5500	45.7	420.4	420.4	0.0	422.6	422.1	0.5	0.9949	0.9960
third point	5500	22.8	209.8	209.8	0.0	210.0	209.8	0.2	0.9988	0.9998
calibrator zero	5500	0.0	0.0	0.0	0.0	-0.2	-0.1	-0.1	N/A	N/A
as left zero	5500	0.0	0.0	0.0	0.0	0.2	-0.1	0.3	N/A	N/A
as left span	5500	81.5	749.8	357.5	392.3	757.0	361.3	395.6	0.9905	0.9893
Average Correction Factor									0.9956	0.9965

Corrected As found

NO<sub>x</sub>= 757.6

NO= 755.8

Percent Change

NO<sub>x</sub>= -1.8%

NO= -1.7%

Previous Response

NO<sub>x</sub>= 744.0

NO= 743.2

### GPT Calibration Data

Dilution Flow

5500

ccm

Source Gas Flow

81.50

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			-0.1			N/A	
1st NO <sub>2</sub> (300)	N/A	357.5	395.3	752.4	357.5	395.0	0.9820	1.0000	1.0008	99.9%
2nd NO <sub>2</sub> (200)	N/A	550.1	202.7	752.2	550.1	202.1	0.9823	1.0000	1.0027	99.7%
3rd NO <sub>2</sub> (100)	N/A	646.2	106.5	752.0	646.2	105.8	0.9825	1.0000	1.0070	99.3%
4th NO <sub>2</sub> (0)	752.7	N/A	0.4	753.2	752.7	0.4	0.9810	1.0000	N/A	N/A
Average Correction Factor							0.9820	1.0000	1.0035	99.7%

Calibration Performed By:

Michael Martineau



# Wood Buffalo Environmental Association

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

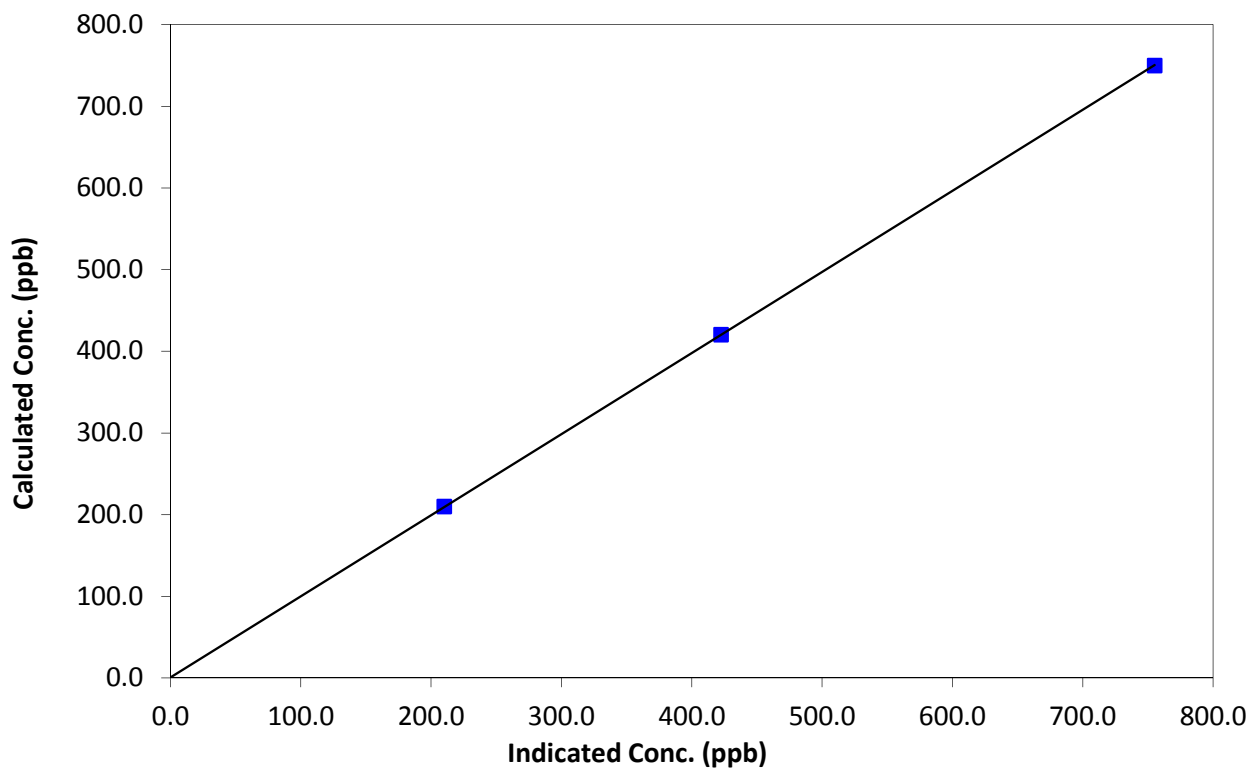
### Station Information

Calibration Date	May 12, 2014	Previous Calibration	April 9, 2014
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:20	End Time (MST)	14:00
Analyzer make	Thermo 42i NO/NO <sub>2</sub> /NO <sub>x</sub> Analyzer	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	0.999997
749.8	755.1	0.9930		
420.4	422.6	0.9949	Slope	0.992808
209.8	210.0	0.9988		
0.0	-0.2	0.0000	Intercept	0.523692

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





# Wood Buffalo Environmental Association

## NO Calibration Summary

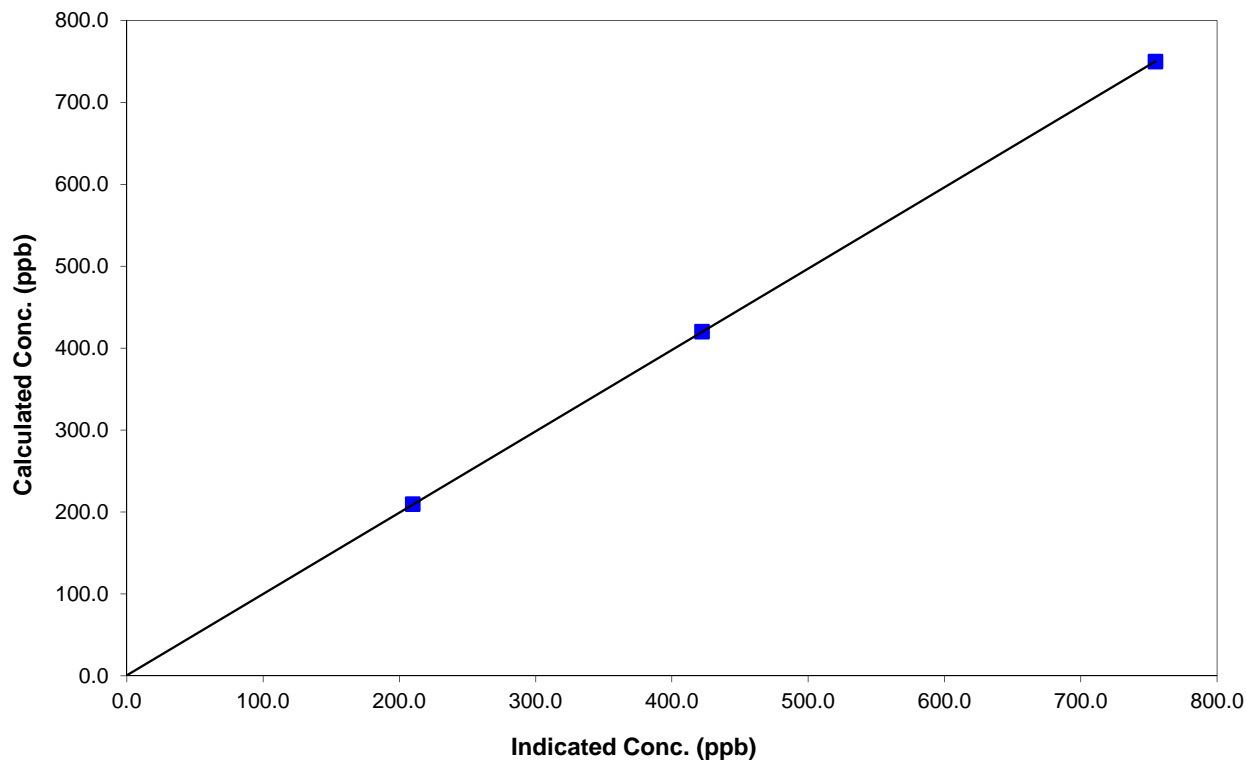
### Station Information

Calibration Date	May 12, 2014	Previous Calibration	April 9, 2014
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:20	End Time (MST)	14:00
Analyzer make	Thermo 42i NO/NO2/NOx Analyzer	Analyzer serial #	1218153357

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999996
749.8	754.7	0.9935		
420.4	422.1	0.9960	Slope	0.993542
209.8	209.8	0.9998		
0.0	-0.1	0.0000	Intercept	0.522704

### NO Calibration Curve







# Wood Buffalo Environmental Association

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

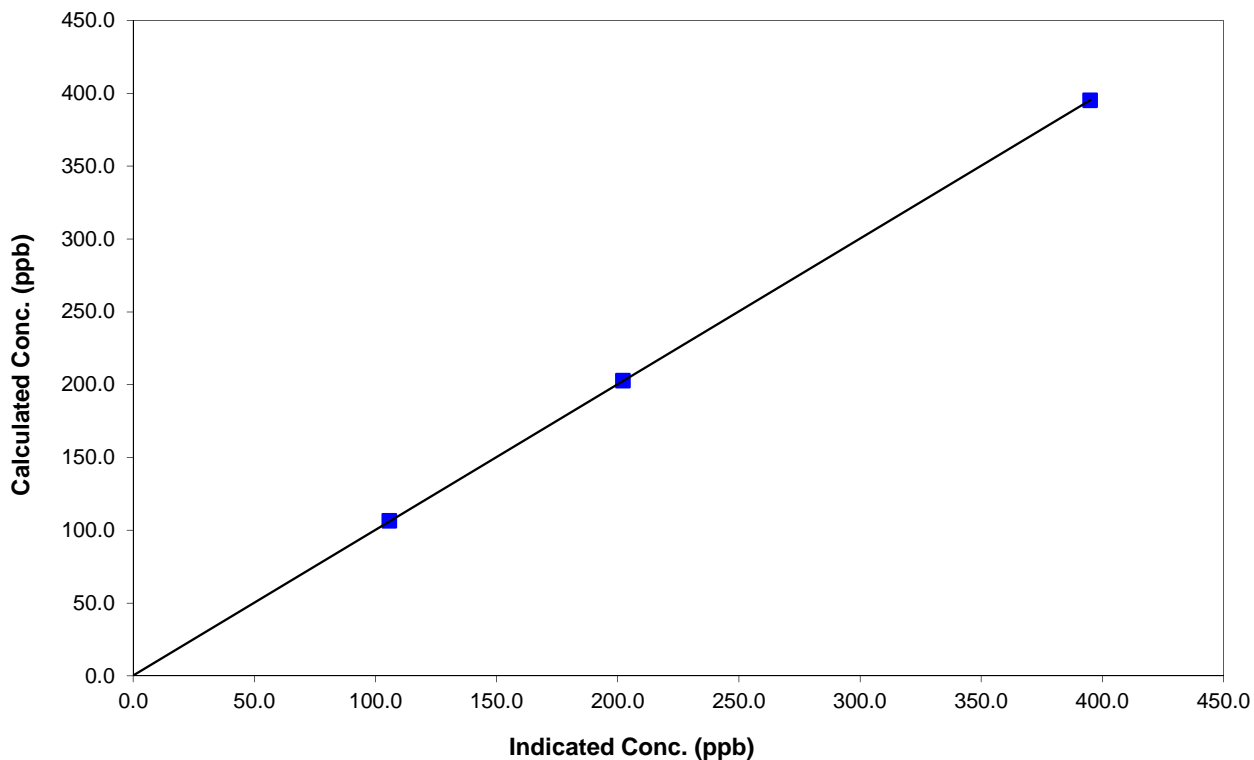
### Station Information

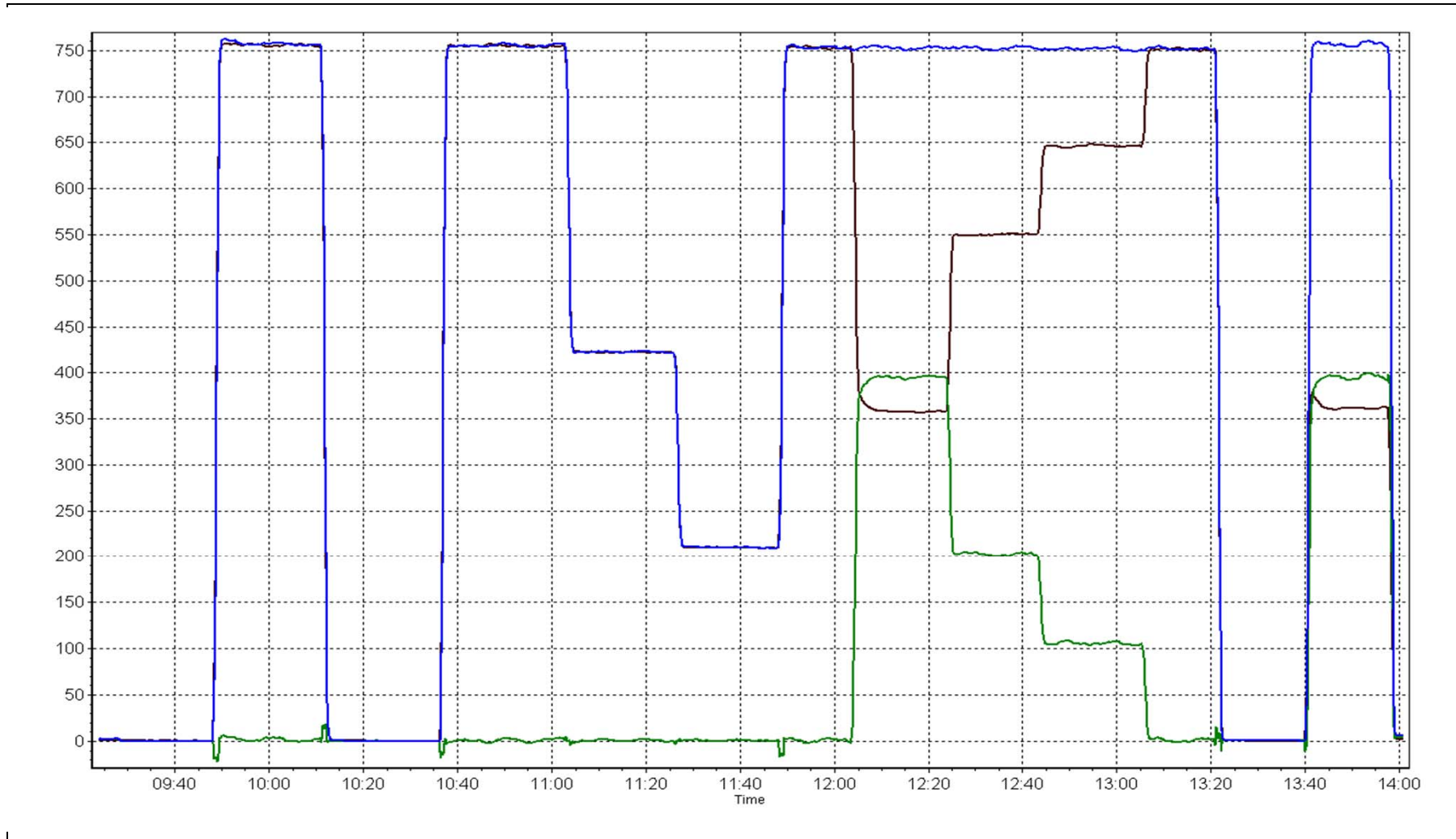
Calibration Date	May 12, 2014	Previous Calibration	April 9, 2014
Station Number	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:20	End Time (MST)	14:00
Analyzer make	Thermo 42i NO/NO <sub>2</sub> /NO <sub>x</sub> Analyzer	Analyzer serial #	1218153357

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999997
395.3	395.0	1.0008		
202.7	202.1	1.0027	Slope	1.000236
106.5	105.8	1.0070		
			Intercept	0.371052

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







# Wood Buffalo Environmental Association

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

### Station Information

Calibration Date	May 14, 2014	Previous Calibration	April 15, 2014
Station Name	Bertha Ganter - Fort McKay	Station Number	AMS 1
Reason:	Routine		
Start Time (MST)	9:40	End Time (MST)	15:00
Barometric Pressure	N/A mmHg	Station Temperature	21.0 Deg C
Calibrator	Sabio 4010	Serial Number	224632
NH3 Cal Gas Conc	192 ppm	Cal Gas Expiry Date	March 3rd 2012
NOx Cal Gas Conc	50.6 ppm	Cal Gas Serial #	LL156612

### DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	2403
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Parameter		Nt	NOx	NH3
MV conversion	Analyzer Range (ppb)	2500	1000	2500
	Analyzer Range (mv)	5000	5000	5000
Before	Data Slope	1.046226	0.000000	1.016432
	Data Offset	-6.636119	749.800000	-4.673016
After	Data Slope	0.990622	0.998087	0.999545
	Data Offset	-7.968897	-0.225500	-6.298805
Channel #		NA	6	7
Voltage Range		NA	0-5000mv	0-5000mv

### Analyzer Information

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

Test Point	before		after	
Concentration range	0-2500	ppb	0-2500	ppb
Nt coefficient	1.170	ppb	1.195	ppb
NOX coefficient	1.174	ppb	1.189	ppb
NH3 coefficient	1.000		1.000	
NO coefficient	1.171		1.172	
NO2 coefficient	1.000	ppb	1.000	ppb
No bkgnd	-0.3		-0.3	
Nt bkgnd	0.0		0.0	
NOX bkgnd	-0.2		-0.2	
NhH3 conv temp	825	DegC	825	Deg C
Chamber Temp	49.9	Deg C	50.0	Deg C
Moly Temp	315.4	Deg C	314.5	Deg C
PMT Temp	7.0	Deg C	7.0	Deg C
O3 flow	85.0	ccm	85.0	ccm
R Cell Press	4.0	mmHg	4.1	mmHg
PMT Voltage		v		v
Sample Flow 1 NO	550.0	ccm	546.0	ccm
Sample Flow 2 Nox	520.0	ccm	516.0	ccm
Sample Flow 3 Nt	n/a	ccm	n/a	ccm

Notes:

Adjusted NT span
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# Wood Buffalo Environmental Association

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

### Station Information

Calibration Date:

May 14, 2014

Station Number:

AMS 1

### 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	5000	0.0	0.0	0.0	0.0	-0.3	0.2	-1.2	NA	NA
as found NO	5500	81.5	749.8	749.8	NA	738.8	740.7	-4.9	1.015	NA
calibrator zero	5000	0.0	0.0	0.0	-0.5	-0.3	0.2	-1.2	NA	NA
high NO point	5500	81.5	749.8	749.8	NA	751.7	751.6	0.2	0.997	NA
NO/O <sub>3</sub> point	5500	81.5	749.8	749.8	NA	752.1	751.3	2.0	0.997	NA
as found NH <sub>3</sub>	6500	67.7	1999.8	NA	1999.8	2018.9	7.6	1999.8	0.991	1.000
first NH <sub>3</sub>	6500	67.7	1999.8	NA	1999.8	2018.9	7.6	1999.8	0.991	1.000
second NH <sub>3</sub>	6500	33.9	1001.4	NA	1001.4	1033.3	4.5	1022.0	0.969	0.980
third NH <sub>3</sub>	6500	16.9	499.2	NA	499.2	513.6	3.0	506.1	0.972	0.986
as left zero	0									
as left span										
Average Correction Factor									0.9972	0.9887

Corrected As found

Nt = 739.1 ppb

NH<sub>3</sub> = 2001.0 ppb

Previous response

Nt = 723.3 ppb

NH<sub>3</sub> = 1972.1 ppb

Nt percent change -2.1%

NH<sub>3</sub> percent change -1.4%

Converter efficiency 100.0%

Calibration Performed By:

Devin Russell



# Wood Buffalo Environmental Association

## NH3 Calibration Summary

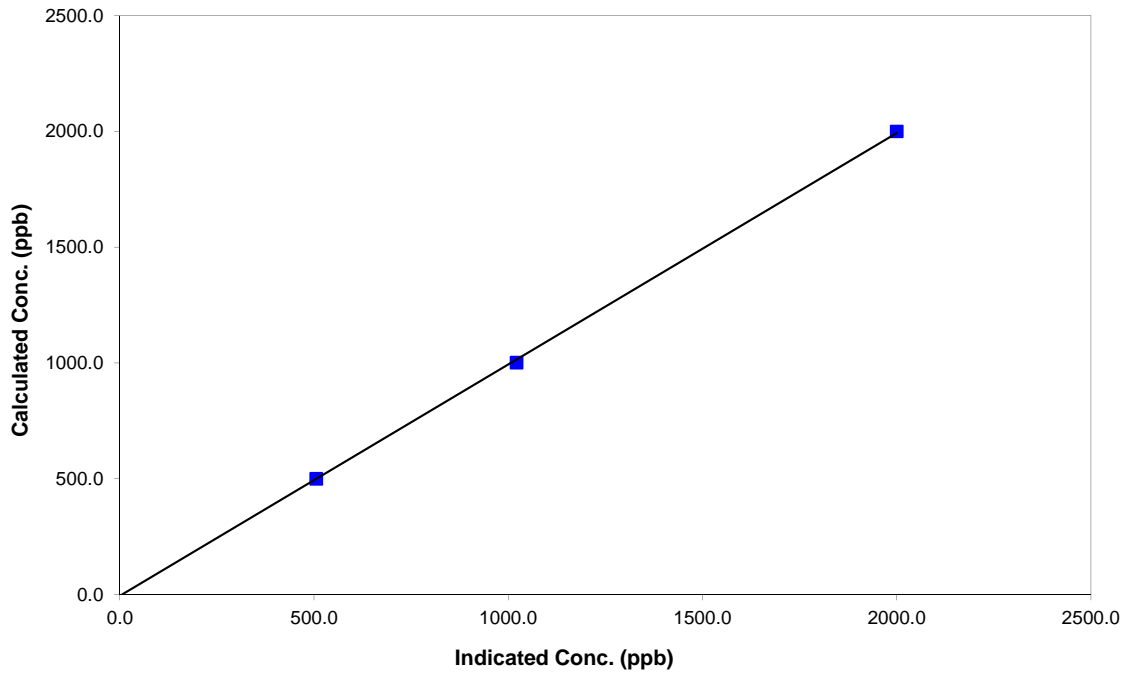
### Station Information

Calibration Date	May 14, 2014	Previous Calibration	April 15, 2014
Station Number	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:40	End Time (MST)	15:00
Analyzer make	API T201	Analyzer serial #	152

### NH3 Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
-0.5	-1.2	N/A	Correlation Coefficient	0.999866
1999.8	1999.8	1.0000		
1001.4	1022.0	0.9798	Slope	0.999545
499.2	506.1	0.9865		
			Intercept	-6.298805

### NH3 Calibration Curve





# Wood Buffalo Environmental Association

## Nt Calibration Summary

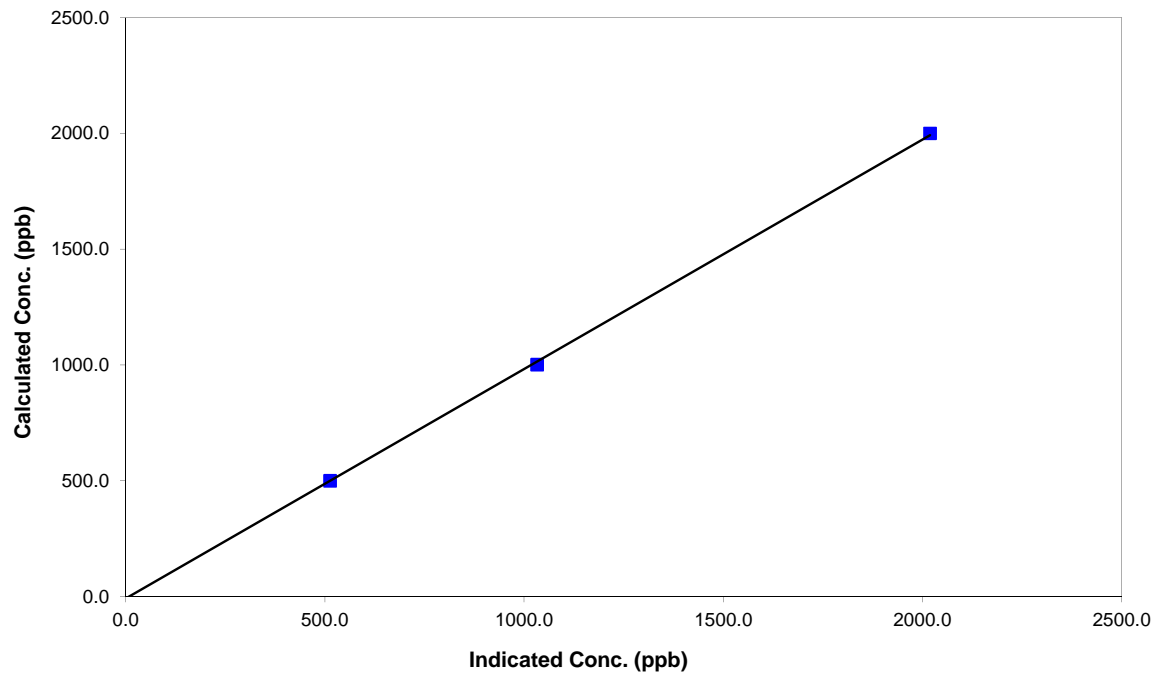
### Station Information

Calibration Date	May 14, 2014	Previous Calibration	April 15, 2014
Station Number	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:40	End Time (MST)	15:00
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	N/A	Correlation Coefficient	0.999847
1999.8	2018.9	0.9905		
1001.4	1033.3	0.9690	Slope	0.990622
499.2	513.6	0.9719		
			Intercept	-7.968897

### Nt Calibration Curve





## Wood Buffalo Environmental Association

### NOx Calibration Summary

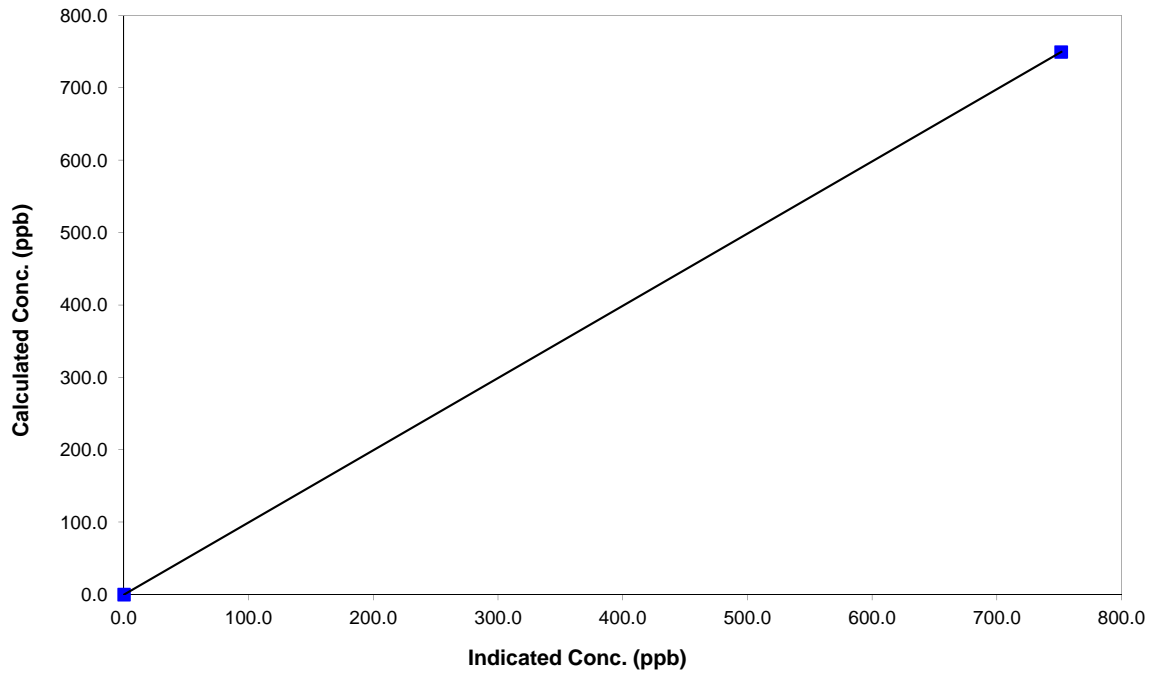
#### Station Information

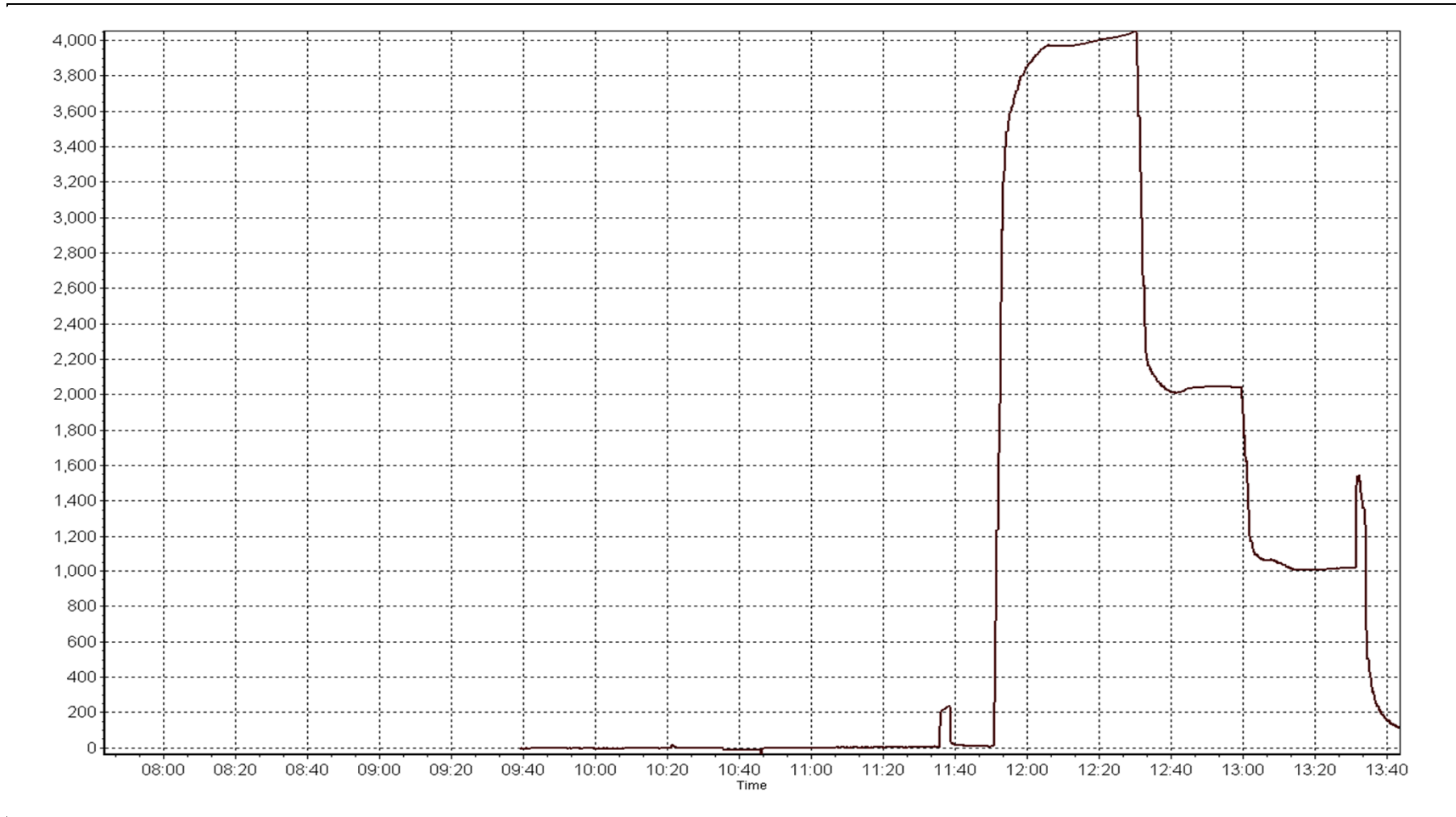
Calibration Date	May 14, 2014	Previous Calibration	April 15, 2014
Station Number	Bertha Ganter - Fort McKay	Station Number	AMS 1
Start Time (MST)	9:40	End Time (MST)	15:00
Analyzer make	API T201	Analyzer serial #	152

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

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	N/A	Correlation Coefficient	1.000000
749.8	751.6	0.9976		
749.8	751.3	0.9980	Slope	0.998087
			Intercept	-0.225500

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







**WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

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

**AMS 2  
MILDRED LAKE  
MAY 2014**

Operations and Data Collection by:  
Wood Buffalo Environmental Association  
Fort McMurray, Alberta

QA/QC, Data Validation and Reporting by:  
Aurora Atmospheric Inc.  
Calgary, Alberta

June 27, 2014

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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MILDRED LAKE (AMS 2)  
MAY 2014

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	706	37	38	99.87	65	0	7	0
H2S (ppb) Average	709	34	35	99.87	8	0	1	0
THC (ppm) Average	706	37	38	99.87	14.7	-	3.5	-
Temperature (C) Average	744	0	0	100.00	28.2	-	21	-
Wind Speed 10 m (km/h) Average	744	0	0	100.00	28	-	-	-
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)  
MAY 2014

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	706	1.4	4	-	0	0	0	0	1	3	65
H2S (ppb) Average	709	0.4	0	-	0	0	0	0	0	1	8
THC (ppm) Average	706	2.22	0.7	-	2	2	2.1	2.1	2.2	2.5	14.7
Temperature 2 m (C) Average	744	8.8	6.8	-	-5.8	0.1	3.3	8.4	14	18.1	28.2
Wind Speed 10 m (km/h) Average	744	10.1	6	-	0	4	6	9	13	18	28
Wind Direction 10 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MILDRED LAKE (AMS 2)  
MAY 2014

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
AIR QUALITY ANALYZERS	20 May 2014 15:00	20 May 2014 15:00	1	Power spike

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Summary of Hour Averages

Mildred Lake - May 2014

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 65 ppb on May 14 09:00	Maximum Daily Average: 7.1 ppb on May 14		Hours of Data:	706
Minimum Value: 0 ppb on May 2 00:00	Minimum Daily Average: 0.0 ppb on May 3		Hours of Missing Data:	38
Maximum Diurnal Average: 3.9 ppb at hour 9	Minimum Diurnal Average: 0.3 ppb at hour 5		Hours of Calibration:	37
Monthly Average: 1.4 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> = 3 P <sub>99</sub> = 22		Percent Operational Time:	99.9

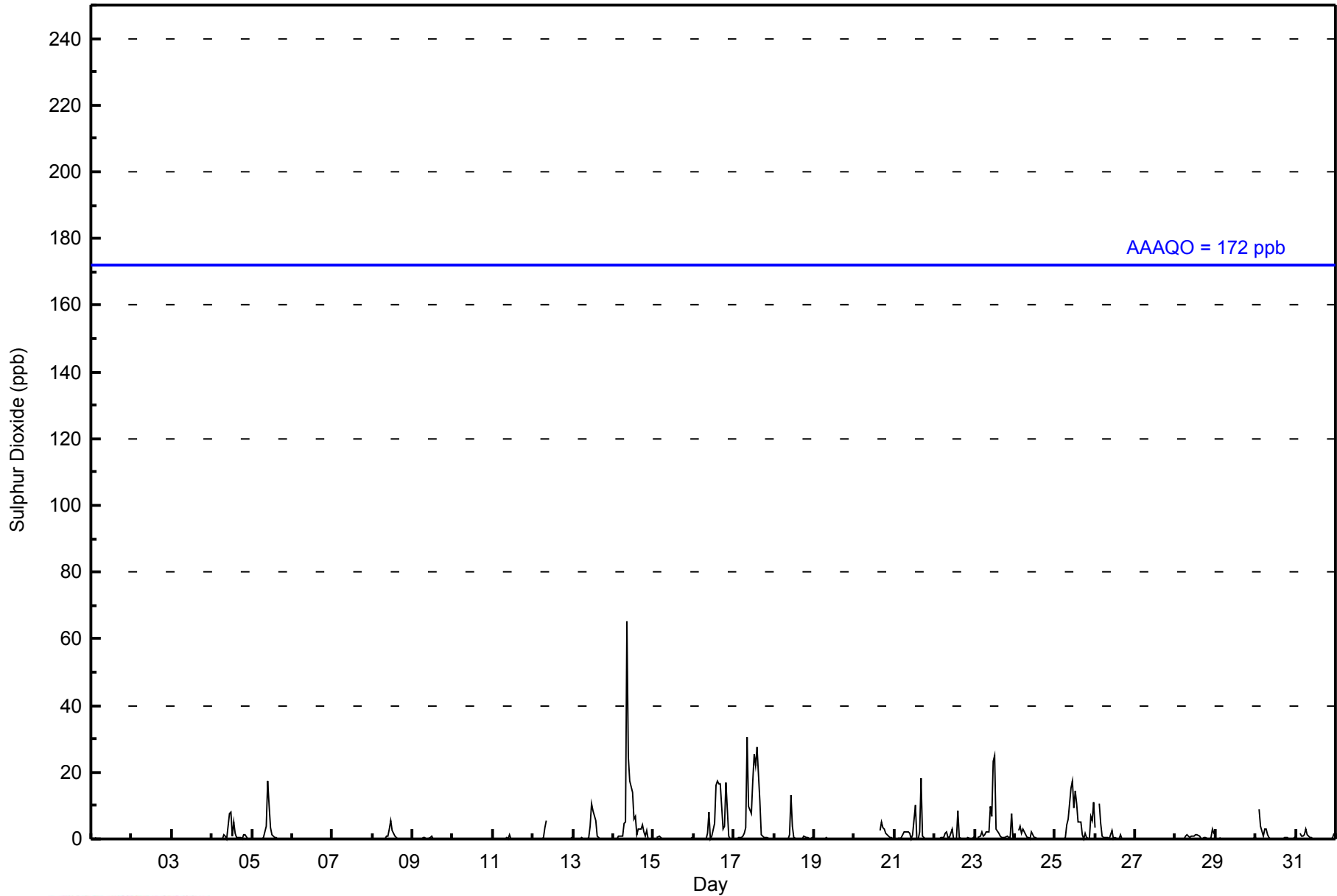
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-May	7	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	7																						
2-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																						
3-May	0	Z	0	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-May	0	Z	0	0	0	0	0	1	1	0	8	8	1	5	2	0	1	0	0	1	1	0	0	0	1.3	8																						
5-May	0	Z	0	0	0	0	0	0	4	17	10	3	1	0	0	0	0	0	0	0	0	0	0	0	1.6	17																						
6-May	0	Z	0	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-May	0	Z	0	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-May	0	Z	0	0	0	0	0	1	1	3	6	3	1	1	0	0	0	0	0	0	0	0	0	0	0.6	6																						
9-May	0	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1																						
10-May	0	Z	0	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-May	0	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1																						
12-May	0	Z	0	0	0	0	1	4	6	C	C	C	C	C	C	0	0	0	0	0	0	0	0	0	--	6																						
13-May	0	Z	0	0	0	0	0	0	0	4	10	9	5	1	0	0	0	0	0	0	0	0	0	0	1.3	10																						
14-May	0	Z	0	1	1	1	4	5	65	24	17	14	6	7	1	3	3	4	2	1	3	0	0	0	7.1	65																						
15-May	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1																						
16-May	0	Z	0	0	0	0	0	0	2	8	0	1	4	16	17	17	16	3	4	17	9	1	0	0	5.1	17																						
17-May	0	Z	0	0	0	1	2	3	30	10	8	17	25	22	27	12	1	1	1	0	1	0	0	0	7.0	30																						
18-May	0	Z	0	0	0	0	0	0	0	1	13	4	0	0	0	0	0	0	0	1	0	0	0	0	0.9	13																						
19-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																						
20-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	PF	3	5	3	3	2	1	0	1	0	0.8	5																						
21-May	0	Z	0	0	0	1	2	2	2	2	0	1	10	0	0	2	18	1	0	0	0	0	0	0	1.9	18																						
22-May	0	Z	0	0	0	1	2	2	1	0	3	0	0	0	9	0	0	0	0	0	0	0	0	0	0.8	9																						
23-May	1	Z	0	1	2	1	1	2	2	10	7	23	25	3	2	1	0	0	1	1	0	0	8	0	3.9	25																						
24-May	0	Z	3	4	2	3	1	1	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0.7	4																						
25-May	0	Z	0	0	0	0	0	4	6	15	17	9	14	11	5	5	1	0	2	1	0	7	5	11	5.0	17																						
26-May	3	Z	10	4	1	1	0	0	0	1	3	0	0	0	0	1	0	0	0	0	0	0	0	0	1.1	10																						
27-May	0	Z	0	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-May	0	Z	0	0	0	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	3	2	0.6	3																						
29-May	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1																						
30-May	1	Z	9	4	1	3	3	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1.0	9																						
31-May	1	Z	2	1	1	1	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0.6	3																						
																								0.5	--	0.8	0.5	0.3	0.4	0.7	1.0	3.9	3.0	3.3	3.3	3.4	2.4	2.3	1.4	1.5	0.5	0.4	0.8	0.5	0.3	0.6	0.6	Diurnal Average
																								7	--	10	4	2	3	4	5	65	24	17	23	25	22	27	17	18	4	4	17	9	7	8	11	Diurnal Maximum

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



WBEA  
Hourly Averages

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Mildred Lake - May 2014







**WBEA**  
**Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Mildred Lake - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	681	96.46	96.46
11 - 20	17	2.41	98.87
21 - 60	7	0.99	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: 706

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Mildred Lake - May 2014**

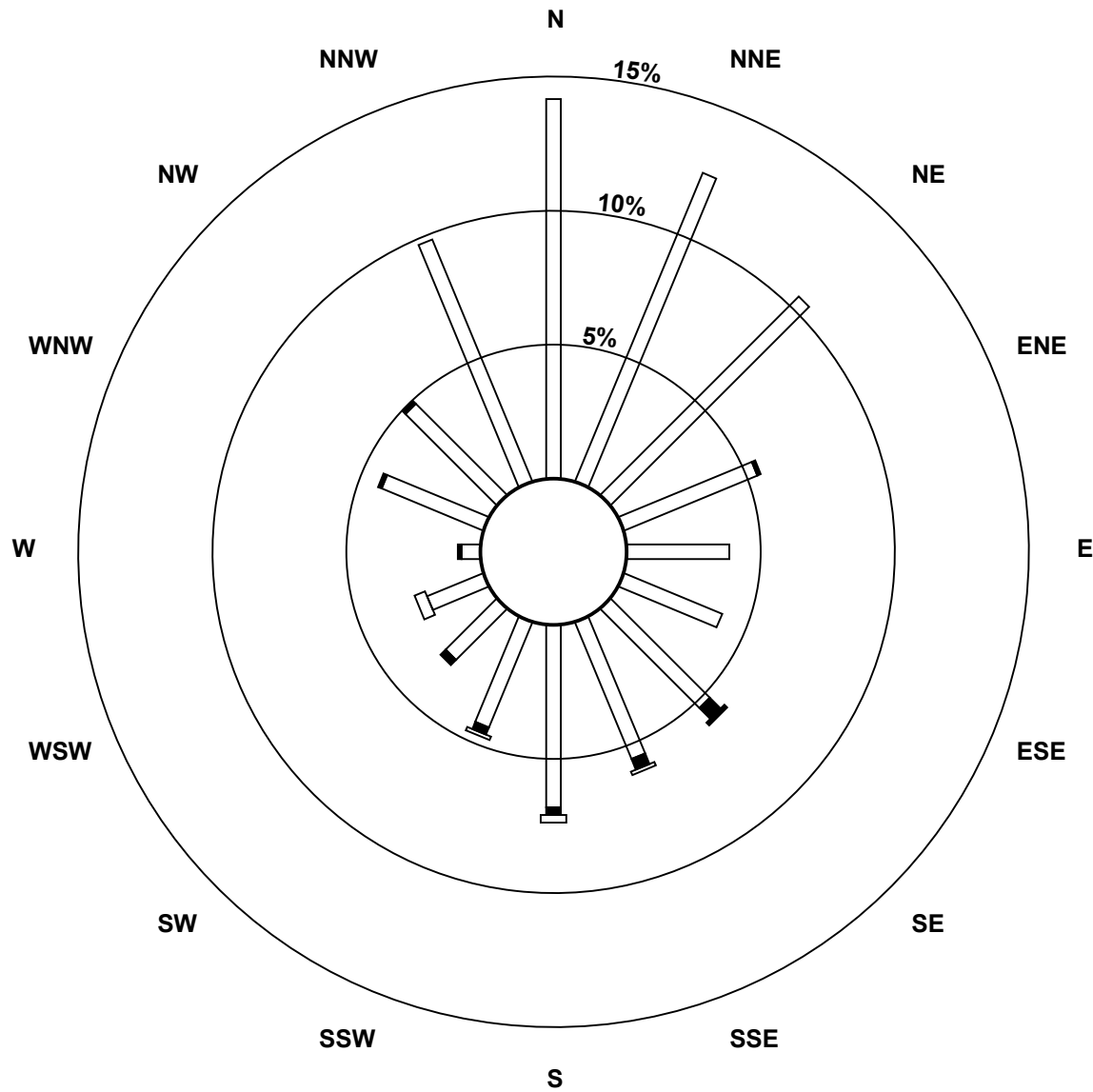
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	100	88	74	38	27	28	37	39	48	30	19	16	5	29	34	69	681
11 - 20	0	0	0	1	0	0	4	3	2	2	2	0	1	1	1	0	17
21 - 60	0	0	0	0	0	0	0	1	2	1	0	3	0	0	0	0	7
61 - 110	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	100	88	74	39	27	28	42	43	52	33	21	19	6	30	35	69	706

Total Number of Valid Hours: 706

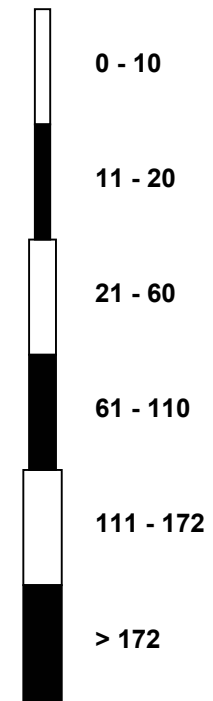
Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

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



Classes (ppb)

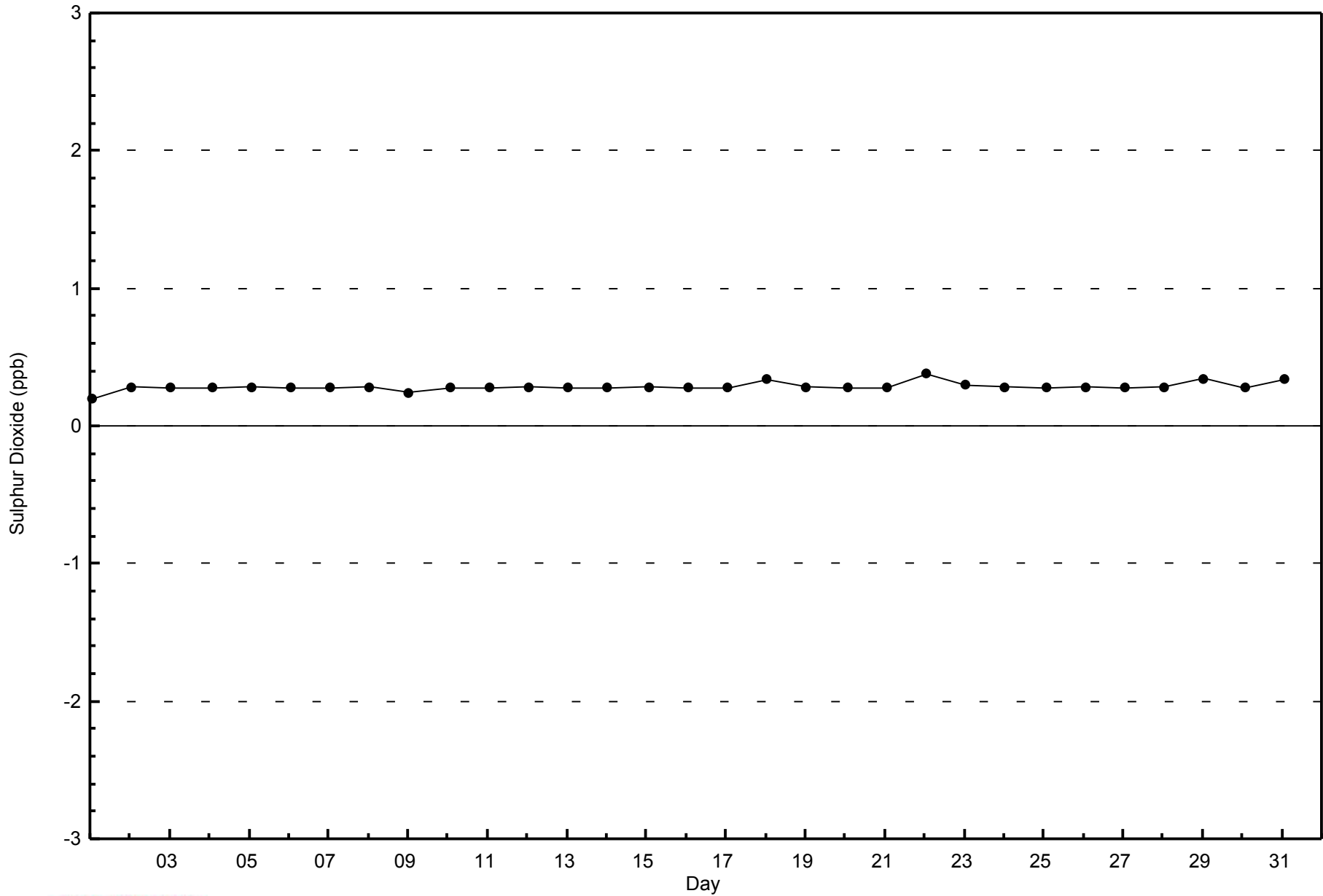


Total Number of Valid Hours: 706



WBEA  
Zero Responses

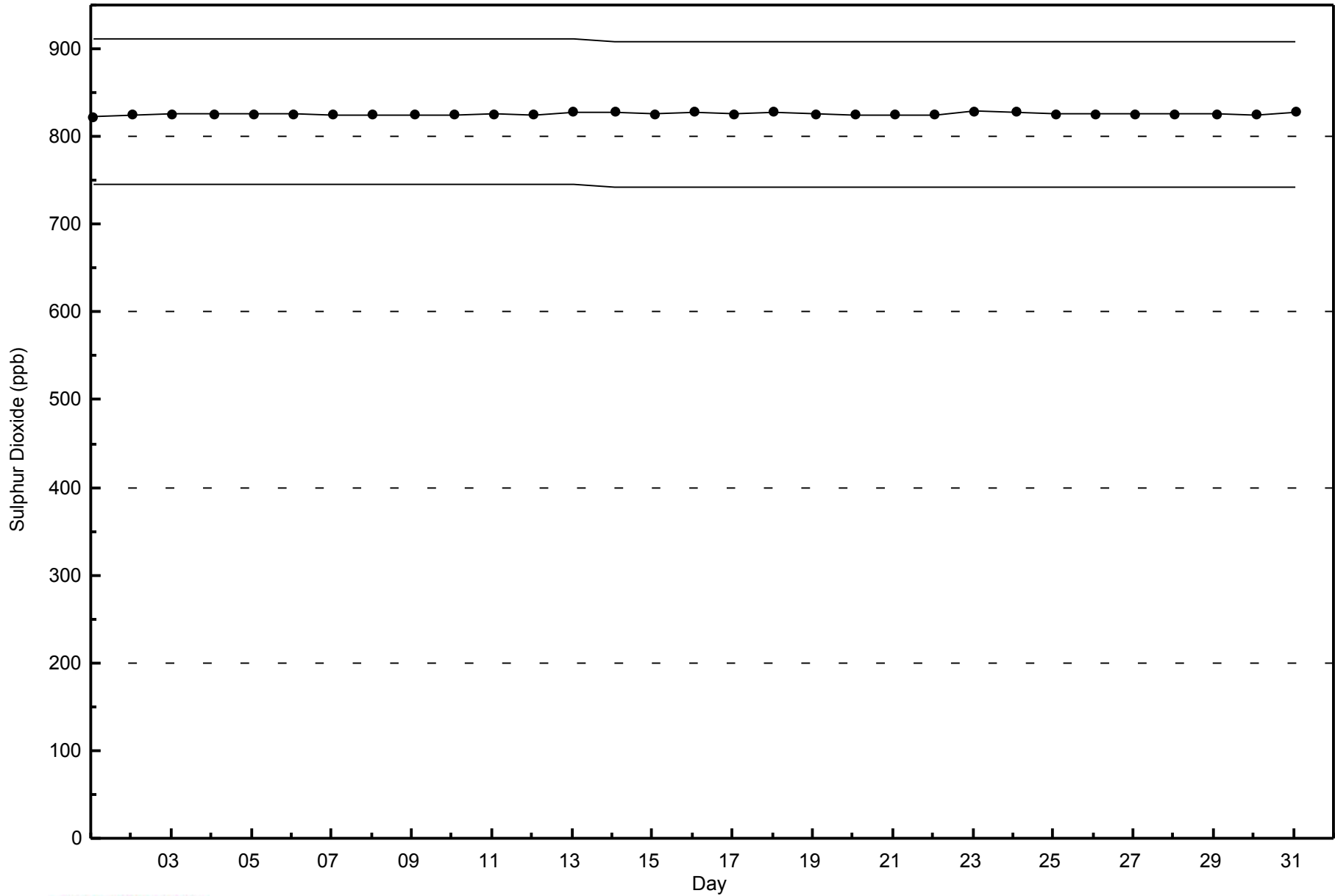
Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Mildred Lake - May 2014





WBEA  
Span Responses

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Mildred Lake - May 2014



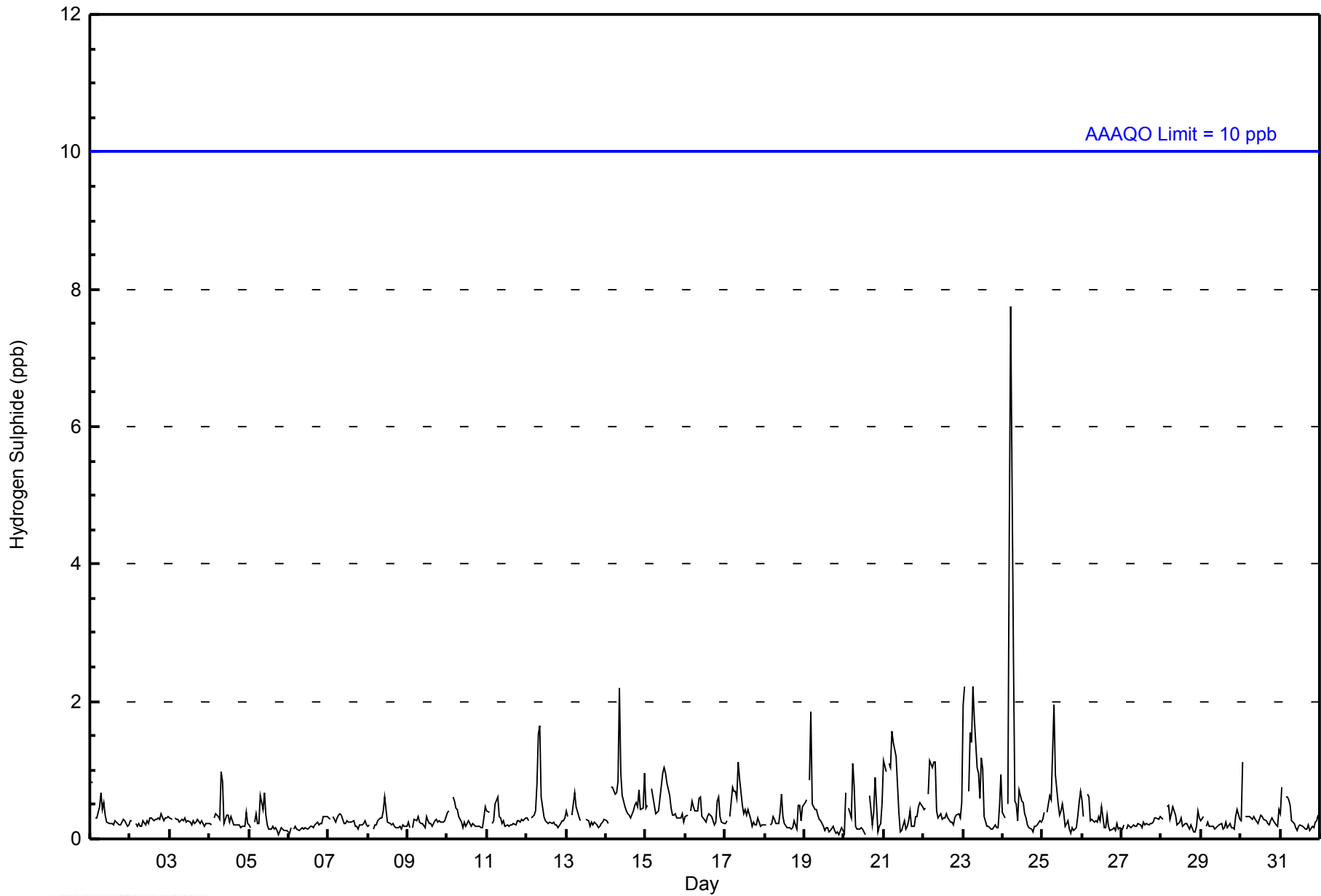


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																																						
Maximum Value: 8 ppb on May 24 06:00										Maximum Daily Average: 0.9 ppb on May 24										Hours of Data: 709																												
Minimum Value: 0 ppb on May 5 19:00										Minimum Daily Average: 0.2 ppb on May 6										Hours of Missing Data: 35																												
Maximum Diurnal Average: 0.7 ppb at hour 6										Minimum Diurnal Average: 0.2 ppb at hour 18										Hours of Calibration: 34																												
Monthly Average: 0.4 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										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-May	1	1	Z	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
2-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0																						
3-May	0	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																						
4-May	0	0	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
5-May	0	0	Z	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																						
6-May	0	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-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0																						
8-May	0	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																						
9-May	0	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																						
10-May	0	0	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
11-May	0	0	Z	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
12-May	0	0	Z	0	0	0	1	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2																						
13-May	0	0	Z	0	1	1	0	0	0	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
14-May	0	0	Z	1	1	1	1	1	2	1	1	0	0	0	0	0	0	0	1	0	1	0	0	1	0.6	2																						
15-May	0	0	Z	1	1	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0.5	1																						
16-May	0	0	Z	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0.4	1																						
17-May	0	0	Z	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1																						
18-May	0	0	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
19-May	1	1	Z	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2																						
20-May	0	1	Z	0	0	1	1	0	0	0	0	0	0	0	PF	1	0	0	0	1	0	0	0	1	0.4	1																						
21-May	1	1	Z	1	1	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.6	2																						
22-May	0	0	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.5	1																						
23-May	2	2	Z	1	2	1	2	2	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	0.9	2																						
24-May	0	0	Z	1	4	8	3	1	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.9	8																						
25-May	0	0	Z	0	1	1	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.5	2																						
26-May	1	0	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
27-May	0	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																						
28-May	0	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																						
29-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0																						
30-May	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
31-May	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																						
																								0.4	0.5	--	0.4	0.7	0.7	0.6	0.6	0.5	0.4	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.4	Diurnal Average
																								2	2	--	1	4	8	3	2	2	1	1	1	1	1	1	1	0	0	1	1	1	0	1	1	Diurnal Maximum
Z - zerospan C - Calibration PF - Power Failure																																																
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb																																																



WBEA  
Hourly Averages

Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Mildred Lake - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Mildred Lake - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	706	99.58	99.58
3 - 4	2	0.28	99.86
5 - 7	0	0.00	99.86
8 - 11	1	0.14	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744





**WBEA**  
**Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Mildred Lake - May 2014**

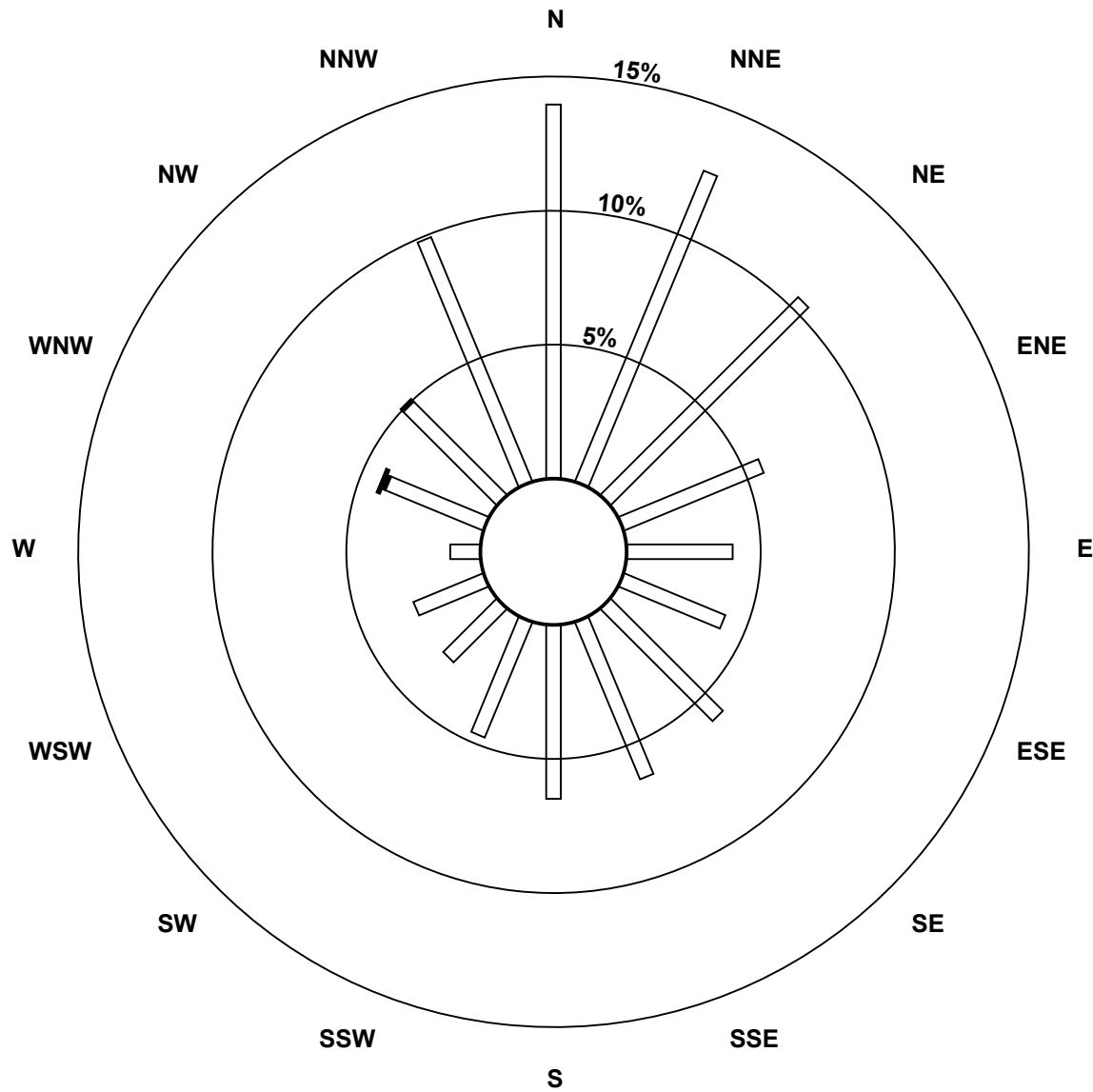
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	99	89	74	40	28	29	42	45	46	33	20	20	8	28	35	70	706
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	99	89	74	40	28	29	42	45	46	33	20	20	8	30	36	70	709

Total Number of Valid Hours: 709

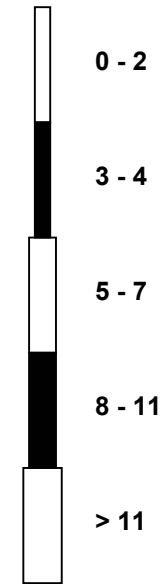
Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

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



**Classes (ppb)**

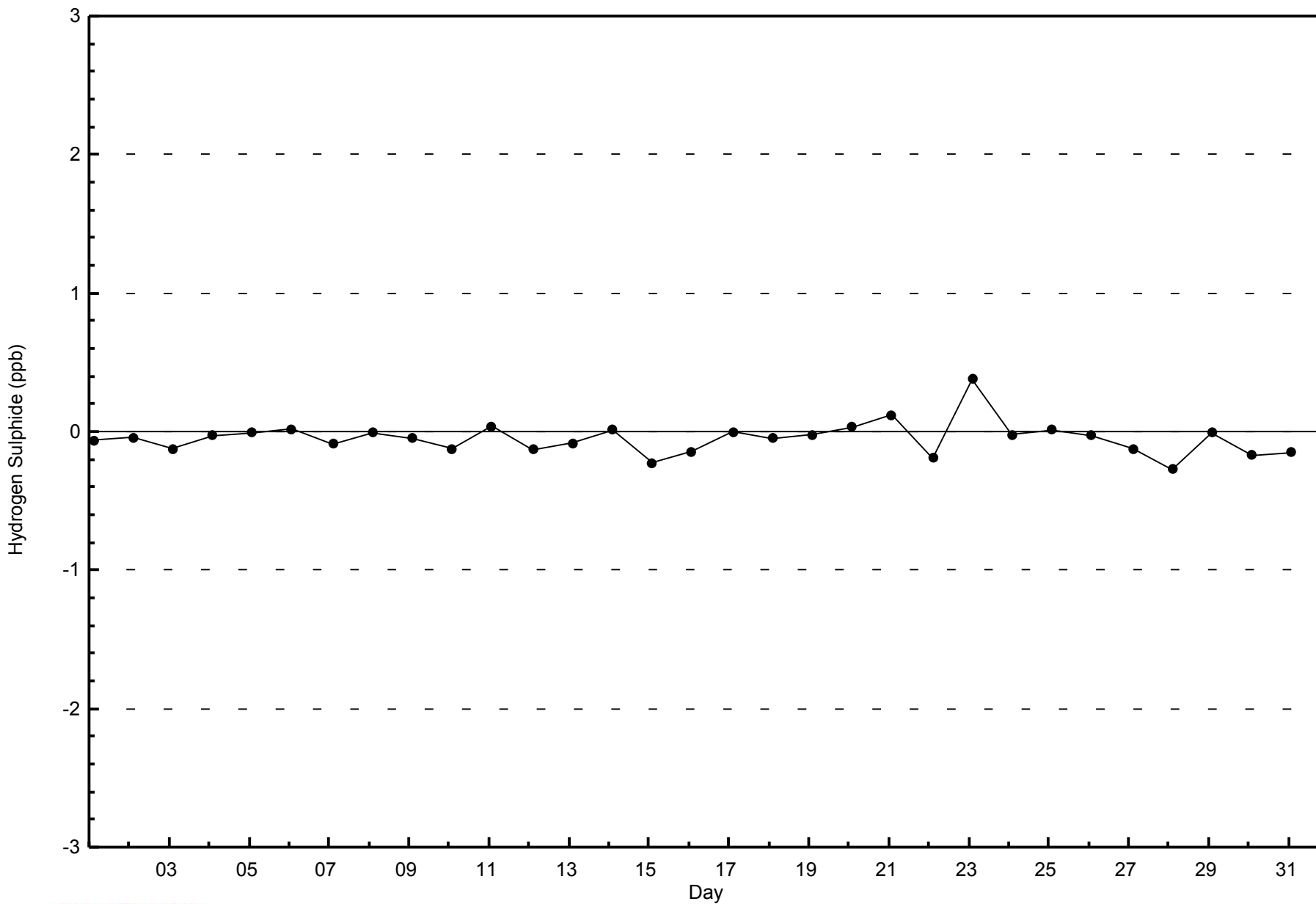


**Total Number of Valid Hours: 709**



WBEA  
Zero Responses

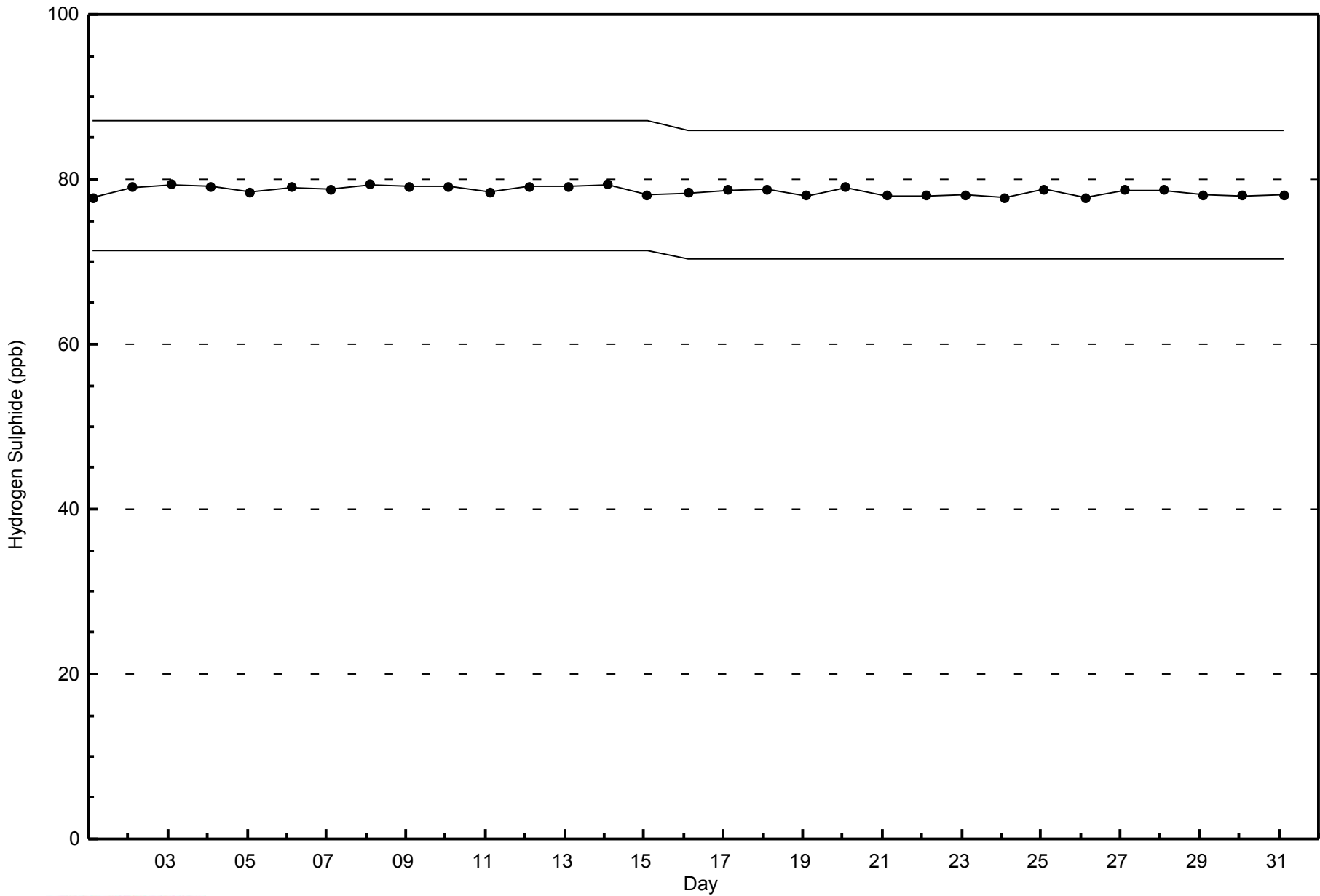
Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Mildred Lake - May 2014





WBEA  
Span Responses

Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Mildred Lake - May 2014





# Wood Buffalo Environmental Association

## Summary of Hour Averages

# Total Hydrocarbons (THC) - ppm

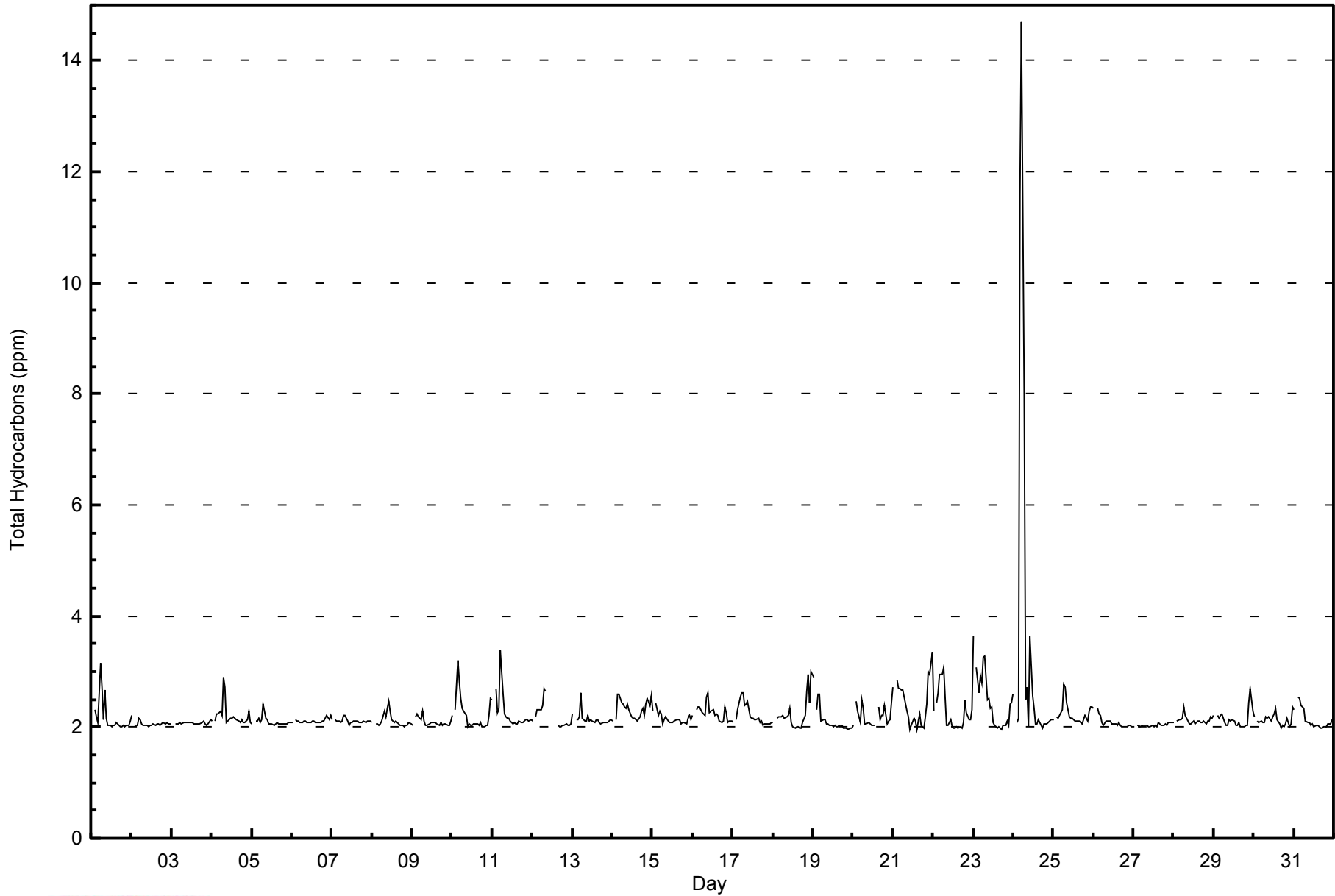
## Mildred Lake - May 2014

Maximum Value: 14.7 ppm on May 24 06:00																		Maximum Daily Average: 3.5 ppm on May 24						Hours in Service: 744																								
Minimum Value: 2.0 ppm on May 23 18:00																		Minimum Daily Average: 2.0 ppm on May 27						Hours of Data: 706																								
Maximum Diurnal Average: 2.8 ppm at hour 6																		Minimum Diurnal Average: 2.1 ppm at hour 18						Hours of Missing Data: 38																								
Monthly Average: 2.22 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> = 2.2 P <sub>90</sub> = 2.5 P <sub>99</sub> = 3.4						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-May	2.2	Z	2.3	2.2	2.1	3.2	2.7	2.1	2.7	2.2	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.2																							
2-May	2.2	Z	2.0	2.0	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1																						
3-May	2.0	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1																						
4-May	2.1	Z	2.1	2.2	2.2	2.3	2.2	2.9	2.7	2.1	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.1	2.2	2.1																						
5-May	2.0	Z	2.1	2.1	2.2	2.1	2.1	2.4	2.2	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1																						
6-May	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.2	2.1	2.2																						
7-May	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1																						
8-May	2.1	Z	2.1	2.1	2.0	2.1	2.1	2.3	2.2	2.3	2.5	2.3	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1																						
9-May	2.0	Z	2.2	2.2	2.2	2.1	2.3	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.0	2.1	2.1	2.0	2.0	2.1	2.1	2.1																						
10-May	2.2	Z	2.3	3.2	2.8	2.5	2.3	2.3	2.2	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.2	2.5	2.2	3.2																						
11-May	2.5	Z	2.7	2.3	2.3	3.4	2.6	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1																						
12-May	2.1	Z	2.2	2.3	2.3	2.3	2.4	2.7	2.6	C	C	C	C	C	C	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.1	--	2.7																						
13-May	2.2	Z	2.1	2.1	2.2	2.6	2.2	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1																						
14-May	2.1	Z	2.1	2.6	2.6	2.4	2.4	2.4	2.3	2.4	2.3	2.2	2.2	2.2	2.1	2.1	2.2	2.3	2.3	2.2	2.4	2.5	2.4	2.6	2.3	2.6																						
15-May	2.3	Z	2.4	2.2	2.3	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	2.2	2.2	2.1	2.2	2.4																						
16-May	2.2	Z	2.3	2.4	2.4	2.3	2.3	2.2	2.5	2.6	2.3	2.3	2.3	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.4	2.3	2.1	2.1	2.1	2.3	2.6																					
17-May	2.1	Z	2.1	2.3	2.5	2.6	2.6	2.4	2.4	2.5	2.2	2.2	2.2	2.1	2.1	2.2	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.2	2.6																						
18-May	2.1	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.7	2.9	2.4	3.0	2.2	3.0																						
19-May	2.9	Z	2.3	2.6	2.6	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.9																						
20-May	2.0	Z	2.5	2.3	2.1	2.5	2.3	2.1	2.1	2.1	2.1	2.0	2.0	2.0	PF	2.4	2.1	2.2	2.2	2.4	2.1	2.1	2.1	2.4	2.2	2.5																						
21-May	2.7	Z	2.8	2.7	2.7	2.7	2.7	2.4	2.3	2.2	2.0	2.0	2.2	2.1	2.0	2.1	2.2	2.0	2.0	2.2	2.4	3.0	3.0	3.4	2.4	3.4																						
22-May	2.3	Z	2.4	2.6	3.0	2.9	3.1	2.5	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.5	2.3	2.1	2.1	2.3	2.3	3.1																						
23-May	3.6	Z	3.1	2.6	2.9	2.8	3.3	3.3	2.5	2.5	2.3	2.4	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.4	2.4	2.5	3.6																						
24-May	2.6	Z	2.1	2.2	11.6	14.7	8.0	2.5	2.7	2.0	3.6	2.6	2.3	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	3.5	14.7																						
25-May	2.1	Z	2.2	2.2	2.3	2.3	2.8	2.7	2.4	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.3	2.4	2.2	2.8																						
26-May	2.3	Z	2.4	2.2	2.2	2.1	2.0	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.4																						
27-May	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.1																						
28-May	2.1	Z	2.1	2.1	2.1	2.2	2.4	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.4																						
29-May	2.2	Z	2.2	2.2	2.2	2.2	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.4	2.7	2.3	2.1	2.7																						
30-May	2.2	Z	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.2	2.2	2.3	2.1	2.1	2.0	2.0	2.0	2.1	2.2	2.0	2.1	2.4	2.1	2.4																						
31-May	2.3	Z	2.5	2.5	2.4	2.4	2.3	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	2.5																						
2.3																								--	2.3	2.3	2.6	2.8	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	2.1	2.2	2.2	2.3	Diurnal Average	
3.6																								--	3.1	3.2	11.6	14.7	8.0	3.3	2.7	2.6	3.6	2.6	2.3	2.3	2.2	2.4	2.2	2.3	2.3	2.5	2.7	3.0	3.0	3.4	Diurnal Maximum	
Z - zerospan			C - Calibration				PF - Power Failure																																									



**WBEA**  
**Hourly Averages**

**Total Hydrocarbons (THC) - ppm**  
**Mildred Lake - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Mildred Lake - May 2014**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	161	22.80	22.80
2.1 - 3.0	532	75.35	98.16
3.1 - 10.0	11	1.56	99.72
> 10.0	2	0.28	100.00

Total Number of Valid Hours: 706

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Mildred Lake - May 2014**

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	28	27	23	8	4	2	0	3	10	11	3	8	0	0	2	32	161
2.1 - 3.0	72	61	51	31	23	25	42	39	40	20	18	11	6	26	30	37	532
3.1 - 10.0	0	0	0	0	0	1	0	1	2	2	0	0	0	2	3	0	11
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2
<b>Totals</b>	100	88	74	39	27	28	42	43	52	33	21	19	6	30	35	69	706

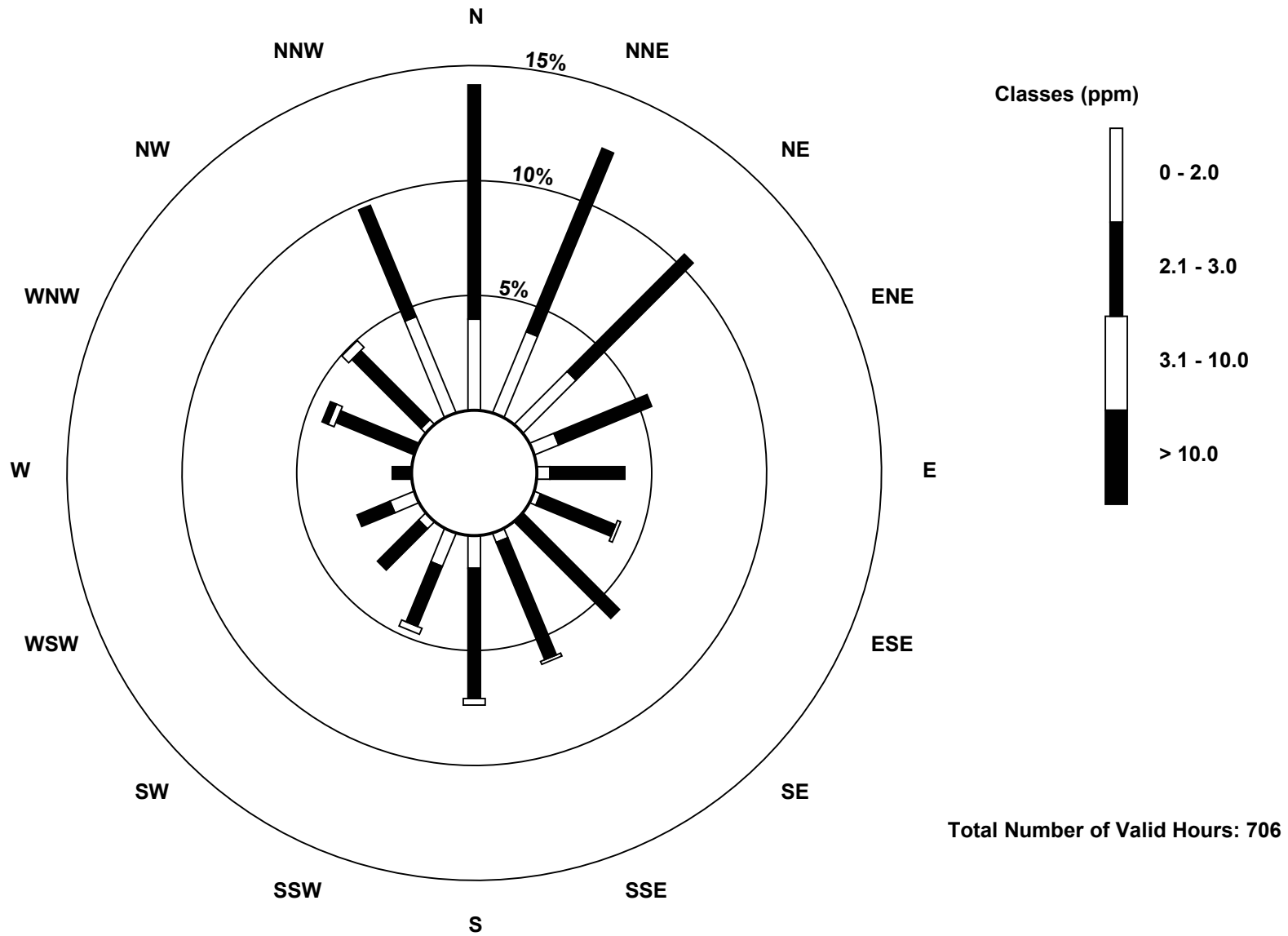
Total Number of Valid Hours: 706

Total Number of Hours: 744



Wood Buffalo Environmental Association  
Wind Rose May 2014

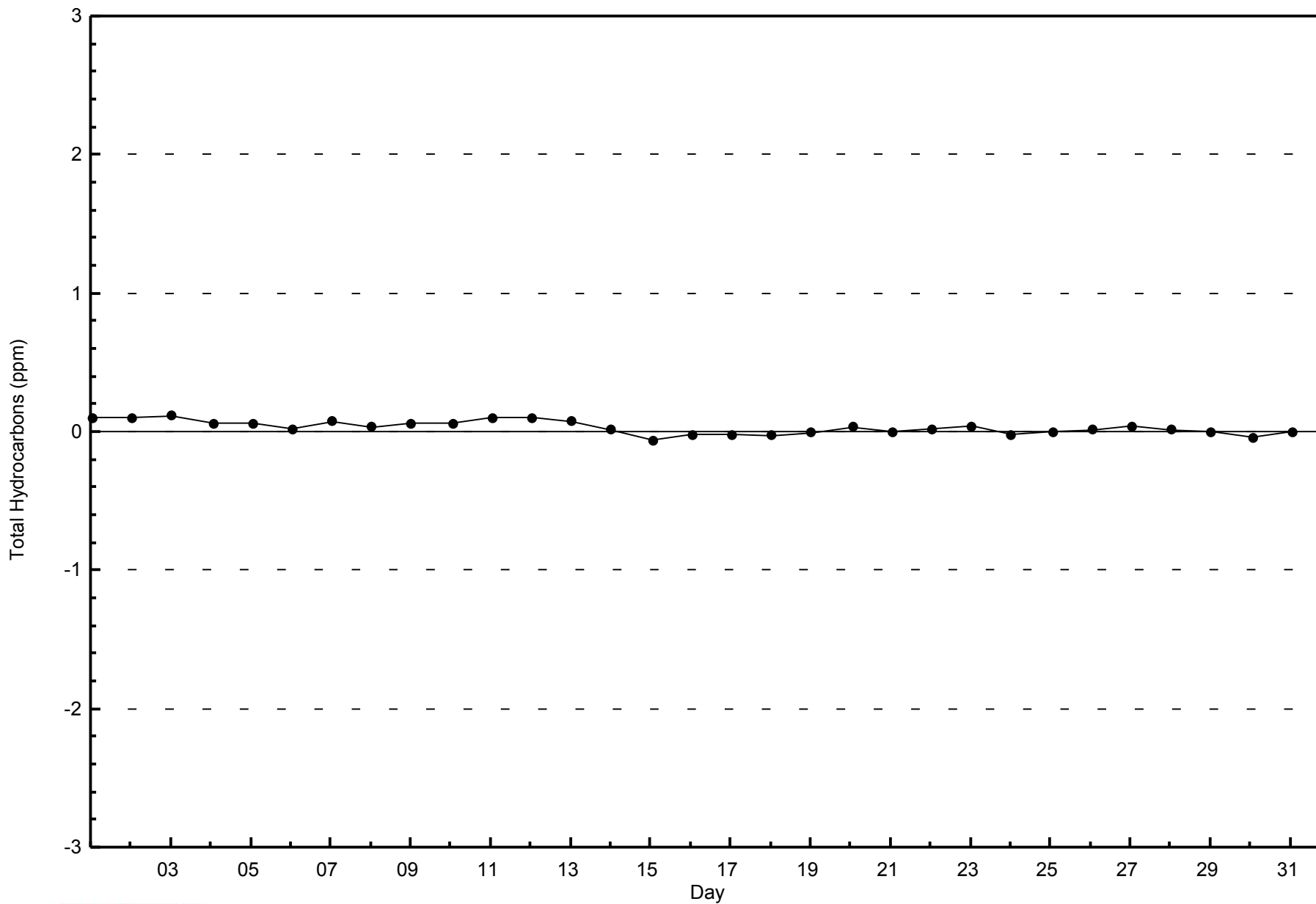
Total Hydrocarbons (THC) - ppm  
Mildred Lake (AMS 2)





WBEA  
Zero Responses

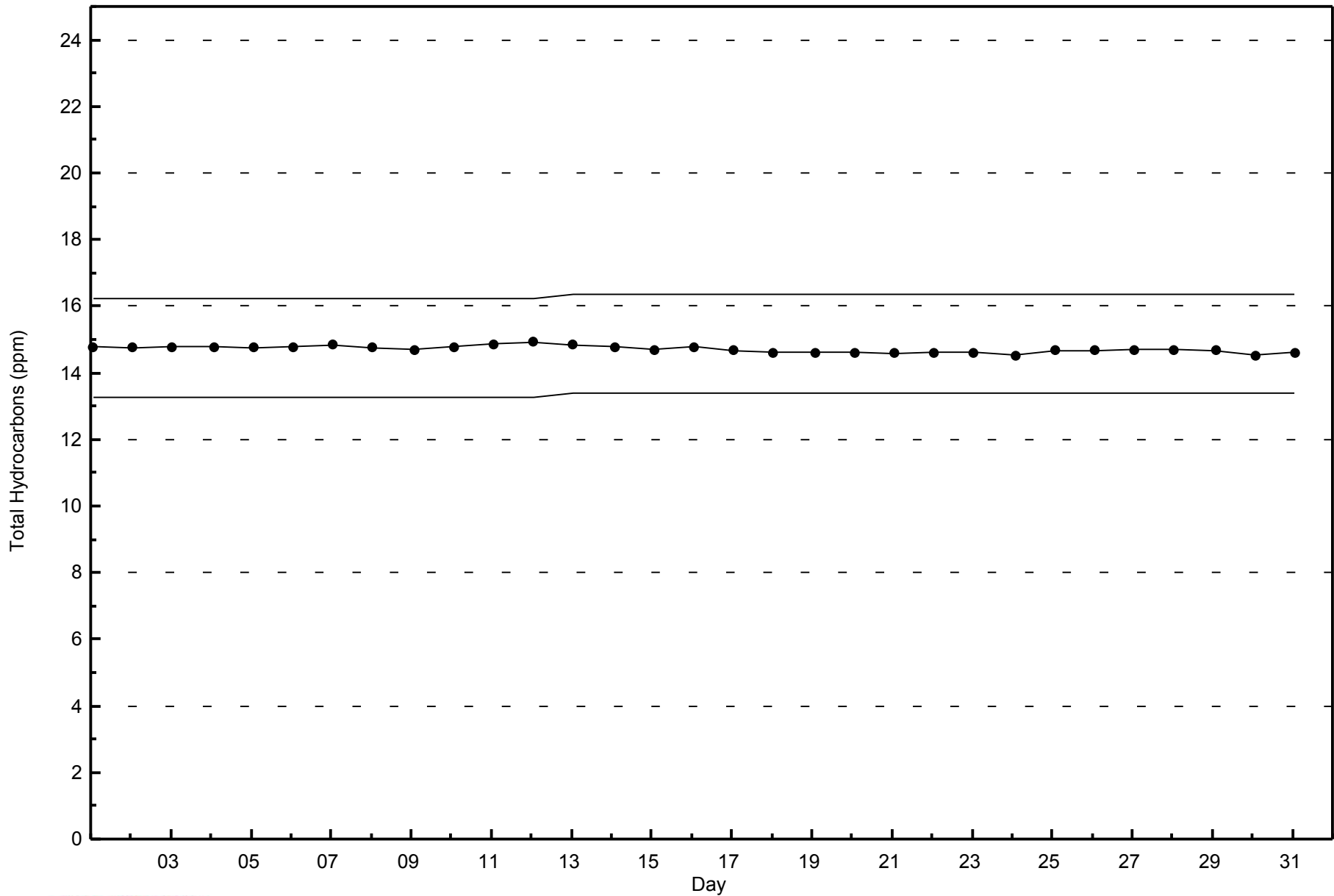
Total Hydrocarbons (THC) - ppm  
Mildred Lake - May 2014





WBEA  
Span Responses

Total Hydrocarbons (THC) - ppm  
Mildred Lake - May 2014



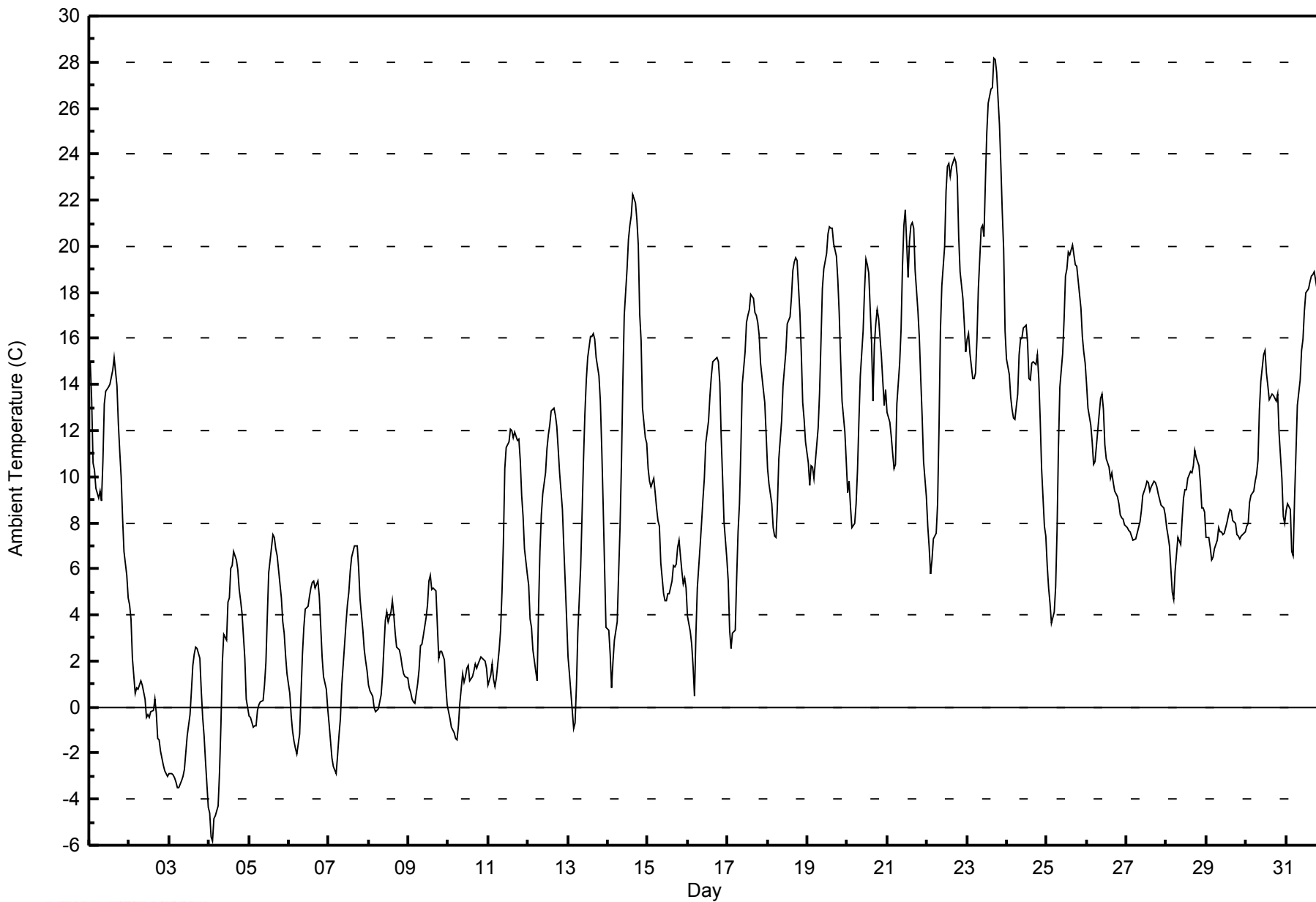


Maximum Value: 28.2 C on May 23 17:00		Maximum Daily Average: 21.0 C on May 23		Hours in Service: 744																																												
Minimum Value: -5.8 C on May 4 03:00		Minimum Daily Average: -1.3 C on May 3		Hours of Data: 744																																												
Maximum Diurnal Average: 12.5 C at hour 16		Minimum Diurnal Average: 4.3 C at hour 5		Hours of Missing Data: 0																																												
Monthly Average: 8.80 C		Percentiles: P <sub>1</sub> = -3.5 P <sub>10</sub> = 0.1 Q <sub>1</sub> = 3.3 Median = 8.4 Q <sub>3</sub> = 14.0 P <sub>90</sub> = 18.1 P <sub>99</sub> = 24.4		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-May	15.0	13.3	10.6	10.3	9.5	9.1	9.4	8.9	10.7	13.2	13.7	13.9	14.0	14.3	14.6	15.1	14.0	12.3	11.1	10.0	8.2	6.7	5.7	4.8	11.2	15.1																						
2-May	4.4	3.8	2.1	0.6	0.8	0.8	1.0	1.1	1.0	0.4	-0.4	-0.3	-0.4	-0.2	-0.1	0.3	-0.3	-1.3	-1.4	-1.9	-2.5	-2.7	-2.9	-3.0	-0.1	4.4																						
3-May	-2.9	-2.9	-3.0	-3.1	-3.2	-3.5	-3.5	-3.2	-3.0	-2.7	-2.0	-1.3	-0.4	0.7	1.8	2.3	2.6	2.5	2.1	0.7	-0.4	-1.2	-2.3	-4.3	-1.3	2.6																						
4-May	-4.6	-5.6	-5.8	-4.8	-4.7	-4.3	-2.9	-0.8	1.9	3.1	2.9	4.6	4.8	6.0	6.1	6.7	6.4	5.9	5.1	4.6	4.1	2.1	0.3	0.0	1.3	6.7																						
5-May	-0.4	-0.4	-0.9	-0.8	-0.8	-0.2	0.1	0.2	0.3	0.9	1.9	4.0	5.8	6.9	7.5	7.4	6.8	6.6	5.9	4.7	3.7	3.2	2.3	1.4	2.8	7.5																						
6-May	0.6	-0.4	-1.1	-1.5	-1.8	-2.0	-1.2	0.6	2.3	3.4	4.2	4.4	4.8	5.1	5.4	5.4	5.2	5.5	4.8	3.5	2.2	1.3	0.8	-0.1	2.1	5.5																						
7-May	-0.7	-1.5	-2.2	-2.6	-2.9	-2.1	-1.2	-0.5	0.9	2.7	3.7	4.4	5.0	5.9	6.5	7.0	7.0	7.0	6.0	4.7	3.4	2.5	2.0	1.6	2.4	7.0																						
8-May	1.0	0.7	0.5	0.0	-0.2	-0.1	-0.1	0.5	1.4	2.6	3.7	4.1	3.7	4.1	4.6	4.0	3.2	2.6	2.5	2.2	1.7	1.4	1.3	1.2	2.0	4.6																						
9-May	0.8	0.7	0.3	0.2	0.2	1.0	1.7	2.7	2.8	3.1	3.9	4.5	5.5	5.7	5.1	5.2	5.1	3.6	2.1	2.4	2.4	2.0	1.0	0.1	2.6	5.7																						
10-May	-0.2	-0.5	-0.9	-1.1	-1.4	-1.4	-0.8	0.2	1.5	1.1	1.3	1.7	1.8	1.1	1.3	1.6	1.9	1.7	1.9	2.2	2.1	2.1	2.0	1.7	0.9	2.2																						
11-May	0.9	1.4	1.9	1.2	0.9	1.3	2.5	3.3	5.0	7.1	10.4	11.3	11.5	12.0	12.0	11.7	11.9	11.6	11.6	10.7	9.2	8.3	6.9	5.8	7.1	12.0																						
12-May	5.3	3.8	3.5	2.5	1.6	1.2	4.2	6.8	8.3	9.2	10.1	11.2	11.8	12.3	12.9	13.0	12.7	12.2	11.2	10.1	8.6	7.0	5.4	3.8	7.9	13.0																						
13-May	2.2	1.4	-0.2	-0.9	-0.7	0.9	3.3	6.1	8.4	10.7	12.7	14.2	15.2	16.1	16.1	16.2	16.0	15.2	14.4	13.3	11.2	8.8	6.1	3.5	8.8	16.2																						
14-May	3.3	2.3	0.8	2.0	2.9	3.7	5.8	7.8	10.5	14.1	17.0	19.0	20.3	20.9	21.3	22.3	21.9	21.1	20.1	17.1	15.9	13.0	11.7	11.5	12.8	22.3																						
15-May	10.4	9.8	9.6	9.9	9.3	8.6	8.1	7.9	6.3	4.9	4.6	4.6	4.9	5.5	6.1	6.1	6.2	6.9	7.2	5.9	5.3	5.6	5.2	6.8	10.4	20.4																						
16-May	3.9	3.3	2.7	1.8	0.5	3.1	5.2	7.0	8.0	9.0	9.9	11.4	12.4	13.5	14.4	15.0	15.0	15.2	15.0	14.0	11.7	9.9	8.0	6.5	9.0	15.2																						
17-May	5.4	3.3	2.5	3.2	3.3	5.6	7.6	8.8	11.2	14.0	15.4	16.7	17.0	17.2	17.9	17.7	17.1	17.0	16.7	16.1	14.9	13.8	13.2	11.8	12.0	17.9																						
18-May	10.3	9.7	8.8	7.8	7.4	7.4	8.8	10.8	12.4	14.0	14.7	15.4	16.6	16.9	17.8	18.9	19.3	19.5	19.4	17.1	15.4	13.2	12.5	11.5	13.6	19.5																						
19-May	10.6	9.6	10.5	10.4	9.9	10.7	12.1	13.6	15.9	18.1	19.0	19.7	20.5	20.8	20.8	20.8	20.1	19.6	18.5	17.0	15.1	13.3	11.9	10.7	15.4	20.8																						
20-May	9.3	9.8	8.7	7.8	8.0	8.8	10.3	12.4	14.4	16.3	18.1	19.5	19.2	18.9	15.9	13.3	15.8	16.7	17.2	16.9	15.2	14.1	13.1	13.7	13.9	19.5																						
21-May	12.8	12.4	11.7	11.0	10.4	10.6	13.2	14.9	16.4	19.1	20.9	21.6	18.6	20.2	20.9	21.0	20.8	18.9	17.2	16.0	14.3	12.6	10.7	9.1	15.6	21.6																						
22-May	7.9	6.9	5.8	6.4	7.3	7.5	8.8	12.2	16.3	18.3	20.0	22.4	23.5	23.6	23.0	23.4	23.9	23.6	23.1	20.4	18.9	17.7	16.7	15.4	16.4	23.9																						
23-May	15.9	16.2	15.4	14.2	14.3	14.5	16.0	18.2	20.8	20.9	20.4	22.8	24.9	26.2	26.8	26.9	28.2	28.1	27.6	25.3	23.5	21.5	19.9	16.4	21.0	28.2																						
24-May	15.1	14.4	13.5	12.9	12.6	12.5	13.6	15.3	16.0	16.5	16.6	15.9	14.3	14.2	15.0	15.0	14.9	15.3	14.3	12.5	10.3	7.9	7.4	13.8	13.8	16.6																						
25-May	6.2	5.2	4.5	3.7	4.2	5.2	7.7	11.4	13.9	15.4	16.8	18.7	19.0	19.7	19.6	20.0	19.6	19.2	19.1	18.5	17.3	16.1	15.4	14.9	13.8	20.0																						
26-May	14.0	13.0	12.3	11.5	10.5	10.7	11.3	12.7	13.4	13.6	12.9	11.4	10.8	10.4	9.9	10.2	9.7	9.4	9.1	8.9	8.3	8.2	8.2	7.9	10.8	14.0																						
27-May	7.8	7.7	7.6	7.4	7.2	7.3	7.6	7.8	8.1	8.5	9.2	9.6	9.8	9.7	9.4	9.6	9.8	9.8	9.6	9.3	9.0	8.8	8.7	8.4	8.6	9.8																						
28-May	7.8	7.4	7.0	5.0	4.7	5.9	6.6	7.3	7.1	8.2	9.1	9.4	9.4	9.9	10.2	10.2	10.5	11.1	10.8	10.5	9.7	8.7	8.6	8.4	8.5	11.1																						
29-May	7.4	7.3	6.9	6.4	6.5	6.9	7.2	7.8	7.6	7.6	7.5	7.5	8.0	8.3	8.6	8.5	8.1	7.9	7.5	7.4	7.3	7.4	7.5	7.6	7.5	8.6																						
30-May	7.9	8.0	8.9	9.2	9.4	9.8	10.1	10.7	12.9	14.1	15.3	15.5	14.5	14.0	13.4	13.6	13.5	13.4	13.3	13.6	11.9	9.9	8.3	8.0	11.6	15.5																						
31-May	8.5	8.8	8.6	6.8	6.6	9.0	11.0	13.1	14.2	15.5	16.0	17.2	18.0	18.2	18.5	18.7	18.8	18.9	18.5	17.7	16.2	14.4	14.0	13.2	14.2	18.9																						
																								6.0	5.5	4.9	4.4	4.3	4.8	5.9	7.3	8.6	9.8	10.6	11.5	11.8	12.2	12.3	12.5	12.4	12.1	11.7	10.8	9.6	8.4	7.4	6.6	Diurnal Average
																								15.9	16.2	15.4	14.2	14.3	14.5	16.0	18.2	20.8	20.9	20.9	22.8	24.9	26.2	26.8	26.9	28.2	28.1	27.6	25.3	23.5	21.5	19.9	16.4	Diurnal Maximum



**WBEA**  
**Hourly Averages**

**Ambient Temperature (AT) - C**  
**Mildred Lake - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C**  
**Mildred Lake - May 2014**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	74	9.95	9.95
0 - 10	365	49.06	59.01
10 - 20	262	35.22	94.22
> 20	43	5.78	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Maximum Speed: 28 km/h on May 1 11:00	Maximum Daily Speed Average: 18.3 km/h on May 2	Hours in Service: 744
Minimum Speed Value: 0 km/h on May 25 07:00	Minimum Daily Speed Average: 0.8 km/h on May 17	Hours of Data: 744
Maximum Diurnal Speed Average: 6.8 km/h at hour 18	Minimum Diurnal Speed Average: 2.0 km/h at hour 9	Hours of Missing Data: 0
Monthly Average Velocity: 3.5 km/h 8.7 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 4 Q <sub>1</sub> = 6 Median = 9 Q <sub>3</sub> = 13 P <sub>90</sub> = 18 P <sub>99</sub> = 25	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-May	WNW11	NNW10	NNE6	NNW11	NNW12	NW11	NNW15	NNW11	NW14	NNW24	NNW28	N25	N21	NNW22	NW22	NNW24	NNW27	NNW26	NNW19	NNW19	N11	N10	NNW11	NNW15	NNW16.3	NNW28
2-May	NW18	NW25	NNW23	NNW19	NW20	NW22	NW25	NNW25	NNW22	NNW25	N24	NNW22	N16	N16	N15	N18	NNE15	NNE16	NNE14	NNE15	NNE15	N17	N19	N20	N18.3	NW25
3-May	N19	N19	N18	N15	N16	N14	NNE13	NNE13	NNE14	N13	NNE12	NNE11	NNE12	NE13	NE13	NE9	NE11	NE11	NE12	NNE9	NE8	NE7	NE5	ENE4	NNE11.6	N19
4-May	N3	NE3	N4	N6	N7	NNE4	E2	SSE4	SSW5	SW8	SW4	SW4	S2	SSW6	SSW7	SW7	SW3	SSW9	SW8	SSW6	ESE6	S12	SE4	E5	SSW2.2	S12
5-May	E5	SE2	NE2	ESE0	SSW2	SSE2	S3	SE4	ESE7	ENE5	ENE6	NE7	NNE8	NE8	N8	NE11	NE14	ENE15	E15	NE14	NE13	ENE14	ENE13	NE10	ENE6.7	E15
6-May	NE9	NNE10	NNE11	N11	N13	N13	NNE15	NNE15	NNE15	NE17	NE18	NNE18	NNE14	NNE15	NE15	ENE13	NE16	NNE12	N9	NNW8	NNW8	NNW8	N9	N9	NNE11.9	NE18
7-May	N10	N10	N10	N9	N9	N10	N12	N13	N12	NNE19	N23	N21	N22	N19	NNE17	N17	NNE17	NNE16	NE14	ENE9	ENE6	E3	NE4	NE4	NNE12.1	N23
8-May	ENE5	ENE5	E5	ENE3	NE2	NNE4	ENE5	NNE6	NNE3	S4	SW4	NE6	NE14	NE14	NNE15	NE17	NNE15	NNE13	NE10	NE8	NNE6	N5	N5	N6	NE6.5	NE17
9-May	NNW7	NNW8	N7	N6	N6	N6	NNW6	NNW13	N11	N8	NNW10	NW9	NW9	NW8	N13	N14	N15	N15	N9	NNW6	NNW10	NNW10	NNW10	NNW9	NNW8.9	N15
10-May	NNW12	NW12	NW12	NW12	NW12	WNW13	WNW13	WNW14	NW18	NNW16	NNW18	NNW22	NNW21	NNW14	NNW13	NNW11	N11	N9	NNW8	NNW7	NW6	NNW5	WNW3	W4	NNW11.2	NNW22
11-May	WNW2	NNW6	NNW9	N8	NNW6	WNW5	WNW7	NW4	SW10	SW11	NW14	NW23	NNW18	N16	NNW11	NW9	N12	NNE10	NE9	NE10	NE7	NE8	NE5	NE5	NNW6.5	NW23
12-May	NE6	NNE6	N8	N8	N8	N7	NNE3	SSW5	SW7	W7	WNW6	N7	NNE8	NE7	NE9	NE14	NE15	NE16	NE15	NE12	ENE11	ESE13	SSE4	NNE5.9	NE16	
13-May	S5	S4	S2	S3	S3	SSE5	SSW6	SSW7	S8	S8	S8	SSW6	S4	S5	N9	NNE12	NNE14	NE13	NE13	NE10	NE5	ENE6	E6	ENE6	E2.1	NNE14
14-May	ENE2	E1	ESE2	SSE5	SE6	SE6	SSE9	SSE9	SE9	S9	S10	SE14	SE14	SE14	SE15	ESE16	SE15	SE14	S13	SE8	SSE10	SW9	SSE5	ESE9	SE8.5	ESE16
15-May	ESE11	NNE1	SE5	SE7	ENE5	NE6	NE8	NNE14	NNE22	NNE25	NNE25	NNE20	NNE21	N24	N22	NNE23	N22	N19	N23	N16	NNW11	NNW10	NNW10	NNW11	NNE13.0	NNE25
16-May	NNW9	NNW10	NNW11	N9	NNW3	NW2	N2	W1	WSW6	W7	WNW7	WSW7	WSW6	SSW7	SSW7	SW7	SE3	SE4	SE6	SSE9	E4	ENE8	E7	E6	WNW0.8	NNW11
17-May	E3	E4	S2	SSW4	SSE2	ESE4	SSW2	SSW1	SSW4	SW6	SW7	SW6	WSW7	WSW4	WSW5	WNW3	ENE5	NE6	E9	ENE5	ENE6	E8	ENE6	N10	ESE0.8	N10
18-May	N11	NNE10	NNE9	N11	NNE9	NE8	N8	N6	NNW5	WNW5	NW10	N14	N12	NNE13	NE12	NE9	NNE12	NNE9	SSW8	WSW6	WNW3	N4	NNW5	NNE2	N6.5	N14
19-May	WNW1	SSW4	S6	SSE9	S7	S10	S11	S12	S12	S12	S13	S11	S12	S17	SSW19	S19	S17	S16	S20	SSW20	SSW18	SSW14	SSW13	SSW9	S12.4	SSW20
20-May	S7	SSE11	S9	S10	S12	SSE13	SSE17	S17	S17	S18	S18	S20	SSW18	SSW18	WSW12	SE12	SE14	SE14	SSE19	SSE12	ENE4	SSE8	SE8	SSE13	S12.0	S20
21-May	SSE14	SSE15	SSE14	S12	SSE6	SE6	SSE8	SSE11	SSE8	S8	WSW11	WSW15	WSW16	WSW16	WSW23	WSW24	W23	NW20	NNW20	NW10	NNW7	NW6	WSW4	SSW5	SW6.7	WSW24
22-May	SSW5	SSW4	S4	E3	E4	ENE3	ESE5	SSW6	SSW6	SSW5	W5	WSW12	SW13	WSW13	WSW12	SW10	WSW8	SW7	SW5	SSE1	NE4	ENE3	NE3	SE3	SW3.8	SW13
23-May	S6	SSE8	SSW4	SE4	SSE5	S7	SSE3	S5	S6	SE8	SE8	S10	SSE9	SSE10	SSE10	SSE7	SSW3	WSW3	NE1	E5	ESE10	ESE9	WNW14	WNW22	S4.1	WNW22
24-May	NNW13	W6	W10	WNW11	WNW11	NNW10	NNW6	NNW10	NW12	WNW13	NNW11	NNW18	NNE13	NNE10	NW14	NW14	NNW16	N9	NE8	ENE6	ENE5	ENE5	NNE5	NNW8.1	NNW18	
25-May	NE4	NNE4	NNE2	E2	E2	ESE2	SSE0	SE6	SSE11	SE13	SSE10	S9	S7	SSE10	SE13	SE13	SE13	SE13	ESE11	SE9	SE11	SE11	SE12	SE12	SE7.3	SE13
26-May	SSE9	ESE10	SE8	ESE3	NE7	NE5	NE6	ENE7	ESE11	SE14	SE15	ENE5	N8	N9	N10	ESE9	E9	ENE10	NE11	NE12	NE10	NE8	NNE7	NNE9	ENE6.1	SE15
27-May	N11	N10	NNE10	NNE11	N11	N11	N12	NNE13	NNE11	NNE11	NNE11	NNE12	NNE11	NNE14	NNE14	NNE12	NNE10	NNE9	NNE8	N8	NNE6	NNE5	NE5	ENE4	NNE9.9	NNE14
28-May	E5	SE4	NE5	NE3	E4	E5	ESE5	ESE8	ESE11	E7	SSE4	SSE6	SSE7	S5	ESE5	SE7	ESE8	ESE12	ESE12	SE11	SE10	ESE7	SE9	SE10	ESE6.5	ESE12
29-May	ESE6	ESE5	NE4	E5	E5	E5	NNE4	N5	N8	N8	N10	NNE11	N11	N11	N11	N13	N18	NNW13	NNW13	NNW13	NNW13	NW12	WNW12	WNW12	N7.3	N18
30-May	WNW13	W8	WNW18	WNW20	WNW19	WNW21	WNW22	WNW20	WNW19	NW22	WNW21	NW24	NW24	NW27	NW25	NW18	NE6	ENE7	NE6	E1	ENE5	ENE6	SSE4	SSW5	NW12.4	NW27
31-May	SW7	WSW8	SW3	NE4	NNE4	N3	NNW7	NNE7	NNE7	NNE5	NNE10	NNE9	ENE11	NNE13	ENE13	NE13	NE12	NE13	NNE12	NNE9	NNE9	ENE7	ESE14	ESE15	NE6.0	ESE15

N2.5	N2.5	N3.1	N3.1	N3.4	N2.9	NNW2.9	N2.4	N2.0	N2.8	NNW4.2	NNW5.2	NNW5.4	N4.6	N5.1	NNE4.8	NNE6.5	NNE6.8	NE5.2	NE4.1	NE4.1	NE3.3	NE2.4	NNE2.2	Diurnal Average	
N19	NW25	NNW23	WNW20	NW20	NW22	NW25	NNW25	NNW22	NNE25	NNW28	N25	NW24	NW27	NW25	NNW24	NNW27	NNW26	N23	SSW20	SSW18	N17	N19	WNW22	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 - May 2014**

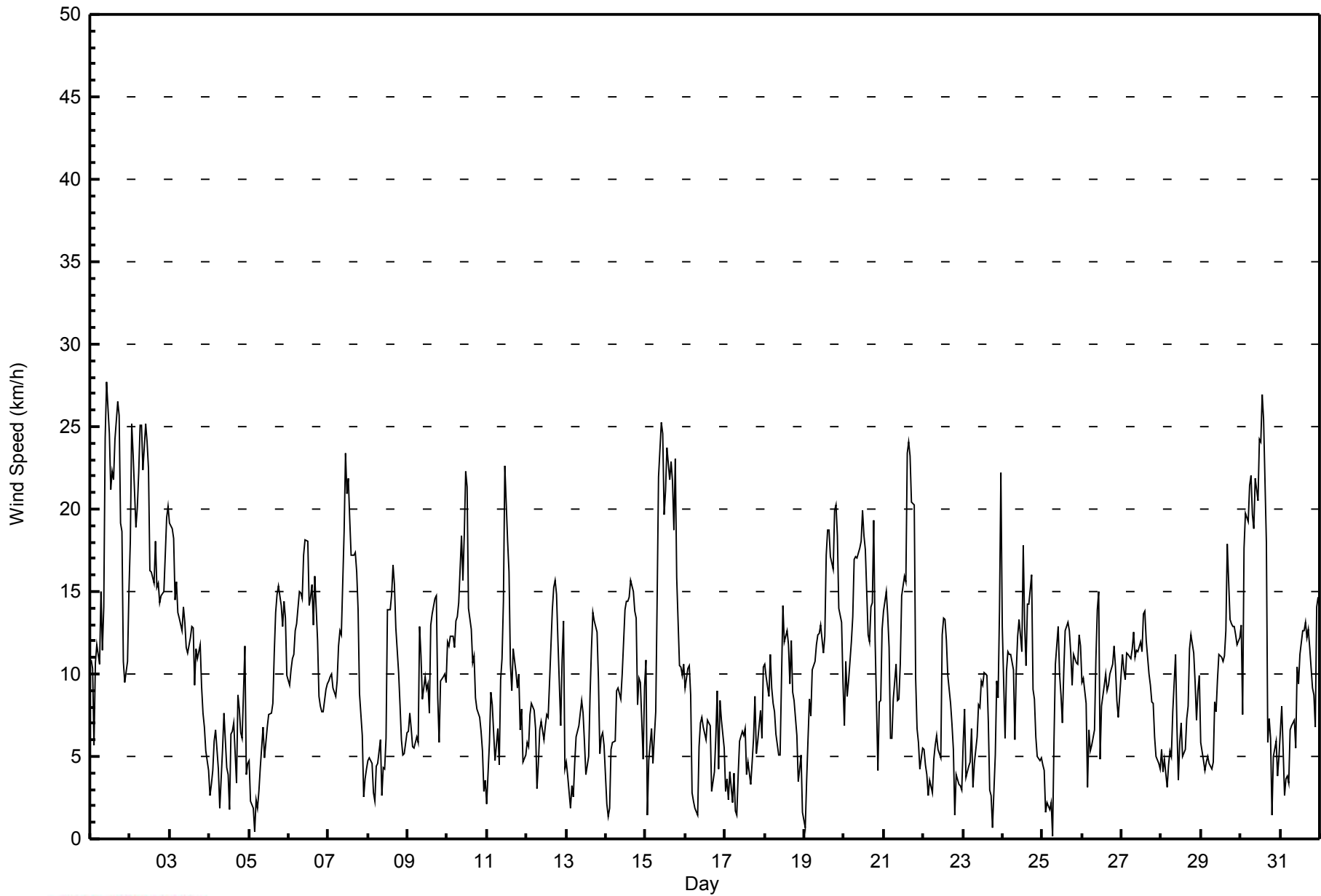
Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 9 km/h on May 2 03:00 Minimum Value: 0 km/h on May 4 00:00 Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 2 Median = 3 Q <sub>3</sub> = 4 P <sub>90</sub> = 5 P <sub>99</sub> = 8																	Hours in Service: 744 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-May	3	3	1	5	4	2	3	5	4	7	6	6	5	5	5	7	7	6	5	8	3	2	2	3	8
2-May	6	9	9	8	5	5	5	5	5	5	5	5	5	5	4	4	4	4	4	4	4	5	5	5	9
3-May	5	5	5	4	4	3	4	3	3	3	4	3	3	4	4	4	3	3	2	2	1	1	0	5	
4-May	1	1	1	1	1	1	1	1	2	2	2	2	3	3	3	2	2	3	2	4	4	2	1	4	
5-May	1	1	1	1	1	1	1	1	1	2	2	3	3	3	4	3	4	4	5	4	3	4	4	5	
6-May	2	2	2	2	2	3	3	4	4	5	5	5	5	5	5	5	3	6	2	1	1	1	2	6	
7-May	1	2	1	1	1	2	2	3	3	5	6	5	5	5	5	5	5	4	2	2	1	1	1	6	
8-May	1	1	2	1	1	1	2	1	2	2	2	3	4	3	4	4	4	3	3	2	1	1	1	4	
9-May	1	1	1	1	1	1	3	4	3	2	3	3	4	5	4	4	5	4	4	3	3	2	2	5	
10-May	2	2	2	3	3	3	4	4	5	4	6	5	5	4	3	2	3	2	1	2	1	1	1	6	
11-May	2	1	1	1	2	2	2	3	3	3	8	5	5	5	6	4	5	3	2	3	1	1	2	8	
12-May	1	2	1	1	1	1	2	2	1	3	3	4	4	4	4	4	4	4	5	3	2	3	2	5	
13-May	1	1	1	1	1	1	1	1	2	2	2	2	2	3	4	4	5	4	3	2	2	1	1	5	
14-May	1	1	2	1	1	2	2	2	2	2	3	4	4	3	3	3	4	4	5	5	3	5	1	5	
15-May	2	2	3	2	1	1	2	7	6	6	6	5	6	6	5	5	5	4	5	5	1	2	2	7	
16-May	1	1	1	1	2	1	1	2	2	2	2	2	3	2	2	2	2	2	2	2	1	2	2	3	
17-May	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	3	2	2	2	1	1	2	2	3	
18-May	2	2	3	2	2	2	2	3	3	2	4	3	3	3	3	4	3	4	3	2	1	2	1	4	
19-May	1	2	2	2	2	1	2	2	3	3	3	4	4	4	5	5	4	4	4	4	4	3	3	5	
20-May	2	2	3	2	3	3	3	4	3	4	4	5	5	4	6	4	3	3	4	5	4	4	5	6	
21-May	2	2	2	2	2	2	2	3	2	2	3	8	6	7	8	8	8	7	6	3	3	2	1	8	
22-May	2	1	1	1	1	1	2	1	2	2	3	4	5	5	4	3	4	2	1	1	1	1	2	5	
23-May	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	2	2	1	2	2	1	8	8	
24-May	5	3	4	4	3	3	3	3	3	4	4	5	5	4	3	5	4	3	3	2	2	1	1	5	
25-May	1	1	1	1	1	2	1	3	3	3	3	3	3	3	4	4	4	3	3	3	3	3	3	4	
26-May	3	2	2	2	3	3	2	2	3	4	4	2	2	2	3	4	3	2	3	3	2	2	2	4	
27-May	2	2	2	2	2	2	2	3	3	3	3	3	3	3	4	3	3	2	2	2	1	1	1	4	
28-May	1	1	2	1	1	2	1	2	2	3	2	2	3	2	2	2	2	3	3	2	2	2	3	3	
29-May	1	2	1	1	1	1	1	1	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	4	
30-May	4	3	6	5	6	6	6	6	6	6	6	7	8	8	7	6	1	2	2	2	5	2	2	8	
31-May	2	2	2	2	1	1	1	2	3	3	4	4	4	4	4	4	3	3	3	2	2	2	4	4	
Diurnal Maximum																									





**WBEA**  
**Hourly Averages**

**Wind Speed (WS) - km/h**  
**Mildred Lake - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h**  
**Mildred Lake - May 2014**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	165	22.18	22.18
6 - 11	316	42.47	64.65
12 - 19	208	27.96	92.61
20 - 28	55	7.39	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



**WBEA**  
**Frequency Distribution**

**Wind Speed (WS) - km/h**  
**Mildred Lake - May 2014**

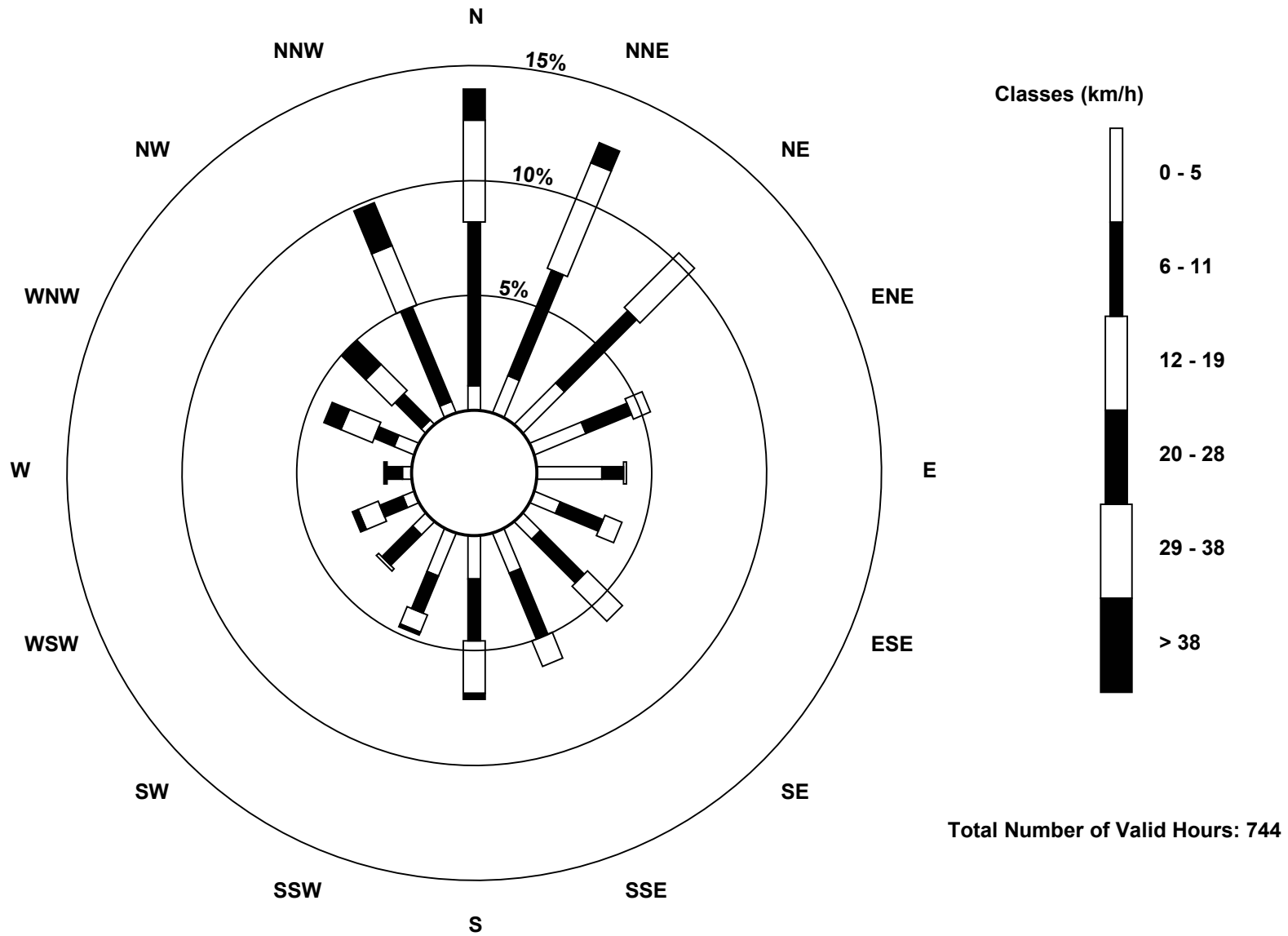
Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	8	13	19	18	21	9	8	14	14	15	6	4	3	7	2	4	165
6 - 11	53	37	33	16	7	15	20	23	20	13	14	8	5	7	12	33	316
12 - 19	33	37	25	6	1	6	16	9	17	6	1	7	0	11	12	21	208
20 - 28	10	7	0	0	0	0	0	0	2	1	0	2	1	6	11	15	55
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>	104	94	77	40	29	30	44	46	53	35	21	21	9	31	37	73	744

Total Number of Valid Hours: 744

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

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





**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Wind Direction (WD) - deg**

**Mildred Lake - May 2014**

Direction of Maximum Speed: 345 deg on May 1 11:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 349.4 deg on May 2	Hours of Data: 744
Direction of Minimum Speed: 156 deg on May 25 07:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 0.8 deg on May 17	Percent Operational Time: 100.0
Monthly Average Direction: 313.1 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-May	286	343	19	343	346	324	335	336	314	330	345	355	353	343	326	329	342	339	347	343	6	353	338	341	339.7
2-May	324	324	340	336	317	321	324	333	346	344	352	347	359	359	6	4	29	28	18	21	14	10	2	0	349.4
3-May	3	5	5	9	9	8	18	12	18	6	12	24	27	51	36	45	38	40	36	31	38	46	52	63	21.7
4-May	8	45	3	4	8	24	93	158	213	222	225	233	191	213	204	220	214	201	233	208	122	169	136	93	197.1
5-May	89	125	41	103	211	159	173	146	106	74	77	40	20	41	6	55	56	59	82	56	50	71	71	56	63.7
6-May	38	24	18	10	11	7	15	20	21	34	43	20	18	32	42	58	35	25	9	339	331	345	351	352	20.4
7-May	358	355	358	356	358	357	5	5	1	14	3	2	1	7	20	11	16	20	34	58	65	88	48	52	11.4
8-May	75	63	79	71	50	26	61	27	23	182	225	46	35	38	33	38	31	30	36	37	26	1	352	350	35.5
9-May	344	347	353	358	0	354	331	336	6	354	330	321	316	308	350	353	0	6	9	339	341	348	345	343	346.5
10-May	328	326	323	308	314	300	293	300	315	348	342	341	342	345	329	345	359	10	343	333	324	328	292	260	328.5
11-May	290	337	328	350	334	298	282	317	226	226	307	322	342	356	341	316	7	29	39	42	36	40	53	55	342.1
12-May	39	12	3	7	8	6	14	206	221	264	301	352	21	38	46	44	49	34	41	41	30	67	104	159	33.5
13-May	188	187	176	186	172	158	201	196	180	187	189	195	169	177	8	18	31	42	46	38	51	70	87	76	96.5
14-May	57	83	103	152	133	134	149	153	141	186	169	143	146	129	124	123	132	138	171	144	150	233	155	119	144.3
15-May	114	26	137	139	60	48	42	23	19	22	19	16	15	11	11	14	10	7	4	360	336	331	333	334	14.3
16-May	339	342	347	351	345	324	352	276	241	260	288	256	245	204	210	219	142	134	129	158	93	70	89	81	289.2
17-May	81	100	175	209	156	107	205	207	213	232	227	235	248	246	238	282	65	55	80	60	70	87	71	5	117.3
18-May	2	15	14	10	15	36	360	357	332	298	321	356	8	24	48	50	20	29	196	239	303	358	334	12	6.8
19-May	302	198	173	168	184	188	185	171	181	181	180	171	191	176	192	191	183	181	189	199	203	201	205	198	187.4
20-May	180	166	185	171	178	159	167	189	180	170	183	183	198	205	243	133	131	127	155	152	70	162	138	166	170.7
21-May	161	161	161	171	164	131	160	155	151	190	242	239	257	238	248	255	264	312	336	323	340	309	239	206	234.0
22-May	194	211	188	93	80	58	123	198	203	213	278	240	230	249	253	229	239	230	215	154	48	65	42	129	221.6
23-May	170	159	201	136	167	174	167	173	190	146	138	171	168	167	158	161	208	255	50	98	109	115	286	303	170.8
24-May	327	276	271	290	296	300	315	333	315	326	293	320	329	19	21	321	320	337	6	55	68	61	62	33	329.9
25-May	34	22	25	94	94	104	156	131	155	125	156	184	179	155	138	138	127	115	138	134	132	132	148	141	136.6
26-May	150	123	131	119	39	41	47	68	106	126	130	68	359	8	2	119	85	57	34	38	34	42	33	16	68.8
27-May	5	9	13	13	10	10	9	14	25	25	25	18	27	19	18	20	17	21	12	8	15	25	36	67	17.4
28-May	91	126	49	47	79	96	108	123	107	93	150	163	160	171	116	131	120	118	112	124	129	121	132	134	119.7
29-May	118	112	43	80	96	88	25	11	10	9	4	12	6	3	359	352	349	346	344	330	330	310	302	294	353.7
30-May	292	270	288	290	291	289	289	293	302	312	299	309	313	308	316	326	43	76	39	79	61	59	161	210	305.2
31-May	235	246	228	36	24	1	333	32	19	13	30	17	58	31	57	50	34	36	28	24	23	76	119	122	41.4
358.4 357.0 351.9 353.6 353.0 352.3 341.4 351.2 351.1 349.6 340.9 341.6 348.0 1.4 1.1 14.9 25.9 30.4 36.5 36.8 37.4 46.6 47.9 27.3																									
Diurnal Average																									

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



Summary of Hour Standard Deviations

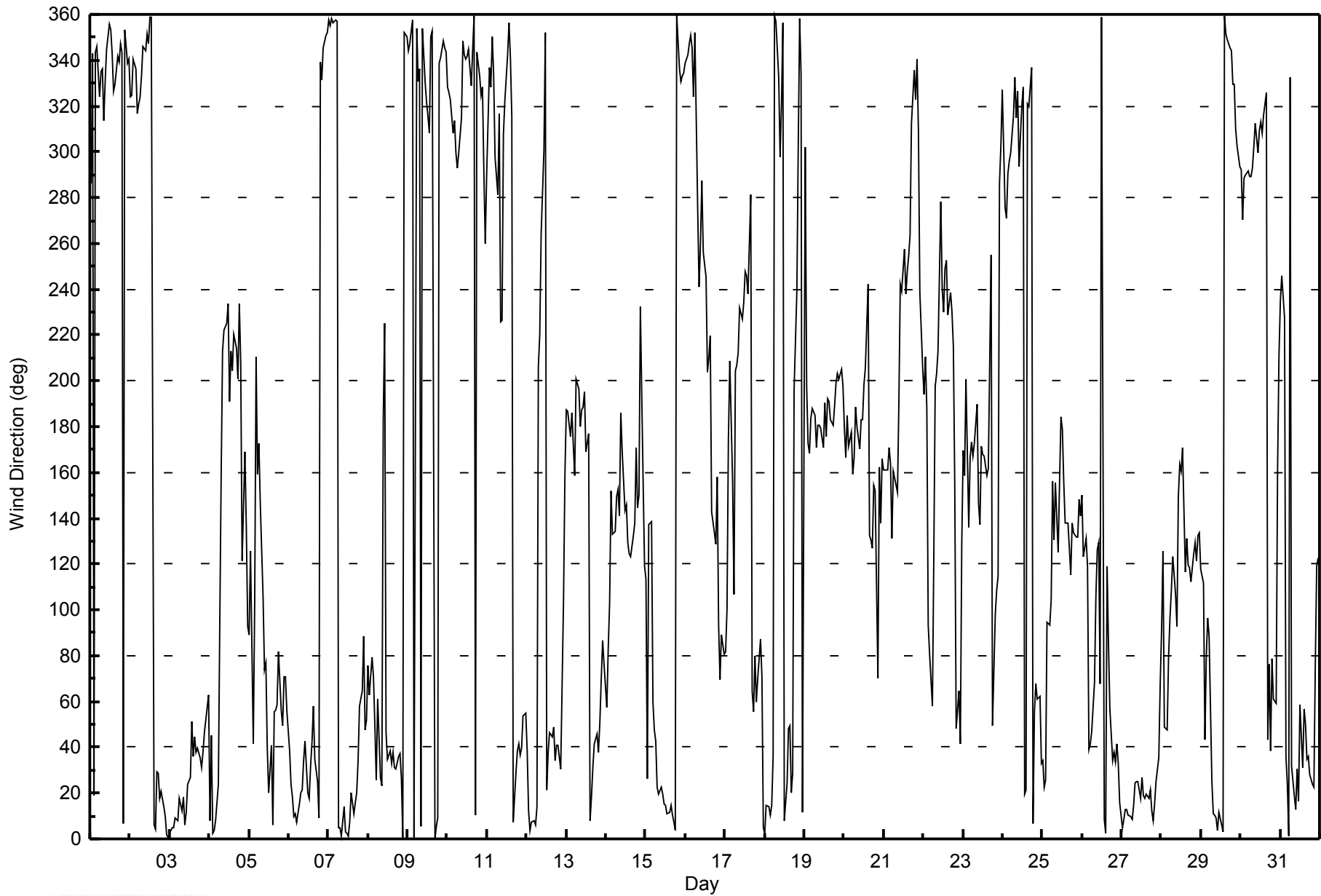
Mildred Lake - May 2014

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 103 deg on May 4 13:00		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 May 16 02:00																									
Percentiles: P <sub>1</sub> = 8 P <sub>10</sub> = 12 Q <sub>1</sub> = 15 Median = 19 Q <sub>3</sub> = 30 P <sub>90</sub> = 49 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-May	16	33	19	16	11	14	9	17	19	17	15	18	17	18	13	18	16	16	16	18	18	19	14	10	33
2-May	15	14	22	20	14	14	12	11	11	13	13	14	19	20	15	13	19	18	17	19	15	15	13	12	22
3-May	13	13	13	14	15	13	16	19	18	20	26	26	27	28	31	40	35	28	22	17	14	13	10	7	40
4-May	66	18	27	16	9	20	63	48	36	25	55	79	103	53	58	43	87	22	24	41	44	26	39	16	103
5-May	12	47	59	78	18	43	20	25	15	41	31	42	54	50	53	28	19	17	23	19	17	18	17	17	78
6-May	17	14	14	11	12	12	16	19	20	25	22	21	30	28	24	38	26	26	31	17	6	10	8	9	38
7-May	8	9	9	7	9	9	11	11	16	18	17	19	16	26	27	23	20	24	20	18	18	45	23	20	45
8-May	34	15	21	49	35	30	31	21	79	38	65	53	18	25	22	19	19	22	22	17	16	16	12	9	79
9-May	8	8	10	9	10	13	19	18	19	28	26	33	40	47	23	24	20	15	19	23	12	12	10	13	47
10-May	10	9	12	15	15	17	16	17	18	15	15	15	17	13	14	17	14	20	15	12	14	14	47	18	47
11-May	88	18	13	10	17	30	24	76	21	23	40	18	21	35	56	35	32	25	22	15	13	12	16	12	88
12-May	16	13	9	8	8	9	50	56	22	37	68	56	58	74	47	27	23	22	19	19	19	19	10	41	74
13-May	22	19	36	21	60	20	13	25	25	27	29	55	79	70	47	39	29	21	19	19	25	11	10	9	79
14-May	64	75	68	23	15	20	17	20	28	27	29	25	23	24	19	17	18	17	31	58	37	28	36	13	75
15-May	10	71	23	22	27	13	14	16	15	15	15	14	14	13	13	15	12	12	12	13	8	8	9	8	71
16-May	6	6	7	6	53	26	39	95	42	36	41	32	47	31	31	32	74	54	21	13	51	17	11	26	95
17-May	70	28	32	14	63	13	78	89	46	30	25	30	35	74	56	67	36	32	15	14	12	11	29	26	89
18-May	10	17	13	10	14	25	16	50	60	43	27	17	20	23	26	42	23	45	49	28	39	55	19	81	81
19-May	94	42	18	13	12	13	17	15	22	25	23	31	26	20	16	18	18	17	16	15	15	13	13	11	94
20-May	19	9	27	14	16	13	13	14	17	17	19	17	16	16	40	35	21	17	14	47	89	36	25	14	89
21-May	10	10	11	12	22	22	21	20	22	26	25	31	28	26	20	21	22	38	13	14	14	21	42	10	42
22-May	17	17	13	54	39	50	30	29	27	40	68	28	27	26	26	25	34	25	22	62	28	43	29	46	68
23-May	17	14	67	41	40	18	44	35	24	29	20	20	27	31	30	41	87	65	90	28	12	15	71	17	90
24-May	18	28	26	19	17	16	19	39	22	24	20	44	25	31	26	22	18	13	33	19	13	11	11	11	44
25-May	32	24	81	29	46	61	91	44	27	24	37	39	52	47	24	27	22	17	20	17	16	16	17	18	91
26-May	23	16	19	62	28	61	36	29	17	16	16	32	11	13	20	32	20	17	16	17	16	17	18	14	62
27-May	10	11	12	12	13	12	10	14	19	17	18	17	18	16	16	16	15	16	15	12	14	14	12	23	23
28-May	15	25	19	21	18	21	27	22	17	40	63	35	25	40	40	22	18	23	15	19	14	12	15	17	63
29-May	22	22	19	15	12	27	22	16	15	12	10	12	12	13	14	16	11	13	14	14	16	18	17	18	27
30-May	17	28	18	17	17	18	17	18	19	19	19	21	20	17	16	15	32	18	30	73	70	25	38	18	73
31-May	19	18	82	44	18	21	13	32	38	70	35	44	36	29	28	31	25	18	19	15	14	35	14	14	82
Diurnal Maximum																									



**WBEA**  
**Hourly Averages**

**Wind Direction (WD) - deg**  
**Mildred Lake - May 2014**





# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Report

### Station Information

Calibration Date	May 12, 2014	Previous Calibration	April 17, 2014
Station Name	Mildred Lake	Station Number	AMS 2
Reason:	Routine		
Start Time (MST)	9:50	End Time (MST)	14:07
Barometric Pressure	mmHg	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11541008
Cal Gas Concentration	59.4 ppm	Cal Gas Expiry Date	3/26/2012
Gas Cert Reference	cc307191		
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2589
DACS voltage range	0-5v	DACS channel #	SE1

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	1000	1000	PMT voltage	-616	-616
Analyzer Range (mv)	5000	5000	Lamp voltage	904	904
Calculated slope	0.999815	0.998214	Chamber temp.	44.4	44.5
Calculated intercept	1.407341	0.631330	Pressure (mmHg)	714.3	713.5
Analyzer Background	26.4	26.4	Flow (lpm)	0.548	0.547
Analyzer Coefficient	0.909	0.909	Intensity	29000	29000

Analyzer make TEI 43c Analyzer serial # 43c-77879-387

### 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	NA
as found span	5000	69.9	830.4	830.2	1.000
calibrator zero	5000	0.0	0.0	0.3	0.000
high point	5000	69.9	830.4	831.8	0.998
second point	5000	35.4	420.6	420.0	1.001
third point	5000	17.7	210.3	209.2	1.005
calibrator zero					
as left zero	5000	0.0	0.0	0.4	0.000
as left span	5000	69.9	830.4	833.4	0.996
Average Correction Factor					1.002

Corrected As found 829.9 Previous response 829.2 % change -0.1%

#### Notes:

No adjustments performed.

Calibration Performed By:

Ryan Power





# Wood Buffalo Environmental Association

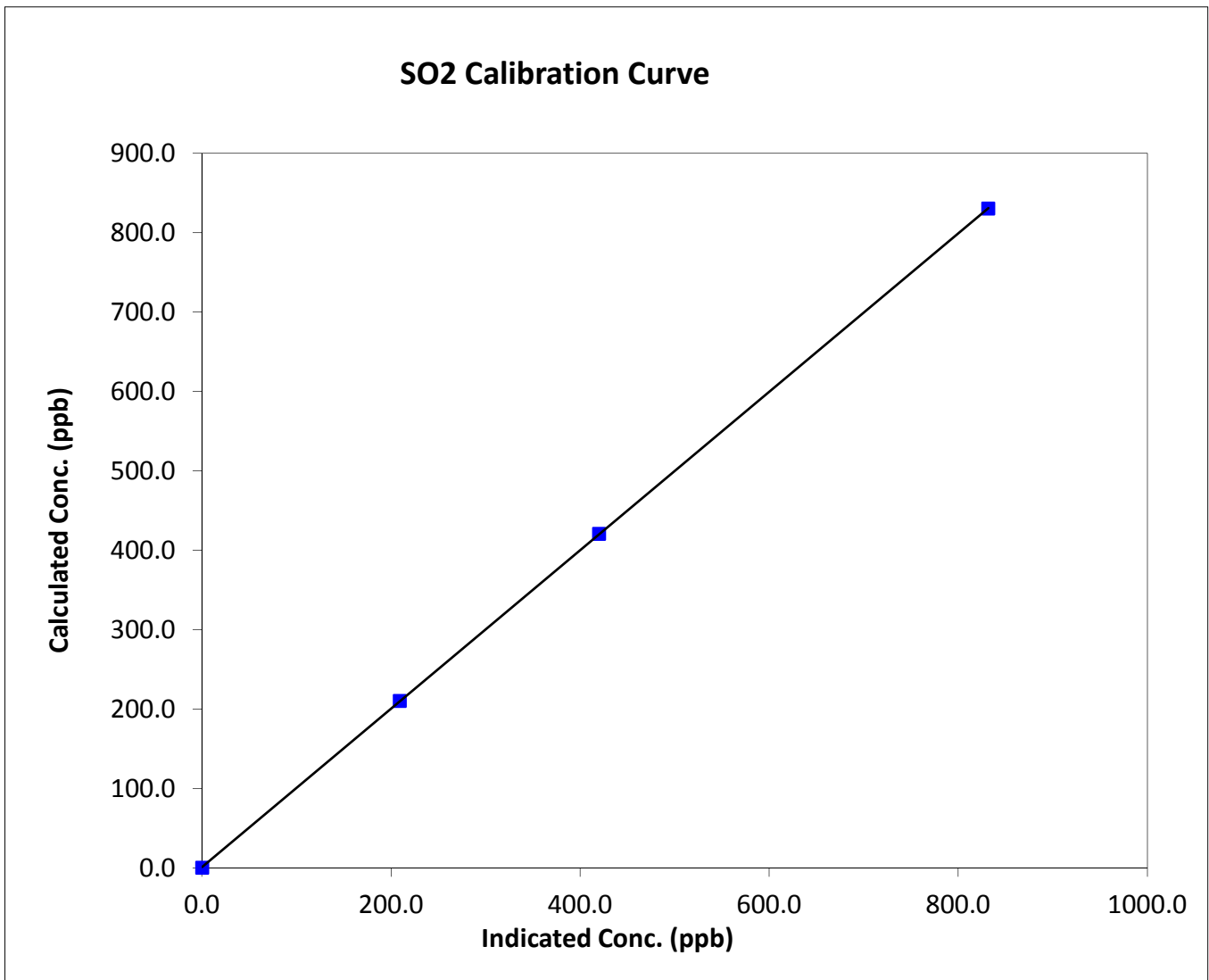
## SO<sub>2</sub> Calibration Summary

### Station Information

Calibration Date	May 12, 2014	Previous Calibration	April 17, 2014
Station Name	Mildred Lake	Station Number	AMS 2
Start Time (MST)	9:50	End Time (MST)	14:07
Analyzer make	TEI 43c	Analyzer serial #	43c-77879-387

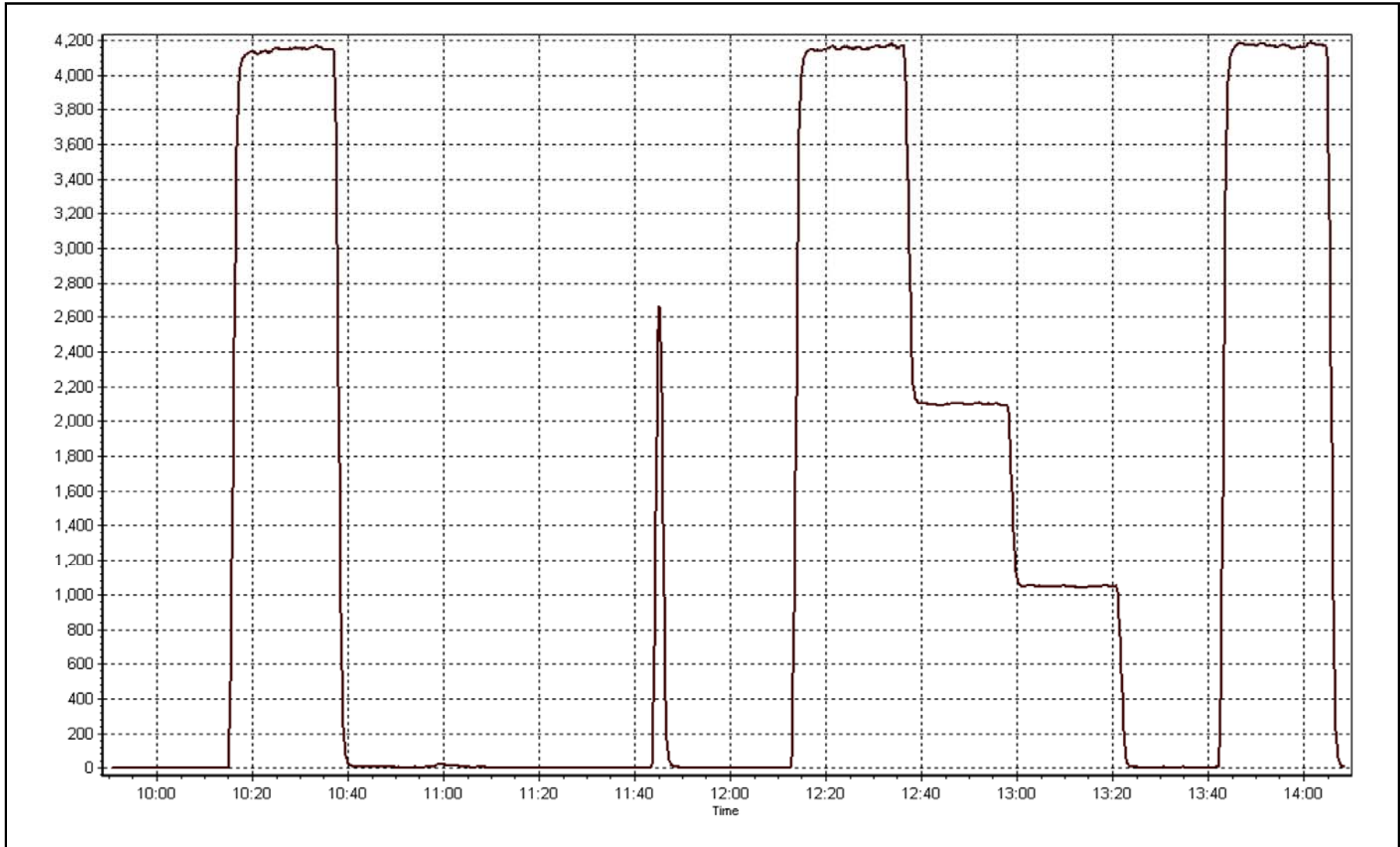
### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.3	N/A	Correlation Coefficient	0.999994
830.4	831.8	0.9983		
420.6	420.0	1.0013	Slope	0.998214
210.3	209.2	1.0050		
			Intercept	0.631330



SO2 Calibration Plot

Date: May 12, 2014





# Wood Buffalo Environmental Association

## H2S Calibration Report

### Station Information

Calibration Date	May 13, 2014	Previous Calibration	April 16, 2014
Station Name	Mildred Lake	Station Number	AMS 2
Reason:	Routine		
Start Time (MST)	9:10	End Time (MST)	11:48
Barometric Pressure	mmHg	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial number	11541008
Cal Gas Concentration	5.59 ppm H2S	Cal Gas Expiry Date	3/11/2009
Gas Cert Reference	cc243460	SO2 gas conc.	59.4 ppm SO2
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2589
DACS voltage range	0-5v	DACS channel #	SE2

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	100	100	PMT voltage	-601	-601
Analyzer Range (mv)	5000	5000	Lamp voltage	777	777
Calculated slope	0.998132	1.007058	Chamber temp.	45	45
Calculated intercept	0.030540	-0.026854	Pressure	557.9	556.7
Analyzer Background	12.5	12.5	Flow	1.030	1.027
Analyzer Coefficient	0.875	0.875	Intensity	88	88
			Converter temp.	325	325

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

### Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	4000	0.0	0.0	-0.1	NA
as found span	4000	57.2	79.9	79.3	1.008
SO2 scrubber check	5000	17.7	210.3	0.1	NA
calibrator zero	4000	0.0	0.0	-0.1	NA
high point	4000	57.2	79.9	79.3	1.008
second point	4000	28.6	40.0	39.8	1.004
third point	4000	14.3	20.0	20.0	1.000
calibrator zero					
as left zero	5000	0.0	0.0	0.1	NA
as left span	4000	57.2	79.9	79.7	1.003
Average Correction Factor					1.004

Corrected As found	79.4	Previous response	80.1	% change	0.8%
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#### Notes:

As Found used as Calibrator Zero and High Point. Scrubber check after third point.

Calibration Performed By:

Ryan Power



# Wood Buffalo Environmental Association

## H2S Calibration Summary

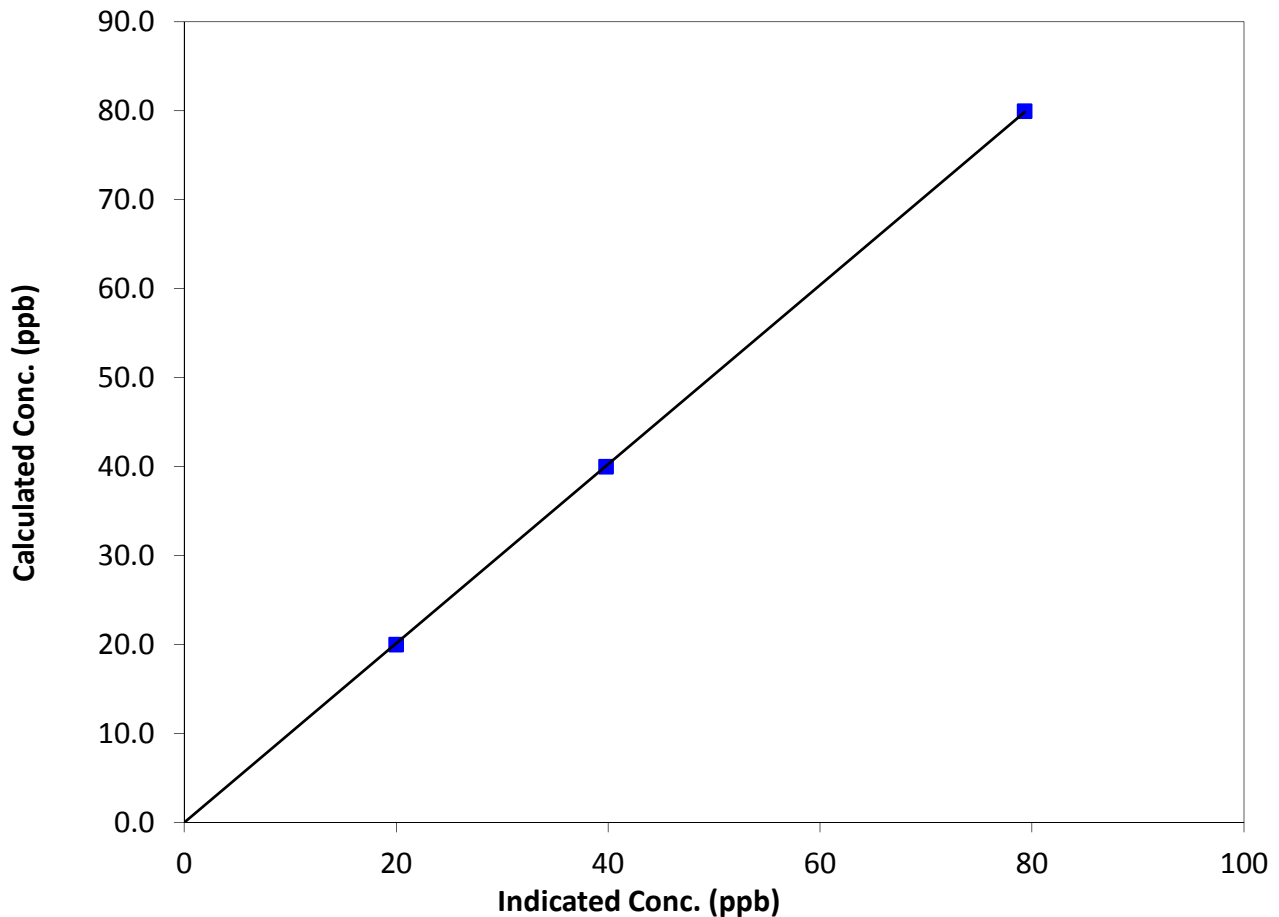
### Station Information

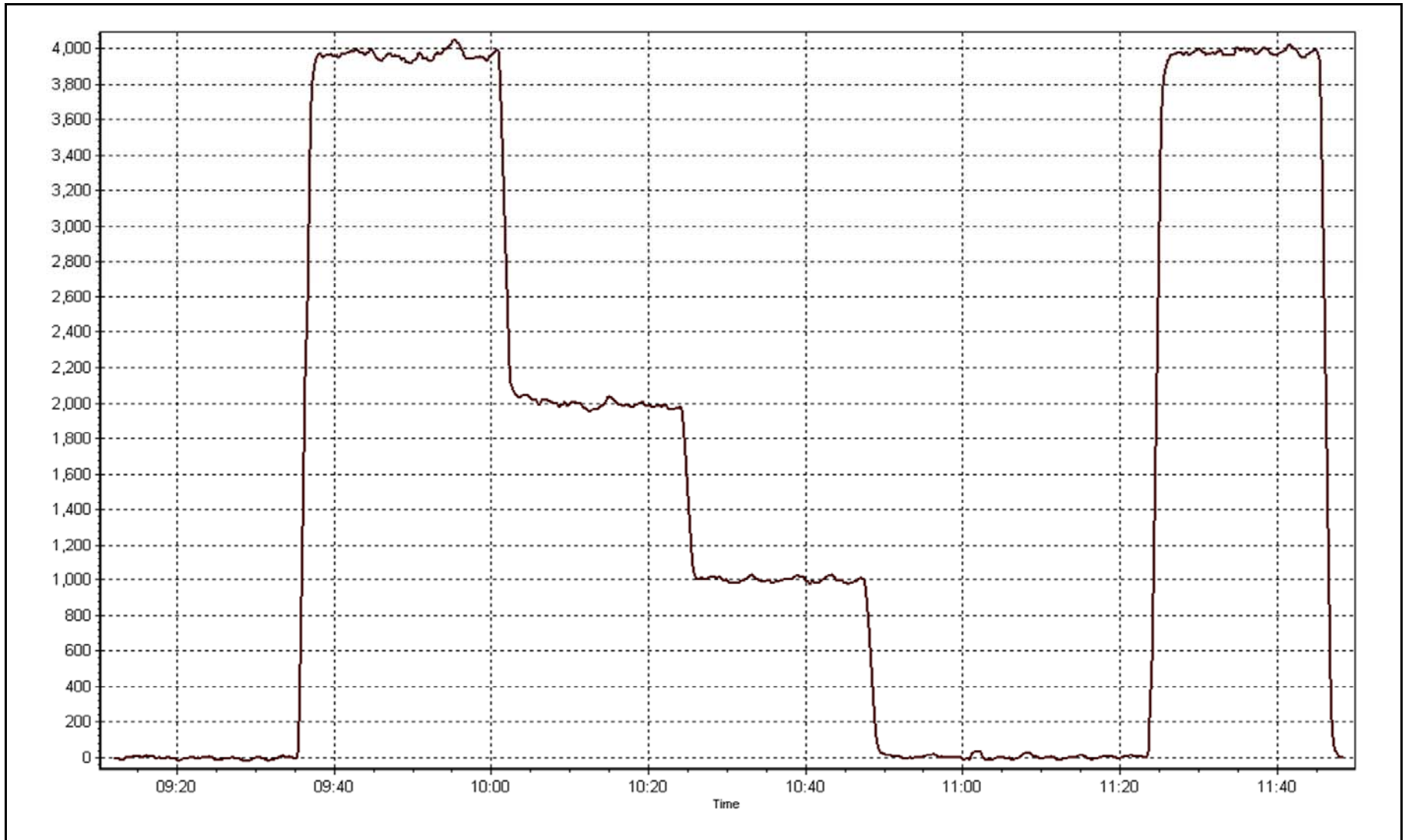
Calibration Date	May 13, 2014	Previous Calibration	April 16, 2014
Station Name	Mildred Lake	Station Number	AMS 2
Start Time (MST)	9:10	End Time (MST)	11:48
Analyzer make	TEI 450i	Analyzer serial #	815129107

### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999985
79.9	79.3	1.0078		
40.0	39.8	1.0037	Slope	1.007058
20.0	20.0	0.9996		
			Intercept	-0.026854

**H2S Calibration Curve**







# Wood Buffalo Environmental Association

## THC Calibration Report

### Station Information

Calibration Date	Monday, May 12, 2014	Previous Calibration	Thursday, April 17, 2014
Station Name	Mildred Lake	Station Number	AMS 2
Reason:	Routine		
Start Time (MST)	9:50	End Time (MST)	14:07
Barometric Pressure	mmHg	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11541008
Gas Cert Reference	cc307191	Cal Gas Expiry Date	3/26/2012
CH4 Cal Gas Conc.	505 ppm	CH4 Equiv Conc.	1060.5 ppm
C3H8 Cal Gas Conc.	202 ppm		
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2589
DACS voltage range	0-5v	DACS channel #	SE3

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppm)	25	25	Sample Pressure	8.2	8.2
Analyzer Range (mv)	5000	5000	Air or Bypass press	39.8	39.8
Calculated slope	1.005953	1.001461	Fuel Pressure	25.7	25.7
Calculated intercept	-0.038524	-0.011958			
BKG	2.50	2.56			
COEF	4.969	4.925			

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	0.13	N/A
as found span	5000	69.9	14.83	14.96	0.991
calibrator zero	5000	0.0	0.00	0.04	N/A
high point	5000	69.9	14.83	14.82	1.000
second point	5000	35.4	7.51	7.53	0.998
third point	5000	17.7	3.75	3.71	1.011
calibrator zero					
as left zero	5000	0.0	0.00	0.05	N/A
as left span	5000	69.9	14.83	14.73	1.007
Average Correction Factor					1.003

Corrected As found 14.83 Previous response 14.78 % change -0.3%

#### Notes:

H2 cylinder changed after As Finds. Minor adjustments performed.

Calibration Performed By:

Ryan Power



# Wood Buffalo Environmental Association

## THC Calibration Summary

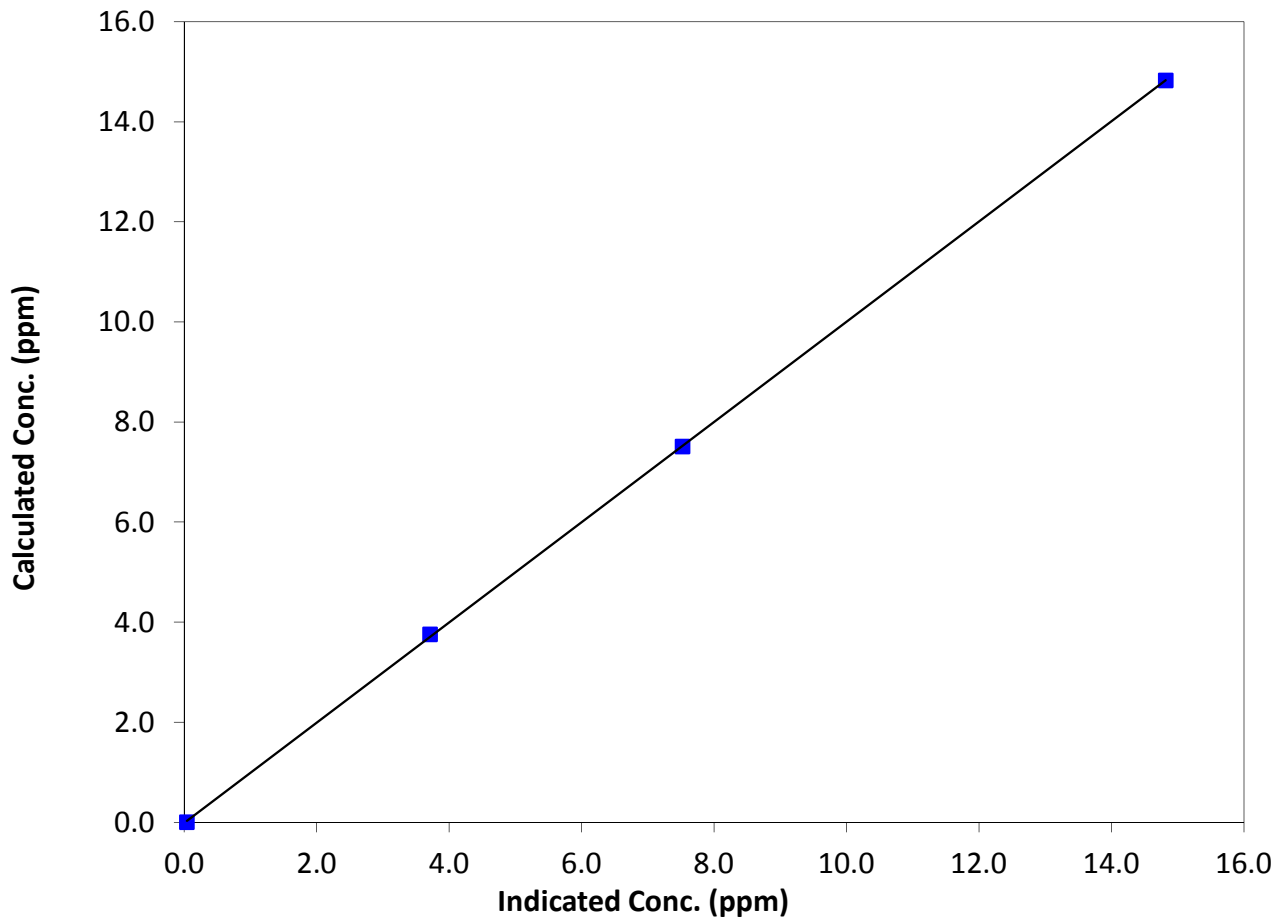
### Station Information

Calibration Date	May 12, 2014	Previous Calibration	April 17, 2014
Station Name	Mildred Lake	Station Number	AMS 2
Start Time (MST)	9:50	End Time (MST)	14:07
Analyzer make	51i-LT	Analyzer serial #	1300156231

### Calibration Data

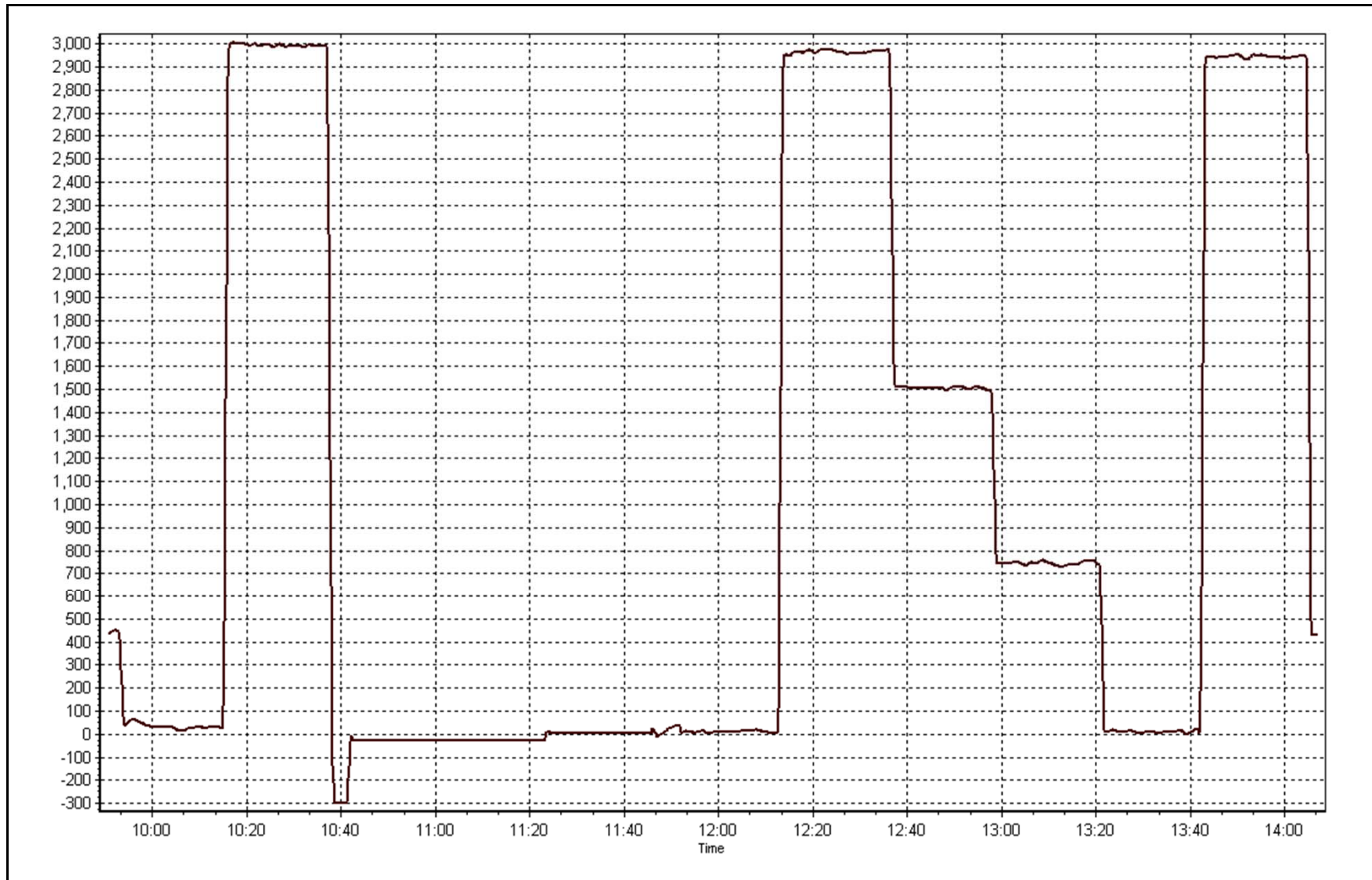
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.04	N/A	Correlation Coefficient	0.999972
14.83	14.82	1.0004		
7.51	7.53	0.9978	Slope	1.001461
3.75	3.71	1.0111		
			Intercept	-0.011958

THC Calibration Curve



THC Calibration Plot

Date: May 12, 2014





**WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS 3  
LOWER CAMP METEOROLOGY  
MAY 2014**

Operations and Data Collection by:  
Wood Buffalo Environmental Association  
Fort McMurray, Alberta

QA/QC, Data Validation and Reporting by:  
Aurora Atmospherics Inc.  
Calgary, Alberta

June 27, 2014

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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP MET TOWER (AMS 3)  
MAY 2014

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	27.7	-	20.9	-
Temperature 45 m (C) Average	744	0	0	100.00	27.5	-	20.9	-
Temperature 100 m (C) Average	736	0	8	98.92	26.8	-	20.8	-
Temperature 167 m (C) Average	744	0	0	100.00	26.6	-	20.9	-
Relative Humidity 20 m (%) Average	744	0	0	100.00	98	-	-	-
Relative Humidity 45 m (%) Average	744	0	0	100.00	98	-	-	-
Relative Humidity 100 m (%) Average	736	0	8	98.92	97	-	-	-
Relative Humidity 167 m (%) Average	744	0	0	100.00	96	-	-	-
Wind Speed 20 m (km/h) Average	736	0	8	98.92	29	-	-	-
Wind Speed 45 m (km/h) Average	738	0	6	99.19	38	-	-	-
Wind Speed 100 m (km/h) Average	744	0	0	100.00	47	-	-	-
Wind Speed 167 m (km/h) Average	744	0	0	100.00	52	-	-	-
Wind Direction 20 m (deg) Average	736	0	8	98.92	-	-	-	-
Wind Direction 45 m (deg) Average	738	0	6	99.19	-	-	-	-
Wind Direction 100 m (deg) Average	744	0	0	100.00	-	-	-	-
Wind Direction 167 m (deg) Average	744	0	0	100.00	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	736	0	8	98.92	0.5	-	-	-
Vertical Wind Speed 45 m (km/h) Average	738	0	6	99.19	1.2	-	-	-
Vertical Wind Speed 100 m (km/h) Average	744	0	0	100.00	1.9	-	-	-
Vertical Wind Speed 167 m (km/h) Average	744	0	0	100.00	2.9	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP MET TOWER (AMS 3)  
MAY 2014

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	9	6.7	-	-5.3	0.4	3.5	8.7	13.9	18.2	27.7
Temperature 45 m (C) Average	744	8.89	6.7	-	-5	0.3	3.4	8.6	13.8	18	27.5
Temperature 100 m (C) Average	736	8.48	6.6	-	-4.5	-0.1	3.1	8.4	13.2	17.6	26.8
Temperature 167 m (C) Average	744	8.33	6.6	-	-4.7	-0.4	2.9	8.6	13.2	17.2	26.6
Relative Humidity 20 m (%) Average	744	61.1	21	-	19	32	41	63	79	91	98
Relative Humidity 45 m (%) Average	744	60.7	21	-	19	32	42	62	78	90	98
Relative Humidity 100 m (%) Average	736	59.2	20	-	17	32	41	60	75	88	97
Relative Humidity 167 m (%) Average	744	57.3	20	-	17	31	40	57	73	86	96
Wind Speed 20 m (km/h) Average	736	7.9	5	-	0	2	3	7	11	15	29
Wind Speed 45 m (km/h) Average	738	10.5	7	-	0	2	5	10	15	20	38
Wind Speed 100 m (km/h) Average	744	14.8	8	-	0	5	8	14	20	26	47
Wind Speed 167 m (km/h) Average	744	17.3	9	-	1	6	10	16	23	30	52
Wind Direction 20 m (deg) Average	736	-	-	-	-	-	-	-	-	-	-
Wind Direction 45 m (deg) Average	738	-	-	-	-	-	-	-	-	-	-
Wind Direction 100 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-
Wind Direction 167 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	736	-0.3	0.3	-	-1.4	-0.7	-0.5	-0.3	-0.1	0	0.5
Vertical Wind Speed 45 m (km/h) Average	738	-0.13	0.4	-	-1.9	-0.6	-0.3	-0.1	0.1	0.4	1.2
Vertical Wind Speed 100 m (km/h) Average	744	0.11	0.4	-	-1.3	-0.4	-0.1	0.1	0.4	0.7	1.9
Vertical Wind Speed 167 m (km/h) Average	744	0.23	0.7	-	-1.7	-0.6	-0.2	0.2	0.6	1.2	2.9

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP MET TOWER (AMS 3)  
MAY 2014

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
Temperature, Relative Humidity 100 m	17 May 2014 15:00	17 May 2014 22:00	8	Flatline in sensor output signal
Wind Speed, Wind Direction, Vertical Wind Speed 20 m	05 May 2014 00:00	05 May 2014 06:00	7	Flatline in sensor output signal
Wind Speed, Wind Direction, Vertical Wind Speed 20 m	05 May 2014 08:00	05 May 2014 08:00	1	Flatline in sensor output signal
Wind Speed, Wind Direction, Vertical Wind Speed 45 m	05 May 2014 00:00	05 May 2014 05:00	6	Flatline in sensor output signal

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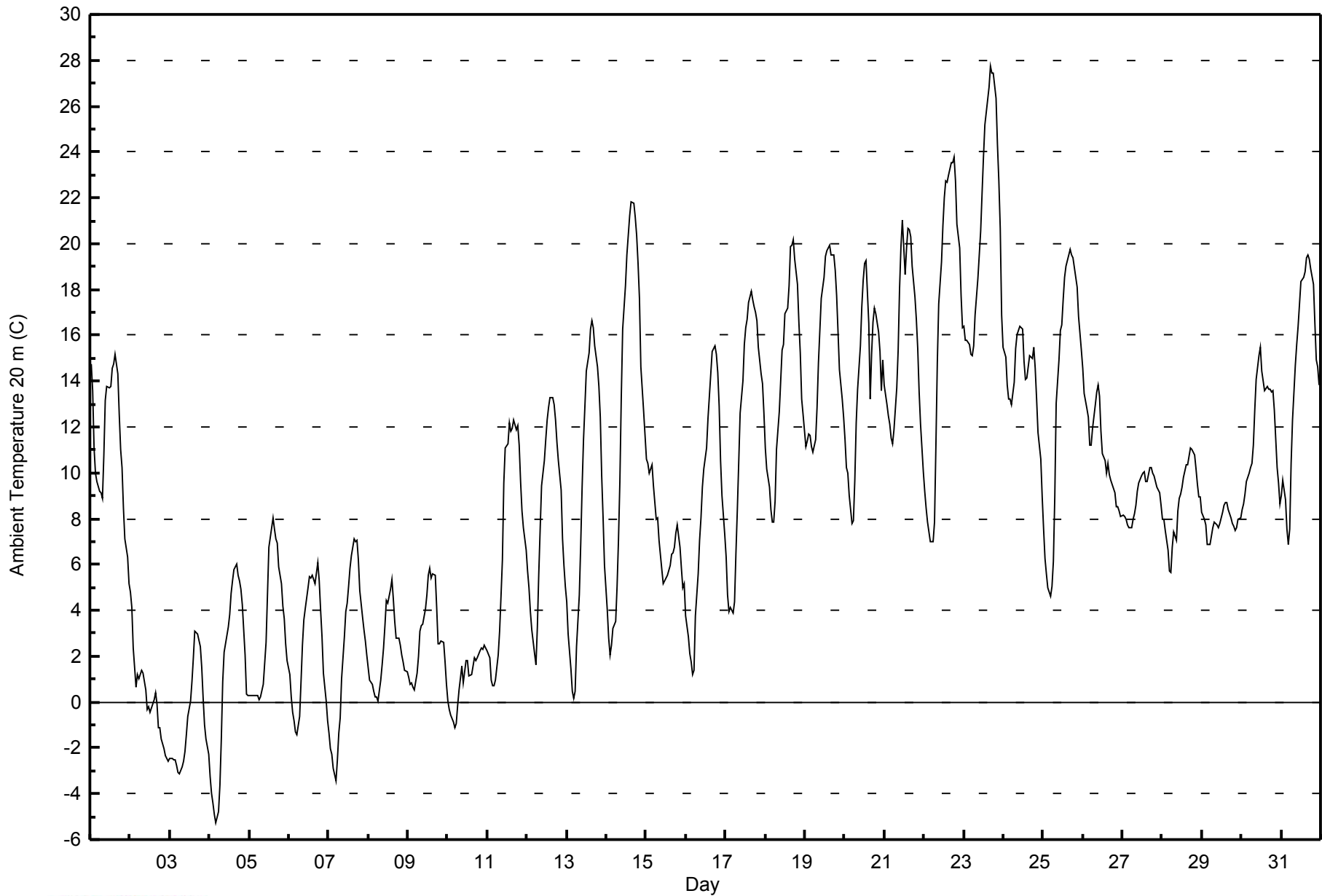


Maximum Value: 27.7 C on May 23 17:00		Maximum Daily Average: 20.9 C on May 23		Hours in Service: 744																																												
Minimum Value: -5.3 C on May 4 05:00		Minimum Daily Average: -0.7 C on May 3		Hours of Data: 744																																												
Maximum Diurnal Average: 12.6 C at hour 17		Minimum Diurnal Average: 4.7 C at hour 5		Hours of Missing Data: 0																																												
Monthly Average: 9.00 C		Percentiles: P <sub>1</sub> = -3.2 P <sub>10</sub> = 0.4 Q <sub>1</sub> = 3.5 Median = 8.7 Q <sub>3</sub> = 13.9 P <sub>90</sub> = 18.2 P <sub>99</sub> = 24.2		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-May	14.7	13.6	11.1	10.0	9.6	9.2	9.1	8.9	10.8	13.2	13.8	13.7	13.8	14.6	14.7	15.2	14.3	12.5	11.0	10.2	8.5	7.1	6.3	5.1	11.3	15.2																						
2-May	4.8	4.1	2.4	0.7	1.2	1.0	1.2	1.4	1.2	0.5	-0.3	-0.2	-0.5	-0.3	0.1	0.4	-0.1	-1.1	-1.1	-1.6	-2.1	-2.3	-2.5	-2.6	0.2	4.8																						
3-May	-2.5	-2.4	-2.6	-2.5	-2.8	-3.1	-3.1	-2.9	-2.6	-2.2	-1.4	-0.6	0.0	0.9	2.0	3.1	3.0	3.0	2.4	1.5	0.1	-1.0	-1.6	-2.3	-0.7	3.1																						
4-May	-3.2	-4.0	-4.4	-4.9	-5.3	-4.8	-3.6	-1.6	0.9	2.2	2.9	3.3	3.8	4.7	5.3	5.8	6.0	5.5	5.3	4.9	4.3	2.0	0.4	0.3	1.1	6.0																						
5-May	0.3	0.3	0.3	0.3	0.3	0.3	0.1	0.2	0.7	1.7	2.6	4.7	6.7	7.6	8.0	7.6	7.1	6.9	5.9	5.2	4.2	3.7	2.6	1.8	3.3	8.0																						
6-May	1.2	0.2	-0.5	-0.8	-1.3	-1.4	-0.7	0.9	2.5	3.6	4.1	5.0	5.4	5.4	5.5	5.3	5.2	6.1	5.3	4.0	2.9	1.3	0.0	-0.8	2.4	6.1																						
7-May	-1.4	-2.0	-2.3	-2.9	-3.4	-2.5	-1.4	-0.7	1.0	2.9	3.9	4.3	5.1	5.8	6.4	7.1	7.0	7.1	6.2	4.9	3.7	3.2	2.6	2.1	2.4	7.1																						
8-May	1.5	1.0	0.7	0.5	0.2	0.2	0.1	0.9	1.6	2.3	3.4	4.4	4.3	4.9	5.3	4.5	3.5	2.8	2.8	2.5	2.1	1.7	1.4	1.3	2.3	5.3																						
9-May	1.1	0.8	0.8	0.7	0.5	1.2	2.0	3.1	3.3	3.4	4.1	4.7	5.5	5.9	5.4	5.6	5.5	4.1	2.5	2.5	2.6	2.6	1.8	0.8	2.9	5.9																						
10-May	0.0	-0.3	-0.6	-0.9	-1.1	-1.0	-0.1	0.5	1.5	0.9	1.3	1.8	1.8	1.2	1.2	1.5	1.9	1.8	1.9	2.3	2.4	2.3	2.5	2.4	1.0	2.5																						
11-May	2.2	1.9	1.0	0.7	0.7	0.9	2.1	3.1	4.6	6.2	9.6	11.1	11.2	12.2	11.8	11.9	12.3	11.9	12.1	11.2	9.6	8.3	7.6	6.7	7.1	12.3																						
12-May	5.7	5.0	3.9	3.2	2.1	1.6	3.3	5.6	7.5	9.5	10.6	11.5	12.3	12.9	13.3	13.3	13.0	12.3	11.3	10.6	9.2	7.1	5.9	5.0	8.1	13.3																						
13-May	4.4	2.9	1.4	0.5	0.2	0.5	2.4	4.7	6.9	9.4	11.5	12.9	14.4	15.2	16.2	16.7	16.4	15.5	14.7	13.8	12.4	9.8	8.1	5.9	9.0	16.7																						
14-May	4.0	2.8	2.0	2.5	3.2	3.5	5.1	7.0	9.6	13.3	16.3	18.2	19.5	20.4	21.2	21.8	21.8	21.1	20.3	19.2	17.6	14.6	12.7	11.7	12.9	21.8																						
15-May	10.6	10.4	10.0	10.4	9.4	8.7	8.0	8.0	7.1	5.8	5.2	5.3	5.4	5.5	6.0	6.4	6.5	6.8	7.3	7.7	6.7	5.8	5.0	5.1	7.2	10.6																						
16-May	3.8	2.8	2.1	1.7	1.2	1.4	3.7	5.6	7.0	8.0	9.4	10.2	11.1	12.3	13.3	14.3	15.3	15.5	15.2	14.4	12.9	10.6	9.0	7.3	8.7	15.5																						
17-May	6.3	4.6	4.0	4.1	3.9	4.4	6.5	8.4	10.5	12.6	14.0	15.6	16.3	16.7	17.4	17.9	17.5	17.3	17.0	16.6	15.5	14.3	13.9	12.6	12.0	17.9																						
18-May	11.1	10.2	9.4	8.4	7.9	7.8	8.8	11.0	12.7	14.0	15.4	15.6	16.9	17.2	18.1	19.9	20.0	20.1	19.3	18.2	16.6	15.3	13.2	12.5	14.1	20.1																						
19-May	11.1	11.4	11.7	11.6	11.2	10.9	11.5	12.8	14.8	16.2	17.6	18.5	19.4	19.7	19.8	19.9	19.5	19.5	18.8	17.8	16.1	14.5	13.2	12.4	15.4	19.9																						
20-May	11.5	10.2	10.0	9.0	7.8	7.9	9.7	12.2	13.7	15.5	17.2	18.4	19.1	19.3	16.5	13.2	15.2	16.6	17.2	16.9	16.2	15.3	13.6	14.9	14.1	19.3																						
21-May	13.8	13.0	12.5	12.2	11.5	11.3	11.9	13.7	15.4	18.0	19.9	21.0	18.6	19.8	20.7	20.6	20.3	19.0	17.7	16.7	15.4	13.6	12.1	10.0	15.8	21.0																						
22-May	9.2	8.4	7.8	7.4	7.0	7.0	7.9	11.2	14.8	17.4	19.2	20.8	22.0	22.7	22.7	23.0	23.5	23.5	23.8	22.7	20.8	19.8	17.8	16.3	16.5	23.8																						
23-May	16.4	15.8	15.8	15.6	15.2	15.1	15.6	16.9	18.5	19.5	20.5	22.2	23.8	25.2	26.2	26.9	27.7	27.4	27.4	26.3	24.3	22.7	20.7	16.9	20.9	27.7																						
24-May	15.4	15.0	13.8	13.2	13.2	13.0	13.9	15.4	16.0	16.2	16.4	16.3	14.8	14.1	14.2	14.6	15.1	15.0	15.5	14.6	13.2	11.8	10.6	9.0	14.2	16.4																						
25-May	7.5	6.2	5.6	5.0	4.6	5.0	6.1	9.0	13.1	15.0	16.2	16.5	17.5	18.6	19.0	19.5	19.8	19.5	19.4	19.0	18.1	16.8	16.1	15.4	13.7	19.8																						
26-May	14.6	13.4	12.8	12.4	11.2	11.2	11.9	13.0	13.5	13.9	13.3	11.8	10.8	10.5	10.0	10.4	9.9	9.7	9.3	9.1	8.5	8.5	8.4	8.1	11.1	14.6																						
27-May	8.2	8.1	8.0	7.7	7.6	7.6	8.0	8.2	8.6	9.2	9.5	9.9	10.0	10.0	9.6	9.6	10.2	10.2	10.0	9.9	9.6	9.4	9.1	8.6	9.0	10.2																						
28-May	8.0	8.0	7.5	6.6	5.7	5.7	6.8	7.4	7.1	8.3	8.9	9.1	9.3	9.8	10.4	10.4	10.7	11.1	11.0	10.8	10.2	9.5	9.0	9.0	8.8	11.1																						
29-May	8.2	8.0	7.7	6.9	6.9	6.9	7.6	7.8	7.8	7.7	7.6	7.8	8.3	8.6	8.7	8.7	8.4	8.0	7.8	7.7	7.5	7.6	8.0	8.0	7.8	8.7																						
30-May	8.4	8.6	9.1	9.6	10.0	10.2	10.4	11.2	12.7	14.0	15.1	15.5	14.4	14.0	13.6	13.8	13.6	13.7	13.5	13.6	12.7	10.3	9.6	8.6	11.9	15.5																						
31-May	9.0	9.7	8.8	7.6	6.9	7.5	10.4	12.3	14.7	15.6	16.4	17.3	18.3	18.5	18.8	19.4	19.5	19.3	18.9	18.2	16.5	14.9	14.6	13.8	14.5	19.5																						
																								6.6	6.1	5.5	5.0	4.7	4.8	5.6	6.9	8.3	9.5	10.5	11.2	11.6	12.1	12.3	12.5	12.6	12.3	11.9	11.3	10.3	9.1	8.1	7.3	Diurnal Average
																								16.4	15.8	15.8	15.6	15.2	15.1	15.6	16.9	18.5	19.5	20.5	22.2	23.8	25.2	26.2	26.9	27.7	27.4	27.4	26.3	24.3	22.7	20.7	16.9	Diurnal Maximum



**WBEA**  
**Hourly Averages**

**Ambient Temperature 20 m (AT20m) - C**  
**Lower Camp Met Tower - May 2014**







**WBEA**  
**Cumulative Frequency Distribution**

**Ambient Temperature 20 m (AT20m) - C**  
**Lower Camp Met Tower - May 2014**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	55	7.39	7.39
0 - 10	370	49.73	57.12
10 - 20	285	38.31	95.43
> 20	34	4.57	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

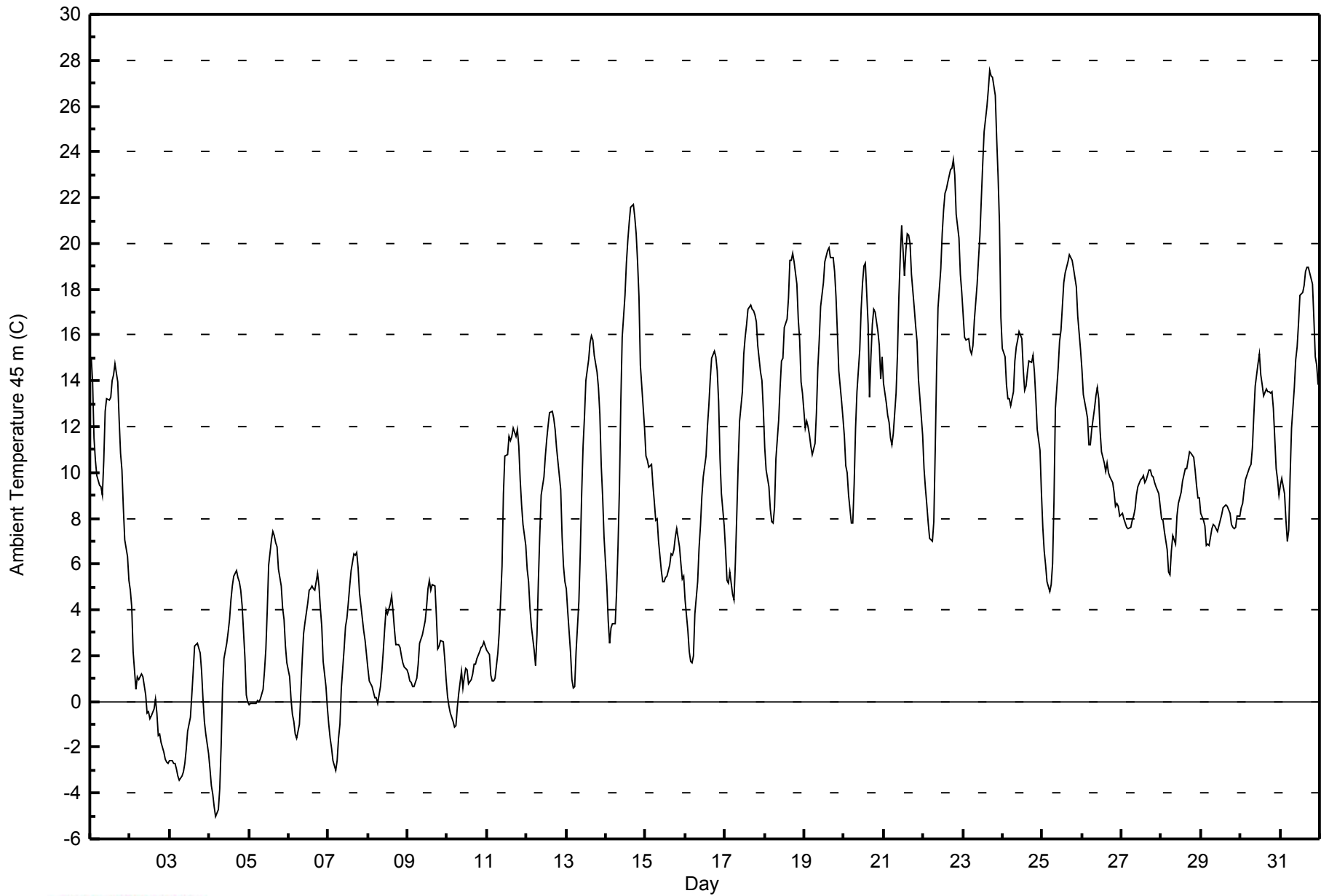


Maximum Value: 27.5 C on May 23 17:00		Maximum Daily Average: 20.9 C on May 23		Hours in Service: 744																																												
Minimum Value: -5.0 C on May 4 05:00		Minimum Daily Average: -1.1 C on May 3		Hours of Data: 744																																												
Maximum Diurnal Average: 12.3 C at hour 17		Minimum Diurnal Average: 4.7 C at hour 6		Hours of Missing Data: 0																																												
Monthly Average: 8.89 C		Percentiles: P <sub>1</sub> = -3.3 P <sub>10</sub> = 0.3 Q <sub>1</sub> = 3.4 Median = 8.6 Q <sub>3</sub> = 13.8 P <sub>90</sub> = 18.0 P <sub>99</sub> = 23.8		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-May	15.1	13.9	11.5	10.5	9.8	9.4	9.3	9.0	10.6	12.7	13.2	13.2	13.3	14.0	14.3	14.7	13.9	12.3	10.8	10.1	8.4	7.1	6.4	5.3	11.2	15.1																						
2-May	4.9	4.1	2.2	0.5	1.1	0.9	1.1	1.2	1.1	0.3	-0.5	-0.4	-0.7	-0.6	-0.3	0.1	-0.5	-1.5	-1.4	-1.8	-2.2	-2.5	-2.6	-2.7	0.0	4.9																						
3-May	-2.6	-2.6	-2.7	-2.7	-3.0	-3.3	-3.4	-3.2	-3.1	-2.7	-2.1	-1.3	-0.7	0.3	1.3	2.4	2.5	2.5	2.1	1.3	0.1	-0.9	-1.4	-2.3	-1.1	2.5																						
4-May	-3.0	-3.7	-4.0	-4.6	-5.0	-4.7	-3.8	-1.9	0.6	1.8	2.5	3.0	3.6	4.4	5.1	5.5	5.7	5.4	5.2	4.9	4.2	1.9	0.3	0.0	1.0	5.7																						
5-May	-0.1	-0.1	-0.1	-0.1	-0.1	0.0	0.0	0.1	0.5	1.3	2.3	4.0	5.9	7.0	7.4	7.3	6.9	6.7	5.8	5.1	4.1	3.6	2.4	1.7	3.0	7.4																						
6-May	1.1	0.1	-0.6	-0.9	-1.4	-1.6	-1.0	0.4	1.8	3.0	3.5	4.3	4.8	4.9	5.1	4.9	4.9	5.6	5.1	4.1	3.3	1.8	0.7	-0.3	2.2	5.6																						
7-May	-1.0	-1.6	-2.0	-2.6	-3.0	-2.6	-1.6	-1.0	0.6	2.3	3.2	3.6	4.3	5.1	5.7	6.4	6.4	6.5	5.8	4.7	3.6	3.1	2.6	2.0	2.1	6.5																						
8-May	1.4	0.9	0.7	0.4	0.2	0.1	-0.1	0.7	1.3	2.2	3.2	4.0	3.8	4.2	4.6	4.0	3.1	2.5	2.5	2.4	2.0	1.7	1.5	1.4	2.0	4.6																						
9-May	1.2	0.9	0.8	0.7	0.6	1.0	1.6	2.6	2.7	2.9	3.5	4.2	4.9	5.3	4.9	5.1	5.1	3.8	2.3	2.4	2.7	2.6	1.9	1.0	2.7	5.3																						
10-May	0.2	-0.2	-0.5	-0.9	-1.1	-1.0	-0.3	0.4	1.3	0.6	1.1	1.4	1.4	0.7	1.0	1.2	1.6	1.6	1.9	2.2	2.4	2.4	2.6	2.4	0.9	2.6																						
11-May	2.2	2.1	1.2	0.9	0.9	1.0	2.1	3.0	4.4	5.9	9.1	10.7	10.8	11.6	11.4	11.6	12.0	11.6	11.9	11.1	9.7	8.6	7.7	6.8	7.0	12.0																						
12-May	5.8	5.2	4.1	3.3	2.2	1.6	2.9	5.2	7.2	9.0	9.8	10.7	11.5	12.1	12.6	12.6	12.4	11.9	11.1	10.5	9.2	7.2	5.9	5.2	7.9	12.6																						
13-May	4.9	3.9	2.2	1.0	0.6	0.6	2.2	4.4	6.5	9.1	11.1	12.4	14.0	14.9	15.7	16.0	15.8	15.1	14.4	13.7	12.5	10.3	8.9	7.2	9.1	16.0																						
14-May	5.1	3.5	2.6	3.2	3.4	3.4	4.8	6.7	9.3	13.0	15.9	17.8	19.1	20.1	20.9	21.6	21.7	21.1	20.4	19.2	17.7	14.7	12.8	11.9	12.9	21.7																						
15-May	10.7	10.5	10.3	10.4	9.4	8.7	7.9	8.0	7.0	5.7	5.2	5.2	5.4	5.5	5.9	6.4	6.4	6.6	7.2	7.6	6.8	6.0	5.3	5.5	7.2	10.7																						
16-May	4.5	3.1	2.2	1.7	1.7	2.0	3.8	5.3	6.7	7.6	9.0	9.8	10.7	12.0	12.9	14.1	15.0	15.3	15.0	14.4	13.1	10.6	9.1	7.7	8.6	15.3																						
17-May	6.6	5.3	5.1	5.6	4.7	4.4	6.1	8.1	10.4	12.2	13.5	15.2	15.9	16.4	17.1	17.3	17.1	17.1	16.9	16.6	15.6	14.4	14.0	12.7	12.0	17.3																						
18-May	11.1	10.1	9.4	8.4	7.9	7.8	8.5	10.6	12.3	13.7	14.9	15.0	16.3	16.7	17.6	19.3	19.3	19.6	19.2	18.2	16.7	15.8	13.9	13.5	14.0	19.6																						
19-May	12.0	12.3	12.0	11.6	11.1	10.8	11.3	12.6	14.6	15.8	17.3	18.3	19.2	19.4	19.7	19.8	19.4	19.4	18.7	17.7	16.1	14.5	13.1	12.4	15.4	19.8																						
20-May	11.6	10.3	10.0	9.0	7.8	7.8	9.5	12.0	13.5	15.3	17.1	18.3	19.0	19.2	16.4	13.3	15.1	16.4	17.1	17.0	16.2	15.6	14.1	15.0	14.0	19.2																						
21-May	13.9	13.0	12.5	12.2	11.5	11.2	11.7	13.4	15.2	17.7	19.5	20.8	18.6	19.7	20.5	20.3	20.0	18.7	17.2	16.4	15.7	14.1	13.3	11.6	15.8	20.8																						
22-May	10.1	9.3	8.6	7.8	7.1	7.0	7.9	11.0	14.5	17.2	18.9	20.4	21.4	22.2	22.4	22.7	23.2	23.3	23.7	23.0	21.3	20.3	18.7	17.9	16.7	23.7																						
23-May	16.9	15.9	15.8	15.9	15.4	15.2	15.5	16.6	18.2	19.3	20.4	21.9	23.5	24.8	26.0	26.7	27.5	27.3	27.3	26.5	24.6	22.9	20.9	16.8	20.9	27.5																						
24-May	15.4	15.0	13.8	13.2	13.2	12.9	13.5	14.9	15.5	15.8	16.1	15.8	14.5	13.6	13.8	14.4	14.9	14.8	15.1	14.4	13.2	11.9	11.0	9.1	14.0	16.1																						
25-May	7.6	6.5	5.9	5.2	4.8	5.1	6.0	8.8	12.8	14.6	15.7	16.2	17.3	18.3	18.7	19.2	19.5	19.4	19.3	18.9	18.1	16.8	16.1	15.3	13.6	19.5																						
26-May	14.5	13.4	12.7	12.4	11.2	11.2	11.9	12.8	13.4	13.7	13.2	11.8	10.9	10.4	10.0	10.4	10.0	9.8	9.6	9.1	8.5	8.6	8.5	8.1	11.1	14.5																						
27-May	8.2	8.0	7.8	7.6	7.6	7.6	7.9	8.1	8.4	9.0	9.4	9.7	9.8	9.8	9.5	9.7	10.1	10.1	9.9	9.8	9.6	9.4	9.1	8.5	8.9	10.1																						
28-May	7.9	7.9	7.4	6.6	5.7	5.6	6.5	7.2	6.9	8.1	8.7	8.9	9.1	9.6	10.2	10.2	10.6	10.9	10.9	10.6	10.1	9.4	8.9	8.9	8.6	10.9																						
29-May	8.2	7.9	7.7	6.8	6.9	6.8	7.5	7.7	7.7	7.6	7.4	7.7	8.2	8.4	8.5	8.6	8.5	8.2	7.7	7.6	7.5	7.6	8.1	8.1	7.8	8.6																						
30-May	8.5	8.7	9.2	9.7	10.0	10.2	10.3	11.1	12.5	13.8	14.7	15.2	14.3	13.8	13.4	13.6	13.5	13.5	13.4	13.5	12.8	10.2	9.7	9.0	11.9	15.2																						
31-May	9.4	9.8	9.1	7.9	7.0	7.5	9.9	11.9	13.7	14.9	15.5	16.5	17.7	17.9	18.2	18.8	19.0	19.0	18.7	18.2	16.7	15.1	14.7	13.8	14.2	19.0																						
																								6.8	6.2	5.6	5.2	4.8	4.7	5.5	6.7	8.0	9.1	10.1	10.8	11.2	11.7	11.9	12.2	12.3	12.1	11.8	11.3	10.3	9.2	8.3	7.5	Diurnal Average
																								16.9	15.9	15.8	15.9	15.4	15.2	15.5	16.6	18.2	19.3	20.4	21.9	23.5	24.8	26.0	26.7	27.5	27.3	27.3	26.5	24.6	22.9	20.9	17.9	Diurnal Maximum



**WBEA**  
**Hourly Averages**

**Ambient Temperature 45 m (AT45m) - C**  
**Lower Camp Met Tower - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Ambient Temperature 45 m (AT45m) - C**  
**Lower Camp Met Tower - May 2014**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	65	8.74	8.74
0 - 10	361	48.52	57.26
10 - 20	284	38.17	95.43
> 20	34	4.57	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

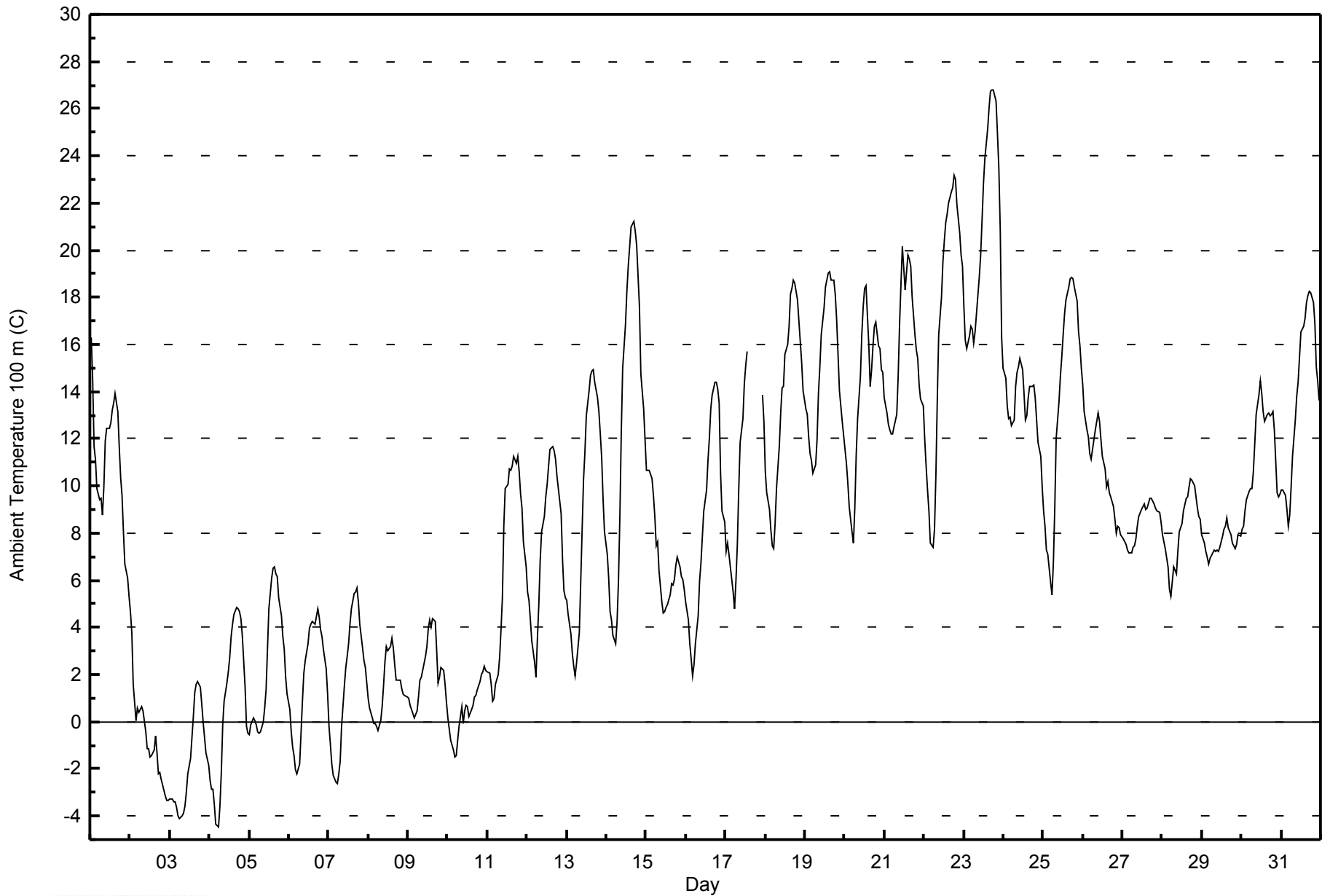


Maximum Value: 26.8 C on May 23 19:00		Maximum Daily Average: 20.8 C on May 23		Hours in Service: 744																																												
Minimum Value: -4.5 C on May 4 06:00		Minimum Daily Average: -1.7 C on May 3		Hours of Data: 736																																												
Maximum Diurnal Average: 11.4 C at hour 17		Minimum Diurnal Average: 4.8 C at hour 6		Hours of Missing Data: 8																																												
Monthly Average: 8.48 C		Percentiles: P <sub>1</sub> = -3.6 P <sub>10</sub> = -0.1 Q <sub>1</sub> = 3.1 Median = 8.4 Q <sub>3</sub> = 13.2 P <sub>90</sub> = 17.6 P <sub>99</sub> = 24.8		Hours of Calibration: 0																																												
				Percent Operational Time: 98.9																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-May	16.3	14.5	11.6	11.1	9.9	9.4	9.5	8.8	10.0	11.9	12.4	12.4	12.7	13.2	13.5	13.9	13.2	11.7	10.4	9.6	8.0	6.7	6.1	5.3	10.9	16.3																						
2-May	4.7	3.8	1.6	0.0	0.6	0.4	0.5	0.6	0.4	-0.4	-1.2	-1.2	-1.5	-1.4	-1.2	-0.6	-1.3	-2.2	-2.1	-2.5	-2.9	-3.2	-3.3	-3.4	-0.7	4.7																						
3-May	-3.3	-3.3	-3.4	-3.4	-3.6	-4.0	-4.1	-4.0	-3.9	-3.6	-3.0	-2.2	-1.6	-0.7	0.2	1.2	1.6	1.7	1.4	0.7	0.0	-0.7	-1.3	-1.9	-1.7	1.7																						
4-May	-2.5	-2.8	-2.8	-3.5	-4.4	-4.5	-3.6	-2.1	-0.1	0.9	1.6	2.1	2.7	3.6	4.1	4.6	4.9	4.8	4.7	4.4	3.7	1.4	-0.2	-0.5	0.7	4.9																						
5-May	-0.5	-0.1	0.1	0.1	-0.1	-0.4	-0.5	-0.4	0.0	0.5	1.4	3.0	4.8	6.1	6.5	6.6	6.3	6.1	5.3	4.5	3.6	3.1	1.9	1.2	2.4	6.6																						
6-May	0.5	-0.4	-1.1	-1.5	-2.0	-2.2	-1.8	-0.5	0.9	2.1	2.6	3.3	3.9	4.1	4.2	4.2	4.1	4.8	4.4	3.9	3.6	3.1	2.3	1.2	1.8	4.8																						
7-May	-0.2	-1.0	-1.8	-2.3	-2.6	-2.6	-2.2	-1.7	-0.2	1.5	2.3	2.7	3.3	4.1	4.8	5.4	5.5	5.7	5.1	4.1	3.2	2.6	2.3	1.6	1.7	5.7																						
8-May	1.0	0.6	0.2	-0.1	-0.1	-0.2	-0.4	0.1	0.6	1.5	2.5	3.2	3.0	3.2	3.6	3.1	2.4	1.8	1.7	1.8	1.4	1.2	1.1	1.0	1.4	3.6																						
9-May	1.0	0.7	0.5	0.3	0.2	0.5	1.0	1.8	1.9	2.2	2.8	3.2	3.9	4.3	4.0	4.4	4.3	3.0	1.7	1.9	2.3	2.2	1.6	0.8	2.1	4.4																						
10-May	0.2	-0.3	-0.8	-1.2	-1.5	-1.5	-0.8	-0.2	0.7	0.0	0.5	0.7	0.7	0.2	0.5	0.7	1.0	1.1	1.3	1.7	2.0	2.1	2.4	2.2	0.5	2.4																						
11-May	2.1	2.0	1.6	0.9	1.0	1.6	2.0	2.7	3.9	5.2	8.3	9.9	10.1	10.7	10.7	10.8	11.3	10.9	11.3	10.6	9.6	9.1	7.7	6.6	6.7	11.3																						
12-May	5.5	5.1	4.3	3.4	2.5	1.9	3.5	4.9	6.8	8.1	8.7	9.5	10.1	10.9	11.5	11.7	11.5	11.1	10.4	9.9	8.8	6.8	5.5	5.2	7.4	11.7																						
13-May	5.1	4.6	3.7	2.9	2.3	1.9	2.5	3.8	5.9	8.1	10.2	11.4	13.0	14.1	14.7	14.9	14.9	14.4	13.8	13.2	12.2	11.2	9.4	8.1	9.0	14.9																						
14-May	7.1	6.1	4.7	4.3	3.7	3.3	4.2	6.0	8.7	12.3	15.0	16.9	18.3	19.3	20.2	21.0	21.2	20.8	20.2	18.9	17.6	14.7	13.3	11.9	12.9	21.2																						
15-May	10.7	10.6	10.7	10.3	9.6	8.7	7.4	7.6	6.4	5.1	4.6	4.7	4.8	4.9	5.4	5.9	5.8	6.1	6.6	7.0	6.6	6.1	6.0	5.6	7.0	10.7																						
16-May	5.1	4.3	3.3	2.6	2.0	2.4	3.3	4.5	6.0	6.7	7.9	8.9	9.8	11.1	12.0	13.3	13.9	14.4	14.4	14.1	13.5	10.5	9.0	8.5	8.4	14.4																						
17-May	7.2	7.6	7.1	6.6	5.5	4.8	6.0	7.5	9.8	11.9	12.9	14.3	15.1	15.7	AF	AF	AF	AF	AF	AF	AF	AF	13.9	12.8	--	15.7																						
18-May	10.6	9.7	9.0	8.1	7.5	7.4	8.4	9.9	11.7	13.1	14.2	14.2	15.6	16.0	16.8	18.1	18.4	18.7	18.6	17.9	17.0	16.1	15.3	14.0	13.6	18.7																						
19-May	13.3	13.0	12.1	11.4	11.1	10.5	10.9	12.0	13.9	15.1	16.4	17.6	18.4	18.7	19.0	19.1	18.7	18.7	18.1	17.1	15.6	14.1	12.7	12.1	15.0	19.1																						
20-May	11.5	11.0	10.1	9.1	8.0	7.6	9.1	11.3	12.9	14.7	16.4	17.6	18.4	18.5	16.0	14.2	14.9	16.0	16.8	17.0	15.9	15.8	15.0	14.8	13.9	18.5																						
21-May	13.8	13.1	12.6	12.4	12.2	12.2	12.5	13.0	14.6	16.8	18.6	20.1	18.3	19.1	19.8	19.6	19.3	18.0	16.4	15.8	15.4	14.3	13.7	13.4	15.6	20.1																						
22-May	11.9	10.8	9.8	9.0	7.6	7.4	8.1	10.5	13.7	16.4	18.0	19.5	20.4	21.2	21.5	22.0	22.5	22.7	23.2	23.0	21.9	20.8	19.8	19.3	16.7	23.2																						
23-May	17.6	16.2	15.8	16.3	16.8	16.7	16.1	16.5	18.1	18.9	19.8	21.3	22.8	23.9	25.1	26.0	26.8	26.8	26.8	26.8	26.3	25.0	23.5	20.8	16.3	20.8	26.8																					
24-May	15.0	14.6	13.4	12.9	12.9	12.6	12.8	14.2	14.8	15.0	15.4	14.9	13.9	12.8	13.0	13.7	14.2	14.2	14.3	13.7	12.8	11.9	11.2	9.9	13.5	15.4																						
25-May	8.9	8.3	7.3	7.1	5.9	5.4	6.8	9.1	12.0	13.6	14.6	15.5	16.4	17.3	17.9	18.4	18.8	18.8	18.8	18.5	17.8	16.5	15.9	15.0	13.5	18.8																						
26-May	14.3	13.1	12.4	12.1	11.3	11.1	11.6	12.4	12.7	13.1	12.7	11.9	11.2	10.7	10.0	10.2	9.7	9.5	9.1	8.6	8.0	8.3	8.2	7.9	10.8	14.3																						
27-May	7.8	7.7	7.5	7.3	7.1	7.2	7.4	7.5	7.7	8.3	8.7	9.0	9.1	9.2	9.0	9.1	9.5	9.5	9.4	9.3	9.1	9.0	8.9	8.5	8.4	9.5																						
28-May	7.9	7.7	7.4	6.5	5.6	5.3	5.9	6.6	6.3	7.2	8.0	8.2	8.4	8.9	9.5	9.6	9.9	10.3	10.2	10.0	9.5	9.1	8.7	8.6	8.1	10.3																						
29-May	7.9	7.5	7.2	7.0	6.7	6.9	7.1	7.3	7.2	7.3	7.2	7.4	7.9	8.2	8.3	8.7	8.2	7.9	7.6	7.4	7.3	7.5	7.9	7.9	7.6	8.7																						
30-May	8.2	8.3	8.9	9.4	9.7	9.9	9.9	10.6	11.8	13.0	13.9	14.4	13.9	13.2	12.7	13.1	13.1	13.0	13.1	13.2	12.4	9.7	9.5	9.7	11.4	14.4																						
31-May	9.8	9.8	9.6	9.0	8.3	8.7	10.0	11.2	12.8	13.8	14.4	15.4	16.5	16.8	17.1	17.8	18.1	18.2	18.2	17.8	16.9	15.1	14.4	13.6	13.9	18.2																						
																								7.1	6.5	5.9	5.4	5.0	4.8	5.3	6.2	7.4	8.4	9.3	10.0	10.5	10.9	11.0	11.4	11.4	11.3	11.0	10.6	9.9	9.0	8.4	7.7	Diurnal Average
																								17.6	16.2	15.8	16.3	16.8	16.7	16.1	16.5	18.1	18.9	19.8	21.3	22.8	23.9	25.1	26.0	26.8	26.8	26.8	26.3	25.0	23.5	20.8	19.3	Diurnal Maximum
AF - Analyzer Failure																																																



**WBEA**  
**Hourly Averages**

**Ambient Temperature 100 m (AT100m) - C**  
**Lower Camp Met Tower - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Ambient Temperature 100 m (AT100m) - C**  
**Lower Camp Met Tower - May 2014**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	79	10.73	10.73
0 - 10	365	49.59	60.33
10 - 20	264	35.87	96.20
> 20	28	3.80	100.00

Total Number of Valid Hours: 736

Total Number of Hours: 744



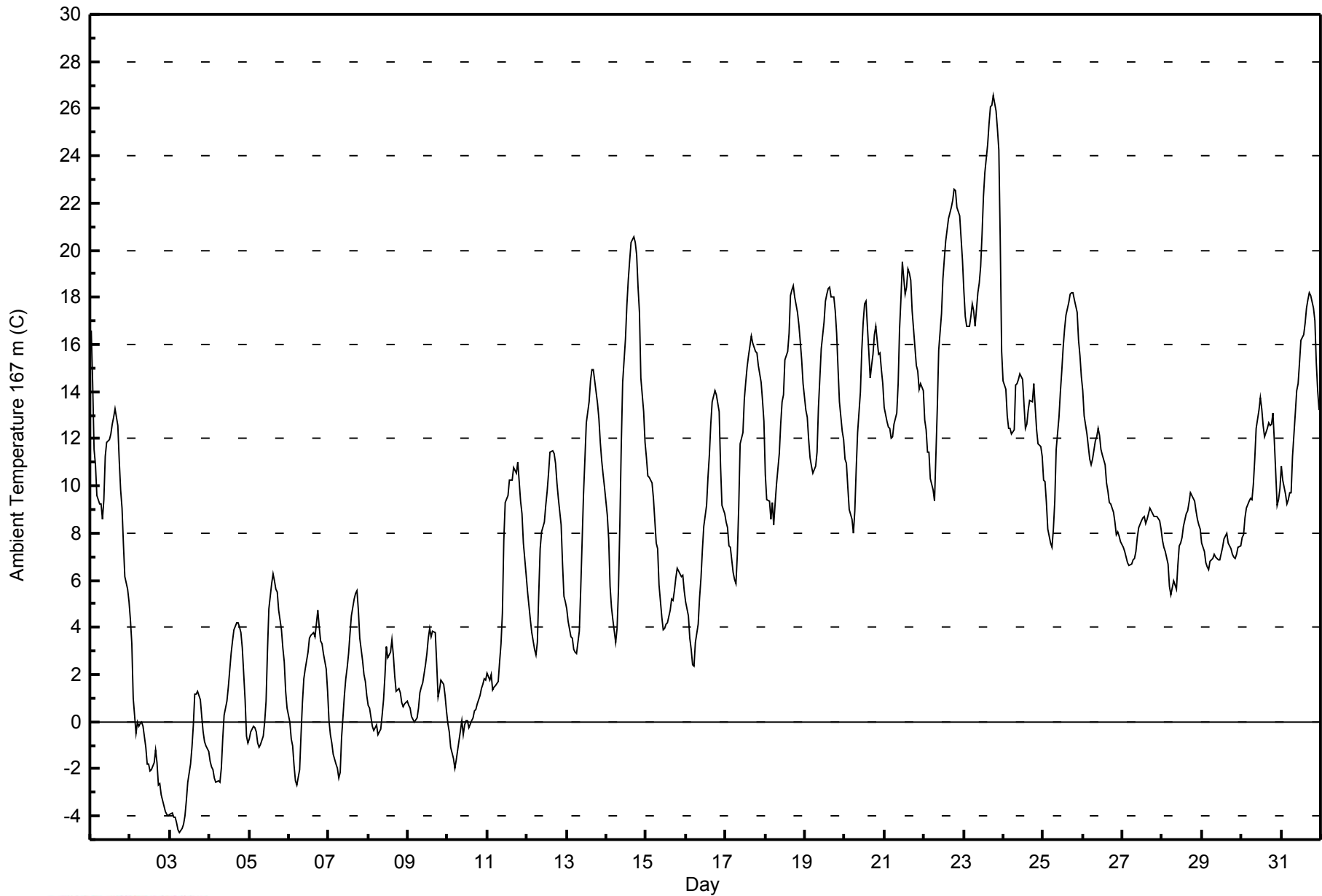
Maximum Value: 26.6 C on May 23 19:00		Maximum Daily Average: 20.9 C on May 23		Hours in Service: 744																																												
Minimum Value: -4.7 C on May 3 07:00		Minimum Daily Average: -2.1 C on May 3		Hours of Data: 744																																												
Maximum Diurnal Average: 11.1 C at hour 17		Minimum Diurnal Average: 5.1 C at hour 6		Hours of Missing Data: 0																																												
Monthly Average: 8.33 C		Percentiles: P <sub>1</sub> = -4.0 P <sub>10</sub> = -0.4 Q <sub>1</sub> = 2.9 Median = 8.6 Q <sub>3</sub> = 13.2 P <sub>90</sub> = 17.2 P <sub>99</sub> = 23.9		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-May	16.6	14.4	11.6	10.9	9.6	9.2	9.2	8.6	9.4	11.3	11.8	11.9	12.2	12.6	12.9	13.3	12.6	11.1	9.9	9.1	7.5	6.2	5.6	5.1	10.5	16.6																						
2-May	4.3	3.3	1.0	-0.5	0.0	-0.2	-0.1	0.0	-0.2	-1.1	-1.8	-1.8	-2.1	-2.0	-1.7	-1.2	-1.8	-2.7	-2.6	-3.1	-3.6	-3.8	-4.0	-4.0	-1.2	4.3																						
3-May	-3.9	-3.9	-4.0	-4.1	-4.3	-4.6	-4.7	-4.5	-4.4	-4.0	-3.4	-2.6	-1.8	-1.1	-0.1	1.2	1.2	1.3	0.9	0.2	-0.5	-0.8	-1.0	-1.3	-2.1	1.3																						
4-May	-1.7	-1.9	-2.0	-2.4	-2.6	-2.5	-2.6	-2.0	-0.7	0.3	0.9	1.5	2.2	2.9	3.4	3.9	4.2	4.2	4.0	3.8	3.1	0.9	-0.6	-0.9	0.6	4.2																						
5-May	-0.8	-0.4	-0.2	-0.3	-0.4	-0.9	-1.1	-1.0	-0.6	0.0	0.9	3.0	4.8	5.9	6.3	6.0	5.6	5.5	4.7	3.9	3.1	2.5	1.3	0.6	2.0	6.3																						
6-May	0.0	-0.7	-1.0	-1.8	-2.5	-2.7	-2.0	-0.6	0.8	1.8	2.3	2.9	3.5	3.6	3.7	3.8	3.6	4.7	4.0	3.4	3.3	2.9	2.2	1.3	1.5	4.7																						
7-May	0.0	-0.6	-0.9	-1.4	-1.8	-2.0	-2.4	-2.1	-0.7	1.1	1.8	2.3	2.9	3.7	4.5	5.2	5.4	5.6	4.7	3.6	2.6	2.0	1.7	1.1	1.5	5.6																						
8-May	0.7	0.6	-0.2	-0.4	-0.2	-0.2	-0.5	-0.3	0.3	0.9	2.0	3.2	2.7	3.0	3.5	2.8	1.9	1.3	1.4	1.2	0.8	0.6	0.8	0.9	1.1	3.5																						
9-May	0.7	0.6	0.2	0.1	0.0	0.1	0.5	1.3	1.5	1.6	2.4	2.9	3.6	4.0	3.6	3.8	3.8	2.5	1.0	1.3	1.8	1.6	1.1	0.4	1.7	4.0																						
10-May	-0.1	-0.5	-1.1	-1.6	-2.0	-1.6	-1.2	-0.8	0.0	-0.6	-0.1	0.0	0.1	-0.3	0.0	0.2	0.4	0.5	0.8	1.1	1.4	1.6	1.8	1.8	0.0	1.8																						
11-May	2.0	1.8	2.0	1.4	1.5	1.5	1.7	2.6	3.3	4.6	7.7	9.3	9.6	10.3	10.2	10.2	10.8	10.5	11.0	10.2	9.3	8.8	7.6	6.2	6.4	11.0																						
12-May	5.5	4.9	4.3	3.8	3.1	2.8	3.4	5.4	7.3	8.0	8.5	9.2	9.7	10.5	11.4	11.5	11.4	10.9	10.1	9.5	8.3	6.7	5.3	5.1	7.4	11.5																						
13-May	4.8	4.3	3.6	3.5	3.0	2.9	2.9	3.9	5.6	7.6	9.6	11.1	12.7	13.6	14.5	14.9	14.9	14.5	13.5	12.9	11.9	11.1	10.5	9.9	9.1	14.9																						
14-May	8.8	7.8	5.7	4.9	4.3	3.4	4.0	5.6	8.4	11.8	14.4	16.2	17.6	18.7	19.6	20.3	20.6	20.3	19.8	18.4	17.4	14.6	13.2	11.9	12.8	20.6																						
15-May	11.2	10.4	10.4	10.1	9.5	8.5	7.6	7.4	5.8	4.4	3.9	4.0	4.2	4.2	4.7	5.2	5.2	5.5	6.1	6.5	6.3	6.1	6.2	5.6	6.6	11.2																						
16-May	5.1	4.5	3.5	3.1	2.4	2.3	3.4	4.2	5.3	6.1	7.3	8.3	9.2	10.4	11.3	12.6	13.6	14.0	13.9	13.5	13.2	10.8	9.2	8.8	8.2	14.0																						
17-May	8.5	8.3	7.5	7.4	6.3	6.0	5.8	7.1	9.1	11.8	12.3	13.7	14.4	15.0	15.5	16.3	16.0	15.9	15.7	15.6	15.1	14.4	13.6	12.7	11.8	16.3																						
18-May	10.5	9.4	9.4	8.6	9.3	8.3	9.2	10.1	11.4	12.6	13.5	13.9	15.3	15.7	16.5	18.1	18.3	18.5	18.0	17.4	16.8	16.1	15.3	14.3	13.6	18.5																						
19-May	13.2	12.9	12.0	11.2	10.9	10.6	10.8	11.4	13.4	14.6	15.8	16.9	17.8	18.1	18.4	18.4	18.0	18.0	17.4	16.5	15.0	13.6	12.3	12.0	14.6	18.4																						
20-May	11.1	10.9	9.9	9.0	8.6	8.0	8.9	10.7	12.2	14.0	15.7	16.9	17.7	17.8	15.7	14.6	15.1	15.6	16.4	16.8	15.6	15.6	14.9	14.3	13.6	17.8																						
21-May	13.3	12.7	12.5	12.4	12.0	12.1	12.6	13.1	14.3	16.6	18.0	19.5	18.1	18.4	19.2	19.0	18.7	17.4	15.9	15.1	14.9	14.1	14.3	14.0	15.4	19.5																						
22-May	12.8	12.4	11.5	11.4	10.3	9.8	9.3	11.3	13.3	15.8	17.3	18.8	19.6	20.4	20.8	21.3	21.8	22.1	22.6	22.5	21.8	21.4	20.5	19.6	17.0	22.6																						
23-May	18.2	17.2	16.8	16.8	17.2	17.7	17.4	16.8	18.2	18.6	19.3	20.7	22.3	23.3	24.5	25.4	26.1	26.2	26.6	25.9	25.1	24.3	20.4	15.7	20.9	26.6																						
24-May	14.5	14.1	13.0	12.4	12.4	12.2	12.4	14.3	14.3	14.5	14.8	14.5	13.4	12.4	12.6	13.2	13.6	13.6	14.3	13.3	12.4	11.8	11.7	11.2	13.2	14.8																						
25-May	10.3	10.2	9.3	8.2	7.6	7.4	8.2	9.4	11.5	12.9	14.0	14.9	15.9	16.6	17.2	17.8	18.2	18.2	18.2	17.9	17.4	16.2	15.5	14.6	13.6	18.2																						
26-May	14.0	13.0	12.2	11.7	11.1	10.9	11.1	11.9	12.1	12.4	12.1	11.6	11.3	10.9	10.1	9.8	9.3	9.2	8.9	8.5	8.0	8.0	7.9	7.6	10.6	14.0																						
27-May	7.4	7.2	7.0	6.7	6.6	6.7	6.9	6.9	7.2	7.8	8.2	8.5	8.6	8.7	8.4	8.6	9.0	9.0	8.8	8.7	8.7	8.7	8.6	8.2	8.0	9.0																						
28-May	7.7	7.4	7.2	6.7	5.7	5.4	5.7	6.0	5.6	6.6	7.4	7.6	7.8	8.3	8.8	8.9	9.3	9.7	9.6	9.4	9.0	8.6	8.3	8.2	7.7	9.7																						
29-May	7.6	7.2	6.7	6.6	6.5	6.8	6.9	7.1	7.0	6.9	6.8	6.9	7.4	7.8	7.9	8.0	7.6	7.3	7.1	7.0	6.9	7.1	7.4	7.5	7.2	8.0																						
30-May	7.8	7.9	8.7	9.1	9.4	9.5	9.4	10.1	11.1	12.4	13.2	13.8	13.3	12.5	12.1	12.5	12.7	12.6	12.6	13.1	11.9	9.2	9.4	9.9	11.0	13.8																						
31-May	10.8	10.3	9.6	9.2	9.4	9.7	9.7	11.3	13.1	14.0	14.3	15.3	16.2	16.4	16.9	17.5	17.9	18.2	18.1	17.6	17.0	15.2	14.0	13.2	14.0	18.2																						
																								7.1	6.6	6.0	5.6	5.3	5.1	5.2	6.0	6.9	7.9	8.7	9.5	10.0	10.4	10.7	11.1	11.1	11.0	10.8	10.3	9.7	8.9	8.2	7.6	Diurnal Average
																								18.2	17.2	16.8	16.8	17.2	17.7	17.4	16.8	18.2	18.6	19.3	20.7	22.3	23.3	24.5	25.4	26.1	26.2	26.6	25.9	25.1	24.3	20.5	19.6	Diurnal Maximum





**WBEA**  
**Hourly Averages**

**Ambient Temperature 167 m (AT167m) - C**  
**Lower Camp Met Tower - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Ambient Temperature 167 m (AT167m) - C**  
**Lower Camp Met Tower - May 2014**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	92	12.37	12.37
0 - 10	350	47.04	59.41
10 - 20	277	37.23	96.64
> 20	25	3.36	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

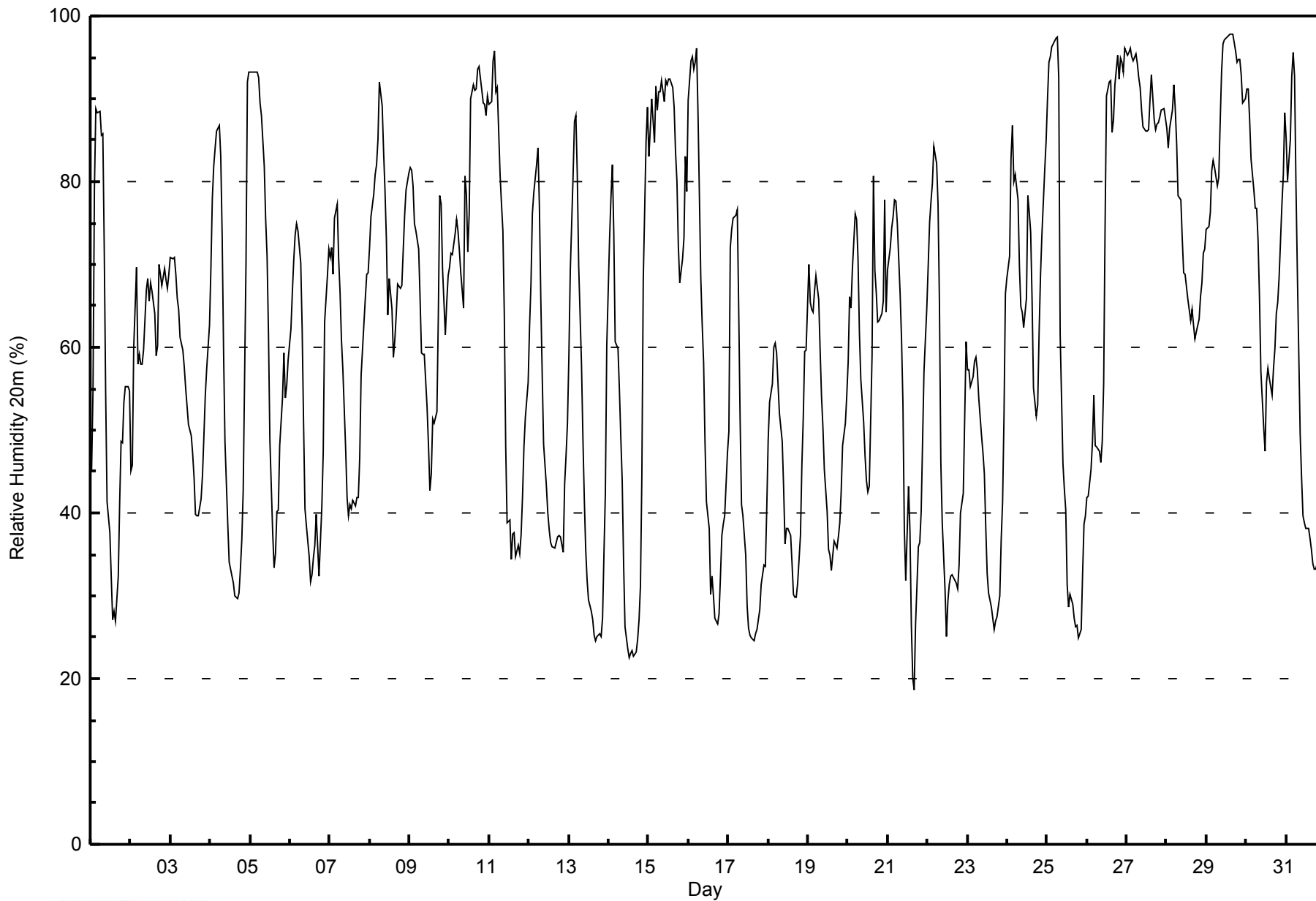


Maximum Value: 98 % on May 29 16:00																			Maximum Daily Average: 90.3 % on May 27						Hours in Service: 744																								
Minimum Value: 19 % on May 21 17:00																			Minimum Daily Average: 43.0 % on May 17						Hours of Data: 744																								
Maximum Diurnal Average: 79.3 % at hour 5																			Minimum Diurnal Average: 47.4 % at hour 17						Hours of Missing Data: 0																								
Monthly Average: 61.1 %																			Percentiles: P <sub>1</sub> = 24 P <sub>10</sub> = 32 Q <sub>1</sub> = 41 Median = 63 Q <sub>3</sub> = 79 P <sub>90</sub> = 91 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-May	45	55	79	89	88	89	86	86	72	55	41	38	32	27	28	27	32	41	49	48	53	55	55	55	55.2	89																							
2-May	45	46	60	70	58	59	58	58	60	67	68	66	68	67	64	59	60	70	69	67	70	68	67	69	63.0	70																							
3-May	71	71	71	69	66	65	61	60	58	55	53	51	49	47	44	40	40	40	42	45	49	54	57	63	54.9	71																							
4-May	70	78	82	84	86	87	83	74	60	49	39	34	33	32	31	30	30	30	33	37	43	70	92	93	57.5	93																							
5-May	93	93	93	93	93	92	89	88	82	75	71	62	49	38	33	35	40	40	48	54	59	54	55	58	66.3	93																							
6-May	62	67	70	74	75	74	70	62	51	40	38	35	32	33	35	36	40	32	37	41	47	63	69	72	52.3	75																							
7-May	71	72	69	76	77	71	67	61	57	48	42	40	41	41	41	41	42	42	47	57	63	66	69	69	56.9	77																							
8-May	72	76	78	81	82	85	92	89	84	79	73	64	68	65	59	61	64	68	67	67	72	76	79	81	74.2	92																							
9-May	82	81	79	75	74	72	66	59	59	59	53	48	43	45	51	51	52	64	78	77	69	62	65	69	63.9	82																							
10-May	70	71	71	74	75	74	72	69	65	81	78	72	76	90	92	91	91	94	94	91	90	89	88	90	81.1	94																							
11-May	89	90	95	96	91	91	81	77	74	64	48	39	39	34	38	38	35	36	35	38	42	48	52	56	59.3	96																							
12-May	63	68	76	79	82	84	77	66	57	48	43	40	38	36	36	36	36	37	37	37	35	44	47	51	52.2	84																							
13-May	59	69	81	87	88	81	70	58	49	42	36	32	29	28	27	25	25	25	25	25	27	35	42	60	46.9	88																							
14-May	73	78	82	74	61	60	55	49	44	34	26	24	22	23	23	23	23	25	27	31	44	68	85	89	47.6	89																							
15-May	83	86	90	85	92	89	91	91	92	90	92	92	92	92	91	89	84	80	72	68	71	73	83	79	85.3	92																							
16-May	90	95	95	94	94	96	88	68	63	58	48	41	38	30	32	30	27	27	28	32	37	39	40	47	55.8	96																							
17-May	50	72	74	76	76	77	65	51	41	40	35	29	26	25	25	25	25	26	27	28	31	34	34	41	43.0	77																							
18-May	49	53	56	60	61	59	56	52	49	43	36	38	38	37	34	30	30	30	32	37	46	52	60	60	45.6	61																							
19-May	70	65	65	64	67	69	66	60	54	50	45	40	36	35	33	35	37	36	37	39	43	48	51	54	49.9	70																							
20-May	58	66	65	69	76	75	71	62	56	51	47	44	42	43	59	81	69	67	63	63	64	66	78	64	62.5	81																							
21-May	69	72	74	76	78	78	75	66	61	53	38	32	43	38	26	20	19	27	36	36	40	49	57	65	51.2	78																							
22-May	70	75	78	80	84	82	77	65	46	39	31	25	29	31	32	33	32	31	31	34	40	42	52	61	50.0	84																							
23-May	57	57	55	56	58	59	57	54	49	47	45	38	33	30	29	27	26	27	27	30	37	41	52	67	44.2	67																							
24-May	68	71	83	87	80	81	78	70	65	64	62	66	78	76	74	66	55	52	53	62	69	73	81	85	70.8	87																							
25-May	90	94	95	96	97	97	98	93	62	46	43	40	31	29	30	29	27	26	26	25	26	33	39	40	54.7	98																							
26-May	42	42	45	48	54	48	48	47	46	49	56	74	90	92	92	86	88	92	95	92	95	94	93	96	71.1	96																							
27-May	95	96	96	95	95	96	94	93	91	89	87	86	86	86	90	93	88	86	87	87	88	89	89	88	90.3	96																							
28-May	86	84	87	89	92	89	85	78	78	73	69	69	67	66	63	65	63	61	62	63	66	68	71	72	73.5	92																							
29-May	74	75	76	81	83	82	79	80	87	93	97	97	97	98	98	98	98	96	94	95	95	93	89	90	89.4	98																							
30-May	91	91	87	83	79	77	77	73	66	57	50	47	56	57	56	54	57	60	64	65	69	77	81	88	69.3	91																							
31-May	85	80	85	93	96	93	79	69	50	44	40	39	38	38	37	36	34	33	33	34	41	46	48	49	55.0	96																							
																								70.7	73.8	77.2	79.0	79.3	78.3	74.5	68.7	62.1	57.5	52.6	49.7	49.8	48.7	48.6	48.0	47.4	48.4	50.2	51.8	55.5	60.3	65.1	68.3	Diurnal Average	
																								95	96	96	96	97	97	98	93	92	93	97	97	97	98	98	98	98	98	96	95	95	95	94	93	96	Diurnal Maximum



**WBEA**  
**Hourly Averages**

**Relative Humidity 20m (RH20m) - %**  
**Lower Camp Met Tower - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Relative Humidity 20m (RH20m) - %**  
**Lower Camp Met Tower - May 2014**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	1	0.13	0.13
20 - 40	168	22.58	22.72
40 - 60	184	24.73	47.45
60 - 80	215	28.90	76.34
80 - 100	176	23.66	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Relative Humidity 45m (RH45m) - %**

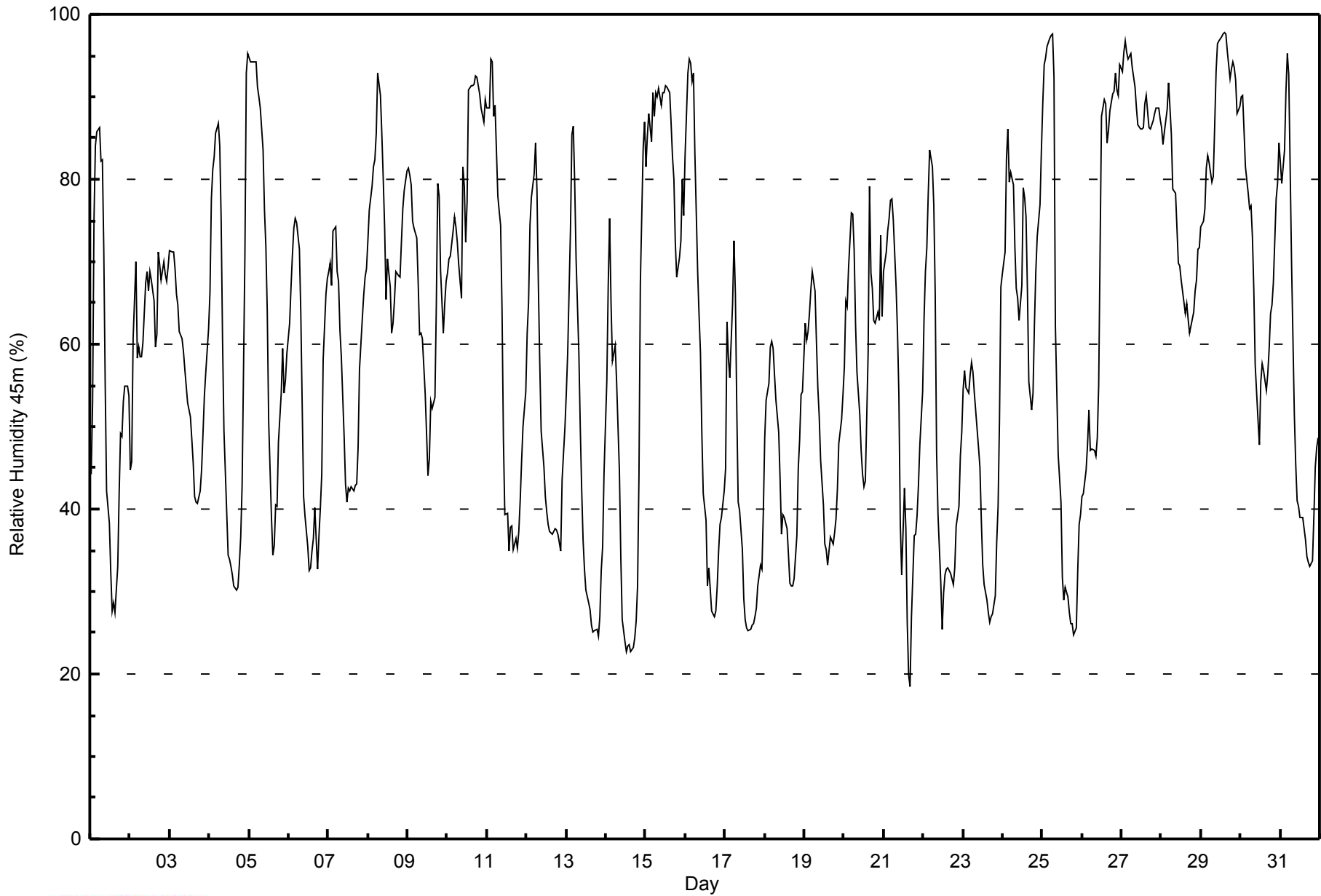
**Lower Camp Met Tower - May 2014**

Maximum Value: 98 % on May 29 15:00																			Maximum Daily Average: 90.0 % on May 27						Hours in Service: 744																									
Minimum Value: 19 % on May 21 17:00																			Minimum Daily Average: 40.3 % on May 17						Hours of Data: 744																									
Maximum Diurnal Average: 78.2 % at hour 5																			Minimum Diurnal Average: 47.5 % at hour 17						Hours of Missing Data: 0																									
Monthly Average: 60.7 %																			Percentiles: P <sub>1</sub> = 24 P <sub>10</sub> = 32 Q <sub>1</sub> = 42 Median = 62 Q <sub>3</sub> = 78 P <sub>90</sub> = 90 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-May	44	53	75	84	86	86	82	82	72	55	42	38	32	28	29	27	33	42	49	49	53	55	55	54	54.4	86																								
2-May	45	46	61	70	58	60	58	58	60	67	69	66	69	68	65	60	61	71	70	68	70	68	68	69	63.6	71																								
3-May	71	71	71	69	66	65	62	61	59	57	55	53	51	48	46	42	41	41	42	45	49	54	57	62	55.7	71																								
4-May	66	78	81	83	86	87	84	75	61	50	40	34	33	32	31	30	31	33	37	43	71	93	95	95	57.7	95																								
5-May	95	94	94	94	94	91	90	89	84	76	72	64	51	39	34	36	40	40	48	54	60	54	56	59	67.0	95																								
6-May	62	67	71	74	75	75	72	64	53	41	39	35	32	33	35	36	40	33	37	40	44	58	66	68	52.1	75																								
7-May	69	70	67	74	74	69	68	62	59	49	43	41	43	42	43	42	43	43	47	57	63	66	68	69	57.1	74																								
8-May	73	76	79	82	82	86	93	90	85	80	74	65	70	67	61	62	65	69	68	68	72	77	79	81	75.2	93																								
9-May	81	81	79	75	74	73	67	61	61	61	54	49	44	46	53	52	53	65	79	78	69	61	65	68	64.6	81																								
10-May	69	70	71	74	75	74	72	70	66	82	79	72	77	91	91	91	92	92	92	90	89	88	87	90	81.0	92																								
11-May	89	89	95	94	88	89	78	76	74	64	48	39	40	35	38	38	35	36	35	37	41	46	50	54	58.7	95																								
12-May	61	65	74	78	81	84	79	67	58	50	45	42	40	38	37	37	37	38	37	37	35	44	47	50	52.5	84																								
13-May	54	59	74	85	86	80	70	59	50	42	36	33	30	29	28	26	25	25	25	25	27	33	35	44	45.1	86																								
14-May	56	67	75	65	58	60	55	50	45	34	27	24	23	23	24	23	23	24	27	31	44	67	84	87	45.6	87																								
15-May	82	85	88	85	90	88	90	90	91	89	90	91	91	91	90	87	83	80	72	68	70	72	80	76	84.2	91																								
16-May	83	93	95	94	92	93	83	69	64	59	49	42	39	31	33	30	28	27	28	31	35	38	39	42	54.8	95																								
17-May	45	63	58	56	65	72	66	52	41	40	35	29	27	26	25	25	26	26	27	28	31	33	33	40	40.3	72																								
18-May	49	53	55	60	60	59	56	53	49	44	37	39	39	38	34	31	31	31	32	37	45	48	54	54	45.4	60																								
19-May	63	61	62	64	67	69	66	60	55	51	46	40	36	35	33	35	37	36	37	39	42	48	51	54	49.4	69																								
20-May	57	65	65	69	76	76	71	62	57	51	47	44	43	43	59	79	69	67	63	63	64	63	73	63	62.1	79																								
21-May	69	71	74	75	77	78	75	67	61	54	38	32	43	38	26	20	19	27	37	37	39	43	48	54	50.0	78																								
22-May	63	69	72	78	84	81	77	66	47	39	31	25	30	32	33	33	32	32	31	33	38	40	46	49	48.4	84																								
23-May	55	57	55	54	56	58	57	54	50	47	45	39	33	31	29	27	26	27	27	30	36	40	51	67	43.8	67																								
24-May	68	71	83	86	80	81	79	72	67	66	63	67	79	78	75	66	55	52	54	62	69	73	77	84	71.1	86																								
25-May	89	94	95	96	97	98	98	92	62	47	44	41	32	29	31	29	27	26	26	25	26	32	38	39	54.7	98																								
26-May	42	42	45	48	52	47	47	47	46	49	55	71	88	90	89	84	86	88	90	91	93	91	90	94	69.4	94																								
27-May	93	95	97	95	95	95	94	92	91	89	87	86	86	86	89	90	86	86	87	87	88	89	89	87	90.0	97																								
28-May	86	84	86	88	92	89	85	79	78	74	70	70	68	66	64	65	63	61	62	64	66	68	71	72	73.8	92																								
29-May	74	75	77	81	83	82	80	80	87	93	96	97	97	98	98	98	96	92	93	94	94	92	88	89	88.9	98																								
30-May	90	90	86	82	78	76	77	73	67	58	51	48	55	58	57	54	57	60	64	65	67	78	79	84	68.9	90																								
31-May	82	79	83	91	95	93	81	70	51	45	41	40	39	39	38	36	34	34	33	34	39	45	48	49	55.0	95																								
																								68.5	72.0	75.5	77.5	78.2	77.8	74.7	69.2	62.9	58.2	53.2	50.3	50.3	49.3	49.0	48.2	47.5	48.4	50.1	51.6	54.9	59.2	63.3	66.0	Diurnal Average		
																								95	95	97	96	97	98	98	92	91	93	96	97	97	98	98	98	98	96	92	93	94	94	92	93	95	Diurnal Maximum	



**WBEA**  
**Hourly Averages**

**Relative Humidity 45m (RH45m) - %**  
**Lower Camp Met Tower - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Relative Humidity 45m (RH45m) - %**  
**Lower Camp Met Tower - May 2014**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	2	0.27	0.27
20 - 40	164	22.04	22.31
40 - 60	187	25.13	47.45
60 - 80	223	29.97	77.42
80 - 100	168	22.58	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



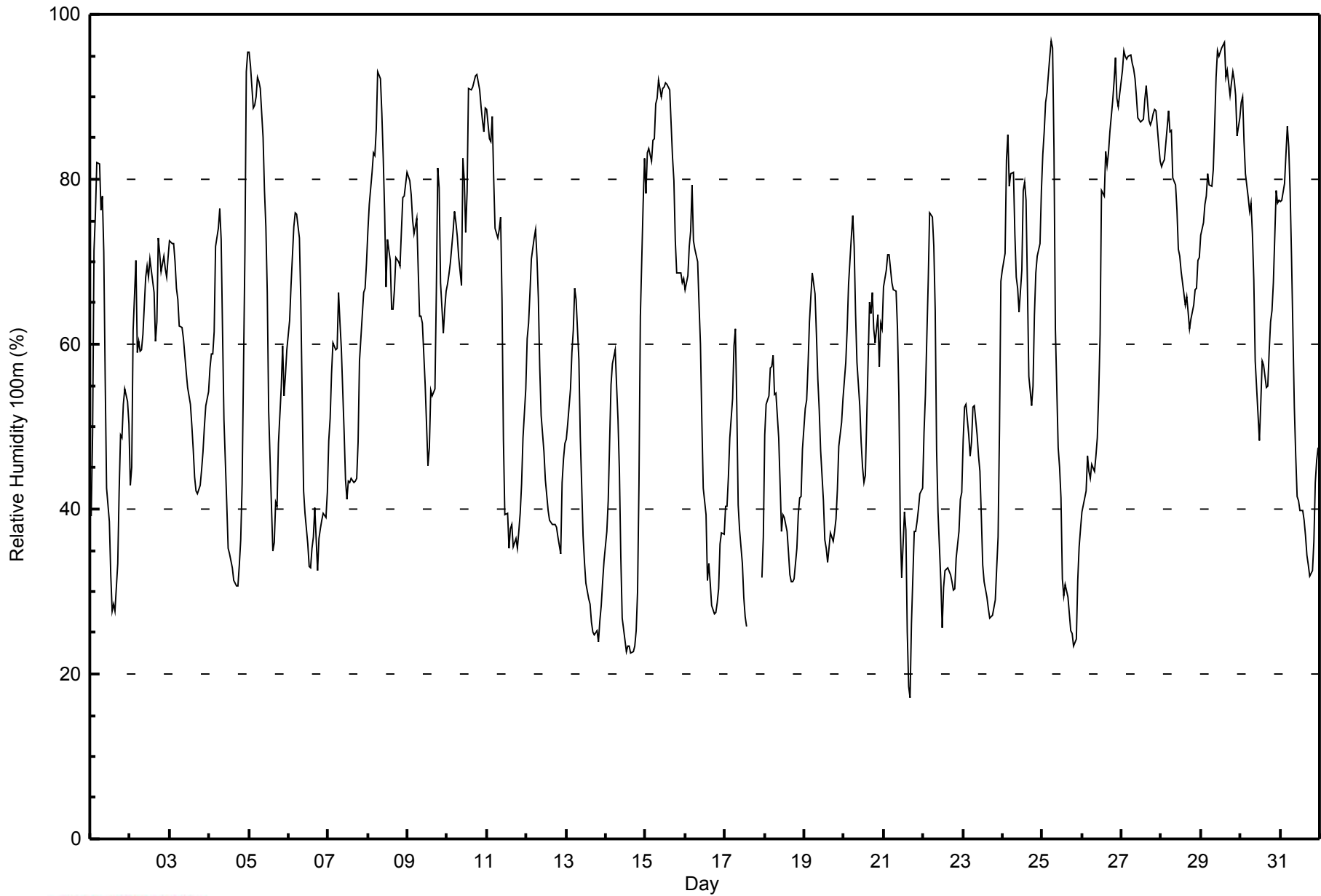


Maximum Value: 97 % on May 25 06:00														Maximum Daily Average: 90.0 % on May 27														Hours in Service: 744																				
Minimum Value: 17 % on May 21 17:00														Minimum Daily Average: 40.0 % on May 13														Hours of Data: 736																				
Maximum Diurnal Average: 73.3 % at hour 6														Minimum Diurnal Average: 48.2 % at hour 17														Hours of Missing Data: 8																				
Monthly Average: 59.2 %														Percentiles: P <sub>1</sub> = 23 P <sub>10</sub> = 32 Q <sub>1</sub> = 41 Median = 60 Q <sub>3</sub> = 75 P <sub>90</sub> = 88 P <sub>99</sub> = 96														Hours of Calibration: 0																				
																												Percent Operational Time: 98.9																				
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-May	39	49	71	76	82	82	76	78	71	56	42	38	32	28	29	28	33	42	49	49	53	55	53	50	52.6	82																						
2-May	43	45	62	70	59	60	59	59	61	68	70	68	70	69	66	60	63	73	71	69	71	69	68	70	64.4	73																						
3-May	72	72	72	70	67	65	62	62	61	59	57	55	53	50	47	44	42	42	43	45	47	50	53	54	56.0	72																						
4-May	57	59	59	62	72	74	76	73	62	51	41	35	35	34	33	31	31	31	33	36	43	71	93	95	53.6	95																						
5-May	95	94	89	89	90	92	92	91	85	79	74	66	52	40	35	36	41	40	48	55	60	54	56	59	67.2	95																						
6-May	63	67	71	74	76	76	73	65	53	42	40	36	33	33	35	37	40	33	37	38	39	39	39	42	49.1	76																						
7-May	48	51	57	60	59	60	66	63	60	49	44	41	43	43	44	43	43	44	48	58	64	66	67	70	53.8	70																						
8-May	74	77	81	83	83	86	93	92	88	83	76	67	73	70	64	64	67	70	70	69	74	78	78	81	76.7	93																						
9-May	80	80	78	75	73	75	69	63	63	63	55	50	45	47	54	54	55	66	81	79	67	61	64	66	65.3	81																						
10-May	67	68	70	74	76	75	73	71	67	83	80	74	78	91	91	91	92	93	93	91	89	87	86	89	81.1	93																						
11-May	89	85	84	88	80	74	73	74	75	65	49	39	40	35	38	38	35	36	35	37	40	43	49	55	56.5	89																						
12-May	61	62	66	70	73	74	70	66	57	51	47	44	42	40	39	38	38	38	38	37	35	43	46	48	50.9	74																						
13-May	49	50	55	59	62	67	65	58	49	43	37	34	31	29	29	26	25	25	25	24	26	28	31	34	40.0	67																						
14-May	37	41	48	55	58	59	55	51	45	34	27	24	23	23	23	22	23	23	25	30	43	63	77	83	41.4	83																						
15-May	78	83	84	82	85	85	89	90	92	90	91	91	92	92	91	87	83	80	72	69	69	69	67	68	82.4	92																						
16-May	67	68	72	74	79	73	71	70	65	60	51	43	39	31	33	31	28	27	27	29	30	36	37	37	49.1	79																						
17-May	40	40	44	49	53	60	62	53	41	38	33	29	27	26	AF	AF	AF	AF	AF	AF	AF	AF	32	37	--	62																						
18-May	49	53	54	57	57	59	54	54	49	43	37	39	39	37	35	32	31	31	32	35	39	41	41	47	43.6	59																						
19-May	52	53	57	63	66	69	66	61	56	52	47	41	36	35	34	35	37	36	37	39	42	48	51	53	48.6	69																						
20-May	56	58	62	67	73	76	72	64	58	53	48	45	43	44	58	65	64	66	62	60	64	57	62	62	59.9	76																						
21-May	67	69	71	71	69	67	67	66	62	54	38	32	40	37	25	19	17	26	37	37	39	40	42	43	47.2	71																						
22-May	49	54	61	68	76	75	72	64	47	40	31	26	30	33	33	33	32	31	30	30	34	37	41	42	44.6	76																						
23-May	48	52	53	49	46	48	52	53	49	46	45	39	33	31	29	28	27	27	27	29	33	37	50	68	41.7	68																						
24-May	69	71	82	85	79	81	81	73	68	67	64	69	79	80	77	67	56	52	55	63	69	71	72	79	71.2	85																						
25-May	83	86	89	91	95	97	96	84	62	48	45	41	32	29	31	29	27	25	25	23	24	31	35	38	52.8	97																						
26-May	40	40	42	46	45	44	45	45	46	49	54	61	79	78	83	82	83	86	89	92	95	90	89	90	66.4	95																						
27-May	93	96	95	95	95	95	94	93	92	90	88	87	87	87	90	91	87	87	87	88	88	88	84	82	90.0	96																						
28-May	82	82	82	86	88	86	86	80	79	76	72	71	69	67	65	66	64	62	63	65	67	67	70	70	73.5	88																						
29-May	73	75	77	78	81	79	79	81	87	92	96	95	96	96	97	92	93	90	92	93	92	90	85	88	87.4	97																						
30-May	89	90	85	81	78	76	77	73	68	58	52	48	53	58	57	55	55	59	63	64	67	79	77	77	68.3	90																						
31-May	77	78	79	83	86	84	78	71	52	46	41	41	40	40	39	37	34	33	32	33	36	43	46	48	53.2	86																						
																								64.1	66.1	69.4	71.9	73.0	73.3	72.5	69.1	63.5	58.9	53.8	50.6	50.4	49.5	50.1	48.7	48.2	49.2	50.9	52.2	54.6	57.7	59.4	62.1	Diurnal Average
																								95	96	95	95	95	97	96	93	92	92	96	95	96	96	97	92	93	93	93	93	95	90	93	95	Diurnal Maximum
AF - Analyzer Failure																																																



**WBEA**  
**Hourly Averages**

**Relative Humidity 100m (RH100m) - %**  
**Lower Camp Met Tower - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Relative Humidity 100m (RH100m) - %**  
**Lower Camp Met Tower - May 2014**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	2	0.27	0.27
20 - 40	167	22.69	22.96
40 - 60	199	27.04	50.00
60 - 80	231	31.39	81.39
80 - 100	137	18.61	100.00

Total Number of Valid Hours: 736

Total Number of Hours: 744

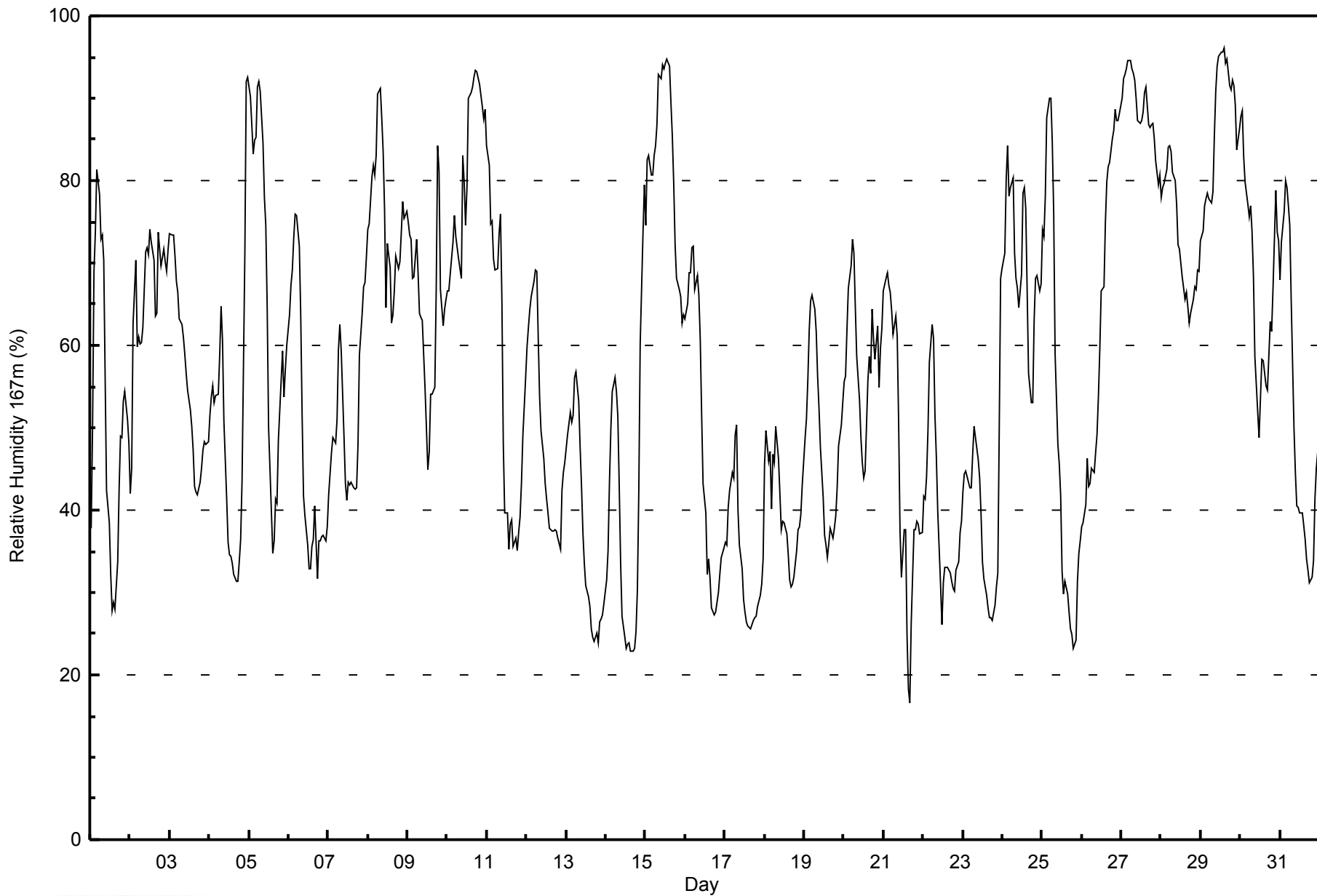


Maximum Value: 96 % on May 29 15:00																			Maximum Daily Average: 88.9 % on May 27						Hours in Service: 744																			
Minimum Value: 17 % on May 21 17:00																			Minimum Daily Average: 34.0 % on May 17						Hours of Data: 744																			
Maximum Diurnal Average: 68.8 % at hour 6																			Minimum Diurnal Average: 47.5 % at hour 17						Hours of Missing Data: 0																			
Monthly Average: 57.3 %																			Percentiles: P <sub>1</sub> = 24 P <sub>10</sub> = 31 Q <sub>1</sub> = 40 Median = 57 Q <sub>3</sub> = 73 P <sub>90</sub> = 86 P <sub>99</sub> = 95						Hours of Calibration: 0																			
																									Percent Operational Time: 100.0																			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																				
1-May	38	50	69	74	81	78	73	73	70	56	42	38	32	28	29	28	34	42	49	49	53	54	51	48	51.8	81																		
2-May	42	45	63	70	60	61	60	60	62	71	72	71	74	73	70	64	64	74	72	70	72	70	69	72	65.8	74																		
3-May	74	73	73	71	68	66	63	62	61	59	57	55	52	50	47	43	42	42	43	45	47	48	48	48	55.8	74																		
4-May	52	54	55	53	54	54	59	65	61	51	41	36	35	34	34	32	31	31	34	36	44	71	92	93	50.0	93																		
5-May	91	90	83	85	85	91	92	91	85	78	75	65	50	40	35	36	41	41	48	56	59	54	57	60	66.2	92																		
6-May	64	67	69	73	76	76	72	64	52	42	39	36	33	33	36	36	40	32	36	36	37	37	36	38	48.3	76																		
7-May	42	44	47	49	48	51	59	63	59	49	43	41	43	43	43	43	43	43	48	59	64	67	68	71	51.2	71																		
8-May	74	75	81	82	81	83	91	91	88	84	77	65	72	70	63	64	67	71	69	70	74	77	75	76	75.7	91																		
9-May	75	73	73	68	68	73	69	64	63	63	55	50	45	47	54	54	55	67	84	81	67	62	64	66	64.2	84																		
10-May	67	67	69	73	76	73	72	71	68	83	80	75	79	90	91	91	93	93	93	92	90	89	87	89	81.2	93																		
11-May	84	82	75	75	70	69	69	74	76	66	48	40	40	35	38	39	36	37	35	37	39	43	49	56	54.7	84																		
12-May	60	62	64	66	68	69	69	61	54	50	46	43	41	40	38	38	37	38	38	37	35	42	45	46	49.4	69																		
13-May	48	49	52	51	52	56	57	53	48	43	37	34	31	29	28	26	25	24	25	24	26	27	27	29	37.5	57																		
14-May	32	35	43	50	54	56	54	51	43	34	27	25	23	24	24	23	23	23	25	30	42	60	74	80	39.8	80																		
15-May	75	82	83	81	81	83	84	87	93	92	94	94	94	95	94	89	85	80	72	68	67	66	63	64	81.9	95																		
16-May	63	65	69	69	72	72	67	69	66	61	52	43	40	32	34	32	28	27	28	29	30	32	34	35	47.8	72																		
17-May	36	36	40	42	45	44	49	50	40	36	33	29	28	26	26	26	26	27	27	27	28	30	31	34	34.0	50																		
18-May	45	50	46	47	40	47	46	50	46	42	38	39	38	37	35	31	31	31	32	35	38	38	39	43	40.2	50																		
19-May	49	51	56	62	65	66	64	62	56	52	48	42	37	36	34	36	38	37	38	39	43	48	50	53	48.4	66																		
20-May	56	56	62	67	70	73	71	65	59	53	49	46	44	45	56	59	57	64	61	58	62	55	60	62	58.7	73																		
21-May	67	68	69	67	67	64	61	64	61	51	37	32	38	38	25	18	17	26	38	38	39	38	37	37	45.6	69																		
22-May	42	41	44	50	58	62	61	52	46	40	31	26	31	33	33	33	32	31	30	30	33	34	37	39	39.6	62																		
23-May	42	44	45	43	43	43	47	50	47	46	44	39	34	32	30	28	27	27	27	28	31	32	50	68	39.5	68																		
24-May	69	71	80	84	78	79	80	71	68	67	65	69	79	77	67	57	53	53	53	63	68	68	67	68	70.0	84																		
25-May	74	73	78	88	90	90	85	76	59	48	46	42	32	30	31	30	28	26	25	23	24	31	35	36	50.0	90																		
26-May	38	38	41	46	43	43	45	45	47	49	54	60	67	67	75	80	82	82	85	86	89	87	87	88	63.5	89																		
27-May	90	92	93	94	94	95	94	93	92	90	87	87	87	88	91	91	87	86	87	87	85	82	79	81	88.9	95																		
28-May	78	79	80	81	84	84	84	81	80	77	72	72	70	68	66	66	65	63	64	66	67	67	69	69	73.0	84																		
29-May	73	74	77	78	78	78	77	79	85	91	94	95	96	96	96	94	95	92	91	92	92	89	84	86	86.7	96																		
30-May	88	88	83	80	77	76	77	74	68	59	52	49	54	58	58	55	55	59	63	62	67	79	74	73	67.7	88																		
31-May	68	73	76	80	79	77	75	66	50	45	41	40	40	40	38	36	34	33	31	32	34	41	45	47	50.8	80																		
																			61.1	62.9	65.7	67.7	67.9	68.8	68.6	66.9	63.0	58.9	54.0	50.8	50.2	49.5	49.3	48.0	47.5	48.4	50.0	51.2	53.1	55.5	57.5	59.8	Diurnal Average	
																			91	92	93	94	94	95	94	93	93	92	94	95	96	96	96	94	95	93	93	92	92	89	92	93	Diurnal Maximum	



**WBEA**  
**Hourly Averages**

**Relative Humidity 167m (RH167m) - %**  
**Lower Camp Met Tower - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Relative Humidity 167m (RH167m) - %**  
**Lower Camp Met Tower - May 2014**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	2	0.27	0.27
20 - 40	189	25.40	25.67
40 - 60	203	27.28	52.96
60 - 80	234	31.45	84.41
80 - 100	116	15.59	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Maximum Speed: 29 km/h on May 21 16:00	Maximum Daily Speed Average: 13.7 km/h on May 2	Hours in Service: 744
Minimum Speed Value: 0 km/h on May 11 23:00	Minimum Daily Speed Average: 1.1 km/h on May 17	Hours of Data: 736
Maximum Diurnal Speed Average: 4.0 km/h at hour 18	Minimum Diurnal Speed Average: 0.5 km/h at hour 23	Hours of Missing Data: 8
Monthly Average Velocity: 1.9 km/h 353.2 deg	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 2 Q <sub>1</sub> = 3 Median = 7 Q <sub>3</sub> = 11 P <sub>90</sub> = 15 P <sub>99</sub> = 20	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-May	W11	NW8	NW4	NNW5	NNW6	NW5	NNW6	NW7	NW12	NW16	NNW18	NNW17	N14	NNW15	NNW14	NW16	NNW20	NNW16	NNW13	NNW12	N10	NNW8	NW10	NW10	NNW10.9	NNW20
2-May	NW16	NW18	NNW16	NNW12	NW13	NW18	NW21	NW18	NNW16	NNW17	NNW16	NNW16	N13	N11	N13	N13	NNE10	NNE11	N11	N12	N13	N15	N15	NNW16	NNW13.7	NW21
3-May	N15	N16	N17	N14	N14	N12	N12	N9	N10	NNW9	NNW9	NNW9	N10	NNE9	NNE9	NNE6	NE8	NE8	ENE9	NE8	NE7	NNE3	N2	ENE1	N8.7	N17
4-May	NW2	NNW2	NW3	NW4	WNW4	WNW2	WNW2	WNW2	S3	S4	SW4	SW4	SE6	SSE4	SE6	SE7	SE5	SSW8	SW12	SW4	E5	S10	ESE4	AF	S2.3	SW12
5-May	AF	AF	AF	AF	AF	AF	SSE5	AF	SE5	SE7	ESE4	N4	N5	N3	N5	ENE8	ENE9	ENE11	ENE12	NE12	NE10	ENE11	ENE12	NE8	---	ENE12
6-May	NE7	NNE7	NNE8	N10	N9	NNE10	N12	N11	N12	NNE12	NNE13	NNE12	NNE11	NNE10	NE12	NNE10	NE9	N11	N8	NW7	NNW4	NNW2	NW2	NNW3	NNE8.4	NNE13
7-May	NNW2	NW3	NNW4	N2	NW3	NNW5	N5	NNW9	NNW8	N14	NNW16	N17	N14	N16	N13	N12	N14	N13	NNE10	NE7	NE5	E1	NNE3	NNE2	N7.8	N17
8-May	ENE3	NE2	ESE1	ENE2	NNW2	NNW3	N2	N4	N4	E2	SSE1	N4	NNE9	NNE9	NNE10	NNE11	NNE12	NNE9	N9	NNE6	NNE4	N3	NW4	NNW4	NNE4.6	NNE12
9-May	NW4	NNW5	NNW5	NNW4	NNW2	NNW2	NW3	WNW8	NNW9	NNW8	N7	NNE6	N6	NNW4	NNW10	NNW9	N10	N11	N5	WNW4	NW6	NNW8	NW7	NW6	NNW5.9	N11
10-May	NW7	NW8	NNW7	NW5	NNW5	WNW11	WNW16	WNW18	WNW17	NNW10	NW10	NNW16	NNW14	NNW10	NW10	NW8	NNW7	NNW7	NW7	NW6	NW6	NW4	WNW2	SSE1	NW8.4	WNW18
11-May	S2	WNW2	E1	WSW2	NW1	ESE2	SW2	ESE1	SW9	SW9	W11	NW16	N10	NNW11	NNW9	W8	NNW10	NNW7	NNE7	NNE8	NNE4	NNE4	NNE0	NNE3	NW3.3	NW16
12-May	N2	NNE2	N4	N2	N3	N2	WNW2	SW2	SSW2	N1	NNW5	N5	N7	N7	N8	NNE9	NNE11	NNE12	NNE13	NNE9	NNE6	ENE4	ESE7	ESE1	NNE4.2	NNE13
13-May	S0	N1	NNW3	NW0	ENE0	SE3	SE5	SE8	SE8	SE8	ESE7	ENE7	NE6	SSW5	NNW3	N9	NNE10	NNE10	NNE9	NNE8	NE3	NE2	NW2	N2	NE2.5	NNE10
14-May	N2	NNW2	NW1	SE2	ESE6	ESE5	SE9	SE8	SSE7	SSE6	SE11	SE14	SE15	SE13	SE13	SE15	SE15	SE17	SSE17	SSE15	SE11	SW14	SSE8	SE9	SE8.6	SE17
15-May	ESE8	WNW1	SE1	SSE5	N3	NE4	N4	N8	N14	N15	N15	N13	N15	N15	N13	N16	N17	N12	NNW15	NNW11	NW8	NW5	NNW2	W1	N7.9	N17
16-May	WNW1	NW1	WNW1	W2	NNE1	E1	WNW1	NNE2	S2	SW5	SW3	SW6	SW6	WSW6	SW6	SSW2	ENE5	E4	SE8	SSE11	ENE2	N2	ESE4	NE2	S1.2	SSE11
17-May	NNW1	NW1	WNW0	S1	E0	NNW3	NNW3	NNE1	SSW3	WSW7	W8	WSW7	W6	SSW3	WSW4	N4	N5	NE5	ENE6	NE4	ENE5	ENE2	NE2	NNW4	NW1.1	W8
18-May	NNW5	N5	N3	NNW7	N4	NNE3	NNW4	NNW2	N2	W3	NW7	N10	N10	N10	NNE8	NNE6	N9	NW7	S12	SSW5	WSW2	SW1	NNW2	ENE1	NNW3.4	S12
19-May	ESE0	SSE2	SSE4	SE8	SSE11	SSE11	SSE15	SSE13	S11	SE15	SSE11	S11	SSE15	SSE16	S17	S18	S19	S17	SSW17	SSW19	S15	S12	SSW12	S10	S11.8	SSW19
20-May	SSE8	SE10	SSE13	SSE11	SE10	SE12	SSE13	SSE16	S19	SSE18	S18	S20	S18	SSW18	SW14	SE12	SE14	SE13	SE20	SSE20	NE2	SE7	E1	SSE15	SSE12.3	S20
21-May	SE12	SE13	SE16	SE17	SE15	SE15	SE15	SE14	SE9	ESE5	W8	SW15	WSW18	SSW14	WSW29	WSW29	WSW28	WNW17	NNW14	NW7	NW4	WNW1	S2	SE5	SSW6.6	WSW29
22-May	SE4	SSE1	SE4	NNE2	N2	NW2	WNW2	SE3	SSE8	SSE3	SW4	SW6	W14	W12	W12	WSW10	WSW8	WSW5	SW5	SW1	NNE2	NNE1	NNW2	NNW2	WSW2.8	W14
23-May	E1	ESE2	E3	SE4	SE8	SE8	SE6	SE8	SE8	SE10	SE7	SSE7	SSE12	SSE10	SE10	SSW7	S4	SSE3	NNW3	E4	SE8	SE7	W15	WNW22	SSE4.3	WNW22
24-May	NW10	W9	W13	W11	WNW13	NW8	NNW5	NNE3	NW6	NNW8	WNW12	NW10	NNW10	N10	NNE7	NNW7	NW12	NW11	N8	NE6	ENE3	NNE2	NNE3	NE2	NW6.0	WNW13
25-May	ENE2	N1	NE1	NNW2	NW2	WNW2	WNW2	SW1	SE10	SE11	SE10	SSE7	SSE10	SSE8	SSE11	SSE12	SE11	ESE10	SE13	SE13	SE12	SE12	SE14	SE13	SE6.9	SE14
26-May	SE10	ESE9	SE13	SE5	N4	NE4	N3	E3	ESE9	SE13	SE13	NNE3	NNW5	NNW5	NNW5	ESE9	ENE7	NE7	NNE7	NE7	NNE7	NE5	NE5	N7	E3.9	SE13
27-May	N7	N7	N6	NNW8	NNW6	NNW5	N7	N8	NNE9	NNE9	NNE8	NNE8	N9	N10	N12	NNE10	NNE7	NNE7	N7	N7	NNE3	NNE3	NNE3	ENE3	N6.8	N12
28-May	E3	ESE2	NNE2	NE2	ENE1	NNE2	E1	SE8	E7	E4	ESE2	SE7	SE6	SE4	SE6	ESE8	ESE6	SE11	ESE8	SE10	ESE8	ESE6	SE3	SE9	ESE4.9	SE11
29-May	ESE4	ESE2	NE1	NNE2	N2	NNE2	NNE2	NNW3	NNW4	NNW4	NNW6	NNW8	N7	NNW8	NNW8	NNW8	NNW11	NW10	NW10	NW9	NW10	WNW11	WNW14	W12	NW5.6	WNW14
30-May	W13	W11	W15	W16	W19	W19	W20	WNW19	WNW20	WNW20	WNW21	WNW21	NW21	NW22	NW22	NW14	NNE3	ENE2	NNE2	SSW2	NNE3	NE3	SE2	SSE1	WNW11.6	NW22
31-May	SW2	WSW5	ESE4	N2	NNW1	NW1	N0	WSW2	NNW5	N5	N8	NNW8	NNE7	NNE8	NNE9	NNE7	NNE8	N10	N9	NNE8	NNE5	E1	SE11	SE14	NNE3.4	SE14

NNW1.4	NNW1.7	NNW1.2	NNW1.3	NNW1.8	NNW1.4	NNW1.3	NNW1.0	NNW1.0	N1.1	NW2.7	NNW3.7	NNW3.4	NNW3.0	NNW3.7	N2.8	N3.8	NNE4.0	NNE2.9	NE2.2	NNE2.5	NNE0.8	NNE0.5	NE0.5	Diurnal Average
NW16	NW18	N17	SE17	W19	W19	NW21	WNW19	WNW20	WNW20	WNW21	WNW21	NW21	NW22	WSW29	WSW29	WSW28	S17	SE20	SSE20	S15	N15	N15	WNW22	Diurnal Maximum

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



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

**Wind Speed 20 m (WS20m) - km/h**  
**Lower Camp Met Tower - May 2014**

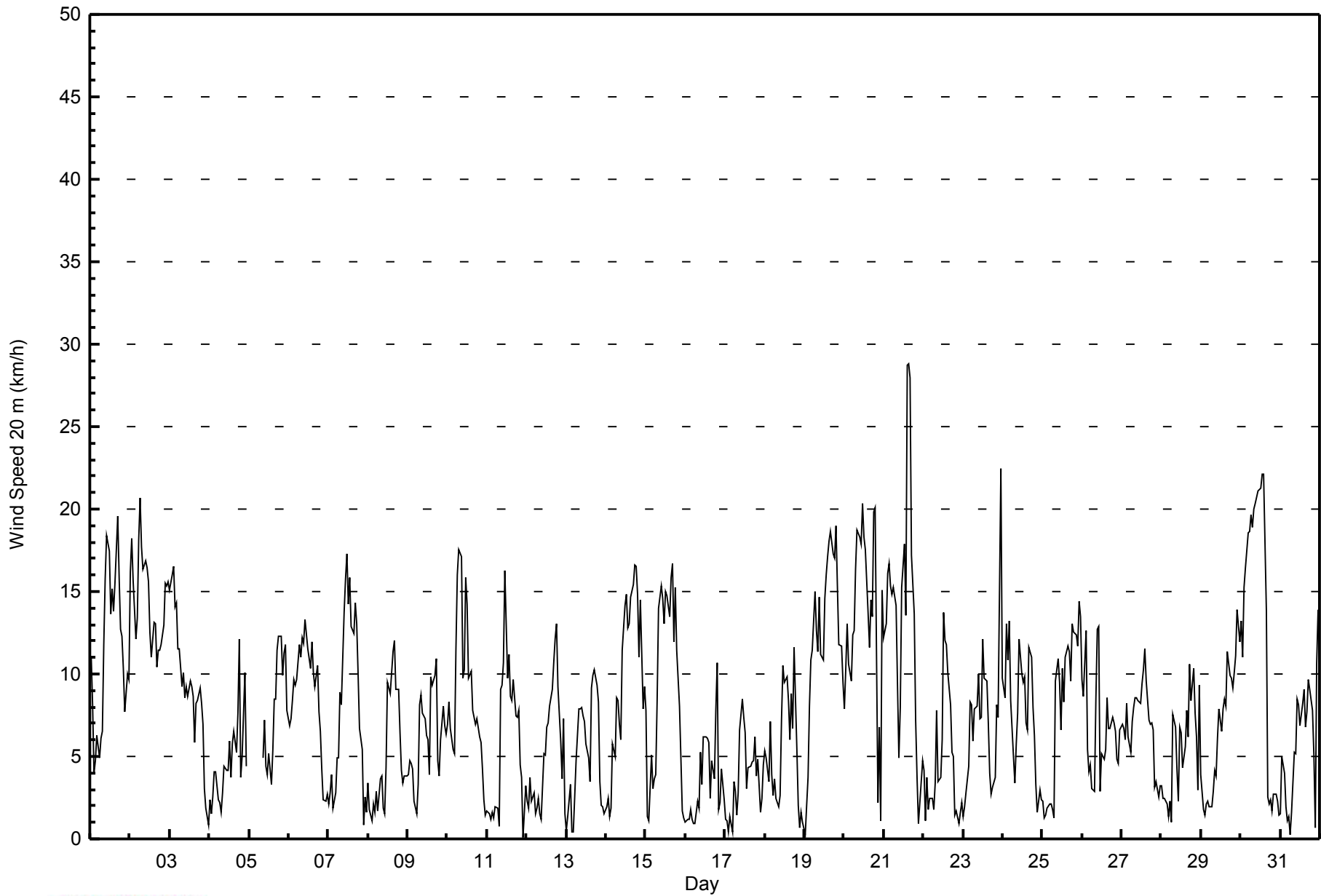
Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 10 km/h on May 23 23:00														Hours in Service: 744 Hours of Data: 736 Hours of Missing Data: 8 Hours of Calibration: 0 Percent Operational Time: 98.9												
Minimum Value: 0 km/h on May 16 02:00																										
Percentiles: 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> = 6 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-May	5	4	3	2	2	3	2	3	5	7	6	7	5	6	5	6	7	7	5	5	4	2	3	3	7	
2-May	5	6	8	7	5	7	7	6	6	6	6	6	5	5	5	5	5	5	5	5	6	6	6	6	8	
3-May	6	6	6	6	5	5	5	4	4	4	4	3	4	4	4	3	5	4	4	4	3	1	1	1	6	
4-May	1	1	1	1	1	1	1	1	1	2	3	2	3	3	2	4	3	3	4	4	3	4	3	AF	4	
5-May	AF	AF	AF	AF	AF	AF	3	AF	2	3	3	3	3	3	3	4	4	5	6	5	4	5	4	3	6	
6-May	2	3	3	4	3	3	4	4	5	5	6	5	5	5	6	5	5	4	4	2	2	1	1	1	6	
7-May	1	1	2	1	2	2	2	3	3	5	6	6	6	6	5	5	6	5	4	3	2	1	2	2	6	
8-May	2	2	1	1	1	1	1	2	2	1	1	2	4	4	4	5	4	4	3	3	2	2	1	1	5	
9-May	1	1	1	1	2	1	1	4	3	3	3	3	3	4	4	4	5	5	4	1	3	3	2	2	5	
10-May	2	2	2	2	2	7	5	6	6	5	4	6	5	4	4	3	3	3	2	2	2	1	1	1	7	
11-May	1	1	1	1	2	1	1	2	3	4	6	7	4	5	5	5	5	4	3	3	2	1	2	1	7	
12-May	1	1	1	1	1	1	1	2	2	3	3	3	4	4	4	4	5	5	5	4	3	3	3	2	5	
13-May	1	2	2	1	1	1	2	2	2	2	3	3	3	3	4	4	4	4	4	1	1	1	1	4		
14-May	1	1	1	2	2	2	3	3	2	2	4	5	5	4	5	5	5	5	4	6	4	6	2	3	6	
15-May	3	1	2	3	1	1	2	6	6	6	6	5	6	6	5	7	6	5	5	2	2	1	1	7		
16-May	1	0	1	1	1	0	1	2	1	3	2	3	3	3	3	2	3	2	5	3	2	1	2	2	5	
17-May	1	1	1	1	1	1	1	1	1	3	3	3	3	2	3	3	2	3	3	1	2	1	1	3	3	
18-May	2	2	2	3	2	1	2	1	2	3	3	4	3	4	3	4	5	4	4	4	2	1	1	2	5	
19-May	1	2	2	3	3	3	3	4	4	5	5	5	5	6	5	5	6	6	4	5	5	4	3	3	6	
20-May	3	2	4	3	3	4	4	4	4	5	5	5	6	6	5	7	8	5	5	6	4	2	6	4	8	
21-May	4	3	3	3	3	4	4	4	4	3	3	4	8	6	6	10	9	9	8	6	3	3	2	1	2	10
22-May	2	1	1	1	1	1	1	4	3	2	2	5	6	5	5	4	3	3	3	2	2	1	1	1	6	
23-May	1	2	2	3	2	4	4	3	3	4	3	3	3	4	5	3	2	2	2	3	3	2	10	8	10	
24-May	5	5	5	5	5	5	3	2	3	3	6	6	4	4	4	4	5	4	4	3	2	1	1	1	6	
25-May	1	1	1	1	1	1	1	1	3	4	4	3	3	4	4	5	5	5	4	4	4	4	5	4	5	
26-May	4	3	4	4	2	2	2	2	4	5	5	1	2	3	3	5	3	3	3	3	3	2	2	2	5	
27-May	2	2	2	3	3	2	3	3	3	4	4	4	4	4	4	4	3	3	3	2	2	2	1	2	4	
28-May	2	2	1	1	1	1	2	3	3	3	2	3	2	2	3	4	3	4	4	4	4	3	2	4	4	
29-May	3	2	1	1	1	1	1	1	2	2	2	3	3	3	3	3	5	4	3	3	4	4	5	4	5	
30-May	5	4	5	6	7	7	7	7	8	8	8	8	9	9	8	7	2	2	2	1	4	2	1	1	9	
31-May	2	2	2	2	1	1	1	2	2	3	4	3	4	4	5	4	4	4	4	3	3	2	5	5	5	
Diurnal Maximum																										
AF - Analyzer Failure																										





**WBEA**  
**Hourly Averages**

**Wind Speed 20 m (WS20m) - km/h**  
**Lower Camp Met Tower - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Wind Speed 20 m (WS20m) - km/h**  
**Lower Camp Met Tower - May 2014**

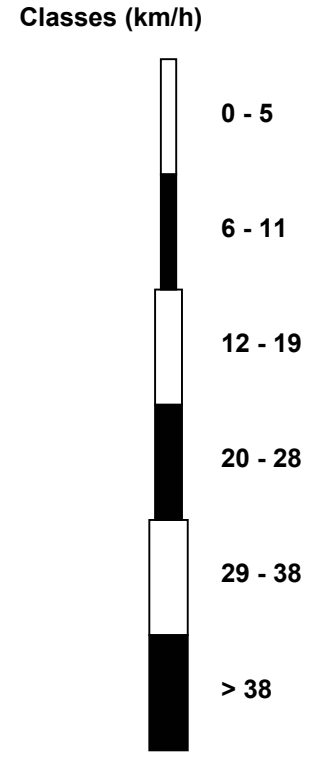
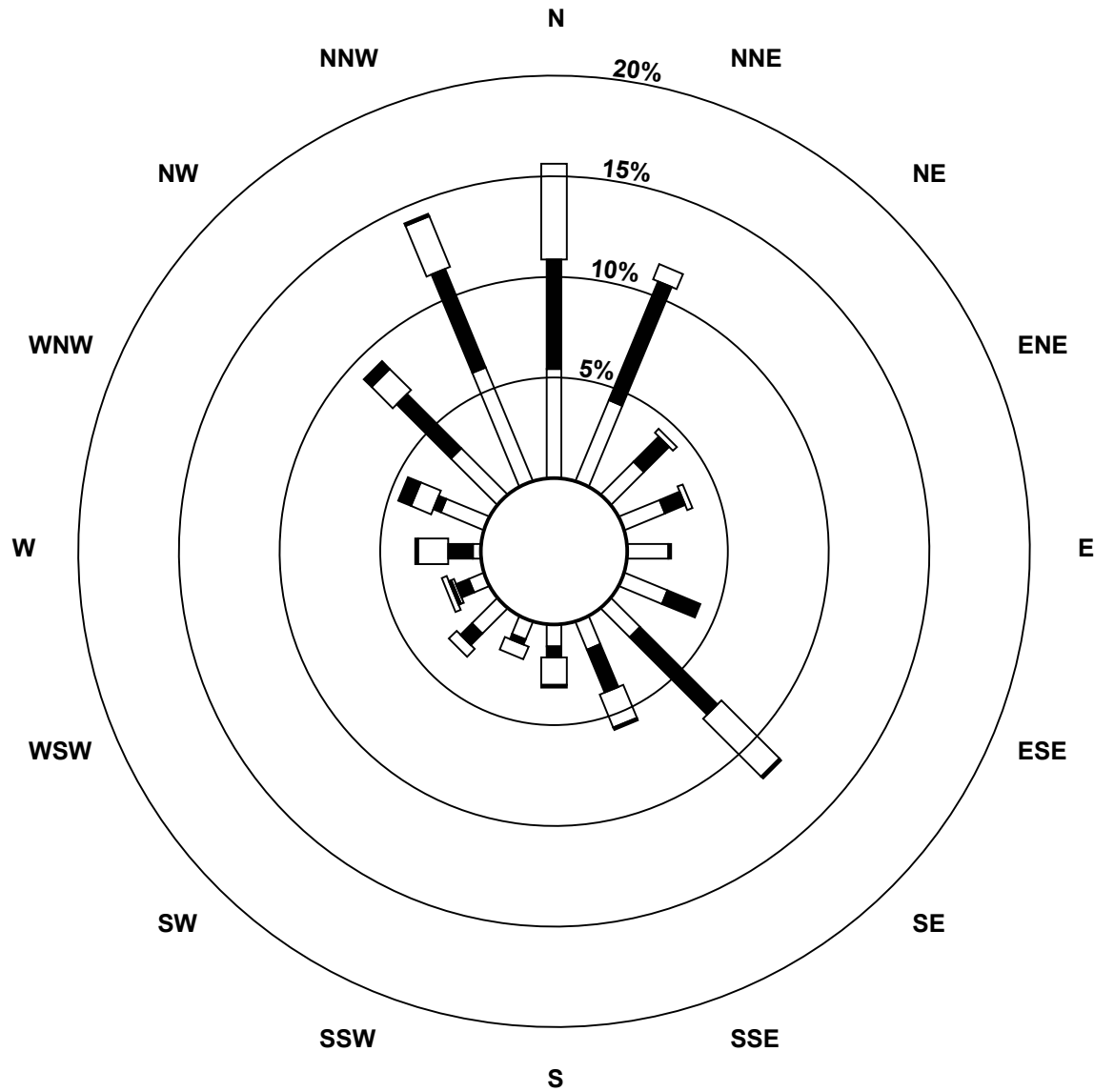
<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	286	38.86	38.86
6 - 11	275	37.36	76.22
12 - 19	158	21.47	97.69
20 - 28	15	2.04	99.73
29 - 38	2	0.27	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 736

Total Number of Hours: 744

Wood Buffalo Environmental Association  
Wind Rose May 2014

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



Total Number of Valid Hours: 736



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

**Wind Speed 45 m (WS45m) - km/h**  
**Lower Camp Met Tower - May 2014**

Maximum Speed: 38 km/h on May 21 16:00	Maximum Daily Speed Average: 18.6 km/h on May 2	Hours in Service: 744
Minimum Speed Value: 0 km/h on May 11 08:00	Minimum Daily Speed Average: 1.2 km/h on May 16	Hours of Data: 738
Maximum Diurnal Speed Average: 6.1 km/h at hour 18	Minimum Diurnal Speed Average: 1.0 km/h at hour 23	Hours of Missing Data: 6
Monthly Average Velocity: 3.0 km/h 355.6 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 2 Q <sub>1</sub> = 5 Median = 10 Q <sub>3</sub> = 15 P <sub>90</sub> = 20 P <sub>99</sub> = 28	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-May	W16	NW12	NW6	NNW8	NNW9	NW8	NNW10	NW9	NW14	NW20	NNW25	NNW24	N19	NNW20	NNW18	NW20	NNW25	NNW21	NNW18	NNW16	N15	NNW11	NW13	NW13	NNW14.9	NNW25	
2-May	NW21	NW23	NNW20	NNW16	NW17	NW22	NW26	NW23	NNW22	NNW23	NNW23	NNW21	N18	N16	N19	N18	NNE16	NNE18	N17	N17	N19	N23	N21	NNW22	NNW18.6	NW26	
3-May	N20	N22	N23	N20	N20	N17	N17	N14	N14	NNW11	NNW12	NNW11	N13	NNE13	NNE12	NNE8	NE11	NE12	ENE13	NE12	NE11	NNE5	N3	ENE1	N12.2	N23	
4-May	NW2	NNW2	NW3	NW5	WNW4	WNW2	WNW2	WNW1	S3	S4	SW5	SW4	SE6	SSE4	SE6	SE8	SE6	SSW9	SW14	SW5	E7	S11	ESE4	AF	S2.5	SW14	
5-May	AF	AF	AF	AF	AF	AF4	SSE5	AF4	SE6	SE8	ESE5	N5	N6	N4	N7	ENE11	ENE11	ENE17	ENE17	NE17	NE14	ENE16	ENE16	NE11	---	NE17	
6-May	NE10	NNE11	NNE13	N13	N14	NNE14	N16	N17	N17	NNE16	NNE20	NNE17	NNE16	NNE15	NE17	NNE15	NE14	N15	N11	NW9	NNW7	NNW5	NW5	NNW5	NNE12.3	NNE20	
7-May	NNW4	NW4	NNW7	N4	NW5	NNW7	N7	NNW12	NNW11	N19	NNW22	N24	N20	N21	N18	N17	N21	N19	NNE15	NE10	NE9	E2	NNE4	NNE4	N11.2	N24	
8-May	ENE5	NE4	ESE2	ENE3	NNW1	NNW4	N2	N5	N5	E2	SSE1	N6	NNE14	NNE12	NNE14	NNE17	NNE19	NNE14	N13	NNE10	NNE7	N5	NW5	NNW6	NNE6.7	NNE19	
9-May	NW6	NNW7	NNW7	NNW6	NNW4	NNW2	NW4	WNW10	NNW12	NNW9	N10	NNE9	N8	NNW6	NNW13	NNW12	N14	N16	N7	WNW4	NW8	NNW11	NW9	NW9	NNW8.0	N16	
10-May	NW10	NW12	NNW9	NW7	NNW7	WNW15	WNW20	WNW22	WNW21	NNW13	NW12	NNW20	NNW19	NNW13	NW12	NW10	NNW10	NNW9	NW9	NW8	NW8	NW6	WNW4	SSE2	NW10.9	WNW22	
11-May	S2	WNW1	E2	WSW2	NW2	ESE1	SW3	ESE0	SW10	SW11	W13	NW20	N13	NNW15	NNW11	W10	NNW12	NNW10	NNE10	NNE12	NNE8	NNE8	NNE2	NNE4	NNW4.6	NW20	
12-May	N3	NNE4	N6	N4	N5	N3	WNW2	SW3	SSW2	N1	NNW5	N7	N9	N9	N10	NNE12	NNE16	NNE19	NNE20	NNE14	NNE9	ENE6	ESE9	ESE4	NNE6.2	NNE20	
13-May	S2	N2	NNW4	NW1	ENE0	SE3	SE6	SE8	SE8	ESE8	ENE8	NE7	SSW5	NNW5	N13	NNE14	NNE15	NNE14	NNE13	NE5	NE5	NW1	N2	NE3.5	NNE15		
14-May	N3	NNW3	NW2	SE5	ESE8	ESE7	SE10	SE9	SSE8	SSE7	SE14	SE17	SE17	SE15	SE17	SE19	SE20	SE22	SSE21	SSE19	SE15	SW18	SSE10	SE12	SE10.8	SE22	
15-May	ESE12	WNW1	SE3	SSE8	N4	NE5	N6	N13	N22	N23	N23	N19	N19	N22	N21	N19	N23	N24	N17	NNW21	NNW16	NNW11	NW7	NNW3	W2	N11.4	N24
16-May	WNW3	NW2	WNW1	W1	NNE1	E1	WNW1	NNE3	S2	SW6	SW3	SW7	SW7	WSW7	SW7	SSW2	ENE6	E4	SE9	SSE13	ENE5	N3	ESE6	NE6	S1.2	SSE13	
17-May	NNW1	NW2	WNW1	S4	E3	NNW4	NNW3	NNE2	SSW3	WSW7	W10	WSW8	W8	SSW3	WSW5	N6	N6	NE6	ENE9	NE6	ENE8	ENE4	NE4	NNW7	NNW1.3	W10	
18-May	NNW8	N7	N5	NNW10	N6	NNE4	NNW5	NNW3	N2	W3	NW9	N14	N13	N15	NNE12	NNE8	N12	NW9	S13	SSW7	WSW2	SW2	NNW4	ENE0	NNW4.9	N15	
19-May	ESE1	SSE3	SSE6	SE12	SSE14	SSE15	SSE18	SSE14	S13	SE17	SSE13	S13	SSE16	SSE18	S18	S20	S20	S19	SSW20	SSW23	S17	S13	SSW14	S11	S13.7	SSW23	
20-May	SSE10	SE13	SSE15	SSE13	SE12	SE17	SSE15	SSE17	S19	SSE20	S20	S22	S20	SSW20	SW16	SE15	SE19	SE17	SE26	SSE23	NE3	SE9	E3	SSE17	SSE14.4	SE26	
21-May	SE15	SE17	SE20	SE20	SE19	SE20	SE20	SE17	SE11	ESE6	W10	SW18	WSW23	SSW16	WSW37	WSW38	WSW37	WNW22	NNW18	NW9	NW6	WNW3	S2	SE5	SSW8.3	WSW38	
22-May	SE8	SSE3	SE5	NNE2	N3	NW3	WNW1	SE4	SSE9	SSE4	SW5	SW7	W17	W15	W15	WSW13	WSW10	WSW7	SW6	SW3	NNE4	NNE1	NNW3	NNW2	WSW3.4	W17	
23-May	E2	ESE4	E4	SE6	SE11	SE11	SE8	SE9	SE9	SE12	SE9	SSE8	SSE13	SSE11	SE11	SSW8	S5	SSE3	NNW4	E6	SE11	SE10	W20	WNW29	SSE5.1	WNW29	
24-May	NW13	W11	W18	W15	WNW18	NW12	NNW7	NNE4	NW7	NNW10	WNW16	NW12	NNW13	N14	NNE10	NNW9	NW15	NW14	N11	NE9	ENE5	NNE3	NNE4	NE4	NW8.0	W18	
25-May	ENE2	N2	NE2	NNW2	NW1	WNW1	WNW1	SW1	SE11	SE13	SE12	SSE8	SSE12	SSE9	SSE13	SE14	SE14	ESE13	SE17	SE16	SE16	SE16	SE19	SE18	SE8.7	SE19	
26-May	SE13	ESE12	SE17	SE8	N6	NE7	N4	E4	ESE11	SE15	SE17	NNE4	NNW8	NNW7	NNW8	ESE12	ENE10	NE10	NNE12	NE12	NNE10	NE8	NE7	N9	ENE5.5	SE17	
27-May	N10	N10	N9	NNW11	NNW9	NNW8	N10	N11	NNE12	NNE12	NNE12	NNE12	N14	N15	N16	NNE14	NNE10	NNE10	N10	N9	NNE5	NNE5	NNE4	ENE6	N9.9	N16	
28-May	E5	ESE3	NNE4	NE3	ENE3	NNE3	E2	SE10	E9	E5	ESE3	SE8	SE8	SE5	SE7	ESE10	ESE8	SE14	ESE12	SE13	ESE10	ESE9	SE4	SE13	ESE6.4	SE14	
29-May	ESE6	ESE3	NE2	NNE3	N3	NNE2	NNE2	NNW4	NNW6	NNW6	NNW10	NNW12	N9	NNW12	NNW13	NNW12	NNW17	NW14	NW13	NW14	NW14	WNW16	WNW20	W17	NW8.0	WNW20	
30-May	W18	W15	W21	W22	W25	W25	W26	WNW25	WNW26	WNW26	WNW27	WNW27	NW28	NW28	NW28	NW18	NNE5	ENE4	NNE4	SSW1	NNE5	NE4	SE4	SSE2	WNW15.3	NW28	
31-May	SW4	WSW6	ESE6	N3	NNW3	NW2	N1	WSW2	NNW6	N6	N11	NNW10	NNE9	NNE11	NNE12	NNE10	NNE11	N14	N13	NNE12	NNE10	E3	SE14	SE19	NNE4.9	SE19	

NNW1.8	NNW2.5	NNW1.8	NNW1.8	NNW2.6	NNW2.1	NNW2.0	NNW1.9	NNW2.0	N2.2	NNW4.1	NNW5.4	NNW5.3	NNW4.7	NNW5.4	N4.3	N5.8	NNE6.1	NNE4.8	NE3.6	NNE4.2	NNE1.8	NNE1.0	NNE1.1	Diurnal Average	
NW21	NW23	N23	W22	W25	W25	W26	WNW25	WNW26	WNW26	WNW27	WNW27	NW28	NW28	WSW37	WSW38	WSW37	SE22	SE26	SSE23	N19	N23	N21	WNW29	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 45 m (WS45m) - km/h**  
**Lower Camp Met Tower - May 2014**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 12 km/h on May 23 23:00	Hours in Service: 744 Hours of Data: 738 Hours of Missing Data: 6 Hours of Calibration: 0 Percent Operational Time: 99.2
Minimum Value: 0 km/h on May 16 03:00	
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> = 6 P <sub>99</sub> = 9	

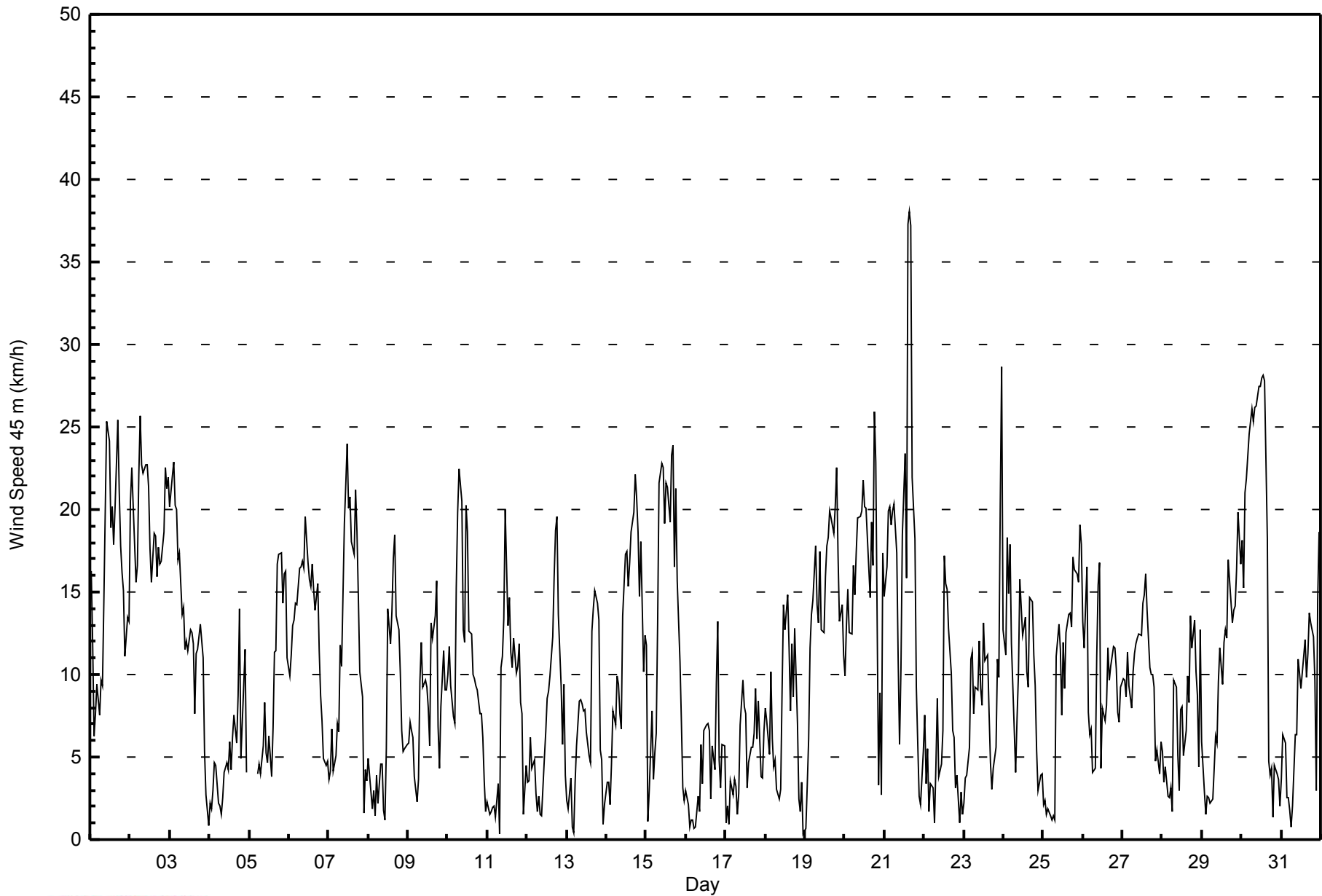
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-May	6	5	3	3	3	3	3	4	5	7	8	7	6	6	6	6	8	7	6	5	5	3	3	3	8
2-May	6	7	8	8	5	7	7	7	7	6	6	6	5	6	6	6	6	5	6	6	7	7	6	7	8
3-May	6	6	6	6	5	5	5	4	4	4	4	4	4	5	5	4	5	5	3	4	3	2	1	1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

AF - Analyzer Failure



**WBEA**  
**Hourly Averages**

**Wind Speed 45 m (WS45m) - km/h**  
**Lower Camp Met Tower - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Wind Speed 45 m (WS45m) - km/h**  
**Lower Camp Met Tower - May 2014**

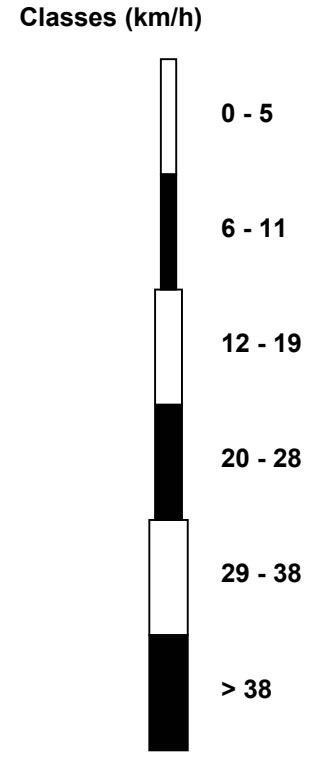
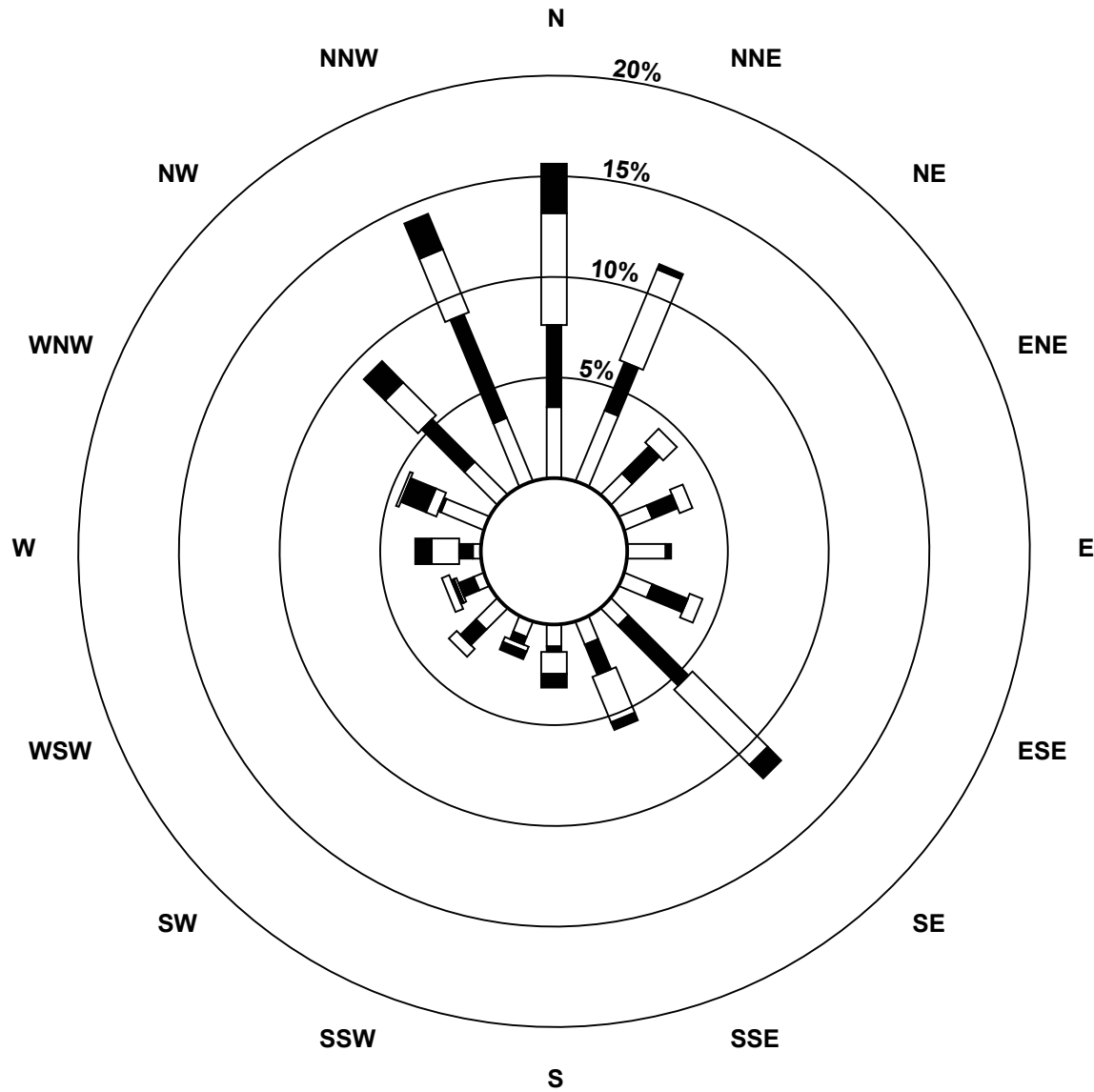
<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	212	28.73	28.73
6 - 11	220	29.81	58.54
12 - 19	222	30.08	88.62
20 - 28	80	10.84	99.46
29 - 38	4	0.54	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 738

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

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



**Total Number of Valid Hours: 736**





Maximum Speed: 47 km/h on May 21 17:00	Maximum Daily Speed Average: 25.5 km/h on May 2	Hours in Service: 744
Minimum Speed Value: 0 km/h on May 25 03:00	Minimum Daily Speed Average: 0.4 km/h on May 16	Hours of Data: 744
Maximum Diurnal Speed Average: 8.6 km/h at hour 18	Minimum Diurnal Speed Average: 1.3 km/h at hour 3	Hours of Missing Data: 0
Monthly Average Velocity: 4.0 km/h 13.5 deg	Percentiles: $P_1 = 1$ $P_{10} = 5$ $Q_1 = 8$ Median = 14 $Q_3 = 20$ $P_{90} = 26$ $P_{99} = 38$	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-May	W30	NNW19	NNE11	NNW15	NNW19	NW16	NNW20	NNW18	NW20	NW27	NNW34	N31	N25	NNW26	NNW25	NNW26	NNW35	NNW32	NNW26	NNW24	N21	N17	NNW22	NNW25	NNW22.3	NNW35
2-May	NW32	NW34	NNW28	NNW22	NW24	NW32	NW35	NW32	NNW31	N31	NNW32	NNW28	N23	N21	N25	N24	NNE21	NNE23	NNE22	NNE23	N26	N30	N29	N29	NNW25.5	NW35
3-May	N27	N29	N30	N27	N26	N23	NNE23	N18	N17	N15	N15	N14	N16	NE16	NE15	NNE10	NE14	NE14	ENE15	NE17	NE21	ENE16	ENE8	E4	NNE16.3	N30
4-May	NE3	ENE2	NE2	NNW7	N8	NE4	ENE3	ENE2	S3	S4	WSW5	SW4	SE5	SSE5	SE6	SE8	SSE7	SSW9	SW15	SSW7	ESE10	S13	SE9	E12	SSE2.8	SW15
5-May	ESE6	S4	S5	SSE5	SSE9	SE8	SSE8	SE6	SE7	ESE9	E6	NNE5	N6	NNE5	N9	ENE14	ENE14	ENE22	ENE24	ENE24	ENE22	E24	E22	ENE16	E9.4	ENE24
6-May	ENE15	NE16	NNE21	NNE18	NNE19	NNE19	NNE22	NNE21	NNE21	NNE22	NNE26	NE21	NNE19	NE20	NE21	NNE20	NE18	NNE21	N16	NNW14	NNW15	NNW14	N13	N14	NNE17.6	NNE26
7-May	NNW13	NNW13	NNW15	NNW13	N13	NNW14	N10	N14	N14	N25	N29	N30	N26	N25	N24	N23	N27	N24	NNE19	NE13	ENE12	ENE2	NNE8	NE8	N16.5	N30
8-May	ENE8	ENE12	E5	E5	ESE3	NNE4	ENE2	NNE5	N5	E2	SSE1	N6	NNE16	NNE14	NNE17	NNE22	NNE23	NNE17	N17	NNE12	NNE9	N7	NNW9	N10	NNE8.8	NNE23
9-May	N10	N11	N10	N9	N8	N3	NNW4	NW11	N15	NNW11	N11	N11	N10	NNW7	N16	NNW15	N18	N20	N9	NW5	NNW13	N19	NNW17	NNW17	N11.5	N20
10-May	NNW18	NW21	NW17	NW17	NW15	WNW24	WNW26	WNW29	NW27	NNW17	NNW17	NNW27	NNW25	NNW17	NW16	NNW13	NNW14	N13	NNW13	NW12	NW11	NNW10	WNW7	WSW8	NW16.3	WNW29
11-May	WSW7	NW6	NNW8	NNW8	NW7	W7	W9	WNW4	SW11	SW13	WNW17	NW26	N17	NNW19	N16	WNW12	NNW15	N13	NNE14	NE16	NE18	ENE18	ENE8	E9	NNW7.1	NW26
12-May	ENE7	ENE3	NNE7	NNE7	NNE6	NE4	NNE1	W1	NNW1	NNW3	N5	N8	N11	N12	N13	NNE16	NNE20	NNE23	NE25	NE18	NE14	ENE14	ESE15	SE11	NE8.4	NE25
13-May	SSE7	SSE8	SSE4	SSE1	SSE2	SE12	SSE7	SE9	SE8	SSE8	SSE6	ENE7	NE7	SW4	N6	N16	NNE18	NNE19	NE18	NNE17	NE10	E17	ESE10	ESE6	ENE5.0	NNE19
14-May	ESE6	SSW2	SE9	SSE12	SE12	SE13	SE15	SE12	SE7	SE8	SE17	SE21	SE22	SE20	SE21	SE24	SE27	SE32	SSE28	SSE26	SE24	SW25	S13	SE20	SE16.2	SE32
15-May	SE20	SSE8	SSE10	SE18	ESE8	E6	NE13	NNE20	NNE30	NNE32	NNE32	N28	N30	N30	N27	N33	N33	N25	N31	N23	NNW18	NNW15	NW13	NNW10	N15.9	N33
16-May	NNW14	NNW14	NNW12	NNW10	NW4	WNW5	NW2	N3	SSW1	WSW6	WSW4	WSW6	WSW7	WSW7	WSW7	SW2	ENE6	ENE5	SE10	SSE16	ESE12	E8	ESE10	ESE13	N0.4	SSE16
17-May	ESE6	SE8	SSE3	SSE9	SSE6	ESE3	N1	NNE1	SE4	WSW4	W8	WSW7	W8	SSW3	W6	N7	N7	ENE9	ENE12	ENE10	E16	ESE14	E8	NNE8	E2.4	E16
18-May	N13	N10	NNE7	N13	NNE9	NE8	NNE6	NNW4	NW3	W3	NW10	N18	N16	NNE19	NNE15	NNE9	N15	NNW11	S15	SSW11	W5	N3	NW8	NNW1	N6.7	NNE19
19-May	SSW4	S8	SSE11	SE17	SSE18	SSE15	SSE18	SSE15	S13	SSE19	SSE15	S14	SSE17	SSE21	S19	SSW20	S20	S20	SSW22	SSW27	SSW21	SSW16	SSW18	S17	S16.1	SSW27
20-May	S15	SSE21	SSE24	SSE21	SSE17	SSE22	SSE19	S18	S20	S21	S22	S23	S22	SSW22	WSW21	SSE22	SE26	SE24	SSE34	SSE27	ESE5	SSE12	SE9	SSE24	SSE19.0	SSE34
21-May	SSE21	SSE23	SSE24	SSE25	SSE15	SSE13	SSE14	SSE19	SE12	SE7	W14	SW22	WSW31	SW18	WSW43	WSW44	WSW47	WNW28	NNW25	NW13	NNW10	NW9	W4	SW6	SW11.2	WSW47
22-May	S5	SSW3	SSE7	SSE8	ESE5	ESE4	SE7	SSE9	SSE8	SSE4	WSW5	WSW9	W21	W19	W21	WSW15	WSW13	WSW9	SW10	SSW7	ENE5	ESE5	SE5	SSE10	SW5.2	W21
23-May	SE13	SE13	SSE8	SSE8	S8	SSE12	SSE11	SSE9	SE8	SE14	SE12	SE7	SSE12	SE13	SSE14	SSW9	S5	S4	NNW4	ESE10	SE20	ESE16	W27	WNW40	SSE6.9	WNW40
24-May	NW19	W13	W24	W22	WNW27	WNW22	NW10	N5	NW10	NNW13	WNW20	NNW16	NNW18	NNE18	NNE14	N13	NW20	NNW20	N15	NE13	ENE11	ENE9	ESE7	E3	NW10.3	WNW27
25-May	ESE3	E2	WNW0	SSE1	SE4	SE3	ESE3	ESE6	SE14	SE16	SE15	SSE10	SSE12	SSE11	SSE16	SSE17	SE18	SE18	SE24	SE24	SE26	SE26	SSE30	SE27	SE13.4	SSE30
26-May	SE23	SE20	SE26	SSE12	ENE9	E10	E6	ESE8	ESE15	SE22	SE25	ESE10	NNE10	NNE12	N11	SE19	E17	ENE19	NE20	ENE20	NE17	E15	ENE13	NE14	E11.7	SE26
27-May	NNE15	NNE14	NNE13	N15	N14	N14	NNE16	NNE17	NNE16	NNE17	NNE17	NNE17	NNE19	NNE21	NNE23	NNE19	NNE14	NNE14	NNE14	NNE13	NE8	NE8	E7	ESE12	NNE14.1	NNE23
28-May	ESE13	SE7	ENE7	E6	SE10	SE10	ESE5	SE13	ESE13	E6	SE4	SE10	SE10	SE7	SE10	SE13	ESE12	SE19	ESE17	SE18	SE15	SE17	SE12	SE22	SE11.1	SE22
29-May	SE14	SE10	ESE4	SE7	ESE7	ESE7	E4	N5	N8	N9	N15	N17	NNE15	N18	N20	N18	NNW28	NNW23	NNW21	NW21	NW23	NW27	WNW31	WNW24	NNW10.2	WNW31
30-May	W25	W21	W31	W33	W35	W37	W37	WNW36	WNW35	NW35	WNW36	NW37	NW39	NW40	NW39	NW26	N9	NE8	NNE10	NNE3	NE9	ENE7	SE7	S5	WNW21.1	NW40
31-May	SSW9	SSW7	SSE5	SE4	NNE3	NNW4	N3	NW4	N8	N8	N14	N13	NNE13	NNE15	NE16	NE14	NE16	NNE18	NNE18	NNE18	NE19	ESE13	SE24	SE30	NE7.1	SE30

N1.4	NNW1.6	N1.3	N1.5	NNW2.6	NNW1.8	NNW2.2	N2.7	N3.5	N3.9	NNW5.6	NNW7.3	N7.4	N6.7	N7.4	N5.8	NNE7.9	NNE8.6	NE7.2	NE5.9	NE7.5	ENE4.9	ENE2.2	E2.2	Diurnal Average
NW32	NW34	W31	W33	W35	W37	W37	WNW36	WNW35	NW35	WNW36	NW37	NW39	NW40	WSW43	WSW44	WSW47	SE32	SSE34	SSE27	N26	N30	WNW31	WNW40	Diurnal Maximum

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



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

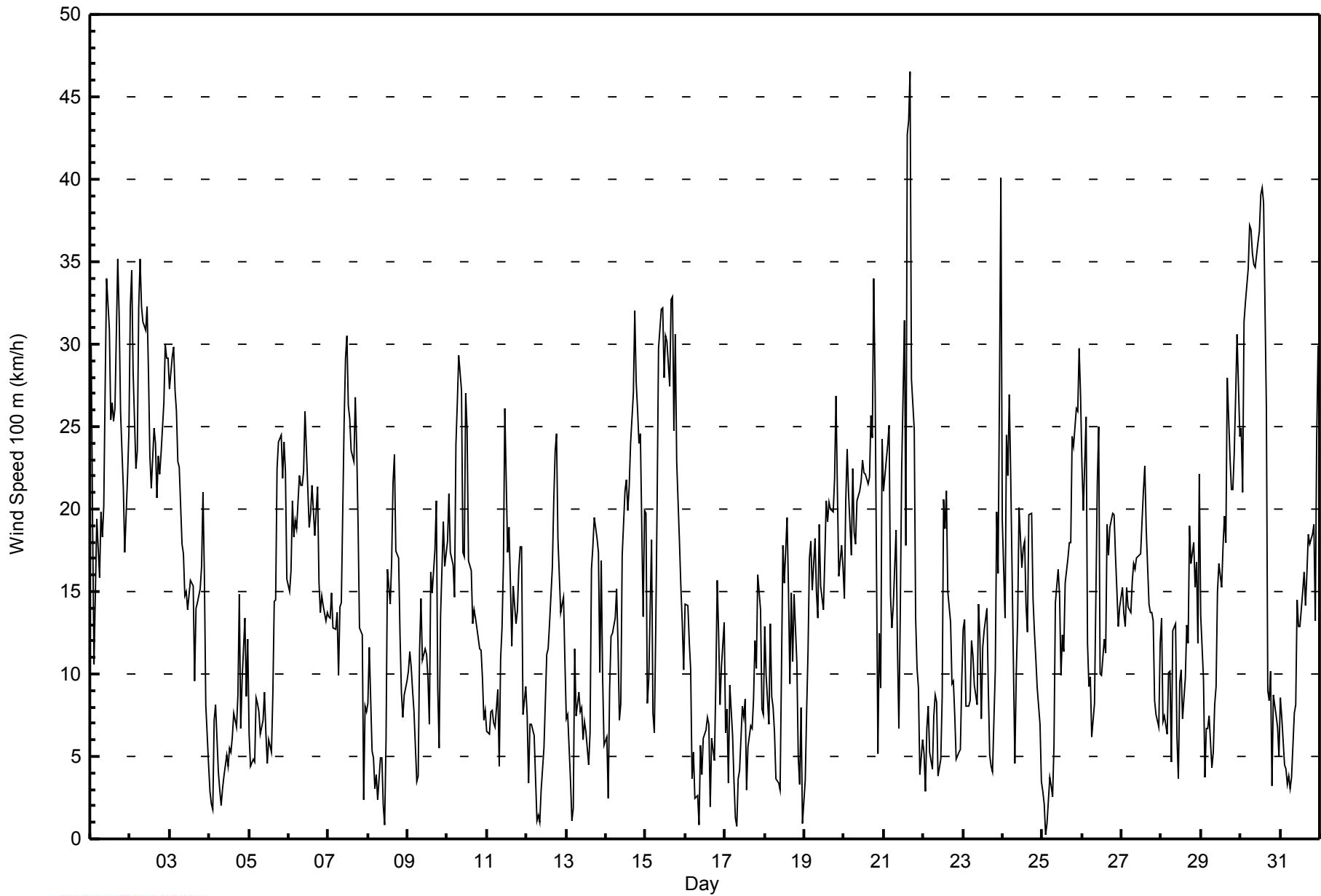
**Wind Speed 100 m (WS100m) - km/h**  
**Lower Camp Met Tower - May 2014**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 13 km/h on May 23 23:00 Minimum Value: 1 km/h on May 16 02:00 Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 2 Q <sub>1</sub> = 2 Median = 3 Q <sub>3</sub> = 5 P <sub>90</sub> = 6 P <sub>99</sub> = 9																		Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0							
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-May	6	8	3	5	4	3	3	5	5	8	7	6	6	6	6	7	7	8	6	5	5	2	4	4	8
2-May	5	7	10	10	5	7	5	7	7	6	6	6	5	6	4	5	5	5	4	4	6	6	5	6	10
3-May	5	5	4	5	4	3	3	3	3	3	3	3	4	4	4	5	5	3	3	2	3	3	2	5	
4-May	2	1	1	2	2	1	1	1	2	2	3	2	3	2	3	4	4	3	4	4	5	4	3	3	5
5-May	3	2	2	2	3	3	3	2	2	2	3	2	2	3	3	4	5	6	8	5	3	5	5	4	8
6-May	3	3	3	2	3	3	4	3	3	6	5	5	6	7	7	8	6	4	5	3	1	1	2	2	8
7-May	1	1	1	1	1	2	2	3	3	6	5	5	5	5	5	5	5	5	5	3	3	2	3	4	6
8-May	3	4	3	2	2	1	1	1	2	1	1	2	3	4	4	3	3	3	2	3	2	2	1	2	4
9-May	1	1	1	1	4	1	2	3	2	3	2	3	4	5	4	4	6	6	6	1	7	4	2	2	7
10-May	2	2	2	3	3	8	4	4	6	4	6	6	5	5	4	3	3	3	2	2	1	2	1	1	8
11-May	3	2	3	3	2	3	2	4	3	3	6	6	5	6	7	5	7	4	3	3	2	2	4	2	7
12-May	3	2	2	1	1	1	1	1	2	3	3	4	4	5	5	4	5	5	5	4	3	7	4	6	7
13-May	4	2	2	1	2	2	2	2	1	2	2	2	3	4	5	5	5	4	3	3	3	3	2	5	
14-May	2	2	4	2	1	2	3	2	2	3	3	4	4	3	4	4	4	4	7	7	5	5	3	3	7
15-May	2	5	4	5	3	4	3	7	5	5	6	5	5	5	4	7	6	4	6	5	3	3	2	2	7
16-May	1	1	1	3	1	1	1	1	1	2	2	2	2	3	3	2	3	3	5	1	3	5	3	2	5
17-May	3	2	3	3	2	2	2	1	2	2	2	2	2	2	3	3	2	5	2	2	3	3	3	4	5
18-May	2	2	3	2	2	3	3	2	2	3	4	3	3	3	3	4	6	5	3	5	2	3	3	3	6
19-May	2	3	4	3	2	3	4	4	5	4	5	7	6	7	5	6	6	6	6	7	6	4	4	3	7
20-May	4	5	6	5	4	3	3	5	5	5	6	6	6	6	10	12	4	7	5	6	4	8	7	5	12
21-May	6	4	3	4	4	3	4	4	2	3	6	9	8	8	7	7	8	7	8	3	7	4	2	2	9
22-May	2	1	3	2	2	2	2	4	3	2	2	7	5	4	4	4	3	3	5	3	3	2	2	2	7
23-May	3	2	3	5	3	4	4	2	2	2	2	2	3	3	5	4	3	3	2	7	4	3	13	9	13
24-May	7	9	3	6	5	6	4	4	4	4	6	5	5	4	3	3	4	4	3	2	3	4	2	2	9
25-May	2	1	1	1	1	1	1	2	3	3	3	4	3	4	4	5	5	4	5	4	3	3	4	3	5
26-May	3	3	4	8	2	3	4	2	4	6	5	3	2	3	4	7	4	4	5	3	3	4	3	3	8
27-May	2	2	2	2	2	2	2	3	3	3	3	3	3	4	3	4	3	2	2	2	3	2	3	2	4
28-May	2	5	3	2	2	3	3	3	3	3	3	3	3	3	4	3	4	4	3	3	3	2	3	4	5
29-May	6	6	3	2	3	2	2	1	1	1	3	2	2	3	2	3	5	4	2	3	3	4	4	4	6
30-May	4	5	4	5	7	7	6	6	6	7	6	9	10	8	7	8	2	3	3	2	8	4	3	2	10
31-May	4	3	2	1	2	1	1	2	2	3	3	4	5	5	4	5	4	4	3	2	3	4	6	3	6
Diurnal Maximum																									



**WBEA**  
**Hourly Averages**

**Wind Speed 100 m (WS100m) - km/h**  
**Lower Camp Met Tower - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Wind Speed 100 m (WS100m) - km/h**  
**Lower Camp Met Tower - May 2014**

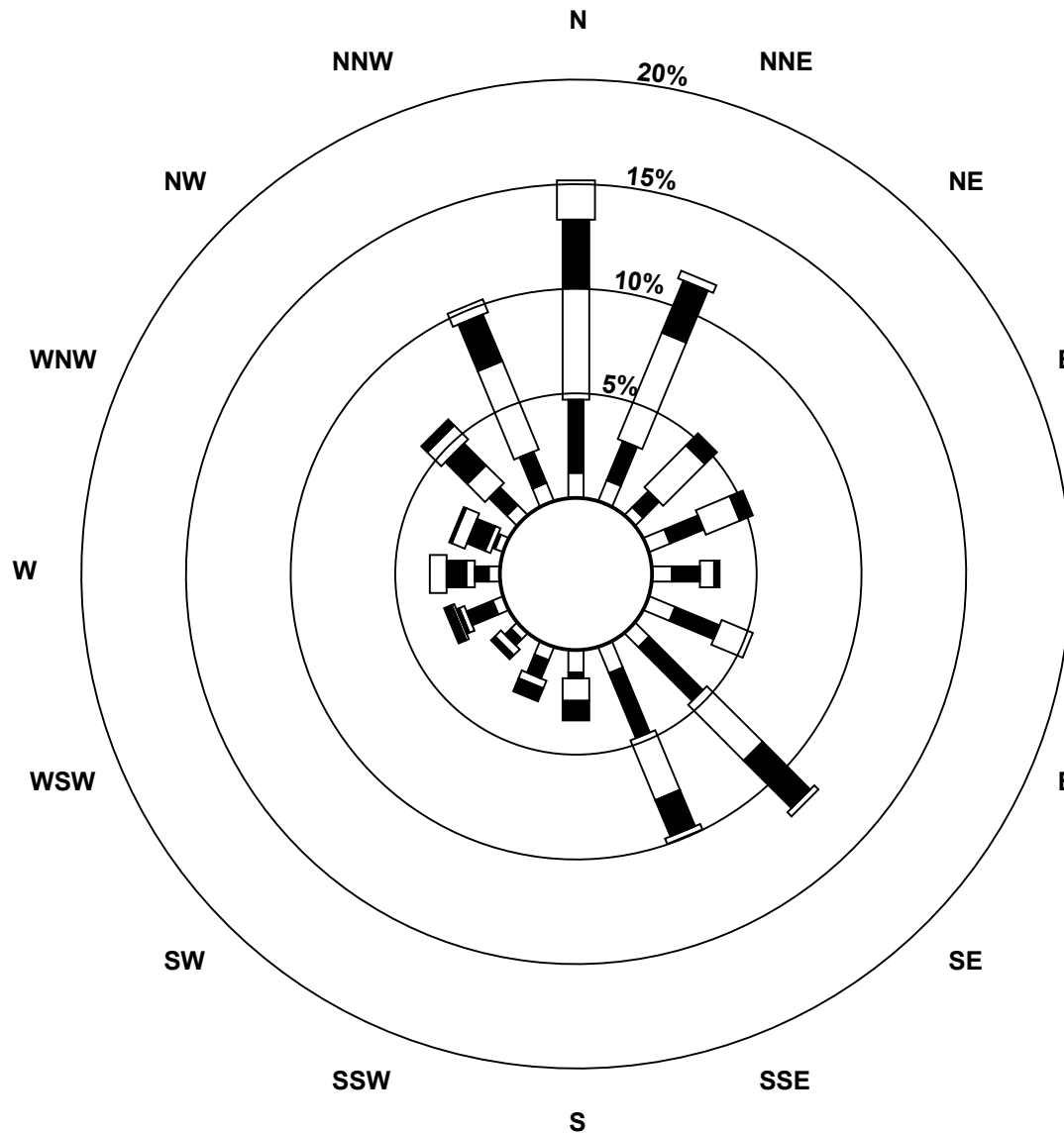
<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	102	13.71	13.71
6 - 11	190	25.54	39.25
12 - 19	247	33.20	72.45
20 - 28	153	20.56	93.01
29 - 38	45	6.05	99.06
> 38	7	0.94	100.00

Total Number of Valid Hours: 744

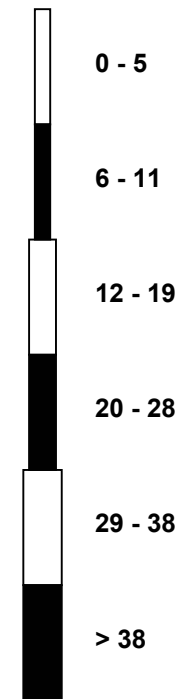
Total Number of Hours: 744

Wood Buffalo Environmental Association  
 Wind Rose May 2014

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



Classes (km/h)



Total Number of Valid Hours: 744



Maximum Speed: 52 km/h on May 21 17:00	Maximum Daily Speed Average: 28.1 km/h on May 2	Hours in Service: 744
Minimum Speed Value: 1 km/h on May 12 08:00	Minimum Daily Speed Average: 2.0 km/h on May 16	Hours of Data: 744
Maximum Diurnal Speed Average: 9.2 km/h at hour 21	Minimum Diurnal Speed Average: 0.6 km/h at hour 2	Hours of Missing Data: 0
Monthly Average Velocity: 4.2 km/h 16.1 deg	Percentiles: $P_1 = 2$ $P_{10} = 6$ $Q_1 = 10$ Median = 16 $Q_3 = 23$ $P_{90} = 30$ $P_{99} = 45$	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-May	W35	NNW23	NNE21	N20	NNW27	NNW22	NNW28	NNW25	NW23	NW31	NNW38	NNW33	N27	NNW29	NNW27	NNW29	NNW39	NNW36	NNW30	NNW27	N24	N21	NNW28	NNW31	NNW26.5	NNW39
2-May	NW40	NW41	NNW31	NNW26	NW28	NW37	NW39	NW36	NNW35	N34	NNW36	NNW31	N24	N23	N25	N26	NNE22	NNE24	NNE23	NNE25	N28	N31	N31	N32	NNW28.1	NW41
3-May	N29	N32	N32	N29	N27	N24	N24	N18	N18	N16	N15	N14	N16	NE15	NE15	NNE10	NE14	NE15	ENE16	NE18	NE22	ENE20	ENE15	E11	NNE17.3	N32
4-May	SE5	SE4	E4	ENE2	NNE3	ENE7	ESE5	SE4	SSW3	SSW4	WSW6	WSW5	SE5	SSE5	SE6	SE7	SSE7	SSW10	SW15	SSW7	E11	S15	SE12	ESE15	SSE4.7	ESE15
5-May	SE9	S7	SSW8	S5	SSE7	SSE8	SSE9	SE7	SE7	ESE8	E6	NNE4	NNE5	NNE6	N9	ENE15	ENE16	ENE24	ENE28	ENE29	ENE28	E29	E28	ENE21	E10.5	ENE29
6-May	ENE20	NE21	NE27	NNE23	NNE24	NNE23	NNE23	NNE22	NNE21	NNE23	NNE27	NE22	NNE19	NNE21	NE23	NNE22	NE20	NNE22	N18	NNW15	NNW17	NNW16	NNE17	NNE18	NNE20.0	NE27
7-May	N14	N15	N20	N19	N20	N21	N16	N16	N16	N27	N31	N32	N28	N27	N25	N24	N27	N25	NNE20	NE14	NE13	ENE3	NNE10	NE10	N19.0	N32
8-May	NE11	NE18	ENE11	E7	ESE7	ESE3	SE4	NE3	N4	E2	S1	N6	NNE16	NNE14	NNE17	NNE22	NNE24	NNE18	NNE17	NNE13	NE12	N9	N11	N14	NNE9.5	NNE24
9-May	N15	N15	N13	NNW12	NNW11	NNW5	NW4	NW12	NNW14	NNW11	N12	N11	NNW9	NNW7	NNW16	NNW16	N19	N22	N10	NNW6	NNW17	N23	NNW21	NNW23	NNW13.2	NNW23
10-May	NNW24	NNW28	NW24	NW24	NW20	NW27	NNW30	NNW32	NW30	NNW20	NNW21	NNW30	NNW27	NNW21	NW18	NNW16	NNW16	N16	NNW15	NNW13	NNW13	NNW11	WNW8	W10	NW19.6	WNW32
11-May	W12	NW12	NW19	NW15	NW15	NNW10	W12	NW8	SW11	SW15	W21	NW28	N19	NNW20	NNW18	NNW13	NNW16	N14	NNE14	NE20	NE24	NE21	E15	ESE16	NNW9.4	NW28
12-May	E14	ESE7	ENE5	E8	E7	ESE7	SE6	S1	N2	NNW3	NNW6	N8	N11	N12	N13	NNE17	NNE21	NNE24	NE26	NE20	NE18	ENE26	ESE23	SE18	NE9.3	ENE26
13-May	SSE10	SSE10	S6	S8	SW4	SSE4	SSW7	S7	S6	S6	S5	ENE6	NNE6	SW3	N7	N18	NNE18	NNE19	NE19	NNE19	NE16	E22	E21	E17	ENE5.0	E22
14-May	ESE16	SE13	SSE11	SSE12	SSE11	SSE18	SSE18	SSE12	ESE10	SE10	SE18	SE22	SE22	SE21	SE21	SE25	SE29	SE36	SSE31	SSE29	SE29	SW27	S17	SE24	SE18.7	SE36
15-May	SE26	SSE13	SSE12	SE21	SE13	ESE7	ENE12	NNE22	NNE33	NNE35	NNE36	NNE31	N33	N34	N32	N37	N37	N29	N36	N28	NNW23	NNW22	NNW23	NNW20	N18.1	N37
16-May	NNW21	N21	N19	N16	N10	NNW3	W1	NW3	SW2	WSW6	WSW5	WSW6	SW7	WSW7	WSW7	SSW2	ENE5	ENE4	SE9	SE15	ESE12	E19	ESE20	ESE12	NE2.0	NNW21
17-May	SE9	SE18	SSE10	SSE14	SE15	SE14	SSE6	SSE2	SE6	WSW3	W7	WSW6	W9	SW3	WSW5	N7	NNW6	ENE9	ENE13	ENE12	E20	ESE19	E11	NE6	ESE5.2	E20
18-May	NNE13	NNE10	ENE9	NE12	ENE13	ENE13	ENE10	NNE4	WNW1	SSW2	NW10	N18	N15	NNE19	NNE15	NE9	N16	NNW11	S16	SSW13	WSW6	N4	NW8	NW3	NNE6.1	NNE19
19-May	SSE3	S11	S15	SSE15	SSE16	S18	S17	S15	S14	SSE17	SSE15	S14	SSE18	SSE22	S22	S23	S23	S23	SSW26	SSW31	SSW26	SSW22	SSW26	SSW24	S18.4	SSW31
20-May	S17	S27	S29	S28	S26	SSE24	S21	S20	S23	S23	S25	S26	S26	SSW26	WSW26	SSE23	SE30	SE30	SSE36	SSE28	SE6	S16	SSE14	SSE25	S22.5	SSE36
21-May	SSE24	SSE25	SSE23	S20	SSW13	SSW10	SSW11	SSE16	SSE11	S5	WSW15	SW25	WSW38	SW22	WSW48	WSW50	WSW52	NNW32	NNW27	NW16	NW14	NW17	NNW12	W8	WSW14.7	WSW52
22-May	SW9	SW10	SW5	S4	SE13	SE13	SE17	S13	S7	S4	WSW6	WSW10	WSW24	WSW22	W23	WSW18	WSW15	WSW12	SW11	SSW11	SE2	SE8	SSE12	SSE14	SSW8.2	WSW24
23-May	SSE17	S17	S14	S6	SSW8	S11	SSW6	S7	SSW6	SE13	SE12	SE8	SE10	SE12	SSE14	SSW10	SSW6	S6	NW3	ESE13	SE23	ESE22	W31	NNW47	S7.1	WNW47
24-May	NW24	W12	W30	W26	NNW30	NW26	NW13	N4	NN12	NNW14	W22	NNW18	NNW20	N18	NNE14	NNW14	NW21	NW22	N15	NE13	ENE15	E14	ESE12	E7	NW11.6	WNW30
25-May	ESE6	ESE10	SSE5	S5	SSE6	SSE5	SSE6	SE12	SE16	SE16	SE14	SE10	SE11	SE12	SSE16	SE17	SE18	SE20	SE26	SE27	SE32	SE31	SSE33	SE33	SE16.0	SE33
26-May	SE28	SE26	SE30	SSE13	E10	ESE14	ESE11	SE11	ESE15	SE23	SE27	ESE14	ENE10	ENE14	NE11	SE24	E24	E26	ENE27	ENE25	ENE24	E23	E20	ENE20	ESE16.6	SE30
27-May	NE20	NE17	NE16	NNE19	NNE17	NNE16	NNE18	NNE20	NNE19	NNE18	NNE19	NNE18	NNE21	NNE22	NNE24	NNE22	NNE15	NNE15	NNE15	NNE16	NE13	ENE11	E10	ESE11	NNE16.2	NNE24
28-May	ESE14	SE10	E7	E10	SE15	SE12	SE9	SE13	ESE14	E6	SE4	SE9	SE10	SE7	SE10	ESE13	ESE13	SE19	ESE18	SE19	SE17	SE20	SE17	SE28	SE12.7	SE28
29-May	SE17	SE14	SE8	SE11	SE12	SE10	ESE9	NE5	NNE9	NNE10	N15	N19	NNE19	N21	N21	N21	NNW34	NNW27	NNW25	NNW26	NW28	NW32	NNW35	NNW28	N10.9	WNW35
30-May	WNW30	W27	W37	W41	NNW43	W45	W44	NNW42	NNW38	NNW37	NNW39	NNW40	NW45	NNW45	NW43	NW30	N12	NE12	N14	N8	NE12	ENE13	ESE5	SSW6	WNW25.1	W45
31-May	SW12	SW16	SW5	N2	ENE4	NNE6	NNW9	NNW6	N7	N8	N15	N13	NE14	NNE15	NE16	NE15	NE16	NNE19	NNE18	NNE21	ENE23	ESE25	SE30	SE35	NE7.6	SE35

NNE1.0	NNE0.6	N1.3	NNW1.8	NNW2.2	NNW1.6	NW1.9	NNW3.0	NNW3.8	N4.3	NNW6.1	NNW7.5	N7.6	N7.1	NNW7.6	N6.3	NNE8.2	NNE9.2	NE8.1	NE7.1	NE9.2	ENE7.4	E4.3	E3.4	Diurnal Average	
NW40	NW41	W37	W41	NNW43	W45	W44	NNW42	NNW38	NNW37	NNW39	NNW40	NW45	NNW45	WSW48	WSW50	WSW52	NNW36	N36	SSW31	SE32	NW32	NNW35	NNW47	Diurnal Maximum	

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



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

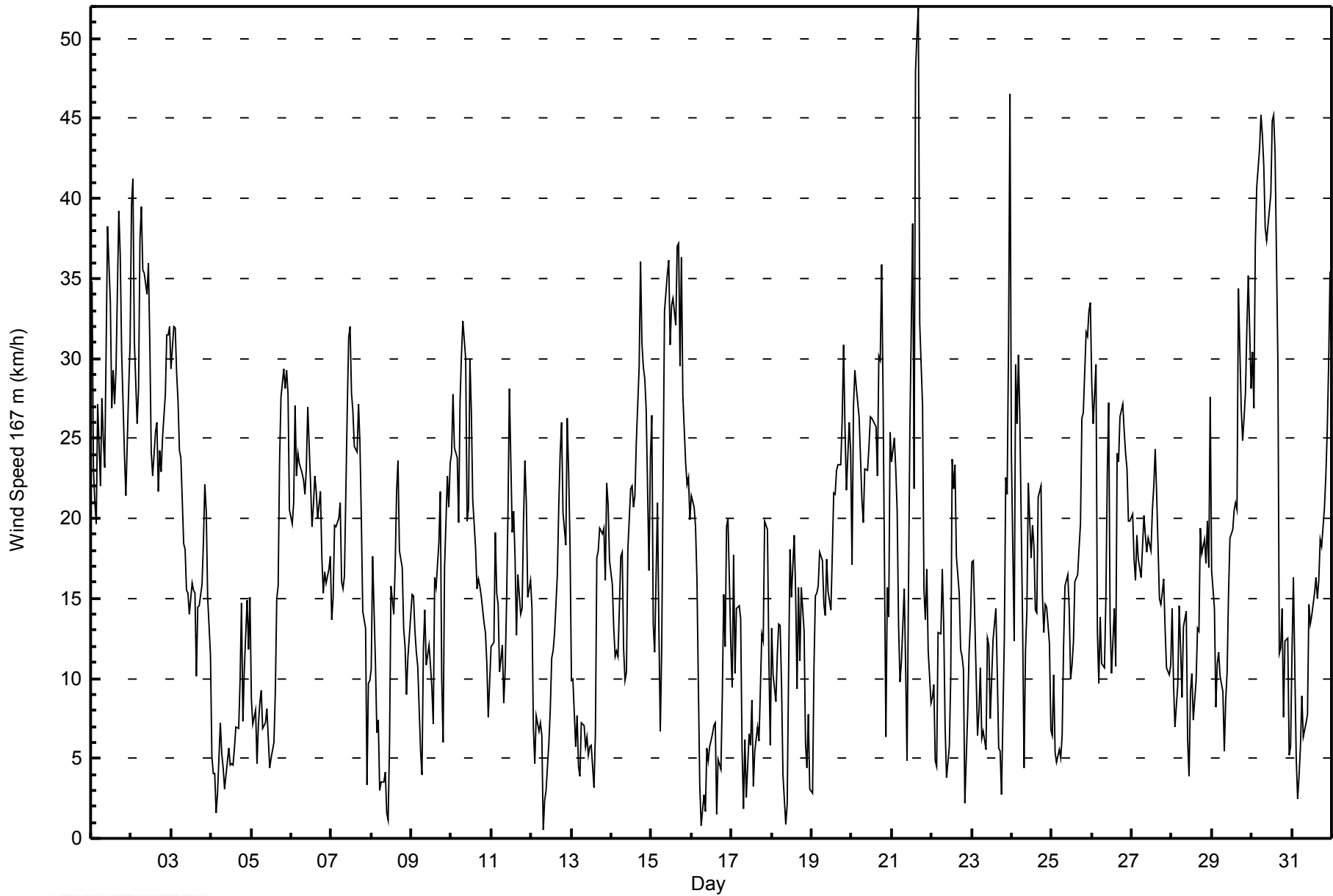
**Wind Speed 167 m (WS167m) - km/h**  
**Lower Camp Met Tower - May 2014**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 13 km/h on May 23 23:00																	Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Minimum Value: 0 km/h on May 16 02:00																									
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> = 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-May	4	7	2	7	4	4	3	4	6	8	6	6	6	6	6	7	6	7	6	4	5	3	4	4	8
2-May	5	7	11	10	6	6	5	6	6	6	6	5	5	6	4	5	5	5	4	5	7	7	5	6	11
3-May	5	5	4	4	4	4	3	3	3	3	3	3	4	4	3	5	4	3	3	2	2	1	1	5	
4-May	3	1	1	1	1	1	1	2	2	2	3	2	3	2	4	4	3	4	4	6	4	3	2	6	
5-May	3	2	2	2	3	3	2	2	1	2	3	2	3	3	3	4	6	5	8	3	3	5	5	3	8
6-May	3	2	2	3	3	4	4	3	4	6	5	5	6	7	7	9	6	4	5	2	1	2	2	2	9
7-May	1	2	2	1	2	3	3	3	4	5	5	5	4	4	5	4	4	5	5	3	3	3	4	3	5
8-May	4	2	3	2	3	2	2	1	2	1	1	2	3	3	4	4	3	4	3	3	2	2	1	1	4
9-May	1	1	2	1	3	2	2	3	3	3	2	3	4	5	4	4	6	6	7	2	7	5	3	2	7
10-May	2	2	2	3	3	5	3	3	5	4	7	7	4	5	3	3	4	3	2	2	1	2	1	1	7
11-May	1	3	3	3	3	2	2	4	2	3	6	6	4	6	7	5	7	4	3	3	1	2	4	2	7
12-May	3	2	2	1	1	1	2	1	2	3	2	4	4	5	5	4	4	4	5	4	3	7	5	7	7
13-May	4	3	2	1	2	1	1	1	2	2	2	2	3	4	5	5	5	3	3	3	2	1	2	5	
14-May	3	3	3	4	2	2	4	2	2	3	3	4	3	3	4	4	4	3	8	7	5	4	2	4	8
15-May	2	6	4	3	3	3	2	8	6	7	7	6	6	5	4	7	6	4	5	5	2	2	2	2	8
16-May	1	0	1	2	2	2	1	1	1	2	3	3	2	3	2	2	3	3	5	2	2	4	3	3	5
17-May	3	2	7	5	2	2	2	1	2	2	1	2	2	2	3	3	2	6	2	3	3	3	3	3	7
18-May	2	2	3	3	2	4	4	3	2	3	5	2	3	3	3	4	5	5	3	5	2	3	3	2	5
19-May	2	3	3	2	2	3	3	3	4	3	4	5	6	6	4	5	5	5	4	4	4	3	4	4	6
20-May	4	3	3	2	5	3	4	4	4	4	5	5	5	5	9	10	3	7	5	5	5	7	9	4	10
21-May	4	3	2	3	4	2	2	3	2	3	4	9	9	10	5	7	6	7	8	3	7	2	3	2	10
22-May	2	2	2	1	4	2	3	3	2	2	3	7	5	4	3	5	3	4	6	2	4	2	2	3	7
23-May	4	3	3	2	4	4	2	2	1	2	1	2	3	3	5	4	3	2	2	8	5	4	13	7	13
24-May	7	11	5	5	4	4	3	4	5	4	6	5	6	4	3	4	4	4	3	2	2	1	1	3	11
25-May	2	1	1	2	2	2	2	1	3	3	3	3	4	4	4	5	5	4	5	3	3	2	5	3	5
26-May	3	4	4	8	2	3	4	2	4	6	4	3	2	2	4	6	4	4	4	3	3	4	3	3	8
27-May	3	3	2	2	4	2	3	3	4	3	3	3	3	4	4	4	3	2	2	2	3	1	3	2	4
28-May	2	4	3	2	2	2	2	3	3	3	3	3	3	2	3	3	4	4	3	3	3	2	3	3	4
29-May	5	6	3	2	2	1	2	2	1	2	4	2	3	3	2	3	4	3	2	3	3	3	3	4	6
30-May	4	5	3	4	5	4	5	5	6	6	6	9	9	8	7	8	2	3	4	3	7	4	2	1	9
31-May	3	5	3	2	2	1	2	3	2	3	3	3	5	4	4	5	4	4	3	3	3	4	5	3	5
Diurnal Maximum																									
7	11	11	10	6	6	5	8	6	8	7	9	9	10	9	10	7	7	8	8	7	7	13	7		



**WBEA**  
**Hourly Averages**

**Wind Speed 167 m (WS167m) - km/h**  
**Lower Camp Met Tower - May 2014**







**WBEA**  
**Cumulative Frequency Distribution**

**Wind Speed 167 m (WS167m) - km/h**  
**Lower Camp Met Tower - May 2014**

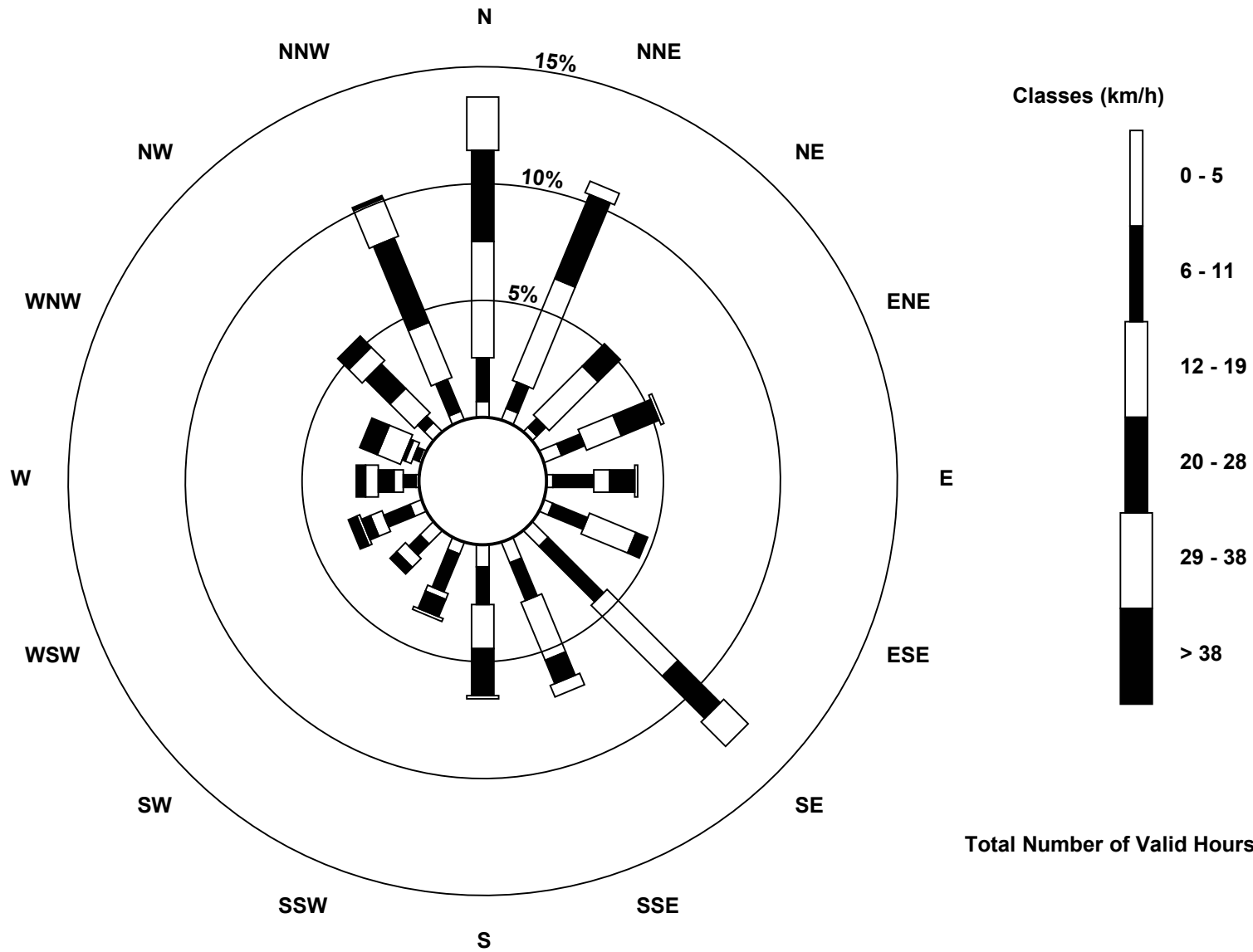
<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	66	8.87	8.87
6 - 11	157	21.10	29.97
12 - 19	238	31.99	61.96
20 - 28	193	25.94	87.90
29 - 38	72	9.68	97.58
> 38	18	2.42	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

Wood Buffalo Environmental Association  
 Wind Rose May 2014

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 - May 2014**

Direction of Maximum Speed: 248 deg on May 21 16:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 339.8 deg on May 2	Hours of Data: 736
Direction of Minimum Speed: 32 deg on May 11 23:00	Direction of Minimum Daily Speed Average: 1.1 deg on May 17
Direction of Minimum Speed: 32 deg on May 11 23:00	Hours of Missing Data: 8
Monthly Average Direction: 326.1 deg	Percent Operational Time: 98.9

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-May	269	326	325	334	329	317	334	323	306	323	339	348	352	340	335	325	335	334	343	341	349	334	323	323	331.4
2-May	313	311	332	331	312	311	312	320	332	345	336	343	356	357	357	355	24	15	9	2	1	358	351	345	339.8
3-May	349	350	350	358	354	4	8	2	353	347	348	356	29	32	18	51	45	58	38	35	17	352	60	7.1	
4-May	326	348	321	307	295	293	289	295	184	183	226	216	131	161	128	131	146	207	220	217	87	179	123	AF	189.1
5-May	AF	AF	AF	AF	AF	AF	166	AF	127	126	111	352	353	9	352	62	67	57	69	53	48	67	71	52	--
6-May	36	19	18	0	8	13	8	11	2	22	17	30	24	33	44	21	37	9	358	321	335	338	320	333	14.4
7-May	327	309	331	350	321	339	352	348	345	353	348	350	352	351	358	350	360	2	18	36	56	87	16	30	355.6
8-May	61	41	107	66	344	348	6	8	358	101	167	7	20	21	14	12	15	23	357	19	19	358	325	341	14.1
9-May	321	332	331	327	331	344	314	303	345	338	0	14	354	335	346	337	352	356	357	293	319	344	323	323	338.4
10-May	325	325	329	325	329	294	285	287	303	333	321	328	333	334	318	320	337	338	319	311	306	304	296	152	315.6
11-May	183	288	87	252	305	118	225	111	222	225	280	315	352	340	348	267	328	347	21	29	26	14	32	29	323.5
12-May	8	21	355	4	0	358	300	234	213	352	335	357	4	359	1	21	17	23	32	30	26	68	122	110	17.6
13-May	172	7	343	312	67	131	130	139	143	138	123	77	47	204	345	2	13	12	31	21	36	50	325	355	55.6
14-May	352	343	315	143	123	117	139	137	152	158	125	128	137	134	128	128	131	137	156	155	145	227	148	132	141.0
15-May	123	283	140	152	353	37	9	9	7	5	5	358	357	355	355	360	356	349	341	340	316	315	334	272	356.7
16-May	303	314	288	272	21	88	290	20	185	234	235	227	230	239	233	204	66	82	140	150	75	9	115	43	189.4
17-May	338	315	283	186	101	328	348	28	194	244	261	247	271	198	241	358	357	43	64	47	63	68	54	327	313.9
18-May	342	359	8	346	3	28	335	333	349	272	306	352	353	0	16	27	354	320	178	209	257	236	327	71	345.5
19-May	120	157	151	143	152	148	148	154	170	141	160	175	161	162	175	189	171	174	195	196	188	188	196	184	171.0
20-May	166	142	156	153	143	140	150	165	170	168	184	174	182	195	235	141	139	132	144	151	35	142	100	154	161.1
21-May	145	141	144	146	141	142	141	146	144	122	263	235	250	210	244	248	256	287	332	323	325	294	190	139	206.7
22-May	130	147	128	13	360	326	300	139	147	168	216	229	259	263	267	256	255	258	230	217	25	12	334	342	245.8
23-May	83	115	98	143	136	138	133	141	141	144	146	149	150	144	194	169	165	344	101	135	138	271	294	155.9	
24-May	316	259	259	270	288	305	331	22	324	339	284	326	338	4	15	341	311	323	359	43	59	17	25	53	320.6
25-May	62	6	37	332	309	289	294	218	141	137	124	155	158	154	151	149	135	121	135	126	127	132	136	134	136.9
26-May	132	122	134	143	6	51	8	90	115	139	138	26	328	348	339	121	75	48	33	36	27	50	35	9	82.2
27-May	1	349	356	347	342	339	353	4	12	13	17	13	10	5	3	15	16	16	8	5	12	15	25	76	6.1
28-May	87	123	17	55	60	31	88	126	95	87	123	141	133	143	133	119	111	130	112	128	122	118	136	129	118.0
29-May	117	120	37	31	360	15	21	328	340	332	333	348	358	343	340	334	332	326	318	317	312	300	291	279	325.5
30-May	278	266	267	277	279	274	277	287	295	303	292	301	305	304	311	318	15	66	12	194	17	43	134	148	292.8
31-May	226	244	103	358	339	322	11	244	348	8	353	348	28	14	21	21	23	10	11	15	18	100	133	133	22.9

337.6 328.0 343.2 331.0 331.9 337.6 322.0 331.9 334.1 2.1 323.5 333.6 342.8 342.3 337.3 349.3 10.7 15.4 32.0 44.3 33.4 33.1 21.7 41.3  
 Diurnal Average

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



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

**Wind Direction 20 m (WD20m) - deg**  
**Lower Camp Met Tower - May 2014**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 103 deg on May 31 07:00	Hours of Data: 736
Minimum Value: 7 deg on May 20 20:00	Hours of Missing Data: 8
Percentiles: P <sub>1</sub> = 10 P <sub>10</sub> = 15 Q <sub>1</sub> = 19 Median = 26 Q <sub>3</sub> = 41 P <sub>90</sub> = 66 P <sub>99</sub> = 98	Hours of Calibration: 0
	Percent Operational Time: 98.9

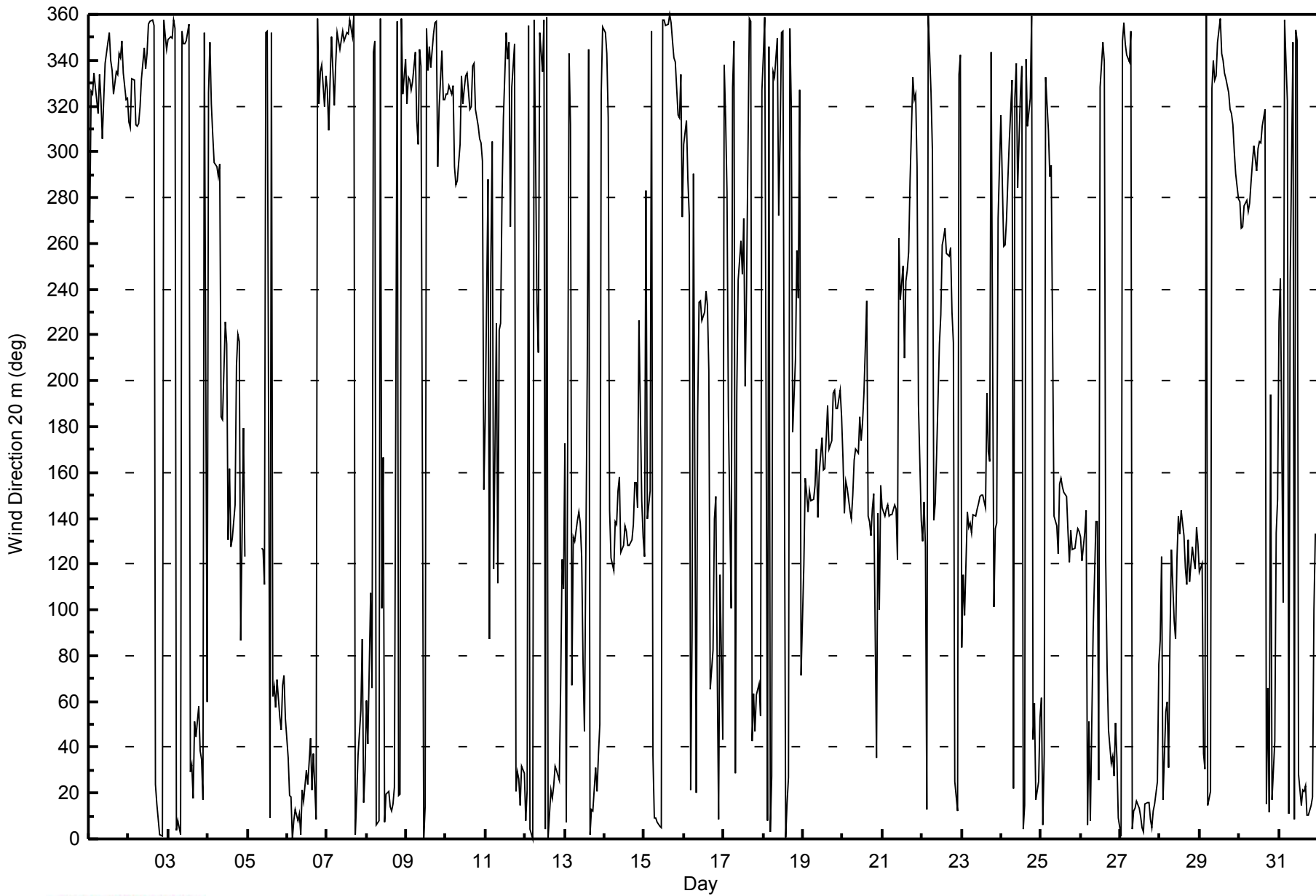
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-May	43	35	32	23	16	31	18	22	20	24	19	21	20	21	23	21	19	22	19	18	18	17	14	17	43
2-May	14	15	28	23	16	15	14	16	17	17	17	18	23	24	20	23	27	25	23	21	21	20	19	17	28
3-May	18	18	17	20	19	20	23	25	26	28	25	24	24	29	39	53	39	34	29	20	18	35	37	57	57
4-May	33	37	16	25	13	27	36	77	44	41	61	40	31	66	37	41	47	20	11	74	53	20	23	77	
5-May	AF	AF	AF	AF	AF	AF	31	AF	19	23	63	84	47	73	52	30	30	23	33	20	19	21	20	84	
6-May	18	19	18	19	19	20	21	21	22	29	29	28	35	30	30	35	37	25	36	17	20	33	31	32	37
7-May	28	27	29	40	41	21	25	19	21	23	21	20	23	22	24	24	24	23	28	26	23	76	47	84	84
8-May	36	78	96	45	65	37	54	29	34	67	67	33	22	33	31	24	24	27	22	22	26	31	15	27	96
9-May	13	13	16	15	73	66	35	39	22	27	34	29	38	63	27	24	27	25	46	24	22	21	14	15	73
10-May	16	12	16	25	22	25	15	17	19	25	19	18	19	19	17	20	21	19	17	14	12	9	39	42	42
11-May	66	76	63	54	89	34	59	100	13	22	39	25	25	31	45	54	32	29	27	18	23	21	95	27	100
12-May	48	42	18	56	30	35	43	53	84	98	48	62	44	51	44	34	30	26	21	22	21	61	22	91	98
13-May	99	85	28	93	82	18	20	15	14	19	27	27	42	67	84	28	29	25	26	20	22	66	51	69	99
14-May	34	65	71	74	14	25	18	16	17	22	20	18	18	21	18	14	13	20	26	27	11	32	13	74	74
15-May	31	81	102	52	26	27	35	26	22	22	22	20	18	19	20	20	18	18	18	18	12	14	34	33	102
16-May	57	33	29	20	56	38	56	63	67	34	67	27	29	35	37	73	63	55	30	9	68	58	25	58	73
17-May	79	82	79	43	87	14	29	79	31	30	21	25	40	54	47	54	30	26	20	15	27	60	49	80	87
18-May	21	32	26	14	27	43	70	53	86	75	33	20	20	25	30	49	44	47	15	75	87	96	75	86	96
19-May	99	51	31	23	10	11	9	16	25	14	23	29	20	20	19	14	15	17	10	13	11	10	12	12	99
20-May	15	10	13	16	11	13	15	13	12	16	16	15	15	15	42	61	14	16	14	7	65	72	96	15	96
21-May	14	12	8	9	9	11	12	14	14	43	37	32	32	28	16	15	17	40	19	19	50	87	31	19	87
22-May	26	75	25	51	37	28	43	77	21	45	40	54	23	24	21	21	27	28	39	76	81	75	72	39	81
23-May	74	81	54	23	19	24	34	16	16	16	24	17	10	21	26	36	56	61	41	57	23	21	64	16	81
24-May	23	24	18	18	17	31	34	52	55	28	30	46	33	26	38	32	21	18	30	27	36	72	17	50	72
25-May	50	54	59	26	31	27	37	81	23	21	30	27	14	34	25	20	23	21	16	15	14	14	16	15	81
26-May	20	17	15	53	35	30	43	59	23	18	20	41	16	41	49	49	30	27	26	29	30	32	32	22	59
27-May	22	18	22	17	22	21	23	25	26	29	26	28	26	26	23	24	29	27	24	24	37	28	34	38	38
28-May	44	55	50	43	90	38	91	23	27	46	66	29	22	29	28	28	27	20	25	21	20	20	28	19	91
29-May	44	88	65	39	43	37	49	34	30	29	18	19	23	21	20	20	21	18	16	19	17	20	16	17	88
30-May	17	17	17	18	18	19	18	19	19	21	21	22	23	19	18	19	65	57	71	60	76	75	47	65	76
31-May	81	33	59	65	80	87	103	84	29	46	31	27	42	38	38	46	37	30	25	23	29	98	19	15	103
	99	88	102	93	90	87	103	100	86	98	67	84	47	73	84	73	65	61	71	76	87	98	96	91	
	Diurnal Maximum																								

AF - Analyzer Failure



WBEA  
Hourly Averages

Wind Direction 20 m (WD20m) - deg  
Lower Camp Met Tower - May 2014





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

**Wind Direction 45 m (WD45m) - deg**  
**Lower Camp Met Tower - May 2014**

Direction of Maximum Speed: 250 deg on May 21 16:00		Hours in Service: 744
Direction of Maximum Daily Speed Average: 346.4 deg on May 2		Hours of Data: 738
Direction of Minimum Speed: 104 deg on May 11 08:00	Direction of Minimum Daily Speed Average: 1.1 deg on May 17	Hours of Missing Data: 6
Monthly Average Direction: 329.5 deg		Percent Operational Time: 99.2

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-May	269	334	337	335	336	322	335	327	308	326	342	352	357	344	340	328	338	339	348	345	356	342	329	326	335.9
2-May	317	315	338	336	315	315	315	323	336	351	342	347	1	4	4	1	28	20	13	10	10	5	357	352	346.4
3-May	355	356	356	5	1	10	14	8	358	354	353	354	1	34	40	22	52	50	59	41	39	36	24	47	13.3
4-May	6	1	349	335	325	319	301	315	180	183	235	220	132	153	130	131	153	207	221	214	90	179	127	AF	181.9
5-May	AF	AF	AF	AF	AF	143	176	119	127	123	96	3	359	16	357	65	72	61	73	57	54	74	77	58	68.5
6-May	41	23	22	6	12	18	15	15	10	26	23	35	27	36	47	25	39	14	1	328	338	352	349	353	19.2
7-May	347	341	348	354	343	347	3	354	350	359	355	354	358	357	3	357	6	8	24	41	60	86	29	44	3.1
8-May	63	54	100	79	9	2	20	16	8	87	165	9	27	27	19	18	21	29	4	25	24	8	339	348	21.1
9-May	337	342	342	338	345	355	320	307	350	343	4	15	2	341	351	343	359	2	358	308	329	352	333	332	346.1
10-May	331	329	332	321	326	297	288	289	306	340	328	332	338	340	323	325	342	345	325	317	313	314	289	210	319.6
11-May	209	290	71	314	318	116	246	104	223	227	280	319	356	348	352	270	332	356	27	33	33	31	65	44	335.3
12-May	25	21	1	8	4	4	326	239	222	331	340	359	8	1	3	23	24	29	35	35	29	66	124	133	23.7
13-May	176	130	351	332	264	143	133	138	141	139	129	77	45	209	352	7	17	18	36	26	41	67	80	24	56.0
14-May	35	354	320	144	129	122	137	137	150	155	128	131	138	137	130	133	139	155	153	143	228	155	133		141.5
15-May	128	210	146	141	19	53	32	17	11	12	11	5	4	4	2	6	3	355	347	345	324	326	333	318	5.6
16-May	335	350	3	265	335	69	321	22	185	242	243	232	234	244	238	213	63	83	141	148	91	45	113	70	168.6
17-May	34	344	327	147	137	345	2	31	186	245	263	250	271	205	251	5	2	48	68	54	68	86	63	336	354.4
18-May	347	4	14	354	9	28	346	336	358	277	311	356	359	8	23	31	359	330	179	208	259	195	315	101	353.2
19-May	312	155	154	140	152	148	149	156	171	144	160	175	162	162	177	189	173	177	193	195	187	188	195	185	171.1
20-May	169	147	159	157	145	140	151	168	172	170	184	175	183	195	237	142	140	135	145	152	55	148	89	159	161.5
21-May	151	144	146	149	144	144	144	147	144	126	265	237	252	213	245	250	258	291	336	325	329	321	228	148	211.9
22-May	139	145	141	78	11	353	338	143	146	165	221	233	260	262	268	257	255	259	232	202	42	51	348	28	240.1
23-May	125	131	114	144	139	140	134	141	139	144	143	147	150	149	146	196	174	168	353	101	133	136	271	296	155.5
24-May	321	263	259	272	289	304	336	24	326	345	286	331	344	14	26	348	312	327	5	48	61	42	47	63	325.6
25-May	69	8	18	6	353	311	300	218	141	137	125	151	157	152	153	149	135	123	136	130	129	135	140	137	136.8
26-May	132	125	136	142	24	51	33	91	116	139	139	50	336	358	344	124	82	56	40	42	35	60	46	18	81.9
27-May	10	355	3	353	350	347	359	13	21	21	23	19	18	13	10	23	25	22	17	12	22	23	41	81	14.1
28-May	90	127	47	65	84	61	84	129	99	84	121	141	134	142	133	123	115	132	114	130	124	121	131	131	119.2
29-May	123	118	54	60	18	44	38	339	346	343	339	355	6	349	343	341	336	332	322	323	314	301	293	281	330.6
30-May	279	267	266	275	279	275	278	287	298	305	293	304	308	305	315	321	18	61	20	186	31	49	141	181	294.5
31-May	216	239	115	11	350	339	355	251	354	11	1	359	33	22	26	30	31	19	18	24	31	113	135	135	33.6

350.5 343.1 358.0 351.8 346.1 355.8 342.1 349.9 355.0 9.4 336.9 345.2 352.1 355.6 347.0 359.5 16.3 22.1 36.5 46.6 40.4 46.5 37.2 49.6  
 Diurnal Average

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



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

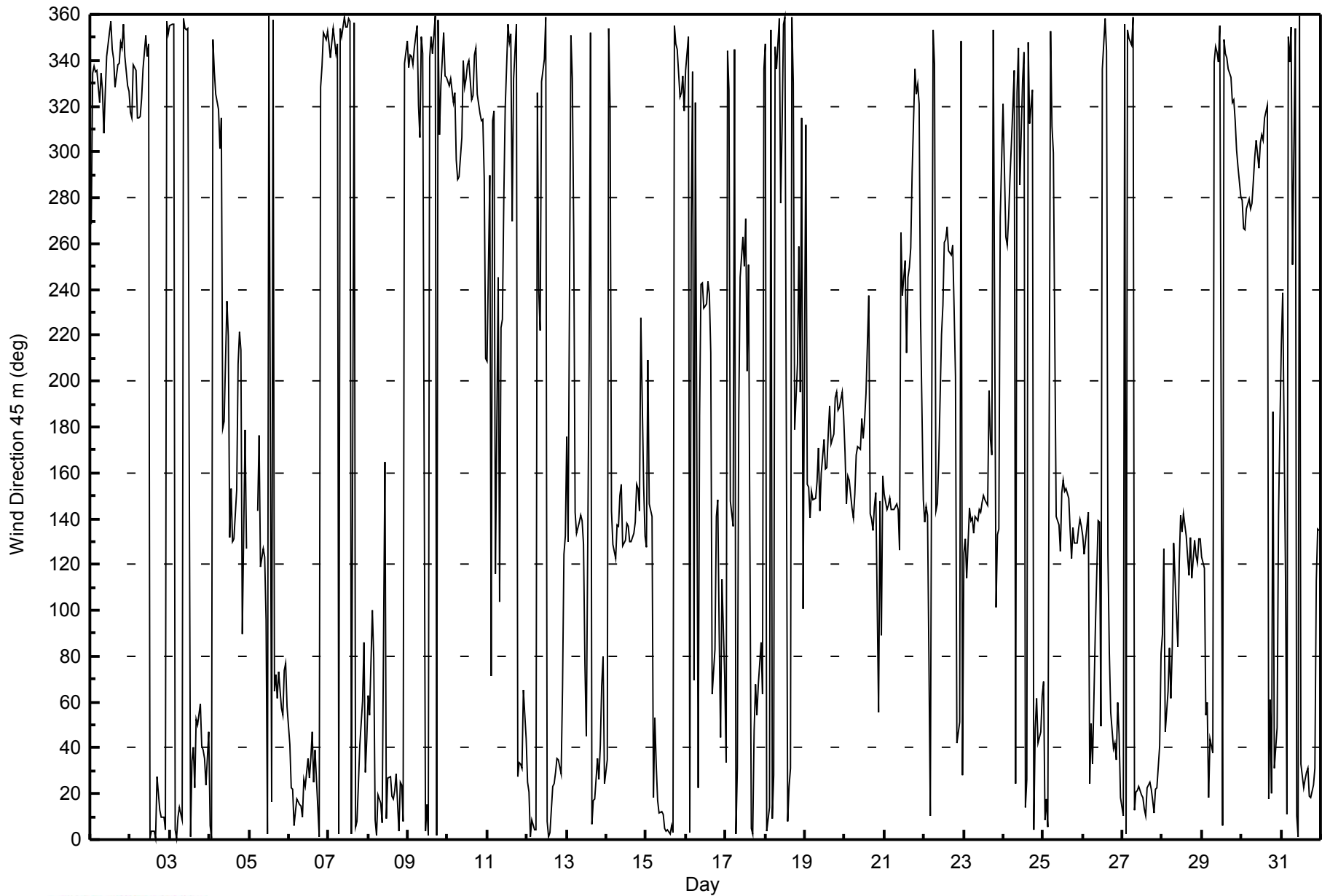
**Wind Direction 45 m (WD45m) - deg**  
**Lower Camp Met Tower - May 2014**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 102 deg on May 12 10:00 Minimum Value: 5 deg on May 21 06:00 Percentiles: P <sub>1</sub> = 7 P <sub>10</sub> = 12 Q <sub>1</sub> = 15 Median = 19 Q <sub>3</sub> = 35 P <sub>90</sub> = 61 P <sub>99</sub> = 86																								Hours in Service: 744 Hours of Data: 738 Hours of Missing Data: 6 Hours of Calibration: 0 Percent Operational Time: 99.2	
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-May	32	36	20	19	13	20	14	18	16	20	15	17	16	19	19	17	15	20	17	16	14	15	13	15	36
2-May	12	12	27	22	15	13	12	13	14	14	13	15	18	18	14	19	21	19	18	17	16	15	14	14	27
3-May	15	14	13	15	15	15	15	18	19	21	21	20	17	24	32	40	33	29	24	17	13	19	28	62	
4-May	48	22	13	19	14	32	52	76	47	42	59	40	32	65	31	32	44	19	10	69	46	18	70	AF	
5-May	AF	AF	AF	AF	AF	37	28	27	18	19	59	77	38	75	50	26	23	20	27	16	14	15	15	17	
6-May	15	13	12	14	13	14	17	15	17	23	21	22	29	24	23	30	32	20	33	19	13	13	14	17	
7-May	16	18	16	24	23	16	21	14	17	18	18	15	18	17	18	19	18	19	22	19	19	67	28	51	
8-May	27	54	71	35	61	32	48	24	28	69	77	26	17	26	25	17	16	19	17	14	16	24	12	18	
9-May	9	10	12	11	44	67	31	38	18	23	28	20	34	56	23	20	22	18	33	27	19	19	14	13	
10-May	14	9	12	19	19	22	11	11	17	23	15	16	15	15	16	16	18	15	13	13	9	7	35	52	
11-May	56	70	48	44	61	63	47	97	11	19	38	24	18	28	39	60	31	24	23	13	14	11	76	19	
12-May	39	27	13	16	14	17	38	52	82	102	53	54	29	37	43	28	25	21	16	19	16	48	18	73	
13-May	41	78	21	91	87	16	16	11	10	15	25	25	36	69	78	20	24	18	21	14	13	62	88	72	
14-May	25	39	58	33	10	14	15	14	13	18	15	15	16	18	17	13	11	9	19	23	25	10	29	10	
15-May	13	96	84	35	28	20	22	23	15	15	16	16	15	14	14	14	14	14	14	15	9	10	24	16	
16-May	11	24	36	51	49	63	64	64	73	29	73	25	24	29	31	73	50	51	25	7	41	53	22	27	
17-May	61	55	86	21	34	16	30	75	29	33	14	21	33	51	44	44	24	24	14	12	16	34	40	77	
18-May	14	22	22	11	17	36	50	49	87	73	29	16	15	16	23	43	39	47	12	69	86	73	60	99	
19-May	98	29	19	12	8	7	7	15	23	12	21	26	18	19	16	13	12	14	9	12	9	8	11	9	
20-May	12	9	12	15	10	8	13	10	9	13	13	12	14	14	43	58	9	12	11	6	64	66	73	12	
21-May	14	10	5	8	5	5	7	11	10	37	30	31	31	27	13	11	12	40	17	16	13	48	39	47	
22-May	5	21	12	59	37	21	75	61	16	45	36	55	17	17	15	15	22	23	37	66	57	64	23	63	
23-May	55	46	61	30	15	15	23	11	12	11	19	14	9	18	22	35	48	61	38	48	19	17	56	13	
24-May	21	24	13	14	12	23	30	49	52	26	25	45	27	19	22	31	16	14	21	19	24	67	23	29	
25-May	47	20	49	25	70	61	53	77	19	17	23	22	11	29	23	17	19	16	12	11	10	10	12	11	
26-May	14	13	10	43	26	19	37	42	19	16	15	40	14	22	56	36	21	18	16	16	16	19	23	16	
27-May	18	13	17	13	17	16	18	18	19	19	17	18	18	18	17	16	19	19	18	17	29	19	26	19	
28-May	28	40	44	40	57	29	68	19	18	37	62	27	18	24	26	22	20	18	20	16	17	14	24	15	
29-May	34	62	68	39	45	41	45	25	22	23	14	15	17	16	15	16	15	12	10	14	12	13	10	13	
30-May	12	13	10	13	13	13	13	14	14	17	16	19	20	15	14	14	48	40	53	70	74	66	31	45	
31-May	63	24	26	45	35	78	78	84	24	39	21	22	34	30	31	37	28	23	17	14	14	62	15	10	
98 96 86 91 87 78 78 97 87 102 77 77 38 75 78 73 50 61 53 70 86 73 88 99																									
Diurnal Maximum																									
AF - Analyzer Failure																									



**WBEA**  
**Hourly Averages**

**Wind Direction 45 m (WD45m) - deg**  
**Lower Camp Met Tower - May 2014**







Direction of Maximum Speed: 257 deg on May 21 17:00		Hours in Service:	744
Direction of Maximum Daily Speed Average: 346.2 deg on May 2		Hours of Data:	744
Direction of Minimum Speed: 288 deg on May 25 03:00		Hours of Missing Data:	0
Direction of Minimum Daily Speed Average: 0.4 deg on May 16		Percent Operational Time:	100.0
Monthly Average Direction: 325.2 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-May	269	337	17	340	344	324	329	327	310	326	341	351	356	343	338	329	338	337	345	348	2	349	335	327	336.2
2-May	318	315	337	334	314	314	316	324	338	354	342	347	1	3	3	1	27	18	15	12	11	6	359	356	346.2
3-May	359	359	359	4	2	10	13	9	358	356	357	355	5	37	40	23	53	54	61	45	51	62	68	100	18.6
4-May	55	63	41	342	352	37	58	62	184	191	240	226	139	150	134	132	153	208	221	210	102	176	137	97	152.8
5-May	112	170	186	147	152	146	155	124	129	120	90	14	8	19	5	69	74	66	78	63	60	80	83	69	81.6
6-May	57	36	31	17	18	24	19	17	14	30	25	36	27	37	48	26	42	19	6	339	328	337	359	359	21.1
7-May	342	343	345	343	351	345	354	358	353	1	356	356	359	357	4	359	8	10	25	41	57	66	30	51	2.5
8-May	63	60	85	96	123	20	69	25	6	94	164	11	30	31	23	21	26	30	9	27	31	8	347	351	27.9
9-May	349	350	355	354	349	357	328	312	350	345	6	6	354	346	349	344	359	3	2	326	337	353	343	339	349.2
10-May	329	324	322	308	310	298	291	292	307	340	330	333	338	336	321	328	344	349	331	322	324	329	287	255	318.9
11-May	254	314	332	343	316	267	264	294	225	230	282	322	354	345	350	284	335	357	32	37	44	59	74	94	340.1
12-May	74	66	26	13	16	48	19	274	330	336	350	3	4	4	4	27	25	31	36	36	34	72	120	142	34.1
13-May	166	166	155	166	153	146	160	143	143	148	147	72	34	215	3	4	21	21	39	29	46	85	105	107	73.9
14-May	108	200	142	147	146	146	143	143	130	144	133	135	137	137	134	133	137	141	154	154	145	229	179	136	145.9
15-May	130	158	162	144	117	92	49	26	15	14	14	9	9	5	5	8	5	359	351	350	333	327	325	327	10.6
16-May	333	333	334	339	325	300	309	350	200	252	257	239	237	250	249	220	66	73	142	148	113	89	108	108	4.2
17-May	112	138	165	154	148	119	8	13	141	244	266	249	273	209	263	4	352	58	70	66	85	102	87	14	92.9
18-May	1	7	13	5	18	36	16	341	319	277	312	354	359	13	29	32	4	334	181	207	278	0	316	338	358.0
19-May	205	169	163	146	151	158	157	164	176	153	163	178	165	161	179	192	174	179	195	197	192	195	201	191	175.4
20-May	174	166	165	167	163	148	160	172	173	174	184	178	189	198	242	154	138	139	150	156	110	164	136	164	166.1
21-May	160	160	159	162	167	165	159	151	142	134	261	234	252	216	245	248	257	293	336	323	329	325	264	231	226.7
22-May	184	212	159	149	123	116	140	153	153	161	245	239	259	260	265	253	254	256	229	203	67	119	135	151	215.9
23-May	142	140	148	157	173	166	148	148	144	143	139	141	147	146	150	197	183	171	342	111	129	123	272	298	159.9
24-May	320	270	260	274	291	299	326	6	323	341	284	335	343	15	23	350	314	328	4	50	66	78	111	93	325.0
25-May	121	100	288	147	127	125	111	121	141	137	132	150	154	148	152	147	136	127	140	134	133	141	147	142	139.3
26-May	141	135	144	147	57	89	88	118	122	139	140	104	26	29	9	129	95	74	56	57	53	80	71	40	97.1
27-May	24	17	18	11	7	7	12	21	25	25	28	23	22	16	15	26	30	26	20	16	35	45	83	107	23.4
28-May	105	134	75	83	127	124	121	133	108	93	130	140	135	137	135	127	119	135	118	133	129	135	143	140	126.1
29-May	135	130	116	126	113	116	95	10	2	5	355	6	14	1	353	354	342	341	332	324	315	304	296	282	340.2
30-May	281	264	267	276	281	276	276	287	297	306	292	304	307	305	315	318	11	50	14	14	37	61	140	184	295.7
31-May	209	212	160	130	25	341	7	318	0	6	7	5	32	28	36	34	38	26	26	30	50	111	137	137	48.8
4.0 348.7 358.6 357.4 347.3 340.6 341.2 349.5 354.7 9.1 342.1 348.7 353.5 0.4 351.2 4.7 18.7 25.9 37.5 48.5 50.3 63.6 73.4 92.2																									
Diurnal Average																									

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



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

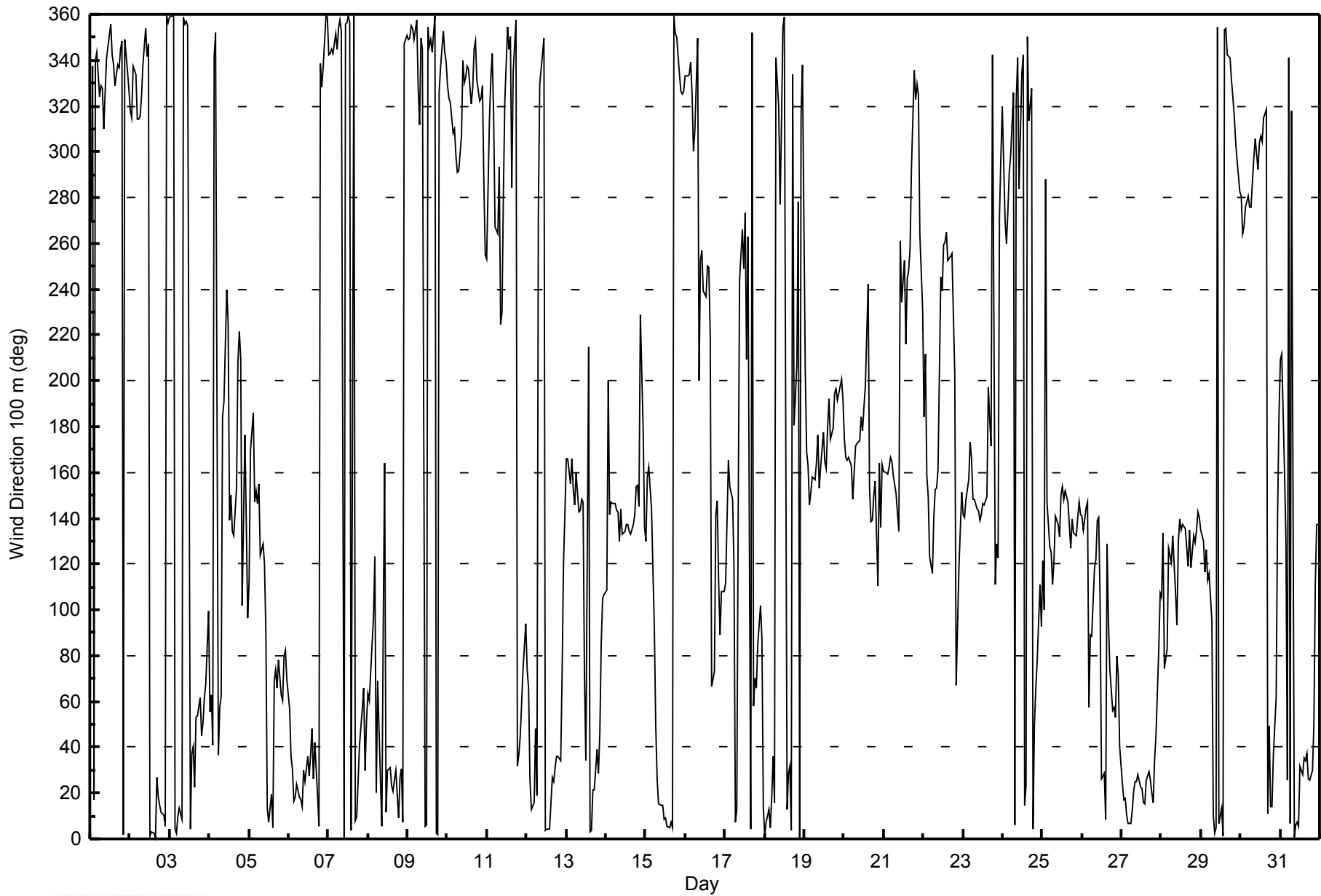
**Wind Direction 100 m (WD100m) - deg**  
**Lower Camp Met Tower - May 2014**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 99 deg on May 16 09:00																	Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Minimum Value: 2 deg on May 16 02:00																									
Percentiles: P <sub>1</sub> = 4 P <sub>10</sub> = 7 Q <sub>1</sub> = 9 Median = 13 Q <sub>3</sub> = 23 P <sub>90</sub> = 40 P <sub>99</sub> = 82																									
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-May	5	40	17	14	7	7	6	11	12	15	11	12	14	15	16	13	11	15	13	14	11	13	8	6	40
2-May	8	7	25	19	11	8	7	9	9	10	8	10	13	12	9	14	16	13	11	11	9	8	9	9	25
3-May	9	8	8	8	10	8	8	12	13	16	15	14	11	20	27	31	25	25	22	13	7	7	16	23	31
4-May	37	25	29	11	10	20	33	45	46	42	59	43	32	39	29	33	41	16	8	61	40	20	17	9	61
5-May	36	25	23	35	14	17	16	19	11	14	43	62	29	58	25	22	20	14	20	13	10	9	10	12	62
6-May	12	10	6	9	8	10	9	10	11	20	14	17	26	18	20	26	28	16	30	19	4	8	10	12	30
7-May	3	6	5	5	6	8	11	8	11	13	12	11	12	12	13	14	12	14	18	13	13	62	14	27	62
8-May	14	15	31	22	40	30	50	24	19	60	91	19	13	21	17	11	10	13	10	9	11	13	6	8	91
9-May	5	5	9	7	15	30	32	35	13	18	20	18	33	50	18	15	16	13	23	19	13	10	10	8	50
10-May	7	4	8	8	10	12	7	6	12	18	11	12	10	10	13	13	12	11	9	10	8	6	30	8	30
11-May	15	25	17	11	30	18	15	85	8	15	34	23	14	24	28	50	28	19	19	9	5	10	26	9	85
12-May	21	39	12	7	10	13	58	49	98	79	44	48	20	32	22	21	19	16	10	14	14	25	16	32	98
13-May	20	14	24	68	62	5	11	12	12	16	32	29	33	76	74	17	20	12	16	9	12	11	14	22	76
14-May	17	50	18	8	6	6	7	7	9	12	9	8	10	12	10	7	6	4	18	20	21	7	22	7	50
15-May	5	30	28	7	22	32	10	21	8	9	10	9	8	7	7	7	7	8	9	10	6	4	5	8	32
16-May	3	2	3	5	23	13	22	44	99	28	66	25	23	22	23	82	44	50	25	4	27	35	13	6	99
17-May	23	18	36	9	22	40	92	80	38	39	10	19	24	53	31	32	21	22	9	8	10	7	24	56	92
18-May	7	17	18	10	12	28	43	42	60	77	27	9	11	11	15	38	33	47	10	46	53	54	26	83	83
19-May	39	13	14	4	4	8	9	11	21	10	17	25	19	16	15	14	12	14	10	12	11	10	11	9	39
20-May	10	7	6	8	11	5	11	9	8	12	12	12	15	15	37	42	5	7	8	7	78	35	54	7	78
21-May	10	8	5	5	11	10	11	10	8	27	26	21	27	24	10	9	8	40	13	11	9	11	63	33	63
22-May	15	25	12	10	33	21	11	19	15	44	35	47	12	11	8	13	17	16	24	13	73	22	17	11	73
23-May	10	6	48	34	24	11	13	16	12	5	7	12	9	13	18	35	43	46	45	35	9	16	52	8	52
24-May	18	32	9	10	6	8	28	46	37	23	22	43	23	11	14	24	13	11	15	12	11	17	12	47	47
25-May	50	30	83	54	24	22	27	24	9	9	11	16	10	16	16	12	13	9	6	6	5	5	5	5	83
26-May	8	5	4	39	20	19	36	22	12	10	8	17	17	15	37	19	13	11	9	10	11	13	18	11	39
27-May	11	9	10	8	11	10	10	9	11	10	9	11	8	9	10	10	12	10	10	9	18	23	26	9	26
28-May	10	27	32	25	12	13	32	12	10	29	51	22	13	16	16	13	12	10	10	10	9	6	9	6	51
29-May	18	24	54	11	26	13	26	19	11	13	6	7	9	11	7	15	9	8	8	9	7	8	7	10	54
30-May	10	8	5	9	9	8	9	10	9	11	11	15	14	10	9	10	30	19	18	51	46	32	20	19	51
31-May	16	20	29	39	47	17	22	52	17	28	12	14	24	22	23	21	19	20	10	9	19	18	8	4	52
																	Diurnal Maximum								



**WBEA**  
**Hourly Averages**

**Wind Direction 100 m (WD100m) - deg**  
**Lower Camp Met Tower - May 2014**





Maximum Value: 0.5 km/h on May 21 00:00		Maximum Daily Average: 0.0 km/h on May 20		Hours in Service: 744																						
Minimum Value: -1.4 km/h on May 30 14:00		Minimum Daily Average: -0.7 km/h on May 30		Hours of Data: 736																						
Maximum Diurnal Average: -0.2 km/h at hour 10		Minimum Diurnal Average: -0.4 km/h at hour 15		Hours of Missing Data: 8																						
Monthly Average: -0.30 km/h		Percentiles: P <sub>1</sub> = -1.1 P <sub>10</sub> = -0.7 Q <sub>1</sub> = -0.5 Median = -0.3 Q <sub>3</sub> = -0.1 P <sub>90</sub> = 0.0 P <sub>99</sub> = 0.3		Hours of Calibration: 0																						
				Percent Operational Time: 98.9																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-May	-0.5	-0.4	-0.4	-0.3	-0.3	-0.3	-0.2	-0.3	-0.7	-0.6	-0.7	-0.6	-0.5	-0.7	-0.5	-0.7	-0.8	-0.5	-0.3	-0.7	-0.4	-0.3	-0.4	-0.6	-0.5	-0.2
2-May	-0.8	-0.9	-0.8	-0.7	-0.7	-0.8	-0.9	-0.8	-0.4	-0.8	-0.7	-0.7	-0.5	-0.4	-0.6	-0.7	-0.2	-0.2	-0.4	-0.6	-0.4	-0.9	-0.8	-0.5	-0.6	-0.2
3-May	-0.8	-0.9	-0.6	-0.5	-0.6	-0.4	-0.4	-0.4	-0.5	-0.3	-0.5	-0.5	-0.7	-0.4	-0.2	0.0	-0.3	-0.3	-0.6	-0.4	-0.1	-0.2	-0.2	-0.1	-0.4	0.0
4-May	-0.2	-0.1	-0.2	-0.4	-0.5	-0.3	-0.3	-0.3	0.0	0.1	0.0	-0.2	0.0	-0.1	-0.3	0.1	0.1	-0.3	-0.5	-0.3	-0.2	-0.1	-0.1	AF	-0.2	0.1
5-May	AF	AF	AF	AF	AF	AF	0.0	AF	-0.4	-0.2	0.0	-0.4	0.1	-0.3	-0.1	-0.5	-0.4	-0.4	-0.3	-0.4	-0.3	-0.3	-0.5	-0.4	--	0.1
6-May	-0.2	-0.2	-0.1	-0.4	-0.3	-0.3	-0.3	-0.4	-0.5	-0.5	-0.2	-0.3	-0.5	-0.3	-0.3	-0.5	-0.2	-0.2	-0.1	-0.5	-0.2	-0.2	-0.2	-0.2	-0.3	-0.1
7-May	-0.2	-0.2	-0.3	-0.2	-0.3	-0.4	-0.3	-0.6	-0.5	-0.8	-0.6	-0.9	-0.3	-1.1	-0.8	-0.5	-0.7	-0.6	-0.4	-0.2	-0.1	-0.1	-0.2	-0.2	-0.4	-0.1
8-May	-0.2	-0.3	-0.2	-0.2	-0.2	-0.3	-0.2	-0.3	-0.2	0.3	0.0	0.0	-0.3	-0.3	-0.4	-0.2	-0.4	-0.2	-0.3	-0.3	-0.2	-0.2	-0.3	-0.3	-0.2	0.3
9-May	-0.3	-0.3	-0.2	-0.3	-0.2	-0.2	-0.1	-0.5	-0.4	-0.3	-0.6	0.0	-0.1	-0.1	-0.3	-0.3	-0.4	-0.5	-0.4	-0.3	-0.4	-0.3	-0.4	-0.4	-0.3	0.0
10-May	-0.3	-0.5	-0.3	-0.2	-0.4	-0.7	-0.9	-0.8	-0.9	-0.6	-0.6	-0.6	-0.5	-0.3	-0.8	-0.3	-0.3	-0.4	-0.4	-0.4	-0.3	-0.2	-0.2	0.0	-0.5	0.0
11-May	-0.1	-0.1	-0.1	-0.1	-0.3	0.0	0.0	-0.1	-0.4	-0.4	-0.5	-0.8	-0.7	-0.6	-0.5	-0.3	-0.5	-0.5	-0.5	-0.3	-0.2	-0.2	-0.2	-0.3	-0.3	0.0
12-May	-0.3	-0.2	-0.3	-0.2	-0.3	-0.2	-0.2	0.1	-0.3	-0.2	-0.3	-0.2	0.1	-0.4	-0.6	-0.1	-0.1	-0.3	-0.4	-0.5	-0.4	-0.1	-0.2	-0.2	-0.2	0.1
13-May	0.0	-0.1	-0.2	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.1	0.2	-0.2	-0.2	-0.2	-0.3	-0.4	-0.4	-0.4	-0.3	-0.3	-0.3	-0.2	-0.1	-0.1	-0.2	0.2
14-May	-0.1	-0.2	-0.2	0.0	-0.2	-0.2	-0.1	0.0	0.2	0.2	-0.3	-0.4	0.0	-0.1	-0.1	-0.2	-0.1	0.0	0.0	0.2	-0.1	-0.3	0.0	-0.2	-0.1	0.2
15-May	-0.1	-0.1	-0.1	0.0	-0.3	-0.2	-0.1	-0.2	-0.4	-0.6	-0.3	-0.3	-0.5	-0.5	-0.5	-0.5	-0.9	-0.4	-0.7	-0.4	-0.5	-0.3	-0.2	-0.1	-0.3	0.0
16-May	-0.1	-0.1	-0.1	-0.1	-0.1	-0.2	0.0	0.0	-0.2	0.1	0.2	-0.4	-0.5	-0.4	-0.3	-0.2	0.2	0.0	0.0	-0.1	-0.1	-0.3	-0.1	-0.2	-0.1	0.2
17-May	-0.1	-0.1	-0.1	-0.1	-0.1	-0.4	-0.3	-0.4	-0.3	-0.5	-0.6	-0.6	-0.4	-0.3	0.0	-0.5	-0.3	-0.2	-0.2	-0.2	-0.2	-0.1	-0.3	-0.2	-0.3	0.0
18-May	-0.2	-0.3	-0.4	-0.4	-0.3	-0.2	-0.3	-0.1	0.0	-0.2	-0.1	-0.5	-0.6	-0.2	-0.4	-0.2	-0.6	-0.5	0.1	-0.2	-0.2	-0.1	-0.3	-0.2	-0.3	0.1
19-May	-0.1	0.0	-0.1	-0.2	0.1	-0.1	-0.3	0.3	-0.1	0.2	0.3	0.0	0.1	0.2	0.1	-0.2	0.3	0.2	-0.8	-0.7	-0.4	-0.3	-0.4	-0.1	-0.1	0.3
20-May	0.1	0.1	0.4	0.4	0.0	-0.1	-0.1	0.4	0.1	0.1	-0.3	0.3	-0.1	-0.3	-0.7	-0.1	-0.2	-0.2	0.1	-0.3	-0.4	0.0	-0.2	0.5	0.0	0.5
21-May	0.0	0.0	-0.1	0.1	-0.1	0.0	-0.4	0.0	-0.1	0.0	-0.3	-0.5	-0.8	-0.3	-0.7	-0.7	-0.9	-1.1	-0.4	-0.4	-0.3	-0.2	-0.1	0.0	-0.3	0.1
22-May	0.0	0.0	0.0	-0.2	-0.2	-0.3	-0.2	0.1	-0.3	-0.3	-0.1	-0.6	-0.6	-0.4	-0.6	-0.6	-0.5	-0.4	-0.3	-0.2	-0.3	-0.1	-0.1	-0.2	-0.3	0.1
23-May	-0.1	-0.1	-0.2	0.0	0.0	-0.1	0.0	0.1	0.1	0.2	0.1	0.0	0.0	0.1	0.1	-0.3	-0.1	-0.1	-0.4	-0.2	0.0	-0.1	-0.7	-1.4	-0.1	0.2
24-May	-0.6	-0.4	-0.7	-0.6	-0.8	-0.4	-0.4	-0.5	-0.5	-0.6	-0.8	-0.8	-0.6	-0.6	-0.4	-0.4	-0.8	-0.7	-0.6	-0.7	-0.4	-0.2	-0.2	-0.2	-0.5	-0.2
25-May	-0.2	-0.1	-0.1	-0.2	-0.3	-0.2	-0.2	-0.2	0.0	0.2	-0.1	-0.1	0.1	-0.1	-0.1	-0.1	-0.1	-0.3	-0.1	-0.1	-0.2	-0.1	-0.1	-0.1	-0.1	0.2
26-May	-0.1	-0.3	-0.2	0.0	-0.5	-0.4	-0.5	-0.1	-0.3	0.1	0.1	-0.4	-0.5	-0.4	-0.4	-0.1	-0.5	-0.6	-0.4	-0.5	-0.4	-0.3	-0.3	-0.5	-0.3	0.1
27-May	-0.5	-0.3	-0.4	-0.6	-0.2	-0.4	-0.4	-0.5	-0.8	-0.5	-0.5	-0.5	-0.6	-0.5	-0.8	-0.8	-0.5	-0.4	-0.6	-0.6	-0.4	-0.4	-0.4	-0.3	-0.5	-0.2
28-May	-0.3	-0.1	-0.5	-0.3	-0.2	-0.3	-0.1	-0.1	-0.5	0.1	-0.2	0.0	0.0	0.2	0.1	-0.2	-0.2	-0.2	-0.3	-0.2	-0.1	-0.2	0.0	-0.3	-0.2	0.2
29-May	-0.2	-0.2	-0.2	-0.3	-0.3	-0.4	-0.3	-0.3	-0.3	-0.3	-0.3	-0.4	-0.5	-0.5	-0.4	-0.5	-0.2	-0.5	-0.7	-0.6	-0.6	-0.6	-0.6	-0.6	-0.4	-0.2
30-May	-0.8	-0.6	-0.7	-1.0	-1.1	-0.8	-0.9	-0.9	-1.3	-1.0	-1.0	-1.1	-1.2	-1.4	-1.4	-0.8	-0.2	-0.2	-0.3	-0.1	-0.4	-0.4	0.0	-0.1	-0.7	0.0
31-May	0.0	-0.4	-0.1	-0.2	-0.2	-0.1	-0.1	-0.1	-0.5	-0.3	-0.6	-1.0	-0.4	-0.5	-0.7	-0.2	-0.3	-0.6	-0.5	-0.7	-0.4	-0.1	0.1	-0.1	-0.3	0.1
																								Diurnal Average		
																								Diurnal Maximum		
-0.2 -0.3 -0.3 -0.2 -0.3 -0.3 -0.3 -0.2 -0.3 -0.2 -0.3 -0.4 -0.4 -0.4 -0.4 -0.4 -0.3 -0.4 -0.3 -0.4 -0.3 -0.2 -0.2 -0.3																								0.1 0.1 0.4 0.4 0.1 0.0 0.0 0.4 0.2 0.3 0.3 0.3 0.1 0.2 0.1 0.1 0.3 0.2 0.1 0.2 0.0 0.0 0.1 0.5		
AF - Analyzer Failure																										



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

**Vertical Wind Speed 20 m (VW20m) - km/h**  
**Lower Camp Met Tower - May 2014**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 4.3 km/h on May 30 14:00 Minimum Value: 0.1 km/h on May 13 05:00 Percentiles: P <sub>1</sub> = 0.2 P <sub>10</sub> = 0.4 Q <sub>1</sub> = 0.9 Median = 1.7 Q <sub>3</sub> = 2.3 P <sub>90</sub> = 2.9 P <sub>99</sub> = 3.9																								Hours in Service: 744 Hours of Data: 736 Hours of Missing Data: 8 Hours of Calibration: 0 Percent Operational Time: 98.9	
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-May	1.7	1.6	0.7	0.7	1.1	0.9	1.1	1.3	2.3	3.2	3.6	3.5	2.9	3.2	3.0	3.2	3.7	3.4	2.6	2.3	2.1	1.4	1.5	1.6	3.7
2-May	2.9	3.2	3.3	2.7	2.4	3.2	3.4	3.3	3.3	3.2	3.3	3.1	2.9	2.6	3.0	2.9	2.8	2.8	2.6	2.7	3.1	3.4	3.1	3.2	3.4
3-May	3.1	3.1	3.1	3.2	3.0	2.9	2.8	2.3	2.3	2.2	2.4	2.1	2.4	2.5	2.6	2.3	2.5	2.3	2.1	1.8	1.5	0.8	0.4	0.2	3.2
4-May	0.3	0.2	0.2	0.4	0.4	0.5	0.7	0.9	1.2	1.7	1.8	1.6	1.9	1.8	2.0	1.9	1.8	1.0	1.0	1.2	1.5	1.2	0.9	AF	2.0
5-May	AF	AF	AF	AF	AF	AF	0.6	AF	0.9	1.7	1.7	1.9	2.2	1.9	1.9	2.1	2.0	2.8	2.7	2.7	2.0	2.5	2.4	1.8	2.8
6-May	1.5	1.7	2.0	2.0	2.2	2.3	2.9	2.8	2.9	3.1	3.5	3.0	3.0	2.8	3.0	2.7	2.5	2.6	2.1	0.8	0.5	0.3	0.3	0.5	3.5
7-May	0.4	0.4	0.7	0.4	0.4	0.9	1.1	1.8	1.8	3.1	3.5	3.6	3.4	3.2	2.9	3.0	3.4	2.9	2.6	1.5	1.2	0.4	0.7	0.8	3.6
8-May	0.7	1.1	0.7	0.6	0.4	0.6	0.6	1.1	1.3	1.1	1.1	1.5	2.4	2.6	2.8	2.9	2.9	2.2	2.1	1.5	1.0	0.9	0.5	0.7	2.9
9-May	0.4	0.7	0.7	0.7	0.5	0.8	1.0	1.9	2.0	1.8	2.0	2.0	2.0	2.2	2.3	2.1	2.5	2.4	1.4	0.6	1.2	1.7	1.0	1.0	2.5
10-May	1.0	1.2	1.2	1.3	1.2	2.3	2.6	2.9	2.9	2.2	1.9	3.2	2.8	2.1	1.8	1.5	1.7	1.5	1.2	1.0	0.7	0.4	0.3	0.4	3.2
11-May	0.5	0.4	0.2	0.3	0.4	0.3	0.7	0.8	1.0	1.5	2.6	3.0	2.1	2.7	2.3	2.0	2.2	1.8	1.7	1.7	1.0	0.7	0.5	0.4	3.0
12-May	0.6	0.3	0.5	0.3	0.5	0.3	0.8	1.3	1.4	1.8	2.1	2.3	2.4	2.6	2.4	2.6	2.8	2.9	2.9	2.1	1.2	1.3	1.4	0.9	2.9
13-May	0.4	0.5	0.3	0.2	0.1	0.3	1.0	1.6	1.8	2.0	2.1	2.1	2.1	1.7	2.2	2.4	2.5	2.5	2.2	2.0	0.6	0.4	0.3	0.3	2.5
14-May	0.2	0.3	0.3	0.3	0.7	0.9	1.6	1.8	1.6	1.5	2.3	2.5	2.6	2.5	2.6	2.6	2.6	2.8	2.2	2.1	1.8	1.2	0.9	1.2	2.8
15-May	1.3	0.7	0.7	1.3	0.5	0.7	1.2	2.3	3.4	3.5	3.4	2.9	3.4	3.2	2.8	3.5	3.6	2.5	3.1	2.3	1.1	0.7	0.2	0.2	3.6
16-May	0.2	0.1	0.1	0.1	0.2	0.2	0.5	1.2	1.2	1.6	1.8	1.6	1.7	1.7	1.8	1.6	1.7	1.5	1.3	1.0	0.6	0.9	0.8	0.7	1.8
17-May	0.3	0.2	0.2	0.3	0.2	0.4	0.9	0.9	1.1	1.6	1.8	1.9	1.7	1.5	1.6	1.6	1.3	1.3	1.4	0.7	1.0	0.6	0.7	0.9	1.9
18-May	1.0	0.9	0.7	1.2	0.9	0.8	1.0	1.1	1.4	1.5	1.8	2.4	2.1	2.6	2.3	2.2	2.3	1.9	1.1	0.8	0.5	0.4	0.5	0.4	2.6
19-May	0.2	0.4	0.7	1.3	1.3	1.6	1.9	1.8	1.8	2.6	2.1	1.9	2.2	2.3	1.9	2.0	1.8	1.9	1.6	1.7	1.5	1.2	1.2	1.0	2.6
20-May	0.8	1.3	1.6	1.6	1.4	2.1	1.9	1.9	1.8	2.1	1.9	2.2	1.9	1.7	2.5	2.2	2.4	2.3	3.0	1.9	1.0	1.2	1.4	1.8	3.0
21-May	1.9	1.6	1.6	1.7	1.7	2.0	2.3	2.2	1.5	1.7	2.0	2.2	3.0	2.0	3.8	4.0	4.3	3.6	3.0	1.5	0.8	0.4	0.3	0.3	4.3
22-May	0.3	0.2	0.2	0.3	0.4	0.4	0.5	1.4	1.8	1.6	1.5	2.0	2.8	2.6	2.5	1.8	1.5	1.2	0.8	0.4	0.5	0.2	0.2	0.4	2.8
23-May	0.4	0.7	0.8	0.6	1.0	1.3	1.0	1.4	1.5	1.9	1.6	1.6	1.8	1.9	1.9	1.4	1.3	0.8	0.7	1.0	1.2	0.9	3.5	3.8	3.8
24-May	2.1	1.5	2.0	1.9	2.3	2.0	1.5	1.6	1.8	2.4	2.8	2.0	2.5	2.1	1.7	2.3	2.0	2.1	1.6	0.9	0.6	0.4	0.5	0.5	2.8
25-May	0.3	0.2	0.2	0.2	0.4	0.5	0.8	1.1	2.1	2.4	2.3	1.4	1.7	1.7	2.2	1.9	2.2	2.0	2.5	2.3	2.1	2.0	2.7	2.5	2.7
26-May	1.9	1.7	2.2	1.4	0.9	1.0	0.8	1.0	2.0	2.6	2.7	0.6	0.8	1.0	1.4	2.2	1.9	1.7	2.0	1.9	1.9	1.3	1.2	1.5	2.7
27-May	1.6	1.4	1.3	1.7	1.3	1.2	1.7	2.1	2.2	2.4	2.2	2.2	2.5	2.5	2.7	2.4	1.9	1.8	1.7	1.5	0.9	0.8	0.6	0.9	2.7
28-May	1.0	0.6	0.8	0.4	0.5	0.7	0.8	1.6	1.7	1.7	1.1	1.4	1.5	1.2	1.5	1.7	1.6	2.3	2.0	2.1	1.6	1.3	0.8	2.0	2.3
29-May	1.3	0.9	0.6	0.5	0.5	0.5	0.5	0.6	0.9	0.9	1.3	1.7	1.6	1.8	1.9	1.7	2.6	2.0	1.8	1.8	2.0	2.4	2.6	2.0	2.6
30-May	2.3	1.8	2.5	3.0	3.2	3.5	3.7	3.6	3.7	3.9	4.1	3.9	4.1	4.3	4.0	2.9	0.9	0.8	0.8	0.4	1.4	1.1	0.3	0.2	4.3
31-May	0.6	0.9	0.6	0.3	0.3	0.4	0.6	1.2	1.7	1.9	2.4	2.2	2.3	2.6	2.8	2.4	2.4	2.5	2.4	2.0	1.3	0.8	2.1	2.5	2.8
3.1 3.2 3.3 3.2 3.2 3.5 3.7 3.6 3.7 3.9 4.1 3.9 4.1 4.3 4.0 4.0 4.3 3.6 3.1 2.7 3.1 3.4 3.5 3.8																									
Diurnal Maximum																									
AF - Analyzer Failure																									



Maximum Value: 1.2 km/h on May 20 19:00		Maximum Daily Average: 0.4 km/h on May 14		Hours in Service: 744																						
Minimum Value: -1.9 km/h on May 30 15:00		Minimum Daily Average: -0.9 km/h on May 30		Hours of Data: 738																						
Maximum Diurnal Average: 0.0 km/h at hour 10		Minimum Diurnal Average: -0.3 km/h at hour 12		Hours of Missing Data: 6																						
Monthly Average: -0.13 km/h		Percentiles: P <sub>1</sub> = -1.5 P <sub>10</sub> = -0.6 Q <sub>1</sub> = -0.3 Median = -0.1 Q <sub>3</sub> = 0.1 P <sub>90</sub> = 0.4 P <sub>99</sub> = 0.8		Hours of Calibration: 0																						
				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-May	-0.5	-0.4	-0.4	-0.3	-0.3	-0.4	-0.2	-0.3	-0.8	-0.9	-0.8	-0.8	-0.5	-0.7	-0.3	-0.8	-1.0	-0.5	-0.4	-0.3	-0.5	-0.4	-0.7	-0.9	-0.6	-0.2
2-May	-1.3	-1.5	-0.9	-0.6	-1.0	-1.2	-1.5	-1.1	-0.5	-0.7	-0.8	-0.7	-0.3	-0.2	-0.3	-0.4	0.1	-0.1	-0.1	-0.1	0.0	-0.6	-0.4	-0.6	-0.6	0.1
3-May	-0.6	-0.7	-0.7	-0.2	-0.5	-0.2	-0.1	-0.2	-0.4	-0.2	-0.3	-0.5	-0.5	0.0	0.3	0.4	-0.1	0.0	-0.1	0.1	0.2	0.1	-0.1	0.0	-0.2	0.4
4-May	0.0	0.0	-0.1	-0.4	-0.5	-0.2	-0.1	-0.2	0.0	0.3	0.3	-0.1	0.4	0.3	0.1	0.4	0.3	-0.4	-0.3	0.0	-0.1	-0.2	0.1	AF	0.0	0.4
5-May	AF	AF	AF	AF	AF	0.4	0.4	0.2	0.1	0.1	0.3	0.0	0.5	0.0	0.0	0.1	0.2	0.1	0.5	0.1	0.1	0.3	0.3	-0.1	0.2	0.5
6-May	0.1	0.0	0.1	-0.2	-0.2	-0.2	-0.1	-0.1	-0.3	-0.4	-0.2	0.0	-0.2	0.0	0.1	-0.3	0.3	0.1	-0.1	-0.6	-0.2	-0.2	-0.2	-0.1	-0.1	0.3
7-May	-0.1	-0.2	-0.3	0.0	-0.2	-0.2	0.0	-0.5	-0.1	-0.7	-0.5	-0.8	-0.6	-1.0	-0.6	-0.1	-0.5	-0.5	-0.3	-0.1	-0.1	0.0	-0.3	0.0	-0.3	0.0
8-May	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.1	-0.1	0.0	0.7	0.2	0.0	0.0	0.1	-0.3	0.0	-0.1	0.0	-0.2	-0.2	0.0	0.0	-0.1	-0.2	0.0	0.7
9-May	-0.3	-0.3	-0.2	-0.2	-0.1	-0.1	0.0	-0.6	-0.4	-0.1	-0.4	-0.1	0.1	0.0	-0.6	-0.2	-0.3	-0.5	-0.2	-0.4	-0.4	-0.1	-0.4	-0.4	-0.3	0.1
10-May	-0.6	-0.8	-0.6	-0.2	-0.5	-1.0	-1.5	-1.5	-1.0	-0.6	-0.4	-0.8	-0.6	-0.1	-0.7	-0.3	-0.3	-0.1	-0.5	-0.6	-0.6	-0.3	-0.2	-0.1	-0.6	-0.1
11-May	-0.2	-0.3	0.0	0.0	-0.1	0.0	-0.1	0.0	-0.2	-0.1	-0.4	-1.0	-0.4	-0.6	-0.4	-0.3	-0.5	-0.4	-0.1	0.0	0.0	-0.1	-0.1	-0.2	-0.2	0.0
12-May	-0.2	-0.1	-0.4	-0.2	-0.2	-0.1	-0.1	0.2	-0.1	0.1	0.2	0.2	0.3	-0.2	-0.4	0.1	0.2	-0.1	0.0	0.0	-0.2	0.0	0.1	-0.1	0.0	0.3
13-May	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.3	0.3	0.6	0.5	0.0	0.1	0.1	-0.2	-0.2	-0.1	-0.2	0.1	-0.1	-0.2	0.0	0.0	-0.1	0.1	0.6
14-May	-0.2	-0.1	-0.1	0.3	0.2	0.0	0.3	0.3	0.6	0.5	0.5	0.3	0.6	0.4	0.8	0.4	0.7	0.7	0.8	0.7	-0.2	0.4	0.4	0.4	0.4	0.8
15-May	0.5	0.1	0.2	0.5	-0.2	-0.1	0.2	0.0	-0.4	-0.5	-0.3	0.0	-0.3	-0.3	-0.5	-0.3	-0.7	-0.3	-0.6	-0.2	-0.6	-0.4	-0.3	-0.2	-0.2	0.5
16-May	-0.1	-0.2	-0.1	0.1	0.0	0.0	0.1	0.4	0.1	0.5	0.5	-0.3	-0.5	-0.4	-0.1	-0.1	0.7	0.4	0.4	0.5	0.1	-0.2	0.0	-0.1	0.1	0.7
17-May	0.0	-0.1	-0.1	0.0	0.1	-0.4	-0.1	-0.1	-0.3	-0.5	-0.6	-0.5	-0.2	-0.2	0.2	-0.4	-0.1	0.2	0.2	0.0	0.1	0.0	-0.1	-0.2	-0.1	0.2
18-May	-0.2	-0.2	-0.2	-0.4	-0.2	-0.1	-0.3	0.2	0.2	0.1	0.0	-0.5	-0.5	-0.1	0.0	0.3	-0.3	-0.3	0.2	0.0	-0.1	0.0	-0.2	0.1	-0.1	0.3
19-May	0.0	0.2	0.1	0.4	0.6	0.6	0.3	0.6	0.3	0.8	0.6	0.5	0.3	0.6	0.0	0.0	0.4	0.3	-0.5	-0.6	-0.3	-0.2	-0.5	-0.2	0.2	0.8
20-May	0.1	0.7	0.8	0.6	0.5	0.6	0.4	0.5	0.0	0.1	-0.1	0.2	0.0	-0.4	-1.0	0.5	0.7	0.7	1.2	0.5	-0.2	0.3	0.1	0.9	0.3	1.2
21-May	0.7	0.8	0.7	0.8	0.8	0.8	0.7	0.7	0.4	0.2	-0.4	-0.2	-1.0	-0.4	-0.9	-1.0	-1.6	-1.2	-0.8	-0.5	-0.3	-0.1	0.0	0.3	-0.1	0.8
22-May	0.5	0.2	0.3	0.0	-0.2	-0.2	-0.1	0.3	0.1	-0.1	-0.2	-0.4	-0.6	-0.4	-0.6	-0.5	-0.4	-0.3	-0.2	0.1	-0.1	0.1	0.0	0.0	-0.1	0.5
23-May	0.1	0.0	0.0	0.2	0.5	0.4	0.3	0.6	0.5	0.7	0.4	0.4	0.4	0.5	0.5	-0.1	0.2	0.2	-0.2	0.2	0.5	0.4	-1.0	-1.7	0.2	0.7
24-May	-0.9	-0.4	-0.4	-0.7	-1.0	-0.4	-0.3	-0.1	-0.4	-0.4	-0.9	-0.5	-0.6	-0.3	0.0	-0.4	-0.9	-0.8	-0.3	-0.3	-0.1	-0.1	0.0	0.1	-0.4	0.1
25-May	0.0	0.0	-0.1	-0.1	-0.2	-0.1	0.0	-0.1	0.3	0.4	0.5	0.3	0.2	0.2	0.2	0.3	0.3	0.3	0.5	0.5	0.4	0.5	0.7	0.3	0.2	0.7
26-May	0.3	0.2	0.5	0.1	-0.2	-0.3	-0.3	0.0	0.2	0.6	0.7	-0.2	-0.5	-0.1	-0.4	0.3	0.0	-0.3	-0.1	-0.3	-0.1	-0.2	-0.3	-0.3	0.0	0.7
27-May	-0.3	-0.2	-0.3	-0.4	-0.2	-0.2	-0.2	-0.4	-0.5	-0.3	-0.5	-0.3	-0.5	-0.4	-0.4	-0.5	-0.3	-0.3	-0.5	-0.3	-0.2	-0.2	-0.2	0.0	-0.3	0.0
28-May	-0.1	0.1	-0.3	-0.2	-0.2	-0.2	-0.1	0.3	-0.1	0.4	0.1	0.3	0.3	0.6	0.5	0.1	0.1	0.3	0.2	0.3	0.3	0.4	0.1	0.2	0.1	0.6
29-May	0.2	-0.1	-0.2	-0.3	-0.2	-0.3	-0.1	-0.1	-0.3	-0.2	-0.2	-0.3	-0.2	-0.6	-0.1	-0.4	-0.3	-0.7	-0.5	-0.9	-0.8	-0.8	-1.2	-0.9	-0.4	0.2
30-May	-1.0	-0.7	-1.1	-1.1	-1.4	-1.2	-1.3	-1.3	-1.6	-1.6	-1.5	-1.5	-1.8	-1.3	-1.9	-1.2	-0.1	-0.1	-0.1	0.0	-0.2	-0.1	0.2	0.0	-0.9	0.2
31-May	0.4	-0.3	0.4	-0.1	-0.1	-0.1	0.1	0.1	-0.4	-0.1	-0.5	-0.6	-0.1	-0.2	-0.4	0.0	-0.2	-0.5	-0.3	-0.1	-0.1	0.1	0.5	0.5	-0.1	0.5
																								Diurnal Average		
																								Diurnal Maximum		
-0.1 -0.1 -0.1 -0.1 -0.2 -0.1 -0.1 -0.1 -0.2 0.0 -0.1 -0.3 -0.2 -0.2 -0.2 -0.2 -0.1 -0.1 -0.1 -0.1 -0.1 -0.1 -0.1 -0.1 -0.1 -0.1																								0.7 0.8 0.8 0.8 0.8 0.8 0.7 0.7 0.6 0.8 0.7 0.5 0.6 0.6 0.8 0.5 0.7 0.7 1.2 0.8 0.7 0.5 0.7 0.9		
AF - Analyzer Failure																										



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 4.8 km/h on May 30 14:00	Hours of Data: 738
Minimum Value: 0.1 km/h on May 13 05:00	Hours of Missing Data: 6
Percentiles: P <sub>1</sub> = 0.2 P <sub>10</sub> = 0.5 Q <sub>1</sub> = 0.9 Median = 1.8 Q <sub>3</sub> = 2.4 P <sub>90</sub> = 3.0 P <sub>99</sub> = 4.2	Hours of Calibration: 0
	Percent Operational Time: 99.2

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-May	1.8	1.7	1.0	0.8	1.4	1.1	1.4	1.6	2.5	3.7	4.0	3.5	2.9	3.6	3.2	3.6	4.2	3.9	2.9	2.6	2.2	1.6	1.8	1.8	4.2
2-May	3.3	3.4	3.5	2.9	2.9	3.5	3.8	3.8	3.7	3.4	3.7	3.4	2.8	2.7	3.0	2.8	2.7	2.7	2.7	2.8	3.1	3.4	3.4	3.3	3.8
3-May	3.1	3.2	3.2	3.3	3.1	2.9	2.9	2.3	2.3	2.2	2.1	2.3	2.6	2.6	2.4	2.5	2.5	2.0	1.8	1.5	1.0	0.6	0.2	3.3	
4-May	0.4	0.2	0.2	0.4	0.3	0.4	0.7	0.9	1.3	1.8	2.1	1.8	2.1	2.1	2.4	2.2	1.9	1.2	1.1	1.4	1.6	1.3	0.8	AF	2.4
5-May	AF	AF	AF	AF	AF	1.0	0.8	0.8	1.1	1.7	1.9	2.1	2.3	2.1	2.0	2.2	2.1	2.7	2.8	2.7	2.2	2.6	2.6	1.9	2.8
6-May	1.6	1.6	1.8	1.9	2.1	2.3	3.0	2.8	2.9	3.1	3.4	2.9	2.8	2.8	2.9	2.8	2.6	2.8	2.3	1.0	0.6	0.3	0.4	0.7	3.4
7-May	0.6	0.5	0.8	0.6	0.6	1.1	1.3	1.8	2.0	3.1	3.7	3.5	3.3	3.0	3.1	3.1	2.9	2.9	2.5	1.6	1.1	0.5	0.8	0.9	3.7
8-May	0.8	1.2	0.8	0.7	0.4	0.6	0.6	1.1	1.3	1.3	1.2	1.7	2.3	2.5	2.7	3.0	2.6	2.4	2.2	1.4	1.1	1.0	0.6	0.8	3.0
9-May	0.5	0.7	0.9	0.8	0.6	0.9	1.2	2.1	2.1	2.0	1.9	2.1	2.2	2.2	2.3	2.3	2.6	2.4	1.4	0.6	1.5	2.0	1.4	1.2	2.6
10-May	1.1	1.3	1.4	1.6	1.5	2.4	2.7	3.0	3.2	2.3	2.2	3.4	3.1	2.3	2.2	1.8	1.9	1.7	1.4	1.2	0.8	0.5	0.5	0.5	3.4
11-May	0.6	0.5	0.3	0.4	0.6	0.4	0.8	0.9	1.2	1.6	2.8	3.6	2.2	2.9	2.4	2.1	2.3	1.8	1.6	1.6	1.1	0.8	0.6	0.6	3.6
12-May	0.8	0.3	0.6	0.4	0.6	0.4	0.7	1.3	1.4	2.0	2.5	2.5	2.7	2.8	2.5	2.8	2.7	2.9	2.7	2.1	1.3	1.6	1.5	1.0	2.9
13-May	0.5	0.6	0.3	0.2	0.1	0.4	1.0	1.5	1.7	2.0	2.2	2.1	2.3	2.0	2.5	2.5	2.6	2.4	2.2	2.0	0.7	0.5	0.4	0.3	2.6
14-May	0.3	0.3	0.5	0.4	0.6	0.9	1.7	1.7	1.6	1.7	2.2	2.4	2.5	2.4	2.4	2.5	2.3	2.4	2.3	2.2	1.8	1.3	1.0	1.2	2.5
15-May	1.2	0.9	0.9	1.4	0.6	0.7	1.3	2.2	3.3	3.8	4.0	3.2	3.3	3.3	2.9	3.7	3.6	2.8	3.5	2.7	1.3	0.7	0.3	0.4	4.0
16-May	0.3	0.3	0.2	0.3	0.2	0.3	0.6	1.4	1.3	1.8	1.9	1.9	1.8	2.0	1.9	1.7	2.0	1.5	1.3	0.8	0.8	1.1	0.8	0.8	2.0
17-May	0.3	0.4	0.2	0.4	0.3	0.5	0.9	0.9	1.1	1.6	1.8	2.1	2.1	1.7	1.9	1.7	1.4	1.3	1.2	0.7	1.0	0.9	0.8	1.1	2.1
18-May	1.1	0.9	0.7	1.2	1.0	1.0	1.0	1.2	1.4	1.6	2.0	2.2	2.0	2.5	2.4	2.3	2.4	2.0	1.4	0.8	0.7	0.4	0.6	0.4	2.5
19-May	0.2	0.6	0.8	1.2	1.2	1.3	1.6	2.1	2.1	2.3	2.3	2.1	2.5	2.6	2.3	2.7	2.3	2.3	2.1	2.2	2.0	1.4	1.7	1.2	2.7
20-May	0.9	1.4	1.8	1.8	1.5	1.8	2.0	2.2	2.4	2.6	2.4	2.7	2.4	2.2	2.6	2.3	2.1	2.1	2.7	1.9	1.0	1.4	1.6	2.0	2.7
21-May	2.0	1.8	1.4	1.5	1.3	1.5	1.9	1.9	1.4	1.7	2.2	2.5	3.2	2.1	3.6	3.5	4.2	3.7	3.2	1.7	0.9	0.4	0.3	0.5	4.2
22-May	0.4	0.3	0.3	0.4	0.5	0.4	0.5	1.4	1.7	1.8	1.7	2.1	3.1	2.8	2.5	1.9	1.7	1.4	0.9	0.4	0.6	0.3	0.3	0.5	3.1
23-May	0.7	0.9	0.9	0.7	1.0	1.2	0.8	1.3	1.3	1.8	1.7	1.6	1.6	2.0	2.1	1.6	1.6	1.0	0.7	1.0	1.2	0.8	3.9	4.2	4.2
24-May	2.3	1.5	2.0	2.1	2.5	2.3	1.7	1.7	1.9	2.0	2.5	2.9	2.2	2.5	2.2	1.9	2.5	2.5	2.2	1.6	0.9	0.7	0.5	0.5	2.9
25-May	0.3	0.2	0.2	0.2	0.3	0.5	0.8	1.2	2.1	2.3	2.4	1.5	1.7	1.8	2.2	2.1	2.3	2.0	2.5	2.1	2.0	1.9	2.5	2.2	2.5
26-May	2.0	1.6	2.0	1.4	0.9	0.9	0.9	0.9	2.0	2.6	2.6	0.7	0.9	1.2	1.4	2.4	2.0	1.9	2.1	2.1	1.9	1.5	1.3	1.6	2.6
27-May	1.6	1.5	1.4	1.8	1.6	1.4	1.7	2.1	2.3	2.5	2.2	2.3	2.5	2.9	2.9	2.4	1.9	1.9	1.8	1.6	0.9	0.9	0.7	1.0	2.9
28-May	1.0	0.8	0.8	0.5	0.6	0.9	0.9	1.5	1.7	1.7	1.3	1.5	1.6	1.2	1.5	1.6	1.8	2.2	2.1	2.0	1.7	1.4	0.9	1.8	2.2
29-May	1.4	1.1	0.7	0.5	0.7	0.5	0.6	0.7	0.9	1.0	1.6	1.9	1.9	1.9	2.1	1.9	3.1	2.2	2.1	2.0	2.1	2.4	2.6	2.1	3.1
30-May	2.5	1.8	2.6	3.3	3.6	3.7	3.8	3.9	4.1	4.2	4.3	4.5	4.6	4.8	4.7	3.2	1.0	0.9	1.0	0.5	1.5	1.2	0.5	0.3	4.8
31-May	1.0	1.1	0.6	0.3	0.4	0.4	0.7	1.4	1.7	2.0	2.5	2.3	2.6	2.7	2.8	2.7	2.5	2.7	2.3	1.9	1.2	1.0	2.1	2.3	2.8
	3.3	3.4	3.5	3.3	3.6	3.7	3.8	3.9	4.1	4.2	4.3	4.5	4.6	4.8	4.7	3.7	4.2	3.9	3.5	2.8	3.1	3.4	3.9	4.2	
	Diurnal Maximum																								

AF - Analyzer Failure



Maximum Value: 1.9 km/h on May 15 04:00		Maximum Daily Average: 0.6 km/h on May 15		Hours in Service: 744																						
Minimum Value: -1.3 km/h on May 24 00:00		Minimum Daily Average: -0.4 km/h on May 30		Hours of Data: 744																						
Maximum Diurnal Average: 0.3 km/h at hour 16		Minimum Diurnal Average: -0.1 km/h at hour 12		Hours of Missing Data: 0																						
Monthly Average: 0.11 km/h		Percentiles: P <sub>1</sub> = -0.9 P <sub>10</sub> = -0.4 Q <sub>1</sub> = -0.1 Median = 0.1 Q <sub>3</sub> = 0.4 P <sub>90</sub> = 0.7 P <sub>99</sub> = 1.2		Hours of Calibration: 0																						
				Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-May	0.9	0.3	-0.3	0.0	0.0	-0.3	0.0	-0.2	-0.1	-0.6	-0.5	-0.3	0.1	-0.1	0.5	-0.3	-0.9	-0.2	0.0	0.4	0.4	0.0	-0.5	-0.3	-0.1	0.9
2-May	-0.5	-0.7	-0.4	-0.1	-0.3	-0.7	-1.0	-0.8	-0.4	0.9	-0.7	-0.1	0.0	0.5	0.4	0.5	0.9	0.0	0.3	0.7	0.6	0.2	0.7	0.8	0.0	0.9
3-May	0.8	0.5	0.3	0.8	0.7	0.6	0.0	0.3	0.0	0.2	-0.2	0.0	-0.6	0.9	1.1	0.3	-0.5	0.0	0.0	0.1	0.4	0.3	0.3	0.1	0.3	1.1
4-May	-0.1	0.0	0.0	-0.1	-0.1	0.0	0.0	-0.1	0.2	0.2	0.9	-0.6	0.3	0.3	0.0	0.7	0.1	-0.2	0.0	0.8	-0.4	-0.3	0.4	-0.1	0.1	0.9
5-May	0.0	0.0	0.0	0.2	0.6	1.5	1.0	0.4	0.0	0.7	0.6	0.0	0.1	0.0	0.1	1.3	0.8	-0.3	-0.1	0.0	-0.2	0.1	0.1	-0.1	0.3	1.5
6-May	-0.1	0.1	0.1	0.4	0.3	0.4	0.5	0.2	0.4	0.3	0.0	0.0	0.5	0.2	-0.2	-0.1	0.6	0.5	0.3	-0.1	0.0	-0.1	-0.1	0.1	0.2	0.6
7-May	-0.2	-0.1	0.1	0.0	0.1	0.1	0.3	0.4	0.3	0.0	0.7	-0.2	-0.1	-0.3	-0.3	0.1	0.0	0.0	0.2	0.2	-0.1	-0.1	-0.2	0.0	0.0	0.7
8-May	-0.1	1.3	0.0	-0.1	0.0	0.0	0.0	0.1	0.0	0.9	0.3	-0.5	0.1	0.1	0.2	0.6	0.1	1.0	0.4	-0.1	0.1	0.2	0.1	0.1	0.2	1.3
9-May	0.1	0.0	0.0	0.0	0.1	0.2	0.6	-0.4	-0.2	0.7	0.0	0.3	0.5	0.0	-0.3	0.1	0.5	0.2	0.2	0.0	-0.1	0.1	-0.1	0.0	0.1	0.7
10-May	-0.5	-0.6	-0.8	0.5	0.1	-0.2	-0.5	-0.9	-0.4	-0.1	-0.1	-0.4	-0.4	-0.2	-0.4	0.0	-0.2	-0.1	-0.5	-0.2	-0.3	0.0	0.1	0.1	-0.2	0.5
11-May	-0.4	-0.2	-0.1	0.0	-0.1	-0.1	-0.2	0.1	0.2	0.2	0.0	0.0	-0.2	-0.3	-0.1	0.4	0.6	-0.7	0.4	0.1	0.2	0.3	-0.2	-0.2	0.0	0.6
12-May	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.3	0.0	0.1	1.6	0.2	1.1	-0.3	-0.4	-0.1	0.6	0.6	0.4	0.0	0.1	-0.3	0.3	-0.1	0.2	0.2	1.6
13-May	0.0	0.0	0.1	0.0	0.0	0.5	0.4	-0.1	0.0	0.0	-0.1	-0.9	-0.7	0.0	-0.4	-0.4	0.8	0.0	0.0	-0.1	-0.2	0.2	-0.1	0.0	0.0	0.8
14-May	0.1	0.1	0.2	0.4	0.0	0.5	0.4	0.0	0.1	0.0	0.5	0.3	0.7	0.7	0.5	0.3	0.8	1.0	1.6	1.5	1.2	0.6	0.3	0.6	0.5	1.6
15-May	0.7	0.7	0.7	1.9	0.4	0.2	1.1	0.3	0.6	0.8	0.7	1.0	1.2	1.3	1.2	0.8	0.7	0.8	0.2	0.3	-0.1	-0.1	-0.3	-0.1	0.6	1.9
16-May	-0.2	-0.2	-0.1	-0.1	-0.2	-0.2	0.0	0.7	1.1	1.3	1.0	-0.5	-0.8	-0.7	-0.2	0.6	1.0	1.2	0.1	0.5	0.8	0.2	-0.3	0.2	0.2	1.3
17-May	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.3	-0.4	-0.6	-0.3	-0.6	0.2	-0.7	0.6	-0.5	-0.3	-0.3	-0.1	0.0	0.1	0.3	-0.1	0.0	-0.1	0.6
18-May	0.1	0.2	-0.1	0.0	0.0	0.1	-0.8	0.5	0.1	-0.1	0.7	-0.5	-0.2	0.3	-0.1	0.6	-0.2	-0.1	-0.2	0.3	-0.1	0.0	-0.1	0.1	0.0	0.7
19-May	0.0	-0.1	0.4	0.7	0.9	0.6	0.3	0.6	0.6	0.4	0.8	1.0	0.5	1.1	-0.4	0.1	-0.2	-0.2	-0.6	-1.0	-0.6	0.0	-0.4	-0.3	0.2	1.1
20-May	0.0	0.6	0.4	0.6	0.9	0.6	0.7	0.2	-0.8	-0.7	-0.6	-0.9	-0.7	-0.8	-0.6	1.6	0.9	0.6	1.2	1.0	-0.1	0.3	0.1	0.5	0.2	1.6
21-May	0.7	0.6	0.8	0.4	-0.2	0.0	0.2	0.5	-0.2	0.1	-0.4	0.6	0.0	0.2	0.8	0.3	0.2	-0.3	-0.4	-0.4	-0.3	0.0	0.0	0.1	0.1	0.8
22-May	0.0	-0.1	0.4	0.4	0.0	0.0	0.2	0.3	0.1	-0.3	-0.6	-0.9	0.0	0.0	-0.4	0.0	-0.1	-0.3	0.0	0.1	0.1	0.2	0.2	0.0	0.0	0.4
23-May	0.4	0.6	-0.1	0.2	0.0	0.2	0.3	0.1	0.2	0.4	0.6	-0.2	0.0	0.2	0.5	-0.3	0.3	0.3	-0.2	0.1	0.8	0.1	-0.3	-1.3	0.1	0.8
24-May	-0.5	0.2	0.4	0.0	-0.3	0.7	0.4	-0.2	-0.4	0.2	-0.4	-0.2	-0.1	0.4	0.5	0.6	-0.8	-0.1	0.0	-0.2	0.3	0.2	-0.1	0.0	0.0	0.7
25-May	0.1	0.0	0.0	0.0	0.1	-0.2	-0.1	-0.1	0.6	0.4	0.3	0.3	0.0	-0.2	-0.2	0.0	0.5	0.3	0.6	0.4	0.5	0.4	1.1	0.6	0.2	1.1
26-May	0.9	0.4	0.4	0.4	0.3	-0.3	-0.3	0.1	0.3	0.8	0.7	0.1	-0.2	0.6	-0.2	0.5	0.0	-0.2	-0.3	-0.2	-0.1	0.2	-0.3	0.1	0.1	0.9
27-May	0.1	0.5	0.4	0.5	0.4	0.3	0.2	0.1	0.5	0.3	-0.2	0.3	-0.1	0.2	0.2	-0.2	0.0	0.1	0.1	0.3	0.1	-0.1	0.2	0.3	0.2	0.5
28-May	0.4	0.1	0.1	-0.1	0.1	0.1	0.1	0.5	0.1	0.4	0.1	0.2	0.1	0.6	1.0	0.1	0.2	0.5	0.5	0.7	0.4	0.5	1.1	0.8	0.3	1.1
29-May	0.7	0.9	-0.2	-0.4	0.4	-0.4	-0.1	0.0	0.0	0.3	0.2	0.3	0.4	0.3	0.3	0.2	-0.2	-0.1	-0.5	-0.2	-0.2	-0.5	-0.7	-0.3	0.0	0.9
30-May	-0.4	0.0	-0.4	-0.6	-0.7	-0.6	-0.6	-0.5	-1.2	-0.9	-0.5	-0.5	-0.9	-0.1	-1.0	-0.7	0.1	0.2	0.0	-0.1	-0.1	0.1	0.3	-0.1	-0.4	0.3
31-May	0.6	-0.6	0.4	0.2	0.1	-0.1	0.0	0.2	-0.5	-0.1	-0.4	-0.4	0.2	-0.1	-0.5	0.1	0.0	-0.2	0.0	0.0	0.3	0.5	0.6	0.5	0.0	0.6
	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.0	0.2	0.1	-0.1	0.0	0.1	0.1	0.3	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	Diurnal Average
	0.9	1.3	0.8	1.9	0.9	1.5	1.1	0.7	1.1	1.6	1.0	1.1	1.2	1.3	1.2	1.6	1.0	1.2	1.6	1.5	1.2	0.6	1.1	0.8	0.0	Diurnal Maximum





Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 5.1 km/h on May 30 14:00 Minimum Value: 0.2 km/h on May 25 04:00 Percentiles: $P_1 = 0.3$ $P_{10} = 0.7$ $Q_1 = 1.1$ Median = 1.8 $Q_3 = 2.6$ $P_{90} = 3.2$ $P_{99} = 4.1$																								Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-May	1.4	1.9	1.7	1.1	1.3	1.2	1.5	1.5	2.6	3.8	4.2	3.5	3.2	3.6	3.8	3.9	4.3	3.7	2.9	2.4	1.8	1.5	1.6	1.6	4.3
2-May	2.5	3.2	3.2	3.0	3.0	3.4	3.2	3.3	3.6	3.5	3.3	3.3	2.7	2.6	2.4	2.8	3.3	2.8	3.1	2.8	3.0	3.0	3.1	3.4	3.6
3-May	3.2	3.3	2.8	3.0	2.8	2.8	2.6	2.6	2.6	2.7	2.7	2.6	2.4	3.3	3.4	2.9	3.5	3.2	2.6	2.1	0.8	1.0	1.1	0.6	3.5
4-May	0.4	0.2	0.2	0.4	0.4	0.6	0.7	0.9	1.6	1.7	2.8	2.5	2.0	2.4	2.6	2.7	2.2	1.7	1.8	1.6	2.2	1.5	1.4	1.1	2.8
5-May	1.3	0.9	1.0	1.0	0.9	1.3	1.4	1.1	1.1	1.9	2.2	2.4	2.3	2.6	2.4	3.1	2.6	2.7	3.3	2.9	2.3	3.1	2.9	2.2	3.3
6-May	1.8	1.6	1.6	1.8	2.0	2.3	2.9	2.7	3.0	3.8	4.0	3.5	3.7	3.1	3.3	3.0	3.2	3.0	2.3	0.9	0.6	0.6	1.2	1.4	4.0
7-May	0.4	0.5	0.6	0.5	0.7	1.0	1.7	2.0	2.3	3.1	3.6	3.2	3.4	3.3	3.1	3.2	3.1	3.1	2.9	2.1	0.8	0.8	1.2	1.2	3.6
8-May	0.9	1.4	1.3	0.9	0.5	0.5	0.5	1.1	1.5	1.6	1.7	1.4	2.3	3.0	3.1	3.2	3.0	3.0	1.9	1.4	1.3	1.1	0.6	0.7	3.2
9-May	0.5	0.6	0.7	0.4	0.7	1.2	1.5	2.6	2.4	2.6	2.3	1.7	2.3	2.0	2.3	2.6	2.7	2.3	1.6	0.7	1.3	1.7	1.4	1.2	2.7
10-May	1.0	1.3	1.3	1.4	1.6	1.7	2.0	2.1	3.2	2.1	2.5	3.7	2.9	2.5	1.8	2.0	2.1	1.7	1.3	1.1	0.8	0.7	0.6	0.8	3.7
11-May	1.1	0.7	0.9	0.5	0.7	0.7	1.0	1.2	1.6	2.1	2.9	3.8	2.2	3.1	3.2	2.5	3.0	2.0	2.3	1.7	0.9	0.6	1.2	0.8	3.8
12-May	1.3	0.4	0.4	0.6	0.4	0.4	0.8	1.0	1.7	2.5	2.5	2.8	2.7	3.0	2.9	3.4	3.5	3.3	3.3	2.5	1.5	2.4	1.9	1.3	3.5
13-May	0.9	1.0	0.5	0.3	0.2	0.5	0.8	0.8	0.9	1.4	1.9	2.1	2.6	2.6	2.8	2.6	3.1	2.8	2.5	2.0	1.2	0.6	1.0	0.6	3.1
14-May	0.6	0.9	0.9	0.7	0.6	1.0	1.7	1.3	0.9	1.5	2.3	2.8	3.1	3.0	2.7	2.4	2.1	2.1	2.5	2.8	1.6	1.3	1.1	1.2	3.1
15-May	1.2	1.5	1.3	1.4	0.9	0.7	1.3	1.9	3.1	4.1	4.0	3.3	3.2	3.1	2.7	3.3	2.9	2.5	3.3	2.9	1.2	0.7	0.8	1.0	4.1
16-May	0.4	0.3	0.3	0.3	0.4	0.3	0.4	1.4	1.6	2.0	2.1	2.4	1.9	2.4	2.4	2.2	2.6	2.0	1.4	0.7	0.9	1.8	1.5	0.8	2.6
17-May	0.6	0.9	0.5	0.6	0.7	0.9	0.9	1.2	1.3	0.9	1.7	2.0	2.7	2.0	2.6	2.0	1.6	1.2	1.5	0.7	0.7	1.1	1.4	1.0	2.7
18-May	0.9	0.8	0.7	0.8	0.9	1.2	1.2	1.3	1.2	1.6	2.5	1.9	2.0	2.1	2.4	3.1	2.7	2.4	1.5	1.1	1.0	0.4	0.5	0.8	3.1
19-May	0.4	1.1	1.2	1.0	1.2	1.4	1.5	2.3	2.4	2.4	2.7	2.7	3.1	3.4	2.8	3.5	2.6	2.3	2.3	2.3	2.1	1.5	1.9	1.4	3.5
20-May	1.0	1.8	1.9	2.1	1.6	1.5	2.1	2.5	2.7	3.2	2.9	3.0	2.9	2.7	2.2	3.1	1.7	2.1	2.4	2.2	1.5	2.2	2.0	2.2	3.2
21-May	2.3	2.5	1.7	1.8	1.5	1.2	1.3	1.5	1.2	1.1	1.8	3.4	2.7	2.4	3.5	3.6	3.0	3.8	3.2	1.7	1.1	0.6	0.8	0.6	3.8
22-May	0.5	0.4	0.6	0.5	0.6	0.7	0.8	1.2	1.4	1.6	2.2	2.5	3.4	3.1	1.9	2.1	2.0	1.5	1.2	0.5	1.0	0.9	0.9	1.3	3.4
23-May	1.6	1.0	1.0	0.7	0.7	1.1	0.9	0.7	0.7	1.1	1.1	1.0	1.4	2.3	2.5	2.2	1.9	1.3	0.9	1.1	1.5	0.9	3.7	3.9	3.9
24-May	2.4	1.1	1.7	2.0	1.9	1.7	1.8	1.7	2.1	2.1	2.5	2.8	2.7	2.5	2.4	2.2	2.4	2.6	2.3	1.7	1.2	0.9	0.7	0.5	2.8
25-May	0.4	0.2	0.3	0.2	0.6	0.6	0.6	1.0	2.0	2.4	2.6	2.0	2.0	2.2	2.5	2.8	2.7	2.0	1.8	1.8	1.8	1.5	2.3	1.9	2.8
26-May	1.7	1.2	1.7	1.2	0.5	0.8	1.4	0.9	2.0	2.6	2.2	0.6	1.0	1.2	1.3	2.6	2.3	2.4	2.1	2.3	2.1	2.1	1.9	1.8	2.6
27-May	1.8	1.7	1.8	1.7	1.8	1.6	2.0	2.1	2.5	2.5	2.1	2.1	2.3	2.5	2.7	2.6	2.1	1.8	1.7	1.6	1.1	0.8	0.6	0.5	2.7
28-May	0.7	0.8	0.8	0.7	0.7	1.2	1.0	1.6	1.4	2.1	1.8	1.6	1.5	1.4	1.7	1.6	1.8	1.8	2.1	1.8	1.4	1.1	1.1	1.6	2.1
29-May	1.0	1.4	1.2	0.8	0.8	0.7	0.9	1.0	0.9	1.2	0.9	1.4	1.6	1.5	1.4	1.8	2.9	1.8	1.4	2.0	1.7	1.7	1.9	1.6	2.9
30-May	2.4	1.9	2.0	3.2	3.8	3.4	4.0	3.8	3.6	3.8	4.2	4.3	4.2	5.1	4.8	3.1	1.1	1.1	1.2	0.7	1.7	1.6	0.7	0.5	5.1
31-May	1.4	1.7	0.9	0.7	0.5	0.3	0.5	1.3	1.8	2.1	2.4	2.2	3.0	2.7	3.2	2.9	2.9	2.7	2.4	1.5	1.1	1.7	2.0	1.7	3.2
Diurnal Maximum																									



Maximum Value: 2.9 km/h on May 8 02:00		Maximum Daily Average: 0.9 km/h on May 14		Hours in Service: 744																							
Minimum Value: -1.7 km/h on May 24 00:00		Minimum Daily Average: -0.4 km/h on May 10		Hours of Data: 744																							
Maximum Diurnal Average: 0.6 km/h at hour 22		Minimum Diurnal Average: -0.2 km/h at hour 12		Hours of Missing Data: 0																							
Monthly Average: 0.23 km/h		Percentiles: P <sub>1</sub> = -1.4 P <sub>10</sub> = -0.6 Q <sub>1</sub> = -0.2 Median = 0.2 Q <sub>3</sub> = 0.6 P <sub>90</sub> = 1.2 P <sub>99</sub> = 2.3		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-May	1.7	0.3	-0.5	-0.1	0.0	-0.7	-0.8	-0.5	0.0	-1.2	-1.0	-0.8	0.1	-0.5	0.4	-0.6	-1.6	-0.8	-0.1	0.6	0.1	-0.1	-0.7	-0.7	-0.3	1.7	
2-May	-1.4	-1.2	-0.4	-0.5	-1.1	-1.3	-1.5	-1.3	-0.8	0.5	-1.6	-0.5	-0.1	0.1	0.1	0.1	1.1	-0.4	0.2	0.4	0.9	-0.1	0.4	0.7	-0.3	1.1	
3-May	0.5	0.3	-0.3	0.5	0.7	0.3	-0.3	-0.1	-0.2	0.2	-0.4	-0.3	-1.1	1.2	1.4	0.5	-0.4	-0.4	0.3	0.5	0.8	1.0	0.9	0.6	0.3	1.4	
4-May	0.3	0.1	0.0	0.0	0.1	0.2	0.2	0.0	0.3	0.3	0.5	-1.0	0.0	-0.1	-0.9	0.7	0.1	0.4	0.6	1.2	-0.1	0.0	1.2	0.8	0.2	1.2	
5-May	0.6	0.1	0.4	0.2	0.7	2.0	1.2	0.7	0.3	0.7	0.8	-0.4	-0.4	-0.6	-0.1	2.3	1.6	0.4	0.4	0.4	0.4	1.2	1.2	0.5	0.6	2.3	
6-May	0.5	0.5	0.4	0.3	0.5	0.6	0.6	0.0	0.4	-0.1	-0.4	0.5	0.6	0.5	0.3	-0.5	0.4	0.5	0.2	-0.2	-0.2	-0.1	0.0	0.1	0.2	0.6	
7-May	-0.2	-0.2	0.2	-0.1	0.2	0.2	0.1	0.2	0.0	-0.2	0.3	-0.6	-0.6	-0.9	-0.6	-0.2	-0.7	-0.2	0.0	-0.1	0.0	0.2	-0.2	0.2	-0.1	0.3	
8-May	0.3	2.9	0.9	0.2	0.4	0.1	0.2	0.3	-0.3	0.2	0.3	-0.8	0.0	0.1	0.1	0.6	-0.4	1.0	0.1	-0.2	0.0	0.2	0.0	-0.1	0.3	2.9	
9-May	0.0	-0.1	-0.1	-0.1	-0.1	0.0	0.5	-0.1	-0.4	0.5	-0.4	0.3	0.6	-0.1	-0.5	-0.1	0.2	-0.1	0.1	0.0	-0.2	0.1	0.0	-0.2	0.0	0.6	
10-May	-0.9	-0.9	-1.0	0.9	0.3	0.0	-0.5	-1.0	-0.6	-0.3	-0.5	-0.8	-0.8	-0.9	-0.7	-0.5	-0.5	-0.4	-0.6	-0.5	-0.5	-0.2	0.1	0.1	-0.4	0.9	
11-May	-0.4	-0.2	-0.4	-0.4	-0.4	-0.2	-0.1	0.0	0.7	0.9	-0.4	-0.4	-0.5	-0.7	-0.5	0.7	0.7	-1.2	0.3	0.3	0.6	0.9	0.5	0.5	0.0	0.9	
12-May	0.8	0.2	0.0	0.3	0.3	0.3	0.4	-0.1	-0.2	2.4	0.0	1.6	-1.0	-1.0	-0.5	0.5	0.5	0.6	-0.3	-0.5	0.0	1.6	0.5	1.0	0.3	2.4	
13-May	0.3	0.2	0.2	0.1	0.1	0.1	0.6	0.3	0.2	0.0	-0.8	-1.2	-1.5	0.2	-0.9	-1.0	0.2	-0.2	0.0	-0.1	0.0	1.1	1.1	0.8	0.0	1.1	
14-May	0.6	0.7	0.6	0.5	0.3	1.2	0.4	0.0	0.3	-0.1	0.7	0.1	0.6	1.0	0.3	0.7	1.3	2.0	2.6	2.2	2.1	1.4	0.7	1.2	0.9	2.6	
15-May	2.4	1.4	0.8	2.7	1.1	0.6	1.9	0.6	0.5	0.9	0.5	0.9	1.1	1.2	1.0	0.4	0.3	0.9	0.0	0.1	-0.2	-0.4	-0.7	-0.5	0.7	2.7	
16-May	-0.3	-0.1	-0.2	-0.1	0.0	-0.1	0.1	0.0	1.4	1.6	1.7	-0.7	-1.0	-0.9	-0.1	1.0	0.5	1.7	-0.1	0.6	1.1	1.7	0.5	0.6	0.4	1.7	
17-May	0.4	0.8	0.5	1.1	0.8	1.0	0.0	0.2	0.1	-0.4	-0.5	-0.8	0.5	-1.0	0.1	-0.5	-0.3	-0.3	-0.1	0.3	1.0	1.4	0.5	0.0	0.2	1.4	
18-May	-0.3	0.0	-0.1	-0.1	0.4	0.3	-0.6	0.2	0.1	0.1	0.7	-0.7	-0.4	0.4	-0.4	0.2	-0.6	-0.2	-0.1	1.0	-0.2	-0.1	-0.1	-0.1	0.0	1.0	
19-May	0.2	0.2	0.6	0.7	0.5	0.5	0.2	0.3	1.2	0.1	1.0	1.4	1.1	1.5	0.1	1.3	-0.2	0.0	0.7	0.7	0.8	1.4	1.5	1.6	0.7	1.6	
20-May	0.0	-0.1	0.1	0.4	0.7	0.9	0.6	0.1	-0.7	-0.4	0.1	-0.5	0.2	0.5	0.6	1.9	1.6	1.3	1.4	1.4	0.5	0.3	0.1	0.3	0.5	1.9	
21-May	0.5	0.4	0.5	0.0	0.2	0.4	0.5	0.4	-0.3	0.2	0.0	1.2	0.7	1.2	1.6	1.0	0.6	-0.3	-0.8	-0.8	-0.5	0.0	-0.3	0.0	0.3	1.6	
22-May	0.4	0.2	0.2	0.2	1.0	0.7	1.0	0.1	0.1	-0.5	-1.4	-1.2	-0.2	-0.2	-0.3	0.6	0.1	-0.1	0.6	0.9	0.4	0.3	0.6	0.0	0.1	1.0	
23-May	0.1	0.6	0.1	0.2	0.3	0.2	0.2	0.3	0.3	0.6	-0.5	-0.4	0.0	0.5	0.2	0.4	0.3	-0.2	0.7	1.5	0.9	-0.2	-1.7	0.2	1.5		
24-May	-0.8	0.3	0.9	0.4	-0.3	1.0	0.6	-0.2	-0.7	0.0	-0.2	-0.1	-0.2	0.3	0.3	0.7	-0.8	-0.6	-0.4	-0.1	0.8	1.1	0.2	0.0	0.1	1.1	
25-May	0.2	0.4	0.3	0.1	0.3	0.2	0.3	0.6	0.7	0.2	0.1	0.1	-0.4	-0.7	-0.4	0.1	0.7	0.9	1.2	1.2	1.7	1.3	1.4	1.5	0.5	1.7	
26-May	1.9	1.4	0.7	0.6	0.8	0.2	0.0	0.4	0.8	1.5	1.3	0.8	0.5	1.3	-0.4	1.3	0.9	0.7	0.4	0.4	0.6	1.0	0.7	0.5	0.8	1.9	
27-May	0.5	0.4	0.4	1.4	0.3	0.4	0.3	0.4	0.6	0.2	-0.3	0.2	-0.2	0.0	0.2	0.3	0.0	0.3	0.1	0.2	0.4	0.3	0.9	0.7	0.3	1.4	
28-May	1.2	0.7	0.6	0.5	0.9	0.8	0.7	0.8	0.4	0.5	0.1	0.2	-0.2	0.9	1.6	0.1	0.7	0.8	1.3	1.2	1.0	1.1	2.1	1.7	0.8	2.1	
29-May	1.8	2.2	0.0	0.1	1.3	-0.1	0.3	-0.2	0.1	0.3	-0.1	0.4	0.4	0.2	0.1	0.1	-0.2	-0.3	-0.5	-0.5	-0.6	-0.7	-1.1	-0.3	0.1	2.2	
30-May	-0.6	0.1	-0.3	-0.5	-0.2	-0.3	0.1	-1.0	-1.6	-1.1	-0.7	-0.6	-1.3	-0.9	-1.4	-1.3	0.1	0.5	0.0	-0.2	0.0	0.3	0.2	0.2	-0.4	0.5	
31-May	1.8	-0.4	0.1	-0.1	0.1	-0.1	-0.1	0.1	-0.7	-0.7	-0.9	-1.1	-0.2	-0.1	-0.5	0.1	-0.2	-0.1	0.1	0.1	1.3	2.3	1.4	1.6	0.2	2.3	
		0.4	0.4	0.2	0.3	0.3	0.3	0.2	0.0	0.1	0.2	0.0	-0.2	-0.1	0.1	0.0	0.3	0.2	0.2	0.2	0.4	0.4	0.6	0.4	0.4	Diurnal Average	
		2.4	2.9	0.9	2.7	1.3	2.0	1.9	0.8	1.4	2.4	1.7	1.6	1.1	1.5	1.6	2.3	1.6	2.0	2.6	2.2	2.1	2.3	2.1	1.7	Diurnal Maximum	



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 5.4 km/h on May 30 14:00 Minimum Value: 0.2 km/h on May 16 04:00 Percentiles: P <sub>1</sub> = 0.3 P <sub>10</sub> = 0.6 Q <sub>1</sub> = 1.0 Median = 1.7 Q <sub>3</sub> = 2.7 P <sub>90</sub> = 3.4 P <sub>99</sub> = 4.5																								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-May	1.6	2.4	1.5	1.2	1.4	1.3	1.6	1.2	2.9	3.9	3.9	3.7	3.8	4.0	4.5	3.9	3.6	3.3	2.8	2.7	1.8	1.4	1.4	1.2	4.5
2-May	2.1	3.0	3.2	3.1	3.4	3.3	2.9	3.5	3.5	3.6	3.1	3.5	3.0	2.6	2.6	3.0	3.6	2.9	3.1	3.1	3.2	3.3	3.4	3.6	3.6
3-May	3.4	3.2	2.8	3.1	3.0	3.1	2.7	2.7	2.7	3.2	3.0	2.9	2.7	3.7	3.9	3.4	3.9	3.2	2.8	1.8	0.5	0.3	0.7	0.4	3.9
4-May	0.5	0.3	0.2	0.3	0.3	0.5	0.5	0.6	1.3	1.9	2.9	2.6	1.8	2.5	2.5	3.1	2.5	1.6	1.8	2.1	2.3	1.4	1.7	0.6	3.1
5-May	1.7	0.8	0.9	1.0	1.1	1.6	1.4	1.3	1.2	2.2	2.6	2.3	2.6	2.6	2.8	3.5	2.7	2.7	3.0	2.4	1.7	2.6	3.1	1.9	3.5
6-May	1.7	1.1	0.9	1.4	1.9	2.2	2.9	2.8	3.6	4.0	4.6	4.5	4.0	3.3	3.9	2.9	3.0	3.4	2.5	0.9	0.6	0.8	1.5	1.6	4.6
7-May	0.7	0.5	0.6	0.5	0.8	1.0	1.6	1.9	2.4	3.5	3.8	3.5	3.7	4.0	3.3	3.6	3.9	3.8	3.1	2.4	0.9	0.9	1.4	1.3	4.0
8-May	0.8	1.2	1.3	0.8	0.7	0.5	0.6	1.0	1.2	1.3	1.4	1.4	2.5	3.2	3.5	3.7	3.0	3.3	2.0	1.1	1.0	0.9	0.8	0.5	3.7
9-May	0.4	0.5	0.8	0.3	0.7	1.2	1.5	3.2	2.9	2.8	2.4	2.2	2.6	2.3	2.2	2.9	2.9	2.1	1.5	0.7	1.6	1.7	1.6	1.2	3.2
10-May	1.0	1.1	1.5	1.6	1.8	1.6	1.8	2.0	3.4	2.2	2.4	3.6	2.7	2.0	1.7	1.8	1.8	1.6	1.2	1.1	0.9	0.9	0.7	0.7	3.6
11-May	1.0	0.9	1.0	0.6	0.8	0.8	0.8	1.4	1.5	2.1	3.6	4.2	2.5	3.7	3.6	3.2	3.7	2.1	2.6	1.5	0.7	0.4	0.9	0.6	4.2
12-May	0.9	0.7	0.4	0.5	0.4	0.3	0.6	0.7	1.8	2.7	2.3	3.1	3.1	2.9	3.3	3.9	4.1	3.9	3.2	2.5	1.6	2.1	2.0	1.6	4.1
13-May	0.8	1.0	0.6	0.4	0.3	0.4	0.5	0.6	0.8	1.2	2.1	2.7	2.9	2.7	3.0	3.2	3.6	3.4	3.0	1.9	0.8	0.4	0.7	0.9	3.6
14-May	1.1	1.3	0.8	0.7	0.6	0.9	1.8	1.2	0.8	1.4	2.5	3.3	3.9	3.7	3.1	2.7	2.0	1.3	2.4	2.8	1.7	1.5	1.0	1.1	3.9
15-May	1.2	1.8	1.4	1.7	1.1	0.8	1.0	1.7	3.3	4.4	4.8	3.7	3.8	3.2	3.0	3.4	3.0	2.5	2.9	2.8	0.8	0.7	0.9	1.0	4.8
16-May	0.4	0.2	0.3	0.2	0.2	0.3	0.3	1.1	1.5	2.0	2.2	2.4	2.1	2.4	2.6	2.3	2.9	2.2	1.5	0.9	1.1	1.7	1.5	1.1	2.9
17-May	1.1	0.8	0.8	1.0	1.0	0.9	0.7	1.0	1.4	0.6	1.0	1.6	2.9	2.2	2.8	2.4	1.9	1.4	1.4	0.6	1.0	1.2	1.9	1.2	2.9
18-May	1.1	0.9	1.2	1.0	0.7	1.1	0.9	0.9	1.3	1.5	2.5	1.8	2.4	2.4	2.7	3.3	2.9	2.4	1.3	1.2	1.3	0.6	0.6	1.2	3.3
19-May	0.4	0.8	1.2	1.6	1.3	1.3	1.2	1.8	2.2	2.5	3.0	2.7	3.2	3.5	2.5	2.8	2.2	2.0	1.5	1.4	1.4	1.1	1.3	0.8	3.5
20-May	0.8	0.8	0.9	0.6	1.0	1.6	1.7	1.9	2.1	2.6	2.3	2.5	2.3	2.1	2.4	3.5	1.5	2.2	2.5	2.3	1.9	2.6	2.4	1.9	3.5
21-May	2.0	1.7	1.3	1.1	1.3	0.7	1.0	1.2	1.2	1.1	1.9	3.7	2.4	2.4	3.5	3.0	2.7	3.7	3.2	1.5	1.1	0.6	0.7	0.6	3.7
22-May	0.8	0.7	0.4	0.2	0.7	0.7	0.8	0.7	1.2	1.2	1.9	2.8	3.2	2.5	1.8	2.0	2.1	1.7	1.4	0.5	1.2	1.3	1.5	1.5	3.2
23-May	1.6	0.8	1.1	0.6	0.7	0.5	0.6	0.5	0.9	1.1	1.2	1.7	2.7	2.8	2.3	2.1	1.2	1.1	1.5	1.8	0.9	3.9	3.6	3.9	3.9
24-May	2.4	0.8	3.4	2.0	2.0	1.7	2.1	1.8	2.2	2.3	2.7	3.1	3.3	2.7	2.5	2.6	2.9	2.5	2.1	1.6	0.9	0.8	0.7	0.7	3.4
25-May	0.5	0.4	0.4	0.3	0.4	0.4	0.5	0.9	2.1	2.7	2.7	2.5	2.4	2.8	2.8	3.4	3.4	2.1	1.8	1.5	1.4	1.2	2.7	1.6	3.4
26-May	1.8	1.2	2.1	1.4	0.7	0.9	1.5	1.1	2.2	2.7	1.9	0.8	1.3	1.4	1.8	2.8	2.4	2.3	2.0	1.9	1.8	2.1	1.9	1.6	2.8
27-May	1.5	1.7	1.6	2.1	1.7	1.8	1.9	2.1	2.6	2.5	2.1	2.1	2.0	2.5	2.9	2.6	2.3	1.8	1.6	1.5	0.8	0.5	0.4	0.6	2.9
28-May	0.6	1.0	0.9	0.7	0.6	0.7	0.9	1.5	1.3	2.0	2.0	1.6	1.6	1.7	2.0	1.6	1.9	2.3	2.1	1.8	1.2	1.1	1.6	1.5	2.3
29-May	1.0	1.7	1.4	1.1	0.8	0.6	0.9	1.1	0.9	1.2	1.0	1.5	1.7	1.5	1.4	1.9	2.2	1.5	1.5	2.1	1.5	1.5	1.7	1.6	2.2
30-May	2.3	1.4	1.5	2.7	3.6	2.9	3.2	3.6	4.4	4.1	4.5	4.8	4.1	5.4	4.9	3.3	1.1	1.1	1.1	0.9	1.5	1.4	0.7	0.5	5.4
31-May	1.8	2.1	1.0	0.8	0.6	0.3	0.4	1.3	2.0	2.2	2.8	2.8	3.4	3.3	4.0	3.4	3.2	2.9	2.4	1.2	1.2	1.7	2.2	1.4	4.0
Diurnal Maximum																									

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**WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS 4  
BUFFALO VIEWPOINT  
MAY 2014**

Operations and Data Collection by:  
Wood Buffalo Environmental Association  
Fort McMurray, Alberta

QA/QC, Data Validation and Reporting by:  
Aurora Atmospheric Inc.  
Calgary, Alberta

June 27, 2014

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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BUFFALO VIEWPOINT (AMS 4)  
MAY 2014

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	8	0	2	0
H2S (ppb) Average	709	35	35	100.00	1	0	0	0
THC (ppm) Average	709	35	35	100.00	3.3	-	2.5	-
Temperature (C) Average	744	0	0	100.00	28.2	-	-	-
Wind Speed 10 m (km/h) Average	744	0	0	100.00	40	-	-	-
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 - BUFFALO VIEWPOINT (AMS 4)  
MAY 2014

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	0.4	1	-	0	0	0	0	0	1	8
H2S (ppb) Average	709	0.3	0	-	0	0	0	0	0	0	1
THC (ppm) Average	709	2.29	0.2	-	2	2.1	2.2	2.3	2.3	2.5	3.3
Temperature 2 m (C) Average	744	8.57	6.7	-	-5.3	0.1	3	8.2	13.5	18.1	28.2
Wind Speed 10 m (km/h) Average	744	12.5	7	-	1	4	7	11	17	24	40
Wind Direction 10 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BUFFALO VIEWPOINT (AMS 4)  
MAY 2014

OPERATIONAL NOTES

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

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Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 8 ppb on May 17 16:00	Maximum Daily Average: 1.5 ppb on May 17		Hours of Data:	709
Minimum Value: 0 ppb on May 4 23:00	Minimum Daily Average: 0.1 ppb on May 10		Hours of Missing Data:	35
Maximum Diurnal Average: 0.8 ppb at hour 12	Minimum Diurnal Average: 0.1 ppb at hour 4		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 Q <sub>3</sub> = 0 P <sub>90</sub> = 1 P <sub>99</sub> = 4		Percent Operational Time:	100.0

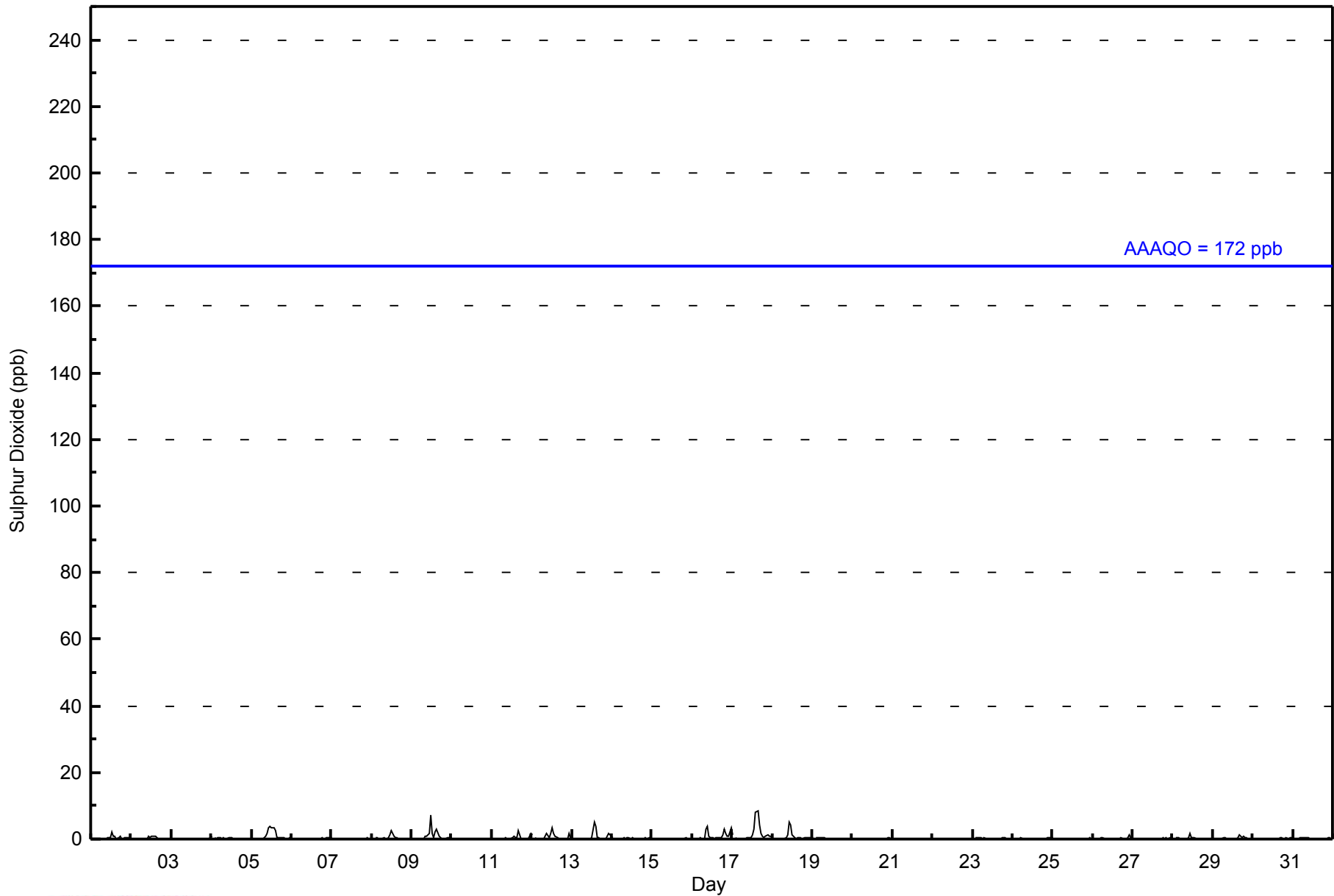
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-May	0	Z	0	0	0	0	0	0	0	0	0	0	2	1	1	0	0	1	0	0	0	0	0	0	0.4	2																							
2-May	0	Z	0	0	0	0	0	0	0	0	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0.2	1																							
3-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1																							
4-May	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																							
5-May	0	Z	0	0	0	0	0	0	0	1	2	3	4	3	3	2	0	0	1	0	0	0	0	0	0.9	4																							
6-May	0	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-May	0	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-May	0	Z	0	0	0	0	0	0	0	0	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0.4	2																							
9-May	0	Z	0	0	0	0	0	0	1	1	2	7	2	0	2	3	1	0	0	0	0	0	0	1	1.0	7																							
10-May	0	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																							
11-May	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	0	2	0	0	0	0	0	0	0	2	0.3	2																							
12-May	1	Z	1	0	0	0	0	0	1	2	0	2	3	2	1	0	0	0	0	0	0	0	2	0	0.7	3																							
13-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	5	4	0	0	0	0	0	0	1	2	1	0.7	5																							
14-May	0	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																							
15-May	0	Z	0	0	0	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.1	0																							
16-May	0	Z	0	0	0	0	0	0	3	4	1	0	0	0	0	1	0	1	3	2	1	1	3	1.0	4																								
17-May	1	Z	0	0	0	0	0	0	0	0	0	0	1	3	8	8	4	2	1	1	1	1	1	1	1.5	8																							
18-May	0	Z	0	0	0	0	0	0	1	1	5	4	1	0	0	0	0	0	0	0	0	0	0	0	0.7	5																							
19-May	0	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-May	0	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																							
21-May	0	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																							
22-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																							
23-May	0	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-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.2	1																							
25-May	0	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-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0.2	1																							
27-May	0	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																							
28-May	0	Z	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2																							
29-May	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0.3	1																							
30-May	0	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-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0																							
																								0.3	--	0.2	0.1	0.1	0.1	0.2	0.2	0.3	0.4	0.6	0.8	0.6	0.6	0.7	0.6	0.5	0.2	0.2	0.2	0.2	0.3	0.4	0.4	Diurnal Average	
																								1	--	1	0	0	0	1	0	3	4	5	7	3	5	8	8	4	2	1	3	2	1	2	3	Diurnal Maximum	

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



**WBEA**  
**Hourly Averages**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Buffalo Viewpoint - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Buffalo Viewpoint - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	709	100.00	100.00
11 - 20	0	0.00	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Buffalo Viewpoint - May 2014**

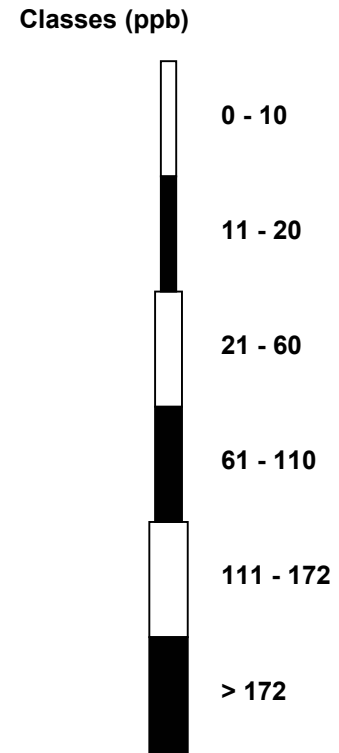
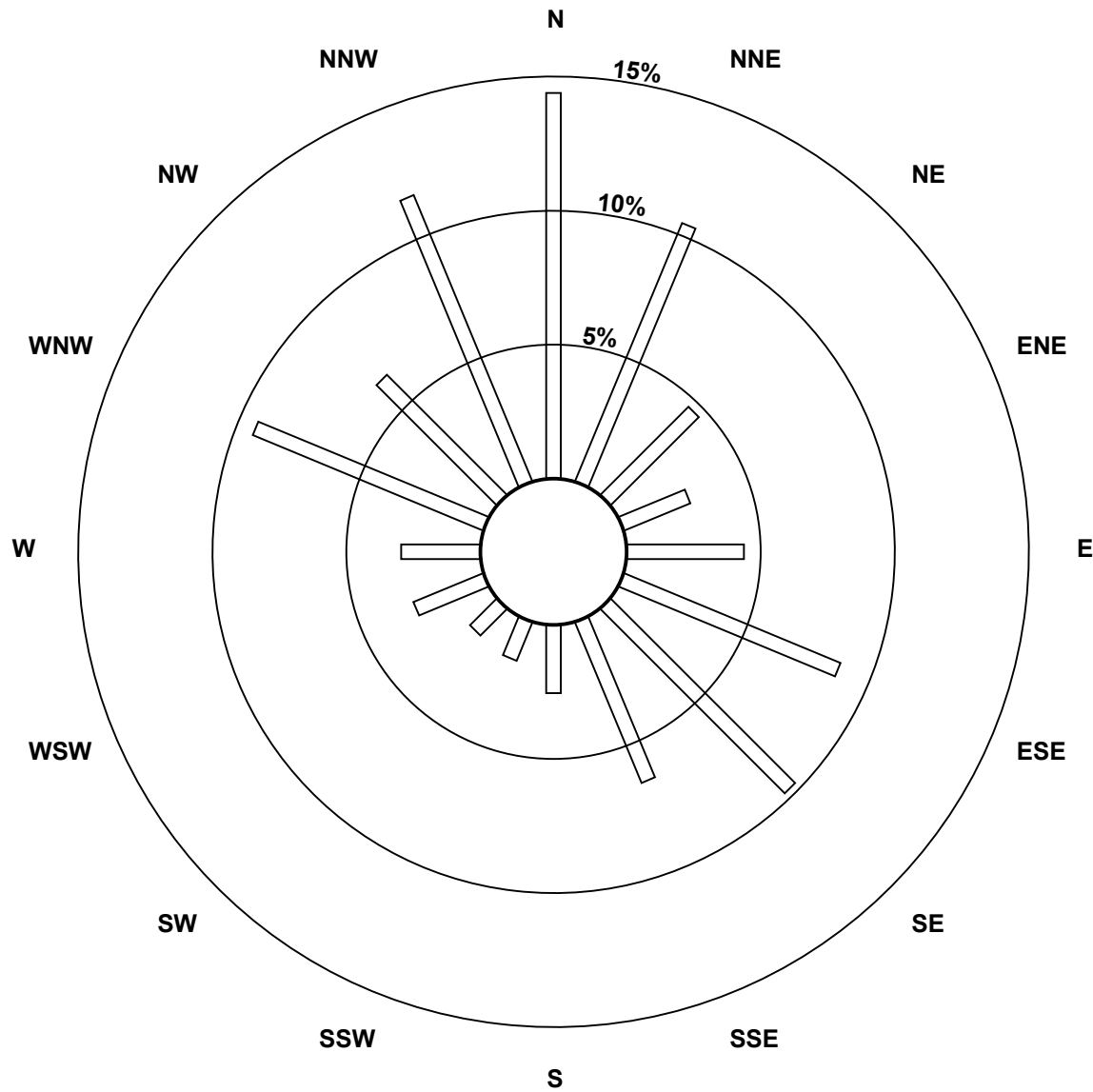
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	102	74	33	19	31	62	69	46	18	11	10	20	21	66	45	82	709
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	102	74	33	19	31	62	69	46	18	11	10	20	21	66	45	82	709

Total Number of Valid Hours: 709

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

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

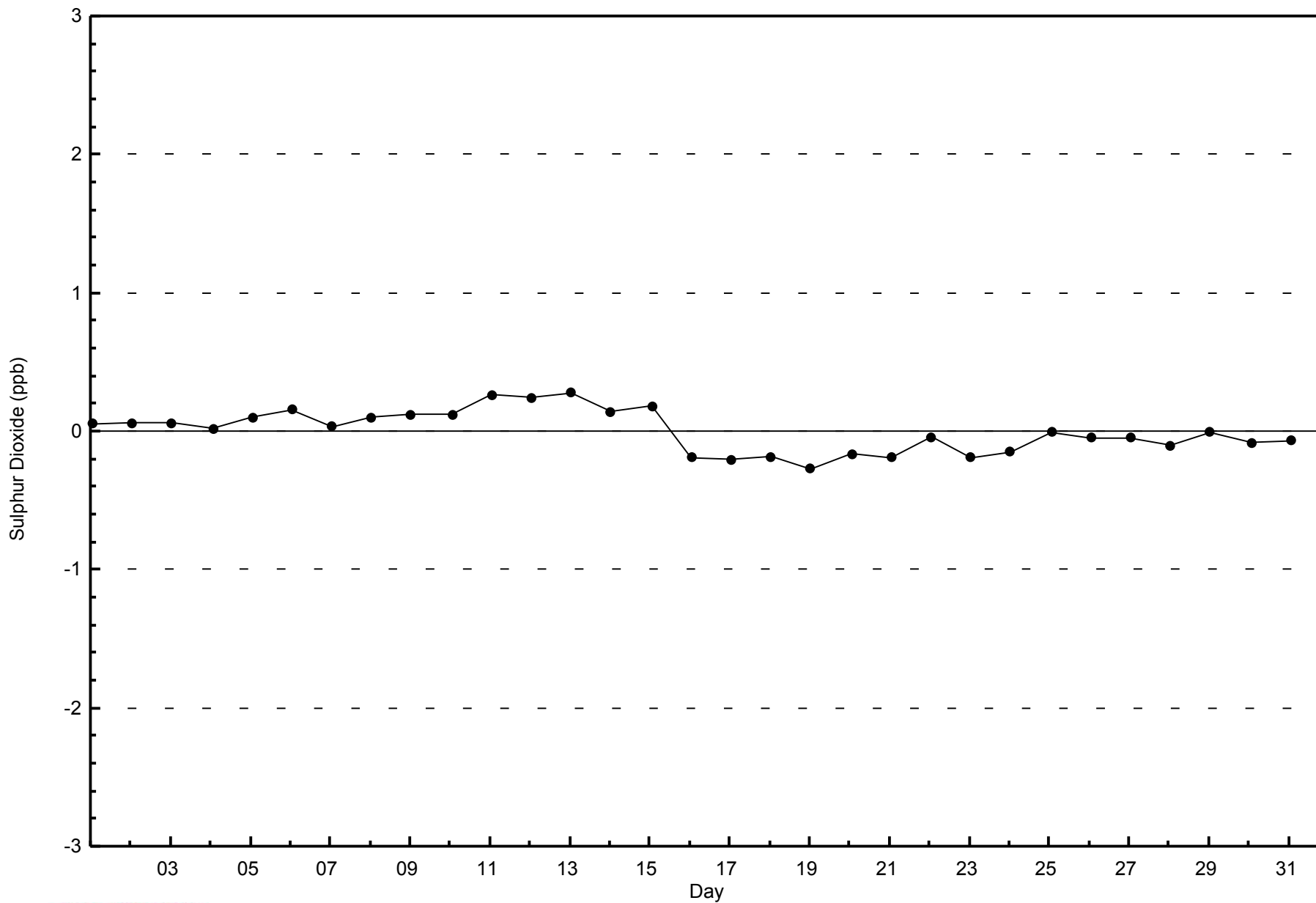


**Total Number of Valid Hours: 709**



WBEA  
Zero Responses

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Buffalo Viewpoint - May 2014

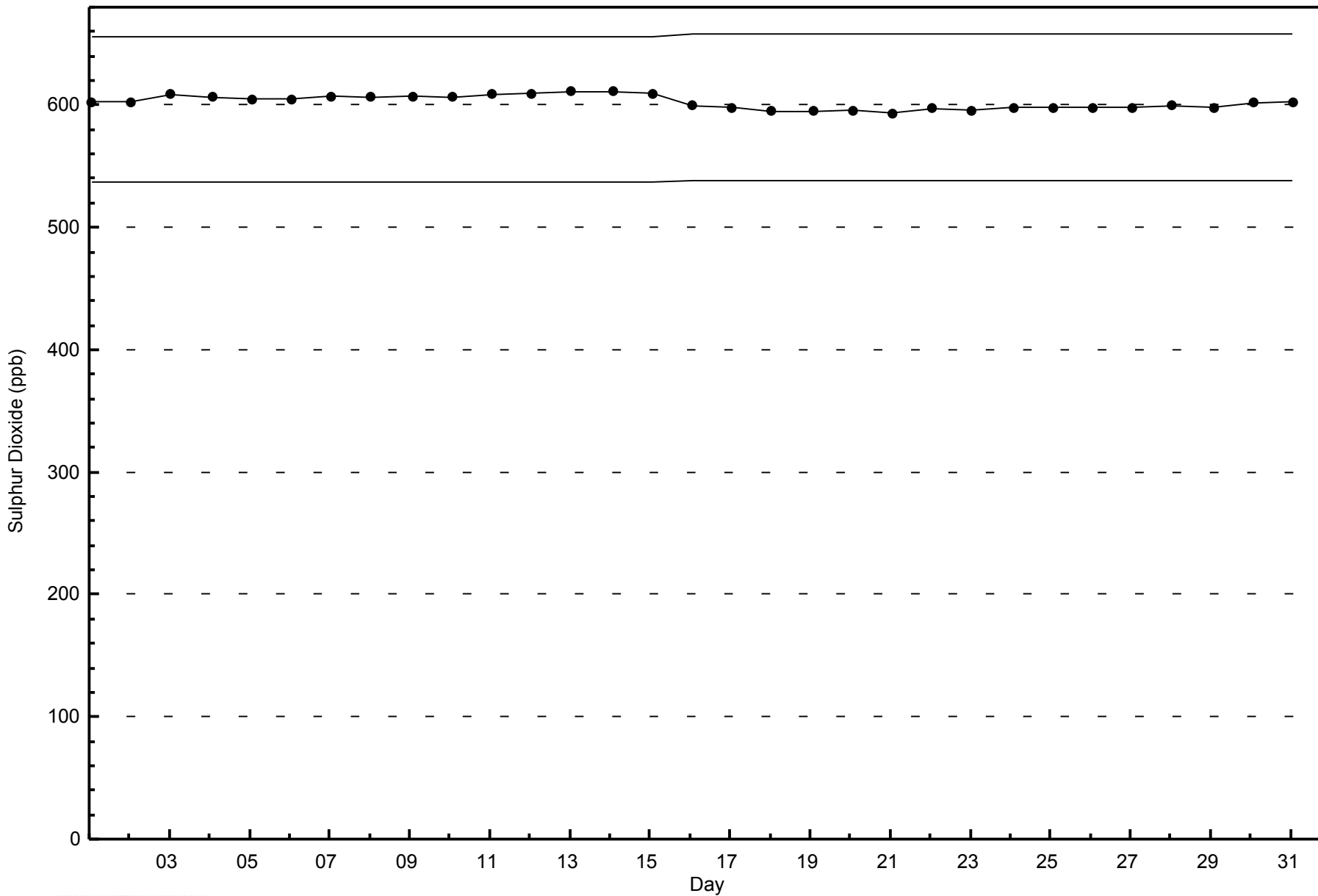






WBEA  
Span Responses

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Buffalo Viewpoint - May 2014



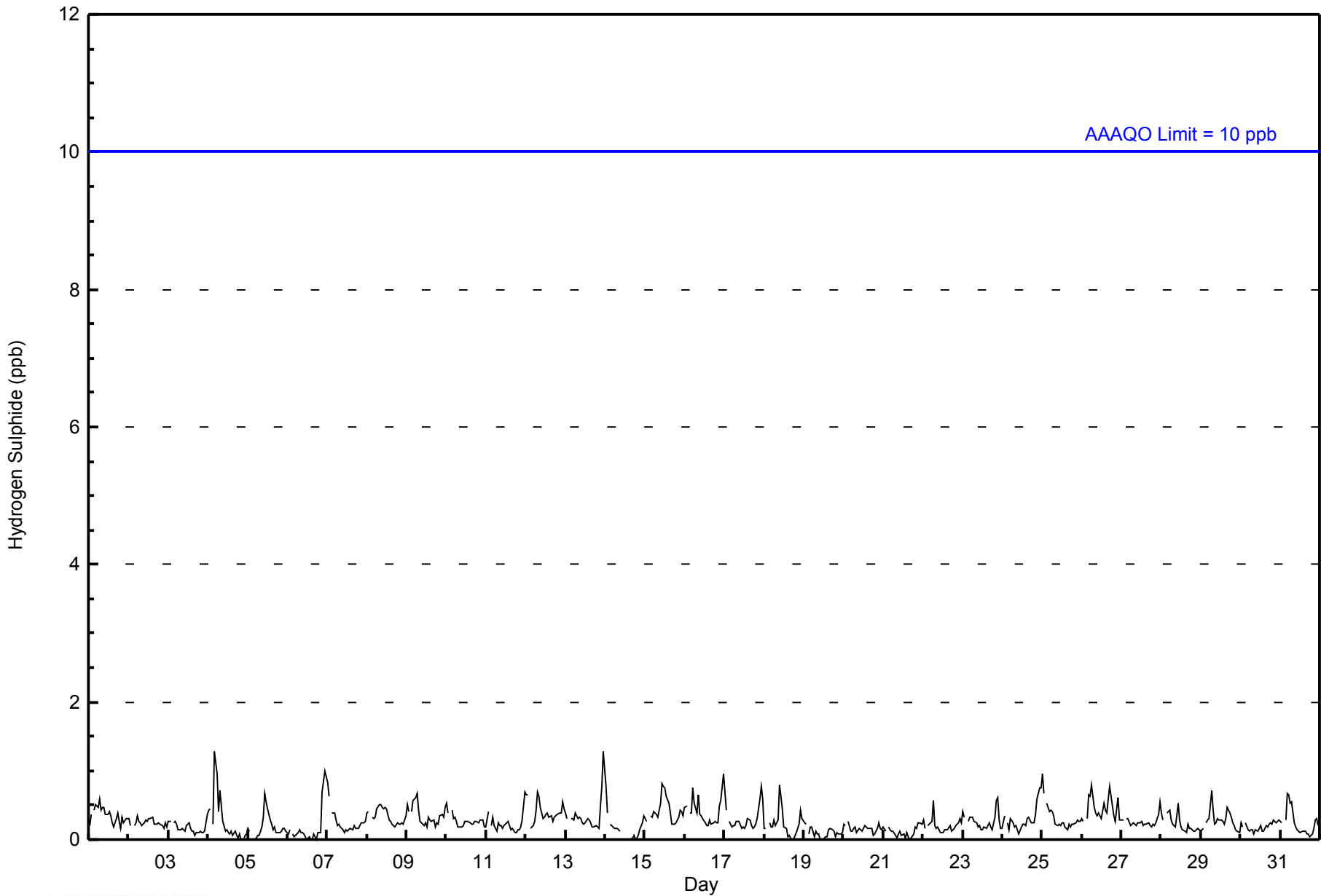


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																																						
Maximum Value: 1 ppb on May 14 00:00										Maximum Daily Average: 0.4 ppb on May 26										Hours of Data: 709																												
Minimum Value: 0 ppb on May 5 04:00										Minimum Daily Average: 0.1 ppb on May 19										Hours of Missing Data: 35																												
Maximum Diurnal Average: 0.4 ppb at hour 24										Minimum Diurnal Average: 0.2 ppb at hour 19										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> = 0 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-May	0	0	Z	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1																						
2-May	0	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-May	0	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																						
4-May	0	0	Z	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
5-May	0	0	Z	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																						
6-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.2	1																						
7-May	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
8-May	0	0	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
9-May	0	0	Z	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1																						
10-May	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
11-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.2	1																						
12-May	1	1	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.4	1																						
13-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.3	1																						
14-May	1	0	Z	0	0	0	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0.2	1																						
15-May	0	0	Z	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0.4	1																						
16-May	0	0	Z	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.4	1																						
17-May	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.3	1																						
18-May	0	0	Z	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																						
19-May	0	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-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0																						
21-May	0	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																						
22-May	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																						
23-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0.3	1																						
24-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.3	1																						
25-May	1	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
26-May	0	0	Z	0	1	1	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	0	0	0.4	1																						
27-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.3	1																						
28-May	0	0	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																						
29-May	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
30-May	0	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-May	0	0	Z	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																						
																								0.4	0.3	--	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.4	0.4	Diurnal Average
																								1	1	--	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	1	1	1	1	Diurnal Maximum
Z - zerospan C - Calibration																																																
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb																																																



WBEA  
Hourly Averages

Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Buffalo Viewpoint - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Buffalo Viewpoint - May 2014**

<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



**WBEA**  
**Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Buffalo Viewpoint - May 2014**

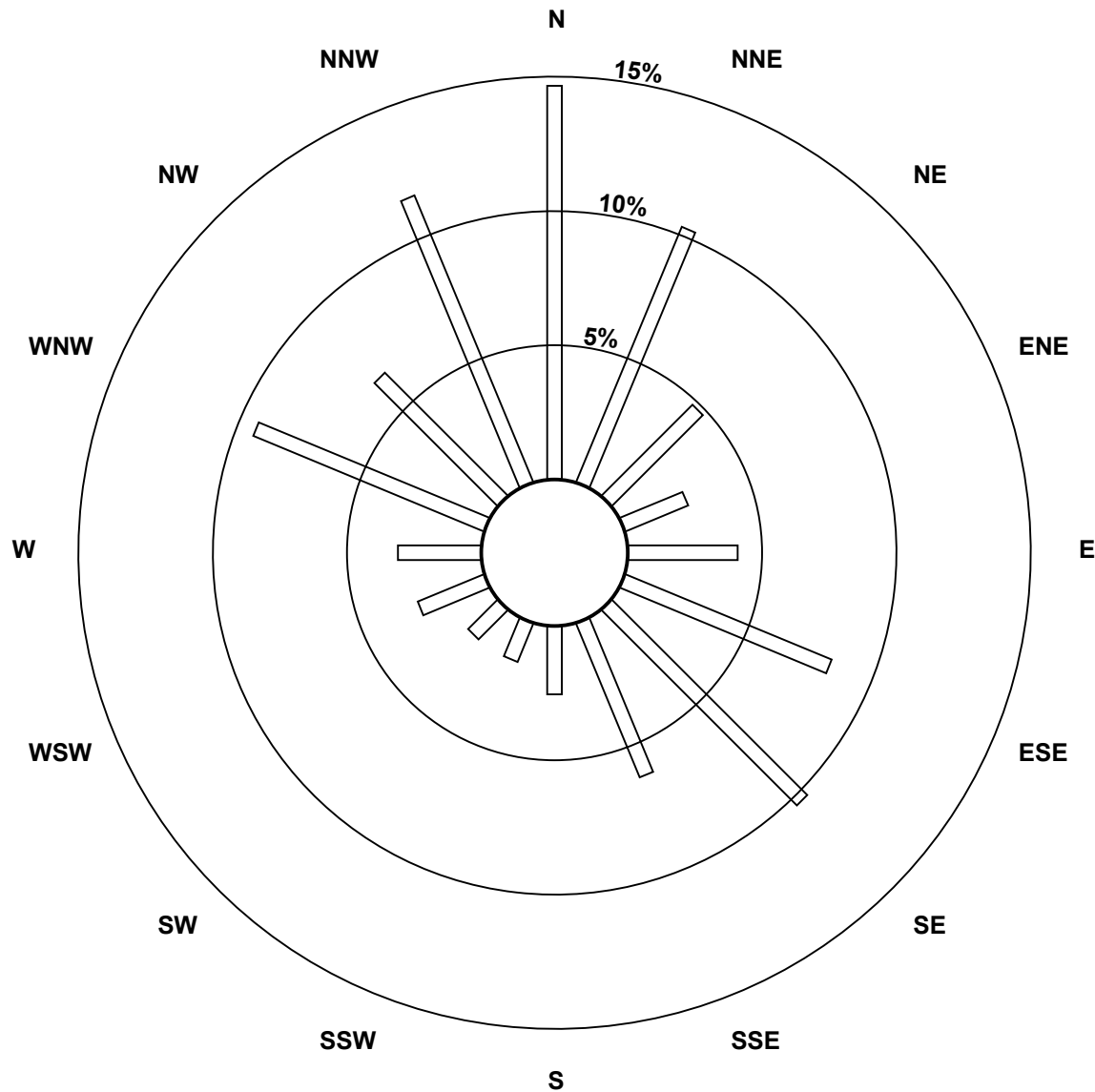
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	104	73	34	18	29	59	73	44	18	11	11	19	22	66	46	82	709
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	104	73	34	18	29	59	73	44	18	11	11	19	22	66	46	82	709

Total Number of Valid Hours: 709

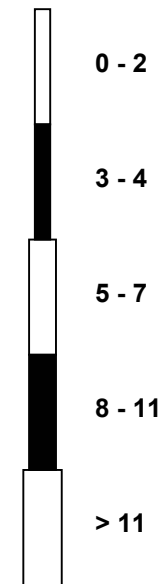
Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

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



**Classes (ppb)**

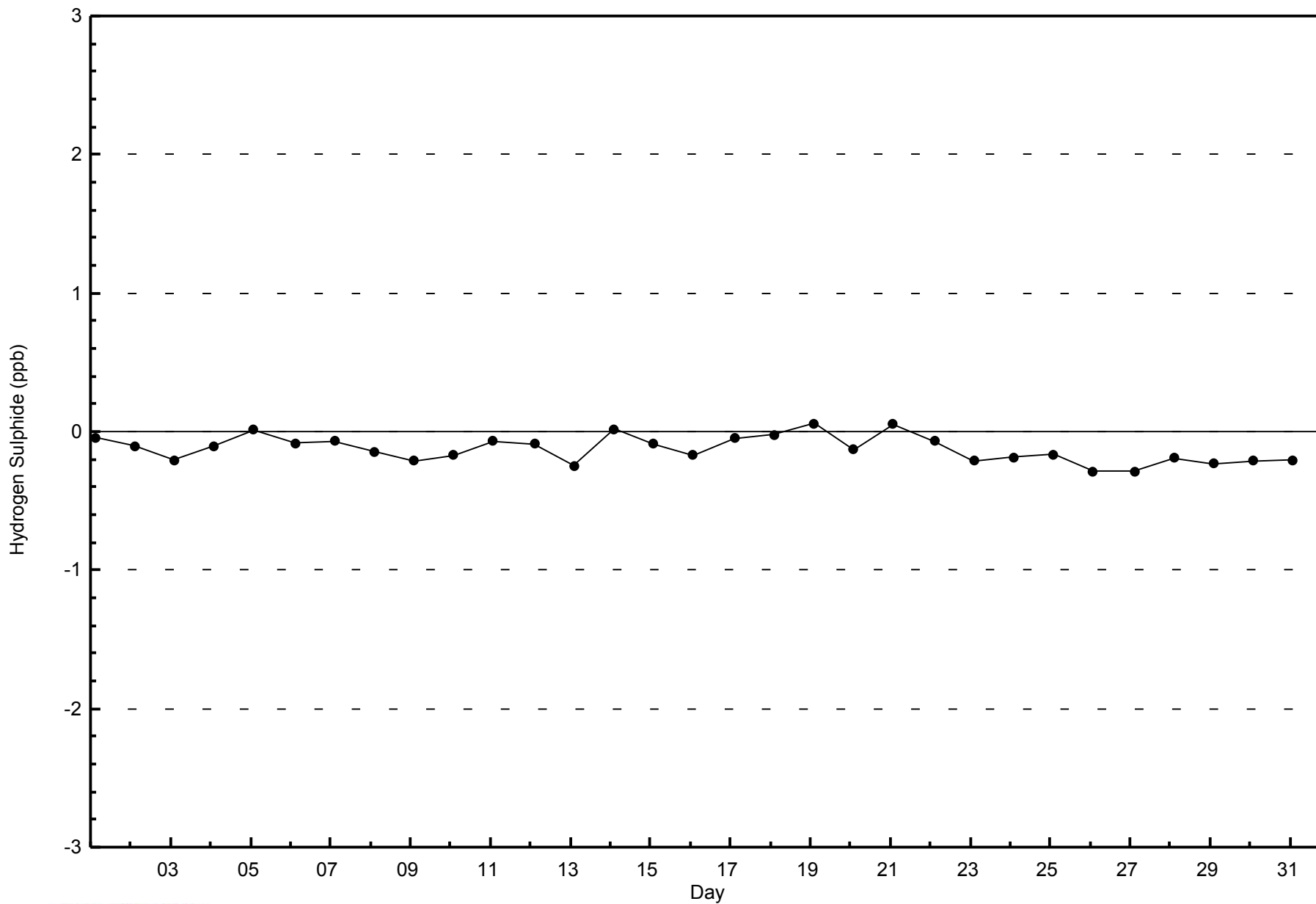


**Total Number of Valid Hours: 709**



WBEA  
Zero Responses

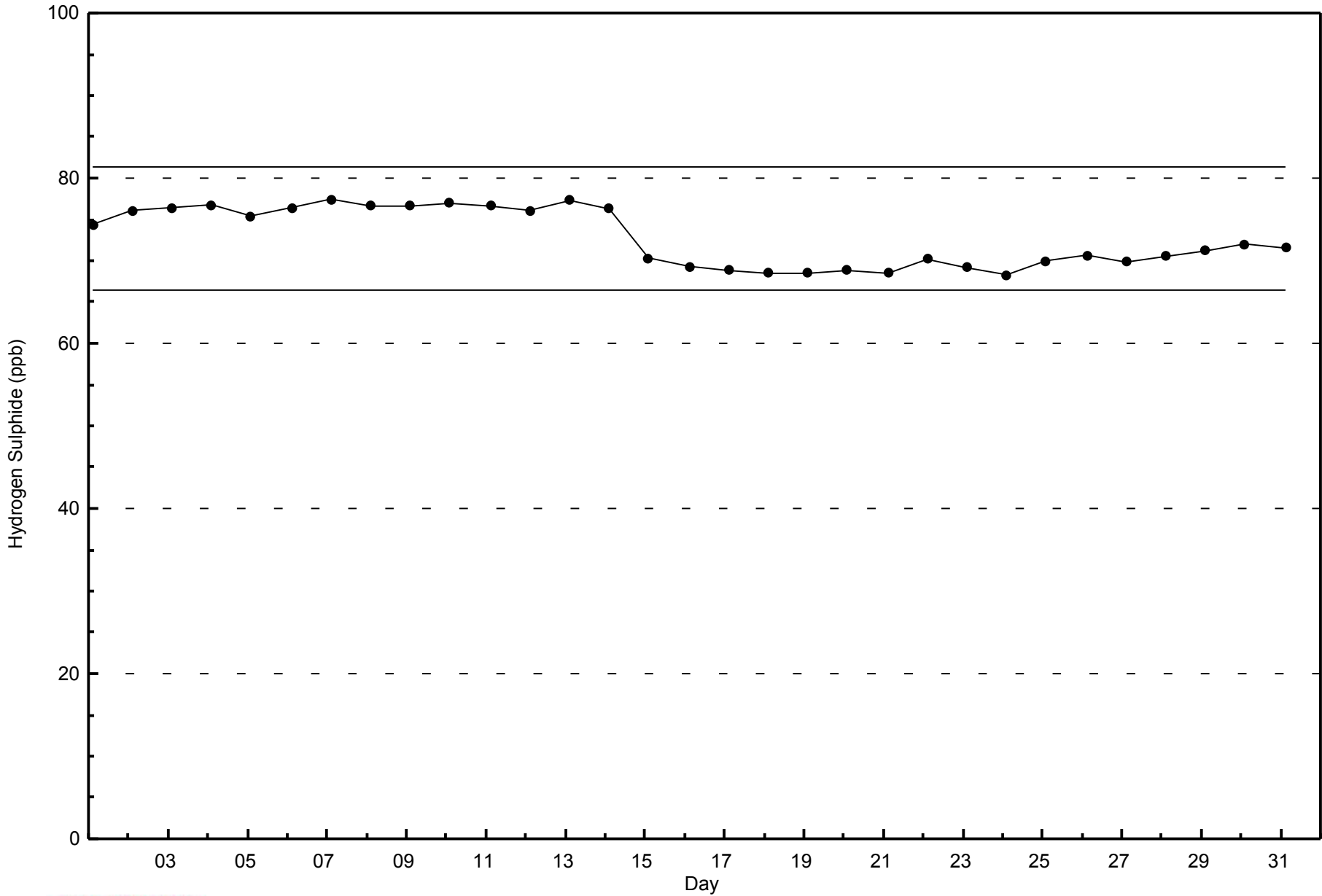
Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Buffalo Viewpoint - May 2014





WBEA  
Span Responses

Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Buffalo Viewpoint - May 2014







Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

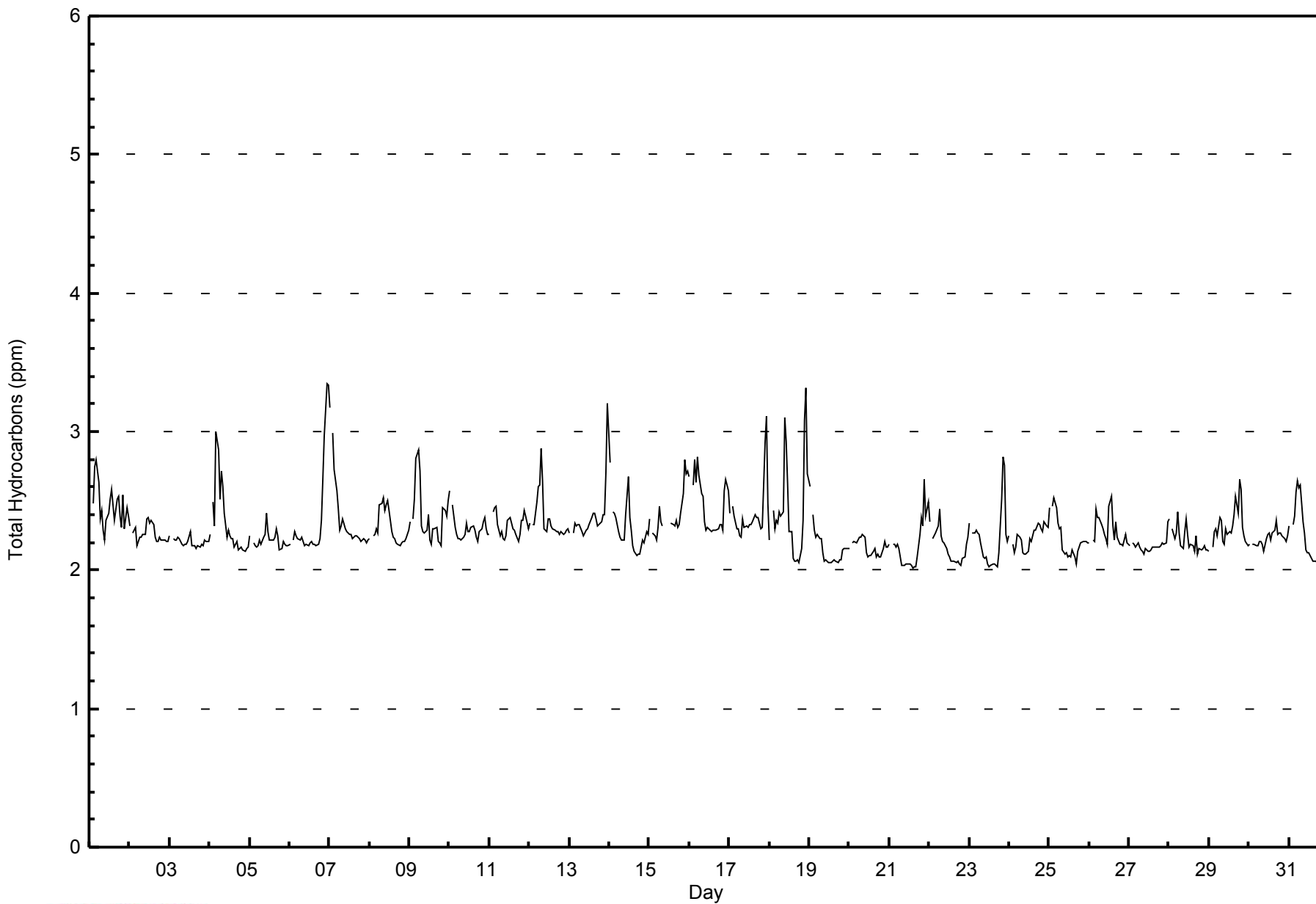
Buffalo Viewpoint - May 2014

Maximum Value: 3.3 ppm on May 6 23:00														Maximum Daily Average: 2.5 ppm on May 16														Hours in Service: 744	
Minimum Value: 2.0 ppm on May 21 15:00														Minimum Daily Average: 2.2 ppm on May 19														Hours of Data: 709	
Maximum Diurnal Average: 2.4 ppm at hour 23														Minimum Diurnal Average: 2.2 ppm at hour 18														Hours of Missing Data: 35	
Monthly Average: 2.29 ppm														Percentiles: P <sub>1</sub> = 2.0 P <sub>10</sub> = 2.1 Q <sub>1</sub> = 2.2 Median = 2.3 Q <sub>3</sub> = 2.3 P <sub>90</sub> = 2.5 P <sub>99</sub> = 3.1														Hours of Calibration: 35	
																												Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-May	2.2	Z	2.5	2.7	2.8	2.6	2.4	2.4	2.3	2.2	2.4	2.4	2.5	2.6	2.5	2.4	2.5	2.5	2.4	2.3	2.5	2.3	2.5	2.4	2.4	2.8			
2-May	2.3	Z	2.3	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.4	2.4	2.3	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4			
3-May	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	2.2	2.2	2.2	2.2	2.2	2.2	2.3			
4-May	2.3	Z	2.5	2.3	3.0	2.9	2.5	2.7	2.6	2.4	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.1	2.2	2.2	2.2	3.0			
5-May	2.3	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.1	2.2	2.2	2.2	2.2	2.2	2.4			
6-May	2.2	Z	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4	2.7	3.0	3.3	3.3	3.3	3.3			
7-May	3.2	Z	3.0	2.7	2.6	2.4	2.3	2.3	2.4	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	3.2			
8-May	2.2	Z	2.2	2.3	2.3	2.3	2.5	2.5	2.5	2.4	2.5	2.5	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.5			
9-May	2.4	Z	2.4	2.5	2.8	2.9	2.7	2.3	2.3	2.3	2.3	2.4	2.2	2.2	2.3	2.3	2.3	2.2	2.2	2.2	2.5	2.4	2.4	2.5	2.9				
10-May	2.6	Z	2.5	2.3	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.3	2.3	2.3	2.4	2.3	2.3	2.6				
11-May	2.3	Z	2.4	2.5	2.5	2.3	2.3	2.3	2.2	2.2	2.2	2.4	2.4	2.3	2.3	2.3	2.3	2.2	2.3	2.4	2.4	2.4	2.4	2.3	2.5				
12-May	2.3	Z	2.3	2.3	2.5	2.6	2.6	2.9	2.6	2.3	2.3	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.9				
13-May	2.3	Z	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.4	2.4	2.7	3.2	3.2				
14-May	2.8	Z	2.4	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.4	2.7	2.4	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.3	2.8				
15-May	2.4	Z	2.3	2.2	2.2	2.3	2.5	2.3	2.3	C	C	C	C	2.3	2.3	2.3	2.4	2.3	2.3	2.4	2.6	2.8	2.7	2.7	2.8				
16-May	2.7	Z	2.6	2.8	2.6	2.8	2.7	2.6	2.5	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.6	2.7	2.6	2.8				
17-May	2.4	Z	2.5	2.4	2.3	2.3	2.2	2.2	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.3	2.3	2.3	2.9	3.1	2.5	3.1				
18-May	2.2	Z	2.4	2.3	2.4	2.3	2.4	2.4	2.4	3.1	2.9	2.6	2.3	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.4	3.1	3.3	2.7				
19-May	2.6	Z	2.4	2.3	2.2	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.6				
20-May	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.3				
21-May	2.2	Z	2.2	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	2.1	2.3	2.4	2.3	2.7	2.4	2.5	2.7				
22-May	2.3	Z	2.2	2.2	2.3	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	2.0	2.0	2.1	2.1	2.2	2.2	2.4				
23-May	2.3	Z	2.3	2.3	2.3	2.3	2.3	2.2	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.5	2.8	2.8	2.3	2.2	2.8				
24-May	2.2	Z	2.2	2.1	2.2	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.3	2.3	2.4				
25-May	2.5	Z	2.5	2.5	2.4	2.3	2.3	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.5				
26-May	2.2	Z	2.2	2.2	2.4	2.4	2.4	2.3	2.3	2.3	2.2	2.2	2.5	2.5	2.3	2.2	2.4	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.5				
27-May	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3				
28-May	2.4	Z	2.3	2.2	2.3	2.4	2.3	2.2	2.2	2.3	2.4	2.3	2.2	2.2	2.2	2.1	2.3	2.1	2.2	2.1	2.2	2.2	2.1	2.1	2.4				
29-May	2.1	Z	2.2	2.3	2.3	2.2	2.4	2.4	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.4	2.5	2.4	2.6	2.6	2.3	2.3	2.2	2.2	2.6				
30-May	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.3	2.3	2.2	2.3	2.3	2.4	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.4				
31-May	2.3	Z	2.3	2.4	2.6	2.6	2.6	2.6	2.4	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.4	2.3	2.2	2.6				
																								Diurnal Average					
																								Diurnal Maximum					
Z - zerospan C - Calibration																													



**WBEA**  
**Hourly Averages**

**Total Hydrocarbons (THC) - ppm**  
**Buffalo Viewpoint - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Buffalo Viewpoint - May 2014**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	21	2.96	2.96
2.1 - 3.0	680	95.91	98.87
3.1 - 10.0	8	1.13	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Buffalo Viewpoint - May 2014**

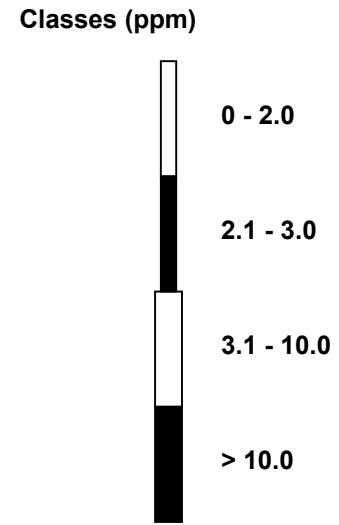
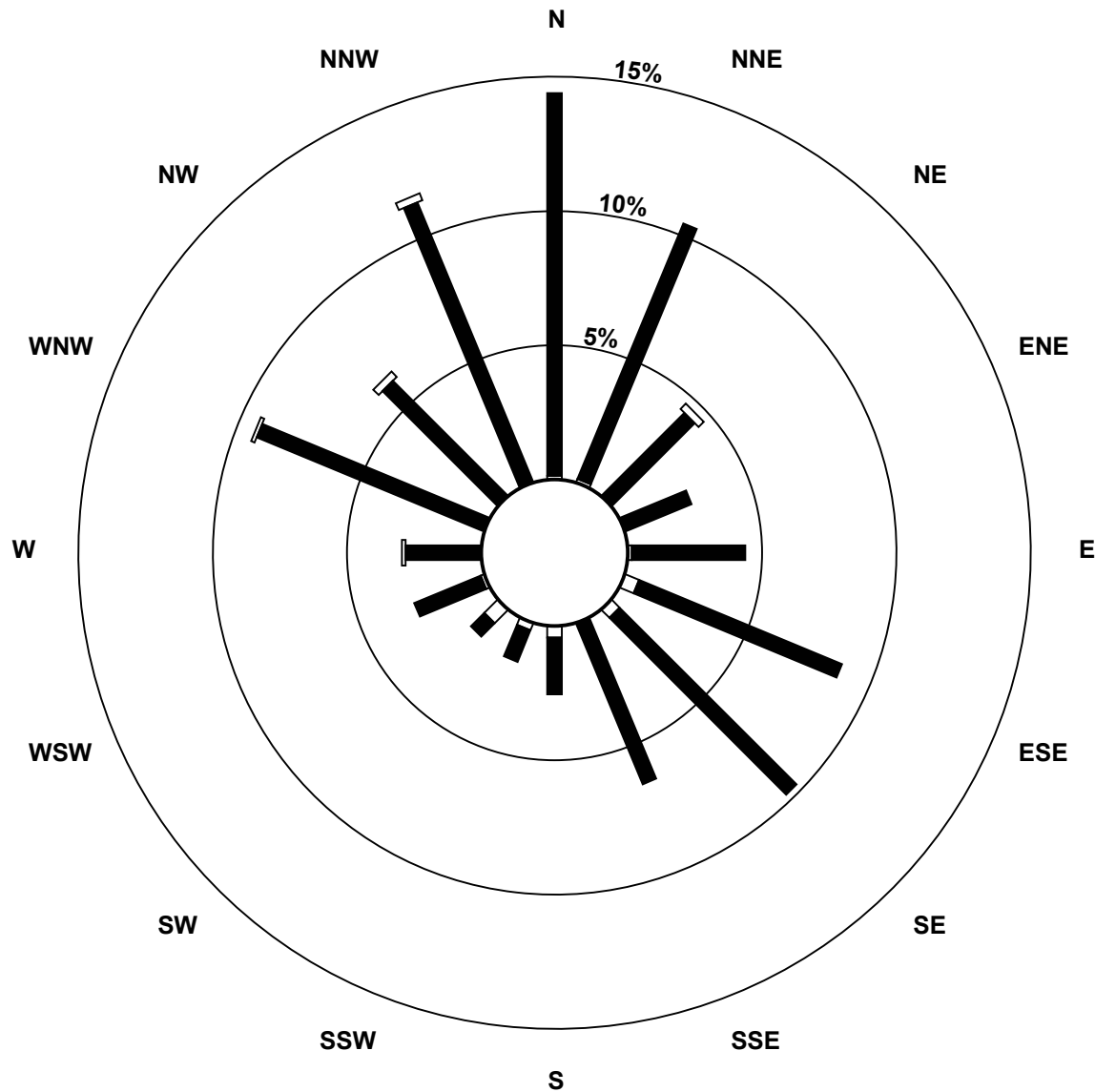
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	1	1	0	0	1	4	3	0	3	2	5	1	0	0	0	0	21
2.1 - 3.0	101	73	31	19	30	58	66	46	15	9	5	19	20	65	43	80	680
3.1 - 10.0	0	0	2	0	0	0	0	0	0	0	0	0	1	1	2	2	8
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	102	74	33	19	31	62	69	46	18	11	10	20	21	66	45	82	709

Total Number of Valid Hours: 709

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

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

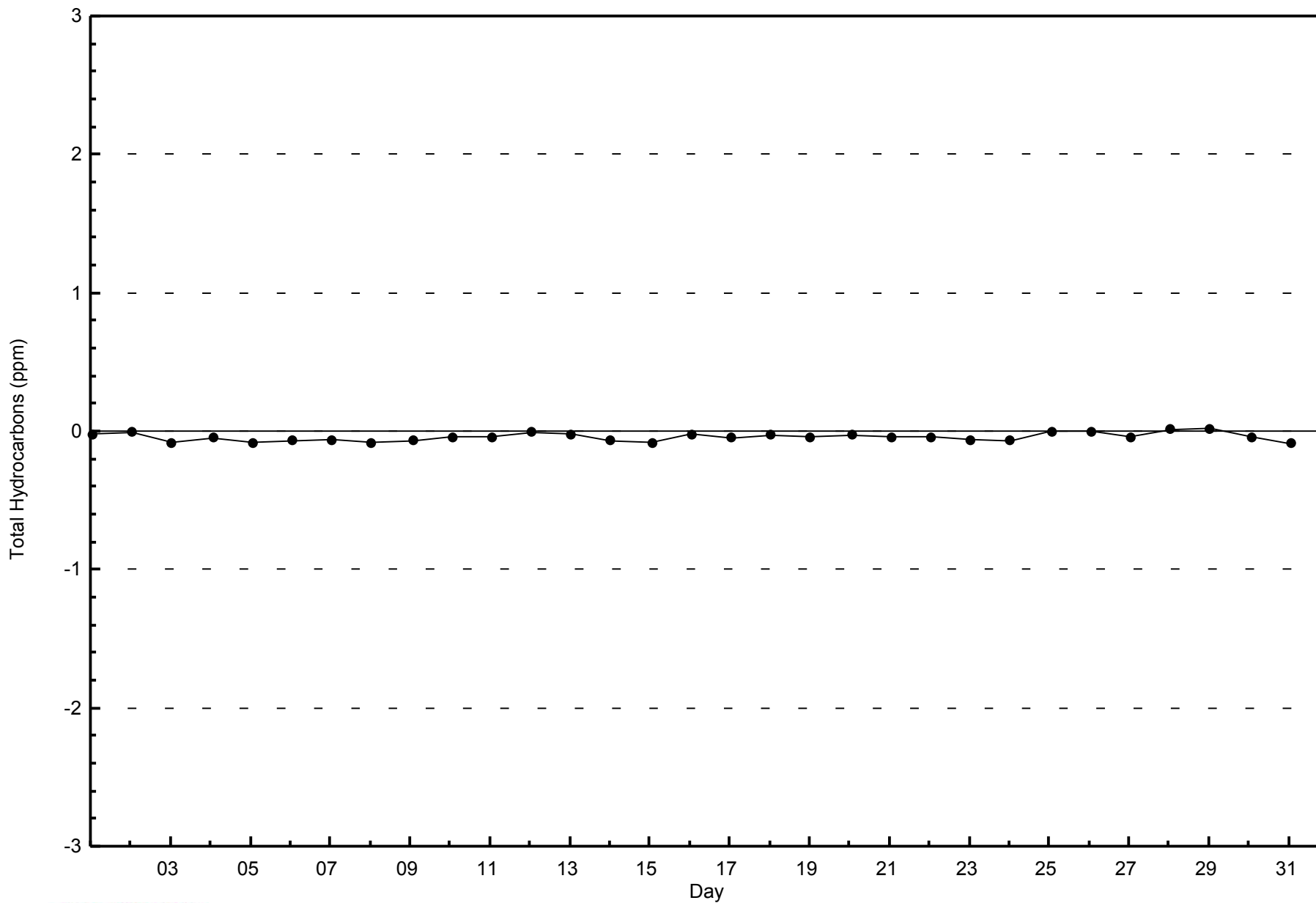


**Total Number of Valid Hours: 709**



WBEA  
Zero Responses

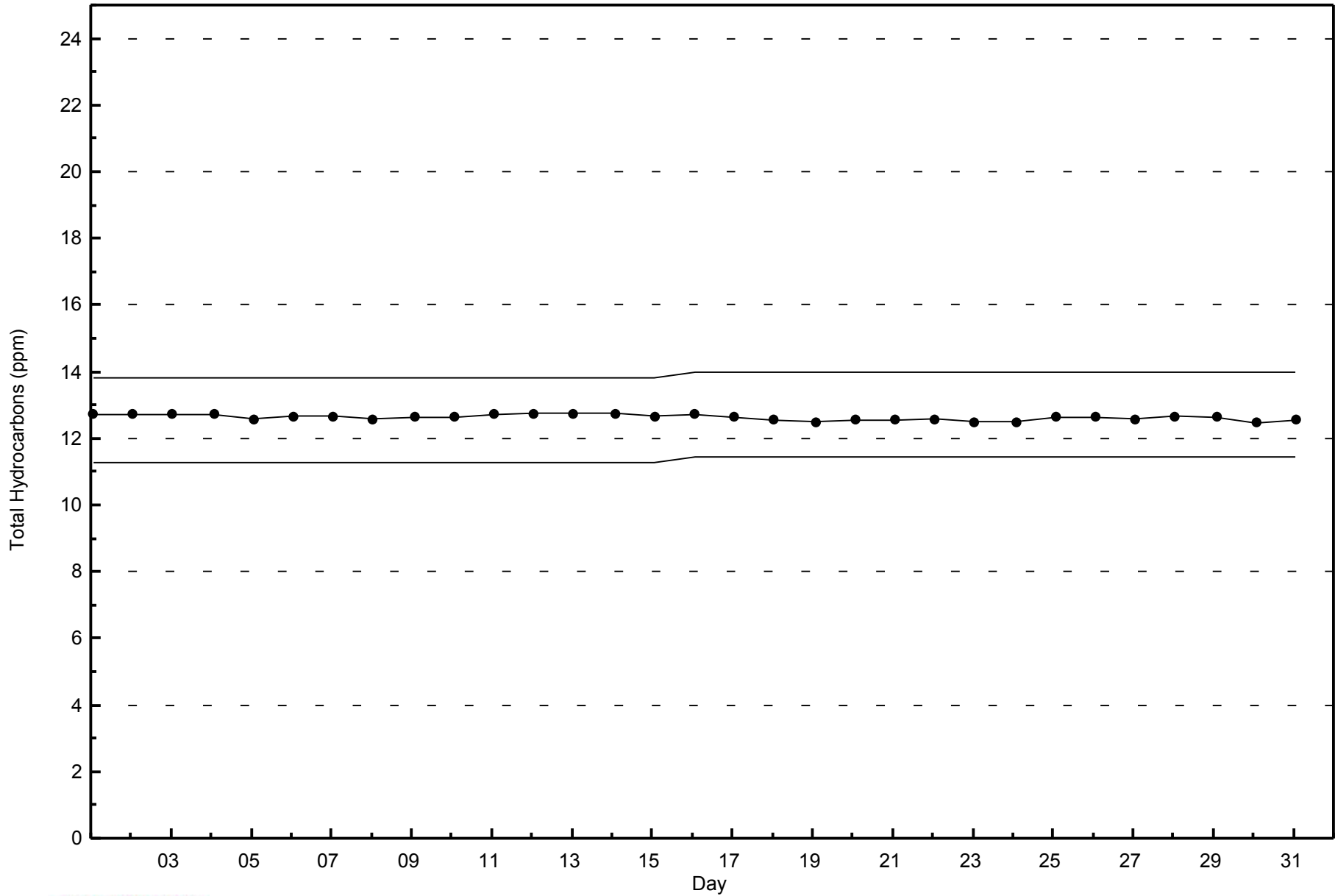
Total Hydrocarbons (THC) - ppm  
Buffalo Viewpoint - May 2014





WBEA  
Span Responses

Total Hydrocarbons (THC) - ppm  
Buffalo Viewpoint - May 2014





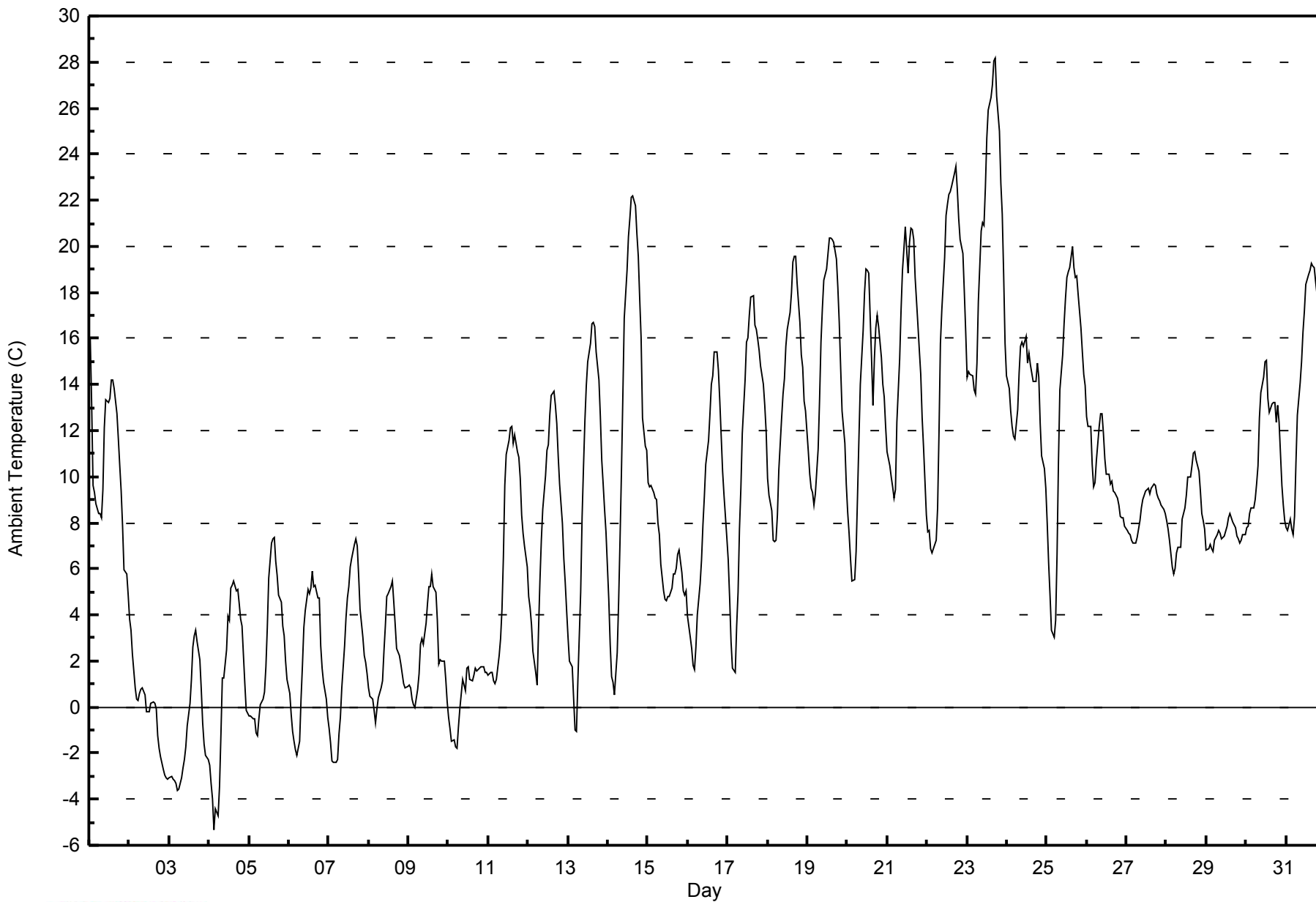
Maximum Value: 28.2 C on May 23 18:00		Maximum Daily Average: 20.5 C on May 23		Hours in Service: 744																							
Minimum Value: -5.3 C on May 4 04:00		Minimum Daily Average: -1.0 C on May 3		Hours of Data: 744																							
Maximum Diurnal Average: 12.4 C at hour 16		Minimum Diurnal Average: 3.8 C at hour 5		Hours of Missing Data: 0																							
Monthly Average: 8.57 C		Percentiles: P <sub>1</sub> = -3.3 P <sub>10</sub> = 0.1 Q <sub>1</sub> = 3.0 Median = 8.2 Q <sub>3</sub> = 13.5 P <sub>90</sub> = 18.1 P <sub>99</sub> = 24.1		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-May	16.0	13.2	9.6	9.3	8.8	8.4	8.4	8.2	9.5	12.1	13.3	13.2	13.4	14.2	14.2	13.9	12.7	11.6	10.5	9.4	7.9	6.0	5.8	4.8	10.6	16.0	
2-May	3.8	3.3	2.3	0.8	0.3	0.3	0.6	0.8	0.9	0.5	-0.2	-0.2	-0.2	0.2	0.2	0.2	-0.1	-1.3	-1.8	-2.1	-2.7	-2.9	-3.1	-3.1	-0.2	3.8	
3-May	-3.1	-3.0	-3.1	-3.2	-3.3	-3.6	-3.5	-3.1	-2.6	-2.3	-1.7	-0.8	0.2	1.2	2.6	3.1	3.3	2.8	2.0	0.8	-0.7	-1.6	-2.1	-2.3	-1.0	3.3	
4-May	-2.5	-3.3	-4.0	-5.3	-4.4	-4.7	-3.4	-1.2	1.3	1.3	2.5	4.0	3.7	5.1	5.3	5.5	5.0	5.1	4.5	3.9	3.5	1.0	-0.1	-0.3	0.9	5.5	
5-May	-0.4	-0.4	-0.5	-0.5	-1.1	-1.2	-0.5	0.1	0.3	0.6	1.8	3.5	5.6	7.1	7.3	7.4	6.3	5.7	4.9	4.6	3.5	3.1	2.0	1.2	2.5	7.4	
6-May	0.6	-0.3	-1.1	-1.5	-1.8	-2.1	-1.5	0.3	1.8	3.4	4.2	5.1	4.9	5.1	5.9	5.3	5.3	4.7	4.7	2.7	1.7	1.1	0.3	-0.5	2.0	5.9	
7-May	-0.9	-1.5	-2.3	-2.4	-2.4	-2.3	-1.2	-0.5	0.8	2.7	3.9	4.7	5.2	6.1	6.4	7.0	7.3	7.0	5.7	4.3	3.0	2.2	1.9	1.5	2.3	7.3	
8-May	0.8	0.5	0.3	-0.2	-0.7	-0.1	0.4	0.8	1.1	2.4	3.5	4.8	4.9	5.2	5.4	4.6	3.6	2.6	2.2	1.9	1.4	1.0	0.8	0.9	2.0	5.4	
9-May	0.9	0.9	0.3	0.1	0.0	0.7	1.4	2.8	3.0	2.8	3.6	4.5	5.2	5.2	5.8	5.2	5.0	3.7	1.9	2.1	2.0	2.0	1.2	0.2	2.5	5.8	
10-May	-0.5	-0.9	-1.5	-1.4	-1.7	-1.8	-0.9	-0.1	1.2	1.0	0.7	1.7	1.8	1.2	1.1	1.4	1.7	1.6	1.6	1.7	1.7	1.7	1.5	1.5	0.6	1.8	
11-May	1.4	1.5	1.5	1.2	1.0	1.2	2.3	3.0	4.3	6.5	9.7	11.0	11.6	12.1	12.2	11.5	11.8	11.1	10.8	9.9	8.3	7.6	7.0	6.1	6.8	12.2	
12-May	4.8	4.3	3.6	2.4	1.5	1.0	3.3	5.5	7.2	8.6	10.0	11.2	11.4	12.7	13.5	13.7	13.1	12.3	10.9	9.7	8.0	6.5	5.4	4.2	7.7	13.7	
13-May	3.0	2.0	1.7	0.3	-1.0	-1.1	1.2	5.0	8.2	10.4	12.4	13.9	15.0	15.8	16.6	16.7	16.5	15.4	14.2	12.6	10.7	9.7	8.6	7.6	9.0	16.7	
14-May	4.7	2.7	1.3	1.1	0.5	2.4	4.5	7.2	10.2	13.5	16.9	18.9	20.4	21.2	22.2	22.2	21.8	20.6	19.6	17.8	16.1	12.6	11.3	11.1	12.5	22.2	
15-May	9.7	9.6	9.6	9.3	9.0	9.0	8.0	7.5	6.2	5.1	4.7	4.6	4.8	4.8	5.2	5.8	5.8	6.0	6.6	6.8	5.8	5.1	4.8	5.1	6.6	9.7	
16-May	4.0	3.0	2.5	1.8	1.6	2.6	4.0	5.4	6.4	7.9	9.1	10.6	11.6	12.7	14.0	14.4	15.4	15.4	14.6	13.3	11.8	10.2	9.2	7.3	8.7	15.4	
17-May	6.4	4.8	2.8	1.7	1.5	3.5	5.0	7.7	9.5	11.9	14.2	15.8	16.0	17.0	17.8	17.8	16.6	16.4	16.0	15.5	14.8	14.0	13.1	11.9	11.3	17.8	
18-May	9.9	9.2	8.5	7.3	7.2	7.3	8.3	10.3	12.5	13.6	14.3	15.7	16.4	17.1	18.0	19.3	19.5	19.6	18.4	16.7	15.3	14.7	13.3	12.9	13.5	19.6	
19-May	11.1	10.1	9.5	9.3	8.7	9.3	11.2	13.3	15.8	17.3	18.5	19.0	19.7	20.4	20.4	20.3	20.2	19.5	18.2	16.7	14.7	12.9	11.4	9.7	14.9	20.4	
20-May	8.5	7.6	6.4	5.5	5.6	6.7	9.1	11.6	14.0	16.3	18.0	19.0	19.0	18.8	15.1	13.1	15.1	16.4	17.0	16.5	15.2	14.0	13.5	12.2	13.1	19.0	
21-May	11.1	10.5	10.0	9.5	9.1	9.4	12.3	15.1	17.2	19.0	19.9	20.8	18.8	20.2	20.8	20.7	20.3	18.7	16.6	15.5	14.4	12.6	11.3	8.4	15.1	20.8	
22-May	7.6	7.7	6.9	6.7	6.9	7.2	8.7	11.9	15.8	17.2	19.5	21.3	21.9	22.3	22.4	22.6	23.2	23.5	22.5	21.2	20.3	19.7	18.0	16.3	16.3	23.5	
23-May	14.3	14.5	14.5	14.4	13.8	13.6	14.9	17.6	20.7	21.0	20.9	22.6	24.7	25.9	26.4	27.0	28.0	28.2	26.5	25.0	22.7	21.4	18.8	15.8	20.5	28.2	
24-May	14.3	13.8	12.9	12.2	11.8	11.6	12.9	14.5	15.7	15.8	15.7	16.1	14.9	15.4	14.9	14.5	14.1	14.1	14.9	14.3	12.3	10.9	10.4	9.5	13.6	16.1	
25-May	8.0	6.3	4.9	3.3	3.1	3.7	6.6	10.7	13.8	15.3	16.6	17.7	18.7	18.9	19.1	20.0	19.0	18.7	18.7	17.9	16.5	15.4	14.4	14.0	13.4	20.0	
26-May	12.6	12.2	12.2	10.6	9.5	9.7	10.7	12.2	12.7	12.7	11.9	10.8	10.1	10.1	9.7	9.8	9.4	9.3	9.1	8.7	8.3	8.2	8.2	7.9	10.3	12.7	
27-May	7.7	7.5	7.5	7.3	7.1	7.1	7.4	7.7	8.1	8.7	9.0	9.4	9.5	9.5	9.2	9.5	9.7	9.6	9.3	9.1	8.9	8.8	8.6	8.4	8.5	9.7	
28-May	8.1	7.7	7.3	6.1	5.8	6.0	6.7	6.9	6.9	8.2	8.4	8.7	9.2	10.0	10.0	10.5	11.0	11.1	10.7	10.2	9.4	8.4	8.1	7.8	8.5	11.1	
29-May	6.8	6.8	7.0	6.9	6.8	7.2	7.5	7.7	7.5	7.3	7.4	7.4	7.9	8.2	8.4	8.2	8.1	7.8	7.4	7.3	7.1	7.3	7.5	7.5	7.5	8.4	
30-May	7.8	7.9	8.4	8.7	8.6	9.0	9.7	10.5	12.5	13.6	14.3	15.0	15.1	13.4	12.8	13.2	13.2	13.2	12.4	13.1	12.4	9.6	8.8	8.1	11.3	15.1	
31-May	7.8	7.7	8.1	7.7	7.5	8.2	10.6	12.7	14.1	15.0	16.2	17.2	18.3	18.8	19.0	19.3	19.1	19.1	18.5	17.3	15.1	14.5	13.9	12.6	14.1	19.3	
		5.9	5.3	4.7	4.2	3.8	4.1	5.3	6.8	8.3	9.3	10.3	11.2	11.6	12.1	12.3	12.4	12.3	11.9	11.3	10.5	9.3	8.3	7.5	6.7	Diurnal Average	
		16.0	14.5	14.5	14.4	13.8	13.6	14.9	17.6	20.7	21.0	20.9	22.6	24.7	25.9	26.4	27.0	28.0	28.2	26.5	25.0	22.7	21.4	18.8	16.3	Diurnal Maximum	





**WBEA**  
**Hourly Averages**

**Ambient Temperature (AT) - C**  
**Buffalo Viewpoint - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C**  
**Buffalo Viewpoint - May 2014**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	73	9.81	9.81
0 - 10	385	51.75	61.56
10 - 20	247	33.20	94.76
> 20	39	5.24	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Maximum Speed: 40 km/h on May 30 14:00	Maximum Daily Speed Average: 25.6 km/h on May 2	Hours in Service: 744
Minimum Speed Value: 1 km/h on May 17 10:00	Minimum Daily Speed Average: 1.9 km/h on May 4	Hours of Data: 744
Maximum Diurnal Speed Average: 9.0 km/h at hour 14	Minimum Diurnal Speed Average: 1.7 km/h at hour 1	Hours of Missing Data: 0
Monthly Average Velocity: 5.0 km/h 345.5 deg	Percentiles: $P_1 = 1$ $P_{10} = 4$ $Q_1 = 7$ Median = 11 $Q_3 = 17$ $P_{90} = 24$ $P_{99} = 32$	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-May	WSW18	W15	N7WNW11	NW19WNW14	NNW17	NW16WNW15	NNW22	NW30	NNW29	NW26	NW25	NW23	NW24	NW28	NW30	NW26	NW25	NNW23	NNW19	NW24	NW22				NW20.1	NW30
2-May	WNW22	NW27	NW34	NW27WNW27	WNW27	WNW31	WNW29	NW25	NW31	NW30	NW28	NW27	NNW29	NNW24	NNW25	N23	N24	N22	N24	N27	N28	NNW36	NNW33		NW25.6	NNW36
3-May	NNW32	NNW32	NNW30	NNW26	NNW25	N23	N20	N16	N15	N16	NNW17	NNW13	N13	NNE14	NNE14	NNE11	NNE11	NNE12	NNE11	N15	NNE12	NNE9	NE8	NE6	N15.9	NNW32
4-May	ENE2	N4	N3	WNW2	WNW4	S1	SE2	SSE1	NNW5	NNW6	NNE8	E4	SE5	E4	SE5	ESE6	E8	SSE7	S9	S5	SE7	SE10	E2	E3	ESE1.9	SE10
5-May	ESE2	SSE3	SSE3	SSE3	S2	S3	SE2	ESE4	ESE7	ESE7	ENE6	N9	N10	N11	NNW10	NNE9	E11	ENE10	NE16	NNE19	NNE18	NE17	NE17	NE13	NE6.3	NNE19
6-May	NNE16	N17	N19	N20	N22	N20	N21	N21	N21	N21	N23	N22	N21	N19	N19	NNE16	NNE15	N17	NNW17	NW9	WNW12	NW12	WNW9	NW9	N16.4	N23
7-May	NNW8	NW8	NNW8	NNW11	NW3	NNW9	NNW18	NNW16	NNW22	NNW24	NNW29	NNW30	NNW29	NNW24	NNW22	N22	N23	N21	N18	NNE13	NNE10	ENE7	ENE8	NE7	N15.4	NNW30
8-May	NE9	NE6	E3	SSE3	ENE1	NNE4	ENE3	N4	N6	NNE5	SE2	N8	NNE13	NNE15	N18	N21	N21	N19	N14	N13	N10	N6	N6	N11	N8.3	N21
9-May	N12	NNW13	NNW8	NW6	WNW6	WNW7	WNW7	WNW12	NW11	NNW8	NNW5	WNW8	W9	W7	NNW12	NNW12	NNW17	NNW24	NNW15	NNW4	WNW12	NNW20	NNW19	NW15	NW10.4	NNW24
10-May	WNW15	WNW15	WNW16	WNW17	WNW17	W17	W17	W20	WNW25	WNW24	NW19	NW26	WNW25	WNW22	WNW17	NNW15	NNW19	NNW13	NNW9	WNW5	WNW5	WSW3	SSW4	SSW5	WNW13.9	NW26
11-May	SW6	W10	W12	WNW12	W8	WSW7	W8	W5	S10	SSW11	W20	WNW24	NW21	NNW21	NW17	NNW14	NNW14	NNE11	NNE11	NNE13	NNE11	NNE5	NE6	NE9	NW7.6	WNW24
12-May	NNE8	NE6	NNE7	N8	NNW6	NNW5	NNW4	NNW5	NNW7	N6	N5	NNE6	NNE3	NNE8	N11	NNE17	NNE20	N22	NNE23	NNE17	N15	NE13	E9	SE9	NNE8.7	NNE23
13-May	SSE9	SSE6	S3	SSE3	SE6	SE7	SE6	SSE6	S5	SSW6	WNW7	NNE6	NNE11	N8	NNE9	NNE13	N17	N20	NNE17	NNE13	NNE10	NE9	E6	NE5	NE4.1	N20
14-May	SE3	S2	SSE3	SE6	SE8	SE10	SE12	SE9	ESE9	ESE10	ESE12	ESE14	ESE14	E14	E16	ESE14	ESE15	ESE17	SE6	E4	SE9	S7	SE9	ESE11	ESE9.2	ESE17
15-May	SE8	SSE3	ESE7	SE8	ESE4	NNE4	NNE12	N20	N32	N32	N36	N30	N27	NNW26	NNW28	NNW30	NNW31	NNW33	NNW36	NNW28	NW16	WNW16	WNW15	WNW14	NNW17.5	N36
16-May	WNW12	WNW11	WNW9	WNW9	WNW8	WNW5	WNW4	NNW5	NW4	WNW7	WNW7	NW7	WNW7	NW8	NNW11	N11	NE4	SSE5	ESE10	ESE10	ESE7	NE10	ENE9	NNE6	NNW3.7	WNW12
17-May	ESE2	SE4	SSE5	SSE6	SE5	SE4	SE4	ESE5	SSW4	WSW1	NW3	WNW2	NNW6	NNE3	N8	NNW10	NNE8	NNE9	NNE11	NE7	ENE8	ENE9	NE11	NE8	NE3.1	NNE11
18-May	N13	NNE13	NNE10	N14	NNE13	NNE11	NNW9	NNW7	WNW1	NNW9	NW14	NNW16	NNW15	NNW18	NNE15	N14	NNW14	NNE10	SE11	SW5	WNW6	NW3	W6	WSW5	N8.0	NNW18
19-May	SSE5	SSE6	SSE8	SE10	SSE8	SSE11	SE12	SSE11	SSE12	S14	SSE13	SSE12	SE14	SE17	SSE19	SSE18	SSE17	SSE17	SSE19	S17	SSE18	SSE12	SSE12	SE8	SSE12.8	SSE19
20-May	SE7	SE11	SSE10	SE10	SE12	SE12	SE14	SSE14	SE15	SE17	SSE17	SSE19	S17	S18	SW10	ESE10	ESE16	ESE15	SE17	SE15	E1	SE11	ESE7	SE11	SE12.1	SSE19
21-May	SE12	ESE13	SE14	SE14	SE10	SE10	ESE9	ESE9	N3	WSW9	SW11	SSW16	SW18	SSW18	SW28	SW31	SW30	W21	NW21	NW9	WNW6	WNW8	SSW5	SE10	SSW7.1	SW31
22-May	SE11	SSE5	SE6	SE5	SE7	E1	SSE5	SE9	SSW1	N8	N9	SW10	WSW17	WSW14	SW14	SSW12	SSW12	SW8	S8	SE4	ESE5	ESE5	SE5	SE6	S4.2	WSW17
23-May	SE9	SE11	SSE6	ESE6	SE8	SE11	SE8	SE6	ESE2	ESE8	ESE10	ESE8	ESE9	E11	SE8	S9	S4	N7	N8	ENE8	ESE10	ESE9	WSW24	W26	SE4.2	W26
24-May	WNW14	WSW11	WSW14	WSW14	W13	W14	W12	WNW9	WNW9	WNW13	W16	WNW22	NNW25	NNW22	NW18	WNW19	WNW16	NW16	NW12	NNE9	NE8	NE8	E4	NE2	WNW10.7	WNW25
25-May	ENE4	SSE3	SSE4	SSE6	SE4	SSE4	SSE3	ESE6	ESE11	ESE13	E10	ENE8	NE9	E9	E9	ESE13	ESE10	ESE11	ESE11	ESE12	ESE11	ESE12	SE12	SE11	ESE7.8	ESE13
26-May	SE6	SE9	ESE13	SSE6	NNE7	NE9	E3	E5	ESE11	ESE15	ESE9	SSE2	NNW7	NNW11	N12	E10	ENE15	NE13	NNE16	NNE17	NNE17	NE13	ENE14	NNE15	ENE7.4	NNE17
27-May	N15	N14	N13	N16	N16	N18	N20	N20	N19	N18	N18	N19	N22	N24	N22	N17	N15	N14	N15	NNE10	NE6	NE6	ENE5		N15.4	N24
28-May	E4	ESE4	NE4	NE6	E5	SE3	SSE4	SE7	E8	NE7	E5	E3	ESE4	NE5	ESE7	ESE8	E9	ESE12	ESE12	ESE12	ESE12	ESE11	ESE8	SE8	ESE6.3	ESE12
29-May	SE6	SE4	ENE2	E6	E6	E4	NNE4	NNE6	N9	N11	NNW15	N18	N16	NNW17	NNW21	NNW21	NNW25	NNW20	NW17	NW17	WNW19	WNW16	W16	WSW14	NNW9.6	NNW25
30-May	WSW15	SW13	WSW19	WSW21	WSW19	WSW22	WSW25	W23	W27	W29	WNW28	W30	WNW32	WNW40	WNW36	NW20	NNE5	ENE6	NNE10	S3	ESE2	NE11	SE5	S8	W14.6	WNW40
31-May	SSE10	SE8	SSE7	NNE5	NNE3	N5	NNW3	N3	NE5	NNE5	N9	N10	NNE10	NNE14	NNE16	N15	N16	N16	N16	N15	NNE12	ENE10	ESE12	ESE13	NNE6.7	N16

NNW1.7	NW2.0	NW2.1	NW2.6	NW2.8	NW2.5	NW3.0	NNW3.4	NNW4.6	NNW5.8	NNW7.4	NNW8.3	NNW8.7	NNW9.0	NNW8.9	N8.1	N8.1	N9.0	N8.2	N6.6	N5.3	NNE4.5	NNE2.9	N2.3		Diurnal Average
NNW32	NNW32	NW34	NW27	WNW27	WNW27	WNW31	WNW29	N32	N32	N36	W30	WNW32	WNW40	WNW36	SW31	NNW31	NNW33	NNW36	NNW28	N27	N28	NNW36	NNW33		Diurnal Maximum

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



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

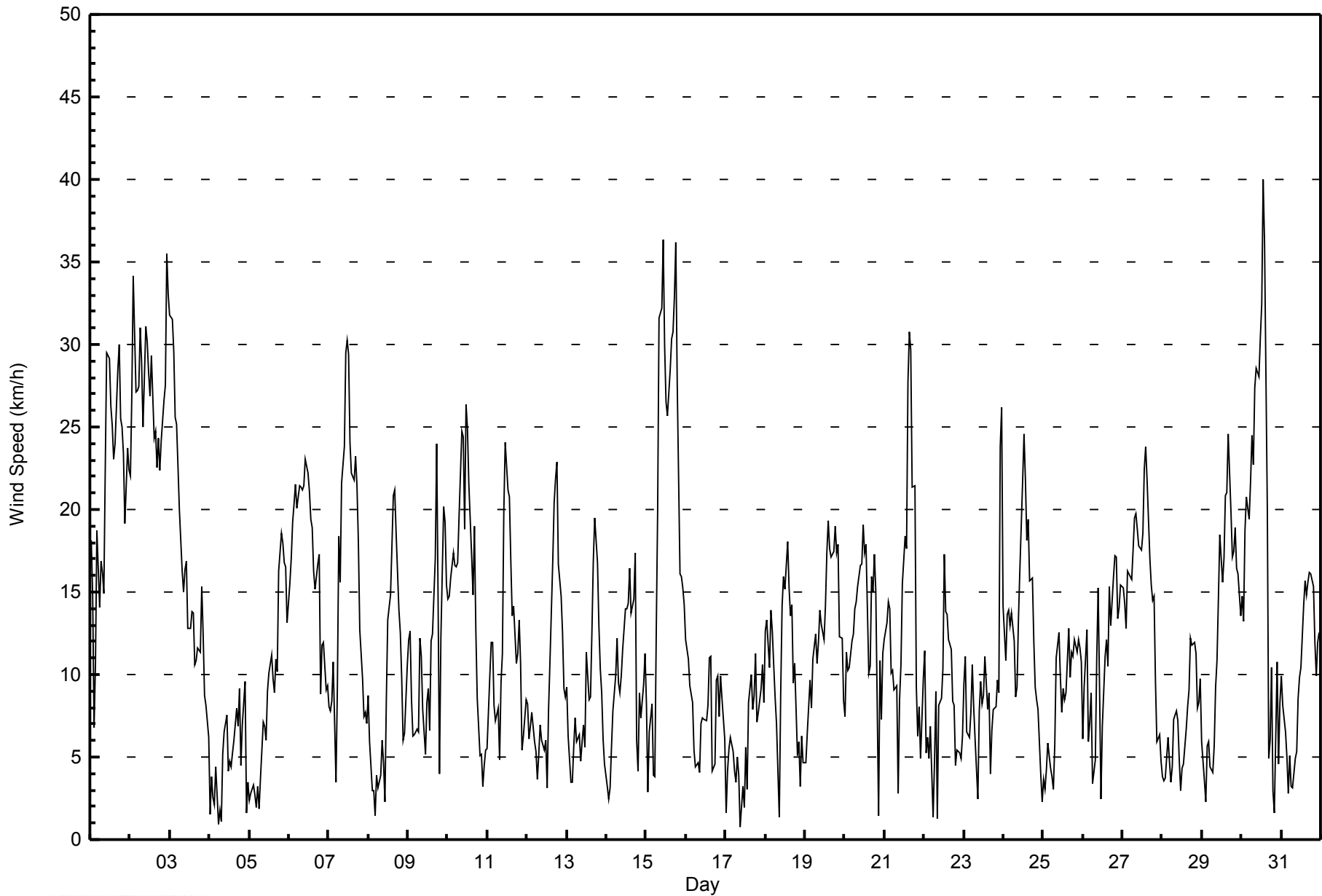
**Wind Speed (WS) - km/h**  
**Buffalo Viewpoint - May 2014**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 10 km/h on May 2 04:00 Minimum Value: 1 km/h on May 5 03:00 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																	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-May	3	4	3	4	5	4	3	4	3	6	6	6	5	6	4	5	6	6	6	4	4	3	5	4	6
2-May	4	7	6	10	6	6	6	6	5	6	6	5	6	5	5	5	6	4	4	4	4	4	5	5	10
3-May	5	5	4	4	4	3	4	3	3	3	3	4	3	4	4	3	3	4	3	3	2	1	3	5	
4-May	1	1	1	2	1	1	1	1	2	2	3	3	3	3	3	3	2	3	2	1	5	5	1	1	5
5-May	1	1	1	1	1	1	1	2	2	2	2	3	2	3	2	4	3	5	6	4	3	4	4	4	6
6-May	3	3	3	3	3	3	4	4	4	6	5	6	6	5	6	5	8	4	7	3	2	1	2	2	8
7-May	1	1	2	2	3	3	3	4	3	5	5	6	4	5	5	5	6	5	3	3	3	1	1	2	6
8-May	2	1	1	1	1	2	1	2	1	2	2	3	5	4	4	4	4	4	3	3	2	2	2	2	5
9-May	1	2	2	1	1	1	3	3	3	2	2	2	3	3	3	4	6	5	7	2	4	4	4	3	7
10-May	2	2	2	3	3	3	4	4	5	5	4	5	5	5	4	3	3	3	3	1	1	1	1	1	5
11-May	1	1	2	2	1	2	2	3	2	3	5	5	5	5	6	6	7	5	3	2	4	1	1	1	7
12-May	1	1	1	1	1	1	1	1	2	2	2	2	3	3	3	4	4	4	4	3	3	3	3	2	4
13-May	1	2	1	2	1	1	1	2	2	2	3	3	3	3	3	3	5	4	3	3	2	1	2	1	5
14-May	2	2	2	1	2	2	3	3	2	3	3	4	4	4	4	4	4	4	6	4	3	3	1	2	6
15-May	3	2	1	2	1	2	3	9	6	6	7	5	6	6	4	6	5	5	6	6	2	2	2	2	9
16-May	1	1	1	2	1	1	1	1	1	2	3	2	3	3	3	3	2	3	2	2	1	2	2	2	3
17-May	1	1	1	1	1	1	1	1	2	2	2	3	2	2	3	2	2	2	2	2	2	2	2	2	3
18-May	2	2	1	2	2	2	1	2	2	3	3	3	3	3	3	3	4	3	3	1	1	2	2	2	4
19-May	1	1	1	2	2	2	4	3	4	4	4	4	5	5	5	5	5	6	5	5	5	3	3	2	6
20-May	2	2	2	1	2	3	4	4	5	5	5	6	5	5	6	5	4	4	4	4	3	5	2	3	6
21-May	2	2	2	2	1	1	2	3	2	3	4	6	6	8	7	8	7	6	4	5	3	1	1	2	8
22-May	2	2	2	1	2	1	2	2	3	2	3	6	4	5	4	3	4	3	3	1	2	1	1	1	6
23-May	1	2	3	2	2	2	2	2	2	2	2	3	4	4	4	3	3	3	3	1	2	1	9	6	9
24-May	5	4	3	4	3	2	2	3	3	4	5	6	5	4	5	4	3	3	2	2	1	1	1	2	6
25-May	1	1	1	1	1	2	1	2	3	3	3	3	3	4	4	4	3	3	3	3	2	3	2	3	4
26-May	1	3	3	3	2	2	2	2	3	4	4	1	2	3	3	4	4	3	4	3	4	4	5	3	5
27-May	2	3	3	3	2	2	3	3	4	3	3	3	3	4	4	4	3	3	2	2	3	1	1	1	4
28-May	1	1	3	2	1	1	2	2	2	2	2	1	2	3	3	2	3	3	3	4	3	2	2	3	4
29-May	2	2	1	1	1	1	2	1	2	2	4	3	3	2	3	4	6	6	3	4	4	4	4	3	6
30-May	3	3	3	4	4	5	6	5	7	6	7	7	9	9	7	8	2	3	2	2	4	3	2	2	9
31-May	1	1	2	3	1	1	1	2	2	2	4	3	3	4	4	4	3	4	3	3	2	2	3	4	4
Diurnal Maximum																									



**WBEA**  
**Hourly Averages**

**Wind Speed (WS) - km/h**  
**Buffalo Viewpoint - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h**  
**Buffalo Viewpoint - May 2014**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	132	17.74	17.74
6 - 11	264	35.48	53.23
12 - 19	221	29.70	82.93
20 - 28	95	12.77	95.70
29 - 38	31	4.17	99.87
> 38	1	0.13	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Wind Speed (WS) - km/h**  
**Buffalo Viewpoint - May 2014**

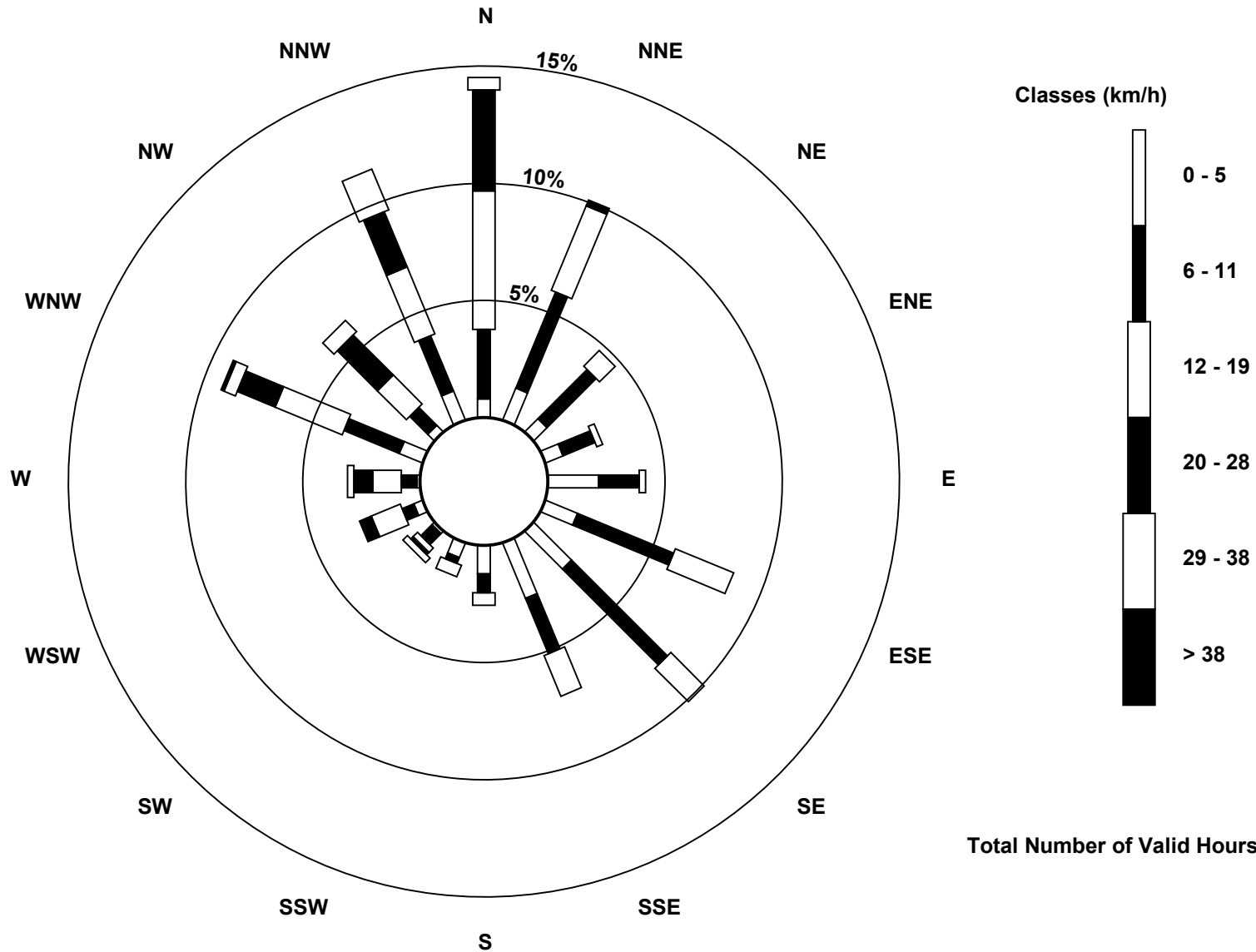
Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	6	11	6	6	16	11	17	19	9	5	1	3	1	8	3	10	132
6 - 11	22	33	22	11	13	33	43	19	6	2	5	4	5	19	8	19	264
12 - 19	44	29	7	2	2	20	15	14	4	4	2	10	9	23	13	23	221
20 - 28	32	2	0	0	0	0	0	0	0	0	1	4	6	13	18	19	95
29 - 38	4	0	0	0	0	0	0	0	0	0	2	0	2	4	5	14	31
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
<b>Totals</b>	108	75	35	19	31	64	75	52	19	11	11	21	23	68	47	85	744

Total Number of Valid Hours: 744

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

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



Total Number of Valid Hours: 744





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

**Wind Direction (WD) - deg**  
**Buffalo Viewpoint - May 2014**

Direction of Maximum Speed: 289 deg on May 30 14:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 325.4 deg on May 2	Hours of Data: 744
Direction of Minimum Speed: 254 deg on May 17 10:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 1.9 deg on May 4	Percent Operational Time: 100.0
Monthly Average Direction: 324.5 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-May	240	278	2	299	317	299	301	308	287	301	316	333	324	320	317	316	313	314	314	310	330	336	322	309	312.6
2-May	299	306	309	313	291	296	297	302	305	313	325	325	325	330	333	343	0	359	353	353	356	350	342	341	325.4
3-May	343	344	343	345	345	352	356	356	353	354	346	344	354	22	22	20	15	16	28	9	13	31	41	52	358.1
4-May	70	349	357	293	303	189	144	162	340	348	15	93	134	98	145	111	100	162	178	187	130	141	90	83	113.9
5-May	119	160	166	156	187	172	132	109	121	122	72	0	1	352	334	22	79	58	39	33	23	45	44	36	42.7
6-May	27	4	1	355	355	356	357	356	357	1	2	357	350	354	7	16	23	356	346	322	298	306	290	304	354.0
7-May	328	319	329	339	326	330	344	346	343	342	339	345	345	342	344	351	352	352	7	18	31	58	58	44	349.5
8-May	43	50	93	167	68	15	66	6	356	25	141	7	20	18	6	354	1	0	1	358	1	2	357	352	9.0
9-May	351	347	335	314	299	301	292	288	305	348	335	301	274	268	328	342	341	346	346	346	301	333	332	311	324.7
10-May	299	293	294	288	284	278	267	275	283	300	307	314	303	302	297	331	346	348	333	296	282	247	197	211	298.0
11-May	225	265	280	294	266	253	259	270	186	208	269	299	311	332	321	343	328	16	14	14	19	33	35	35	311.9
12-May	31	38	12	10	334	330	338	347	346	6	2	20	17	26	11	15	15	6	13	14	5	42	94	146	15.3
13-May	150	162	176	158	136	141	131	162	170	208	291	16	16	3	17	12	8	3	21	14	15	49	80	54	34.9
14-May	139	177	152	131	142	141	137	124	104	110	104	104	104	95	99	114	113	112	146	86	143	182	126	111	118.1
15-May	128	164	114	130	104	30	13	358	350	355	355	352	349	339	339	346	344	340	340	335	309	295	296	300	343.8
16-May	295	292	290	296	298	287	285	334	319	294	285	324	303	310	342	359	47	165	119	116	110	41	58	33	327.9
17-May	108	130	158	147	128	140	143	117	213	254	311	286	331	20	354	344	13	25	31	50	62	74	51	37	49.1
18-May	10	13	18	5	16	23	346	347	297	329	305	338	340	345	13	358	348	15	144	217	283	305	280	247	350.2
19-May	152	157	161	144	154	148	140	150	163	170	147	160	143	146	152	148	156	149	155	169	167	165	162	146	154.6
20-May	141	140	147	131	140	139	142	151	134	146	157	151	170	169	220	121	116	121	129	134	98	139	116	127	142.5
21-May	125	123	127	135	130	127	111	123	9	258	232	206	229	209	219	228	230	275	313	305	287	283	206	125	210.4
22-May	132	157	140	130	144	93	149	143	208	352	357	234	243	247	236	209	209	221	191	131	122	103	126	146	189.6
23-May	131	136	154	111	144	127	140	144	113	108	116	116	105	101	124	183	179	11	359	66	107	114	258	279	133.1
24-May	293	246	237	253	262	274	281	287	292	285	261	282	291	314	305	295	295	310	312	16	43	47	79	50	291.1
25-May	59	151	161	154	130	154	151	115	103	107	96	61	47	83	100	113	112	107	117	108	114	119	128	131	110.3
26-May	137	126	122	154	27	38	92	81	102	115	120	159	327	346	349	88	73	42	29	24	23	48	58	19	57.3
27-May	3	0	6	357	359	355	353	359	0	360	358	356	355	353	354	356	360	0	358	357	18	46	47	64	0.3
28-May	99	122	50	52	96	126	152	141	97	56	92	96	109	37	118	106	91	106	108	104	107	117	124	125	103.8
29-May	134	143	59	92	89	91	16	17	3	356	348	352	353	345	338	332	327	328	322	308	296	287	279	258	330.7
30-May	248	225	240	244	248	247	250	266	274	278	284	281	284	289	292	304	14	68	23	171	113	36	135	172	272.5
31-May	148	146	165	13	16	349	331	352	36	28	2	7	21	19	18	10	2	3	358	1	13	65	113	115	25.0

345.3 321.6 321.6 325.4 318.6 318.6 317.1 329.5 333.2 334.3 331.2 332.1 329.2 337.4 336.7 350.1 0.2 1.9 6.2 9.2 9.2 26.9 17.1 8.1  
 Diurnal Average

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



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

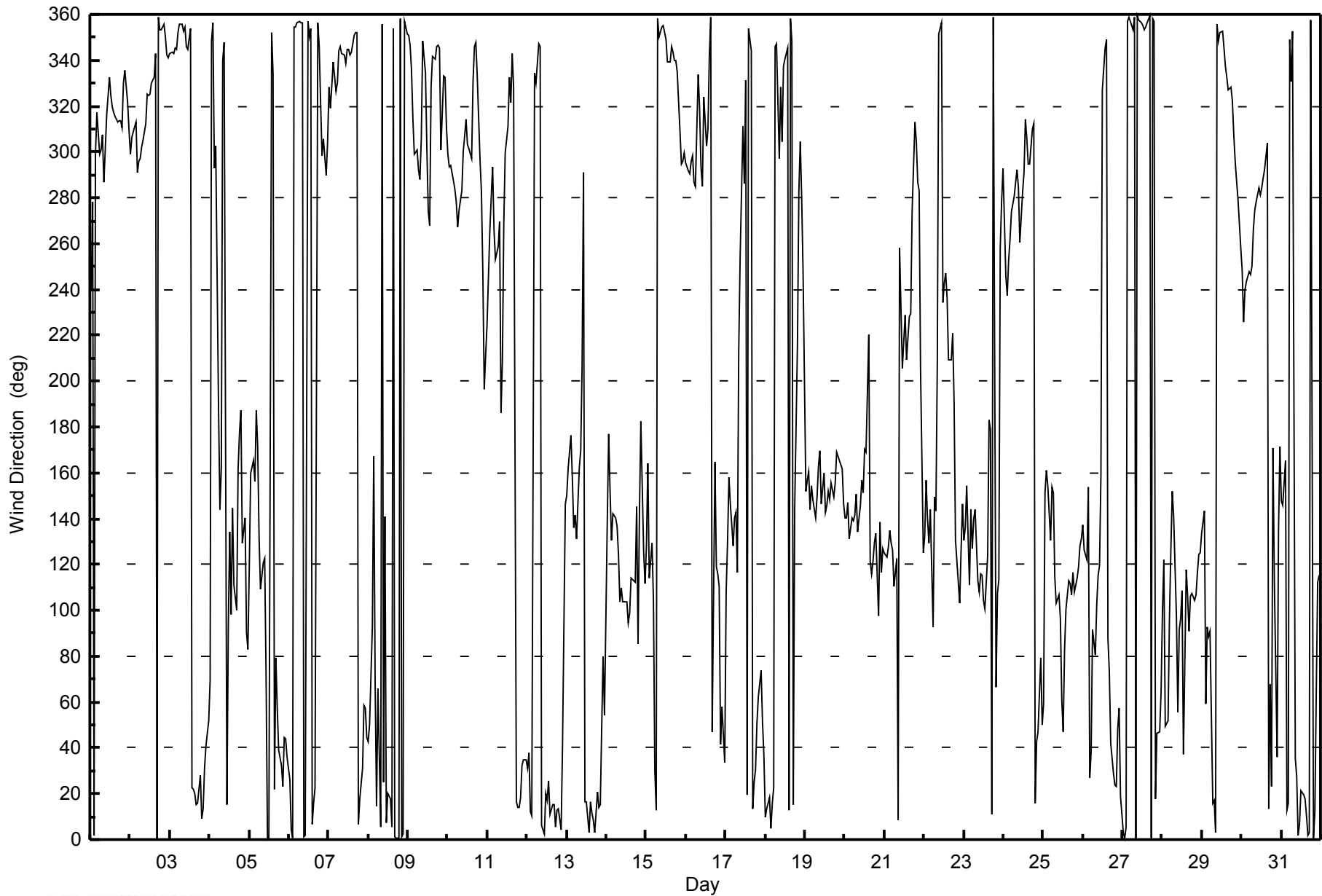
**Wind Direction (WD) - deg**  
**Buffalo Viewpoint - May 2014**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 102 deg on May 17 10:00		Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																							
Minimum Value: 5 deg on May 22 00:00																									
Percentiles: P <sub>1</sub> = 8 P <sub>10</sub> = 11 Q <sub>1</sub> = 13 Median = 17 Q <sub>3</sub> = 27 P <sub>90</sub> = 48 P <sub>99</sub> = 87																									
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-May	11	42	30	14	12	13	11	13	13	17	14	13	13	15	15	13	14	13	13	11	15	15	13	9	42
2-May	11	12	12	16	11	11	11	12	12	12	12	11	12	12	14	14	15	12	12	12	11	10	9	10	16
3-May	9	9	10	10	10	10	11	12	14	13	13	15	19	19	19	27	24	23	23	13	13	12	11	28	28
4-May	64	9	77	38	16	84	46	88	50	24	39	78	68	77	63	50	31	33	18	17	50	15	49	21	88
5-May	29	31	27	44	50	19	36	22	19	21	42	27	23	24	24	47	24	48	29	16	13	18	17	18	50
6-May	14	13	11	11	10	10	12	12	13	18	16	20	15	18	20	24	33	15	19	16	7	8	10	10	33
7-May	11	17	23	13	80	16	9	11	9	12	13	12	10	14	14	15	14	14	15	17	21	10	12	19	80
8-May	14	13	36	48	85	41	62	70	24	42	80	54	25	18	18	13	14	13	15	13	13	15	12	10	85
9-May	9	9	10	17	12	13	26	19	21	18	44	28	27	44	18	22	14	10	13	35	20	11	12	14	44
10-May	8	9	9	11	12	13	15	16	13	14	14	14	13	12	12	18	11	11	16	17	17	43	25	21	43
11-May	23	12	10	9	19	13	15	58	16	25	27	14	20	15	26	23	24	26	14	11	13	17	19	8	58
12-May	8	20	14	7	19	11	35	28	29	41	65	44	86	43	28	20	15	17	13	13	14	16	37	12	86
13-May	10	21	22	35	19	15	11	22	57	59	48	61	24	34	35	21	22	15	12	13	10	15	25	32	61
14-May	40	76	80	16	10	13	14	19	20	22	26	23	24	23	20	22	17	15	74	76	43	37	9	13	80
15-May	20	68	17	13	20	48	13	17	11	11	12	11	11	12	10	10	9	9	9	10	11	7	7	9	68
16-May	7	8	9	8	8	12	17	32	52	33	34	36	42	41	27	24	65	55	18	12	6	17	16	14	65
17-May	69	20	15	18	18	34	30	27	63	102	84	96	49	85	40	19	21	17	15	22	18	13	12	29	102
18-May	13	10	12	10	12	13	13	20	97	27	15	16	14	14	17	19	16	51	27	40	18	48	32	44	97
19-May	29	27	16	11	13	15	16	21	27	23	27	27	27	23	20	25	24	23	21	18	18	17	16	13	29
20-May	19	11	13	10	12	14	17	19	19	23	23	25	21	20	62	44	16	15	17	15	89	31	23	13	89
21-May	10	10	9	10	9	9	13	24	88	45	36	30	29	26	19	18	18	41	12	19	9	14	48	5	88
22-May	15	19	18	43	29	81	37	19	93	19	35	59	22	28	26	17	23	38	19	19	9	23	25	9	93
23-May	9	10	53	28	29	13	13	30	85	21	20	27	35	32	65	32	79	46	18	25	17	13	49	14	85
24-May	18	22	15	14	14	12	16	21	23	15	22	14	17	15	22	16	12	13	14	27	14	13	39	76	76
25-May	58	23	22	15	14	30	30	27	20	22	34	46	39	48	38	26	23	20	19	17	16	16	16	18	58
26-May	22	18	17	57	31	16	53	28	19	18	20	48	31	12	13	35	18	19	14	13	14	23	22	14	57
27-May	13	13	16	12	11	10	11	11	12	14	12	12	13	11	12	11	13	12	11	11	16	15	13	13	16
28-May	17	21	57	23	19	25	24	26	24	33	38	47	45	53	35	32	25	21	19	20	18	18	16	17	57
29-May	20	17	64	13	15	19	19	16	15	12	11	10	11	12	10	15	14	13	14	18	11	16	15	16	64
30-May	14	16	11	12	14	13	14	16	15	14	14	16	17	12	12	14	41	33	19	53	57	15	45	12	57
31-May	11	10	52	80	51	13	35	57	42	51	32	28	27	19	16	18	15	14	13	12	11	29	19	19	80
Diurnal Maximum																									



**WBEA**  
**Hourly Averages**

**Wind Direction (WD) - deg**  
**Buffalo Viewpoint - May 2014**





# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Report

### Station Information

Calibration Date	May 15, 2014	Previous Calibration	April 8, 2014
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Reason:	Routine		
Start Time (MST)	8:55	End Time (MST)	12:04
Barometric Pressure	747 mmHg	Station temp.	23 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11061107
Cal Gas Concentration	51.00 ppm	Cal Gas Expiry Date	5/29/2014
Gas Cert Reference	LL107926		
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2586
DACS voltage range	0-5V	DACS channel #	11

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	1000	1000	PMT voltage	-592	-592
Analyzer Range (mv)	5000	5000	Lamp voltage	829	828
Calculated slope	0.996503	0.996331	Chamber temp.	45.0	45.0
Calculated intercept	-0.259297	-0.386412	Pressure (mmHg)	686.1	688.6
Analyzer Background	9.1	9.4	Flow (lpm)	0.488	0.489
Analyzer Coefficient	0.969	0.946	Intensity	85	85

Analyzer make TEI 43i Analyzer serial # JC1327300932

### Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.3	NA
as found span	5000	58.8	599.8	615.4	0.975
calibrator zero	5000	0.0	0.0	0.0	NA
high point	5000	58.8	599.8	601.8	0.997
second point	5000	29.4	299.9	302.7	0.991
third point	5000	14.7	149.9	150.5	0.996
calibrator zero	5000	0.0	0.0		
as left zero	5000	0.0	0.0	-0.1	NA
as left span	5000	58.8	599.8	603.1	NA
Average Correction Factor					0.994

Corrected As found 615.2 Previous response 602.1 % change -2.1%

#### Notes:

Zero and Span adjusted

Calibration Performed By:

Ryan Power



# Wood Buffalo Environmental Association

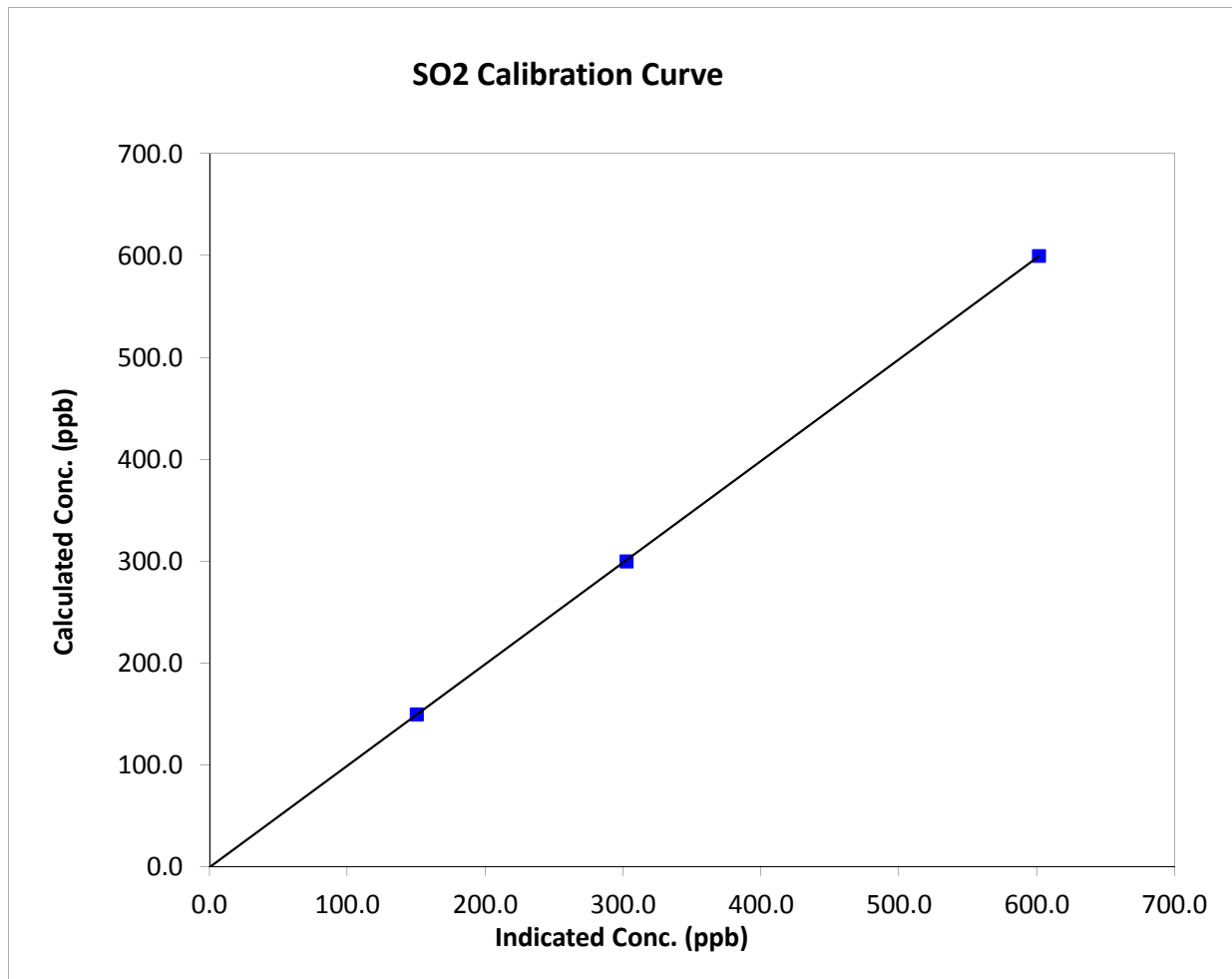
## SO<sub>2</sub> Calibration Summary

### Station Information

Calibration Date	May 15, 2014	Previous Calibration	April 8, 2014
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Start Time (MST)	8:55	End Time (MST)	12:04
Analyzer make	TEI 43i	Analyzer serial #	JC1327300932

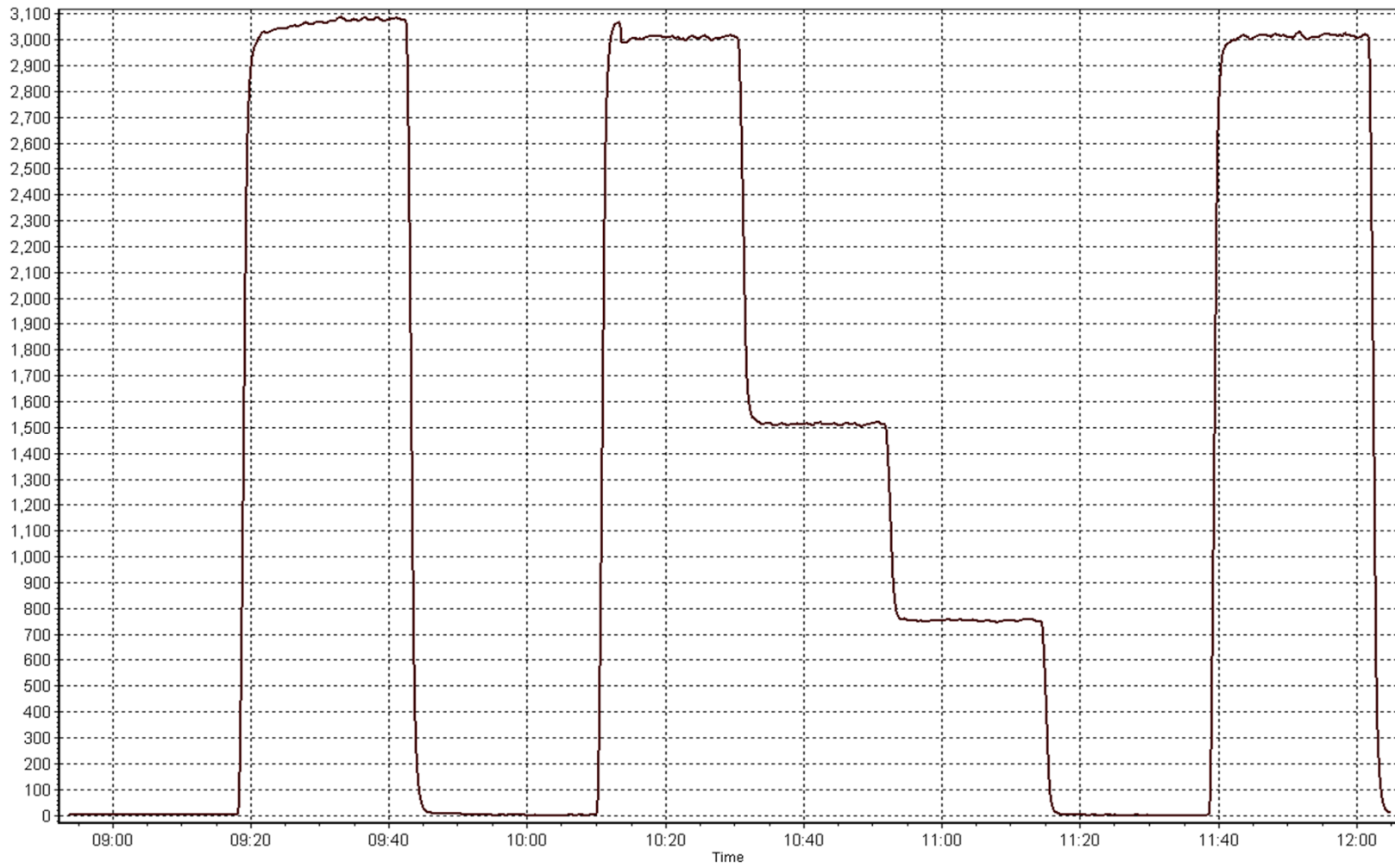
### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999987
599.8	601.8	0.9967		
299.9	302.7	0.9906	Slope	0.996331
149.9	150.5	0.9960		
			Intercept	-0.386412



SO2 Calibration Plot

Date: May 15, 2014





# Wood Buffalo Environmental Association

## H2S Calibration Report

### Station Information

Calibration Date	May 14, 2014	Previous Calibration	April 8, 2014
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Reason:	Routine		
Start Time (MST)	10:15	End Time (MST)	13:15
Barometric Pressure	NA mmHg	Station temp.	23 Deg C
Calibrator Make/Model	Sabio 4010	Serial number	11551008
Cal Gas Concentration	9.75 ppm H2S	Cal Gas Expiry Date	2/22/2016
Gas Cert Reference	LL101590	SO2 gas conc.	51.0 ppm SO2
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2586
DACS voltage range	0-5V	DACS channel #	

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	100	100	PMT voltage	-616	-616
Analyzer Range (mv)	5000	5000	Lamp voltage	876	876
Calculated slope	0.992113	0.993211	Chamber temp.	45	45
Calculated intercept	-0.338776	-0.134041	Pressure	540.0	540.3
Analyzer Background	17.4	16.4	Flow	1.034	1.035
Analyzer Coefficient	1.081	1.025	Intensity	94	94
			Converter temp.	330	331

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	5000	0.0	0.0	-0.1	NA
as found span	6000	46.2	75.1	78.7	0.954
SO2 scrubber check	5000	29.4	299.9	3.1	NA
calibrator zero	6000	0.0	0.0	-0.1	NA
high point	6000	46.2	75.1	75.5	0.994
second point	6000	25.8	41.9	42.6	0.983
third point	6000	15.4	25.0	25.5	0.982
calibrator zero					
as left zero	5000	0.0	0.0	-0.2	NA
as left span	6000	46.2	75.1	77.6	0.968
Average Correction Factor					0.986

Corrected As found	78.8	Previous response	76.0	% change	-3.5%
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#### Notes:

As Found Zero used as Calibrator Zero. Span adjusted

Calibration Performed By:

Ryan Power



# Wood Buffalo Environmental Association

## H2S Calibration Summary

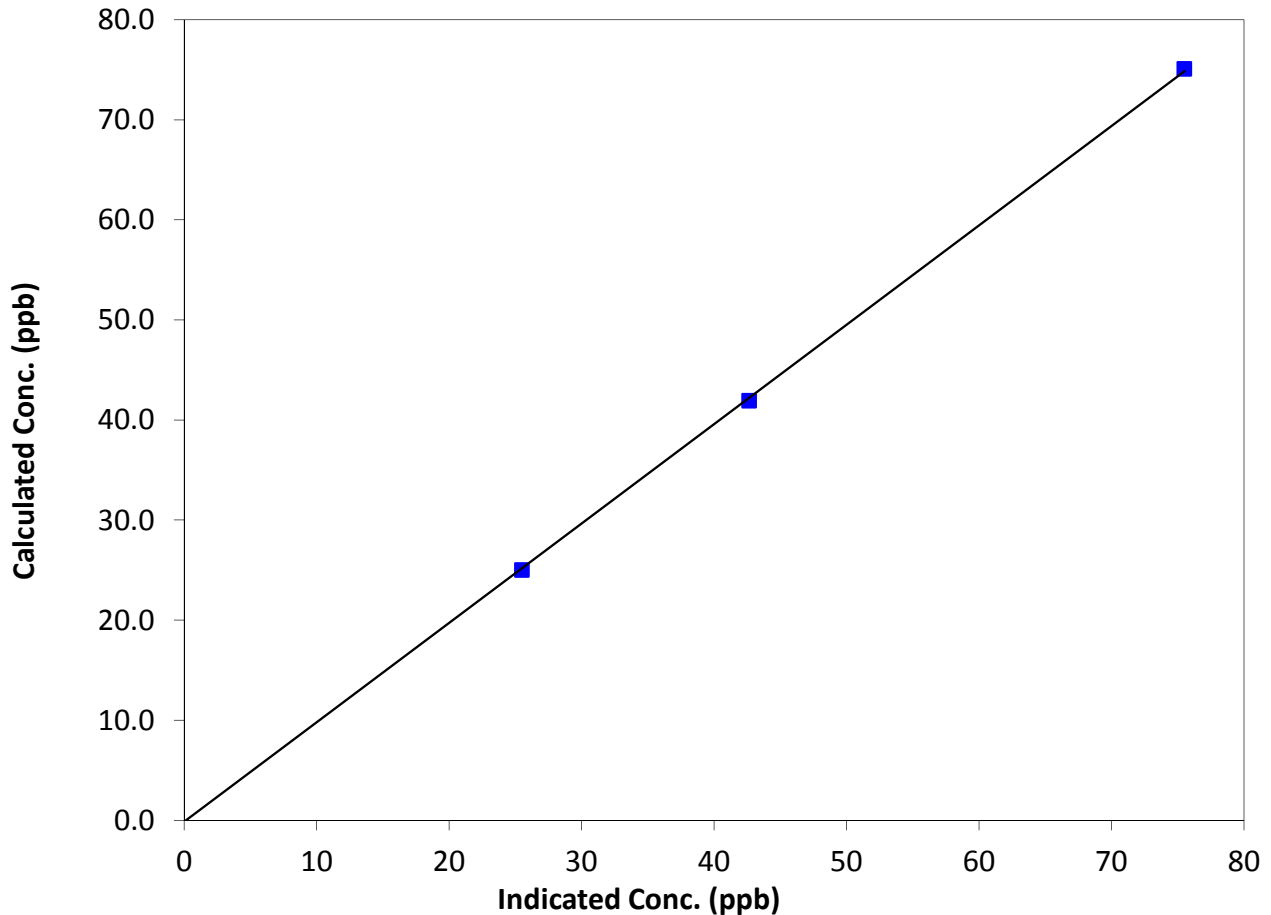
### Station Information

Calibration Date	May 14, 2014	Previous Calibration	April 8, 2014
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Start Time (MST)	10:15	End Time (MST)	13:15
Analyzer make	TEI 450i	Analyzer serial #	1336160094

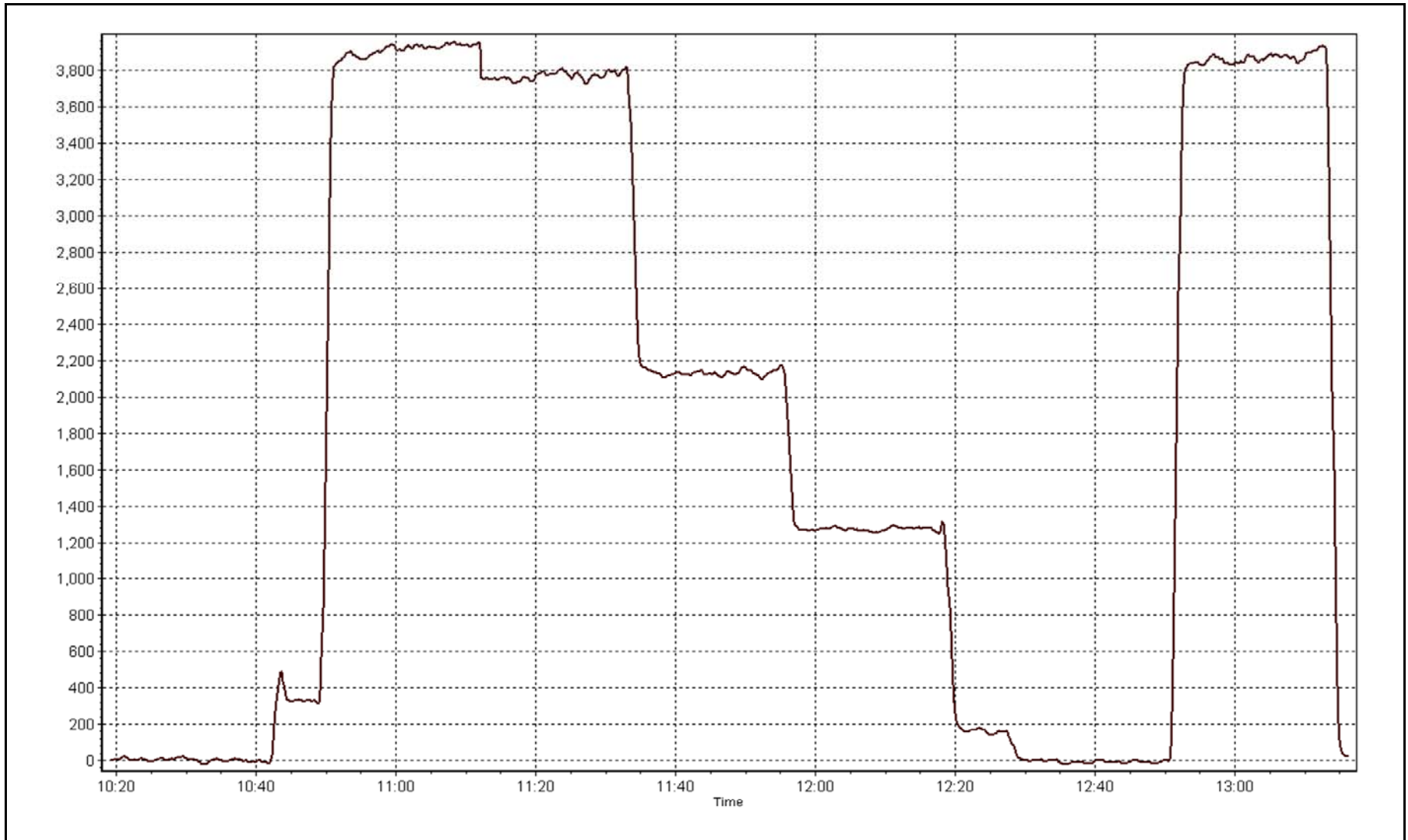
### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999929
75.1	75.5	0.9943		
41.9	42.6	0.9831	Slope	0.993211
25.0	25.5	0.9820		
			Intercept	-0.134041

**H2S Calibration Curve**









# Wood Buffalo Environmental Association

## THC Calibration Report

### Station Information

Calibration Date	Thursday, May 15, 2014	Previous Calibration	Tuesday, April 08, 2014
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Reason:	Routine		
Start Time (MST)	8:55	End Time (MST)	12:02
Barometric Pressure	747 mmHg	Station temp.	23 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11061107
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		
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2586
DACS voltage range	0-5V	DACS channel #	19

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppm)	25	25	Sample Pressure	8.5	8.5
Analyzer Range (mv)	5000	5000	Air or Bypass press	30.4	30.4
Calculated slope	1.001017	0.994852	Fuel Pressure	19.9	15.7
Calculated intercept	-0.044087	-0.021375			
BKG	1.8	1.7			
COEF	4.239	4.203			

Analyzer make TEI 51i-LT Analyzer serial # 1201650671

### Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	-0.04	N/A
as found span	4997	58.8	12.56	12.66	0.992
calibrator zero	5000	0.0	0.00	-0.02	N/A
high point	5000	58.8	12.56	12.62	0.995
second point	5000	29.4	6.28	6.36	0.987
third point	5005	14.7	3.14	3.21	0.978
calibrator zero					
as left zero	5000	0.0	0.00	0.01	N/A
as left span	5000	58.8	12.56	12.66	0.992
Average Correction Factor					0.987

Corrected As found 12.70 Previous response 12.60 % change -0.8%

#### Notes:

Minor changes to Zero and Span

Calibration Performed By:

Ryan Power



# Wood Buffalo Environmental Association

## THC Calibration Summary

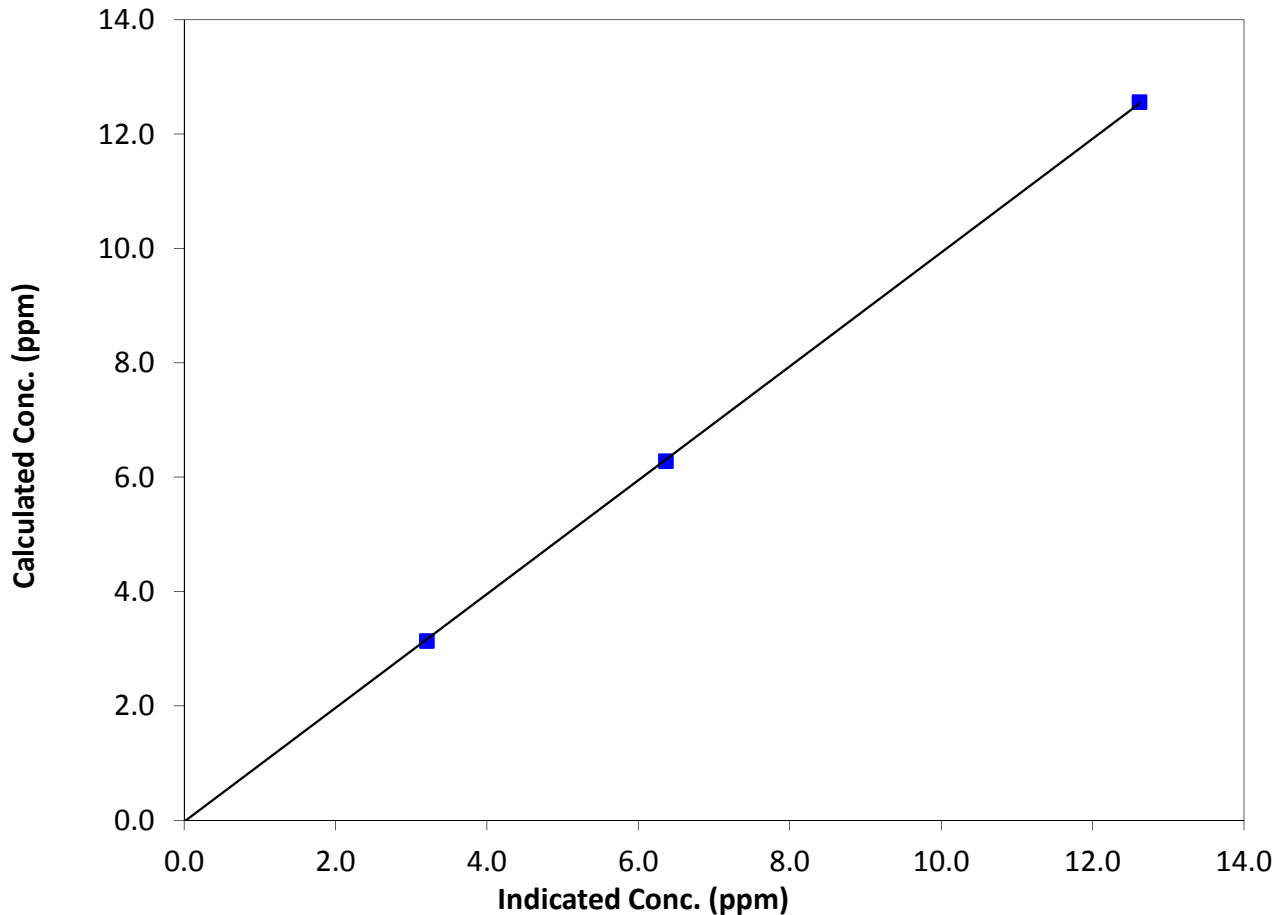
### Station Information

Calibration Date	May 15, 2014	Previous Calibration	April 8, 2014
Station Name	Buffalo Viewpoint	Station Number	AMS 4
Start Time (MST)	8:55	End Time (MST)	12:02
Analyzer make	TEI 51i-LT	Analyzer serial #	1201650671

### Calibration Data

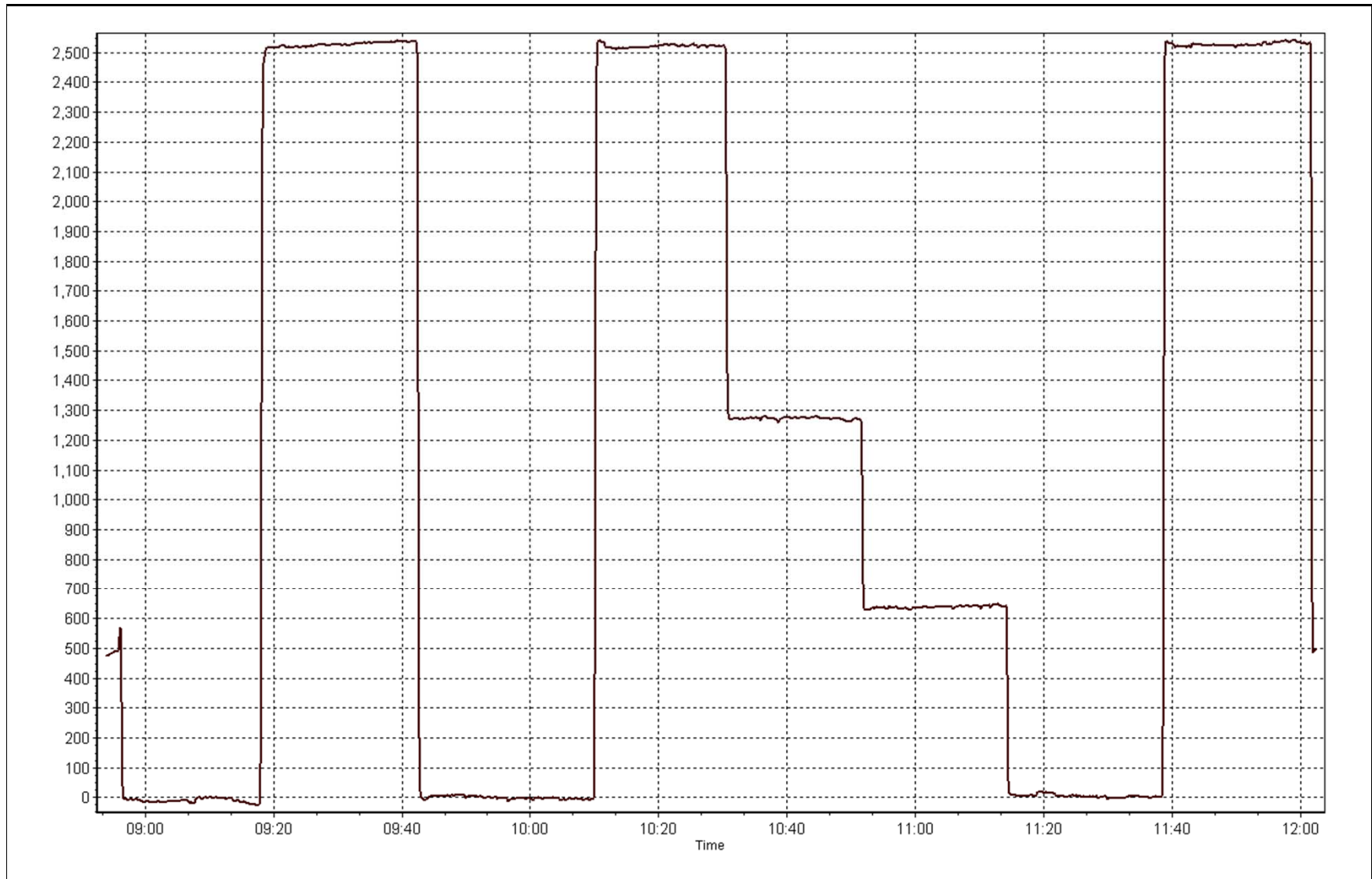
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	-0.02	N/A	Correlation Coefficient	0.999953
12.56	12.62	0.9951		
6.28	6.36	0.9865	Slope	0.994852
3.14	3.21	0.9784		
			Intercept	-0.021375

**THC Calibration Curve**



THC Calibration Plot

Date: May 15, 2014



# **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

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

### **AMS 5 MANNIX MAY 2014**

Operations and Data Collection by:  
Wood Buffalo Environmental Association  
Fort McMurray, Alberta

QA/QC, Data Validation and Reporting by:  
Aurora Atmospherics Inc.  
Calgary, Alberta

June 27, 2014

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

MAY 2014

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	74	0	10	0
H2S (ppb) Average	709	35	35	100.00	5	0	1	0
THC (ppm) Average	471	32	273	67.61	5.5	-	2.6	-
Temperature 2 m (C) Average	744	0	0	100.00	27.5	-	20.5	-
Temperature 20 m (C) Average	744	0	0	100.00	27.2	-	20.8	-
Temperature 45 m (C) Average	744	0	0	100.00	26.8	-	20.9	-
Temperature 75 m (C) Average	744	0	0	100.00	26.6	-	20.9	-
Temperature 90 m (C) Average	744	0	0	100.00	26.4	-	20.9	-
Relative Humidity 2 m (%) Average	744	0	0	100.00	96	-	-	-
Relative Humidity 20 m (%) Average	744	0	0	100.00	97	-	-	-
Relative Humidity 45 m (%) Average	744	0	0	100.00	97	-	-	-
Relative Humidity 75 m (%) Average	744	0	0	100.00	97	-	-	-
Relative Humidity 90 m (%) Average	744	0	0	100.00	98	-	-	-
Wind Speed 20 m (km/h) Average	744	0	0	100.00	37	-	-	-
Wind Speed 45 m (km/h) Average	744	0	0	100.00	46	-	-	-
Wind Speed 75 m (km/h) Average	744	0	0	100.00	49	-	-	-
Wind Speed 90 m (km/h) Average	744	0	0	100.00	49	-	-	-
Wind Direction 20 m (deg) Average	744	0	0	100.00	-	-	-	-
Wind Direction 45 m (deg) Average	744	0	0	100.00	-	-	-	-
Wind Direction 75 m (deg) Average	744	0	0	100.00	-	-	-	-
Wind Direction 90 m (deg) Average	744	0	0	100.00	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	744	0	0	100.00	0.8	-	-	-
Vertical Wind Speed 45 m (km/h) Average	744	0	0	100.00	1.5	-	-	-
Vertical Wind Speed 75 m (km/h) Average	744	0	0	100.00	1.4	-	-	-
Vertical Wind Speed 90 m (km/h) Average	744	0	0	100.00	5.8	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MANNIX (AMS 5)  
MAY 2014

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	708	2	5	-	0	0	0	0	1	6	74
H2S (ppb) Average	709	0.5	0	-	0	0	0	0	1	1	5
THC (ppm) Average	471	2.24	0.3	-	1.8	1.9	2	2.2	2.4	2.6	5.5
Temperature 2 m (C) Average	744	8.84	6.7	-	-4	0.2	3.4	8.5	13.6	18.3	27.5
Temperature 20 m (C) Average	744	8.65	6.6	-	-4.1	0	3.4	8.6	13.3	17.7	27.2
Temperature 45 m (C) Average	744	8.47	6.6	-	-4.4	-0.3	3.2	8.5	13.2	17.4	26.8
Temperature 75 m (C) Average	744	8.3	6.6	-	-4.7	-0.5	3.1	8.5	13.1	17.2	26.6
Temperature 90 m (C) Average	744	8.22	6.6	-	-4.8	-0.6	2.9	8.4	13	17.3	26.4
Relative Humidity 2 m (%) Average	744	60.4	21	-	16	32	42	61	78	91	96
Relative Humidity 20 m (%) Average	744	59	21	-	15	31	40	59	77	89	97
Relative Humidity 45 m (%) Average	744	58.4	21	-	14	31	40	58	76	88	97
Relative Humidity 75 m (%) Average	744	58.4	21	-	14	31	40	58	76	88	97
Relative Humidity 90 m (%) Average	744	58.7	21	-	14	31	40	59	76	88	98
Wind Speed 20 m (km/h) Average	744	11.6	7	-	1	4	7	11	15	20	37
Wind Speed 45 m (km/h) Average	744	15	8	-	1	5	9	14	20	25	46
Wind Speed 75 m (km/h) Average	744	16.4	9	-	2	5	9	15	22	28	49
Wind Speed 90 m (km/h) Average	744	17.6	9	-	1	6	10	16	24	30	49
Wind Direction 20 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-
Wind Direction 45 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-
Wind Direction 75 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-
Wind Direction 90 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	744	-0.01	0.3	-	-1	-0.5	-0.2	0	0.2	0.4	0.8
Vertical Wind Speed 45 m (km/h) Average	744	0.11	0.5	-	-1.4	-0.6	-0.2	0.2	0.5	0.7	1.5
Vertical Wind Speed 75 m (km/h) Average	744	0.13	0.4	-	-1.2	-0.3	-0.1	0.1	0.4	0.6	1.4
Vertical Wind Speed 90 m (km/h) Average	744	0.6	1.1	-	-1.2	-0.5	-0.1	0.2	1.1	2.2	5.8



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MANNIX (AMS 5)  
MAY 2014

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
THC	05 May 2014 08:00	06 May 2014 13:00	30	Analyzer Failure - flow control board failure, analyzer replaced
THC	06 May 2014 18:00	06 May 2014 20:00	3	Intermittent baseline drift below threshold limit
THC	06 May 2014 23:00	06 May 2014 23:00	1	Intermittent baseline drift below threshold limit
THC	07 May 2014 04:00	07 May 2014 04:00	1	Intermittent baseline drift below threshold limit
THC	07 May 2014 08:00	08 May 2014 00:00	17	Intermittent baseline drift below threshold limit
THC	08 May 2014 03:00	08 May 2014 07:00	5	Intermittent baseline drift below threshold limit
THC	08 May 2014 09:00	08 May 2014 09:00	1	Intermittent baseline drift below threshold limit
THC	08 May 2014 11:00	08 May 2014 11:00	1	Intermittent baseline drift below threshold limit
THC	08 May 2014 14:00	08 May 2014 20:00	7	Intermittent baseline drift below threshold limit
THC	08 May 2014 22:00	09 May 2014 00:00	3	Intermittent baseline drift below threshold limit
THC	09 May 2014 03:00	09 May 2014 03:00	1	Intermittent baseline drift below threshold limit
THC	09 May 2014 09:00	09 May 2014 20:00	12	Intermittent baseline drift below threshold limit
THC	09 May 2014 22:00	09 May 2014 23:00	2	Intermittent baseline drift below threshold limit
THC	10 May 2014 04:00	10 May 2014 09:00	6	Intermittent baseline drift below threshold limit
THC	10 May 2014 12:00	10 May 2014 13:00	2	Intermittent baseline drift below threshold limit
THC	10 May 2014 15:00	10 May 2014 15:00	1	Intermittent baseline drift below threshold limit
THC	10 May 2014 17:00	10 May 2014 18:00	2	Intermittent baseline drift below threshold limit
THC	10 May 2014 23:00	11 May 2014 01:00	3	Intermittent baseline drift below threshold limit
THC	11 May 2014 03:00	11 May 2014 03:00	1	Intermittent baseline drift below threshold limit
THC	11 May 2014 06:00	11 May 2014 11:00	6	Intermittent baseline drift below threshold limit
THC	13 May 2014 01:00	13 May 2014 01:00	1	Intermittent baseline drift below threshold limit
THC	13 May 2014 03:00	13 May 2014 04:00	2	Intermittent baseline drift below threshold limit
THC	13 May 2014 07:00	13 May 2014 07:00	1	Intermittent baseline drift below threshold limit
THC	13 May 2014 09:00	13 May 2014 10:00	2	Intermittent baseline drift below threshold limit
THC	14 May 2014 06:00	14 May 2014 09:00	4	Intermittent baseline drift below threshold limit
THC	14 May 2014 15:00	14 May 2014 17:00	3	Intermittent baseline drift below threshold limit
THC	14 May 2014 19:00	14 May 2014 21:00	3	Intermittent baseline drift below threshold limit
THC	15 May 2014 11:00	15 May 2014 12:00	2	Intermittent baseline drift below threshold limit
THC	15 May 2014 14:00	15 May 2014 14:00	1	Intermittent baseline drift below threshold limit
THC	15 May 2014 17:00	15 May 2014 17:00	1	Intermittent baseline drift below threshold limit
THC	15 May 2014 19:00	15 May 2014 19:00	1	Intermittent baseline drift below threshold limit
THC	17 May 2014 04:00	17 May 2014 05:00	2	Intermittent baseline drift below threshold limit
THC	17 May 2014 07:00	17 May 2014 07:00	1	Intermittent baseline drift below threshold limit
THC	18 May 2014 13:00	18 May 2014 20:00	8	Intermittent baseline drift below threshold limit
THC	19 May 2014 06:00	19 May 2014 06:00	1	Intermittent baseline drift below threshold limit
THC	19 May 2014 10:00	19 May 2014 10:00	1	Intermittent baseline drift below threshold limit
THC	19 May 2014 12:00	19 May 2014 13:00	2	Intermittent baseline drift below threshold limit
THC	22 May 2014 10:00	22 May 2014 22:00	13	Intermittent baseline drift below threshold limit
THC	23 May 2014 08:00	23 May 2014 08:00	1	Intermittent baseline drift below threshold limit
THC	23 May 2014 10:00	23 May 2014 19:00	10	Intermittent baseline drift below threshold limit
THC	23 May 2014 23:00	24 May 2014 01:00	3	Intermittent baseline drift below threshold limit
THC	24 May 2014 03:00	24 May 2014 07:00	5	Intermittent baseline drift below threshold limit
THC	24 May 2014 10:00	24 May 2014 13:00	4	Intermittent baseline drift below threshold limit
THC	27 May 2014 13:00	27 May 2014 13:00	1	Intermittent baseline drift below threshold limit
THC	29 May 2014 00:00	29 May 2014 00:00	1	Intermittent baseline drift below threshold limit
THC	29 May 2014 11:00	29 May 2014 14:00	4	Maintenance - trouble shooting and calibration

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MANNIX (AMS 5)  
MAY 2014

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
THC	29 May 2014 15:00	01 Jun 2014 00:00	58	Analyzer failed calibration as per AMD criteria



Summary of Hour Averages

Mannix - May 2014

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 74 ppb on May 15 13:00	Maximum Daily Average: 9.7 ppb on May 15
Minimum Value: 0 ppb on May 3 19:00	Minimum Daily Average: 0.1 ppb on May 26
Maximum Diurnal Average: 5.5 ppb at hour 13	Minimum Diurnal Average: 0.4 ppb at hour 4
Monthly Average: 2.0 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> = 6 P <sub>99</sub> = 25
	Hours of Data: 708
	Hours of Missing Data: 36
	Hours of Calibration: 36
	Percent Operational Time: 100.0

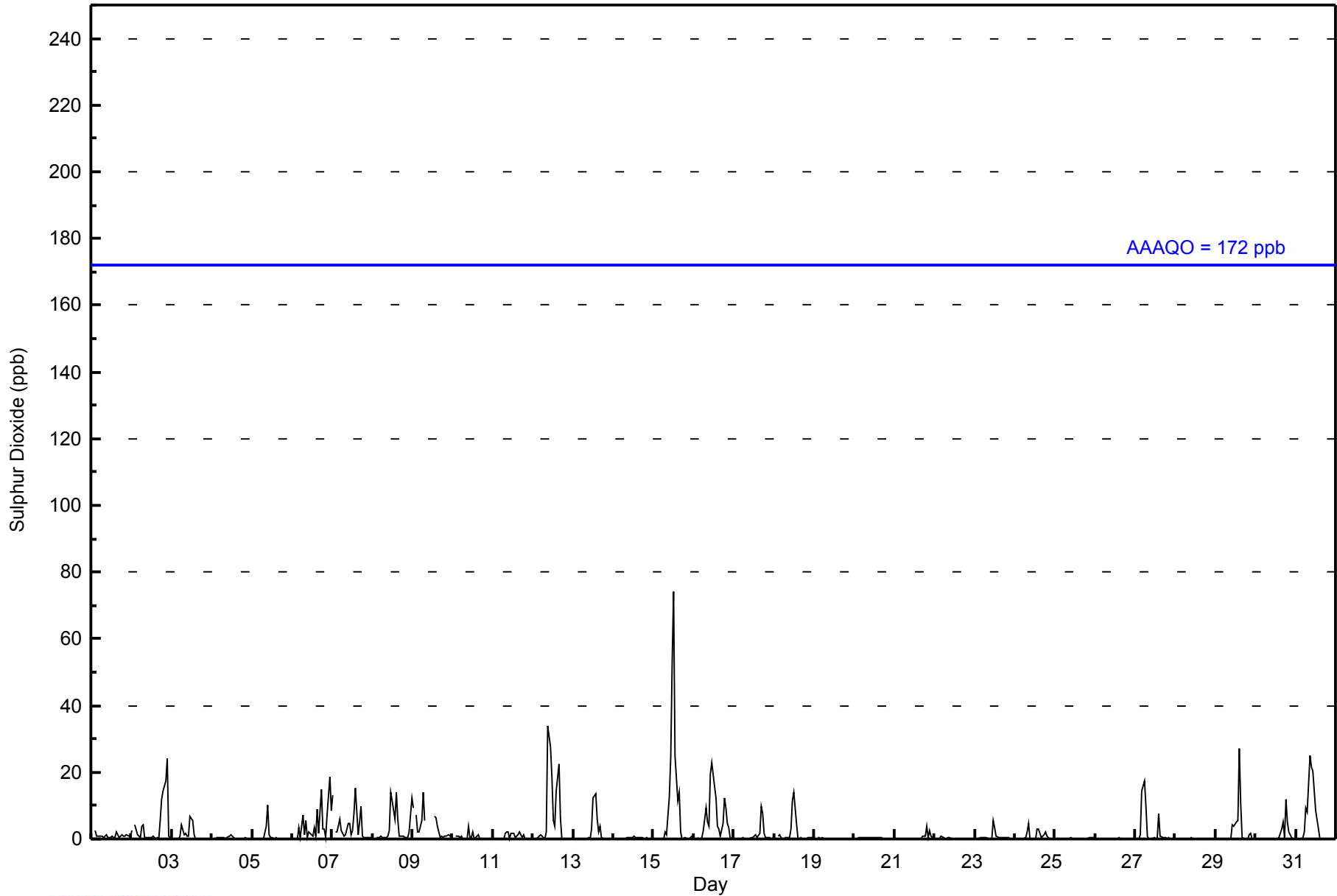
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-May	0	Z	2	1	1	1	1	0	1	1	1	0	1	0	1	2	0	1	1	1	1	1	1	1	0.9	2
2-May	2	Z	4	1	1	0	4	4	0	0	0	0	1	0	0	0	0	6	12	14	17	24	1	0	4.1	24
3-May	0	Z	0	0	0	1	4	1	2	1	1	7	5	1	0	0	0	0	0	0	0	0	0	0	1.1	7
4-May	0	Z	0	1	0	0	1	0	0	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0.3	1
5-May	0	Z	0	0	0	0	0	0	4	10	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	10
6-May	0	Z	0	0	4	0	7	1	5	0	2	1	1	3	1	9	2	15	3	3	1	7	19	8	4.0	19
7-May	13	Z	2	2	6	2	2	1	1	5	5	1	2	8	15	1	5	10	1	1	1	0	1	1	3.7	15
8-May	1	Z	1	1	1	1	0	0	1	1	2	14	11	6	14	6	1	1	1	1	1	1	2	12	3.4	14
9-May	9	Z	7	2	2	5	14	5	C	C	C	C	C	7	6	4	0	1	0	1	1	1	1	0	3.8	14
10-May	1	Z	1	1	0	1	0	0	0	4	0	1	2	0	1	1	0	0	0	0	0	0	0	0	0.5	4
11-May	0	Z	0	0	0	0	0	1	2	2	0	2	1	0	1	1	2	1	1	0	0	0	0	0	0.7	2
12-May	0	Z	0	0	1	1	0	0	2	34	28	18	6	4	14	22	6	0	0	0	0	0	0	0	6.0	34
13-May	0	Z	0	0	0	0	0	0	0	0	0	3	12	14	6	2	4	0	0	0	0	0	0	0	1.9	14
14-May	0	Z	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1
15-May	0	Z	0	0	0	0	0	2	1	13	25	53	74	25	11	14	2	0	0	0	0	0	1	1	9.7	74
16-May	0	Z	0	0	0	0	2	9	5	4	19	23	16	12	4	3	1	5	12	9	4	3	0	0	5.8	23
17-May	0	Z	0	0	0	0	0	0	0	0	0	1	1	1	0	2	10	8	2	0	0	0	0	0	1.2	10
18-May	1	Z	1	1	0	0	0	0	0	0	3	12	14	4	0	0	0	0	0	0	0	0	0	0	1.7	14
19-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
20-May	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
21-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	4	0	3	1	0	0.4	4
22-May	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
23-May	0	Z	0	0	0	0	0	0	0	0	0	5	3	1	1	0	0	0	0	0	0	0	0	0	0.6	5
24-May	0	Z	0	0	0	0	1	2	5	0	0	0	0	3	3	2	0	1	2	1	0	0	0	0	0.9	5
25-May	0	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-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.1	1
27-May	0	Z	0	1	14	17	10	1	0	0	0	0	0	1	7	1	0	0	0	0	0	0	0	0	2.4	17
28-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
29-May	0	Z	0	0	0	0	0	0	0	0	4	4	5	5	27	10	0	0	0	0	1	2	0	0	2.6	27
30-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	3	5	0	12	5	2	0	0	0	0	1.3	12
31-May	0	Z	0	0	0	2	9	8	25	21	20	15	8	3	0	0	0	0	0	0	0	0	0	0	4.9	25
	1.0	--	0.7	0.4	1.1	1.1	1.8	1.3	1.9	3.3	3.8	5.4	5.5	3.3	3.7	2.8	1.3	1.6	1.6	1.3	1.0	1.5	0.9	0.8	Diurnal Average	
	13	--	7	2	14	17	14	9	25	34	28	53	74	25	27	22	10	15	12	14	17	24	19	12	Diurnal Maximum	

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



WBEA  
Hourly Averages

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Mannix - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Mannix - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	666	94.07	94.07
11 - 20	30	4.24	98.31
21 - 60	11	1.55	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



**WBEA**  
**Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Mannix - May 2014**

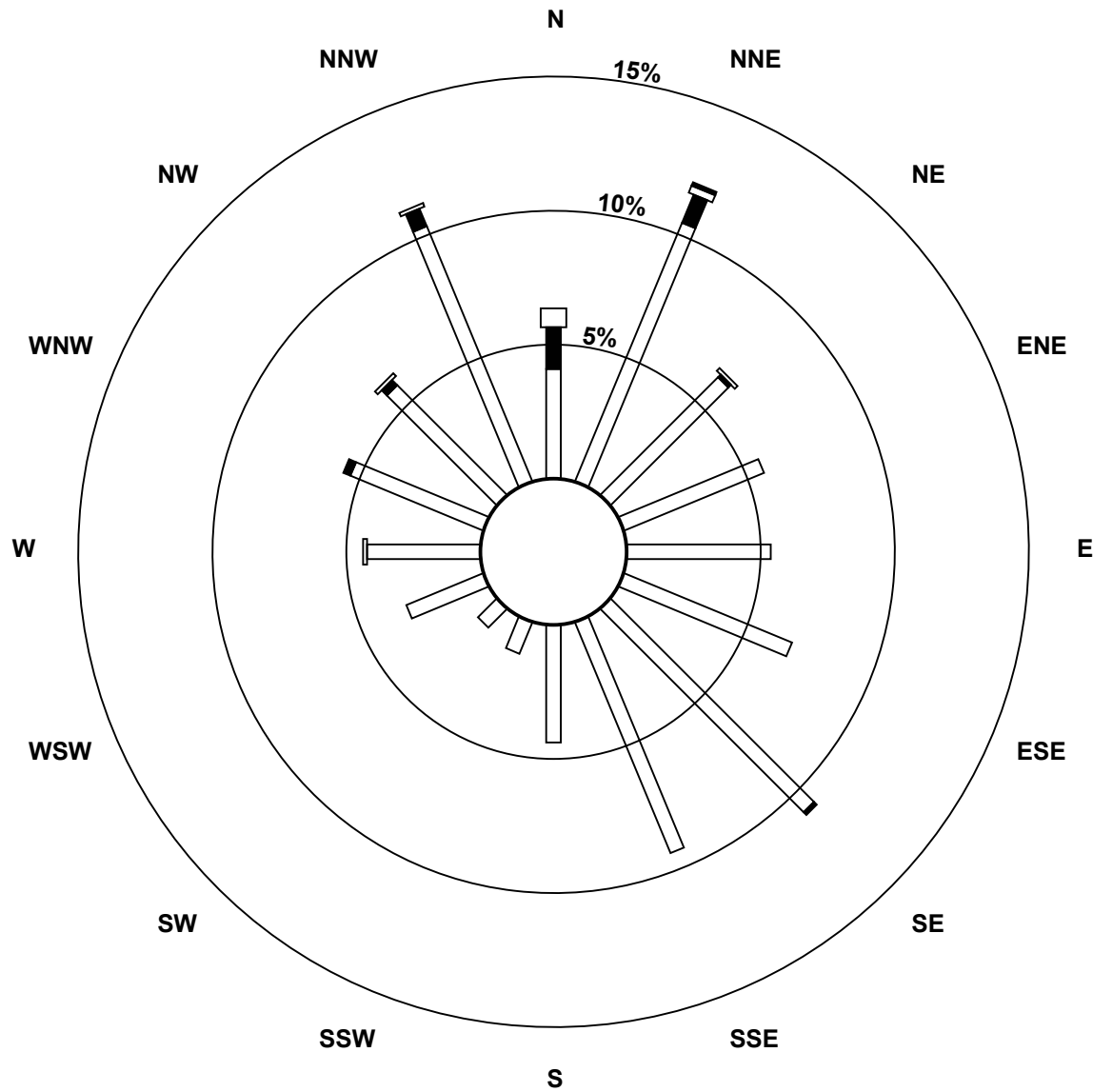
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	29	74	44	40	38	48	76	66	31	9	7	22	30	38	41	73	666
11 - 20	11	8	1	0	0	0	1	0	0	0	0	0	0	2	2	5	30
21 - 60	5	2	1	0	0	0	0	0	0	0	0	0	1	0	1	1	11
61 - 110	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	45	85	46	40	38	48	77	66	31	9	7	22	31	40	44	79	708

Total Number of Valid Hours: 708

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Mannix (AMS 5)**



**Classes (ppb)**

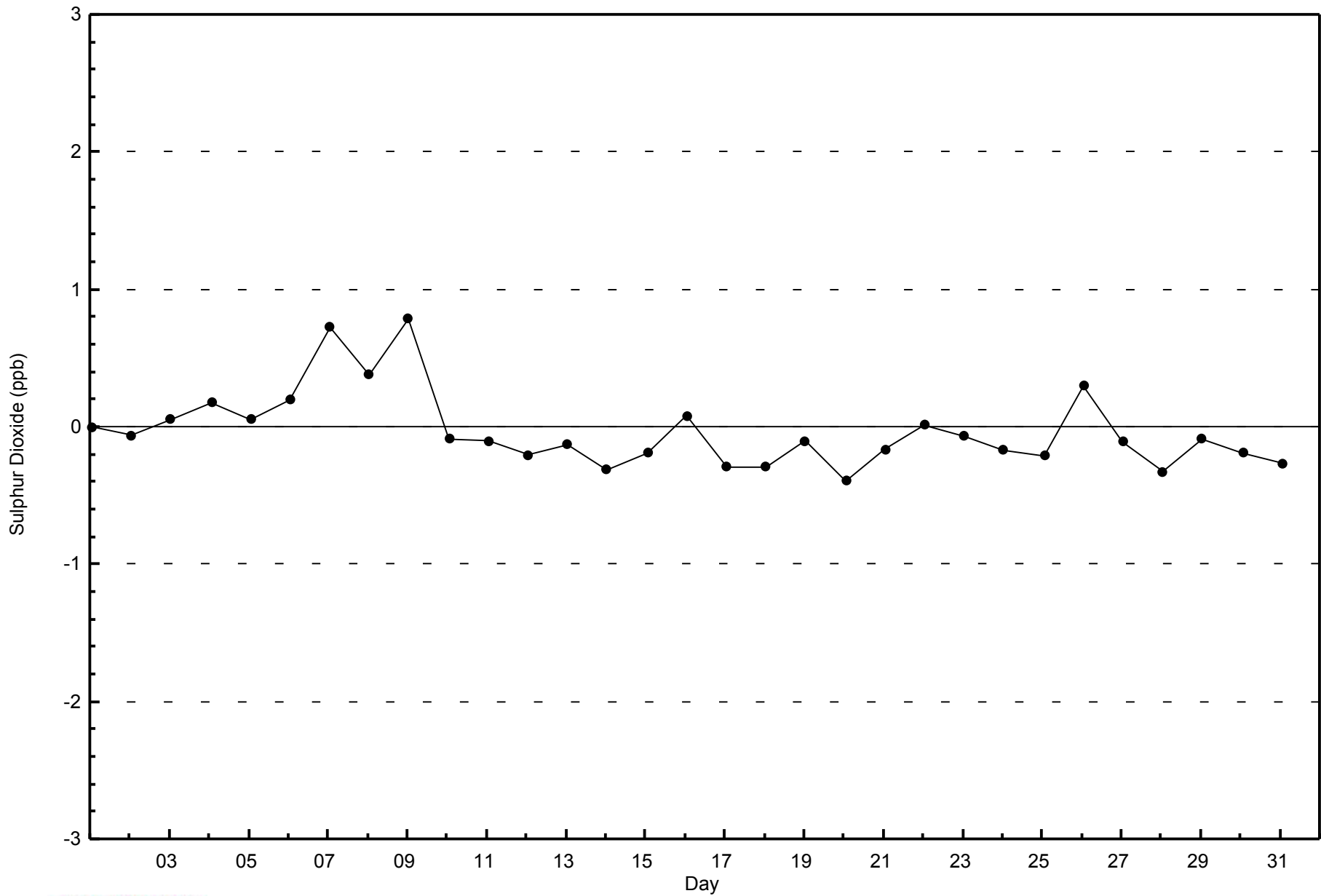


**Total Number of Valid Hours: 708**



WBEA  
Zero Responses

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Mannix - May 2014

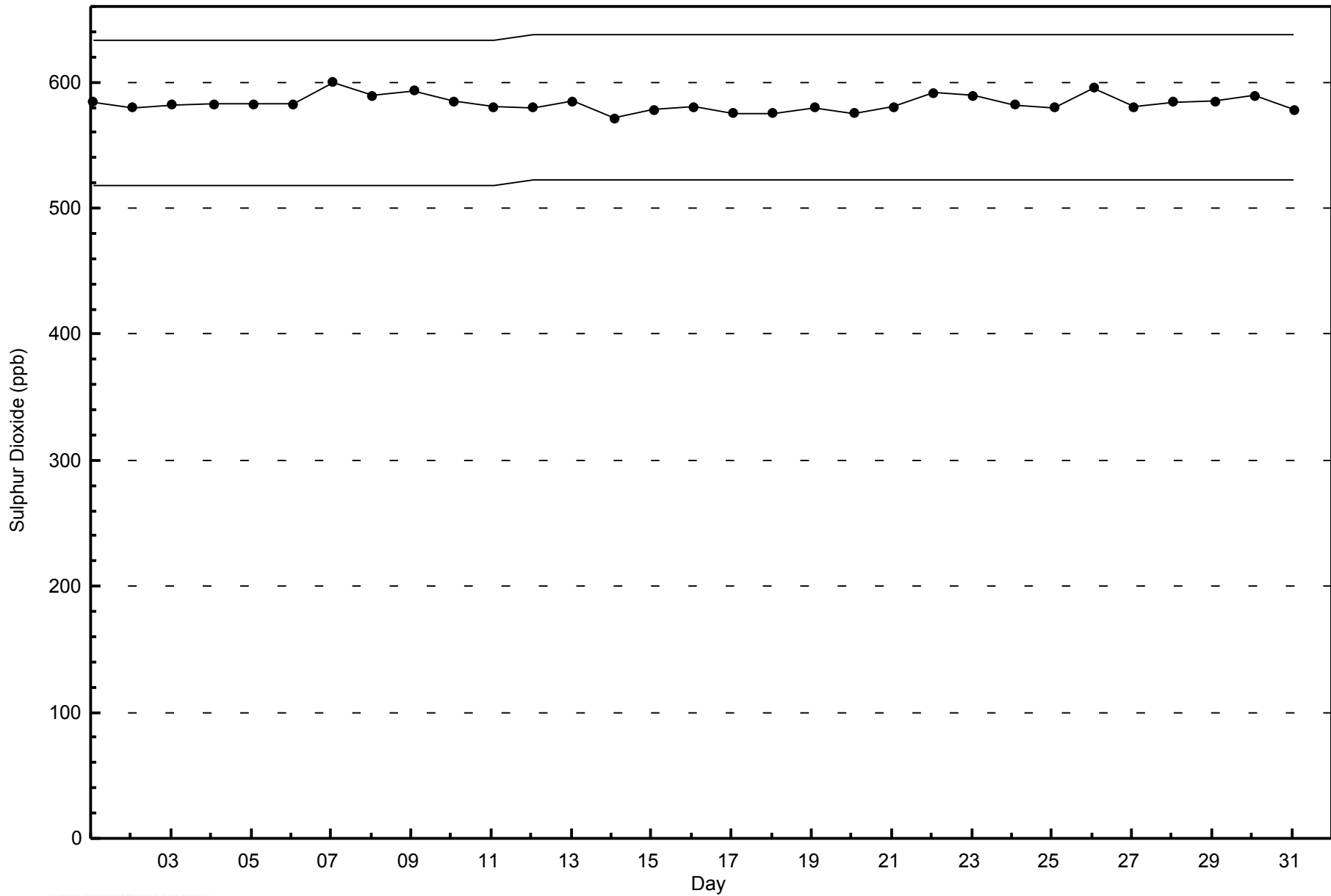






WBEA  
Span Responses

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Mannix - May 2014





Summary of Hour Averages

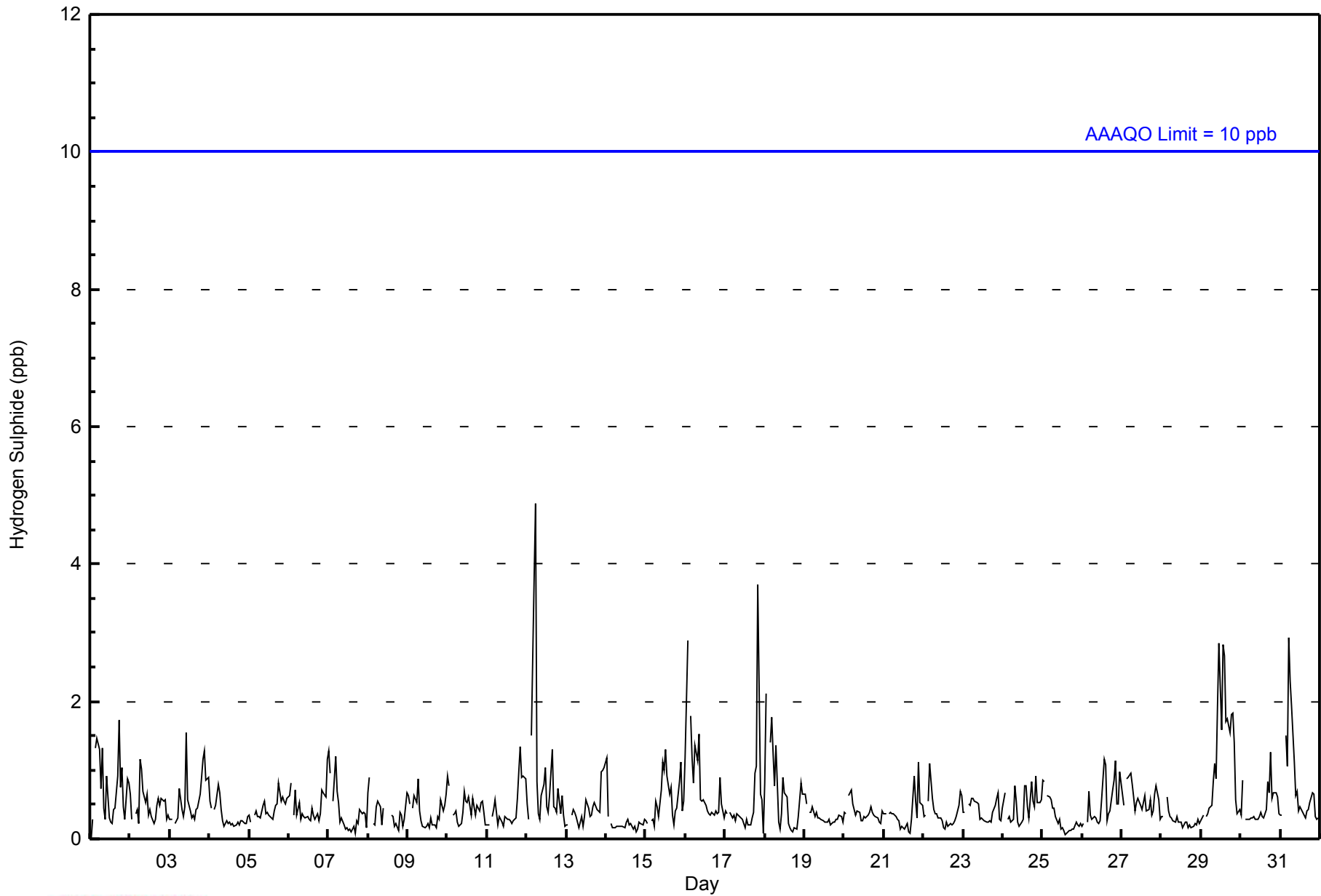
Mannix - May 2014

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																
Maximum Value: 5 ppb on May 12 06:00										Maximum Daily Average: 1.2 ppb on May 29										Hours of Data: 709						
Minimum Value: 0 ppb on May 1 01:00										Minimum Daily Average: 0.2 ppb on May 14										Hours of Missing Data: 35						
Maximum Diurnal Average: 0.7 ppb at hour 6										Minimum Diurnal Average: 0.4 ppb at hour 10										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> = 3										Percent Operational Time: 100.0						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-May	0	0	Z	1	1	1	1	1	0	0	1	0	0	0	0	0	1	2	1	1	0	0	1	1	0.7	2
2-May	1	0	Z	0	0	0	1	1	1	1	1	0	0	0	0	0	0	1	0	1	1	1	0	0	0.5	1
3-May	0	0	Z	0	0	0	1	0	0	0	2	1	0	0	0	0	0	0	1	1	1	1	1	1	0.6	2
4-May	1	0	Z	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
5-May	0	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0.4	1
6-May	1	1	Z	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.5	1
7-May	1	1	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
8-May	1	1	Z	0	0	0	1	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	1	0.4	1
9-May	1	1	Z	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0.4	1
10-May	1	1	Z	0	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0	0	1	1	0	0	0.5	1
11-May	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0.5	1
12-May	1	0	Z	2	4	5	1	0	0	1	1	1	0	0	1	1	0	0	0	1	0	1	0	0	0.9	5
13-May	0	0	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	1	1	1	0.4	1
14-May	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
15-May	0	0	Z	0	0	0	1	0	0	1	1	1	1	1	1	1	0	0	0	0	1	1	0	1	0.6	1
16-May	1	3	Z	2	1	1	1	1	2	1	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0.8	3
17-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	4	1	1	0	0.5	4
18-May	1	2	Z	1	2	1	1	1	0	0	0	1	1	1	0	0	0	0	0	0	0	1	1	1	0.7	2
19-May	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
20-May	0	0	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
21-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	0	0.4	1
22-May	0	0	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.4	1
23-May	0	0	Z	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0.4	1
24-May	0	1	Z	0	0	0	0	1	1	0	0	0	0	1	1	0	0	1	1	0	1	1	1	1	0.5	1
25-May	1	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
26-May	0	0	Z	0	1	0	0	0	0	0	0	1	1	1	0	0	0	0	1	1	1	1	1	1	0.5	1
27-May	1	0	Z	1	1	1	1	1	0	1	1	0	0	1	1	0	0	1	0	0	1	1	1	0	0.6	1
28-May	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
29-May	0	0	Z	0	0	0	0	1	1	1	2	3	2	3	3	2	2	2	2	2	2	1	1	0	1.2	3
30-May	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0.5	1
31-May	0	0	Z	2	1	3	2	2	1	1	1	0	0	0	0	0	0	0	1	1	1	0	0	0	0.8	3
0.5 0.6 -- 0.6 0.7 0.7 0.6 0.5 0.4 0.4 0.5 0.5 0.4 0.5 0.4 0.4 0.4 0.4 0.4 0.5 0.5 0.7 0.6 0.5 0.5																								Diurnal Average		
1 3 -- 2 4 5 2 2 2 1 2 3 2 3 3 2 2 2 2 2 2 2 4 1 1 1																								Diurnal Maximum		
Z - zerospan C - Calibration																										
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb																										



**WBEA**  
**Hourly Averages**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Mannix - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Mannix - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	701	98.87	98.87
3 - 4	7	0.99	99.86
5 - 7	1	0.14	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Mannix - May 2014**

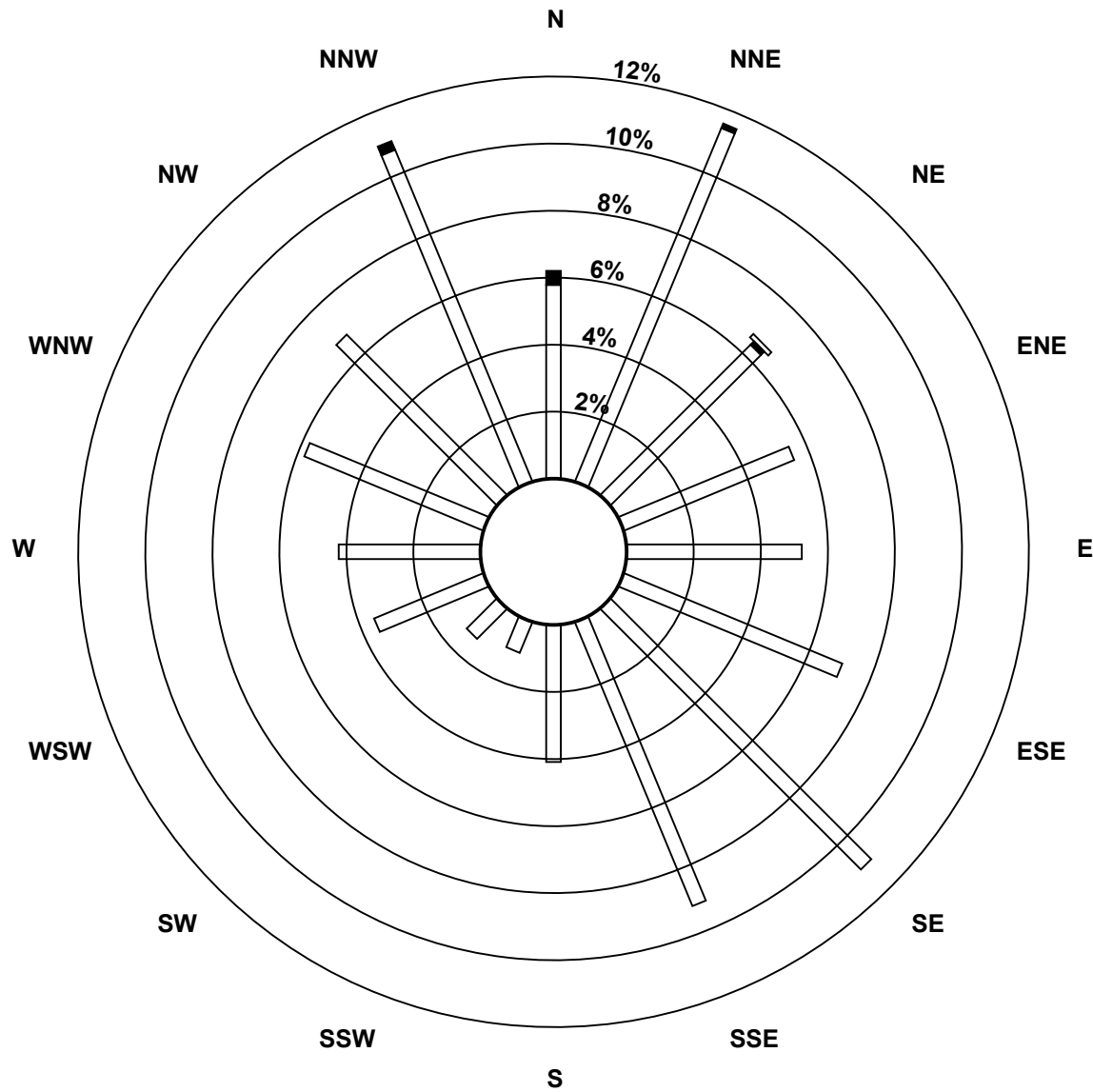
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	41	81	45	39	37	50	78	65	29	7	9	25	30	41	48	76	701
3 - 4	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	2	7
5 - 7	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	44	82	47	39	37	50	78	65	29	7	9	25	30	41	48	78	709

Total Number of Valid Hours: 709

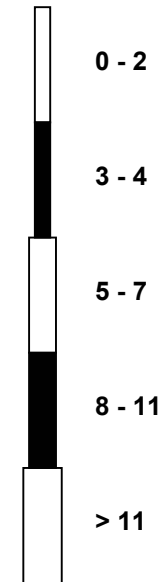
Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Mannix (AMS 5)**



Classes (ppb)

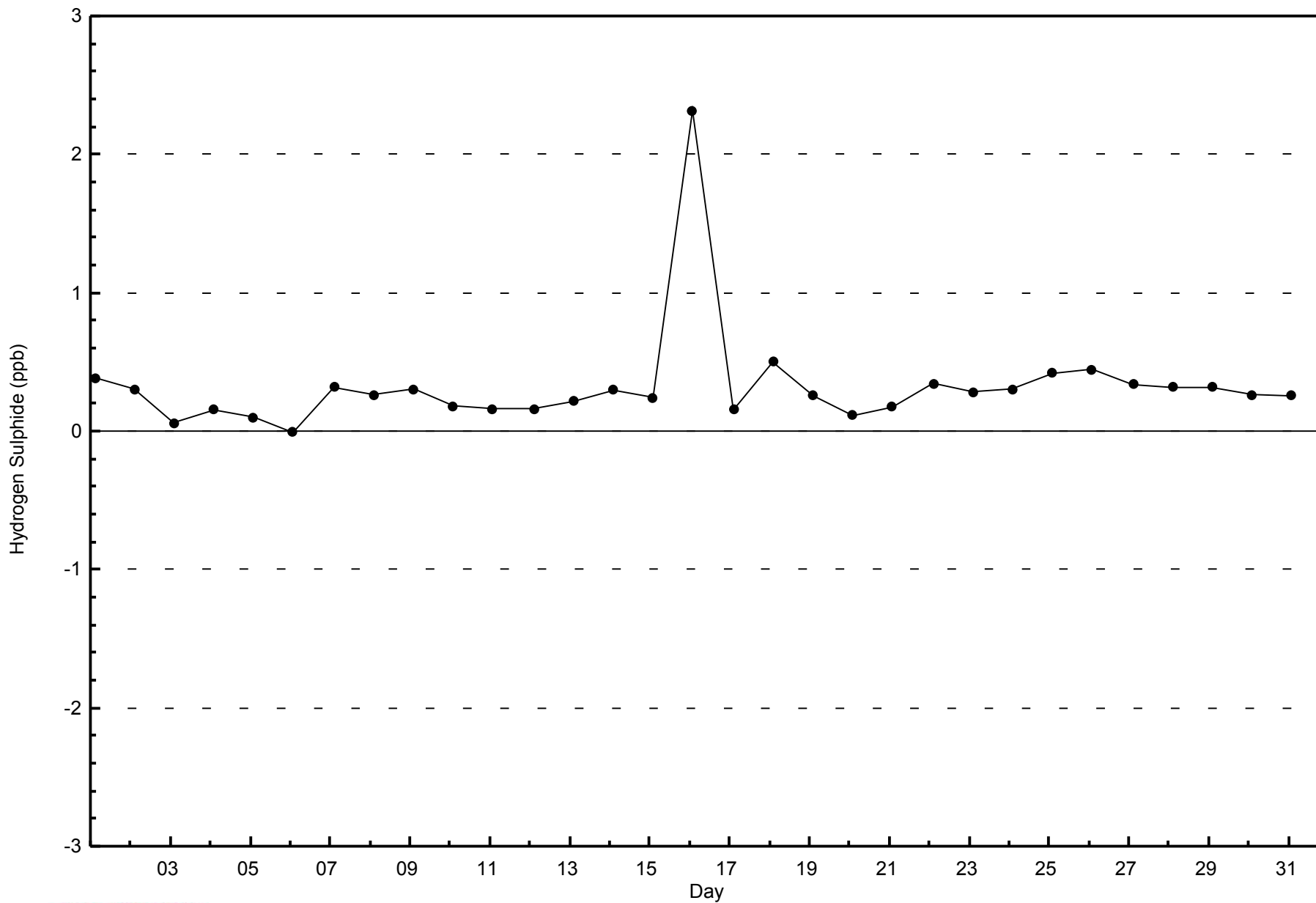


**Total Number of Valid Hours: 709**



WBEA  
Zero Responses

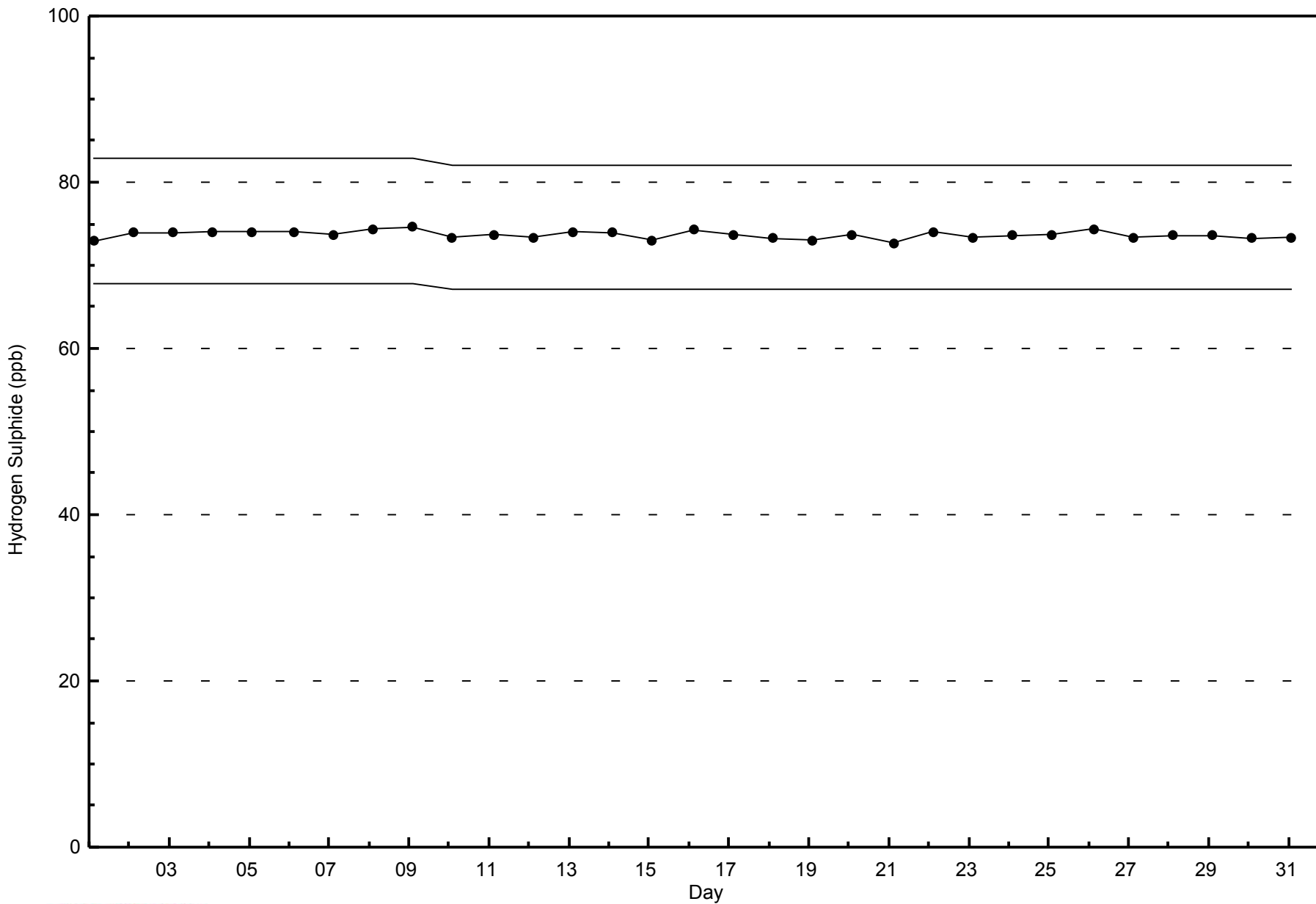
Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Mannix - May 2014





WBEA  
Span Responses

Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Mannix - May 2014





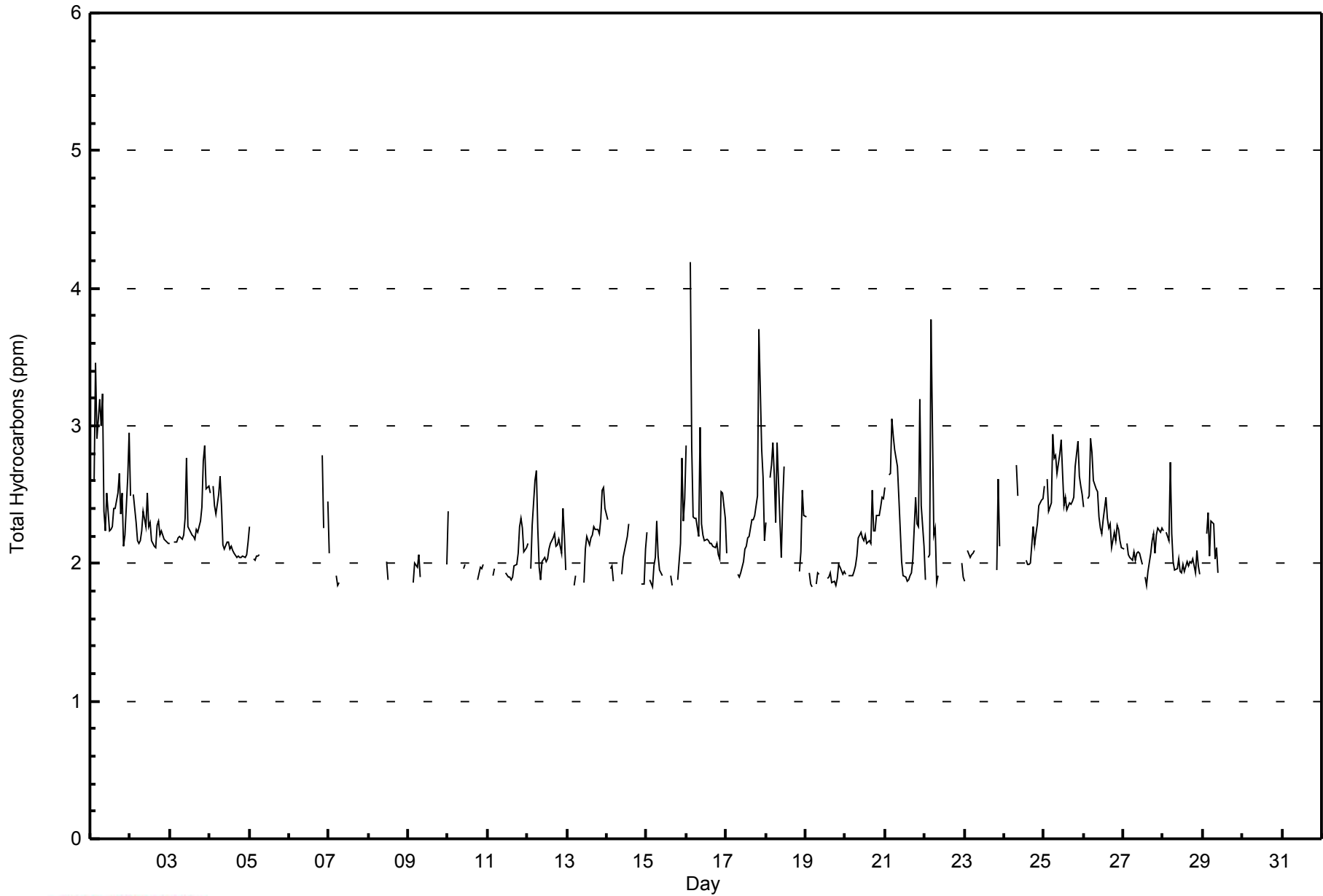


Maximum Value: 5.5 ppm on May 9 01:00																			Maximum Daily Average: 2.6 ppm on May 25						Hours in Service: 744						
Minimum Value: 1.8 ppm on May 19 05:00																			Minimum Daily Average: 1.9 ppm on May 19						Hours of Data: 471						
Maximum Diurnal Average: 2.4 ppm at hour 1																			Minimum Diurnal Average: 2.1 ppm at hour 15						Hours of Missing Data: 273						
Monthly Average: 2.24 ppm																			Percentiles: P <sub>1</sub> = 1.8 P <sub>10</sub> = 1.9 Q <sub>1</sub> = 2.0 Median = 2.2 Q <sub>3</sub> = 2.4 P <sub>90</sub> = 2.6 P <sub>99</sub> = 3.4						Hours of Calibration: 32						
																									Percent Operational Time: 67.6						
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-May	2.1	Z	2.6	3.5	2.9	3.2	3.0	3.2	2.4	2.2	2.5	2.2	2.3	2.3	2.4	2.4	2.5	2.7	2.4	2.5	2.1	2.2	2.6	2.9	2.6	3.5					
2-May	2.5	Z	2.5	2.3	2.2	2.1	2.2	2.2	2.4	2.3	2.5	2.3	2.3	2.2	2.1	2.1	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.1	2.3	2.5					
3-May	2.1	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.8	2.3	2.2	2.2	2.2	2.2	2.3	2.2	2.3	2.4	2.7	2.9	2.5	2.6	2.3	2.9					
4-May	2.5	Z	2.6	2.4	2.4	2.5	2.6	2.4	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.2	2.2	2.6					
5-May	2.3	Z	2.0	2.0	2.0	2.0	2.1	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	2.3					
6-May	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	C	C	C	C	UO	UO	UO	2.8	2.3	UO	2.5	--	2.8					
7-May	2.1	Z	2.2	UO	1.9	1.8	1.9	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	2.2					
8-May	2.0	Z	UO	UO	UO	UO	UO	2.1	UO	2.0	UO	2.0	1.9	UO	UO	UO	UO	UO	UO	UO	1.9	UO	UO	UO	UO	2.1					
9-May	5.5	Z	UO	1.9	2.0	2.0	2.1	1.9	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	2.0	UO	UO	2.0	--	5.5					
10-May	2.4	Z	1.9	UO	UO	UO	UO	UO	UO	2.0	2.0	UO	UO	1.9	UO	2.0	UO	UO	1.9	2.0	2.0	2.0	UO	UO	--	2.4					
11-May	UO	Z	UO	1.9	2.0	UO	UO	UO	UO	UO	UO	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.1	2.3	2.3	2.3	2.1	2.1	--	2.3					
12-May	2.1	Z	2.0	2.3	2.6	2.7	2.3	2.0	1.9	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.2	2.1	2.1	2.2	2.1	2.4	2.2	1.9	2.2	2.7					
13-May	UO	Z	UO	UO	1.8	1.9	UO	1.8	UO	UO	1.9	2.1	2.2	2.1	2.2	2.2	2.3	2.3	2.2	2.2	2.3	2.5	2.6	2.4	--	2.6					
14-May	2.3	Z	2.0	2.0	1.9	UO	UO	UO	UO	1.9	2.0	2.1	2.2	2.3	UO	UO	UO	1.9	UO	UO	UO	1.9	1.9	2.1	--	2.3					
15-May	2.2	Z	1.9	1.8	2.0	2.0	2.3	2.1	1.9	1.9	UO	UO	1.9	UO	1.9	1.8	UO	1.9	UO	1.9	1.9	2.8	2.3	2.5	2.1	2.8					
16-May	2.9	Z	4.2	2.8	2.3	2.3	2.3	2.2	3.0	2.3	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.5	2.5	2.3	2.4	4.2					
17-May	2.1	Z	1.8	UO	UO	2.0	UO	1.9	1.9	1.9	2.0	2.1	2.1	2.2	2.2	2.3	2.3	2.3	2.4	2.5	3.7	2.8	2.6	2.2	2.3	3.7					
18-May	2.3	Z	2.6	2.7	2.9	2.6	2.3	2.9	2.3	2.0	2.4	2.7	UO	UO	UO	UO	UO	UO	UO	UO	1.9	2.1	2.5	2.3	--	2.9					
19-May	2.3	Z	1.9	1.9	1.8	UO	1.8	1.9	1.9	UO	1.8	UO	UO	1.9	1.9	1.9	1.9	1.9	1.8	1.9	2.0	2.0	1.9	1.9	1.9	2.3					
20-May	1.9	Z	1.9	1.9	1.9	1.9	2.0	2.1	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.1	2.5	2.2	2.2	2.4	2.3	2.4	2.5	2.5	2.2	2.5					
21-May	2.6	Z	2.6	2.7	3.0	2.9	2.8	2.7	2.5	2.2	2.0	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.5	2.3	2.3	3.2	2.4	2.1	2.4	3.2					
22-May	1.9	Z	2.0	2.1	3.8	2.2	2.3	1.9	1.9	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	2.0	1.9	--	3.8					
23-May	1.9	Z	2.1	2.0	2.1	2.1	2.1	UO	2.0	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	2.0	2.6	2.1	UO	UO	--	2.6					
24-May	UO	Z	UO	UO	UO	UO	UO	2.7	2.5	UO	UO	UO	2.0	2.0	2.0	2.0	2.0	2.3	2.1	2.2	2.3	2.4	2.5	2.5	--	2.7					
25-May	2.6	Z	2.6	2.4	2.4	2.9	2.8	2.8	2.7	2.8	2.9	2.7	2.4	2.5	2.4	2.4	2.4	2.4	2.5	2.5	2.7	2.9	2.6	2.5	2.6	2.9					
26-May	2.4	Z	2.5	2.5	2.9	2.8	2.6	2.5	2.5	2.3	2.3	2.2	2.3	2.5	2.3	2.3	2.3	2.1	2.2	2.2	2.3	2.3	2.2	2.1	2.4	2.9					
27-May	2.1	Z	2.1	2.1	2.0	2.0	2.1	2.0	2.1	2.1	2.1	2.0	UO	1.9	1.8	1.9	1.9	2.1	2.2	2.2	2.1	2.2	2.3	2.2	2.1	2.3					
28-May	2.2	Z	2.2	2.2	2.7	2.2	2.0	2.0	2.0	2.0	1.9	1.9	2.0	1.9	2.0	2.0	2.0	2.0	2.0	1.9	2.1	2.0	1.9	UO	2.1	2.7					
29-May	2.1	Z	2.2	2.4	2.1	2.3	2.3	2.0	2.1	1.9	M	M	M	M	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	2.4				
30-May	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-May	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							
Z - zerospan																								C - Calibration		M - Maintenance		AF - Analyzer Failure		UO - Unstable Operation	



WBEA  
Hourly Averages

Total Hydrocarbons (THC) - ppm  
Mannix - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Mannix - May 2014**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	153	32.48	32.48
2.1 - 3.0	310	65.82	98.30
3.1 - 10.0	8	1.70	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 471

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Mannix - May 2014**

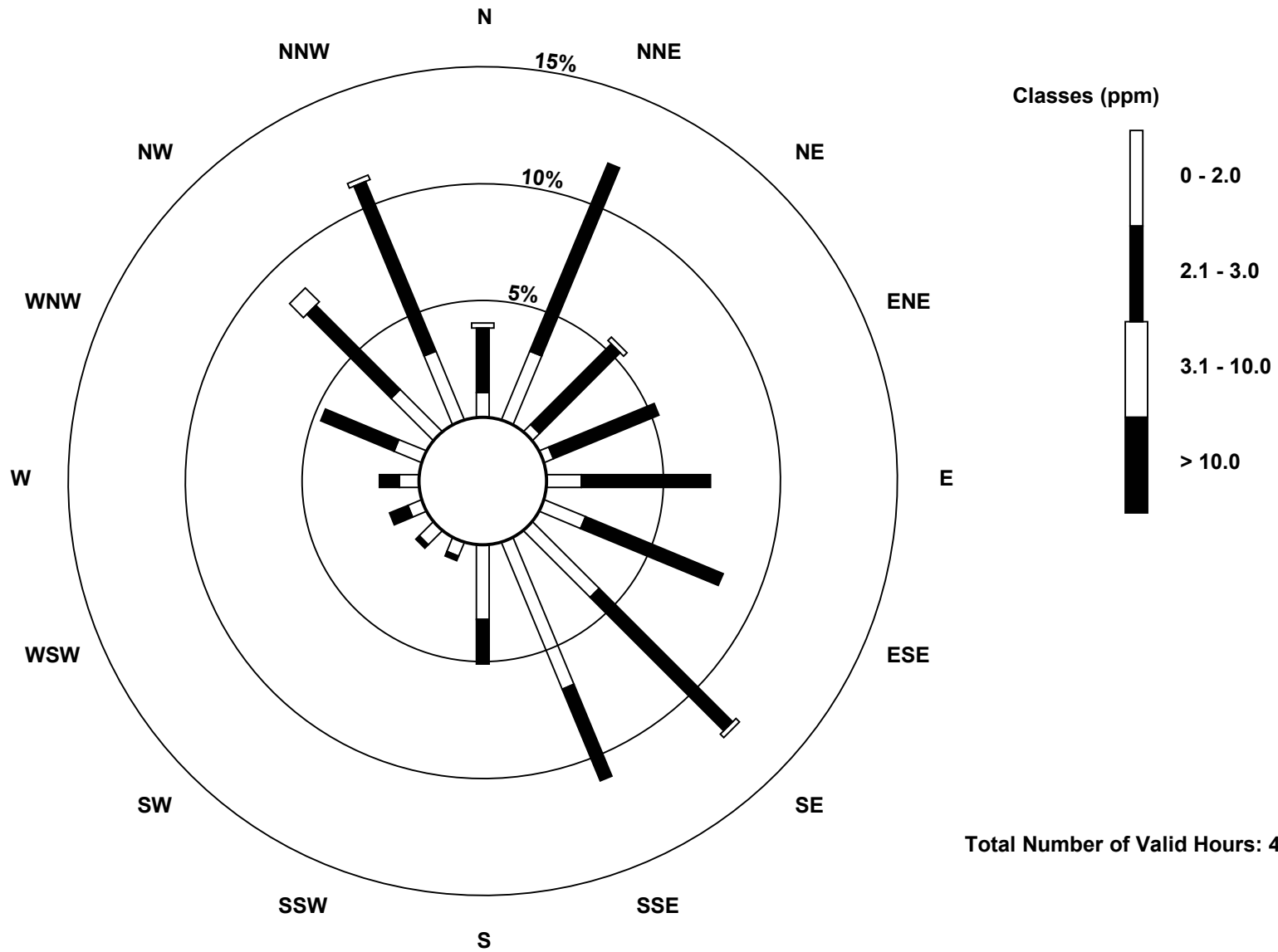
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	5	15	2	2	7	9	19	32	15	3	4	3	4	6	12	15	153
2.1 - 3.0	13	41	23	23	26	30	38	20	9	1	1	4	4	16	24	37	310
3.1 - 10.0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	4	1	8
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	19	56	26	25	33	39	58	52	24	4	5	7	8	22	40	53	471

Total Number of Valid Hours: 471

Total Number of Hours: 744

Wood Buffalo Environmental Association  
Wind Rose May 2014

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

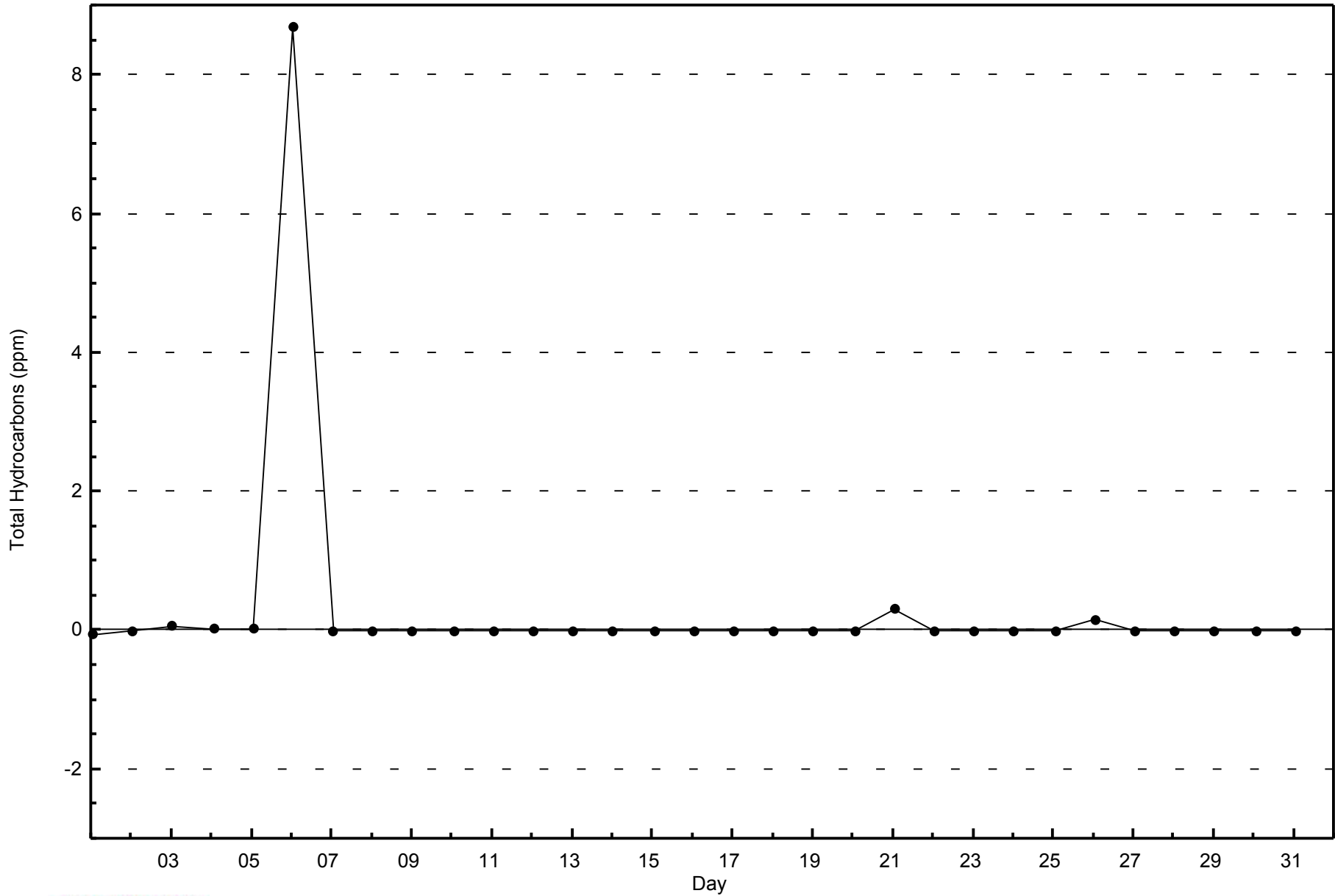


Total Number of Valid Hours: 471



WBEA  
Zero Responses

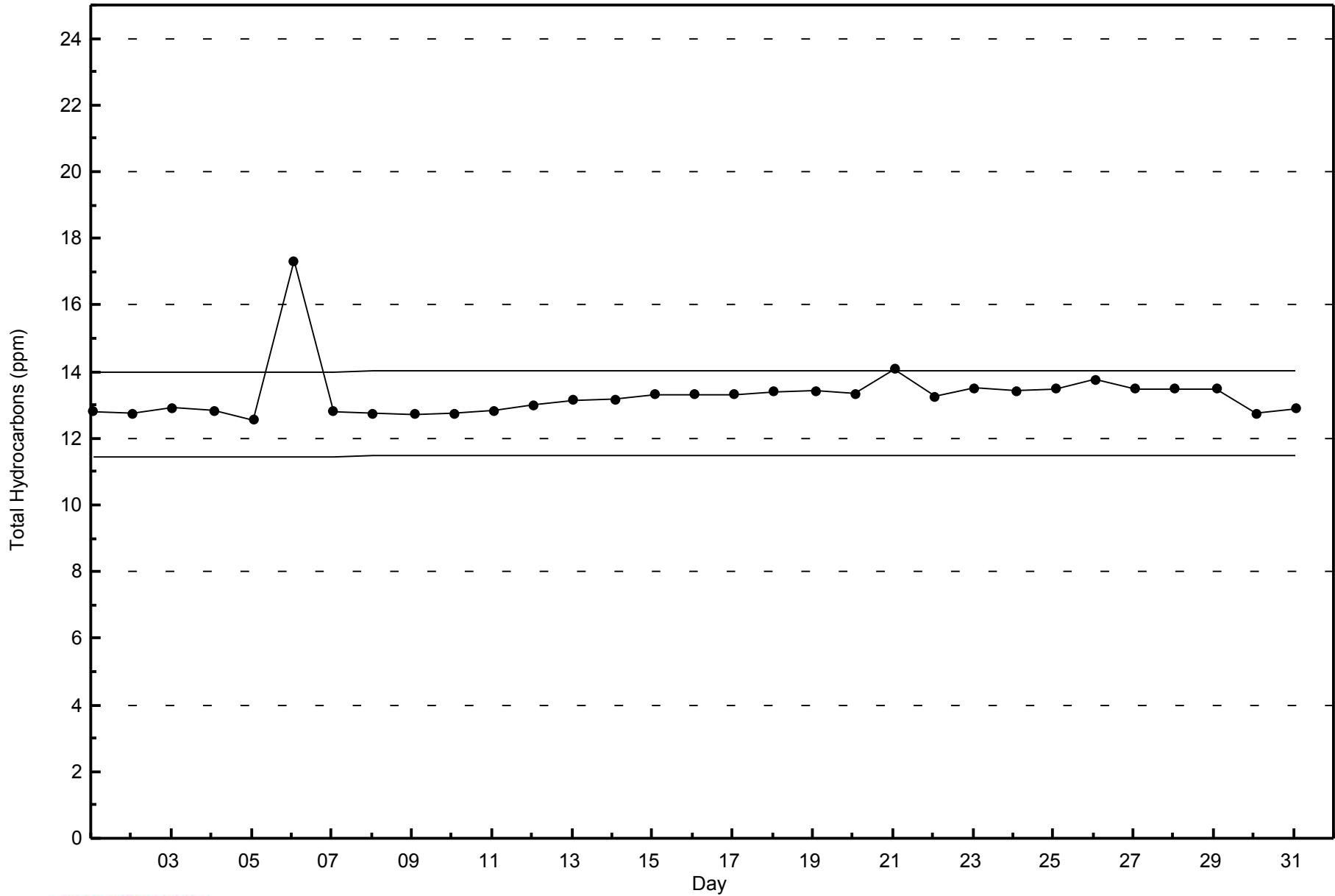
Total Hydrocarbons (THC) - ppm  
Mannix - May 2014





WBEA  
Span Responses

Total Hydrocarbons (THC) - ppm  
Mannix - May 2014





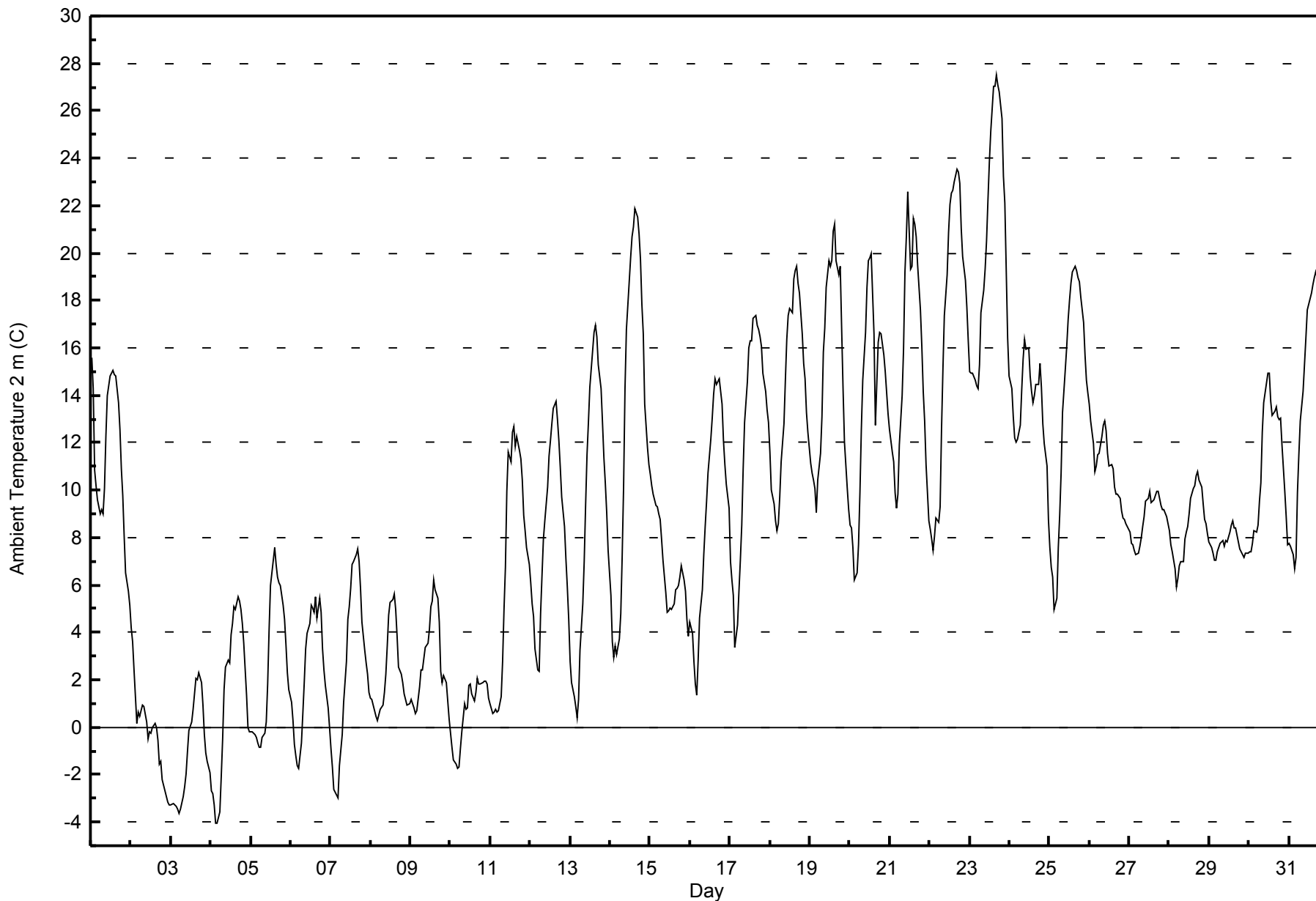
Maximum Value: 27.5 C on May 23 17:00		Maximum Daily Average: 20.5 C on May 23		Hours in Service: 744																							
Minimum Value: -4.0 C on May 4 04:00		Minimum Daily Average: -1.1 C on May 3		Hours of Data: 744																							
Maximum Diurnal Average: 12.4 C at hour 15		Minimum Diurnal Average: 4.5 C at hour 5		Hours of Missing Data: 0																							
Monthly Average: 8.84 C		Percentiles: P <sub>1</sub> = -3.3 P <sub>10</sub> = 0.2 Q <sub>1</sub> = 3.4 Median = 8.5 Q <sub>3</sub> = 13.6 P <sub>90</sub> = 18.3 P <sub>99</sub> = 24.6		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-May	15.6	14.3	10.8	10.2	9.6	9.0	9.2	9.0	10.0	12.3	14.0	14.8	14.9	15.0	14.9	14.8	13.7	12.6	10.9	9.8	8.0	6.5	5.8	5.1	11.3	15.6	
2-May	4.2	3.6	2.4	0.1	0.6	0.5	0.7	0.9	0.9	0.2	-0.5	-0.2	-0.3	0.0	0.2	0.0	-0.6	-1.6	-1.4	-2.2	-2.7	-2.9	-3.2	-3.3	-0.2	4.2	
3-May	-3.3	-3.2	-3.3	-3.4	-3.5	-3.6	-3.5	-2.9	-2.5	-1.9	-1.0	-0.1	0.2	0.8	1.4	2.1	2.0	2.3	1.9	0.9	-0.3	-1.1	-1.4	-1.9	-1.1	2.3	
4-May	-2.7	-2.8	-3.3	-4.0	-4.0	-3.6	-2.1	-0.5	1.6	2.5	2.8	2.7	3.9	4.4	5.1	5.0	5.5	5.3	4.9	4.4	3.6	1.3	0.0	-0.2	1.2	5.5	
5-May	-0.2	-0.2	-0.3	-0.4	-0.7	-0.8	-0.8	-0.4	-0.3	0.2	1.8	4.1	6.0	7.0	7.6	6.9	6.3	6.1	6.0	5.1	4.5	3.5	2.3	1.6	2.7	7.6	
6-May	1.0	0.3	-0.7	-1.2	-1.6	-1.7	-0.6	0.6	1.9	3.3	3.9	4.4	5.2	5.0	4.8	5.5	4.6	5.4	4.9	3.3	2.4	1.7	0.8	0.0	2.2	5.5	
7-May	-0.9	-1.7	-2.7	-2.7	-3.0	-1.6	-1.0	-0.3	1.0	2.7	4.6	5.1	5.9	6.9	7.0	7.3	7.5	7.0	5.8	4.4	3.3	2.7	2.3	1.5	2.5	7.5	
8-May	1.3	1.2	0.7	0.4	0.3	0.5	0.8	0.9	1.5	2.2	3.4	4.7	5.3	5.4	5.6	4.9	3.8	2.5	2.3	1.9	1.4	1.2	0.9	1.0	2.3	5.6	
9-May	1.1	1.0	0.8	0.6	0.7	1.7	2.4	2.4	2.9	3.4	3.5	4.1	5.1	5.3	6.2	5.8	5.5	4.4	2.3	1.9	2.2	1.9	1.1	0.4	2.8	6.2	
10-May	-0.2	-0.8	-1.4	-1.5	-1.7	-1.7	-0.9	-0.2	1.0	0.7	0.8	1.7	1.8	1.4	1.1	1.5	2.1	1.8	1.8	1.9	1.9	2.0	1.8	1.2	0.7	2.1	
11-May	1.0	0.6	0.6	0.7	0.6	0.7	1.3	2.7	5.0	6.8	9.9	11.6	11.2	12.4	12.7	11.9	12.2	11.7	11.3	10.4	8.9	8.3	7.6	6.9	7.0	12.7	
12-May	6.1	5.2	4.7	3.3	2.4	2.4	4.8	6.4	7.9	8.7	10.1	11.5	12.1	12.8	13.4	13.7	13.0	12.1	11.0	9.7	8.5	7.1	5.9	4.6	8.2	13.7	
13-May	2.8	1.9	1.3	0.9	0.4	1.2	3.2	5.2	7.0	9.3	11.5	12.9	14.4	15.9	16.6	17.0	16.5	15.3	14.3	12.9	11.4	10.3	9.0	7.5	9.1	17.0	
14-May	5.5	3.6	3.0	3.4	3.1	3.7	4.8	7.2	10.1	14.3	16.8	18.8	19.8	20.7	21.1	21.9	21.5	20.8	19.7	17.8	16.6	13.7	11.8	11.1	12.9	21.9	
15-May	10.7	10.2	9.8	9.4	9.3	9.0	8.7	7.9	7.0	5.7	4.9	4.9	5.0	5.0	5.2	5.8	5.8	6.0	6.3	6.8	6.2	5.8	4.6	3.8	6.8	10.7	
16-May	4.4	4.0	2.8	1.8	1.3	2.8	4.6	5.8	7.3	8.5	9.5	10.7	12.2	13.0	14.0	14.7	14.5	14.7	14.1	13.6	12.1	11.1	10.3	9.2	9.0	14.7	
17-May	7.0	6.2	5.6	3.4	4.3	5.8	7.1	8.5	10.9	12.9	14.6	16.0	16.3	16.3	17.3	17.4	16.9	16.7	16.5	16.1	14.9	14.2	13.4	12.8	12.1	17.4	
18-May	11.6	10.0	9.4	8.7	8.3	8.6	9.7	11.2	12.8	14.6	16.3	17.3	17.7	17.5	18.9	19.3	19.5	18.7	18.3	16.6	15.4	14.7	13.3	12.5	14.2	19.5	
19-May	11.1	10.7	10.4	10.1	9.1	10.5	11.6	13.1	15.8	16.8	18.5	19.7	19.4	19.7	20.9	21.2	19.7	19.1	19.5	16.8	14.3	12.0	10.1	9.2	15.0	21.2	
20-May	8.5	8.4	7.6	6.2	6.5	7.7	9.9	12.6	14.6	16.7	18.5	19.7	19.8	20.0	16.6	12.7	14.5	16.2	16.7	16.6	15.7	15.0	14.1	13.2	13.7	20.0	
21-May	12.5	11.6	11.2	9.9	9.2	9.8	11.9	14.0	15.9	19.2	20.7	22.6	19.3	19.4	21.5	21.2	20.7	19.5	17.6	16.0	14.2	12.9	11.1	8.7	15.4	22.6	
22-May	8.4	7.9	7.5	8.0	8.8	8.6	9.3	12.6	15.1	17.4	19.1	20.9	22.1	22.5	22.6	23.0	23.5	23.4	23.0	21.1	19.8	18.9	17.7	16.3	16.6	23.5	
23-May	15.0	14.9	14.9	14.6	14.4	14.3	15.3	17.5	18.4	19.3	20.5	22.3	23.8	25.1	27.0	27.0	27.5	27.1	26.8	25.7	23.3	22.1	19.3	16.4	20.5	27.5	
24-May	14.8	14.3	13.1	12.2	12.0	12.1	12.8	14.2	15.5	16.3	15.9	16.0	14.8	14.2	13.7	14.0	14.5	14.5	15.4	14.3	12.8	12.0	11.0	8.8	13.7	16.3	
25-May	7.6	6.8	6.3	5.0	5.4	7.6	8.9	10.7	13.3	15.1	16.1	17.2	18.0	18.7	19.2	19.4	19.2	19.0	18.8	18.1	17.1	15.7	14.6	14.1	13.8	19.4	
26-May	13.6	12.9	12.0	10.8	11.0	11.5	11.5	12.2	12.7	12.9	12.5	11.6	11.0	11.1	10.9	10.1	9.8	9.9	9.6	9.1	8.8	8.8	8.6	8.5	10.9	13.6	
27-May	8.2	7.8	7.7	7.5	7.3	7.3	7.6	8.0	8.5	8.9	9.6	9.6	9.9	9.5	9.5	9.6	10.0	9.9	9.7	9.4	9.2	9.2	8.9	8.6	8.8	10.0	
28-May	8.3	7.7	7.4	6.7	5.9	6.3	6.8	7.0	7.0	7.9	8.2	8.5	9.0	9.6	10.1	10.2	10.6	10.8	10.4	10.1	9.4	8.8	8.6	8.2	8.5	10.8	
29-May	7.8	7.6	7.3	7.0	7.1	7.4	7.8	7.8	7.9	7.6	7.9	7.8	8.2	8.5	8.7	8.4	8.4	7.8	7.5	7.4	7.3	7.1	7.4	7.3	7.7	8.7	
30-May	7.4	7.4	7.8	8.3	8.2	8.5	9.5	10.3	12.5	13.7	14.5	14.9	14.9	13.7	13.2	13.3	13.5	13.1	13.0	13.0	11.9	9.9	8.9	7.7	11.2	14.9	
31-May	7.8	7.6	7.3	6.7	7.2	9.9	11.5	12.9	14.2	15.3	16.4	17.6	17.9	18.3	18.7	18.9	19.2	19.0	18.9	18.2	16.5	15.5	14.1	12.9	14.3	19.2	
		6.3	5.8	5.2	4.6	4.5	5.0	5.9	7.0	8.3	9.5	10.5	11.4	11.8	12.1	12.4	12.4	12.3	12.0	11.5	10.7	9.6	8.7	7.8	6.9	Diurnal Average	
		15.6	14.9	14.9	14.6	14.4	14.3	15.3	17.5	18.4	19.3	20.7	22.6	23.8	25.1	27.0	27.0	27.5	27.1	26.8	25.7	23.3	22.1	19.3	16.4	Diurnal Maximum	





**WBEA**  
**Hourly Averages**

**Ambient Temperature 2 m (AT2m) - C**  
**Mannix - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Ambient Temperature 2 m (AT2m) - C**  
**Mannix - May 2014**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	70	9.41	9.41
0 - 10	370	49.73	59.14
10 - 20	271	36.42	95.56
> 20	33	4.44	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Summary of Hour Averages

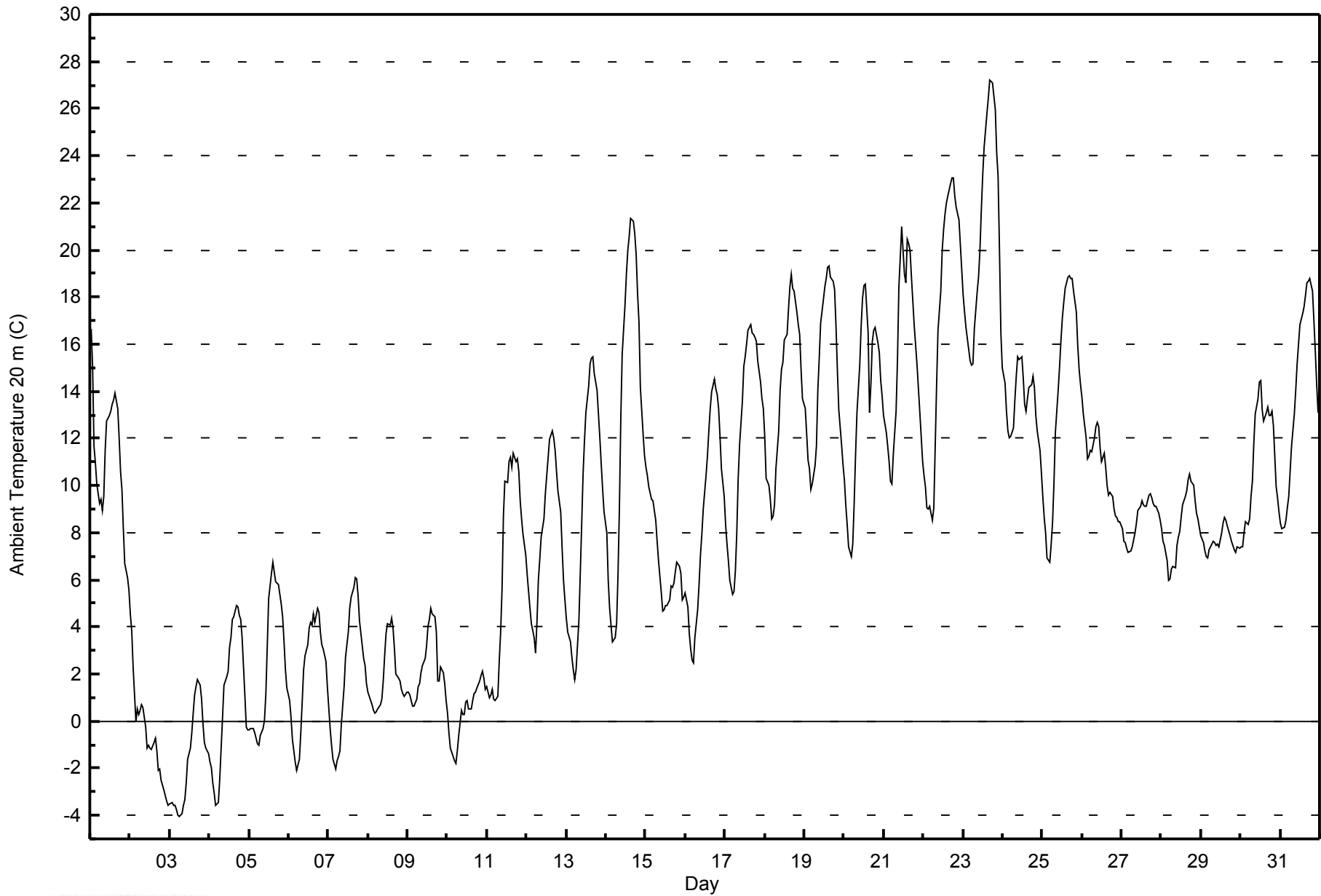
Mannix - May 2014

Maximum Value: 27.2 C on May 23 17:00		Maximum Daily Average: 20.8 C on May 23		Hours in Service: 744																																												
Minimum Value: -4.1 C on May 3 07:00		Minimum Daily Average: -1.6 C on May 3		Hours of Data: 744																																												
Maximum Diurnal Average: 11.8 C at hour 17		Minimum Diurnal Average: 4.9 C at hour 6		Hours of Missing Data: 0																																												
Monthly Average: 8.65 C		Percentiles: P <sub>1</sub> = -3.6 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 3.4 Median = 8.6 Q <sub>3</sub> = 13.3 P <sub>90</sub> = 17.7 P <sub>99</sub> = 23.1		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-May	16.6	15.1	11.6	11.0	10.1	9.2	9.4	8.9	9.5	11.5	12.8	13.0	13.1	13.5	13.6	13.9	13.3	12.0	10.6	9.8	8.2	6.7	6.1	5.6	11.0	16.6																						
2-May	4.5	3.8	2.3	0.0	0.5	0.3	0.5	0.7	0.6	-0.3	-1.1	-1.0	-1.2	-1.2	-0.9	-0.7	-1.3	-2.1	-2.0	-2.5	-2.9	-3.2	-3.4	-3.6	-0.6	4.5																						
3-May	-3.5	-3.5	-3.6	-3.6	-3.7	-4.0	-4.1	-3.9	-3.6	-3.3	-2.6	-1.6	-1.1	-0.5	0.3	1.1	1.5	1.8	1.5	0.9	-0.1	-0.9	-1.2	-1.4	-1.6	1.8																						
4-May	-1.7	-2.0	-2.6	-3.0	-3.6	-3.5	-2.4	-1.1	0.2	1.5	1.9	2.1	3.1	3.6	4.3	4.4	4.9	4.9	4.5	4.3	3.5	1.0	-0.2	-0.4	1.0	4.9																						
5-May	-0.4	-0.3	-0.3	-0.5	-0.7	-1.0	-1.0	-0.6	-0.3	0.0	1.2	3.2	5.2	6.3	6.8	6.3	5.9	5.9	5.8	5.0	4.4	3.4	2.2	1.4	2.4	6.8																						
6-May	0.9	0.2	-0.8	-1.3	-1.7	-2.1	-1.6	-0.5	0.8	2.2	2.8	3.3	4.0	4.2	4.1	4.6	4.2	4.8	4.6	3.8	3.3	3.1	2.5	1.5	1.9	4.8																						
7-May	0.6	-0.3	-1.0	-1.6	-2.0	-1.7	-1.5	-1.2	-0.1	1.5	2.7	3.2	3.8	4.8	5.3	5.7	6.1	6.1	5.3	4.2	3.2	2.7	2.3	1.6	2.1	6.1																						
8-May	1.2	1.0	0.7	0.5	0.4	0.4	0.5	0.7	0.9	1.7	2.7	3.7	4.1	4.1	4.3	3.9	3.0	2.0	1.8	1.7	1.3	1.1	1.1	1.2	1.8	4.3																						
9-May	1.2	1.1	0.9	0.6	0.6	0.9	1.5	1.6	2.0	2.3	2.7	3.2	4.0	4.3	4.8	4.6	4.4	3.8	1.7	1.7	2.3	2.1	1.6	0.9	2.3	4.8																						
10-May	0.3	-0.5	-1.1	-1.5	-1.7	-1.8	-1.3	-0.6	0.5	0.3	0.3	0.8	0.9	0.5	0.5	0.9	1.2	1.2	1.4	1.7	1.9	2.1	1.8	1.4	0.4	2.1																						
11-May	1.5	1.0	1.1	1.3	1.0	0.9	1.0	2.5	3.8	5.5	8.7	10.2	10.1	11.0	11.2	10.8	11.4	11.0	11.1	10.6	9.3	8.6	8.0	7.0	6.6	11.4																						
12-May	6.2	5.5	4.8	4.2	3.5	2.9	4.2	6.0	6.9	7.8	8.6	9.7	10.4	11.2	12.0	12.3	12.0	11.5	10.6	9.8	8.9	7.3	5.9	5.1	7.8	12.3																						
13-May	4.4	3.8	3.4	2.7	2.2	1.8	2.2	4.2	6.3	8.3	10.5	11.9	13.1	14.2	15.2	15.4	15.4	14.8	14.0	13.1	12.0	10.9	9.8	8.9	9.1	15.4																						
14-May	8.0	6.0	4.8	4.1	3.3	3.5	4.1	6.2	9.1	12.9	15.6	17.7	18.9	19.9	20.6	21.4	21.2	20.7	19.8	18.1	16.9	14.2	12.1	11.3	12.9	21.4																						
15-May	10.8	10.4	9.9	9.4	9.4	8.9	8.5	7.7	6.8	5.4	4.7	4.8	4.9	4.9	5.2	5.8	5.7	5.8	6.3	6.8	6.6	6.3	5.1	5.3	6.9	10.8																						
16-May	5.4	4.9	3.7	3.0	2.6	2.5	3.5	4.7	5.8	7.0	7.9	9.0	10.4	11.2	12.3	13.3	14.0	14.5	14.1	13.8	13.3	12.1	10.7	9.5	8.7	14.5																						
17-May	8.4	7.5	6.8	6.0	5.4	5.5	6.4	8.0	10.3	11.7	13.6	15.0	15.5	16.0	16.6	16.8	16.5	16.4	16.3	16.1	15.3	14.4	13.7	13.3	12.1	16.8																						
18-May	12.1	10.3	10.0	9.4	8.6	8.7	9.2	10.7	12.3	14.1	14.9	15.2	16.2	16.4	17.5	18.4	18.9	18.4	18.3	17.4	16.9	16.4	15.0	13.7	14.1	18.9																						
19-May	13.3	12.2	11.1	10.7	9.8	10.1	10.9	11.7	14.0	15.4	16.9	17.9	18.4	18.8	19.2	19.3	18.8	18.7	18.3	16.8	14.9	13.2	11.7	10.9	14.7	19.3																						
20-May	10.3	9.1	8.3	7.4	7.0	7.5	9.2	11.3	13.1	15.1	16.7	18.0	18.5	18.6	16.5	13.1	14.4	16.1	16.6	16.7	16.1	15.7	14.4	13.8	13.5	18.6																						
21-May	13.0	12.3	11.7	11.0	10.2	10.0	11.3	13.2	15.4	18.5	19.7	21.0	19.0	18.6	20.4	20.3	20.0	18.9	16.8	15.9	15.1	14.1	13.1	11.0	15.4	21.0																						
22-May	10.4	9.9	9.1	9.0	9.1	8.6	9.1	11.7	14.3	16.6	18.2	19.9	20.9	21.5	22.0	22.3	22.8	23.1	23.0	22.3	21.8	21.3	20.2	19.2	16.9	23.1																						
23-May	18.1	17.4	16.7	15.7	15.3	15.1	15.2	16.7	18.2	18.8	20.0	21.7	23.2	24.4	25.8	26.4	27.2	27.1	27.1	25.9	24.1	23.1	20.0	16.4	20.8	27.2																						
24-May	15.0	14.4	13.1	12.3	12.0	12.1	12.4	13.6	14.6	15.5	15.3	15.5	14.6	13.5	13.2	13.7	14.2	14.3	14.7	14.2	13.0	12.3	11.5	10.6	13.6	15.5																						
25-May	9.5	8.6	8.0	6.9	6.7	7.5	8.4	10.1	12.2	14.1	15.0	16.2	17.1	17.8	18.4	18.8	18.9	18.8	18.8	18.3	17.4	15.9	15.0	14.3	13.9	18.9																						
26-May	13.8	13.0	12.0	11.2	11.3	11.5	11.5	12.0	12.5	12.7	12.5	11.6	11.0	11.4	10.8	10.0	9.6	9.7	9.5	9.0	8.7	8.6	8.4	8.4	10.9	13.8																						
27-May	8.1	7.7	7.6	7.4	7.1	7.2	7.4	7.7	8.0	8.4	8.9	9.1	9.3	9.2	9.1	9.1	9.6	9.6	9.5	9.2	9.1	9.1	8.8	8.5	8.5	9.6																						
28-May	8.1	7.6	7.5	6.8	6.0	6.0	6.5	6.6	6.5	7.4	7.8	8.1	8.7	9.2	9.5	9.8	10.2	10.5	10.2	10.0	9.4	8.8	8.6	8.3	8.2	10.5																						
29-May	7.8	7.6	7.2	7.0	6.9	7.3	7.5	7.7	7.6	7.5	7.5	7.4	8.0	8.4	8.7	8.6	8.3	7.9	7.6	7.5	7.3	7.2	7.4	7.3	7.6	8.7																						
30-May	7.4	7.4	8.0	8.5	8.3	8.6	9.5	10.2	11.8	13.0	13.7	14.4	14.5	13.2	12.7	13.1	13.3	13.0	13.0	13.1	12.5	9.9	9.5	8.9	11.1	14.5																						
31-May	8.4	8.2	8.3	8.5	9.1	9.5	10.6	11.7	13.1	14.0	15.2	16.0	16.9	17.3	17.6	18.1	18.6	18.7	18.8	18.3	17.0	15.7	14.3	13.1	14.0	18.8																						
																								7.1	6.4	5.8	5.3	4.9	4.9	5.4	6.4	7.5	8.6	9.5	10.3	10.8	11.2	11.5	11.7	11.8	11.6	11.3	10.8	10.0	9.1	8.3	7.5	Diurnal Average
																								18.1	17.4	16.7	15.7	15.3	15.1	15.2	16.7	18.2	18.8	20.0	21.7	23.2	24.4	25.8	26.4	27.2	27.1	27.1	25.9	24.1	23.1	20.2	19.2	Diurnal Maximum



**WBEA**  
**Hourly Averages**

**Ambient Temperature 20 m (AT20m) - C**  
**Mannix - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Ambient Temperature 20 m (AT20m) - C**  
**Mannix - May 2014**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	73	9.81	9.81
0 - 10	366	49.19	59.01
10 - 20	276	37.10	96.10
> 20	29	3.90	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Summary of Hour Averages

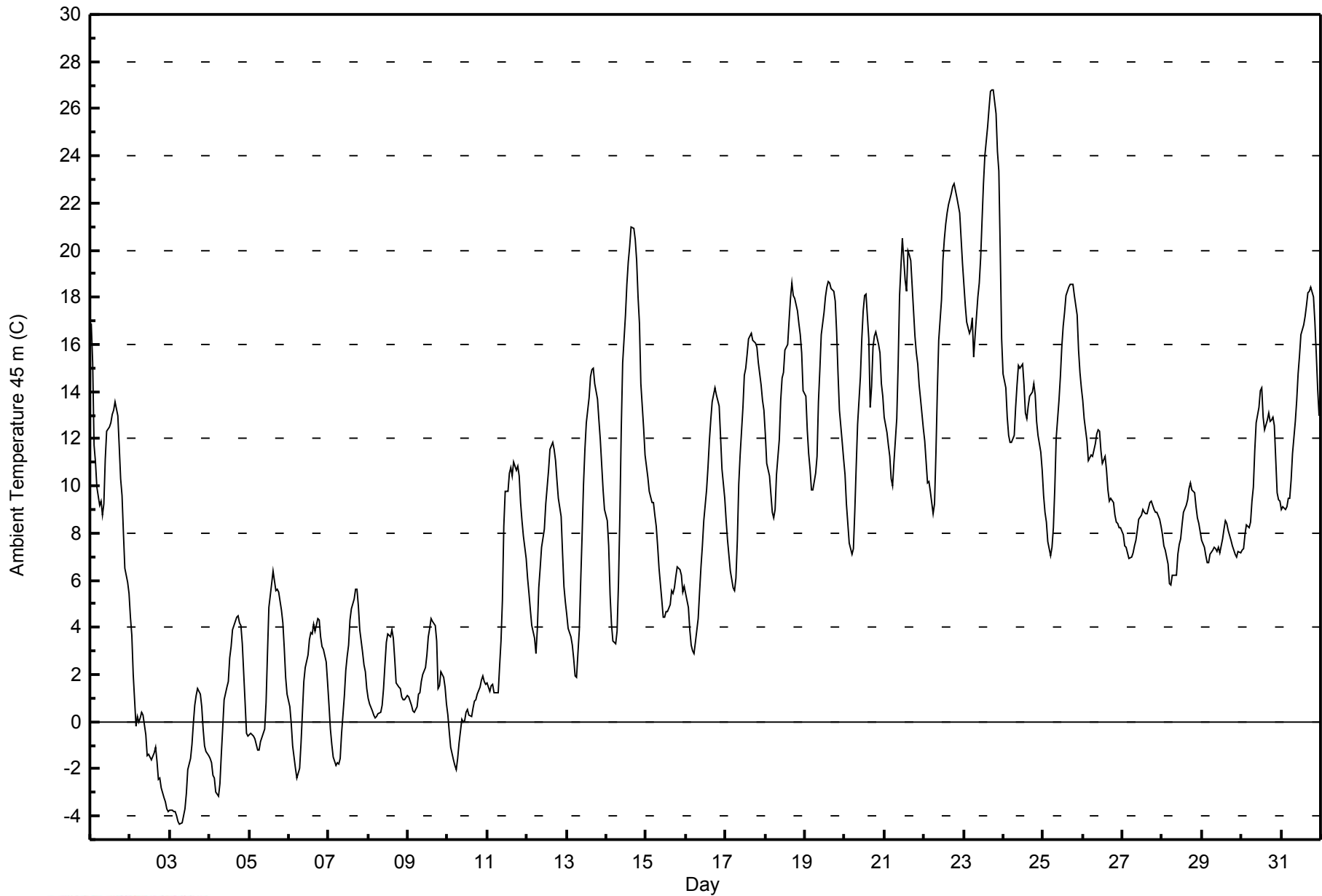
Mannix - May 2014

Maximum Value: 26.8 C on May 23 18:00		Maximum Daily Average: 20.9 C on May 23		Hours in Service: 744																						
Minimum Value: -4.4 C on May 3 07:00		Minimum Daily Average: -1.9 C on May 3		Hours of Data: 744																						
Maximum Diurnal Average: 11.4 C at hour 17		Minimum Diurnal Average: 4.9 C at hour 6		Hours of Missing Data: 0																						
Monthly Average: 8.47 C		Percentiles: P <sub>1</sub> = -3.8 P <sub>10</sub> = -0.3 Q <sub>1</sub> = 3.2 Median = 8.5 Q <sub>3</sub> = 13.2 P <sub>90</sub> = 17.4 P <sub>99</sub> = 23.1		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-May	16.9	15.2	11.7	11.0	10.0	9.2	9.4	8.7	9.2	11.1	12.3	12.5	12.7	13.0	13.2	13.6	13.0	11.7	10.3	9.6	8.0	6.5	5.9	5.4	10.8	16.9
2-May	4.4	3.7	2.0	-0.2	0.2	0.0	0.2	0.4	0.3	-0.6	-1.4	-1.4	-1.5	-1.6	-1.3	-1.1	-1.7	-2.4	-2.4	-2.8	-3.2	-3.4	-3.7	-3.8	-0.9	4.4
3-May	-3.8	-3.7	-3.8	-3.8	-4.0	-4.2	-4.4	-4.3	-4.0	-3.7	-3.0	-2.0	-1.5	-1.0	-0.1	0.7	1.1	1.4	1.2	0.6	-0.3	-1.0	-1.3	-1.4	-1.9	1.4
4-May	-1.6	-1.7	-2.3	-2.4	-3.0	-3.2	-2.6	-1.4	-0.3	0.9	1.4	1.7	2.7	3.2	3.9	4.1	4.5	4.5	4.2	4.1	3.3	0.8	-0.5	-0.6	0.8	4.5
5-May	-0.5	-0.5	-0.6	-0.7	-0.9	-1.2	-1.2	-0.9	-0.5	-0.3	0.8	2.9	4.8	5.9	6.4	6.0	5.6	5.6	5.5	4.7	4.2	3.1	1.9	1.2	2.1	6.4
6-May	0.6	-0.1	-1.0	-1.5	-2.0	-2.4	-2.0	-0.9	0.4	1.7	2.3	2.8	3.5	3.8	3.7	4.1	3.9	4.4	4.3	3.6	3.2	3.1	2.5	1.6	1.6	4.4
7-May	0.7	-0.3	-0.9	-1.5	-1.9	-1.7	-1.8	-1.6	-0.5	1.1	2.2	2.8	3.2	4.3	4.8	5.2	5.6	5.6	4.9	3.9	3.0	2.4	2.1	1.4	1.8	5.6
8-May	1.0	0.8	0.4	0.3	0.2	0.2	0.3	0.4	0.7	1.4	2.4	3.4	3.7	3.6	3.9	3.5	2.6	1.7	1.5	1.4	1.1	0.9	0.9	1.1	1.6	3.9
9-May	1.0	0.9	0.7	0.4	0.4	0.6	1.2	1.2	1.7	2.0	2.3	2.9	3.6	4.0	4.3	4.2	4.1	3.4	1.4	1.5	2.1	1.9	1.4	0.8	2.0	4.3
10-May	0.3	-0.4	-1.1	-1.6	-1.9	-2.0	-1.6	-0.9	0.1	0.0	0.0	0.4	0.5	0.3	0.2	0.6	0.9	1.0	1.2	1.5	1.8	1.9	1.7	1.6	0.2	1.9
11-May	1.7	1.3	1.5	1.6	1.2	1.2	1.2	2.4	3.4	5.2	8.3	9.8	9.8	10.6	10.8	10.4	11.0	10.7	10.8	10.4	9.3	8.6	7.8	6.9	6.5	11.0
12-May	6.1	5.4	4.7	4.1	3.6	2.9	3.9	5.7	6.5	7.4	8.2	9.2	10.0	10.6	11.5	11.9	11.6	11.1	10.3	9.5	8.7	7.2	5.7	5.1	7.5	11.9
13-May	4.6	4.0	3.6	3.2	2.6	2.0	1.9	3.9	6.0	7.9	10.1	11.5	12.7	13.7	14.6	14.9	15.0	14.3	13.7	12.8	12.0	10.9	9.9	9.0	9.0	15.0
14-May	8.5	7.5	5.4	4.1	3.4	3.3	3.9	5.9	8.8	12.5	15.2	17.2	18.5	19.5	20.2	21.0	20.9	20.4	19.6	18.0	16.9	14.3	12.4	11.3	12.9	21.0
15-May	10.9	10.3	9.8	9.3	9.3	8.8	8.3	7.4	6.5	5.1	4.4	4.5	4.7	4.7	5.0	5.6	5.5	5.7	6.1	6.5	6.4	6.2	5.5	5.7	6.8	10.9
16-May	5.4	4.9	3.9	3.3	3.0	2.9	3.3	4.4	5.5	6.6	7.4	8.5	9.8	10.8	11.9	12.8	13.6	14.2	13.9	13.6	13.4	12.1	10.7	9.5	8.6	14.2
17-May	8.5	7.7	7.1	6.4	5.7	5.5	6.1	7.7	10.1	11.3	13.3	14.7	15.0	15.6	16.2	16.5	16.2	16.1	16.0	15.9	15.2	14.3	13.6	13.2	12.0	16.5
18-May	12.2	10.9	10.4	9.7	8.9	8.7	9.0	10.5	12.0	13.6	14.6	14.8	15.8	16.0	17.0	18.0	18.6	18.1	18.0	17.4	16.9	16.4	15.7	14.0	14.1	18.6
19-May	13.8	12.4	11.3	10.7	9.8	9.8	10.5	11.2	13.6	14.9	16.4	17.4	18.0	18.4	18.7	18.6	18.4	18.2	17.8	16.5	14.8	13.2	11.9	11.1	14.5	18.7
20-May	10.5	9.2	8.4	7.6	7.1	7.3	8.9	10.8	12.6	14.6	16.2	17.4	18.1	18.1	16.3	13.3	14.2	15.9	16.4	16.6	16.0	15.6	14.4	13.8	13.3	18.1
21-May	12.9	12.3	11.7	11.2	10.3	10.0	11.0	12.8	15.1	18.1	19.3	20.5	18.7	18.2	20.0	19.8	19.6	18.5	16.4	15.7	15.2	14.3	13.7	12.5	15.3	20.5
22-May	11.9	11.0	10.1	10.2	9.8	8.8	9.2	11.4	14.0	16.2	17.9	19.6	20.4	21.1	21.6	21.9	22.4	22.7	22.8	22.5	22.2	21.6	20.5	19.5	17.1	22.8
23-May	18.6	17.7	16.9	16.5	16.6	17.1	15.5	16.4	18.0	18.6	19.7	21.3	22.8	24.0	25.3	26.0	26.8	26.8	26.8	25.8	24.2	23.4	20.0	16.2	20.9	26.8
24-May	14.8	14.2	12.9	12.1	11.8	11.8	12.1	13.3	14.3	15.1	15.0	15.1	14.3	13.1	12.9	13.4	13.8	14.0	14.3	13.8	12.7	12.2	11.4	10.7	13.3	15.1
25-May	9.6	8.9	8.5	7.6	7.1	7.4	8.2	9.9	12.1	13.6	14.6	15.9	16.8	17.4	18.1	18.5	18.6	18.6	18.5	18.1	17.2	15.8	14.8	14.1	13.7	18.6
26-May	13.7	12.9	11.9	11.1	11.2	11.3	11.3	11.8	12.2	12.4	12.3	11.5	11.0	11.3	10.7	9.8	9.4	9.5	9.3	8.8	8.5	8.4	8.2	8.2	10.7	13.7
27-May	7.9	7.5	7.4	7.1	6.9	7.0	7.2	7.4	7.7	8.1	8.6	8.8	9.0	8.9	8.8	8.8	9.3	9.3	9.2	9.0	8.9	8.9	8.6	8.3	8.3	9.3
28-May	7.9	7.4	7.3	6.7	5.8	5.8	6.2	6.2	6.2	7.1	7.5	7.8	8.3	8.9	9.2	9.4	9.9	10.1	9.9	9.7	9.1	8.6	8.4	8.1	8.0	10.1
29-May	7.7	7.4	7.0	6.7	6.8	7.1	7.3	7.4	7.3	7.2	7.4	7.2	7.8	8.2	8.5	8.4	8.1	7.7	7.4	7.3	7.1	7.0	7.2	7.2	7.4	8.5
30-May	7.3	7.3	7.9	8.4	8.2	8.5	9.3	10.0	11.5	12.7	13.3	14.0	14.1	12.9	12.4	12.8	13.1	12.7	12.8	12.9	12.5	9.7	9.4	9.3	11.0	14.1
31-May	9.0	9.1	9.0	9.1	9.5	9.4	10.2	11.4	12.7	13.6	14.8	15.5	16.4	16.9	17.2	17.6	18.2	18.3	18.4	18.0	17.0	15.6	14.1	13.0	13.9	18.4
																								Diurnal Average		
																								Diurnal Maximum		



**WBEA**  
**Hourly Averages**

**Ambient Temperature 45 m (AT45m) - C**  
**Mannix - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Ambient Temperature 45 m (AT45m) - C**  
**Mannix - May 2014**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	79	10.62	10.62
0 - 10	367	49.33	59.95
10 - 20	271	36.42	96.37
> 20	27	3.63	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744





Summary of Hour Averages

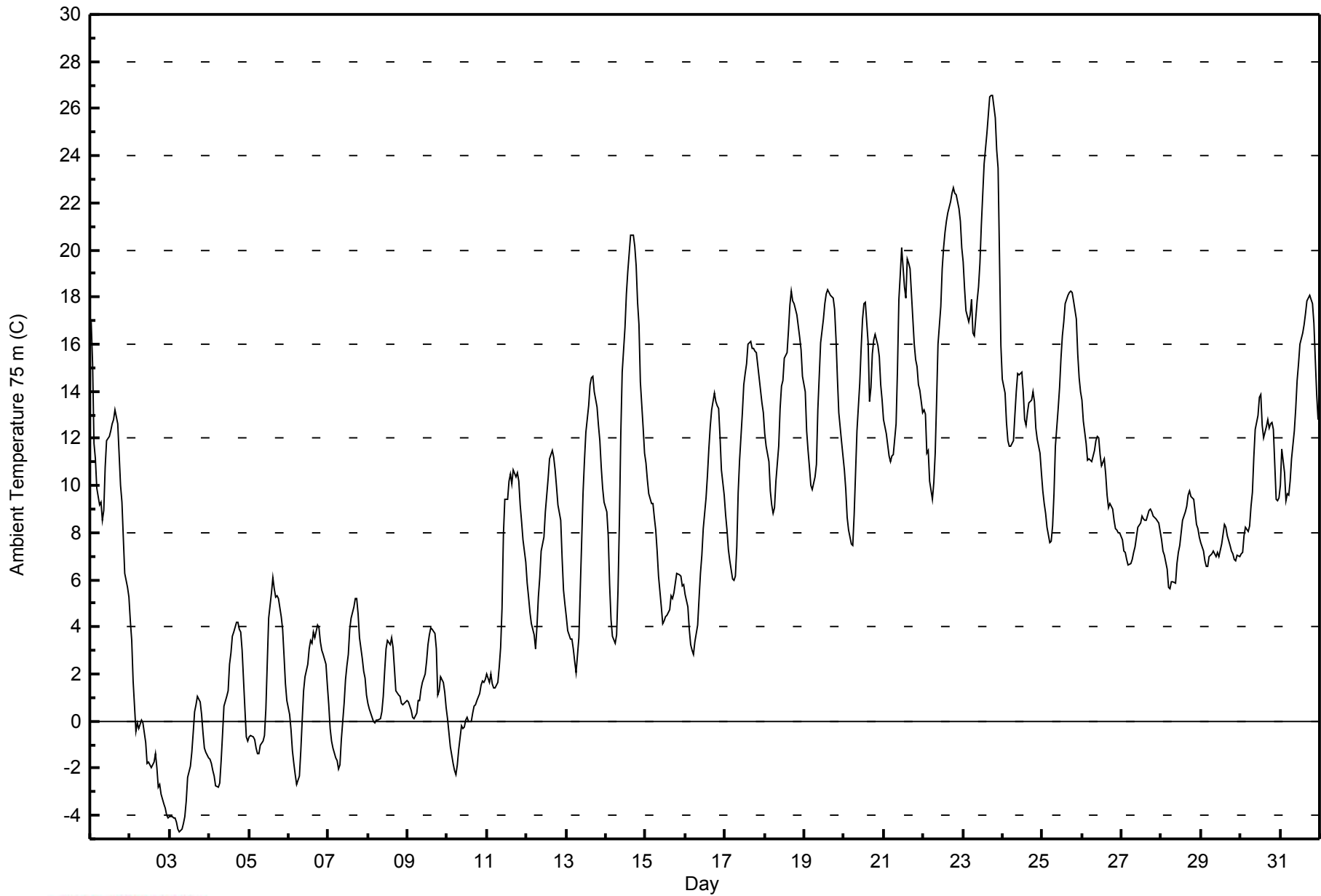
Mannix - May 2014

Maximum Value: 26.6 C on May 23 18:00		Maximum Daily Average: 20.9 C on May 23		Hours in Service: 744																																												
Minimum Value: -4.7 C on May 3 07:00		Minimum Daily Average: -2.2 C on May 3		Hours of Data: 744																																												
Maximum Diurnal Average: 11.1 C at hour 17		Minimum Diurnal Average: 5.0 C at hour 6		Hours of Missing Data: 0																																												
Monthly Average: 8.30 C		Percentiles: P <sub>1</sub> = -4.1 P <sub>10</sub> = -0.5 Q <sub>1</sub> = 3.1 Median = 8.5 Q <sub>3</sub> = 13.1 P <sub>90</sub> = 17.2 P <sub>99</sub> = 23.6		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-May	16.9	15.2	11.8	11.1	9.9	9.2	9.3	8.5	9.0	10.8	11.9	12.1	12.3	12.6	12.8	13.2	12.6	11.3	10.0	9.3	7.7	6.3	5.7	5.3	10.6	16.9																						
2-May	4.2	3.4	1.7	-0.4	-0.1	-0.3	-0.1	0.1	-0.1	-0.9	-1.8	-1.7	-1.9	-2.0	-1.7	-1.4	-2.0	-2.8	-2.7	-3.1	-3.5	-3.7	-4.0	-4.1	-1.2	4.2																						
3-May	-4.1	-4.0	-4.1	-4.1	-4.3	-4.6	-4.7	-4.6	-4.4	-4.0	-3.4	-2.4	-1.9	-1.3	-0.5	0.4	0.7	1.1	0.8	0.3	-0.5	-1.1	-1.3	-1.5	-2.2	1.1																						
4-May	-1.6	-1.8	-2.1	-2.4	-2.7	-2.8	-2.6	-1.7	-0.6	0.6	1.0	1.3	2.4	2.9	3.6	3.8	4.2	4.2	3.9	3.8	3.0	0.5	-0.7	-0.8	0.6	4.2																						
5-May	-0.7	-0.6	-0.6	-0.8	-1.1	-1.4	-1.4	-1.0	-0.9	-0.6	0.5	2.5	4.4	5.4	6.1	5.6	5.3	5.3	5.2	4.4	3.9	2.8	1.6	0.9	1.9	6.1																						
6-May	0.3	-0.4	-1.3	-1.8	-2.2	-2.7	-2.3	-1.3	0.0	1.3	1.9	2.4	3.1	3.4	3.3	3.8	3.5	4.1	4.0	3.4	3.0	2.9	2.4	1.5	1.3	4.1																						
7-May	0.7	-0.3	-0.9	-1.1	-1.5	-1.7	-2.0	-1.8	-0.8	0.7	1.8	2.3	2.8	3.9	4.4	4.8	5.2	5.2	4.6	3.5	2.7	2.1	1.8	1.1	1.6	5.2																						
8-May	0.7	0.5	0.1	0.0	-0.1	0.0	0.0	0.1	0.4	1.1	2.1	3.1	3.4	3.3	3.5	3.1	2.3	1.3	1.1	1.1	0.8	0.7	0.8	0.9	1.3	3.5																						
9-May	0.8	0.6	0.4	0.2	0.1	0.3	0.9	0.9	1.4	1.6	2.0	2.5	3.3	3.6	4.0	3.9	3.7	3.0	1.1	1.3	1.9	1.6	1.2	0.6	1.7	4.0																						
10-May	0.1	-0.5	-1.1	-1.8	-2.1	-2.3	-1.9	-1.2	-0.2	-0.3	-0.3	0.1	0.2	0.0	0.0	0.3	0.6	0.7	0.9	1.2	1.5	1.7	1.6	1.8	0.0	1.8																						
11-May	2.0	1.6	2.0	1.6	1.4	1.4	1.7	2.3	3.1	4.8	7.9	9.4	9.4	10.2	10.5	10.1	10.7	10.4	10.5	10.2	9.2	8.5	7.7	6.8	6.4	10.7																						
12-May	5.9	5.3	4.6	4.1	3.7	3.1	4.0	5.3	6.1	7.2	7.8	8.9	9.6	10.3	11.1	11.5	11.2	10.7	9.9	9.2	8.5	7.0	5.5	5.0	7.3	11.5																						
13-May	4.4	3.8	3.5	3.5	3.1	2.5	2.0	3.5	5.6	7.7	9.7	11.1	12.3	13.4	14.3	14.6	14.6	14.0	13.4	12.5	11.9	10.8	9.9	9.3	8.8	14.6																						
14-May	8.9	7.9	5.8	4.3	3.6	3.3	3.7	5.6	8.5	12.2	14.8	16.7	18.1	19.1	19.8	20.7	20.6	20.1	19.3	17.8	16.8	14.4	12.5	11.3	12.7	20.7																						
15-May	10.9	10.3	9.6	9.2	9.2	8.6	8.1	7.2	6.2	4.8	4.1	4.2	4.4	4.5	4.8	5.3	5.2	5.4	5.9	6.3	6.2	6.1	5.7	5.8	6.6	10.9																						
16-May	5.4	4.8	3.9	3.3	3.0	2.8	3.4	4.1	5.2	6.3	7.1	8.2	9.5	10.5	11.5	12.5	13.2	13.9	13.6	13.4	13.3	12.1	10.6	9.6	8.4	13.9																						
17-May	8.8	8.1	7.3	6.8	6.0	6.0	6.1	7.4	9.7	11.1	13.1	14.3	14.8	15.2	16.0	16.1	15.8	15.8	15.7	15.6	15.1	14.1	13.5	13.1	11.9	16.1																						
18-May	12.2	11.7	11.0	9.8	9.2	8.8	9.0	10.2	11.7	13.3	14.2	14.4	15.4	15.6	16.6	17.6	18.2	17.9	17.7	17.2	16.8	16.3	15.7	14.7	14.0	18.2																						
19-May	14.0	12.4	11.5	10.8	10.0	9.8	10.3	10.9	13.2	14.6	16.0	17.1	17.7	18.1	18.3	18.2	18.1	17.9	17.5	16.2	14.6	13.1	11.9	11.3	14.3	18.3																						
20-May	10.7	9.8	8.6	8.1	7.5	7.5	8.8	10.5	12.3	14.3	15.9	17.1	17.7	17.8	16.1	13.6	14.2	15.6	16.2	16.4	15.9	15.5	14.3	13.7	13.3	17.8																						
21-May	12.8	12.2	11.8	11.3	11.0	11.3	11.3	12.6	15.0	17.9	19.0	20.1	18.4	18.0	19.6	19.4	19.2	18.1	16.0	15.4	15.1	14.3	14.0	13.1	15.3	20.1																						
22-May	13.2	13.0	11.3	11.5	10.2	9.4	10.1	11.3	13.6	16.0	17.6	19.2	20.1	20.8	21.2	21.6	22.1	22.4	22.6	22.4	22.3	21.7	21.2	20.1	17.3	22.6																						
23-May	19.5	18.4	17.4	17.0	17.2	17.9	16.5	16.4	17.9	18.5	19.4	21.0	22.4	23.7	25.0	25.7	26.5	26.6	26.5	25.6	24.2	23.5	19.8	15.9	20.9	26.6																						
24-May	14.5	13.9	12.7	11.9	11.7	11.7	11.9	13.0	14.0	14.8	14.7	14.8	14.0	12.8	12.6	13.1	13.5	13.7	14.0	13.5	12.5	12.0	11.4	10.6	13.0	14.8																						
25-May	9.8	9.3	8.8	8.3	7.6	7.6	8.3	9.6	11.7	13.3	14.2	15.4	16.4	17.0	17.7	18.1	18.2	18.3	18.2	17.8	17.1	15.6	14.6	14.0	13.6	18.3																						
26-May	13.6	12.8	11.8	11.1	11.1	11.1	11.0	11.5	11.9	12.1	12.0	11.3	10.9	11.1	10.5	9.6	9.1	9.2	9.0	8.5	8.2	8.1	8.0	8.0	10.5	13.6																						
27-May	7.7	7.2	7.2	6.9	6.6	6.7	6.9	7.1	7.4	7.8	8.2	8.4	8.7	8.6	8.6	8.5	9.0	9.0	8.9	8.7	8.6	8.6	8.4	8.1	8.0	9.0																						
28-May	7.7	7.2	7.0	6.4	5.7	5.6	5.9	5.9	5.9	6.7	7.2	7.5	8.0	8.5	8.9	9.1	9.6	9.8	9.5	9.4	8.9	8.4	8.2	7.8	7.7	9.8																						
29-May	7.6	7.2	6.8	6.5	6.6	7.0	7.1	7.2	7.1	7.0	7.2	7.0	7.5	8.0	8.3	8.2	7.9	7.5	7.2	7.1	6.9	6.8	7.0	7.0	7.2	8.3																						
30-May	7.1	7.2	7.9	8.2	8.1	8.3	9.1	9.7	11.2	12.4	13.0	13.7	13.8	12.6	12.1	12.5	12.8	12.4	12.6	12.7	12.4	9.4	9.4	9.5	10.8	13.8																						
31-May	10.0	11.5	10.6	9.4	9.7	9.6	10.2	11.1	12.3	13.3	14.4	15.2	16.0	16.5	16.8	17.3	17.8	17.9	18.1	17.7	16.9	15.4	13.9	12.8	13.9	18.1																						
																								7.2	6.7	6.0	5.4	5.1	5.0	5.2	5.8	6.9	7.9	8.8	9.6	10.1	10.4	10.8	11.0	11.1	11.0	10.7	10.3	9.7	8.9	8.1	7.5	Diurnal Average
																								19.5	18.4	17.4	17.0	17.2	17.9	16.5	16.4	17.9	18.5	19.4	21.0	22.4	23.7	25.0	25.7	26.5	26.6	26.5	25.6	24.2	23.5	21.2	20.1	Diurnal Maximum



**WBEA**  
**Hourly Averages**

**Ambient Temperature 75 m (AT75m) - C**  
**Mannix - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Ambient Temperature 75 m (AT75m) - C**  
**Mannix - May 2014**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	88	11.83	11.83
0 - 10	356	47.85	59.68
10 - 20	273	36.69	96.37
> 20	27	3.63	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Summary of Hour Averages

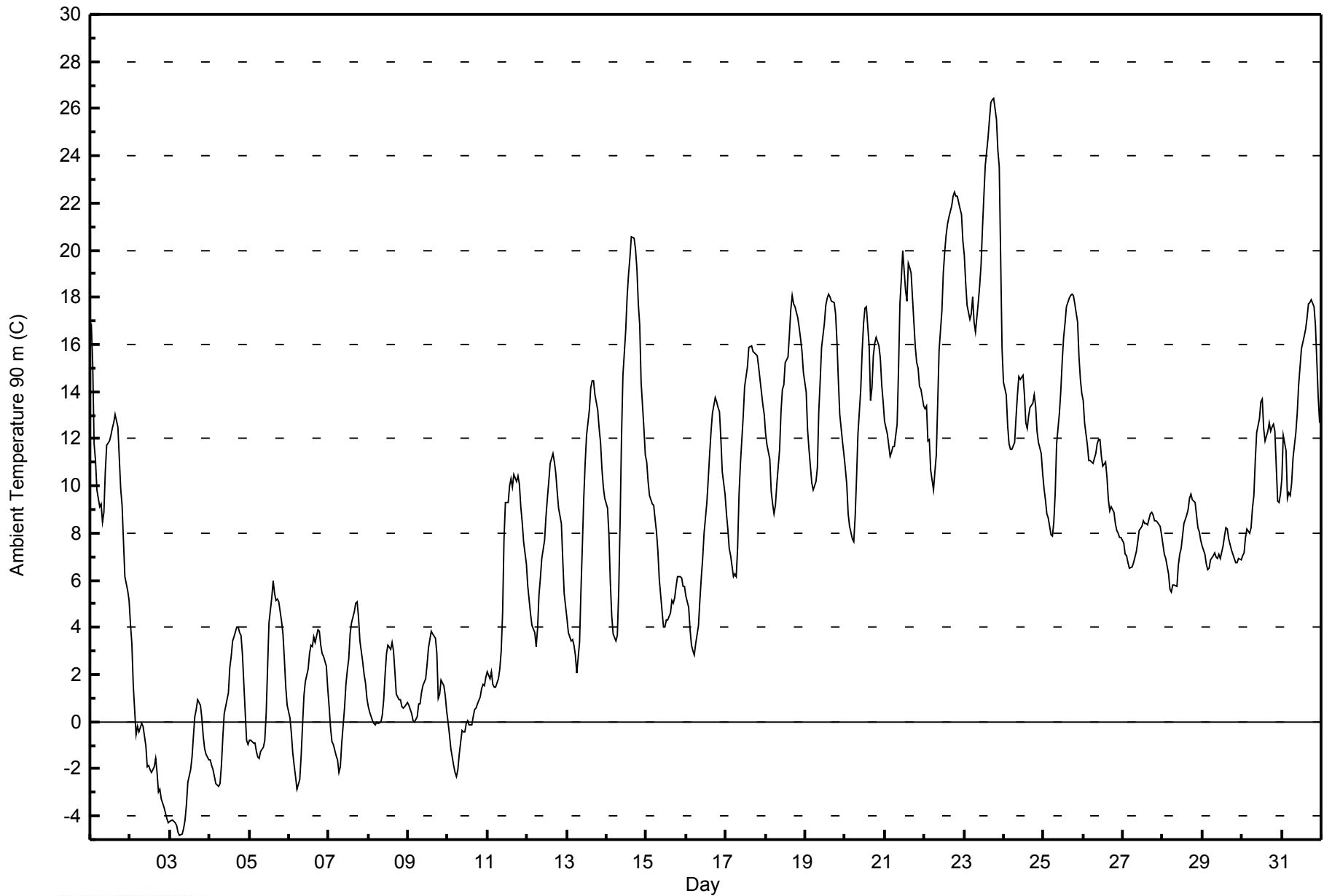
Mannix - May 2014

Maximum Value: 26.4 C on May 23 19:00		Maximum Daily Average: 20.9 C on May 23		Hours in Service: 744																																												
Minimum Value: -4.8 C on May 3 07:00		Minimum Daily Average: -2.4 C on May 3		Hours of Data: 744																																												
Maximum Diurnal Average: 10.9 C at hour 17		Minimum Diurnal Average: 5.0 C at hour 6		Hours of Missing Data: 0																																												
Monthly Average: 8.22 C		Percentiles: P <sub>1</sub> = -4.3 P <sub>10</sub> = -0.6 Q <sub>1</sub> = 2.9 Median = 8.4 Q <sub>3</sub> = 13.0 P <sub>90</sub> = 17.3 P <sub>99</sub> = 23.8		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-May	16.9	15.2	11.8	11.1	9.8	9.1	9.3	8.5	8.9	10.6	11.7	11.9	12.2	12.5	12.7	13.0	12.5	11.2	9.9	9.2	7.6	6.2	5.6	5.2	10.5	16.9																						
2-May	4.1	3.3	1.5	-0.6	-0.2	-0.4	-0.3	-0.1	-0.2	-1.1	-1.9	-1.9	-2.0	-2.1	-1.9	-1.5	-2.2	-3.0	-2.8	-3.3	-3.7	-3.9	-4.1	-4.3	-1.3	4.1																						
3-May	-4.2	-4.2	-4.3	-4.3	-4.4	-4.7	-4.8	-4.8	-4.5	-4.2	-3.5	-2.6	-2.1	-1.5	-0.6	0.2	0.5	0.9	0.7	0.2	-0.6	-1.2	-1.4	-1.6	-2.4	0.9																						
4-May	-1.6	-1.9	-2.0	-2.3	-2.6	-2.7	-2.6	-1.8	-0.7	0.4	0.9	1.2	2.3	2.7	3.4	3.6	4.0	4.0	3.8	3.6	2.9	0.4	-0.8	-0.9	0.5	4.0																						
5-May	-0.8	-0.8	-0.9	-0.9	-1.3	-1.5	-1.5	-1.3	-1.1	-0.8	0.3	2.3	4.2	5.3	6.0	5.5	5.1	5.2	5.1	4.3	3.7	2.6	1.4	0.7	1.7	6.0																						
6-May	0.2	-0.5	-1.3	-1.9	-2.4	-2.8	-2.5	-1.4	-0.1	1.1	1.7	2.2	2.9	3.2	3.2	3.6	3.4	3.9	3.8	3.2	2.9	2.8	2.4	1.4	1.2	3.9																						
7-May	0.6	-0.3	-0.9	-1.0	-1.4	-1.6	-2.1	-1.9	-0.9	0.6	1.6	2.2	2.7	3.7	4.2	4.7	5.1	5.1	4.4	3.4	2.5	2.0	1.7	1.0	1.5	5.1																						
8-May	0.7	0.4	0.0	-0.1	-0.1	0.0	-0.1	0.0	0.3	1.0	2.0	2.9	3.3	3.1	3.4	3.0	2.1	1.2	1.0	0.9	0.6	0.6	0.7	0.8	1.1	3.4																						
9-May	0.7	0.5	0.3	0.1	0.0	0.2	0.8	0.7	1.2	1.5	1.8	2.4	3.1	3.5	3.8	3.7	3.6	2.9	1.0	1.2	1.7	1.5	1.1	0.5	1.6	3.8																						
10-May	0.0	-0.6	-1.1	-1.9	-2.2	-2.4	-2.0	-1.4	-0.3	-0.4	-0.4	-0.1	0.0	-0.1	-0.1	0.2	0.5	0.6	0.8	1.1	1.4	1.6	1.5	1.9	-0.1	1.9																						
11-May	2.1	1.8	2.1	1.6	1.5	1.5	1.8	2.2	3.0	4.6	7.8	9.3	9.3	10.0	10.3	9.9	10.5	10.2	10.4	10.1	9.1	8.4	7.6	6.7	6.3	10.5																						
12-May	5.8	5.2	4.5	4.1	3.8	3.2	4.0	5.4	6.1	6.9	7.7	8.7	9.5	10.2	10.9	11.3	11.0	10.5	9.8	9.0	8.4	6.8	5.4	4.9	7.2	11.3																						
13-May	4.4	3.8	3.4	3.5	3.2	2.8	2.0	3.3	5.5	7.5	9.5	11.0	12.1	13.2	14.2	14.4	14.5	13.9	13.2	12.4	11.8	10.7	9.9	9.5	8.7	14.5																						
14-May	9.1	7.9	5.9	4.5	3.7	3.4	3.7	5.6	8.5	12.1	14.7	16.6	18.0	19.0	19.7	20.5	20.5	20.0	19.2	17.7	16.8	14.4	12.4	11.3	12.7	20.5																						
15-May	11.0	10.2	9.6	9.2	9.2	8.6	8.1	7.2	6.0	4.7	4.0	4.0	4.3	4.3	4.6	5.2	5.0	5.3	5.8	6.1	6.1	6.1	5.8	5.8	6.5	11.0																						
16-May	5.3	4.9	3.9	3.3	3.0	2.8	3.3	4.1	5.1	6.1	6.9	8.0	9.3	10.3	11.4	12.3	13.1	13.8	13.6	13.3	13.1	12.0	10.6	9.6	8.3	13.8																						
17-May	8.8	8.2	7.3	7.0	6.2	6.3	6.1	7.4	9.7	10.9	13.0	14.2	14.6	15.0	15.9	15.9	15.7	15.6	15.6	15.5	15.0	14.0	13.5	13.0	11.9	15.9																						
18-May	12.2	11.7	11.1	9.8	9.3	8.8	9.2	10.1	11.6	13.2	14.1	14.3	15.3	15.5	16.4	17.5	18.1	17.7	17.6	17.1	16.7	16.2	15.7	14.8	13.9	18.1																						
19-May	14.0	12.4	11.6	10.8	10.1	9.8	10.2	10.8	13.1	14.4	15.9	16.9	17.6	18.0	18.1	18.0	17.9	17.8	17.3	16.1	14.5	13.0	11.8	11.3	14.2	18.1																						
20-May	10.7	10.1	8.8	8.3	7.8	7.6	8.7	10.4	12.2	14.1	15.7	16.9	17.5	17.6	16.0	13.6	14.2	15.5	16.1	16.3	15.9	15.4	14.3	13.6	13.2	17.6																						
21-May	12.7	12.2	11.7	11.3	11.4	11.6	11.7	12.6	15.0	17.7	18.8	20.0	18.3	17.8	19.4	19.3	19.0	18.0	15.9	15.3	15.0	14.2	14.1	13.4	15.3	20.0																						
22-May	13.3	13.4	11.9	12.0	10.7	9.8	10.6	11.3	13.5	15.7	17.4	19.0	19.9	20.6	21.1	21.4	21.9	22.3	22.5	22.3	22.3	21.7	21.5	20.4	17.4	22.5																						
23-May	19.8	18.6	17.6	17.0	17.3	18.0	17.0	16.5	17.8	18.5	19.4	20.9	22.3	23.6	24.8	25.6	26.3	26.4	26.4	25.5	24.3	23.5	19.7	15.8	20.9	26.4																						
24-May	14.4	13.8	12.6	11.8	11.6	11.6	11.8	12.9	13.8	14.6	14.5	14.7	13.9	12.7	12.4	13.0	13.4	13.5	13.9	13.4	12.3	11.8	11.3	10.6	12.9	14.7																						
25-May	9.9	9.4	8.8	8.7	7.9	7.9	8.5	9.7	11.8	13.1	14.0	15.3	16.3	16.9	17.6	18.0	18.1	18.1	18.1	17.7	17.0	15.5	14.5	13.9	13.6	18.1																						
26-May	13.6	12.7	11.7	11.1	11.1	11.0	10.9	11.4	11.8	12.0	12.0	11.3	10.8	11.0	10.4	9.4	8.9	9.1	8.9	8.4	8.1	8.0	7.8	7.8	10.4	13.6																						
27-May	7.6	7.1	7.0	6.7	6.5	6.6	6.7	7.0	7.2	7.6	8.1	8.3	8.5	8.4	8.4	8.4	8.8	8.9	8.7	8.5	8.5	8.5	8.3	7.9	7.9	8.9																						
28-May	7.5	7.1	6.9	6.3	5.6	5.5	5.8	5.8	5.7	6.6	7.1	7.4	7.9	8.4	8.8	9.0	9.5	9.7	9.4	9.3	8.7	8.2	8.0	7.7	7.6	9.7																						
29-May	7.5	7.1	6.7	6.5	6.5	6.9	7.0	7.2	7.0	6.9	7.1	6.9	7.4	7.9	8.2	8.2	7.8	7.3	7.1	6.9	6.8	6.7	6.9	6.9	7.1	8.2																						
30-May	7.0	7.1	7.8	8.2	8.0	8.2	9.1	9.6	11.1	12.2	12.9	13.6	13.7	12.4	11.9	12.3	12.7	12.3	12.5	12.6	12.3	9.3	9.3	9.6	10.7	13.7																						
31-May	10.3	12.2	11.5	9.5	9.7	9.6	10.1	11.2	12.3	13.1	14.3	15.0	15.9	16.3	16.7	17.1	17.7	17.8	17.9	17.6	16.9	15.3	13.8	12.7	13.9	17.9																						
																								7.2	6.7	6.0	5.5	5.1	5.0	5.2	5.7	6.8	7.8	8.7	9.4	10.0	10.3	10.7	10.9	10.9	10.8	10.6	10.2	9.6	8.8	8.1	7.5	Diurnal Average
																								19.8	18.6	17.6	17.0	17.3	18.0	17.0	16.5	17.8	18.5	19.4	20.9	22.3	23.6	24.8	25.6	26.3	26.4	26.4	25.5	24.3	23.5	21.5	20.4	Diurnal Maximum



**WBEA**  
**Hourly Averages**

**Ambient Temperature 90 m (AT90m) - C**  
**Mannix - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Ambient Temperature 90 m (AT90m) - C**  
**Mannix - May 2014**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	95	12.77	12.77
0 - 10	350	47.04	59.81
10 - 20	274	36.83	96.64
> 20	25	3.36	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

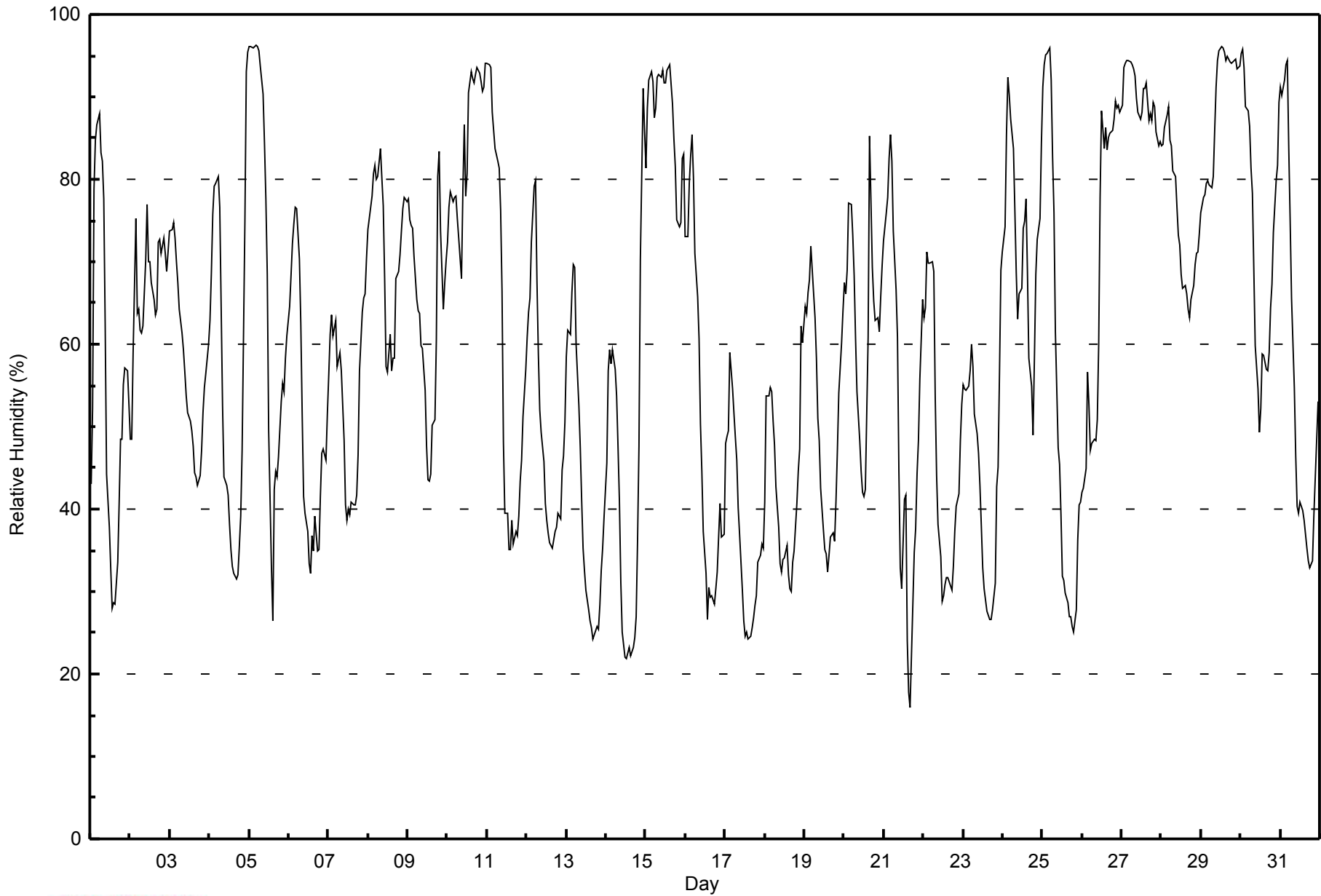


Maximum Value: 96 % on May 5 05:00																		Maximum Daily Average: 90.1 % on May 27																		Hours in Service: 744												
Minimum Value: 16 % on May 21 17:00																		Minimum Daily Average: 37.0 % on May 17																		Hours of Data: 744												
Maximum Diurnal Average: 77.1 % at hour 5																		Minimum Diurnal Average: 48.0 % at hour 17																		Hours of Missing Data: 0												
Monthly Average: 60.4 %																		Percentiles: P <sub>1</sub> = 23 P <sub>10</sub> = 32 Q <sub>1</sub> = 42 Median = 61 Q <sub>3</sub> = 78 P <sub>90</sub> = 91 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-May	43	52	79	85	87	88	83	82	78	62	44	38	33	28	29	29	34	41	48	48	55	57	57	53	55.5	88																						
2-May	48	48	59	75	64	64	62	61	62	70	77	70	70	67	65	64	64	72	73	71	73	71	69	71	66.3	77																						
3-May	74	74	75	73	70	67	64	61	59	57	54	52	51	49	48	44	44	43	44	47	52	55	56	60	57.2	75																						
4-May	63	69	76	79	79	80	77	65	53	44	43	42	38	35	33	32	31	32	35	39	47	75	93	95	56.5	95																						
5-May	96	96	96	96	96	96	96	94	90	84	78	68	49	33	27	42	45	44	46	53	55	54	58	61	68.9	96																						
6-May	65	68	72	75	77	76	70	63	51	41	39	37	33	32	37	35	39	35	35	42	47	47	46	51	50.6	77																						
7-May	56	61	64	61	63	57	58	59	57	48	40	39	40	39	41	40	41	42	47	57	64	66	66	70	53.2	70																						
8-May	74	75	78	81	82	80	80	84	80	77	68	57	57	61	57	58	58	68	69	71	74	76	78	77	71.7	84																						
9-May	78	75	74	74	71	65	64	64	60	60	54	48	43	43	44	50	51	61	80	83	74	64	67	70	63.3	83																						
10-May	72	77	79	77	78	78	75	73	68	79	87	78	81	91	93	92	92	93	93	93	92	91	91	94	84.0	94																						
11-May	94	94	94	88	86	84	82	81	76	66	48	40	39	35	35	39	36	37	37	39	43	46	51	57	59.5	94																						
12-May	61	64	66	72	79	80	68	59	52	49	46	41	39	37	36	35	36	37	38	39	39	45	46	50	50.6	80																						
13-May	59	62	61	66	70	69	60	53	48	41	35	32	30	28	26	24	25	26	25	28	33	35	39	41.7	70																							
14-May	46	57	59	58	59	57	54	48	41	31	25	22	22	23	23	22	23	24	27	36	48	70	91	86	43.8	91																						
15-May	81	89	92	93	92	87	89	92	93	92	93	92	92	93	94	92	89	85	81	75	74	75	83	83	87.5	94																						
16-May	73	73	79	83	85	80	71	66	61	50	45	37	32	27	31	29	30	28	30	32	37	41	37	37	49.8	85																						
17-May	48	49	49	59	55	51	49	46	40	37	30	26	25	25	24	25	26	27	28	30	33	34	36	35	37.0	59																						
18-May	41	54	54	55	54	51	48	43	38	33	32	34	34	36	32	30	30	34	35	41	45	47	62	60	42.5	62																						
19-May	65	64	66	68	72	69	63	58	51	48	43	37	35	35	32	34	37	37	36	41	47	54	60	64	50.7	72																						
20-May	68	66	69	77	77	73	68	61	54	48	45	42	41	42	61	85	77	69	65	63	63	61	66	69	63.0	85																						
21-May	73	76	78	83	85	82	74	67	61	45	33	30	41	42	24	18	16	22	35	38	44	48	56	65	51.4	85																						
22-May	63	64	71	70	70	70	69	54	44	38	34	29	29	31	32	32	31	30	33	37	40	42	48	53	46.4	71																						
23-May	55	55	54	55	57	60	57	52	49	47	43	38	33	30	28	27	27	27	28	31	43	45	57	69	44.4	69																						
24-May	71	74	85	92	90	87	84	76	69	63	66	67	74	75	78	69	58	55	49	58	68	73	75	84	72.6	92																						
25-May	91	94	95	95	96	92	83	76	61	47	45	39	32	31	30	29	27	27	26	25	28	36	40	41	53.6	96																						
26-May	42	42	45	57	53	47	48	48	48	51	60	78	88	84	86	84	85	86	86	87	90	89	89	88	69.2	90																						
27-May	89	94	94	94	94	94	94	93	92	90	88	87	88	91	91	92	87	88	87	89	89	86	84	85	90.1	94																						
28-May	84	84	86	88	89	85	84	81	80	77	73	72	68	67	67	66	64	63	65	67	70	71	71	73	74.9	89																						
29-May	76	78	78	79	80	79	79	80	86	91	94	96	96	96	95	94	95	94	94	94	94	95	93	94	88.9	96																						
30-May	95	96	94	89	88	86	81	78	69	60	55	49	52	59	59	57	57	59	64	67	74	80	82	89	72.5	96																						
31-May	91	90	92	94	94	84	75	66	55	46	40	39	41	40	39	37	35	34	33	34	39	44	49	53	56.0	94																						
																								68.8	71.4	74.6	77.1	77.1	74.9	71.2	67.2	62.2	57.2	53.5	50.2	49.3	48.6	48.2	48.6	48.0	49.0	50.8	53.4	57.0	60.3	64.3	67.1	Diurnal Average
																								96	96	96	96	96	96	96	94	93	92	94	96	96	96	95	94	95	94	94	94	94	95	93	95	Diurnal Maximum



**WBEA**  
**Hourly Averages**

**Relative Humidity (RH) - %**  
**Mannix - May 2014**







**WBEA**  
**Cumulative Frequency Distribution**

**Relative Humidity (RH) - %**  
**Mannix - May 2014**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	2	0.27	0.27
20 - 40	162	21.77	22.04
40 - 60	201	27.02	49.06
60 - 80	213	28.63	77.69
80 - 100	166	22.31	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Summary of Hour Averages

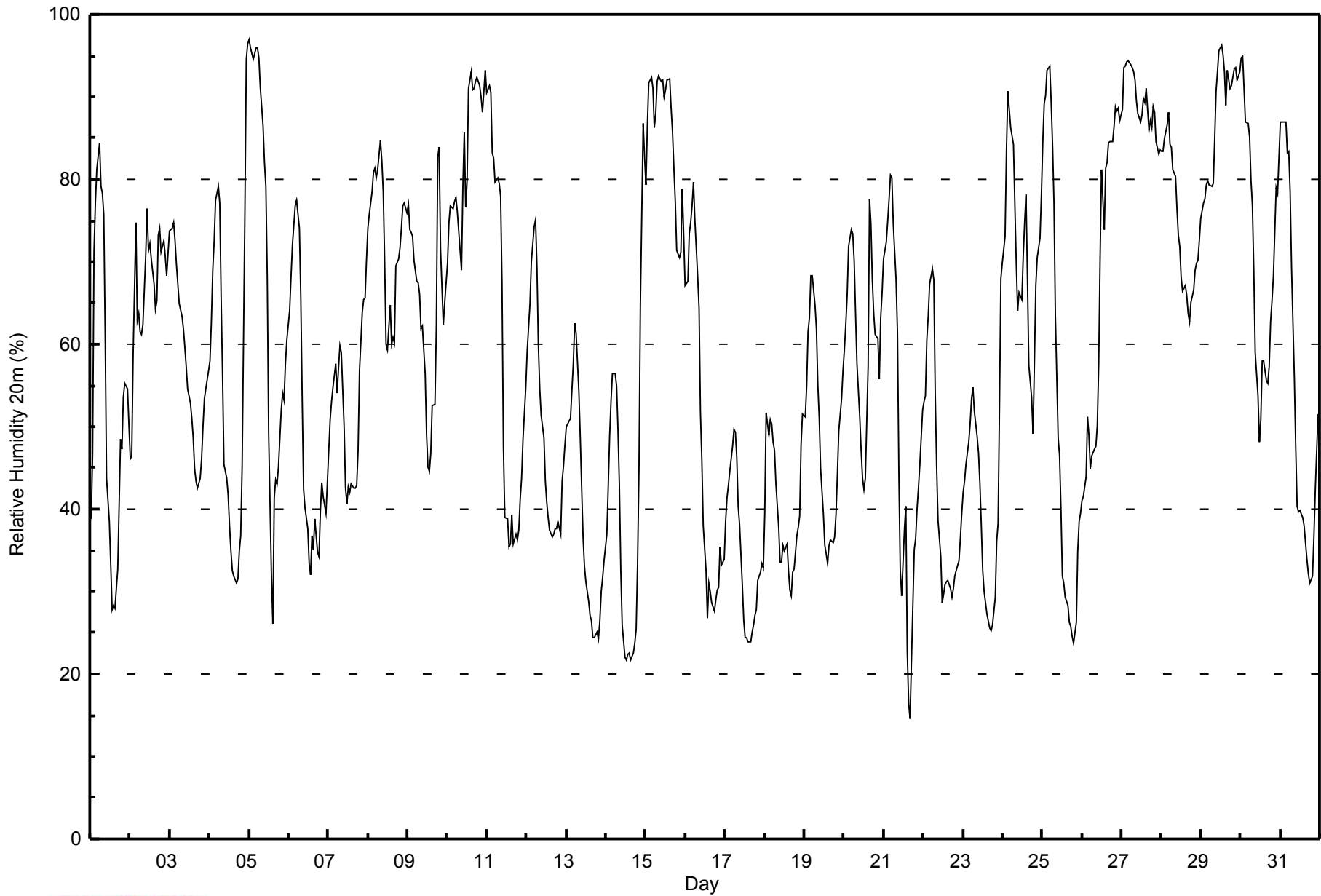
Mannix - May 2014

Maximum Value: 97 % on May 5 01:00														Maximum Daily Average: 89.5 % on May 27														Hours in Service: 744	
Minimum Value: 15 % on May 21 17:00														Minimum Daily Average: 34.5 % on May 17														Hours of Data: 744	
Maximum Diurnal Average: 73.9 % at hour 5														Minimum Diurnal Average: 47.5 % at hour 17														Hours of Missing Data: 0	
Monthly Average: 59.0 %														Percentiles: P <sub>1</sub> = 23 P <sub>10</sub> = 31 Q <sub>1</sub> = 40 Median = 59 Q <sub>3</sub> = 77 P <sub>90</sub> = 89 P <sub>99</sub> = 95														Hours of Calibration: 0	
																												Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-May	39	47	71	77	81	84	79	78	76	61	44	38	33	28	28	28	33	41	48	47	54	55	55	50	53.1	84			
2-May	46	46	59	75	63	64	61	61	62	71	76	71	72	70	67	64	65	73	74	71	72	71	68	71	66.5	76			
3-May	74	74	75	73	70	67	65	63	62	60	57	55	53	51	49	45	43	42	44	46	50	53	55	57	57.6	75			
4-May	58	63	69	72	77	79	77	66	56	45	44	42	38	35	33	32	31	32	35	37	45	76	94	96	55.5	96			
5-May	97	96	95	95	96	96	95	91	87	82	79	68	49	32	26	41	44	43	45	52	54	53	58	60	68.1	97			
6-May	64	68	72	74	77	77	74	66	53	42	40	38	33	32	37	35	39	35	34	40	43	41	40	43	49.9	77			
7-May	47	51	53	55	58	54	57	60	59	50	43	41	43	42	43	43	42	43	47	57	64	65	66	70	52.1	70			
8-May	74	76	78	81	81	80	81	85	82	78	70	60	59	65	60	61	60	70	70	72	74	77	77	76	72.8	85			
9-May	77	74	74	73	70	68	67	66	62	62	56	49	45	45	47	53	53	62	83	84	72	62	65	67	64.0	84			
10-May	70	75	77	76	77	78	76	74	69	79	86	77	80	91	93	91	91	92	92	91	90	88	91	93	83.2	93			
11-May	90	91	90	83	83	80	80	79	78	67	47	39	39	35	36	39	36	37	36	38	41	44	48	55	58.0	91			
12-May	59	62	65	70	74	75	69	60	55	51	49	43	41	39	37	37	37	38	38	38	37	43	45	48	50.4	75			
13-May	50	50	51	54	58	63	61	54	49	42	37	33	31	29	27	26	24	24	25	24	26	30	32	34	39.0	63			
14-May	37	43	49	53	56	56	55	50	43	32	26	22	22	23	22	23	24	25	33	45	65	87	83	83	41.4	87			
15-May	79	87	92	92	91	86	88	92	92	92	92	90	91	92	92	89	86	81	77	71	70	71	79	73	85.3	92			
16-May	67	68	73	75	77	80	75	68	64	52	46	38	33	27	31	30	29	28	29	30	31	35	33	34	48.0	80			
17-May	38	41	43	45	48	50	49	46	40	38	31	27	24	24	24	24	25	26	27	28	31	32	33	33	34.5	50			
18-May	39	52	49	51	50	48	47	43	38	34	34	36	35	36	33	30	29	32	33	37	38	39	48	51	40.0	52			
19-May	51	55	62	63	68	68	65	62	55	51	45	39	36	35	33	36	36	36	37	39	44	49	53	57	49.0	68			
20-May	59	62	66	72	74	73	70	64	58	51	47	44	42	44	57	78	74	68	64	61	61	56	63	66	61.4	78			
21-May	70	72	75	78	81	80	75	68	61	44	32	30	38	40	23	16	15	22	35	36	40	43	45	52	48.8	81			
22-May	53	54	60	63	67	69	68	54	45	39	34	29	30	31	31	31	30	29	30	32	33	34	36	39	42.6	69			
23-May	42	43	45	48	50	53	55	52	49	47	43	38	33	30	27	26	26	25	26	29	36	38	52	68	40.9	68			
24-May	70	73	84	91	88	86	84	77	70	64	66	65	71	75	78	68	57	54	49	58	67	70	73	78	71.5	91			
25-May	85	89	90	93	94	89	84	77	64	49	47	40	32	31	29	28	26	26	25	24	26	35	39	40	52.5	94			
26-May	41	41	44	51	49	45	46	47	48	50	57	70	81	74	81	82	84	84	85	86	89	88	89	87	66.8	89			
27-May	89	94	94	94	94	94	94	93	92	89	88	87	88	90	89	91	86	87	86	89	88	85	83	84	89.5	94			
28-May	83	83	85	87	88	84	84	81	80	76	73	72	68	66	67	66	64	63	65	67	69	70	70	73	74.4	88			
29-May	75	77	78	79	80	79	79	79	85	91	93	96	96	95	93	89	93	91	91	92	93	94	92	93	87.7	96			
30-May	95	95	91	87	87	85	80	77	69	59	54	48	51	58	58	56	55	57	63	65	68	79	78	83	70.7	95			
31-May	87	87	87	87	83	83	78	69	56	47	40	40	40	39	38	36	34	32	31	32	37	42	47	52	54.4	87			
														64.7														Diurnal Average	
														97														Diurnal Maximum	



**WBEA**  
**Hourly Averages**

**Relative Humidity 20m (RH20m) - %**  
**Mannix - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Relative Humidity 20m (RH20m) - %**  
**Mannix - May 2014**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	2	0.27	0.27
20 - 40	180	24.19	24.46
40 - 60	199	26.75	51.21
60 - 80	217	29.17	80.38
80 - 100	146	19.62	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

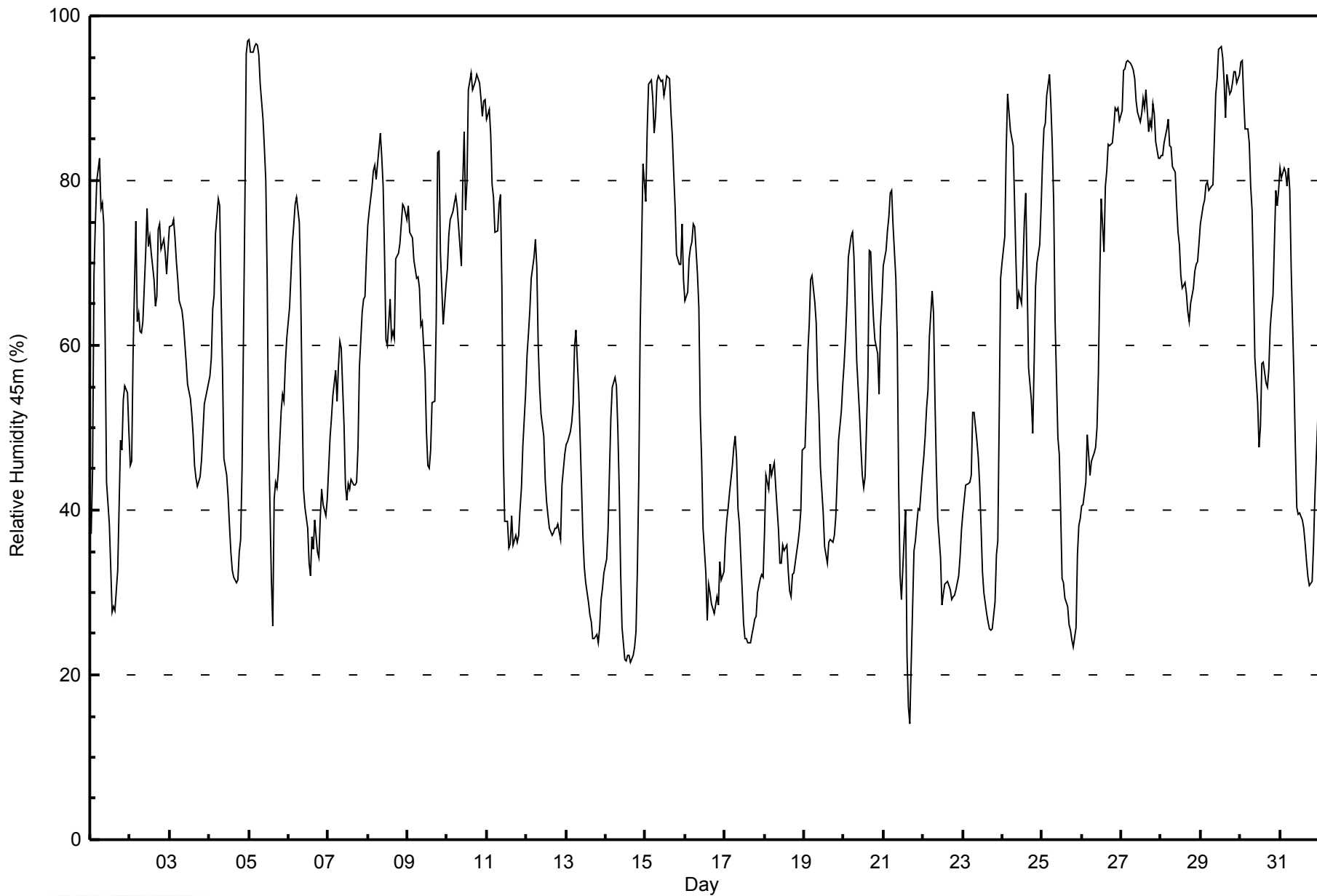


Maximum Value: 97 % on May 5 01:00														Maximum Daily Average: 89.5 % on May 27														Hours in Service: 744	
Minimum Value: 14 % on May 21 17:00														Minimum Daily Average: 33.7 % on May 17														Hours of Data: 744	
Maximum Diurnal Average: 72.2 % at hour 6														Minimum Diurnal Average: 47.4 % at hour 17														Hours of Missing Data: 0	
Monthly Average: 58.4 %														Percentiles: P <sub>1</sub> = 22 P <sub>10</sub> = 31 Q <sub>1</sub> = 40 Median = 58 Q <sub>3</sub> = 76 P <sub>90</sub> = 88 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-May	37	45	69	75	80	83	77	77	75	61	43	38	33	28	28	28	33	41	49	47	53	55	54	49	52.4	83			
2-May	45	46	59	75	63	64	62	61	63	71	77	72	73	71	68	65	66	74	75	72	73	71	69	72	66.9	77			
3-May	74	75	75	73	70	68	65	64	63	60	58	55	54	52	49	45	44	43	44	46	49	53	54	55	57.9	75			
4-May	56	58	64	66	74	78	77	66	57	46	44	42	38	35	33	32	31	32	35	36	45	76	95	97	54.8	97			
5-May	97	96	96	96	97	96	95	92	88	84	80	68	49	32	26	41	43	43	45	52	54	53	58	61	68.4	97			
6-May	65	69	72	75	77	78	75	66	54	43	40	38	33	32	37	35	39	35	34	39	43	41	39	41	50.0	78			
7-May	45	49	51	54	57	53	57	60	60	50	43	41	43	42	44	43	43	43	48	57	64	66	66	71	52.1	71			
8-May	75	76	79	81	82	80	82	86	83	79	71	61	60	66	61	62	61	71	71	72	75	77	77	75	73.4	86			
9-May	77	74	73	73	70	68	68	67	62	63	57	49	45	45	47	53	53	63	83	84	71	63	65	67	64.2	84			
10-May	69	73	75	76	77	78	77	74	70	80	86	76	80	91	93	91	91	92	93	92	90	88	90	90	83.0	93			
11-May	87	89	86	79	78	74	74	77	78	67	47	39	39	35	36	39	36	37	36	37	40	43	48	54	56.5	89			
12-May	59	61	64	68	71	73	70	60	55	52	49	44	41	39	38	37	37	38	38	38	36	43	45	47	50.1	73			
13-May	48	48	49	51	53	60	62	54	49	43	37	33	31	29	27	26	24	24	25	24	26	29	31	32	38.2	62			
14-May	34	38	45	51	55	56	55	50	43	33	26	22	22	22	22	22	22	23	25	33	44	62	82	80	40.2	82			
15-May	77	86	92	92	90	86	88	92	93	92	92	90	91	93	92	88	85	81	77	71	70	70	75	68	84.7	93			
16-May	65	66	71	72	73	75	74	69	65	52	46	38	32	27	31	30	29	27	29	29	28	34	32	33	46.9	75			
17-May	36	39	40	42	45	48	49	46	40	38	30	26	24	24	24	24	25	26	27	27	30	32	32	32	33.7	49			
18-May	37	44	43	46	44	45	46	43	38	34	34	36	35	36	33	30	30	32	32	35	36	38	40	47	38.0	47			
19-May	48	53	59	63	68	68	65	63	56	52	45	40	36	35	34	36	36	36	37	39	44	48	52	55	48.6	68			
20-May	58	61	65	71	73	74	71	65	58	52	48	44	43	44	56	72	71	67	63	61	59	54	62	65	60.7	74			
21-May	70	72	74	76	79	79	75	68	61	43	32	29	37	40	22	16	14	21	35	36	38	40	40	45	47.6	79			
22-May	46	49	52	55	61	67	64	53	45	39	34	29	30	31	31	31	30	29	30	30	30	32	34	38	40.4	67			
23-May	40	41	43	43	44	52	52	49	46	43	38	33	30	27	26	26	25	26	29	35	36	51	68	68	39.4	68			
24-May	70	73	84	90	88	86	84	77	70	64	66	65	70	75	78	68	57	53	49	58	67	70	72	77	71.4	90			
25-May	82	86	87	90	93	89	84	77	63	49	47	40	32	31	29	28	26	25	24	23	26	35	38	39	51.9	93			
26-May	41	41	43	49	47	44	46	47	48	50	57	68	78	71	79	81	84	84	84	87	89	89	89	87	66.0	89			
27-May	89	93	94	94	95	94	94	93	92	90	88	87	88	90	89	91	86	87	86	89	88	85	83	83	89.5	95			
28-May	83	83	85	86	87	84	84	82	81	77	74	72	69	67	68	66	64	63	65	67	69	70	70	72	74.5	87			
29-May	75	77	78	79	80	79	79	80	85	90	92	96	96	95	92	88	93	91	91	92	93	93	92	93	87.4	96			
30-May	94	95	90	86	86	85	79	76	68	59	53	48	50	58	58	55	55	57	62	64	66	79	77	79	70.0	95			
31-May	81	80	82	81	79	82	79	69	56	48	40	40	40	39	38	36	34	32	31	31	36	42	47	51	53.0	82			
														63.3 65.7 69.0 71.3 72.1 72.2 71.3 68.0 63.4 58.3 54.2 50.4 49.2 48.5 48.1 48.0 47.4 48.3 50.0 51.6 53.8 56.9 59.9 62.0														Diurnal Average	
														97 96 96 96 97 96 95 93 93 92 92 96 96 95 93 91 93 92 93 93 92 93 93 95 97														Diurnal Maximum	



**WBEA**  
**Hourly Averages**

**Relative Humidity 45m (RH45m) - %**  
**Mannix - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Relative Humidity 45m (RH45m) - %**  
**Mannix - May 2014**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	2	0.27	0.27
20 - 40	185	24.87	25.13
40 - 60	196	26.34	51.48
60 - 80	226	30.38	81.85
80 - 100	135	18.15	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Maximum Value: 97 % on May 29 13:00														Maximum Daily Average: 90.3 % on May 27														Hours in Service: 744																					
Minimum Value: 14 % on May 21 17:00														Minimum Daily Average: 33.3 % on May 17														Hours of Data: 744																					
Maximum Diurnal Average: 70.9 % at hour 5														Minimum Diurnal Average: 47.9 % at hour 17														Hours of Missing Data: 0																					
Monthly Average: 58.4 %														Percentiles: P <sub>1</sub> = 23 P <sub>10</sub> = 31 Q <sub>1</sub> = 40 Median = 58 Q <sub>3</sub> = 76 P <sub>90</sub> = 88 P <sub>99</sub> = 95														Hours of Calibration: 0																					
																												Percent Operational Time: 100.0																					
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-May	37	44	67	73	79	81	75	76	74	61	44	39	34	28	29	28	33	41	49	48	54	56	54	49	52.2	81																							
2-May	45	46	60	76	64	65	63	62	64	72	77	73	75	73	69	66	67	75	76	73	74	72	70	73	67.9	77																							
3-May	76	76	76	74	71	69	67	65	64	62	59	56	55	53	50	46	45	44	45	47	49	53	53	54	58.7	76																							
4-May	55	58	60	63	71	72	74	66	58	47	45	43	39	35	33	32	32	32	35	37	46	76	95	96	54.3	96																							
5-May	96	94	94	95	96	96	94	89	87	84	81	69	50	32	27	42	44	43	45	53	55	54	59	62	68.4	96																							
6-May	66	69	73	75	78	79	76	68	55	43	41	39	34	33	37	36	40	35	35	39	42	41	39	41	50.5	79																							
7-May	44	48	51	54	55	53	58	61	61	51	44	42	44	43	45	44	44	44	48	58	65	66	67	72	52.6	72																							
8-May	75	77	80	82	83	80	83	87	84	81	72	62	61	67	62	63	62	72	73	74	76	77	77	75	74.3	87																							
9-May	77	74	74	74	71	69	69	68	64	64	58	50	46	46	48	54	54	64	84	84	71	63	65	68	65.1	84																							
10-May	70	73	74	76	78	79	78	76	71	80	87	77	80	91	93	91	92	92	93	93	91	89	89	88	83.3	93																							
11-May	84	85	78	78	75	70	69	76	79	68	48	39	39	36	37	40	36	38	37	37	40	43	48	55	55.5	85																							
12-May	59	62	64	67	69	71	69	61	56	52	50	45	42	40	39	38	38	38	38	39	36	43	45	47	50.4	71																							
13-May	48	49	50	50	52	54	59	55	50	43	38	34	32	29	28	27	25	25	25	24	26	29	30	31	38.0	59																							
14-May	32	36	42	49	53	55	55	50	43	33	26	23	22	23	23	22	23	24	25	33	43	60	80	79	39.8	80																							
15-May	77	86	91	92	89	86	88	92	94	93	93	91	92	93	93	89	86	81	77	72	70	69	72	66	84.7	94																							
16-May	64	66	70	71	72	73	73	69	66	52	47	39	33	27	31	31	29	28	29	29	28	33	31	32	46.8	73																							
17-May	35	37	39	39	44	45	48	47	41	39	31	27	25	25	24	24	25	26	27	27	29	32	32	32	33.3	48																							
18-May	35	36	37	41	40	42	44	43	38	34	34	36	36	36	33	31	30	33	33	35	36	37	39	43	36.8	44																							
19-May	46	53	58	62	68	68	66	64	57	52	46	40	36	35	34	37	37	37	37	40	44	49	52	55	48.9	68																							
20-May	57	59	65	70	72	74	71	66	59	53	49	45	44	45	56	67	68	66	63	61	58	54	62	66	60.3	74																							
21-May	70	71	73	75	72	69	71	68	61	42	33	30	37	40	23	16	14	22	36	37	38	39	37	42	46.5	75																							
22-May	42	42	48	49	56	59	53	51	46	39	35	29	30	32	32	32	31	30	30	30	30	31	32	35	38.5	59																							
23-May	36	38	40	41	41	42	48	51	49	46	44	39	33	31	28	27	26	26	26	29	34	35	52	69	38.8	69																							
24-May	71	74	85	91	88	86	84	79	71	66	67	66	70	76	79	69	58	54	50	59	68	70	72	77	72.0	91																							
25-May	80	83	85	86	89	87	83	78	64	50	48	41	33	32	30	29	27	26	25	23	26	35	38	39	51.4	89																							
26-May	40	40	43	48	45	44	46	48	48	51	57	68	75	70	79	82	85	84	85	87	89	89	89	88	65.9	89																							
27-May	89	94	94	95	96	95	95	95	93	91	89	88	89	90	89	92	87	88	88	90	88	86	83	83	90.3	96																							
28-May	84	84	85	87	88	85	85	83	82	79	75	73	70	68	69	67	65	64	66	68	70	71	71	73	75.5	88																							
29-May	75	77	78	80	81	79	80	80	85	90	93	97	97	96	92	86	93	91	91	92	94	93	92	93	87.7	97																							
30-May	95	95	90	86	86	85	80	77	69	59	54	48	51	58	59	56	55	58	63	64	66	79	76	76	70.2	95																							
31-May	73	68	72	78	77	79	78	70	57	48	41	40	40	40	38	37	34	32	31	31	35	42	47	51	51.8	79																							
																								62.4	64.3	67.6	70.3	70.9	70.7	70.4	68.4	64.2	58.9	55.0	51.2	49.8	49.1	48.6	48.4	47.9	48.8	50.5	52.0	53.9	57.0	59.6	61.5	Diurnal Average	
																								96	95	94	95	96	96	95	95	94	93	93	97	97	96	93	92	93	92	93	93	94	93	95	96	Diurnal Maximum	

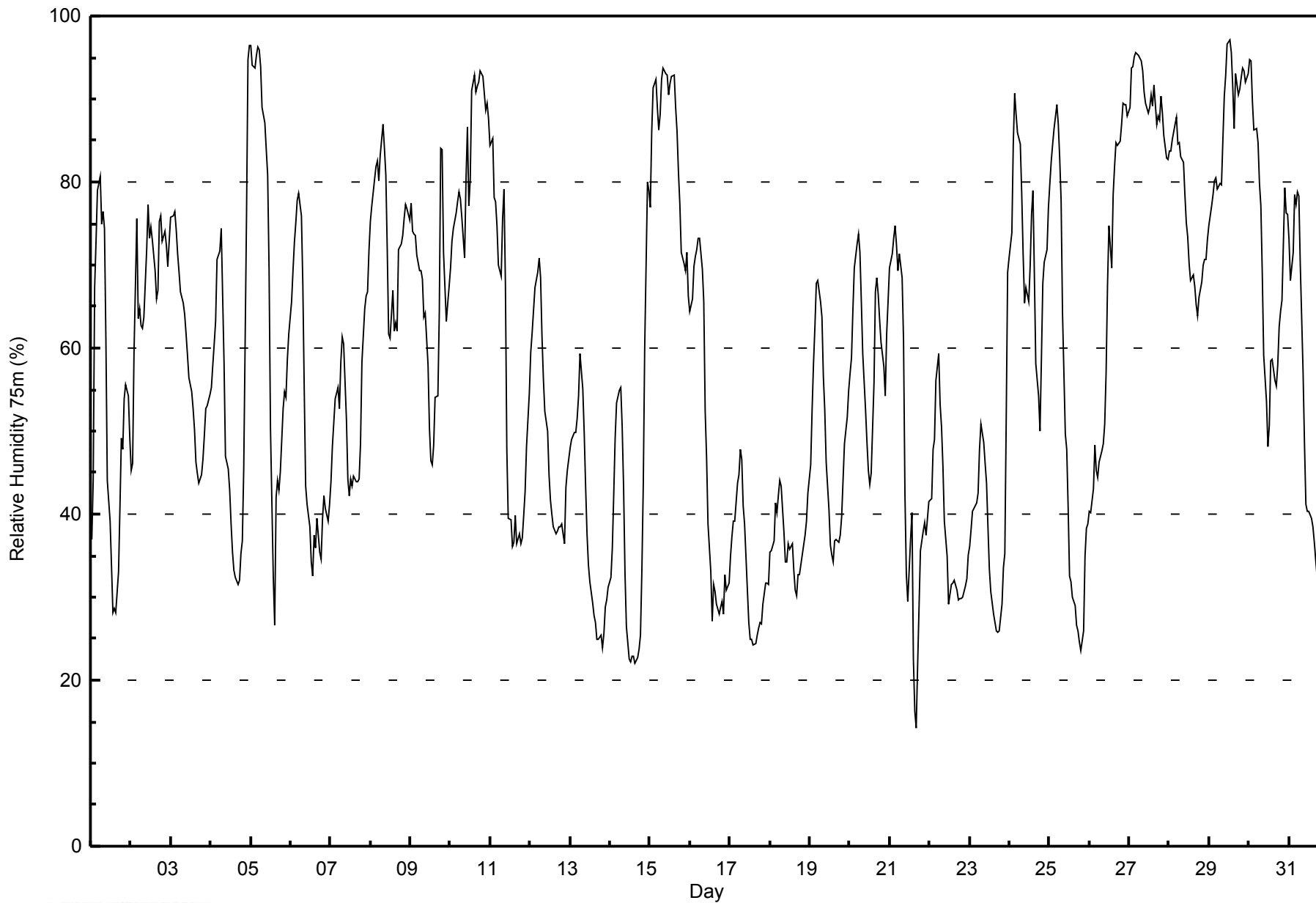




**WBEA**  
**Hourly Averages**

**Relative Humidity 75m (RH75m) - %**

**Mannix - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Relative Humidity 75m (RH75m) - %**  
**Mannix - May 2014**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	2	0.27	0.27
20 - 40	187	25.13	25.40
40 - 60	197	26.48	51.88
60 - 80	223	29.97	81.85
80 - 100	135	18.15	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

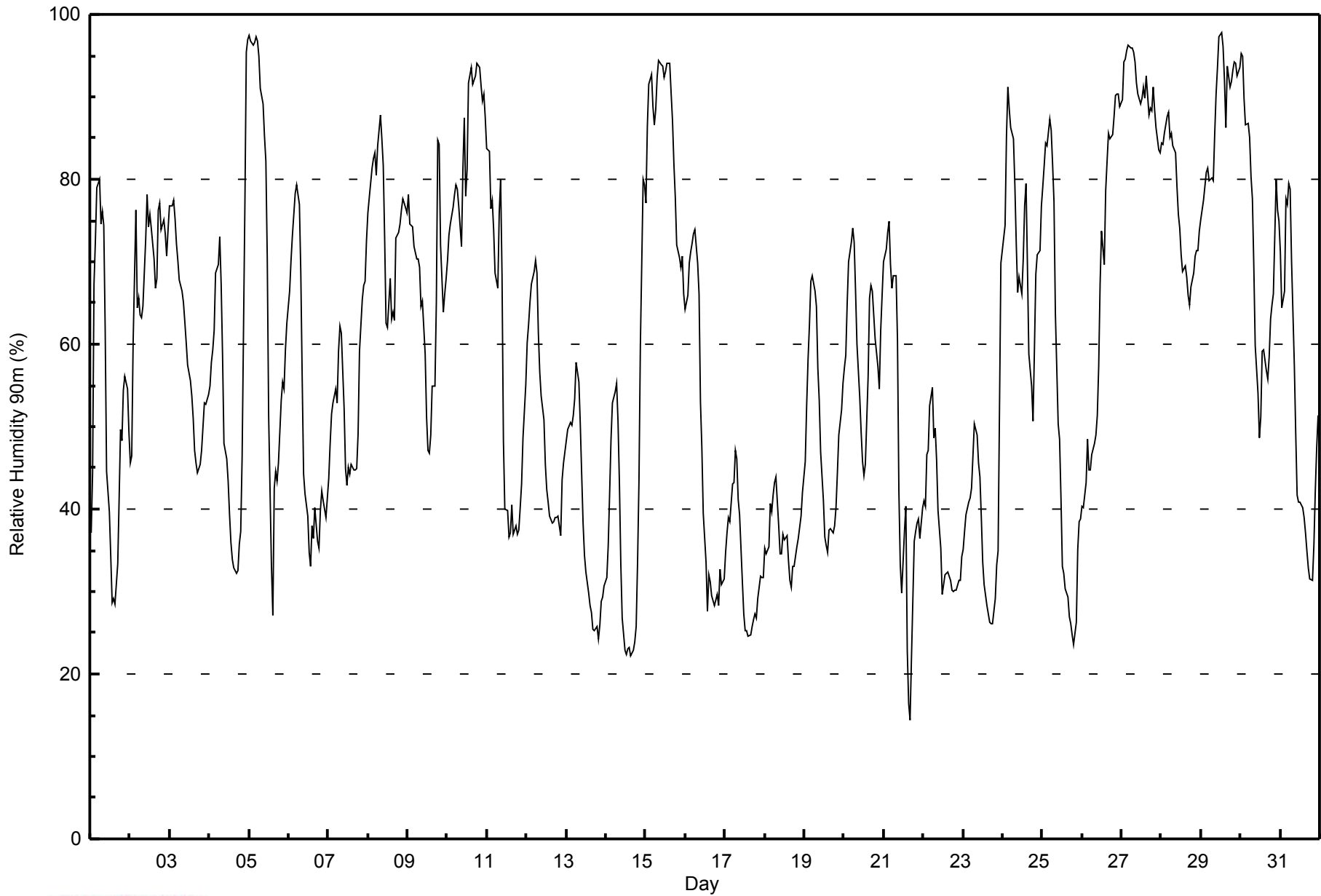


Maximum Value: 98 % on May 29 13:00														Maximum Daily Average: 91.0 % on May 27														Hours in Service: 744	
Minimum Value: 14 % on May 21 17:00														Minimum Daily Average: 33.3 % on May 17														Hours of Data: 744	
Maximum Diurnal Average: 70.7 % at hour 5														Minimum Diurnal Average: 48.4 % at hour 17														Hours of Missing Data: 0	
Monthly Average: 58.7 %														Percentiles: P <sub>1</sub> = 23 P <sub>10</sub> = 31 Q <sub>1</sub> = 40 Median = 59 Q <sub>3</sub> = 76 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-May	37	44	67	73	79	80	75	76	74	62	45	40	34	29	29	29	33	41	50	48	54	56	55	49	52.5	80			
2-May	46	46	60	76	64	66	64	63	65	73	78	74	76	74	70	67	68	76	77	74	75	73	71	74	68.7	78			
3-May	77	77	77	75	72	70	68	67	65	63	60	57	56	54	51	47	46	44	45	47	50	53	53	54	59.5	77			
4-May	55	58	59	62	69	70	73	67	59	48	46	43	39	36	34	33	32	33	36	37	46	77	95	97	54.4	97			
5-May	97	97	96	97	97	97	95	91	89	85	82	70	51	33	27	43	45	43	46	53	55	55	59	63	69.5	97			
6-May	66	70	73	76	78	79	77	69	56	44	42	39	35	33	38	36	40	36	35	40	42	41	39	41	51.1	79			
7-May	44	48	52	53	55	53	59	62	61	52	45	43	45	44	45	45	45	45	49	59	65	67	68	73	53.2	73			
8-May	76	78	81	82	83	80	84	88	85	82	73	63	62	68	63	64	63	73	74	75	76	78	77	76	75.1	88			
9-May	78	75	74	74	72	70	70	69	65	65	59	51	47	47	49	55	55	65	85	84	72	64	66	68	65.8	85			
10-May	70	73	75	77	78	79	79	77	72	81	87	78	81	92	94	91	92	93	94	94	91	89	90	87	83.9	94			
11-May	84	83	76	77	74	69	67	76	80	68	48	40	40	37	37	40	37	38	37	37	40	43	49	55	55.6	84			
12-May	60	62	65	67	69	70	69	61	57	54	51	45	42	41	39	38	39	39	39	39	37	44	46	47	50.8	70			
13-May	48	50	50	50	51	53	58	55	50	44	38	34	32	30	28	27	25	25	26	24	26	29	29	31	38.2	58			
14-May	32	36	42	49	53	54	55	51	43	33	27	23	23	23	23	22	23	24	26	34	43	60	80	79	39.9	80			
15-May	77	86	92	93	89	87	88	92	94	94	94	92	93	94	94	90	87	82	78	72	70	69	71	66	85.2	94			
16-May	64	66	70	71	72	73	74	70	66	53	48	39	34	28	32	31	30	28	29	30	28	33	31	31	47.1	74			
17-May	35	37	39	38	43	43	47	46	41	39	31	27	25	25	25	25	26	27	27	27	29	32	32	32	33.3	47			
18-May	35	35	35	41	40	42	43	44	38	35	35	37	36	37	34	31	31	33	33	35	36	38	39	42	36.8	44			
19-May	46	53	58	62	68	68	66	65	57	53	47	41	37	36	35	37	38	37	38	40	44	49	52	55	49.2	68			
20-May	57	59	65	70	72	74	72	66	60	54	49	46	44	46	56	66	67	66	64	61	57	55	62	66	60.5	74			
21-May	70	72	74	75	70	67	68	68	60	42	33	30	37	40	23	16	14	22	36	37	38	39	37	40	46.2	75			
22-May	41	40	47	47	53	55	49	50	46	40	35	30	31	32	32	32	31	30	30	30	30	31	31	34	37.8	55			
23-May	35	37	39	41	41	43	46	50	49	46	44	39	34	31	28	27	26	26	26	29	33	35	52	70	38.7	70			
24-May	71	74	85	91	89	86	85	79	72	66	68	66	70	77	79	69	59	55	51	59	68	71	71	77	72.5	91			
25-May	79	82	84	84	87	86	82	77	64	50	48	41	33	32	30	29	27	26	25	24	26	35	38	39	51.3	87			
26-May	40	40	43	48	45	45	47	48	49	51	57	67	74	70	79	82	86	85	85	88	90	90	90	89	66.2	90			
27-May	90	94	95	96	96	96	96	95	94	92	90	89	90	91	90	92	88	89	88	91	88	86	84	83	91.0	96			
28-May	84	84	86	88	88	85	86	84	83	79	76	74	71	69	70	68	66	65	67	69	71	71	71	74	76.1	88			
29-May	75	78	79	81	81	80	80	80	85	90	94	97	98	96	92	86	94	91	92	93	94	94	93	94	88.2	98			
30-May	95	95	90	87	87	85	80	78	70	60	54	49	51	59	59	57	56	58	63	65	66	80	76	75	70.6	95			
31-May	71	64	66	78	77	79	79	70	58	49	42	41	41	40	39	37	35	33	32	31	36	42	47	51	51.6	79			
														62.5 64.3 67.6 70.3 70.7 70.5 70.3 68.9 64.8 59.6 55.7 51.9 50.4 49.7 49.2 48.9 48.4 49.3 51.0 52.5 54.3 57.4 59.8 61.7														Diurnal Average	
														97 97 96 97 97 97 96 95 94 94 94 97 98 96 94 92 94 93 94 94 94 94 95 97														Diurnal Maximum	



**WBEA**  
**Hourly Averages**

**Relative Humidity 90m (RH90m) - %**  
**Mannix - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Relative Humidity 90m (RH90m) - %**  
**Mannix - May 2014**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	2	0.27	0.27
20 - 40	184	24.73	25.00
40 - 60	199	26.75	51.75
60 - 80	223	29.97	81.72
80 - 100	136	18.28	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Summary of Hour Averages

Mannix - May 2014

Maximum Speed: 37 km/h on May 30 14:00	Maximum Daily Speed Average: 19.7 km/h on May 2	Hours in Service: 744
Minimum Speed Value: 1 km/h on May 19 00:00	Minimum Daily Speed Average: 2.6 km/h on May 16	Hours of Data: 744
Maximum Diurnal Speed Average: 6.4 km/h at hour 18	Minimum Diurnal Speed Average: 0.7 km/h at hour 1	Hours of Missing Data: 0
Monthly Average Velocity: 3.0 km/h 359.3 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 4 Q <sub>1</sub> = 7 Median = 11 Q <sub>3</sub> = 15 P <sub>90</sub> = 20 P <sub>99</sub> = 32	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-May	W13WNW17	N12NNW10	NNW16	NW13	NW14	NW15WNW17	WNW21	NW27	NNW23	NNW20	NNW19	NW22	NW22	NW24	NW26	NNW18	NNW21	N17	NNW14	NNW14	NW19					NW17.0	NW27
2-May	NW22	NW27	NW28	NW18WNW26	WNW24	WNW29	NW27	NNW25	NNW22	NNW25	NNW21	NNW19	N17	N19	N19	NNE18	NNE20	N18	N18	N18	N21	NNW21	NNW23			NNW19.7	WNW29
3-May	NNW22	NNW22	NNW19	NNW19	NNW18	NNW16	NNW16	NNW14	NNW12	NNW12	NNW12	N11	NNE12	NNE14	NE13	NE10	ENE12	NE11	NNE13	NE13	NE11	NE11	NE9	E5	N12.0	NNW22	
4-May	E2	WSW1	WNW2	WNW3	W2	SE1	SE1	SSE4	S4	SE4	ENE4	E6	E5	SE5	ESE7	SE5	S7	S5	SW10	S8	SSE12	SSE7	ESE5	E7	SSE3.3	SSE12	
5-May	E2	SW4	S5	SSE4	SSE6	SSE9	SSE8	SSE7	ESE5	ENE5	NE3	ENE5	NE5	NE6	NNE6	E14	ENE16	ENE12	ENE18	ENE22	ENE19	ENE21	ENE19	ENE17	E8.1	ENE22	
6-May	ENE15	NE13	NNE16	NNE17	N18	N18	N18	N18	N18	NNE19	NNE22	NNE19	NNE19	NNE16	NE20	NNE15	NE15	NNE18	NNE17	NNW8	NW9	N9	NNW7	NNW5	NNE14.7	NNE22	
7-May	N5	NW4	NNW6	NNW9	N10	NNW11	NNW12	NNW16	NNW14	NNW19	NNW21	NNW24	NNW20	NNW18	N17	NNW17	N18	NNE19	NNE17	NE13	NE10	NE7	NNE9	N6	N12.6	NNW24	
8-May	NE9	NE10	NE4	SE3	SSE3	E2	SE3	ESE2	WSW3	ENE4	SSW3	NNW5	NNE10	NNE15	NNE16	NNE17	NNE20	NNE17	NNE13	NNE11	NNE10	NNE6	N5	N9	NNE7.0	NNE20	
9-May	N9	N9	N10	N8	NNE5	NNW7	WNW4	W11	NW13	NW10	NW7	NW8	WNW9	WNW9	NNW11	NW12	NNW14	N15	N13	N2	NNW9	NNW15	NNW13	NNW14	NNW9.0	NNW15	
10-May	NW12	WNW13	WNW13	WNW17	WNW17	WNW19	W23	W23	WNW26	NW20	NW16	NNW24	NW23	NW16	WNW17	NW14	NNW15	NNW15	NNW12	NW11	NW10	NW10	WSW6	WSW7	WNW14.8	WNW26	
11-May	WSW8	WSW6	W8	WNW8	W7	WSW6	WSW7	W8	SSW8	SW12	W18	NW26	NW18	NNW14	NNW14	NNW12	NW12	NNW13	NNE8	NNE12	NNE11	NE8	ENE8	ENE8	NW6.6	NW26	
12-May	E8	ESE5	E4	NNE4	NNE4	NE3	SE3	E3	NNE2	W3	NW5	WNW9	WNW10	WNW10	NNE9	NNE14	NNE21	NNE20	NNE21	NNE14	NNE14	NE13	E17	SE7	NNE6.3	NNE21	
13-May	S9	SSE7	SSE6	SSW4	SSW2	SE4	S5	SSE5	ESE5	SE7	SE4	ENE7	NE6	N11	NNW9	NNW10	NNE13	NE18	NNE17	NNE15	NNE11	ENE9	E7	ENE6	NE4.1	NE18	
14-May	E2	WSW6	SSE5	SE7	SSE9	SE10	SE11	SE9	SE9	SE10	SE10	ESE12	ESE12	ESE13	ESE13	ESE14	SE13	SE16	SE16	SE15	SSE12	SW11	SSE7	ESE9	SE9.5	SE16	
15-May	ESE8	SSE9	SSE8	SSE6	ESE4	ESE6	NE7	NNE13	NNE25	NNE30	N30	N31	NNE28	N21	N18	N26	N27	NNW24	NNW19	NNW19	NNW14	NNW13	WNW11	WNW7	N12.9	N31	
16-May	NW11	NNW12	NW8	NW6	WNW3	W3	NW1	NNW1	W5	NW7	WNW8	NW8	NW7	NNW9	NNW10	NNW7	NE6	E3	SE9	SE9	SE8	E8	E11	E13	N2.6	E13	
17-May	SE4	SE8	SSE7	SSE9	SE7	SE5	S3	E3	SE2	W6	WNW2	SE3	SSE5	E4	ESE5	ENE7	NE7	NE7	NE9	ENE8	NE7	E7	E5	SE8	ESE3.7	NE9	
18-May	NNE4	NNE9	NNE7	NNE9	NNE9	NE7	NNE4	NNE2	SE4	ESE5	NW9	NNW14	N13	N15	NNE14	NE9	ENE5	SSE11	SSE9	S6	S3	ENE1	WSW7	SW1	NNE3.8	N15	
19-May	S5	SSE7	S7	SSE10	SSE8	SSE9	SSE14	S15	SSE13	SSE12	SSE13	S14	SE17	SSE18	S18	S20	SSE20	SSE19	S17	S23	S15	S12	S11	SSE10	SSE13.3	S23	
20-May	SSE8	SSE11	SSE11	SSE12	SSE14	SE14	SSE16	SSE20	SSE19	SSE19	S21	S22	S22	S19	WSW14	SSE11	ESE11	SE14	SE18	SE15	SSE8	S9	SE8	SSE14	SSE13.6	S22	
21-May	SSE13	SSE14	SSE12	SSE14	SSE9	SSE9	SE9	SE11	ESE7	W5	WSW13	SSW18	SW22	SSW12	SW32	WSW34	WSW36	W25	NW23	NW13	WNW7	NW8	W6	SSW6	SW8.8	WSW36	
22-May	S5	S4	SE3	SE5	SE6	ESE5	SE7	SSE11	SE6	SE5	ENE5	WSW2	WSW20	W19	WSW19	WSW13	WSW14	WSW10	S8	S5	SSE6	SE6	SSE9	SSE12	SSW5.1	WSW20	
23-May	SSE14	SSE12	SSE8	SSE7	SSE8	SSE8	SSE6	SSE6	ESE4	SE8	SE8	SE4	E8	ESE9	SSE9	SE10	SSE7	SSE2	NE2	E7	E9	ESE8	W28	W31	SSE4.7	W31	
24-May	WNW18	WSW11	WSW14	WSW14	W15	W15	WNW14	WNW7	WNW9	WNW26	W19	W22	WNW26	N18	NNE11	NNW10	WNW17	NW15	NNW10	NNE8	ENE10	ENE9	E7	ESE2	WNW9.2	WNW26	
25-May	E3	ESE2	S3	S3	SE2	SE3	SE4	SE6	SE9	SE10	ESE9	E7	E6	E8	ESE10	ESE12	ESE11	SE12	SE12	SE11	SE10	SE13	SE12	SE13	SE7.7	SE13	
26-May	SE12	SE11	SE12	SE7	NE7	E8	ESE9	ESE9	ESE13	SE14	SE11	SSE3	NNW5	NNE6	ENE3	ESE14	ENE17	ENE17	ENE16	ENE16	ENE14	ENE16	ENE13	NE15	E9.3	ENE17	
27-May	NE11	NNE11	NNE10	NNE13	NNE13	NNE12	NNE13	NNE14	NNE13	NNE12	NNE15	NNE12	NNE15	N19	NNE19	NNE14	NNE9	NNE11	NNE11	NE9	NE8	E7	ESE6	NNE11.6	N19		
28-May	E7	ESE5	ENE5	ENE7	ESE5	SE7	SE7	SE10	E10	ENE8	E6	SE6	E5	ESE6	SE9	ESE7	ESE9	ESE12	ESE10	SE13	ESE8	SE9	SE10	SE10	ESE7.5	SE13	
29-May	ESE8	SE6	ESE7	ESE6	ESE6	ESE5	ENE5	NE5	NNE7	NNE8	NNW10	NNW12	N14	N15	N13	NNW13	NNW17	NNW18	NW16	NW16	WNW17	WNW18	W20	W16	NNW6.8	W20	
30-May	W16	WSW13	WSW18	W22	W23	W25	W31	W29	W30	W33	W28	WNW32	WNW33	WNW37	WNW33	WNW22	NNW6	ENE7	NNE10	ESE2	NNW2	NE10	ESE4	SSW5	W16.5	WNW37	
31-May	SW7	SW8	SSW1	E4	ENE3	N3	NE2	W4	NE6	NNE4	N8	N10	NE11	NNE12	NNE13	NE13	NE12	NE13	NE11	NNE12	NE10	E11	ESE11	ESE12	NE5.4	NNE13	

N0.7WNW1.2NNW0.9NNW1.1	NW1.6	NW1.1	WNW1.5	WNW1.6	NNW2.2	NNW3.2	NNW5.1	NNW6.1	NNW5.8	N6.3	NNW5.9	N5.4	NNE6.0	NNE6.4	NNE6.4	NE4.9	NE4.4	NE4.1	NE1.9	ENE1.4						Diurnal Average
NNW22	NW27	NW28	W22	WNW26	W25	W31	W29	W30	W33	N30	WNW32	WNW33	WNW37	WNW33	WSW34	WSW36	NW26	NW23	S23	ENE19	ENE21	W28	W31			Diurnal Maximum

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

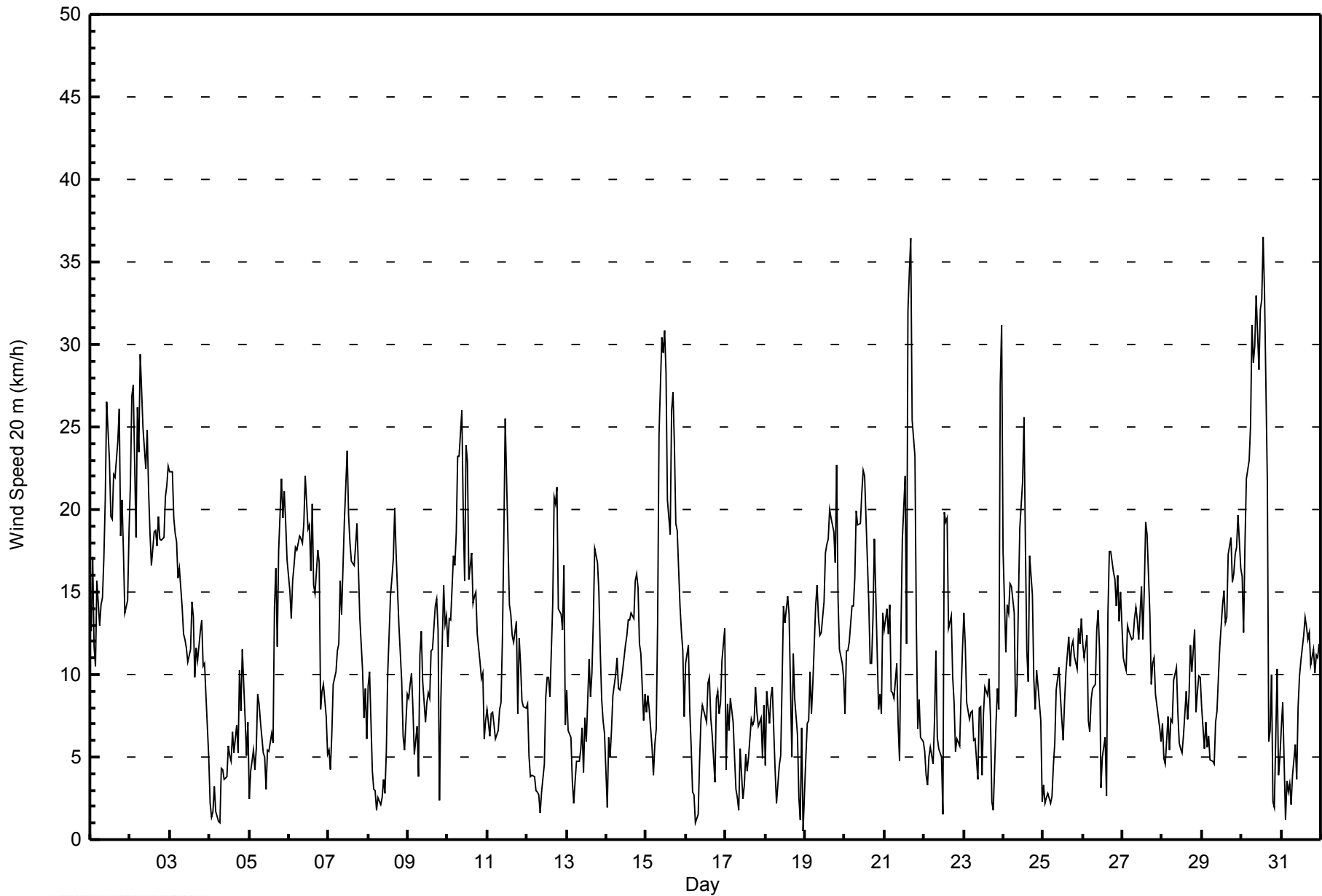


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 14 km/h on May 23 23:00																	Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																				
Minimum Value: 1 km/h on May 21 23:00																		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



**WBEA**  
**Hourly Averages**

**Wind Speed 20 m (WS20m) - km/h**  
**Mannix - May 2014**







**WBEA**  
**Cumulative Frequency Distribution**

**Wind Speed 20 m (WS20m) - km/h**  
**Mannix - May 2014**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	133	17.88	17.88
6 - 11	278	37.37	55.24
12 - 19	248	33.33	88.58
20 - 28	69	9.27	97.85
29 - 38	16	2.15	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

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

**Mannix - May 2014**

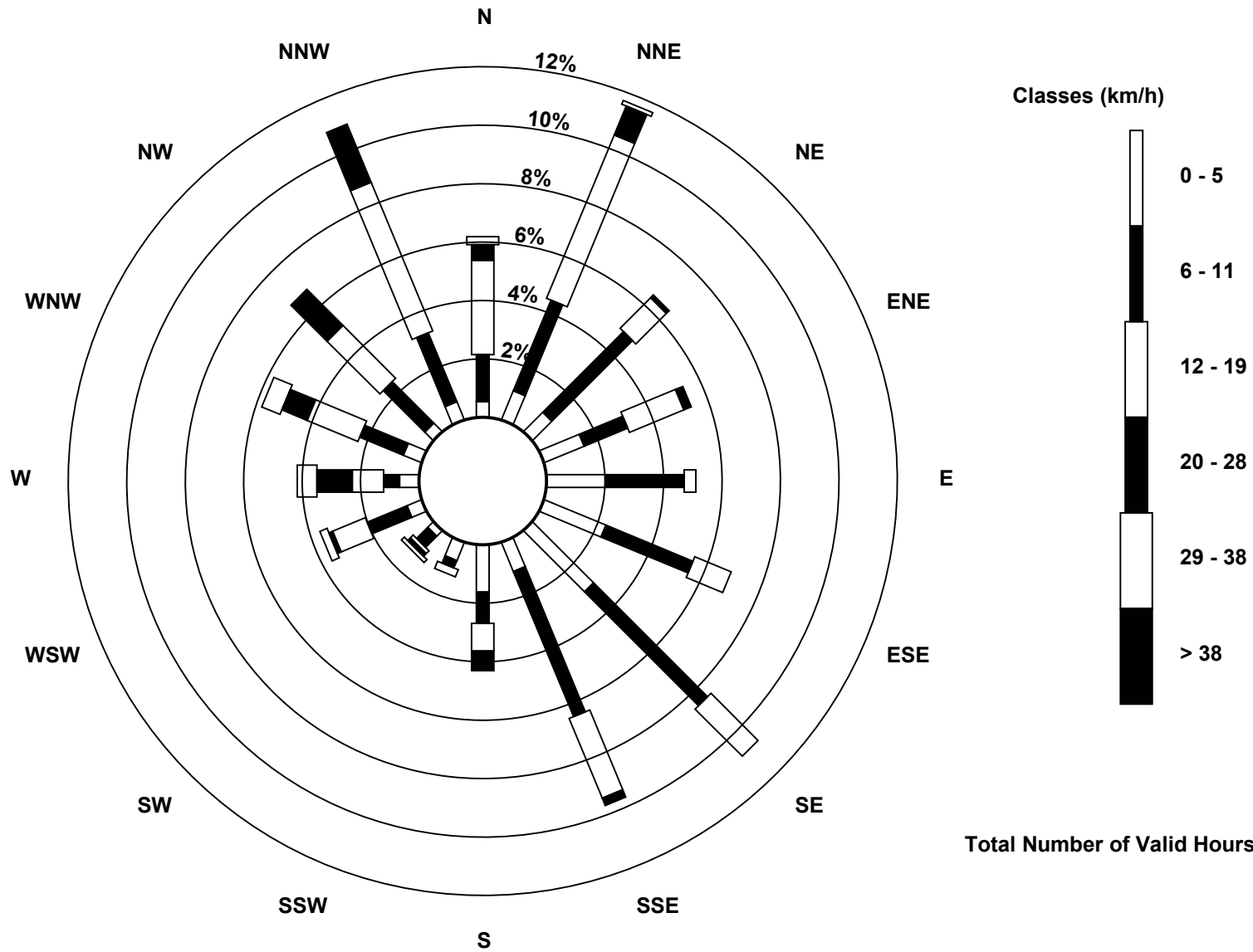
Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	4	8	7	11	15	17	22	8	12	5	2	4	5	5	3	5	133
6 - 11	12	25	29	12	20	24	41	40	8	2	4	11	4	12	15	19	278
12 - 19	24	45	11	15	3	10	17	22	7	2	1	9	8	14	19	41	248
20 - 28	4	8	1	2	0	0	0	2	5	0	1	1	9	7	13	16	69
29 - 38	2	1	0	0	0	0	0	0	0	0	0	1	2	5	5	0	16
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	46	87	48	40	38	51	80	72	32	9	9	27	31	43	50	81	744

Total Number of Valid Hours: 744

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

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





Summary of Hour Averages

Mannix - May 2014

Maximum Speed: 46 km/h on May 30 14:00	Maximum Daily Speed Average: 25.2 km/h on May 2	Hours in Service: 744
Minimum Speed Value: 1 km/h on May 4 03:00	Minimum Daily Speed Average: 3.9 km/h on May 16	Hours of Data: 744
Maximum Diurnal Speed Average: 8.0 km/h at hour 18	Minimum Diurnal Speed Average: 0.6 km/h at hour 3	Hours of Missing Data: 0
Monthly Average Velocity: 3.7 km/h 5.5 deg	Percentiles: P <sub>1</sub> = 2 P <sub>10</sub> = 5 Q <sub>1</sub> = 9 Median = 14 Q <sub>3</sub> = 20 P <sub>90</sub> = 25 P <sub>99</sub> = 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-May	W17WNW21	NNE18	NNW16	NNW22	NW19	NW21	NW19	WNW20	WNW25	NW33	NNW29	NNW24	NNW24	NW27	NW26	NNW31	NNW33	NNW24	NNW27	N24	NNW19	NNW20	NW25	NW22.0	NNW33	
2-May	NW28	NW35	NNW35	NNW23	WNW33	WNW30	WNW36	NW34	NNW31	NNW29	NNW32	NNW27	NNW23	N21	N24	N24	NNE23	NNE24	N23	N24	N24	N27	NNW28	NNW30	NNW25.2	WNW36
3-May	NNW29	NNW29	NNW26	NNW25	NNW24	NNW21	N21	NNW17	NNW15	NNW14	NNW14	N13	NNE13	NNE17	NE15	NE11	ENE13	NE12	NNE15	NNE16	NE14	NE15	NE12	E8	N15.3	NNW29
4-May	E5	SE2	ENE1	N2	NNE2	ENE2	SE2	SSE5	S5	SSE4	ENE4	E6	E6	SE6	ESE7	SE6	SSE9	S7	SW12	S10	S15	SSE10	ESE7	E10	SE4.5	SSE15
5-May	SE5	SSW8	S10	SSE6	SSE8	SSE12	SSE11	SSE9	E6	ENE6	NE4	ENE6	NE6	NE7	NNE7	E17	ENE19	ENE14	ENE21	ENE25	ENE25	ENE25	ENE19	E9.5	ENE25	
6-May	ENE18	NE17	NNE20	NNE21	N23	NNE23	N23	NNE23	N21	NNE23	NNE27	NNE24	NNE23	NNE20	NE24	NNE19	NE18	NNE21	NNE21	NNW11	NW12	N13	N11	N9	NNE18.6	NNE27
7-May	N9	NNW6	NNW10	N15	N16	N17	N16	NNW20	NNW17	N24	N27	NNW29	NNW25	N22	N16	NNW21	N23	NNE23	NNE19	NE17	NE13	NE9	NNE11	NNE8	N16.6	NNW29
8-May	NE12	NE13	NE5	ESE4	SSE4	ESE3	SE3	SE2	WSW2	ENE4	SSW3	NNW7	NNE12	NNE17	NNE18	NNE21	NNE24	NNE20	NNE16	NNE14	NNE12	NNE8	N7	N12	NNE8.5	NNE24
9-May	N11	N12	N13	N10	N6	NNW9	WNW4	WNW12	NW15	NNW11	NW8	NW10	NW10	WNW10	NNW14	NNW13	NNW17	N18	N16	N3	NNW11	NNW21	NNW18	NNW18	NNW11.2	NNW21
10-May	NW16	WNW19	WNW19	WNW23	WNW22	WNW23	W26	W26	WNW31	NW24	NW19	NNW30	NW28	NW20	WNW22	NW17	NNW18	NNW19	NNW15	NW13	NW12	NW13	W9	WSW12	NW18.6	WNW31
11-May	WSW12	W11	WNW14	NW13	WNW10	W10	W10	W10	SW10	SW14	W20	NW30	NW22	NNW18	NNW17	NNW15	NW14	NNW16	NNE10	NNE16	NNE15	NE13	ENE11	E10	NW9.0	NW30
12-May	E10	ESE7	E6	NE4	NE5	ENE4	SE3	E3	NE2	W3	WNW5	NW10	WNW11	WNW11	NNE10	NNE17	NNE24	NNE25	NNE27	NNE18	NNE18	NE17	E20	SE11	NNE7.8	NNE27
13-May	SSE13	SSE11	SSE10	S7	SSE4	SE5	SSE6	SSE5	ESE5	SE7	SE4	ENE7	NE7	N13	NNW10	N12	NNE16	NNE21	NNE20	NNE19	NNE17	ENE13	E10	E8	ENE5.2	NNE21
14-May	E7	S3	SE10	SE10	SE13	SE14	SE13	SE10	SE10	SE11	SE11	ESE14	ESE14	ESE15	ESE15	ESE17	SE18	SE20	SE21	SE17	SSW18	SSE12	ESE12	SE12.7	SE21	
15-May	ESE11	SSE13	SE11	SSE8	ESE6	ESE7	NE8	NNE16	NNE32	NNE39	N39	N42	NNE36	N29	N25	N35	N36	NNW32	NNW25	NNW25	NNW19	NNW17	WNW16	NW13	N17.5	N42
16-May	NNW15	NNW17	NNW12	NNW10	NNW6	NNW2	NNW1	NNW2	WNW5	NW8	NW9	NNW9	NNW9	NNW12	NNW12	NNW9	NE7	E4	SE11	SE12	SE13	E11	E14	E16	N3.9	NNW17
17-May	ESE7	SE14	SSE11	SE14	SE12	SE7	SSE3	ESE3	SSE2	WSW5	W2	SE4	SSE6	E5	ESE5	ENE8	NE8	NE8	NE11	ENE10	NE10	E10	E7	SE12	ESE5.5	SE14
18-May	NE6	NNE11	NE11	NNE11	NE12	NE9	NNE5	NNE2	SE6	ESE6	NW10	NNW16	N15	NNE18	NNE16	NE10	ENE6	SSE14	SSE11	S12	SSW6	E2	W8	NW2	NNE4.5	NNE18
19-May	SSE8	SSE12	SSE13	SSE14	SSE12	SSE12	SSE17	S19	SSE18	SSE15	SSE16	S19	SE21	SSE22	S25	S28	SSE24	SSE25	S27	S32	S24	S21	S20	S18	SSE18.8	S32
20-May	SSE13	SSE18	SSE17	SSE18	SSE19	SSE19	SSE20	SSE24	SSE23	SSE23	S28	S29	S30	S28	WSW18	SSE14	ESE14	SE19	SE23	SE19	SSE13	S12	SE12	SSE19	SSE18.5	S30
21-May	SSE18	SSE20	SSE19	SSE22	SSE14	SSE14	SSE12	SE13	SE8	WSW6	WSW15	SSW25	SW30	SSW15	SW40	WSW42	WSW43	W30	NNW30	NW17	WNW10	NW14	WNW11	SSW12	SW11.7	WSW43
22-May	S15	SSW7	SSE4	SE7	SE10	ESE7	SE12	SSE14	SE7	SE6	ENE5	WSW2	WSW22	WSW21	WSW22	WSW15	WSW16	WSW13	SSW13	S10	S12	SSE12	SSE16	SSE18	SSW7.9	WSW22
23-May	SSE23	SSE20	SSE15	SSE13	S12	S14	SSE10	SSE7	SE4	SE10	SE9	SE4	E8	ESE11	S12	SSE12	SSE10	SSE3	E2	E9	E12	ESE12	W32	WNW36	SSE7.3	WNW36
24-May	WNW22	W14	WSW17	W17	W18	WNW19	WNW17	WNW9	WNW11	WNW16	W21	W25	WNW31	N22	NNE14	NNW12	WNW21	NW19	NNW12	NNE10	NE13	ENE11	E9	ESE4	WNW11.2	WNW31
25-May	ESE5	SE5	SE7	SE7	SE5	SE4	SE5	SE7	SE11	ESE12	ESE10	E8	E7	ESE10	ESE11	ESE14	ESE13	SE14	SE16	SE14	SE18	SE18	SE16	SE19	SE10.3	SE19
26-May	SE18	ESE15	SE17	SE10	ENE10	E11	ESE13	ESE12	ESE15	SE17	SE15	SE5	N6	NE8	ENE4	ESE18	E22	ENE22	ENE20	ENE20	ENE18	ENE19	ENE16	ENE18	E12.4	ENE22
27-May	NE15	NNE14	NNE13	NNE17	NNE17	NNE15	NNE16	NNE17	NNE18	NNE17	NNE16	NNE19	NNE15	NNE20	N26	NNE24	NNE17	NNE12	NNE13	NNE14	NE11	NE10	E9	ESE7	NNE14.8	N26
28-May	E8	ESE6	ENE5	ENE9	ESE7	ESE9	SE9	SE12	E12	E9	E7	SE7	E6	ESE7	SE11	ESE8	ESE10	ESE15	ESE14	SE16	ESE10	SE11	SE13	SE14	ESE9.4	SE16
29-May	ESE11	SE8	ESE9	ESE8	ESE9	ESE7	ENE6	NE6	NNE9	NNE10	N13	N16	N20	N21	N19	NNW18	NNW23	NNW24	NNW21	NW21	WNW23	WNW23	W23	W19	NNW9.1	NNW24
30-May	W20	WSW18	WSW24	W27	W28	W30	W35	W32	W34	WNW38	WNW33	WNW37	WNW38	WNW46	WNW42	WNW27	NNW8	ENE8	NNE14	E3	N4	NE14	E6	S9	WNW19.6	WNW46
31-May	SSW14	SW15	SW8	E4	E4	N5	NNE2	W4	NE6	NNE6	N10	N12	NE12	NNE15	NNE16	NE15	NE14	NE15	NE12	NNE15	NE14	E15	ESE15	ESE16	NE6.0	NNE16

E0.7	W0.7	NNE0.6	N1.1	NNW1.6	NNW1.6	NNW1.6	NNW1.6	NNW2.7	NNW4.1	NNW6.1	NNW7.4	NNW7.1	N7.8	NNW7.3	N6.7	NNE7.5	NNE8.0	NNE7.8	NE6.1	NE5.7	NE5.3	ENE2.7	E2.2	Diurnal Average	
NNW29	NW35	NNW35	W27	WNW33	W30	WNW36	NW34	W34	NNE39	N39	N42	WNW38	WNW46	WNW42	WSW42	WSW43	NNW33	NNW30	S32	N24	N27	W32	WNW36	Diurnal Maximum	

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



Summary of Hour Standard Deviations

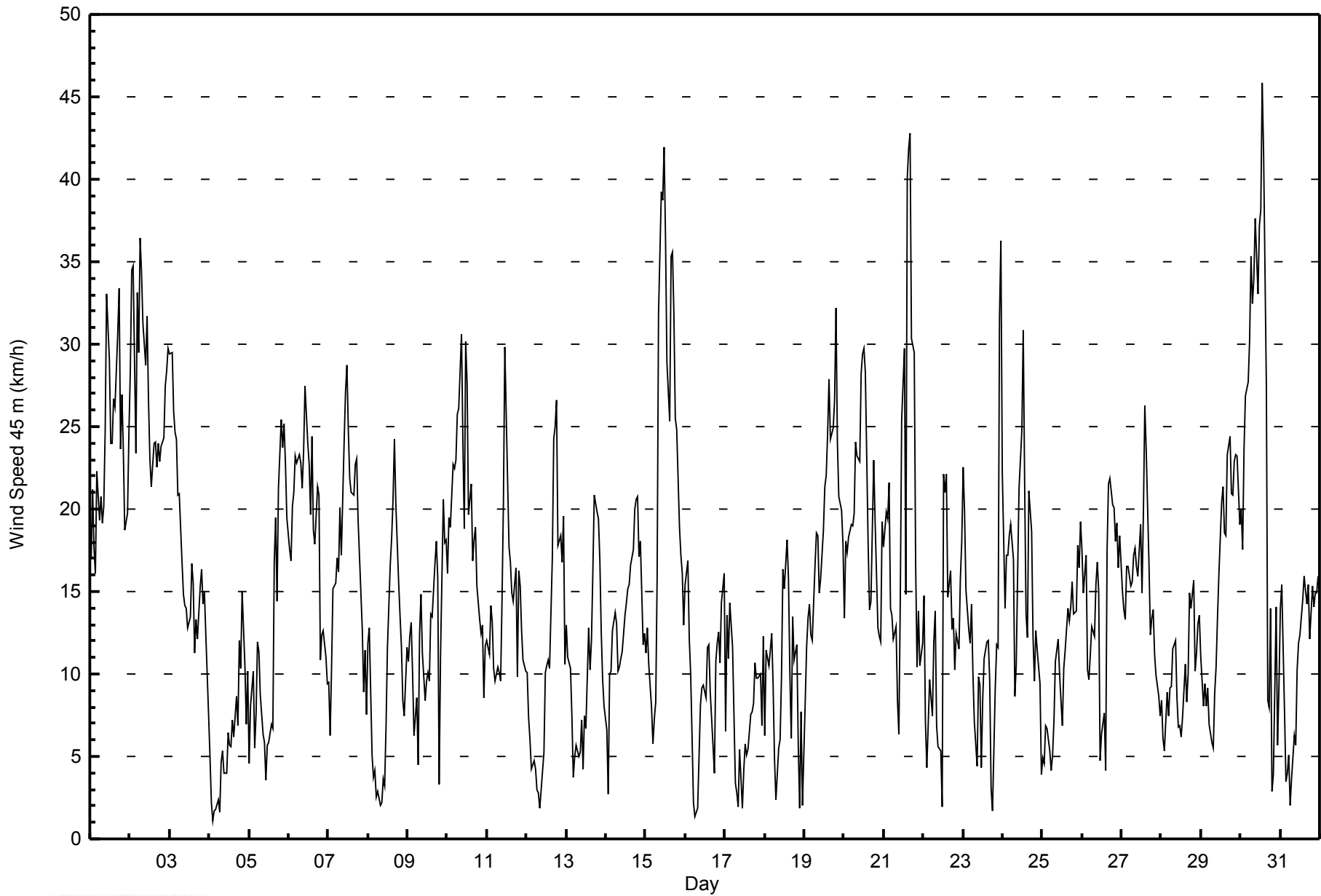
Mannix - May 2014

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



**WBEA**  
**Hourly Averages**

**Wind Speed 45 m (WS45m) - km/h**  
**Mannix - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Wind Speed 45 m (WS45m) - km/h**  
**Mannix - May 2014**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	78	10.48	10.48
6 - 11	200	26.88	37.37
12 - 19	275	36.96	74.33
20 - 28	140	18.82	93.15
29 - 38	43	5.78	98.92
> 38	8	1.08	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Wind Speed 45 m (WS45m) - km/h**  
**Mannix - May 2014**

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	4	5	8	9	7	16	9	2	1	0	3	3	3	1	3	78
6 - 11	8	13	20	12	25	27	30	18	6	3	2	1	6	8	8	13	200
12 - 19	18	46	22	10	6	20	31	36	10	5	3	10	4	8	17	29	275
20 - 28	22	24	1	9	1	0	5	11	8	1	0	4	8	13	10	23	140
29 - 38	3	2	0	0	0	0	0	0	3	0	1	0	6	10	4	14	43
> 38	2	1	0	0	0	0	0	0	0	0	1	2	0	2	0	0	8
<b>Totals</b>	57	90	48	39	41	54	82	74	29	10	7	20	27	44	40	82	744

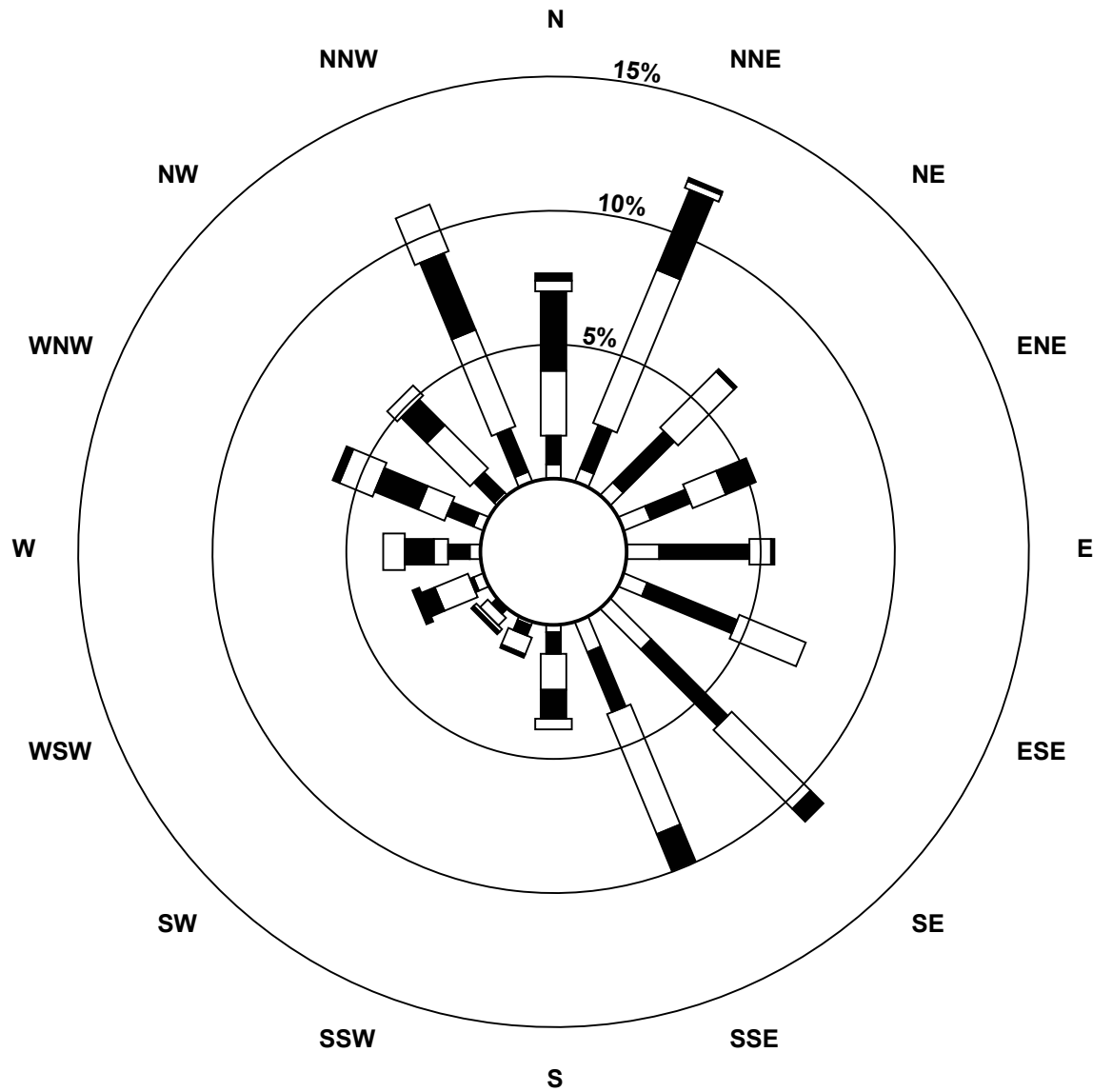
Total Number of Valid Hours: 744

Total Number of Hours: 744

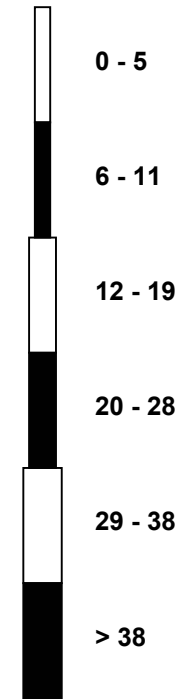


Wood Buffalo Environmental Association  
 Wind Rose May 2014

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



Classes (km/h)



Total Number of Valid Hours: 744



Maximum Speed: 49 km/h on May 30 14:00	Maximum Daily Speed Average: 28.0 km/h on May 2	Hours in Service: 744
Minimum Speed Value: 2 km/h on May 4 05:00	Minimum Daily Speed Average: 4.6 km/h on May 18	Hours of Data: 744
Maximum Diurnal Speed Average: 9.1 km/h at hour 18	Minimum Diurnal Speed Average: 0.2 km/h at hour 3	Hours of Missing Data: 0
Monthly Average Velocity: 4.1 km/h 5.6 deg	Percentiles: P <sub>1</sub> = 2 P <sub>10</sub> = 5 Q <sub>1</sub> = 9 Median = 15 Q <sub>3</sub> = 22 P <sub>90</sub> = 28 P <sub>99</sub> = 44	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-May	W21WNW24	NNE22	N21 NNW28	NW24	NW25 NNW24	WNW22	NW26 NNW35	NNW31	NNW25	NNW26	NW29	NW28 NNW34	NNW38	NNW27	NNW31	N27	N22 NNW23	NW29								NNW24.9	NNW38
2-May	NW32	NW39 NNW39	NNW26	WNW36	WNW32	WNW38	NW38 NNW35	NNW32	NNW35	NNW29	NNW26	N23	N26	N26	NNE25	NNE27	N25	N27	N27	N31	N32	N33			NNW28.0	NW39	
3-May	N33	N33 NNW29	N27	N27	N23	N23	N18 NNW16	NNW14	NNW14	N14	NNE14	NNE18	NE16	NE12	ENE14	NE13	NNE17	NE19	NE17	NE19	NE16	E10			N16.9	N33	
4-May	E6	ESE3	ESE3	NNE2	NNE2	E2	SE2	SSE5	S6	SSE4	ENE4	E7	E5	SE6	SE7	SE6	SSE9	S7	SSW12	S11	SSE17	SSE12	SE7	E10	SE5.0	SSE17	
5-May	SE5	SSW9	S12	S6	SSE9	SSE13	SSE13	SE8	ESE6	ENE6	NE4	ENE6	NE6	NE8	NNE7	E17	ENE21	ENE15	ENE24	ENE29	ENE27	ENE28	ENE25	ENE21	E10.4	ENE29	
6-May	ENE19	NE19	NNE24	NNE24	NNE26	NNE25	N25	NNE25	NNE23	NNE26	NNE30	NNE27	NNE25	NNE21	NE26	NNE20	NE20	NNE23	NNE23	NNW13	NW15	N13	N13	N12	NNE20.6	NNE30	
7-May	N12	N9	N13	N17	N19	N21	N19	N23	NNW18	N26	N30	NNW30	N27	N23	N22	NNW23	N25	NNE25	NNE21	NE20	NE15	NE10	NNE13	NNE9	N18.6	NNW30	
8-May	NE14	NE15	NE6	ESE4	SSE6	SE4	SE3	SE2	WSW2	ENE4	SSW3	NNW7	NNE12	NNE18	NNE19	NNE22	NNE26	NNE22	NNE17	NNE15	NNE14	NNE11	N9	N13	NNE9.4	NNE26	
9-May	N12	N14	N14	N11	N7	NNW9	WNW5	W13	NW15	NNW12	NW9	NW9	NW10	NNW10	NNW14	NNW14	NNW17	N20	N17	N4	NNW13	NNW24	NNW21	NNW22	NNW12.1	NNW24	
10-May	NW19	NW22	NW22	WNW26	WNW26	WNW25	W27	W27	WNW32	NW26	NW20	NNW33	NW29	NNW21	WNW22	NW18	NNW20	NNW21	NNW17	NW14	NW14	NNW15	W9	W15	NW20.3	NNW33	
11-May	W16	NNW16	NNW21	NW16	NNW13	NNW13	W15	NNW12	SW9	SW16	W21	NW31	NW22	NNW19	NNW17	NNW16	NW15	NNW18	NNE11	NNE20	NNE20	NE17	ENE14	E11	NW10.6	NW31	
12-May	E10	ESE6	ESE5	ENE3	ENE4	E4	SE3	E3	NE2	W3	NW5	NW10	NW10	NW11	NNE11	NNE18	NNE26	NNE27	NNE29	NNE21	NNE22	NE20	E21	SE9	NNE8.4	NNE29	
13-May	SSE15	SSE13	SSE12	S9	SW3	SE5	SSE7	SSE5	SE5	SE6	SE4	ENE7	NE7	N13	NNW10	N13	NNE17	NE22	NNE22	NNE22	NNE21	ENE16	E13	E11	ENE6.0	NE22	
14-May	E9	SE5	SE10	SE9	SE14	SE14	SE13	SE10	SE8	SE10	SE10	SE10	SE11	ESE12	ESE12	ESE12	SE13	SE15	SE15	SE22	SE22	SE17	SSW22	SSE15	SE11	SE12.1	SE22
15-May	ESE9	SE16	SE13	SE9	ESE5	ESE6	NE9	NNE17	NNE36	NNE44	NNE43	NNE47	ENE40	N33	N29	N40	N41	N37	NNW30	NNW28	NNW22	NW20	NW19	NNW17	N20.2	NNE47	
16-May	NNW20	NNW20	NNW16	NNW14	N9	N5	NNE2	N2	WNW5	NW8	NW9	NW9	NW9	NNW12	NNW12	NNW9	NE7	ESE5	SE10	SE13	SE12	E10	E14	E15	N4.8	NNW20	
17-May	ESE7	SE7	SE11	SE13	SE9	SE8	SE4	ESE3	SSE2	WSW5	WSW2	SE5	SSE6	E5	ESE5	ENE8	NE8	NE9	NE12	ENE12	ENE10	E11	ESE7	SE13	ESE5.7	SE13	
18-May	NE6	NE11	ENE13	NE12	ENE14	ENE11	NE5	NNE2	SE5	ESE6	NW9	NNW16	N16	NNE19	NNE17	NE11	ENE7	SSE14	SSE12	S13	SSW8	ESE2	WSW8	NW4	NE4.6	NNE19	
19-May	SSE12	SSE16	SSE18	SSE18	SE18	SSE15	SSE18	S19	SSE20	SSE15	SSE16	S20	SE21	SSE23	S26	S29	SSE26	SSE27	S29	S36	S28	S25	S25	S24	SSE21.4	S36	
20-May	SSE20	SSE27	SSE25	SSE26	SSE24	SSE25	SSE23	SSE26	SSE24	SSE24	S30	SSE32	S32	S31	SW19	S13	ESE10	SE18	SE25	SSE23	SSE18	S15	SSE17	SSE24	SSE21.8	S32	
21-May	SSE23	SSE26	SSE25	S26	S16	S16	SSE15	SSE14	SE9	WSW7	WSW15	SSW28	SW33	SSW17	SW44	WSW46	WSW47	W32	NNW33	NW18	NW12	NW17	NNW14	SW10	SW13.9	WSW47	
22-May	S19	SSW15	SSW6	SSE2	SE10	SE8	SSE17	SSE16	SSE8	SE5	ENE5	WSW3	WSW23	WSW22	WSW24	WSW16	WSW18	SW14	S15	SSW12	S16	SSE16	SSE22	SSE25	SSW10.4	SSE25	
23-May	SSE31	SSE28	S23	S12	S10	S12	SSE12	SSE9	SSE5	SE9	SE9	SE4	ESE8	ESE10	S12	SSE13	SSE10	SSE3	ESE2	E8	E12	ESE12	W33	NNW39	S8.4	NNW39	
24-May	WNW25	W16	WSW20	W20	W21	WNW22	WNW19	WNW9	WNW11	WNW17	W22	W26	NNW33	N23	NNE15	NW13	NNW22	NW20	NNW13	NNE11	ENE14	ENE13	E10	SE4	WNW12.2	NNW33	
25-May	ESE4	SE5	SE9	SE5	SE8	SE7	SE6	SE6	SE9	ESE10	ESE9	E8	E7	ESE10	ESE11	ESE12	ESE12	SE13	SE13	SE11	SE10	SE18	SE19	SE20	SE9.8	SE20	
26-May	SE19	SE12	SE18	SE10	ENE12	E11	ESE10	ESE9	ESE12	SE14	SE13	SE6	NNE7	NE9	ENE5	ESE16	E24	ENE25	ENE23	ENE24	ENE21	E21	ENE20	ENE21	E13.2	ENE25	
27-May	NE17	NNE15	NNE15	NNE18	NNE18	NNE17	NNE17	NNE19	NNE19	NNE18	NNE17	NNE21	NNE16	NNE22	N29	NNE26	NNE18	NNE14	NNE15	NNE15	NE13	ENE11	E8	ESE6	NNE16.3	N29	
28-May	E7	ESE6	ENE5	E9	ESE5	SE7	SE8	SE11	E11	E9	E6	ESE7	E6	ESE7	SE9	ESE7	ESE9	ESE12	ESE10	SE13	ESE9	SE10	SE13	SE14	ESE8.3	SE14	
29-May	SE10	SE8	ESE7	ESE7	ESE7	ESE6	ENE6	NE6	NE10	NNE12	N15	N18	N23	N24	N21	N21	NNW27	NNW28	NNW24	NW23	NW24	WNW26	WNW26	W22	NNW10.6	NNW28	
30-May	W23	WSW22	WSW29	W31	W32	W34	W39	W35	WNW35	WNW39	WNW34	WNW39	WNW40	WNW49	WNW44	NW29	NNW10	ENE8	NNE17	ENE4	N6	NE16	E6	S9	WNW21.4	WNW49	
31-May	SSW18	SW22	SW17	WSW2	NE4	NNE7	N2	W3	NE6	NNE7	N10	N12	NE13	NNE15	NNE17	NE16	NE15	NE16	NE14	NNE18	ENE18	E16	ESE12	SE13	NE5.7	SW22	

ESE0.7	SW1.1	E0.2	NNW1.5	NNW2.2	NW1.4	NNW1.7	NW2.2	NNW3.2	NNW4.6	NNW6.7	NNW7.9	NNW7.5	N8.4	NNW7.9	N7.5	NNE8.4	NNE9.1	NNE8.9	NE7.2	NE6.9	NE6.1	ENE3.2	E2.0	Diurnal Average	
N33	NW39	NNW39	W31	WNW36	W34	W39	NW38	NNE36	NNE44	NNE43	NNE47	WNW40	WNW49	WNW44	WSW46	WSW47	NNW38	NNW33	S36	S28	N31	W33	WNW39	Diurnal Maximum	

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



Summary of Hour Standard Deviations

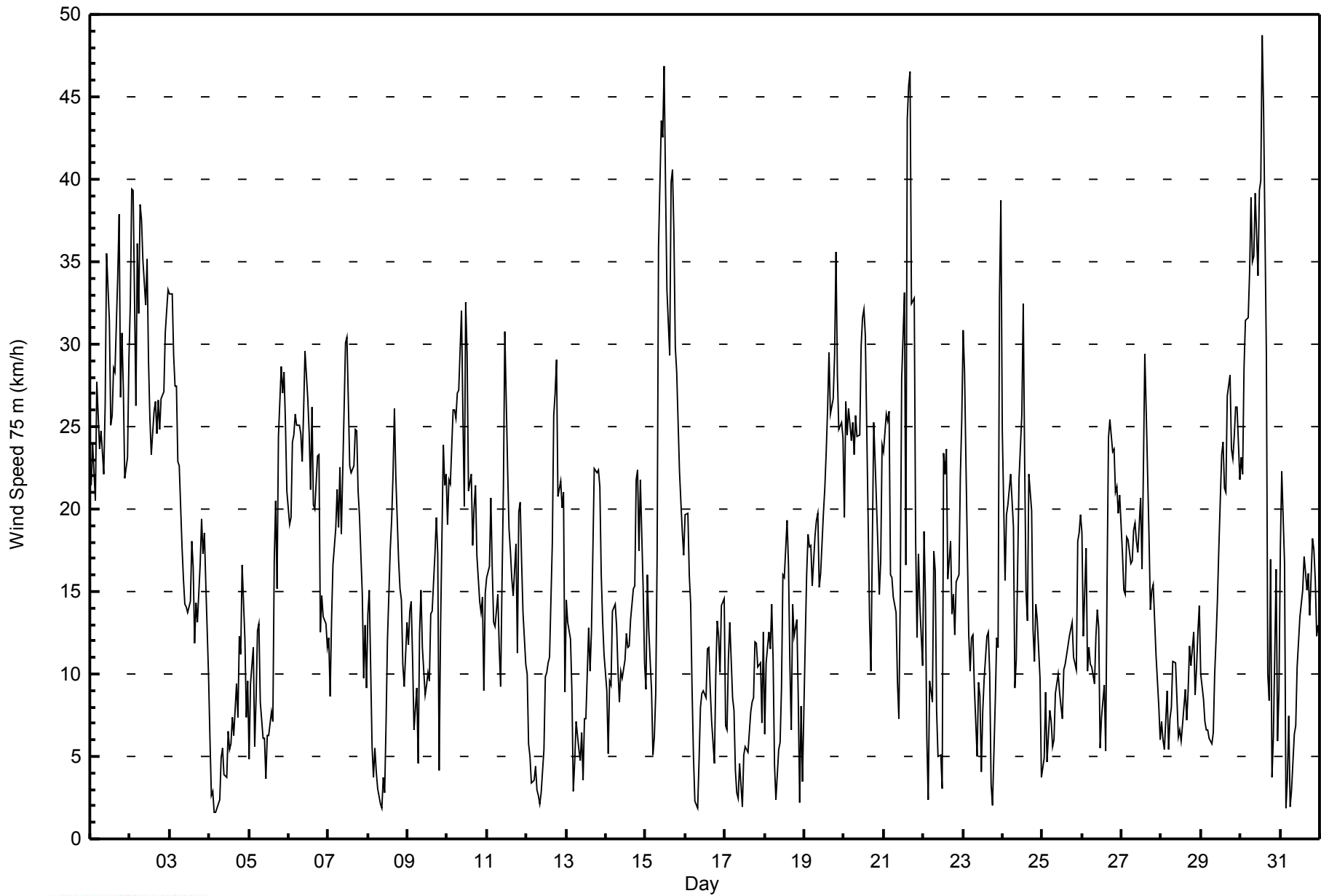
Mannix - May 2014

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 12 km/h on May 23 23:00																	Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Minimum Value: 1 km/h on May 4 05:00																									
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 2 Q <sub>1</sub> = 2 Median = 4 Q <sub>3</sub> = 5 P <sub>90</sub> = 6 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-May	2	5	3	4	4	2	3	5	4	7	7	6	6	5	5	7	7	7	7	6	4	4	4	6	7
2-May	5	7	10	9	5	5	6	7	6	6	7	6	5	4	4	5	4	5	6	6	6	6	6	6	10
3-May	6	5	5	5	6	4	5	4	3	3	3	4	4	3	5	5	4	4	3	3	2	2	1	2	6
4-May	2	1	2	1	1	1	1	2	2	3	3	3	4	4	4	3	5	3	4	4	6	4	3	2	6
5-May	2	2	2	1	2	2	2	2	2	3	3	3	3	3	4	5	6	9	4	6	5	5	5	5	9
6-May	4	3	3	3	4	3	4	4	4	5	5	6	6	6	7	7	5	4	5	4	5	4	2	2	7
7-May	2	2	6	1	2	3	3	4	4	7	6	6	5	5	6	6	5	5	4	2	2	2	4	2	7
8-May	4	4	3	2	2	2	2	1	1	2	2	3	4	4	4	4	4	4	3	3	2	2	2	2	4
9-May	2	2	2	2	2	2	3	3	3	2	3	2	4	3	4	4	3	4	8	2	6	4	3	3	8
10-May	3	3	2	2	2	3	3	4	4	5	6	6	6	5	3	3	4	4	4	3	2	3	2	2	6
11-May	2	2	1	2	2	2	1	7	2	3	7	6	8	5	5	7	4	7	4	3	2	3	2	3	8
12-May	3	2	2	1	1	1	1	1	2	3	3	5	4	4	5	4	5	4	5	4	3	4	6	4	6
13-May	2	2	2	3	2	3	2	2	2	3	2	4	4	4	4	4	6	4	4	2	2	3	3	2	6
14-May	3	2	3	6	4	4	4	4	3	4	4	4	5	4	4	5	6	6	7	8	7	4	2	4	8
15-May	3	3	3	3	2	2	2	6	6	6	7	5	9	9	6	8	7	6	7	6	4	3	2	2	9
16-May	3	2	3	2	3	1	2	2	2	3	3	3	3	3	3	4	3	3	4	2	3	3	4	3	4
17-May	4	2	2	3	4	4	3	2	2	2	2	3	2	2	3	4	2	2	2	2	3	3	3	6	6
18-May	3	1	2	2	1	1	2	2	3	3	6	3	3	3	4	4	4	4	4	2	3	2	3	3	6
19-May	5	3	2	2	2	3	4	2	5	4	6	6	6	6	7	5	5	5	5	5	4	3	2	2	7
20-May	3	2	3	2	3	3	4	3	4	5	6	6	6	5	7	12	3	7	7	5	6	6	5	4	12
21-May	3	3	2	2	3	2	2	4	3	5	3	12	8	7	8	8	8	7	6	4	3	2	1	4	12
22-May	3	2	3	1	4	3	5	3	3	2	2	8	7	6	4	5	4	5	4	1	1	1	2	1	8
23-May	1	1	4	4	4	6	5	5	2	4	2	2	3	4	6	5	5	2	1	4	4	5	12	7	12
24-May	5	6	3	4	3	4	3	4	3	4	4	5	6	6	3	6	3	3	5	3	1	2	3	1	6
25-May	2	2	2	2	2	2	3	3	4	4	4	4	4	4	4	4	5	5	5	4	4	5	5	7	7
26-May	6	5	5	4	3	4	4	3	5	6	6	3	3	2	4	6	5	4	5	4	4	5	4	4	6
27-May	3	2	3	2	2	2	2	3	3	4	3	3	3	4	3	5	3	3	2	2	2	2	3	2	5
28-May	2	2	3	2	2	3	3	4	3	2	2	3	2	2	3	3	4	5	3	5	3	4	5	5	5
29-May	4	4	2	2	2	2	2	1	2	2	3	3	3	4	5	4	8	5	4	4	3	3	3	3	8
30-May	2	3	3	4	3	5	5	5	6	6	6	6	7	8	7	7	3	4	5	4	8	4	3	4	8
31-May	3	2	5	3	2	2	2	2	2	4	5	4	4	4	4	4	3	3	3	3	3	5	5	5	5
Diurnal Maximum																									



**WBEA**  
**Hourly Averages**

**Wind Speed 75 m (WS75m) - km/h**  
**Mannix - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Wind Speed 75 m (WS75m) - km/h**  
**Mannix - May 2014**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	75	10.08	10.08
6 - 11	178	23.92	34.01
12 - 19	235	31.59	65.59
20 - 28	180	24.19	89.78
29 - 38	58	7.80	97.58
> 38	18	2.42	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Wind Speed 75 m (WS75m) - km/h**  
**Mannix - May 2014**

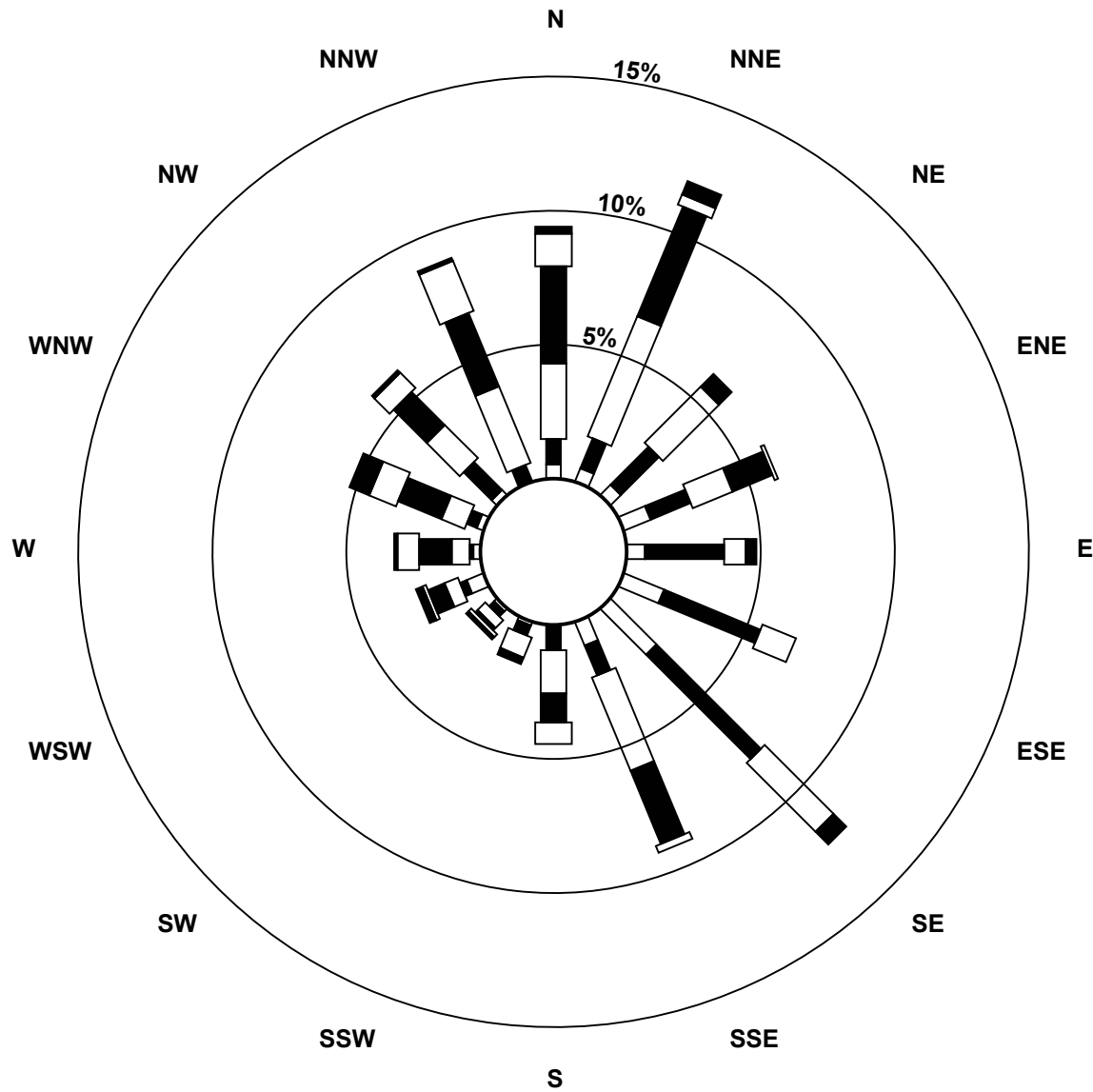
Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	4	4	4	8	5	12	18	7	0	1	1	5	2	2	2	0	75
6 - 11	7	9	15	12	22	29	41	9	7	3	2	2	1	3	11	5	178
12 - 19	21	36	22	12	6	10	27	28	12	6	3	4	5	7	13	23	235
20 - 28	27	33	5	12	3	0	5	22	8	2	1	5	9	13	13	22	180
29 - 38	9	3	0	1	0	0	0	2	6	0	1	1	6	8	6	15	58
> 38	2	4	0	0	0	0	0	0	0	0	1	2	1	6	1	1	18
<b>Totals</b>	70	89	46	45	36	51	91	68	33	12	9	19	24	39	46	66	744

Total Number of Valid Hours: 744

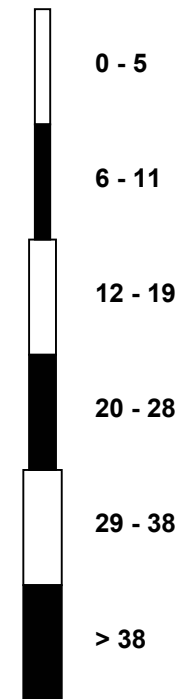
Total Number of Hours: 744

Wood Buffalo Environmental Association  
 Wind Rose May 2014

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



Classes (km/h)



Total Number of Valid Hours: 744



Maximum Speed: 49 km/h on May 15 12:00	Maximum Daily Speed Average: 28.9 km/h on May 2	Hours in Service: 744
Minimum Speed Value: 1 km/h on May 4 04:00	Minimum Daily Speed Average: 4.6 km/h on May 18	Hours of Data: 744
Maximum Diurnal Speed Average: 9.5 km/h at hour 18	Minimum Diurnal Speed Average: 0.6 km/h at hour 3	Hours of Missing Data: 0
Monthly Average Velocity: 4.1 km/h 5.9 deg	Percentiles: $P_1 = 2$ $P_{10} = 6$ $Q_1 = 10$ Median = 16 $Q_3 = 24$ $P_{90} = 30$ $P_{99} = 44$	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24						
1-May	WSW23WNW25	N24 NNW22 NNW30	NW25 NW27	NW25WNW23WNW27	NW37 NNW32 NNW26 NNW26	NW29 NW29	NW35 NW39 NNW28	NW32 N29 NNW23 NNW25	NW31																NW26.1	NW39				
2-May	WNW34 NW41	NW40 NW27WNW36WNW32WNW38	NW38 NW36 NNW34 NNW37 NNW30 NNW26 NNW24	N27 NNW27 NNE25 NNE28	N25 N28 N28	N32 NNW34 NNW35																			NNW28.9	NW41				
3-May	NNW34 NNW34 NNW30 NNW29 NNW29 NNW24 NNW23 NNW18 NNW16 NNW14 NNW14	N14 N15 NNE19 NNE17	NE12 NE15 NE14 NNE17 NNE20 NNE18	NE20 NNE18	NE20 NNE18	NE20 NNE18	NE20 NNE18	NE20 NNE18	NE20 NNE18	NE20 NNE18	NE20 NNE18	NE20 NNE18	NE20 NNE18	NE20 NNE18	NE20 NNE18	NE20 NNE18	NE20 NNE18	NE20 NNE18	NE20 NNE18	NE20 NNE18	NE20 NNE18	NE20 NNE18	NE20 NNE18	NE20 NNE18	NE20 NNE18	N17.6	NNW34			
4-May	E9 ESE5 ESE5 NNE1	N1 ESE3 SE3 SE5 S5 SE4 ENE4	E7 E6 SE6 ESE8 ESE7 SSE10	S8 SSW12 SSE12 SSE18 SSE13 ESE10	E13																				SE5.8	SSE18				
5-May	SE6 SSW10 S12	S6 SSE9 SSE12 SE13 SE8	E7 ENE7 NE4 NE6 NE7 NE8 NNE7 ENE19 ENE22	ENE17 ENE26 ENE31 ENE29 ENE30 ENE27 ENE22																					ENE11.1	ENE31				
6-May	ENE20 NE21 NNE26 NNE26	N27 N26 N26 N25 N24 N27 N30	N28 NNE25 NNE22 NNE27 NNE21 NNE21	N24 N24 NNW13 NW16	N14 N14 N13																					NNE21.4	N30			
7-May	N13 N10 N14 N17	N20 N23 N20 NNW24 NNW19 NNW27 NNW31 NNW31 NNW27 NNW23	N23 NNW23 N26 N26 NNE22 NNE20 NNE16	NE10 NNE14 NNE10																							N19.6	NNW31		
8-May	NE14 NE16 NE6 ESE5 SSE7 SE5 ESE3 SE2 WSW2 ENE4 SSW3 NNW7 NNE12 NNE18	N20 NNE23 NNE27 NNE23 NNE17 NNE16 NNE16 NNE12	N10 N14																								NNE9.8	NNE27		
9-May	NNW12 N14 N15 N12 N7 NNW9 WNW5 W13WNW15 NW12 NW9 WNW9WNW10WNW10 NNW14 NW14 NNW18	N20 N18 NNW5 NNW13 NNW25 NNW23 NNW24																									NNW12.6	NNW25		
10-May	NW20 NW23 NNW22WNW26WNW26WNW26 W27 W27WNW32 NW26 NW21 NW33 NW30 NW22WNW22 NW18 NNW21 NNW23 NNW18	NW15 NW15 NW15 W9 W16																									NW20.9	NW33		
11-May	W17 W18WNW22WNW17WNW14WNW14 W17WNW13 SSW9 SW16 W22WNW31 NW23 NW19 NW18 NNW16 NW15 NNW18 NNE12 NNE21 NNE22	NE19 ENE15 E13																									NW11.3	WNW31		
12-May	E12 ESE9 E7 ENE3 ENE3 E6 SE4 E2 NE2 WSW3 WNW6 NW10WNW10WNW11 NNE11 N18 NNE26 NNE28 NNE30 NNE22 NNE23	NE22 ENE24 ESE13																									NNE8.8	NNE30		
13-May	SE15 SE15 SSE13 S9 W4 SE4 SSE8 SSE6 SE6 SE7 SE4 NE7 NE7 NNW13 NNW10 NNW13	N18 NNE23 NNE23 NNE23 NNE23 ENE18 ENE16	E14																								NE6.3	NNE23		
14-May	E14 ESE8 SE11 SE13 SE15 SE16 SE15 SE11 ESE10 SE11 ESE12 ESE15 ESE16 ESE17 ESE18 ESE18 ESE18 ESE23 SE24 SE26 SE21 SSW23 SSE17 ESE17																										SE15.0	SE26		
15-May	ESE16 SE18 SE14 SE10 ESE8 ESE9 NE9 NNE18 N37 N45 N44 N49 N41 N35 N31 N42 N43 NNW39 NNW32 NNW30 NNW24 NNW22 NNW20 NNW19																										N21.0	N49		
16-May	NNW22 NNW21 NNW17 NNW16	N10 N6 NNE3 NNW2 WNW5 WNW8 WNW9 NW9 NW9 NNW12 NNW12 NNW9 NNE7	E5 SE11 SE14 SE13 E14 E19 E21																								N5.1	NNW22		
17-May	ESE10 ESE12 SE13 ESE11 ESE11 ESE12 SE5 ESE4 SSE3 SW4 WSW2 SE5 SE6 E6 E5 NE8 NE8 NE9 NE13 ENE13 ENE10 E14 ESE9 SE15																										E7.0	SE15		
18-May	ENE7 ENE11 ENE14 NE12 ENE14 ENE12 ENE5 NNE2 ESE7 ESE6 NW9 NNW16 N16 N20 NNE17 NE11 ENE7 SE15 SSE13 S14 SSW10 ESE2 WSW8 WNW4																										NE4.6	N20		
19-May	SE14 SSE18 SSE21 SE20 SE20 SSE18 SSE19 SSE20 SSE20 SSE16 SSE17 SSE20 SE23 SSE25 S27 SSE30 SSE27 SSE28 S30 SSE37 S30 S27 S28 S27																											SSE22.9	SSE37	
20-May	SSE22 SSE30 SSE28 SSE29 SSE28 SSE29 SSE26 SSE27 SSE25 SSE26 SSE31 SSE33 SSE33 S32 SW20 SSE14 ESE21 ESE22 SE28 SE26 SSE20 SSE16 SE21 SSE27																											SSE24.3	SSE33	
21-May	SSE27 SSE28 SSE27 SSE27 S17 S16 SSE15 SSE15 SSE11 WSW8 SW15 SSW29 SSW34 SSW17 SW45WSW46WSW47 W34 NW34 NW18WNW13 NW18WNW15 SW9																											SW14.8	WSW47	
22-May	S18 SSW15 SSW9 S4 SE10 SE14 SSE20 SSE18 SSE8 SE5 ENE5 SW3WSW23WSW22WSW24WSW16 SW19 SW14 S15 S13 S17 SSE18 SSE24 SSE28																											S11.4	SSE28	
23-May	SSE31 SSE31 SSE26 SSW12 SSW9 S11 SSE12 SSE10 SSE5 SE10 SE9 SE4 E9 ESE11 SSE13 SSE13 SSE11 SSE3 ESE2 E12 E15 ESE16 W33 W39																											SSE9.0	W39	
24-May	WNW26 W16WSW21WSW21 W22WNW23WNW20 WNW9WNW11 W16 W21 W26WNW33NNW23 N15 NNW14WNW22 NW20 NNW13 NNE11 NE15 ENE14 E12 SE5																											WNW12.4	WNW33	
25-May	ESE6 ESE5 SE9 SE6 SE9 SE9 ESE8 ESE11 ESE12 ESE11 E9 E8 E12 ESE13 ESE15 ESE16 ESE15 ESE18 ESE16 ESE16 SE21 SE21 SE23																											ESE12.1	SE23	
26-May	SE23 ESE18 SE21 SE14 ENE14 E14 ESE16 ESE16 ESE18 ESE18 ESE16 ESE7 NNE8 NE10 ENE6 E22 ENE27 ENE28 ENE25 NE26 ENE23 ENE24 ENE22 ENE23																												E16.2	ENE28
27-May	NE19 NNE16 NNE16 NNE19 N19 NNE18 N17 N19 NNE20 NNE19 NNE18 NNE21 NNE17 N23 N30 N27 NNE19 NNE15 NNE16 N16 NE14 NE12 E10 E9																											NNE17.0	N30	
28-May	E9 ESE7 ENE5 ENE10 ESE9 ESE10 ESE9 SE12 E13 ENE9 E7 ESE7 E7 ESE8 ESE11 ESE9 ESE11 ESE15 ESE17 ESE16 ESE12 ESE12 SE15 SE17																												ESE10.4	SE17
29-May	ESE14 ESE10 ESE10 ESE10 ESE10 ESE9 ENE7 NE7 NE11 NNE13 N15 N18 N24 N25 N22 NNW22 NNW28 NNW29 NW24 NW24WNW25WNW26 W27 W23																												NNW10.4	NNW29
30-May	W24WSW24WSW30WSW33WSW33WSW36 W39 W35 W35 W39 W34 W39 W40WNW49WNW44WNW30 NNW11 NE9 N18 NE4 N7 NE17 ENE7 S8																												W21.8	WNW49
31-May	SSW17 SW22 SW20 WSW4 NNE4 N8 NW2 W3 NNE6 N7 N11 NNW12 NNE14 NNE16 NNE17 NNE17 NNE15 NE16 NE14 NNE19 NE19 E21 ESE19 ESE20																												NE6.0	SW22

ESE1.6 S1.1 SE0.6 NNW1.3 NNW2.0 NNW0.8 W1.3 NW2.0 NNW2.9 NNW4.5 NNW6.7 NNW7.9 NNW7.6 N8.5 NNW8.0 N7.6 N8.7 NNE9.5 NNE9.3 NE7.7 NE7.4 NE6.9 ENE4.2 E3.3	Diurnal Average
NNW34 NW41 NW40 WSW33 WNW36 WSW36 W39 NW38 N37 N45 N44 N49 N41 WNW49 SW45 WSW46 WSW47 NW39 NW34 SSE37 S30 N32 NNW34 W39	Diurnal Maximum

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





Summary of Hour Standard Deviations

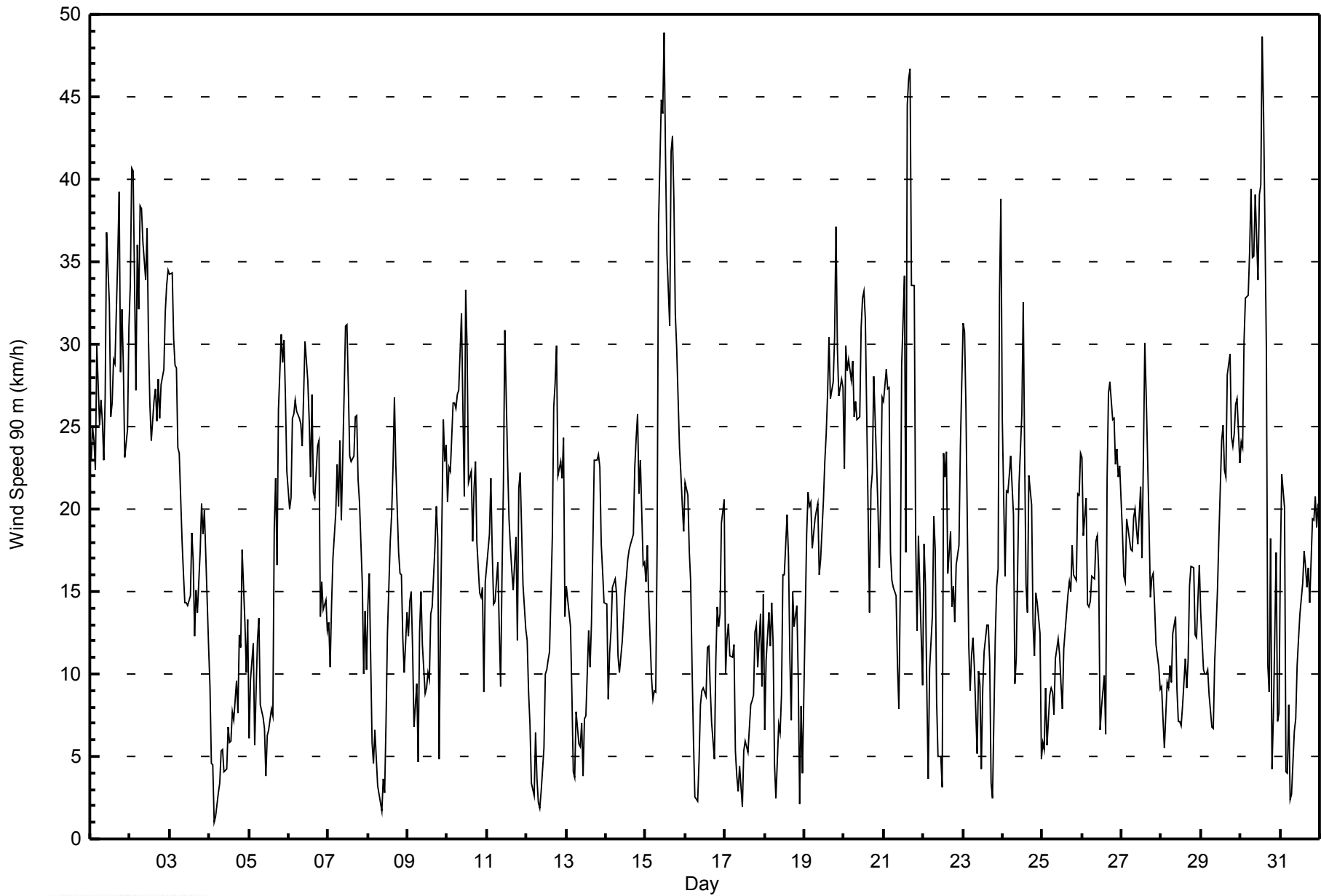
Mannix - May 2014

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 12 km/h on May 23 23:00																		Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0							
Minimum Value: 1 km/h on May 4 05:00																									
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 2 Q <sub>1</sub> = 2 Median = 4 Q <sub>3</sub> = 5 P <sub>90</sub> = 6 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-May	2	5	2	4	4	2	4	4	4	7	7	6	6	5	4	7	7	7	7	6	3	4	4	5	7
2-May	5	7	10	8	5	5	6	7	5	6	6	7	5	4	4	5	4	4	6	6	6	6	6	6	10
3-May	6	5	4	5	5	4	5	4	3	3	3	4	4	3	5	5	4	4	3	3	2	2	1	2	6
4-May	1	2	2	1	1	2	2	2	2	3	4	3	4	4	4	3	5	3	4	4	6	4	3	3	6
5-May	2	2	2	1	2	2	2	2	3	3	2	3	3	3	4	6	6	9	4	6	5	5	5	5	9
6-May	4	3	3	3	4	2	4	4	4	5	5	6	6	6	7	8	5	4	4	4	5	4	3	3	8
7-May	1	2	6	1	3	3	2	4	4	7	6	6	5	5	6	5	5	5	4	2	2	2	4	2	7
8-May	4	3	3	1	2	2	2	2	1	2	2	3	4	3	4	4	4	4	3	3	2	2	2	2	4
9-May	2	2	2	2	2	2	3	3	3	2	3	2	4	3	4	4	3	4	8	2	6	4	4	3	8
10-May	3	3	2	2	2	2	2	4	4	5	6	5	5	5	3	3	4	4	4	3	3	3	2	3	6
11-May	2	2	1	2	2	1	1	7	2	3	6	6	8	5	5	7	4	7	4	3	2	3	2	2	8
12-May	2	2	1	1	1	2	1	1	2	3	3	5	4	4	5	4	5	4	5	4	3	4	5	4	5
13-May	2	1	2	4	1	3	2	2	3	3	3	4	4	4	4	4	6	4	4	2	2	3	3	2	6
14-May	3	2	3	5	4	4	4	4	3	4	3	4	5	5	4	5	4	5	7	6	5	4	2	3	7
15-May	5	3	3	3	2	2	2	6	6	5	6	5	9	8	6	8	7	6	6	6	4	3	2	2	9
16-May	3	2	2	2	2	1	2	2	2	3	3	3	3	3	3	3	3	3	4	1	3	3	3	2	4
17-May	6	3	3	2	2	3	3	2	2	2	2	3	2	2	3	4	3	2	2	1	2	3	3	5	6
18-May	4	1	2	1	1	1	3	2	3	3	6	4	3	3	4	5	3	4	4	2	3	2	3	3	6
19-May	6	3	2	2	2	3	3	3	5	4	6	6	6	5	7	5	5	5	5	5	5	3	2	2	7
20-May	3	2	2	2	2	3	4	3	4	5	6	6	6	5	7	9	4	5	6	5	6	7	4	4	9
21-May	3	3	2	3	3	2	2	4	2	5	4	12	8	7	8	8	8	7	6	4	3	2	1	3	12
22-May	3	1	3	2	4	2	4	3	3	3	3	8	8	6	4	4	5	5	4	1	1	1	2	2	8
23-May	1	1	4	4	4	6	5	6	2	3	2	2	3	3	6	5	5	3	1	5	4	4	12	7	12
24-May	5	7	3	4	3	4	3	4	3	4	4	4	5	6	3	5	3	3	5	3	1	2	2	1	7
25-May	2	1	3	1	2	2	4	3	3	4	3	4	4	4	5	5	4	5	5	4	4	4	5	5	5
26-May	5	4	4	4	4	5	6	5	5	5	6	3	4	2	5	6	5	4	5	4	4	5	5	4	6
27-May	4	2	3	2	2	2	2	3	3	3	3	3	3	4	3	4	3	3	2	2	2	2	2	2	4
28-May	2	1	3	2	3	3	3	4	3	2	2	3	2	3	3	3	4	4	4	4	4	3	4	4	4
29-May	4	4	3	3	2	2	3	1	2	1	3	3	3	3	5	4	8	5	4	4	3	3	3	3	8
30-May	3	3	3	4	4	5	5	5	6	6	5	6	7	8	7	7	3	4	5	4	8	4	2	4	8
31-May	4	2	4	4	3	2	2	2	2	4	5	4	4	4	4	4	3	3	3	3	3	5	5	4	5
Diurnal Maximum																									



**WBEA**  
**Hourly Averages**

**Wind Speed 90 m (WS90m) - km/h**  
**Mannix - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Wind Speed 90 m (WS90m) - km/h**  
**Mannix - May 2014**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	60	8.06	8.06
6 - 11	153	20.56	28.63
12 - 19	242	32.53	61.16
20 - 28	198	26.61	87.77
29 - 38	71	9.54	97.31
> 38	20	2.69	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Wind Speed 90 m (WS90m) - km/h**  
**Mannix - May 2014**

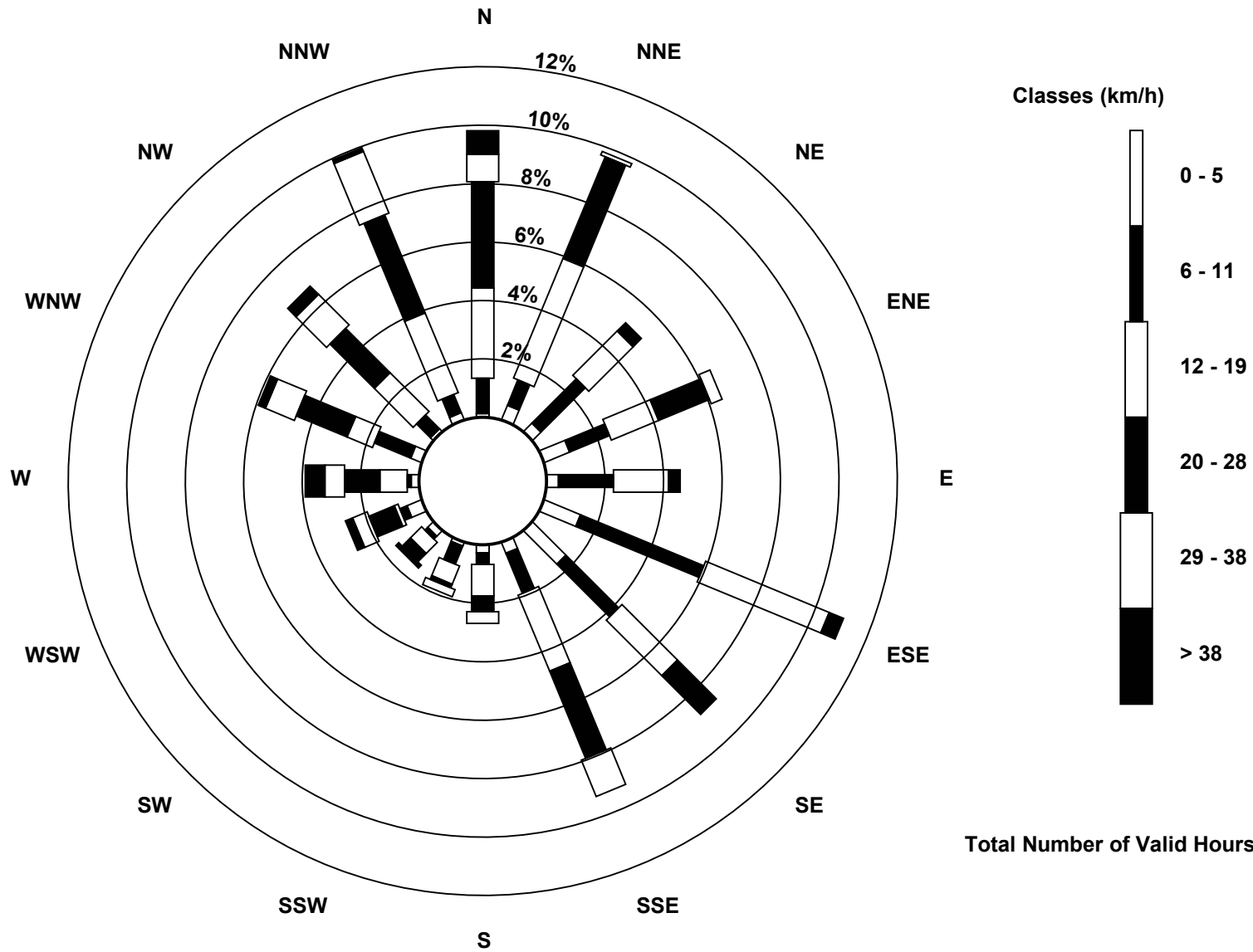
Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	1	4	3	7	3	10	12	3	2	1	2	4	2	3	1	2	60
6 - 11	9	7	16	11	14	34	19	11	3	5	1	2	1	10	5	5	153
12 - 19	23	33	16	13	14	34	20	21	8	5	4	1	7	7	14	22	242
20 - 28	27	28	3	14	3	4	14	24	4	1	3	7	9	14	16	27	198
29 - 38	7	1	0	3	0	0	0	10	3	2	0	4	5	8	11	17	71
> 38	6	0	0	0	0	0	0	0	0	0	1	2	5	2	3	1	20
<b>Totals</b>	<b>73</b>	<b>73</b>	<b>38</b>	<b>48</b>	<b>34</b>	<b>82</b>	<b>65</b>	<b>69</b>	<b>20</b>	<b>14</b>	<b>11</b>	<b>20</b>	<b>29</b>	<b>44</b>	<b>50</b>	<b>74</b>	<b>744</b>

Total Number of Valid Hours: 744

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

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





Summary of Hour Averages

Mannix - May 2014

Direction of Maximum Speed: 295 deg on May 30 14:00		Hours in Service:	744
Direction of Maximum Daily Speed Average: 334.1 deg on May 2		Hours of Data:	744
Direction of Minimum Speed: 233 deg on May 19 00:00		Hours of Missing Data:	0
Direction of Minimum Daily Speed Average: 2.6 deg on May 16		Percent Operational Time:	100.0
Monthly Average Direction: 311.1 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-May	266	291	10	343	332	305	310	320	283	300	323	339	335	335	319	312	326	325	335	327	354	346	331	322	323.1
2-May	306	308	325	326	294	292	300	307	330	340	334	338	343	351	354	351	22	23	4	9	357	352	345	345	334.1
3-May	346	345	344	345	344	346	347	344	335	338	338	3	15	26	38	39	64	52	32	34	36	38	44	82	5.9
4-May	94	244	285	282	278	128	140	150	189	134	61	93	101	145	120	126	173	174	223	173	168	168	118	97	151.7
5-May	99	220	173	153	150	154	154	153	102	77	39	57	48	43	20	82	72	60	60	72	70	68	67	71	79.3
6-May	65	39	20	17	10	10	8	11	10	14	13	16	24	27	38	17	35	16	18	346	323	351	345	342	16.5
7-May	2	308	338	348	351	347	348	344	337	346	348	335	347	348	0	340	2	14	27	37	45	47	23	9	356.5
8-May	49	50	44	128	162	96	124	120	254	64	208	342	16	27	17	17	16	23	23	27	24	16	8	358	25.6
9-May	360	358	357	356	12	341	302	281	305	326	319	309	302	286	334	323	328	2	3	1	331	336	333	328	332.2
10-May	312	294	294	291	289	284	278	279	288	314	318	327	318	320	300	317	336	336	329	306	308	316	257	248	303.5
11-May	252	253	275	301	274	256	252	271	213	225	275	306	319	327	327	331	309	333	23	28	32	44	61	74	311.0
12-May	80	115	97	27	27	46	128	80	31	279	307	307	294	291	25	13	20	25	23	32	21	49	82	135	27.9
13-May	171	167	158	198	202	137	171	149	112	129	136	73	35	357	328	347	14	34	30	22	25	64	82	75	52.2
14-May	85	247	148	134	147	138	137	141	136	146	134	121	122	114	112	121	131	130	145	136	147	214	156	122	136.7
15-May	112	154	151	151	114	103	43	17	14	14	11	11	13	356	349	354	350	345	339	337	326	308	288	301	359.6
16-May	322	331	317	308	292	259	313	328	276	308	303	326	321	340	345	332	46	99	138	143	141	85	88	88	352.4
17-May	139	134	154	153	146	146	176	98	145	259	284	126	158	83	120	64	47	44	54	58	46	89	95	135	106.6
18-May	23	12	30	18	28	41	12	19	141	107	313	335	6	10	16	42	58	147	159	190	188	72	256	233	22.8
19-May	185	166	171	155	149	162	150	171	166	149	157	169	145	159	174	175	163	166	188	174	179	179	188	166	167.0
20-May	150	147	154	156	160	146	152	161	163	159	172	170	175	190	240	150	122	130	141	142	153	171	136	154	159.6
21-May	149	156	152	160	152	148	146	142	119	264	244	196	219	193	233	244	253	271	326	310	298	308	259	192	224.6
22-May	187	177	136	131	129	107	141	153	129	126	65	256	252	259	256	246	241	242	191	179	167	143	152	158	199.6
23-May	159	156	160	155	158	165	156	156	120	134	137	139	98	119	168	146	153	150	55	93	85	111	268	281	161.1
24-May	298	258	251	257	267	281	288	299	287	284	280	280	292	354	21	327	295	310	337	30	58	71	83	116	299.3
25-May	98	113	176	177	127	130	128	127	134	126	112	99	100	100	120	112	116	132	127	130	132	139	140	132	125.0
26-May	124	125	134	135	55	94	122	110	115	134	133	161	340	24	57	105	78	66	60	60	57	75	70	56	89.4
27-May	34	14	21	15	14	15	15	12	17	25	19	21	24	13	7	12	26	25	18	12	34	53	84	103	21.4
28-May	88	102	61	77	106	128	131	132	99	77	92	129	97	109	126	110	113	120	114	132	117	139	139	134	114.7
29-May	122	129	105	112	105	111	67	39	27	23	341	346	3	7	3	341	336	334	325	314	297	288	277	267	337.1
30-May	261	249	256	261	261	261	266	270	279	280	281	282	284	295	294	301	342	75	22	122	338	45	105	206	279.5
31-May	226	231	201	83	64	7	43	272	40	15	4	351	42	28	29	35	46	49	45	27	43	92	122	122	44.7

4.7	286.6	336.3	331.3	319.2	306.2	289.4	297.9	330.7	341.6	329.4	334.8	338.2	352.3	344.6	356.5	11.7	21.6	26.9	40.7	36.4	45.5	50.7	78.1
Diurnal Average																							

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

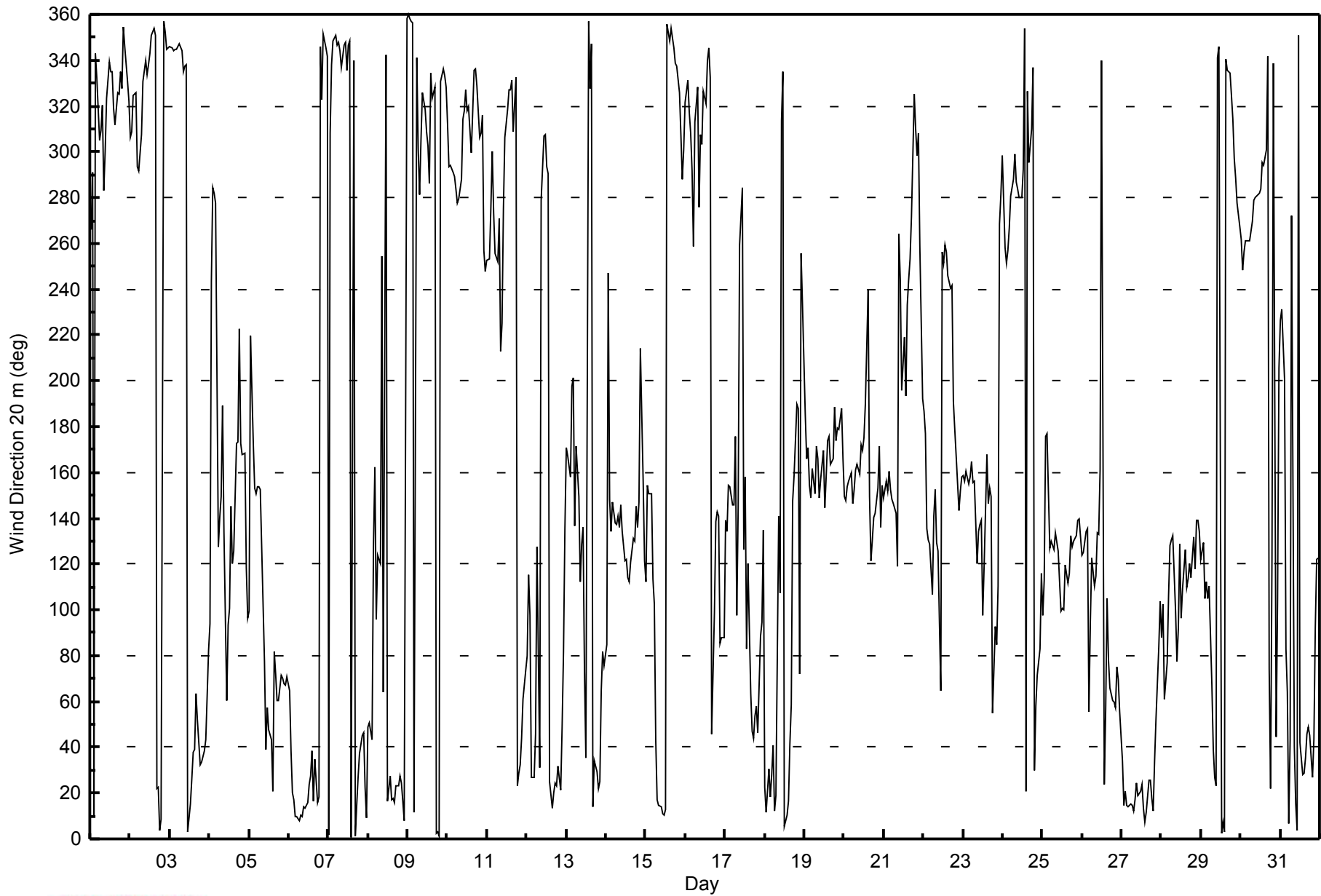


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0																	Hours in Service: 744								
Maximum Value: 100 deg on May 12 10:00																	Hours of Data: 744								
Minimum Value: 6 deg on May 23 00:00																	Hours of Missing Data: 0								
Percentiles: P <sub>1</sub> = 8 P <sub>10</sub> = 10 Q <sub>1</sub> = 12 Median = 17 Q <sub>3</sub> = 26 P <sub>90</sub> = 42 P <sub>99</sub> = 86																	Hours of Calibration: 0								
																	Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-May	8	29	16	22	13	14	14	13	13	17	13	17	17	18	14	13	13	12	18	16	14	18	14	12	29
2-May	17	15	22	20	9	10	10	13	12	16	13	14	16	14	13	12	16	14	16	15	14	15	12	13	22
3-May	12	13	12	13	14	15	15	15	19	20	24	25	27	19	25	36	23	26	15	12	9	10	9	20	36
4-May	35	75	76	26	55	67	70	24	40	68	81	49	66	64	46	52	46	37	19	20	22	30	27	14	81
5-May	87	32	18	13	14	14	12	16	27	43	70	46	53	45	58	27	20	36	15	11	12	11	11	12	87
6-May	14	11	10	9	10	9	12	12	12	14	13	15	20	19	17	25	19	15	16	22	28	20	10	24	28
7-May	19	23	35	9	10	12	13	12	14	20	16	17	18	24	23	19	19	19	14	11	11	13	17	18	35
8-May	12	13	29	36	36	76	79	64	42	44	59	53	26	17	16	15	11	12	13	11	12	14	12	12	79
9-May	13	12	12	11	17	18	63	20	23	20	25	20	35	29	24	20	17	18	26	52	22	11	13	11	63
10-May	15	10	9	8	9	9	7	9	12	13	15	14	15	15	11	15	13	12	13	12	13	15	33	13	33
11-May	9	23	13	11	9	21	12	51	14	16	22	13	20	30	29	39	18	16	28	10	9	12	10	16	51
12-May	15	21	25	14	16	30	31	35	88	100	60	44	34	29	41	25	13	14	14	12	10	17	14	24	100
13-May	16	18	12	31	31	21	23	32	28	22	73	33	56	27	39	37	31	14	13	11	9	16	11	9	73
14-May	72	13	47	13	12	11	12	17	16	18	18	21	21	19	17	19	12	13	14	15	24	20	25	13	72
15-May	13	16	12	19	13	17	30	9	11	11	11	11	10	15	15	13	12	12	14	13	12	12	7	16	30
16-May	11	11	20	32	42	20	83	82	37	47	28	32	38	31	27	45	37	62	15	10	10	20	13	9	83
17-May	48	11	21	7	18	22	27	55	77	32	72	71	40	37	54	38	30	25	11	11	16	15	29	15	77
18-May	55	9	14	15	11	19	34	73	31	40	56	18	21	17	16	33	61	13	14	12	50	79	45	98	98
19-May	29	21	28	9	10	10	12	14	24	20	27	25	18	18	26	18	16	16	17	13	14	12	12	15	29
20-May	9	9	11	9	8	11	12	10	15	15	18	17	17	17	33	38	13	13	14	9	54	58	25	11	58
21-May	11	9	9	7	12	11	15	15	21	90	22	22	29	39	13	15	14	36	10	17	15	22	18	25	90
22-May	20	23	35	11	14	15	19	12	32	26	41	97	18	18	17	19	20	23	20	17	14	11	10	6	97
23-May	7	9	14	16	24	20	30	22	23	14	12	43	22	28	47	23	34	66	90	23	25	45	40	8	90
24-May	12	20	12	10	9	10	13	22	20	19	16	12	14	27	15	39	11	17	31	28	11	9	15	25	39
25-May	26	28	28	26	30	38	22	23	14	22	29	48	52	40	33	23	25	18	15	14	13	12	11	12	52
26-May	14	15	13	22	35	19	22	16	20	17	15	40	40	25	80	19	13	11	12	12	12	13	15	12	80
27-May	18	11	12	10	11	11	11	11	12	14	15	13	14	12	11	11	13	16	11	11	17	11	20	18	20
28-May	17	38	35	17	16	20	20	19	18	20	28	33	24	28	23	22	25	21	18	15	19	11	12	13	38
29-May	18	19	19	18	16	20	35	19	13	20	11	12	13	12	16	16	18	12	13	13	11	10	9	8	35
30-May	10	11	9	8	8	8	8	8	10	9	11	12	13	10	10	10	41	24	24	51	85	13	43	20	85
31-May	17	15	73	30	42	19	59	41	40	82	46	34	26	19	22	21	20	22	22	13	22	18	17	15	82
																	87 75 76 36 55 76 83 82 88 100 81 97 66 64 80 52 61 66 90 52 85 79 45 98								
																	Diurnal Maximum								



**WBEA**  
**Hourly Averages**

**Wind Direction 20 m (WD20m) - deg**  
**Mannix - May 2014**







Summary of Hour Averages

Mannix - May 2014

Direction of Maximum Speed: 296 deg on May 30 14:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 336.0 deg on May 2	Hours of Data: 744
Direction of Minimum Speed: 61 deg on May 4 03:00	Direction of Minimum Daily Speed Average: 3.9 deg on May 16
Direction of Minimum Speed: 61 deg on May 4 03:00	Hours of Missing Data: 0
Monthly Average Direction: 322.2 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-May	263	293	12	348	336	311	314	324	287	303	326	342	337	337	320	315	328	327	337	330	356	348	333	324	326.1
2-May	308	311	327	328	295	294	301	310	332	342	335	339	344	353	355	352	23	23	6	10	359	354	347	347	336.0
3-May	348	347	347	348	347	348	350	348	339	339	340	4	14	26	38	41	60	51	32	33	36	39	48	80	7.0
4-May	97	125	61	6	22	68	144	147	188	150	69	86	95	144	123	125	167	175	218	173	169	168	119	96	143.5
5-May	124	209	177	163	154	158	153	150	101	75	44	60	44	45	25	82	73	63	60	72	70	67	68	72	83.5
6-May	63	38	22	19	11	12	8	12	10	16	14	17	24	27	36	17	34	16	17	342	324	355	355	354	16.6
7-May	3	332	347	353	358	351	351	347	341	350	350	339	348	351	2	343	4	15	26	35	40	46	25	21	358.8
8-May	49	48	49	121	163	120	129	127	254	67	209	345	17	27	17	18	17	23	24	28	24	19	6	0	26.2
9-May	359	359	359	359	11	346	303	282	307	327	322	309	307	290	335	327	332	4	2	0	332	339	337	333	335.1
10-May	317	302	303	294	291	287	279	281	290	316	320	329	319	324	301	320	338	340	332	313	316	322	267	256	306.8
11-May	255	271	286	305	292	274	266	279	215	225	276	308	319	330	328	334	314	337	23	27	31	45	62	80	314.9
12-May	85	116	99	38	39	73	133	86	42	278	297	309	298	300	24	12	21	24	24	29	21	50	84	129	31.6
13-May	161	162	160	177	166	129	163	157	123	139	70	44	356	332	350	16	33	29	22	26	63	84	85	85	58.4
14-May	99	169	137	132	139	136	135	140	133	142	131	123	121	114	113	121	130	126	143	136	144	211	165	122	135.1
15-May	115	149	146	148	115	107	48	20	15	14	11	10	13	358	351	356	353	348	342	341	330	315	303	319	1.8
16-May	330	338	334	331	344	347	344	338	285	309	306	327	325	340	346	336	42	99	137	141	137	92	93	91	4.0
17-May	120	131	149	143	138	134	159	106	148	254	274	134	158	84	114	62	49	45	53	61	53	92	98	133	108.6
18-May	34	22	48	28	42	51	25	24	136	104	312	337	7	12	18	43	62	147	157	188	199	93	259	305	33.4
19-May	161	159	167	150	148	160	152	172	167	150	156	169	144	159	175	175	163	167	187	175	180	181	188	173	167.8
20-May	154	149	153	157	157	148	155	161	164	158	172	169	175	190	237	157	120	130	141	145	154	171	144	157	160.1
21-May	151	157	155	164	158	151	150	144	133	255	241	197	216	195	233	244	252	272	327	311	303	313	286	201	222.2
22-May	184	199	162	128	129	114	141	154	139	129	70	246	251	258	255	244	238	239	192	187	176	153	154	158	192.7
23-May	158	158	163	168	175	174	160	162	141	134	136	142	100	119	170	150	153	152	90	97	91	114	267	283	164.1
24-May	300	262	253	259	271	284	289	300	289	286	281	281	294	355	18	327	297	312	338	29	56	73	84	121	301.5
25-May	102	129	141	132	134	134	128	130	130	122	114	100	98	102	120	111	115	129	127	124	127	136	138	131	124.0
26-May	126	123	132	132	68	95	120	110	115	129	129	141	360	37	58	105	79	67	60	60	59	76	72	57	90.7
27-May	38	20	24	16	15	16	15	15	18	25	19	21	24	14	8	14	29	27	19	14	37	55	87	105	22.9
28-May	89	107	68	77	109	123	127	130	99	79	94	126	94	108	124	112	113	120	114	128	117	134	135	134	114.4
29-May	122	130	106	113	106	112	73	43	29	24	349	351	6	8	6	346	338	336	327	318	302	293	281	270	343.1
30-May	263	249	256	261	262	262	266	272	281	282	284	284	285	296	295	302	341	71	20	97	358	43	98	189	281.3
31-May	208	220	215	81	92	11	27	275	37	15	4	354	40	28	28	34	43	48	42	28	49	94	121	123	49.2

82.0	260.4	24.9	3.6	343.9	328.5	297.3	309.7	335.3	347.0	334.0	338.0	341.1	354.4	345.1	357.7	13.7	22.4	28.1	41.7	39.9	49.1	57.6	90.8
Diurnal Average																							

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

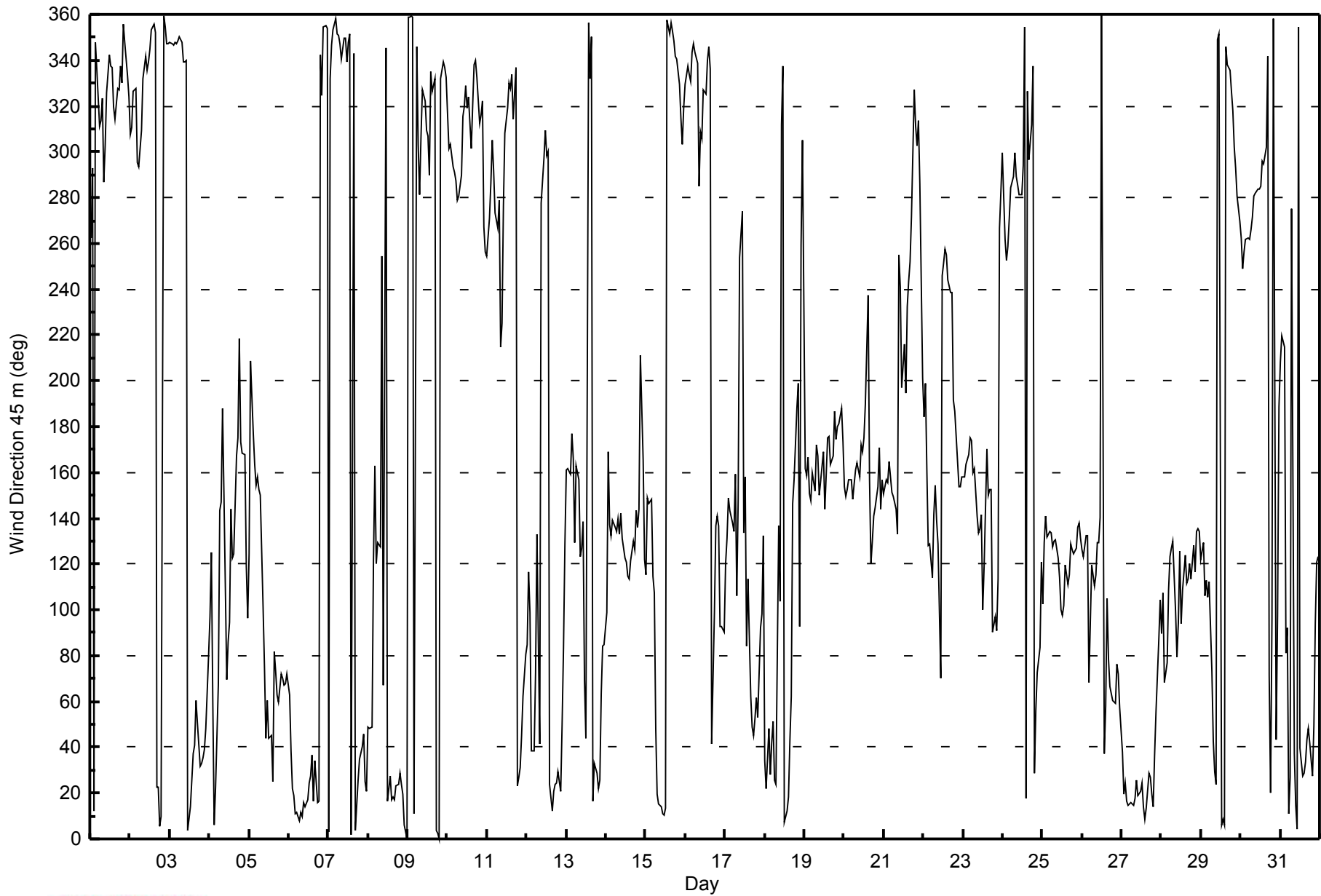


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 101 deg on May 12 10:00		Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																							
Minimum Value: 4 deg on May 23 00:00																									
Percentiles: P <sub>1</sub> = 4 P <sub>10</sub> = 8 Q <sub>1</sub> = 9 Median = 13 Q <sub>3</sub> = 21 P <sub>90</sub> = 38 P <sub>99</sub> = 77																									
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-May	6	31	12	19	10	10	10	11	12	17	11	14	15	15	11	13	11	10	17	13	11	15	11	9	31
2-May	16	14	20	19	7	8	8	12	10	13	10	11	14	10	9	8	13	11	14	12	11	12	9	9	20
3-May	9	8	9	9	10	12	11	12	15	16	20	22	23	15	22	33	19	23	11	10	7	6	5	13	33
4-May	11	32	93	33	53	44	58	24	29	60	80	36	55	66	42	45	39	30	16	16	19	26	22	11	93
5-May	33	10	9	11	12	10	9	13	21	35	63	49	52	37	53	24	17	34	13	9	11	10	9	12	63
6-May	13	9	8	6	7	5	8	8	9	11	10	12	16	16	14	23	15	12	14	19	22	15	8	10	23
7-May	8	19	24	4	6	7	9	8	12	17	13	14	14	20	19	15	16	16	12	7	9	11	12	15	24
8-May	10	11	22	30	34	66	75	63	47	48	55	47	24	14	14	11	8	9	8	9	11	10	9	75	
9-May	12	9	8	8	17	14	47	18	21	18	21	18	32	24	19	19	15	16	25	43	17	9	10	9	47
10-May	11	8	7	5	6	8	6	8	10	12	13	11	14	14	8	13	10	9	11	12	11	12	29	8	29
11-May	6	10	6	4	10	13	6	52	11	14	21	11	17	28	27	35	16	13	22	8	6	10	9	14	52
12-May	12	15	17	12	7	32	23	34	85	101	54	37	39	24	35	21	11	11	11	10	9	16	13	18	101
13-May	14	15	7	15	22	9	13	30	29	20	71	36	53	24	35	32	29	11	10	9	6	15	10	8	71
14-May	14	52	17	10	7	9	8	14	11	14	15	15	17	15	13	15	8	9	13	11	21	19	24	9	52
15-May	9	11	9	17	11	19	26	8	8	7	7	7	7	11	11	9	8	8	11	10	9	9	6	9	26
16-May	10	8	9	15	35	47	89	76	32	36	23	22	27	21	22	29	29	57	11	7	6	17	10	7	89
17-May	41	4	17	4	10	14	22	50	72	30	77	65	36	29	42	42	18	19	10	8	18	12	23	11	77
18-May	52	11	15	18	14	16	30	52	33	34	59	15	17	13	14	32	49	10	13	7	40	64	54	89	89
19-May	20	11	17	8	7	8	9	9	20	17	24	21	15	16	22	13	13	13	10	8	8	6	6	11	24
20-May	6	6	6	5	4	8	10	7	11	13	13	12	12	12	32	41	8	9	11	7	48	54	19	9	54
21-May	9	7	7	4	9	7	12	13	16	78	20	18	26	38	11	14	13	36	8	15	13	15	11	28	78
22-May	7	16	20	16	7	10	17	10	30	24	33	93	15	18	15	17	16	20	12	11	8	6	5	4	93
23-May	4	6	9	12	24	17	17	19	22	11	10	41	18	23	41	20	33	56	66	20	21	39	41	7	66
24-May	12	22	11	9	8	8	11	20	18	17	16	11	13	26	12	37	9	16	27	24	9	8	14	19	37
25-May	18	8	7	8	12	21	19	18	11	18	25	39	46	37	28	19	21	15	12	11	10	9	8	8	46
26-May	9	11	9	17	23	14	16	10	15	13	11	42	40	24	80	16	12	9	11	10	10	11	13	9	80
27-May	15	8	11	7	7	7	7	8	8	10	10	10	11	8	6	7	9	12	9	7	14	9	19	12	19
28-May	17	31	37	14	10	14	17	17	15	18	25	27	20	26	20	18	22	16	13	10	14	8	9	8	37
29-May	13	18	14	11	8	15	30	16	10	16	8	9	7	7	10	16	12	9	10	11	8	9	9	8	30
30-May	8	8	7	7	6	6	7	8	8	8	10	11	12	9	8	8	34	21	19	52	78	10	33	25	78
31-May	10	7	23	39	29	12	72	43	35	49	38	27	23	15	17	16	18	18	20	10	22	14	13	10	72
Diurnal Maximum																									



**WBEA**  
**Hourly Averages**

**Wind Direction 45 m (WD45m) - deg**  
**Mannix - May 2014**





Direction of Maximum Speed: 296 deg on May 30 14:00		Hours in Service:	744
Direction of Maximum Daily Speed Average: 337.1 deg on May 2		Hours of Data:	744
Direction of Minimum Speed: 31 deg on May 4 05:00		Hours of Missing Data:	0
Direction of Minimum Daily Speed Average: 4.6 deg on May 18		Percent Operational Time:	100.0
Monthly Average Direction: 323.2 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-May	260	291	16	353	341	318	319	327	290	304	328	343	339	337	321	316	329	328	338	331	356	350	335	325	328.1
2-May	309	312	328	329	296	295	303	311	333	342	336	339	346	355	356	353	23	23	7	11	2	356	350	349	337.1
3-May	350	350	348	350	349	350	353	349	343	340	341	4	16	26	38	43	59	53	33	35	39	45	55	82	9.9
4-May	98	121	106	27	31	97	140	147	187	153	75	87	96	139	124	125	162	175	213	173	167	165	125	96	143.8
5-May	135	204	174	177	154	159	150	145	102	77	50	58	49	48	30	82	74	62	63	73	72	68	70	74	84.9
6-May	64	42	27	23	14	15	10	14	12	18	15	18	26	29	37	19	35	17	18	339	326	357	4	1	18.7
7-May	6	353	355	4	3	356	355	352	344	352	350	341	350	353	3	345	6	16	27	35	40	48	26	29	2.0
8-May	50	48	49	117	158	134	130	135	255	68	205	348	19	30	18	19	19	25	26	30	25	21	5	2	28.4
9-May	357	359	2	360	4	348	303	281	307	329	326	309	308	290	335	329	334	6	4	356	334	343	341	336	337.5
10-May	322	309	310	297	293	290	281	281	290	317	321	330	320	327	303	324	341	344	336	317	324	328	280	262	309.8
11-May	264	283	293	307	303	285	279	291	216	225	276	309	320	332	329	336	317	340	26	28	33	49	67	89	318.7
12-May	90	118	103	67	60	93	131	101	46	265	307	311	304	307	26	12	22	25	26	30	23	54	84	125	33.3
13-May	152	154	160	177	233	138	158	166	139	128	141	65	44	354	333	354	18	34	29	23	31	65	84	88	59.9
14-May	96	131	135	134	137	136	136	140	130	139	130	125	123	117	115	125	132	126	141	138	144	208	168	128	137.2
15-May	123	147	143	141	119	116	54	24	16	15	12	12	13	360	355	358	356	351	345	344	333	322	318	327	3.5
16-May	338	346	342	342	359	5	23	350	295	309	304	326	322	338	344	342	42	102	136	140	137	96	96	96	6.4
17-May	108	124	138	135	131	130	141	119	157	237	258	137	154	85	107	61	52	48	55	66	62	95	106	133	104.2
18-May	56	54	73	47	61	71	54	33	131	105	311	342	8	14	21	44	64	147	154	185	202	106	256	306	51.4
19-May	151	156	165	149	145	156	154	173	168	153	156	169	144	158	175	174	162	166	185	174	179	182	187	178	167.2
20-May	161	156	155	162	158	151	156	161	162	158	171	167	174	188	235	172	119	132	143	147	157	171	150	159	161.6
21-May	153	159	161	169	181	175	162	150	146	247	239	197	216	196	231	242	251	271	328	312	304	313	296	214	222.2
22-May	189	203	195	167	135	132	150	158	155	139	72	238	250	256	253	242	237	236	191	193	183	163	161	163	195.4
23-May	164	167	169	189	191	179	163	167	153	139	139	138	102	120	170	154	152	153	114	99	93	115	266	284	171.4
24-May	301	266	252	259	274	287	292	301	291	286	281	281	295	355	13	325	297	314	339	30	57	74	86	133	302.1
25-May	116	134	143	132	138	141	130	130	130	123	116	101	93	103	121	112	116	131	127	124	124	136	138	133	125.6
26-May	133	126	135	134	77	97	119	111	117	128	129	127	26	52	65	104	81	69	62	62	63	80	76	62	89.8
27-May	45	29	33	20	17	19	17	17	22	28	21	22	28	16	10	17	31	31	22	17	43	60	88	106	26.0
28-May	89	115	76	79	116	125	128	132	99	82	96	123	95	109	124	113	113	122	115	129	121	133	134	136	115.5
29-May	127	131	111	118	113	119	77	53	39	30	356	358	9	11	10	350	340	338	330	321	307	297	284	272	344.5
30-May	264	250	257	262	263	263	266	272	282	282	284	285	286	296	296	304	343	65	17	64	4	45	84	178	282.5
31-May	196	218	221	240	52	16	353	280	35	13	7	356	38	28	31	34	42	49	43	31	60	95	122	125	48.3

123.5	228.7	79.8	343.4	336.7	320.4	293.8	312.7	335.1	347.1	335.8	340.3	343.3	355.8	346.0	356.1	13.1	20.7	28.2	40.4	40.7	50.8	59.0	85.4
Diurnal Average																							

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



Summary of Hour Standard Deviations

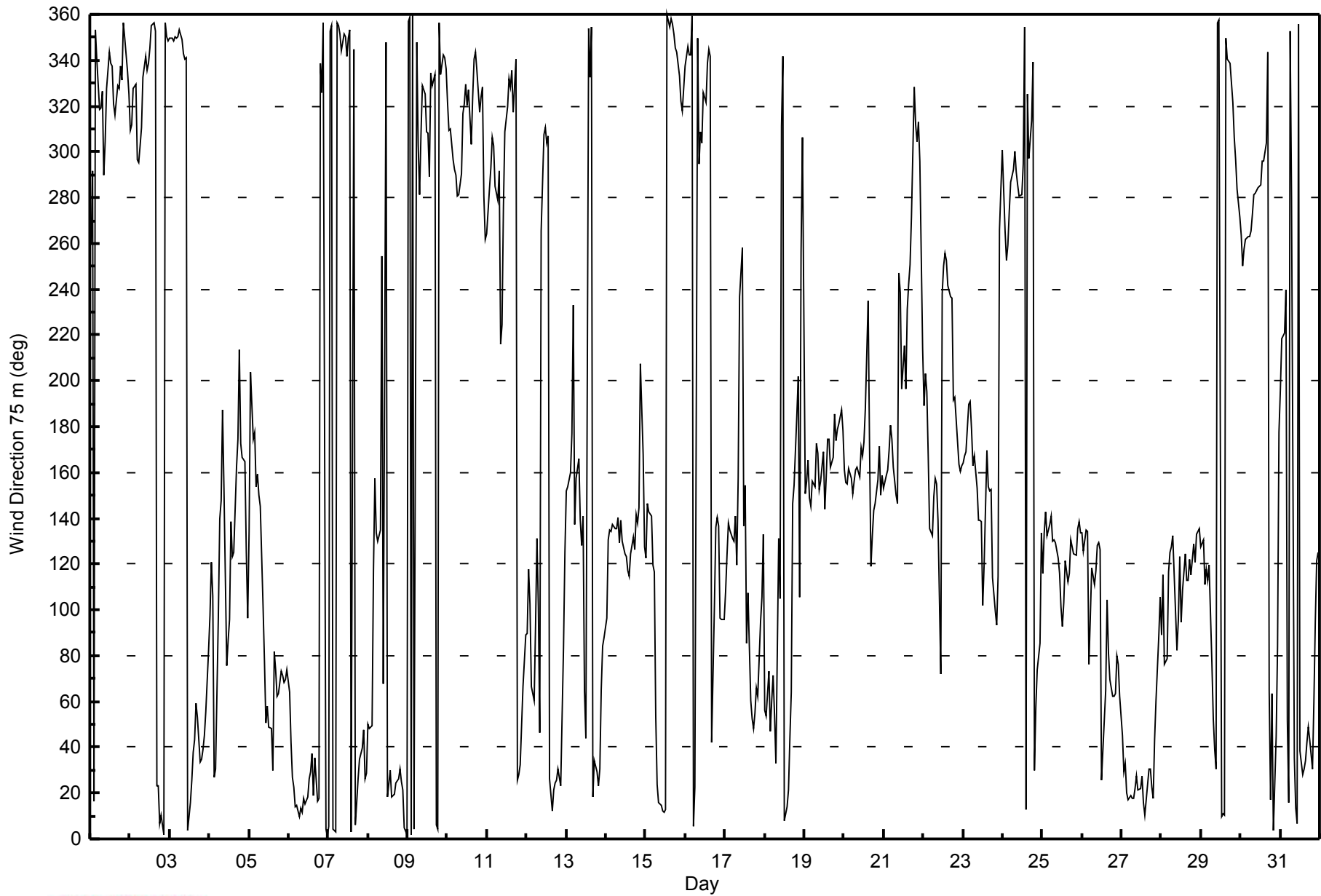
Mannix - May 2014

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0																		Hours in Service: 744							
Maximum Value: 89 deg on May 31 07:00																		Hours of Data: 744							
Minimum Value: 3 deg on May 23 00:00																		Hours of Missing Data: 0							
Percentiles: P <sub>1</sub> = 4 P <sub>10</sub> = 6 Q <sub>1</sub> = 8 Median = 12 Q <sub>3</sub> = 19 P <sub>90</sub> = 35 P <sub>99</sub> = 70																		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-May	5	34	10	17	8	9	7	9	12	16	10	13	14	15	10	12	9	9	16	12	10	14	9	8	34
2-May	15	13	19	19	7	7	7	11	8	13	9	11	13	8	7	7	11	9	12	11	11	10	8	7	19
3-May	7	7	8	9	9	11	10	11	15	14	19	22	21	12	19	30	16	20	10	8	4	5	5	9	30
4-May	11	19	45	46	41	32	32	22	26	51	78	31	54	58	39	41	33	25	15	15	17	21	20	12	78
5-May	30	10	7	12	10	8	7	11	18	26	72	41	41	29	44	23	16	33	11	8	9	8	8	10	72
6-May	11	7	6	4	5	4	6	7	8	9	9	10	14	15	13	21	14	11	13	18	14	12	8	9	21
7-May	6	15	15	4	4	5	7	7	11	16	11	13	13	18	18	13	15	15	11	5	8	10	10	13	18
8-May	8	9	22	26	21	48	70	54	51	46	61	45	22	12	13	10	7	7	8	7	7	10	8	9	70
9-May	12	8	7	7	20	12	51	17	20	17	21	18	30	23	18	17	14	16	24	39	15	7	8	8	51
10-May	9	7	6	4	5	8	5	7	9	12	12	10	13	11	7	13	8	9	11	12	10	11	25	5	25
11-May	4	6	4	6	13	11	4	73	9	14	21	11	17	25	27	33	15	12	22	6	3	9	10	11	73
12-May	12	15	19	20	17	24	20	37	86	88	51	34	38	23	33	19	10	10	10	8	8	14	11	16	88
13-May	12	12	6	8	31	35	8	23	32	19	73	36	43	25	33	30	27	9	9	7	5	12	8	8	73
14-May	9	24	9	13	6	7	8	12	13	14	14	14	16	15	16	15	9	10	11	10	19	19	19	13	24
15-May	12	9	8	15	14	18	23	8	6	6	6	5	7	10	10	7	7	6	9	9	8	7	5	7	23
16-May	8	6	8	8	12	24	73	75	33	38	22	19	25	19	21	26	31	49	12	5	5	18	10	6	75
17-May	21	11	9	4	11	14	16	36	64	35	87	54	31	25	38	36	14	14	10	7	21	11	21	11	87
18-May	47	15	12	15	12	13	29	58	23	30	60	14	15	11	13	34	41	9	12	6	9	41	52	65	65
19-May	12	6	9	7	5	6	8	8	18	16	22	20	13	14	20	12	12	11	9	7	6	4	5	8	22
20-May	4	3	4	3	6	6	8	6	11	12	12	10	10	11	33	45	11	8	9	6	43	50	14	7	50
21-May	7	5	5	5	9	7	12	11	12	73	19	16	25	35	10	14	12	37	7	14	13	14	7	36	73
22-May	7	4	17	46	8	10	13	8	29	29	36	89	13	17	15	16	15	23	11	10	4	4	4	3	89
23-May	3	3	7	15	26	17	13	17	18	12	10	37	18	21	38	19	28	58	54	19	18	36	43	6	58
24-May	12	24	11	8	7	6	10	21	17	17	15	10	12	25	12	34	7	15	23	24	8	7	15	13	34
25-May	18	10	8	9	5	11	14	14	11	17	21	31	38	32	24	19	21	14	12	13	12	8	7	7	38
26-May	9	11	7	17	16	14	15	12	16	13	11	28	40	23	52	18	10	8	9	10	9	10	10	9	52
27-May	13	9	12	6	6	7	6	6	7	9	8	8	11	6	4	7	8	12	8	7	13	8	20	14	20
28-May	17	31	39	12	14	13	15	14	15	16	24	24	20	23	18	18	23	16	14	11	14	9	9	8	39
29-May	12	19	15	13	12	16	27	15	9	16	7	8	6	6	8	17	11	7	9	10	8	9	8	8	27
30-May	8	6	5	6	5	6	7	8	8	8	9	10	11	7	7	8	32	20	15	50	59	8	27	26	59
31-May	10	5	7	89	39	5	89	48	29	35	37	25	23	13	15	14	17	16	19	8	19	13	14	10	89
Diurnal Maximum																									



**WBEA**  
**Hourly Averages**

**Wind Direction 75 m (WD75m) - deg**  
**Mannix - May 2014**



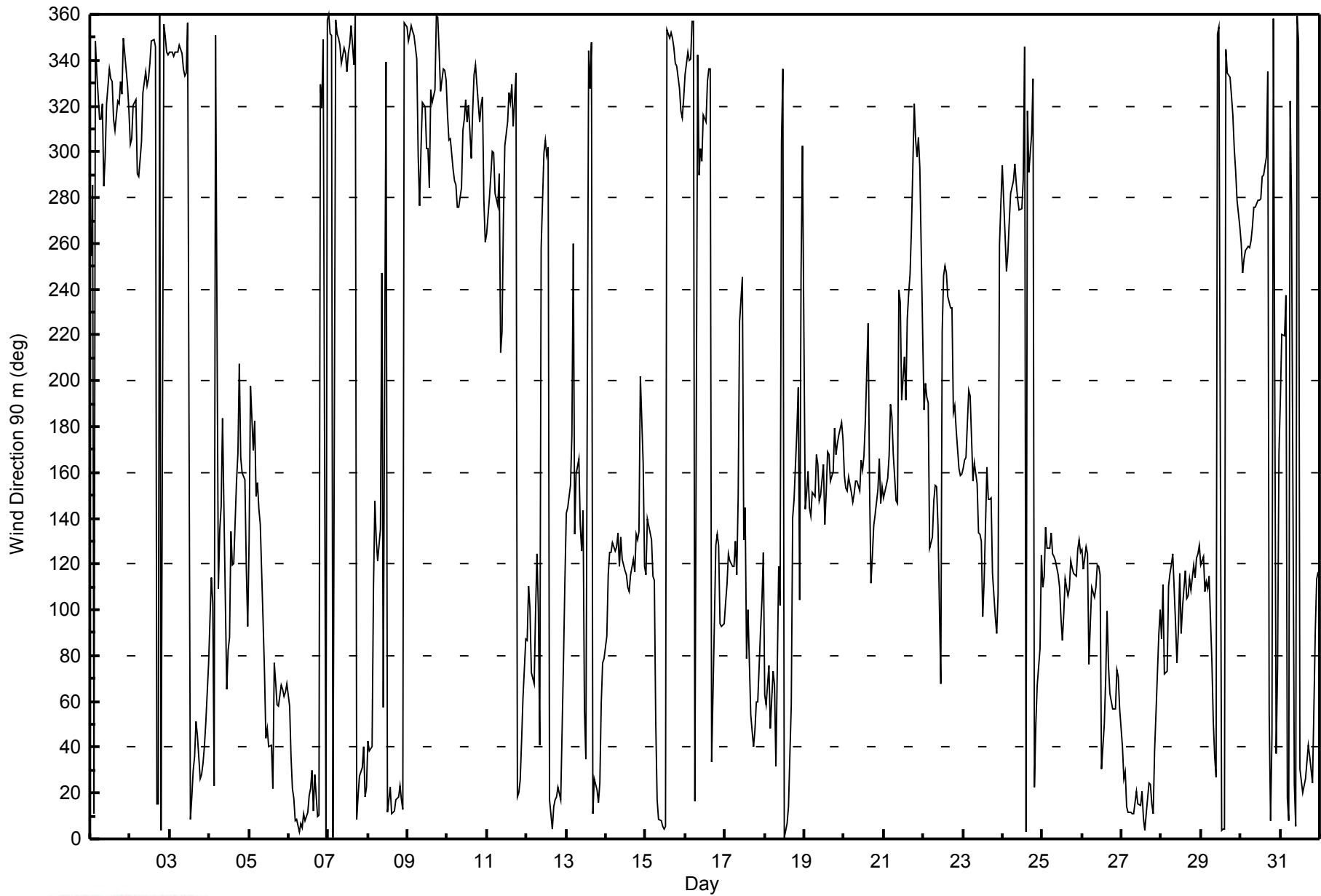


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 100 deg on May 12 09:00 Minimum Value: 2 deg on May 20 04:00 Percentiles: P <sub>1</sub> = 3 P <sub>10</sub> = 6 Q <sub>1</sub> = 8 Median = 11 Q <sub>3</sub> = 19 P <sub>90</sub> = 36 P <sub>99</sub> = 64																								Hours in 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-May	5	34	9	16	8	8	6	9	11	16	10	12	14	14	10	12	9	8	15	12	10	14	9	8	34
2-May	14	13	18	20	6	7	7	11	7	12	8	10	13	8	7	6	11	8	11	11	10	10	7	7	20
3-May	6	6	7	8	8	10	9	11	14	15	18	22	20	12	18	29	16	18	10	7	4	5	5	8	29
4-May	6	12	33	63	48	37	21	21	28	52	79	31	58	57	40	41	35	25	15	16	16	20	16	10	79
5-May	30	11	6	14	9	9	6	11	19	26	69	41	36	31	42	23	15	32	11	8	9	8	8	11	69
6-May	11	7	6	4	5	4	6	6	7	8	8	9	13	15	13	20	13	11	13	17	11	14	8	9	20
7-May	6	11	13	3	4	4	6	7	11	15	11	12	13	18	18	13	15	15	11	5	7	11	9	12	18
8-May	7	8	24	25	16	47	71	60	54	49	62	44	21	11	12	9	7	7	8	6	6	9	8	8	71
9-May	11	8	7	7	22	11	45	17	19	16	20	17	29	21	18	16	13	16	23	33	16	7	8	7	45
10-May	8	7	5	4	5	8	5	7	9	11	11	10	12	11	7	12	8	8	10	12	11	11	25	5	25
11-May	4	5	3	6	13	10	3	61	9	14	20	11	17	24	26	31	15	11	22	6	3	9	11	9	61
12-May	11	10	17	22	30	16	21	47	100	83	50	34	34	23	32	18	10	9	9	7	9	13	12	12	100
13-May	12	11	6	14	21	61	8	23	31	24	69	41	43	25	32	29	26	9	9	6	6	12	7	6	69
14-May	5	18	8	12	6	5	8	12	13	15	15	13	16	13	12	13	7	7	12	9	19	20	17	11	20
15-May	8	9	8	14	10	13	24	8	5	5	5	5	6	9	9	6	6	6	9	8	7	6	5	7	24
16-May	8	6	8	8	10	15	66	64	30	36	22	18	24	19	20	26	39	50	13	5	5	15	9	4	66
17-May	16	7	8	3	7	9	14	33	54	39	92	53	33	27	43	32	16	13	9	6	23	10	18	10	92
18-May	45	15	11	15	14	12	36	57	23	34	59	14	15	10	12	37	40	9	13	6	9	46	50	54	59
19-May	13	5	7	6	4	6	7	8	18	17	22	20	13	14	20	11	12	11	8	7	6	5	4	7	22
20-May	3	3	3	2	6	5	8	6	10	12	12	10	10	11	32	47	5	6	10	6	41	49	13	6	49
21-May	7	4	4	6	10	8	15	12	12	68	18	17	25	35	10	13	11	36	6	14	13	13	4	40	68
22-May	7	4	8	55	8	8	12	8	26	37	39	87	12	17	14	15	14	20	11	10	4	5	4	2	87
23-May	3	2	7	20	34	18	12	16	20	11	11	36	19	20	39	20	28	57	52	17	16	34	44	6	57
24-May	12	24	10	7	6	6	10	20	16	15	13	10	12	25	12	32	6	15	22	24	8	7	14	11	32
25-May	14	15	10	8	5	10	10	15	11	21	21	32	41	32	24	19	19	13	11	9	10	7	7	5	41
26-May	7	8	6	18	16	12	12	9	12	12	11	24	36	23	51	16	10	7	9	9	9	10	11	9	51
27-May	13	9	13	7	6	6	6	6	7	8	8	7	10	6	3	6	7	12	8	6	12	8	18	11	18
28-May	16	30	42	12	9	11	16	14	14	17	23	25	23	24	17	19	25	15	10	9	15	8	8	7	42
29-May	10	16	14	11	8	12	25	16	9	16	6	7	5	5	7	16	10	7	8	10	8	9	8	8	25
30-May	7	5	5	5	5	5	6	7	7	7	8	10	10	7	7	7	31	20	14	58	42	7	24	30	58
31-May	11	6	10	51	49	6	78	45	27	33	36	24	24	13	14	13	17	16	18	7	18	12	11	7	78
45 34 42 63 49 61 78 64 100 83 92 87 58 57 51 47 40 57 52 58 42 49 50 54																									
Diurnal Maximum																									



**WBEA**  
**Hourly Averages**

**Wind Direction 90 m (WD90m) - deg**  
**Mannix - May 2014**







Summary of Hour Averages

Mannix - May 2014

Maximum Value: 0.8 km/h on May 5 22:00		Maximum Daily Average: 0.4 km/h on May 26		Hours in Service: 744																						
Minimum Value: -1.0 km/h on May 2 16:00		Minimum Daily Average: -0.6 km/h on May 2		Hours of Data: 744																						
Maximum Diurnal Average: 0.1 km/h at hour 23		Minimum Diurnal Average: -0.1 km/h at hour 11		Hours of Missing Data: 0																						
Monthly Average: -0.01 km/h		Percentiles: P <sub>1</sub> = -0.9 P <sub>10</sub> = -0.5 Q <sub>1</sub> = -0.2 Median = 0.0 Q <sub>3</sub> = 0.2 P <sub>90</sub> = 0.4 P <sub>99</sub> = 0.6		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-May	-0.1	-0.3	-0.3	-0.4	-0.6	-0.3	-0.4	-0.4	-0.1	-0.3	-0.7	-0.6	-0.4	-0.6	-0.6	-0.6	-0.9	-0.9	-0.7	-0.6	-0.7	-0.4	-0.5	-0.6	-0.5	-0.1
2-May	-0.5	-0.7	-0.8	-0.6	-0.5	-0.4	-0.6	-0.6	-0.9	-0.7	-0.9	-0.6	-0.6	-0.4	-0.7	-1.0	0.0	0.1	-0.6	-0.3	-0.4	-0.6	-0.6	-0.9	-0.6	0.1
3-May	-0.9	-0.7	-0.8	-0.7	-0.6	-0.6	-0.5	-0.7	-0.3	-0.3	-0.2	0.2	0.0	0.0	0.3	0.0	0.5	0.3	0.2	0.0	0.1	-0.1	-0.1	0.1	-0.2	0.5
4-May	-0.1	-0.1	-0.2	-0.2	-0.1	0.0	0.1	0.2	0.2	0.5	0.2	0.1	0.4	0.2	-0.1	0.3	0.3	0.1	-0.2	0.2	0.4	0.2	0.2	-0.1	0.1	0.5
5-May	0.8	0.4	0.3	0.2	0.2	0.4	0.4	0.4	-0.1	0.0	0.2	-0.1	0.2	0.0	0.0	0.5	0.4	0.3	0.5	0.5	0.6	0.8	0.6	0.4	0.3	0.8
6-May	0.4	0.0	-0.3	-0.5	-0.5	-0.5	-0.5	-0.3	-0.6	-0.2	-0.5	-0.1	-0.1	0.1	0.1	-0.4	0.0	-0.2	-0.1	-0.2	-0.1	-0.3	-0.2	-0.2	-0.2	0.4
7-May	-0.2	-0.1	-0.2	-0.5	-0.5	-0.5	-0.3	-0.6	-0.3	-0.5	-0.6	-0.9	-0.4	-0.3	-0.2	-0.3	-0.2	-0.2	-0.1	0.2	0.1	0.1	0.1	-0.1	-0.3	0.2
8-May	0.2	0.0	0.2	0.2	0.0	0.0	0.2	0.1	-0.2	-0.1	-0.2	-0.1	0.1	-0.2	-0.2	-0.2	-0.4	-0.2	0.0	0.1	0.1	0.0	-0.2	-0.4	-0.1	0.2
9-May	-0.3	-0.3	-0.3	-0.4	-0.1	-0.2	0.0	0.0	-0.3	-0.2	-0.1	-0.3	-0.2	0.0	-0.3	-0.2	-0.6	-0.2	-0.2	0.0	-0.3	-0.6	-0.5	-0.7	-0.3	0.0
10-May	-0.3	-0.2	-0.5	-0.6	-0.3	-0.3	-0.4	-0.2	-0.3	-0.4	-0.5	-0.8	-0.8	-0.2	-0.3	-0.4	-0.5	-0.6	-0.5	-0.2	-0.1	-0.3	-0.2	-0.2	-0.4	-0.1
11-May	-0.2	-0.2	-0.2	-0.3	-0.2	-0.2	-0.1	0.0	-0.4	-0.2	0.1	-0.6	-0.5	-0.3	-0.2	-0.3	-0.2	-0.3	-0.1	0.2	0.0	0.1	0.3	0.3	-0.1	0.3
12-May	0.3	0.1	-0.1	0.0	0.0	0.0	0.3	0.0	0.3	-0.4	-0.2	0.0	-0.2	0.0	-0.1	-0.1	-0.3	-0.2	-0.3	0.2	-0.2	0.1	0.4	0.3	0.0	0.4
13-May	0.1	0.0	0.2	-0.1	0.0	0.1	0.1	0.3	0.4	0.2	0.0	0.3	0.4	-0.2	0.4	0.0	0.1	-0.1	0.1	0.0	0.0	0.3	0.3	0.2	0.1	0.4
14-May	0.0	-0.2	0.1	0.2	0.3	0.2	0.1	0.3	0.1	0.2	0.1	0.6	0.4	0.2	0.2	0.4	0.1	0.2	0.4	0.4	0.3	-0.1	0.3	0.1	0.2	0.6
15-May	0.2	0.3	0.2	0.2	0.2	0.3	0.2	-0.2	-0.5	-0.6	-0.8	-0.4	-0.5	-0.4	-0.4	-0.8	-1.0	-0.9	-0.6	-0.6	-0.6	-0.3	-0.1	0.2	-0.3	0.3
16-May	-0.2	-0.4	-0.1	0.0	-0.1	-0.1	0.2	0.2	-0.3	-0.2	0.0	-0.1	0.3	-0.4	-0.1	-0.1	0.3	0.3	0.4	0.3	0.3	0.4	0.5	0.4	0.1	0.5
17-May	0.1	0.3	0.1	0.3	0.2	0.0	0.0	0.0	0.3	0.1	-0.4	0.3	0.1	0.1	0.0	0.2	0.0	0.1	0.2	0.4	0.3	0.3	0.3	0.2	0.1	0.4
18-May	0.0	-0.3	0.0	-0.1	0.0	0.1	0.0	-0.1	0.1	0.3	0.0	-0.2	-0.3	-0.3	-0.1	0.2	0.0	0.4	0.3	0.0	0.0	0.0	0.1	0.0	0.0	0.4
19-May	-0.1	0.2	0.1	0.4	0.2	0.4	0.4	0.1	0.3	0.5	0.3	0.1	0.2	0.4	0.3	0.5	0.4	0.5	0.1	0.4	0.2	0.1	0.0	0.4	0.3	0.5
20-May	0.3	0.4	0.4	0.5	0.5	0.3	0.5	0.6	0.4	0.5	0.2	0.4	0.3	0.0	-0.2	0.2	0.1	0.4	0.3	0.3	0.3	0.4	0.2	0.5	0.3	0.6
21-May	0.5	0.5	0.6	0.7	0.4	0.4	0.4	0.2	0.4	0.4	-0.2	0.1	-0.4	-0.1	-0.5	-0.8	-0.6	-0.6	-0.9	-0.3	-0.1	-0.2	-0.2	0.0	0.0	0.7
22-May	-0.1	0.0	0.1	0.2	0.1	0.2	0.3	0.4	0.2	0.2	-0.1	0.5	-0.4	-0.4	-0.1	-0.2	-0.3	0.0	0.1	0.0	0.2	0.3	0.4	0.6	0.1	0.6
23-May	0.6	0.6	0.4	0.3	0.1	0.2	0.2	0.4	0.4	0.4	0.1	0.1	0.2	0.2	0.3	0.2	0.3	0.0	0.2	0.3	0.2	0.2	-0.1	-0.2	0.2	0.6
24-May	-0.3	-0.1	-0.2	-0.2	-0.1	-0.1	0.0	0.1	-0.1	-0.1	-0.2	-0.1	-0.3	-0.5	0.2	-0.1	-0.1	-0.2	-0.2	0.1	0.2	0.4	0.2	0.1	-0.1	0.4
25-May	0.2	0.1	0.0	-0.1	0.1	0.3	0.7	0.5	0.0	0.4	0.0	0.0	0.2	0.4	0.2	0.2	0.5	0.3	0.6	0.3	0.4	0.3	0.2	0.2	0.2	0.7
26-May	0.3	0.3	0.2	0.2	0.2	0.3	0.6	0.3	0.5	0.5	0.3	0.0	0.1	0.0	-0.1	0.3	0.5	0.5	0.6	0.5	0.4	0.7	0.7	0.5	0.4	0.7
27-May	0.2	0.0	0.0	-0.2	-0.2	-0.3	-0.1	-0.2	-0.1	0.0	0.1	-0.2	0.2	-0.2	-0.4	-0.4	-0.1	0.3	-0.2	-0.2	0.1	0.4	0.5	0.2	0.0	0.5
28-May	0.3	0.2	0.3	0.2	0.1	0.5	0.5	0.6	0.2	0.2	0.0	0.2	0.1	0.0	0.4	0.2	0.4	0.5	0.6	0.3	0.6	0.1	0.2	0.1	0.3	0.6
29-May	0.4	0.1	0.4	0.3	0.4	0.3	0.3	0.3	0.1	-0.1	-0.3	-0.3	-0.3	-0.3	-0.3	-0.4	-0.5	-0.8	-0.5	-0.5	-0.2	-0.1	0.2	0.1	-0.1	0.4
30-May	0.0	-0.3	-0.3	0.0	-0.3	-0.4	-0.3	-0.1	-0.2	-0.2	-0.1	-0.4	-0.3	-0.4	-0.5	-0.3	0.0	0.2	-0.1	0.0	0.0	0.2	0.1	-0.1	-0.2	0.2
31-May	0.0	0.0	0.1	0.1	0.1	0.0	0.2	-0.2	0.2	0.1	0.0	-0.2	0.5	0.1	-0.2	-0.1	0.3	0.4	0.2	0.0	0.2	0.4	0.3	0.2	0.1	0.5
																								Diurnal Average		
																								Diurnal Maximum		
																								0.8 0.6 0.6 0.7 0.5 0.5 0.7 0.6 0.5 0.5 0.3 0.6 0.5 0.4 0.4 0.5 0.5 0.5 0.6 0.5 0.6 0.8 0.7 0.6		



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 4.1 km/h on May 15 12:00  Minimum Value: 0.2 km/h on May 12 05:00  Percentiles: P <sub>1</sub> = 0.3 P <sub>10</sub> = 0.7 Q <sub>1</sub> = 1.1 Median = 1.7 Q <sub>3</sub> = 2.2 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-May	0.8	1.6	1.4	1.2	2.1	1.7	1.7	1.9	1.8	2.4	3.4	3.4	2.8	2.7	2.6	2.5	3.0	3.3	2.6	2.7	2.4	1.9	2.1	2.3	3.4
2-May	2.5	3.2	3.3	2.4	2.6	2.6	2.9	3.2	3.1	3.1	3.4	3.1	2.7	2.6	2.9	2.6	2.6	2.6	2.5	2.7	2.8	3.0	3.2	3.2	3.4
3-May	3.1	3.0	2.7	2.7	2.7	2.4	2.4	2.0	2.0	2.0	2.1	2.2	2.1	2.4	2.3	2.1	2.0	1.9	1.8	1.7	1.2	1.3	1.0	0.6	3.1
4-May	0.3	0.3	0.4	0.3	0.4	0.3	0.7	1.2	1.5	1.8	2.0	1.7	2.0	1.8	2.0	1.7	1.7	1.3	1.3	1.1	1.6	1.4	0.8	0.9	2.0
5-May	1.5	1.0	0.8	0.5	0.7	1.0	1.0	0.9	1.1	1.3	1.5	1.8	2.0	1.9	1.7	2.2	2.1	2.0	2.2	2.5	2.3	2.6	2.4	2.0	2.6
6-May	1.9	1.7	1.8	1.9	2.1	2.1	2.5	2.4	2.5	2.7	3.1	2.8	2.7	2.5	2.6	2.5	2.1	2.4	2.3	1.2	1.0	1.1	0.8	0.7	3.1
7-May	0.6	0.5	0.9	1.0	1.1	1.6	1.8	2.2	1.9	2.9	3.3	3.2	3.1	2.9	2.9	2.5	2.8	2.8	2.1	1.9	1.3	0.9	1.2	0.9	3.3
8-May	1.1	1.3	0.8	0.5	0.5	0.6	0.8	0.8	1.1	1.2	1.5	1.7	1.8	2.3	2.2	2.3	2.6	2.0	1.9	1.6	1.2	0.9	0.7	1.0	2.6
9-May	1.0	1.3	1.2	0.9	0.8	1.2	1.2	1.4	1.5	1.6	1.5	1.4	1.7	1.5	2.0	1.9	1.9	2.2	2.0	0.6	1.3	2.1	1.7	1.7	2.2
10-May	1.3	1.4	1.3	1.7	1.8	1.8	1.8	1.9	2.5	2.3	2.0	2.9	2.6	2.1	1.7	1.6	2.0	2.1	1.6	1.2	1.1	1.3	0.6	0.5	2.9
11-May	0.4	0.5	0.5	0.7	0.5	0.5	0.7	1.2	1.2	1.8	2.3	2.6	2.2	2.5	2.2	2.2	1.8	1.8	1.3	1.5	1.3	0.9	0.7	0.8	2.6
12-May	0.9	0.8	0.7	0.3	0.2	0.3	0.9	1.2	1.5	1.7	1.9	2.4	2.1	2.1	2.2	2.5	2.6	2.6	2.5	2.0	1.6	1.6	1.8	1.1	2.6
13-May	0.8	0.5	0.4	0.2	0.2	0.5	0.8	1.4	1.6	1.8	1.8	2.1	2.1	2.2	2.2	2.2	2.3	2.4	2.2	1.7	1.3	0.9	0.8	0.5	2.4
14-May	0.3	0.3	0.8	0.9	1.0	1.4	1.5	1.5	1.7	1.9	2.5	2.3	2.4	2.1	2.2	2.2	2.8	2.2	2.1	1.7	1.5	0.7	1.4	1.4	2.8
15-May	1.2	1.1	0.9	0.6	0.7	0.9	0.9	1.4	3.2	3.8	3.9	4.1	3.5	3.5	2.9	3.9	3.7	3.3	3.0	2.7	1.8	1.3	0.9	0.9	4.1
16-May	1.3	1.3	0.9	0.8	0.7	0.5	0.9	1.3	1.4	1.8	1.9	2.0	2.1	2.2	2.3	2.0	1.8	1.5	1.3	1.1	0.7	0.9	1.4	1.2	2.3
17-May	0.7	1.2	0.9	0.6	0.7	0.8	0.8	1.1	1.4	1.4	1.7	1.9	1.5	1.6	1.9	1.8	1.4	1.2	1.2	1.0	0.9	1.2	0.9	1.3	1.9
18-May	0.9	0.8	0.7	0.8	0.7	0.8	0.9	0.8	1.1	1.8	1.8	2.1	2.2	2.2	2.3	2.1	1.7	1.4	1.1	0.8	0.3	0.2	0.5	0.6	2.3
19-May	0.5	0.7	1.0	0.9	0.9	1.0	1.7	1.9	2.3	2.1	2.4	2.3	2.5	2.4	2.8	2.9	2.4	2.5	2.7	2.8	2.3	1.7	1.4	1.1	2.9
20-May	0.7	1.3	1.2	1.1	1.2	1.6	1.9	2.2	2.4	2.4	2.9	2.9	2.9	2.8	1.8	1.8	2.1	2.3	2.4	1.8	1.4	1.8	1.3	1.7	2.9
21-May	1.6	1.5	1.5	1.2	0.9	1.0	1.3	1.6	1.4	1.8	1.8	2.9	3.0	2.1	3.7	4.0	4.0	3.4	2.8	1.6	0.6	0.9	0.2	0.5	4.0
22-May	0.6	0.3	0.2	0.5	0.7	0.7	1.0	1.6	1.5	1.6	1.7	2.2	2.3	2.2	2.2	1.8	1.9	1.5	1.2	0.5	0.5	0.5	0.7	0.8	2.3
23-May	1.3	1.3	1.0	0.8	0.7	0.8	1.0	1.1	0.9	1.2	1.2	1.5	1.9	1.9	2.0	1.9	1.7	0.9	0.6	1.1	1.0	1.2	2.8	2.8	2.8
24-May	1.9	1.3	1.5	1.6	1.3	1.5	1.5	1.3	1.4	1.7	1.7	2.0	2.4	2.4	1.7	1.6	1.9	1.8	1.8	1.3	1.1	0.8	0.7	0.3	2.4
25-May	0.4	0.3	0.3	0.3	0.3	0.6	1.1	1.4	1.8	2.0	2.0	2.0	2.1	2.0	2.0	2.2	2.0	1.9	2.3	2.1	1.8	1.9	1.6	2.2	2.3
26-May	2.0	2.0	2.0	1.1	1.0	1.4	1.7	1.8	2.1	2.6	2.1	0.7	0.7	0.9	1.2	2.4	2.3	2.2	2.2	2.1	2.0	2.2	2.0	1.9	2.6
27-May	1.6	1.3	1.3	1.5	1.5	1.4	1.6	1.8	1.9	1.9	1.9	2.1	1.9	2.1	2.6	2.5	1.8	1.6	1.4	1.5	1.2	1.1	1.0	0.7	2.6
28-May	0.8	0.8	0.7	0.6	0.8	1.5	1.3	1.7	1.5	1.5	1.3	1.3	1.2	1.4	1.6	1.4	1.7	2.1	2.1	2.2	1.8	1.2	1.5	1.4	2.2
29-May	1.4	1.0	1.1	1.2	1.1	0.9	0.8	0.8	0.9	1.1	1.2	1.6	2.2	2.2	2.0	1.8	2.4	2.3	1.9	1.7	1.8	1.8	1.6	1.2	2.4
30-May	1.5	1.5	2.1	2.1	2.2	2.4	2.7	2.4	2.6	2.8	2.7	2.8	3.1	3.9	3.5	2.4	1.1	0.9	1.6	0.7	1.0	1.4	0.5	0.6	3.9
31-May	0.7	0.7	0.4	0.3	0.2	0.6	0.9	1.2	1.5	1.8	2.0	2.1	2.3	2.3	2.3	2.2	2.0	1.9	1.6	1.6	1.3	1.8	2.1	2.1	2.3
Diurnal Maximum																									



Summary of Hour Averages

Mannix - May 2014

Maximum Value: 1.5 km/h on May 28 08:00		Maximum Daily Average: 0.6 km/h on May 20		Hours in Service: 744																						
Minimum Value: -1.4 km/h on May 21 16:00		Minimum Daily Average: -0.6 km/h on May 1		Hours of Data: 744																						
Maximum Diurnal Average: 0.2 km/h at hour 7		Minimum Diurnal Average: -0.1 km/h at hour 11		Hours of Missing Data: 0																						
Monthly Average: 0.11 km/h		Percentiles: P <sub>1</sub> = -1.1 P <sub>10</sub> = -0.6 Q <sub>1</sub> = -0.2 Median = 0.2 Q <sub>3</sub> = 0.5 P <sub>90</sub> = 0.7 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-May	-0.2	-0.5	-0.3	-0.5	-0.9	-0.6	-0.4	-0.4	-0.2	-0.6	-0.9	-0.5	-0.2	-0.6	-0.7	-0.6	-1.2	-1.0	-0.7	-1.0	-0.8	-0.5	-0.6	-0.7	-0.6	-0.2
2-May	-0.6	-0.9	-1.0	-0.8	-0.7	-0.8	-0.9	-0.8	-1.1	-0.5	-0.7	-0.2	-0.5	-0.6	-0.9	-1.2	0.1	0.4	-0.2	0.3	0.2	-0.5	-0.9	-1.1	-0.6	0.4
3-May	-1.1	-1.2	-1.0	-0.7	-0.7	-0.6	-0.6	-0.6	-0.1	0.0	-0.1	0.5	0.4	-0.1	0.8	0.1	0.6	0.5	0.5	0.1	0.2	0.0	0.1	0.4	-0.1	0.8
4-May	0.2	0.2	0.2	0.1	0.2	0.1	0.4	0.3	0.2	0.7	0.6	0.2	0.7	0.4	0.0	0.6	0.6	0.5	-0.1	0.3	0.8	0.2	0.3	0.1	0.3	0.8
5-May	0.3	0.1	0.6	0.2	0.4	0.6	0.5	0.4	0.1	-0.1	0.6	0.0	0.3	0.1	-0.1	0.5	0.6	0.5	0.8	0.9	0.8	0.8	0.5	0.7	0.4	0.9
6-May	0.6	0.2	0.1	-0.1	-0.3	-0.3	-0.4	-0.1	-0.4	0.1	-0.6	0.0	0.1	0.4	0.1	-0.2	0.2	0.2	0.0	-0.1	0.0	-0.4	-0.1	0.0	0.0	0.6
7-May	-0.1	-0.1	0.0	-0.4	-0.2	-0.5	-0.3	-0.5	-0.2	-0.5	-0.6	-0.9	-0.7	0.0	0.0	-0.4	0.1	0.2	0.1	0.2	0.3	0.2	0.3	0.0	-0.2	0.3
8-May	0.3	0.2	0.5	0.3	0.2	0.3	0.3	0.2	-0.3	0.1	-0.3	-0.1	0.4	0.0	0.1	-0.1	-0.1	0.1	0.1	0.4	0.3	0.4	-0.3	-0.5	0.1	0.5
9-May	-0.3	-0.5	-0.5	-0.4	-0.1	-0.4	0.2	0.1	-0.2	-0.3	-0.1	-0.1	0.1	0.3	0.0	-0.1	-0.6	0.0	-0.1	0.0	-0.2	-0.7	-0.8	-0.8	-0.2	0.3
10-May	-0.4	-0.2	-0.3	-0.6	-0.5	-0.4	-0.7	-0.2	-0.6	-0.5	-0.5	-1.2	-0.9	0.0	-0.6	-0.3	-0.5	-0.8	-0.4	-0.2	-0.1	-0.4	-0.2	-0.3	-0.5	0.0
11-May	-0.3	-0.2	-0.4	-0.4	-0.3	-0.2	-0.2	0.1	-0.3	0.0	0.3	-0.5	-1.0	-0.1	-0.1	-0.2	-0.4	-0.2	0.2	0.2	0.1	0.2	0.4	0.5	-0.1	0.5
12-May	0.5	0.5	0.1	0.2	0.1	0.1	0.6	0.0	0.5	-0.4	-0.1	0.2	-0.1	0.0	0.2	0.1	0.0	-0.2	-0.3	0.2	-0.2	0.2	0.5	0.7	0.1	0.7
13-May	0.4	0.2	0.3	0.1	0.2	0.2	0.4	0.6	0.6	0.4	0.2	0.1	0.6	-0.2	0.9	0.3	0.3	0.1	0.4	0.0	0.0	0.3	0.5	0.3	0.3	0.9
14-May	0.2	0.2	0.5	0.5	0.6	0.6	0.4	0.5	0.1	0.3	0.3	0.9	0.9	0.5	0.3	0.8	0.4	0.3	0.7	0.4	0.5	0.0	0.4	0.4	0.5	0.9
15-May	0.5	0.5	0.4	0.3	0.3	0.5	0.4	-0.1	-0.2	-0.6	-0.9	-0.8	-0.4	0.1	-0.1	-0.9	-0.7	-1.4	-0.9	-1.0	-0.9	-0.5	-0.2	0.3	-0.3	0.5
16-May	-0.3	-0.5	0.0	0.0	0.0	0.1	0.4	0.8	-0.4	-0.3	0.1	-0.3	0.2	-0.3	-0.1	0.1	0.6	0.7	0.6	0.4	0.6	0.5	0.8	0.5	0.2	0.8
17-May	0.4	0.6	0.4	0.6	0.5	0.3	0.3	0.1	0.5	0.4	-0.4	0.6	0.1	-0.1	0.2	0.3	0.2	0.1	0.4	0.6	0.4	0.4	0.6	0.6	0.3	0.6
18-May	0.3	0.0	0.2	0.3	0.2	0.5	0.2	0.1	0.2	0.4	0.1	0.3	-0.1	-0.4	0.0	0.3	-0.1	0.4	0.4	0.1	0.1	0.2	0.1	0.0	0.2	0.5
19-May	0.4	0.6	0.5	0.6	0.6	0.6	0.6	0.2	0.6	1.0	0.6	0.1	0.5	1.0	0.5	0.8	0.5	0.9	0.5	0.6	0.5	0.4	0.1	0.4	0.5	1.0
20-May	0.6	0.8	0.8	0.8	0.7	0.6	0.7	0.9	0.8	0.9	0.8	0.8	0.5	0.1	-0.2	0.3	0.5	0.6	0.6	0.6	0.5	0.5	0.5	0.8	0.6	0.9
21-May	0.8	0.6	0.9	0.8	0.5	0.9	0.7	0.4	0.6	0.7	-0.5	0.6	-0.4	0.2	-0.9	-1.4	-0.7	-0.9	-1.1	-0.4	-0.1	-0.4	-0.3	0.2	0.0	0.9
22-May	0.1	0.0	0.2	0.4	0.4	0.3	0.7	0.7	0.4	0.4	-0.1	1.0	-0.7	-0.5	0.0	0.0	-0.2	-0.1	0.3	0.2	0.3	0.7	0.7	0.7	0.2	1.0
23-May	0.9	0.8	0.6	0.5	0.1	0.3	0.5	0.7	0.6	0.5	0.0	0.4	0.1	0.4	0.6	0.5	0.8	0.2	0.4	0.4	0.2	0.5	-0.4	-0.3	0.4	0.9
24-May	-0.5	-0.2	-0.3	-0.3	-0.2	-0.2	0.0	0.3	-0.2	-0.1	-0.3	-0.4	-0.3	-0.6	0.6	-0.1	-0.2	-0.1	-0.2	0.3	0.3	0.4	0.4	0.3	-0.1	0.6
25-May	0.3	0.3	0.3	0.3	0.4	0.3	1.1	1.1	0.0	1.2	0.0	0.2	0.5	0.5	0.7	0.4	0.6	0.8	1.1	1.0	0.9	0.3	0.3	0.5	0.5	1.2
26-May	0.6	0.7	0.5	0.4	0.6	0.5	0.9	0.4	0.8	0.9	0.8	0.4	0.3	0.3	0.2	0.5	0.4	0.5	0.7	0.6	0.4	0.8	0.7	0.5	0.6	0.9
27-May	0.4	0.1	0.1	-0.1	-0.2	-0.2	-0.2	0.0	-0.1	0.1	0.3	0.1	0.2	0.1	-0.6	-0.3	-0.1	0.5	0.0	-0.1	0.2	0.5	0.8	0.4	0.1	0.8
28-May	0.4	0.5	0.3	0.4	0.4	1.1	0.9	1.5	0.3	0.3	-0.1	0.4	-0.1	0.1	0.6	0.5	0.8	0.8	0.9	0.6	1.3	0.3	0.4	0.5	0.5	1.5
29-May	0.8	0.4	1.1	1.1	0.9	0.6	0.4	0.3	0.2	0.1	-0.3	-0.3	-0.3	-0.3	-0.2	-0.2	-0.5	-0.9	-0.7	-0.5	-0.2	-0.3	0.0	0.0	0.1	1.1
30-May	-0.1	-0.3	-0.4	-0.3	-0.5	-0.6	-0.4	-0.3	-0.5	-0.5	-0.5	-0.6	-0.6	-0.5	-0.6	-0.3	0.1	0.3	0.0	0.3	0.2	0.2	0.2	0.1	-0.2	0.3
31-May	0.2	0.0	0.0	0.2	0.3	0.1	0.6	0.2	0.4	0.1	0.7	0.1	0.9	0.3	0.0	0.2	0.3	0.5	0.4	0.2	0.3	0.2	0.4	0.7	0.3	0.9
																								Diurnal Average		
																								Diurnal Maximum		



Summary of Hour Standard Deviations

Mannix - May 2014

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 4.6 km/h on May 21 17:00 Minimum Value: 0.1 km/h on May 4 04:00 Percentiles: P <sub>1</sub> = 0.3 P <sub>10</sub> = 0.7 Q <sub>1</sub> = 1.1 Median = 1.8 Q <sub>3</sub> = 2.5 P <sub>90</sub> = 3.0 P <sub>99</sub> = 3.9																								Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-May	1.0	1.7	1.4	1.3	2.5	1.7	1.9	2.2	2.0	2.8	4.1	4.1	3.8	3.4	3.2	3.1	3.6	3.9	2.8	3.2	2.4	2.2	2.5	2.9	4.1
2-May	2.8	3.7	3.7	2.4	2.6	2.7	3.1	3.5	3.6	3.6	3.8	3.8	3.1	2.8	2.8	2.5	2.7	2.6	2.7	2.8	3.1	3.5	3.5	3.5	3.8
3-May	3.2	3.0	2.9	3.1	3.0	2.7	2.7	2.4	2.4	2.8	2.7	2.8	2.8	2.6	3.1	2.6	2.5	2.3	2.0	1.7	1.2	1.1	0.6	0.8	3.2
4-May	0.4	0.3	0.5	0.1	0.5	0.3	0.9	1.4	1.8	2.1	2.3	2.2	2.4	2.5	2.5	2.1	2.2	1.7	1.5	1.3	2.1	1.6	0.9	1.0	2.5
5-May	0.8	0.5	0.7	0.4	1.0	1.0	1.2	1.1	1.5	1.6	1.7	2.3	2.5	2.3	2.2	2.5	2.4	2.1	2.3	2.7	2.6	2.9	2.6	2.3	2.9
6-May	2.2	1.6	1.7	1.6	1.8	1.8	2.3	2.5	2.6	3.0	3.1	3.0	2.9	2.9	2.8	2.6	2.2	2.6	2.2	1.5	1.2	1.3	0.8	1.0	3.1
7-May	0.7	0.7	1.0	0.8	0.9	1.5	1.8	2.4	2.5	3.1	3.8	3.7	3.7	3.6	3.6	3.2	3.2	3.4	2.5	1.6	1.3	0.8	1.5	1.0	3.8
8-May	1.0	1.2	1.1	0.6	0.6	0.7	1.0	1.0	1.1	1.4	1.7	2.3	2.4	2.9	2.9	2.6	2.6	2.1	2.0	1.8	1.5	1.1	0.8	1.0	2.9
9-May	1.3	1.2	1.2	0.9	1.0	1.4	1.5	1.6	1.8	2.0	2.0	1.8	2.3	2.1	2.6	2.6	2.3	2.4	2.2	0.8	1.7	2.5	1.9	2.0	2.6
10-May	1.6	1.3	1.2	1.4	1.6	1.7	1.8	2.3	2.8	2.7	2.3	3.3	3.0	2.7	1.6	2.0	2.5	2.4	1.9	1.5	1.4	1.5	0.6	0.3	3.3
11-May	0.4	0.5	0.5	0.5	0.4	0.2	0.4	1.2	1.3	2.1	2.9	3.3	2.8	3.0	3.0	2.6	2.0	2.3	1.5	1.6	1.4	0.8	0.8	0.9	3.3
12-May	1.0	1.0	0.7	0.4	0.2	0.3	1.1	1.3	1.8	2.1	2.6	3.1	2.7	2.8	2.8	3.0	3.0	2.7	2.5	2.1	1.6	1.8	2.2	1.2	3.1
13-May	0.9	0.5	0.3	0.2	0.2	0.5	0.9	1.5	1.6	2.1	2.2	2.5	2.6	2.8	2.9	2.9	2.6	2.6	2.4	1.7	1.2	1.0	1.2	0.7	2.9
14-May	0.4	0.4	0.8	0.8	0.8	1.3	1.6	1.8	1.8	2.2	2.3	2.7	2.7	2.6	2.2	2.4	2.0	2.9	2.7	2.2	1.6	1.4	0.6	1.3	2.9
15-May	1.2	1.1	0.9	0.7	0.9	0.9	0.9	1.5	3.1	3.5	3.4	3.5	3.8	3.9	3.6	4.0	3.9	3.5	3.5	3.2	2.1	1.5	0.7	1.3	4.0
16-May	1.8	1.6	1.3	1.1	0.8	0.5	1.2	1.6	1.8	2.2	2.4	2.5	2.7	2.8	2.8	2.7	2.1	1.9	1.4	1.0	0.5	1.1	1.6	1.1	2.8
17-May	0.8	0.8	0.9	0.5	0.8	0.7	0.8	1.0	1.5	1.8	1.9	2.4	1.9	1.8	2.3	2.4	1.7	1.4	1.2	1.1	0.8	1.5	1.2	1.3	2.4
18-May	0.9	0.6	0.7	0.7	0.8	0.7	0.9	0.9	1.2	2.0	2.3	2.9	2.5	2.1	2.7	2.6	2.2	1.6	1.3	0.5	0.3	0.3	0.6	0.8	2.9
19-May	0.8	0.9	1.0	0.9	0.9	1.1	2.0	2.1	2.4	2.6	2.7	2.7	2.8	2.9	3.1	3.2	2.7	2.7	2.6	2.5	2.1	1.4	1.2	1.1	3.2
20-May	0.8	1.3	1.2	1.1	1.0	1.7	2.1	2.4	2.8	2.9	2.9	3.2	3.2	2.6	1.8	1.9	1.8	2.2	2.4	2.0	1.5	2.6	1.7	2.0	3.2
21-May	2.1	1.8	1.7	1.1	0.8	1.0	1.2	1.7	1.3	2.3	2.1	3.3	3.2	2.3	4.2	4.4	4.6	3.9	3.2	1.9	0.7	1.0	0.3	0.3	4.6
22-May	0.5	0.2	0.3	0.5	0.6	0.7	1.0	1.6	1.7	1.9	2.0	2.9	2.8	2.7	2.6	2.3	2.3	1.9	1.3	0.4	0.2	0.5	0.6	0.8	2.9
23-May	1.4	1.5	1.2	0.8	0.6	0.5	1.0	1.3	0.9	1.0	1.2	1.7	2.2	2.4	2.7	2.4	2.3	1.2	0.8	1.3	1.2	1.3	3.1	3.0	3.1
24-May	2.0	1.3	1.5	1.4	1.3	1.6	1.5	1.7	1.8	2.0	1.9	2.1	2.6	2.6	2.0	1.7	1.9	2.2	2.1	1.4	1.0	0.9	0.7	0.3	2.6
25-May	0.4	0.3	0.3	0.3	0.4	0.7	1.2	1.5	2.0	2.6	2.2	2.3	2.7	2.7	2.4	2.7	2.4	2.2	2.6	2.4	2.1	2.0	1.8	2.1	2.7
26-May	1.7	1.9	1.6	1.2	1.0	1.6	1.8	1.8	2.4	2.7	2.1	0.9	0.9	1.3	1.4	2.6	2.8	2.4	2.4	2.4	2.2	2.6	2.4	2.2	2.8
27-May	1.7	1.2	1.3	1.5	1.4	1.5	1.5	1.8	1.9	2.1	2.0	2.2	2.1	2.0	2.3	2.2	1.9	1.7	1.5	1.4	1.1	1.1	1.0	0.7	2.3
28-May	0.9	0.8	0.7	0.7	1.0	1.4	1.6	2.0	1.6	1.8	1.5	1.6	1.5	1.8	1.9	1.7	2.1	2.3	2.2	2.1	1.9	1.5	1.6	1.6	2.3
29-May	1.5	1.2	1.3	1.3	1.1	0.9	0.8	0.8	0.9	1.0	1.2	1.7	1.9	1.9	1.9	1.9	3.0	2.7	2.2	2.1	1.8	1.8	1.7	1.2	3.0
30-May	1.5	1.7	2.0	2.2	2.2	2.4	3.1	2.8	2.8	3.2	3.1	3.1	3.3	4.1	3.7	2.5	1.3	0.9	1.8	0.9	1.2	1.3	0.5	0.4	4.1
31-May	0.5	0.4	0.5	0.4	0.3	0.6	1.0	1.4	1.8	2.4	2.7	2.9	2.7	2.8	2.7	2.5	2.3	2.0	1.7	1.6	1.4	2.1	2.5	2.3	2.9
3.2 3.7 3.7 3.1 3.0 2.7 3.1 3.5 3.6 3.6 4.1 4.1 3.8 4.1 4.2 4.4 4.6 3.9 3.5 3.2 3.1 3.5 3.5 3.5																									
Diurnal Maximum																									



Summary of Hour Averages

Mannix - May 2014

Maximum Value: 1.4 km/h on May 13 15:00		Maximum Daily Average: 0.4 km/h on May 5		Hours in Service: 744																																												
Minimum Value: -1.2 km/h on May 21 16:00		Minimum Daily Average: -0.2 km/h on May 1		Hours of Data: 744																																												
Maximum Diurnal Average: 0.3 km/h at hour 21		Minimum Diurnal Average: 0.0 km/h at hour 11		Hours of Missing Data: 0																																												
Monthly Average: 0.13 km/h		Percentiles: $P_1 = -0.8$ $P_{10} = -0.3$ $Q_1 = -0.1$ Median = 0.1 $Q_3 = 0.4$ $P_{90} = 0.6$ $P_{99} = 1.2$		Hours of Calibration: 0																																												
				Percent Operational Time: 100.0																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-May	-0.2	-0.2	-0.2	-0.2	-0.6	-0.3	0.0	-0.2	0.1	0.0	-0.1	0.2	0.4	-0.1	-0.2	0.2	-0.4	-0.3	-0.2	-0.4	-0.6	-0.4	-0.4	-0.1	-0.2	0.4																						
2-May	0.0	-0.1	0.0	-0.2	0.0	-0.1	0.1	-0.1	-0.5	0.3	-0.5	0.5	0.0	-0.4	-0.8	-0.9	0.4	0.7	0.3	1.1	1.0	0.3	-0.5	-0.8	0.0	1.1																						
3-May	-0.9	-0.9	-0.6	-0.3	-0.6	-0.4	-0.3	-0.4	0.2	0.3	0.2	1.1	0.6	-0.2	1.2	0.3	0.2	0.6	0.6	0.3	0.4	0.2	0.2	0.2	0.1	1.2																						
4-May	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.0	0.8	0.9	-0.1	0.4	0.4	-0.2	0.4	0.1	0.5	-0.3	0.1	0.6	-0.1	0.0	-0.2	0.2	0.9																						
5-May	0.3	-0.2	0.3	0.0	0.3	0.5	0.4	0.1	0.0	-0.3	0.8	-0.2	-0.2	-0.2	-0.1	0.0	0.7	0.7	1.3	1.0	0.8	1.1	0.7	0.8	0.4	1.3																						
6-May	1.1	0.6	0.4	0.3	0.0	0.0	-0.1	0.1	-0.1	0.4	-0.2	0.2	0.3	0.5	0.3	0.0	0.4	0.3	0.3	0.4	0.4	-0.3	0.1	0.1	0.2	1.1																						
7-May	-0.1	0.0	0.2	0.1	0.2	-0.4	0.2	0.1	0.1	-0.2	-0.3	-0.2	-0.4	0.7	0.4	-0.3	0.6	0.6	0.3	0.2	0.3	0.1	0.3	0.3	0.1	0.7																						
8-May	0.3	0.5	0.4	0.2	0.2	0.3	0.3	0.2	-0.5	0.2	-0.5	-0.3	0.5	0.1	0.4	0.1	0.2	0.2	0.0	0.4	0.5	0.5	-0.3	-0.7	0.1	0.5																						
9-May	-0.3	-0.5	-0.5	-0.4	0.0	-0.7	0.4	0.4	0.1	-0.2	0.0	0.1	0.3	0.6	0.4	0.1	-0.4	0.4	0.1	-0.1	0.1	-0.4	-0.5	-0.6	-0.1	0.6																						
10-May	0.1	0.4	0.2	0.1	-0.1	0.1	-0.2	0.3	-0.1	0.3	-0.1	-0.6	-0.1	0.2	-0.1	0.0	-0.4	-0.6	-0.4	0.0	0.0	-0.3	0.0	-0.2	-0.1	0.4																						
11-May	-0.3	-0.2	-0.1	0.0	-0.1	-0.2	0.0	0.2	-0.4	-0.3	0.6	0.5	-0.8	0.1	0.2	0.0	-0.2	0.0	0.5	0.5	0.2	0.4	0.4	0.1	0.0	0.6																						
12-May	0.2	0.4	-0.1	0.1	0.1	0.0	0.3	-0.3	0.7	-0.4	-0.1	0.4	0.1	0.0	0.2	0.4	0.6	0.0	-0.2	0.4	0.1	0.2	0.2	0.4	0.2	0.7																						
13-May	0.1	0.1	0.2	0.1	0.1	0.0	0.3	0.6	0.2	0.0	0.0	0.1	0.8	-0.3	1.4	0.5	0.7	0.4	0.6	0.1	0.4	0.5	0.1	0.2	0.3	1.4																						
14-May	-0.4	0.2	-0.2	0.0	-0.2	-0.1	-0.2	0.1	-0.2	0.0	-0.2	0.4	0.7	0.0	-0.2	0.1	-0.4	-0.5	0.1	-0.4	-0.2	-0.1	0.1	-0.2	-0.1	0.7																						
15-May	0.3	0.1	0.0	0.0	0.2	0.3	0.4	0.2	0.3	0.0	-0.4	-0.3	0.1	1.2	0.4	-0.5	-0.1	-0.8	-0.4	-0.5	-0.4	-0.1	0.0	0.6	0.0	1.2																						
16-May	-0.1	-0.1	0.2	0.3	0.1	0.0	0.1	0.9	-0.4	-0.6	0.4	-0.5	0.3	-0.3	-0.1	0.2	0.6	0.8	0.1	-0.2	0.0	0.2	0.6	-0.4	0.1	0.9																						
17-May	0.1	-0.2	-0.1	0.0	-0.1	0.0	0.1	0.2	0.3	0.4	-0.3	0.1	-0.1	-0.6	-0.2	0.1	0.0	0.0	0.6	0.5	0.4	0.1	0.5	0.1	0.1	0.6																						
18-May	0.4	0.1	0.3	0.4	0.4	0.6	0.3	0.0	-0.3	0.1	0.2	0.9	0.2	-0.2	0.0	0.3	-0.6	-0.1	0.1	0.0	-0.1	0.1	0.2	0.1	0.1	0.9																						
19-May	0.5	0.4	0.4	0.1	0.2	0.4	0.3	-0.1	0.3	0.5	0.4	-0.5	-0.2	0.7	0.3	0.8	0.2	0.6	0.4	0.4	0.3	0.1	-0.1	0.2	0.3	0.8																						
20-May	0.4	0.7	0.5	0.8	0.4	0.1	0.4	0.4	0.8	0.5	0.5	0.5	0.4	-0.3	0.0	-0.1	-0.2	-0.4	-0.2	0.1	0.2	0.2	0.1	0.6	0.3	0.8																						
21-May	0.3	0.3	0.7	0.6	0.2	0.4	0.4	0.2	0.3	0.9	-0.5	0.5	-0.4	0.0	-0.7	-1.2	-0.3	-0.4	-0.5	0.0	0.2	-0.1	-0.1	0.1	0.0	0.9																						
22-May	0.0	-0.2	0.0	0.2	0.1	0.0	0.4	0.5	0.3	-0.1	-0.2	0.9	-0.7	-0.3	0.1	-0.1	-0.3	-0.2	0.1	-0.1	0.1	0.5	0.6	0.7	0.1	0.9																						
23-May	1.0	0.7	0.4	0.1	-0.1	0.1	0.3	0.6	0.2	0.1	-0.3	0.3	-0.3	-0.2	0.3	0.0	0.6	0.0	0.2	0.2	-0.3	-0.1	-0.1	0.4	0.2	1.0																						
24-May	-0.1	0.0	-0.3	-0.1	-0.1	0.0	0.2	0.8	-0.2	0.2	-0.1	-0.3	0.4	-0.2	0.9	0.1	0.0	0.3	0.1	0.4	0.5	0.4	0.4	0.2	0.1	0.9																						
25-May	0.0	0.0	0.0	0.1	0.2	-0.1	0.4	0.7	-0.5	0.9	-0.4	0.2	0.4	0.0	0.7	0.3	0.1	0.4	0.4	0.5	0.4	-0.5	-0.6	-0.6	0.1	0.9																						
26-May	-0.4	-0.1	-0.3	0.0	0.9	0.5	0.6	0.0	0.3	0.4	0.2	0.2	0.5	0.2	0.2	0.1	0.2	0.6	0.8	0.7	0.6	0.7	0.6	0.7	0.3	0.9																						
27-May	0.6	0.4	0.3	0.1	-0.1	-0.2	0.0	0.2	0.1	0.4	0.6	0.3	0.2	0.3	-0.4	0.2	-0.1	0.6	0.1	0.1	0.2	0.5	0.7	0.1	0.2	0.7																						
28-May	0.2	0.2	0.3	0.3	0.4	0.7	0.8	1.2	-0.2	0.4	-0.5	0.2	-0.3	0.0	0.3	0.0	0.5	0.3	0.3	0.1	1.2	-0.3	-0.3	-0.4	0.2	1.2																						
29-May	0.4	0.0	1.1	1.2	1.1	0.2	0.2	0.2	0.2	0.3	-0.2	0.0	0.0	-0.1	0.0	0.0	-0.3	-0.7	-0.3	0.0	0.3	0.1	0.3	0.2	0.2	1.2																						
30-May	0.1	-0.1	0.0	-0.2	-0.1	-0.3	-0.1	0.0	0.1	0.0	0.2	0.1	0.1	0.7	0.4	0.2	0.2	0.2	0.2	0.3	0.4	0.2	0.0	0.0	0.1	0.7																						
31-May	0.3	-0.2	-0.2	0.0	0.1	0.2	0.7	0.2	0.5	-0.1	1.2	0.1	1.3	0.3	0.2	0.3	0.4	0.6	0.2	0.4	0.5	-0.1	-0.3	0.0	0.3	1.3																						
																								0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.2	0.0	0.2	0.1	0.1	0.2	0.1	0.1	0.2	0.2	0.2	0.3	0.1	0.1	0.1	Diurnal Average
																								1.1	0.7	1.1	1.2	1.1	0.7	0.8	1.2	0.8	0.9	1.2	1.1	1.3	1.2	1.4	0.8	0.7	0.8	1.3	1.1	1.2	1.1	0.7	0.8	Diurnal Maximum



Summary of Hour Standard Deviations

Mannix - May 2014

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 4.8 km/h on May 21 17:00 Minimum Value: 0.2 km/h on May 4 04:00 Percentiles: P <sub>1</sub> = 0.3 P <sub>10</sub> = 0.7 Q <sub>1</sub> = 1.2 Median = 1.9 Q <sub>3</sub> = 2.7 P <sub>90</sub> = 3.2 P <sub>99</sub> = 4.0																								Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-May	1.4	1.8	1.3	1.2	2.2	1.3	1.9	1.9	2.2	2.8	3.7	4.0	4.0	3.5	3.2	3.1	3.1	3.4	2.8	2.8	2.0	2.0	2.5	2.7	4.0
2-May	2.7	3.3	3.4	2.4	2.5	2.8	3.4	3.3	3.1	3.8	3.6	3.6	3.0	2.8	2.5	2.2	2.7	2.5	2.8	2.9	3.1	3.5	3.3	3.1	3.8
3-May	2.9	2.7	2.6	3.0	2.6	2.5	2.7	2.4	2.5	3.1	3.2	3.1	3.2	2.9	3.7	2.9	2.7	2.4	1.9	1.2	0.9	0.8	0.6	1.0	3.7
4-May	1.0	0.6	0.7	0.2	0.5	0.5	0.9	1.4	1.8	2.5	2.5	2.5	2.7	3.0	2.8	2.5	2.4	2.1	1.6	1.6	2.4	1.8	1.3	1.7	3.0
5-May	1.2	0.6	0.7	0.4	0.8	0.9	1.0	1.1	2.0	1.9	2.0	3.0	2.6	2.8	2.5	2.8	2.8	2.3	2.3	2.9	2.5	2.9	2.8	2.7	3.0
6-May	2.5	1.4	1.3	1.3	1.4	1.4	2.0	2.3	2.4	2.9	2.9	3.0	3.0	2.9	2.9	2.8	2.2	2.7	1.9	1.7	1.3	1.5	0.9	1.1	3.0
7-May	0.7	0.8	1.0	0.6	0.7	1.3	1.7	2.1	2.5	3.3	3.9	3.8	3.8	3.8	3.9	3.2	3.3	3.4	2.4	1.2	1.0	0.8	1.4	1.1	3.9
8-May	0.7	1.0	1.3	0.7	0.6	0.8	1.0	1.2	1.0	1.7	1.7	2.6	2.6	3.2	3.2	2.6	2.5	2.1	2.1	1.6	1.3	1.3	0.9	1.2	3.2
9-May	1.5	1.3	1.2	1.1	1.1	1.5	1.7	1.7	2.0	2.3	2.3	2.1	2.7	2.4	2.8	2.9	2.4	2.5	2.1	1.0	1.8	2.2	1.7	1.8	2.9
10-May	1.7	1.5	1.2	1.1	1.2	1.6	1.8	2.4	3.0	2.7	2.3	3.0	3.0	2.7	1.6	1.9	2.3	2.3	1.8	1.7	1.6	1.5	0.7	0.2	3.0
11-May	0.3	0.5	0.3	0.5	0.5	0.2	0.3	1.3	1.3	1.9	3.2	3.6	3.0	3.2	3.4	2.7	2.2	2.2	1.6	1.3	0.9	0.6	0.8	1.3	3.6
12-May	1.4	1.4	1.0	0.5	0.3	0.9	1.0	1.4	2.2	2.5	3.1	3.4	3.1	3.0	3.2	3.3	3.3	2.8	2.2	1.9	1.3	1.7	2.6	1.7	3.4
13-May	1.0	0.6	0.3	0.2	0.3	0.5	0.7	1.5	1.7	2.2	2.3	2.9	3.0	3.2	3.4	3.3	2.7	2.8	2.3	1.3	0.7	1.0	1.6	1.1	3.4
14-May	1.1	0.9	0.9	0.9	0.7	1.4	1.5	1.7	1.8	2.3	2.4	3.1	3.1	3.0	2.9	2.9	2.1	2.8	2.8	2.1	1.8	1.5	0.7	1.6	3.1
15-May	1.9	1.0	0.9	0.9	1.3	1.2	0.7	1.4	2.8	3.1	3.2	3.3	3.9	4.0	3.6	3.9	3.7	3.0	3.5	3.0	1.9	1.5	0.9	1.4	4.0
16-May	2.0	1.4	1.2	1.0	1.0	0.7	1.2	1.8	1.9	2.2	2.7	2.7	3.2	3.2	3.2	3.2	2.4	2.2	1.6	0.9	0.7	1.6	2.4	1.6	3.2
17-May	1.4	1.3	1.0	0.8	0.9	1.1	0.8	1.1	1.5	1.8	2.1	3.0	2.1	2.1	2.6	2.7	1.9	1.4	1.1	1.0	1.0	1.9	1.7	1.6	3.0
18-May	1.0	0.7	0.8	0.8	0.6	0.8	0.8	0.9	1.3	2.2	2.4	3.3	2.7	2.0	2.8	2.8	2.4	1.6	1.3	0.6	0.4	0.4	0.8	0.9	3.3
19-May	0.7	1.0	0.9	0.7	0.5	1.1	1.7	2.1	2.5	2.9	3.2	3.0	3.2	3.4	3.2	3.6	2.8	2.8	2.8	2.4	2.0	1.4	1.2	0.8	3.6
20-May	0.6	0.8	0.9	0.6	0.8	1.4	2.1	2.2	2.9	3.2	3.2	3.5	3.3	2.8	1.9	2.2	2.2	2.1	2.5	1.8	1.4	2.9	2.0	2.0	3.5
21-May	1.9	1.6	1.3	1.1	0.9	0.9	0.9	1.4	1.3	2.5	2.3	3.4	3.3	2.4	4.3	4.2	4.8	3.7	2.7	1.7	0.7	0.9	0.3	0.4	4.8
22-May	0.4	0.3	0.3	0.6	0.7	0.9	0.9	1.4	1.8	2.0	2.4	3.4	3.2	3.2	2.9	2.5	2.4	2.0	1.4	0.4	0.3	0.4	0.4	0.4	3.4
23-May	0.7	0.8	0.9	0.9	0.7	0.5	0.9	1.3	0.8	0.9	1.3	1.8	2.5	2.6	3.2	2.7	2.7	1.4	1.0	2.0	1.6	1.9	3.3	3.1	3.3
24-May	1.9	1.1	1.5	1.4	1.3	1.5	1.5	1.9	2.0	2.3	2.0	2.3	2.9	2.5	2.1	1.8	1.9	2.1	2.3	1.3	0.8	0.8	1.1	0.5	2.9
25-May	0.7	0.5	0.4	0.5	0.5	0.8	1.2	1.5	1.9	3.1	2.7	2.9	3.3	3.1	2.9	3.2	2.9	2.4	2.8	2.6	2.4	2.0	1.9	2.0	3.3
26-May	1.7	2.2	1.5	1.5	1.5	2.3	2.4	2.6	2.9	2.8	2.2	1.2	1.0	1.5	1.6	3.2	3.0	2.6	2.4	2.4	2.3	3.0	2.8	2.2	3.2
27-May	1.7	1.4	1.5	1.4	1.5	1.5	1.4	1.6	1.8	2.1	2.1	2.2	2.1	1.8	1.6	2.0	1.8	1.7	1.4	1.4	1.0	1.0	1.5	1.4	2.2
28-May	1.3	1.0	0.7	0.9	1.5	1.7	1.9	2.3	2.3	2.1	1.6	1.9	1.8	2.3	2.3	2.1	2.4	2.6	2.6	2.3	2.3	1.6	1.6	1.7	2.6
29-May	1.9	1.4	1.8	1.7	1.7	1.4	1.0	0.6	0.8	0.9	1.2	1.6	1.6	1.6	1.9	1.9	2.7	2.4	2.1	2.2	1.9	1.8	1.9	1.3	2.7
30-May	1.4	1.5	1.8	2.3	2.2	2.5	3.2	3.0	3.2	3.4	3.3	3.3	3.6	4.2	3.9	2.7	1.2	1.0	1.8	1.0	1.3	1.1	0.7	0.4	4.2
31-May	0.7	0.5	0.5	0.6	0.5	0.4	1.2	1.4	2.2	2.7	3.2	3.4	3.1	3.2	3.3	2.7	2.7	2.1	1.7	1.4	1.4	2.8	2.9	2.6	3.4
2.9 3.3 3.4 3.0 2.6 2.8 3.4 3.3 3.2 3.8 3.9 4.0 4.0 4.2 4.3 4.2 4.8 3.7 3.5 3.0 3.1 3.5 3.3 3.1																									
Diurnal Maximum																									



Summary of Hour Averages

Mannix - May 2014

Maximum Value: 5.8 km/h on May 30 14:00		Maximum Daily Average: 2.5 km/h on May 30		Hours in Service: 744																						
Minimum Value: -1.2 km/h on May 26 00:00		Minimum Daily Average: -0.4 km/h on May 14		Hours of Data: 744																						
Maximum Diurnal Average: 0.9 km/h at hour 12		Minimum Diurnal Average: 0.3 km/h at hour 22		Hours of Missing Data: 0																						
Monthly Average: 0.60 km/h		Percentiles: $P_1 = -1.0$ $P_{10} = -0.5$ $Q_1 = -0.1$ Median = 0.2 $Q_3 = 1.1$ $P_{90} = 2.2$ $P_{99} = 4.1$		Hours of Calibration: 0																						
				Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-May	2.1	2.5	-0.2	0.6	1.1	1.8	2.3	1.8	2.5	2.6	2.9	2.4	2.2	1.7	2.4	3.0	2.4	3.0	1.8	2.1	0.5	0.8	1.2	2.6	1.9	3.0
2-May	3.3	4.1	3.6	2.1	3.9	3.3	4.2	3.7	2.2	2.4	1.9	2.6	1.4	0.4	0.4	0.1	0.2	0.6	0.9	1.9	2.1	1.6	1.1	1.0	2.0	4.2
3-May	0.6	0.7	0.8	1.0	0.9	0.7	0.7	0.5	1.1	1.2	0.9	1.6	0.6	-0.6	0.7	-0.1	-0.6	0.3	0.1	-0.3	-0.2	-0.2	-0.4	-0.3	0.4	1.6
4-May	-0.1	-0.1	-0.1	0.0	0.1	-0.1	0.0	0.1	0.1	0.6	0.7	-0.5	0.1	0.2	-0.4	0.0	0.1	0.7	0.3	0.4	1.0	0.1	-0.5	-0.7	0.1	1.0
5-May	0.1	0.2	0.5	0.0	0.4	0.6	0.7	0.2	-0.6	-0.7	0.7	-0.4	-0.5	-0.5	-0.1	-0.8	-0.3	-0.1	0.4	0.1	-0.2	-0.2	-0.1	0.0	0.0	0.7
6-May	0.4	0.0	-0.1	0.0	0.0	-0.1	0.0	0.2	0.0	0.3	-0.2	0.0	-0.2	0.1	-0.3	-0.1	-0.1	0.3	0.4	1.4	1.8	0.1	0.4	0.4	0.2	1.8
7-May	0.0	0.2	0.7	0.4	0.7	0.5	1.1	1.3	1.0	0.9	1.2	1.6	0.8	1.8	1.0	1.0	1.2	0.8	0.0	-0.4	-0.2	-0.3	0.0	0.1	0.6	1.8
8-May	-0.2	0.1	0.2	0.0	0.3	0.2	0.1	0.0	-0.5	-0.1	-0.5	-0.1	0.5	-0.2	0.2	0.0	0.1	-0.2	-0.4	0.1	0.2	0.5	-0.1	-0.5	0.0	0.5
9-May	0.1	-0.1	-0.2	-0.2	0.3	-0.5	0.7	1.7	1.5	0.7	0.3	0.9	1.2	1.5	1.3	1.1	0.8	0.8	0.4	0.0	1.1	0.9	0.7	0.8	0.7	1.7
10-May	2.0	2.7	2.6	3.0	2.9	2.9	2.7	3.1	3.2	2.9	1.7	1.7	2.6	1.9	2.1	1.5	0.7	0.5	0.6	1.3	1.2	0.9	0.9	1.3	2.0	3.2
11-May	1.4	1.9	2.4	2.0	1.4	1.4	1.8	1.3	0.0	0.5	2.7	3.6	1.0	1.4	1.6	1.2	0.8	1.0	0.3	0.1	-0.3	-0.3	-0.1	-0.3	1.1	3.6
12-May	-0.3	0.0	-0.4	-0.1	-0.1	-0.3	-0.1	-0.5	0.6	-0.3	0.2	1.0	0.8	0.8	0.0	0.4	0.5	-0.4	-0.6	0.0	-0.1	-0.6	-0.6	-0.1	0.0	1.0
13-May	0.2	0.3	0.5	0.4	0.4	0.0	0.4	0.7	0.0	-0.5	0.0	-0.1	0.8	0.1	2.0	0.9	0.7	-0.1	0.2	-0.2	-0.1	-0.2	-0.4	-0.3	0.2	2.0
14-May	-0.6	0.0	-0.3	-0.1	-0.3	-0.7	-0.6	0.0	-0.6	-0.3	-0.9	-0.6	-0.2	-0.6	-0.9	-0.6	-1.0	-1.2	0.1	-0.5	-0.4	0.9	0.7	-0.6	-0.4	0.9
15-May	-0.3	0.2	0.0	-0.1	-0.2	0.0	0.0	0.1	0.4	0.2	0.0	0.0	0.4	2.7	1.7	0.9	1.5	1.0	1.4	1.2	1.2	1.7	1.8	2.2	0.7	2.7
16-May	1.2	1.0	1.2	1.2	0.4	0.0	0.0	0.9	-0.2	-0.2	1.1	-0.1	0.8	0.1	0.2	0.5	0.3	0.6	-0.2	-0.2	-0.3	-0.3	-0.2	-0.8	0.3	1.2
17-May	-0.2	-0.5	-0.3	-0.8	-0.5	-0.4	0.0	0.0	0.0	0.6	-0.1	-0.3	-0.2	-1.0	-0.6	-0.4	-0.3	-0.4	0.1	0.0	0.0	-0.4	0.0	-0.3	-0.2	0.6
18-May	0.2	-0.3	-0.3	-0.1	-0.2	0.1	0.1	-0.2	-0.4	-0.3	0.8	1.8	0.4	-0.3	-0.3	-0.1	-0.9	-0.1	0.2	0.5	0.3	0.0	1.1	0.6	0.1	1.8
19-May	0.7	0.9	1.1	0.5	0.7	0.8	0.7	0.4	0.8	0.7	0.5	0.1	-0.1	1.4	1.3	2.0	0.9	1.4	1.8	1.7	1.3	1.1	1.2	1.3	1.0	2.0
20-May	1.2	1.6	1.4	1.8	1.2	0.9	1.0	1.0	1.5	1.2	1.5	1.5	1.7	1.0	1.9	0.2	-0.5	-1.0	-0.1	0.6	1.0	0.9	0.6	1.2	1.0	1.9
21-May	1.0	1.2	1.5	1.5	0.7	0.7	0.9	0.5	0.5	1.7	0.5	2.2	1.8	1.1	2.5	2.5	4.1	3.3	2.1	1.8	1.5	1.8	1.6	0.9	1.6	4.1
22-May	0.8	0.5	0.3	0.1	0.0	0.1	0.9	1.0	0.4	-0.2	-0.5	1.2	1.5	1.9	2.4	1.3	1.0	0.8	0.7	0.5	0.9	1.2	1.3	1.7	0.8	2.4
23-May	2.1	1.9	1.6	0.4	0.1	0.5	0.6	0.8	0.1	0.1	-0.4	0.2	-0.9	-0.8	0.3	0.2	0.6	-0.1	0.0	-0.4	-0.8	-0.5	3.4	4.4	0.6	4.4
24-May	2.6	1.7	1.5	1.9	2.2	2.5	2.3	1.6	0.9	1.8	2.2	2.3	3.9	0.9	1.1	1.1	2.2	2.2	0.8	0.2	-0.1	-0.1	-0.2	0.1	1.5	3.9
25-May	-0.3	-0.2	0.0	0.0	-0.1	-0.1	0.0	0.2	-0.9	0.1	-1.0	-0.5	-0.1	-0.6	0.1	-0.5	-0.6	-0.1	-0.3	-0.2	-0.2	-0.8	-0.9	-1.2	-0.3	0.2
26-May	-0.7	-0.8	-0.6	-0.1	0.3	-0.1	-0.3	-0.9	-0.5	-0.2	-0.4	-0.1	0.3	-0.2	0.0	-0.9	-0.8	-0.4	-0.2	-0.2	-0.3	-0.2	-0.4	-0.1	-0.3	0.3
27-May	0.1	0.1	-0.1	-0.1	-0.2	-0.3	0.0	0.1	0.0	0.0	0.5	0.0	-0.3	0.3	-0.3	0.1	-0.6	0.2	0.0	0.1	-0.3	0.0	0.0	-0.4	0.0	0.5
28-May	-0.3	0.0	0.1	-0.1	-0.2	0.2	0.2	0.6	-0.8	-0.1	-1.0	-0.1	-0.6	-0.5	-0.1	-0.5	-0.2	-0.3	-0.4	-0.5	0.4	-0.8	-0.7	-0.7	-0.3	0.6
29-May	-0.1	-0.3	0.3	0.5	0.4	-0.1	-0.1	0.0	-0.2	0.1	0.2	0.8	0.2	0.1	0.0	1.0	1.7	1.2	1.6	2.2	3.0	3.2	3.2	2.5	0.9	3.2
30-May	2.6	2.2	2.9	3.1	3.1	3.3	3.9	3.7	3.7	4.1	3.7	4.3	4.2	5.8	5.0	3.2	0.9	-0.3	0.3	0.1	0.4	-0.3	-0.2	0.2	2.5	5.8
31-May	0.9	0.9	0.8	0.2	0.0	0.1	0.8	0.3	0.3	-0.2	1.6	0.4	0.8	-0.2	-0.1	-0.1	-0.1	0.1	-0.2	0.0	-0.1	-0.8	-1.2	-0.9	0.1	1.6
																								Diurnal Average		
																								Diurnal Maximum		



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 5.0 km/h on May 21 17:00 Minimum Value: 0.1 km/h on May 4 04:00 Percentiles: P <sub>1</sub> = 0.3 P <sub>10</sub> = 0.7 Q <sub>1</sub> = 1.1 Median = 1.9 Q <sub>3</sub> = 2.7 P <sub>90</sub> = 3.3 P <sub>99</sub> = 4.1																								Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-May	1.6	2.2	1.4	1.5	2.2	1.4	1.9	1.9	2.1	2.9	3.7	4.1	4.1	3.6	3.1	2.9	3.0	3.3	2.8	2.8	1.8	2.0	2.5	2.7	4.1
2-May	2.6	3.2	3.3	2.8	2.4	2.7	3.1	3.1	3.1	3.7	3.6	3.5	3.0	2.7	2.5	2.0	2.7	2.6	2.9	3.1	3.2	3.5	3.2	2.9	3.7
3-May	2.9	2.7	2.5	2.9	2.7	2.6	2.7	2.5	2.5	3.1	3.3	3.2	3.5	3.0	3.9	2.9	2.7	2.5	2.0	1.1	0.8	0.7	0.5	0.8	3.9
4-May	0.4	0.4	0.6	0.1	0.5	0.4	0.9	1.4	1.9	2.3	2.3	2.3	2.4	3.0	2.7	2.4	2.5	2.2	1.6	1.7	2.5	2.0	0.8	1.1	3.0
5-May	1.2	0.6	0.7	0.4	0.7	0.9	0.8	1.1	1.8	1.8	2.1	3.0	2.6	2.8	2.7	2.4	2.4	2.1	2.2	2.6	2.3	2.7	2.6	2.5	3.0
6-May	2.5	1.4	1.2	1.2	1.4	1.4	2.1	2.5	2.5	3.1	3.1	3.2	3.1	3.0	3.1	2.8	2.2	2.8	2.1	2.0	1.5	1.6	1.0	1.3	3.2
7-May	0.8	0.9	1.1	0.7	0.8	1.3	1.7	2.1	2.6	3.4	3.9	3.8	3.9	3.9	3.9	3.3	3.4	3.6	2.7	1.0	0.9	0.9	1.5	1.1	3.9
8-May	0.6	1.0	1.2	0.6	0.6	0.7	0.9	1.1	1.0	1.4	1.7	2.6	2.7	3.4	3.2	2.7	2.5	2.1	2.1	1.6	1.2	1.3	0.9	1.3	3.4
9-May	1.6	1.4	1.3	1.1	1.2	1.5	1.7	1.7	2.1	2.4	2.3	2.2	2.8	2.6	3.0	3.0	2.5	2.5	1.9	1.1	2.0	2.1	1.6	1.8	3.0
10-May	1.8	1.7	1.4	1.0	1.1	1.5	1.8	2.3	2.8	2.8	2.3	3.0	2.8	2.6	1.5	1.9	2.3	2.2	1.8	1.8	1.9	1.8	0.8	0.4	3.0
11-May	0.4	0.6	0.3	0.6	0.6	0.3	0.3	1.5	1.3	2.0	3.3	3.5	3.3	3.3	3.7	2.8	2.3	2.3	1.7	1.2	0.8	0.6	0.8	1.0	3.7
12-May	1.2	1.1	0.8	0.5	0.3	0.4	0.8	1.1	2.3	2.6	3.2	3.7	3.4	3.4	3.2	3.4	3.5	2.8	2.3	1.9	1.3	1.7	2.2	1.3	3.7
13-May	1.1	0.7	0.4	0.3	0.4	0.4	0.6	1.4	1.6	1.7	2.4	2.9	3.3	3.3	3.6	3.5	2.8	3.0	2.3	1.3	0.6	0.9	1.5	0.9	3.6
14-May	0.5	0.8	0.7	0.8	0.7	1.2	1.6	1.6	1.6	2.2	2.1	2.9	2.6	2.3	2.1	2.4	2.0	2.8	3.0	2.2	2.0	1.6	0.7	1.3	3.0
15-May	1.5	1.0	0.8	0.9	1.1	0.8	0.6	1.4	3.0	3.2	3.4	3.4	4.3	4.1	3.7	4.1	3.6	3.0	3.4	3.0	1.9	1.6	1.2	1.6	4.3
16-May	2.0	1.5	1.3	1.0	1.0	0.7	1.3	1.8	1.9	2.3	2.9	2.7	3.2	3.3	3.3	3.3	2.4	2.2	1.4	0.8	0.6	1.1	1.8	0.7	3.3
17-May	0.9	1.1	1.0	0.6	1.0	1.1	0.7	1.0	1.4	1.8	2.2	2.8	2.2	1.9	2.5	2.7	1.9	1.3	1.1	0.7	0.9	1.5	1.4	1.6	2.8
18-May	1.1	0.7	0.7	0.8	0.5	0.6	0.7	0.9	1.2	2.0	2.4	3.4	2.8	2.0	2.9	2.9	2.4	1.6	1.3	0.6	0.4	0.3	1.0	1.0	3.4
19-May	0.8	1.0	0.9	0.7	0.5	1.1	1.6	2.1	2.6	3.0	3.0	3.1	3.4	3.8	3.2	3.8	2.9	2.9	2.7	2.4	2.1	1.5	1.2	0.9	3.8
20-May	0.6	0.6	0.7	0.5	0.7	1.3	2.0	2.2	3.0	3.4	3.3	3.6	3.3	2.8	3.1	2.1	1.5	2.2	2.4	1.8	1.4	3.0	2.0	1.9	3.6
21-May	1.9	1.5	1.2	1.1	1.1	1.1	0.9	1.3	1.2	2.5	2.5	3.5	3.4	2.6	4.7	4.5	5.0	3.9	2.6	1.6	0.8	1.0	0.4	0.7	5.0
22-May	0.6	0.5	0.5	0.4	0.6	0.7	0.8	1.4	1.7	1.7	2.4	3.6	3.5	3.4	3.1	2.8	2.5	1.9	1.5	0.4	0.3	0.4	0.3	0.3	3.6
23-May	0.5	0.7	0.9	0.9	0.8	0.7	0.9	1.2	0.7	0.8	1.3	1.9	2.1	2.3	3.2	2.9	2.7	1.5	1.0	1.5	1.4	1.5	4.9	3.0	4.9
24-May	2.0	1.1	1.6	1.5	1.4	1.5	1.5	2.0	2.1	2.3	2.0	2.3	2.8	2.8	2.3	2.0	1.7	2.1	2.4	1.3	0.7	0.8	0.7	0.4	2.8
25-May	0.5	0.4	0.4	0.4	0.5	0.8	1.0	1.4	1.8	2.8	2.4	2.6	2.8	3.0	2.6	2.6	2.5	2.1	2.5	2.4	2.3	2.0	1.9	2.0	3.0
26-May	1.4	2.1	1.5	1.3	1.2	1.9	2.0	1.9	2.4	2.8	2.1	1.1	1.1	1.5	1.6	2.6	2.7	2.5	2.3	2.4	2.3	2.8	2.5	2.2	2.8
27-May	1.7	1.5	1.6	1.4	1.6	1.6	1.5	1.7	2.0	2.2	2.3	2.2	2.0	1.8	1.6	2.1	1.9	1.8	1.5	1.4	0.9	0.9	1.1	0.9	2.3
28-May	0.8	0.8	0.6	0.8	1.2	1.4	1.5	2.0	1.7	1.9	1.4	1.7	1.6	2.0	2.1	1.9	2.1	2.2	2.0	2.2	1.9	1.7	1.7	1.7	2.2
29-May	1.7	1.5	1.3	1.3	1.2	1.1	0.6	0.5	0.8	0.9	1.4	1.5	1.8	1.7	2.1	2.0	2.8	2.2	2.1	2.4	1.9	1.8	1.9	1.4	2.8
30-May	1.6	1.6	1.9	2.5	2.4	2.7	3.4	3.1	3.1	3.4	3.2	3.2	3.6	3.7	3.5	2.7	1.4	0.8	1.9	1.0	1.3	1.0	0.6	0.5	3.7
31-May	0.7	0.7	0.8	0.7	0.4	0.4	1.3	1.3	2.3	2.8	3.5	3.6	3.1	3.3	3.4	3.0	2.9	2.2	1.6	1.2	1.2	2.2	2.8	2.5	3.6
Diurnal Maximum																									





# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Report

### Station Information

Calibration Date	May 9, 2014	Previous Calibration	April 22, 2014
Station Name	Mannix	Station Number	AMS 5
Reason:	Routine		
Start Time (MST)	8:50	End Time (MST)	12:15
Barometric Pressure	725 mmHg	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11061107
Cal Gas Concentration	51 ppm	Cal Gas Expiry Date	29-May-14
Gas Cert Reference	LL107934		
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2633
DACS voltage range		DACS channel #	N/A

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	1000	1000	PMT voltage	-645	-645
Analyzer Range (mv)	5000	5000	Lamp voltage	803	803
Calculated slope	0.991014	1.010329	Chamber temp.	44.4	44.4
Calculated intercept	-0.046686	-0.037976	Pressure (mmHg)	692.6	692.9
Analyzer Background	16.2	16.4	Flow (lpm)	0.499	0.500
Analyzer Coefficient	0.790	0.776	Intensity	25xxx	25xxx

Analyzer make TEI 43C Analyzer serial # 613516797

### Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.4	NA
as found span	5000	58.8	599.8	593.4	1.011
calibrator zero	5000	0.0	0.0	-0.2	0.000
high point	5000	58.8	599.8	593.2	1.011
second point	5000	29.4	299.9	298.0	1.006
third point	5000	14.7	149.9	148.0	1.013
calibrator zero					
as left zero	5000	0.0	0.0	0.0	0.000
as left span	5000	58.8	599.8	596.5	1.005
Average Correction Factor					1.010

Corrected As found 593.0 Previous response 605.2 % change 2.1%

#### Notes:

Small adjustments to both zero and span. As Left Zero long because analyzer was left in service mode

Calibration Performed By: Ryan Power



# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Summary

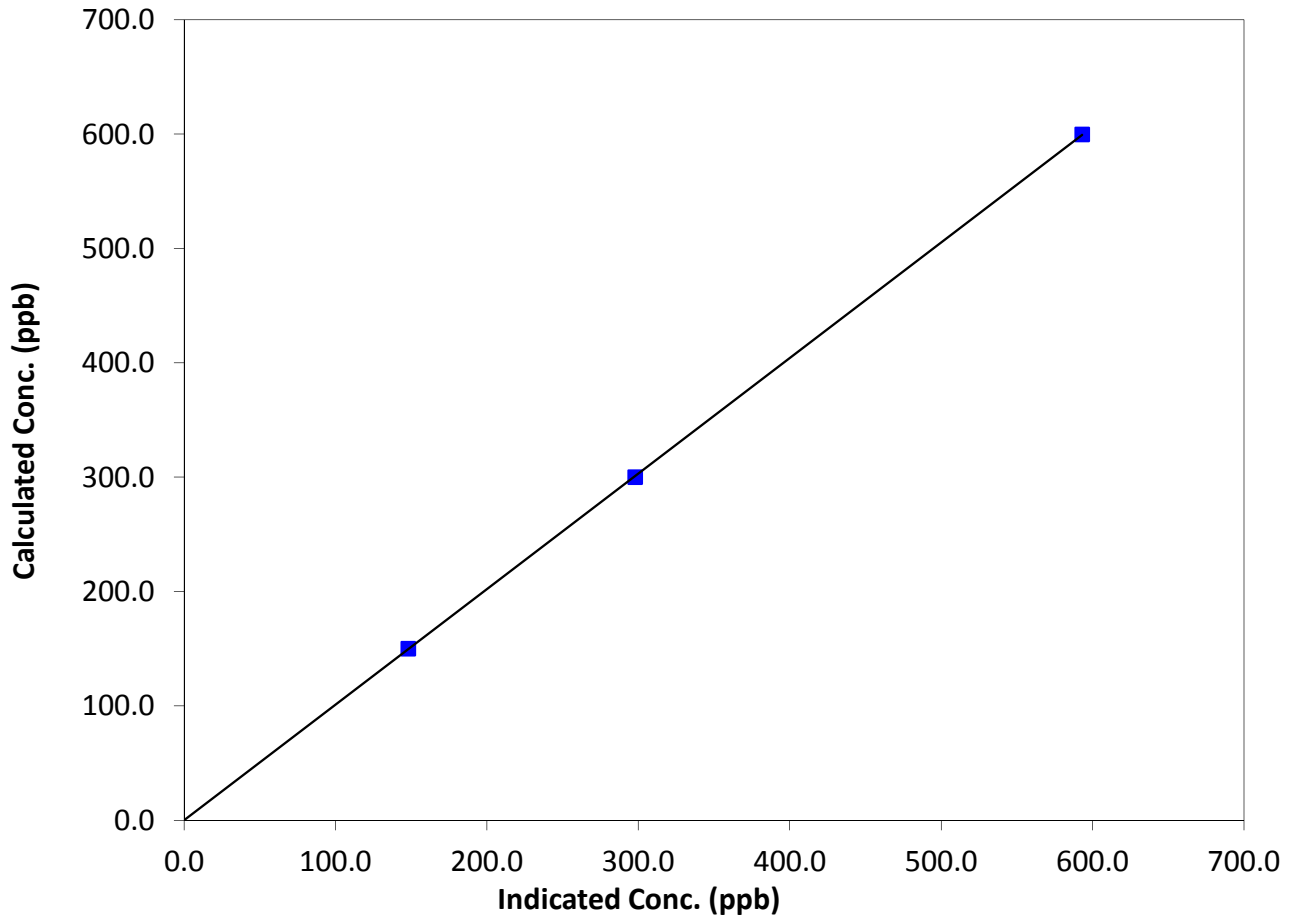
### Station Information

Calibration Date	May 9, 2014	Previous Calibration	April 22, 2014
Station Name	Mannix	Station Number	AMS 5
Start Time (MST)	8:50	End Time (MST)	12:15
Analyzer make	TEI 43C	Analyzer serial #	613516797

### Calibration Data

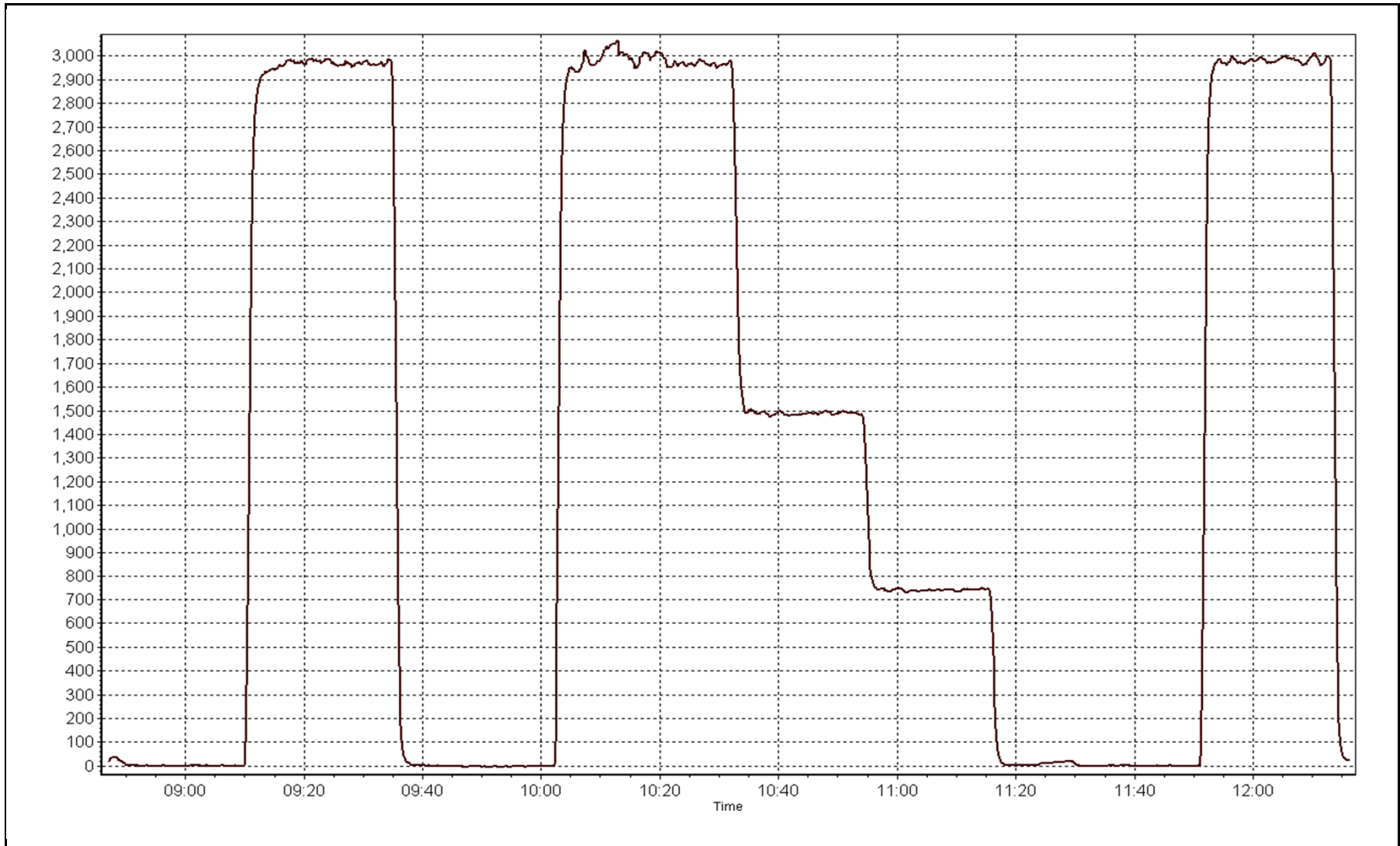
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	N/A	Correlation Coefficient	0.999991
599.8	593.2	1.0111		
299.9	298.0	1.0063	Slope	1.010329
149.9	148.0	1.0131		
			Intercept	-0.037976

**SO<sub>2</sub> Calibration Curve**



SO2 Calibration Plot

Date: May 9, 2014





# Wood Buffalo Environmental Association

## H2S Calibration Report

### Station Information

Calibration Date	May 8, 2014	Previous Calibration	April 15, 2014
Station Name	Mannix	Station Number	AMS 5
Reason:	Routine		
Start Time (MST)	10:50	End Time (MST)	13:24
Barometric Pressure	734 mmHg	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial number	11061107
Cal Gas Concentration	10.2 ppm H2S	Cal Gas Expiry Date	30-May-13
Gas Cert Reference	LL155272	SO2 gas conc.	51.0 ppm SO2
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2633
DACS voltage range	0-5v	DACS channel #	28

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	100	100	PMT voltage	-624	-624
Analyzer Range (mv)	5000	5000	Lamp voltage	887	895
Calculated slope	0.988039	0.993062	Chamber temp.	45	45
Calculated intercept	-0.037234	-0.175412	Pressure	486.2	489.5
Analyzer Background	14.7	14.6	Flow	1.015	1.019
Analyzer Coefficient	1.110	1.11	Intensity (%)	115	115
			Converter temp.	325	327

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	0.15	NA
as found span	5000	36.8	75.1	75.7	0.992
SO2 scrubber check	5000	29.4	299.9	2.2	NA
calibrator zero	5000	0.0	0.0	0.2	NA
high point	5000	36.8	75.1	75.7	0.992
second point	5000	20.6	42.0	42.7	0.985
third point	5000	12.3	25.1	25.4	0.989
calibrator zero					
as left zero	5000	0.0	0.0	0.4	NA
as left span	5000	36.8	75.1	75.9	0.989
Average Correction Factor					0.989

Corrected As found	75.5	Previous response	76.0	% change	0.6%
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#### Notes:

As Finds used for calibrator zero and high point. Scrubber check after third point. No adjustments needed

Calibration Performed By:

Ryan Power



# Wood Buffalo Environmental Association

## H2S Calibration Summary

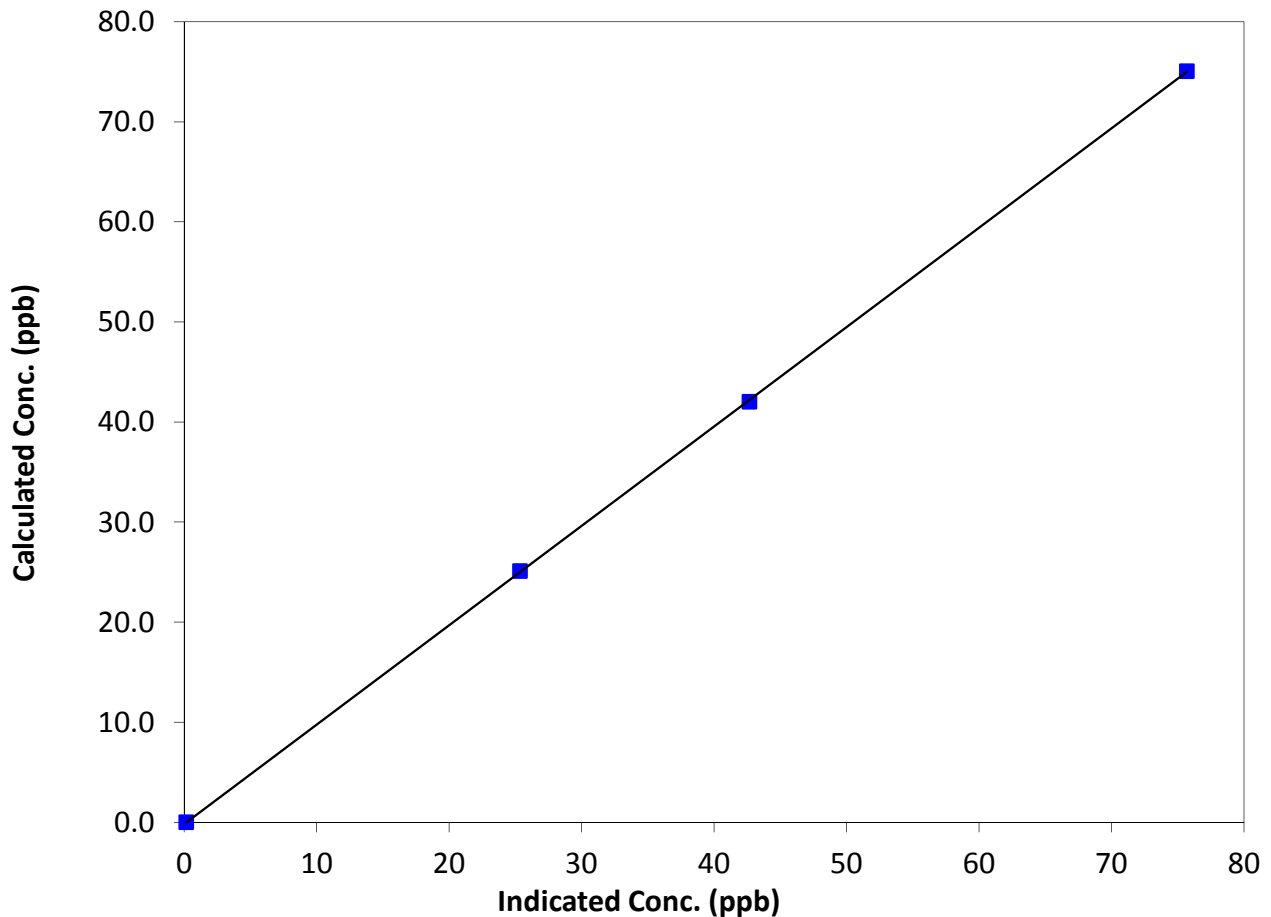
### Station Information

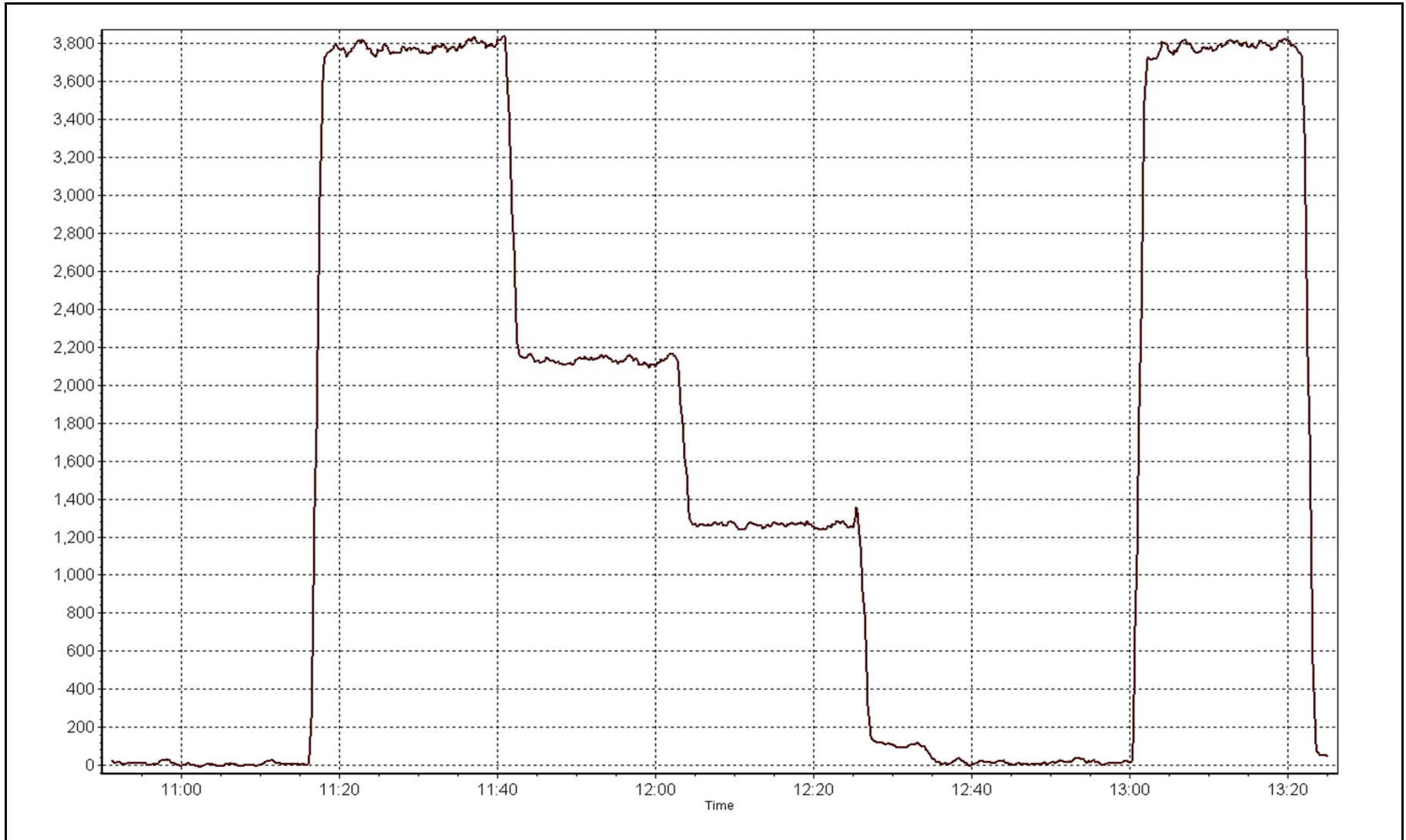
Calibration Date	May 8, 2014	Previous Calibration	April 15, 2014
Station Name	Mannix	Station Number	AMS 5
Start Time (MST)	10:50	End Time (MST)	13:24
Analyzer make	TEI 450i	Analyzer serial #	815129108

### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	N/A	Correlation Coefficient	0.999985
75.1	75.7	0.9917		
42.0	42.7	0.9848	Slope	0.993062
25.1	25.4	0.9894		
			Intercept	-0.175412

**H2S Calibration Curve**







# Wood Buffalo Environmental Association

## THC Calibration Report

### Station Information

Calibration Date	Thursday, May 29, 2014	Previous Calibration	Tuesday, May 06, 2014
Station Name	Mannix	Station Number	AMS 5
Reason:	Install		
Start Time (MST)	10:45	End Time (MST)	13:10
Barometric Pressure	725 mmHg	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11061107
Gas Cert Reference	LL107934	Cal Gas Expiry Date	29-May-14
CH4 Cal Gas Conc.	515 ppm	CH4 Equiv Conc.	1081.5 ppm
C3H8 Cal Gas Conc.	206 ppm		
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2633
DACS voltage range	0-5v	DACS channel #	

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppm)	25	25	Sample Pressure	8.8	8.7
Analyzer Range (mv)	5000	5000	Air	28.3	38.0
Calculated slope	0.980206	0.995738	Fuel Pressure	26.3	26.3
Calculated intercept	0.073883	0.125299	Detector Temp	125.0	125.0
Bkg	0.000000	0.00	Flame Temp	141.0	151.5
Slope	5.183000	4.910			

Analyzer make	TEI 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	0.00	N/A
as found span	5000	58.8	12.72	13.40	0.949
calibrator zero	5000	0.0	0.00	0.00	N/A
high point	5000	58.8	12.72	12.69	1.002
second point	5000	29.0	6.27	6.15	1.020
third point	5000	14.7	3.18	2.93	1.087
calibrator zero	5000	0.0	0.00	0.00	N/A
as left zero	5000	0.0	0.00	0.00	N/A
as left span	5000	58.8	12.72	12.72	1.000
Average Correction Factor					1.036

Corrected As found	13.40	Previous response	12.90	% change	-3.7%
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#### Notes:

Span adjusted.
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Calibration Performed By: Devin Russell



# Wood Buffalo Environmental Association

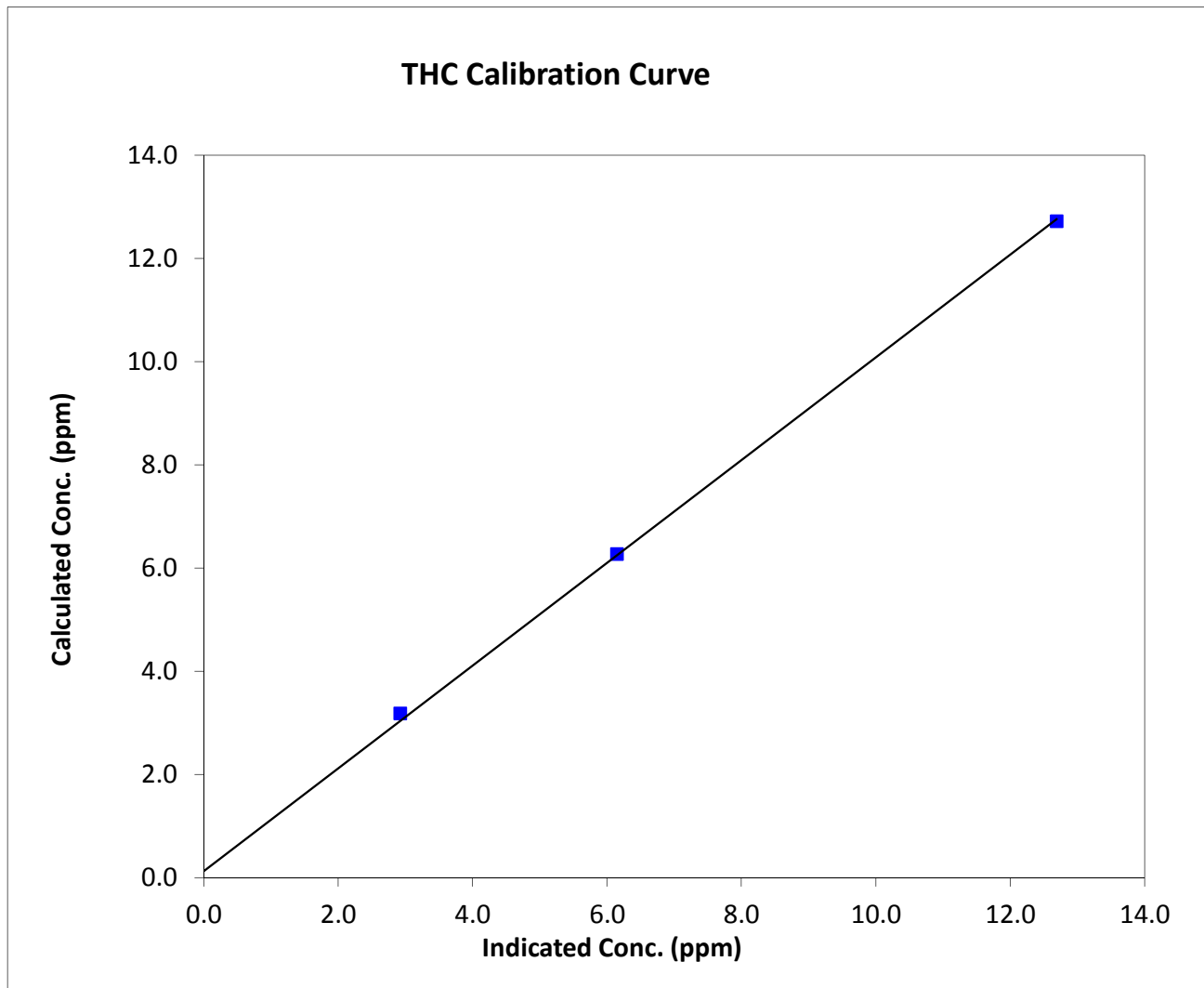
## THC Calibration Summary

### Station Information

Calibration Date	May 29, 2014	Previous Calibration	May 6, 2014
Station Name	Mannix	Station Number	AMS 5
Start Time (MST)	10:45	End Time (MST)	13:10
Analyzer make	TEI 51i-LT	Analyzer serial #	1327059295

### Calibration Data

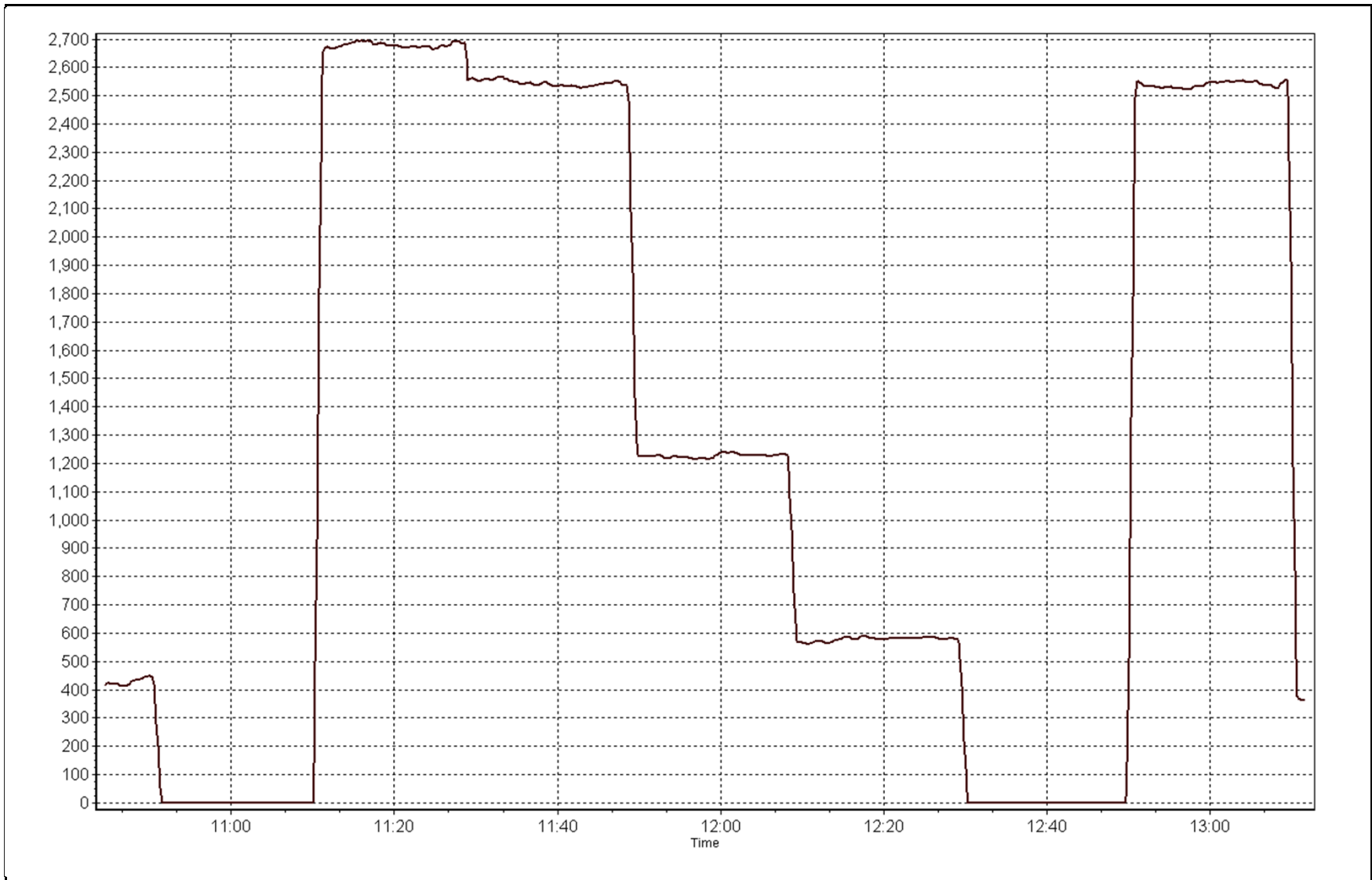
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	N/A	Correlation Coefficient	0.999572
12.72	12.69	1.0020		
6.27	6.15	1.0204	Slope	0.995738
3.18	2.93	1.0870		
			Intercept	0.125299





THC Calibration Plot

Date: May 29, 2014



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**WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS 6**  
**PATRICIA MCINNES**  
**MAY 2014**

Operations and Data Collection by:  
Wood Buffalo Environmental Association  
Fort McMurray, Alberta

QA/QC, Data Validation and Reporting by:  
Aurora Atmospherics Inc.  
Calgary, Alberta

June 27, 2014

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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - PATRICIA McINNES (AMS 6)  
MAY 2014

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	702	37	42	99.33	26	0	4	0
TRS (ppb) Average	707	36	37	99.87	1	0	0	0
THC (ppm) Average	700	37	44	99.06	2.3	-	2	-
NMHC(ppm) Average	700	37	44	99.06	0.228	-	0.028	-
CH4(ppm) Average	700	37	44	99.06	2.1	-	2	-
O3 (ppb) Average	702	34	42	98.92	56	0	41	-
NO2 (ppb) Average	687	36	57	97.18	17	0	7	-
NO (ppb) Average	687	36	57	97.18	10	-	2	-
NOX (ppb) Average	687	36	57	97.18	24	-	8	-
NH3 (ppb) Average	669	40	75	95.30	0	0	0	-
PM2.5 (ug/m3) Average	727	0	17	97.72	23.8	-	9.6	0
Temperature 2 m (C) Average	744	0	0	100.00	27.7	-	20.5	-
Relative Humidity (%) Average	744	0	0	100.00	97	-	-	-
Wind Speed 10 m (km/h) Average	744	0	0	100.00	33	-	-	-
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 - PATRICIA McINNES (AMS 6)  
MAY 2014

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	702	0.8	2	-	0	0	0	0	0	2	26
TRS (ppb) Average	707	0.2	0	-	0	0	0	0	0	0	1
THC (ppm) Average	700	1.94	0.1	-	1.8	1.9	1.9	1.9	2	2	2.3
NMHC(ppm) Average	700	0.004	0.02	-	0	0	0	0	0	0	0.228
CH4(ppm) Average	700	1.94	0	-	1.8	1.9	1.9	1.9	2	2	2.1
O3 (ppb) Average	702	30.1	11	-	2	16	22	30	38	44	56
NO2 (ppb) Average	687	3.3	3	-	0	0	1	2	5	7	17
NO (ppb) Average	687	1	1	-	0	0	0	1	1	2	10
NOX (ppb) Average	687	4.4	4	-	0	0	2	3	6	10	24
NH3 (ppb) Average	669	0	0	-	0	0	0	0	0	0	0
PM2.5 (ug/m3) Average	727	4.55	3.6	-	0	1	2	3.6	6.3	9.1	23.8
Temperature 2 m (C) Average	744	8.47	7	-	-6.1	-0.3	2.7	8.1	13.9	18.1	27.7
Relative Humidity (%) Average	744	60.7	22	-	16	31	41	61	80	91	97
Wind Speed 10 m (km/h) Average	744	11.3	7	-	1	4	6	10	15	21	33
Wind Direction 10 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - PATRICIA McINNES (AMS 6)  
MAY 2014

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2	01 May 2014 10:00	01 May 2014 14:00	5	Maintenance - replaced in-situ calibrator
TRS	02 May 2014 12:00	02 May 2014 12:00	1	Maintenance - sample manifold cleaned
NMHC, CH4, THC	01 May 2014 10:00	01 May 2014 14:00	5	Maintenance - replaced in-situ calibrator
NMHC, CH4, THC	30 May 2014 13:00	30 May 2014 13:00	2	Maintenance - replaced pressure gauge on fuel cylinder
O3	02 May 2014 12:00	02 May 2014 12:00	1	Maintenance - sample manifold cleaned
O3	05 May 2014 13:00	05 May 2014 15:00	3	Maintenance - confirm calibration points with new calibrator
O3	23 May 2014 16:00	23 May 2014 18:00	3	Maintenance - station operator on site rewiring
O3	30 May 2014 13:00	30 May 2014 13:00	1	Power spike
NO2, NO, NOX	01 May 2014 10:00	01 May 2014 14:00	5	Maintenance - replaced in-situ calibrator
NO2, NO, NOX	05 May 2014 14:00	05 May 2014 15:00	2	Maintenance - confirm calibration points with new calibrator
NO2, NO, NOX	29 May 2014 16:00	30 May 2014 05:00	14	Maintenance - analyzer signal disconnected from data logger
NH3	01 May 2014 03:00	31 May 2014 05:00	31	Stabilization after daily span
NH3	01 May 2014 14:00	01 May 2014 15:00	2	Maintenance - replaced in-situ calibrator
NH3	02 May 2014 12:00	02 May 2014 12:00	1	Maintenance - sample manifold cleaned
NH3	30 May 2014 13:00	30 May 2014 13:00	1	Power spike
PM2.5	01 May 2014 17:00	01 May 2014 17:00	1	Intermittent unstable operation - baseline drift
PM2.5	02 May 2014 01:00	02 May 2014 10:00	10	Intermittent unstable operation - baseline drift
PM2.5	09 May 2014 11:00	09 May 2014 12:00	2	Maintenance - Flow and zero check, sample head cleaning
PM2.5	10 May 2014 08:00	10 May 2014 09:00	2	Intermittent unstable operation - baseline drift
PM2.5	10 May 2014 14:00	10 May 2014 14:00	1	Intermittent unstable operation - baseline drift
PM2.5	27 May 2014 07:00	27 May 2014 07:00	1	Maintenance - station operator on site rewiring

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Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 26 ppb on May 15 16:00	Maximum Daily Average: 3.5 ppb on May 12		Hours of Data:	702
Minimum Value: 0 ppb on May 2 08:00	Minimum Daily Average: 0.0 ppb on May 28		Hours of Missing Data:	42
Maximum Diurnal Average: 1.7 ppb at hour 16	Minimum Diurnal Average: 0.2 ppb at hour 3		Hours of Calibration:	37
Monthly Average: 0.8 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> = 11		Percent Operational Time:	99.3

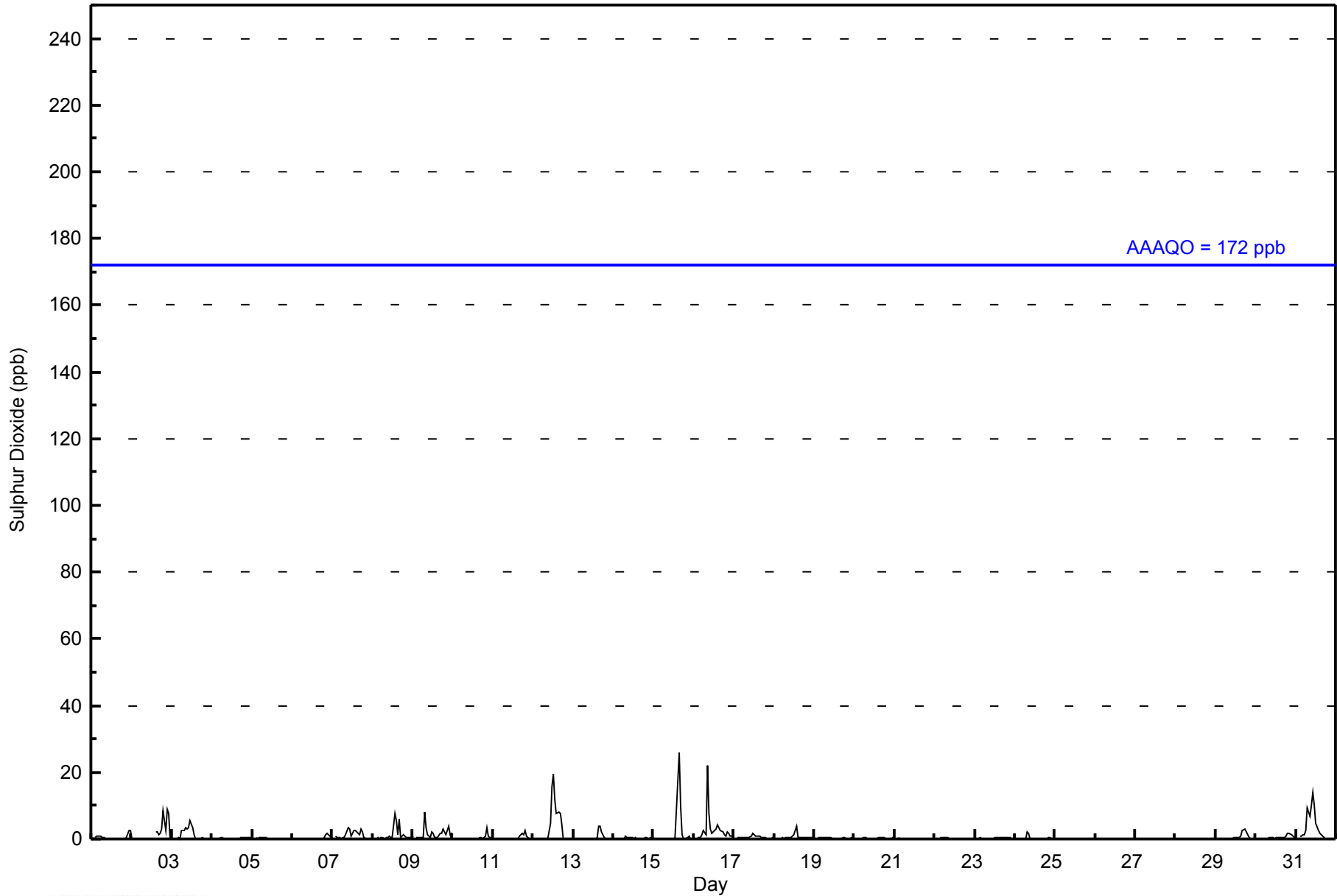
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-May	0	Z	0	1	1	1	0	0	1	M	M	M	M	M	0	0	0	0	0	0	0	0	3	3	0.5	3
2-May	0	Z	0	0	0	0	0	0	C	C	C	C	C	C	2	2	1	2	3	8	3	9	8	0	--	9
3-May	0	Z	0	0	0	0	2	3	3	3	3	5	3	1	0	0	0	0	0	0	0	0	0	0	1.2	5
4-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
5-May	0	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-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	0	0.2	2
7-May	1	Z	1	1	0	0	0	0	1	3	3	1	2	3	2	2	1	3	2	0	0	0	0	0	1.2	3
8-May	0	Z	0	0	0	0	0	0	0	1	1	1	8	5	1	6	0	1	1	0	0	0	0	0	1.2	8
9-May	1	Z	0	0	0	0	1	8	4	1	0	2	2	0	0	0	2	2	3	2	1	4	1	2	1.6	8
10-May	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	1	1	0	0.4	3
11-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	3	1	0	0	0	0	0.4	3
12-May	0	Z	0	0	0	0	0	0	0	0	5	16	20	12	8	8	8	4	0	0	0	0	0	0	3.5	20
13-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	4	4	2	0	0	0	0	0	0	0	0.5	4
14-May	0	Z	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
15-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	17	26	10	1	0	0	1	1	0	0	2.5	26
16-May	0	Z	0	0	0	1	2	1	22	8	3	2	2	3	4	4	3	2	1	1	2	2	1	1	2.8	22
17-May	1	Z	0	0	0	0	0	0	0	0	1	2	1	1	1	1	1	1	0	0	0	0	0	0	0.5	2
18-May	0	Z	0	0	0	0	0	0	0	0	0	1	1	4	1	0	0	0	1	0	0	0	0	1	0.6	4
19-May	0	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-May	0	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
21-May	0	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
22-May	0	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
23-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0.3	1
24-May	0	Z	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2
25-May	0	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-May	0	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
27-May	0	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
28-May	0	Z	0	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-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	2	3	2	1	0	0	0	0	0	0.5	3
30-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	1	1	1	0.5	2
31-May	1	Z	1	1	1	1	2	9	7	10	14	10	5	2	2	1	1	0	0	0	0	0	0	0	3.0	14
																								Diurnal Average		
																								Diurnal Maximum		

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



WBEA  
Hourly Averages

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Patricia McInnes - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Patricia McInnes - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	695	99.00	99.00
11 - 20	5	0.71	99.72
21 - 60	2	0.28	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 702

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Patricia McInnes - May 2014**

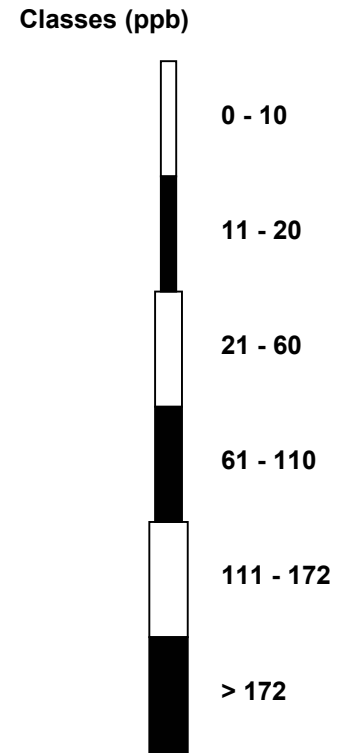
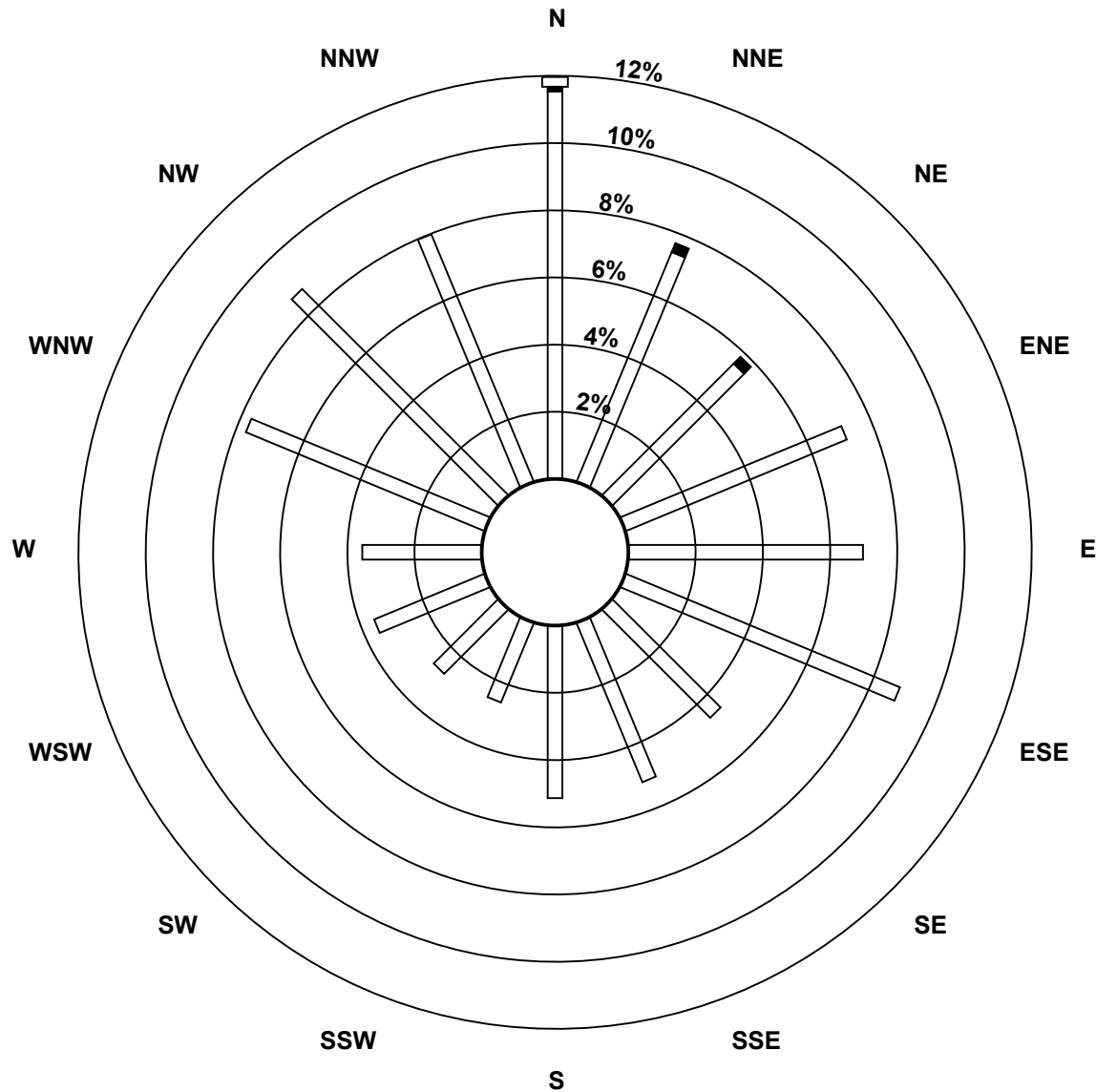
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	81	52	39	50	49	62	32	36	36	18	19	25	25	54	61	56	695
11 - 20	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	5
21 - 60	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	84	54	41	50	49	62	32	36	36	18	19	25	25	54	61	56	702

Total Number of Valid Hours: 702

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Patricia McInnes (AMS 6)**

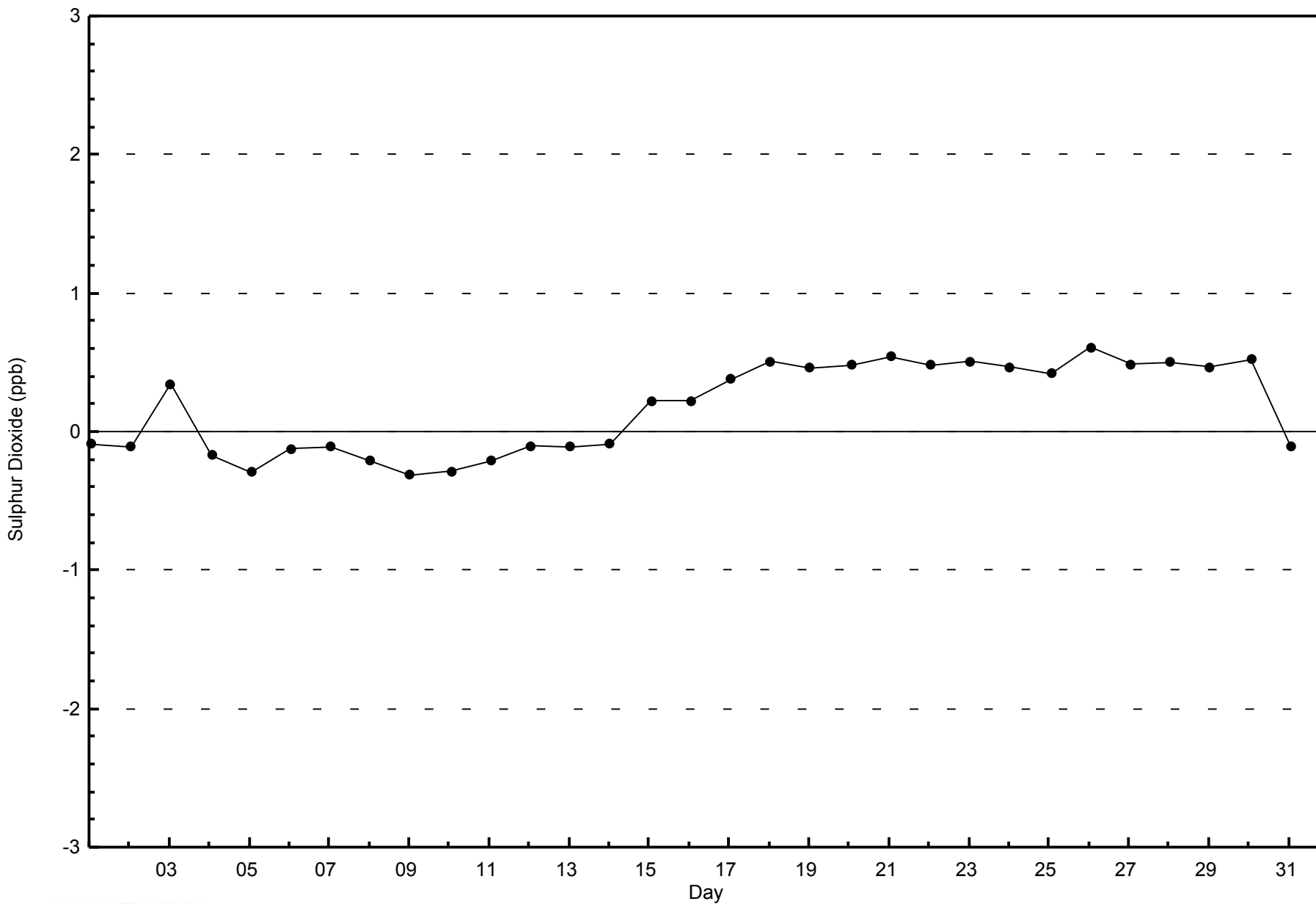


**Total Number of Valid Hours: 702**



WBEA  
Zero Responses

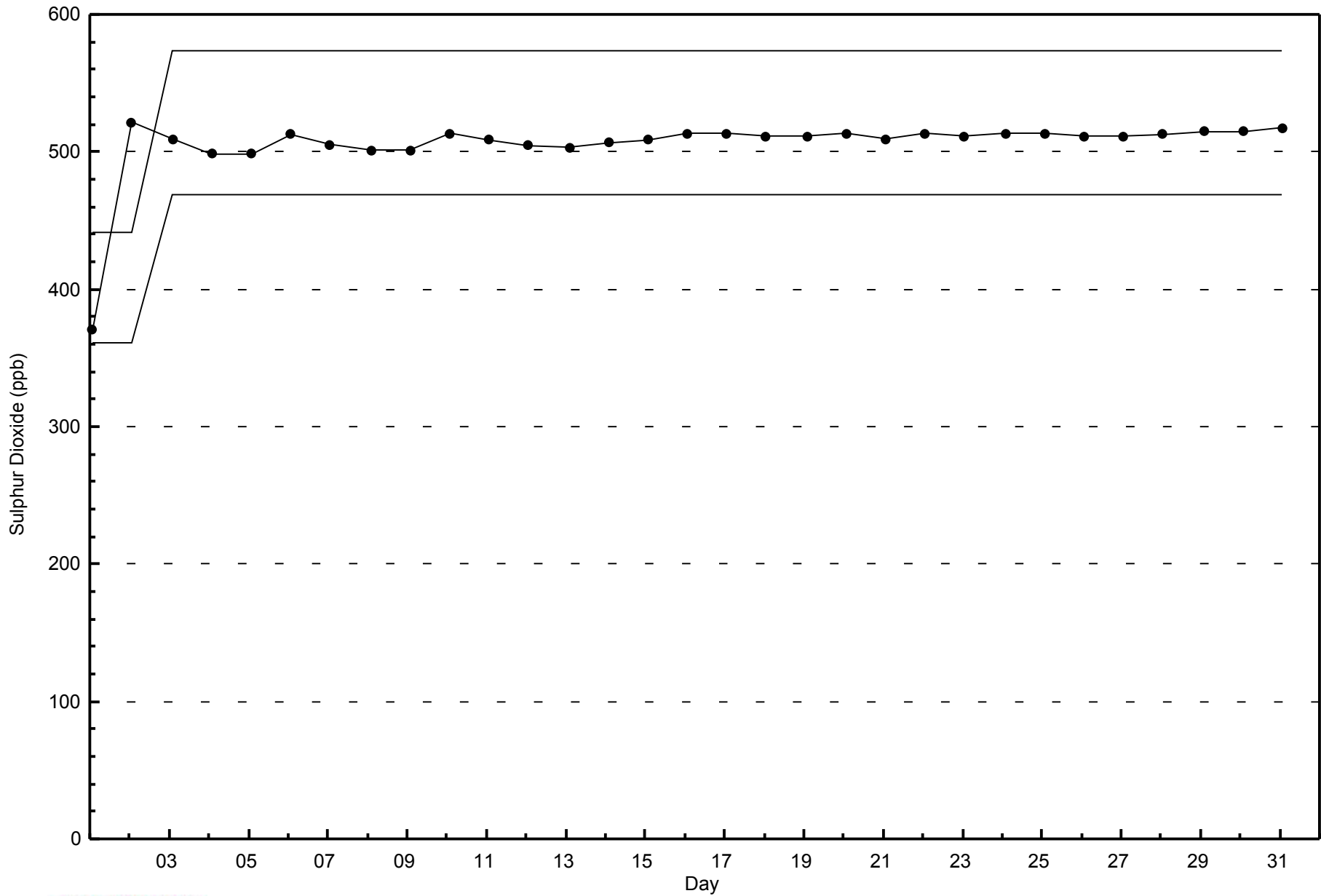
Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Patricia McInnes - May 2014





WBEA  
Span Responses

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Patricia McInnes - May 2014





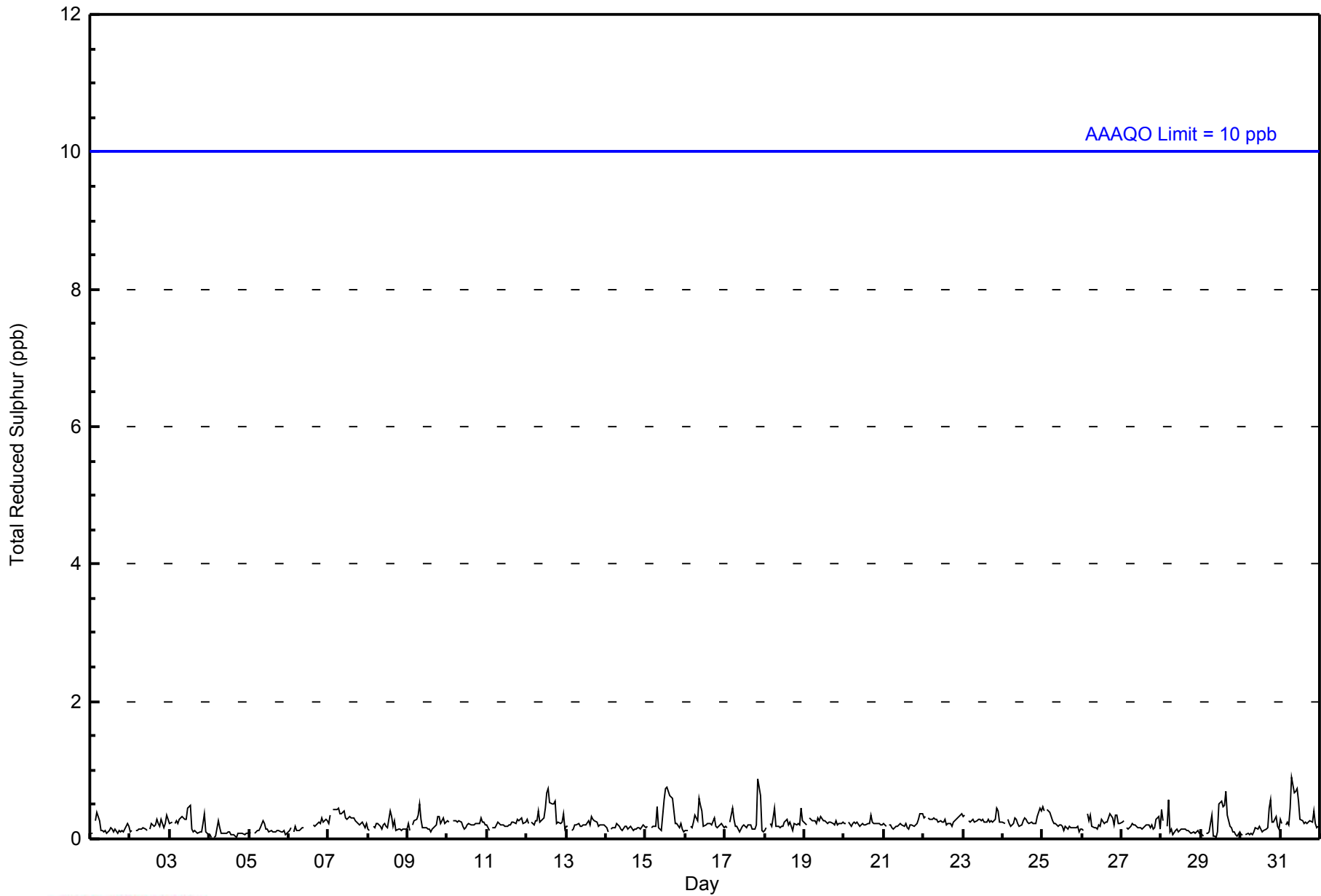
Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																																						
Maximum Value: 1 ppb on May 31 08:00										Maximum Daily Average: 0.4 ppb on May 12										Hours of Data: 707																												
Minimum Value: 0 ppb on May 4 02:00										Minimum Daily Average: 0.1 ppb on May 4										Hours of Missing Data: 37																												
Maximum Diurnal Average: 0.3 ppb at hour 14										Minimum Diurnal Average: 0.2 ppb at hour 2										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: 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-May	0	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-May	0	0	Z	0	0	0	0	0	0	0	0	M	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0																						
3-May	0	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																						
4-May	0	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																						
5-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																						
6-May	0	0	Z	0	0	0	0	0	0	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0.2	0																						
7-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0																						
8-May	0	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-May	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																						
10-May	0	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																						
11-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0																						
12-May	0	0	Z	0	0	0	0	0	0	0	0	1	1	1	0	1	1	0	0	0	0	0	0	0	0.4	1																						
13-May	0	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-May	0	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-May	0	0	Z	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0.3	1																						
16-May	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																						
17-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0.2	1																						
18-May	0	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-May	0	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-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0																						
21-May	0	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																						
22-May	0	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																						
23-May	0	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																						
24-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0																						
25-May	0	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-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0																						
27-May	0	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																						
28-May	0	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																						
29-May	0	0	Z	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0.2	1																						
30-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.2	1																						
31-May	0	0	Z	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1																						
																								0.2	0.2	--	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	Diurnal Average
																								0	0	--	0	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	Diurnal Maximum
Z - zerospan C - Calibration M - Maintenance																																																
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb																																																





**WBEA**  
**Hourly Averages**

**Total Reduced Sulphur (TRS) - ppb**  
**Patricia McInnes - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb**  
**Patricia McInnes - May 2014**

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

Total Number of Valid Hours: 707

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb**  
**Patricia McInnes - May 2014**

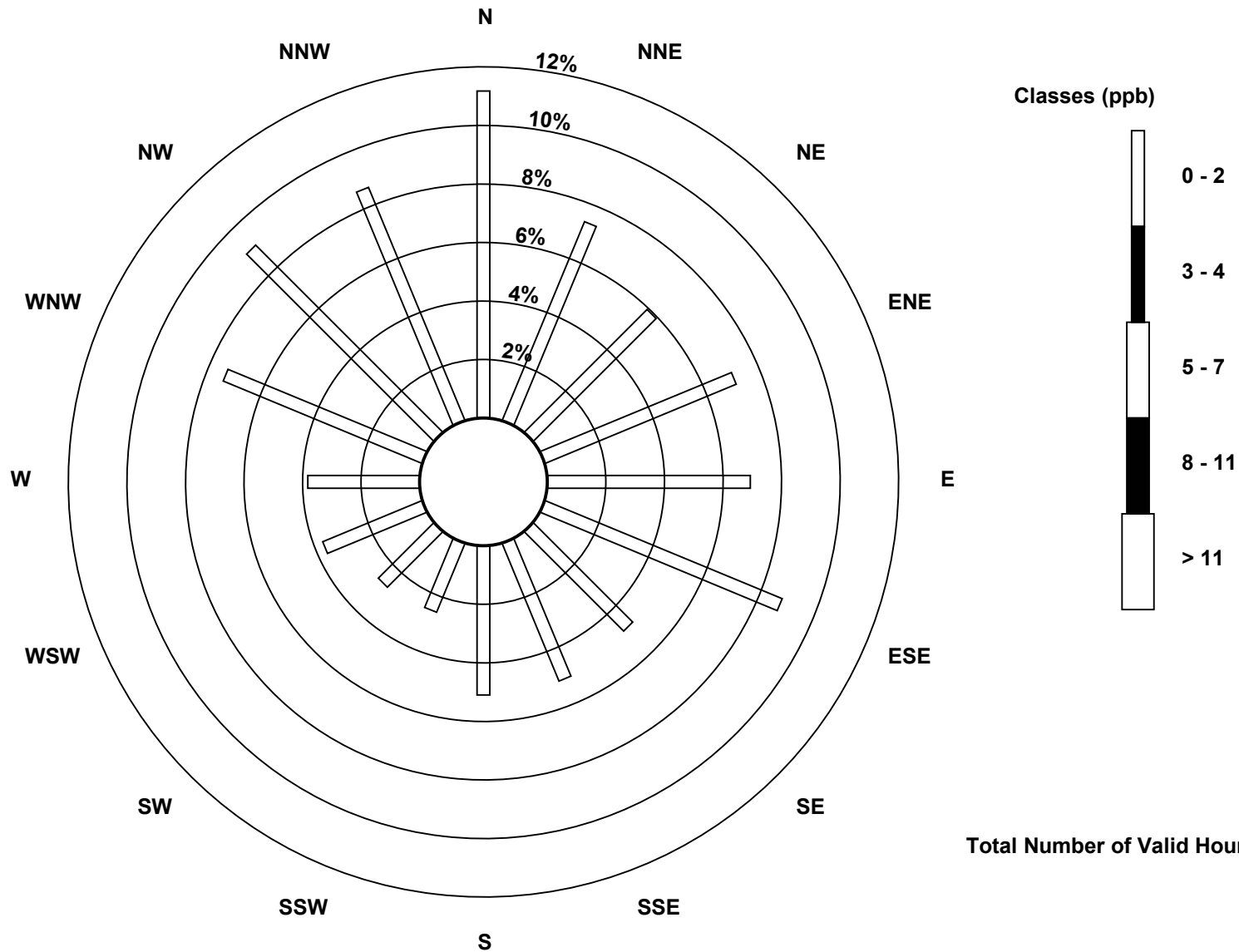
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	79	52	42	50	49	62	34	36	36	18	19	26	27	52	64	61	707
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	79	52	42	50	49	62	34	36	36	18	19	26	27	52	64	61	707

Total Number of Valid Hours: 707

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

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

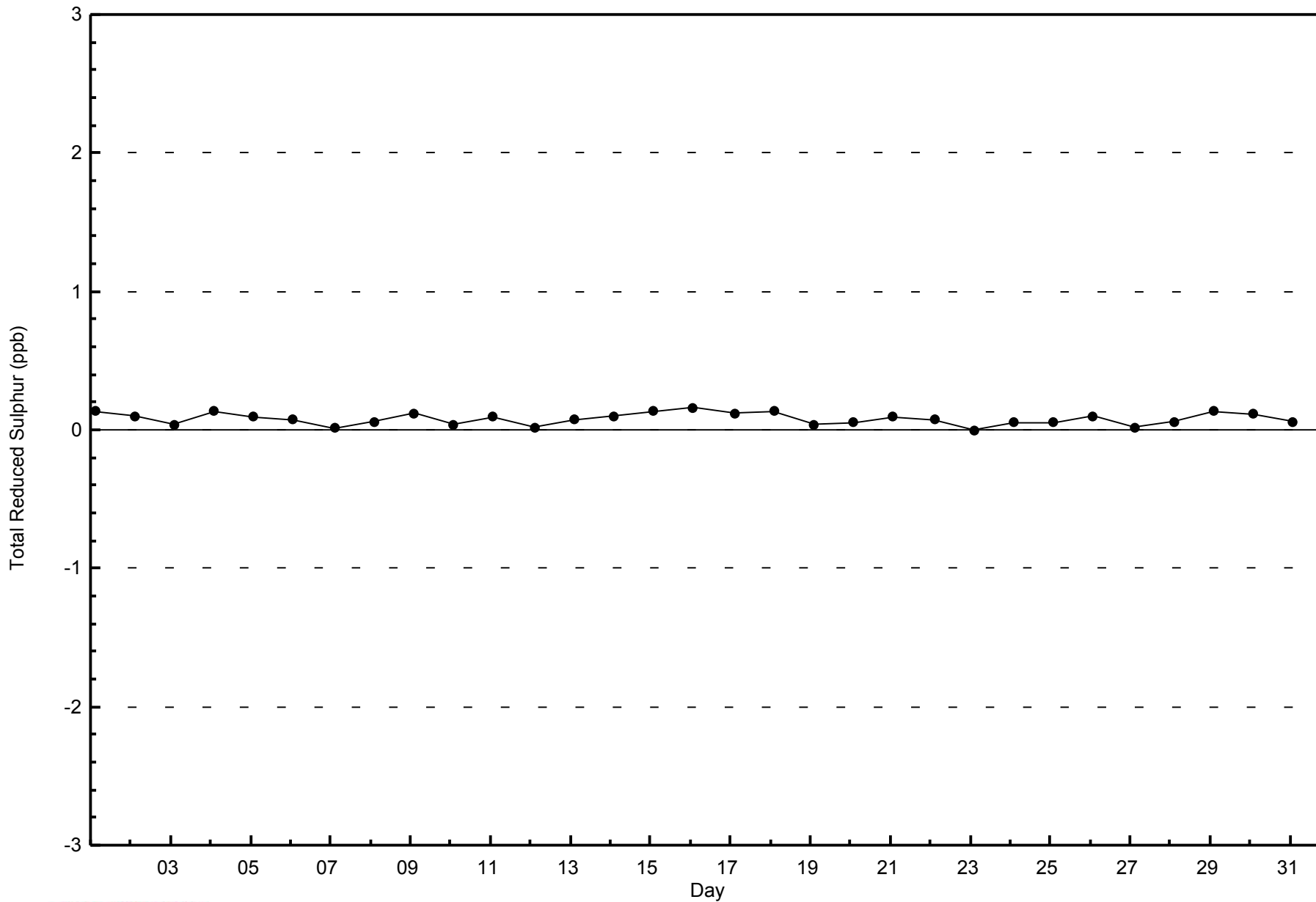


**Total Number of Valid Hours: 707**



WBEA  
Zero Responses

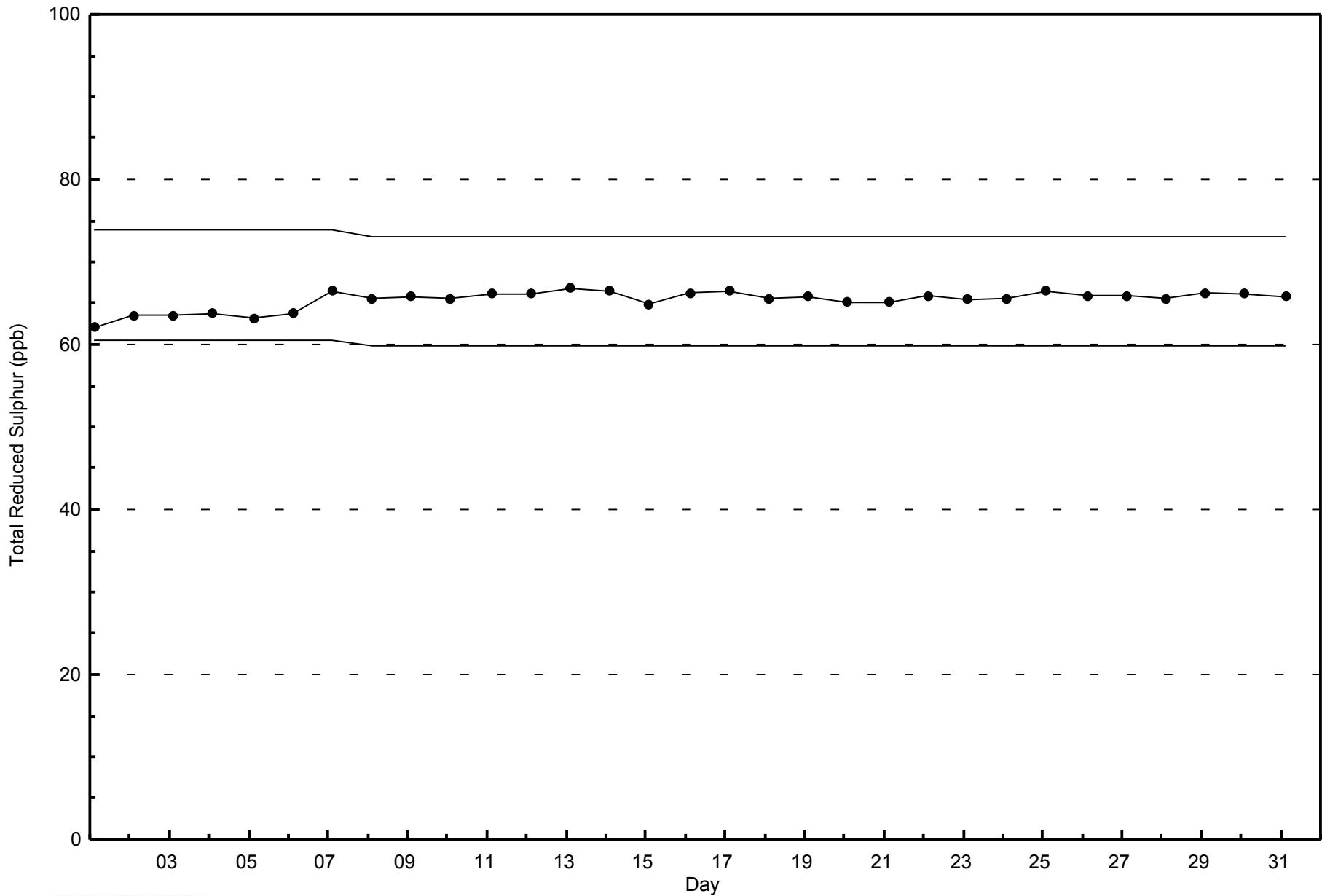
Total Reduced Sulphur (TRS) - ppb  
Patricia McInnes - May 2014





**WBEA**  
**Span Responses**

**Total Reduced Sulphur (TRS) - ppb**  
**Patricia McInnes - May 2014**

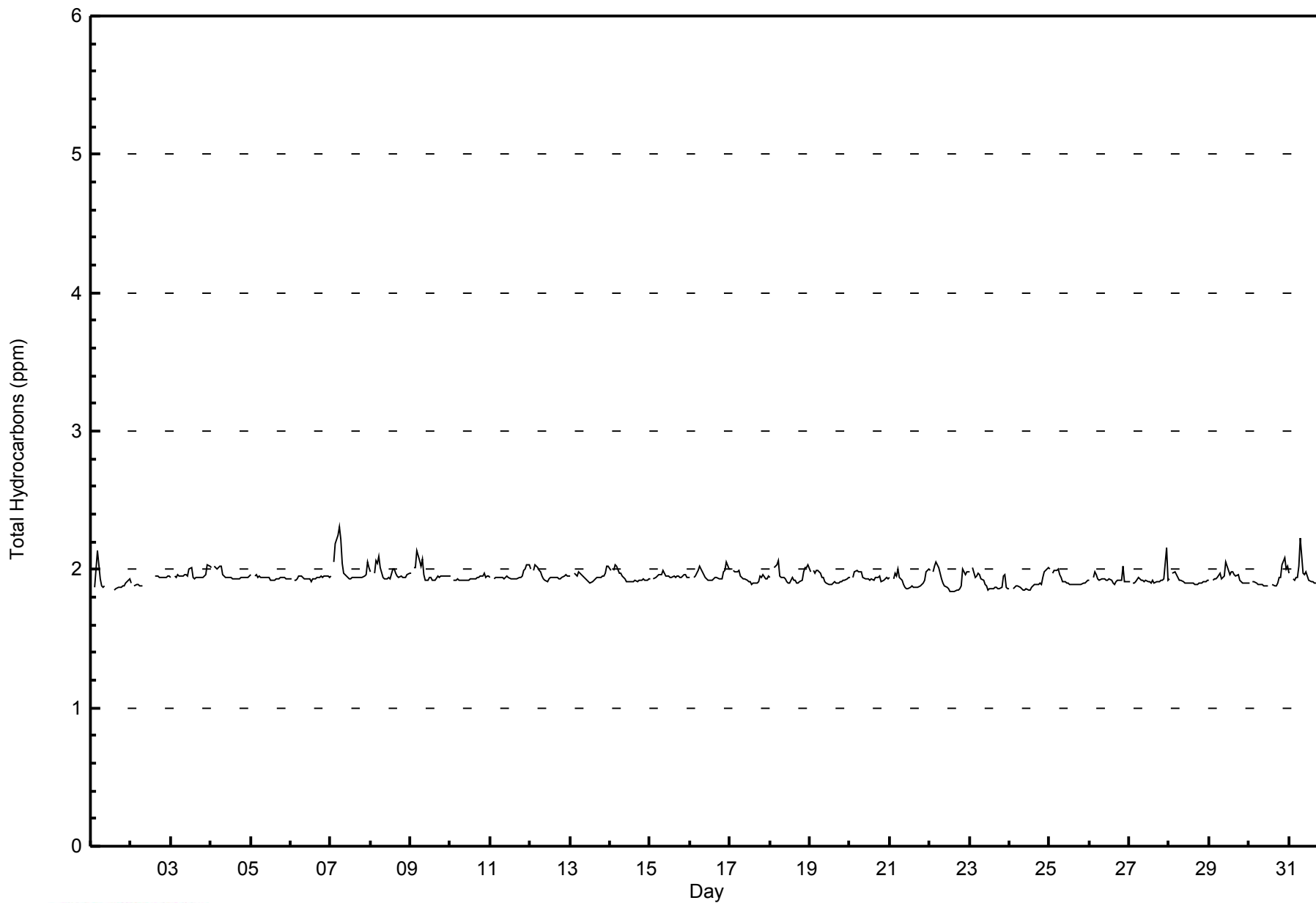






**WBEA**  
**Hourly Averages**

**Total Hydrocarbons (THC) - ppm**  
**Patricia McInnes - May 2014**







**WBEA**  
**Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Patricia McInnes - May 2014**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	683	97.57	97.57
2.1 - 3.0	17	2.43	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 700

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Patricia McInnes - May 2014**

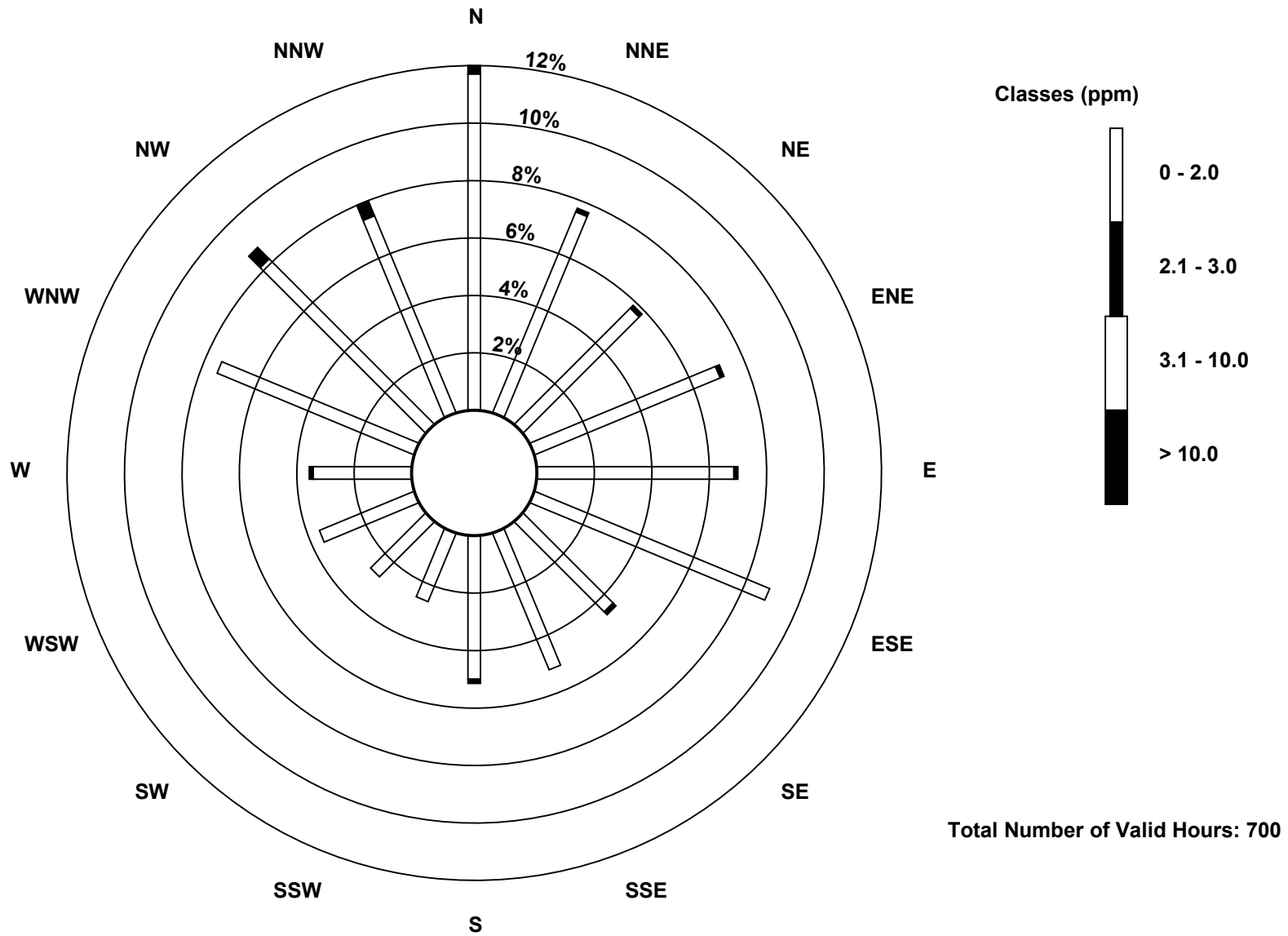
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	82	53	40	49	48	62	31	36	35	18	19	25	24	52	57	52	683
2.1 - 3.0	2	1	1	1	1	0	1	0	1	0	0	0	1	0	4	4	17
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	84	54	41	50	49	62	32	36	36	18	19	25	25	52	61	56	700

Total Number of Valid Hours: 700

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

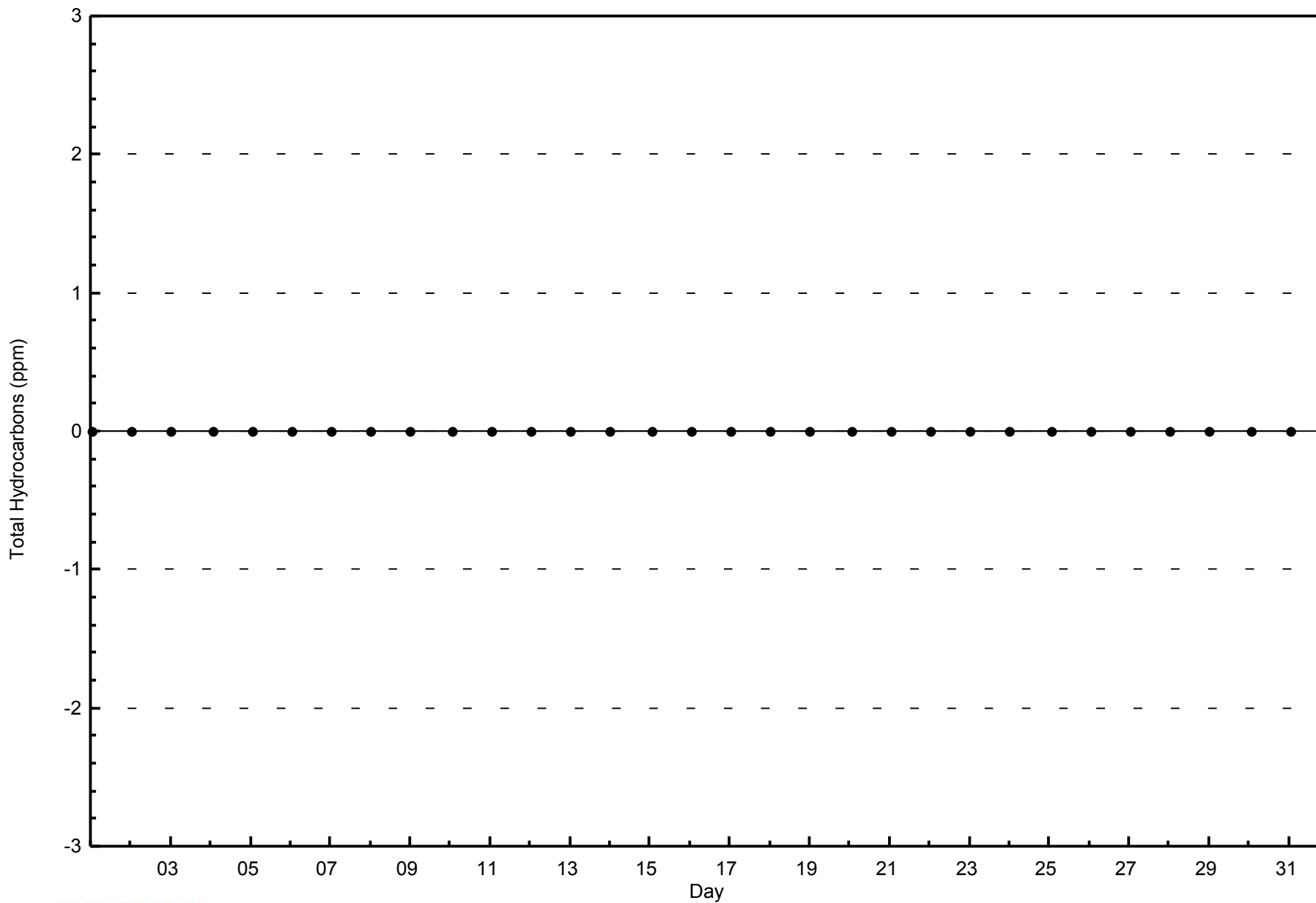
**Total Hydrocarbons (THC) - ppm  
Patricia McInnes (AMS 6)**





**WBEA**  
**Zero Responses**

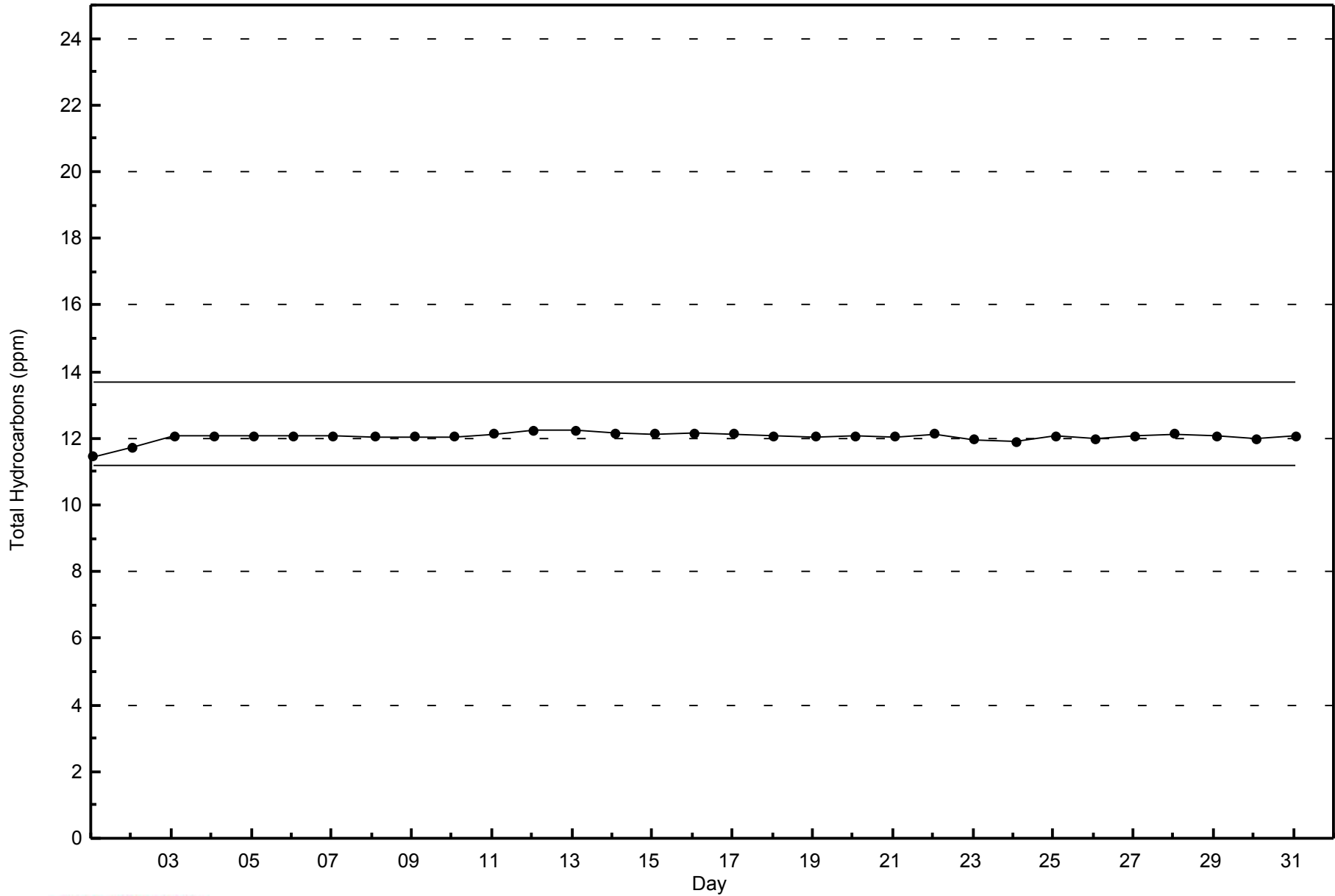
**Total Hydrocarbons (THC) - ppm**  
**Patricia McInnes - May 2014**





**WBEA**  
**Span Responses**

**Total Hydrocarbons (THC) - ppm**  
**Patricia McInnes - May 2014**





Wood Buffalo Environmental Association

Summary of Hour Averages

Non Methane Hydrocarbons (NMHC) - ppm

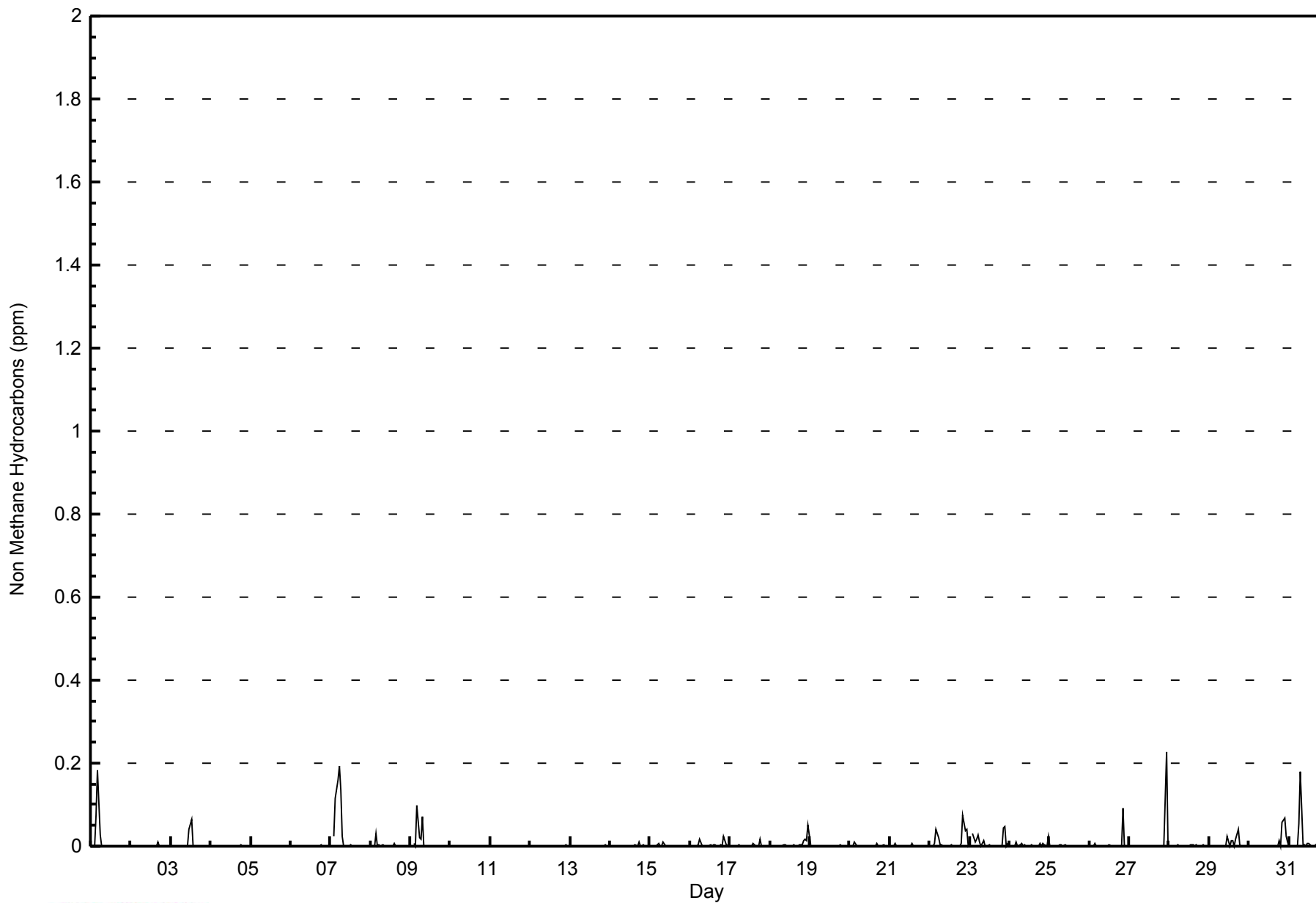
Patricia McInnes - May 2014

Maximum Value: 0.228 ppm on May 27 23:00		Maximum Daily Average: 0.028 ppm on May 7		Hours in Service:	744																						
Minimum Value: 0.000 ppm on May 1 07:00		Minimum Daily Average: 0.000 ppm on May 5		Hours of Data:	700																						
Maximum Diurnal Average: 0.016 ppm at hour 5		Minimum Diurnal Average: 0.000 ppm at hour 11		Hours of Missing Data:	44																						
Monthly Average: 0.004 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:	37																						
				Percent Operational Time:	99.1																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-May	0.002	Z	0.002	0.073	0.182	0.027	0.000	0.000	0.000	M	M	M	M	M	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.016	0.182	
2-May	0.004	Z	0.000	0.000	0.000	0.000	0.000	0.000	C	C	C	C	C	C	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	--	0.011	
3-May	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.040	0.064	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.064	
4-May	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	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.002	
5-May	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	
6-May	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	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.003	
7-May	0.000	Z	0.023	0.115	0.159	0.194	0.135	0.023	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.028	0.194	
8-May	0.000	Z	0.000	0.030	0.000	0.004	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.030	
9-May	0.000	Z	0.008	0.000	0.097	0.020	0.017	0.070	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	0.009	0.097	
10-May	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
11-May	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
12-May	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.002	0.000	0.000	0.000	0.002	
13-May	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.003	0.000	0.000	0.000	0.003	
14-May	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	0.004	0.000	0.012	0.000	0.001	0.002	0.000	0.000	0.000	0.000	0.001	0.012	
15-May	0.000	Z	0.000	0.000	0.003	0.007	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.011	
16-May	0.000	Z	0.000	0.000	0.000	0.004	0.015	0.000	0.000	0.000	0.000	0.003	0.000	0.003	0.002	0.000	0.000	0.002	0.000	0.023	0.014	0.003	0.000	0.000	0.003	0.023	
17-May	0.000	Z	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.000	0.018	0.001	0.002	0.000	0.000	0.000	0.000	0.001	0.018	
18-May	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.002	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.002	0.005	0.013	0.018	0.014	0.051	0.005	0.051	
19-May	0.003	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	
20-May	0.000	Z	0.000	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.001	0.009	
21-May	0.000	Z	0.001	0.006	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.006	
22-May	0.000	Z	0.000	0.008	0.039	0.020	0.003	0.003	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.006	0.076	0.038	0.042	0.000	0.000	0.010	0.076	
23-May	0.005	Z	0.030	0.009	0.018	0.027	0.012	0.000	0.015	0.002	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.002	0.046	0.047	0.000	0.006	0.000	0.010	0.047	
24-May	0.005	Z	0.001	0.000	0.010	0.000	0.003	0.006	0.000	0.003	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.006	0.000	0.007	0.002	0.000	0.023	0.000	0.003	0.023	
25-May	0.000	Z	0.000	0.000	0.000	0.000	0.002	0.003	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	
26-May	0.000	Z	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.090	0.000	0.000	0.000	0.000	0.004	0.090	
27-May	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	0.228	0.000	0.000	0.010	0.228	
28-May	0.000	Z	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.004	0.000	0.002	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.001	0.004	
29-May	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.025	0.000	0.013	0.013	0.000	0.017	0.040	0.004	0.000	0.000	0.000	0.000	0.000	0.005	0.040	
30-May	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	PF	M	0.000	0.000	0.000	0.000	0.012	0.001	0.057	0.067	0.023	0.009	0.008	0.067	
31-May	0.000	Z	0.000	0.000	0.000	0.000	0.056	0.180	0.003	0.002	0.000	0.008	0.005	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.180	
		0.001	--	0.002	0.008	0.016	0.010	0.008	0.009	0.001	0.000	0.000	0.003	0.003	0.001	0.001	0.000	0.001	0.002	0.002	0.001	0.010	0.006	0.010	0.003	Diurnal Average	
		0.005	--	0.030	0.115	0.182	0.194	0.135	0.180	0.015	0.003	0.000	0.040	0.064	0.013	0.013	0.004	0.017	0.040	0.018	0.006	0.090	0.067	0.228	0.051	Diurnal Maximum	
Z - zerospan			C - Calibration				M - Maintenance				PF - Power Failure																



WBEA  
Hourly Averages

Non Methane Hydrocarbons (NMHC) - ppm  
Patricia McInnes - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm**  
**Patricia McInnes - May 2014**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.005	630	90.00	90.00
0.006 - 0.05	54	7.71	97.71
0.06 - 0.1	11	1.57	99.29
> 0.1	5	0.71	100.00

Total Number of Valid Hours: 700

Total Number of Hours: 744





**WBEA**  
**Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm**  
**Patricia McInnes - May 2014**

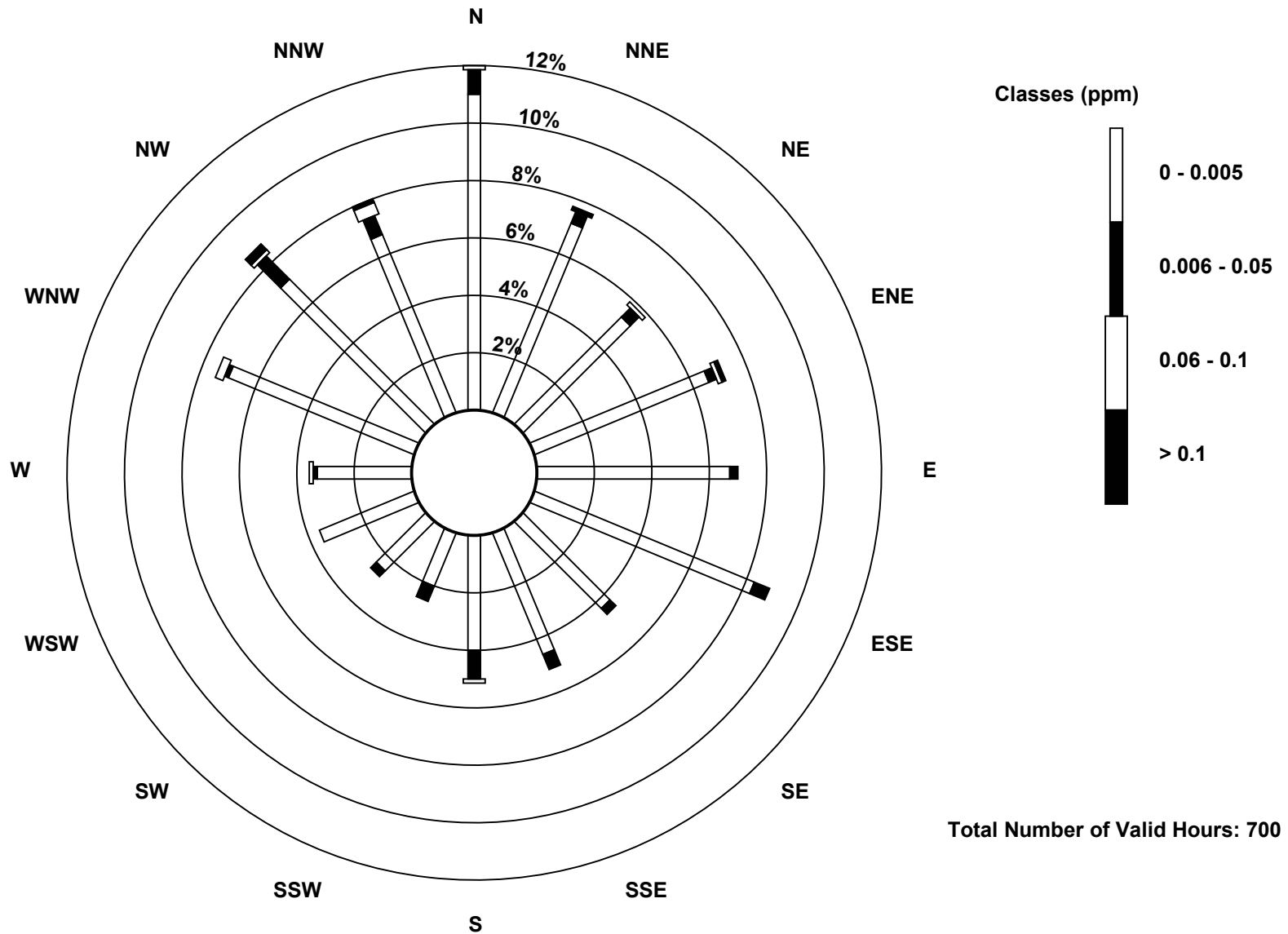
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	77	50	37	46	47	58	30	32	28	14	17	25	23	49	50	47	630
0.006 - 0.05	6	3	3	2	2	4	2	4	7	4	2	0	1	1	8	5	54
0.06 - 0.1	1	0	1	1	0	0	0	0	1	0	0	0	1	2	1	3	11
> 0.1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	2	1	5
<b>Totals</b>	84	54	41	50	49	62	32	36	36	18	19	25	25	52	61	56	700

Total Number of Valid Hours: 700

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Non Methane Hydrocarbons (NMHC) - ppm  
Patricia McInnes (AMS 6)**



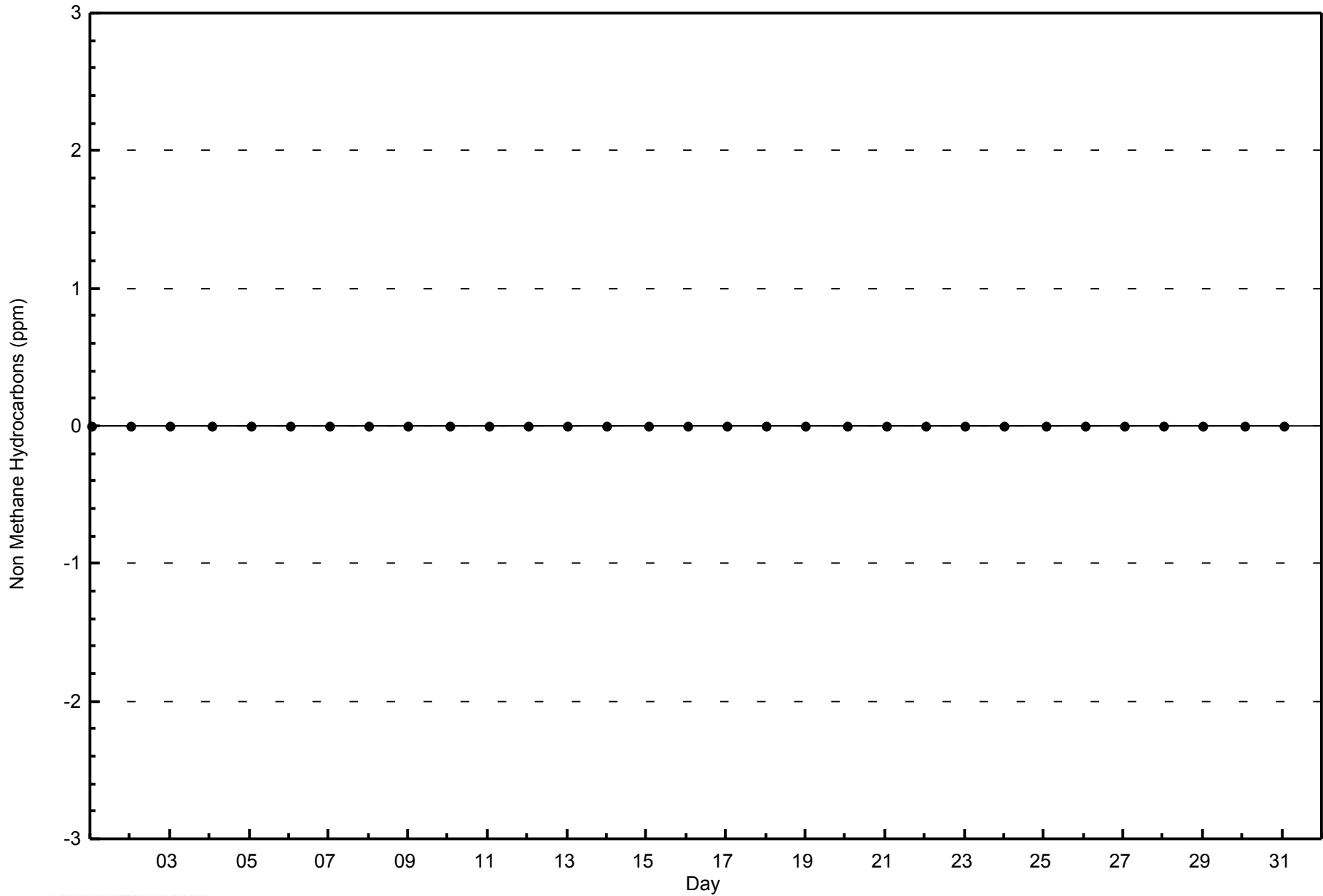


WBEA

Zero Responses

Non Methane Hydrocarbons (NMHC) - ppm

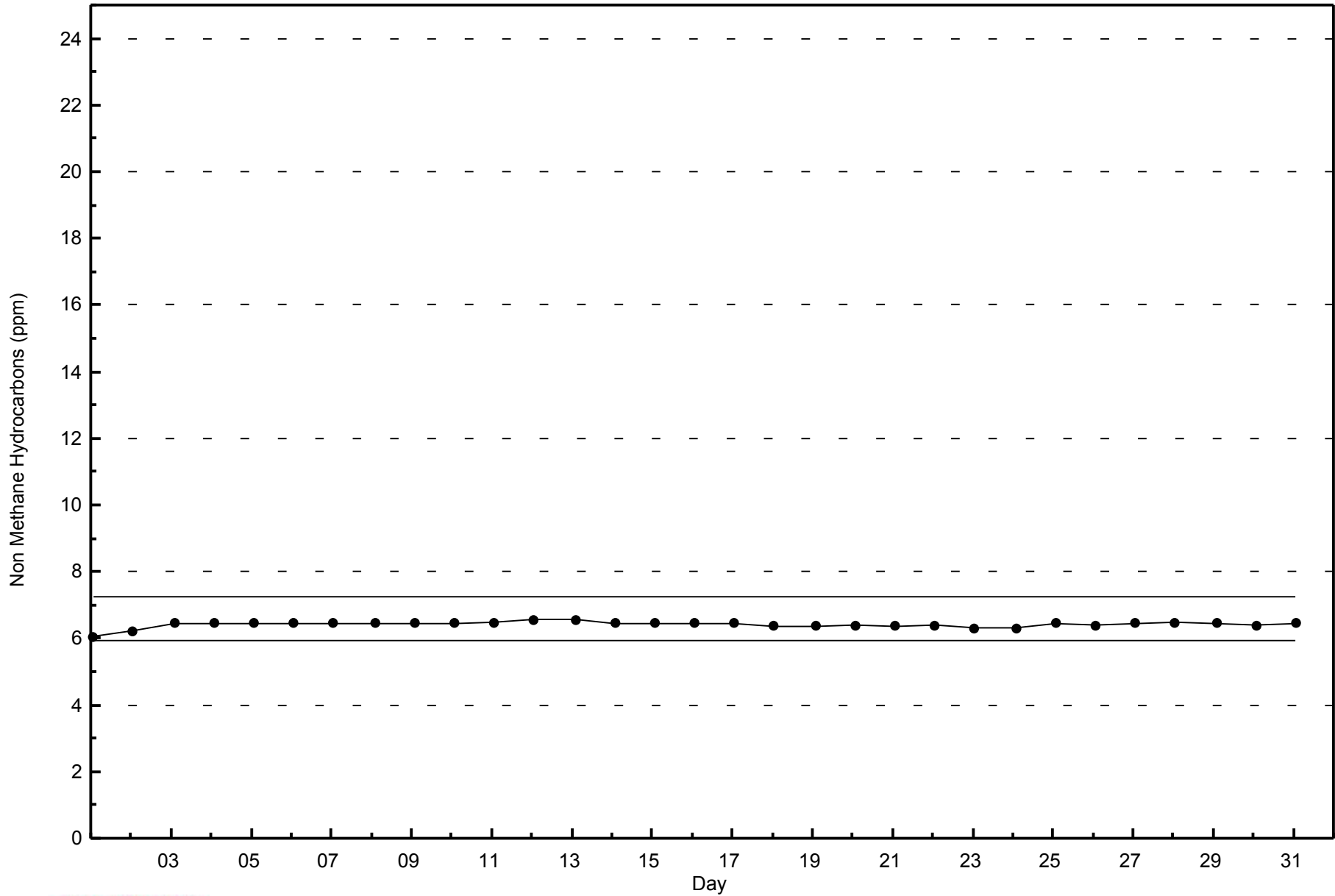
Patricia McInnes - May 2014





WBEA  
Span Responses

Non Methane Hydrocarbons (NMHC) - ppm  
Patricia McInnes - May 2014

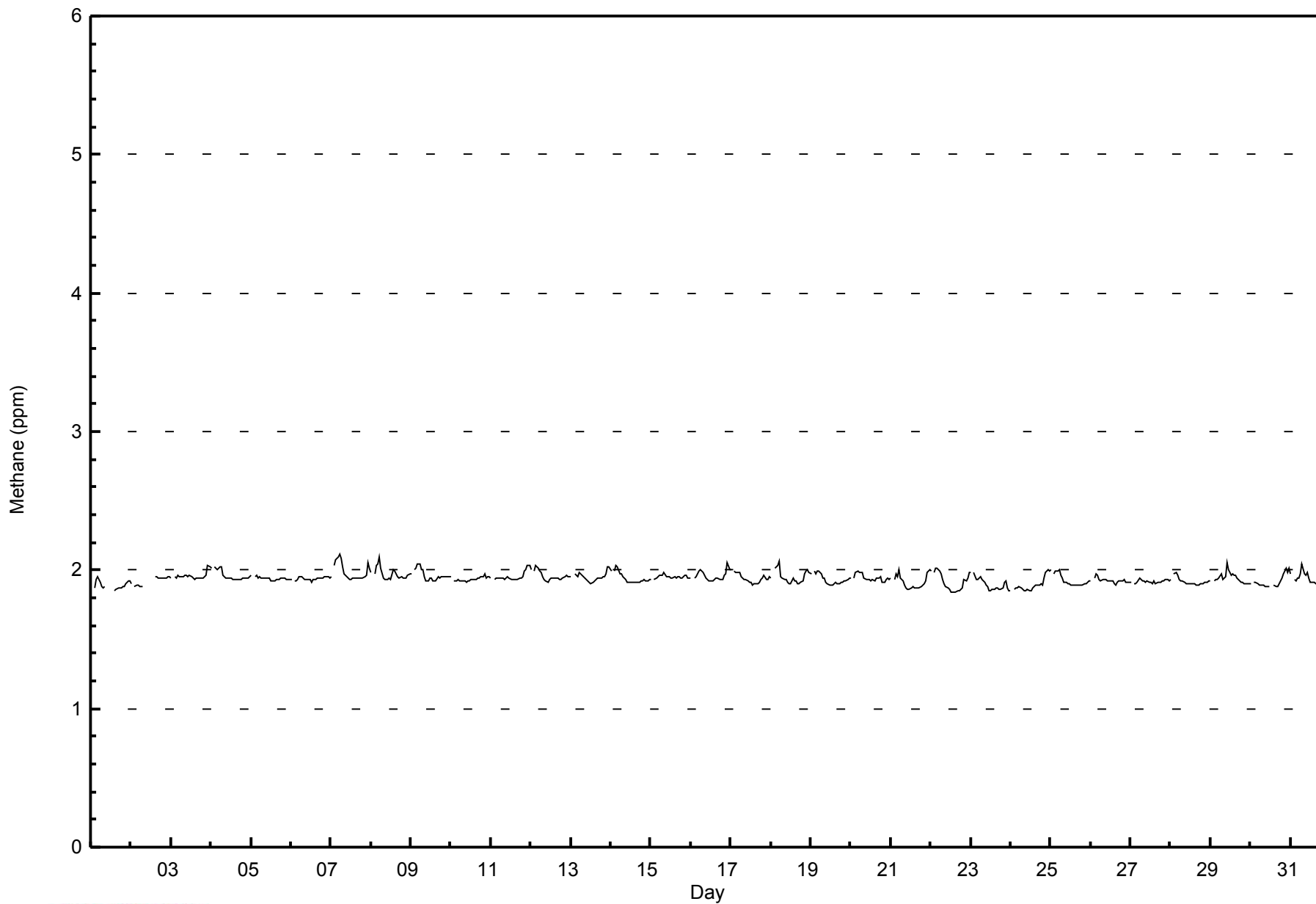






WBEA  
Hourly Averages

Methane (CH<sub>4</sub>) - ppm  
Patricia McInnes - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Methane (CH<sub>4</sub>) - ppm**  
**Patricia McInnes - May 2014**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	693	99.00	99.00
2.1 - 3.0	7	1.00	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 700

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Methane (CH<sub>4</sub>) - ppm**  
**Patricia McInnes - May 2014**

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	82	54	41	50	48	62	32	36	36	18	19	25	25	52	58	55	693
2.1 - 3.0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	3	1	7
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>	84	54	41	50	49	62	32	36	36	18	19	25	25	52	61	56	700

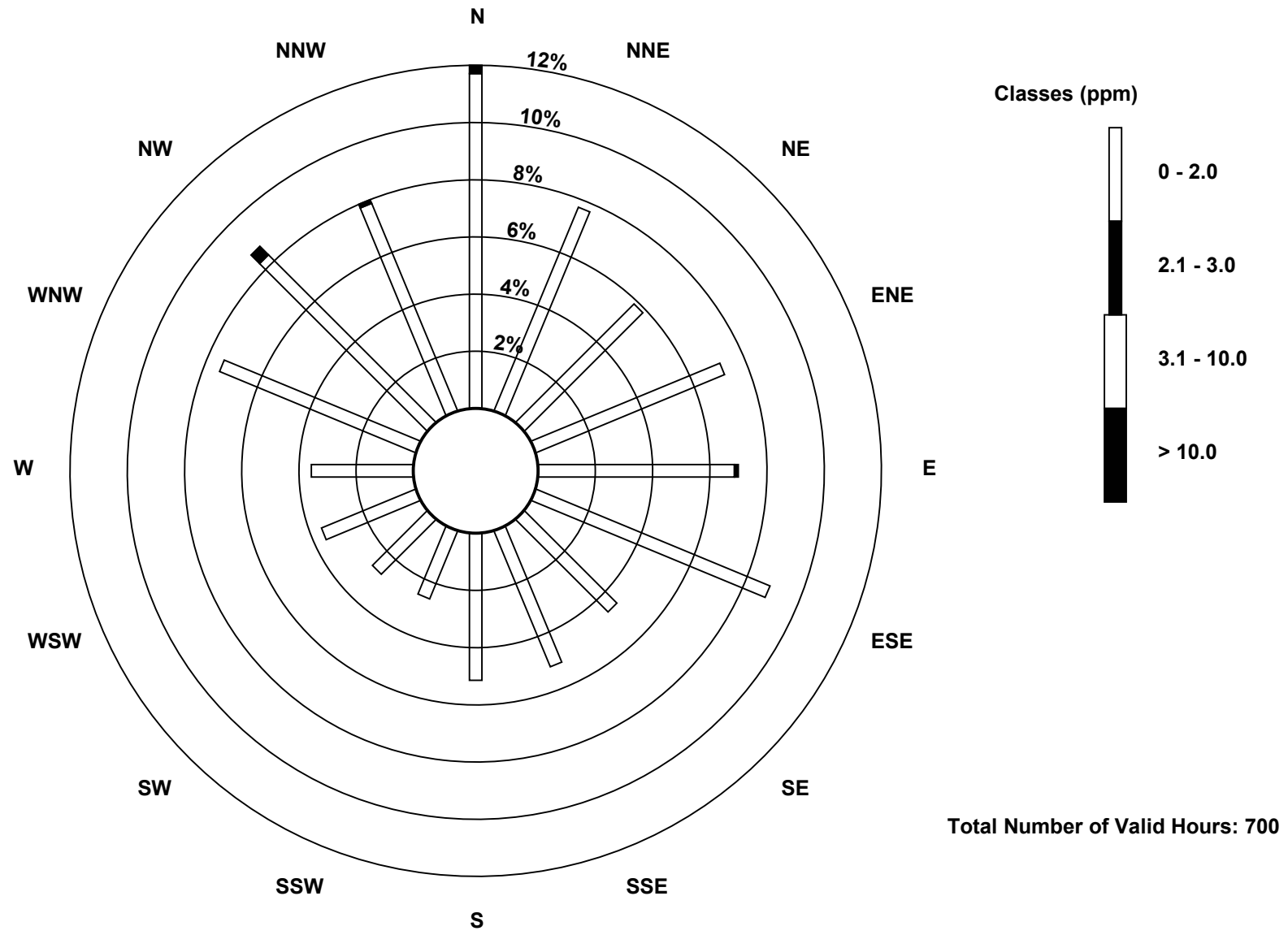
Total Number of Valid Hours: 700

Total Number of Hours: 744



Wood Buffalo Environmental Association  
Wind Rose May 2014

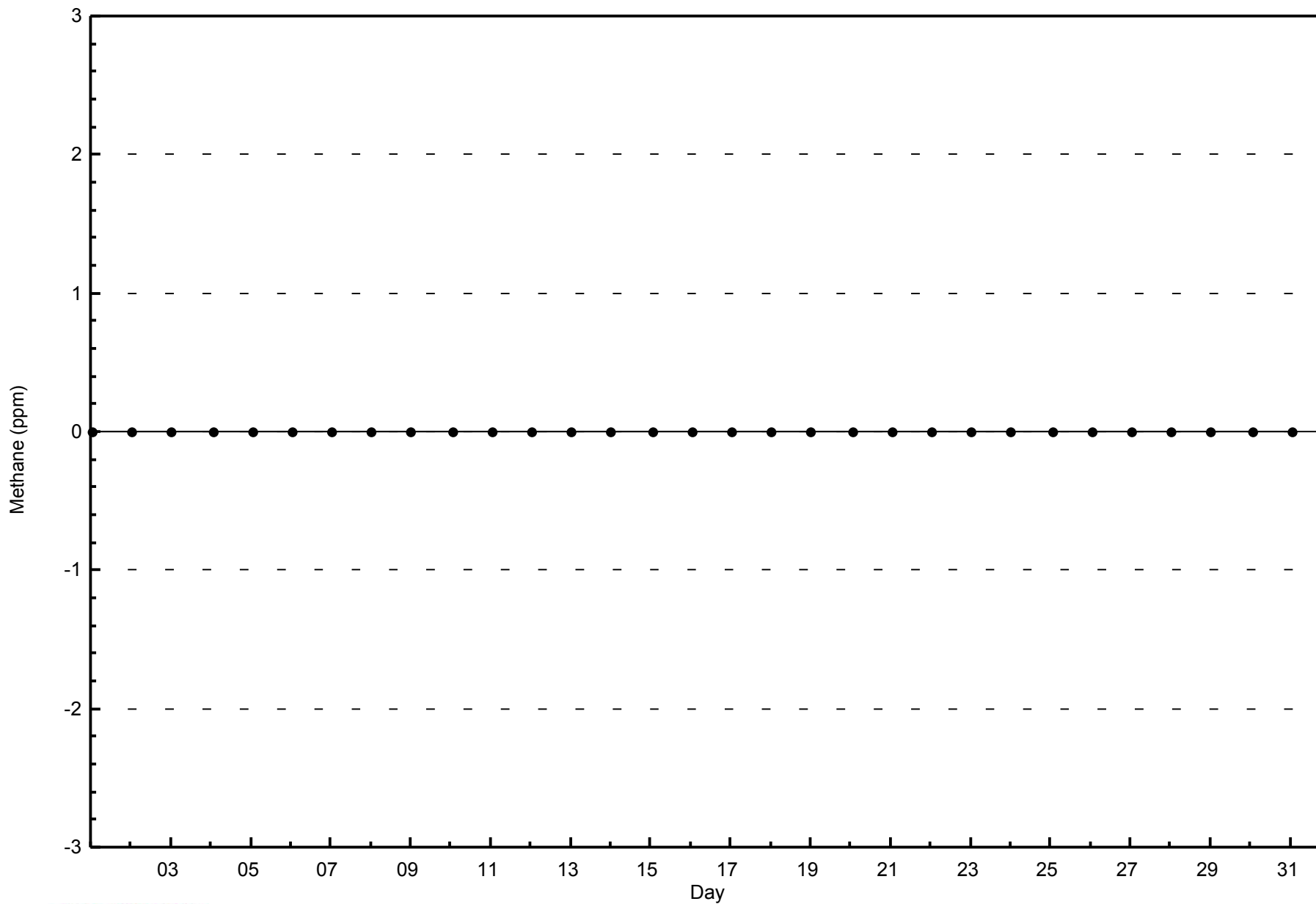
Methane (CH<sub>4</sub>) - ppm  
Patricia McInnes (AMS 6)





WBEA  
Zero Responses

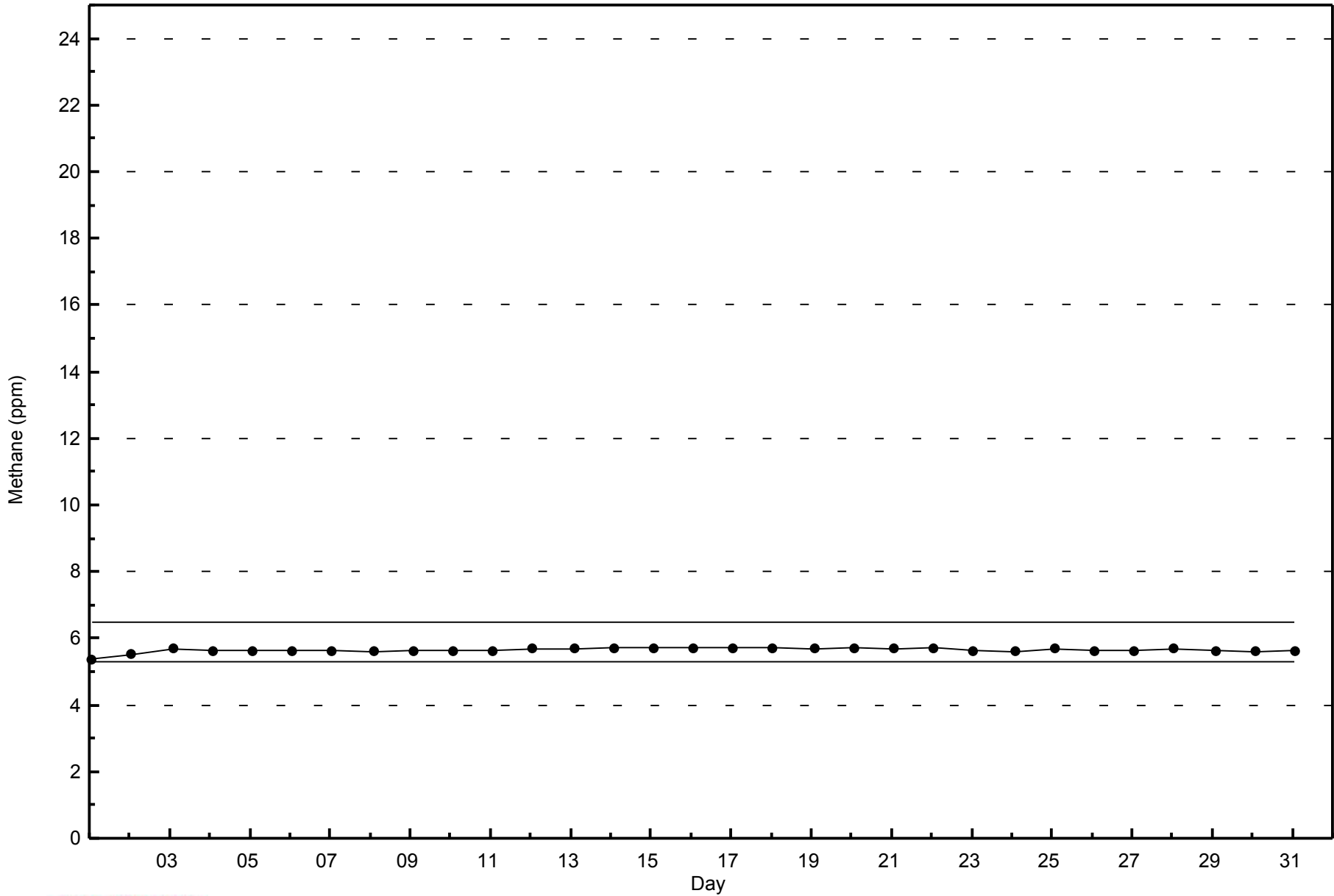
Methane (CH<sub>4</sub>) - ppm  
Patricia McInnes - May 2014





WBEA  
Span Responses

Methane (CH<sub>4</sub>) - ppm  
Patricia McInnes - May 2014





Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O<sub>3</sub>) - ppb

Patricia McInnes - May 2014

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 56 ppb on May 21 17:00	Maximum Daily Average: 40.5 ppb on May 19
Minimum Value: 2 ppb on May 25 04:00	Hours of Data: 702
Maximum Diurnal Average: 37.2 ppb at hour 16	Hours of Missing Data: 42
Monthly Average: 30.1 ppb	Hours of Calibration: 34
Minimum Daily Average: 13.4 ppb on May 29	Percent Operational Time: 98.9
Minimum Diurnal Average: 19.1 ppb at hour 5	
Percentiles: P <sub>1</sub> = 6 P <sub>10</sub> = 16 Q <sub>1</sub> = 22 Median = 30 Q <sub>3</sub> = 38 P <sub>90</sub> = 44 P <sub>99</sub> = 52	

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-May	39	38	Z	23	22	28	31	34	37	39	43	44	44	46	45	44	43	43	44	44	43	38	35	36	38.3	46
2-May	40	41	Z	40	37	37	36	36	35	35	37	M	36	33	32	30	27	21	21	21	21	21	23	26	31.2	41
3-May	28	29	Z	32	31	31	28	28	28	28	28	32	34	34	36	37	37	36	33	29	25	17	17	30.2	37	
4-May	11	8	Z	9	9	7	12	26	31	37	39	40	42	43	43	43	43	43	40	41	39	37	34	31.2	43	
5-May	31	29	Z	23	21	26	27	27	29	31	33	37	M	M	M	42	43	41	41	37	35	35	36	33.0	43	
6-May	36	35	Z	33	31	26	27	29	C	C	C	35	36	36	37	36	36	35	35	34	31	30	30	33.2	37	
7-May	28	22	Z	14	14	15	18	23	24	26	31	36	37	36	36	37	37	34	32	29	23	20	18	26.4	37	
8-May	17	16	Z	6	9	9	15	28	32	34	34	34	36	29	31	32	32	31	30	31	29	26	25	27	25.8	36
9-May	26	26	Z	15	16	12	19	24	27	31	32	28	30	32	33	32	30	30	27	26	26	22	22	20	25.4	33
10-May	23	25	Z	27	27	27	28	29	28	29	29	29	29	29	29	29	28	27	26	23	20	22	18	16	26.0	29
11-May	18	20	Z	25	24	26	27	31	38	36	37	38	40	40	41	42	39	40	39	33	23	21	14	14	30.6	42
12-May	23	29	Z	14	12	12	21	26	34	35	36	35	38	40	40	40	40	39	37	36	35	30	41	41	32.0	41
13-May	35	28	Z	19	22	15	21	31	35	39	43	43	44	44	45	47	47	45	40	36	34	37	27	24	34.8	47
14-May	20	20	Z	14	14	28	31	33	37	43	43	46	47	48	47	45	44	44	39	41	39	34	28	28	35.4	48
15-May	29	22	Z	23	22	15	14	12	16	27	31	30	31	33	30	29	31	33	32	34	33	28	27	28	26.5	34
16-May	27	26	Z	26	24	25	30	34	39	42	43	45	48	50	50	50	50	50	50	47	43	31	17	19	37.8	50
17-May	15	14	Z	16	16	18	31	37	40	43	50	51	52	51	52	52	50	47	44	43	39	41	41	43	38.5	52
18-May	41	37	Z	23	17	17	32	37	38	41	44	46	47	42	44	44	46	45	45	44	35	31	24	31	37.0	47
19-May	33	30	Z	29	24	22	28	35	35	47	49	49	48	49	48	49	48	46	45	46	47	45	42	38	40.5	49
20-May	38	37	Z	28	23	24	26	30	41	44	45	46	46	45	44	41	39	39	40	51	48	44	43	38	39.0	51
21-May	36	34	Z	24	24	15	27	34	37	39	40	42	45	41	47	55	56	55	52	47	42	32	24	19	37.6	56
22-May	17	15	Z	12	6	14	24	33	37	40	44	42	37	37	37	38	38	38	37	30	17	20	19	19	28.4	44
23-May	21	21	Z	28	24	19	19	27	27	32	34	40	43	49	49	M	M	M	50	42	37	35	37	37	33.6	50
24-May	35	33	Z	24	25	26	30	32	33	35	33	35	30	26	26	24	24	22	22	24	17	10	6	5	25.1	35
25-May	4	3	Z	2	2	3	7	11	14	18	21	25	28	30	31	31	29	29	30	30	28	30	28	28	20.1	31
26-May	27	25	Z	17	15	20	20	20	22	22	20	19	17	17	19	24	22	21	22	23	24	25	26	26	21.4	27
27-May	27	25	Z	25	22	16	16	18	20	22	22	24	23	25	22	22	21	22	20	20	21	19	20	19	21.3	27
28-May	17	18	Z	11	9	13	16	17	20	24	26	30	29	29	29	27	29	29	28	27	25	23	23	21	22.5	30
29-May	20	20	Z	14	13	11	8	10	13	9	5	9	8	8	9	14	13	15	16	16	18	21	19	18	13.4	21
30-May	17	15	Z	17	21	22	22	24	27	29	32	35	PF	32	32	36	36	29	25	24	18	12	17	13	24.4	36
31-May	13	17	Z	21	15	15	19	21	26	30	32	36	41	43	44	45	45	44	43	40	38	40	38	38	32.3	45

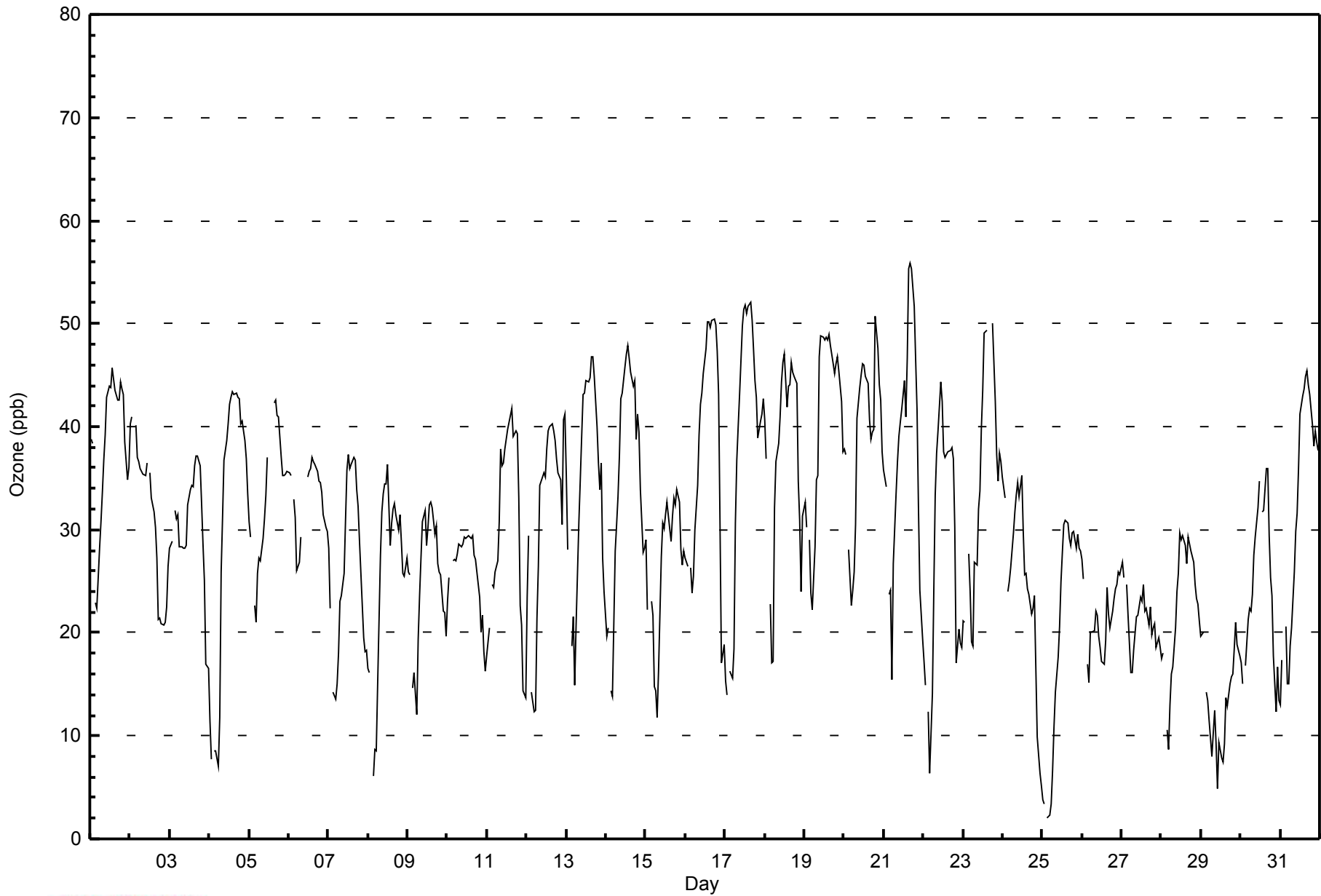
25.5	24.6	--	20.4	19.1	19.3	22.9	26.9	30.1	32.8	34.5	36.1	36.8	36.6	36.8	37.2	36.7	35.9	35.2	34.0	30.9	28.6	26.5	26.0			Diurnal Average
41	41	--	40	37	37	36	37	41	47	50	51	52	51	52	55	56	55	52	51	48	45	43	43			Diurnal Maximum

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



**WBEA**  
**Hourly Averages**

**Ozone (O<sub>3</sub>) - ppb**  
**Patricia McInnes - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Ozone (O<sub>3</sub>) - ppb**  
**Patricia McInnes - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	142	20.23	20.23
21 - 50	550	78.35	98.58
51 - 82	10	1.42	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 702

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Ozone (O<sub>3</sub>) - ppb**  
**Patricia McInnes - May 2014**

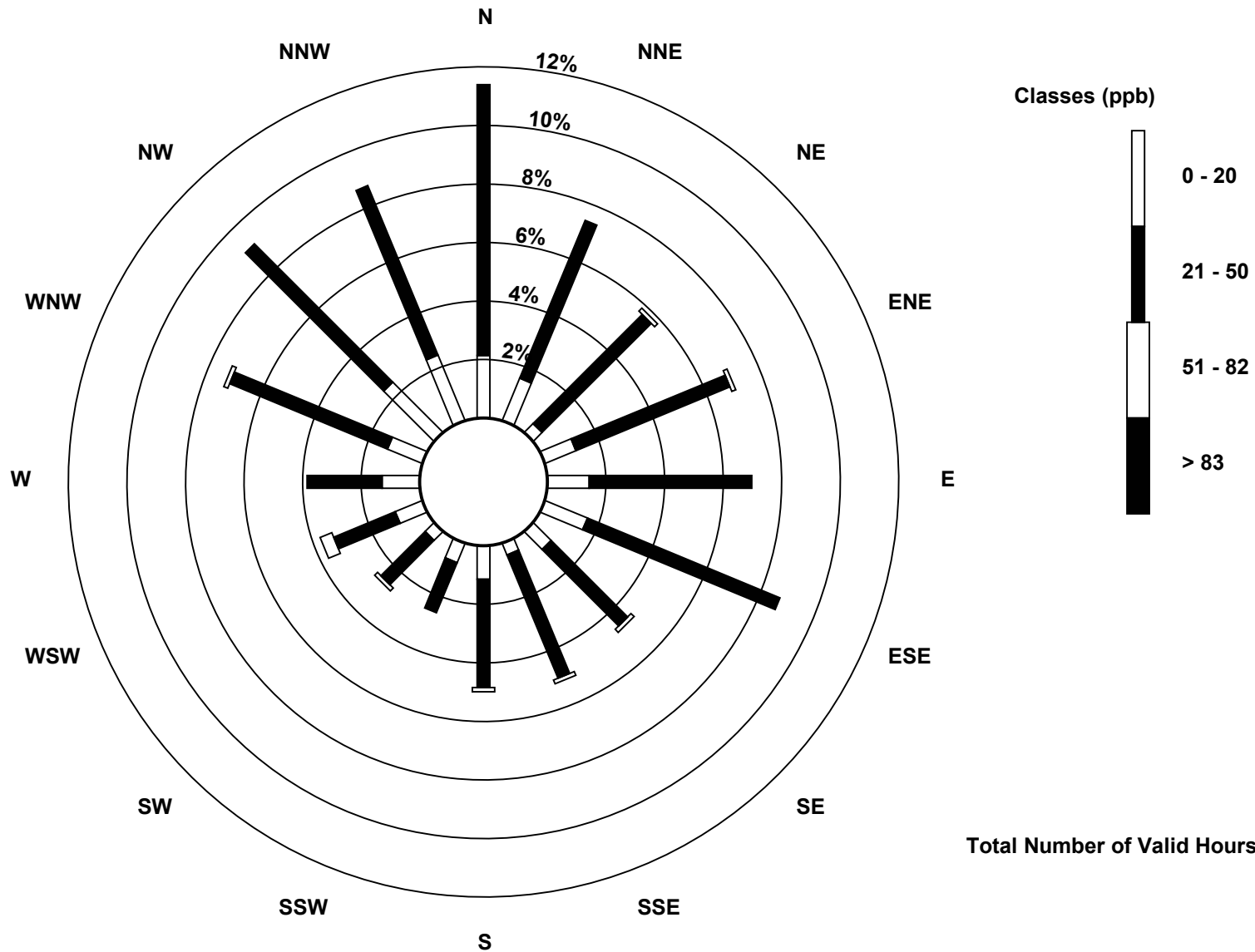
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	15	11	3	8	10	11	6	3	8	5	3	7	9	9	17	17	142
21 - 50	65	41	37	40	39	50	26	32	26	13	15	16	18	41	47	44	550
51 - 82	0	0	1	1	0	0	1	1	1	0	1	3	0	1	0	0	10
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	80	52	41	49	49	61	33	36	35	18	19	26	27	51	64	61	702

Total Number of Valid Hours: 702

Total Number of Hours: 744

Wood Buffalo Environmental Association  
 Wind Rose May 2014

Ozone (O<sub>3</sub>) - ppb  
 Patricia McInnes (AMS 6)

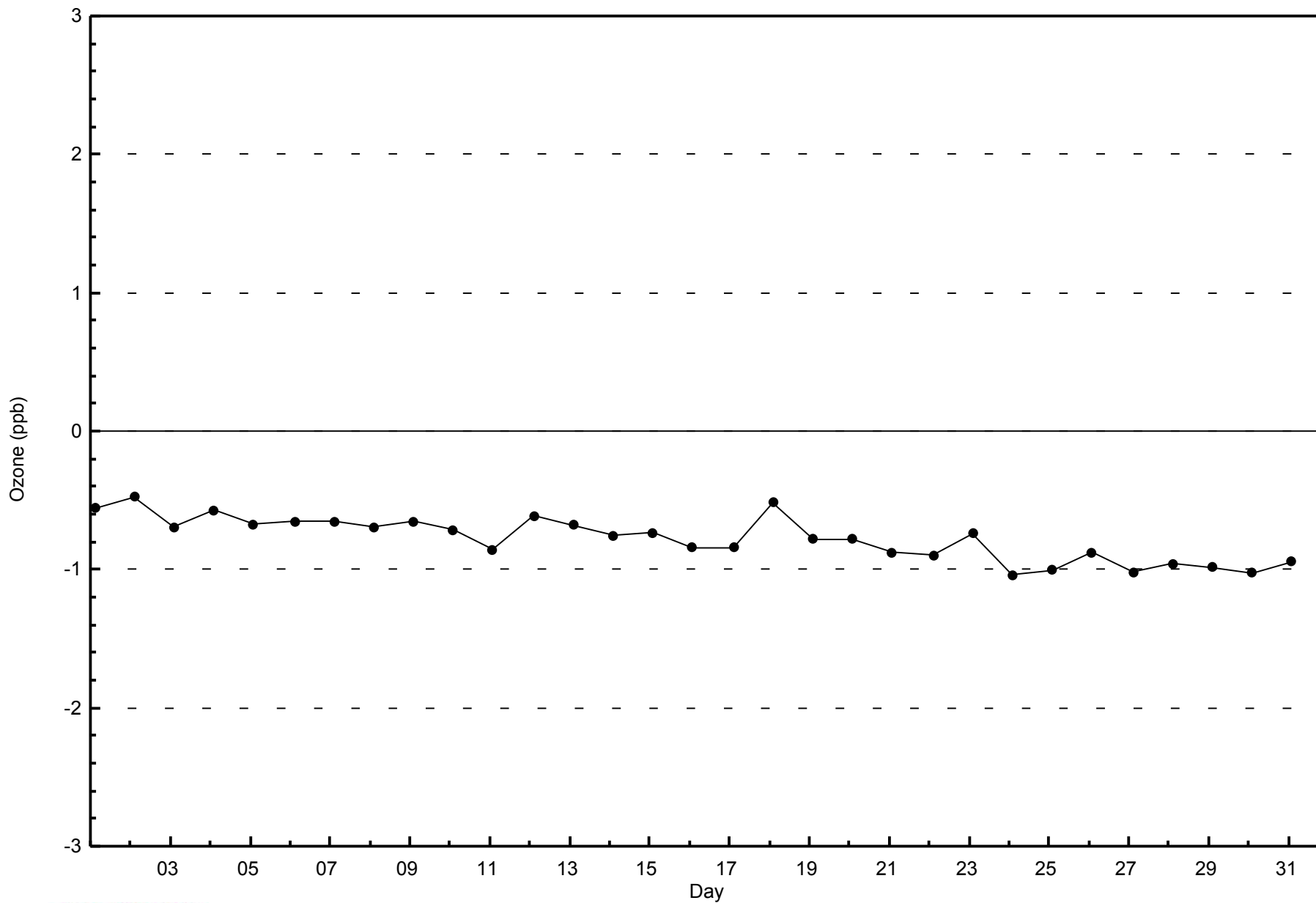






WBEA  
Zero Responses

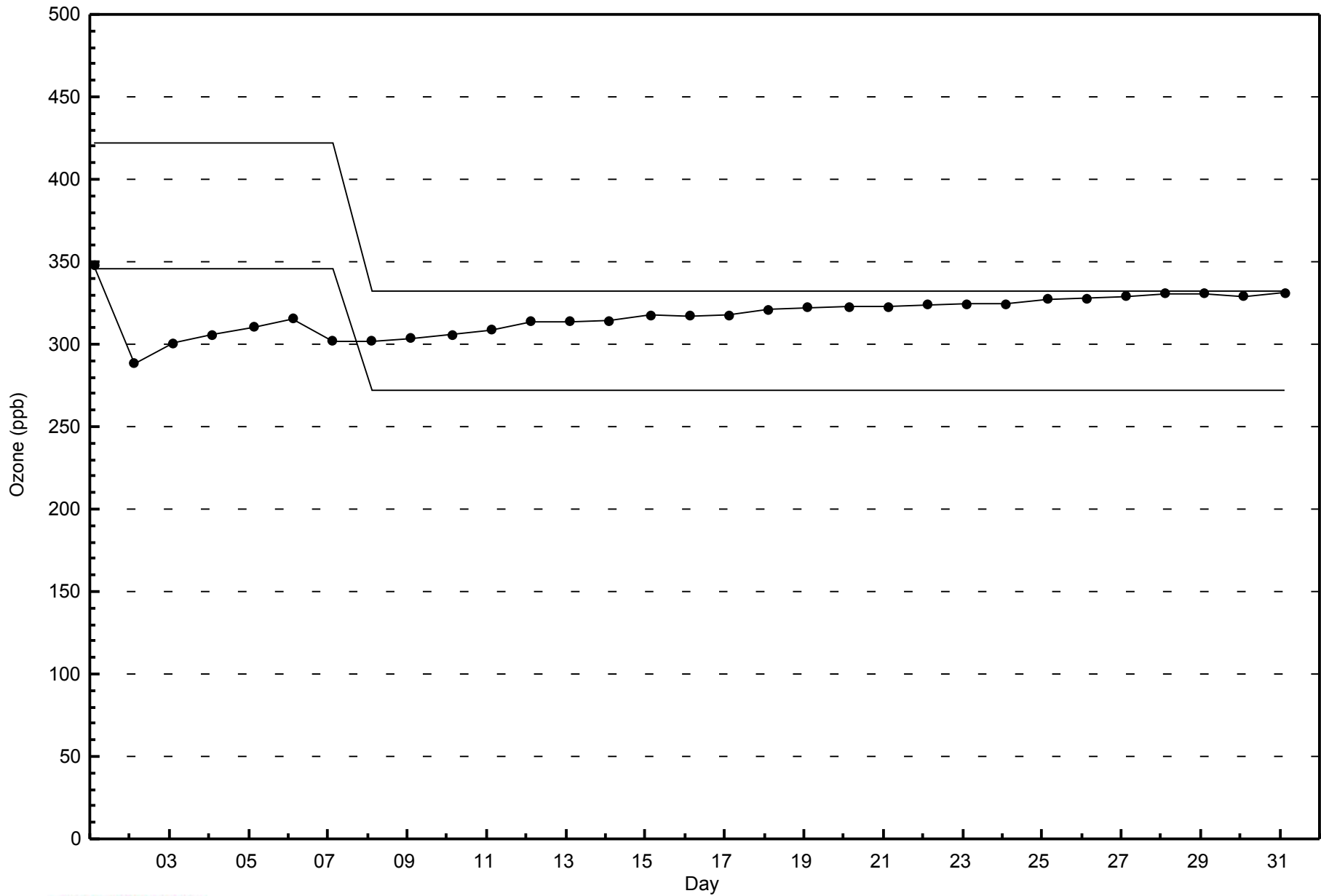
Ozone (O<sub>3</sub>) - ppb  
Patricia McInnes - May 2014





**WBEA**  
**Span Responses**

**Ozone (O<sub>3</sub>) - ppb**  
**Patricia McInnes - May 2014**



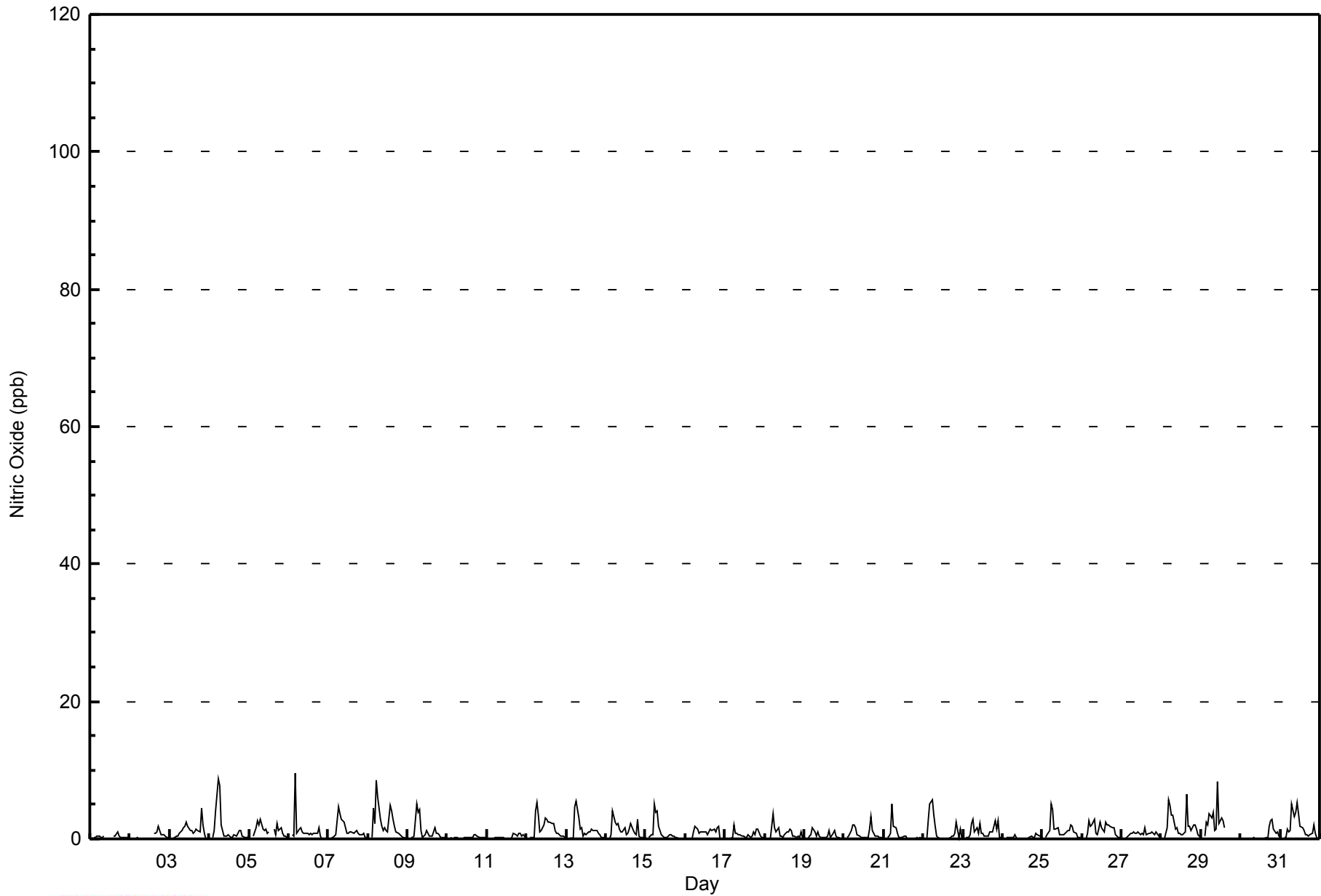


Maximum Value: 10 ppb on May 6 05:00																	Maximum Daily Average: 2.1 ppb on May 8																	Hours in Service: 744															
Minimum Value: 0 ppb on May 16 00:00																	Minimum Daily Average: 0.2 ppb on May 10																	Hours of Data: 687															
Maximum Diurnal Average: 2.8 ppb at hour 6																	Minimum Diurnal Average: 0.2 ppb at hour 1																	Hours of Missing Data: 57															
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> = 6																	Hours of Calibration: 36															
																	Percent Operational Time: 97.2																																
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-May	0	Z	0	0	1	0	0	0	0	M	M	M	M	M	0	0	1	0	0	0	0	0	0	0	0.3	1																							
2-May	0	Z	0	0	0	0	0	0	C	C	C	C	C	C	1	1	1	2	1	1	1	0	0	0	--	2																							
3-May	0	Z	0	0	0	0	1	1	2	2	2	2	1	1	1	1	1	1	1	4	2	1	0	0	1.1	4																							
4-May	0	Z	0	1	4	9	8	2	1	0	0	1	0	0	1	0	1	1	1	1	0	0	0	0	1.4	9																							
5-May	1	Z	0	1	2	3	2	3	1	1	1	1	1	M	M	2	1	2	1	2	1	0	0	0	1.2	3																							
6-May	0	Z	1	0	10	1	1	2	1	1	1	1	1	1	1	1	1	1	2	0	0	0	0	0	1.1	10																							
7-May	0	Z	0	0	1	3	5	4	3	2	2	1	1	1	1	1	1	1	1	1	1	1	0	0	1.2	5																							
8-May	0	Z	0	5	2	9	6	3	2	1	2	1	1	5	4	3	2	1	1	1	0	0	0	0	2.1	9																							
9-May	0	Z	0	0	0	5	4	4	1	0	1	1	1	0	0	0	2	1	1	1	0	0	0	0	1.0	5																							
10-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0.2	1																							
11-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	0	1	0	0	0.3	1																							
12-May	0	Z	0	0	0	4	5	3	1	1	2	3	3	2	2	2	2	1	1	1	0	0	0	0	1.6	5																							
13-May	0	Z	0	0	0	5	5	3	1	2	0	1	1	1	1	1	1	1	1	1	1	0	0	0	1.2	5																							
14-May	0	Z	0	1	4	2	2	2	1	1	1	2	1	1	1	2	1	1	1	3	0	0	0	0	1.2	4																							
15-May	0	Z	0	1	1	5	4	4	2	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0.9	5																							
16-May	0	Z	0	0	0	1	2	1	1	1	1	1	1	1	1	1	1	1	1	2	2	0	0	0	0.8	2																							
17-May	0	Z	0	0	0	2	1	1	1	1	0	0	0	0	1	0	0	1	1	1	1	0	0	0	0.5	2																							
18-May	0	Z	0	0	2	4	2	1	2	0	0	0	1	1	1	2	1	0	0	0	0	0	1	0	0.8	4																							
19-May	0	Z	0	0	1	2	1	0	1	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0.5	2																							
20-May	0	Z	0	0	1	2	2	2	1	0	0	0	0	0	0	1	3	1	1	0	0	0	0	0	0.8	3																							
21-May	0	Z	0	0	1	5	2	2	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.6	5																							
22-May	0	Z	0	3	5	6	3	2	1	0	0	0	0	0	0	0	0	0	0	1	2	0	2	0	1.1	6																							
23-May	0	Z	0	0	1	2	3	1	2	1	2	1	1	0	0	0	1	1	1	3	1	3	0	0	1.1	3																							
24-May	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0.2	1																							
25-May	0	Z	0	1	1	5	4	1	1	2	1	1	1	1	1	1	1	2	2	1	1	0	0	0	1.2	5																							
26-May	0	Z	0	1	3	2	2	3	1	1	1	2	2	1	2	2	2	2	2	2	1	0	0	0	1.4	3																							
27-May	0	Z	0	0	0	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	0	0	0.7	2																							
28-May	0	Z	0	2	6	5	3	3	2	2	1	1	1	1	7	2	2	2	1	2	2	1	1	0	1.9	7																							
29-May	0	Z	0	2	2	4	3	4	1	1	8	2	3	3	2	M	M	M	M	M	M	M	M	M	--	8																							
30-May	M	M	M	M	M	0	0	0	0	0	0	0	0	0	0	0	0	2	3	3	1	1	1	0	0.6	3																							
31-May	0	Z	0	0	1	1	1	5	3	4	5	4	2	2	1	1	1	0	1	1	2	1	0	0	1.6	5																							
																								0.2	--	0.2	0.6	1.6	2.8	2.4	1.9	1.2	0.9	1.2	0.9	0.8	0.8	0.9	1.1	1.0	1.0	0.9	1.1	0.8	0.5	0.3	0.2	Diurnal Average	
																								1	--	1	5	10	9	8	5	3	4	8	4	3	5	4	7	3	2	3	4	2	3	2	0	Diurnal Maximum	
Z - zerospan      C - Calibration      M - Maintenance																																																	



**WBEA**  
**Hourly Averages**

**Nitric Oxide (NO) - ppb**  
**Patricia McInnes - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb**  
**Patricia McInnes - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	687	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: 687

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Nitric Oxide (NO) - ppb**  
**Patricia McInnes - May 2014**

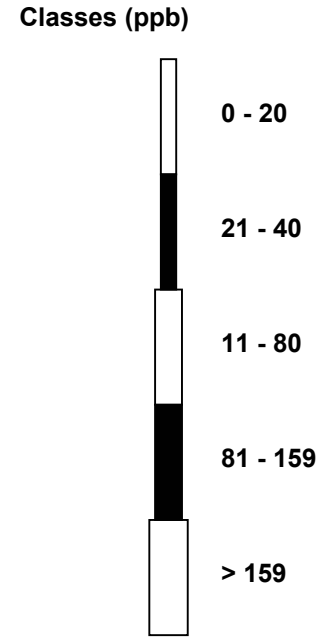
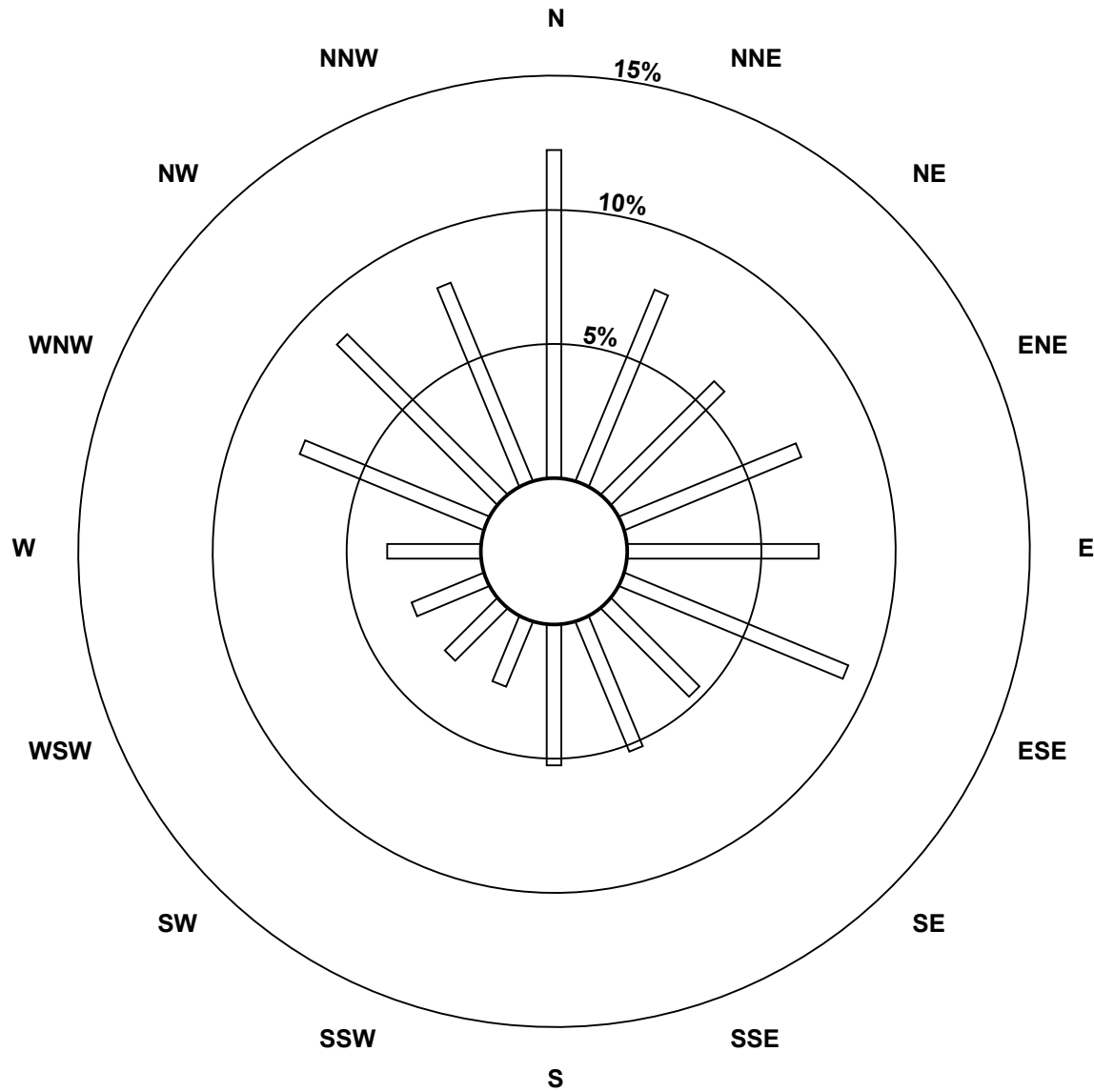
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	84	53	41	49	49	62	32	36	36	18	19	20	24	51	58	55	687
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	84	53	41	49	49	62	32	36	36	18	19	20	24	51	58	55	687

Total Number of Valid Hours: 687

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Nitric Oxide (NO) - ppb  
Patricia McInnes (AMS 6)**

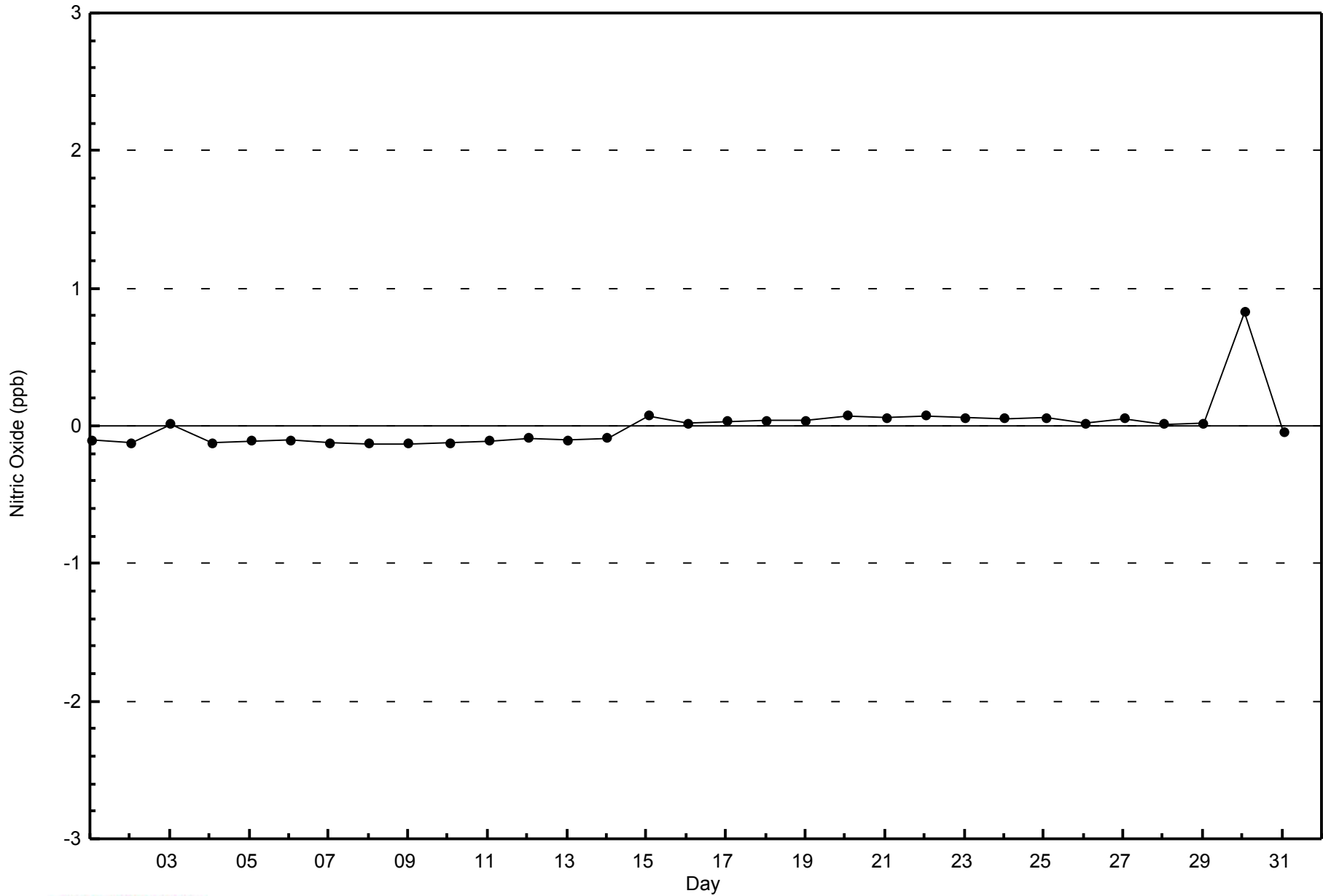


**Total Number of Valid Hours: 687**



WBEA  
Zero Responses

Nitric Oxide (NO) - ppb  
Patricia McInnes - May 2014

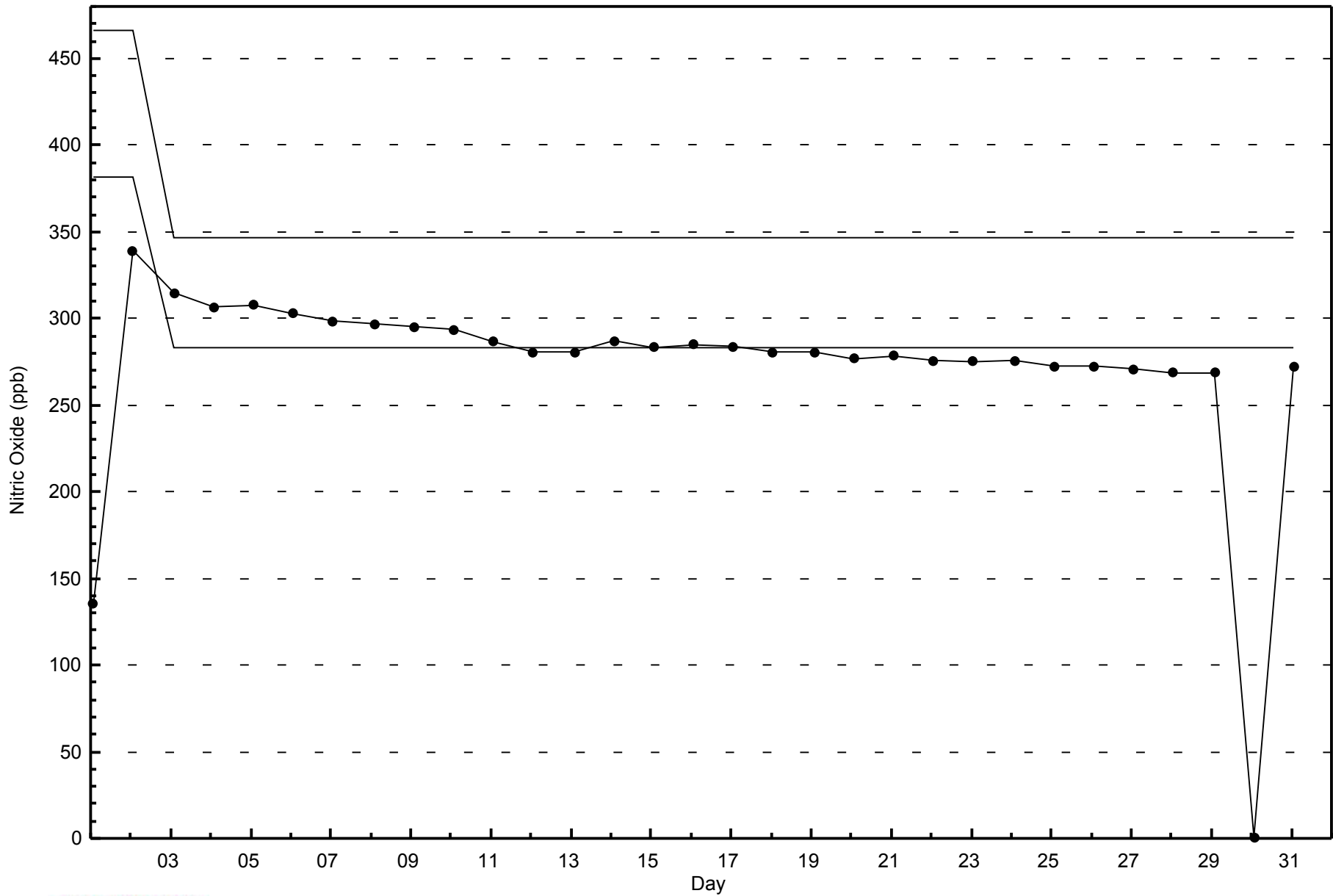






WBEA  
Span Responses

Nitric Oxide (NO) - ppb  
Patricia McInnes - May 2014





Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 17 ppb on May 22 05:00	Maximum Daily Average: 6.6 ppb on May 7		Hours of Data:	687
Minimum Value: 0 ppb on May 1 01:00	Minimum Daily Average: 0.9 ppb on May 24		Hours of Missing Data:	57
Maximum Diurnal Average: 7.2 ppb at hour 6	Minimum Diurnal Average: 1.7 ppb at hour 13		Hours of Calibration:	36
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> = 5 P <sub>90</sub> = 7 P <sub>99</sub> = 15		Percent Operational Time:	97.2

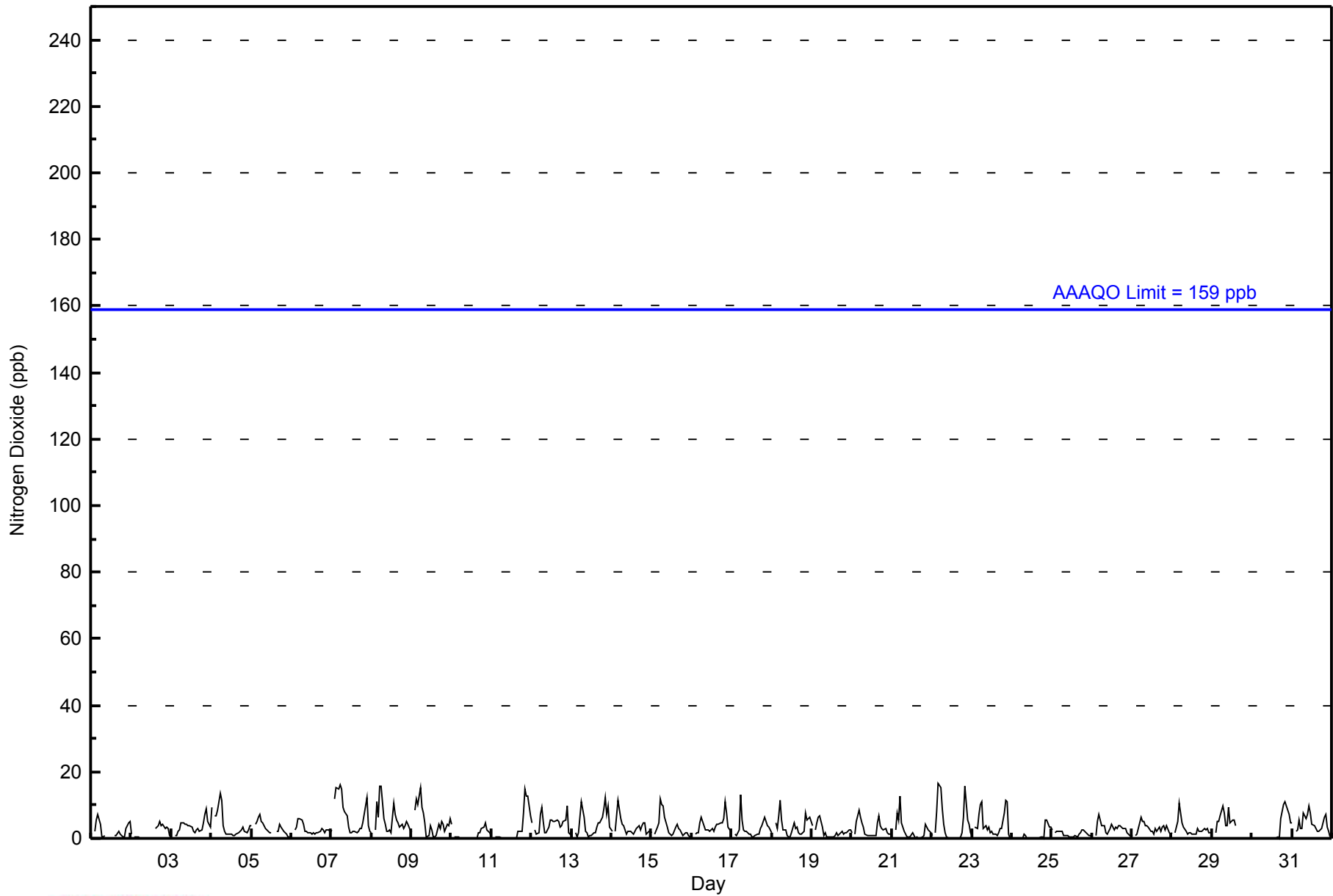
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-May	0	Z	2	6	7	4	1	0	1	M	M	M	M	M	1	1	2	1	1	1	0	3	5	5	2.2	7																							
2-May	1	Z	0	0	0	0	0	0	C	C	C	C	C	C	3	4	4	5	4	4	3	3	3	1	--	5																							
3-May	0	Z	1	1	2	3	5	5	4	4	4	4	3	2	2	2	3	2	3	5	7	9	5	4	3.4	9																							
4-May	9	Z	7	7	9	14	11	4	2	1	1	1	1	1	1	1	2	2	3	3	2	2	3	4	3.9	14																							
5-May	4	Z	4	5	6	7	5	5	3	3	2	2	2	M	M	2	2	4	3	2	2	1	1	0	3.1	7																							
6-May	0	Z	3	3	6	6	6	4	2	2	2	2	1	2	1	2	2	2	3	3	2	2	3	2	2.6	6																							
7-May	3	Z	12	15	15	16	15	9	8	7	3	2	2	2	2	2	2	3	3	5	10	12	4	2	6.6	16																							
8-May	2	Z	3	11	7	16	16	6	4	2	2	3	2	11	7	5	5	3	4	3	4	5	4	2	5.5	16																							
9-May	2	Z	9	12	10	15	10	8	5	0	1	4	3	1	0	1	4	3	5	4	2	4	4	6	4.9	15																							
10-May	4	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	3	3	5	2	2	2	1.1	5																							
11-May	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	8	15	13	13	7	2.8	15																							
12-May	5	Z	2	1	2	7	9	5	2	2	3	5	5	5	5	6	5	4	4	5	6	10	2	1	4.4	10																							
13-May	2	Z	2	0	2	6	11	6	2	2	0	1	1	2	2	4	5	5	7	9	12	7	10	3	4.4	12																							
14-May	2	Z	2	7	12	6	4	4	2	1	2	2	1	2	2	3	4	3	4	5	5	1	2	2	3.4	12																							
15-May	2	Z	1	3	5	12	10	10	6	3	2	1	1	1	3	4	3	3	2	1	2	2	1	0	3.4	12																							
16-May	0	Z	1	2	2	5	6	4	2	3	3	2	3	2	3	4	4	5	5	6	11	8	4	2	3.7	11																							
17-May	2	Z	1	1	3	13	6	3	2	2	1	1	1	1	1	1	1	3	4	5	7	4	3	3	2.9	13																							
18-May	2	Z	5	3	7	11	5	3	3	1	1	0	2	5	3	3	2	1	1	2	8	6	6	6	3.7	11																							
19-May	4	Z	3	5	6	7	4	1	2	1	1	1	0	1	1	2	1	2	2	1	2	2	2	3	2.2	7																							
20-May	2	Z	1	5	9	7	5	3	1	1	1	1	1	1	1	5	7	4	3	3	3	2	1	1	2.9	9																							
21-May	2	Z	3	8	6	13	5	2	1	0	1	0	2	1	0	0	0	0	1	1	4	3	3	2	2.4	13																							
22-May	1	Z	2	8	17	15	9	4	2	1	0	0	0	0	0	0	0	1	2	6	16	5	4	2	4.1	17																							
23-May	1	Z	3	3	7	10	11	3	4	3	4	2	2	1	1	1	2	3	3	8	11	11	1	0	4.1	11																							
24-May	0	Z	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	1	0	6	6	4	3	0.9	6																							
25-May	3	Z	2	2	2	2	2	1	1	1	1	0	1	0	1	1	1	1	2	3	3	2	1	1	1.4	3																							
26-May	1	Z	1	5	7	5	4	4	2	1	2	3	4	3	3	3	4	4	3	3	3	2	1	1	3.0	7																							
27-May	1	Z	1	1	3	6	5	5	4	4	3	2	2	1	3	2	4	2	4	4	3	4	2	1	2.9	6																							
28-May	2	Z	2	5	11	8	5	4	2	1	2	2	1	1	1	3	2	2	2	3	2	3	2	2	2.9	11																							
29-May	2	Z	2	5	5	7	10	8	4	4	9	5	6	6	4	M	M	M	M	M	M	M	M	M	--	10																							
30-May	M	M	M	M	M	0	0	0	0	0	0	0	0	0	0	0	0	6	8	10	11	9	7	5	3.0	11																							
31-May	5	Z	2	2	6	3	3	8	6	7	10	8	4	4	3	2	2	2	3	6	7	4	2	1	4.3	10																							
																								2.1	--	2.6	4.2	5.7	7.2	5.8	3.8	2.6	2.0	2.1	1.8	1.7	1.9	1.8	2.1	2.5	2.7	3.1	4.0	5.7	4.8	3.4	2.4	Diurnal Average	
																								9	--	12	15	17	16	16	10	8	7	10	8	6	11	7	6	7	6	8	10	16	13	13	7	Diurnal Maximum	

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



WBEA  
Hourly Averages

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Patricia McInnes - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Patricia McInnes - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	687	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: 687

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Patricia McInnes - May 2014**

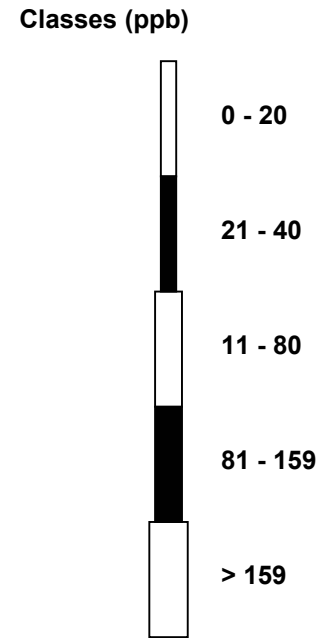
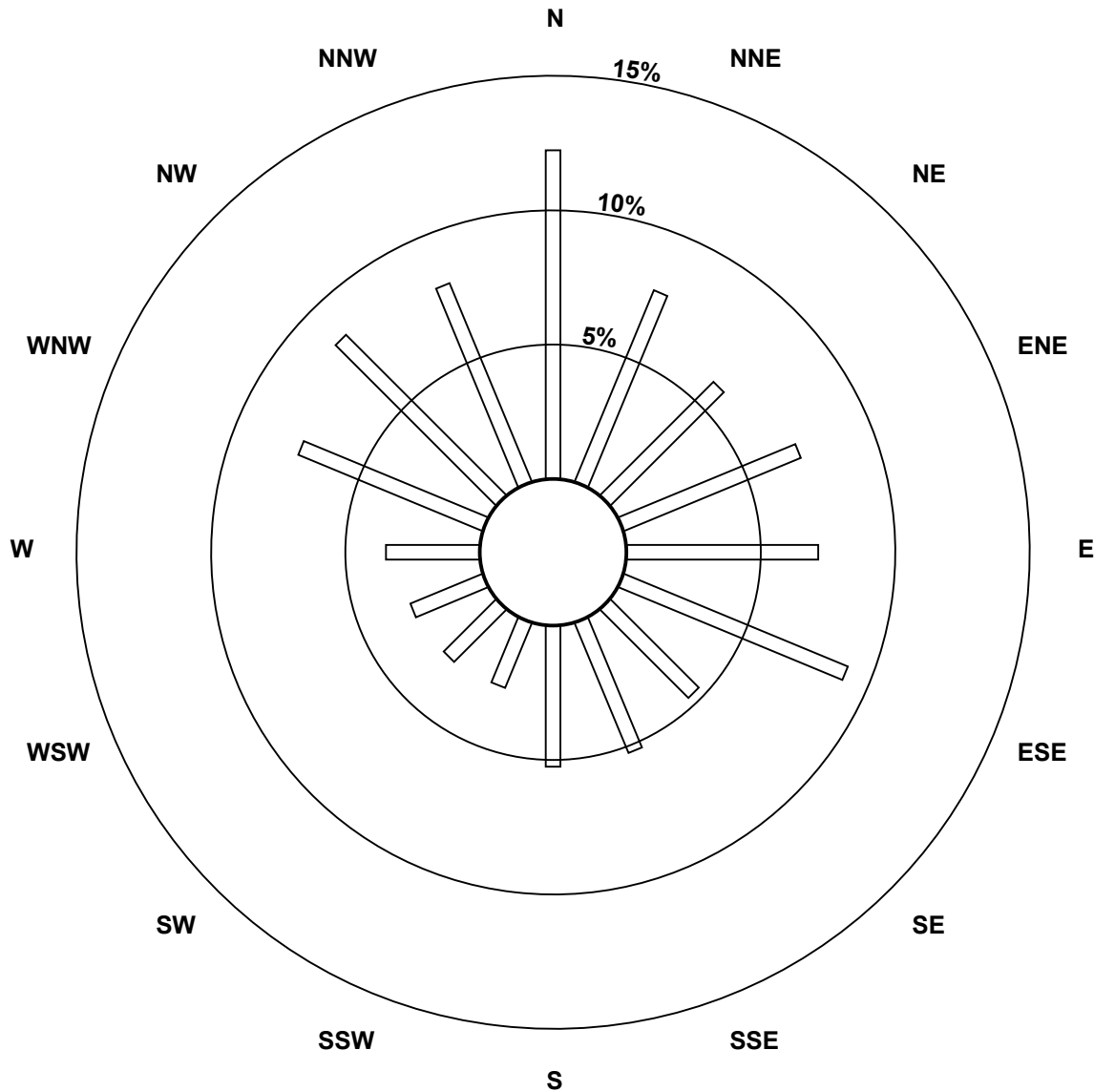
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	84	53	41	49	49	62	32	36	36	18	19	20	24	51	58	55	687
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	84	53	41	49	49	62	32	36	36	18	19	20	24	51	58	55	687

Total Number of Valid Hours: 687

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Patricia McInnes (AMS 6)**

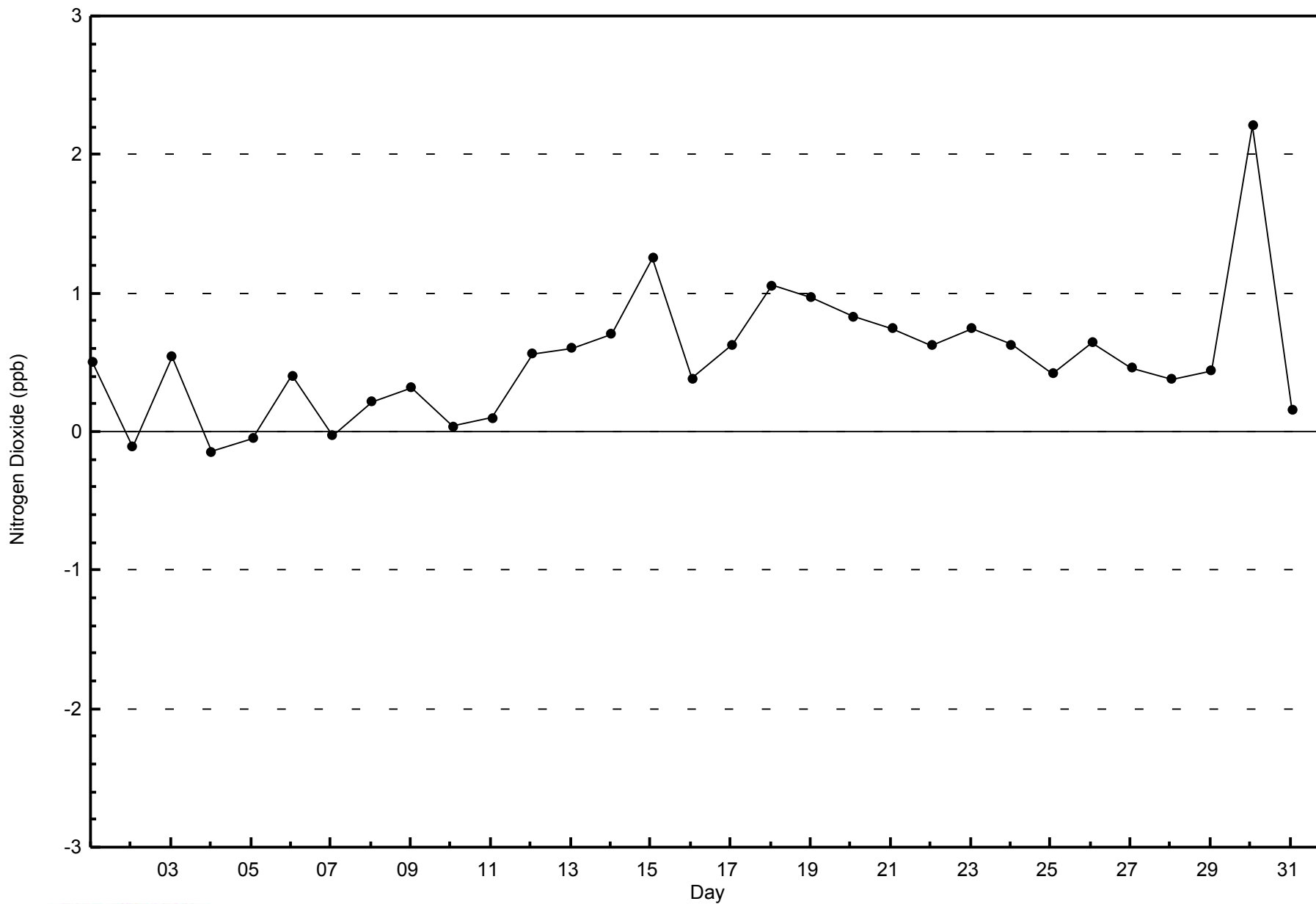


**Total Number of Valid Hours: 687**



WBEA  
Zero Responses

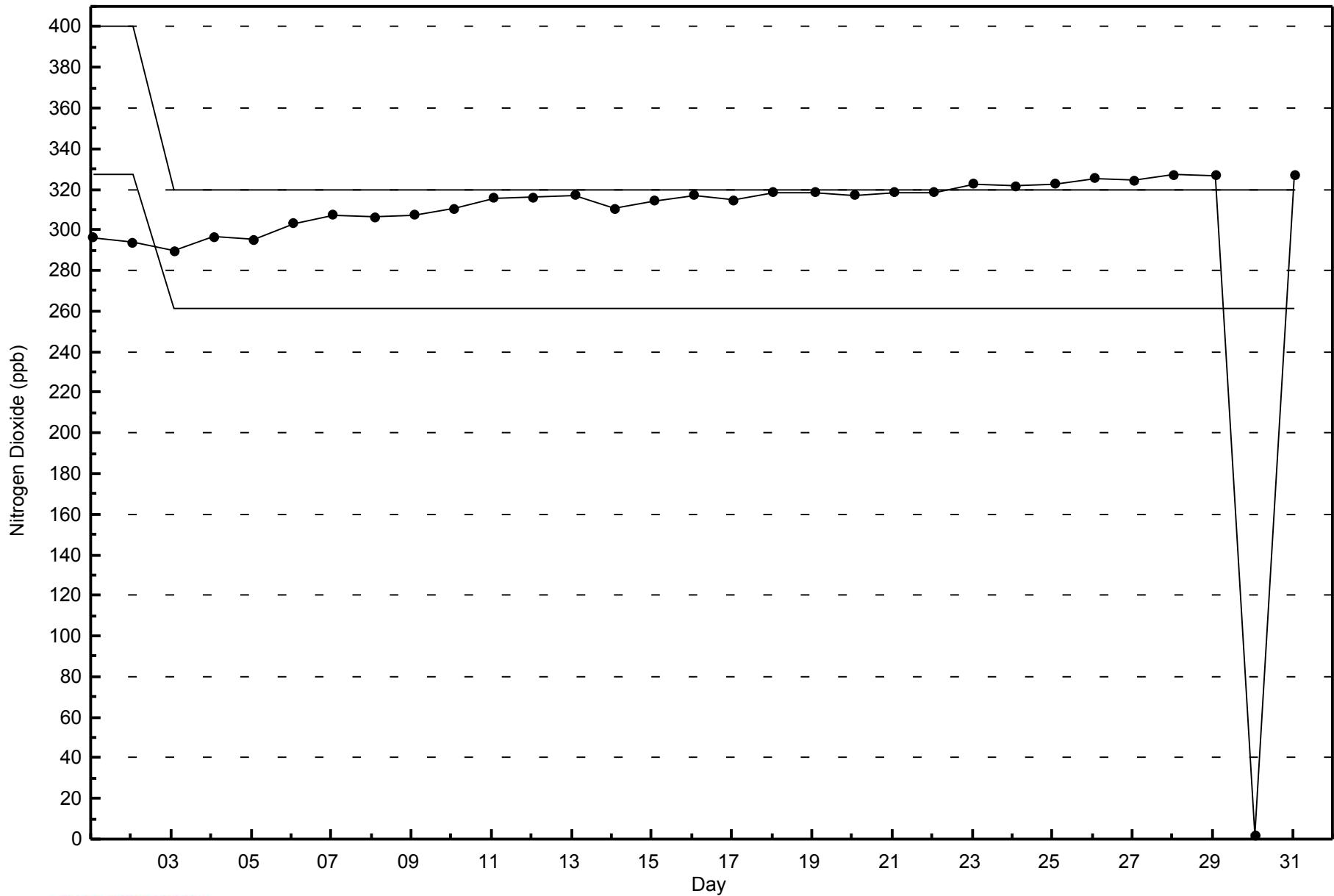
Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Patricia McInnes - May 2014





WBEA  
Span Responses

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Patricia McInnes - May 2014





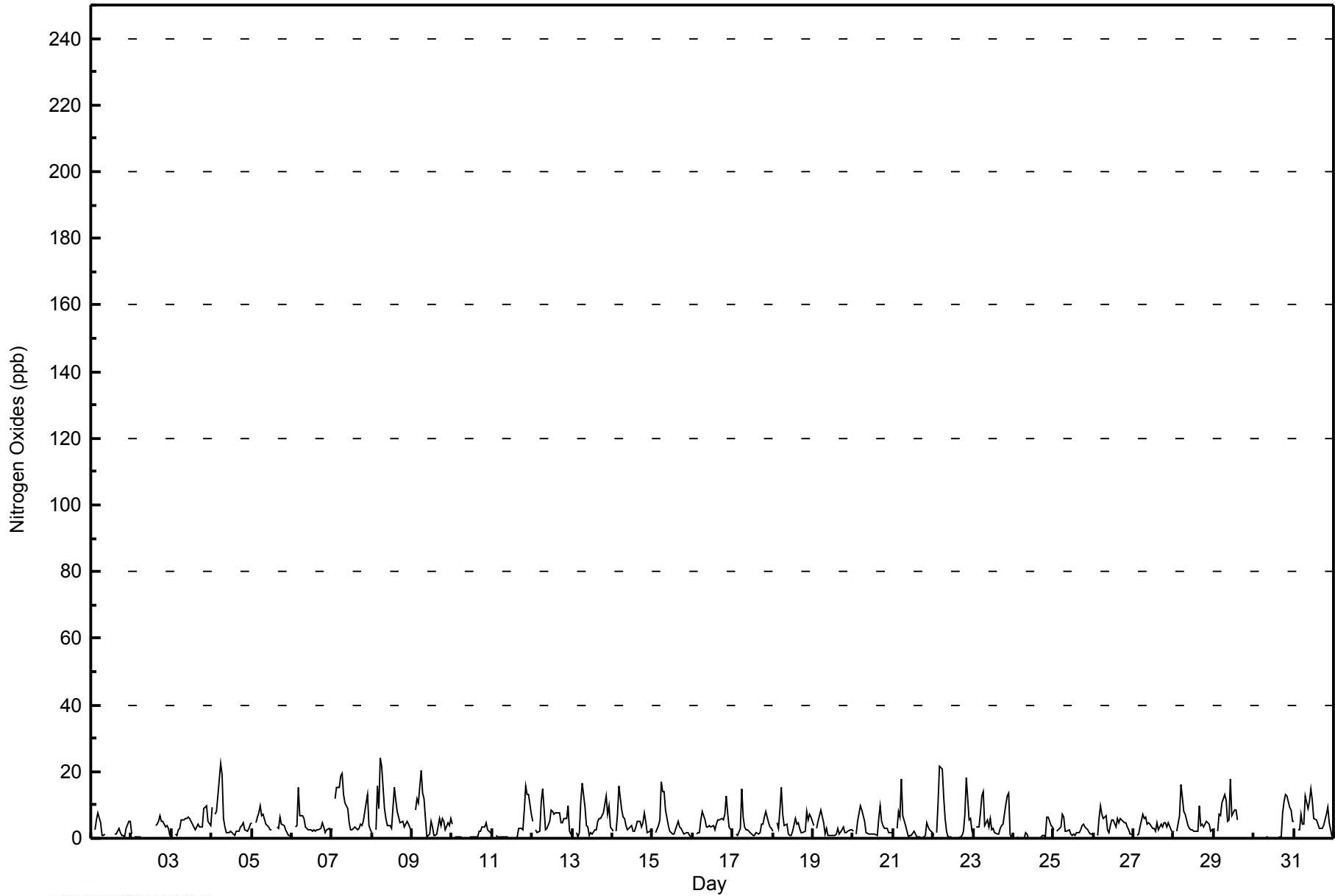


Maximum Value: 24 ppb on May 8 06:00																	Maximum Daily Average: 7.9 ppb on May 7																	Hours in Service: 744	
Minimum Value: 0 ppb on May 22 12:00																	Minimum Daily Average: 1.2 ppb on May 24																	Hours of Data: 687	
Maximum Diurnal Average: 10.0 ppb at hour 6																	Minimum Diurnal Average: 2.2 ppb at hour 1																	Hours of Missing Data: 57	
Monthly Average: 4.4 ppb																	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 2 Median = 3 Q <sub>3</sub> = 6 P <sub>90</sub> = 10 P <sub>99</sub> = 19																	Hours of Calibration: 36	
																																		Percent Operational Time: 97.2	
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-May	0	Z	2	6	8	5	1	1	1	M	M	M	M	M	1	1	3	2	1	1	0	3	5	5	2.5	8									
2-May	1	Z	0	0	1	0	0	0	C	C	C	C	C	C	4	4	5	7	5	5	4	4	3	1	--	7									
3-May	0	Z	1	1	2	3	5	6	6	6	6	4	3	3	4	4	3	3	3	9	9	10	5	4	4.6	10									
4-May	10	Z	7	8	13	22	19	6	3	2	2	2	1	1	2	2	3	4	5	3	2	3	4	4	5.4	22									
5-May	5	Z	5	6	8	10	7	7	4	4	4	2	3	M	M	4	3	6	4	4	3	2	1	1	4.3	10									
6-May	0	Z	3	4	15	7	7	6	3	3	3	2	2	2	3	3	3	3	5	3	2	3	3	2	3.7	15									
7-May	3	Z	12	15	15	19	20	13	11	9	5	2	2	3	3	2	3	4	4	5	10	13	4	2	7.9	20									
8-May	2	Z	3	16	9	24	22	9	6	4	4	4	3	15	12	8	6	4	5	3	4	5	4	2	7.6	24									
9-May	2	Z	9	12	11	20	13	12	6	0	1	5	3	1	1	1	6	4	6	5	2	4	4	6	5.9	20									
10-May	4	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	3	4	5	2	2	2	1.3	5									
11-May	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	3	3	3	8	16	13	13	7	7	3.1	16									
12-May	5	Z	3	2	2	11	15	9	3	3	5	8	8	7	7	8	7	5	4	6	6	10	2	1	6.0	15									
13-May	2	Z	2	0	2	11	17	9	4	4	1	2	1	3	3	5	6	6	8	10	13	7	10	3	5.6	17									
14-May	2	Z	2	7	16	8	6	6	4	2	3	4	2	3	5	5	3	4	8	5	2	2	3	3	4.6	16									
15-May	2	Z	2	4	5	17	14	14	8	4	2	2	1	1	4	5	4	3	2	1	2	2	1	0	4.3	17									
16-May	0	Z	1	2	2	5	8	5	3	4	4	3	4	3	4	6	5	6	6	7	13	8	4	2	4.5	13									
17-May	2	Z	1	1	3	15	7	4	3	3	2	1	1	1	2	1	2	4	4	6	8	4	3	3	3.5	15									
18-May	2	Z	4	3	9	15	7	4	4	1	1	1	2	6	4	5	3	2	2	2	8	6	7	6	4.5	15									
19-May	4	Z	3	5	7	9	5	1	3	1	1	1	1	1	1	3	1	3	3	2	2	2	2	3	2.7	9									
20-May	2	Z	1	5	10	9	7	5	2	1	1	1	1	1	1	6	10	5	4	3	3	2	2	2	3.6	10									
21-May	2	Z	3	8	6	18	7	4	2	1	1	1	2	1	0	0	0	0	1	1	4	3	3	2	3.0	18									
22-May	1	Z	2	11	22	21	12	6	2	1	0	0	0	0	0	0	0	1	2	7	18	6	6	2	5.2	22									
23-May	1	Z	3	3	8	13	14	4	6	3	6	2	3	2	1	1	3	4	4	10	13	14	1	0	5.2	14									
24-May	0	Z	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	1	1	0	6	6	4	3	1.2	6									
25-May	3	Z	2	3	3	7	7	2	2	3	1	1	1	1	1	2	2	3	4	4	4	3	2	1	1	2.6	7								
26-May	1	Z	1	6	10	7	6	7	3	2	4	6	6	3	6	5	6	6	5	5	4	2	1	1	4.3	10									
27-May	1	Z	1	1	3	7	6	6	4	5	4	3	3	2	5	3	4	3	5	4	3	5	2	2	3.6	7									
28-May	2	Z	2	7	16	12	8	7	4	3	2	2	2	2	2	10	4	4	4	5	5	4	2	2	4.8	16									
29-May	2	Z	2	7	7	11	13	12	5	6	18	7	9	8	5	M	M	M	M	M	M	M	M	M	--	18									
30-May	M	M	M	M	M	0	0	0	0	0	0	0	0	0	0	0	0	8	11	13	13	9	9	5	3.6	13									
31-May	5	Z	2	3	7	4	4	13	9	11	15	11	6	6	4	3	3	3	4	7	9	5	2	1	5.9	15									
		2.2	--	2.7	4.8	7.3	10.0	8.2	5.8	3.8	2.9	3.3	2.8	2.5	2.7	2.7	3.2	3.6	3.7	4.0	5.1	6.5	5.3	3.7	2.6	Diurnal Average									
		10	--	12	16	22	24	22	14	11	11	18	11	9	15	12	10	10	8	11	13	18	14	13	7	Diurnal Maximum									
Z - zerospan		C - Calibration					M - Maintenance																												



**WBEA**  
**Hourly Averages**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Patricia McInnes - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Patricia McInnes - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	682	99.27	99.27
21 - 40	5	0.73	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Patricia McInnes - May 2014**

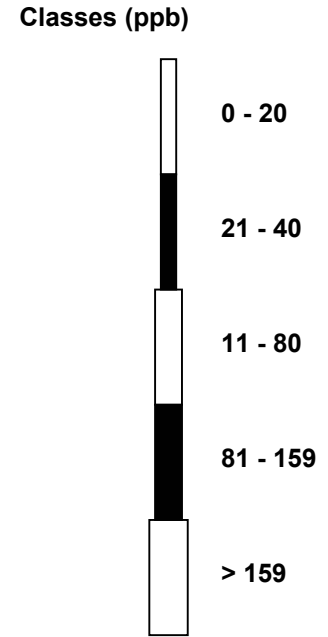
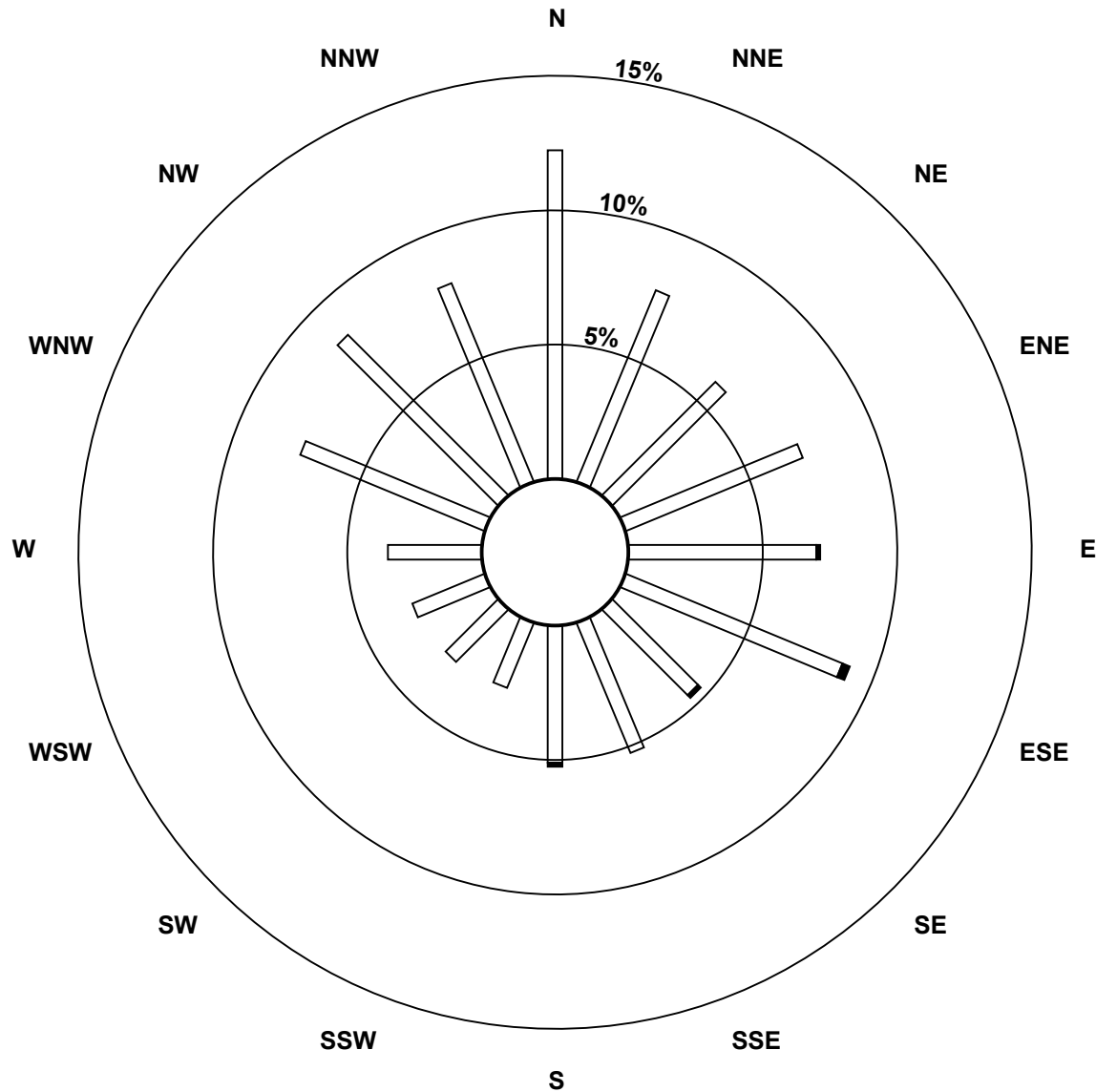
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	84	53	41	49	48	60	31	36	35	18	19	20	24	51	58	55	682
21 - 40	0	0	0	0	1	2	1	0	1	0	0	0	0	0	0	0	5
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	84	53	41	49	49	62	32	36	36	18	19	20	24	51	58	55	687

Total Number of Valid Hours: 687

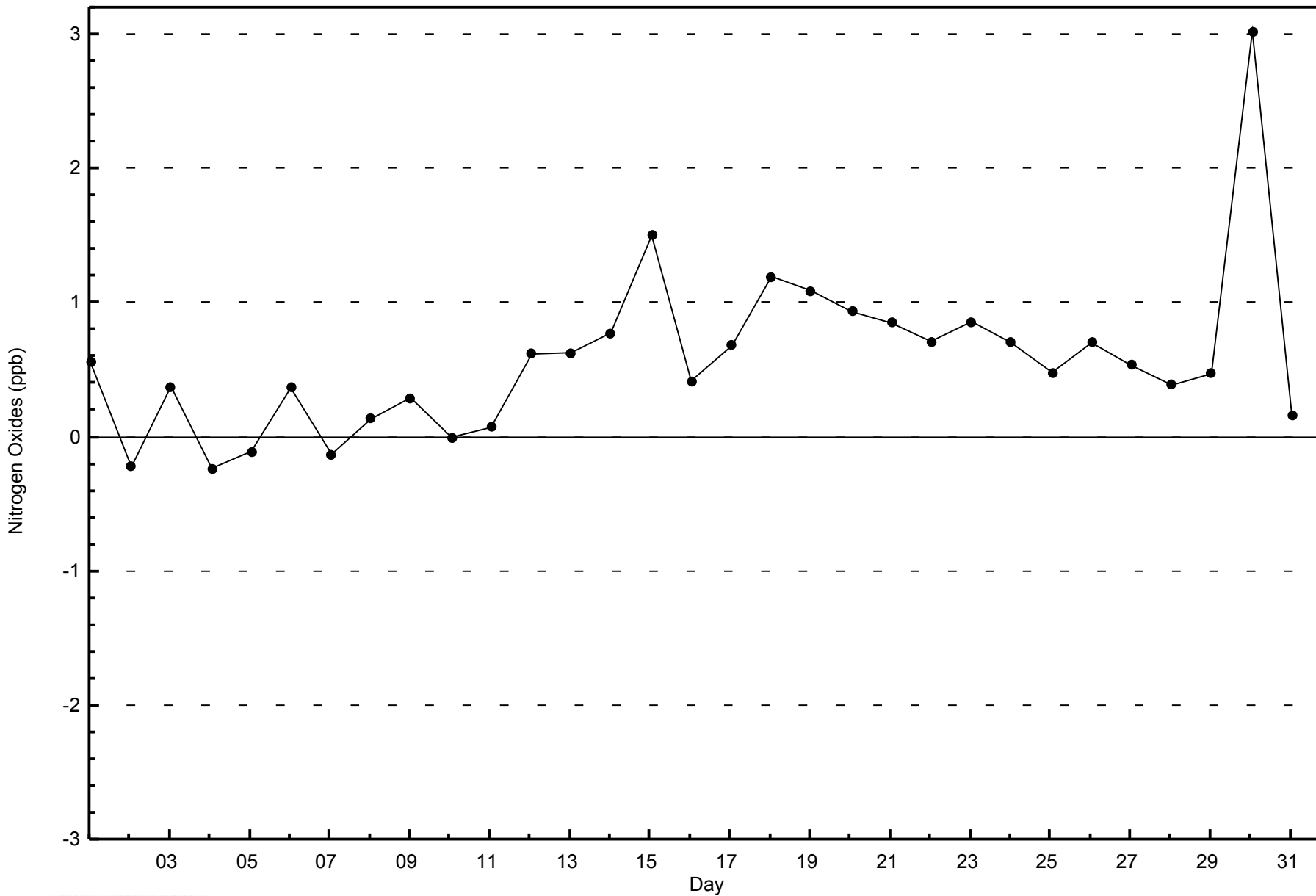
Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Patricia McInnes (AMS 6)**



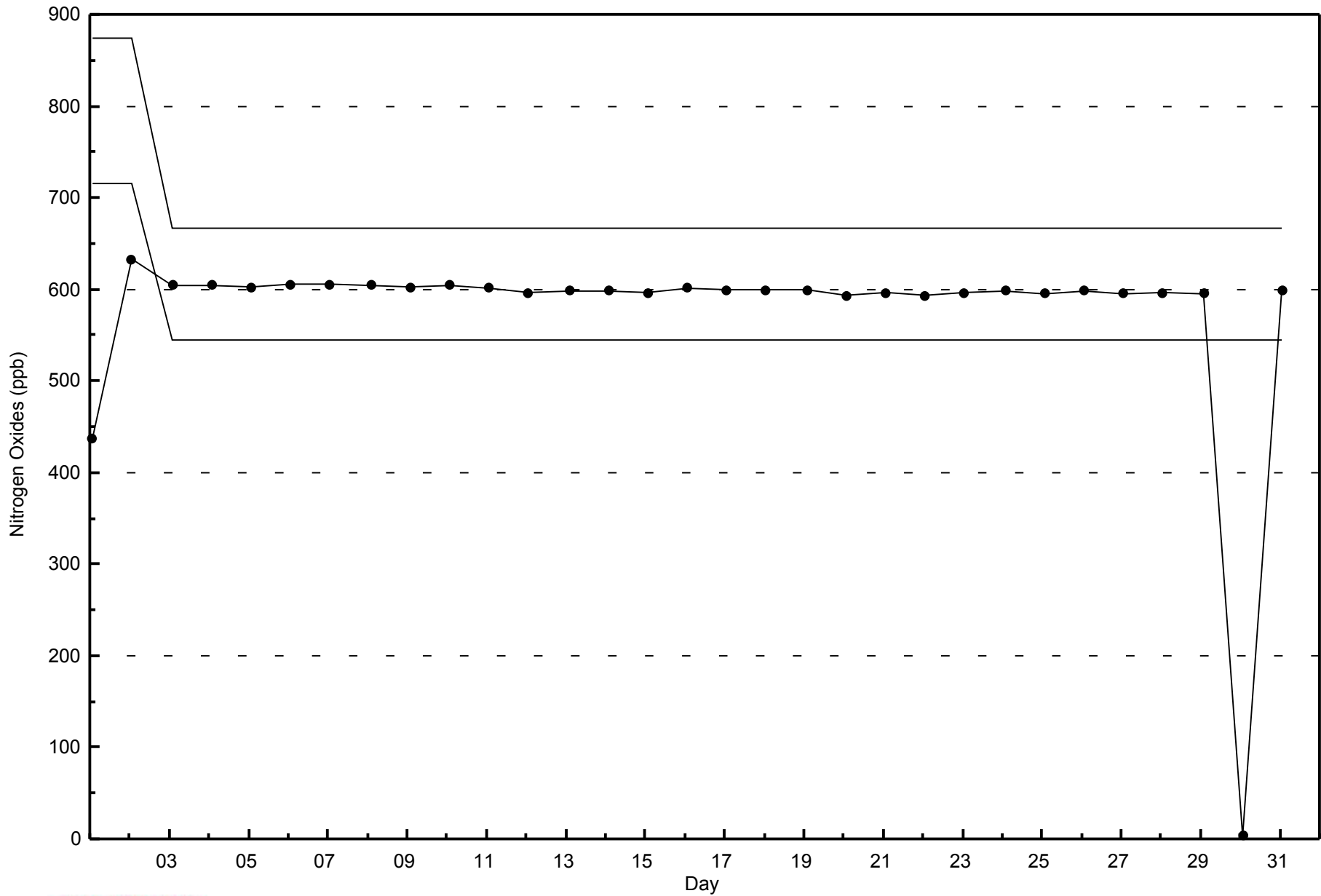
**Total Number of Valid Hours: 687**





WBEA  
Span Responses

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Patricia McInnes - May 2014





Number of Exceedences (AAAQO): 1-hr: 0	Maximum Value: 0 ppb on May 1 01:00	Maximum Daily Average: 0.0 ppb on May 1	Hours in Service: 744
Minimum Value: 0 ppb on May 1 01:00	Maximum Diurnal Average: 0.0 ppb at hour 1	Minimum Daily Average: 0.0 ppb on May 1	Hours of Data: 669
Monthly Average: 0.0 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> = 0 P <sub>99</sub> = 0		Hours of Missing Data: 75
			Hours of Calibration: 40
			Percent Operational Time: 95.3

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-May	0	Z	RE	0	0	0	0	0	0	0	0	0	M	M	0	0	0	0	0	0	0	0	0	0	0.0	0
2-May	0	Z	RE	0	0	0	0	0	0	0	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3-May	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
4-May	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
5-May	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
6-May	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
7-May	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
8-May	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
9-May	0	Z	RE	0	0	0	0	C	C	C	C	C	C	C	C	C	C	0	0	0	0	0	0	0	-	0
10-May	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
11-May	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
12-May	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
13-May	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
14-May	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
15-May	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
16-May	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
17-May	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
18-May	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
19-May	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
20-May	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
21-May	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
22-May	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
23-May	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-May	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-May	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
26-May	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
27-May	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
28-May	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
29-May	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-May	0	0	0	Z	RE	0	0	0	0	0	0	PF	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
31-May	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0

0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Diurnal Average
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Diurnal Maximum

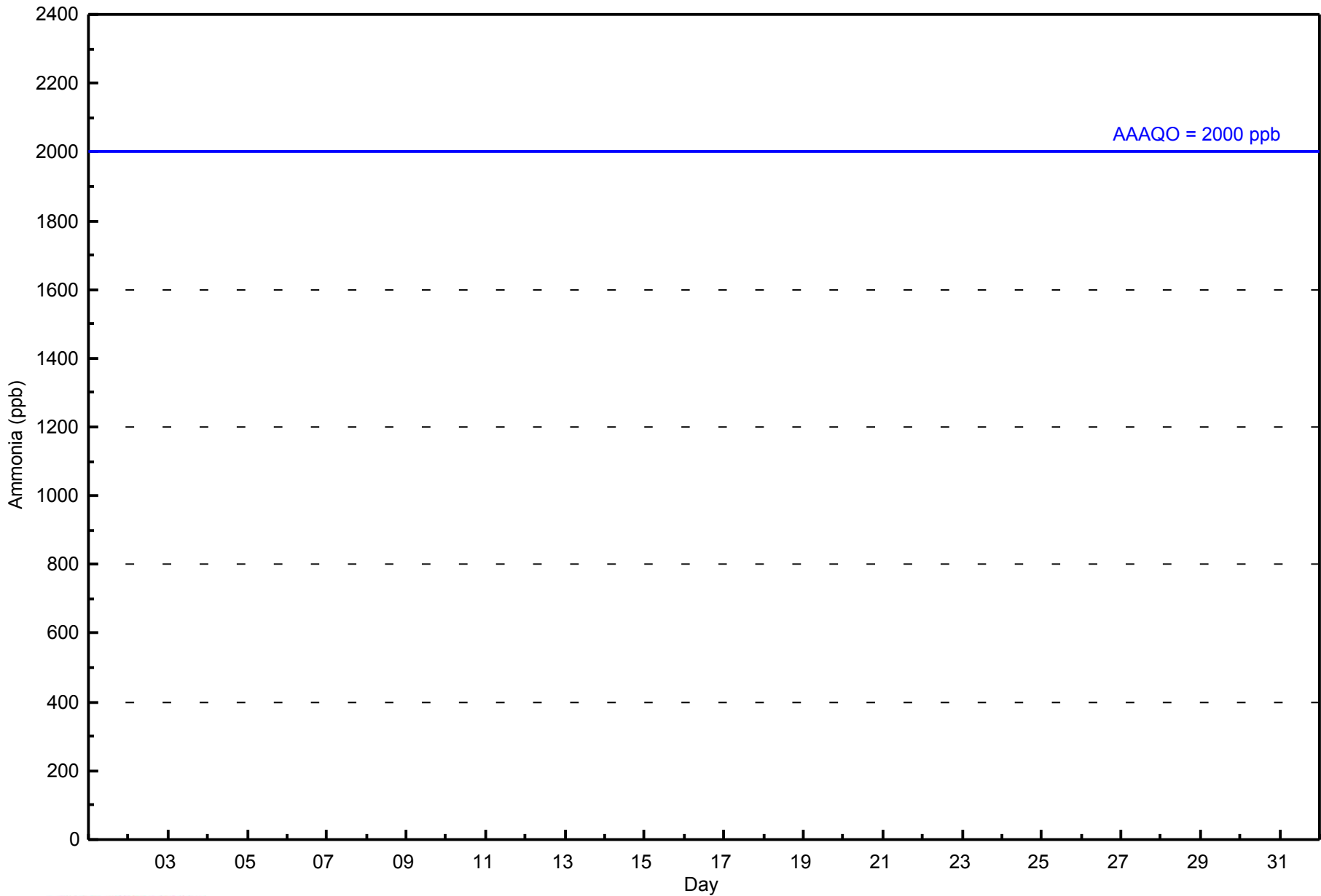
Z - zerospan      C - Calibration      M - Maintenance      PF - Power Failure      RE - Recovery  
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 2000 ppb





**WBEA**  
**Hourly Averages**

**Ammonia (NH<sub>3</sub>) - ppb**  
**Patricia McInnes - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Ammonia (NH<sub>3</sub>) - ppb**  
**Patricia McInnes - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	669	100.00	100.00
6 - 10	0	0.00	100.00
11 - 15	0	0.00	100.00
16 - 20	0	0.00	100.00
21 - 25	0	0.00	100.00
> 26	0	0.00	100.00

Total Number of Valid Hours: 669

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Ammonia (NH<sub>3</sub>) - ppb**  
**Patricia McInnes - May 2014**

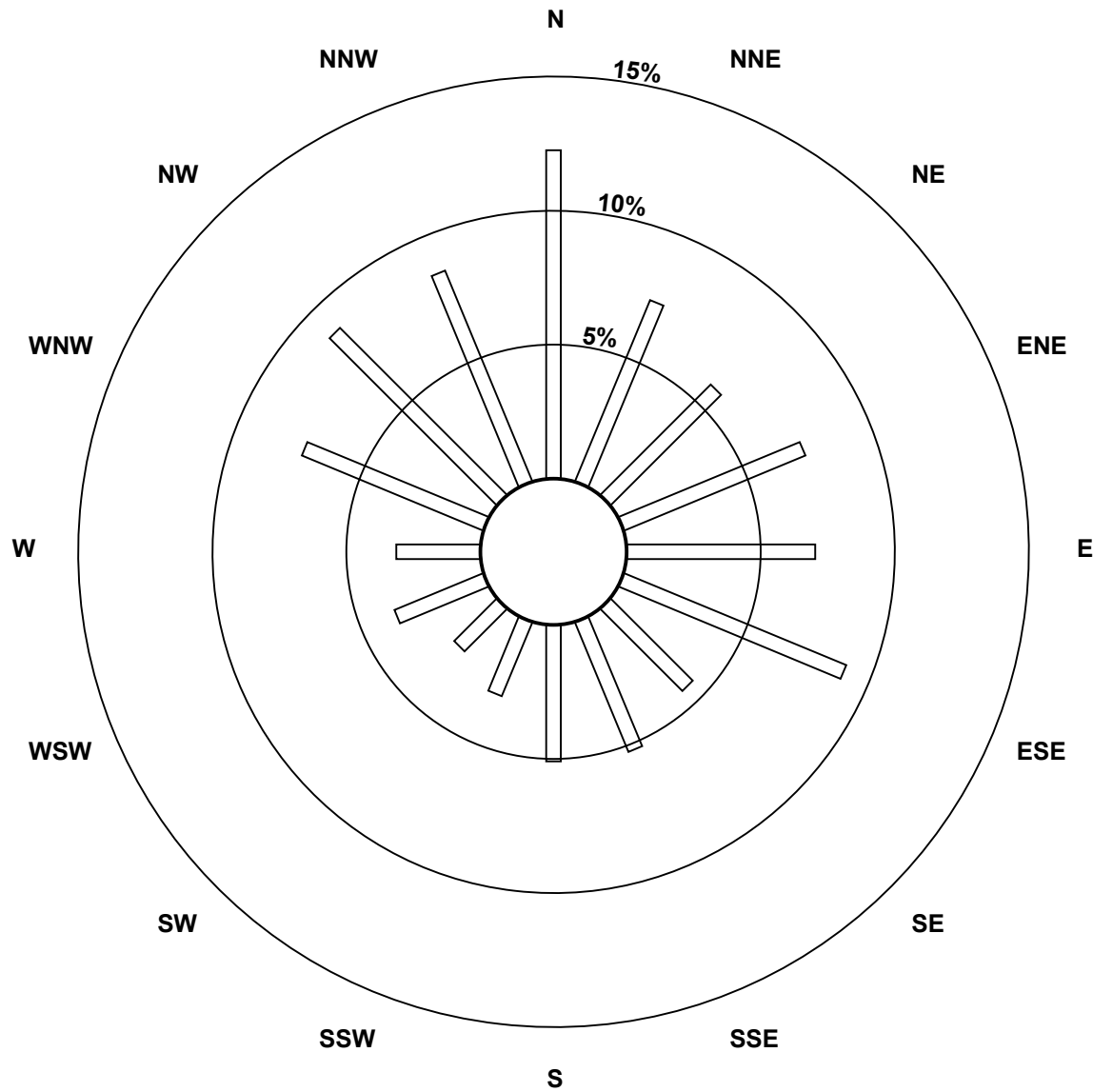
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	82	49	39	49	47	60	29	35	34	20	15	24	21	49	59	57	669
6 - 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	82	49	39	49	47	60	29	35	34	20	15	24	21	49	59	57	669

Total Number of Valid Hours: 669

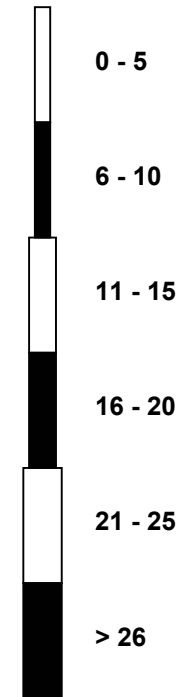
Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Ammonia (NH<sub>3</sub>) - ppb  
Patricia McInnes (AMS 6)**



Classes (ppb)

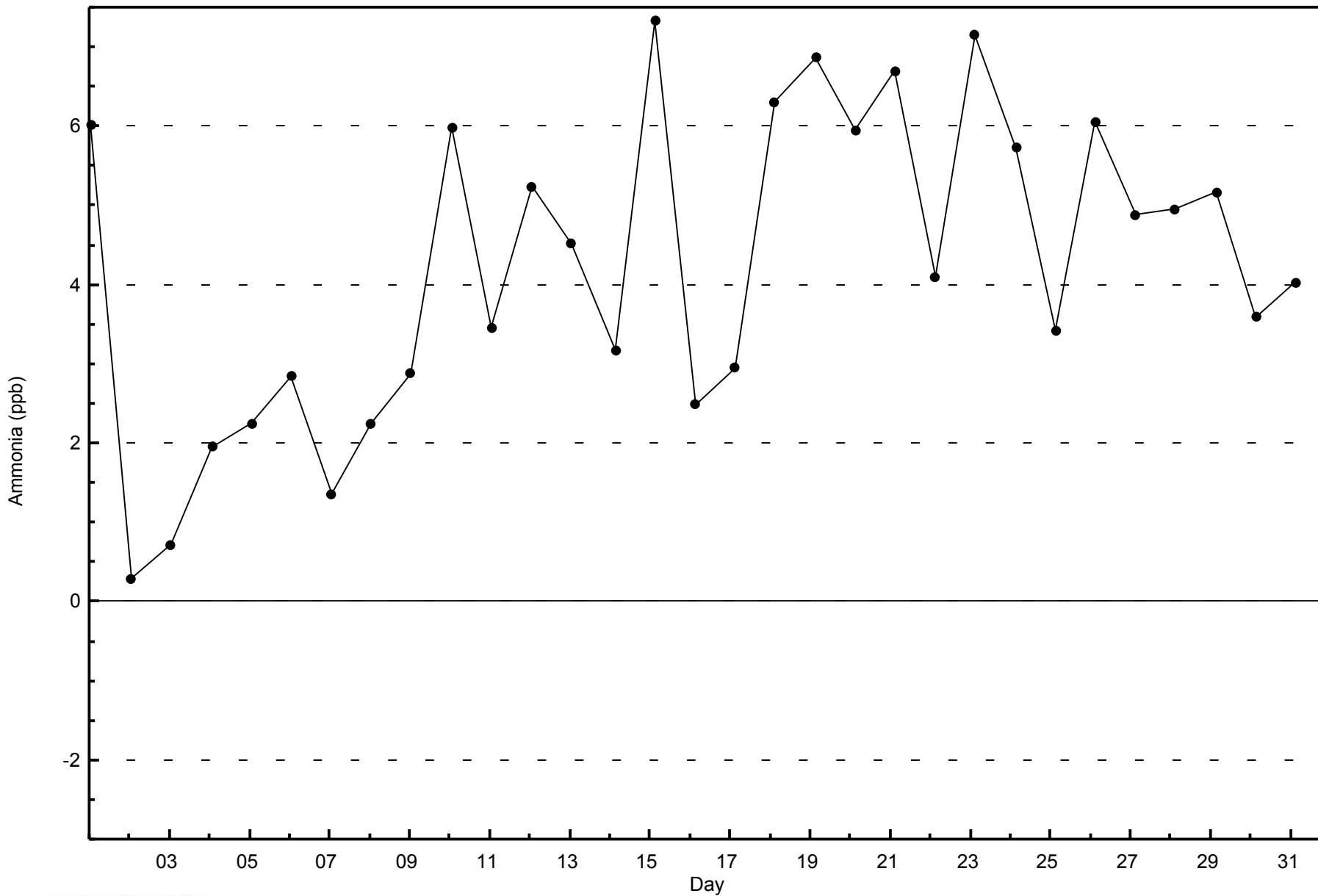


**Total Number of Valid Hours: 669**



WBEA  
Zero Responses

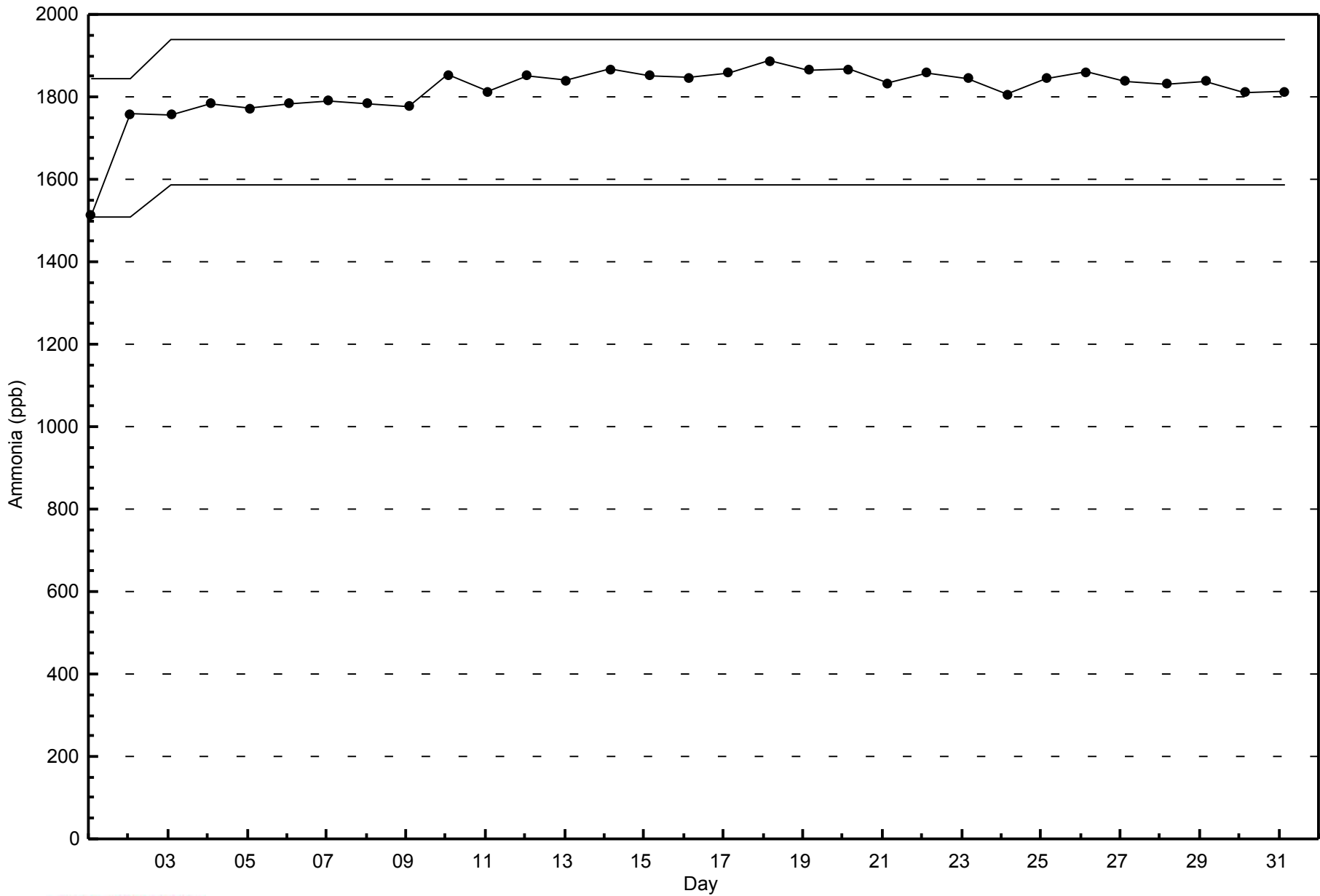
Ammonia (NH<sub>3</sub>) - ppb  
Patricia McInnes - May 2014





WBEA  
Span Responses

Ammonia (NH<sub>3</sub>) - ppb  
Patricia McInnes - May 2014





Summary of Hour Averages

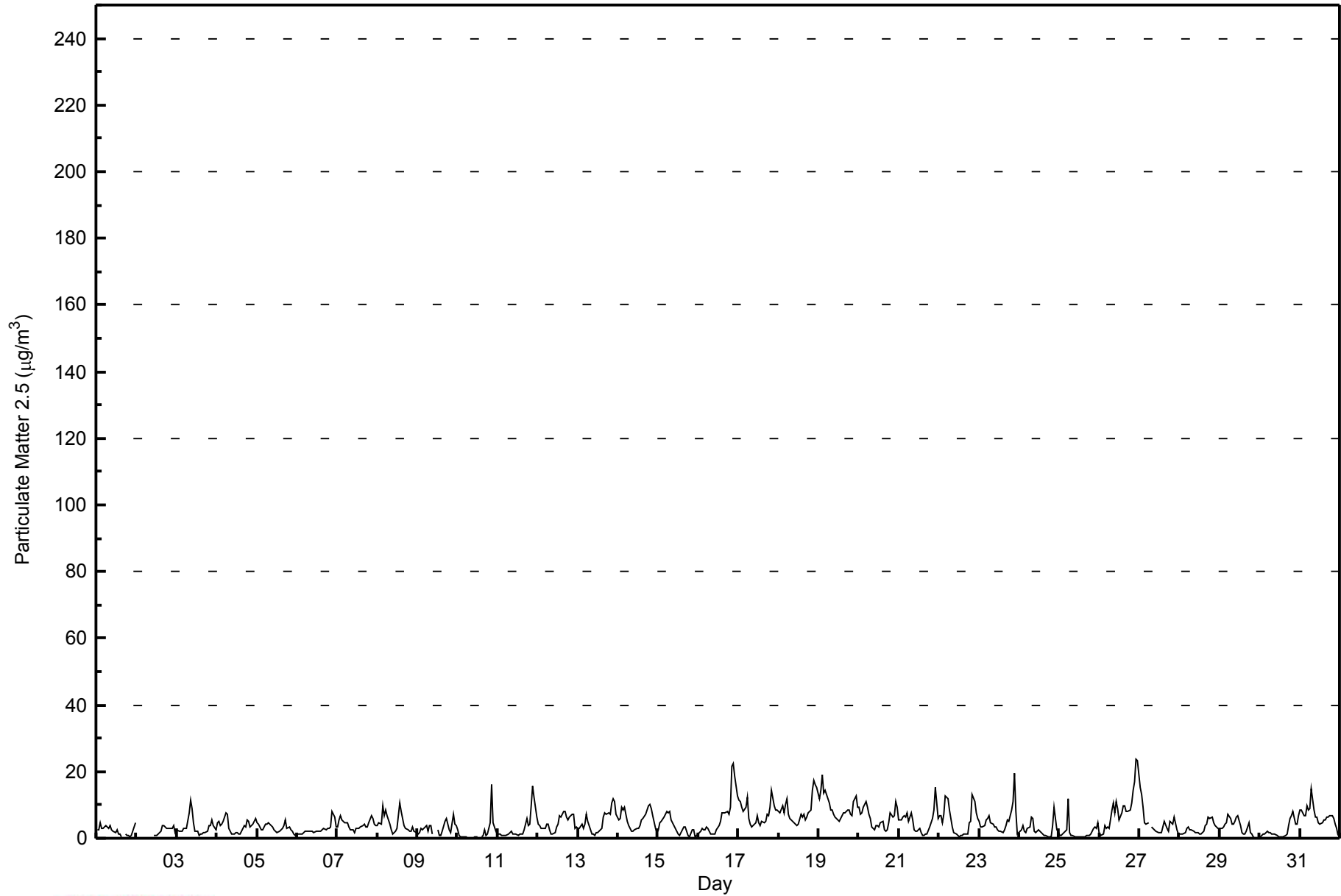
Patricia McInnes - May 2014

Number of Exceedences (AAAQO):		24-hr: 0		Hours in Service:		744																				
Maximum Value: 23.8 µg/m <sup>3</sup> on May 26 23:00		Maximum Daily Average: 9.6 µg/m <sup>3</sup> on May 19		Hours of Data:		727																				
Minimum Value: 0.0 µg/m <sup>3</sup> on May 29 23:00		Minimum Daily Average: 1.8 µg/m <sup>3</sup> on May 25		Hours of Missing Data:		17																				
Maximum Diurnal Average: 7.9 µg/m <sup>3</sup> at hour 22		Minimum Diurnal Average: 2.5 µg/m <sup>3</sup> at hour 13		Hours of Calibration:		0																				
Monthly Average: 4.55 µg/m <sup>3</sup>		Percentiles: P <sub>1</sub> = 0.3 P <sub>10</sub> = 1.0 Q <sub>1</sub> = 2.0 Median = 3.6 Q <sub>3</sub> = 6.3 P <sub>90</sub> = 9.1 P <sub>99</sub> = 18.2		Percent Operational Time:		97.7																				
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-May	2.5	2.6	4.8	2.8	3.0	3.8	3.3	3.1	3.8	2.5	2.1	1.7	2.8	1.2	1.3	0.4	UO	1.2	0.9	0.9	0.3	1.0	3.5	4.7	2.4	4.8
2-May	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	0.7	0.7	0.7	1.4	2.3	3.7	3.8	3.3	2.8	2.8	2.9	2.8	3.9	1.8	--	3.9
3-May	2.7	2.0	1.9	2.1	2.9	2.8	3.0	7.4	11.4	8.9	4.8	2.2	2.1	0.9	1.2	1.3	1.5	1.8	2.0	3.6	3.9	5.6	3.9	2.6	3.5	11.4
4-May	4.9	5.0	4.0	4.3	5.0	7.5	7.1	2.8	2.2	1.2	1.3	1.7	1.6	1.4	1.3	2.2	4.0	3.5	5.7	5.2	3.6	4.3	5.3	5.9	3.8	7.5
5-May	4.6	4.1	2.6	2.7	3.4	4.1	4.2	4.8	4.0	3.4	2.5	2.1	1.7	2.0	2.4	3.2	3.6	5.4	3.0	3.4	2.4	2.0	1.3	0.9	3.1	5.4
6-May	1.1	1.1	1.1	1.2	1.7	2.3	2.2	2.1	2.0	2.0	1.9	2.3	2.3	2.3	2.3	2.7	2.8	2.6	3.1	2.9	3.3	8.0	6.3	3.5	2.6	8.0
7-May	3.3	5.5	6.8	5.6	4.8	4.9	4.8	3.3	2.6	2.5	1.8	3.1	3.1	3.0	3.4	4.0	4.4	3.5	3.3	4.8	6.7	5.9	4.1	3.6	4.1	6.8
8-May	4.0	4.5	4.4	9.5	6.8	8.6	6.7	4.3	2.7	1.4	1.8	2.3	2.8	10.8	7.9	5.8	3.9	3.1	2.7	2.0	1.9	3.3	2.1	1.6	4.4	10.8
9-May	1.3	1.5	2.8	2.7	2.9	3.8	2.3	4.0	3.9	1.3	M	M	2.6	1.0	0.8	2.2	5.3	5.7	4.3	2.7	1.9	7.4	4.4	3.9	3.1	7.4
10-May	2.7	0.8	0.6	0.6	0.5	0.2	0.1	UO	UO	0.2	0.3	0.6	0.4	UO	0.4	0.8	2.5	1.0	1.4	4.5	16.1	4.7	3.5	2.2	2.1	16.1
11-May	1.3	1.1	0.9	0.7	0.8	1.0	1.1	1.5	2.0	1.3	1.2	1.2	1.0	1.2	1.2	1.3	2.5	5.7	3.8	4.4	9.9	15.9	12.4	6.3	3.3	15.9
12-May	4.0	3.7	3.0	3.0	3.0	4.0	4.2	2.5	1.2	1.4	1.6	3.4	4.4	6.9	6.3	8.2	8.2	6.5	5.3	6.3	7.1	7.1	2.8	3.6	4.5	8.2
13-May	3.1	3.0	4.2	2.8	4.3	7.0	5.2	2.5	1.3	1.2	1.0	1.5	1.6	2.4	3.0	6.4	7.8	7.1	7.8	7.2	10.6	11.7	11.1	7.3	5.1	11.7
14-May	5.4	5.8	9.2	8.3	9.4	4.9	3.6	3.1	2.1	2.0	2.7	2.8	3.0	3.8	5.5	6.0	7.3	8.6	9.8	10.1	9.0	6.9	3.0	1.7	5.6	10.1
15-May	2.6	4.5	5.0	6.3	7.2	7.9	7.8	8.1	5.4	3.9	3.1	2.3	1.5	0.9	2.6	3.6	3.6	2.1	1.1	0.5	2.4	2.7	0.6	0.9	3.6	8.1
16-May	1.2	2.2	3.0	2.5	2.7	3.6	3.0	1.5	1.1	1.2	1.4	2.4	3.8	5.0	7.5	7.8	7.4	8.0	7.4	9.3	21.6	22.5	18.6	12.8	6.6	22.5
17-May	11.4	10.9	9.4	8.2	9.2	12.4	5.9	4.2	3.6	3.7	4.5	6.6	4.6	3.9	4.9	4.6	5.2	7.1	6.8	9.3	14.2	9.7	8.5	8.6	7.4	14.2
18-May	7.9	7.6	9.6	7.7	10.1	12.0	7.3	5.9	5.0	4.6	4.4	4.0	4.4	7.2	6.3	7.2	5.5	6.2	7.4	8.4	14.3	17.5	16.2	15.2	8.4	17.5
19-May	12.1	14.5	19.0	13.8	14.4	13.3	10.7	8.5	8.6	7.3	6.3	5.3	4.9	5.8	6.6	7.8	7.5	8.7	8.5	7.4	6.6	11.0	12.8	9.2	9.6	19.0
20-May	9.1	7.3	7.7	9.3	11.1	9.2	7.4	6.1	3.4	2.6	3.9	3.9	3.6	4.6	5.1	2.8	2.2	2.3	4.6	7.8	6.5	6.9	10.9	9.2	6.1	11.1
21-May	5.4	5.5	6.4	6.6	6.2	7.6	5.3	7.7	5.5	2.5	2.1	2.0	2.8	1.5	0.9	0.8	1.1	1.4	3.4	4.8	5.9	8.4	15.4	6.1	4.8	15.4
22-May	6.8	6.7	4.6	7.2	12.5	11.8	8.6	5.8	3.3	1.6	1.2	0.8	0.5	0.7	1.0	1.3	1.3	1.4	4.5	5.2	12.9	11.0	7.7	6.1	5.2	12.9
23-May	4.9	3.4	3.2	3.7	5.5	5.9	6.9	4.8	4.4	3.6	3.3	2.5	2.0	2.0	1.9	2.6	3.6	5.4	5.1	8.6	11.1	19.4	7.9	1.4	5.1	19.4
24-May	1.5	2.7	3.7	2.1	1.7	3.2	3.5	6.3	5.9	2.3	1.7	2.3	2.1	1.5	1.1	0.9	0.7	0.5	0.4	0.5	3.7	9.5	2.6	2.1	2.6	9.5
25-May	1.0	0.6	1.1	1.9	2.4	12.1	1.8	0.8	0.7	0.6	0.5	0.3	0.3	0.3	0.5	0.4	0.7	0.9	0.8	1.4	3.1	3.5	2.8	4.7	1.8	12.1
26-May	1.4	0.9	1.3	3.7	3.1	3.4	3.1	8.4	10.7	7.8	10.9	9.0	5.4	7.7	9.8	9.6	7.9	8.1	8.4	10.6	14.5	17.0	23.8	23.3	8.8	23.8
27-May	15.4	12.9	9.3	4.8	4.4	4.8	M	3.4	2.8	2.6	2.1	1.6	1.5	1.7	3.4	5.1	2.8	2.0	5.1	4.6	4.2	6.3	2.6	1.1	4.5	15.4
28-May	1.3	1.3	1.3	1.6	3.1	3.3	2.6	2.4	2.1	1.6	1.8	1.6	1.4	1.5	2.0	3.9	4.2	6.3	6.1	6.2	4.6	4.0	3.4	3.1	2.9	6.3
29-May	3.1	3.1	3.3	4.1	4.9	7.3	5.9	4.2	4.2	5.1	6.3	6.9	3.6	1.6	1.3	1.3	2.2	4.6	1.8	1.4	0.3	0.1	0.0	0.2	3.2	7.3
30-May	0.3	1.0	1.1	1.4	1.9	1.6	1.6	1.4	1.1	1.1	0.9	0.6	0.5	0.4	0.3	0.8	1.4	3.7	5.8	6.9	8.2	4.2	4.3	6.8	2.4	8.2
31-May	8.4	8.6	6.8	6.9	9.7	8.5	8.8	14.9	8.6	6.3	6.2	4.7	4.4	4.6	5.3	5.5	6.5	6.3	6.9	6.8	5.7	4.4	2.9	1.0	6.6	14.9
																								Diurnal Average		
																								Diurnal Maximum		
4.5 4.5 4.7 4.6 5.3 6.1 4.8 4.7 4.0 2.9 2.8 2.7 2.5 3.0 3.2 3.7 4.1 4.3 4.5 5.2 7.1 7.9 6.7 5.2																										
15.4 14.5 19.0 13.8 14.4 13.3 10.7 14.9 11.4 8.9 10.9 9.0 5.4 10.8 9.8 9.6 8.2 8.7 9.8 10.6 21.6 22.5 23.8 23.3																										
M - Maintenance UO - Unstable Operation																										
Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m <sup>3</sup>																										



**WBEA**  
**Hourly Averages**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Patricia McInnes - May 2014**







**WBEA**  
**Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Patricia McInnes - May 2014**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
1 - 5	437	60.11	60.11
6 - 15	209	28.75	88.86
16 - 25	12	1.65	90.51
26 - 80	0	0.00	90.51
> 81.0	0	0.00	90.51

Total Number of Valid Hours: 727

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) - μg/m<sup>3</sup>**  
**Patricia McInnes - May 2014**

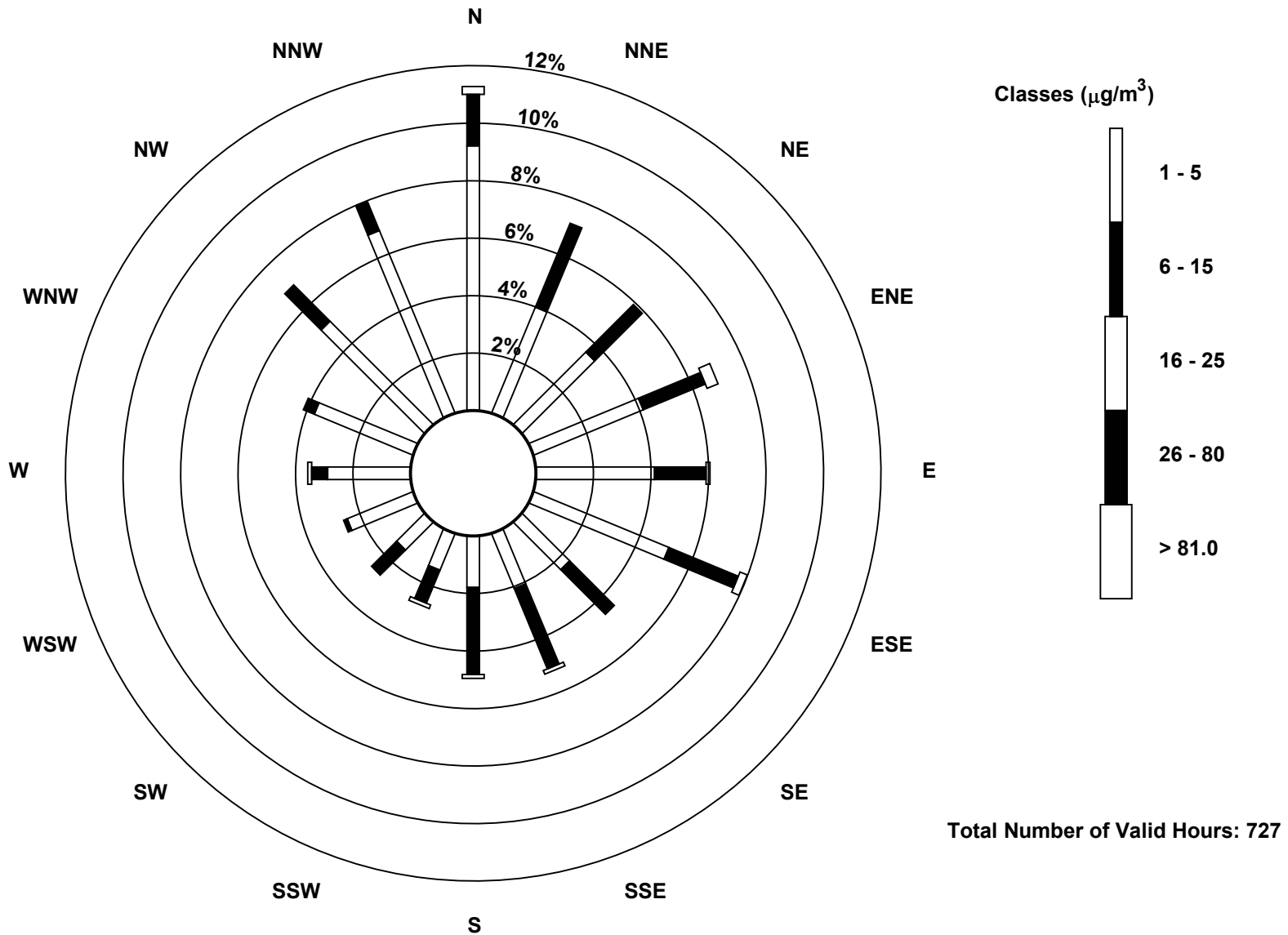
Concentration Ranges (μg/m <sup>3</sup> )	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	67	29	26	30	30	37	17	15	13	10	10	18	21	27	37	50	437
6 - 15	13	23	17	17	13	19	16	22	22	9	9	1	4	3	13	8	209
16 - 25	2	0	0	3	1	2	0	1	1	1	0	0	1	0	0	0	12
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	82	52	43	50	44	58	33	38	36	20	19	19	26	30	50	58	658

Total Number of Valid Hours: 727

Total Number of Hours: 744

Wood Buffalo Environmental Association  
 Wind Rose May 2014

Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
 Patricia McInnes (AMS 6)



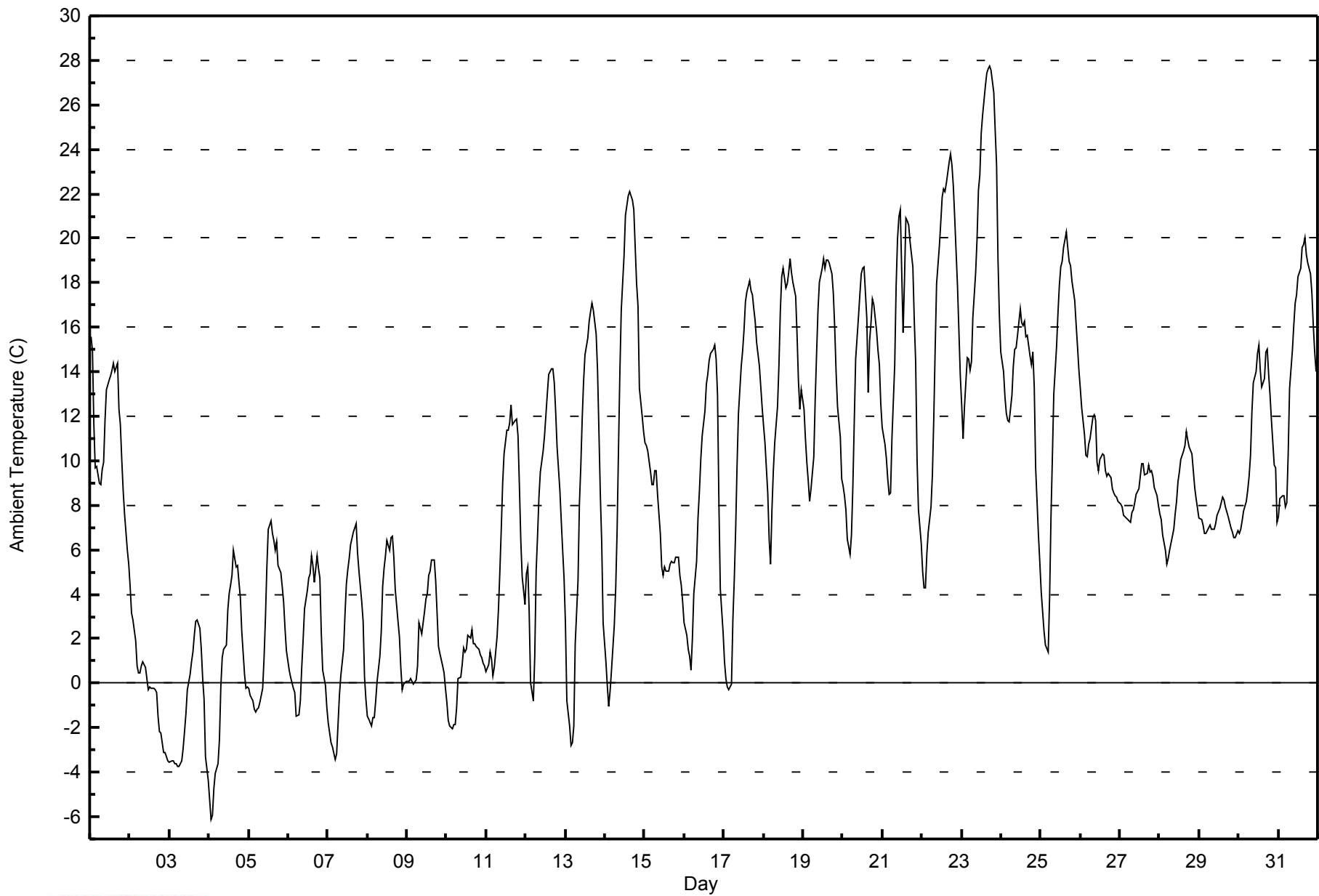


Maximum Value: 27.7 C on May 23 18:00		Maximum Daily Average: 20.5 C on May 23		Hours in Service: 744																																												
Minimum Value: -6.1 C on May 4 02:00		Minimum Daily Average: -1.2 C on May 3		Hours of Data: 744																																												
Maximum Diurnal Average: 12.5 C at hour 17		Minimum Diurnal Average: 3.5 C at hour 5		Hours of Missing Data: 0																																												
Monthly Average: 8.47 C		Percentiles: P <sub>1</sub> = -3.7 P <sub>10</sub> = -0.3 Q <sub>1</sub> = 2.7 Median = 8.1 Q <sub>3</sub> = 13.9 P <sub>90</sub> = 18.1 P <sub>99</sub> = 24.6		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-May	15.6	14.9	11.6	9.7	9.7	9.0	8.9	9.6	10.0	11.8	13.2	13.6	13.8	14.1	14.4	14.0	14.4	12.3	11.6	10.1	8.7	7.6	6.0	5.4	11.2	15.6																						
2-May	4.3	3.2	2.8	1.9	0.8	0.4	0.4	0.8	1.0	0.7	0.2	-0.3	-0.2	-0.2	-0.2	-0.3	-0.4	-1.5	-2.2	-2.3	-3.1	-3.1	-3.3	-3.5	-0.2	4.3																						
3-May	-3.6	-3.5	-3.5	-3.6	-3.6	-3.7	-3.8	-3.5	-2.9	-2.2	-1.4	-0.3	0.4	1.0	1.4	2.1	2.8	2.8	2.5	1.5	0.2	-0.7	-3.3	-4.4	-1.2	2.8																						
4-May	-5.2	-6.1	-5.9	-4.7	-4.1	-3.6	-2.6	-0.2	1.2	1.5	1.7	3.3	4.0	4.4	4.8	6.0	5.3	5.3	4.5	3.9	2.3	0.4	-0.2	-0.2	0.7	6.0																						
5-May	-0.2	-0.5	-0.8	-1.2	-1.3	-1.2	-1.1	-0.9	-0.3	1.1	3.0	5.2	6.9	7.3	6.7	6.4	6.0	6.3	5.3	5.0	4.3	3.6	2.5	1.5	2.7	7.3																						
6-May	0.6	0.3	0.0	-0.2	-0.4	-1.5	-1.4	-0.8	0.7	2.0	3.4	4.2	4.7	4.9	5.7	5.3	4.6	5.7	5.2	4.7	2.3	0.6	-0.1	-1.1	2.1	5.7																						
7-May	-1.8	-2.3	-2.6	-2.9	-3.4	-3.1	-1.9	-0.5	0.4	1.5	3.1	4.5	5.1	5.6	6.2	6.8	7.0	7.2	5.8	5.0	3.7	2.8	0.3	-0.7	1.9	7.2																						
8-May	-1.5	-1.6	-1.9	-1.6	-1.6	-0.8	0.1	1.2	2.3	4.4	5.2	5.7	6.4	6.0	6.5	6.6	5.6	4.2	2.8	2.1	0.7	-0.3	0.0	0.1	2.1	6.6																						
9-May	0.1	0.1	0.2	0.1	0.0	0.1	0.8	2.7	2.5	2.2	3.2	3.8	4.0	4.8	5.0	5.6	5.5	4.6	3.2	1.7	1.4	0.8	0.5	-0.2	2.2	5.6																						
10-May	-0.9	-1.7	-1.9	-2.0	-1.8	-1.9	-1.1	0.2	0.3	0.8	1.6	1.4	1.5	2.2	2.0	2.4	1.8	1.8	1.6	1.5	1.3	1.1	0.9	0.8	0.5	2.4																						
11-May	0.5	0.8	1.4	1.1	0.3	0.7	2.1	3.4	5.0	6.9	9.0	10.3	11.4	11.4	11.7	12.5	11.6	11.8	11.9	11.1	8.9	6.4	4.8	3.5	6.6	12.5																						
12-May	4.9	5.2	3.2	0.0	-0.8	1.2	5.1	6.6	8.4	9.5	10.4	11.1	12.0	13.0	13.9	14.1	14.1	13.5	12.2	10.6	8.7	7.3	6.0	4.7	8.1	14.1																						
13-May	2.7	-0.8	-1.9	-2.8	-2.7	-2.0	1.8	4.6	8.0	9.7	11.9	13.6	14.7	15.5	16.3	16.7	17.1	16.7	15.7	14.1	11.3	8.5	6.3	2.7	8.2	17.1																						
14-May	1.0	-0.1	-1.1	-0.4	0.6	2.6	4.2	6.8	10.4	13.9	16.8	19.2	21.0	21.5	21.9	22.1	21.7	21.3	19.6	18.0	17.0	13.2	12.0	11.3	12.3	22.1																						
15-May	10.8	10.7	10.5	9.5	8.9	8.9	9.6	9.6	8.5	6.8	5.2	4.9	5.2	5.0	5.0	5.3	5.5	5.4	5.4	5.7	5.7	4.8	4.4	3.6	6.9	10.8																						
16-May	2.7	2.1	1.5	1.2	0.6	2.0	4.0	5.5	7.4	8.6	10.0	11.1	12.3	13.5	13.9	14.5	14.8	15.0	15.2	14.6	12.9	8.0	4.2	2.3	8.3	15.2																						
17-May	0.9	0.2	-0.2	-0.3	0.0	2.9	4.6	6.9	9.8	12.1	14.3	14.9	15.9	17.1	17.6	18.1	17.7	17.4	16.8	16.2	15.3	14.3	13.3	12.4	10.8	18.1																						
18-May	11.5	10.8	8.5	6.5	5.4	7.8	9.5	10.8	12.5	14.3	16.7	18.3	18.7	17.8	18.0	18.5	19.1	18.5	18.0	17.4	15.7	13.5	12.3	13.2	13.9	19.1																						
19-May	12.3	11.0	9.9	9.1	8.2	8.7	10.2	12.8	14.8	16.8	18.0	18.6	19.1	18.6	19.0	19.1	18.9	18.4	17.5	16.0	13.9	12.4	11.1	9.2	14.3	19.1																						
20-May	8.9	8.4	7.8	6.5	5.8	6.6	8.8	11.7	14.6	16.4	17.4	18.4	18.6	18.7	16.4	13.1	15.4	16.2	17.3	17.0	15.8	15.0	14.3	12.6	13.4	18.7																						
21-May	11.5	10.8	10.1	9.2	8.5	8.5	11.0	14.3	17.8	20.0	20.9	21.3	15.8	18.1	20.9	20.8	20.6	19.8	18.7	16.3	14.4	10.0	7.8	6.3	14.7	21.3																						
22-May	5.1	4.3	4.3	5.8	6.8	7.9	9.4	11.9	15.1	18.0	19.7	20.7	21.9	22.2	22.1	22.5	23.4	23.8	23.3	22.3	20.9	17.8	15.8	13.8	15.8	23.8																						
23-May	12.5	11.0	12.4	14.6	14.6	14.1	14.4	16.5	18.5	20.0	22.2	22.8	24.8	25.5	26.8	27.4	27.6	27.7	27.5	26.5	24.8	23.3	19.1	16.5	20.5	27.7																						
24-May	14.9	14.0	12.9	12.1	11.8	11.7	12.9	14.3	15.0	15.1	15.6	16.8	16.2	16.1	16.3	15.6	15.6	14.7	14.3	14.9	13.3	9.7	6.7	5.4	13.6	16.8																						
25-May	4.1	3.2	2.3	1.7	1.4	3.9	7.5	10.2	13.0	15.2	16.7	17.9	18.7	19.0	19.6	20.3	19.6	19.0	18.7	18.1	17.2	16.1	15.1	14.1	13.0	20.3																						
26-May	13.3	12.4	11.2	10.3	10.2	10.7	11.0	11.9	12.0	11.8	9.9	9.6	10.0	10.3	10.3	9.6	9.3	9.5	9.3	8.8	8.5	8.4	8.4	8.2	10.2	13.3																						
27-May	8.1	7.9	7.6	7.5	7.4	7.3	7.3	7.6	7.8	8.1	8.5	8.8	9.3	9.9	9.9	9.4	9.5	9.8	9.5	9.6	9.3	8.8	8.4	8.0	8.5	9.9																						
28-May	7.6	7.4	6.6	6.0	5.3	5.6	6.0	6.3	6.9	7.6	8.2	9.0	9.5	10.1	10.4	10.7	11.3	10.9	10.6	10.3	9.5	8.8	8.3	7.9	8.4	11.3																						
29-May	7.5	7.4	7.1	6.7	6.7	6.8	7.1	6.9	6.9	6.9	7.2	7.5	7.9	8.1	8.3	8.2	7.9	7.5	7.2	7.0	6.8	6.6	6.5	6.9	7.2	8.3																						
30-May	6.7	6.9	7.3	7.7	8.2	8.7	9.3	10.2	12.2	13.5	14.0	14.8	15.2	14.1	13.3	13.7	14.9	15.0	13.9	13.0	11.8	9.8	9.7	7.2	11.3	15.2																						
31-May	7.5	8.3	8.4	8.4	7.9	8.1	10.3	13.2	14.9	16.1	17.1	17.5	18.3	18.6	19.6	19.7	20.0	19.3	18.9	18.4	17.5	16.1	14.9	14.0	14.7	20.0																						
																								5.2	4.7	4.1	3.7	3.5	4.1	5.3	6.8	8.2	9.4	10.4	11.2	11.7	12.1	12.4	12.5	12.5	12.3	11.7	10.9	9.7	8.1	6.9	5.9	Diurnal Average
																								15.6	14.9	12.9	14.6	14.6	14.1	14.4	16.5	18.5	20.0	22.2	22.8	24.8	25.5	26.8	27.4	27.6	27.7	27.5	26.5	24.8	23.3	19.1	16.5	Diurnal Maximum



**WBEA**  
**Hourly Averages**

**Ambient Temperature (AT) - C**  
**Patricia McInnes - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C**  
**Patricia McInnes - May 2014**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	92	12.37	12.37
0 - 10	358	48.12	60.48
10 - 20	259	34.81	95.30
> 20	35	4.70	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

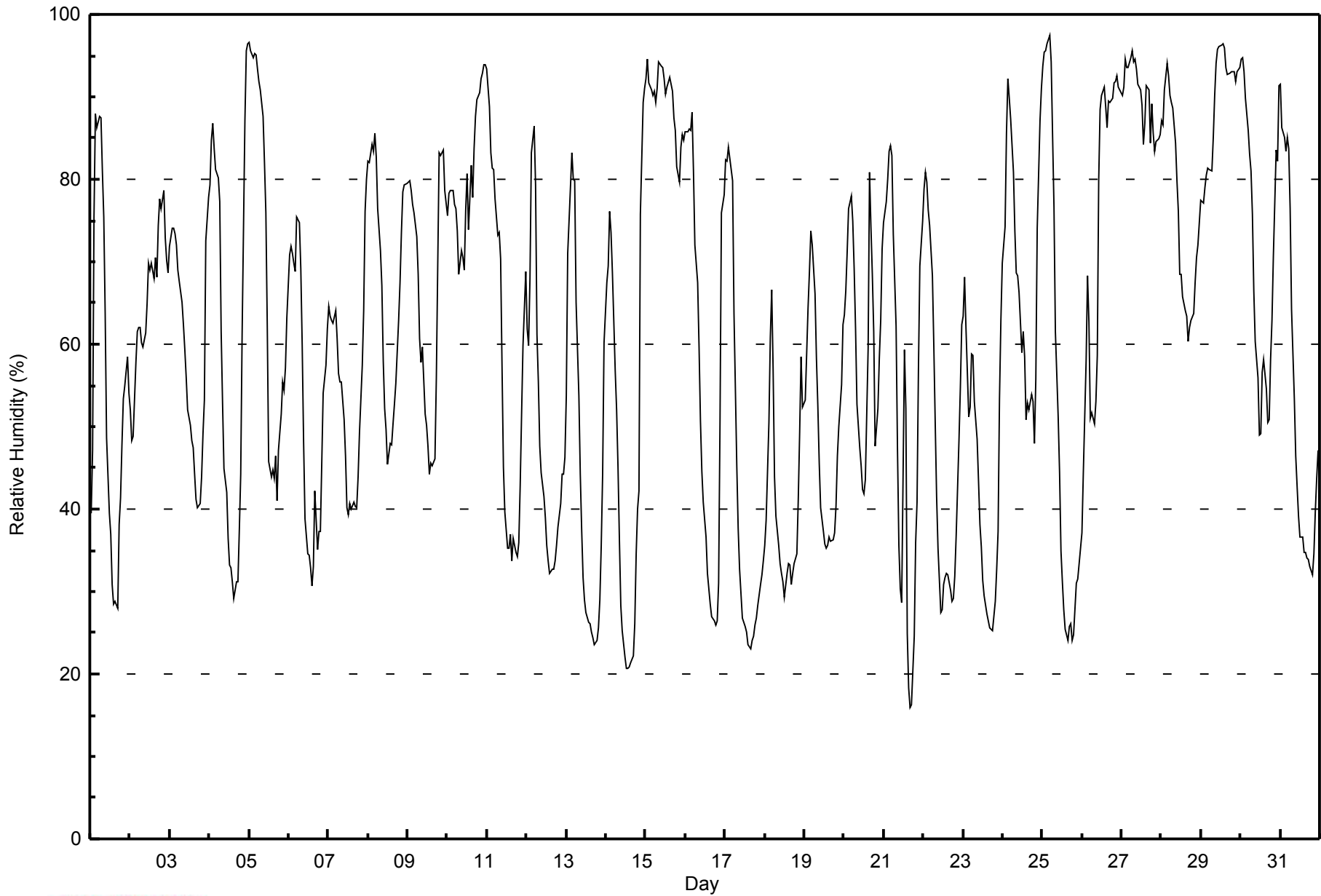


Maximum Value: 97 % on May 25 05:00																		Maximum Daily Average: 89.9 % on May 27																		Hours in Service: 744							
Minimum Value: 16 % on May 21 17:00																		Minimum Daily Average: 41.0 % on May 18																		Hours of Data: 744							
Maximum Diurnal Average: 79.5 % at hour 4																		Minimum Diurnal Average: 46.6 % at hour 15																		Hours of Missing Data: 0							
Monthly Average: 60.7 %																		Percentiles: P <sub>1</sub> = 22 P <sub>10</sub> = 31 Q <sub>1</sub> = 41 Median = 61 Q <sub>3</sub> = 80 P <sub>90</sub> = 91 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-May	40	47	75	88	86	88	87	81	75	64	49	39	37	31	28	29	28	38	41	48	53	55	59	54	55.0	88																	
2-May	52	48	49	58	61	62	62	60	60	61	65	70	69	70	68	71	68	74	78	77	79	73	70	69	65.6	79																	
3-May	72	74	74	73	72	69	68	65	62	59	56	52	50	48	47	44	41	40	41	44	49	53	72	78	58.6	78																	
4-May	79	85	87	84	81	80	77	62	53	45	42	36	33	33	31	29	31	31	37	44	61	87	96	96	59.2	96																	
5-May	97	96	95	95	95	93	92	91	88	82	76	62	46	44	45	44	46	41	47	51	55	54	57	63	69.0	97																	
6-May	71	72	71	70	69	75	75	69	60	48	39	35	34	33	31	33	42	35	37	37	46	54	57	62	52.3	75																	
7-May	65	63	63	62	64	61	56	55	55	51	46	40	39	41	40	41	40	40	44	49	57	64	76	80	54.0	80																	
8-May	82	82	84	83	86	83	76	71	67	58	52	50	45	48	48	50	53	55	63	67	74	78	79	80	67.3	86																	
9-May	80	80	79	77	76	73	68	61	58	60	52	50	48	44	46	45	46	56	70	83	83	84	79	77	65.5	84																	
10-May	76	78	79	79	77	76	74	69	71	71	69	76	81	74	82	78	84	88	90	90	92	93	94	94	80.5	94																	
11-May	93	89	83	81	81	78	73	74	70	57	45	40	35	35	37	34	36	35	34	36	43	51	60	69	57.1	93																	
12-May	62	60	68	83	86	79	61	55	48	44	41	39	36	34	32	33	33	34	36	38	41	44	44	46	49.1	86																	
13-May	54	71	79	83	80	80	65	54	44	37	32	29	27	26	25	24	23	24	26	29	36	44	60	45.0	83																		
14-May	67	70	76	74	69	57	52	45	36	28	25	22	21	21	21	21	22	26	35	40	42	76	89	91	46.9	91																	
15-May	92	95	92	91	90	91	89	91	94	94	94	92	90	91	92	92	91	87	86	82	80	84	85	85	89.5	95																	
16-May	86	86	86	86	88	81	72	68	60	51	45	41	37	32	30	29	27	26	26	27	31	51	76	78	54.9	88																	
17-May	82	82	84	83	80	64	55	45	38	33	27	26	26	25	24	23	24	25	26	27	28	31	32	34	42.6	84																	
18-May	36	39	51	61	67	57	44	39	36	33	32	31	29	32	33	33	31	32	33	35	41	49	58	52	41.0	67																	
19-May	53	59	64	69	74	72	66	58	52	46	40	37	36	35	36	37	36	36	37	40	46	50	55	62	49.9	74																	
20-May	64	66	71	76	78	75	69	62	53	47	45	42	42	44	60	81	74	68	61	48	52	58	63	72	61.3	81																	
21-May	75	77	80	83	84	83	73	62	47	36	30	29	59	52	25	18	16	16	25	36	41	57	69	75	52.1	84																	
22-May	79	81	80	76	74	68	60	50	42	35	28	28	31	32	32	32	30	29	29	32	37	48	55	62	47.9	81																	
23-May	63	68	62	51	52	59	59	53	48	43	38	35	31	29	27	26	25	25	29	33	37	53	63	43.3	68																		
24-May	70	74	86	92	90	87	81	74	69	68	66	59	62	58	51	53	52	54	53	48	56	74	87	91	68.9	92																	
25-May	94	95	96	97	97	94	85	77	62	51	44	35	31	28	25	24	26	24	24	25	31	32	33	35	52.8	97																	
26-May	37	44	58	68	63	51	52	50	53	59	80	89	90	91	89	86	89	89	90	92	92	93	91	91	74.5	93																	
27-May	90	91	95	94	94	95	96	94	95	93	92	91	89	84	87	91	91	84	89	86	83	85	85	85	89.9	96																	
28-May	87	87	91	94	93	90	89	89	84	80	76	69	69	66	64	63	60	62	63	64	67	71	72	75	76.0	94																	
29-May	77	77	79	81	81	81	81	85	90	94	96	96	96	96	96	94	93	93	93	93	93	92	93	94	89.3	96																	
30-May	95	95	93	90	86	83	81	76	67	60	56	49	49	57	58	55	50	51	58	63	71	84	82	91	70.8	95																	
31-May	92	86	85	83	85	84	76	64	53	47	43	39	37	37	35	35	34	34	33	32	35	40	44	47	53.3	92																	
																		72.9	74.8	77.8	79.5	79.3	76.4	71.5	66.1	61.0	56.0	52.2	49.3	48.5	47.5	46.6	46.7	46.6	47.0	49.3	51.2	55.5	62.5	68.1	71.3	Diurnal Average	
																		97	96	96	97	97	95	96	94	95	94	96	96	96	96	96	94	93	93	93	93	93	93	96	96	Diurnal Maximum	



**WBEA**  
**Hourly Averages**

**Relative Humidity (RH) - %**  
**Patricia McInnes - May 2014**







Maximum Speed: 33 km/h on May 30 15:00	Maximum Daily Speed Average: 18.5 km/h on May 2	Hours in Service: 744
Minimum Speed Value: 1 km/h on May 17 05:00	Minimum Daily Speed Average: 2.2 km/h on May 4	Hours of Data: 744
Maximum Diurnal Speed Average: 7.6 km/h at hour 14	Minimum Diurnal Speed Average: 0.9 km/h at hour 24	Hours of Missing Data: 0
Monthly Average Velocity: 3.5 km/h 350.5 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 4 Q <sub>1</sub> = 6 Median = 10 Q <sub>3</sub> = 15 P <sub>90</sub> = 21 P <sub>99</sub> = 28	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-May	WSW15	WSW15	NW12	WNW9	NNW15	NW16	NNW13	NW18	NW17	NW21	NW26	NNW28	NNW26	NNW28	NNW22	NNW21	NW21	NNW27	NW23	NW21	NW14	NNW14	NNW13	NW12	NW17.4	NNW28
2-May	WNW16	WNW19	NW23	NW25	NW24	WNW22	WNW19	WNW24	NW25	NW26	NW27	NNW21	NNW21	NNW19	NNW19	N16	N16	NNE18	N16	N16	N16	N18	N20	NNW21	NNW18.5	NW27
3-May	NNW20	NNW17	NNW20	NNW18	NNW16	N17	N14	N15	N14	N13	NNW13	N14	N14	NNE18	N15	NNE13	NE12	NE10	ENE9	ENE10	ENE9	ENE6	NNW4	NNW5	N11.7	NNW20
4-May	NW4	NW5	WNW4	WNW2	NW1	S2	SSE4	SE4	ESE5	S4	NW5	ENE5	SSE4	SW5	SW5	ESE8	SE7	E4	SSE8	SE9	S9	S5	E4	SE3	SSE2.2	SE9
5-May	SE4	ESE6	SE4	ESE4	ESE5	ENE3	E4	E4	NE5	NE3	N4	N7	NE10	NNE13	ENE15	ESE10	SE5	ESE9	ENE15	E18	ENE20	ENE22	E21	ENE20	ENE8.4	ENE22
6-May	E18	NE14	NE14	NE15	NNE13	N17	N17	N19	N18	N19	N22	N22	N24	N22	NNE20	N20	N19	N15	NE14	NNE8	NW11	NW10	NW11	NW11	N14.3	N24
7-May	NW10	NW8	NW10	NW11	NW8	NW9	NNW13	NNW17	NNW16	NNW19	NNW23	NNW24	NNW24	NNW21	NNW19	NNW21	N20	N18	N16	NNE12	NNE8	NNE7	N3	NNW4	NNW13.5	NNW24
8-May	WNW3	W3	W3	S1	W1	E3	ESE5	ESE8	E9	ENE8	ENE7	NE10	ENE12	NNE17	NNE18	NNE19	N21	N21	N19	N15	N10	NNW7	NNW7	NW8	NNE7.4	N21
9-May	NW6	NW5	NW8	NW8	NNW8	NNW5	NNW5	NE4	NW7	W10	N8	NNE9	N8	NW8	SW6	E1	NNE10	NNW14	N18	N16	NW7	WNW9	WNW8	WNW8	NNW6.8	N18
10-May	NNW11	WNW11	WNW12	WNW14	WNW14	WNW14	WNW19	WNW23	WNW23	WNW24	NW23	NW20	NW23	NW24	NW21	NW18	N16	NNW14	NNW11	WNW7	W7	W7	WSW9	WSW8	NW14.5	NW24
11-May	W7	W10	WNW11	WNW10	WNW11	WNW10	WNW6	NW11	W4	WSW15	W17	WNW21	NW24	WNW21	WNW20	NW16	NNW13	NNW14	N14	N9	N7	N7	N5	N4	NW9.9	NW24
12-May	ENE7	E8	ENE3	NNW3	NNW5	N5	ENE5	ESE4	NE5	NNE4	NE10	NNE12	NNE11	NE10	NE10	NE13	NE16	NNE19	NNE21	NNE20	N11	NNE11	ENE13	ESE8	NE8.6	NNE21
13-May	SSE3	W3	W3	NW4	W2	SSW1	SE3	SSE3	E4	ESE7	E6	ENE9	ENE2	ENE9	NNE12	NE12	NNE15	NNE17	NNE17	NNE17	N8	N7	NE3	NW3	NE4.9	NNE17
14-May	WNW5	W3	NW3	ESE3	SE3	ESE8	ESE10	ESE9	ESE8	ESE11	ESE15	E17	E17	E18	E17	E15	ESE15	SSE11	SSW5	ESE14	SSE7	SW10	S5	ESE10	ESE7.8	E18
15-May	SE6	SE7	SE11	ESE6	ESE5	ESE4	E5	NNE7	N19	N25	N29	N28	N28	N25	N23	N23	N25	NNW23	NNW20	NNW21	NNW16	NNW10	WNW10	WNW12	N12.4	N29
16-May	WNW11	NW10	WNW10	NW10	NW7	NNW7	N8	N7	N7	N9	NNE7	NNE6	E5	N9	NNE13	NE11	NE9	ENE8	ENE7	E6	ESE7	SSE2	N1	NW5	N4.8	NNE13
17-May	NW4	WNW4	NW5	NW3	S1	SE2	SW2	SE6	SE7	SE5	SE7	SSE6	SW6	SE3	ENE7	NE6	NNE6	NE10	NE11	ENE10	ENE8	E9	ESE8	SE9	E3.0	NE11
18-May	ESE8	ENE5	N4	NNW3	NNW5	N4	ESE6	ENE6	E6	ESE6	SSE5	NNW3	NE7	N15	ESE8	E12	E9	SSE8	SSE12	S9	SSW3	S2	SSW3	ESE5	E3.2	N15
19-May	SE6	SE4	ESE7	SE8	SE5	SE6	SE8	S11	SE8	S11	SSE13	SSE15	SSE17	SSE18	SSE20	S19	SSE17	S18	SSE22	S20	S16	S12	S7	S6	SSE11.8	SSE22
20-May	SSE9	SSE10	SSE9	SSE6	SE6	ESE8	SE9	SE11	SSE15	S17	S19	S20	S19	S19	SW16	NW6	E12	ESE14	SSE15	S13	S14	SSW10	S14	SSE10	SSE10.9	S20
21-May	SSE10	SSE9	SSE9	S7	SW7	S7	S6	S11	SSW13	WSW17	SSW18	SSW21	SW13	SW14	WSW32	WSW33	WSW32	WSW27	WNW22	NNW15	NNW6	SW2	W3	WSW3	SW10.5	WSW33
22-May	SW4	SSW3	SSW2	SSE2	SE3	ESE4	ESE7	SSE5	S9	SSW12	SW15	WSW18	WSW19	WSW17	WSW15	WSW13	SW15	SSW16	SSW11	S7	S4	S4	SSW3	SSW3	SW7.2	WSW19
23-May	SSW4	SSW3	SSW6	SW7	SW6	S4	S5	SSW4	SE5	SSE3	E4	SSE6	ESE7	SSE6	ESE7	S7	ESE4	SE2	ESE3	E9	ENE8	E7	W29	WNW20	S2.6	W29
24-May	NW12	WSW10	WSW13	WSW9	W10	W11	WNW13	NNW11	NW5	WSW17	WSW21	WSW19	WNW27	WNW26	W23	WNW19	WNW21	NW18	NW12	WNW6	NNE4	NNE3	N3	NW2	WNW11.7	WNW27
25-May	NW4	NNW4	WNW4	WNW3	W2	SE1	SE5	SE9	ESE12	E13	E11	E7	ENE9	E8	ESE11	E11	ESE16	ESE15	E15	ESE16	ESE15	ESE14	SE11	ESE8.1	ESE16	
26-May	SSE8	SE7	ENE3	NE5	NE4	E11	ESE5	E9	E14	ESE15	ESE10	E7	NE7	NNE6	E11	ENE18	ENE14	ENE15	ENE14	NE13	ENE12	ENE13	ENE15	ENE13	E9.2	ENE18
27-May	ENE13	NE9	NNE9	NNE10	NNE11	N10	NNW11	N11	N12	N12	N10	N10	N12	NNE14	N15	N13	N10	NNE11	N9	NNE10	NE9	ENE8	ENE9	E6	NNE9.5	N15
28-May	ENE6	ENE5	NNW3	NE5	ENE5	E5	ESE6	ESE7	ENE10	E8	ESE6	ENE7	NE8	NE9	ENE9	E10	E12	ESE12	ESE12	E13	E11	E9	E8	ESE7	E7.3	E13
29-May	ESE6	ESE7	E6	ENE5	E7	ENE5	NNE6	NNE7	NNE7	NNW6	NNW11	N14	N13	N13	NNW11	NNW18	NW18	NW18	WNW14	NW13	WNW13	WNW13	W12	WSW13	NNW6.7	NNW18
30-May	WSW13	WSW13	WSW15	WSW18	WSW20	W21	W23	W22	W27	W26	W28	W31	W24	WNW28	WNW33	NW23	WNW9	NE5	NE10	NE7	NNW2	W2	NNE5	NW1	W14.5	WNW33
31-May	SW8	SW7	SW12	SW10	SSE5	SSW3	WNW5	NNE6	NNE5	NE9	NE9	NE15	NE14	NE14	NE12	NNE16	NNE15	NNE15	NNE13	NE9	ENE10	E11	ESE13	ESE17	NE5.2	ESE17

WNW1.3	W1.8	WNW3.1	NW3.3	NW3.2	NNW2.8	NW2.2	N2.8	N3.0	NW3.3	NNW4.4	NNW5.5	NNW6.6	NNW7.6	NNW5.4	N6.1	N6.5	N6.1	NNE6.1	NNE5.6	NE3.2	NE2.2	NNE1.4	N0.9	Diurnal Average	
NNW20	WNW19	NW23	NW25	NW24	WNW22	W23	WNW24	W27	W26	N29	W31	N28	WNW28	WNW33	WSW33	WSW32	NNW27	NW23	NNW21	ENE20	ENE22	W29	NNW21	Diurnal Maximum	

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



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

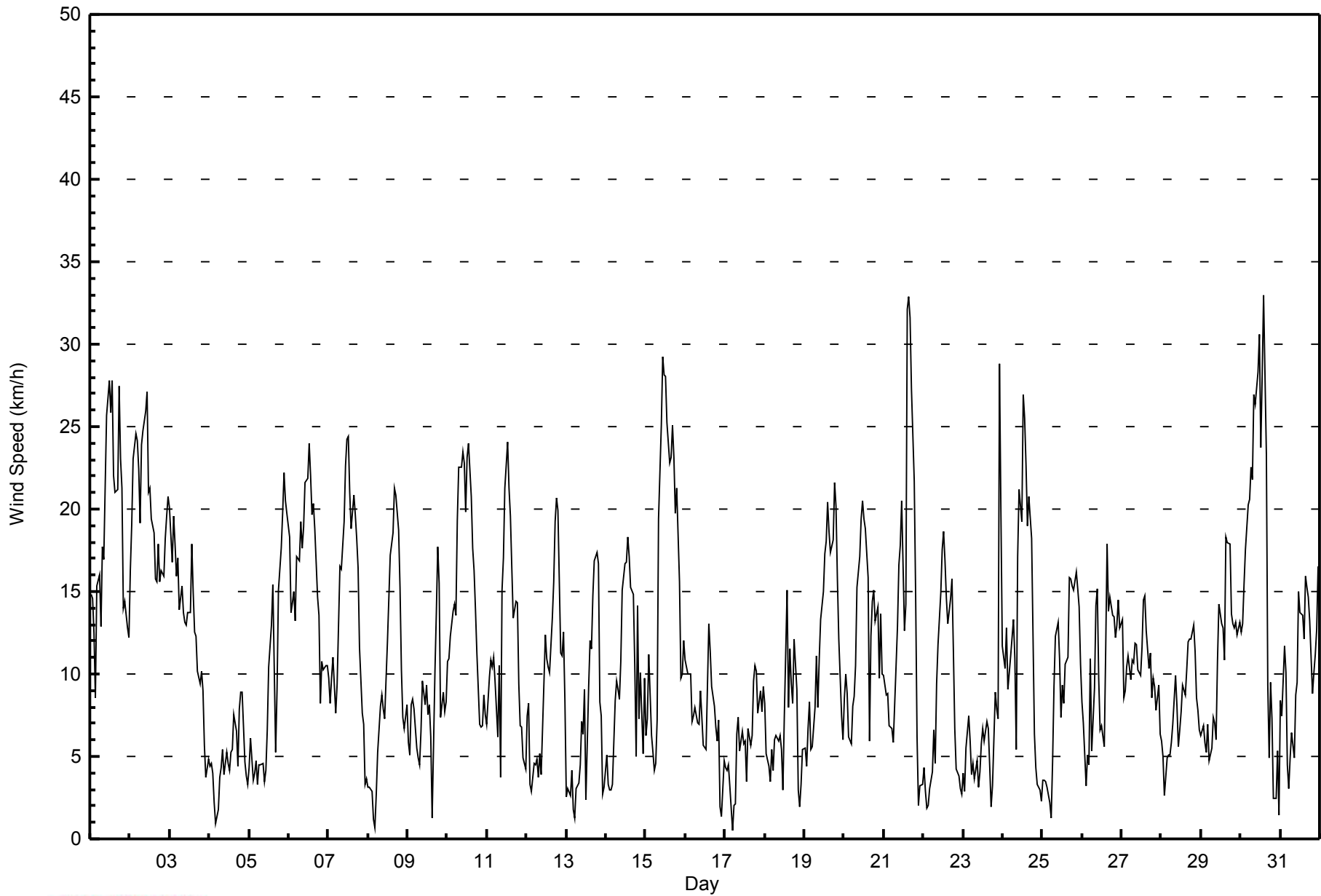
**Wind Speed (WS) - km/h**  
**Patricia McInnes - May 2014**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 16 km/h on May 21 13:00														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 May 4 02:00																									
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-May	2	3	6	2	4	4	2	4	3	5	7	6	5	7	6	5	5	6	6	5	3	4	3	3	7
2-May	4	7	5	6	6	5	4	5	5	5	6	5	5	5	5	4	3	3	4	5	4	4	5	5	7
3-May	4	4	4	4	4	4	3	3	3	3	4	3	4	4	4	3	4	4	3	3	2	1	1	1	4
4-May	1	0	1	1	1	1	1	2	2	3	2	3	3	3	3	4	3	4	5	4	4	2	1	1	5
5-May	1	2	1	2	1	2	2	2	2	2	2	3	4	5	3	3	4	4	6	4	5	5	5	5	6
6-May	5	3	3	3	3	3	3	4	3	4	5	5	5	4	6	5	9	6	5	3	2	1	1	1	9
7-May	1	1	1	2	3	1	3	4	3	4	5	5	5	4	5	5	4	4	4	3	2	2	1	1	5
8-May	1	1	1	1	1	2	2	2	2	2	3	3	3	3	3	4	4	4	4	4	2	1	1	1	4
9-May	1	1	2	1	2	1	1	2	5	3	3	2	3	3	3	3	3	4	3	5	2	2	1	1	5
10-May	1	2	2	2	2	3	3	5	5	6	5	4	6	4	5	4	3	3	2	1	1	1	1	1	6
11-May	1	1	2	2	1	2	1	4	4	4	5	6	5	6	5	4	3	3	3	2	2	1	2	1	6
12-May	2	2	2	1	1	1	1	1	2	3	4	5	5	4	4	4	4	4	4	4	4	3	3	3	5
13-May	1	1	1	1	1	1	1	1	2	2	3	3	4	4	4	4	4	4	4	3	3	2	2	1	4
14-May	1	1	1	1	2	2	2	2	2	3	3	4	5	4	4	4	4	3	3	4	2	2	2	2	5
15-May	2	3	2	1	2	1	1	2	6	5	6	6	6	6	5	6	6	5	4	4	4	1	2	1	6
16-May	1	1	1	1	1	1	1	1	2	3	3	3	3	4	4	3	3	3	2	2	1	1	1	1	4
17-May	0	1	1	1	1	1	2	2	2	2	3	2	3	3	4	3	4	3	3	2	1	2	1	2	4
18-May	2	2	1	1	2	1	3	2	2	2	3	3	4	5	4	4	4	4	4	3	1	2	1	3	5
19-May	1	2	1	1	1	2	2	2	3	4	5	4	5	5	5	5	5	5	5	5	4	3	2	2	5
20-May	1	1	2	2	1	2	2	2	4	4	4	5	4	4	7	6	3	3	4	4	4	3	3	2	7
21-May	1	1	1	2	1	1	2	2	3	5	5	5	16	9	8	7	8	7	6	4	2	1	1	1	16
22-May	1	1	1	1	2	2	1	2	3	4	5	6	5	5	4	3	5	4	3	2	1	1	1	1	6
23-May	1	1	1	2	2	2	2	1	2	1	2	2	3	4	4	4	3	2	3	3	2	1	9	6	9
24-May	4	3	3	2	2	2	3	3	2	5	4	5	6	6	5	5	4	4	3	3	2	1	1	1	6
25-May	1	1	2	1	1	2	1	3	3	4	4	4	4	4	4	5	5	3	4	4	4	4	3	3	5
26-May	2	2	2	1	3	3	2	2	4	4	3	2	1	2	4	4	4	4	4	3	3	3	3	3	4
27-May	3	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	2	2	2	2	2	2	2	3
28-May	1	2	1	2	1	1	2	2	2	2	2	2	2	2	3	2	3	3	3	3	3	2	2	1	3
29-May	1	2	2	1	2	1	2	2	2	2	2	3	3	2	3	3	3	4	2	3	3	2	2	2	4
30-May	2	2	2	3	4	4	5	5	7	6	7	7	7	7	8	9	4	3	4	5	1	1	3	1	9
31-May	3	3	2	2	1	2	1	2	2	3	3	4	4	5	4	3	3	3	3	2	2	3	3	4	5
														Diurnal Maximum											



**WBEA**  
**Hourly Averages**

**Wind Speed (WS) - km/h**  
**Patricia McInnes - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h**  
**Patricia McInnes - May 2014**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	162	21.77	21.77
6 - 11	270	36.29	58.06
12 - 19	215	28.90	86.96
20 - 28	90	12.10	99.06
29 - 38	7	0.94	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Wind Speed (WS) - km/h**  
**Patricia McInnes - May 2014**

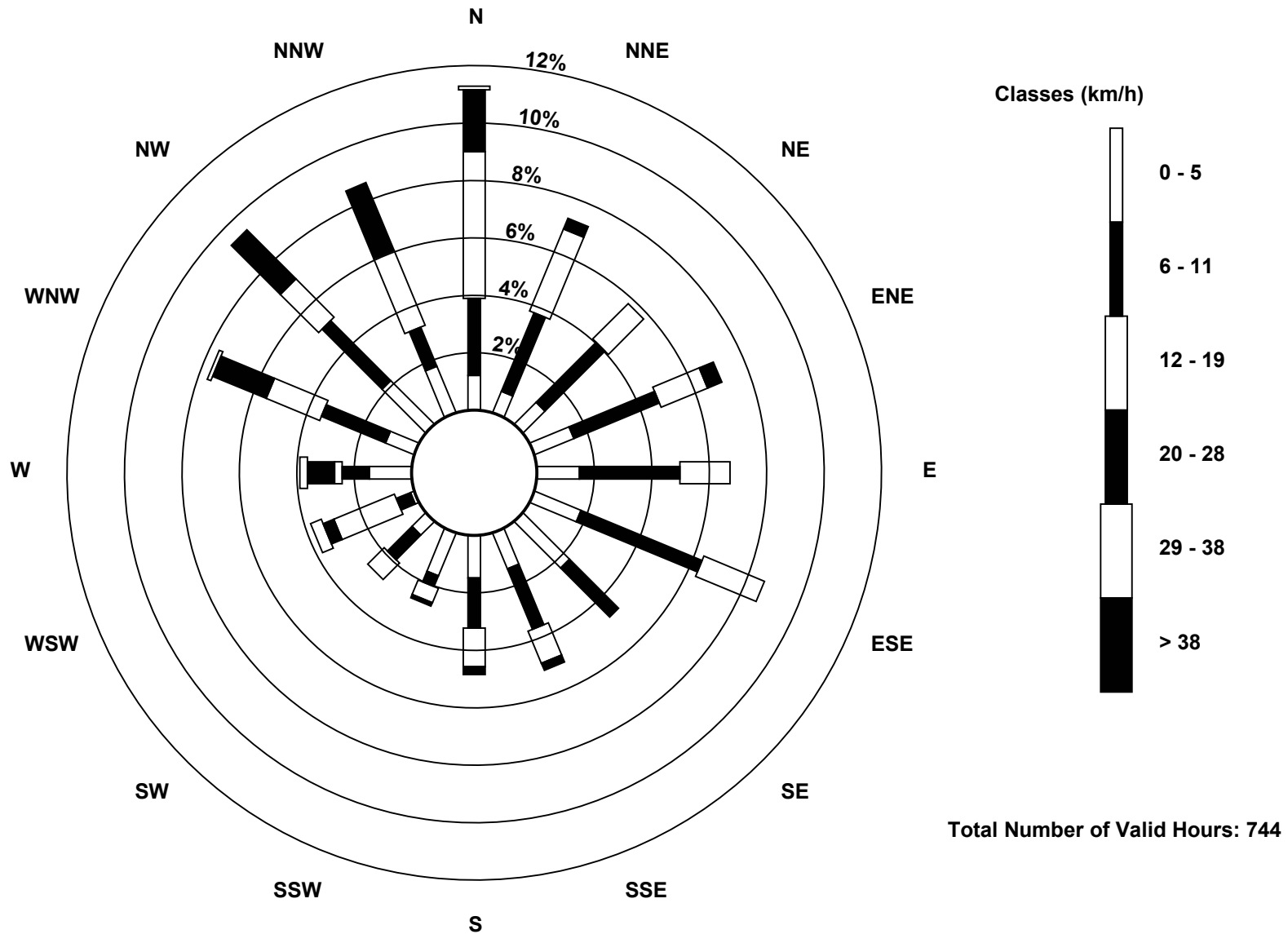
Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	9	6	8	11	11	13	17	10	11	12	5	1	11	8	16	13	162
6 - 11	20	22	22	24	26	34	18	17	13	3	9	4	7	18	22	11	270
12 - 19	38	23	13	13	13	17	0	9	10	4	6	17	2	15	14	21	215
20 - 28	16	3	0	4	0	0	0	2	2	1	0	3	7	15	18	19	90
29 - 38	1	0	0	0	0	0	0	0	0	0	0	3	2	1	0	0	7
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	84	54	43	52	50	64	35	38	36	20	20	28	29	57	70	64	744

Total Number of Valid Hours: 744

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

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





**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Wind Direction (WD) - deg**

**Patricia McInnes - May 2014**

Direction of Maximum Speed: 300 deg on May 30 15:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 329.2 deg on May 2	Hours of Data: 744
Direction of Minimum Speed: 170 deg on May 17 05:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 2.2 deg on May 4	Percent Operational Time: 100.0
Monthly Average Direction: 315.9 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-May	247	258	321	302	329	319	302	321	309	306	326	338	338	333	345	332	316	339	325	317	309	345	338	324	322.3
2-May	303	296	309	318	313	298	297	302	311	313	323	331	331	346	343	352	0	12	10	1	2	1	352	345	329.2
3-May	342	340	346	345	347	355	357	352	353	354	339	350	10	16	10	19	50	50	57	72	65	67	344	336	4.2
4-May	310	305	299	291	304	177	158	146	110	171	308	59	168	234	228	106	125	85	162	138	171	170	98	131	154.4
5-May	131	119	131	111	103	58	90	99	54	46	354	359	39	33	69	113	141	115	69	81	76	74	79	77	76.7
6-May	83	56	35	35	30	355	356	359	354	351	355	3	360	358	14	11	355	1	45	15	318	307	317	306	5.2
7-May	312	315	320	325	309	319	330	340	338	343	343	344	343	341	346	341	350	8	11	15	25	33	360	338	344.0
8-May	297	275	275	180	280	88	115	111	89	69	72	50	58	24	25	22	8	2	0	357	349	345	334	324	19.2
9-May	313	320	309	319	327	330	329	36	304	277	1	25	350	307	234	85	15	339	354	357	315	298	303	298	330.3
10-May	308	293	294	295	299	295	297	300	300	290	307	319	320	318	311	320	350	337	337	290	274	271	251	246	305.5
11-May	259	267	284	296	295	296	290	306	274	237	268	292	307	303	287	308	343	347	358	9	10	357	10	8	305.1
12-May	74	83	78	338	334	3	59	106	49	27	50	18	33	40	45	39	35	15	13	13	9	31	69	107	35.0
13-May	156	261	272	312	262	192	133	164	89	109	100	78	68	59	24	49	25	26	24	24	360	358	42	318	36.3
14-May	300	264	325	113	124	117	118	113	121	117	105	97	97	96	101	99	105	167	207	109	155	222	177	106	115.4
15-May	146	143	124	113	117	116	92	30	353	355	354	352	355	358	359	357	351	348	342	340	334	298	289	295	353.3
16-May	296	305	303	310	311	327	351	350	357	357	20	29	81	11	24	47	52	78	75	85	116	154	355	312	5.3
17-May	316	299	315	321	170	138	214	126	145	143	133	147	219	131	64	42	20	37	38	60	60	86	103	125	83.3
18-May	116	65	3	346	344	3	104	72	94	117	164	332	46	2	119	99	89	163	157	176	205	186	212	122	99.8
19-May	129	125	121	130	133	127	146	170	136	170	156	161	151	160	166	177	157	169	166	170	188	184	183	178	161.7
20-May	160	155	162	155	132	119	128	142	158	178	178	178	180	185	218	307	98	119	148	169	180	195	169	163	165.0
21-May	158	153	151	174	216	182	176	179	211	239	204	208	215	225	238	243	251	254	301	330	332	231	261	240	231.1
22-May	234	213	199	158	125	122	120	162	185	201	235	255	247	246	238	239	232	213	194	183	173	173	197	198	218.2
23-May	197	212	200	220	219	174	191	213	139	166	97	158	115	163	113	174	122	126	120	90	62	100	271	285	186.9
24-May	309	242	242	250	261	273	291	327	321	255	253	257	289	292	275	282	301	304	308	301	26	14	353	317	283.0
25-May	321	328	287	301	274	137	145	125	109	96	81	87	72	97	113	100	115	115	108	101	113	119	115	131	106.8
26-May	154	139	76	37	34	85	112	86	96	112	120	87	35	31	95	76	64	68	59	50	61	71	74	74	79.0
27-May	74	41	17	15	13	1	344	352	349	9	360	359	350	14	357	360	359	25	4	23	38	62	69	85	14.9
28-May	69	67	340	35	72	85	106	105	77	85	102	61	42	48	73	88	94	110	105	101	98	96	101	107	85.9
29-May	102	110	81	76	82	74	23	26	15	339	347	356	357	349	347	334	317	311	301	304	293	284	259	253	332.6
30-May	244	243	245	251	258	267	271	277	279	279	275	266	281	295	300	305	289	44	48	37	329	276	24	311	279.3
31-May	228	218	229	232	158	209	282	14	29	53	52	38	35	38	44	18	13	13	25	42	76	95	109	115	46.7

287.3 279.7 303.1 313.7 319.1 328.6 324.9 348.8 350.6 314.6 329.0 340.9 346.2 346.6 347.1 359.6 7.5 10.6 20.1 32.1 34.2 38.0 20.7 10.1  
Diurnal Average

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



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

**Wind Direction (WD) - deg**  
**Patricia McInnes - May 2014**

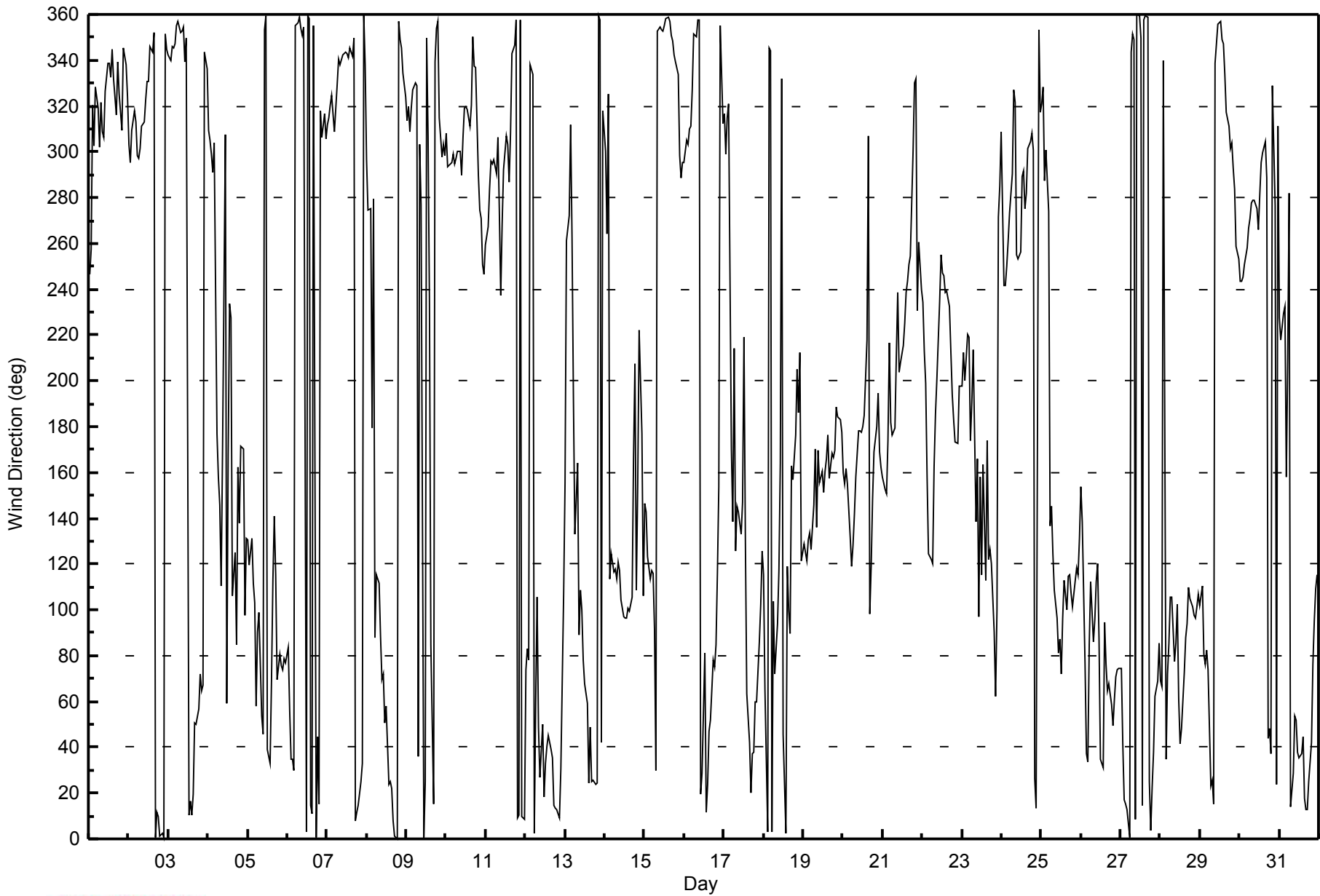
Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 99 deg on May 9 16:00 Minimum Value: 5 deg on May 10 23:00 Percentiles: P <sub>1</sub> = 6 P <sub>10</sub> = 11 Q <sub>1</sub> = 14 Median = 17 Q <sub>3</sub> = 28 P <sub>90</sub> = 49 P <sub>99</sub> = 82																	Hours in Service: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





**WBEA**  
**Hourly Averages**

**Wind Direction (WD) - deg**  
**Patricia McInnes - May 2014**





# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Report

### Station Information

Calibration Date	May 2, 2014	Previous Calibration	April 1, 2014
Station Name	Patricia McInnes	Station Number	AMS 6
Reason:	Routine		
Start Time (MST)	8:50	End Time (MST)	13:20
Barometric Pressure	n/a mmHg	Station temp.	Deg C
Calibrator Make/Model	API T700	Serial Number	1220
Cal Gas Concentration	47.0 ppm	Cal Gas Expiry Date	12/12/2016
Gas Cert Reference	SA130110A		
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2582
DACS voltage range	0-5000mV	DACS channel #	SE 1

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	1000	1000	PMT voltage	-670	-670
Analyzer Range (mv)	5000	5000	Lamp voltage	762	761
Calculated slope	1.009563	0.996696	Chamber temp.	45.0	44.9
Calculated intercept	3.146143	0.681037	Pressure (mmHg)	693.7	697.3
Analyzer Background	4.9	4.7	Flow (lpm)	0.429	0.431
Analyzer Coefficient	1.198	1.144	Intensity	93	93

Analyzer make Thermo 43i Analyzer serial # 1008841397

### Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.3	NA
as found span	5000	55.3	519.8	537.0	0.968
calibrator zero	5000	0.0	0.0	-0.3	NA
high point	5000	55.3	519.8	521.0	0.998
second point	5000	27.7	260.4	260.4	1.000
third point	5000	13.9	130.7	130.0	1.005
calibrator zero	5000	0.0	0.0	-0.3	NA
as left zero	5000	0.0	0.0	0.3	NA
as left span	5000	55.3	519.8	525.1	0.990
Average Correction Factor					1.001

Corrected As found 537.3 Previous response 511.7 % change -4.7%

#### Notes:

Span adjusted.

Calibration Performed By:

Devin Russell



# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Summary

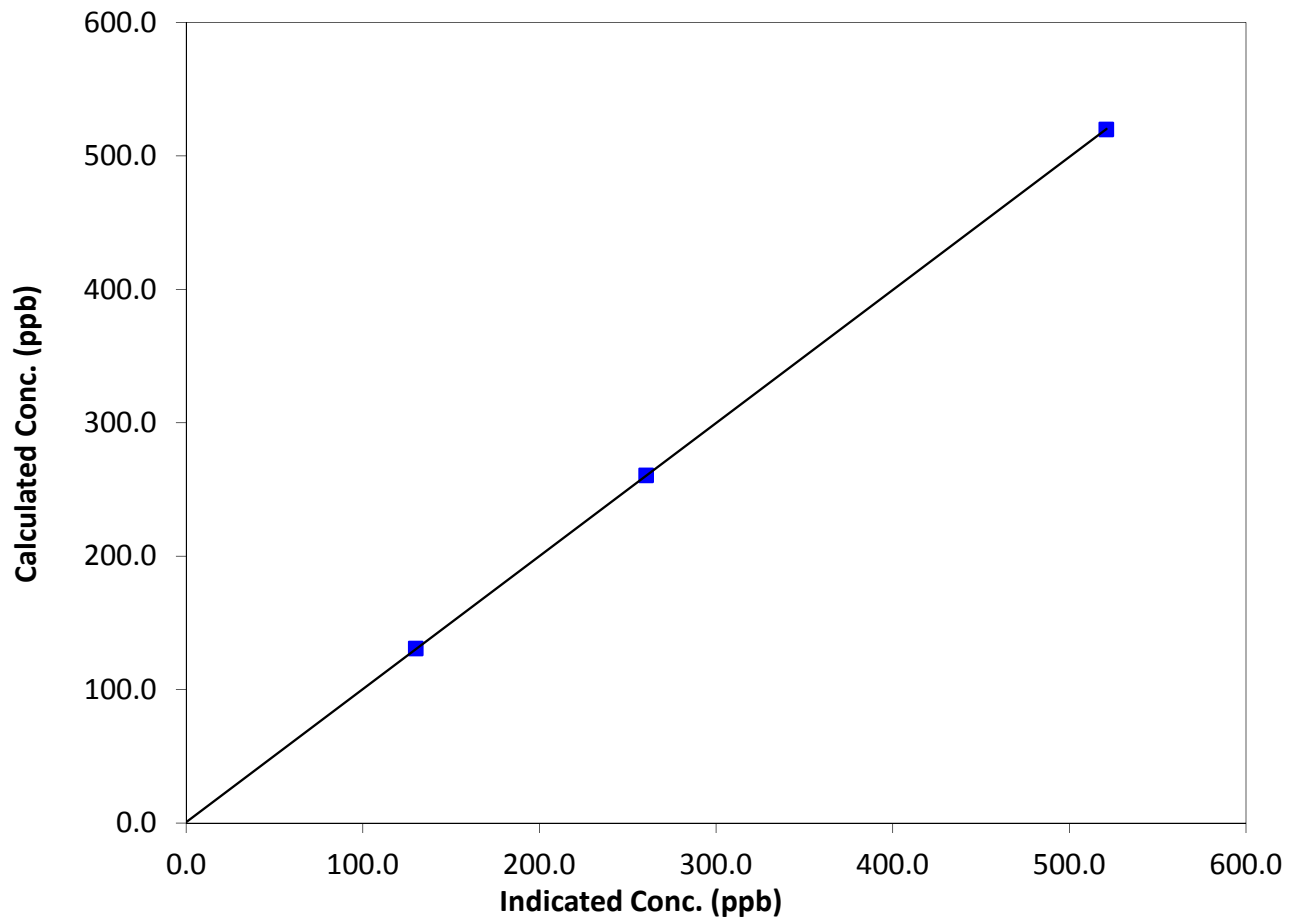
### Station Information

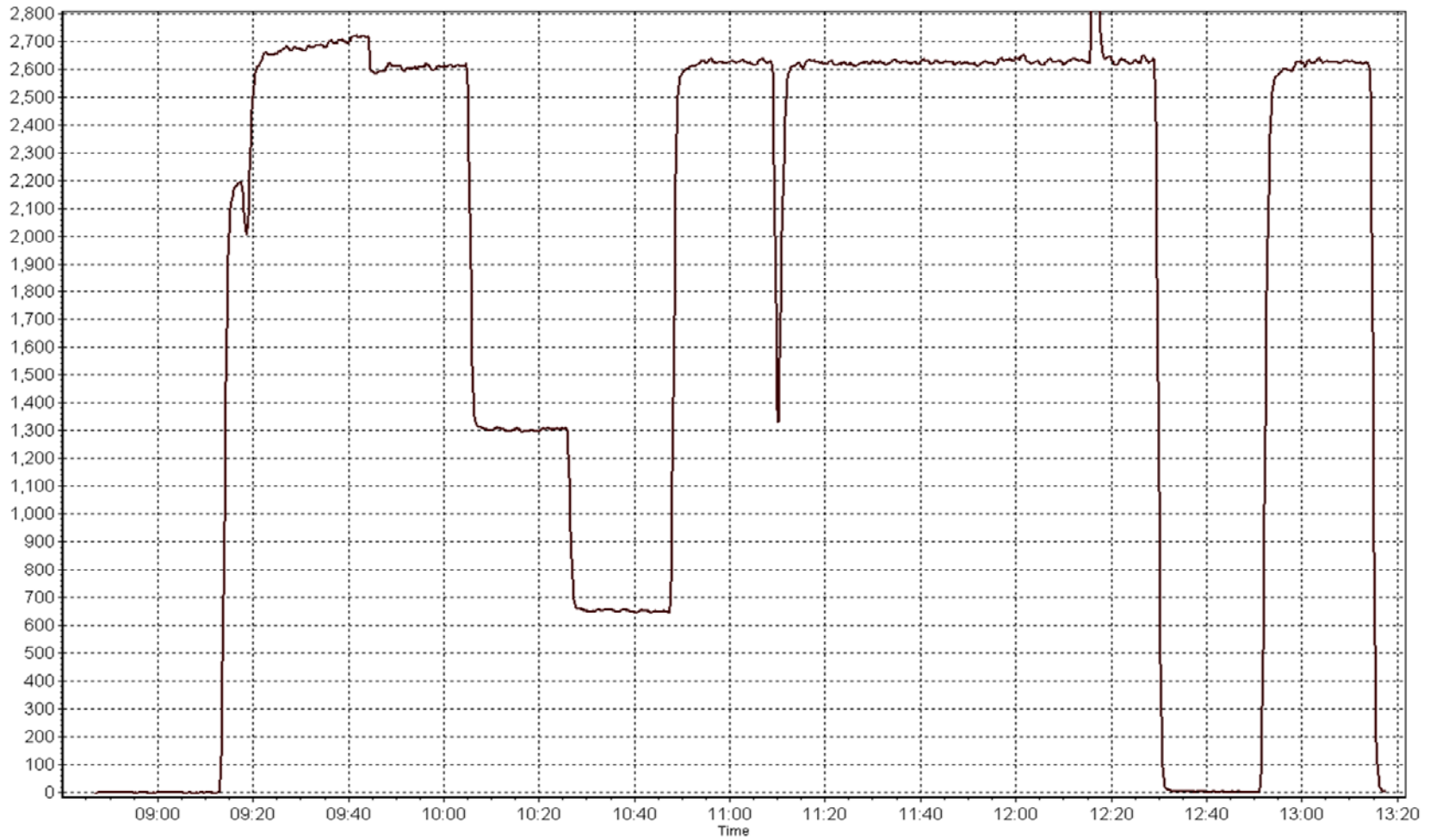
Calibration Date	May 2, 2014	Previous Calibration	April 1, 2014
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	8:50	End Time (MST)	13:20
Analyzer make	Thermo 43i	Analyzer serial #	1008841397

### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.3	N/A	Correlation Coefficient	0.999997
519.8	521.0	0.9977		
260.4	260.4	0.9999	Slope	0.996696
130.7	130.0	1.0053		
			Intercept	0.681037

### SO<sub>2</sub> Calibration Curve







# Wood Buffalo Environmental Association

## TRS Calibration Report

### Station Information

Calibration Date	May 6, 2014	Previous Calibration	April 2, 2014
Station Name	Patricia McInnes	Station Number	AMS 6
Reason:	Routine		
Start Time (MST)	10:45	End Time (MST)	14:15
Barometric Pressure	n/a mmHg	Station temp.	22 Deg C
Calibrator Make/Model	API T700	Serial number	1220
Cal Gas Concentration	4.84 ppm H2S	Cal Gas Expiry Date	June 10 2014
Gas Cert Reference	ALM009562	SO2 gas conc.	47.0 ppm SO2
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2582
DACS voltage range	0-500mV	DACS channel #	SE 2

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	100	100	PMT voltage	-657	-657
Analyzer Range (input)	5000	5000	Lamp voltage	855	856
Calculated slope	1.013789	1.002814	Chamber temp.	45	45
Calculated intercept	-0.038727	0.110472	Pressure	700.2	704.2
Analyzer Background	12	13.5	Flow	0.481	0.485
Analyzer Coefficient	1.047	1.171	Intensity	115	114
			Converter temp.	850	850

Analyzer make/model	TEI 43i	Analyzer serial #	1008841398
Converter make/model	JC Andelle model 26	Converter serial #	20101-07

### 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	NA
as found span	5000	36.2	70.2	66.6	1.055
SO2 scrubber check	5000	10.6	99.6	0.2	NA
calibrator zero	5000	0.0	0.0	0.1	NA
high point	5000	72.3	70.0	69.8	1.003
second point	5000	36.3	35.1	34.8	1.011
third point	5000	18.7	18.1	17.8	1.017
calibrator zero	5000	0.0	0.0	0.1	NA
as left zero	5000	0.0	0.0	0.1	NA
as left span	5000	72.3	70.0	69.0	1.014
Average Correction Factor					1.010

Corrected As found 66.5 Previous response 69.3 % change 4.3%

#### Notes:

Changed out calibration gas cylinder and adjusted span.

Calibration Performed By:

Devin Russell



# Wood Buffalo Environmental Association

## TRS Calibration Summary

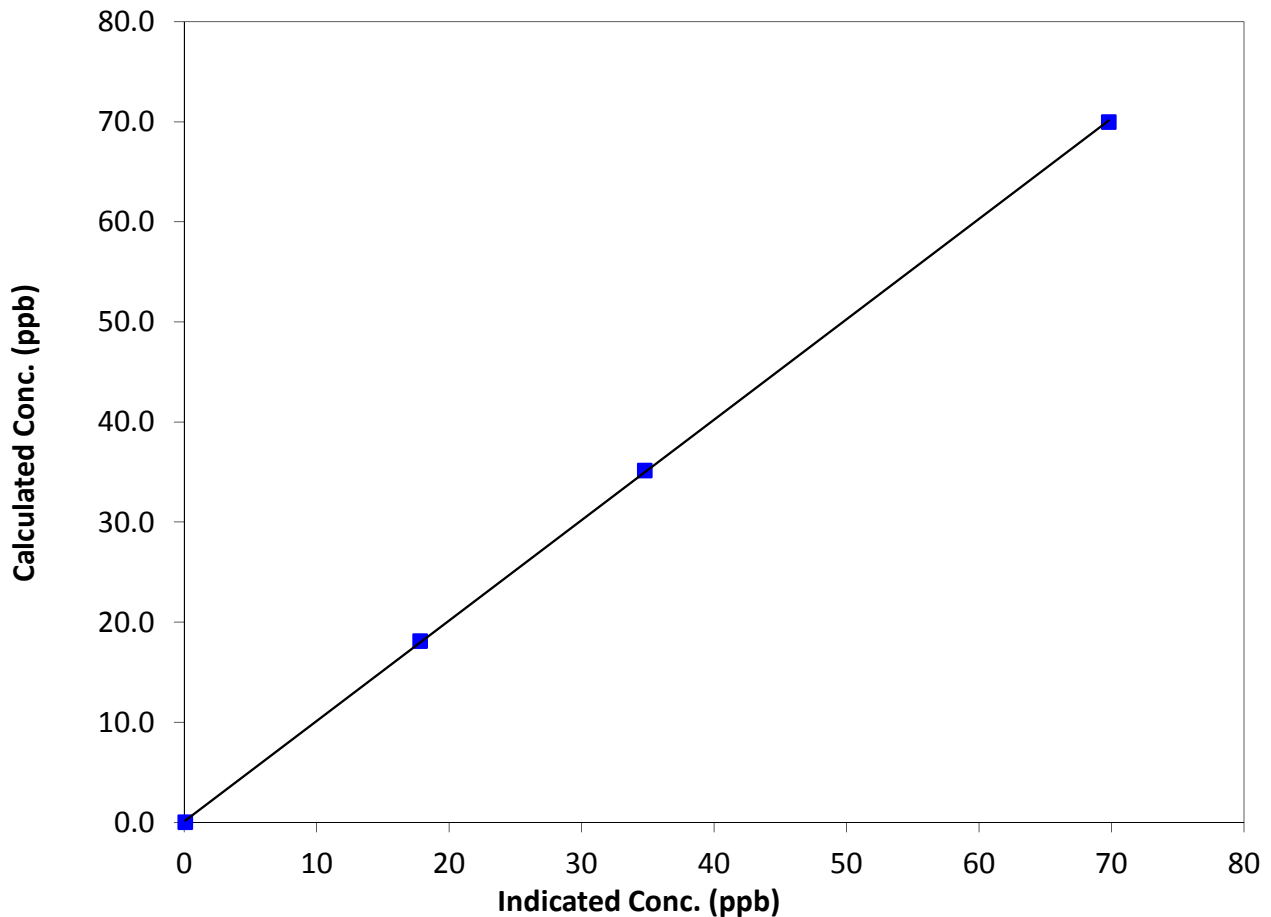
### Station Information

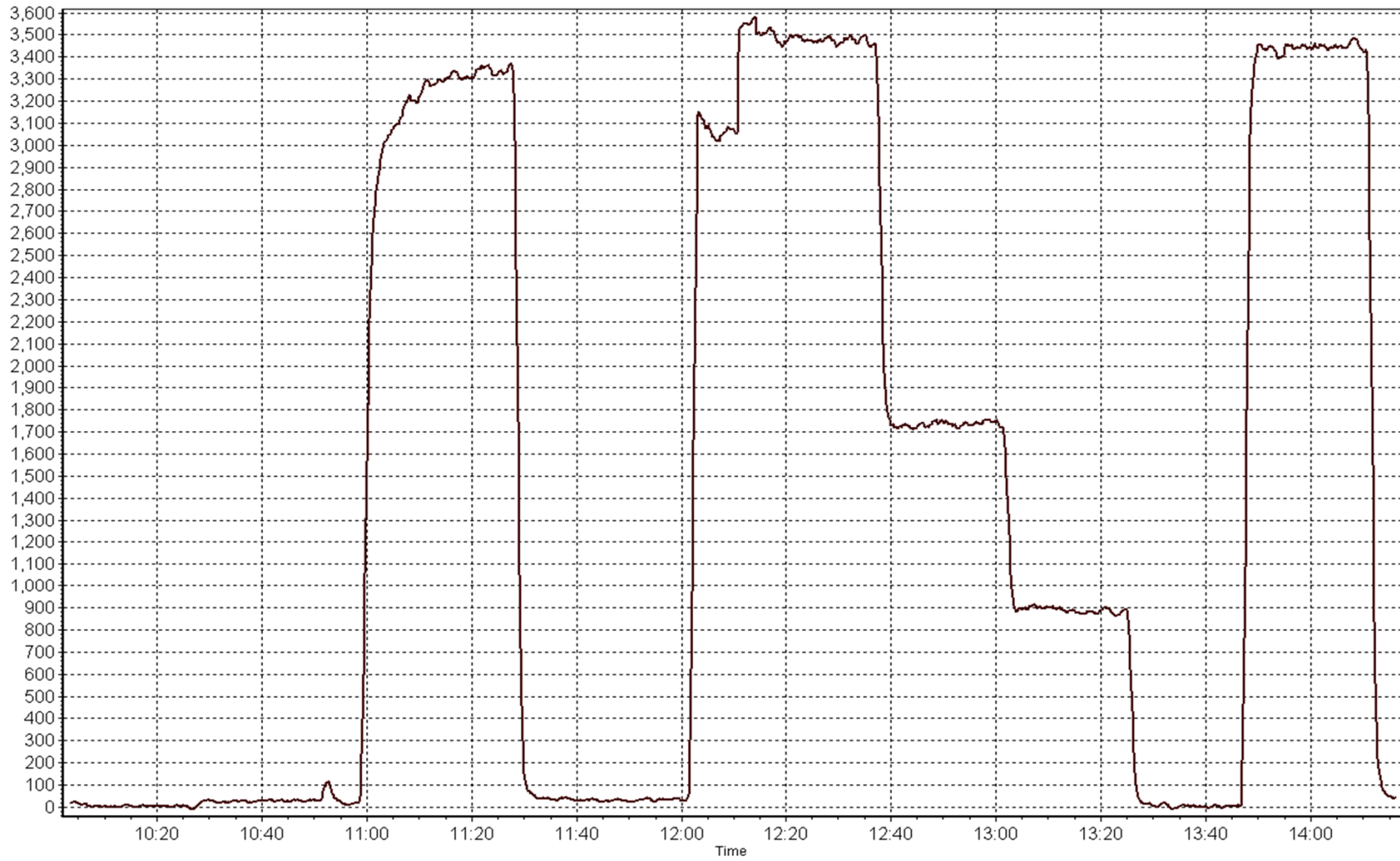
Calibration Date	May 6, 2014	Previous Calibration	April 2, 2014
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	10:45	End Time (MST)	14:15
Analyzer make	TEI 43i	Analyzer serial #	1008841398

### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	N/A	Correlation Coefficient	0.999963
70.0	69.8	1.0027		
35.1	34.8	1.0109	Slope	1.002814
18.1	17.8	1.0169		
			Intercept	0.110472

**TRS Calibration Curve**







# Wood Buffalo Environmental Association

## THC / NMHC Calibration Report

### Station Information

Calibration Date	Friday, May 02, 2014	Prev Calibration	Tuesday, April 01, 2014
Station Name	Patricia McInnes	Station Number	AMS 6
Reason:	Routine		
Start Time (MST)	8:50	End Time (MST)	13:20
Barometric Pressure	n/a mmHg	Station temp.	21 Deg C
Calibrator Model	API T700	Serial Number	1220
Gas Cert Reference	SA130110A	Cal Gas Expiry Date	Monday, December 12, 2016
CH4 Cal Gas Conc.	512.0 ppm	CH4 Equiv Conc.	1092.3 ppm
C3H8 Cal Gas Conc.	211.0 ppm		
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2582

### Analyzer Information

	Before	After		Before	After
THC Range (ppm)	50	50	Internal Temp	36.6	37.4
THC Range (input)	50	50	Flame Temp	385.7	384.5
NMHC Range (ppm)	50	50	Carrier Pressure	33.8	33.8
NMHC Range (input)	50	50	Fuel Pressure	40.3	40.3
THC Calc slope	0.988806	0.999284	Air Pressure	28.2	28.2
THC Calc intercept	0.027777	0.000745			
NMHC Calc slope	0.986128	1.000406			
NMHC Calc intercept	0.005926	-0.007332			

Analyzer make Thermo 55i Analyzer serial # 1118148495

### 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	N/A
as found span	5000	55.3	12.08	11.76	1.027
calibrator zero	5000	0.0	0.00	0.00	N/A
high point	5000	55.3	12.08	12.09	0.999
second point	5000	27.7	6.05	6.05	1.000
third point	5000	13.9	3.04	3.04	0.999
calibrator zero	5000	0.0	0.00	0.00	N/A
as left zero	5000	0.0	0.00	0.00	N/A
as left span	5000	55.3	12.08	12.09	0.999
Average Correction Factor					0.999

Corrected As found 11.76 Previous response 12.19 % change 3.7%

**Notes:**

Span adjusted.

Calibration Performed By: Devin Russell





# Wood Buffalo Environmental Association

## THC / NMHC Calibration Report

### NMHC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0	0.00	0.00	N/A
as found span	5000	55.3	6.42	6.25	1.027
calibrator zero	5000	0.0	0.00	0.00	N/A
high point	5000	55.3	6.42	6.42	1.000
second point	5000	27.7	3.21	3.22	0.998
third point	5000	13.9	1.61	1.63	0.990
calibrator zero	5000	0.0	0.00	0.00	N/A
as left zero	5000	0.0	0.00	0.00	N/A
as left span	5000	55.3	6.42	6.39	1.004
Average Correction Factor					0.996

Corrected As found      6.25      Previous response      6.50      % change      4.0%

### CH4 Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0	0.00	0.00	N/A
as found span	5000	55.3	5.66	5.51	1.028
calibrator zero	5000	0.0	0.00	0.00	N/A
high point	5000	55.3	5.66	5.67	0.999
second point	5000	27.7	2.84	2.83	1.002
third point	5000	13.9	1.42	1.41	1.009
calibrator zero	5000	0.0	0.00	0.00	N/A
as left zero	5000	0.0	0.00	0.00	N/A
as left span	5000	55.3	5.66	5.70	0.993
Average Correction Factor					

Corrected As found      5.51      Previous response      5.69      % change      3.2%



# Wood Buffalo Environmental Association

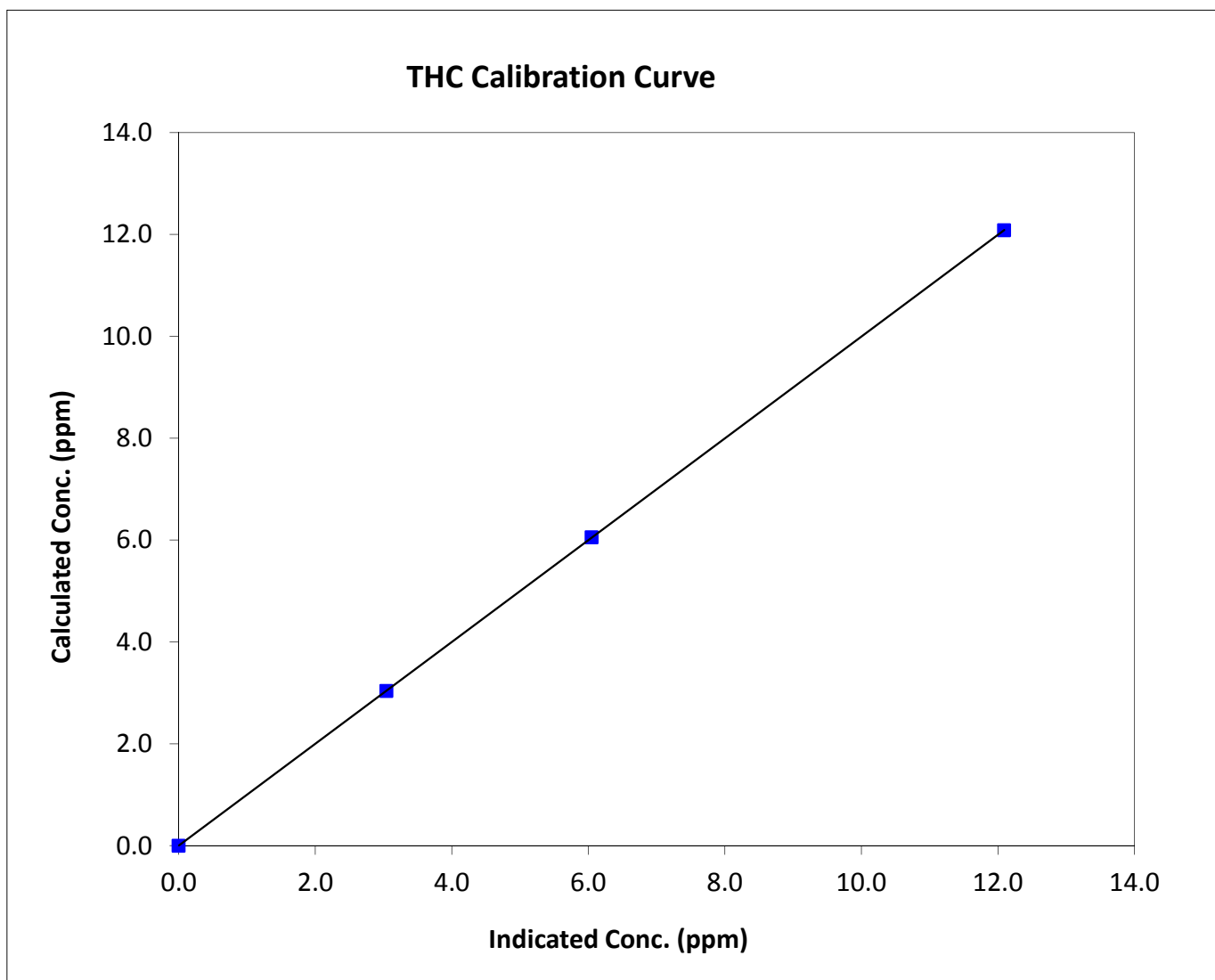
## THC Calibration Summary

### Station Information

Calibration Date	May 2, 2014	Previous Calibration	April 1, 2014
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	8:50	End Time (MST)	13:20
Analyzer make	Thermo 55i	Analyzer serial #	1118148495

### Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	N/A	Correlation Coefficient	1.000000
12.08	12.09	0.9992		
6.05	6.05	1.0002	Slope	0.999284
3.04	3.04	0.9988		
			Intercept	0.000745





# Wood Buffalo Environmental Association

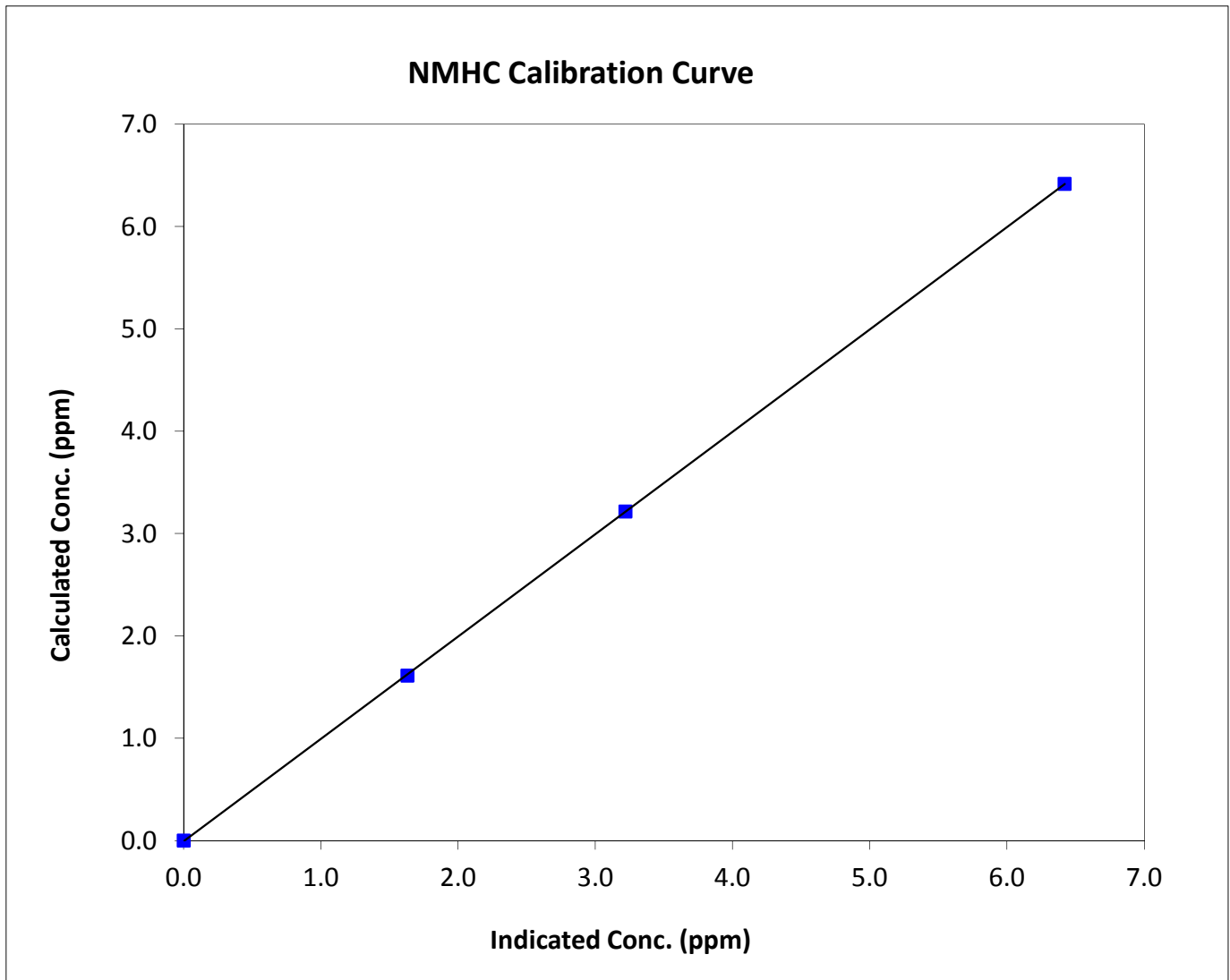
## NMHC Calibration Summary

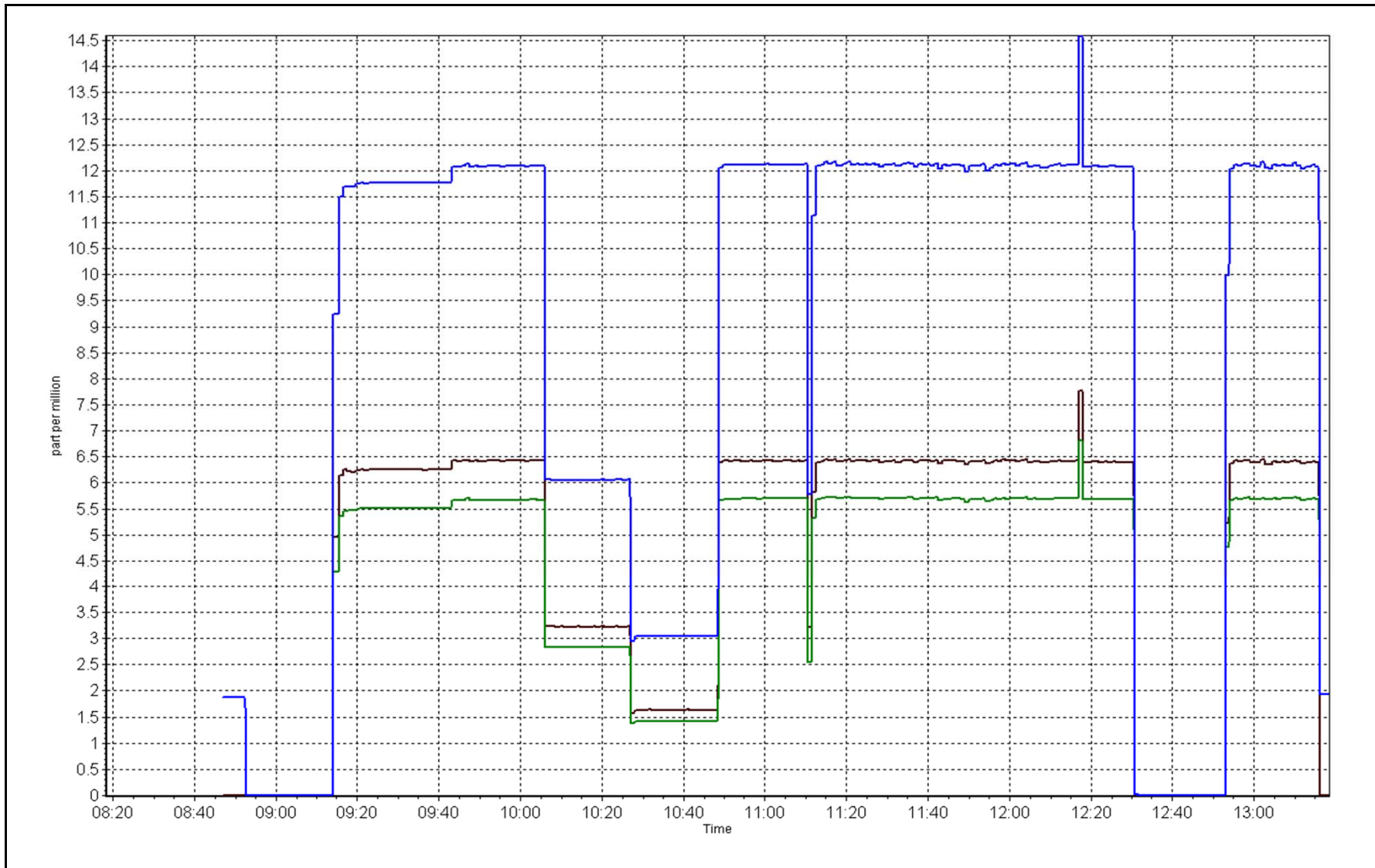
### Station Information

Calibration Date	May 2, 2014	Previous Calibration	April 1, 2014
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	8:50	End Time (MST)	13:20
Analyzer make	Thermo 55i	Analyzer serial #	1118148495

### Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	N/A	Correlation Coefficient	0.999993
6.42	6.42	0.9996		
3.21	3.22	0.9983	Slope	1.000406
1.61	1.63	0.9896		
			Intercept	-0.007332







# Wood Buffalo Environmental Association

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

### Station Information

Calibration Date	May 6, 2014	Previous Calibration	April 2, 2014
Station Name	Patricia McInnes	Station Number	AMS 6
Reason:	Routine		
Start Time (MST)	7:50	End Time (MST)	10:50
Barometric Pressure	n/a mmHg	Station temp.	23 Deg C
Calibrator Make/Model	API T700	Serial Number	1220
NO2 calibration used	Monday, May 05, 2014	Transfer Standard	SA130110A
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2582
DACS voltage range	0-5000mV	DACS channel #	SE4

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	500	500	Bench temp.	33.4	32.0
Analyzer Range (input)	5000	5000	Lamp temp.	53.6	53.6
Calculated slope	0.997225	1.009579	Pressure	666.2	692.9
Calculated intercept	0.675296	-0.894105	Flow cell A	0.605	0.628
Analyzer Background	0.0	0.0	Flow cell B	0.626	0.648
Analyzer Coefficient	1.036	0.984	Cell A Intensity	94380	92638
			Cell B Intensity	86630	84675

Analyzer make Thermo 49i Analyzer serial # 1300156234

### Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator Lamp Intensity (mA)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.000	0.0	-0.2	N/A
as found span	5000	0.950	296.5	312.5	0.949
calibrator zero	5000	0.000	0.0	-0.2	N/A
high point	5000	0.953	296.5	293.7	1.010
second point	5000	0.542	202.5	202.0	1.003
third point	5000	0.324	101.5	102.9	0.986
calibrator zero	5000	0.000	0.0	-0.2	N/A
as left zero	5000	0.000	0.0	0.0	N/A
as left span	5000	0.950	296.5	305.4	0.971
Average Correction Factor					1.000

Corrected As found 312.7 Previous response 296.6 % change -5.1%

#### Notes:

Adjusted span and changed filter after as founds.

Calibration Performed By:

Devin Russell



## Wood Buffalo Environmental Association

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

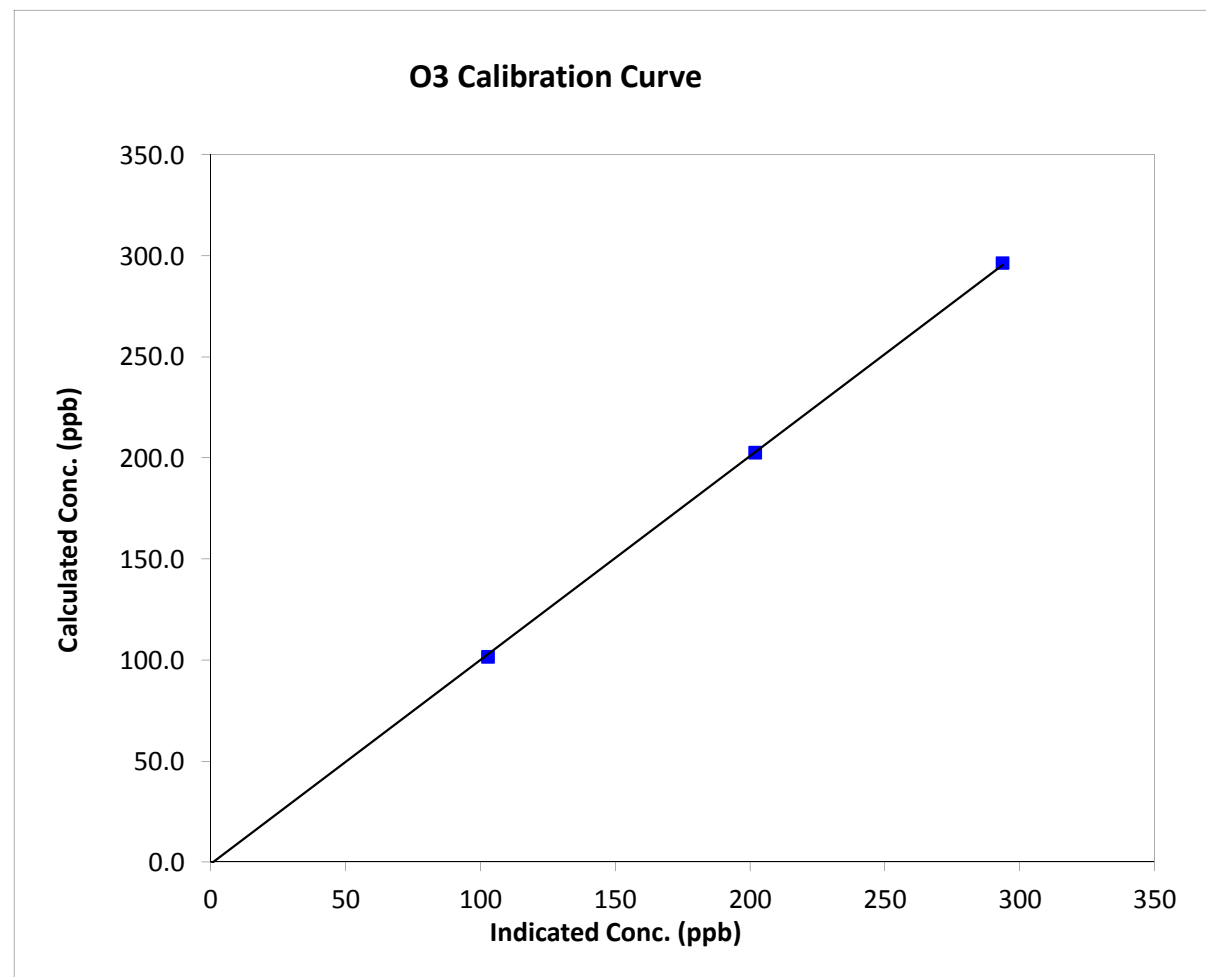
#### Station Information

Calibration Date	Tuesday, May 06, 2014	Previous Calibration	April 2, 2014
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	7:50	End Time (MST)	10:50
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	-0.2	N/A	Correlation Coefficient	0.999907
296.5	293.7	1.0095		
202.5	202.0	1.0026	Slope	1.009579
101.5	102.9	0.9864		
			Intercept	-0.894105

**O<sub>3</sub> Calibration Curve**



O3 Calibration Plot

Date: May 6, 2014





# Wood Buffalo Environmental Association

## NO<sub>x</sub>-NO-NO<sub>2</sub> Calibration Report

### Station Information

Calibration Date	May 2, 2014	Previous Calibration	April 1, 2014
Station Name	Patricia McInnes	Station Number	AMS 6
Reason:	<input type="text" value="Routine"/>		
Start Time (MST)	8:50	End Time (MST)	
Barometric Pressure	n/a mmHg	Station Temperature	22.0 Deg C
Calibrator	API T700	Serial Number	1220
NO Cal Gas Conc	54.4 ppm	Cal Gas Expiry Date	December 12, 2016
NO <sub>x</sub> Cal Gas Conc	54.4 ppm	Cal Gas Serial #	SA130110A

### DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	2582
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Parameter		NO <sub>x</sub>	NO	NO <sub>2</sub>
MV conversion	Analyzer Range (ppb)	1000	1000	1000
	Analyzer Range (mv)	1000	1000	1000
Before	Data Slope	0.978839	0.982819	0.996112
	Data Offset	-0.238998	-0.521516	0.137059
After	Data Slope	1.000939	1.001262	1.003731
	Data Offset	0.841305	1.126035	1.084613
IP address:		192.168.1.42		
Voltage Range		N/A		

### Analyzer Information

Analyzer make/model	Thermo Scientific 42i	Analyzer serial #	1218153460
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Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
NO coefficient	1.035		0.988	
NO <sub>x</sub> coefficient	1.002		0.993	
NO <sub>2</sub> coefficient	1		1.000	
NO bkgrnd	2.8		2.7	
NO <sub>x</sub> bkgrnd	3.4		3.2	
Chamber Temp	50.7	Deg C	50.4	Deg C
Moly Temp	326	Deg C	327.6	Deg C
PMT Temp	-3	Deg C	-3.0	Deg C
O <sub>3</sub> flow	ok	ccm	ok	ccm
R Cell Press	177.4	mmHg	179.4	mmHg
Sample Flow	807	ccm	814	ccm

Notes:

Span adjusted.





# Wood Buffalo Environmental Association

## NO<sub>x</sub>-NO-NO<sub>2</sub> Calibration Report

### Station Information

Calibration Date:

May 2, 2014

Station Number:

AMS 6

### 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 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
as found zero	5000	0.0	0.0	0.0	0.0	-0.6	-0.2	-0.4	N/A	N/A
as found span	5000	55.3	601.7	601.7	0.0	637.3	629.8	7.5	0.9440	0.9554
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.6	-0.2	-0.4	N/A	N/A
high point	5000	55.3	601.7	601.7	0.0	600.4	600.7	-0.3	1.0020	1.0017
second point	5000	27.7	301.4	301.4	0.0	300.2	299.1	1.1	1.0039	1.0077
third point	5000	13.9	151.2	151.2	0.0	149.6	148.0	1.7	1.0108	1.0222
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.6	-0.2	-0.4	N/A	N/A
as left zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	N/A	N/A
as left span	5000	55.3	601.7	324.1	277.6	596.6	320.8	275.8	1.0084	1.0101
Average Correction Factor									1.0056	1.0105

Corrected As found

NO<sub>x</sub>= 637.9

NO= 630.0

Percent Change

NO<sub>x</sub>= -3.6%

NO= -2.7%

Previous Response

NO<sub>x</sub>= 614.9

NO= 612.7

### GPT Calibration Data

Dilution Flow

5000

ccm

Source Gas Flow

55.30

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			-0.4			N/A	
1st NO <sub>2</sub> (300)	N/A	324.1	274.1	596.5	324.1	272.4	0.9977	1.0000	1.0061	99.4%
2nd NO <sub>2</sub> (200)	N/A	410.0	188.1	596.2	410.0	186.2	0.9982	1.0000	1.0104	99.0%
3rd NO <sub>2</sub> (100)	N/A	501.4	96.7	595.7	501.4	94.3	0.9989	1.0000	1.0253	97.5%
4th NO <sub>2</sub> (0)	598.1	N/A	-0.9	597.2	598.1	-0.9	0.9965	1.0000	N/A	N/A
Average Correction Factor							0.9978	1.0000	1.0139	98.6%

Calibration Performed By:

Devin Russell



# Wood Buffalo Environmental Association

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

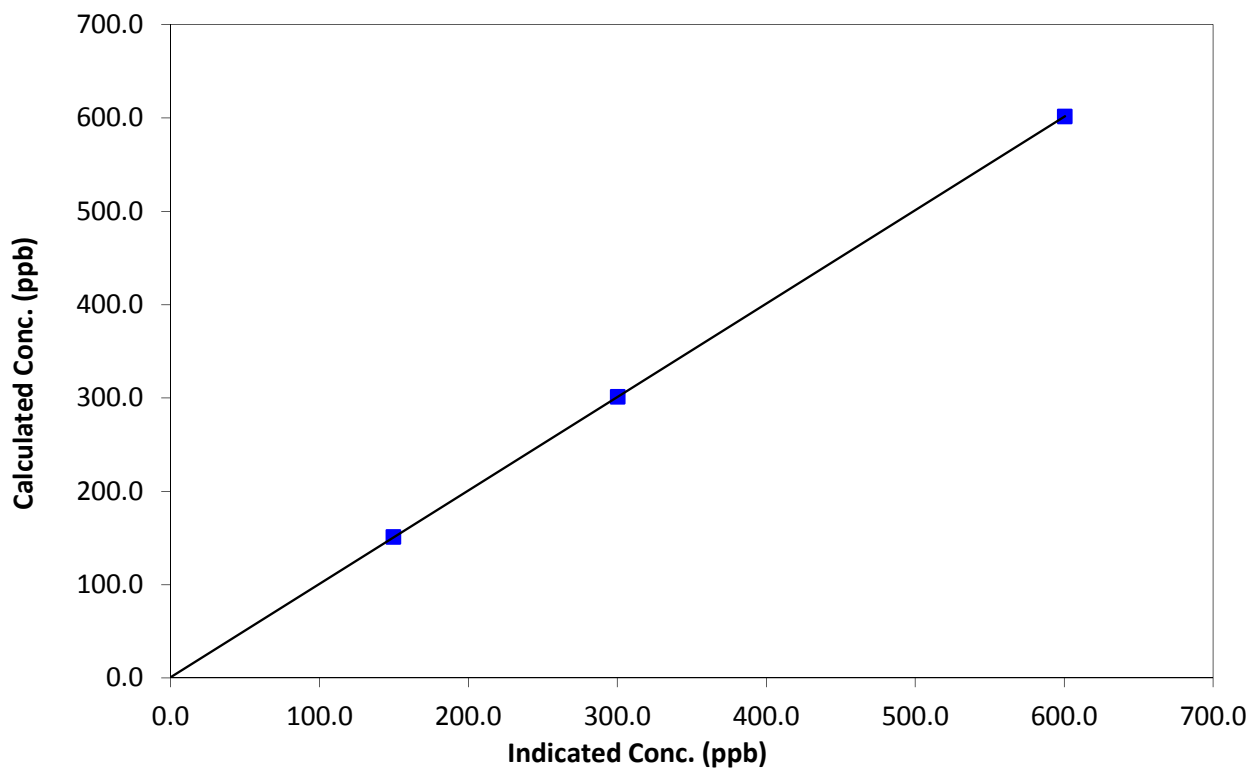
### Station Information

Calibration Date	May 2, 2014	Previous Calibration	April 1, 2014
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	8:50	End Time (MST)	
Analyzer make	Thermo Scientific 42i	Analyzer serial #	1218153460

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.6	N/A	Correlation Coefficient	0.999998
601.7	600.4	1.0020		
301.4	300.2	1.0039	Slope	1.000939
151.2	149.6	1.0108		
0.0	-0.6	0.0000	Intercept	0.841305

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





# Wood Buffalo Environmental Association

## NO Calibration Summary

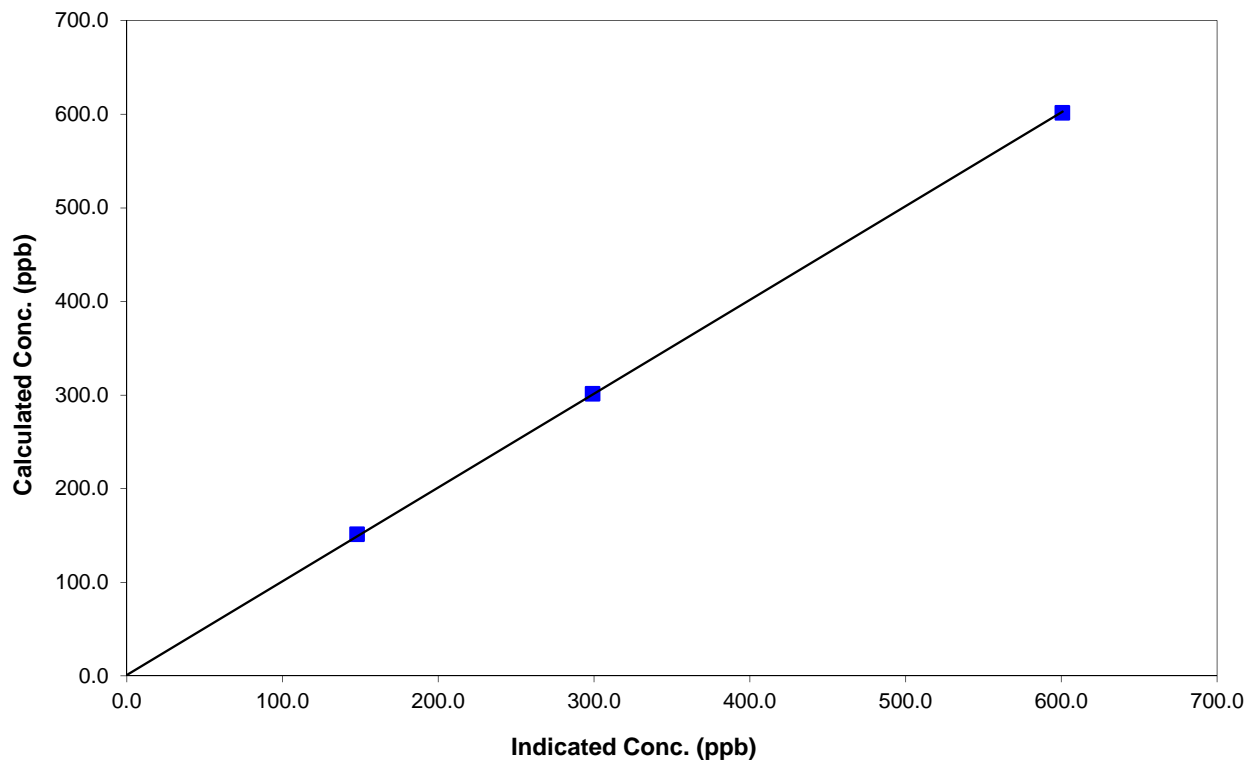
### Station Information

Calibration Date	May 2, 2014	Previous Calibration	April 1, 2014
Station Name	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	8:50	End Time (MST)	
Analyzer make	Thermo Scientific 42i	Analyzer serial #	1218153460

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	N/A	Correlation Coefficient	0.999972
601.7	600.7	1.0017		
301.4	299.1	1.0077	Slope	1.001262
151.2	148.0	1.0222		
0.0	-0.2	0.0000	Intercept	1.126035

### NO Calibration Curve





# Wood Buffalo Environmental Association

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

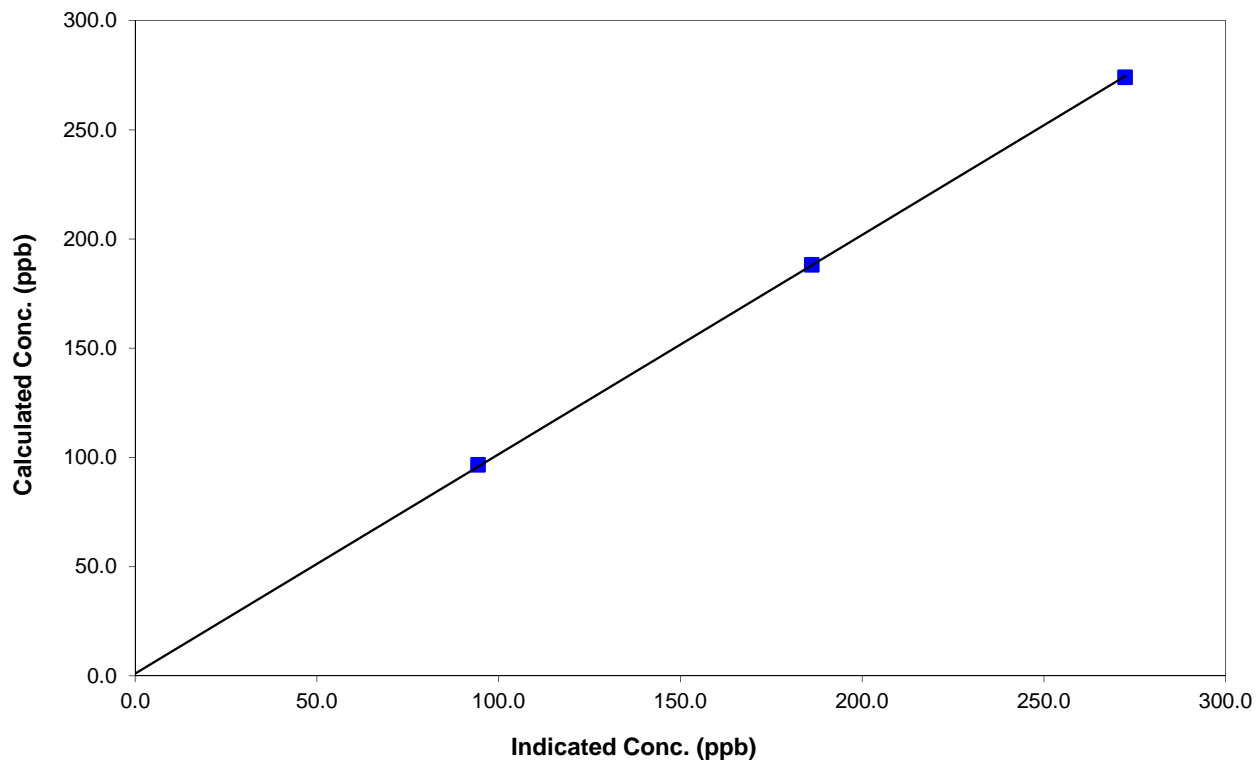
### Station Information

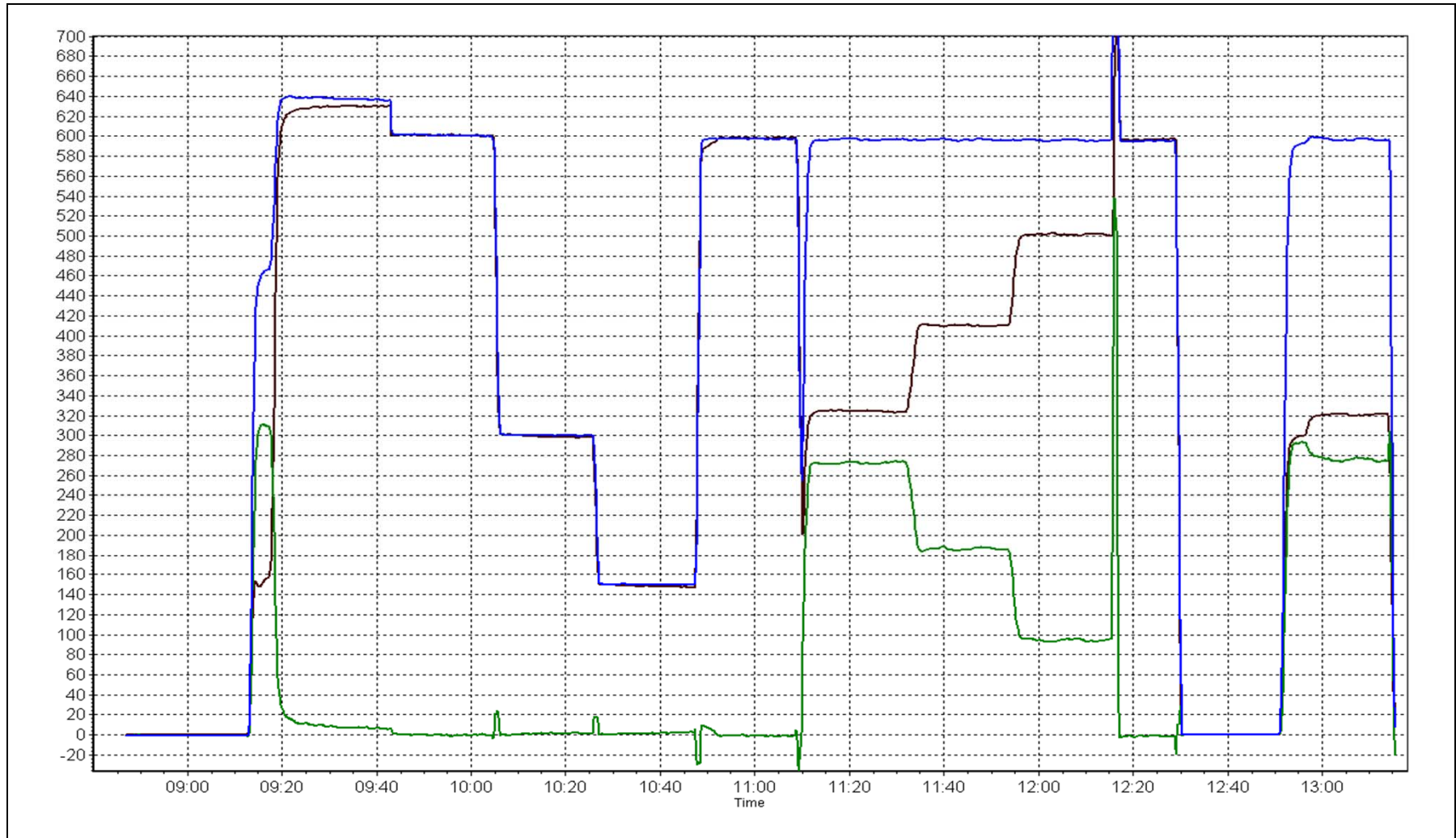
Calibration Date	May 2, 2014	Previous Calibration	April 1, 2014
Station Number	Patricia McInnes	Station Number	AMS 6
Start Time (MST)	8:50	End Time (MST)	
Analyzer make	Thermo Scientific 42i	Analyzer serial #	1218153460

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.4	N/A	Correlation Coefficient	0.999962
274.1	272.4	1.0061		
188.1	186.2	1.0104	Slope	1.003731
96.7	94.3	1.0253		
			Intercept	1.084613

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







# Wood Buffalo Environmental Association

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

### Station Information

Calibration Date	May 9, 2014	Previous Calibration	April 8, 2014
Station Name	Patricia McInnis	Station Number	AMS 6
Reason:	Routine		
Start Time (MST)	8:15	End Time (MST)	13:00
Barometric Pressure	715 mmHg	Station Temperature	21.0 Deg C
Calibrator	API T700	Serial Number	1220
NH3 Cal Gas Conc	190 ppm	Cal Gas Expiry Date	April 3, 2012
NOx Cal Gas Conc	54.4 ppm	Cal Gas Serial #	LL86349

### DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	2582
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Parameter		Nt	NH3
MV conversion	Analyzer Range (ppb)	2500	2500
	Analyzer Range (mv)	5000	5000
Before	Data Slope	1.002361	1.002857
	Data Offset	6.413815	6.461686
After	Data Slope	0.982807	0.984365
	Data Offset	8.034752	6.391942
Channel #			
Voltage Range		0-5	0-5

### Analyzer Information

Analyzer make/model	Thermo 17c	Analyzer serial #	622817829
		Converter serial #	617817369

Test Point	before		after	
Concentration range	0-1000	ppb	0-2500	ppb
Nt coefficient	0.886	ppb	0.886	ppb
NOX coefficient	0.907	ppb	0.904	ppb
NH3 coefficient	0.969		0.910	
NO coefficient	0.909		0.881	
NO2 coefficient	1.000	ppb	1.000	ppb
No bkgnd	5.9		5.8	
Nt bkgnd	8.4		8.6	
NOX bkgnd	5.2		5.1	
NH3 conv temp	779	DegC	774	Deg C
Chamber Temp	50.0	Deg C	50.0	Deg C
Moly Temp	322.0	Deg C	322.0	Deg C
PMT Temp	-8.6	Deg C	-8.7	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell Press	118.8	mmHg	120.3	mmHg
PMT Voltage	-838.0	v	-838.0	v
Sample Flow 1 NO	443.0	ccm	446.0	ccm
Sample Flow 2 Nox	489.0	ccm	493.0	ccm
Sample Flow 3 Nt	493.0	ccm	497.0	ccm

Notes:

Adjusted span for NO high point. Adjusted NH3 span.



# Wood Buffalo Environmental Association

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

### Station Information

Calibration Date:

May 9, 2014

Station Number:

AMS 6

### 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	5000	0.0	0.0	0.0	0.0	-2.8		-2.7	NA	NA
as found NO	5000	55.2	600.6	600.6	NA	634.6		13.3	0.946	NA
calibrator zero	5000	0.0	0.0	0.0	0.0	-2.8		-2.7	NA	NA
high NO point	5000	55.2	600.6	600.6	NA	602.8		2.3	0.996	NA
NO/O <sub>3</sub> point	5000	55.2	600.6	600.6	NA	603.2		2.0	0.996	NA
as found NH <sub>3</sub>	5000	52.8	2006.4	NA	2006.4	1896.4		1895.5	1.058	1.059
first NH <sub>3</sub>	5000	52.8	2006.4	NA	2006.4	2035.9		2035.0	0.986	0.986
second NH <sub>3</sub>	5000	26.3	999.4	NA	999.4	1006.3		1005.4	0.993	0.994
third NH <sub>3</sub>	5000	13.3	505.4	NA	505.4	500.5		500.6	1.010	1.010
as left zero						0.0				
as left span						0.0				
Average Correction Factor									0.9960	0.9965

Corrected As found

Nt = 637.4 ppb

NH<sub>3</sub> = 1898.2 ppb

Previous response

Nt = 592.7 ppb

NH<sub>3</sub> = 1994.2 ppb

Nt percent change -7.0%

NH<sub>3</sub> percent change 5.1%

Converter efficiency 91.0%

Calibration Performed By:

Devin Russell



## Wood Buffalo Environmental Association NH3 Calibration Summary

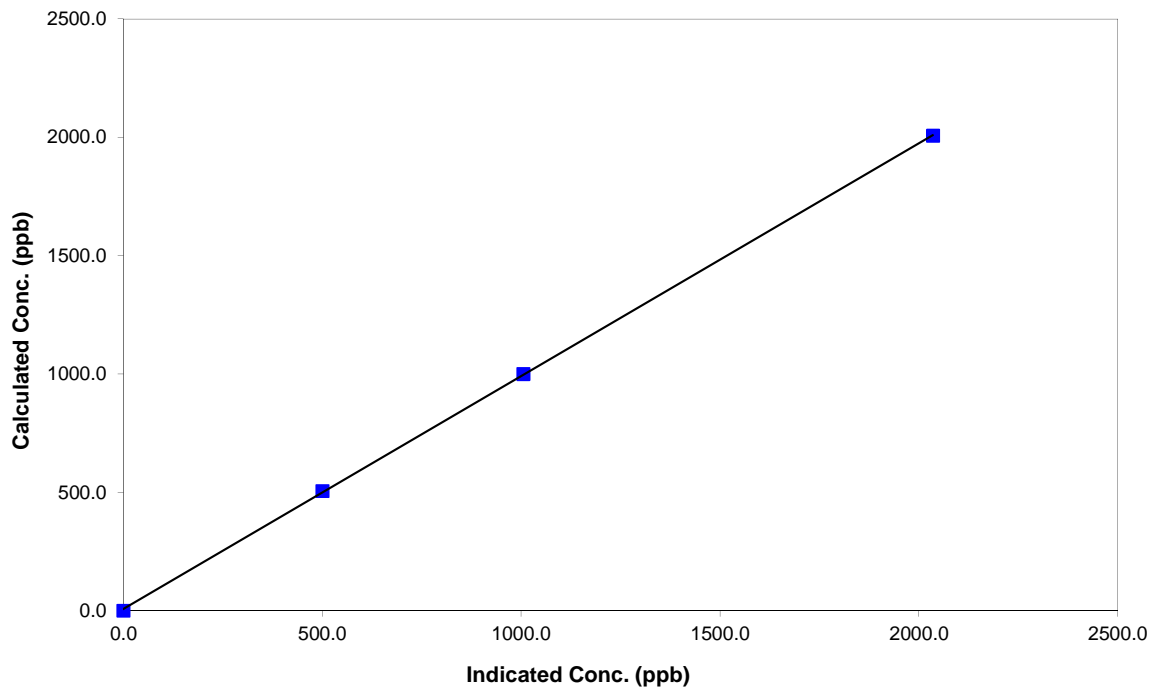
### Station Information

Calibration Date	May 9, 2014	Previous Calibration	April 8, 2014
Station Number	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	8:15	End Time (MST)	13:00
Analyzer make	Thermo 17c	Analyzer serial #	622817829

### NH3 Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999954
2006.4	2035.0	0.9859		
999.4	1005.4	0.9940	Slope	0.984365
505.4	500.6	1.0096		
			Intercept	6.391942

### NH3 Calibration Curve







## Wood Buffalo Environmental Association

### Nt Calibration Summary

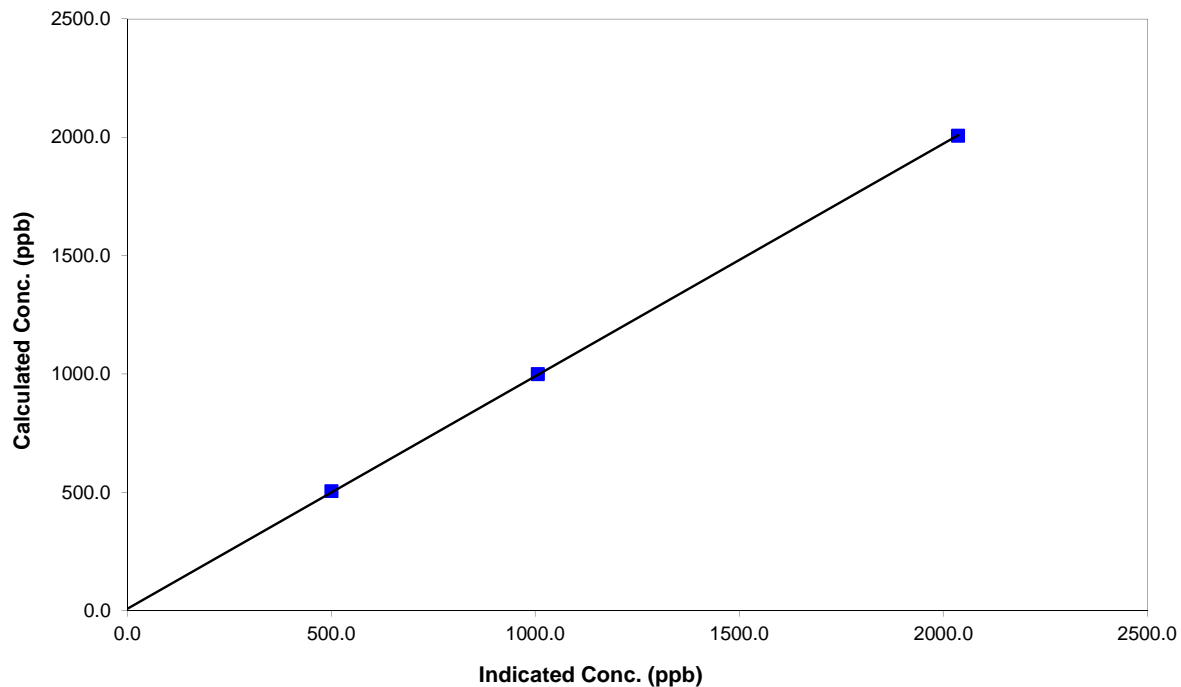
#### Station Information

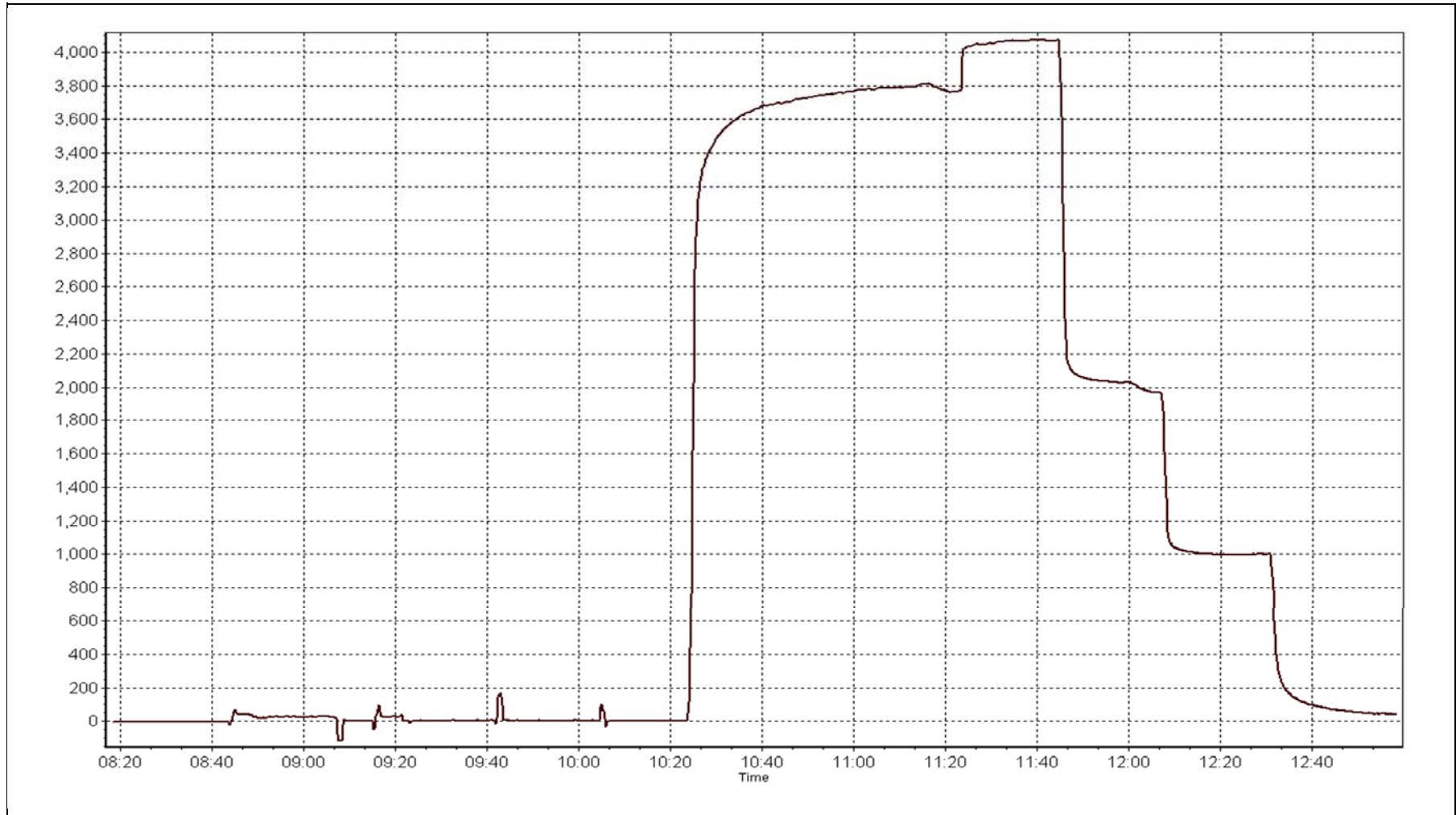
Calibration Date	May 9, 2014	Previous Calibration	April 8, 2014
Station Number	Patricia McInnis	Station Number	AMS 6
Start Time (MST)	8:15	End Time (MST)	13:00
Analyzer make	Thermo 17c	Analyzer serial #	622817829

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

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-2.8	N/A	Correlation Coefficient	0.999968
2006.4	2035.9	0.9855		
999.4	1006.3	0.9931	Slope	0.982807
505.4	500.5	1.0097		
	0.0		Intercept	8.034752

#### Nt Calibration Curve





# **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS 7**  
**ATHABASCA VALLEY**  
**MAY 2014**

Operations and Data Collection by:  
Wood Buffalo Environmental Association  
Fort McMurray, Alberta

QA/QC, Data Validation and Reporting by:  
Aurora Atmospheric Inc.  
Calgary, Alberta

June 27, 2014

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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ATHABASCA VALLEY (AMS 7)  
MAY 2014

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	707	36	37	99.87	12	0	3	0
TRS (ppb) Average	709	34	35	99.87	3	0	1	0
THC (ppm) Average	707	36	37	99.87	2.2	-	1.9	-
NMHC (ppm) Average	707	36	37	99.87	0.082	-	0.007	-
CH4(ppm) Average	707	36	37	99.87	2.2	-	1.9	-
O3 (ppb) Average	708	35	36	99.87	55	0	41	-
NO2 (ppb) Average	707	36	37	99.87	52	0	11	-
NO (ppb) Average	707	36	37	99.87	223	-	15	-
NOX (ppb) Average	707	36	37	99.87	274	-	20	-
PM2.5 (ug/m3) Average	741	0	3	99.60	22.8	-	10.9	0
CO(ppm) Average	702	39	42	99.60	0.3	0	0.2	-
Temperature 2 m (C) Average	744	0	0	100.00	28.4	-	20.7	-
Barometric Pressure (inHg) Average	744	0	0	100.00	29.5	-	-	-
Relative Humidity (%) Average	744	0	0	100.00	97	-	-	-
Wind Speed 10 m (km/h) Average	744	0	0	100.00	36	-	-	-
Wind Direction 10 m (deg) Average	744	0	0	100.00	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ATHABASCA VALLEY (AMS 7)  
MAY 2014

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	12
TRS (ppb) Average	709	0.3	0	-	0	0	0	0	0	0	3
THC (ppm) Average	707	1.89	0	-	1.8	1.9	1.9	1.9	1.9	1.9	2.2
NMHC (ppm) Average	707	0.001	0.005	-	0	0	0	0	0	0	0.082
CH4(ppm) Average	707	1.89	0	-	1.8	1.9	1.9	1.9	1.9	1.9	2.2
O3 (ppb) Average	708	29.2	12	-	1	13	21	29	38	45	55
NO2 (ppb) Average	707	4.8	5	-	0	1	2	3	6	10	52
NO (ppb) Average	707	2	10	-	0	0	0	0	1	4	223
NOX (ppb) Average	707	6.8	13	-	0	1	2	4	8	14	274
PM2.5 (ug/m3) Average	741	6.24	3.8	-	0.5	2.1	3.4	5.6	8.2	11.3	22.8
CO(ppm) Average	702	0.11	0	-	0	0.1	0.1	0.1	0.1	0.2	0.3
Temperature 2 m (C) Average	744	9.42	6.7	-	-3.3	0.7	3.8	9	14.3	18.8	28.4
Barometric Pressure (inHg) Average	744	29.03	0.2	-	28.6	28.8	28.9	29	29.1	29.3	29.5
Relative Humidity (%) Average	744	60.3	21	-	18	31	43	61	77	89	97
Wind Speed 10 m (km/h) Average	744	9.4	7	-	0	2	4	8	13	20	36
Wind Direction 10 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ATHABASCA VALLEY (AMS 7)  
MAY 2014

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
ALL PARAMETERS	09 May 2014 14:00	09 May 2014 14:00	1	Station power failure
PM2.5	22 May 2014 11:00	22 May 2014 12:00	2	Maintenance - Flow and zero check, sample head cleaning
CO	20 May 2014 11:00	20 May 2014 12:00	2	Maintenance - NAPS inter-laboratory CO audit

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Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 12 ppb on May 12 12:00	Maximum Daily Average: 2.9 ppb on May 12		Hours of Data:	707
Minimum Value: 0 ppb on May 14 02:00	Minimum Daily Average: 0.2 ppb on May 26		Hours of Missing Data:	37
Maximum Diurnal Average: 1.5 ppb at hour 12	Minimum Diurnal Average: 0.4 ppb at hour 6		Hours of Calibration:	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> = 1 P <sub>90</sub> = 2 P <sub>99</sub> = 8		Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-May	0	0	2	Z	1	1	1	1	1	1	1	1	2	2	1	1	0	2	1	4	0	1	1	2	1.1	4
2-May	1	1	0	Z	2	0	0	2	1	0	0	1	1	2	4	3	3	1	1	1	0	0	1	5	1.3	5
3-May	4	2	1	Z	1	1	2	4	4	4	4	3	1	1	0	0	0	0	0	0	0	0	0	0	1.5	4
4-May	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.3	1
5-May	0	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
6-May	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.4	1
7-May	0	1	1	Z	1	1	1	3	5	11	3	4	4	4	3	5	4	4	1	1	0	0	0	0	2.5	11
8-May	0	0	0	Z	0	0	0	0	0	1	0	1	0	5	5	1	2	0	0	0	0	0	0	0	0.9	5
9-May	0	0	0	Z	1	0	1	2	5	2	1	3	4	PF	1	0	2	4	2	1	0	2	1	1	1.6	5
10-May	1	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	3	5	1	2	1	1	1	0.9	5
11-May	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	2	2	3	2	1	0	0	0	0.6	3
12-May	0	0	0	Z	0	0	0	0	0	0	4	12	11	9	8	8	7	4	1	0	0	0	0	0	2.9	12
13-May	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	3	3	2	1	0	0	0	0	0	0.7	3
14-May	0	0	0	Z	0	0	0	1	0	1	1	1	1	1	1	0	0	0	1	1	1	0	0	0	0.4	1
15-May	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	2	1	1	1	0.5	2
16-May	1	1	0	Z	0	0	1	1	2	7	8	6	5	5	4	3	3	2	1	2	3	2	1	1	2.5	8
17-May	1	1	1	Z	0	0	0	0	1	0	1	2	2	1	1	1	1	1	0	0	0	0	0	0	0.7	2
18-May	0	0	0	Z	0	0	0	0	1	1	1	1	2	2	1	0	0	1	1	1	0	0	0	0	0.7	2
19-May	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
20-May	0	0	0	Z	0	0	0	0	0	C	C	C	C	C	0	0	1	1	0	0	0	0	0	0	0.4	1
21-May	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0.3	1
22-May	0	0	1	Z	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
23-May	0	0	0	Z	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0.6	1
24-May	0	0	0	Z	0	0	0	2	3	1	0	0	0	0	1	1	2	0	0	1	1	0	0	0	0.7	3
25-May	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
26-May	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
27-May	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
28-May	0	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
29-May	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	2	1	2	1	1	0	0	0	0.5	2
30-May	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.3	1
31-May	0	0	0	Z	0	1	1	2	11	6	10	6	3	2	1	1	1	0	0	0	0	0	0	0	2.0	11

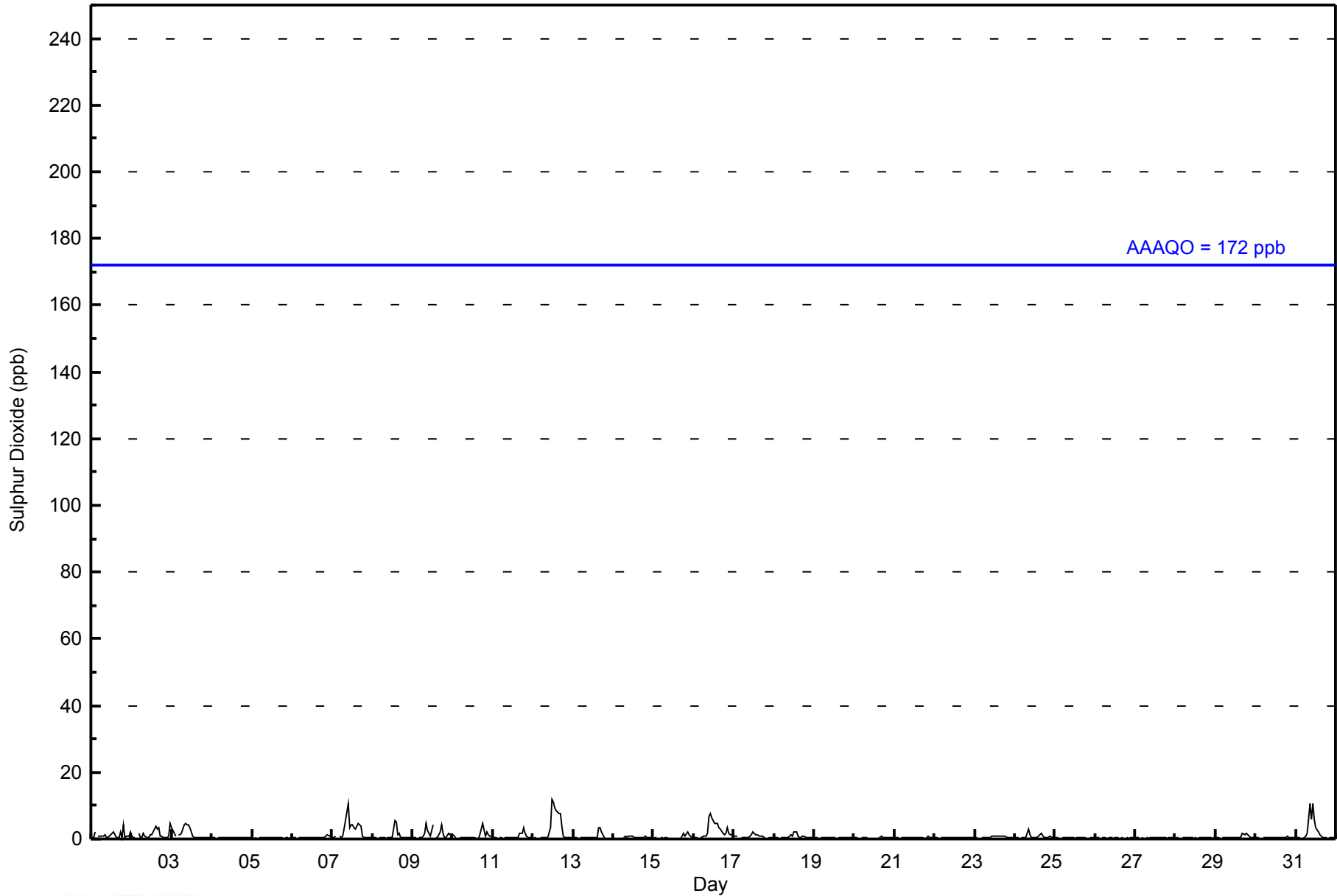
0.5	0.4	0.4	--	0.4	0.4	0.4	0.8	1.3	1.3	1.4	1.5	1.4	1.3	1.2	1.1	1.3	1.1	0.8	0.6	0.6	0.5	0.4	0.6	Diurnal Average
4	2	2	--	2	1	2	4	11	11	10	12	11	9	8	8	7	4	5	4	3	2	1	5	Diurnal Maximum

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



**WBEA**  
**Hourly Averages**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Athabasca Valley - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Athabasca Valley - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	703	99.43	99.43
11 - 20	4	0.57	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



**WBEA**  
**Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Athabasca Valley - May 2014**

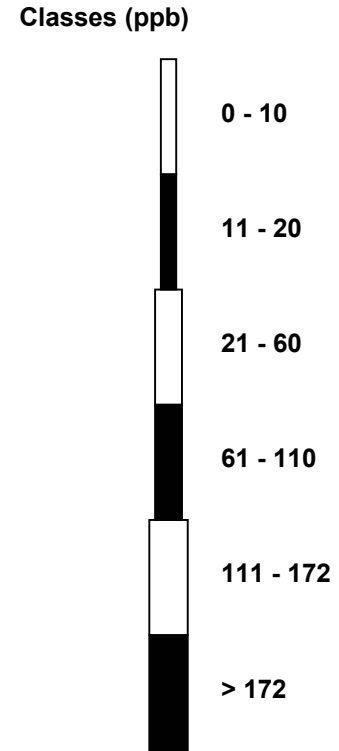
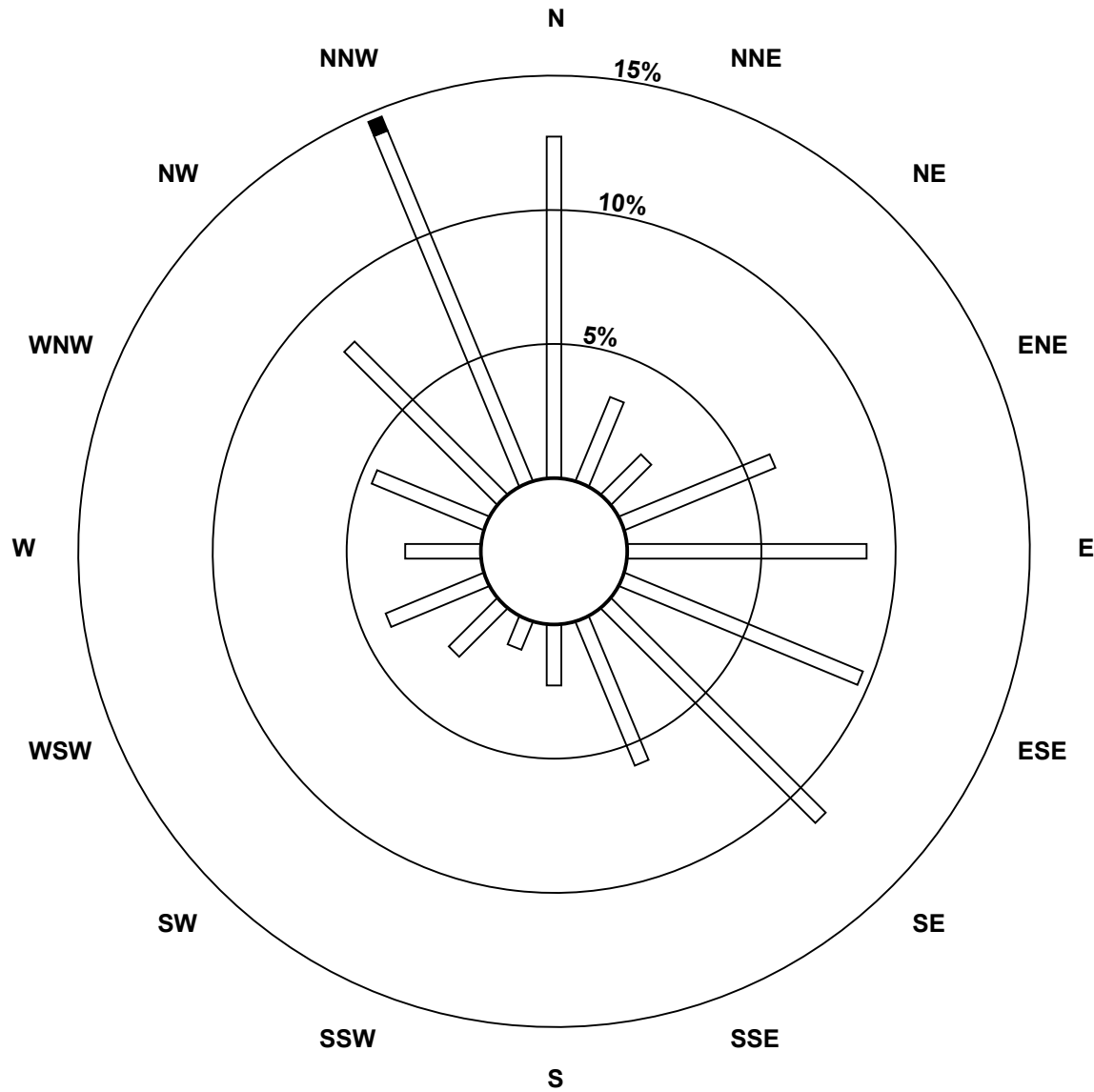
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	90	24	15	43	63	68	80	41	16	8	18	28	20	32	57	100	703
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	90	24	15	43	63	68	80	41	16	8	18	28	20	32	57	104	707

Total Number of Valid Hours: 707

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Athabasca Valley (AMS 7)**

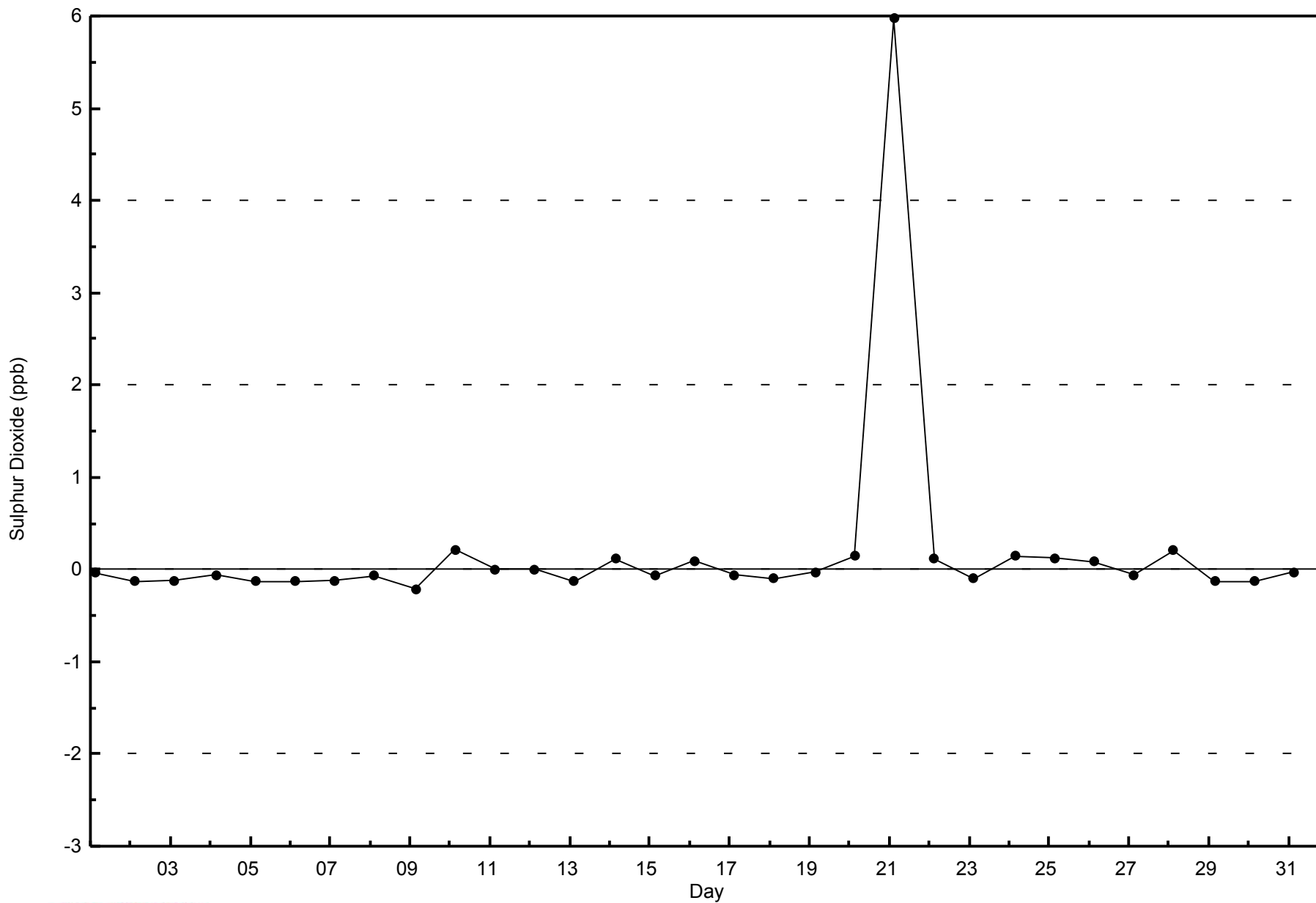


**Total Number of Valid Hours: 707**



WBEA  
Zero Responses

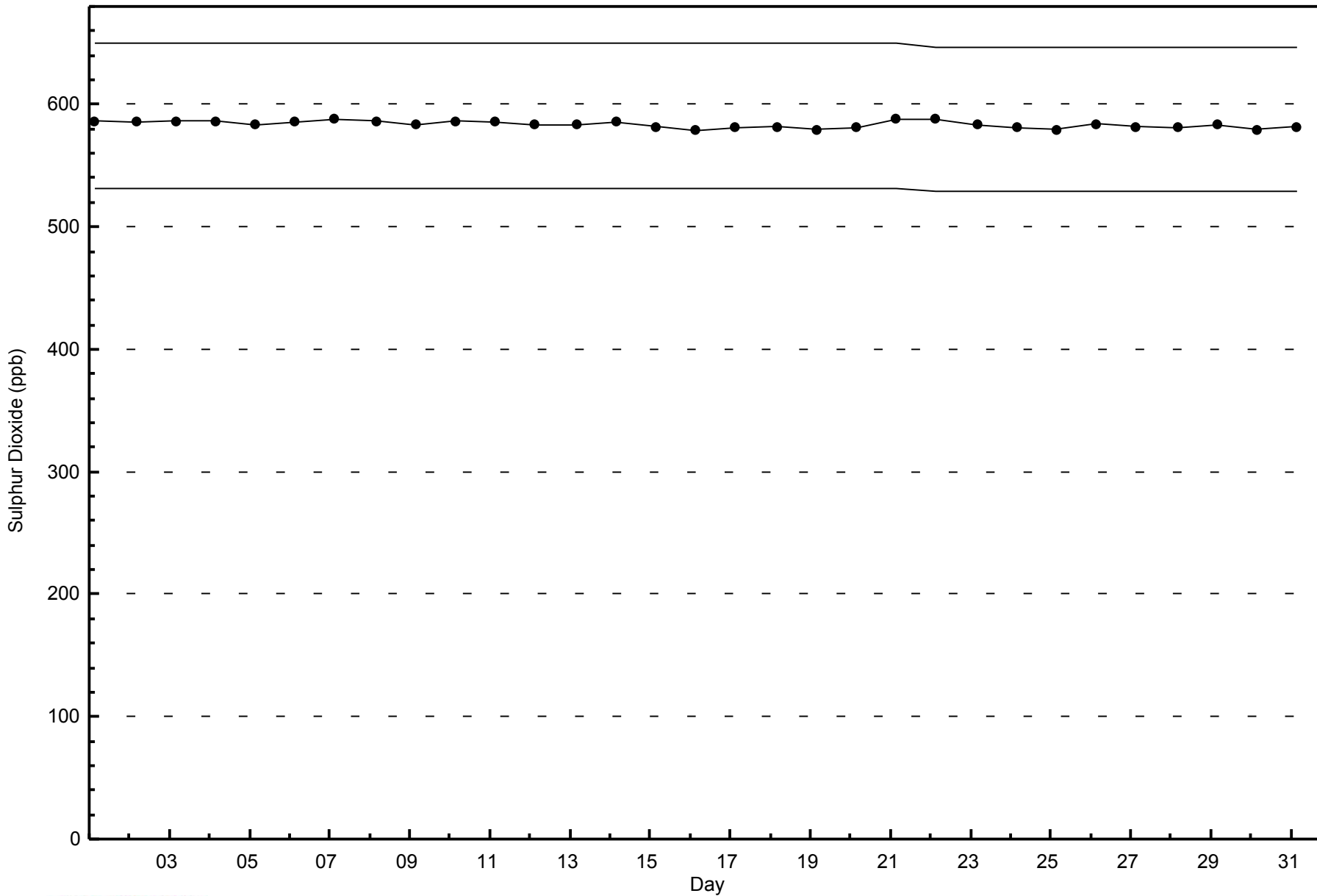
Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Athabasca Valley - May 2014





WBEA  
Span Responses

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Athabasca Valley - May 2014





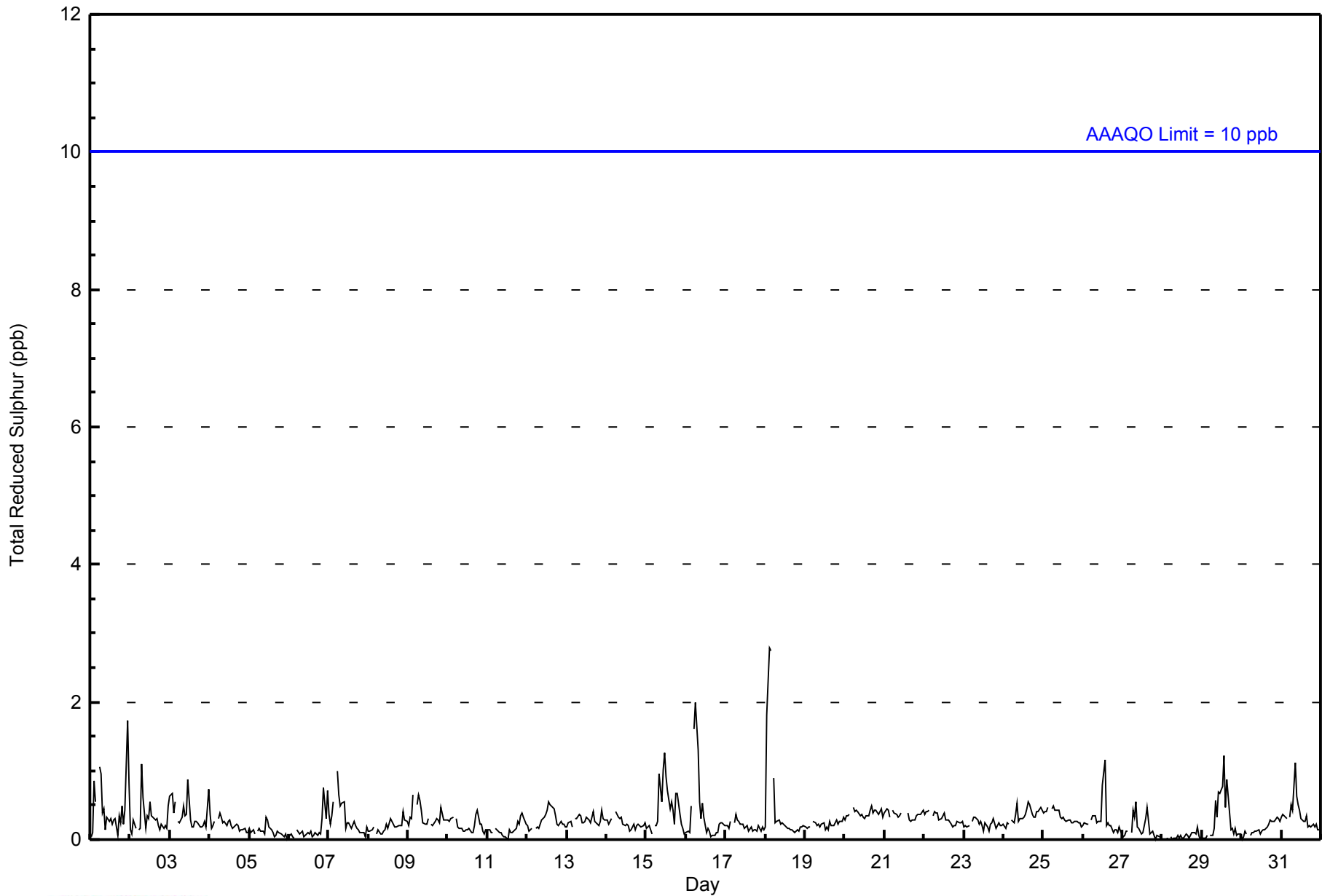
Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																																							
Maximum Value: 3 ppb on May 18 03:00										Maximum Daily Average: 0.5 ppb on May 18										Hours of Data: 709																													
Minimum Value: 0 ppb on May 28 01:00										Minimum Daily Average: 0.0 ppb on May 28										Hours of Missing Data: 35																													
Maximum Diurnal Average: 0.4 ppb at hour 9										Minimum Diurnal Average: 0.2 ppb at hour 1										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> = 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-May	0	0	1	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0.5	2																							
2-May	0	0	0	0	Z	0	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
3-May	1	1	0	1	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0.4	1																							
4-May	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0																							
5-May	0	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																							
6-May	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0.2	1																							
7-May	0	0	0	1	Z	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																							
8-May	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0																							
9-May	0	0	0	1	Z	1	1	1	0	0	0	0	PF	0	0	0	0	0	0	0	0	0	0	0	0.3	1																							
10-May	0	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-May	0	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																							
12-May	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.3	1																							
13-May	0	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																							
14-May	0	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-May	0	0	0	0	Z	0	0	0	1	1	1	1	1	1	0	1	0	0	1	1	0	0	0	0	0.5	1																							
16-May	0	0	0	0	Z	2	2	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2																							
17-May	0	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																							
18-May	0	2	3	3	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	3																							
19-May	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0																							
20-May	0	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																							
21-May	0	0	0	0	Z	0	0	0	0	0	0	C	C	C	0	0	0	0	0	0	0	0	0	0	0.4	0																							
22-May	0	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																							
23-May	0	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																							
24-May	0	0	0	0	Z	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.4	1																							
25-May	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0																							
26-May	0	0	0	0	Z	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0.3	1																							
27-May	0	0	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																							
28-May	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
29-May	0	0	0	0	Z	0	0	0	1	0	1	1	1	1	0	1	1	0	0	0	0	0	0	0	0.3	1																							
30-May	0	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																							
31-May	0	0	0	0	Z	0	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																							
																								0.2	0.3	0.3	0.3	--	0.4	0.4	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	Diurnal Average	
																								1	2	3	3	--	2	2	1	1	1	1	1	1	1	0	1	1	0	1	1	0	1	2	1	Diurnal Maximum	
Z - zerospan C - Calibration PF - Power Failure																																																	
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb																																																	





**WBEA**  
**Hourly Averages**

**Total Reduced Sulphur (TRS) - ppb**  
**Athabasca Valley - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb**  
**Athabasca Valley - May 2014**

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

Total Number of Valid Hours: 709

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb**  
**Athabasca Valley - May 2014**

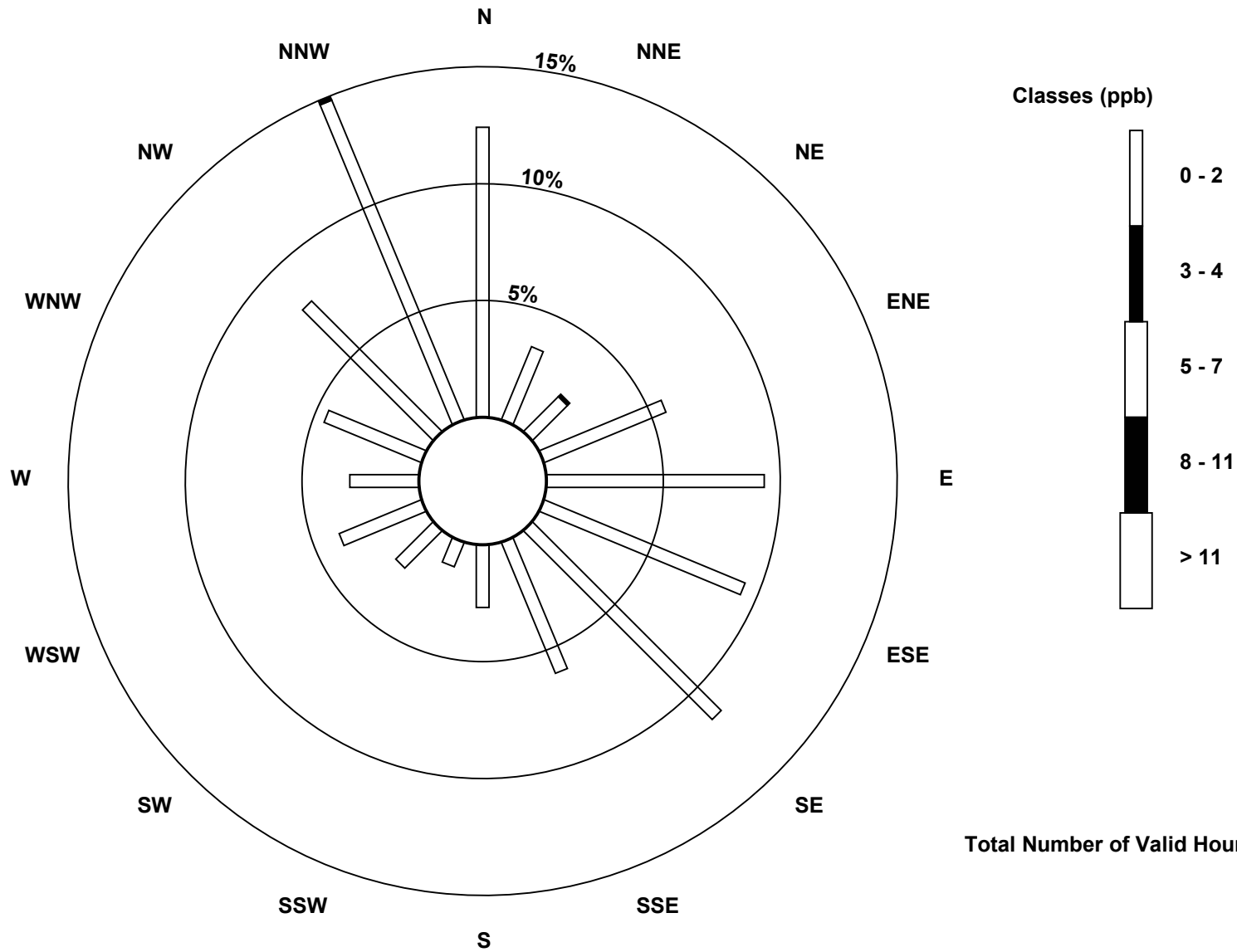
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	88	24	15	40	66	66	81	43	19	8	16	27	21	32	56	105	707
3 - 4	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	2
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	88	24	16	40	66	66	81	43	19	8	16	27	21	32	56	106	709

Total Number of Valid Hours: 709

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Total Reduced Sulphur (TRS) - ppb  
Athabasca Valley (AMS 7)**

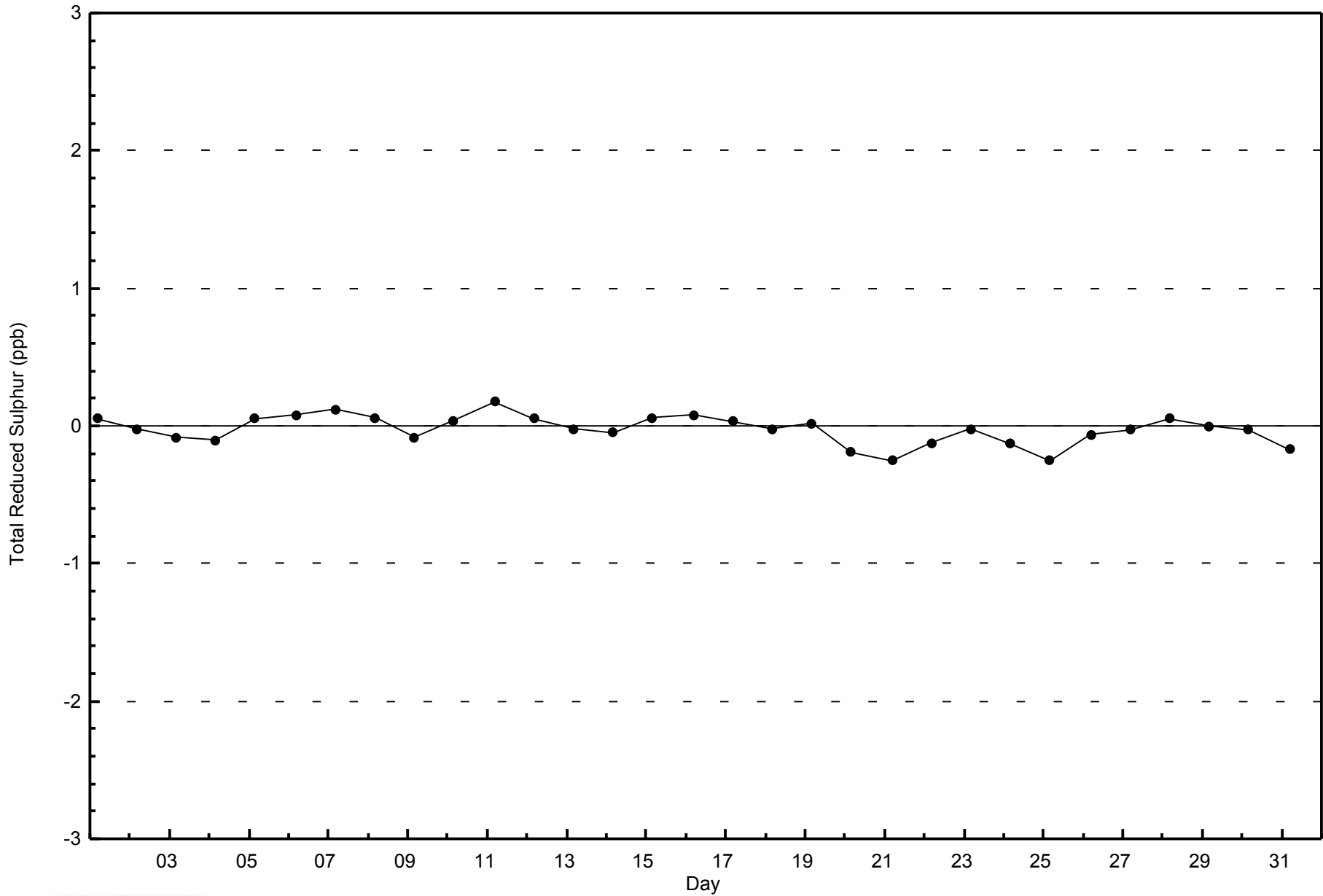


**Total Number of Valid Hours: 709**



WBEA  
Zero Responses

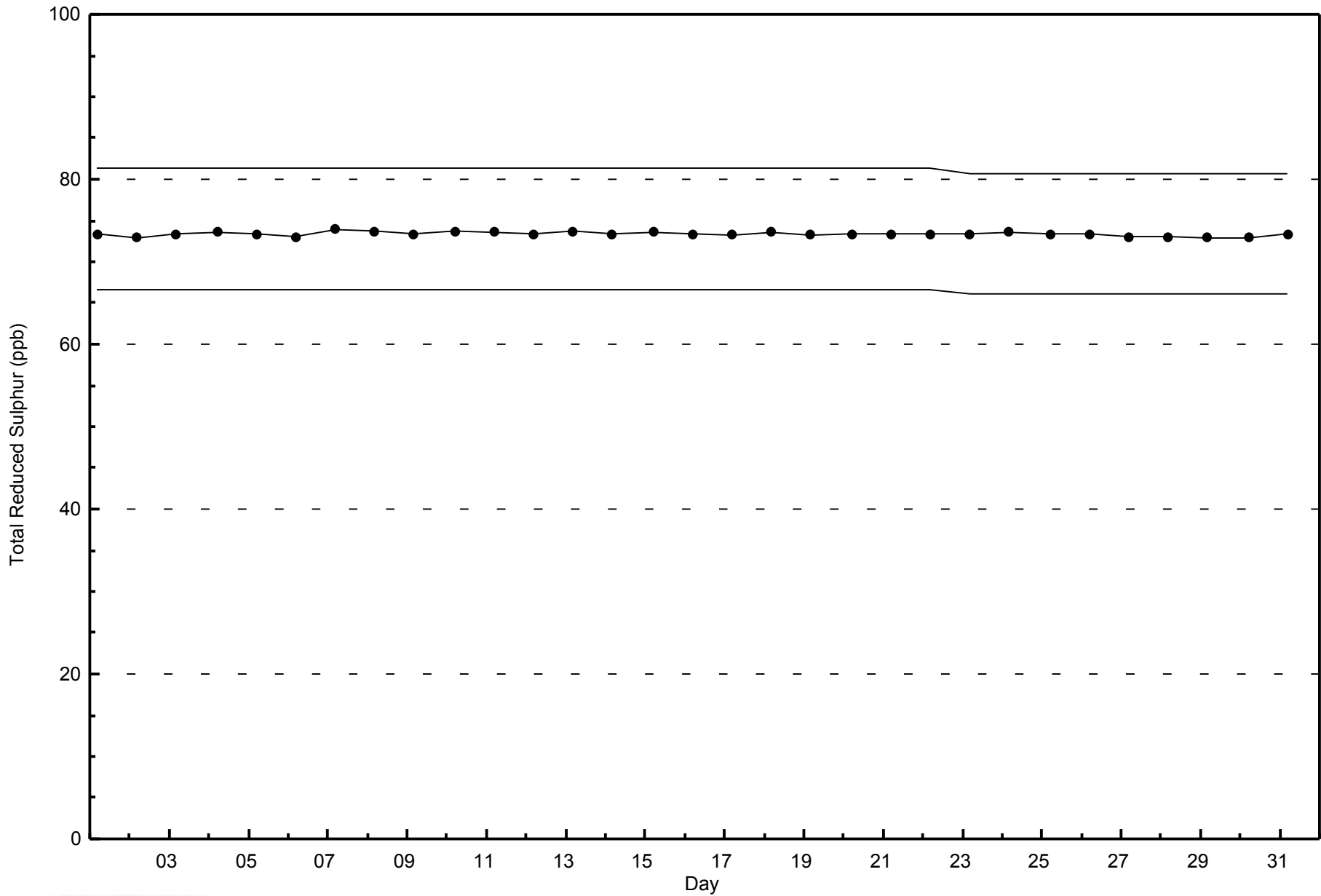
Total Reduced Sulphur (TRS) - ppb  
Athabasca Valley - May 2014





**WBEA**  
**Span Responses**

**Total Reduced Sulphur (TRS) - ppb**  
**Athabasca Valley - May 2014**

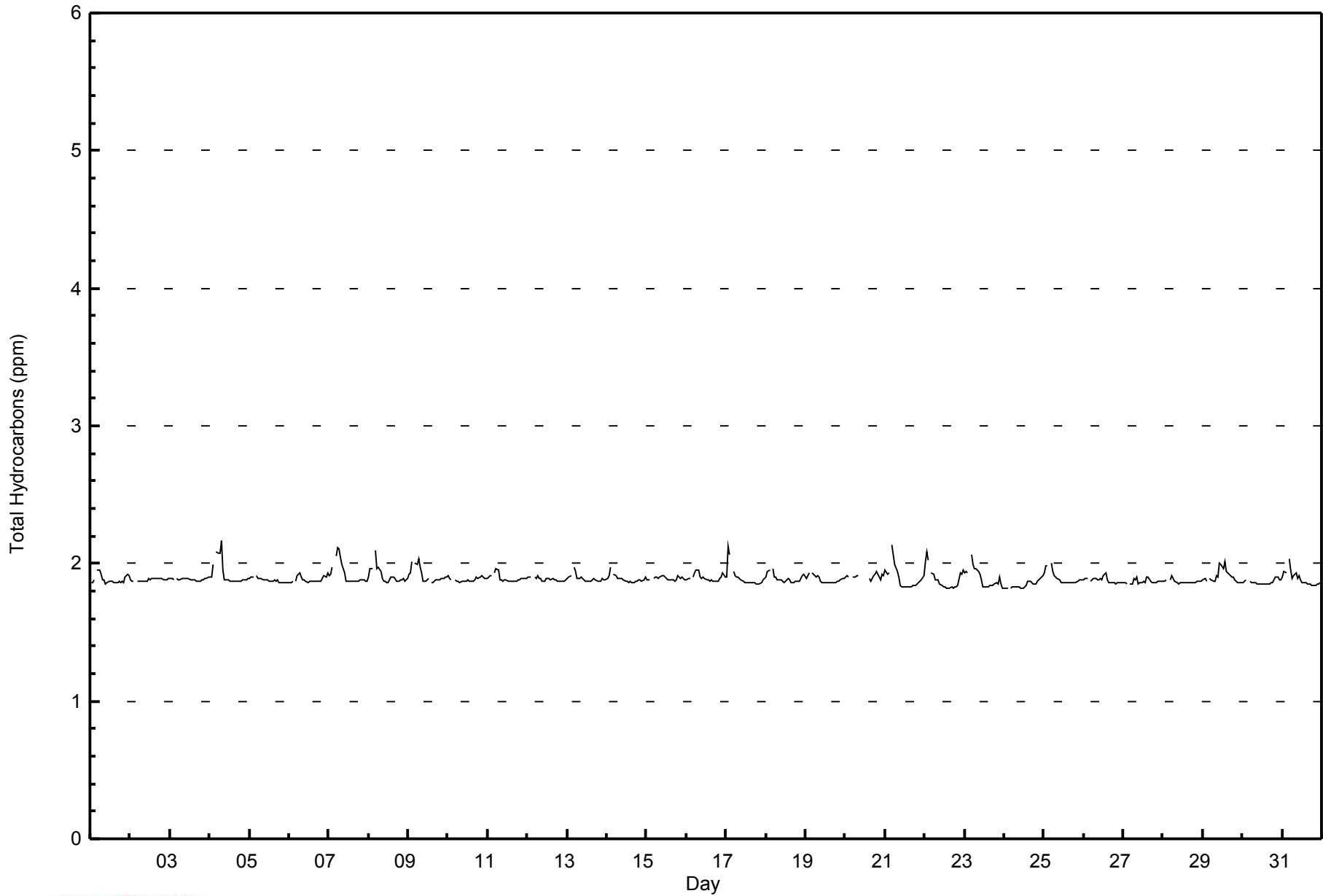






**WBEA**  
**Hourly Averages**

**Total Hydrocarbons (THC) - ppm**  
**Athabasca Valley - May 2014**







**WBEA**  
**Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Athabasca Valley - May 2014**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	693	98.02	98.02
2.1 - 3.0	14	1.98	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Athabasca Valley - May 2014**

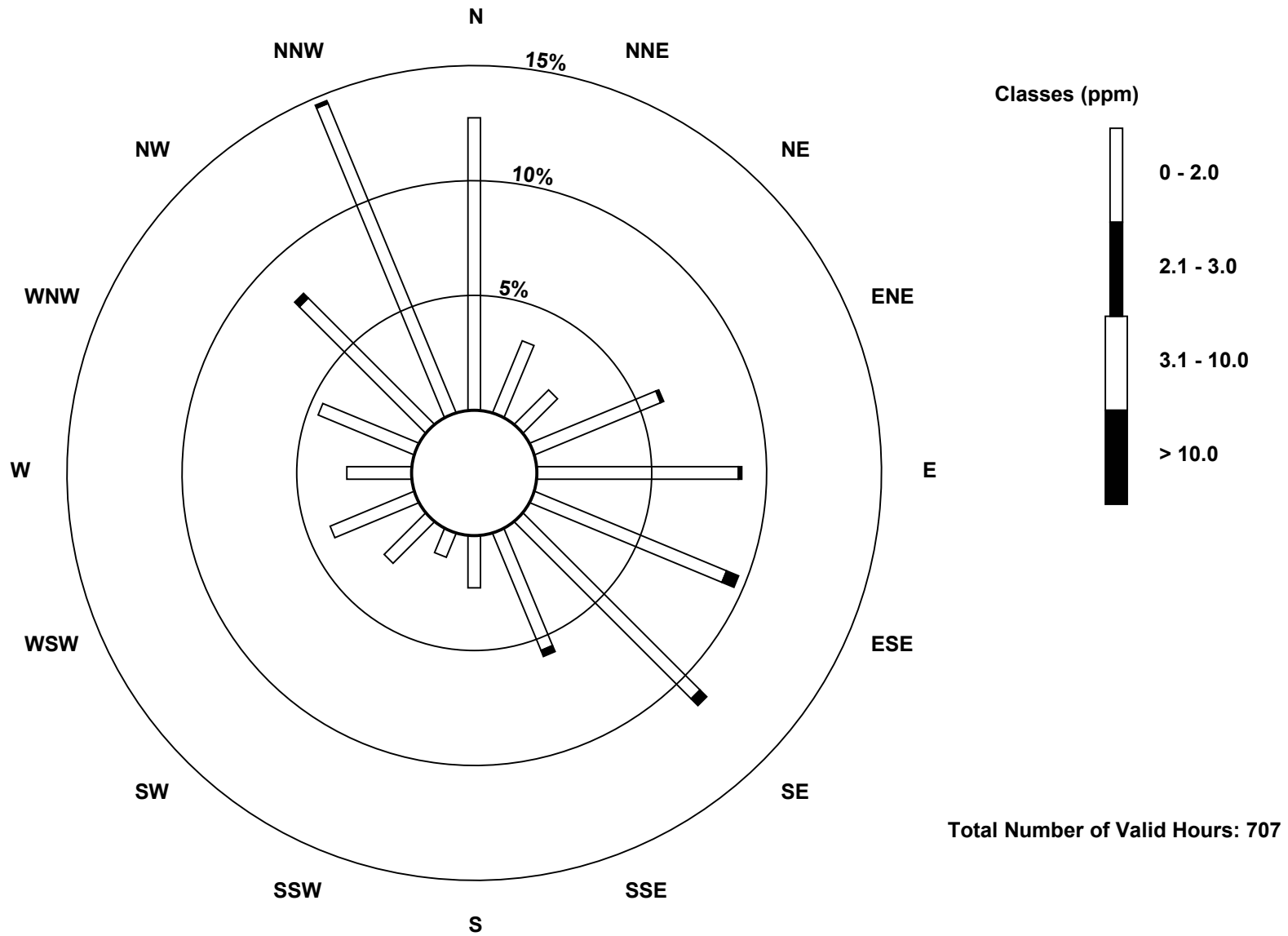
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	90	24	15	42	62	64	77	39	16	8	18	28	20	32	55	103	693
2.1 - 3.0	0	0	0	1	1	4	3	2	0	0	0	0	0	0	2	1	14
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	90	24	15	43	63	68	80	41	16	8	18	28	20	32	57	104	707

Total Number of Valid Hours: 707

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

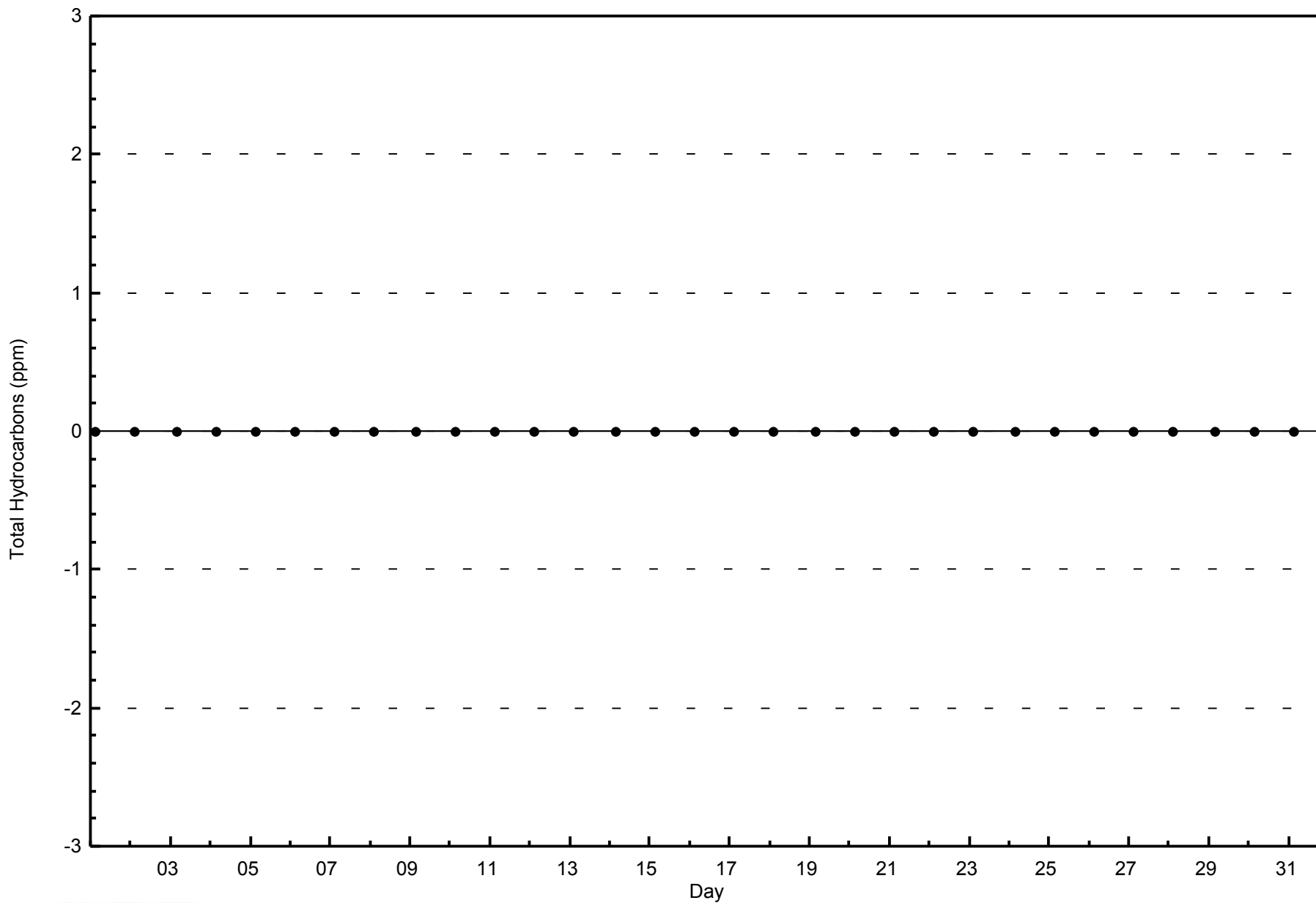
**Total Hydrocarbons (THC) - ppm  
Athabasca Valley (AMS 7)**





**WBEA**  
**Zero Responses**

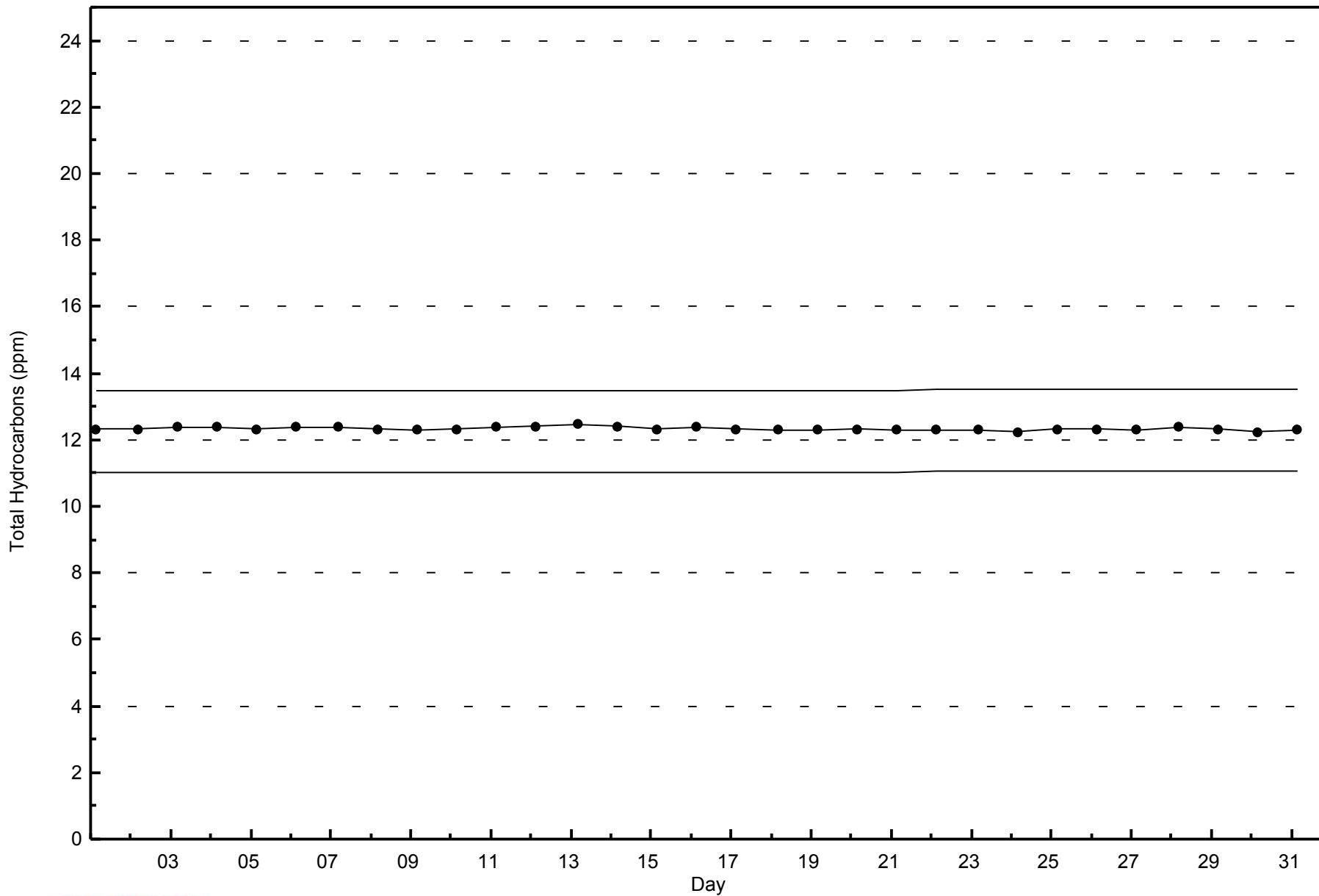
**Total Hydrocarbons (THC) - ppm**  
**Athabasca Valley - May 2014**





**WBEA**  
**Span Responses**

**Total Hydrocarbons (THC) - ppm**  
**Athabasca Valley - May 2014**



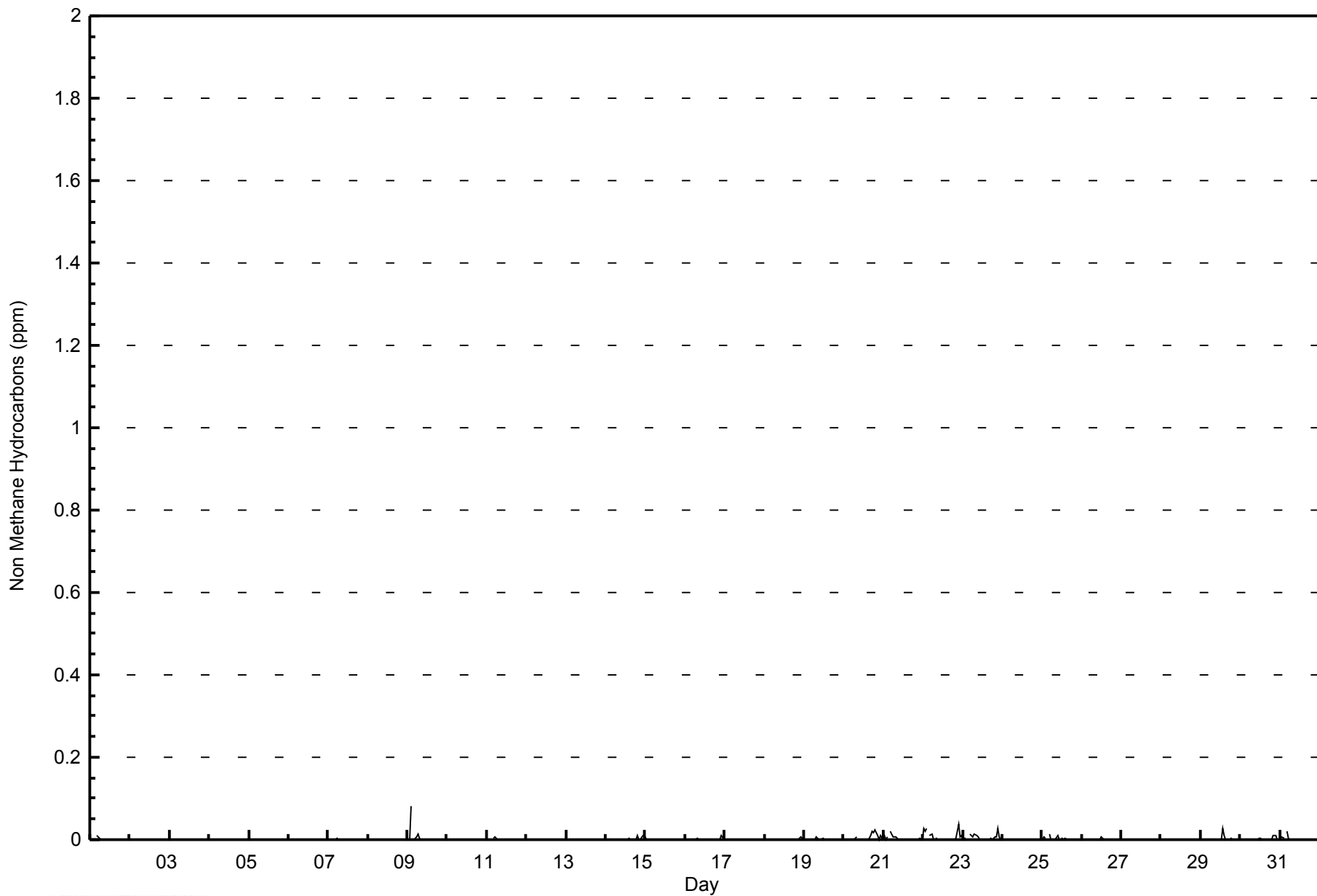


Maximum Value: 0.082 ppm on May 9 03:00		Maximum Daily Average: 0.007 ppm on May 22		Hours in Service: 744																										
Minimum Value: 0.000 ppm on May 1 01:00		Minimum Daily Average: 0.000 ppm on May 2		Hours of Data: 707																										
Maximum Diurnal Average: 0.004 ppm at hour 3		Minimum Diurnal Average: 0.000 ppm at hour 11		Hours of Missing Data: 37																										
Monthly Average: 0.001 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> = 0.0		Hours of Calibration: 36																										
				Percent Operational Time: 99.9																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24						
1-May	0.000	0.000	0.001	Z	0.010	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.010				
2-May	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000			
3-May	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	0.001	0.000	0.000	0.000	0.000	0.001	0.001			
4-May	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000			
5-May	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000			
6-May	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000			
7-May	0.000	0.000	0.000	Z	0.000	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002			
8-May	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000			
9-May	0.000	0.000	0.082	Z	0.000	0.007	0.013	0.003	0.000	0.000	0.000	0.000	0.000	PF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.082			
10-May	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000			
11-May	0.000	0.000	0.000	Z	0.003	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007			
12-May	0.000	0.000	0.000	Z	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001			
13-May	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000			
14-May	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	0.003	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.010	0.010	0.002	0.011				
15-May	0.003	0.000	0.000	Z	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003			
16-May	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.001	0.010	0.000	0.001	0.010				
17-May	0.000	0.001	0.001	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001			
18-May	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.007	0.003	0.001	0.007				
19-May	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.008	0.005	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.008				
20-May	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.002	0.005	C	C	C	C	C	0.001	0.002	0.011	0.021	0.016	0.025	0.010	0.000	0.009	0.004	0.006	0.025				
21-May	0.016	0.001	0.006	Z	0.019	0.013	0.008	0.006	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.003	0.003	0.019				
22-May	0.026	0.019	0.026	Z	0.010	0.012	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.038	0.007	0.010	0.007	0.038				
23-May	0.000	0.002	0.003	Z	0.014	0.009	0.006	0.012	0.009	0.008	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.003	0.002	0.008	0.007	0.026	0.007	0.000	0.005	0.026				
24-May	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.001			
25-May	0.002	0.007	0.002	Z	0.013	0.002	0.000	0.000	0.000	0.011	0.000	0.000	0.003	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.013			
26-May	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007			
27-May	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000			
28-May	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001			
29-May	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	0.026	0.010	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.002	0.026				
30-May	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.003	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.009	0.011	0.001	0.001	0.001	0.011			
31-May	0.002	0.007	0.002	Z	0.021	0.002	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.021			
		0.002	0.001	0.004	--	0.003	0.002	0.001	0.001	0.001	0.001	0.000	0.000	0.001	0.001	0.000	0.000	0.001	0.001	0.001	0.001	0.003	0.002	0.001	Diurnal Average					
		0.026	0.019	0.082	--	0.021	0.013	0.013	0.012	0.009	0.011	0.001	0.003	0.007	0.010	0.002	0.011	0.021	0.016	0.025	0.010	0.038	0.010	0.010	Diurnal Maximum					
Z - zerospan		C - Calibration			PF - Power Failure																									



**WBEA**  
**Hourly Averages**

**Non Methane Hydrocarbons (NMHC) - ppm**  
**Athabasca Valley - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm**  
**Athabasca Valley - May 2014**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.005	657	92.93	92.93
0.006 - 0.05	49	6.93	99.86
0.06 - 0.1	1	0.14	100.00
> 0.1	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744





**WBEA**  
**Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm**  
**Athabasca Valley - May 2014**

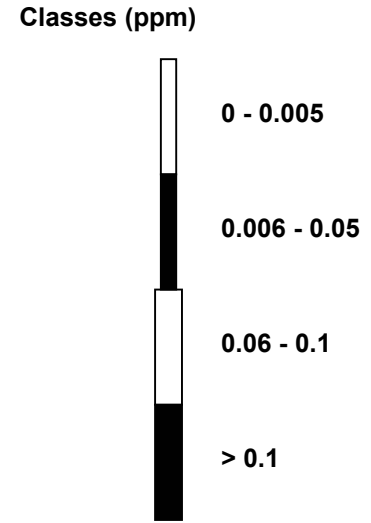
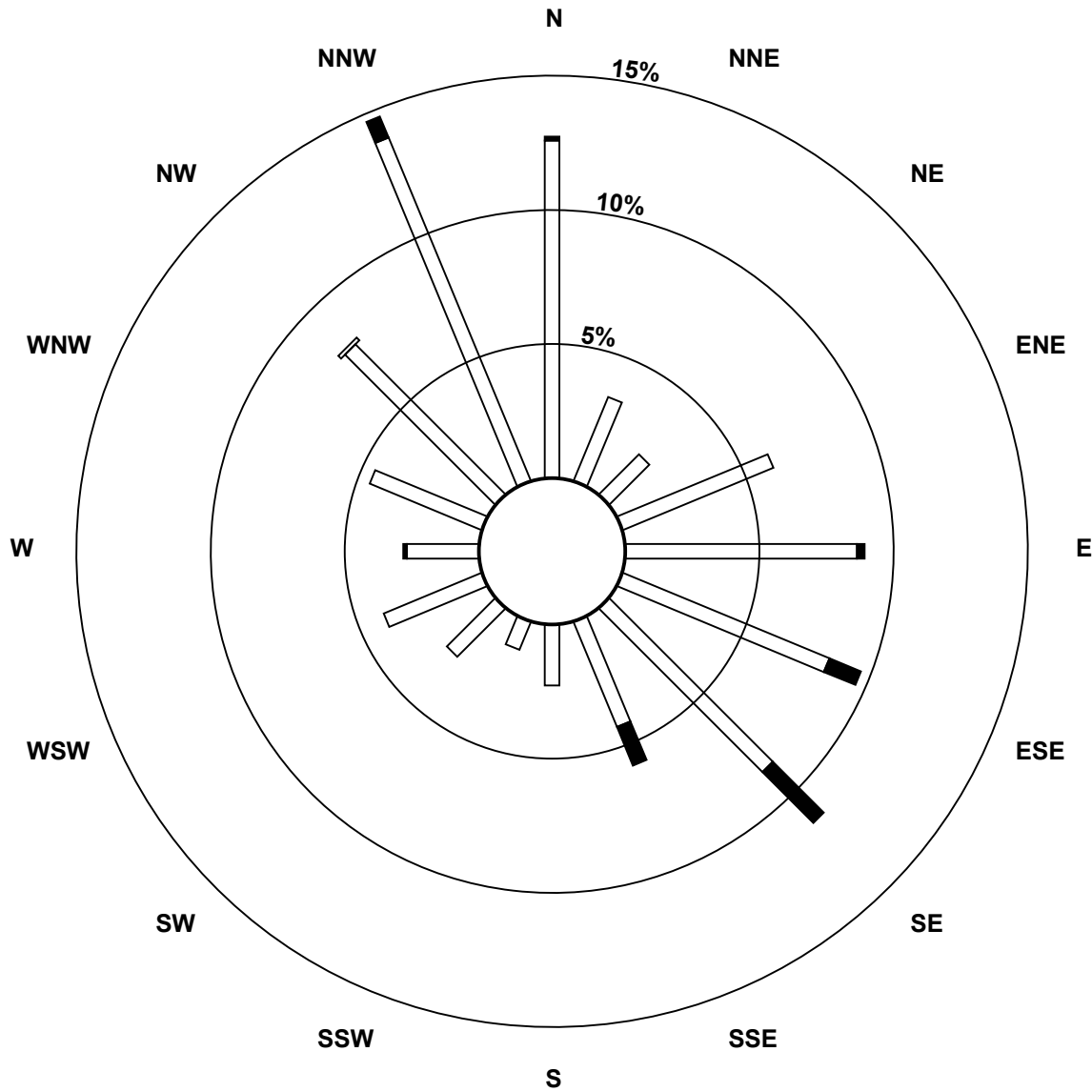
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	89	24	15	43	61	59	61	30	16	8	18	28	19	32	56	98	657
0.006 - 0.05	1	0	0	0	2	9	19	11	0	0	0	0	1	0	0	6	49
0.06 - 0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
> 0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	90	24	15	43	63	68	80	41	16	8	18	28	20	32	57	104	707

Total Number of Valid Hours: 707

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Non Methane Hydrocarbons (NMHC) - ppm  
Athabasca Valley (AMS 7)**

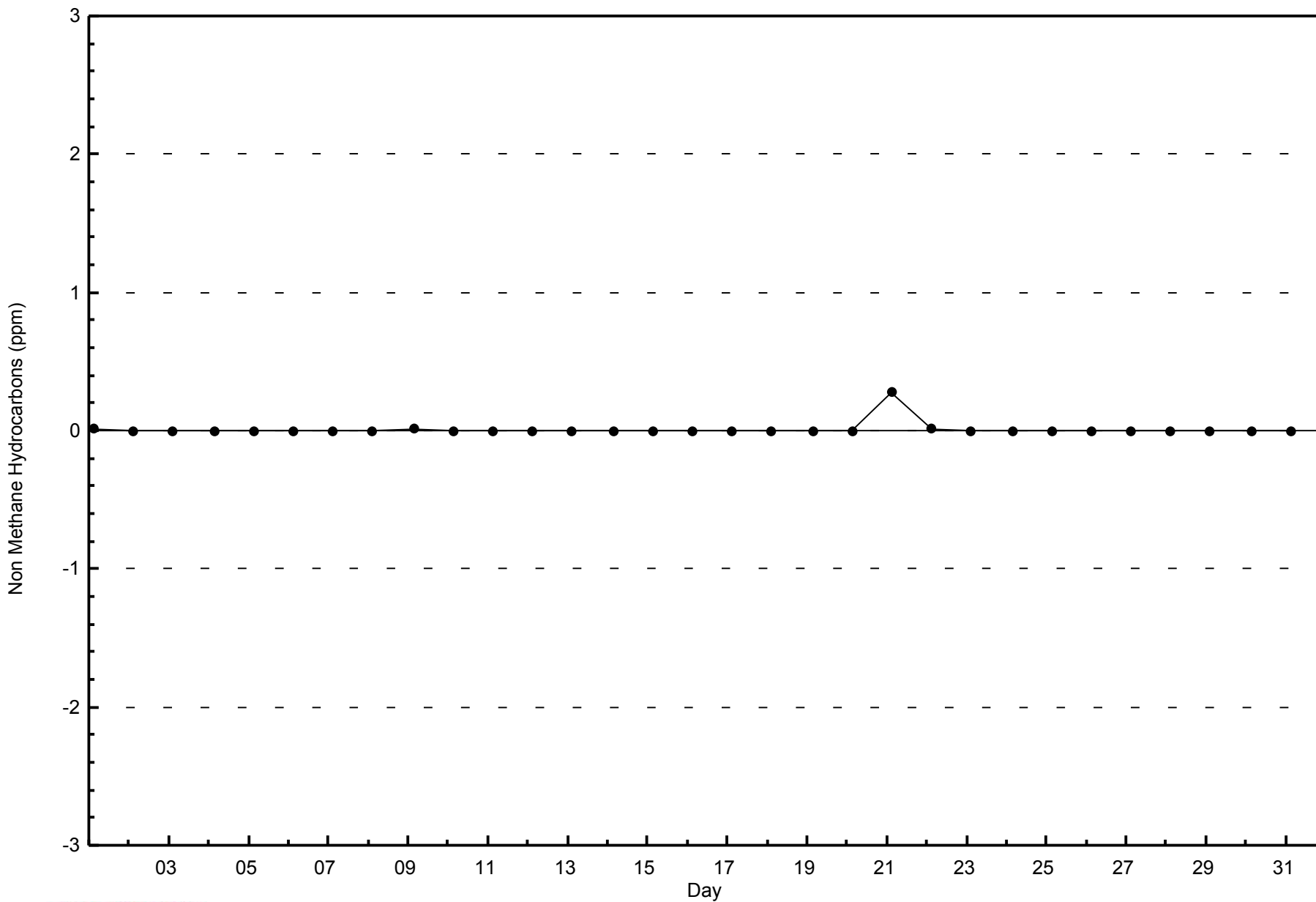


**Total Number of Valid Hours: 707**



WBEA  
Zero Responses

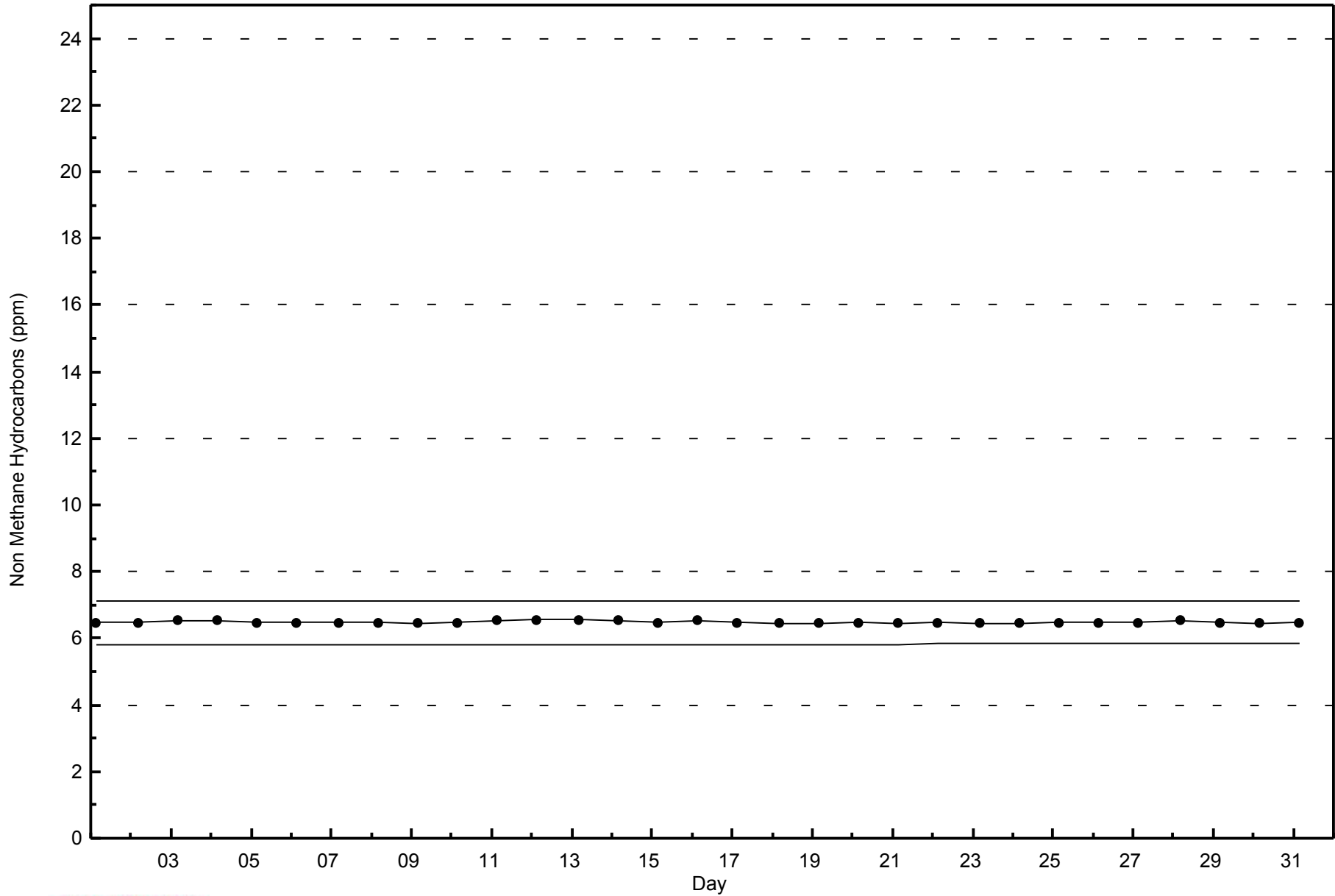
Non Methane Hydrocarbons (NMHC) - ppm  
Athabasca Valley - May 2014





WBEA  
Span Responses

Non Methane Hydrocarbons (NMHC) - ppm  
Athabasca Valley - May 2014

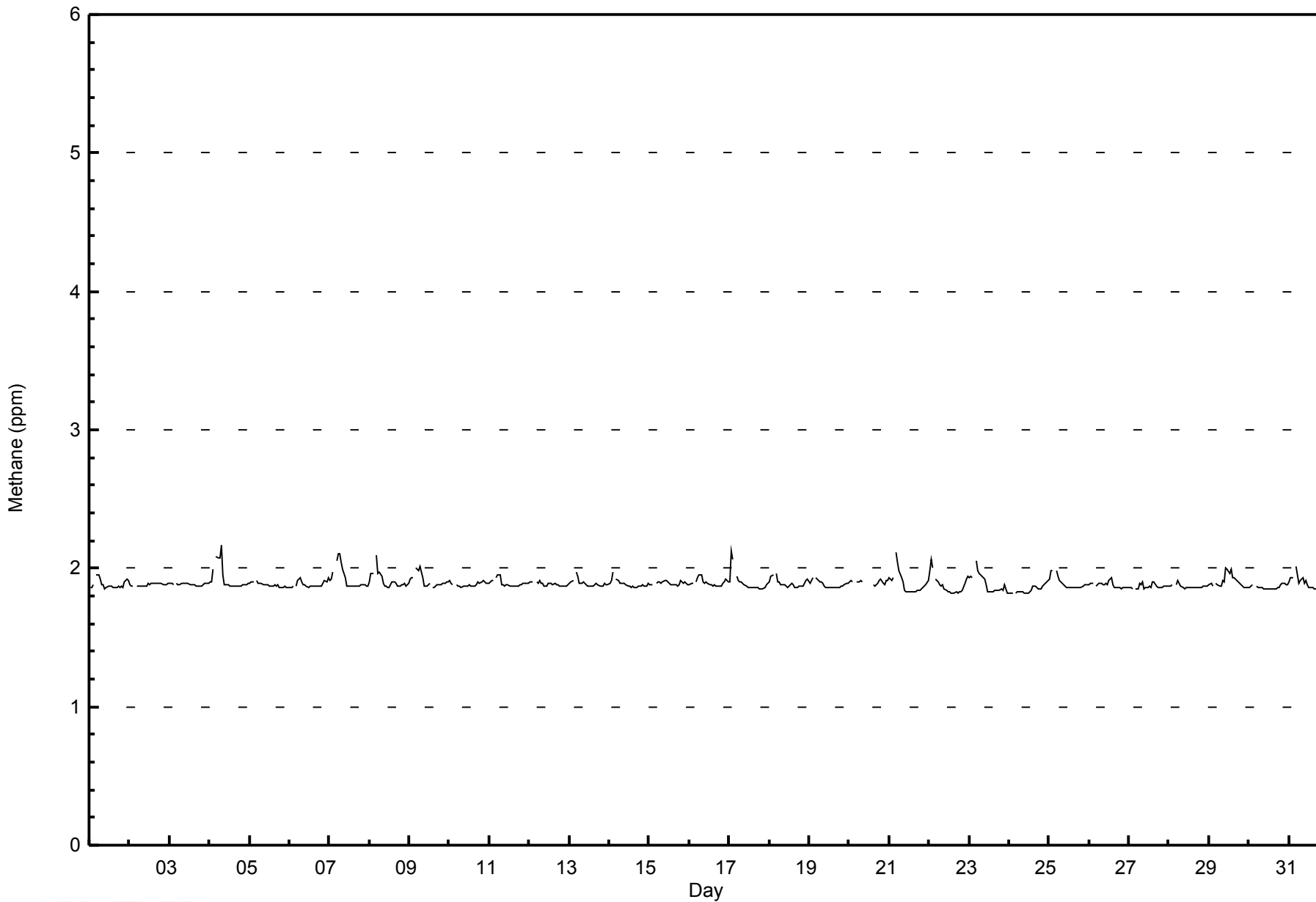






WBEA  
Hourly Averages

Methane (CH<sub>4</sub>) - ppm  
Athabasca Valley - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Methane (CH<sub>4</sub>) - ppm**  
**Athabasca Valley - May 2014**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	695	98.30	98.30
2.1 - 3.0	12	1.70	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Methane (CH<sub>4</sub>) - ppm**  
**Athabasca Valley - May 2014**

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	90	24	15	42	62	64	78	40	16	8	18	28	20	32	55	103	695
2.1 - 3.0	0	0	0	1	1	4	2	1	0	0	0	0	0	0	2	1	12
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>	90	24	15	43	63	68	80	41	16	8	18	28	20	32	57	104	707

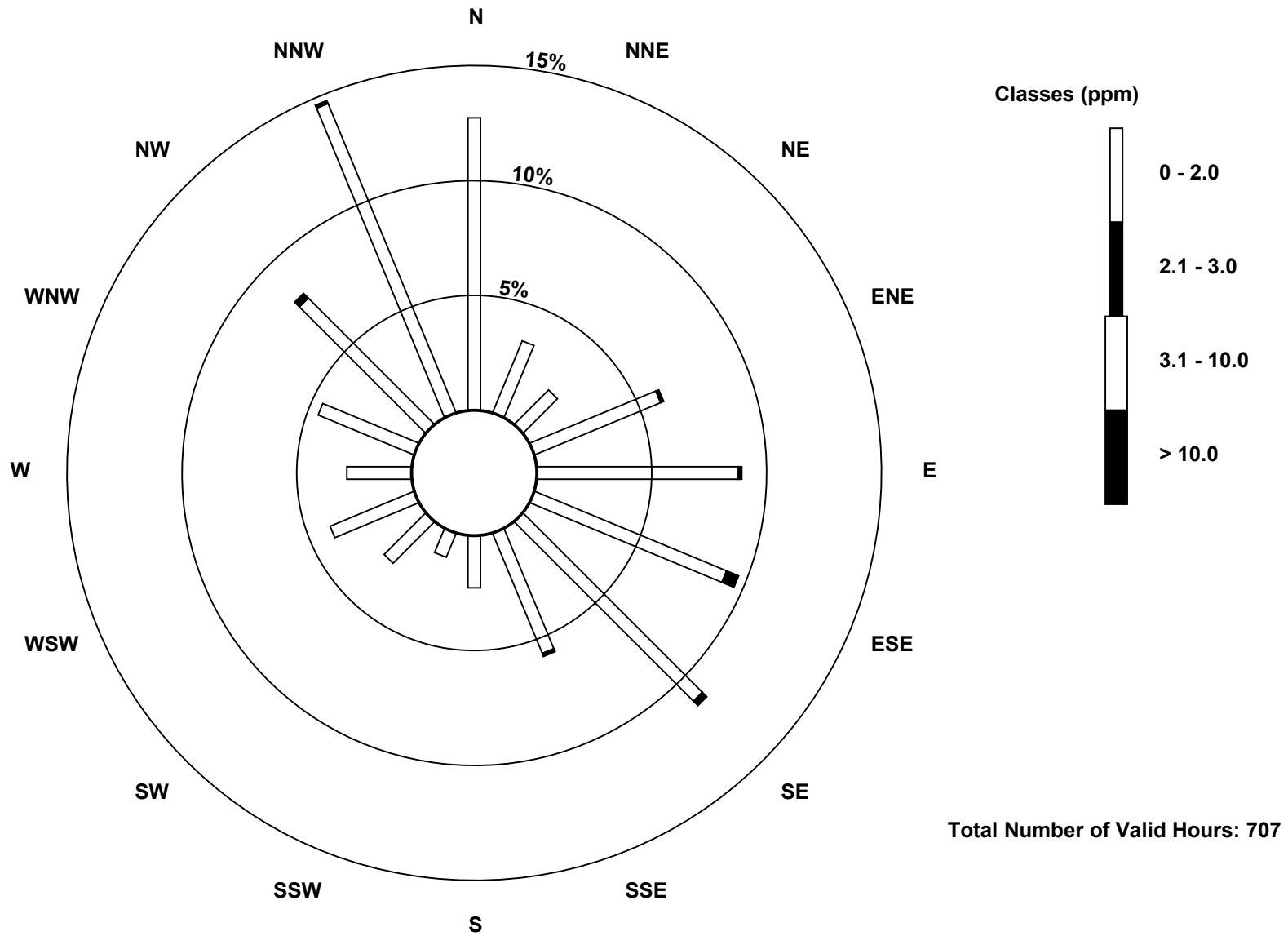
Total Number of Valid Hours: 707

Total Number of Hours: 744



Wood Buffalo Environmental Association  
Wind Rose May 2014

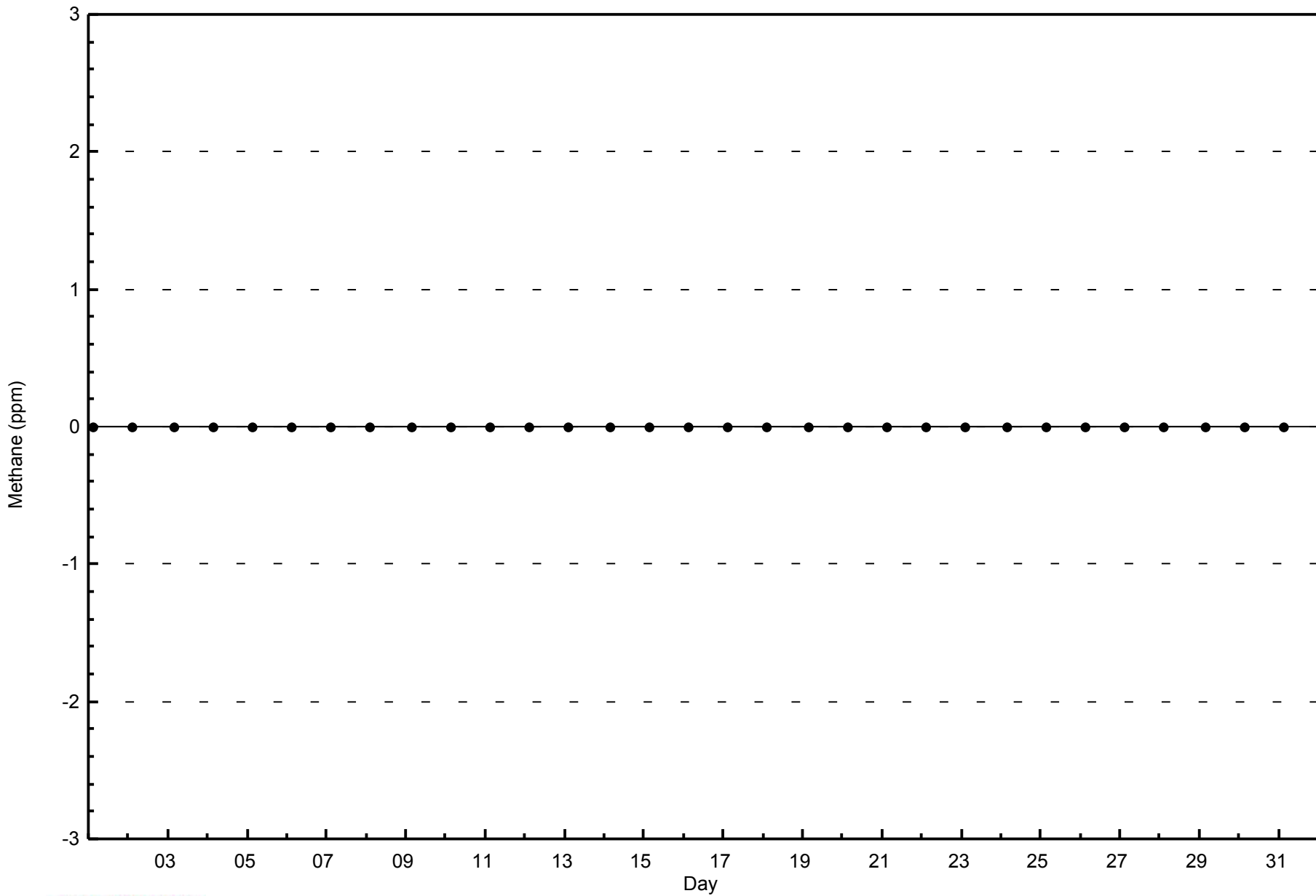
Methane (CH<sub>4</sub>) - ppm  
Athabasca Valley (AMS 7)





WBEA  
Zero Responses

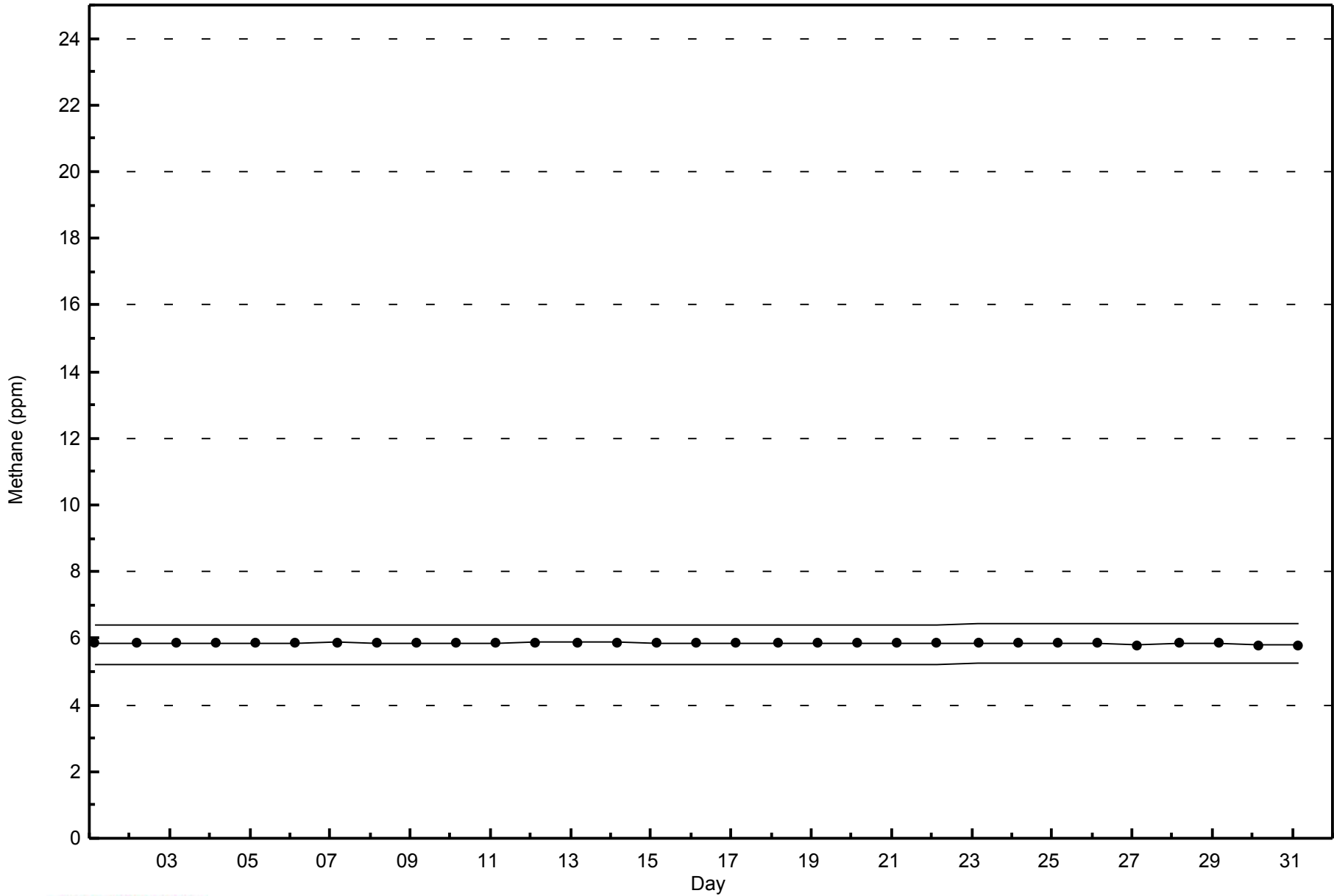
Methane (CH<sub>4</sub>) - ppm  
Athabasca Valley - May 2014





WBEA  
Span Responses

Methane (CH<sub>4</sub>) - ppm  
Athabasca Valley - May 2014





Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 55 ppb on May 16 18:00	Maximum Daily Average: 41.1 ppb on May 19		Hours of Data:	708
Minimum Value: 1 ppb on May 7 05:00	Minimum Daily Average: 11.5 ppb on May 29		Hours of Missing Data:	36
Maximum Diurnal Average: 37.8 ppb at hour 16	Minimum Diurnal Average: 16.3 ppb at hour 5		Hours of Calibration:	35
Monthly Average: 29.2 ppb	Percentiles: P <sub>1</sub> = 3 P <sub>10</sub> = 13 Q <sub>1</sub> = 21 Median = 29 Q <sub>3</sub> = 38 P <sub>90</sub> = 45 P <sub>99</sub> = 53		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-May	35	35	30	Z	17	22	23	28	33	40	43	44	45	46	45	43	43	41	42	40	42	35	29	35	36.3	46
2-May	38	40	41	Z	34	36	35	23	29	34	34	33	32	31	29	30	26	23	21	21	21	22	24	23	29.6	41
3-May	26	27	29	Z	30	31	30	28	28	28	29	27	30	31	33	35	36	37	37	35	33	25	22	20	29.8	37
4-May	18	17	6	Z	2	3	8	16	28	37	39	42	43	44	44	43	44	44	42	40	39	36	34	31	30.4	44
5-May	29	27	24	Z	16	18	23	25	29	31	32	34	38	41	41	40	40	40	42	38	37	36	37	36	32.8	42
6-May	36	36	36	Z	36	24	18	25	31	33	38	39	38	39	40	39	37	38	38	39	27	25	14	15	32.2	40
7-May	16	14	6	Z	1	3	9	15	17	23	34	37	38	38	38	37	37	36	34	32	31	30	31	31	25.6	38
8-May	21	13	15	Z	10	13	15	19	29	34	36	37	39	33	34	35	34	36	33	32	31	23	25	23	26.9	39
9-May	18	16	13	Z	3	10	13	19	23	29	32	31	32	PF	33	33	32	31	29	28	23	23	22	23	23.4	33
10-May	20	24	26	Z	27	26	28	29	29	29	30	28	29	30	30	30	27	24	25	24	20	21	19	18	25.8	30
11-May	17	11	10	Z	5	5	11	24	33	37	37	39	41	42	42	43	41	42	40	39	30	24	22	18	28.4	43
12-May	22	25	23	Z	15	13	18	22	25	35	35	38	42	43	43	43	42	41	41	41	41	42	45	41	33.7	45
13-May	39	29	25	Z	14	15	23	23	25	36	42	45	46	47	48	50	49	49	47	46	45	33	31	29	36.3	50
14-May	26	23	18	Z	23	22	26	32	33	38	44	48	49	50	49	47	46	44	43	37	37	23	28	28	35.8	50
15-May	33	33	29	Z	25	21	16	12	17	22	29	29	30	33	34	32	34	36	32	31	32	29	28	28	28.1	36
16-May	28	26	22	Z	13	11	20	28	38	38	39	43	47	50	53	53	54	55	54	53	43	29	18	23	36.5	55
17-May	24	13	11	Z	17	21	22	24	26	34	46	53	52	53	54	54	53	52	52	48	45	44	41	39	38.1	54
18-May	36	27	22	Z	13	25	33	34	36	39	44	47	48	43	44	48	49	46	46	42	36	24	21	26	36.1	49
19-May	37	33	32	Z	26	26	31	30	32	45	51	50	51	50	50	50	49	48	46	45	47	44	39	33	41.1	51
20-May	35	32	31	Z	26	24	26	27	37	46	45	47	48	46	45	43	39	36	37	29	37	37	31	33	36.4	48
21-May	29	32	28	Z	11	14	20	23	C	C	C	C	42	36	41	51	53	53	50	45	41	25	21	16	33.2	53
22-May	11	9	15	Z	15	14	19	24	26	37	41	39	32	33	31	32	36	35	33	26	16	10	14	15	24.5	41
23-May	14	13	11	Z	10	9	12	16	19	22	28	38	45	49	49	49	47	50	48	45	39	31	36	35	31.1	50
24-May	34	33	31	Z	23	22	27	30	30	32	33	33	30	26	22	19	20	20	22	23	17	12	8	7	24.2	34
25-May	4	2	1	Z	1	2	3	4	9	17	20	24	27	29	29	30	28	28	31	30	26	25	24	24	18.1	31
26-May	25	22	20	Z	23	21	16	16	20	20	13	17	13	14	19	24	23	22	24	24	25	25	25	25	20.7	25
27-May	26	25	24	Z	22	21	18	19	20	23	23	24	23	24	21	21	22	21	21	20	20	19	17	16	21.4	26
28-May	15	17	16	Z	13	7	9	14	21	24	25	29	29	28	27	28	29	28	28	27	25	24	22	20	22.0	29
29-May	18	17	17	Z	14	13	14	12	8	6	3	5	4	3	4	10	10	13	11	13	16	19	18	16	11.5	19
30-May	16	15	13	Z	18	20	20	21	26	29	31	34	34	32	31	35	34	29	28	27	17	9	18	18	24.2	35
31-May	12	7	9	Z	2	6	11	13	24	31	32	37	41	43	43	44	45	43	45	44	43	40	38	36	29.9	45

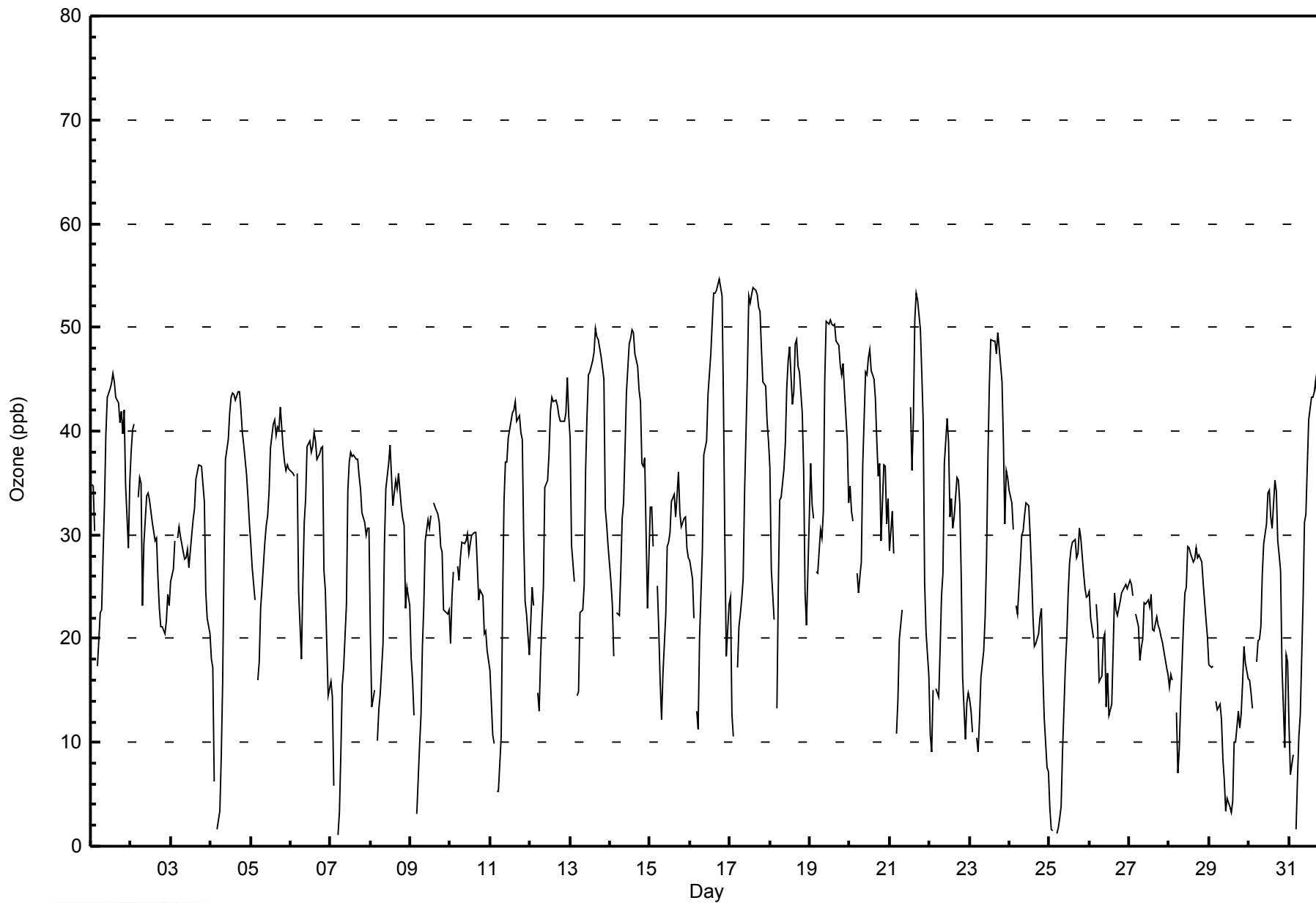
24.3	22.3	20.5	--	16.3	16.8	19.2	21.8	26.1	31.1	33.6	35.7	36.7	36.9	36.9	37.8	37.4	36.8	36.2	34.3	31.6	27.7	25.8	25.3	Diurnal Average	
39	40	41	--	36	36	35	34	38	46	51	53	52	53	54	54	54	55	54	53	47	44	45	41	Diurnal Maximum	

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



WBEA  
Hourly Averages

Ozone (O<sub>3</sub>) - ppb  
Athabasca Valley - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Ozone (O<sub>3</sub>) - ppb**  
**Athabasca Valley - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	168	23.73	23.73
21 - 50	521	73.59	97.32
51 - 82	19	2.68	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Ozone (O<sub>3</sub>) - ppb**  
**Athabasca Valley - May 2014**

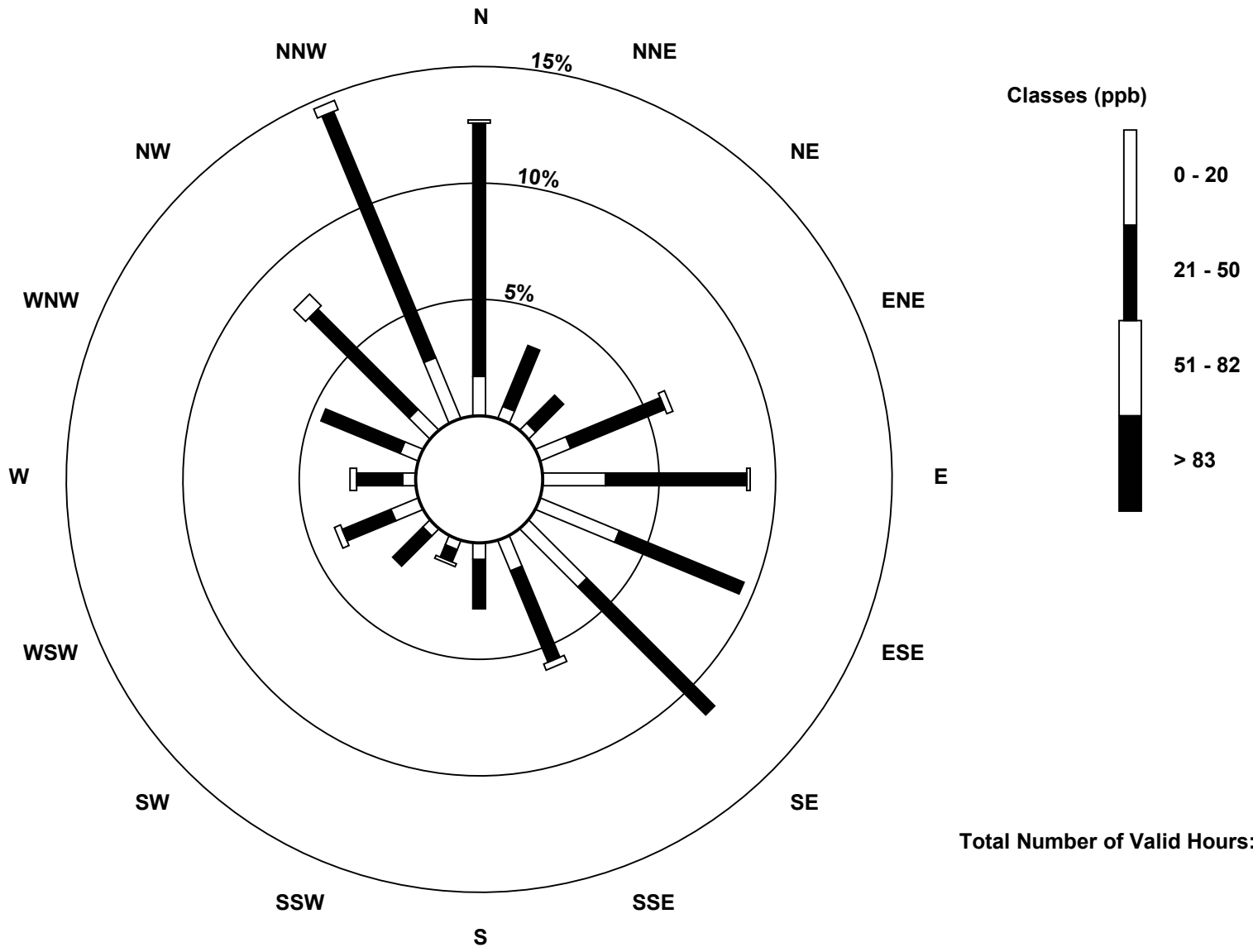
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	12	4	3	10	19	26	25	10	5	3	3	9	4	6	9	20	168
21 - 50	77	20	12	31	43	41	55	30	15	4	13	16	14	26	43	81	521
51 - 82	1	0	0	2	1	0	0	2	0	1	0	2	2	0	5	3	19
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	90	24	15	43	63	67	80	42	20	8	16	27	20	32	57	104	708

Total Number of Valid Hours: 708

Total Number of Hours: 744

Wood Buffalo Environmental Association  
 Wind Rose May 2014

Ozone (O<sub>3</sub>) - ppb  
 Athabasca Valley (AMS 7)



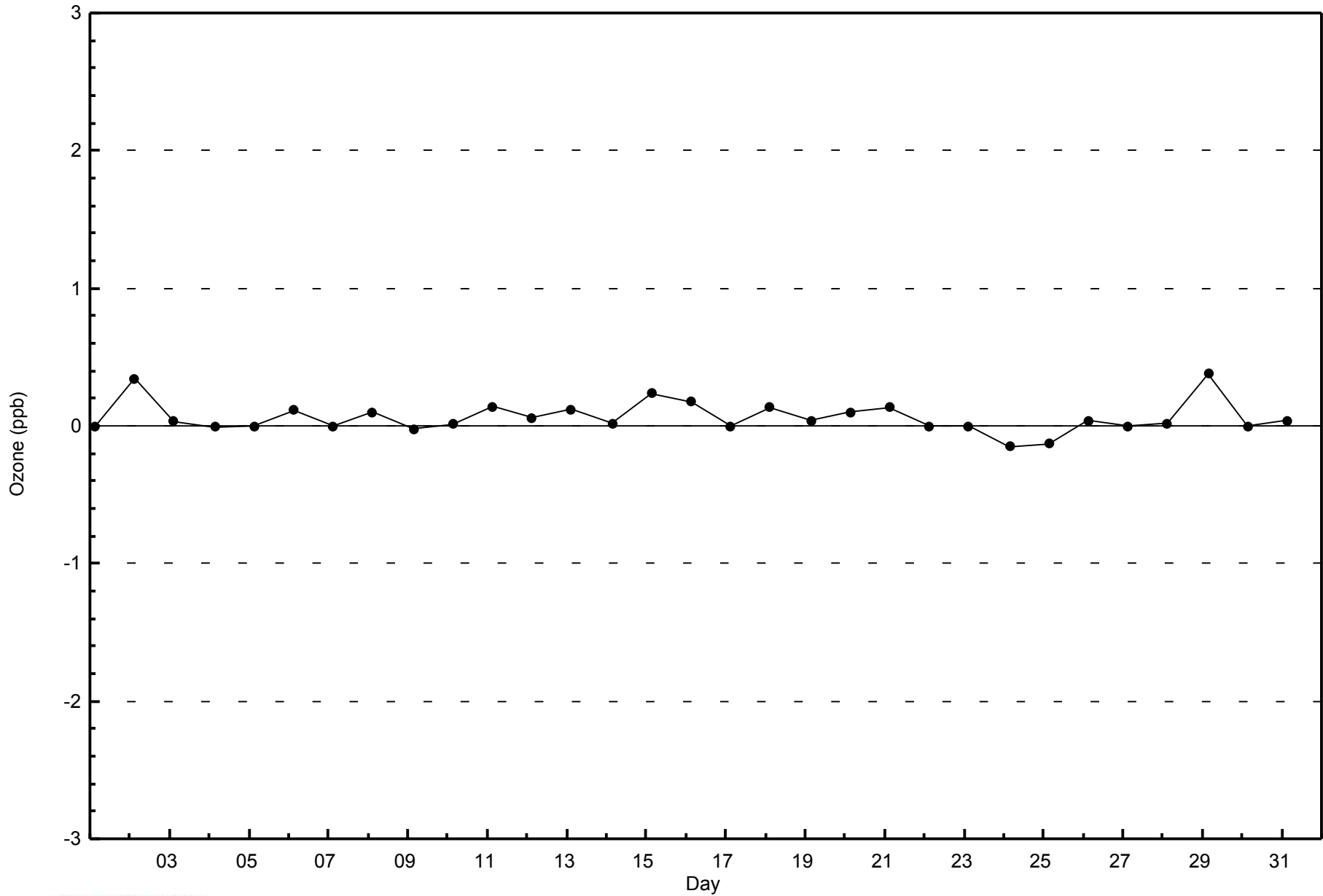
Total Number of Valid Hours: 708





WBEA  
Zero Responses

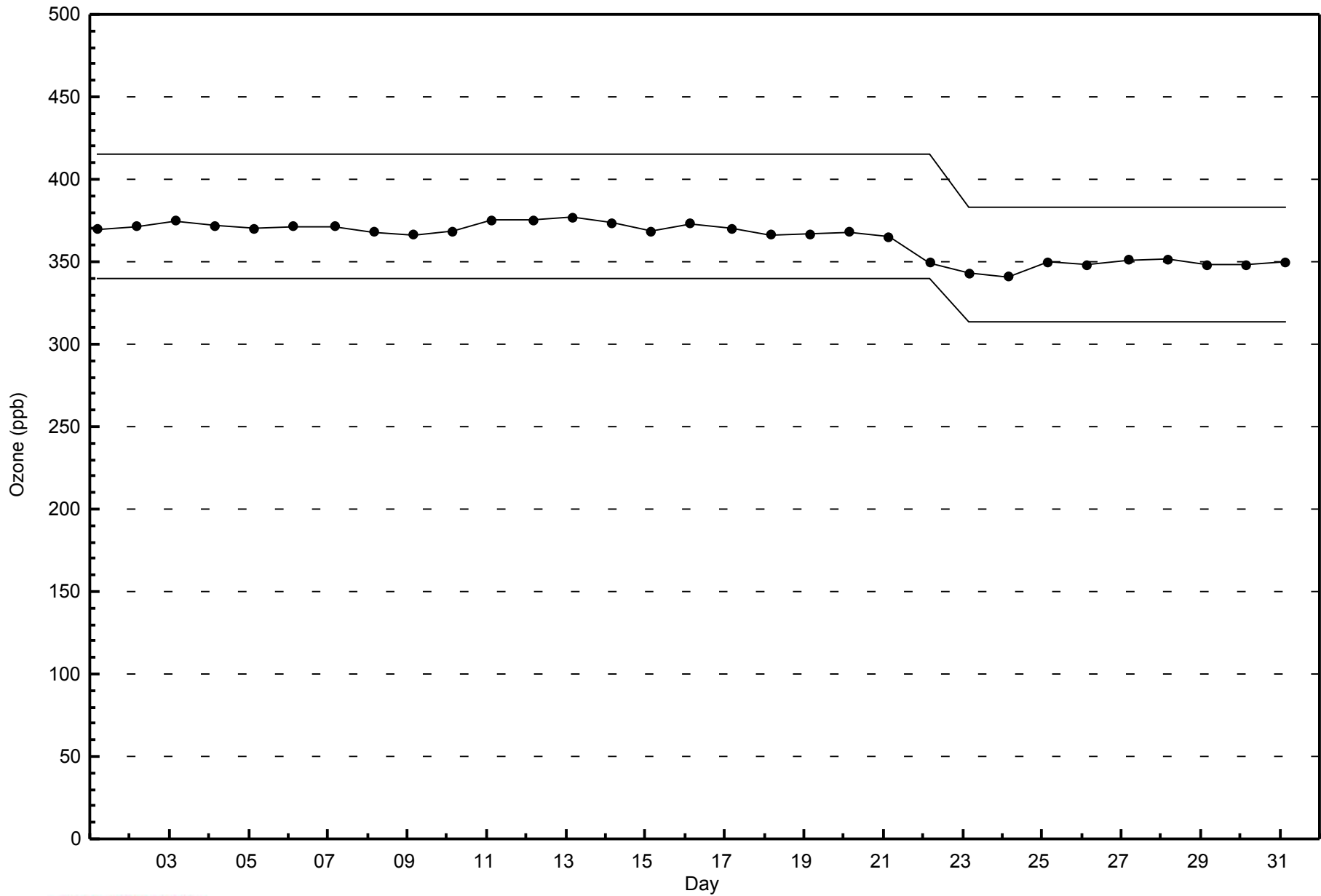
Ozone (O<sub>3</sub>) - ppb  
Athabasca Valley - May 2014





WBEA  
Span Responses

Ozone (O<sub>3</sub>) - ppb  
Athabasca Valley - May 2014



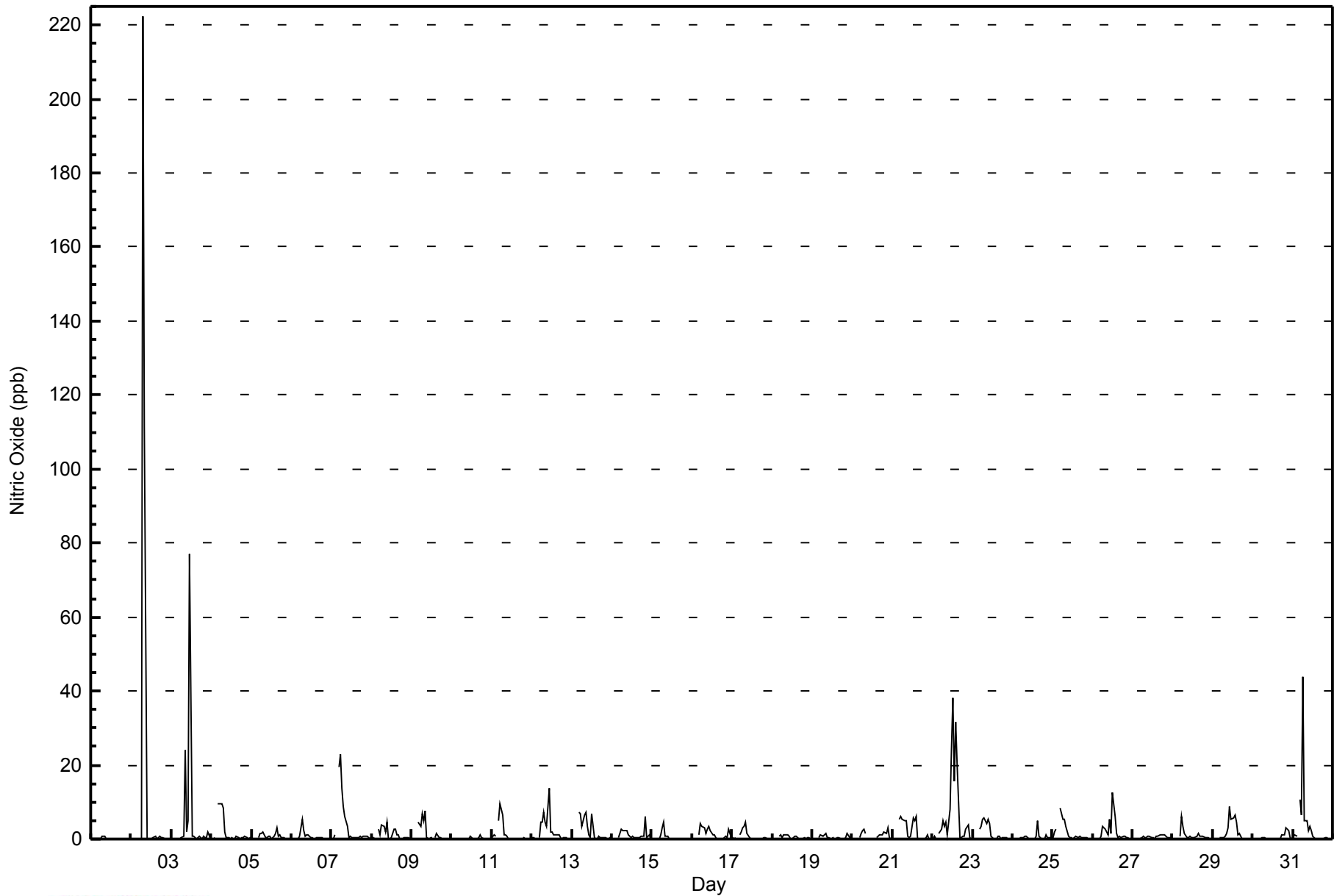


Maximum Value: 223 ppb on May 2 08:00														Maximum Daily Average: 14.7 ppb on May 2														Hours in Service: 744											
Minimum Value: 0 ppb on May 1 06:00														Minimum Daily Average: 0.1 ppb on May 1														Hours of Data: 707											
Maximum Diurnal Average: 10.2 ppb at hour 8														Minimum Diurnal Average: 0.1 ppb at hour 24														Hours of Missing Data: 37											
Monthly Average: 2.0 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> = 4 P <sub>99</sub> = 20														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-May	0	0	0	Z	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1													
2-May	0	0	0	Z	0	0	0	223	112	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	14.7	223													
3-May	0	0	0	Z	0	0	0	1	24	2	5	77	1	1	0	0	0	1	0	1	1	0	2	0	5.0	77													
4-May	0	0	0	Z	10	9	10	8	2	0	0	0	0	0	1	0	0	0	0	0	1	0	0	1	1.9	10													
5-May	0	0	0	Z	0	2	2	2	1	0	1	1	0	1	2	3	1	1	0	0	0	0	0	0	0.7	3													
6-May	0	0	0	Z	0	1	5	2	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0.6	5													
7-May	0	0	1	Z	19	23	14	9	6	4	0	1	1	0	0	1	0	1	0	1	1	1	0	0	3.6	23													
8-May	1	0	0	Z	2	1	4	3	2	4	0	0	0	3	3	1	1	0	0	0	0	0	1	0	1.2	4													
9-May	0	0	0	Z	5	3	7	5	8	0	0	0	1	PF	0	2	1	0	0	0	0	0	0	0	1.4	8													
10-May	0	0	0	Z	0	0	0	0	0	0	0	1	1	0	0	0	1	1	0	0	0	0	0	0	0.1	1													
11-May	0	1	1	Z	5	10	6	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.2	10													
12-May	0	0	0	Z	0	4	4	7	5	4	14	2	2	1	1	1	1	1	0	0	0	0	0	0	2.1	14													
13-May	0	0	0	Z	7	7	3	6	7	3	1	0	7	1	0	0	1	0	0	0	0	0	0	0	2.0	7													
14-May	0	0	0	Z	0	3	2	2	2	2	1	0	1	0	0	0	0	1	1	1	6	0	1	0	1.1	6													
15-May	0	0	0	Z	0	1	3	4	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	4													
16-May	0	0	0	Z	1	4	3	3	2	3	3	2	1	1	0	0	0	0	0	0	1	0	3	0	1.2	4													
17-May	0	0	0	Z	1	2	3	3	5	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	5													
18-May	0	0	0	Z	1	1	0	1	1	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0.4	1													
19-May	0	0	0	Z	0	1	1	1	1	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0.4	1													
20-May	0	0	0	Z	0	2	2	3	1	C	C	C	C	C	0	1	1	1	1	1	2	2	3	1	0	1.1	3												
21-May	0	0	0	Z	5	6	5	5	5	1	0	1	6	5	6	0	0	0	0	0	0	1	0	0	2.0	6													
22-May	0	1	0	Z	2	3	5	3	5	1	8	25	38	16	32	20	0	0	1	1	3	4	0	0	7.2	38													
23-May	0	0	0	Z	3	3	5	6	4	5	4	1	0	0	0	1	1	0	0	0	0	0	0	0	1.5	6													
24-May	0	0	0	Z	0	0	0	1	1	0	0	0	0	0	1	5	1	0	0	0	1	1	0	0	0.5	5													
25-May	1	2	3	Z	8	7	5	5	3	1	0	0	0	0	1	0	1	0	0	0	1	0	0	0	1.7	8													
26-May	0	0	0	Z	0	1	3	3	2	1	5	2	13	6	1	0	1	0	1	1	0	0	0	0	1.8	13													
27-May	0	0	0	Z	0	0	1	0	0	1	1	0	0	0	1	1	1	1	1	1	1	1	0	0	0.5	1													
28-May	0	0	0	Z	1	6	3	1	1	0	1	0	0	0	1	2	1	1	1	1	0	0	0	0	0.9	6													
29-May	0	0	0	Z	0	0	0	1	1	3	9	5	6	7	4	1	1	0	0	0	0	0	0	0	1.8	9													
30-May	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	3	2	0	0	0.4	3													
31-May	1	1	1	Z	11	7	44	5	5	2	4	2	1	0	0	0	0	0	0	0	0	0	0	0	3.6	44													
														0.1	0.2	0.2	--	2.7	3.5	4.7	10.2	6.8	1.5	2.0	4.1	2.6	1.5	1.8	1.3	0.5	0.4	0.3	0.4	0.7	0.5	0.3	0.1	Diurnal Average	
														1	2	3	--	19	23	44	223	112	5	14	77	38	16	32	20	1	1	1	2	6	4	3	1	Diurnal Maximum	
Z - zerospan														C - Calibration				PF - Power Failure																					



**WBEA**  
**Hourly Averages**

**Nitric Oxide (NO) - ppb**  
**Athabasca Valley - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb**  
**Athabasca Valley - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	698	98.73	98.73
21 - 40	5	0.71	99.43
41 - 80	2	0.28	99.72
81 - 159	1	0.14	99.86
> 159	1	0.14	100.00

Total Number of Valid Hours: 707  
Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Nitric Oxide (NO) - ppb**  
**Athabasca Valley - May 2014**

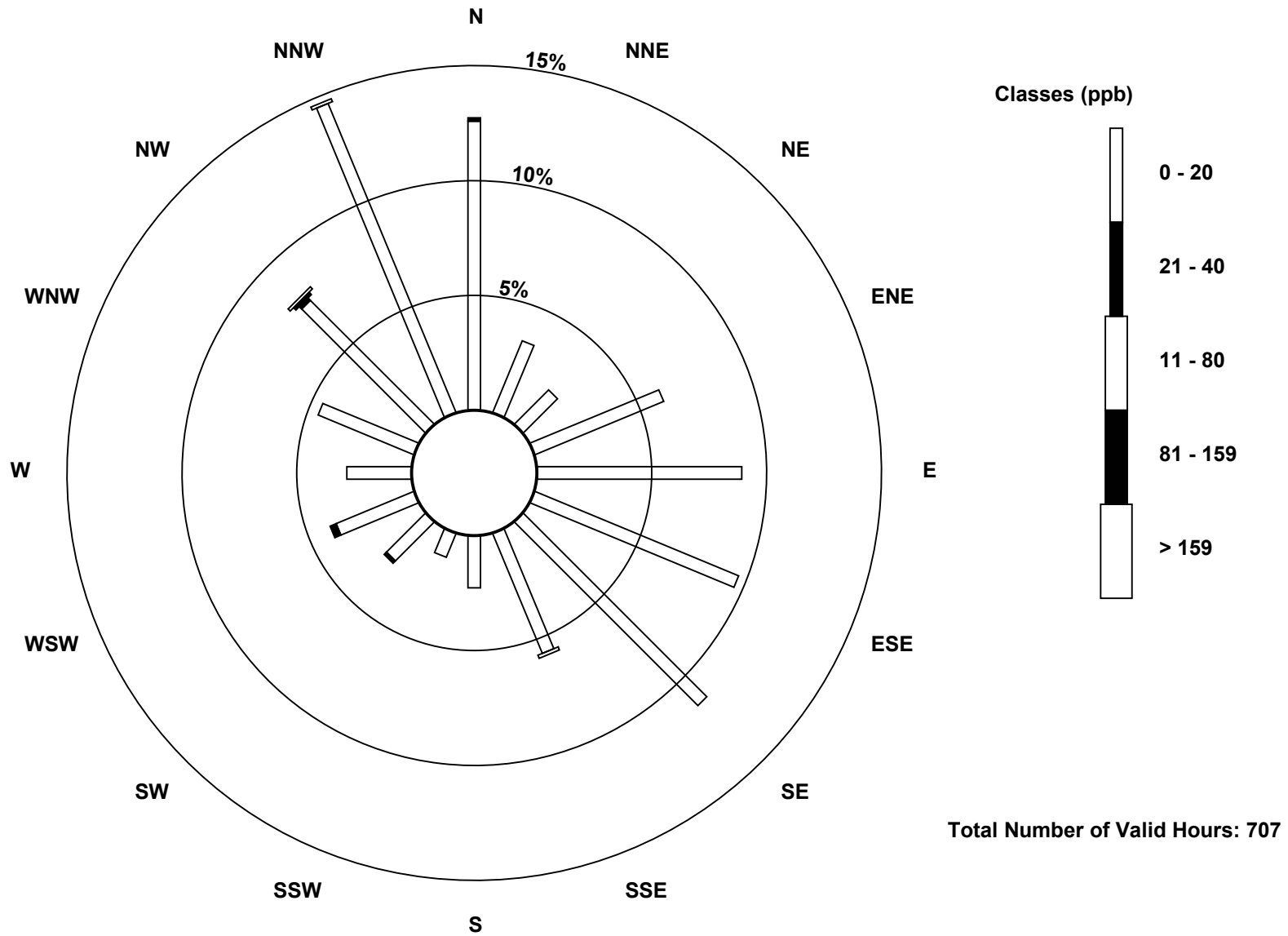
Concentration Ranges (ppb)	Wind Direction																Totals	
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW		
0 - 20	89	24	15	43	63	68	80	40	16	8	17	26	20	32	54	103	698	
21 - 40	1	0	0	0	0	0	0	0	0	0	0	1	2	0	0	1	0	5
11 - 80	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	2
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
<b>Totals</b>	90	24	15	43	63	68	80	41	16	8	18	28	20	32	57	104	707	

Total Number of Valid Hours: 707

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

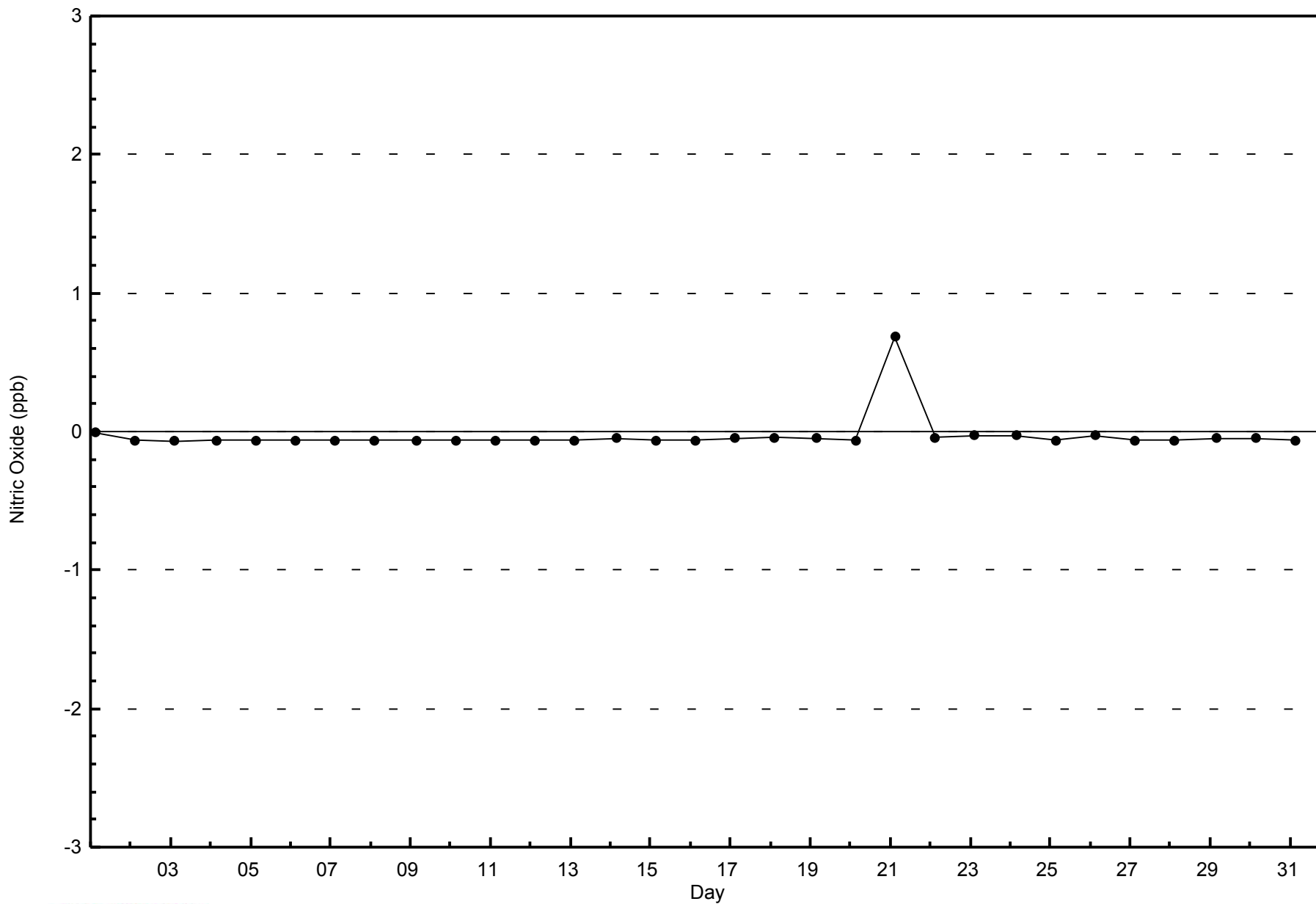
**Nitric Oxide (NO) - ppb  
Athabasca Valley (AMS 7)**





WBEA  
Zero Responses

Nitric Oxide (NO) - ppb  
Athabasca Valley - May 2014

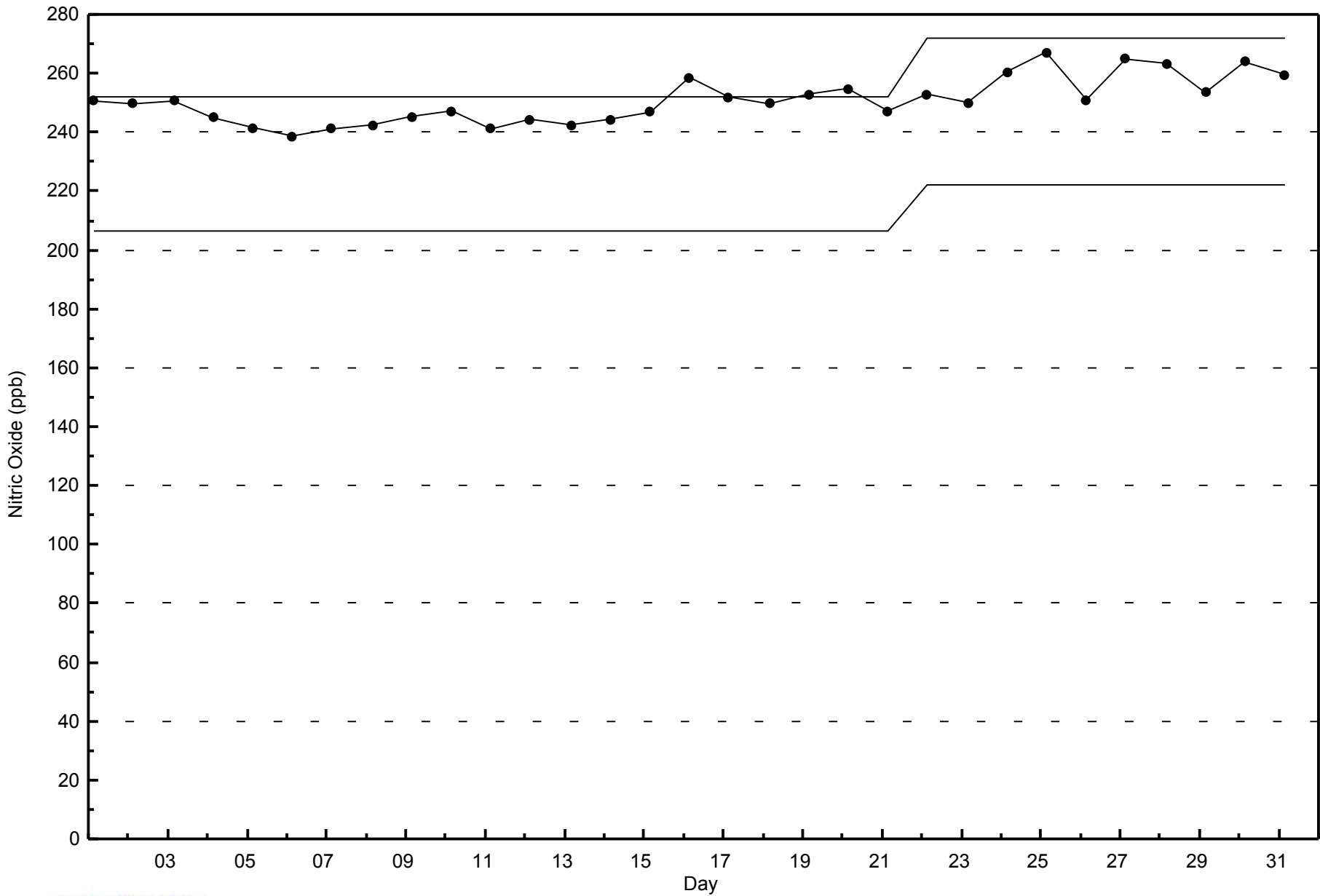






WBEA  
Span Responses

Nitric Oxide (NO) - ppb  
Athabasca Valley - May 2014





Wood Buffalo Environmental Association

Summary of Hour Averages

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

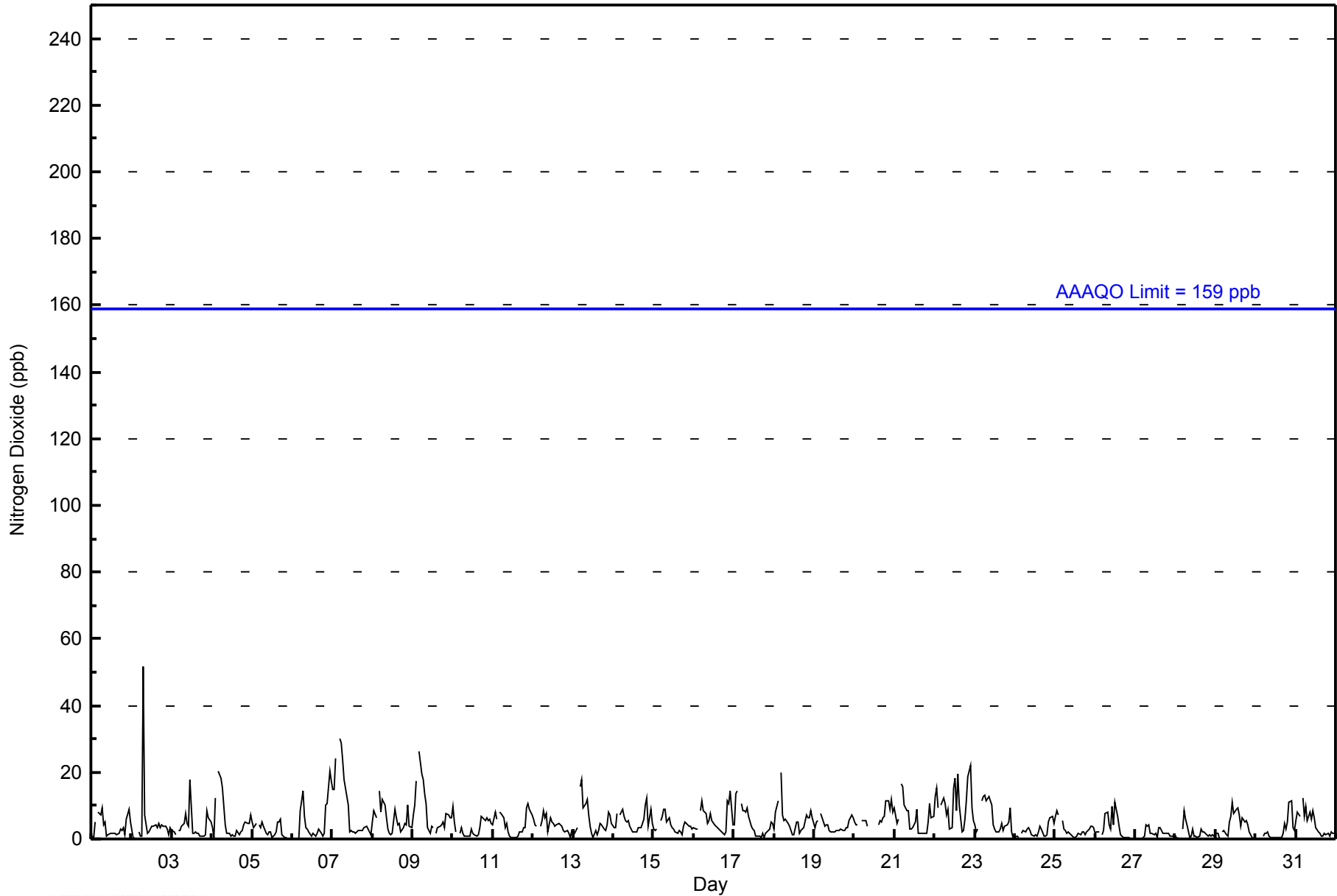
Athabasca Valley - May 2014

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																	
Maximum Value: 52 ppb on May 2 08:00										Maximum Daily Average: 10.5 ppb on May 22										Hours of Data: 707							
Minimum Value: 0 ppb on May 5 23:00										Minimum Daily Average: 1.6 ppb on May 27										Hours of Missing Data: 37							
Maximum Diurnal Average: 8.6 ppb at hour 5										Minimum Diurnal Average: 2.8 ppb at hour 16										Hours of Calibration: 36							
Monthly Average: 4.8 ppb										Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 1 Q <sub>1</sub> = 2 Median = 3 Q <sub>3</sub> = 6 P <sub>90</sub> = 10 P <sub>99</sub> = 21										Percent Operational Time: 99.9							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-May	1	0	5	Z	8	7	9	4	5	1	1	2	2	2	2	1	2	3	3	3	1	6	9	5	3.6	9	
2-May	2	0	1	Z	2	1	1	52	7	2	2	3	4	4	4	3	5	3	4	4	4	3	1	3	5.1	52	
3-May	3	2	1	Z	3	3	4	5	8	5	4	18	2	2	2	2	2	1	1	1	1	9	6	5	3.7	18	
4-May	4	1	12	Z	21	18	15	10	4	2	2	1	1	1	1	3	1	2	3	4	5	5	7	5.5	21		
5-May	5	3	5	Z	4	4	5	4	2	1	2	2	0	1	2	5	5	6	1	0	0	0	0	0	2.5	6	
6-May	0	0	0	Z	0	9	14	7	3	3	2	1	2	1	1	2	3	2	1	2	10	11	20	17	4.8	20	
7-May	15	15	24	Z	30	29	24	18	15	10	2	3	2	2	2	2	3	3	3	4	4	3	2	1	9.3	30	
8-May	5	8	6	Z	15	8	12	10	6	3	2	1	2	9	7	4	5	2	3	5	4	10	4	3	5.8	15	
9-May	7	10	18	Z	26	20	18	14	11	3	2	4	3	PF	2	4	4	4	5	3	8	7	7	6	8.4	26	
10-May	10	5	2	Z	2	3	2	1	1	1	1	3	2	1	1	1	3	7	6	5	7	5	6	5	3.4	10	
11-May	4	8	6	Z	8	8	6	3	5	2	1	0	0	1	1	1	2	2	3	4	9	11	9	7	4.4	11	
12-May	6	4	4	Z	4	5	8	7	8	2	6	5	5	4	4	5	4	4	3	2	3	2	0	3	4.2	8	
13-May	2	2	4	Z	16	18	9	11	12	7	4	2	1	3	1	2	5	4	3	2	4	8	7	5	5.7	18	
14-May	3	3	8	Z	7	9	7	6	5	5	4	2	2	2	2	3	3	5	6	10	12	4	9	5	5.4	12	
15-May	3	3	3	Z	5	7	9	9	5	6	4	3	3	2	2	3	2	1	4	5	4	4	4	3	4.1	9	
16-May	3	3	3	Z	8	12	8	8	5	6	8	6	4	4	4	3	3	2	1	2	11	11	15	4	5.8	15	
17-May	4	13	15	Z	11	9	9	8	9	7	4	3	3	1	1	1	0	2	0	2	2	3	5	5	5.0	15	
18-May	3	8	12	Z	20	7	6	6	5	4	3	1	1	5	5	2	2	3	4	7	6	6	8	6	5.7	20	
19-May	4	5	5	Z	8	7	4	4	4	3	2	2	2	3	2	3	3	3	3	3	3	3	5	7	7	4.0	8
20-May	5	4	4	Z	5	6	6	6	4	C	C	C	C	C	4	6	5	7	7	11	12	9	12	8	6.7	12	
21-May	10	5	6	Z	17	16	10	9	9	3	3	3	5	9	2	2	2	2	2	2	5	11	6	7	6.2	17	
22-May	13	15	9	Z	10	12	11	7	9	3	3	15	18	8	20	10	2	3	6	12	19	22	9	6	10.5	22	
23-May	4	2	3	Z	11	13	13	12	13	11	10	4	3	2	2	3	5	3	4	4	5	9	2	0	6.0	13	
24-May	0	1	0	Z	2	3	2	3	4	3	1	1	1	1	2	4	3	1	1	1	5	6	7	5	2.4	7	
25-May	7	9	7	Z	6	3	2	2	2	1	1	1	1	1	1	2	1	2	2	1	2	3	4	4	3	2.8	9
26-May	2	2	2	Z	1	3	8	8	4	3	10	4	11	7	4	1	1	1	1	0	1	0	0	0	3.2	11	
27-May	0	0	0	Z	0	1	4	4	4	2	2	1	2	0	4	3	2	2	2	2	2	1	1	1	1.6	4	
28-May	1	0	1	Z	3	9	6	4	1	1	3	1	1	1	1	3	2	2	2	1	1	1	1	1	1.9	9	
29-May	2	2	0	Z	2	3	1	1	5	7	11	8	9	10	7	4	6	5	6	4	2	1	1	0	4.1	11	
30-May	0	0	0	Z	1	2	2	2	1	1	1	0	1	1	0	1	2	5	3	5	11	11	4	3	2.3	11	
31-May	6	8	7	Z	12	7	10	6	8	6	9	6	4	2	2	1	1	2	1	2	1	2	2	2	4.5	12	
4.3 4.6 5.5 -- 8.6 8.3 7.9 8.0 5.8 3.8 3.6 3.6 3.2 3.0 3.0 2.8 2.9 2.9 2.9 3.7 5.4 6.1 5.6 4.2																								Diurnal Average			
15 15 24 -- 30 29 24 52 15 11 11 18 18 10 20 10 6 7 7 12 19 22 20 17																								Diurnal Maximum			
Z - zerospan C - Calibration PF - Power Failure																											
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb																											



WBEA  
Hourly Averages

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Athabasca Valley - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Athabasca Valley - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	699	98.87	98.87
21 - 40	7	0.99	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: 707

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Athabasca Valley - May 2014**

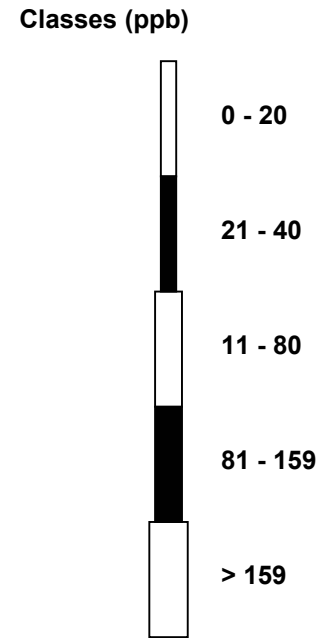
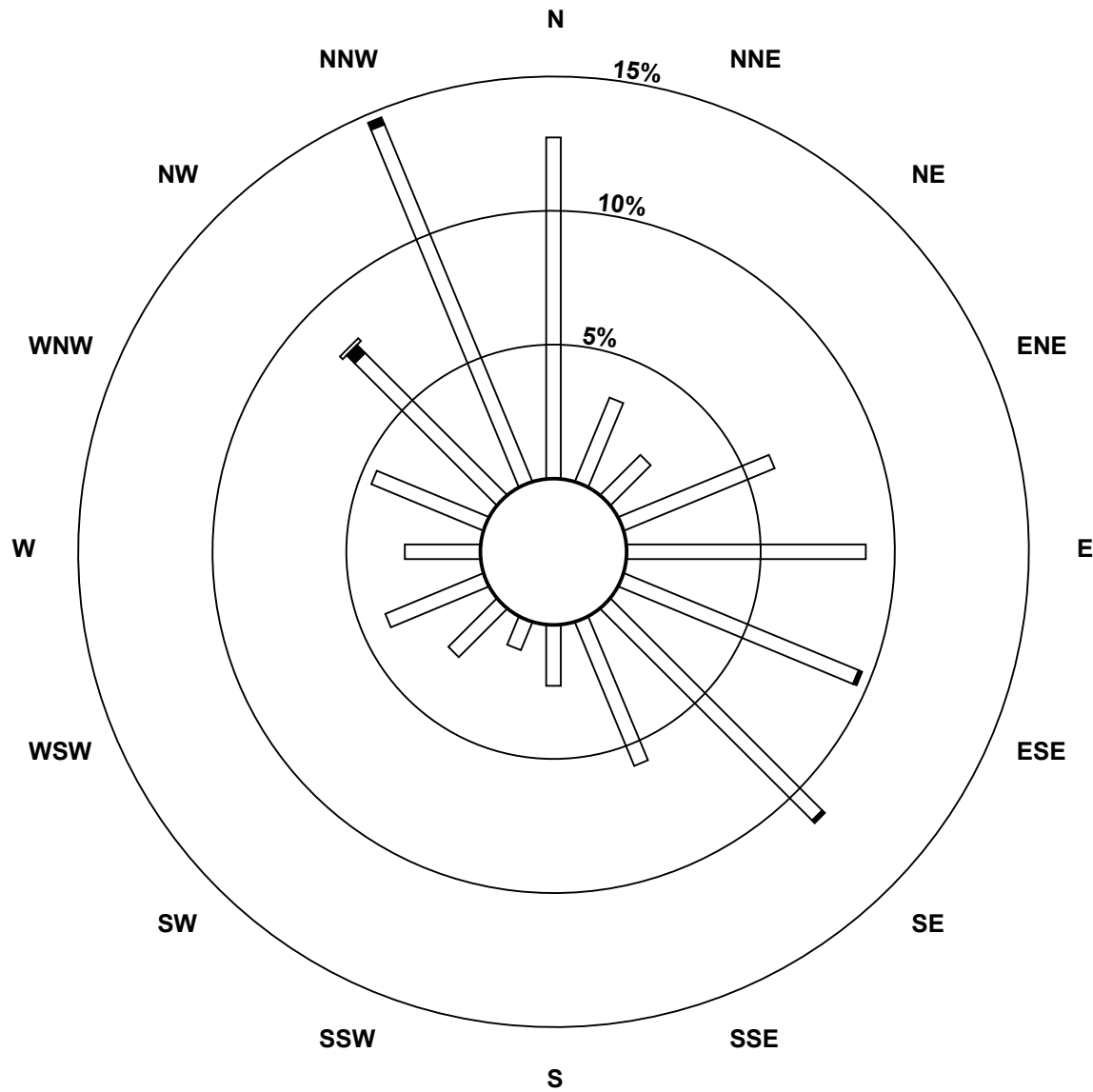
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	90	24	15	43	63	67	79	41	16	8	18	28	20	32	53	102	699
21 - 40	0	0	0	0	0	1	1	0	0	0	0	0	0	0	3	2	7
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	90	24	15	43	63	68	80	41	16	8	18	28	20	32	57	104	707

Total Number of Valid Hours: 707

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Athabasca Valley (AMS 7)**

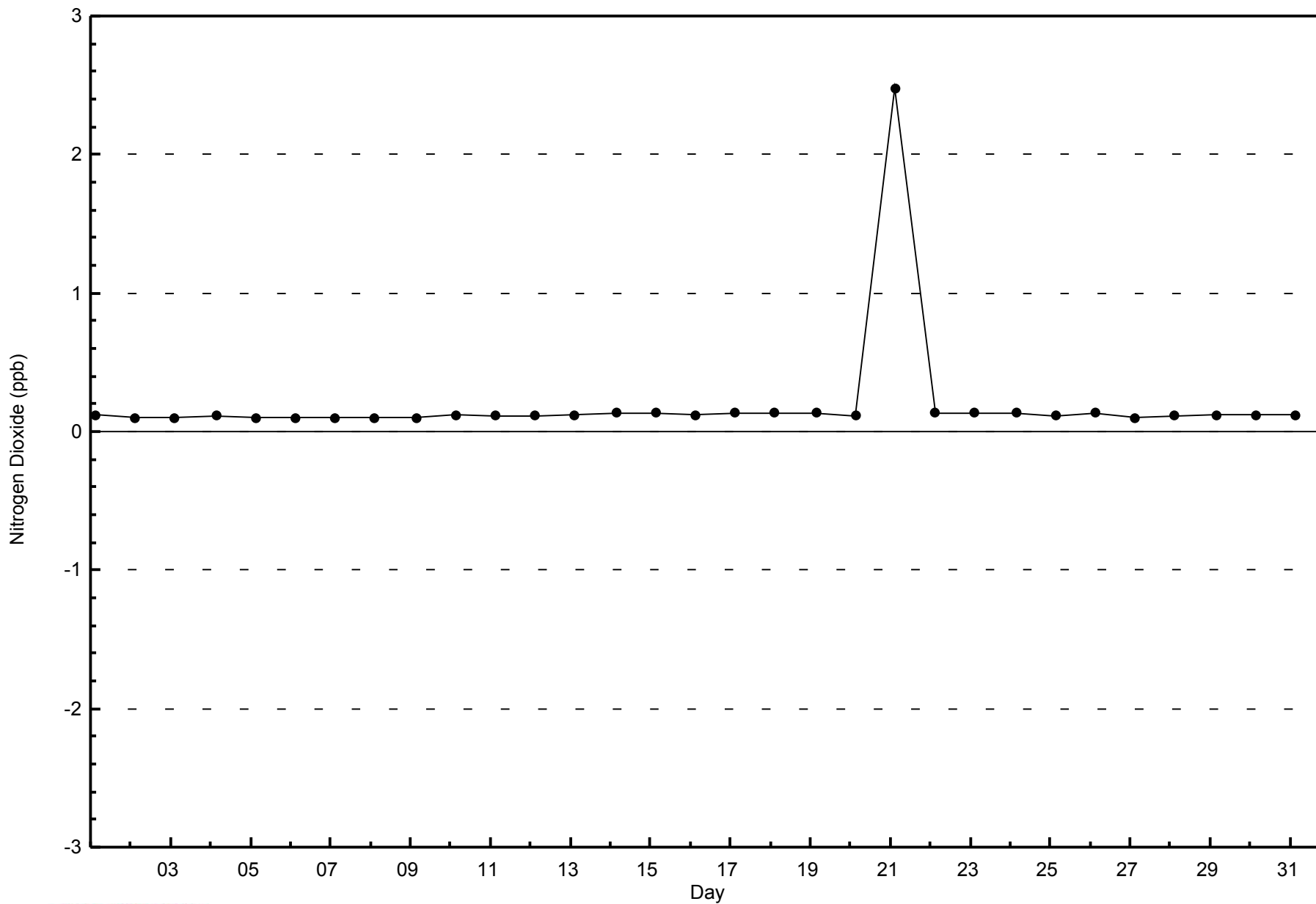


**Total Number of Valid Hours: 707**



WBEA  
Zero Responses

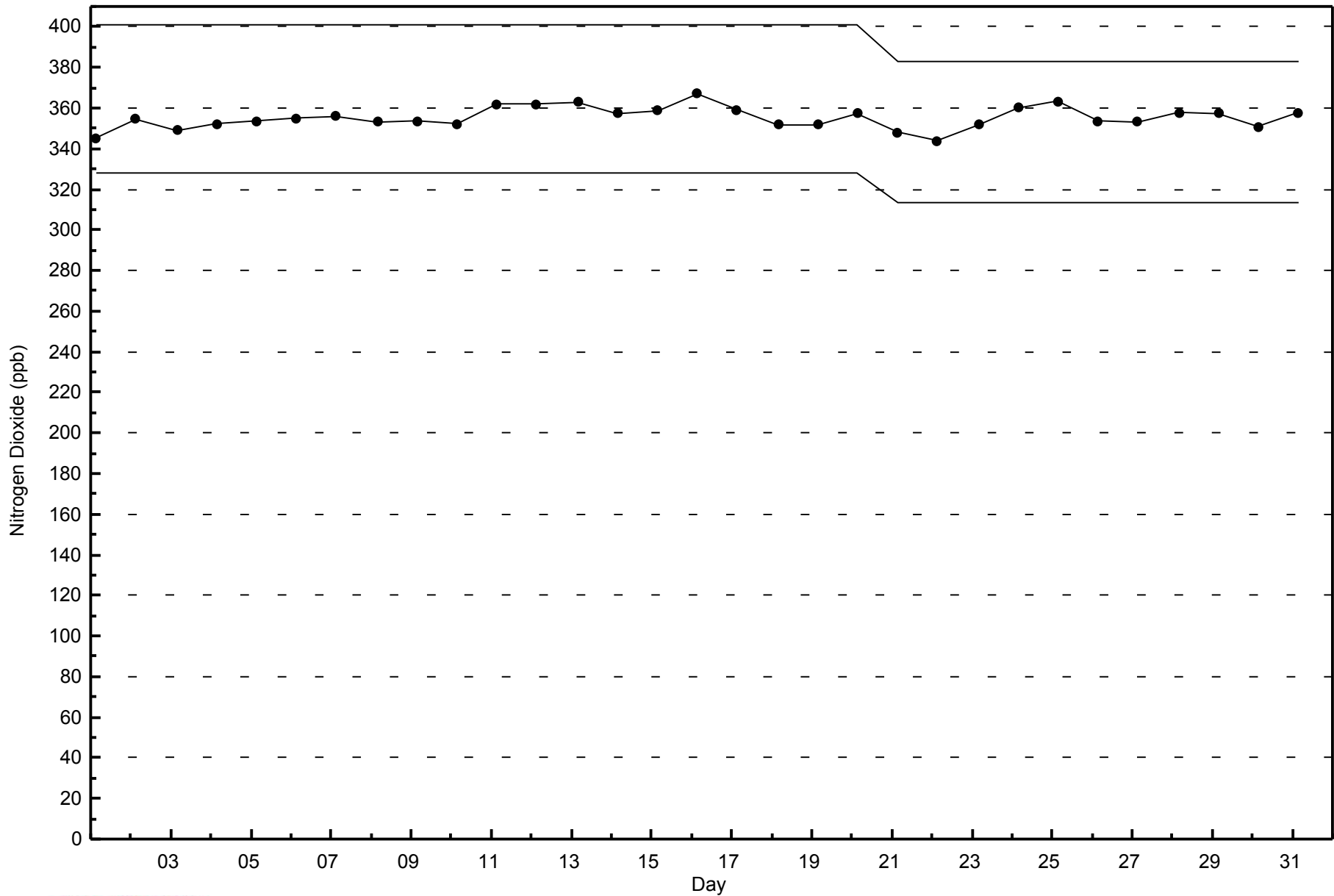
Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Athabasca Valley - May 2014





WBEA  
Span Responses

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Athabasca Valley - May 2014







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

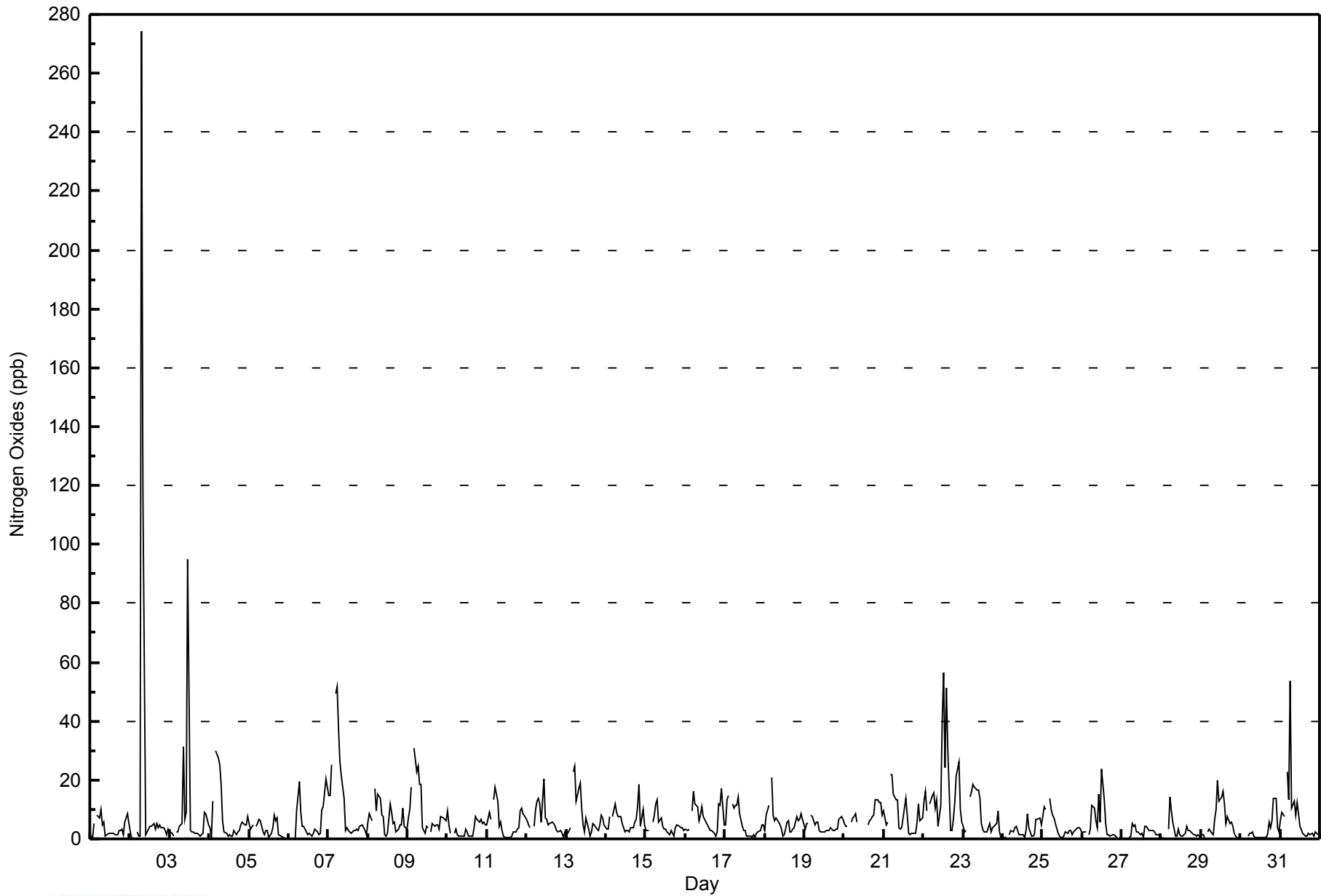
**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Athabasca Valley - May 2014**

Maximum Value: 274 ppb on May 2 08:00																		Maximum Daily Average: 19.7 ppb on May 2						Hours in Service: 744		
Minimum Value: 0 ppb on May 6 00:00																		Minimum Daily Average: 2.2 ppb on May 27						Hours of Data: 707		
Maximum Diurnal Average: 18.2 ppb at hour 8																		Minimum Diurnal Average: 3.2 ppb at hour 19						Hours of Missing Data: 37		
Monthly Average: 6.8 ppb																		Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 1 Q <sub>1</sub> = 2 Median = 4 Q <sub>3</sub> = 8 P <sub>90</sub> = 14 P <sub>99</sub> = 51						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-May	1	0	5	Z	8	7	10	5	6	1	1	2	2	2	2	1	2	3	3	3	1	6	9	5	3.7	10
2-May	2	0	1	Z	2	1	1	274	119	2	2	3	4	4	5	3	5	4	5	4	4	3	1	3	19.7	274
3-May	3	2	1	Z	2	3	4	5	31	6	9	95	3	2	2	2	2	2	1	2	2	9	8	5	8.8	95
4-May	4	1	13	Z	30	28	25	18	6	2	2	1	1	1	1	3	2	2	3	5	6	5	5	8	7.4	30
5-May	5	3	5	Z	4	5	7	6	2	2	3	3	0	2	4	8	6	7	1	1	0	0	0	0	3.3	8
6-May	0	0	0	Z	0	10	20	9	4	4	3	1	2	2	1	2	3	2	1	2	10	11	20	18	5.5	20
7-May	15	15	25	Z	49	52	37	26	21	14	3	4	3	2	2	3	3	3	3	4	5	4	3	1	12.9	52
8-May	6	9	6	Z	17	9	15	14	8	7	2	1	2	12	9	5	6	2	3	5	5	10	4	3	7.0	17
9-May	7	10	18	Z	31	23	25	19	18	4	2	4	4	PF	2	5	4	5	5	3	8	7	7	6	9.8	31
10-May	10	5	2	Z	2	3	1	1	1	1	1	3	2	1	1	1	4	8	7	5	6	5	6	5	3.6	10
11-May	5	9	7	Z	13	17	13	4	6	3	1	0	0	0	1	1	2	2	3	4	9	11	9	7	5.5	17
12-May	6	5	4	Z	4	10	13	14	12	6	20	7	7	5	5	6	5	4	3	2	3	2	0	3	6.3	20
13-May	2	2	4	Z	23	25	13	17	19	10	5	2	7	3	1	2	5	5	3	3	5	8	7	5	7.7	25
14-May	3	3	7	Z	7	12	9	8	8	8	5	3	3	3	3	4	4	6	7	11	19	4	10	5	6.5	19
15-May	3	3	3	Z	5	8	12	13	6	7	4	3	3	2	2	3	2	1	4	5	4	4	4	3	4.5	13
16-May	3	3	3	Z	10	16	12	11	6	8	11	8	6	5	4	3	3	2	1	2	12	11	17	5	7.0	17
17-May	5	13	15	Z	12	10	12	11	14	9	4	3	3	1	1	1	0	2	1	2	3	3	5	5	5.8	15
18-May	3	8	11	Z	21	8	6	7	6	5	3	1	1	6	6	2	2	3	4	7	6	7	9	6	6.1	21
19-May	3	5	5	Z	8	8	5	6	6	3	2	2	2	3	3	3	4	3	3	3	3	7	8	7	4.4	8
20-May	5	4	4	Z	6	7	8	8	5	C	C	C	C	C	5	6	6	8	8	13	13	12	12	8	7.8	13
21-May	10	5	6	Z	22	22	15	14	13	4	3	4	11	14	8	2	2	2	2	2	5	12	6	7	8.2	22
22-May	13	16	9	Z	12	15	16	11	13	4	11	40	56	24	51	30	3	3	6	12	21	26	10	6	17.8	56
23-May	4	2	3	Z	14	16	19	17	17	14	5	3	2	2	4	5	3	4	5	5	9	2	0	0	7.5	19
24-May	0	1	0	Z	1	3	2	4	4	3	1	1	1	1	3	9	4	1	1	1	6	7	7	5	2.9	9
25-May	7	11	10	Z	14	10	8	7	5	2	1	1	1	1	3	2	3	3	2	2	3	4	4	3	4.6	14
26-May	2	2	2	Z	1	3	11	11	6	4	15	6	24	13	5	2	2	1	1	1	1	0	0	0	5.0	24
27-May	0	0	0	Z	0	1	5	4	5	3	2	2	2	0	4	4	3	3	3	3	2	1	1	1	2.2	5
28-May	1	0	1	Z	4	14	9	6	1	1	4	1	1	1	2	4	3	3	2	2	2	1	1	1	2.8	14
29-May	2	2	0	Z	2	3	2	2	7	10	20	13	14	16	12	5	8	5	6	4	2	1	1	0	5.9	20
30-May	0	0	0	Z	1	2	2	2	1	1	1	0	1	1	0	1	2	6	4	6	14	14	4	3	2.8	14
31-May	6	9	7	Z	23	13	54	11	13	8	12	9	4	2	2	1	1	2	1	2	1	2	2	2	8.1	54
4.4 4.8 5.7 -- 11.3 11.7 12.6 18.2 12.6 5.2 5.6 7.6 5.8 4.5 4.9 4.1 3.4 3.4 3.2 4.1 6.1 6.7 5.9 4.3																		Diurnal Average								
15 16 25 -- 49 52 54 274 119 17 20 95 56 24 51 30 8 8 8 13 21 26 20 18																		Diurnal Maximum								
Z - zerospan			C - Calibration			PF - Power Failure																				



**WBEA**  
**Hourly Averages**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Athabasca Valley - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Athabasca Valley - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	676	95.62	95.62
21 - 40	23	3.25	98.87
41 - 80	5	0.71	99.58
81 - 159	2	0.28	99.86
> 159	1	0.14	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Athabasca Valley - May 2014**

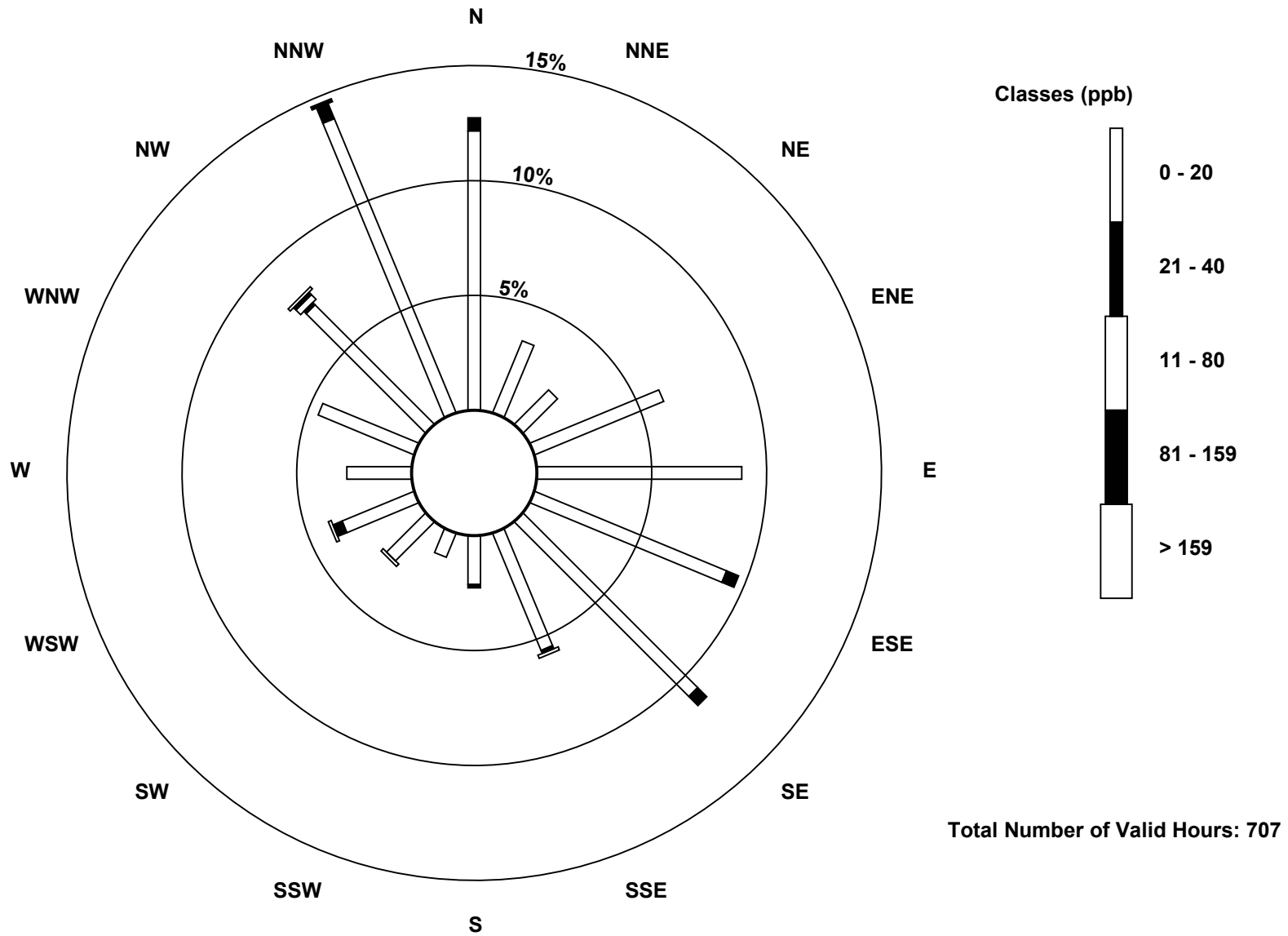
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	86	24	15	43	63	64	76	39	15	8	17	24	20	32	52	98	676
21 - 40	4	0	0	0	0	4	4	1	1	0	0	3	0	0	1	5	23
11 - 80	0	0	0	0	0	0	0	1	0	0	1	1	0	0	2	0	5
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
<b>Totals</b>	90	24	15	43	63	68	80	41	16	8	18	28	20	32	57	104	707

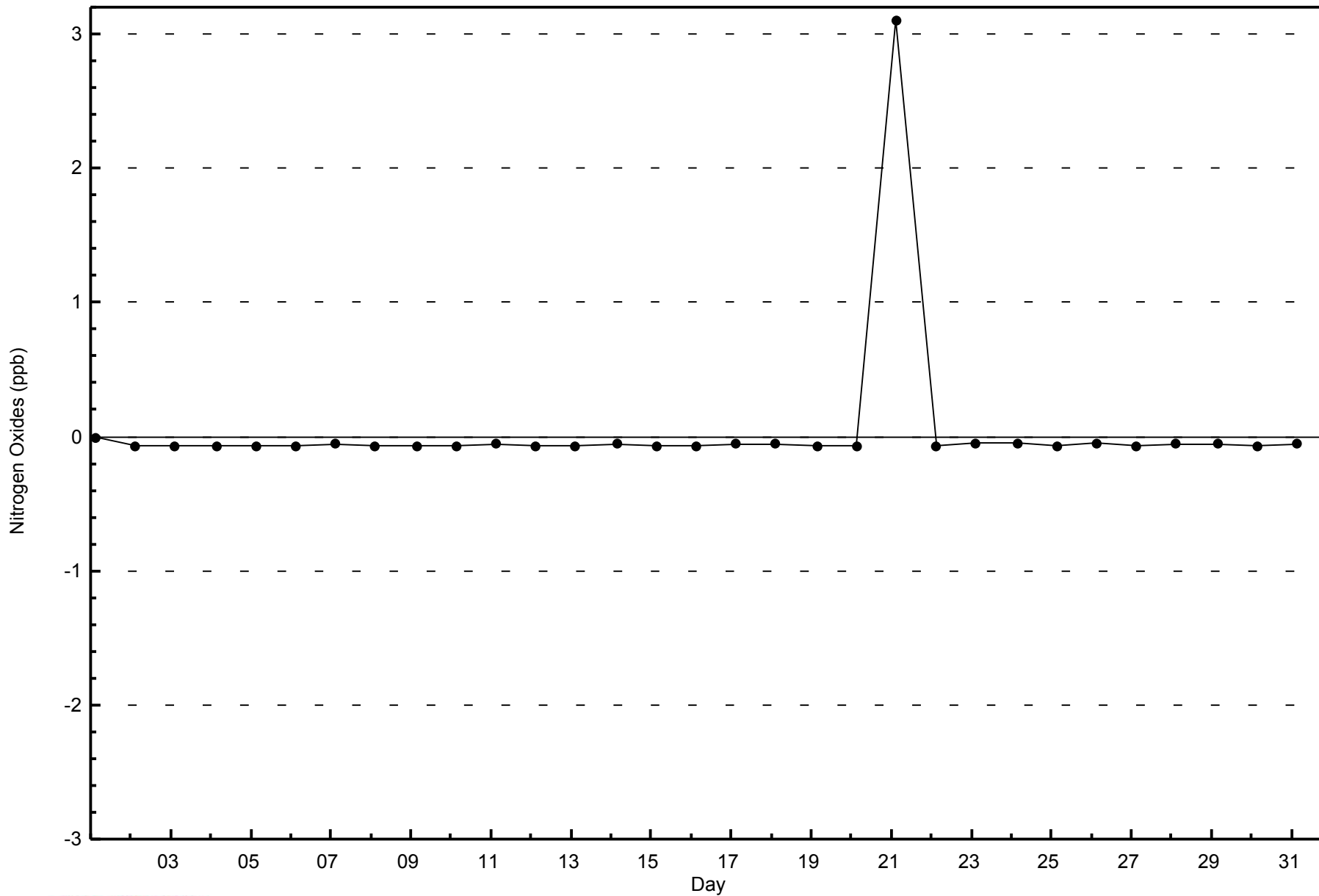
Total Number of Valid Hours: 707

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Athabasca Valley (AMS 7)**

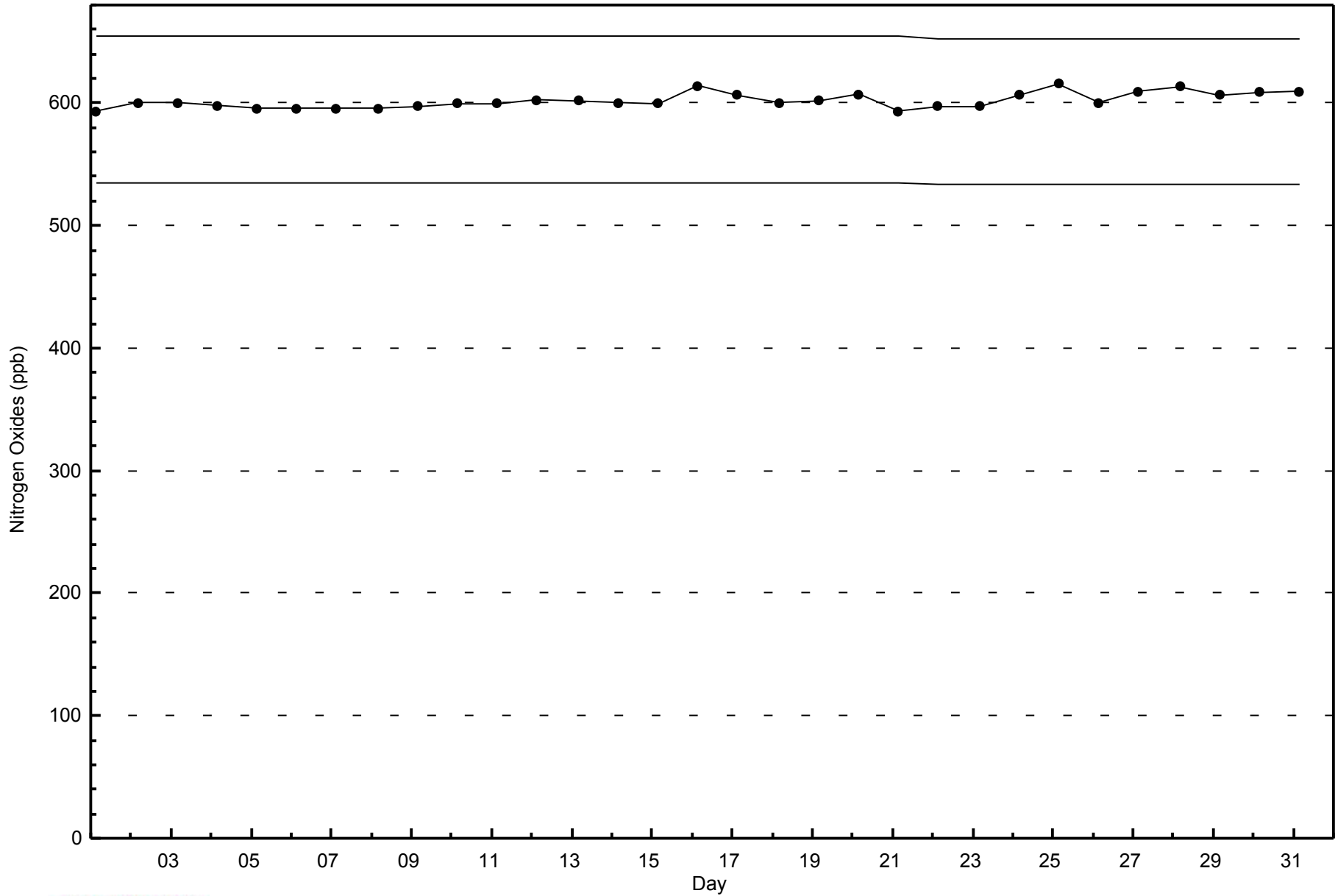






WBEA  
Span Responses

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Athabasca Valley - May 2014





Summary of Hour Averages

Athabasca Valley - May 2014

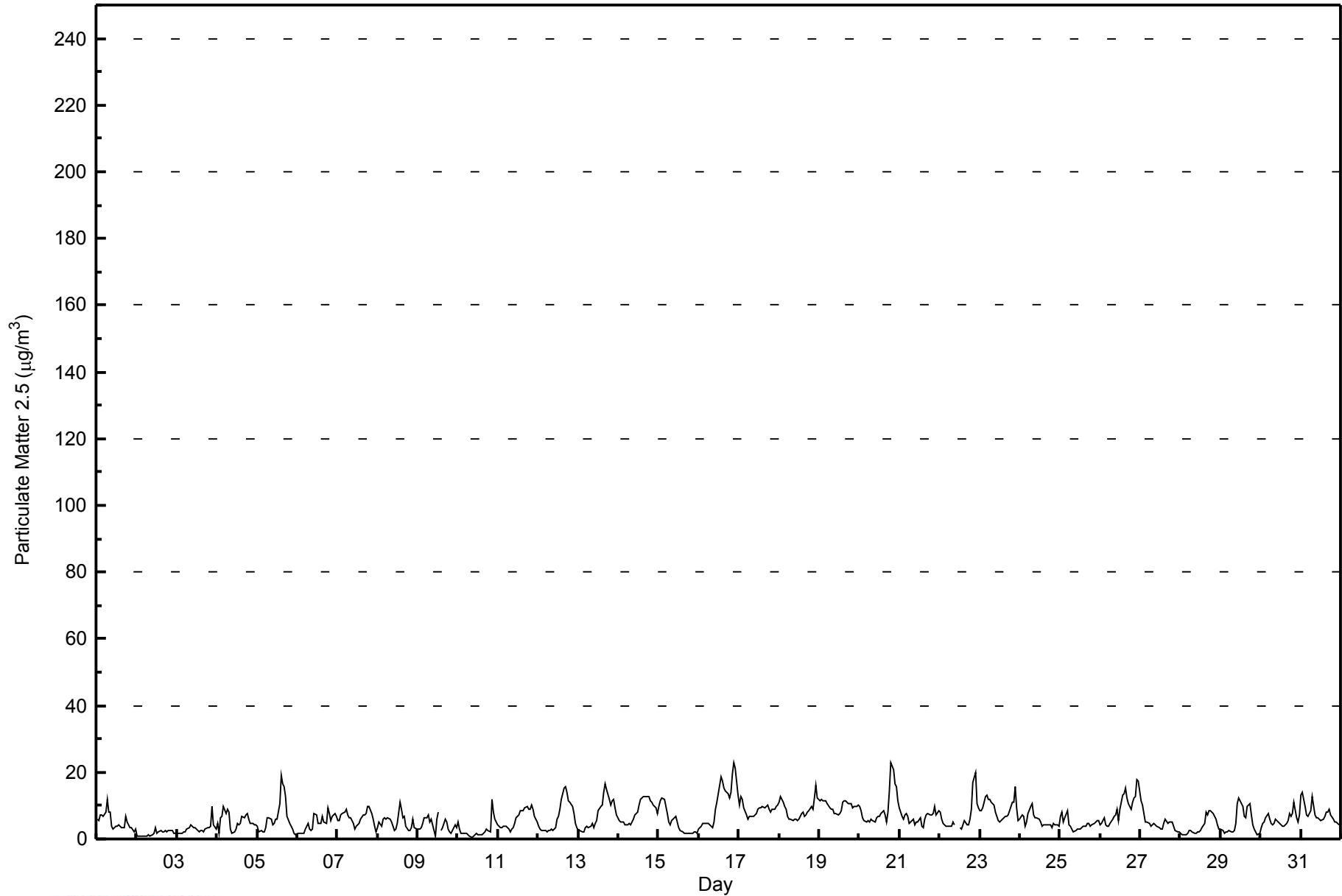
Number of Exceedences (AAAQO): 24-hr: 0		Hours in Service: 744																																														
Maximum Value: 22.8 µg/m <sup>3</sup> on May 20 20:00		Maximum Daily Average: 10.9 µg/m <sup>3</sup> on May 16																																														
Minimum Value: 0.5 µg/m <sup>3</sup> on May 10 09:00		Hours of Data: 741																																														
Maximum Diurnal Average: 8.2 µg/m <sup>3</sup> at hour 22		Hours of Missing Data: 3																																														
Monthly Average: 6.24 µg/m <sup>3</sup>		Hours of Calibration: 0																																														
Minimum Daily Average: 1.7 µg/m <sup>3</sup> on May 2		Percent Operational Time: 99.6																																														
Minimum Diurnal Average: 4.5 µg/m <sup>3</sup> at hour 10		Percentiles: P <sub>1</sub> = 0.9 P <sub>10</sub> = 2.1 Q <sub>1</sub> = 3.4 Median = 5.6 Q <sub>3</sub> = 8.2 P <sub>90</sub> = 11.3 P <sub>99</sub> = 18.3																																														
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-May	5.7	5.5	7.3	7.2	6.7	8.2	11.7	8.0	7.9	3.6	2.8	3.6	3.9	4.2	4.0	3.4	3.3	6.8	5.1	4.2	3.2	3.4	2.2	3.0	5.2	11.7																						
2-May	1.0	0.7	0.8	0.9	0.8	0.7	0.8	1.5	1.0	1.3	1.6	3.4	1.7	2.2	2.5	2.1	2.0	2.3	2.3	2.5	2.6	2.4	1.8	1.5	1.7	3.4																						
3-May	1.6	1.8	1.6	1.7	2.3	2.1	2.9	3.4	4.4	3.9	3.3	3.5	2.7	2.2	2.4	2.4	2.1	2.9	3.3	3.2	4.0	9.7	4.3	2.8	3.1	9.7																						
4-May	4.5	1.9	6.3	6.7	9.7	7.5	9.0	8.1	3.0	1.9	2.1	3.1	4.7	4.0	4.6	6.9	6.2	7.4	7.7	5.8	4.8	4.8	4.3	4.1	5.4	9.7																						
5-May	3.8	2.3	2.4	2.0	2.1	3.3	6.4	6.2	6.0	4.1	4.9	5.8	6.0	10.6	18.9	16.4	15.5	12.8	6.9	4.5	3.7	2.8	1.9	1.4	6.3	18.9																						
6-May	1.5	1.8	1.6	1.5	1.7	2.9	4.5	2.9	2.4	3.1	7.5	7.2	4.8	4.5	4.6	6.7	5.2	4.8	9.2	7.4	5.6	6.7	7.8	6.6	4.7	9.2																						
7-May	5.6	5.6	7.1	7.7	8.1	8.9	7.4	6.5	6.2	4.7	3.0	3.7	4.1	4.7	5.8	7.2	7.4	7.5	9.7	9.6	7.7	5.8	3.9	2.2	6.3	9.7																						
8-May	3.3	4.9	3.6	5.9	6.1	5.8	6.2	5.8	5.1	4.0	2.5	2.9	4.8	11.1	9.0	6.3	6.9	3.7	2.6	2.7	3.4	5.7	3.3	3.0	5.0	11.1																						
9-May	3.1	3.1	3.4	4.8	6.2	6.2	7.2	5.1	5.9	4.1	1.0	6.1	8.2	PF	2.4	3.6	6.0	5.3	3.1	2.1	1.7	3.5	4.3	3.4	4.3	8.2																						
10-May	5.2	2.8	1.8	1.8	1.7	1.8	1.4	0.8	0.5	0.9	1.5	1.6	1.3	1.2	1.2	1.6	2.1	2.9	2.5	2.0	12.0	8.2	6.0	5.3	2.8	12.0																						
11-May	4.4	3.5	3.5	3.9	3.8	4.0	3.0	2.0	2.9	3.5	4.7	6.2	7.3	8.4	8.5	8.5	9.5	9.6	8.9	8.9	10.2	9.1	6.7	5.2	6.1	10.2																						
12-May	3.8	2.8	2.5	2.4	2.3	2.3	2.7	2.3	2.9	2.6	3.5	5.9	7.0	9.0	11.9	15.2	15.6	14.1	11.6	11.2	9.7	7.5	4.8	3.4	6.5	15.6																						
13-May	2.6	2.4	2.3	2.0	3.3	3.6	3.4	3.9	4.8	3.6	4.5	5.6	8.5	9.9	10.3	14.2	16.6	14.6	11.8	10.3	11.4	12.0	9.3	7.1	7.4	16.6																						
14-May	5.6	5.0	5.2	5.2	4.4	4.4	4.5	4.1	5.3	6.1	7.3	8.2	10.2	11.7	12.2	12.5	12.7	12.6	12.8	11.6	11.0	10.1	9.3	7.8	8.3	12.8																						
15-May	9.6	11.5	12.2	12.0	9.7	7.5	4.9	4.4	5.7	6.2	6.7	5.1	3.3	2.5	2.0	1.9	1.7	1.6	1.6	1.6	1.6	2.1	2.0	1.9	5.0	12.2																						
16-May	3.1	4.0	4.5	4.9	4.8	4.5	4.6	4.0	3.3	5.0	8.9	10.8	16.1	18.7	17.4	15.4	14.5	13.5	12.4	13.9	19.5	22.7	21.0	13.3	10.9	22.7																						
17-May	10.1	12.6	11.7	9.4	7.2	6.1	6.8	6.8	6.7	6.6	7.6	8.8	9.2	9.2	9.7	9.5	9.6	10.2	8.9	8.2	8.8	8.9	9.8	10.3	8.9	12.6																						
18-May	11.0	12.8	10.8	9.6	8.9	6.6	5.9	5.8	5.4	6.1	5.7	5.7	6.1	7.8	8.0	6.7	7.0	7.9	8.4	9.7	8.9	12.1	16.0	12.5	8.6	16.0																						
19-May	11.5	11.8	11.5	11.3	11.3	10.5	9.4	9.0	8.7	7.5	7.5	7.3	7.7	8.4	11.0	11.3	11.5	10.6	10.8	10.5	9.4	9.6	9.5	10.1	9.9	11.8																						
20-May	9.6	8.4	6.4	5.7	5.3	5.3	5.0	5.8	5.5	5.0	6.2	6.6	6.9	7.5	8.6	7.1	5.3	8.2	14.4	22.8	20.8	16.4	15.5	11.3	9.1	22.8																						
21-May	9.5	6.8	6.0	7.3	7.6	6.6	4.5	5.4	6.1	4.0	4.9	5.0	6.4	3.7	3.4	5.7	7.3	7.8	7.4	7.1	7.4	9.8	7.3	8.5	6.5	9.8																						
22-May	7.9	6.1	4.5	4.2	3.7	3.9	3.9	3.8	5.0	4.4	M	M	3.2	2.9	4.2	5.7	4.2	4.3	6.0	8.8	17.0	20.0	10.6	9.5	6.5	20.0																						
23-May	8.3	8.5	9.5	12.7	13.3	11.8	11.8	11.0	10.1	8.1	6.8	5.5	5.1	5.5	6.4	6.8	6.9	7.1	8.4	11.0	11.2	15.7	9.2	5.6	9.0	15.7																						
24-May	5.9	7.2	6.6	3.9	4.9	7.5	9.6	10.4	7.3	6.5	6.3	5.7	5.0	3.9	4.2	4.1	4.4	4.2	4.2	3.6	4.5	4.4	4.3	3.9	5.5	10.4																						
25-May	6.9	7.9	5.2	6.3	8.4	4.2	3.6	3.1	2.2	2.4	3.0	2.9	3.0	3.3	3.8	3.8	4.6	4.6	3.8	4.2	4.6	5.2	5.3	5.6	4.5	8.4																						
26-May	4.1	4.7	6.2	4.3	3.9	3.6	4.6	6.1	6.7	7.1	8.8	5.6	9.1	13.1	13.6	15.3	12.4	10.4	8.9	10.9	12.2	12.7	18.0	17.5	9.2	18.0																						
27-May	11.5	10.2	7.8	5.0	5.0	4.5	4.0	4.1	4.7	4.0	3.7	3.2	2.9	3.1	4.9	5.9	4.8	5.1	5.3	5.0	3.9	2.7	2.1	2.0	4.8	11.5																						
28-May	1.7	1.4	1.2	1.2	1.6	2.5	2.7	2.1	1.6	1.6	2.0	2.0	2.5	3.4	4.9	8.0	7.4	8.3	8.5	7.5	6.8	5.9	4.2	3.0	3.8	8.5																						
29-May	3.2	2.6	1.8	2.1	1.9	2.4	2.3	2.2	2.5	4.7	10.6	12.4	10.4	9.8	6.6	6.4	9.7	10.7	7.1	4.2	2.8	2.1	1.4	1.8	5.1	12.4																						
30-May	3.3	4.8	5.2	6.4	7.4	6.1	4.5	4.1	4.7	6.0	5.2	4.8	4.4	4.0	3.8	4.5	5.6	7.5	6.6	7.6	11.0	6.6	5.1	7.4	5.7	11.0																						
31-May	13.0	13.9	9.7	7.2	6.9	7.8	8.3	12.7	7.0	6.4	6.3	5.9	5.7	5.7	6.7	7.8	8.0	8.8	7.2	5.9	5.1	5.3	4.7	4.4	7.5	13.9																						
																								5.9	5.8	5.5	5.4	5.5	5.3	5.4	5.2	4.9	4.5	5.0	5.5	5.9	6.5	7.0	7.5	7.6	7.7	7.3	7.4	7.9	8.2	7.0	6.0	Diurnal Average
																								13.0	13.9	12.2	12.7	13.3	11.8	11.8	12.7	10.1	8.1	10.6	12.4	16.1	18.7	18.9	16.4	16.6	14.6	14.4	22.8	20.8	22.7	21.0	17.5	Diurnal Maximum
M - Maintenance PF - Power Failure																																																
Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m <sup>3</sup>																																																





**WBEA**  
**Hourly Averages**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Athabasca Valley - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Athabasca Valley - May 2014**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
1 - 5	355	47.91	47.91
6 - 15	355	47.91	95.82
16 - 25	20	2.70	98.52
26 - 80	0	0.00	98.52
> 81.0	0	0.00	98.52

Total Number of Valid Hours: 741

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Athabasca Valley - May 2014**

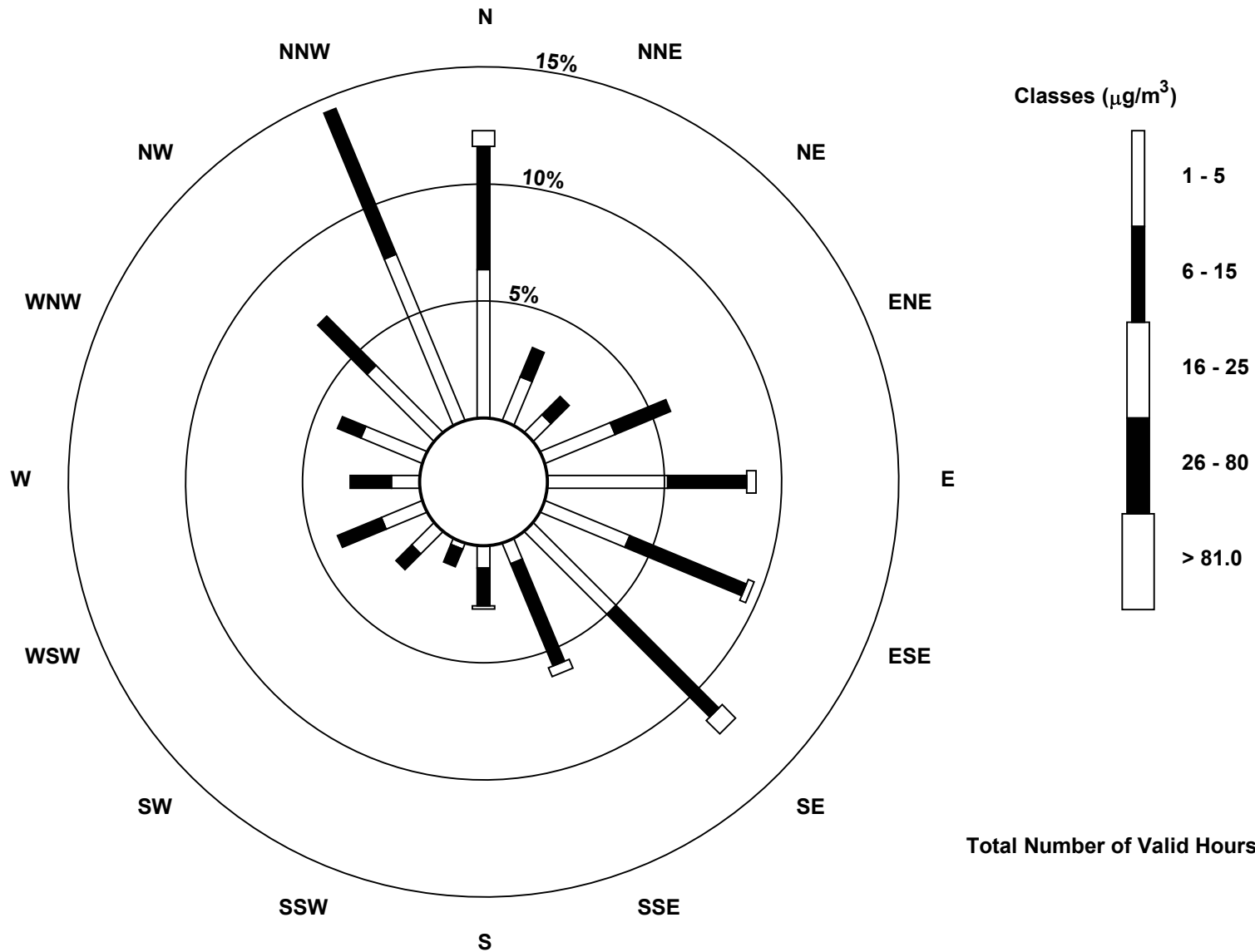
Concentration Ranges ( $\mu\text{g}/\text{m}^3$ )	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	47	15	8	24	38	29	37	7	7	2	10	14	9	21	30	57	355
6 - 15	39	10	8	19	25	40	46	35	12	6	7	15	13	8	22	50	355
16 - 25	5	0	0	0	3	2	6	3	1	0	0	0	0	0	0	0	20
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	91	25	16	43	66	71	89	45	20	8	17	29	22	29	52	107	730

Total Number of Valid Hours: 741

Total Number of Hours: 744

Wood Buffalo Environmental Association  
Wind Rose May 2014

Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
Athabasca Valley (AMS 7)



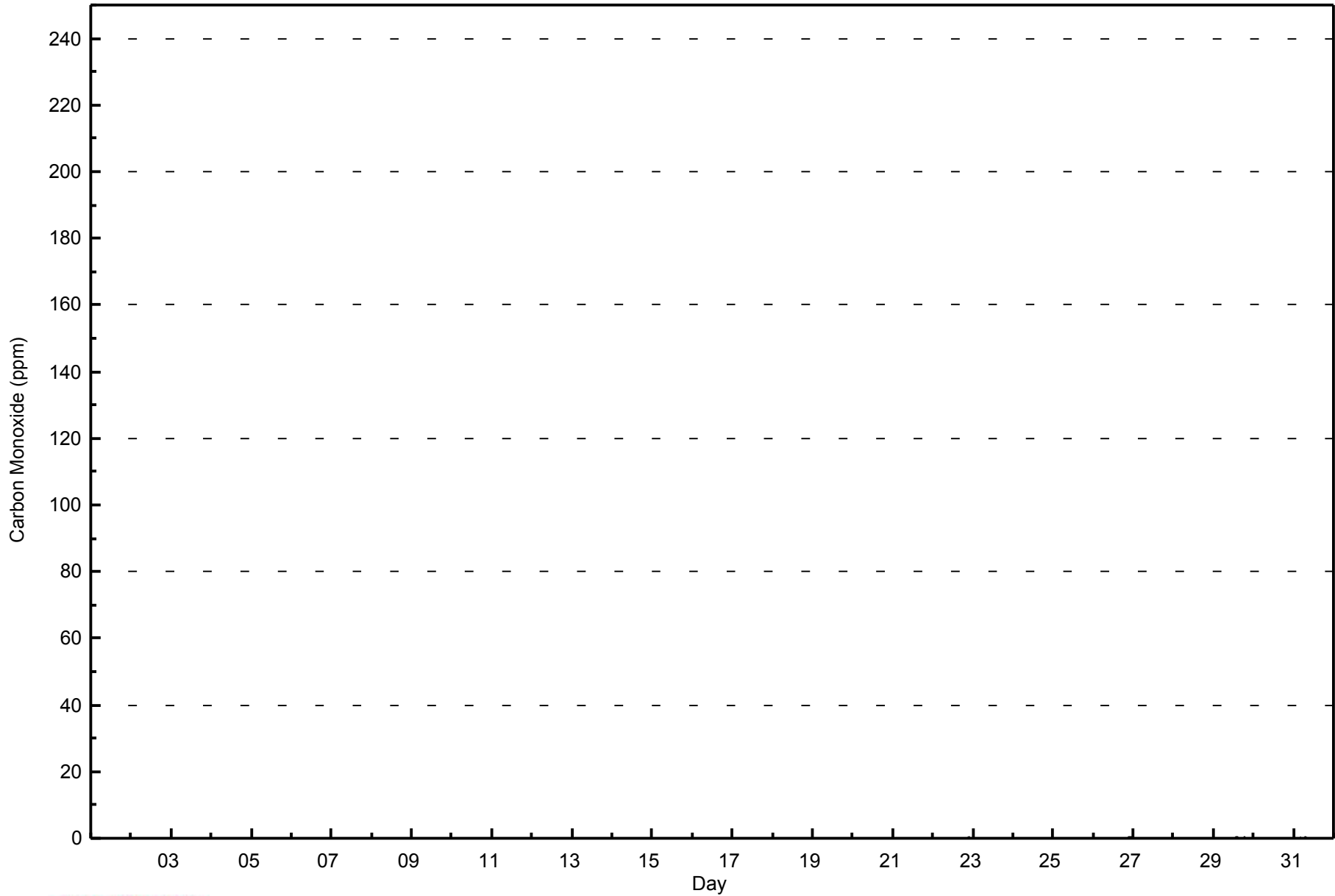
Total Number of Valid Hours: 741





**WBEA**  
**Hourly Averages**

**Carbon Monoxide (CO) - ppm**  
**Athabasca Valley - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Carbon Monoxide (CO) - ppm**  
**Athabasca Valley - May 2014**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.3	702	100.00	100.00
0.4 - 0.5	0	0.00	100.00
0.6 - 0.7	0	0.00	100.00
0.8 - 1.4	0	0.00	100.00
1.5 - 10	0	0.00	100.00
> 10	0	0.00	100.00

Total Number of Valid Hours: 702

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Carbon Monoxide (CO) - ppm**  
**Athabasca Valley - May 2014**

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	88	24	16	41	65	67	79	42	18	8	15	28	21	31	56	103	702
0.4 - 0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.6 - 0.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.8 - 1.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.5 - 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	88	24	16	41	65	67	79	42	18	8	15	28	21	31	56	103	702

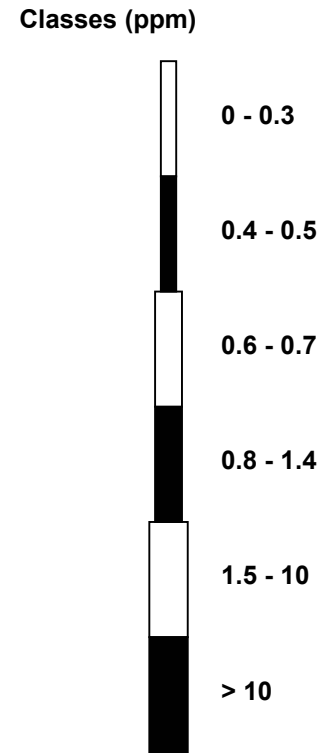
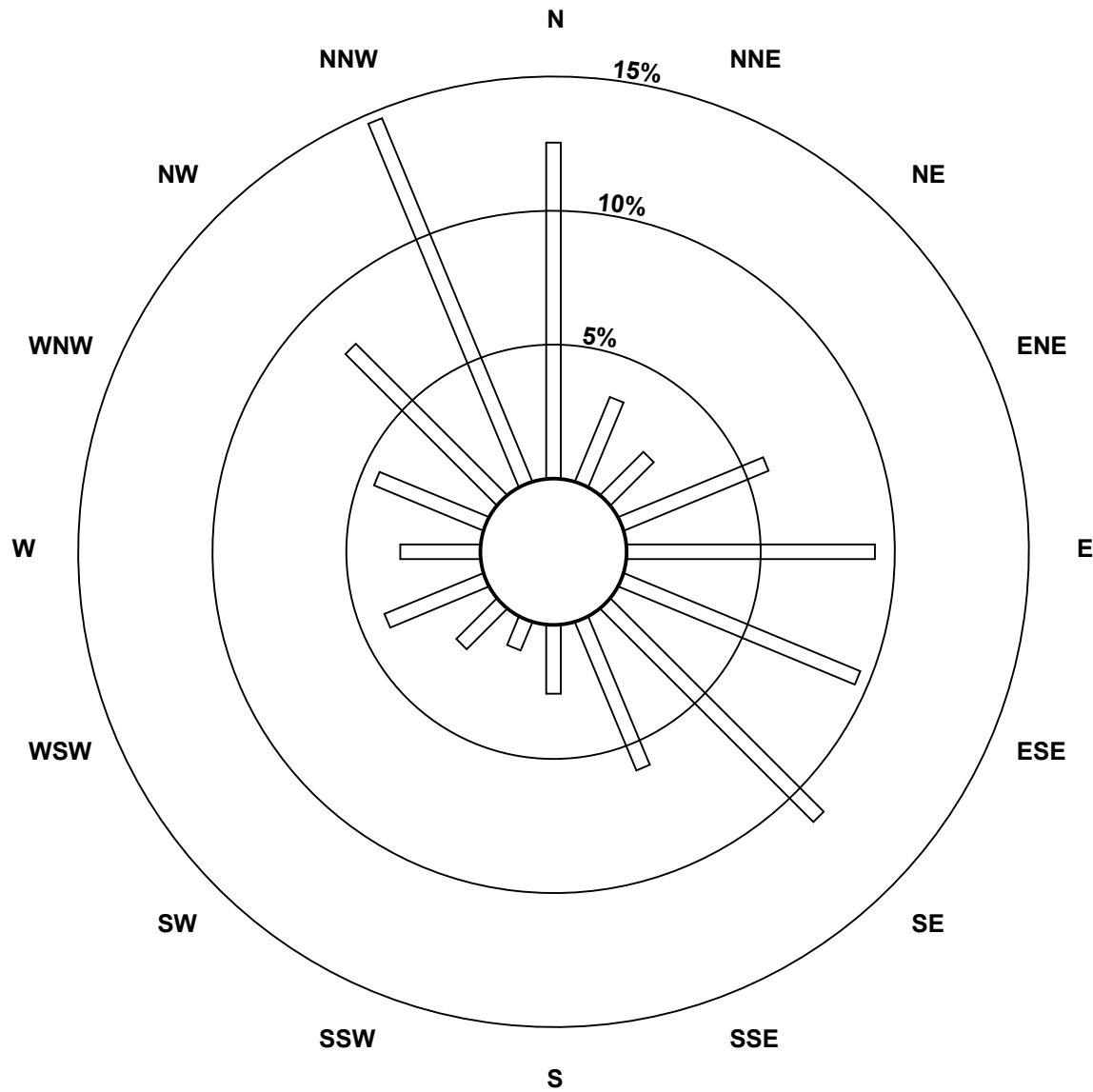
Total Number of Valid Hours: 702

Total Number of Hours: 744



**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Carbon Monoxide (CO) - ppm  
Athabasca Valley (AMS 7)**

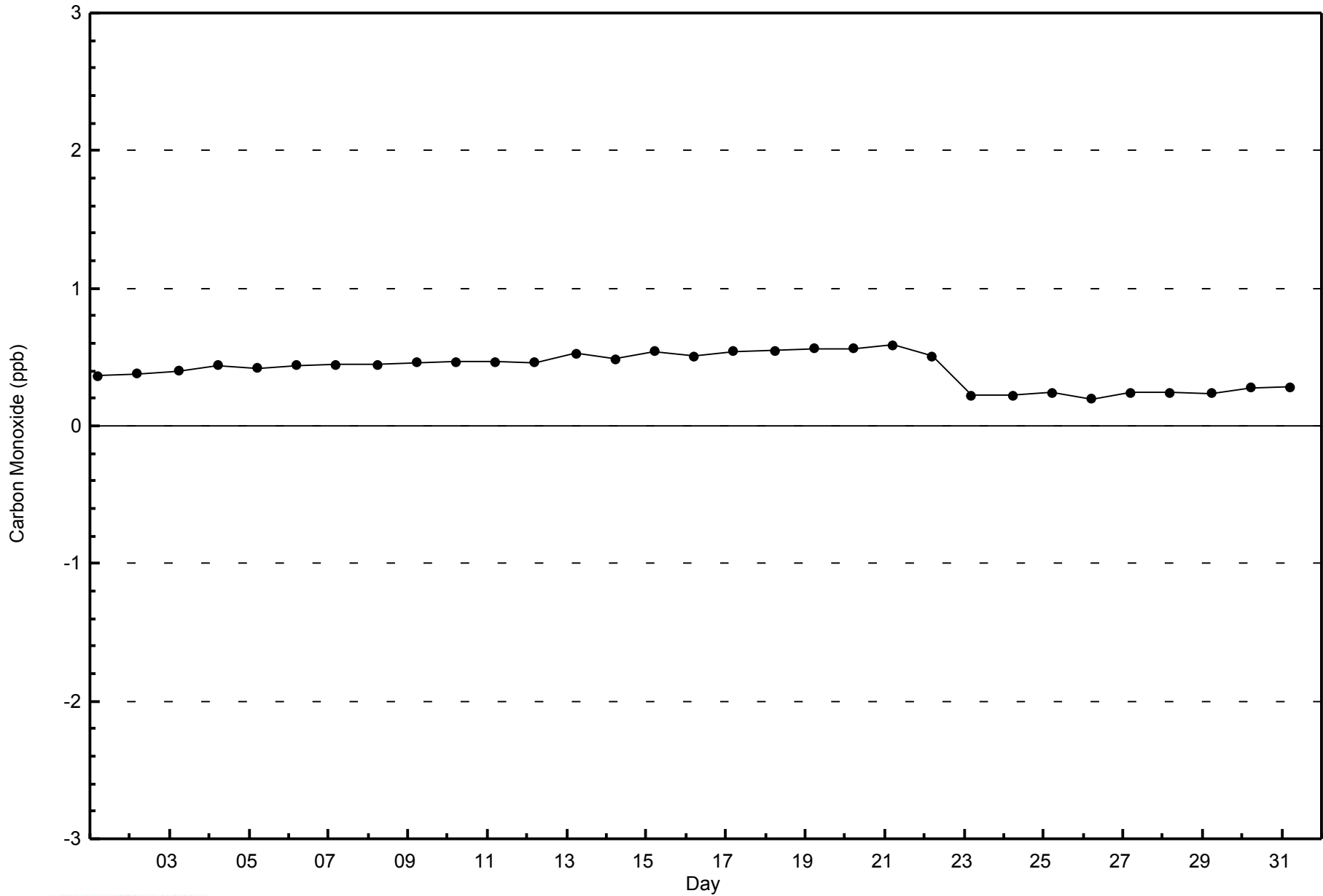


**Total Number of Valid Hours: 702**



WBEA  
Zero Responses

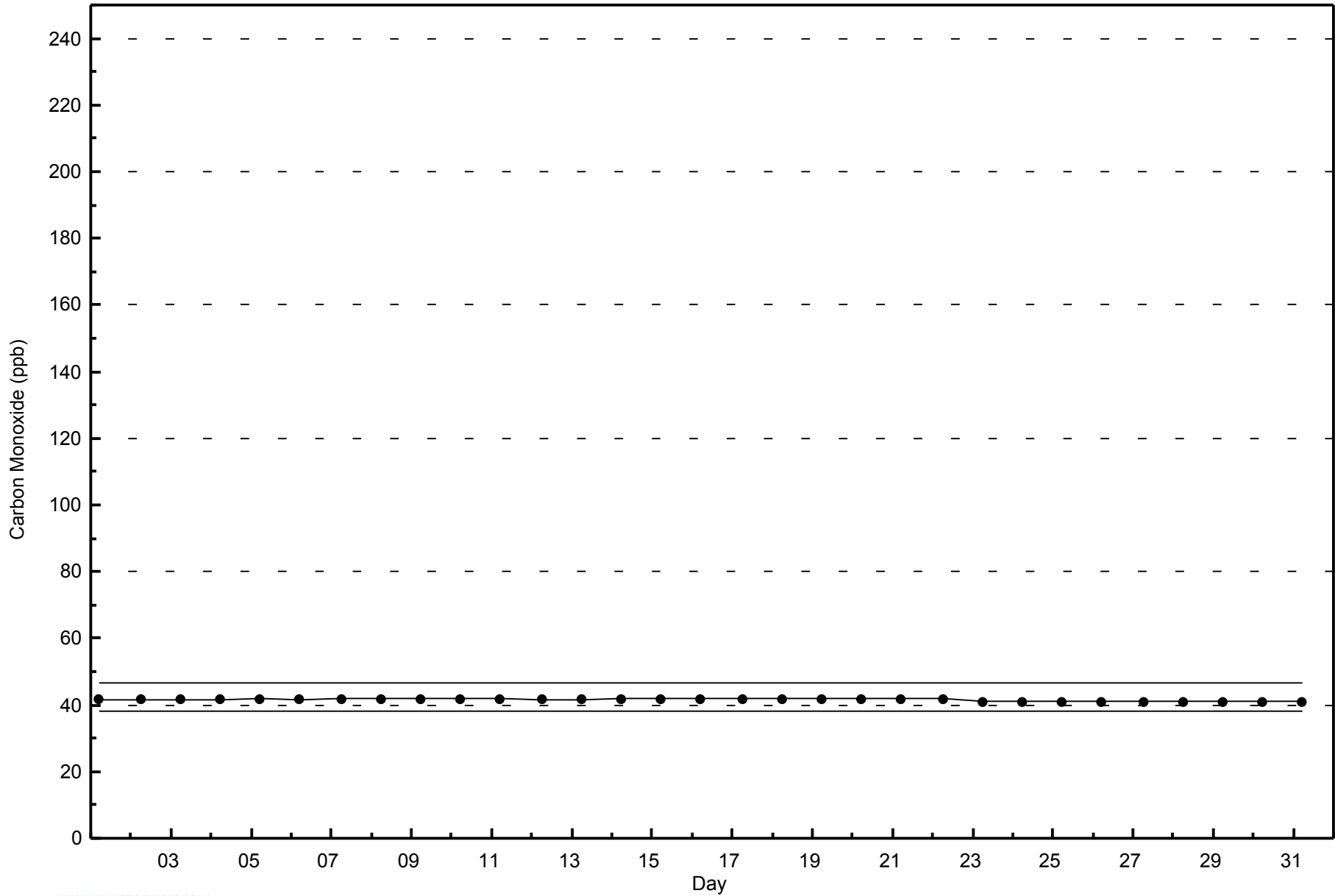
Carbon Monoxide (CO) - ppb  
Athabasca Valley - May 2014





**WBEA**  
**Span Responses**

**Carbon Monoxide (CO) - ppb**  
**Athabasca Valley - May 2014**



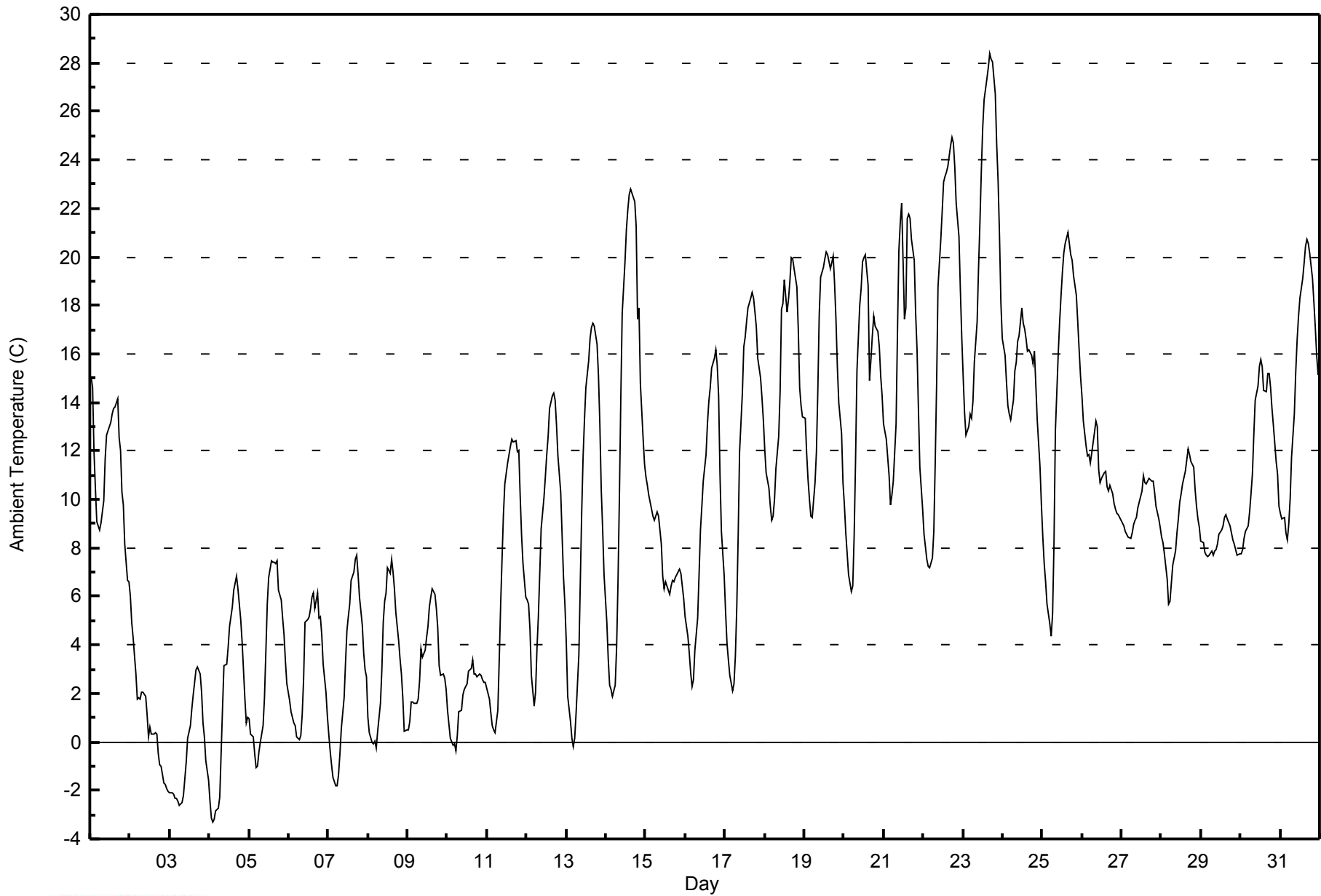


Maximum Value: 28.4 C on May 23 17:00		Maximum Daily Average: 20.7 C on May 23		Hours in Service: 744																																												
Minimum Value: -3.3 C on May 4 03:00		Minimum Daily Average: -0.3 C on May 3		Hours of Data: 744																																												
Maximum Diurnal Average: 13.3 C at hour 17		Minimum Diurnal Average: 4.7 C at hour 5		Hours of Missing Data: 0																																												
Monthly Average: 9.42 C		Percentiles: P <sub>1</sub> = -2.4 P <sub>10</sub> = 0.7 Q <sub>1</sub> = 3.8 Median = 9.0 Q <sub>3</sub> = 14.3 P <sub>90</sub> = 18.8 P <sub>99</sub> = 26.3		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-May	15.0	14.6	12.0	10.5	9.1	8.7	9.0	9.5	10.0	11.7	12.7	13.0	13.2	13.5	13.7	13.8	14.1	12.5	12.0	10.3	9.8	8.2	6.7	6.6	11.3	15.0																						
2-May	6.0	4.9	4.3	2.8	1.8	1.8	1.8	2.1	2.1	1.9	1.1	0.2	0.6	0.3	0.3	0.4	0.3	-0.5	-1.0	-1.0	-1.7	-1.8	-1.9	-2.0	0.9	6.0																						
3-May	-2.1	-2.1	-2.1	-2.3	-2.3	-2.4	-2.6	-2.5	-2.2	-1.5	-0.8	0.1	0.7	1.4	1.9	2.5	3.0	3.1	2.8	2.0	0.8	0.2	-0.8	-1.6	-0.3	3.1																						
4-May	-2.4	-3.1	-3.3	-3.2	-2.9	-2.8	-2.3	-0.4	1.4	3.1	3.2	3.9	4.8	5.2	5.6	6.2	6.8	6.3	5.7	5.1	4.1	1.7	0.8	1.0	1.9	6.8																						
5-May	1.0	0.3	0.2	-0.5	-1.1	-1.0	-0.5	0.0	0.7	1.8	3.7	5.7	6.8	7.5	7.4	7.4	7.3	7.5	6.3	5.8	5.1	4.4	3.3	2.4	3.4	7.5																						
6-May	1.7	1.2	1.0	0.8	0.7	0.2	0.1	0.3	1.1	2.6	4.9	5.1	5.1	5.5	6.0	6.1	5.5	6.1	5.1	5.1	4.4	3.2	2.0	1.1	3.1	6.1																						
7-May	0.3	-0.4	-0.9	-1.5	-1.8	-1.8	-1.3	-0.5	0.5	1.8	3.3	4.6	5.2	5.7	6.7	7.0	7.5	7.7	6.9	6.0	4.8	3.7	3.0	2.7	2.9	7.7																						
8-May	1.0	0.4	0.0	-0.1	0.0	-0.2	0.4	1.6	3.0	4.9	5.8	6.1	7.2	7.0	7.5	7.0	6.3	5.3	4.2	3.4	2.8	1.8	0.4	0.5	3.2	7.5																						
9-May	0.5	0.9	1.6	1.6	1.6	1.6	1.8	2.5	3.8	3.5	3.8	4.3	4.8	5.6	6.0	6.3	6.1	5.5	4.7	3.2	2.8	2.8	2.6	2.1	3.3	6.3																						
10-May	1.3	0.7	0.1	-0.1	-0.1	-0.4	0.3	1.3	1.3	1.9	2.2	2.3	2.4	2.9	3.1	3.4	2.8	2.8	2.7	2.8	2.7	2.6	2.4	2.4	1.8	3.4																						
11-May	2.2	1.7	1.2	0.7	0.5	0.4	1.3	3.4	5.6	7.5	9.4	10.7	11.5	11.9	12.2	12.5	12.3	12.4	12.0	12.0	10.1	8.5	7.3	6.0	7.2	12.5																						
12-May	5.8	5.7	4.7	2.8	1.5	2.0	3.8	5.2	7.0	8.8	10.1	10.9	11.8	12.6	13.7	14.3	14.4	14.1	13.1	11.8	10.3	8.5	6.8	5.7	8.6	14.4																						
13-May	4.1	1.9	0.9	0.2	-0.2	0.2	1.2	3.6	6.6	9.4	11.7	13.3	14.6	15.7	16.6	17.1	17.2	17.2	16.4	15.1	13.1	10.4	8.8	6.9	9.2	17.2																						
14-May	4.9	3.5	2.4	2.2	1.9	2.3	3.9	6.6	10.1	14.1	17.6	19.8	21.1	21.9	22.5	22.8	22.5	22.3	21.3	17.5	17.9	14.8	12.5	11.5	13.2	22.8																						
15-May	10.9	10.6	10.2	9.6	9.3	9.2	9.3	9.5	9.3	8.1	6.8	6.3	6.6	6.4	6.1	6.4	6.7	6.6	6.8	6.9	7.1	6.9	6.4	5.9	7.8	10.9																						
16-May	5.1	4.3	3.7	2.9	2.3	2.6	3.8	5.1	6.9	8.7	9.7	10.8	11.8	13.1	14.0	14.6	15.4	15.8	16.1	15.6	14.3	11.0	8.7	6.8	9.3	16.1																						
17-May	5.3	4.1	3.4	2.7	2.1	2.4	3.6	5.5	8.5	11.9	14.4	16.3	16.7	17.3	17.9	18.3	18.5	18.3	17.7	17.1	15.8	15.0	14.2	13.3	11.7	18.5																						
18-May	12.1	11.1	10.4	9.7	9.1	9.3	10.0	11.3	12.6	14.5	17.8	18.1	19.1	17.7	18.2	19.0	20.0	19.9	19.5	18.8	17.0	14.6	13.8	13.4	14.9	20.0																						
19-May	13.3	11.9	10.8	10.0	9.3	9.3	10.7	11.9	14.5	17.6	19.2	19.6	19.9	20.2	20.1	19.8	19.5	20.0	18.9	17.4	15.4	14.0	12.7	10.7	15.3	20.2																						
20-May	9.8	8.6	7.7	6.9	6.2	6.4	8.5	11.6	15.3	18.0	18.7	19.8	20.0	20.1	18.8	14.9	15.8	16.8	17.5	17.2	16.9	16.3	15.1	14.3	14.2	20.1																						
21-May	13.1	12.5	11.7	11.0	9.8	10.2	10.8	13.1	16.9	20.2	21.4	22.2	17.4	17.9	21.6	21.8	21.6	20.7	19.9	17.6	16.2	13.7	11.3	9.6	15.9	22.2																						
22-May	8.6	8.1	7.5	7.2	7.2	7.6	8.7	11.5	14.8	18.7	20.7	21.9	23.1	23.3	23.5	23.7	24.6	24.9	24.7	23.7	22.2	20.8	18.6	16.7	17.2	24.9																						
23-May	15.1	13.6	12.6	13.0	13.5	13.3	14.0	15.6	17.3	19.5	21.4	23.6	25.3	26.5	27.3	27.8	28.4	28.1	28.0	26.7	24.7	23.1	20.9	18.1	20.7	28.4																						
24-May	16.7	15.9	14.8	13.9	13.5	13.3	14.1	15.3	15.7	16.5	16.7	17.9	17.2	17.0	16.7	16.1	16.2	15.9	15.6	16.1	14.7	13.3	11.3	9.8	15.2	17.9																						
25-May	8.5	7.4	6.6	5.7	4.9	4.3	5.3	8.2	12.8	15.9	17.3	18.3	19.3	20.2	20.6	21.0	20.6	20.1	19.9	19.2	18.4	17.3	16.1	15.1	14.3	21.0																						
26-May	14.3	13.2	12.2	11.8	11.9	11.5	11.9	12.8	13.2	13.0	11.2	10.7	10.9	11.1	11.2	10.5	10.4	10.6	10.2	9.8	9.6	9.4	9.4	9.2	11.2	14.3																						
27-May	9.0	8.9	8.7	8.5	8.5	8.4	8.6	9.0	9.1	9.2	9.7	10.1	10.4	11.0	10.7	10.6	10.8	10.8	10.7	10.7	10.3	9.7	9.2	8.9	9.7	11.0																						
28-May	8.4	8.2	7.8	6.7	5.7	5.8	6.5	7.3	7.9	8.6	9.2	9.9	10.2	10.7	11.2	11.6	12.1	11.9	11.6	11.3	10.4	9.7	9.2	8.8	9.2	12.1																						
29-May	8.3	8.2	7.8	7.7	7.6	7.7	7.8	7.7	7.8	7.9	8.2	8.6	8.7	8.9	9.3	9.4	9.2	8.9	8.6	8.3	8.2	8.0	7.7	7.7	8.3	9.4																						
30-May	7.8	7.9	8.4	8.7	8.9	9.5	10.2	11.0	12.7	14.1	14.7	15.5	15.8	15.5	14.5	14.5	15.2	15.2	14.6	13.7	13.0	11.5	11.0	9.7	12.2	15.8																						
31-May	9.4	9.2	9.2	8.6	8.3	9.0	10.0	11.7	13.5	15.3	16.6	17.6	18.3	19.1	19.7	20.4	20.7	20.5	20.1	19.1	18.1	17.1	16.0	15.2	15.1	20.7																						
																								6.9	6.3	5.7	5.1	4.7	4.8	5.5	6.8	8.4	10.0	11.0	11.8	12.3	12.7	13.1	13.1	13.3	13.1	12.7	11.9	11.0	9.7	8.6	7.7	Diurnal Average
																								16.7	15.9	14.8	13.9	13.5	13.3	14.1	15.6	17.3	20.2	21.4	23.6	25.3	26.5	27.3	27.8	28.4	28.1	28.0	26.7	24.7	23.1	20.9	18.1	Diurnal Maximum



**WBEA**  
**Hourly Averages**

**Ambient Temperature (AT) - C**  
**Athabasca Valley - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C**  
**Athabasca Valley - May 2014**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	47	6.32	6.32
0 - 10	371	49.87	56.18
10 - 20	274	36.83	93.01
> 20	52	6.99	100.00

Total Number of Valid Hours: 744

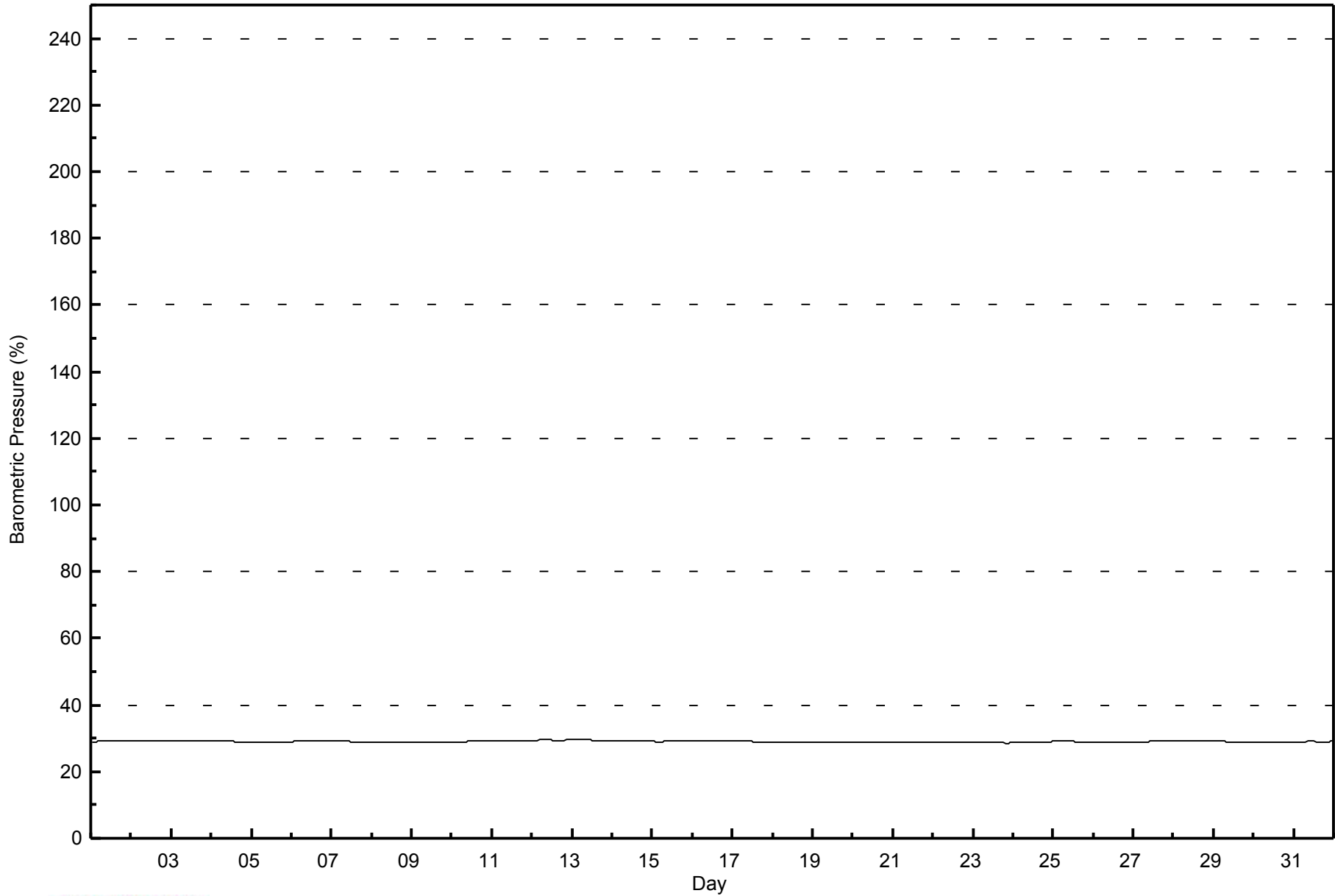
Total Number of Hours: 744





**WBEA**  
**Hourly Averages**

**Barometric Pressure (BP) - %**  
**Athabasca Valley - May 2014**





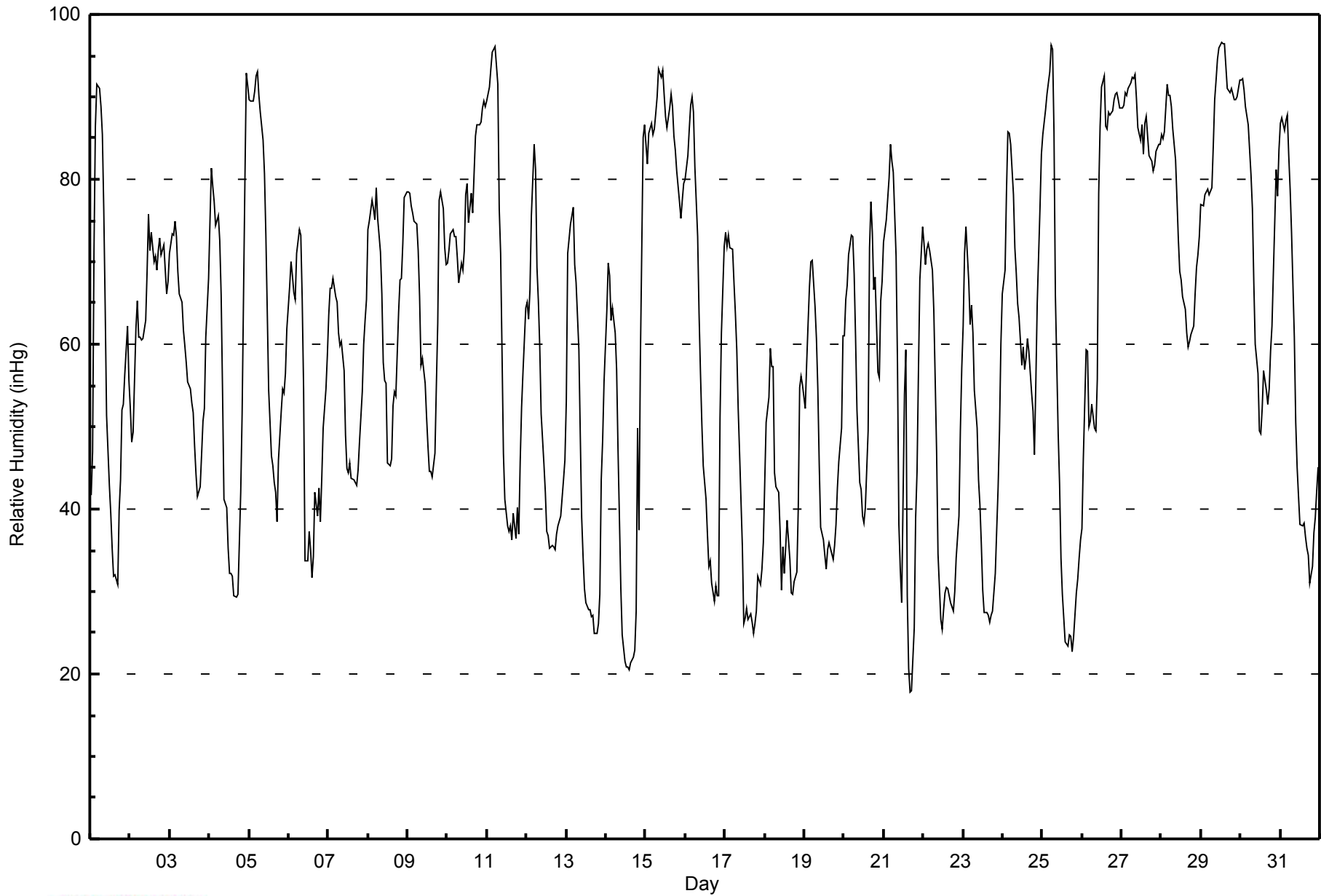


Maximum Value: 97 inHg on May 29 13:00																			Maximum Daily Average: 87.9 inHg on May 29						Hours in Service: 744																							
Minimum Value: 18 inHg on May 21 17:00																			Minimum Daily Average: 42.7 inHg on May 18						Hours of Data: 744																							
Maximum Diurnal Average: 77.4 inHg at hour 5																			Minimum Diurnal Average: 46.9 inHg at hour 18						Hours of Missing Data: 0																							
Monthly Average: 60.3 inHg																			Percentiles: P <sub>1</sub> = 22 P <sub>10</sub> = 31 Q <sub>1</sub> = 43 Median = 61 Q <sub>3</sub> = 77 P <sub>90</sub> = 89 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-May	42	47	71	86	92	91	89	85	76	65	51	43	40	35	32	32	31	40	44	52	53	56	62	56	57.1	92																						
2-May	52	48	49	62	65	61	61	60	61	63	69	76	71	74	70	71	69	71	73	71	72	69	66	68	65.5	76																						
3-May	71	73	73	75	73	69	66	65	62	60	58	55	54	53	52	48	44	42	43	47	51	52	61	68	58.9	75																						
4-May	75	81	79	77	74	76	72	66	54	41	40	35	32	32	30	29	30	36	42	52	80	93	91	56.3	93																							
5-May	90	89	89	91	93	93	90	88	85	81	73	64	54	46	45	43	42	39	46	52	55	54	56	62	67.5	93																						
6-May	67	70	68	66	65	71	74	73	65	55	34	34	37	35	32	34	42	39	43	39	44	50	55	59	52.1	74																						
7-May	64	67	67	68	66	65	61	60	60	57	49	45	44	46	44	44	43	43	45	48	54	60	63	65	55.3	68																						
8-May	74	75	77	76	75	79	75	71	66	58	56	55	46	45	46	53	54	54	64	68	68	72	78	79	65.1	79																						
9-May	78	78	77	76	75	75	71	66	58	58	55	51	48	45	45	44	47	55	63	77	78	76	72	70	64.0	78																						
10-May	70	71	73	74	73	73	71	68	70	69	71	78	80	75	78	76	81	85	87	87	87	89	89	89	77.6	89																						
11-May	90	91	93	95	96	96	91	76	71	59	47	41	38	37	38	36	39	36	40	37	46	52	57	64	61.2	96																						
12-May	65	63	67	76	84	81	69	65	60	52	45	42	37	37	35	36	35	35	37	38	39	41	44	46	51.2	84																						
13-May	53	71	75	76	77	70	67	59	49	39	34	30	29	28	27	27	25	25	26	30	44	48	55	45.5	77																							
14-May	64	70	68	63	64	61	57	47	39	30	25	22	21	21	21	21	22	23	28	50	37	58	85	87	45.2	87																						
15-May	84	82	86	87	85	86	88	90	93	92	93	90	88	86	89	90	89	85	83	81	77	75	77	79	85.8	93																						
16-May	80	83	86	89	90	88	82	73	64	57	50	45	41	37	33	34	31	29	31	30	30	51	61	72	56.9	90																						
17-May	74	72	73	72	71	67	64	59	52	47	35	26	27	28	27	27	26	25	26	28	32	31	33	36	44.1	74																						
18-May	43	50	54	59	57	57	44	43	42	37	30	35	32	39	36	34	30	30	31	32	40	55	56	55	42.7	59																						
19-May	52	58	62	67	70	70	65	61	55	45	38	36	34	33	35	36	35	34	36	38	43	46	50	61	48.3	70																						
20-May	61	65	67	71	73	73	68	61	52	43	42	39	38	40	50	72	77	73	67	68	57	56	65	68	60.3	77																						
21-May	72	75	78	80	84	82	81	71	58	38	33	29	54	59	30	21	18	18	26	39	45	57	68	74	53.6	84																						
22-May	72	70	71	72	71	69	64	56	47	35	27	25	28	30	30	30	29	28	28	30	34	39	49	57	45.5	72																						
23-May	62	71	74	68	62	65	61	54	50	44	40	36	30	27	27	27	26	27	28	32	37	43	50	60	45.9	74																						
24-May	66	69	78	86	86	84	78	72	69	65	63	57	60	57	58	61	59	54	52	47	55	65	77	83	66.7	86																						
25-May	85	87	89	90	93	96	96	86	66	49	43	34	30	27	24	23	25	25	23	24	30	31	34	36	51.9	96																						
26-May	38	46	59	59	50	51	53	50	50	56	78	86	91	93	86	86	88	88	88	90	90	91	90	89	72.7	93																						
27-May	89	89	91	90	91	92	92	92	93	90	86	85	87	83	87	88	83	82	82	81	82	83	84	84	86.9	93																						
28-May	85	85	86	92	90	90	89	86	82	78	73	69	68	66	64	61	60	60	61	62	66	69	71	73	74.4	92																						
29-May	77	77	78	78	79	78	79	84	90	92	95	96	97	96	96	94	91	90	91	90	90	90	90	92	87.9	97																						
30-May	92	92	91	89	87	84	80	77	67	60	56	49	49	52	57	54	53	55	59	62	69	81	78	84	69.9	92																						
31-May	87	87	86	87	88	83	79	74	61	51	45	42	38	38	38	37	35	34	31	33	37	39	42	45	54.9	88																						
																								70.1	72.7	75.4	77.3	77.4	76.6	73.5	69.0	63.4	56.9	52.8	50.1	49.1	48.4	47.2	47.4	47.1	46.9	48.8	51.6	54.1	59.8	64.6	67.9	Diurnal Average
																								92	92	93	95	96	96	96	92	93	92	95	96	97	96	96	94	91	90	91	90	90	91	93	92	Diurnal Maximum



**WBEA**  
**Hourly Averages**

**Relative Humidity (RH) - inHg**  
**Athabasca Valley - May 2014**





Maximum Speed: 36 km/h on May 30 12:00	Maximum Daily Speed Average: 18.3 km/h on May 2	Hours in Service: 744
Minimum Speed Value: 0 km/h on May 12 04:00	Minimum Daily Speed Average: 0.7 km/h on May 18	Hours of Data: 744
Maximum Diurnal Speed Average: 8.0 km/h at hour 14	Minimum Diurnal Speed Average: 0.3 km/h at hour 4	Hours of Missing Data: 0
Monthly Average Velocity: 2.9 km/h 344.4 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 2 Q <sub>1</sub> = 4 Median = 8 Q <sub>3</sub> = 13 P <sub>90</sub> = 20 P <sub>99</sub> = 32	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-May	WSW11	WSW11	NW12	W5	NNW8	NNW10	NNW6	NNW7	NNW10	NW18	NNW23	NNW25	NNW21	NNW20	NNW21	NW20	NW21	NNW23	NNW21	NNW16	NW17	N11	NNW7	NW12	NNW13.6	NNW25	
2-May	NW17	WNW19	NW28	NNW22	NW22	NW25	NW26	NW28	NW27	NW29	NNW26	N19	NNW21	N15	N14	N13	N13	NNE12	N14	N15	N16	N16	N17	N17	NNW18.3	NW29	
3-May	NNW19	NNW16	N16	NNW15	N14	N14	N14	N13	N12	N12	NNW14	NNW14	NNW17	NNW16	NNW16	NNW11	NNE8	ENE8	ENE10	E9	E6	ESE3	NE2	N3	N10.1	NNW19	
4-May	NE0	ESE1	E3	E3	ESE3	ESE4	ESE4	ENE4	ENE2	ENE2	E3	W5	ENE3	ENE3	NW3	NW3	ESE6	ESE3	SE5	ESE8	S9	S10	SSE7	SE4	S3	SE2.3	S10
5-May	SE4	SE4	SE5	SE4	ENE2	ENE3	ESE4	ENE2	ENE3	NW4	NNW8	NNW10	NNW10	ENE9	E15	SE9	SE7	SE10	E14	E17	E20	E20	E24	E23	E7.2	E24	
6-May	E17	ENE10	ENE10	NE11	NNE9	N13	N14	NNW21	NNW20	NNW20	NE14	N16	N22	N18	N15	N14	NNW17	NNE10	E8	NE7	NNW8	NNW9	NNW8	NNW6	N11.0	N22	
7-May	NW7	WNW6	NW8	NW8	NW8	NNW10	N12	N10	NNW13	N20	NNW21	NNW21	NNW22	NNW18	N16	NNW16	N15	N12	NNE8	NE5	ENE4	ENE2	N2	NNW10.6	NNW22		
8-May	SE2	E2	E2	SE4	SE4	ESE3	SE6	ESE3	ENE5	E4	NNW4	NNW9	ENE8	NE12	NNE11	N16	N17	N16	NNW16	N14	N10	N4	E2	ENE2	NNE5.0	N17	
9-May	ENE2	N3	NW6	NNW7	NNW8	NNW8	NNW6	NW4	SW4	W11	NW6	N7	NNW5	N5	WNW6	SSW4	N7	N12	NNW16	N13	NW8	NW9	NW9	NW9	NNW6.1	NNW16	
10-May	NNW9	WNW8	NW8	NW10	NW11	NW8	WNW16	WNW21	NW25	WNW24	NW25	NNW20	NNW22	NNW22	NNW24	NNW20	NNW14	NNW13	NNW13	NW10	W11	W9	WSW9	WSW6	NW13.7	NW25	
11-May	SW4	S2	SSE1	SE1	S1	SSE1	S2	WSW5	SW0	SW13	W16	NNW23	NW23	NW21	NW19	NNW15	N13	N9	NNW11	N8	N4	NW4	W3	SW1	NW6.2	NW23	
12-May	SSE2	SE3	ESE1	ESE0	ENE1	ENE2	ENE3	NNW2	WNW2	WNW3	NNW11	NNW13	NNW10	NNW10	NNW6	N9	N12	N14	N15	N13	NNE7	ENE8	E12	ESE5	N5.0	N15	
13-May	ESE3	ESE2	SE2	E3	SE2	SE5	E6	E6	ENE4	ENE6	ENE5	E5	ENE6	N7	N9	NNW9	N10	N11	NNE13	NNE11	NNE4	NNW3	W3	WSW2	NNE3.7	NNE13	
14-May	SW2	ESE1	SE2	SE5	ESE4	SE6	SE7	SE9	SE8	SSE11	SE11	ESE13	ESE14	ESE13	ESE13	ESE14	ESE12	SE9	SE11	ESE7	SE9	SW8	SSE4	SE9	SE7.7	ESE14	
15-May	SSE8	SE10	SE9	SE8	SE8	SE9	SE6	ESE3	NNW13	NNW21	NNW27	NNW24	NNW23	N22	N18	NNW17	N20	N20	NNW16	NNW15	NNW11	NNW9	WNW6	WNW7	NNW8.5	NNW27	
16-May	WNW6	WNW6	WNW6	W6	W6	WNW5	NNW5	NNW5	N6	N8	NNE6	N8	N7	N6	N4	NW6	NW4	NW3	NW3	E4	SE6	ESE1	ESE1	ESE2	NNW3.2	N8	
17-May	E3	E3	ESE3	SE4	SE5	SE6	ESE4	ENE5	NNW2	WNW2	WSW4	SSW5	WSW6	NW6	NNW5	NNW7	NNW4	ENE4	ENE10	ENE11	E6	ESE6	ESE5	ESE5	E2.0	ENE11	
18-May	E3	NNE4	NE2	NNW0	N3	E2	SE6	N2	WNW3	S1	SW1	NW8	NNW10	NW13	ESE1	E11	SSE5	SSE9	SSE11	S7	SW2	S1	SE1	SE5	SE0.7	NW13	
19-May	SSE7	SE10	SE8	SE12	SE8	SE8	SE11	SE9	ESE6	SSE4	SSE12	SSE14	SSE16	SSE16	SSE19	SSE16	SSE16	S14	S17	S14	S11	SSE9	SSE6	S4	SSE10.8	SSE19	
20-May	SSE9	SSE5	SSE6	SE5	SE7	SE9	SE11	SE11	SE11	S14	S14	S14	SSE15	S13	SW14	NW5	ESE7	SE12	SE13	SSE8	SSE8	SSE3	SSE6	SSE7	SSE8.3	SSE15	
21-May	SSE5	SE12	SSE10	SSE7	SSE6	SE7	SE10	SE8	ESE4	SW14	WSW12	SW16	WSW13	SW2	WSW24	WSW31	W32	W34	NW21	N14	N5	NNE0	SE1	ESE2	WSW6.5	W34	
22-May	ESE3	SE4	SSE3	SE5	SE8	SE6	SE8	ESE5	E5	SW8	SW11	WSW12	SW15	WSW15	WSW11	WSW9	SW12	WSW10	SW7	SSW3	S1	SE3	SE1	SE2	SSW4.6	WSW15	
23-May	SSW2	SW2	SSW1	SSE4	SSE5	SE6	SE6	SE5	ESE5	SE4	NNW2	NE3	ESE4	E7	E9	W3	W6	NNW5	NE4	ESE7	N2	SE4	W22	WNW17	SSE0.8	W22	
24-May	NW14	W12	WSW16	WSW11	WSW12	W12	WNW11	NNW7	N6	WSW11	W20	WSW16	NNW25	NNW28	NW20	NNW11	NNW15	NW21	NNW16	NNW7	NE3	WNW1	E2	E3	WNW10.2	WNW28	
25-May	E3	ESE2	SE2	ESE1	SE4	SE6	ESE5	E5	ESE6	ESE10	ESE6	E4	NNE2	E6	SSE10	SE10	SE14	ESE12	ESE11	ESE11	ESE11	SE8	SE9	SE10	ESE6.6	SE14	
26-May	SSW5	S4	E1	NNE3	ENE3	ESE5	SE4	SE3	ESE10	SE15	SSE6	ESE3	NNW6	N5	ESE10	E13	ENE11	E13	ENE13	ENE11	E10	E10	E11	E11	E6.3	SE15	
27-May	E9	ENE5	NNE6	N7	N7	NNE7	NNE7	N7	N8	NNE6	NNE6	N5	N8	N11	NNW14	N9	NE5	NE6	NE5	NNE5	NE6	ENE4	ENE4	E4	NNE5.8	NNW14	
28-May	ESE1	E4	E3	E4	ESE6	SE3	E2	ESE5	E7	ENE6	SE3	NNE5	ENE4	E8	E7	SE6	ESE9	ESE10	ESE9	ESE10	E8	E5	E6	E3	E5.2	ESE10	
29-May	E4	E4	E4	ESE4	ESE4	ESE2	NNE4	N4	N2	NNW4	NNW11	NNW13	NNW14	NNW12	NNW13	NNW18	NW16	NW20	NNW15	NNW16	NNW18	W19	WSW15	WSW15	NW7.2	NW20	
30-May	WSW18	WSW15	WSW20	WSW23	WSW21	WSW19	W23	W21	WNW27	WNW32	W35	WNW36	WNW30	WNW32	NW34	NW24	N3	E5	ENE5	ENE4	E1	E0	NNE3	ENE1	W15.1	WNW36	
31-May	SSW3	SSE3	S4	SSE3	ESE3	SSE2	SSE2	N2	NNW6	NNW8	NNW10	N11	N12	NNW12	NNW10	N13	N12	N8	NE9	ENE8	E10	ESE7	ESE9	SE12	NNE3.7	N13	

SW0.4	SSW0.7	NW1.0	NNW0.3	N0.5	N0.7	N0.7	N2.5	NNW3.7	NW4.2	NW6.1	NNW6.9	NNW7.6	NNW8.0	NNW6.3	NNW6.0	NNW5.2	N4.8	NNE4.8	NE4.4	NE2.2	NE1.3	E0.9	E0.8	Diurnal Average
NNW19	WNW19	NW28	WSW23	NW22	NW25	NW26	NW28	NW27	WNW32	W35	WNW36	WNW30	WNW32	NW34	WSW31	W32	W34	NW21	E17	E20	E20	E24	E23	Diurnal Maximum

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



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

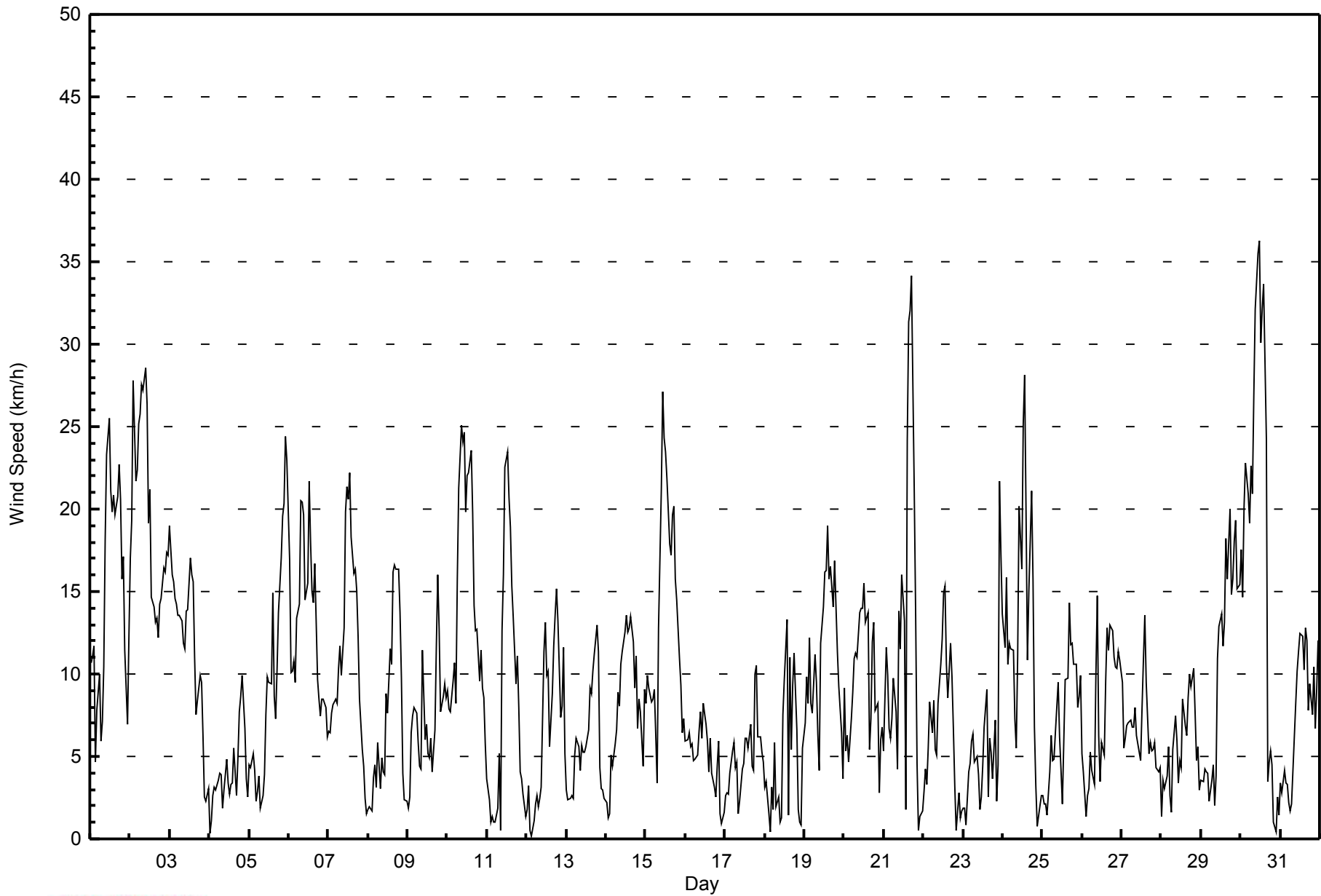
**Wind Speed (WS) - km/h**  
**Athabasca Valley - May 2014**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 17 km/h on May 21 13:00														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 May 12 07:00																									
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-May	2	4	7	2	5	2	2	3	4	6	6	8	5	5	6	6	5	7	7	7	5	3	2	2	8
2-May	4	5	7	10	7	5	5	6	5	6	6	5	5	5	4	3	3	4	4	4	4	5	5	5	10
3-May	5	4	4	4	4	4	4	3	3	3	3	3	3	3	3	3	4	3	3	3	2	1	2	1	5
4-May	1	1	1	1	1	1	1	1	1	3	3	2	2	2	2	3	4	4	5	4	5	4	2	1	5
5-May	2	2	2	2	1	1	2	1	1	2	2	2	3	7	4	3	4	4	4	4	4	5	5	5	7
6-May	4	3	3	3	3	4	4	4	5	5	5	5	6	5	6	5	7	7	6	6	3	2	2	2	7
7-May	1	2	2	2	1	1	2	3	3	5	6	6	5	4	4	4	4	4	4	3	2	2	1	1	6
8-May	2	1	1	1	1	1	2	2	2	2	1	2	3	3	4	4	4	5	4	3	3	2	1	2	5
9-May	1	2	1	1	1	1	2	2	4	3	3	2	3	3	3	3	4	4	4	5	2	2	2	2	5
10-May	2	2	2	3	3	2	4	4	5	5	5	5	5	5	5	5	4	3	5	2	2	2	1	2	5
11-May	1	2	1	1	1	1	2	3	2	4	5	6	6	6	6	6	5	3	3	3	1	1	1	1	6
12-May	1	2	1	1	1	1	1	1	1	1	3	3	4	3	3	3	3	4	4	4	2	4	5	2	5
13-May	2	1	1	1	1	2	2	1	1	2	2	3	3	3	3	4	4	3	3	3	3	1	2	2	4
14-May	2	1	1	2	1	2	3	2	2	2	4	4	4	3	4	4	3	3	5	5	3	2	3	2	5
15-May	3	3	2	3	2	2	2	2	7	4	5	5	5	6	5	5	6	5	4	3	2	2	1	1	7
16-May	1	1	1	1	1	1	2	1	1	2	2	2	3	3	3	2	2	2	1	3	2	1	2	1	3
17-May	1	1	1	1	2	1	2	1	1	2	2	2	2	3	3	2	2	3	2	2	1	2	2	1	3
18-May	1	3	1	1	2	1	2	2	1	2	2	2	4	7	4	4	3	4	3	3	1	1	1	3	7
19-May	2	2	3	3	3	2	3	2	2	4	5	4	5	5	6	4	5	5	5	5	3	2	2	2	6
20-May	4	3	3	3	2	2	3	3	3	5	5	5	5	5	7	7	4	3	3	2	3	3	2	2	7
21-May	1	2	2	2	2	3	2	3	2	3	3	5	17	3	7	8	9	8	7	4	4	1	2	1	17
22-May	1	1	1	2	2	2	2	2	2	3	4	6	5	5	4	5	3	3	3	1	1	2	1	1	6
23-May	1	2	1	3	2	3	3	2	2	2	1	2	2	3	4	3	2	2	2	4	2	5	11	4	11
24-May	5	4	2	3	3	2	3	2	3	6	5	5	7	7	9	5	5	4	3	4	1	1	2	1	9
25-May	1	1	1	1	1	2	1	1	4	3	3	3	3	4	4	4	4	4	4	3	4	2	2	2	4
26-May	1	2	2	1	2	2	1	2	3	4	3	2	3	3	5	4	3	4	3	3	3	3	3	3	5
27-May	4	2	2	2	2	2	2	3	2	2	2	2	2	3	2	3	2	3	3	2	2	2	2	1	4
28-May	1	1	1	1	1	1	1	2	2	2	2	2	3	3	2	3	4	3	2	3	2	2	2	1	4
29-May	2	1	2	1	1	1	1	1	2	3	3	3	2	3	3	3	3	3	3	3	3	3	2	2	3
30-May	3	2	3	3	3	3	4	5	6	7	8	7	9	7	7	8	3	1	2	3	1	1	2	1	9
31-May	2	2	3	2	1	1	1	1	2	2	2	3	3	3	3	3	3	3	3	2	2	3	3	4	4
														Diurnal Maximum											



**WBEA**  
**Hourly Averages**

**Wind Speed (WS) - km/h**  
**Athabasca Valley - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h**  
**Athabasca Valley - May 2014**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	253	34.01	34.01
6 - 11	260	34.95	68.95
12 - 19	156	20.97	89.92
20 - 28	65	8.74	98.66
29 - 38	10	1.34	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Wind Speed (WS) - km/h**  
**Athabasca Valley - May 2014**

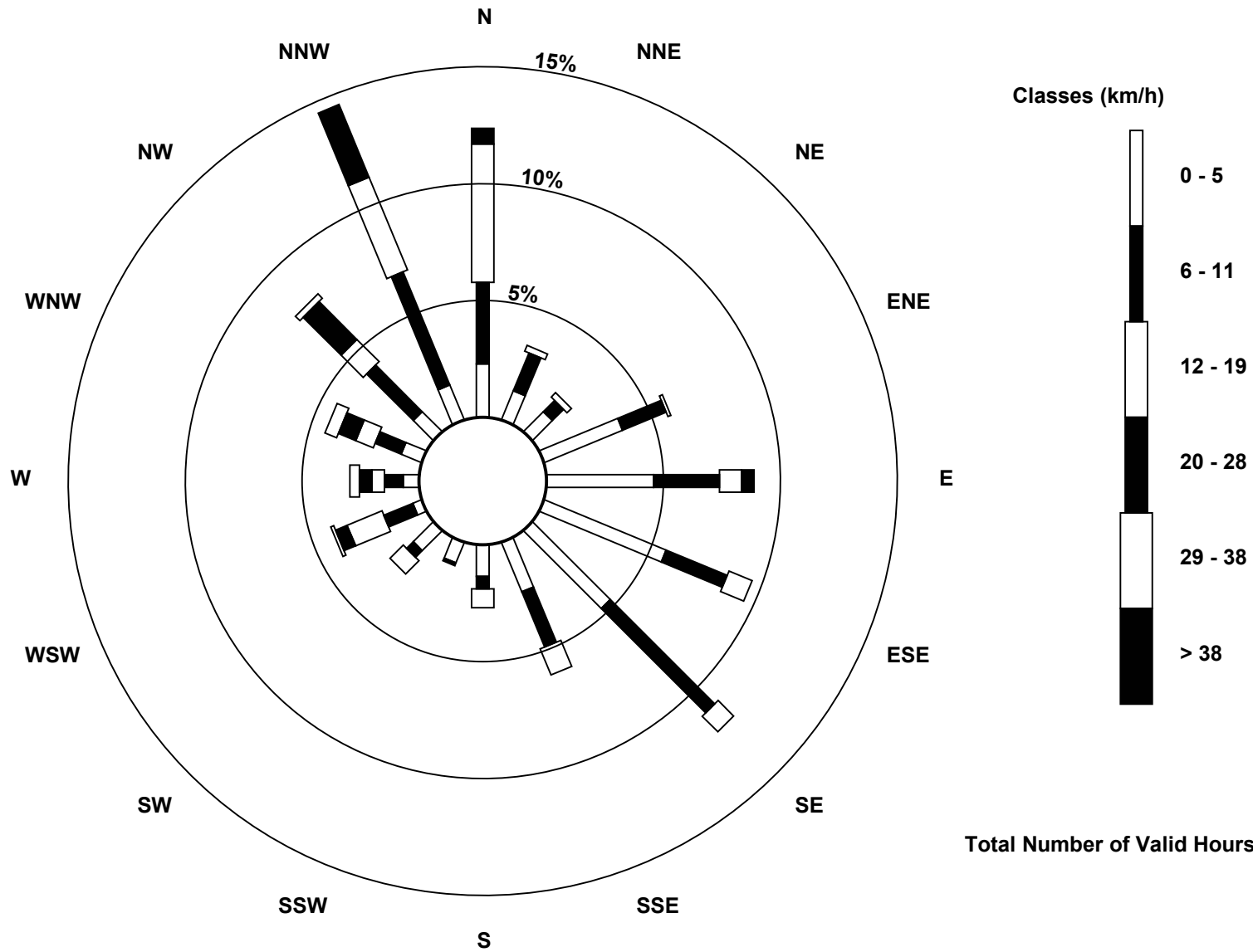
Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	17	10	9	27	34	42	35	17	10	7	9	3	5	7	9	12	253
6 - 11	26	13	5	15	21	21	47	19	4	1	3	10	6	9	21	39	260
12 - 19	44	2	2	1	7	8	7	9	6	0	6	12	4	6	10	32	156
20 - 28	5	0	0	0	4	0	0	0	0	0	0	4	4	6	17	25	65
29 - 38	0	0	0	0	0	0	0	0	0	0	0	1	3	4	2	0	10
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	92	25	16	43	66	71	89	45	20	8	18	30	22	32	59	108	744

Total Number of Valid Hours: 744

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Wind Speed (WS) - km/h  
Athabasca Valley (AMS 7)**







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

**Wind Direction (WD) - deg**  
**Athabasca Valley - May 2014**

Direction of Maximum Speed: 284 deg on May 30 12:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 333.0 deg on May 2	Hours of Data: 744
Direction of Minimum Speed: 105 deg on May 12 04:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 0.7 deg on May 18	Percent Operational Time: 100.0
Monthly Average Direction: 332.4 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-May	240	252	320	265	335	342	338	347	333	315	338	342	347	346	338	322	321	346	332	335	314	359	334	320	329.8
2-May	308	292	317	329	322	309	307	313	315	325	335	350	341	358	353	350	355	15	359	3	357	359	356	352	333.0
3-May	348	346	353	348	356	359	4	354	353	355	344	340	340	343	342	346	24	61	78	83	87	111	51	3	359.2
4-May	56	105	85	98	116	103	123	74	28	91	266	60	58	308	308	120	114	124	115	169	185	161	129	186	128.7
5-May	138	143	127	134	57	76	102	74	76	307	335	344	341	59	84	138	135	137	84	88	85	84	85	87	85.6
6-May	92	75	59	49	33	359	354	343	346	341	38	5	351	356	1	8	346	12	82	42	327	334	335	327	7.3
7-May	307	301	315	326	322	321	339	349	350	346	351	345	345	341	348	353	347	355	8	31	56	63	58	6	347.1
8-May	129	85	100	130	129	102	130	121	78	95	327	345	64	47	30	351	355	354	348	349	11	5	82	76	20.1
9-May	62	4	323	334	330	330	334	320	229	276	319	357	342	354	286	198	8	355	345	353	325	317	313	311	328.9
10-May	332	300	313	314	305	326	299	301	304	298	312	328	331	330	329	330	342	339	344	309	277	269	244	240	313.9
11-May	223	176	147	134	180	154	176	246	224	226	274	300	318	325	308	330	349	351	346	4	359	308	275	236	310.6
12-May	159	140	116	105	73	75	63	327	296	301	340	344	342	340	347	354	356	357	359	9	19	58	92	118	5.7
13-May	112	113	126	87	134	125	99	79	73	73	63	79	74	354	351	345	352	10	14	12	16	343	265	241	33.1
14-May	223	115	125	135	115	128	131	141	142	150	129	116	120	110	120	104	113	128	145	119	136	214	151	130	129.4
15-May	152	143	136	137	137	135	128	119	348	343	340	341	346	354	354	346	349	350	340	332	321	307	287	291	347.4
16-May	296	290	286	272	259	292	343	344	355	9	19	358	357	6	1	323	309	326	320	84	125	120	104	103	336.4
17-May	94	97	109	126	125	128	117	78	339	283	245	195	239	316	334	327	338	77	76	69	81	107	116	120	87.5
18-May	94	17	34	340	356	81	136	8	285	179	235	312	336	304	120	101	153	164	164	171	230	189	141	130	142.7
19-May	155	137	141	137	142	140	138	129	103	160	153	151	151	161	163	161	157	178	175	169	169	162	155	178	154.8
20-May	149	153	152	130	134	133	133	136	128	177	187	176	167	188	217	309	123	142	140	148	161	161	156	161	158.1
21-May	149	141	147	151	148	143	137	128	122	226	240	222	248	219	243	258	266	277	306	350	349	15	125	110	242.0
22-May	106	142	165	127	140	136	142	107	97	222	215	240	226	253	251	238	232	240	218	193	187	140	145	139	205.8
23-May	203	220	200	149	149	140	140	126	104	143	294	46	103	98	94	259	261	335	52	113	8	135	272	292	162.6
24-May	315	261	257	255	256	267	286	345	357	249	264	255	287	303	305	329	337	323	320	340	49	301	88	91	293.8
25-May	85	106	141	117	131	134	120	94	117	116	107	82	17	87	163	131	131	123	111	111	122	132	137	136	121.6
26-May	194	175	87	23	76	105	145	127	111	134	152	105	347	355	104	86	78	81	73	70	80	89	91	92	94.0
27-May	90	69	12	9	9	13	12	10	357	32	22	356	349	350	340	356	41	38	38	30	46	67	71	82	19.9
28-May	111	88	99	82	105	146	88	122	82	75	135	25	74	81	94	129	109	117	104	102	101	92	100	87	98.5
29-May	98	92	82	107	105	105	32	9	349	335	341	342	339	340	336	340	320	310	303	293	284	276	252	243	313.9
30-May	246	247	244	243	245	256	267	269	285	284	281	284	289	302	311	310	2	90	62	68	82	101	25	77	279.1
31-May	194	165	173	148	116	149	156	9	342	333	344	356	2	348	344	355	351	6	54	69	87	114	118	128	26.5
221.1 210.2 305.6 346.9 353.0 6.1 7.0 351.9 347.1 306.0 316.6 327.9 331.6 339.0 332.8 339.4 347.4 357.5 19.2 34.3 37.1 47.0 78.9 94.0																									
Diurnal Average																									

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



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

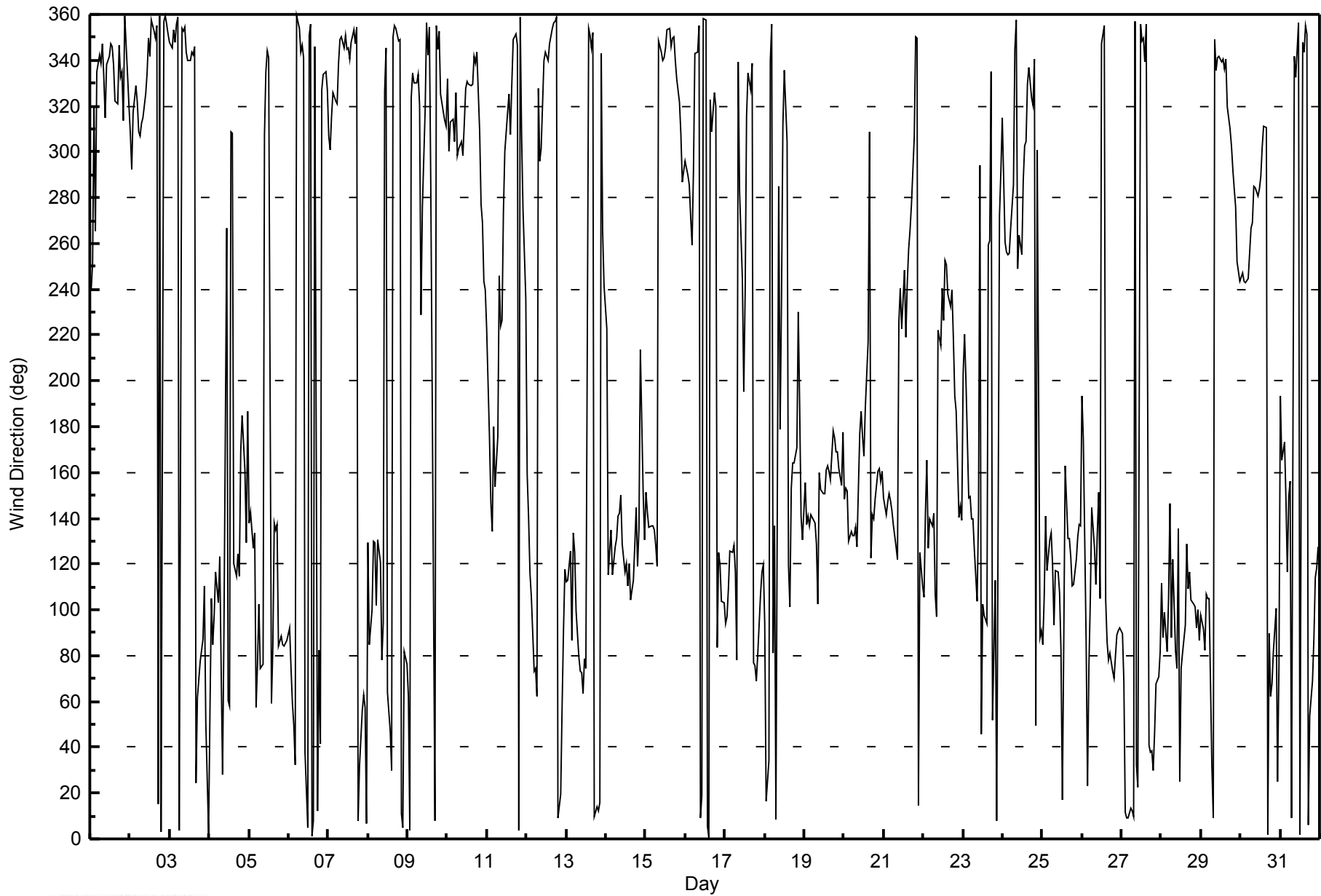
**Wind Direction (WD) - deg**  
**Athabasca Valley - May 2014**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0																			Hours in Service: 744						
Maximum Value: 102 deg on May 4 17:00																			Hours of Data: 744						
Minimum Value: 8 deg on May 30 04:00																			Hours of Missing Data: 0						
Percentiles: P <sub>1</sub> = 9 P <sub>10</sub> = 13 Q <sub>1</sub> = 16 Median = 22 Q <sub>3</sub> = 36 P <sub>90</sub> = 57 P <sub>99</sub> = 97																			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-May	12	24	32	43	26	12	22	19	17	16	18	14	18	18	17	16	16	23	22	13	21	18	14	43	
2-May	8	13	15	19	18	11	12	11	10	13	15	18	13	24	18	16	21	22	21	20	19	21	20	20	24
3-May	17	17	20	23	22	20	20	19	18	21	13	16	13	13	14	19	43	29	18	10	12	39	55	31	55
4-May	89	48	19	22	29	18	14	20	56	72	57	74	85	47	69	58	102	51	52	32	34	37	46	34	102
5-May	39	34	27	38	31	24	38	48	49	44	20	12	11	56	17	41	35	23	20	11	11	11	11	11	56
6-May	14	16	21	17	16	20	18	12	14	12	31	31	20	20	24	25	21	49	26	44	14	12	10	22	49
7-May	20	21	15	10	11	12	11	16	16	18	18	16	17	12	16	19	16	20	22	17	17	27	44	66	66
8-May	57	54	53	35	25	30	20	42	19	63	29	12	30	23	38	17	19	18	16	17	17	27	35	29	63
9-May	31	37	13	11	12	13	16	39	69	24	37	26	42	62	50	61	49	20	16	20	16	13	11	11	69
10-May	12	19	19	18	16	23	18	16	16	13	15	14	17	14	13	17	14	14	15	19	11	16	9	28	28
11-May	30	55	56	56	77	73	68	53	97	12	24	17	19	20	27	30	18	22	16	21	25	22	40	96	97
12-May	69	50	99	97	68	21	19	47	21	29	14	14	27	16	45	36	25	20	18	18	17	21	20	36	99
13-May	36	29	31	46	43	15	27	18	15	24	36	59	64	41	22	25	31	26	19	18	42	37	55	65	65
14-May	63	79	54	22	31	19	27	16	19	23	24	22	22	25	21	21	25	30	42	29	17	34	13	79	79
15-May	19	16	16	20	14	12	14	32	20	13	10	12	17	20	20	17	18	18	18	11	12	18	29	20	32
16-May	18	18	21	22	16	36	14	15	16	23	40	23	38	50	61	20	37	46	31	56	17	74	88	54	88
17-May	43	18	25	18	22	17	31	15	60	76	53	50	28	23	42	17	57	60	13	11	13	22	22	22	76
18-May	31	54	56	92	37	47	16	62	57	86	97	28	25	45	81	22	48	38	20	29	44	87	76	39	97
19-May	35	14	16	10	16	15	15	16	31	88	33	24	22	23	19	21	18	26	19	17	17	16	14	42	88
20-May	33	45	26	27	17	15	16	14	20	27	30	25	25	32	40	98	47	13	17	19	17	78	24	13	98
21-May	16	11	11	18	15	20	14	19	57	14	16	22	93	99	18	16	17	12	36	16	53	81	77	40	99
22-May	31	15	33	32	18	16	14	45	27	23	20	34	17	19	23	20	20	20	31	36	59	31	63	53	63
23-May	69	75	77	59	41	51	47	30	27	33	61	55	47	36	28	91	33	26	53	24	51	69	50	17	91
24-May	16	20	13	14	15	13	20	32	32	33	20	22	16	32	30	18	13	17	25	41	86	64	27	86	86
25-May	24	42	56	59	16	14	23	28	38	31	60	67	97	64	32	36	23	22	20	19	19	18	16	15	97
26-May	31	30	86	57	73	28	29	45	21	16	25	30	22	65	23	17	16	14	14	16	15	16	17	16	86
27-May	19	25	15	15	16	14	19	21	25	20	26	40	25	22	11	33	38	24	29	21	21	24	28	24	40
28-May	63	26	27	16	21	38	53	26	16	27	49	38	57	21	25	42	31	22	19	19	18	19	22	34	63
29-May	34	28	23	23	24	49	17	19	86	33	11	14	11	12	11	11	10	9	13	11	13	8	10	8	86
30-May	9	11	8	8	9	11	11	13	14	14	13	14	20	23	15	14	62	30	30	32	78	89	61	83	89
31-May	40	49	50	43	27	59	71	54	9	16	13	22	23	19	19	23	19	25	20	11	15	23	21	18	71
89 79 99 97 77 73 71 62 97 88 97 74 97 99 81 98 102 60 53 56 78 89 88 96																									
Diurnal Maximum																									



**WBEA**  
**Hourly Averages**

**Wind Direction (WD) - deg**  
**Athabasca Valley - May 2014**





# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Report

### Station Information

Calibration Date	May 20, 2014	Previous Calibration	April 3, 2014
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Routine		
Start Time (MST)	9:10	End Time (MST)	13:35
Barometric Pressure	n/a mmHg	Station temp.	21 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	8400311
Cal Gas Concentration	50.8 ppm	Cal Gas Expiry Date	41557
Gas Cert Reference	LL 105142		
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2575
DACS voltage range	0-5V	DACS channel #	1

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	1000	1000	PMT voltage	-681	-681
Analyzer Range (mv)	5000	5000	Lamp voltage	807	802
Calculated slope	0.996265	1.001679	Chamber temp.	43.6	43.6
Calculated intercept	1.318866	1.645538	Pressure (mmHg)	714.3	711.4
Analyzer Background	10.3	10.4	Flow (lpm)	0.521	0.522
Analyzer Coefficient	0.814	0.814	Intensity	49000	49000

Analyzer make Thermo 43c Analyzer serial # 607415781

### 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	NA
as found span	5000	58.8	597.4	595.7	1.003
calibrator zero	5000	0.0	0.0	0.0	NA
high point	5000	58.8	597.4	595.7	1.003
second point	5000	29.4	298.7	295.2	1.012
third point	5000	14.7	149.4	146.2	1.021
calibrator zero	6000	0.0	0.0	0.0	NA
as left zero	6000	0.0	0.0	0.3	NA
as left span	5000	58.8	597.4	603.2	0.990
Average Correction Factor					1.012

Corrected As found 595.8 Previous response 598.3 % change 0.4%

#### Notes:

no adjustments required.

Calibration Performed By:

Michael Martineau



# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Summary

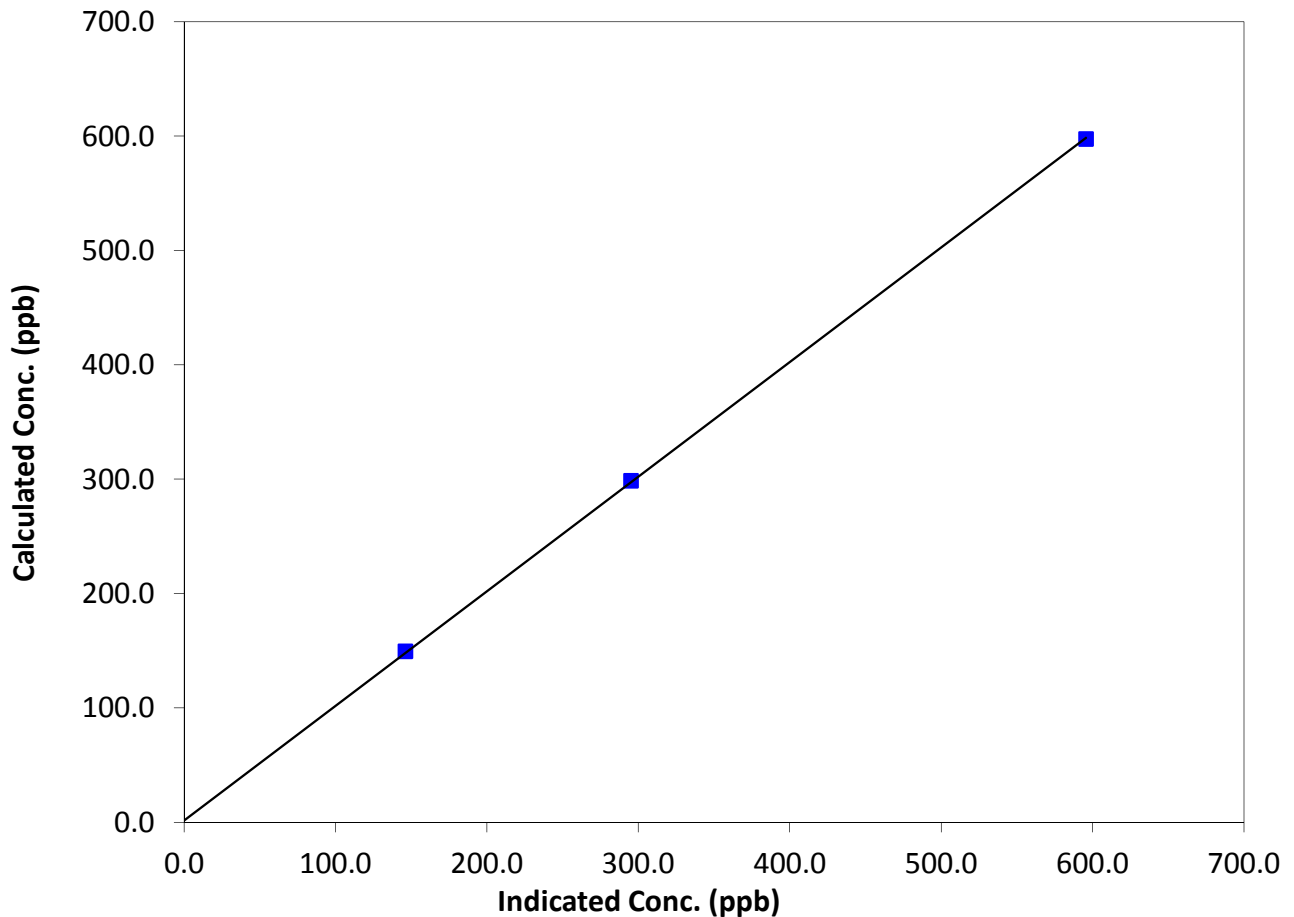
### Station Information

Calibration Date	May 20, 2014	Previous Calibration	April 3, 2014
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	9:10	End Time (MST)	13:35
Analyzer make	Thermo 43c	Analyzer serial #	607415781

### Calibration Data

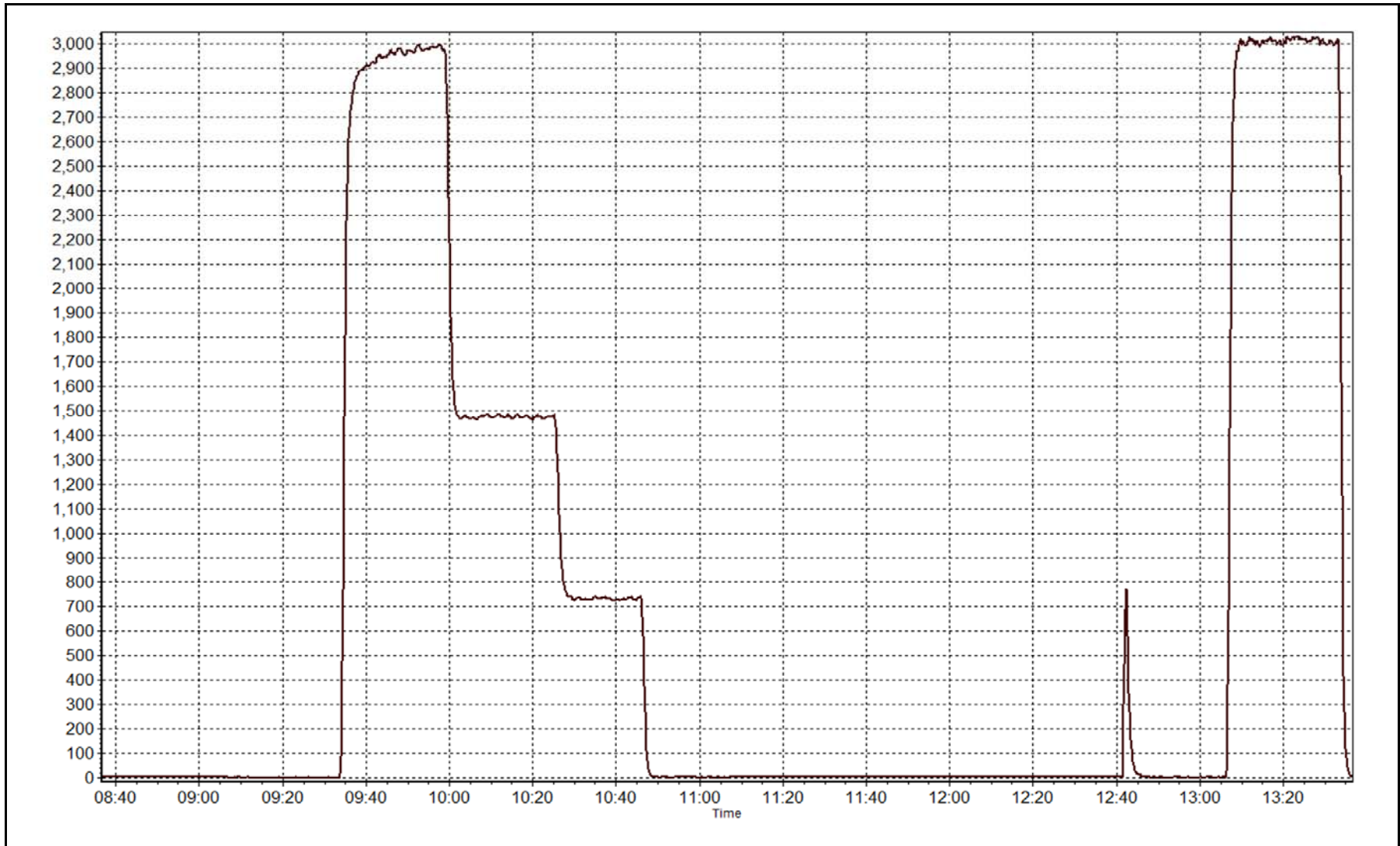
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999965
597.4	595.7	1.0028		
298.7	295.2	1.0118	Slope	1.001679
149.4	146.2	1.0214		
			Intercept	1.645538

**SO<sub>2</sub> Calibration Curve**



SO2 Calibration Plot

Date: May 20, 2014





# Wood Buffalo Environmental Association

## TRS Calibration Report

### Station Information

Calibration Date	May 21, 2014	Previous Calibration	April 16, 2014
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Routine		
Start Time (MST)	11:20	End Time (MST)	13:45
Barometric Pressure	n/a mmHg	Station temp.	21 Deg C
Calibrator Make/Model	Sabio 4010	Serial number	8400311
Cal Gas Concentration	5.64 ppm H2S	Cal Gas Expiry Date	11/3/2009
Gas Cert Reference	CC 188098	SO2 gas conc.	50.8 ppm SO2
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2575
DACS voltage range	0-5V	DACS channel #	2

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	100	100	PMT voltage	-619	-619
Analyzer Range (input)	5000	5000	Lamp voltage	812	810
Calculated slope	1.010925	1.014238	Chamber temp.	44	44
Calculated intercept	-0.033257	0.112929	Pressure	685.8	675.0
Analyzer Background	16.2	16.4	Flow	0.473	0.470
Analyzer Coefficient	0.984	0.984	Intensity	43500	43500
			Converter temp.	800	800

Analyzer make/model	TEI 45C	Analyzer serial #	630718530
Converter make/model	CDN-101	Converter serial #	468

### 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	NA
as found span	6000	79.8	75.0	73.9	1.015
SO2 scrubber check	5000	8.9	90.4	0.0	NA
calibrator zero	6000	0.0	0.0	0.0	NA
high point	6000	79.8	75.0	73.9	1.015
second point	6000	44.7	42.0	41.2	1.020
third point	6000	26.6	25.0	24.5	1.020
calibrator zero	5000	0.0	0.0	0.0	NA
as left zero	5000	0.0	0.0	0.0	NA
as left span	6000	79.8	75.0	74.1	1.012
Average Correction Factor					1.018

Corrected As found	74.0	Previous response	74.2	% change	0.4%
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#### Notes:

no adjustments required. Changed inlet filter.

Calibration Performed By:

Mike Martineau



# Wood Buffalo Environmental Association

## TRS Calibration Summary

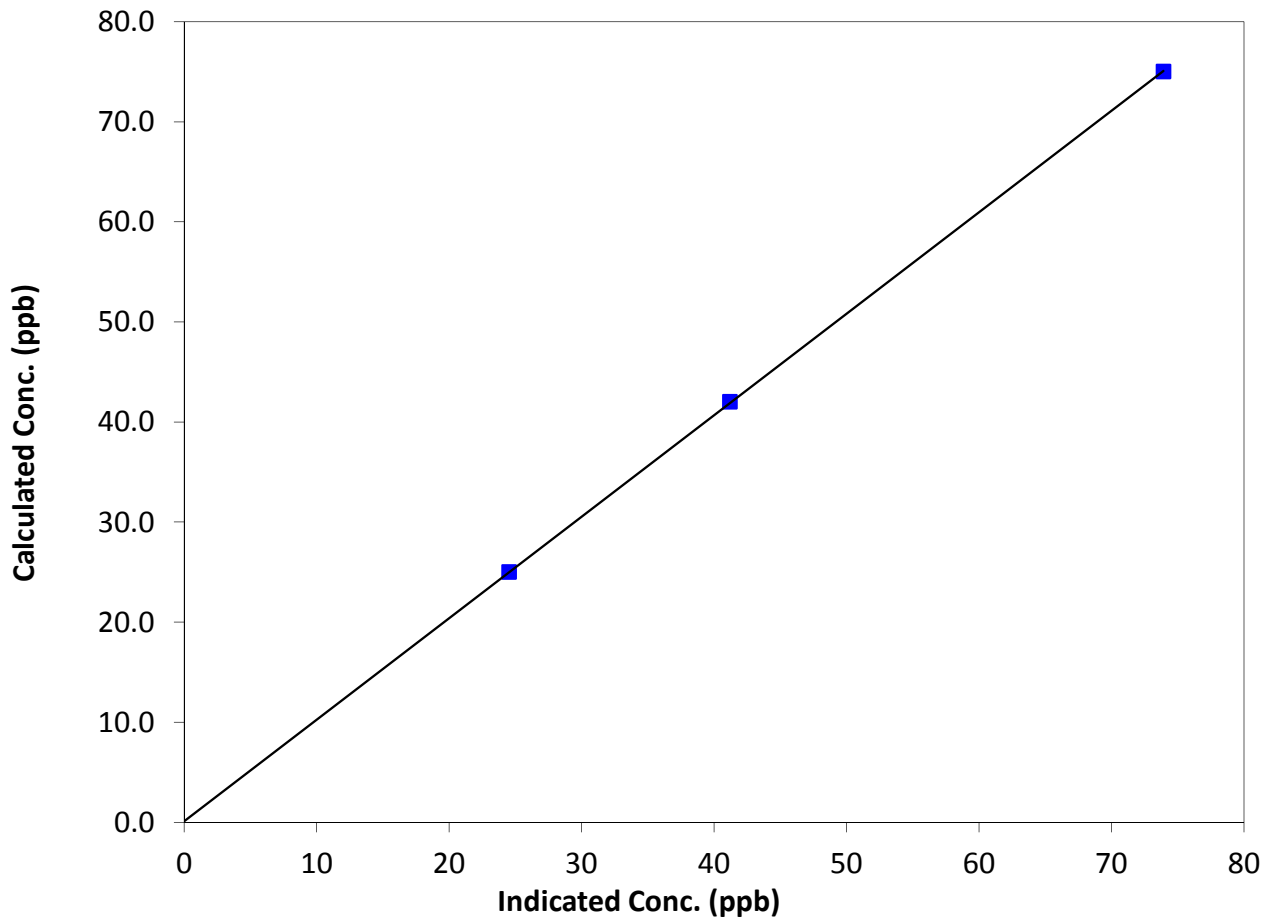
### Station Information

Calibration Date	May 21, 2014	Previous Calibration	April 16, 2014
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	11:20	End Time (MST)	13:45
Analyzer make	TEI 45C	Analyzer serial #	630718530

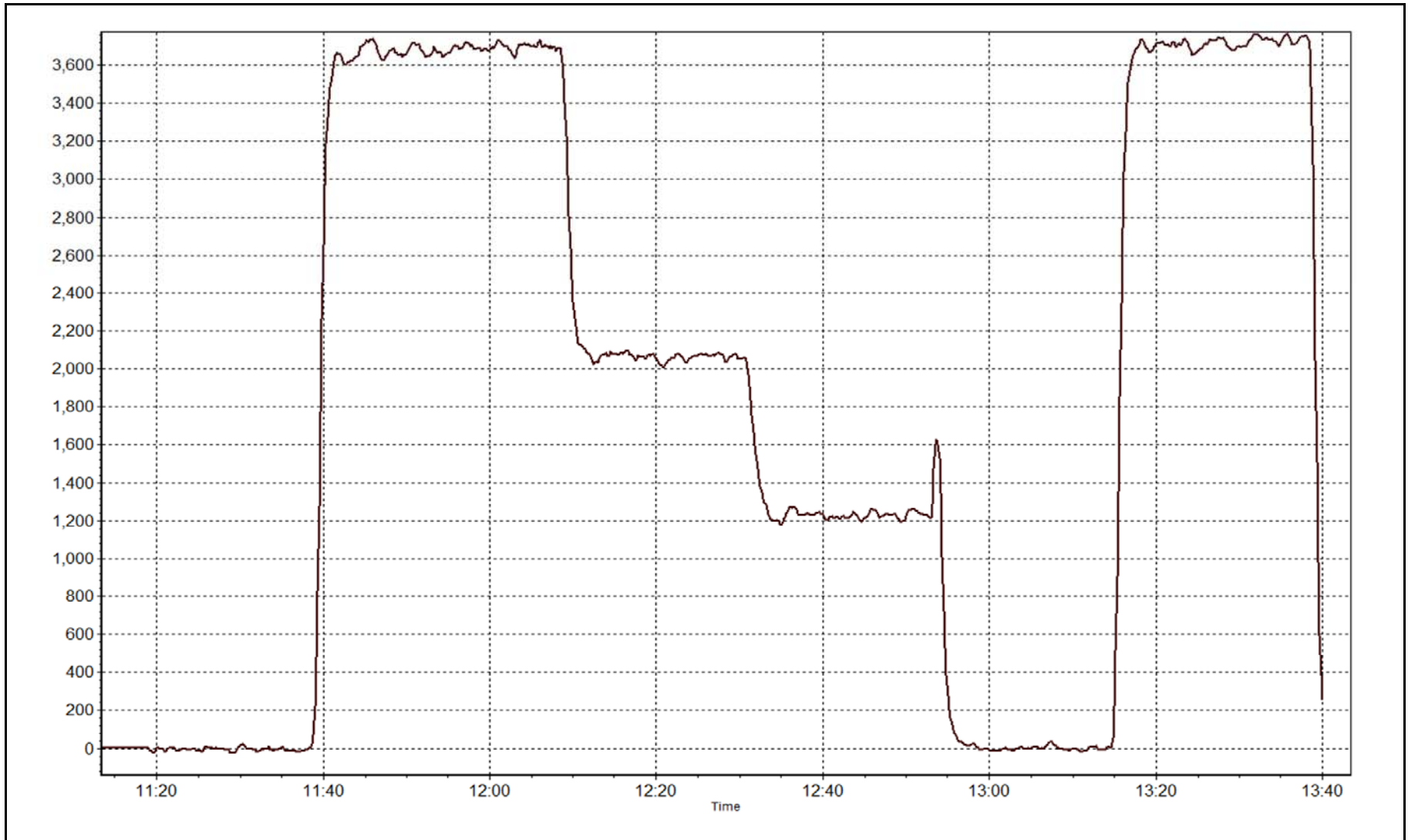
### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999992
75.0	73.9	1.0148		
42.0	41.2	1.0199	Slope	1.014238
25.0	24.5	1.0197		
			Intercept	0.112929

**TRS Calibration Curve**









# Wood Buffalo Environmental Association

## THC / NMHC Calibration Report

### Station Information

Calibration Date	Tuesday, May 20, 2014	Prev Calibration	Thursday, April 03, 2014
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Routine		
Start Time (MST)	9:10	End Time (MST)	13:35
Barometric Pressure	mmHg	Station temp.	21 Deg C
Calibrator Model	Sabio 4010	Serial Number	8400311
Gas Cert Reference	LL 105142	Cal Gas Expiry Date	Thursday, October 10, 2013
CH4 Cal Gas Conc.	502.0 ppm	CH4 Equiv Conc.	1063.0 ppm
C3H8 Cal Gas Conc.	204.0 ppm		
DACS make/model	Campbell Scientific CR3000	DACS serial No.	5563

### Analyzer Information

	Before	After		Before	After
THC Range (ppm)	50	50	Internal Temp	33.0	33.0
THC Range (input)	50	50	Flame Temp	389.0	389.0
NMHC Range (ppm)	50	50	Carrier Pressure	32.1	32.1
NMHC Range (input)	50	50	Fuel Pressure	41.4	41.4
THC Calc slope	1.007743	1.015789	Air Pressure	32.5	32.5
THC Calc intercept	0.022287	0.024504			
NMHC Calc slope	1.009702	1.018620			
NMHC Calc intercept	0.016266	0.016382			

Analyzer make Thermo Scientific 55i Analyzer serial # 1218153354

### THC Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	0.00	N/A
as found span	5000	58.8	12.50	12.30	1.016
calibrator zero	5000	0.0	0.00	0.00	N/A
high point	5000	58.8	12.50	12.30	1.016
second point	5000	29.4	6.25	6.10	1.025
third point	5000	14.7	3.13	3.04	1.028
calibrator zero	6000	0.0	0.00	0.00	N/A
as left zero	6000	0.0	0.00	0.00	N/A
as left span	5000	58.8	12.50	12.31	1.016
Average Correction Factor					1.023

Corrected As found 12.30 Previous response 12.38 % change 0.7%

**Notes:**

no adjustments required.

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	5000	0	0.00	0.00	N/A
as found span	5000	58.8	6.60	6.47	1.020
calibrator zero	5000	0.0	0.00	0.00	N/A
high point	5000	58.8	6.60	6.47	1.020
second point	5000	29.4	3.30	3.21	1.028
third point	5000	14.7	1.65	1.59	1.037
calibrator zero	6000	0.0	0.00	0.00	N/A
as left zero	6000	0.0	0.00	0.00	N/A
as left span	5000	58.8	6.60	6.47	1.020
Average Correction Factor					1.028

Corrected As found      6.47      Previous response      6.52      % change      0.7%

### CH4 Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0	0.00	0.00	N/A
as found span	5000	58.8	5.90	5.83	1.013
calibrator zero	5000	0.0	0.00	0.00	N/A
high point	5000	58.8	5.90	5.83	1.013
second point	5000	29.4	2.95	2.90	1.018
third point	5000	14.7	1.48	1.45	1.018
calibrator zero	6000	0.0	0.00	0.00	N/A
as left zero	6000	0.0	0.00	0.00	N/A
as left span	5000	58.8	5.90	5.84	1.011
Average Correction Factor					

Corrected As found      5.83      Previous response      5.86      % change      0.6%



# Wood Buffalo Environmental Association

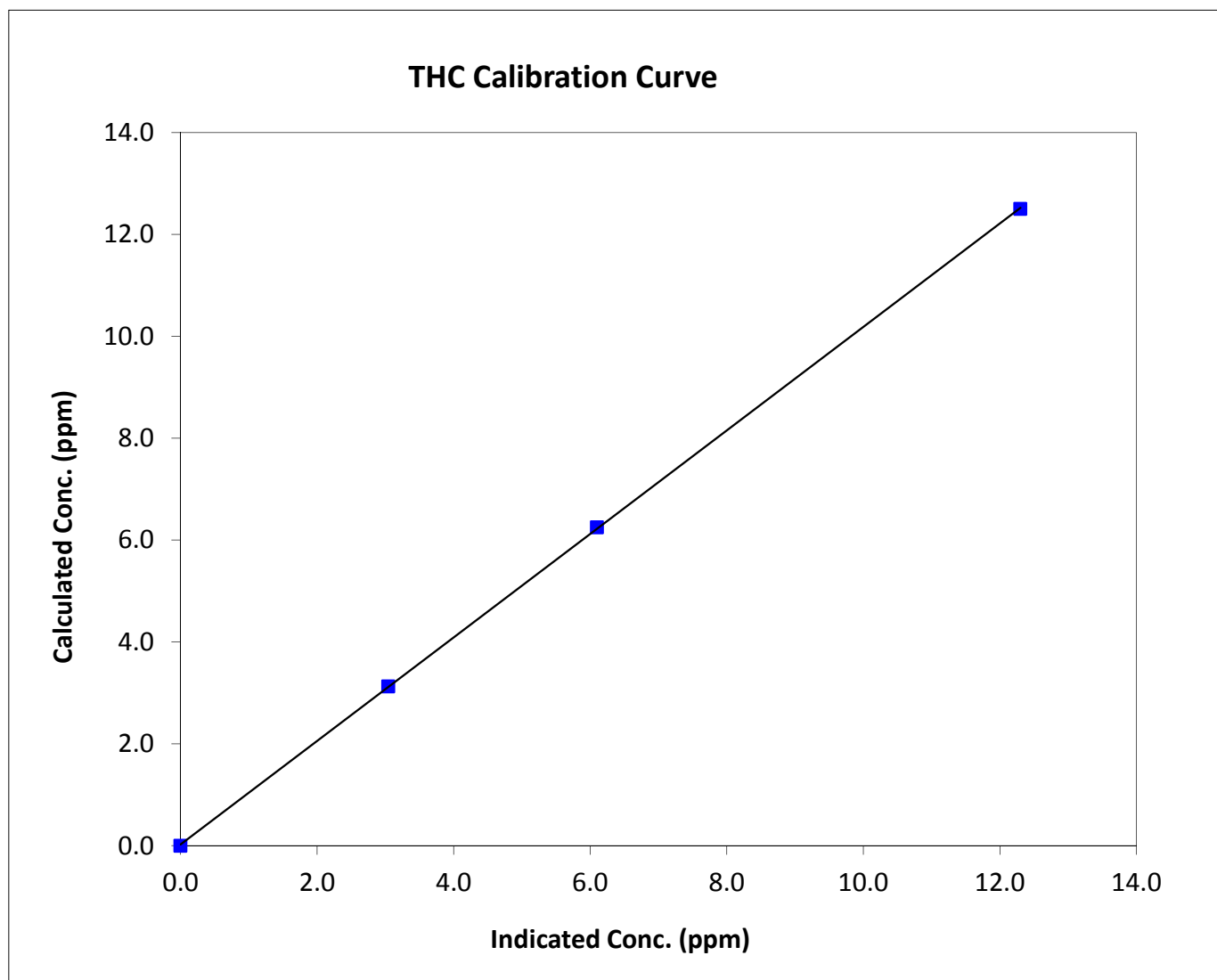
## THC Calibration Summary

### Station Information

Calibration Date	May 20, 2014	Previous Calibration	April 3, 2014
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	9:10	End Time (MST)	13:35
Analyzer make	Thermo Scientific 55i	Analyzer serial #	1218153354

### Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	N/A	Correlation Coefficient	0.999977
12.50	12.30	1.0163		
6.25	6.10	1.0247	Slope	1.015789
3.13	3.04	1.0280		
			Intercept	0.024504





# Wood Buffalo Environmental Association

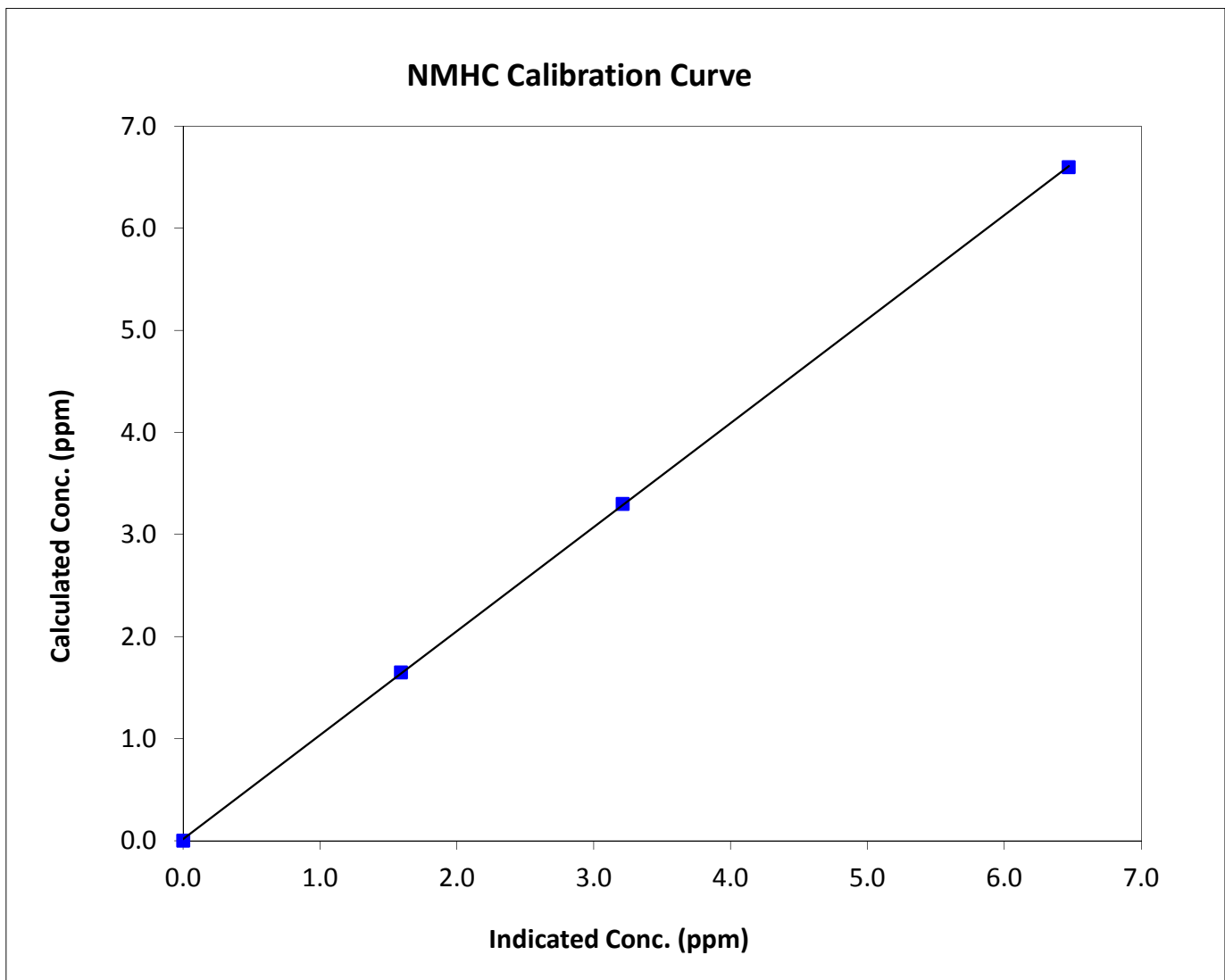
## NMHC Calibration Summary

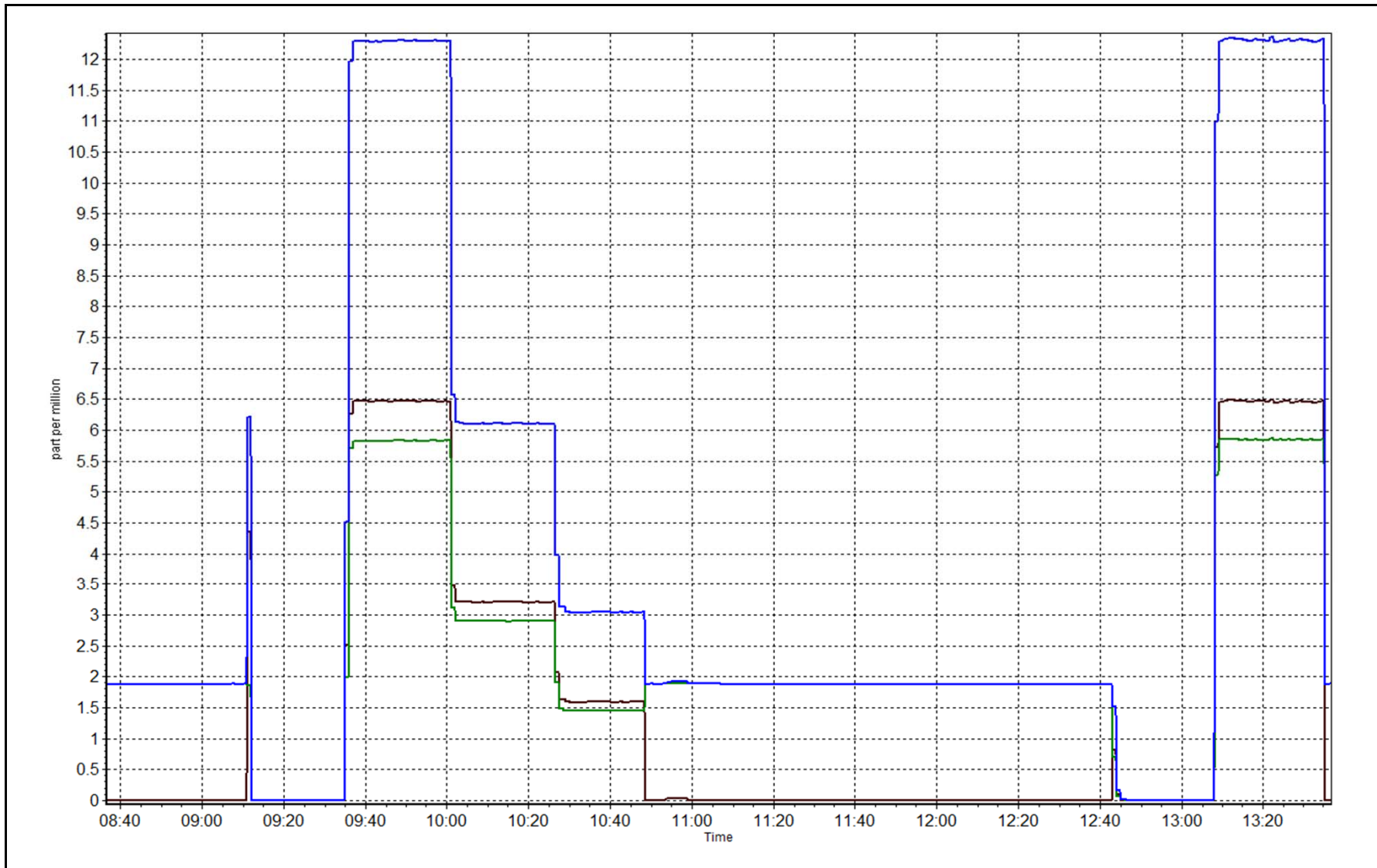
### Station Information

Calibration Date	May 20, 2014	Previous Calibration	April 3, 2014
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	9:10	End Time (MST)	13:35
Analyzer make	Thermo Scientific 55i	Analyzer serial #	1218153354

### Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	N/A	Correlation Coefficient	0.999971
6.60	6.47	1.0197		
3.30	3.21	1.0276	Slope	1.018620
1.65	1.59	1.0373		
			Intercept	0.016382







# Wood Buffalo Environmental Association

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

### Station Information

Calibration Date	May 21, 2014	Previous Calibration	April 4, 2014
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Routine		
Start Time (MST)	8:20	End Time (MST)	11:15
Barometric Pressure	N/A mmHg	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11021107
NO2 calibration used	Tuesday, May 20, 2014	Transfer Standard	N/A
DACS make/model	Campbell Scientific CR3000	DACS serial No.	5563
DACS voltage range	0-5V	DACS channel #	5

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	500	500	Bench temp.	29.0	27.9
Analyzer Range (input)	5000	5000	Lamp temp.	70.8	70.8
Calculated slope	1.003855	0.997887	Pressure	707.7	714.1
Calculated intercept	-1.893977	0.358600	Flow cell A	0.672	0.675
Analyzer Background	-0.2	-0.2	Flow cell B	0.737	0.741
Analyzer Coefficient	1.110	1.053	Cell A Intensity	108150	106600
			Cell B Intensity	90800	89600

Analyzer make TEI 49C Analyzer serial # 607415760

### 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	N/A
as found span	5000	N/A	347.7	370.4	0.939
calibrator zero	5000	0.00	0.0	0.0	N/A
high point	5000	N/A	347.7	348.4	0.998
second point	5000	N/A	177.4	176.9	1.003
third point	5000	N/A	89.0	88.7	1.003
calibrator zero	5000	0.00	0.0	0.0	N/A
as left zero	5000	0.00	0.0	0.1	N/A
as left span	5000	N/A	347.7	349.5	0.995
Average Correction Factor					1.001

Corrected As found 370.4 Previous response 348.3 % change -6.0%

#### Notes:

changed inlet filter after as founds. Adjusted span. Diagnostics and pump OK.

Calibration Performed By:

Michael Martineau



## Wood Buffalo Environmental Association

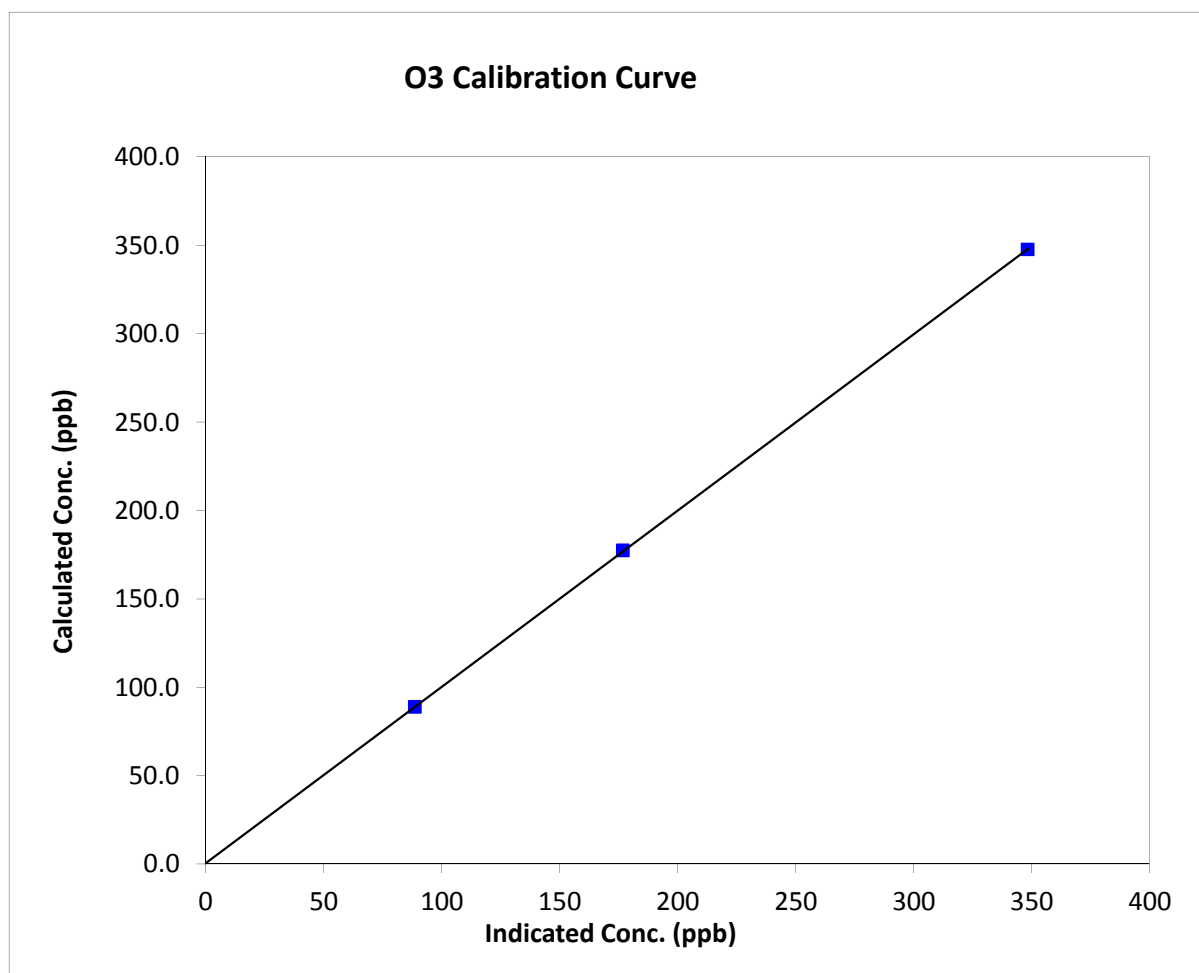
### O<sub>3</sub> Calibration Summary

#### Station Information

Calibration Date	Wednesday, May 21, 2014	Previous Calibration	April 4, 2014
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	8:20	End Time (MST)	11:15
Analyzer make	TEI 49C	Analyzer serial #	607415760

#### Calibration Data

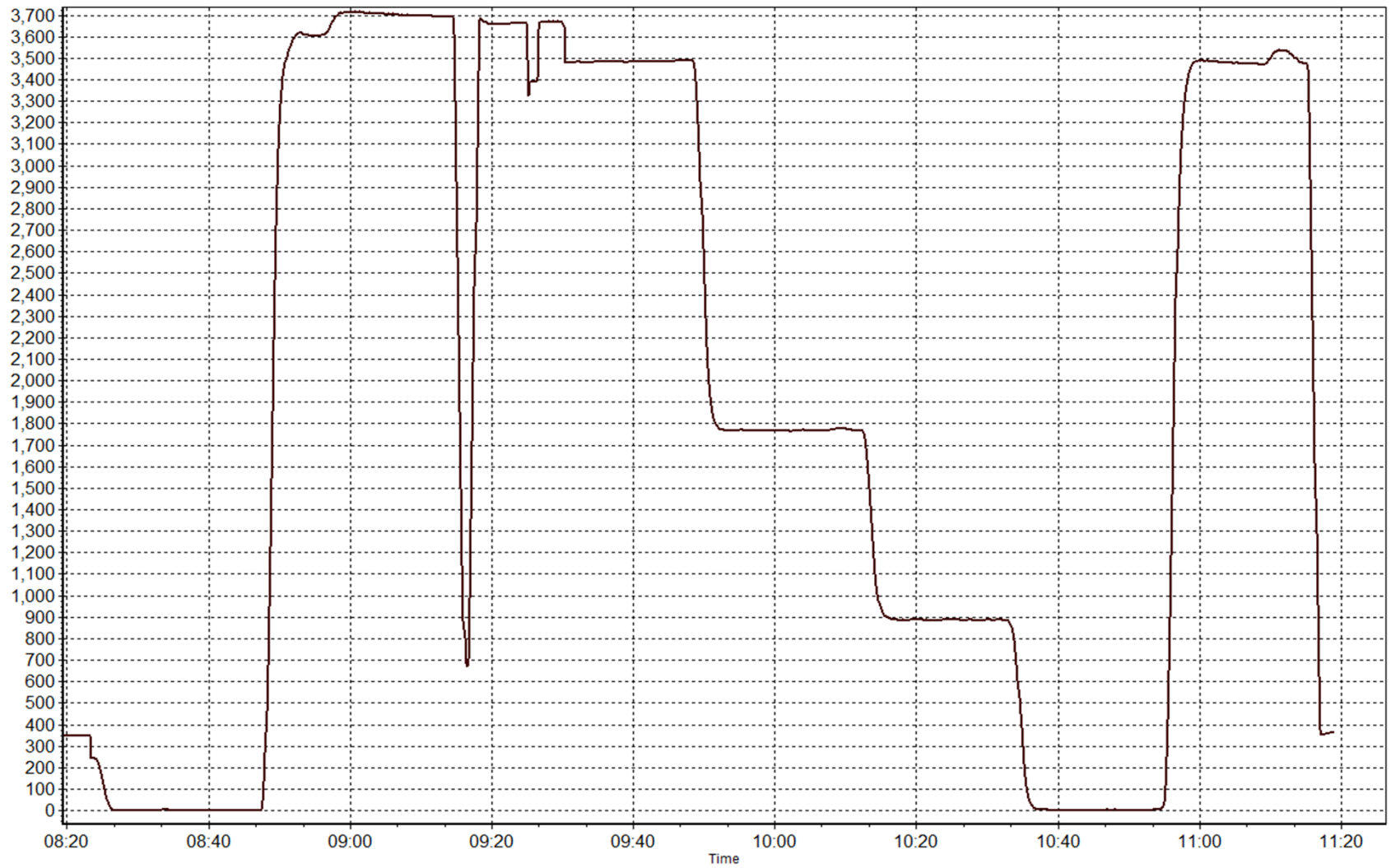
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999993
347.7	348.4	0.9981		
177.4	176.9	1.0028	Slope	0.997887
89.0	88.7	1.0034		
			Intercept	0.358600





O3 Calibration Plot

Date: May 21, 2014





# Wood Buffalo Environmental Association

## NO<sub>x</sub>-NO-NO<sub>2</sub> Calibration Report

### Station Information

Calibration Date	May 20, 2014	Previous Calibration	April 3, 2014
Station Name	Athabasca Valley	Station Number	AMS 7
Reason:	Routine		
Start Time (MST)	9:10	End Time (MST)	13:35
Barometric Pressure	n/a mmHg	Station Temperature	21.0 Deg C
Calibrator	Sabio 4010	Serial Number	11021107
NO Cal Gas Conc	51 ppm	Cal Gas Expiry Date	October 10, 2013
NOx Cal Gas Conc	51.2 ppm	Cal Gas Serial #	LL 105142

### DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	2575
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Parameter		NOx	NO	NO2
MV conversion	Analyzer Range (ppb)	1000	1000	1000
	Analyzer Range (mv)	5000	5000	5000
Before	Data Slope	0.997225	1.000979	0.991901
	Data Offset	1.424153	1.386788	-1.663780
After	Data Slope	1.006384	1.011884	0.992421
	Data Offset	1.498589	1.443239	-1.267257
Channel #		4	5	6
Voltage Range		0 - 5V	0 - 5V	0 - 5V

### Analyzer Information

Analyzer make/model	Thermo 42c	Analyzer serial #	601114773
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Test Point	before		after	
Concentration range	1000	ppb	1000	ppb
NO coefficient	0.867	ppb	0.867	ppb
NOx coefficient	1.007	ppb	1.007	ppb
NO2 coefficient	1.000	ppb	1.000	ppb
NO bkgrnd	3.7		3.7	
NOx bkgrnd	3.9		3.9	
Nt coefficient	n/a		n/a	
Chamber Temp	49.7	Deg C	49.7	Deg C
Moly Temp	323.0	Deg C	323.0	Deg C
PMT Temp	-3.7	Deg C	-3.6	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell Press	164.2	mmHg	161.7	mmHg
Sample Flow	0.751	ccm	0.756	ccm

**Notes:**

no adjustments required.



# Wood Buffalo Environmental Association

## NO<sub>x</sub>-NO-NO<sub>2</sub> Calibration Report

### Station Information

Calibration Date:

May 20, 2014

Station Number:

AMS 7

### 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 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
as found zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.1	N/A	N/A
as found span	5000	58.8	602.1	599.8	2.4	598.3	592.8	5.6	1.0064	1.0117
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.1	N/A	N/A
high point	5000	58.8	602.1	599.8	2.4	598.3	592.8	5.6	1.0064	1.0117
second point	5000	29.4	301.1	299.9	1.2	295.9	293.0	3.0	1.0175	1.0235
third point	5000	14.7	150.5	149.9	0.6	145.6	144.5	1.1	1.0340	1.0378
calibrator zero	6000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.1	N/A	N/A
as left zero	6000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.1	N/A	N/A
as left span	5000	58.8	602.1	241.3	360.8	592.1	244.9	347.2	1.0169	0.9853
Average Correction Factor									1.0193	1.0244

Corrected As found

NO<sub>x</sub>= 598.4

NO= 592.9

Percent Change

NO<sub>x</sub>= 0.7%

NO= 0.8%

Previous Response

NO<sub>x</sub>= 602.4

NO= 597.8

### GPT Calibration Data

Dilution Flow

5000

ccm

Source Gas Flow

58.80

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			0.1			N/A	
1st NO <sub>2</sub> (300)	N/A	241.3	347.7	592.3	241.3	351.0	1.0048	1.0000	0.9906	101.0%
2nd NO <sub>2</sub> (200)	N/A	411.5	177.4	592.1	411.5	180.7	1.0050	1.0000	0.9821	101.8%
3rd NO <sub>2</sub> (100)	N/A	500.0	89.0	592.0	500.0	92.1	1.0053	1.0000	0.9658	103.5%
4th NO <sub>2</sub> (0)	589.0	N/A	4.7	593.7	589.0	4.9	1.0024	1.0000	N/A	N/A
Average Correction Factor							1.0044	1.0000	0.9795	102.1%

Calibration Performed By:

Michael Martineau



# Wood Buffalo Environmental Association

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

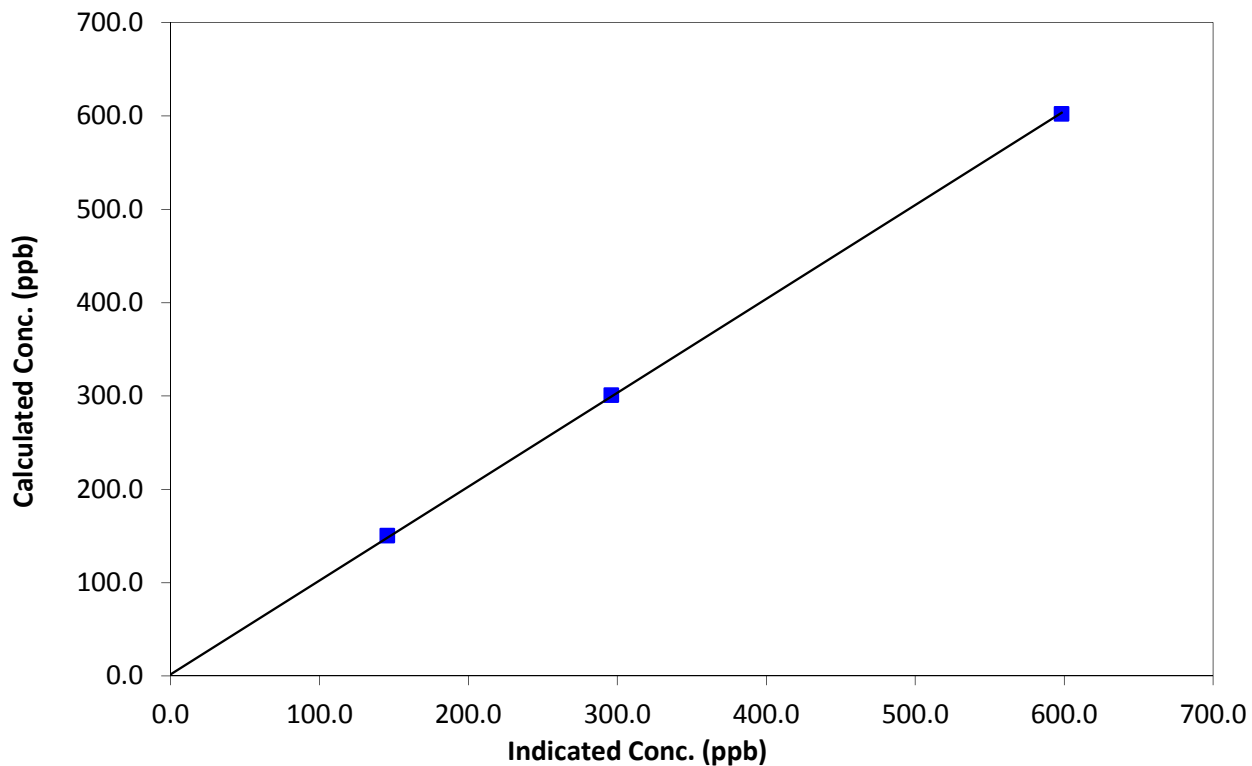
### Station Information

Calibration Date	May 20, 2014	Previous Calibration	April 3, 2014
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	9:10	End Time (MST)	13:35
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	0.999938
602.1	598.3	1.0064		
301.1	295.9	1.0175	Slope	1.006384
150.5	145.6	1.0340		
0.0	-0.1	0.0000	Intercept	1.498589

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





# Wood Buffalo Environmental Association

## NO Calibration Summary

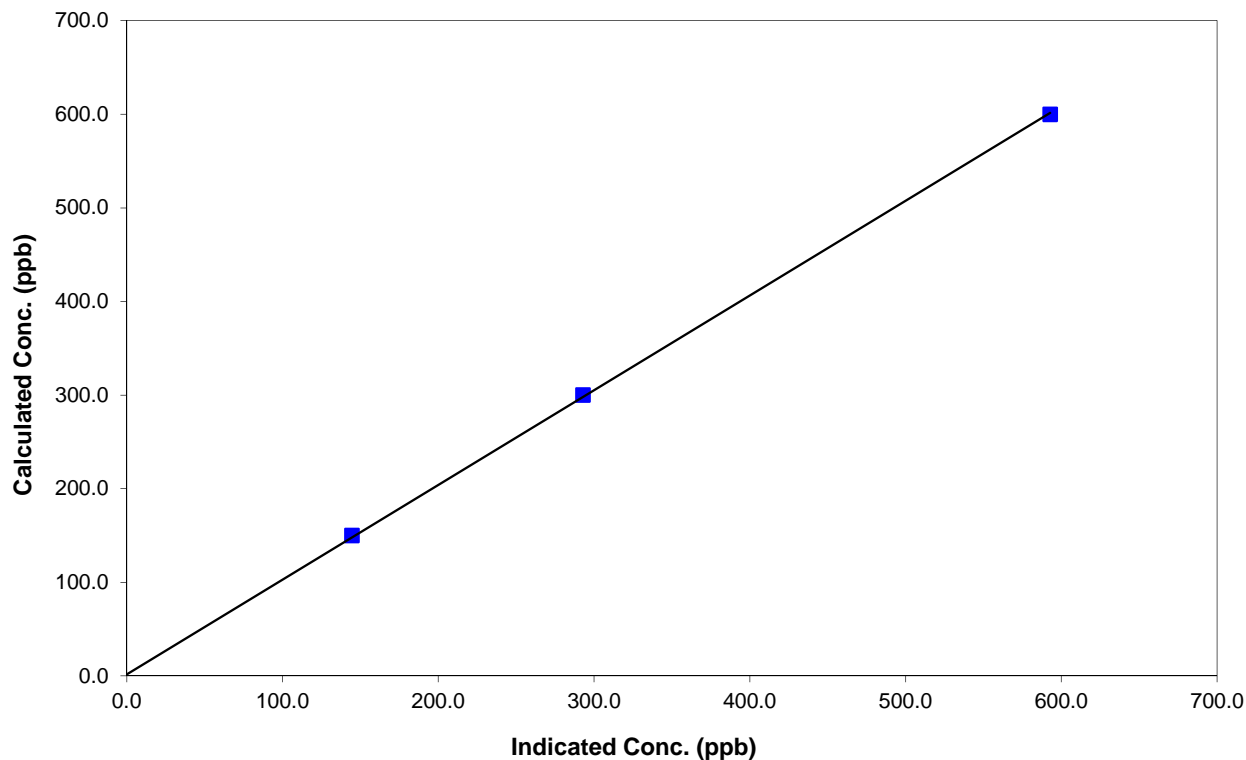
### Station Information

Calibration Date	May 20, 2014	Previous Calibration	April 3, 2014
Station Name	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	9:10	End Time (MST)	13:35
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	0.999940
599.8	592.8	1.0117		
299.9	293.0	1.0235	Slope	1.011884
149.9	144.5	1.0378		
0.0	-0.1	0.0000	Intercept	1.443239

### NO Calibration Curve





# Wood Buffalo Environmental Association

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

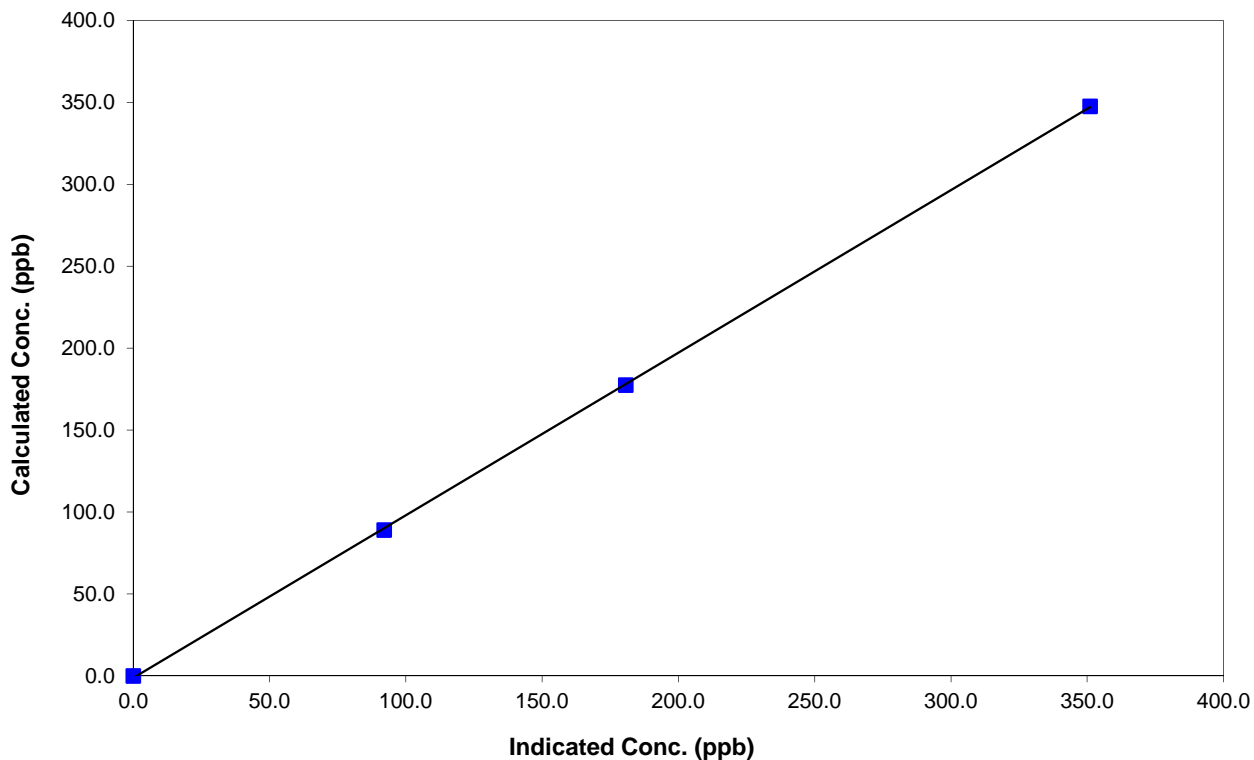
### Station Information

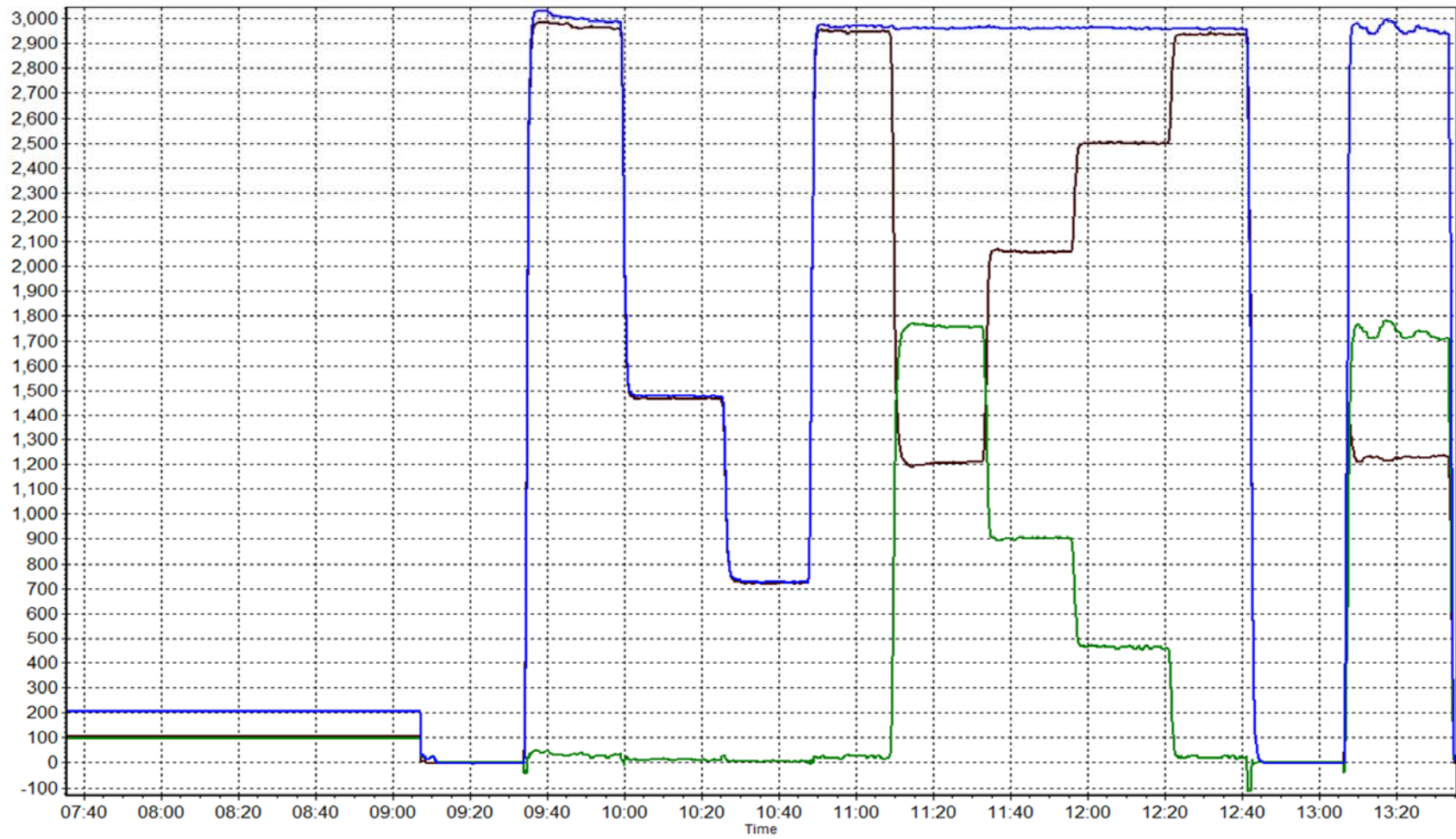
Calibration Date	May 20, 2014	Previous Calibration	April 3, 2014
Station Number	Athabasca Valley	Station Number	AMS 7
Start Time (MST)	9:10	End Time (MST)	13:35
Analyzer make	Thermo 42c	Analyzer serial #	601114773

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	N/A	Correlation Coefficient	0.999947
347.7	351.0	0.9906		
177.4	180.7	0.9821	Slope	0.992421
89.0	92.1	0.9658		
			Intercept	-1.267257

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







# Wood Buffalo Environmental Association

## CO Calibration Report

### Station Information

Calibration Date	May 22, 2014	Previous Calibration	April 14, 2014
Station Name	Athabasca Valley	Station Number	7
Reason:	Routine	Install	Removal
		Other:	
Start Time (MST)	8:55	End Time (MST)	12:05
Barometric Pressure	735 mmHg	Station temp.	20 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11021107
Cal Gas Concentration	3060 ppm	Cal Gas Expiry Date	4/27/2015
Gas Cert Reference	LL 85940		
DACS make/model	Campbell Scientific CR3000	DACS serial No.	5563
DACS voltage range	0-5V	DACS channel #	11

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppm)	50	50	Chamber temp.	47.8	48.0
Analyzer Range (mv)	5000	5000	Pressure	720.8	711.5
Calculated slope	0.998609	1.001276	Flow	1.272	1.262
Calculated intercept	0.175364	0.136283	Intensity	200250	200300
Analyzer Background	1.249	1.614	S/R ratio	1.119306	1.166000
Analyzer Coefficient	1.020	1.020			

Analyzer make TEI 48C Analyzer serial # 508011060

### Calibration Data

Set Point	Dilution air 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	0.00	0.0	0.3	N/A
as found span	5000	67.60	41.4	42.5	0.974
calibrator zero	5000	0.00	0.0	0.0	N/A
high point	5000	67.60	41.4	41.3	1.002
second point	5000	34.20	20.9	20.6	1.017
third point	5000	14.70	9.0	8.8	1.023
calibrator zero	6000	0.00	0.0	0.0	N/A
as left zero	6000	0.00	0.0	0.0	N/A
as left span	5000	67.60	41.4	41.2	1.004
Average Correction Factor					1.014

Corrected As found 42.1 Previous response 41.1 % change -2.3%

**Notes:**

changed inlet filter and adjusted zero.

Calibration Performed By: Michael Martineau





# Wood Buffalo Environmental Association

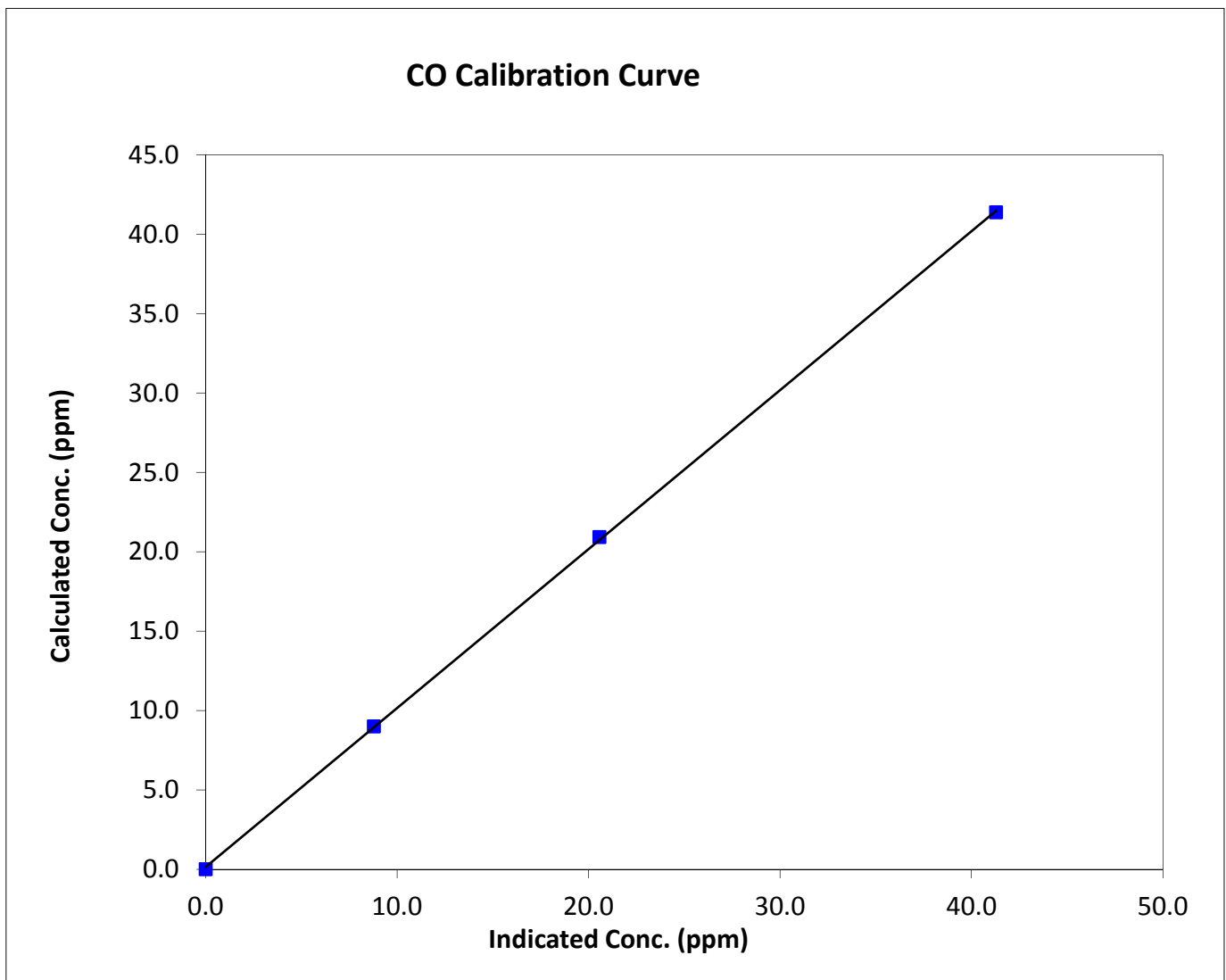
## CO Calibration Summary

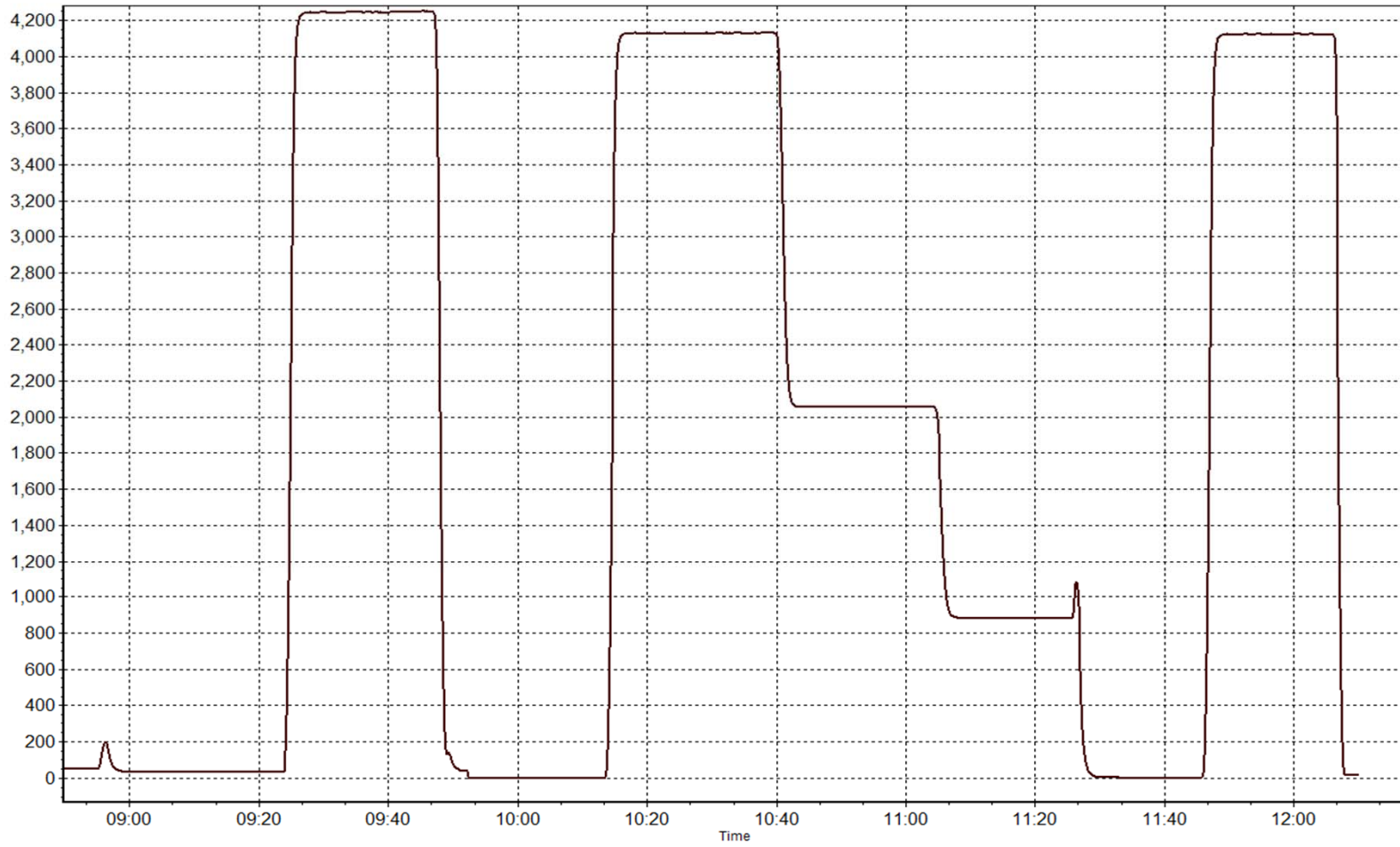
### Station Information

Calibration Date	May 22, 2014	Previous Calibration	April 14, 2014
Station Name	Athabasca Valley	Station Number	7
Start Time (MST)	8:55	End Time (MST)	12:05
Analyzer make	TEI 48C	Analyzer serial #	508011060

### Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999925
41.4	41.3	1.0020		
20.9	20.6	1.0172	Slope	1.001276
9.0	8.8	1.0234		
			Intercept	0.136283





**WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS 8  
FORT CHIPEWYAN  
MAY 2014**

Operations and Data Collection by:  
Wood Buffalo Environmental Association  
Fort McMurray, Alberta

QA/QC, Data Validation and Reporting by:  
Aurora Atmospheric Inc.  
Calgary, Alberta

June 27, 2014

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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS 8)  
MAY 2014

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	704	39	40	99.87	1	0	0	0
O3(ppb) Average	708	35	36	99.87	52	0	45	-
NO2(ppb) Average	704	39	40	99.87	4	0	1	-
NO(ppb) Average	704	39	40	99.87	1	-	0	-
NOX(ppb) Average	704	39	40	99.87	4	-	1	-
PM2.5(ug/m3) Average	711	0	33	95.56	16.4	-	5.7	0
Wind Speed 10 m (km/h) Average	742	0	2	99.73	36	-	-	-
Wind Direction 10 m (deg) Average	742	0	2	99.73	-	-	-	-
Temperature 2 m (C) Average	743	0	1	99.87	20	-	14	-
Relative Humidity (%) Average	743	0	1	99.87	98	-	-	-
Precipitation (mm) Total	101	0	643	13.58	5.3	-	-	-
Global Solar Radiation (W/m2) Average	388	0	356	52.15	888	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS 8)  
MAY 2014

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile							
					Min	P10	Q1	Median	Q3	P90	Max	
SO2(ppb) Average	704	0.1	0	-	0	0	0	0	0	0	0	1
O3(ppb) Average	708	33.8	8	-	12	24	28	35	40	44	44	52
NO2(ppb) Average	704	0.3	0	-	0	0	0	0	0	1	1	4
NO(ppb) Average	704	0.1	0	-	0	0	0	0	0	0	0	1
NOX(ppb) Average	704	0.3	0	-	0	0	0	0	0	1	1	4
PM2.5(ug/m3) Average	711	2.17	2.1	-	0	0.4	0.9	1.5	2.6	4.5	4.5	16.4
Wind Speed 10 m (km/h) Average	742	15.1	7	-	1	5	9	15	20	24	24	36
Wind Direction 10 m (deg) Average	742	-	-	-	-	-	-	-	-	-	-	-
Temperature 2 m (C) Average	743	6.08	5.8	-	-6.4	-1.7	1.1	7.3	10.5	13	13	20
Relative Humidity (%) Average	743	66.3	17	-	29	43	53	66	80	90	90	98
Precipitation (mm) Total	101	-	-	45.47	0	0	0	0	-0.2	1.5	1.5	5.3
Global Solar Radiation (W/m2) Average	388	251	281	-	0	0	2	132	450	731	731	888

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS 8)  
MAY 2014

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
ALL PARAMETERS	27 May 2014 19:00	27 May 2014 19:00	1	Maintenance - new data collection program uploaded
PM2.5	09 May 2014 11:00	09 May 2014 11:00	1	Intermittent unstable operation - baseline drift
PM2.5	09 May 2014 16:00	09 May 2014 20:00	5	Intermittent unstable operation - baseline drift
PM2.5	10 May 2014 11:00	10 May 2014 19:00	9	Intermittent unstable operation - baseline drift
PM2.5	10 May 2014 21:00	10 May 2014 21:00	1	Intermittent unstable operation - baseline drift
PM2.5	15 May 2014 16:00	15 May 2014 16:00	1	Intermittent unstable operation - baseline drift
PM2.5	15 May 2014 17:00	15 May 2014 17:00	1	Flow and zero reference checks, sample head cleaning
PM2.5	24 May 2014 07:00	24 May 2014 13:00	7	Intermittent unstable operation - baseline drift
PM2.5	24 May 2014 22:00	25 May 2014 00:00	3	Intermittent unstable operation - baseline drift
PM2.5	30 May 2014 02:00	30 May 2014 04:00	3	Intermittent unstable operation - baseline drift
PM2.5	30 May 2014 10:00	30 May 2014 10:00	1	Intermittent unstable operation - baseline drift
Wind Speed, Wind Direction	17 May 2014 07:00	17 May 2014 07:00	1	Flatline in sensor output signal
PC	01 May 2014 01:00	27 May 2014 18:00	642	Sensor not in operation
GR	01 May 2014 01:00	15 May 2014 14:00	350	Sensor not in operation
GR	15 May 2014 15:00	15 May 2014 19:00	5	Maintenance - sensor installed and calibrated

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Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO<sub>2</sub>) - ppb

Fort Chiheywan - May 2014

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 1 ppb on May 19 14:00	Maximum Daily Average: 0.5 ppb on May 20		Hours of Data:	704
Minimum Value: 0 ppb on May 3 11:00	Minimum Daily Average: 0.0 ppb on May 29		Hours of Missing Data:	40
Maximum Diurnal Average: 0.1 ppb at hour 14	Minimum Diurnal Average: 0.0 ppb at hour 24		Hours of Calibration:	39
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-May	0	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-May	0	Z	0	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-May	0	Z	0	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-May	0	Z	0	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-May	0	Z	0	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-May	0	Z	0	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-May	0	Z	0	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-May	0	Z	0	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-May	0	Z	0	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-May	0	Z	0	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-May	0	Z	0	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-May	0	Z	0	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-May	0	Z	0	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-May	0	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
15-May	0	Z	0	0	0	0	0	0	0	C	C	C	C	C	C	C	C	C	0	0	0	0	0	0	--	0
16-May	0	Z	0	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-May	0	Z	0	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-May	0	Z	0	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-May	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0.2	1
20-May	0	Z	0	0	0	1	1	1	1	1	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0.5	1
21-May	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
22-May	0	Z	0	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-May	0	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-May	0	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-May	0	Z	0	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-May	0	Z	0	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-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	MS	1	1	0	0	0.1	1
28-May	0	Z	0	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-May	0	Z	0	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-May	0	Z	0	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-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0

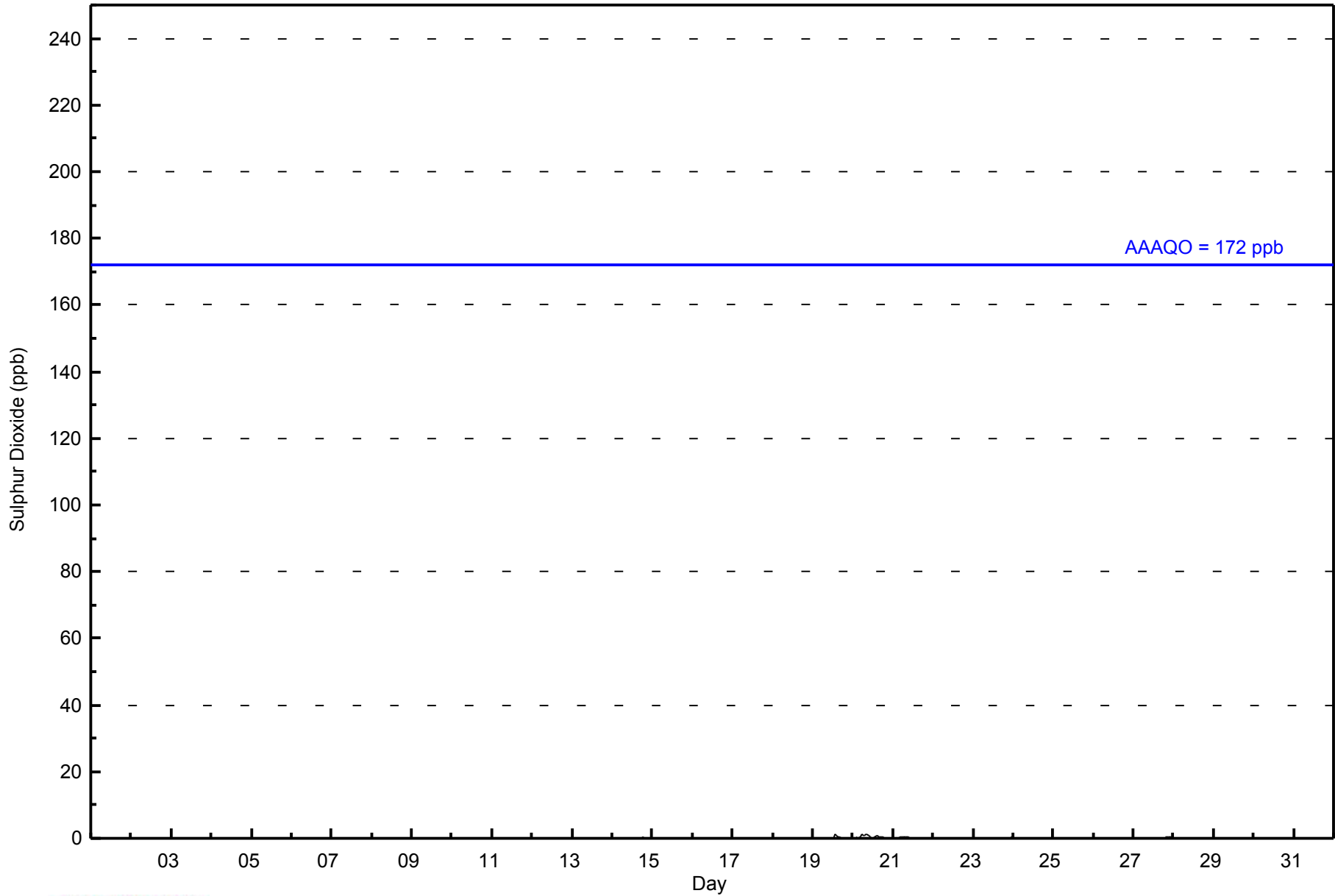
0.0	--	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.0	0.0	Diurnal Average	
0	--	0	0	0	1	1	1	1	1	0	0	0	1	1	1	1	0	0	1	1	0	0	Diurnal Maximum		

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



WBEA  
Hourly Averages

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Fort Chipecywan - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Fort Chipeywan - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	704	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: 704

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Fort Chipecwan - May 2014**

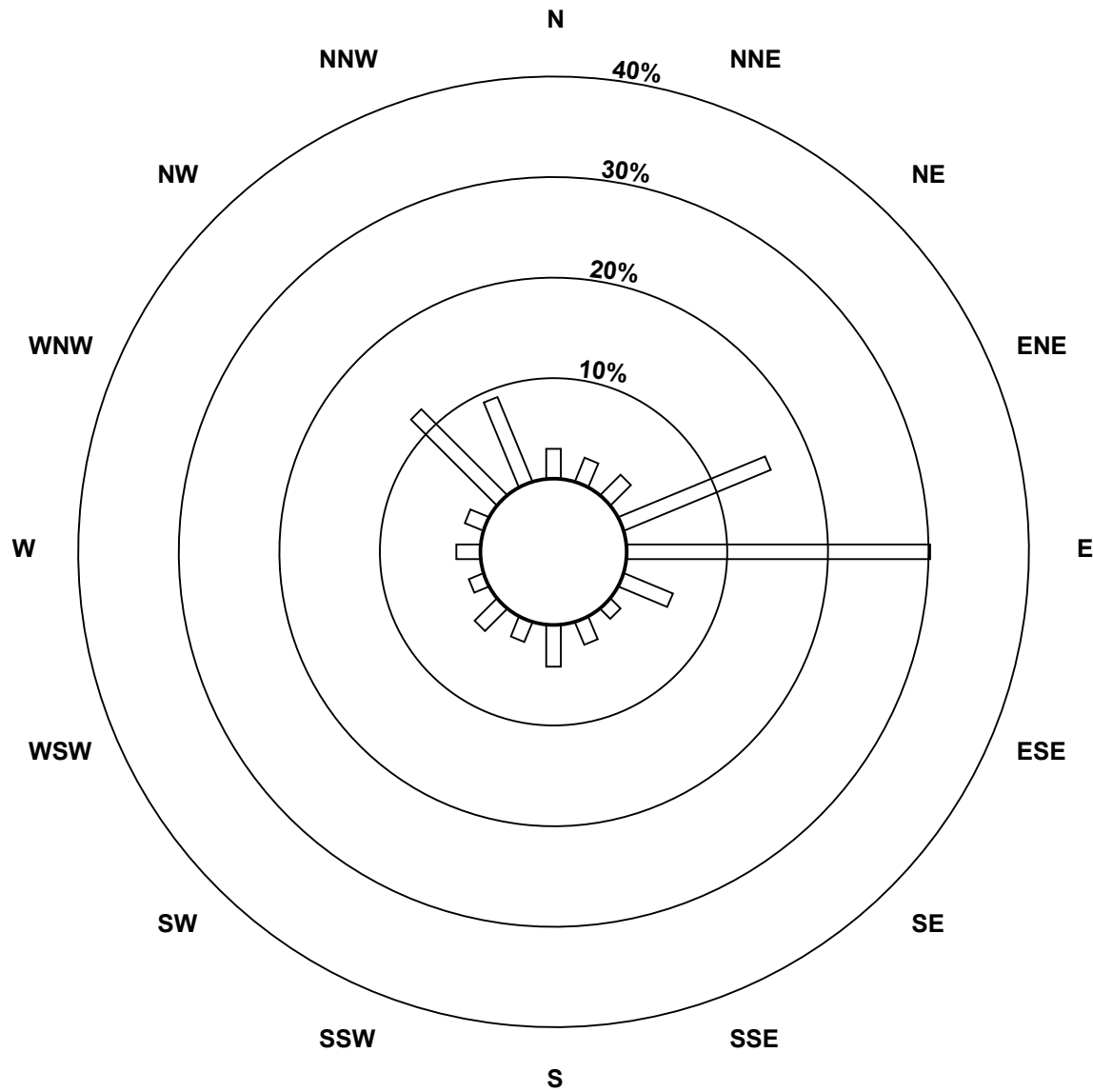
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	21	18	20	111	212	37	10	17	29	15	22	11	17	14	85	64	703
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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>	21	18	20	111	212	37	10	17	29	15	22	11	17	14	85	64	703

Total Number of Valid Hours: 703

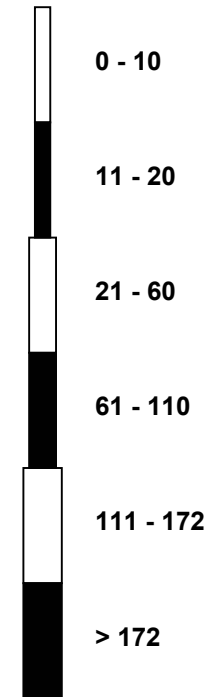
Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Fort Chipeywan (AMS 8)**



Classes (ppb)

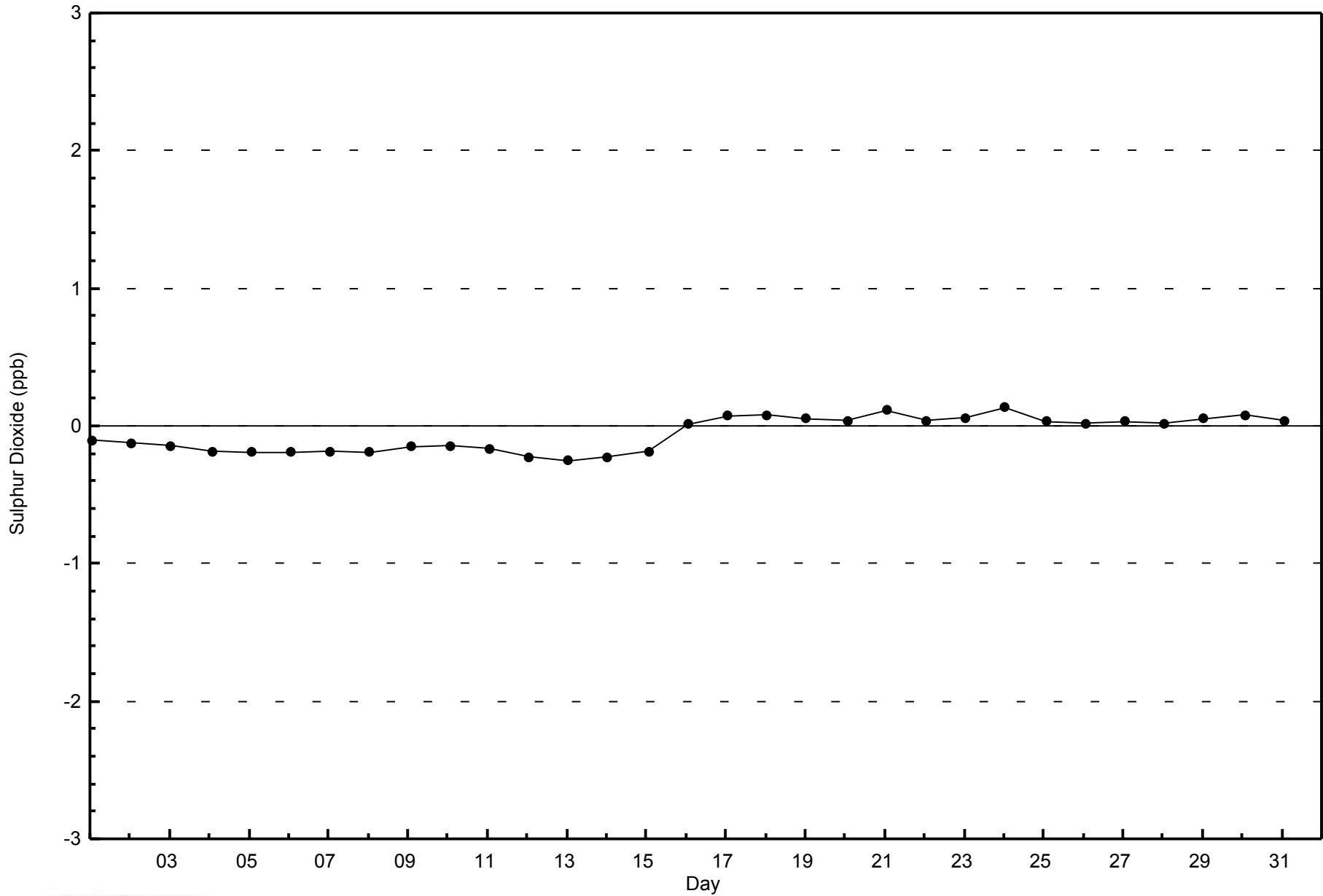


Total Number of Valid Hours: 703



WBEA  
Zero Responses

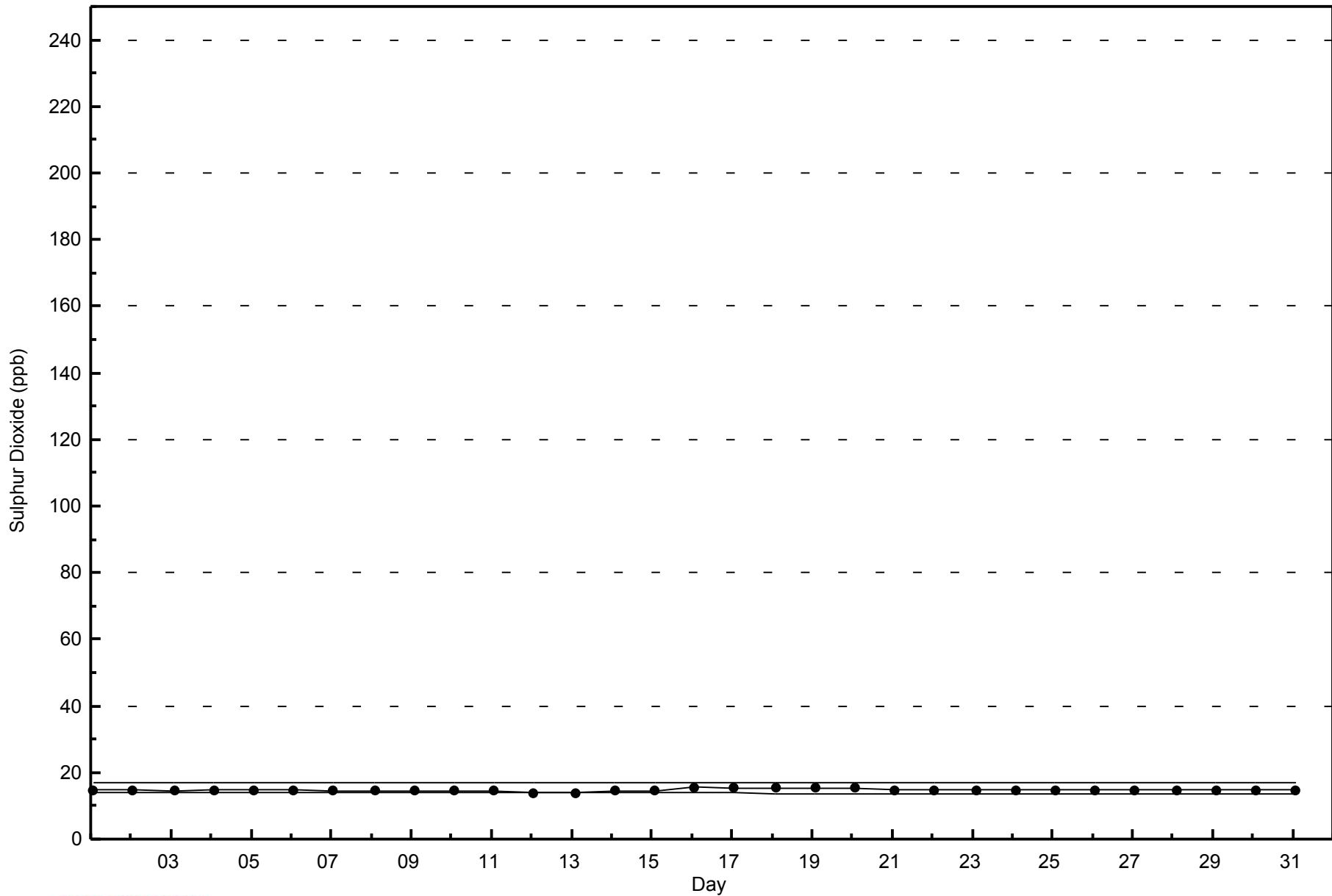
Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Fort Chipecywan - May 2014





**WBEA**  
**Span Responses**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Fort Chipecywan - May 2014**





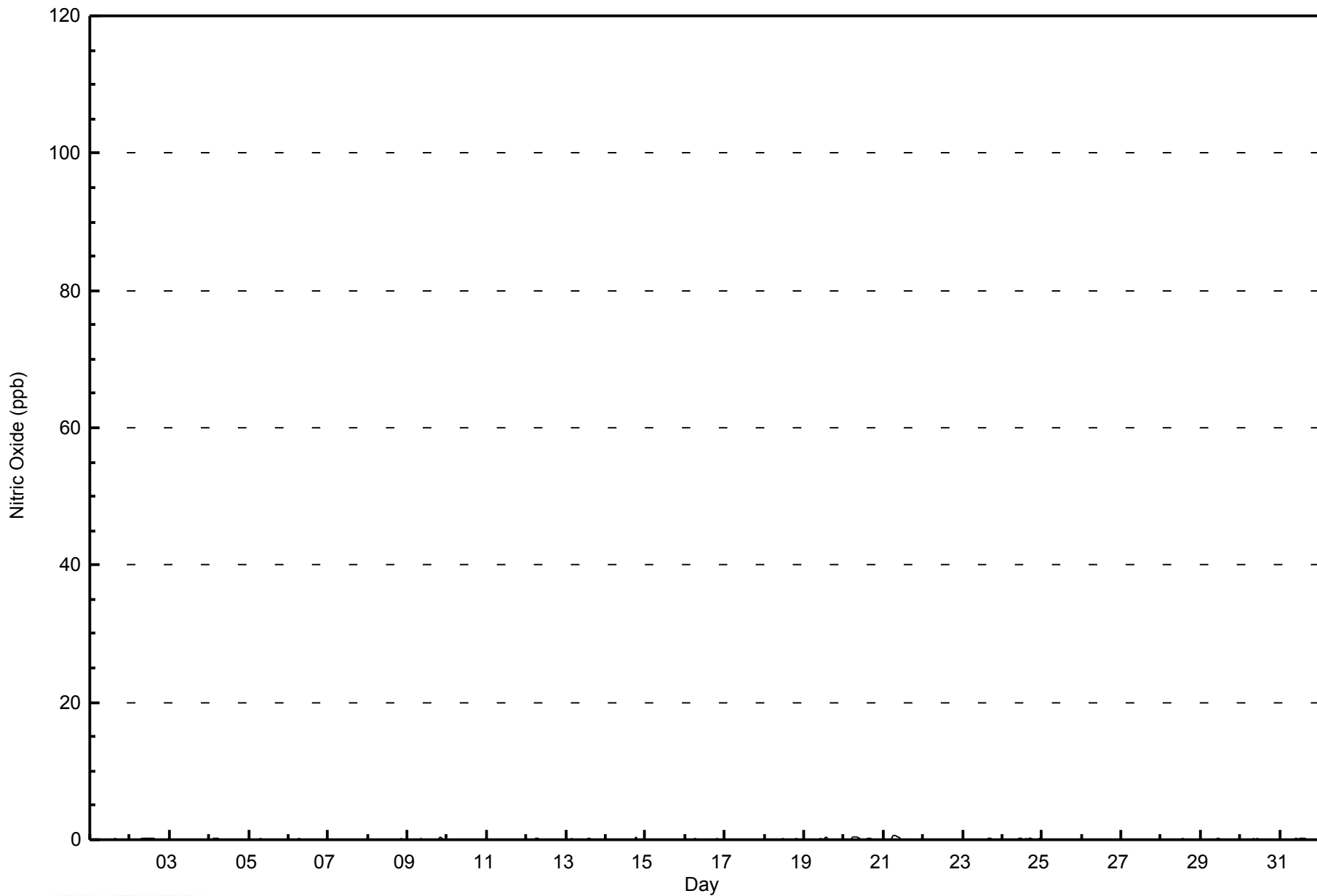
Maximum Value: 1 ppb on May 21 08:00										Maximum Daily Average: 0.1 ppb on May 20										Hours in Service: 744						
Minimum Value: 0 ppb on May 6 11:00										Minimum Daily Average: 0.0 ppb on May 10										Hours of Data: 704						
Maximum Diurnal Average: 0.1 ppb at hour 7										Minimum Diurnal Average: 0.0 ppb at hour 24										Hours of Missing Data: 40						
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> = 0										Hours of Calibration: 39						
																				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-May	0	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-May	0	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
3-May	0	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
4-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
5-May	0	Z	0	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-May	0	Z	0	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-May	0	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-May	0	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
9-May	0	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
10-May	0	Z	0	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-May	0	Z	0	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-May	0	Z	0	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-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
14-May	0	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
15-May	0	Z	0	0	0	0	0	0	0		C	C	C	C	C	C	C	C		0	0	0	0	0	--	0
16-May	0	Z	0	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-May	0	Z	0	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-May	0	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-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
20-May	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
21-May	0	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
22-May	0	Z	0	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-May	0	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-May	0	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-May	0	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-May	0	Z	0	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-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	MS	0	0	0	0	0.0	0
28-May	0	Z	0	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-May	0	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-May	0	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-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
0.0		--	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	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	Diurnal Average	
0		--	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Diurnal Maximum	
Z - zerospan		C - Calibration					MS - Missing																			





**WBEA**  
**Hourly Averages**

**Nitric Oxide (NO) - ppb**  
**Fort Chipecywan - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb**  
**Fort Chipecywan - May 2014**

<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



**WBEA**  
**Frequency Distribution**

**Nitric Oxide (NO) - ppb**  
**Fort Chipecywan - May 2014**

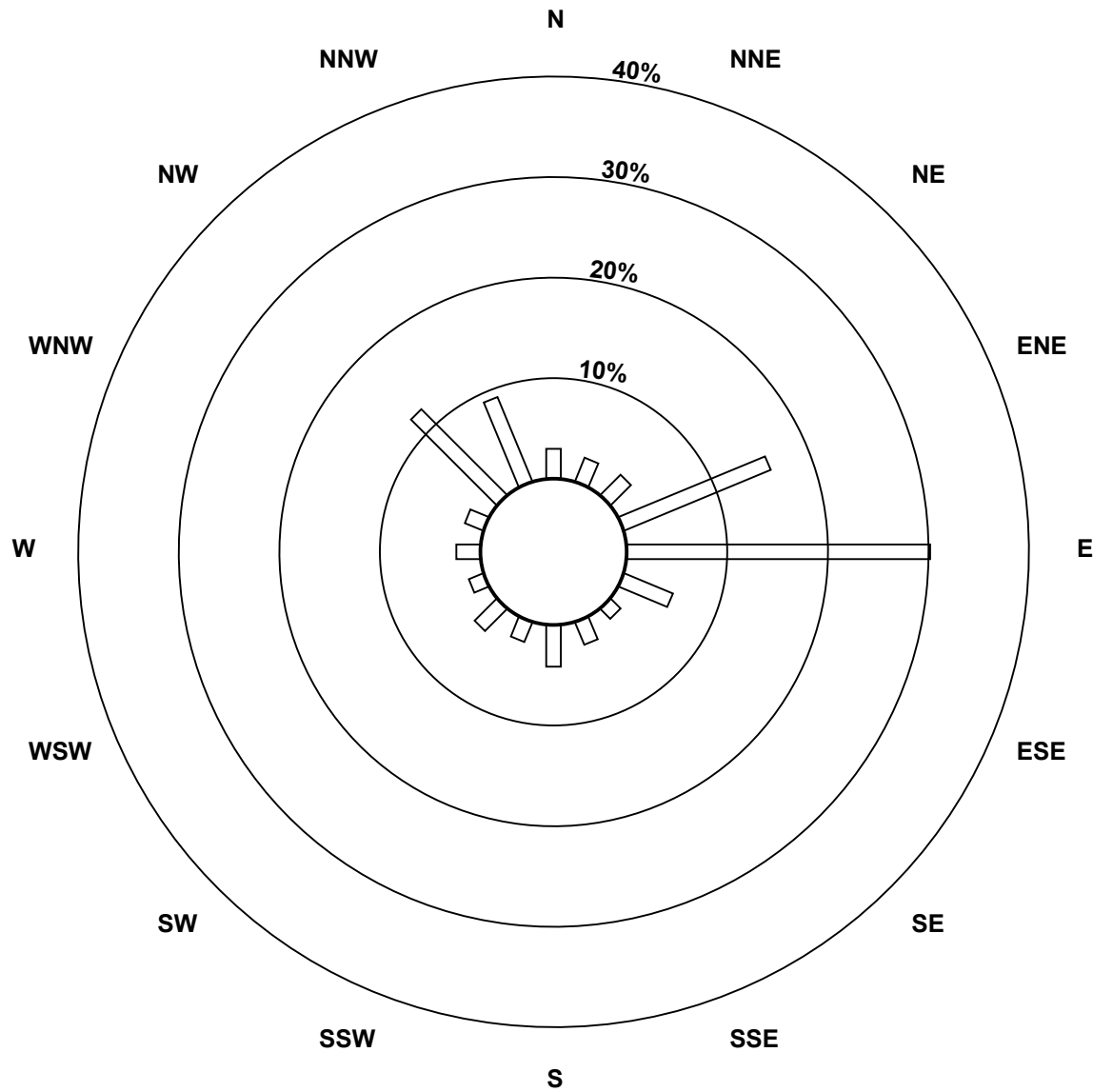
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	21	18	20	111	212	37	10	17	29	15	22	11	17	14	85	64	703
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	21	18	20	111	212	37	10	17	29	15	22	11	17	14	85	64	703

Total Number of Valid Hours: 703

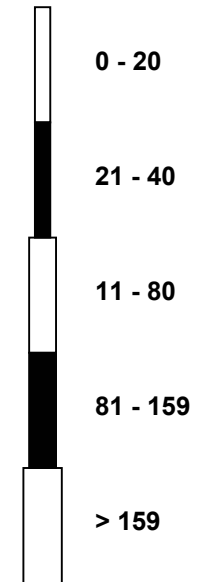
Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Nitric Oxide (NO) - ppb  
Fort Chipeywan (AMS 8)**



Classes (ppb)

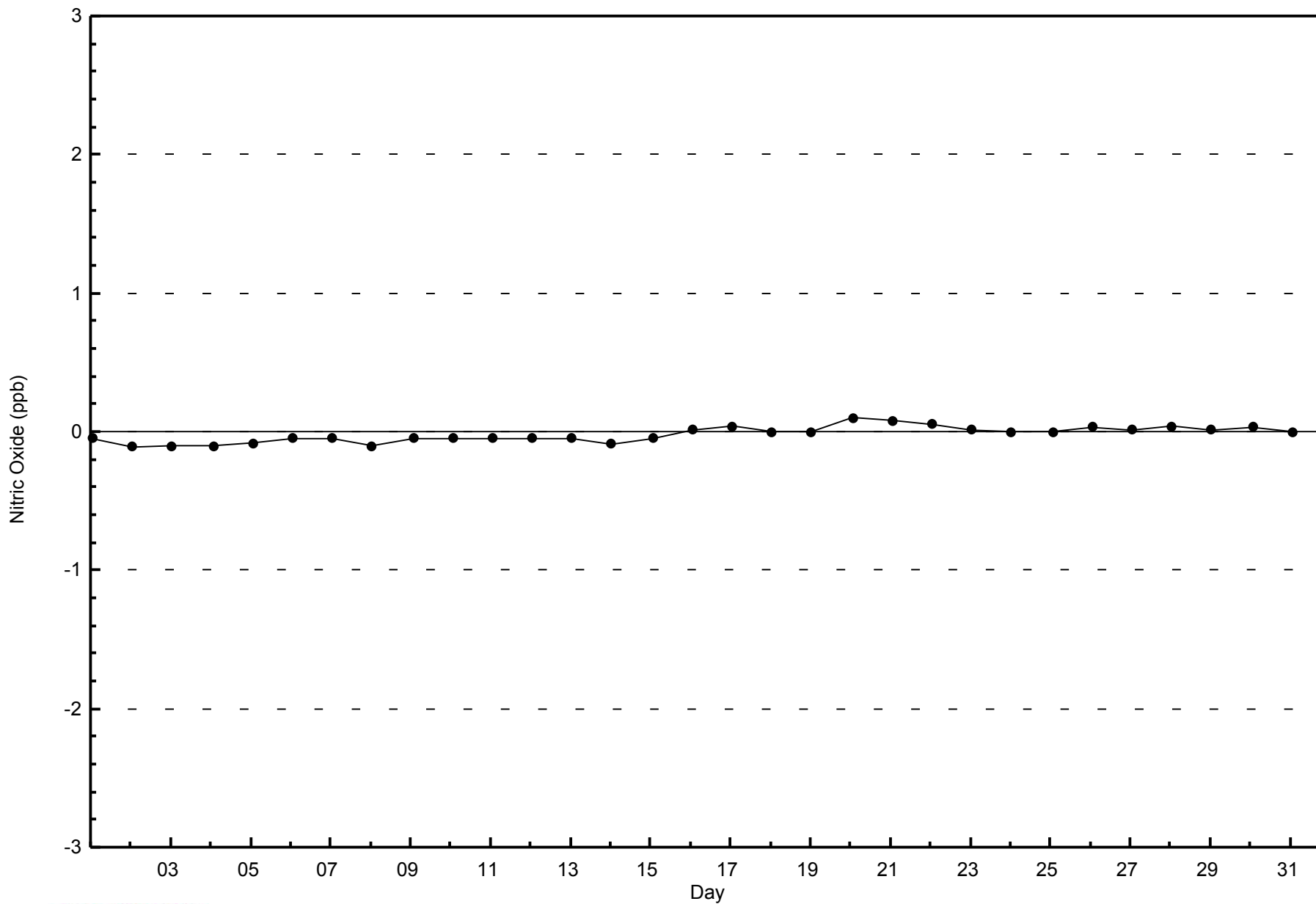


Total Number of Valid Hours: 703



WBEA  
Zero Responses

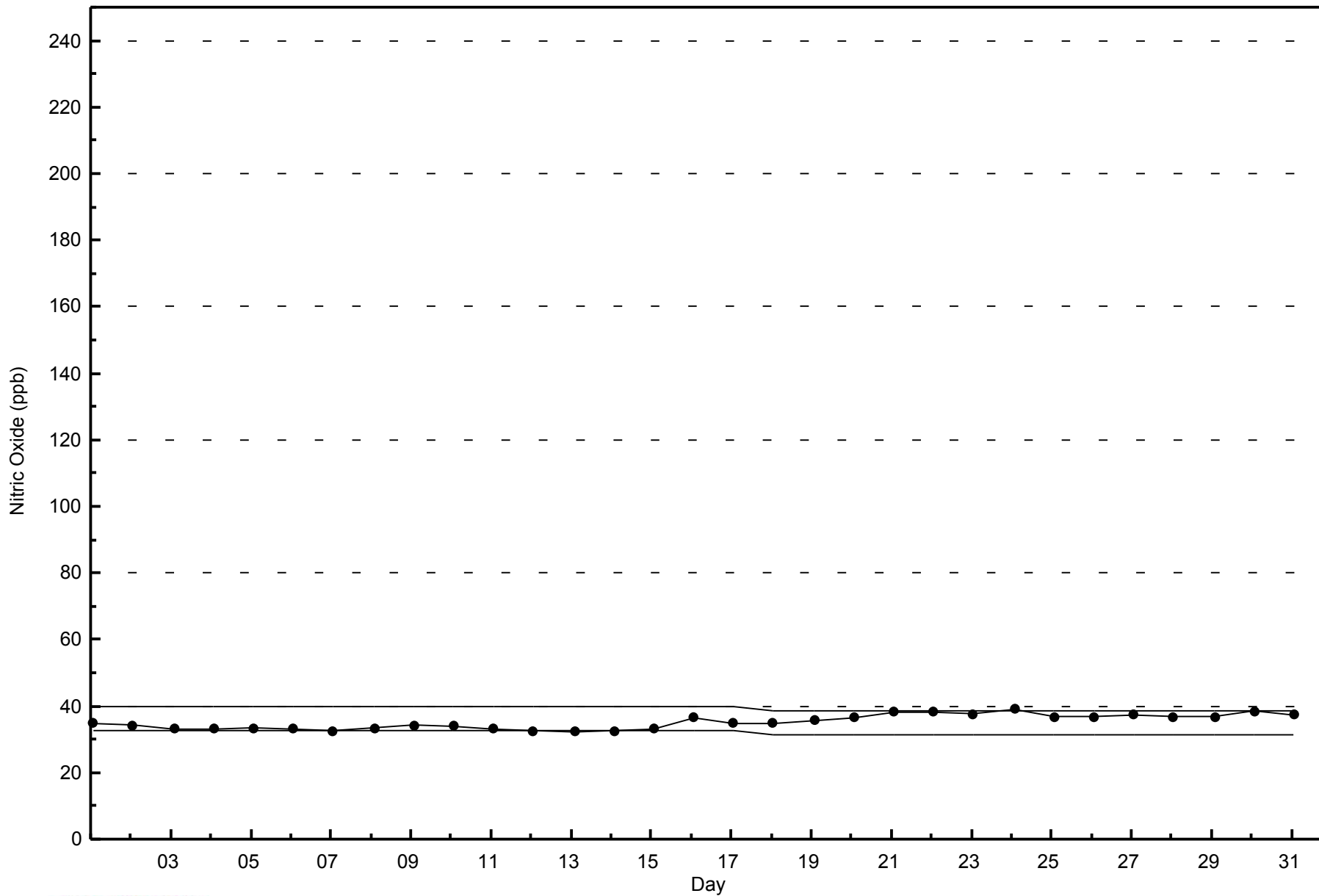
Nitric Oxide (NO) - ppb  
Fort Chipecywan - May 2014





**WBEA**  
**Span Responses**

**Nitric Oxide (NO) - ppb**  
**Fort Chipecywan - May 2014**





Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 4 ppb on May 4 03:00	Maximum Daily Average: 1.2 ppb on May 20		Hours of Data:	704
Minimum Value: 0 ppb on May 1 09:00	Minimum Daily Average: 0.1 ppb on May 24		Hours of Missing Data:	40
Maximum Diurnal Average: 0.4 ppb at hour 22	Minimum Diurnal Average: 0.1 ppb at hour 12		Hours of Calibration:	39
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		Percent Operational Time:	99.9

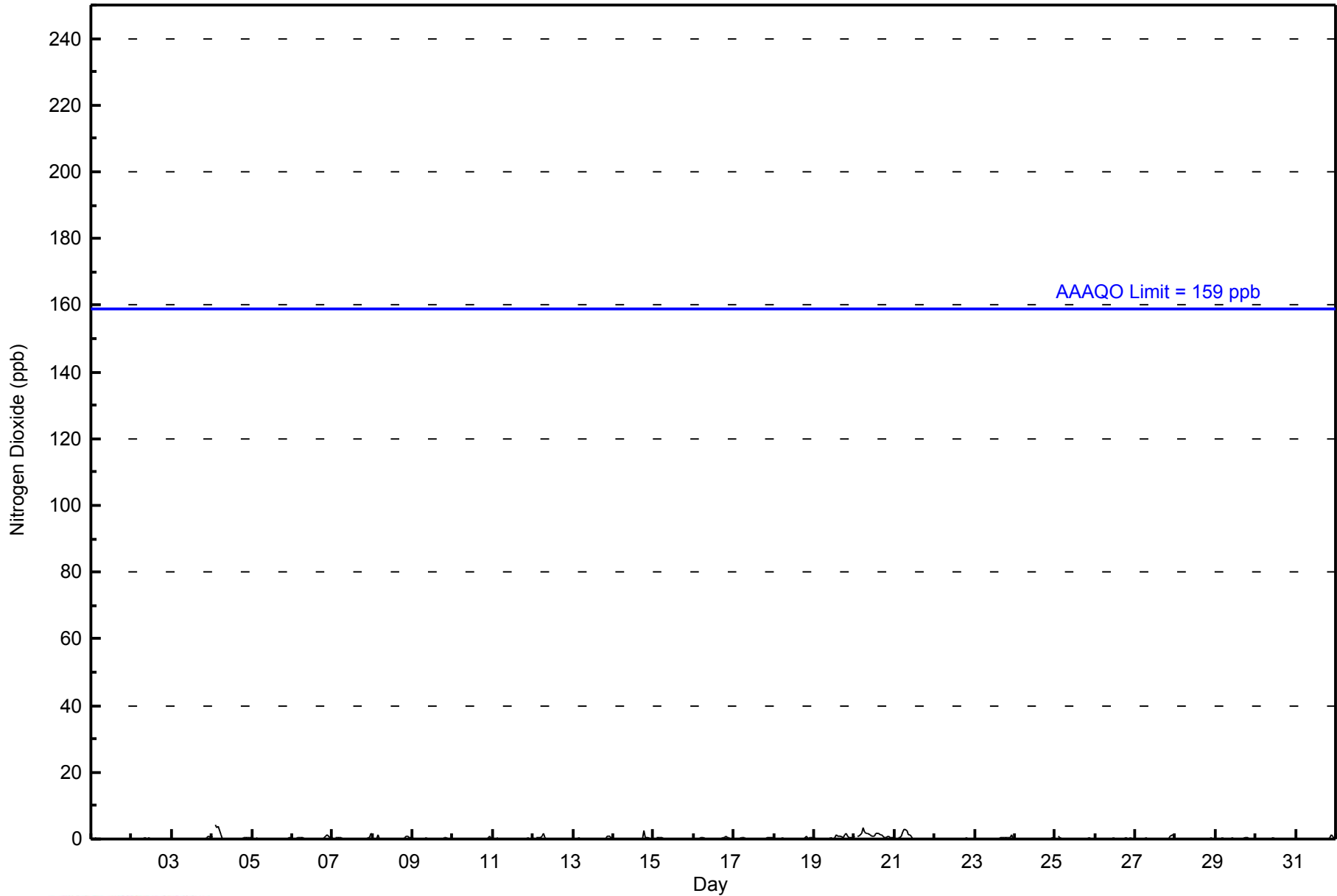
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
2-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
3-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0.1	1	
4-May	1	Z	4	3	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	4	
5-May	0	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-May	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0.3	1	
7-May	1	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0.3	2	
8-May	1	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0.3	1	
9-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.2	1	
10-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0.1	1	
11-May	0	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-May	1	Z	1	0	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2	
13-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0.3	1	
14-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	1	0	0.2	2	
15-May	0	Z	0	0	0	0	0	0	0	C	C	C	C	C	C	C	C	C	0	0	0	0	0	0	--	0	
16-May	0	Z	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.3	1	
17-May	0	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-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0.2	1	
19-May	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	2	1	1	0	0	0.5	2	
20-May	1	Z	1	1	2	4	2	2	2	1	1	1	1	2	2	1	1	1	1	0	1	1	1	0	1.2	4	
21-May	0	Z	1	1	1	2	3	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	3	
22-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
23-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	1	0	0.2	1	
24-May	0	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-May	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1	
26-May	0	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	
27-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	MS	0	0	1	1	0	0.2	1
28-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
29-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.2	1	
30-May	0	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-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0.2	1	
0.3																								Diurnal Average			
1																								Diurnal Maximum			

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



WBEA  
Hourly Averages

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Fort Chipecywan - May 2014







**WBEA**  
**Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Fort Chipecywan - May 2014**

<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



**WBEA**  
**Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Fort Chipecywan - May 2014**

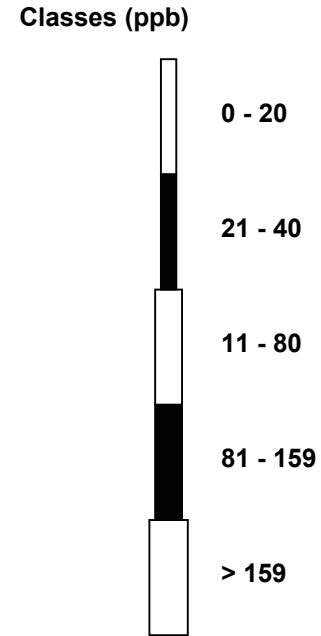
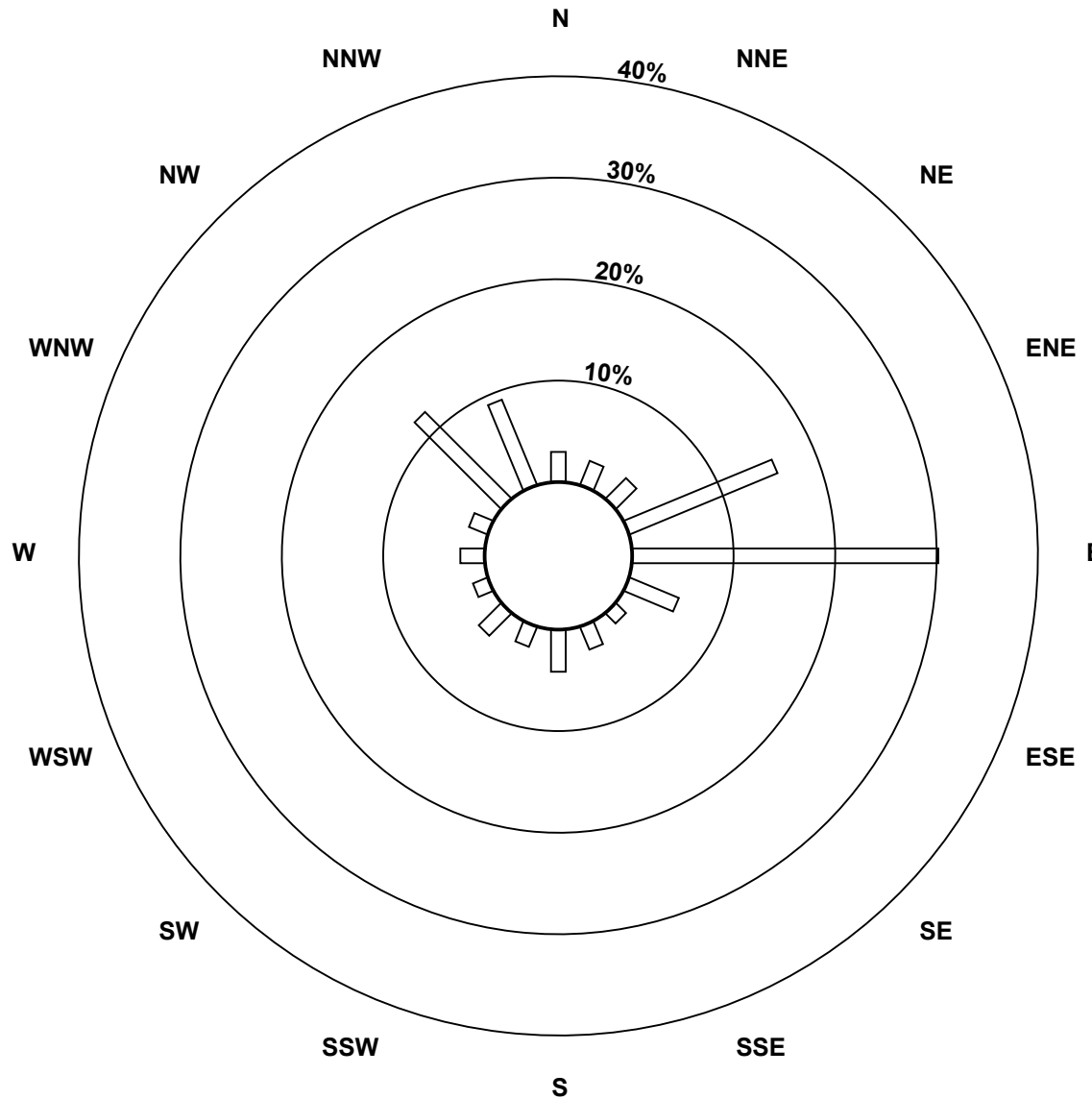
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	21	18	20	111	212	37	10	17	29	15	22	11	17	14	85	64	703
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	21	18	20	111	212	37	10	17	29	15	22	11	17	14	85	64	703

Total Number of Valid Hours: 703

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Fort Chipeywan (AMS 8)**

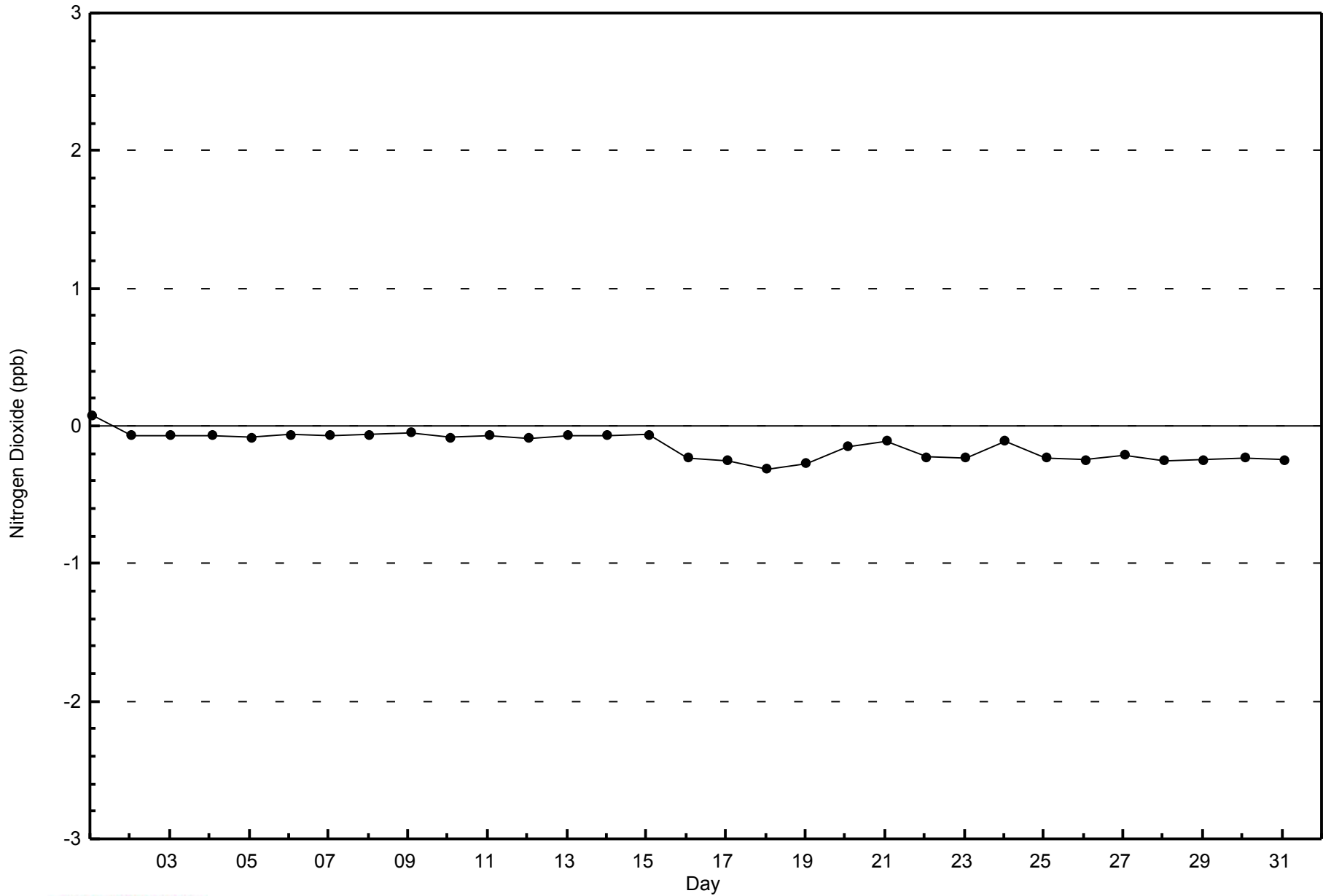


**Total Number of Valid Hours: 703**



WBEA  
Zero Responses

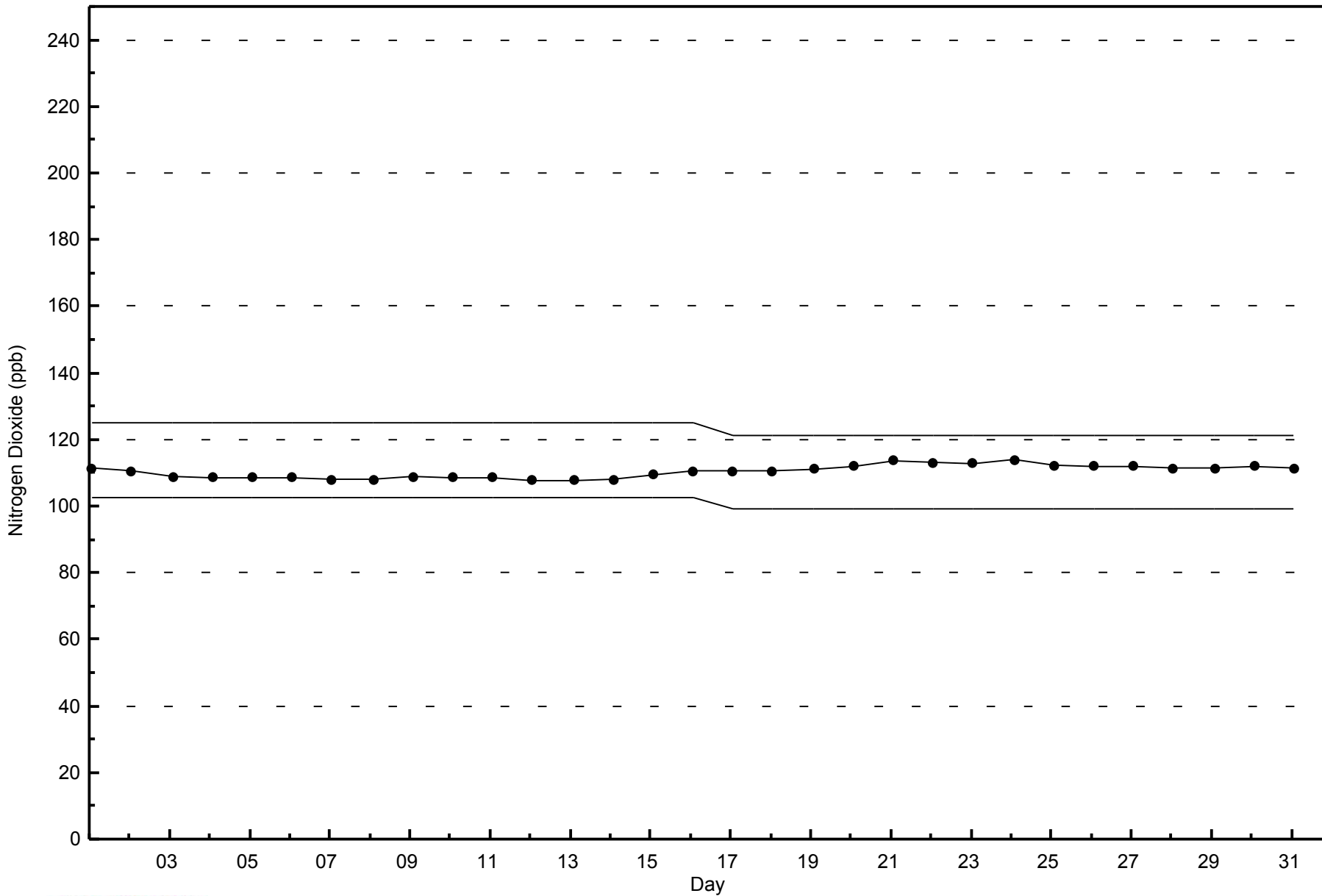
Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Fort Chipecywan - May 2014





WBEA  
Span Responses

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Fort Chipecywan - May 2014



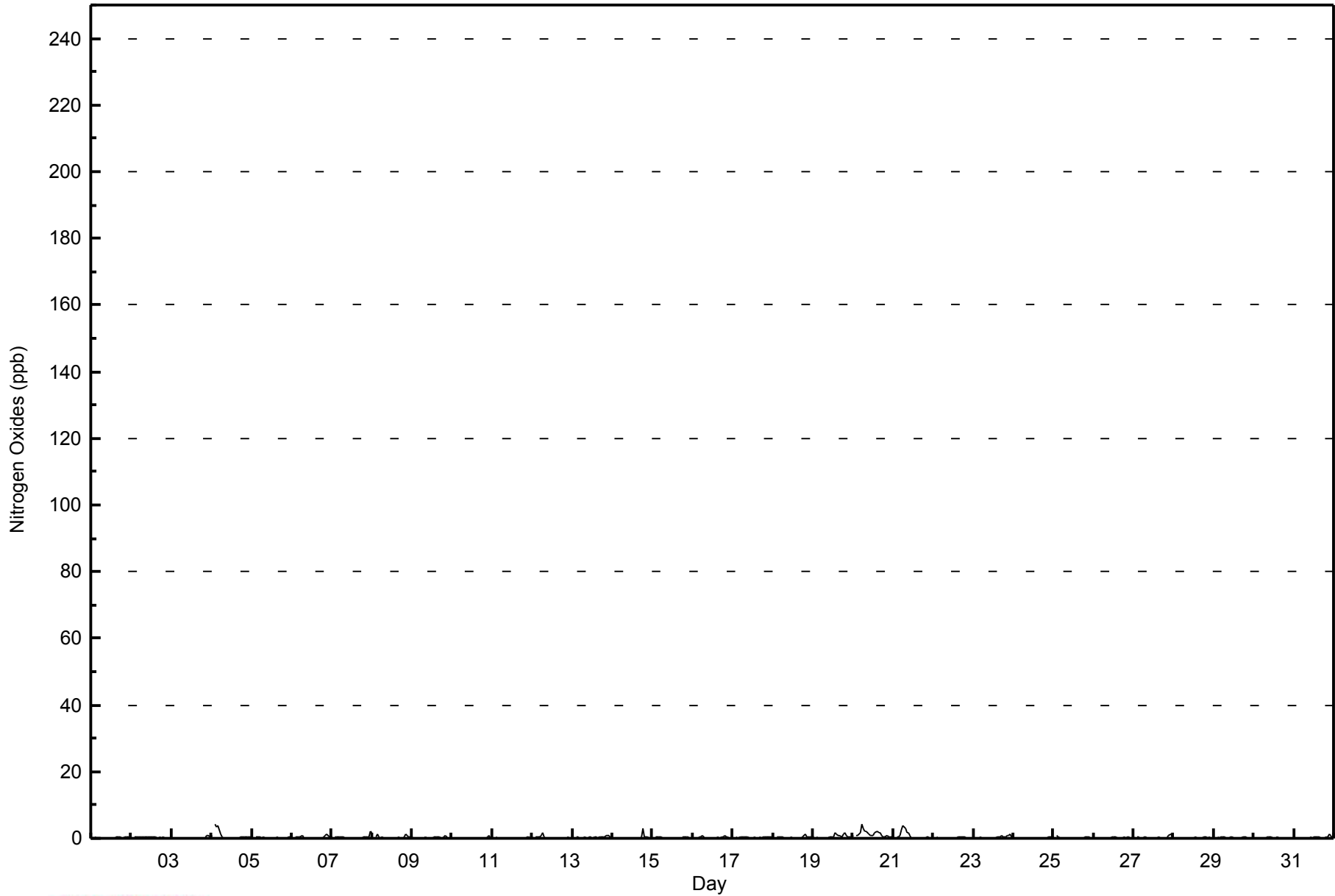


Maximum Value: 4 ppb on May 4 03:00														Maximum Daily Average: 1.3 ppb on May 20														Hours in Service: 744	
Minimum Value: 0 ppb on May 26 10:00														Minimum Daily Average: 0.1 ppb on May 11														Hours of Data: 704	
Maximum Diurnal Average: 0.5 ppb at hour 7														Minimum Diurnal Average: 0.2 ppb at hour 12														Hours of Missing Data: 40	
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> = 3														Hours of Calibration: 39	
																												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-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0			
2-May	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1			
3-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0.2	1			
4-May	1	Z	4	3	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.8	4			
5-May	0	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-May	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0.3	1			
7-May	1	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0.4	2			
8-May	2	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0.4	2			
9-May	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0.2	1			
10-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.1	1			
11-May	0	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-May	1	Z	0	0	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2			
13-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0.3	1			
14-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	1	0	0	0.3	3			
15-May	0	Z	0	0	0	0	0	0	0	C	C	C	C	C	C	C	C	C	0	0	0	0	0	0	--	0			
16-May	0	Z	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.3	1			
17-May	0	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-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0.3	1			
19-May	0	Z	0	0	0	0	0	0	0	0	0	1	2	1	1	1	1	1	1	2	1	0	0	0	0.5	2			
20-May	1	Z	1	1	2	4	3	2	2	1	1	1	1	2	2	2	2	1	1	0	1	1	0	0	1.3	4			
21-May	0	Z	1	1	1	2	4	3	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	4			
22-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0			
23-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	1	1	1	0	0	0.3	1			
24-May	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			
25-May	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			
26-May	0	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			
27-May	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	MS	0	0	1	1	0	0.2	1			
28-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0			
29-May	0	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.2	1			
30-May	0	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-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0.3	1			
		0.3	--	0.4	0.4	0.4	0.5	0.5	0.3	0.3	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.2	0.3	0.3	0.4	0.4	0.4	0.4	0.3	Diurnal Average			
		2	--	4	3	4	4	4	3	2	2	1	1	1	2	2	2	2	1	3	2	1	1	1	2	Diurnal Maximum			
Z - zerospan		C - Calibration					MS - Missing																						



**WBEA**  
**Hourly Averages**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Fort Chipecywan - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Fort Chipecywan - May 2014**

<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





**WBEA**  
**Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Fort Chipecywan - May 2014**

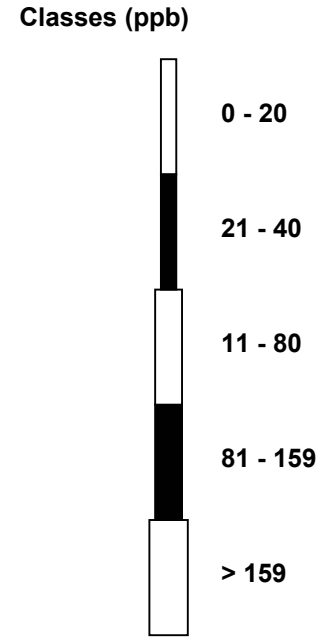
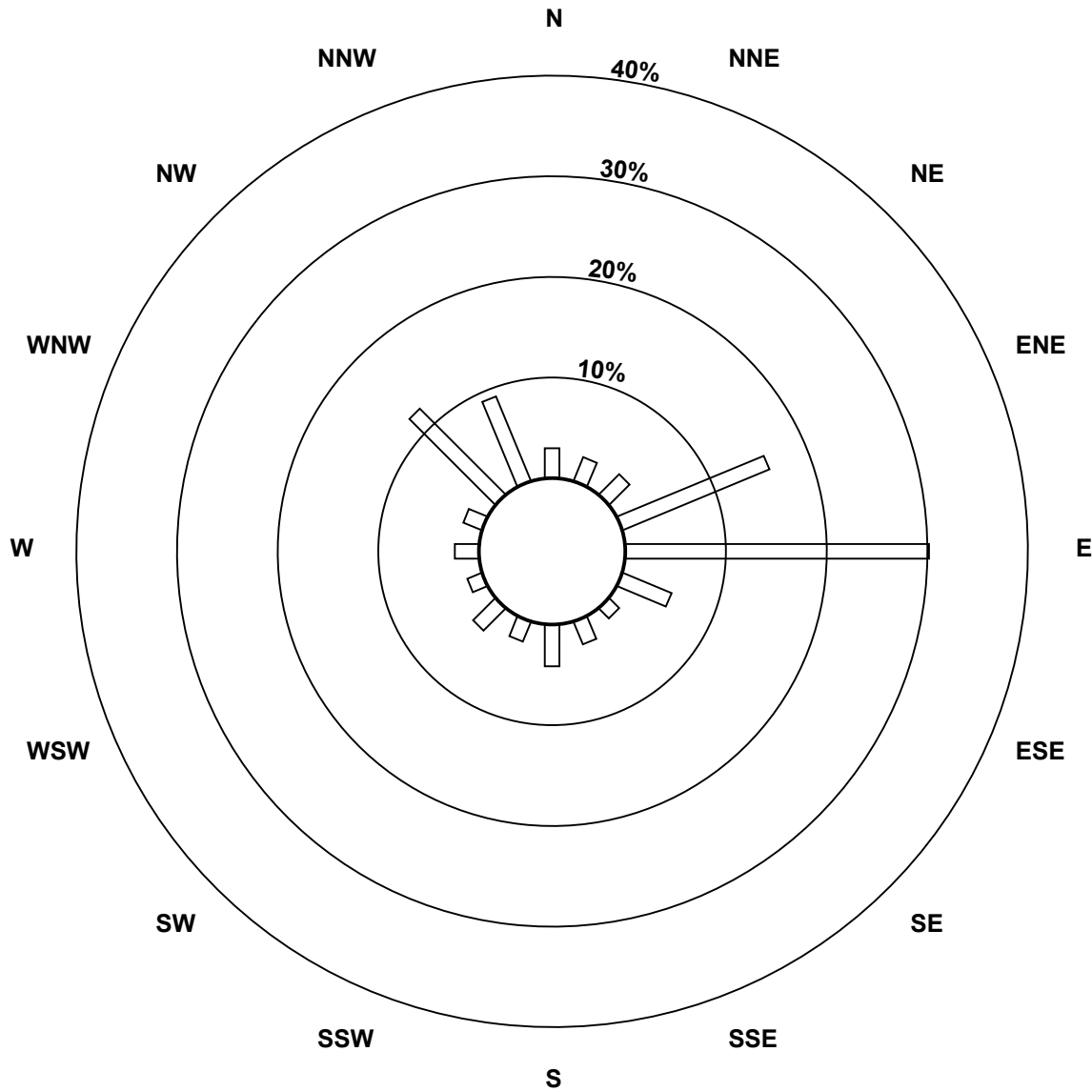
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	21	18	20	111	212	37	10	17	29	15	22	11	17	14	85	64	703
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	21	18	20	111	212	37	10	17	29	15	22	11	17	14	85	64	703

Total Number of Valid Hours: 703

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Fort Chipeywan (AMS 8)**

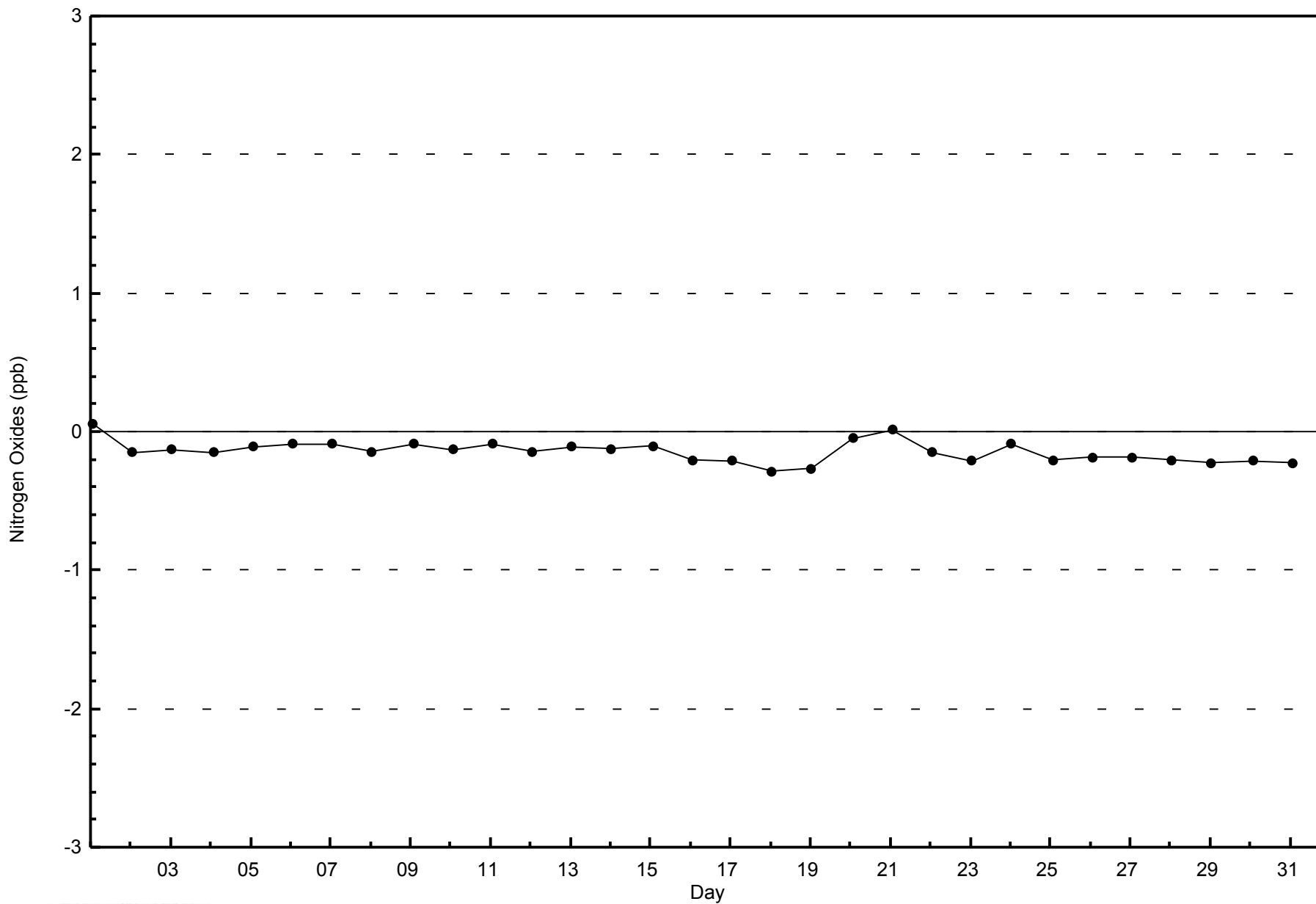


**Total Number of Valid Hours: 703**



Wood Buffalo Environmental Association  
Zero Responses

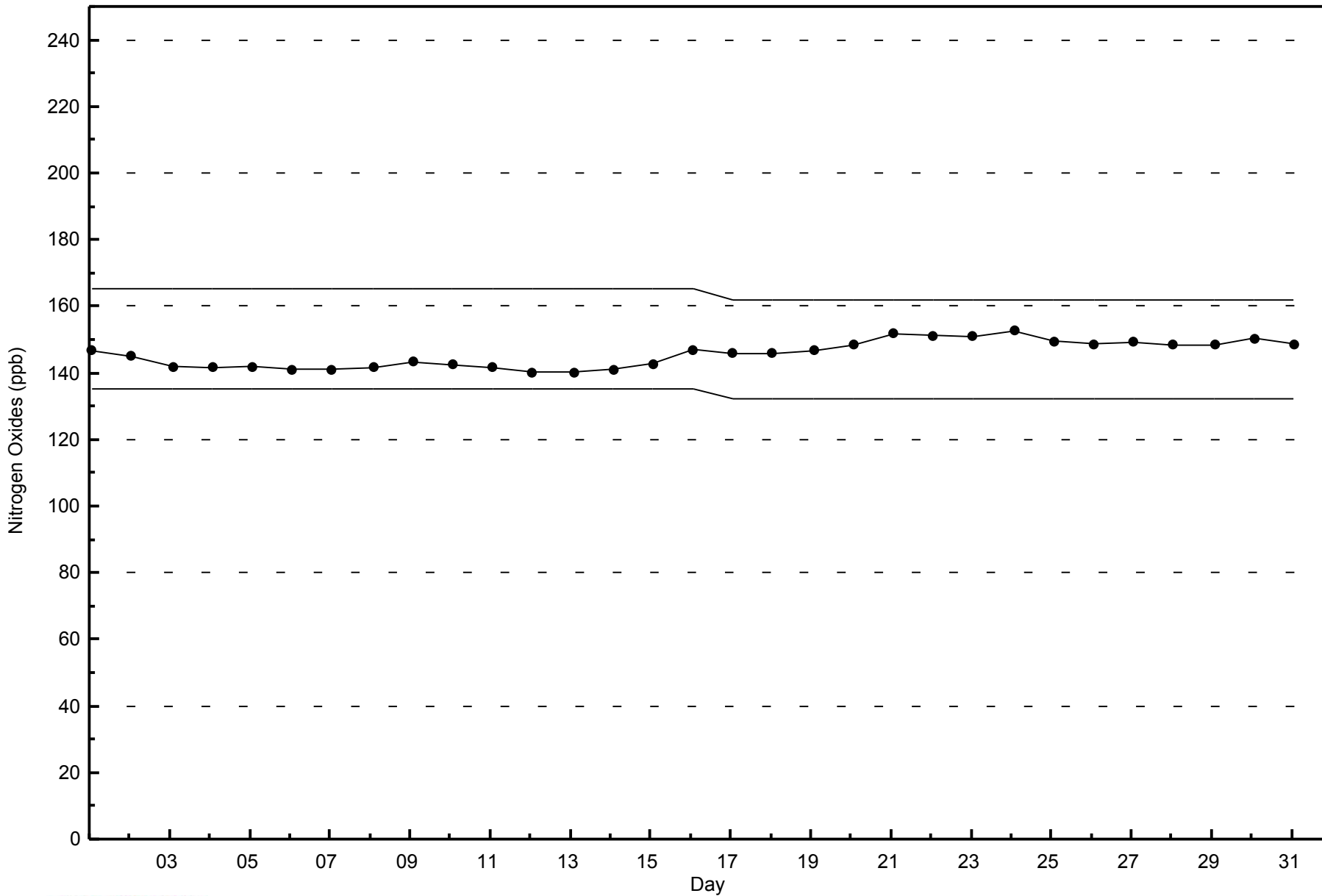
Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Fort Chipecywan - May 2014





WBEA  
Span Responses

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Fort Chipecywan - May 2014





# Wood Buffalo Environmental Association

## Summary of Hour Averages

Ozone (O<sub>3</sub>) - ppb

Fort Chipewyan - May 2014

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 52 ppb on May 14 20:00	Maximum Daily Average: 45.3 ppb on May 14		Hours of Data:	708
Minimum Value: 12 ppb on May 25 06:00	Minimum Daily Average: 17.2 ppb on May 24		Hours of Missing Data:	36
Maximum Diurnal Average: 37.2 ppb at hour 19	Minimum Diurnal Average: 29.8 ppb at hour 6		Hours of Calibration:	35
Monthly Average: 33.8 ppb	Percentiles: P <sub>1</sub> = 14 P <sub>10</sub> = 24 Q <sub>1</sub> = 28 Median = 35 Q <sub>3</sub> = 40 P <sub>90</sub> = 44 P <sub>99</sub> = 50		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-May	36	36	Z	41	44	42	41	37	37	40	41	41	43	45	46	45	45	44	45	44	42	43	42	30	41.3	46
2-May	29	31	Z	36	33	31	25	19	18	20	23	23	23	24	24	26	26	27	28	29	30	30	31	32	26.9	36
3-May	32	28	Z	26	25	25	25	25	25	25	27	30	34	27	29	31	37	39	40	42	41	41	41	40	31.9	42
4-May	37	34	Z	29	31	32	36	37	35	34	34	36	38	39	41	39	39	39	38	38	37	36	37	37	36.2	41
5-May	36	34	Z	33	32	31	30	29	28	29	30	32	35	35	35	35	37	39	39	39	40	39	38	36	34.4	40
6-May	36	35	Z	37	33	31	31	33	32	31	29	30	29	30	33	34	35	34	34	35	35	34	33	34	33.0	37
7-May	33	32	Z	32	31	32	32	34	34	35	36	36	36	38	37	37	39	41	41	40	39	38	36	32	35.6	41
8-May	33	36	Z	31	30	29	37	38	38	38	37	37	36	36	36	37	36	37	36	34	30	29	28	25	34.0	38
9-May	25	23	Z	21	20	22	24	25	26	26	27	34	35	34	36	31	29	29	30	29	27	28	28	28	27.7	36
10-May	28	29	Z	29	30	29	28	28	28	28	29	31	33	34	35	36	36	36	36	33	34	33	35	36	32.0	36
11-May	37	33	Z	36	34	35	33	32	33	37	40	40	40	39	40	40	40	41	42	44	46	45	45	44	38.9	46
12-May	41	41	Z	36	37	30	27	32	36	38	40	45	47	47	46	46	45	45	46	47	45	45	46	44	41.4	47
13-May	41	39	Z	42	41	40	38	40	42	39	40	40	43	45	45	46	46	46	46	49	49	47	45	46	43.3	49
14-May	45	44	Z	40	39	38	38	38	39	41	43	45	47	49	49	48	48	49	50	52	52	50	49	48	45.3	52
15-May	47	47	Z	44	43	40	40	36	36	38	38	40	40	39	41	42	47	C	C	C	C	41	41	41	41.2	47
16-May	40	39	Z	37	38	32	30	35	40	41	42	41	41	42	42	42	42	42	42	41	40	40	40	39	39.5	42
17-May	39	39	Z	40	37	34	35	38	36	35	37	37	37	37	39	40	40	40	39	39	38	37	37	37	37.6	40
18-May	36	35	Z	34	33	32	31	30	28	28	28	28	30	31	31	30	29	29	31	34	34	37	37	37	31.9	37
19-May	35	33	Z	32	31	32	32	31	30	32	29	31	32	41	40	41	39	42	48	44	45	45	43	41	36.9	48
20-May	41	42	Z	42	40	36	37	37	37	40	43	47	48	47	44	47	47	47	46	44	43	44	46	46	43.1	48
21-May	46	44	Z	41	38	32	29	32	37	36	40	43	44	45	49	50	50	50	51	50	44	41	36	30	41.7	51
22-May	26	25	Z	21	21	22	25	26	27	28	28	28	30	29	30	35	39	39	39	36	30	29	28	26	28.9	39
23-May	25	26	Z	28	26	26	26	26	26	25	24	23	23	26	28	30	29	29	33	37	36	35	34	40	28.8	40
24-May	36	26	Z	16	15	14	15	15	15	16	15	16	15	16	19	19	17	16	16	17	17	16	15	15	17.2	36
25-May	15	13	Z	12	13	12	12	12	14	20	22	24	26	26	27	27	27	27	27	27	27	28	28	28	21.4	28
26-May	27	27	Z	26	26	26	26	25	25	26	26	25	25	26	27	28	28	29	29	30	30	29	29	27	27.0	30
27-May	27	26	Z	22	22	23	23	26	31	32	29	29	28	28	28	27	27	26	MS	25	25	24	22	25	26.3	32
28-May	27	26	Z	23	26	27	26	32	37	37	37	36	36	35	36	35	35	35	36	37	37	35	34	33	33.0	37
29-May	32	30	Z	31	29	28	25	25	25	24	22	22	23	23	21	19	16	14	15	17	17	20	21	19	22.6	32
30-May	19	25	Z	24	23	25	27	29	29	30	33	34	33	34	34	35	38	35	35	37	36	31	26	28	30.4	38
31-May	31	33	Z	37	36	37	39	38	38	39	38	38	39	39	39	38	39	39	42	43	41	40	40	39	38.2	43

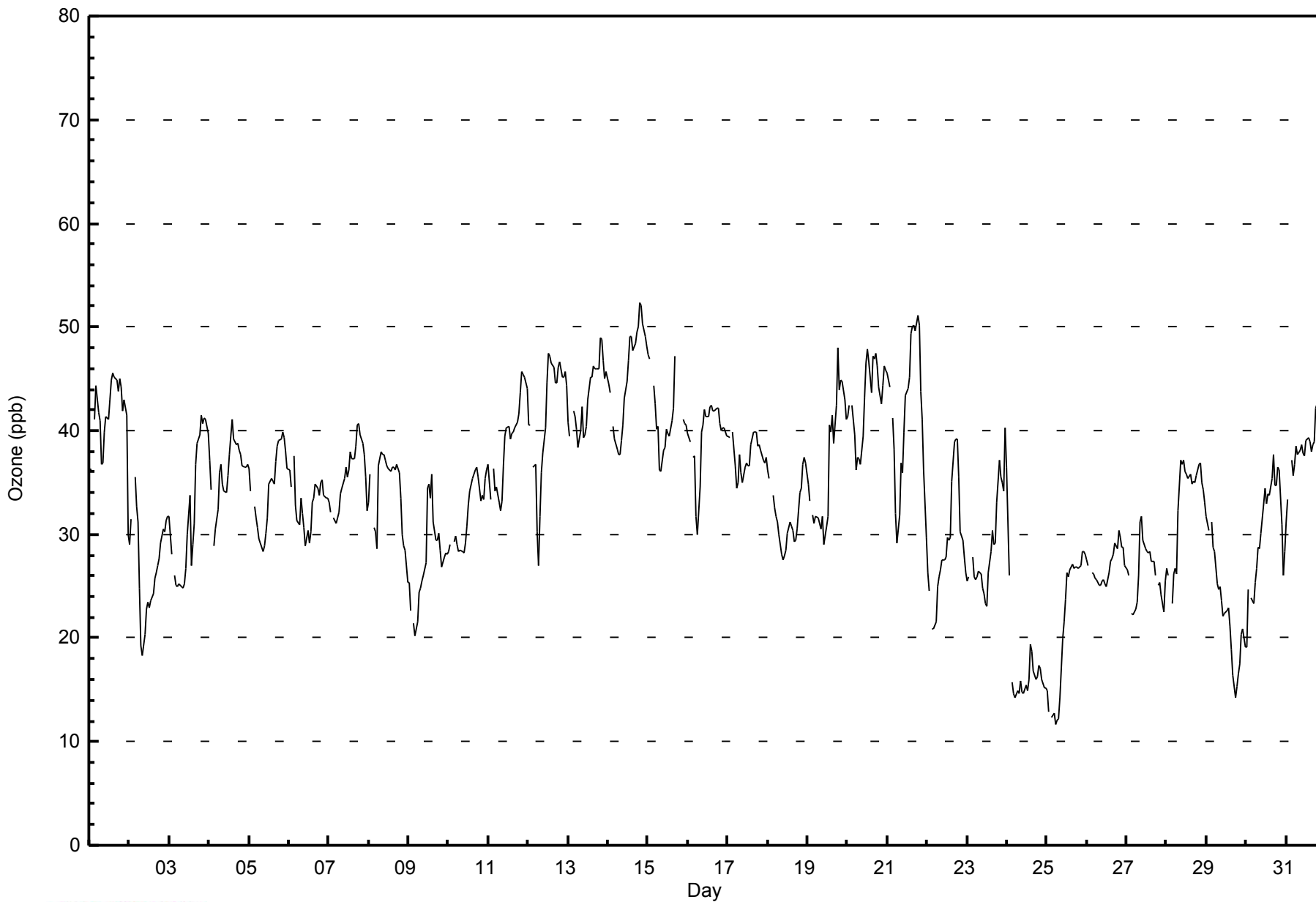
33.5	32.7	--	31.7	30.8	29.8	29.8	30.3	31.1	31.7	32.5	33.6	34.5	35.1	35.7	36.0	36.4	36.2	37.2	37.0	36.2	35.9	35.2	34.3	Diurnal Average	
47	47	--	44	44	42	41	40	42	41	43	47	48	49	49	50	50	50	51	52	52	50	49	48	Diurnal Maximum	

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



WBEA  
Hourly Averages

Ozone (O<sub>3</sub>) - ppb  
Fort Chipeywan - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Ozone (O<sub>3</sub>) - ppb**  
**Fort Chipeywan - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	43	6.07	6.07
21 - 50	662	93.50	99.58
51 - 82	3	0.42	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Ozone (O<sub>3</sub>) - ppb**  
**Fort Chipecywan - May 2014**

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	<b>Totals</b>
0 - 20	3	3	2	0	4	0	1	0	3	0	0	0	0	1	18	8	43
21 - 50	19	15	17	107	210	38	10	15	24	17	21	11	17	14	66	60	661
51 - 82	0	0	0	2	0	0	0	0	0	0	0	0	1	0	0	0	3
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	22	18	19	109	214	38	11	15	27	17	21	11	18	15	84	68	707

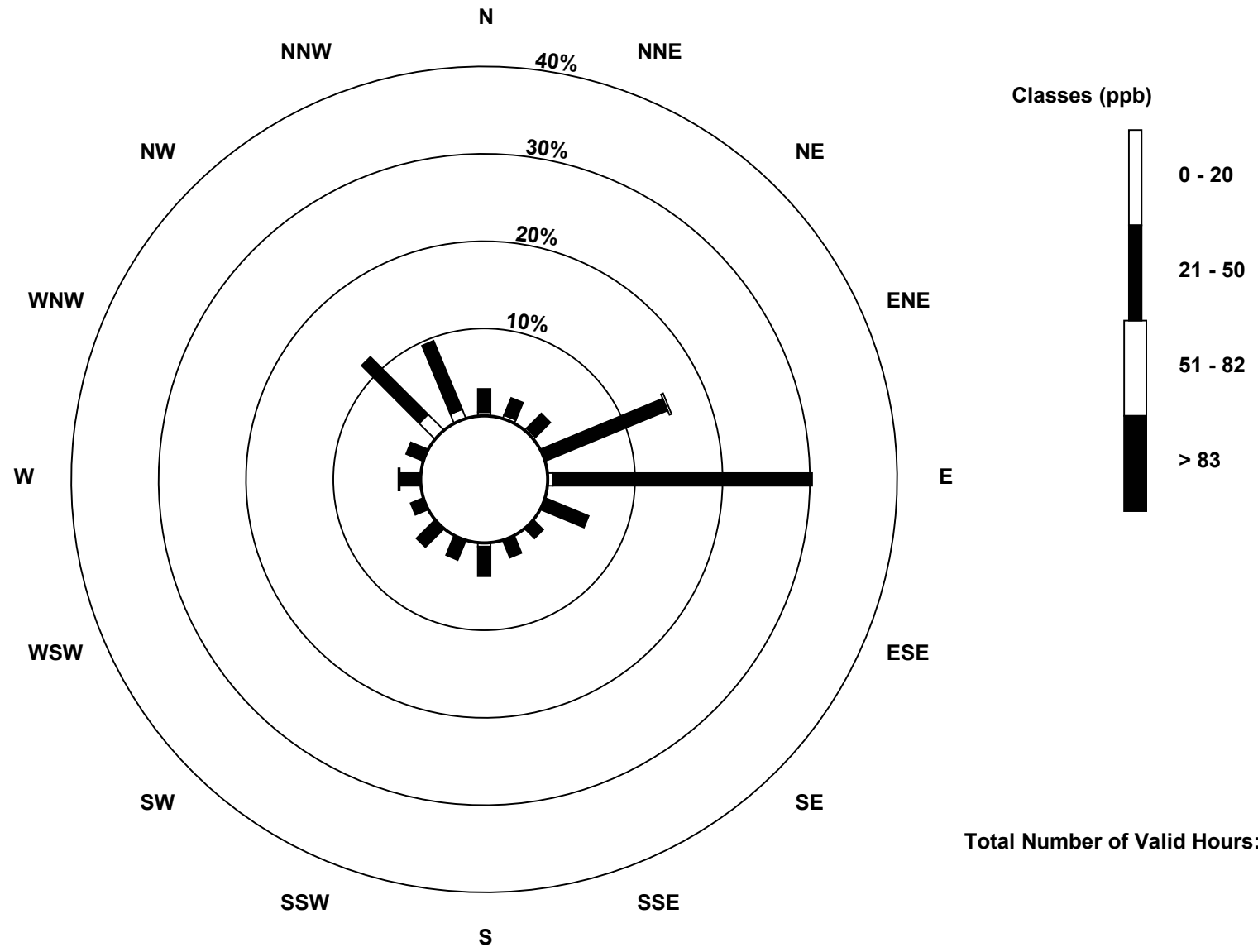
Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Ozone (O<sub>3</sub>) - ppb  
Fort Chipeywan (AMS 8)**

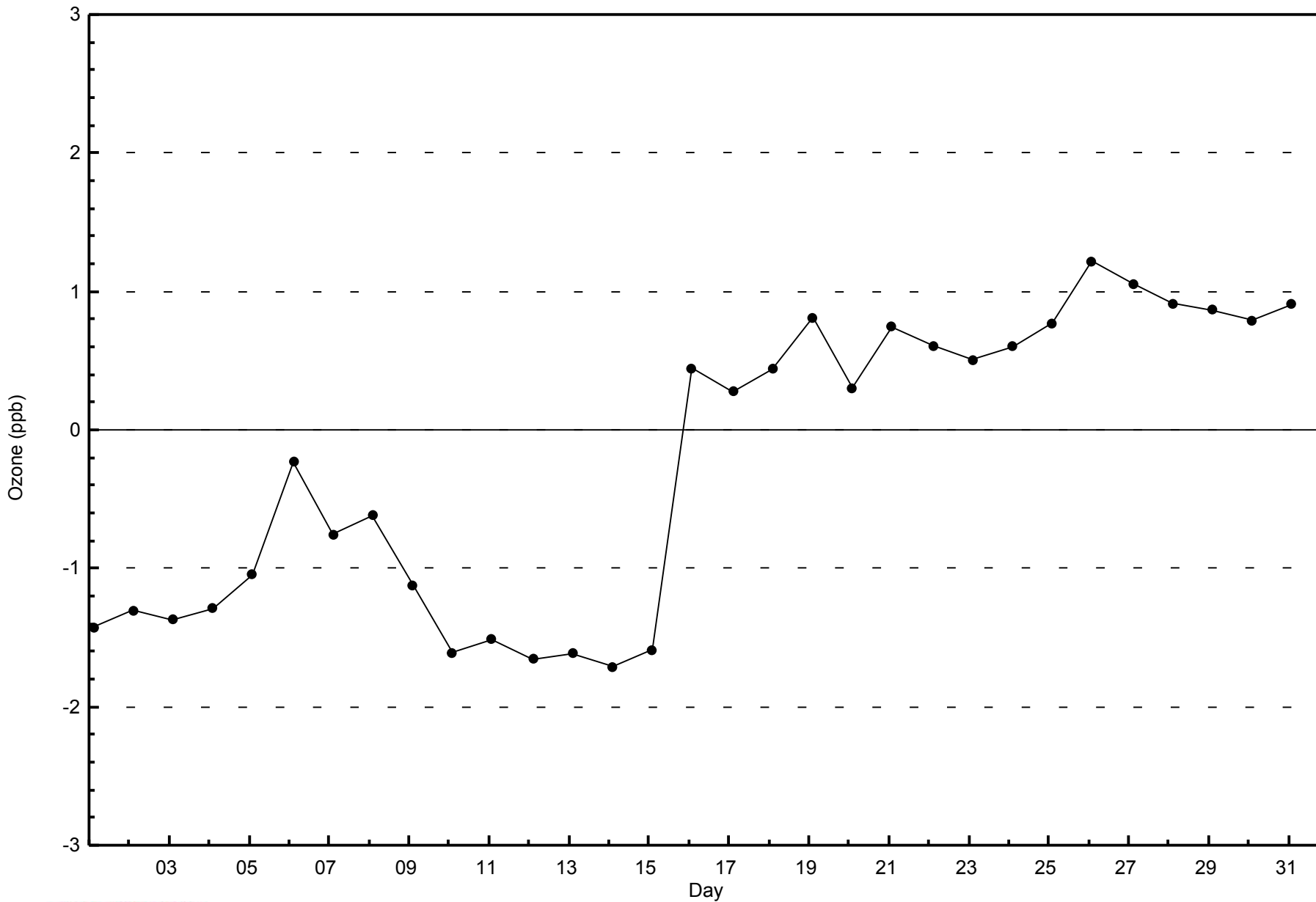


**Total Number of Valid Hours: 707**



WBEA  
Zero Responses

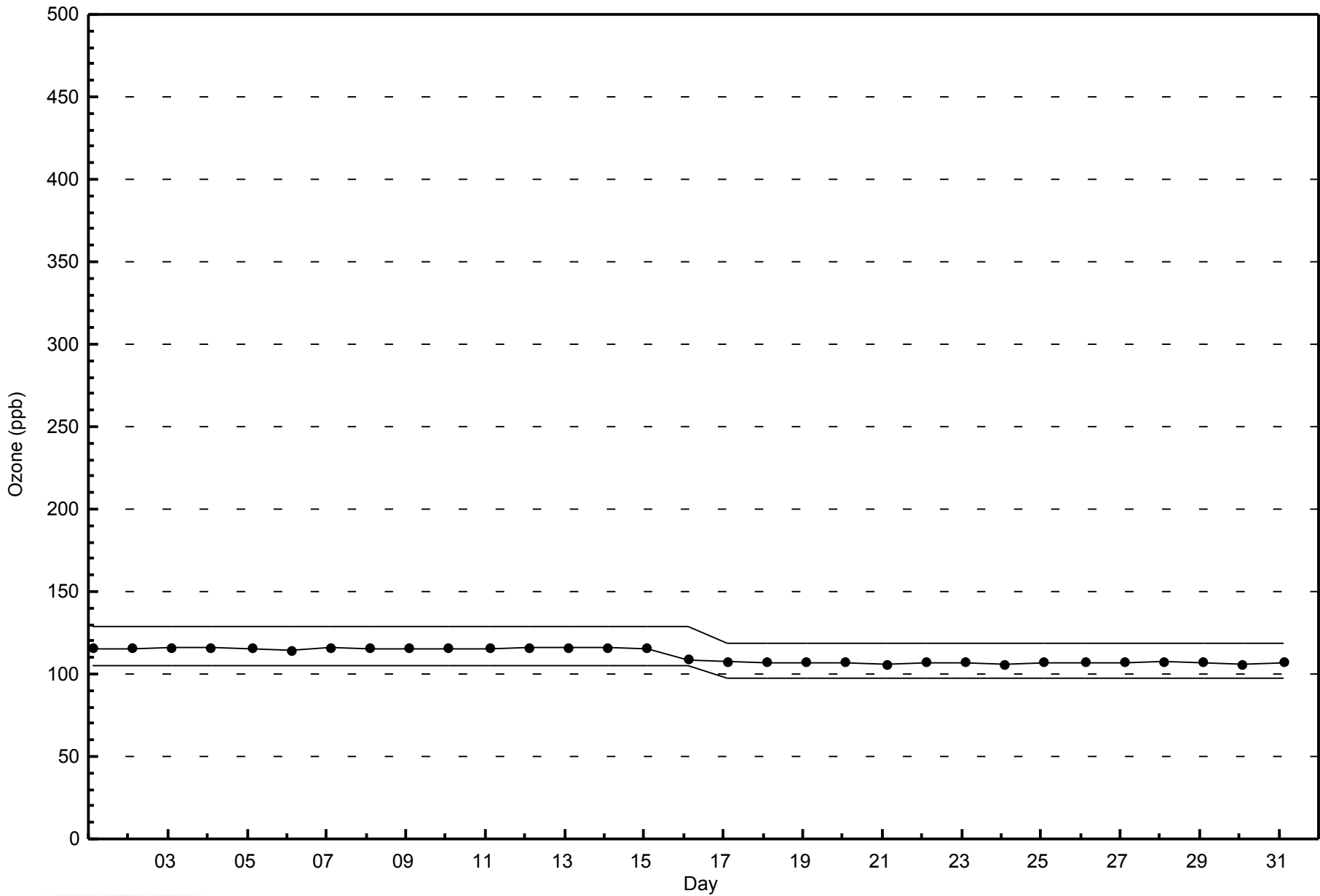
Ozone (O<sub>3</sub>) - ppb  
Fort Chipeywan - May 2014





WBEA  
Span Responses

Ozone (O<sub>3</sub>) - ppb  
Fort Chipeywan - May 2014





Wood Buffalo Environmental Association

Summary of Hour Averages

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

Fort Chipewyan - May 2014

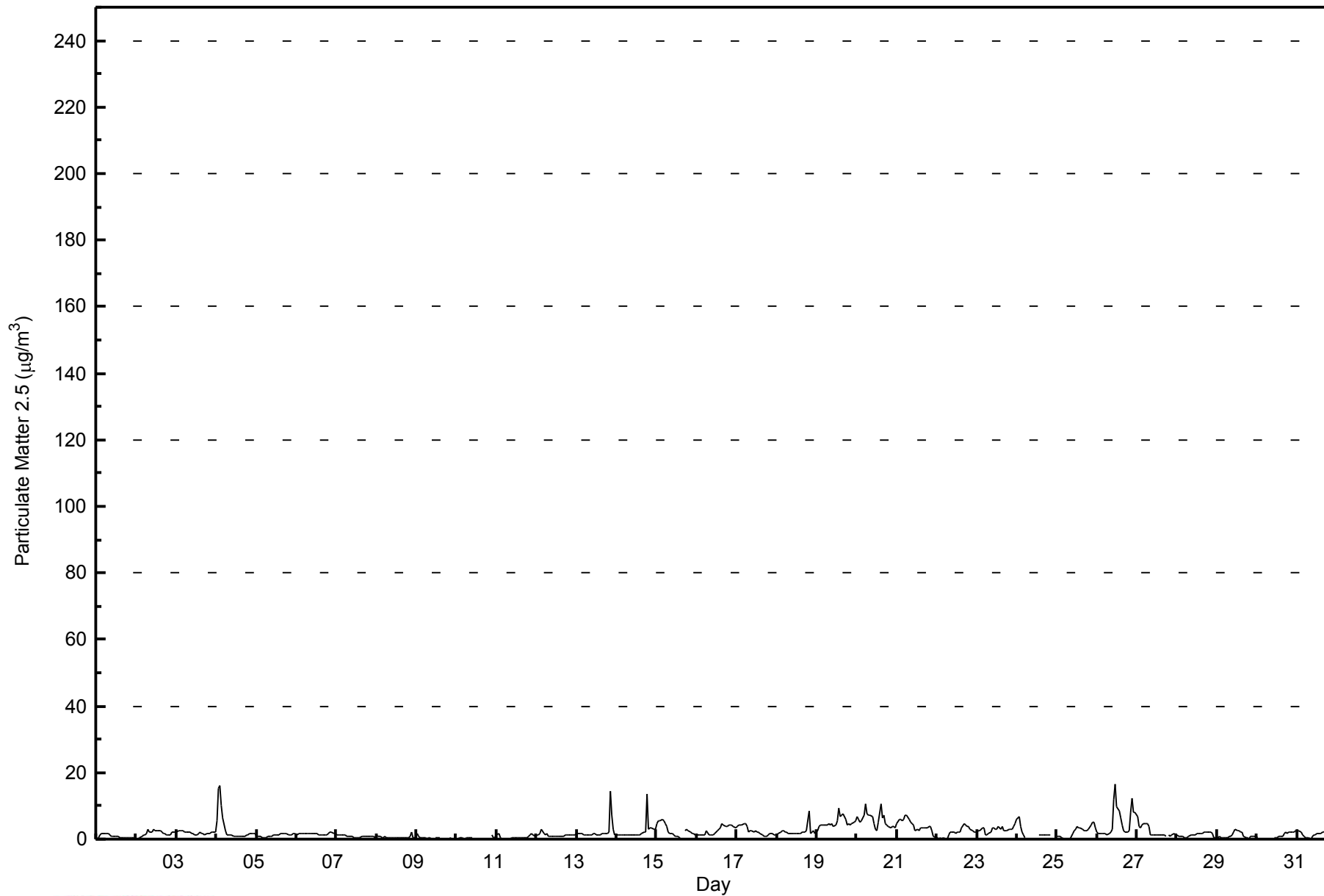
Number of Exceedences (AAAQO): 24-hr: 0		Hours in Service: 744																									
Maximum Value: 16.4 µg/m <sup>3</sup> on May 26 12:00		Maximum Daily Average: 5.7 µg/m <sup>3</sup> on May 20																									
Minimum Value: 0.0 µg/m <sup>3</sup> on May 25 05:00		Hours of Data: 711																									
Maximum Diurnal Average: 2.8 µg/m <sup>3</sup> at hour 22		Hours of Missing Data: 33																									
Monthly Average: 2.17 µg/m <sup>3</sup>		Hours of Calibration: 0																									
Minimum Daily Average: 0.3 µg/m <sup>3</sup> on May 9		Percent Operational Time: 95.6																									
Minimum Diurnal Average: 1.6 µg/m <sup>3</sup> at hour 9		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.4 Q <sub>1</sub> = 0.9 Median = 1.5 Q <sub>3</sub> = 2.6 P <sub>90</sub> = 4.5 P <sub>99</sub> = 11.8																									
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-May	0.2	0.4	1.3	1.5	1.7	1.6	1.8	1.6	1.4	0.9	0.8	1.0	0.8	0.7	0.6	0.4	0.5	0.6	0.5	0.4	0.4	0.4	0.4	0.1	0.8	1.8	
2-May	0.1	0.2	0.5	0.7	1.3	1.4	1.7	2.8	2.3	2.3	3.0	2.6	2.5	2.5	2.4	2.0	1.5	1.5	1.3	1.2	1.3	1.9	2.2	2.2	1.7	3.0	
3-May	2.2	2.4	2.4	2.4	2.5	2.3	2.2	2.1	2.0	1.8	1.5	1.3	1.2	1.7	1.9	1.8	1.5	1.4	1.8	1.6	1.7	2.2	2.0	2.3	1.9	2.5	
4-May	5.6	15.1	16.1	10.1	6.2	2.7	1.4	1.1	1.1	1.1	1.0	1.0	1.0	0.8	0.9	0.9	1.0	1.1	1.1	1.1	1.6	1.7	1.7	1.5	3.2	16.1	
5-May	1.0	1.0	0.7	0.6	0.6	0.6	0.6	0.8	1.0	1.0	1.1	1.3	1.2	1.4	1.7	1.8	1.6	1.6	1.5	1.4	1.2	1.2	1.5	1.5	1.2	1.8	
6-May	1.4	1.7	1.5	1.5	1.5	1.6	1.8	1.5	1.5	1.6	1.7	1.7	1.6	1.4	1.3	1.3	1.3	1.3	1.4	1.5	2.0	2.3	1.6	1.6	1.6	2.3	
7-May	1.2	1.3	1.4	1.1	1.4	1.1	0.8	0.8	0.7	0.7	0.6	0.5	0.5	0.5	0.6	0.6	1.0	0.8	0.9	0.7	0.9	1.0	1.0	0.5	0.9	1.4	
8-May	1.2	0.8	0.9	0.6	0.5	0.8	0.5	0.4	0.4	0.5	0.5	0.4	0.4	0.4	0.6	0.6	0.4	0.3	0.5	0.6	1.0	2.3	0.6	0.3	0.6	2.3	
9-May	1.8	0.8	0.2	0.2	0.2	0.3	0.2	0.3	0.3	0.2	UO	0.2	0.2	0.2	0.3	UO	UO	UO	UO	UO	UO	0.4	0.1	0.1	0.1	0.3	1.8
10-May	0.1	0.2	0.3	0.2	0.1	0.2	0.4	0.5	0.5	0.4	UO	UO	UO	UO	UO	UO	UO	UO	UO	0.2	UO	1.4	0.4	0.5	--	1.4	
11-May	1.4	1.5	0.5	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.5	0.5	0.4	0.5	0.4	0.3	0.4	0.4	0.6	0.9	1.1	1.6	1.2	0.8	0.6	1.6	
12-May	1.2	1.3	1.5	3.0	1.6	1.3	1.5	1.0	0.9	0.8	0.8	0.8	0.9	1.0	1.0	1.0	1.1	1.1	1.3	1.3	1.4	1.4	1.4	1.3	1.2	3.0	
13-May	1.5	1.7	1.5	1.7	1.5	1.4	1.5	1.4	1.2	1.3	1.6	1.6	1.3	1.3	1.1	1.5	1.7	1.7	1.8	2.3	14.5	7.3	3.1	1.3	2.4	14.5	
14-May	1.2	1.2	1.3	1.3	1.4	1.3	1.3	1.3	1.3	1.3	1.2	1.4	1.5	1.5	1.6	2.0	2.2	13.6	3.1	3.4	3.3	3.0	3.1	2.3	2.3	13.6	
15-May	4.5	5.5	5.5	6.1	5.4	4.8	3.8	2.1	1.7	1.6	1.5	0.9	0.6	0.8	0.1	UO	M	2.6	2.9	2.7	2.1	1.7	1.6	1.4	2.7	6.1	
16-May	1.3	1.2	1.3	1.4	1.4	1.3	2.4	1.3	1.2	1.1	1.4	1.5	2.6	3.1	3.2	4.6	4.2	3.8	3.9	4.2	4.3	4.3	3.6	3.5	2.6	4.6	
17-May	3.7	4.4	4.3	4.2	4.5	4.5	3.8	2.2	2.4	2.4	2.2	2.5	2.1	2.0	1.5	1.4	1.0	0.9	0.9	1.1	1.6	1.7	1.3	1.3	2.4	4.5	
18-May	1.4	1.6	2.1	2.4	2.5	2.3	2.0	1.7	1.6	1.6	1.7	1.8	1.8	1.8	1.8	2.0	2.0	2.1	2.4	8.4	1.8	2.1	2.6	1.9	2.2	8.4	
19-May	2.4	3.9	4.1	4.4	4.3	4.2	4.4	4.5	4.2	4.5	3.7	4.2	5.4	9.2	6.7	7.0	7.7	6.0	4.3	4.5	4.2	4.6	4.9	5.6	5.0	9.2	
20-May	6.9	6.0	5.1	5.6	7.1	10.6	7.8	7.0	7.2	6.6	4.6	2.8	2.6	5.0	10.5	6.4	7.0	4.5	4.1	3.7	3.6	3.7	3.7	3.5	5.7	10.6	
21-May	4.7	5.8	6.0	5.7	6.0	7.1	7.1	6.0	5.0	4.5	4.2	2.7	2.9	2.7	3.5	3.4	3.3	3.6	3.4	3.7	3.9	2.4	0.7	0.3	4.1	7.1	
22-May	0.4	0.1	0.5	0.2	0.4	0.2	0.1	1.5	2.2	2.0	2.0	1.8	2.1	2.2	2.3	3.4	4.6	4.4	4.0	3.9	3.0	2.4	2.2	2.2	2.0	4.6	
23-May	2.3	2.5	2.8	3.2	3.2	1.2	1.3	1.6	2.0	3.2	3.3	3.1	3.0	3.6	3.1	3.8	2.5	2.5	2.6	3.1	2.8	3.0	3.9	4.6	2.8	4.6	
24-May	5.9	6.6	3.9	2.2	1.2	0.4	UO	UO	UO	UO	UO	UO	UO	1.3	1.3	1.2	1.3	1.4	1.3	1.1	1.3	UO	UO	UO	--	6.6	
25-May	0.7	0.8	0.8	0.5	0.0	0.0	0.0	0.0	0.0	1.7	2.6	3.1	3.7	3.5	3.4	2.9	2.7	2.5	2.7	2.9	4.0	5.1	5.1	3.3	2.2	5.1	
26-May	2.1	1.8	1.7	1.8	1.7	1.5	1.5	1.7	2.1	3.0	11.9	16.4	9.6	8.6	6.3	4.2	2.4	1.9	2.0	2.5	8.0	12.1	7.9	7.9	5.0	16.4	
27-May	6.7	3.7	3.3	4.4	4.5	4.7	4.6	3.9	1.2	1.2	1.1	1.3	1.3	1.4	1.1	1.1	1.2	1.0	MS	1.3	0.8	1.2	1.5	1.3	2.3	6.7	
28-May	1.1	0.7	0.7	0.7	0.6	0.6	0.6	0.8	1.3	1.4	1.4	1.4	1.6	1.7	1.7	1.9	2.1	2.3	2.2	2.3	2.1	1.8	0.6	0.2	1.3	2.3	
29-May	0.2	0.8	0.6	0.5	0.6	0.6	0.6	0.6	0.8	1.2	2.0	2.8	2.6	2.4	2.2	1.9	0.8	0.6	0.2	0.1	0.7	0.8	0.8	0.9	1.1	2.8	
30-May	0.5	UO	UO	UO	0.1	0.0	0.0	0.0	0.0	UO	0.6	0.4	0.5	1.0	1.1	0.8	1.6	2.0	1.9	2.0	2.3	2.1	2.0	2.5	1.1	2.5	
31-May	2.6	2.5	2.0	1.3	1.0	0.4	0.3	0.3	0.2	0.9	1.2	1.3	1.5	1.6	1.7	1.9	2.3	2.5	2.8	3.6	4.3	6.9	7.7	3.7	2.3	7.7	
																								Diurnal Average			
																								Diurnal Maximum			
																								2.2 6.9			
																								2.6 15.1			
																								2.5 16.1			
																								2.3 10.1			
																								2.1 7.1			
																								2.0 10.6			
																								1.9 7.8			
																								1.7 7.0			
																								1.6 7.2			
																								1.8 6.6			
																								2.1 11.9			
																								2.1 16.4			
																								2.0 9.6			
																								2.2 9.2			
																								2.2 10.5			
																								2.2 7.0			
																								2.2 7.7			
																								2.0 6.0			
																								2.4 13.6			
																								2.3 8.4			
																								2.7 14.5			
																								2.8 12.1			
																								2.3 7.9			
																								2.0 7.9			

M - Maintenance UO - Unstable Operation MS - Missing  
 Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m<sup>3</sup>



WBEA  
Hourly Averages

Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
Fort Chipeywan - May 2014





**WBEA**

**Cumulative Frequency Distribution**

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

**Fort Chipecywan - May 2014**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
1 - 5	463	65.12	65.12
6 - 15	49	6.89	72.01
16 - 25	2	0.28	72.29
26 - 80	0	0.00	72.29
> 81.0	0	0.00	72.29

Total Number of Valid Hours: 711

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Fort Chipeywan - May 2014**

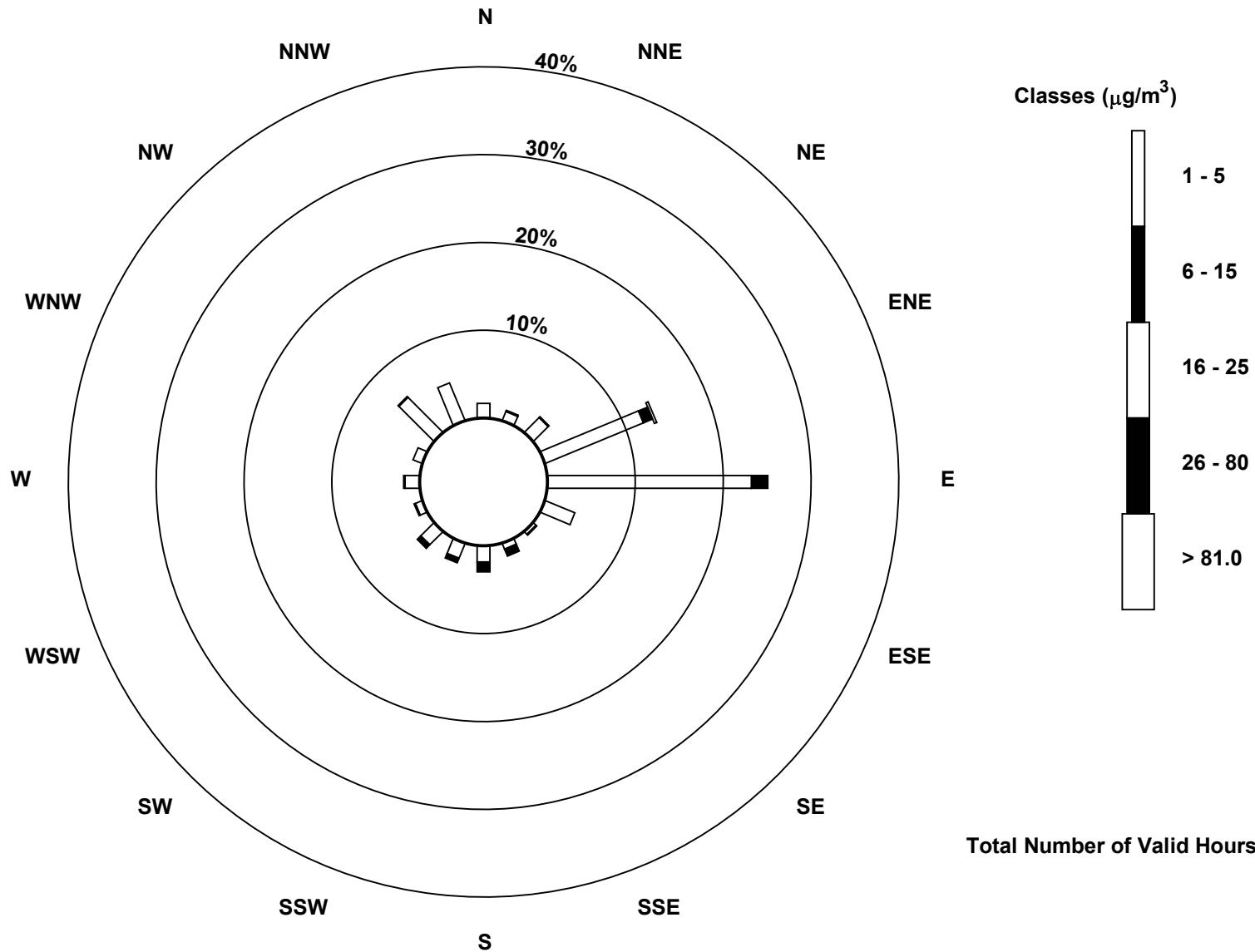
Concentration Ranges ( $\mu\text{g}/\text{m}^3$ )	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	12	8	17	86	165	26	3	5	13	13	15	6	12	8	40	33	462
6 - 15	0	1	1	8	13	0	1	6	8	4	4	1	1	0	1	0	49
16 - 25	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	12	9	18	96	178	26	4	11	21	17	19	7	13	8	41	33	513

Total Number of Valid Hours: 710

Total Number of Hours: 744

Wood Buffalo Environmental Association  
Wind Rose May 2014

Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
Fort Chipeywan (AMS 8)



Total Number of Valid Hours: 710



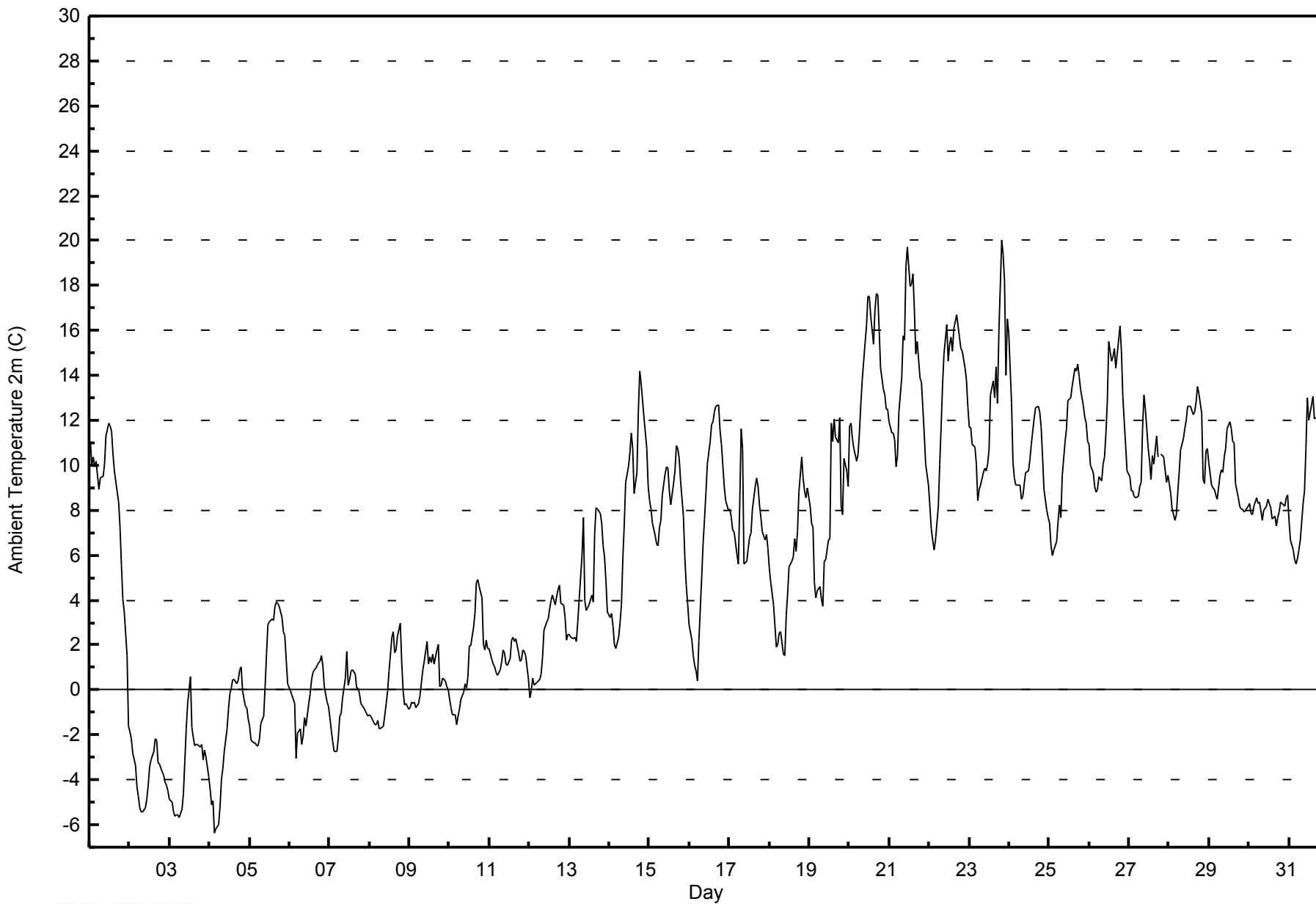


Maximum Value: 20.0 C on May 23 20:00		Maximum Daily Average: 14.0 C on May 20		Hours in Service: 744																						
Minimum Value: -6.4 C on May 4 04:00		Minimum Daily Average: -3.8 C on May 2		Hours of Data: 743																						
Maximum Diurnal Average: 8.1 C at hour 18		Minimum Diurnal Average: 3.5 C at hour 5		Hours of Missing Data: 1																						
Monthly Average: 6.08 C		Percentiles: P <sub>1</sub> = -5.5 P <sub>10</sub> = -1.7 Q <sub>1</sub> = 1.1 Median = 7.3 Q <sub>3</sub> = 10.5 P <sub>90</sub> = 13.0 P <sub>99</sub> = 17.9		Hours of Calibration: 0																						
				Percent Operational Time: 99.9																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-May	11.0	10.0	10.4	9.9	10.2	8.9	9.4	9.5	9.5	10.1	11.3	11.9	11.8	11.5	10.5	9.7	8.8	8.4	7.2	5.5	4.0	3.5	1.5	-1.6	8.5	11.9
2-May	-1.9	-2.2	-2.8	-3.4	-4.3	-4.7	-5.3	-5.4	-5.5	-5.2	-4.9	-4.2	-3.4	-3.1	-2.8	-2.2	-2.3	-3.3	-3.3	-3.5	-3.8	-4.1	-4.2	-4.5	-3.8	-1.9
3-May	-4.9	-5.0	-5.4	-5.6	-5.6	-5.5	-5.7	-5.3	-4.6	-3.2	-1.7	-0.6	0.6	-1.7	-2.1	-2.5	-2.4	-2.4	-2.5	-2.4	-3.1	-2.7	-3.0	-3.9	-3.4	0.6
4-May	-4.4	-5.1	-4.9	-6.4	-6.2	-6.0	-5.2	-4.0	-3.5	-2.7	-1.7	-0.9	-0.2	0.1	0.5	0.5	0.3	0.4	0.9	1.0	0.0	-0.8	-0.8	-1.3	-2.1	1.0
5-May	-1.6	-2.2	-2.3	-2.3	-2.5	-2.5	-2.1	-1.5	-1.2	0.1	1.6	2.9	3.0	3.2	3.1	3.7	3.9	3.9	3.7	3.2	2.6	2.4	1.3	0.3	0.9	3.9
6-May	-0.1	-0.3	-0.4	-0.6	-3.0	-1.9	-1.7	-2.4	-2.0	-1.2	-1.6	-0.6	-0.1	0.5	0.8	0.9	1.0	1.2	1.3	1.5	1.1	0.1	-0.6	-0.7	-0.4	1.5
7-May	-1.2	-1.8	-2.3	-2.7	-2.8	-2.1	-1.2	-1.0	-0.3	0.5	1.7	0.2	0.5	0.8	0.9	0.7	0.1	0.1	-0.2	-0.6	-0.8	-0.9	-1.0	-1.2	-0.6	1.7
8-May	-1.1	-1.2	-1.4	-1.6	-1.6	-1.3	-1.7	-1.6	-1.6	-1.1	-0.6	0.0	0.8	2.3	2.6	1.7	1.8	2.4	3.0	1.2	0.0	-0.7	-0.6	-0.9	-0.1	3.0
9-May	-0.8	-0.5	-0.6	-0.5	-0.8	-0.6	-0.2	0.3	0.9	1.3	2.1	1.2	1.5	1.2	1.6	1.1	1.8	2.1	0.1	0.2	0.5	0.4	0.1	0.1	0.5	2.1
10-May	-0.4	-0.8	-1.1	-1.1	-1.5	-1.2	-0.9	-0.4	-0.1	0.3	0.1	0.6	2.0	2.0	2.8	3.4	4.8	4.9	4.6	4.1	2.0	1.8	2.2	1.9	1.2	4.9
11-May	1.8	1.4	1.1	1.0	0.8	0.7	0.9	1.3	1.8	1.6	1.2	1.1	1.4	2.2	2.3	2.2	2.3	1.7	1.3	1.3	1.8	1.7	1.5	0.5	1.4	2.3
12-May	-0.3	0.0	0.5	0.2	0.3	0.4	0.4	0.7	1.4	2.6	3.0	3.2	3.6	4.0	4.2	3.8	4.2	4.5	4.7	3.8	3.8	3.2	2.2	2.5	2.4	4.7
13-May	2.4	2.4	2.3	2.3	2.2	3.0	4.0	6.0	7.7	4.0	3.5	3.6	3.8	4.2	3.9	7.0	8.1	8.0	7.9	7.4	6.4	5.9	4.9	3.5	4.8	8.1
14-May	3.2	3.4	2.9	2.0	1.9	2.3	3.0	3.8	5.9	7.3	9.3	9.9	10.5	11.4	10.7	8.7	9.7	12.4	14.2	13.6	12.9	12.1	10.8	9.0	8.0	14.2
15-May	8.4	8.1	7.4	6.9	6.5	6.4	7.2	7.6	8.7	9.6	9.9	9.9	8.9	8.2	9.2	9.7	10.9	10.8	10.3	9.3	7.8	5.9	4.6	3.9	8.2	10.9
16-May	2.9	2.2	1.5	1.1	0.8	0.4	2.2	5.1	6.5	7.6	8.8	10.0	11.0	11.8	11.9	12.4	12.7	12.7	11.6	11.0	10.0	9.1	8.5	8.0	7.5	12.7
17-May	8.1	7.7	7.1	7.1	6.1	5.6	8.3	11.6	10.8	5.6	5.8	6.3	6.8	7.0	8.0	9.1	9.4	9.1	8.2	7.7	7.1	6.7	6.9	6.3	7.6	11.6
18-May	5.4	4.8	3.8	2.8	1.9	2.0	2.5	2.6	1.6	1.5	3.3	4.3	5.5	5.7	5.9	6.7	6.2	7.0	8.8	10.4	9.4	8.9	8.5	9.0	5.4	10.4
19-May	8.2	7.4	7.2	4.8	4.1	4.4	4.6	4.0	3.7	5.7	5.8	6.7	6.7	11.9	11.1	12.1	11.3	11.0	12.1	8.2	7.8	10.3	9.7	9.1	7.8	12.1
20-May	11.8	11.9	11.2	10.7	10.2	10.5	11.5	12.8	13.8	15.4	16.2	17.5	17.5	16.6	15.4	16.9	17.7	17.6	16.0	14.3	13.4	13.1	12.5	12.5	14.0	17.7
21-May	11.9	11.5	11.4	11.1	9.9	10.4	12.4	13.9	15.7	15.6	18.9	19.7	18.0	18.1	18.5	16.9	15.0	15.5	13.9	13.7	12.5	11.4	10.1	9.1	14.0	19.7
22-May	8.2	7.2	6.7	6.2	6.7	8.2	10.0	11.7	13.6	15.0	16.3	14.7	15.4	15.7	15.1	16.1	16.7	16.2	15.7	15.2	15.1	14.3	13.8	12.6	12.8	16.7
23-May	11.7	11.7	11.0	10.8	10.0	8.4	8.9	9.1	9.7	9.9	9.7	10.1	10.7	13.1	13.8	13.0	14.4	12.8	15.9	20.0	19.4	18.2	14.0	16.5	12.6	20.0
24-May	15.9	12.8	10.1	9.4	9.1	9.1	8.5	8.6	9.2	9.7	9.8	10.3	10.9	11.5	12.1	12.6	12.6	12.4	11.7	10.4	8.9	8.0	7.6	10.4	15.9	10.4
25-May	7.4	6.4	6.0	6.2	6.6	7.5	8.2	7.7	9.5	11.1	11.6	12.9	12.9	13.0	13.5	14.3	14.2	14.5	13.9	13.4	12.7	12.1	11.9	11.1	10.8	14.5
26-May	11.0	10.0	9.7	9.0	8.8	8.9	9.5	9.3	10.1	10.4	11.4	12.9	15.5	14.6	14.8	15.2	14.3	15.0	16.2	15.1	13.0	11.9	10.9	9.8	12.0	16.2
27-May	9.5	8.9	8.9	8.6	8.6	8.6	9.1	9.3	11.6	13.2	12.5	10.8	10.2	9.4	10.4	10.0	11.3	10.4	MS	10.5	10.4	10.3	9.2	9.5	10.1	13.2
28-May	9.2	8.8	8.1	7.6	7.8	8.8	9.7	10.7	11.2	11.6	12.0	12.6	12.7	12.7	12.3	12.3	12.8	13.5	13.2	12.3	9.4	9.2	10.6	10.7	10.8	13.5
29-May	10.1	9.1	9.0	8.9	8.7	8.5	9.5	9.8	9.7	10.4	10.7	11.6	11.9	11.6	11.0	11.0	9.2	8.6	8.2	8.1	8.0	7.9	8.0	8.2	9.5	11.9
30-May	8.3	7.9	7.8	8.2	8.5	8.3	8.4	8.0	7.5	8.0	8.2	8.5	8.3	8.1	7.6	7.8	7.3	7.7	7.9	8.4	8.3	8.2	8.6	8.7	8.1	8.7
31-May	7.6	6.7	6.2	5.8	5.6	5.8	6.3	6.7	8.3	8.9	10.7	13.0	12.0	12.7	13.1	12.1	12.1	12.1	12.6	12.7	12.3	10.4	10.9	10.2	9.8	13.1
																								Diurnal Average		
																								Diurnal Maximum		
5.1 4.5 4.2 3.8 3.5 3.6 4.2 4.8 5.4 5.9 6.6 7.1 7.4 7.7 7.8 8.0 8.1 8.1 8.0 7.7 6.9 6.4 5.8 5.4																										
15.9 12.8 11.4 11.1 10.2 10.5 12.4 13.9 15.7 15.6 18.9 19.7 18.0 18.1 18.5 16.9 17.7 17.6 16.2 20.0 19.4 18.2 14.0 16.5																										
MS - Missing																										



**WBEA**  
**Hourly Averages**

**Ambient Temperature 2m (AT 2m) - C**  
**Fort Chipecywan - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Ambient Temperature 2m (AT 2m) - C**  
**Fort Chipecwan - May 2014**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	138	18.57	18.57
0 - 10	390	52.49	71.06
10 - 20	215	28.94	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 743

Total Number of Hours: 744



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

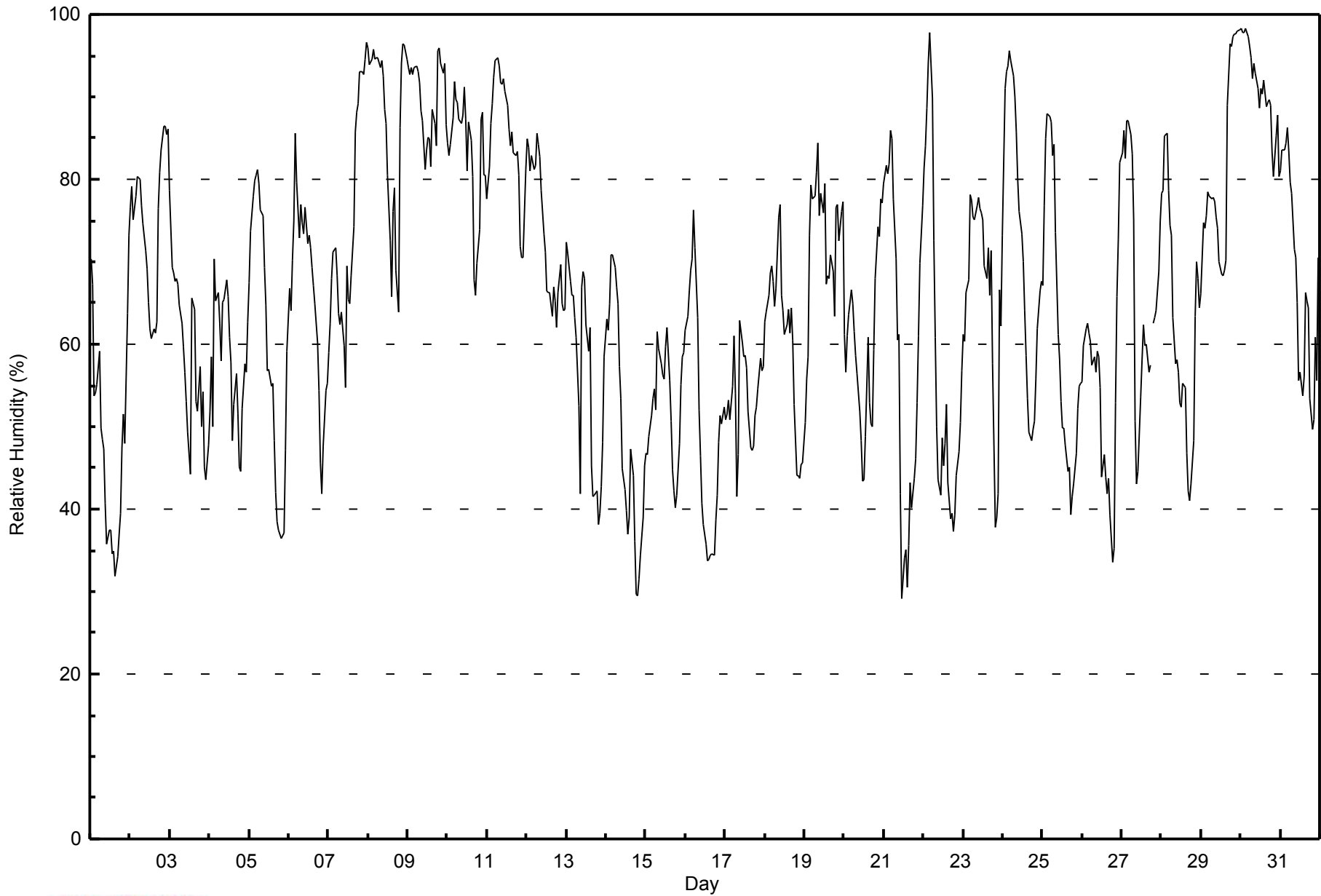
**Relative Humidity (RH) - %**  
**Fort Chipecwan - May 2014**

Maximum Value: 98 % on May 30 04:00																			Maximum Daily Average: 91.1 % on May 30						Hours in Service: 744																								
Minimum Value: 29 % on May 21 12:00																			Minimum Daily Average: 48.0 % on May 1						Hours of Data: 743																								
Maximum Diurnal Average: 78.2 % at hour 5																			Minimum Diurnal Average: 56.7 % at hour 19						Hours of Missing Data: 1																								
Monthly Average: 66.3 %																			Percentiles: P <sub>1</sub> = 34 P <sub>10</sub> = 43 Q <sub>1</sub> = 53 Median = 66 Q <sub>3</sub> = 80 P <sub>90</sub> = 90 P <sub>99</sub> = 98						Hours of Calibration: 0																								
																									Percent Operational Time: 99.9																								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-May	70	67	54	54	55	59	50	48	47	41	36	37	37	35	35	32	34	37	39	48	51	48	64	73	48.0	73																							
2-May	77	79	75	78	80	80	80	77	75	71	69	65	62	61	62	61	63	76	81	84	87	86	85	86	75.0	87																							
3-May	79	69	69	68	68	67	65	63	60	57	53	49	44	66	65	64	53	52	57	50	54	45	43	48	58.6	79																							
4-May	52	58	50	70	65	66	63	58	65	66	68	66	61	58	48	53	56	52	45	45	52	58	57	63	58.0	70																							
5-May	67	74	78	80	81	81	80	76	76	69	65	57	57	55	55	48	42	38	37	36	37	37	47	59	59.7	81																							
6-May	67	64	70	75	86	80	73	77	75	73	77	72	73	72	69	67	65	60	54	46	42	48	54	55	66.4	86																							
7-May	59	63	68	71	72	68	64	62	64	60	55	69	65	65	68	74	86	88	89	93	93	93	95	97	74.2	97																							
8-May	96	94	95	96	95	95	95	94	94	93	88	87	81	73	66	76	79	69	64	86	94	97	96	95	87.3	97																							
9-May	94	93	94	93	94	94	93	92	88	87	81	84	85	85	82	88	87	84	96	96	94	93	94	87	89.8	96																							
10-May	84	83	84	88	92	90	89	87	87	88	91	87	81	87	85	80	68	66	70	74	87	88	80	80	83.2	92																							
11-May	78	82	87	89	92	94	95	94	92	92	92	91	89	86	84	86	83	83	83	81	72	70	70	81	85.2	95																							
12-May	85	84	81	83	81	82	86	84	83	79	73	71	67	66	66	63	67	65	62	66	70	65	64	64	73.2	86																							
13-May	72	71	68	66	66	63	61	53	42	67	69	68	62	59	62	45	42	42	42	38	40	43	48	59	56.1	72																							
14-May	63	62	65	71	71	69	67	65	57	53	45	42	40	37	39	47	44	36	30	29	32	34	39	45	49.3	71																							
15-May	47	47	49	51	53	55	52	61	60	58	56	56	60	62	56	51	45	42	40	42	48	55	58	59	52.5	62																							
16-May	62	63	67	69	70	76	72	63	52	46	41	38	36	34	34	34	35	34	39	42	48	51	50	52	50.4	76																							
17-May	51	52	53	51	55	61	54	42	47	63	60	58	59	57	52	48	47	48	51	52	55	58	57	57	53.6	63																							
18-May	63	64	66	69	70	68	65	67	75	77	66	64	61	62	64	61	64	61	53	44	44	44	45	46	60.9	77																							
19-May	51	56	58	73	79	78	78	81	84	76	78	76	79	67	68	68	71	69	63	77	77	72	76	77	72.2	84																							
20-May	61	57	61	64	67	65	61	59	56	52	48	43	44	49	61	53	50	50	59	68	74	73	78	77	59.6	78																							
21-May	79	82	81	82	86	85	78	70	61	61	42	29	34	35	30	36	43	40	44	46	53	61	70	77	58.5	86																							
22-May	81	84	89	94	98	90	73	61	50	44	42	49	45	48	53	43	39	39	37	39	44	47	50	57	58.1	98																							
23-May	61	60	66	68	78	77	75	75	77	78	77	76	75	69	68	72	66	71	58	38	39	42	67	62	66.5	78																							
24-May	73	91	93	94	96	94	93	90	86	80	76	73	70	64	59	53	49	48	50	51	56	62	66	68	72.3	96																							
25-May	67	77	85	88	88	87	83	84	74	61	58	53	50	50	48	45	45	39	41	43	47	52	55	55	61.4	88																							
26-May	55	60	62	63	61	60	57	59	57	59	58	55	44	47	44	42	44	39	34	35	53	66	73	82	54.5	82																							
27-May	83	86	83	87	87	85	83	75	51	43	45	54	58	62	60	60	57	57	MS	63	63	64	69	75	67.4	87																							
28-May	78	79	85	86	79	74	73	63	58	58	57	53	52	55	55	47	42	41	43	48	63	70	68	64	62.2	86																							
29-May	66	75	74	76	78	78	78	78	77	75	74	70	68	68	69	70	89	97	96	97	98	98	98	98	81.1	98																							
30-May	98	98	98	98	97	96	95	92	94	93	91	89	91	90	92	89	89	90	89	83	80	85	88	80	91.1	98																							
31-May	81	84	84	84	86	83	80	78	71	71	65	56	57	54	56	66	65	64	53	50	51	61	56	70	67.8	86																							
																								71.0	72.7	73.8	76.7	78.2	77.5	74.4	71.9	68.8	67.4	64.4	62.5	60.9	60.6	59.8	58.8	58.3	57.4	56.7	57.7	61.2	63.4	66.5	69.3	Diurnal Average	
																								98	98	98	98	98	96	95	94	94	93	92	91	91	90	92	89	89	97	96	97	98	98	98	98	Diurnal Maximum	
MS - Missing																																																	



**WBEA**  
**Hourly Averages**

**Relative Humidity (RH) - %**  
**Fort Chipeywan - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Relative Humidity (RH) - %**  
**Fort Chipeywan - May 2014**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	48	6.46	6.46
40 - 60	227	30.55	37.01
60 - 80	282	37.95	74.97
80 - 100	186	25.03	100.00

Total Number of Valid Hours: 743

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Precipitation (PC) - mm

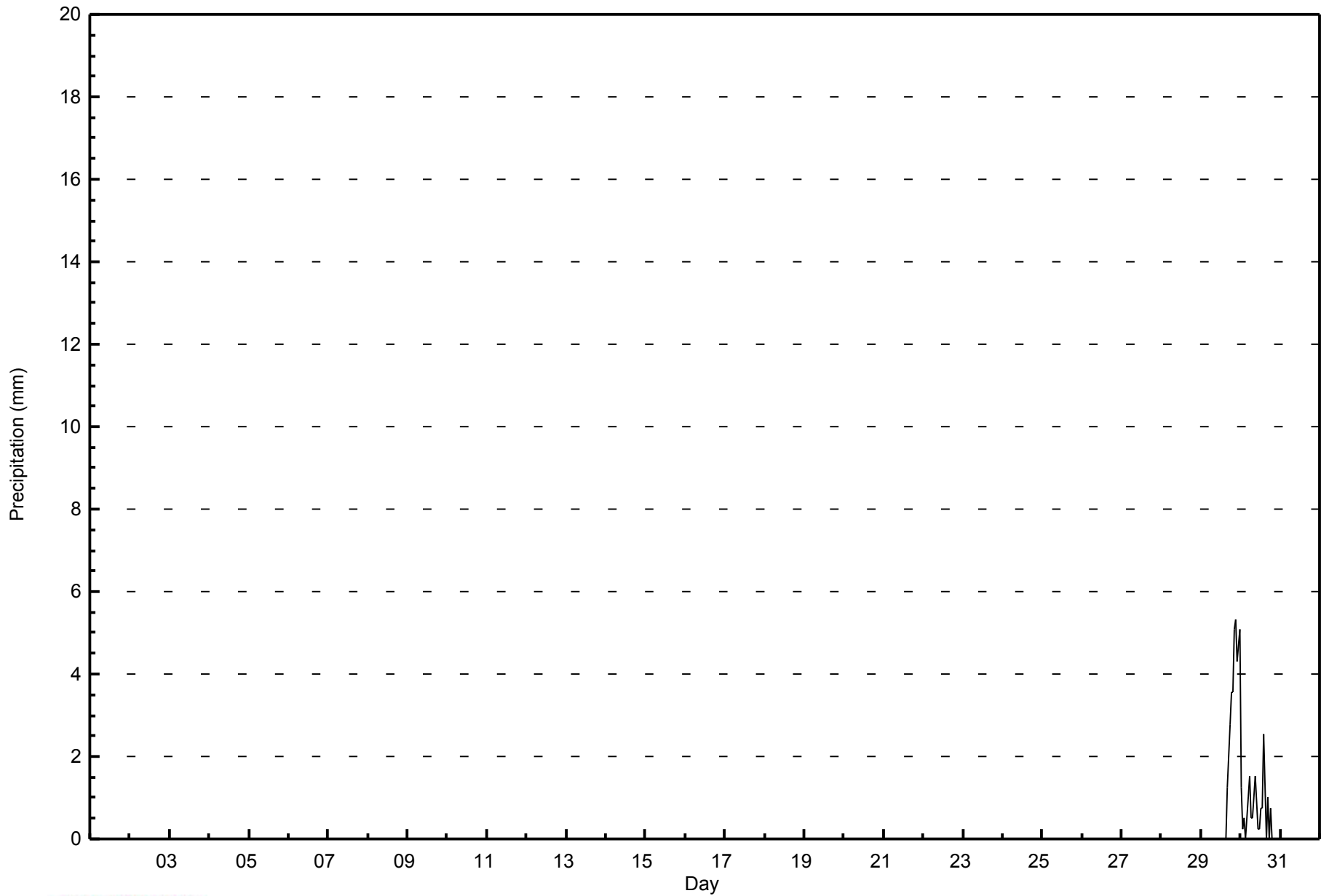
Fort Chipewyan - May 2014

Maximum Value: 5.3 mm on May 29 22:00      Maximum Daily Total: 31.0 mm on May 29																								Hours in Service: 744 Hours of Data: 101			
Minimum Value: 0.0 mm on May 27 20:00      Minimum Daily Total: 0.0 mm on May 28 Maximum Diurnal Total: 5.3 mm at hour 22      Minimum Diurnal Total: 0.0 mm at hour 4 Monthly Total: 45.47 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> = -0.2 P <sub>90</sub> = 1.5 P <sub>99</sub> = 5.3																								Hours of Missing Data: 643 Hours of Calibration: 0 Percent Operational Time: 13.6			
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-May	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-May	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-May	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-May	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-May	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-May	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-May	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-May	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-May	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-May	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-May	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-May	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-May	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-May	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-May	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-May	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-May	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-May	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-May	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-May	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-May	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-May	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-May	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-May	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-May	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-May	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-May	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	MS	0.0	0.0	0.0	0.0	0.0	--	0.0
28-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	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	2.8	3.6	3.6	5.1	5.3	4.3	5.1	31.0	5.3
30-May	1.3	0.3	0.5	0.0	1.0	1.5	0.5	0.5	1.0	1.5	0.3	0.3	0.8	0.8	2.5	0.0	1.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	14.5	2.5	
31-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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   0.3   0.5   0.0   1.0   1.5   0.5   0.5   1.0   1.5   0.3   0.3   0.8   0.8   2.5   0.0   2.3   2.8   4.3   3.6   5.1   5.3   4.3   5.1																								Diurnal Average			
1.3   0.3   0.5   0.0   1.0   1.5   0.5   0.5   1.0   1.5   0.3   0.3   0.8   0.8   2.5   0.0   1.3   2.8   3.6   3.6   5.1   5.3   4.3   5.1																								Diurnal Maximum			
AF - Analyzer Failure      MS - Missing																											



Wood Buffalo Environmental Association  
Hourly Averages

Precipitation (PC) - mm  
Fort Chipewyan - May 2014







**WBEA**  
**Cumulative Frequency Distribution**

**Precipitation (PC) - mm**  
**Fort Chipecywan - May 2014**

<b>Concentration Ranges (mm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.3	80	79.21	79.21
0.4 - 0.5	3	2.97	82.18
0.6 - 0.7	0	0.00	82.18
0.8 - 1.4	8	7.92	90.10
1.5 - 10	10	9.90	100.00
> 10	0	0.00	100.00

Total Number of Valid Hours: 101

Total Number of Hours: 744



Maximum Value: 888 W/m2 on May 25 13:00	Maximum Daily Average: 351.0 W/m2 on May 25	Hours in Service: 744
Minimum Value: 0 W/m2 on May 21 23:00	Minimum Daily Average: 85.1 W/m2 on May 30	Hours of Data: 388
Maximum Diurnal Average: 661.1 W/m2 at hour 12	Minimum Diurnal Average: 0.2 W/m2 at hour 24	Hours of Missing Data: 356
Monthly Average: 251.0 W/m2	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 2 Median = 132 Q <sub>3</sub> = 450 P <sub>90</sub> = 731 P <sub>99</sub> = 869	Hours of Calibration: 0
		Percent Operational Time: 52.2

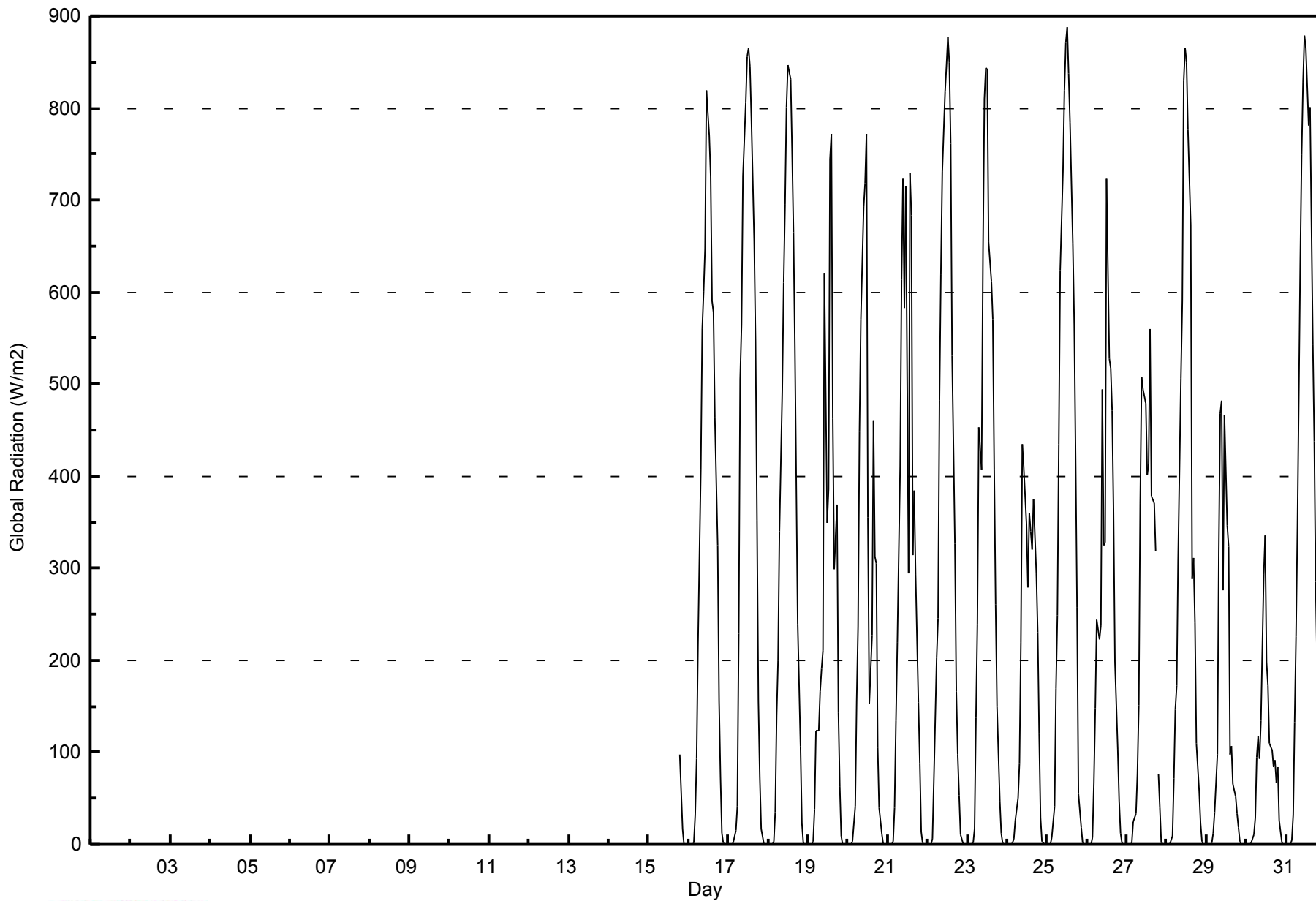
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-May	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--	
2-May	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--
3-May	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-May	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-May	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-May	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-May	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-May	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-May	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-May	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-May	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-May	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-May	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-May	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-May	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	M	M	M	97	17	1	0	0	--	97
16-May	1	0	0	2	32	93	219	407	559	601	647	820	770	726	590	578	463	325	155	74	12	1	0	0	294.8	820	
17-May	0	0	0	2	15	42	228	505	564	726	806	855	865	845	788	656	545	352	155	73	17	1	0	0	335.1	865	
18-May	0	0	0	2	36	140	200	341	492	610	695	801	846	832	754	665	541	389	239	107	23	1	0	0	321.5	846	
19-May	0	0	0	3	39	123	123	167	191	211	620	349	385	744	772	462	300	369	144	62	9	1	0	0	211.4	772	
20-May	0	0	0	2	41	155	237	448	571	692	719	772	356	152	227	461	313	306	106	39	10	1	0	0	233.7	772	
21-May	0	0	0	3	40	134	219	410	613	724	582	715	295	730	683	314	385	292	154	88	14	1	0	0	266.5	730	
22-May	0	0	0	5	70	203	246	482	620	731	818	847	878	849	761	531	326	166	98	53	11	1	0	0	320.7	878	
23-May	0	0	0	1	17	137	239	454	408	644	810	844	842	654	612	571	408	260	149	47	12	1	1	0	296.3	844	
24-May	0	0	0	1	5	26	50	88	220	435	410	348	280	361	340	320	375	295	231	120	29	2	0	0	164.1	435	
25-May	0	0	1	7	40	170	248	435	624	732	819	871	888	837	784	653	564	416	258	55	18	2	0	0	351.0	888	
26-May	0	0	0	7	68	148	244	223	238	494	326	329	723	527	517	471	360	198	103	48	12	1	0	0	209.8	723	
27-May	0	0	0	2	24	33	76	151	370	508	494	479	401	413	560	379	371	320	MS	76	40	2	0	0	204.3	560	
28-May	0	0	1	9	72	146	173	309	506	590	829	865	849	776	673	288	311	241	110	58	22	3	0	0	284.7	865	
29-May	0	0	0	2	12	34	98	319	469	483	276	467	346	324	98	107	66	51	34	19	3	0	0	0	133.7	483	
30-May	0	0	0	1	10	29	95	118	93	135	292	335	198	172	109	102	83	92	67	83	26	1	0	0	85.1	335	
31-May	0	0	0	4	32	132	226	345	632	749	828	878	864	781	800	673	543	437	286	104	52	4	0	0	348.8	878	
	0.2	0.2	0.2	3.4	34.5	109.1	182.6	325.1	448.1	566.4	623.2	661.1	611.5	607.7	566.8	452.0	372.1	281.8	152.5	70.8	19.2	1.4	0.2	0.2		Diurnal Average	
	1	0	1	9	72	203	248	505	632	749	829	878	888	849	800	673	564	437	286	120	52	4	1	0		Diurnal Maximum	

M - Maintenance      AF - Analyzer Failure      MS - Missing



**WBEA**  
**Hourly Averages**

**Global Radiation (GR) - W/m<sup>2</sup>**  
**Fort Chipeywan - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Global Radiation (GR) - W/m2**  
**Fort Chipecywan - May 2014**

<b>Concentration Ranges (W/m2)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	132	34.02	34.02
21 - 100	50	12.89	46.91
101 - 300	65	16.75	63.66
301 - 600	76	19.59	83.25
601 - 900	65	16.75	100.00
> 900	0	0.00	100.00

Total Number of Valid Hours: 388

Total Number of Hours: 744



Maximum Speed: 36 km/h on May 17 15:00	Maximum Daily Speed Average: 21.4 km/h on May 5	Hours in Service: 744
Minimum Speed Value: 1 km/h on May 12 04:00	Minimum Daily Speed Average: 1.6 km/h on May 8	Hours of Data: 742
Maximum Diurnal Speed Average: 11.6 km/h at hour 16	Minimum Diurnal Speed Average: 2.7 km/h at hour 1	Hours of Missing Data: 2
Monthly Average Velocity: 6.5 km/h 65.6 deg	Percentiles: P <sub>1</sub> = 2 P <sub>10</sub> = 5 Q <sub>1</sub> = 9 Median = 15 Q <sub>3</sub> = 20 P <sub>90</sub> = 24 P <sub>99</sub> = 33	Percent Operational Time: 99.7

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-May	W11WNW11	NW11	NW14WNW15	NNW14	NW19	NW19	NW24	NW23	NW22	NW25	NW24	NW25	NW26	NW25	NW23	NW19	NW23	NW17	NW13	NW17	NW23	NW24	NW19.1	NW26		
2-May	WNW22	NW24	NW25	NW22	NW20	NW20	NW23	NW23	NW21	NW23	NW23	NNW24	NW27	NNW24	NNW23	NNW25	NNW22	NNW19	NNW15	NNW15	NNW15	NNW14	NNW13	NW20.5	NW27	
3-May	NNW10	NNW11	NNW11	NNW12	NNW9	NNW9	NNW10	NNW9	NW7	NW7	NW8	NW11	NW9	E23	E24	E19	E10	E6	E7	SE2	ENE3	ENE2	N2	NNE5.1	E24	
4-May	NNE3	ENE3	ENE2	E3	E5	E6	E9	E11	ESE11	ESE13	E14	E15	E15	E20	E25	E26	E26	E27	ENE24	ENE18	ENE16	ENE15	ENE15	ENE14	E13.5	E27
5-May	E15	ENE15	ENE17	ENE19	ENE21	E21	E18	ENE17	E21	E22	E20	ENE27	ENE29	ENE32	ENE33	ENE30	ENE30	ENE29	ENE24	NE19	NE19	NE18	ENE18	ENE8	ENE21.4	ENE33
6-May	E8	NNE7	NE5	SSE2	ENE1	E3	ENE4	ESE8	ESE9	ESE11	E20	ESE18	ESE15	ESE11	E11	E14	E17	E19	E18	ENE14	ENE13	ENE10	ENE11	ENE11	E10.2	E20
7-May	ENE13	ENE16	ENE16	ENE13	ENE15	ENE14	ENE15	ENE19	E20	ENE23	ENE20	E30	E31	E27	E25	E25	E32	ENE34	ENE28	ENE21	ENE16	NE10	NNE7	NNE4	ENE19.2	ENE34
8-May	NE5	NE6	NE5	N3	N1	NNE4	E6	ESE5	E7	ESE5	ESE7	ESE7	SE6	SSE3	NW7	ENE6	SW1	SE3	WSW7	N5	ENE1	WNW3	WNW5	NW7	ENE1.6	ESE7
9-May	NNW5	NNW6	NNW8	NNW5	NNW5	NNW7	NNW6	NW7	NW7	NNW9	N7	NW6	S6	NNE4	NW12	NNW14	NW14	NNW10	NNW11	NW9	NW8	NNW12	NW14	NW14	NNW7.9	NW14
10-May	NNW14	NW18	NW17	NW15	NNW14	NNW15	NNW14	NNW14	NNW14	NNW15	NNW11	NNW13	NNW16	NNW13	N16	NNW15	N13	NNE12	NNE7	ENE3	ESE6	ENE8	NNE7	N5	NNW11.1	NW18
11-May	NNE4	W4	SSE3	SSE5	S5	SE5	SE7	ESE7	E8	E15	E21	E18	E17	E17	E22	E20	ESE17	E18	E16	E16	E17	E17	E16	ESE8	E11.7	E22
12-May	E5	E3	ENE3	NE1	NNE1	NNE2	ESE2	E3	ESE5	SE9	ESE12	ESE15	ESE16	E17	E17	E24	E18	E17	E19	E16	E10	E10	E11	E12	E10.1	E24
13-May	E9	ESE6	S9	SSE10	S7	SSW2	W3	NNW8	NNW10	ESE11	E14	E20	E25	E26	E25	E27	ENE25	ENE23	ENE21	ENE21	ENE18	ENE14	E12	E14	E12.3	E27
14-May	E15	E16	E19	E17	E15	E14	E16	E18	E18	E19	E22	E24	E24	E25	E26	E24	E22	ENE22	ENE20	ENE22	ENE23	ENE20	E23	E24	E20.0	E26
15-May	E22	E19	ENE15	ENE12	NE7	N11	N19	N20	NNW16	NNW18	NNW21	NNW22	NNW21	NNW20	NNW19	N16	N16	N16	N14	NNE11	NNW9	NNW9	NNW8	N10	N12.3	E22
16-May	N11	N12	N9	NNE4	NNE2	WNW3	W3	SW10	W13	WSW13	WSW14	SW14	SW13	SW10	SW11	SW12	SW11	SW11	SSW10	S10	SSE11	S8	SSW7	SSW5	SW5.9	SW14
17-May	SSW5	SSW4	SW4	WSW5	NW5	ESE2	AF	WNW2	ESE7	E31	E32	E33	E30	E31	E36	ENE31	ENE30	ENE28	ENE27	ENE23	ENE20	ENE21	ENE22	ENE19	ENE17.3	E36
18-May	ENE22	ENE18	ENE18	ENE17	ENE12	ENE15	ENE15	ENE16	E24	E28	E26	E23	E23	E23	E24	E24	E26	E22	E16	NE11	NE11	NE11	ENE16	ENE18	E18.6	E28
19-May	ENE15	ENE13	E12	E10	E12	E13	E16	E16	E16	E15	E15	E18	E17	E22	E24	E22	E15	E15	E17	ESE17	E15	E19	E22	E14	E16.2	E24
20-May	SSW17	S17	S19	S19	SSE18	SSE19	SSE19	SSE20	S25	S28	S33	S35	SSW29	SSW24	S22	SSE25	SSE26	S32	SW16	WSW10	SSW8	S9	SSW8	S21	S19.9	S35
21-May	S24	SSW17	S16	S12	SE7	S6	SW8	SW11	SW7	ESE7	SSW16	SW35	SW31	SW28	W24	W34	W25	W28	W22	WSW16	W11	NW10	NNW12	NW9	WSW13.2	SW35
22-May	W5	W9	W7	WSW6	WSW7	WSW7	W10	WSW10	W8	SW8	SSE7	ESE12	E14	E19	E22	E22	ENE20	ENE21	ENE23	ENE26	E29	ENE31	ENE27	E23	E8.7	ENE31
23-May	E21	E19	E15	E10	E11	E20	E20	E17	ESE12	E12	E17	E16	E18	ESE17	ESE19	ESE15	ESE16	ESE12	E12	ENE14	N7	NE9	E15	SSE16	E13.9	E21
24-May	W21	NNW20	NNW22	NNW20	NW16	NW14	NW16	NNW19	NNW19	NNW17	NW17	NNW18	NW15	NW15	NW15	NW16	NW13	NNW11	NNW10	NNW5	NNW6	N6	N7	NW14.2	NW22	
25-May	NNE5	SE2	SSE2	S4	S4	S1	E9	E13	E14	E16	E20	E25	E25	E23	E22	ENE22	ENE25	ENE29	ENE30	ENE24	E25	E23	E23	E16.0	ENE30	
26-May	E23	E22	E18	E21	E23	E24	E24	E25	E19	E18	E16	ENE14	E19	E22	E22	E20	E24	E17	NE13	ENE9	SW19	SSW23	SSW15	SW7	E15.1	E25
27-May	WSW4	NW4	NW5	NNW6	N8	NE9	NNE10	NE14	NE16	NE20	ENE21	E20	E17	E20	E20	E20	E17	E18	MS	E9	E6	E5	ENE6	S4	ENE9.6	ENE21
28-May	SSW6	S10	S4	SW7	W6	SW3	SSE6	SSE6	SE9	E9	E9	E13	E16	E16	E21	E19	ENE21	ENE19	ENE17	ENE15	ESE12	E8	S11	S16	ESE8.1	E21
29-May	S7	E7	ENE10	E8	E9	ENE8	E6	E13	E18	E21	E22	ENE19	ENE21	ENE24	NE22	NE16	NE17	NNE10	NNE12	N9	NNW11	NNW14	NNW14	NW15	ENE10.3	ENE24
30-May	NNW12	NNW12	NNW9	NNW9	NW14	NW18	NW18	NW18	NNW15	NW17	NW20	NNW22	NNW22	NW23	NW19	NW23	NW19	NNW20	NW22	NW20	NNW16	W16	NNW16	NW14	NW16.8	NW23
31-May	NW12	NW13	NW12	NNW13	NNW10	N9	NNW11	NNW8	NNW5	SE7	S8	SSW8	SE12	SE12	ESE11	E19	E20	E17	E17	E12	ENE10	ENE6	ENE11	E14	ENE5.1	E20

ENE2.7	NE3.3	NE3.5	NE3.0	NE3.1	NE3.8	NE4.1	NE4.3	ENE4.5	ENE7.0	E7.7	E7.5	E8.3	E10.4	ENE11.2	ENE11.6	ENE11.4	ENE10.4	NE9.8	ENE9.1	ENE6.9	ENE6.6	ENE6.3	ENE4.6	Diurnal Average
S24	NW24	NW25	NW22	E23	E24	E24	E25	S25	E31	S33	SW35	SW31	ENE32	E36	W34	E32	ENE34	ENE29	ENE30	ENE29	ENE31	ENE27	E24	Diurnal Maximum

AF - Analyzer Failure MS - Missing  
 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 - May 2014**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 11 km/h on May 21 16:00	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 May 12 02:00	
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> = 6 P <sub>99</sub> = 8	

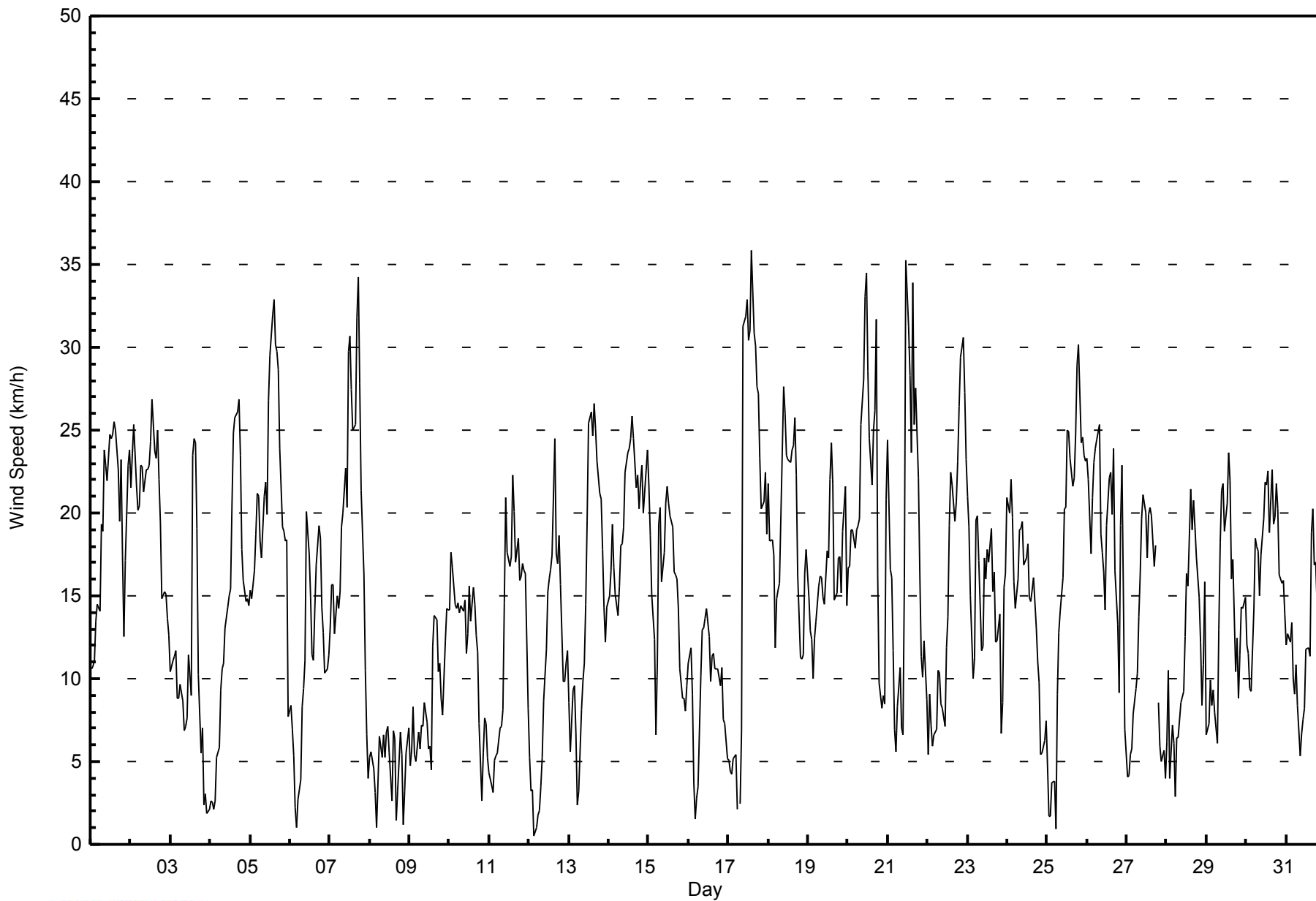
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-May	2	3	3	4	4	3	6	6	8	7	8	8	8	9	7	8	7	7	8	6	3	7	7	9	9
2-May	5	8	8	7	7	7	8	8	7	8	7	8	8	8	8	8	9	8	6	5	6	5	5	4	9
3-May	4	4	4	4	4	3	3	3	3	3	4	4	4	3	2	2	3	2	1	1	1	1	1	3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

AF - Analyzer Failure MS - Missing



**WBEA**  
**Hourly Averages**

**Wind Speed (WS) - km/h**  
**Fort Chipeywan - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h**  
**Fort Chipecywan - May 2014**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	80	10.78	10.78
6 - 11	180	24.26	35.04
12 - 19	269	36.25	71.29
20 - 28	184	24.80	96.09
29 - 38	29	3.91	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 742

Total Number of Hours: 744





**WBEA**  
**Frequency Distribution**

**Wind Speed (WS) - km/h**  
**Fort Chipeywan - May 2014**

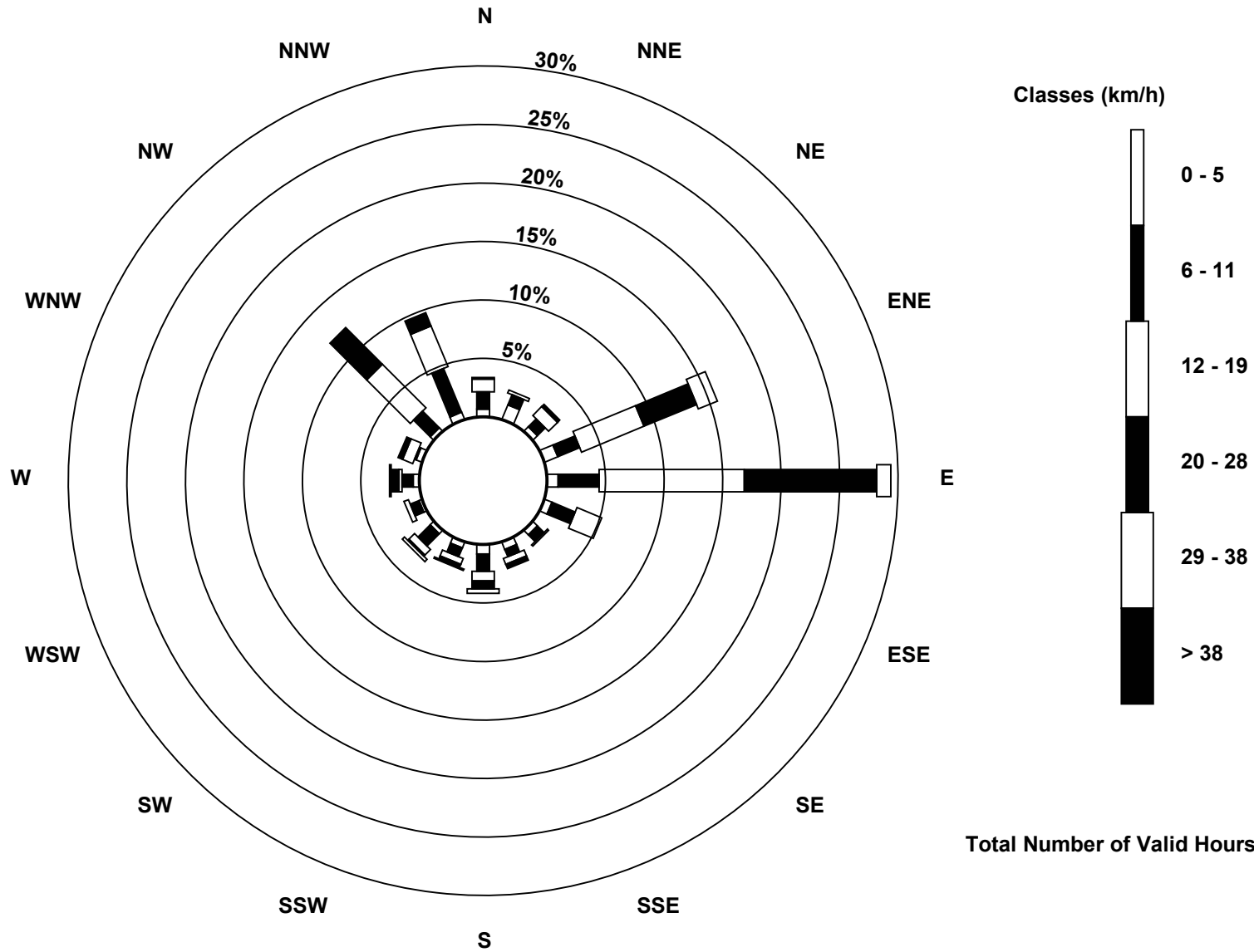
Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	5	10	4	9	7	5	4	5	6	4	3	2	4	4	3	5	80
6 - 11	11	7	7	15	26	16	6	5	11	6	11	6	7	1	15	30	180
12 - 19	8	2	8	43	92	17	1	4	6	4	5	3	2	7	39	28	269
20 - 28	1	0	2	36	84	0	0	3	5	2	1	0	5	3	33	9	184
29 - 38	0	0	0	13	9	0	0	0	3	1	2	0	1	0	0	0	29
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	25	19	21	116	218	38	11	17	31	17	22	11	19	15	90	72	742

Total Number of Valid Hours: 742

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Wind Speed (WS) - km/h  
Fort Chipeywan (AMS 8)**





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

**Wind Direction (WD) - deg**  
**Fort Chipewyan - May 2014**

Direction of Maximum Speed: 83 deg on May 17 15:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 70.8 deg on May 5	Hours of Data: 742
Direction of Minimum Speed: 42 deg on May 12 04:00	Hours of Missing Data: 2
Direction of Minimum Daily Speed Average: 1.6 deg on May 8	Percent Operational Time: 99.7
Monthly Average Direction: 341.4 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-May	275	300	321	312	286	289	319	320	319	321	320	314	316	313	314	313	319	315	315	317	313	304	317	317	313.0
2-May	287	306	316	324	324	325	323	324	325	321	318	324	328	326	329	335	341	337	333	340	337	344	342	336	326.0
3-May	339	343	343	346	337	340	340	333	316	318	314	318	322	91	92	90	91	101	101	94	136	70	60	1	31.9
4-May	17	75	69	87	83	91	97	100	106	103	98	97	99	95	92	90	89	82	72	61	71	61	68	72	84.9
5-May	81	74	75	78	77	79	83	78	89	89	87	67	65	76	68	69	67	62	58	48	50	52	65	77	70.8
6-May	85	16	34	147	68	84	76	113	111	107	96	105	106	102	100	96	94	89	88	78	63	66	60	62	87.9
7-May	60	57	68	67	66	64	69	64	84	75	69	93	92	91	93	93	79	76	73	74	67	56	31	18	76.0
8-May	37	55	35	7	3	28	94	118	100	103	104	108	125	161	308	71	227	141	246	355	62	293	282	304	65.9
9-May	329	340	342	344	341	338	333	315	326	329	349	323	186	13	315	341	310	330	333	323	314	336	321	321	328.1
10-May	327	324	320	326	331	332	334	336	335	339	343	337	341	346	352	345	359	12	15	63	108	63	22	354	343.5
11-May	29	263	168	162	173	143	134	114	91	99	96	94	96	98	96	98	102	92	94	90	86	83	84	103	98.0
12-May	94	82	62	42	25	32	110	95	104	129	110	105	108	99	95	88	93	94	90	99	95	88	89	90	95.8
13-May	96	114	177	155	178	209	260	335	335	104	100	95	90	92	92	85	77	71	69	67	66	65	79	93	85.4
14-May	92	91	92	91	86	89	90	88	88	87	87	87	88	87	86	85	84	71	59	59	65	76	87	89	83.1
15-May	87	82	76	76	36	353	349	351	338	336	333	332	335	338	339	353	352	0	6	14	348	340	342	4	360.0
16-May	3	1	353	14	21	283	274	235	261	242	245	233	236	222	222	215	220	223	193	171	161	186	212	202	232.0
17-May	200	205	226	247	324	113	AF	297	123	92	88	82	81	86	83	76	67	69	66	68	65	67	73	67	78.0
18-May	69	69	67	64	65	63	71	77	95	97	88	91	92	95	95	95	92	88	81	56	42	55	66	76	80.7
19-May	74	73	83	90	96	94	91	96	99	88	101	92	101	89	90	96	82	90	88	107	96	88	91	98	91.6
20-May	192	190	184	171	165	166	168	168	173	171	172	176	192	207	181	158	160	176	229	238	192	180	193	187	179.6
21-May	185	192	174	180	130	177	219	235	218	106	206	221	226	215	275	265	274	260	265	257	275	307	297	305	236.3
22-May	270	272	273	251	252	250	265	245	263	220	164	117	99	91	90	87	73	73	67	73	79	78	77	79	84.7
23-May	81	80	90	88	86	88	95	98	102	95	96	96	101	102	104	109	115	114	88	63	7	37	98	161	94.9
24-May	261	309	322	325	305	319	317	313	317	313	308	304	291	311	314	315	318	315	341	341	343	331	350	6	314.1
25-May	31	131	152	180	187	189	98	95	92	91	90	89	89	88	87	83	76	65	65	64	66	82	84	87	82.0
26-May	89	91	93	88	85	85	87	86	86	90	88	76	81	86	86	85	88	81	52	61	214	194	197	234	93.2
27-May	252	306	323	340	357	38	15	46	51	55	65	81	94	93	97	96	95	93	MS	87	89	83	76	174	71.9
28-May	200	187	188	225	266	216	157	156	124	93	94	94	95	96	92	83	76	68	67	78	104	88	175	189	106.7
29-May	179	92	78	83	79	71	99	90	89	87	82	78	74	69	55	53	52	24	31	354	338	332	331	322	57.9
30-May	331	346	341	328	321	311	311	317	302	315	309	306	301	307	309	312	307	294	304	306	301	277	288	313	308.8
31-May	311	311	318	337	337	357	345	344	346	141	175	192	133	124	117	94	91	92	86	82	72	72	77	91	67.6

62.2 36.1 38.4 43.7 36.7 40.8 40.9 46.3 61.9 75.9 81.6 83.8 84.8 82.8 75.6 74.3 69.8 68.6 55.0 56.4 59.5 56.6 59.5 66.0  
 Diurnal Average

AF - Analyzer Failure MS - Missing  
 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 Chiheywan - May 2014

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 93 deg on May 25 06:00	Hours of Data: 742
Minimum Value: 2 deg on May 18 15:00	Hours of Missing Data: 2
Percentiles: P <sub>1</sub> = 3 P <sub>10</sub> = 4 Q <sub>1</sub> = 7 Median = 13 Q <sub>3</sub> = 21 P <sub>90</sub> = 29 P <sub>99</sub> = 75	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-May	12	28	18	21	13	14	18	18	19	20	21	19	21	19	18	19	20	18	21	19	16	17	20	20	28
2-May	15	17	18	20	20	23	19	22	22	19	18	20	21	21	22	23	23	22	22	23	21	22	22	19	23
3-May	22	23	20	22	25	22	22	25	30	39	43	31	41	10	4	4	3	11	8	9	31	11	15	45	45
4-May	26	13	36	32	9	8	5	8	8	4	6	3	4	3	3	4	7	9	9	8	9	9	8	36	
5-May	6	7	6	5	6	6	7	9	9	7	10	8	11	11	10	9	10	11	11	10	10	10	8	12	12
6-May	18	26	21	79	86	59	38	11	6	9	5	6	6	11	6	4	3	4	4	8	8	8	6	7	86
7-May	9	9	8	8	8	9	12	9	16	23	19	4	4	5	6	6	7	8	8	8	9	10	13	17	23
8-May	14	12	21	25	18	31	14	11	10	17	7	15	14	74	35	86	74	24	37	35	66	51	7	7	86
9-May	33	16	12	21	41	17	22	20	26	26	34	78	41	76	20	25	17	39	21	21	16	20	19	18	78
10-May	20	17	16	19	19	20	21	21	21	23	23	22	24	24	25	24	26	23	23	45	15	21	14	15	45
11-May	23	54	55	24	19	16	17	24	6	4	5	5	5	5	5	7	7	4	5	6	5	5	6	12	55
12-May	9	18	10	34	30	41	42	17	14	8	15	8	12	10	7	4	5	4	3	7	6	5	5	4	42
13-May	11	21	24	17	18	22	46	24	28	43	8	5	3	3	4	6	7	8	8	7	6	6	8	4	46
14-May	5	4	5	5	4	5	6	4	3	3	3	4	4	4	4	4	8	8	8	8	7	7	7	9	9
15-May	8	7	7	7	55	51	23	24	26	25	25	23	24	25	25	29	27	26	26	24	21	16	14	15	55
16-May	15	15	35	48	49	33	33	14	20	20	20	21	26	34	15	14	23	14	16	6	5	17	13	24	49
17-May	13	24	13	34	13	52	AF	78	25	5	5	9	12	13	8	8	9	8	8	7	7	7	7	8	78
18-May	9	8	7	8	8	7	9	13	4	4	8	8	4	3	2	3	4	3	11	10	16	13	6	8	16
19-May	7	6	13	11	8	9	11	7	5	6	6	4	10	4	3	14	16	11	7	4	9	5	4	11	16
20-May	18	10	6	8	10	11	11	10	10	10	11	10	16	10	13	10	12	8	31	18	13	15	20	12	31
21-May	5	7	9	13	12	31	23	13	49	30	37	10	20	32	18	17	17	17	15	15	27	22	13	15	49
22-May	19	11	17	28	11	16	16	21	32	38	21	6	6	3	3	7	11	10	9	8	6	6	7	7	38
23-May	5	5	9	8	22	7	5	5	5	5	4	5	6	12	14	16	15	24	23	11	52	21	15	54	54
24-May	20	32	18	20	17	18	19	17	17	19	20	18	16	21	21	19	21	21	27	22	19	12	11	9	32
25-May	39	55	27	24	16	93	23	6	4	4	3	4	4	5	7	11	12	8	8	7	8	6	6	4	93
26-May	4	4	5	4	4	5	4	5	7	8	6	10	10	5	6	6	4	11	9	54	25	9	11	23	54
27-May	29	68	9	19	22	33	21	33	14	19	17	12	7	4	7	7	8	8	MS	8	12	13	14	52	68
28-May	18	7	25	27	10	38	17	20	19	6	4	4	6	3	3	7	8	7	7	12	25	9	25	6	38
29-May	41	16	7	6	8	12	30	4	3	4	7	11	11	9	10	12	16	16	16	22	22	22	22	18	41
30-May	23	22	22	22	18	16	16	18	19	20	18	17	16	17	17	18	18	15	18	16	18	13	15	16	23
31-May	16	16	19	21	23	24	29	33	54	40	26	21	8	10	14	4	3	4	4	6	10	12	9	5	54
	41	68	55	79	86	93	46	78	54	43	43	78	41	76	35	86	74	39	37	54	66	51	25	54	

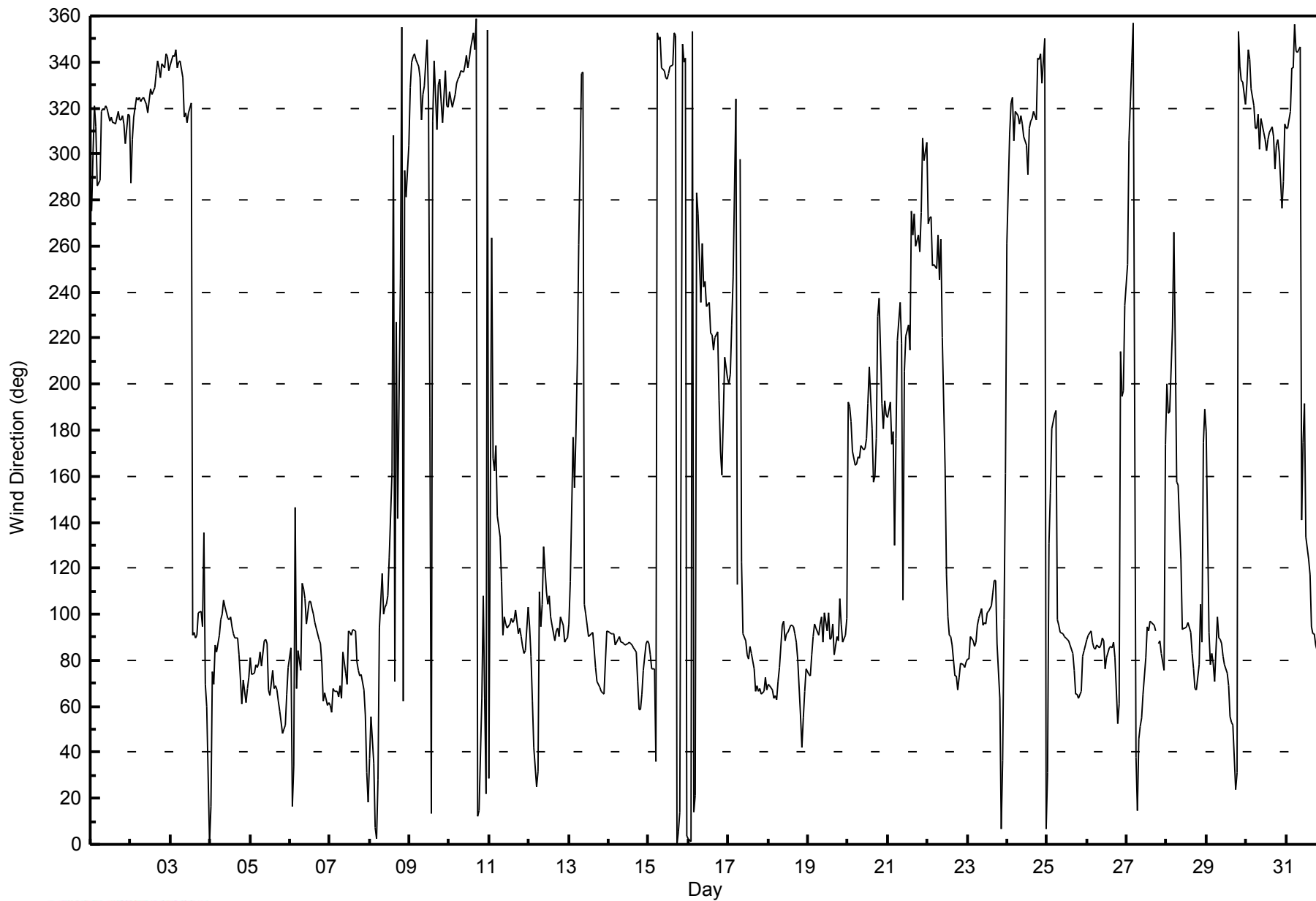
Diurnal Maximum

AF - Analyzer Failure MS - Missing



**WBEA**  
**Hourly Averages**

**Wind Direction (WD) - deg**  
**Fort Chipeywan - May 2014**





# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Report

### Station Information

Calibration Date	May 15, 2014	Previous Calibration	April 8, 2014
Station Name	Fort Chipewyan	Station Number	AMS 8
Reason:	Routine		
Start Time (MST)	11:20	End Time (MST)	17:35
Barometric Pressure	760 mmHg	Station temp.	21 Deg C
Calibrator Make/Model	API T700	Serial Number	747
Cal Gas Concentration	2.45 ppm	Cal Gas Expiry Date	9/16/2016
Gas Cert Reference	LL103809		
DACS make/model	Campbell Scientific CR3000	DACS serial No.	8205
DACS voltage range	0-5v	DACS channel #	DIFF 1

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	20	20	PMT voltage (mV)	7	7
Analyzer Range (mv)	5000	5000	HV power supply (V)	529	529
Calculated slope	0.986565	0.997488	Chamber temp.	50.0	50.0
Calculated intercept	-0.062386	-0.074333	Pressure (in Hg)	26.4	26.4
Analyzer Background	7.3	6.9	Flow (lpm)	0.619	0.619
Analyzer Coefficient	0.932	0.995	UV Lamp (mV)	4411	4411

Analyzer make	T100u	Analyzer serial #	138
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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	5000	0.0	0.0	-0.30	NA
as found span	5000	36.7	18.0	17.1	1.054
calibrator zero	5000	0.0	0.0	0.03	NA
high point	5000	36.7	18.0	18.1	0.994
second point	5000	19.8	9.7	9.8	0.990
third point	5000	9.9	4.9	5.0	0.970
calibrator zero	5000	0.0	0.0	0.0	NA
as left zero	5000	0.0	0.0	0.1	NA
as left span	5000	36.6	17.9	16.3	NA
Average Correction Factor					0.985

Corrected As found	17.4	Previous response	18.3	% change	5.3%
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#### Notes:

Zero and span adjusted.

Calibration Performed By:

Zack Eastman



## Wood Buffalo Environmental Association

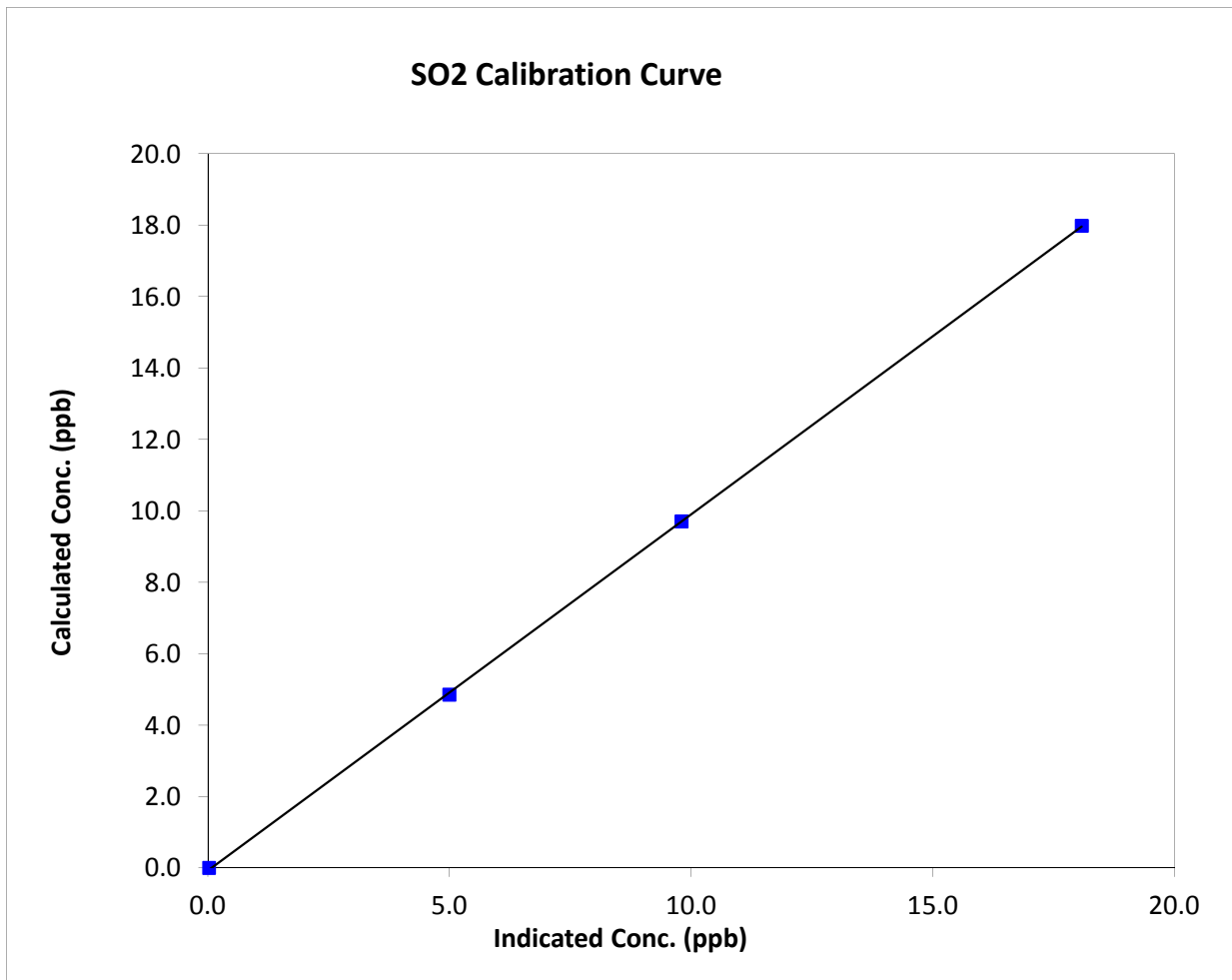
### SO<sub>2</sub> Calibration Summary

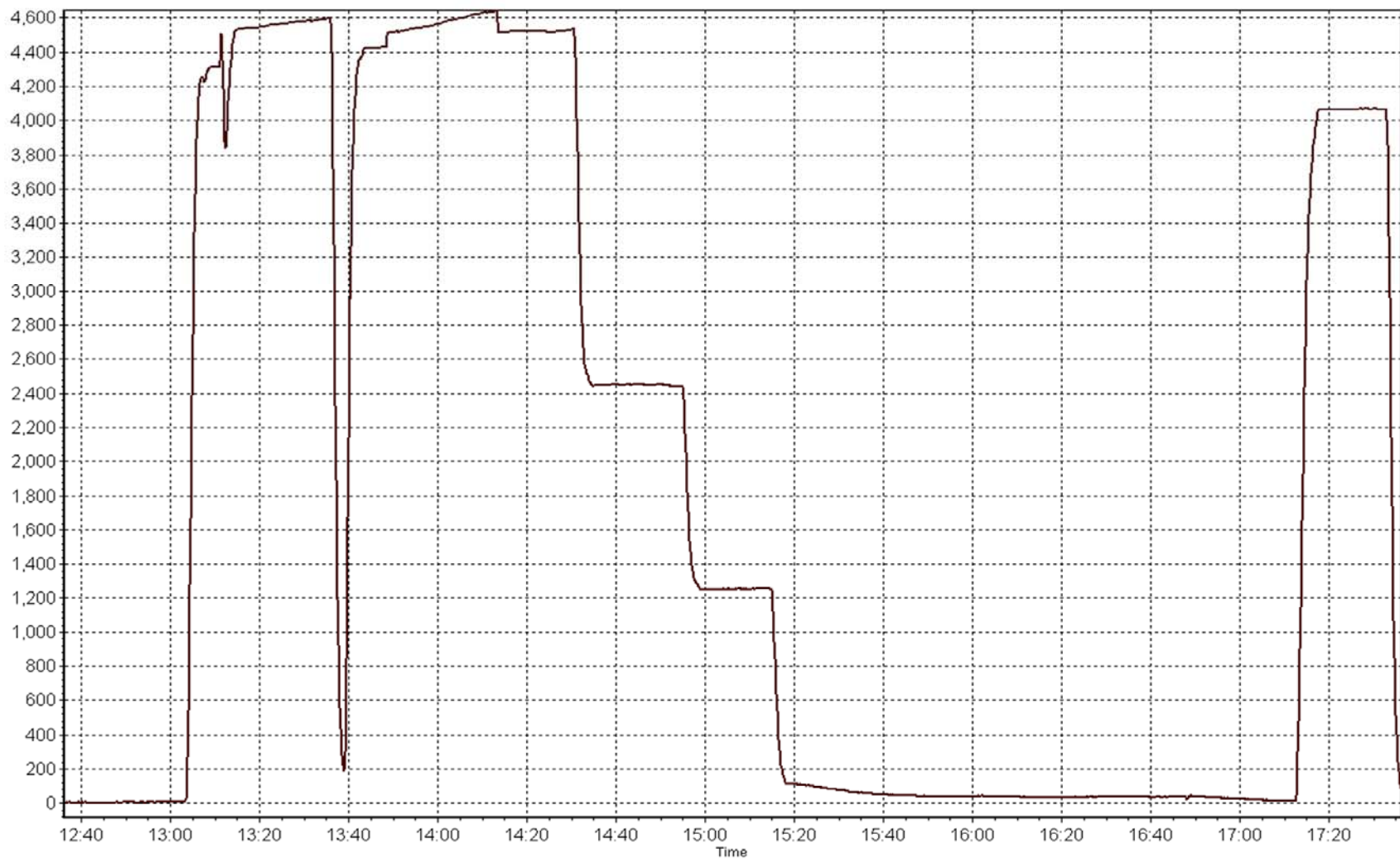
#### Station Information

Calibration Date	May 15, 2014	Previous Calibration	April 8, 2014
Station Name	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	11:20	End Time (MST)	17:35
Analyzer make	T100u	Analyzer serial #	138

#### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999964
18.0	18.1	0.9944		
9.7	9.8	0.9896	Slope	0.997488
4.9	5.0	0.9702		
			Intercept	-0.074333









# Wood Buffalo Environmental Association

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

### Station Information

Calibration Date	May 15, 2014	Previous Calibration	April 8, 2014
Station Name	Fort Chipewyan	Station Number	AMS 8
Reason:	Routine	SHOP	
Start Time (MST)	17:35	End Time (MST)	20:15
Barometric Pressure	760 mmHg	Station temp.	21 Deg C
Calibrator Make/Model	API T700	Serial Number	747
NO2 calibration used	May 15 2014	Transfer Standard	NA
DACS make/model	Campebls CR3000	DACS serial No.	8205
DACS voltage range	0-5V	DACS channel #	Digital

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	200	200	Bench temp. (Deg C)	40.0	40.0
Analyzer Range (input)	5000	5000	Lamp temp. (Deg C)	58.0	58.0
Calculated slope	0.994852	1.003423	Pressure (in Hg)	27.3	27.3
Calculated intercept	-0.218861	-0.629753	Flow cell (LPM)	0.754	0.754
Analyzer Background	1.50	0.5	Cell A Intensity	NA	NA
Analyzer Coefficient	1.059	0.979	Cell B Intensity	NA	NA

Analyzer make API T400 Analyzer serial # 1020

### Calibration Data

Set Point	Dilution air flow rate (cc/min)	O3 Ref -- O3 Drive (mV)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.00	0.0	-1.9	N/A
as found span	5000	198 -- 813	107.7	115.0	0.937
calibrator zero	5000	0.00	0.0	0.6	N/A
high point	5000	198 -- 813	107.7	107.8	0.999
second point	5000	148 -- 772	81.8	82.4	0.993
third point	5000	93 -- 715	53.9	54.4	0.992
calibrator zero	5000	0.00	0.0	0.6	N/A
as left zero	5000	0.00	0.0	0.3	N/A
as left span	5000	198 -- 813	107.7	108.2	0.996
Average Correction Factor					0.995

Corrected As found 116.9 Previous response 108.5 % change -7.2%

#### Notes:

zero and span adjusted. No issues to note.

Calibration Performed By:

Zack Eastman



# Wood Buffalo Environmental Association

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

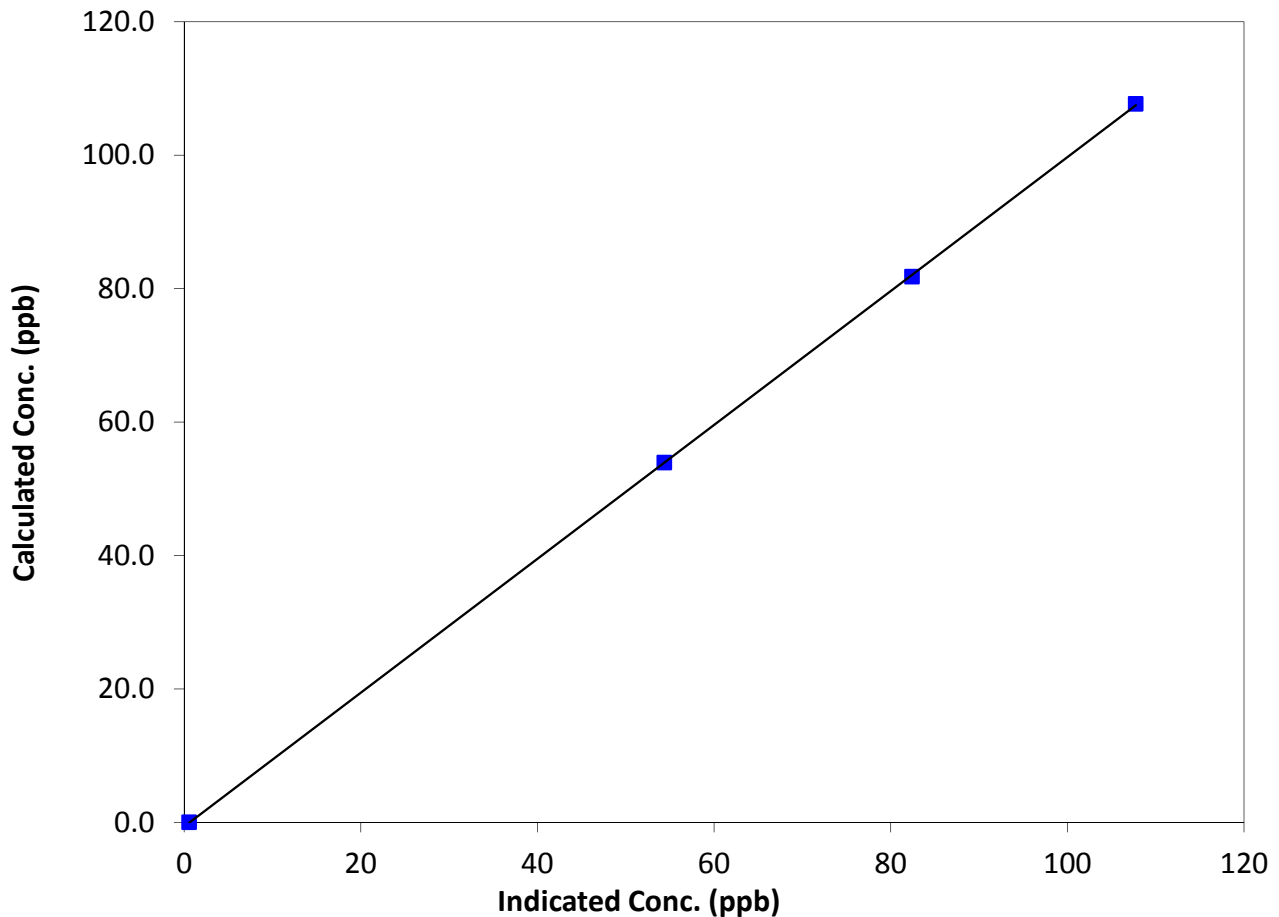
### Station Information

Calibration Date	Thursday, May 15, 2014	Previous Calibration	April 8, 2014
Station Name	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	17:35	End Time (MST)	20:15
Analyzer make	API T400	Analyzer serial #	1020

### Calibration Data

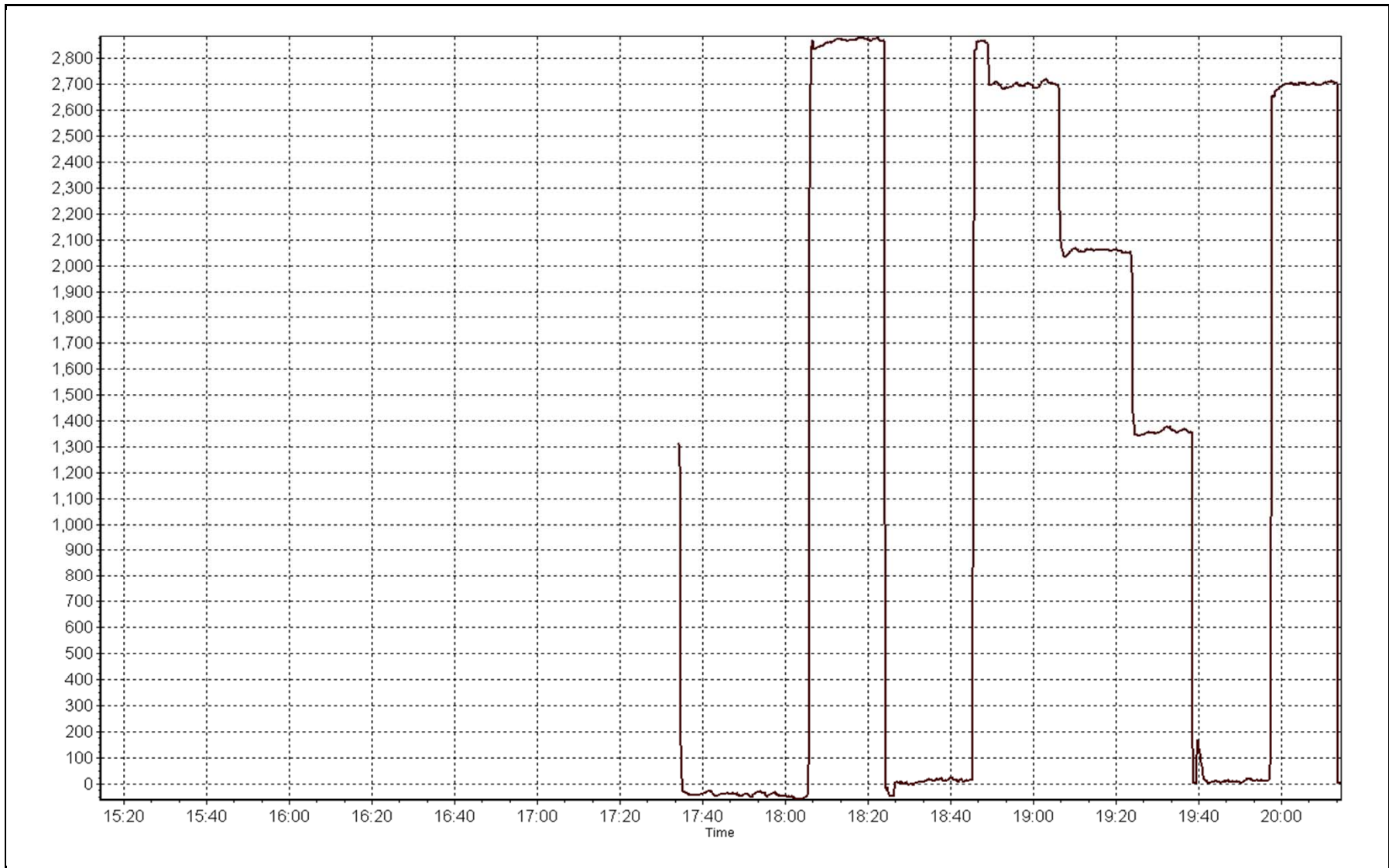
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.6	N/A	Correlation Coefficient	0.999983
107.7	107.8	0.9994		
81.8	82.4	0.9927	Slope	1.003423
53.9	54.4	0.9915		
			Intercept	-0.629753

**O<sub>3</sub> Calibration Curve**



O3 Calibration Plot

Date: May 15, 2014





# Wood Buffalo Environmental Association

## NO<sub>x</sub>-NO-NO<sub>2</sub> Calibration Report

### Station Information

Calibration Date	May 15, 2014	Previous Calibration	April 8, 2014
Station Name	Fort Chipewyan	Station Number	AMS 8
Reason:	Routine		
Start Time (MST)	11:20	End Time (MST)	17:35
Barometric Pressure	760 mmHg	Station Temperature	21.0 Deg C
Calibrator	API T700	Serial Number	747
NO Cal Gas Conc	20.2 ppm	Cal Gas Expiry Date	09-16-2016
NO <sub>x</sub> Cal Gas Conc	20.2 ppm	Cal Gas Serial #	LL103809

### DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	8205
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Parameter		NO <sub>x</sub>	NO	NO <sub>2</sub>
MV conversion	Analyzer Range (ppb)	200	200	200
	Analyzer Range (mv)	5000	5000	5000
Before	Data Slope	0.994242	0.993900	0.991572
	Data Offset	0.271005	0.304951	0.212929
After	Data Slope	1.009771	1.012323	0.976154
	Data Offset	0.352501	0.402088	0.182038
Channel #		DIFF 3	DIFF 1	DIFF 2
Voltage Range		0 - 5V	0 - 5V	0 - 5V

### Analyzer Information

Analyzer make/model	API T200u	Analyzer serial #	172
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Test Point	before		after	
Concentration range	200	ppb	200	ppb
NO coefficient	1.208	mv	1.249	mv
NO <sub>x</sub> coefficient	1.214	mv	1.253	mv
NO bkgrnd	0.0	mv	0.1	mv
NO <sub>x</sub> bkgrnd	0.2	mv	0.4	mv
Chamber Temp	40	Deg C	40	Deg C
Moly Temp	317	Deg C	317	Deg C
PMT Temp	8	Deg C	8	Deg C
O <sub>3</sub> flow	86	ccm	86	ccm
R Cell Press	2.6	mmHg	2.6	mmHg
Sample Flow	1100	ccm	1100	ccm
PMT Voltage	-807.0	V	-807.0	V

Notes:

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# Wood Buffalo Environmental Association

## NO<sub>x</sub>-NO-NO<sub>2</sub> Calibration Report

### Station Information

Calibration Date:

May 15, 2014

Station Number:

AMS 8

### 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 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
as found zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.1	-0.1	N/A	N/A
as found span	5000	36.9	149.1	149.1	0.0	140.8	140.6	0.2	1.059	1.061
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1	N/A	N/A
high point	5000	36.9	149.1	149.1	0.0	147.2	147.6	-0.4	1.013	1.010
second point	5000	19.8	80.0	80.0	0.0	78.1	78.4	-0.3	1.024	1.020
third point	5000	9.9	40.0	40.0	0.0	39.0	39.1	-0.2	1.026	1.023
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1	NA	NA
as left zero	5000	0.0	0.0	0.0	0.0	-0.2	0.0	-0.2	NA	NA
as left span	5000	36.6	147.9	147.9	0.0	148.0	37.6	110.3	NA	NA
Average Correction Factor									1.021	1.018

Corrected As found  
Previous Response

NO<sub>x</sub>= 141.0  
NO<sub>x</sub>= 147.9

NO= 140.7  
NO= 147.9

Percent Change

NO<sub>x</sub>= 5.0%

NO= 5.1%

### GPT Calibration Data

Dilution Flow 5000 ccm Source Gas Flow 36.90 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			-0.1			N/A	
1st NO <sub>2</sub> (100ppb O <sub>3</sub> )	N/A	38.4	107.7	148.8	38.4	110.3	1.002	1.000	0.976	102.5%
2nd NO <sub>2</sub> (75ppb O <sub>3</sub> )	N/A	64.2	81.8	147.6	64.2	83.4	1.010	1.000	0.981	101.9%
3rd NO <sub>2</sub> (50ppb O <sub>3</sub> )	N/A	92.2	53.9	147.2	92.2	55.0	1.013	1.000	0.980	102.1%
4th NO <sub>2</sub> (0ppb O <sub>3</sub> )	146.1	N/A	-0.2	145.9	146.1	-0.2	1.022	1.000	N/A	N/A
Average Correction Factor							1.012	1.000	0.979	102.1%

Calibration Performed By: Zach Eastman



# Wood Buffalo Environmental Association

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

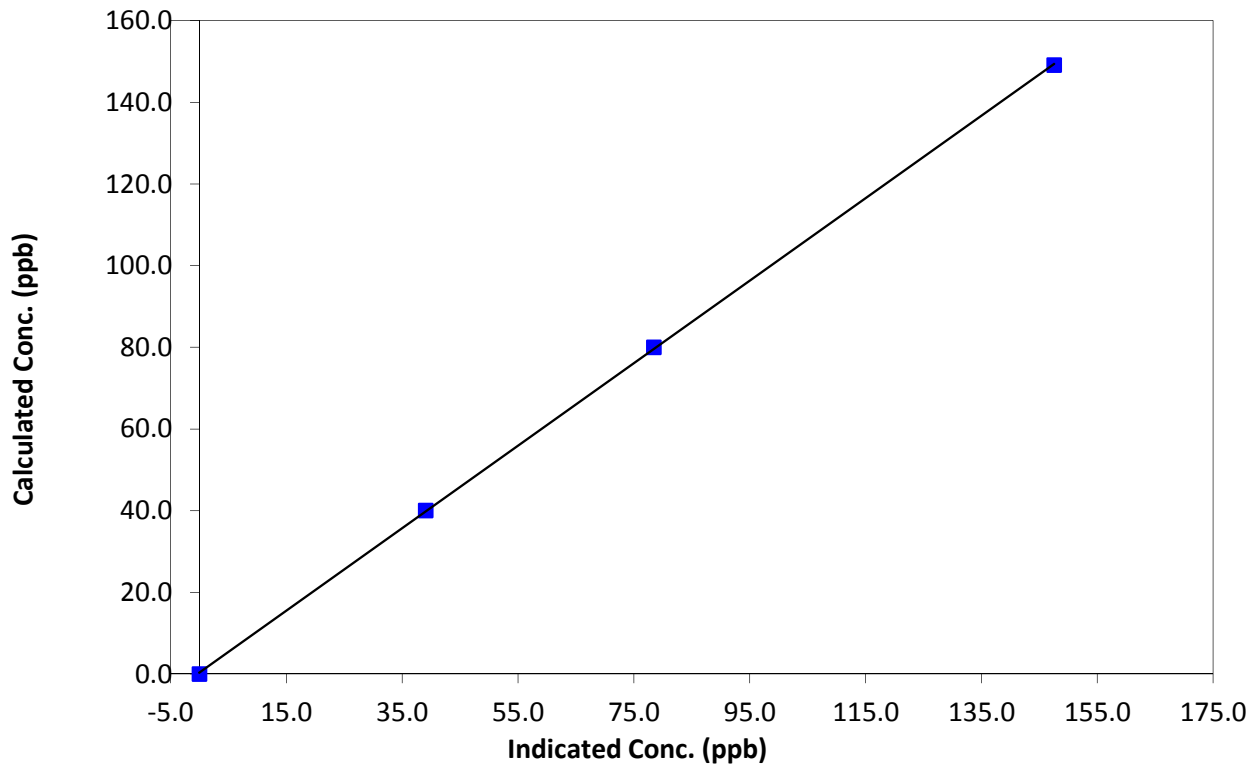
### Station Information

Calibration Date	May 15, 2014	Previous Calibration	April 8, 2014
Station Number	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	11:20	End Time (MST)	17:35
Analyzer make	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	0.999966
149.1	147.6	1.0103		
80.0	78.4	1.0198	Slope	1.009771
40.0	39.1	1.0234		
			Intercept	0.352501

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





# Wood Buffalo Environmental Association

## NO Calibration Summary

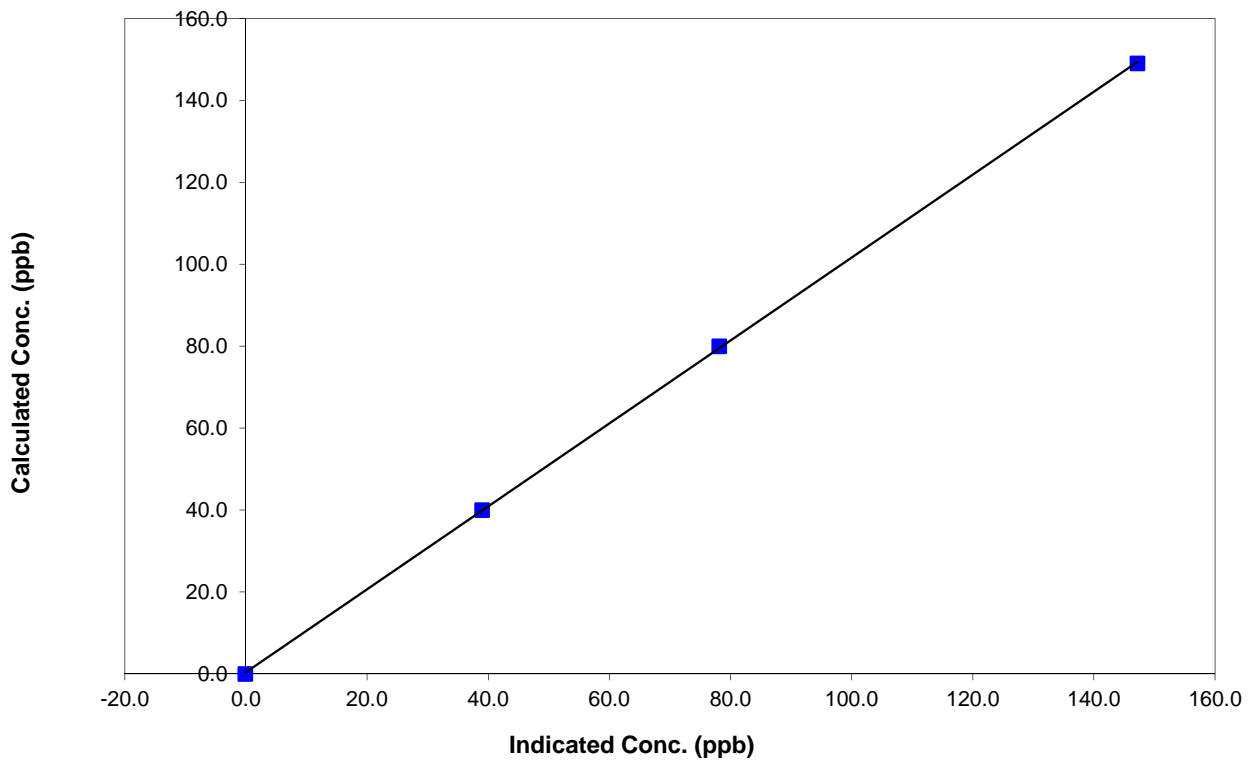
### Station Information

Calibration Date	May 15, 2014	Previous Calibration	April 8, 2014
Station Number	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	11:20	End Time (MST)	17:35
Analyzer make	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	0.999962
149.1	147.2	1.0130		
80.0	78.1	1.0240	Slope	1.012323
40.0	39.0	1.0255		
			Intercept	0.402088

### NO Calibration Curve





# Wood Buffalo Environmental Association

## NO2 Calibration Summary

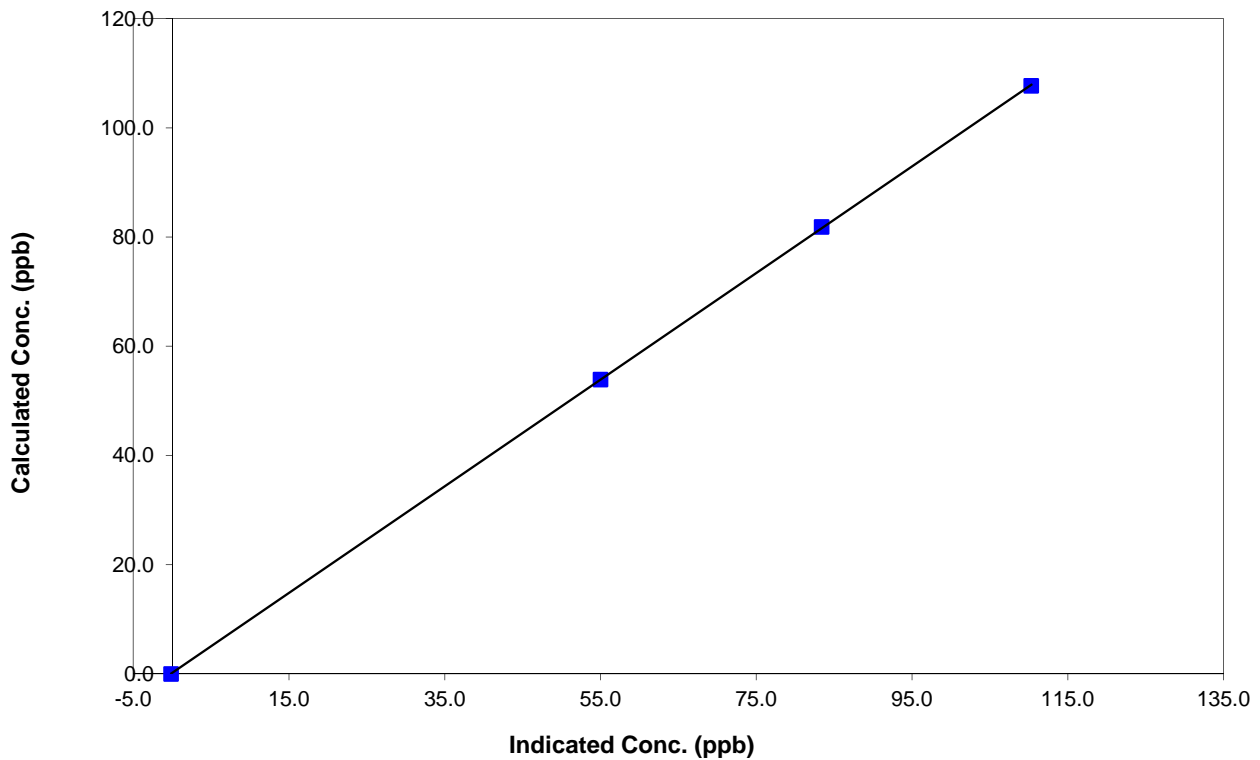
### Station Information

Calibration Date	May 15, 2014	Previous Calibration	April 8, 2014
Station Number	Fort Chipewyan	Station Number	AMS 8
Start Time (MST)	11:20	End Time (MST)	17:35
Analyzer make	API T200u	Analyzer serial #	172

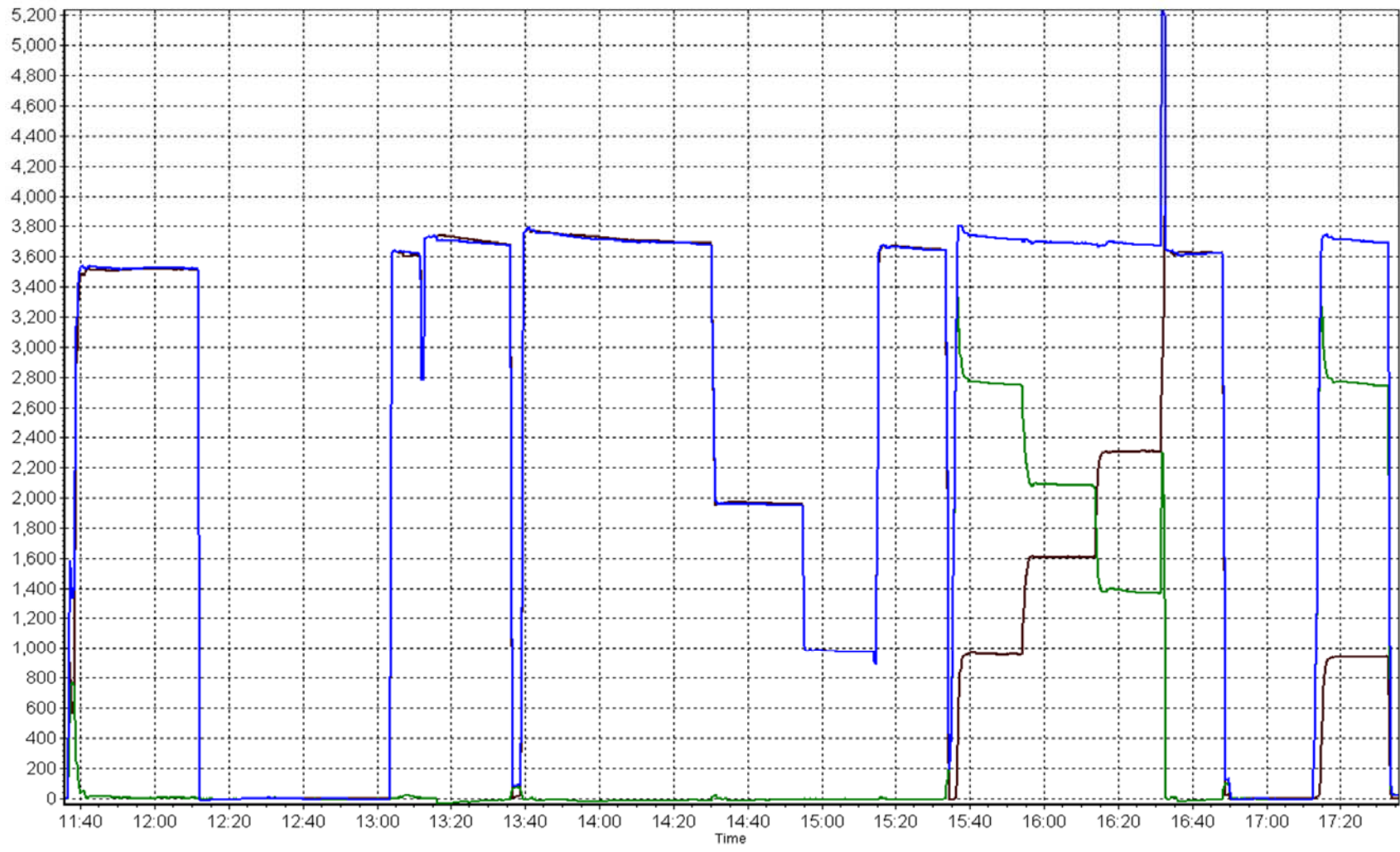
### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999984
107.7	110.3	0.9761		
81.8	83.4	0.9813	Slope	0.976154
53.9	55.0	0.9796		
			Intercept	0.182038

### NO2 Calibration Curve







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**WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS 9  
BARGE LANDING  
MAY 2014**

Operations and Data Collection by:  
Wood Buffalo Environmental Association  
Fort McMurray, Alberta

QA/QC, Data Validation and Reporting by:  
Aurora Atmospherics Inc.  
Calgary, Alberta

June 27, 2014

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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BARGE LANDING (AMS 9)  
MAY 2014

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	696	35	48	98.25	2	0	0	0
THC(ppm) Average	698	36	46	98.66	6.7	-	2.5	-
Temperature (C) Average	735	0	9	98.79	30.1	-	22.2	-
Wind Speed 10 m (km/h) Average	729	0	15	97.98	22	-	-	-
Wind Direction 10 m (deg) Average	729	0	15	97.98	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BARGE LANDING (AMS 9)  
MAY 2014

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile							
					Min	P10	Q1	Median	Q3	P90	Max	
TRS(ppb) Average	696	0.1	0	-	0	0	0	0	0	0	0	2
THC(ppm) Average	698	2.11	0.3	-	1.8	1.9	2	2.1	2.2	2.3	6.7	6.7
Temperature (C) Average	735	10.08	7	-	-6.1	1.1	4.4	9.7	15.1	19.6	30.1	30.1
Wind Speed 10 m (km/h) Average	729	6.7	4	-	0	2	4	6	9	12	22	22
Wind Direction 10 m (deg) Average	729	-	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BARGE LANDING (AMS 9)  
MAY 2014

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
ALL PARAMETERS	15 May 2014 04:00	15 May 2014 12:00	9	Station power failure
TRS	02 May 2014 09:00	02 May 2014 11:00	3	Maintenance - repair sample manifold
TRS	06 May 2014 11:00	06 May 2014 11:00	1	Maintenance - replaced H2S span gas cylinder
THC	01 May 2014 09:00	01 May 2014 09:00	1	Maintenance - sample manifold cleaned
Wind Speed, Wind Direction	04 May 2014 05:00	04 May 2014 05:00	1	Flatline in sensor output signal
Wind Speed, Wind Direction	08 May 2014 23:00	08 May 2014 23:00	1	Flatline in sensor output signal
Wind Speed, Wind Direction	09 May 2014 05:00	09 May 2014 05:00	1	Flatline in sensor output signal
Wind Speed, Wind Direction	22 May 2014 06:00	22 May 2014 06:00	1	Flatline in sensor output signal
Wind Speed, Wind Direction	25 May 2014 00:00	25 May 2014 01:00	2	Flatline in sensor output signal

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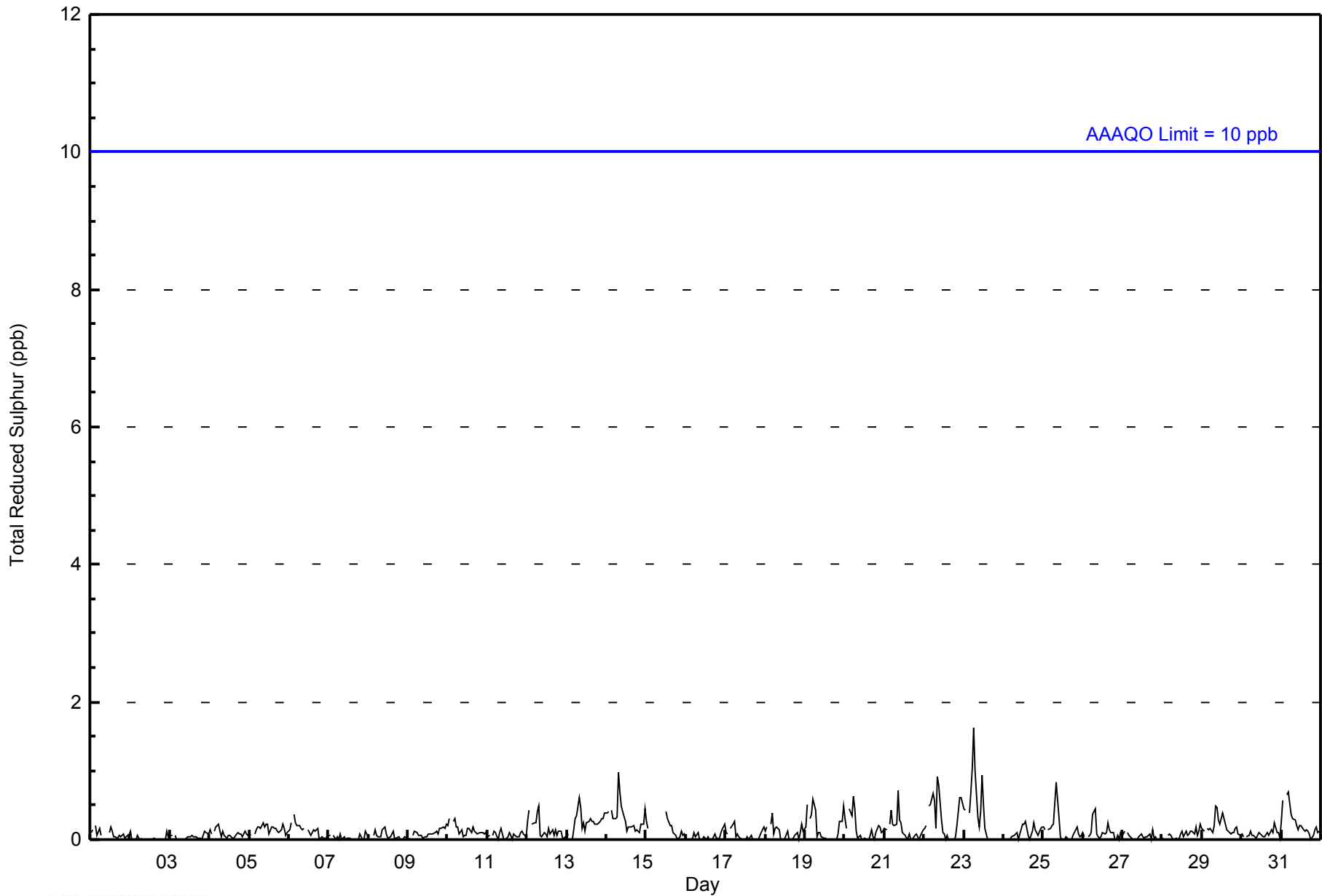


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 2 ppb on May 23 07:00 Maximum Daily Average: 0.4 ppb on May 23																	Hours in Service: 744 Hours of Data: 696										
Minimum Value: 0 ppb on May 2 02:00 Minimum Daily Average: 0.0 ppb on May 2 Maximum Diurnal Average: 0.2 ppb at hour 6 Minimum Diurnal Average: 0.1 ppb at hour 19 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 Missing Data: 48 Hours of Calibration: 35 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-May	0	0	Z	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
2-May	0	0	Z	0	0	0	0	0	M	M	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
3-May	0	0	Z	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-May	0	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	
5-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
6-May	0	0	Z	0	0	0	0	0	0	0	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
7-May	0	0	Z	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-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
9-May	0	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	
10-May	0	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	
11-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
12-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
13-May	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
14-May	0	0	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
15-May	0	0	Z	PF	PF	PF	PF	PF	PF	PF	PF	PF	0	0	0	0	0	0	0	0	0	0	0	0	--	0	
16-May	0	0	Z	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-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
18-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
19-May	0	1	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	
20-May	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
21-May	0	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
22-May	0	0	Z	0	1	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.3	1
23-May	0	0	Z	0	1	1	2	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0.4	2	
24-May	0	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-May	0	0	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1	
26-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
27-May	0	0	Z	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-May	0	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	
29-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
30-May	0	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-May	0	1	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
																								Diurnal Average			
																								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																											



**WBEA**  
**Hourly Averages**

**Total Reduced Sulphur (TRS) - ppb**  
**Barge Landing - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb**  
**Barge Landing - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	696	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: 696

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb**  
**Barge Landing - May 2014**

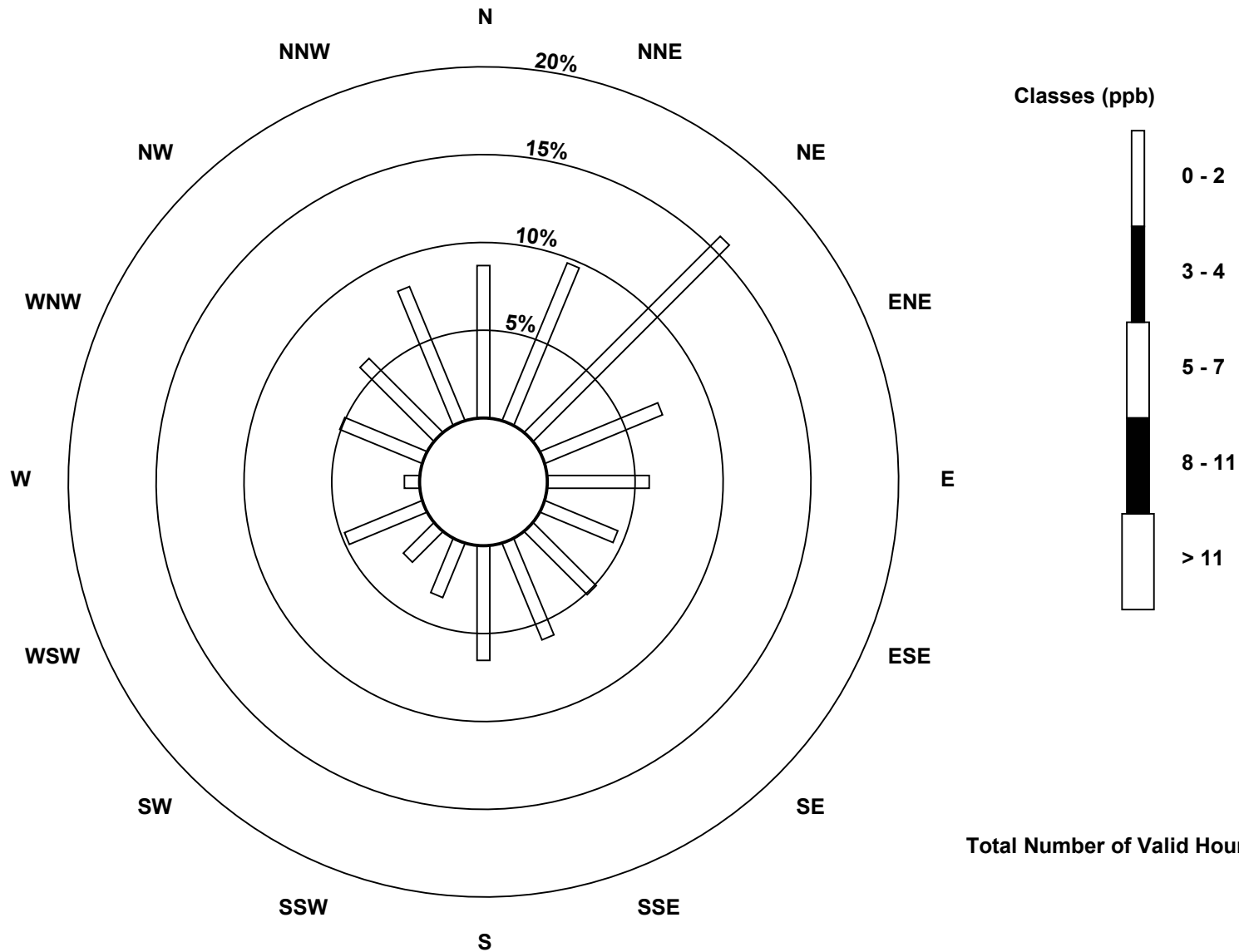
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	60	67	109	50	40	31	35	41	45	23	17	33	6	35	41	57	690
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	60	67	109	50	40	31	35	41	45	23	17	33	6	35	41	57	690

Total Number of Valid Hours: 690

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Total Reduced Sulphur (TRS) - ppb  
Barge Landing (AMS 9)**

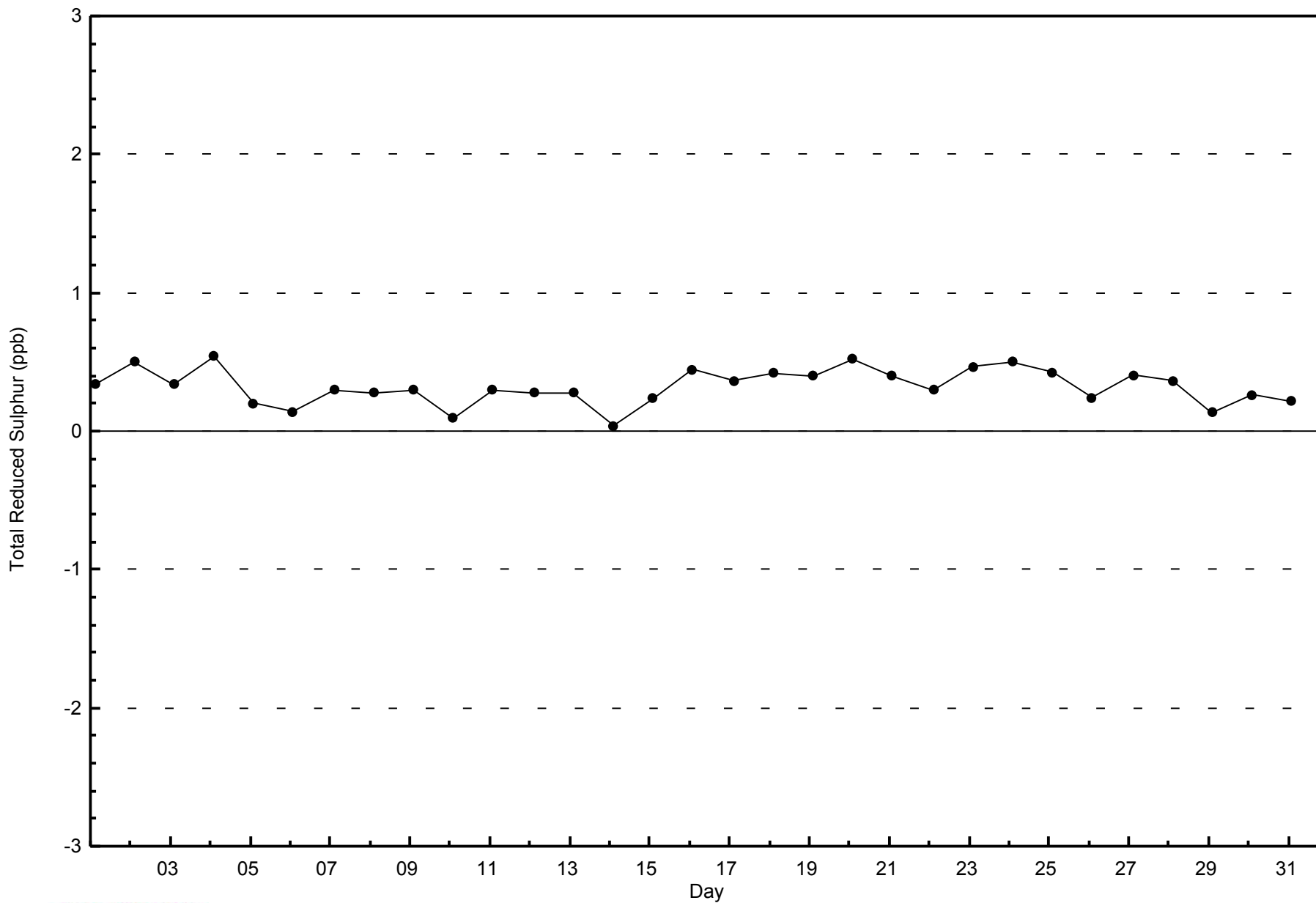


**Total Number of Valid Hours: 690**



WBEA  
Zero Responses

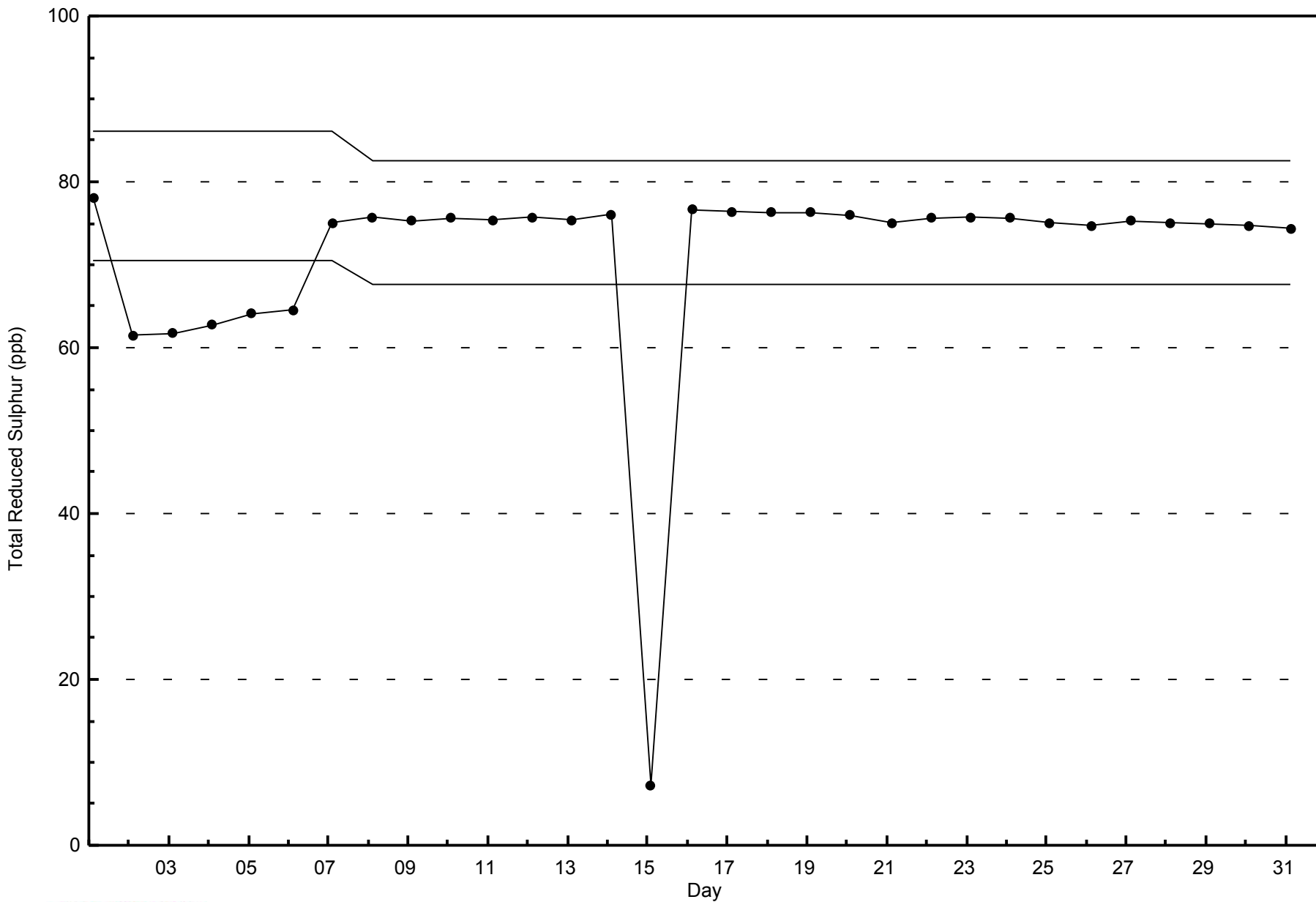
Total Reduced Sulphur (TRS) - ppb  
Barge Landing - May 2014





WBEA  
Span Responses

Total Reduced Sulphur (TRS) - ppb  
Barge Landing - May 2014





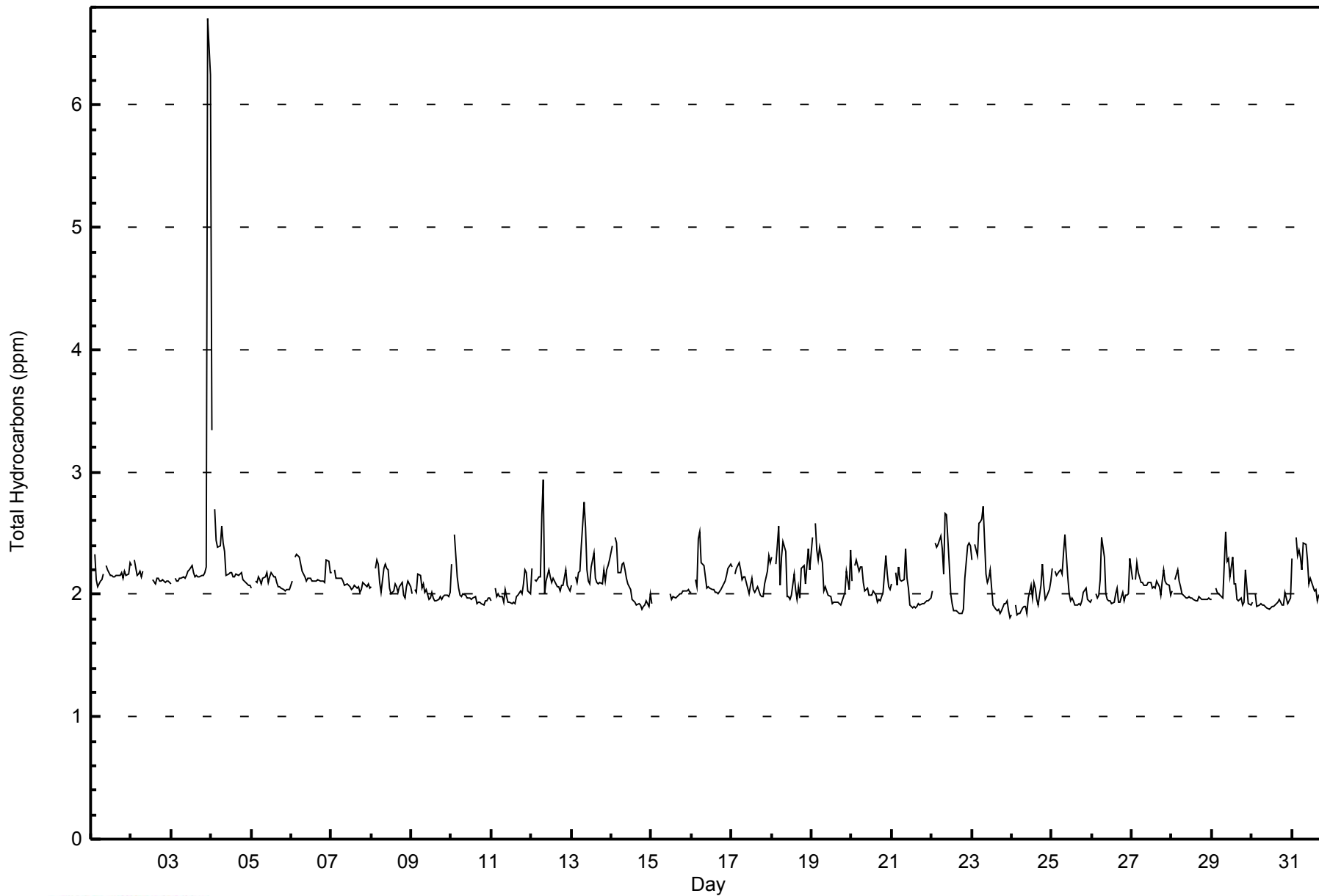
Maximum Value: 6.7 ppm on May 3 23:00																	Maximum Daily Average: 2.5 ppm on May 3																	Hours in Service: 744	
Minimum Value: 1.8 ppm on May 24 00:00																	Minimum Daily Average: 1.9 ppm on May 30																	Hours of Data: 698	
Maximum Diurnal Average: 2.2 ppm at hour 3																	Minimum Diurnal Average: 2.0 ppm at hour 18																	Hours of Missing Data: 46	
Monthly Average: 2.11 ppm																	Percentiles: P <sub>1</sub> = 1.8 P <sub>10</sub> = 1.9 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> = 2.7																	Hours of Calibration: 36	
																																		Percent Operational Time: 98.7	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24											
1-May	2.1	Z	2.3	2.1	2.1	2.1	2.1	2.2	M	2.2	2.2	2.1	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.3	2.2	2.3									
2-May	2.2	Z	2.3	2.2	2.2	2.2	2.1	2.2	C	C	C	C	C	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3									
3-May	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.1	2.1	2.2	2.2	2.2	2.2	6.7	6.2	2.5	6.7									
4-May	3.3	Z	2.7	2.4	2.4	2.4	2.6	2.4	2.4	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.3	3.3									
5-May	2.0	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.2									
6-May	2.1	Z	2.3	2.3	2.3	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.3	2.2	2.2	2.3									
7-May	2.2	Z	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.2									
8-May	2.1	Z	2.2	2.3	2.2	2.1	2.0	2.2	2.3	2.2	2.2	2.1	2.0	2.0	2.1	2.1	2.0	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.3									
9-May	2.0	Z	2.0	2.0	2.2	2.2	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2									
10-May	2.2	Z	2.5	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.5									
11-May	1.9	Z	2.1	2.0	2.0	2.0	2.0	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.1	2.2	2.2	2.0	2.0	2.0	2.2									
12-May	2.2	Z	2.1	2.1	2.1	2.1	2.7	2.9	2.0	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.2	2.1	2.1	2.0	2.2	2.9									
13-May	2.1	Z	2.1	2.1	2.2	2.2	2.4	2.7	2.6	2.2	2.1	2.1	2.2	2.3	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.2	2.3	2.2	2.7									
14-May	2.4	Z	2.5	2.4	2.2	2.2	2.2	2.3	2.2	2.1	2.1	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1	2.5									
15-May	1.9	Z	PF	PF	PF	PF	PF	PF	PF	PF	PF	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	--	2.0									
16-May	2.0	Z	2.1	2.1	2.4	2.5	2.3	2.2	2.1	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.5									
17-May	2.2	Z	2.2	2.2	2.3	2.2	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.1	2.2	2.3	2.3	2.1	2.3									
18-May	2.3	Z	2.2	2.4	2.6	2.1	2.3	2.4	2.3	2.0	2.0	2.0	2.0	2.2	2.0	2.0	2.1	2.0	2.2	2.2	2.1	2.2	2.4	2.2	2.2	2.6									
19-May	2.5	Z	2.6	2.4	2.3	2.4	2.3	2.0	2.1	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.2	2.0	2.4	2.1	2.6									
20-May	2.1	Z	2.2	2.3	2.2	2.2	2.2	2.1	2.0	2.1	2.0	2.0	2.0	2.0	2.0	1.9	2.0	1.9	2.0	2.0	2.3	2.2	2.1	2.0	2.1	2.3									
21-May	2.1	Z	2.2	2.1	2.2	2.1	2.1	2.1	2.4	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.4									
22-May	2.0	Z	2.4	2.4	2.4	2.5	2.4	2.2	2.7	2.6	2.2	2.0	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.9	2.1	2.4	2.4	2.4	2.2	2.7									
23-May	2.3	Z	2.4	2.3	2.6	2.6	2.6	2.7	2.2	2.1	2.1	2.2	2.0	1.9	1.9	1.9	1.9	1.8	1.9	1.9	1.9	1.9	1.8	1.8	2.1	2.7									
24-May	1.8	Z	1.9	1.8	1.8	1.8	1.9	1.9	1.9	1.8	2.0	2.1	2.0	2.1	2.0	2.0	1.9	2.1	2.2	2.1	2.0	2.0	2.1	2.0	2.0	2.2									
25-May	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.3	2.5	2.1	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	1.9	2.1	2.5									
26-May	2.0	Z	2.0	2.0	2.0	2.1	2.5	2.3	2.0	2.0	1.9	1.9	1.9	1.9	2.0	2.0	1.9	1.9	2.0	1.9	2.0	2.0	2.0	2.3	2.0	2.5									
27-May	2.1	Z	2.1	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.2	2.1	2.1	2.1	2.0	2.1	2.3									
28-May	2.0	Z	2.1	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2									
29-May	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.2	2.5	2.3	2.3	2.1	2.3	2.1	2.1	2.0	1.9	2.0	1.9	1.9	2.2	2.1	1.9	1.9	2.1	2.5									
30-May	1.9	Z	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	2.0	1.9	1.9	2.0	1.9	2.0									
31-May	2.3	Z	2.5	2.3	2.4	2.3	2.2	2.4	2.4	2.3	2.1	2.1	2.1	2.0	2.0	1.9	2.0	2.0	2.0	2.1	2.6	2.1	2.1	2.1	2.2	2.6									
																								Diurnal Average											
																								Diurnal Maximum											
Z - zerospan      C - Calibration      M - Maintenance      PF - Power Failure																																			





WBEA  
Hourly Averages

Total Hydrocarbons (THC) - ppm  
Barge Landing - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Barge Landing - May 2014**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	302	43.27	43.27
2.1 - 3.0	393	56.30	99.57
3.1 - 10.0	3	0.43	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 698

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Barge Landing - May 2014**

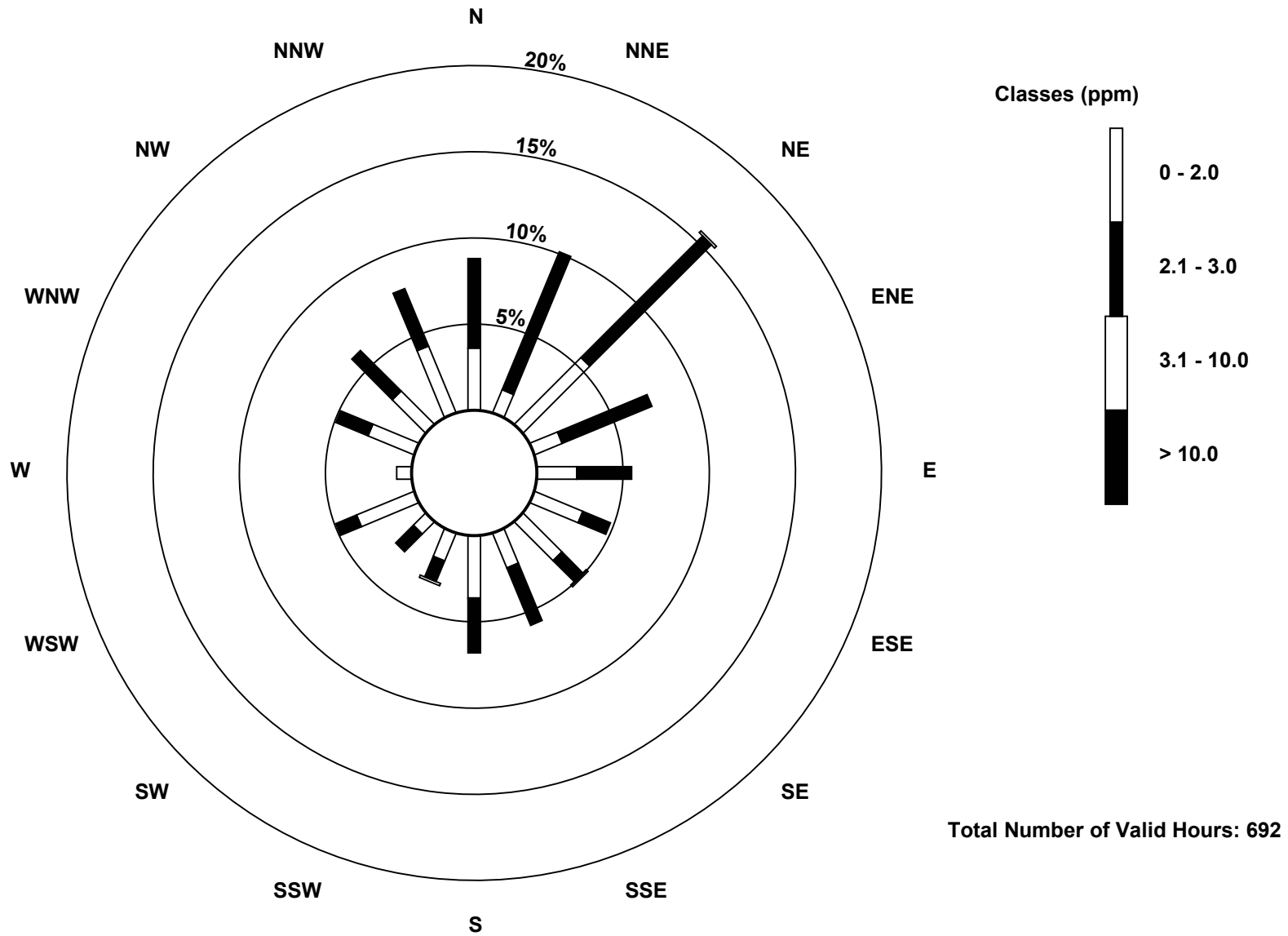
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	25	10	38	12	16	21	22	15	25	12	7	25	6	20	19	29	302
2.1 - 3.0	36	60	69	39	22	12	12	25	22	9	10	9	0	14	23	25	387
3.1 - 10.0	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0	0	3
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	61	70	108	51	38	33	35	40	47	22	17	34	6	34	42	54	692

Total Number of Valid Hours: 692

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

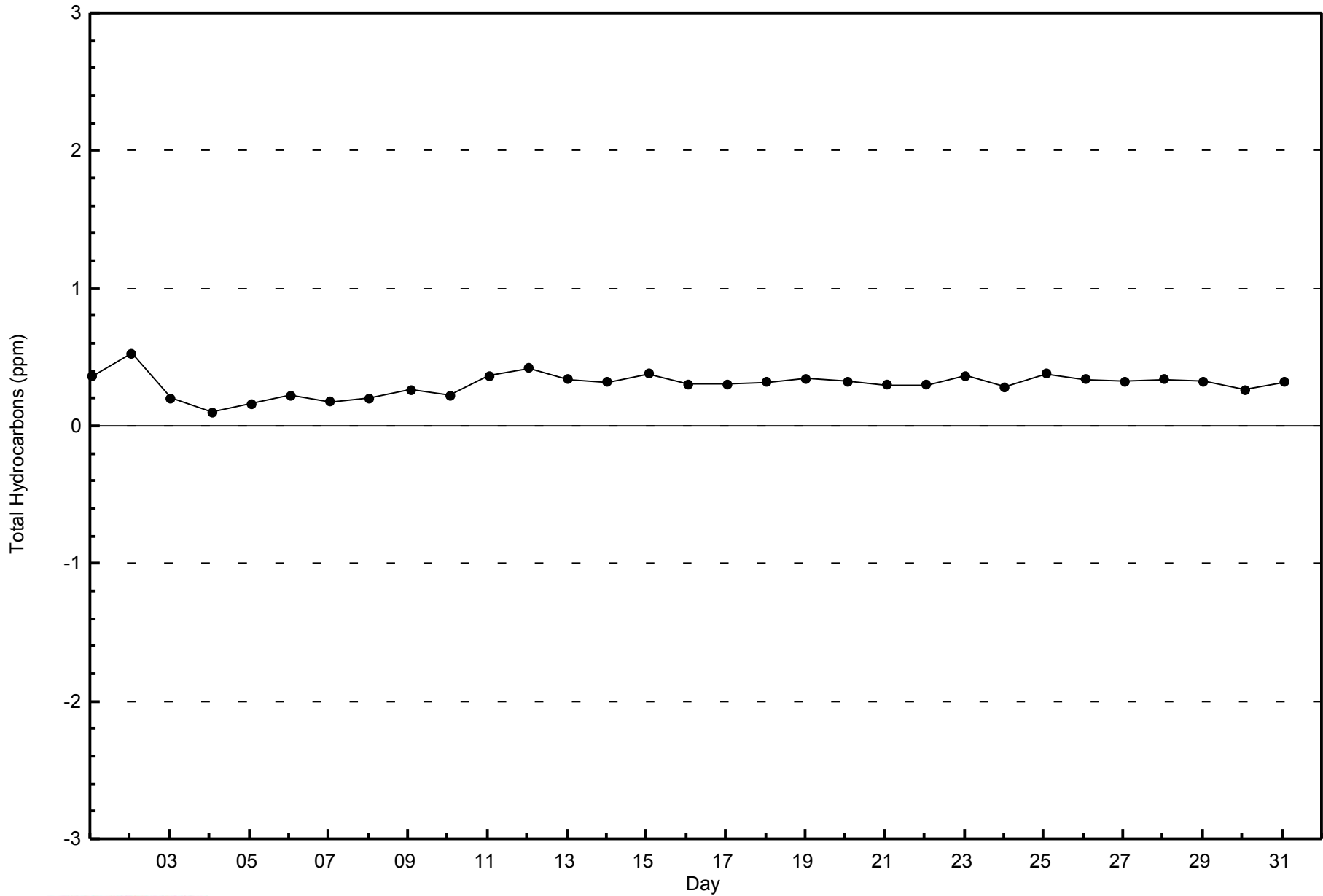
**Total Hydrocarbons (THC) - ppm  
Barge Landing (AMS 9)**





WBEA  
Zero Responses

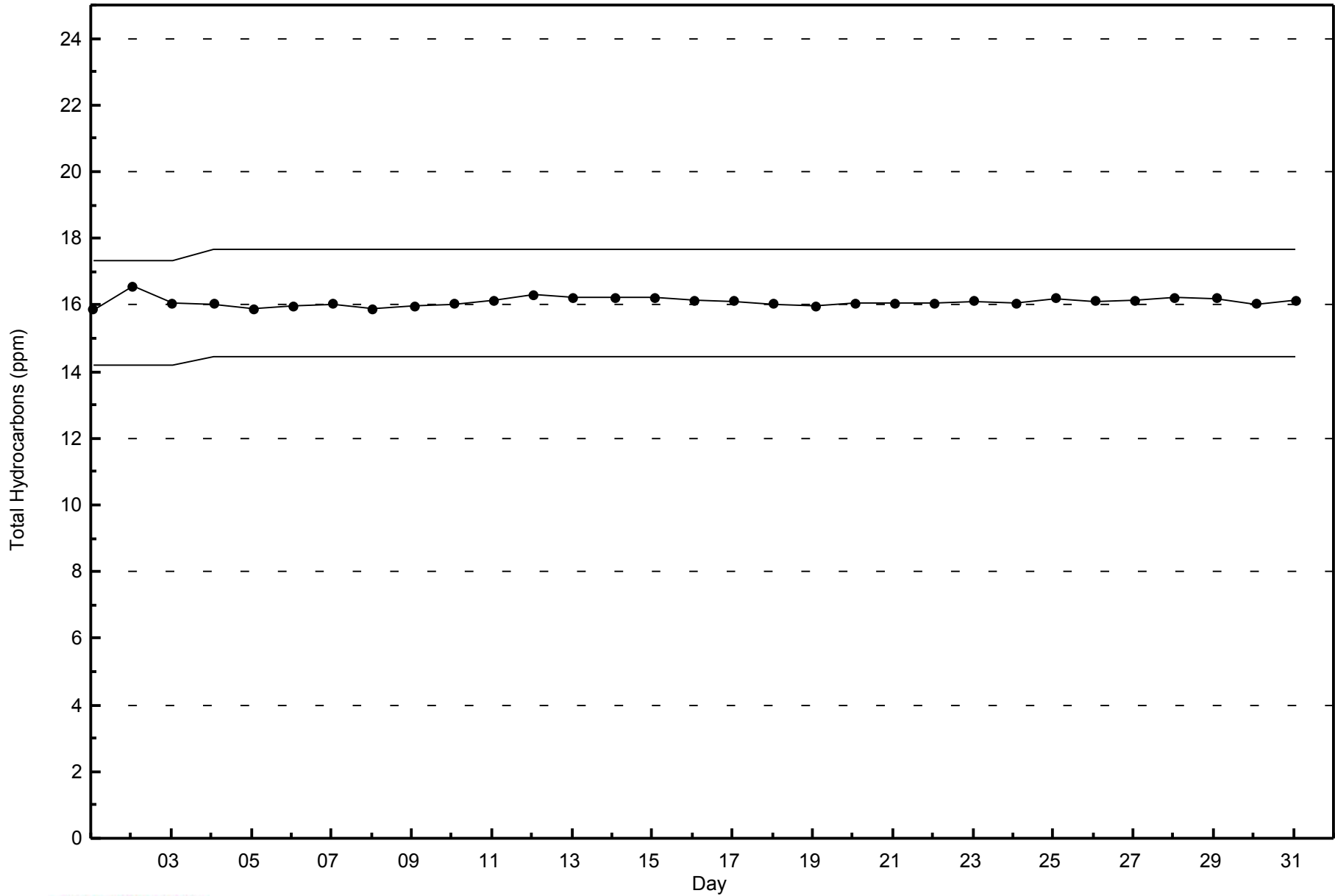
Total Hydrocarbons (THC) - ppm  
Barge Landing - May 2014





WBEA  
Span Responses

Total Hydrocarbons (THC) - ppm  
Barge Landing - May 2014



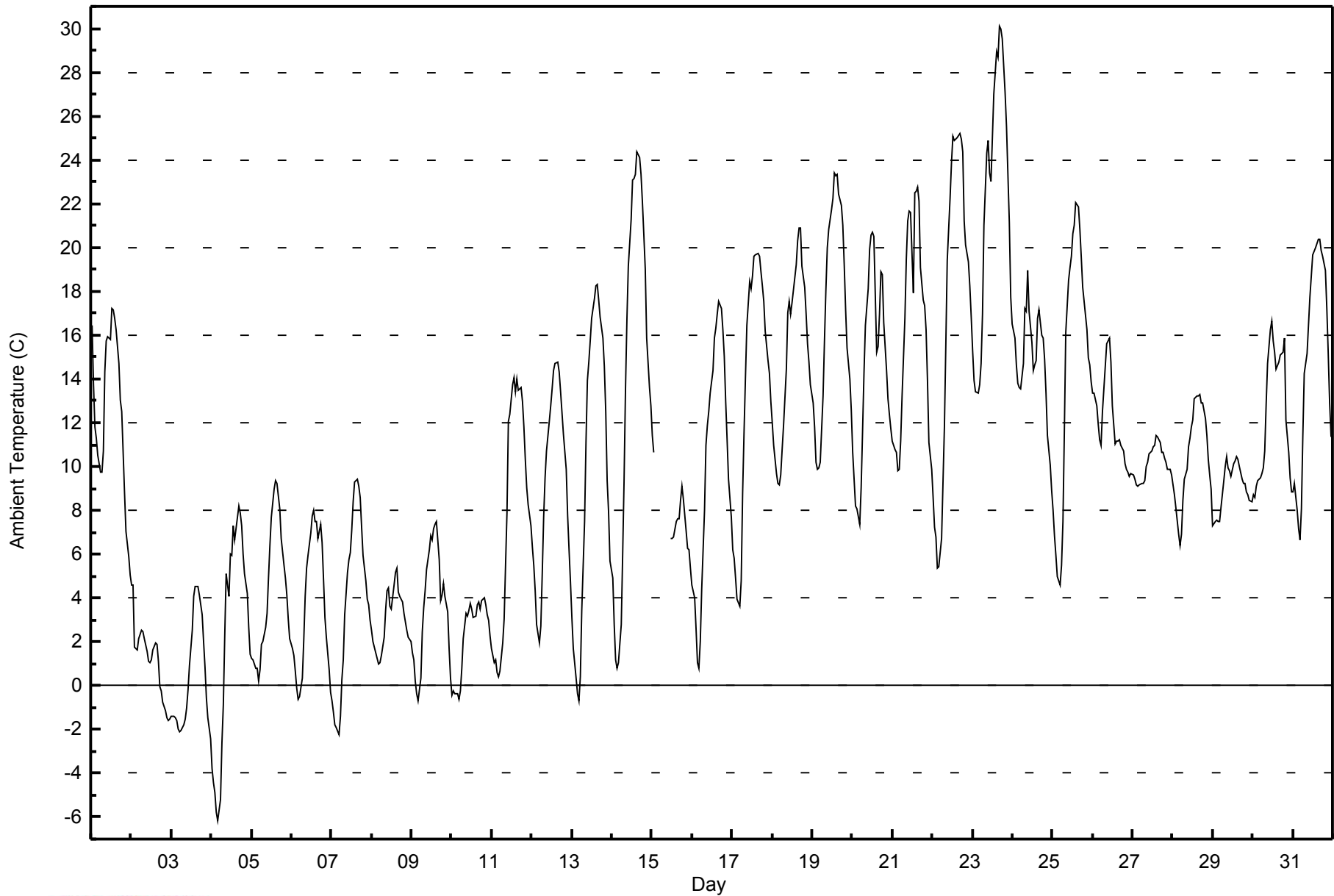


Maximum Value: 30.1 C on May 23 17:00		Maximum Daily Average: 22.2 C on May 23		Hours in Service: 744																						
Minimum Value: -6.1 C on May 4 05:00		Minimum Daily Average: 0.4 C on May 3		Hours of Data: 735																						
Maximum Diurnal Average: 14.3 C at hour 16		Minimum Diurnal Average: 4.4 C at hour 5		Hours of Missing Data: 9																						
Monthly Average: 10.08 C		Percentiles: P <sub>1</sub> = -2.5 P <sub>10</sub> = 1.1 Q <sub>1</sub> = 4.4 Median = 9.7 Q <sub>3</sub> = 15.1 P <sub>90</sub> = 19.6 P <sub>99</sub> = 26.9		Hours of Calibration: 0																						
				Percent Operational Time: 98.8																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-May	16.4	13.7	11.8	11.3	10.5	9.8	9.8	10.7	14.3	15.7	15.9	15.8	17.2	17.1	16.8	16.3	14.7	13.1	12.5	10.7	8.8	7.0	5.9	5.0	12.5	17.2
2-May	4.6	4.6	1.7	1.7	2.1	2.3	2.5	2.5	2.2	1.6	1.1	1.1	1.2	1.6	2.0	1.9	1.1	0.0	-0.2	-0.7	-1.2	-1.5	-1.6	-1.5	1.2	4.6
3-May	-1.4	-1.4	-1.5	-1.6	-2.0	-2.1	-2.0	-1.8	-1.5	-1.0	-0.2	0.9	2.5	4.1	4.5	4.5	4.5	4.2	3.2	2.0	0.9	-0.6	-1.4	-2.4	0.4	4.5
4-May	-3.8	-4.4	-4.9	-5.8	-6.1	-5.2	-2.6	-0.9	2.3	5.1	4.1	6.0	6.0	7.3	6.7	7.1	8.2	7.9	7.3	6.0	5.1	4.2	2.7	1.4	2.2	8.2
5-May	1.3	1.2	0.8	0.8	0.2	0.7	1.9	2.0	2.7	3.3	4.9	6.4	7.7	9.0	9.4	9.2	8.6	8.1	6.7	5.5	4.9	4.1	3.0	2.1	4.4	9.4
6-May	1.7	1.4	0.7	-0.1	-0.6	-0.5	0.3	2.1	4.1	5.4	5.9	7.0	7.7	8.0	7.5	7.5	6.7	7.4	6.6	4.8	3.1	2.2	0.7	-0.3	3.7	8.0
7-May	-0.7	-1.2	-1.8	-1.9	-2.2	-1.4	0.3	1.2	3.3	5.1	5.8	6.0	7.1	8.4	9.3	9.4	9.1	8.6	7.3	5.9	4.8	3.9	3.7	3.0	3.9	9.4
8-May	2.5	2.0	1.5	1.2	1.0	1.0	1.4	2.2	3.4	4.3	4.4	3.6	3.5	4.6	5.2	5.4	4.3	4.1	3.8	3.3	2.9	2.5	2.2	2.0	3.0	5.4
9-May	1.5	1.2	0.2	-0.4	-0.7	0.3	2.5	3.6	4.4	5.3	6.2	6.8	6.6	7.2	7.4	7.5	5.8	3.9	4.2	4.6	4.1	3.4	1.7	0.3	3.6	7.5
10-May	-0.4	-0.3	-0.4	-0.3	-0.6	-0.2	0.8	2.1	3.3	3.1	3.4	3.8	3.5	3.1	3.2	3.7	3.8	3.5	3.9	4.0	3.7	3.3	3.0	2.3	2.3	4.0
11-May	1.7	1.1	1.2	0.6	0.4	0.7	2.0	3.1	5.5	7.9	12.1	12.4	13.7	14.1	13.4	14.0	13.5	13.6	13.0	11.8	10.4	9.0	8.2	7.3	7.9	14.1
12-May	6.4	5.5	4.4	2.8	1.9	2.7	5.1	7.7	9.5	10.7	12.1	12.7	13.6	14.4	14.7	14.8	14.3	13.4	12.5	11.5	9.9	7.8	6.2	4.7	9.1	14.8
13-May	3.1	1.7	0.3	-0.4	-0.7	0.4	3.4	7.5	11.1	13.9	14.8	15.7	16.8	17.6	18.3	18.3	17.6	16.8	15.8	14.6	12.5	9.4	7.9	5.7	10.1	18.3
14-May	4.9	2.8	1.2	0.8	1.1	2.8	6.0	9.4	13.6	16.7	19.2	21.3	23.0	23.2	23.4	24.4	24.1	23.3	22.0	20.6	19.0	15.9	13.6	12.8	14.4	24.4
15-May	11.4	10.6	PF	PF	PF	PF	PF	PF	PF	PF	PF	6.7	6.7	6.8	7.5	7.7	7.6	8.4	9.1	8.5	7.0	6.3	6.2	5.4	--	11.4
16-May	4.6	4.0	2.6	1.0	0.8	2.0	4.4	8.0	11.0	11.9	12.5	13.4	14.4	15.9	16.3	17.0	17.5	17.2	16.2	15.0	13.0	11.2	9.5	7.7	10.3	17.5
17-May	6.2	5.8	4.9	3.9	3.6	4.8	8.8	11.5	14.1	16.5	18.4	18.1	18.7	19.6	19.6	19.8	19.6	18.9	18.3	17.5	16.2	14.8	14.2	13.0	13.6	19.8
18-May	12.0	11.0	9.7	9.2	9.2	9.6	10.8	11.9	14.5	17.0	17.5	16.9	17.5	18.6	19.2	20.3	20.9	20.9	19.2	18.2	17.0	15.6	14.7	13.7	15.2	20.9
19-May	12.9	11.8	10.2	9.8	9.9	10.2	13.3	15.7	18.0	20.0	20.8	21.7	22.2	23.4	23.3	23.3	22.5	21.9	21.0	19.2	17.2	15.4	14.0	12.6	17.1	23.4
20-May	10.6	9.4	8.2	8.1	7.4	9.0	11.6	14.2	16.5	18.1	19.9	20.6	20.7	20.5	15.2	15.5	17.0	18.9	18.8	16.6	14.4	13.1	12.4	11.7	14.5	20.7
21-May	11.2	10.8	10.7	9.8	9.9	11.2	13.2	16.7	19.5	21.2	21.6	21.6	17.9	22.5	22.5	22.8	22.1	19.1	17.6	17.4	16.2	13.9	11.1	9.9	16.3	22.8
22-May	8.6	7.2	6.8	5.4	5.4	6.7	9.3	11.8	15.5	19.4	22.2	23.9	25.1	24.9	24.9	25.0	25.2	24.9	24.4	21.2	20.1	19.4	18.2	16.8	17.2	25.2
23-May	15.3	13.9	13.4	13.4	13.7	14.7	17.0	21.0	24.3	24.9	23.4	23.0	25.0	27.0	28.9	28.7	30.1	30.0	29.5	27.1	25.5	23.3	21.1	17.7	22.2	30.1
24-May	16.5	15.8	14.6	13.8	13.6	13.6	14.7	17.2	17.1	19.0	17.1	15.7	14.4	14.6	14.8	16.8	17.1	16.0	15.9	14.9	13.3	11.4	10.1	8.9	14.9	19.0
25-May	8.0	6.8	6.0	5.0	4.6	5.5	7.5	11.6	16.1	18.5	19.1	19.6	20.6	21.0	22.1	21.9	20.8	19.6	18.2	17.5	16.2	15.0	14.6	13.8	14.6	22.1
26-May	13.4	13.4	12.8	11.9	11.2	11.0	12.5	14.6	15.6	15.7	15.9	14.7	12.7	11.0	11.2	11.1	11.2	11.0	10.7	10.1	9.9	9.7	9.5	9.7	12.1	15.9
27-May	9.6	9.4	9.1	9.1	9.2	9.2	9.2	9.3	10.0	10.2	10.6	10.7	10.9	11.0	11.4	11.3	11.1	10.7	10.6	10.4	10.2	9.9	9.9	9.6	10.1	11.4
28-May	9.2	8.7	8.1	6.9	6.4	6.9	8.5	9.4	9.9	10.9	11.3	11.8	12.1	13.1	13.2	13.2	13.3	12.9	12.9	12.2	11.4	10.3	9.6	9.0	10.5	13.3
29-May	7.3	7.5	7.5	7.5	7.5	8.2	9.4	10.0	10.5	10.0	9.8	9.5	10.1	10.2	10.4	10.3	10.0	9.4	9.2	9.2	8.9	8.7	8.4	8.4	9.1	10.5
30-May	8.7	8.6	9.1	9.3	9.5	9.7	10.0	10.7	12.9	14.7	16.2	16.7	15.8	15.2	14.4	14.8	15.1	15.2	15.2	15.8	12.1	10.7	9.5	8.8	12.4	16.7
31-May	8.8	9.2	8.0	7.2	6.6	8.1	11.4	14.3	15.1	16.5	17.7	18.7	19.7	20.0	20.2	20.3	20.4	19.9	19.6	19.0	17.2	15.1	12.9	11.4	14.9	20.4
																								Diurnal Average		
																								Diurnal Maximum		
6.8 6.2 5.2 4.7 4.4 5.1 6.8 8.7 10.6 12.1 12.8 13.0 13.4 14.0 14.1 14.3 14.1 13.6 13.1 12.1 10.8 9.5 8.4 7.4																										
16.5 15.8 14.6 13.8 13.7 14.7 17.0 21.0 24.3 24.9 23.4 23.9 25.1 27.0 28.9 28.7 30.1 30.0 29.5 27.1 25.5 23.3 21.1 17.7																										
PF - Power Failure																										



**WBEA**  
**Hourly Averages**

**Ambient Temperature (AT) - C**  
**Barge Landing - May 2014**







**WBEA**  
**Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C**  
**Barge Landing - May 2014**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	49	6.67	6.67
0 - 10	337	45.85	52.52
10 - 20	282	38.37	90.88
> 20	67	9.12	100.00

Total Number of Valid Hours: 735

Total Number of Hours: 744



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

**Wind Speed (WS) - km/h**  
**Barge Landing - May 2014**

Maximum Speed: 22 km/h on May 21 16:00	Maximum Daily Speed Average: 10.6 km/h on May 2	Hours in Service: 744
Minimum Speed Value: 0 km/h on May 25 05:00	Minimum Daily Speed Average: 0.9 km/h on May 4	Hours of Data: 729
Maximum Diurnal Speed Average: 4.2 km/h at hour 19	Minimum Diurnal Speed Average: 0.1 km/h at hour 6	Hours of Missing Data: 15
Monthly Average Velocity: 2.1 km/h 23.8 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 2 Q <sub>1</sub> = 4 Median = 6 Q <sub>3</sub> = 9 P <sub>90</sub> = 12 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-May	NNW4	N6	N3	NNW7	NNW5	WNW3	NNW5	WNW4	WNW9	NNW15	NNW16	NNW14	NNW14	NW13	NW12	NNW15	NW14	NNW12	NNW11	NNW10	N8	NNW5	NW5	NW8	NNW8.8	NNW16		
2-May	WNW7	NW13	N10	NW7	NW10	NW11	NW13	NW13	NNW13	NNW14	NNW13	NNW13	N11	N12	NNW12	N10	NNE12	NNE12	NNE11	NNE11	NNE12	N13	N13	N12	NNW10.6	NNW14		
3-May	N12	N13	N10	N10	N10	N8	NNE8	NNE7	NNE8	NNE8	NE8	NE7	NE8	NE9	NE9	NE9	NE8	NE8	ENE8	ENE6	ENE4	NE2	SE1	NNE7.3	N13			
4-May	SSW2	NW2	NW2	SW1	AF	SE1	ESE1	ESE2	ENE2	WSW5	NE5	NNE6	E4	SSE4	N4	ENE2	SSW1	SW4	SW6	SW3	S3	SSE7	SSE7	ESE3	SSE0.9	SSE7		
5-May	E3	E1	E1	SSE1	WNW1	S2	SSE2	ESE3	WSW1	NE4	NE6	NNE8	NNE9	NNE9	NNE8	NNE9	ENE11	NE13	ENE14	ENE14	ENE12	NE12	NE11	NE11	NE6.1	ENE14		
6-May	NE10	NE9	NE8	N7	N7	NNE7	NE9	NNE10	NNE11	NNE11	NNE10	NE11	NNE10	NNE11	NNE11	NNE10	NE11	NE8	NE6	NW3	NNW4	N5	NNW5	NW5	NNE7.8	NNE11		
7-May	NNW4	NNW6	NNW5	NNW5	NNW5	NNW6	N6	NNW10	N9	N12	N12	NNE13	N12	NNE12	N11	NNE11	NNE11	NNE11	NNE10	NE9	ENE6	E3	ENE5	ENE4	NNE7.4	NNE13		
8-May	E3	E5	ESE4	E4	SE2	SE2	E3	NE3	SW2	NE3	NE7	NE9	NE9	NE8	NE11	NE10	NNE10	NNE8	NE7	E4	ENE3	N1	AF	NW4	NE4.4	NE11		
9-May	NNW4	NNW4	NW2	NNW2	AF	WSW3	WSW4	WNW4	NNW4	NNW5	NNW6	NNW6	N7	N7	N9	NNW7	NNW5	NNW6	NW4	N9	N10	NNW7	NW6	NW5	NNW4.8	N10		
10-May	NW4	NW5	NW4	WNW6	NW4	W6	W7	WNW8	NNW11	NNW11	NNW15	NW13	N10	NNW6	NNW4	NNW6	N7	NNW5	WNW3	WNW3	WSW2	WSW4	WSW4	S3	NW5.4	NNW15		
11-May	SW2	WNW3	NW4	NW3	WSW2	SW4	SW3	SSW6	SSW10	SSW10	WNW8	N10	NNW10	N9	NNE7	NE7	NE6	NE8	NE8	NE7	NE5	ENE5	NE6	NE5	N2.2	NNW10		
12-May	N3	NNW4	N4	NNE2	NNE2	N3	NNE3	NE5	NE6	NNE6	NNE6	NE7	NE9	NE8	NE10	ENE10	NE11	NE11	NE11	NNE10	NE8	E7	ESE5	S3	NE5.7	NE11		
13-May	SW2	WNW1	S2	S3	SSE3	SSE3	SSE4	S6	S6	SSW6	E6	ENE7	ENE7	NE9	NNE9	NE11	NE11	NE9	NNE10	NE8	ENE5	E4	ESE5	SE1	ENE3.3	NE11		
14-May	N3	NNW1	S2	ESE2	SE4	SE5	SSE6	S7	WNW2	WNW5	WNW4	ESE5	SSE8	SSE7	SE8	SE9	SE11	SE13	SE10	S6	SE7	SSW11	S5	SE8	SSE4.4	SE13		
15-May	ESE6	NW0	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	ENE12	N14	N15	N14	N14	N13	N15	N14	N10	NNW5	NW4	NW6	NW6	---	N15
16-May	NNW6	NNW6	NW5	SSE1	WSW4	SW2	WSW4	WSW4	WSW4	WNW3	ENE4	ENE4	ENE6	ESE3	ENE4	SSE5	SE5	E7	ENE9	ENE9	ENE8	ENE7	E4	E2	ENE2.0	ENE9		
17-May	SSE2	SSE1	SE2	E1	E2	E2	ESE4	S5	WNW3	NW4	NW4	NNE5	NNE4	NNE5	NE5	NE4	NE4	E6	ENE7	NE6	NE5	E2	N7	N7	NE2.4	N7		
18-May	N6	N4	N5	NNE5	NE4	NE6	NE5	NNE6	NE7	ENE5	WNW6	N2	N6	NE8	NE7	NE8	NE8	NE8	NE8	ENE4	NW2	N4	ENE6	NNE3	NNE4.8	NE8		
19-May	N4	ENE1	ESE3	SE3	S6	SE5	SSE8	S12	SSW10	S10	S10	S11	S11	S11	SSE14	S14	S14	S13	S12	SSW12	SSW12	S10	S10	S6	S8.6	S14		
20-May	SSE6	SE5	SSE5	SSE7	SSE7	SSE7	SSE10	S12	S13	S14	S14	S14	S12	SSW9	WSW4	SE12	SE11	SE11	SSE11	N5	N3	NE6	E6	ESE6	SSE7.0	S14		
21-May	SE6	SSE7	SE7	SSE6	SSE6	S7	S5	SSW7	S8	S8	SSW9	SW12	SSW5	WSW13	WSW22	WSW22	WSW20	NW15	NW11	WNW7	WNW9	WSW4	SSE3	S3	SW6.1	WSW22		
22-May	SW3	SSE4	SSE2	ESE1	ESE2	AF	E1	S2	SW4	WSW6	WSW5	WSW6	SW11	WSW13	WSW12	WSW10	WSW9	SSW5	SW3	NNE4	ENE4	E4	NE2	E3	SW3.1	WSW13		
23-May	ENE1	E1	SSW1	SE3	S4	SSE5	SSW4	SW5	S5	SSE5	SSE7	SSE8	S5	S7	S8	SSE7	S6	SSW7	SSE6	ESE3	ESE8	E4	W14	WNW16	S3.5	WNW16		
24-May	NW8	WSW4	WSW7	W7	W5	WNW4	WNW3	NE3	NW3	WNW6	NNW6	NNE6	NNE10	NE7	ESE5	WNW5	NW11	NNE6	ENE6	ENE6	E5	ESE3	E2	AF	NNW2.4	NW11		
25-May	AF	E2	ENE1	E1	ENE0	S1	SW2	WNW2	NW4	WNW4	ESE3	N4	NE5	ESE4	E7	ESE6	SE6	NE2	N6	NW2	N3	ESE3	E6	ESE6	E1.4	E7		
26-May	SSE4	SE9	SE7	SSE4	NE1	NE3	E3	ENE4	E5	SE10	SSE10	SE6	ENE7	NE9	NE9	ESE4	ESE5	NE5	NE8	NE9	NE11	NE11	NE10	NE10	E5.1	NE11		
27-May	NNE10	NE10	NE9	NNE8	NNE9	NE10	NE10	NNE11	NE11	NE9	NNE9	NNE9	NNE10	NNE10	NNE11	NNE9	NE8	NE5	NNE5	NNE4	NW2	NNW1	ENE3	E4	NNE7.6	NNE11		
28-May	E3	NE2	ENE2	ENE2	ENE3	E4	E4	E6	E7	ENE7	ENE7	ESE6	SE8	SSE8	SSE8	SSE9	SSE7	SE10	ESE7	ESE7	SE8	SE6	ESE4	ESE5	ESE4.9	SE10		
29-May	ESE2	SE2	NNE1	E1	E3	SE1	NNW3	N3	N4	NNE3	NNE4	N6	N7	N5	NNW6	NNW8	NNW8	NNW6	N4	NW7	NW6	WNW6	W6	WSW6	NNW3.2	NNW8		
30-May	WSW6	SW4	WSW11	WSW12	WSW10	WSW9	WSW11	WSW11	WNW9	WNW13	NW12	WNW13	WNW15	WNW16	NW15	NW9	NNW6	NNW7	NNW5	N4	ENE6	SE2	SSW5	S3	WNW6.6	WNW16		
31-May	SSW6	SSW3	E2	E2	S2	SSW2	NW2	NE4	NE6	ENE6	NE7	NE8	NE8	NE9	NE9	NE8	NE9	NE8	NE7	NNE7	NE8	ENE7	ENE3	ENE2	NE4.5	NE9		

N1.3	N1.6	NNE1.1	N0.8	NNW0.5	NE0.1	NW0.2	NW0.4	NNW1.2	NNW1.8	N2.8	NNE3.7	NNE3.9	NNE3.4	NNE3.5	NNE2.9	NNE3.4	NE4.1	NE4.2	NNE3.9	NE3.3	ENE2.1	NE1.3	NNE1.3	Diurnal Average	
N12	NW13	WSW11	WSW12	WSW10	NW11	NW13	NW13	NNW13	NNW15	NNW16	NNW14	WNW15	WNW16	WSW22	WSW22	WSW20	N15	ENE14	ENE14	SSW12	N13	W14	WNW16	Diurnal Maximum	

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



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

**Wind Speed (WS) - km/h**  
**Barge Landing - May 2014**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 10 km/h on May 23 23:00	Hours in Service: 744 Hours of Data: 729 Hours of Missing Data: 15 Hours of Calibration: 0 Percent Operational Time: 98.0
Minimum Value: 1 km/h on May 9 00:00	
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> = 4 P <sub>99</sub> = 6	

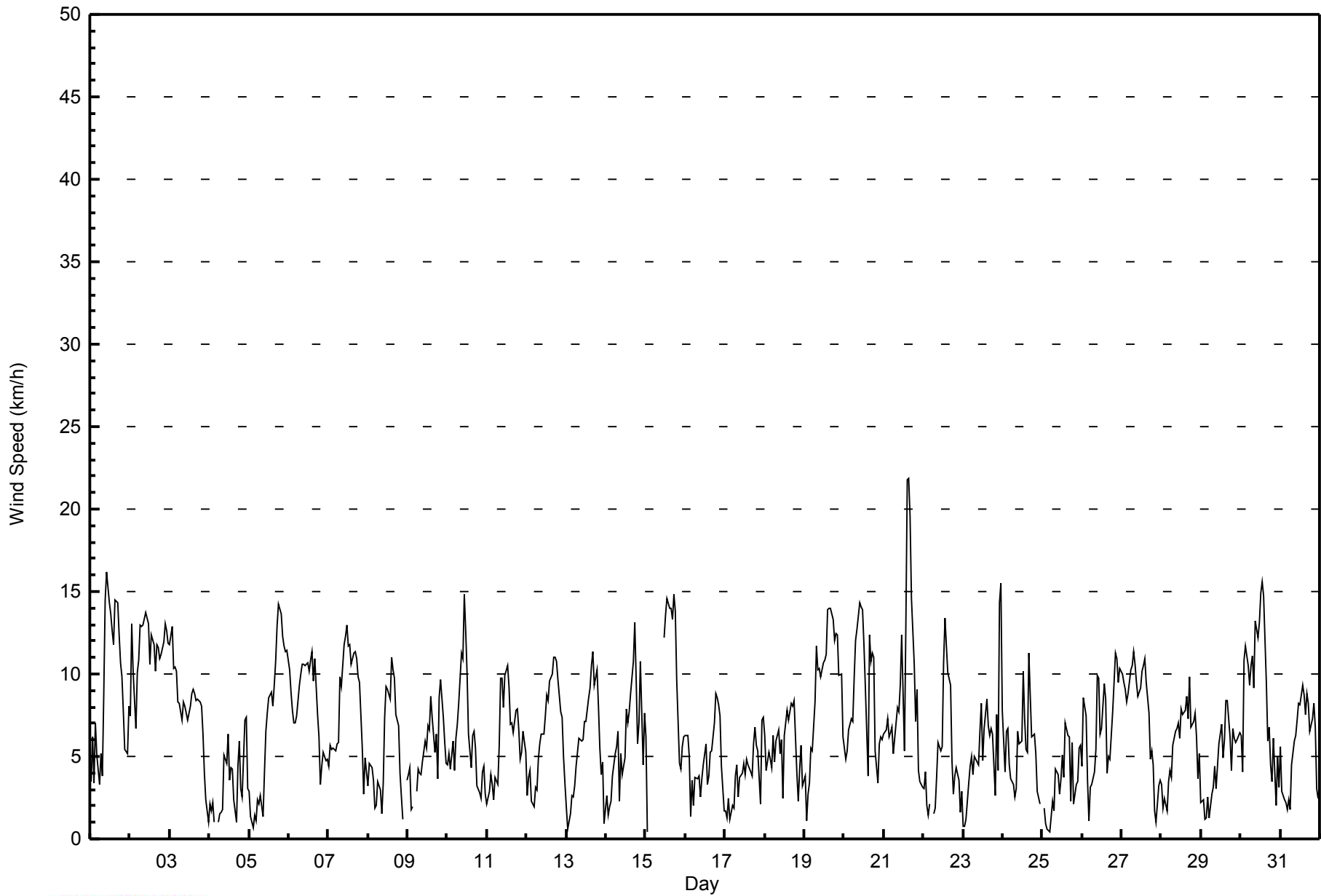
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-May	2	3	1	3	2	1	2	2	3	5	5	5	5	4	4	5	4	5	4	3	2	2	2	3	5
2-May	3	5	3	4	4	4	4	4	4	5	4	4	4	4	4	3	4	3	3	4	4	4	4	4	5
3-May	4	4	3	3	3	3	2	2	2	2	2	2	3	3	3	3	3	3	3	3	2	1	1	1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

AF - Analyzer Failure PF - Power Failure



**WBEA**  
**Hourly Averages**

**Wind Speed (WS) - km/h**  
**Barge Landing - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h**  
**Barge Landing - May 2014**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	307	42.11	42.11
6 - 11	343	47.05	89.16
12 - 19	76	10.43	99.59
20 - 28	3	0.41	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 729

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Wind Speed (WS) - km/h**  
**Barge Landing - May 2014**

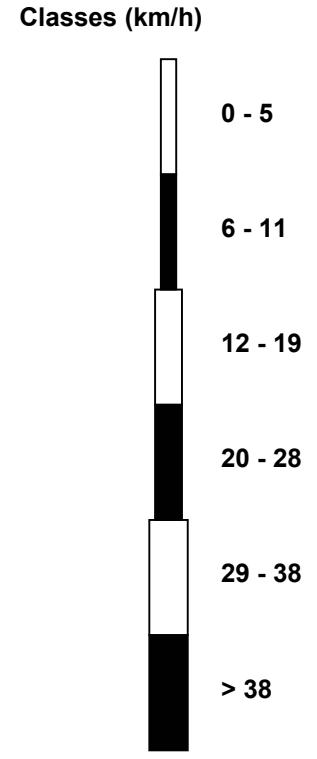
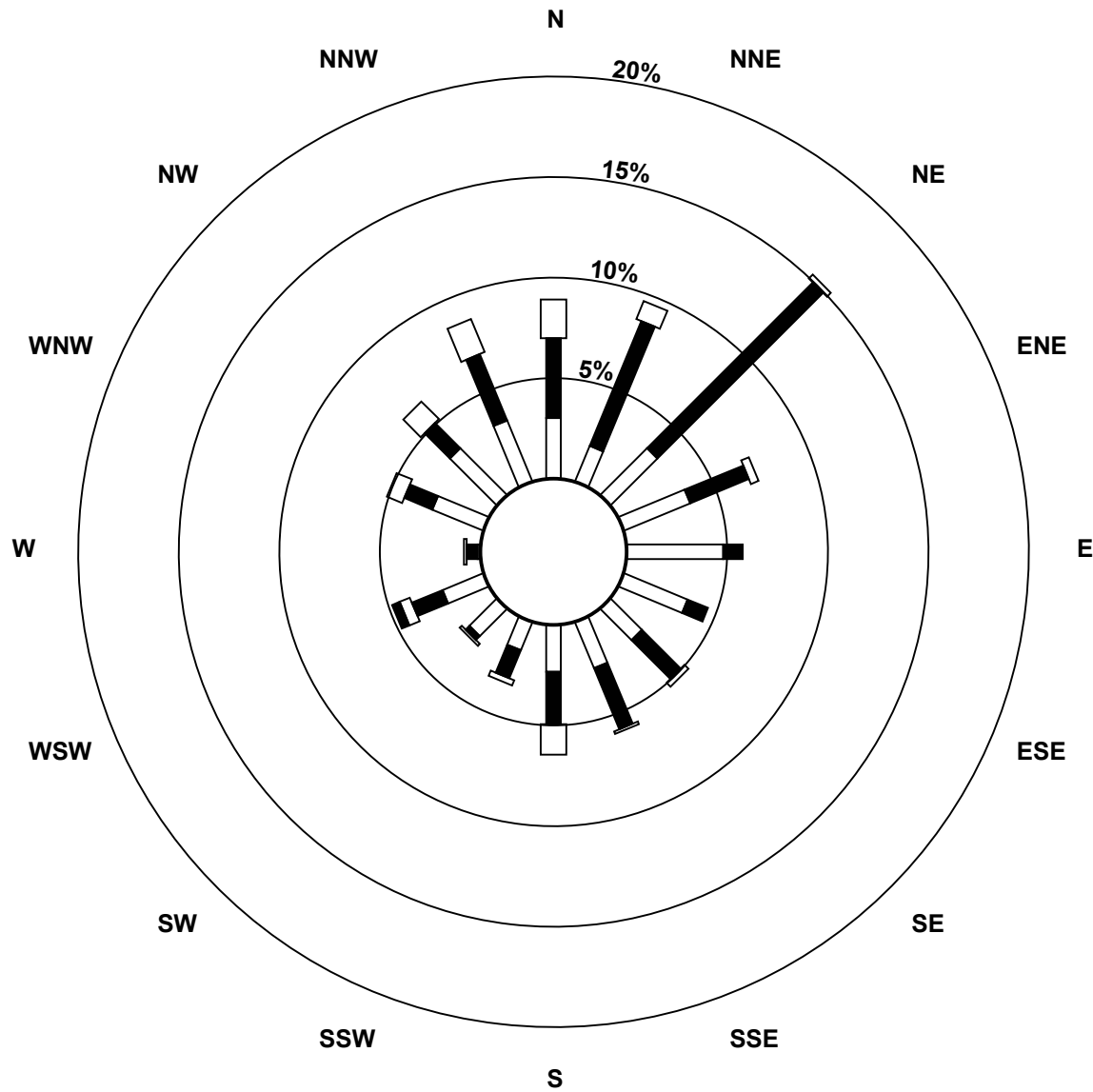
Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	22	14	24	26	35	25	16	18	17	11	14	16	1	20	24	24	307
6 - 11	29	49	85	23	7	8	20	24	19	11	2	12	4	11	13	26	343
12 - 19	14	7	2	3	0	0	2	1	11	2	1	4	1	6	9	13	76
20 - 28	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	3
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	65	70	111	52	42	33	38	43	47	24	17	35	6	37	46	63	729

Total Number of Valid Hours: 729

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Wind Speed (WS) - km/h  
Barge Landing (AMS 9)**



**Total Number of Valid Hours: 729**



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

**Wind Direction (WD) - deg**  
**Barge Landing - May 2014**

Direction of Maximum Speed: 240 deg on May 21 16:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 347.3 deg on May 2	Hours of Data: 729
Direction of Minimum Speed: 73 deg on May 25 05:00	Direction of Minimum Daily Speed Average: 0.9 deg on May 4
Direction of Minimum Speed: 73 deg on May 25 05:00	Hours of Missing Data: 15
Monthly Average Direction: 315.4 deg	Percent Operational Time: 98.0

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-May	332	350	1	335	339	282	330	297	295	331	334	336	332	325	320	327	326	327	336	348	359	338	322	313	329.9
2-May	302	320	9	317	310	313	322	322	340	343	336	341	350	349	345	10	24	19	17	16	13	6	358	353	347.3
3-May	357	356	360	7	7	11	22	27	25	25	34	35	55	56	51	51	40	39	55	69	64	68	55	141	30.5
4-May	210	314	308	223	AF	124	120	122	60	254	40	33	85	165	1	69	198	226	233	226	191	151	153	122	159.5
5-May	87	83	98	158	301	188	161	109	251	39	56	24	17	21	20	31	58	51	58	59	58	55	51	49	49.0
6-May	46	41	36	8	4	12	35	27	26	26	23	36	32	25	14	18	40	51	34	304	343	349	332	325	23.0
7-May	330	329	328	331	329	341	359	347	1	11	2	18	6	29	11	21	27	27	16	38	66	95	61	76	12.1
8-May	100	85	104	84	145	125	83	42	221	48	37	42	52	42	34	36	28	17	49	98	75	2	AF	320	49.2
9-May	333	337	316	284	AF	237	257	300	332	343	330	339	2	6	355	332	343	342	304	356	350	348	326	310	336.0
10-May	310	322	305	303	307	268	272	291	334	334	339	323	351	333	334	335	351	339	294	295	256	242	244	177	316.4
11-May	226	294	324	307	245	228	230	207	203	199	294	351	338	354	26	41	44	45	47	49	40	66	56	40	5.5
12-May	353	346	356	26	29	352	26	35	42	33	33	49	56	44	39	57	40	36	43	22	39	85	113	187	40.9
13-May	224	292	173	186	164	149	167	169	181	211	88	57	64	50	33	40	51	48	29	38	61	79	105	127	70.4
14-May	351	333	184	122	138	125	164	184	286	290	293	122	159	151	133	129	128	131	139	171	127	208	173	124	149.4
15-May	103	309	PF	PF	PF	PF	PF	PF	PF	PF	PF	14	9	0	357	4	356	353	359	349	334	313	319	326	--
16-May	330	332	323	158	242	219	238	255	237	286	74	69	61	111	76	148	136	79	74	72	73	73	87	90	72.5
17-May	160	154	130	79	81	83	122	190	283	316	307	27	29	33	50	46	34	92	67	55	54	85	358	7	45.9
18-May	5	5	11	15	52	47	40	25	45	57	282	8	360	34	40	48	42	55	45	77	305	353	73	29	32.0
19-May	355	58	108	137	171	139	166	187	202	183	188	173	173	173	163	181	175	172	176	194	195	190	191	181	178.1
20-May	151	135	153	152	151	153	167	180	179	173	176	169	187	197	241	136	125	139	147	8	350	45	100	123	157.2
21-May	135	151	146	150	165	181	189	193	187	182	192	227	205	238	238	240	252	313	309	294	297	257	154	176	225.0
22-May	230	155	168	123	123	AF	96	174	228	246	247	241	219	237	237	248	254	200	226	20	73	83	36	98	225.3
23-May	69	79	205	140	172	151	192	221	190	158	161	159	169	175	183	167	182	209	148	113	115	86	268	294	183.3
24-May	307	243	238	263	280	298	283	44	306	302	342	30	14	45	110	287	315	20	60	63	80	106	87	AF	344.5
25-May	AF	90	78	91	73	169	226	295	309	301	108	5	53	120	92	119	137	48	351	326	355	120	136	121	84.9
26-May	168	124	132	152	43	52	82	66	101	127	147	135	76	51	46	113	116	52	43	53	40	44	45	34	78.8
27-May	26	36	40	31	33	40	37	30	36	36	26	29	31	22	23	27	43	48	27	29	318	345	70	97	33.0
28-May	98	52	67	63	71	88	81	94	100	76	72	104	132	165	156	158	166	138	123	120	131	130	112	117	118.8
29-May	123	129	23	84	98	125	330	5	351	24	18	356	8	354	342	342	345	346	358	320	309	285	275	250	340.8
30-May	243	214	243	254	255	245	248	245	282	301	304	300	290	302	304	311	340	348	337	7	61	133	206	182	282.2
31-May	207	201	88	90	177	193	312	46	45	64	49	50	40	39	42	55	36	41	46	32	42	59	68	73	50.1

357.0	7.2	18.5	352.3	343.6	48.7	322.9	310.0	333.1	348.4	1.4	19.0	22.9	17.1	14.7	28.9	31.6	37.7	40.6	33.4	42.0	57.4	53.1	30.5
Diurnal Average																							

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





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

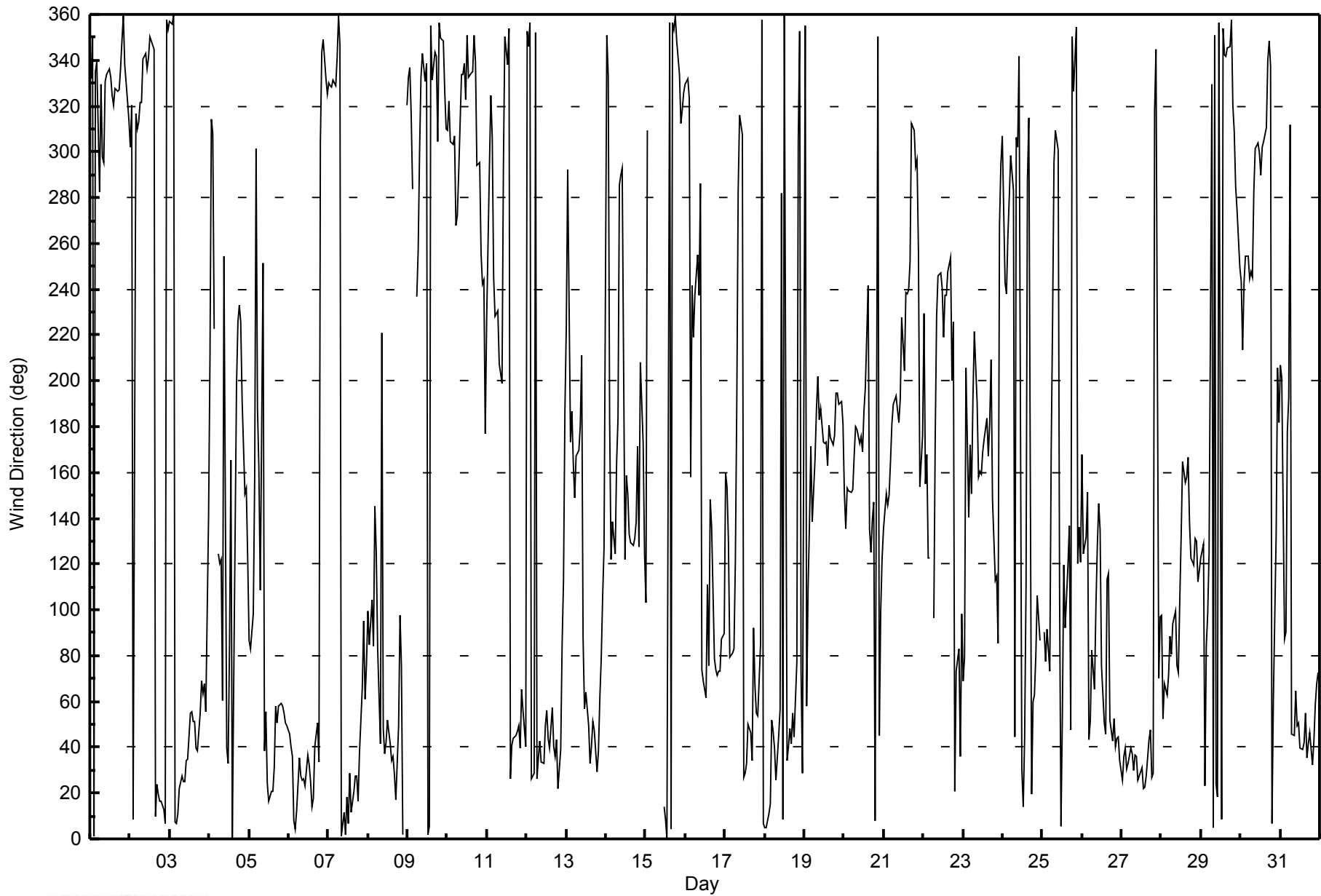
**Wind Direction (WD) - deg**  
**Barge Landing - May 2014**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 97 deg on May 4 17:00 Minimum Value: 9 deg on May 21 03:00 Percentiles: P <sub>1</sub> = 12 P <sub>10</sub> = 18 Q <sub>1</sub> = 21 Median = 27 Q <sub>3</sub> = 37 P <sub>90</sub> = 55 P <sub>99</sub> = 83																			Hours in Service: 744 Hours of Data: 729 Hours of Missing Data: 15 Hours of Calibration: 0 Percent Operational Time: 98.0																												
Day	Hourly Period Ending At (MST)																								Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																							
1-May	43	25	22	24	27	20	23	36	28	24	23	26	27	25	25	25	23	28	25	23	24	18	23	20	43																						
2-May	27	22	21	37	22	20	21	22	24	24	22	25	28	25	24	30	22	21	21	21	21	24	23	23	37																						
3-May	24	23	23	22	22	21	19	20	21	26	26	30	29	27	28	28	29	24	24	19	18	17	21	77																							
4-May	33	54	36	45	AF	55	83	53	78	52	38	44	72	64	47	78	97	60	35	88	75	22	21	18																							
5-May	21	32	52	72	56	48	63	43	78	38	29	31	30	27	27	26	25	19	20	19	19	20	19	19																							
6-May	18	19	18	22	21	23	18	19	21	24	25	23	27	22	30	29	21	34	40	28	23	15	16	12																							
7-May	13	14	12	13	18	17	30	22	26	26	28	21	30	24	34	28	23	22	21	20	25	32	22	18																							
8-May	25	20	25	20	54	50	26	37	72	48	22	20	23	25	21	21	21	28	22	24	18	48	AF	12																							
9-May	12	16	34	19	AF	30	26	39	41	63	38	52	43	52	32	31	47	53	43	24	23	22	16	12																							
10-May	15	17	19	21	30	26	27	27	27	25	22	21	25	25	29	28	30	28	33	22	22	16	13	32																							
11-May	45	25	24	29	49	24	21	24	23	25	48	27	30	32	25	22	30	23	20	21	18	19	16	30																							
12-May	44	20	19	41	39	19	40	36	33	38	37	32	29	30	23	25	22	21	20	22	29	26	20	35																							
13-May	37	50	41	33	34	30	28	29	42	45	47	35	34	26	31	26	22	23	18	21	17	24	20	90																							
14-May	34	35	67	49	16	14	29	35	80	39	66	77	50	45	31	31	22	16	19	57	18	30	36	14																							
15-May	21	85	PF	PF	PF	PF	PF	PF	PF	PF	PF	22	23	23	24	23	23	22	23	21	16	14	11	13																							
16-May	11	13	10	68	16	29	12	40	51	85	72	70	41	81	63	59	50	29	18	17	17	16	34	50																							
17-May	48	46	26	39	42	43	26	35	64	51	59	58	65	58	67	60	54	46	19	17	17	67	26	24																							
18-May	26	29	19	26	26	24	31	33	30	41	40	65	31	20	25	26	22	24	19	71	63	41	24	43																							
19-May	17	39	28	37	15	17	27	24	31	33	42	37	33	37	34	30	28	27	25	24	24	23	22	19																							
20-May	12	21	24	16	15	21	25	25	27	26	28	26	27	45	75	23	16	19	21	82	47	38	27	17																							
21-May	14	11	9	12	14	21	37	33	33	36	34	32	62	29	20	20	33	23	22	27	28	32	34	43																							
22-May	60	21	66	57	44	AF	79	71	55	37	54	65	40	28	23	24	33	41	56	36	41	27	37	51																							
23-May	71	52	80	40	46	23	34	24	52	60	22	24	35	45	43	41	55	40	31	31	17	18	62	29																							
24-May	33	54	23	32	36	31	43	62	89	38	50	39	21	30	39	81	24	38	31	24	18	21	38	AF																							
25-May	AF	33	50	64	92	58	49	57	30	52	87	69	53	71	38	45	30	71	27	53	20	53	11	12																							
26-May	31	15	12	36	75	53	43	32	31	20	23	38	20	21	24	53	23	21	22	21	19	20	21	21																							
27-May	20	20	21	20	22	21	21	20	20	20	21	23	21	23	22	21	21	21	23	25	46	57	19	18																							
28-May	24	29	18	23	18	21	35	29	26	28	30	34	27	35	30	32	33	20	24	18	14	13	10	13																							
29-May	19	27	23	49	24	64	29	27	28	35	31	26	26	25	25	24	26	25	43	24	25	33	35	30																							
30-May	27	24	18	23	24	18	21	18	34	26	26	31	32	27	26	30	27	27	30	37	23	40	16	50																							
31-May	21	37	27	44	69	45	59	42	28	28	30	28	28	25	30	29	25	25	23	21	19	23	27	28																							
Diurnal Maximum																								71	85	80	72	92	64	83	71	89	85	87	77	72	81	75	81	97	71	56	88	75	67	62	90
AF - Analyzer Failure    PF - Power Failure																																															



**WBEA**  
**Hourly Averages**

**Wind Direction (WD) - deg**  
**Barge Landing - May 2014**





# Wood Buffalo Environmental Association

## TRS Calibration Report

### Station Information

Calibration Date	May 1, 2014	Previous Calibration	April 1, 2014
Station Name	Barge Landing	Station Number	AMS 9
Reason:	Routine		
Start Time (MST)	8:40	End Time (MST)	10:35
Barometric Pressure	NA mmHg	Station temp.	23 Deg C
Calibrator Make/Model	Sabio 4010	Serial number	11071107
Cal Gas Concentration	9.98 ppm H2S	Cal Gas Expiry Date	05/30/13
Gas Cert Reference	LL86129	SO2 gas conc.	59.0 ppm SO2
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2638
DACS voltage range		DACS channel #	

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	100	100	PMT voltage	-536	-536
Analyzer Range (input)	5000	5000	Lamp voltage	853	853
Calculated slope	1.013251	1.007497	Chamber temp.	45	45
Calculated intercept	-0.198410	-0.415640	Pressure	568.5	568.5
Analyzer Background	18.9	20	Flow	0.326	0.326
Analyzer Coefficient	1.192	1.237	Intensity	39300	39300
			Converter temp.	850	850

Analyzer make/model	Thermo 45C	Analyzer serial #	328702540
Converter make/model	CDN-101	Converter serial #	376

### Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero					
as found span					
SO2 scrubber check					
calibrator zero	5000	0.0	0.0	0.3	NA
high point	5000	40.1	80.0	79.8	1.003
second point	5000	20.0	39.9	40.0	0.997
third point	5000	10.0	20.0	20.4	0.980
calibrator zero	6000	0.0	0.0	0.6	NA
as left zero	6000	0.0	0.0	0.6	NA
as left span	5000	40.1	80.0	77.7	1.030
Average Correction Factor					0.993

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

Filter changed out, New Cal Gas installed

Calibration Performed By:

Melissa Lemay



# Wood Buffalo Environmental Association

## TRS Calibration Summary

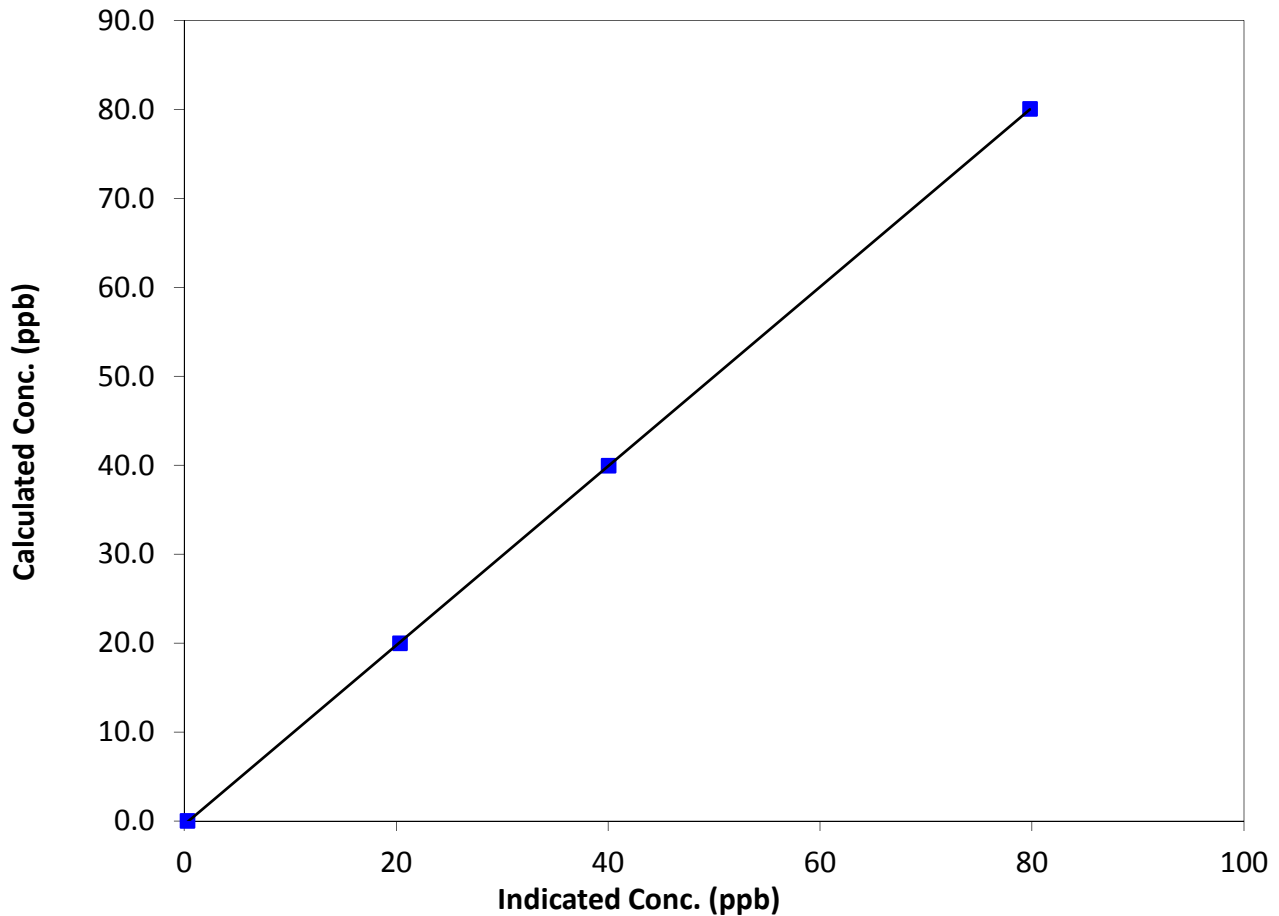
### Station Information

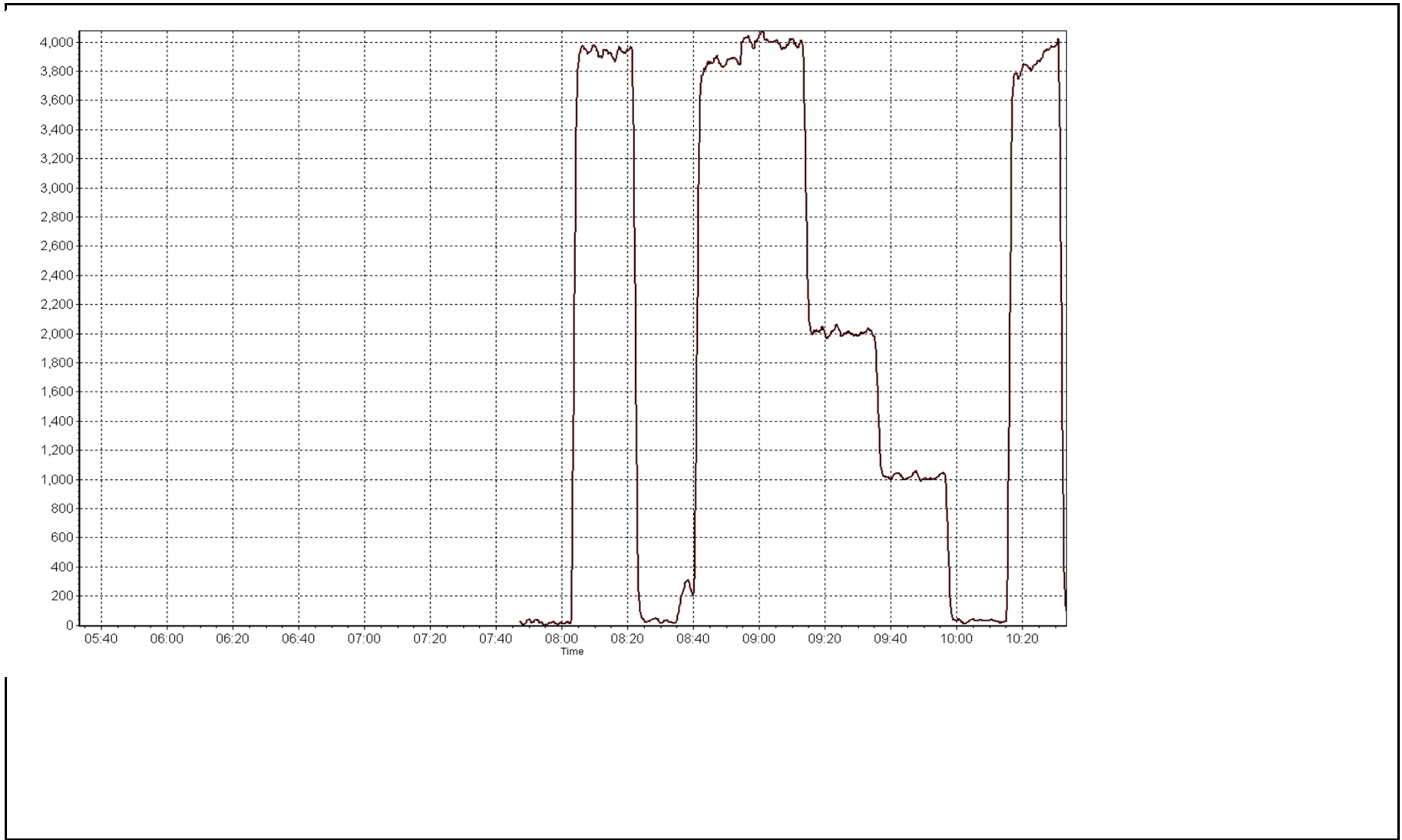
Calibration Date	May 1, 2014	Previous Calibration	April 1, 2014
Station Name	Barge Landing	Station Number	AMS 9
Start Time (MST)	8:40	End Time (MST)	10:35
Analyzer make	Thermo 45C	Analyzer serial #	328702540

### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.3	N/A	Correlation Coefficient	0.999991
80.0	79.8	1.0028		
39.9	40.0	0.9970	Slope	1.007497
20.0	20.4	0.9804		
			Intercept	-0.415640

TRS Calibration Curve







# Wood Buffalo Environmental Association

## THC Calibration Report

### Station Information

Calibration Date	Thursday, May 01, 2014	Previous Calibration	Tuesday, April 01, 2014
Station Name	Barge Landing	Station Number	AMS 9
Reason:	Routine		
Start Time (MST)	10:13	End Time (MST)	12:50
Barometric Pressure	730 mmHg	Station temp.	21 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11071107
Gas Cert Reference	139843	Cal Gas Expiry Date	11/24/2012
CH4 Cal Gas Conc.	494 ppm	CH4 Equiv Conc.	1049.5 ppm
C3H8 Cal Gas Conc.	202 ppm		
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2638
DACS voltage range		DACS channel #	5

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppm)	25	25	Sample Pressure	9.1	9.1
Analyzer Range (mv)	5000	5000	Air or Bypass press	34.7	34.7
Calculated slope	1.011081	0.989185	Fuel Pressure	24.1	24.1
Calculated intercept	-0.035222	0.007979	BKG	5.97	6.10
			COEF	4.505	4.505

Analyzer make Thermo 51i-LT Analyzer serial # 1327059296

### Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	6000	0.0	0.00	0.26	N/A
as found span	6000	89.8	15.71	15.98	0.983
calibrator zero	6000	0.0	0.00	0.00	N/A
high point	6000	89.8	15.71	15.88	0.989
second point	6000	48.0	8.40	8.47	0.992
third point	6000	18.0	3.15	3.17	0.993
calibrator zero	6000	0.0	0.00	-0.06	N/A
as left zero	6000	0.0	0.00	-0.06	N/A
as left span	6000	89.8	15.71	15.86	0.990
Average Correction Factor					0.991

Corrected As found 15.72 Previous response 15.57 % change -0.9%

#### Notes:

Filter Changed, No Maintenance Done, Zero adjusted

Calibration Performed By:

Melissa Lemay



# Wood Buffalo Environmental Association

## THC Calibration Summary

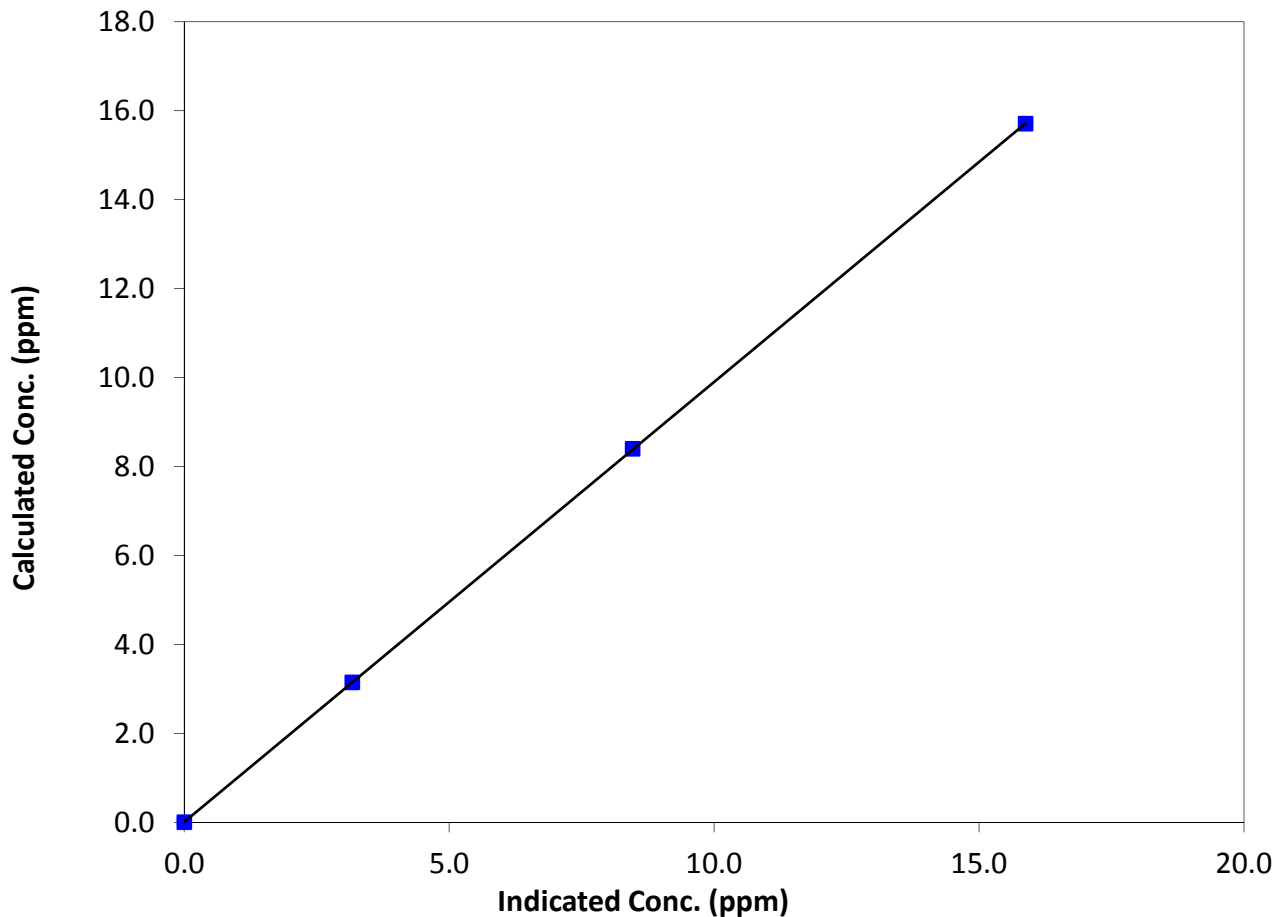
### Station Information

Calibration Date	May 1, 2014	Previous Calibration	April 1, 2014
Station Name	Barge Landing	Station Number	AMS 9
Start Time (MST)	10:13	End Time (MST)	12:50
Analyzer make	Thermo 51i-LT	Analyzer serial #	1327059296

### Calibration Data

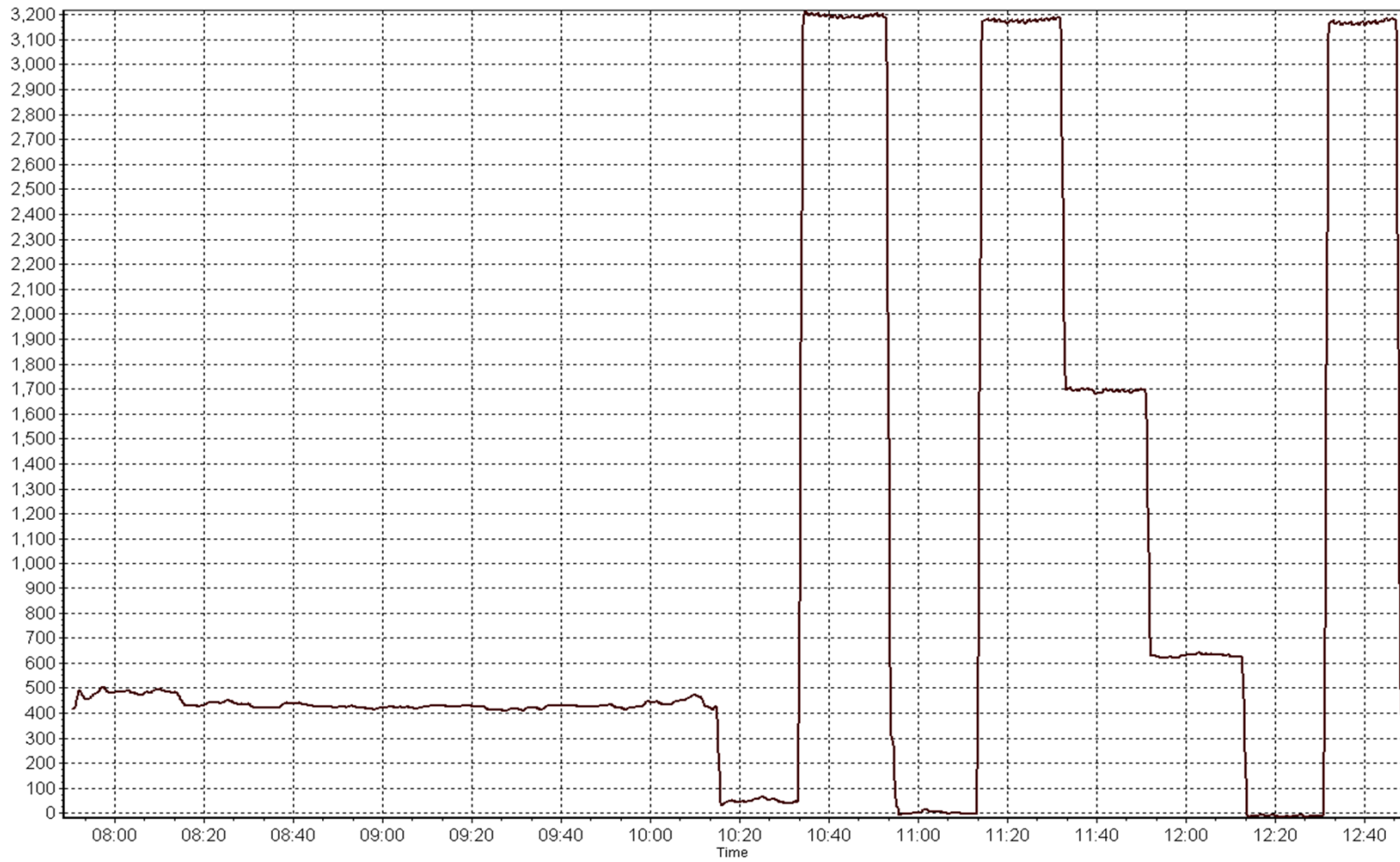
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	N/A	Correlation Coefficient	0.999997
15.71	15.88	0.9891		
8.40	8.47	0.9918	Slope	0.989185
3.15	3.17	0.9932		
			Intercept	0.007979

**THC Calibration Curve**



THC Calibration Plot

Date: May 1, 2014





**WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS 11  
LOWER CAMP  
MAY 2014**

Operations and Data Collection by:  
Wood Buffalo Environmental Association  
Fort McMurray, Alberta

QA/QC, Data Validation and Reporting by:  
Aurora Atmospheric Inc.  
Calgary, Alberta

June 27, 2014

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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP (AMS 11)  
MAY 2014

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	39	0	6	0
H2S (ppb) Average	709	35	35	100.00	7	0	1	0
THC (ppm) Average	709	35	35	100.00	15.9	-	2.9	-
Temperature (C) Average	744	0	0	100.00	29.1	-	21.1	-
Wind Speed 10 m (km/h) Average	744	0	0	100.00	34	-	-	-
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)  
MAY 2014

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	3	-	0	0	0	0	0	1	39
H2S (ppb) Average	709	0.4	0	-	0	0	0	0	0	1	7
THC (ppm) Average	709	2.16	0.6	-	1.8	2	2	2.1	2.2	2.4	15.9
Temperature 2 m (C) Average	744	9.3	6.7	-	-4.6	0.7	3.7	8.9	14.3	18.2	29.1
Wind Speed 10 m (km/h) Average	744	9.8	6	-	0	2	4	9	14	18	34
Wind Direction 10 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP (AMS 11)  
MAY 2014

OPERATIONAL NOTES

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

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Summary of Hour Averages

Lower Camp - May 2014

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 39 ppb on May 17 15:00	Maximum Daily Average: 5.7 ppb on May 17		Hours of Data:	707
Minimum Value: 0 ppb on May 1 20:00	Minimum Daily Average: 0.0 ppb on May 28		Hours of Missing Data:	37
Maximum Diurnal Average: 2.3 ppb at hour 15	Minimum Diurnal Average: 0.1 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> = 0 P <sub>90</sub> = 1 P <sub>99</sub> = 11		Percent Operational Time:	100.0

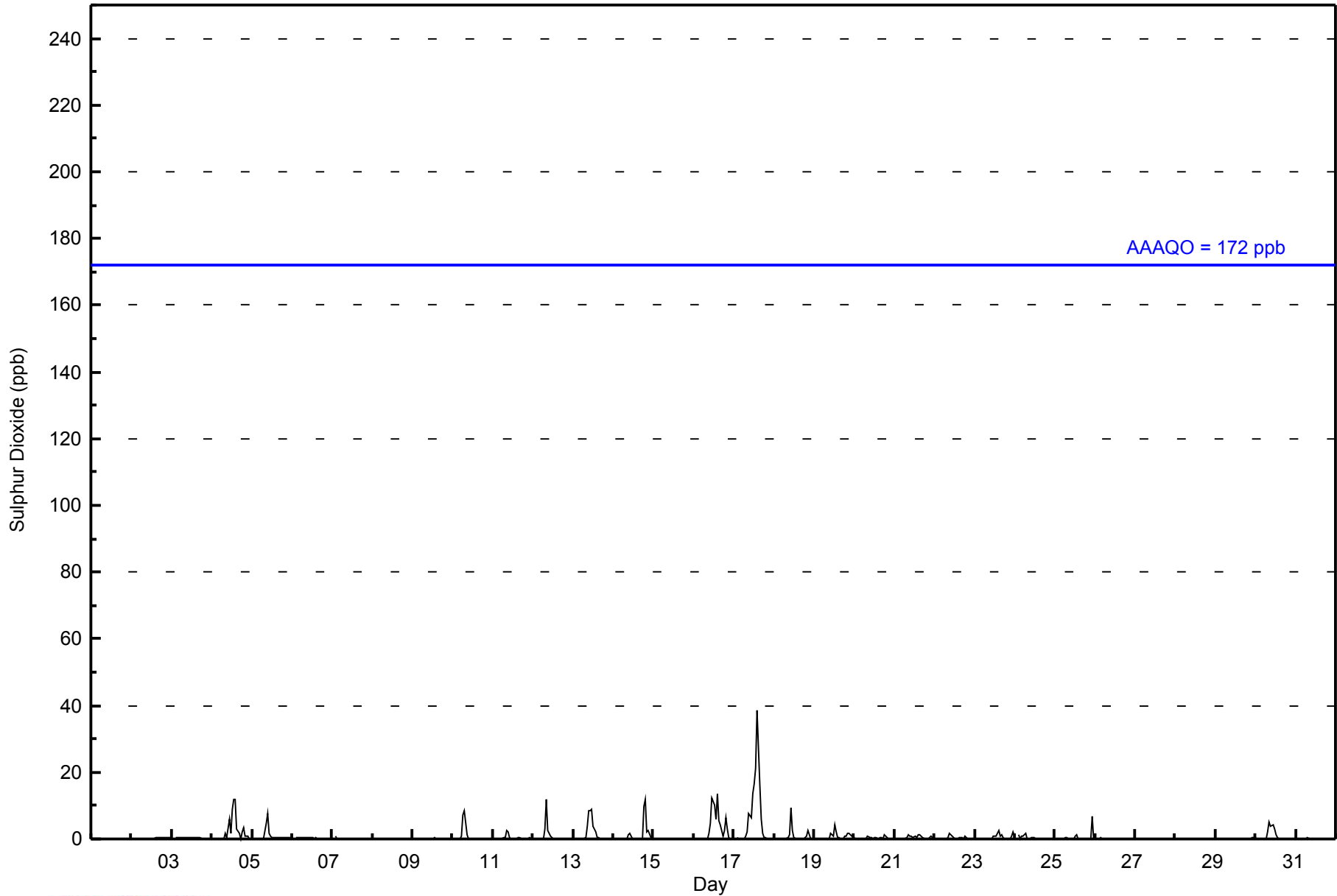
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-May	3	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	3																							
2-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0																							
3-May	0	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																							
4-May	0	Z	0	0	0	0	0	0	2	0	6	2	9	12	12	3	2	0	2	4	1	1	0	0	2.4	12																							
5-May	0	Z	0	0	0	0	0	0	5	8	2	1	0	0	1	0	0	0	0	0	0	0	0	0	0.8	8																							
6-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0																							
7-May	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	1																							
8-May	0	Z	0	0	0	0	0	0	C	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	--	0																							
9-May	0	Z	0	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-May	0	Z	0	0	0	1	7	8	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	8																							
11-May	0	Z	0	0	0	0	0	0	2	2	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0.3	2																							
12-May	0	Z	0	0	0	0	0	3	12	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	12																							
13-May	0	Z	0	0	0	0	0	0	4	8	9	9	4	2	1	0	0	0	0	0	0	0	0	0	1.6	9																							
14-May	0	Z	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	10	12	2	3	1	0	1.3	12																							
15-May	0	Z	0	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-May	0	Z	0	0	0	0	0	0	0	2	5	12	10	6	14	6	4	1	2	6	3	1	0	0	3.1	14																							
17-May	0	Z	0	0	0	0	0	1	2	7	7	13	16	21	39	16	6	2	0	0	0	0	0	0	5.7	39																							
18-May	0	Z	0	0	0	0	0	0	0	1	9	2	0	0	0	0	0	0	0	1	2	1	0	0	0.8	9																							
19-May	0	Z	0	0	0	0	0	0	0	0	2	1	4	2	0	0	0	0	1	1	2	2	1	1	0.8	4																							
20-May	0	Z	0	0	0	0	0	0	1	1	1	0	0	0	0	1	1	0	1	1	0	0	0	0	0.3	1																							
21-May	0	Z	0	0	0	0	0	0	1	1	1	1	1	0	1	1	1	1	0	0	0	1	1	0	0.4	1																							
22-May	0	Z	0	0	0	0	0	0	0	2	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0.3	2																							
23-May	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	3	1	1	0	0	0	0	0	1	2	0.5	3																							
24-May	1	Z	1	0	1	1	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2																							
25-May	0	Z	0	0	0	0	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	7	0	0.4	7																							
26-May	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	1																							
27-May	0	Z	0	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-May	0	Z	0	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-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.1	1																							
30-May	0	Z	0	0	0	0	0	2	5	4	4	3	1	0	0	0	0	0	0	0	0	0	0	0	0.9	5																							
31-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
																								0.2	--	0.1	0.1	0.1	0.1	0.4	0.6	1.2	1.4	1.6	1.6	1.6	1.6	2.3	1.0	0.5	0.2	0.6	0.9	0.4	0.3	0.4	0.2	Diurnal Average	
																								3	--	1	1	1	1	7	8	12	8	9	13	16	21	39	16	6	2	10	12	3	3	7	2	Diurnal Maximum	

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



WBEA  
Hourly Averages

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Lower Camp - May 2014







**WBEA**  
**Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Lower Camp - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	696	98.44	98.44
11 - 20	9	1.27	99.72
21 - 60	2	0.28	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Lower Camp - May 2014**

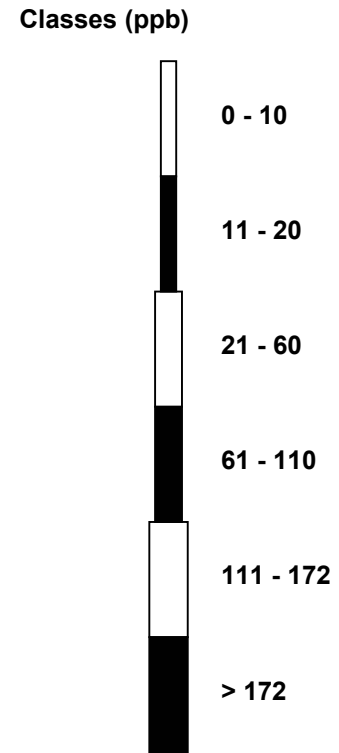
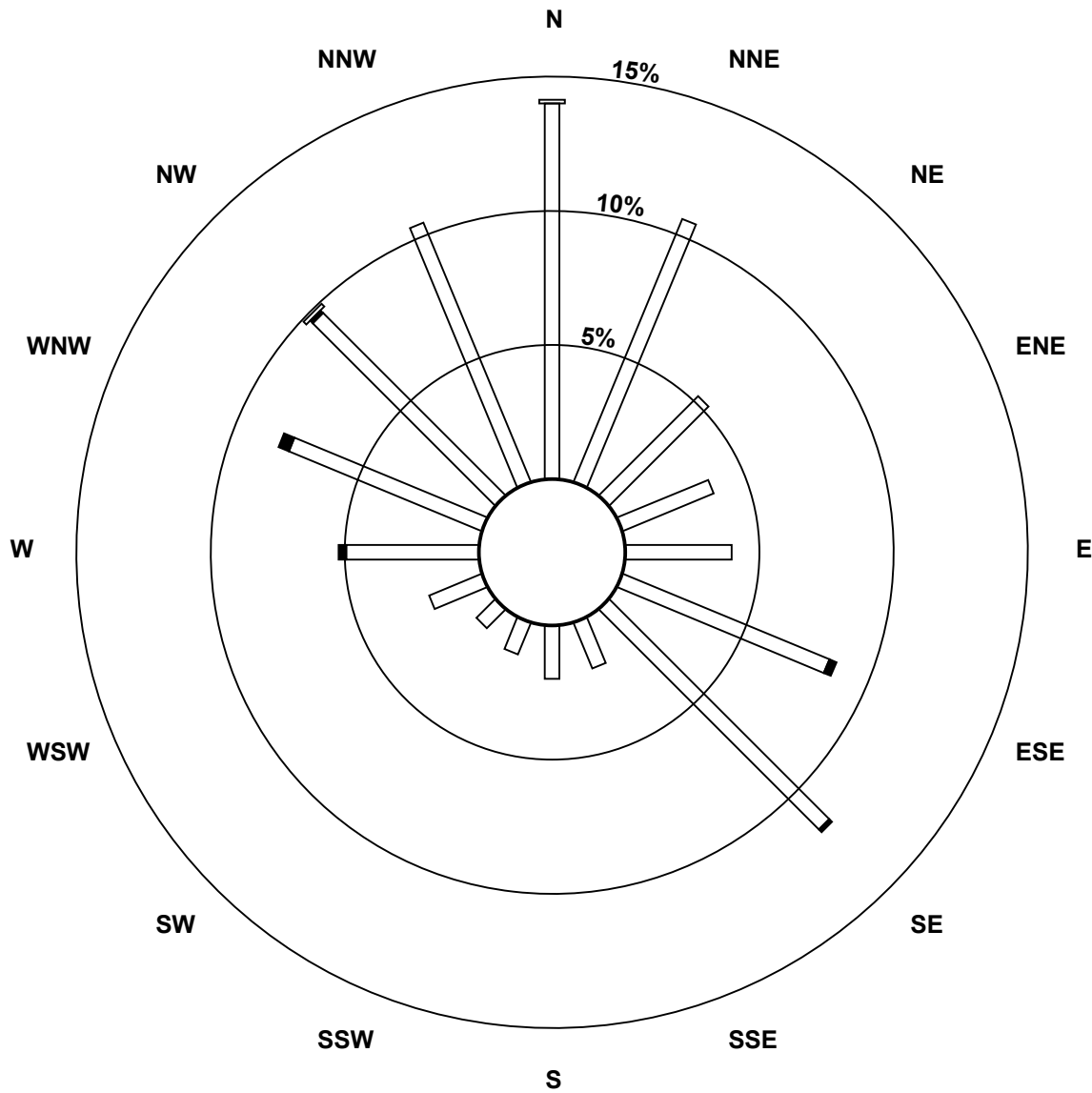
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	99	75	37	26	28	59	82	13	14	9	7	15	35	55	68	74	696
11 - 20	0	0	0	0	0	2	1	0	0	0	0	0	2	3	1	0	9
21 - 60	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	100	75	37	26	28	61	83	13	14	9	7	15	37	58	70	74	707

Total Number of Valid Hours: 707

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Lower Camp (AMS 11)**

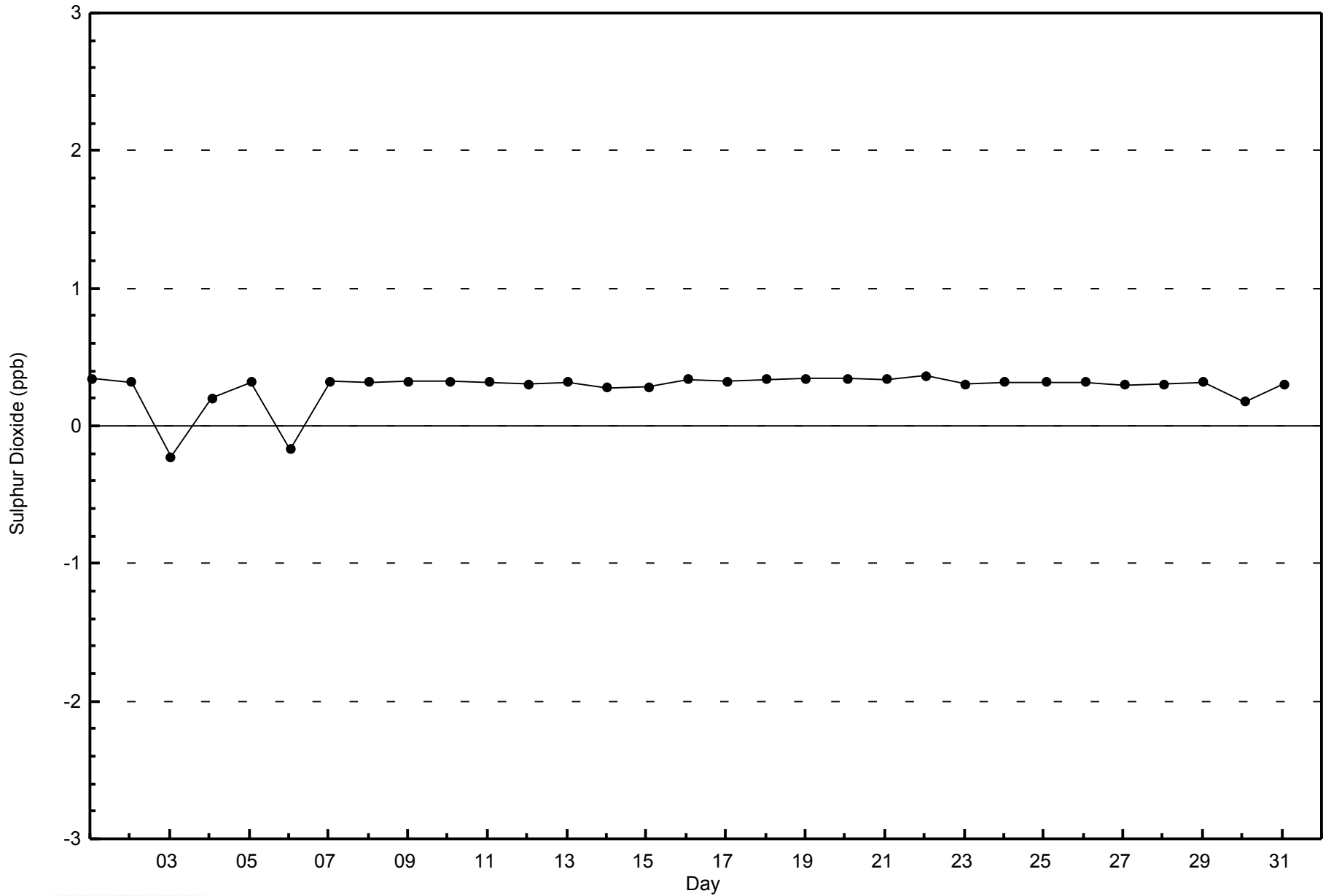


**Total Number of Valid Hours: 707**



WBEA  
Zero Responses

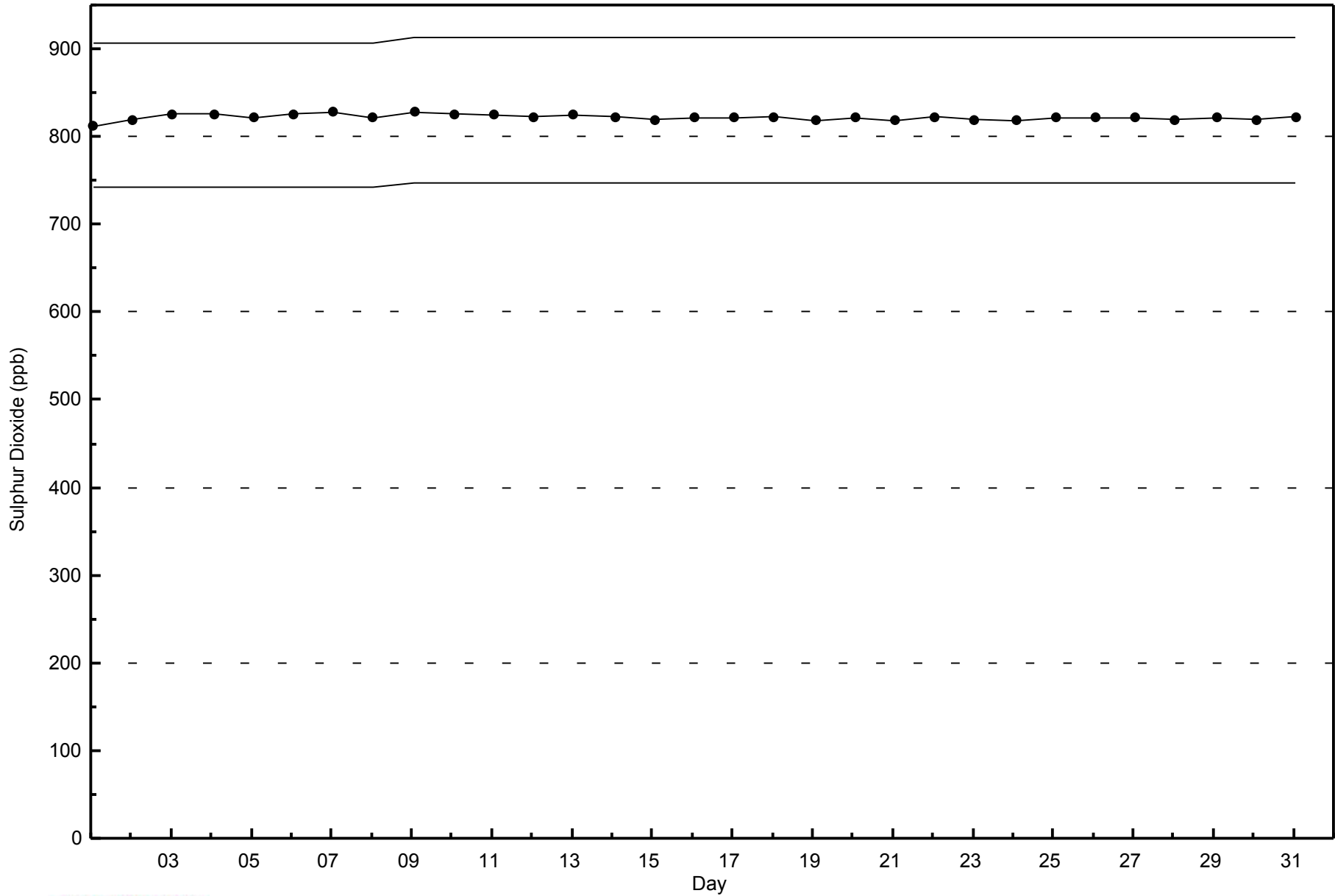
Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Lower Camp - May 2014





WBEA  
Span Responses

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Lower Camp - May 2014





Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 7 ppb on May 24 07:00	Maximum Daily Average: 0.8 ppb on May 19		Hours of Data:	709
Minimum Value: 0 ppb on May 28 01:00	Minimum Daily Average: 0.1 ppb on May 27		Hours of Missing Data:	35
Maximum Diurnal Average: 0.6 ppb at hour 7	Minimum Diurnal Average: 0.2 ppb at hour 18		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 Q <sub>3</sub> = 0 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-May	1	1	Z	1	1	0	1	1	0	0	0	1	0	1	0	0	0	0	1	1	1	1	0	0	0.6	1
2-May	0	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
3-May	0	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
4-May	0	1	Z	0	0	0	0	1	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.4	1
5-May	0	0	Z	1	0	0	1	0	0	1	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0.3	1
6-May	0	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-May	0	1	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
8-May	0	0	Z	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
9-May	0	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
10-May	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.3	1
11-May	1	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.3	1
12-May	0	1	Z	0	0	0	1	2	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	3
13-May	0	0	Z	0	1	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0.4	1
14-May	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0.4	1
15-May	0	0	Z	0	1	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.4	1
16-May	0	0	Z	0	1	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
17-May	0	2	Z	1	1	1	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0.5	2
18-May	0	0	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	2	2	1	1	0.5	2
19-May	1	1	Z	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	1	1	1	2	2	2	0.8	2
20-May	1	1	Z	1	0	0	0	0	1	0	0	1	0	1	1	1	0	0	0	0	0	0	0	0	0.5	1
21-May	0	0	Z	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	2	1	0.5	2
22-May	1	1	Z	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	2	1	1	1	0.7	2
23-May	1	0	Z	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.5	1
24-May	0	1	Z	1	1	2	7	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.8	7
25-May	0	1	Z	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.5	1
26-May	1	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
27-May	0	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
28-May	0	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
29-May	0	0	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
30-May	0	1	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
31-May	0	1	Z	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.4	1

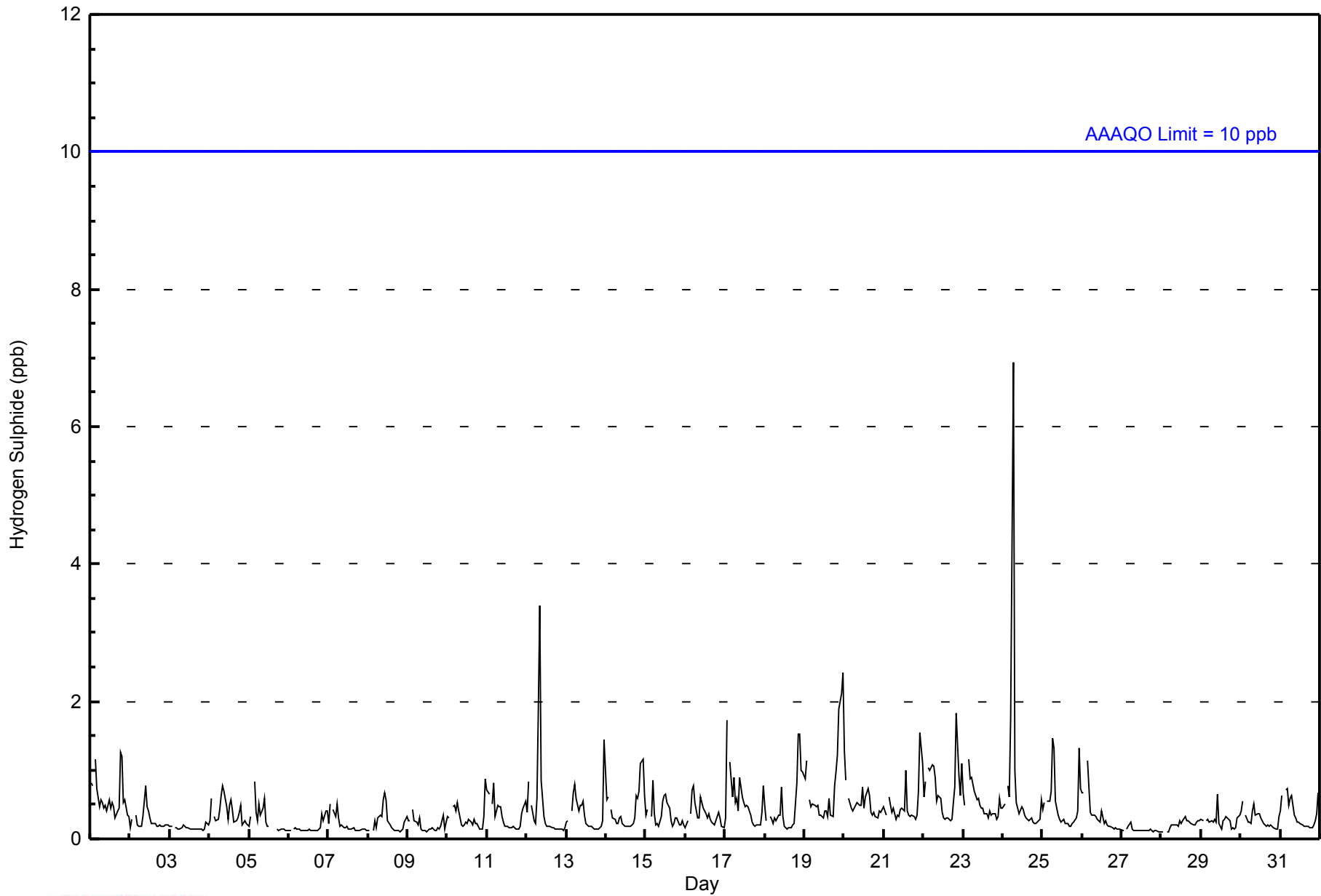
0.4	0.5	--	0.5	0.5	0.5	0.6	0.5	0.5	0.4	0.4	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.5	Diurnal Average		
1	2	--	1	1	2	7	2	3	1	1	1	1	1	1	1	1	0	0	1	1	2	2	2	2	Diurnal Maximum	

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



WBEA  
Hourly Averages

Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Lower Camp - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Lower Camp - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	707	99.72	99.72
3 - 4	1	0.14	99.86
5 - 7	1	0.14	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744





**WBEA**  
**Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Lower Camp - May 2014**

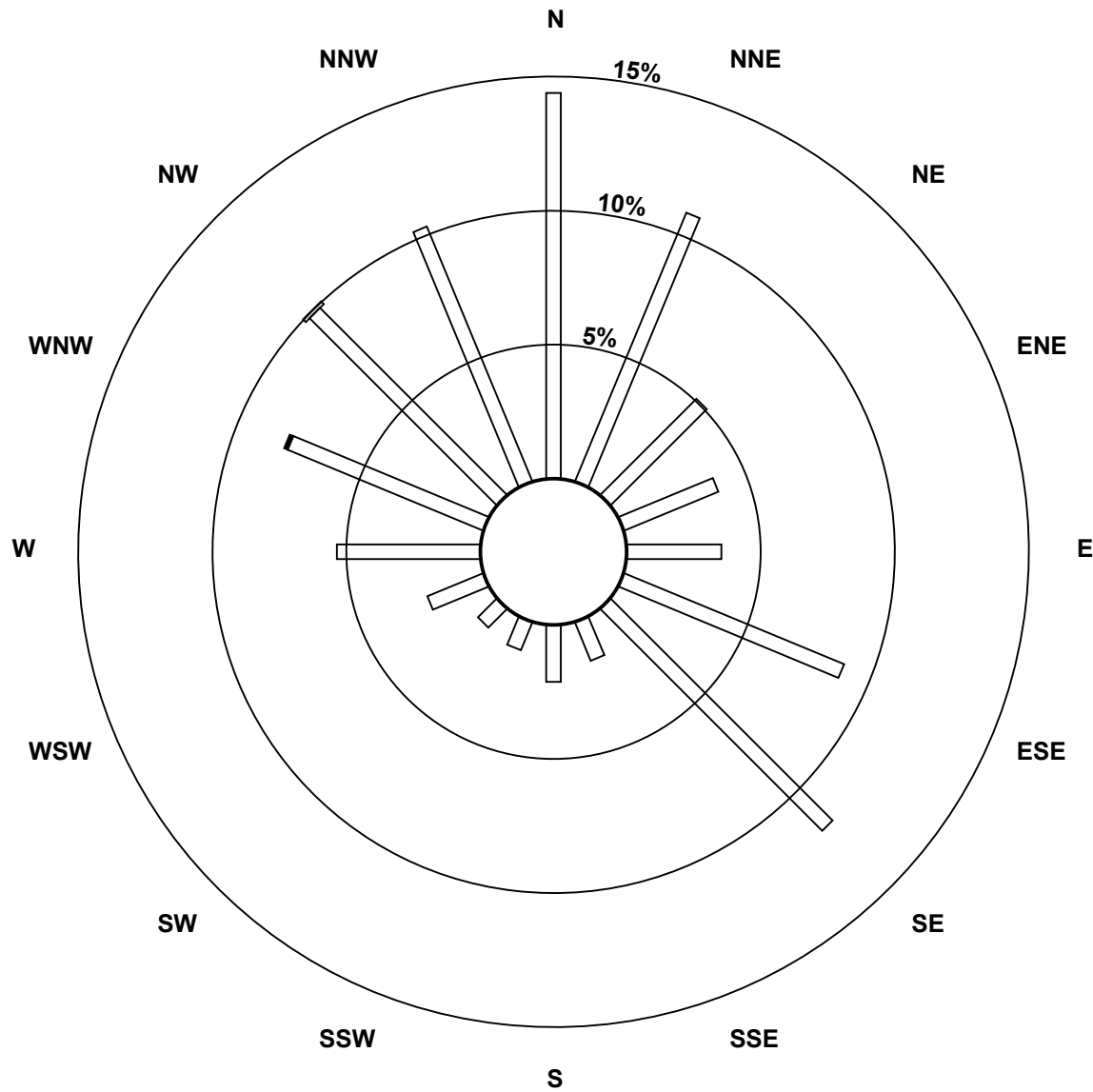
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	102	77	36	27	25	63	83	11	15	8	7	16	38	56	70	73	707
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	102	77	36	27	25	63	83	11	15	8	7	16	38	57	71	73	709

Total Number of Valid Hours: 709

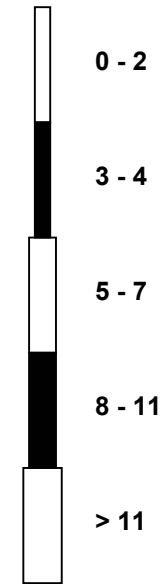
Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Lower Camp (AMS 11)**



Classes (ppb)

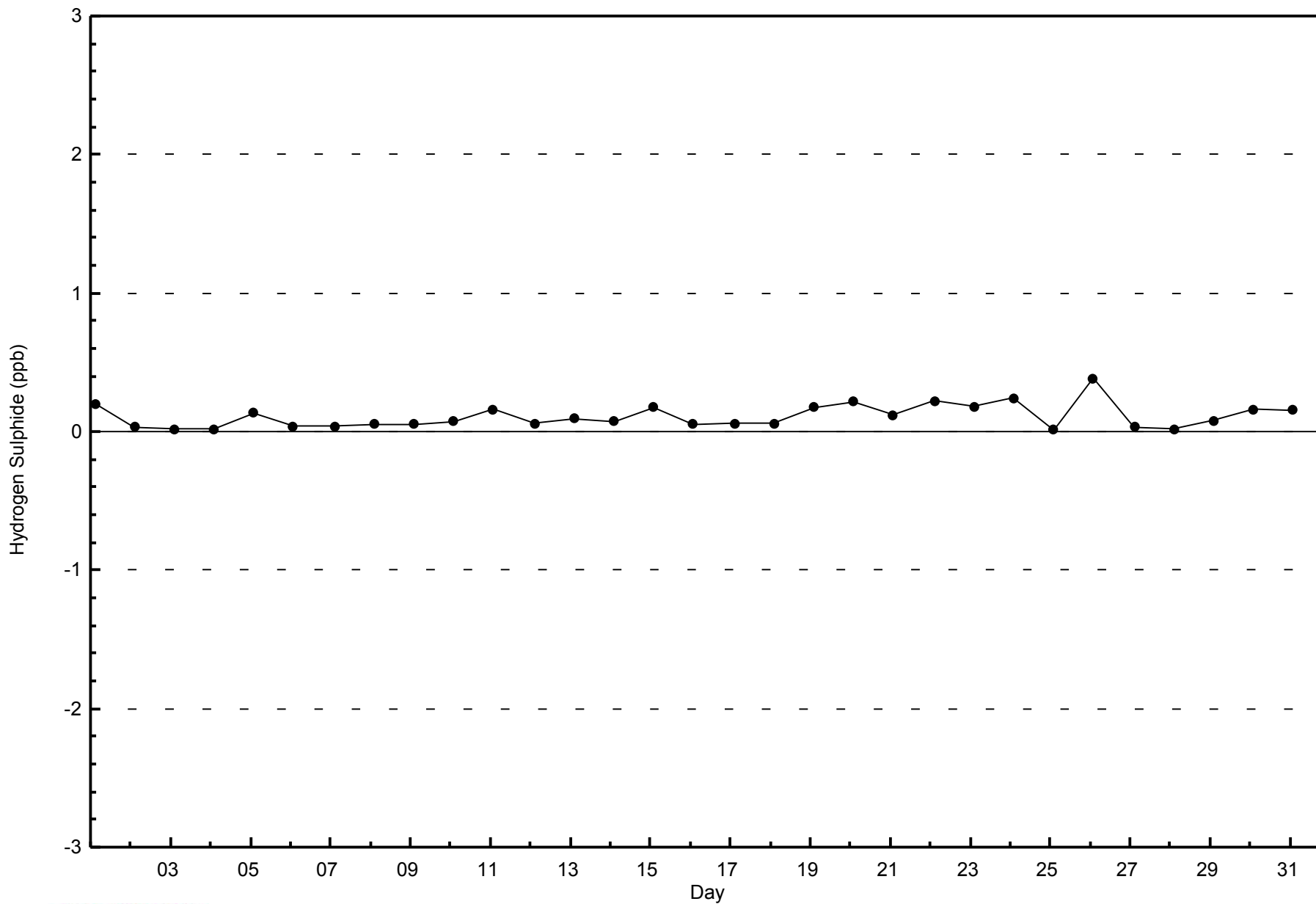


Total Number of Valid Hours: 709



WBEA  
Zero Responses

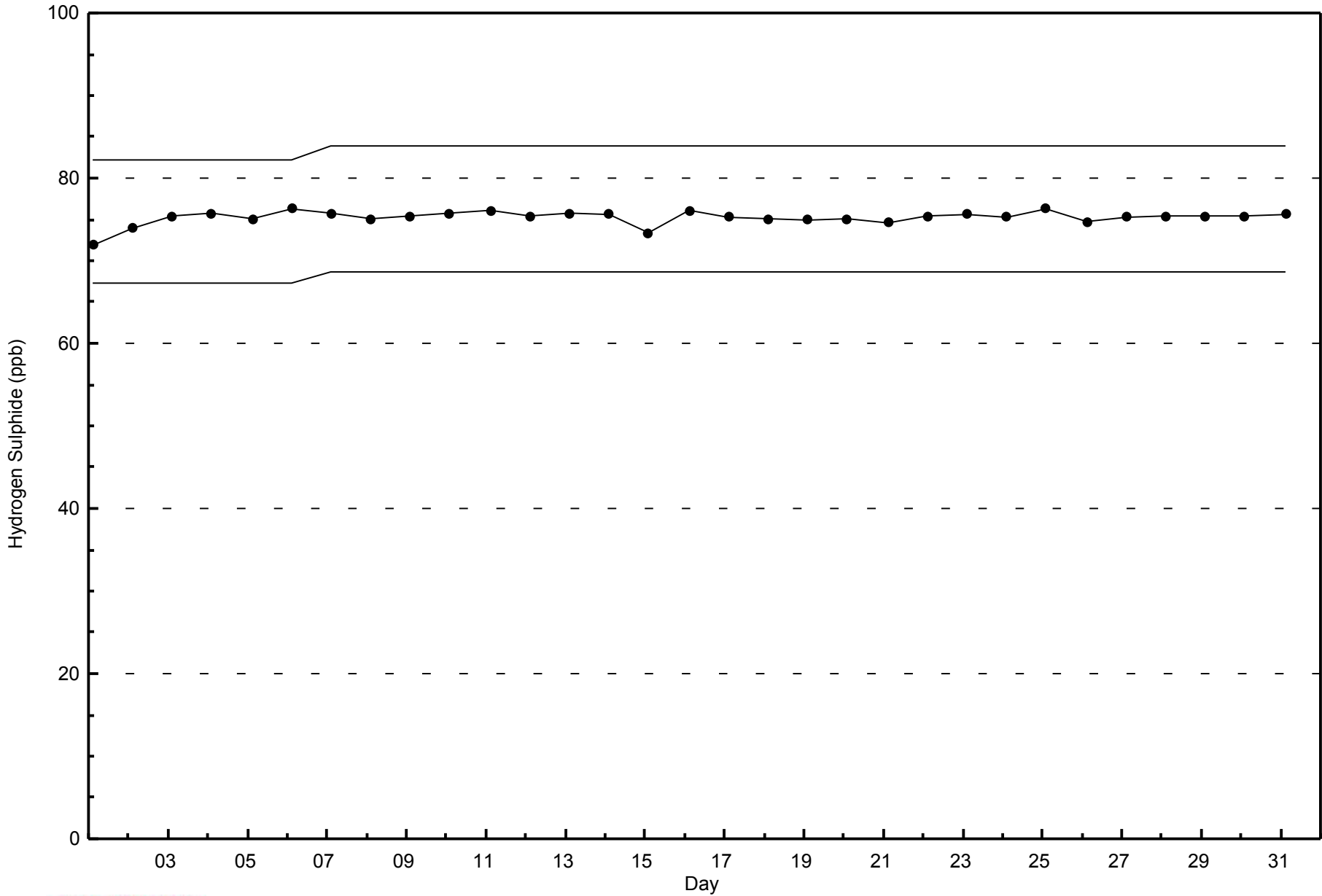
Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Lower Camp - May 2014





WBEA  
Span Responses

Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Lower Camp - May 2014

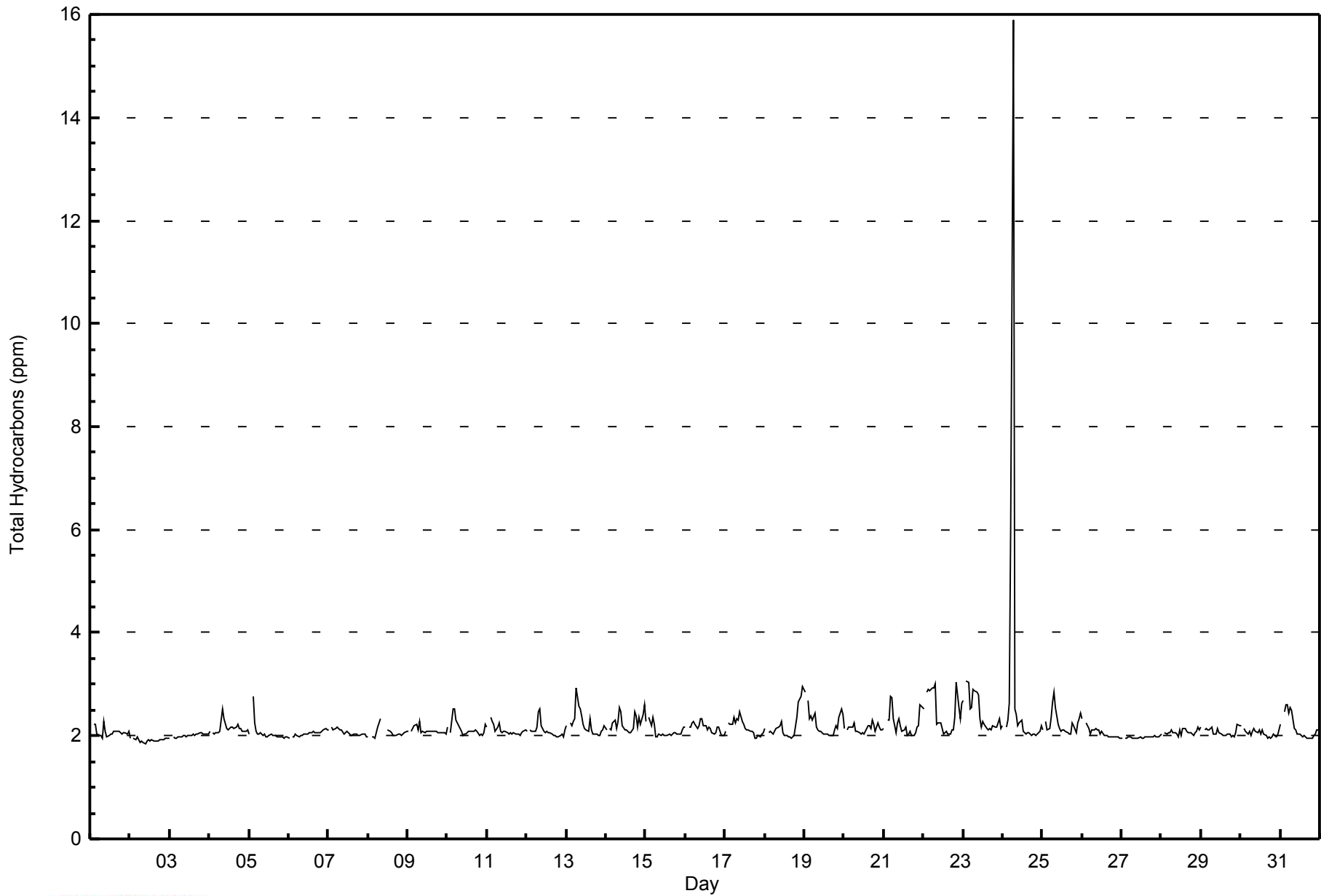






WBEA  
Hourly Averages

Total Hydrocarbons (THC) - ppm  
Lower Camp - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Lower Camp - May 2014**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	272	38.36	38.36
2.1 - 3.0	434	61.21	99.58
3.1 - 10.0	2	0.28	99.86
> 10.0	1	0.14	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Lower Camp - May 2014**

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	59	60	27	16	9	11	7	3	4	1	0	4	4	13	22	32	272
2.1 - 3.0	41	17	10	10	19	50	75	10	10	8	7	11	33	44	47	42	434
3.1 - 10.0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	2
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
<b>Totals</b>	100	77	37	26	28	61	83	13	14	9	7	15	37	58	70	74	709

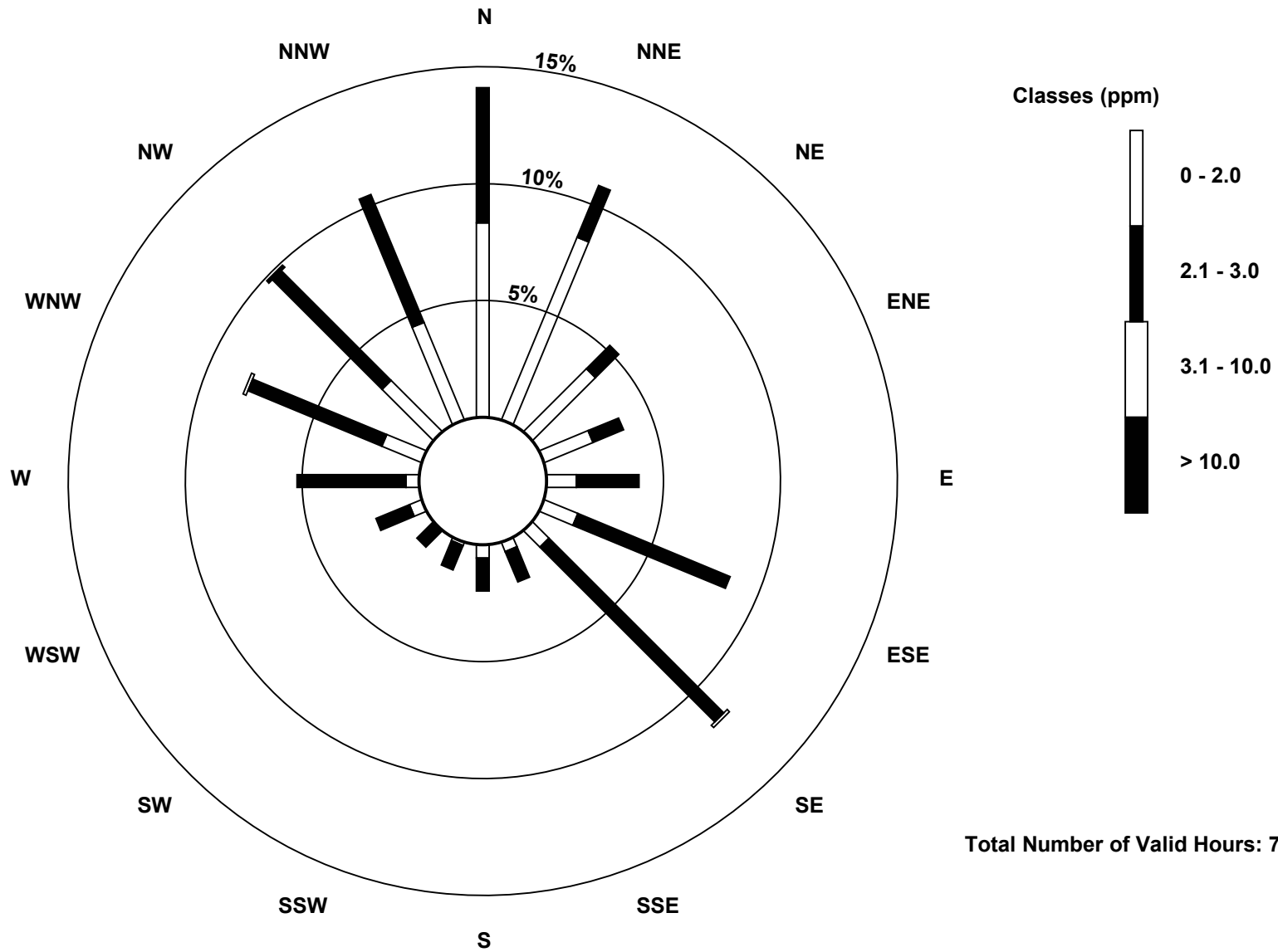
Total Number of Valid Hours: 709

Total Number of Hours: 744



Wood Buffalo Environmental Association  
Wind Rose May 2014

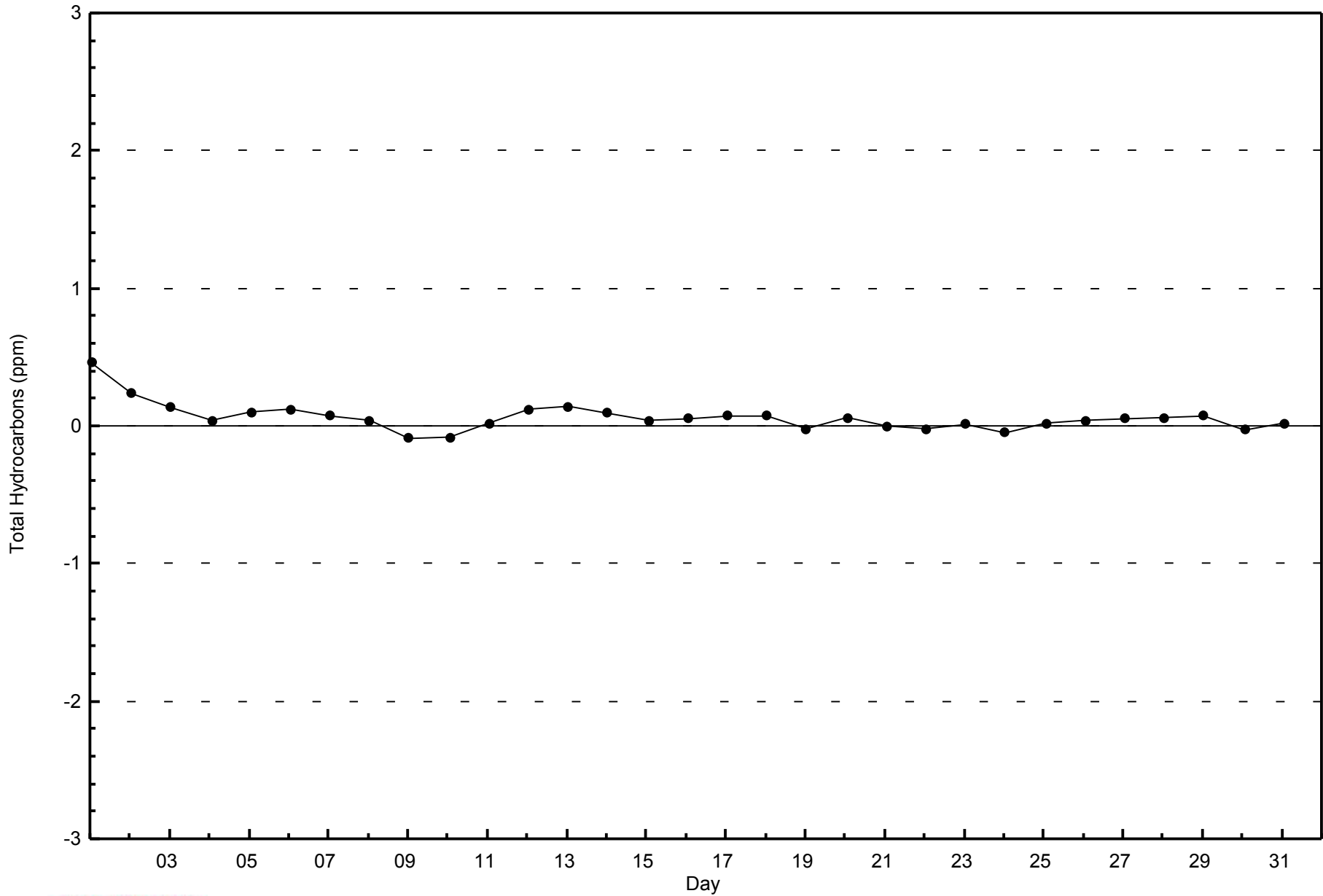
Total Hydrocarbons (THC) - ppm  
Lower Camp (AMS 11)





WBEA  
Zero Responses

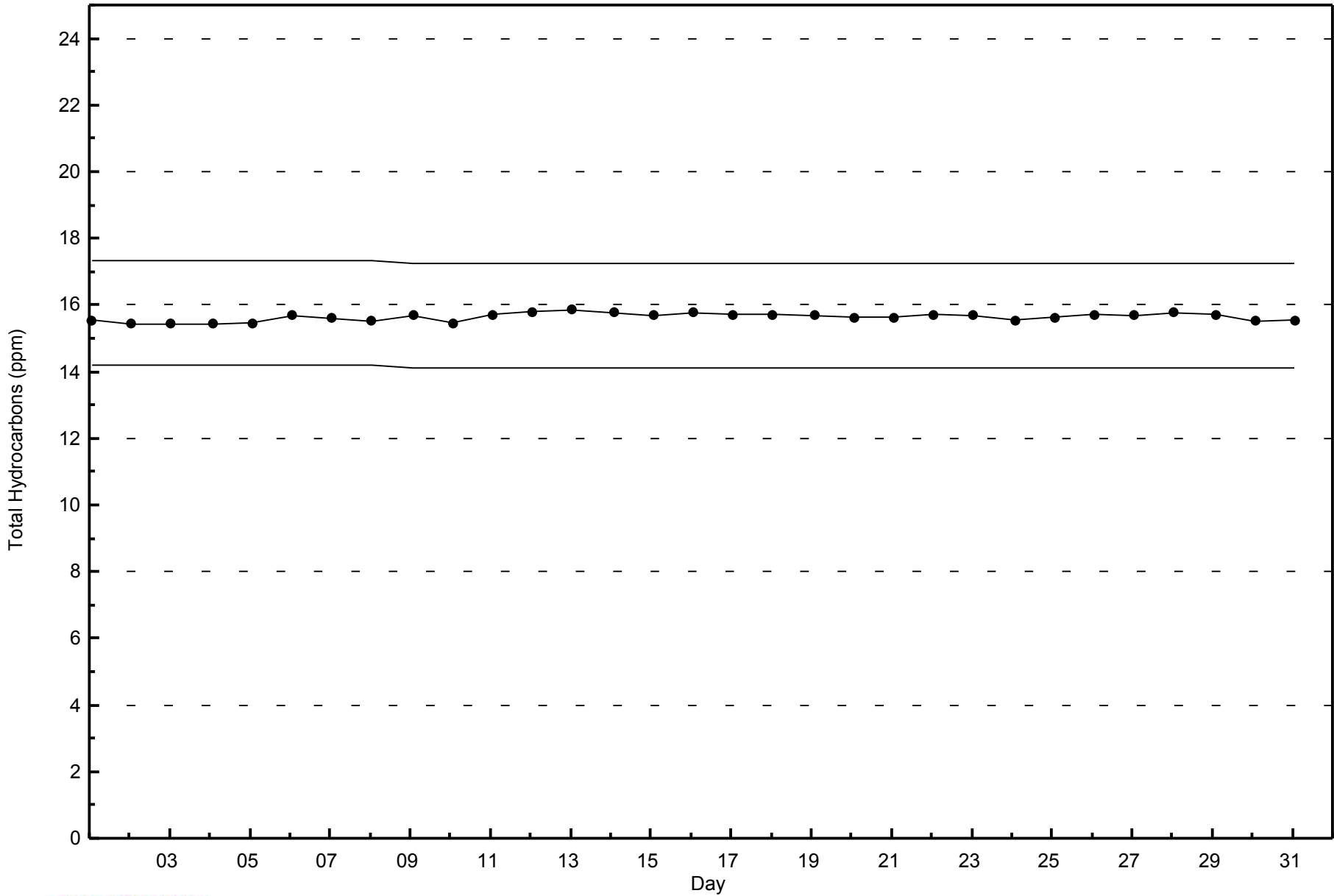
Total Hydrocarbons (THC) - ppm  
Lower Camp - May 2014





WBEA  
Span Responses

Total Hydrocarbons (THC) - ppm  
Lower Camp - May 2014



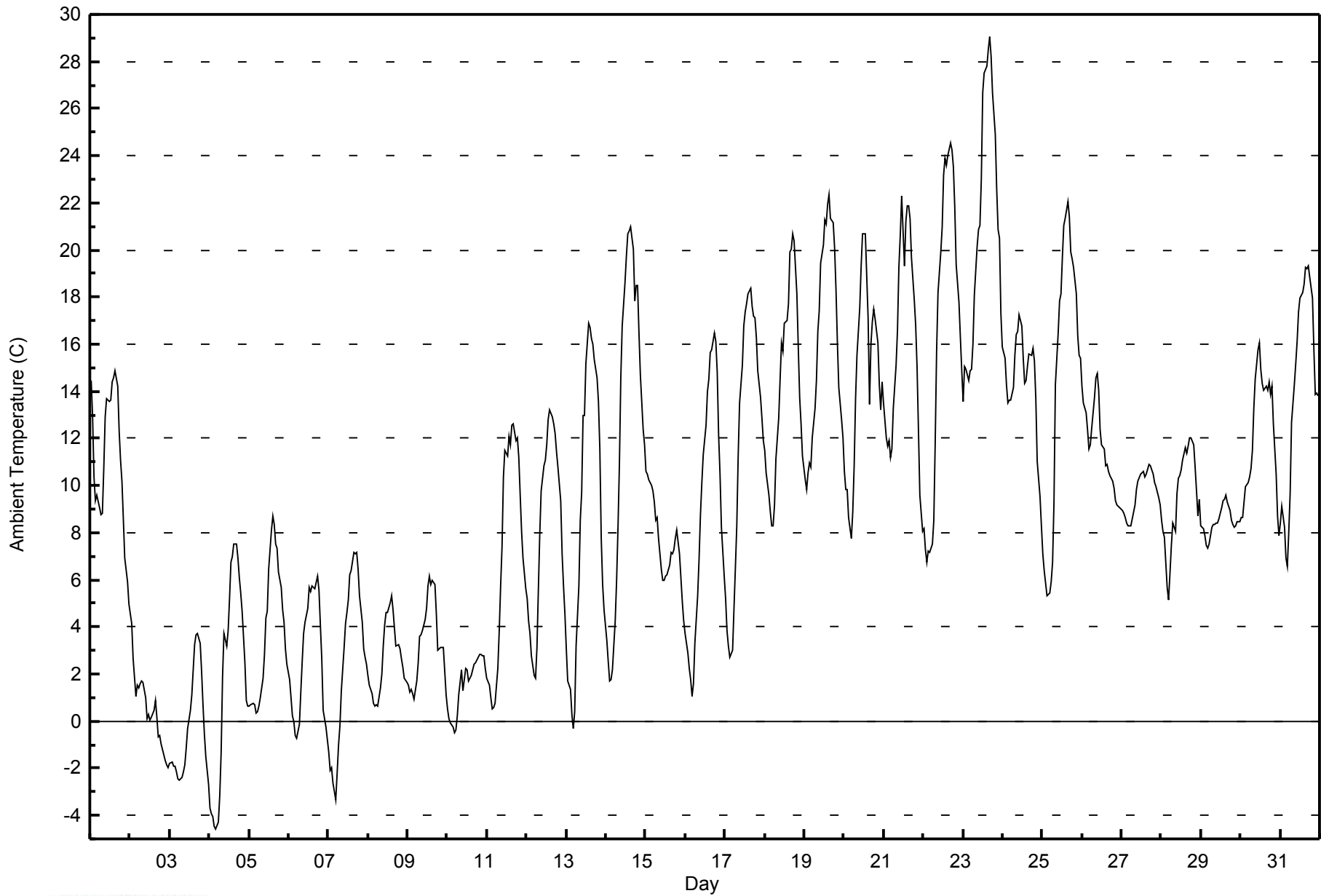


Maximum Value: 29.1 C on May 23 17:00		Maximum Daily Average: 21.1 C on May 23		Hours in Service: 744																																												
Minimum Value: -4.6 C on May 4 05:00		Minimum Daily Average: -0.3 C on May 3		Hours of Data: 744																																												
Maximum Diurnal Average: 13.1 C at hour 16		Minimum Diurnal Average: 4.8 C at hour 5		Hours of Missing Data: 0																																												
Monthly Average: 9.30 C		Percentiles: P <sub>1</sub> = -3.2 P <sub>10</sub> = 0.7 Q <sub>1</sub> = 3.7 Median = 8.9 Q <sub>3</sub> = 14.3 P <sub>90</sub> = 18.2 P <sub>99</sub> = 26.6		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-May	14.4	12.9	10.4	9.4	9.6	9.1	8.8	8.8	10.7	12.9	13.7	13.6	13.6	14.4	14.6	14.9	14.3	12.3	11.1	10.2	8.6	6.9	5.9	4.9	11.1	14.9																						
2-May	4.6	4.1	2.7	1.0	1.5	1.4	1.6	1.7	1.6	1.0	0.1	0.3	0.1	0.1	0.4	0.9	0.2	-0.7	-0.6	-1.0	-1.5	-1.7	-1.8	-2.0	0.6	4.6																						
3-May	-1.8	-1.7	-1.9	-1.9	-2.2	-2.4	-2.5	-2.4	-2.2	-1.8	-1.1	-0.3	0.4	1.1	2.2	3.3	3.6	3.7	3.3	2.1	0.7	-0.5	-1.5	-2.7	-0.3	3.7																						
4-May	-3.7	-4.0	-4.0	-4.5	-4.6	-4.3	-3.2	-1.3	1.9	3.7	3.2	3.8	5.2	6.8	7.0	7.5	7.5	7.0	6.1	5.4	4.7	2.5	0.9	0.6	1.8	7.5																						
5-May	0.6	0.7	0.7	0.7	0.3	0.4	0.6	1.0	1.8	2.8	4.3	4.7	6.4	8.1	8.7	8.3	7.5	7.3	6.3	5.7	4.7	4.2	3.1	2.4	3.8	8.7																						
6-May	1.8	1.0	0.2	0.0	-0.6	-0.7	-0.1	1.2	2.5	3.7	4.2	4.8	5.7	5.5	5.8	5.7	5.6	6.2	5.6	4.1	2.6	0.4	-0.3	-0.8	2.7	6.2																						
7-May	-1.3	-2.1	-2.0	-2.6	-3.4	-2.2	-1.0	-0.2	1.3	3.2	4.2	4.6	5.1	6.2	6.4	7.2	7.1	7.2	6.4	5.3	4.2	3.1	2.7	2.4	2.6	7.2																						
8-May	1.9	1.5	1.2	0.8	0.6	0.7	0.6	1.4	2.0	3.2	4.1	4.6	4.6	5.0	5.3	4.8	3.9	3.2	3.3	3.1	2.6	2.3	1.8	1.7	2.7	5.3																						
9-May	1.5	1.2	1.3	1.2	0.9	1.7	2.5	3.6	3.7	3.8	4.3	4.8	5.7	6.2	5.8	6.0	5.8	4.6	3.0	3.0	3.1	3.1	2.1	1.1	3.3	6.2																						
10-May	0.5	0.1	-0.1	-0.3	-0.5	-0.4	0.2	1.1	2.2	1.3	1.7	2.2	2.2	1.7	1.9	2.2	2.4	2.5	2.6	2.8	2.8	2.8	2.8	2.2	1.5	2.8																						
11-May	1.8	1.5	1.0	0.5	0.6	0.8	2.3	3.8	5.7	7.4	10.4	11.5	11.3	12.1	11.7	12.6	12.6	11.9	12.0	11.2	9.6	8.1	6.9	5.6	7.2	12.6																						
12-May	5.2	4.3	3.7	2.8	2.0	1.8	3.2	5.5	8.0	9.8	10.8	11.1	11.7	12.8	13.2	12.9	12.6	12.2	11.4	10.8	9.4	7.1	5.8	4.6	8.0	13.2																						
13-May	3.1	1.7	1.4	0.3	-0.3	0.4	3.2	5.7	8.5	9.7	13.0	13.0	15.2	16.9	16.7	16.3	16.0	15.4	14.5	13.6	11.6	7.8	5.8	4.7	8.9	16.9																						
14-May	3.4	2.5	1.7	1.8	2.2	4.3	6.0	8.2	10.9	14.6	16.8	18.6	19.7	20.7	20.8	21.0	20.0	17.9	18.5	16.5	14.7	12.4	11.7	12.6	12.6	21.0																						
15-May	10.6	10.5	10.2	10.0	9.8	9.3	8.5	8.7	7.8	6.5	6.0	6.0	6.1	6.2	6.6	7.1	7.1	7.3	7.8	8.1	7.1	6.1	5.1	4.3	7.6	10.6																						
16-May	3.7	2.9	2.2	1.7	1.0	1.6	3.3	5.3	6.8	8.8	10.1	11.3	12.6	14.0	14.5	15.6	15.7	16.5	16.1	14.8	12.2	10.5	8.3	6.1	9.0	16.5																						
17-May	5.2	3.8	3.2	2.7	3.0	4.8	6.5	8.3	11.2	13.5	15.1	16.8	17.4	17.7	18.2	18.3	17.6	17.2	17.1	16.3	14.9	13.8	12.9	11.9	12.0	18.3																						
18-May	11.5	10.6	9.6	8.9	8.3	8.3	9.2	11.1	12.8	14.5	16.0	15.7	16.9	17.0	17.7	19.9	20.0	20.7	20.4	18.1	15.9	13.7	12.6	11.3	14.2	20.7																						
19-May	10.3	9.8	10.6	11.0	10.8	12.1	13.3	14.4	16.6	17.4	19.5	20.2	21.3	21.1	21.9	22.4	21.4	21.2	20.1	18.3	16.0	14.2	12.8	12.0	16.2	22.4																						
20-May	10.6	9.8	9.8	8.7	7.7	8.9	10.8	13.7	15.5	17.6	19.3	20.7	20.7	20.7	17.0	13.4	16.0	16.9	17.5	17.1	16.1	14.3	13.2	14.4	14.6	20.7																						
21-May	13.5	12.0	11.6	11.9	11.2	11.6	13.3	15.1	16.6	19.3	20.6	22.3	19.3	21.2	21.9	21.8	21.3	19.7	17.9	16.8	15.1	12.4	9.6	8.0	16.0	22.3																						
22-May	8.1	7.3	6.7	7.2	7.2	7.5	8.5	11.9	15.7	18.2	19.9	21.0	23.2	23.9	23.6	24.0	24.6	24.3	23.5	21.8	19.4	17.8	16.3	14.9	16.5	24.6																						
23-May	13.5	15.0	14.9	14.4	14.9	14.9	16.0	18.1	20.1	20.9	21.1	23.0	26.7	27.5	27.8	28.5	29.1	28.2	26.7	24.9	22.6	20.9	20.5	17.3	21.1	29.1																						
24-May	15.9	15.4	14.3	13.5	13.6	13.6	14.2	15.5	16.4	16.5	17.2	16.8	15.4	14.3	14.5	15.0	15.6	15.5	15.8	15.3	13.7	11.0	9.6	8.3	14.5	17.2																						
25-May	7.1	6.4	5.9	5.3	5.4	5.9	6.7	9.3	14.3	16.5	17.8	18.1	19.7	21.0	21.3	22.0	21.4	19.9	19.6	19.2	18.1	16.3	15.5	15.4	14.5	22.0																						
26-May	14.2	13.5	13.1	12.4	11.6	11.7	12.5	13.7	14.6	14.8	14.1	12.4	11.7	11.6	10.9	10.9	10.6	10.4	10.2	9.9	9.3	9.2	9.1	9.0	11.7	14.8																						
27-May	8.9	8.8	8.6	8.4	8.3	8.3	8.6	8.9	9.2	9.8	10.2	10.5	10.6	10.6	10.4	10.5	10.9	10.8	10.7	10.5	10.1	9.9	9.5	9.2	9.7	10.9																						
28-May	8.5	8.1	7.8	5.7	5.1	6.3	7.4	8.4	8.0	9.7	10.3	10.4	10.6	11.1	11.6	11.4	11.7	12.0	12.1	11.7	10.8	9.8	8.7	9.4	9.4	12.1																						
29-May	8.3	8.2	7.9	7.5	7.3	7.5	8.2	8.4	8.4	8.4	8.4	8.6	9.1	9.4	9.4	9.6	9.3	8.9	8.6	8.4	8.2	8.3	8.5	8.4	8.5	9.6																						
30-May	8.7	8.7	9.3	10.0	10.1	10.4	10.7	11.5	13.3	14.5	15.8	16.1	14.9	14.4	14.0	14.2	14.0	14.4	13.8	14.2	12.6	10.5	8.7	7.9	12.2	16.1																						
31-May	8.4	9.1	8.2	6.9	6.6	8.0	9.7	12.7	14.3	15.2	16.1	17.4	18.0	18.2	18.6	19.3	19.2	19.3	18.8	17.9	15.8	13.9	13.9	13.8	14.1	19.3																						
																								6.4	5.9	5.5	5.0	4.8	5.2	6.1	7.5	9.0	10.2	11.2	11.8	12.3	12.8	12.9	13.1	13.1	12.7	12.3	11.6	10.2	8.8	7.8	7.0	Diurnal Average
																								15.9	15.4	14.9	14.4	14.9	14.9	16.0	18.1	20.1	20.9	21.1	23.0	26.7	27.5	27.8	28.5	29.1	28.2	26.7	24.9	22.6	20.9	20.5	17.3	Diurnal Maximum



**WBEA**  
**Hourly Averages**

**Ambient Temperature (AT) - C**  
**Lower Camp - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C**  
**Lower Camp - May 2014**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	49	6.59	6.59
0 - 10	363	48.79	55.38
10 - 20	280	37.63	93.01
> 20	52	6.99	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Maximum Speed: 34 km/h on May 30 14:00	Maximum Daily Speed Average: 17.4 km/h on May 2	Hours in Service: 744
Minimum Speed Value: 0 km/h on May 11 03:00	Minimum Daily Speed Average: 0.6 km/h on May 16	Hours of Data: 744
Maximum Diurnal Speed Average: 6.3 km/h at hour 18	Minimum Diurnal Speed Average: 1.1 km/h at hour 23	Hours of Missing Data: 0
Monthly Average Velocity: 3.2 km/h 3.5 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 2 Q <sub>1</sub> = 4 Median = 9 Q <sub>3</sub> = 14 P <sub>90</sub> = 18 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-May	W10	NW10	WNW5	NW6	NW7	WNW7	NW7	NW8WNW15	NW18	NNW22	NNW21	NNW17	NNW17	NNW17	NW19	NNW23	NW21	NNW16	NNW15	NNW11	NW9	NW12	NW12	NW12	NW12.9	NNW23
2-May	NW18	WNW22	NNW21	NNW15	WNW18	WNW20	NW24	NW22	NNW21	N22	NNW21	NNW19	N18	N17	N19	N17	NNE17	NNE18	N17	N17	N18	N20	N21	N21	NNW17.4	NW24
3-May	N19	N20	N19	N20	N18	N17	N17	N15	N14	N12	NNW12	NNW11	N12	NNE13	NE14	NE8	NE11	ENE14	ENE14	NE13	NNE9	NNE6	NNW3	NW1	N11.9	N20
4-May	W3	WNW3	WNW5	WNW5	WNW5	W4	W3	NW4	E3	SE4	WNW3	ENE3	ESE5	ESE6	ESE8	SE10	SE6	SSW7	SW9	SSW2	E3	S8	ESE6	ENE6	SSE1.5	SE10
5-May	E3	S2	SSE3	ESE2	SE6	SE8	SE5	ESE4	ESE6	ESE9	E5	N6	N5	NNE4	N5	E13	E14	ENE16	ENE18	NE17	NE15	ENE16	ENE15	NE11	ENE7.1	ENE18
6-May	NE10	NNE11	NNE12	N14	N14	NNE14	N18	N17	NNE17	NNE16	NNE19	NNE18	NNE15	NNE16	NE17	N16	NE14	NNE16	N11	NW8	NW4	WNW1	W4	WNW4	NNE11.8	NNE19
7-May	WNW3	W4	WNW4	NNW2	W5	NW5	N8	N12	NNW12	N18	N21	NNW20	N20	NNW18	N17	N17	N20	N17	NNE14	NE10	ENE7	ESE2	NNE3	NE3	N9.9	N21
8-May	ENE6	NE4	ENE2	E3	NW2	N4	NNE3	NNE5	N5	ENE2	NNE3	N7	NNE14	NNE12	N15	N17	NNE19	NNE16	N12	NNE10	NNE7	N6	NW5	NNW3	NNE7.1	NNE19
9-May	WNW5	NW6	NW6	NW6	NW3	N4	NW4	NW10	NNW12	NNW10	N10	N10	NNW7	N6	NNW13	NNW12	N13	N14	N6	WNW5	NW8	NNW10	NW8	NW8	NNW7.7	N14
10-May	NW9	NW10	NW9	NW10	NW10	WNW15	W18	W20	WNW23	NNW13	NW13	NW21	NNW18	NNW13	NW12	NW11	NNW10	NNW9	NW10	WNW9	WNW8	WNW6	NW2	WSW1	NW11.1	WNW23
11-May	E1	W2	SSW0	WSW1	NW1	SE2	W2	NNW1	SW7	SW8	W14	NW20	NNW12	NNW14	NNW12	W10	NW12	NNW10	NNE10	NNE11	NNE6	NNW3	SW1	NW1	NW4.6	NW20
12-May	NNW2	WNW1	WNW3	N1	N1	NW2	NW3	NNW4	WNW3	WNW3	WNW7	N9	N9	N8	N9	NNE14	NNE17	NNE18	NNE19	NNE13	NNE8	ENE5	ESE9	ESE3	NNE5.6	NNE19
13-May	NE2	N2	WNW3	NW1	E1	ESE3	ESE9	SE12	SE12	ESE13	E6	NE8	ENE5	S3	N6	N11	NNE14	NNE14	NNE15	NNE12	NE2	SSW1	N1	N1	NE3.8	NNE15
14-May	NW2	WNW3	NNW1	E1	E5	E6	ESE16	SE11	SE11	SE10	ESE16	ESE19	SE20	ESE18	ESE19	ESE20	ESE21	SE21	SE16	SE15	SE13	SW13	SE7	SE10	SE11.0	ESE21
15-May	ESE12	ESE3	SE3	SE8	NNW3	NNE5	NNE7	NNE12	N20	N21	N23	N19	N19	N20	N19	N21	N21	N15	NNW17	NNW14	WNW9	WNW7	NW2	ENE1	N10.3	N23
16-May	N1	WNW4	WNW3	NW2	E0	WNW1	NNW2	NNE4	NNE5	W6	W4	W6	WSW6	WSW6	WNW5	ENE5	NE4	NE3	SE9	SE8	E1	N2	ENE7	N1	NW0.6	SE9
17-May	WNW1	NNW1	ENE1	E1	NE1	NW4	N4	NNE3	E3	W8	W11	W9	WNW7	N3	NW5	NW6	NNW6	NE5	ENE9	NE6	ENE4	NNE1	ENE2	NNW4	NNW2.4	W11
18-May	NNW6	N5	NNE4	NNW8	N5	NNE4	NNW4	NNW4	NNW5	NW4	WNW10	N13	N13	N13	NNE12	NNE7	NNW11	NW6	S8	SSW4	WSW3	SSW1	NNW2	SE1	NNW4.7	N13
19-May	E0	SE1	SE5	SE9	SE10	SE12	SE15	SE13	SE13	SE16	SE12	SE12	SE14	SE16	S13	SSE14	SSE14	SSE13	S13	S13	S11	S8	S8	SSE7	SSE10.2	SE16
20-May	SSE5	SE7	SSE9	SE9	SE10	SE16	SE13	SSE13	SSE13	SSE14	S13	SSE14	S14	S14	SW13	SE16	SE19	SE19	SE20	SE15	NNE3	SE5	N1	SSE10	SSE10.6	SE20
21-May	SE9	SE11	SE12	SE13	SE12	SE15	SE17	SE17	SE12	ESE7	W10	SW12	WSW16	SSW9	WSW26	WSW29	WSW29	WNW20	NW17	NW9	NW5	WNW1	ESE3	ESE4	SSW5.1	WSW29
22-May	E3	ENE1	E3	WNW2	WNW2	WNW3	WNW3	ESE10	ESE13	ESE6	NE1	NNE5	W17	W15	W15	WSW12	WSW9	W7	WSW2	SSW2	W1	NNW1	WNW2	WNW1	WSW2.5	W17
23-May	E1	SE7	SE3	SE5	SE7	SE10	SE7	SE11	SE10	SE13	SE12	SE12	SE15	SE12	SE12	S6	ESE4	SSE3	NNW4	ESE3	SE9	SE7	W18	WNW26	SE5.4	WNW26
24-May	NW11	WSW10	WSW14	WSW15	W14	WNW14	NW9	NNE5	NW7	NNW10	W15	NW12	NNW12	N16	NNE11	N9	WNW16	NW15	N11	NE11	NE5	NW2	NNW1	NNW2	NW7.6	N16
25-May	NE2	NW1	NW1	W2	WSW3	W3	W4	N1	SE10	ESE13	ESE13	SE8	SE10	SE9	SE10	SE13	SE14	ESE14	ESE18	ESE17	ESE17	ESE15	SE15	ESE16	ESE8.4	ESE18
26-May	ESE12	ESE12	SE15	ESE6	NNE8	NE8	N7	ENE5	ESE10	SE17	SE17	NE6	NW7	NNW6	NW6	ESE12	E10	NE11	NE12	NE11	NE10	ENE8	NE7	NNE9	ENE6.4	SE17
27-May	N9	N9	N8	N10	NNW8	NNW8	N10	N12	NNE13	NNE14	NNE13	NNE13	NNE15	N15	N17	NNE14	NNE11	NNE11	N10	N9	NNE5	NNE5	NE3	ENE6	N10.0	N17
28-May	E6	SE2	NE6	ESE1	E4	ENE6	ENE3	ESE10	E9	E7	ESE5	SE8	ESE9	ESE7	SE9	ESE12	ESE9	ESE16	ESE15	ESE16	ESE14	ESE11	ESE4	ESE15	ESE8.1	ESE16
29-May	ESE7	ESE5	NE1	NNE3	E5	N2	N2	NNW4	NNW6	NNW6	NW9	N9	N9	NNW10	NNW10	NNW11	NW16	NW14	NW13	NW12	WNW15	WNW16	WNW18	W15	NW6.9	WNW18
30-May	W16	WSW12	W17	W21	W21	W23	W25	W24	WNW22	WNW24	WNW25	WNW27	WNW27	WNW34	WNW28	NW18	NNE4	E4	NNE3	SSW2	NE5	NE3	ESE2	S1	WNW14.3	WNW34
31-May	NE2	ENE1	ESE4	WNW1	WNW1	NW2	N2	WNW3	N6	N8	N11	NNW10	NNE10	NNE12	NNE13	NE11	NNE14	NNE13	NNE14	NNE11	NNE5	SE1	ESE13	ESE18	NNE5.5	ESE18

N1.8NNW1.9NNW1.6NNW2.0NNW2.0NNW1.8NNW2.1	N2.2	N2.7	NNE3.0	NNW4.4	NNW6.1	N5.5	N5.4	N5.9	N4.5	NNE6.0	NNE6.3	NNE5.7	NE4.4	NNE3.3	NNE1.3	NNE1.1	NE1.1	Diurnal Average									
N19WNW22NNW21	W21	W21	W23	W25	W24	WNW23	WNW24	WNW25	WNW27	WNW27	WNW34	WNW28	WSW29	WSW29	SE21	SE20	ENE17	N18	N20	N21	WNW26	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 - May 2014**

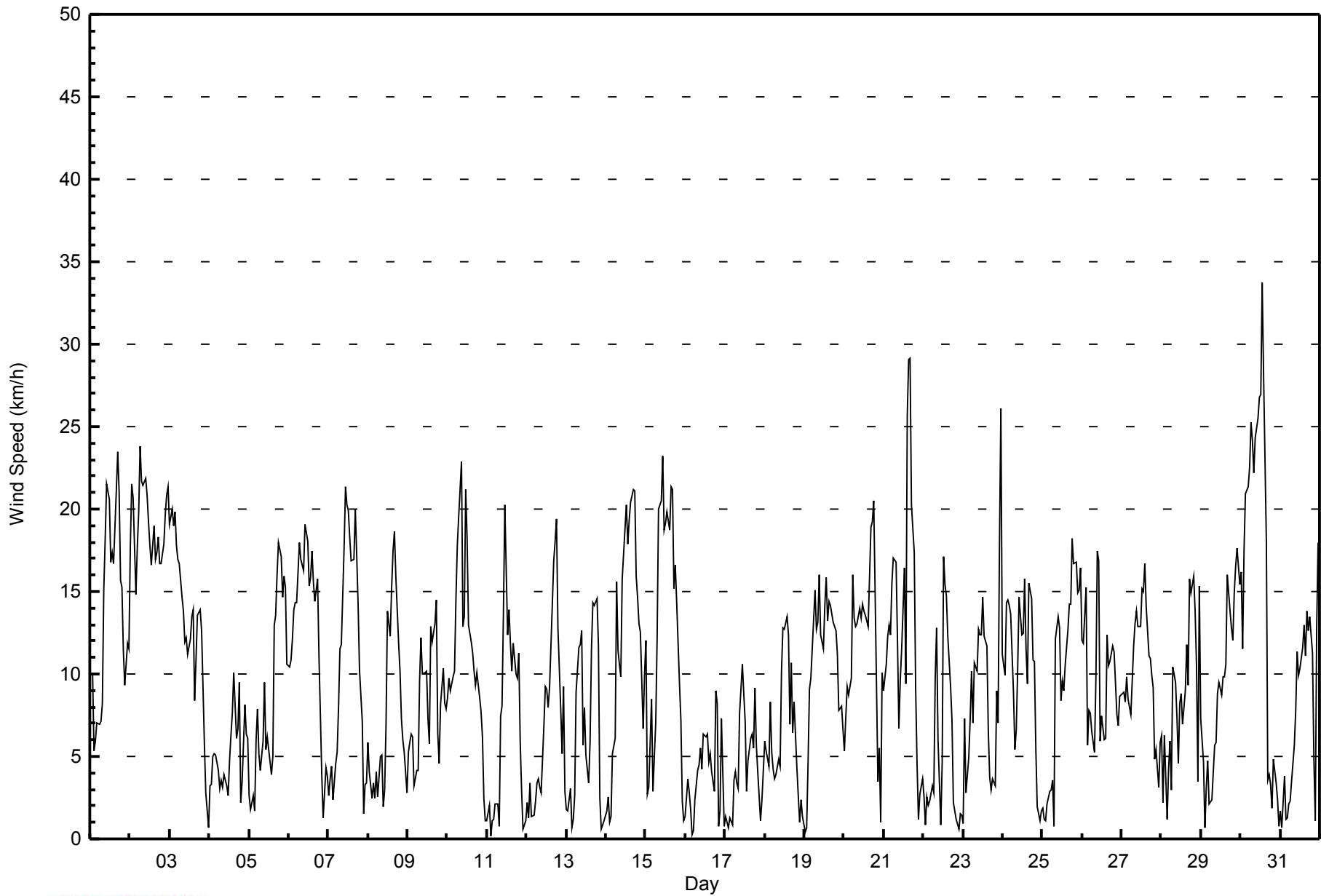
Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 11 km/h on May 23 23:00 Minimum Value: 0 km/h on May 16 02:00 Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 2 Median = 3 Q <sub>3</sub> = 4 P <sub>90</sub> = 5 P <sub>99</sub> = 7																	Hours in Service: 744 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-May	4	3	3	1	2	1	2	2	4	6	6	5	5	5	4	6	7	6	5	4	3	2	2	3	7
2-May	4	6	8	7	4	4	5	6	5	5	5	5	4	5	4	4	4	4	4	4	4	5	5	5	8
3-May	4	5	5	4	4	3	3	3	3	3	3	3	4	4	4	5	4	3	2	3	1	1	1	5	
4-May	1	1	1	1	1	1	1	1	1	1	2	2	1	3	4	3	4	3	3	4	3	2	2	4	
5-May	3	1	1	1	2	2	2	2	2	2	3	3	2	2	4	4	4	4	7	3	3	3	2	7	
6-May	2	2	2	2	2	3	4	3	4	5	5	5	6	6	5	8	5	4	4	1	2	1	1	8	
7-May	1	1	1	1	2	1	2	3	3	6	5	5	5	4	6	5	5	4	4	2	2	1	3	6	
8-May	2	2	2	2	1	1	2	1	2	1	1	2	3	4	4	4	4	3	2	3	2	1	1	4	
9-May	1	1	1	1	2	1	1	3	3	2	2	3	4	3	3	3	5	5	4	1	4	3	2	5	
10-May	2	2	1	3	3	6	3	4	4	4	5	6	5	3	2	2	2	2	2	2	1	1	1	6	
11-May	1	1	1	2	2	1	2	2	2	3	6	6	4	4	6	5	5	4	3	2	2	1	1	6	
12-May	1	1	1	1	1	1	1	1	2	2	3	4	3	4	4	4	4	5	4	4	3	3	3	5	
13-May	1	1	1	2	1	2	2	2	1	2	2	2	3	4	4	4	4	3	3	4	2	1	2	4	
14-May	2	1	2	1	1	2	3	2	2	2	3	3	4	3	3	3	3	2	4	6	4	5	2	6	
15-May	2	4	2	4	1	2	2	7	5	5	5	4	5	4	4	5	5	4	5	4	2	1	1	7	
16-May	1	0	1	1	1	1	1	1	1	2	2	2	2	3	2	2	3	2	5	3	1	1	2	5	
17-May	1	1	1	1	1	1	1	1	1	3	2	2	2	3	2	2	2	3	2	1	1	2	2	3	
18-May	2	1	2	3	1	1	2	2	2	3	3	3	3	3	3	4	4	3	3	2	1	2	1	4	
19-May	1	1	3	2	2	2	3	4	4	4	4	5	4	6	5	5	4	4	5	5	4	2	3	6	
20-May	1	2	3	2	2	3	3	4	4	5	5	5	5	5	7	10	3	3	5	4	2	3	4	10	
21-May	3	3	2	3	2	3	3	4	2	3	4	6	6	6	7	7	6	6	5	3	3	2	1	7	
22-May	1	1	1	2	1	1	1	4	3	3	2	3	4	3	3	3	3	2	2	1	2	1	1	4	
23-May	2	2	3	4	2	3	3	2	1	2	2	2	2	2	4	3	2	2	2	3	4	2	11	11	
24-May	6	5	3	4	3	4	3	3	2	4	4	4	4	4	3	3	3	3	3	2	1	1	1	6	
25-May	2	2	2	1	1	1	1	1	4	3	3	3	3	3	3	4	4	3	4	3	2	3	4	4	
26-May	4	2	4	3	3	2	2	2	3	5	4	2	2	2	3	6	3	3	2	2	2	2	2	6	
27-May	2	2	2	2	3	2	2	3	3	2	2	3	3	3	3	3	2	2	2	2	2	2	1	3	
28-May	1	2	2	2	1	2	2	3	2	3	2	2	3	2	4	3	3	3	3	3	3	2	2	4	
29-May	3	3	1	2	2	1	2	1	1	1	2	2	2	2	3	3	5	3	2	3	3	3	3	5	
30-May	3	3	4	4	4	4	5	5	5	5	5	7	10	7	7	5	2	2	1	1	6	2	1	10	
31-May	1	2	1	2	2	1	1	2	2	3	4	3	4	4	4	5	4	4	3	2	3	2	4	5	
Diurnal Maximum																									





**WBEA**  
**Hourly Averages**

**Wind Speed (WS) - km/h**  
**Lower Camp - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h**  
**Lower Camp - May 2014**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	233	31.32	31.32
6 - 11	217	29.17	60.48
12 - 19	241	32.39	92.88
20 - 28	50	6.72	99.60
29 - 38	3	0.40	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Wind Speed (WS) - km/h**  
**Lower Camp - May 2014**

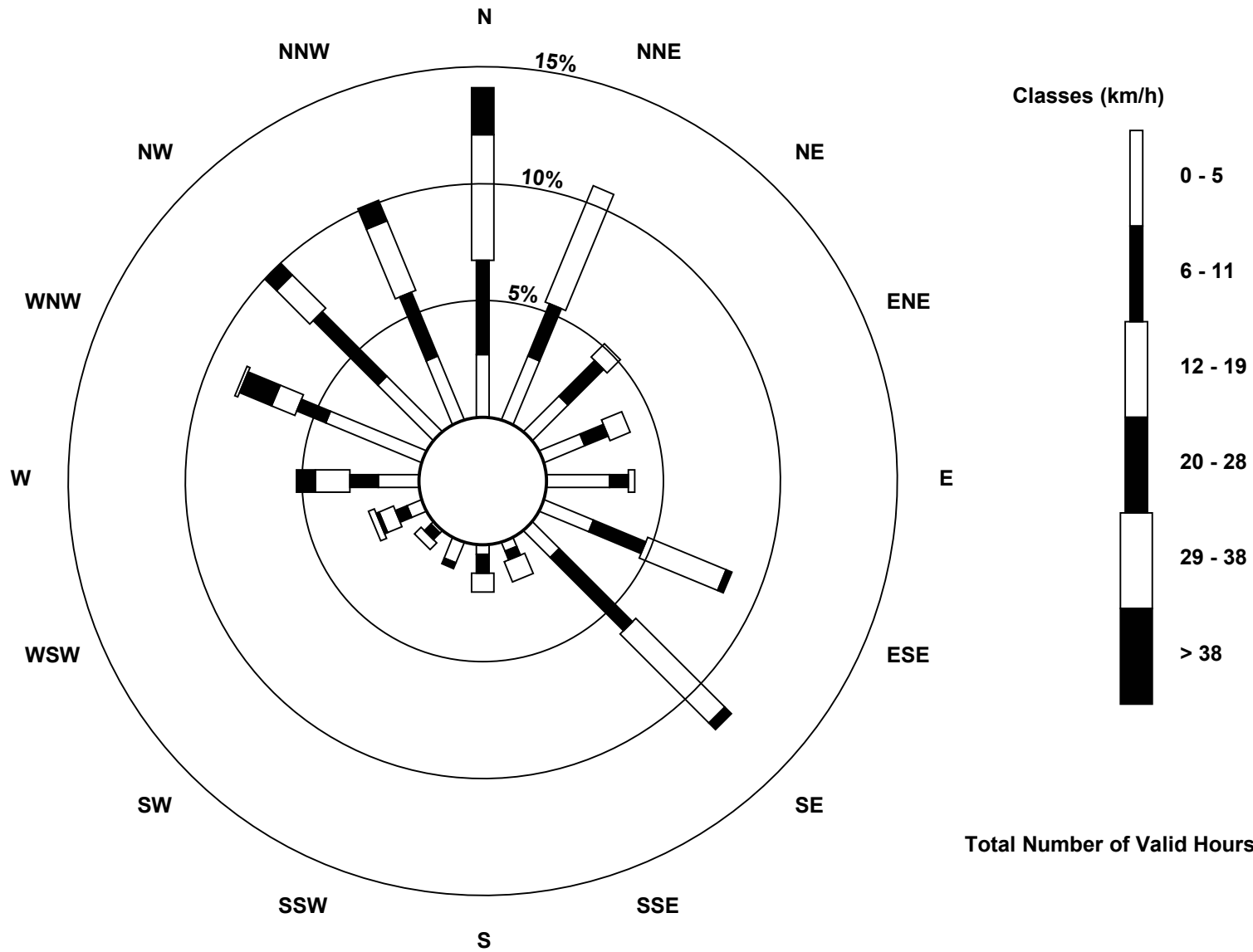
Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	20	22	16	14	20	17	12	3	3	7	1	5	13	33	25	22	233
6 - 11	30	18	16	8	6	18	33	3	6	2	3	4	9	10	29	22	217
12 - 19	40	40	6	7	2	27	40	7	6	0	3	5	11	8	15	24	241
20 - 28	15	0	0	0	0	2	3	0	0	0	0	1	6	11	5	7	50
29 - 38	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	3
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	105	80	38	29	28	64	88	13	15	9	7	17	39	63	74	75	744

Total Number of Valid Hours: 744

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Wind Speed (WS) - km/h  
Lower Camp (AMS 11)**





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

**Wind Direction (WD) - deg**  
**Lower Camp - May 2014**

Direction of Maximum Speed: 296 deg on May 30 14:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 339.4 deg on May 2	Hours of Data: 744
Direction of Minimum Speed: 192 deg on May 11 03:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 0.6 deg on May 16	Percent Operational Time: 100.0
Monthly Average Direction: 323.6 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-May	269	307	285	308	307	287	316	309	297	315	331	346	348	337	332	321	329	326	339	334	346	324	312	310	323.2
2-May	305	301	329	328	302	303	306	311	327	349	331	339	354	358	356	355	26	13	8	4	5	357	354	349	339.4
3-May	353	354	352	357	357	3	6	6	352	349	346	345	357	29	38	40	45	57	59	37	32	33	341	312	10.1
4-May	281	293	285	293	283	279	281	306	94	144	294	61	115	118	116	126	137	197	221	203	93	171	113	68	163.6
5-May	96	189	165	109	138	127	144	102	110	114	91	5	7	16	357	90	93	58	65	56	48	71	73	54	74.4
6-May	39	20	18	4	9	16	11	8	14	28	21	29	32	24	44	6	40	16	5	308	310	299	276	285	16.2
7-May	291	278	297	339	278	315	356	354	342	355	352	348	351	347	358	350	356	7	23	42	59	104	20	53	355.3
8-May	57	43	73	83	310	350	26	17	1	71	26	357	27	29	3	11	14	21	7	19	16	356	314	332	15.0
9-May	300	315	318	320	318	10	316	304	346	334	4	11	346	355	339	338	356	355	2	300	311	342	310	307	336.5
10-May	312	312	317	307	316	290	271	279	298	328	316	323	327	328	316	315	330	335	313	300	293	291	310	256	308.7
11-May	89	276	192	248	326	133	271	340	225	227	281	307	346	339	342	266	317	339	24	27	19	331	234	325	321.0
12-May	339	297	287	349	354	316	322	333	293	285	290	356	351	358	8	23	17	28	27	33	15	74	115	111	12.4
13-May	41	11	303	319	79	106	120	130	132	123	92	36	67	189	353	357	16	24	30	14	37	199	354	358	53.0
14-May	304	297	343	93	94	85	123	130	130	134	118	118	124	122	122	120	121	128	140	136	131	223	144	128	127.2
15-May	119	116	137	124	333	33	26	12	8	5	5	1	360	358	357	0	359	355	337	336	301	291	324	68	1.2
16-May	350	291	293	308	101	297	338	30	23	262	263	268	248	258	283	63	34	42	127	140	79	357	78	11	322.6
17-May	301	338	69	91	48	309	3	31	79	275	273	276	285	357	323	326	342	48	57	46	58	26	68	335	340.9
18-May	329	5	19	346	7	28	340	334	331	309	296	349	353	359	12	14	348	314	171	212	251	204	336	124	345.2
19-May	100	127	139	127	144	133	133	138	138	131	139	146	142	142	171	166	167	166	187	188	180	174	183	168	153.6
20-May	163	137	152	138	129	126	134	153	163	157	173	167	178	189	236	129	131	127	134	141	33	146	1	149	148.9
21-May	137	127	136	139	135	134	133	130	130	115	277	227	248	195	244	249	255	287	326	317	312	284	112	116	207.5
22-May	93	73	95	289	301	289	283	121	122	109	50	28	264	270	270	258	254	274	240	208	273	342	290	300	257.7
23-May	84	141	141	132	138	132	132	132	137	133	132	129	133	132	129	180	110	158	347	105	135	136	267	292	143.5
24-May	307	254	253	258	276	290	325	18	320	335	278	317	334	10	17	353	299	317	355	43	48	320	333	334	316.7
25-May	42	320	318	277	258	274	279	352	124	123	122	131	135	132	133	126	124	112	122	117	115	119	124	122	123.5
26-May	117	106	126	119	29	39	10	69	122	128	125	42	325	342	323	114	79	52	42	42	37	59	46	12	74.5
27-May	6	357	359	351	345	340	352	6	17	16	18	14	13	8	6	15	25	19	9	6	18	16	34	69	9.7
28-May	84	140	53	108	91	76	63	111	84	80	122	127	117	117	124	118	103	118	106	116	111	106	113	116	107.3
29-May	106	111	38	17	96	360	349	339	341	333	324	350	358	343	340	332	325	319	307	304	295	290	283	273	319.5
30-May	267	256	261	267	269	266	269	277	290	293	286	290	300	296	300	307	14	81	27	203	37	40	120	171	285.2
31-May	46	67	102	297	285	311	10	297	351	359	352	340	22	24	20	37	28	21	19	15	16	146	122	117	26.8

350.5 328.8 329.2 330.3 326.9 341.0 344.7 6.7 11.1 17.6 338.8 348.7 352.3 358.4 350.3 6.6 15.0 21.2 32.0 34.1 30.9 24.0 21.6 36.3  
 Diurnal Average

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



Summary of Hour Standard Deviations

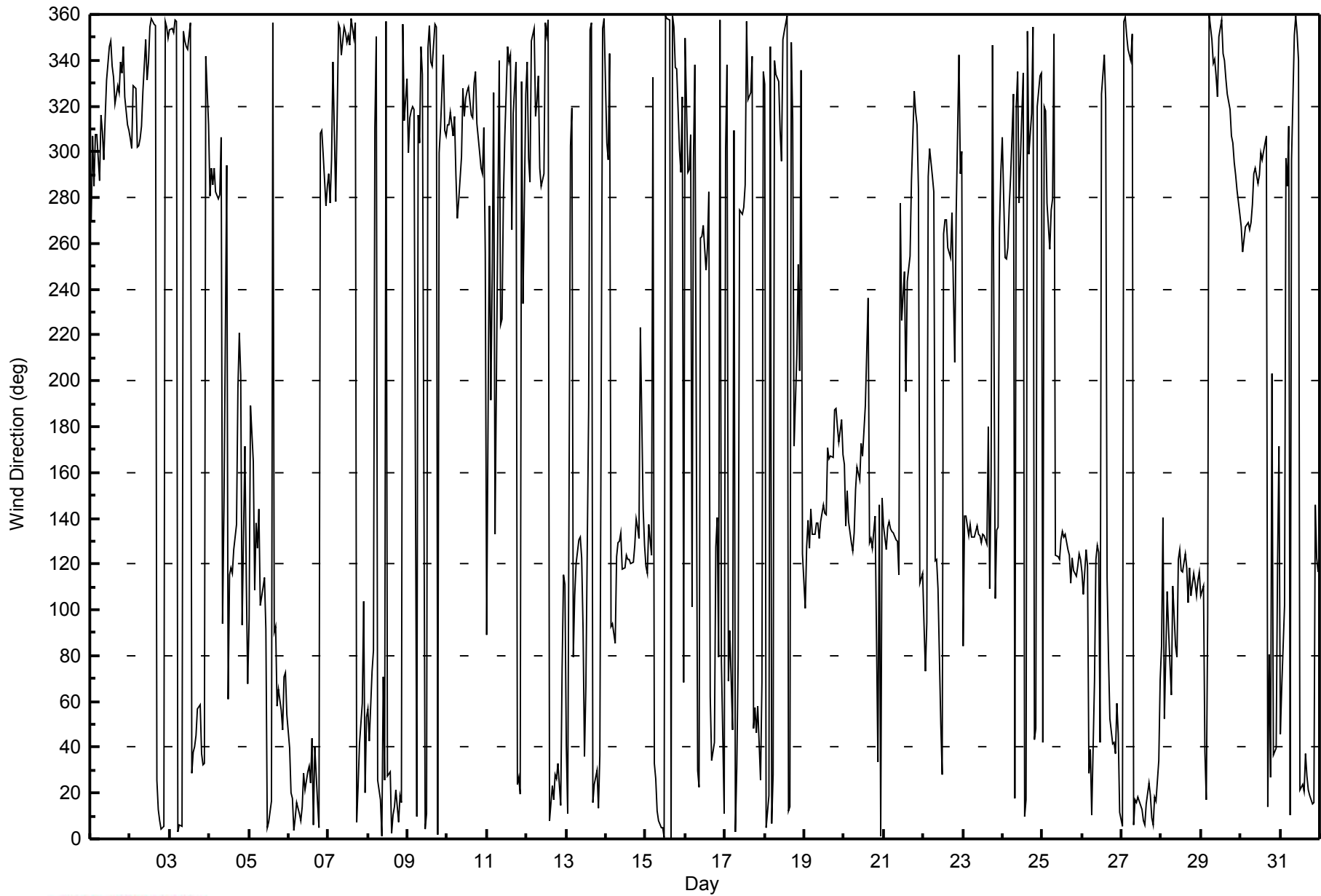
Lower Camp - May 2014

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 104 deg on May 29 03:00		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 May 14 18:00																										
Percentiles: P <sub>1</sub> = 8 P <sub>10</sub> = 12 Q <sub>1</sub> = 16 Median = 23 Q <sub>3</sub> = 44 P <sub>90</sub> = 69 P <sub>99</sub> = 95																										
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-May	33	35	25	26	15	20	19	18	11	20	19	21	20	21	21	18	18	19	19	19	19	19	13	17	35	
2-May	10	11	30	26	13	11	11	14	15	21	15	19	21	19	16	19	18	21	19	18	16	18	18	19	30	
3-May	19	19	19	17	19	16	16	20	20	22	20	20	23	22	25	60	33	26	21	12	21	22	48	77	77	
4-May	34	32	9	24	10	18	37	32	50	67	73	73	32	35	30	22	51	37	32	88	86	29	23	26	88	
5-May	93	60	42	84	24	18	34	37	22	16	40	34	51	57	75	25	27	16	23	14	10	14	12	16	93	
6-May	12	13	10	14	12	14	13	17	21	25	20	19	31	22	20	27	35	23	41	15	53	82	18	17	82	
7-May	19	18	35	47	21	29	23	19	19	21	20	21	21	21	24	23	21	25	25	16	22	65	79	48	79	
8-May	21	51	60	36	76	45	56	24	21	55	50	18	18	24	23	17	13	17	21	15	15	18	13	86	86	
9-May	15	18	16	12	57	36	36	39	20	23	19	21	47	54	28	24	23	18	33	19	19	24	19	17	57	
10-May	18	10	12	20	20	25	11	13	14	24	14	16	16	15	17	15	18	19	13	13	11	10	62	90	90	
11-May	76	81	83	79	87	45	77	97	27	34	30	24	21	28	41	49	32	25	24	12	29	46	95	80	97	
12-May	60	70	25	62	47	48	32	47	67	85	52	33	27	48	37	26	23	21	17	15	18	48	22	83	85	
13-May	64	71	46	79	52	38	12	8	8	7	36	13	40	82	77	23	28	23	17	13	46	89	82	49	89	
14-May	66	50	68	55	29	20	9	10	7	8	8	12	11	13	10	9	9	6	17	30	27	15	33	18	68	
15-May	7	95	78	26	51	31	15	25	16	16	17	17	16	16	17	16	17	17	19	18	12	9	51	52	95	
16-May	37	12	18	52	84	75	49	20	48	42	78	47	43	42	61	20	69	61	37	13	90	85	16	85	90	
17-May	65	72	90	64	71	17	36	18	55	46	15	26	34	68	51	44	23	38	12	10	31	78	73	66	90	
18-May	27	26	36	20	24	34	57	52	47	50	25	18	18	18	19	64	59	56	25	64	79	92	67	89	92	
19-May	96	94	71	14	15	11	9	19	27	14	22	34	25	25	29	28	27	26	26	26	24	23	22	22	96	
20-May	22	18	24	21	14	9	16	24	29	31	31	31	29	30	44	56	8	7	14	14	66	60	99	22	99	
21-May	22	15	10	13	11	9	8	15	8	30	53	43	36	44	19	16	14	36	19	17	37	94	15	21	94	
22-May	48	79	24	82	53	35	30	44	11	38	91	70	16	14	14	19	29	18	80	61	89	96	78	54	96	
23-May	78	16	66	45	31	18	31	10	8	8	10	6	6	11	25	55	64	63	47	66	24	29	58	12	78	
24-May	24	20	13	12	12	18	31	39	33	27	24	45	26	18	22	30	14	15	22	15	22	60	66	60	66	
25-May	75	49	78	50	48	35	26	84	19	14	18	26	22	19	24	20	18	14	11	9	8	10	16	12	84	
26-May	19	12	15	49	24	21	29	33	21	15	16	32	17	22	41	48	17	15	10	13	14	18	24	15	49	
27-May	18	18	20	19	21	22	19	16	19	13	15	16	14	16	14	14	17	15	13	14	29	29	64	21	64	
28-May	22	73	30	75	33	22	64	22	15	30	39	18	20	25	22	13	21	13	16	12	12	11	68	14	75	
29-May	48	69	104	64	34	51	69	40	28	25	16	19	18	22	23	21	16	14	12	14	11	11	12	13	104	
30-May	12	13	12	12	11	12	11	12	15	13	15	16	19	11	13	15	60	35	74	61	78	61	49	81	81	
31-May	75	97	31	81	90	59	58	59	42	20	24	27	40	28	26	33	24	25	18	13	51	98	16	9	98	
		96	97	104	84	90	75	77	97	67	85	91	73	51	82	77	64	69	63	80	88	90	98	99	90	
		Diurnal Maximum																								



**WBEA**  
**Hourly Averages**

**Wind Direction (WD) - deg**  
**Lower Camp - May 2014**





# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Report

### Station Information

Calibration Date	May 8, 2014	Previous Calibration	April 2, 2014
Station Name	Lower Camp	Station Number	AMS 11
Reason:	Routine		
Start Time (MST)	8:27	End Time (MST)	11:37
Barometric Pressure	760 mmHg	Station temp.	21 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11051107
Cal Gas Concentration	51.3 ppm	Cal Gas Expiry Date	5/29/2014
Gas Cert Reference	LL107920		
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2634
DACS voltage range	0-5v	DACS channel #	SE1

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	1000	1000	PMT voltage	-558	-558
Analyzer Range (mv)	5000	5000	Lamp voltage	877	877
Calculated slope	0.998996	0.992457	Chamber temp.	45.1	45.1
Calculated intercept	1.393682	0.166010	Pressure (mmHg)	715.2	715.2
Analyzer Background	20.8	20.8	Flow (lpm)	0.498	0.498
Analyzer Coefficient	0.988	0.988	Intensity	34xxx	34xxx

Analyzer make TEI 43C Analyzer serial # 518112184

### 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	NA
as found span	5001	80.9	829.9	835.0	0.994
calibrator zero	5000	0.0	0.0	0.3	NA
high point	5001	80.9	829.9	836.4	0.992
second point	5000	40.9	419.6	422.0	0.994
third point	5002	20.4	209.2	210.4	0.994
calibrator zero	5000	0.0	0.0	0.4	NA
as left zero	5000	0.0	0.0	0.6	NA
as left span	5000	80.9	830.0	836.0	0.993
Average Correction Factor					0.994

Corrected As found 834.7 Previous response 829.3 % change -0.6%

#### Notes:

No adjustments made, no issues to report.

Calibration Performed By:

Zack Eastman





# Wood Buffalo Environmental Association

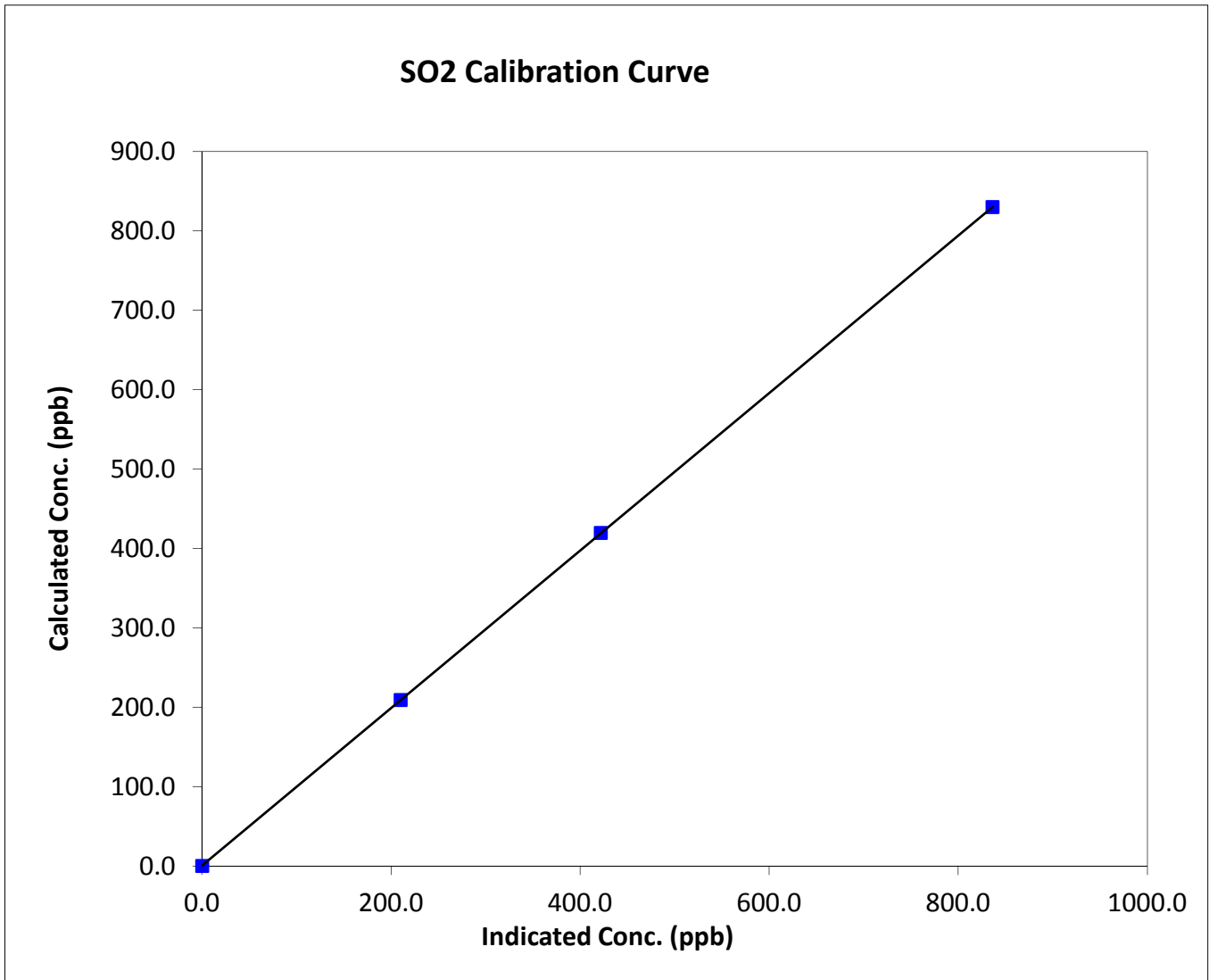
## SO<sub>2</sub> Calibration Summary

### Station Information

Calibration Date	May 8, 2014	Previous Calibration	April 2, 2014
Station Name	Lower Camp	Station Number	AMS 11
Start Time (MST)	8:27	End Time (MST)	11:37
Analyzer make	TEI 43C	Analyzer serial #	518112184

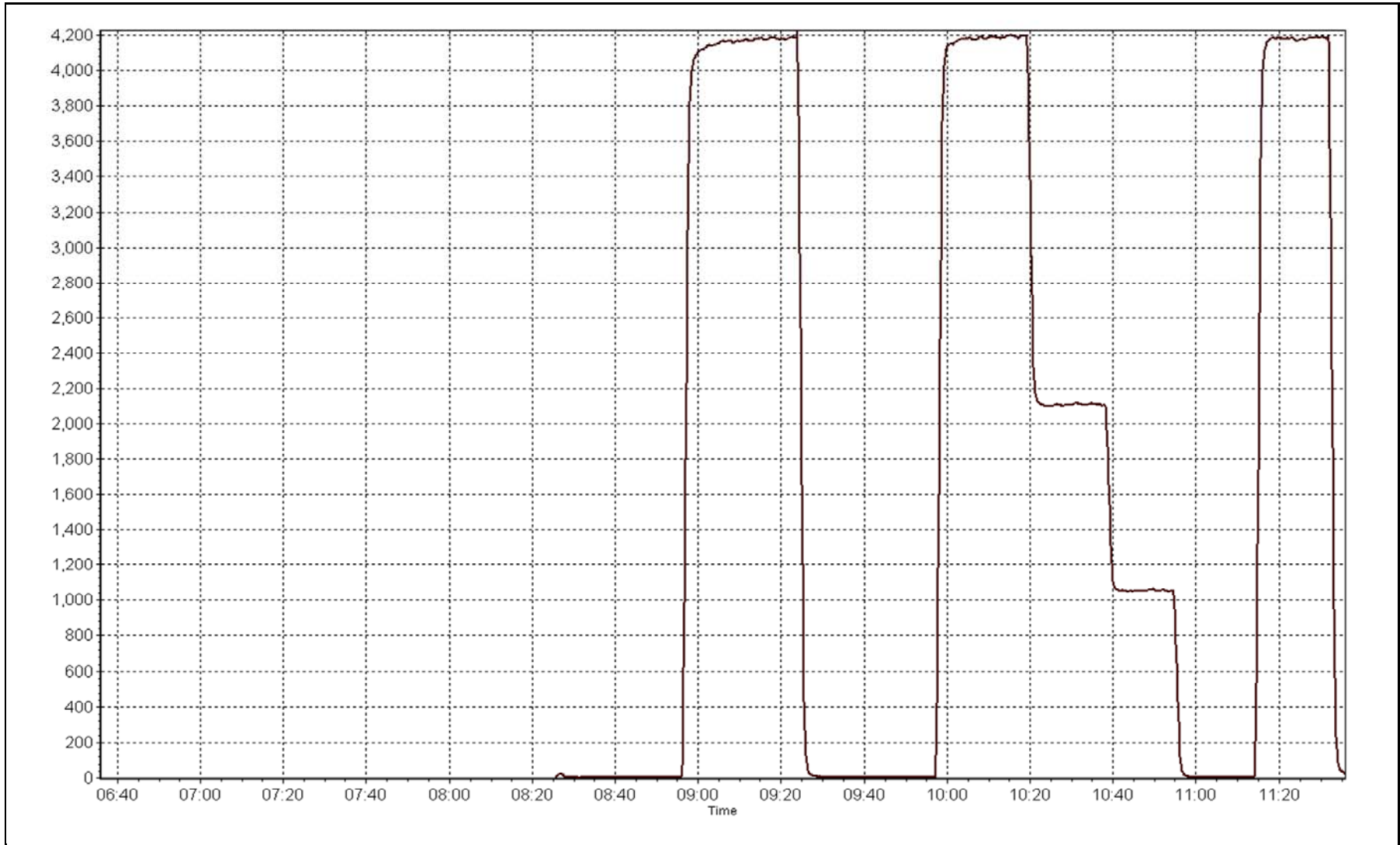
### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.3	N/A	Correlation Coefficient	0.999998
829.9	836.4	0.9922		
419.6	422.0	0.9944	Slope	0.992457
209.2	210.4	0.9944		
			Intercept	0.166010



SO2 Calibration Plot

Date: May 8, 2014





# Wood Buffalo Environmental Association

## H2S Calibration Report

### Station Information

Calibration Date	May 5, 2014	Previous Calibration	April 2, 2014
Station Name	Lower Camp	Station Number	AMS 11
Reason:	Routine		
Start Time (MST)	13:40	End Time (MST)	16:26
Barometric Pressure	760 mmHg	Station temp.	21 Deg C
Calibrator Make/Model	Sabio 4010	Serial number	11051107
Cal Gas Concentration	10.3 ppm H2S	Cal Gas Expiry Date	5/30/2013
Gas Cert Reference	LL20284	SO2 gas conc.	51.3 ppm SO2
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2634
DACS voltage range	0-5v	DACS channel #	SE2

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	100	100	PMT voltage (v)	-680	-680
Analyzer Range (mv)	5000	5000	Lamp voltage (v)	997	997
Calculated slope	1.007473	0.996240	Chamber temp. (deg C)	45	45
Calculated intercept	-0.165603	-0.236073	Pressure (mmHg)	647.8	647.8
Analyzer Background	1.52	1.52	Flow(LPM)	0.417	0.417
Analyzer Coefficient	0.885	0.885	Intensity(%)	89	89
			Converter temp.(deg C)	370	370

Analyzer make/model	Thermo 43i	Analyzer serial #	1008841400
Converter make/model	TEI 340	Converter serial #	328702539

### Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.2	NA
as found span	5000	36.4	75.0	75.5	0.993
SO2 scrubber check	5000	10.0	102.6	0.2	NA
calibrator zero	5001	0.0	0.0	0.2	NA
high point	5001	36.4	75.0	75.5	0.993
second point	5003	19.4	39.9	40.3	0.992
third point	5002	9.7	20.0	20.3	0.982
calibrator zero	5000	0.0	0.0	0.2	NA
as left zero	5000	0.0	0.0	0.2	NA
as left span	4999	36.4	75.0	75.7	0.990
Average Correction Factor					0.989

Corrected As found	75.3	Previous response	74.6	% change	-0.9%
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#### Notes:

No adjustments made. No issues detected.

Calibration Performed By:

Zack Eastman



# Wood Buffalo Environmental Association

## H2S Calibration Summary

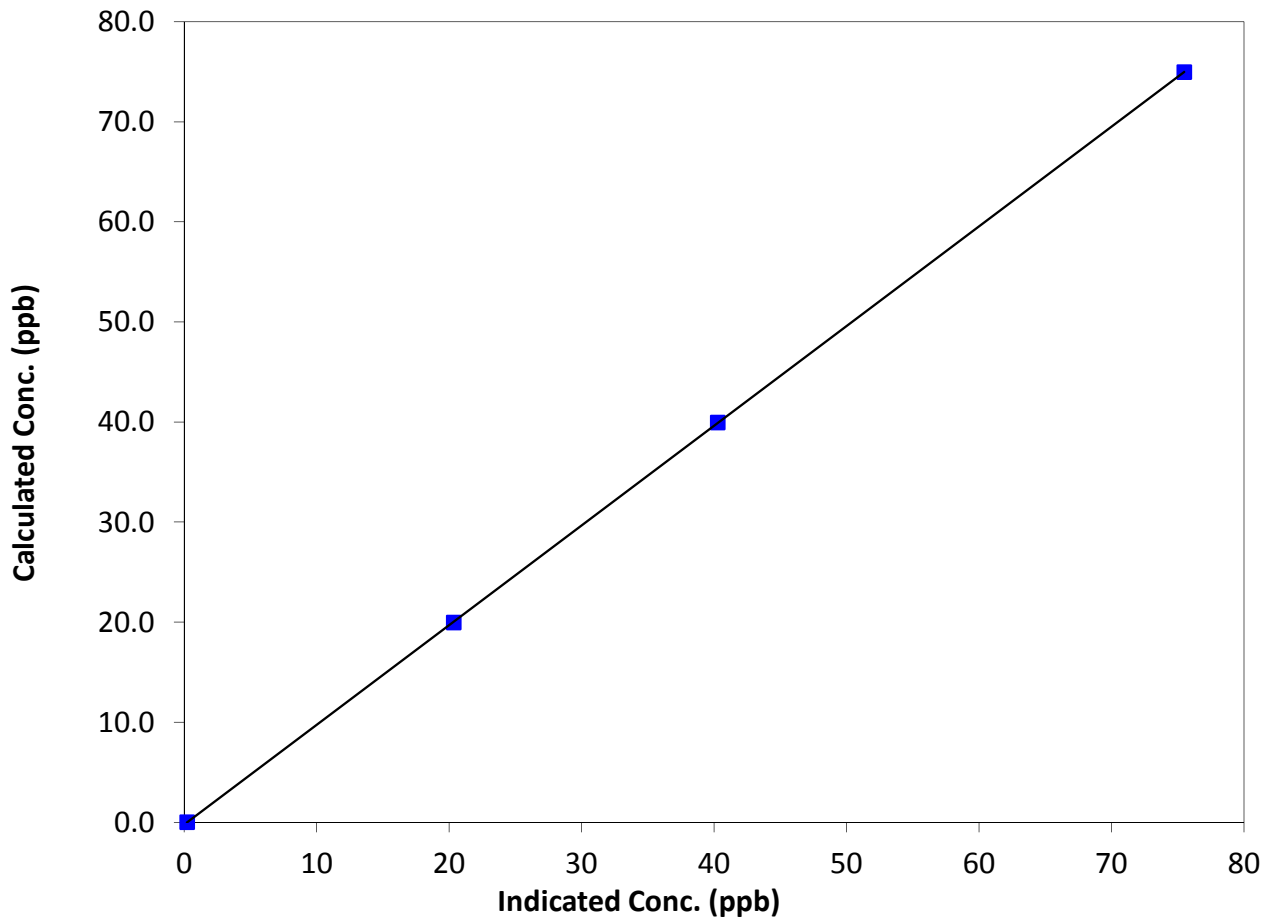
### Station Information

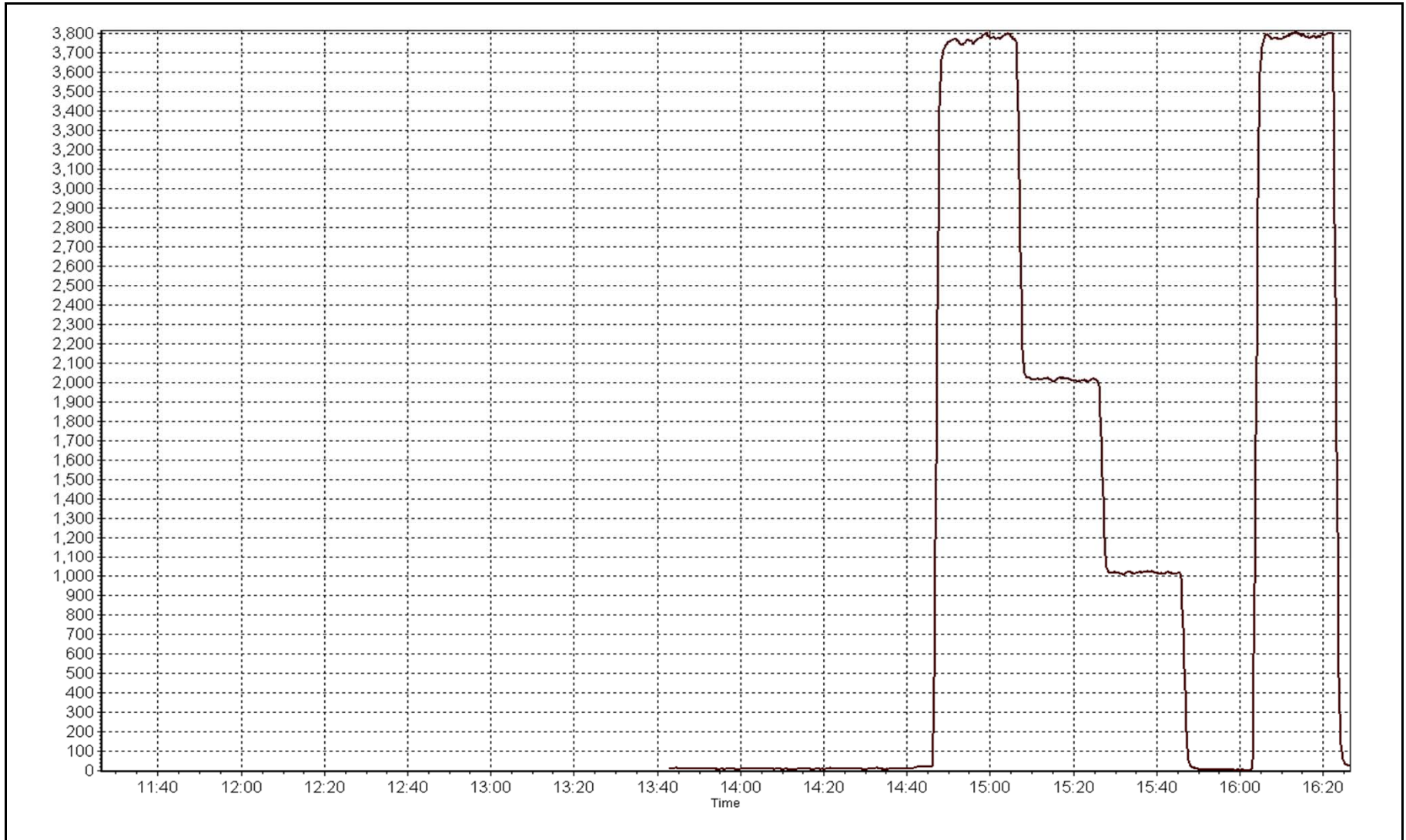
Calibration Date	May 5, 2014	Previous Calibration	April 2, 2014
Station Name	Lower Camp	Station Number	AMS 11
Start Time (MST)	13:40	End Time (MST)	16:26
Analyzer make	Thermo 43i	Analyzer serial #	1008841400

### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	N/A	Correlation Coefficient	0.999998
75.0	75.5	0.9930		
39.9	40.3	0.9916	Slope	0.996240
20.0	20.3	0.9820		
			Intercept	-0.236073

**H2S Calibration Curve**







# Wood Buffalo Environmental Association

## THC Calibration Report

### Station Information

Calibration Date	Thursday, May 08, 2014	Previous Calibration	Wednesday, April 02, 2014
Station Name	Lower Camp	Station Number	AMS 11
Reason:	Routine		
Start Time (MST)	8:27	End Time (MST)	11:35
Barometric Pressure	760 mmHg	Station temp.	21 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11051107
Gas Cert Reference	CC 302056	Cal Gas Expiry Date	
CH4 Cal Gas Conc.	510 ppm	CH4 Equiv Conc.	1073.8 ppm
C3H8 Cal Gas Conc.	205 ppm		
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2634
DACS voltage range	0-5v	DACS channel #	SE3

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppm)	25	25	Sample Pressure	8.1	8.1
Analyzer Range (mv)	5000	5000	Air or Bypass press	37.8	37.8
Calculated slope	0.994537	1.001880	Fuel Pressure	25.2	25.2
Calculated intercept	0.002474	0.021272			

Analyzer make	51i-LT	Analyzer serial #	1218153580
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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	N/A
as found span	5001	80.9	17.37	17.21	1.009
calibrator zero	5000	0.0	0.00	-0.02	N/A
high point	5001	80.9	17.37	17.33	1.003
second point	5000	40.9	8.78	8.73	1.007
third point	5002	20.4	4.38	4.36	1.006
calibrator zero	5000	0.0	0.00	-0.02	N/A
as left zero	5000	0.0	0.00	0.00	N/A
as left span	5000	80.9	17.37	17.36	1.001
Average Correction Factor					1.005

Corrected As found	17.24	Previous response	17.46	% change	1.3%
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#### Notes:

Fuel change after as founds adjustments required. Zero and span adjusted after analog out signal was adjusted for a slight discrepancy from what was being displayed on the analyzer screen and the RTMC.

Calibration Performed By:

Zack Eastman



# Wood Buffalo Environmental Association

## THC Calibration Summary

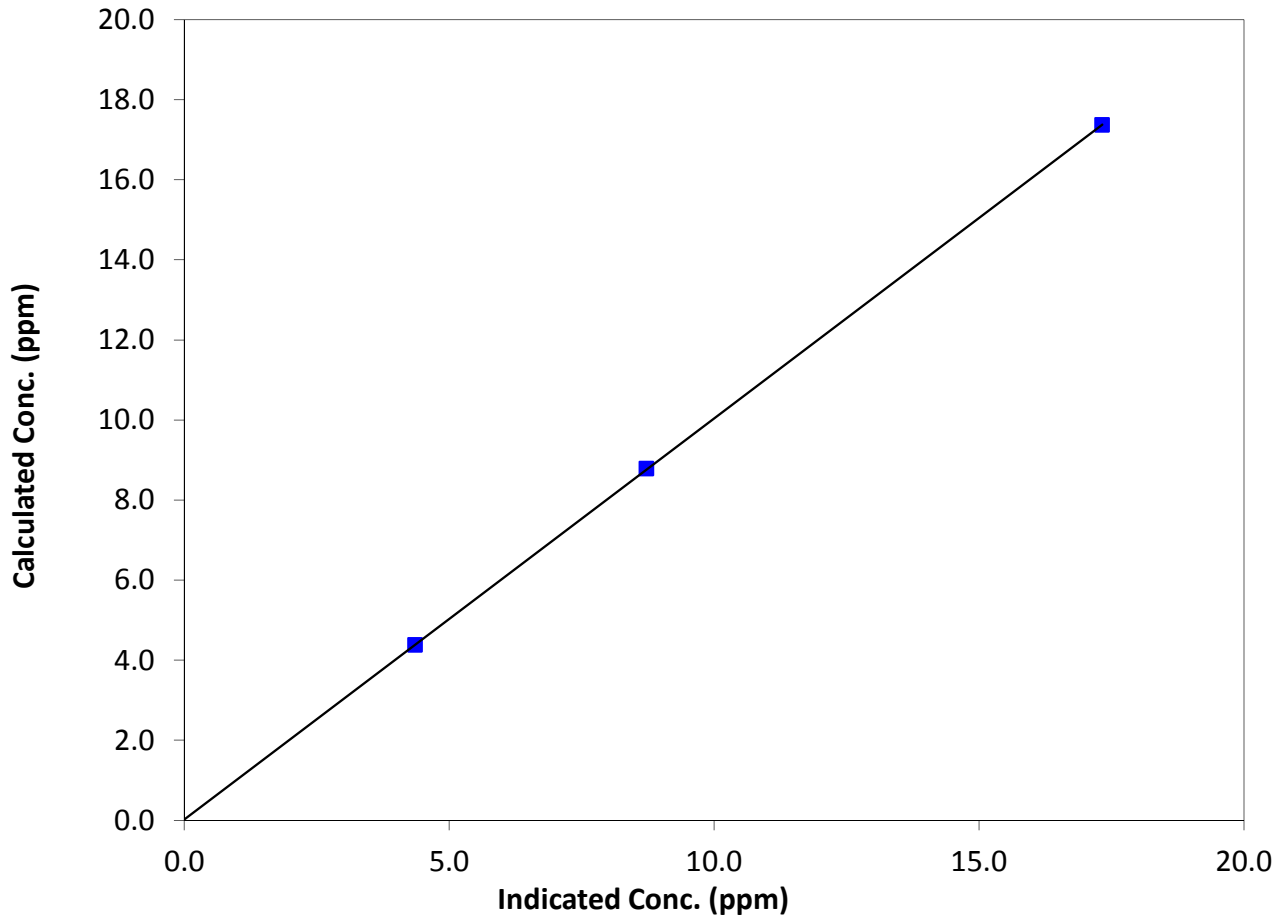
### Station Information

Calibration Date	May 8, 2014	Previous Calibration	April 2, 2014
Station Name	Lower Camp	Station Number	AMS 11
Start Time (MST)	8:27	End Time (MST)	11:35
Analyzer make	51i-LT	Analyzer serial #	1218153580

### Calibration Data

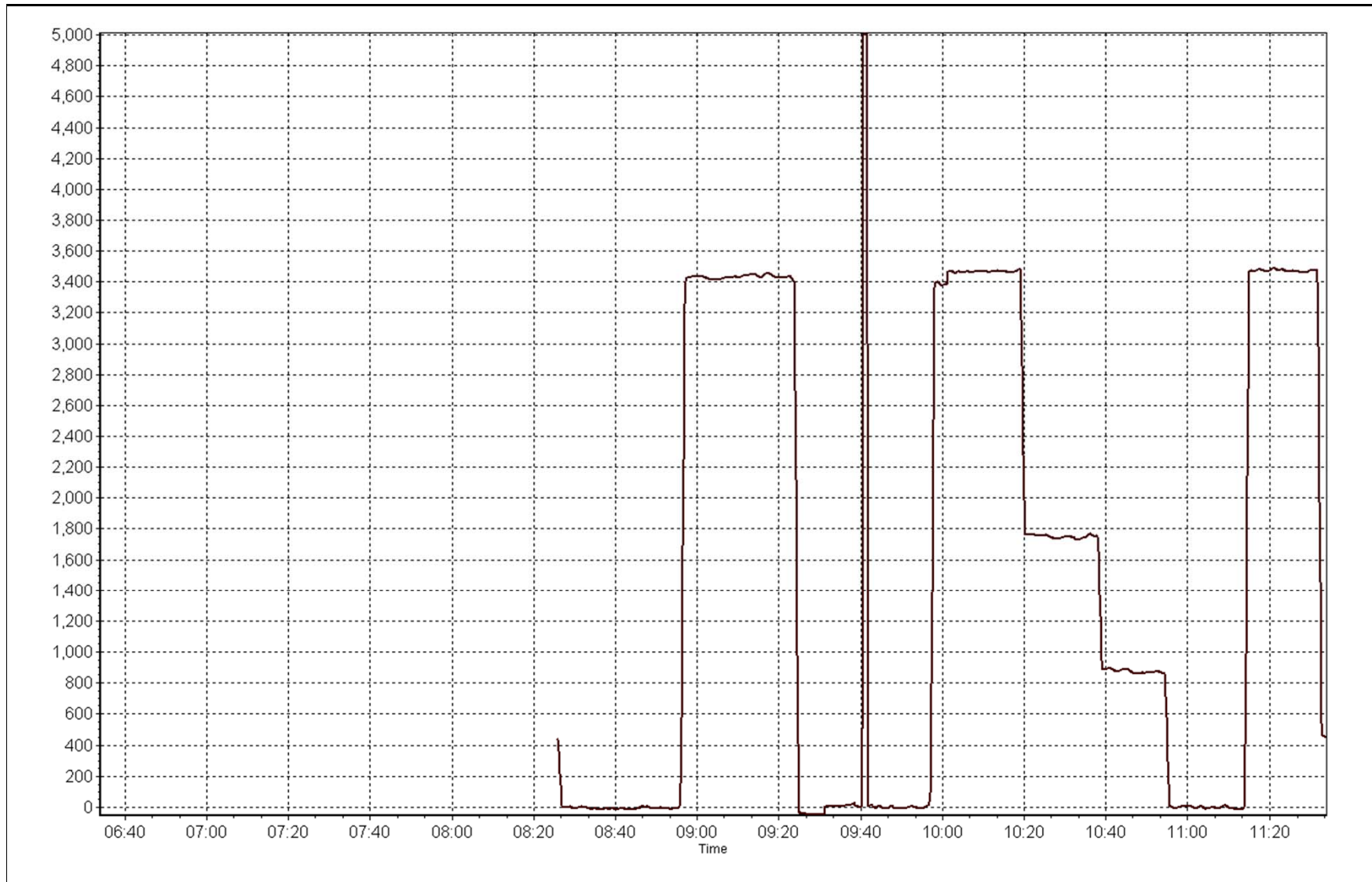
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	-0.02	N/A	Correlation Coefficient	0.999997
17.37	17.33	1.0026		
8.78	8.73	1.0067	Slope	1.001880
4.38	4.36	1.0055		
			Intercept	0.021272

**THC Calibration Curve**



THC Calibration Plot

Date: May 8, 2014





**WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS 12  
MILLENNIUM MINE  
MAY 2014**

Operations and Data Collection by:  
Wood Buffalo Environmental Association  
Fort McMurray, Alberta

QA/QC, Data Validation and Reporting by:  
Aurora Atmospheric Inc.  
Calgary, Alberta

June 27, 2014

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## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MILLENNIUM MINE (AMS 12)

MAY 2014

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	54	0	17	0
TRS(ppb) Average	708	36	36	100.00	3	0	1	0
THC(ppm) Average	706	36	38	99.73	6.6	-	2.8	-
NO2(ppb) Average	708	36	36	100.00	41	0	19	-
NO(ppb) Average	708	36	36	100.00	112	-	28	-
NOX(ppb) Average	708	36	36	100.00	139	-	45	-
PM2.5(ug/m3) Average	743	0	1	99.87	54.9	-	15.2	0
Temperature 2 m (C) Average	744	0	0	100.00	28.2	-	20.9	-
Wind Speed 10 m (km/h) Average	742	0	2	99.73	30	-	-	-
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 - MILLENNIUM MINE (AMS 12)  
MAY 2014

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	1.3	5	-	0	0	0	0	0	2	54
TRS(ppb) Average	708	0.5	0	-	0	0	0	0	1	1	3
THC(ppm) Average	706	2.25	0.4	-	1.7	2	2.1	2.2	2.3	2.6	6.6
NO2(ppb) Average	708	9.3	9	-	0	1	2	5	14	26	41
NO(ppb) Average	708	5.6	15	-	0	0	0	1	3	12	112
NOX(ppb) Average	708	14.9	21	-	0	2	3	6	18	39	139
PM2.5(ug/m3) Average	743	6.15	5.8	-	0.4	1.5	2.5	4.3	7.8	12.8	54.9
Temperature 2 m (C) Average	744	8.61	6.8	-	-3.9	0	3.1	8.3	13.3	18.3	28.2
Wind Speed 10 m (km/h) Average	742	9.1	5	-	0	4	5	8	12	16	30
Wind Direction 10 m (deg) Average	742	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION -MILLENNIUM MINE (AMS 12)  
MAY 2014

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
THC	28 May 2014 11:00	28 May 2014 12:00	2	Maintenance - replaced fuel cylinder
PM2.5	28 May 2014 10:00	28 May 2014 10:00	1	Flow and zero reference checks, sample head cleaning
Wind Speed, Wind Direction	08 May 2014 06:00	08 May 2014 06:00	1	Flatline in sensor output signal
Wind Speed, Wind Direction	22 May 2014 02:00	22 May 2014 02:00	1	Flatline in sensor output signal

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Summary of Hour Averages

Millennium - May 2014

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 54 ppb on May 16 11:00	Maximum Daily Average: 17.0 ppb on May 16		Hours of Data:	708
Minimum Value: 0 ppb on May 5 07:00	Minimum Daily Average: 0.1 ppb on May 27		Hours of Missing Data:	36
Maximum Diurnal Average: 3.4 ppb at hour 12	Minimum Diurnal Average: 0.3 ppb at hour 24		Hours of Calibration:	36
Monthly Average: 1.3 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> = 2 P <sub>99</sub> = 24		Percent Operational Time:	100.0

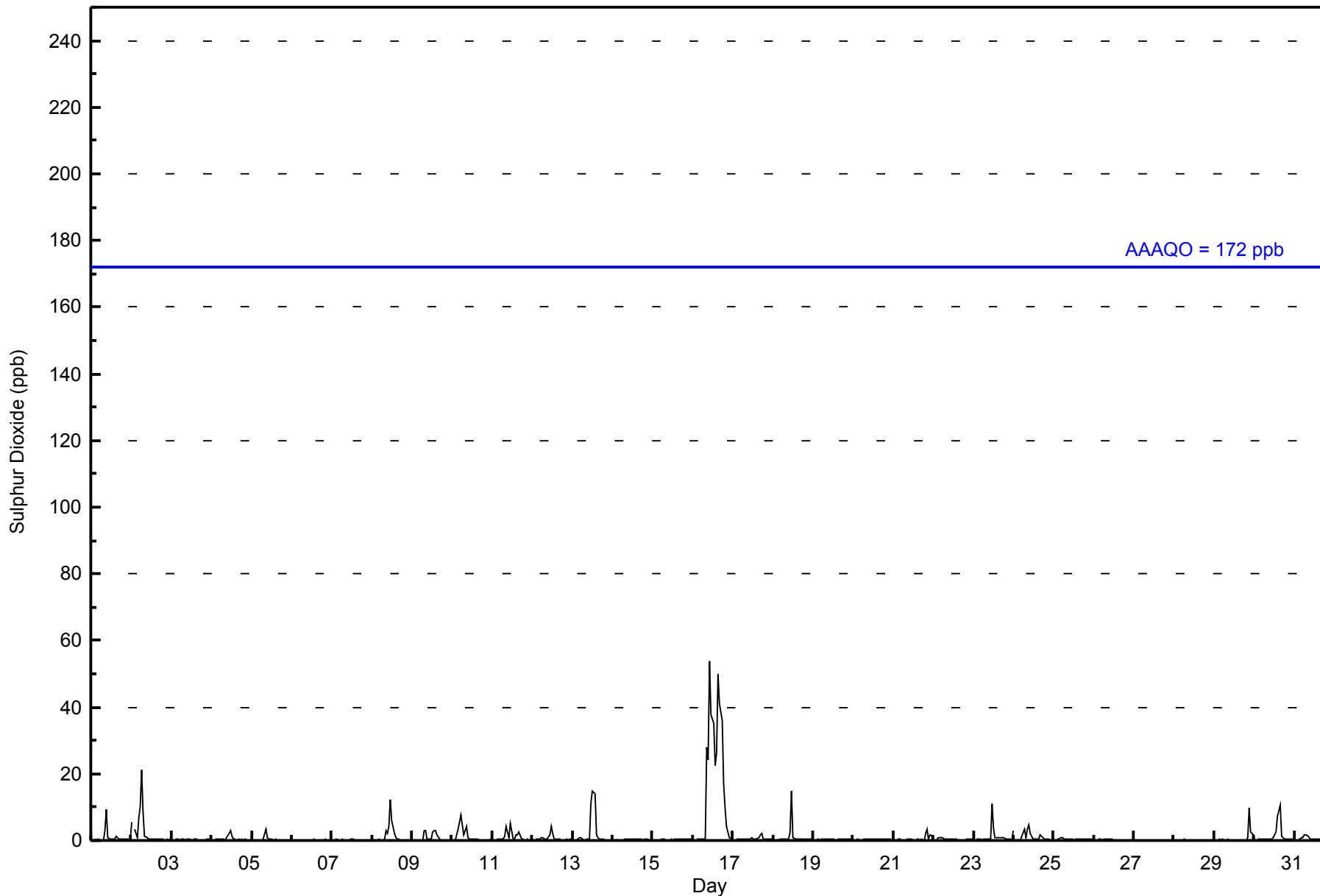
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-May	0	Z	0	0	0	0	0	0	3	9	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0.9	9																						
2-May	5	Z	3	1	7	10	21	9	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.7	21																						
3-May	0	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																						
4-May	0	Z	0	0	0	0	0	0	0	1	2	3	1	1	0	0	0	0	0	0	0	0	0	0	0.5	3																						
5-May	0	Z	0	0	0	0	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	3																						
6-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0																						
7-May	0	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-May	0	Z	0	0	0	0	0	1	3	2	4	12	6	2	1	0	0	0	0	0	0	0	0	0	1.5	12																						
9-May	0	Z	0	0	0	0	0	3	3	0	0	0	3	3	3	2	0	0	0	0	0	0	0	0	0.8	3																						
10-May	0	Z	0	4	6	7	5	2	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.4	7																						
11-May	0	Z	0	0	0	0	0	1	4	2	1	5	1	0	2	1	3	0	0	0	0	0	0	0	1.1	5																						
12-May	0	Z	0	0	0	1	1	0	0	0	2	4	2	1	0	0	0	0	0	0	0	0	0	0	0.6	4																						
13-May	0	Z	0	0	1	1	0	0	0	0	0	11	15	14	2	1	0	0	0	0	0	0	0	0	2.1	15																						
14-May	0	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																						
15-May	0	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																						
16-May	0	Z	0	0	0	0	0	0	28	24	54	38	35	23	26	50	41	36	17	10	4	2	1	1	17.0	54																						
17-May	0	Z	0	0	0	0	0	0	0	0	1	1	1	0	0	1	2	2	1	0	1	0	0	0	0.6	2																						
18-May	0	Z	0	0	0	0	0	0	0	0	3	15	1	0	0	0	0	0	0	0	0	1	0	0	1.1	15																						
19-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0																						
20-May	0	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																						
21-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	0	2	1	0.6	3																					
22-May	1	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.4	1																					
23-May	0	Z	0	0	0	0	1	0	0	0	0	11	4	1	1	1	1	1	1	0	0	0	0	0	1.0	11																						
24-May	3	Z	0	0	0	1	4	1	4	5	2	1	0	0	0	0	2	1	0	0	0	0	0	0	1.1	5																						
25-May	0	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
26-May	0	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																						
27-May	0	Z	0	0	0	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																						
28-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																						
29-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	10	3	2	0.8	10																						
30-May	0	Z	0	0	0	0	0	0	0	0	0	1	2	2	7	10	1	1	1	1	0	0	0	0	1.3	10																						
31-May	0	Z	0	1	1	1	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2																						
																								0.5	--	0.4	0.4	0.7	0.9	1.3	0.8	2.0	1.7	2.5	3.4	2.4	1.7	1.5	2.4	1.8	1.5	0.8	0.6	0.5	0.6	0.4	0.3	Diurnal Average
																								5	--	3	4	7	10	21	9	28	24	54	38	35	23	26	50	41	36	17	10	4	10	3	2	Diurnal Maximum

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



WBEA  
Hourly Averages

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Millennium - May 2014







**WBEA**  
**Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Millennium - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	690	97.46	97.46
11 - 20	7	0.99	98.45
21 - 60	11	1.55	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



**WBEA**  
**Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Millennium - May 2014**

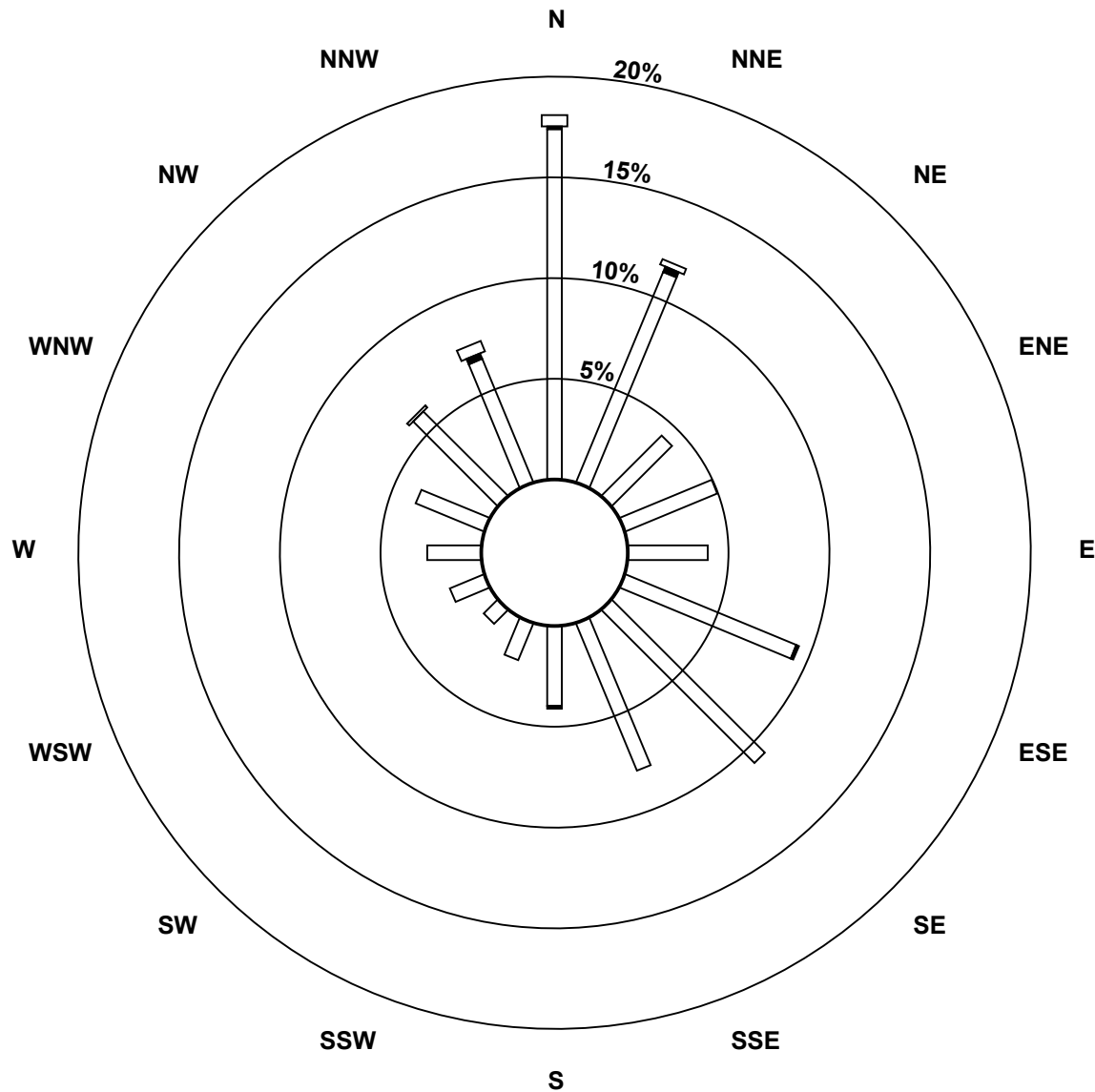
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	123	80	30	35	28	65	76	56	28	14	7	13	19	26	42	47	689
11 - 20	1	2	0	0	0	1	0	0	1	0	0	0	0	0	0	2	7
21 - 60	4	2	0	0	0	0	0	0	0	0	0	0	0	0	1	4	11
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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>	128	84	30	35	28	66	76	56	29	14	7	13	19	26	43	53	707

Total Number of Valid Hours: 707

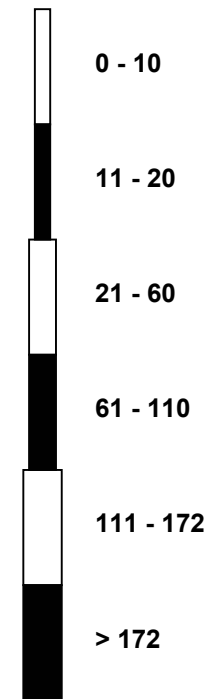
Total Number of Hours: 744

Wood Buffalo Environmental Association  
Wind Rose May 2014

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Millennium (AMS 12)



Classes (ppb)

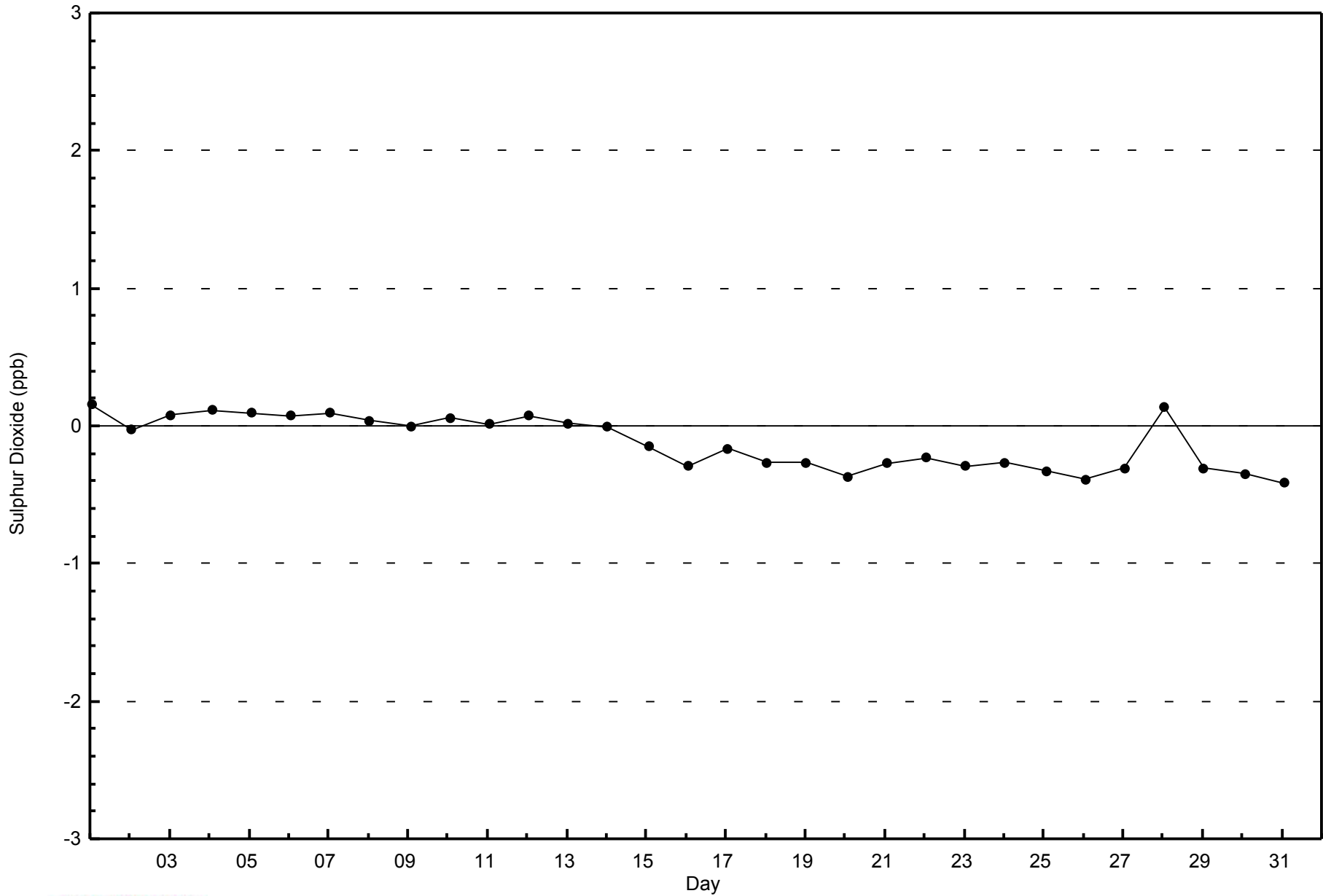


Total Number of Valid Hours: 707



WBEA  
Zero Responses

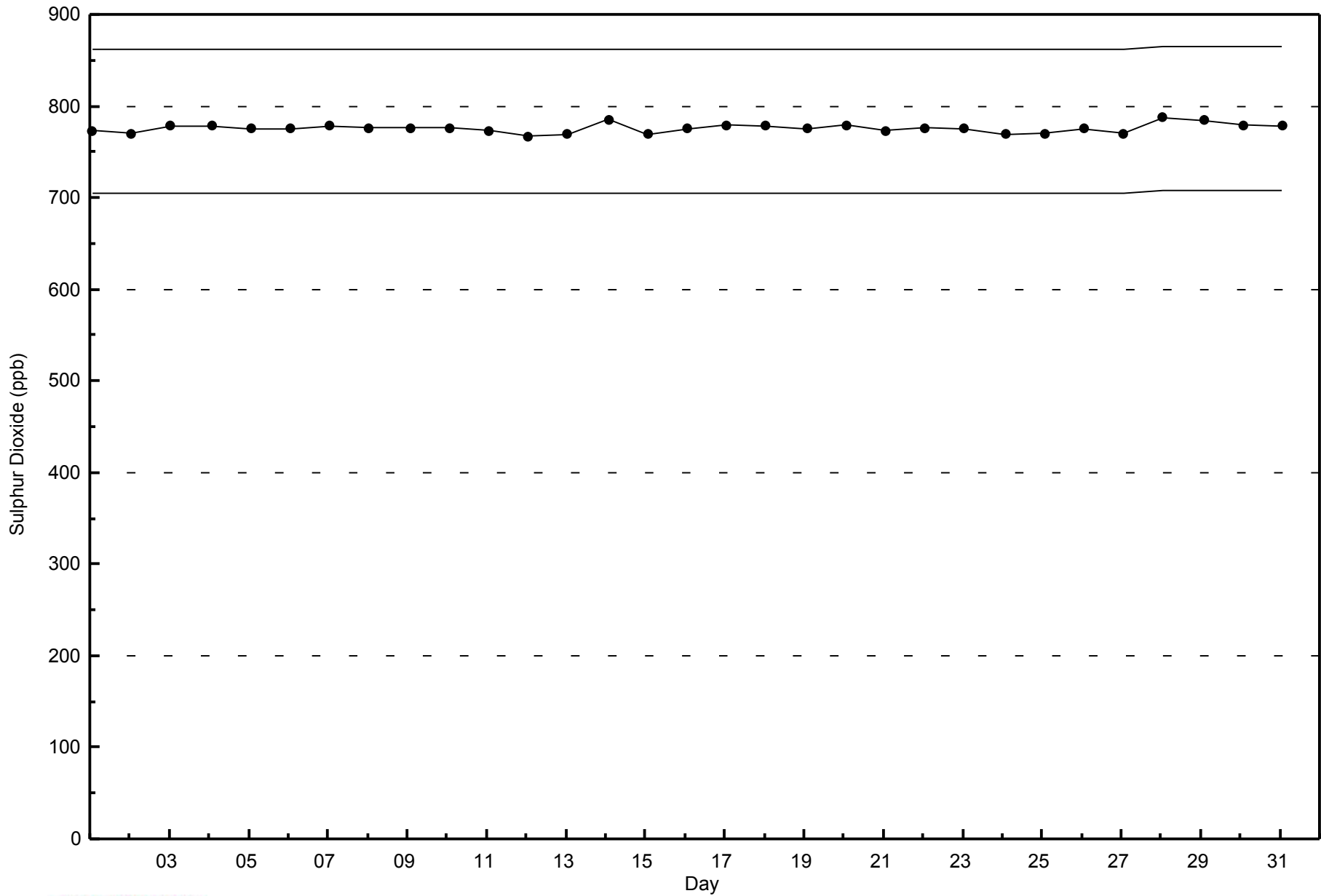
Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Millennium - May 2014





WBEA  
Span Responses

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Millennium - May 2014





Summary of Hour Averages

Millennium - May 2014

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 3 ppb on May 24 07:00	Maximum Daily Average: 0.7 ppb on May 24		Hours of Data:	708
Minimum Value: 0 ppb on May 30 23:00	Minimum Daily Average: 0.2 ppb on May 31		Hours of Missing Data:	36
Maximum Diurnal Average: 0.6 ppb at hour 7	Minimum Diurnal Average: 0.4 ppb at hour 19		Hours of Calibration:	36
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> = 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-May	0	1	Z	1	0	0	1	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.5	1
2-May	1	1	Z	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1
3-May	0	0	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
4-May	0	0	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
5-May	0	0	Z	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
6-May	1	0	Z	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.4	1
7-May	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
8-May	0	0	Z	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
9-May	0	0	Z	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
10-May	0	0	Z	1	1	1	1	1	1	1	0	0	0	0	0	0	1	0	0	0	1	1	1	0	0.6	1
11-May	0	0	Z	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	0	0	0.6	1
12-May	0	0	Z	1	1	1	1	1	0	0	1	1	0	0	0	0	0	1	1	0	1	1	0	0	0.5	1
13-May	0	0	Z	1	1	1	1	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0.5	1
14-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.4	1
15-May	0	0	Z	1	0	1	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	1	1	0.5	1
16-May	0	0	Z	0	0	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.6	1
17-May	1	1	Z	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1
18-May	0	0	Z	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	1	1	1	0.5	1
19-May	1	1	Z	1	1	1	1	1	0	0	0	1	0	1	1	1	1	1	1	1	1	1	1	1	0.6	1
20-May	1	1	Z	1	1	1	1	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0	0.6	1
21-May	0	0	Z	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	1	1	1	0.5	1
22-May	1	1	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0.6	1
23-May	1	0	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	2	0.7	2	
24-May	1	1	Z	1	1	1	3	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1	0.7	3	
25-May	1	1	Z	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1
26-May	0	0	Z	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.4	1
27-May	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
28-May	0	0	Z	0	0	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
29-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.3	1
30-May	0	0	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
31-May	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1

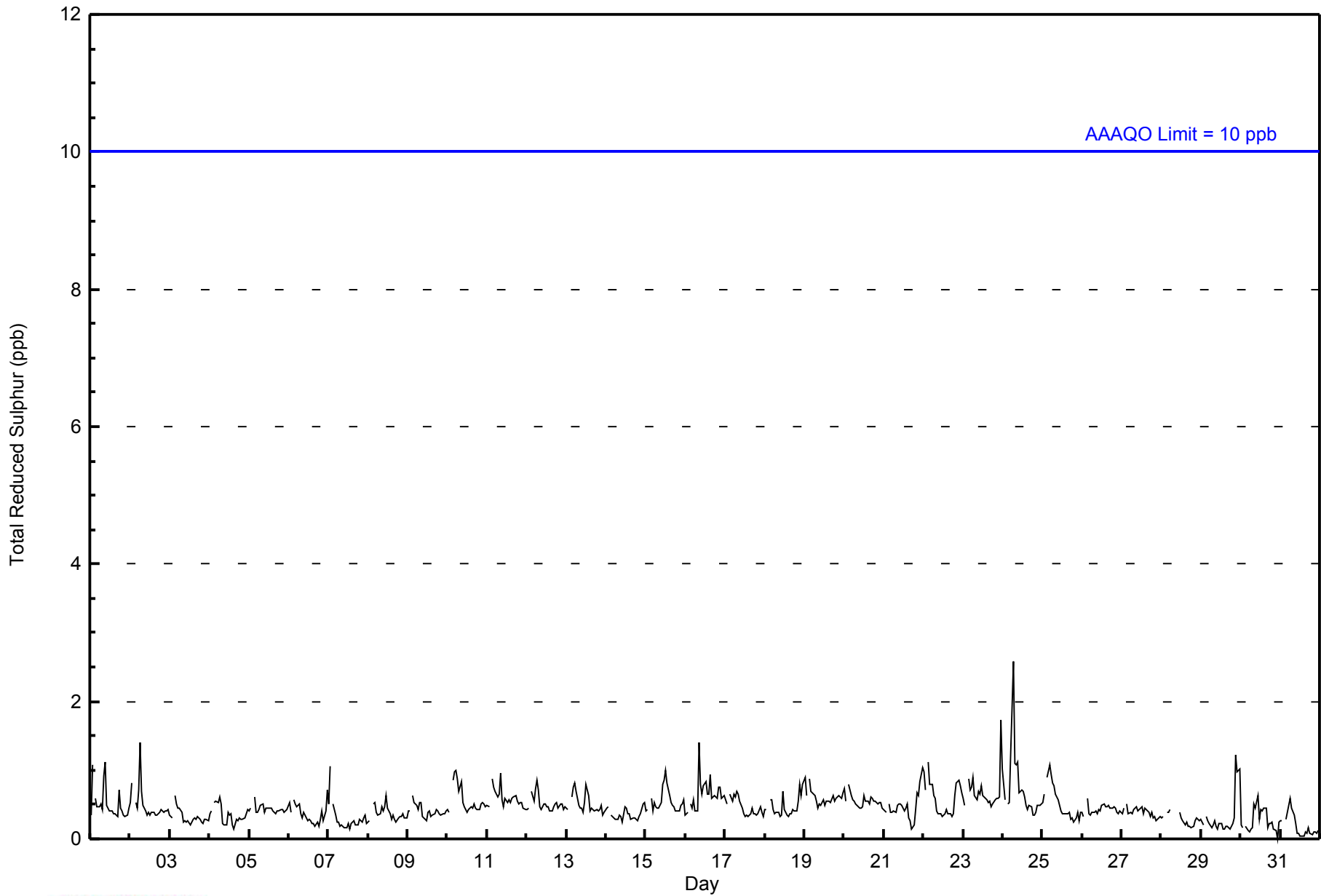
0.5	0.5	--	0.6	0.5	0.6	0.6	0.5	0.5	0.5	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.5	Diurnal Average
1	1	--	1	1	1	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	Diurnal Maximum

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



**WBEA**  
**Hourly Averages**

**Total Reduced Sulphur (TRS) - ppb**  
**Millennium - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb**  
**Millennium - May 2014**

<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





**WBEA**  
**Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb**  
**Millennium - May 2014**

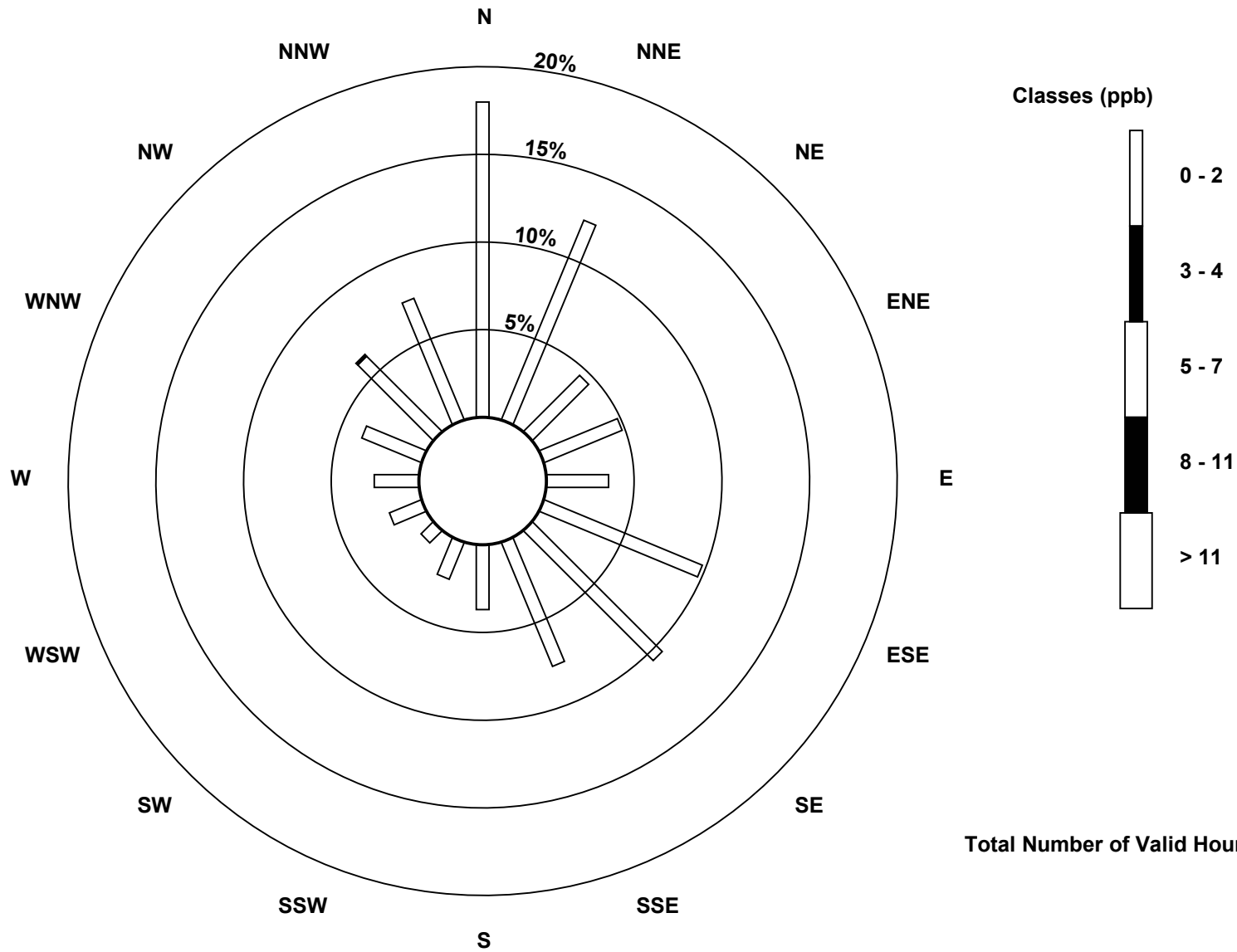
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	127	87	32	34	25	69	74	54	26	16	7	14	18	26	43	53	705
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	127	87	32	34	25	69	74	54	26	16	7	14	18	26	44	53	706

Total Number of Valid Hours: 706

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Total Reduced Sulphur (TRS) - ppb  
Millennium (AMS 12)**

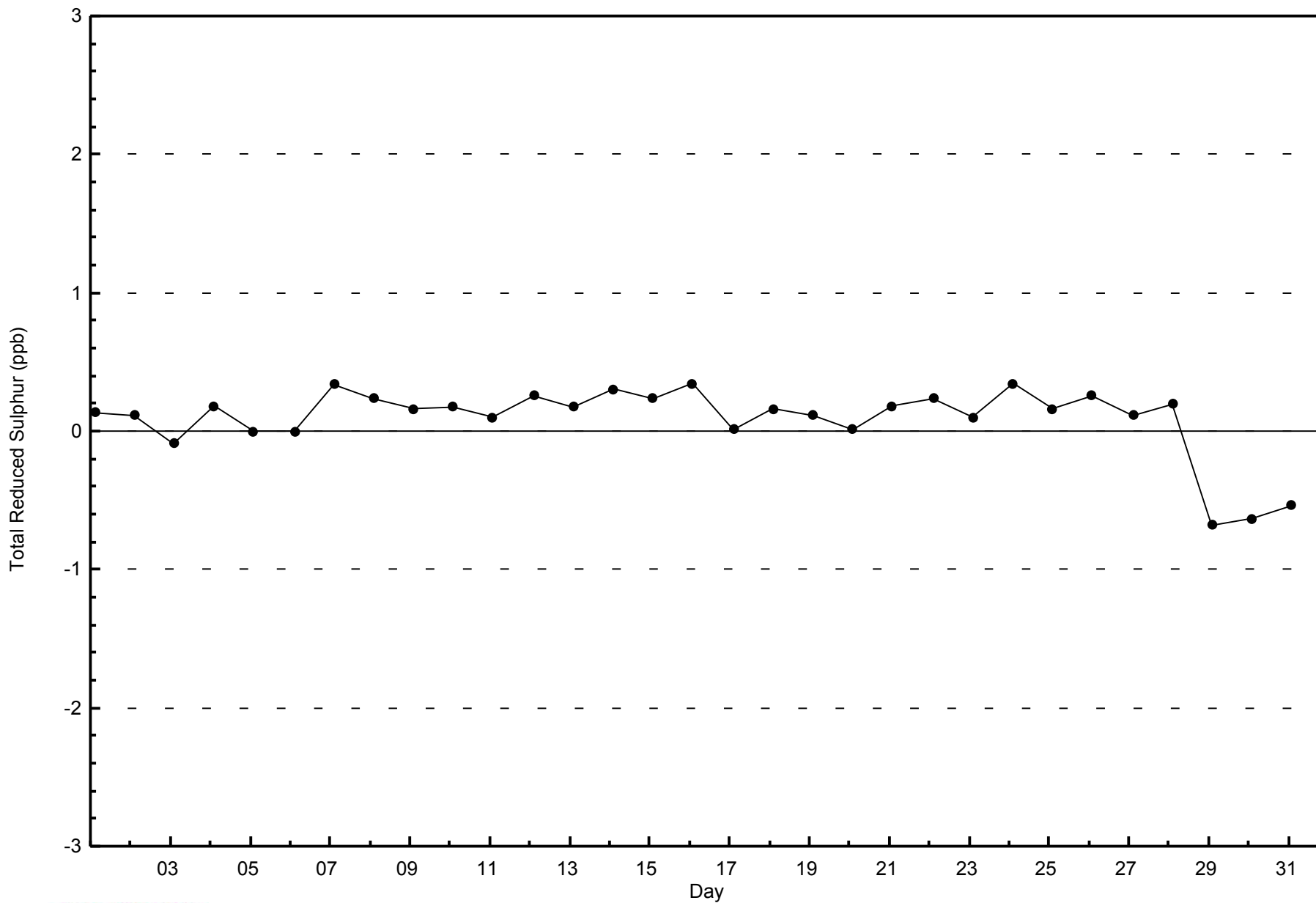


**Total Number of Valid Hours: 706**



WBEA  
Zero Responses

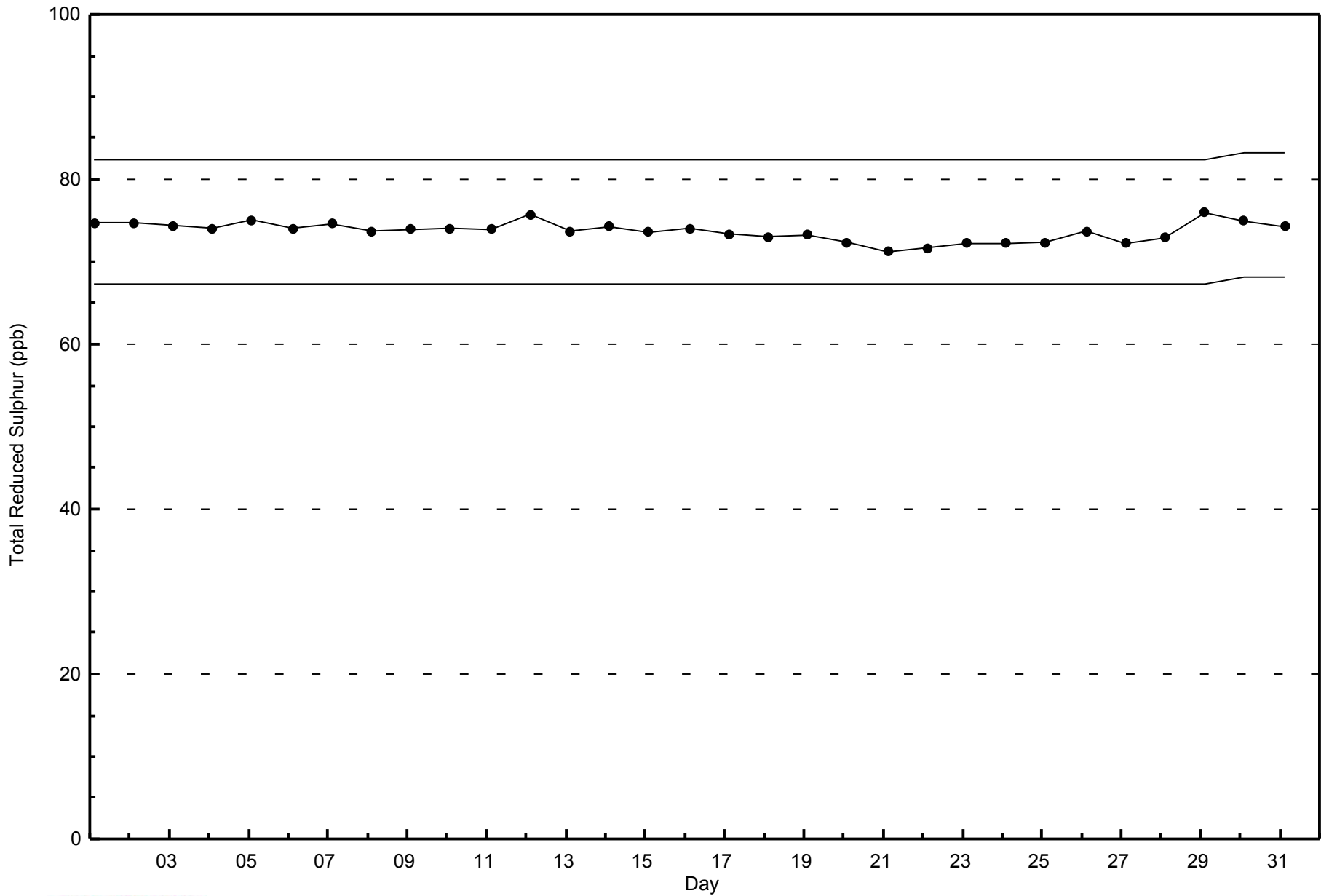
Total Reduced Sulphur (TRS) - ppb  
Millennium - May 2014





WBEA  
Span Responses

Total Reduced Sulphur (TRS) - ppb  
Millennium - May 2014

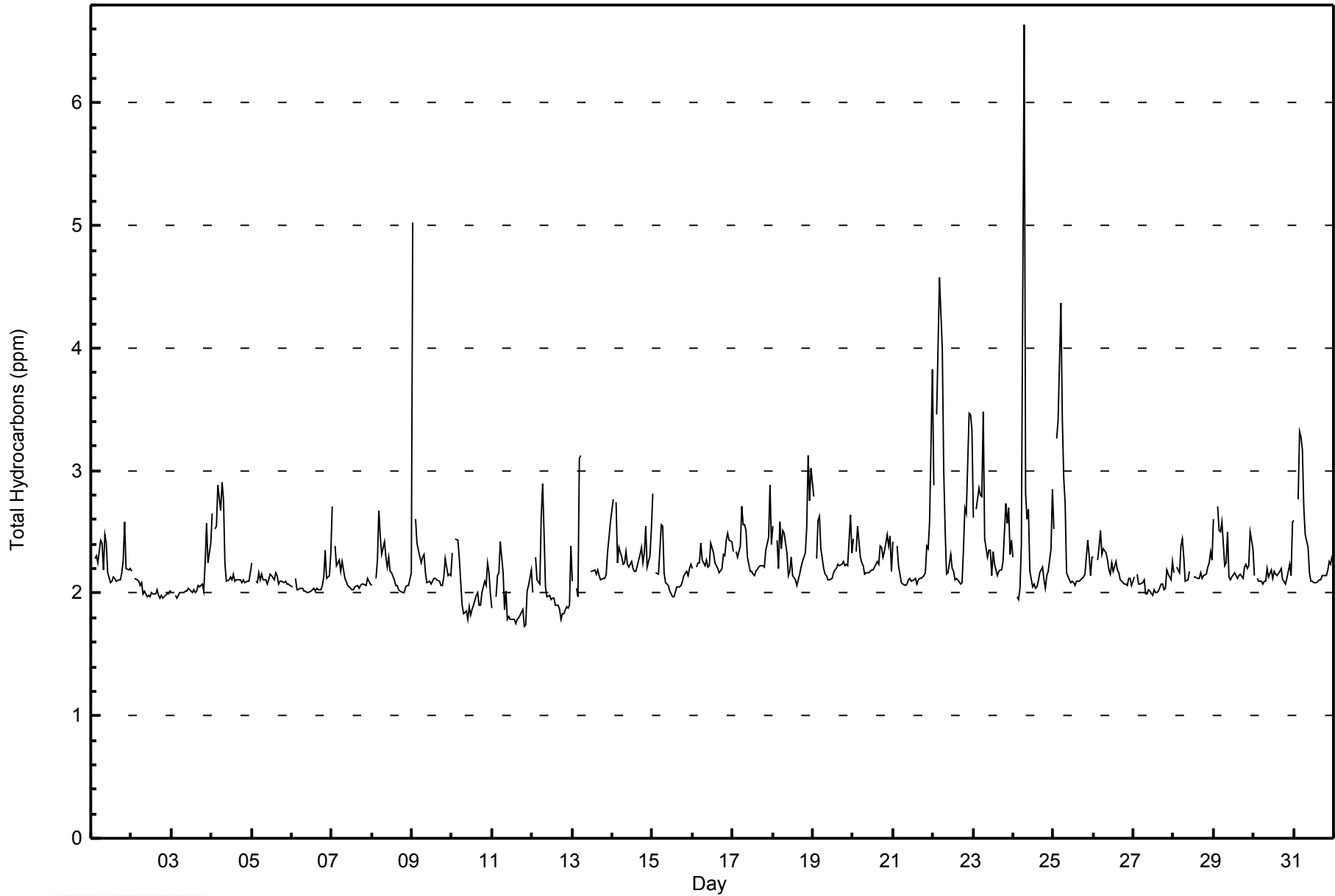






**WBEA**  
**Hourly Averages**

**Total Hydrocarbons (THC) - ppm**  
**Millennium - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Millennium - May 2014**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	128	18.13	18.13
2.1 - 3.0	557	78.90	97.03
3.1 - 10.0	21	2.97	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 706

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Millennium - May 2014**

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	51	35	4	1	2	0	1	1	1	0	2	3	5	2	9	11	128
2.1 - 3.0	76	53	26	34	23	56	71	49	26	14	5	10	14	24	33	42	556
3.1 - 10.0	1	1	0	0	3	9	3	3	0	0	0	0	0	0	1	0	21
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	128	89	30	35	28	65	75	53	27	14	7	13	19	26	43	53	705

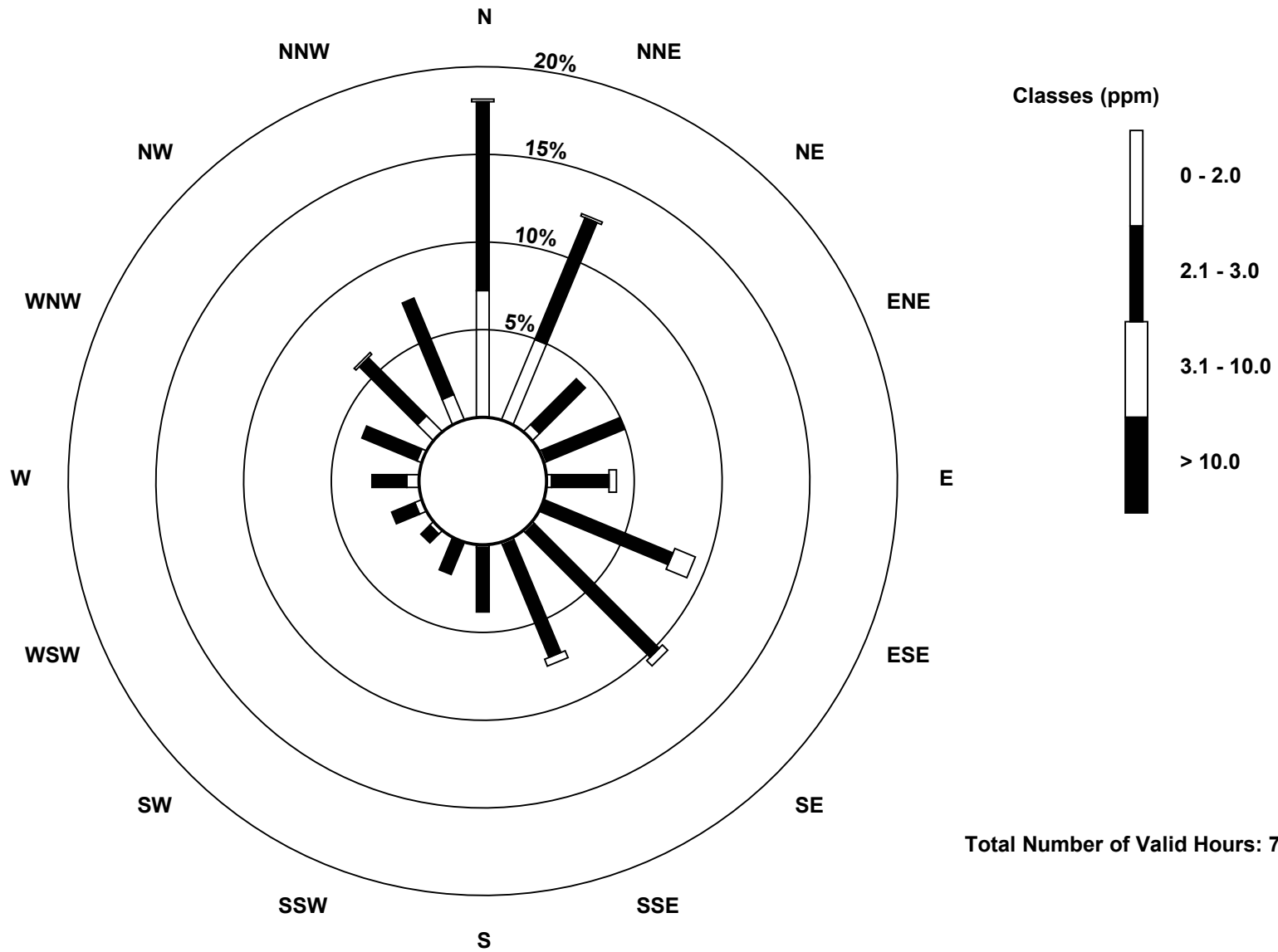
Total Number of Valid Hours: 705

Total Number of Hours: 744



**Wood Buffalo Environmental Association  
Wind Rose May 2014**

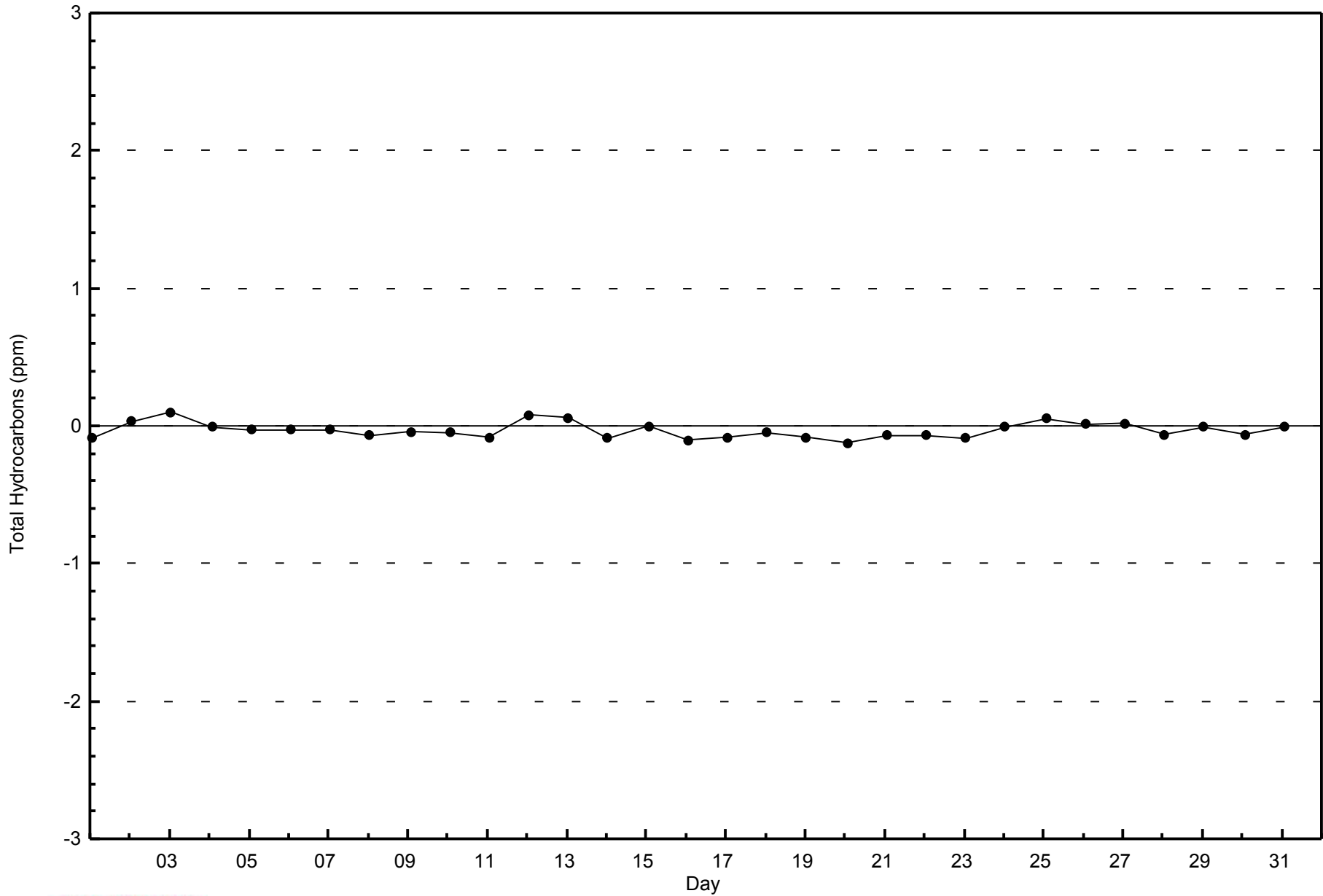
**Total Hydrocarbons (THC) - ppm  
Millennium (AMS 12)**





WBEA  
Zero Responses

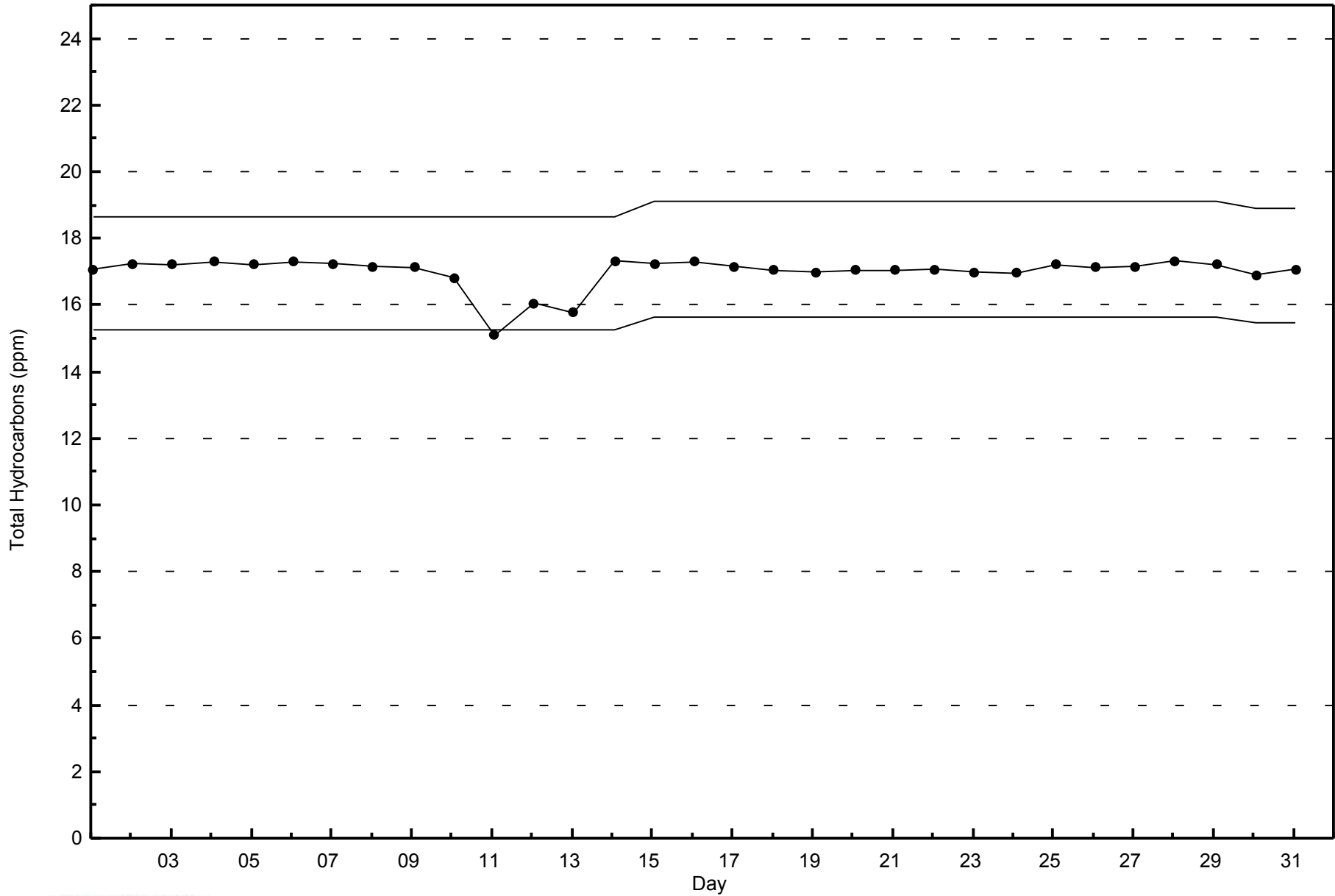
Total Hydrocarbons (THC) - ppm  
Millennium - May 2014





WBEA  
Span Responses

Total Hydrocarbons (THC) - ppm  
Millennium - May 2014



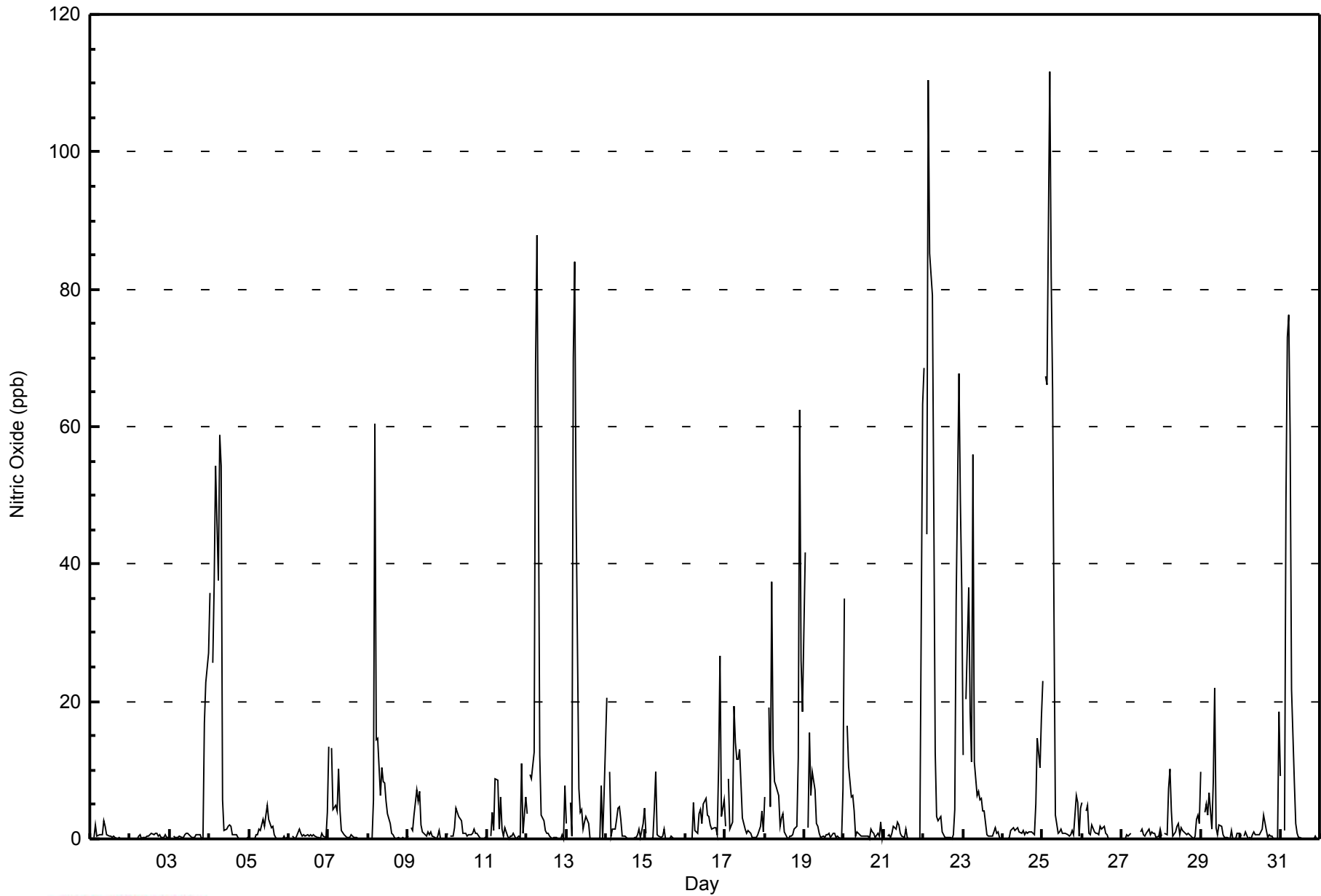


Maximum Value: 112 ppb on May 25 05:00																		Maximum Daily Average: 28.4 ppb on May 22																		Hours in Service: 744			
Minimum Value: 0 ppb on May 1 20:00																		Minimum Daily Average: 0.3 ppb on May 2																		Hours of Data: 708			
Maximum Diurnal Average: 18.2 ppb at hour 5																		Minimum Diurnal Average: 0.4 ppb at hour 18																		Hours of Missing Data: 36			
Monthly Average: 5.6 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> = 12 P <sub>99</sub> = 78																		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-May	0	Z	0	2	0	1	1	1	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	3													
2-May	0	Z	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	0	1	0	0	1	0	0	0.3	1													
3-May	0	Z	0	0	0	0	0	0	0	1	1	1	0	0	0	0	1	1	1	0	0	17	23	27	3.2	27													
4-May	36	Z	26	37	54	38	59	54	6	1	2	2	2	2	1	1	1	0	0	0	0	0	0	0	13.9	59													
5-May	0	Z	0	0	1	1	1	1	3	2	4	5	3	2	2	1	0	0	0	0	0	0	0	0	1.1	5													
6-May	0	Z	0	0	0	1	1	1	0	1	0	1	0	1	0	1	0	0	0	0	1	0	0	4	0.6	4													
7-May	14	Z	13	4	5	4	10	4	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2.5	14													
8-May	0	Z	0	6	60	14	15	6	10	8	8	5	4	2	1	1	0	0	0	0	0	0	0	0	6.2	60													
9-May	0	Z	2	1	3	7	6	7	2	1	1	0	1	1	1	0	0	0	0	1	0	0	0	0	1.5	7													
10-May	1	Z	0	0	2	4	4	3	3	1	1	1	0	1	1	1	2	1	1	0	0	0	0	0	1.1	4													
11-May	0	Z	0	4	1	9	9	1	6	1	0	2	0	0	0	0	1	0	0	0	0	11	1	6	2.4	11													
12-May	4	Z	9	9	13	69	88	53	12	3	3	1	1	1	0	0	0	0	0	0	0	1	0	8	12.0	88													
13-May	2	Z	5	0	70	84	48	7	4	4	2	2	3	2	0	0	0	0	0	0	0	8	0	6	10.8	84													
14-May	21	Z	10	0	1	2	3	4	5	3	0	0	0	0	0	0	0	0	0	1	1	0	2	4	2.6	21													
15-May	1	Z	0	0	0	5	10	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.8	10													
16-May	0	Z	0	0	0	5	1	1	4	4	2	5	6	3	3	2	1	2	2	1	10	27	3	6	3.9	27													
17-May	2	Z	9	1	3	19	14	12	12	13	3	2	1	1	1	1	0	0	0	0	1	2	4	1	4.4	19													
18-May	6	Z	19	5	37	13	8	8	6	2	3	4	1	0	0	0	0	1	1	2	12	62	26	19	10.3	62													
19-May	42	Z	2	15	6	10	7	2	2	1	0	0	0	1	1	1	0	1	1	0	0	0	0	7	4.3	42													
20-May	35	Z	16	11	6	6	4	0	1	1	0	0	0	0	0	0	2	1	1	0	1	0	2	0	3.9	35													
21-May	1	Z	0	1	0	1	2	1	2	2	1	0	0	1	0	0	0	0	0	0	0	0	0	63	3.4	63													
22-May	69	Z	44	110	85	79	48	13	3	3	3	1	1	0	0	0	0	0	1	4	34	68	49	36	28.4	110													
23-May	12	Z	20	37	19	11	56	11	6	7	6	6	4	4	1	0	0	0	0	2	1	1	0	0	8.9	56													
24-May	0	Z	0	0	0	1	2	1	1	2	1	1	1	1	1	1	1	1	1	1	5	15	10	18	2.8	18													
25-May	23	Z	67	66	112	82	65	32	3	1	1	1	1	1	1	1	0	1	1	1	6	5	0	5	20.7	112													
26-May	5	Z	4	5	1	1	2	1	1	1	1	2	1	2	1	1	0	0	0	0	0	0	0	0	1.2	5													
27-May	0	Z	0	1	0	1	C	C	C	C	C	1	1	1	1	1	1	1	1	1	1	0	0	1	0.7	1													
28-May	0	Z	1	1	7	10	4	0	1	2	2	1	2	1	1	1	1	1	0	0	0	3	4	2	1.9	10													
29-May	10	Z	4	5	3	7	1	8	22	2	1	2	2	1	0	0	0	0	1	0	0	0	1	1	3.1	22													
30-May	0	Z	0	1	0	0	0	1	1	1	1	1	1	2	3	1	0	1	0	0	0	0	0	19	1.4	19													
31-May	9	Z	1	49	73	76	59	22	8	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	13.1	76													
9.5		--	8.2	12.0	18.2	18.1	17.6	8.6	4.3	2.4	1.6	1.6	1.3	1.0	0.7	0.5	0.5	0.4	0.5	0.5	2.4	7.2	4.1	7.5	Diurnal Average														
69		--	67	110	112	84	88	54	22	13	8	6	6	4	3	2	2	2	2	2	4	34	68	49	63	Diurnal Maximum													
Z - zerospan		C - Calibration																																					



**WBEA**  
**Hourly Averages**

**Nitric Oxide (NO) - ppb**  
**Millennium - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb**  
**Millennium - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	659	93.08	93.08
21 - 40	18	2.54	95.62
41 - 80	25	3.53	99.15
81 - 159	6	0.85	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Nitric Oxide (NO) - ppb**  
**Millennium - May 2014**

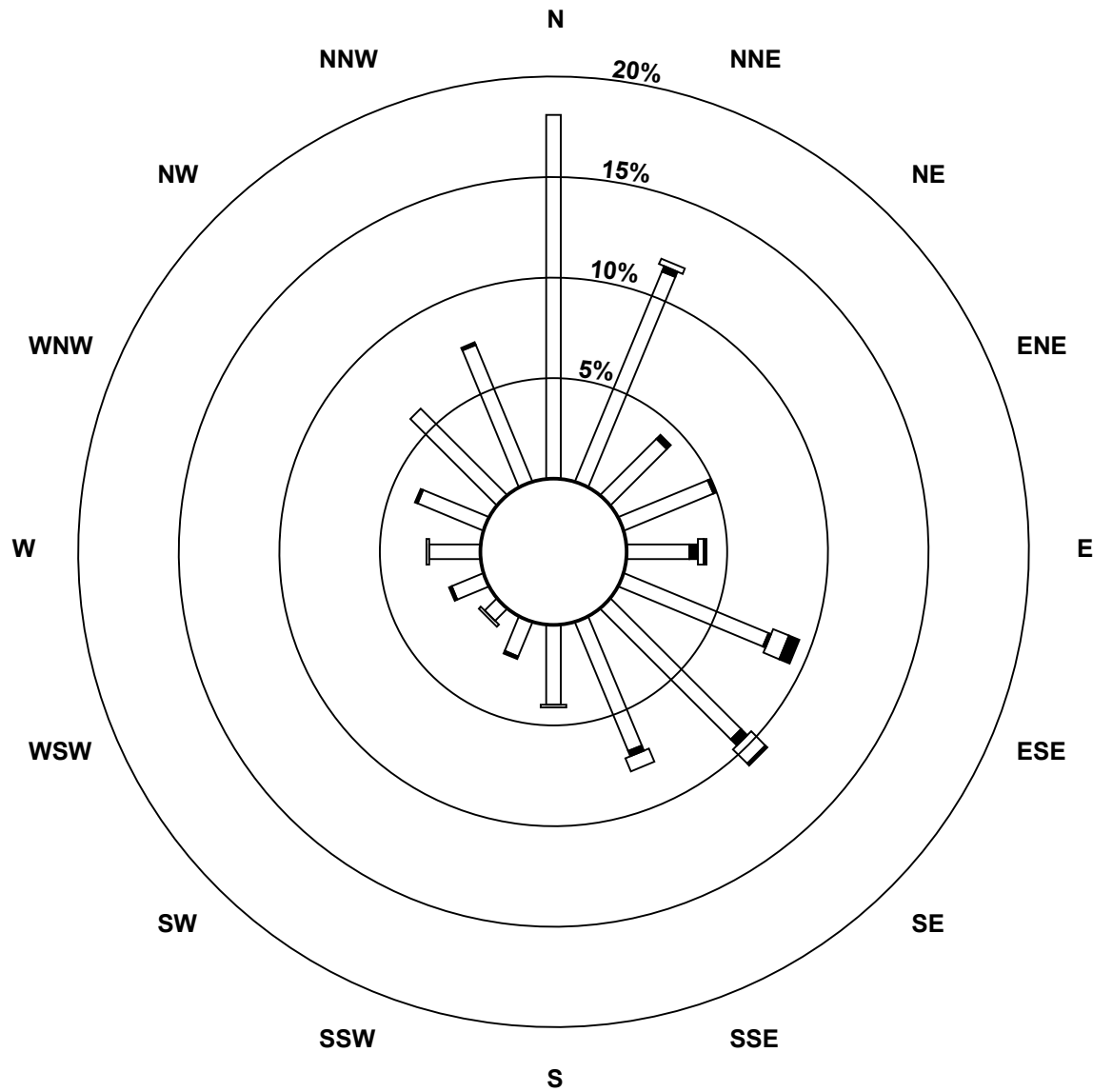
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	128	80	28	34	22	55	65	49	28	13	6	12	18	25	43	52	658
21 - 40	0	2	2	1	3	1	3	2	0	1	0	1	0	1	0	1	18
11 - 80	0	2	0	0	2	6	7	5	1	0	1	0	1	0	0	0	25
81 - 159	0	0	0	0	1	4	1	0	0	0	0	0	0	0	0	0	6
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	128	84	30	35	28	66	76	56	29	14	7	13	19	26	43	53	707

Total Number of Valid Hours: 707

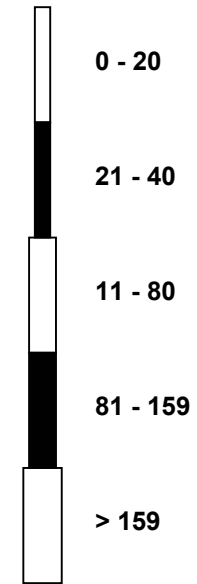
Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Nitric Oxide (NO) - ppb  
Millennium (AMS 12)**



Classes (ppb)



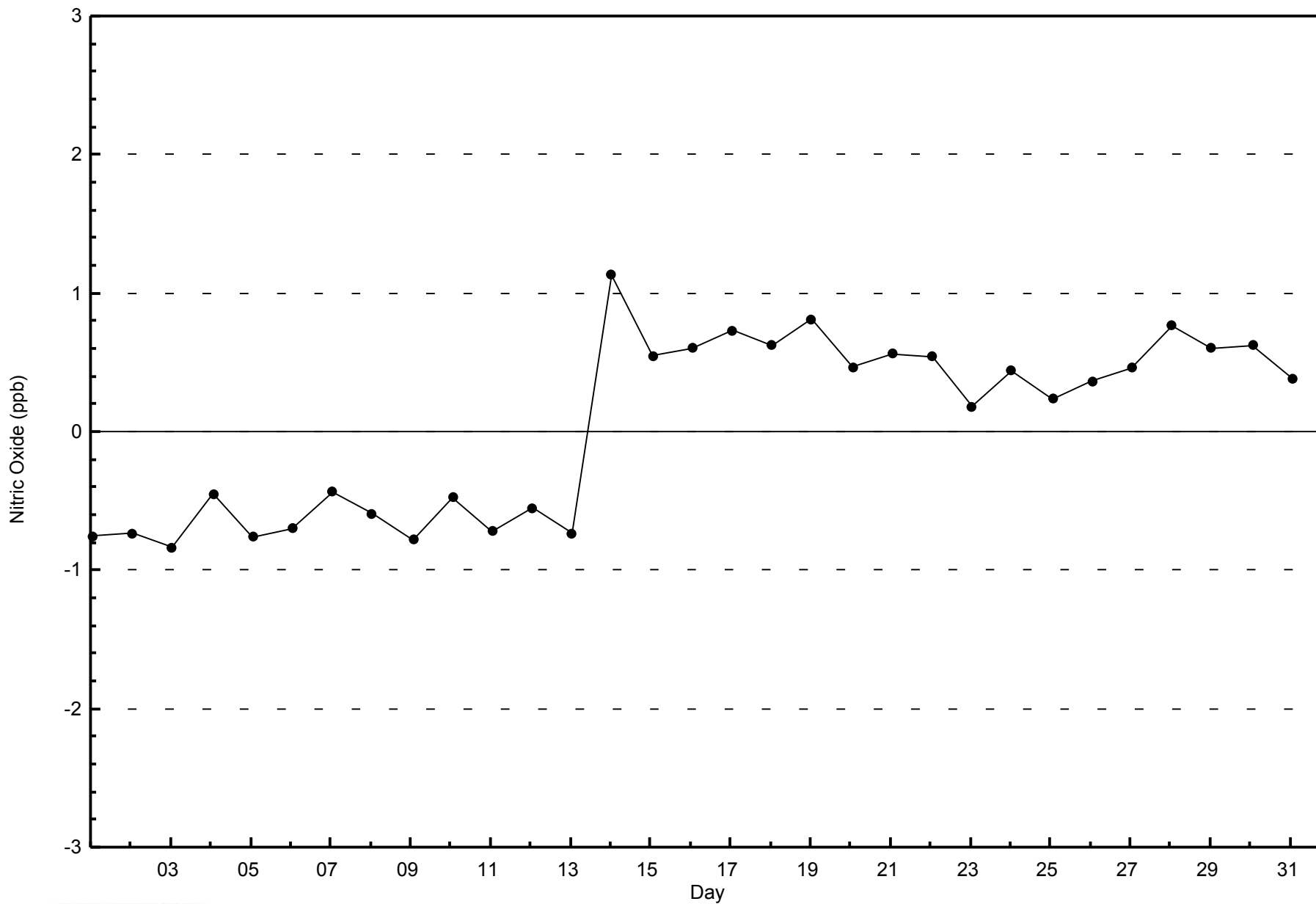
Total Number of Valid Hours: 707





WBEA  
Zero Responses

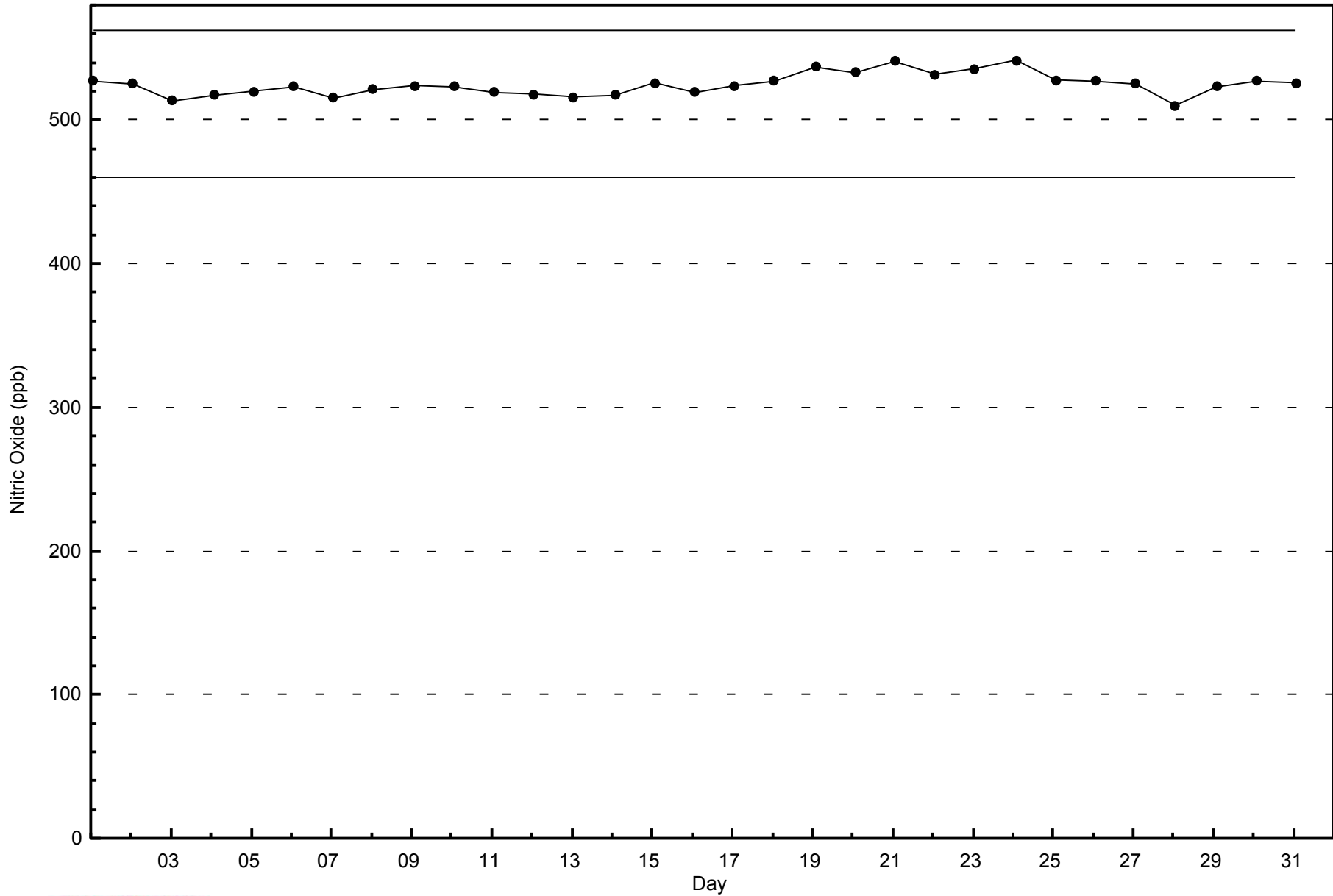
Nitric Oxide (NO) - ppb  
Millennium - May 2014





WBEA  
Span Responses

Nitric Oxide (NO) - ppb  
Millennium - May 2014





Wood Buffalo Environmental Association

Summary of Hour Averages

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

Millennium - May 2014

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 41 ppb on May 16 22:00	Maximum Daily Average: 18.8 ppb on May 18
Minimum Value: 0 ppb on May 13 18:00	Minimum Daily Average: 2.9 ppb on May 2
Maximum Diurnal Average: 18.2 ppb at hour 1	Minimum Diurnal Average: 2.4 ppb at hour 17
Monthly Average: 9.3 ppb	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 2 Median = 5 Q <sub>3</sub> = 14 P <sub>90</sub> = 26 P <sub>99</sub> = 37
	Hours of Data: 708
	Hours of Missing Data: 36
	Hours of Calibration: 36
	Percent Operational Time: 100.0

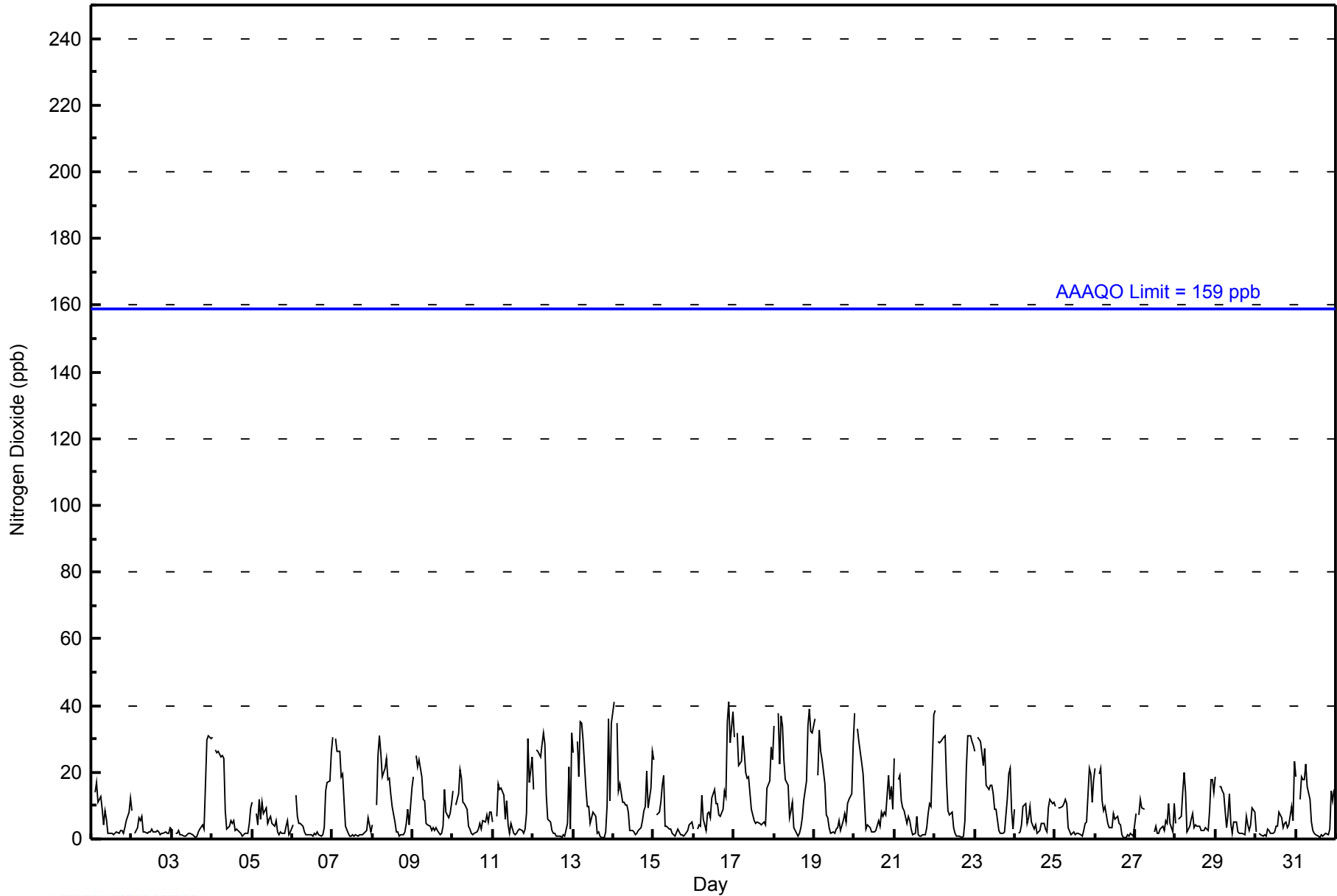
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-May	6	Z	14	17	11	13	9	4	8	6	2	2	2	1	2	2	2	3	2	2	3	5	8	12	5.9	17
2-May	8	Z	2	4	6	6	7	2	2	2	2	2	3	2	2	2	2	1	2	2	2	2	2	3	2.9	8
3-May	3	Z	2	2	3	1	1	1	1	1	2	2	1	1	1	1	2	3	4	3	16	30	31	30	6.1	31
4-May	31	Z	27	26	26	25	25	24	8	3	4	5	5	5	3	3	2	2	1	1	2	2	5	9	10.6	31
5-May	11	Z	8	4	12	6	11	8	9	5	6	7	5	4	5	2	1	2	2	2	4	5	1	2	5.3	12
6-May	4	Z	13	7	5	5	4	2	1	1	1	1	1	2	1	2	1	1	1	3	14	17	17	26	5.7	26
7-May	31	Z	30	26	26	19	20	12	4	2	1	1	1	1	1	1	1	1	1	2	3	6	4	2	8.5	31
8-May	4	Z	10	25	31	26	19	21	24	18	18	14	10	5	2	2	1	1	1	2	5	9	4	15	11.7	31
9-May	19	Z	25	22	24	19	12	12	5	4	4	3	3	3	3	2	1	2	4	15	8	6	8	11	9.2	25
10-May	14	Z	10	14	21	18	11	11	9	4	3	2	1	2	2	3	5	3	5	5	7	5	8	8	7.4	21
11-May	5	Z	7	16	15	15	13	6	11	4	2	5	2	1	2	2	3	2	2	3	8	30	17	25	8.5	30
12-May	15	Z	27	26	25	29	32	28	13	6	5	3	2	2	1	1	1	1	1	1	5	22	3	32	12.1	32
13-May	26	Z	29	19	35	35	30	15	10	10	5	6	8	7	2	2	1	0	1	2	10	36	12	35	14.5	36
14-May	41	Z	35	14	17	11	11	10	10	8	3	3	2	1	2	3	4	6	8	10	20	9	15	26	11.7	41
15-May	24	Z	7	8	11	16	19	4	4	3	3	2	1	1	3	2	1	1	1	1	3	4	5	5	5.6	24
16-May	3	Z	3	4	4	13	6	3	8	8	7	12	15	11	10	7	7	9	14	13	35	41	29	38	13.0	41
17-May	31	Z	32	22	24	31	26	20	18	19	9	7	6	5	5	5	4	5	5	4	15	17	28	24	15.6	32
18-May	34	Z	38	22	37	34	24	18	16	6	9	11	3	2	1	2	3	6	12	18	34	39	32	32	18.8	39
19-May	36	Z	19	33	26	24	17	7	7	3	2	2	2	3	4	6	3	5	8	5	11	12	14	28	11.9	36
20-May	38	Z	33	29	23	20	12	3	4	3	2	2	2	3	5	4	8	7	8	7	19	12	16	9	11.7	38
21-May	24	Z	18	19	12	10	8	5	7	5	3	1	2	7	1	1	1	1	1	3	8	11	10	37	8.4	37
22-May	38	Z	29	29	29	31	31	17	8	7	8	4	2	1	1	1	1	1	6	21	31	31	29	28	16.7	38
23-May	26	Z	30	29	26	22	27	16	15	16	16	14	9	9	3	2	2	2	2	12	19	21	9	3	14.3	30
24-May	9	Z	2	2	4	10	11	5	6	10	5	3	4	2	2	2	5	5	3	2	10	12	11	11	5.8	12
25-May	10	Z	9	9	10	11	12	11	3	1	2	2	1	2	2	1	1	3	5	5	21	20	11	18	7.3	21
26-May	21	Z	19	21	12	9	10	5	4	4	4	8	6	7	5	4	1	0	0	1	1	2	1	1	6.2	21
27-May	8	Z	7	12	10	9	C	C	C	C	C	2	4	2	2	3	4	3	6	5	11	5	2	10	5.7	12
28-May	5	Z	6	7	14	20	14	2	4	6	8	3	4	4	4	3	3	3	3	2	9	18	18	14	7.5	20
29-May	19	Z	16	16	14	14	4	7	14	5	2	5	5	2	2	2	2	1	7	4	3	4	9	8	7.1	19
30-May	2	Z	2	1	1	1	1	3	3	2	2	2	4	4	8	7	4	5	5	4	4	10	6	23	4.4	23
31-May	19	Z	12	19	18	18	22	16	12	5	3	2	1	1	1	1	1	1	2	1	3	14	11	15	8.5	22
	18.2	--	16.8	16.3	17.0	16.7	14.8	9.9	8.3	5.9	4.6	4.4	3.7	3.2	2.8	2.6	2.4	2.7	3.9	5.2	11.0	14.7	12.1	17.4	Diurnal Average	
	41	--	38	33	37	35	32	28	24	19	18	14	15	11	10	7	8	9	14	21	35	41	32	38	Diurnal Maximum	

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



**WBEA**  
**Hourly Averages**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Millennium - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Millennium - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	607	85.73	85.73
21 - 40	99	13.98	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: 708

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Millennium - May 2014**

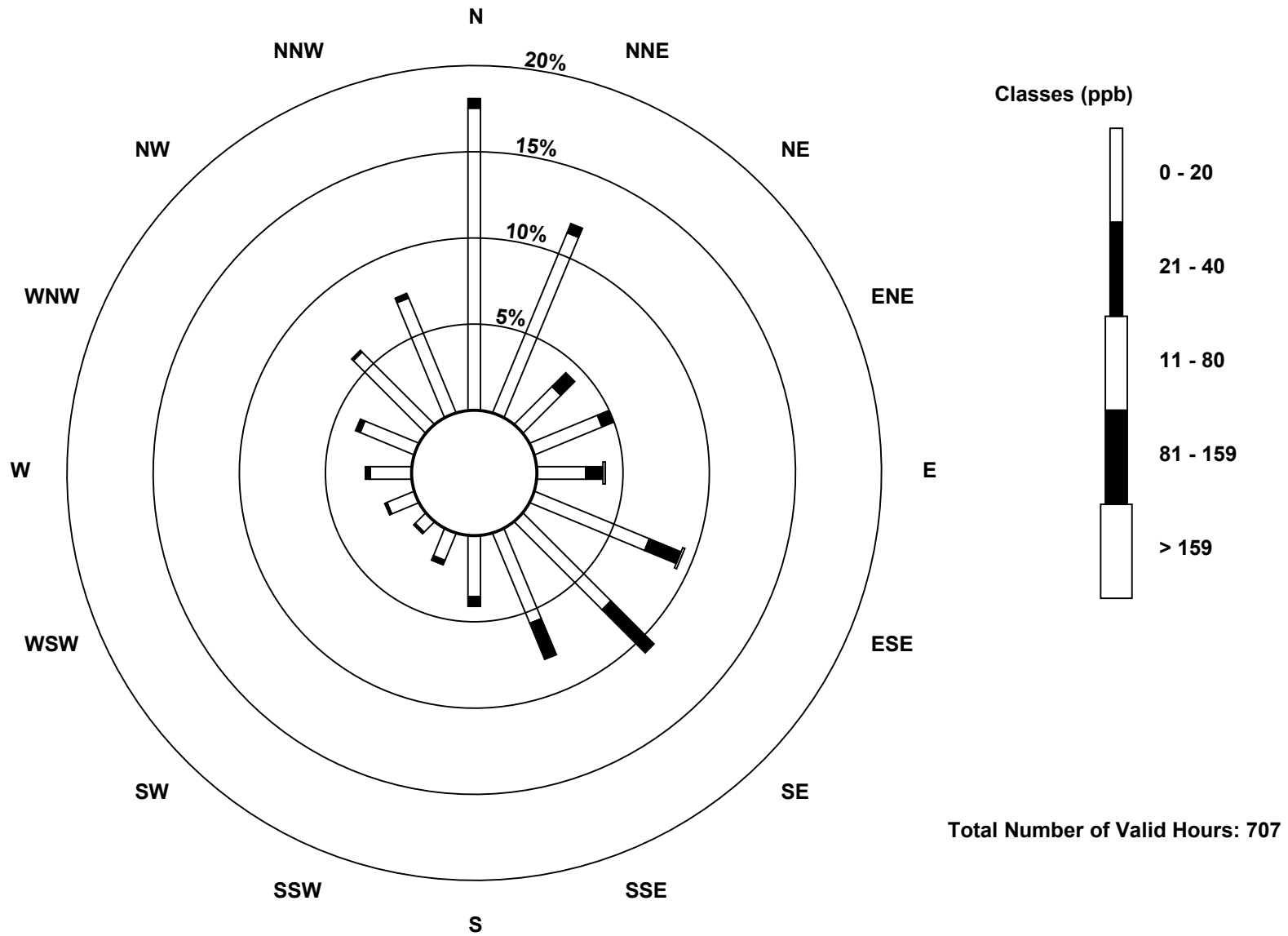
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	124	80	22	30	20	51	51	40	25	12	6	12	17	24	42	51	607
21 - 40	4	4	8	5	7	14	25	16	4	2	1	1	2	2	1	2	98
11 - 80	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	2
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	128	84	30	35	28	66	76	56	29	14	7	13	19	26	43	53	707

Total Number of Valid Hours: 707

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

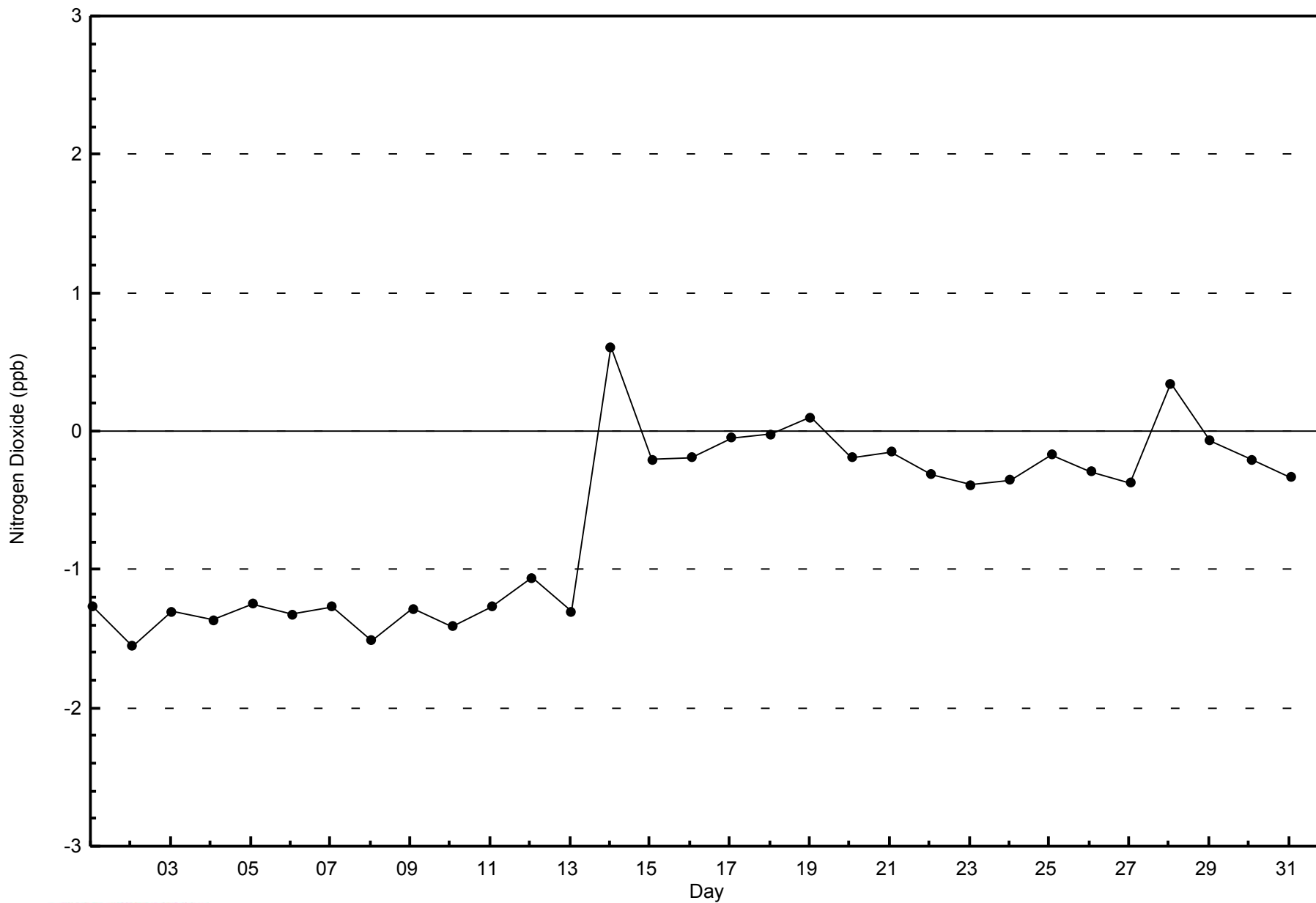
**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Millennium (AMS 12)**





WBEA  
Zero Responses

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Millennium - May 2014

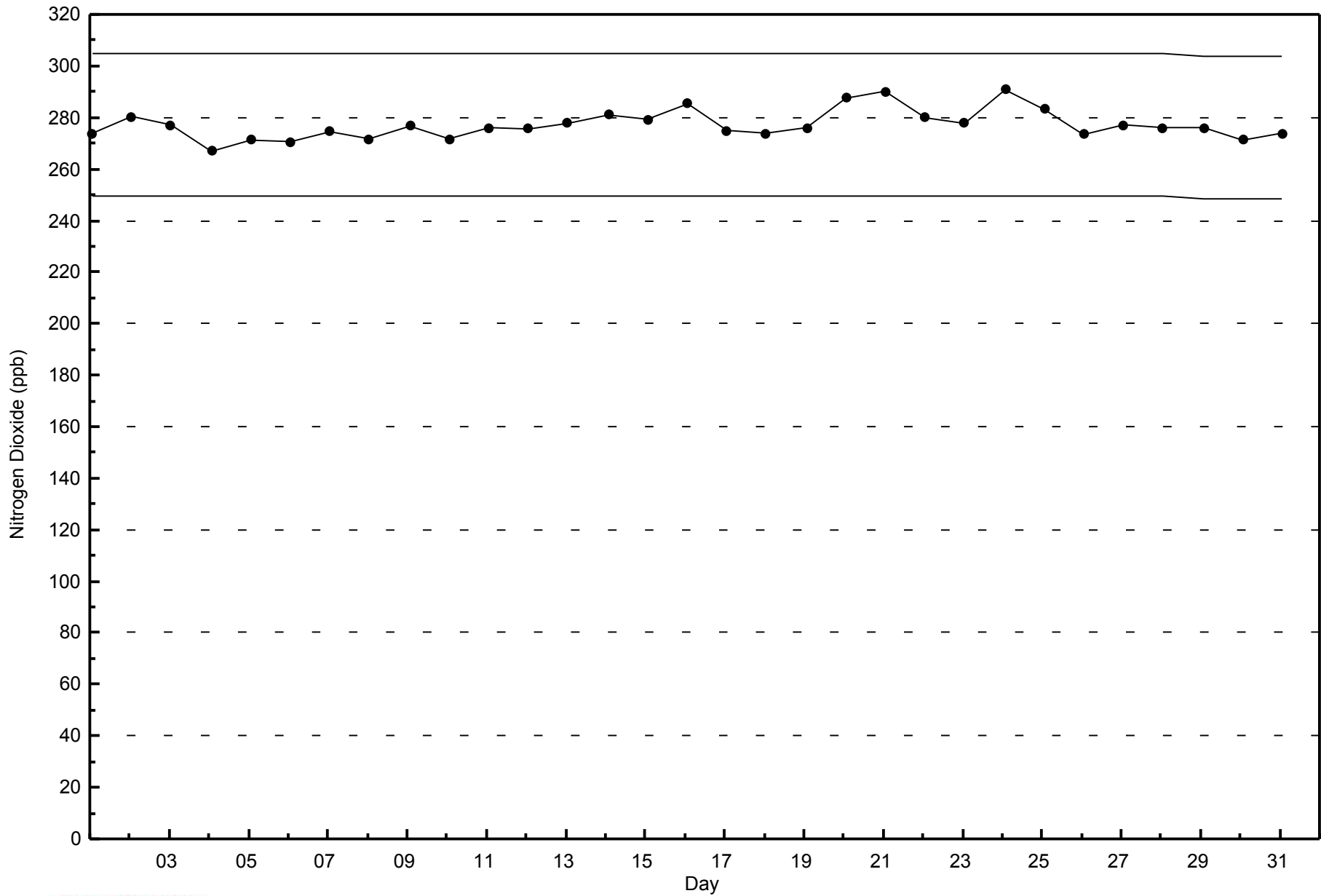






**WBEA**  
**Span Responses**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Millennium - May 2014**



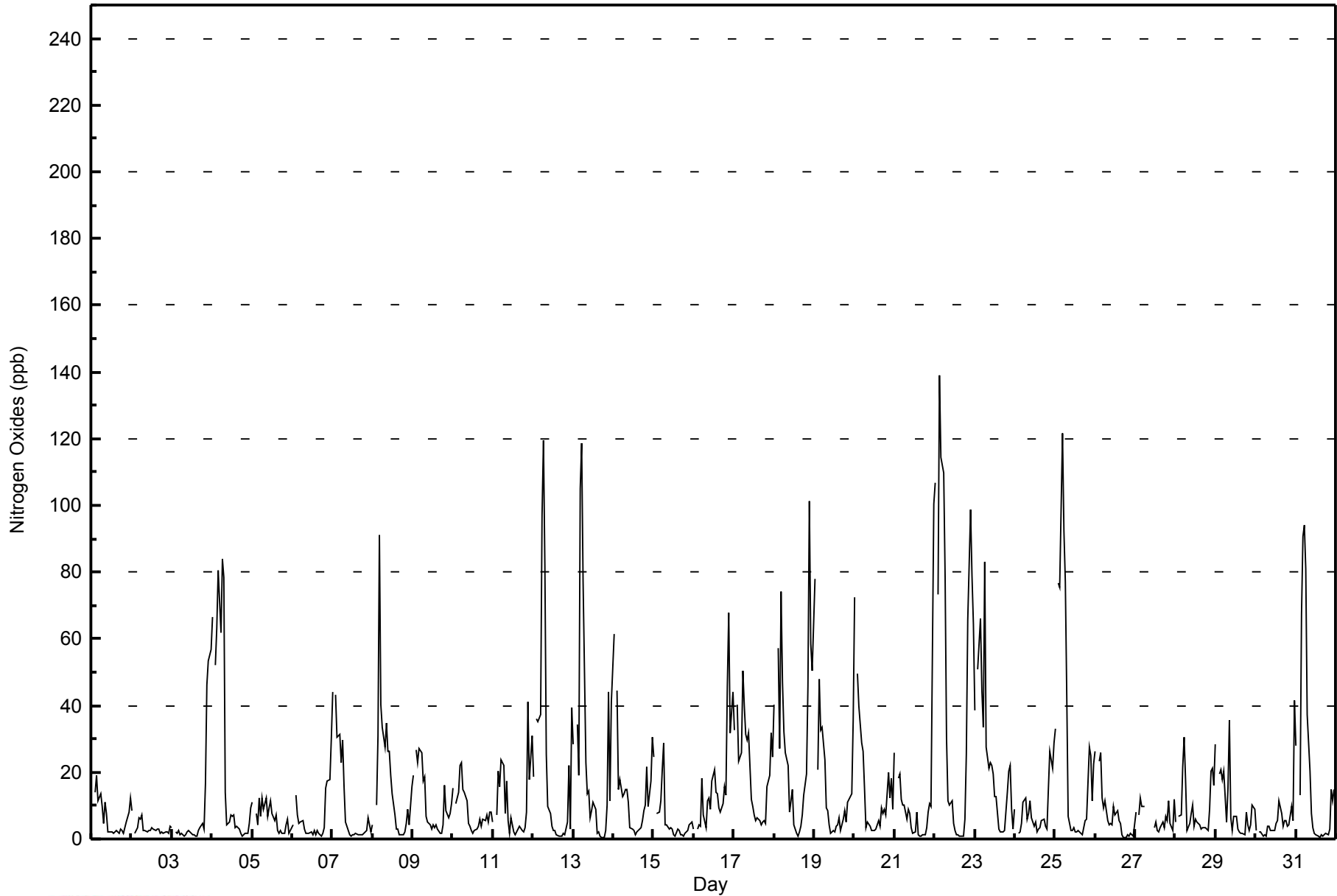


Maximum Value: 139 ppb on May 22 04:00																			Maximum Daily Average: 45.0 ppb on May 22						Hours in Service: 744		
Minimum Value: 0 ppb on May 13 18:00																			Minimum Daily Average: 3.3 ppb on May 2						Hours of Data: 708		
Maximum Diurnal Average: 35.2 ppb at hour 5																			Minimum Diurnal Average: 2.9 ppb at hour 17						Hours of Missing Data: 36		
Monthly Average: 14.9 ppb																			Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 2 Q <sub>1</sub> = 3 Median = 6 Q <sub>3</sub> = 18 P <sub>90</sub> = 39 P <sub>99</sub> = 105						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-May	6	Z	14	19	11	13	10	5	11	8	2	2	2	2	2	2	3	2	2	3	5	8	12	6.4	19		
2-May	8	Z	2	3	6	6	7	2	3	2	3	2	3	3	3	3	2	2	2	2	2	2	4	3.3	8		
3-May	3	Z	2	2	3	1	2	1	1	2	3	2	1	1	1	3	3	5	3	16	46	53	57	9.3	57		
4-May	67	Z	52	63	81	62	84	78	14	4	5	7	7	7	3	4	3	2	1	1	2	5	10	24.5	84		
5-May	11	Z	8	4	12	7	12	9	12	7	9	12	8	5	7	3	2	2	2	4	6	2	2	6.4	12		
6-May	4	Z	13	7	5	5	5	3	2	2	1	2	1	2	1	3	2	1	2	3	15	17	18	30	6.3	30	
7-May	44	Z	43	31	31	23	30	16	5	2	1	1	1	1	2	1	1	1	1	2	3	6	4	2	11.0	44	
8-May	4	Z	10	31	91	40	33	27	35	26	26	19	14	7	3	3	1	1	1	2	5	9	4	16	17.8	91	
9-May	19	Z	27	23	27	26	17	19	7	5	4	3	4	3	4	3	2	2	4	16	8	6	7	11	10.8	27	
10-May	15	Z	11	14	22	23	15	14	12	5	4	3	2	2	3	4	6	4	6	5	7	5	8	8	8.5	23	
11-May	5	Z	7	20	16	24	22	7	17	6	2	6	2	1	2	3	4	2	2	3	8	41	18	31	10.9	41	
12-May	19	Z	36	35	37	97	119	82	25	10	8	4	3	3	1	1	1	1	2	1	5	22	3	39	24.0	119	
13-May	28	Z	34	19	105	119	78	23	14	14	6	9	11	9	2	2	1	0	1	2	10	44	12	41	25.4	119	
14-May	62	Z	44	15	18	13	14	15	15	11	3	3	2	1	2	3	3	6	9	10	22	10	17	31	14.2	62	
15-May	24	Z	8	8	11	21	29	4	4	3	3	3	1	1	3	3	1	1	1	2	3	4	5	5	6.5	29	
16-May	3	Z	3	4	4	18	7	3	11	12	9	17	21	14	14	9	8	11	16	13	46	68	32	44	16.9	68	
17-May	33	Z	40	23	26	50	40	32	30	32	12	10	7	6	6	5	4	5	5	5	16	19	32	25	20.1	50	
18-May	40	Z	57	27	74	47	32	26	22	8	12	15	4	2	1	2	4	7	13	19	46	101	58	50	29.0	101	
19-May	78	Z	21	48	32	34	24	9	8	4	2	3	2	4	4	6	3	6	8	5	11	12	14	36	16.2	78	
20-May	73	Z	49	40	29	26	15	4	5	4	3	2	3	3	6	4	9	8	9	7	20	12	18	9	15.5	73	
21-May	26	Z	18	20	12	10	10	6	9	7	4	2	2	8	1	1	1	1	1	3	8	10	10	101	11.8	101	
22-May	107	Z	73	139	115	110	78	30	12	10	11	5	2	1	1	1	1	1	6	26	65	99	79	64	45.0	139	
23-May	38	Z	51	66	44	33	83	28	21	23	22	20	13	13	3	2	2	2	3	14	20	22	9	3	23.2	83	
24-May	9	Z	2	2	5	11	12	6	8	11	6	4	5	2	3	3	5	6	4	3	15	26	21	29	8.6	29	
25-May	33	Z	77	75	122	92	77	43	7	2	2	3	2	2	2	2	1	3	6	6	28	25	12	22	28.0	122	
26-May	26	Z	23	26	12	9	12	5	4	5	4	10	7	8	6	5	1	0	0	1	1	2	1	1	7.4	26	
27-May	8	Z	7	12	10	10	C	C	C	C	C	3	5	2	2	4	5	3	7	6	11	5	3	12	6.4	12	
28-May	5	Z	7	7	22	30	18	2	5	8	10	4	6	5	4	3	3	3	4	3	9	21	21	16	9.4	30	
29-May	28	Z	20	21	18	20	5	15	36	7	2	7	7	3	2	2	2	1	8	4	3	4	10	9	10.2	36	
30-May	2	Z	2	2	1	1	1	4	4	2	2	3	5	5	12	8	4	5	6	4	4	10	6	42	5.8	42	
31-May	28	Z	13	67	91	94	81	37	20	7	3	2	1	1	1	1	1	1	2	1	3	15	11	15	21.6	94	
		27.6	--	25.0	28.2	35.2	34.7	32.4	18.5	12.6	8.3	6.2	6.0	5.0	4.2	3.5	3.1	2.9	3.1	4.4	5.7	13.5	21.8	16.2	25.0	Diurnal Average	
		107	--	77	139	122	119	119	82	36	32	26	20	21	14	14	9	9	11	16	26	65	101	79	101	Diurnal Maximum	
Z - zerospan		C - Calibration																									



**WBEA**  
**Hourly Averages**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Millennium - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Millennium - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	554	78.25	78.25
21 - 40	89	12.57	90.82
41 - 80	44	6.21	97.03
81 - 159	19	2.68	99.72
> 159	0	0.00	99.72

Total Number of Valid Hours: 708

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Millennium - May 2014**

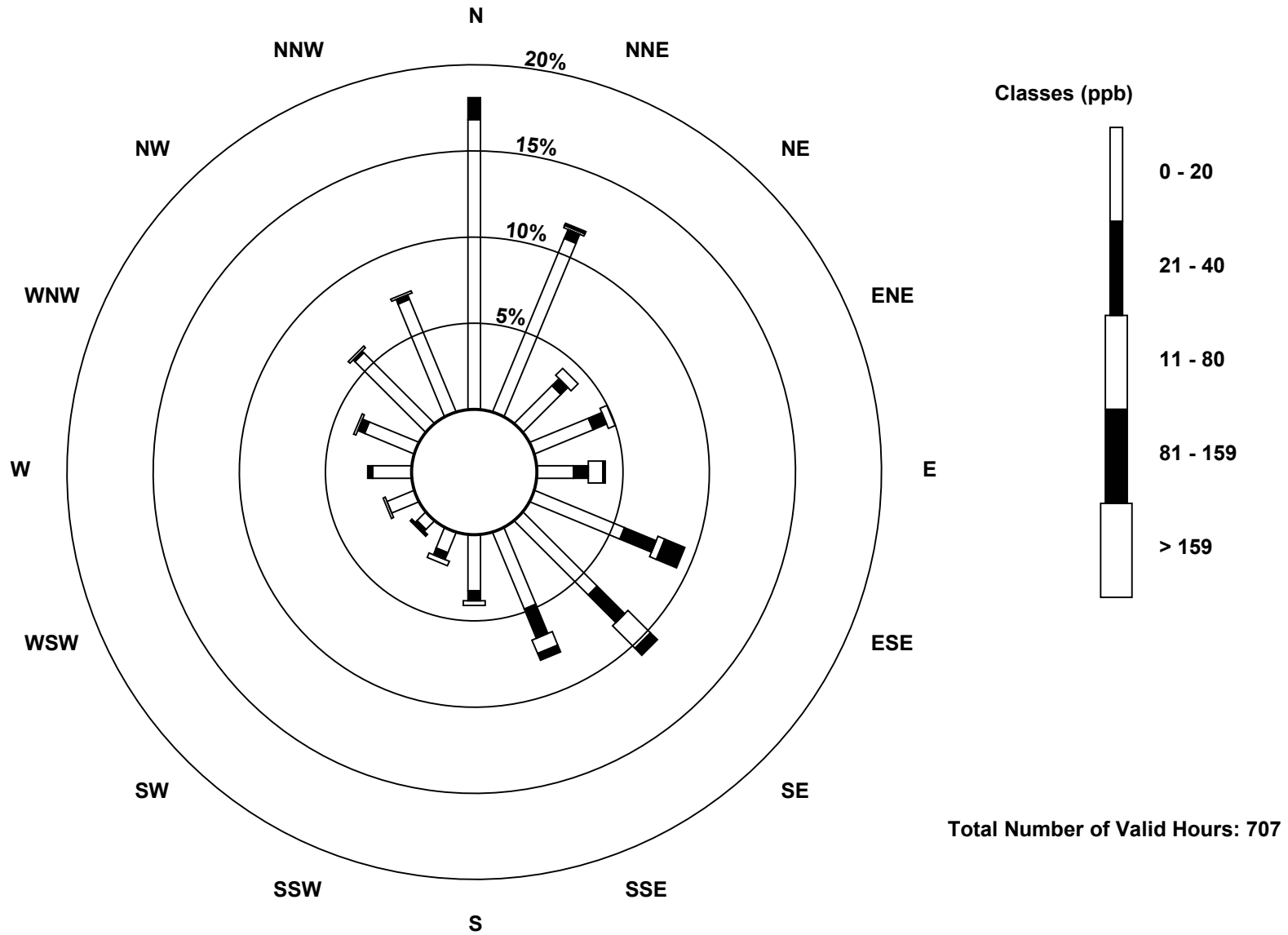
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	119	77	22	26	15	40	43	34	23	9	5	12	16	22	41	50	554
21 - 40	9	4	4	6	6	14	16	13	4	3	1	0	2	3	1	2	88
41 - 80	0	1	4	3	6	3	13	6	2	2	0	1	0	1	1	1	44
81 - 159	0	1	0	0	1	9	4	3	0	0	1	0	0	0	0	0	19
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	128	83	30	35	28	66	76	56	29	14	7	13	18	26	43	53	705

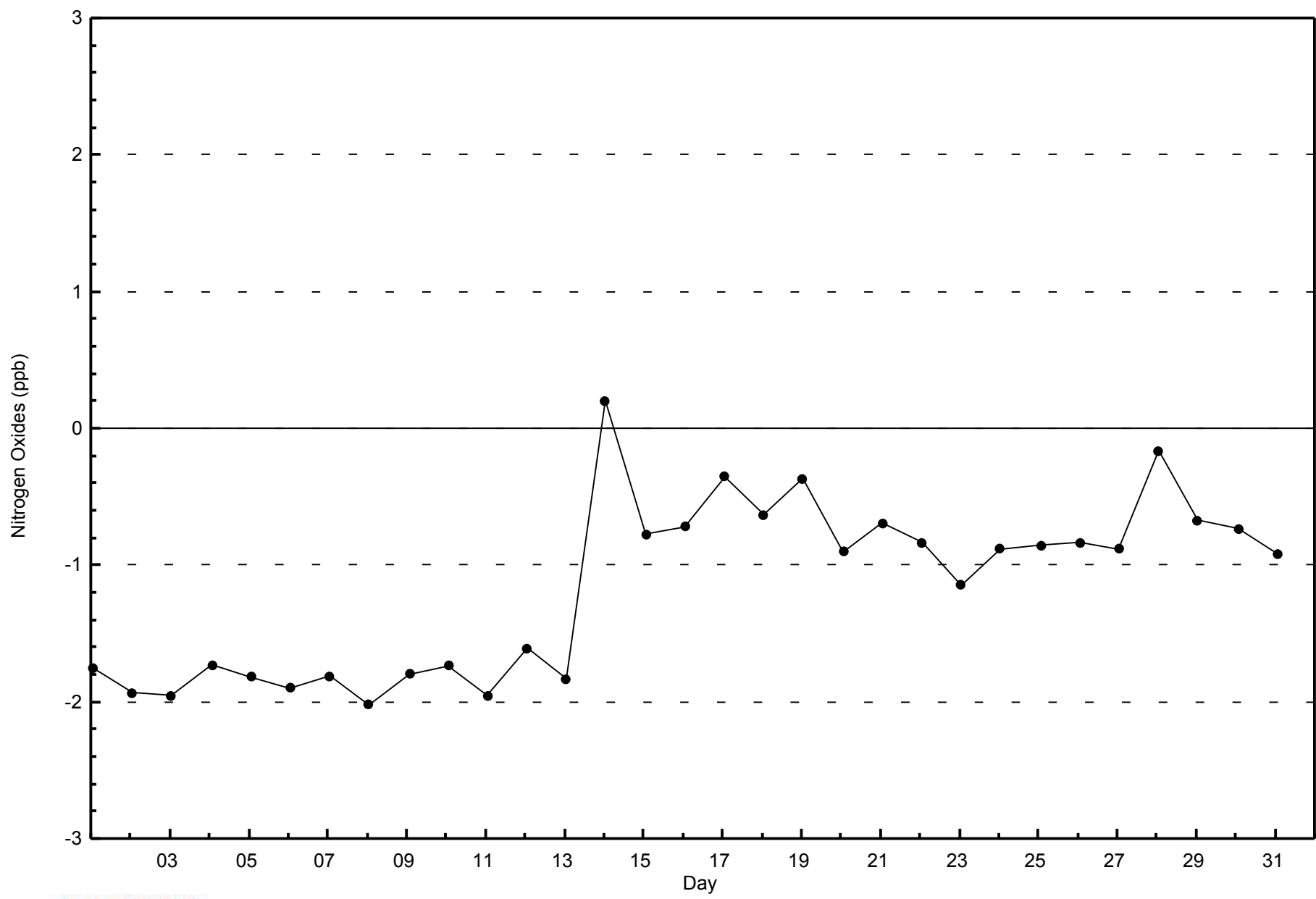
Total Number of Valid Hours: 707

Total Number of Hours: 744

Wood Buffalo Environmental Association  
Wind Rose May 2014

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Millennium (AMS 12)

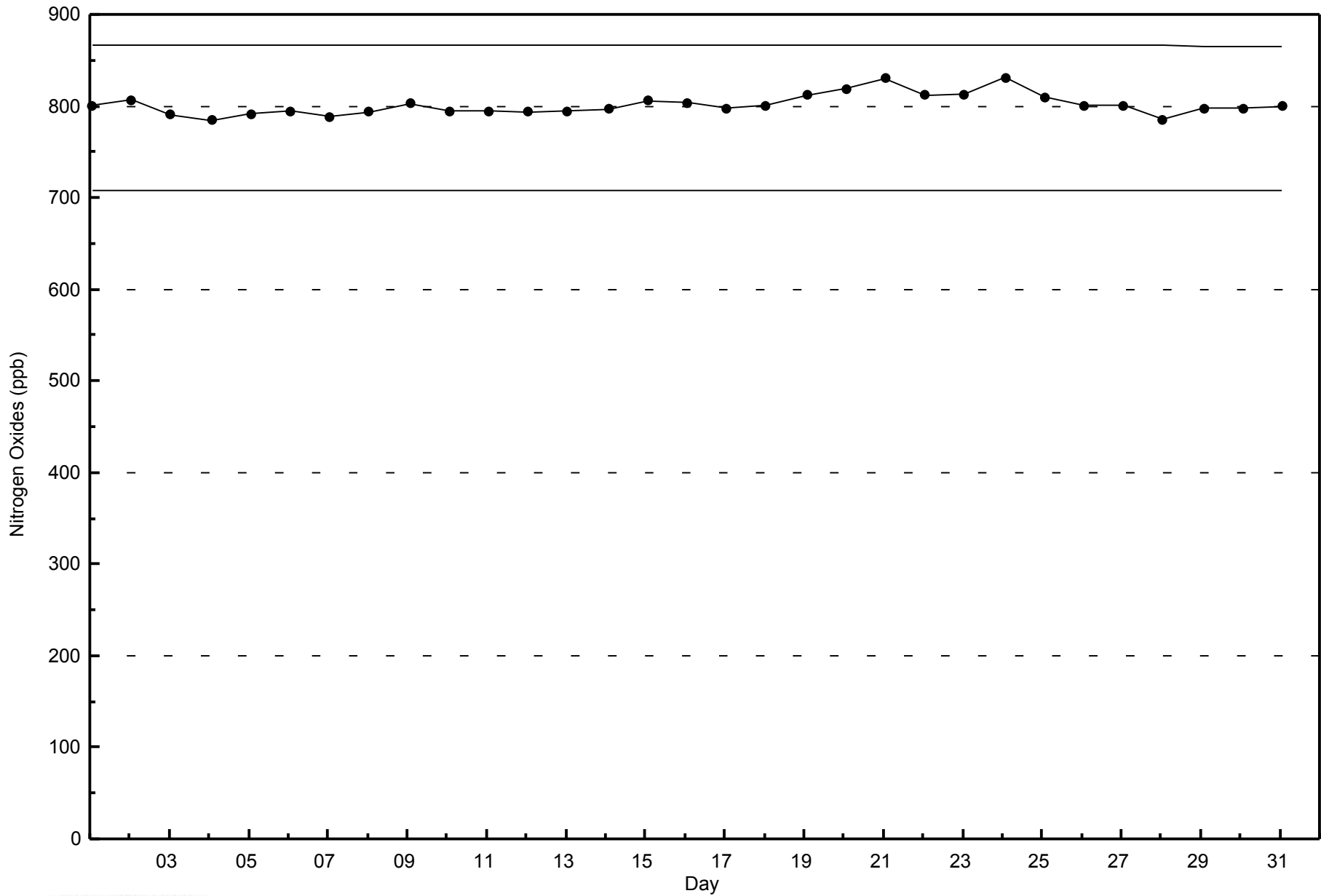






**WBEA**  
**Span Responses**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Millennium - May 2014**







Summary of Hour Averages

Millennium - May 2014

Number of Exceedences (AAAQO): 24-hr: 0	Hours in Service: 744
Maximum Value: 54.9 µg/m <sup>3</sup> on May 18 22:00	Maximum Daily Average: 15.2 µg/m <sup>3</sup> on May 18
Minimum Value: 0.4 µg/m <sup>3</sup> on May 24 15:00	Hours of Data: 743
Maximum Diurnal Average: 10.1 µg/m <sup>3</sup> at hour 22	Hours of Missing Data: 1
Monthly Average: 6.15 µg/m <sup>3</sup>	Hours of Calibration: 0
Minimum Daily Average: 1.6 µg/m <sup>3</sup> on May 28	Percent Operational Time: 99.9
Minimum Diurnal Average: 3.9 µg/m <sup>3</sup> at hour 17	
Percentiles: P <sub>1</sub> = 0.7 P <sub>10</sub> = 1.5 Q <sub>1</sub> = 2.5 Median = 4.3 Q <sub>3</sub> = 7.8 P <sub>90</sub> = 12.8 P <sub>99</sub> = 26.7	

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-May	7.3	7.3	5.2	4.6	3.1	2.5	2.8	2.2	7.5	5.3	2.1	2.9	3.6	2.3	1.6	1.9	2.3	2.4	2.4	2.4	1.6	2.1	2.4	3.2	3.4	7.5																						
2-May	4.5	13.3	2.1	1.7	9.1	14.6	5.3	2.6	2.5	2.6	3.0	2.9	3.0	3.2	2.8	3.0	4.5	4.9	5.2	5.9	4.6	4.5	3.8	3.8	4.7	14.6																						
3-May	3.7	4.1	3.7	4.1	3.9	3.9	4.3	4.0	3.2	2.9	2.7	2.1	2.4	2.7	1.5	1.8	1.9	2.3	4.5	5.4	4.6	5.8	7.3	10.5	3.9	10.5																						
4-May	9.0	9.7	9.3	8.6	8.9	7.1	13.3	10.5	4.8	2.9	3.9	4.7	4.2	4.7	3.7	3.6	3.4	3.3	3.0	4.8	3.3	3.4	4.2	4.3	5.8	13.3																						
5-May	3.8	4.1	3.3	3.1	3.5	5.1	5.4	5.1	5.6	4.1	3.9	3.1	2.2	1.9	2.1	2.2	1.6	2.5	2.7	2.5	2.2	2.3	2.0	2.3	3.2	5.6																						
6-May	2.3	3.0	3.2	2.7	2.8	2.8	3.1	2.9	2.6	2.4	2.9	2.8	2.7	2.7	2.5	2.5	2.1	2.8	3.8	3.4	3.9	6.0	8.2	9.5	3.5	9.5																						
7-May	6.7	6.1	6.4	7.0	6.0	4.6	5.3	4.4	3.2	2.6	3.5	2.4	3.3	2.9	3.1	2.7	2.0	3.6	3.3	4.9	4.3	4.2	3.3	2.5	4.1	7.0																						
8-May	2.4	2.9	2.4	3.7	7.3	7.3	4.9	6.5	7.9	7.8	7.8	6.9	6.7	4.9	3.1	2.1	2.1	1.3	2.0	2.2	1.9	2.5	2.0	2.6	4.2	7.9																						
9-May	3.4	3.0	3.1	2.9	3.5	3.3	3.7	3.9	4.3	1.8	1.9	1.8	2.4	2.2	2.4	3.2	1.7	1.6	1.4	1.5	1.8	1.8	2.0	2.1	2.5	4.3																						
10-May	2.6	2.6	2.7	2.9	6.4	7.8	6.3	3.2	5.3	2.0	1.6	1.4	1.3	1.3	1.4	1.8	1.6	1.4	1.7	1.9	2.0	2.1	2.3	3.9	2.8	7.8																						
11-May	3.6	3.2	3.6	3.7	3.0	4.4	3.3	2.9	4.8	3.2	1.8	2.1	1.5	1.6	1.5	1.5	2.4	3.0	4.4	3.9	3.2	12.6	6.2	6.6	3.7	12.6																						
12-May	4.3	5.7	5.9	5.6	5.6	10.1	10.1	6.8	3.1	2.1	2.1	2.0	2.2	2.4	2.9	3.4	3.2	3.0	6.0	6.0	4.0	8.5	3.1	12.6	5.0	12.6																						
13-May	8.1	6.6	8.5	6.9	12.0	13.3	10.7	8.1	6.5	5.1	3.9	6.6	7.5	7.6	5.0	7.5	7.1	5.1	11.6	10.5	4.9	15.9	7.6	21.6	8.7	21.6																						
14-May	11.1	9.4	16.6	10.1	13.5	7.4	4.8	6.0	5.3	6.0	5.2	7.3	6.7	5.6	8.8	12.7	16.0	23.7	13.3	22.2	18.8	11.1	6.9	5.3	10.6	23.7																						
15-May	4.3	4.7	5.5	5.4	6.7	7.2	7.2	6.1	5.9	5.0	3.8	2.5	2.4	2.9	3.3	2.9	2.8	2.6	2.1	2.0	2.1	2.5	3.3	4.6	4.1	7.2																						
16-May	4.0	4.2	4.6	5.0	4.9	6.6	4.0	2.7	2.7	2.7	4.2	16.3	26.6	17.7	18.9	10.5	8.6	9.3	10.8	12.6	21.7	17.1	10.1	9.7	9.8	26.6																						
17-May	7.6	5.8	8.1	8.1	7.9	9.4	7.5	11.9	8.7	7.6	5.4	5.9	6.2	6.3	6.5	6.8	6.0	7.4	12.2	12.6	15.0	11.5	11.3	8.8	8.5	15.0																						
18-May	12.1	9.5	13.5	11.6	15.5	14.6	13.6	10.1	10.6	6.1	7.7	8.3	8.9	9.3	6.9	5.7	6.5	9.4	8.4	18.0	37.9	54.9	29.0	35.4	15.2	54.9																						
19-May	43.0	14.9	16.0	15.1	14.3	13.7	12.8	11.2	12.0	10.1	7.9	7.8	9.3	8.4	15.5	21.9	10.0	23.7	17.0	13.9	18.5	11.4	10.3	21.4	15.0	43.0																						
20-May	14.0	11.9	12.3	13.6	11.5	9.3	7.1	4.6	5.2	5.4	5.9	7.5	5.8	7.2	6.6	6.0	2.8	1.4	2.2	3.8	6.2	8.4	7.5	6.0	7.2	14.0																						
21-May	7.3	6.4	6.5	7.0	7.2	6.3	3.6	1.9	2.6	2.7	2.6	2.9	5.5	4.4	4.2	3.8	3.5	6.0	3.4	5.0	12.0	5.2	8.4	23.6	5.9	23.6																						
22-May	23.5	17.4	17.3	21.2	13.8	10.6	8.9	6.7	5.7	5.5	5.8	4.5	3.2	1.2	1.0	1.2	1.5	1.7	2.7	19.8	39.0	27.8	13.6	10.2	11.0	39.0																						
23-May	9.6	6.8	8.3	10.2	10.0	8.6	10.0	9.6	10.4	9.7	7.1	10.7	4.7	4.1	3.7	3.0	2.5	2.7	37.1	17.8	21.8	19.3	14.5	10.1	10.5	37.1																						
24-May	16.3	6.0	2.6	1.0	1.2	3.8	7.0	3.3	16.5	16.1	9.5	2.3	2.9	0.6	0.4	1.0	5.5	2.5	1.4	1.0	1.7	2.3	2.0	3.1	4.6	16.5																						
25-May	2.9	4.1	5.5	6.1	7.9	6.3	5.8	3.2	1.8	1.6	1.6	2.3	1.9	2.0	2.8	2.7	3.1	8.2	6.6	9.1	20.3	20.7	9.2	9.8	6.1	20.7																						
26-May	11.2	8.9	12.8	9.5	4.4	5.0	9.4	13.5	8.0	9.6	9.7	13.1	14.1	8.2	5.7	8.5	9.2	9.8	12.2	17.7	25.1	30.9	25.4	13.8	12.3	30.9																						
27-May	10.2	7.7	4.9	4.7	3.9	3.5	2.5	2.3	2.0	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.6	0.8	2.2	10.2																						
28-May	0.7	0.8	0.8	0.8	1.0	1.1	0.9	0.7	0.7	M	0.9	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.0	1.1	3.1	4.1	5.2	5.1	5.2	1.6	5.2																					
29-May	5.1	4.6	4.7	4.5	4.4	4.6	3.9	3.8	3.1	1.9	2.2	3.1	2.0	1.5	1.4	1.1	0.9	0.7	1.0	0.9	0.8	1.1	4.3	2.7	2.7	5.1																						
30-May	1.0	1.2	1.4	1.4	1.5	1.5	1.3	1.4	1.3	1.2	1.3	1.4	1.7	5.9	6.5	5.3	2.9	3.0	3.0	2.4	2.3	2.2	3.1	6.3	2.5	6.5																						
31-May	6.7	4.2	4.9	9.4	12.2	7.2	6.7	7.8	6.0	4.0	3.6	3.5	3.1	3.3	3.5	3.4	3.1	2.9	3.2	3.2	3.0	10.3	4.9	5.5	5.2	12.2																						
																								8.1	6.5	6.6	6.5	7.0	6.9	6.3	5.5	5.5	4.7	4.1	4.6	4.8	4.2	4.2	4.4	3.9	5.0	6.2	7.1	9.5	10.1	7.2	8.6	Diurnal Average
																								43.0	17.4	17.3	21.2	15.5	14.6	13.6	13.5	16.5	16.1	9.7	16.3	26.6	17.7	18.9	21.9	16.0	23.7	37.1	22.2	39.0	54.9	29.0	35.4	Diurnal Maximum

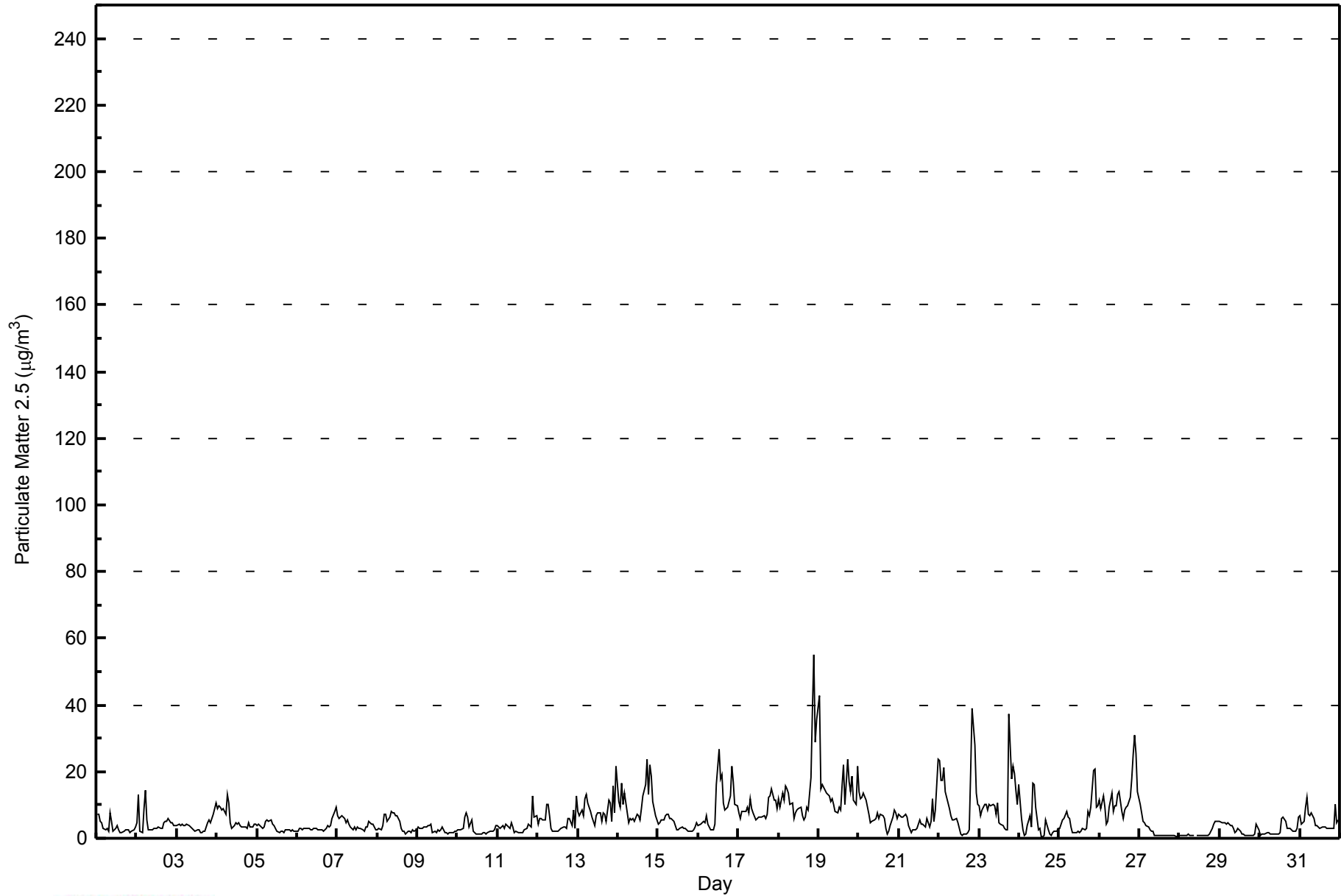
M - Maintenance

Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m<sup>3</sup>



WBEA  
Hourly Averages

Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
Millennium - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Millennium - May 2014**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
1 - 5	410	55.18	55.18
6 - 15	248	33.38	88.56
16 - 25	38	5.11	93.67
26 - 80	10	1.35	95.02
> 81.0	0	0.00	95.02

Total Number of Valid Hours: 743

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) - μg/m<sup>3</sup>**  
**Millennium - May 2014**

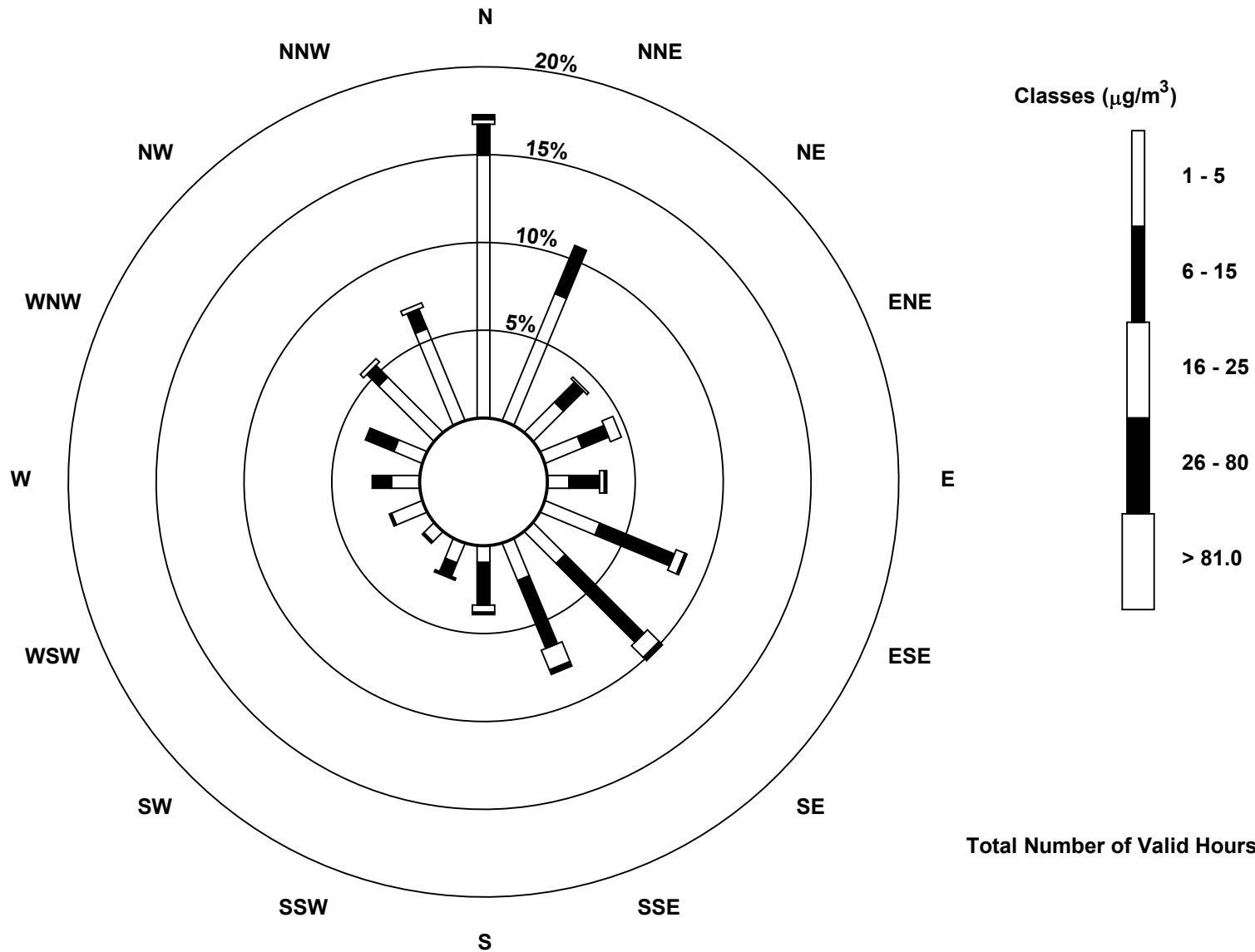
Concentration Ranges (μg/m <sup>3</sup> )	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	111	58	18	17	9	25	19	17	7	9	6	14	12	13	33	42	410
6 - 15	13	22	12	12	13	34	47	31	18	6	1	1	8	13	7	9	247
16 - 25	2	0	1	5	2	4	7	9	3	0	0	0	0	0	2	2	37
26 - 80	2	0	0	0	1	1	2	2	1	1	0	0	0	0	0	0	10
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	128	80	31	34	25	64	75	59	29	16	7	15	20	26	42	53	704

Total Number of Valid Hours: 741

Total Number of Hours: 744

Wood Buffalo Environmental Association  
 Wind Rose May 2014

Particulate Matter 2.5 (PM<sub>2.5</sub>) - μg/m<sup>3</sup>  
 Millennium (AMS 12)



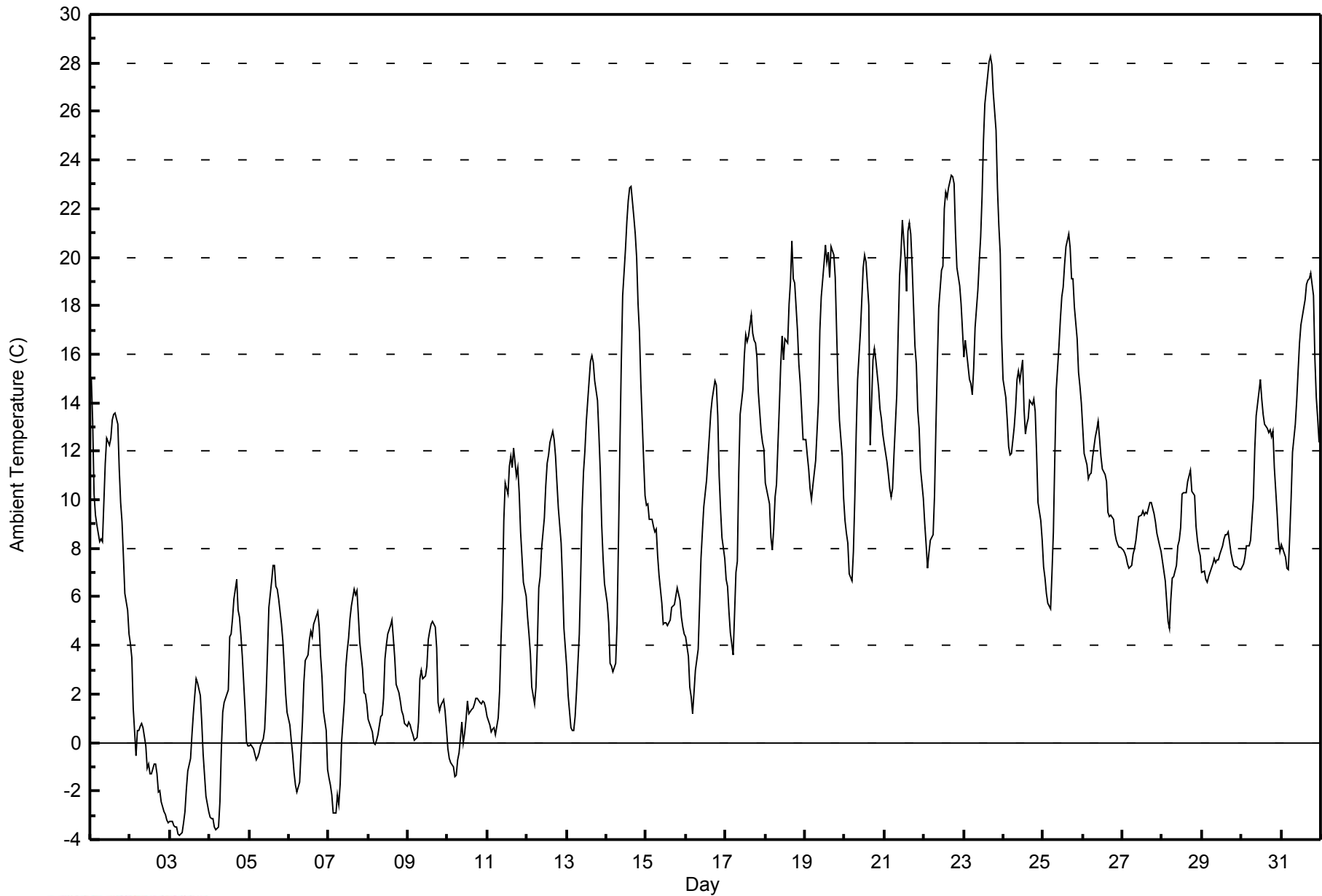


Maximum Value: 28.2 C on May 23 17:00		Maximum Daily Average: 20.9 C on May 23		Hours in Service: 744																						
Minimum Value: -3.9 C on May 3 07:00		Minimum Daily Average: -1.4 C on May 3		Hours of Data: 744																						
Maximum Diurnal Average: 12.3 C at hour 17		Minimum Diurnal Average: 4.4 C at hour 5		Hours of Missing Data: 0																						
Monthly Average: 8.61 C		Percentiles: P <sub>1</sub> = -3.5 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 3.1 Median = 8.3 Q <sub>3</sub> = 13.3 P <sub>90</sub> = 18.3 P <sub>99</sub> = 24.1		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-May	15.1	13.2	10.2	9.4	8.9	8.3	8.4	8.3	9.9	11.5	12.5	12.3	12.6	13.3	13.5	13.6	13.1	11.3	9.9	9.1	7.6	6.2	5.4	4.5	10.3	15.1
2-May	4.0	3.5	1.4	-0.5	0.5	0.5	0.7	0.8	0.6	-0.1	-1.1	-0.9	-1.3	-1.3	-0.9	-0.9	-1.3	-2.0	-2.0	-2.4	-2.8	-3.0	-3.2	-3.3	-0.6	4.0
3-May	-3.3	-3.2	-3.4	-3.5	-3.5	-3.8	-3.9	-3.7	-3.3	-2.9	-1.9	-1.2	-0.7	0.3	1.2	1.9	2.6	2.4	1.9	0.9	-0.5	-1.4	-2.2	-2.9	-1.4	2.6
4-May	-3.1	-3.1	-3.1	-3.5	-3.6	-3.5	-2.5	-0.3	1.2	1.6	2.0	2.2	4.4	4.5	5.1	5.9	6.7	5.5	5.2	4.4	3.5	1.4	0.0	-0.2	1.3	6.7
5-May	-0.2	-0.1	-0.3	-0.5	-0.7	-0.6	-0.4	-0.1	0.1	0.6	1.9	3.7	5.6	6.7	7.3	7.3	6.4	6.3	5.9	4.9	4.2	3.2	2.0	1.3	2.7	7.3
6-May	0.7	0.1	-0.5	-1.2	-1.8	-2.0	-1.6	-0.4	0.9	2.5	3.4	3.6	4.2	4.6	4.4	4.9	5.0	5.4	4.7	3.5	2.7	1.3	0.5	-1.1	1.8	5.4
7-May	-1.4	-1.8	-2.2	-2.9	-2.9	-2.2	-2.5	-1.7	0.0	1.7	3.1	3.8	4.3	5.1	5.6	6.3	6.1	6.3	5.2	4.1	3.0	2.0	2.0	1.6	1.8	6.3
8-May	1.0	0.8	0.5	0.0	-0.1	0.1	0.3	1.1	1.2	1.8	3.4	4.0	4.5	4.8	5.1	4.3	3.5	2.4	2.0	1.7	1.3	1.1	0.8	0.7	1.9	5.1
9-May	0.8	0.7	0.5	0.3	0.1	0.2	0.8	2.7	3.0	2.6	2.7	3.1	4.2	4.6	4.9	5.0	4.8	3.9	1.6	1.3	1.5	1.8	1.3	0.5	2.2	5.0
10-May	-0.2	-0.7	-0.8	-1.0	-1.4	-1.4	-0.7	-0.4	0.8	0.0	0.4	1.0	1.7	1.2	1.3	1.4	1.6	1.8	1.8	1.7	1.6	1.7	1.7	1.4	0.6	1.8
11-May	1.1	0.7	0.4	0.6	0.6	0.3	1.0	2.1	4.3	5.9	9.2	10.7	10.2	11.4	11.8	11.4	12.2	11.0	11.3	10.3	8.7	7.6	6.6	6.0	6.5	12.2
12-May	5.2	4.4	3.7	2.3	1.6	2.3	4.1	6.4	6.9	8.0	9.2	10.6	11.5	11.8	12.4	12.8	12.5	11.8	10.7	9.6	8.2	6.6	4.7	3.9	7.5	12.8
13-May	3.1	2.0	0.6	0.5	0.5	1.1	2.1	4.5	6.9	9.6	11.2	12.0	13.2	14.9	15.7	15.9	15.6	14.9	14.1	12.7	11.2	8.9	7.6	6.5	8.6	15.9
14-May	5.7	4.9	3.2	3.1	2.9	3.2	4.9	8.3	12.1	15.6	18.4	20.3	21.5	22.3	22.8	22.9	21.7	20.9	20.0	18.1	16.9	14.8	11.6	10.2	13.6	22.9
15-May	9.7	9.8	9.2	9.2	8.9	8.7	8.8	7.7	6.9	5.7	4.9	4.9	4.8	5.1	5.6	5.6	5.7	6.1	6.4	5.9	5.1	4.8	4.5	4.5	6.6	9.8
16-May	4.3	3.6	2.3	1.9	1.2	2.0	3.0	3.9	5.7	7.6	8.7	9.7	10.8	11.7	12.7	13.6	14.1	14.9	14.7	13.5	11.0	9.6	8.4	7.6	8.2	14.9
17-May	6.7	6.4	5.4	4.5	3.6	5.3	7.0	7.5	11.1	13.5	14.5	16.0	16.8	16.5	16.7	17.6	16.9	16.6	16.4	15.9	14.4	12.8	12.4	12.1	11.9	17.6
18-May	10.7	10.4	9.8	8.4	8.0	8.8	10.1	10.6	13.8	15.6	16.7	15.8	16.6	16.5	18.0	19.0	20.7	19.1	19.0	17.0	15.6	14.8	13.6	12.5	14.2	20.7
19-May	12.5	11.8	11.3	10.4	10.0	10.6	11.6	12.8	14.1	17.0	18.4	19.7	20.5	19.8	20.2	19.2	20.4	20.1	19.2	16.9	14.8	13.3	11.8	10.1	15.3	20.5
20-May	9.2	8.6	8.2	6.9	6.7	7.9	10.0	12.8	14.9	16.9	18.3	19.6	20.1	19.8	18.0	12.3	14.0	15.8	16.2	15.8	14.6	13.7	13.3	12.7	13.6	20.1
21-May	12.3	11.6	11.1	10.4	10.1	10.4	11.9	14.3	16.8	19.2	20.1	21.5	19.9	18.6	21.1	21.4	21.0	19.7	16.3	15.6	13.7	13.0	11.3	10.0	15.5	21.5
22-May	9.0	8.2	7.2	7.8	8.3	8.6	10.2	13.0	15.6	17.9	19.4	19.7	22.0	22.7	22.5	22.8	23.4	23.3	23.0	21.0	19.6	18.8	18.0	17.0	16.6	23.4
23-May	15.9	16.6	16.1	15.0	14.8	14.3	15.4	17.1	18.6	19.8	20.8	22.5	24.8	26.3	27.5	28.0	28.2	28.0	26.8	25.2	22.8	21.3	20.2	16.7	20.9	28.2
24-May	15.0	14.2	13.3	12.2	11.8	11.9	13.0	13.8	14.9	15.3	14.9	15.7	13.7	12.7	13.1	13.4	14.1	13.9	14.1	13.7	11.9	9.9	9.1	8.3	13.1	15.7
25-May	7.2	6.8	6.1	5.7	5.5	7.0	8.7	11.7	14.5	16.3	17.5	18.3	18.8	19.7	20.4	20.9	20.4	19.1	19.1	18.0	16.6	15.3	14.6	14.0	14.3	20.9
26-May	12.9	11.9	11.4	10.9	11.0	11.1	11.7	12.6	12.9	13.2	12.6	11.8	11.2	11.0	10.8	9.5	9.3	9.4	9.2	8.6	8.4	8.2	8.0	8.0	10.7	13.2
27-May	7.9	7.8	7.6	7.4	7.2	7.3	7.8	8.0	8.3	8.8	9.3	9.4	9.6	9.3	9.5	9.4	9.9	9.9	9.7	9.4	9.1	8.6	8.1	7.9	8.6	9.9
28-May	7.5	7.0	6.7	5.0	4.7	5.9	6.8	6.8	7.3	8.1	8.3	8.9	10.2	10.3	10.3	10.7	11.0	11.2	10.3	10.2	8.9	8.3	7.9	7.7	8.3	11.2
29-May	7.0	7.1	6.7	6.6	6.9	7.0	7.4	7.6	7.4	7.5	7.5	7.7	8.1	8.4	8.6	8.6	8.7	7.8	7.5	7.3	7.2	7.3	7.2	7.1	7.5	8.7
30-May	7.2	7.4	7.7	8.1	8.1	8.3	9.2	10.1	12.0	13.5	14.4	15.0	14.1	13.5	13.1	13.0	12.8	12.9	12.6	12.9	11.3	9.5	8.3	7.9	10.9	15.0
31-May	8.1	8.0	7.6	7.2	7.1	8.5	10.1	12.0	13.1	14.1	15.3	16.5	17.2	17.9	18.3	18.9	19.1	19.1	19.3	18.4	15.8	14.2	13.3	12.3	13.8	19.3
																								Diurnal Average		
																								Diurnal Maximum		



**WBEA**  
**Hourly Averages**

**Ambient Temperature (AT) - C**  
**Millennium - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C**  
**Millennium - May 2014**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	76	10.22	10.22
0 - 10	367	49.33	59.54
10 - 20	259	34.81	94.35
> 20	42	5.65	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744





Maximum Speed: 30 km/h on May 15 12:00	Maximum Daily Speed Average: 16.6 km/h on May 2	Hours in Service: 744
Minimum Speed Value: 0 km/h on May 20 22:00	Minimum Daily Speed Average: 1.7 km/h on May 4	Hours of Data: 742
Maximum Diurnal Speed Average: 6.3 km/h at hour 14	Minimum Diurnal Speed Average: 1.0 km/h at hour 6	Hours of Missing Data: 2
Monthly Average Velocity: 3.4 km/h 20.4 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 4 Q <sub>1</sub> = 5 Median = 8 Q <sub>3</sub> = 12 P <sub>90</sub> = 16 P <sub>99</sub> = 24	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-May	NNE2	NNW8	N7	NNW7	NNW8	NW7	NW8	NNW8	WNW10	NW12	NW15	N17	N18	N16	NNW13	NNW11	NNW16	NNW15	N14	N13	N17	N11	NNW9	NW8	NNW10.6	N18
2-May	NW14	NW16	N20	NNW13	WNW15	WNW17	NW17	NW18	NNW16	N19	N17	N16	N19	N17	N19	N16	NNE18	NNE20	N20	N23	N24	N24	N20	N19	NNW16.6	N24
3-May	N17	N17	N19	N16	N15	N17	N17	N16	N13	N11	N12	N15	N14	N14	NNE14	NNE11	NE10	NE9	NE12	NE13	NE10	NE10	NE8	E4	N12.4	N19
4-May	E4	ENE2	NNE2	WNW2	W3	WSW1	SW2	SSE4	S6	NE3	NNW7	N7	ENE6	ENE6	ESE4	ESE5	SE6	SSW6	S6	SSE5	SSE7	SSE5	SE2	E2	SE1.7	SSE7
5-May	ESE3	SSW2	S4	S3	SSE3	SSE3	SE4	ESE4	ENE5	NNE4	NNW6	NNW7	N8	N8	NNE5	E11	NE10	ENE11	ENE12	ENE14	ENE13	ENE15	ENE13	ENE11	ENE5.4	ENE15
6-May	ENE11	NE12	NNE14	NNE13	NNE16	NNE16	N20	N20	N16	N20	NNE21	NNE20	NNE19	NNE15	NNE13	NNE15	NNE18	N18	N15	N9	NNW6	NNE6	N6	W4	NNE13.5	NNE21
7-May	NW5	NNW5	NNW6	N6	N9	N9	N11	N13	N11	N20	N21	N18	N20	N19	N17	N17	N19	NNE19	NNE13	NNE11	NNE10	NNE3	N5	N9	N12.0	N21
8-May	NE10	NE11	NE6	ENE3	SE1	AF	ENE3	ENE2	N4	NNE5	SSW3	NNE6	NNE9	NNE12	N16	N17	NNE19	NNE16	NNE14	N13	NNE10	N7	N4	N7	NNE8.0	NNE19
9-May	N7	N9	N9	N7	NNE6	N5	N4	NW6	NNW7	NNW7	N7	N4	N5	N7	N8	N9	N12	NNE17	NNE14	N3	NW6	N12	N10	NNW8	N7.5	NNE17
10-May	NW7	NW9	WNW9	WNW10	WNW10	WNW10	WNW12	W13	WNW15	NNW11	NW10	NNW13	NW13	NW11	NW10	NW10	NNW11	NNW12	NW8	NW7	NW6	NW5	WNW4	WSW4	NW9.0	WNW15
11-May	SW4	WSW5	W3	NNW3	NW4	SW2	SSW3	WSW4	S7	SW9	W8	NW14	NNW10	NNW12	NNW10	NW8	NNW8	NNW9	NNE9	NNE13	NNE11	NE9	E5	E6	NNW3.6	NW14
12-May	E5	ESE6	E2	NE3	E4	ESE4	SE4	SE0	N5	N5	N5	N6	N7	N8	N9	N14	NNE19	NNE19	NNE21	NNE14	NNE11	NE16	E8	ESE8	NNE6.8	NNE21
13-May	SSE5	SSE5	S3	SE3	ESE4	ESE5	S4	S5	SSE4	SSE6	SE4	NNE7	N8	NNW7	N8	N10	N14	NNE17	NNE14	NNE13	NNE10	ENE7	E5	ESE5	NE3.7	NNE17
14-May	ESE6	ESE4	SE4	SE7	SE7	SE9	SE10	SE6	SSE7	SE9	ESE11	ESE11	ESE10	ESE10	ESE12	SE14	SE17	SE13	SE13	SE13	SSW9	SE5	ESE7	SE8.8	SE17	
15-May	ESE8	SSE6	S6	SSE5	ESE8	ESE6	ENE5	NNE11	NNE22	NNE26	NNE29	N30	N25	N23	N19	N23	N26	N17	N13	NNW13	NNW7	NW6	NW5	WNW5	N11.2	N30
16-May	NW4	N6	NNW4	NNW5	NNW4	NW4	NNW4	N5	NNW5	NNW6	NNW5	NNW6	N6	N7	N7	N8	NNE6	NNE4	ESE6	SE4	SE4	E6	ESE7	E5	N3.3	N8
17-May	SE5	ESE6	SSE5	SE7	SE6	SE4	S4	WNW1	S1	W1	NNW6	NW1	E2	NNW5	N7	NNE5	N7	NNE6	NE7	ENE6	E6	E6	ESE6	SE5	ENE2.3	SE7
18-May	NNE3	NE4	ENE6	NE6	NE6	ENE5	NE4	NW3	SSE4	SE5	NW7	NNW10	N13	N13	N13	N6	SSE7	SSE7	SSE6	S5	S4	ESE2	SSW3	SSE2	NE2.3	N13
19-May	SE7	SE8	SSE6	SE8	SE8	SSE6	SSE8	S9	SSE8	S10	S10	S8	SSE12	S12	SSE11	SSE11	S15	SSE12	SSE12	S17	S14	S11	SSW10	SSE6	SSE9.5	S17
20-May	SSE6	SSE6	SSE6	SSE5	SE6	SE9	SSE9	SSE11	SSE10	SSE12	S14	S16	S15	S16	SSW11	SSE5	ESE10	SE15	SE15	SE10	SE7	W0	SE6	SE8	SSE8.8	S16
21-May	SE10	SE8	SE8	SSE7	SE7	SE7	SSE6	SSE8	SSE7	SE4	WSW4	SSW13	SSW16	SSE7	SW21	WSW20	WSW21	W15	NNW12	NW7	NW4	NW5	W2	SSE3	SSW5.0	WSW21
22-May	SSE4	AF	SSE2	E3	ESE4	ESE6	SE8	SE8	SSE7	SSE6	ENE4	N9	WSW5	WSW9	WSW11	WSW9	WSW8	SW7	SSW7	S3	SSE3	SE5	SE6	SE6	S2.9	WSW11
23-May	SSE5	SSE6	SE7	SE6	SE5	SE5	SSE5	SSE5	SSE4	SE6	SE6	S4	ESE6	SE6	SSE9	SSW10	SSW7	SW6	N3	ESE8	ENE7	ESE7	W12	WNW16	SSE3.8	WNW16
24-May	NW10	W5	W7	WSW7	W8	WNW9	NW8	N5	NW5	NNW5	WNW7	WNW10	NNW9	N18	NNE13	N8	WNW8	NW8	N9	NE9	NE7	ENE5	E4	E3	NNW5.1	N18
25-May	ENE3	ESE2	E3	ESE4	ESE3	ESE5	SE4	SE5	SE8	SE8	SE7	ESE6	SSE4	S5	ESE8	ESE9	SE8	SE9	SE14	SE12	ESE11	SE11	SE13	ESE12	SE7.1	SE14
26-May	SE10	ESE10	SE10	SE6	E7	ESE11	ESE6	ESE8	ESE14	ESE16	ESE11	ESE5	NNE4	ENE3	SE6	ESE11	ENE11	ENE13	ENE13	ENE12	ENE11	E11	ENE10	NE10	E8.5	ESE16
27-May	NE10	NE9	NE9	N9	NNE9	NNE7	NNE9	NNE12	NNE13	NNE12	NNE12	NNE14	NNE12	N11	N14	NNE15	NE13	NNE12	NNE10	NNE9	NE7	NE6	E4	E3	NNE9.8	NNE15
28-May	ENE4	ESE3	ENE5	E4	ESE6	ESE5	ESE7	ESE9	ESE6	E4	SSE1	ESE5	SE6	SE5	SE6	ESE6	ESE9	ESE10	ESE10	SE12	ESE10	ESE8	ESE8	SE9	ESE6.4	SE12
29-May	ESE7	ESE6	ESE6	E5	ESE4	ENE2	E4	NNE3	NNE6	NNE8	N10	N14	N14	N13	N11	NNW10	NNW10	NNW11	NW10	NW11	NW13	NW14	WNW11	W9	N5.6	NW14
30-May	W8	WSW7	WSW9	W13	W13	W14	W17	W16	WNW16	WNW19	WNW18	WNW18	WNW16	WNW22	WNW20	NW15	NNW4	NE4	NNE9	NNE2	NNE5	NE10	ESE4	SSW5	WNW9.3	WNW22
31-May	SSW8	SSW8	S4	E4	ESE3	NNE2	NNE3	NNW3	NNW4	N6	N10	NNE9	NNE13	NNE11	N13	NNE11	NNE13	NNE13	NE7	NE8	ENE7	E9	ESE13	ESE13	NE4.8	ESE13

ENE1.6	NE1.4	NE1.8	NE1.6	NNE1.5	NE1.0	NNE1.2	N1.7	N2.1	NNE3.5	N4.6	N6.1	N6.1	N6.3	N5.7	N5.5	NNE6.0	NNE6.2	NNE6.2	NE4.9	NE4.7	NE4.3	ENE2.4	E2.0	Diurnal Average	
N17	N17	N20	N16	NNE16	N17	N20	N20	NNE22	NNE26	NNE29	N30	N25	N23	SW21	N23	N26	NNE20	NNE21	N23	N24	N24	N20	N19	Diurnal Maximum	

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



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

**Wind Speed (WS) - km/h**  
**Millennium - May 2014**

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

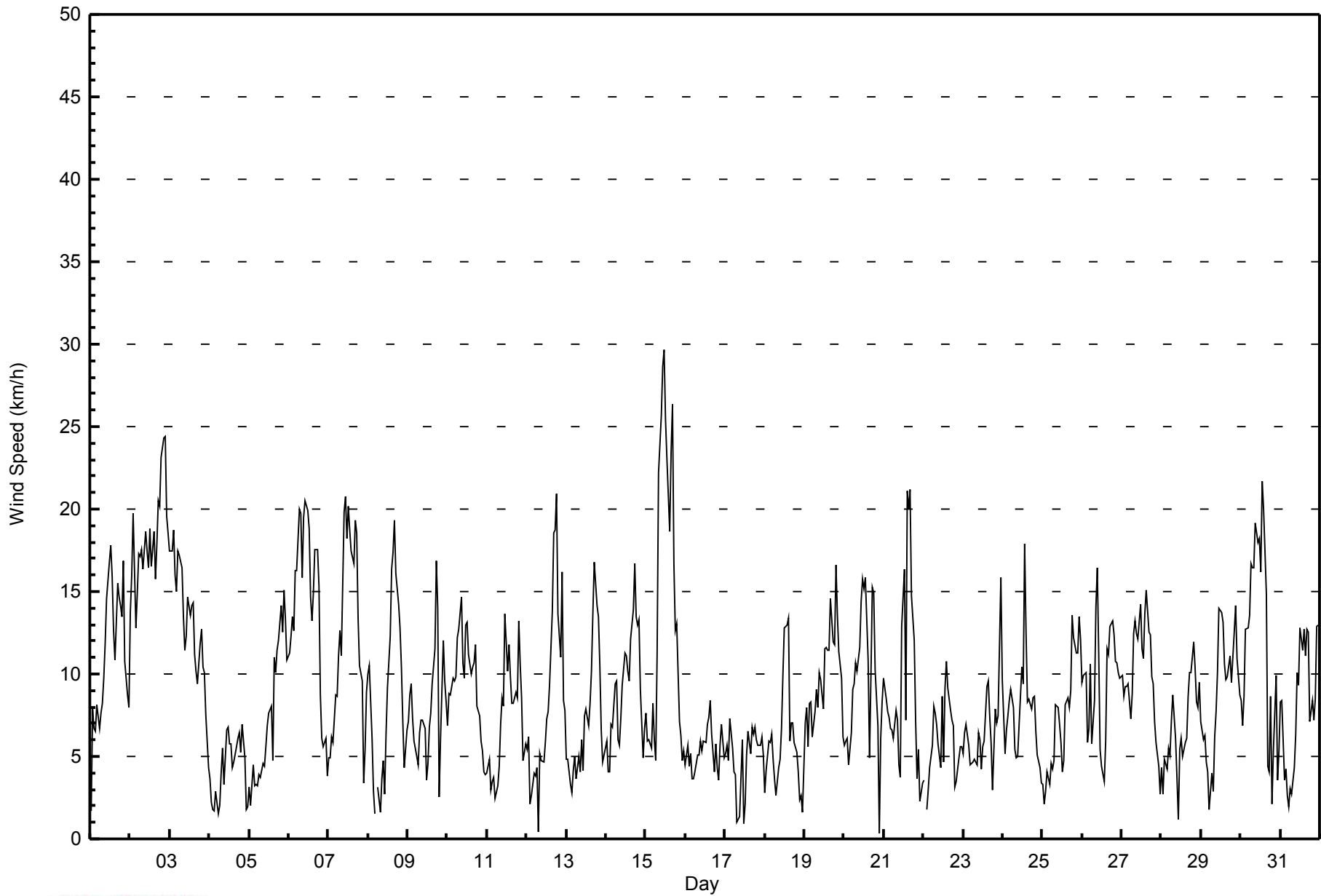
Diurnal Maximum

AF - Analyzer Failure



**WBEA**  
**Hourly Averages**

**Wind Speed (WS) - km/h**  
**Millennium - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h**  
**Millennium - May 2014**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	199	26.82	26.82
6 - 11	338	45.55	72.37
12 - 19	176	23.72	96.09
20 - 28	27	3.64	99.73
29 - 38	2	0.27	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 742

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Wind Speed (WS) - km/h**  
**Millennium - May 2014**

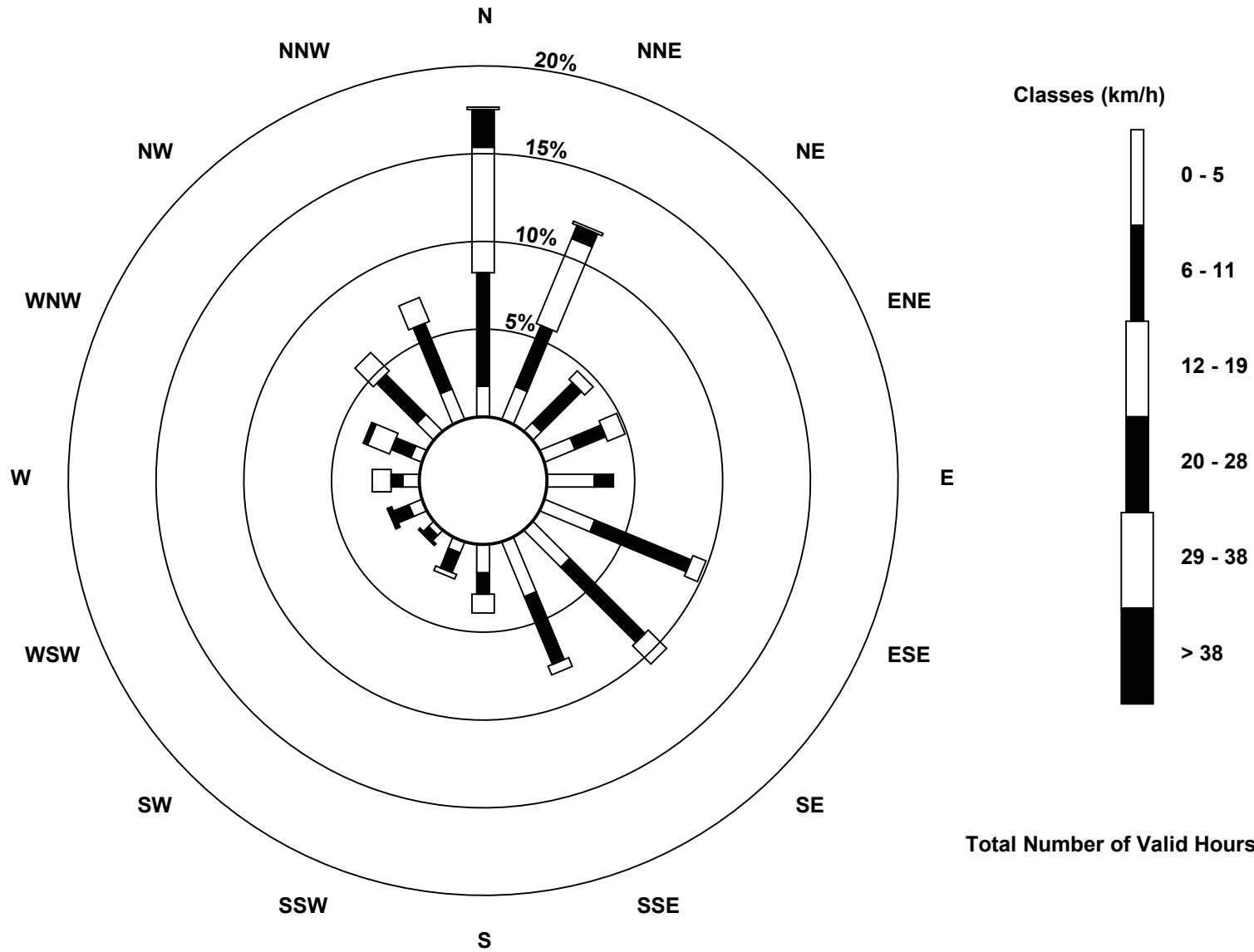
Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	13	15	5	14	20	23	22	25	12	5	3	6	7	5	10	14	199
6 - 11	48	28	24	14	8	44	45	31	9	9	3	7	5	9	24	30	338
12 - 19	53	39	5	8	0	6	11	4	8	2	0	0	8	10	11	11	176
20 - 28	16	6	0	0	0	0	0	0	0	0	1	2	0	2	0	0	27
29 - 38	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	131	89	34	36	28	73	78	60	29	16	7	15	20	26	45	55	742

Total Number of Valid Hours: 742

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Wind Speed (WS) - km/h  
Millennium (AMS 12)**





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

**Wind Direction (WD) - deg**  
**Millennium - May 2014**

Direction of Maximum Speed: 7 deg on May 15 12:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 348.7 deg on May 2	Hours of Data: 742
Direction of Minimum Speed: 273 deg on May 20 22:00	Direction of Minimum Daily Speed Average: 1.7 deg on May 4
Direction of Minimum Speed: 273 deg on May 20 22:00	Hours of Missing Data: 2
Monthly Average Direction: 336.0 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-May	27	344	10	341	333	310	317	327	303	311	325	350	354	352	337	327	334	335	352	350	4	3	337	320	339.6
2-May	313	311	350	346	302	297	308	316	328	350	350	349	0	0	359	9	20	14	10	10	6	5	357	353	348.7
3-May	354	357	358	359	350	2	1	5	3	357	3	4	358	6	13	18	38	50	43	37	40	39	49	87	11.1
4-May	97	74	25	291	265	246	225	167	173	39	14	0	62	66	120	111	136	208	191	163	151	163	134	81	127.3
5-May	120	198	188	171	149	152	128	115	61	27	343	345	349	351	32	79	56	58	73	68	68	64	68	68	62.5
6-May	59	44	26	23	14	14	11	10	5	9	17	12	12	31	12	28	17	1	1	351	338	20	11	262	14.4
7-May	315	330	337	349	360	351	358	360	351	1	359	354	2	5	360	359	6	12	18	22	27	31	354	10	1.5
8-May	38	35	38	75	142	AF	75	63	10	22	195	15	24	22	9	6	12	13	12	11	13	10	358	353	17.5
9-May	355	357	10	6	18	8	353	305	327	346	354	349	358	2	353	354	355	13	12	7	309	350	349	341	354.8
10-May	315	313	316	302	296	290	284	278	295	346	319	327	320	319	315	319	338	344	324	310	313	312	299	243	311.8
11-May	227	238	278	329	317	230	199	255	189	218	271	310	344	342	330	315	333	340	15	24	29	52	82	81	332.6
12-May	85	116	96	35	79	105	132	126	8	3	5	353	355	5	9	7	14	14	20	23	29	52	85	114	31.2
13-May	167	165	169	137	108	117	190	174	160	147	125	16	2	341	1	356	11	15	22	15	29	66	89	112	40.2
14-May	114	110	128	141	146	135	136	146	132	150	129	121	122	121	122	123	126	126	137	139	126	193	144	109	131.6
15-May	109	148	169	152	123	119	63	18	13	13	12	7	6	2	360	2	359	353	349	347	343	309	313	303	7.7
16-May	325	360	344	334	329	304	339	2	346	334	329	332	349	7	9	4	17	27	120	142	130	91	110	97	7.8
17-May	128	115	158	131	130	137	172	299	171	265	336	304	80	341	360	18	5	14	50	69	88	96	105	129	78.7
18-May	30	37	65	36	45	66	44	314	148	138	325	343	359	2	1	4	159	156	154	170	187	111	209	151	35.6
19-May	142	125	157	133	138	147	148	181	167	170	181	170	163	169	160	162	183	157	158	182	177	185	195	164	165.6
20-May	148	155	149	157	141	138	155	163	155	164	177	175	173	184	207	159	106	126	133	138	140	273	144	142	155.5
21-May	142	140	141	149	146	146	155	158	148	139	240	203	209	164	226	240	253	269	338	322	324	325	269	156	208.5
22-May	156	AF	167	82	121	120	133	146	167	147	72	5	257	246	255	246	239	222	192	173	150	130	128	131	177.6
23-May	151	157	144	138	143	145	154	167	155	139	143	186	119	134	168	193	204	228	351	112	78	109	268	290	162.9
24-May	304	264	260	252	270	289	313	357	313	337	295	292	348	9	18	359	301	316	357	34	54	68	96	95	331.8
25-May	70	107	97	106	109	118	124	131	136	127	132	110	148	169	106	120	128	134	129	125	119	124	128	122	123.9
26-May	128	122	126	125	80	115	104	111	115	121	122	107	32	69	131	107	74	65	59	62	66	79	76	55	94.7
27-May	36	35	37	11	15	16	22	24	26	29	18	14	30	8	5	17	36	30	26	27	44	52	81	101	25.7
28-May	72	119	60	84	104	120	115	112	114	92	148	122	125	126	135	102	116	118	114	126	120	117	119	124	114.5
29-May	116	109	110	96	103	71	87	24	24	13	0	8	5	360	357	346	340	340	318	310	311	305	284	279	349.6
30-May	264	247	251	265	265	262	266	278	286	284	285	287	296	297	302	304	341	45	13	29	15	40	111	193	288.0
31-May	206	207	170	97	107	15	12	331	339	3	4	18	18	18	11	20	16	28	44	52	62	93	117	118	40.5
66.9 52.9 42.2 36.2 30.8 37.5 16.9 355.5 7.2 13.9 355.3 354.3 3.6 2.9 356.4 6.7 14.2 21.7 32.9 41.1 44.5 49.3 70.0 80.2																									
Diurnal Average																									

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



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

**Wind Direction (WD) - deg**  
**Millennium - May 2014**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 102 deg on May 17 10:00	Hours of Data: 742
Minimum Value: 8 deg on May 3 22:00	Hours of Missing Data: 2
	Hours of Calibration: 0
	Percent Operational Time: 99.7
Percentiles: P <sub>1</sub> = 11 P <sub>10</sub> = 15 Q <sub>1</sub> = 18 Median = 24 Q <sub>3</sub> = 33 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-May	78	30	35	33	37	31	33	37	30	33	36	29	25	28	33	36	34	33	30	26	20	28	32	33	78
2-May	29	28	36	30	32	28	29	31	34	26	25	28	19	20	19	15	15	15	15	15	17	15	20	24	36
3-May	22	21	19	18	25	15	17	16	20	18	20	20	20	19	20	27	32	34	21	12	9	8	10	17	34
4-May	16	44	66	50	16	62	41	38	36	75	32	29	58	55	64	54	53	27	27	40	45	47	51	38	75
5-May	28	29	19	16	17	22	23	28	33	57	42	26	22	19	55	32	38	26	21	19	19	18	19	22	57
6-May	17	11	14	13	13	13	12	11	15	15	17	18	17	19	32	23	21	18	17	20	31	18	13	52	52
7-May	17	15	22	16	20	27	20	16	23	20	23	25	19	22	20	24	17	18	16	14	15	20	22	17	27
8-May	13	12	16	22	72	AF	75	87	30	37	68	44	23	19	16	15	14	15	14	12	11	13	21	20	87
9-May	20	19	15	21	17	22	28	47	33	28	29	42	58	39	52	24	31	15	20	34	34	24	24	31	58
10-May	34	29	31	30	23	24	26	24	31	27	33	35	32	32	34	31	32	29	34	29	30	28	30	21	35
11-May	19	16	36	38	37	25	22	49	24	27	47	38	37	30	37	44	36	28	33	13	11	11	22	20	49
12-May	21	16	79	28	15	22	23	102	32	52	63	55	43	28	30	20	16	17	15	14	15	12	29	17	102
13-May	27	17	35	20	12	13	32	25	53	44	59	28	18	45	28	27	19	15	15	10	23	19	22	59	
14-May	15	37	33	16	14	18	20	30	40	30	29	26	28	25	28	20	18	16	20	17	18	33	19	18	40
15-May	18	32	15	18	14	21	38	12	14	15	14	15	16	18	18	17	20	22	25	26	33	30	31	19	38
16-May	39	20	17	15	21	27	29	26	36	38	55	55	56	33	33	18	22	56	26	26	33	20	19	28	56
17-May	26	25	25	16	17	33	26	76	101	102	37	98	81	50	26	67	21	18	21	20	26	24	21	33	102
18-May	67	31	14	25	20	17	45	30	45	51	53	29	16	17	16	68	35	24	21	15	31	40	55	56	68
19-May	12	16	21	16	16	20	20	21	23	25	34	37	23	20	20	20	21	21	21	17	16	17	17	21	37
20-May	13	14	14	18	14	16	20	19	21	24	20	20	20	19	33	62	24	17	18	16	33	101	25	18	101
21-May	14	16	15	14	12	14	18	21	23	51	82	23	29	28	26	29	30	44	34	39	29	27	50	23	82
22-May	16	AF	38	23	17	22	16	22	25	36	64	19	99	39	34	33	33	27	22	18	15	10	10	14	99
23-May	15	18	18	23	27	42	35	26	26	21	22	43	43	49	30	31	33	34	52	27	25	26	55	29	55
24-May	35	34	32	26	26	25	32	33	51	45	41	44	37	18	17	28	33	35	30	14	17	11	21	30	51
25-May	30	44	21	18	24	17	26	33	25	32	44	52	79	61	40	43	35	27	19	17	17	17	15	17	79
26-May	19	16	18	27	32	25	49	30	22	19	21	31	36	66	45	30	24	19	18	19	20	25	26	21	66
27-May	14	17	17	12	14	14	16	15	14	14	15	14	16	17	17	15	14	15	14	14	12	15	24	38	38
28-May	17	35	20	22	20	31	24	23	28	46	93	39	35	40	27	31	27	24	22	18	18	19	18	17	93
29-May	18	22	23	27	29	79	21	38	17	14	15	13	14	16	20	30	32	32	32	27	27	31	27	26	79
30-May	30	30	30	27	26	28	28	26	29	28	30	32	34	30	31	31	47	21	22	57	35	14	24	19	57
31-May	16	18	33	18	41	20	21	71	47	23	23	27	18	24	18	26	18	19	23	13	15	28	21	18	71
	78	44	79	50	72	79	75	102	101	102	93	98	99	66	64	68	53	56	52	57	45	101	55	56	
	Diurnal Maximum																								

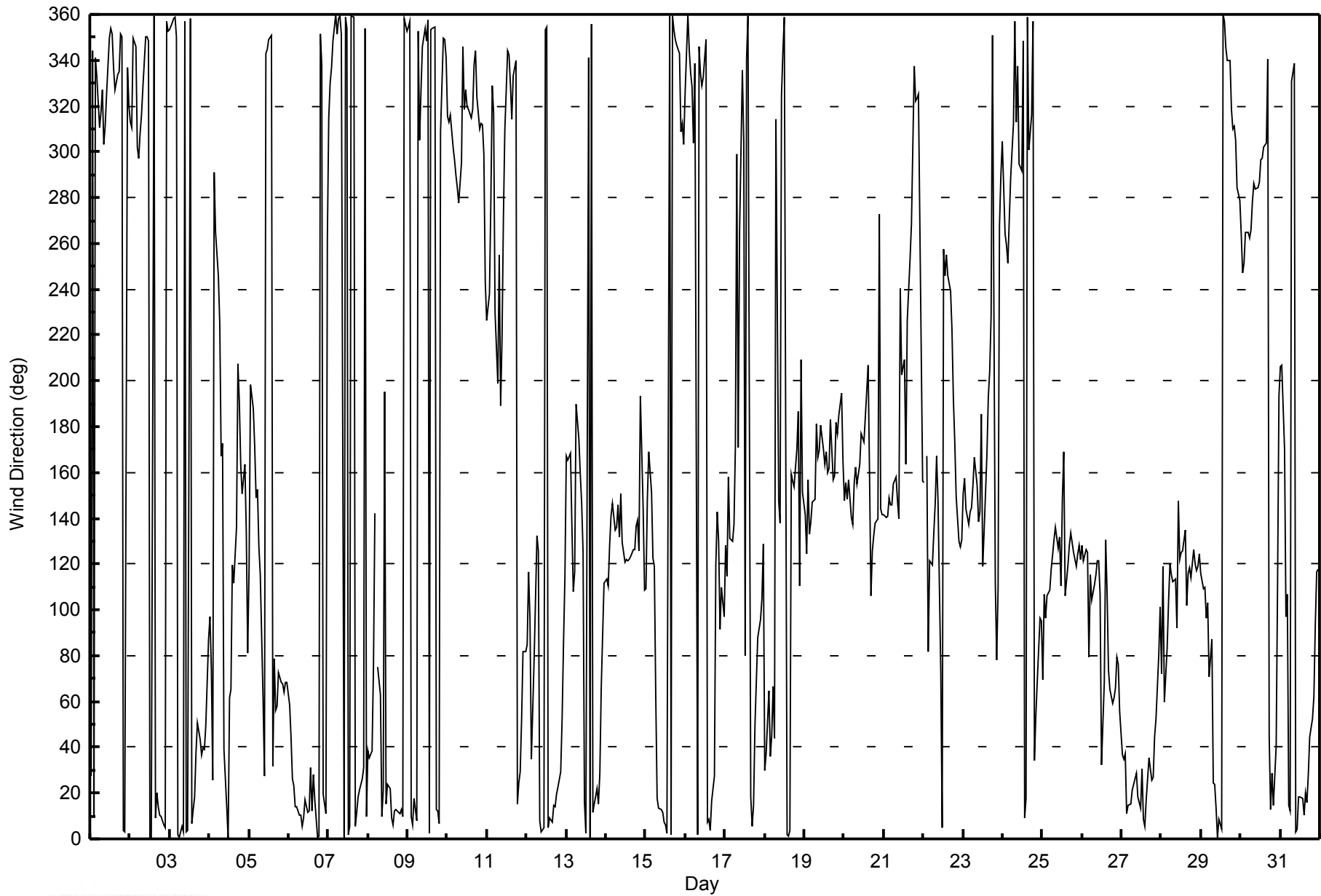
AF - Analyzer Failure





**WBEA**  
**Hourly Averages**

**Wind Direction (WD) - deg**  
**Millennium - May 2014**





# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Report

### Station Information

Calibration Date	May 27, 2014	Previous Calibration	April 24, 2014
Station Name	Millenium Mine	Station Number	AMS 12
Reason:	Routine		
Start Time (MST)	6:45	End Time (MST)	10:50
Barometric Pressure	724 mmHg	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11091107
Cal Gas Concentration	51.1 ppm	Cal Gas Expiry Date	29/05/2014
Gas Cert Reference	LL107924		
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2374
DACS voltage range	0-5 volts	DACS channel #	1

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	1000	1000	PMT voltage	-665	-665
Analyzer Range (mv)	5000	5000	Lamp voltage	792	792
Calculated slope	1.001268	1.010616	Chamber temp.	45.0	45.0
Calculated intercept	-0.293841	-1.636154	Pressure (mmHg)	701.2	701.2
Analyzer Background	8.6	8.6	Flow (lpm)	0.441	0.441
Analyzer Coefficient	1.190	1.190	Intensity	90	90

Analyzer make	43i Thermo	Analyzer serial #	1118148499
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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	0.8	NA
as found span	6000	94.1	801.4	794.0	1.009
calibrator zero	6000	0.0	0.0	0.8	NA
high point	6000	94.1	801.4	794.0	1.009
second point	6000	47.1	401.1	399.6	1.004
third point	6000	23.5	200.1	200.0	1.001
calibrator zero	6000	0.0	0.0	0.0	NA
as left zero	6000	0.0	0.0	0.0	NA
as left span	6000	94.1	801.4	801.4	1.000
Average Correction Factor					1.005

Corrected As found	793.2	Previous response	800.7	% change	0.9%
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#### Notes:

Filter changed No mainanence or adjustments made

Calibration Performed By: Melissa Lemay



# Wood Buffalo Environmental Association

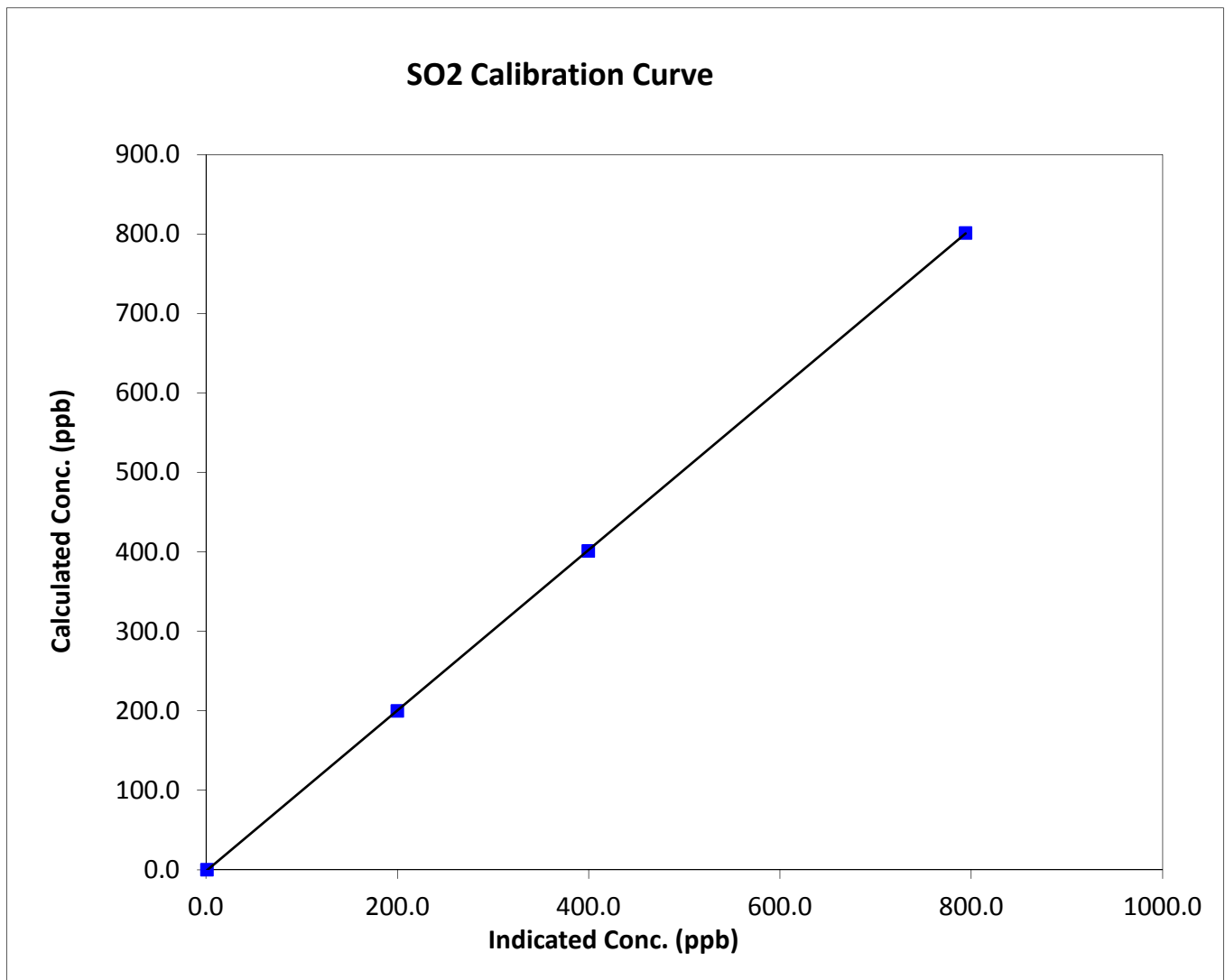
## SO<sub>2</sub> Calibration Summary

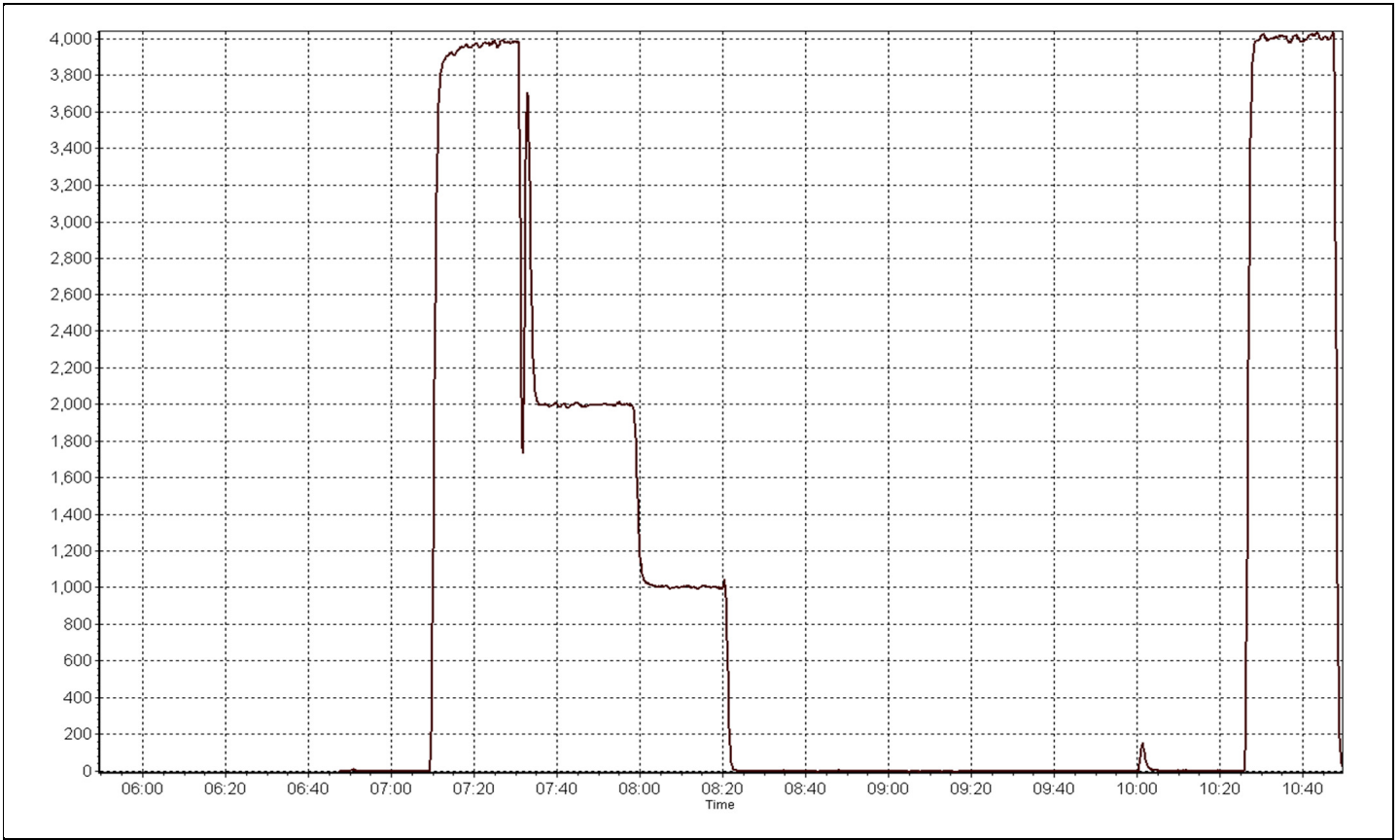
### Station Information

Calibration Date	May 27, 2014	Previous Calibration	April 24, 2014
Station Name	Millenium Mine	Station Number	AMS 12
Start Time (MST)	6:45	End Time (MST)	10:50
Analyzer make	43i Thermo	Analyzer serial #	1118148499

### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.8	N/A	Correlation Coefficient	0.999994
801.4	794.0	1.0093		
401.1	399.6	1.0038	Slope	1.010616
200.1	200.0	1.0007		
			Intercept	-1.636154







# Wood Buffalo Environmental Association

## TRS Calibration Report

### Station Information

Calibration Date	May 28, 2014	Previous Calibration	April 29, 2014
Station Name	Millenium Mine	Station Number	Ams 12
Reason:	Routine		
Start Time (MST)	6:55	End Time (MST)	9:58
Barometric Pressure	727 mmHg	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial number	11091107
Cal Gas Concentration	10.4 ppm H2S	Cal Gas Expiry Date	29/05/2014
Gas Cert Reference	LL84557	SO2 gas conc.	51.1 ppm SO2
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2374
DACS voltage range	0-5 volts	DACS channel #	2

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	100	100	PMT voltage	-597	-597
Analyzer Range (input)	5000	5000	Lamp voltage	888	888
Calculated slope	0.994330	0.993785	Chamber temp.	44	44
Calculated intercept	-0.262527	0.531552	Pressure	712.5	690.3
Analyzer Background	16.6	18	Flow	0.392	0.605
Analyzer Coefficient	0.641	0.641	Intensity	46500	46500
			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	0.2	NA
as found span	5000	38.5	80.1	78.7	1.017
SO2 scrubber check	6000	23.5	200.1	1.5	NA
calibrator zero	5000	0.0	0.0	-0.4	NA
high point	5000	38.5	80.1	80.1	0.999
second point	5000	19.2	39.9	39.5	1.012
third point	5000	9.6	20.0	19.6	1.021
calibrator zero	6000	0.0	0.0	-0.2	NA
as left zero	6000	0.0	0.0	-0.2	NA
as left span	5000	38.5	80.1	79.4	1.008
Average Correction Factor					1.011

Corrected As found	78.5	Previous response	80.8	% change	2.9%
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#### Notes:

Pump changed out, Scrubber checked after as founds and pump change out, Filter changed, zero adjusted

Calibration Performed By:

Melissa Lemay



# Wood Buffalo Environmental Association

## TRS Calibration Summary

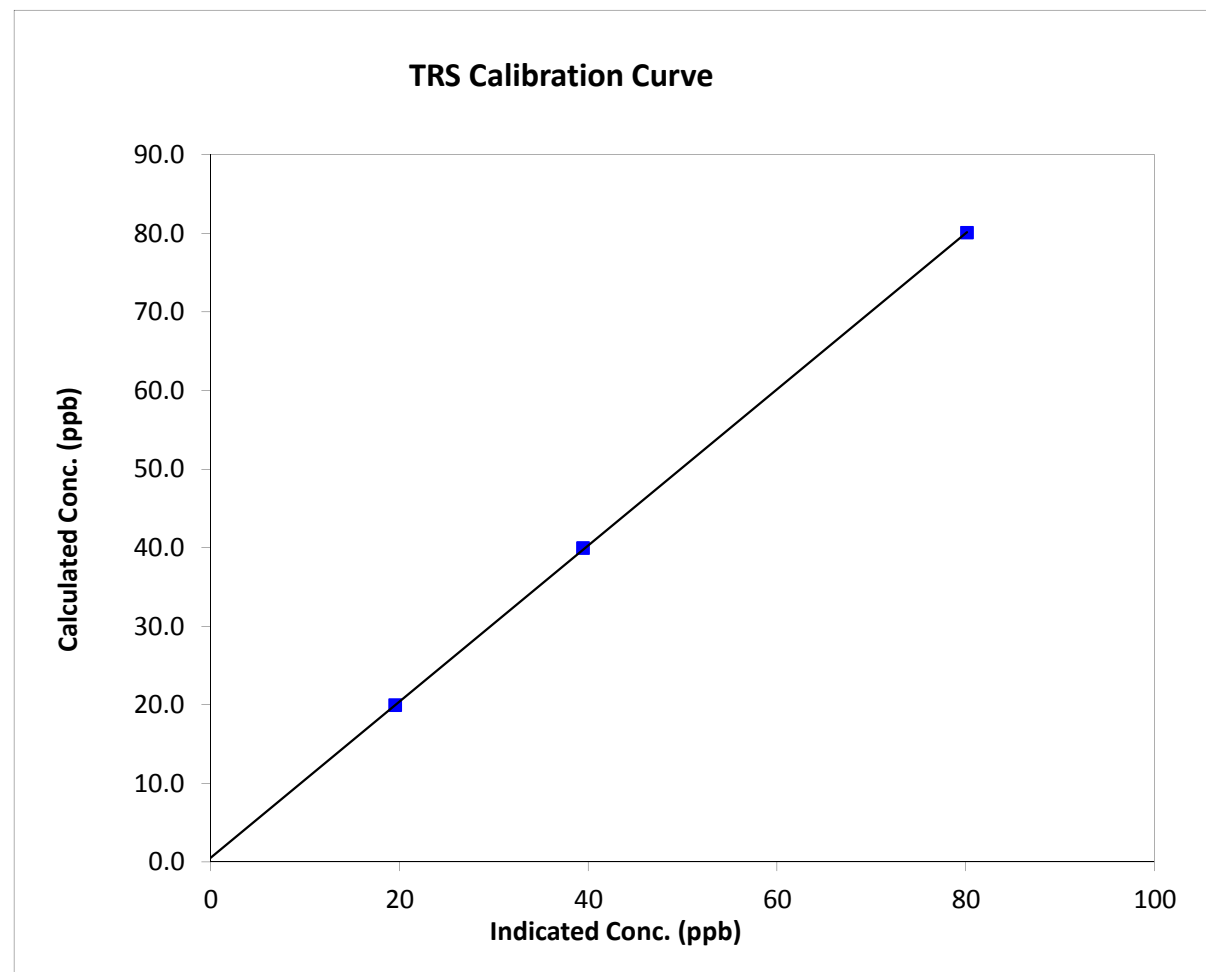
### Station Information

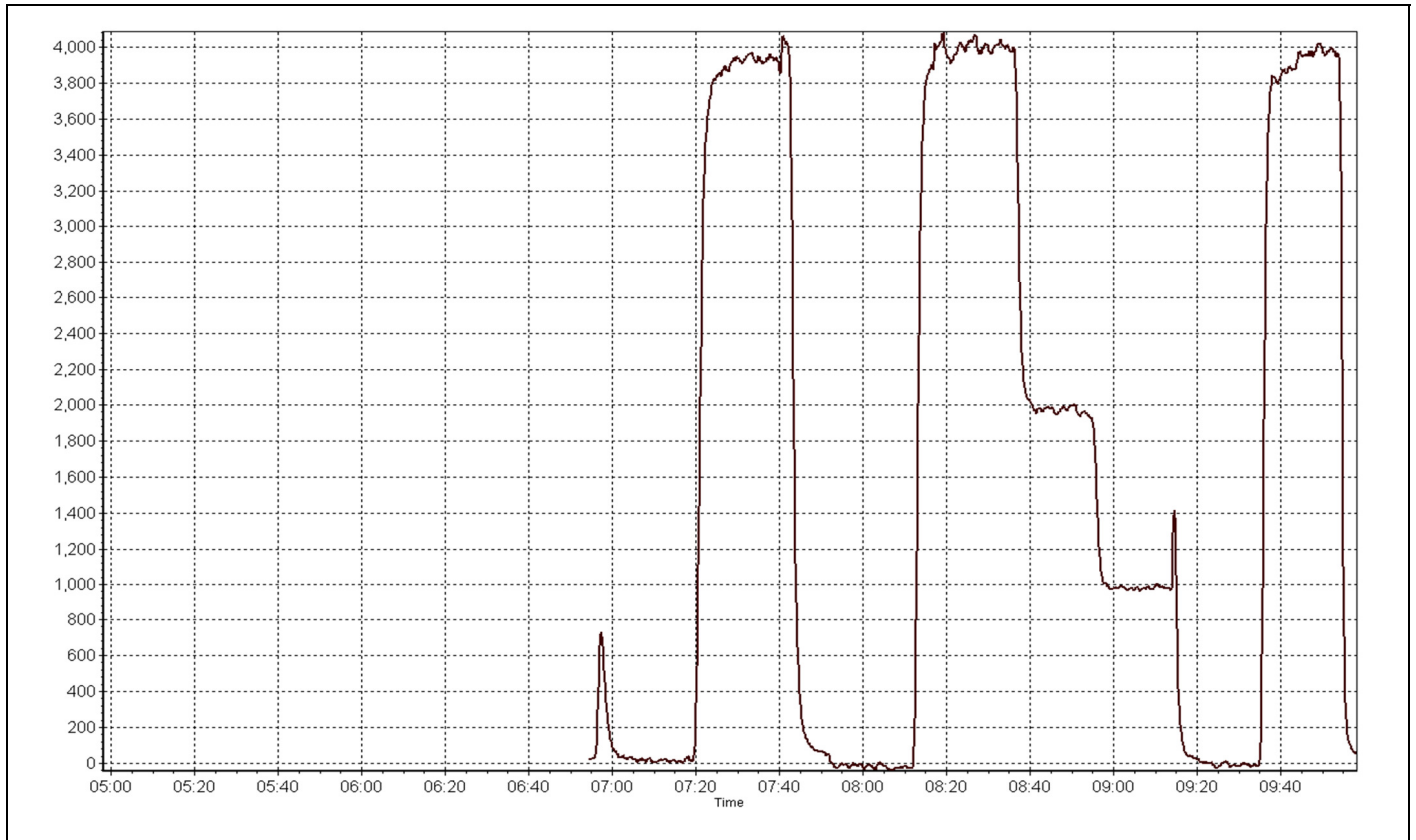
Calibration Date	May 28, 2014	Previous Calibration	April 29, 2014
Station Name	Millenium Mine	Station Number	Ams 12
Start Time (MST)	6:55	End Time (MST)	9:58
Analyzer make	TEI 43C	Analyzer serial #	0509110887

### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.4	N/A	Correlation Coefficient	0.999985
80.1	80.1	0.9993		
39.9	39.5	1.0121	Slope	0.993785
20.0	19.6	1.0209		
			Intercept	0.531552

TRS Calibration Curve







# Wood Buffalo Environmental Association

## THC Calibration Report

### Station Information

Calibration Date	Tuesday, May 13, 2014	Previous Calibration	Tuesday, April 29, 2014
Station Name	Millennium	Station Number	AMS 12
Reason:	Removal		
Start Time (MST)	6:40	End Time (MST)	8:00
Barometric Pressure	na mmHg	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11091107
Gas Cert Reference	LL107924	Cal Gas Expiry Date	5/29/2014
CH4 Cal Gas Conc.	510.0 ppm	CH4 Equiv Conc.	1079.3 ppm
C3H8 Cal Gas Conc.	207.0 ppm		
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2374
DACS voltage range	0 - 5 volts	DACS channel #	3

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppm)	25	NA	Sample Pressure	8.5	NA
Analyzer Range (mv)	5000	NA	Air or Bypass press	35.4	NA
Calculated slope	1.000758	1.147893	Fuel Pressure	24.0	NA
Calculated intercept	-0.004628	-0.041367		5.92	NA
				4.09	NA

Analyzer make	Thermo 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	6000	0.0	0.00	0.01	N/A
as found span	6000	94.1	16.93	14.75	1.148
calibrator zero	6000	0.0	0.00	0.01	N/A
high point	6000	94.1	16.93	14.75	1.148
second point	6000	47.0	8.45	7.47	1.133
third point	6000	23.5	4.23	3.72	1.138
calibrator zero					
as left zero					
as left span					
Average Correction Factor					1.139

Corrected As found	14.74	Previous response	16.92	% change	14.8%
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#### Notes:

Removed to re-install original 51i analyzer.

Calibration Performed By:

Melissa Lemay





# Wood Buffalo Environmental Association

## THC Calibration Summary

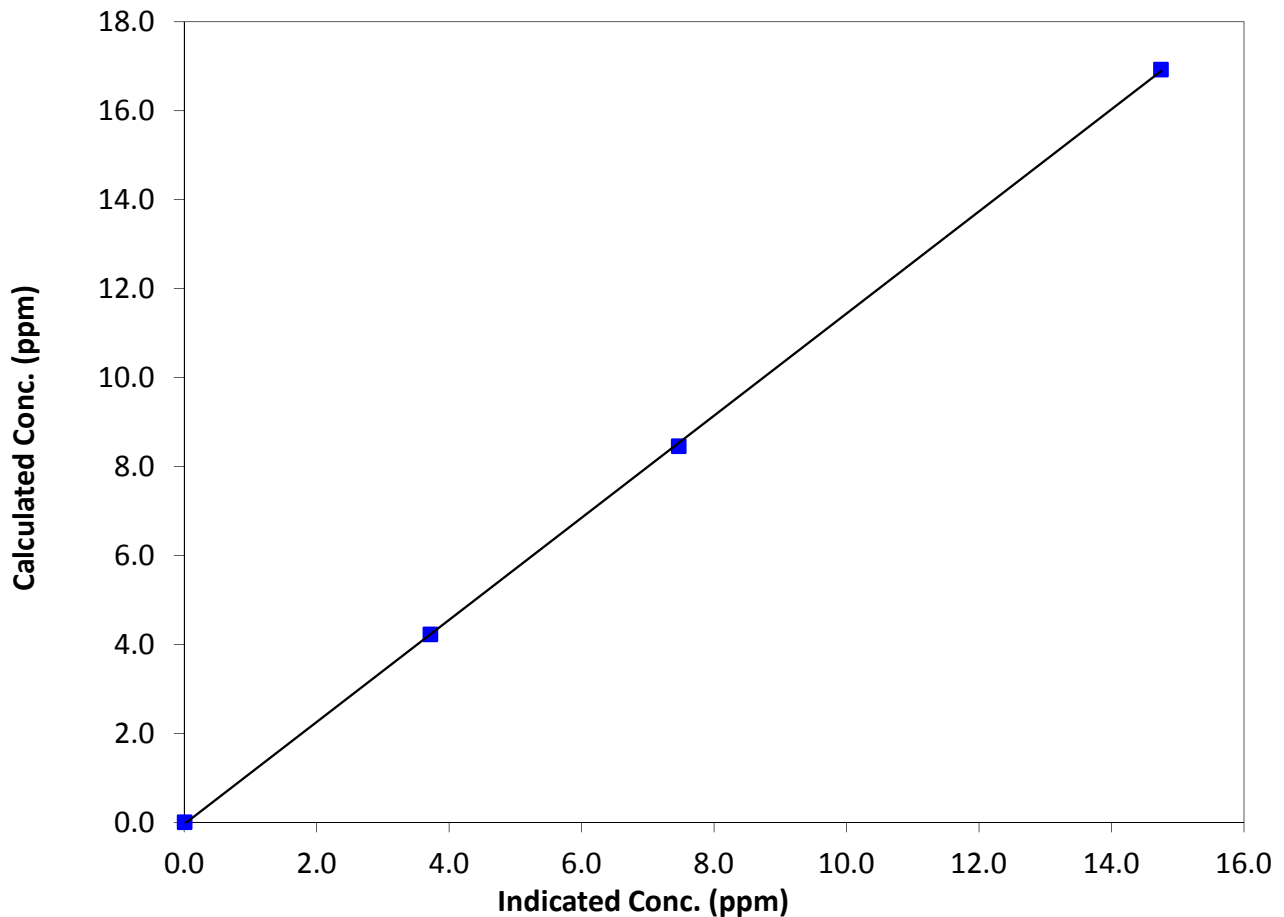
### Station Information

Calibration Date	May 13, 2014	Previous Calibration	April 29, 2014
Station Name	Millennium	Station Number	AMS 12
Start Time (MST)	6:40	End Time (MST)	8:00
Analyzer make	Thermo 51i-LT	Analyzer serial #	1410661326

### Calibration Data

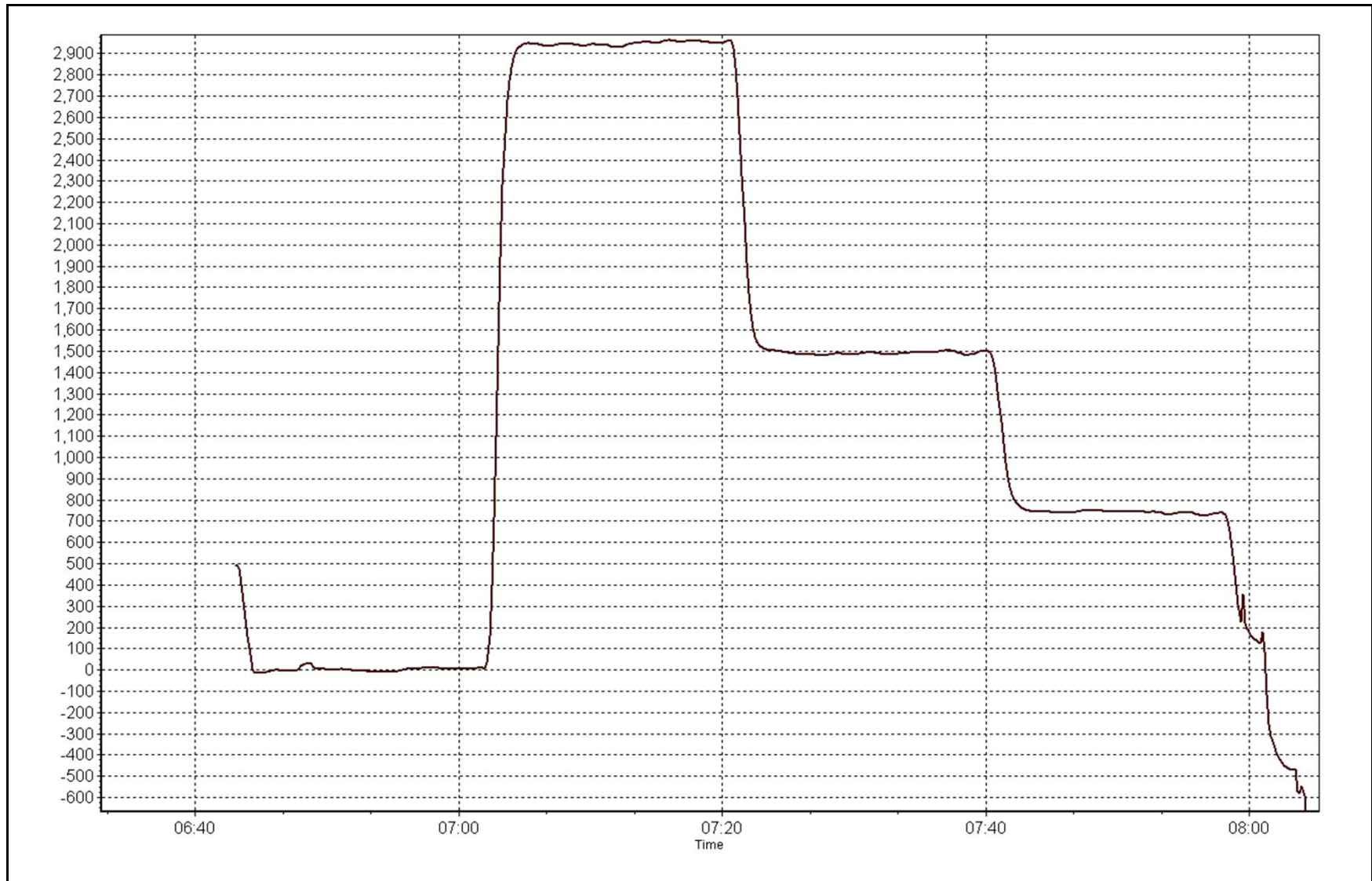
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.01	N/A	Correlation Coefficient	0.999950
16.93	14.75	1.1475		
8.45	7.47	1.1325	Slope	1.147893
4.23	3.72	1.1378		
			Intercept	-0.041367

**THC Calibration Curve**



THC Calibration Plot

Date: May 13, 2014





# Wood Buffalo Environmental Association

## THC Calibration Report

### Station Information

Calibration Date	Tuesday, May 13, 2014	Previous Calibration	NA
Station Name	Millennium	Station Number	AMS 12
Reason:	Install		
Start Time (MST)	8:30	End Time (MST)	10:40
Barometric Pressure	na mmHg	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11091107
Gas Cert Reference	LL107924	Cal Gas Expiry Date	5/29/2014
CH4 Cal Gas Conc.	510.0 ppm	CH4 Equiv Conc.	1079.3 ppm
C3H8 Cal Gas Conc.	207.0 ppm		
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2374
DACS voltage range	0 - 5 volts	DACS channel #	3

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppm)	25	25	Sample Pressure	NA	11.8
Analyzer Range (mv)	5000	5000	Air or Bypass press	NA	42.9
Calculated slope	NA	0.998983	Fuel Pressure	NA	19.3
Calculated intercept	NA	0.045873		NA	3.83
				NA	2.23

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					
as found span					
calibrator zero	6000	0.0	0.00	-0.02	N/A
high point	6000	94.1	16.93	16.91	1.001
second point	6000	47.1	8.47	8.42	1.006
third point	6000	23.5	4.23	4.17	1.015
calibrator zero	6000	0.0	0.00	-0.02	N/A
as left zero	6000	0.0	0.00	-0.02	N/A
as left span	6000	94.1	16.93	17.15	0.987
Average Correction Factor					1.007

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

Original 51i installation after shop repair.

Calibration Performed By:

Melissa Lemay



# Wood Buffalo Environmental Association

## THC Calibration Summary

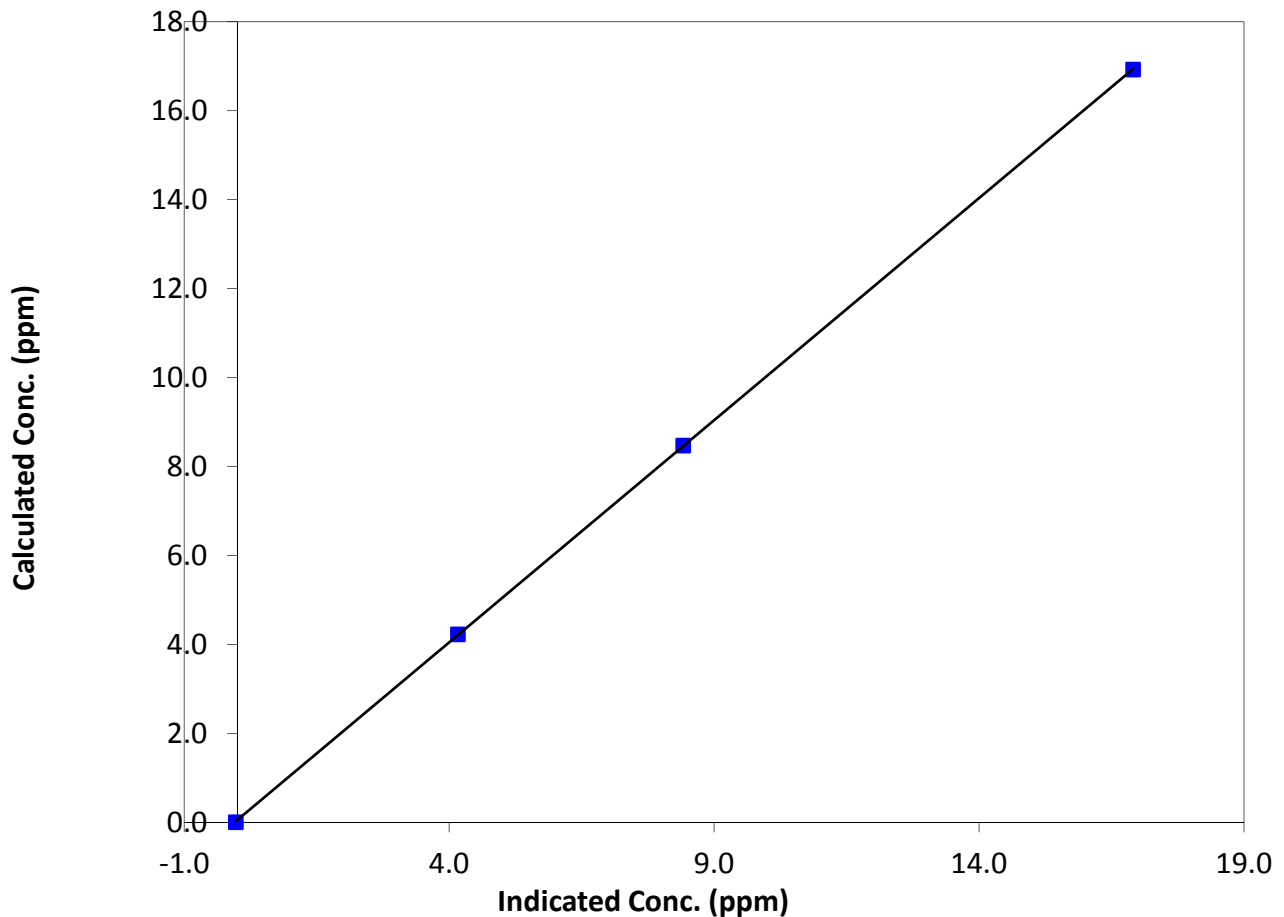
### Station Information

Calibration Date	May 13, 2014	Previous Calibration	NA
Station Name	Millennium	Station Number	AMS 12
Start Time (MST)	8:30	End Time (MST)	10:40
Analyzer make	Thermo 51i-LT	Analyzer serial #	1317958296

### Calibration Data

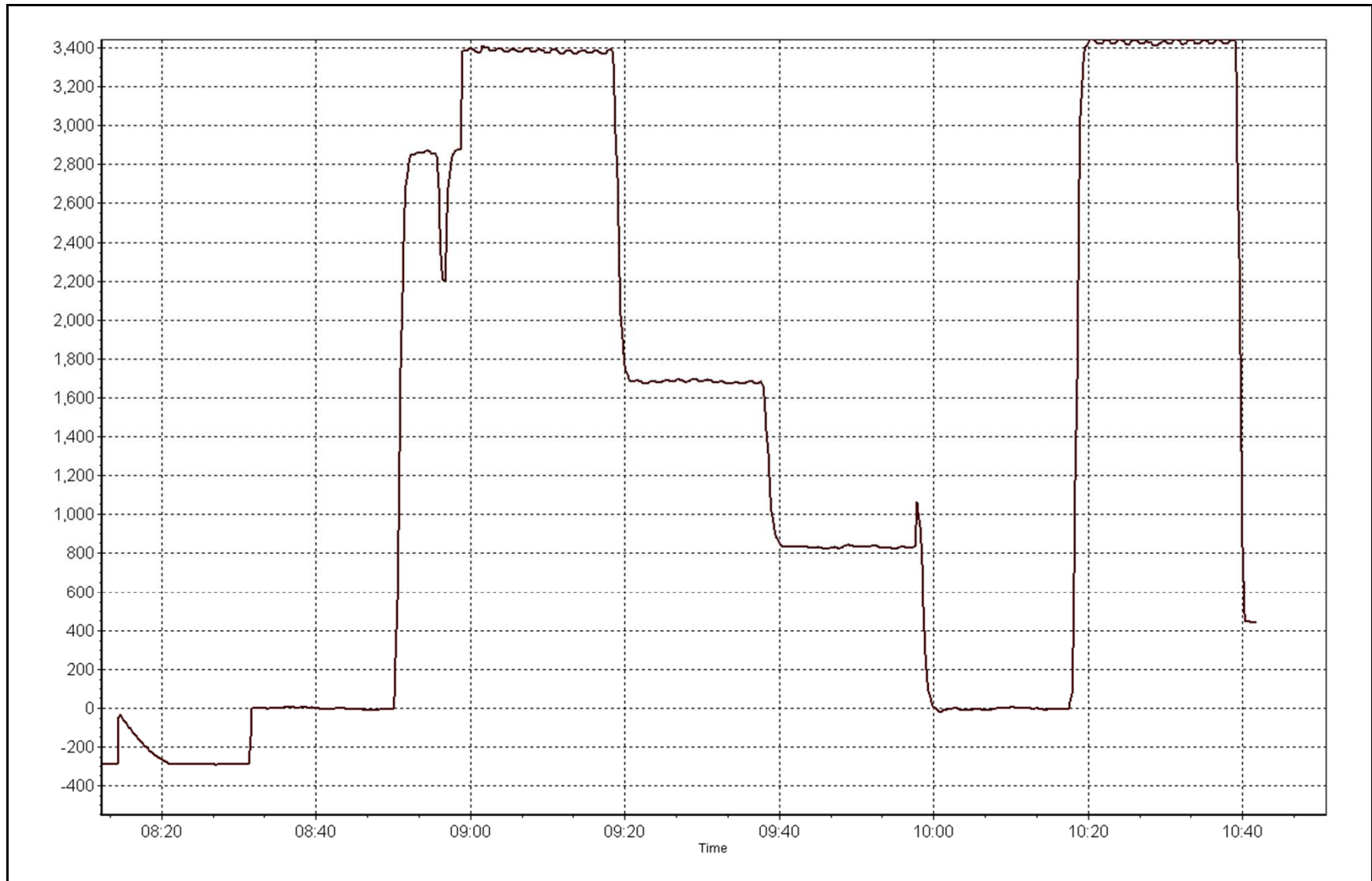
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	-0.02	N/A	Correlation Coefficient	0.999992
16.93	16.91	1.0010		
8.47	8.42	1.0062	Slope	0.998983
4.23	4.17	1.0149		
			Intercept	0.045873

THC Calibration Curve



THC Calibration Plot

Date: May 13, 2014





# Wood Buffalo Environmental Association

## NO<sub>x</sub>-NO-NO<sub>2</sub> Calibration Report

### Station Information

Calibration Date	May 27, 2014	Previous Calibration	April 23, 2014
Station Name	Millenium Mine	Station Number	AMS 12
Reason:	<input type="text" value="Routine"/>		
Start Time (MST)	6:45	End Time (MST)	10:50
Barometric Pressure	724 mmHg	Station Temperature	22.0 Deg C
Calibrator	Sabio 4010	Serial Number	11091107
NO Cal Gas Conc	51 ppm	Cal Gas Expiry Date	May 29, 2014
NOx Cal Gas Conc	51 ppm	Cal Gas Serial #	LL107924

### DACs Information

DACS make & model Campbell Scientific CR3000 DACS serial No. \_\_\_\_\_

Parameter		NOx	NO	NO2
MV conversion	Analyzer Range (ppb)	1000	1000	1000
	Analyzer Range (mv)	5000	5000	5000
Before	Data Slope	1.000128	0.999333	1.011162
	Data Offset	0.873091	-0.137917	0.320915
After	Data Slope	1.004308	1.005140	1.018232
	Data Offset	1.718354	0.134822	-0.775123
Channel #		7	6	5
Voltage Range		0 - 5V	0 - 5V	0 - 5V

### Analyzer Information

Analyzer make/model API T200 Analyzer serial # 723

Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
NO coefficient	1.088	ppb	1.088	ppb
NOX coefficient	1.080	ppb	1.080	ppb
NO2 coefficient		ppb		ppb
NO bkgrnd	0.0		0.0	
NOX bkgrnd	2.7		2.7	
Nt coefficient				
Chamber Temp	50.0	Deg C	50.0	Deg C
Moly Temp	316.4	Deg C	316.4	Deg C
PMT Temp	6.8	Deg C	6.8	Deg C
O3 flow	87.0	ccm	87.0	ccm
R Cell Press	2.8	mmHg	2.8	mmHg
Sample Flow	499-492	ccm	499-492	ccm

**Notes:**

Filter changed, No mainenance or adjustments made



# Wood Buffalo Environmental Association

## NO<sub>x</sub>-NO-NO<sub>2</sub> Calibration Report

### Station Information

Calibration Date:

May 27, 2014

Station Number:

AMS 12

### 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 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
as found zero	6000	0.0	0.0	0.0	0.0	-1.0	0.4	-0.5	N/A	N/A
as found span	6000	94.1	799.9	799.9	0.0	796.2	796.8	-0.2	1.0046	1.0038
calibrator zero	6000	0.0	0.0	0.0	0.0	-1.0	0.4	-0.5	N/A	N/A
high point	6000	94.1	799.9	799.9	0.0	796.2	796.8	-0.2	1.0046	1.0038
second point	6000	47.1	400.4	400.4	0.0	394.6	396.2	-0.8	1.0146	1.0105
third point	6000	23.5	199.8	199.8	0.0	195.8	197.8	-1.2	1.0202	1.0099
calibrator zero	6000	0.0	0.0	0.0	0.0	-0.3	0.9	0.0	N/A	N/A
as left zero	6000	0.0	0.0	0.0	0.0	-0.3	0.9	0.0	N/A	N/A
as left span	6000	94.1	799.9	504.0	295.9	778.6	499.4	279.6	1.0273	1.0092
Average Correction Factor									1.0131	1.0081

Corrected As found

NO<sub>x</sub>= 797.2

NO= 796.4

Percent Change

NO<sub>x</sub>= 0.2%

NO= 0.5%

Previous Response

NO<sub>x</sub>= 798.9

NO= 800.5

### GPT Calibration Data

Dilution Flow

6000

ccm

Source Gas Flow

94.10

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			-0.5			N/A	
1st NO <sub>2</sub> (300)	N/A	504.0	288.8	787.0	504.0	282.8	1.0006	1.0000	1.0212	97.9%
2nd NO <sub>2</sub> (200)	N/A	600.8	192.0	790.6	600.8	191.2	0.9961	1.0000	1.0042	99.6%
3rd NO <sub>2</sub> (100)	N/A	697.4	95.4	791.6	697.4	95.4	0.9948	1.0000	1.0000	100.0%
4th NO <sub>2</sub> (0)	792.8	N/A	-1.4	791.4	792.8	-1.2	0.9951	1.0000	N/A	N/A
Average Correction Factor							0.9967	1.0000	1.0085	99.2%

Calibration Performed By: \_\_\_\_\_



# Wood Buffalo Environmental Association

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

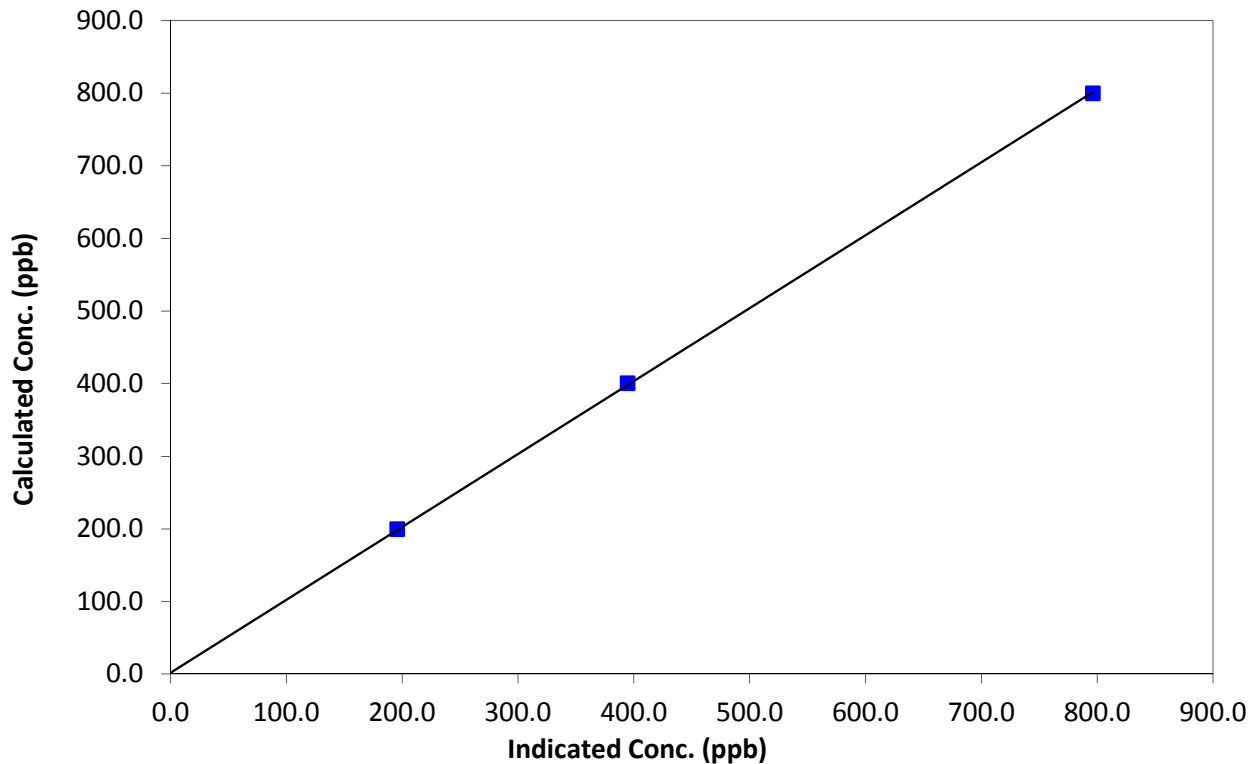
### Station Information

Calibration Date	May 27, 2014	Previous Calibration	April 23, 2014
Station Name	Millenium Mine	Station Number	AMS 12
Start Time (MST)	6:45	End Time (MST)	10:50
Analyzer make	API T200	Analyzer serial #	723

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-1.0	N/A	Correlation Coefficient	0.999973
799.9	796.2	1.0046		
400.4	394.6	1.0146	Slope	1.004308
199.8	195.8	1.0202		
0.0	-0.3	0.0000	Intercept	1.718354

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







# Wood Buffalo Environmental Association

## NO Calibration Summary

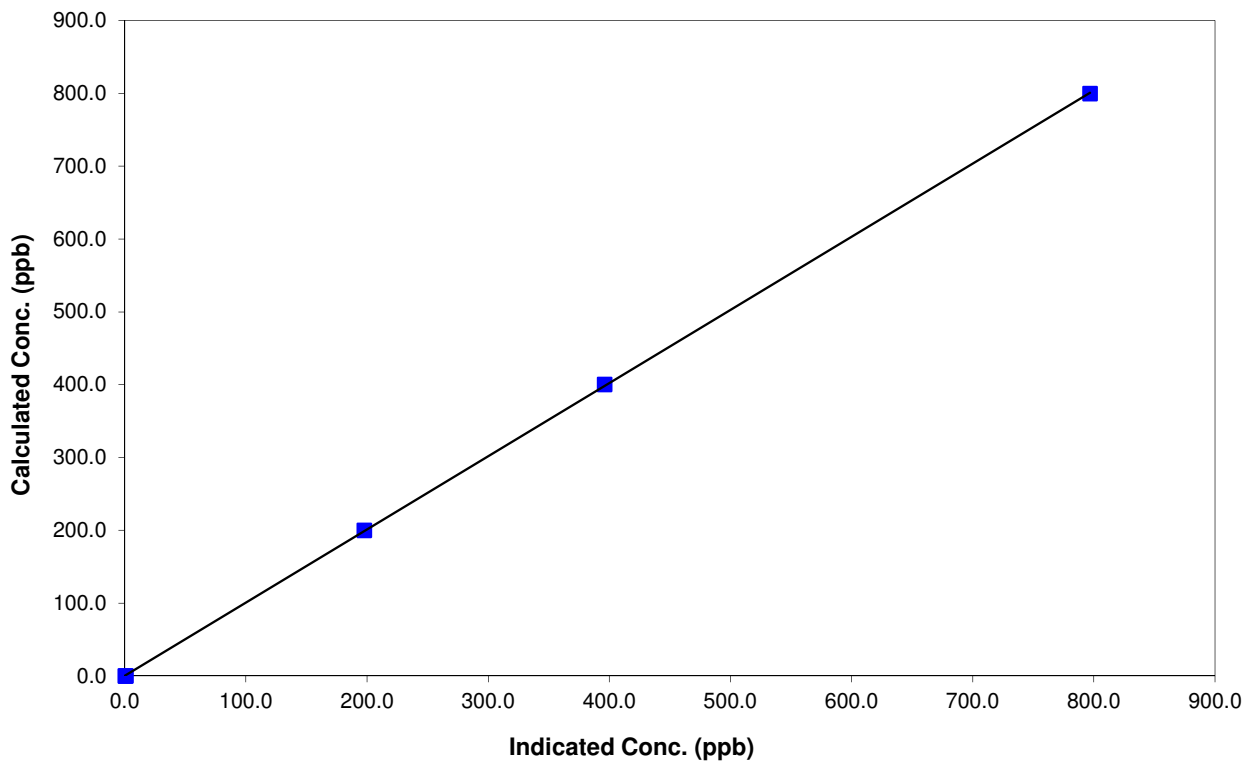
### Station Information

Calibration Date	May 27, 2014	Previous Calibration	April 23, 2014
Station Name	Millenium Mine	Station Number	AMS 12
Start Time (MST)	6:45	End Time (MST)	10:50
Analyzer make	API T200	Analyzer serial #	723

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.4	N/A	Correlation Coefficient	0.999984
799.9	796.8	1.0038		
400.4	396.2	1.0105	Slope	1.005140
199.8	197.8	1.0099		
0.0	0.9	0.0000	Intercept	0.134822

### NO Calibration Curve





# Wood Buffalo Environmental Association

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

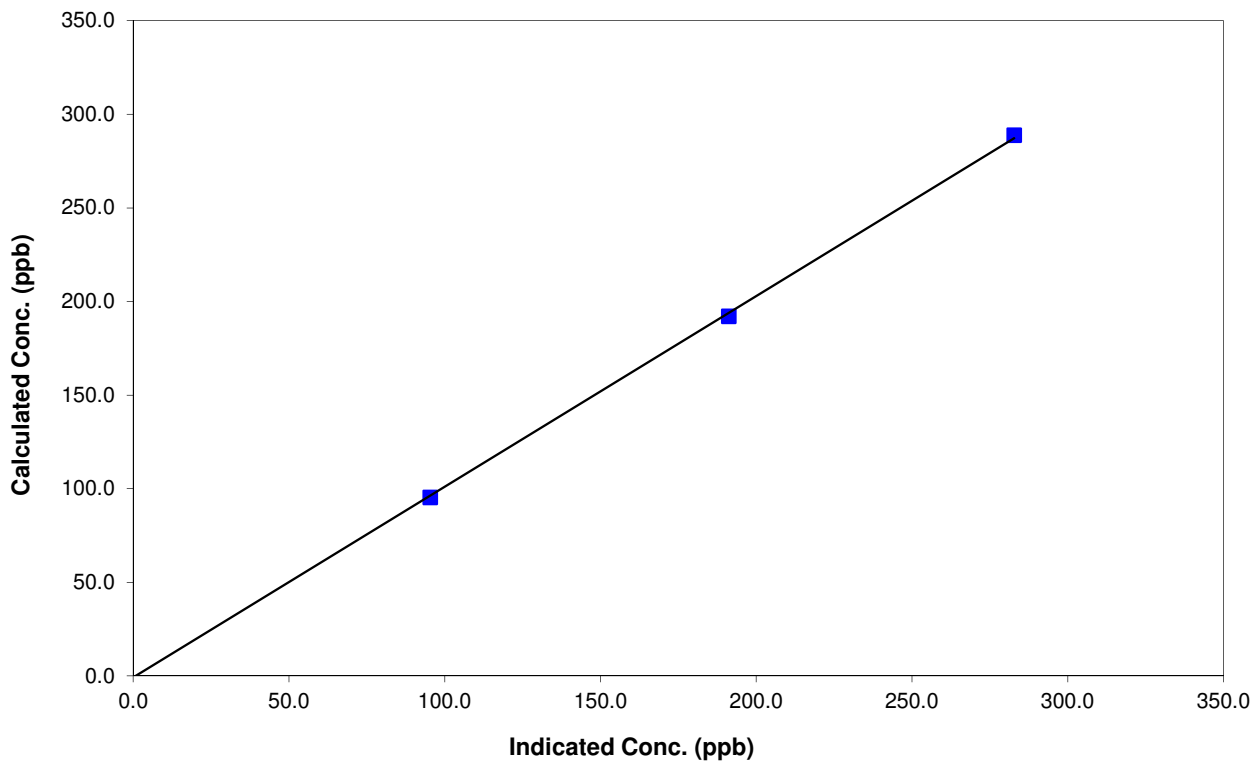
### Station Information

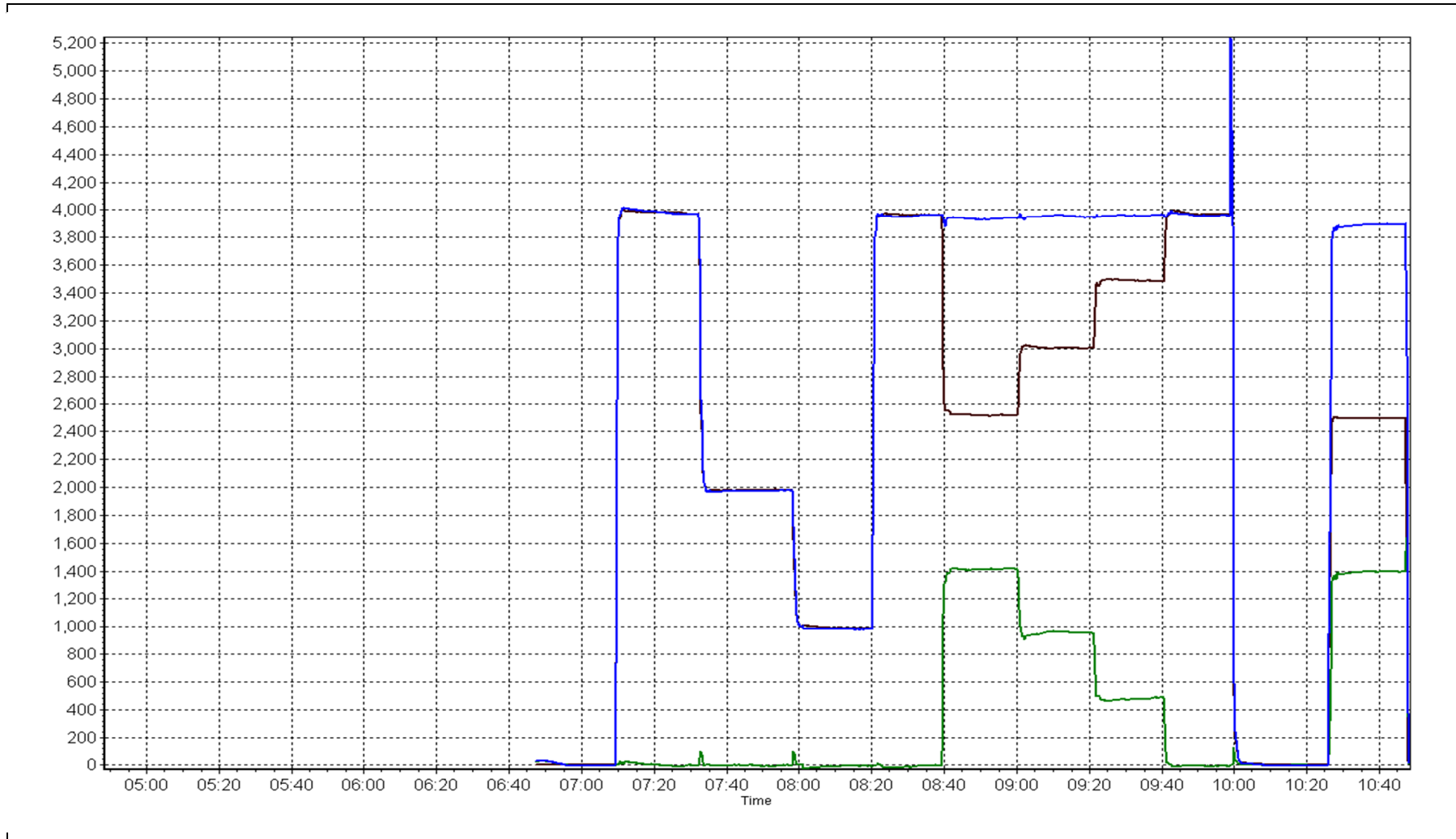
Calibration Date	May 27, 2014	Previous Calibration	April 23, 2014
Station Number	Millenium Mine	Station Number	AMS 12
Start Time (MST)	6:45	End Time (MST)	10:50
Analyzer make	API T200	Analyzer serial #	723

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.5	N/A	Correlation Coefficient	0.999811
288.8	282.8	1.0212		
192.0	191.2	1.0042	Slope	1.018232
95.4	95.4	1.0000		
			Intercept	-0.775123

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







# Wood Buffalo Environmental Association

## SHARP AUDIT / CALIBRATION

### STATION INFORMATION

Calibration Date:	<u>May 28, 2014</u>	Previous Calibration:	<u>April 24, 2014</u>
Station Name:	<u>Millenium Mine</u>	Station Number:	<u>12</u>
Start Time (MST):	<u>9:25</u>	End Time (MST):	<u>9:53</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>5691</u>
Source SN:	<u>3534</u>
Mass Foil Set SN:	
HEPA PN:	
Time Correct (MST):	<u>Yes</u>
Paremeters Checked:	<u>T1, P3, Neph,Flow</u>

### AUDIT DATA

#### Temperature (deg C)

<u>Sensor</u>	<u>Indicated</u>	<u>Measured</u>	<u>Difference</u>	<u>Final Indicated</u>
T1	7.0	7.9	0.9	7.0
T2	NA	NA	#VALUE!	NA
T3	NA	NA	#VALUE!	NA
T4	NA	NA	#VALUE!	NA

#### Pressure (Hpa)

<u>Sensor</u>	<u>Indicated</u>	<u>Measured</u>	<u>Difference</u>	<u>Final Indicated</u>
P3	979.000	979.000	0.0	979

#### Main Flow (Lph)

<u>Indicated</u>	<u>Measured</u>	<u>Difference</u>	<u>Final Indicated</u>
1000.00	980.00	-20.00	1000

#### Mass Foil Calibration

Zeroed?:	<u>Yes</u>
Foil Mass:	<u>NO</u>
Previous Correction Factor:	<u>6972</u>
New Correction Factor:	<u>7044</u>

#### Nephelometer Calibration

<u>Parameter</u>	<u>As Found</u>	<u>Zeroed</u>	<u>As Left</u>
Analog	185	No	185
Neph	0.6	No	0.6
C14	8.7	No	8.7
Indicated Concentration (ug/m3)	0.1	No	0.1
Range 1		No	
Range 2		No	

#### INSPECTION DATA

<u>Item</u>	<u>Condition</u>	<u>Item</u>	<u>Condition</u>
Cyclone	Good	HEPA filter	Good
Pump	Good		
Filter Tape	Good		
Mass Foil Cal Set	Good		

#### NOTES:

Samples Head Changed Out

**Audit Performed By:** Melissa Lemay

**WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS 13  
FORT MCKAY SOUTH  
MAY 2014**

Operations and Data Collection by:  
Wood Buffalo Environmental Association  
Fort McMurray, Alberta

QA/QC, Data Validation and Reporting by:  
Aurora Atmospheric Inc.  
Calgary, Alberta

June 27, 2014

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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT MCKAY SOUTH (AMS 13)  
MAY 2014

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	695	38	49	98.52	53	0	6	0
TRS(ppb) Average	695	34	49	97.98	2	0	1	0
THC(ppm) Average	695	38	49	98.52	2.9	-	2.3	-
O3(ppb) Average	701	33	43	98.66	55	0	35	-
NO2(ppb) Average	696	37	48	98.52	28	0	7	-
NO(ppb) Average	696	37	48	98.52	42	-	3	-
NOX(ppb) Average	696	37	48	98.52	70	-	9	-
PM2.5(ug/m3) Average	733	0	11	98.52	29.7	-	11.1	0
Temperature 2 m (C) Average	744	0	0	100.00	29	-	19.5	-
Relative Humidity (%) Average	744	0	0	100.00	100	-	-	-
Wind Speed 10 m (km/h) Average	744	0	0	100.00	19	-	-	-
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 - FORT MCKAY SOUTH (AMS 13)  
MAY 2014

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2(ppb) Average	695	1.1	4	-	0	0	0	0	1	2	53
TRS(ppb) Average	695	0.2	0	-	0	0	0	0	0	0	2
THC(ppm) Average	695	2.07	0.1	-	1.8	1.9	2	2	2.1	2.2	2.9
O3(ppb) Average	701	24.6	14	-	0	4	14	26	35	42	55
NO2(ppb) Average	696	3.2	4	-	0	0	1	2	4	7	28
NO(ppb) Average	696	0.9	3	-	0	0	0	0	0	2	42
NOX(ppb) Average	696	4.1	7	-	0	0	1	2	5	10	70
PM2.5(ug/m3) Average	733	4.35	3.3	-	0.5	1.6	2.2	3.5	5.4	8.1	29.7
Temperature 2 m (C) Average	744	7.88	7.3	-	-9.9	-1.4	2.1	7.6	13.4	17.5	29
Relative Humidity (%) Average	744	66.3	24	-	18	32	45	68	89	97	100
Wind Speed 10 m (km/h) Average	744	6.2	4	-	0	2	3	5	9	12	19
Wind Direction 10 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION -FORT McKAY SOUTH (AMS 13)  
MAY 2014

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
ALL PARAMETERS	15 May 2014 03:00	15 May 2014 12:00	10	Station power failure
SO2	21 May 2014 14:00	21 May 2014 14:00	1	Maintenance - sample manifold cleaned
TRS	21 May 2014 14:00	21 May 2014 14:00	1	Maintenance - sample manifold cleaned
THC	21 May 2014 14:00	21 May 2014 14:00	1	Maintenance - sample manifold cleaned
NO2, NO, NOX	21 May 2014 14:00	21 May 2014 14:00	1	Maintenance - sample manifold cleaned
PM2.5	21 May 2014 15:00	21 May 2014 15:00	1	Flow and zero reference checks, sample head cleaning

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Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO<sub>2</sub>) - ppb

Fort McKay South - May 2014

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 53 ppb on May 14 09:00	Maximum Daily Average: 6.4 ppb on May 23		Hours of Data:	695
Minimum Value: 0 ppb on May 14 05:00	Minimum Daily Average: 0.2 ppb on May 27		Hours of Missing Data:	49
Maximum Diurnal Average: 4.6 ppb at hour 9	Minimum Diurnal Average: 0.3 ppb at hour 24		Hours of Calibration:	38
Monthly Average: 1.1 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> = 23		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-May	1	Z	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0.5	1
2-May	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0.4	1
3-May	0	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
4-May	0	Z	0	0	0	0	0	0	1	1	1	1	2	1	2	3	5	3	2	3	1	1	0	1.3	5	
5-May	0	Z	0	0	0	0	0	1	1	2	2	3	2	1	1	1	1	0	0	1	0	0	0	0.8	3	
6-May	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-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	
8-May	0	Z	0	0	0	0	0	0	0	1	2	1	1	1	1	0	0	0	0	0	0	0	0	0.5	2	
9-May	0	Z	0	0	0	0	0	0	1	1	1	0	1	1	1	0	0	0	1	0	0	0	1	0.5	1	
10-May	0	Z	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0.4	1	
11-May	0	Z	0	0	0	0	0	0	1	1	1	0	0	1	0	0	0	1	0	0	0	0	0	0.5	1	
12-May	0	Z	0	0	0	0	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.4	1	
13-May	0	Z	0	0	0	0	0	1	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0.4	1	
14-May	0	Z	0	0	0	0	1	5	53	10	24	14	9	8	4	2	3	1	1	2	2	1	0	6.1	53	
15-May	0	Z	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	1	1	1	1	1	1	0	0	0	0	0	--	1	
16-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	3	4	1	1	0	0	0.7	4	
17-May	0	Z	0	0	0	0	0	2	16	25	7	6	9	5	1	1	1	1	1	1	1	1	0	3.5	25	
18-May	0	Z	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0.5	1	
19-May	0	Z	0	0	0	1	6	8	3	1	6	7	3	3	1	3	3	2	3	0	0	0	0	2.2	8	
20-May	0	Z	0	0	1	1	2	27	21	C	C	C	C	C	C	C	4	2	5	4	1	0	0	--	27	
21-May	0	Z	0	0	0	0	0	1	1	2	2	0	1	M	0	0	0	0	0	0	0	0	0	0.5	2	
22-May	0	Z	0	0	0	0	1	1	5	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0.6	5	
23-May	0	Z	0	0	0	1	1	1	1	1	12	49	50	9	9	3	2	1	2	2	1	1	1	6.4	50	
24-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	
25-May	0	Z	0	0	0	0	0	1	27	4	3	2	4	3	1	0	0	0	1	1	1	0	0	2.3	27	
26-May	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	
27-May	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	
28-May	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	
29-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
30-May	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	
31-May	1	Z	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0.4	1	

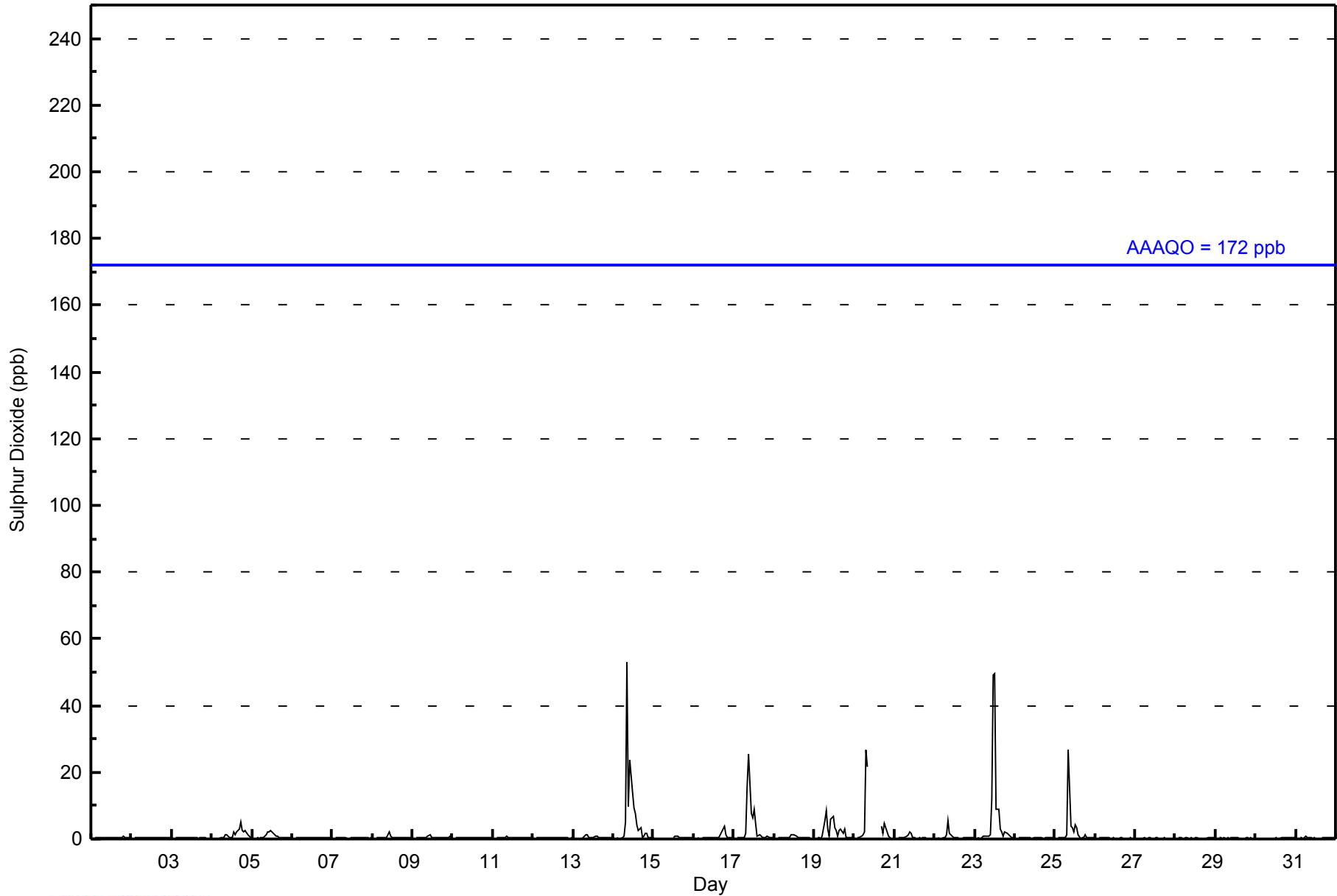
0.3	--	0.3	0.3	0.3	0.4	0.6	1.9	4.6	2.0	2.3	3.1	2.9	1.4	0.9	0.7	0.8	0.7	0.9	0.6	0.5	0.4	0.3	0.3	Diurnal Average
1	--	1	1	1	1	6	27	53	25	24	49	50	9	9	3	4	5	5	4	3	1	1	1	Diurnal Maximum

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



WBEA  
Hourly Averages

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Fort McKay South - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Fort McKay South - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	684	98.42	98.42
11 - 20	3	0.43	98.85
21 - 60	8	1.15	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 695

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Fort McKay South - May 2014**

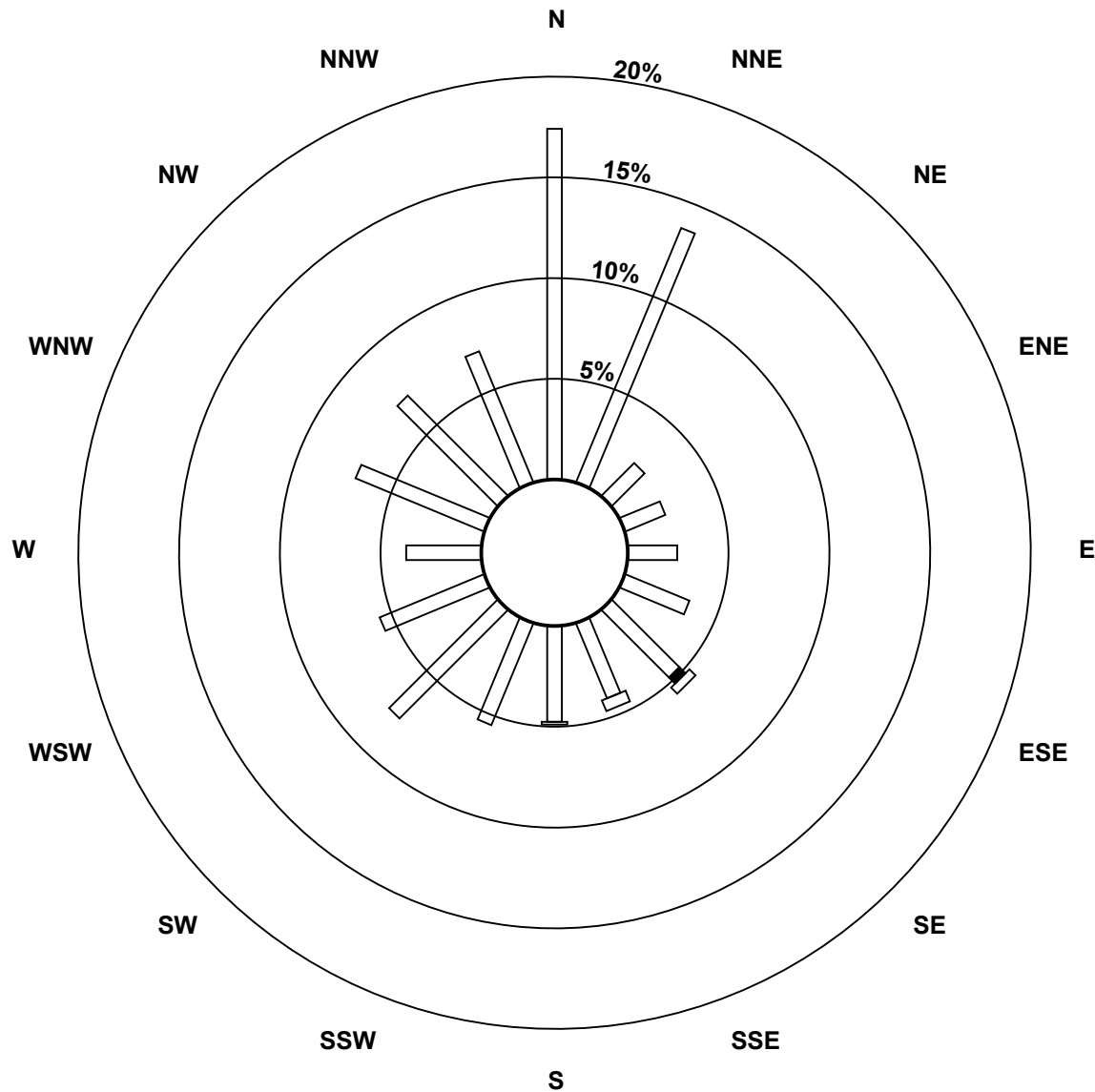
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	121	95	16	15	17	24	33	28	33	38	53	39	26	48	49	49	684
11 - 20	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	3
21 - 60	0	0	0	0	0	0	3	4	1	0	0	0	0	0	0	0	8
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	121	95	16	15	17	24	39	32	34	38	53	39	26	48	49	49	695

Total Number of Valid Hours: 695

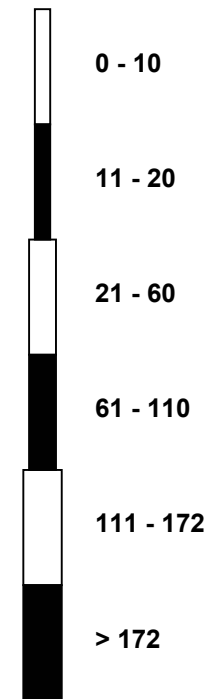
Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Fort McKay South (AMS 13)**



Classes (ppb)

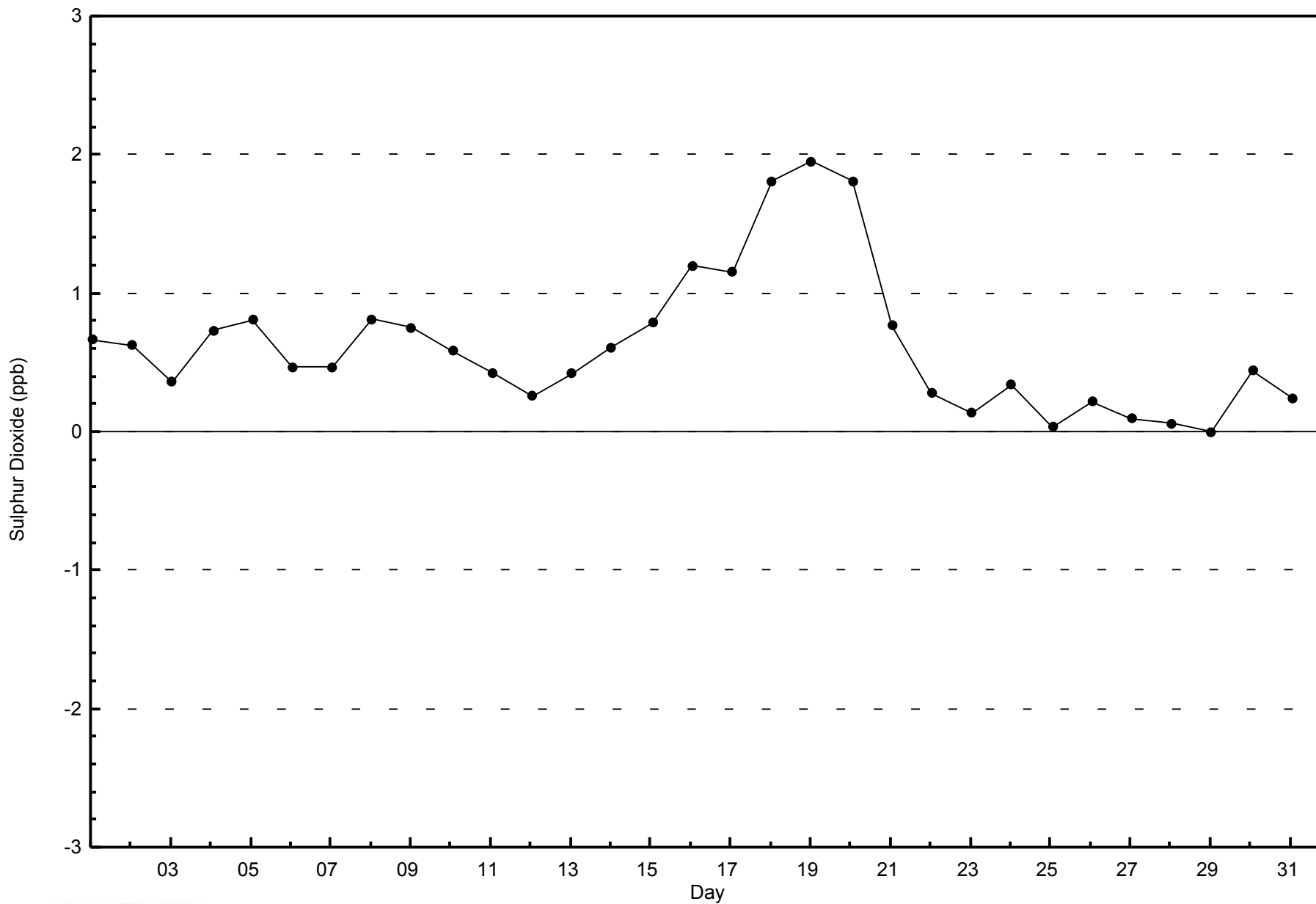


Total Number of Valid Hours: 695



WBEA  
Zero Responses

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Fort McKay South - May 2014

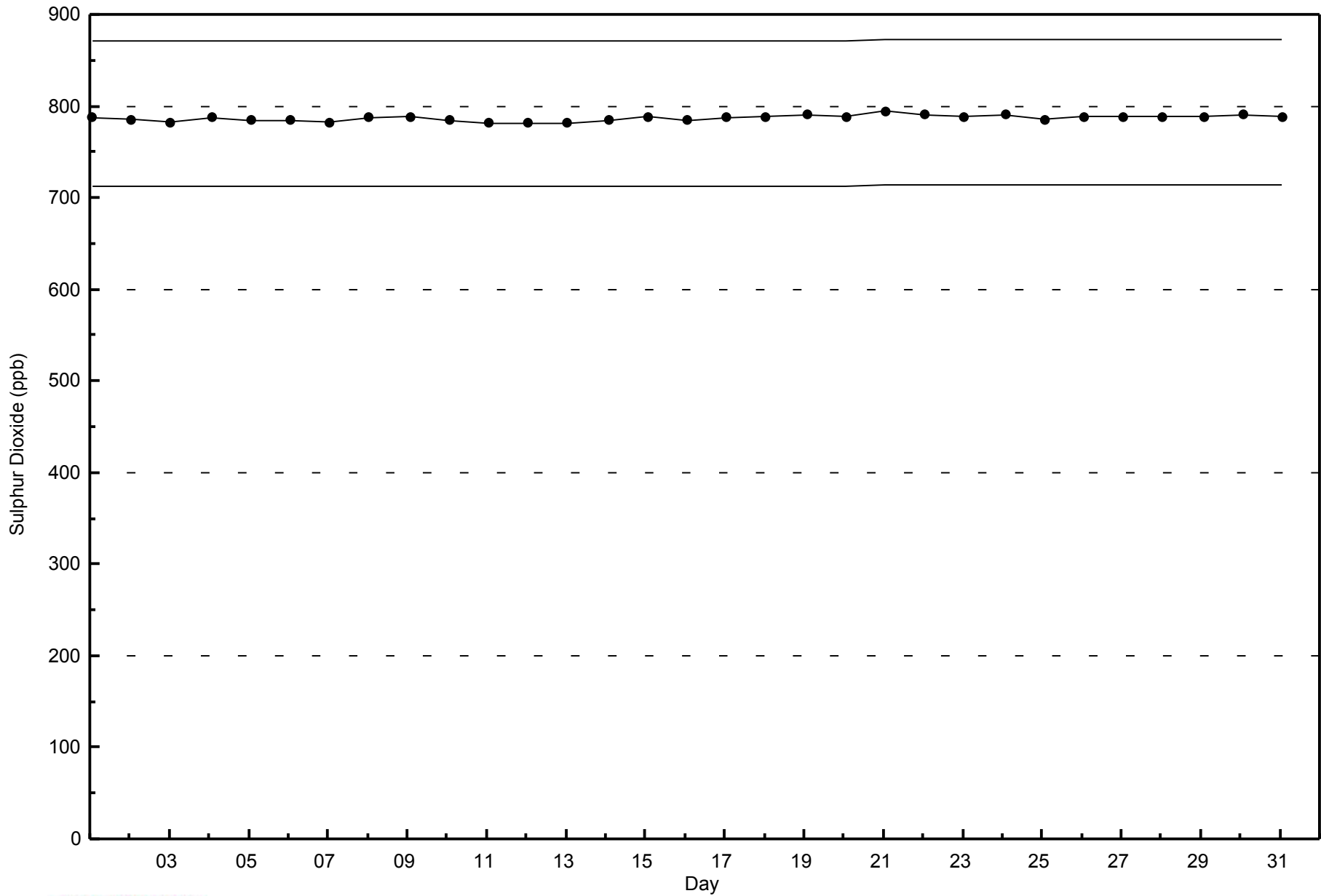






**WBEA**  
**Span Responses**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Fort McKay South - May 2014**





Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

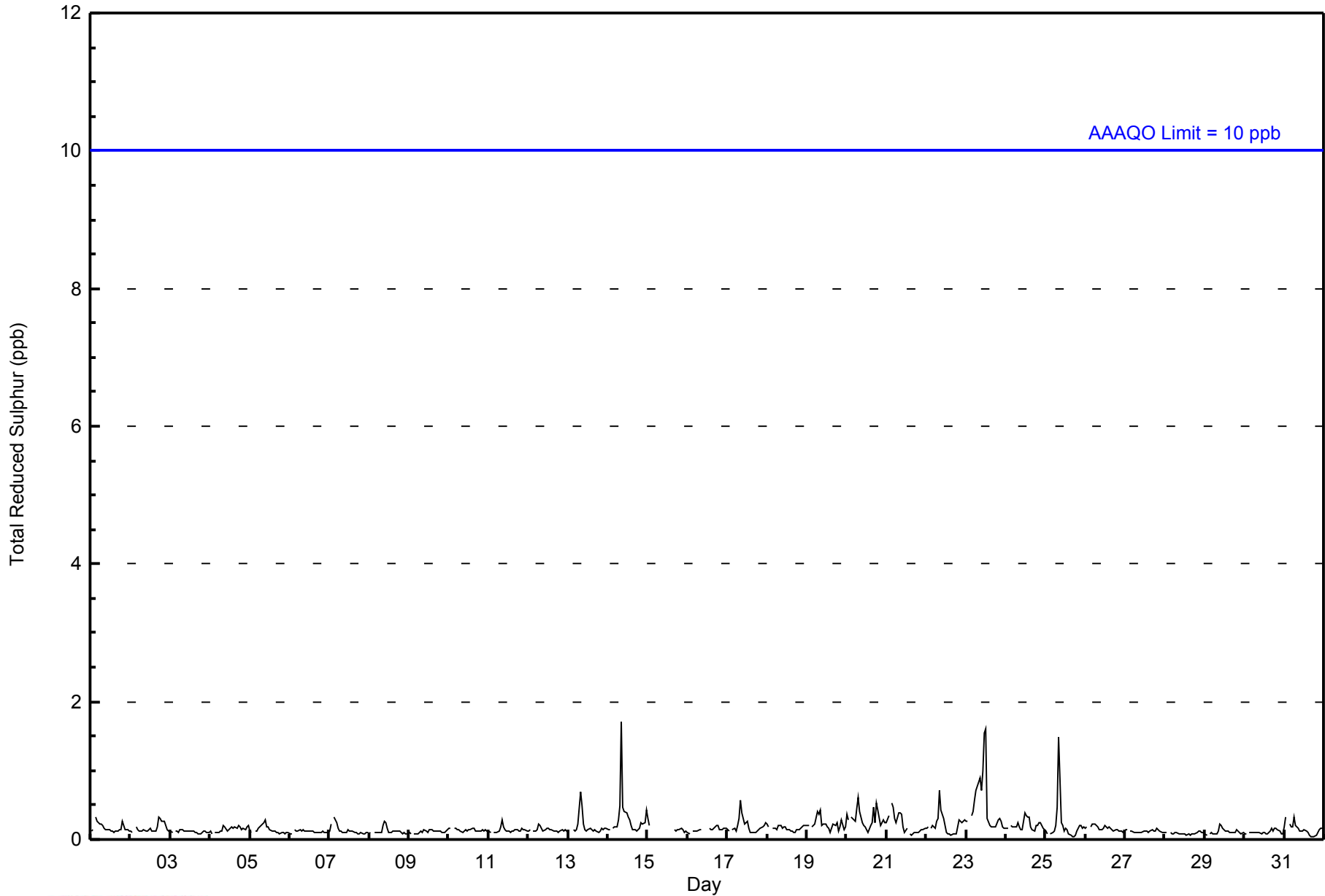
Fort McKay South - May 2014

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																																								
Maximum Value: 2 ppb on May 14 09:00										Maximum Daily Average: 0.5 ppb on May 23										Hours of Data: 695																														
Minimum Value: 0 ppb on May 31 19:00										Minimum Daily Average: 0.1 ppb on May 28										Hours of Missing Data: 49																														
Maximum Diurnal Average: 0.3 ppb at hour 9										Minimum Diurnal Average: 0.1 ppb at hour 16										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: 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-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0																							
2-May	0	0	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																							
3-May	0	0	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																							
4-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																							
5-May	0	0	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-May	0	0	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-May	0	0	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-May	0	0	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																							
9-May	0	0	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																							
10-May	0	0	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																							
11-May	0	0	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-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																							
13-May	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																							
14-May	0	0	Z	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2																							
15-May	0	0	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	0	0	0	0	0	0	0	0	0	--	0																							
16-May	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	0.1	0																							
17-May	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	0.2	1																							
18-May	0	0	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-May	0	0	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-May	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.3	1																							
21-May	0	0	Z	1	0	0	0	0	0	0	0	0	0	M	0	0	0	0	0	0	0	0	0	0	0	0.2	1																							
22-May	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	0.2	1																							
23-May	0	0	Z	0	0	1	1	1	1	1	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2																							
24-May	0	0	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-May	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	0.2	1																							
26-May	0	0	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																							
27-May	0	0	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																							
28-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																							
29-May	0	0	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-May	0	0	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-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																							
																								0.2	0.2	--	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.2	Diurnal Average		
																								0	0	--	1	0	1	1	1	2	1	1	2	2	0	0	0	0	0	0	1	0	0	0	0	0	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																																																		



**WBEA**  
**Hourly Averages**

**Total Reduced Sulphur (TRS) - ppb**  
**Fort McKay South - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb**  
**Fort McKay South - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	695	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: 695

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb**  
**Fort McKay South - May 2014**

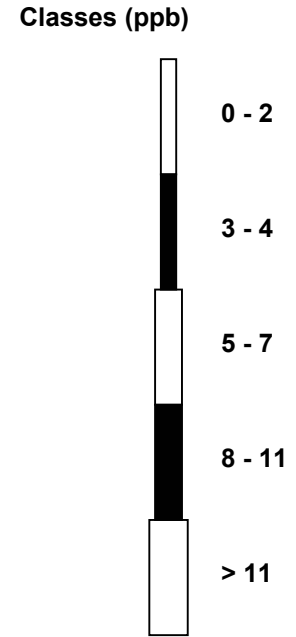
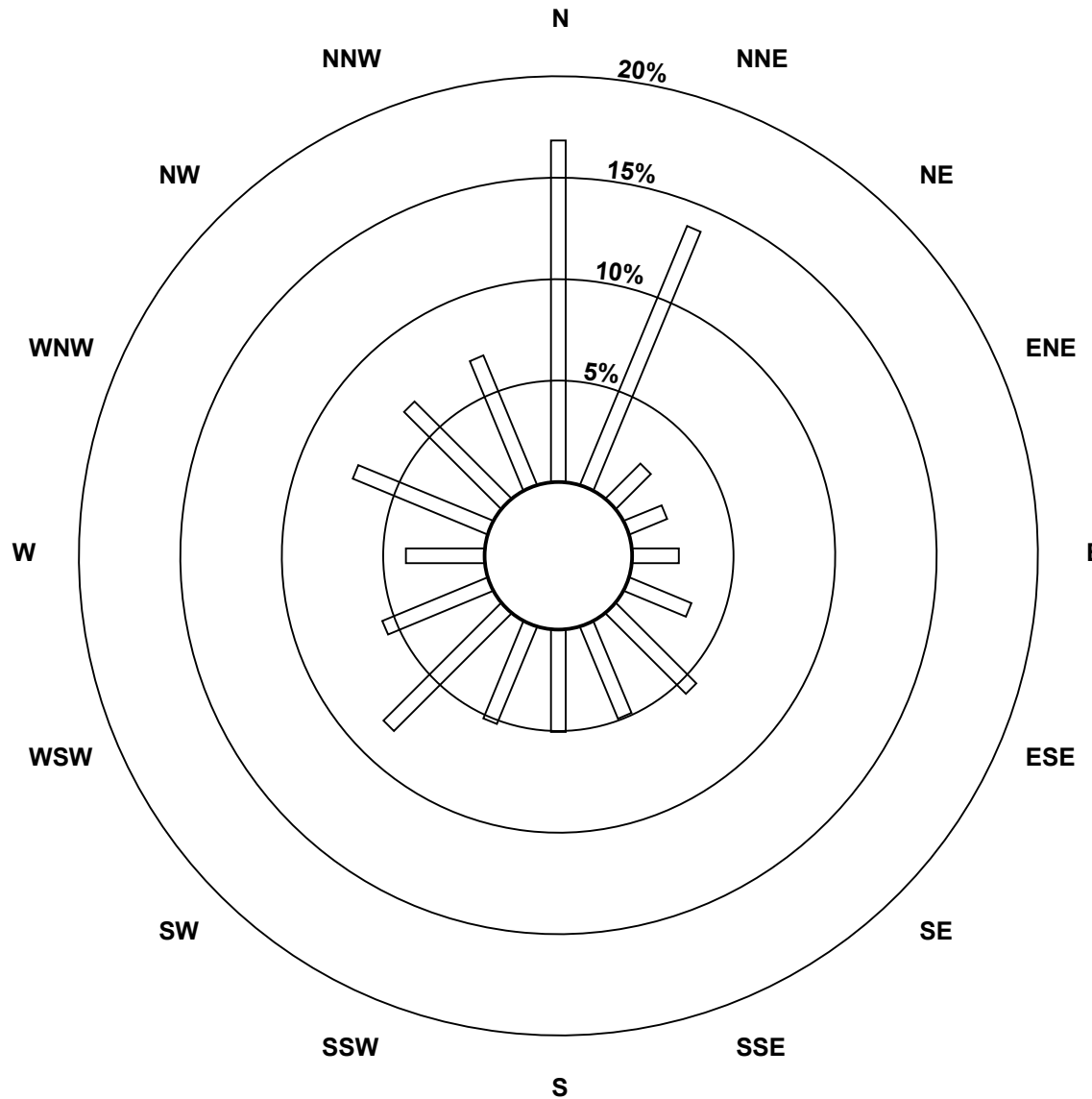
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	117	96	17	14	16	23	39	34	35	36	57	39	27	50	47	48	695
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	117	96	17	14	16	23	39	34	35	36	57	39	27	50	47	48	695

Total Number of Valid Hours: 695

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Total Reduced Sulphur (TRS) - ppb  
Fort McKay South (AMS 13)**

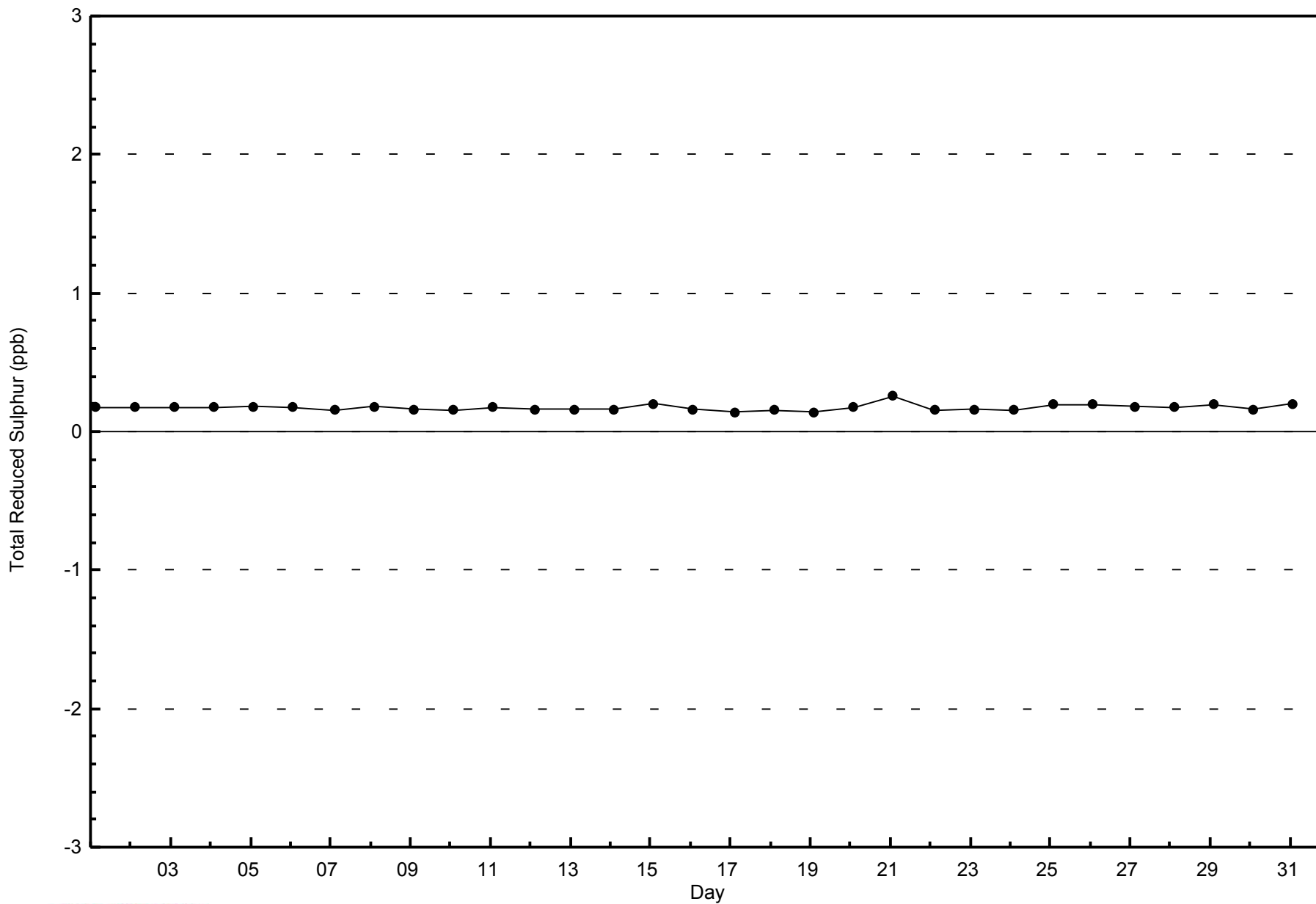


**Total Number of Valid Hours: 695**



WBEA  
Zero Responses

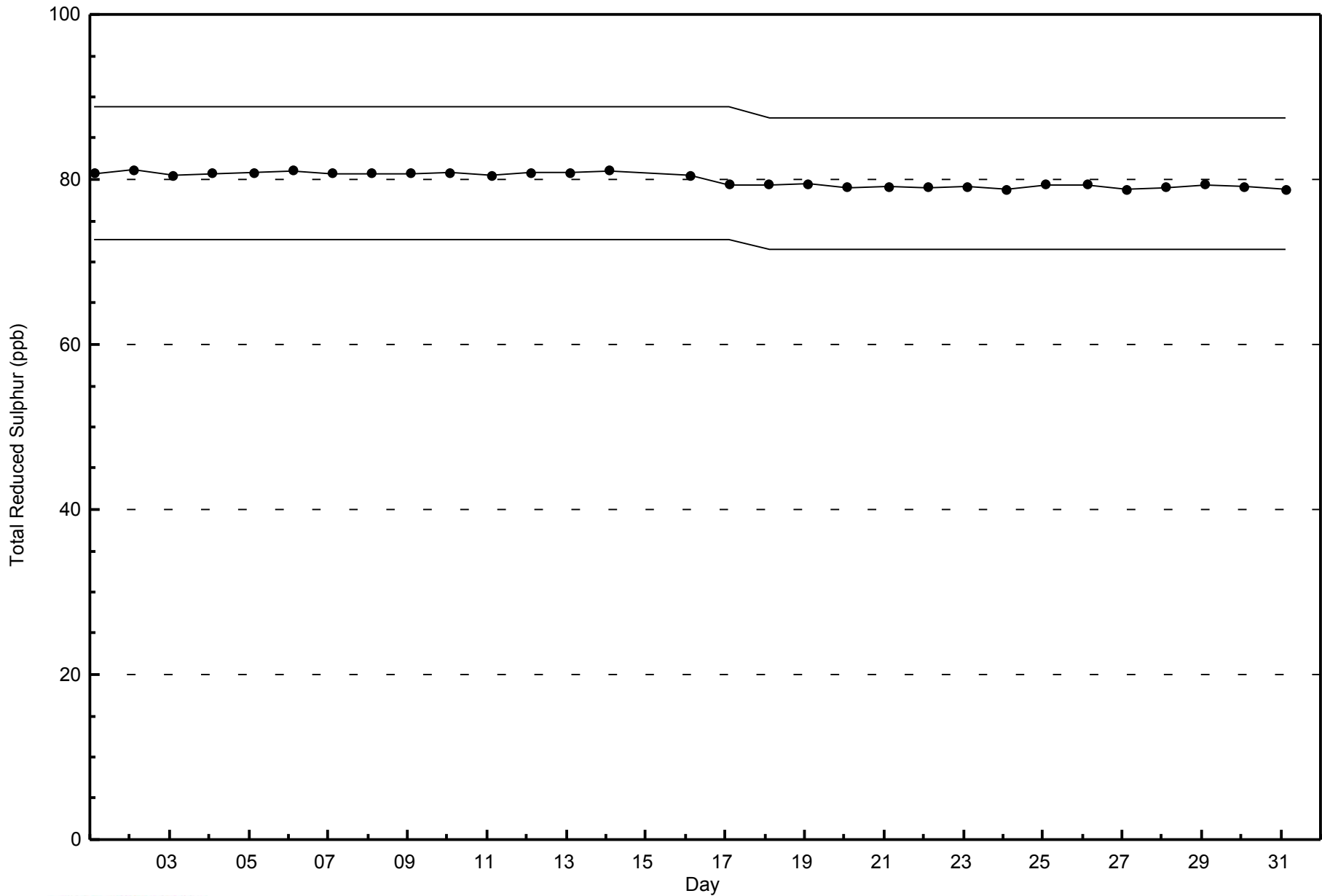
Total Reduced Sulphur (TRS) - ppb  
Fort McKay South - May 2014





WBEA  
Span Responses

Total Reduced Sulphur (TRS) - ppb  
Fort McKay South - May 2014





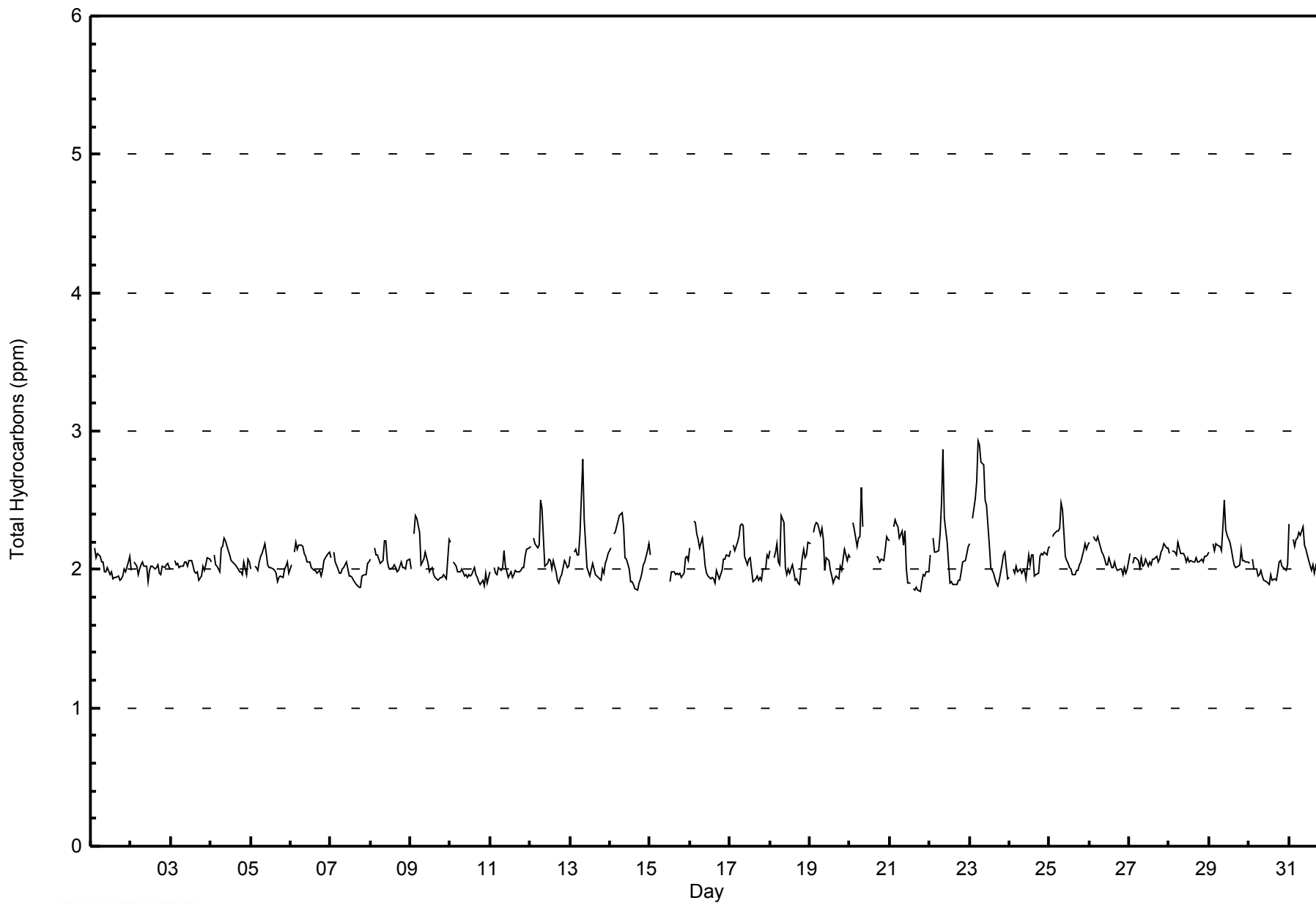


Maximum Value: 2.9 ppm on May 23 06:00																			Maximum Daily Average: 2.3 ppm on May 23						Hours in Service: 744		
Minimum Value: 1.8 ppm on May 21 19:00																			Minimum Daily Average: 2.0 ppm on May 10						Hours of Data: 695		
Maximum Diurnal Average: 2.2 ppm at hour 8																			Minimum Diurnal Average: 2.0 ppm at hour 18						Hours of Missing Data: 49		
Monthly Average: 2.07 ppm																			Percentiles: P <sub>1</sub> = 1.9 P <sub>10</sub> = 1.9 Q <sub>1</sub> = 2.0 Median = 2.0 Q <sub>3</sub> = 2.1 P <sub>90</sub> = 2.2 P <sub>99</sub> = 2.6						Hours of Calibration: 38		
																									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-May	2.0	Z	2.2	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.1	2.1	2.0	2.2	
2-May	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
3-May	2.0	Z	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.1	2.1	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.1	
4-May	2.1	Z	2.1	2.0	2.0	2.0	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1	2.1	2.1	2.2	
5-May	2.0	Z	2.0	2.0	2.0	2.1	2.1	2.1	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	2.0	2.0	2.1	2.0	2.0	2.2	
6-May	2.0	Z	2.1	2.2	2.1	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.1	2.1	2.1	2.1	2.1	2.2	
7-May	2.1	Z	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.1	2.0	2.1	
8-May	2.1	Z	2.2	2.1	2.1	2.1	2.0	2.1	2.2	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.2	
9-May	2.0	Z	2.3	2.4	2.4	2.3	2.0	2.1	2.1	2.1	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.1	2.2	2.1	2.4	2.4	
10-May	2.2	Z	2.1	2.0	2.0	2.0	2.0	2.0	1.9	2.0	1.9	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	2.0	2.2	
11-May	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	1.9	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.0	2.2	
12-May	2.2	Z	2.2	2.2	2.2	2.2	2.5	2.4	2.2	2.0	2.0	2.1	2.1	2.0	2.1	2.0	1.9	1.9	1.9	2.0	2.1	2.0	2.0	2.0	2.1	2.5	
13-May	2.1	Z	2.1	2.1	2.1	2.1	2.3	2.8	2.4	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	2.0	2.0	2.0	2.1	2.1	2.1	2.8	
14-May	2.2	Z	2.3	2.3	2.3	2.4	2.4	2.4	2.3	2.1	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.1	2.1	2.2	2.1	2.4	
15-May	2.1	Z	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	1.9	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.1	2.1	2.1	--	2.1	
16-May	2.2	Z	2.3	2.3	2.3	2.2	2.2	2.2	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.3	
17-May	2.1	Z	2.2	2.1	2.2	2.2	2.3	2.3	2.3	2.1	2.0	2.1	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.1	2.1	2.1	2.3	
18-May	2.1	Z	2.1	2.1	2.2	2.1	2.0	2.4	2.3	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	2.1	2.1	2.1	2.1	2.2	2.1	2.4		
19-May	2.2	Z	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.0	2.1	2.1	2.0	1.9	1.9	1.9	2.0	1.9	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.3	
20-May	2.1	Z	2.3	2.3	2.2	2.2	2.2	2.6	2.3	C	C	C	C	C	C	C	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	--	2.6	
21-May	2.2	Z	2.3	2.4	2.3	2.3	2.2	2.3	2.2	2.3	2.0	1.9	1.9	M	1.9	1.8	1.9	1.9	1.8	1.9	2.0	2.0	2.0	2.0	2.1	2.4	
22-May	2.1	Z	2.2	2.1	2.1	2.1	2.3	2.5	2.9	2.4	2.2	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1	2.1	2.1	2.2	2.1	2.9	
23-May	2.2	Z	2.4	2.5	2.6	2.9	2.9	2.8	2.8	2.5	2.5	2.3	2.2	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.1	2.1	2.0	1.9	2.3	2.9	
24-May	1.9	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.1	2.0	2.1	2.0	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.2	2.0	2.2	
25-May	2.2	Z	2.2	2.3	2.3	2.3	2.3	2.5	2.4	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.1	2.2	2.1	2.5	
26-May	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.0	2.0	2.1	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	
27-May	2.1	Z	2.0	2.1	2.1	2.1	2.0	2.1	2.0	2.0	2.1	2.0	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.2	
28-May	2.1	Z	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	
29-May	2.1	Z	2.2	2.1	2.2	2.2	2.2	2.1	2.3	2.5	2.3	2.2	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.5	
30-May	2.0	Z	2.1	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.1	
31-May	2.3	Z	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.2	2.2	2.2	2.1	2.3	
		2.1	--	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	Diurnal Average		
		2.3	--	2.4	2.5	2.6	2.9	2.9	2.8	2.9	2.5	2.5	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	Diurnal Maximum		
Z - zerospan			C - Calibration			M - Maintenance			PF - Power Failure																		



**WBEA**  
**Hourly Averages**

**Total Hydrocarbons (THC) - ppm**  
**Fort McKay South - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Fort McKay South - May 2014**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	357	51.37	51.37
2.1 - 3.0	338	48.63	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 695

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Fort McKay South - May 2014**

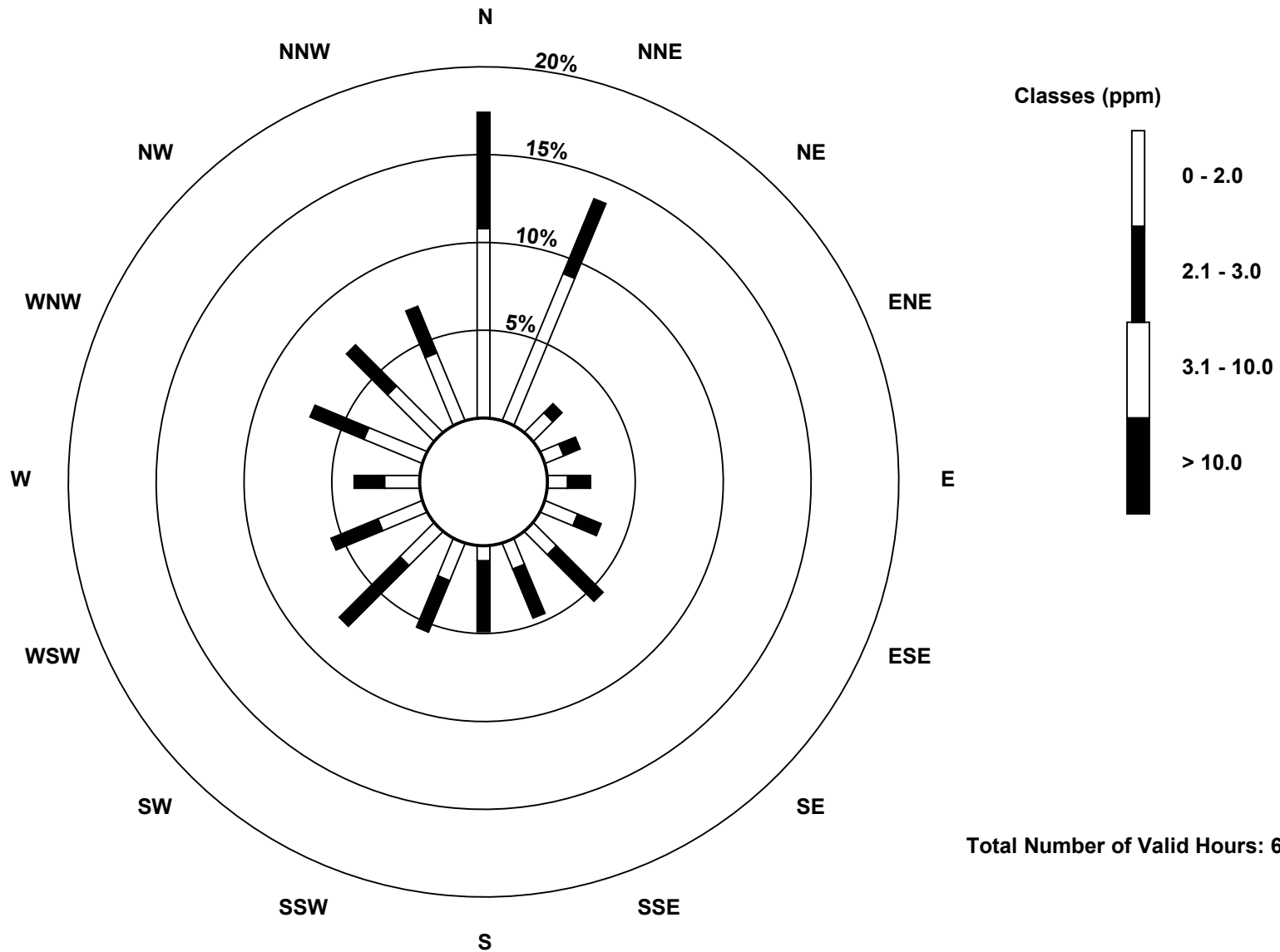
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	75	63	11	8	8	14	13	11	6	16	19	19	14	25	26	29	357
2.1 - 3.0	46	32	5	7	9	10	26	21	28	22	34	20	12	23	23	20	338
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	121	95	16	15	17	24	39	32	34	38	53	39	26	48	49	49	695

Total Number of Valid Hours: 695

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

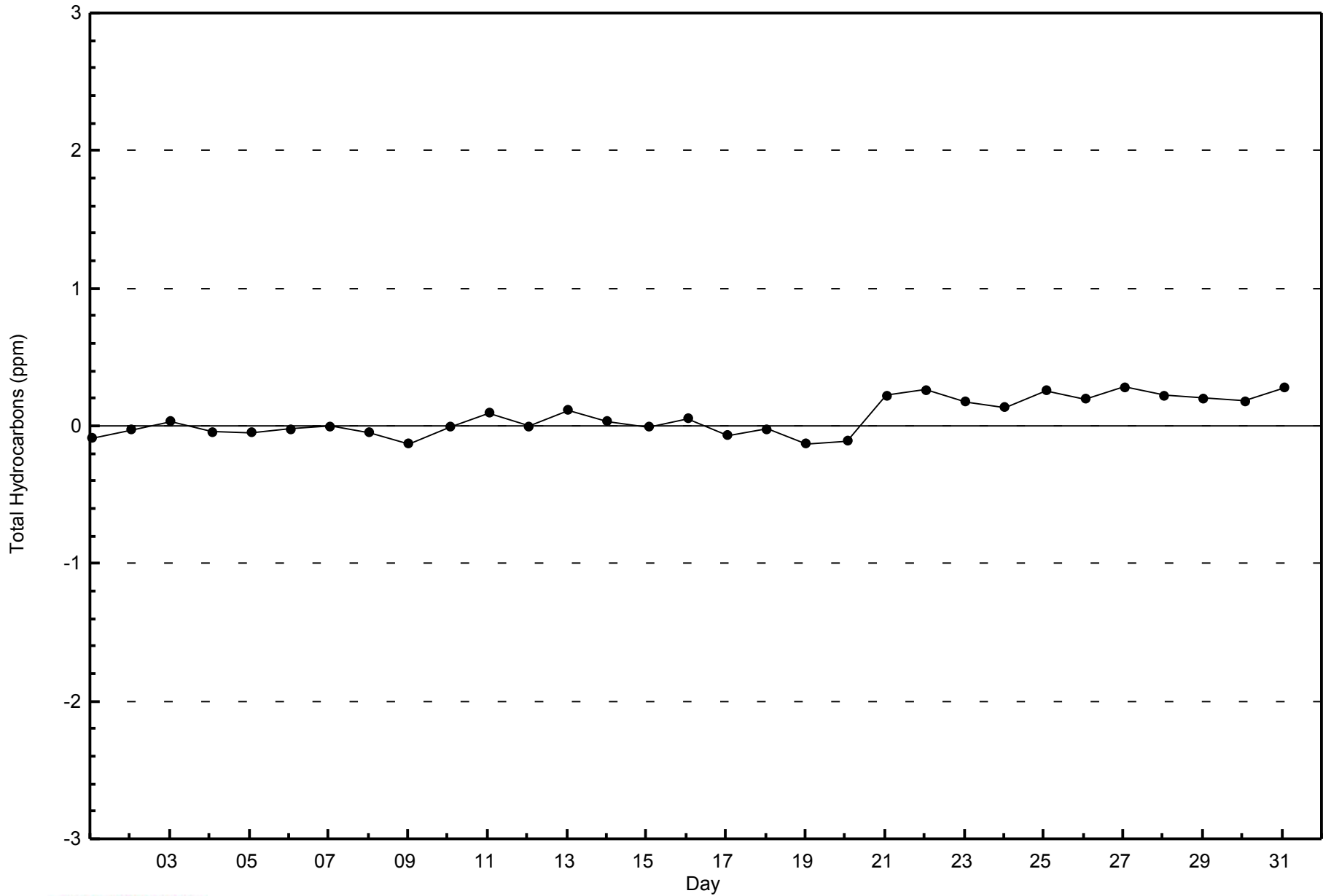
**Total Hydrocarbons (THC) - ppm  
Fort McKay South (AMS 13)**





WBEA  
Zero Responses

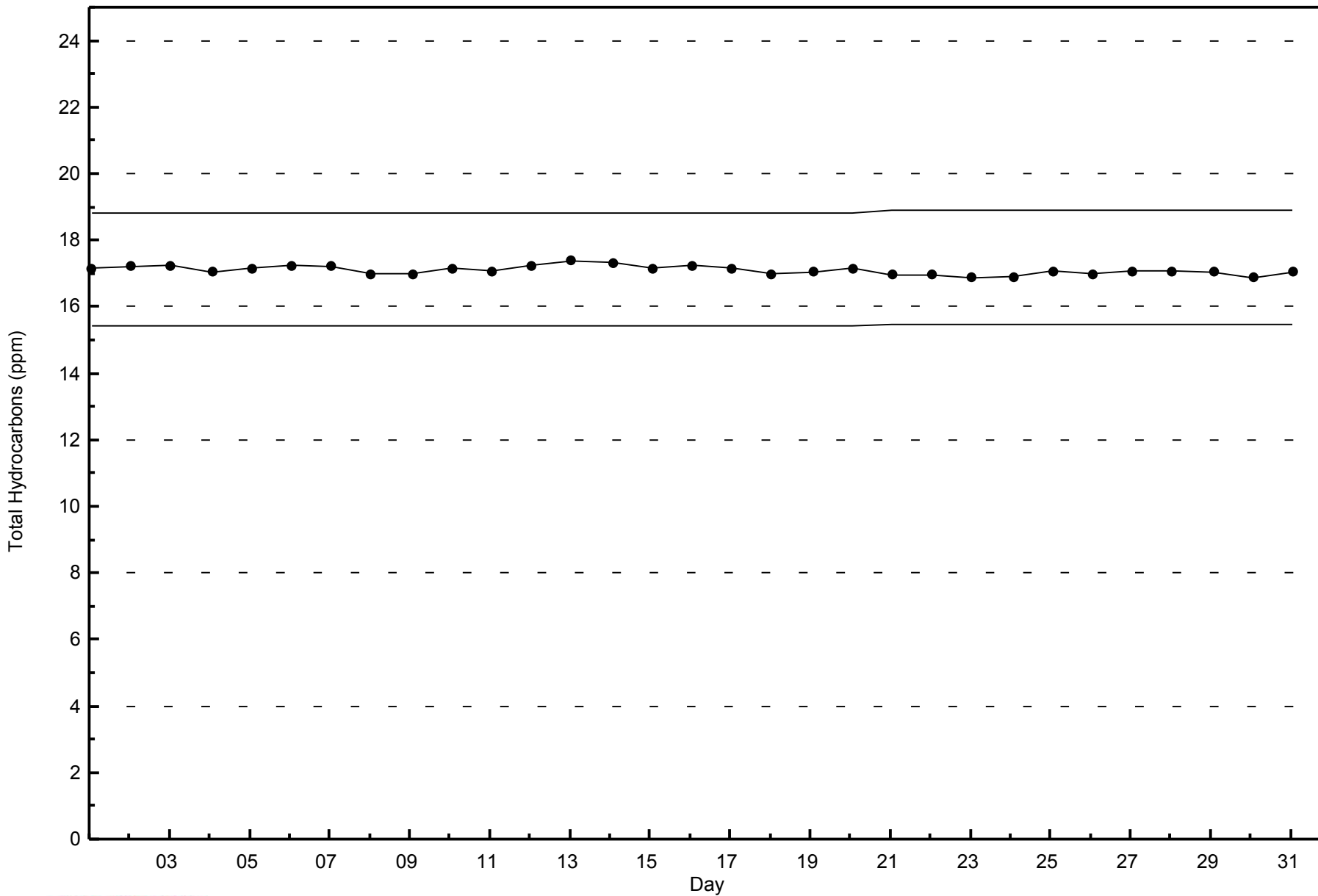
Total Hydrocarbons (THC) - ppm  
Fort McKay South - May 2014





WBEA  
Span Responses

Total Hydrocarbons (THC) - ppm  
Fort McKay South - May 2014





Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O<sub>3</sub>) - ppb

Fort McKay South - May 2014

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 55 ppb on May 21 17:00	Maximum Daily Average: 34.7 ppb on May 1		Hours of Data:	701
Minimum Value: 0 ppb on May 29 04:00	Minimum Daily Average: 9.5 ppb on May 29		Hours of Missing Data:	43
Maximum Diurnal Average: 36.4 ppb at hour 16	Minimum Diurnal Average: 9.1 ppb at hour 5		Hours of Calibration:	33
Monthly Average: 24.6 ppb	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 4 Q <sub>1</sub> = 14 Median = 26 Q <sub>3</sub> = 35 P <sub>90</sub> = 42 P <sub>99</sub> = 50		Percent Operational Time:	98.7

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-May	35	29	Z	15	22	20	25	26	34	40	41	43	44	42	42	41	41	41	42	39	37	35	32	32	34.7	44																							
2-May	38	39	Z	31	33	33	32	32	32	33	34	33	32	31	31	28	23	23	23	22	22	24	26	28	29.7	39																							
3-May	30	31	Z	33	33	32	30	30	29	29	29	28	28	32	34	34	34	35	33	33	26	17	12	9	28.7	35																							
4-May	6	5	Z	5	3	3	8	13	17	31	33	35	36	38	39	40	40	37	37	37	37	34	29	26.1	40																								
5-May	26	20	Z	13	5	12	21	21	21	27	31	34	36	38	40	40	39	39	36	35	31	26	28	31	28.3	40																							
6-May	31	29	Z	15	17	20	21	27	31	34	35	36	37	37	37	37	36	36	36	30	20	15	14	12	28.0	37																							
7-May	12	15	Z	15	16	14	28	28	29	30	34	37	38	39	38	37	35	36	35	32	31	21	14	13	27.2	39																							
8-May	10	13	Z	5	6	8	25	24	19	21	23	23	30	30	31	31	30	32	31	29	24	14	10	8	20.7	32																							
9-May	6	6	Z	3	5	7	21	25	26	26	28	33	31	31	32	32	32	30	27	26	27	28	26	20	22.9	33																							
10-May	18	22	Z	25	25	25	25	25	28	28	28	29	28	27	24	25	26	26	23	22	13	9	9	6	22.4	29																							
11-May	9	13	Z	4	2	11	15	13	7	21	30	38	39	39	37	37	37	38	37	36	23	12	7	10	22.5	39																							
12-May	11	3	Z	7	3	6	13	17	26	36	38	37	39	39	38	37	37	39	40	41	35	32	27	18	27.0	41																							
13-May	12	8	Z	4	4	4	8	8	26	34	37	40	43	44	46	46	44	44	45	45	32	22	17	13	27.2	46																							
14-May	9	8	Z	4	3	3	10	16	16	33	33	39	45	46	47	46	45	45	41	40	31	26	12	18	26.8	47																							
15-May	14	12	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	32	32	32	33	33	33	35	31	14	13	25	22	--	35																						
16-May	5	3	Z	1	1	3	17	24	29	41	42	44	46	48	48	48	48	49	49	48	33	18	14	10	29.0	49																							
17-May	8	6	Z	4	2	4	17	22	23	31	42	43	43	49	53	54	54	52	51	41	23	19	28	28	30.4	54																							
18-May	25	25	Z	14	9	26	27	20	23	35	35	34	41	40	43	45	45	45	43	35	29	23	14	8	29.8	45																							
19-May	6	4	Z	2	2	5	20	29	34	42	44	46	49	49	49	48	48	49	45	45	42	42	41	35	33.8	49																							
20-May	20	7	Z	10	17	20	27	25	27	33	38	41	42	37	32	38	36	38	33	35	33	15	3	1	26.4	42																							
21-May	2	2	Z	2	1	2	10	25	30	31	34	C	C	C	46	54	55	48	48	45	44	36	18	10	27.2	55																							
22-May	4	2	Z	3	3	5	6	6	13	26	37	42	42	37	36	37	37	36	34	22	12	8	5	3	19.9	42																							
23-May	2	1	Z	0	1	1	4	17	23	32	28	15	25	42	46	49	47	45	45	25	19	17	35	37	24.1	49																							
24-May	37	28	Z	26	24	23	24	31	34	38	36	22	19	16	14	21	22	23	13	8	6	2	0	0	20.3	38																							
25-May	0	0	Z	0	0	1	2	4	7	16	20	23	26	28	29	29	29	30	26	21	11	8	7	6	14.0	30																							
26-May	6	4	Z	6	4	6	5	12	21	23	21	19	14	19	19	16	20	19	19	22	24	24	22	22	16.0	24																							
27-May	17	17	Z	19	16	19	22	21	24	25	21	21	23	22	23	22	23	21	19	12	8	5	1	4	17.6	25																							
28-May	6	4	Z	0	0	2	16	20	19	27	30	29	29	31	30	30	28	29	28	26	24	11	2	1	18.4	31																							
29-May	1	0	Z	0	0	2	9	11	10	2	4	10	8	9	10	13	15	15	14	16	19	17	16	15	9.5	19																							
30-May	14	13	Z	15	16	16	17	17	21	27	30	28	28	30	34	35	27	28	25	22	24	14	2	1	21.1	35																							
31-May	1	12	Z	0	0	1	7	20	29	35	39	42	43	45	47	46	46	45	46	43	36	27	14	9	27.5	47																							
																								13.6	12.3	--	9.4	9.1	11.2	17.1	20.4	23.7	29.5	31.9	32.6	33.8	34.8	35.8	36.4	35.8	35.6	34.2	31.1	25.5	19.9	16.6	14.9	Diurnal Average	
																								38	39	--	33	33	33	32	32	34	42	44	46	49	49	53	54	55	52	51	48	44	42	41	37	Diurnal Maximum	

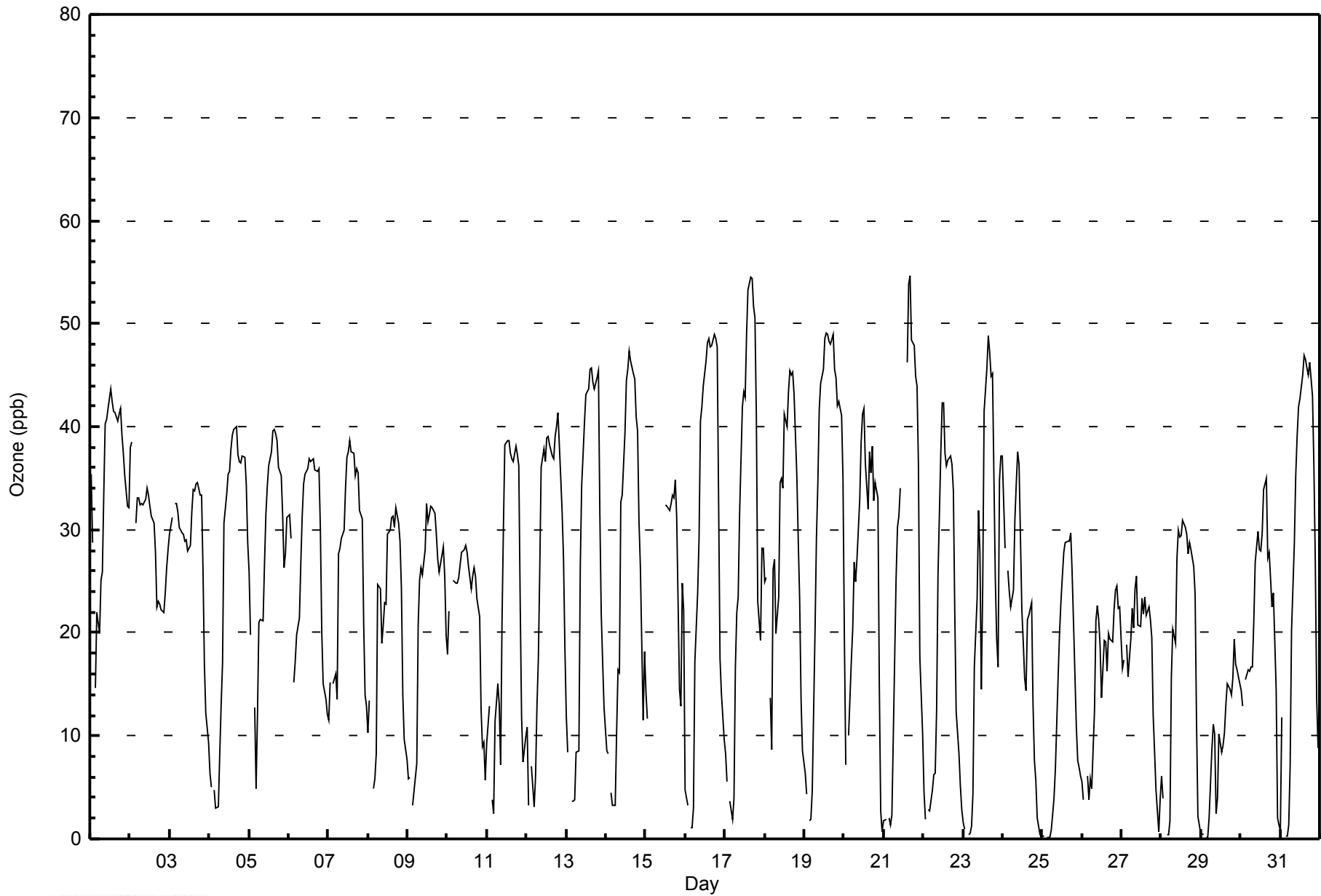
Z - zerospan      C - Calibration      PF - Power Failure  
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb





**WBEA**  
**Hourly Averages**

**Ozone (O<sub>3</sub>) - ppb**  
**Fort McKay South - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Ozone (O<sub>3</sub>) - ppb**  
**Fort McKay South - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	260	37.09	37.09
21 - 50	434	61.91	99.00
51 - 82	7	1.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 701

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Ozone (O<sub>3</sub>) - ppb**  
**Fort McKay South - May 2014**

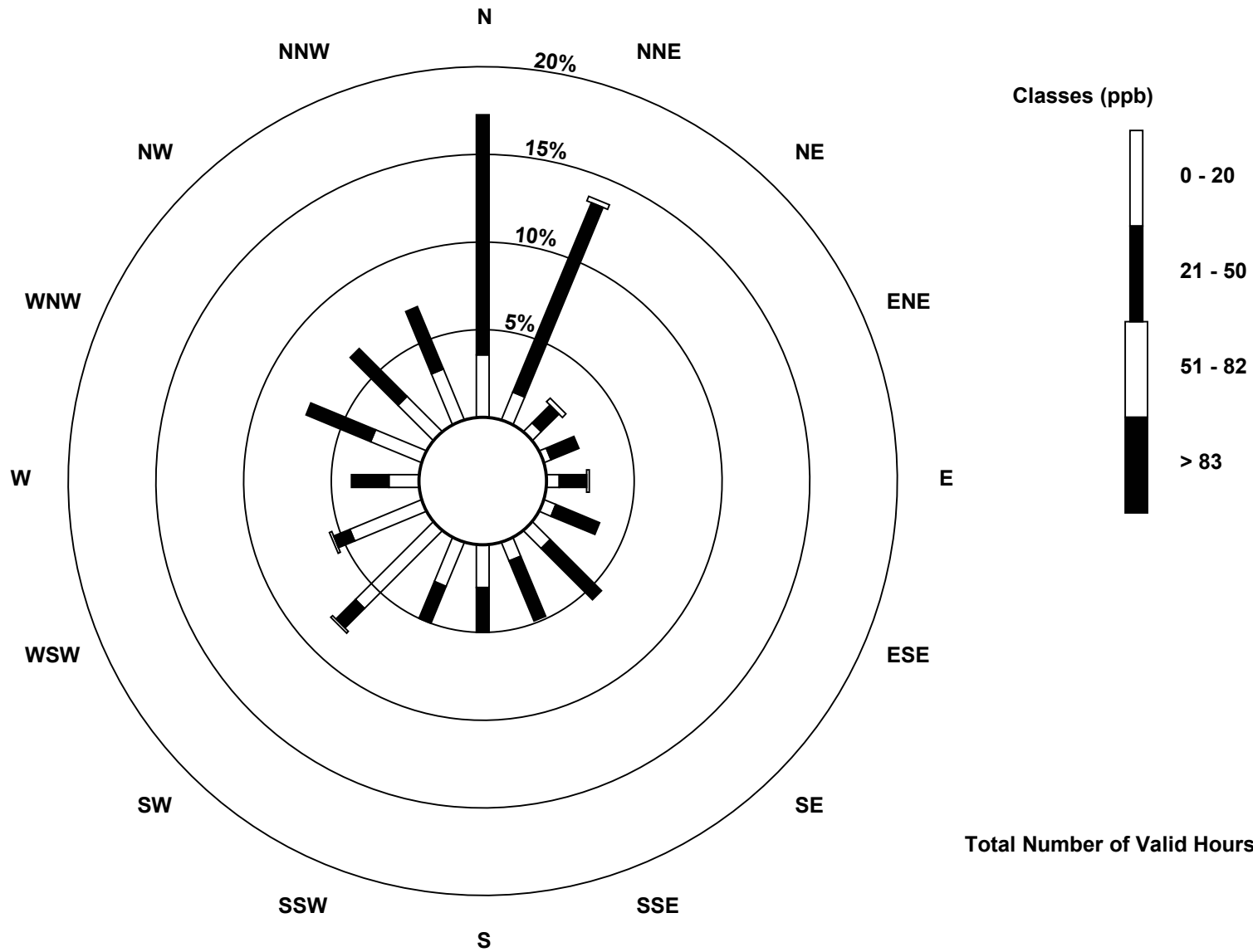
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	25	12	5	3	5	5	10	8	17	19	44	31	12	22	20	22	260
21 - 50	96	82	10	12	11	19	29	26	18	16	11	7	15	28	27	27	434
51 - 82	0	2	2	0	1	0	0	0	0	0	1	1	0	0	0	0	7
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	121	96	17	15	17	24	39	34	35	35	56	39	27	50	47	49	701

Total Number of Valid Hours: 701

Total Number of Hours: 744

Wood Buffalo Environmental Association  
 Wind Rose May 2014

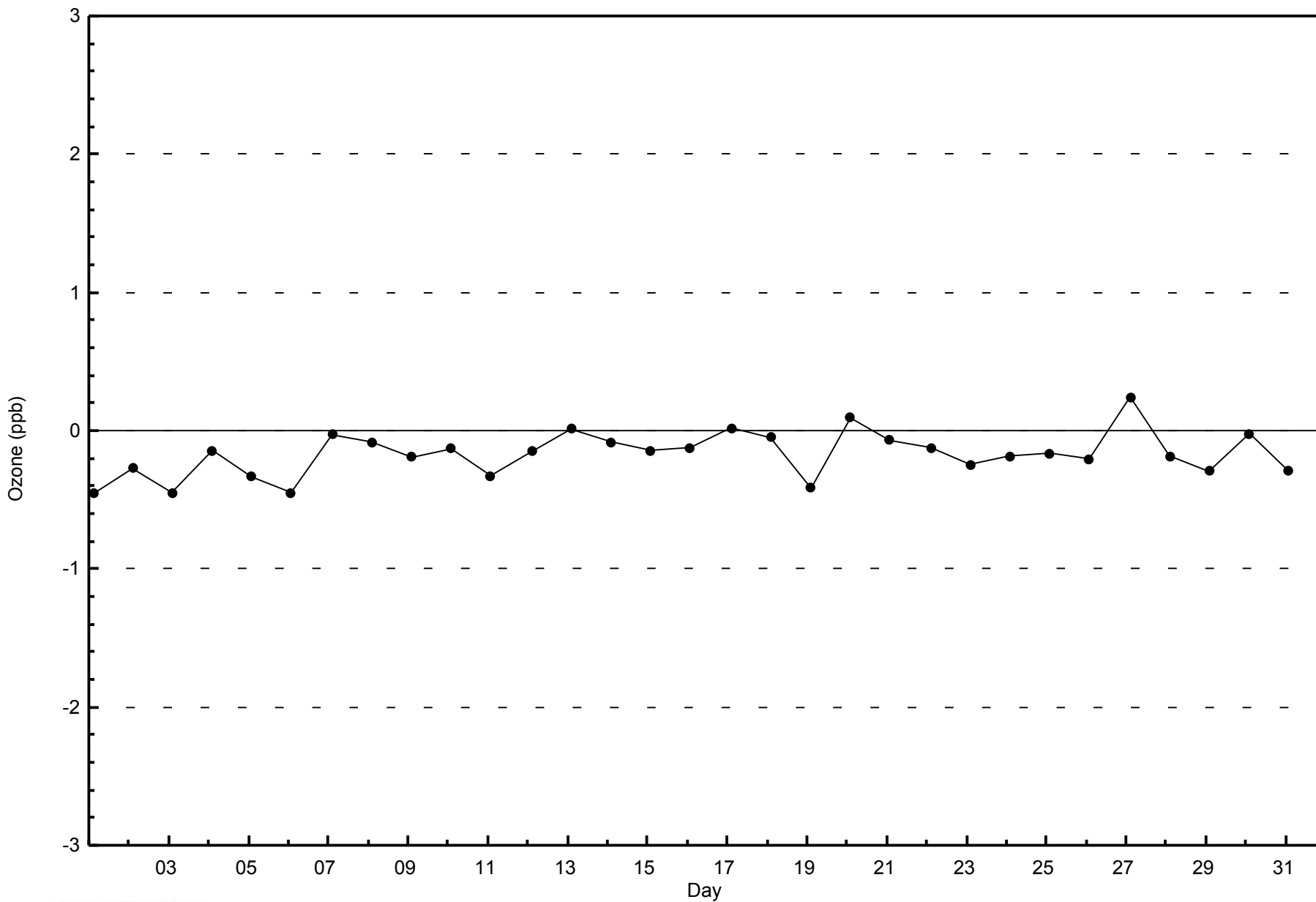
Ozone (O<sub>3</sub>) - ppb  
 Fort McKay South (AMS 13)





WBEA  
Zero Responses

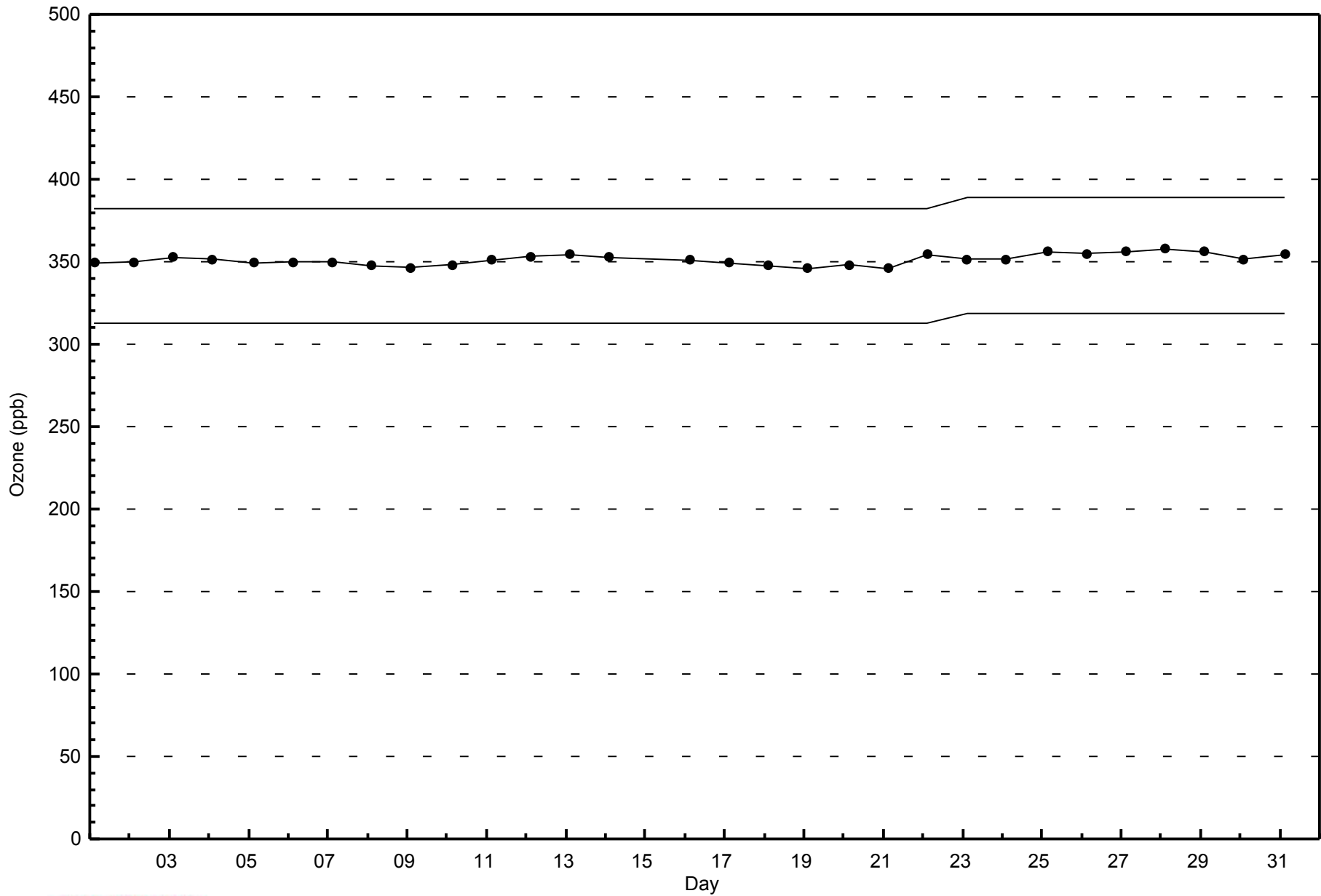
Ozone (O<sub>3</sub>) - ppb  
Fort McKay South - May 2014





WBEA  
Span Responses

Ozone (O<sub>3</sub>) - ppb  
Fort McKay South - May 2014



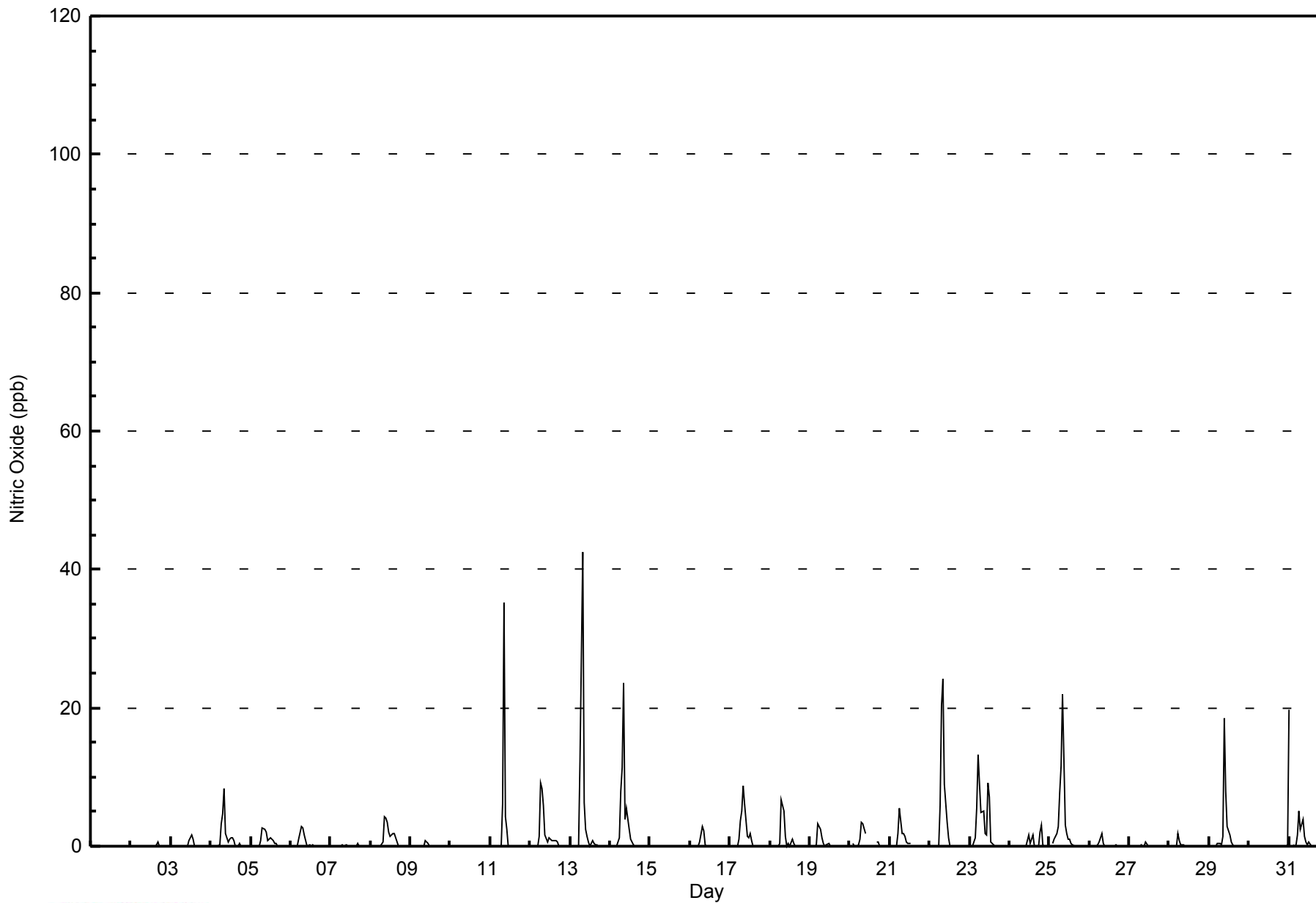


Maximum Value: 42 ppb on May 13 08:00														Maximum Daily Average: 2.9 ppb on May 13														Hours in Service: 744			
Minimum Value: 0 ppb on May 1 01:00														Minimum Daily Average: 0.0 ppb on May 1														Hours of Data: 696			
Maximum Diurnal Average: 5.5 ppb at hour 9														Minimum Diurnal Average: 0.0 ppb at hour 22														Hours of Missing Data: 48			
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> = 19														Hours of Calibration: 37			
																												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-May	0	Z	0	0	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-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.0	1				
3-May	0	Z	0	0	0	0	0	0	0	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2				
4-May	0	Z	0	0	0	0	3	5	8	2	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1.0	8				
5-May	0	Z	0	0	0	0	1	3	2	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.6	3				
6-May	0	Z	0	0	0	1	3	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	3				
7-May	0	Z	0	0	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-May	0	Z	0	0	0	0	1	4	4	3	2	1	2	2	1	1	0	0	0	0	0	0	0	0	0	0.9	4				
9-May	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1				
10-May	0	Z	0	0	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-May	0	Z	0	0	0	0	6	35	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.1	35				
12-May	0	Z	0	0	0	1	9	8	6	2	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1.4	9				
13-May	0	Z	0	0	0	0	12	42	6	3	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	2.9	42				
14-May	0	Z	0	0	0	1	8	11	24	4	5	3	1	1	0	0	0	0	0	0	0	0	0	0	0	2.5	24				
15-May	0	Z	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	0	0	0	0	0	0	0	0	0	0	0	0	0	--	0				
16-May	0	Z	0	0	0	0	1	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	3				
17-May	0	Z	0	0	0	1	4	5	9	6	1	1	2	1	0	0	0	0	0	0	0	0	0	0	0	1.3	9				
18-May	0	Z	0	0	0	0	7	5	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.7	7				
19-May	0	Z	0	0	0	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	3				
20-May	0	Z	0	0	0	0	1	3	3	2	C	C	C	C	C	C	1	1	0	0	0	0	0	0	0	--	3				
21-May	0	Z	0	0	0	2	5	2	2	1	1	0	0	M	0	0	0	0	0	0	0	0	0	0	0	0.6	5				
22-May	0	Z	0	0	0	0	6	20	24	9	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2.8	24				
23-May	0	Z	0	1	6	13	9	5	5	2	2	9	7	1	0	0	0	0	0	0	0	0	0	0	0	2.6	13				
24-May	0	Z	0	0	0	0	0	0	0	0	0	2	0	1	2	0	0	0	0	2	3	0	0	0	0	0.4	3				
25-May	0	Z	0	1	2	3	8	12	22	3	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	2.4	22				
26-May	0	Z	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	2				
27-May	0	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				
28-May	0	Z	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	2				
29-May	0	Z	0	0	0	0	0	1	19	8	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	1.5	19				
30-May	0	Z	0	0	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-May	20	Z	0	0	0	2	5	3	4	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1.6	20				
																								Diurnal Average							
																								Diurnal Maximum							
Z - zerospan      C - Calibration      M - Maintenance      PF - Power Failure																															



WBEA  
Hourly Averages

Nitric Oxide (NO) - ppb  
Fort McKay South - May 2014







**WBEA**  
**Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb**  
**Fort McKay South - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	691	99.28	99.28
21 - 40	4	0.57	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: 696

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Nitric Oxide (NO) - ppb**  
**Fort McKay South - May 2014**

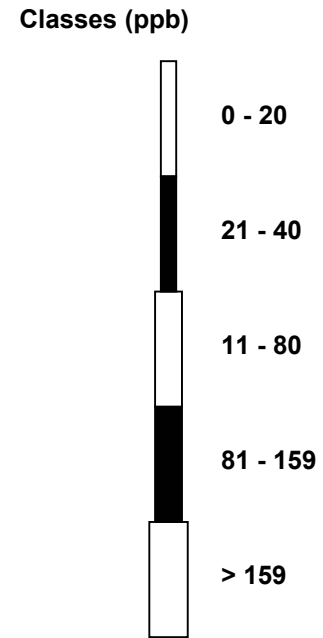
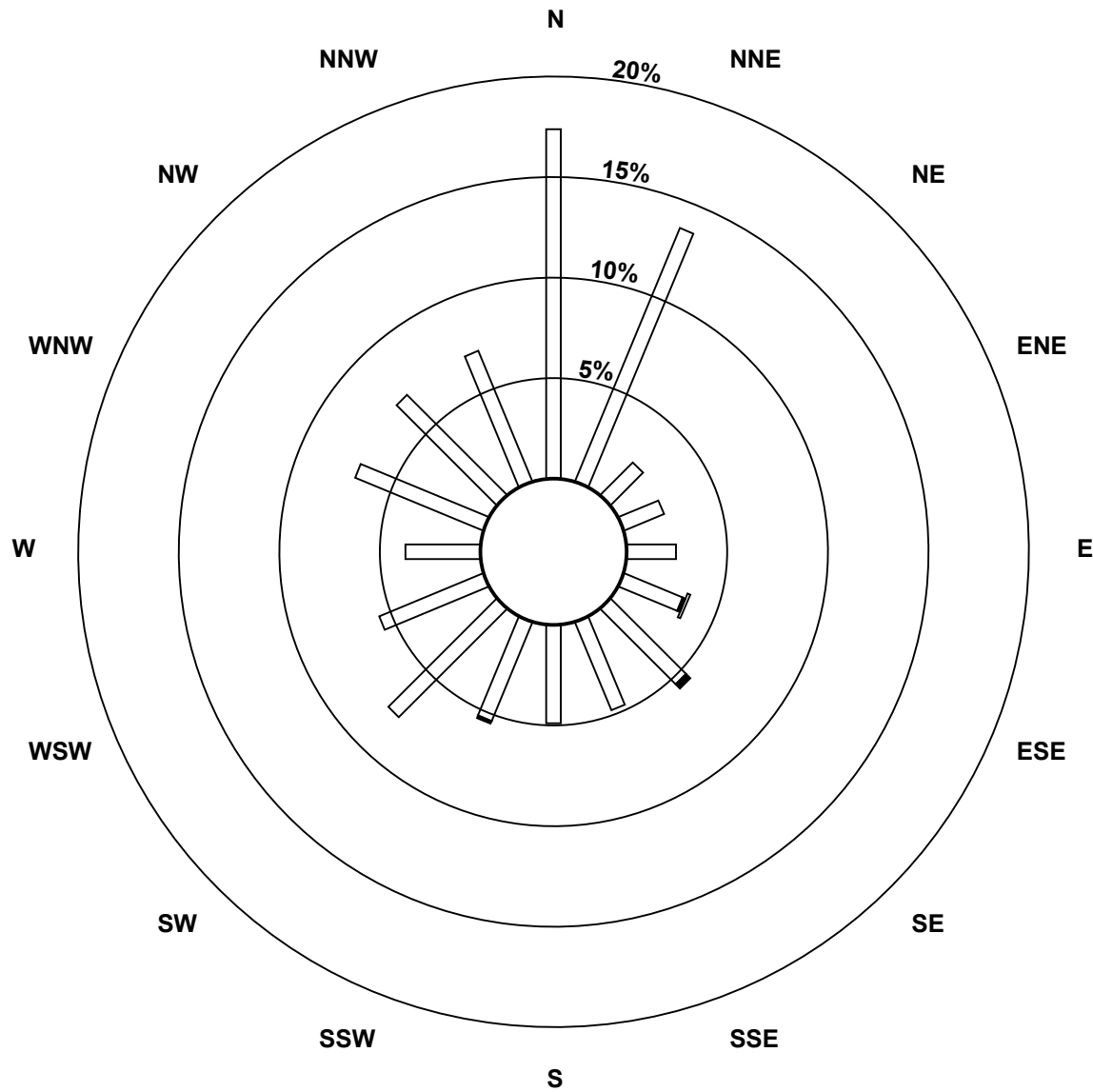
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	121	95	16	15	17	22	37	33	34	37	53	39	26	48	49	49	691
21 - 40	0	0	0	0	0	1	2	0	0	1	0	0	0	0	0	0	4
11 - 80	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	121	95	16	15	17	24	39	33	34	38	53	39	26	48	49	49	696

Total Number of Valid Hours: 696

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Nitric Oxide (NO) - ppb  
Fort McKay South (AMS 13)**

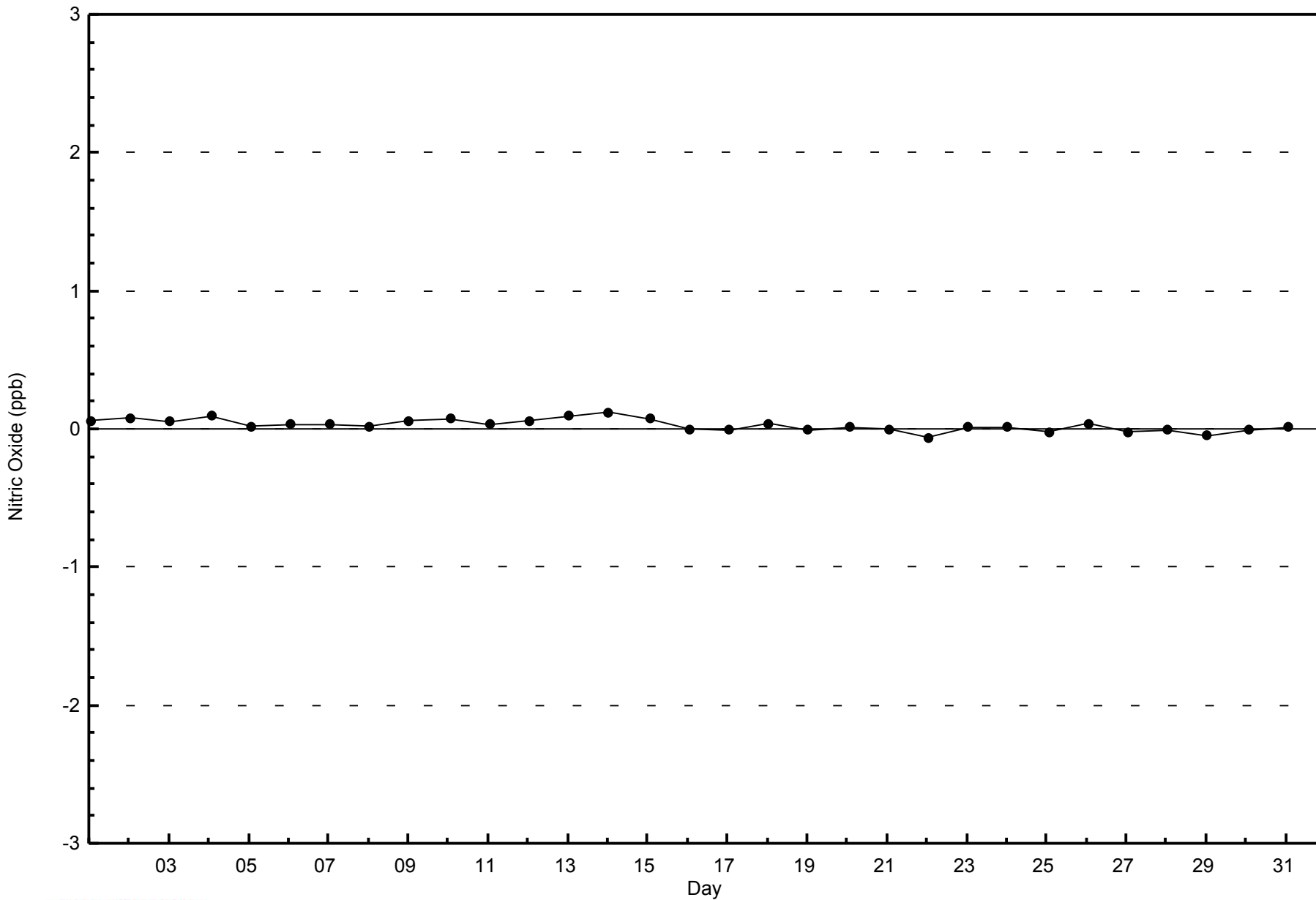


**Total Number of Valid Hours: 696**



WBEA  
Zero Responses

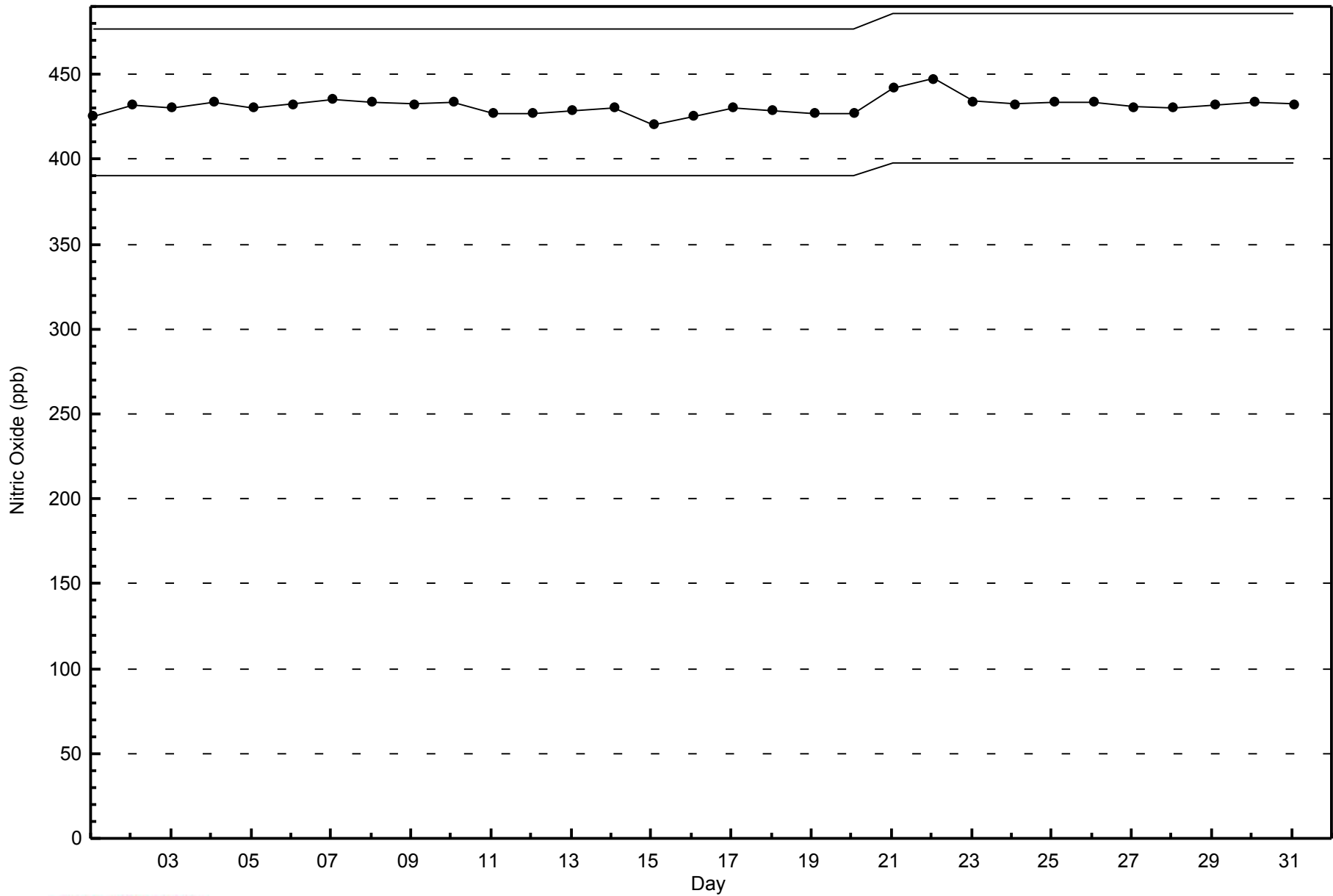
Nitric Oxide (NO) - ppb  
Fort McKay South - May 2014





WBEA  
Span Responses

Nitric Oxide (NO) - ppb  
Fort McKay South - May 2014





Wood Buffalo Environmental Association

Summary of Hour Averages

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

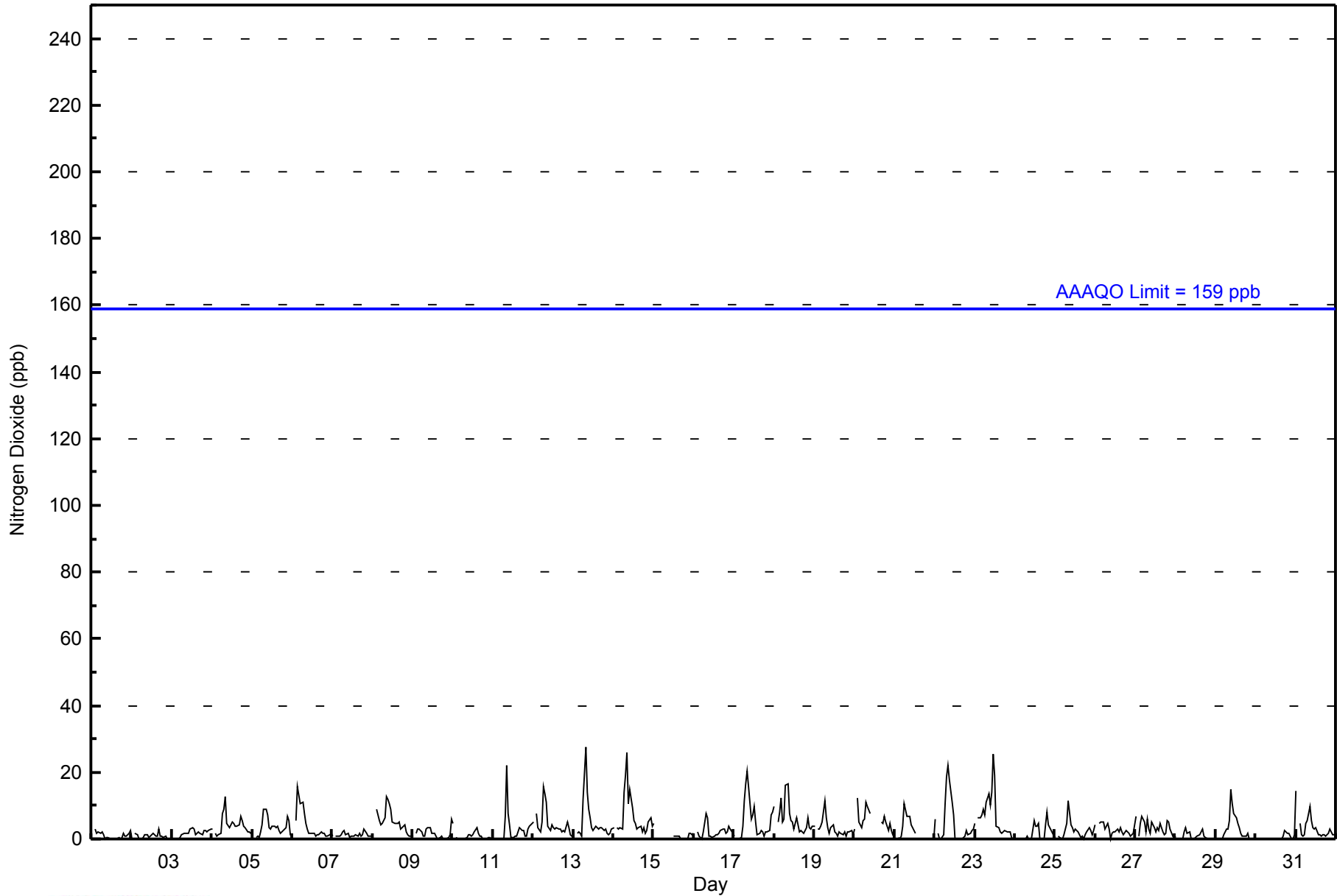
Fort McKay South - May 2014

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																																						
Maximum Value: 28 ppb on May 13 08:00										Maximum Daily Average: 6.8 ppb on May 23										Hours of Data: 696																												
Minimum Value: 0 ppb on May 1 01:00										Minimum Daily Average: 0.4 ppb on May 30										Hours of Missing Data: 48																												
Maximum Diurnal Average: 8.5 ppb at hour 9										Minimum Diurnal Average: 1.7 ppb at hour 18										Hours of Calibration: 37																												
Monthly Average: 3.2 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> = 19										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-May	0	Z	3	2	2	2	2	1	0	1	1	0	0	0	0	0	1	0	0	2	1	1	2	3	1.0	3																						
2-May	0	Z	2	1	0	0	0	1	1	1	1	1	2	1	1	3	1	1	0	1	0	0	0	0	0.8	3																						
3-May	0	Z	0	0	0	1	1	2	2	2	2	3	4	3	1	2	2	2	1	2	3	2	3	3	1.6	4																						
4-May	3	Z	2	1	1	2	8	9	13	5	3	4	5	5	4	4	4	7	5	4	4	2	2	2	4.2	13																						
5-May	2	Z	1	1	1	2	4	9	9	7	4	3	4	4	3	4	2	2	2	3	3	7	5	1	3.6	9																						
6-May	1	Z	5	16	13	11	11	8	5	3	2	2	2	1	1	1	2	2	2	1	1	1	2	2	4.0	16																						
7-May	1	Z	1	1	1	1	2	3	1	2	1	1	1	1	1	2	1	1	3	2	1	1	1	1	1.3	3																						
8-May	1	Z	9	7	5	4	5	6	13	12	11	9	5	5	5	5	5	3	4	4	2	1	1	1	5.3	13																						
9-May	1	Z	2	3	3	2	1	1	3	3	3	2	2	2	1	0	1	1	0	0	0	0	1	6	1.6	6																						
10-May	5	Z	1	0	0	0	0	0	0	1	1	1	2	3	2	1	1	0	0	0	0	1	0	0	0.9	5																						
11-May	1	Z	0	0	0	0	0	7	22	8	4	0	0	1	1	2	3	3	3	1	1	3	4	5	2.9	22																						
12-May	5	Z	8	4	2	5	16	14	11	4	2	4	4	3	3	3	3	2	2	2	5	3	1	1	4.7	16																						
13-May	1	Z	2	2	2	1	12	28	14	9	6	4	3	4	3	3	4	3	3	2	1	2	3	3	4.9	28																						
14-May	3	Z	3	3	3	3	14	19	26	11	15	10	6	5	3	3	4	2	3	2	3	5	6	4	6.7	26																						
15-May	5	Z	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	1	1	1	1	0	0	0	0	0	2	2	1	--	5																						
16-May	2	Z	2	1	1	0	2	8	6	1	1	1	1	1	2	3	3	3	2	2	4	3	2	2	2.2	8																						
17-May	1	Z	0	0	1	4	12	16	20	16	6	7	10	5	1	2	3	2	1	2	2	3	7	8	5.6	20																						
18-May	10	Z	5	8	12	5	6	16	16	8	5	5	3	6	4	2	3	2	2	3	6	3	3	4	6.0	16																						
19-May	4	Z	3	3	4	5	12	6	4	2	3	4	2	2	1	2	2	1	2	1	2	2	3	1	3.1	12																						
20-May	3	Z	12	5	3	6	6	11	10	8	C	C	C	C	C	C	5	5	7	5	3	5	3	1	--	12																						
21-May	1	Z	0	0	1	4	11	7	7	7	4	3	2	M	0	0	0	0	0	0	0	0	0	0	2.1	11																						
22-May	6	Z	2	0	0	1	11	19	22	18	11	7	0	0	0	0	0	1	1	3	1	2	2	3	4.7	22																						
23-May	5	Z	6	6	7	9	7	11	14	10	14	26	19	4	4	2	2	2	3	2	2	0	0	0	6.8	26																						
24-May	0	Z	0	0	0	0	0	1	0	0	0	6	4	4	5	0	0	0	4	8	4	3	2	1	1.8	8																						
25-May	1	Z	1	1	0	1	3	5	12	4	3	2	3	2	2	1	1	0	1	2	3	3	1	3	2.4	12																						
26-May	4	Z	5	5	5	5	3	5	3	0	2	2	2	3	2	4	2	1	2	2	2	1	1	2	2.7	5																						
27-May	7	Z	1	5	7	5	2	6	3	2	5	4	2	3	3	5	2	1	2	5	5	3	1	1	3.4	7																						
28-May	0	Z	0	0	0	2	3	2	2	0	0	0	1	1	1	2	3	1	0	0	0	0	0	0	0.8	3																						
29-May	0	Z	0	0	0	1	3	3	6	15	10	8	6	5	3	2	1	1	1	2	0	0	0	0	2.9	15																						
30-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	2	2	2	0	0	1	0.4	3																						
31-May	15	Z	5	1	1	1	5	6	10	5	3	3	4	1	1	1	1	1	1	2	3	2	1	1	3.2	15																						
2.7																								--	2.7	2.5	2.4	2.8	5.4	7.5	8.5	5.4	4.2	4.1	3.2	2.6	2.0	1.8	2.0	1.7	1.9	2.2	2.0	2.0	1.9	1.9	Diurnal Average	
15																								--	12	16	13	11	16	28	26	18	15	26	19	6	5	5	5	7	7	8	6	7	7	8	Diurnal Maximum	
Z - zerospan C - Calibration M - Maintenance PF - Power Failure																																																
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb																																																



**WBEA**  
**Hourly Averages**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Fort McKay South - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Fort McKay South - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	691	99.28	99.28
21 - 40	5	0.72	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: 696

Total Number of Hours: 744





**WBEA**  
**Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Fort McKay South - May 2014**

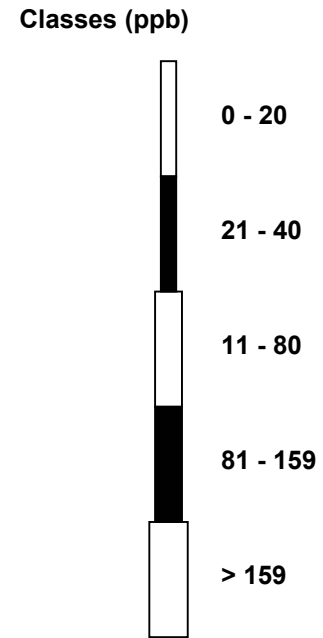
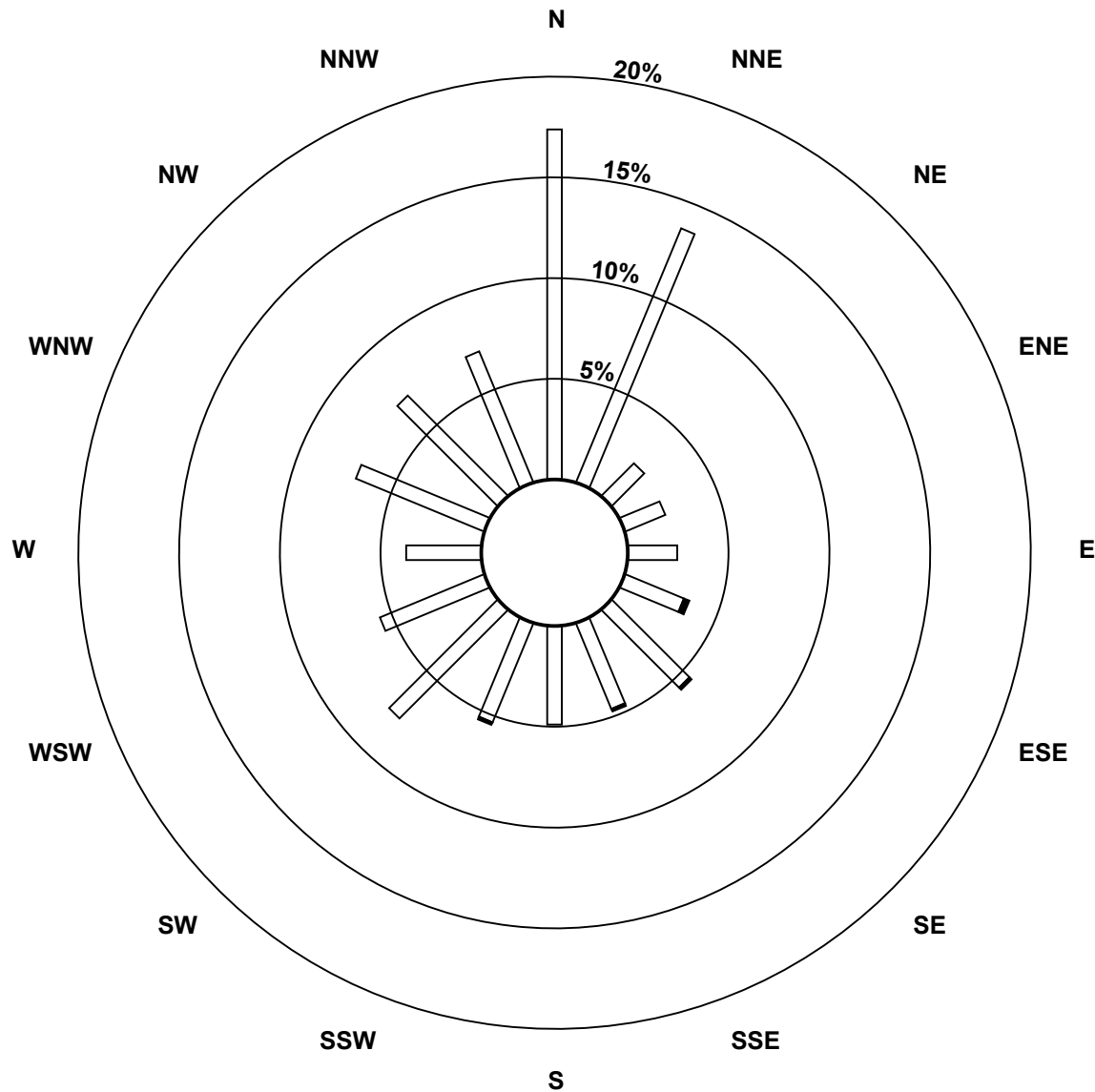
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	121	95	16	15	17	22	38	32	34	37	53	39	26	48	49	49	691
21 - 40	0	0	0	0	0	2	1	1	0	1	0	0	0	0	0	0	5
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	121	95	16	15	17	24	39	33	34	38	53	39	26	48	49	49	696

Total Number of Valid Hours: 696

Total Number of Hours: 744

Wood Buffalo Environmental Association  
Wind Rose May 2014

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Fort McKay South (AMS 13)

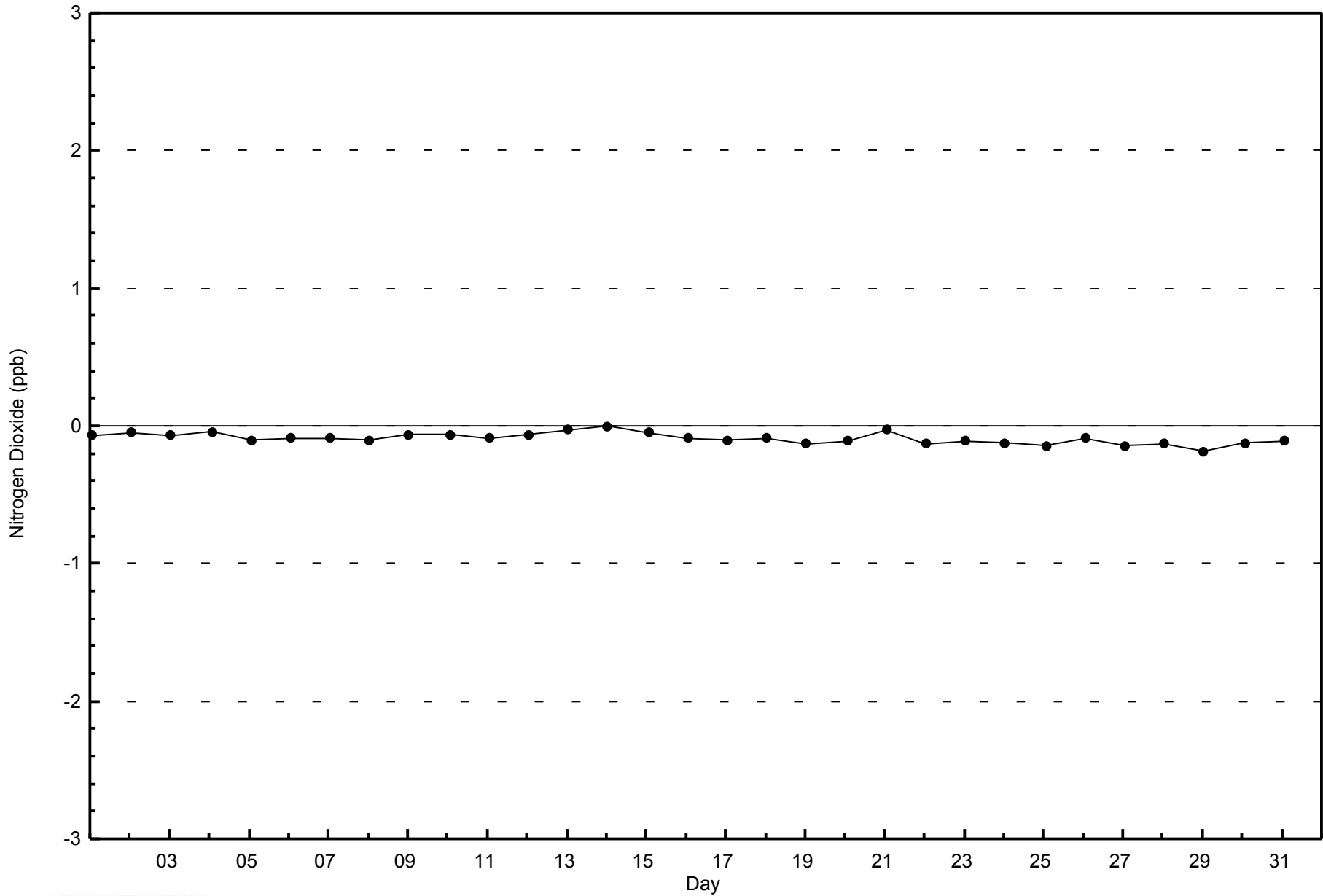


Total Number of Valid Hours: 696



WBEA  
Zero Responses

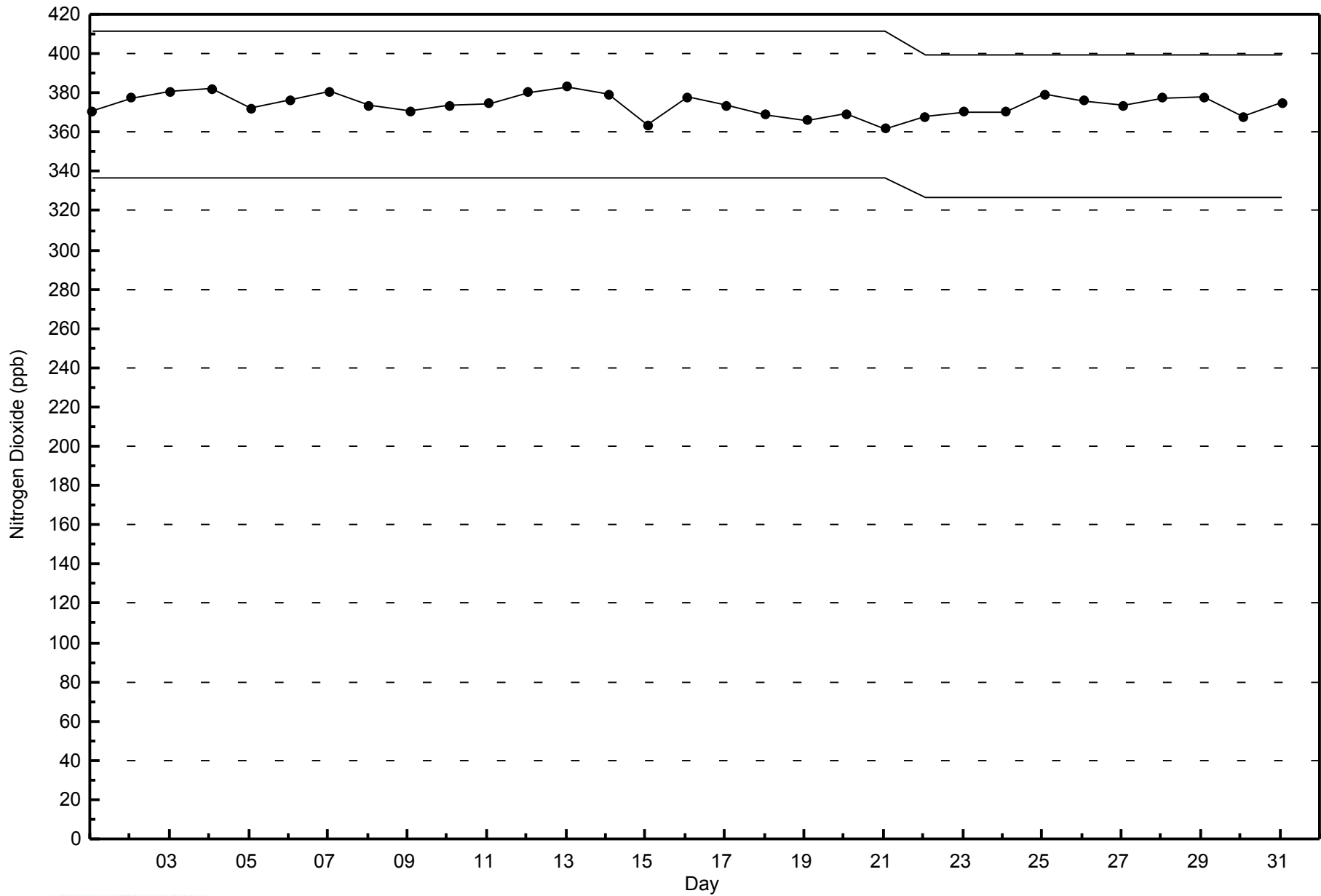
Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Fort McKay South - May 2014





WBEA  
Span Responses

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Fort McKay South - May 2014



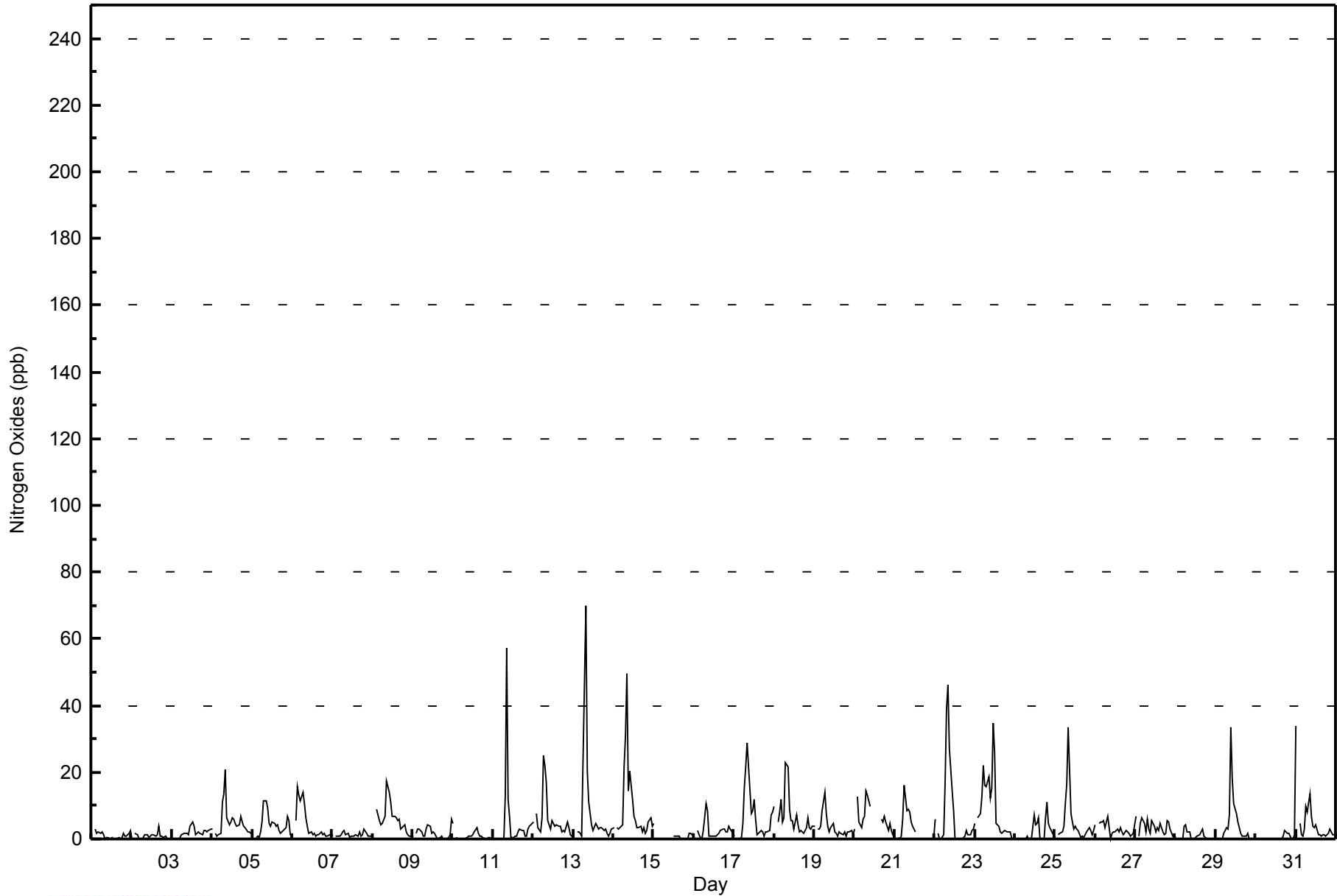


Maximum Value: 70 ppb on May 13 08:00		Maximum Daily Average: 9.4 ppb on May 23		Hours in Service: 744																							
Minimum Value: 0 ppb on May 1 01:00		Minimum Daily Average: 0.4 ppb on May 30		Hours of Data: 696																							
Maximum Diurnal Average: 14.0 ppb at hour 9		Minimum Diurnal Average: 1.7 ppb at hour 18		Hours of Missing Data: 48																							
Monthly Average: 4.1 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> = 34		Hours of Calibration: 37																							
				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-May	0	Z	3	2	2	2	2	1	0	0	1	0	0	0	0	0	1	0	0	2	1	1	2	3	1.0	3	
2-May	0	Z	2	1	0	0	0	1	1	1	1	1	1	1	1	1	4	1	1	0	1	0	0	0	0.8	4	
3-May	0	Z	0	0	0	1	1	2	2	2	1	4	5	4	1	2	2	2	1	2	3	2	2	3	1.8	5	
4-May	3	Z	2	1	1	2	11	14	21	6	4	5	6	5	4	4	7	5	4	3	2	2	2	2	5.2	21	
5-May	2	Z	1	1	1	2	5	12	11	9	4	4	5	5	4	4	2	2	2	3	3	7	5	1	4.2	12	
6-May	1	Z	5	16	13	12	14	11	6	4	2	2	1	2	1	1	1	2	1	2	1	1	1	2	4.4	16	
7-May	1	Z	1	1	1	1	2	3	1	2	1	1	1	1	1	1	2	1	1	3	2	1	1	1	1.3	3	
8-May	1	Z	9	7	5	4	5	7	17	16	14	11	7	7	6	6	6	3	4	4	2	1	1	1	6.3	17	
9-May	1	Z	2	3	3	2	1	1	3	4	4	2	2	2	1	0	1	1	0	0	0	0	1	6	1.7	6	
10-May	5	Z	1	0	0	0	0	0	0	1	1	1	2	3	2	1	1	0	0	0	0	0	1	0	0.9	5	
11-May	1	Z	0	0	0	0	0	13	57	12	7	0	0	1	1	2	3	3	3	1	1	3	4	5	5.0	57	
12-May	5	Z	8	3	2	7	25	22	17	5	3	5	4	4	4	4	4	2	2	2	5	3	1	1	6.0	25	
13-May	1	Z	2	2	2	1	24	70	20	11	8	4	3	5	4	3	3	4	3	3	2	1	2	3	7.8	70	
14-May	3	Z	3	3	3	4	22	31	49	14	21	12	7	5	3	3	4	2	3	2	3	5	6	4	9.3	49	
15-May	4	Z	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	1	1	1	1	1	0	0	0	0	2	2	1	--	4	
16-May	1	Z	2	1	1	0	3	11	9	1	1	1	1	1	1	2	3	3	3	2	2	4	3	2	2.4	11	
17-May	1	Z	0	0	1	5	15	21	29	22	8	9	12	6	1	2	3	2	1	2	2	3	7	8	6.9	29	
18-May	10	Z	5	8	12	5	6	23	22	9	5	5	3	7	4	2	3	2	1	3	6	3	3	4	6.6	23	
19-May	4	Z	3	3	4	8	14	8	4	2	3	5	2	2	1	2	2	1	2	1	2	2	3	1	3.4	14	
20-May	3	Z	13	5	3	6	7	15	13	10	C	C	C	C	C	C	6	5	7	5	2	5	3	1	--	15	
21-May	1	Z	0	0	1	6	16	8	9	8	5	4	2	M	0	0	0	0	0	0	0	0	0	0	2.7	16	
22-May	6	Z	2	0	0	1	17	39	46	27	14	8	0	0	0	0	0	0	1	3	1	1	2	3	7.5	46	
23-May	5	Z	6	8	13	22	16	16	19	12	15	35	26	5	4	2	2	2	3	2	2	2	0	0	9.4	35	
24-May	0	Z	0	0	0	0	1	0	0	0	0	7	4	5	6	0	0	0	6	11	5	3	2	1	2.3	11	
25-May	1	Z	1	2	2	4	11	16	33	7	5	3	4	3	3	0	1	0	1	2	3	3	1	2	4.8	33	
26-May	4	Z	5	5	5	5	3	7	4	0	1	2	2	3	2	3	2	1	2	2	2	1	1	2	2.9	7	
27-May	7	Z	1	5	7	5	2	6	3	2	6	4	2	3	3	5	2	1	2	5	5	3	1	1	3.4	7	
28-May	0	Z	0	0	0	4	4	2	2	0	0	0	1	1	1	2	3	1	0	0	0	0	0	0	1.0	4	
29-May	0	Z	0	0	0	2	4	3	7	33	18	11	8	5	3	2	1	1	1	2	0	0	0	0	4.4	33	
30-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	2	2	2	0	0	1	0.4	3	
31-May	34	Z	5	1	1	3	10	8	14	7	4	3	4	1	1	1	1	1	1	1	2	3	2	1	1	4.7	34
		3.4	--	2.7	2.6	2.7	3.8	8.0	12.3	14.0	7.6	5.4	5.1	3.9	3.0	2.2	1.9	2.1	1.7	2.0	2.3	2.1	2.0	1.9	1.9	Diurnal Average	
		34	--	13	16	13	22	25	70	57	33	21	35	26	7	6	6	6	7	7	11	6	7	7	8	Diurnal Maximum	
Z - zerospan		C - Calibration				M - Maintenance				PF - Power Failure																	



WBEA  
Hourly Averages

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Fort McKay South - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Fort McKay South - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	672	96.55	96.55
21 - 40	20	2.87	99.43
41 - 80	4	0.57	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 696

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Fort McKay South - May 2014**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	118	93	16	14	16	21	35	29	32	35	53	39	25	48	49	49	672
21 - 40	3	2	0	1	1	1	3	4	2	2	0	0	1	0	0	0	20
11 - 80	0	0	0	0	0	2	1	0	0	1	0	0	0	0	0	0	4
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	121	95	16	15	17	24	39	33	34	38	53	39	26	48	49	49	696

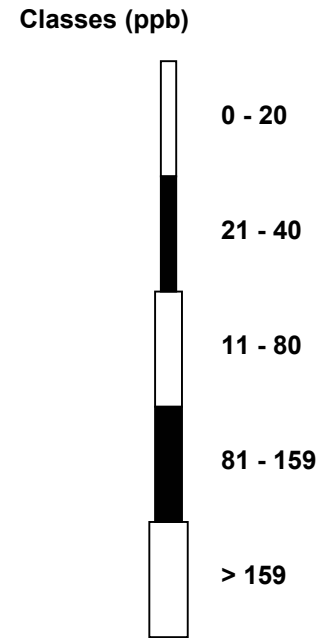
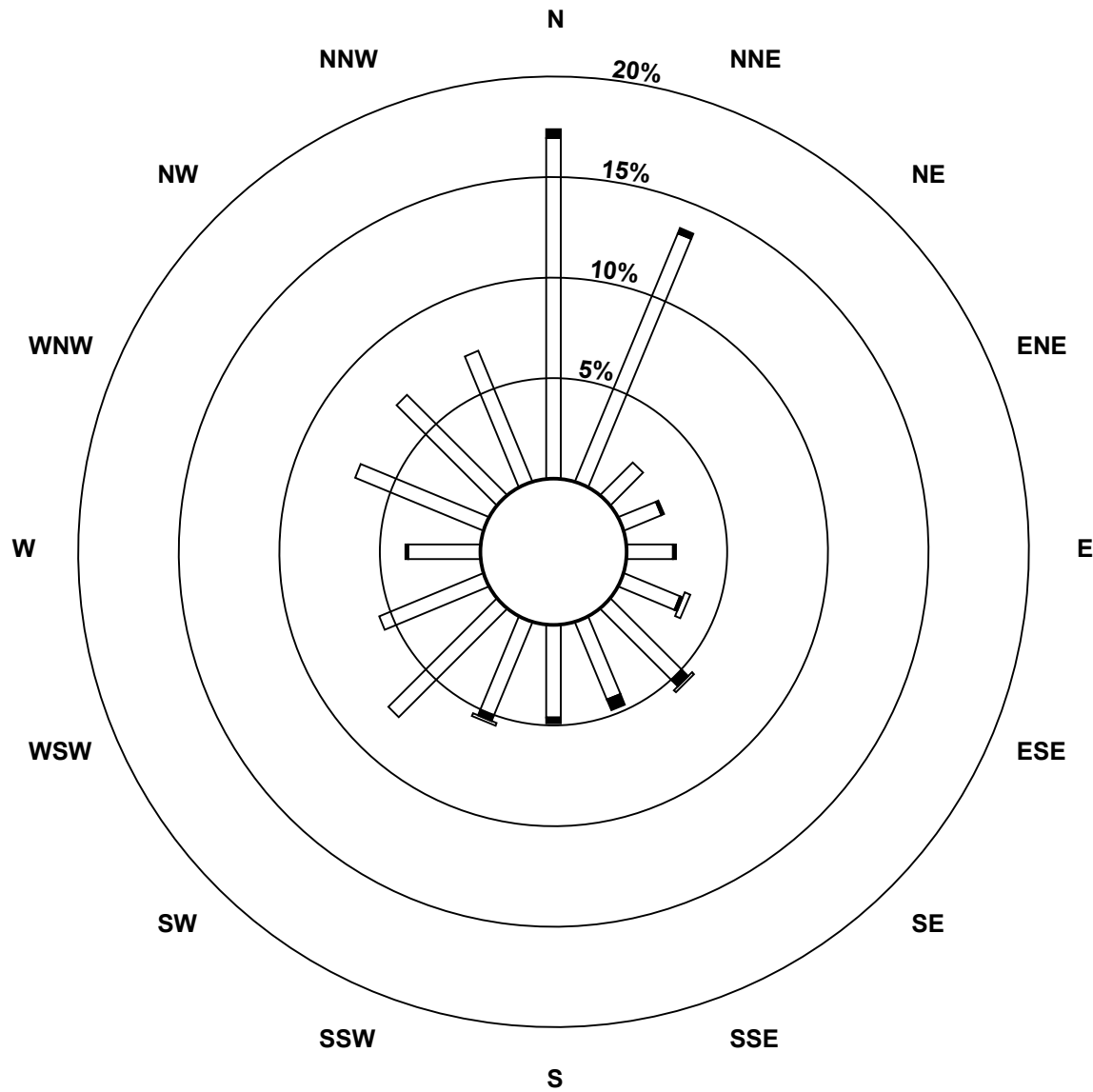
Total Number of Valid Hours: 696

Total Number of Hours: 744

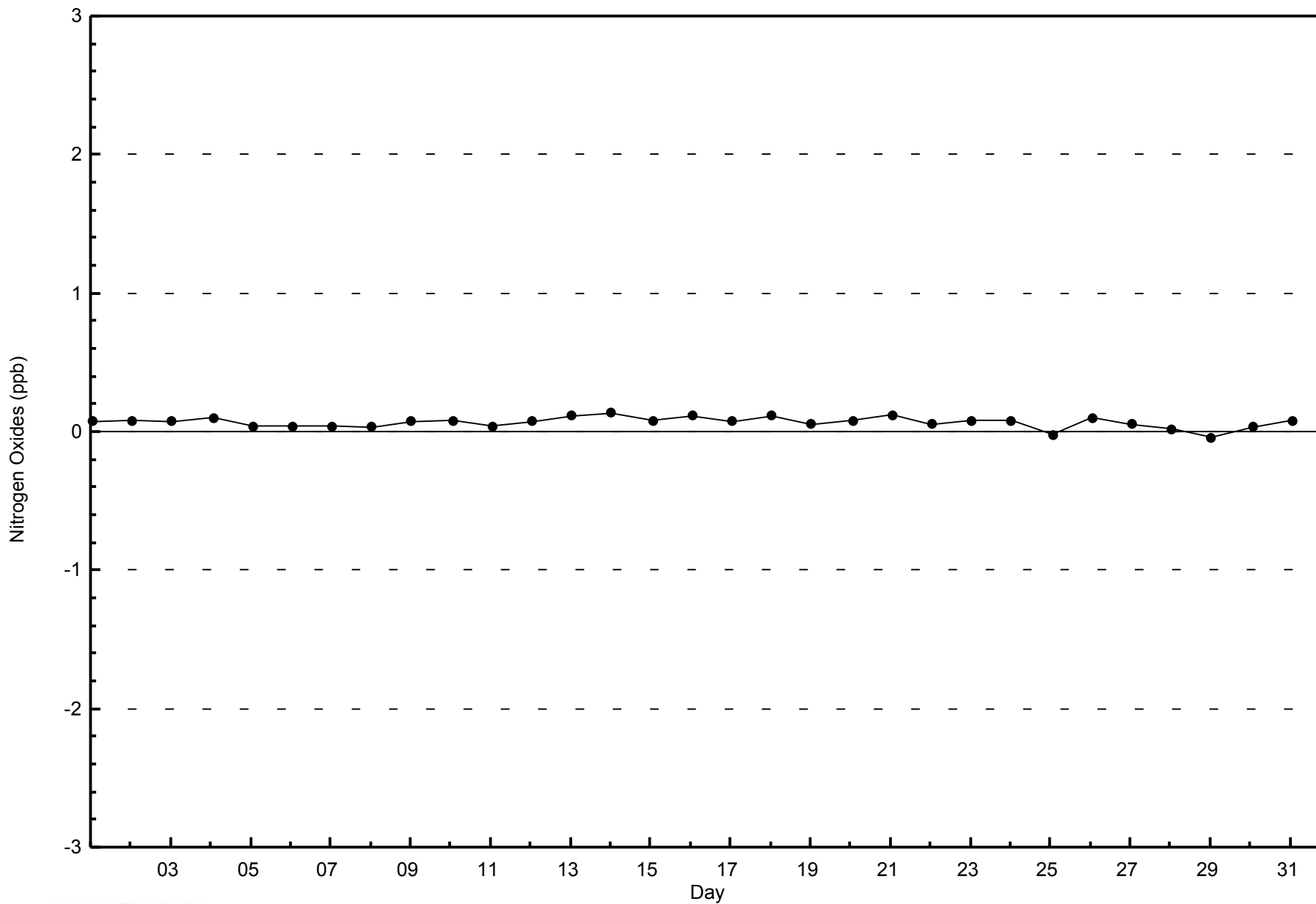


**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Fort McKay South (AMS 13)**



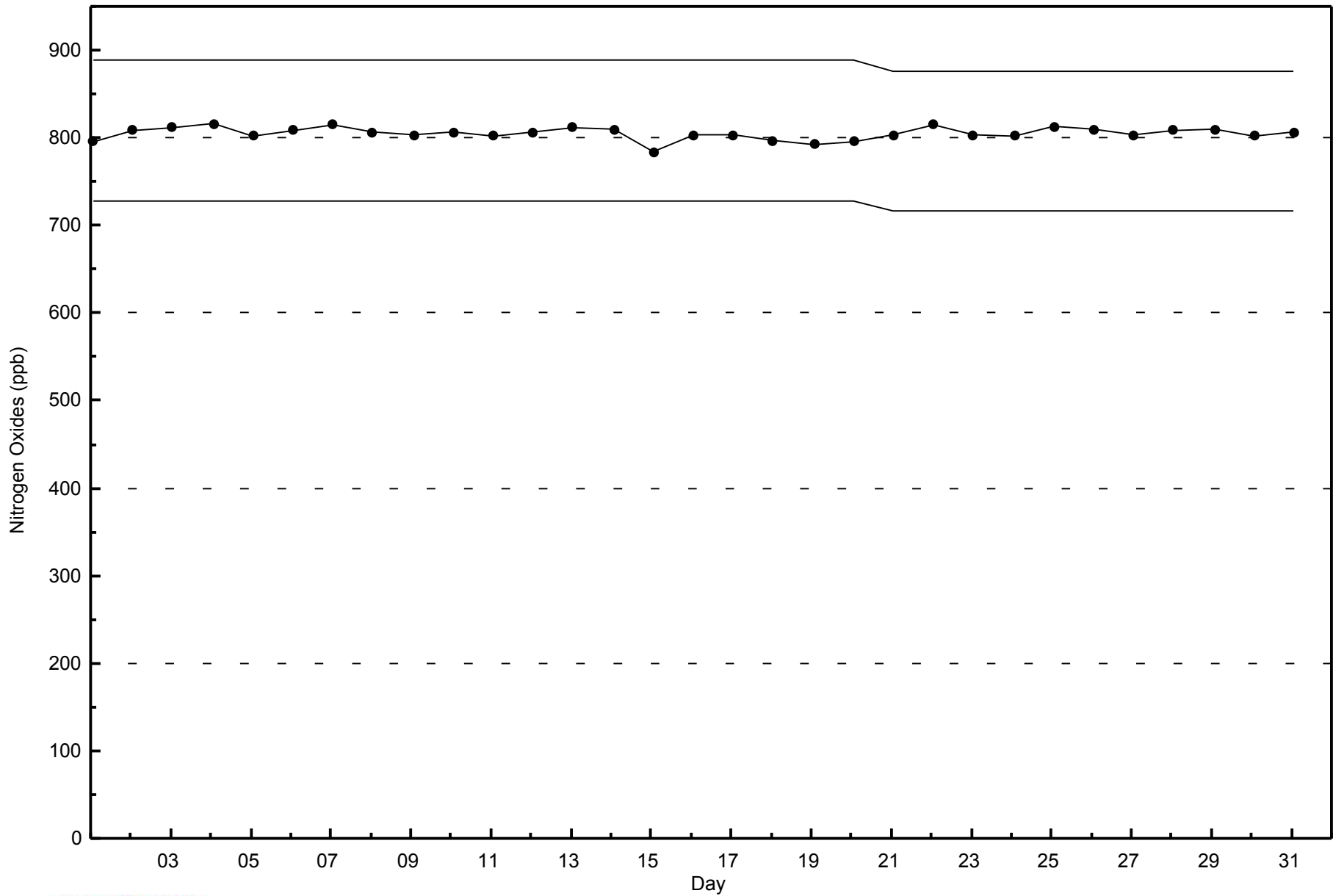
**Total Number of Valid Hours: 696**





WBEA  
Span Responses

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Fort McKay South - May 2014





Summary of Hour Averages

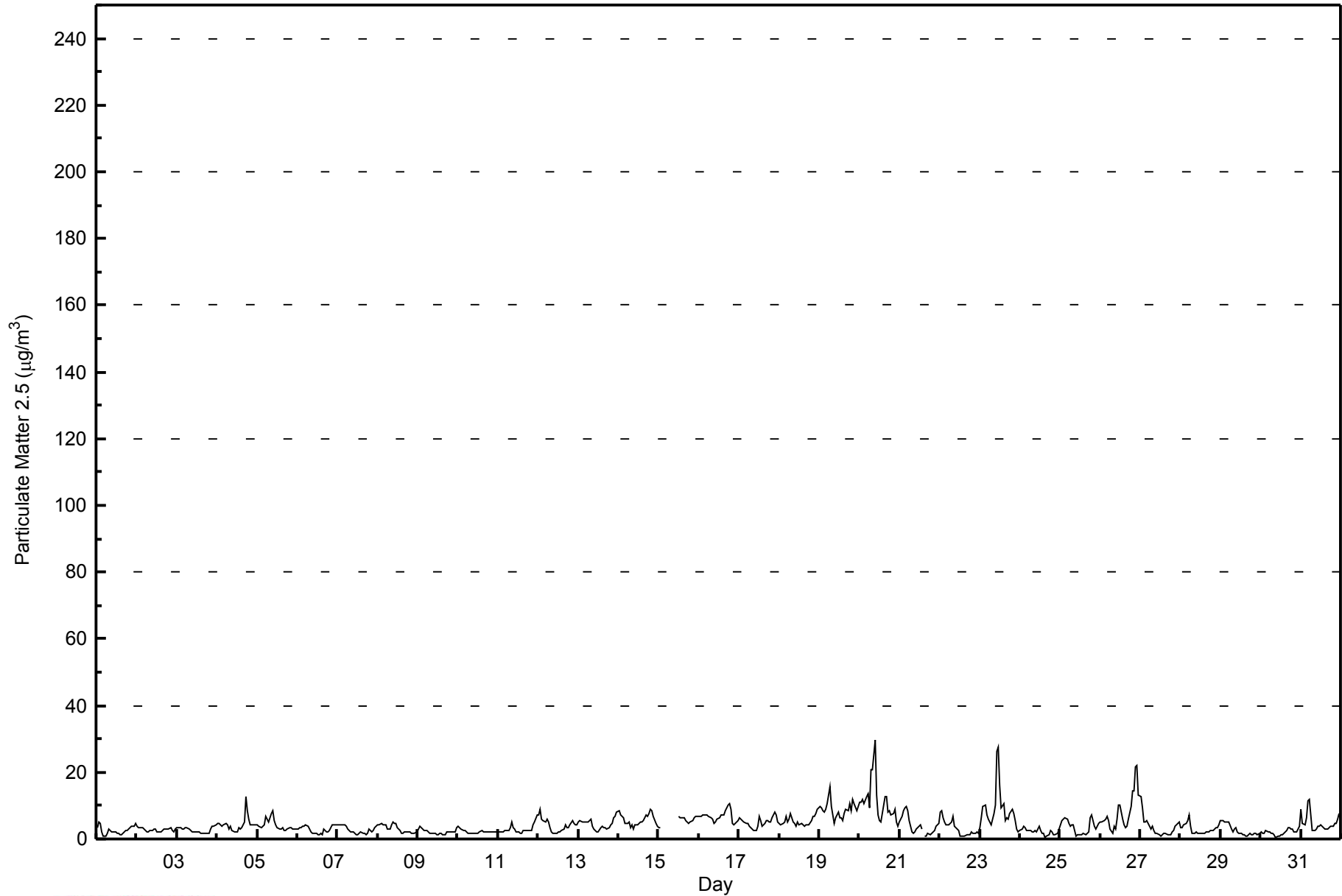
Fort McKay South - May 2014

Number of Exceedences (AAAQO): 24-hr: 0		Hours in Service: 744																																															
Maximum Value: 29.7 µg/m <sup>3</sup> on May 20 10:00		Maximum Daily Average: 11.1 µg/m <sup>3</sup> on May 20																																															
Minimum Value: 0.5 µg/m <sup>3</sup> on May 30 10:00		Hours of Data: 733																																															
Maximum Diurnal Average: 5.3 µg/m <sup>3</sup> at hour 1		Hours of Missing Data: 11																																															
Monthly Average: 4.35 µg/m <sup>3</sup>		Hours of Calibration: 0																																															
Minimum Daily Average: 2.0 µg/m <sup>3</sup> on May 30		Percent Operational Time: 98.5																																															
Minimum Diurnal Average: 3.2 µg/m <sup>3</sup> at hour 14																																																	
Percentiles: P <sub>1</sub> = 0.8 P <sub>10</sub> = 1.6 Q <sub>1</sub> = 2.2 Median = 3.5 Q <sub>3</sub> = 5.4 P <sub>90</sub> = 8.1 P <sub>99</sub> = 20.5																																																	
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-May	3.5	5.0	4.8	2.3	1.0	1.0	1.7	2.9	2.6	2.0	2.1	2.2	1.8	1.6	1.4	1.4	2.0	2.7	2.7	2.8	3.4	3.7	3.8	4.6	2.6	5.0																							
2-May	3.9	3.4	3.5	3.4	3.0	2.7	2.3	2.3	2.6	2.7	2.9	2.9	2.3	2.0	2.0	2.4	3.2	2.9	3.1	3.1	3.2	2.7	2.3	2.8	2.8	3.9																							
3-May	3.3	3.3	3.3	3.0	2.8	3.3	3.3	3.1	2.7	2.1	2.1	2.2	2.3	2.1	1.5	1.7	1.7	1.6	1.6	1.9	3.0	3.7	3.9	4.4	2.7	4.4																							
4-May	4.6	4.6	4.3	3.9	4.4	4.4	4.4	3.0	4.0	2.4	2.0	1.9	1.9	3.3	2.9	3.4	5.1	12.9	8.3	6.1	4.4	4.2	4.3	4.3	4.4	12.9																							
5-May	4.2	3.7	3.4	3.7	4.1	6.9	6.0	5.1	7.5	8.3	5.5	4.3	3.5	2.9	2.9	3.2	2.6	2.7	2.9	3.3	3.2	3.1	2.8	2.8	4.1	8.3																							
6-May	3.1	3.3	3.4	3.7	3.8	4.2	3.9	3.0	2.3	1.8	1.5	1.5	1.4	1.4	1.5	1.4	3.0	2.1	1.9	2.7	3.5	4.3	4.1	4.2	2.8	4.3																							
7-May	4.3	4.2	4.1	4.4	4.3	3.7	2.8	2.5	2.2	2.0	1.7	1.4	1.4	1.7	1.9	1.8	1.9	1.4	1.9	3.1	2.2	2.5	3.2	3.7	2.7	4.4																							
8-May	4.4	4.3	4.6	4.1	4.1	4.1	2.9	3.0	4.1	5.0	4.5	4.7	3.6	2.5	1.8	1.7	2.0	2.1	2.0	2.0	1.8	1.9	1.8	2.2	3.1	5.0																							
9-May	3.0	3.7	3.4	2.8	2.4	2.5	2.0	1.6	1.8	1.8	1.8	1.3	1.4	1.6	1.5	1.2	1.4	1.9	2.3	2.2	2.1	2.0	2.2	3.2	2.1	3.7																							
10-May	3.8	3.4	3.1	2.4	2.4	2.0	1.9	1.8	1.8	1.9	1.7	1.8	1.9	2.0	2.3	2.2	2.1	2.2	2.1	2.1	2.2	2.3	2.3	2.1	2.2	3.8																							
11-May	2.3	2.3	2.2	2.1	2.4	2.5	2.7	3.3	4.9	3.3	2.8	2.3	2.1	1.6	1.9	2.4	2.7	2.7	2.6	2.4	2.5	4.3	5.2	7.0	2.9	7.0																							
12-May	7.2	8.8	6.1	5.4	5.3	5.8	5.0	3.4	2.0	1.6	1.5	1.7	1.9	1.9	2.4	3.0	4.1	3.3	3.5	4.1	5.5	4.7	4.1	4.4	4.0	8.8																							
13-May	4.9	5.4	5.1	5.0	5.0	5.0	5.2	5.7	3.9	2.8	2.5	2.0	2.2	3.3	3.6	3.5	3.5	3.1	3.2	4.1	4.8	6.4	6.8	7.9	4.4	7.9																							
14-May	8.5	7.3	6.9	6.2	4.8	4.7	4.9	3.5	4.4	3.1	4.4	4.3	4.5	5.2	5.2	5.6	7.0	6.7	7.8	8.9	8.4	6.6	4.5	3.9	5.7	8.9																							
15-May	3.4	3.4	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	6.6	6.6	6.3	6.2	5.6	5.0	4.8	4.9	5.4	6.2	6.9	6.7	--	6.9																							
16-May	6.8	6.8	7.1	7.4	7.2	7.1	6.9	6.3	5.9	4.8	5.2	5.7	6.5	7.0	7.4	7.3	8.5	10.0	10.8	9.0	4.7	4.1	4.5	5.5	6.8	10.8																							
17-May	6.2	5.8	5.4	5.2	4.6	4.7	3.9	3.2	3.1	2.6	2.4	3.8	6.6	5.4	3.7	4.8	5.6	5.3	5.1	5.1	6.3	8.2	7.3	4.9	5.0	8.2																							
18-May	4.6	4.3	4.7	5.0	6.8	5.0	5.8	7.8	5.2	4.5	4.0	4.9	4.4	4.7	4.3	4.0	4.3	4.3	4.1	5.7	6.8	6.7	7.7	9.1	5.4	9.1																							
19-May	9.7	9.1	8.5	8.2	9.0	10.6	15.5	9.8	7.1	4.7	6.4	8.0	6.5	6.3	5.4	7.8	9.0	8.6	10.7	8.7	11.9	10.8	8.3	9.6	8.8	15.5																							
20-May	11.0	11.0	11.7	10.4	12.7	13.6	9.3	20.6	20.6	29.7	13.0	7.3	5.5	5.2	10.1	12.7	12.6	8.1	8.3	7.3	7.5	9.0	5.2	3.8	11.1	29.7																							
21-May	5.2	6.9	8.5	9.2	9.8	8.5	5.6	2.2	1.8	2.3	3.0	3.5	4.4	2.9	M	0.8	0.8	1.6	1.4	1.9	2.3	2.7	3.7	4.7	4.1	9.8																							
22-May	8.3	8.6	6.2	5.0	4.4	4.2	4.8	5.1	6.7	3.9	2.9	2.6	1.0	0.8	0.9	0.9	1.1	1.4	1.4	2.0	1.6	1.8	2.1	1.7	3.3	8.6																							
23-May	3.5	6.4	9.8	10.4	7.1	5.8	5.1	4.4	7.5	10.0	26.3	27.3	16.0	9.3	10.7	5.4	6.4	5.8	7.8	8.8	7.8	5.7	2.9	2.3	8.8	27.3																							
24-May	2.4	3.1	3.9	3.4	2.5	2.4	2.5	1.9	2.0	2.4	2.2	3.7	2.5	1.8	1.6	0.6	0.8	1.3	2.7	2.2	1.4	1.2	1.6	3.0	2.2	3.9																							
25-May	4.3	5.4	5.9	6.4	5.8	4.8	3.9	4.4	4.2	0.8	1.2	1.1	1.5	1.4	1.5	1.4	1.6	2.1	6.4	7.3	3.7	3.2	4.0	4.8	3.6	7.3																							
26-May	5.1	5.0	5.4	5.9	6.6	5.6	2.9	1.9	3.9	3.1	5.7	10.1	10.2	6.0	4.2	3.6	3.7	6.0	9.9	14.3	14.5	21.8	22.1	13.1	7.9	22.1																							
27-May	12.6	9.5	5.2	5.2	5.5	3.9	3.1	3.6	2.7	1.6	1.7	1.2	0.9	1.4	1.7	1.7	1.3	1.2	1.4	2.2	2.6	3.6	4.5	5.0	3.5	12.6																							
28-May	3.2	3.3	4.1	4.6	5.7	7.1	3.8	1.5	1.5	2.1	1.8	1.7	1.8	1.8	1.9	2.1	2.3	2.1	2.4	2.6	3.1	3.3	3.6	4.4	3.0	7.1																							
29-May	5.4	5.7	5.2	5.1	5.2	4.9	2.8	2.3	2.8	3.4	2.2	1.6	1.6	1.3	1.2	0.8	0.7	1.5	1.2	1.1	1.8	1.9	1.3	1.6	2.6	5.7																							
30-May	2.0	1.7	1.9	2.3	2.2	1.9	1.7	1.7	1.2	0.5	0.7	0.8	1.1	1.2	1.5	2.5	3.3	3.3	2.9	2.9	2.2	2.2	2.8	3.9	2.0	3.9																							
31-May	8.9	4.5	4.1	6.4	11.3	12.0	7.0	2.5	2.6	3.0	3.7	3.9	4.2	3.2	3.1	2.9	3.0	3.2	3.6	3.7	4.8	4.8	6.0	7.6	5.0	12.0																							
																								5.3	5.3	5.2	5.1	5.2	5.2	4.4	4.1	4.2	4.0	4.0	4.1	3.7	3.2	3.3	3.2	3.6	3.8	4.2	4.5	4.5	4.8	4.7	4.8	Diurnal Average	
																								12.6	11.0	11.7	10.4	12.7	13.6	15.5	20.6	20.6	29.7	26.3	27.3	16.0	9.3	10.7	12.7	12.6	12.9	10.8	14.3	14.5	21.8	22.1	13.1	Diurnal Maximum	
M - Maintenance PF - Power Failure																																																	
Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m <sup>3</sup>																																																	



**WBEA**  
**Hourly Averages**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Fort McKay South - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Fort McKay South - May 2014**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
1 - 5	547	74.62	74.62
6 - 15	161	21.96	96.59
16 - 25	6	0.82	97.41
26 - 80	3	0.41	97.82
> 81.0	0	0.00	97.82

Total Number of Valid Hours: 733

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Fort McKay South - May 2014**

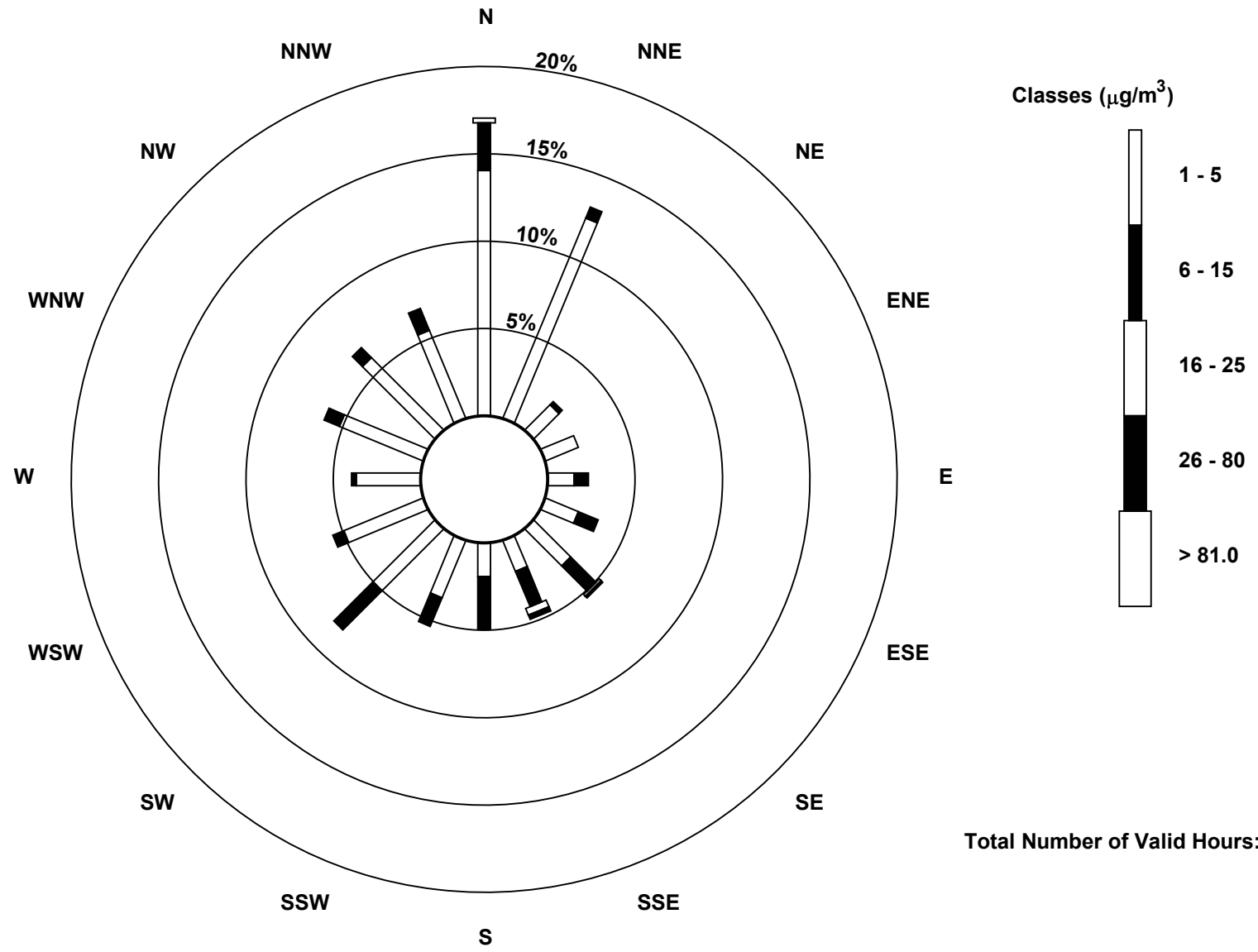
Concentration Ranges ( $\mu\text{g}/\text{m}^3$ )	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	103	91	15	15	11	15	22	14	14	26	37	36	27	38	43	40	547
6 - 15	20	5	2	0	6	9	15	16	22	13	23	5	2	7	6	10	161
16 - 25	2	0	0	0	0	0	1	3	0	0	0	0	0	0	0	0	6
26 - 80	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	3
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	125	96	17	15	17	24	39	35	36	39	60	41	29	45	49	50	717

Total Number of Valid Hours: 733

Total Number of Hours: 744

Wood Buffalo Environmental Association  
 Wind Rose May 2014

Particulate Matter 2.5 (PM<sub>2.5</sub>) - μg/m<sup>3</sup>  
 Fort McKay South (AMS 13)





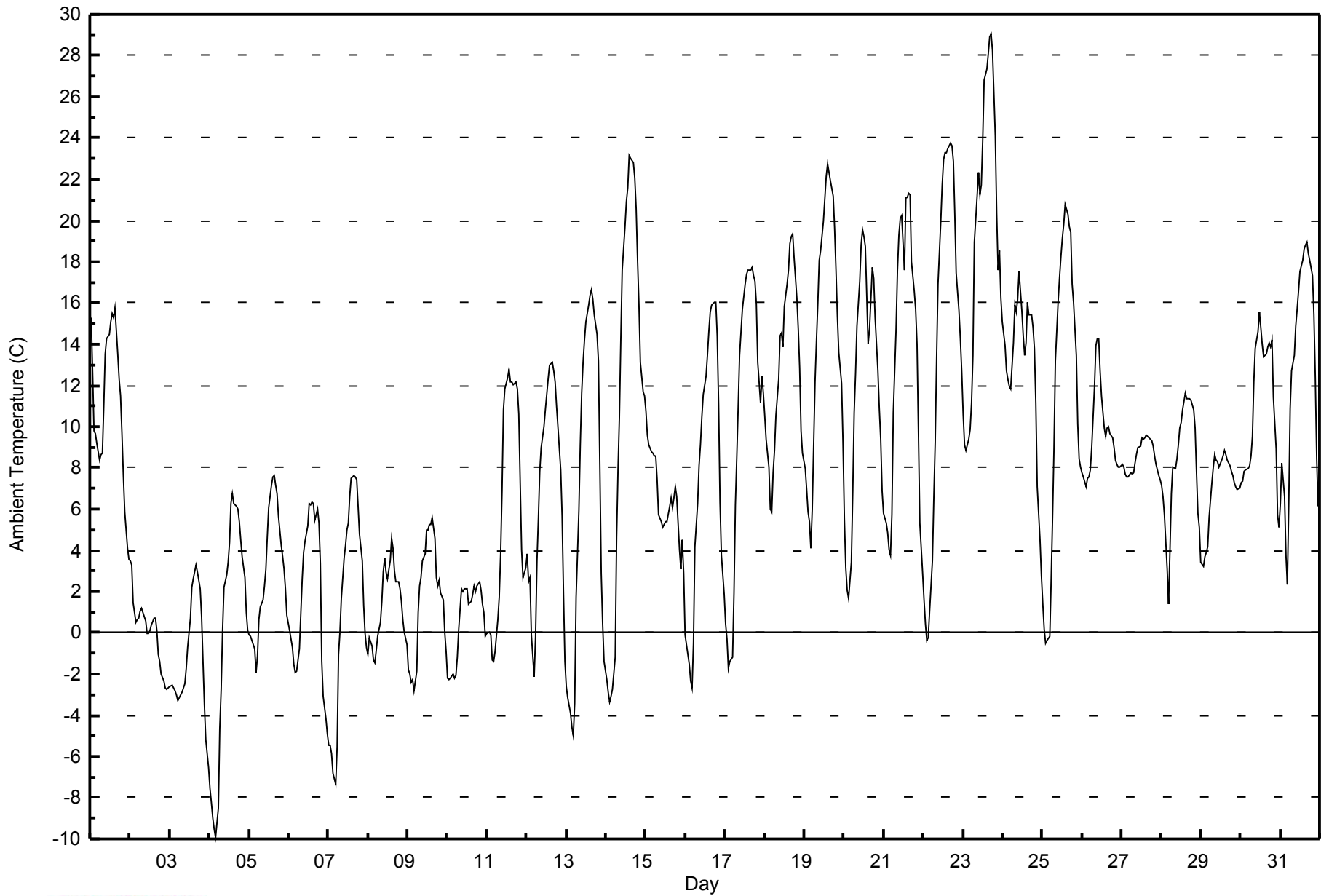


Maximum Value: 29.0 C on May 23 18:00		Maximum Daily Average: 19.5 C on May 23		Hours in Service: 744																						
Minimum Value: -9.9 C on May 4 05:00		Minimum Daily Average: -1.2 C on May 3		Hours of Data: 744																						
Maximum Diurnal Average: 12.9 C at hour 16		Minimum Diurnal Average: 1.4 C at hour 5		Hours of Missing Data: 0																						
Monthly Average: 7.88 C		Percentiles: P <sub>1</sub> = -6.8 P <sub>10</sub> = -1.4 Q <sub>1</sub> = 2.1 Median = 7.6 Q <sub>3</sub> = 13.4 P <sub>90</sub> = 17.5 P <sub>99</sub> = 21.6		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-May	15.3	12.7	9.8	9.7	9.2	8.3	8.6	8.7	11.0	13.5	14.3	14.4	15.1	15.5	15.3	15.8	13.5	12.3	11.5	9.6	7.6	5.9	4.1	3.6	11.1	15.8
2-May	3.5	3.3	1.4	0.5	0.6	0.7	1.0	1.2	1.0	0.6	-0.1	0.0	0.1	0.4	0.7	0.7	0.1	-1.1	-1.4	-2.0	-2.4	-2.7	-2.7	-2.7	0.0	3.5
3-May	-2.6	-2.6	-2.7	-2.8	-3.0	-3.3	-3.1	-2.9	-2.7	-2.4	-1.8	-0.7	0.7	2.2	2.6	2.9	3.3	3.0	2.1	0.8	-1.4	-3.5	-5.2	-6.6	-1.2	3.3
4-May	-7.5	-8.2	-9.0	-9.5	-9.9	-8.5	-4.7	-2.8	0.1	2.2	2.8	3.4	4.3	6.3	6.8	6.3	6.1	6.0	5.4	4.5	3.7	2.7	1.0	0.1	0.1	6.8
5-May	-0.1	-0.2	-0.6	-0.8	-1.9	-1.1	0.6	1.2	1.6	2.3	3.1	4.7	6.0	7.1	7.6	7.6	7.1	6.7	5.7	4.3	3.7	3.1	2.1	0.8	2.9	7.6
6-May	0.1	-0.3	-0.7	-1.5	-2.0	-1.9	-0.8	0.9	2.6	3.9	4.4	5.2	6.2	6.2	6.3	6.3	5.5	6.0	5.3	3.4	-1.4	-3.1	-4.1	-4.9	1.7	6.3
7-May	-5.5	-5.5	-5.9	-6.8	-7.4	-5.6	-1.0	0.0	1.6	3.6	4.3	5.0	5.3	6.6	7.5	7.6	7.6	7.4	6.1	4.8	3.5	1.3	-0.1	-0.7	1.4	7.6
8-May	-1.1	-0.2	-0.7	-1.3	-1.4	-0.9	-0.2	0.5	1.5	2.9	3.6	2.9	2.6	3.5	4.6	4.1	3.0	2.5	2.4	2.1	1.5	0.7	0.0	-0.6	1.3	4.6
9-May	-1.8	-2.0	-2.4	-2.2	-2.8	-1.9	1.0	2.2	2.7	3.5	3.8	5.0	5.0	5.3	5.3	5.6	4.6	2.7	2.2	2.6	1.9	1.6	0.0	-0.9	1.7	5.6
10-May	-2.2	-2.3	-2.2	-2.0	-2.2	-2.1	-1.2	0.1	2.1	2.0	2.1	2.1	2.1	1.4	1.5	1.9	2.2	2.0	2.3	2.5	2.0	1.4	1.0	-0.2	0.6	2.5
11-May	0.0	0.1	-0.1	-1.3	-1.4	-0.9	0.7	1.7	3.8	6.9	10.8	11.8	12.4	12.8	12.2	12.2	12.0	12.2	11.8	10.6	7.3	4.1	2.7	3.1	6.1	12.8
12-May	3.8	2.5	2.7	-0.1	-2.1	-0.2	3.5	5.6	7.8	9.0	10.0	10.8	11.6	12.3	13.0	13.1	12.7	12.2	11.0	10.0	7.9	5.6	1.9	-1.4	6.8	13.1
13-May	-2.6	-3.2	-3.9	-4.6	-4.9	-3.4	1.7	5.9	9.1	11.6	13.1	14.2	15.1	15.9	16.4	16.7	16.2	15.4	14.5	13.2	8.1	2.9	0.5	-1.4	6.9	16.7
14-May	-2.2	-2.8	-3.4	-3.1	-2.8	-1.2	4.7	7.9	10.5	14.2	17.6	19.7	20.9	21.6	23.2	23.0	22.8	22.1	20.6	18.1	15.9	13.1	11.7	11.5	11.8	23.2
15-May	10.8	9.6	9.1	8.8	8.7	8.6	8.6	7.4	5.7	5.4	5.1	5.3	5.4	5.4	6.1	6.5	6.0	6.6	7.1	6.6	4.0	3.1	4.5	2.9	6.6	10.8
16-May	-0.1	-1.1	-1.6	-2.3	-2.7	-0.5	4.1	6.2	8.1	9.1	10.5	11.5	12.5	13.5	14.6	15.6	15.9	16.0	16.1	14.4	11.1	6.3	3.7	1.9	7.6	16.1
17-May	0.5	-0.3	-1.7	-1.4	-1.2	1.9	6.2	8.5	11.0	13.4	15.7	16.3	16.9	17.4	17.6	17.6	17.7	17.3	17.1	16.0	13.1	11.1	12.4	11.6	10.6	17.7
18-May	10.6	9.4	8.0	6.0	5.9	7.8	8.9	10.6	12.3	14.4	14.5	13.9	15.8	16.9	17.6	18.9	19.2	19.4	18.2	16.2	14.7	12.8	9.8	8.7	12.9	19.4
19-May	8.0	7.0	5.9	5.4	4.1	6.0	12.1	14.1	16.0	18.1	18.6	19.9	21.1	22.1	22.8	22.4	21.9	21.2	19.7	17.6	15.4	13.6	12.1	9.2	14.8	22.8
20-May	5.5	3.1	2.1	1.6	3.4	6.8	10.7	12.6	14.9	17.1	18.8	19.5	19.2	18.8	14.0	14.7	16.2	17.7	17.2	15.3	12.7	10.8	9.4	6.9	12.1	19.5
21-May	5.8	5.3	4.8	4.1	3.7	5.7	10.7	14.8	17.6	19.3	20.1	20.2	17.6	21.1	21.1	21.3	21.2	18.0	16.6	15.7	14.0	9.7	5.3	2.9	13.2	21.3
22-May	1.6	0.5	-0.4	-0.2	1.0	3.5	6.5	9.3	13.3	16.9	20.0	21.7	23.0	23.3	23.3	23.5	23.7	23.6	22.9	20.4	17.5	15.6	14.3	12.7	14.1	23.7
23-May	10.6	9.1	8.8	9.4	9.9	11.1	13.5	18.9	21.2	22.4	21.2	21.7	23.9	26.8	27.4	28.1	28.9	29.0	28.3	24.1	20.3	17.6	18.6	16.2	19.5	29.0
24-May	15.1	13.9	12.7	12.3	12.0	11.9	14.0	15.9	15.6	16.2	17.5	15.6	14.4	13.5	14.1	16.1	15.4	15.4	14.8	13.8	11.1	7.1	4.5	2.7	13.2	17.5
25-May	1.4	0.2	-0.5	-0.3	-0.2	2.6	5.7	9.0	13.2	16.1	17.2	18.2	19.2	19.8	20.8	20.3	19.7	19.4	16.9	16.0	13.5	10.1	8.4	8.0	11.4	20.8
26-May	7.8	7.6	7.1	7.5	7.5	7.9	9.0	12.0	13.9	14.2	14.3	12.7	11.5	9.9	9.5	9.9	10.0	9.7	9.5	9.0	8.4	8.2	8.0	8.1	9.7	14.3
27-May	8.2	8.1	7.7	7.6	7.6	7.7	7.7	7.8	8.2	8.6	9.0	9.0	9.5	9.4	9.5	9.6	9.5	9.4	9.3	9.1	8.6	8.2	7.6	7.5	8.5	9.6
28-May	7.2	6.6	5.8	3.1	1.4	4.0	6.8	8.0	8.0	8.4	9.1	9.9	10.2	10.8	11.6	11.3	11.3	11.3	11.3	10.8	9.9	7.8	5.8	5.1	8.1	11.6
29-May	3.4	3.2	3.7	3.9	4.1	5.6	7.3	8.0	8.7	8.4	8.3	8.1	8.3	8.6	8.8	8.7	8.4	8.1	7.9	7.6	7.3	7.1	6.9	7.0	7.0	8.8
30-May	7.3	7.4	7.8	7.9	8.0	8.1	8.6	9.5	12.2	13.8	14.6	15.6	14.8	14.0	13.4	13.5	13.9	14.1	13.8	14.2	11.4	8.9	5.8	5.1	11.0	15.6
31-May	6.3	8.3	6.6	3.8	2.4	6.3	10.9	12.7	13.5	14.9	15.7	16.6	17.5	18.1	18.6	18.8	18.9	18.4	18.1	17.3	15.4	12.4	8.4	6.1	12.7	18.9
																								Diurnal Average		
																								Diurnal Maximum		



**WBEA**  
**Hourly Averages**

**Ambient Temperature (AT) - C**  
**Fort McKay South - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C**  
**Fort McKay South - May 2014**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	118	15.86	15.86
0 - 10	360	48.39	64.25
10 - 20	223	29.97	94.22
> 20	43	5.78	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

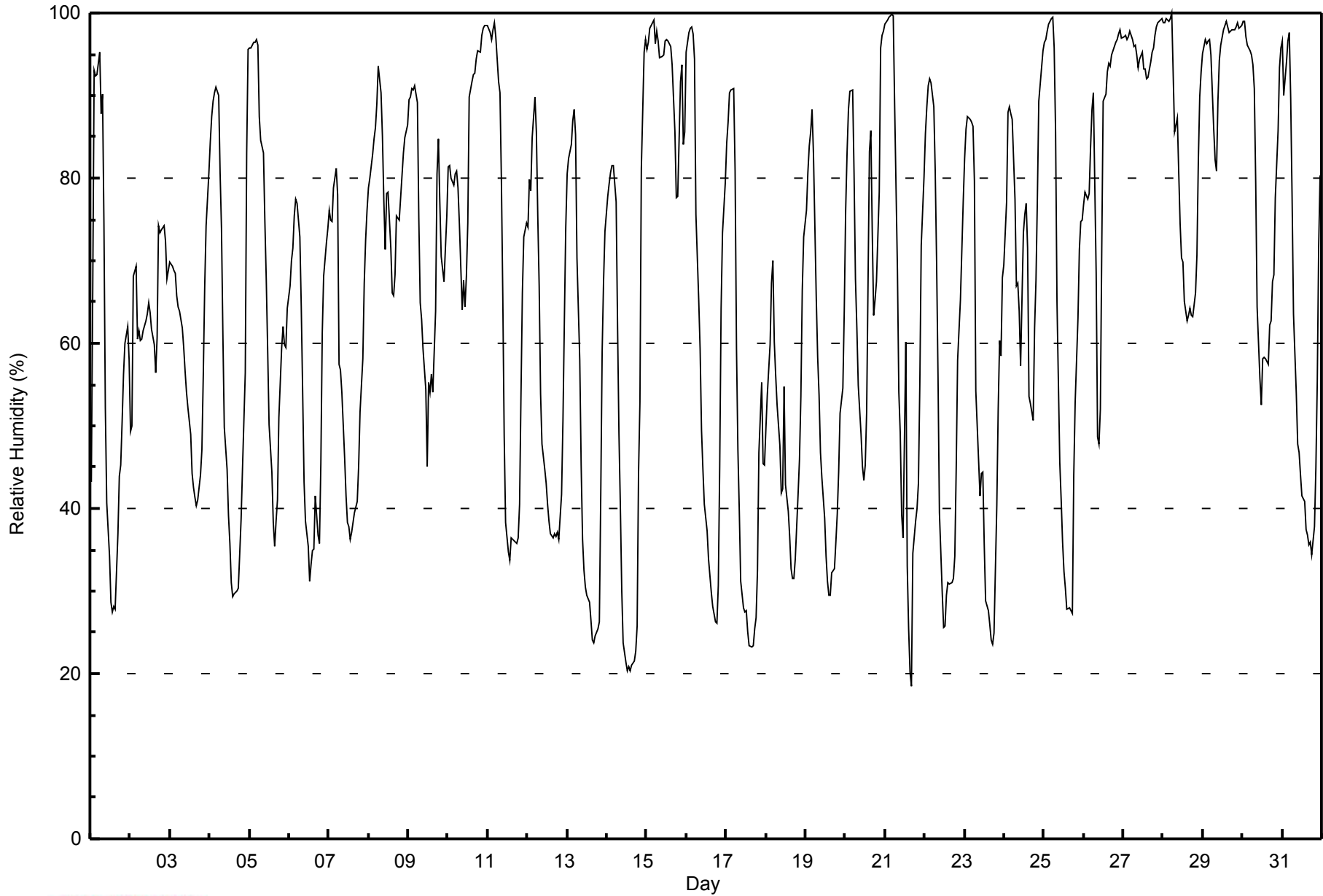
**Relative Humidity (RH) - %  
Fort McKay South - May 2014**

Maximum Value: 100 % on May 28 06:00																		Maximum Daily Average: 95.9 % on May 27																		Hours in Service: 744														
Minimum Value: 18 % on May 21 17:00																		Minimum Daily Average: 48.2 % on May 17																		Hours of Data: 744														
Maximum Diurnal Average: 88.8 % at hour 5																		Minimum Diurnal Average: 48.1 % at hour 16																		Hours of Missing Data: 0														
Monthly Average: 66.3 %																		Percentiles: P <sub>1</sub> = 21 P <sub>10</sub> = 32 Q <sub>1</sub> = 45 Median = 68 Q <sub>3</sub> = 89 P <sub>90</sub> = 97 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-May	43	66	93	92	93	95	88	90	75	52	41	34	29	27	28	28	37	44	45	50	56	60	62	58	57.8	95																								
2-May	49	50	68	69	60	62	60	61	62	63	63	65	64	62	60	56	61	74	73	74	74	72	68	69	64.1	74																								
3-May	70	69	69	68	66	64	64	62	59	57	54	52	49	44	43	41	40	41	44	47	56	67	74	81	57.6	81																								
4-May	84	87	89	90	91	90	81	74	61	50	45	39	36	31	29	30	30	34	39	45	56	83	96	59.2	96																									
5-May	96	96	96	96	97	96	88	85	83	75	68	59	50	44	38	35	39	41	51	60	62	60	59	64	68.2	97																								
6-May	67	70	72	75	77	77	73	64	54	43	39	35	31	33	35	35	41	37	36	45	61	68	72	74	54.8	77																								
7-May	76	75	75	79	81	78	57	57	54	46	42	38	38	36	37	39	40	41	45	52	58	67	73	76	56.7	81																								
8-May	79	80	83	85	86	89	94	90	85	77	71	78	78	72	66	66	68	75	75	78	80	83	85	86	79.6	94																								
9-May	89	90	91	91	91	89	75	65	63	59	54	45	55	54	56	54	64	81	85	77	70	68	72	75	71.4	91																								
10-May	81	82	80	79	81	81	79	74	64	68	64	68	75	90	92	93	93	94	95	95	97	98	98	98	84.2	98																								
11-May	98	98	97	98	99	97	92	90	80	66	49	38	35	34	36	36	36	36	36	41	54	66	73	75	64.9	99																								
12-May	74	80	79	85	90	86	75	67	54	48	45	43	41	38	37	36	37	37	37	36	42	51	63	74	56.4	90																								
13-May	80	82	84	87	88	85	70	58	45	36	32	31	29	29	26	24	24	25	25	26	42	59	67	74	51.3	88																								
14-May	78	79	81	81	82	77	62	49	40	30	24	21	20	21	20	21	21	23	26	44	53	81	95	97	51.2	97																								
15-May	96	96	98	99	99	96	98	97	95	95	95	97	97	97	96	94	90	86	78	78	92	94	84	86	92.8	99																								
16-May	95	98	98	98	98	94	76	65	59	50	45	41	37	34	32	30	28	26	26	31	45	64	73	80	59.3	98																								
17-May	84	87	90	91	91	81	59	47	40	31	28	27	28	25	23	23	23	25	27	33	47	55	45	45	48.2	91																								
18-May	50	54	60	67	70	60	56	53	48	42	42	55	43	40	37	33	32	31	34	42	46	54	67	73	49.4	73																								
19-May	76	81	84	86	88	83	65	58	54	47	44	39	34	31	30	29	32	33	36	39	44	51	55	64	53.5	88																								
20-May	76	83	88	90	91	80	68	62	55	49	45	43	45	52	83	86	74	63	65	67	78	96	97	98	72.3	98																								
21-May	99	99	99	100	100	100	89	69	54	49	39	36	60	33	25	20	18	35	38	40	43	55	72	80	60.6	100																								
22-May	86	89	91	92	92	89	81	70	56	39	30	26	26	29	31	31	31	32	34	45	58	65	71	77	57.0	92																								
23-May	82	86	87	87	87	86	80	54	46	42	44	44	36	29	28	26	24	24	25	40	52	60	58	68	54.0	87																								
24-May	69	77	88	89	88	87	77	67	67	64	57	73	76	77	72	54	53	51	62	68	78	89	93	95	73.8	95																								
25-May	97	97	98	99	99	100	96	86	65	46	41	36	32	30	28	28	28	27	44	53	63	71	75	75	63.0	100																								
26-May	77	78	77	78	84	88	90	68	49	48	52	71	89	90	93	94	94	95	96	96	97	97	98	97	83.2	98																								
27-May	97	97	97	97	98	97	96	96	95	93	94	95	93	93	92	92	94	95	96	97	98	99	99	99	95.9	99																								
28-May	99	99	99	99	99	100	93	86	87	81	74	70	70	65	63	63	64	63	63	66	71	82	90	93	80.8	100																								
29-May	95	97	96	97	97	95	86	82	81	89	94	96	98	99	99	98	98	98	98	98	98	99	98	98	95.2	99																								
30-May	99	99	97	96	95	95	94	91	80	64	56	53	58	58	58	57	62	63	67	68	78	86	93	96	77.7	99																								
31-May	97	90	94	97	98	90	78	64	54	48	47	44	42	41	37	37	36	36	34	38	45	55	72	80	60.5	98																								
																								81.9	84.2	87.1	88.3	88.8	86.7	78.7	70.9	63.3	56.3	52.2	51.5	51.4	49.6	49.4	48.1	48.7	50.4	52.7	56.9	64.0	71.9	76.9	80.7	Diurnal Average		
																								99	99	99	100	100	100	98	97	95	95	95	97	98	99	99	98	98	98	98	98	98	99	99	99	99	Diurnal Maximum	



**WBEA**  
**Hourly Averages**

**Relative Humidity (RH) - %**  
**Fort McKay South - May 2014**





Maximum Speed: 19 km/h on May 21 16:00	Maximum Daily Speed Average: 10.1 km/h on May 2	Hours in Service: 744
Minimum Speed Value: 0 km/h on May 7 22:00	Minimum Daily Speed Average: 1.1 km/h on May 17	Hours of Data: 744
Maximum Diurnal Speed Average: 4.5 km/h at hour 18	Minimum Diurnal Speed Average: 1.2 km/h at hour 7	Hours of Missing Data: 0
Monthly Average Velocity: 2.2 km/h 349.0 deg	Percentiles: $P_1 = 0$ $P_{10} = 2$ $Q_1 = 3$ Median = 5 $Q_3 = 9$ $P_{90} = 12$ $P_{99} = 16$	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-May	WSW8	NNW7	WSW1	NW4	NW5	WNW5	NW7	W5	WNW8	NW15	NNW17	NNW16	NNW14	NW13	NNW12	NW14	NW15	NW12	NW13	NNW8	N9	NW6	WNW5	WNW8	NW8.8	NNW17
2-May	WNW8	WNW11	NNW9	NW6	WNW8	WNW10	WNW9	NW12	NNW12	NNW13	NNW13	NNW12	NNW11	NNW13	NNW12	N13	N12	N12	N11	N11	N12	N13	N13	N11	NNW10.1	NNW13
3-May	N12	N12	N11	N11	N10	N10	N9	NNE7	NNE9	NNE9	N8	N8	NNE9	NNE10	NNE9	NE9	NE9	NNE9	NE9	NE6	NNE4	NW2	WSW2	SW3	NNE7.5	N12
4-May	SSW2	SW2	SW2	SW2	SW2	SSW2	W0	SSW1	E3	SW4	E4	SE3	E4	S4	SSW5	SSW6	ENE3	ESE3	SSW6	SSW5	SSE5	SSE5	SSE5	ENE2	S2.2	SSW6
5-May	ENE2	NNW1	SW1	NW1	WNW2	SSW2	SE1	SE4	SE4	ESE4	ENE4	NE6	N10	N11	N10	N12	NNE11	NNE11	NNE13	NNE13	NNE11	NNE9	NNE9	NNE8	NNE5.4	NNE13
6-May	NNE9	NNE9	NNE9	N8	NNW8	NNW9	N9	N12	N12	N14	N13	NNE12	NNE11	N13	N14	N13	NNE12	NNE8	NNE6	WNW3	W2	WNW3	WNW3	WNW4	N8.4	N14
7-May	WNW4	NW4	NW4	NW3	WNW3	NNW3	N7	N8	N10	N13	N14	N14	N13	N15	N13	N14	NNE13	N13	N13	NNE9	NNE4	SSW0	SW2	SW1	N7.7	N15
8-May	NE1	NE3	SSE1	NNE1	S0	WNW0	NE3	N4	ENE2	ENE3	NNE4	N10	NNE11	NNE13	N14	N14	N12	N10	NNE8	ENE4	NNE1	WNW1	SW1	NW2	NNE4.6	N14
9-May	W1	WSW1	SW2	SW2	SW1	SW1	W4	WNW5	N4	NNE3	N5	N4	NNE9	NNE6	NNE9	N6	N9	NNW7	W2	NW4	NW5	NNW8	NW6	WNW6	NNW3.5	NNE9
10-May	W5	W5	W5	W6	W6	WSW8	WSW8	W7	WNW9	NNW11	NNW14	NW10	NW10	NW7	NW4	NNW6	N7	NNW5	WNW3	WSW2	WSW3	WSW4	SW4	SW3	WNW5.1	NNW14
11-May	WSW3	W5	W4	SW1	SSW1	SW4	WSW2	SSW5	SSW9	SSW9	WNW6	NW13	NNW12	NNW10	NNE9	NNE8	NE7	NNE7	NNE8	NNE6	N3	NW3	NW3	N5	NNW2.7	NW13
12-May	N4	NNW4	NNW5	NNW3	NW2	NNW3	NNE5	N5	NE5	NNE6	NNE8	NNE10	NNE9	N10	NNE11	NNE11	NNE12	NNE12	NNE13	N10	N6	NE4	SE2	SW3	NNE6.2	NNE13
13-May	WSW3	SW3	SW3	SW3	S2	SSW2	SSE3	ESE5	SE4	S5	ESE8	ENE6	NNE8	NNE10	NNE11	NNE13	NNE12	NNE12	NNE10	NNE7	N2	WSW3	SW3	WSW3	NE2.6	NNE13
14-May	SW3	SW3	SSW2	SSW2	SSW2	SW1	SSE3	ESE4	SE5	SSE6	SSE8	SE10	ESE9	ESE8	SE8	SE7	SE8	SE8	SE7	SW4	SSE4	SW10	S4	SE3	SSE4.3	SSW10
15-May	ENE2	NNW1	NNW1	N1	N4	NNE4	N3	N16	N15	N17	N16	N12	N17	N14	N13	N13	N12	NNW11	N14	NNW7	WNW4	WNW5	WNW7	WNW5	N8.4	N17
16-May	WNW3	WNW3	NNW2	SW3	SW3	SSW2	SSE1	E1	SE3	NNW3	ENE3	E5	ESE5	E7	E8	E7	ESE5	E6	SE4	NE6	N4	WNW2	NW1	WSW3	E1.5	E8
17-May	SW3	SW3	SW3	WSW2	WSW2	NW2	NE2	ENE2	SE2	S5	SE2	SSW3	SW5	NE5	NNE6	NNE5	NE3	NE6	E5	NNE4	N3	NW1	NNE6	N8	NNE1.1	N8
18-May	N7	N5	N6	N4	N5	NNE7	N6	NNE8	N8	SW2	WNW5	N8	N8	N9	NNE9	NNE8	NNE8	NNE8	N8	W4	W4	NW4	NW3	NW3	N5.3	N9
19-May	NW2	SSW2	SSW2	SW2	SW3	S3	SSE7	S9	S9	S11	S9	S8	SSE10	SSE11	SE11	SSE12	S12	SSE12	SSE11	S13	S11	S9	S9	SSW5	S7.5	S13
20-May	SW2	WSW3	SW3	SSE4	S5	SSE7	SSE8	SSE10	SSE9	SSE9	S11	SSE12	S12	SSW8	SW5	SE7	SE6	SE8	SSE8	NNE4	NNW4	NNW3	NNW2	SSW3	SSE4.9	SSE12
21-May	S4	S4	S4	S4	S3	S4	SSE5	S6	S7	SSE8	SSW10	SW12	SSW7	SW15	SW18	SW19	WSW16	NW13	NW10	WNW5	WNW6	WSW5	S3	SW3	SW5.7	SW19
22-May	SW2	SW3	SW2	WSW2	SW2	SSW0	NNE1	W0	ESE1	SSW3	SSW3	SSE6	SW11	SSW11	SW9	SW9	SW8	SSW5	SSW5	N1	N2	NW2	WNW1	SSW2	SW3.2	SSW11
23-May	SW2	SW2	SSW2	S3	S2	S3	SSW2	SE3	ESE5	SE6	SE6	SSE5	SE4	SSE7	SSE7	SE6	S5	S5	ESE5	ESE0	SE3	WSW0	W15	W14	S2.8	W15
24-May	NW7	SW4	WSW6	WSW7	W6	W6	W4	NW2	NW6	W7	WNW9	N9	N7	NNE7	NNE4	WNW9	WNW9	NW8	NNE7	NNE5	NE3	WSW2	W2	WSW2	NW3.7	N9
25-May	WSW2	SW2	SW2	SW2	SW2	S2	E2	NE3	SE5	SE8	S7	ESE4	SE5	ESE5	ESE6	ENE8	ESE6	ENE5	N7	NNW3	NNW2	SE1	WSW2	WSW1	ESE1.8	ENE8
26-May	SW1	N1	SE3	SSW1	NW2	N3	WSW1	N3	E5	ESE7	SE6	SE3	N2	N7	NNW4	N1	ESE4	NNE4	N6	N8	N9	N8	N6	N10	NNE2.6	N10
27-May	N8	N8	N9	N7	N7	N8	N9	N9	NNE10	NNE11	N7	N7	NNE8	N9	N10	N8	NNE7	N5	N5	NNW3	WNW2	WNW2	WSW1	ENE2	N6.5	NNE11
28-May	E1	W0	NW1	WSW2	SW2	NW1	E3	ESE2	SE4	E3	NNE6	E3	SE5	SSE6	SSE6	SE5	SSE5	SE6	ESE5	ESE5	SE5	SE3	W0	SW1	SE2.4	SSE6
29-May	WSW2	WSW1	NW2	WNW1	NW1	NW2	NNW3	NNW3	N5	N4	N4	N7	N7	NNW5	NNW6	NNW8	NNW8	NNW5	NW6	WNW7	WNW6	W6	W6	WSW7	NW3.8	NNW8
30-May	WSW5	SW5	WSW9	WSW9	WSW8	WSW7	WSW8	WSW8	WNW9	WNW11	WNW12	WNW13	W13	WNW15	WNW13	NW7	ESE2	E3	N3	ESE2	NNE6	E1	SW3	S3	W5.5	WNW15
31-May	SSW5	SW6	N2	W1	SW2	S2	NNE3	NNE5	N7	NNE6	NNE9	NNE8	NNE9	NNE11	NNE11	NNE11	NNE10	NNE10	NNE8	N7	N7	NNW5	NNW1	NNW1	NNE4.7	NNE11

WNW1.9	WNW2.0	WNW1.7	WNW1.8	WNW1.8	WNW1.5	WNW1.2	N1.7	NNE1.6	N1.6	N2.8	N3.5	N3.8	N4.3	N4.2	N4.2	NNE4.2	NNE4.5	NNE4.1	N3.1	N2.4	NW1.7	WNW1.8	WNW2.0	Diurnal Average
N12	N12	N11	N11	N10	WNW10	N9	N16	N15	N17	NNW17	NNW16	N17	WNW15	SW18	SW19	WSW16	NW13	N14	S13	N12	N13	W15	W14	Diurnal Maximum

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

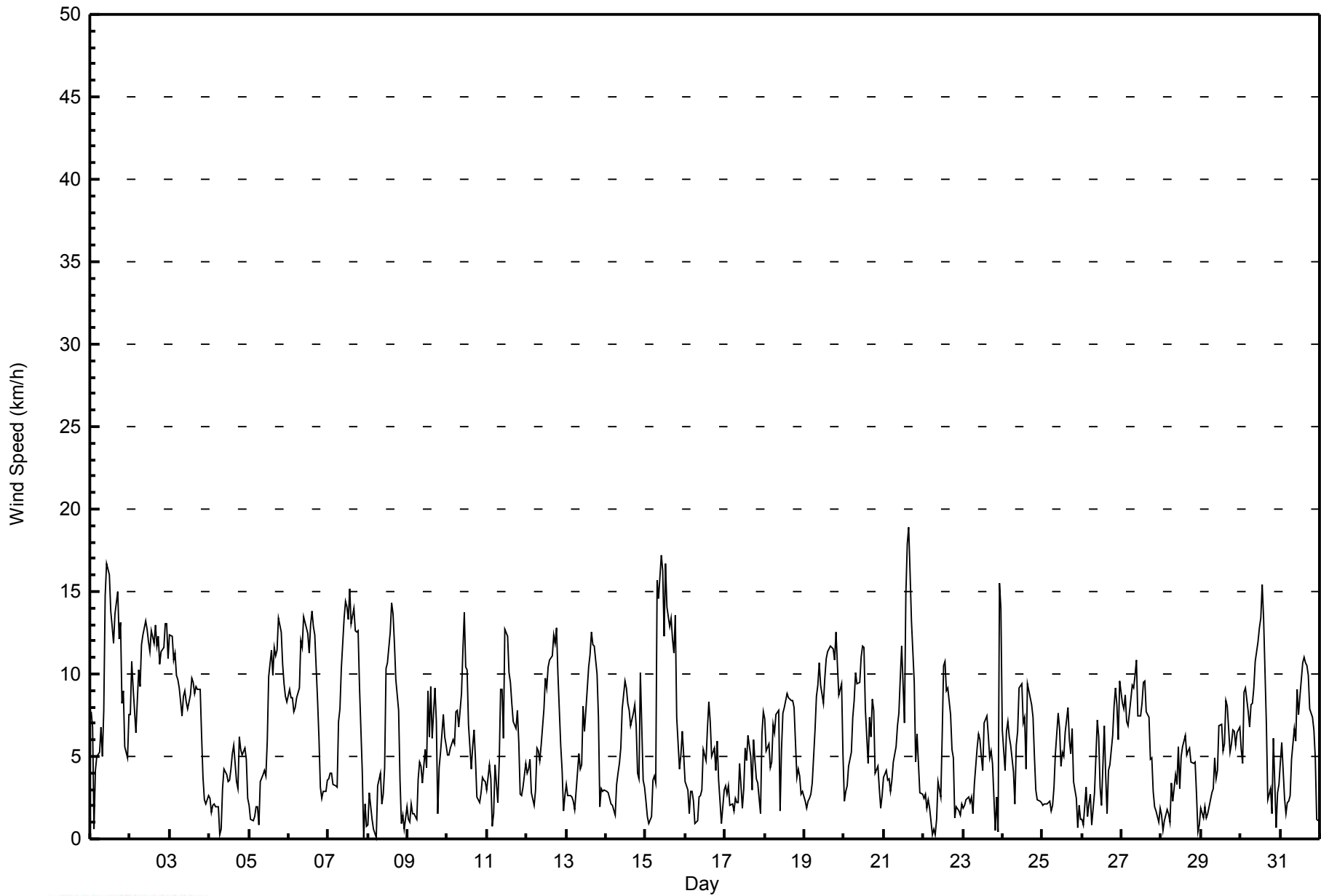


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 9 km/h on May 23 23:00														Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0											
Minimum Value: 0 km/h on May 19 04:00																									
Percentiles: 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> = 4 P <sub>99</sub> = 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-May	2	3	1	3	3	2	3	2	3	6	6	5	6	5	5	5	6	5	5	4	4	2	2	3	6
2-May	3	6	4	3	4	4	4	5	4	5	5	4	4	5	5	4	4	4	3	4	4	5	4	4	6
3-May	4	4	4	3	3	3	3	2	3	3	3	3	3	4	3	3	3	3	3	3	1	1	1	1	4
4-May	1	1	1	1	1	1	1	1	2	2	2	2	2	3	4	2	2	2	2	2	2	2	3	1	4
5-May	1	1	1	1	1	1	2	1	1	1	2	3	3	4	3	3	4	4	5	5	4	3	3	3	5
6-May	3	3	3	2	2	2	3	4	4	4	4	4	4	4	5	4	5	3	3	3	1	1	1	1	5
7-May	1	1	1	1	1	1	2	3	3	5	5	4	5	5	4	5	4	4	4	3	3	1	1	1	5
8-May	1	1	1	1	1	1	1	1	1	1	2	3	3	3	4	4	4	3	2	1	1	1	1	1	4
9-May	1	1	1	1	1	1	2	2	2	2	2	3	4	3	3	4	4	4	1	2	2	3	2	2	4
10-May	1	2	2	2	2	2	3	3	4	4	5	4	4	3	2	2	2	2	1	1	1	1	1	2	5
11-May	2	2	2	1	1	2	2	2	3	3	5	5	5	4	4	3	3	2	3	2	1	1	1	1	5
12-May	1	1	1	1	1	2	1	2	2	2	3	3	3	4	4	4	4	4	4	3	2	2	1	1	4
13-May	1	1	1	1	1	1	1	2	2	3	4	2	3	3	4	4	4	4	3	3	1	1	1	1	4
14-May	1	1	1	1	1	1	1	1	2	2	3	3	3	3	3	2	3	3	3	2	3	1	1	1	3
15-May	1	1	1	1	1	1	1	6	5	6	6	4	5	5	4	4	4	4	5	3	1	1	2	2	6
16-May	1	1	1	1	1	1	1	1	2	2	2	3	2	3	3	3	2	2	1	2	1	1	1	1	3
17-May	1	1	1	1	1	1	1	1	2	2	2	2	2	3	3	2	1	3	2	1	1	1	3	3	3
18-May	2	2	1	1	2	2	2	3	3	1	3	3	2	3	3	3	3	3	3	2	1	2	1	1	3
19-May	1	1	1	0	1	2	2	3	3	4	4	4	4	4	4	4	5	4	4	4	3	3	3	1	5
20-May	1	1	1	1	1	3	3	4	3	4	4	4	4	4	4	3	3	4	3	3	2	1	1	1	4
21-May	1	1	1	1	1	1	1	2	3	3	3	5	4	7	6	7	6	5	5	2	3	1	1	1	7
22-May	1	1	1	1	1	1	1	1	2	2	3	3	5	4	3	3	3	2	2	2	1	1	1	1	5
23-May	1	1	1	1	2	1	1	2	2	2	2	2	2	3	3	3	2	2	1	1	1	9	6	9	
24-May	3	3	2	3	2	2	2	2	2	3	5	3	4	3	2	4	4	3	2	2	1	1	1	1	5
25-May	1	1	1	1	1	1	1	1	3	3	3	3	3	3	3	3	2	3	2	2	1	1	1	1	3
26-May	1	1	1	1	2	2	1	1	2	3	3	2	2	2	2	1	2	2	2	2	3	2	2	3	3
27-May	2	3	3	2	2	3	3	3	4	4	2	2	3	3	3	3	3	2	1	1	1	1	1	1	4
28-May	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	2
29-May	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	3	3	2	3	3	2	2	2	2	3
30-May	2	2	3	3	3	2	3	3	5	5	5	6	6	7	6	5	1	1	2	1	4	1	1	1	7
31-May	1	3	2	1	1	1	1	2	2	2	3	3	3	3	4	3	4	4	2	2	2	1	1	1	4
Diurnal Maximum																									
4	6	4	3	4	4	4	4	6	5	6	6	6	6	7	6	7	6	5	5	5	5	4	5	9	6



**WBEA**  
**Hourly Averages**

**Wind Speed (WS) - km/h**  
**Fort McKay South - May 2014**







**WBEA**  
**Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h**  
**Fort McKay South - May 2014**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	375	50.40	50.40
6 - 11	279	37.50	87.90
12 - 19	90	12.10	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



**WBEA**  
**Frequency Distribution**

**Wind Speed (WS) - km/h**  
**Fort McKay South - May 2014**

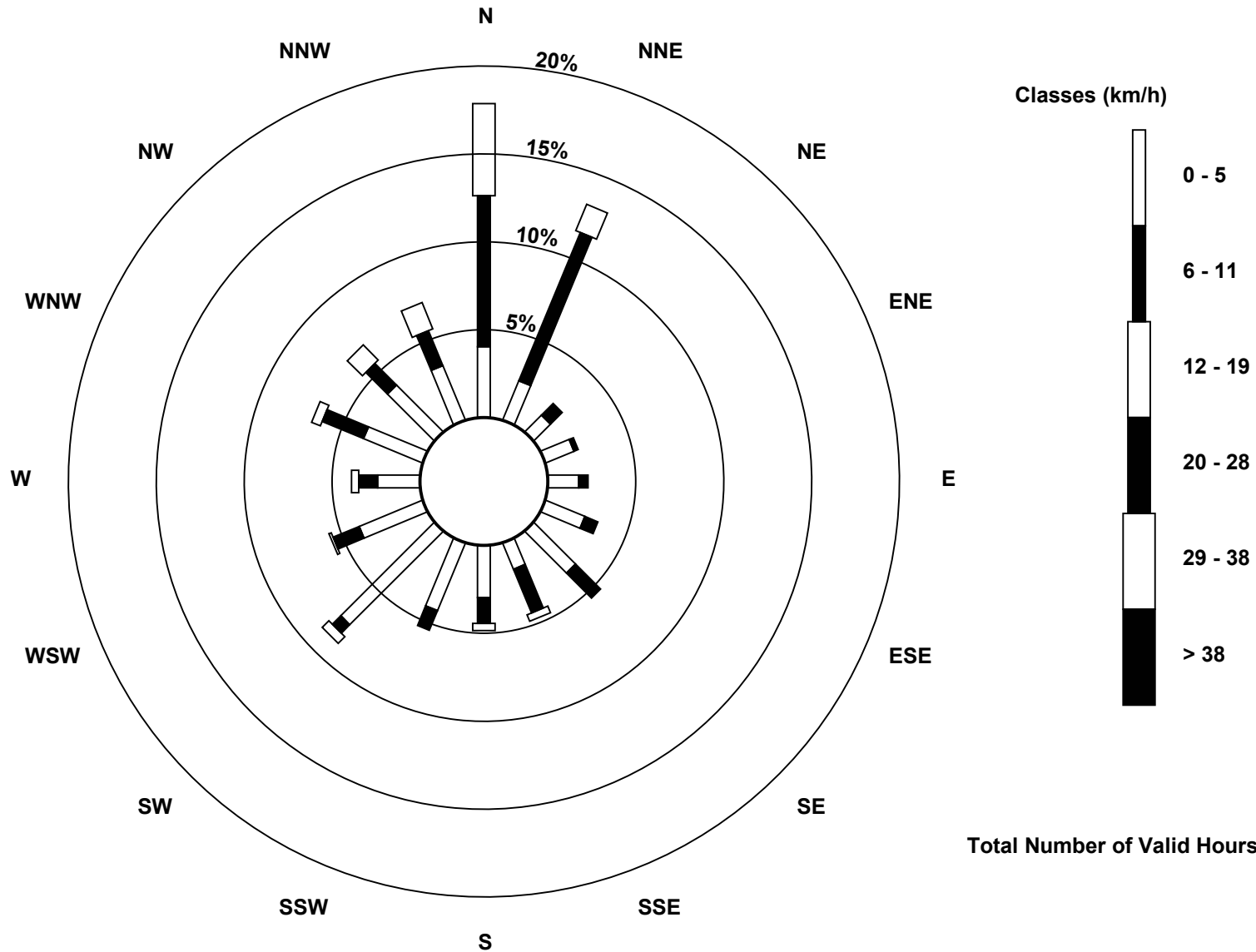
Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	30	18	10	13	13	18	25	12	22	31	56	29	18	27	28	25	375
6 - 11	64	68	7	2	4	6	15	20	11	9	5	12	8	19	13	16	279
12 - 19	39	12	0	0	0	0	0	3	3	0	4	1	3	4	9	12	90
20 - 28	0	0	0	0	0	0	0	0	0	0	0	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>	133	98	17	15	17	24	40	35	36	40	65	42	29	50	50	53	744

Total Number of Valid Hours: 744

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Wind Speed (WS) - km/h  
Fort McKay South (AMS 13)**



**Total Number of Valid Hours: 744**



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

**Wind Direction (WD) - deg**  
**Fort McKay South - May 2014**

Direction of Maximum Speed: 230 deg on May 21 16:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 338.6 deg on May 2	Hours of Data: 744
Direction of Minimum Speed: 204 deg on May 7 22:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 1.1 deg on May 17	Percent Operational Time: 100.0
Monthly Average Direction: 289.3 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-May	257	330	255	318	318	282	309	274	283	311	333	342	330	321	331	320	326	322	326	335	352	326	300	301	319.8
2-May	292	302	338	313	296	298	295	319	332	328	336	340	336	334	333	358	9	9	10	9	6	357	357	355	338.6
3-May	352	352	356	359	357	356	5	16	14	16	2	11	30	33	32	35	34	23	54	49	31	317	246	229	13.1
4-May	205	215	232	216	225	194	263	200	95	223	89	125	84	178	211	194	77	113	209	210	158	153	158	75	170.8
5-May	62	28	214	322	284	198	134	137	137	113	58	37	357	1	357	4	25	29	30	30	28	31	24	12	24.1
6-May	16	15	16	351	348	345	0	1	0	6	4	13	20	6	3	4	17	22	16	303	279	283	283	299	2.4
7-May	297	315	315	314	302	334	351	356	359	360	3	4	7	8	5	10	14	11	2	21	26	204	235	221	0.0
8-May	53	39	159	21	176	292	37	5	77	73	26	1	21	13	9	10	9	0	20	65	12	297	224	305	14.6
9-May	265	255	230	225	226	215	259	301	7	32	359	1	21	15	13	2	350	333	271	304	325	329	316	299	338.6
10-May	268	276	278	268	266	254	253	266	300	335	331	309	315	326	310	347	356	342	287	256	237	244	227	221	296.1
11-May	243	260	267	229	204	230	246	201	198	197	301	326	331	346	20	22	34	30	31	28	351	326	326	349	332.4
12-May	359	345	343	343	307	338	16	357	39	25	22	24	27	10	25	23	22	19	22	5	5	52	130	233	15.4
13-May	240	227	223	219	175	210	155	110	136	174	113	78	27	21	22	21	17	23	15	14	357	254	228	246	34.3
14-May	231	223	211	207	210	231	152	106	137	148	147	135	118	108	133	130	133	134	146	221	160	214	175	126	149.7
15-May	59	343	330	358	8	17	351	360	3	4	6	0	356	353	350	357	353	348	351	332	285	285	300	298	351.8
16-May	293	288	327	223	222	212	163	85	138	333	62	95	121	86	92	101	105	99	131	46	9	296	318	246	93.5
17-May	233	231	231	241	243	324	38	70	134	169	125	192	224	41	23	19	46	52	85	21	353	315	15	2	25.7
18-May	357	357	357	358	10	12	11	13	3	234	284	2	354	10	30	27	29	19	9	278	281	321	322	307	0.3
19-May	319	195	206	226	221	169	155	174	180	179	170	173	150	158	146	168	170	160	166	188	179	185	180	198	172.7
20-May	215	243	229	161	174	166	155	166	153	150	169	162	191	197	219	142	136	143	152	26	329	330	338	206	167.9
21-May	186	184	187	179	171	169	163	170	184	155	193	220	199	224	230	230	238	315	310	290	295	254	191	231	223.2
22-May	222	217	229	250	235	211	23	268	119	204	206	166	225	212	225	225	219	203	211	354	357	318	285	201	218.1
23-May	225	227	211	188	180	182	199	133	109	131	139	150	131	166	167	139	176	180	103	104	133	253	259	278	178.1
24-May	307	231	237	257	262	259	271	306	306	269	287	5	352	25	28	284	303	323	25	31	48	239	260	242	305.5
25-May	244	234	235	221	226	181	90	56	133	140	171	112	139	121	120	76	105	67	1	346	344	134	249	239	118.7
26-May	223	350	144	208	320	353	239	5	94	109	135	141	10	6	329	4	102	16	7	11	8	9	2	11	25.8
27-May	3	3	3	358	354	6	8	8	13	13	1	360	12	6	3	9	14	1	354	335	297	294	244	73	3.9
28-May	81	265	316	240	220	304	94	118	133	79	30	95	141	160	150	145	152	141	111	107	126	126	273	220	127.8
29-May	246	254	312	298	305	326	345	348	350	9	358	354	350	345	336	330	335	329	313	295	287	267	263	242	319.0
30-May	239	230	241	247	245	244	248	243	283	288	283	294	278	283	298	311	107	90	356	121	20	86	223	173	271.9
31-May	208	233	356	265	228	173	31	25	6	31	31	26	32	14	14	15	24	15	15	9	4	339	336	338	13.2

295.2 297.9 295.9 284.7 282.9 289.7 335.5 357.0 11.5 5.2 358.9 6.0 1.5 0.5 2.9 6.6 17.3 16.9 15.9 2.9 353.1 309.7 287.6 296.7  
 Diurnal Average

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



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

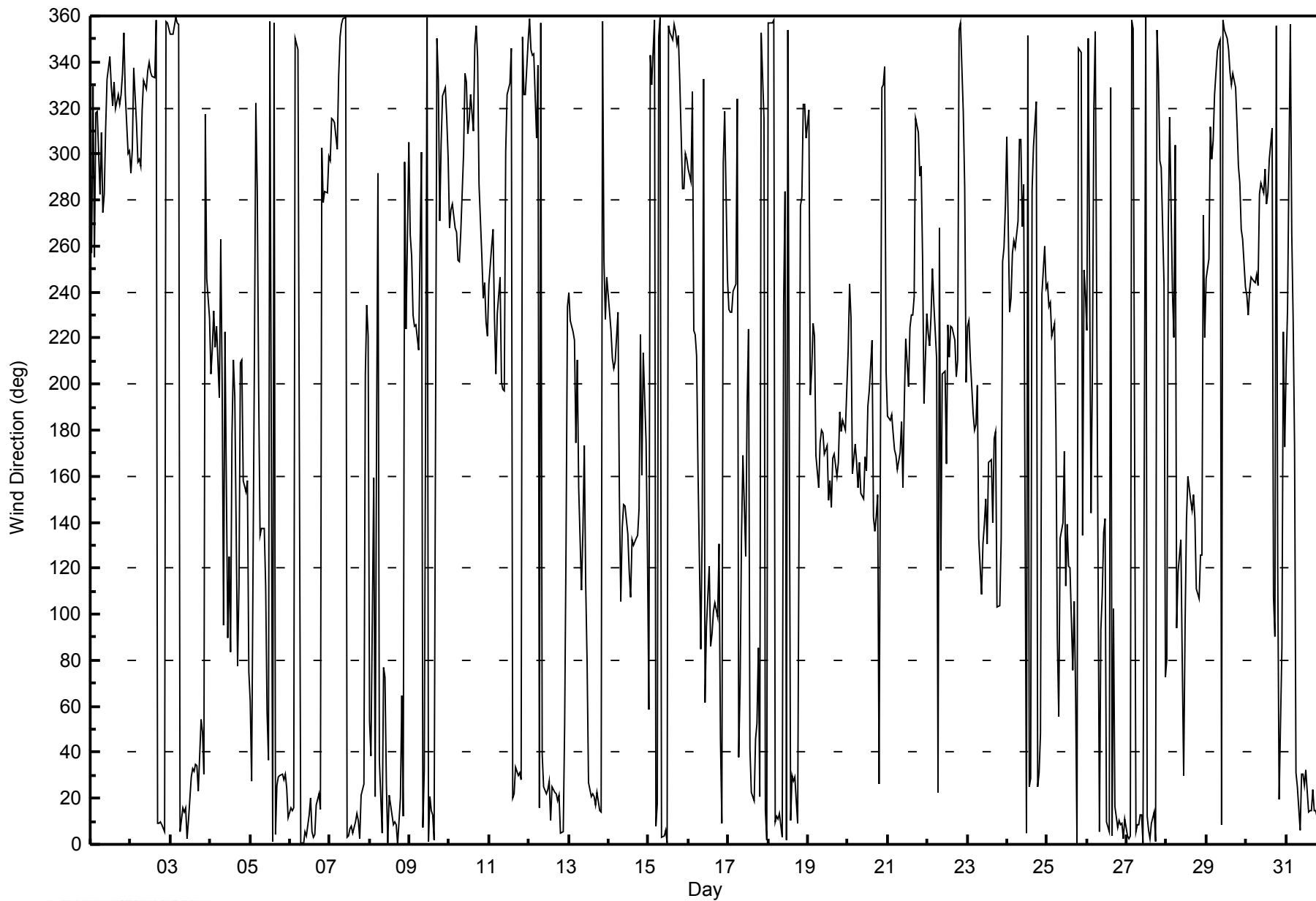
**Wind Direction (WD) - deg**  
**Fort McKay South - May 2014**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 107 deg on May 22 07:00		Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																							
Minimum Value: 5 deg on May 28 04:00																									
Percentiles: P <sub>1</sub> = 12 P <sub>10</sub> = 23 Q <sub>1</sub> = 27 Median = 34 Q <sub>3</sub> = 46 P <sub>90</sub> = 69 P <sub>99</sub> = 98																									
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-May	23	41	86	64	37	29	32	35	35	35	36	31	39	39	41	42	32	34	34	29	25	27	28	31	86
2-May	31	36	39	45	43	37	35	34	32	35	32	30	34	32	35	30	28	27	28	27	26	26	24	29	45
3-May	27	28	26	24	26	24	27	30	29	31	33	42	41	40	43	40	35	40	37	36	31	33	40	39	43
4-May	47	46	26	38	36	48	93	91	57	68	71	69	73	87	83	49	77	68	32	32	47	35	33	32	93
5-May	41	40	64	61	32	44	90	40	39	51	63	59	35	30	36	28	34	31	28	29	28	31	27	24	90
6-May	25	25	26	23	23	23	24	29	29	31	31	30	39	31	35	31	30	32	50	43	20	15	11	11	50
7-May	10	16	15	14	40	25	24	26	29	32	32	30	28	27	33	29	31	30	25	29	34	90	29	87	90
8-May	96	37	59	77	96	94	33	37	76	65	61	26	30	27	30	27	27	25	28	37	79	28	89	50	96
9-May	50	78	14	45	62	77	38	48	53	69	50	76	40	57	29	85	37	43	88	35	29	25	24	28	88
10-May	22	24	26	24	21	20	24	35	42	33	32	40	38	36	43	35	30	38	49	41	23	15	20	34	49
11-May	65	29	66	82	57	39	87	30	23	29	93	38	36	45	37	33	32	34	31	29	33	28	16	21	93
12-May	18	15	17	17	37	25	23	38	58	58	37	35	44	35	37	36	32	31	27	26	30	40	65	30	65
13-May	12	12	12	18	26	34	24	27	65	62	49	51	47	34	31	30	30	30	28	26	49	29	35	33	65
14-May	19	24	42	45	41	65	38	49	57	49	38	38	43	40	45	40	33	31	34	79	40	20	32	35	79
15-May	55	48	49	57	18	23	19	25	26	26	26	26	24	25	26	25	24	27	25	30	21	24	27	33	57
16-May	29	26	48	29	20	30	80	93	84	98	86	63	72	53	37	44	59	37	43	39	41	39	84	22	98
17-May	19	27	9	23	18	50	39	68	73	60	88	79	54	75	50	48	66	42	39	25	22	83	46	23	88
18-May	23	21	17	20	19	22	24	26	32	86	50	27	26	29	33	41	36	31	31	57	32	31	27	34	86
19-May	46	44	32	30	24	35	28	33	31	32	38	43	38	36	35	36	33	32	28	23	24	21	21	23	46
20-May	41	18	30	14	14	23	26	30	33	37	34	30	29	37	68	35	33	33	31	71	43	51	58	33	71
21-May	16	15	15	13	20	21	23	32	34	30	33	32	52	32	27	25	35	35	40	40	37	19	26	22	52
22-May	28	27	43	26	47	98	107	106	98	79	101	60	42	34	37	32	35	36	25	70	42	58	49	42	107
23-May	45	33	38	31	65	33	49	33	32	33	26	36	56	59	47	48	56	46	46	81	47	99	36	35	99
24-May	40	65	20	27	25	24	56	93	45	46	46	31	62	33	57	45	39	41	30	35	28	46	38	33	93
25-May	26	36	18	41	52	42	34	39	49	41	52	78	70	84	62	44	37	42	23	50	63	92	50	68	92
26-May	70	74	30	70	71	74	100	39	48	41	36	86	89	27	42	85	49	30	25	24	25	26	26	28	100
27-May	27	28	26	25	26	25	28	27	30	28	27	25	29	24	25	27	27	26	22	26	35	28	52	44	52
28-May	48	93	52	5	50	59	53	58	43	73	44	66	39	38	41	39	34	33	39	34	34	27	86	71	93
29-May	24	38	16	24	27	26	26	28	26	30	32	25	24	28	26	27	29	34	34	34	34	30	31	20	38
30-May	21	28	24	26	26	27	30	28	43	40	39	46	43	36	41	46	48	46	58	54	42	81	15	29	81
31-May	21	76	56	46	55	52	47	34	37	53	38	46	38	31	35	34	36	29	27	25	25	20	77	84	84
Diurnal Maximum																									



**WBEA**  
**Hourly Averages**

**Wind Direction (WD) - deg**  
**Fort McKay South - May 2014**





# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Report

### Station Information

Calibration Date	May 20, 2014	Previous Calibration	April 24, 2014
Station Name	Fort McKay South	Station Number	AMS 13
Reason:	Routine		
Start Time (MST)	9:45	End Time (MST)	15:10
Barometric Pressure	735 mmHg	Station temp.	24 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	1377
Cal Gas Concentration	51.1 ppm	Cal Gas Expiry Date	29/05/2014
Gas Cert Reference	LL107		
DACS make/model	Campbell Scientific CR3000	DACS serial No.	3492
DACS voltage range	0-5v	DACS channel #	

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	1000	1000	PMT voltage	37	26
Analyzer Range (mv)	5000	5000	Lamp voltage	2394	2395
Calculated slope	0.998401	0.994612	Chamber temp.	50.0	50.0
Calculated intercept	0.866261	1.883802	Pressure ("Hg)	26.1	26.1
Analyzer Background	23.7	26.0	Flow (lpm)	672	671
Analyzer Coefficient	1.604	1.608	Intensity	81	81

Analyzer make	API T100	Analyzer serial #	599
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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	5000	0.0	0.0	1.5	NA
as found span	5000	78.9	806.4	805.6	1.001
calibrator zero	5000	0.0	0.0	-0.3	0.000
high point	5000	78.9	806.4	809.8	0.996
second point	5000	39.4	402.7	401.7	1.002
third point	5000	19.7	201.3	199.2	1.011
calibrator zero					
as left zero	5000	0.0	0.0	-0.3	NA
as left span	5000	78.9	806.4	803.1	NA
Average Correction Factor					1.003

Corrected As found	804.1	Previous response	806.8	% change	0.3%
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#### Notes:

Zero and Span with small adjustments

Calibration Performed By: Ryan Power



# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Summary

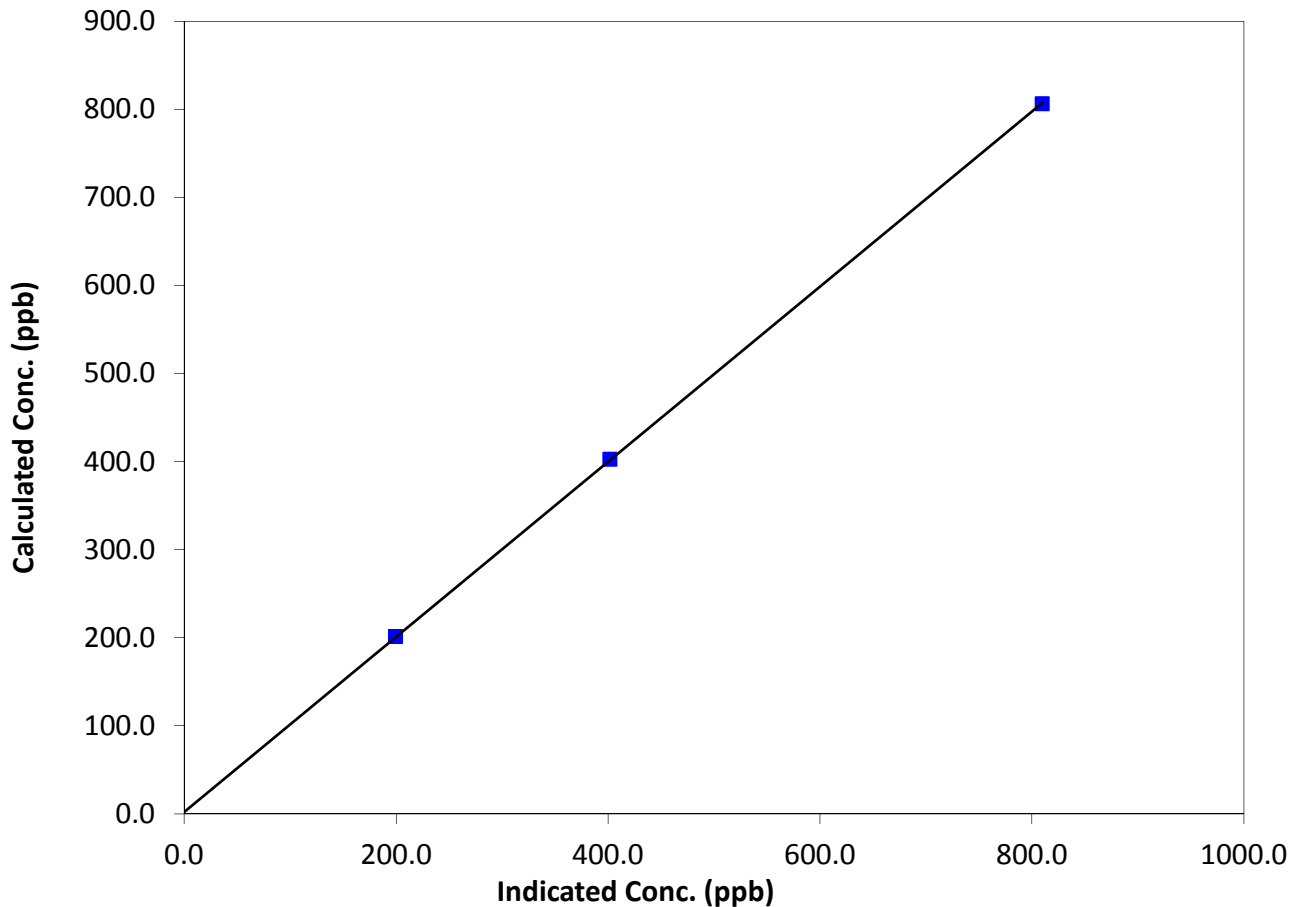
### Station Information

Calibration Date	May 20, 2014	Previous Calibration	April 24, 2014
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	9:45	End Time (MST)	15:10
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	N/A	Correlation Coefficient	0.999982
806.4	809.8	0.9958		
402.7	401.7	1.0023	Slope	0.994612
201.3	199.2	1.0106		
			Intercept	1.883802

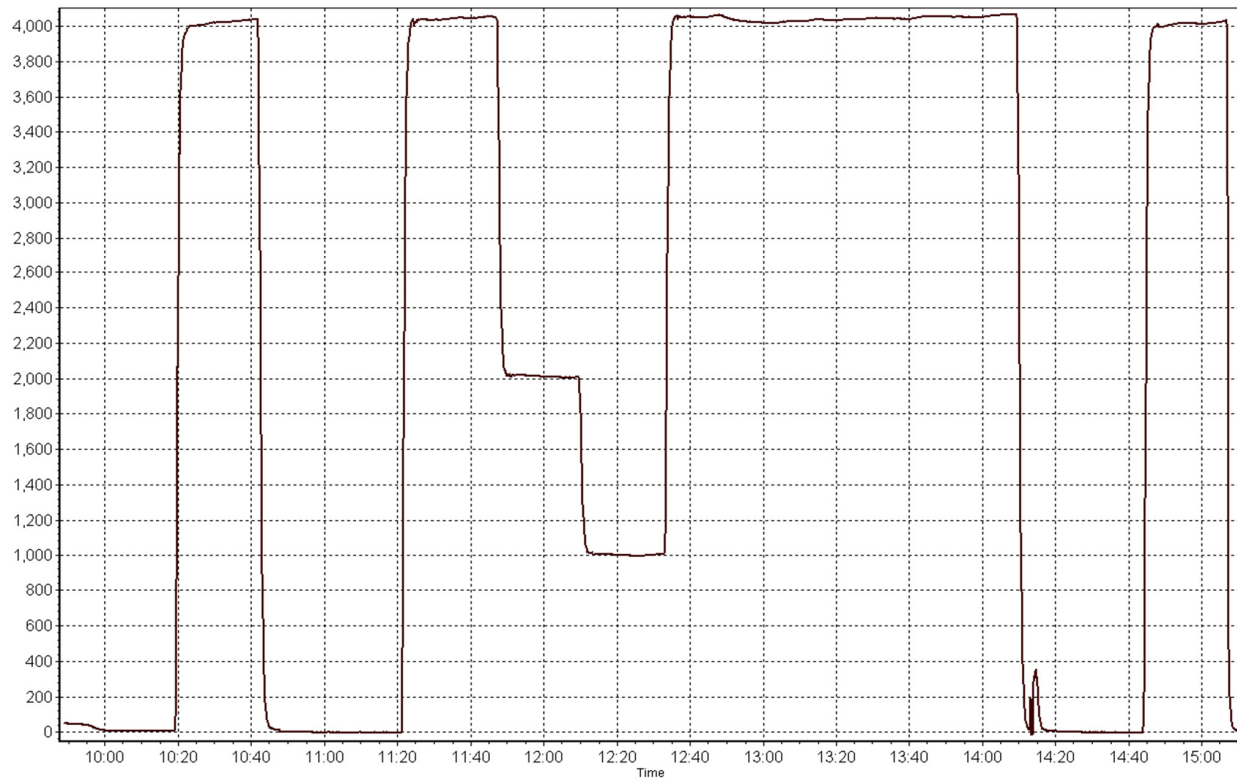
SO<sub>2</sub> Calibration Curve





SO2 Calibration Plot

Date: May 20, 2014





# Wood Buffalo Environmental Association

## TRS Calibration Report

### Station Information

Calibration Date	May 16, 2014	Previous Calibration	April 23, 2014
Station Name	Fort McKay South	Station Number	AMS 13
Reason:	Routine		
Start Time (MST)	9:10	End Time (MST)	12:05
Barometric Pressure	743 mmHg	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial number	11041107
Cal Gas Concentration	10.4 ppm H2S	Cal Gas Expiry Date	30/05/2013
Gas Cert Reference	LL82750	SO2 gas conc.	51.1 ppm SO2
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2581
DACS voltage range	0-5v	DACS channel #	

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	100	100	PMT voltage	-727	-727
Analyzer Range (input)	5000	5000	Lamp voltage	1008	1006
Calculated slope	0.989346	1.002228	Chamber temp.	45	45
Calculated intercept	-0.158590	-0.124576	Pressure	695.3	693.2
Analyzer Background	1.83	1.8	Flow	0.438	0.436
Analyzer Coefficient	1.046	1.023	Intensity	90	90
			Converter temp.	800	800

Analyzer make/model	TEI 43i-TLE	Analyzer serial #	1218153359
Converter make/model	CDN-101	Converter serial #	456

### Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.1	NA
as found span	5000	38.5	80.1	81.5	0.983
SO2 scrubber check	5000	39.4	402.7	0.7	NA
calibrator zero	5000	0.0	0.0	0.1	NA
high point	5000	38.5	80.1	80.0	1.001
second point	5000	19.2	39.9	40.1	0.996
third point	5000	9.6	20.0	20.0	1.000
calibrator zero					
as left zero	5000	0.0	0.0	0.2	NA
as left span	4000	30.8	80.1	80.2	0.999
Average Correction Factor					0.999

Corrected As found	81.3	Previous response	81.1	% change	-0.3%
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#### Notes:

Small adjustment to span. As Found zero used as Calibrator Zero. Scrubber check after third point

Calibration Performed By:

Ryan Power



# Wood Buffalo Environmental Association

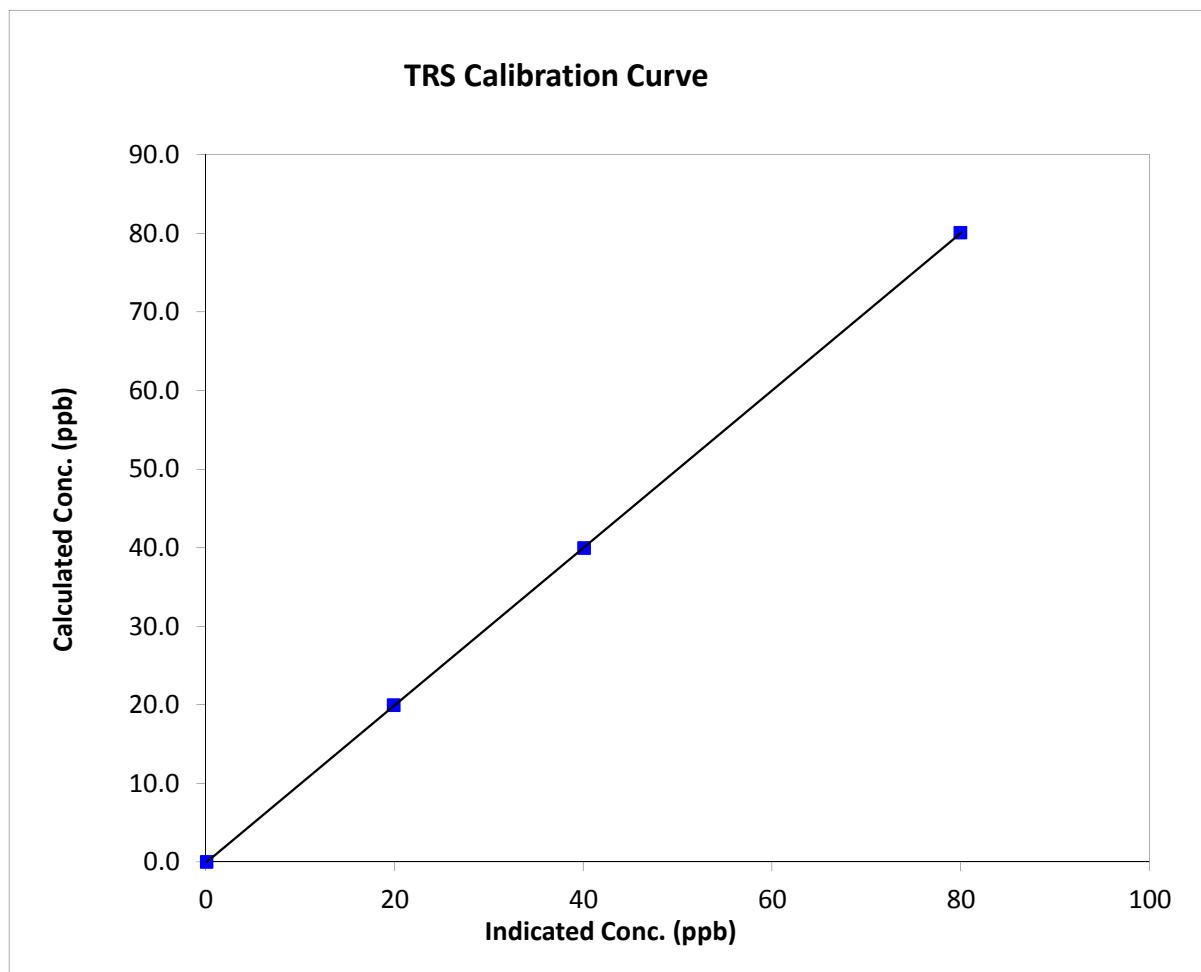
## TRS Calibration Summary

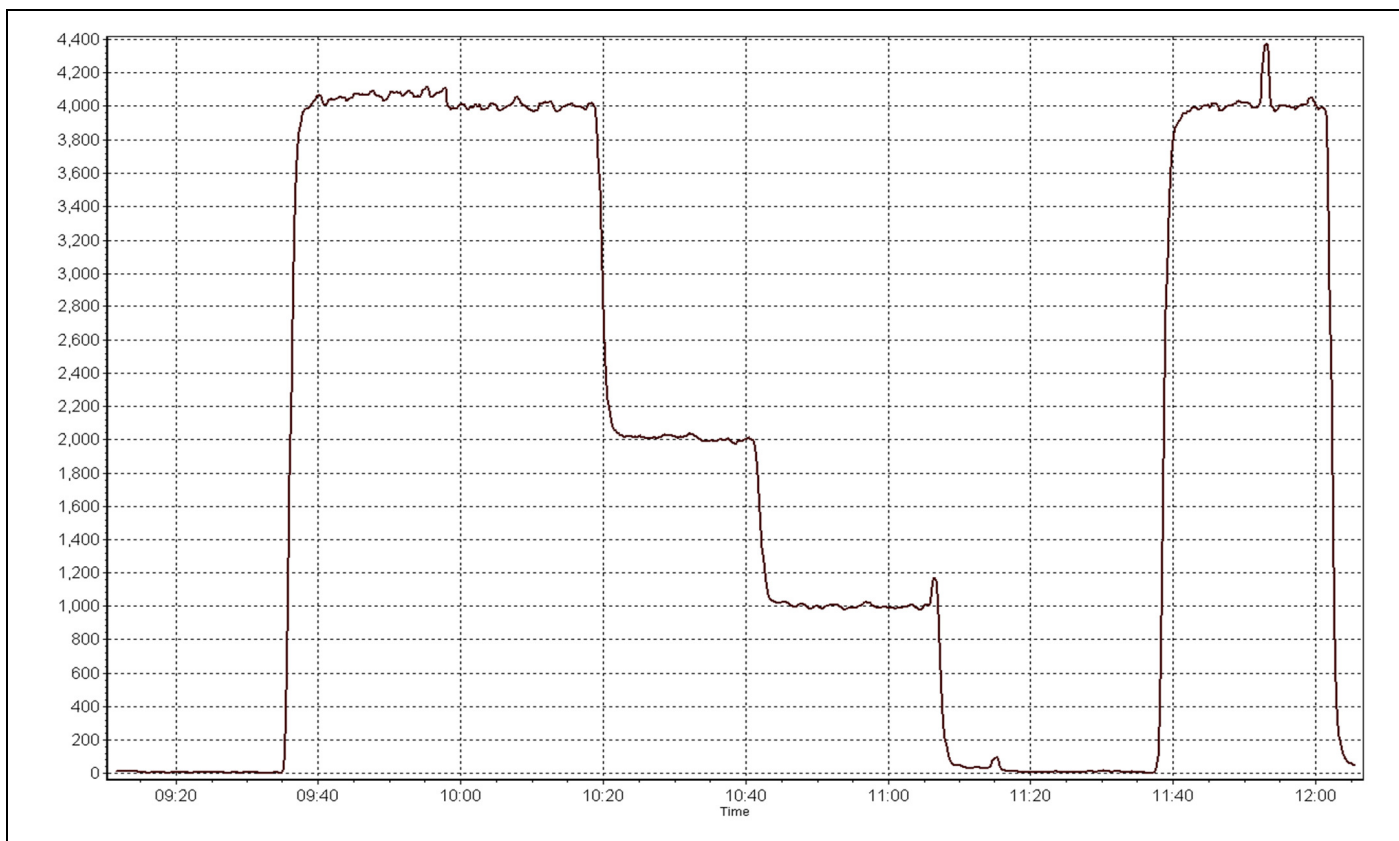
### Station Information

Calibration Date	May 16, 2014	Previous Calibration	April 23, 2014
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	9:10	End Time (MST)	12:05
Analyzer make	TEI 43i-TLE	Analyzer serial #	1218153359

### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	N/A	Correlation Coefficient	0.999993
80.1	80.0	1.0012		
39.9	40.1	0.9960	Slope	1.002228
20.0	20.0	1.0005		
			Intercept	-0.124576







# Wood Buffalo Environmental Association

## THC Calibration Report

### Station Information

Calibration Date	May-20-14	Previous Calibration	April-24-14
Station Name	Fort McKay South	Station Number	AMS 13
Reason:	Routine		
Start Time (MST)	9:45	End Time (MST)	15:08
Barometric Pressure	735 mmHg	Station temp.	24 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11041107
Gas Cert Reference	LL107918	Cal Gas Expiry Date	29/05/2014
CH4 Cal Gas Conc.	515 ppm	CH4 Equiv Conc.	1076.0 ppm
C3H8 Cal Gas Conc.	204 ppm		
DACS make/model	Campbell Scientific CR3000	DACS serial No.	3492
DACS voltage range	0-5v	DACS channel #	

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppm)	25	25	Sample Pressure	8.0	8.0
Analyzer Range (mv)	5000	5000	Air or Bypass press	42.4	42.4
Calculated slope	0.993058	1.014057	Fuel Pressure	22.6	22.6
Calculated intercept	0.086546	-0.046295			
BKG	2.8	2.4			
COEF	4.834	4.706			

Analyzer make: Thermo Model 51iLT      Analyzer serial #: 1236656114

### Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration THC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.00	-0.08	N/A
as found span	5000	78.9	16.98	16.89	1.005
calibrator zero	5000	0.0	0.00	0.05	N/A
high point	5000	78.9	16.98	16.79	1.011
second point	5000	39.4	8.48	8.41	1.009
third point	5000	19.7	4.24	4.22	1.004
calibrator zero					
as left zero	5000	0.0	0.00	0.14	N/A
as left span	5000	78.9	16.98	16.84	1.008
Average Correction Factor					1.008

Corrected As found: 16.97      Previous response: 17.01      % change: 0.2%

#### Notes:

Zero and span adjusted. Still drifting. Will address next visit

Calibration Performed By:

Ryan Power



# Wood Buffalo Environmental Association

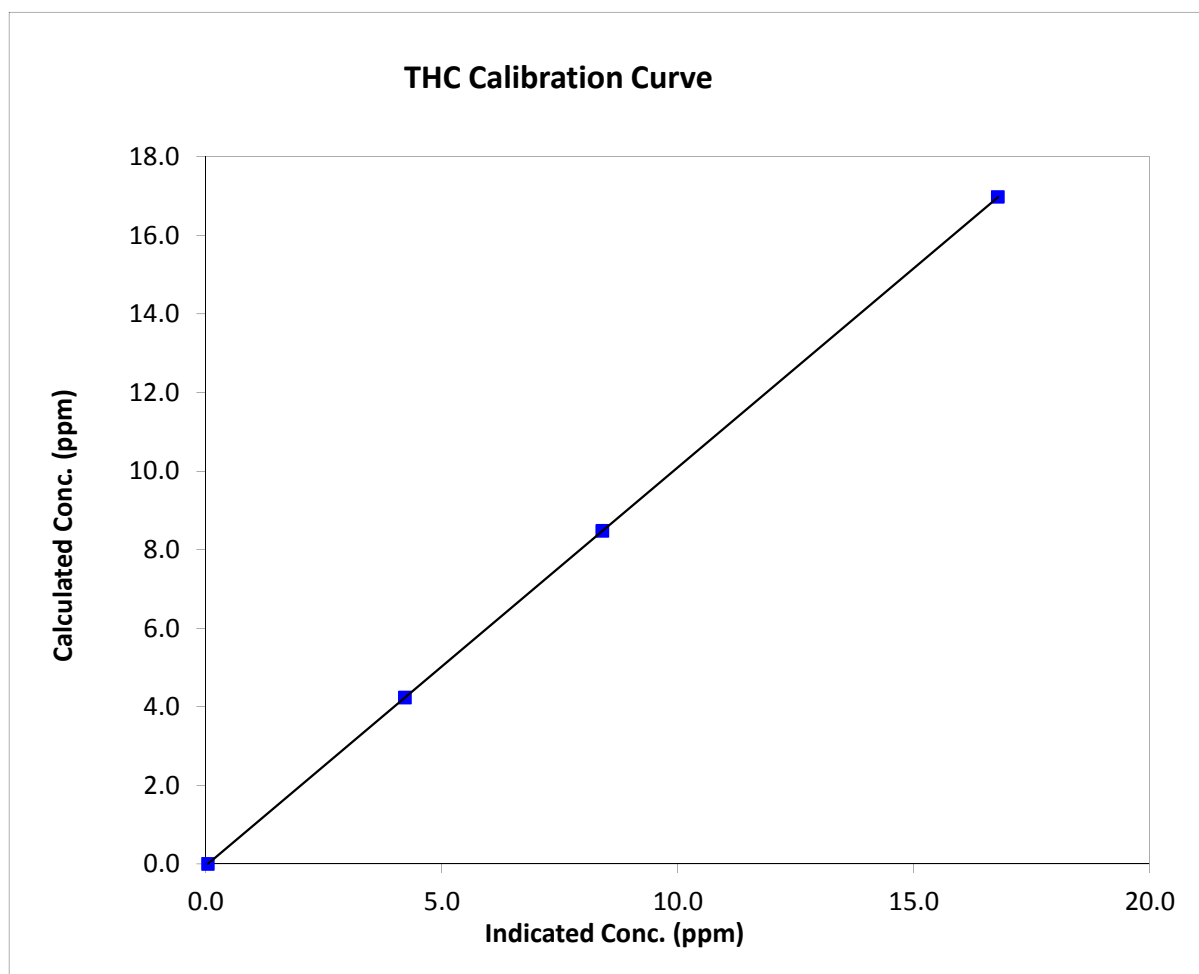
## THC Calibration Summary

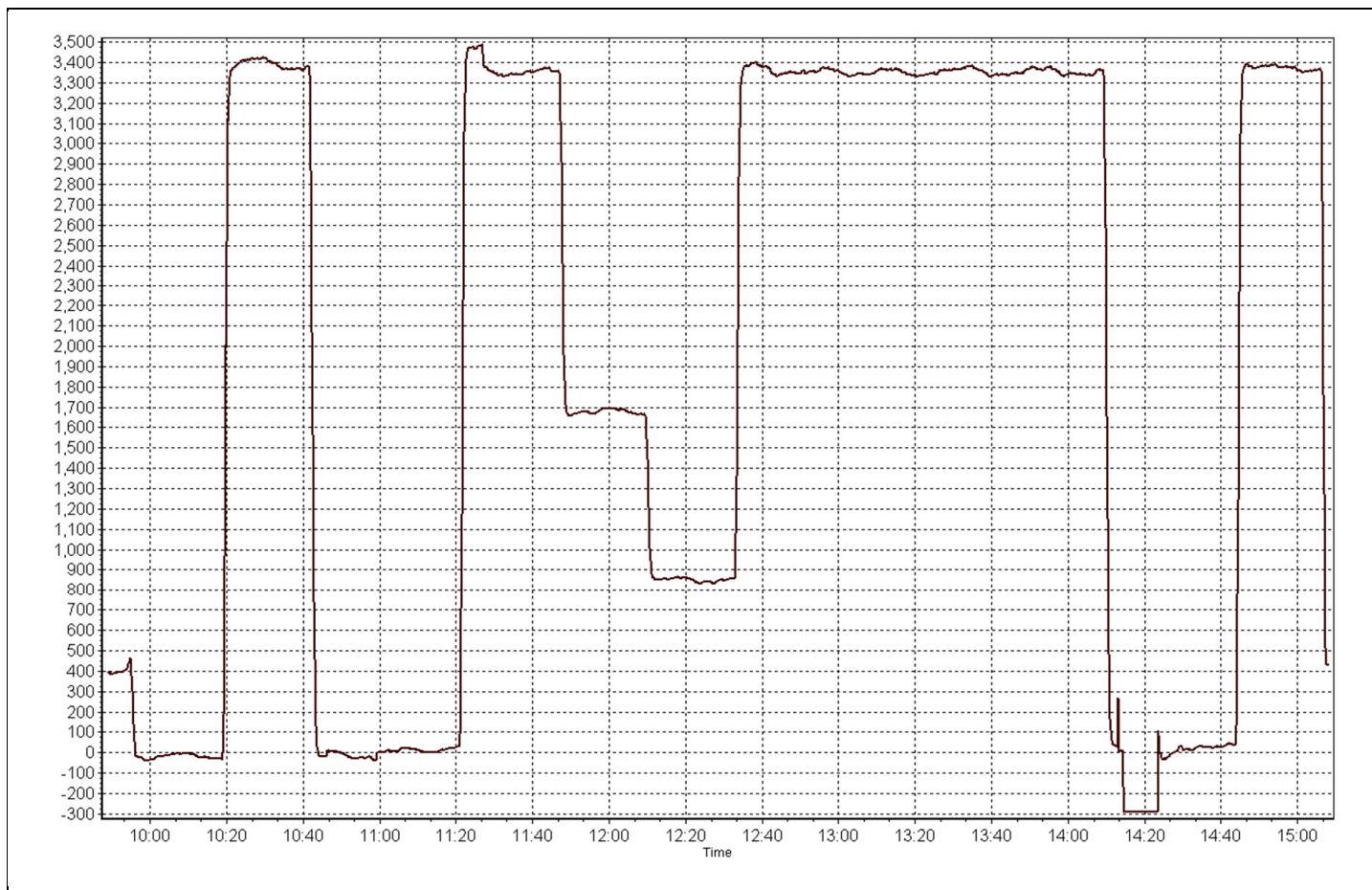
### Station Information

Calibration Date	May 20, 2014	Previous Calibration	April 24, 2014
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	9:45	End Time (MST)	15:08
Analyzer make	Thermo Model 51iLT	Analyzer serial #	1236656114

### Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.05	N/A	Correlation Coefficient	1.000000
16.98	16.79	1.0113		
8.48	8.41	1.0085	Slope	1.014057
4.24	4.22	1.0038		
			Intercept	-0.046295







# Wood Buffalo Environmental Association

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

### Station Information

Calibration Date	May 21, 2014	Previous Calibration	April 25, 2014
Station Name	Fort McKay South	Station Number	AMS 13
Reason:	Routine		
Start Time (MST)	11:05	End Time (MST)	13:56
Barometric Pressure	730 mmHg	Station temp.	23 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11041107
NO2 calibration used	May-20-14	Transfer Standard	??
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2681
DACS voltage range	0-5v	DACS channel #	

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	500	500	Bench temp.	29.4	29.6
Analyzer Range (input)	5000	500	Lamp temp.	58.0	58.0
Calculated slope	0.999575	0.999961	Pressure ("Hg)	26.2	26.2
Calculated intercept	-0.120489	0.619074	Flow cell A	696	693
Analyzer Background	-1.1	-1.1	Flow cell B	N/A	
Analyzer Coefficient	1.003	1.025	Cell A Intensity	N/A	
			Cell B Intensity	N/A	

Analyzer make API T400 Analyzer serial # 825

### Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator Lamp Intensity (mA)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.00	0.0	-0.1	N/A
as found span	5000	0.903	357.3	349.3	1.023
calibrator zero	5000	0.00	0.0	-0.1	N/A
high point	5000	0.903	357.3	356.8	1.001
second point	5000	0.585	212.5	212.1	1.002
third point	5000	0.358	112.9	111.4	1.013
calibrator zero					
as left zero	5000	0.00	0.0	0.0	N/A
as left span	5000	0.903	357.3	352.0	N/A
Average Correction Factor					1.005

Corrected As found 349.4 Previous response 357.6 % change 2.3%

#### Notes:

Small adjustment to span. As found Zero used as Calibrator Zero.

Calibration Performed By:

Ryan Power





## Wood Buffalo Environmental Association

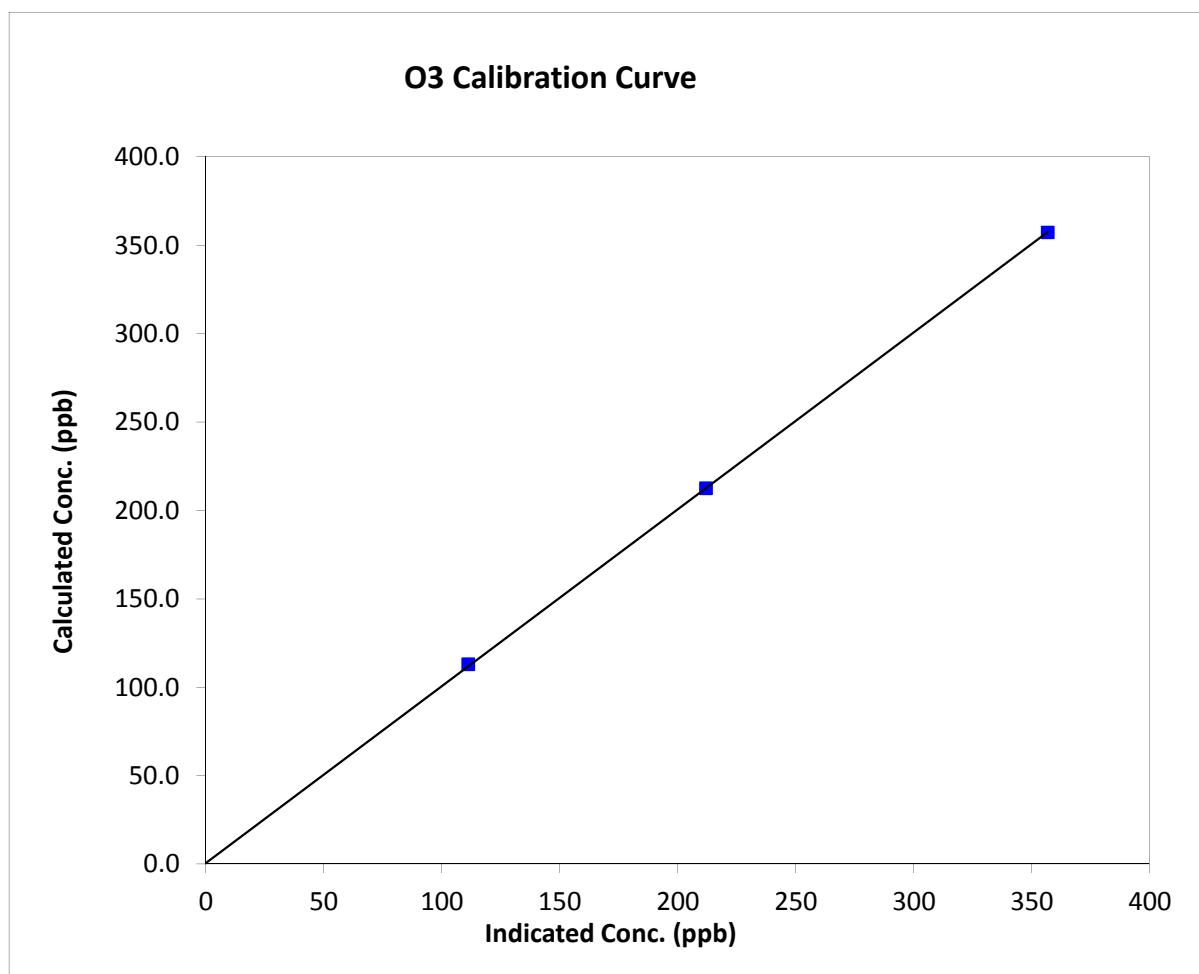
### O<sub>3</sub> Calibration Summary

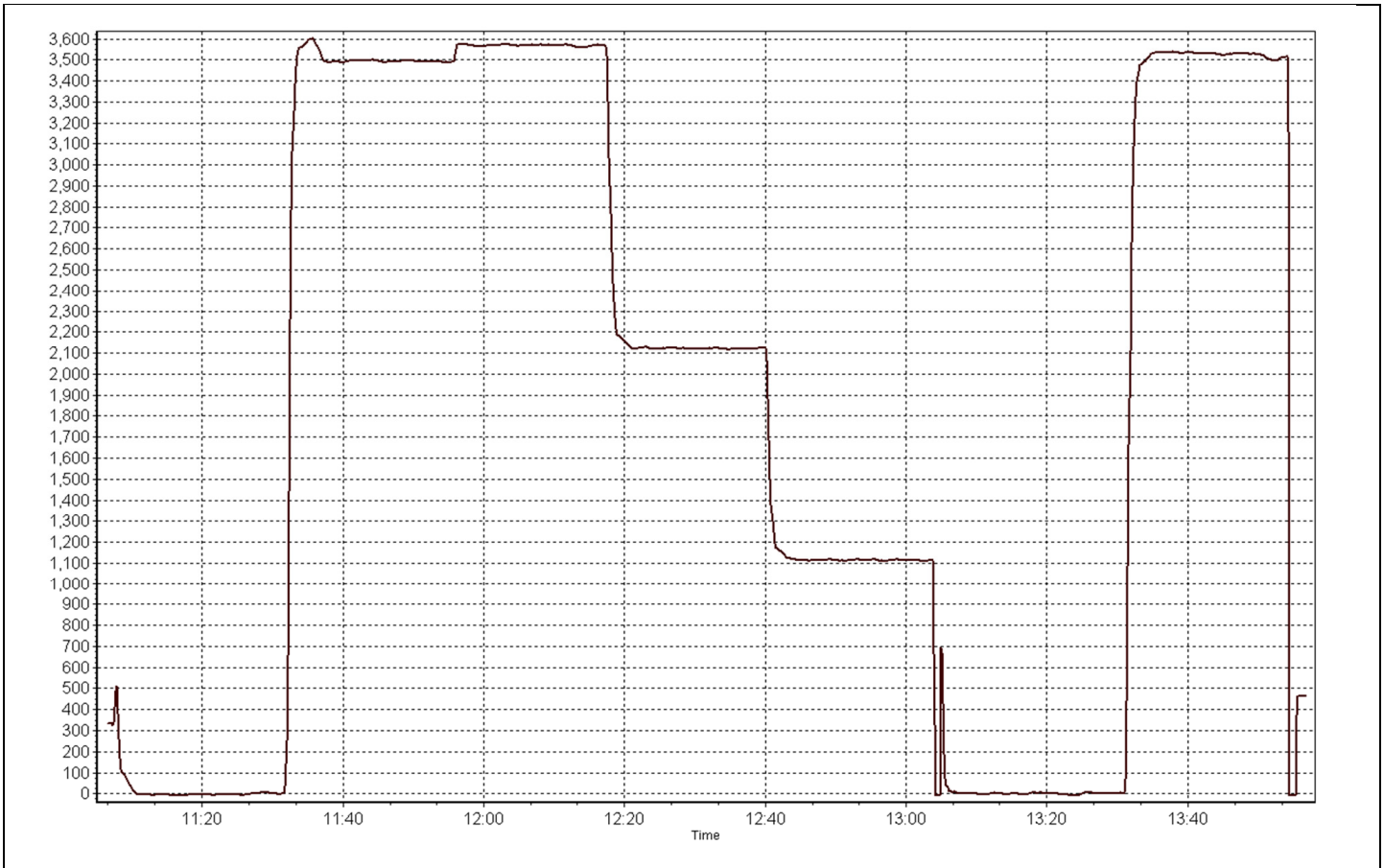
#### Station Information

Calibration Date	May-21-14	Previous Calibration	April 25, 2014
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	11:05	End Time (MST)	13:56
Analyzer make	API T400	Analyzer serial #	825

#### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999985
357.3	356.8	1.0013		
212.5	212.1	1.0020	Slope	0.999961
112.9	111.4	1.0132		
			Intercept	0.619074







# Wood Buffalo Environmental Association

## NO<sub>x</sub>-NO-NO<sub>2</sub> Calibration Report

### Station Information

Calibration Date	May 20, 2014	Previous Calibration	April 24, 2014
Station Name	Fort McKay South	Station Number	AMS 13
Reason:	Routine		
Start Time (MST)	9:50	End Time (MST)	15:10
Barometric Pressure	735 mmHg	Station Temperature	24.0 Deg C
Calibrator	Sabio 4010	Serial Number	11041107
NO Cal Gas Conc	50.7 ppm	Cal Gas Expiry Date	May 29, 2014
NOx Cal Gas Conc	50.8 ppm	Cal Gas Serial #	LL107918

### DACs Information

DACS make & model Campbell Scientific CR3000 DACS serial No. 3492

Parameter		NOx	NO	NO2
MV conversion	Analyzer Range (ppb)	1000	1000	1000
	Analyzer Range (mv)	5000	5000	5000
Before	Data Slope	1.002419	1.000609	0.991391
	Data Offset	1.939296	1.664425	0.050006
After	Data Slope	0.996821	0.996803	0.995418
	Data Offset	2.062689	1.872155	0.246492
Channel #		3	2	1
Voltage Range		0 - 5V	0 - 5V	0 - 5V

### Analyzer Information

Analyzer make/model Thermo 42C Analyzer serial # 2185

Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
NO coefficient	0.850	ppb	0.866	ppb
NOx coefficient	0.999	ppb	1.001	ppb
NO2 coefficient	1.000	ppb	1.000	ppb
NO bkgrnd	4.3		4.4	
NOx bkgrnd	4.4		4.4	
Nt coefficient	N/A		N/A	
Chamber Temp	49.9	Deg C	49.4	Deg C
Moly Temp	325.0	Deg C	325.0	Deg C
PMT Temp	-3.7	Deg C	-3.8	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell Press	198.9	mmHg	198.1	mmHg
Sample Flow	0.815	ccm	0.815	ccm

Notes:

Span adjusted.



# Wood Buffalo Environmental Association

## NO<sub>x</sub>-NO-NO<sub>2</sub> Calibration Report

### Station Information

Calibration Date:

May 20, 2014

Station Number:

AMS 13

### 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 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
as found zero	5000	0.0	0.0	0.0	0.0	0.1	0.1	-0.1	N/A	N/A
as found span	5000	78.9	801.6	800.0	1.6	788.7	788.2	1.0	1.0164	1.0150
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	-0.1	N/A	N/A
high point	5000	78.9	801.6	800.0	1.6	803.4	801.9	2.0	0.9977	0.9977
second point	5000	39.4	400.3	399.5	0.8	397.6	397.3	0.5	1.0067	1.0056
third point	5000	19.7	200.2	199.8	0.4	197.1	197.1	0.0	1.0154	1.0136
calibrator zero										
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	-0.1	N/A	N/A
as left span	5000	78.9	801.6	444.6	357.1	801.4	453.5	348.2	1.0003	0.9803
Average Correction Factor									1.0066	1.0056

Corrected As found

NO<sub>x</sub>= 788.6

NO= 788.1

Percent Change

NO<sub>x</sub>= 1.2%

NO= 1.2%

Previous Response

NO<sub>x</sub>= 797.8

NO= 797.9

### GPT Calibration Data

Dilution Flow

5000

ccm

Source Gas Flow

78.90

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			-0.1			N/A	
1st NO <sub>2</sub> (350)	N/A	444.6	357.3	802.9	444.6	358.6	0.9830	1.0000	0.9962	100.4%
2nd NO <sub>2</sub> (200)	N/A	589.3	212.5	802.5	589.3	213.5	0.9834	1.0000	0.9953	100.5%
3rd NO <sub>2</sub> (100)	N/A	689.0	112.9	801.3	689.0	112.8	0.9849	1.0000	1.0010	99.9%
4th NO <sub>2</sub> (0)	801.8	N/A	0.6	802.4	801.8	1.1	0.9835	1.0000	N/A	N/A
Average Correction Factor							0.9837	1.0000	0.9975	100.3%

Calibration Performed By:

Ryan Power



# Wood Buffalo Environmental Association

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

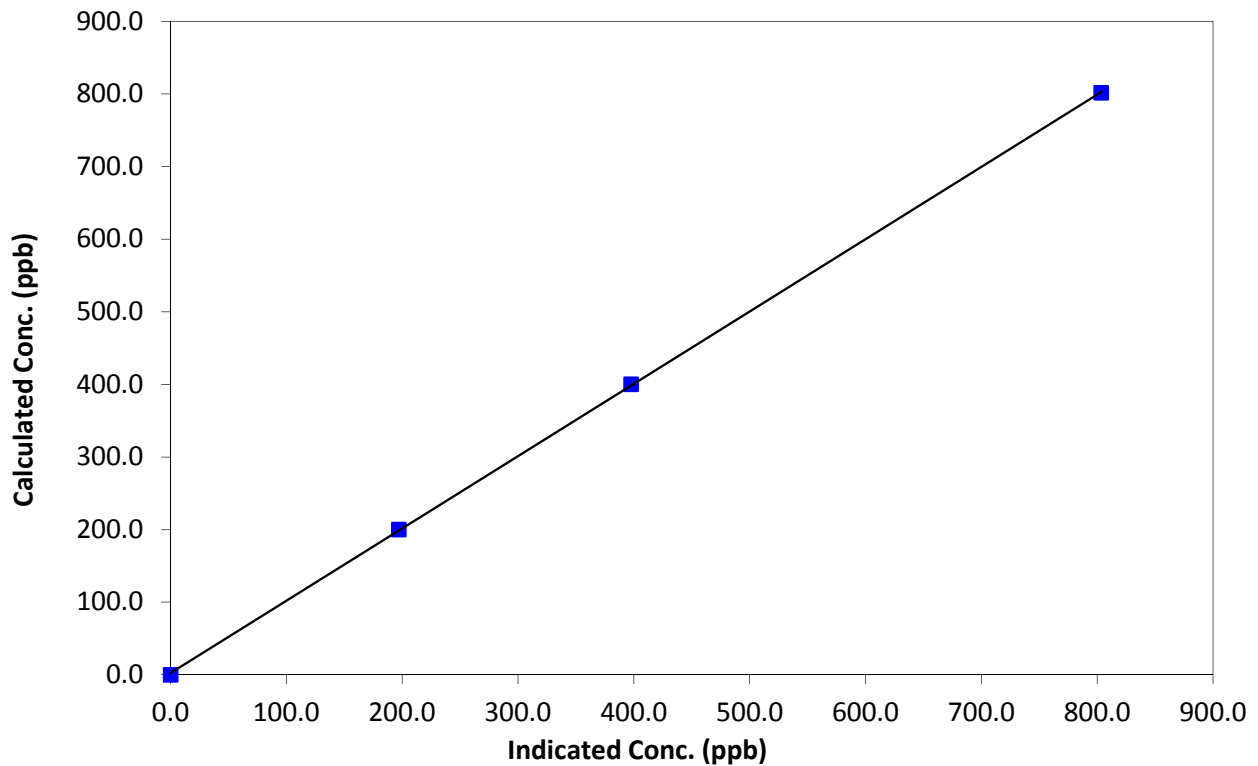
### Station Information

Calibration Date	May 20, 2014	Previous Calibration	April 24, 2014
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	9:50	End Time (MST)	15:10
Analyzer make	Thermo 42C	Analyzer serial #	2185

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	N/A	Correlation Coefficient	0.999964
801.6	803.4	0.9977		
400.3	397.6	1.0067	Slope	0.996821
200.2	197.1	1.0154		
			Intercept	2.062689

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





# Wood Buffalo Environmental Association

## NO Calibration Summary

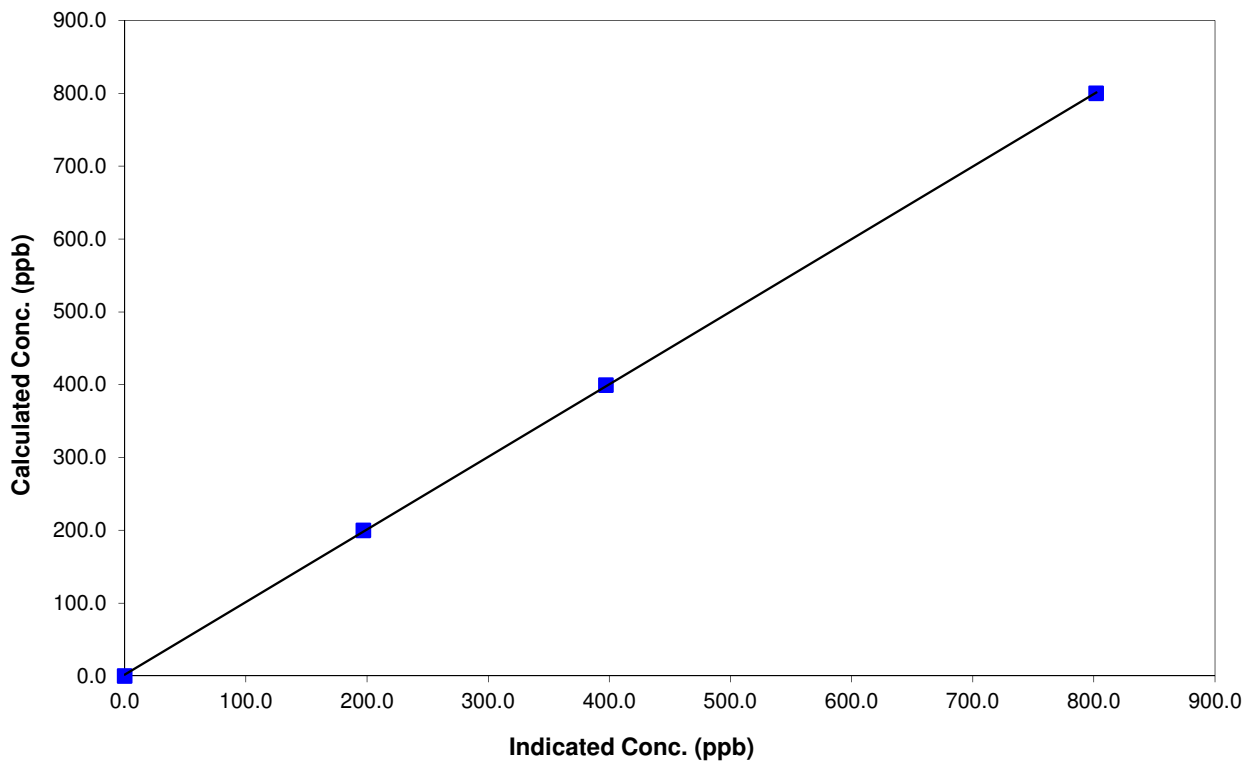
### Station Information

Calibration Date	May 20, 2014	Previous Calibration	April 24, 2014
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	9:50	End Time (MST)	15:10
Analyzer make	Thermo 42C	Analyzer serial #	2185

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999973
800.0	801.9	0.9977		
399.5	397.3	1.0056	Slope	0.996803
199.8	197.1	1.0136		
			Intercept	1.872155

### NO Calibration Curve





# Wood Buffalo Environmental Association

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

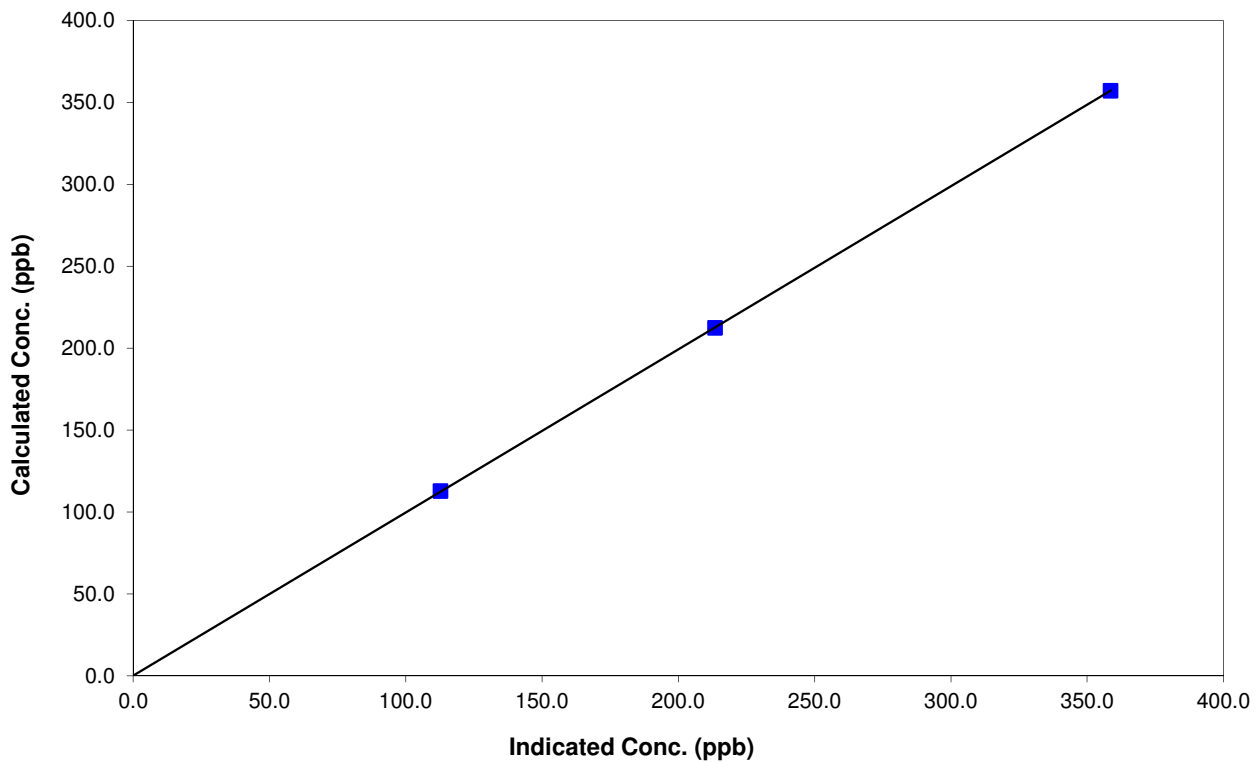
### Station Information

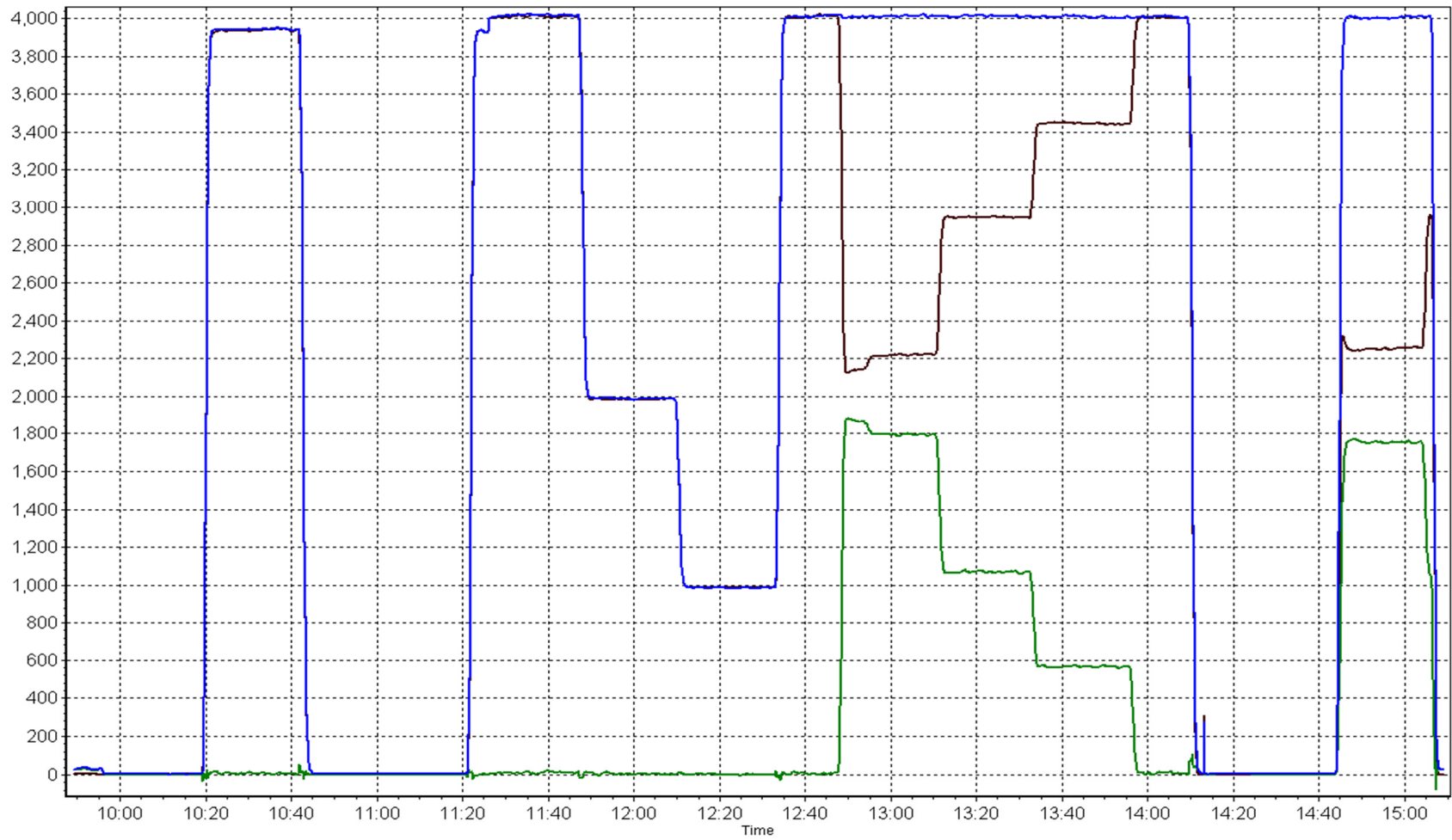
Calibration Date	May 20, 2014	Previous Calibration	April 24, 2014
Station Number	Fort McKay South	Station Number	AMS 13
Start Time (MST)	9:50	End Time (MST)	15:10
Analyzer make	Thermo 42C	Analyzer serial #	2185

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999996
357.3	358.6	0.9962		
212.5	213.5	0.9953	Slope	0.995418
112.9	112.8	1.0010		
			Intercept	0.246492

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









# Wood Buffalo Environmental Association

## SHARP AUDIT / CALIBRATION

### STATION INFORMATION

Calibration Date:	<u>May 21, 2014</u>	Previous Calibration:	<u>April 25, 2014</u>
Station Name:	<u>Fort McKay South</u>	Station Number:	<u>13</u>
Start Time (MST):	<u>14:00</u>	End Time (MST):	<u>14:30</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>773</u>
Source SN:	<u>4066</u>
Mass Foil Set SN:	<u>2022</u>
HEPA PN:	
Time Correct (MST):	<u>Yes</u>
Parameters Checked:	<u>T1, P3, Main Flow, Neph</u>

### AUDIT DATA

#### Temperature (deg C)

Sensor	Indicated	Measured	Difference	Final Indicated
T1 Ambient	19.0	20.7	1.7	21.0
T2 Sample	28.0			
T3 Flow Sensor	26.0			
T4 Heater	31.0			

#### Pressure (Hpa)

Sensor	Indicated	Measured	Difference	Final Indicated
P3	971	973.0	2.0	973

#### Main Flow (Lph)

Indicated	Measured	Difference	Final Indicated
1001.00	980.00	-21.00	1000

#### Mass Foil Calibration

Zeroed?:	<u>N/A</u>
Foil Mass:	<u>1507</u>
Previous Correction Factor:	<u>6970</u>
New Correction Factor:	<u>6979</u>

#### Nephelometer Calibration

Parameter	As Found	Zeroed	As Left
Analog	267	na	269
Neph	4.7	Yes	-1
C14	2	na	0.7
Indicated Concentration (ug/m3)	1.3	Yes	-0.4
Range 1	260.2	na	270.8
Range 2	37.1	na	38.1

#### INSPECTION DATA

Item	Condition	Item	Condition
Cyclone	Good	HEPA filter	Good
Pump	Good		
Filter Tape	Good		
Mass Foil Cal Set	Good		

#### NOTES:

Neph/ Concentration Zeroed

Audit Performed By: Ryan Power

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**WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS 14  
ANZAC  
MAY 2014**

Operations and Data Collection by:  
Wood Buffalo Environmental Association  
Fort McMurray, Alberta

QA/QC, Data Validation and Reporting by:  
Aurora Atmospheric Inc.  
Calgary, Alberta

June 27, 2014

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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ANZAC (AMS 14)  
MAY 2014

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	8	0	2	0
TRS(ppb) Average	710	34	34	100.00	1	0	0	0
THC(ppm) Average	709	35	35	100.00	2.1	-	1.9	-
NMHC(ppm) Average	709	35	35	100.00	0.208	-	0.029	-
CH4(ppm) Average	709	35	35	100.00	2	-	1.9	-
NO2(ppb) Average	682	36	62	96.51	14	0	3	-
NO(ppb) Average	682	36	62	96.51	22	-	2	-
NOX(ppb) Average	682	36	62	96.51	36	-	4	-
O3(ppb) Average	708	34	36	99.73	58	0	43	-
PM2.5(ug/m3) Average	740	0	4	99.46	16.5	-	9.1	0
Temperature 2 m (C) Average	744	0	0	100.00	27.6	-	20.2	-
Relative Humidity (%) Average	744	0	0	100.00	98	-	-	-
Surface Wetness (% of range) Average	744	0	0	100.00	74	-	-	-
Wind Speed 10 m (km/h) Average	740	0	4	99.46	21	-	-	-
Wind Direction 10 m (deg) Average	740	0	4	99.46	-	-	-	-
Precipitation (mm) Total	744	0	0	100.00	5.6	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ANZAC (AMS 14)  
MAY 2014

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	0.4	1	-	0	0	0	0	0	1	8
TRS(ppb) Average	710	0.2	0	-	0	0	0	0	0	0	1
THC(ppm) Average	709	1.82	0	-	1.8	1.8	1.8	1.8	1.8	1.9	2.1
NMHC (ppm) Average	709	0.008	0.016	-	0	0	0	0	0	0	0.208
CH4(ppm) Average	709	1.82	0	-	1.8	1.8	1.8	1.8	1.8	1.8	2
NO2(ppb) Average	682	1.3	2	-	0	0	0	1	2	3	14
NO(ppb) Average	682	0.4	1	-	0	0	0	0	0	1	22
NOX(ppb) Average	682	1.7	3	-	0	0	0	1	2	4	36
O3(ppb) Average	708	31.4	12	-	1	17	23	31	40	47	58
PM2.5(ug/m3) Average	740	4.47	2.6	-	0.1	1.9	2.6	3.9	5.7	8.1	16.5
Temperature 2 m (C) Average	744	7.56	7.1	-	-6.3	-1.5	1.5	7	12.9	17.1	27.6
Relative Humidity (%) Average	744	63.7	23	-	21	32	43	65	85	95	98
Surface Wetness (% of range) Average	744	3.9	9	-	0	0	0	0	0	18	74
Wind Speed 20 m (km/h) Average	740	8.8	4	-	0	4	6	8	12	15	21
Wind Direction 20 m (deg) Average	740	-	-	-	-	-	-	-	-	-	-
Precipitation (mm) Total	744	-	-	92.46	0	0	0	0	0	0.3	5.6

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ANZAC (AMS 14)  
MAY 2014

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
NO2, NO, NOX	21 May 2014 09:00	21 May 2014 09:00	1	Maintenance - diagnose analyzer performance
NO2, NO, NOX	22 May 2014 08:00	23 May 2014 08:00	25	Analyzer Failure - PMT cooler failed, analyzer replaced
O3	29 May 2014 10:00	29 May 2014 11:00	2	Maintenance - confirm analyzer response to daily QA check
PM2.5	29 May 2014 09:00	29 May 2014 10:00	2	Flow and zero reference checks, sample head cleaning
PM2.5	30 May 2014 16:00	30 May 2014 16:00	1	Intermittent unstable operation - baseline drift
PM2.5	31 May 2014 23:00	31 May 2014 23:00	1	Intermittent unstable operation - baseline drift
Wind Speed, Wind Direction	04 May 2014 01:00	04 May 2014 02:00	2	Flatline in sensor output signal
Wind Speed, Wind Direction	30 May 2014 23:00	30 May 2014 23:00	1	Flatline in sensor output signal
Wind Speed, Wind Direction	31 May 2014 01:00	31 May 2014 01:00	1	Flatline in sensor output signal

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Summary of Hour Averages

Anzac - May 2014

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 8 ppb on May 31 09:00	Maximum Daily Average: 1.7 ppb on May 16		Hours of Data:	709
Minimum Value: 0 ppb on May 2 07:00	Minimum Daily Average: 0.0 ppb on May 27		Hours of Missing Data:	35
Maximum Diurnal Average: 0.7 ppb at hour 10	Minimum Diurnal Average: 0.0 ppb at hour 5		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 Q <sub>3</sub> = 0 P <sub>90</sub> = 1 P <sub>99</sub> = 3		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-May	0	0	0	0	Z	0	2	3	2	3	0	0	2	2	3	1	0	0	3	2	1	0	0	1	1.2	3
2-May	2	1	0	0	0	Z	0	0	0	0	0	2	0	1	2	3	3	3	0	0	0	0	0	0	0.7	3
3-May	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
4-May	Z	0	0	0	0	0	0	0	0	1	2	3	1	1	2	1	0	0	1	1	0	0	0	0	0.6	3
5-May	0	Z	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
6-May	0	0	Z	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-May	0	0	0	Z	0	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
8-May	0	0	0	0	Z	0	0	1	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0.2	1
9-May	0	0	0	0	0	Z	0	0	0	2	2	1	2	1	0	0	0	0	0	0	0	0	0	0	0.4	2
10-May	0	0	1	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	0.3	1
11-May	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0.2	1
12-May	0	Z	0	0	0	0	0	0	0	0	0	0	2	1	0	3	5	3	0	0	0	0	0	0	0.6	5
13-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0.2	2
14-May	0	0	0	Z	0	0	1	2	3	5	3	1	1	1	1	0	0	1	1	1	1	1	0	0	0.9	5
15-May	0	0	0	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-May	0	0	0	0	0	Z	1	1	0	0	1	1	2	7	6	3	1	1	1	5	3	3	2	1	1.7	7
17-May	1	0	0	0	0	0	Z	1	0	1	1	1	1	2	1	1	1	0	0	0	0	0	0	0	0.5	2
18-May	Z	0	0	1	0	1	2	2	0	0	0	0	0	1	0	0	1	0	1	1	1	0	0	0	0.5	2
19-May	0	Z	0	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-May	0	0	Z	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-May	0	0	0	Z	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	2	1	0	0	0.2	2
22-May	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
23-May	0	0	0	0	0	Z	0	0	2	1	1	3	2	2	0	0	0	0	0	0	0	0	0	0	0.6	3
24-May	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.2	1
25-May	Z	0	0	0	0	0	0	2	3	1	1	1	2	1	1	0	0	0	0	0	0	0	1	1	0.6	3
26-May	0	Z	0	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-May	0	0	Z	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-May	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
29-May	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
30-May	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.0	1
31-May	0	0	0	0	0	0	Z	4	8	3	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.8	8

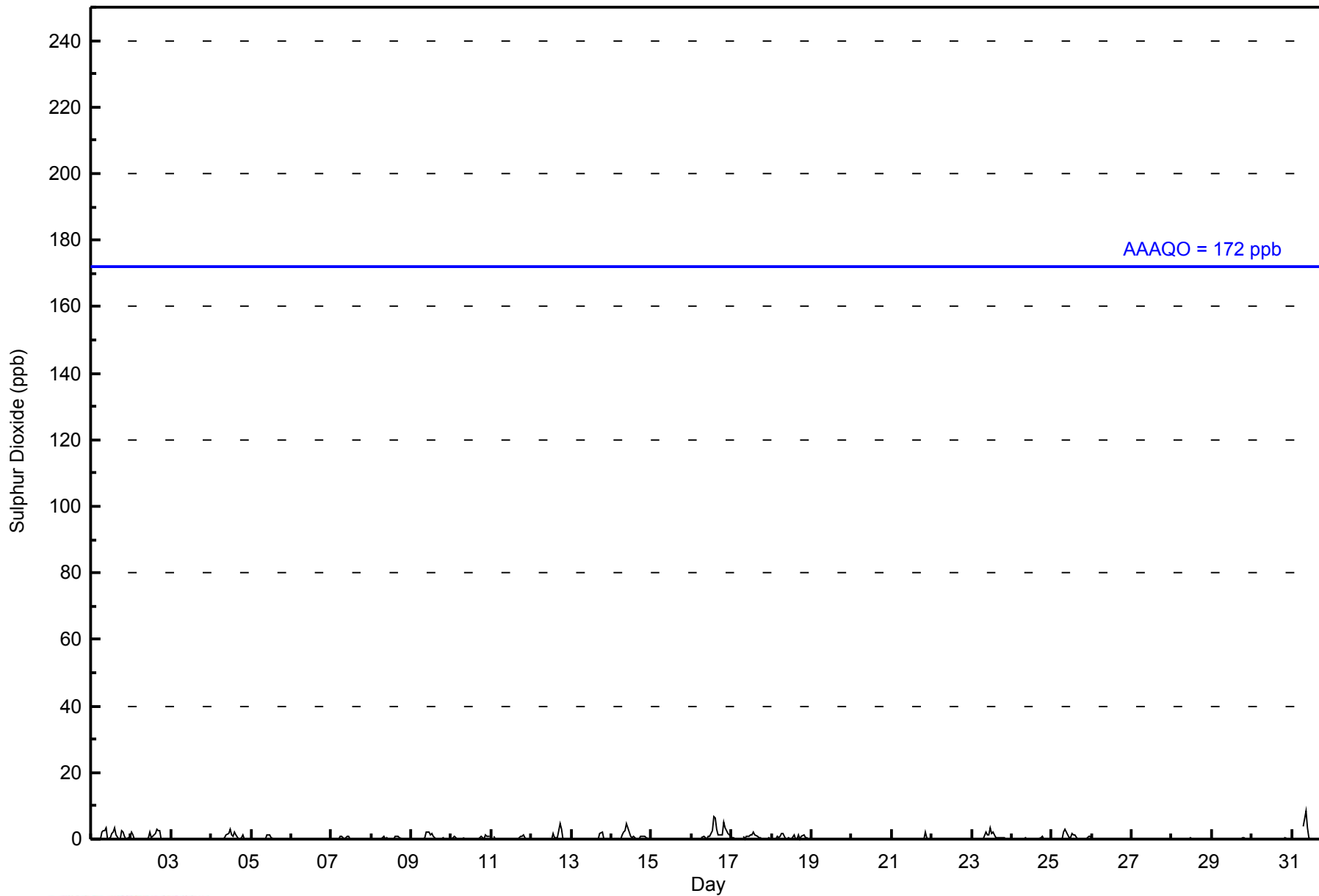
0.1	0.1	0.1	0.1	0.0	0.1	0.3	0.5	0.7	0.7	0.7	0.5	0.5	0.4	0.7	0.6	0.4	0.3	0.5	0.5	0.4	0.3	0.2	0.2	0.2	Diurnal Average	
2	1	1	1	0	1	2	4	8	5	3	3	3	2	7	6	3	3	5	3	5	3	3	2	2	Diurnal Maximum	

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



WBEA  
Hourly Averages

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Anzac - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Anzac - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	709	100.00	100.00
11 - 20	0	0.00	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Anzac - May 2014**

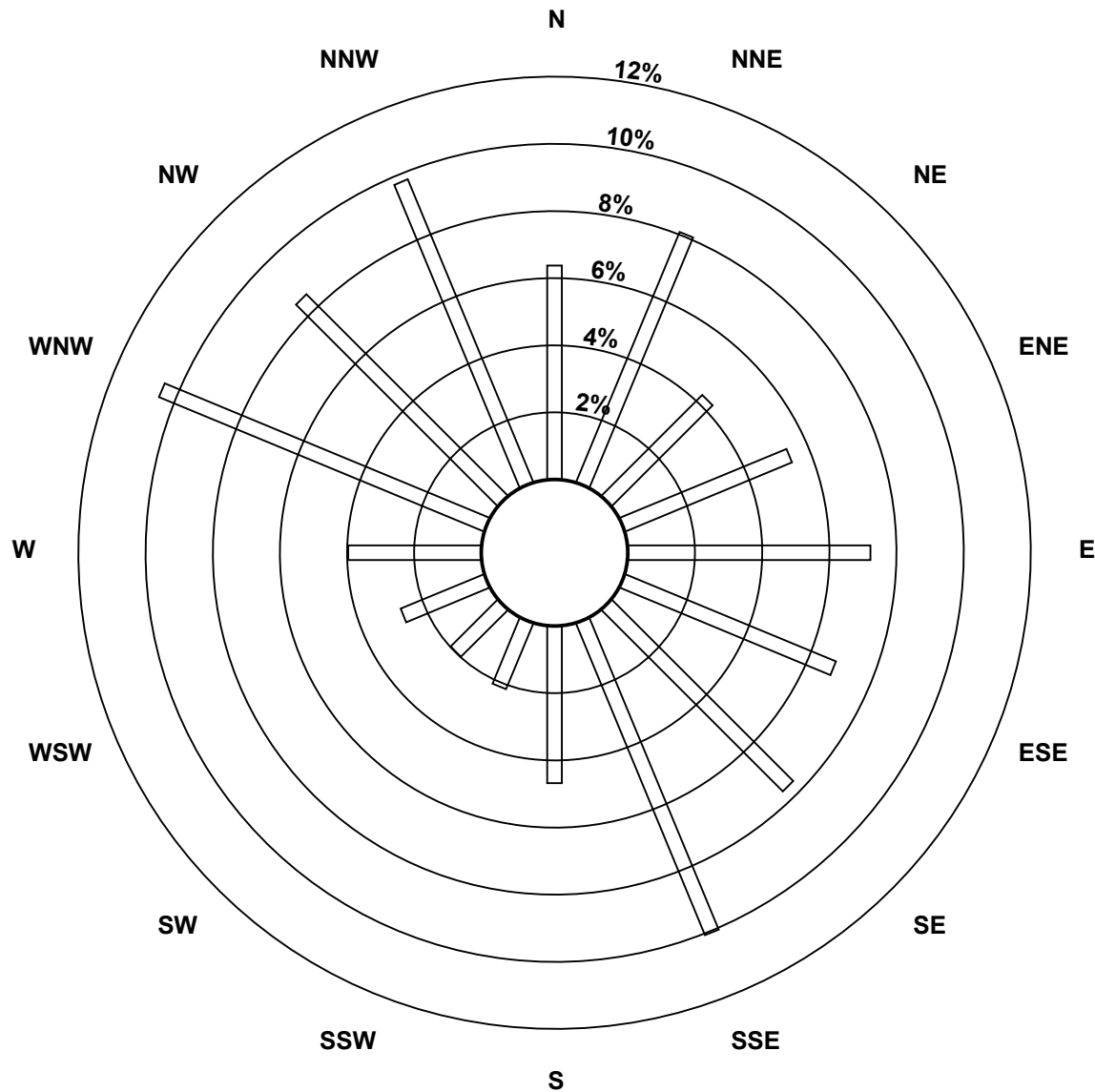
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	45	57	30	38	51	48	54	71	33	15	14	19	28	74	60	69	706
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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>	45	57	30	38	51	48	54	71	33	15	14	19	28	74	60	69	706

Total Number of Valid Hours: 706

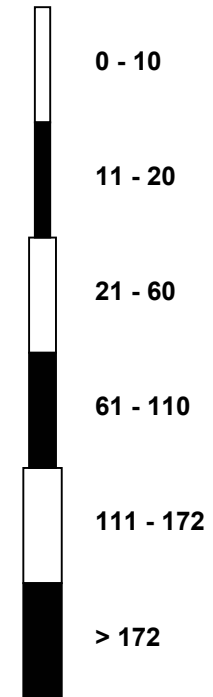
Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Anzac (AMS 14)**



Classes (ppb)

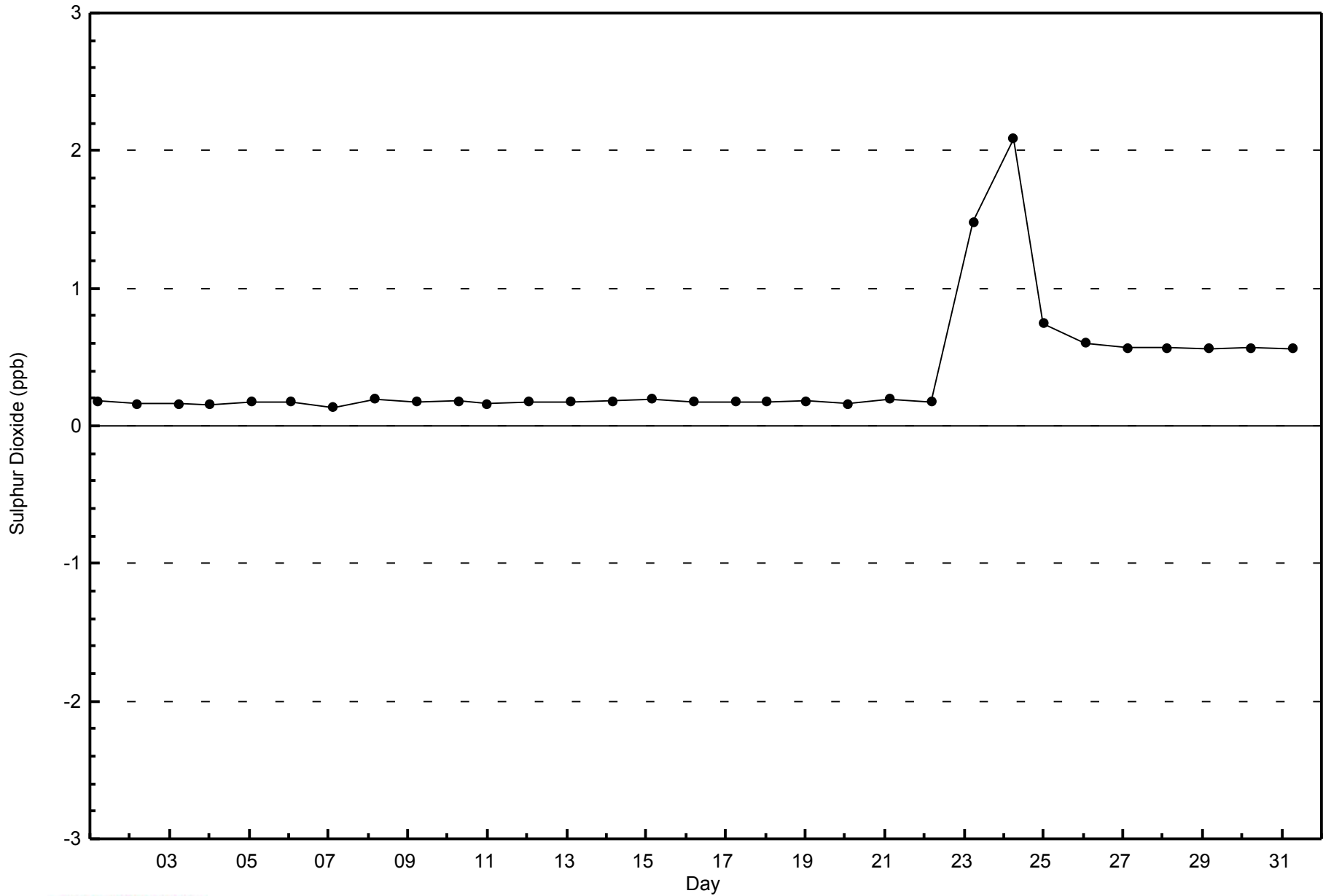


Total Number of Valid Hours: 706



WBEA  
Zero Responses

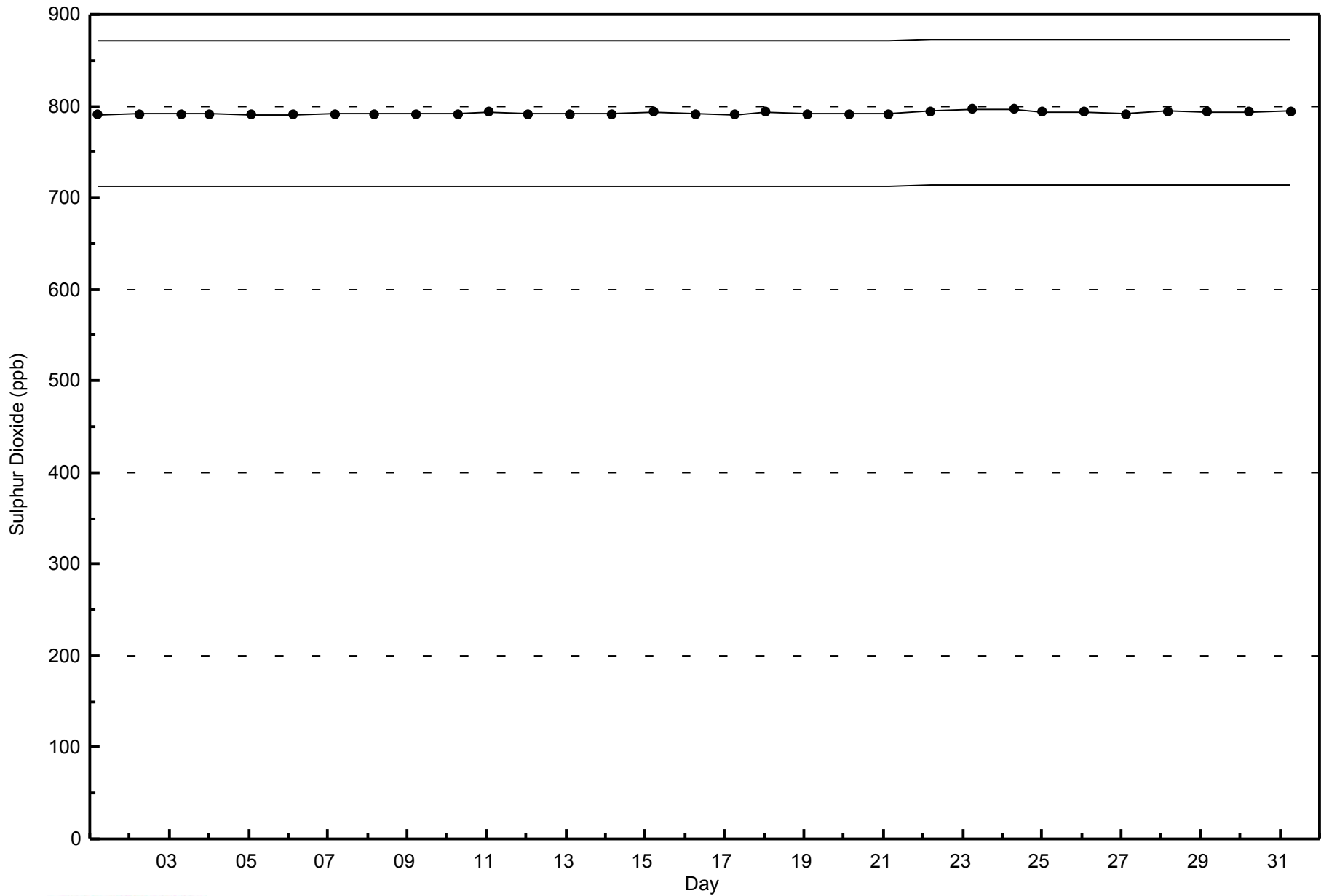
Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Anzac - May 2014





WBEA  
Span Responses

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Anzac - May 2014





Summary of Hour Averages

Anzac - May 2014

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 1 ppb on May 14 08:00	Maximum Daily Average: 0.4 ppb on May 14		Hours of Data:	710
Minimum Value: 0 ppb on May 28 04:00	Minimum Daily Average: 0.2 ppb on May 4		Hours of Missing Data:	34
Maximum Diurnal Average: 0.3 ppb at hour 8	Minimum Diurnal Average: 0.2 ppb at hour 3		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:	100.0

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

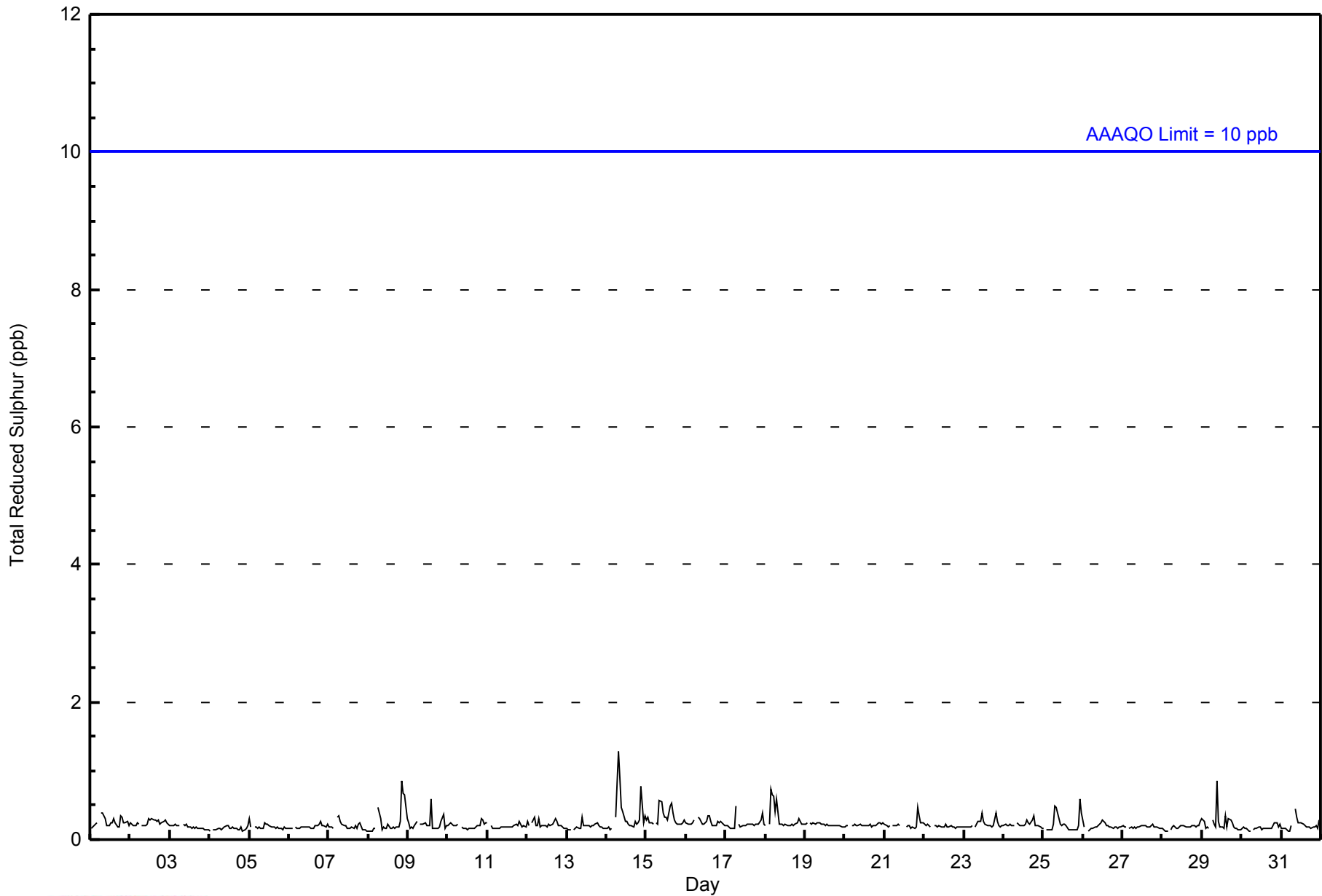
Z - zerospan C - Calibration  
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb





WBEA  
Hourly Averages

Total Reduced Sulphur (TRS) - ppb  
Anzac - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb**  
**Anzac - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	710	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: 710

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb**  
**Anzac - May 2014**

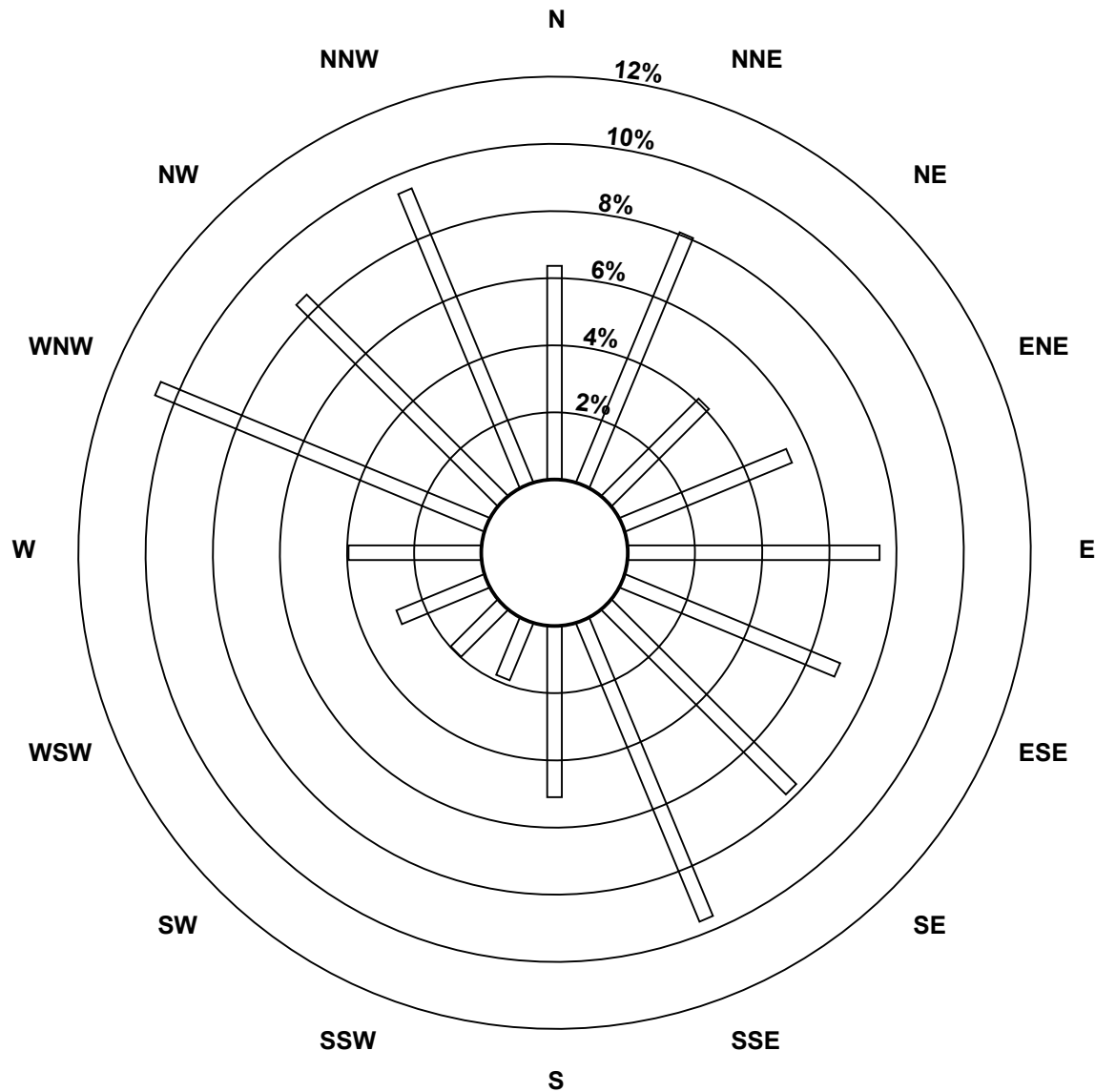
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	45	57	29	38	53	49	55	68	36	13	14	20	28	75	60	67	707
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	45	57	29	38	53	49	55	68	36	13	14	20	28	75	60	67	707

Total Number of Valid Hours: 707

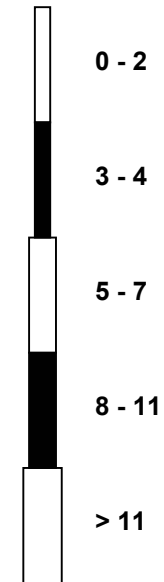
Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Total Reduced Sulphur (TRS) - ppb  
Anzac (AMS 14)**



Classes (ppb)



**Total Number of Valid Hours: 707**

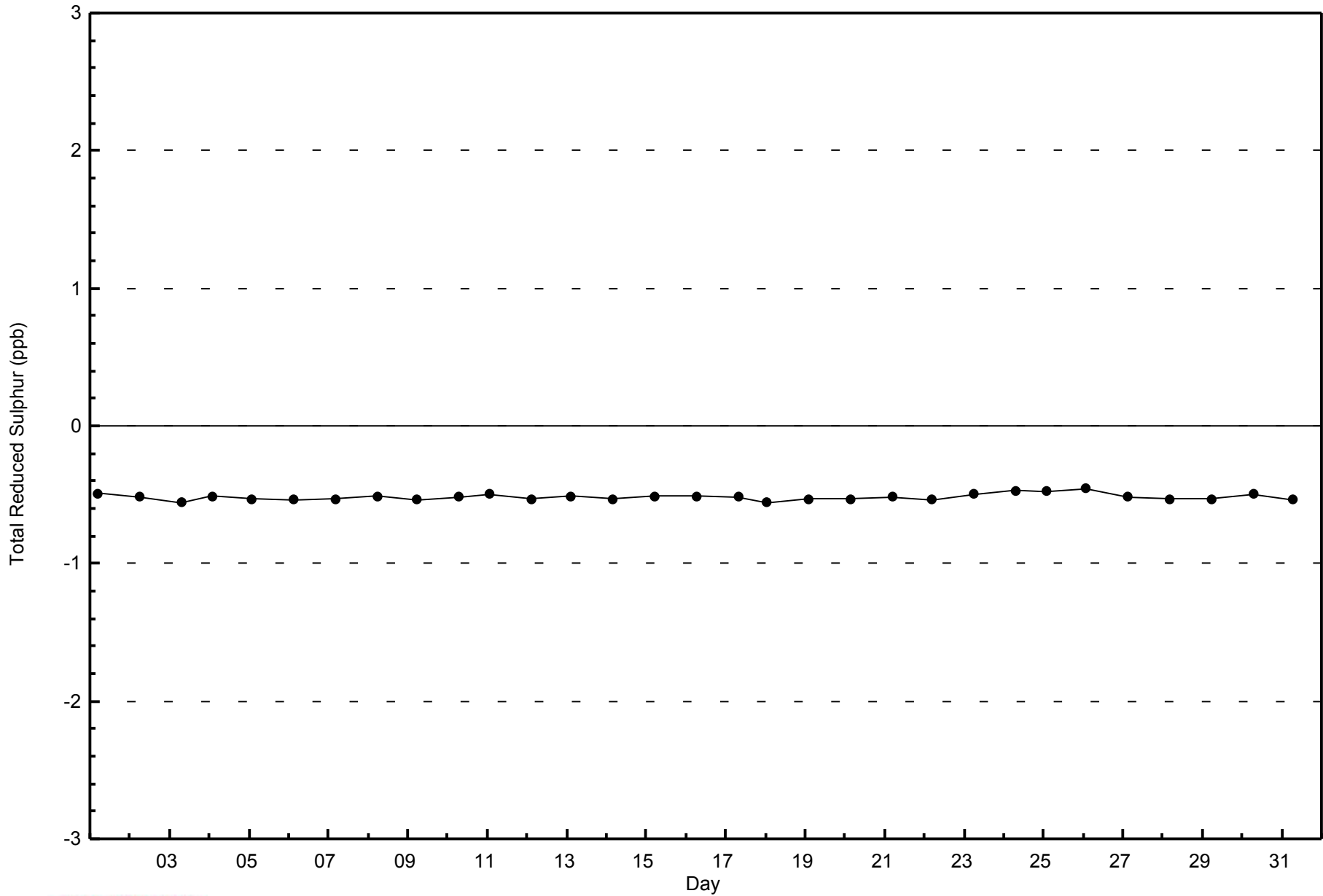


WBEA

Zero Responses

Total Reduced Sulphur (TRS) - ppb

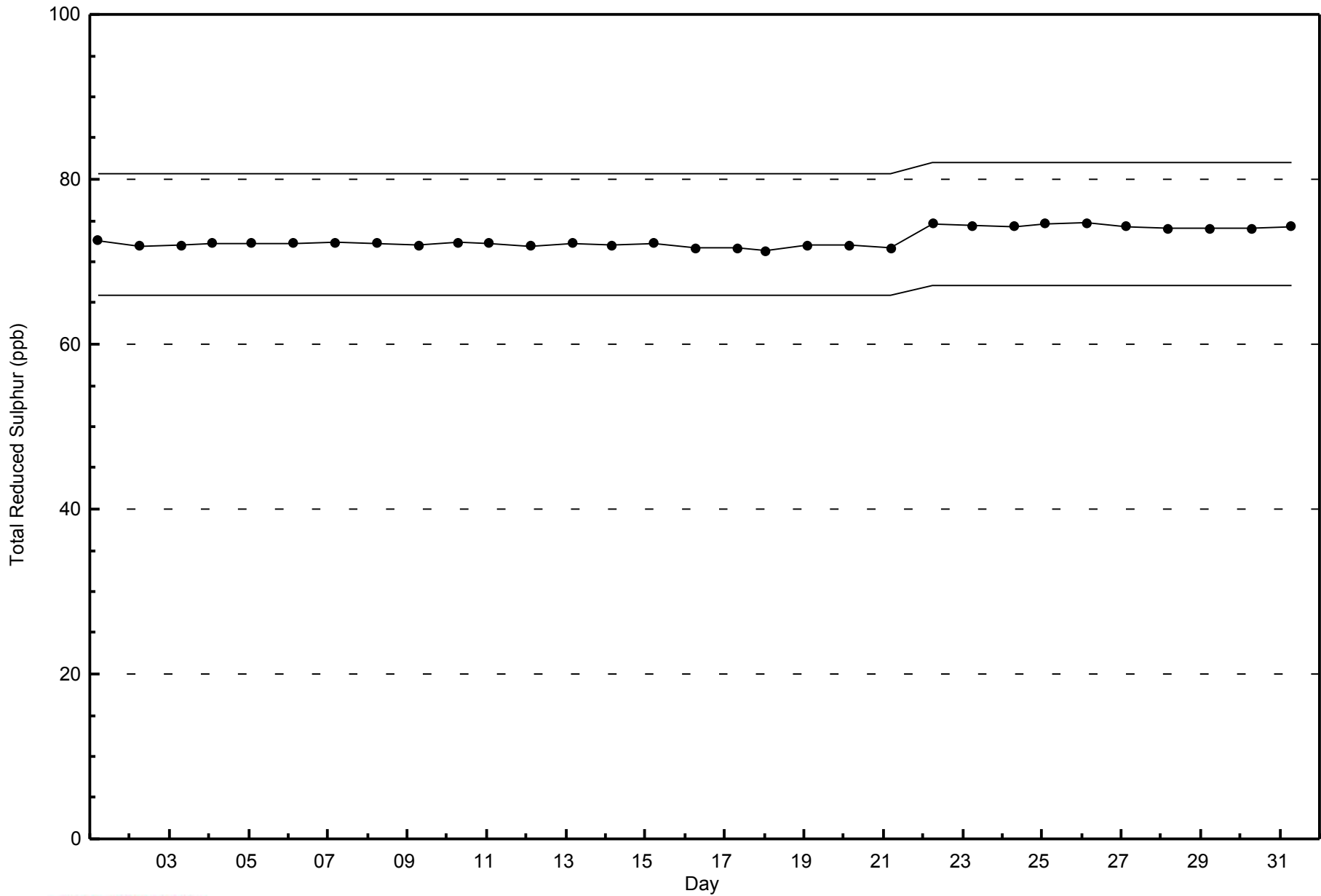
Anzac - May 2014





WBEA  
Span Responses

Total Reduced Sulphur (TRS) - ppb  
Anzac - May 2014

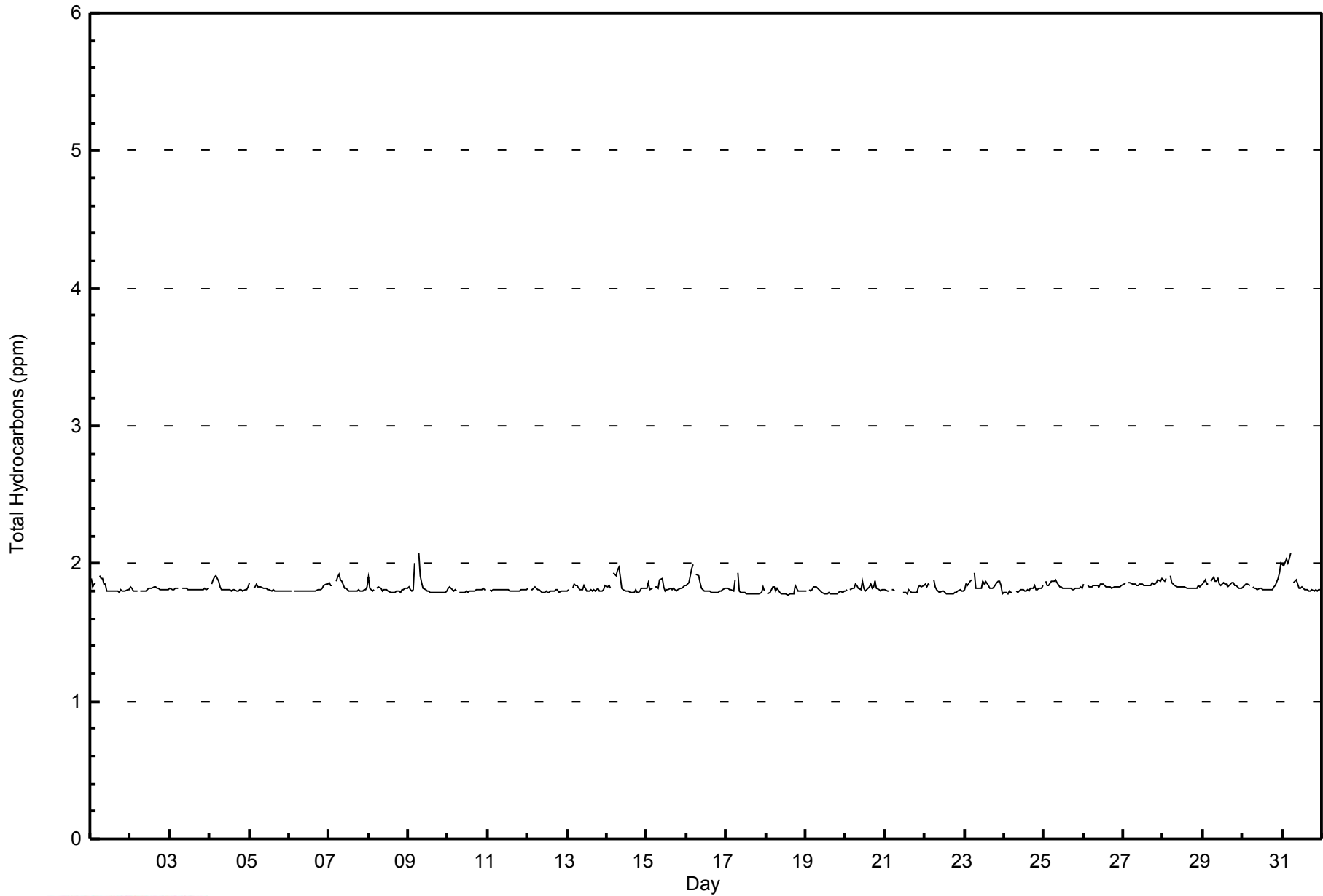






WBEA  
Hourly Averages

Total Hydrocarbons (THC) - ppm  
Anzac - May 2014







**WBEA**  
**Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Anzac - May 2014**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	707	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: 709

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Anzac - May 2014**

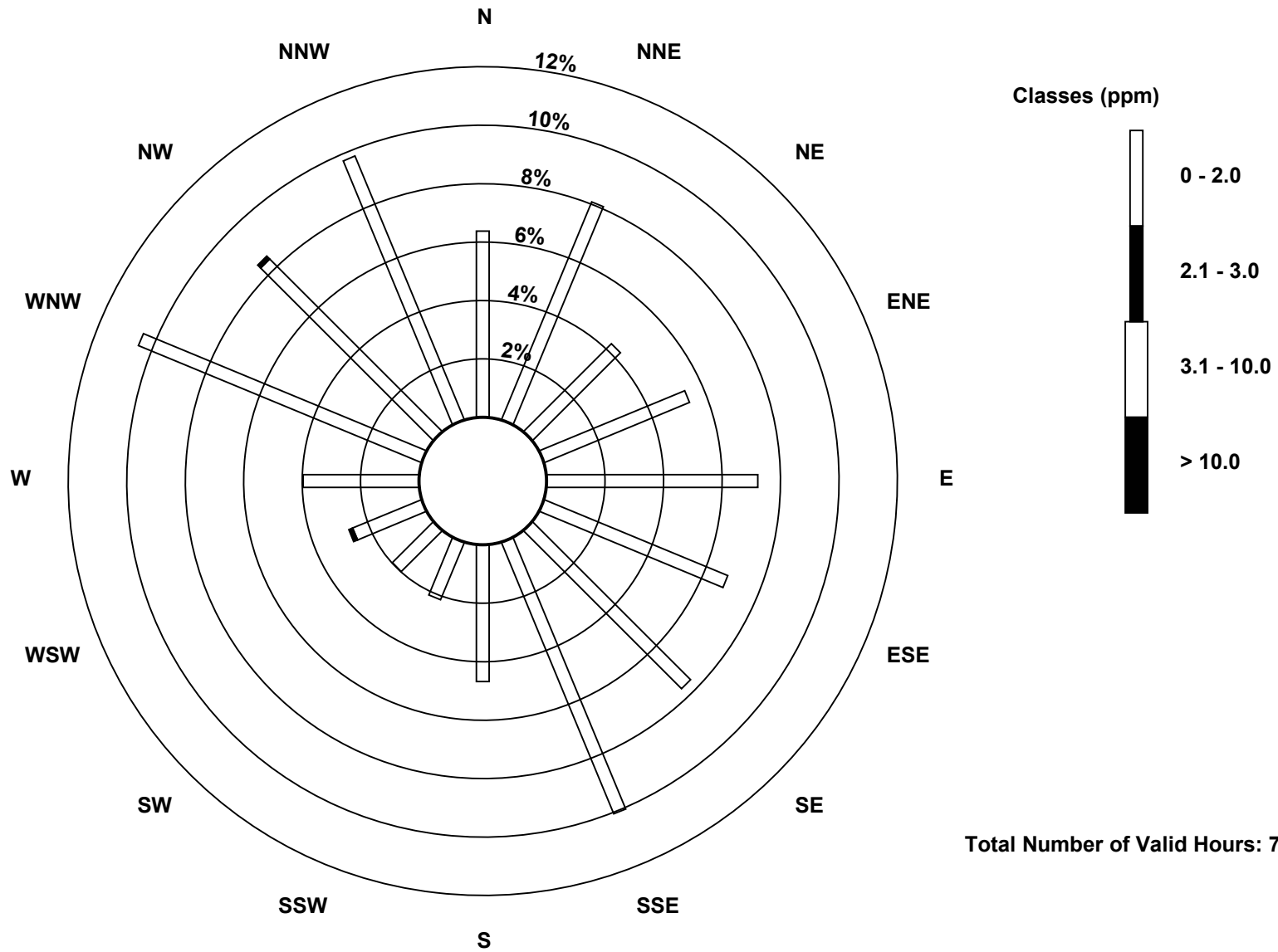
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	45	57	30	38	51	48	54	71	33	15	14	18	28	74	59	69	704
2.1 - 3.0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	2
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	45	57	30	38	51	48	54	71	33	15	14	19	28	74	60	69	706

Total Number of Valid Hours: 706

Total Number of Hours: 744

Wood Buffalo Environmental Association  
Wind Rose May 2014

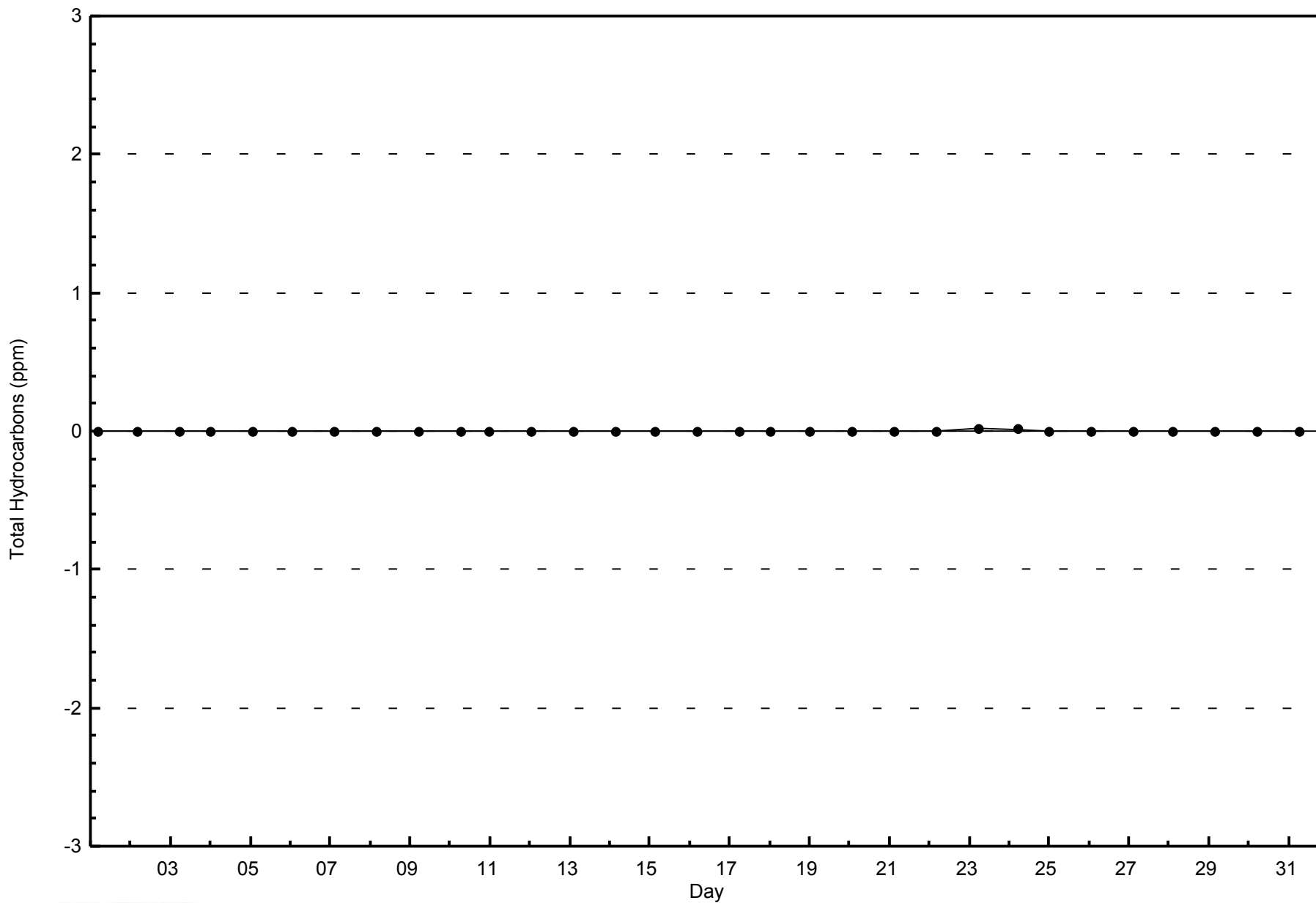
Total Hydrocarbons (THC) - ppm  
Anzac (AMS 14)





WBEA  
Zero Responses

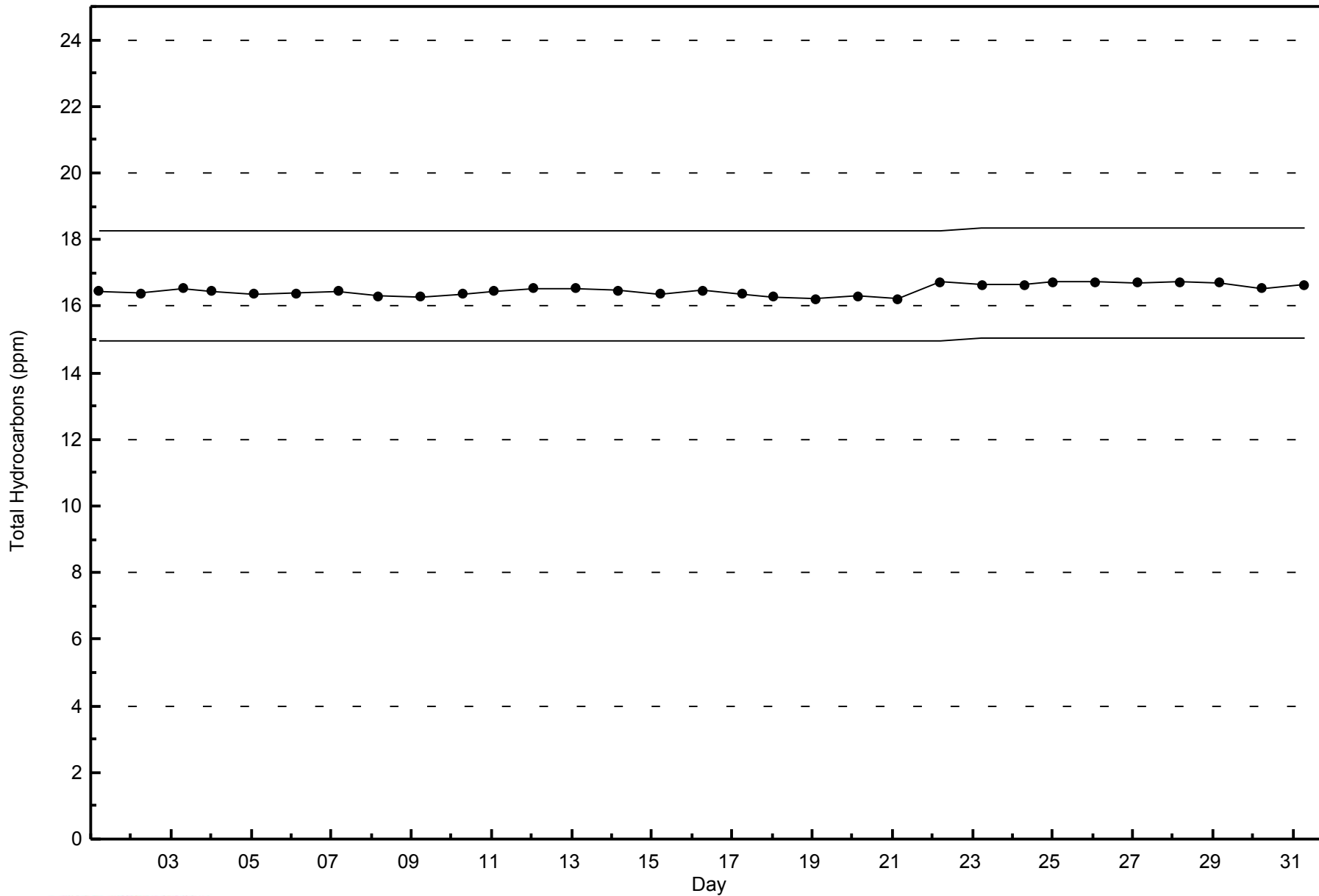
Total Hydrocarbons (THC) - ppm  
Anzac - May 2014





WBEA  
Span Responses

Total Hydrocarbons (THC) - ppm  
Anzac - May 2014





Summary of Hour Averages

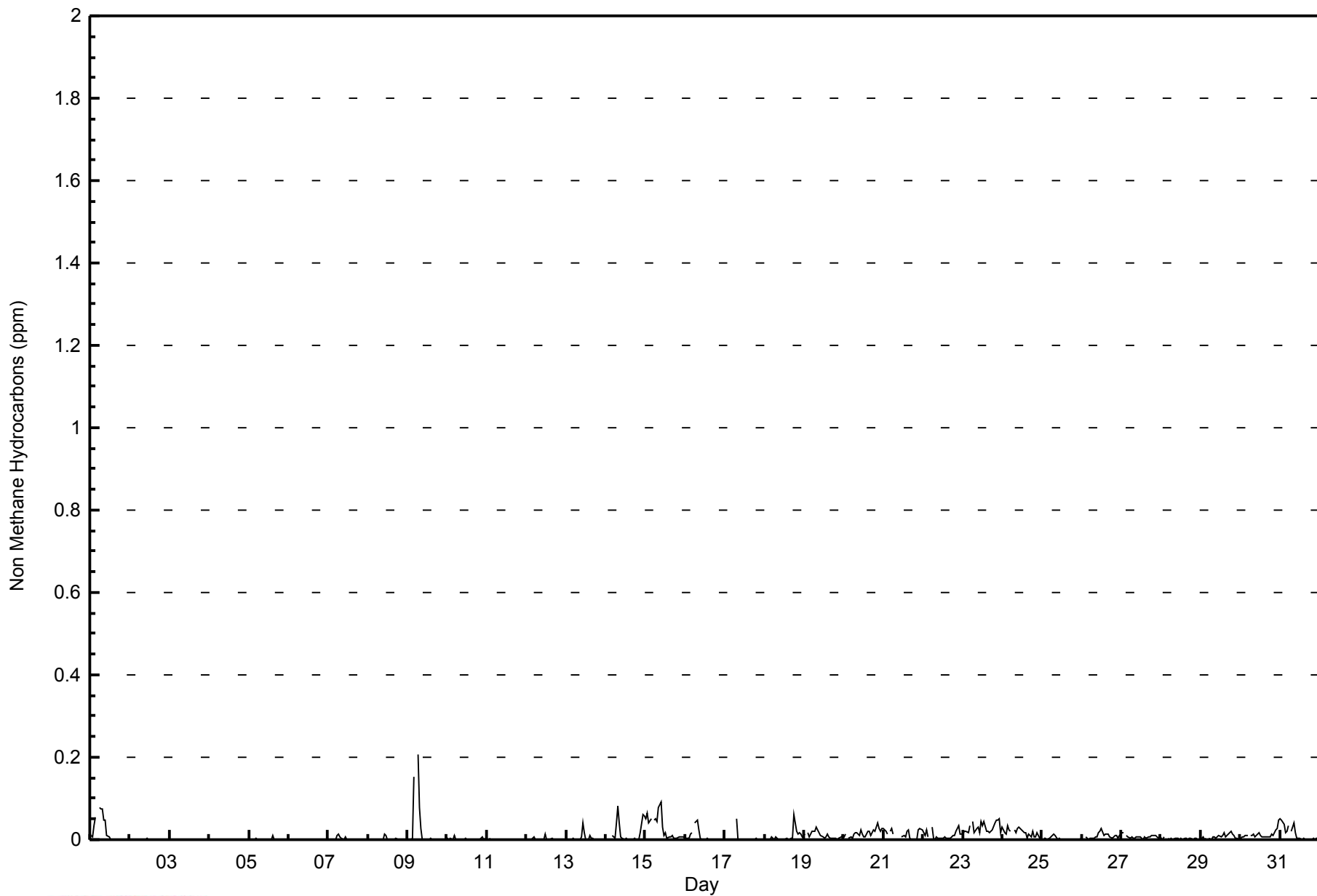
Anzac - May 2014

Maximum Value: 0.208 ppm on May 9 07:00		Maximum Daily Average: 0.029 ppm on May 23		Hours in Service: 744																							
Minimum Value: 0.000 ppm on May 1 15:00		Minimum Daily Average: 0.000 ppm on May 4		Hours of Data: 709																							
Maximum Diurnal Average: 0.022 ppm at hour 7		Minimum Diurnal Average: 0.003 ppm at hour 18		Hours of Missing Data: 35																							
Monthly Average: 0.008 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: 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-May	0.009	0.005	0.034	0.055	Z	0.078	0.073	0.076	0.049	0.046	0.009	0.008	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.019	0.078	
2-May	0.000	0.000	0.000	0.000	0.000	Z	0.001	0.001	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	
3-May	0.000	0.000	0.000	0.000	0.000	0.000	Z	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	
4-May	Z	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	
5-May	0.001	Z	0.001	0.001	0.002	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.001	0.111	
6-May	0.001	0.000	Z	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.002	
7-May	0.001	0.001	0.000	Z	0.001	0.009	0.014	0.006	0.004	0.000	0.006	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.002	0.014	
8-May	0.001	0.000	0.000	0.002	Z	0.001	0.001	0.000	0.000	0.000	0.012	0.009	0.000	0.002	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.012	
9-May	0.000	0.000	0.000	0.002	0.153	Z	0.208	0.076	0.029	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.021	0.208	
10-May	0.002	0.001	0.002	0.001	0.012	0.000	Z	0.001	0.000	0.000	0.000	0.002	0.000	0.001	0.000	0.001	0.000	0.001	0.001	0.001	0.003	0.007	0.001	0.003	0.002	0.012	
11-May	Z	0.004	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	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.004	
12-May	0.000	Z	0.002	0.000	0.006	0.000	0.000	0.001	0.000	0.000	0.000	0.012	0.000	0.000	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.012	
13-May	0.001	0.000	Z	0.000	0.004	0.000	0.000	0.000	0.000	0.006	0.039	0.015	0.001	0.000	0.009	0.003	0.005	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.004	0.039	
14-May	0.000	0.001	0.001	Z	0.011	0.002	0.040	0.083	0.041	0.008	0.004	0.001	0.002	0.000	0.000	0.000	0.005	0.000	0.001	0.001	0.001	0.015	0.061	0.059	0.015	0.083	
15-May	0.049	0.064	0.042	0.050	Z	0.047	0.051	0.043	0.080	0.093	0.029	0.010	0.017	0.004	0.007	0.008	0.009	0.003	0.003	0.004	0.006	0.007	0.006	0.007	0.028	0.093	
16-May	0.003	0.003	0.005	0.013	0.018	Z	0.042	0.046	0.023	0.003	0.001	0.001	0.001	0.002	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.001	0.000	0.007	0.046	
17-May	0.001	0.001	0.000	0.000	0.000	0.001	Z	0.052	0.001	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.003	0.052		
18-May	Z	0.001	0.000	0.000	0.007	0.004	0.000	0.006	0.000	0.000	0.001	0.000	0.001	0.002	0.001	0.001	0.004	0.004	0.062	0.020	0.014	0.017	0.012	0.008	0.007	0.062	
19-May	0.012	Z	0.015	0.008	0.014	0.021	0.021	0.030	0.022	0.018	0.010	0.005	0.005	0.006	0.015	0.006	0.003	0.002	0.003	0.004	0.001	0.005	0.005	0.010	0.010	0.030	
20-May	0.008	0.013	Z	0.005	0.007	0.004	0.012	0.016	0.017	0.012	0.022	0.013	0.008	0.008	0.019	0.021	0.012	0.017	0.024	0.020	0.041	0.026	0.020	0.027	0.016	0.041	
21-May	0.027	0.022	0.013	Z	0.020	0.026	0.015	C	C	C	C	0.007	0.010	0.005	0.022	0.023	0.005	0.000	0.001	0.000	0.002	0.023	0.026	0.025	0.014	0.027	
22-May	0.017	0.009	0.022	0.007	Z	0.029	0.003	0.001	0.006	0.002	0.003	0.004	0.003	0.007	0.003	0.005	0.005	0.006	0.010	0.010	0.020	0.033	0.012	0.013	0.010	0.033	
23-May	0.015	0.019	0.022	0.017	0.033	Z	0.045	0.017	0.026	0.032	0.017	0.046	0.034	0.044	0.021	0.021	0.017	0.019	0.025	0.040	0.049	0.048	0.050	0.018	0.029	0.050	
24-May	0.030	0.018	0.014	0.034	0.023	0.019	Z	0.023	0.019	0.026	0.031	0.023	0.020	0.016	0.016	0.003	0.015	0.007	0.021	0.007	0.007	0.018	0.004	0.006	0.017	0.034	
25-May	Z	0.002	0.004	0.002	0.002	0.006	0.010	0.015	0.011	0.001	0.003	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	0.002	0.015	
26-May	0.006	Z	0.005	0.002	0.000	0.002	0.002	0.002	0.006	0.006	0.017	0.022	0.027	0.011	0.015	0.015	0.012	0.005	0.005	0.008	0.011	0.009	0.005	0.011	0.009	0.027	
27-May	0.017	0.016	Z	0.012	0.007	0.003	0.007	0.003	0.005	0.007	0.006	0.008	0.005	0.000	0.006	0.005	0.007	0.008	0.009	0.011	0.011	0.009	0.002	0.010	0.008	0.017	
28-May	0.004	0.002	0.006	Z	0.004	0.001	0.004	0.001	0.003	0.003	0.003	0.002	0.003	0.001	0.002	0.002	0.000	0.004	0.002	0.001	0.002	0.003	0.001	0.001	0.002	0.006	
29-May	0.001	0.006	0.001	0.002	Z	0.003	0.000	0.006	0.007	0.004	0.006	0.009	0.006	0.009	0.017	0.005	0.009	0.015	0.021	0.012	0.010	0.002	0.003	0.001	0.007	0.021	
30-May	0.004	0.007	0.006	0.010	0.010	Z	0.012	0.009	0.013	0.008	0.013	0.017	0.010	0.005	0.008	0.007	0.007	0.008	0.006	0.013	0.011	0.025	0.026	0.048	0.012	0.048	
31-May	0.050	0.046	0.037	0.016	0.022	0.033	Z	0.022	0.040	0.018	0.004	0.002	0.002	0.001	0.002	0.001	0.001	0.000	0.001	0.000	0.003	0.000	0.003	0.003	0.013	0.050	
		0.010	0.009	0.009	0.009	0.014	0.011	0.022	0.018	0.013	0.010	0.008	0.007	0.005	0.004	0.006	0.004	0.004	0.003	0.006	0.005	0.006	0.008	0.008	0.008	Diurnal Average	
		0.050	0.064	0.042	0.055	0.153	0.078	0.208	0.083	0.080	0.093	0.039	0.046	0.034	0.044	0.022	0.023	0.017	0.019	0.062	0.040	0.049	0.048	0.061	0.059	Diurnal Maximum	
Z - zerospan		C - Calibration																									



WBEA  
Hourly Averages

Non Methane Hydrocarbons (NMHC) - ppm  
Anzac - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm**  
**Anzac - May 2014**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.005	457	64.46	64.46
0.006 - 0.05	238	33.57	98.03
0.06 - 0.1	12	1.69	99.72
> 0.1	2	0.28	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744





**WBEA**  
**Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm**

**Anzac - May 2014**

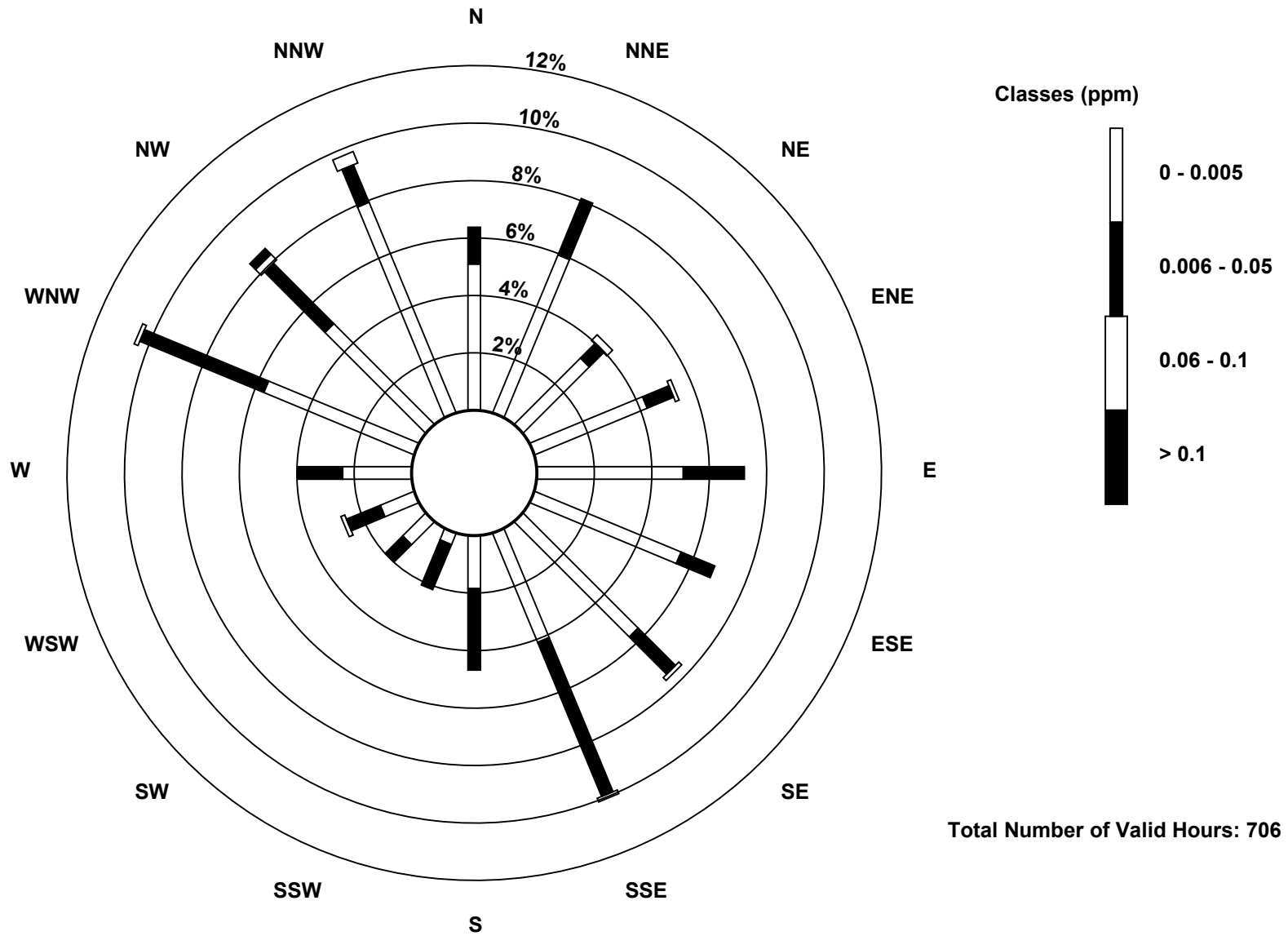
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	36	42	23	30	36	39	40	29	13	3	8	9	17	40	35	56	456
0.006 - 0.05	9	15	5	7	15	9	13	41	20	12	6	9	11	33	21	10	236
0.06 - 0.1	0	0	2	1	0	0	1	1	0	0	0	1	0	1	2	3	12
> 0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
<b>Totals</b>	45	57	30	38	51	48	54	71	33	15	14	19	28	74	60	69	706

Total Number of Valid Hours: 706

Total Number of Hours: 744

Wood Buffalo Environmental Association  
 Wind Rose May 2014

Non Methane Hydrocarbons (NMHC) - ppm  
 Anzac (AMS 14)



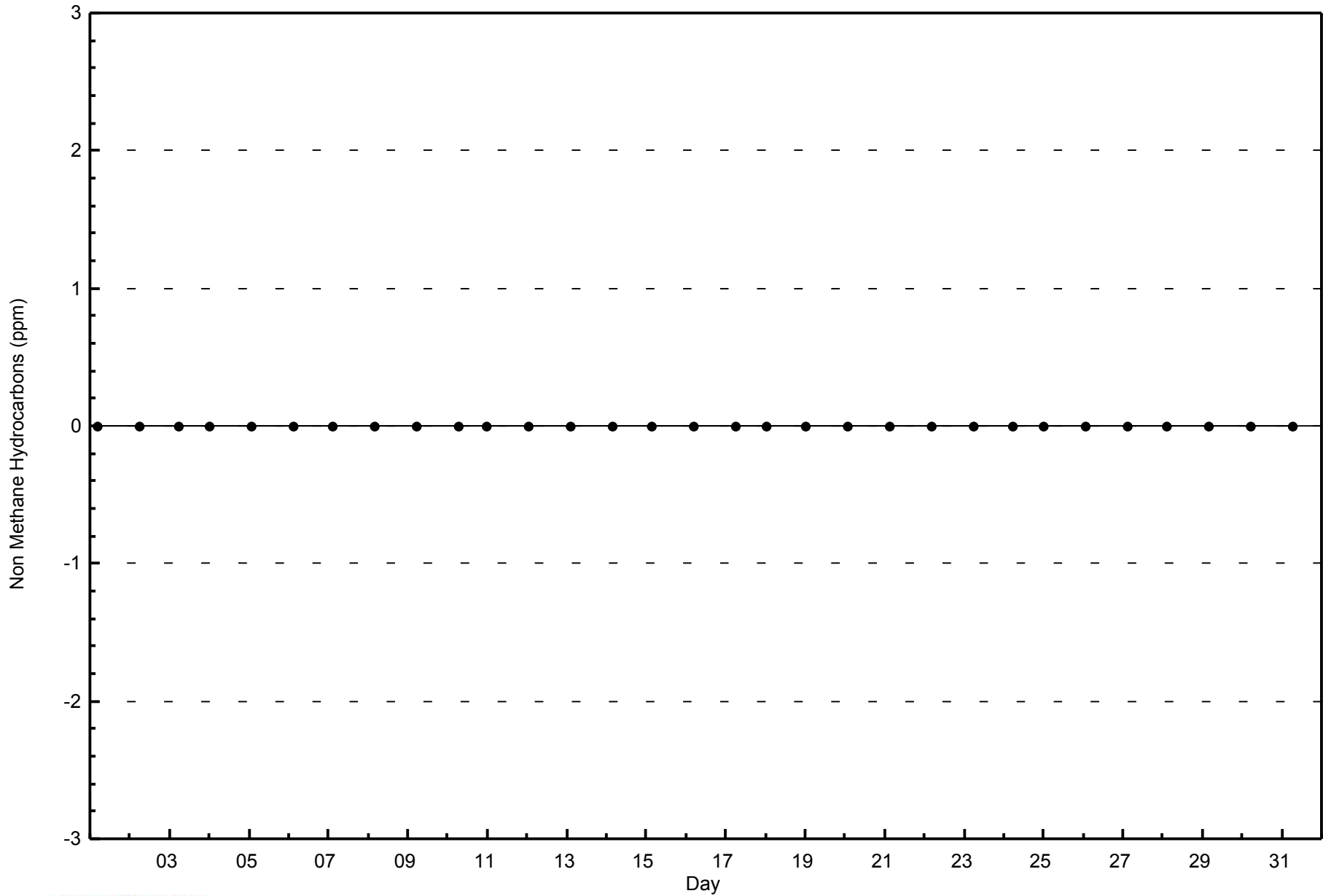


WBEA

Zero Responses

Non Methane Hydrocarbons (NMHC) - ppm

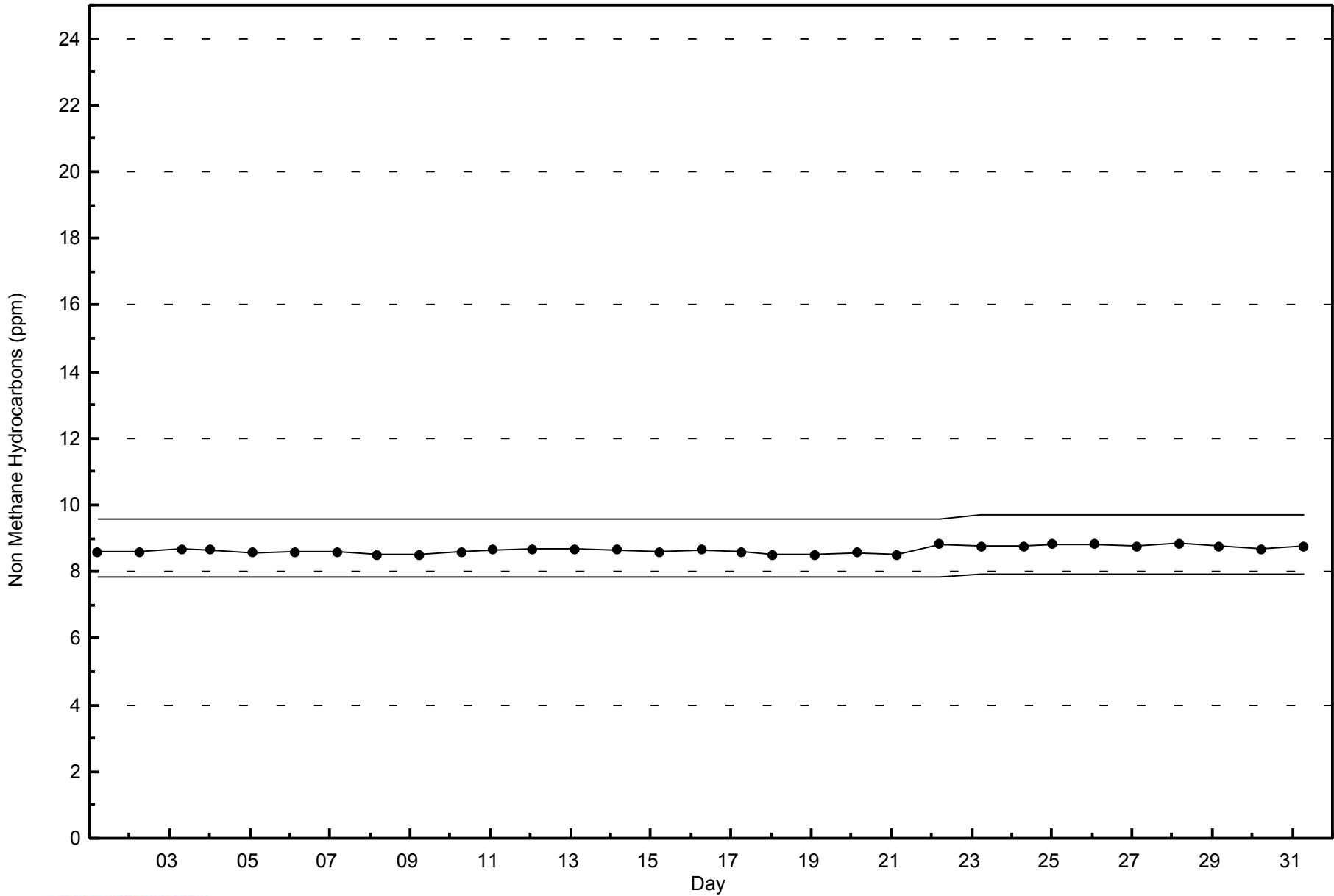
Anzac - May 2014





WBEA  
Span Responses

Non Methane Hydrocarbons (NMHC) - ppm  
Anzac - May 2014

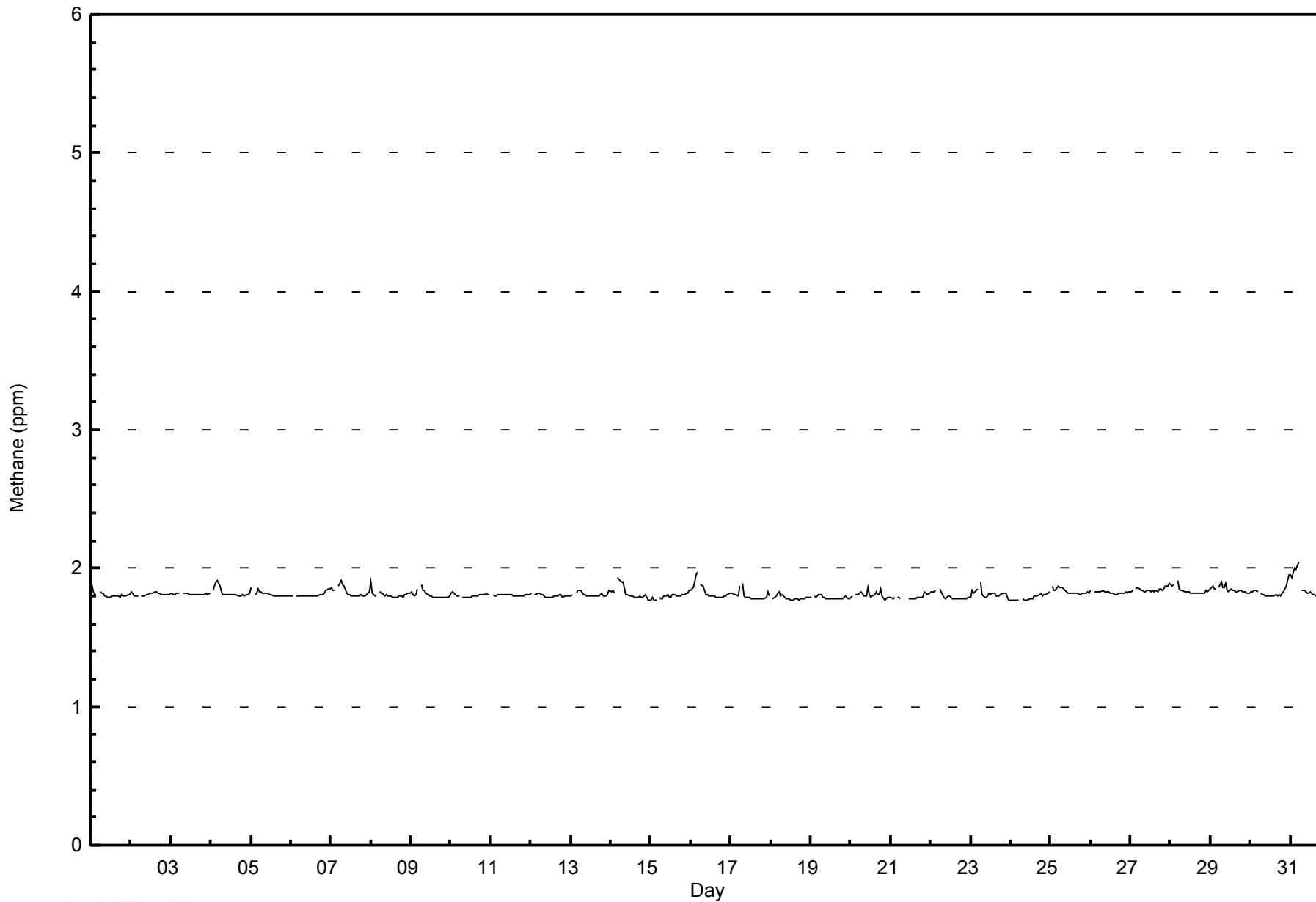






WBEA  
Hourly Averages

Methane (CH<sub>4</sub>) - ppm  
Anzac - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Methane (CH<sub>4</sub>) - ppm**  
**Anzac - May 2014**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	709	100.00	100.00
2.1 - 3.0	0	0.00	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Methane (CH<sub>4</sub>) - ppm**  
**Anzac - May 2014**

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	45	57	30	38	51	48	54	71	33	15	14	19	28	74	60	69	706
2.1 - 3.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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>	45	57	30	38	51	48	54	71	33	15	14	19	28	74	60	69	706

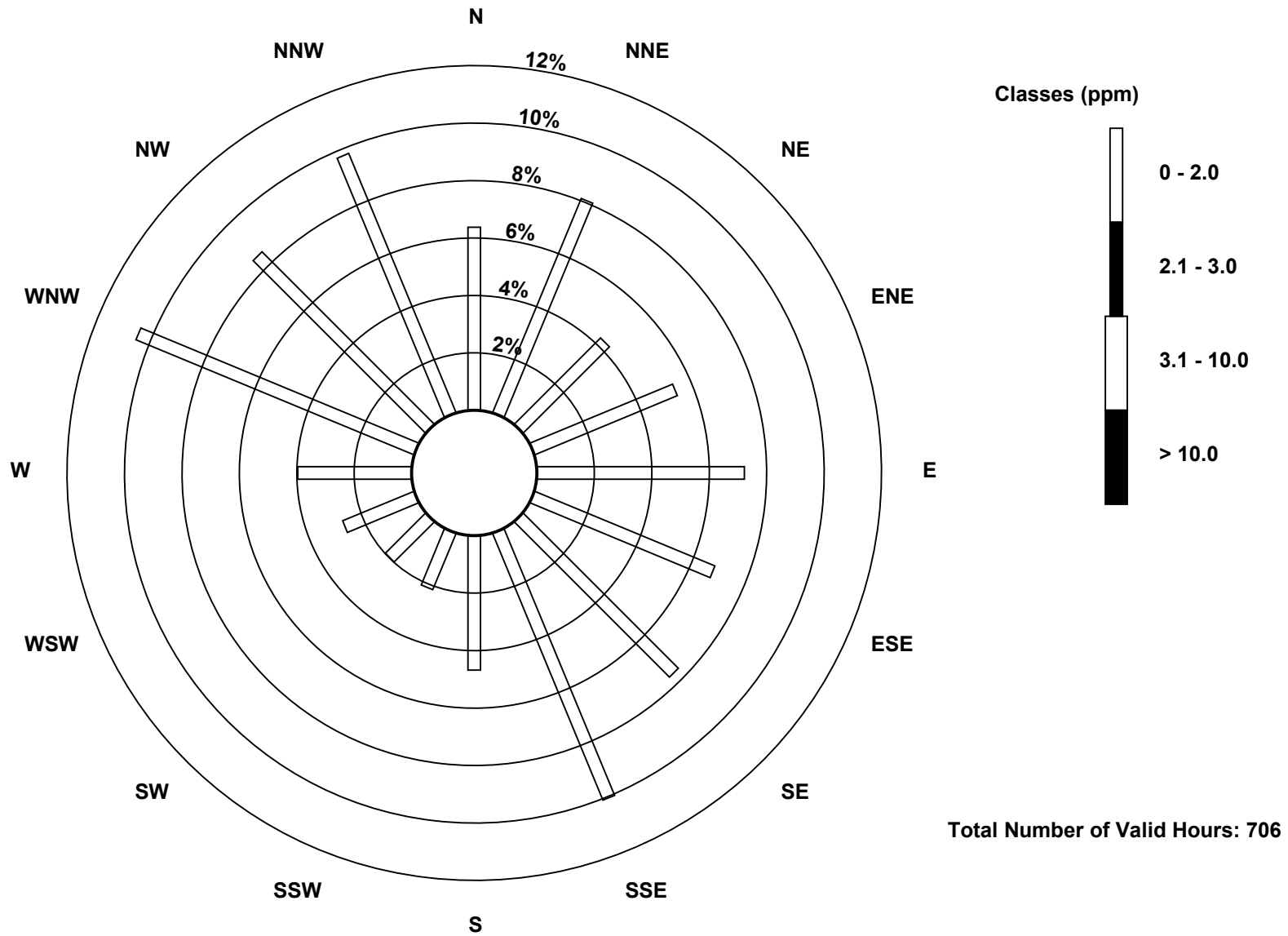
Total Number of Valid Hours: 706

Total Number of Hours: 744



**Wood Buffalo Environmental Association  
Wind Rose May 2014**

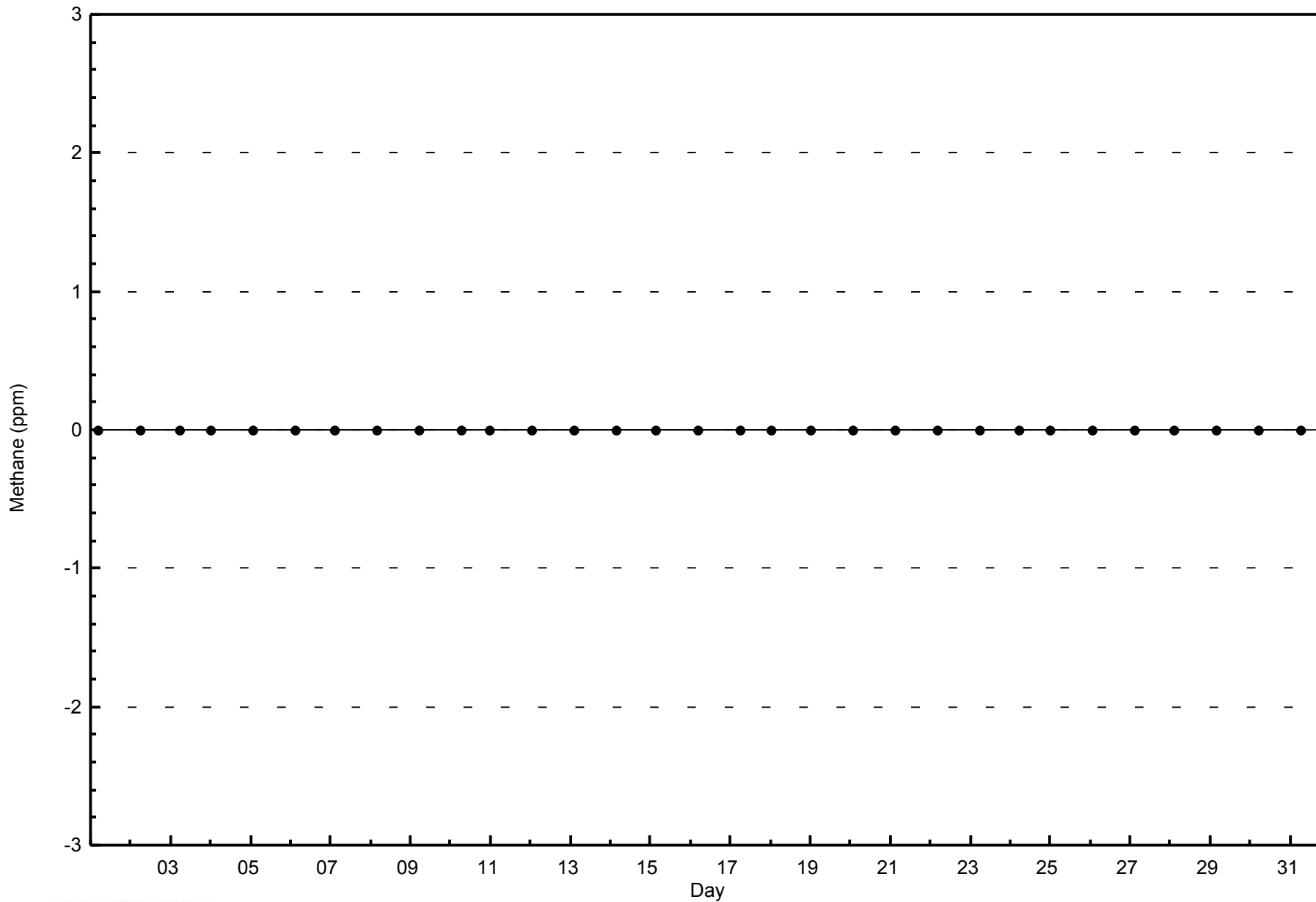
**Methane (CH<sub>4</sub>) - ppm  
Anzac (AMS 14)**





WBEA  
Zero Responses

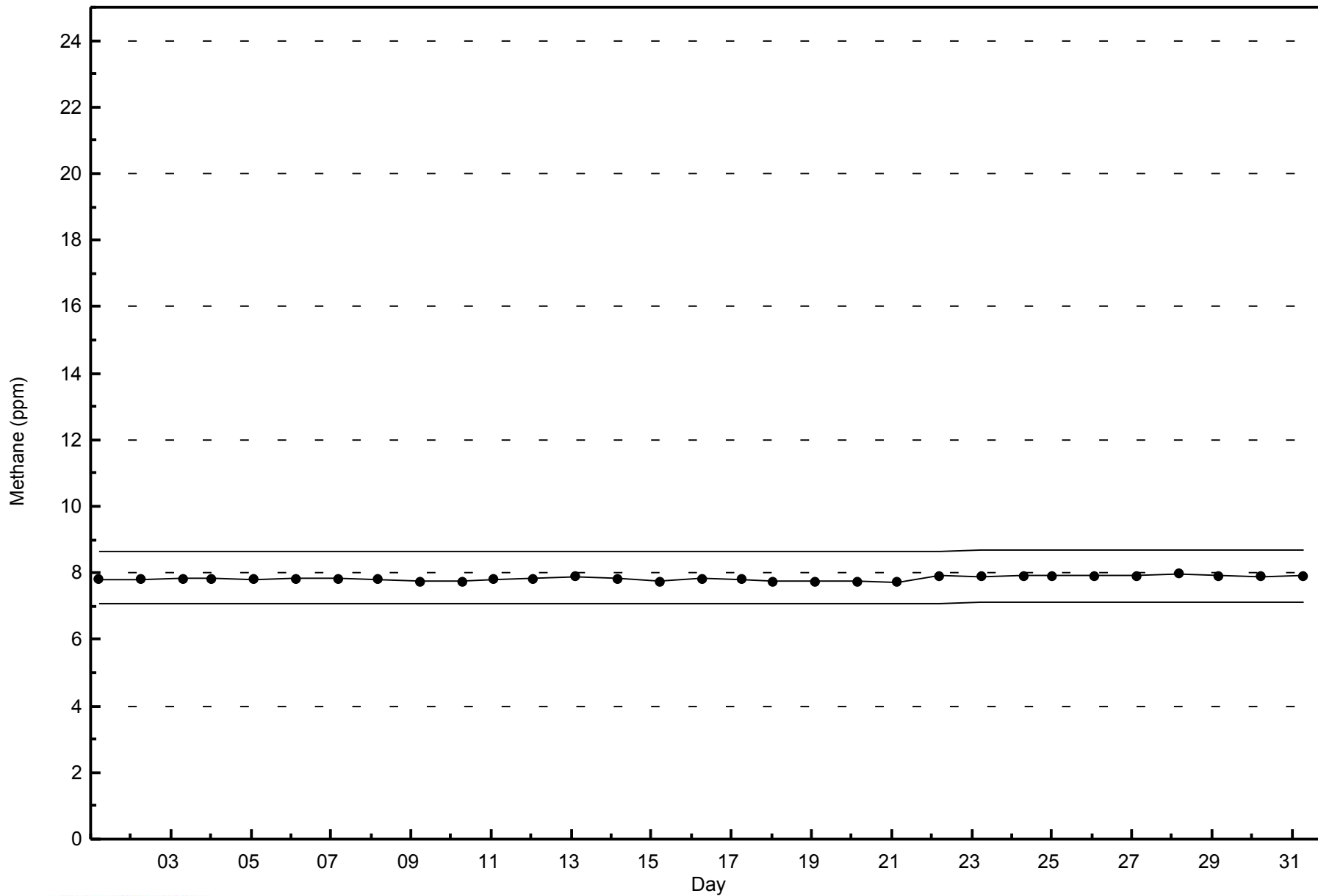
Methane (CH<sub>4</sub>) - ppm  
Anzac - May 2014





WBEA  
Span Responses

Methane (CH<sub>4</sub>) - ppm  
Anzac - May 2014



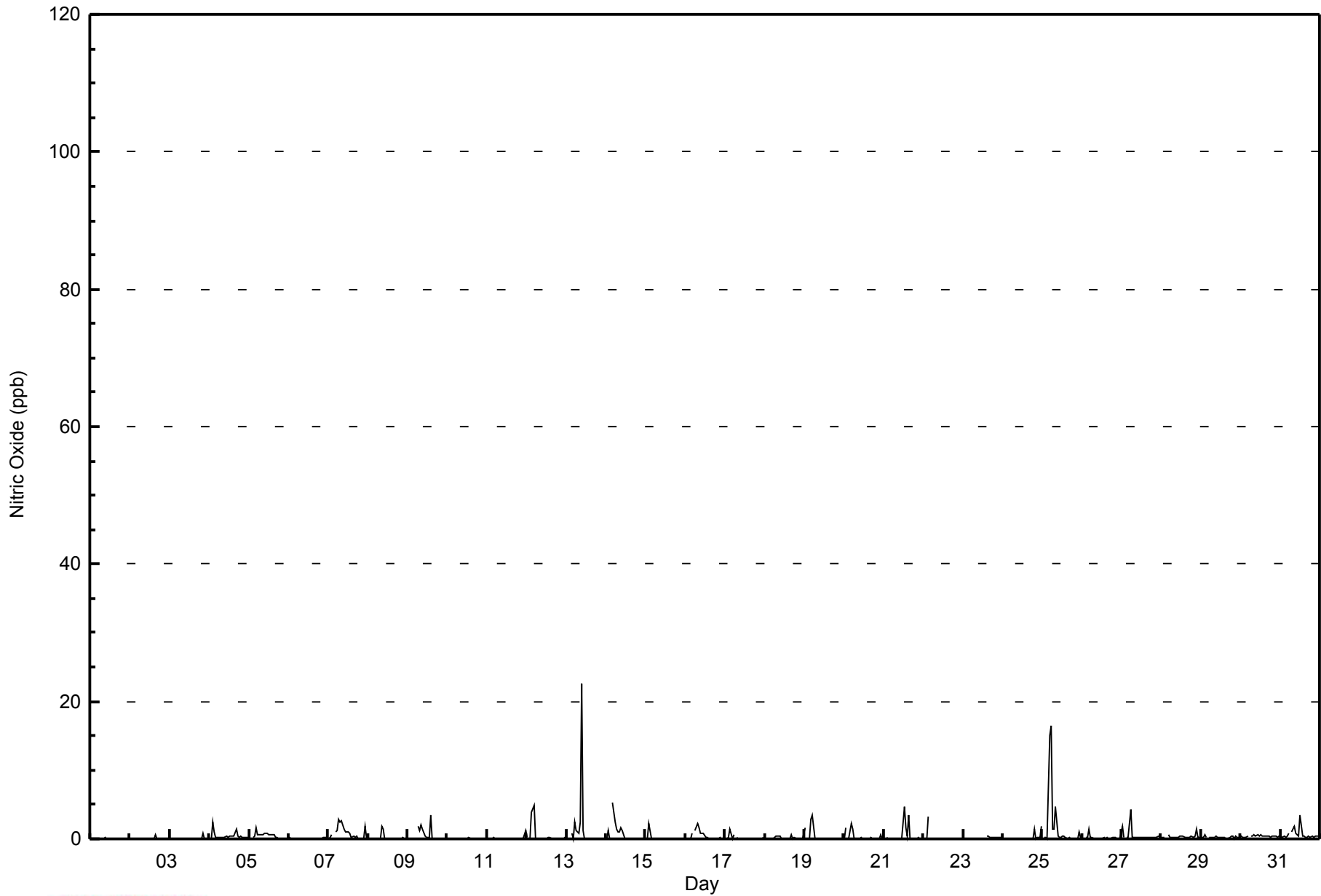


Maximum Value: 22 ppb on May 13 10:00																	Maximum Daily Average: 1.9 ppb on May 25																	Hours in Service: 744			
Minimum Value: 0 ppb on May 1 07:00																	Minimum Daily Average: 0.0 ppb on May 1																	Hours of Data: 682			
Maximum Diurnal Average: 1.5 ppb at hour 5																	Minimum Diurnal Average: 0.1 ppb at hour 19																	Hours of Missing Data: 62			
Monthly Average: 0.4 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> = 5																	Hours of Calibration: 36			
																																		Percent Operational Time: 96.5			
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-May	0	0	0	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-May	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.0	1											
3-May	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.1	1											
4-May	Z	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.4	2											
5-May	0	Z	0	0	2	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0.5	2											
6-May	0	0	Z	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-May	0	0	1	Z	1	1	3	2	3	1	1	1	1	1	0	0	0	0	0	0	0	0	2	0	0.9	3											
8-May	0	0	0	0	Z	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2											
9-May	0	0	0	0	0	Z	2	1	2	1	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0.5	3											
10-May	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											
11-May	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1											
12-May	0	Z	0	4	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	5											
13-May	0	0	Z	1	0	2	1	1	3	22	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.4	22											
14-May	0	1	0	Z	5	2	1	1	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	5											
15-May	0	0	2	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	2											
16-May	0	0	0	0	1	Z	1	2	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2											
17-May	0	0	0	1	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1											
18-May	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.1	1											
19-May	2	Z	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	3											
20-May	0	2	Z	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.3	2											
21-May	0	0	0	Z	0	0	0	0	M	0	0	0	5	2	0	4	0	0	0	0	0	0	0	0	0.5	5											
22-May	0	0	0	3	Z	0	0	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	3											
23-May	AF	AF	AF	AF	AF	AF	AF	AF	C	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	--	0											
24-May	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	0.2	2											
25-May	Z	0	0	0	15	16	2	1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1.9	16											
26-May	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1											
27-May	2	0	Z	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	4											
28-May	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.3	1											
29-May	0	0	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1											
30-May	0	0	0	0	0	Z	0	0	1	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0.4	1											
31-May	0	0	0	0	1	1	Z	1	2	1	1	0	3	0	0	0	0	0	0	0	0	0	0	0	0.6	3											
																	Diurnal Average				Diurnal Maximum																
0.2 0.2 0.3 0.5 1.5 1.3 0.5 0.4 0.8 1.1 0.3 0.2 0.4 0.2 0.3 0.3 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.2 0.2																																					
2 2 2 4 15 16 3 2 5 22 1 1 5 2 3 4 1 0 0 1 1 1 1 1 2 2																																					
Z - zerospan																	C - Calibration				M - Maintenance				AF - Analyzer Failure												



WBEA  
Hourly Averages

Nitric Oxide (NO) - ppb  
Anzac - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb**  
**Anzac - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	681	99.85	99.85
21 - 40	1	0.15	100.00
11 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Nitric Oxide (NO) - ppb**  
**Anzac - May 2014**

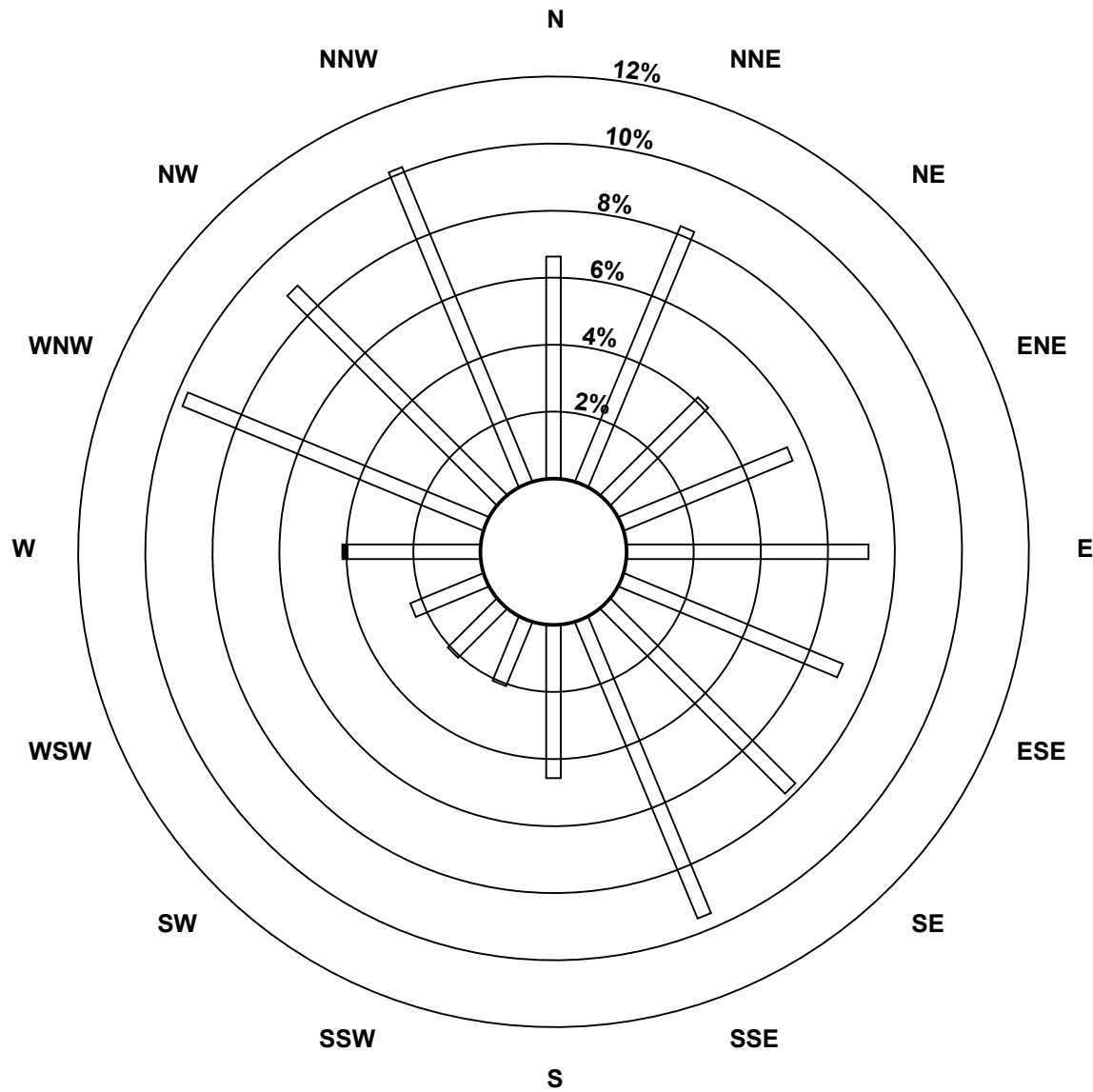
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	45	56	28	37	49	48	53	65	31	14	14	16	27	66	60	69	678
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	45	56	28	37	49	48	53	65	31	14	14	16	28	66	60	69	679

Total Number of Valid Hours: 679

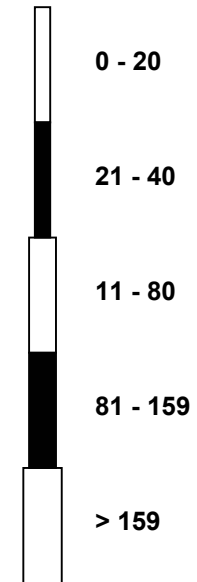
Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Nitric Oxide (NO) - ppb  
Anzac (AMS 14)**



Classes (ppb)



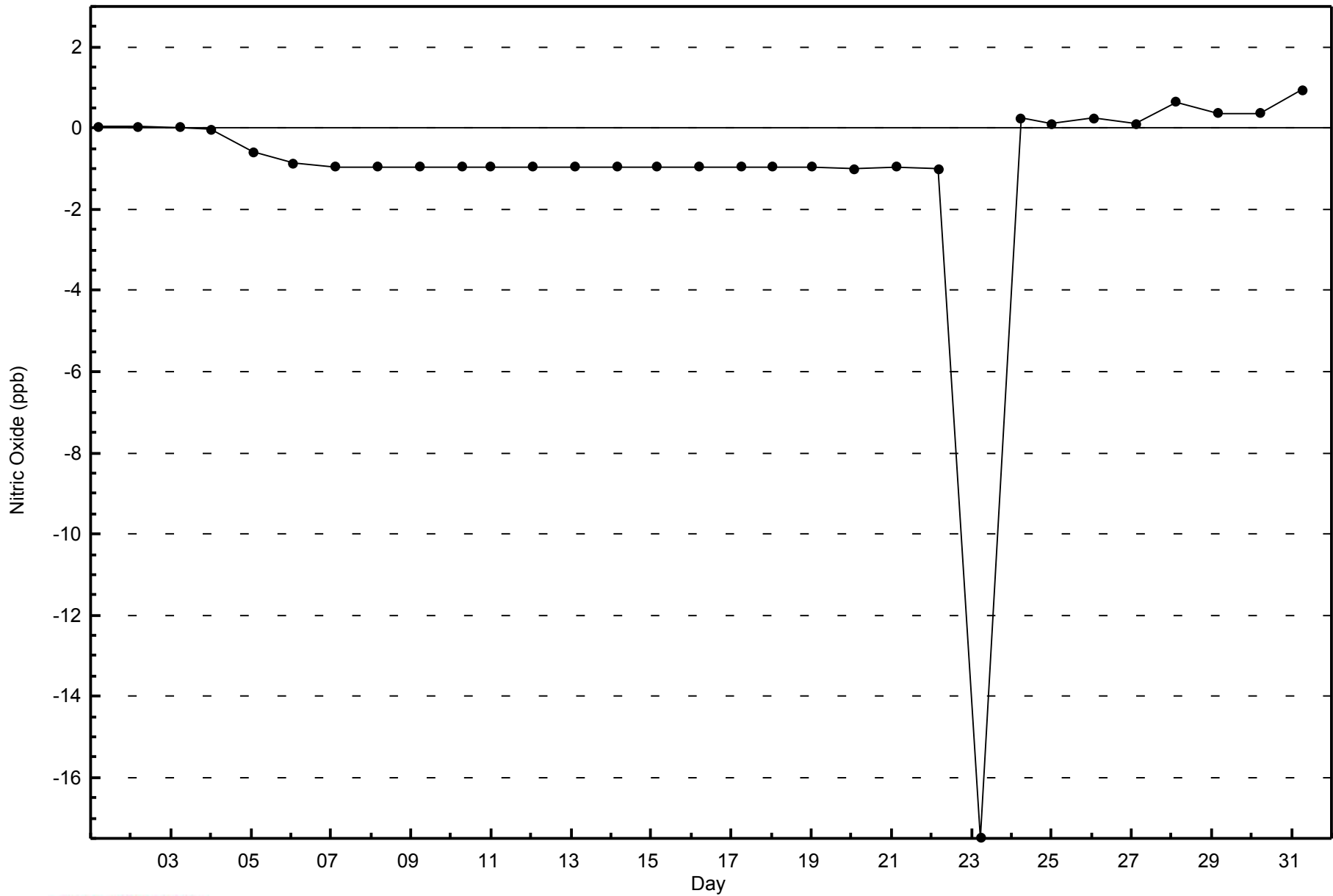
**Total Number of Valid Hours: 679**





WBEA  
Zero Responses

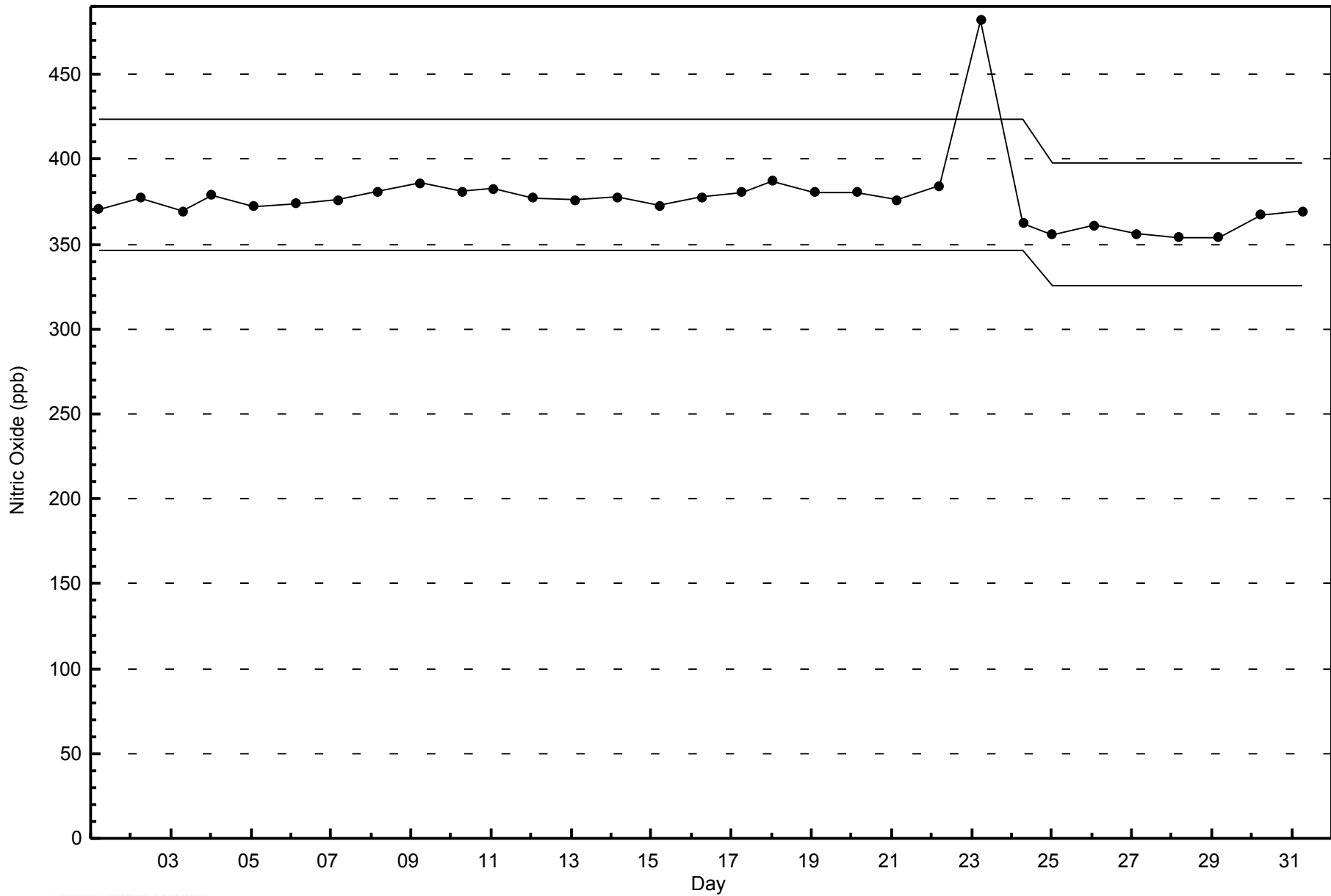
Nitric Oxide (NO) - ppb  
Anzac - May 2014





WBEA  
Span Responses

Nitric Oxide (NO) - ppb  
Anzac - May 2014





Summary of Hour Averages

Anzac - May 2014

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 14 ppb on May 13 10:00	Maximum Daily Average: 3.3 ppb on May 7		Hours of Data:	682
Minimum Value: 0 ppb on May 8 14:00	Minimum Daily Average: 0.0 ppb on May 30		Hours of Missing Data:	62
Maximum Diurnal Average: 2.8 ppb at hour 5	Minimum Diurnal Average: 0.8 ppb at hour 21		Hours of Calibration:	36
Monthly Average: 1.3 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> = 10		Percent Operational Time:	96.5

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-May	1	1	1	2	Z	6	5	6	4	4	2	2	3	3	3	2	2	1	3	2	2	2	2	2	2.7	6
2-May	4	3	1	1	2	Z	1	1	1	1	1	3	3	3	5	5	5	4	1	1	1	1	1	1	2.2	5
3-May	2	1	2	2	2	2	Z	3	3	3	2	2	1	1	1	1	1	1	1	1	2	1	1	1	1.6	3
4-May	Z	2	5	9	5	5	2	1	1	2	3	3	1	1	2	1	1	1	1	1	1	1	1	1	2.1	9
5-May	2	Z	1	1	3	1	1	1	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1.1	3
6-May	1	1	Z	1	1	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	0	2	5	5	1.0	5
7-May	3	3	3	Z	6	10	13	10	9	4	3	2	1	1	1	1	1	1	1	1	1	0	2	1	3.3	13
8-May	1	1	1	2	Z	1	2	2	1	2	1	1	0	0	1	1	1	1	1	1	0	2	0	0	0.9	2
9-May	0	1	2	4	12	Z	11	7	6	6	3	2	2	2	2	1	0	0	1	2	1	2	0	2	2.9	12
10-May	4	4	4	2	1	1	Z	1	0	0	1	0	0	1	0	0	0	2	3	2	3	4	3	3	1.7	4
11-May	Z	2	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	2	2	1	1	0	2	0.8	2
12-May	2	Z	0	4	10	0	1	0	0	0	0	0	2	2	1	3	4	3	1	0	0	0	0	1	1.5	10
13-May	0	0	Z	7	2	5	5	2	3	14	2	1	1	0	0	1	1	3	1	0	0	0	0	0	2.0	14
14-May	1	3	1	Z	9	7	6	5	5	5	4	1	1	1	1	1	1	1	1	1	1	1	1	1	2.5	9
15-May	1	1	4	2	Z	2	1	1	1	1	0	0	0	0	1	1	1	1	0	0	2	2	2	2	1.0	4
16-May	1	1	1	2	4	Z	4	5	4	2	2	2	2	2	2	1	1	1	1	2	2	3	2	1	2.1	5
17-May	1	1	1	3	0	2	Z	3	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	4	1.1	4
18-May	Z	1	1	2	1	3	3	2	1	1	1	0	0	1	0	0	3	0	2	1	1	1	1	1	1.2	3
19-May	5	Z	1	1	4	6	2	2	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1.5	6
20-May	1	4	Z	1	4	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1.4	4
21-May	1	1	1	Z	2	1	1	2	M	1	1	1	7	4	1	8	0	0	0	0	3	4	2	1	1.8	8
22-May	1	1	1	11	Z	3	3	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	11
23-May	AF	AF	AF	AF	AF	AF	AF	AF	AF	C	C	C	C	C	C	0	0	0	0	0	0	0	0	0	--	0
24-May	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.1	1
25-May	Z	0	0	0	1	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0.3	2
26-May	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
27-May	2	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	2
28-May	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.0	1
29-May	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
30-May	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
31-May	0	0	0	0	0	0	Z	1	2	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0.3	2

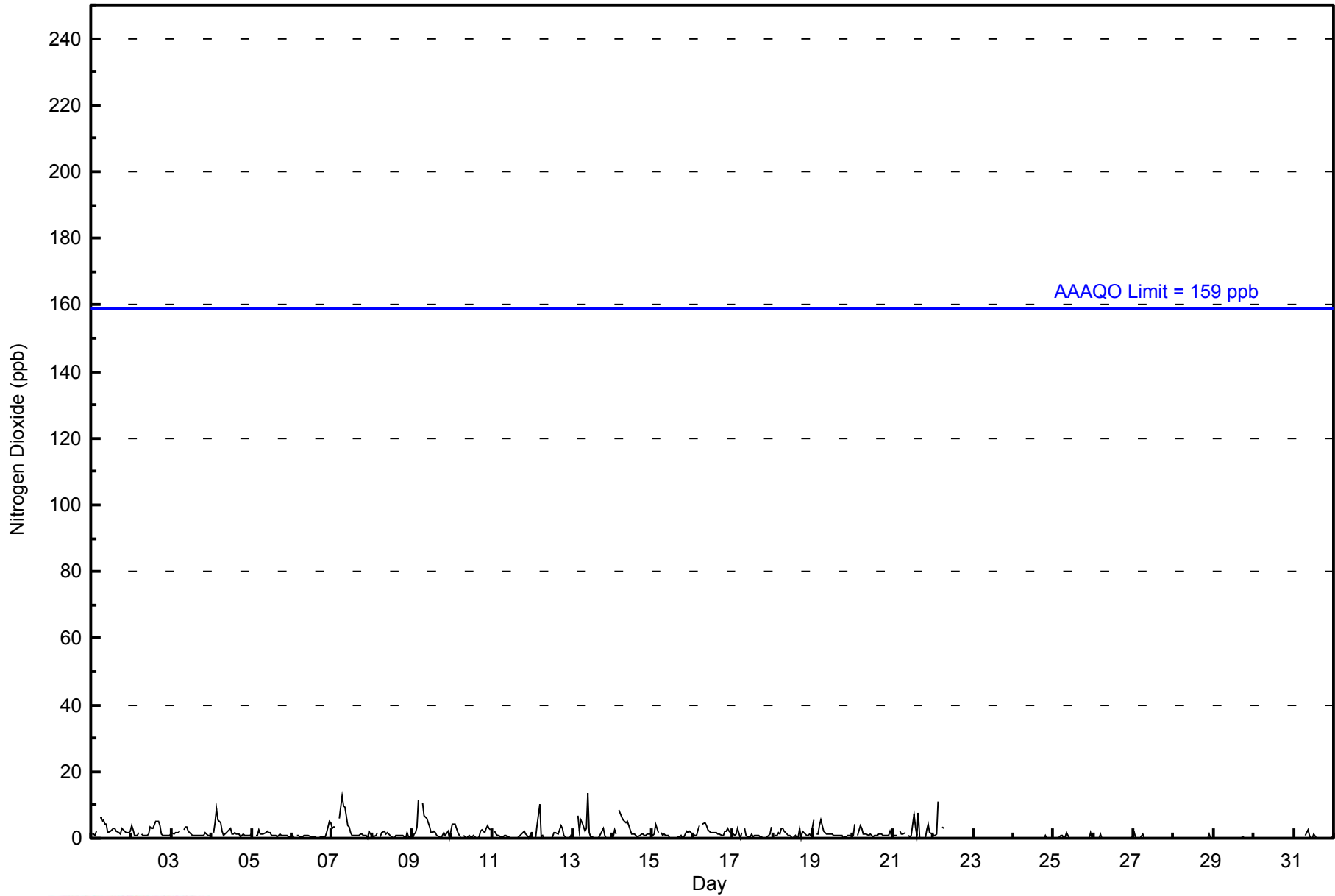
1.3	1.2	1.2	2.1	2.8	2.3	2.5	2.0	1.8	1.8	1.1	0.9	0.9	0.8	0.8	0.9	0.8	0.8	0.8	0.9	0.8	0.8	1.0	1.0	1.0	Diurnal Average	
5	4	5	11	12	10	13	10	9	14	4	3	7	4	5	8	5	4	3	2	3	4	5	5	Diurnal Maximum		

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



WBEA  
Hourly Averages

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Anzac - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Anzac - May 2014**

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

Total Number of Valid Hours: 682

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Anzac - May 2014**

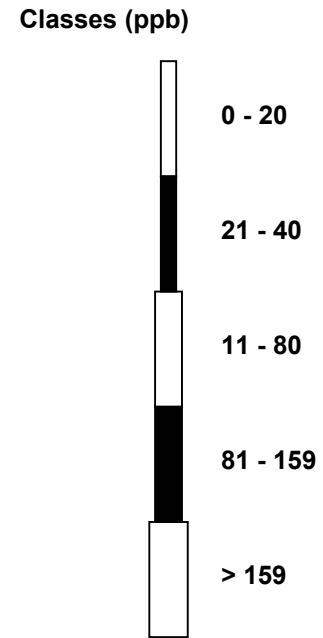
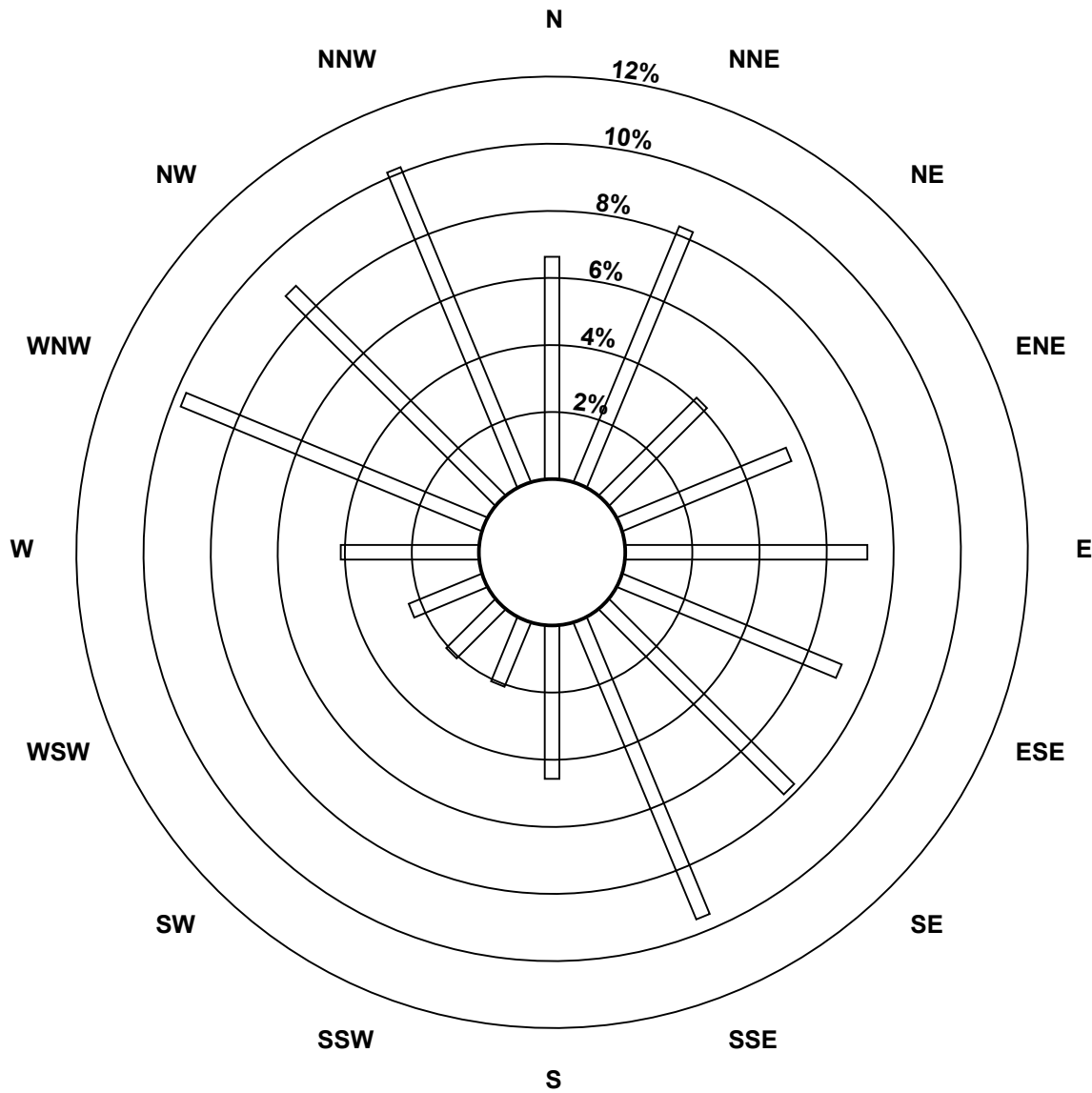
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	45	56	28	37	49	48	53	65	31	14	14	16	28	66	60	69	679
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	45	56	28	37	49	48	53	65	31	14	14	16	28	66	60	69	679

Total Number of Valid Hours: 679

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Anzac (AMS 14)**

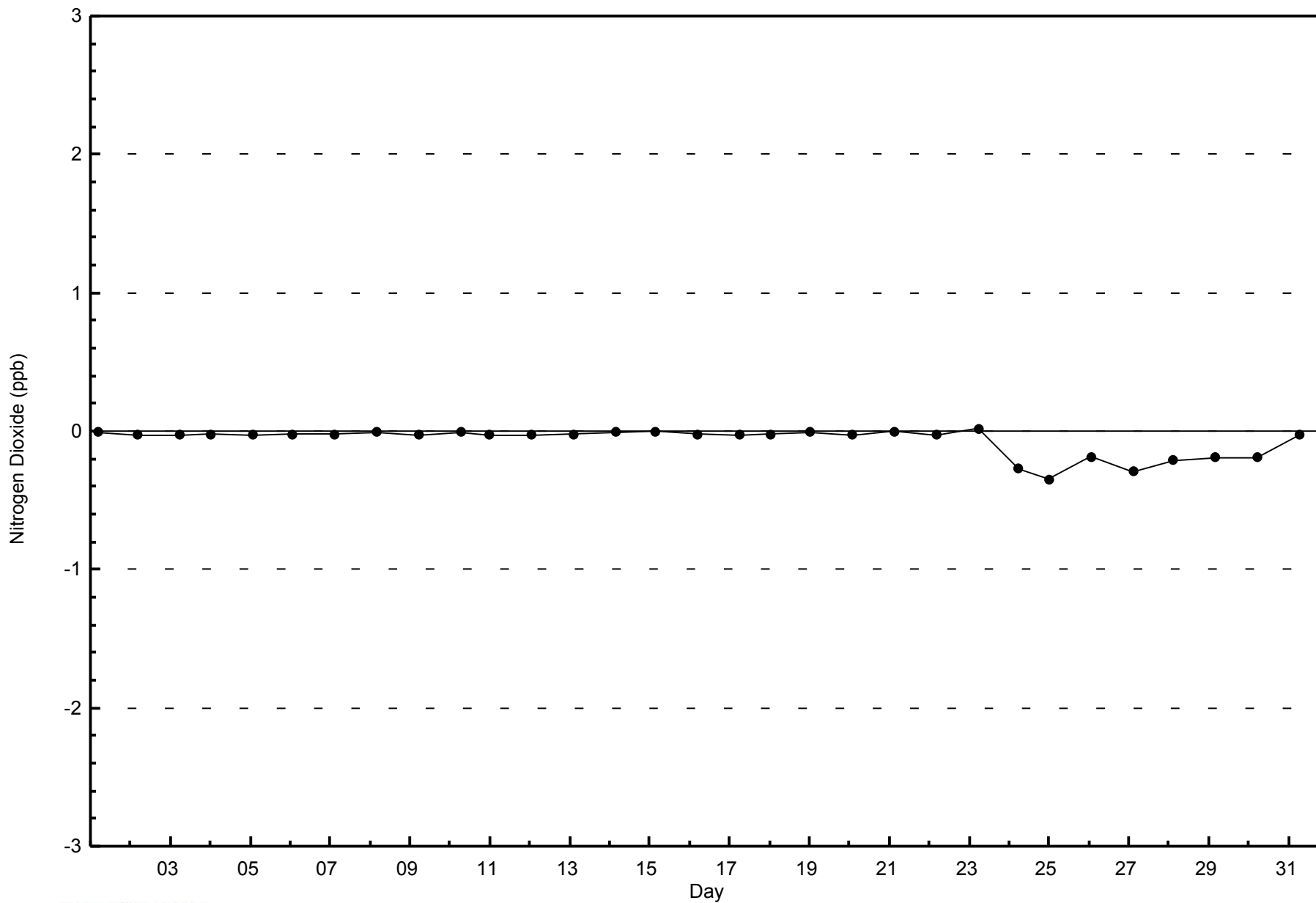


**Total Number of Valid Hours: 679**



WBEA  
Zero Responses

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Anzac - May 2014

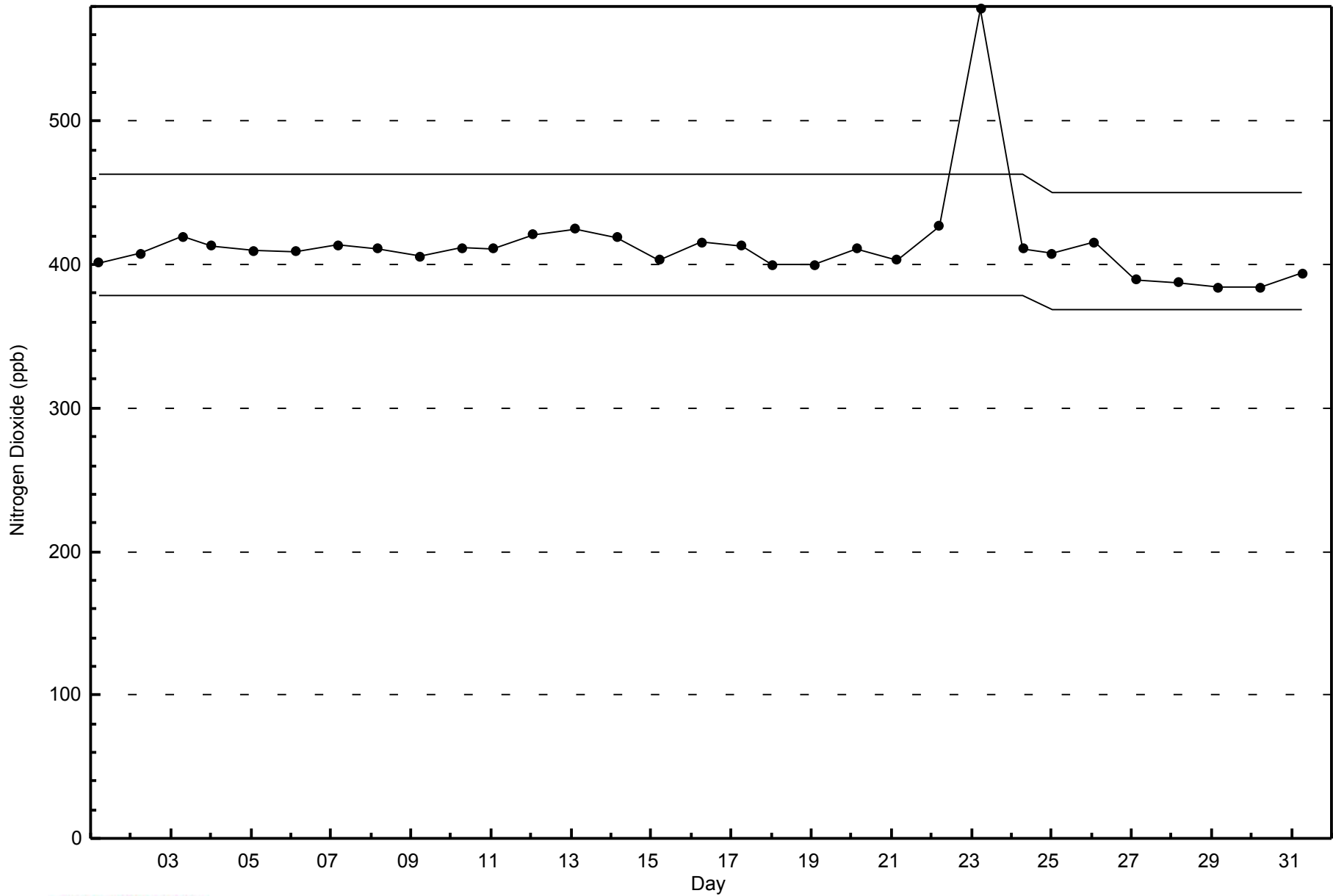






WBEA  
Span Responses

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Anzac - May 2014



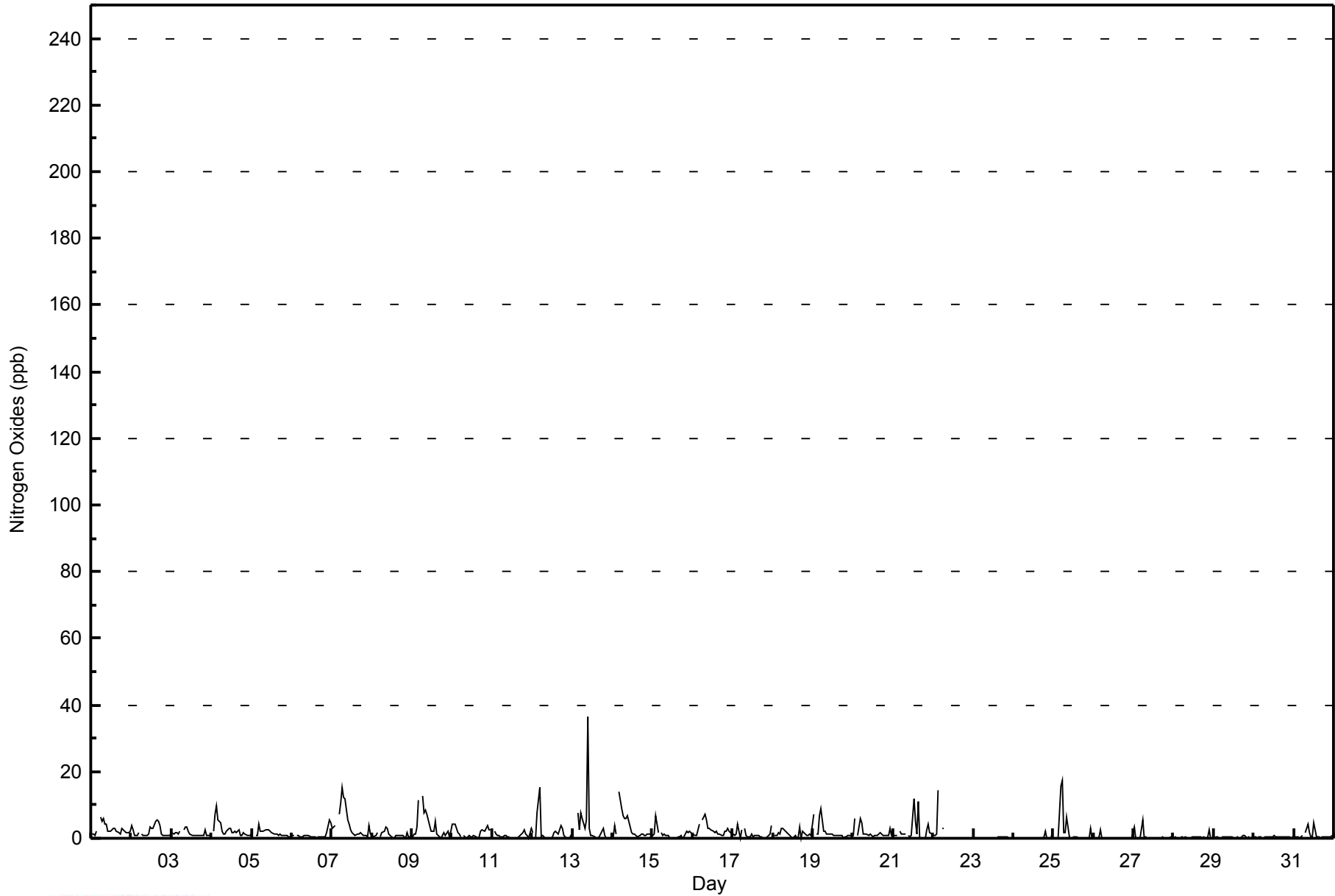


Maximum Value: 36 ppb on May 13 10:00											Maximum Daily Average: 4.2 ppb on May 7											Hours in Service: 744				
Minimum Value: 0 ppb on May 11 23:00											Minimum Daily Average: 0.2 ppb on May 26											Hours of Data: 682				
Maximum Diurnal Average: 4.3 ppb at hour 5											Minimum Diurnal Average: 0.9 ppb at hour 21											Hours of Missing Data: 62				
Monthly Average: 1.7 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> = 14											Hours of Calibration: 36				
																						Percent Operational Time: 96.5				
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-May	1	1	1	2	Z	6	5	6	4	4	2	2	3	3	3	2	2	1	3	2	2	2	2	2	2.7	6
2-May	4	3	1	1	2	Z	1	1	1	1	1	3	3	3	5	6	5	4	1	1	1	1	1	1	2.2	6
3-May	2	1	1	2	1	2	Z	3	3	3	2	1	1	1	1	1	1	1	1	1	3	1	1	1	1.6	3
4-May	Z	2	7	10	5	5	2	1	1	2	3	3	2	1	2	1	3	1	1	2	1	1	1	1	2.6	10
5-May	2	Z	1	1	4	2	2	2	3	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1	1.6	4
6-May	1	1	Z	1	1	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	0	2	5	5	1.0	5
7-May	3	3	4	Z	7	11	15	12	12	5	4	3	2	1	1	1	1	2	1	1	1	0	4	1	4.2	15
8-May	1	1	1	2	Z	0	2	2	3	3	1	1	0	0	1	1	1	1	1	1	0	2	0	0	1.1	3
9-May	0	1	1	4	12	Z	13	8	8	7	4	2	2	2	5	1	0	0	1	2	1	2	0	2	3.4	13
10-May	4	4	4	1	1	1	Z	1	0	0	1	0	0	1	0	0	0	2	3	2	3	4	3	3	1.7	4
11-May	Z	2	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	2	2	1	1	0	3	0.8	3
12-May	2	Z	0	8	15	0	1	0	0	0	0	0	2	2	1	3	4	3	1	0	0	0	0	1	1.9	15
13-May	0	0	Z	8	2	8	6	3	5	36	3	1	1	0	0	0	1	3	1	0	0	0	0	0	3.4	36
14-May	0	4	1	Z	14	9	7	6	6	7	5	2	1	1	1	1	1	1	1	1	1	1	1	1	3.2	14
15-May	1	1	7	2	Z	2	1	1	1	1	0	0	0	0	0	0	1	1	0	0	2	2	2	2	1.1	7
16-May	1	1	1	2	4	Z	5	7	6	3	3	3	2	2	2	1	1	1	1	2	2	3	2	1	2.5	7
17-May	1	1	1	4	0	2	Z	3	1	1	1	1	1	1	1	1	0	0	0	0	0	1	1	4	1.2	4
18-May	Z	1	1	2	1	3	3	3	2	1	1	0	0	1	0	0	3	0	2	1	1	1	1	1	1.3	3
19-May	7	Z	1	1	7	9	2	2	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1.9	9
20-May	1	6	Z	1	6	5	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	3	1	1.7	6
21-May	1	1	1	Z	2	1	1	1	M	1	1	1	12	5	1	11	0	0	0	0	3	4	2	1	2.3	12
22-May	1	1	1	14	Z	3	3	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	14
23-May	AF	AF	AF	AF	AF	AF	AF	AF	C	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	--	0
24-May	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0.2	2
25-May	Z	0	0	0	16	17	2	2	7	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	2.1	17
26-May	0	Z	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	3
27-May	3	0	Z	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	6
28-May	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0.4	2
29-May	0	0	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0.3	1
30-May	0	0	0	0	0	Z	0	0	1	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0.4	1
31-May	0	0	0	0	1	1	Z	2	4	2	1	0	5	0	0	0	0	0	0	0	0	0	0	1	0.9	5
1.5											1.4											Diurnal Average				
7											6											Diurnal Maximum				
Z - zerospan			C - Calibration			M - Maintenance			AF - Analyzer Failure																	



WBEA  
Hourly Averages

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Anzac - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Anzac - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	681	99.85	99.85
21 - 40	1	0.15	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Anzac - May 2014**

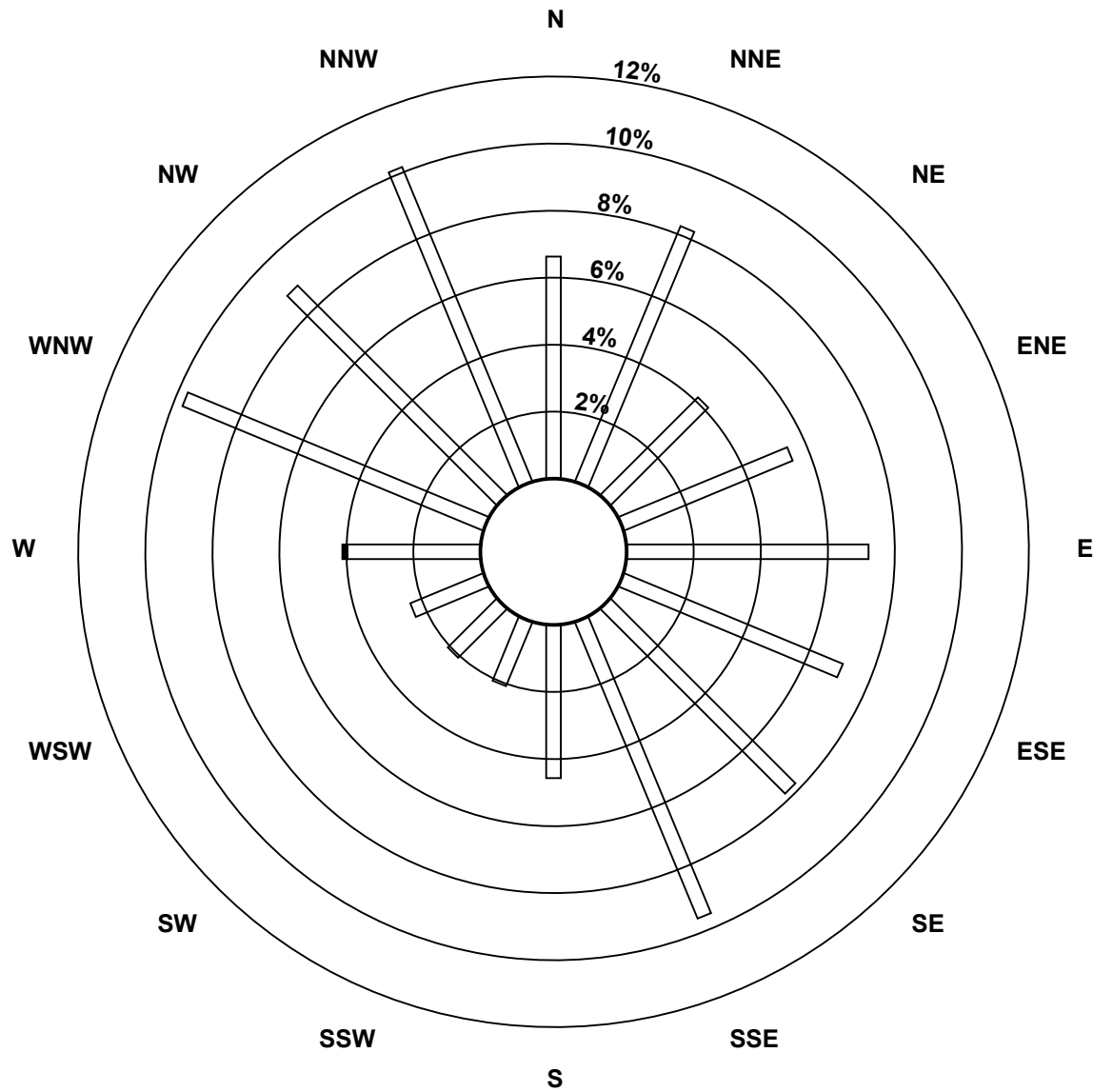
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	45	56	28	37	49	48	53	65	31	14	14	16	27	66	60	69	678
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	45	56	28	37	49	48	53	65	31	14	14	16	28	66	60	69	679

Total Number of Valid Hours: 679

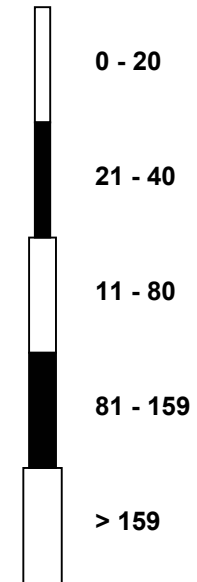
Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

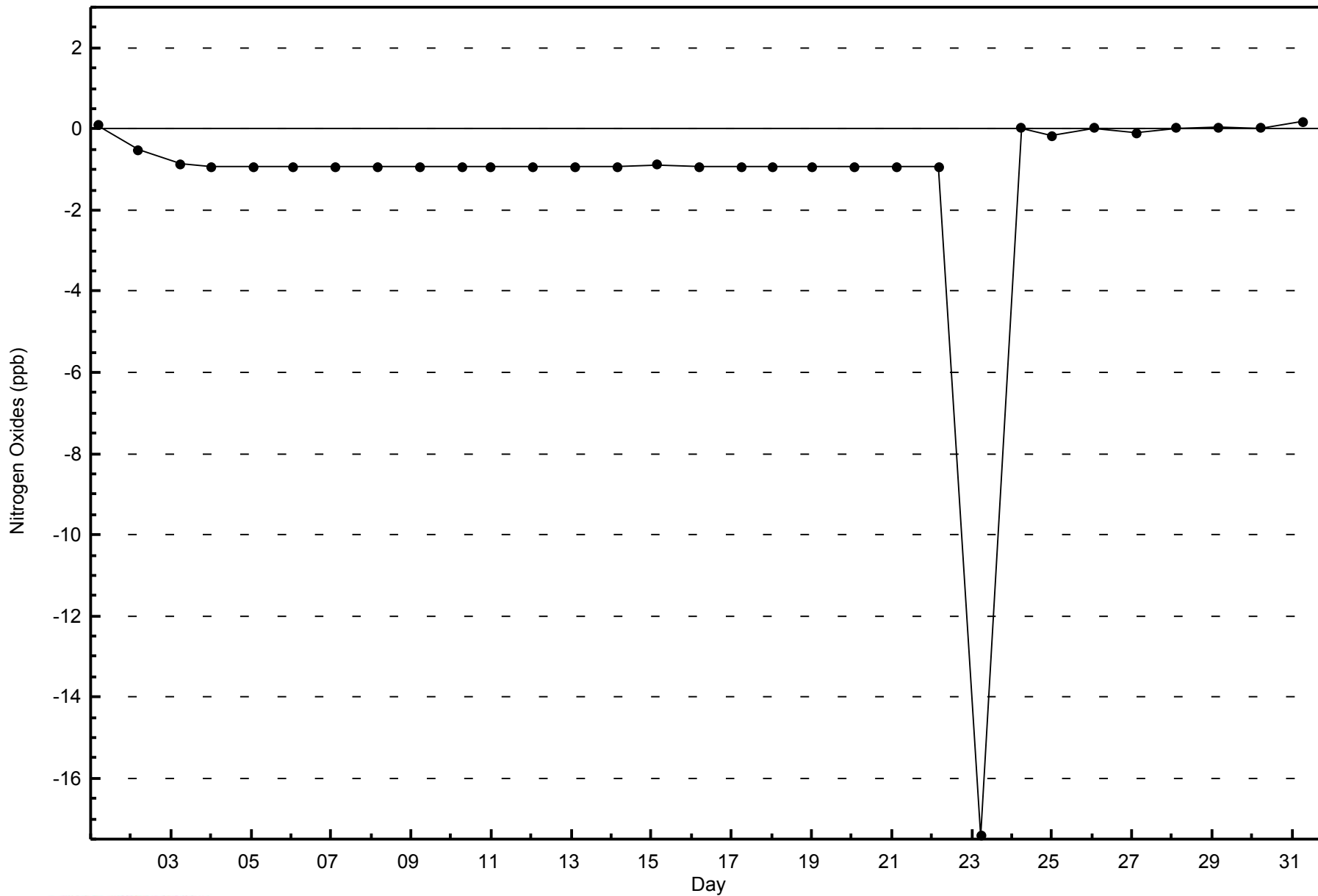
**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Anzac (AMS 14)**



**Classes (ppb)**



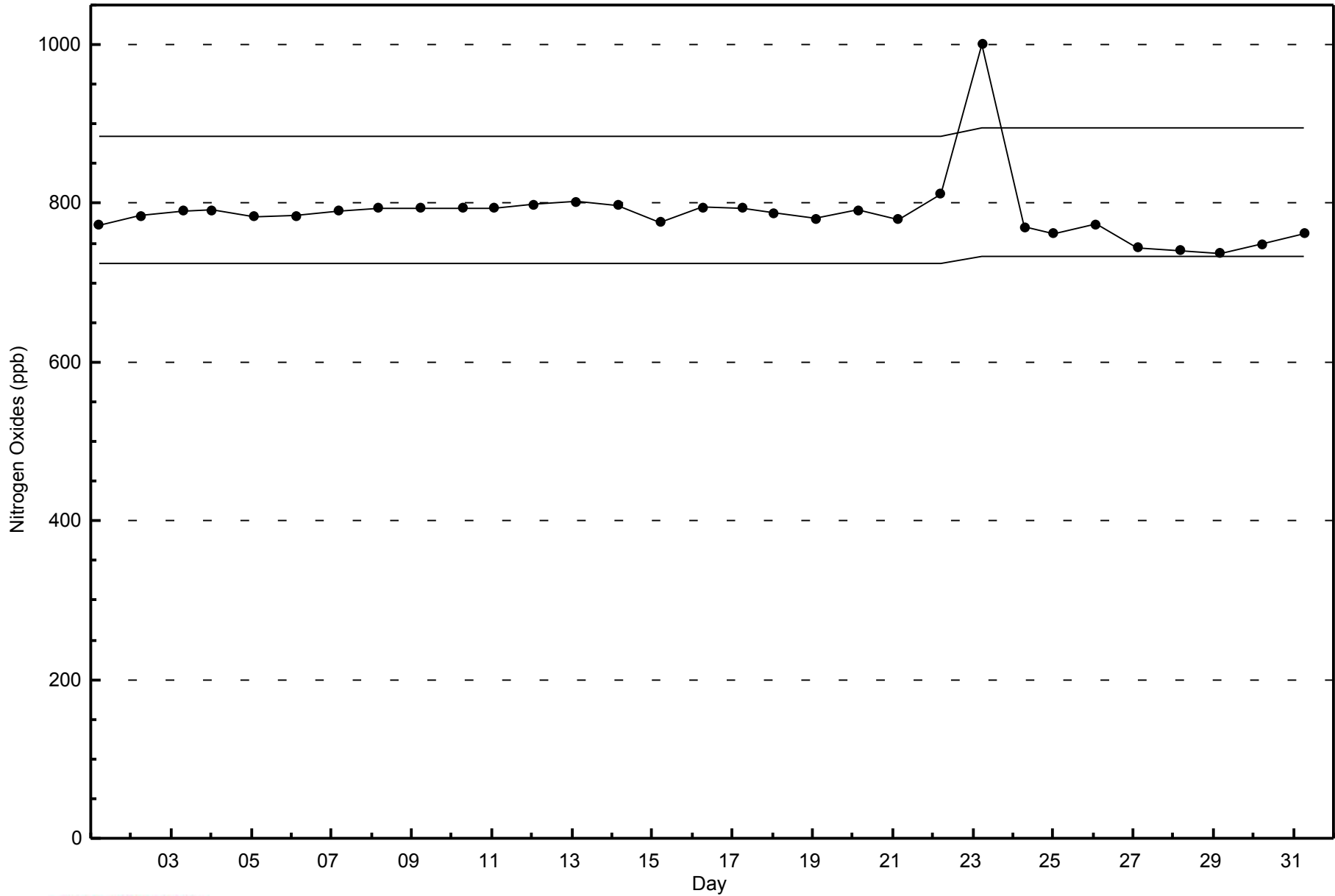
**Total Number of Valid Hours: 679**





WBEA  
Span Responses

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Anzac - May 2014







# Wood Buffalo Environmental Association

## Summary of Hour Averages

Ozone (O<sub>3</sub>) - ppb

Anzac - May 2014

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 58 ppb on May 23 14:00	Maximum Daily Average: 42.7 ppb on May 18		Hours of Data:	708
Minimum Value: 1 ppb on May 25 05:00	Minimum Daily Average: 12.7 ppb on May 29		Hours of Missing Data:	36
Maximum Diurnal Average: 38.4 ppb at hour 17	Minimum Diurnal Average: 20.0 ppb at hour 5		Hours of Calibration:	34
Monthly Average: 31.4 ppb	Percentiles: P <sub>1</sub> = 3 P <sub>10</sub> = 17 Q <sub>1</sub> = 23 Median = 31 Q <sub>3</sub> = 40 P <sub>90</sub> = 47 P <sub>99</sub> = 54		Percent Operational Time:	99.7

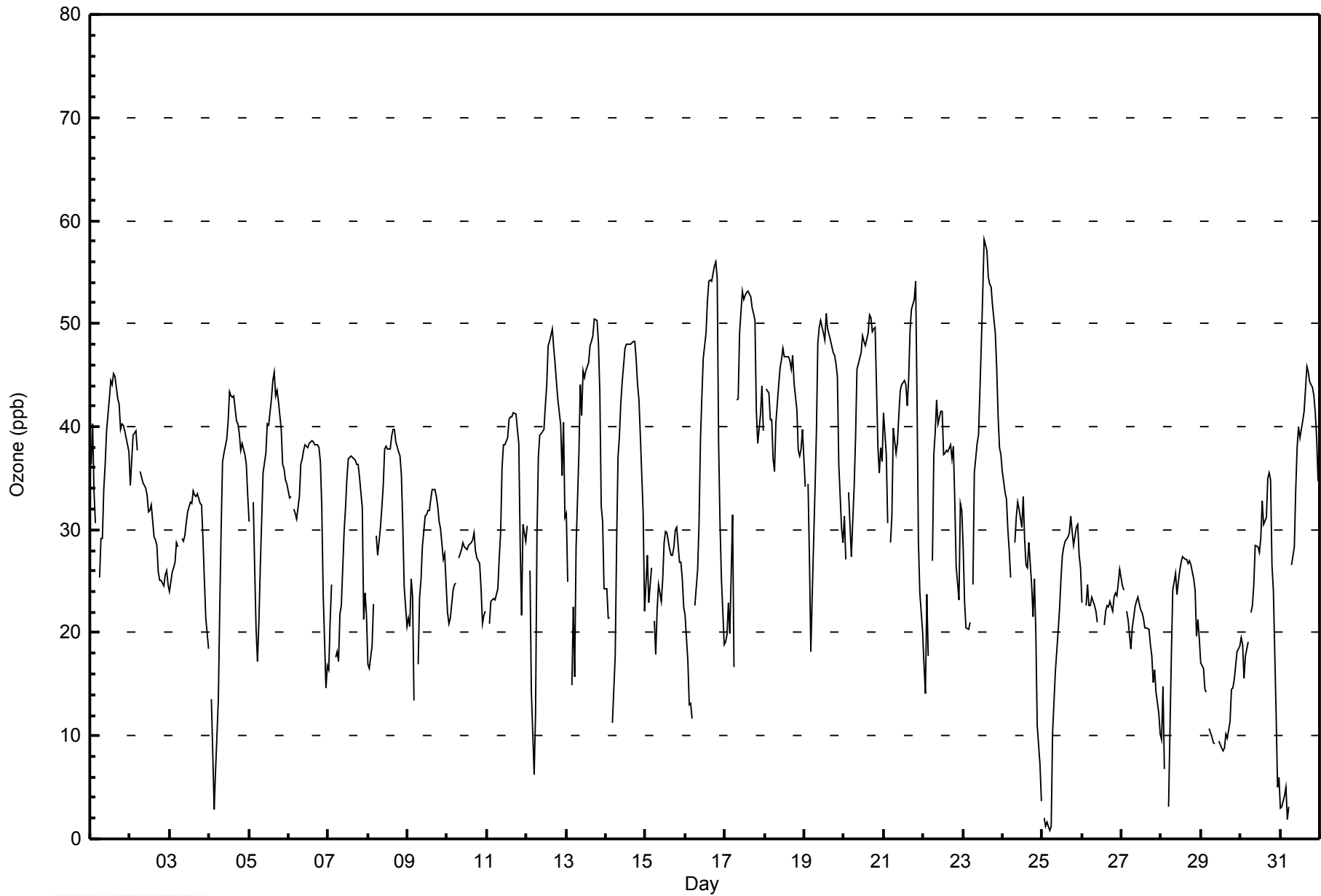
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-May	36	40	34	31	Z	25	29	29	34	36	40	43	44	44	45	45	43	42	40	40	40	40	38	38	38.1	45
2-May	34	37	39	40	38	Z	36	35	35	34	33	32	32	32	29	29	29	26	25	25	25	26	26	25	31.3	40
3-May	24	26	26	27	29	28	Z	29	29	29	31	32	33	33	34	33	33	33	33	32	29	25	21	18	29.0	34
4-May	Z	14	8	3	7	14	22	30	37	37	39	41	43	43	43	43	41	40	39	38	38	37	36	33	31.6	43
5-May	31	Z	33	26	20	17	21	26	36	37	37	40	40	43	44	45	43	43	42	40	36	36	35	34	35.1	45
6-May	33	33	Z	32	32	31	33	36	37	38	38	38	38	38	39	38	38	38	38	37	32	24	15	17	33.6	39
7-May	16	21	25	Z	18	18	17	22	23	30	32	35	37	37	37	37	36	36	35	32	21	24	22	22	28.2	37
8-May	17	17	19	23	Z	29	28	30	32	34	38	38	38	38	39	40	40	38	38	37	35	30	24	21	31.4	40
9-May	21	21	25	23	13	Z	17	23	25	28	31	32	32	32	33	34	34	33	32	31	30	27	28	25	27.5	34
10-May	22	21	21	24	25	25	Z	27	28	29	28	28	28	29	29	29	30	28	27	27	24	21	22	22	25.8	30
11-May	Z	21	23	23	23	23	24	27	30	36	38	38	39	41	41	41	41	41	40	38	29	22	31	29	32.1	41
12-May	30	Z	26	14	6	12	29	37	39	39	40	42	44	48	48	50	48	46	44	43	40	35	40	31	36.2	50
13-May	32	25	Z	15	23	16	28	37	44	41	45	45	45	46	48	48	49	50	50	48	43	32	31	24	37.7	50
14-May	24	21	21	Z	11	18	29	37	39	42	44	48	48	48	48	48	48	46	44	43	39	32	22	22	36.9	48
15-May	25	28	23	26	Z	21	18	22	25	23	25	29	30	30	28	28	28	28	30	30	27	27	25	23	26.0	30
16-May	22	17	13	13	12	Z	23	26	31	39	43	47	49	52	54	54	54	56	56	54	38	31	25	19	35.9	56
17-May	19	20	23	20	32	17	Z	43	43	49	53	52	53	53	53	53	52	51	50	41	38	41	44	40	40.8	53
18-May	Z	44	43	41	41	37	36	40	44	46	47	48	47	47	47	46	46	47	44	42	38	37	38	40	42.7	48
19-May	34	Z	34	27	18	24	34	40	48	50	50	49	48	51	50	49	48	47	47	46	45	36	30	29	40.7	51
20-May	31	27	Z	34	27	31	34	39	46	47	47	49	48	48	49	51	51	49	49	50	38	36	38	37	41.5	51
21-May	41	37	31	Z	29	31	40	37	39	41	43	44	44	44	42	45	49	51	52	54	42	29	24	20	39.6	54
22-May	17	14	24	18	Z	27	37	39	43	40	41	41	37	37	38	38	38	37	38	33	26	23	33	32	32.7	43
23-May	28	23	20	20	21	Z	25	35	38	39	44	48	53	58	57	54	54	52	49	46	41	38	37	37	40.7	58
24-May	36	34	33	30	28	25	Z	29	31	33	32	30	33	29	27	26	29	25	22	25	20	11	7	4	26.0	36
25-May	Z	2	1	2	1	1	10	13	16	20	22	25	28	28	29	29	30	31	30	28	30	28	26	26	20.1	31
26-May	23	Z	23	25	23	23	23	23	22	21	C	C	C	21	22	23	23	23	22	24	24	24	25	26	23.0	26
27-May	25	24	Z	22	21	18	21	21	22	23	23	22	22	21	20	20	20	19	18	15	16	14	12	10	19.7	25
28-May	10	15	7	Z	3	11	18	24	26	24	25	26	27	27	27	27	27	27	27	25	24	20	21	19	21.1	27
29-May	17	17	15	14	Z	11	10	9	9	M	M	9	9	8	9	10	10	11	15	15	15	17	18	19	12.7	19
30-May	20	19	16	18	19	Z	22	23	25	29	28	28	29	33	31	31	35	36	35	27	24	12	5	6	23.8	36
31-May	3	3	4	5	2	3	Z	27	28	34	38	40	39	41	41	44	46	45	44	44	43	41	39	35	30.0	46
24.9 22.9 22.6 22.0 20.0 20.6 25.5 29.6 32.3 34.9 37.2 37.3 37.9 38.1 38.1 38.3 38.4 38.1 37.5 36.0 32.7 28.6 27.5 25.2																								Diurnal Average		
41 44 43 41 41 37 40 43 48 50 53 52 53 58 57 54 54 56 56 54 46 41 44 40																								Diurnal Maximum		

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



**WBEA**  
**Hourly Averages**

**Ozone (O<sub>3</sub>) - ppb**  
**Anzac - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Ozone (O<sub>3</sub>) - ppb**  
**Anzac - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	110	15.54	15.54
21 - 50	570	80.51	96.05
51 - 82	28	3.95	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Ozone (O<sub>3</sub>) - ppb**  
**Anzac - May 2014**

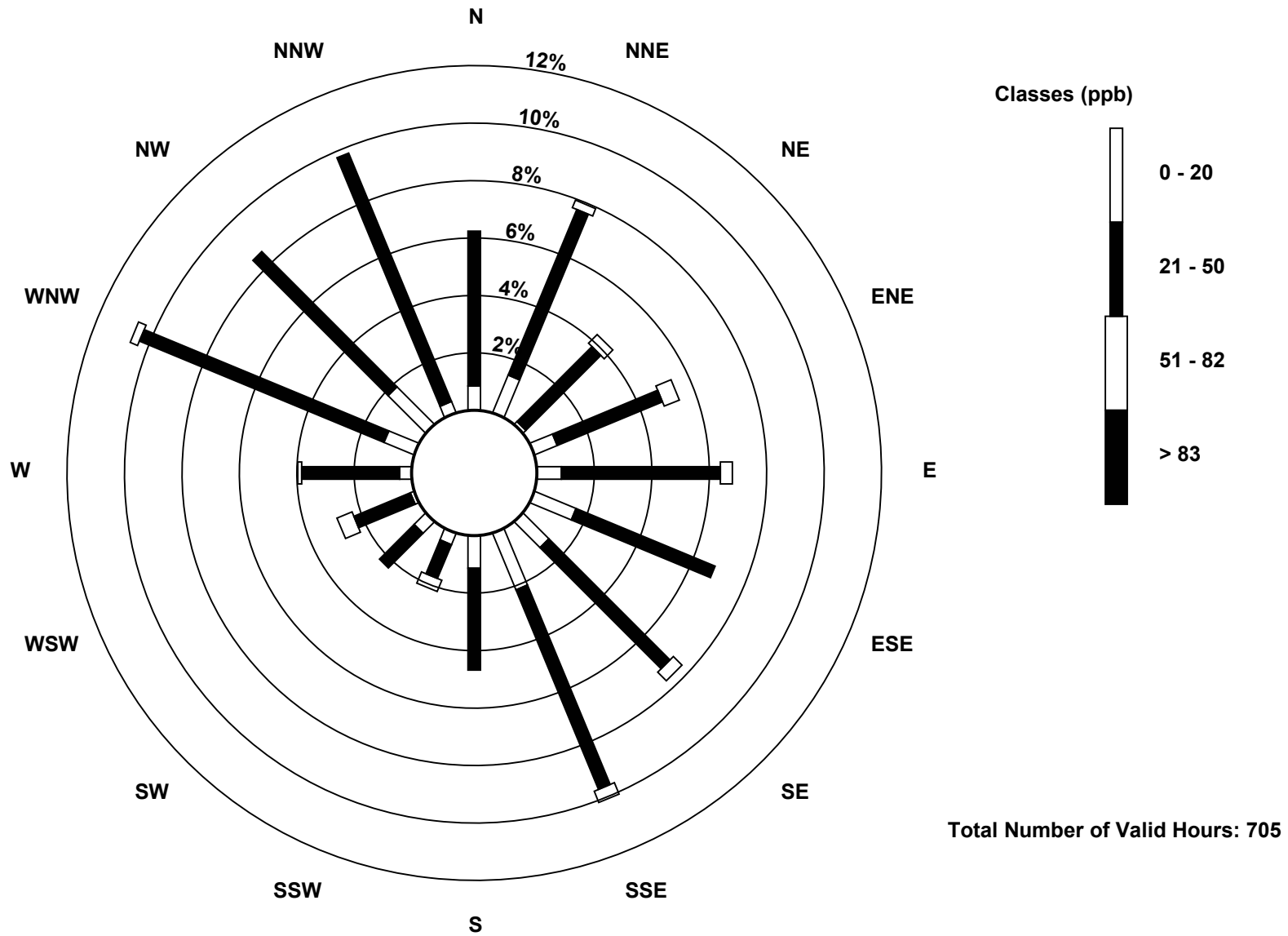
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	6	10	1	6	6	11	9	15	8	3	4	1	3	8	13	3	107
21 - 50	38	44	26	28	39	37	42	53	25	9	12	15	24	65	47	66	570
51 - 82	0	2	3	4	3	0	3	3	0	3	0	4	1	2	0	0	28
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	44	56	30	38	48	48	54	71	33	15	16	20	28	75	60	69	705

Total Number of Valid Hours: 705

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

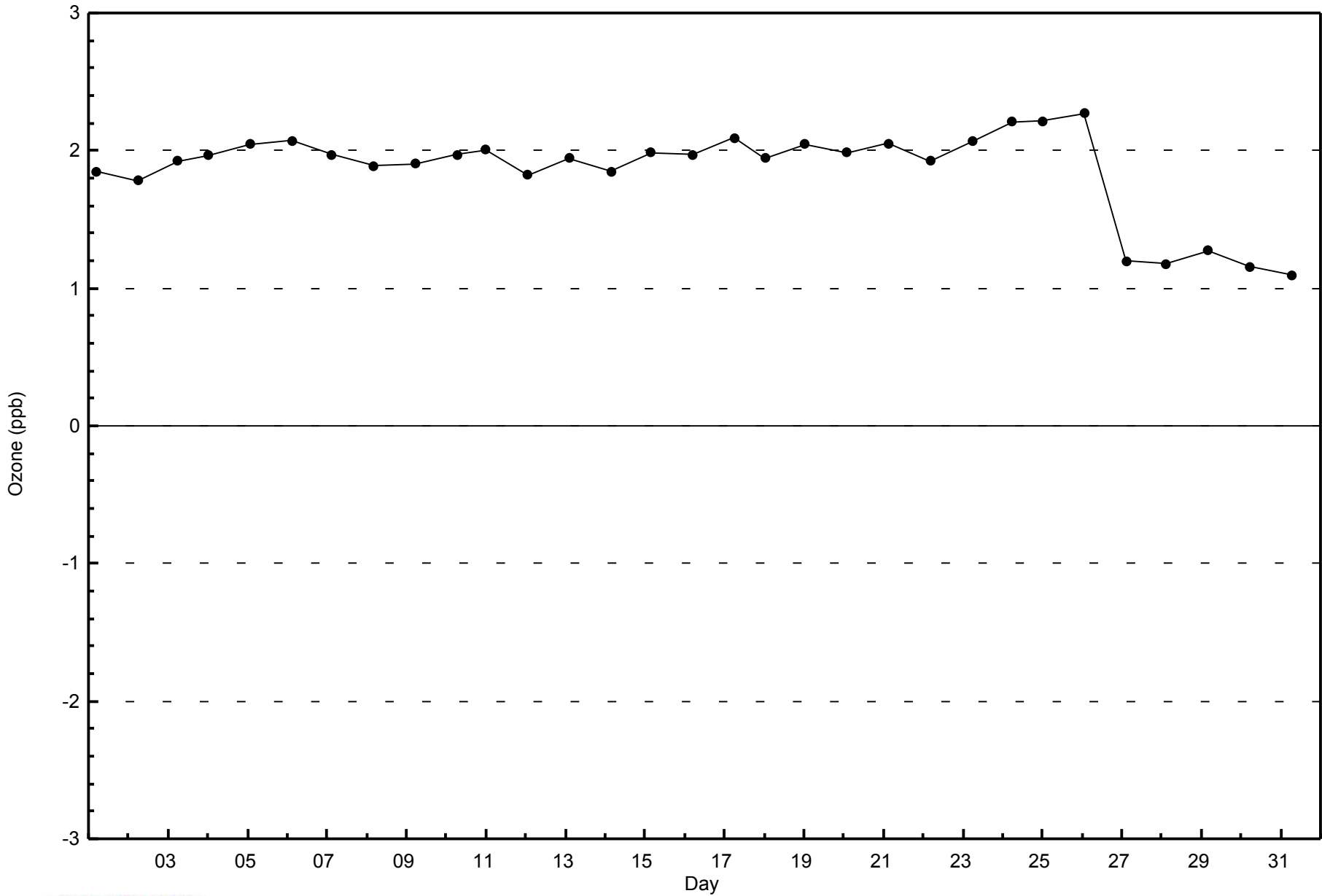
**Ozone (O<sub>3</sub>) - ppb  
Anzac (AMS 14)**





WBEA  
Zero Responses

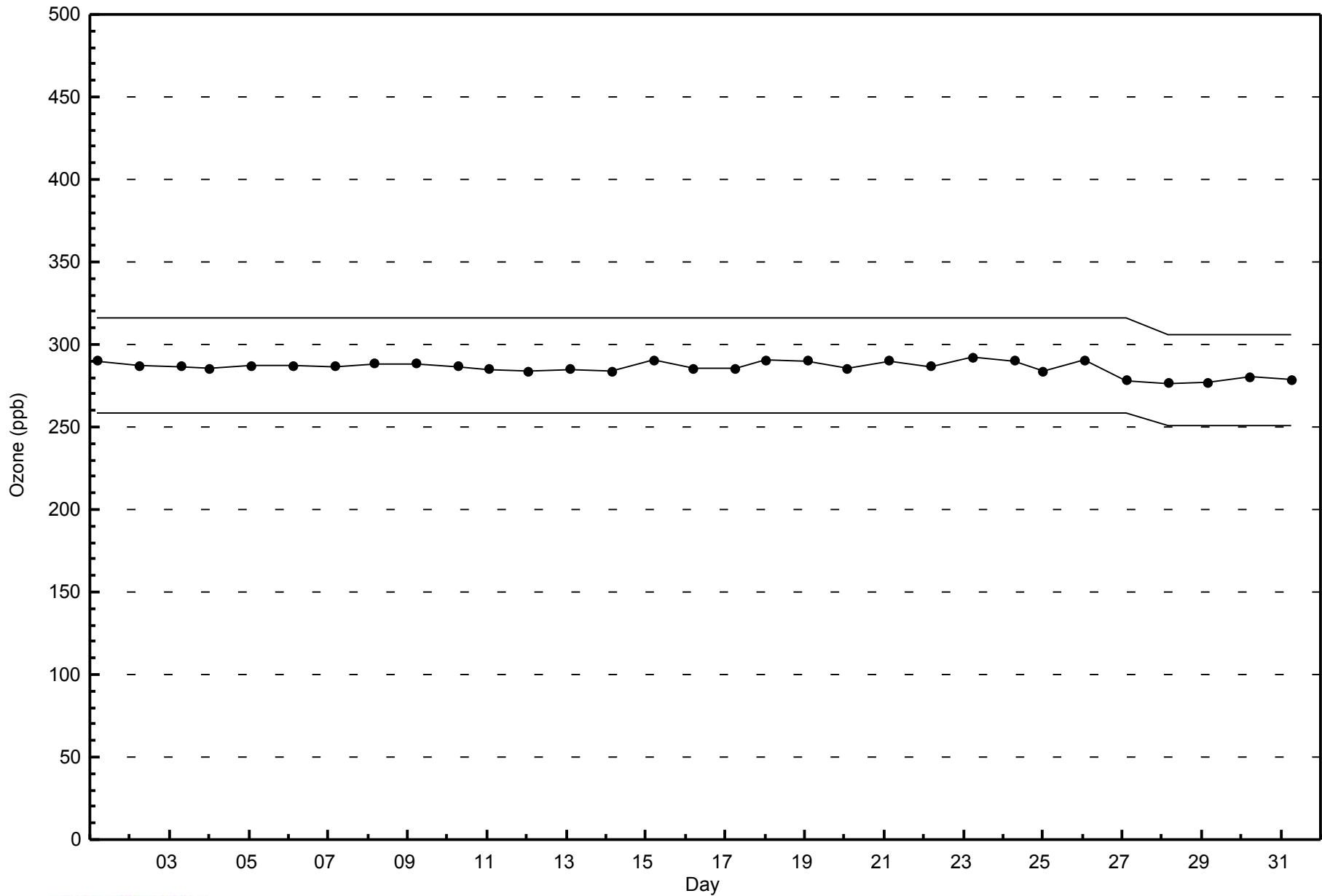
Ozone (O<sub>3</sub>) - ppb  
Anzac - May 2014





WBEA  
Span Responses

Ozone (O<sub>3</sub>) - ppb  
Anzac - May 2014





Summary of Hour Averages

Anzac - May 2014

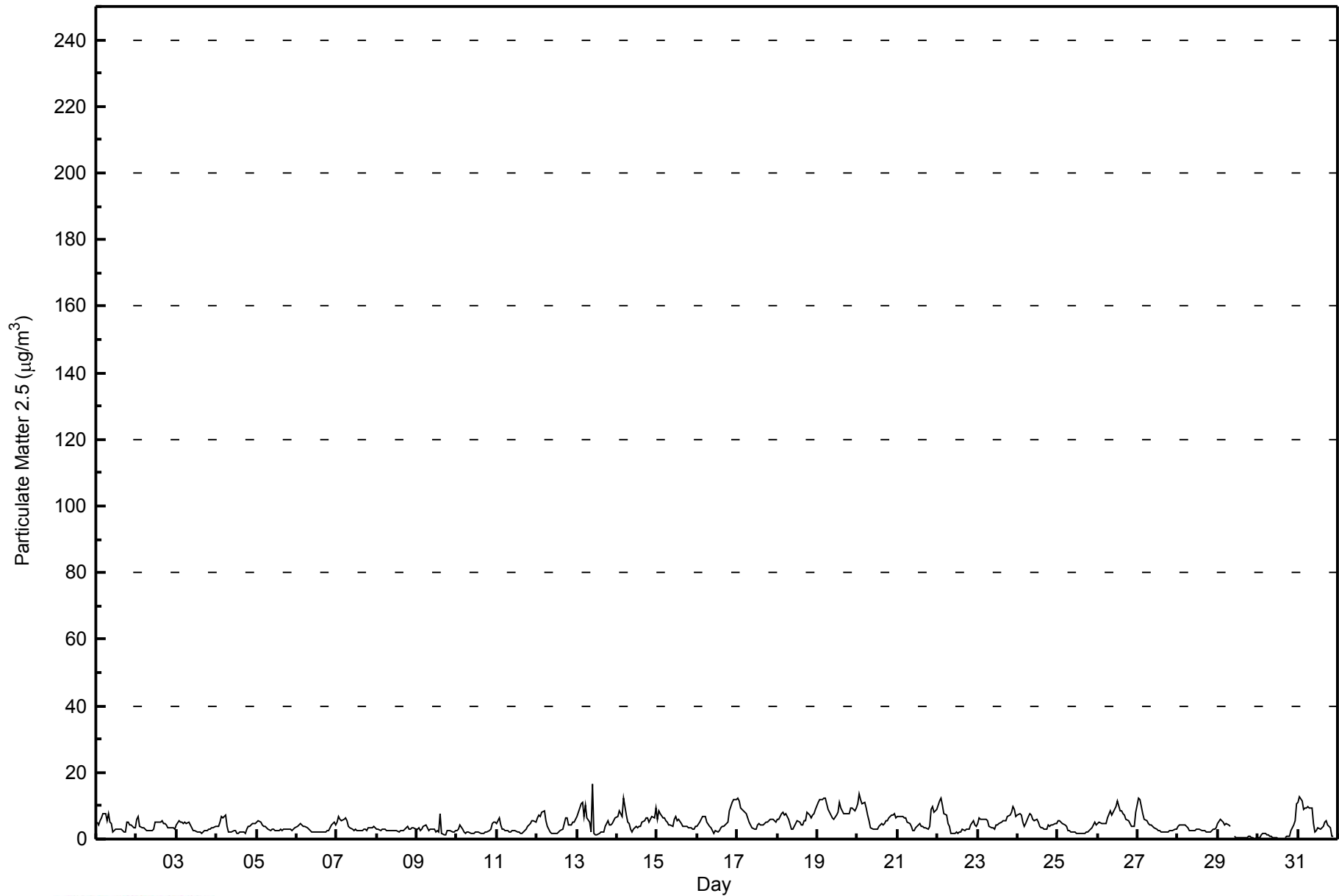
Number of Exceedences (AAAQO): 24-hr: 0 Maximum Value: 16.5 µg/m <sup>3</sup> on May 13 10:00 Minimum Value: 0.1 µg/m <sup>3</sup> on May 30 14:00 Maximum Diurnal Average: 6.8 µg/m <sup>3</sup> at hour 2 Monthly Average: 4.47 µg/m <sup>3</sup>		Maximum Daily Average: 9.1 µg/m <sup>3</sup> on May 19 Minimum Daily Average: 1.6 µg/m <sup>3</sup> on May 30 Minimum Diurnal Average: 2.9 µg/m <sup>3</sup> at hour 11 Percentiles: P <sub>1</sub> = 0.3 P <sub>10</sub> = 1.9 Q <sub>1</sub> = 2.6 Median = 3.9 Q <sub>3</sub> = 5.7 P <sub>90</sub> = 8.1 P <sub>99</sub> = 12.1		Hours in Service: 744 Hours of Data: 740 Hours of Missing Data: 4 Hours of Calibration: 0 Percent Operational Time: 99.5																																													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-May	5.1	4.3	5.3	6.3	7.5	7.5	5.7	7.6	5.1	4.5	2.2	2.9	2.9	2.8	3.1	2.9	2.1	2.1	5.1	5.3	4.3	4.4	3.5	3.5	4.4	7.6																							
2-May	5.9	6.6	3.8	3.2	3.4	3.0	2.6	2.4	2.4	2.6	3.2	4.9	5.1	5.0	4.9	5.4	4.8	4.6	4.0	3.4	3.6	3.3	3.2	3.0	3.9	6.6																							
3-May	4.1	5.3	5.2	5.2	4.5	5.0	4.8	4.9	4.2	3.2	2.5	2.3	2.0	2.1	1.9	1.9	2.1	2.4	2.5	2.8	3.0	3.4	3.5	3.7	3.4	5.3																							
4-May	3.7	4.0	5.0	6.6	6.3	7.1	3.6	2.3	2.1	2.3	2.3	1.8	1.8	1.9	2.2	1.9	1.8	2.9	3.9	3.9	4.8	4.6	4.5	4.5	3.5	7.1																							
5-May	5.0	5.5	5.0	4.2	3.8	3.6	3.5	2.9	2.7	3.0	3.0	2.8	2.6	2.7	2.9	2.6	3.1	3.1	2.8	3.0	2.8	2.7	2.9	3.3	3.3	5.5																							
6-May	3.6	4.3	4.5	4.1	3.8	3.9	3.6	3.0	2.4	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.3	2.3	2.4	2.6	3.2	4.3	5.1	4.3	3.1	5.1																							
7-May	5.3	6.7	5.8	5.6	6.1	6.5	5.3	3.7	3.5	3.0	2.7	2.8	2.7	2.6	2.6	2.7	3.0	2.9	2.6	3.4	3.6	3.6	3.9	3.6	3.9	6.7																							
8-May	2.9	2.8	2.7	2.9	2.9	2.8	2.7	2.6	2.5	2.5	2.7	2.5	2.4	2.3	2.5	2.6	2.6	3.0	3.6	3.1	2.9	3.4	3.3	2.9	2.8	3.6																							
9-May	2.9	3.4	2.7	2.9	4.0	4.4	3.4	2.4	2.9	3.2	3.0	2.2	2.6	2.3	7.6	1.8	1.3	1.5	2.4	2.4	2.5	2.3	2.3	2.5	2.9	7.6																							
10-May	2.7	3.0	4.1	2.8	2.2	1.9	2.1	2.0	1.7	1.8	1.8	1.9	2.1	2.0	1.8	1.8	1.9	2.3	2.3	2.6	3.1	4.5	4.9	5.0	2.6	5.0																							
11-May	4.7	6.5	4.2	3.1	2.9	2.7	2.5	2.1	2.2	2.6	2.5	2.4	2.2	1.9	1.9	1.8	2.0	2.8	3.6	4.0	4.5	5.4	5.7	4.9	3.3	6.5																							
12-May	6.3	7.1	6.8	8.0	8.5	5.4	4.0	3.1	2.1	1.9	1.8	1.8	1.8	2.2	2.4	2.9	4.6	6.4	6.5	4.1	4.2	4.9	5.2	6.1	4.5	8.5																							
13-May	6.9	8.1	10.8	11.2	6.9	10.0	6.4	5.0	2.2	16.5	1.5	1.4	1.2	1.5	1.9	2.0	2.3	3.8	5.3	4.3	4.4	4.6	5.5	6.4	5.4	16.5																							
14-May	7.0	8.6	7.6	6.8	12.2	7.0	5.3	4.8	3.0	2.3	3.0	3.7	3.6	3.6	3.8	5.0	5.6	6.2	6.5	5.2	6.1	6.9	6.3	9.2	5.8	12.2																							
15-May	6.1	8.4	7.4	6.4	6.3	5.7	5.0	4.4	4.2	3.9	6.1	6.8	5.7	5.8	4.6	3.8	3.9	4.0	3.6	3.4	3.4	2.9	2.8	3.7	4.9	8.4																							
16-May	3.8	5.2	5.8	6.6	6.8	6.7	5.2	4.0	3.3	2.6	1.9	2.4	2.3	2.5	3.3	3.8	3.9	4.6	5.2	8.5	9.7	11.2	12.1	11.8	5.5	12.1																							
17-May	12.5	11.4	9.4	9.1	8.1	7.5	6.3	5.2	4.2	3.4	2.8	3.2	4.2	4.6	4.2	4.2	4.7	5.1	5.0	5.6	6.0	6.1	5.6	5.3	6.0	12.5																							
18-May	6.0	6.1	7.6	8.2	7.3	7.5	6.7	5.9	3.0	2.8	3.9	4.7	5.3	5.1	4.3	4.4	5.7	5.4	8.1	7.0	6.5	7.2	7.6	8.8	6.0	8.8																							
19-May	10.9	11.9	12.1	12.1	12.3	12.1	9.0	8.0	7.4	6.3	6.0	7.1	8.0	10.8	9.3	8.3	7.7	7.7	7.7	7.6	9.3	9.3	8.5	9.4	9.1	12.3																							
20-May	10.4	13.7	11.8	10.7	10.9	9.2	7.3	5.5	3.2	2.8	2.9	3.1	3.0	3.8	4.6	4.4	4.8	5.4	5.7	6.2	7.2	7.3	7.6	6.4	6.6	13.7																							
21-May	6.8	6.9	6.9	6.8	6.4	6.4	5.2	4.8	3.7	2.6	2.5	3.3	4.3	4.5	3.8	3.7	3.3	3.2	3.1	4.0	8.9	9.9	8.2	8.8	5.3	9.9																							
22-May	10.0	11.5	12.3	10.0	7.6	7.3	4.8	3.8	1.9	1.7	1.8	2.0	1.7	2.2	2.3	2.8	2.6	2.8	2.9	3.0	4.3	5.4	4.4	3.9	4.7	12.3																							
23-May	4.8	6.2	6.0	5.9	5.8	5.8	5.4	3.6	3.3	3.4	2.9	4.1	4.1	4.6	5.0	5.4	5.3	5.6	6.9	7.4	8.0	9.8	8.9	6.6	5.6	9.8																							
24-May	7.2	7.6	7.1	5.1	3.7	4.6	6.9	7.7	7.3	5.7	5.3	5.8	5.0	4.0	3.3	3.5	2.8	3.1	4.4	3.6	4.1	4.3	4.5	4.8	5.1	7.7																							
25-May	5.3	5.6	5.1	4.5	4.4	3.8	2.7	2.5	2.2	2.0	1.9	1.8	1.7	1.7	1.6	1.9	2.3	2.3	2.7	3.2	4.2	4.9	4.3	3.1	5.6	5.6																							
26-May	4.7	4.9	4.8	4.6	4.8	4.6	6.1	8.3	7.0	8.2	9.0	9.8	11.4	8.3	8.4	7.4	7.3	6.0	5.7	4.5	3.9	3.9	3.9	8.2	6.5	11.4																							
27-May	12.1	11.8	9.5	7.5	5.9	5.5	4.8	4.3	4.0	3.6	3.4	3.0	2.7	2.3	2.3	2.1	2.0	2.0	2.3	2.4	2.6	2.7	2.9	2.8	4.4	12.1																							
28-May	3.8	4.3	4.2	4.1	4.1	3.6	3.2	2.7	2.3	2.4	2.4	2.8	3.0	2.9	2.6	2.6	2.4	2.2	2.1	2.1	2.4	2.9	3.1	3.3	3.0	4.3																							
29-May	4.5	5.8	5.7	4.9	4.3	4.6	4.4	4.0	M	M	0.7	0.5	0.5	0.4	0.4	0.3	0.3	0.4	0.8	0.8	0.4	0.2	0.2	0.3	2.0	5.8																							
30-May	0.3	0.5	1.4	1.6	1.6	1.3	1.2	0.9	0.7	0.5	0.3	0.2	0.2	0.1	0.1	UO	0.3	0.7	0.9	1.0	2.3	4.3	5.6	10.5	1.6	10.5																							
31-May	11.2	12.5	11.4	8.8	9.2	9.1	9.5	9.3	9.1	4.6	2.3	2.5	3.5	2.8	3.5	3.7	5.0	5.3	4.3	3.2	0.9	0.7	UO	0.7	5.8	12.5																							
																								6.0	6.8	6.5	6.1	6.0	5.7	4.8	4.3	3.5	3.6	2.9	3.2	3.3	3.3	3.4	3.3	3.3	3.6	4.0	4.0	4.4	4.9	5.0	5.2	Diurnal Average	
																								12.5	13.7	12.3	12.1	12.3	12.1	9.5	9.3	9.1	16.5	9.0	9.8	11.4	10.8	9.3	8.3	7.7	7.7	8.1	8.5	9.7	11.2	12.1	11.8	Diurnal Maximum	
M - Maintenance																								UO - Unstable Operation																									
Alberta Ambient Air Quality Objectives (AAAQO):																								24-hr		30 µg/m <sup>3</sup>																							





**WBEA**  
**Hourly Averages**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Anzac - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Anzac - May 2014**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
1 - 5	510	68.92	68.92
6 - 15	199	26.89	95.81
16 - 25	1	0.14	95.95
26 - 80	0	0.00	95.95
> 81.0	0	0.00	95.95

Total Number of Valid Hours: 740

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) - μg/m<sup>3</sup>**  
**Anzac - May 2014**

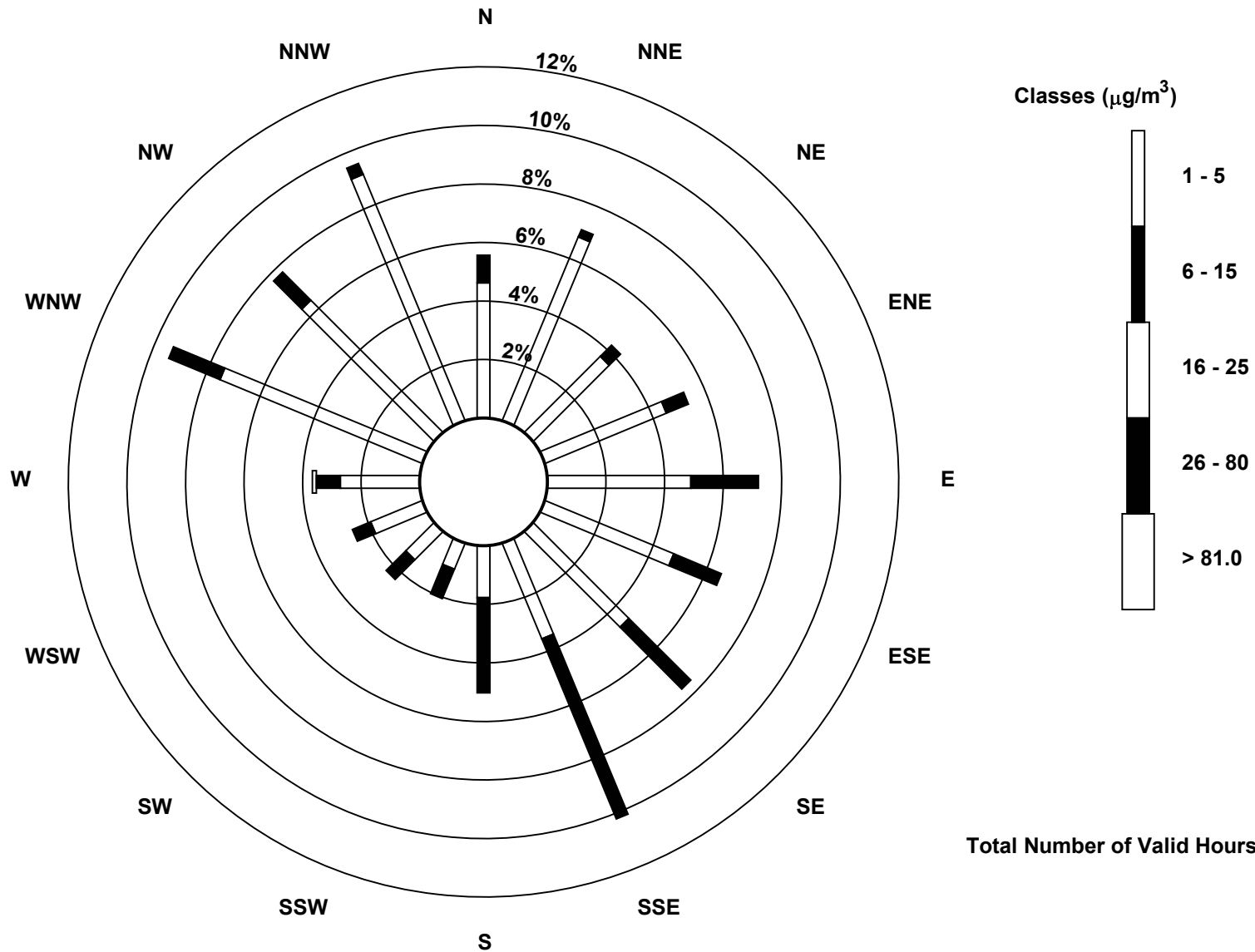
Concentration Ranges (μg/m <sup>3</sup> )	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	34	50	27	33	36	35	34	26	13	7	10	14	20	55	47	67	508
6 - 15	7	2	4	6	17	13	22	49	24	8	7	5	6	14	10	3	197
16 - 25	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	41	52	31	39	53	48	56	75	37	15	17	19	27	69	57	70	706

Total Number of Valid Hours: 736

Total Number of Hours: 744

Wood Buffalo Environmental Association  
 Wind Rose May 2014

Particulate Matter 2.5 (PM<sub>2.5</sub>) - μg/m<sup>3</sup>  
 Anzac (AMS 14)



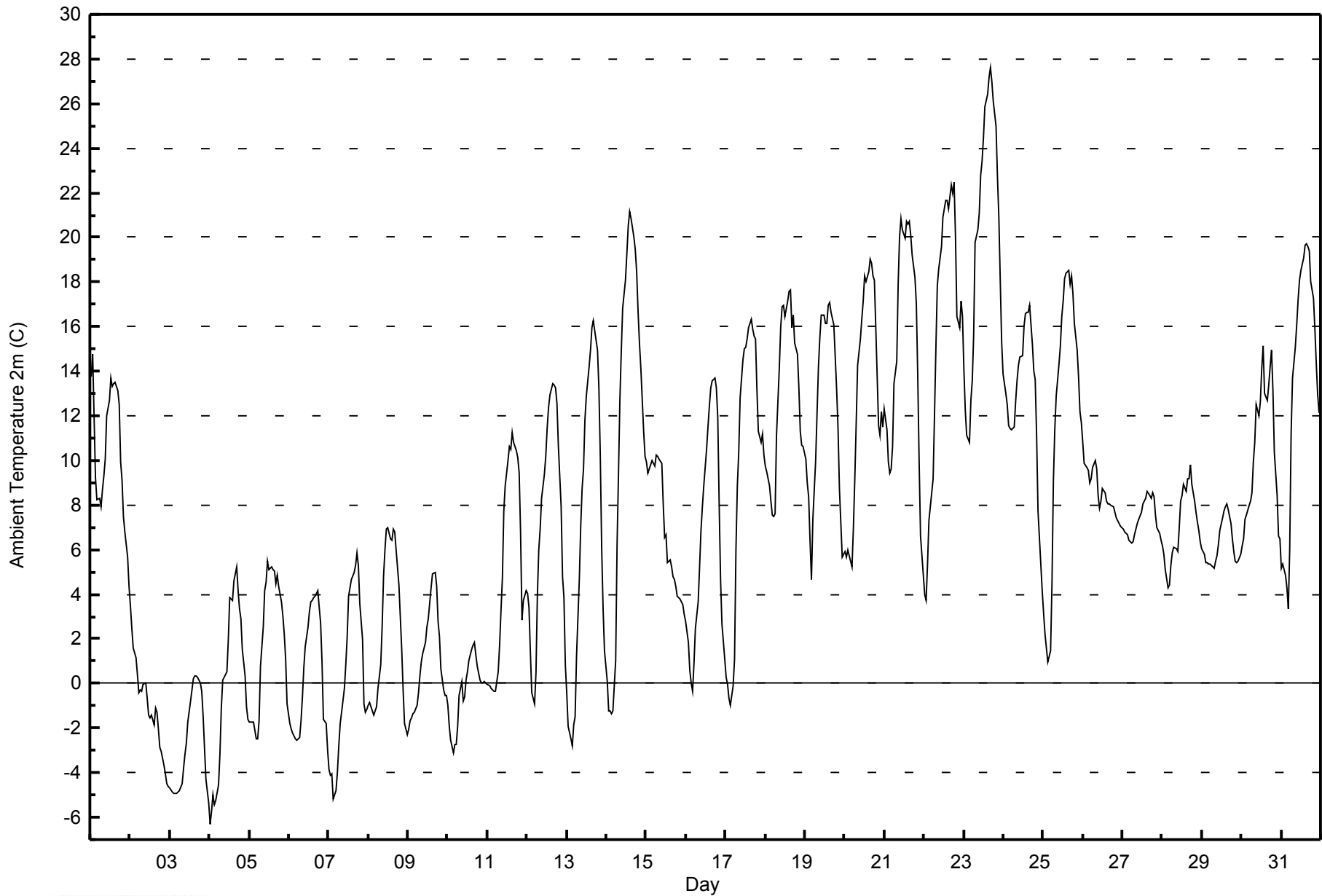


Maximum Value: 27.6 C on May 23 17:00		Maximum Daily Average: 20.2 C on May 23		Hours in Service: 744																																												
Minimum Value: -6.3 C on May 4 01:00		Minimum Daily Average: -2.7 C on May 3		Hours of Data: 744																																												
Maximum Diurnal Average: 11.8 C at hour 16		Minimum Diurnal Average: 2.8 C at hour 5		Hours of Missing Data: 0																																												
Monthly Average: 7.56 C		Percentiles: P <sub>1</sub> = -4.9 P <sub>10</sub> = -1.5 Q <sub>1</sub> = 1.5 Median = 7.0 Q <sub>3</sub> = 12.9 P <sub>90</sub> = 17.1 P <sub>99</sub> = 24.2		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-May	13.8	14.8	12.0	9.2	8.3	8.3	7.9	8.7	9.3	10.1	12.0	12.7	13.7	13.3	13.5	13.5	13.1	12.5	10.0	9.1	7.5	6.8	5.7	4.4	10.4	14.8																						
2-May	3.5	2.5	1.6	1.2	0.4	-0.4	-0.3	-0.4	0.0	0.0	-0.6	-1.4	-1.5	-1.4	-1.8	-1.1	-1.3	-2.0	-2.8	-3.1	-3.7	-4.1	-4.5	-4.6	-1.1	3.5																						
3-May	-4.7	-4.8	-4.9	-4.9	-4.9	-4.9	-4.8	-4.5	-3.8	-3.2	-2.7	-1.7	-0.8	-0.3	0.2	0.3	0.3	0.0	-0.4	-1.5	-2.9	-4.3	-5.4	-2.7	0.3																							
4-May	-6.3	-5.7	-5.0	-5.4	-5.3	-4.6	-3.1	-1.1	0.1	0.3	0.5	2.0	3.8	3.8	3.7	4.6	5.3	4.2	3.4	2.9	1.5	0.4	-1.0	-1.6	-0.1	5.3																						
5-May	-1.7	-1.7	-1.7	-2.1	-2.5	-2.5	-1.7	0.7	2.5	4.2	4.5	5.5	5.1	5.2	5.1	5.1	4.5	4.8	4.4	3.6	3.0	2.2	1.1	-0.9	1.9	5.5																						
6-May	-1.8	-2.0	-2.2	-2.4	-2.5	-2.5	-2.4	-1.7	-0.6	0.7	1.7	2.5	3.2	3.7	3.7	3.8	3.9	4.1	3.4	2.7	0.9	-1.6	-1.8	-3.0	0.4	4.1																						
7-May	-3.9	-4.1	-4.1	-5.2	-4.8	-4.0	-2.8	-1.8	-1.3	-0.2	0.9	2.1	3.9	4.3	4.6	5.0	5.3	5.8	5.3	3.6	2.0	-0.9	-1.3	-1.2	0.3	5.8																						
8-May	-1.0	-0.9	-1.2	-1.4	-1.2	-1.0	-0.2	0.9	2.6	4.8	6.0	6.9	7.0	6.5	6.5	6.9	6.8	6.0	4.4	2.9	1.5	-0.3	-1.8	-2.3	2.4	7.0																						
9-May	-2.0	-1.7	-1.5	-1.4	-1.3	-1.0	-0.4	0.3	1.0	1.4	1.9	2.5	2.9	3.6	4.3	4.9	5.0	4.3	2.8	2.1	0.7	-0.3	-0.5	-0.6	1.1	5.0																						
10-May	-1.0	-1.9	-2.6	-3.1	-2.8	-2.8	-1.9	-0.6	0.1	-0.8	-0.6	0.2	0.5	1.1	1.6	1.7	1.9	1.3	0.8	0.2	0.0	0.0	0.1	0.0	-0.4	1.9																						
11-May	0.0	-0.1	-0.2	-0.3	-0.4	-0.3	0.5	1.7	3.3	4.7	7.8	8.8	10.0	10.6	10.5	11.2	10.8	10.4	10.1	9.4	6.8	2.8	3.7	4.2	5.3	11.2																						
12-May	4.0	3.4	1.4	-0.4	-0.9	0.5	3.9	6.0	6.9	8.3	9.4	10.2	11.4	12.4	12.9	13.4	13.4	13.3	12.6	10.7	8.0	4.8	3.8	0.9	7.1	13.4																						
13-May	-0.4	-1.9	-2.5	-2.8	-1.8	-1.5	1.2	4.7	7.0	8.7	9.6	11.8	12.9	14.2	15.0	15.9	16.3	15.8	15.0	13.2	10.2	6.1	3.4	1.5	7.1	16.3																						
14-May	0.1	-1.2	-1.2	-1.4	-1.2	1.0	6.2	9.4	12.7	14.9	16.8	18.1	19.3	20.5	21.2	20.8	20.0	19.5	18.5	16.7	15.2	14.1	11.3	10.2	11.7	21.2																						
15-May	9.9	9.4	9.6	10.0	9.9	9.7	10.2	10.2	10.1	9.9	8.0	6.5	6.6	5.4	5.5	5.2	4.8	4.7	4.3	3.9	3.8	3.7	3.5	3.1	7.0	10.2																						
16-May	2.8	1.8	0.6	0.0	-0.4	0.9	2.5	3.6	5.2	6.8	7.9	8.9	10.5	11.5	12.4	13.3	13.6	13.7	13.3	11.9	8.0	4.6	2.7	1.1	6.6	13.7																						
17-May	0.3	-0.1	-0.6	-1.0	-0.1	1.1	6.0	8.8	10.4	12.8	14.5	15.0	15.1	15.4	16.0	16.3	15.9	15.6	15.5	13.2	11.3	10.8	11.2	10.2	9.7	16.3																						
18-May	9.7	9.5	8.8	8.2	7.6	7.5	7.6	11.1	14.2	16.0	16.9	16.9	16.5	17.2	17.6	17.6	15.9	16.5	15.3	14.7	13.2	11.3	10.7	10.6	13.0	17.6																						
19-May	10.1	9.0	8.4	6.4	4.6	7.4	10.0	12.1	14.2	15.5	16.5	16.5	16.1	16.2	16.9	17.1	16.6	16.1	14.7	13.2	11.5	8.7	5.7	5.8	12.0	17.1																						
20-May	5.9	5.7	6.0	5.8	5.2	7.0	9.2	11.7	14.3	15.4	16.3	17.2	18.3	18.0	18.5	19.0	18.8	18.3	18.1	15.9	11.6	11.1	12.2	11.5	13.0	19.0																						
21-May	12.3	11.4	9.9	9.4	9.6	10.6	13.5	14.5	17.9	20.0	20.8	20.3	20.0	20.7	20.6	20.7	20.1	19.2	18.2	17.0	13.8	9.9	6.6	4.8	15.1	20.8																						
22-May	4.0	3.7	5.4	7.3	7.9	9.2	12.1	15.1	17.8	18.6	19.6	20.9	21.3	21.7	21.6	21.3	22.4	21.9	22.5	20.0	16.5	15.9	17.2	16.5	15.8	22.5																						
23-May	14.1	12.3	11.1	10.8	12.7	13.6	15.6	19.8	20.4	21.1	22.8	23.4	24.5	25.9	26.4	27.2	27.6	27.0	26.1	25.0	22.7	20.9	18.1	15.4	20.2	27.6																						
24-May	13.9	13.0	12.5	11.5	11.4	11.4	11.5	12.6	13.6	14.3	14.6	14.7	16.0	16.6	16.6	16.6	17.0	15.2	14.0	13.6	11.1	7.7	5.4	4.2	12.9	17.0																						
25-May	3.2	2.2	1.6	1.0	1.5	4.5	9.0	11.4	12.9	14.3	15.2	16.5	17.2	18.2	18.4	18.5	17.9	18.3	17.5	16.2	14.9	13.8	12.2	11.7	12.0	18.5																						
26-May	10.8	9.9	9.7	9.6	9.0	9.2	9.7	10.0	9.6	8.5	7.8	8.2	8.7	8.6	8.2	8.1	8.1	8.0	7.9	7.7	7.4	7.3	7.2	7.0	8.6	10.8																						
27-May	6.9	6.8	6.7	6.6	6.4	6.3	6.4	6.7	6.9	7.2	7.3	7.7	8.1	8.2	8.3	8.6	8.5	8.3	8.6	8.4	7.6	7.0	6.8	6.4	7.4	8.6																						
28-May	6.2	5.8	5.1	4.3	4.4	5.3	5.8	6.1	6.0	5.9	7.0	8.2	8.5	8.9	8.6	9.2	9.2	9.8	9.0	8.2	7.6	7.2	6.8	6.3	7.1	9.8																						
29-May	6.1	5.8	5.4	5.4	5.4	5.3	5.2	5.1	5.5	5.7	6.2	6.9	7.4	7.8	7.9	8.0	7.8	7.2	6.5	5.9	5.5	5.4	5.5	5.8	6.2	8.0																						
30-May	6.2	6.5	7.4	7.6	8.0	8.1	8.6	9.9	10.8	12.5	12.0	12.6	14.1	15.2	13.0	12.7	13.4	14.2	15.0	13.1	10.3	8.4	6.6	6.5	10.5	15.2																						
31-May	5.1	5.3	4.9	4.3	3.3	6.0	11.2	13.7	15.1	16.1	17.2	18.1	18.6	19.1	19.7	19.7	19.6	19.4	18.0	17.3	15.9	14.3	12.9	12.1	13.6	19.7																						
																								4.1	3.6	3.2	2.8	2.8	3.5	5.0	6.6	7.9	8.9	9.6	10.3	10.9	11.3	11.5	11.8	11.7	11.4	10.7	9.6	7.9	6.3	5.3	4.5	Diurnal Average
																								14.1	14.8	12.5	11.5	12.7	13.6	15.6	19.8	20.4	21.1	22.8	23.4	24.5	25.9	26.4	27.2	27.6	27.0	26.1	25.0	22.7	20.9	18.1	16.5	Diurnal Maximum



**WBEA**  
**Hourly Averages**

**Ambient Temperature 2m (AT 2m) - C**  
**Anzac - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Ambient Temperature 2m (AT 2m) - C**  
**Anzac - May 2014**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	133	17.88	17.88
0 - 10	349	46.91	64.78
10 - 20	228	30.65	95.43
> 20	34	4.57	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



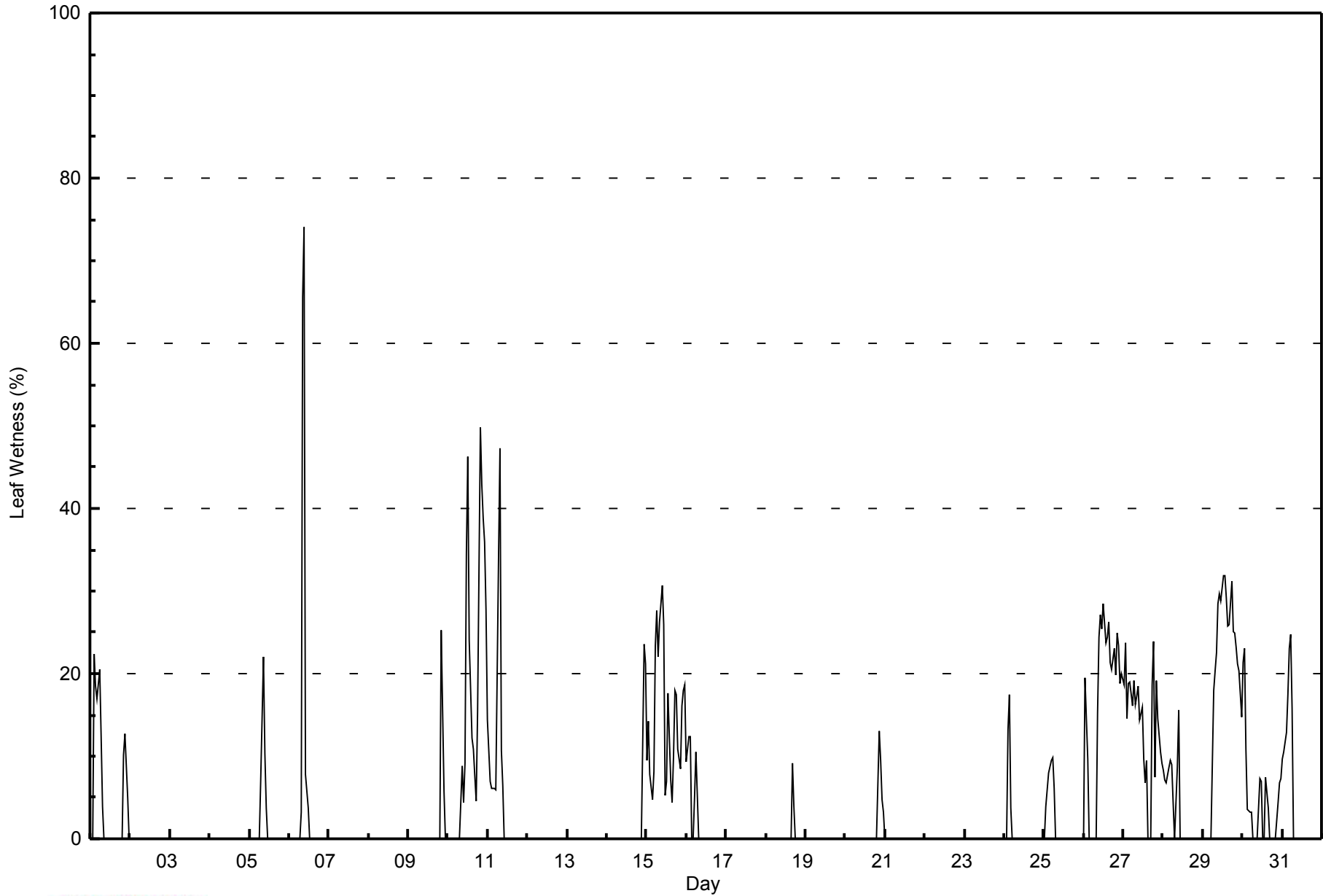
Maximum Value: 74 % on May 6 10:00																	Maximum Daily Average: 18.9 % on May 29																	Hours in Service: 744														
Minimum Value: 0 % on May 1 01:00																	Minimum Daily Average: 0.0 % on May 2																	Hours of Data: 744														
Maximum Diurnal Average: 6.9 % at hour 10																	Minimum Diurnal Average: 2.3 % at hour 16																	Hours of Missing Data: 0														
Monthly Average: 3.9 %																	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> = 18 P <sub>99</sub> = 35																	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-May	0	0	22	18	17	20	12	4	0	0	0	0	0	0	0	0	0	0	0	10	13	5	0	5.1	22																							
2-May	0	0	0	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-May	0	0	0	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-May	0	0	0	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-May	0	0	0	0	0	0	0	7	22	10	4	0	0	0	0	0	0	0	0	0	0	0	0	1.8	22																							
6-May	0	0	0	0	0	0	0	3	66	74	8	4	0	0	0	0	0	0	0	0	0	0	0	6.4	74																							
7-May	0	0	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-May	0	0	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-May	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	6	0	0	1.3	25																							
10-May	0	0	0	0	0	0	0	0	9	4	9	35	46	24	12	11	8	5	16	50	43	39	36	28	15.6	50																						
11-May	14	7	6	6	6	6	34	47	11	6	0	0	0	0	0	0	0	0	0	0	0	0	0	6.0	47																							
12-May	0	0	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-May	0	0	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-May	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	21	1.9	23																							
15-May	10	14	8	5	8	23	28	22	26	31	26	5	7	18	7	4	10	18	17	11	8	16	18	19	15.0	31																						
16-May	9	12	12	0	0	5	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.1	12																							
17-May	0	0	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-May	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	4	0	0	0	0	0	0	0.5	9																							
19-May	0	0	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-May	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	9	5	3	1.3	13																							
21-May	0	0	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-May	0	0	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-May	0	0	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-May	0	0	13	17	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.4	17																							
25-May	0	4	6	8	10	10	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.8	10																							
26-May	0	19	10	0	0	0	0	0	15	24	27	25	29	24	24	26	21	21	23	20	25	23	19	20	16.5	29																						
27-May	19	24	15	19	19	16	19	16	17	19	14	16	10	7	10	0	0	19	24	7	19	15	11	9	14.3	24																						
28-May	8	7	7	9	9	9	4	0	9	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.2	16																						
29-May	0	0	0	0	0	0	18	20	23	28	30	29	32	32	29	26	26	31	25	25	23	21	20	15	18.9	32																						
30-May	21	23	11	3	3	3	0	0	0	0	7	7	0	0	8	4	0	0	0	0	0	4	7	7	4.5	23																						
31-May	10	11	13	18	23	25	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.8	25																						
																								2.9	3.9	4.0	3.3	3.2	3.8	4.8	3.9	6.4	6.9	4.0	3.9	4.0	3.4	2.9	2.3	2.4	3.1	3.4	3.6	5.4	4.7	4.6	3.9	Diurnal Average
																								21	24	22	19	23	25	34	47	66	74	30	35	46	32	29	26	26	31	25	50	43	39	36	28	Diurnal Maximum





**WBEA**  
**Hourly Averages**

**Leaf Wetness (SW) - %**  
**Anzac - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Leaf Wetness (SW) - %**  
**Anzac - May 2014**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.3	565	75.94	75.94
0.4 - 0.5	0	0.00	75.94
0.6 - 0.7	0	0.00	75.94
0.8 - 1.4	0	0.00	75.94
1.5 - 10	67	9.01	84.95
> 10	112	15.05	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

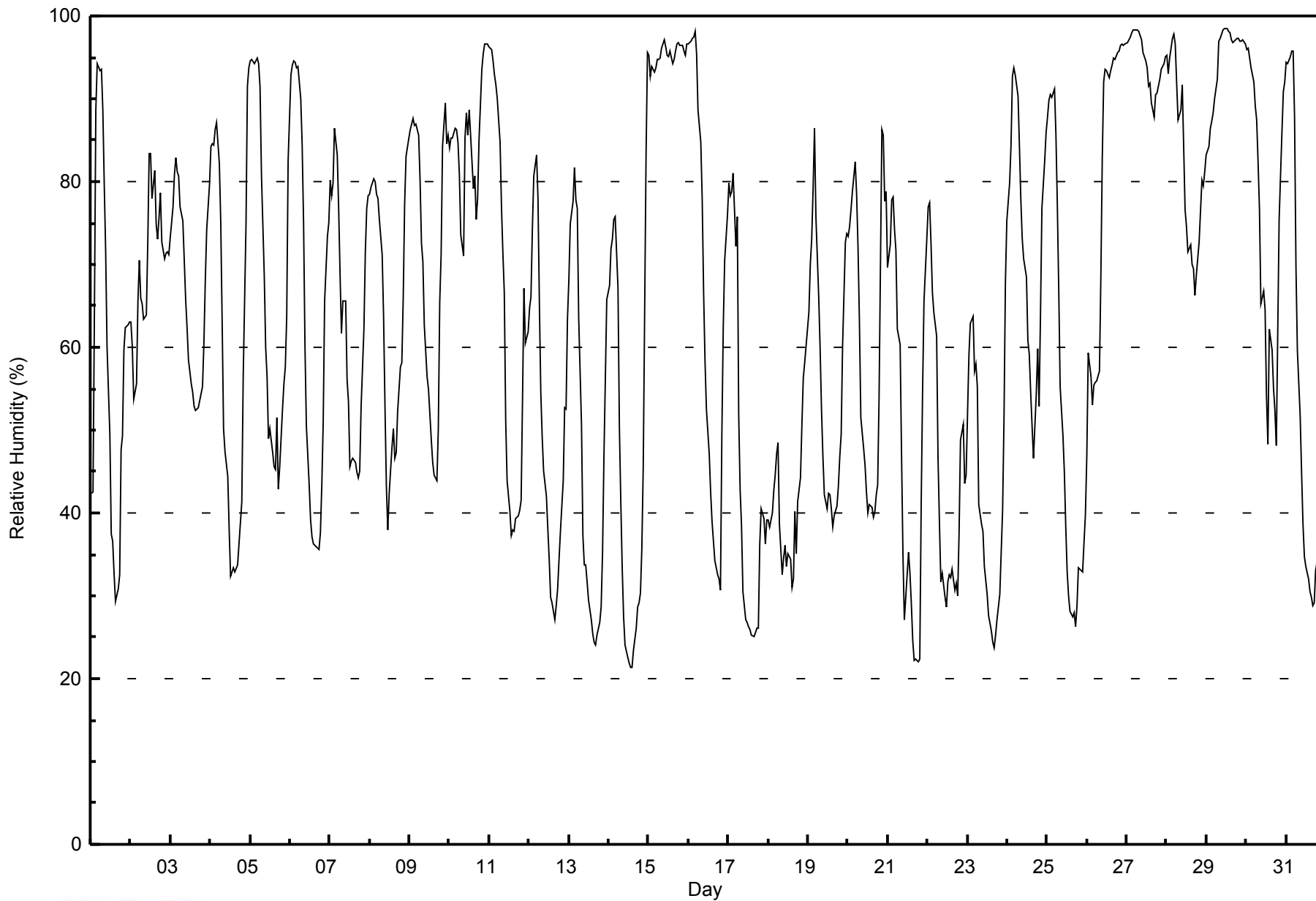


Maximum Value: 98 % on May 29 12:00														Maximum Daily Average: 95.3 % on May 15														Hours in Service: 744	
Minimum Value: 21 % on May 14 14:00														Minimum Daily Average: 41.4 % on May 18														Hours of Data: 744	
Maximum Diurnal Average: 82.8 % at hour 5														Minimum Diurnal Average: 47.3 % at hour 17														Hours of Missing Data: 0	
Monthly Average: 63.7 %														Percentiles: P <sub>1</sub> = 22 P <sub>10</sub> = 32 Q <sub>1</sub> = 43 Median = 65 Q <sub>3</sub> = 85 P <sub>90</sub> = 95 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-May	42	43	64	89	94	93	93	89	80	72	60	49	37	37	33	29	31	32	48	49	60	62	63	63	58.9	94			
2-May	63	60	54	56	66	71	66	65	63	64	73	83	83	78	81	75	73	76	79	73	71	71	72	71	70.2	83			
3-May	73	77	81	83	81	81	77	75	71	66	62	59	56	55	53	52	53	53	54	55	61	68	74	80	66.6	83			
4-May	84	85	84	86	87	82	75	63	50	47	44	38	32	33	33	34	36	39	41	57	75	92	94	59.4	94				
5-May	95	95	94	94	95	94	91	81	69	60	56	49	50	47	46	45	52	43	46	53	56	58	64	83	67.2	95			
6-May	93	94	95	94	94	94	90	84	75	60	51	43	39	37	36	36	36	36	38	43	51	66	73	75	63.9	95			
7-May	80	78	80	86	83	77	69	62	66	66	56	53	46	46	47	46	45	44	45	53	62	72	77	78	63.2	86			
8-May	79	79	80	80	78	78	75	71	64	53	43	38	42	48	50	47	47	52	58	58	66	77	83	85	63.9	85			
9-May	86	87	88	87	87	86	80	72	70	63	56	55	52	49	46	45	44	50	65	71	84	89	85	86	70.1	89			
10-May	84	85	85	86	86	85	81	74	71	85	88	86	89	86	79	81	75	78	85	94	95	97	97	97	85.3	97			
11-May	96	96	95	93	92	90	85	77	71	67	51	44	40	37	38	38	39	40	40	42	54	67	61	62	63.1	96			
12-May	65	66	74	81	83	78	65	55	49	45	42	38	34	30	29	27	29	31	34	38	44	53	52	63	50.3	83			
13-May	68	75	78	82	78	77	64	51	37	34	34	32	29	27	25	24	24	25	27	29	35	47	56	66	46.8	82			
14-May	67	72	73	75	76	67	50	41	33	27	24	23	22	21	21	23	26	29	29	30	36	46	83	96	45.5	96			
15-May	95	93	94	93	94	95	95	95	96	97	96	95	95	96	94	95	96	97	97	97	96	96	95	97	95.3	97			
16-May	97	97	97	98	98	95	89	85	78	67	58	53	47	43	39	37	34	33	32	31	49	63	70	76	65.1	98			
17-May	80	78	79	81	72	76	52	43	39	31	27	27	26	26	25	25	26	26	26	36	40	39	36	39	44.0	81			
18-May	39	38	40	43	45	47	48	39	33	35	36	34	35	34	31	32	40	35	41	44	51	56	58	60	41.4	60			
19-May	64	70	73	79	86	76	66	60	52	47	42	41	42	42	41	38	40	41	43	47	50	60	73	74	56.1	86			
20-May	73	75	77	79	82	78	72	63	51	48	46	43	40	41	41	40	40	42	43	54	86	86	78	79	60.7	86			
21-May	70	72	78	78	74	72	62	60	47	35	27	30	35	33	29	25	22	22	22	22	41	55	66	73	47.9	78			
22-May	77	77	73	67	64	61	47	39	32	33	30	29	32	33	32	33	31	32	30	38	49	51	44	45	44.8	77			
23-May	52	59	63	64	57	58	55	41	39	38	33	32	30	28	26	24	24	25	27	30	35	40	51	68	41.6	68			
24-May	75	80	84	93	94	93	90	84	78	73	71	68	61	59	54	50	47	54	60	53	64	77	83	86	72.1	94			
25-May	88	90	91	90	91	86	77	67	55	49	45	38	33	30	28	27	28	26	29	33	33	33	36	40	51.8	91			
26-May	47	59	56	53	55	56	56	57	68	83	92	94	93	93	93	94	95	95	96	96	96	97	96	97	79.9	97			
27-May	97	97	97	98	98	98	98	98	98	97	96	95	94	91	92	89	88	91	91	92	92	94	94	95	94.6	98			
28-May	95	93	95	97	98	97	92	87	89	92	84	77	75	71	72	70	70	66	69	73	76	80	79	81	82.4	98			
29-May	83	84	86	87	88	90	92	97	97	98	98	98	98	98	98	97	97	97	97	97	97	97	97	97	94.5	98			
30-May	96	96	95	94	92	89	87	82	77	65	67	65	54	48	62	60	55	52	48	62	75	86	91	92	74.6	96			
31-May	94	94	95	96	96	88	70	60	52	45	39	35	34	32	30	30	29	29	33	35	40	45	49	53	54.2	96			
														77.4 78.9 80.6 82.6 82.8 80.8 74.5 68.3 62.9 59.3 55.8 52.9 50.9 49.3 48.6 47.4 47.3 48.0 50.7 53.8 61.4 67.8 71.9 75.7														Diurnal Average	
														97 97 97 98 98 98 98 98 98 98 98 98 98 98 98 98 97 97 97 97 97 97 97 97 97														Diurnal Maximum	



**WBEA**  
**Hourly Averages**

**Relative Humidity (RH) - %**  
**Anzac - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Relative Humidity (RH) - %**  
**Anzac - May 2014**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	160	21.51	21.51
40 - 60	174	23.39	44.89
60 - 80	180	24.19	69.09
80 - 100	230	30.91	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Maximum Speed: 21 km/h on May 1 13:00	Maximum Daily Speed Average: 14.7 km/h on May 2	Hours in Service: 744
Minimum Speed Value: 0 km/h on May 4 06:00	Minimum Daily Speed Average: 1.5 km/h on May 13	Hours of Data: 740
Maximum Diurnal Speed Average: 3.8 km/h at hour 14	Minimum Diurnal Speed Average: 0.4 km/h at hour 4	Hours of Missing Data: 4
Monthly Average Velocity: 1.4 km/h 350.6 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> = 15 P <sub>99</sub> = 19	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-May	WSW8WSW10	NW5	NW6	NW8	NNW13	NNW13	NW13	NNW15	NW13	NW15	NNW20	NNW21	NNW17	NNW16	NNW15	NW13	NNW14	N12	N10	NNW10	NW9	N10	NNW9	NNW11.5	NNW21	
2-May	NW9	NW13	NW15	NW18	NNW16	NW14	NW16	NW17	NW20	NNW17	NNW18	NNW17	NNW15	NNW16	NNW14	NNW14	NNW15	N14	NNW13	N15	N15	N13	N15	NNW12	NNW14.7	NW20
3-May	NNW14	NNW14	NNW11	NNW11	NNW11	NNW12	NNW12	NNW11	NNW11	NNW11	N9	N8	NNE7	NNE8	NNE8	NNE8	NE7	NNE6	NE6	ENE7	ENE6	ENE6	ENE3	ESE3	N7.5	NNW14
4-May	AF	AF	SW2	SW2	SW1	ENE0	ENE3	ENE4	E6	NE3	W2	N5	SE8	NE6	ESE7	SSE3	E7	ESE10	ESE7	SE6	SSE7	SW6	SSE7	SE7	ESE3.3	ESE10
5-May	SE8	SSE10	SSE8	SE6	SSE6	SSE5	SSE4	SSE4	SW5	SE10	SE11	SSE10	E9	SSE6	SSW4	E7	ENE10	ENE9	ENE12	ENE14	ENE17	ENE18	ENE18	ENE16	ESE7.1	ENE18
6-May	ENE13	ENE12	NE10	NE8	NNE6	NNE6	NNE8	NNE8	NNE8	NNE9	NNE10	NNE11	NNE13	NNE11	N14	NNE13	NNE11	NNE11	N11	N8	N5	NW3	NNW3	NW2	NNE8.3	N14
7-May	W5	W5	W5	WNW5	WNW5	WNW7	NW8	NNW10	NNW11	NW15	NNW17	NNW16	NNW17	NNW17	NNW14	NNW12	N13	NNW14	N11	N8	NNE4	NNE5	NE5	SSE1	NNW8.4	NNW17
8-May	S1	SE3	ESE5	E6	E7	E7	ESE6	SE9	SE10	S5	WNW8	NW7	NNE10	NE12	NE13	NE13	NE11	NNE11	NNE9	NNE9	N9	N6	N4	NNW4	NE4.6	NE13
9-May	NW3	WNW3	WNW4	WNW5	NW5	NW6	NW6	NW7	W7	WNW6	WNW7	NW9	NNW9	NW7	W8	W10	W9	NW9	W7	NW6	N8	NNW5	NW6	NW7	NW5.9	W10
10-May	NW8	NW7	WNW7	WNW9	WNW9	WNW11	WNW10	WNW13	WNW13	NW15	WNW13	NW14	NW15	NNW17	NW15	NW16	NNW17	NNW14	NNW13	NNW10	NW8	NW7	WNW8	WNW8	NW11.1	NNW17
11-May	WNW7	WNW6	WNW7	WNW9	WNW8	WNW7	WNW7	WNW8	WNW10	W10	W12	WNW13	NW14	NNW14	NNW15	NNW13	NNW10	NNW10	NW8	N6	NE2	NNE4	ENE8	ESE6	NW7.1	NNW15
12-May	SE6	ESE7	SE5	SSE4	SSE4	SE3	SSE3	E6	NE7	NE5	NNE7	NNW8	NW5	NW6	NNW7	NNW11	NNW9	N6	NNE9	NNE11	NNE8	NNE6	ENE8	E7	NNE3.7	NNW11
13-May	SE5	SSE3	SE4	SSE6	SSE8	S4	SW3	SSW3	S3	W2	WSW9	WNW9	W8	W9	WNW7	NW7	NW8	N9	NNE9	NNE8	NNE7	NE7	NE4	WSW1	WNW1.5	N9
14-May	SSW1	N2	SE3	SE6	SSE6	SSE6	ESE5	SE6	ESE9	ESE11	SE12	SE13	SE13	SE12	SE11	S9	S9	SE9	SE7	ESE11	ESE9	WSW5	WNW4	NE5	SE6.3	SE13
15-May	ESE7	SSE8	SSE7	SSE10	S8	SSW4	S3	ESE3	ENE4	NE5	N11	N12	N13	N14	N13	NNW12	NNW11	NNW13	NNW13	NNW12	NNW10	NW9	NW8	WNW7	NNW4.4	N14
16-May	WNW6	NW5	NW5	WNW4	WNW4	WNW3	W5	W7	W7	W10	WSW12	W10	WSW10	WSW10	WSW9	WSW6	NE5	NNE6	NE7	E6	ESE6	SSE6	SSE5	W3.3	WSW12	
17-May	SSE5	ESE7	ESE6	ESE6	ESE8	SE5	SE6	SE7	ESE8	SE8	E4	SSW1	ENE4	ENE3	E5	NE6	ENE8	E6	E7	E5	E6	SE8	SE9	SSE8	ESE5.3	SE9
18-May	SSE8	SSE9	SE9	SE9	ESE7	ESE8	SE10	SE13	SE13	SE11	SSE8	ENE3	NNE7	NE10	NE7	W3	E7	WSW8	ENE5	SE6	SSE8	SSE9	SSE12	SE5.9	SE13	
19-May	SSE12	SSE11	SSE11	SSE5	SSE5	SSE8	SSE9	SSE10	S11	SSE11	SSE13	SSE14	SSE13	SSE16	S17	S16	S15	S17	S16	S12	S9	SW6	S4	SSE8	SSE11.0	S17
20-May	SSE8	SSE8	SSE8	SSE9	SSE9	SSE9	SSE11	SSE13	SSE15	S18	S15	S19	S18	S13	SSW15	SSW16	SSW16	S13	S13	SSW17	S4	SSE9	SSE13	S9	S11.8	S19
21-May	SSW11	SE6	SSE4	S5	SSW8	SW9	SW12	SW9	WSW7	WNW8	SW17	SW15	SW17	WSW21	W20	WSW20	W20	W16	WNW14	WNW14	N8	NNE1	S2	S3	WSW8.8	WSW21
22-May	SSE6	SSE6	SSE8	S7	S5	S6	S6	SW9	WSW14	WNW12	WNW11	WNW12	WNW12	WNW12	WNW10	WNW9	WNW7	WSW4	SW4	SSW5	SSE5	SSE7	SSE8	SSE8	SW4.6	WSW14
23-May	SSE8	SSE7	S6	S7	W4	SW4	WNW1	SE5	E7	NE4	NE5	E1	NNE6	ENE3	SSE8	SSE9	SE7	SE7	SE6	SE6	SE8	SSE7	W11	WNW16	SSE2.9	WNW16
24-May	WNW11	WNW9	WNW11	WNW10	WNW11	WNW11	NW10	NW8	WNW9	WNW10	WNW12	W12	W13	WNW16	WNW16	WNW16	WNW13	NNW11	NNW11	NNW10	NNW4	NE1	E3	ESE3	WNW9.1	WNW16
25-May	S2	SSE2	SE3	SE3	SE3	SE4	SSE6	SE9	SSE10	SE5	NE2	E8	E7	SE8	ESE8	E12	ESE12	ESE10	ESE12	ESE11	SE9	ESE8	SE8	ESE6.7	E12	
26-May	SSE6	ESE5	ENE7	ENE8	ESE6	ESE7	E7	E9	ESE11	ESE11	E9	E9	E12	E13	E13	E14	E13	E13	E13	E13	E13	E13	E12	E12	E10.0	E14
27-May	E10	ENE9	ENE8	NE6	NE8	NNE8	NNE7	NNE6	NNE6	NNE7	NNE8	N5	NNE6	N6	NNE6	N6	NNE6	NNE5	N5	NNE4	ENE6	ENE5	ENE5	E3	NE5.7	E10
28-May	E3	ENE5	ENE3	E4	ESE4	E3	ESE5	ESE5	ENE7	E7	E10	E9	ESE10	E10	E12	E11	ESE10	SE10	ESE12	ESE8	E6	ESE5	ESE9	SE6	ESE6.9	ESE12
29-May	ESE6	ESE5	E4	E3	E3	NNW2	N4	NNE5	NNE4	N5	NNE6	NNE8	NNE7	NNE7	N7	N9	N8	NW10	NW13	NW12	NW14	NW13	WNW13	WNW13	NNW5.1	NW14
30-May	WNW13	W11	WNW15	WNW13	W15	W17	W17	WNW15	WNW17	WNW15	WNW15	WNW16	WNW15	WNW18	NW17	NW17	WNW13	W9	WSW10	N5	ENE1	NW1	AF	S1	WNW11.6	WNW18
31-May	AF	SSW4	SSW5	SSW6	SW4	WSW4	WNW5	NW9	NW8	NW8	NNW10	N10	N10	N9	NNE9	NNE9	NE10	NNE8	NE7	ENE7	E10	ESE10	ESE12	SE12	NNE3.1	SE12

S1.3 SSE1.1 S0.8 SSW0.4 WSW0.9 WNW1.4 WNW1.3 WNW0.9 WNW1.1 NW1.8 NW2.8 NW3.5 NNW3.5 NNW3.8 NNW3.7 NNW3.3 NNE3.4 N3.0 NNE3.3 NE3.3 ENE1.9 E1.9 ESE1.4	Diurnal Average
NNW14 NNW14 NW15 NW18 NNW16 W17 W17 NW17 NW20 S18 NNW18 NNW20 NNW21 WSW21 WSW20 WSW20 W20 S17 S16 SSW17 ENE17 ENE18 ENE18 WNW16	Diurnal Maximum

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



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

**Wind Speed (WS) - km/h**  
**Anzac - May 2014**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 10 km/h on May 23 23:00	Hours in Service: 744 Hours of Data: 740 Hours of Missing Data: 4 Hours of Calibration: 0 Percent Operational Time: 99.5
Minimum Value: 0 km/h on May 4 03:00	
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> = 7	

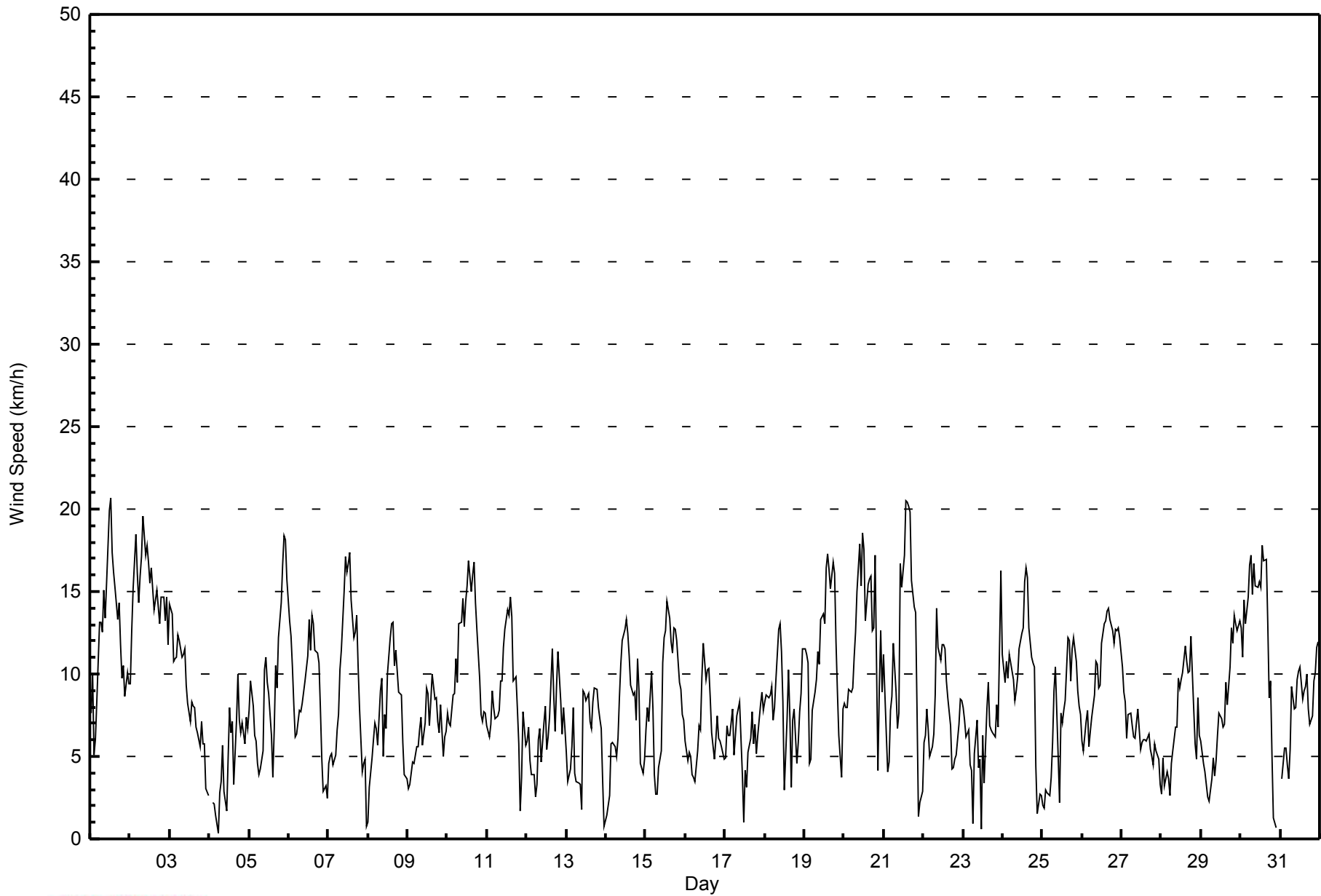
Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-May	2	4	2	2	3	4	4	4	5	5	6	7	7	5	6	5	5	6	4	3	5	3	3	3	7	
2-May	3	4	5	6	6	5	6	6	7	6	6	5	5	5	5	5	5	4	4	4	4	5	5	4	7	
3-May	5	4	4	3	3	4	3	4	4	4	3	3	3	3	3	3	3	3	2	2	1	1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

AF - Analyzer Failure



**WBEA**  
**Hourly Averages**

**Wind Speed (WS) - km/h**  
**Anzac - May 2014**







**WBEA**  
**Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h**  
**Anzac - May 2014**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	163	22.03	22.03
6 - 11	388	52.43	74.46
12 - 19	182	24.59	99.05
20 - 28	7	0.95	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 740

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Wind Speed (WS) - km/h**  
**Anzac - May 2014**

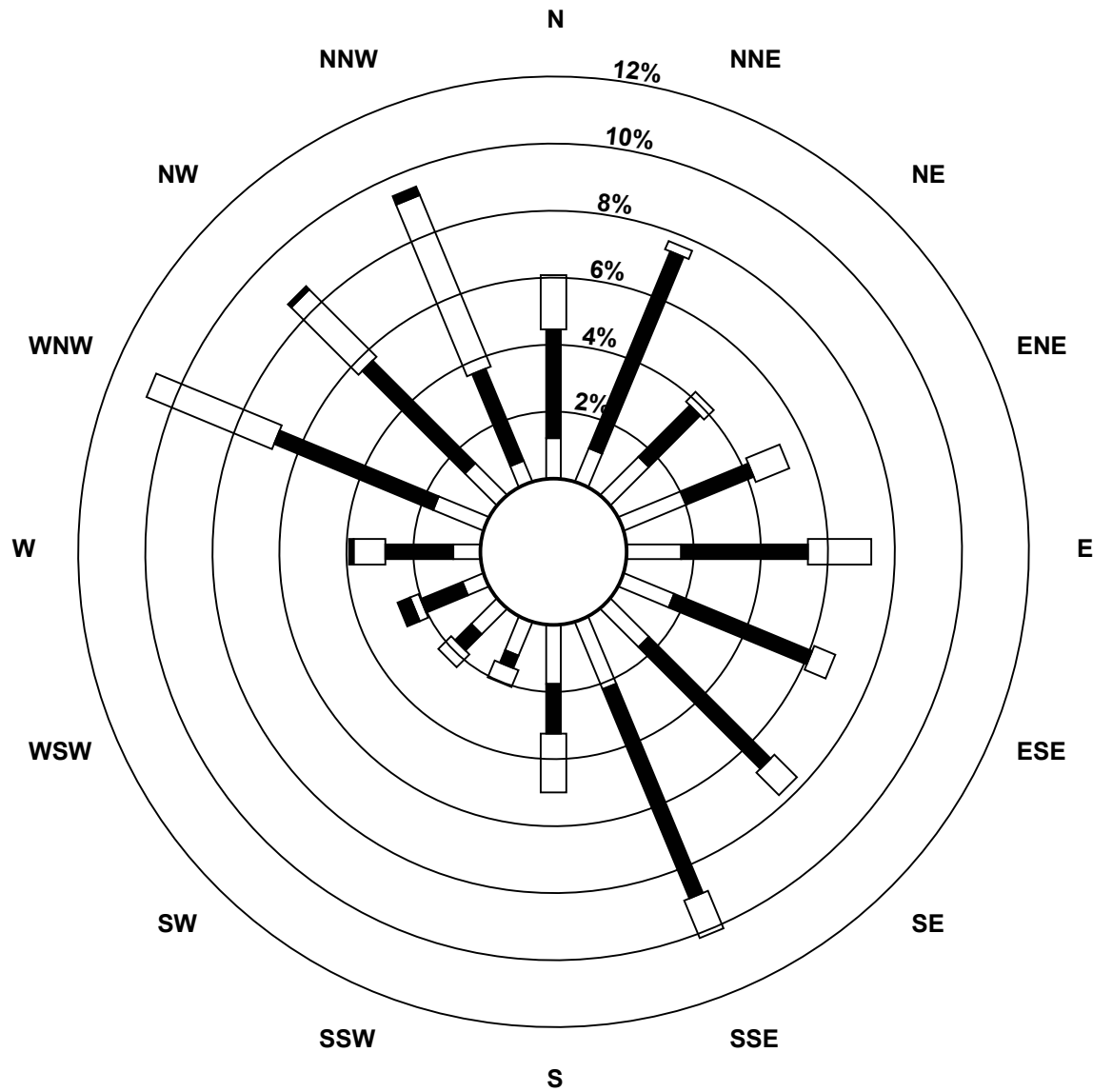
Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	9	8	12	15	12	12	12	16	13	8	8	5	6	12	10	5	163
6 - 11	24	47	16	16	28	33	38	50	11	3	5	10	15	38	32	22	388
12 - 19	12	2	3	8	14	5	7	9	13	4	4	2	7	30	21	41	182
20 - 28	0	0	0	0	0	0	0	0	0	0	0	3	1	0	1	2	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>	45	57	31	39	54	50	57	75	37	15	17	20	29	80	64	70	740

Total Number of Valid Hours: 740

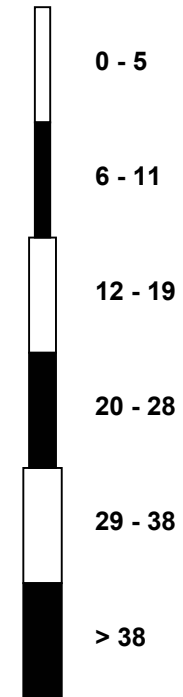
Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Wind Speed (WS) - km/h  
Anzac (AMS 14)**



Classes (km/h)



Total Number of Valid Hours: 740



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

**Wind Direction (WD) - deg**  
**Anzac - May 2014**

Direction of Maximum Speed: 339 deg on May 1 13:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 333.9 deg on May 2	Hours of Data: 740
Direction of Minimum Speed: 65 deg on May 4 06:00	Direction of Minimum Daily Speed Average: 1.5 deg on May 13
Direction of Minimum Daily Speed Average: 1.5 deg on May 13	Hours of Missing Data: 4
Monthly Average Direction: 305.0 deg	Percent Operational Time: 99.5

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-May	239	255	310	307	323	334	331	326	336	321	325	329	339	344	345	334	322	333	357	351	335	325	354	340	330.4
2-May	325	321	318	323	331	321	313	317	320	329	330	338	338	341	340	336	339	351	345	350	352	356	351	342	333.9
3-May	338	342	344	344	338	340	346	341	337	342	353	360	23	31	14	29	36	32	37	66	64	73	78	114	2.0
4-May	AF	AF	216	220	221	65	65	77	100	43	281	5	138	56	109	156	101	122	110	128	155	233	151	134	121.3
5-May	139	158	158	136	159	157	159	163	218	126	132	156	79	157	201	89	62	77	64	68	77	77	76	78	105.0
6-May	68	63	56	45	33	23	24	27	13	23	23	29	25	16	9	18	12	16	353	2	354	326	344	312	23.4
7-May	266	267	265	285	294	298	309	334	334	315	332	333	332	346	346	338	352	343	357	9	28	31	46	168	333.9
8-May	169	134	118	89	87	92	102	129	143	170	288	311	18	48	53	44	42	27	31	15	357	3	354	347	48.7
9-May	322	295	285	290	319	321	315	318	270	285	286	322	340	315	275	264	281	307	270	311	354	340	318	321	304.2
10-May	325	306	298	301	296	295	296	295	302	304	301	309	321	328	324	326	328	333	334	330	308	304	298	299	312.9
11-May	303	296	295	300	296	299	297	291	294	270	273	295	320	329	332	328	347	347	324	355	37	22	62	103	315.6
12-May	133	105	137	163	166	136	150	80	52	39	16	342	306	305	331	343	344	356	14	16	16	32	62	79	26.0
13-May	126	155	145	156	159	187	233	201	185	278	249	291	274	271	289	305	323	357	12	20	24	39	41	245	300.7
14-May	197	356	137	137	159	157	106	145	110	123	131	133	129	141	143	170	170	124	135	107	115	247	299	55	134.5
15-May	120	155	156	165	178	199	178	107	78	51	8	5	356	350	353	342	336	334	333	331	324	320	312	295	345.4
16-May	301	313	319	322	296	283	284	262	262	267	262	251	266	256	251	248	245	42	30	53	83	106	164	148	270.5
17-May	153	117	108	102	111	135	135	134	111	125	89	210	65	65	90	47	57	82	98	85	95	130	144	152	109.7
18-May	154	156	132	125	131	106	106	133	139	145	134	156	78	32	36	41	268	92	247	74	128	158	163	162	129.6
19-May	161	164	163	166	162	153	157	167	178	168	157	152	158	159	175	170	173	173	179	179	180	216	180	160	168.0
20-May	166	152	148	154	152	151	152	162	167	172	182	169	175	182	202	193	194	178	169	211	181	160	161	172	173.7
21-May	195	144	159	189	209	233	231	234	242	295	225	228	220	237	259	256	259	279	294	290	3	21	189	181	244.3
22-May	165	165	164	171	176	176	187	217	244	288	294	291	289	285	283	290	291	254	222	195	163	154	163	162	233.4
23-May	159	168	177	178	259	220	285	127	100	49	56	87	33	62	155	149	135	125	131	138	137	163	266	291	154.0
24-May	297	287	282	284	285	299	304	305	298	285	285	281	274	283	298	297	302	331	346	321	340	46	81	113	297.8
25-May	182	148	141	124	145	134	153	139	148	139	44	81	99	144	122	89	109	112	117	113	115	130	123	129	120.9
26-May	156	104	72	76	103	112	101	96	114	113	96	97	98	86	86	90	84	85	81	83	85	81	81	83	91.5
27-May	83	76	70	49	36	33	26	22	14	16	28	8	14	7	14	8	19	17	5	12	70	72	69	84	36.6
28-May	100	78	73	96	123	82	104	116	77	81	100	99	116	100	91	94	123	130	121	118	101	105	122	127	105.5
29-May	121	108	94	85	82	330	11	14	15	357	16	15	27	18	6	7	354	325	310	312	306	304	302	292	341.7
30-May	283	279	283	284	279	279	279	287	284	291	287	303	300	297	324	314	303	262	257	8	67	316	AF	178	290.8
31-May	AF	207	203	208	219	250	287	322	320	326	338	351	0	359	17	32	43	33	40	68	89	113	113	128	25.5

174.3	163.4	171.2	205.7	244.8	288.7	298.6	300.5	297.6	317.1	312.7	321.8	343.9	337.8	340.7	343.1	347.9	11.8	10.6	25.8	50.1	64.5	82.0	115.0
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**

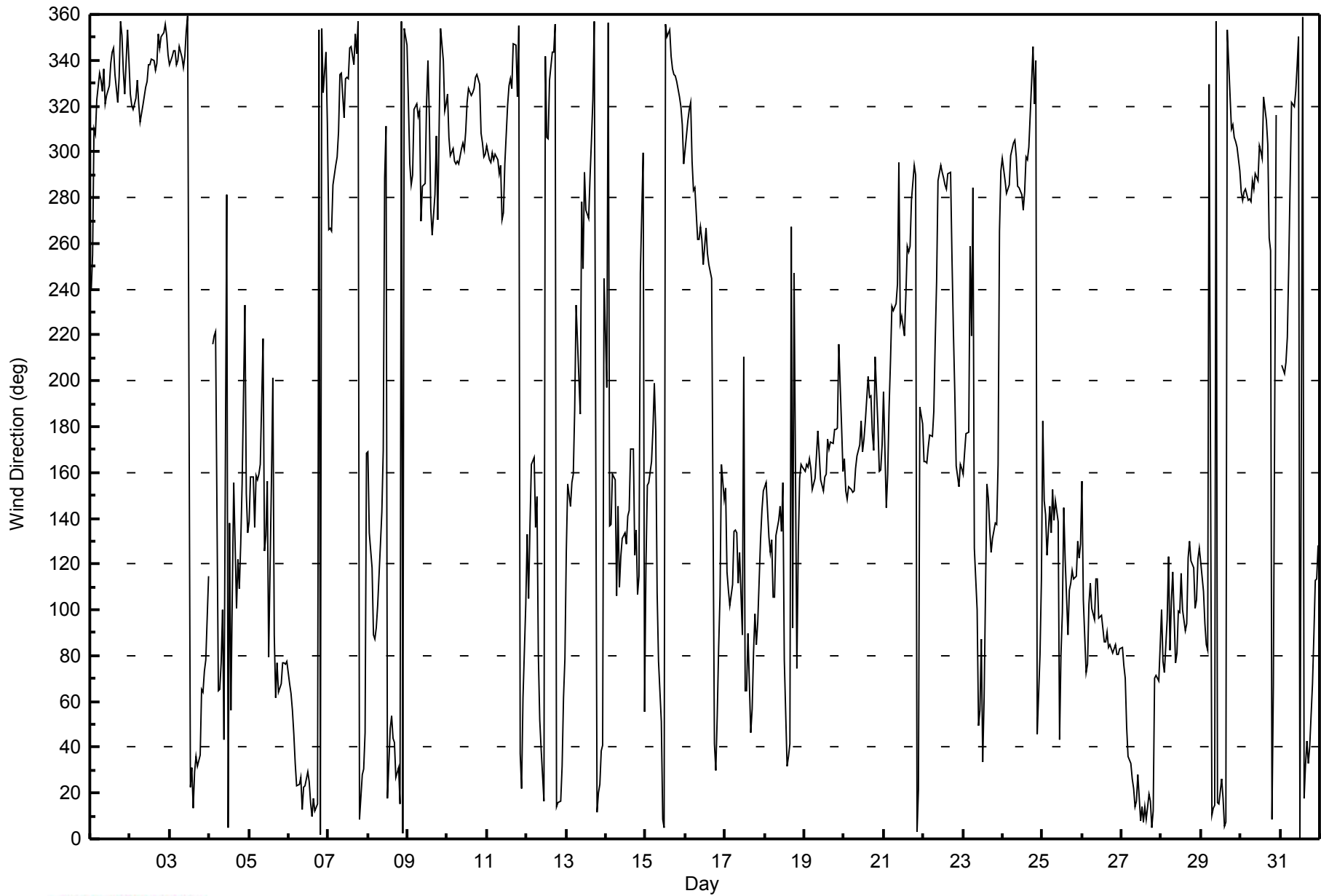
**Wind Direction (WD) - deg**  
**Anzac - May 2014**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 106 deg on May 17 12:00		Hours in Service: 744 Hours of Data: 740 Hours of Missing Data: 4 Hours of Calibration: 0 Percent Operational Time: 99.5																							
Minimum Value: 10 deg on May 16 23:00  Percentiles: P <sub>1</sub> = 12 P <sub>10</sub> = 16 Q <sub>1</sub> = 19 Median = 24 Q <sub>3</sub> = 32 P <sub>90</sub> = 47 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-May	19	25	47	33	26	17	17	17	18	22	22	20	20	20	19	23	22	24	18	19	25	20	16	16	47
2-May	16	18	19	18	19	20	22	19	18	18	19	16	18	18	18	18	17	17	18	17	17	18	17	17	22
3-May	17	16	17	16	17	17	16	20	21	21	22	39	41	35	37	38	32	30	28	24	21	14	22	21	41
4-May	AF	AF	22	36	56	87	24	40	54	70	82	52	52	58	46	82	73	31	27	28	45	42	20	18	87
5-May	18	19	24	20	18	18	26	37	49	31	35	47	38	52	90	53	26	33	24	20	20	21	19	21	90
6-May	20	19	21	21	20	19	20	23	23	31	42	28	25	26	22	27	26	26	18	20	21	36	18	37	42
7-May	16	24	21	20	25	24	22	20	18	19	20	20	24	21	21	25	21	21	24	19	18	11	22	79	79
8-May	68	41	14	14	16	17	25	27	29	69	36	38	29	26	26	25	26	24	23	20	16	18	12	10	69
9-May	13	20	21	22	18	17	23	23	36	44	31	29	27	41	48	35	34	30	27	34	19	22	16	19	48
10-May	15	17	20	22	22	25	25	25	26	24	24	22	19	18	20	19	18	17	17	17	21	24	21	21	26
11-May	21	22	23	21	21	21	23	27	25	33	35	29	28	23	25	24	26	20	22	32	36	12	20	34	36
12-May	21	23	23	24	17	54	40	38	41	78	51	48	69	63	55	32	39	42	23	18	17	19	16	22	78
13-May	22	23	18	12	14	41	29	36	68	96	35	46	41	45	55	63	42	32	21	17	15	13	80	84	96
14-May	77	50	27	18	15	15	24	31	22	27	29	28	27	32	33	38	28	23	42	23	22	62	37	29	77
15-May	28	20	19	15	21	30	29	36	24	21	22	18	20	17	17	16	16	16	16	17	16	15	21	23	36
16-May	22	20	17	14	19	24	30	26	27	46	37	25	43	32	35	39	65	59	32	17	16	17	10	14	65
17-May	13	14	13	13	14	25	19	23	24	34	84	106	81	76	49	46	27	32	27	14	25	16	18	16	106
18-May	16	19	18	15	18	22	20	24	26	34	35	48	60	28	29	61	93	46	34	60	32	14	16	16	93
19-May	16	14	16	35	21	14	17	23	30	36	28	32	26	22	28	27	29	27	24	24	21	15	28	14	36
20-May	15	16	19	14	16	16	18	25	25	24	30	25	28	29	27	30	30	28	19	24	62	17	19	25	62
21-May	24	37	54	45	24	19	22	23	47	34	26	34	33	28	30	33	30	31	29	33	15	79	14	36	79
22-May	25	13	13	18	19	17	23	23	33	39	29	32	27	32	33	28	34	57	63	23	14	14	12	12	63
23-May	15	15	14	16	55	14	90	39	35	51	59	98	47	93	43	47	51	39	22	18	15	28	59	28	98
24-May	26	25	28	29	28	25	26	25	29	30	33	34	34	31	27	28	28	27	22	19	18	20	25	42	42
25-May	26	62	19	16	29	21	27	24	33	79	95	56	55	64	52	36	27	32	25	23	21	18	14	16	95
26-May	18	34	17	16	26	21	24	28	23	23	28	28	26	25	24	25	24	27	23	25	23	22	23	23	34
27-May	24	23	21	24	22	22	22	23	21	21	24	21	23	23	20	28	24	28	21	18	28	17	17	20	28
28-May	35	17	20	17	18	40	29	25	27	29	26	33	24	29	24	32	26	30	19	19	27	27	22	18	40
29-May	22	35	29	29	49	23	26	26	31	17	22	21	25	24	21	20	19	23	22	20	21	23	26	28	49
30-May	27	28	26	29	30	29	29	31	30	30	30	25	26	27	21	24	26	31	31	68	90	77	AF	87	90
31-May	AF	60	13	17	14	28	29	23	36	38	32	29	31	40	44	40	33	33	23	25	26	23	23	20	60
Diurnal Maximum																									
77 62 54 45 56 87 90 40 68 96 95 106 81 93 90 82 93 59 63 68 90 79 80 87																									
AF - Analyzer Failure																									



**WBEA**  
**Hourly Averages**

**Wind Direction (WD) - deg**  
**Anzac - May 2014**



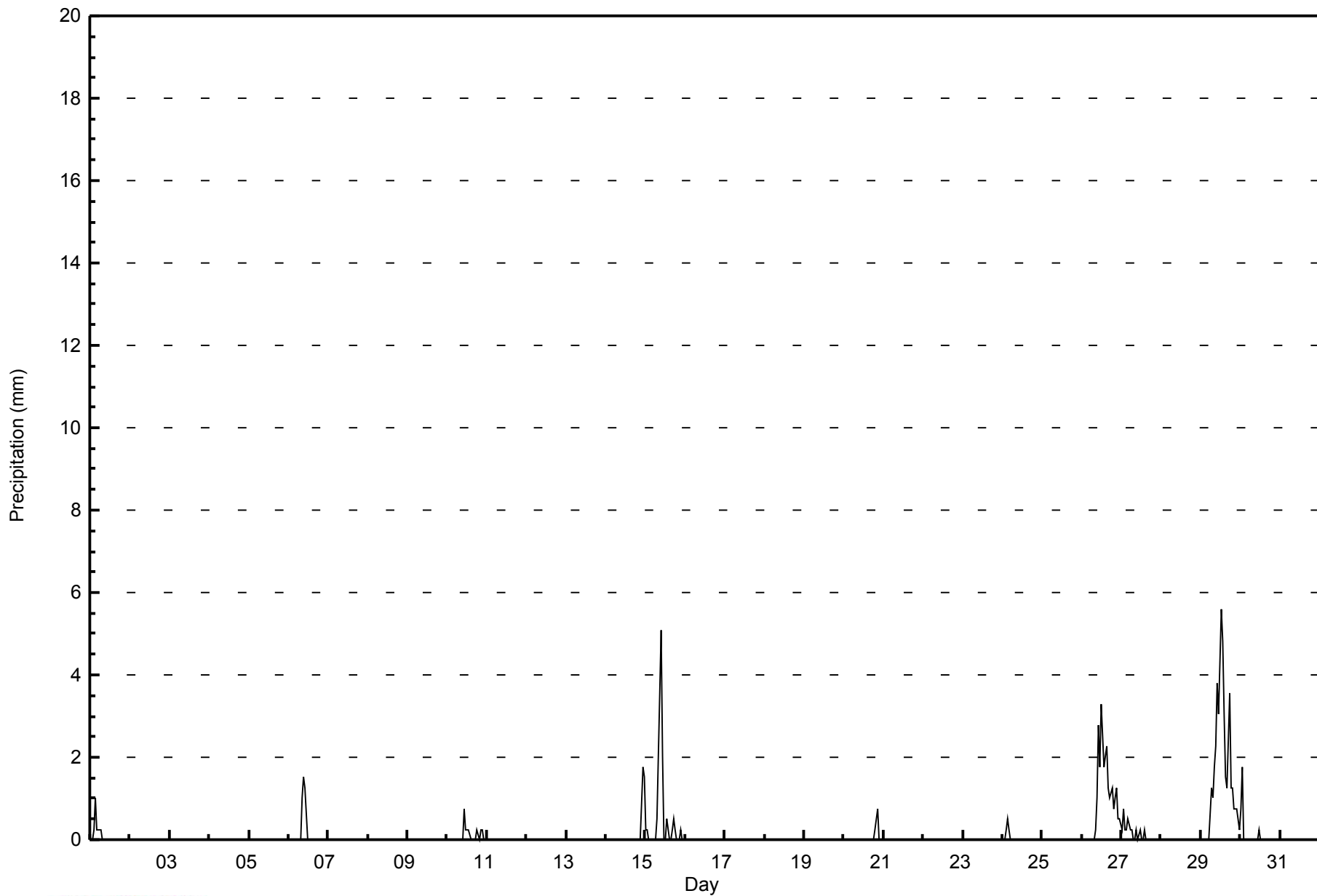


Maximum Value: 5.6 mm on May 29 13:00		Maximum Daily Total: 38.1 mm on May 29		Hours in Service: 744																																													
Minimum Value: 0.0 mm on May 1 01:00		Minimum Daily Total: 0.0 mm on May 2		Hours of Data: 744																																													
Maximum Diurnal Total: 10.7 mm at hour 11		Minimum Diurnal Total: 0.5 mm at hour 6		Hours of Missing Data: 0																																													
Monthly Total: 92.46 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> = 0.3 P <sub>99</sub> = 2.8		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-May	0.0	0.0	0.3	1.0	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	1.0																							
2-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.5	1.3	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	1.5																							
7-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.3	0.0	0.3	0.3	0.0	0.0	2.3	0.8																							
11-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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																							
15-May	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.5	2.0	5.1	2.0	0.0	0.0	0.5	0.0	0.0	0.3	0.5	0.3	0.0	0.0	0.3	0.0	11.9	5.1																								
16-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.8	0.0	0.0	1.0	0.8	0.0																							
21-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.3	0.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.5	0.0																							
25-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.0	2.8	1.8	3.3	1.8	2.0	2.3	1.3	1.0	1.3	0.8	1.0	1.3	0.5	0.5	22.9	3.3																							
27-May	0.3	0.8	0.3	0.3	0.5	0.3	0.3	0.0	0.0	0.3	0.0	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3	0.8																							
28-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	1.3	1.0	1.8	2.3	3.8	3.0	5.6	4.8	3.0	1.5	1.3	3.6	1.3	1.3	0.8	0.8	0.8	0.3	38.1	5.6																							
30-May	0.8	1.8	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	2.8	1.8	0.0																							
31-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	2.8	0.8	1.8	1.0	0.5	1.8	1.5	5.1	10.2	10.7	5.6	9.1	7.4	5.3	3.8	2.8	5.1	3.0	2.3	2.8	2.5	3.0	2.3	Diurnal Average	
																								0.8	1.8	0.3	1.0	0.5	0.3	1.3	1.0	2.0	5.1	3.8	3.0	5.6	4.8	3.0	2.3	1.3	3.6	1.3	1.3	1.0	1.3	1.8	1.5	Diurnal Maximum	



Wood Buffalo Environmental Association  
Hourly Averages

Precipitation (PC) - mm  
Anzac - May 2014







# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Report

### Station Information

Calibration Date	May 21, 2014	Previous Calibration	April 17, 2014
Station Name	Anzac	Station Number	AMS 14
Reason:	Routine		
Start Time (MST)	7:45	End Time (MST)	10:10
Barometric Pressure	782 mmHg	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	8400311
Cal Gas Concentration	51 ppm	Cal Gas Expiry Date	29/05/2014
Gas Cert Reference	LL107928		
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2372
DACS voltage range	NA	DACS channel #	NA

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	1000	1000	PMT voltage	-596	-596
Analyzer Range (mv)	5000	5000	Lamp voltage	808	808
Calculated slope	0.991108	0.991234	Chamber temp.	44.1	44.1
Calculated intercept	0.789768	0.150570	Pressure (mmHg)	682.1	682.1
Analyzer Background	12.9	12.9	Flow (lpm)	0.389	0.389
Analyzer Coefficient	0.945	0.945	Intensity	30000	30000

Analyzer make TEI 43C Analyzer serial # 613516095

### 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	NA
as found span	5000	78.3	798.7	806.0	0.991
calibrator zero	5000	0.0	0.0	0.2	NA
high point	5000	78.3	798.7	806.0	0.991
second point	5000	39.1	398.8	401.2	0.994
third point	5000	19.6	199.9	201.8	0.991
calibrator zero	5000	0.0	0.0	0.2	NA
as left zero	5000	0.0	0.0	0.2	NA
as left span	5000	78.3	798.7	806.8	0.990
Average Correction Factor					0.992

Corrected As found 805.8 Previous response 805.0 % change -0.1%

#### Notes:

Filter changed, No Maintenance or adjustments made

Calibration Performed By:

Melissa Lemay



# Wood Buffalo Environmental Association

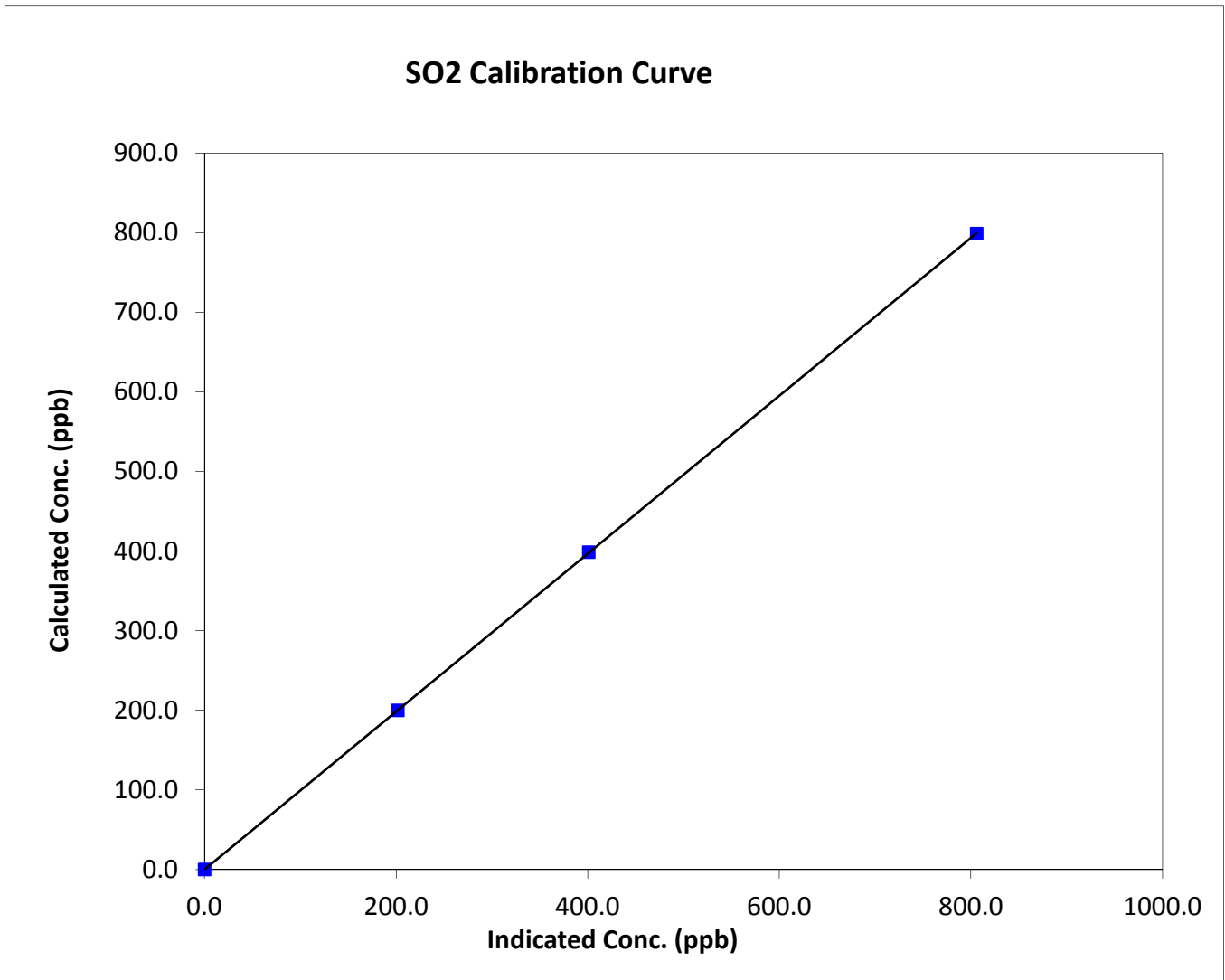
## SO<sub>2</sub> Calibration Summary

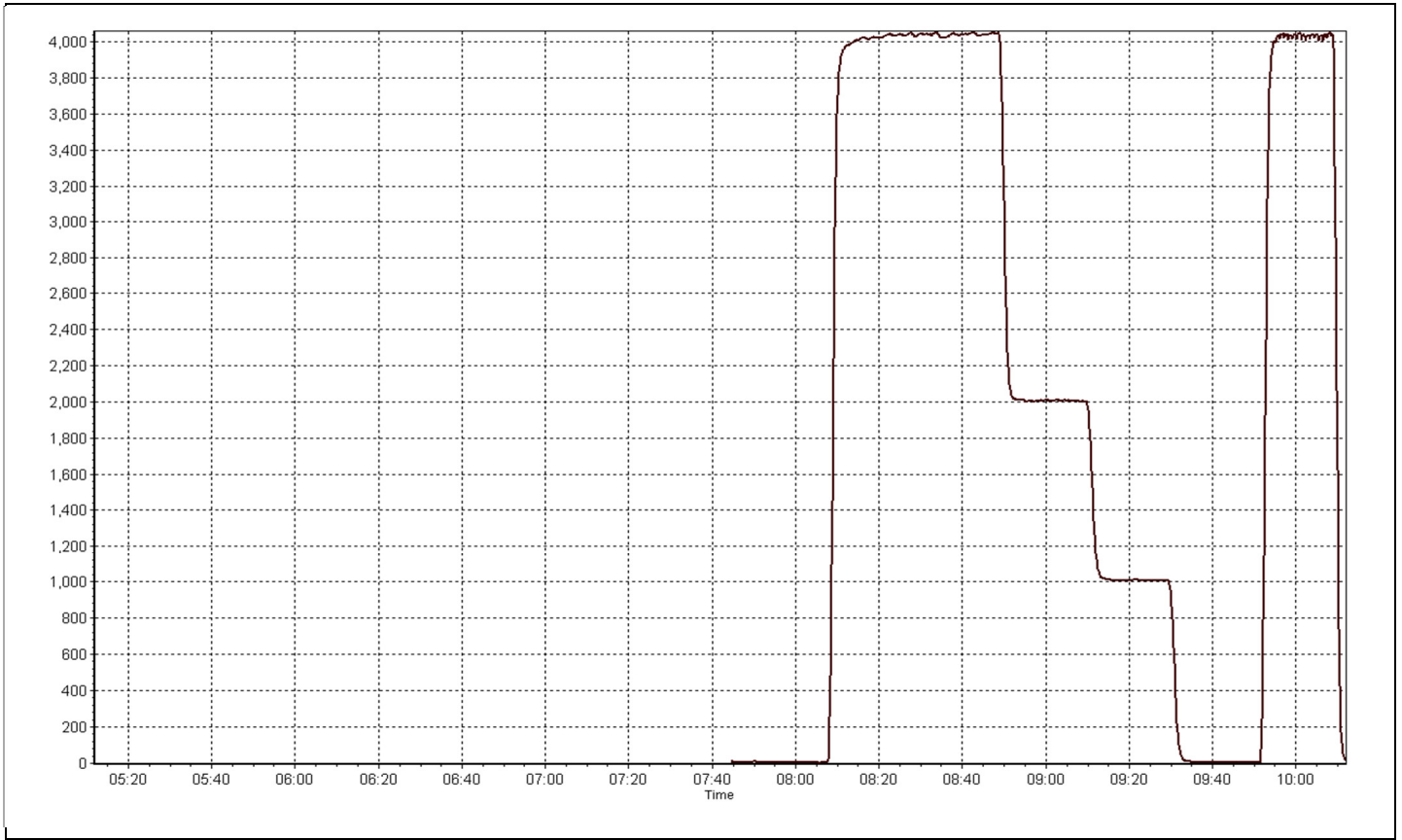
### Station Information

Calibration Date	May 21, 2014	Previous Calibration	April 17, 2014
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	7:45	End Time (MST)	10:10
Analyzer make	TEI 43C	Analyzer serial #	613516095

### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	N/A	Correlation Coefficient	0.999996
798.7	806.0	0.9909		
398.8	401.2	0.9941	Slope	0.991234
199.9	201.8	0.9907		
			Intercept	0.150570







# Wood Buffalo Environmental Association

## TRS Calibration Report

### Station Information

Calibration Date	May 21, 2014	Previous Calibration	April 22, 2014
Station Name	Anzac	Station Number	AMS 14
Reason:	Routine		
Start Time (MST)	10:10	End Time (MST)	12:40
Barometric Pressure	732 mmHg	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial number	8400311
Cal Gas Concentration	9.6 ppm H2S	Cal Gas Expiry Date	22/02/2016
Gas Cert Reference	LL82745	SO2 gas conc.	51.0 ppm SO2
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2372
DACS voltage range	0-5 volts	DACS channel #	2

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	100	100	PMT voltage	-731	-731
Analyzer Range (input)	5000	5000	Lamp voltage	968	968
Calculated slope	1.016720	0.992360	Chamber temp.	45	45
Calculated intercept	0.049908	0.210178	Pressure	652.6	652.6
Analyzer Background	2.03	2.1	Flow	0.395	0.395
Analyzer Coefficient	1.120	1.157	Intensity	91	91
			Converter temp.	800	800

Analyzer make/model	43i-TL	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	-0.5	NA
as found span	5000	39.1	75.1	72.5	1.035
SO2 scrubber check	5000	78.3	798.7	-0.2	NA
calibrator zero	5000	0.0	0.0	-0.5	NA
high point	5000	39.1	75.1	75.2	0.999
second point	5000	20.8	39.9	40.5	0.987
third point	5000	10.4	20.0	20.0	0.996
calibrator zero	5000	0.0	0.0	-0.3	NA
as left zero	5000	0.0	0.0	-0.3	NA
as left span	5000	39.1	75.1	73.4	1.023
Average Correction Factor					0.994

Corrected As found	73.0	Previous response	73.8	% change	1.1%
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#### Notes:

No adjustments made, no maintenance done, scrubber checked after third period

Calibration Performed By:

Melissa Lemay



# Wood Buffalo Environmental Association

## TRS Calibration Summary

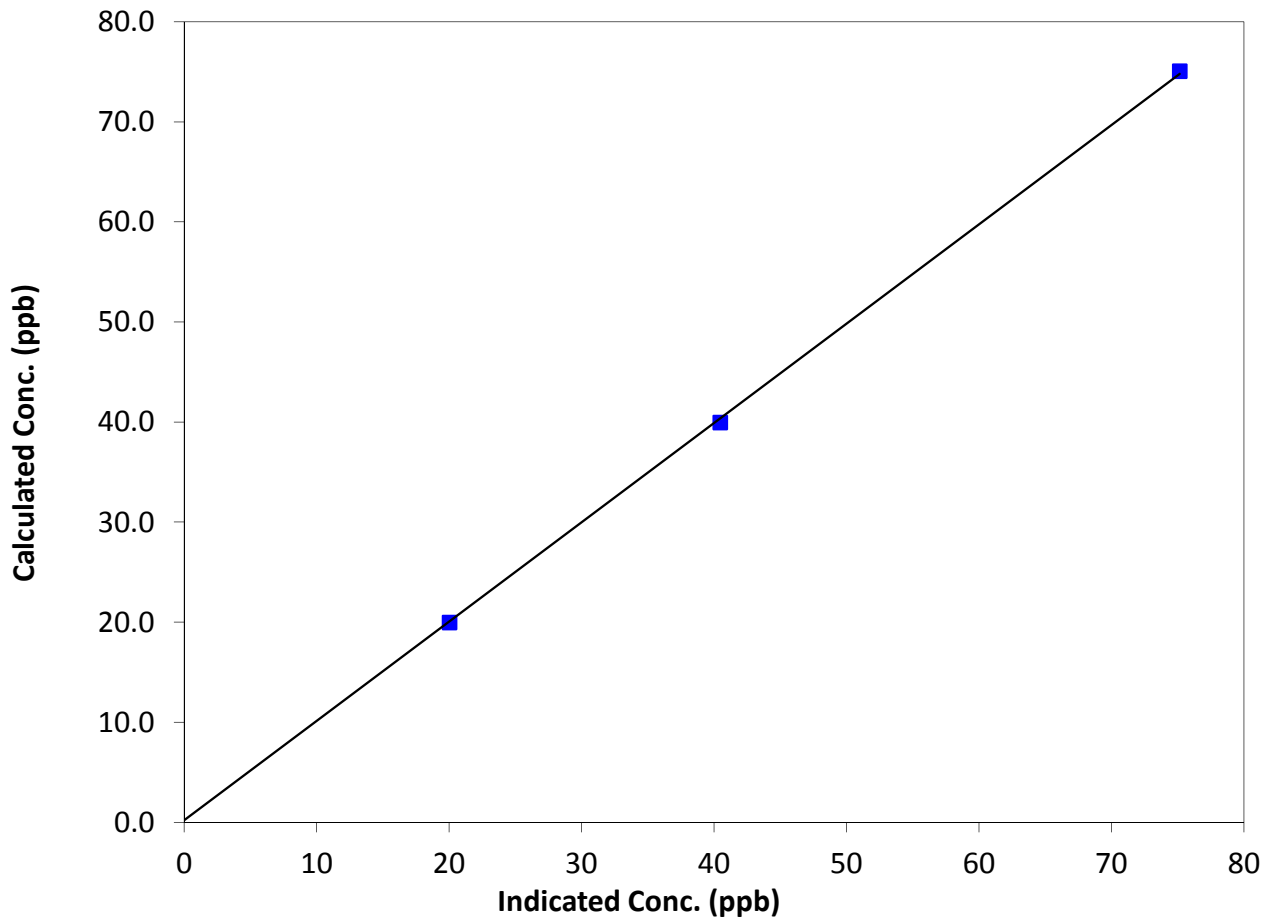
### Station Information

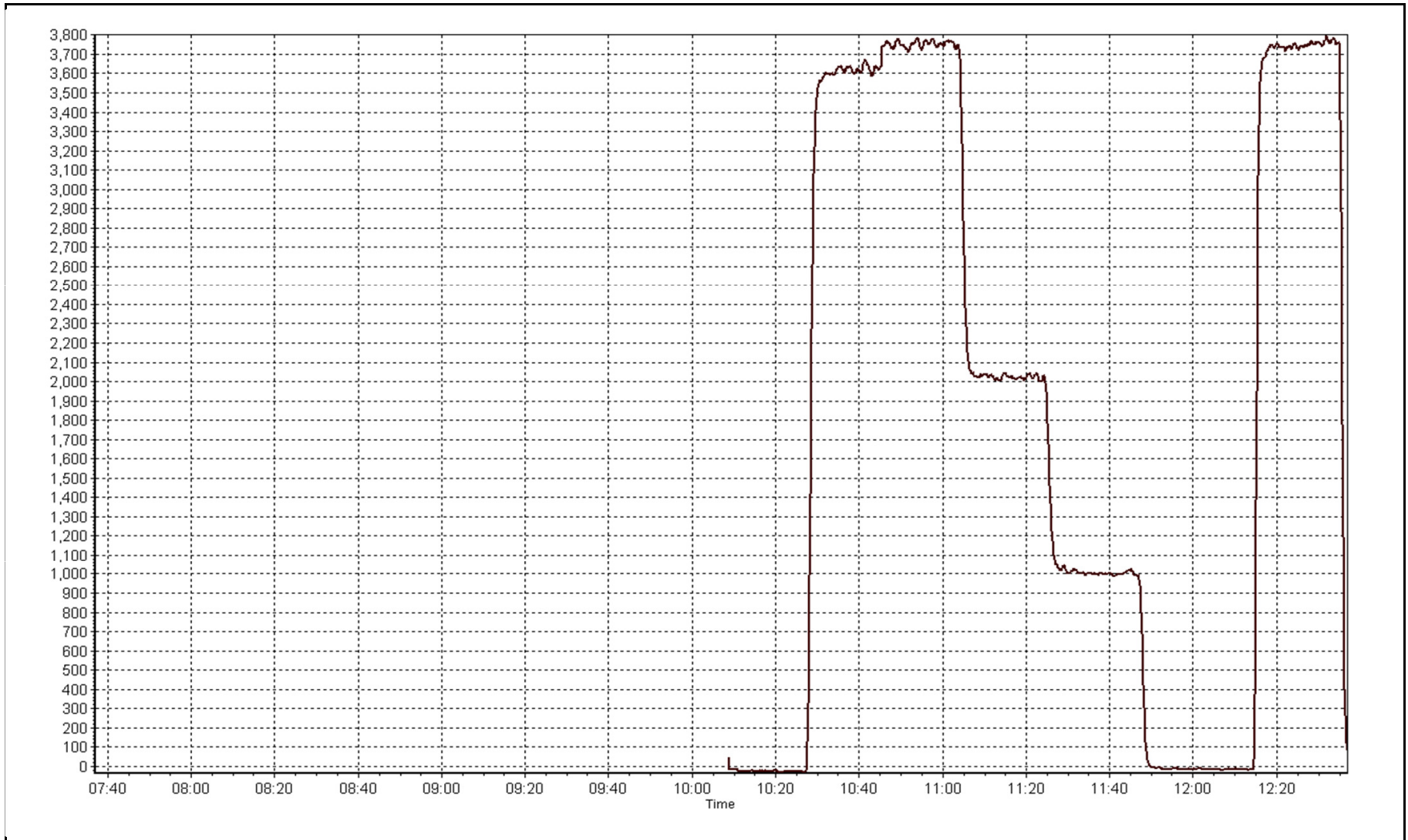
Calibration Date	May 21, 2014	Previous Calibration	April 22, 2014
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	10:10	End Time (MST)	12:40
Analyzer make	43i-TL	Analyzer serial #	1300156232

### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.5	N/A	Correlation Coefficient	0.999877
75.1	75.2	0.9988		
39.9	40.5	0.9866	Slope	0.992360
20.0	20.0	0.9964		
			Intercept	0.210178

**TRS Calibration Curve**







Wood Buffalo Environmental Association

THC / NMHC Calibration Report

Station Information

Calibration Date	May-21-14	Prev Calibration	April-15-14
Station Name	Anzac	Station Number	AMS 14
Reason:	Routine		
Start Time (MST)	7:45	End Time (MST)	10:10
Barometric Pressure	782 mmHg	Station temp.	21 Deg C
Calibrator Model	Sabio 4010	Serial Number	8400311
Gas Cert Reference	LL107928	Cal Gas Expiry Date	May-29-14
CH4 Cal Gas Conc.	505.0 ppm	CH4 Equiv Conc.	1066.0 ppm
C3H8 Cal Gas Conc.	204.0 ppm		
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2372

Analyzer Information

	Before	After		Before	After
THC Range (ppm)	50	50	Internal Temp	34.4	31.1
THC Range (input)	50	50	Flame Temp	405.0	405.0
NMHC Range (ppm)	50	50	Carrier Pressure	31.8	31.8
NMHC Range (input)	50	50	Fuel Pressure	41.4	41.4
THC Calc slope	0.999708	1.001214	Air Pressure	32.5	32.5
THC Calc intercept	0.024224	0.018271			
NMHC Calc slope	1.001253	1.001757			
NMHC Calc intercept	-0.001962	-0.003896			

Analyzer make TEC 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	N/A
as found span	5000	78.3	16.69	16.14	1.034
calibrator zero	5000	0.0	0.00	0.00	N/A
high point	5000	78.3	16.69	16.68	1.001
second point	5000	39.1	8.34	8.25	1.010
third point	5000	19.6	4.18	4.17	1.002
calibrator zero	5000	0.0	0.00	0.00	N/A
as left zero	5000	0.0	0.00	0.00	N/A
as left span	5000	78.3	16.69	16.68	1.001
Average Correction Factor					1.004

Corrected As found 16.14 Previous response 16.67 % change 3.3%

Notes:

Filter change 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	N/A
as found span	5000	78.3	8.79	8.44	1.041
calibrator zero	5000	0.0	0.00	0.00	N/A
high point	5000	78.3	8.79	8.78	1.001
second point	5000	39.1	4.39	4.36	1.006
third point	5000	19.6	2.20	2.22	0.991
calibrator zero	5000	0.0	0.00	0.00	N/A
as left zero	5000	0.0	0.00	0.00	N/A
as left span	5000	78.3	8.79	8.78	1.001
Average Correction Factor					0.999

Corrected As found 8.44 Previous response 8.78 % change 4.0%

CH4 Calibration Data

Set Point	Dilution air flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration NMHC (ppm) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0	0.00	0.00	N/A
as found span	5000	78.3	7.91	7.70	1.027
calibrator zero	5000	0.0	0.00	0.00	N/A
high point	5000	78.3	7.91	7.90	1.001
second point	5000	39.1	3.95	3.88	1.018
third point	5000	19.6	1.98	1.95	1.015
calibrator zero	5000	0.0	0.00	0.00	N/A
as left zero	5000	0.0	0.00	0.00	N/A
as left span	5000	78.3	7.91	7.90	1.001
Average Correction Factor					

Corrected As found 7.70 Previous response 7.90 % change 2.6%



# Wood Buffalo Environmental Association

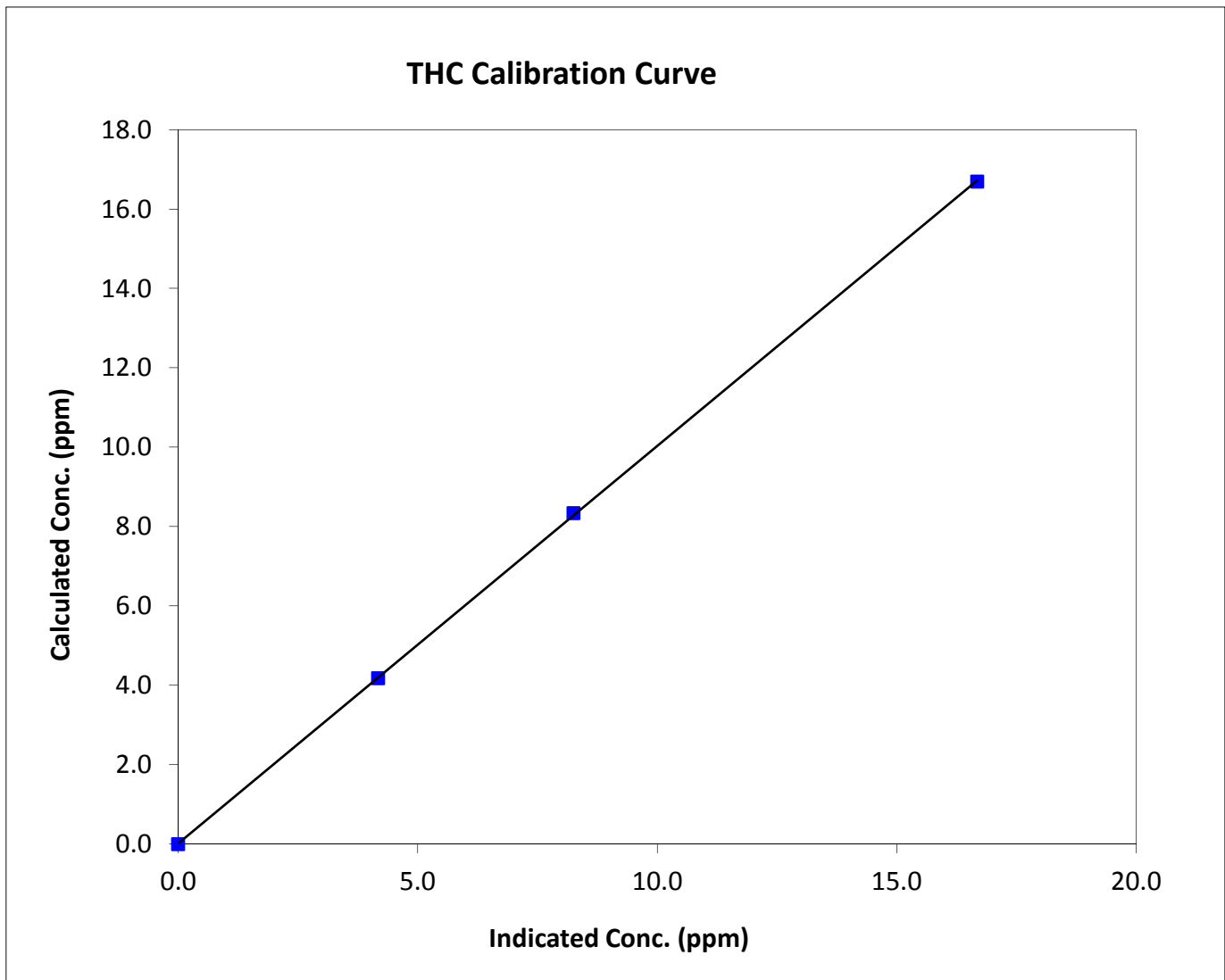
## THC Calibration Summary

### Station Information

Calibration Date	May 21, 2014	Previous Calibration	April 15, 2014
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	7:45	End Time (MST)	10:10
Analyzer make	TEC 55i	Analyzer serial #	1218153355

### Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	N/A	Correlation Coefficient	0.999970
16.69	16.68	1.0008		
8.34	8.25	1.0104	Slope	1.001214
4.18	4.17	1.0021		
			Intercept	0.018271







# Wood Buffalo Environmental Association

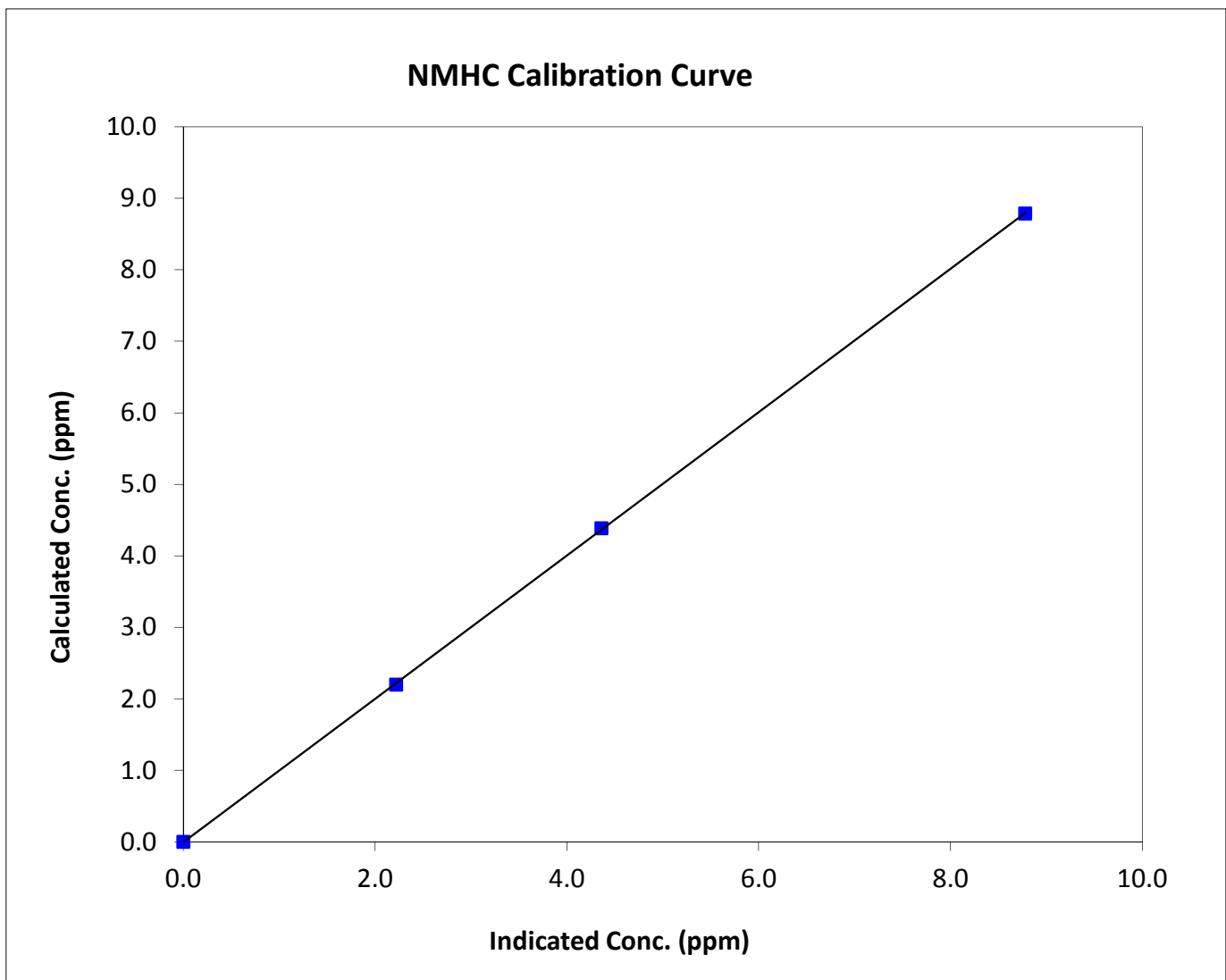
## NMHC Calibration Summary

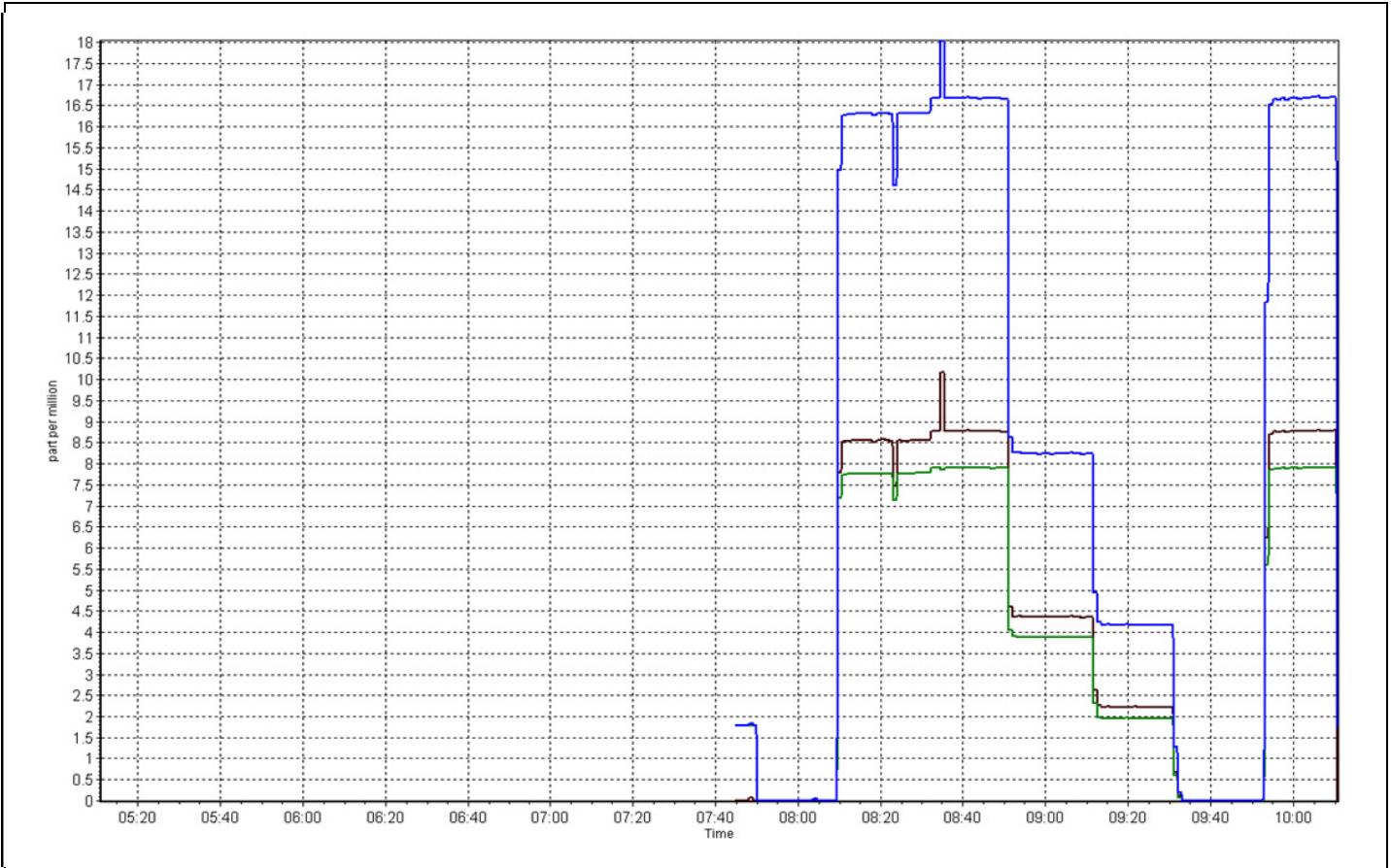
### Station Information

Calibration Date	May 21, 2014	Previous Calibration	April 15, 2014
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	7:45	End Time (MST)	10:10
Analyzer make	TEC 55i	Analyzer serial #	1218153355

### Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.00	N/A	Correlation Coefficient	0.999976
8.79	8.78	1.0006		
4.39	4.36	1.0062	Slope	1.001757
2.20	2.22	0.9906		
			Intercept	-0.003896







# Wood Buffalo Environmental Association

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

### Station Information

Calibration Date	May 26, 2014	Previous Calibration	April 22, 2014
Station Name	Anzac	Station Number	AMS 14
Reason:	Routine		
Start Time (MST)	10:00	End Time (MST)	12:40
Barometric Pressure	732 mmHg	Station temp.	23 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	8400311
NO2 calibration used	April-17-14	Transfer Standard	
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2372
DACS voltage range	5000	DACS channel #	7 & 8

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	500	500	Bench temp.	28.6	28.6
Analyzer Range (input)	5000	5000	Lamp temp.	55.7	55.7
Calculated slope	0.987536	0.994656	Pressure	683.3	683.3
Calculated intercept	0.176599	-3.114275	Flow cell A	0.861	0.861
Analyzer Background	-1.7	-0.5	Flow cell B	0.749	0.749
Analyzer Coefficient	1.031	1.01	Cell A Intensity	65388	65388
			Cell B Intensity	59992	59992

Analyzer make 49C Analyzer serial # 509110892

### 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	-4.3	N/A
as found span	5000	N/A	394.6	397.7	0.992
calibrator zero	5000	0.00	0.0	0.6	N/A
high point	5000	N/A	394.6	396.5	0.995
second point	5000	N/A	266.2	274.5	0.970
third point	5000	N/A	136.2	142.2	0.958
calibrator zero	N/A	N/A	0.0	1.3	N/A
as left zero	N/A	N/A	0.0	1.3	N/A
as left span	N/A	N/A	N/A	281.6	
Average Correction Factor					0.974

Corrected As found 402.0 Previous response 399.4 % change -0.6%

#### Notes:

zero adjusted, No Maintenance Done, Filter changed out

Calibration Performed By:

Melissa Lemay



# Wood Buffalo Environmental Association

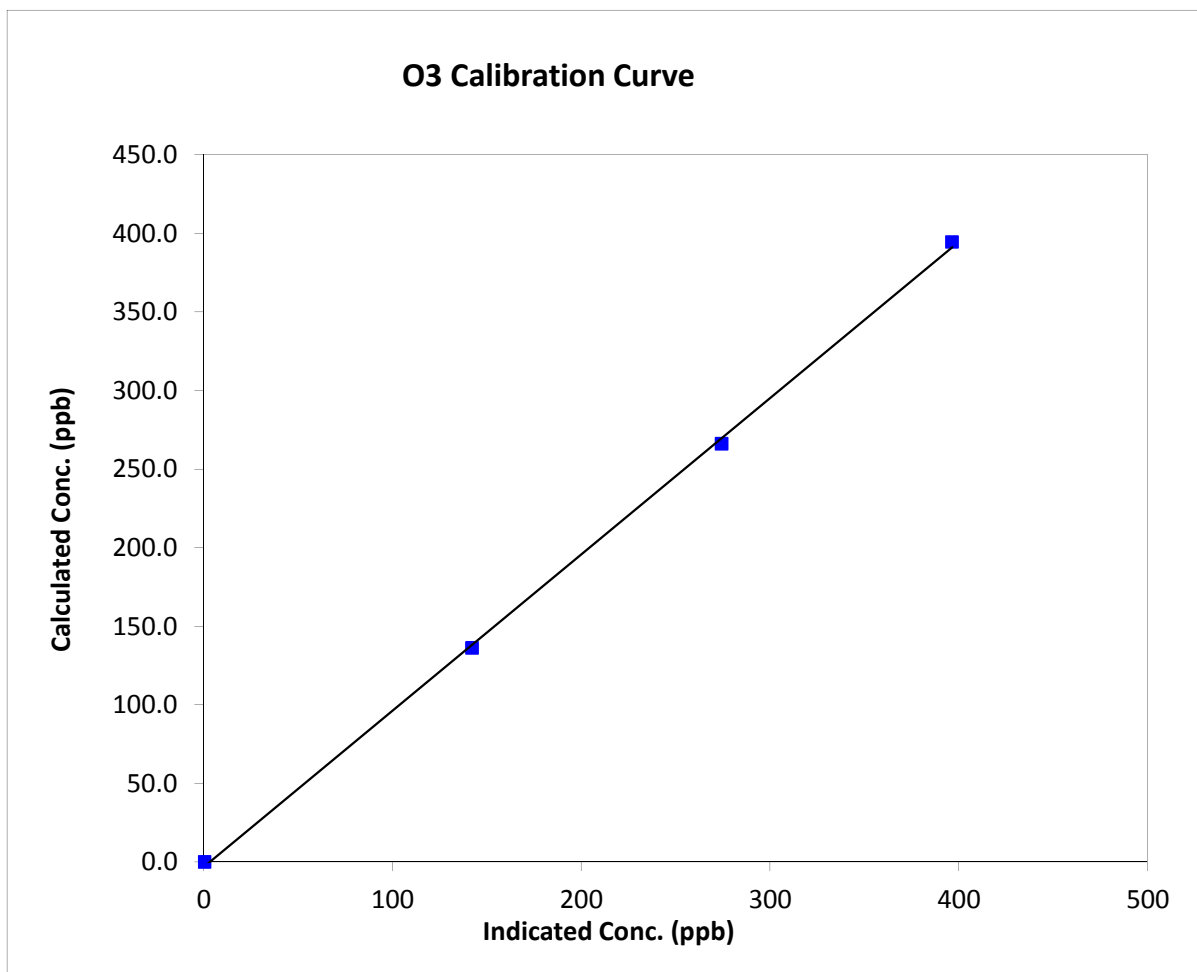
## O<sub>3</sub> Calibration Summary

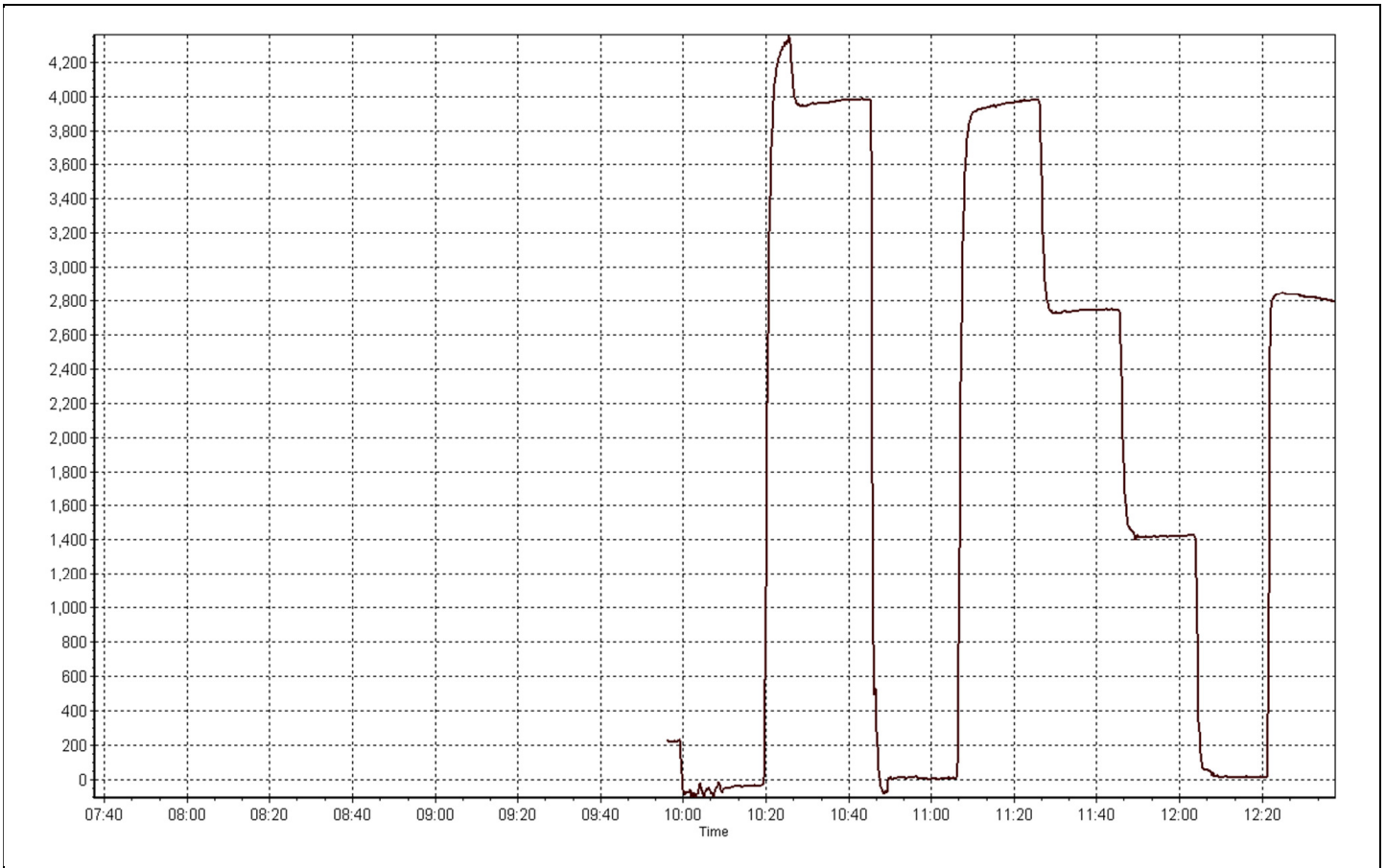
### Station Information

Calibration Date	May-26-14	Previous Calibration	April 22, 2014
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	10:00	End Time (MST)	12:40
Analyzer make	49C	Analyzer serial #	509110892

### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.6	N/A	Correlation Coefficient	0.999586
394.6	396.5	0.9952		
266.2	274.5	0.9698	Slope	0.994656
136.2	142.2	0.9578		
			Intercept	-3.114275







# Wood Buffalo Environmental Association

## NO<sub>x</sub>-NO-NO<sub>2</sub> Calibration Report

### Station Information

Calibration Date	May 22, 2014	Previous Calibration	April 17, 2014
Station Name	Anzac	Station Number	AMS 14
Reason:	Repair		
Start Time (MST)	7:40	End Time (MST)	
Barometric Pressure	782 mmHg	Station Temperature	22.0 Deg C
Calibrator	Sabio 4010	Serial Number	8400311
NO Cal Gas Conc	51.1 ppm	Cal Gas Expiry Date	May 29, 2014
NOx Cal Gas Conc	51.2 ppm	Cal Gas Serial #	LL107928

### DACs Information

DACS make & model Campbell Scientific CR3000 DACS serial No. \_\_\_\_\_

Parameter		NOx	NO	NO2
MV conversion	Analyzer Range (ppb)	1000	1000	1000
	Analyzer Range (mv)	5000	5000	5000
Before	Data Slope	1.008054	1.009772	0.999293
	Data Offset	0.830520	0.681785	-0.149390
After	Data Slope			
	Data Offset			
Channel #		6	5	4
Voltage Range		0 - 5V	0 - 5V	0 - 5V

### Analyzer Information

Analyzer make/model 42C Analyzer serial # 509110890

Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
NO coefficient	0.973	ppb		ppb
NOx coefficient	1.001	ppb		ppb
NO2 coefficient	1.002	ppb		ppb
NO bkgrnd	1.4			
NOx bkgrnd	1.7			
Nt coefficient	NA			
Chamber Temp	49.5	Deg C		Deg C
Moly Temp	317.0	Deg C		Deg C
PMT Temp	15.1	Deg C		Deg C
O3 flow	OK	ccm		ccm
R Cell Press	203.4	mmHg		mmHg
Sample Flow	0.543	ccm		ccm

**Notes:**

Photomultiplier tube and cooler changed out, PMT adjusted. Was -752 now -891



# Wood Buffalo Environmental Association

## NO<sub>x</sub>-NO-NO<sub>2</sub> Calibration Report

### Station Information

Calibration Date:

May 22, 2014

Station Number:

AMS 14

### 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 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
as found zero	5000	0.0	0.0	0.0	0.0	-0.9	-1.0	0.0	N/A	N/A
as found span	5000	78.3	801.8	800.2	1.6	795.0	793.0	1.0	1.0085	1.0091
calibrator zero										
high point										
second point										
third point										
calibrator zero										
as left zero										
as left span										
Average Correction Factor										

Corrected As found

NO<sub>x</sub>= 795.9

NO= 794.0

Percent Change

NO<sub>x</sub>= -0.2%

NO= -0.3%

Previous Response

NO<sub>x</sub>= 794.6

NO= 791.8

### GPT Calibration Data

Dilution Flow \_\_\_\_\_

ccm

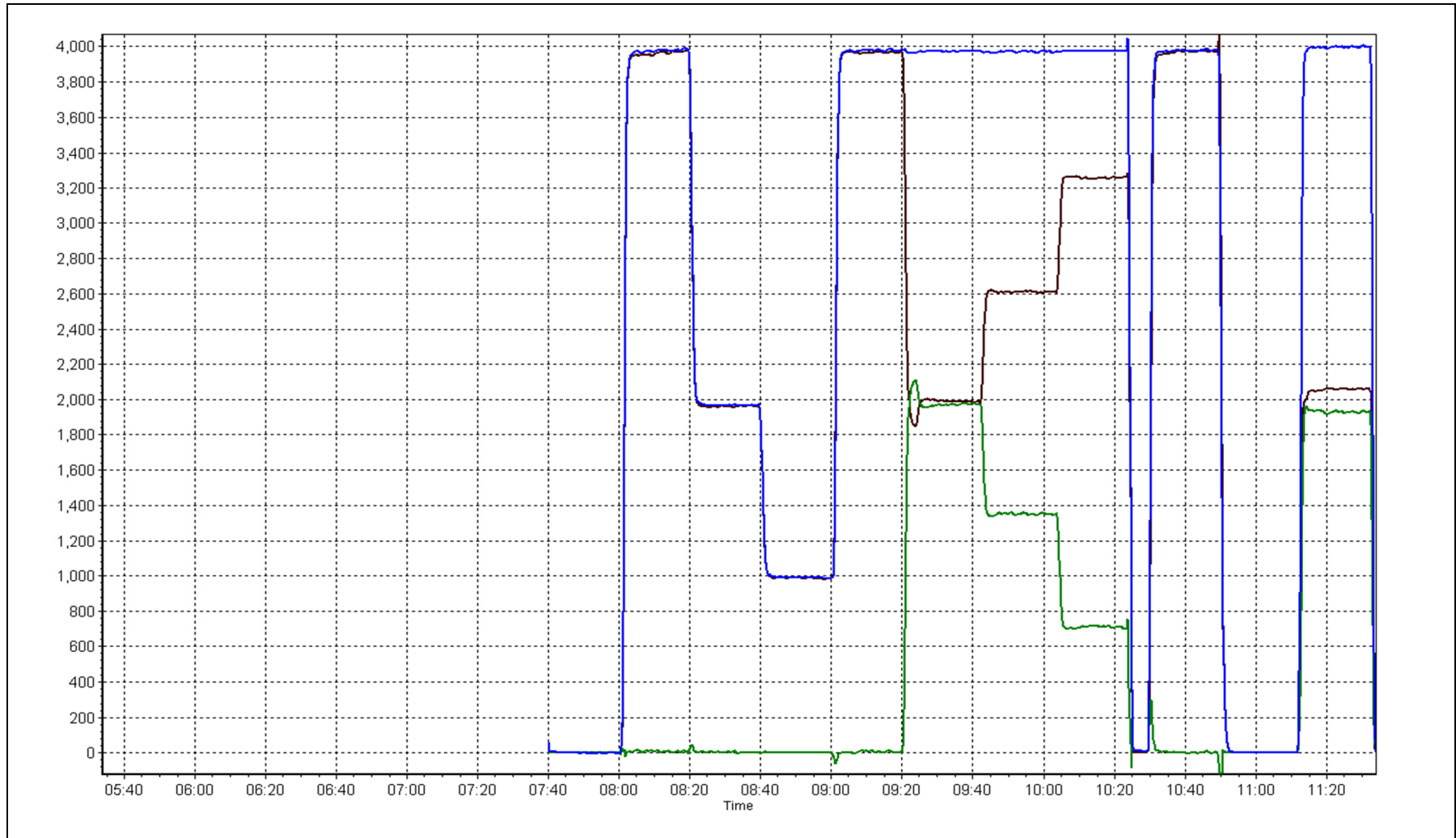
Source Gas Flow \_\_\_\_\_

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										
1st NO <sub>2</sub> (300)										
2nd NO <sub>2</sub> (200)										
3rd NO <sub>2</sub> (100)										
4th NO <sub>2</sub> (0)										
Average Correction Factor										

Calibration Performed By:

Melissa Lemay







# Wood Buffalo Environmental Association

## NO<sub>x</sub>-NO-NO<sub>2</sub> Calibration Report

### Station Information

Calibration Date	May 23, 2014	Previous Calibration	
Station Name	Anzac	Station Number	AMS 14
Reason:	Install		
Start Time (MST)	10:28	End Time (MST)	13:30
Barometric Pressure	782 mmHg	Station Temperature	22.0 Deg C
Calibrator	Sabio 4010	Serial Number	8400311
NO Cal Gas Conc	51.1 ppm	Cal Gas Expiry Date	May 29, 2014
NO <sub>x</sub> Cal Gas Conc	51.2 ppm	Cal Gas Serial #	LL107928

### DACs Information

DACS make & model Campbell Scientific CR3000 DACS serial No. \_\_\_\_\_

Parameter		NO <sub>x</sub>	NO	NO <sub>2</sub>
MV conversion	Analyzer Range (ppb)	1000	1000	1000
	Analyzer Range (mv)	5000	5000	5000
Before	Data Slope			
	Data Offset			
After	Data Slope	1.003805	1.001570	1.003327
	Data Offset	1.766776	1.529153	-0.674019
Channel #		6	5	4
Voltage Range		0 - 5V	0 - 5V	0 - 5V

### Analyzer Information

Analyzer make/model T200 Analyzer serial # 837

Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
NO coefficient	NA	ppb	0.870	ppb
NO <sub>x</sub> coefficient	NA	ppb	0.865	ppb
NO <sub>2</sub> coefficient	NA	ppb	N/A	ppb
NO bkgrnd	NA		-1.6	
NO <sub>x</sub> bkgrnd	NA		2.9	
Nt coefficient	NA		N/A	
Chamber Temp	NA	Deg C	49.9	Deg C
Moly Temp	NA	Deg C	314.7	Deg C
PMT Temp	NA	Deg C	7.2	Deg C
O <sub>3</sub> flow	NA	ccm	81.0	ccm
R Cell Press	NA	mmHg	26.9	mmHg
Sample Flow	NA	ccm	449	ccm

**Notes:**

Calibration post PMT cooler replacement on May 22.



# Wood Buffalo Environmental Association

## NO<sub>x</sub>-NO-NO<sub>2</sub> Calibration Report

### Station Information

Calibration Date:

May 23, 2014

Station Number:

AMS 14

### 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 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
as found zero										
as found span										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	0.3	-0.2	N/A	N/A
high point	5000	78.3	801.8	800.2	1.6	799.4	799.6	0.7	1.0030	1.0008
second point	5000	39.1	400.4	399.6	0.8	393.4	394.6	-0.1	1.0178	1.0127
third point	5000	19.6	200.7	200.3	0.4	195.8	195.4	0.8	1.0250	1.0251
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	0.5	-0.1	N/A	N/A
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.5	-0.1	N/A	N/A
as left span	5000	78.3	801.8	400.4	401.4	773.4	401.0	374.8	1.0367	0.9985
Average Correction Factor									1.0153	1.0129

Corrected As found

NO<sub>x</sub>=

NA

NO=

NA

Percent Change

NO<sub>x</sub>=

N/A

NO=

N/A

Previous Response

NO<sub>x</sub>=

NA

NO=

NA

### GPT Calibration Data

Dilution Flow

5000

ccm

Source Gas Flow

78.30

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			-0.2			N/A	
1st NO <sub>2</sub> (300)	N/A	400.4	394.6	791.2	400.4	392.8	0.9978	1.0000	1.0046	99.5%
2nd NO <sub>2</sub> (200)	N/A	528.8	266.2	794.4	528.8	267.4	0.9937	1.0000	0.9955	100.5%
3rd NO <sub>2</sub> (100)	N/A	658.8	136.2	794.2	658.8	137.0	0.9940	1.0000	0.9942	100.6%
4th NO <sub>2</sub> (0)	795.0	N/A	6.2	801.2	795.0	-0.1	0.9853	1.0000	N/A	N/A
Average Correction Factor							0.9927	1.0000	0.9981	100.2%

Calibration Performed By:

Melissa Lemay



# Wood Buffalo Environmental Association

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

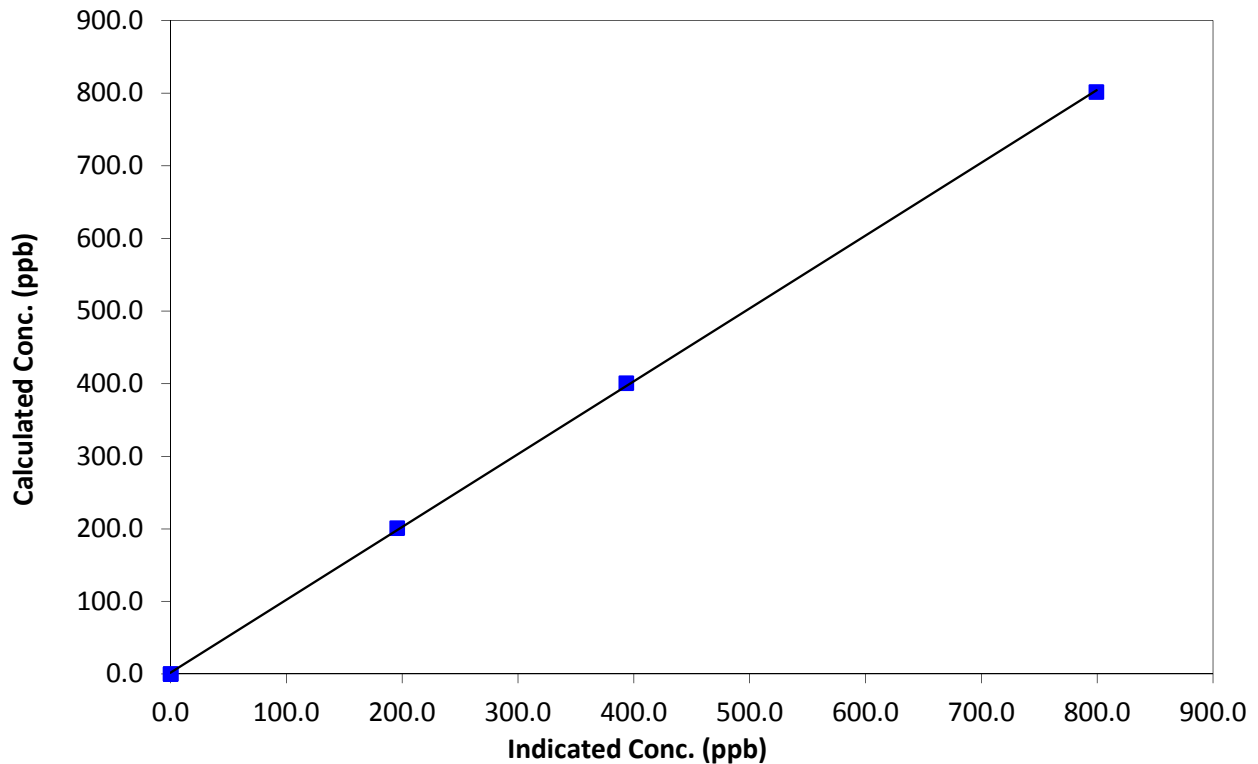
### Station Information

Calibration Date	May 23, 2014	Previous Calibration	
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	10:28	End Time (MST)	13:30
Analyzer make	T200	Analyzer serial #	837

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	N/A	Correlation Coefficient	0.999928
801.8	799.4	1.0030		
400.4	393.4	1.0178	Slope	1.003805
200.7	195.8	1.0250		
0.0	0.1	0.0000	Intercept	1.766776

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





# Wood Buffalo Environmental Association

## NO Calibration Summary

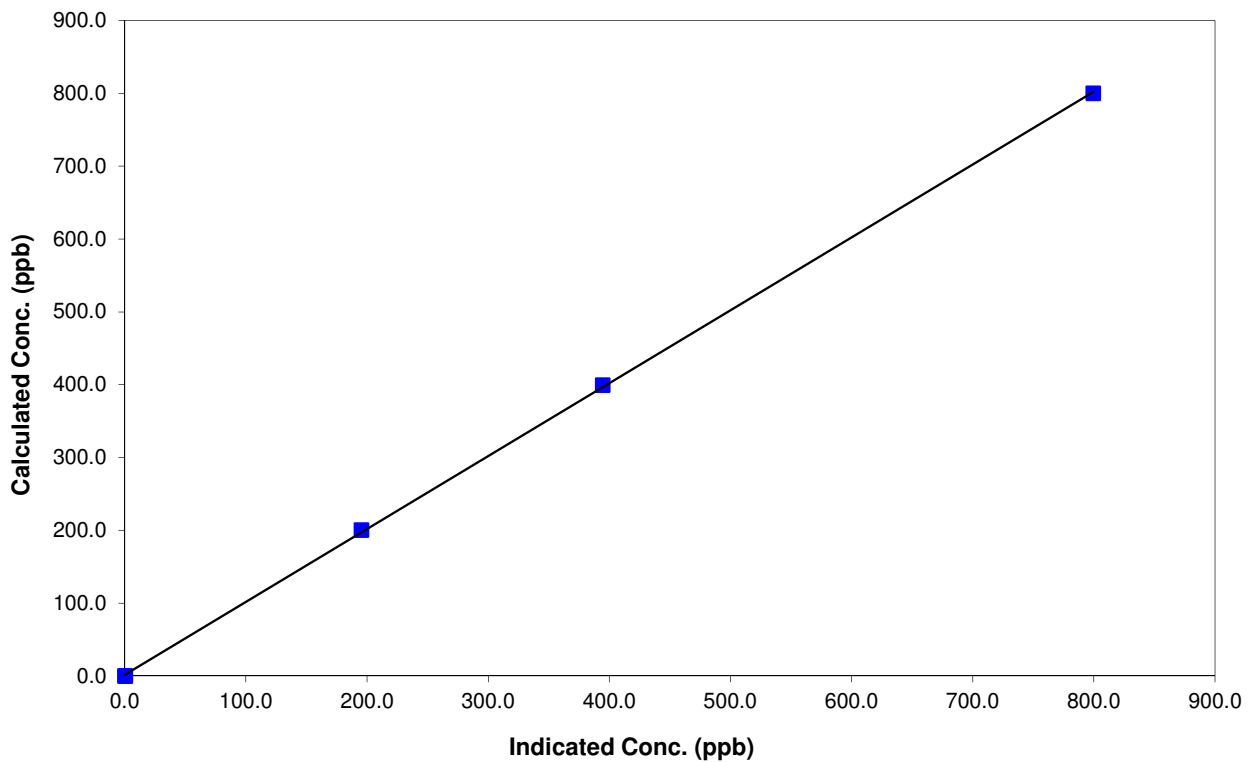
### Station Information

Calibration Date	May 23, 2014	Previous Calibration	
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	10:28	End Time (MST)	13:30
Analyzer make	T200	Analyzer serial #	837

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.3	N/A	Correlation Coefficient	0.999934
800.2	799.6	1.0008		
399.6	394.6	1.0127	Slope	1.001570
200.3	195.4	1.0251		
0.0	0.5	0.0000	Intercept	1.529153

### NO Calibration Curve





# Wood Buffalo Environmental Association

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

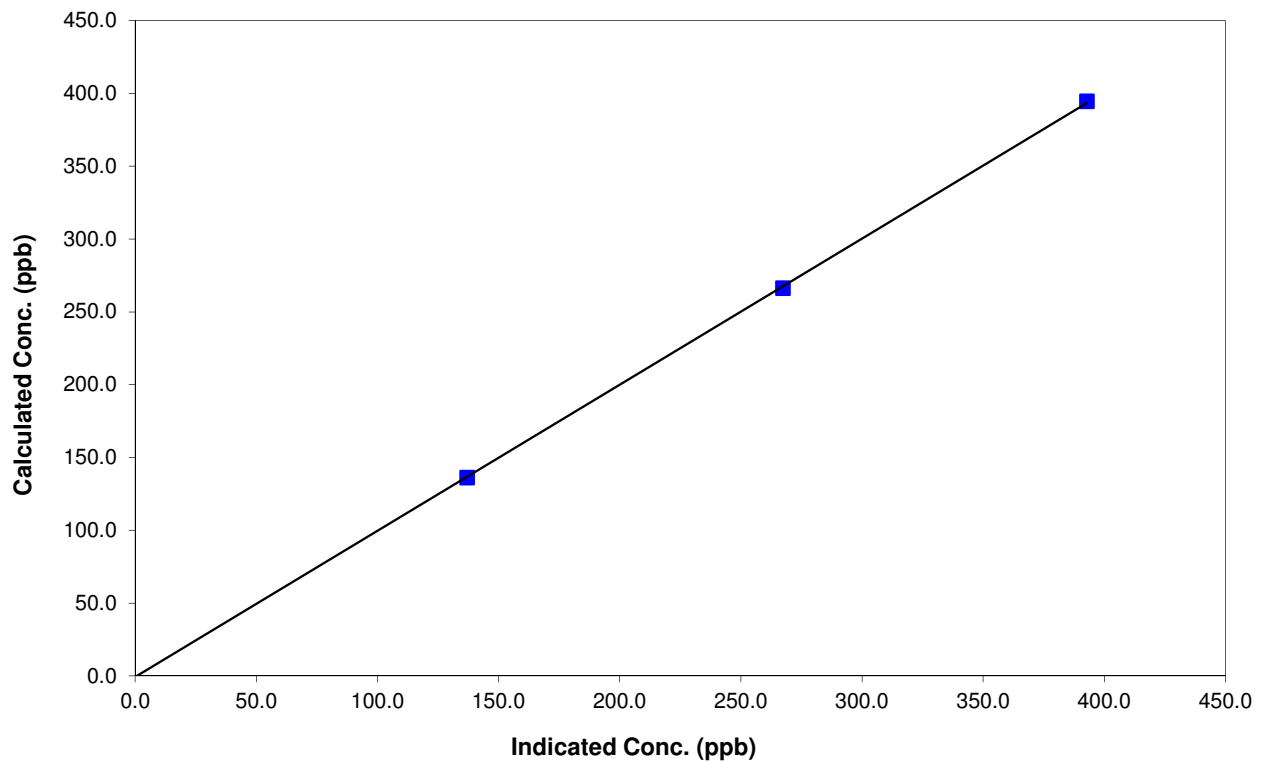
### Station Information

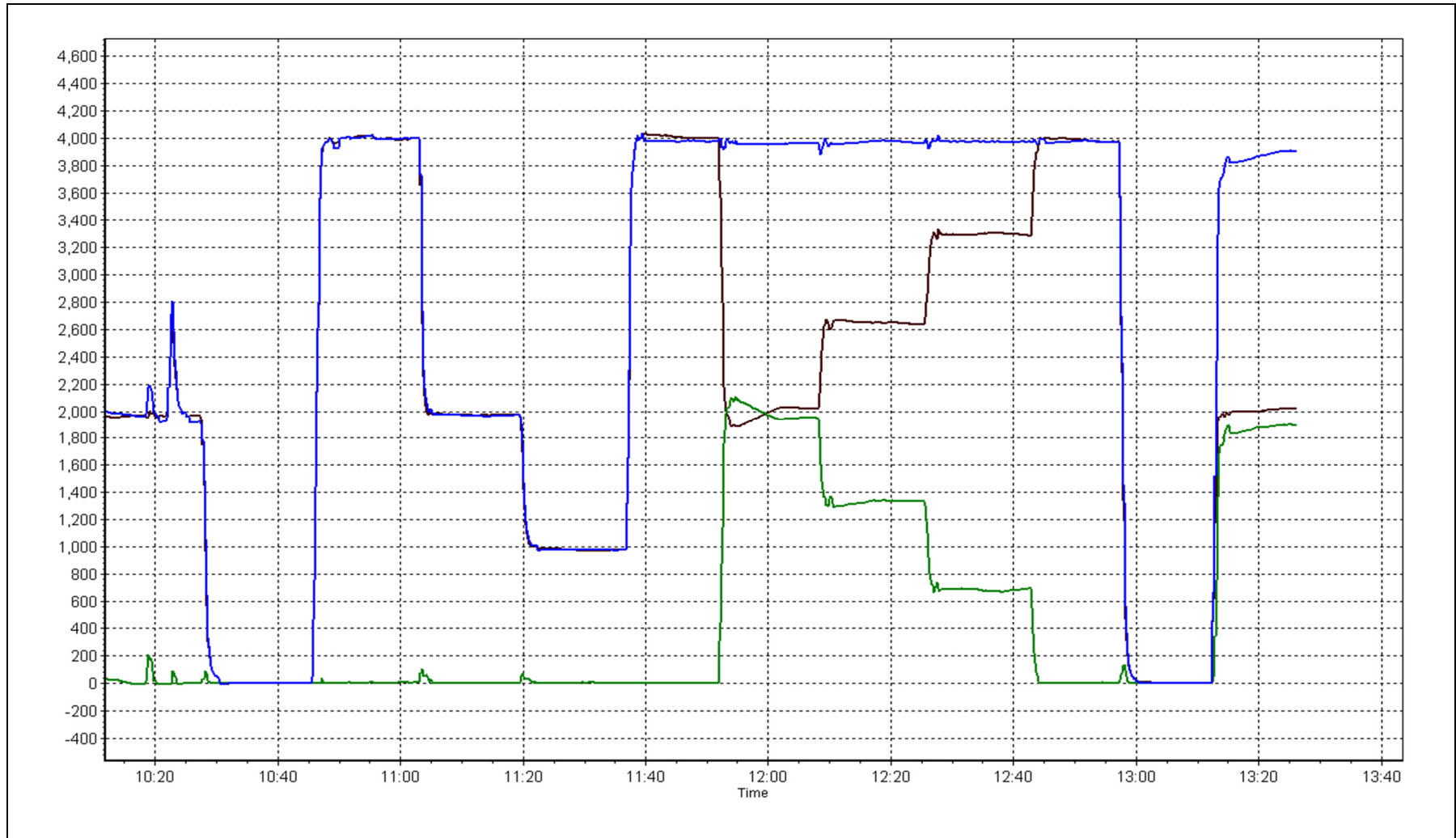
Calibration Date	May 23, 2014	Previous Calibration	
Station Number	Anzac	Station Number	AMS 14
Start Time (MST)	10:28	End Time (MST)	13:30
Analyzer make	T200	Analyzer serial #	837

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	N/A	Correlation Coefficient	0.999949
394.6	392.8	1.0046		
266.2	267.4	0.9955	Slope	1.003327
136.2	137.0	0.9942		
			Intercept	-0.674019

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





**WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS 15  
CNRL HORIZON  
MAY 2014**

Operations and Data Collection by:  
Wood Buffalo Environmental Association  
Fort McMurray, Alberta

QA/QC, Data Validation and Reporting by:  
Aurora Atmospheric Inc.  
Calgary, Alberta

June 27, 2014

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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CNRL HORIZON (AMS 15)  
MAY 2014

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	706	36	38	99.73	36	0	5	0
TRS (ppb) Average	709	34	35	99.87	10	0	1	0
THC (ppm) Average	708	36	36	100.00	4.1	-	2.5	-
NO2 (ppb) Average	708	36	36	100.00	32	0	9	-
NO (ppb) Average	708	36	36	100.00	46	-	9	-
NOX (ppb) Average	708	36	36	100.00	73	-	18	-
PM2.5 (ug/m3) Average	743	0	1	99.87	36	-	12.3	0
Temperature 2 m (C) Average	744	0	0	100.00	28.7	-	20.9	-
Wind Speed 10 m (km/h) Average	743	0	1	99.87	28	-	-	-
Wind Direction 10 m (deg) Average	743	0	1	99.87	-	-	-	-
Precipitation (mm) Total	718	0	26	96.51	6.1	-	-	-
Relative Humidity (%) Average	744	0	0	100.00	99	-	-	-
Global Solar Radiation (W/m2) Average	744	0	0	100.00	685	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CNRL HORIZON (AMS 15)  
MAY 2014

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	706	0.8	3	-	0	0	0	0	1	1	36
TRS (ppb) Average	709	0.1	0	-	0	0	0	0	0	0	10
THC (ppm) Average	708	2.33	0.2	-	2.1	2.2	2.2	2.2	2.3	2.5	4.1
NO2 (ppb) Average	708	4.1	5	-	0	0	1	2	5	10	32
NO (ppb) Average	708	1.5	4	-	0	0	0	0	1	3	46
NOX (ppb) Average	708	5.6	9	-	0	0	1	2	6	14	73
PM2.5 (ug/m3) Average	743	6.29	3.3	-	1	3.4	4.5	5.5	7.5	10.4	36
Temperature 2 m (C) Average	744	8.49	7	-	-9.6	-0.5	2.7	8.3	13.6	17.8	28.7
Wind Speed 10 m (km/h) Average	743	9.6	5	-	0	4	6	9	13	17	28
Wind Direction 10 m (deg) Average	743	-	-	-	-	-	-	-	-	-	-
Precipitation (mm) Total	718	-	-	96.01	0	0	0	0	0	0.3	6.1
Relative Humidity (%) Average	744	62.4	22	-	20	32	43	62	81	94	99
Global Solar Radiation (W/m2) Average	744	154.8	186	-	0	0	0	72	269	470	685

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CNRL HORIZON (AMS 15)  
MAY 2014

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2	21 May 2014 09:00	21 May 2014 09:00	1	Intermittent unstable operation - baseline drift
SO2	27 May 2014 13:00	27 May 2014 13:00	1	Intermittent unstable operation - baseline drift
TRS	15 May 2014 08:00	15 May 2014 08:00	1	Maintenance - confirm analyzer response to daily QA check
PM2.5	09 May 2014 11:00	09 May 2014 11:00	1	Flow and zero reference checks, sample head cleaning
Wind Speed, Wind Direction	04 May 2014 06:00	04 May 2014 06:00	1	Flatline in sensor output signal
PC	11 May 2014 10:00	12 May 2014 11:00	26	Sensor failure - electrical interference on output signal

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Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 36 ppb on May 14 09:00	Maximum Daily Average: 4.9 ppb on May 14
Minimum Value: 0 ppb on May 3 13:00	Hours of Data: 706
Maximum Diurnal Average: 2.8 ppb at hour 9	Hours of Missing Data: 38
Monthly Average: 0.8 ppb	Hours of Calibration: 36
Minimum Daily Average: 0.1 ppb on May 8	Percent Operational Time: 99.7
Minimum Diurnal Average: 0.2 ppb at hour 4	
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> = 18	

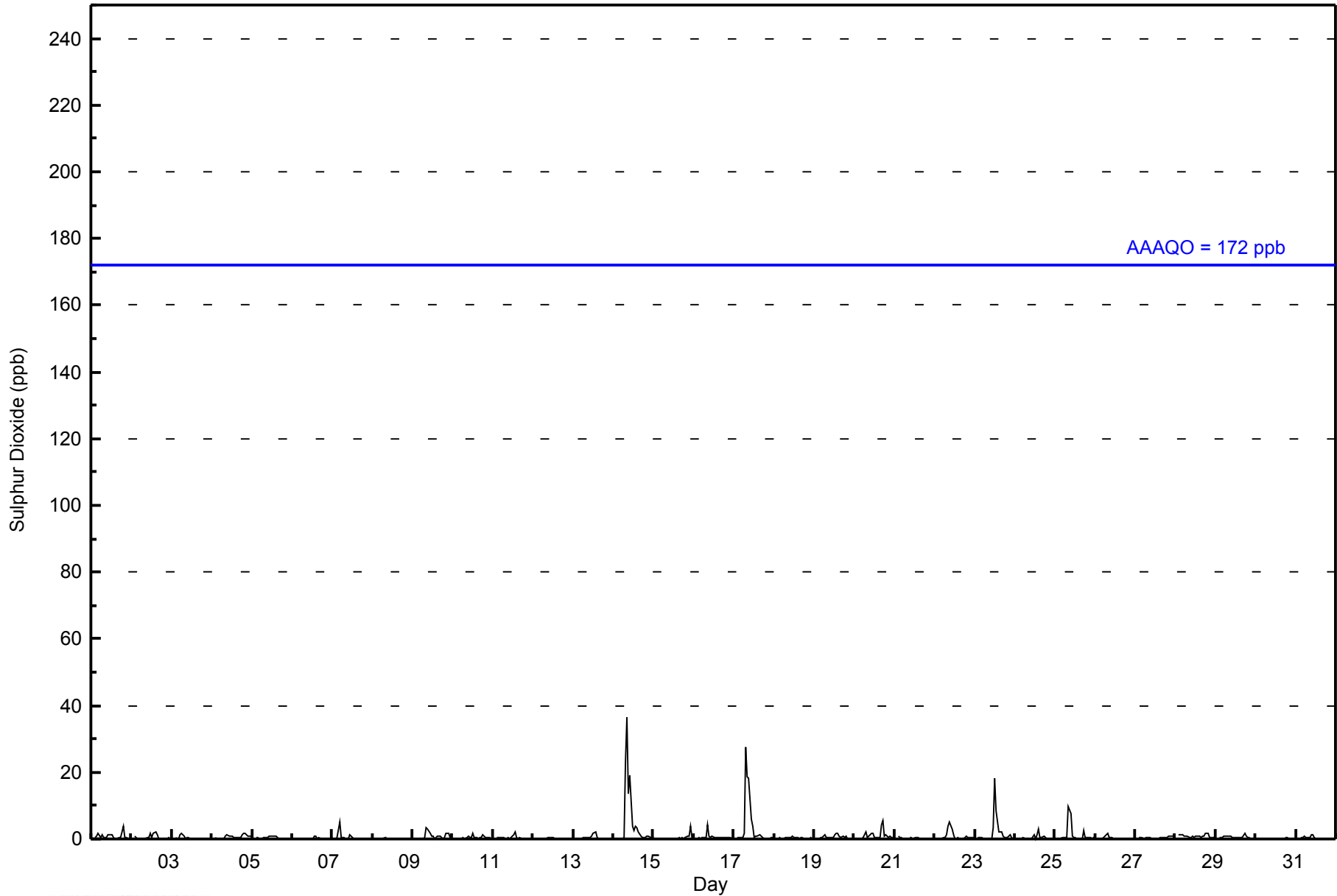
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-May	0	Z	0	1	2	0	1	0	0	0	1	1	1	0	0	0	0	0	2	4	1	0	0	0	0.8	4
2-May	0	Z	1	0	0	0	0	0	0	0	0	2	1	2	2	1	0	0	0	0	0	0	0	0	0.5	2
3-May	0	Z	0	0	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2
4-May	0	Z	0	0	0	0	0	0	1	1	1	1	1	1	0	0	1	1	1	2	2	1	1	1	0.7	2
5-May	1	Z	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0.4	1
6-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0.2	1
7-May	0	Z	0	0	5	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.5	5
8-May	0	Z	0	0	0	0	0	0	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0.1	0
9-May	0	Z	0	0	0	0	0	0	3	3	2	1	1	0	1	1	1	0	0	0	2	2	0	0	0.7	3
10-May	0	Z	0	0	0	0	0	0	0	1	0	0	2	0	0	0	0	0	1	1	0	0	0	0	0.4	2
11-May	0	Z	0	0	0	0	0	0	0	0	0	1	1	2	0	0	0	0	0	0	0	0	0	0	0.3	2
12-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
13-May	0	Z	0	0	0	0	0	0	0	0	0	1	2	2	0	0	0	0	0	0	0	0	0	0	0.3	2
14-May	0	Z	0	0	0	0	0	23	36	14	19	4	2	4	4	2	1	0	0	1	1	1	0	0	4.9	36
15-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	4	0	0.4	4
16-May	1	Z	0	0	0	0	0	0	4	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.5	4
17-May	0	Z	0	0	0	0	2	28	19	18	6	4	1	1	1	1	1	0	0	0	0	0	0	0	3.6	28
18-May	0	Z	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1
19-May	0	Z	0	0	0	0	1	0	0	0	0	1	1	2	2	1	0	1	1	1	0	0	0	0	0.6	2
20-May	0	Z	0	0	0	0	1	2	1	1	2	2	0	0	0	0	4	5	1	1	0	1	0	0	1.1	5
21-May	0	Z	1	0	0	0	0	0	UO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
22-May	0	Z	0	0	0	0	0	1	4	5	3	1	0	0	0	0	0	0	0	1	0	0	0	0	0.8	5
23-May	0	Z	0	0	0	0	0	0	0	0	0	3	18	9	2	2	2	1	0	0	1	1	0	0	1.8	18
24-May	0	Z	0	0	0	0	0	0	0	0	0	1	0	1	3	0	0	1	1	0	0	0	0	0	0.4	3
25-May	0	Z	0	0	0	0	0	1	10	7	1	1	0	0	0	0	0	3	0	0	0	0	0	0	1.1	10
26-May	0	Z	0	0	0	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2
27-May	0	Z	0	0	0	0	0	0	0	0	0	0	UO	0	0	0	0	0	0	1	1	1	1	1	0.4	1
28-May	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	0	0	0	1	0.8	2
29-May	1	Z	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	2	1	0	0	0	0	0	0.6	2
30-May	0	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-May	0	Z	0	0	1	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
	0.2	--	0.3	0.2	0.4	0.3	0.5	2.1	2.8	1.9	1.4	0.9	1.2	1.0	0.7	0.4	0.5	0.6	0.4	0.5	0.4	0.3	0.4	0.2		Diurnal Average
	1	--	1	1	5	1	2	28	36	18	19	4	18	9	4	2	4	5	2	4	2	2	4	1		Diurnal Maximum

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



WBEA  
Hourly Averages

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
CNRL Horizon - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**CNRL Horizon - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	698	98.87	98.87
11 - 20	5	0.71	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: 706

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**CNRL Horizon - May 2014**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	87	124	69	48	17	19	28	32	47	31	27	11	19	33	50	55	697
11 - 20	0	0	1	0	0	2	2	0	0	0	0	0	0	0	0	0	5
21 - 60	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	3
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	87	124	70	48	17	22	31	33	47	31	27	11	19	33	50	55	705

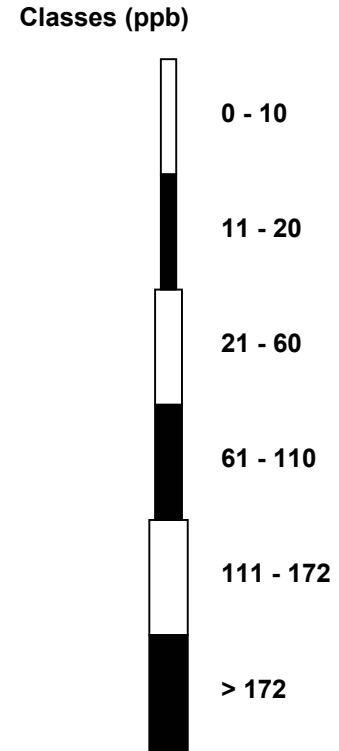
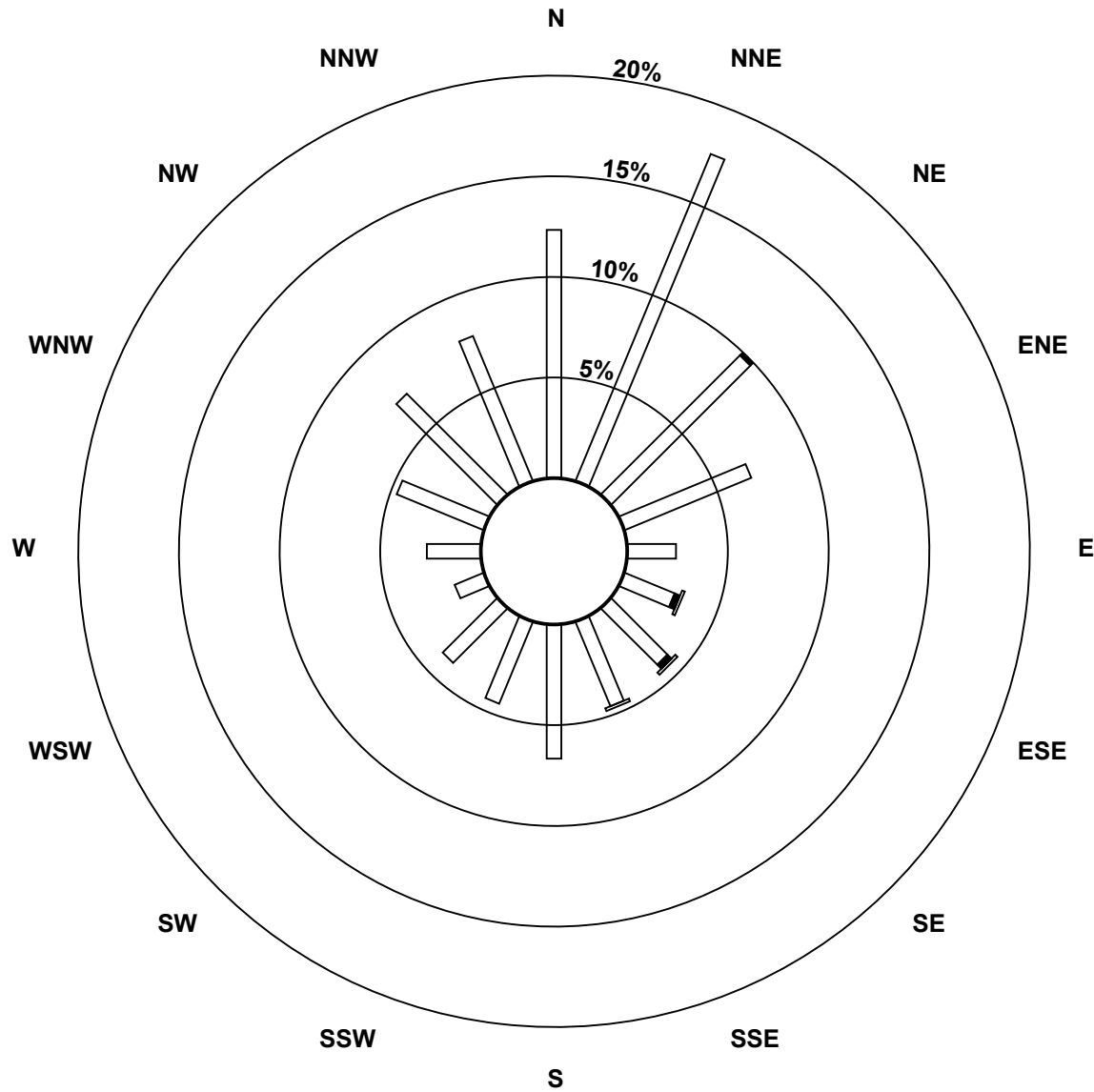
Total Number of Valid Hours: 705

Total Number of Hours: 744



**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
CNRL Horizon (AMS 15)**

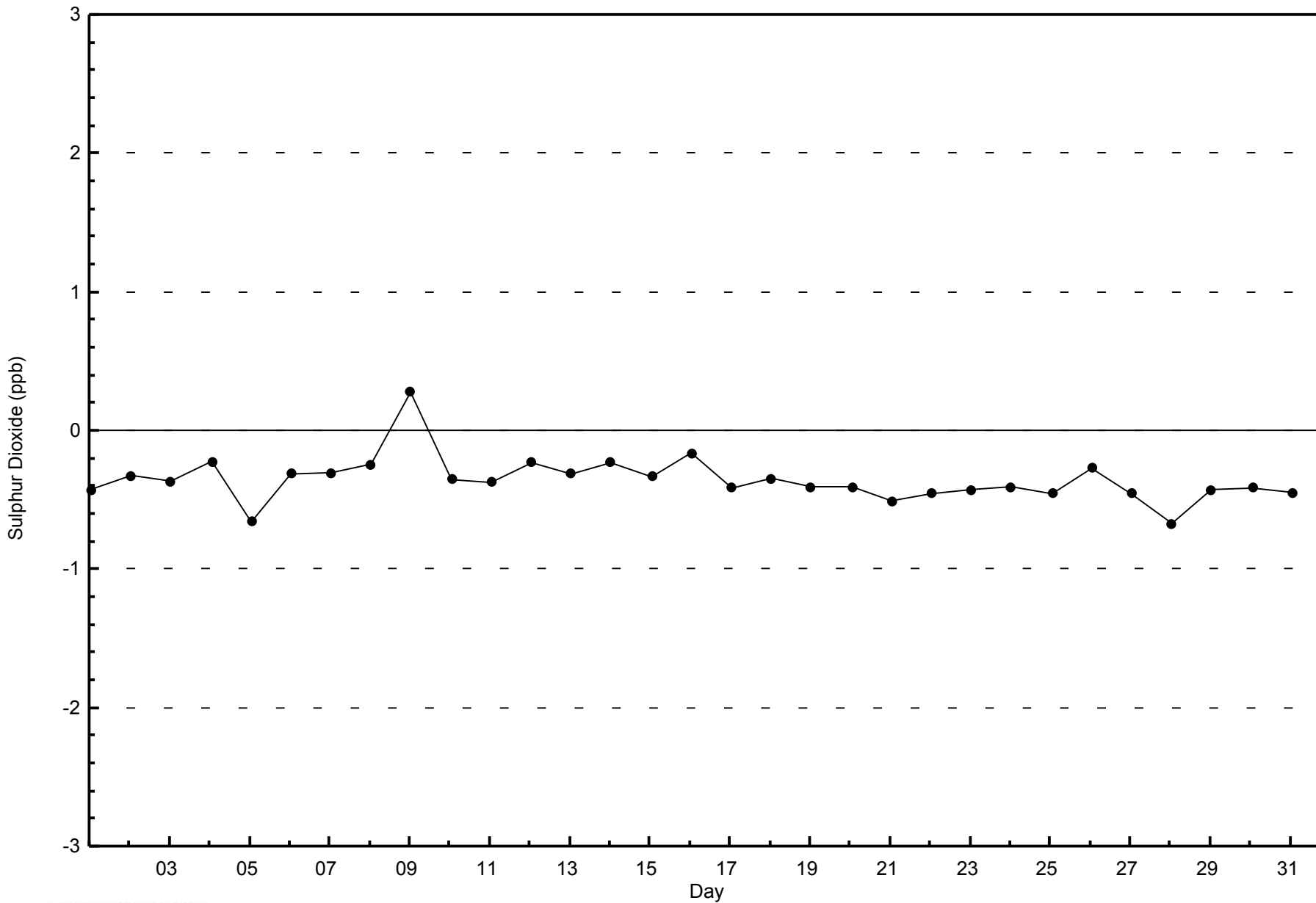


**Total Number of Valid Hours: 705**



WBEA  
Zero Responses

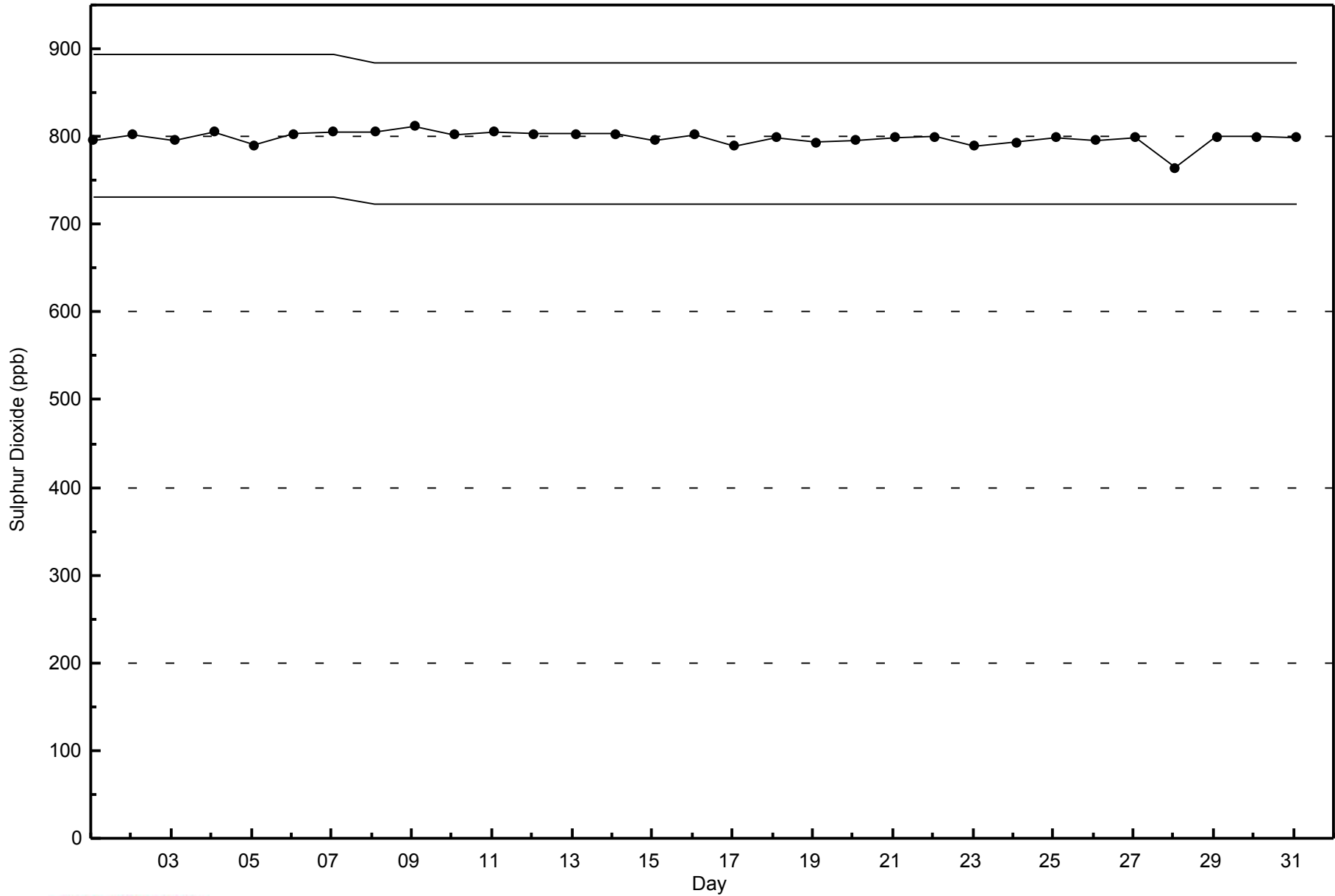
Sulphur Dioxide (SO<sub>2</sub>) - ppb  
CNRL Horizon - May 2014





WBEA  
Span Responses

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
CNRL Horizon - May 2014





Summary of Hour Averages

CNRL Horizon - May 2014

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 10 ppb on May 7 01:00	Maximum Daily Average: 0.6 ppb on May 7		Hours of Data:	709
Minimum Value: 0 ppb on May 3 01:00	Minimum Daily Average: 0.0 ppb on May 11		Hours of Missing Data:	35
Maximum Diurnal Average: 0.9 ppb at hour 3	Minimum Diurnal Average: 0.1 ppb at hour 17		Hours of Calibration:	34
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-May	0	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-May	0	0	Z	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-May	0	0	Z	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-May	0	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
5-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
6-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5	0.4	5
7-May	10	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	10
8-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
9-May	0	0	Z	0	0	0	0	0	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
10-May	0	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
11-May	0	0	Z	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-May	0	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-May	0	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-May	0	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-May	0	0	Z	0	0	0	0	M	1	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0.4	1
16-May	0	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
17-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
18-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
19-May	0	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-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
21-May	0	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
22-May	0	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
23-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
24-May	0	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-May	0	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
26-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
27-May	0	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
28-May	0	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
29-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
30-May	0	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-May	0	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

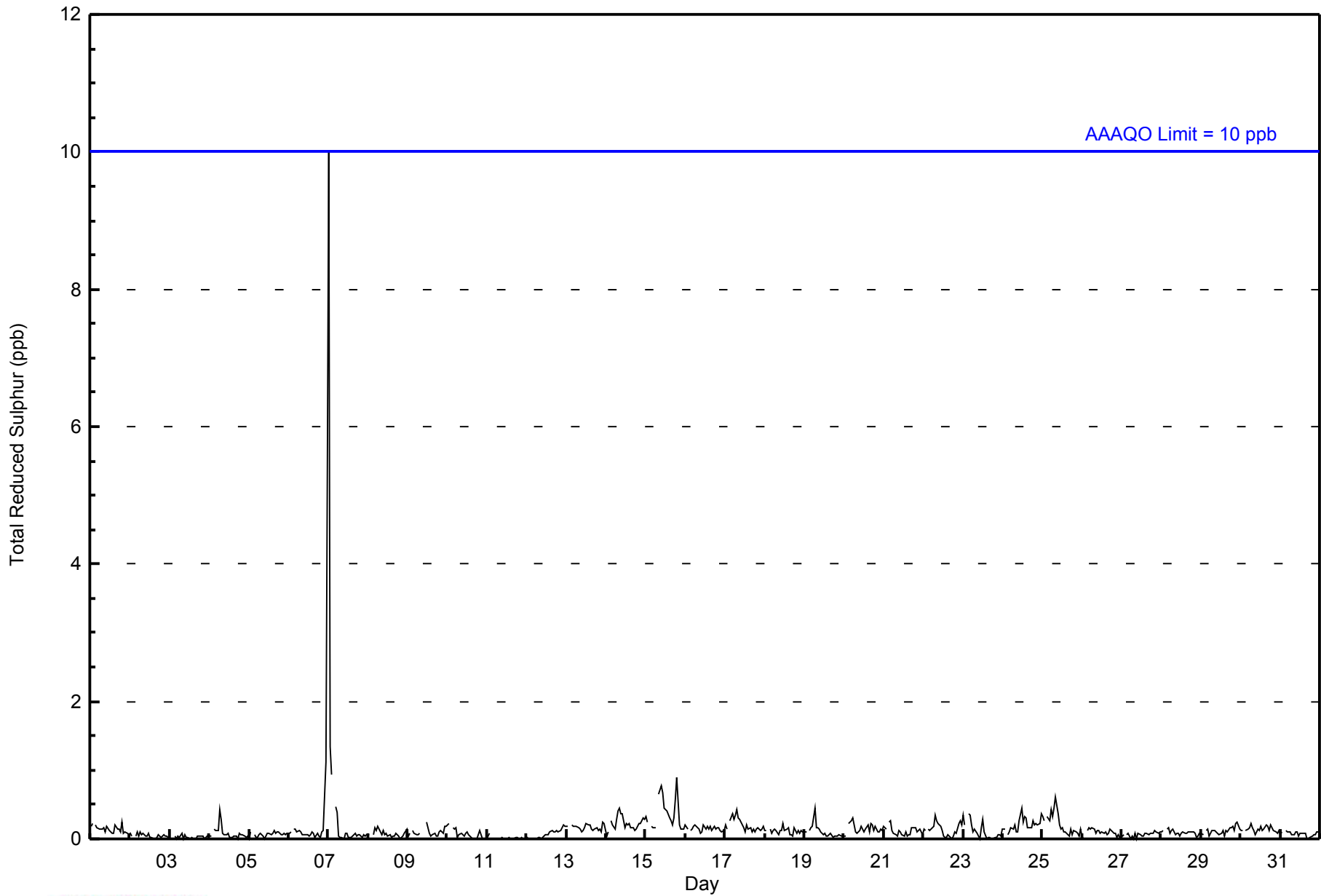
0.4	0.2	0.9	0.1	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3	Diurnal Average
10	1	1	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	1	1	0	0	1	5	Diurnal Maximum	

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



WBEA  
Hourly Averages

Total Reduced Sulphur (TRS) - ppb  
CNRL Horizon - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb**  
**CNRL Horizon - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	707	99.72	99.72
3 - 4	0	0.00	99.72
5 - 7	1	0.14	99.86
8 - 11	1	0.14	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb**  
**CNRL Horizon - May 2014**

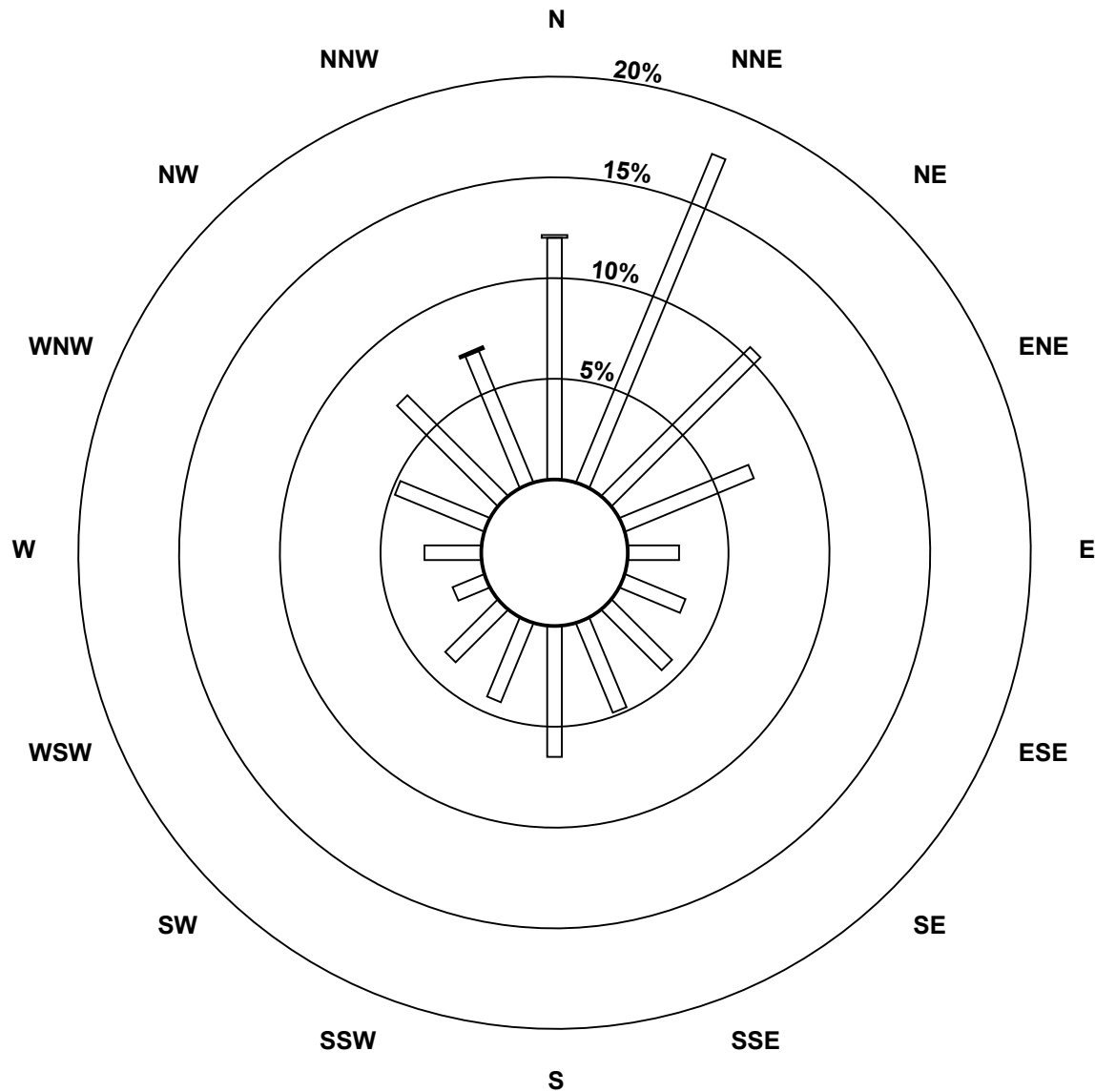
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	85	125	74	49	18	23	30	34	46	30	26	12	20	34	50	50	706
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	86	125	74	49	18	23	30	34	46	30	26	12	20	34	50	51	708

Total Number of Valid Hours: 708

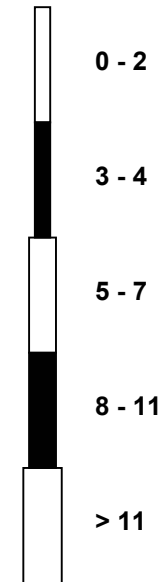
Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Total Reduced Sulphur (TRS) - ppb  
CNRL Horizon (AMS 15)**



Classes (ppb)



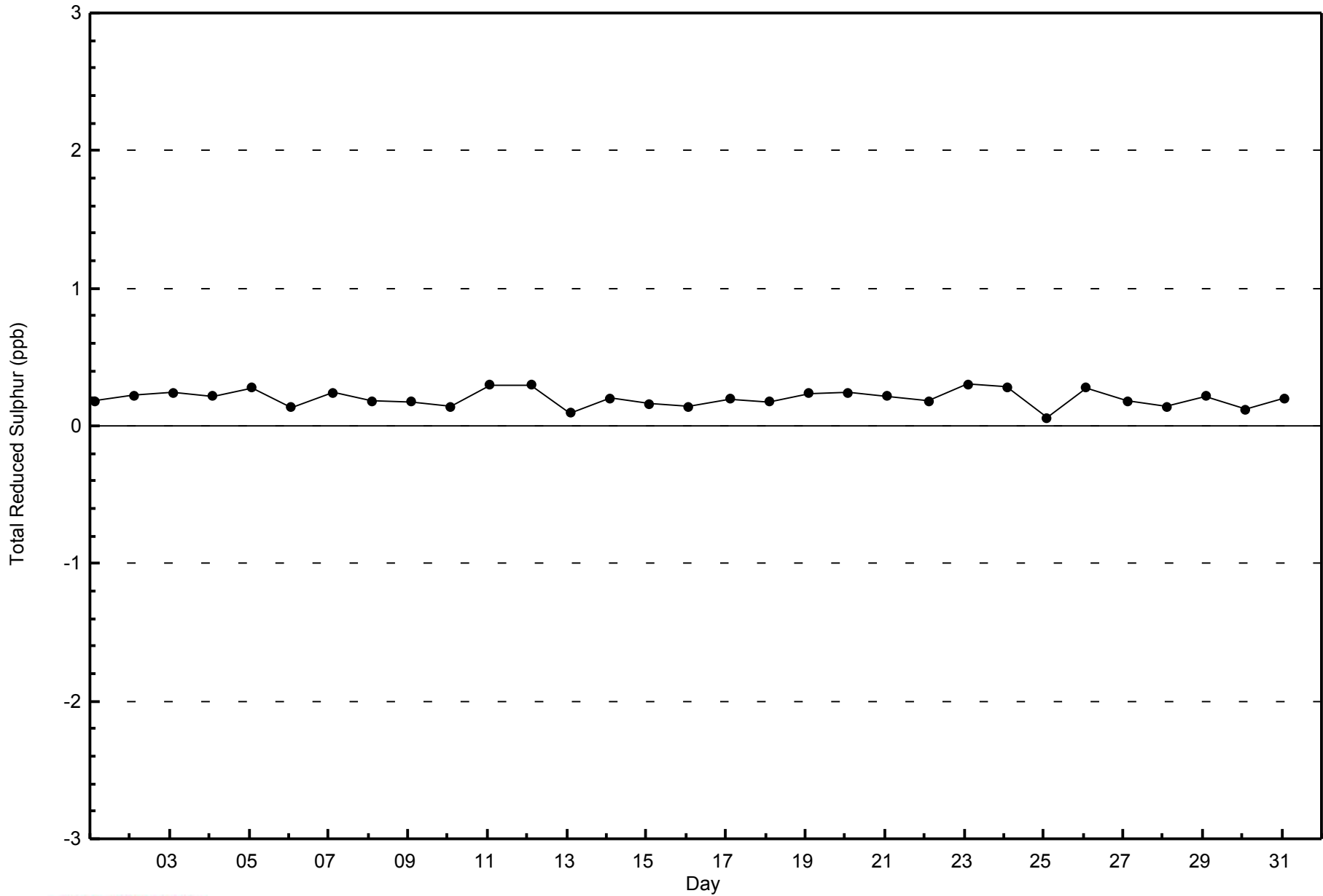
Total Number of Valid Hours: 708





WBEA  
Zero Responses

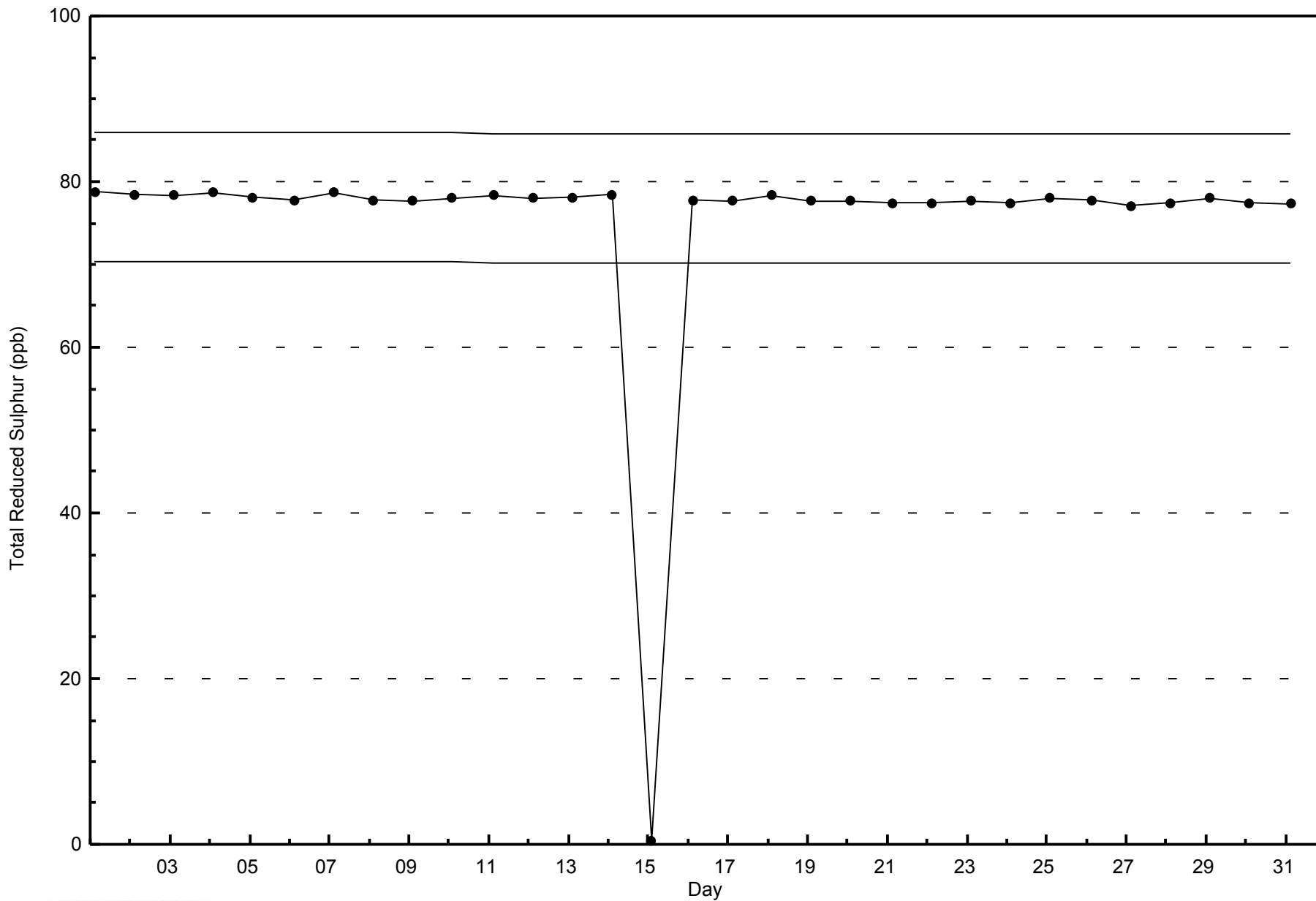
Total Reduced Sulphur (TRS) - ppb  
CNRL Horizon - May 2014





WBEA  
Span Responses

Total Reduced Sulphur (TRS) - ppb  
CNRL Horizon - May 2014



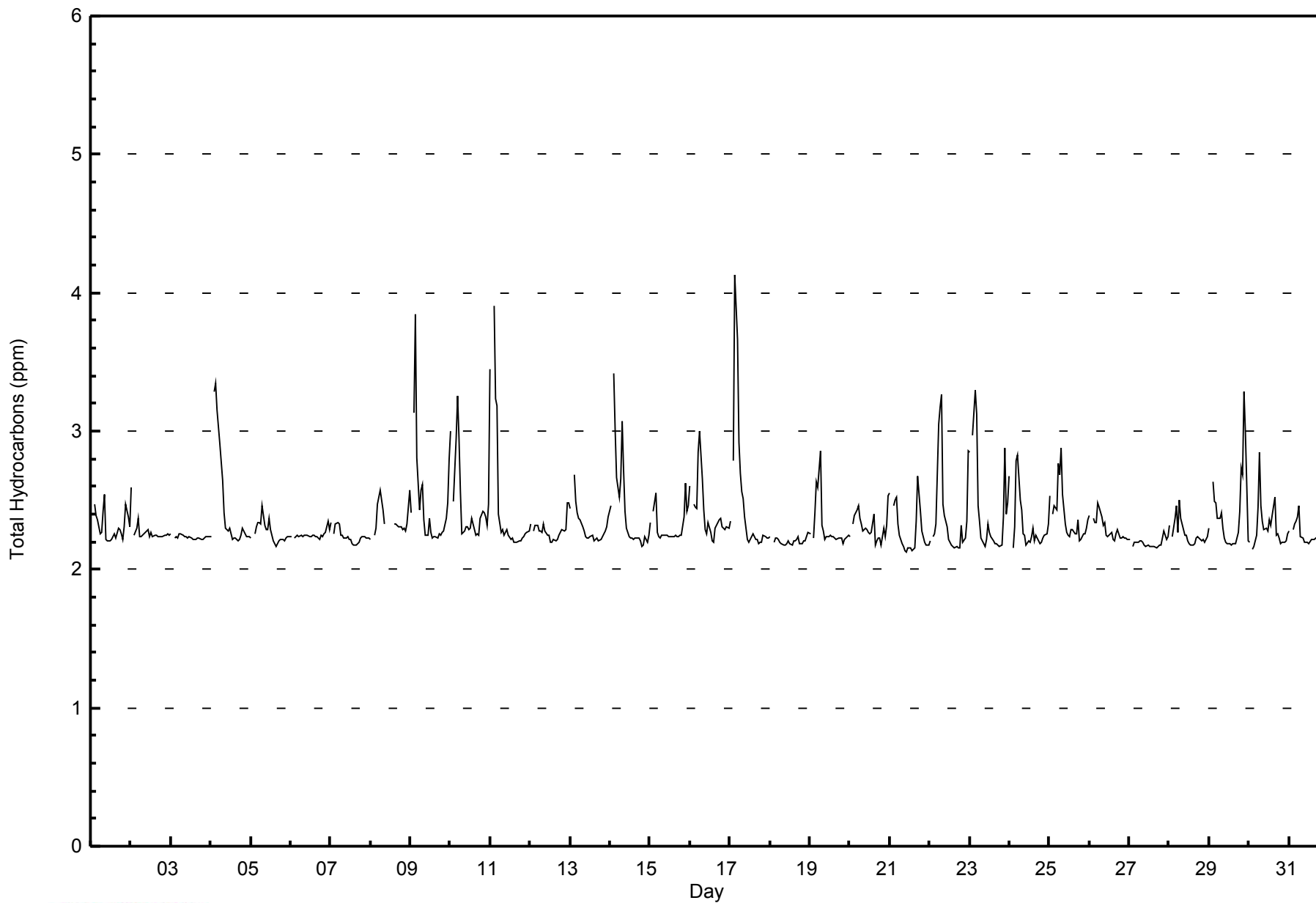


Maximum Value: 4.1 ppm on May 17 04:00																	Maximum Daily Average: 2.5 ppm on May 17										Hours in Service: 744	
Minimum Value: 2.1 ppm on May 21 11:00																	Minimum Daily Average: 2.2 ppm on May 27										Hours of Data: 708	
Maximum Diurnal Average: 2.6 ppm at hour 4																	Minimum Diurnal Average: 2.2 ppm at hour 16										Hours of Missing Data: 36	
Monthly Average: 2.33 ppm																	Percentiles: P <sub>1</sub> = 2.2 P <sub>10</sub> = 2.2 Q <sub>1</sub> = 2.2 Median = 2.2 Q <sub>3</sub> = 2.3 P <sub>90</sub> = 2.5 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-May	3.0	Z	2.5	2.4	2.4	2.3	2.3	2.4	2.5	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.3	2.3	2.3	2.2	2.3	2.5	2.4	2.3	2.3	3.0		
2-May	2.6	Z	2.3	2.3	2.4	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.6		
3-May	2.3	Z	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3		
4-May	2.2	Z	3.3	3.3	3.2	2.9	2.8	2.6	2.4	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	3.3		
5-May	2.2	Z	2.3	2.3	2.3	2.3	2.3	2.5	2.3	2.3	2.3	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	2.5		
6-May	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3		
7-May	2.3	Z	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3		
8-May	2.2	Z	2.2	2.3	2.5	2.5	2.6	2.4	2.3	C	C	C	C	C	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.6	2.6			
9-May	2.4	Z	3.1	3.8	2.8	2.4	2.6	2.6	2.4	2.2	2.3	2.4	2.3	2.2	2.2	2.2	2.2	2.3	2.2	2.3	2.3	2.4	2.5	2.8	3.8			
10-May	3.0	Z	2.5	3.0	3.3	3.0	2.6	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.3	2.2	2.3	2.3	2.4	2.4	2.4	2.4	2.3	2.5	3.3			
11-May	3.4	Z	3.9	3.2	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	2.3	2.3	2.3	3.9			
12-May	2.3	Z	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.5	2.5	2.5			
13-May	2.4	Z	2.7	2.5	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	2.2	2.2	2.3	2.3	2.3	2.4	2.7			
14-May	2.5	Z	3.4	3.0	2.7	2.5	2.7	3.1	2.7	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	3.4			
15-May	2.3	Z	2.4	2.6	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	2.4	2.6	2.4	2.6			
16-May	2.6	Z	2.5	2.5	2.4	2.9	3.0	2.7	2.4	2.3	2.3	2.3	2.3	2.2	2.2	2.3	2.3	2.4	2.4	2.3	2.3	2.3	2.3	2.3	3.0			
17-May	2.4	Z	2.8	4.1	3.7	2.9	2.7	2.6	2.5	2.4	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	4.1			
18-May	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3			
19-May	2.3	Z	2.2	2.4	2.6	2.6	2.9	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.9			
20-May	2.2	Z	2.3	2.4	2.4	2.5	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.3	2.5	2.5			
21-May	2.6	Z	2.5	2.5	2.5	2.3	2.3	2.2	2.2	2.1	2.1	2.2	2.2	2.1	2.1	2.2	2.3	2.7	2.4	2.3	2.2	2.2	2.2	2.2	2.7			
22-May	2.2	Z	2.2	2.3	2.3	3.1	3.2	3.3	2.5	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.4	2.9	3.3			
23-May	2.8	Z	3.0	3.3	3.1	2.5	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4	2.9	2.4	2.5	3.3			
24-May	2.7	Z	2.2	2.3	2.8	2.8	2.5	2.4	2.3	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	2.3	2.8			
25-May	2.5	Z	2.4	2.5	2.4	2.8	2.7	2.9	2.5	2.3	2.3	2.3	2.2	2.3	2.3	2.3	2.3	2.4	2.2	2.2	2.3	2.3	2.3	2.4	2.9			
26-May	2.4	Z	2.4	2.3	2.3	2.5	2.5	2.4	2.3	2.3	2.3	2.2	2.2	2.3	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.5			
27-May	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.3			
28-May	2.3	Z	2.2	2.4	2.5	2.3	2.5	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.5			
29-May	2.3	Z	2.6	2.5	2.5	2.4	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.7	2.7	3.3	3.0	2.2	3.3			
30-May	2.2	Z	2.1	2.2	2.2	2.5	2.8	2.5	2.3	2.3	2.3	2.3	2.4	2.3	2.4	2.5	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.3	2.8			
31-May	2.3	Z	2.3	2.3	2.3	2.4	2.5	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.5			
																								Diurnal Average				
																								Diurnal Maximum				
Z - zerospan C - Calibration																												



**WBEA**  
**Hourly Averages**

**Total Hydrocarbons (THC) - ppm**  
**CNRL Horizon - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**CNRL Horizon - May 2014**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	0	0.00	0.00
2.1 - 3.0	688	97.18	97.18
3.1 - 10.0	20	2.82	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**CNRL Horizon - May 2014**

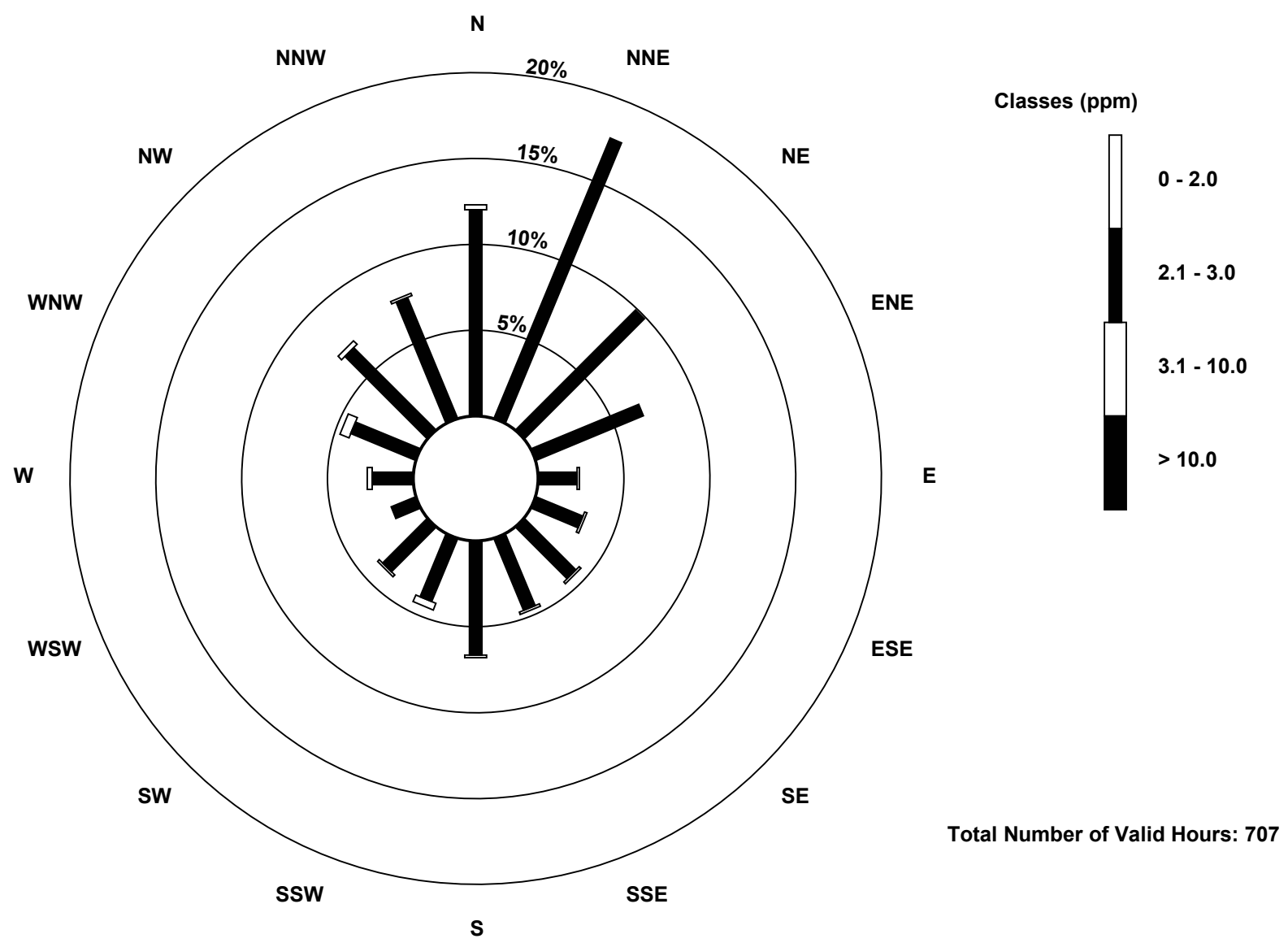
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.1 - 3.0	85	125	70	48	16	21	30	32	47	28	26	11	17	29	48	54	687
3.1 - 10.0	2	0	0	0	1	1	1	1	1	3	1	0	2	4	2	1	20
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	87	125	70	48	17	22	31	33	48	31	27	11	19	33	50	55	707

Total Number of Valid Hours: 707

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

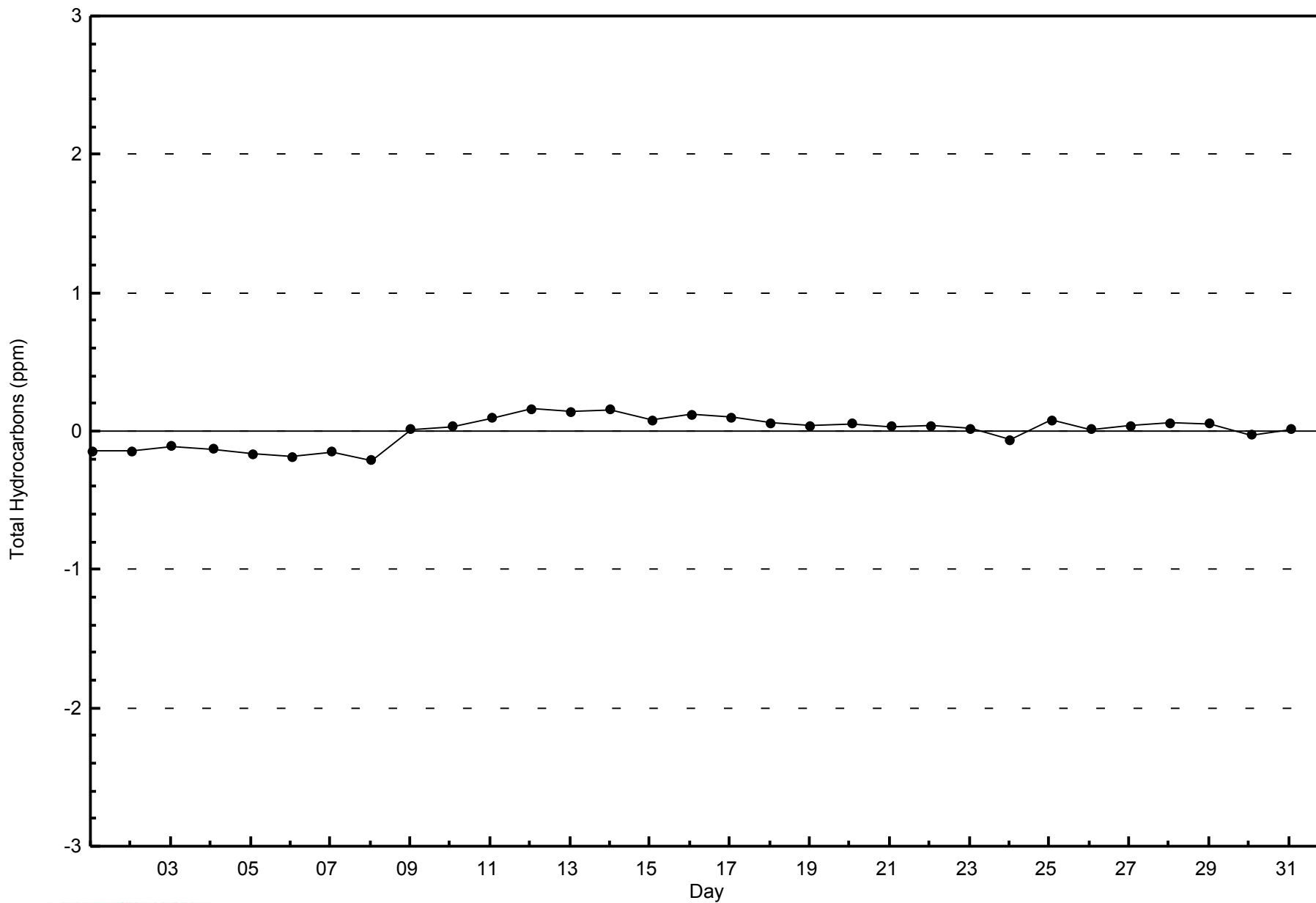
**Total Hydrocarbons (THC) - ppm  
CNRL Horizon (AMS 15)**





WBEA  
Zero Responses

Total Hydrocarbons (THC) - ppm  
CNRL Horizon - May 2014

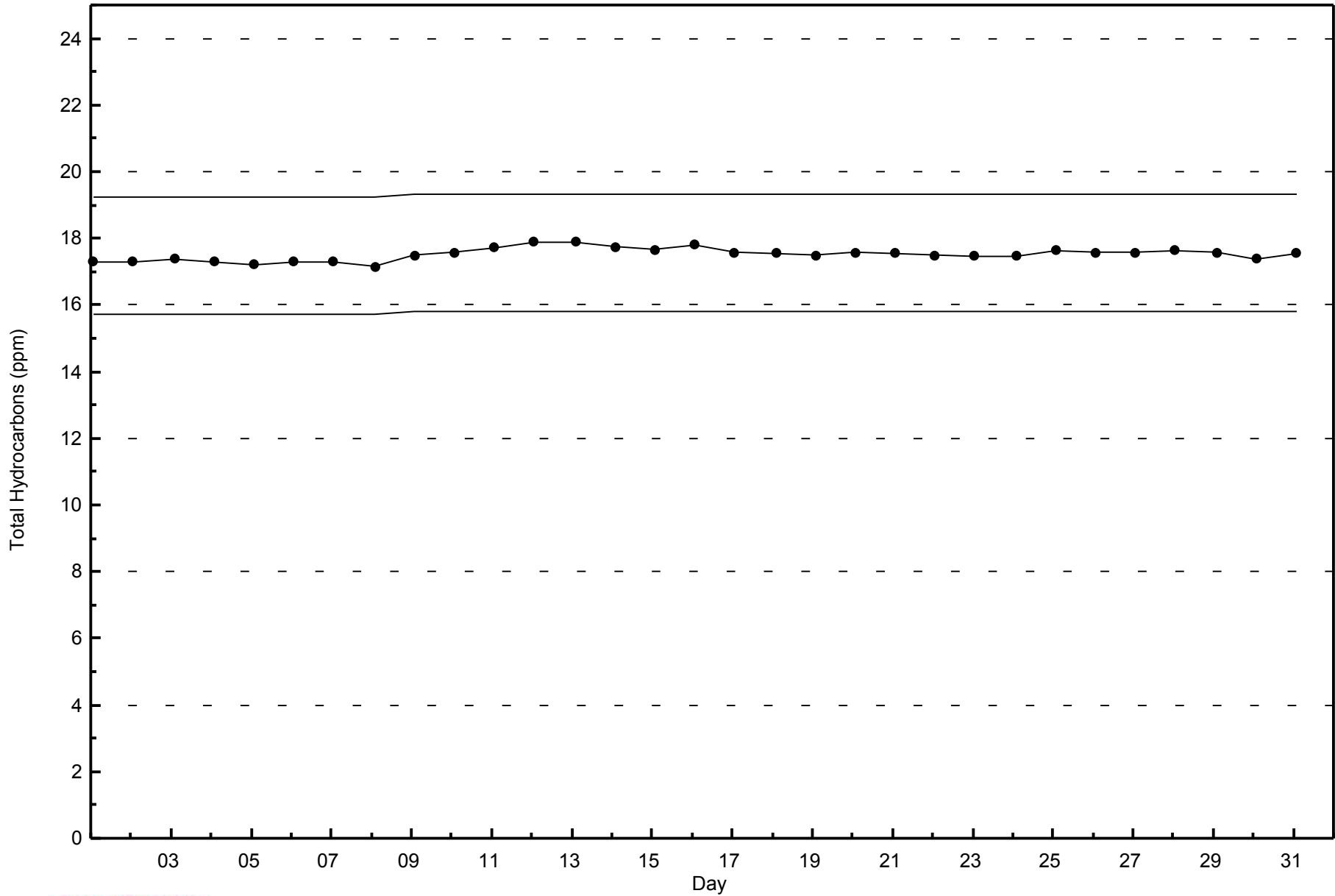






WBEA  
Span Responses

Total Hydrocarbons (THC) - ppm  
CNRL Horizon - May 2014



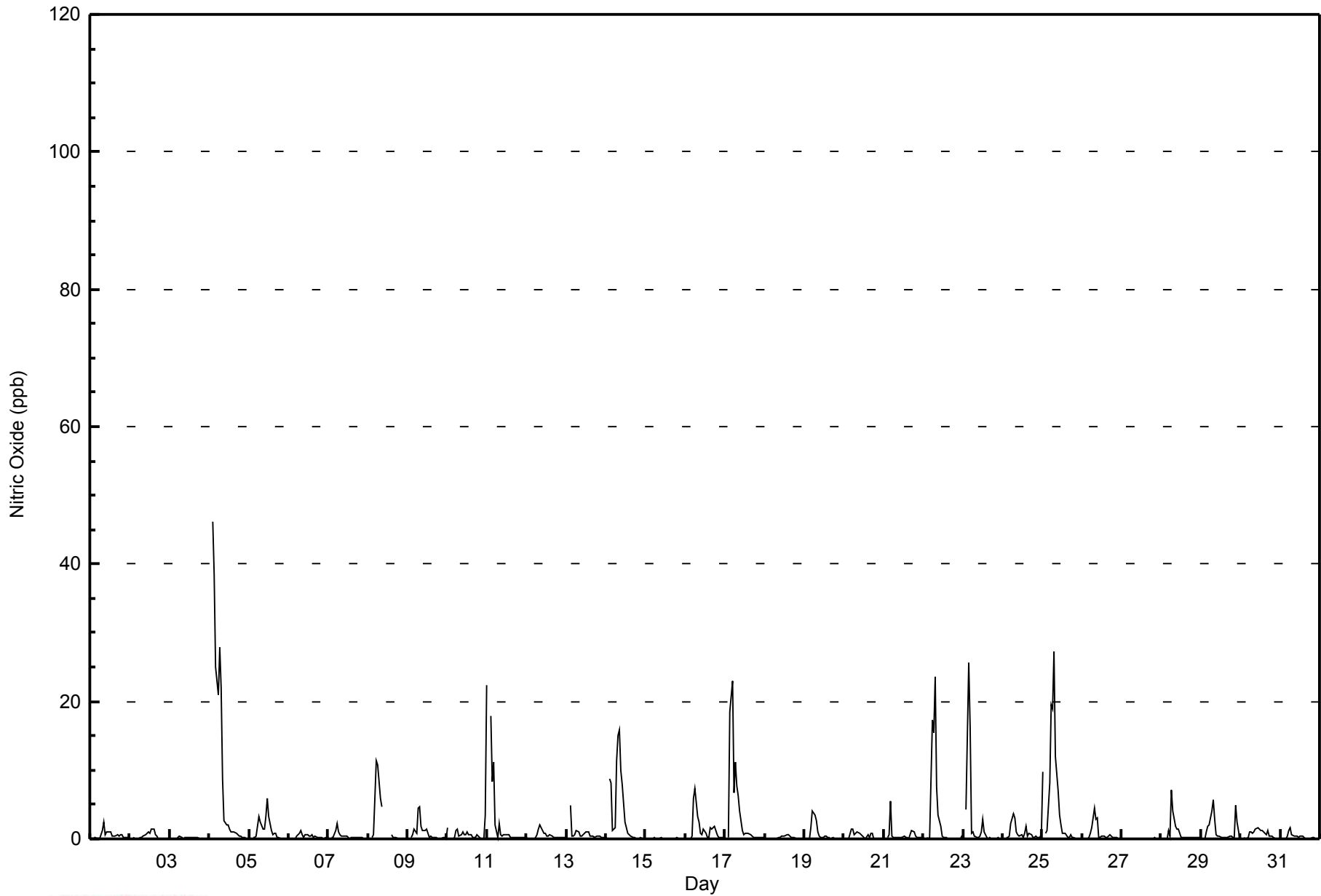


Maximum Value: 46 ppb on May 4 03:00														Maximum Daily Average: 8.8 ppb on May 4														Hours in Service: 744			
Minimum Value: 0 ppb on May 8 22:00														Minimum Daily Average: 0.0 ppb on May 27														Hours of Data: 708			
Maximum Diurnal Average: 4.6 ppb at hour 8														Minimum Diurnal Average: 0.1 ppb at hour 21														Hours of Missing Data: 36			
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> = 3 P <sub>99</sub> = 23														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-May	3	Z	0	0	0	0	1	1	2	1	1	1	1	0	0	0	1	0	1	1	0	0	0	0	0.7	3					
2-May	0	Z	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0.4	1					
3-May	0	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					
4-May	0	Z	46	38	25	21	28	22	9	3	2	2	1	1	1	1	1	1	0	0	0	0	0	0	8.8	46					
5-May	0	Z	0	0	0	2	3	2	1	1	3	6	3	1	1	1	1	0	0	0	0	0	0	0	1.2	6					
6-May	0	Z	0	0	0	0	1	1	1	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0.3	1					
7-May	0	Z	0	0	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2					
8-May	0	Z	0	1	6	11	11	6	5	C	C	C	C	C	1	0	0	0	0	0	0	0	0	0	2.3	11					
9-May	0	Z	0	1	1	1	5	5	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.9	5					
10-May	2	Z	0	0	0	1	1	0	1	1	1	1	1	1	1	0	0	0	0	1	0	0	0	0	0.6	3					
11-May	22	Z	18	8	11	2	0	2	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	3.0	22					
12-May	0	Z	0	0	0	0	1	1	2	2	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0.5	2					
13-May	0	Z	5	0	0	1	1	1	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.7	5					
14-May	0	Z	9	8	1	2	11	15	16	10	8	2	2	1	1	0	0	0	0	0	0	0	0	0	3.8	16					
15-May	0	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					
16-May	0	Z	0	0	0	6	7	3	2	1	1	1	1	0	0	2	1	2	1	1	0	0	0	0	1.3	7					
17-May	0	Z	0	18	23	7	11	8	6	4	1	1	1	1	1	1	0	0	0	0	0	0	0	0	3.7	23					
18-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0.2	1					
19-May	0	Z	0	0	2	4	3	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	4					
20-May	0	Z	0	0	1	1	1	1	1	1	1	0	0	0	1	0	1	1	0	0	0	0	0	0	0.4	1					
21-May	0	Z	0	1	6	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0.5	6					
22-May	0	Z	0	0	0	17	15	23	8	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	3.1	23					
23-May	0	Z	4	26	16	1	1	0	0	0	1	3	1	0	0	0	0	0	0	0	0	0	0	0	2.4	26					
24-May	0	Z	0	0	0	2	4	3	1	0	1	0	1	2	0	1	1	0	0	0	0	0	1	0	0.8	4					
25-May	10	Z	1	1	8	19	19	27	12	7	4	2	1	1	1	0	0	1	0	0	0	0	0	0	5.0	27					
26-May	0	Z	0	0	0	1	2	4	3	3	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.7	4					
27-May	0	Z	0	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-May	0	Z	0	0	1	0	7	4	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.9	7					
29-May	0	Z	0	1	2	2	4	6	3	1	0	0	0	0	0	0	0	0	0	0	0	5	2	0	1.2	6					
30-May	0	Z	0	0	0	1	1	1	1	1	2	2	1	1	1	1	1	0	0	0	0	0	0	0	0.7	2					
31-May	0	Z	0	0	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2					
		1.3	--	2.7	3.4	3.5	3.5	4.6	4.6	2.6	1.5	1.1	1.0	0.8	0.5	0.5	0.4	0.4	0.3	0.2	0.2	0.1	0.3	0.2	0.2	Diurnal Average					
		22	--	46	38	25	21	28	27	16	10	8	6	3	1	2	2	1	2	1	1	0	5	2	3	Diurnal Maximum					
Z - zerospan		C - Calibration																													



**WBEA**  
**Hourly Averages**

**Nitric Oxide (NO) - ppb**  
**CNRL Horizon - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb**  
**CNRL Horizon - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	697	98.45	98.45
21 - 40	10	1.41	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



**WBEA**  
**Frequency Distribution**

**Nitric Oxide (NO) - ppb**  
**CNRL Horizon - May 2014**

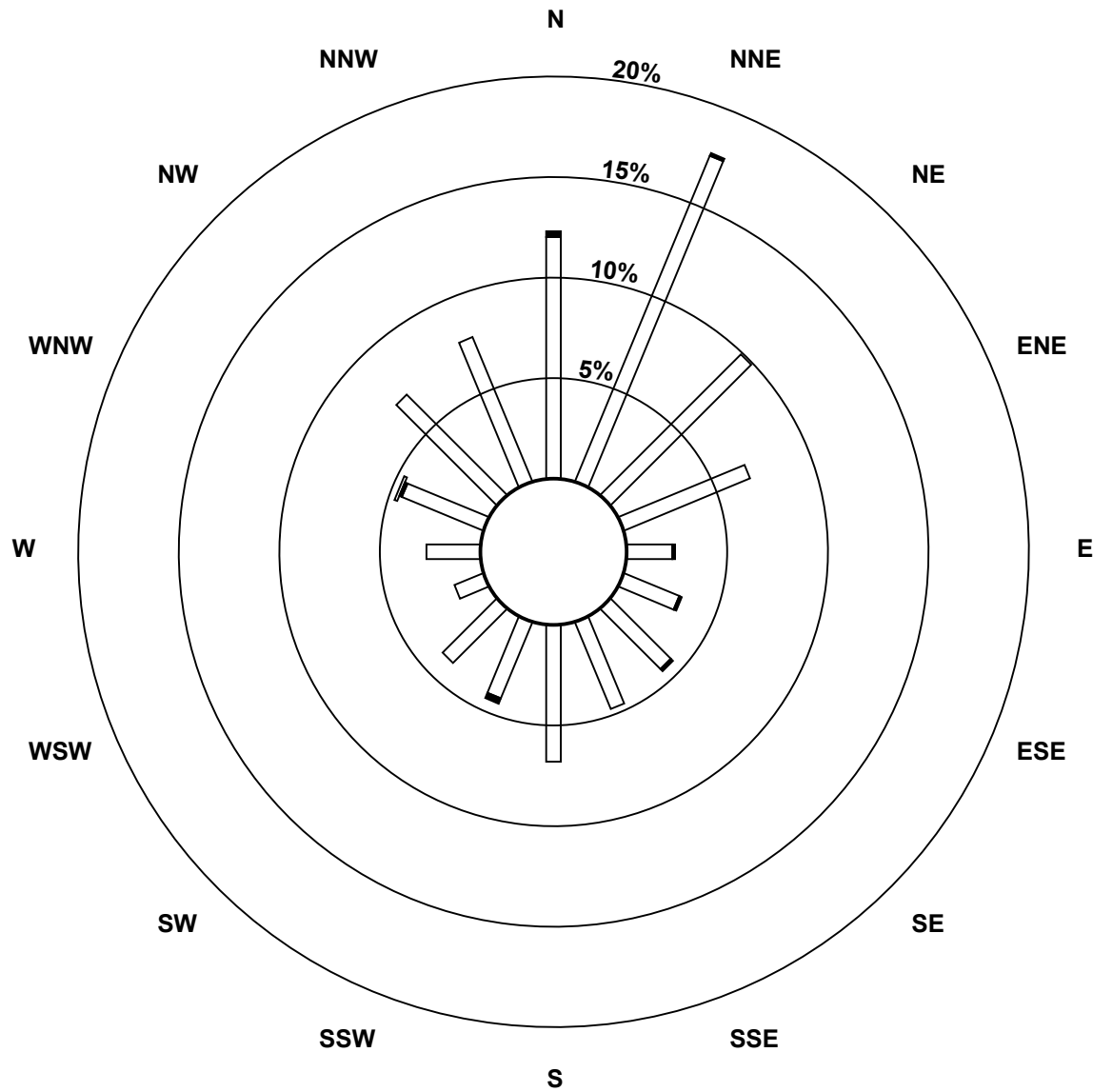
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	85	124	70	48	16	21	30	33	48	29	27	11	19	31	50	55	697
21 - 40	2	1	0	0	1	1	1	0	0	2	0	0	0	1	0	0	9
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	87	125	70	48	17	22	31	33	48	31	27	11	19	33	50	55	707

Total Number of Valid Hours: 707

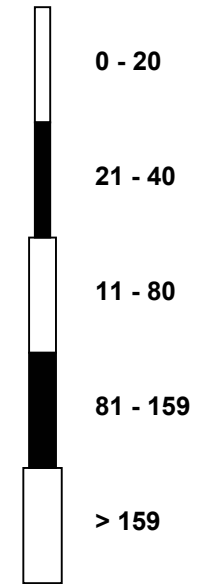
Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Nitric Oxide (NO) - ppb  
CNRL Horizon (AMS 15)**



**Classes (ppb)**

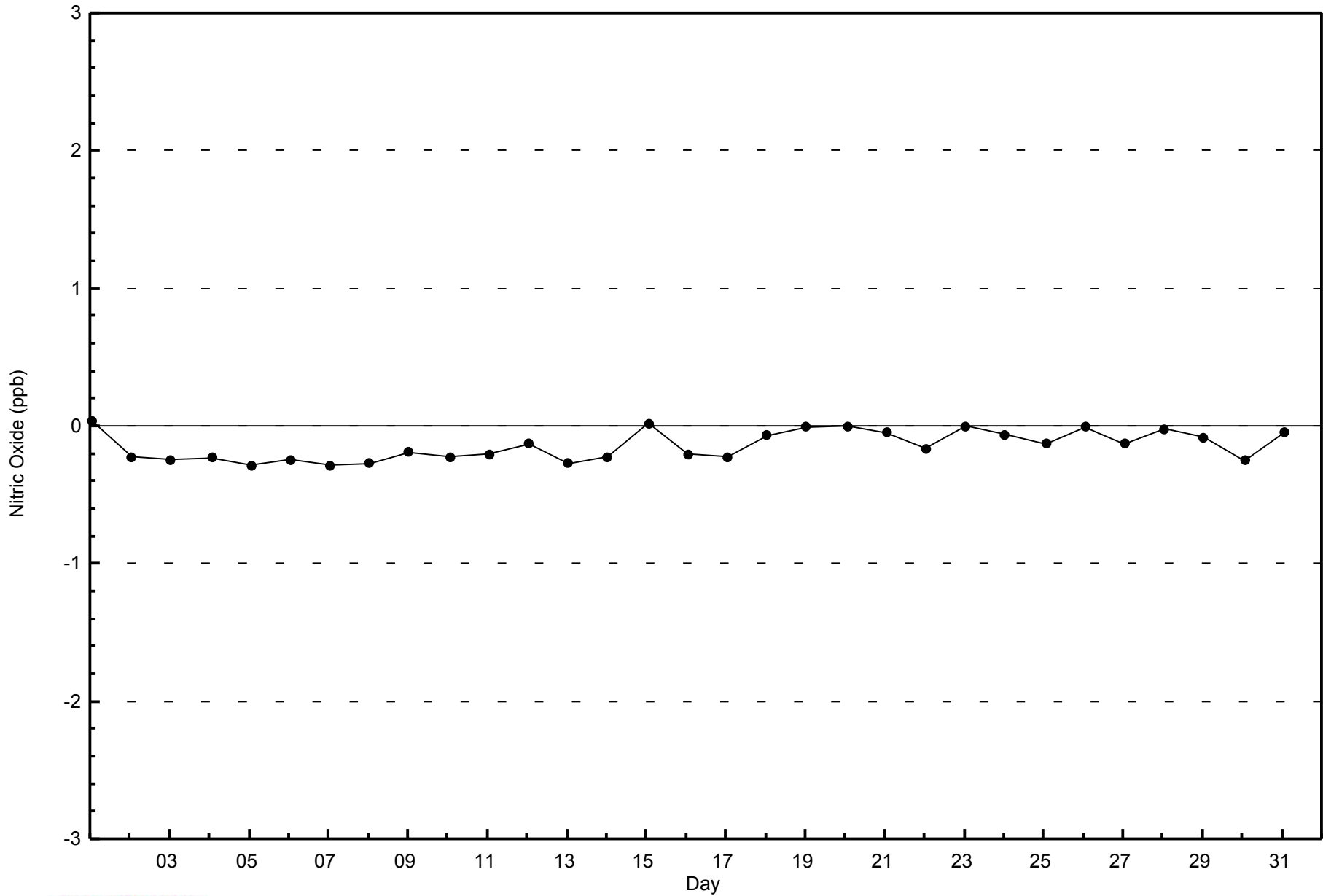


**Total Number of Valid Hours: 707**



WBEA  
Zero Responses

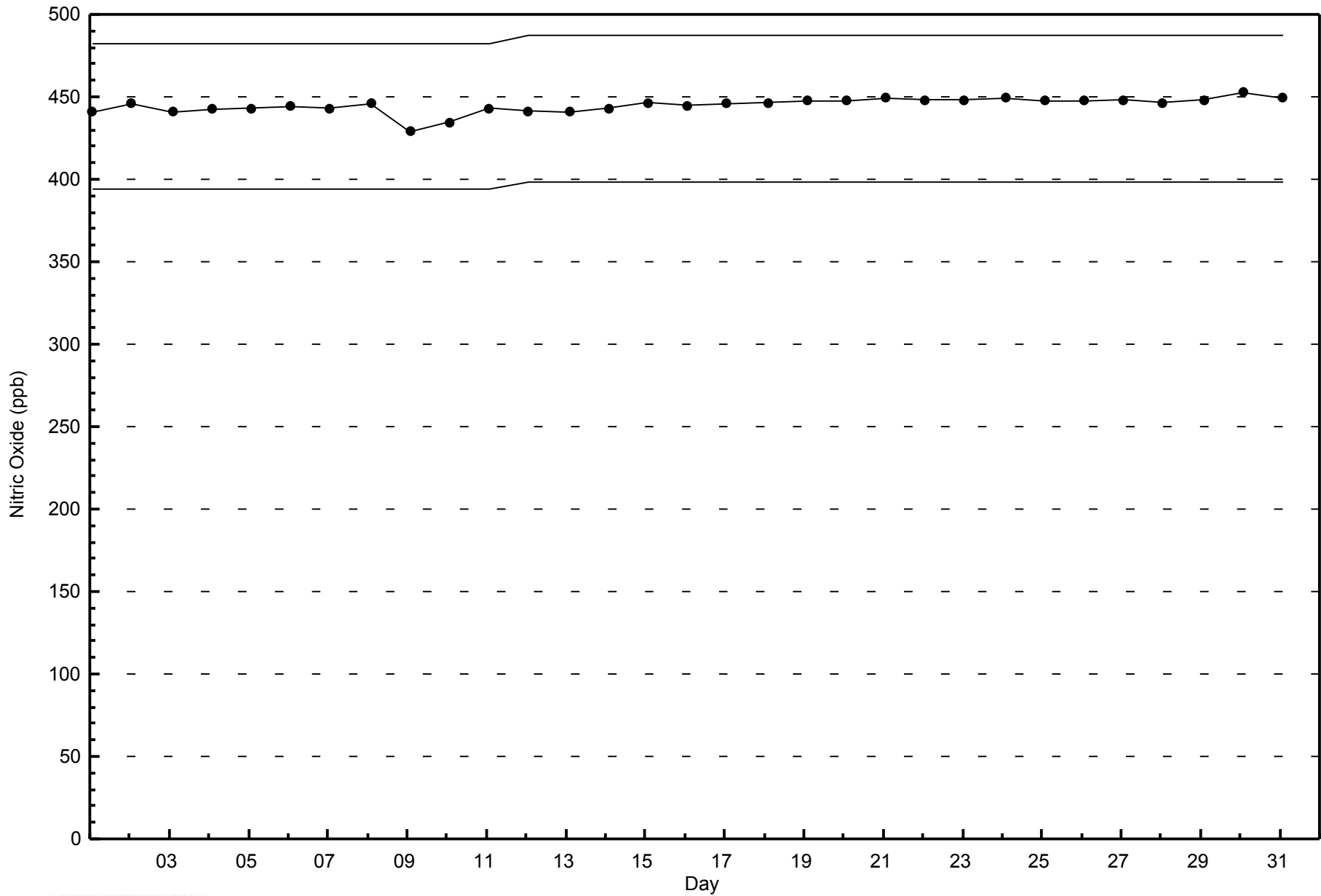
Nitric Oxide (NO) - ppb  
CNRL Horizon - May 2014





WBEA  
Span Responses

Nitric Oxide (NO) - ppb  
CNRL Horizon - May 2014







Wood Buffalo Environmental Association

Summary of Hour Averages

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

CNRL Horizon - May 2014

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 32 ppb on May 17 04:00	Maximum Daily Average: 8.7 ppb on May 4		Hours of Data:	708
Minimum Value: 0 ppb on May 8 18:00	Minimum Daily Average: 0.8 ppb on May 27		Hours of Missing Data:	36
Maximum Diurnal Average: 9.7 ppb at hour 5	Minimum Diurnal Average: 1.2 ppb at hour 16		Hours of Calibration:	36
Monthly Average: 4.1 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> = 26		Percent Operational Time:	100.0

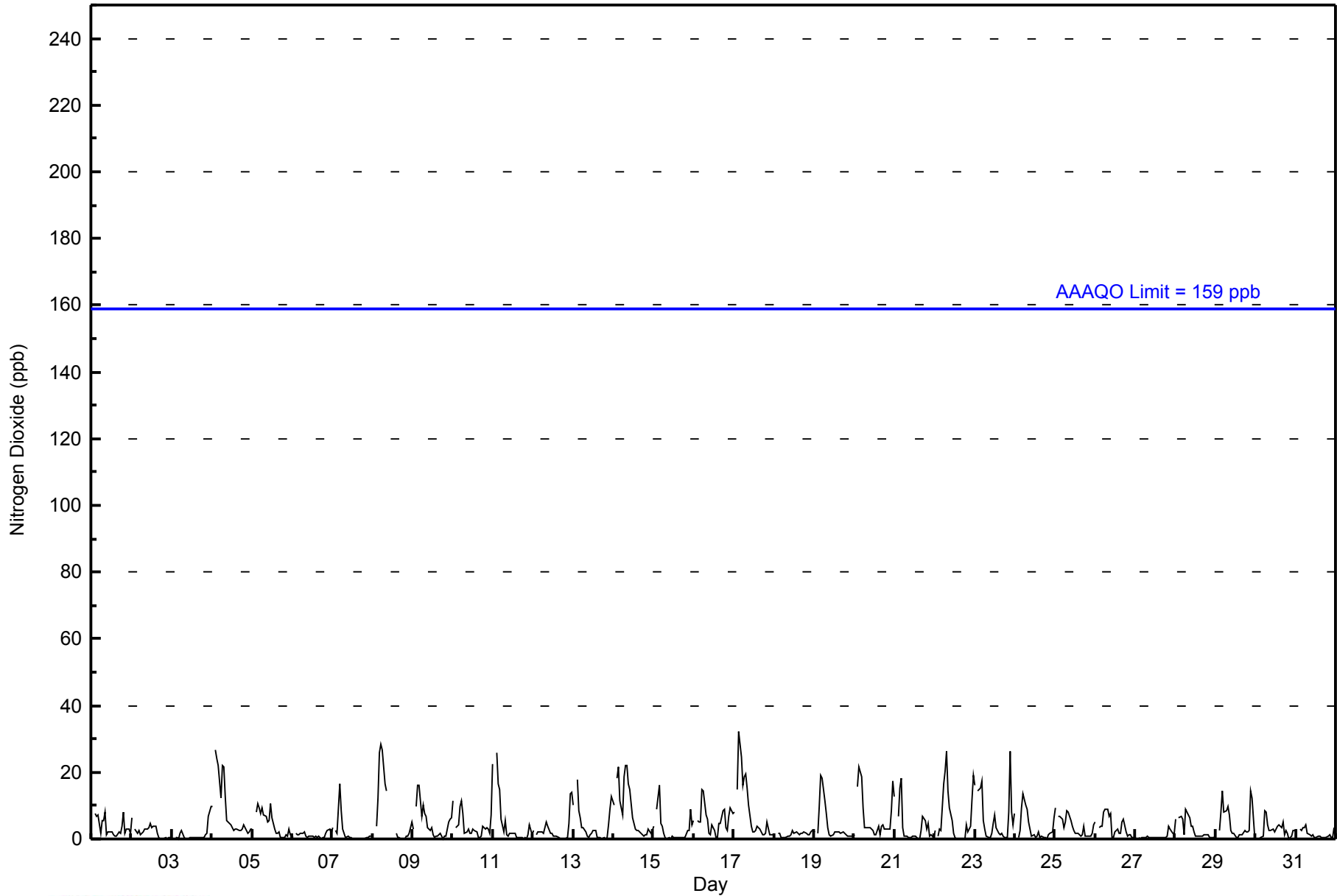
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-May	23	Z	8	7	7	2	6	5	8	1	2	2	2	1	1	1	2	2	4	8	2	3	3	2	4.3	23																							
2-May	7	Z	3	2	3	1	2	2	3	3	4	5	3	4	4	2	1	0	0	0	0	0	1	1	2.1	7																							
3-May	1	Z	1	0	0	2	2	1	0	0	0	0	1	0	0	1	1	0	0	0	1	2	7	10	1.3	10																							
4-May	10	Z	27	24	22	12	22	22	13	6	5	4	3	3	3	3	3	3	3	4	4	2	2	3	8.7	27																							
5-May	3	Z	8	11	9	8	9	7	7	5	6	11	6	3	2	2	2	1	1	1	1	3	1	4.6	11																								
6-May	1	Z	2	1	1	2	2	2	1	1	1	1	1	1	1	1	1	0	0	1	2	3	3	2	1.2	3																							
7-May	3	Z	2	2	17	9	3	2	1	1	1	1	0	0	0	0	0	0	0	0	0	1	1	1	1.9	17																							
8-May	1	Z	4	12	26	28	27	17	15	C	C	C	C	C	2	0	0	0	0	0	1	1	2	5	7.8	28																							
9-May	3	Z	10	16	16	7	10	8	7	4	3	4	1	0	1	1	2	1	0	1	1	5	6	6	4.8	16																							
10-May	11	Z	3	4	10	11	8	2	2	3	2	2	3	3	2	0	1	1	4	3	4	3	2	7	3.9	11																							
11-May	23	Z	26	17	15	6	2	5	1	1	2	2	2	0	1	0	0	0	0	0	1	4	1	1	4.9	26																							
12-May	2	Z	1	2	2	2	2	4	5	4	2	2	1	1	1	1	0	0	0	0	1	5	13	14	2.8	14																							
13-May	10	Z	18	9	6	4	3	2	1	1	1	2	3	2	0	0	1	0	0	0	4	9	13	13	3.9	18																							
14-May	10	Z	18	22	11	7	19	22	22	16	15	6	5	3	3	2	2	1	1	1	1	3	2	2	8.5	22																							
15-May	4	Z	9	16	5	4	2	1	0	0	0	1	1	0	0	1	0	0	0	1	2	9	4	4	2.7	16																							
16-May	5	Z	5	5	5	15	14	7	6	2	1	4	3	1	0	5	5	9	9	4	3	7	9	8	5.7	15																							
17-May	8	Z	15	32	24	16	19	19	15	10	4	2	2	3	4	3	2	1	1	2	5	1	1	1	8.3	32																							
18-May	1	Z	2	2	0	1	0	0	1	1	1	3	2	2	2	1	2	2	2	2	1	1	2	3	1.5	3																							
19-May	2	Z	2	10	19	18	11	8	3	1	1	1	2	2	2	2	2	2	2	1	1	1	1	1	4.1	19																							
20-May	1	Z	16	21	19	9	3	3	3	3	3	2	1	1	4	1	4	4	3	3	3	3	8	18	6.0	21																							
21-May	13	Z	7	15	18	4	1	1	1	1	0	1	1	0	0	0	3	7	5	3	5	1	1	0	3.7	18																							
22-May	2	Z	1	3	3	17	20	26	15	10	6	2	0	0	0	0	0	0	0	4	2	4	12	19	6.4	26																							
23-May	16	Z	15	15	18	6	3	1	1	1	2	5	7	4	2	1	2	1	0	0	8	26	8	4	6.3	26																							
24-May	8	Z	0	3	9	14	10	9	5	3	1	0	1	2	0	1	1	0	0	1	2	2	6	6	3.5	14																							
25-May	10	Z	7	7	6	3	5	9	8	6	4	3	2	2	2	1	1	4	1	1	1	2	4	4	3.8	10																							
26-May	5	Z	3	4	4	8	9	9	7	8	1	1	2	3	2	2	5	6	2	1	1	1	1	1	3.7	9																							
27-May	1	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	1	1	4	3	2	2	0.8	4																							
28-May	6	Z	6	7	6	1	9	8	6	4	4	2	1	1	1	1	1	1	1	1	1	1	1	1	3.0	9																							
29-May	1	Z	3	8	14	8	8	10	7	2	2	2	1	1	1	1	1	3	2	2	3	14	12	0	4.6	14																							
30-May	0	Z	0	0	1	8	8	4	3	2	3	2	3	4	4	4	5	1	2	2	0	1	3	3	2.7	8																							
31-May	2	Z	3	3	3	3	4	2	1	1	1	1	1	1	1	0	1	0	0	1	1	0	1	3	1.5	4																							
																								6.2	--	7.2	9.0	9.7	7.6	7.9	7.0	5.3	3.3	2.5	2.4	2.0	1.6	1.5	1.2	1.6	1.7	1.5	1.6	1.9	3.3	4.2	4.7	Diurnal Average	
																								23	--	27	32	26	28	27	26	22	16	15	11	7	4	4	5	5	9	9	8	8	26	13	19	Diurnal Maximum	

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



WBEA  
Hourly Averages

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
CNRL Horizon - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**CNRL Horizon - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	689	97.32	97.32
21 - 40	19	2.68	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



**WBEA**  
**Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**CNRL Horizon - May 2014**

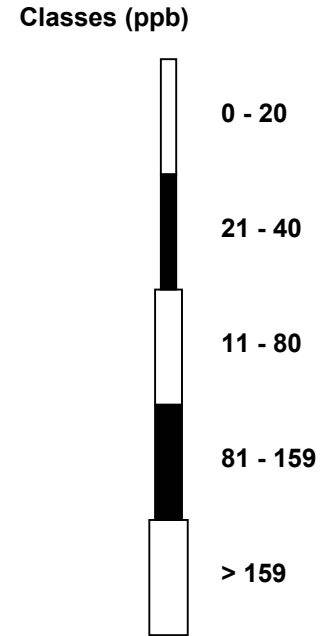
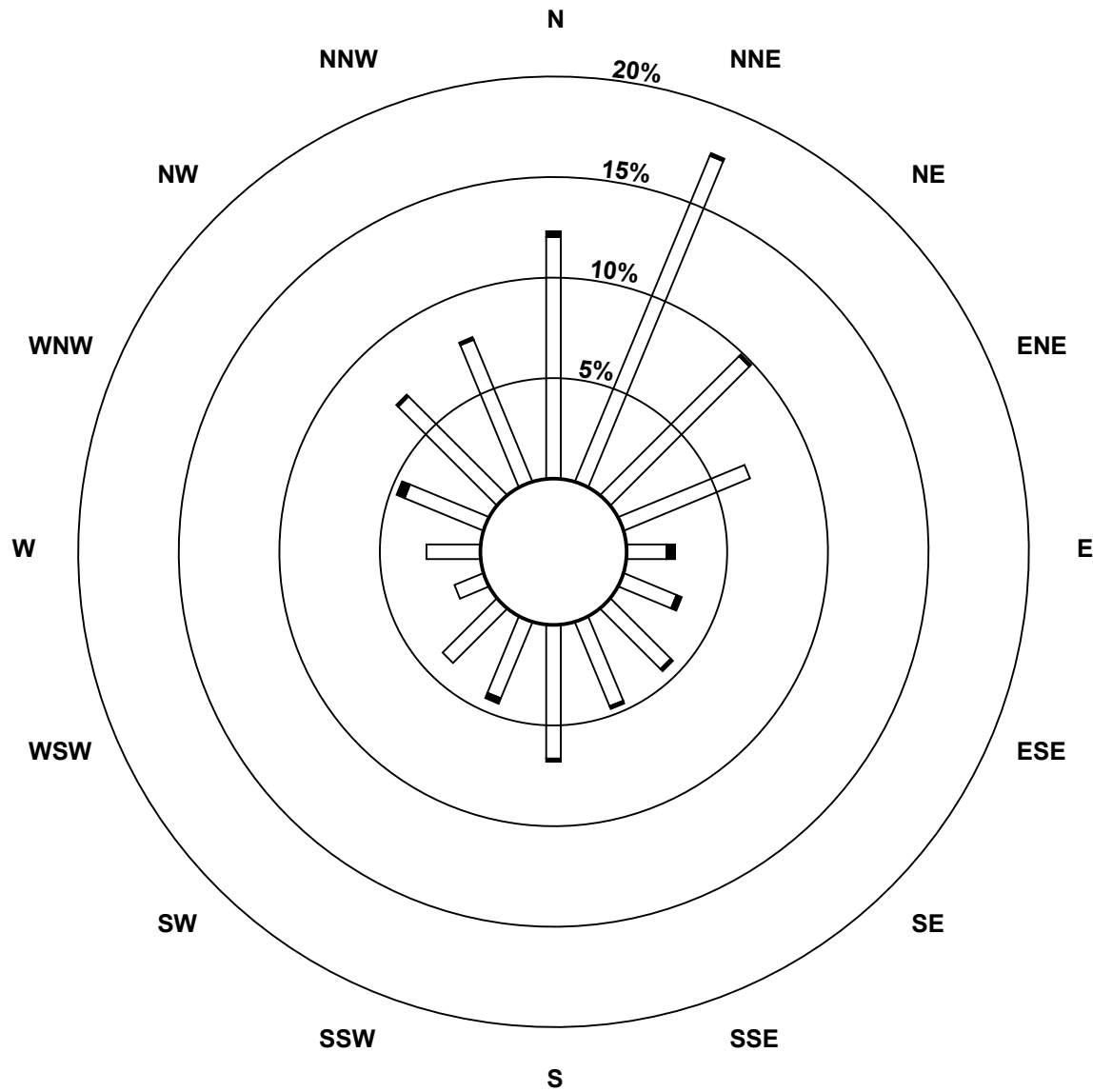
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	85	124	69	48	14	20	30	32	47	29	27	11	19	30	49	54	688
21 - 40	2	1	1	0	3	2	1	1	1	2	0	0	0	3	1	1	19
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	87	125	70	48	17	22	31	33	48	31	27	11	19	33	50	55	707

Total Number of Valid Hours: 707

Total Number of Hours: 744

Wood Buffalo Environmental Association  
Wind Rose May 2014

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
CNRL Horizon (AMS 15)

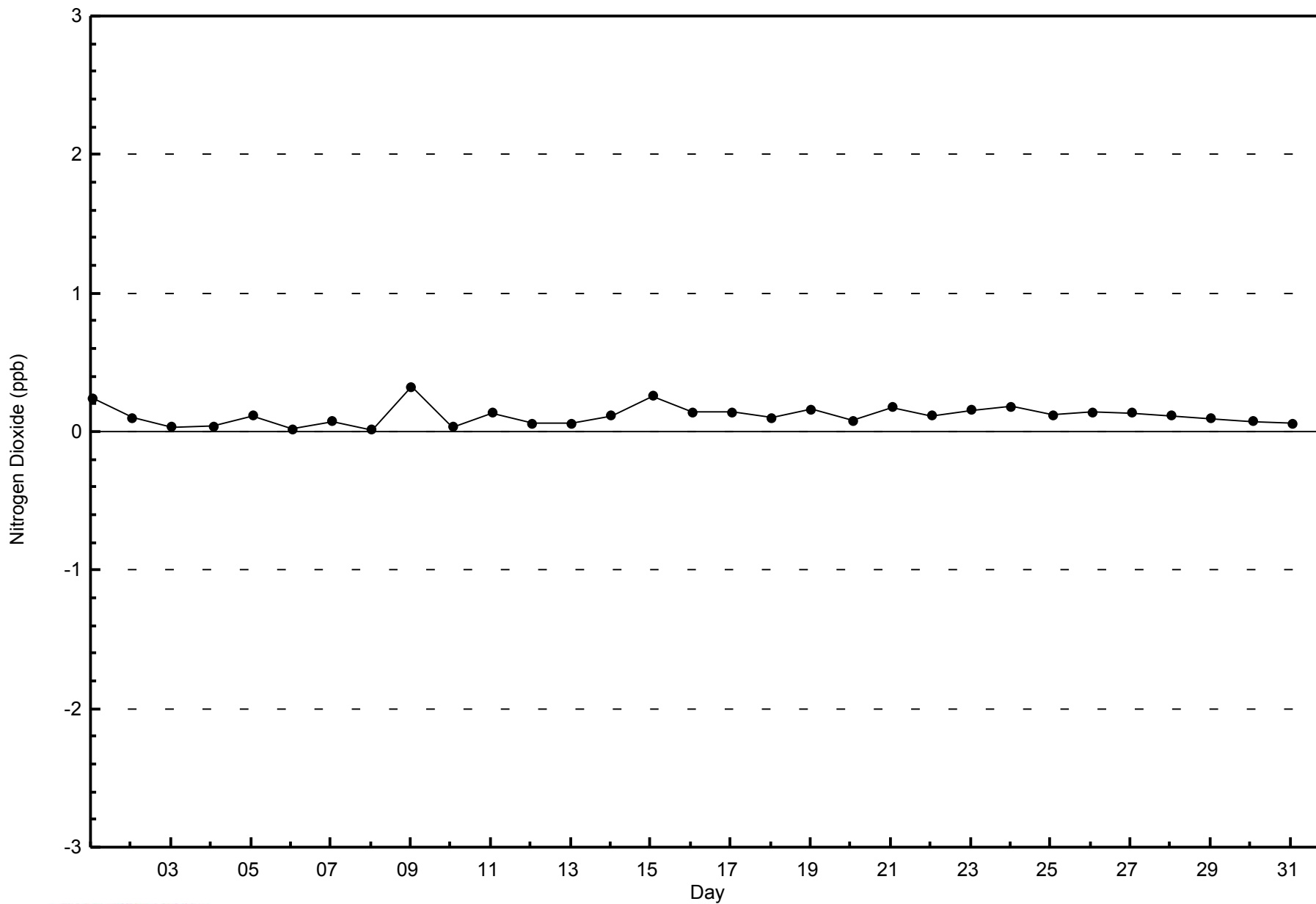


Total Number of Valid Hours: 707



WBEA  
Zero Responses

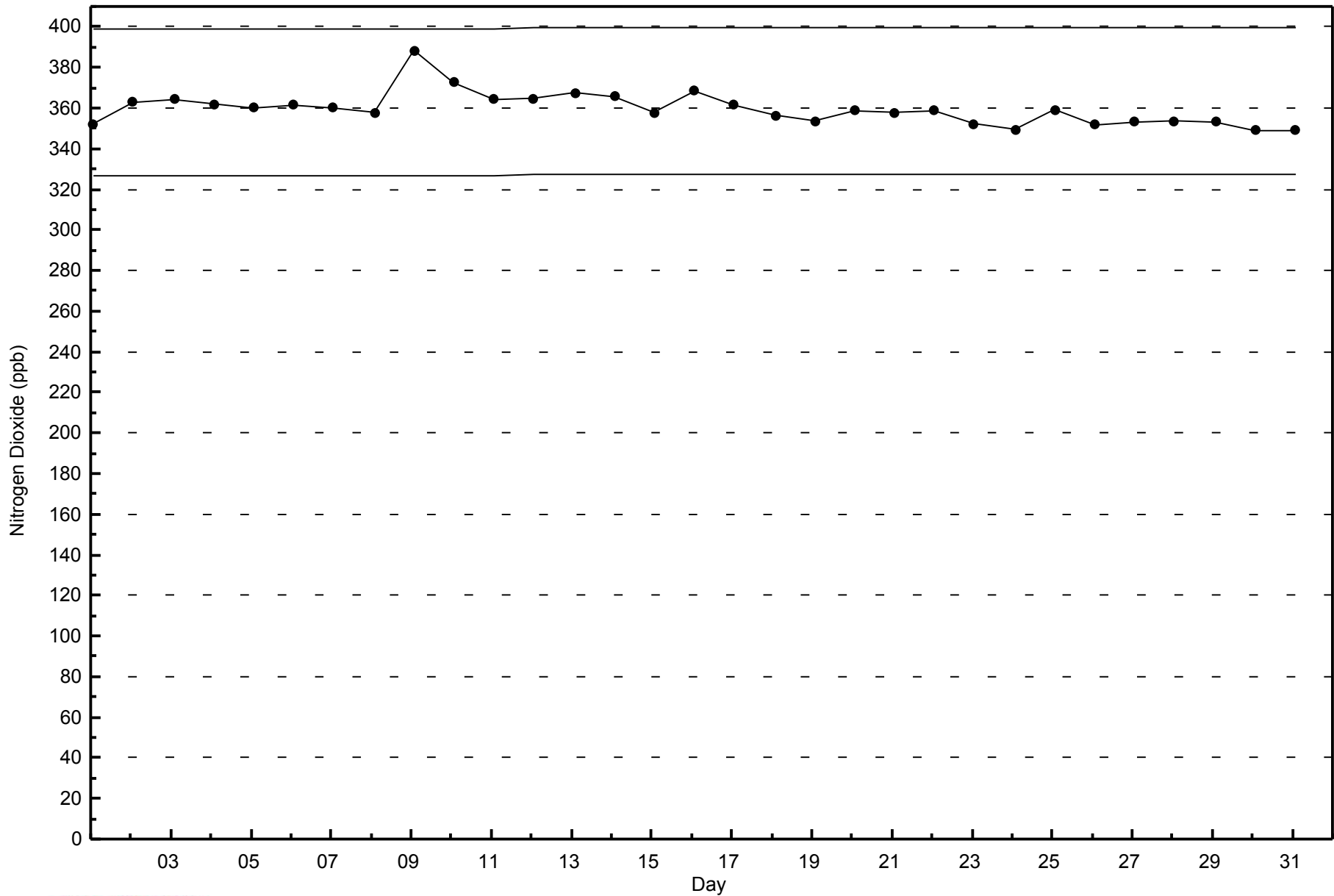
Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
CNRL Horizon - May 2014





WBEA  
Span Responses

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
CNRL Horizon - May 2014





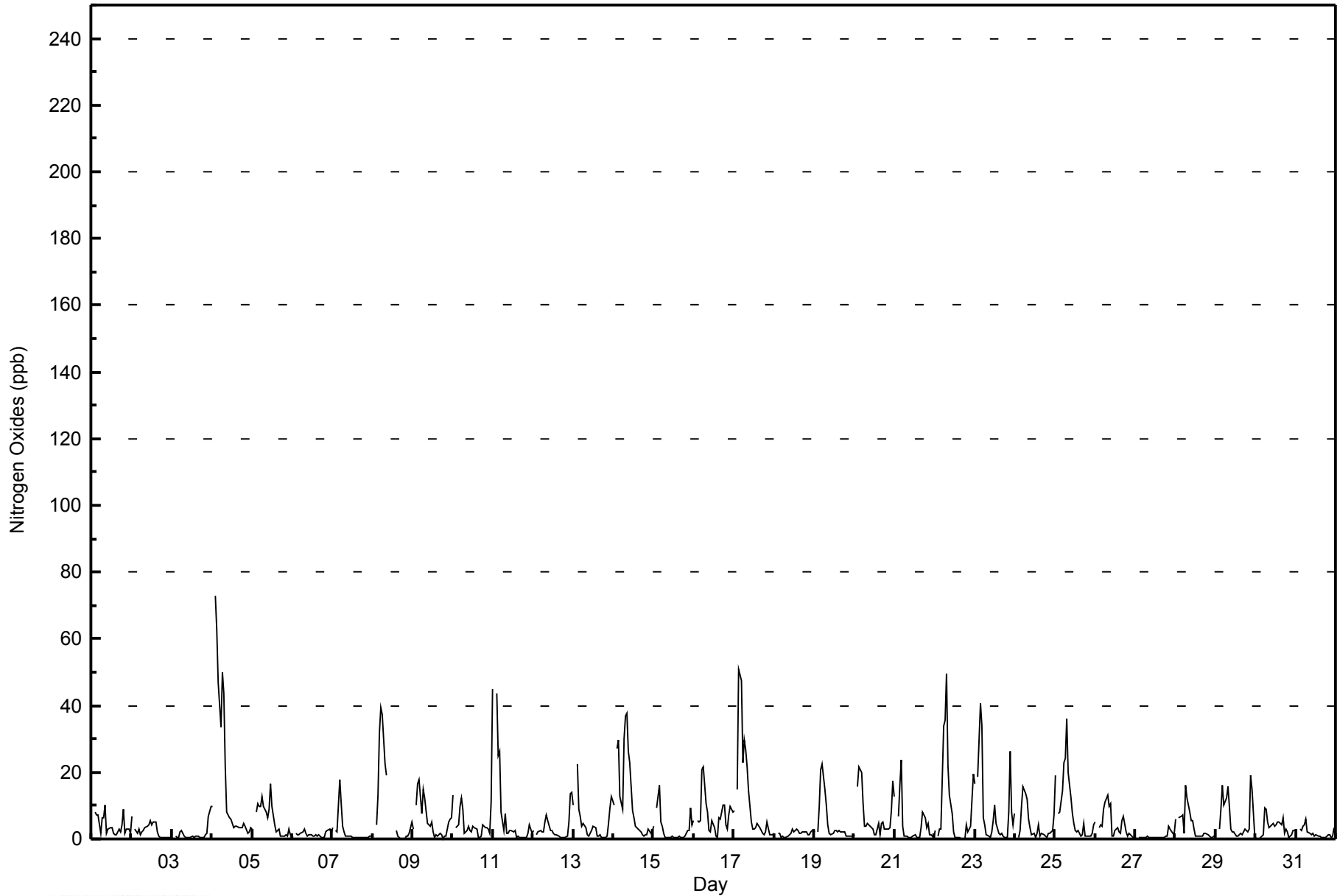
Maximum Value: 73 ppb on May 4 03:00														Maximum Daily Average: 17.5 ppb on May 4														Hours in Service: 744	
Minimum Value: 0 ppb on May 8 20:00														Minimum Daily Average: 0.8 ppb on May 27														Hours of Data: 708	
Maximum Diurnal Average: 13.2 ppb at hour 5														Minimum Diurnal Average: 1.6 ppb at hour 16														Hours of Missing Data: 36	
Monthly Average: 5.6 ppb														Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 1 Median = 2 Q <sub>3</sub> = 6 P <sub>90</sub> = 14 P <sub>99</sub> = 47														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-May	26	Z	8	7	7	2	6	7	10	2	3	3	3	2	1	1	3	2	4	9	2	3	3	2	5.0	26			
2-May	7	Z	3	2	3	1	2	2	3	4	4	6	4	5	5	2	1	0	0	0	0	0	1	0	2.5	7			
3-May	1	Z	1	0	0	2	3	1	0	0	0	1	1	1	1	1	1	0	0	0	1	2	7	10	1.4	10			
4-May	10	Z	73	63	47	33	50	44	22	8	7	6	5	4	4	4	3	3	3	5	4	2	2	3	17.5	73			
5-May	3	Z	8	11	10	10	13	10	8	6	9	17	10	4	2	3	3	1	1	1	1	3	1	5.8	17				
6-May	1	Z	2	1	1	2	2	3	2	1	1	1	1	1	1	1	1	0	0	1	2	3	3	2	1.5	3			
7-May	4	Z	3	2	18	11	4	2	1	1	1	1	0	0	0	0	0	0	0	0	1	0	1	1	2.3	18			
8-May	1	Z	4	13	32	40	37	22	19	C	C	C	C	C	2	1	1	0	0	0	1	1	2	5	10.0	40			
9-May	3	Z	10	17	18	8	15	12	9	5	4	5	2	0	1	1	2	1	0	1	1	5	6	6	5.7	18			
10-May	13	Z	3	4	10	12	9	2	3	4	2	2	4	3	3	1	1	1	4	3	4	3	2	11	4.5	13			
11-May	45	Z	44	25	26	8	3	8	2	2	3	2	2	3	1	1	0	0	0	0	0	2	4	2	7.9	45			
12-May	3	Z	1	2	2	2	2	5	7	5	3	2	2	1	1	1	0	0	0	0	1	5	14	14	3.3	14			
13-May	10	Z	23	9	7	4	5	3	1	1	2	3	4	3	1	1	1	0	1	1	1	5	9	13	4.6	23			
14-May	10	Z	27	30	13	9	30	37	38	26	23	9	6	4	3	3	2	1	1	1	1	3	2	2	12.2	38			
15-May	4	Z	9	16	5	4	2	1	0	0	0	1	1	0	0	1	0	0	0	1	3	2	9	4	2.8	16			
16-May	5	Z	6	5	5	21	21	10	8	3	2	6	3	1	1	6	6	10	10	4	3	7	10	8	7.0	21			
17-May	8	Z	15	51	47	23	30	27	22	14	5	3	3	3	5	3	3	2	1	2	5	1	1	1	12.0	51			
18-May	2	Z	2	2	0	1	0	1	1	1	2	3	2	3	2	2	2	2	2	2	1	1	2	3	1.7	3			
19-May	2	Z	2	10	21	22	15	10	4	2	1	2	2	2	2	2	2	2	2	1	1	1	1	1	4.8	22			
20-May	1	Z	16	21	20	11	4	4	4	4	3	3	1	1	5	1	4	5	3	3	3	3	8	18	6.4	21			
21-May	13	Z	7	16	24	4	1	1	1	1	0	1	1	0	0	0	3	8	6	3	5	1	1	0	4.3	24			
22-May	3	Z	1	3	3	34	36	50	22	13	7	2	0	0	0	0	0	0	0	4	2	4	12	20	9.5	50			
23-May	16	Z	19	41	34	6	4	1	1	1	2	6	10	5	2	1	2	1	0	0	8	26	8	4	8.6	41			
24-May	8	Z	0	3	10	16	14	12	6	4	1	2	0	2	4	1	2	1	1	0	2	2	2	7	4.3	16			
25-May	19	Z	7	8	14	23	24	36	20	12	7	5	2	2	3	1	1	5	1	1	1	1	2	4	8.7	36			
26-May	5	Z	3	4	4	9	11	13	10	11	1	1	2	3	2	2	5	7	2	1	1	1	1	0	4.4	13			
27-May	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0	0	1	1	4	3	2	2	0.8	4			
28-May	6	Z	6	7	7	2	16	12	8	5	5	3	1	1	1	1	1	2	2	1	1	1	1	1	3.9	16			
29-May	1	Z	3	9	16	10	12	16	10	3	2	2	1	1	1	2	1	3	3	2	3	19	15	0	5.8	19			
30-May	0	Z	0	0	1	9	9	5	3	4	4	4	4	5	5	4	6	2	3	2	0	1	3	3	3.4	9			
31-May	2	Z	3	3	4	4	6	2	2	1	2	1	1	1	1	1	1	0	0	1	1	0	1	3	1.8	6			
		7.4	--	9.9	12.4	13.2	11.0	12.4	11.6	8.0	4.8	3.6	3.3	2.7	2.1	2.0	1.6	1.9	2.0	1.8	1.7	2.0	3.5	4.4	4.9	Diurnal Average			
		45	--	73	63	47	40	50	50	38	26	23	17	10	5	5	6	6	10	10	9	8	26	15	20	Diurnal Maximum			
Z - zerospan		C - Calibration																											





WBEA  
Hourly Averages

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
CNRL Horizon - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**CNRL Horizon - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	662	93.50	93.50
21 - 40	35	4.94	98.45
41 - 80	11	1.55	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



**WBEA**  
**Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**CNRL Horizon - May 2014**

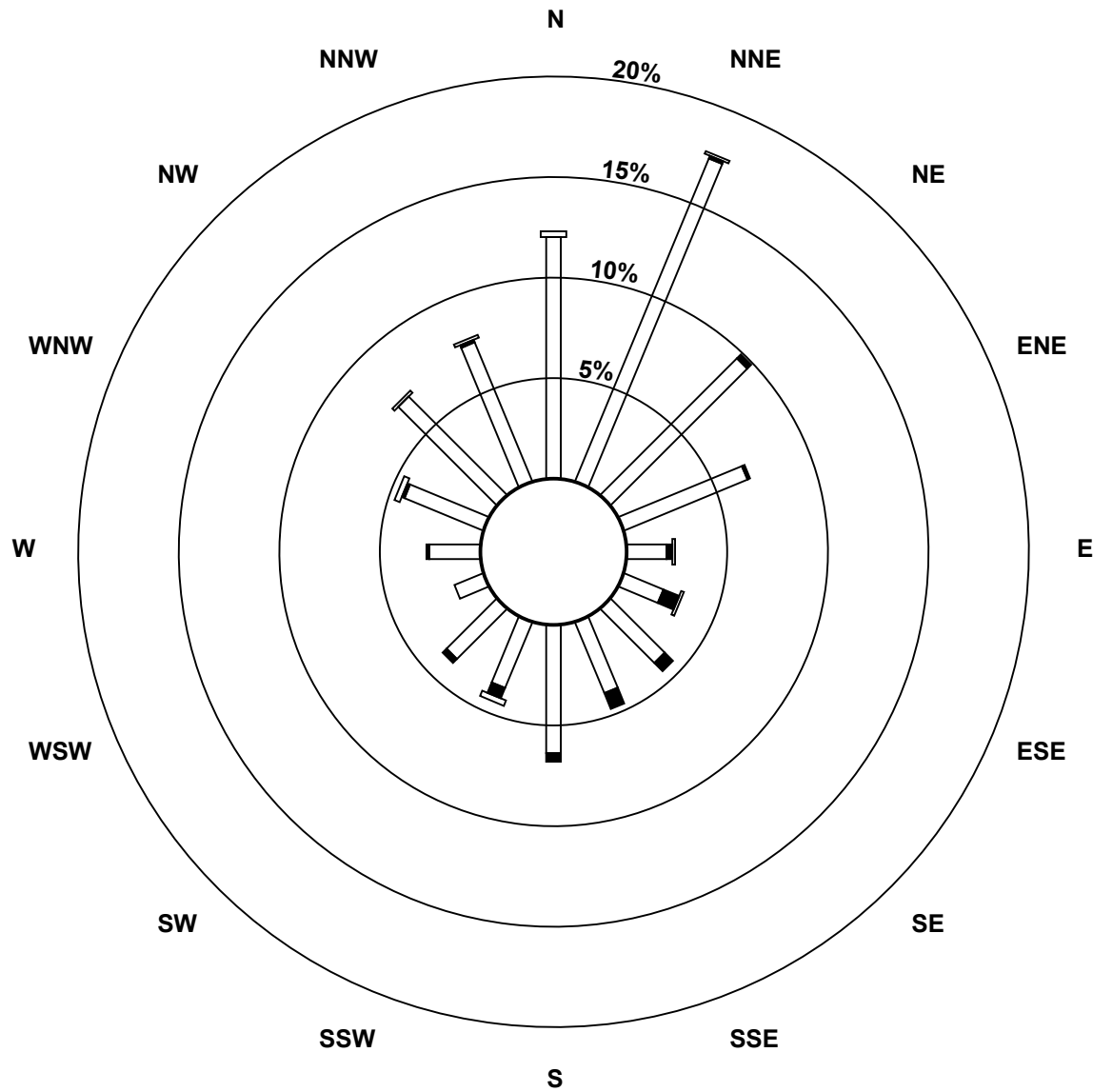
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	85	123	68	47	14	15	27	27	45	25	25	11	18	30	49	53	662
21 - 40	0	1	2	1	2	6	4	6	3	4	2	0	1	1	0	1	34
11 - 80	2	1	0	0	1	1	0	0	0	2	0	0	0	2	1	1	11
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	87	125	70	48	17	22	31	33	48	31	27	11	19	33	50	55	707

Total Number of Valid Hours: 707

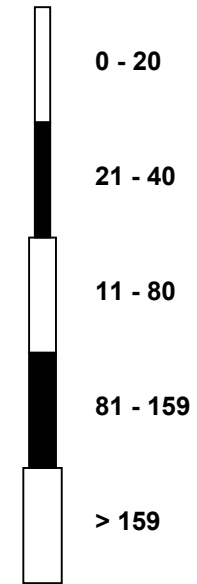
Total Number of Hours: 744

Wood Buffalo Environmental Association  
Wind Rose May 2014

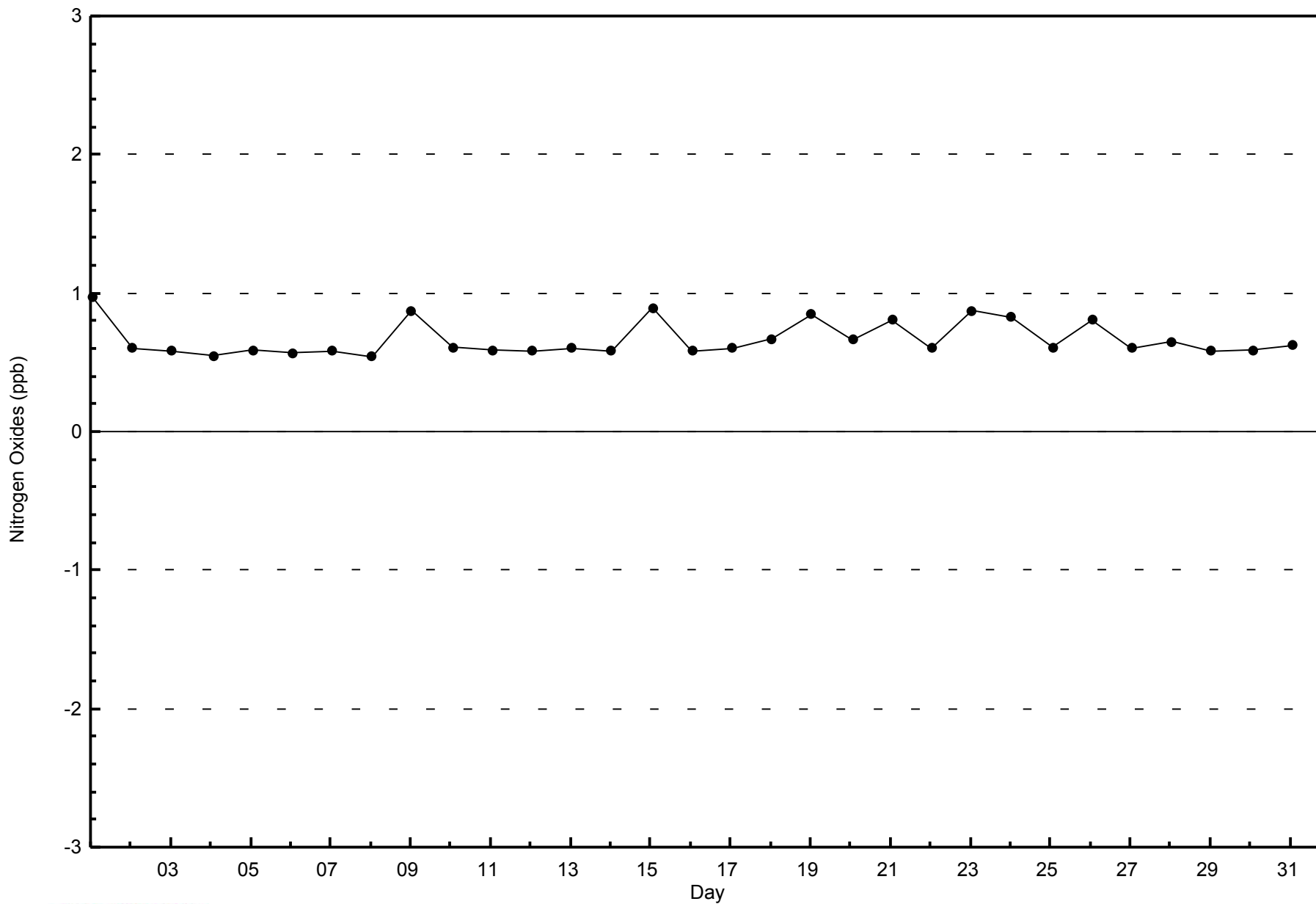
Nitrogen Oxides (NO<sub>x</sub>) - ppb  
CNRL Horizon (AMS 15)



Classes (ppb)



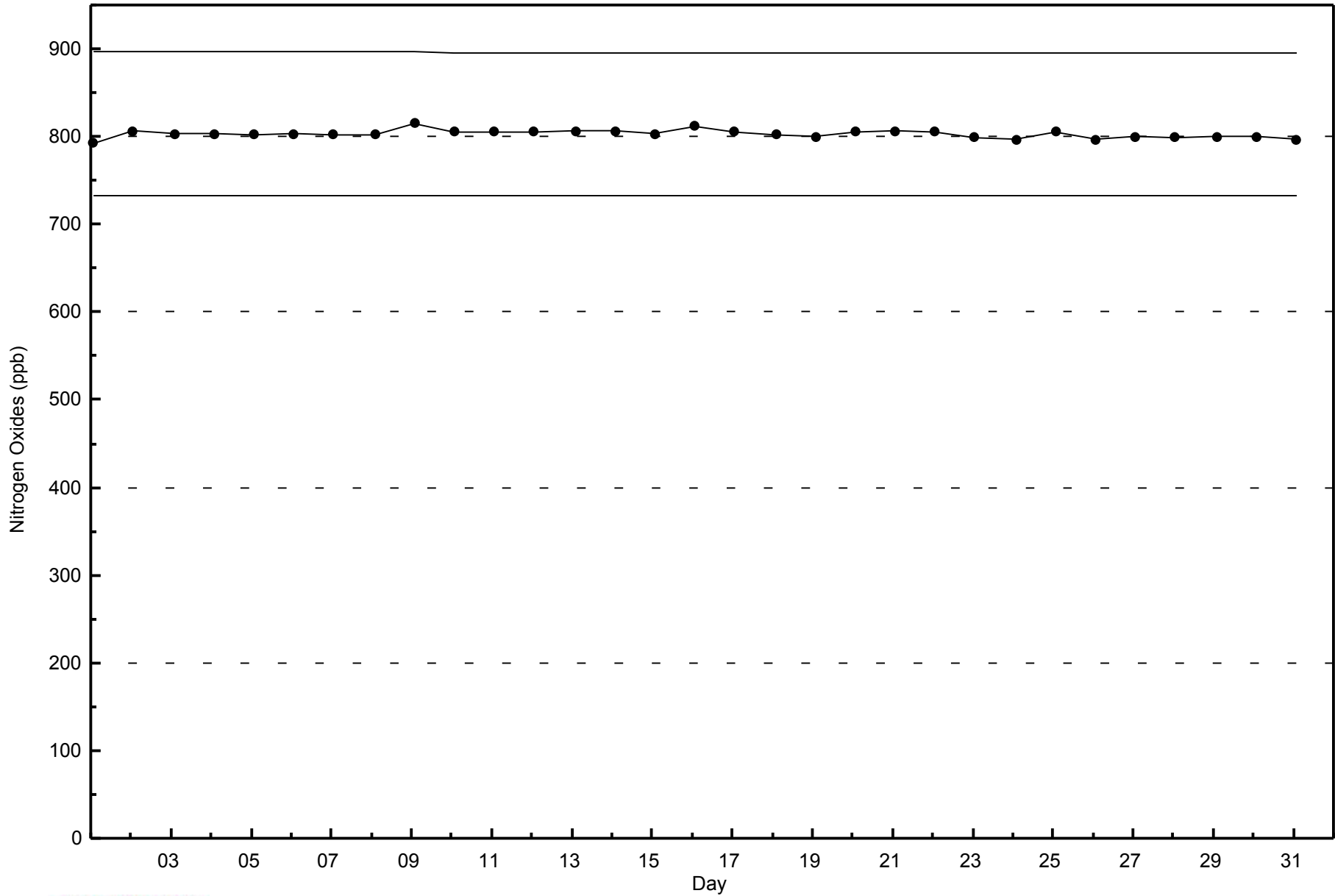
Total Number of Valid Hours: 707





WBEA  
Span Responses

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
CNRL Horizon - May 2014





Summary of Hour Averages

CNRL Horizon - May 2014

Number of Exceedences (AAAQO):	24-hr: 0	Hours in Service:	744
Maximum Value: 36.0 µg/m <sup>3</sup> on May 19 12:00	Maximum Daily Average: 12.3 µg/m <sup>3</sup> on May 19	Hours of Data:	743
Minimum Value: 1.0 µg/m <sup>3</sup> on May 12 15:00	Minimum Daily Average: 2.4 µg/m <sup>3</sup> on May 10	Hours of Missing Data:	1
Maximum Diurnal Average: 7.4 µg/m <sup>3</sup> at hour 5	Minimum Diurnal Average: 5.4 µg/m <sup>3</sup> at hour 16	Hours of Calibration:	0
Monthly Average: 6.29 µg/m <sup>3</sup>	Percentiles: P <sub>1</sub> = 1.1 P <sub>10</sub> = 3.4 Q <sub>1</sub> = 4.5 Median = 5.5 Q <sub>3</sub> = 7.5 P <sub>90</sub> = 10.4 P <sub>99</sub> = 15.9	Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-May	5.2	4.3	5.6	5.3	5.4	5.2	4.7	4.7	4.5	4.3	5.6	4.0	3.4	2.8	2.3	5.1	5.3	4.2	4.4	4.8	5.5	5.6	5.0	5.0	4.7	5.6																							
2-May	5.3	5.7	5.3	5.3	5.6	5.5	5.7	6.0	6.1	6.1	5.9	5.7	5.5	5.6	5.6	5.8	5.9	6.0	5.8	5.9	5.9	5.8	5.8	5.9	5.7	6.1																							
3-May	6.0	6.0	6.0	6.1	6.1	6.1	6.1	6.0	5.8	5.8	5.6	5.5	5.3	3.5	3.6	3.6	3.8	3.7	3.8	3.9	4.0	4.2	4.5	4.6	5.0	6.1																							
4-May	4.4	5.5	6.7	7.4	9.2	8.9	8.3	6.9	7.2	6.6	5.9	5.5	5.7	5.6	5.6	5.5	5.8	7.1	9.4	9.3	7.7	7.5	7.4	6.9	9.4																								
5-May	6.0	5.8	6.0	6.0	5.9	5.7	5.7	4.7	4.9	5.5	4.9	5.2	5.2	5.5	5.4	5.1	5.1	5.2	5.5	5.1	4.6	4.5	3.9	5.3	6.0																								
6-May	3.9	4.0	4.2	4.1	4.2	4.1	4.0	3.9	3.8	3.8	3.7	3.6	3.6	3.9	3.6	3.8	4.1	3.7	4.0	4.2	4.6	4.3	4.3	4.3	4.0	4.6																							
7-May	4.4	4.6	4.6	4.5	4.8	4.4	3.9	4.1	3.8	3.7	3.7	3.6	3.5	3.5	3.5	3.7	4.0	3.8	4.4	5.2	5.0	4.6	4.4	4.3	4.2	5.2																							
8-May	4.3	4.5	4.5	4.6	4.8	4.8	5.1	5.0	5.0	4.5	4.0	3.9	3.4	3.3	3.3	3.4	3.4	3.4	3.4	3.5	3.6	3.6	3.7	3.7	4.0	5.1																							
9-May	3.7	3.7	3.8	4.0	4.1	3.9	3.9	3.8	3.8	3.5	M	1.7	2.0	2.1	2.1	2.2	2.2	2.3	2.3	2.3	2.3	2.4	2.6	2.6	2.9	4.1																							
10-May	2.6	2.5	2.5	2.5	2.6	2.5	2.4	2.4	2.4	2.2	2.2	2.2	2.3	2.4	2.4	2.3	2.4	2.5	2.5	2.5	2.4	2.4	2.4	2.6	2.4	2.6																							
11-May	4.5	6.4	5.5	5.2	5.3	4.5	4.1	4.1	4.0	3.7	3.0	2.6	2.0	1.5	1.1	1.1	1.1	1.1	1.1	1.2	1.4	2.0	3.0	3.4	3.0	6.4																							
12-May	4.4	4.3	4.6	5.1	5.5	5.4	4.9	4.5	4.1	3.9	3.5	3.1	1.8	1.1	1.0	1.1	1.0	2.0	1.5	2.4	3.9	6.1	7.5	8.8	3.8	8.8																							
13-May	9.3	10.7	12.5	9.9	9.8	9.5	9.6	8.7	7.5	7.0	6.6	6.2	3.5	3.2	1.7	1.2	3.2	2.3	1.8	1.8	2.5	3.8	5.3	6.3	6.0	12.5																							
14-May	7.9	8.8	9.3	9.4	9.7	9.7	8.0	10.8	31.6	17.6	8.1	6.6	5.6	6.3	9.5	10.8	10.4	9.9	9.2	8.0	6.1	6.9	7.0	8.4	9.8	31.6																							
15-May	10.2	10.1	11.7	12.1	10.5	10.4	9.9	9.4	9.1	9.4	10.2	10.7	10.8	10.7	10.4	9.9	9.3	8.7	8.6	8.9	9.5	10.0	10.3	10.8	10.1	12.1																							
16-May	11.1	11.1	11.1	11.1	11.1	11.9	11.8	10.4	9.4	8.8	8.6	8.4	7.6	3.5	2.7	3.8	6.1	8.7	6.0	5.4	5.9	8.3	9.5	8.9	8.4	11.9																							
17-May	6.6	6.8	6.3	6.1	6.4	5.7	5.2	5.3	8.7	9.4	6.1	5.6	4.5	4.2	8.3	7.4	7.6	5.8	6.7	6.2	7.0	5.9	5.5	5.7	6.4	9.4																							
18-May	6.1	6.8	6.4	6.3	5.3	4.8	4.3	4.2	3.9	4.0	4.3	3.9	4.8	4.8	5.1	7.6	7.1	6.4	5.5	4.7	5.3	5.5	7.1	7.9	5.5	7.9																							
19-May	7.5	7.4	6.7	7.8	9.4	9.4	8.9	7.8	6.8	6.0	11.3	36.0	30.4	21.3	15.4	13.8	11.8	12.0	11.3	11.5	10.6	10.6	10.6	10.6	12.3	36.0																							
20-May	10.8	11.6	12.7	13.4	12.5	11.2	8.8	7.9	7.4	7.2	7.7	8.0	8.3	9.7	12.3	9.6	8.8	10.3	9.4	9.8	10.7	10.5	10.3	10.1	10.0	13.4																							
21-May	12.0	14.0	14.4	13.4	12.5	10.4	9.4	7.2	5.5	4.7	4.6	4.8	6.2	4.9	5.1	4.6	4.6	5.2	5.4	5.3	6.0	6.9	7.1	6.5	7.5	14.4																							
22-May	6.3	6.3	6.1	6.1	5.9	5.5	5.2	5.1	5.1	5.1	4.9	4.8	5.2	5.4	5.2	4.6	4.8	4.5	4.7	5.4	5.9	6.1	6.9	7.9	5.5	7.9																							
23-May	8.2	8.3	8.9	9.8	9.7	8.6	7.9	6.1	5.2	5.8	5.4	5.9	6.1	6.5	6.0	6.5	6.8	6.4	6.1	6.8	9.0	12.0	10.9	11.0	7.7	12.0																							
24-May	11.6	11.6	11.2	11.0	10.6	10.0	9.1	7.6	7.3	7.0	7.1	6.9	6.4	6.3	5.6	5.0	4.5	5.3	4.5	4.7	5.0	5.9	6.3	5.3	7.3	11.6																							
25-May	5.4	5.8	5.8	5.3	5.9	7.7	6.8	6.1	5.4	5.0	4.7	4.5	4.5	5.4	5.6	5.2	5.8	7.5	7.0	6.7	7.5	8.2	8.6	8.6	6.2	8.6																							
26-May	7.5	6.8	6.8	6.9	6.8	7.3	7.3	6.7	6.5	8.8	8.0	8.7	10.8	12.4	11.2	10.6	11.8	12.3	13.3	14.7	15.5	17.4	16.6	14.4	10.4	17.4																							
27-May	13.2	11.8	10.6	10.0	9.5	9.0	8.5	7.9	7.3	6.7	6.4	6.1	5.7	5.4	5.3	5.3	5.4	5.3	5.2	5.2	5.3	5.5	5.2	5.1	7.1	13.2																							
28-May	5.2	5.2	5.2	5.5	5.9	5.4	5.4	5.1	5.0	5.0	4.9	4.8	4.7	4.6	4.6	4.5	4.6	4.6	5.0	5.0	4.7	4.9	5.1	5.4	5.0	5.9																							
29-May	7.2	8.2	7.8	8.1	7.3	7.4	6.6	5.8	6.0	5.7	5.9	6.2	6.0	6.0	5.9	5.5	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	6.1	8.2																							
30-May	5.5	5.6	5.6	5.3	5.3	5.2	5.2	5.2	5.1	5.0	4.8	4.8	4.7	4.6	4.7	4.9	5.0	4.9	4.9	4.8	5.7	6.3	6.5	5.9	5.2	6.5																							
31-May	8.1	8.8	8.9	10.1	10.8	9.9	7.5	6.2	5.9	5.7	5.2	5.2	5.4	5.6	6.1	5.2	4.7	4.6	4.6	4.3	5.1	5.6	5.9	6.2	6.5	10.8																							
																								6.9	7.2	7.3	7.3	7.4	7.1	6.6	6.1	6.6	6.0	5.8	6.3	6.0	5.5	5.5	5.4	5.5	5.6	5.5	5.6	6.0	6.4	6.6	6.7	Diurnal Average	
																								13.2	14.0	14.4	13.4	12.5	11.9	11.8	10.8	31.6	17.6	11.3	36.0	30.4	21.3	15.4	13.8	11.8	12.3	13.3	14.7	15.5	17.4	16.6	14.4	Diurnal Maximum	

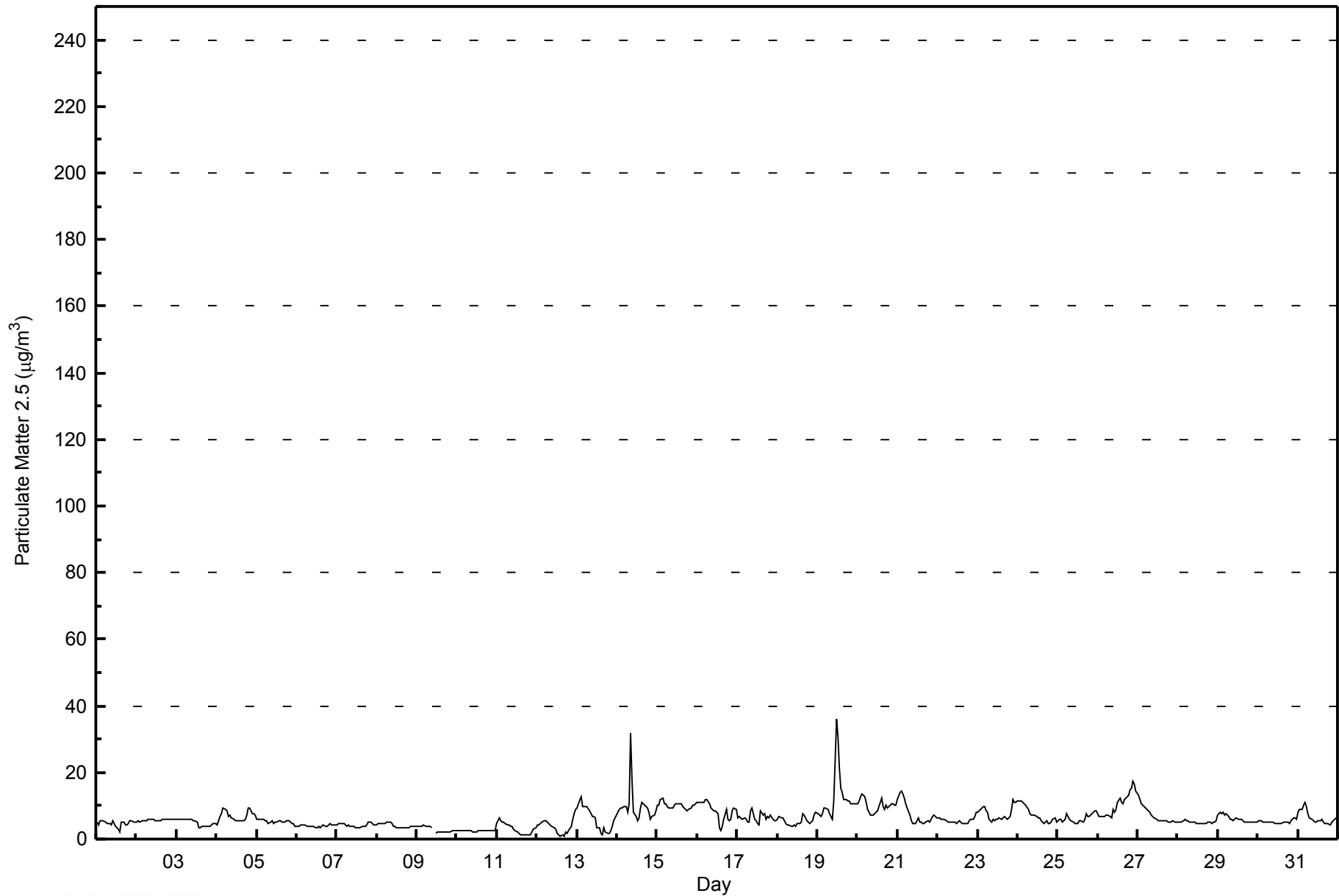
M - Maintenance

Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m<sup>3</sup>



WBEA  
Hourly Averages

Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
CNRL Horizon - May 2014







**WBEA**  
**Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**CNRL Horizon - May 2014**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
1 - 5	363	48.86	48.86
6 - 15	373	50.20	99.06
16 - 25	4	0.54	99.60
26 - 80	3	0.40	100.00
> 81.0	0	0.00	100.00

Total Number of Valid Hours: 743

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) - μg/m<sup>3</sup>**  
**CNRL Horizon - May 2014**

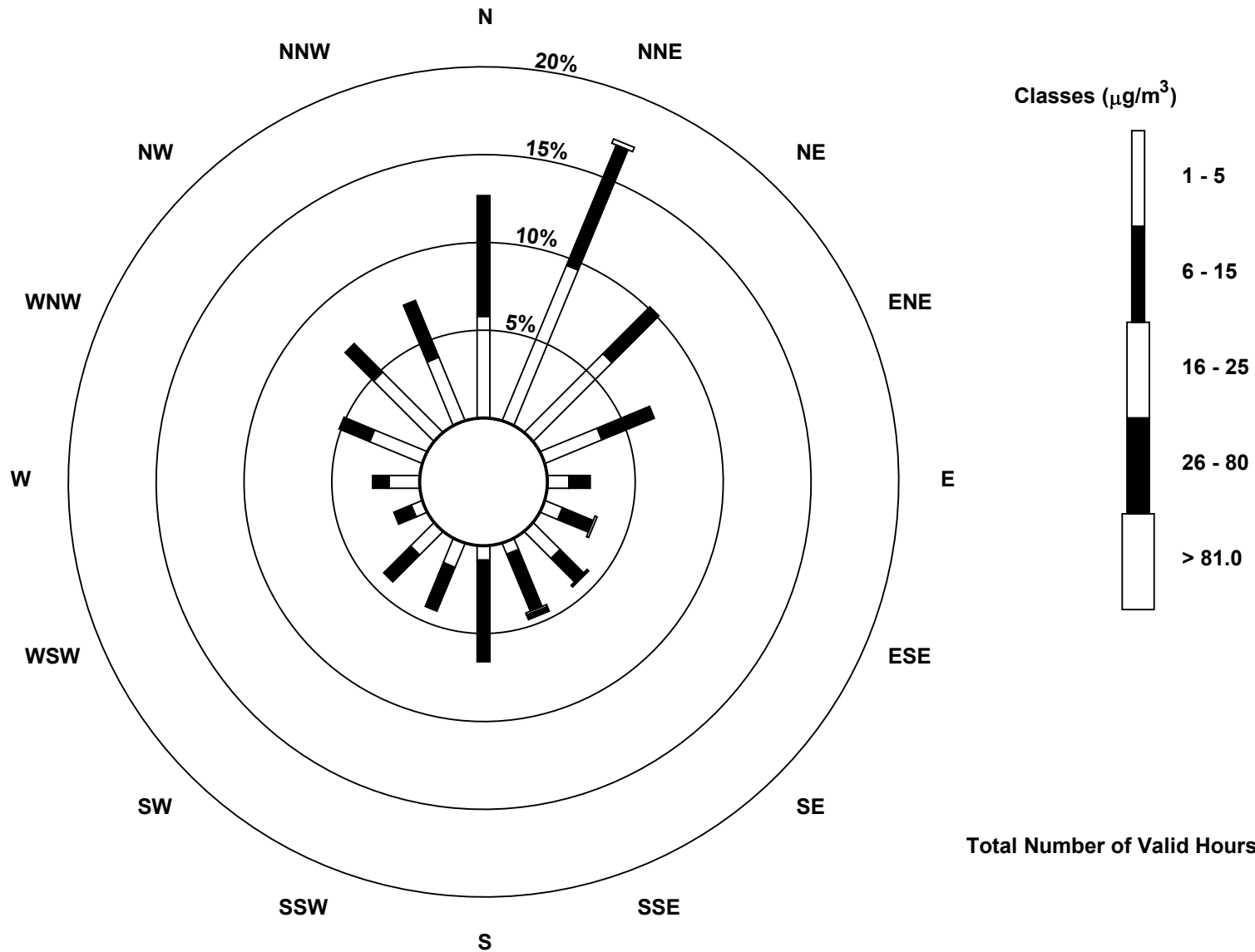
Concentration Ranges (μg/m <sup>3</sup> )	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	43	71	47	26	9	8	16	5	6	11	14	5	13	24	36	29	363
6 - 15	51	55	28	24	9	14	14	26	43	20	16	8	7	14	17	26	372
16 - 25	0	2	0	0	0	1	0	1	0	0	0	0	0	0	0	0	4
26 - 80	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	3
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	94	128	75	50	18	23	31	34	49	31	30	13	20	38	53	55	742

Total Number of Valid Hours: 742

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) - μg/m<sup>3</sup>  
CNRL Horizon (AMS 15)**



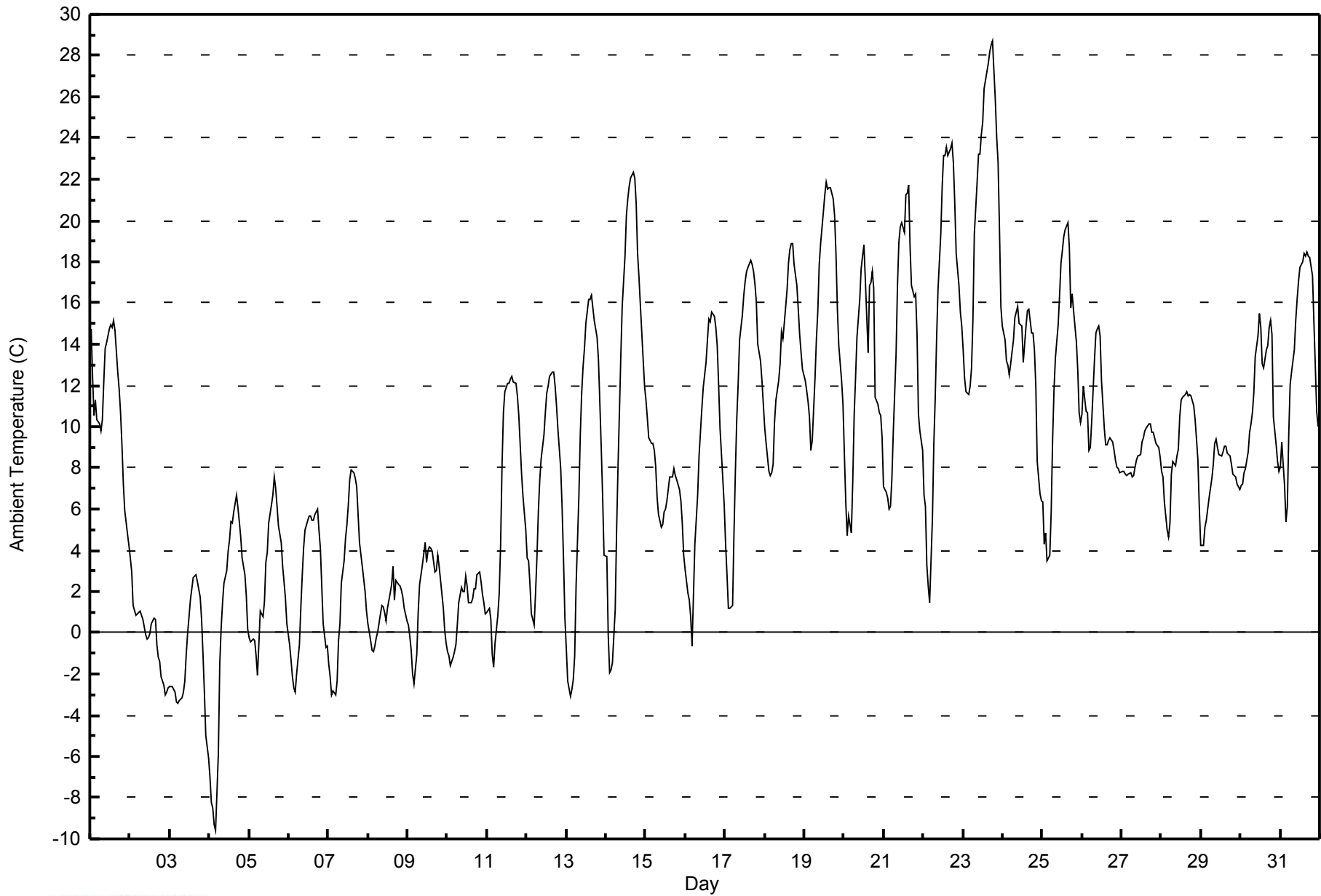


Maximum Value: 28.7 C on May 23 19:00		Maximum Daily Average: 20.9 C on May 23		Hours in Service: 744																																												
Minimum Value: -9.6 C on May 4 05:00		Minimum Daily Average: -1.2 C on May 3		Hours of Data: 744																																												
Maximum Diurnal Average: 12.7 C at hour 16		Minimum Diurnal Average: 3.0 C at hour 5		Hours of Missing Data: 0																																												
Monthly Average: 8.49 C		Percentiles: P <sub>1</sub> = -5.1 P <sub>10</sub> = -0.5 Q <sub>1</sub> = 2.7 Median = 8.3 Q <sub>3</sub> = 13.6 P <sub>90</sub> = 17.8 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-May	14.7	12.4	10.6	11.3	10.3	10.1	9.8	10.4	12.2	13.8	14.0	14.8	15.0	14.8	15.2	14.7	12.6	11.9	10.7	9.1	7.2	5.9	4.8	4.2	11.3	15.2																						
2-May	3.6	3.0	1.3	0.9	0.9	1.0	1.0	0.8	0.6	-0.1	-0.3	-0.3	0.0	0.5	0.7	0.7	-0.6	-1.2	-1.4	-2.1	-2.5	-3.0	-2.9	-2.7	-0.1	3.6																						
3-May	-2.6	-2.6	-2.7	-2.9	-3.4	-3.4	-3.3	-3.1	-2.9	-2.3	-1.0	0.0	1.6	2.2	2.7	2.7	2.8	2.5	1.7	0.7	-1.0	-2.9	-5.0	-6.1	-1.2	2.8																						
4-May	-7.0	-8.2	-8.5	-9.3	-9.6	-5.9	-1.5	0.2	1.5	2.4	3.0	4.0	4.5	5.4	5.3	5.9	6.6	6.0	5.4	4.6	3.6	2.8	1.8	0.2	0.6	6.6																						
5-May	-0.2	-0.4	-0.3	-0.3	-1.1	-2.0	-0.5	1.0	0.8	1.5	3.4	3.9	5.3	6.2	6.7	7.6	7.0	6.1	5.2	4.3	3.2	2.5	1.6	0.4	2.6	7.6																						
6-May	-0.6	-1.3	-2.1	-2.7	-2.9	-2.0	-0.6	1.2	2.7	4.1	5.0	5.5	5.7	5.7	5.4	5.5	5.7	6.0	5.0	4.1	2.3	0.5	-0.7	-0.7	2.1	6.0																						
7-May	-1.6	-2.1	-3.0	-2.8	-3.0	-2.4	-0.4	0.4	2.4	3.5	4.6	5.3	6.2	7.4	7.9	7.8	7.5	7.1	5.7	4.4	3.2	2.6	2.0	1.0	2.7	7.9																						
8-May	0.4	0.0	-0.9	-0.9	-0.7	-0.2	0.1	0.9	1.3	1.3	1.0	0.6	1.2	2.0	2.4	3.2	1.6	2.5	2.4	2.3	2.1	1.7	1.2	0.5	1.1	3.2																						
9-May	0.4	-0.2	-0.8	-2.0	-2.5	-1.0	1.0	2.4	2.8	3.3	4.3	3.4	4.0	4.2	4.1	4.0	2.9	3.0	3.7	3.2	2.5	1.2	0.1	-0.5	1.8	4.3																						
10-May	-0.9	-1.1	-1.6	-1.2	-0.9	-0.6	0.4	1.4	2.2	2.0	2.0	2.7	2.3	1.5	1.5	1.7	2.1	2.2	2.8	3.0	2.5	1.9	1.5	0.9	1.2	3.0																						
11-May	1.0	1.2	0.7	-1.1	-1.6	-0.5	0.8	1.9	4.3	8.1	10.7	11.7	12.1	12.1	12.3	12.5	12.2	12.1	11.5	10.6	9.1	7.7	6.6	5.0	6.7	12.5																						
12-May	3.7	3.5	2.3	0.9	0.4	1.9	3.7	5.9	7.4	8.5	9.6	10.7	11.6	11.9	12.4	12.7	12.6	12.0	11.0	9.9	7.9	6.0	3.6	0.7	7.1	12.7																						
13-May	-0.8	-2.3	-3.1	-2.7	-2.3	-1.1	2.3	6.6	9.6	11.7	12.9	13.8	15.0	16.2	16.2	16.4	15.8	15.1	14.4	13.2	11.2	9.0	6.6	3.8	8.2	16.4																						
14-May	3.7	-0.1	-1.9	-1.8	-1.5	1.1	5.0	8.0	10.7	13.4	15.8	18.3	20.2	21.1	21.7	22.1	22.3	22.1	20.8	18.4	17.3	15.9	13.3	11.9	12.4	22.3																						
15-May	11.3	10.4	9.5	9.2	9.2	8.9	8.0	6.5	5.7	5.1	5.2	5.8	6.0	6.4	7.6	7.6	7.6	8.0	7.6	7.4	6.9	6.4	5.3	3.7	7.3	11.3																						
16-May	3.1	1.9	1.6	0.8	-0.6	1.8	4.3	6.7	8.6	9.7	10.9	11.9	13.1	14.2	15.2	15.1	15.6	15.4	14.8	13.9	12.0	9.9	8.7	6.2	9.0	15.6																						
17-May	4.3	2.8	1.2	1.2	1.3	4.8	7.9	10.4	12.1	14.2	15.4	16.4	17.1	17.5	17.7	18.1	17.9	17.5	16.9	16.1	14.0	13.2	12.3	11.1	11.7	18.1																						
18-May	10.0	9.2	7.9	7.7	7.8	8.1	10.2	11.3	12.2	13.1	14.6	14.3	15.0	16.6	18.0	18.6	18.9	18.9	17.9	16.8	15.7	14.5	13.6	12.8	13.5	18.9																						
19-May	12.2	11.8	11.2	10.5	8.9	9.4	12.4	14.2	15.7	17.9	18.9	20.4	21.2	21.9	21.5	21.6	21.6	21.1	20.2	18.3	15.7	13.9	12.3	11.1	16.0	21.9																						
20-May	8.6	6.4	4.7	5.7	4.8	7.3	10.6	12.4	14.4	16.2	17.7	18.3	18.8	17.1	13.6	16.9	17.0	17.5	16.7	11.4	11.1	10.7	10.6	9.5	12.4	18.8																						
21-May	7.1	6.8	6.5	6.0	6.2	7.5	9.8	13.5	16.8	18.9	19.7	19.9	19.4	21.2	21.3	21.7	18.8	16.8	16.3	16.4	14.5	10.6	9.8	8.9	13.9	21.7																						
22-May	6.7	6.1	3.3	2.3	1.5	5.5	9.1	11.3	14.3	16.6	19.4	21.7	23.2	23.2	23.6	23.2	23.5	23.7	22.8	20.8	18.4	16.8	15.6	14.9	15.3	23.7																						
23-May	13.7	12.4	11.7	11.5	12.0	12.9	15.2	19.3	21.9	23.2	24.2	24.8	26.4	27.2	27.6	28.1	28.5	28.7	25.9	24.0	22.8	19.6	15.8	20.9	28.7																							
24-May	14.9	14.2	13.2	13.0	12.5	13.0	14.2	15.3	15.6	15.8	15.0	14.9	13.1	14.0	14.9	15.6	15.7	14.6	14.6	13.7	12.0	8.3	6.8	6.4	13.4	15.8																						
25-May	6.4	4.3	4.8	3.5	3.8	5.9	9.3	11.7	13.3	14.9	16.4	18.0	18.5	19.2	19.5	19.9	18.7	15.7	16.5	15.6	14.1	12.8	10.7	10.2	12.7	19.9																						
26-May	10.6	12.0	10.7	10.7	8.9	9.0	10.3	13.3	14.5	14.7	14.9	14.4	12.3	9.9	9.1	9.1	9.3	9.4	9.3	8.9	8.4	8.1	8.0	7.7	10.6	14.9																						
27-May	7.8	7.8	7.7	7.6	7.7	7.7	7.6	7.6	8.0	8.3	8.5	8.6	9.3	9.5	9.8	9.9	10.1	10.1	9.7	9.7	9.4	9.2	9.0	8.5	8.7	10.1																						
28-May	7.8	7.6	6.3	5.0	4.7	5.3	7.7	8.3	8.1	8.6	8.9	10.5	11.3	11.4	11.6	11.7	11.5	11.6	11.5	11.0	10.3	9.4	8.4	6.0	8.9	11.7																						
29-May	4.2	4.2	5.1	5.5	6.0	6.5	7.5	8.1	9.2	9.4	9.0	8.6	8.6	8.8	9.0	9.1	8.7	8.6	8.2	7.7	7.7	7.5	7.2	6.9	7.6	9.4																						
30-May	7.2	7.2	7.7	8.0	8.8	9.8	10.2	10.7	11.6	13.4	14.4	15.5	14.8	13.0	12.9	13.7	13.9	14.8	15.2	14.5	10.5	9.1	8.3	7.8	11.4	15.5																						
31-May	8.1	9.3	7.1	5.4	6.1	9.6	12.0	12.6	13.7	15.1	16.2	17.0	17.7	18.0	18.4	18.3	18.5	18.3	18.2	17.4	15.1	13.0	10.7	10.0	13.6	18.5																						
																								5.1	4.4	3.6	3.2	3.0	4.1	5.9	7.5	8.8	9.9	10.8	11.4	11.9	12.2	12.4	12.7	12.5	12.2	11.7	10.7	9.3	8.0	6.8	5.7	Diurnal Average
																								14.9	14.2	13.2	13.0	12.5	13.0	15.2	19.3	21.9	23.2	23.2	24.2	24.8	26.4	27.2	27.6	28.1	28.5	28.7	25.9	24.0	22.8	19.6	15.8	Diurnal Maximum



**WBEA**  
**Hourly Averages**

**Ambient Temperature (AT) - C**  
**CNRL Horizon - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C**  
**CNRL Horizon - May 2014**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	88	11.83	11.83
0 - 10	356	47.85	59.68
10 - 20	259	34.81	94.49
> 20	41	5.51	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



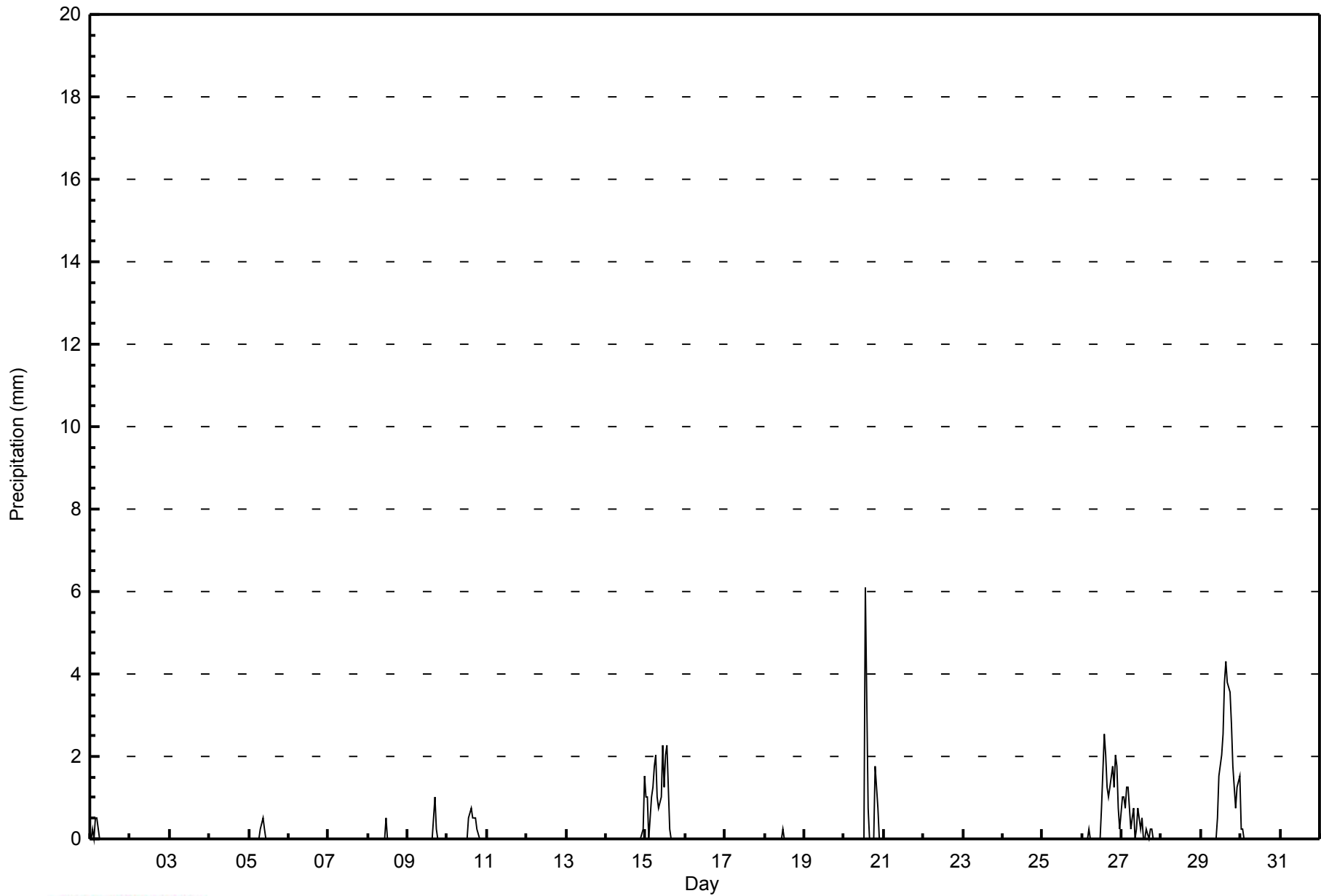
Wood Buffalo Environmental Association

Summary of Hour Averages

Precipitation (PC) - mm

CNRL Horizon - May 2014

Maximum Value: 6.1 mm on May 20 14:00		Maximum Daily Total: 31.5 mm on May 29		Hours in Service: 744																							
Minimum Value: 0.0 mm on May 1 01:00		Minimum Daily Total: 0.0 mm on May 2		Hours of Data: 718																							
Maximum Diurnal Total: 14.0 mm at hour 14		Minimum Diurnal Total: 0.8 mm at hour 3		Hours of Missing Data: 26																							
Monthly Total: 96.01 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> = 0.3 P <sub>99</sub> = 2.4		Hours of Calibration: 0																							
				Percent Operational Time: 96.5																							
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-May	0.0	0.3	0.0	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.5	
2-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.5	
6-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.5
9-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	1.0	1.3
10-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.8	0.5	0.5	0.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.8	3.0
11-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	0.0	--
12-May	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.5	1.8	1.5
15-May	1.0	1.0	0.0	1.0	1.3	1.8	2.0	1.0	0.8	1.0	2.3	1.3	2.0	2.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.1	2.3	19.1
16-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	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	0.3	0.3	0.3
19-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	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	0.8	0.0	0.0	0.0	0.0	1.8	0.8	0.0	0.0	0.0	9.4	6.1	9.4
21-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.8	2.5	2.0	1.3	1.0	1.3	1.8	1.3	2.0	1.8	0.8	0.3	17.0	2.5	17.0	2.5
27-May	1.0	1.0	0.8	1.3	1.3	0.3	0.5	0.8	0.0	0.3	0.8	0.3	0.5	0.0	0.0	0.3	0.0	0.3	0.3	0.0	0.0	0.0	0.0	9.4	1.3	9.4	1.3
28-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.5	2.0	2.5	3.8	4.3	3.8	3.6	2.8	1.8	1.3	0.8	1.3	31.5	4.3	31.5	4.3
30-May	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.3	0.5	0.3
31-May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		2.3	2.5	0.8	2.8	3.3	2.0	2.5	2.0	1.3	1.5	3.6	3.8	5.3	14.0	7.6	6.4	6.4	5.8	5.1	4.8	4.1	2.5	2.3	3.3	Diurnal Average	
		1.0	1.0	0.8	1.3	1.3	1.8	2.0	1.0	0.8	1.0	2.3	1.5	2.0	6.1	3.8	4.3	3.8	3.6	2.8	1.8	2.0	1.8	1.3	1.5	Diurnal Maximum	
AF - Analyzer Failure																											





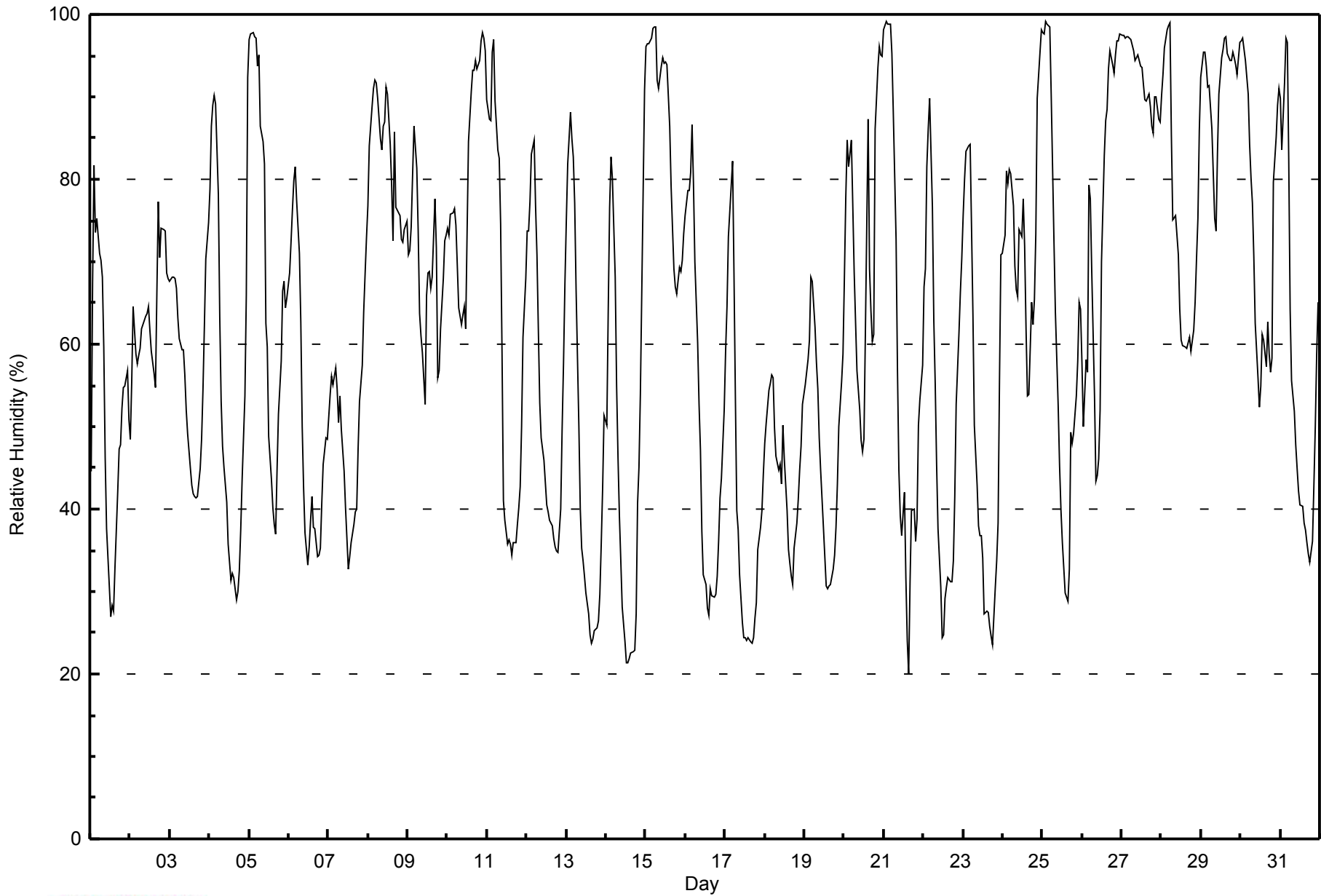


Maximum Value: 99 % on May 21 02:00																		Maximum Daily Average: 92.6 % on May 27						Hours in Service: 744																									
Minimum Value: 20 % on May 21 16:00																		Minimum Daily Average: 41.4 % on May 17						Hours of Data: 744																									
Maximum Diurnal Average: 84.1 % at hour 5																		Minimum Diurnal Average: 47.9 % at hour 16						Hours of Missing Data: 0																									
Monthly Average: 62.4 %																		Percentiles: P <sub>1</sub> = 24 P <sub>10</sub> = 32 Q <sub>1</sub> = 43 Median = 62 Q <sub>3</sub> = 81 P <sub>90</sub> = 94 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-May	45	68	82	74	75	71	70	68	60	46	38	30	27	28	28	33	42	47	48	52	55	55	57	51	52.0	82																							
2-May	49	55	65	59	58	59	60	62	62	63	64	64	62	59	56	55	66	77	71	74	74	74	69	68	63.5	77																							
3-May	68	68	68	68	67	63	61	59	59	56	52	49	45	43	42	41	41	42	45	48	55	62	70	75	56.2	75																							
4-May	79	87	89	90	89	78	63	53	48	45	41	36	34	31	32	32	29	30	33	37	44	54	66	92	54.6	92																							
5-May	97	98	98	97	97	94	95	86	85	82	63	60	49	43	40	38	37	45	52	58	66	68	64	66	69.9	98																							
6-May	69	72	76	80	81	78	71	63	50	43	37	33	35	39	42	38	38	34	34	35	41	45	49	49	51.3	81																							
7-May	51	54	56	55	57	55	50	54	50	45	40	36	33	34	36	38	40	40	47	53	57	64	68	73	49.5	73																							
8-May	77	84	89	91	92	92	90	85	84	86	87	91	90	84	79	73	86	77	76	76	73	72	74	75	82.6	92																							
9-May	71	71	74	81	86	81	74	64	61	59	53	66	69	69	67	68	78	72	56	57	62	68	73	73	68.8	86																							
10-May	74	73	76	76	76	74	70	64	62	64	65	62	74	85	91	93	93	94	93	94	97	98	97	96	80.9	98																							
11-May	90	87	87	95	97	89	84	82	75	59	41	39	36	36	36	34	36	36	38	40	43	50	61	68	60.0	97																							
12-May	74	74	77	83	85	77	71	62	53	49	46	43	41	40	39	38	37	35	35	35	40	50	58	67	54.4	85																							
13-May	75	82	88	85	83	77	67	50	40	35	34	32	30	27	25	24	24	25	26	26	30	36	43	51	46.4	88																							
14-May	50	64	77	83	80	68	55	46	39	34	28	24	21	21	22	23	23	23	27	41	45	54	79	91	46.5	91																							
15-May	96	96	97	97	98	98	98	92	91	94	95	94	94	94	87	79	74	69	67	66	69	69	70	73	85.8	98																							
16-May	76	79	79	81	87	79	70	60	53	47	37	32	31	28	27	30	29	29	30	32	36	41	44	52	49.5	87																							
17-May	59	65	73	76	82	68	54	40	37	32	26	24	24	24	24	24	24	24	27	29	35	38	40	44	41.4	82																							
18-May	48	50	54	55	56	56	50	46	45	45	43	50	46	40	35	33	32	31	35	38	41	45	48	53	44.9	56																							
19-May	55	57	58	61	68	68	62	58	55	49	45	38	34	31	30	31	31	33	34	38	43	50	55	59	47.5	68																							
20-May	68	78	85	81	85	77	69	63	57	52	48	47	48	61	87	69	64	60	61	86	94	96	95	95	72.0	96																							
21-May	98	99	99	99	99	95	88	73	57	45	39	37	42	32	24	20	31	40	40	36	39	50	53	57	58.0	99																							
22-May	67	69	81	86	90	77	63	55	45	38	31	24	25	29	30	32	31	31	34	41	53	61	66	70	51.3	90																							
23-May	76	80	83	84	84	74	63	50	43	38	37	37	34	27	28	28	26	25	24	30	34	38	56	71	48.7	84																							
24-May	71	73	81	79	81	81	77	70	67	66	74	73	78	72	62	54	54	65	62	65	73	90	95	98	73.4	98																							
25-May	98	98	99	99	98	90	81	72	64	53	45	40	36	33	30	29	33	49	48	49	54	58	65	64	61.9	99																							
26-May	58	50	58	57	79	78	69	54	43	44	46	52	70	83	87	89	93	96	94	93	95	97	97	98	74.1	98																							
27-May	97	97	97	97	97	97	96	96	94	95	95	94	93	92	90	89	90	89	86	86	90	90	87	87	92.6	97																							
28-May	90	93	96	98	99	99	85	75	76	73	71	64	61	60	60	59	60	61	59	62	65	70	75	86	74.9	99																							
29-May	92	96	95	94	91	91	86	81	75	74	83	90	95	96	97	97	95	94	94	95	95	94	93	97	91.3	97																							
30-May	97	97	96	94	90	84	80	77	71	63	56	52	55	61	60	57	63	59	57	58	80	85	89	91	73.9	97																							
31-May	90	84	92	97	97	82	64	56	52	48	45	42	40	40	38	37	36	35	33	36	43	50	59	65	56.7	97																							
																								74.3	77.3	81.4	82.3	84.1	79.1	72.1	65.0	59.7	55.5	51.7	50.2	50.0	49.7	49.4	47.9	49.5	50.6	50.5	53.8	58.7	63.6	68.2	72.7	Diurnal Average	
																								98	99	99	99	99	99	98	96	94	95	95	94	95	96	97	97	95	96	94	95	97	98	97	98	Diurnal Maximum	



**WBEA**  
**Hourly Averages**

**Relative Humidity (RH) - %**  
**CNRL Horizon - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Relative Humidity (RH) - %**  
**CNRL Horizon - May 2014**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	1	0.13	0.13
20 - 40	158	21.24	21.37
40 - 60	189	25.40	46.77
60 - 80	200	26.88	73.66
80 - 100	196	26.34	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

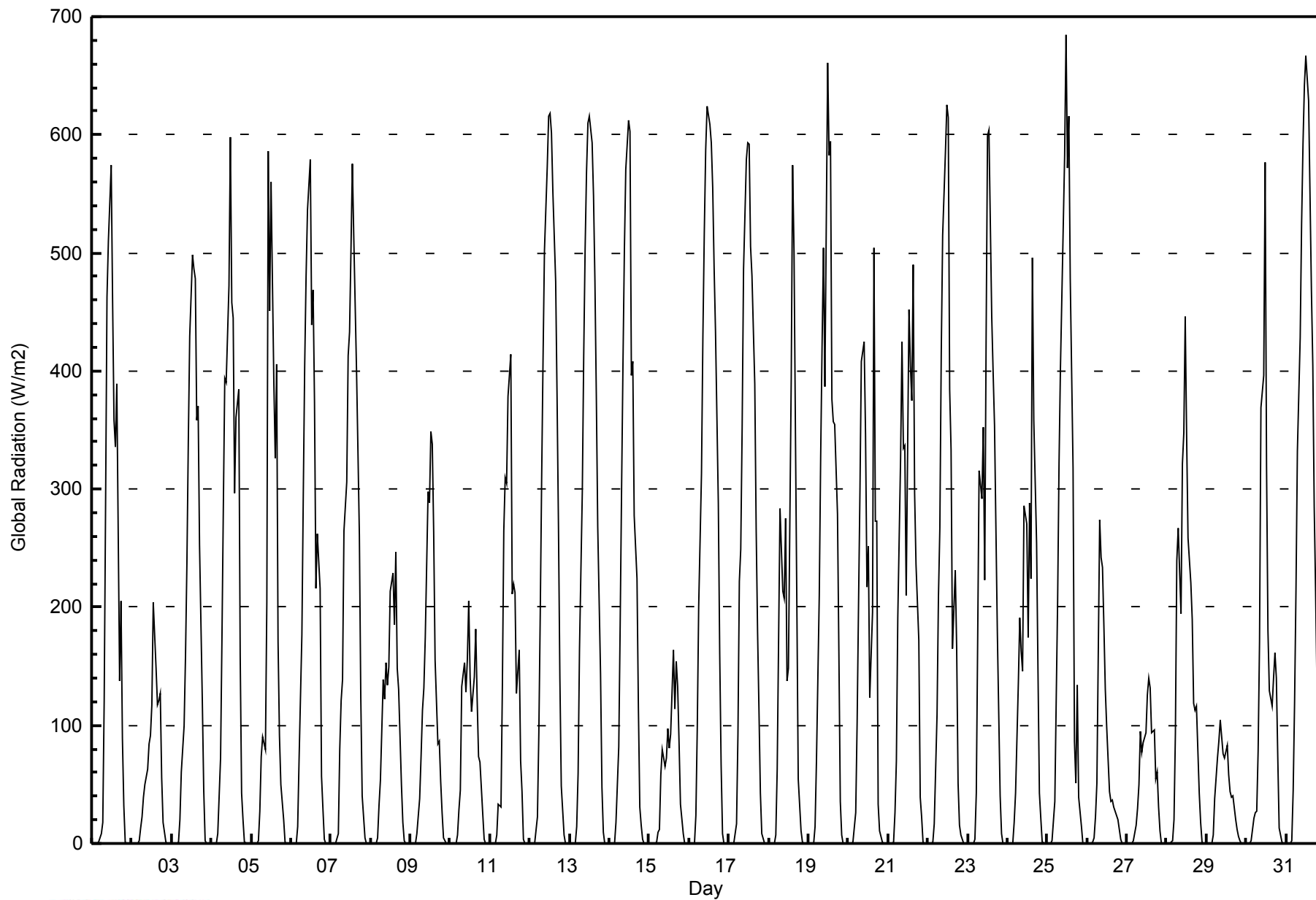


Maximum Value: 685 W/m2 on May 25 12:00		Maximum Daily Average: 257.4 W/m2 on May 31		Hours in Service: 744																							
Minimum Value: 0 W/m2 on May 31 02:00		Minimum Daily Average: 35.4 W/m2 on May 29		Hours of Data: 744																							
Maximum Diurnal Average: 404.1 W/m2 at hour 12		Minimum Diurnal Average: 0.0 W/m2 at hour 2		Hours of Missing Data: 0																							
Monthly Average: 154.8 W/m2		Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 72 Q <sub>3</sub> = 269 P <sub>90</sub> = 470 P <sub>99</sub> = 622		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-May	0	0	0	0	1	8	18	121	287	463	510	574	460	358	335	389	138	205	89	32	1	0	0	0	166.3	574	
2-May	0	0	0	0	2	14	23	39	49	62	84	92	118	204	149	117	122	127	55	18	1	0	0	0	53.2	204	
3-May	0	0	0	0	2	20	60	100	159	237	341	430	499	487	478	359	370	253	120	45	3	0	0	0	165.1	499	
4-May	0	0	0	0	8	73	175	287	394	390	473	598	458	445	297	361	384	159	43	20	1	0	0	0	190.3	598	
5-May	0	0	0	0	2	27	73	90	79	204	586	451	560	390	326	406	171	91	50	21	2	0	0	0	147.0	586	
6-May	0	0	0	0	14	71	176	295	405	480	536	579	439	469	374	216	263	216	57	30	4	0	0	0	192.7	579	
7-May	0	0	0	0	9	79	121	139	265	306	413	434	502	575	514	399	331	261	124	41	4	0	0	0	188.2	575	
8-May	0	0	0	0	5	33	53	138	122	154	134	149	213	229	185	246	148	131	49	18	2	0	0	0	83.7	246	
9-May	0	0	0	0	8	38	74	112	132	175	298	289	349	338	263	156	85	86	53	26	4	0	0	0	103.6	349	
10-May	0	0	0	0	7	29	45	133	154	128	155	205	140	112	142	181	122	74	69	25	3	0	0	0	71.7	205	
11-May	0	0	0	0	7	33	31	134	265	310	305	379	414	211	220	212	127	163	70	44	4	0	0	0	122.1	414	
12-May	0	0	0	0	22	93	195	308	411	502	573	616	618	601	551	475	377	268	140	48	7	0	0	0	241.9	618	
13-May	0	0	0	0	14	60	165	298	412	503	568	610	616	594	548	476	378	268	143	47	9	0	0	0	237.9	616	
14-May	0	0	0	0	18	82	186	300	406	502	571	612	603	396	408	277	224	115	30	16	4	0	0	0	197.9	612	
15-May	0	0	0	0	2	10	12	58	79	65	73	98	81	93	164	113	154	133	85	33	9	0	0	0	52.7	164	
16-May	0	0	0	0	23	98	201	313	429	517	587	624	609	593	556	487	433	288	160	66	8	0	0	0	249.7	624	
17-May	0	0	0	0	17	93	222	249	352	487	579	593	592	506	481	389	265	179	113	43	9	0	0	0	215.3	593	
18-May	0	0	0	0	7	63	173	283	214	207	276	138	149	393	574	501	349	204	55	11	1	0	0	0	149.9	574	
19-May	0	0	0	0	14	70	210	328	421	504	387	661	583	595	376	357	354	279	160	36	7	0	0	0	222.7	661	
20-May	0	0	0	1	26	102	201	297	409	424	346	217	252	123	195	504	273	273	33	11	1	0	0	0	153.7	504	
21-May	0	0	0	1	26	70	191	326	425	335	337	210	452	404	375	490	296	237	173	40	22	1	0	0	183.8	490	
22-May	0	0	0	2	17	109	209	267	415	515	586	625	614	385	333	165	231	165	51	15	7	0	0	0	196.3	625	
23-May	0	0	0	0	4	43	175	315	292	353	223	429	599	604	447	398	353	266	179	41	8	0	0	0	197.1	604	
24-May	0	0	0	0	18	43	137	191	163	146	286	270	175	288	224	496	358	254	145	43	22	1	0	0	135.8	496	
25-May	0	0	0	2	36	122	206	321	402	522	582	685	572	616	478	318	87	52	135	39	14	1	0	0	216.2	685	
26-May	0	0	0	1	5	22	51	274	242	233	184	131	98	44	36	37	31	27	20	12	3	0	0	0	60.4	274	
27-May	0	0	0	0	2	15	29	50	94	77	86	94	126	140	132	94	96	55	60	30	10	0	0	0	49.7	140	
28-May	0	0	0	2	21	94	240	266	195	322	347	447	345	258	221	189	119	113	117	43	17	1	0	0	139.9	447	
29-May	0	0	0	0	7	37	73	86	105	90	75	72	83	59	44	39	40	20	12	6	2	0	0	0	35.4	105	
30-May	0	0	0	3	21	27	27	79	171	369	396	577	319	180	129	117	140	162	140	74	13	1	0	0	122.6	577	
31-May	0	0	0	3	45	120	215	333	428	525	592	642	667	629	549	468	405	285	212	47	14	1	0	0	257.4	667	
		0.0	0.0	0.0	0.6	13.2	58.0	128.0	210.6	270.1	326.0	370.6	404.1	396.9	365.1	325.9	304.3	233.0	174.5	94.9	32.8	7.0	0.2	0.0	0.0	Diurnal Average	
		0	0	0	3	45	122	240	333	429	525	592	685	667	629	574	504	433	288	212	74	22	1	0	0	Diurnal Maximum	



WBEA  
Hourly Averages

Global Radiation (GR) - W/m<sup>2</sup>  
CNRL Horizon - May 2014





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

**Wind Speed (WS) - km/h**  
**CNRL Horizon - May 2014**

Maximum Speed: 28 km/h on May 30 14:00	Maximum Daily Speed Average: 16.8 km/h on May 2	Hours in Service: 744
Minimum Speed Value: 0 km/h on May 31 03:00	Minimum Daily Speed Average: 1.4 km/h on May 4	Hours of Data: 743
Maximum Diurnal Speed Average: 6.5 km/h at hour 18	Minimum Diurnal Speed Average: 2.0 km/h at hour 8	Hours of Missing Data: 1
Monthly Average Velocity: 3.7 km/h 4.5 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 4 Q <sub>1</sub> = 6 Median = 9 Q <sub>3</sub> = 13 P <sub>90</sub> = 17 P <sub>99</sub> = 23	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-May	WNW7	NNE7	NW7	NNW15	NNW14	NW14	NNW16	WNW9	WNW15	NW24	NNW25	NNW24	NNW22	NNW20	WNW22	NW25	NW21	NW21	NNW19	NNW16	NNW13	NW14	NW12	NW12	NW15.9	NNW25
2-May	NW12	NW22	NNW17	WNW21	NW23	NW20	NW22	NW22	NNW22	NNW23	NNW21	NNW21	NNW20	NNW22	NNW20	N18	NE16	NNE14	NNE14	NNE13	NNE14	N15	N17	N18	NNW16.8	NW23
3-May	N18	N17	N14	N12	N12	NNW14	NNW12	N9	NE8	NE7	NE7	ENE9	NE10	NE11	ENE13	NE12	ENE13	ENE12	ENE14	ENE9	ENE7	E4	SE1	NW3	NNE8.9	N18
4-May	W2	W3	WNW2	N1	SSW3	AF	NNE1	ESE4	SE7	SE3	N4	NNE6	ENE7	SSE4	SE2	SW3	SSE6	SSW5	S5	SW5	SE1	WNW5	SSE5	S4	SSE1.4	SE7
5-May	ESE1	N2	NNE1	ENE1	NW3	S1	SE3	S1	NE5	ENE6	ESE9	ENE10	NE9	NNE11	NNE11	NNE16	NNE16	NE19	NE20	NE16	NNE13	NE12	NE13	NNE12	NE8.0	NE20
6-May	NNE11	NNE11	N10	N9	N11	NNE12	NNE15	NNE14	NNE16	NNE13	NNE15	NE15	NNE16	N15	NNE11	NNE16	N15	N13	N12	NNE9	N7	N7	N7	N9	NNE11.8	NNE16
7-May	NNW7	NNW5	N7	N8	NNW6	N5	NNE9	N11	NNE13	NNE18	N19	N18	N17	N16	N16	N18	NNE17	N19	NNE16	NE13	NE6	NNE6	NNE5	NE4	N11.4	N19
8-May	NE3	ENE5	SE2	E3	ESE3	E4	NE5	ENE3	ENE6	NE9	NE12	NE10	NE10	NE10	NE12	NNE14	NNE12	NNE11	NNE8	NNE5	N6	N5	NNW5	NW5	NE6.2	NNE14
9-May	N5	NW6	WNW7	W4	SSW5	SW4	WSW4	NW7	NNW5	NW7	NNW6	NNW8	NNE12	N14	N8	N6	N7	N7	N15	N14	N15	NW9	NW10	NW10	NNW6.4	N15
10-May	NW10	WNW9	WNW8	WNW9	NW9	WNW9	NW12	NW17	NW20	NNW20	NW21	NW22	NNW15	NW7	NNE6	NNE5	N6	NNW2	W2	SW2	SSW4	SW7	SW8	WSW7	NW8.2	NW22
11-May	WNW6	WNW7	NW5	W4	SW5	SW8	SW7	SSW10	S14	W6	NW21	NNW18	NNW16	NNW13	NNE12	NNE10	NNE10	NNE12	NNE11	NNE11	NNE9	ENE7	NE7	NNE6	NNW4.8	NW21
12-May	N6	N8	N6	NNW5	N6	N5	NNE7	ENE6	ENE6	ENE6	ENE5	E7	NE10	ENE13	NE14	NE13	NNE16	NNE18	NNE16	NNE15	NNE9	ENE7	SE4	SSW4	NE7.5	NNE18
13-May	WSW4	SW4	SW6	SW9	SSW8	SSW8	S8	S8	SSE7	ESE5	NE7	ENE6	NE7	NNE9	NE11	NNE14	NE15	NNE14	NNE15	NNE14	NE8	ENE7	NNE6	NW5	NE3.1	NNE15
14-May	NNW5	WNW4	SSW4	SSW5	S5	SSE2	S8	SSE5	SE5	ESE3	ESE7	ESE10	ESE11	SSE10	ESE8	ESE9	E11	ESE12	S9	WSW6	SSE7	S13	S10	SE8	SE5.3	S13
15-May	SE4	ENE2	NE5	NNE5	N8	N10	N14	NNE21	NNE23	NE21	NNE16	NNE19	N18	N16	N19	N21	N22	N20	N17	N13	NW8	NW10	NNW9	NW9	N12.6	NNE23
16-May	NW9	WNW9	WNW9	NW8	WNW5	SSE3	SSE4	S4	S5	N4	NNW7	N5	NNE2	S6	SSE5	E13	E12	ENE13	ENE12	ENE11	ENE9	NE6	NE6	NNE4	NE2.6	ENE13
17-May	NW5	WNW4	WSW2	NNW3	N4	NNW3	NNE3	ESE2	NE2	SE4	ENE7	ENE6	NE6	NE3	ENE7	NNE5	NE5	ENE9	ENE9	ENE7	NE5	N14	NNE13	N13	NNE4.5	N14
18-May	NNE10	N9	N7	NNE7	NNE7	NNE9	NNE10	NNE10	NNE11	N10	NW3	NNE4	NE7	NE9	NE10	ENE12	E10	ENE9	NE10	NNE9	N10	NNE8	N6	N8	NNE7.9	ENE12
19-May	NNE8	N7	ENE6	W1	ESE5	SSE6	S11	S13	S10	S13	S12	SSE14	SSE15	SSE17	S17	S18	S17	S18	S18	S20	S16	S16	S13	S12	S10.7	S20
20-May	SSW7	SSE6	S7	S8	SSW6	S8	S13	S16	SSE15	SSE17	SSE17	S16	SSW14	SW11	ESE1	SSE11	SSE14	SE12	NNW4	NNE11	NNW5	NE8	E9	SSE2	SSE7.0	SSE17
21-May	SSW3	S8	S7	SSW7	SSW10	S10	S9	S10	S12	SSW12	SSW9	SSW16	WSW10	SW18	SW21	SW24	W19	WNW22	WNW11	W13	W10	SW6	SW8	WSW8	SW9.5	SW24
22-May	SW9	SW9	S4	SSW5	NW4	SE2	ESE2	E4	SSE2	SSW7	S7	SSW10	SW12	SW15	SW12	SSW11	SW11	SSW9	S10	W1	NNE4	N5	NW5	NNW5	SW4.7	SW15
23-May	NNW4	WNW1	SW4	SSW5	S8	SSW9	S10	SSW8	WSW4	SSE4	SSE10	SSE13	SE13	SSE11	S13	SSE14	SSE11	S8	W4	NE3	E6	E8	W19	WNW22	S5.1	WNW22
24-May	WNW14	WSW4	SW8	WNW8	W7	W5	S2	WNW7	W11	WNW10	N11	NNW11	NNE12	NNE8	WNW10	W19	NW12	NE7	NE8	NE8	ENE6	ENE3	NNW3	NNW5	NW5.2	W19
25-May	NW5	N4	NNW5	NNW4	NNW2	SSW3	SSE2	SE3	SE6	ESE10	ESE9	SE4	E7	E9	E10	SE7	N1	NNW11	NNE12	NNE8	NNE6	NNE3	NNW5	ENE3	NE3.0	NNE12
26-May	E3	ESE7	N3	E4	NNE3	N6	ENE6	ENE8	E8	ESE10	SE11	SSE10	ESE11	ENE11	NNE13	NNE11	NE4	N6	NE9	NE11	NE12	NNE13	NNE14	NNE14	NE6.4	NNE14
27-May	NNE14	NNE12	NNE11	NNE11	NNE10	NNE11	NNE13	N15	NNE15	N13	N14	N18	NNE14	NNE17	NNE16	N14	NNE11	NNE8	NE6	NNE3	NNW4	NNE5	ENE6	ENE5	NNE10.8	N18
28-May	NE3	N4	N4	NNW5	N4	NNE5	NE6	ENE9	E9	ENE9	ENE11	SE9	SE9	ESE9	SE8	SE8	SE7	SSE9	SE8	SE8	SE6	SE6	SE6	ESE4	ESE5.0	ENE11
29-May	NNE2	E3	NNW4	NE3	NE5	NNE3	N5	N6	N7	NNE8	NNE7	NNE8	NNE10	N10	N11	N9	N12	NNW14	NW13	WNW11	NW11	WNW9	W9	WSW8	NNW6.0	NNW14
30-May	SW7	SW8	SW10	WSW9	W8	WNW12	WNW13	W12	WNW18	WNW19	WNW23	WNW28	WNW28	WNW28	WNW21	NW23	NW14	NW18	NW11	N12	NE9	S4	SSW9	SW10	WNW12.0	WNW28
31-May	SW12	WSW11	N0	SE4	SSW6	WSW1	NNE4	NE8	NE5	NE6	NE7	ENE10	NE12	NE14	NE14	NE13	NE13	NE13	NE12	NE11	NNE11	NNE7	N5	NNE6	NE5.8	NE14

NW3.8	NNW3.2	NW2.9	NW2.9	NW2.6	NW2.3	N2.1	N2.0	N2.6	N3.6	N4.7	NNE4.6	NNE5.4	N4.6	NNE5.0	NNE5.1	NNE5.8	NNE6.5	NNE6.5	NNE6.0	NNE4.9	NNE3.4	NNW2.5	NNW3.3	Diurnal Average	
N18	NW22	NNW17	WNW21	NW23	NW20	NW22	NW22	NNE23	NW24	NNW25	WNW28	WNW28	WNW28	WNW22	NW25	N22	WNW22	NE20	S20	S16	S16	W19	WNW22	Diurnal Maximum	

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



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

**Wind Speed (WS) - km/h**  
**CNRL Horizon - May 2014**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 12 km/h on May 23 23:00	Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9
Minimum Value: 0 km/h on May 25 01:00	
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> = 7	

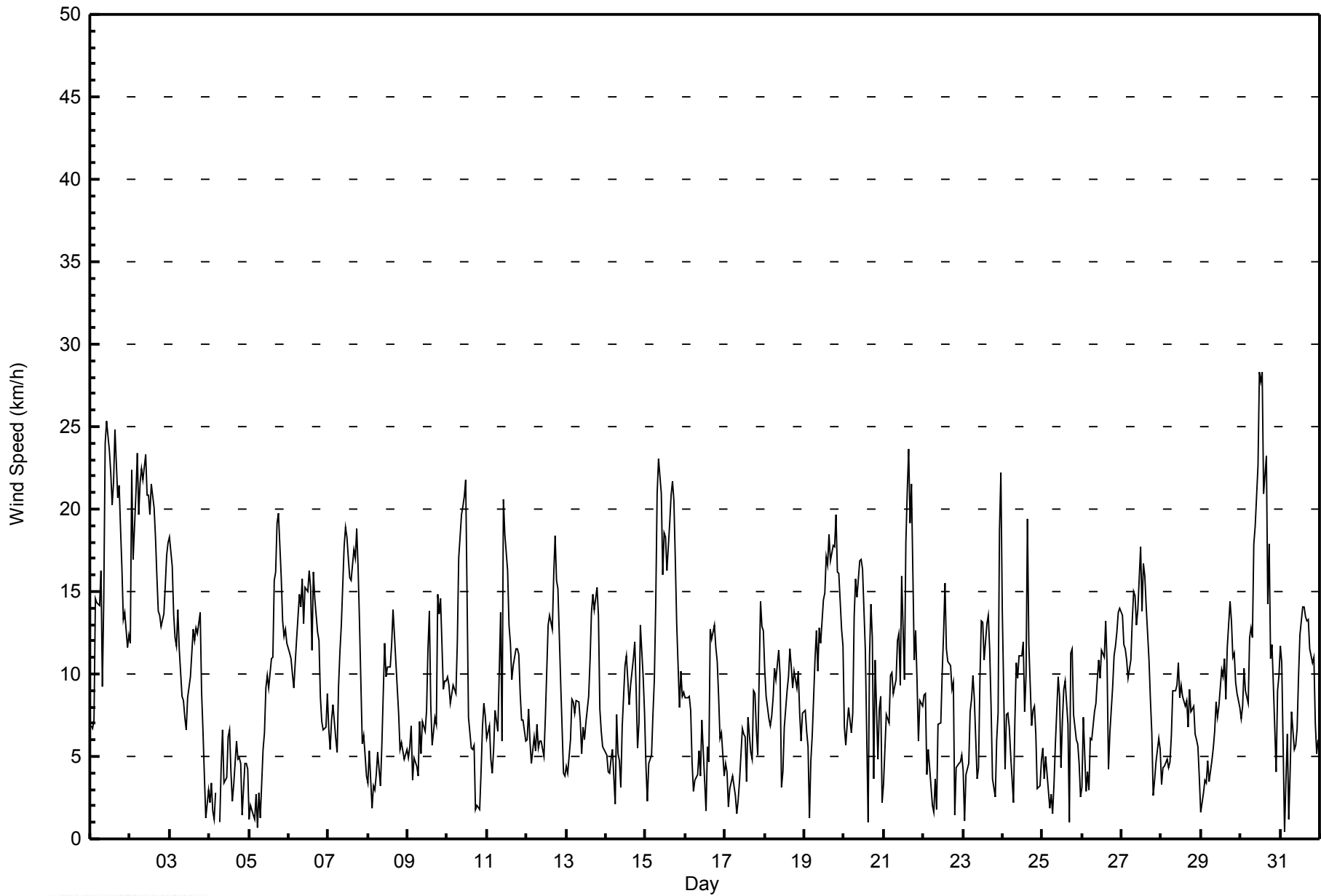
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-May	2	3	2	4	4	3	4	2	7	6	7	6	6	6	6	6	6	6	5	4	4	3	3	3	7
2-May	4	7	5	5	5	5	5	6	6	5	5	5	5	6	5	5	4	4	4	3	3	4	4	5	7
3-May	4	4	4	3	3	4	3	3	2	2	2	3	4	5	4	4	4	3	3	2	1	1	1	1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

AF - Analyzer Failure



**WBEA**  
**Hourly Averages**

**Wind Speed (WS) - km/h**  
**CNRL Horizon - May 2014**







**WBEA**  
**Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h**  
**CNRL Horizon - May 2014**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	184	24.76	24.76
6 - 11	319	42.93	67.70
12 - 19	195	26.24	93.94
20 - 28	45	6.06	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



**WBEA**  
**Frequency Distribution**

**Wind Speed (WS) - km/h**  
**CNRL Horizon - May 2014**

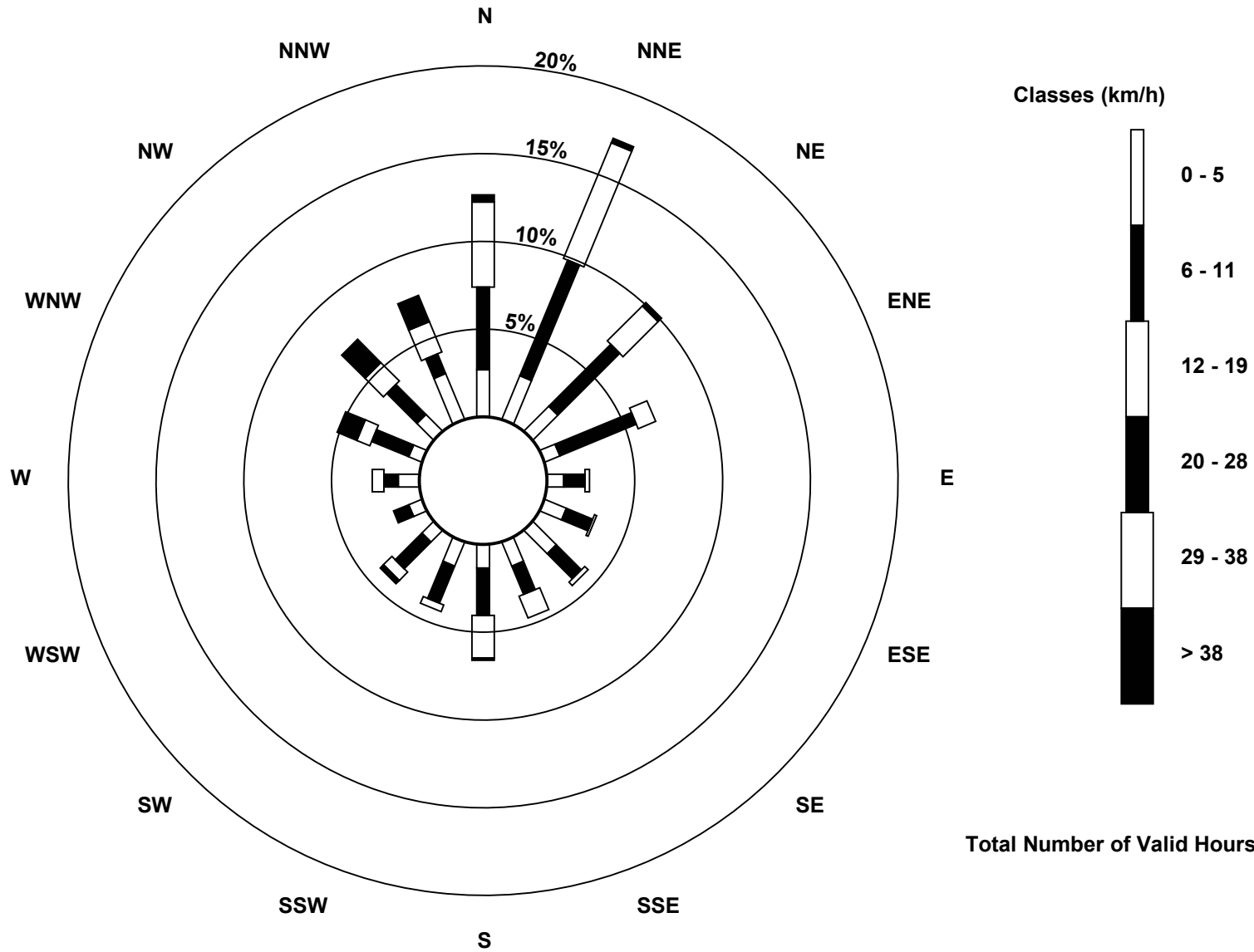
Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	20	20	15	7	7	10	14	11	10	11	7	6	9	6	10	21	184
6 - 11	35	53	37	35	9	12	15	13	20	17	16	7	6	17	18	9	319
12 - 19	36	53	21	8	2	1	2	10	18	3	5	0	5	6	11	14	195
20 - 28	3	2	2	0	0	0	0	0	1	0	2	0	0	9	14	12	45
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	94	128	75	50	18	23	31	34	49	31	30	13	20	38	53	56	743

Total Number of Valid Hours: 743

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Wind Speed (WS) - km/h  
CNRL Horizon (AMS 15)**





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

**Wind Direction (WD) - deg**  
**CNRL Horizon - May 2014**

Direction of Maximum Speed: 292 deg on May 30 14:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 338.9 deg on May 2	Hours of Data: 743
Direction of Minimum Speed: 1 deg on May 31 03:00	Direction of Minimum Daily Speed Average: 1.4 deg on May 4
Direction of Minimum Speed: 1 deg on May 31 03:00	Hours of Missing Data: 1
Monthly Average Direction: 304.2 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-May	288	19	321	327	328	318	327	303	300	325	339	341	340	328	303	321	314	315	333	340	344	323	315	313	324.8
2-May	305	320	333	303	307	316	319	320	329	331	327	336	331	342	342	0	34	20	19	27	17	7	359	0	338.9
3-May	1	2	5	8	11	348	341	11	38	42	34	64	48	36	63	46	63	63	61	58	59	83	137	324	30.2
4-May	261	270	283	0	196	AF	32	111	132	142	355	21	77	147	125	236	167	197	190	217	130	286	161	172	165.5
5-May	107	7	17	61	309	174	142	170	35	58	102	63	46	17	12	21	32	36	51	48	33	35	44	31	39.8
6-May	21	16	6	5	2	14	13	23	23	15	25	39	16	8	15	14	9	6	5	14	359	354	349	355	12.9
7-May	348	345	358	351	340	5	17	8	13	13	354	359	360	9	9	11	16	11	22	35	40	15	16	49	9.1
8-May	34	62	133	98	120	101	53	74	61	38	40	38	47	46	40	28	16	15	31	24	10	6	342	308	35.6
9-May	1	306	297	272	205	226	253	316	327	317	330	346	20	8	10	5	6	8	4	0	354	323	319	304	340.6
10-May	305	303	300	301	309	282	307	313	321	329	326	325	330	312	26	17	11	330	268	226	198	224	231	250	311.5
11-May	282	285	305	279	225	236	214	193	187	269	318	331	334	340	26	20	29	30	33	23	21	58	37	13	342.9
12-May	357	6	353	347	349	4	13	60	76	72	74	79	36	63	47	50	24	18	27	22	28	63	132	213	34.3
13-May	253	233	227	220	208	201	184	181	155	115	55	58	51	14	38	31	37	31	29	28	40	76	28	305	46.9
14-May	331	294	212	200	191	165	180	166	134	117	116	119	110	147	104	102	100	120	169	246	148	179	170	138	144.6
15-May	137	77	44	17	10	11	7	18	21	40	32	13	6	1	5	359	0	6	359	355	323	325	329	310	7.2
16-May	314	307	301	304	289	157	150	188	177	357	337	8	17	179	166	99	83	71	76	69	58	52	45	17	49.0
17-May	316	282	247	341	357	346	21	108	51	143	70	73	46	51	73	24	37	59	63	62	35	10	12	11	33.1
18-May	15	0	7	20	26	19	21	27	17	11	326	28	35	39	46	57	79	71	52	21	9	16	358	352	26.5
19-May	13	9	60	278	112	151	169	179	171	190	173	147	166	167	170	173	173	169	172	180	185	185	185	186	170.9
20-May	196	161	174	175	198	187	172	177	168	164	164	173	197	219	120	154	150	129	341	22	343	38	88	163	165.4
21-May	212	175	187	205	192	186	183	189	189	207	212	212	257	224	229	221	276	300	284	272	267	221	223	237	228.3
22-May	221	230	173	212	316	138	115	99	148	202	176	206	220	227	222	213	222	207	182	270	28	352	306	337	216.3
23-May	335	290	231	192	181	199	183	200	238	162	147	150	145	160	173	163	160	169	267	45	86	92	263	283	184.2
24-May	297	249	234	292	275	280	190	298	281	295	9	346	26	12	292	279	309	46	39	35	65	32	347	340	320.3
25-May	322	356	346	335	337	200	151	126	125	116	102	124	86	97	90	133	4	337	21	25	25	18	340	70	56.0
26-May	87	114	352	91	21	10	76	58	79	111	132	159	108	78	26	12	43	6	35	47	40	23	26	14	54.8
27-May	14	18	17	15	22	27	18	8	16	10	9	8	20	16	15	11	18	24	38	14	327	14	60	62	17.0
28-May	36	2	9	342	8	33	54	73	92	66	77	126	140	113	130	141	127	152	130	136	134	136	126	103	102.9
29-May	15	99	338	35	36	30	3	5	1	25	29	25	13	5	358	358	355	344	323	300	311	286	272	238	346.4
30-May	234	229	232	241	261	292	295	279	286	289	293	298	293	292	298	312	326	325	325	4	37	185	212	216	291.5
31-May	233	238	1	135	211	250	32	46	35	42	55	59	45	52	53	51	36	47	47	36	31	16	9	12	41.6

324.3 328.0 325.1 317.1 313.1 322.5 350.1 359.8 10.5 7.2 11.2 13.4 16.1 9.1 17.0 15.9 23.6 21.4 25.7 21.5 21.6 14.5 347.5 327.8  
 Diurnal Average

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



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

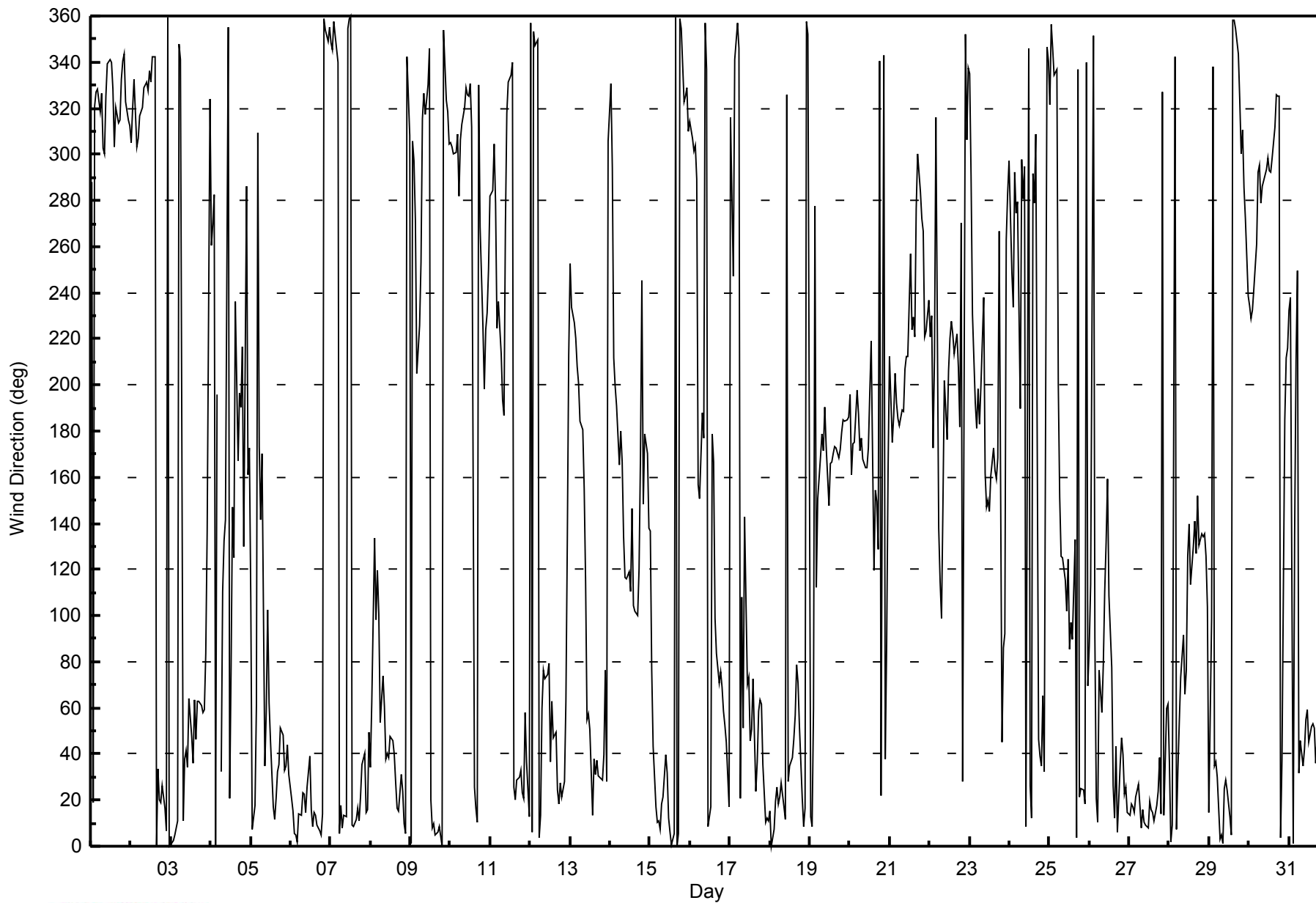
**Wind Direction (WD) - deg**  
**CNRL Horizon - May 2014**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0																			Hours in Service: 744						
Maximum Value: 102 deg on May 4 21:00																			Hours of Data: 743						
Minimum Value: 6 deg on May 21 02:00																			Hours of Missing Data: 1						
Percentiles: P <sub>1</sub> = 9 P <sub>10</sub> = 14 Q <sub>1</sub> = 17 Median = 21 Q <sub>3</sub> = 32 P <sub>90</sub> = 56 P <sub>99</sub> = 89																			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-May	35	26	19	14	15	13	16	19	24	17	22	21	19	21	18	17	21	21	18	17	26	14	14	18	35
2-May	19	18	22	16	14	15	16	18	16	16	15	17	17	18	20	22	18	17	17	18	18	19	20	19	22
3-May	19	18	18	18	18	20	20	24	27	31	45	45	41	40	29	35	23	22	16	16	10	16	86	13	86
4-May	56	24	38	75	47	AF	82	50	40	75	88	47	53	82	92	87	60	57	32	25	102	41	64	28	102
5-May	71	26	55	74	17	85	24	72	20	27	37	27	39	29	30	24	18	16	16	15	17	17	14	14	85
6-May	15	15	15	15	15	18	17	18	21	29	25	27	25	29	40	25	27	21	21	17	12	11	18	14	40
7-May	18	20	12	13	19	28	17	20	21	23	23	23	24	25	26	27	23	21	21	17	19	15	20	25	28
8-May	15	12	55	29	43	32	22	54	48	19	16	19	18	22	19	21	20	22	19	19	16	16	28	10	55
9-May	23	23	11	38	14	12	32	21	28	25	47	45	34	20	38	64	52	61	19	19	18	21	14	14	64
10-May	16	15	13	15	15	16	15	14	16	18	16	16	19	19	34	30	29	68	67	40	16	15	12	20	68
11-May	14	12	40	33	11	10	18	15	15	73	19	18	27	26	31	26	22	19	17	17	14	15	19	12	73
12-May	14	14	17	12	8	14	18	39	49	62	76	57	36	29	26	25	22	19	19	20	16	24	31	41	76
13-May	14	18	13	6	8	11	16	20	35	62	51	74	48	51	42	28	24	19	18	17	15	17	33	20	74
14-May	14	28	14	20	20	73	20	37	46	71	50	31	30	43	59	35	25	20	49	63	25	26	19	15	73
15-May	44	46	23	15	16	16	17	17	18	16	17	19	19	18	18	20	20	20	18	18	16	14	14	9	46
16-May	13	8	9	6	27	15	26	46	46	79	34	63	91	65	79	25	25	22	18	17	13	12	13	12	91
17-May	21	27	47	41	14	24	36	87	74	72	58	76	60	90	56	75	68	39	18	13	24	20	18	17	90
18-May	18	18	18	19	19	17	20	22	20	24	80	80	17	24	38	30	26	26	22	17	17	17	15	17	80
19-May	13	14	27	89	42	15	17	20	29	24	28	29	30	22	24	21	23	19	17	16	13	14	13	14	89
20-May	17	20	15	11	15	17	16	18	19	20	21	22	20	56	88	26	20	22	84	37	43	38	16	63	88
21-May	41	6	13	11	13	14	18	22	18	24	34	36	37	25	23	22	38	17	31	26	23	14	12	10	41
22-May	9	9	45	39	31	77	71	57	88	37	45	52	35	28	30	24	27	29	16	85	26	23	11	20	88
23-May	13	87	38	32	21	16	20	21	69	64	30	21	24	35	26	27	26	35	60	66	25	17	76	18	87
24-May	25	59	25	26	18	32	67	45	23	26	26	33	22	33	44	21	50	31	34	19	11	22	21	13	67
25-May	18	23	9	13	83	36	89	48	46	28	40	70	65	52	38	56	85	30	18	18	12	13	16	56	89
26-May	68	17	49	34	56	63	36	23	31	26	23	22	24	27	19	24	29	19	24	15	16	17	16	17	68
27-May	17	17	17	17	20	18	18	18	17	18	18	19	22	19	17	18	17	24	16	37	24	17	15	18	37
28-May	33	11	17	21	29	22	25	24	24	28	29	39	35	30	32	29	29	25	24	20	18	14	14	17	39
29-May	49	34	25	42	12	29	20	18	24	18	17	16	18	18	17	19	18	19	16	15	16	17	22	17	49
30-May	18	15	16	20	23	21	21	21	18	20	19	18	20	17	19	16	18	17	19	31	15	52	12	13	52
31-May	15	29	92	46	21	80	55	30	43	50	68	36	29	23	26	28	23	21	19	18	15	13	16	21	92
71 87 92 89 83 85 89 87 88 79 88 80 91 90 92 87 85 68 84 85 102 52 86 63																									
Diurnal Maximum																									
AF - Analyzer Failure																									



**WBEA**  
**Hourly Averages**

**Wind Direction (WD) - deg**  
**CNRL Horizon - May 2014**





# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Report

### Station Information

Calibration Date	May 8, 2014	Previous Calibration	April 11, 2014
Station Name	CNRL	Station Number	15
Reason:	Routine		
Start Time (MST)	9:20	End Time (MST)	13:35
Barometric Pressure	736 mmHg	Station temp.	20 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	10880507
Cal Gas Concentration	50.3 ppm	Cal Gas Expiry Date	06/11/2014
Gas Cert Reference	LL107945		
DACS make/model	Campbell Scientific CR3000	DACS serial No.	1850
DACS voltage range	0-5000mV	DACS channel #	Diff 1

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	1000	1000	PMT voltage	-648	-648
Analyzer Range (mv)	5000	5000	Lamp voltage	780	780
Calculated slope	1.006850	1.018836	Chamber temp.	45.3	45.3
Calculated intercept	0.021069	-1.007381	Pressure (mmHg)	702.4	702.4
Analyzer Background	12.4	12.4	Flow (lpm)	0.423	0.423
Analyzer Coefficient	0.984	0.984	Intensity	87	87

Analyzer make 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	-0.2	NA
as found span	5000	82.3	827.9	812.2	1.019
calibrator zero	5000	0.0	0.0	-0.2	NA
high point	5000	82.3	827.9	812.2	1.019
second point	5000	41.2	414.5	410.8	1.009
third point	5000	20.6	207.2	204.0	1.016
calibrator zero	5000	0.0	0.0	0.0	NA
as left zero	5000	0.0	0.0	0.0	NA
as left span	5000	82.3	827.9	816.4	1.014
Average Correction Factor					1.015

Corrected As found 812.4 Previous response 822.3 % change 1.2%

#### Notes:

NO Maintenance or adjustments made, filter changed

Calibration Performed By:

Melissa Lemay



# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Summary

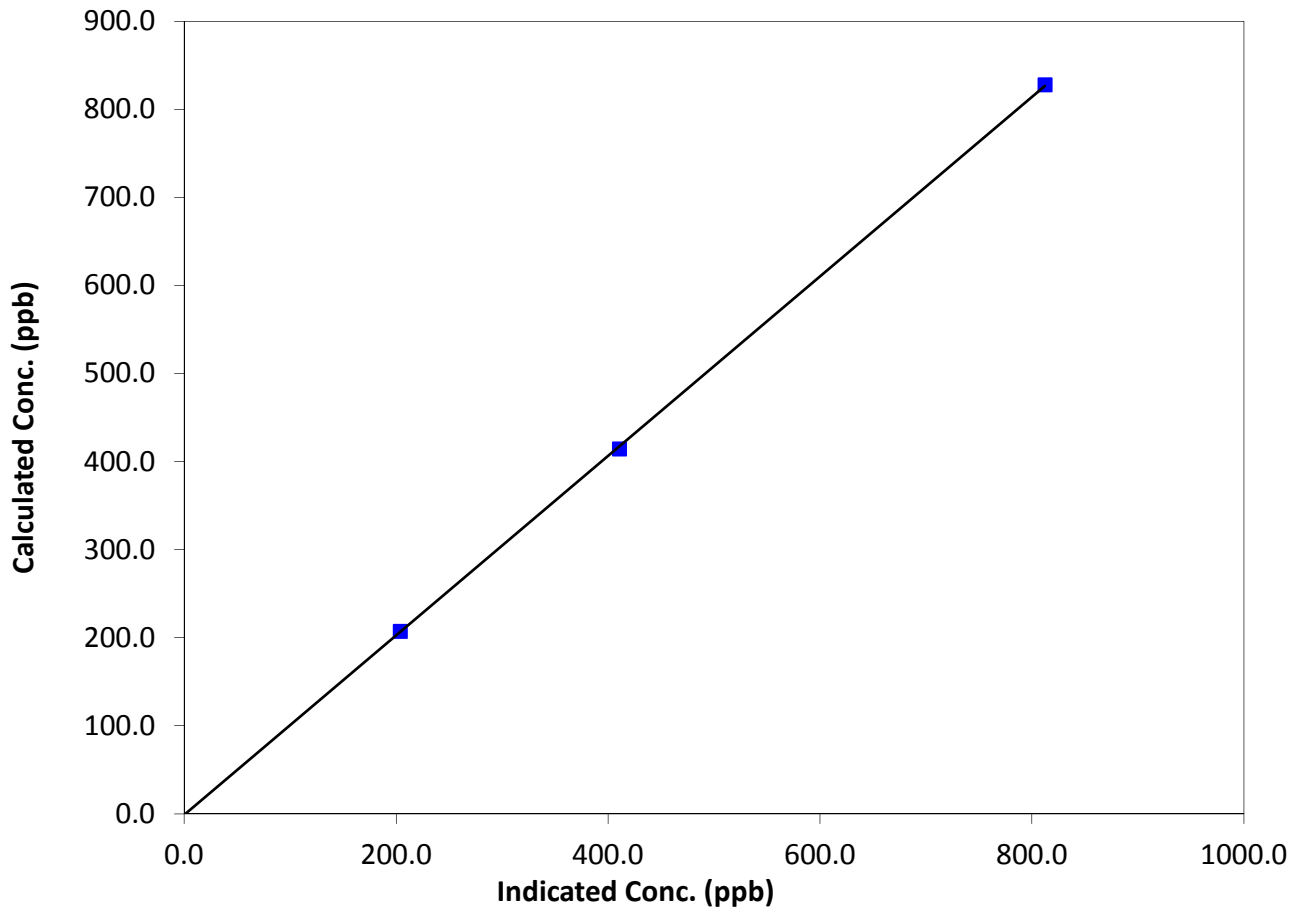
### Station Information

Calibration Date	May 8, 2014	Previous Calibration	April 11, 2014
Station Name	CNRL	Station Number	15
Start Time (MST)	9:20	End Time (MST)	13:35
Analyzer make	43i	Analyzer serial #	10710321322

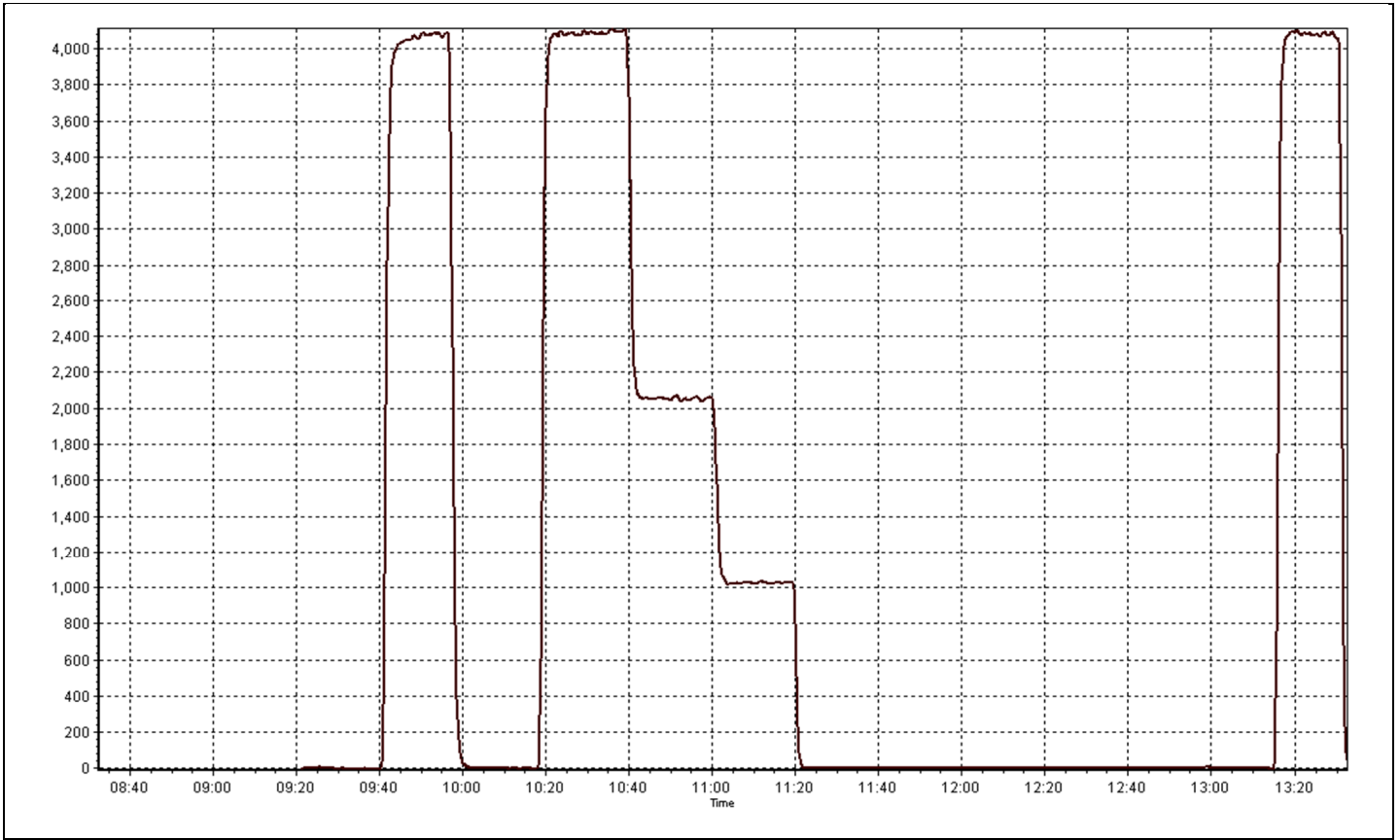
### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	N/A	Correlation Coefficient	0.999965
827.9	812.2	1.0194		
414.5	410.8	1.0089	Slope	1.018836
207.2	204.0	1.0159		
			Intercept	-1.007381

**SO<sub>2</sub> Calibration Curve**









# Wood Buffalo Environmental Association

## TRS Calibration Report

### Station Information

Calibration Date	May 9, 2014	Previous Calibration	April 14, 2014
Station Name	CNRL Horizon	Station Number	15
Reason:	Routine		
Start Time (MST)	8:30	End Time (MST)	10:40
Barometric Pressure	736 mmHg	Station temp.	25 Deg C
Calibrator Make/Model	Sabio 4010	Serial number	LL155297
Cal Gas Concentration	10.4 ppm H2S	Cal Gas Expiry Date	5-30-2013
Gas Cert Reference	cc257967	SO2 gas conc.	50.3 ppm SO2
DACS make/model	Campbell Scientific CR3000	DACS serial No.	1850
DACS voltage range	0-5000mV	DACS channel #	DIFF 2

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	100	100	PMT voltage	-672	-672
Analyzer Range (input)	5000	5000	Lamp voltage	767	767
Calculated slope	1.008261	1.023311	Chamber temp.	45	45
Calculated intercept	-0.378823	-0.564042	Pressure	680.7	680.7
Analyzer Background	8.8	8.8	Flow	0.413	0.413
Analyzer Coefficient	0.909	0.909	Intensity	90	90
			Converter temp.	809	809

Analyzer make/model	TEI 431	Analyzer serial #	0710321323
Converter make/model	NOVA model CDN101	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	5000	0.0	0.0	0.2	NA
as found span	5000	38.5	80.1	78.5	1.020
SO2 scrubber check	5000	20.6	207.2	0.2	NA
calibrator zero	5000	0.0	0.0	0.2	NA
high point	5000	38.5	80.1	78.5	1.020
second point	5000	19.2	39.9	40.2	0.994
third point	5000	9.6	20.0	20.1	0.991
calibrator zero	5000	0.0	0.0	0.2	NA
as left zero	5000	0.0	0.0	0.2	NA
as left span	5000	38.5	80.1	79.1	1.012
Average Correction Factor					1.002

Corrected As found	78.3	Previous response	79.8	% change	1.9%
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#### Notes:

NO adjustments made, scrubber checked after third point

Calibration Performed By:

Melissa Lemay



## Wood Buffalo Environmental Association

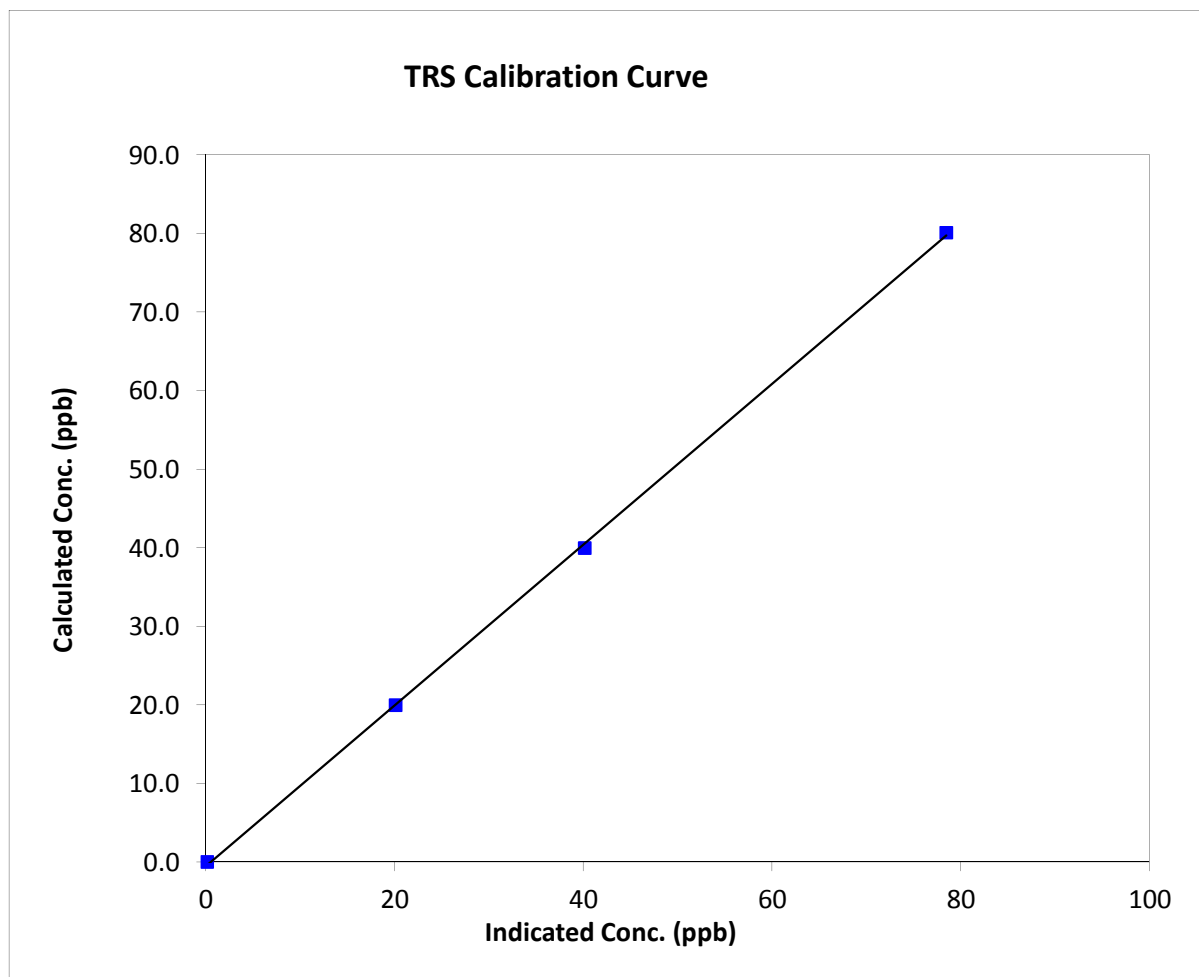
### TRS Calibration Summary

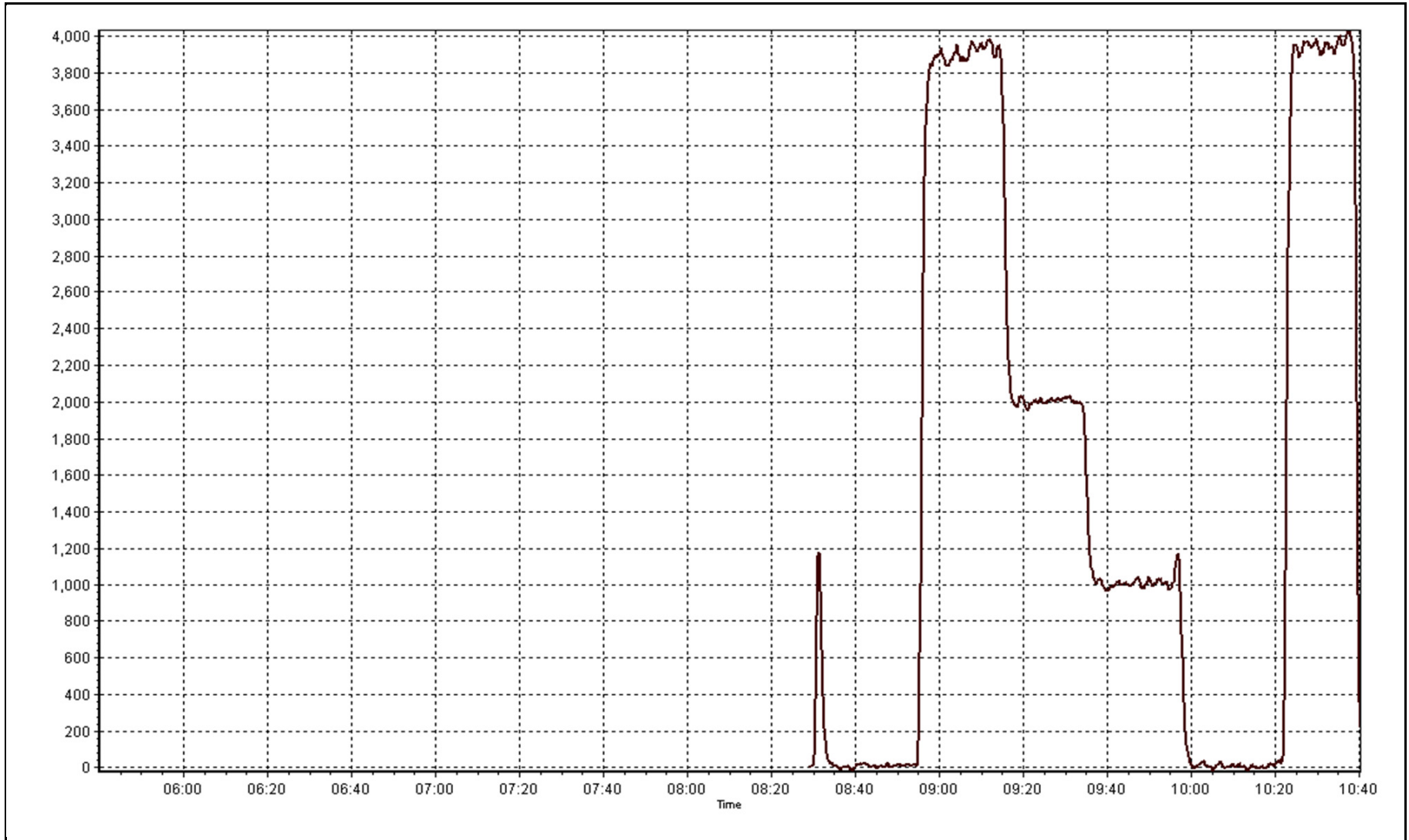
#### Station Information

Calibration Date	May 9, 2014	Previous Calibration	April 14, 2014
Station Name	CNRL Horizon	Station Number	15
Start Time (MST)	8:30	End Time (MST)	10:40
Analyzer make	TEI 43I	Analyzer serial #	0710321323

#### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.2	N/A	Correlation Coefficient	0.999821
80.1	78.5	1.0204		
39.9	40.2	0.9939	Slope	1.023311
20.0	20.1	0.9915		
			Intercept	-0.564042







# Wood Buffalo Environmental Association

## THC Calibration Report

### Station Information

Calibration Date	May 8, 2014	Previous Calibration	April 29, 2014
Station Name	CNRL Horizon	Station Number	AMS 15
Reason:	Routine		
Start Time (MST)	9:20	End Time (MST)	13:35
Barometric Pressure	741 mmHg	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	10880507
Gas Cert Reference	LL107945	Cal Gas Expiry Date	06/11/2014
CH4 Cal Gas Conc.	490.0 ppm	CH4 Equiv Conc.	1062.0 ppm
C3H8 Cal Gas Conc.	208 ppm		
DACS make/model	Campbell Scientific CR3000	DACS serial No.	2582
DACS voltage range	0-5000mV	DACS channel #	SE 3

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppm)	25	25	Sample Pressure	6.0	6.0
Analyzer Range (mv)	5000	5000	Air or Bypass press	20.0	20.0
Calculated slope	1.007409	1.002616	Fuel Pressure	18.0	18.0
Calculated intercept	-0.005225	0.014280			

Analyzer make	TEI 51C-LT	Analyzer serial #	76232382
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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	-0.20	N/A
as found span	5000	82.3	17.48	17.18	1.018
calibrator zero	5000	0.0	0.00	-0.01	N/A
high point	5000	82.3	17.48	17.43	1.003
second point	5000	41.2	8.75	8.71	1.005
third point	5000	20.6	4.38	4.34	1.008
calibrator zero	5000	0.0	0.00	-0.01	N/A
as left zero	5000	0.0	0.00	-0.01	N/A
as left span	5000	82.3	17.48	17.42	1.003
Average Correction Factor					1.005

Corrected As found	17.38	Previous response	17.36	% change	-0.1%
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#### Notes:

Filter changed, No maintenance Done, Zero and Span adjusted

Calibration Performed By:

Melissa Lemay



# Wood Buffalo Environmental Association

## THC Calibration Summary

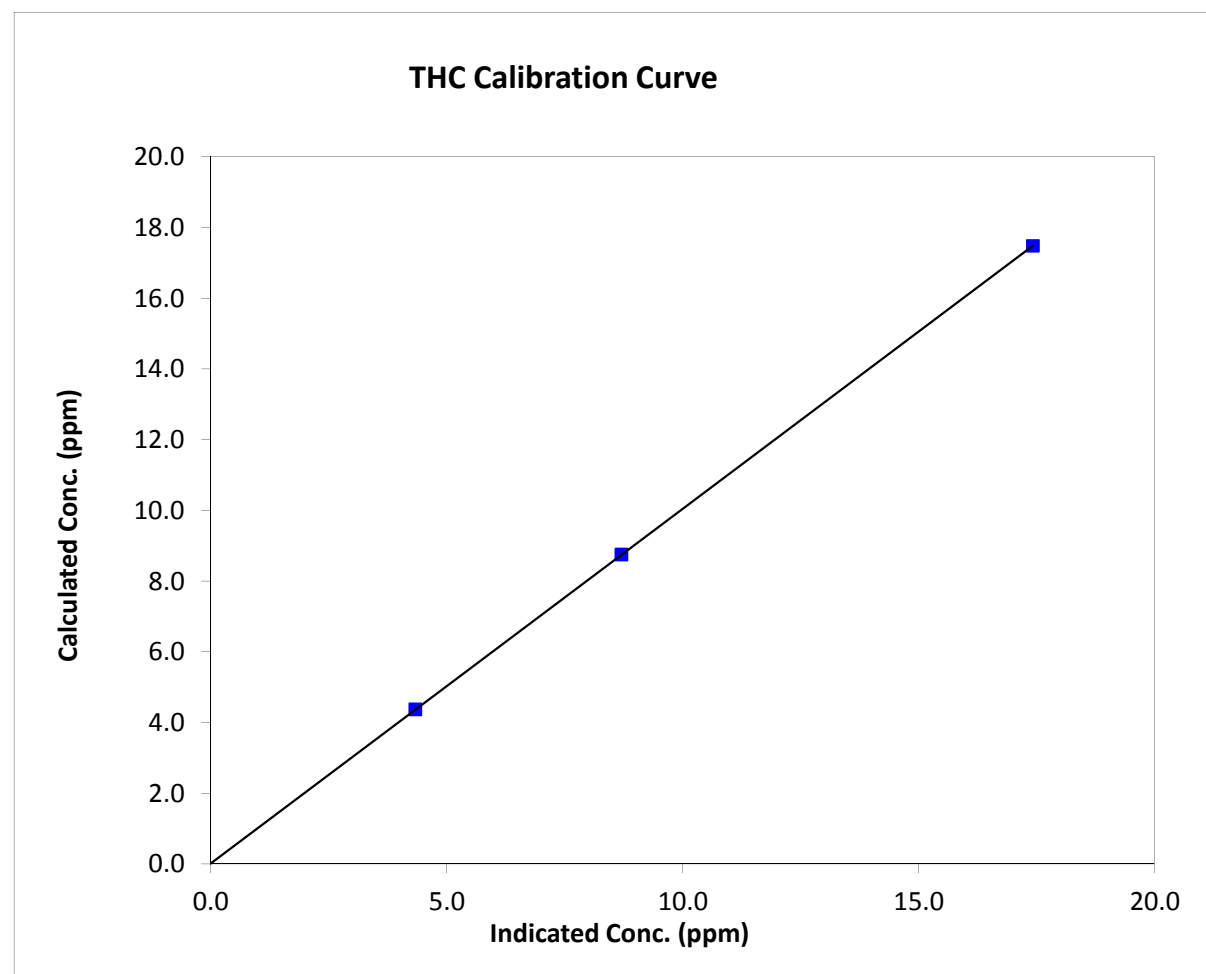
### Station Information

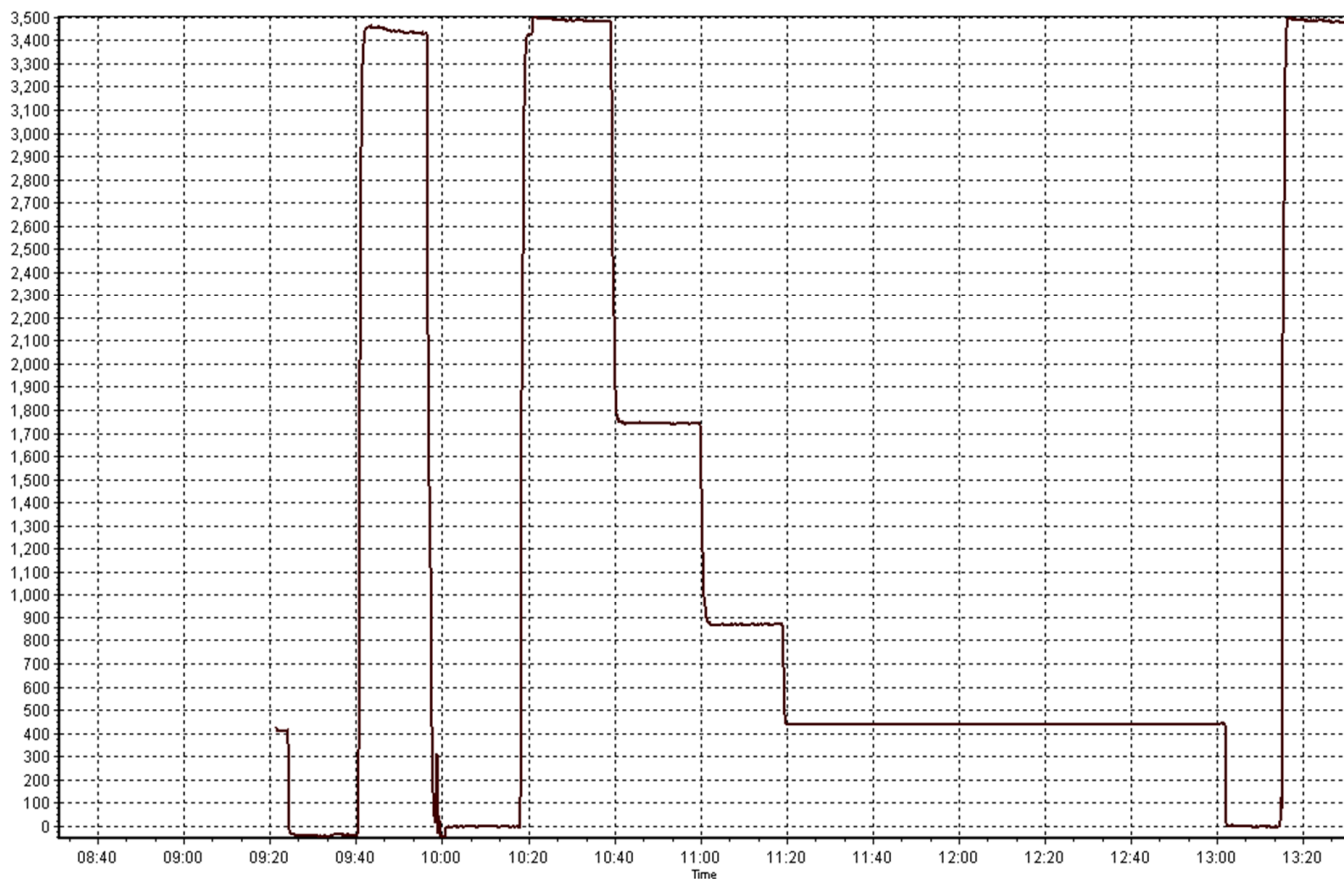
Calibration Date	May 8, 2014	Previous Calibration	April 29, 2014
Station Name	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	9:20	End Time (MST)	13:35
Analyzer make	TEI 51C-LT	Analyzer serial #	76232382

### Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	-0.01	N/A	Correlation Coefficient	0.999999
17.48	17.43	1.0032		
8.75	8.71	1.0047	Slope	1.002616
4.38	4.34	1.0082		
			Intercept	0.014280

**THC Calibration Curve**







# Wood Buffalo Environmental Association

## NO<sub>x</sub>-NO-NO<sub>2</sub> Calibration Report

### Station Information

Calibration Date	May 8, 2014	Previous Calibration	April 11, 2014
Station Name	CNRL Horizon	Station Number	AMS 15
Reason:	Routine		
Start Time (MST)	9:20	End Time (MST)	13:30
Barometric Pressure	mmHg	Station Temperature	22.0 Deg C
Calibrator	Sabio 4010	Serial Number	10880507
NO Cal Gas Conc	48.6 ppm	Cal Gas Expiry Date	November 6, 2014
NOx Cal Gas Conc	48.6 ppm	Cal Gas Serial #	LL107945

### DACS Information

DACS make & model Campbell Scientific CR3000      DACS serial No. 2632

Parameter		NOx	NO	NO2
MV conversion	Analyzer Range (ppb)	1000	1000	1000
	Analyzer Range (mv)	5000	5000	5000
Before	Data Slope	0.987288	0.983871	1.004268
	Data Offset	-0.417371	-0.135157	0.509968
After	Data Slope	0.990212	0.986649	1.003761
	Data Offset	-0.495757	0.060077	0.758586
Channel #		Diff 3	Diff 4	Diff 5
Voltage Range		0-5000mv	0-5000mv	0-5000mv

### Analyzer Information

Analyzer make/model 42i      Analyzer serial # 710321429

Test Point	before		after	
Concentration range	1000	ppb	1000	ppb
NO coefficient	0.843	ppb	0.843	ppb
NOX coefficient	0.998	ppb	0.998	ppb
NO2 coefficient	1.000	ppb	1.000	ppb
NO bkgrnd	10.3		10.3	
NOX bkgrnd	10.6		10.6	
Nt coefficient				
Chamber Temp	50.0	Deg C	50.0	Deg C
Moly Temp	325.0	Deg C	325.0	Deg C
PMT Temp	-3.0	Deg C	-3.0	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell Press	171.9	mmHg	171.9	mmHg
Sample Flow	0.690	ccm	0.690	ccm

**Notes:**

Filter changed, No adjustments made





# Wood Buffalo Environmental Association

## NO<sub>x</sub>-NO-NO<sub>2</sub> Calibration Report

### Station Information

Calibration Date: May 8, 2014 Station Number: AMS 15

### 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 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
as found zero	5000	0.0	0.0	0.0	0.0	0.0	-0.2	0.0	N/A	N/A
as found span	5000	82.3	800.0	800.0	0.0	808.0	810.6	0.0	0.9900	0.9869
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	-0.2	0.0	N/A	N/A
high point	5000	82.3	800.0	800.0	0.0	808.0	810.6	0.0	0.9900	0.9869
second point	5000	41.2	400.5	400.5	0.0	406.0	406.2	0.2	0.9864	0.9859
third point	5000	20.6	200.2	200.2	0.0	202.0	202.6	0.0	0.9912	0.9883
calibrator zero	5000	0.0	0.0	0.0	0.0	1.0	0.1	0.4	N/A	N/A
as left zero	5000	0.0	0.0	0.0	0.0	1.0	0.1	0.4	N/A	N/A
as left span	5000	82.3	800.0	438.8	361.2	810.0	446.8	364.8	0.9876	0.9821
Average Correction Factor									0.9892	0.9870

Corrcted As found NO<sub>x</sub>= 808.0 NO= 810.8 Percent Change NO<sub>x</sub>= 0.3% NO= 0.3%  
 Previous Response NO<sub>x</sub>= 810.7 NO= 813.2

### GPT Calibration Data

Dilution Flow 5000 ccm Source Gas Flow 82.30 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			0.0			N/A	
1st NO <sub>2</sub> (300)	N/A	438.8	367.6	802.0	438.8	365.8	0.9813	1.0000	1.0049	99.5%
2nd NO <sub>2</sub> (200)	N/A	576.6	229.8	802.0	576.6	228.0	0.9813	1.0000	1.0079	99.2%
3rd NO <sub>2</sub> (100)	N/A	716.0	90.4	802.0	716.0	88.4	0.9813	1.0000	1.0226	97.8%
4th NO <sub>2</sub> (0)	806.4	N/A	-2.4	804.0	806.4	-0.2	0.9789	1.0000	N/A	N/A
Average Correction Factor							0.9807	1.0000	1.0118	98.8%

Calibration Performed By: Melissa Lemay



# Wood Buffalo Environmental Association

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

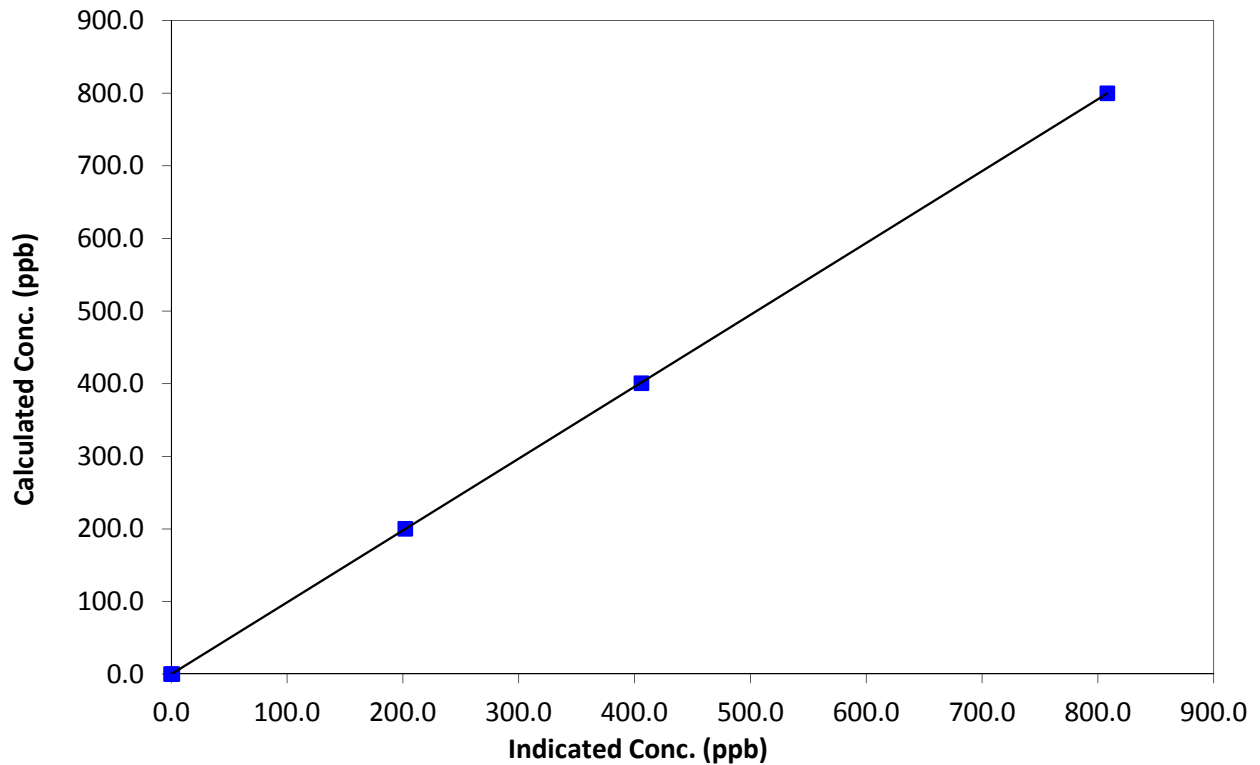
### Station Information

Calibration Date	May 8, 2014	Previous Calibration	April 11, 2014
Station Name	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	9:20	End Time (MST)	13:30
Analyzer make	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	0.999995
800.0	808.0	0.9900		
400.5	406.0	0.9864	Slope	0.990212
200.2	202.0	0.9912		
0.0	1.0	0.0000	Intercept	-0.495757

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





# Wood Buffalo Environmental Association

## NO Calibration Summary

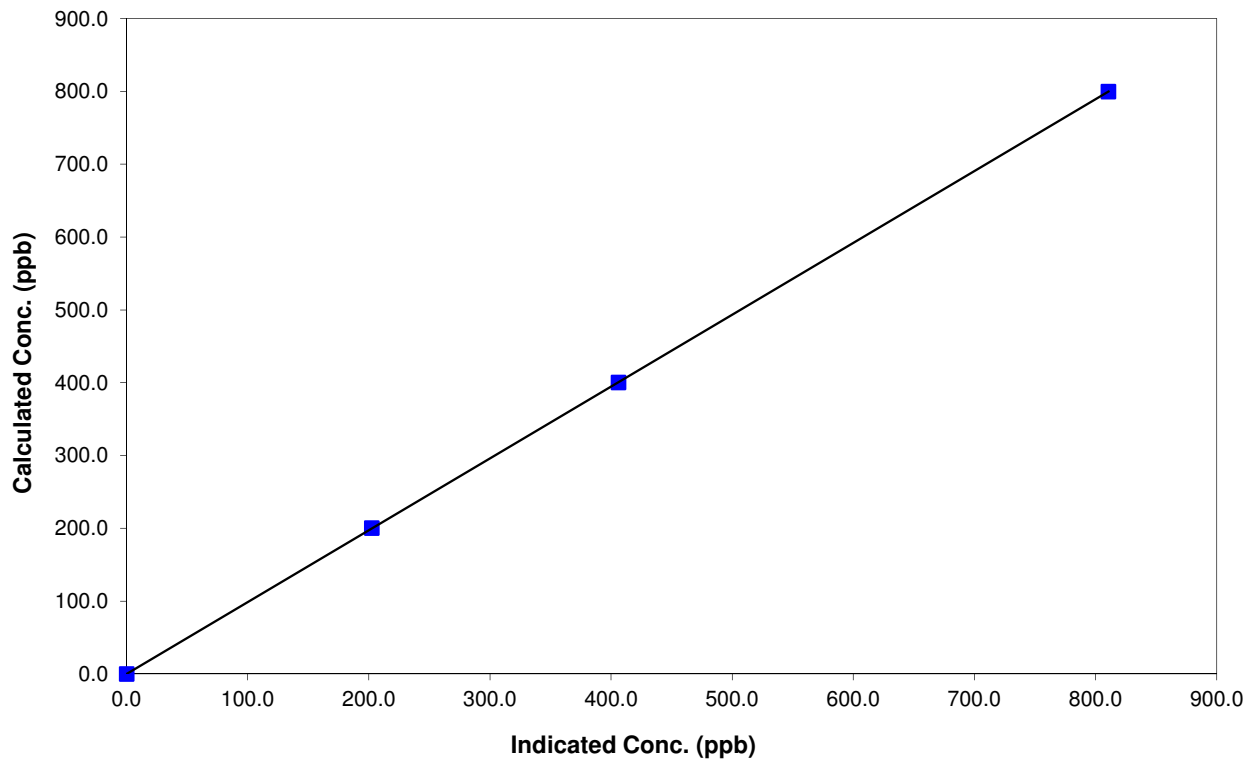
### Station Information

Calibration Date	May 8, 2014	Previous Calibration	April 11, 2014
Station Name	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	9:20	End Time (MST)	13:30
Analyzer make	42i	Analyzer serial #	710321429

### 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
800.0	810.6	0.9869		
400.5	406.2	0.9859	Slope	0.986649
200.2	202.6	0.9883		
0.0	0.1	0.0000	Intercept	0.060077

### NO Calibration Curve





# Wood Buffalo Environmental Association

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

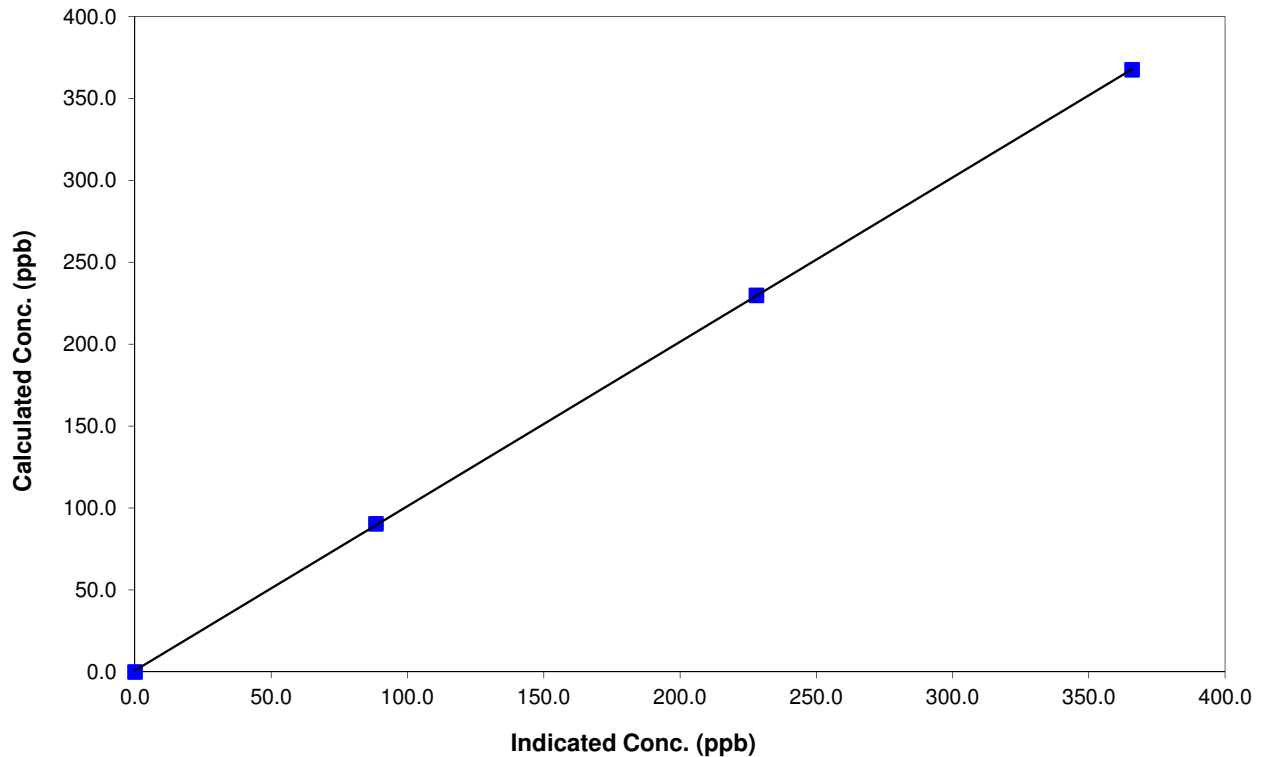
### Station Information

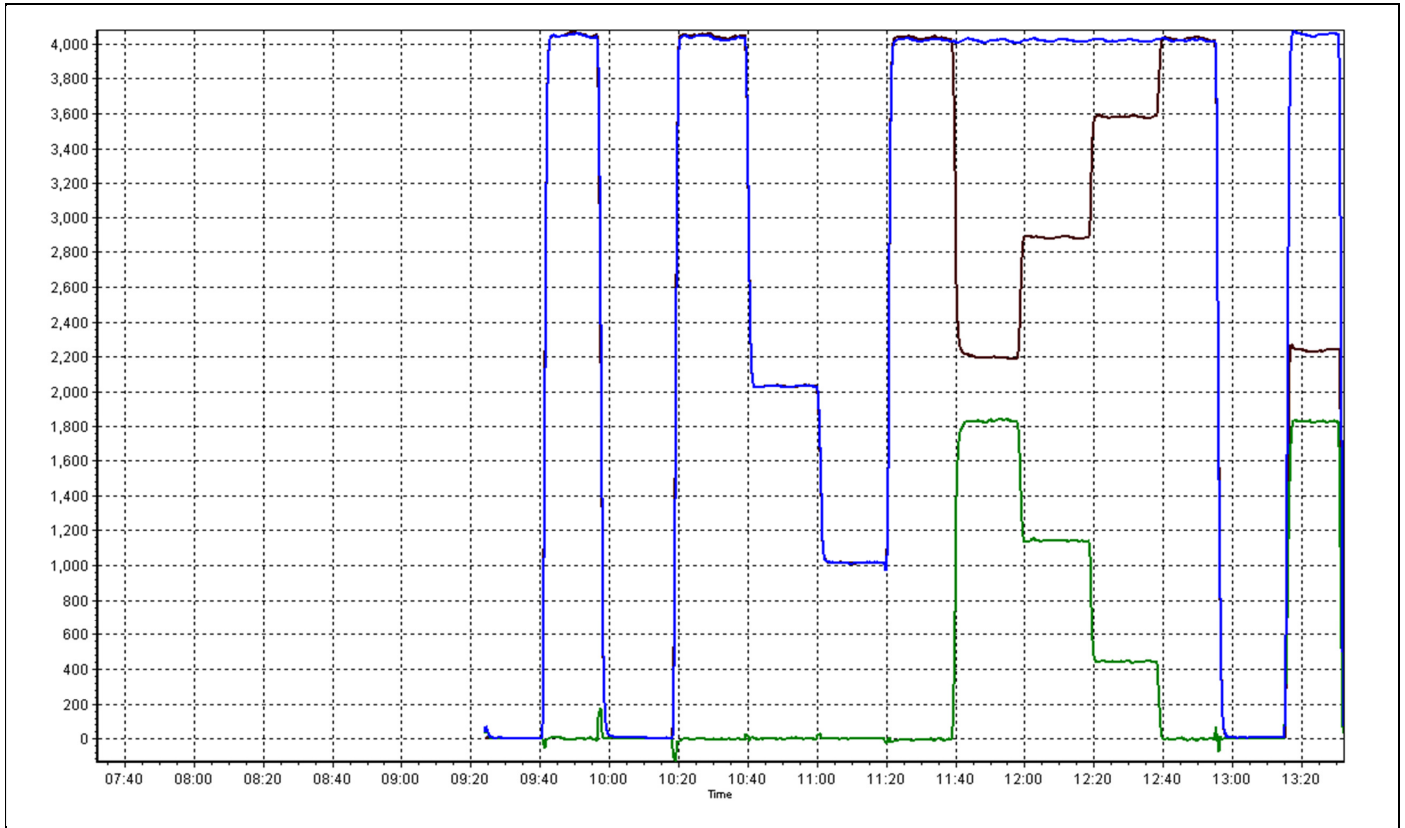
Calibration Date	May 8, 2014	Previous Calibration	April 11, 2014
Station Number	CNRL Horizon	Station Number	AMS 15
Start Time (MST)	9:20	End Time (MST)	13:30
Analyzer make	42i	Analyzer serial #	710321429

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999980
367.6	365.8	1.0049		
229.8	228.0	1.0079	Slope	1.003761
90.4	88.4	1.0226		
			Intercept	0.758586

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







# Wood Buffalo Environmental Association

## SHARP AUDIT / CALIBRATION

### STATION INFORMATION

Calibration Date:	<u>May 9, 2014</u>	Previous Calibration:	<u>April 14, 2014</u>
Station Name:	<u>CNRL Horizon</u>	Station Number:	<u>15</u>
Start Time (MST):	<u>10:41</u>	End Time (MST):	<u>11:01</u>
Calibrator Make/Model:	<u>DeltaCal</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-599</u>
Source SN:	<u>3534</u>
Mass Foil Set SN:	<u>2022</u>
HEPA PN:	<u>12144</u>
Time Correct (MST):	<u>Yes</u>
Parameters Checked:	<u>T1,P1,Flow Neph</u>

### AUDIT DATA

#### Temperature (deg C)

Sensor	Indicated	Measured	Difference	Final Indicated
T1 (Ambient Temp)	5.0	4.3	-0.7	5.0
T2 (Sample Temp)	N/A	N/A	#VALUE!	N/A
T3 (Orifice Temp)	N/A	N/A	#VALUE!	N/A
T4 (Heater external wall)	N/A	N/A	#VALUE!	N/A

#### Pressure (Hpa)

Sensor	Indicated	Measured	Difference	Final Indicated
P3 (Barometric Pressure)	966	969.0	3.0	969

#### Main Flow (Lph)

	Indicated	Measured	Difference	Final Indicated
	1000	1063	63	1009

#### Mass Foil Calibration

Zeroed?:	<u>Yes</u>
Foil Mass:	<u>No</u>
Previous Correction Factor:	<u>10780</u>
New Correction Factor:	<u>6977</u>

#### Nephelometer Calibration

Parameter	As Found	Zeroed	As Left
Analog	352	No	350
Neph	4.9	Yes	-0.8
C14	-9.9	Yes	-11.6
Indicated Concentration (ug/m3)	1.3	Yes	-0.2
Range 1	352	No	352.3
Range 2	45.9	No	45.6

### INSPECTION DATA

Item	Condition	Item	Condition
Cyclone	Good	HEPA filter	Good
Pump	Good		Good
Filter Tape	Good		Good
Mass Foil Cal Set	Good		Good

### NOTES:

Sampling Head Cleaned'

Audit Performed By:

Melissa Lemay

**WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS 16  
SHELL MUSKEG RIVER  
MAY 2014**

Operations and Data Collection by:  
Wood Buffalo Environmental Association  
Fort McMurray, Alberta

QA/QC, Data Validation and Reporting by:  
Aurora Atmospherics Inc.  
Calgary, Alberta

June 27, 2014

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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SHELL MUSKEG RIVER (AMS 16)  
MAY 2014

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	703	38	41	99.60	14	0	2	0
THC (ppm) Average	705	37	39	99.73	3.6	-	2.6	-
NO2 (ppb) Average	703	38	41	99.60	47	0	19	-
NO (ppb) Average	703	38	41	99.60	70	-	17	-
NOX (ppb) Average	703	38	41	99.60	112	-	33	-
PM2.5 (ug/m3) Average	741	0	3	99.60	25.3	-	7.8	0
Temperature 2 m (C) Average	744	0	0	100.00	28.8	-	20.6	-
Relative Humidity (%) Average	744	0	0	100.00	99	-	-	-
Barometric Pressure (inHg) Average	744	0	0	100.00	29.4	-	-	-
Wind Speed 10 m (km/h) Average	744	0	0	100.00	36	-	-	-
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 - SHELL MUSKEG RIVER (AMS 16)  
MAY 2014

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	703	0.4	1	-	0	0	0	0	0	1	14
THC (ppm) Average	705	2.32	0.2	-	1.9	2.1	2.2	2.3	2.4	2.6	3.6
NO2 (ppb) Average	703	9.1	8	-	0	1	3	7	13	20	47
NO (ppb) Average	703	4.6	8	-	0	0	0	2	6	11	70
NOX (ppb) Average	703	13.8	15	-	0	1	3	9	19	30	112
PM2.5 (ug/m3) Average	741	4.83	3.5	-	0.3	1.5	2.2	4	6.3	9.1	25.3
Temperature 2 m (C) Average	744	8.36	6.8	-	-8	-0.5	2.5	8.3	13.1	17.6	28.8
Relative Humidity (%) Average	744	63.4	22	-	20	33	44	64	84	92	99
Barometric Pressure (inHg) Average	744	28.94	0.2	-	28.5	28.7	28.8	28.9	29.1	29.2	29.4
Wind Speed 10 m (km/h) Average	744	11.4	6	-	0	4	6	11	16	20	36
Wind Direction 10 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SHELL MUSKEG RIVER (AMS 16)  
MAY 2014

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2	15 May 2014 11:00	15 May 2014 11:00	1	Power spike
SO2	17 May 2014 11:00	17 May 2014 12:00	2	Station power failure
THC	17 May 2014 11:00	17 May 2014 12:00	2	Station power failure
NO2, NO, NOX	15 May 2014 11:00	15 May 2014 11:00	1	Power spike
NO2, NO, NOX	17 May 2014 11:00	17 May 2014 12:00	2	Station power failure
PM2.5	17 May 2014 11:00	17 May 2014 12:00	2	Power spike
PM2.5	28 May 2014 13:00	28 May 2014 13:00	1	Flow and zero reference checks, sample head cleaning

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Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 14 ppb on May 20 09:00	Maximum Daily Average: 2.3 ppb on May 23		Hours of Data:	703
Minimum Value: 0 ppb on May 2 07:00	Minimum Daily Average: 0.0 ppb on May 24		Hours of Missing Data:	41
Maximum Diurnal Average: 1.6 ppb at hour 9	Minimum Diurnal Average: 0.1 ppb at hour 5		Hours of Calibration:	38
Monthly Average: 0.4 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> = 8		Percent Operational Time:	99.6

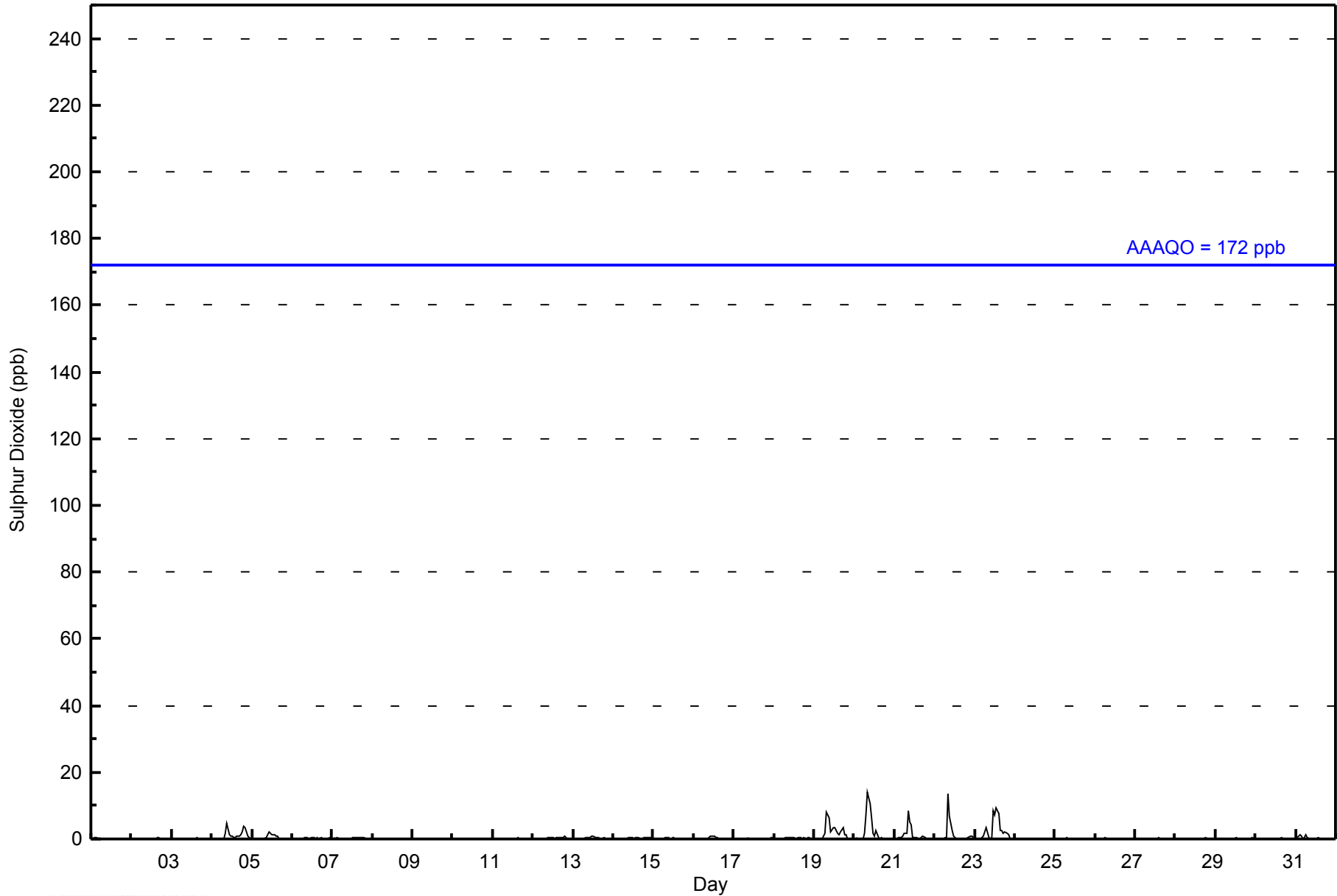
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-May	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
2-May	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
3-May	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
4-May	Z	0	0	0	0	0	0	0	2	5	1	1	1	1	1	1	1	1	2	4	4	1	1	0	1.0	5
5-May	Z	0	0	0	0	0	0	0	0	1	2	2	1	1	1	1	0	0	0	0	0	0	0	0	0.5	2
6-May	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
7-May	Z	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
8-May	Z	0	0	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-May	Z	0	0	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-May	Z	0	0	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-May	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
12-May	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0.2	1
13-May	Z	0	0	0	0	0	0	1	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1
14-May	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0.2	1
15-May	Z	0	0	0	0	0	0	0	0	0	PF	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
16-May	Z	0	0	0	0	0	0	0	0	0	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0.2	1
17-May	Z	0	0	0	0	0	0	0	0	0	PF	PF	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
18-May	Z	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
19-May	Z	0	0	0	0	0	2	8	7	6	2	3	3	2	2	1	2	3	1	1	0	0	0	0	2.0	8
20-May	Z	0	0	0	0	0	2	7	14	11	6	2	1	3	0	0	0	0	0	0	0	0	0	0	2.0	14
21-May	Z	0	0	0	0	1	2	2	8	5	4	0	0	0	0	0	1	0	0	0	0	0	0	0	1.1	8
22-May	Z	0	0	0	0	0	0	1	13	7	3	1	0	0	0	0	0	0	0	0	0	1	1	0	1.2	13
23-May	Z	0	0	0	0	1	2	3	1	0	0	8	7	9	8	2	3	2	2	2	1	0	0	0	2.3	9
24-May	Z	0	0	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-May	Z	0	0	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-May	Z	0	0	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-May	Z	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
28-May	Z	0	0	0	0	0	0	0	0	C	C	C	C	C	C	C	0	0	0	0	0	0	0	0	--	0
29-May	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
30-May	Z	0	0	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-May	Z	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
--	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.8	1.6	1.3	0.8	0.7	0.6	0.7	0.5	0.3	0.3	0.3	0.3	0.3	0.2	0.1	0.1	0.1	Diurnal Average	
--	1	1	1	1	0	1	2	8	14	11	6	8	7	9	8	2	3	3	2	4	4	1	1	0	Diurnal Maximum	

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



WBEA  
Hourly Averages

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Shell Muskeg River - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Shell Muskeg River - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	700	99.57	99.57
11 - 20	3	0.43	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 703

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Shell Muskeg River - May 2014**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	66	48	103	70	29	25	28	43	70	54	33	29	17	14	34	37	700
11 - 20	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	3
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	66	48	103	70	29	25	28	43	72	55	33	29	17	14	34	37	703

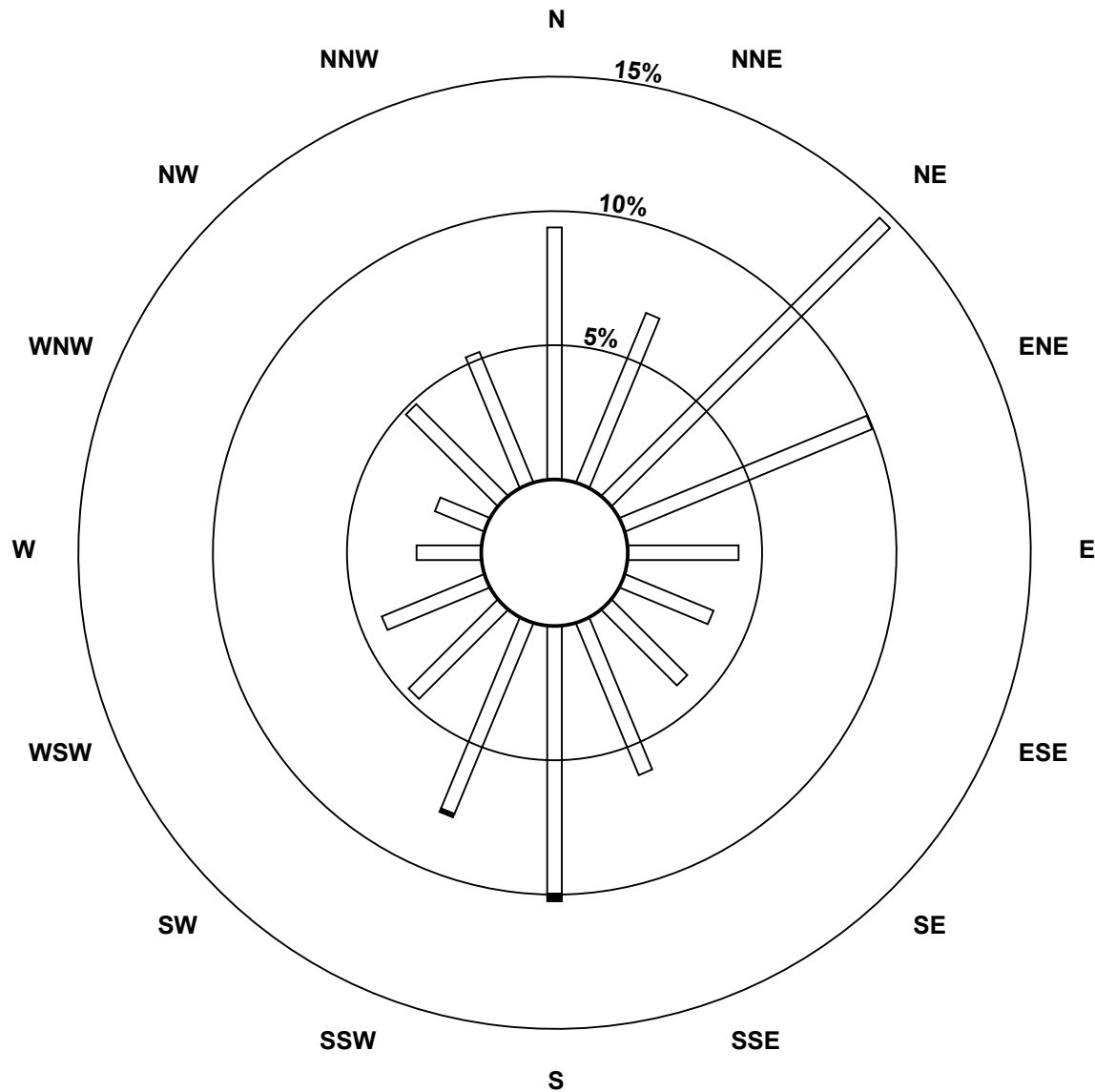
Total Number of Valid Hours: 703

Total Number of Hours: 744

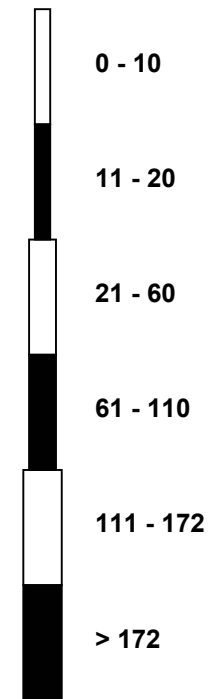


**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Shell Muskeg River (AMS 16)**



Classes (ppb)

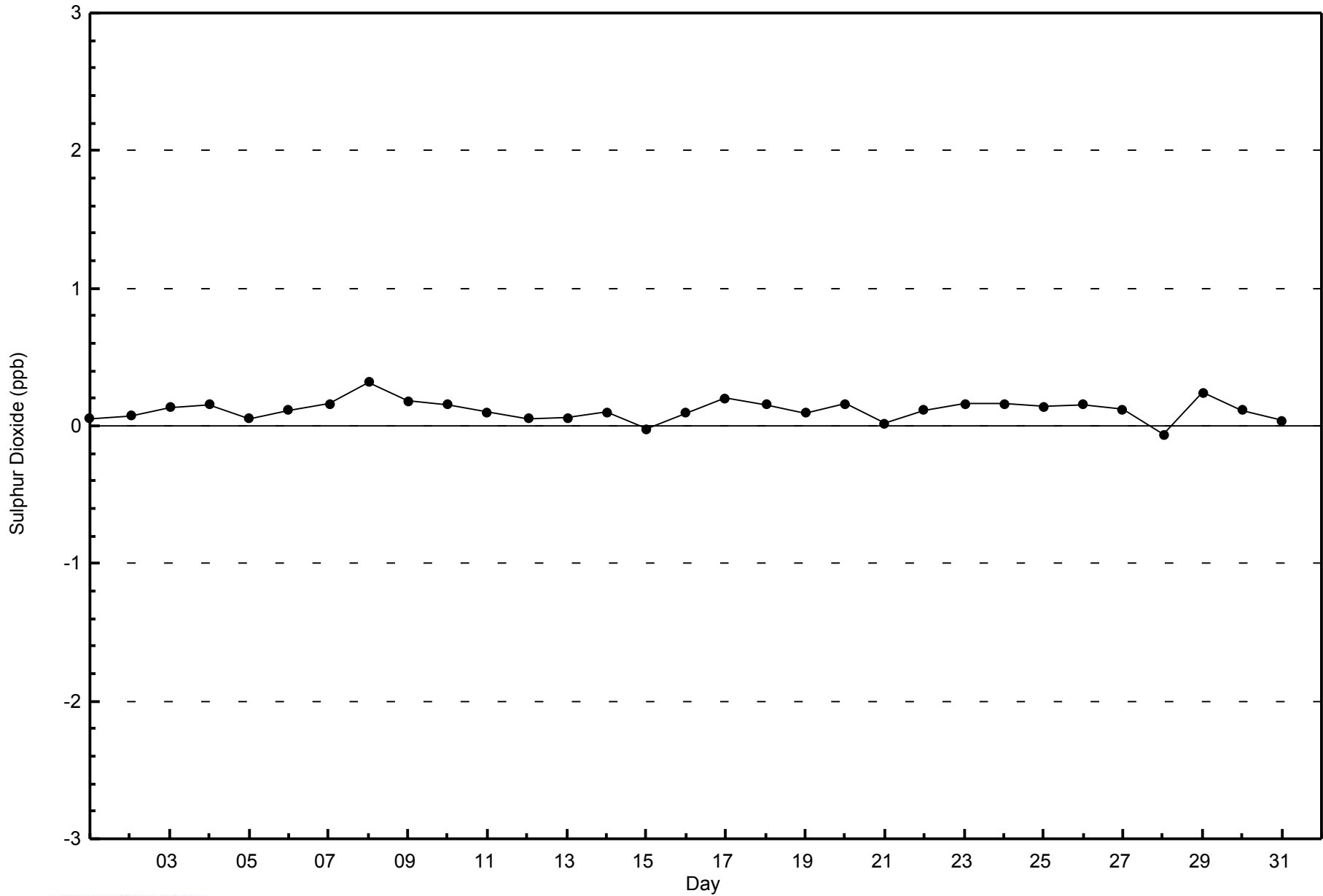


Total Number of Valid Hours: 703



WBEA  
Zero Responses

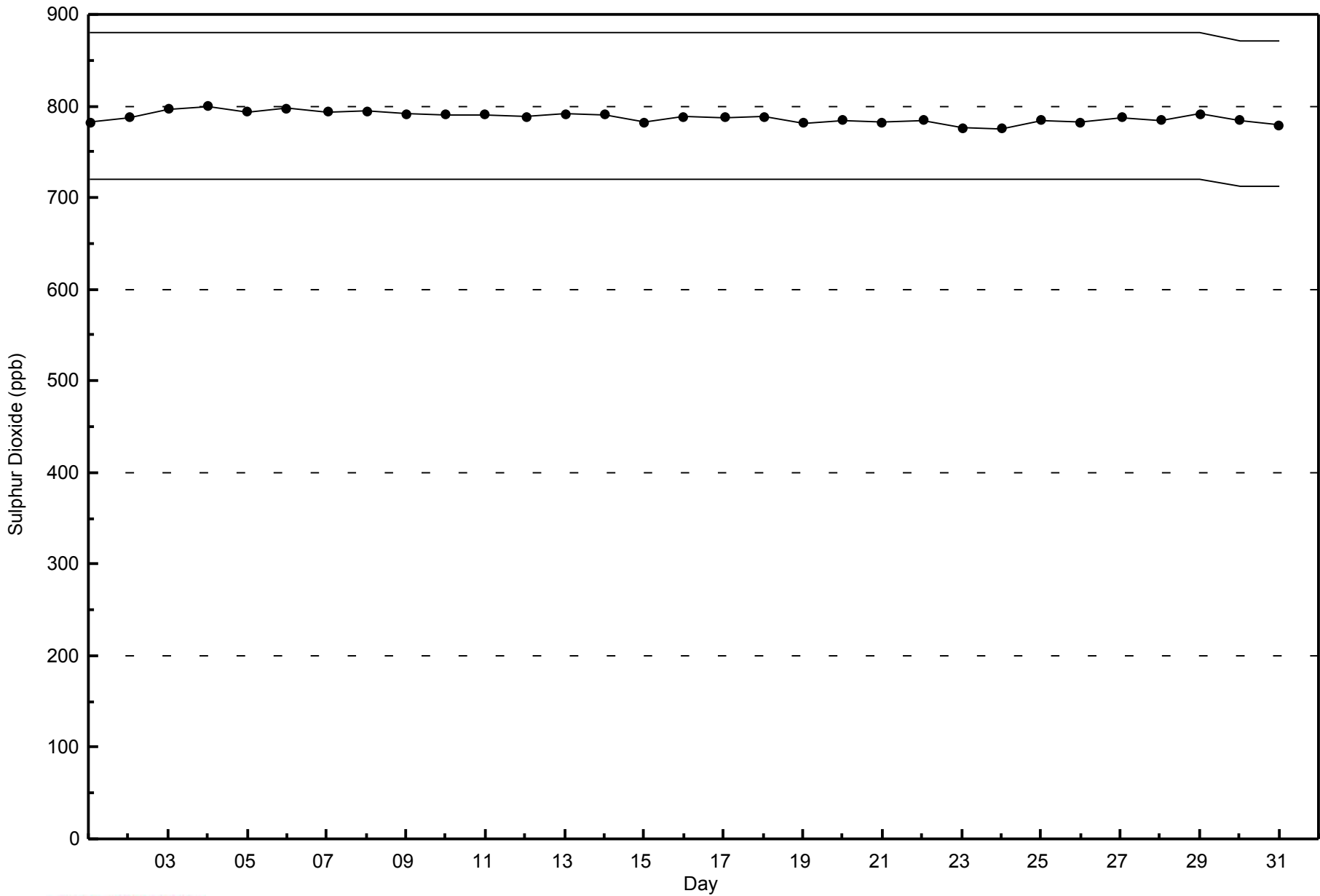
Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Shell Muskeg River - May 2014





WBEA  
Span Responses

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Shell Muskeg River - May 2014

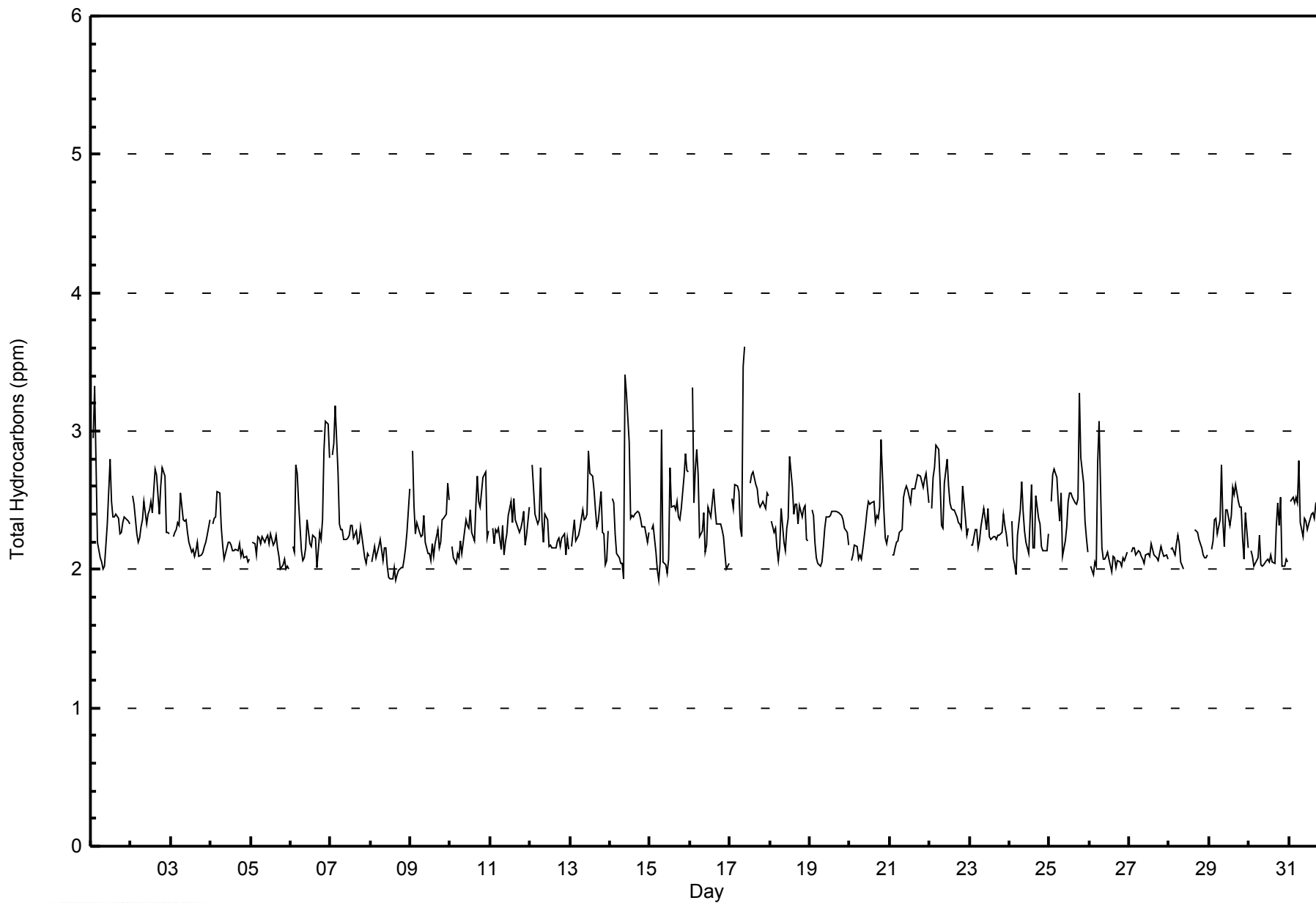






**WBEA**  
**Hourly Averages**

**Total Hydrocarbons (THC) - ppm**  
**Shell Muskeg River - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Shell Muskeg River - May 2014**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	49	6.95	6.95
2.1 - 3.0	646	91.63	98.58
3.1 - 10.0	10	1.42	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 705

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Shell Muskeg River - May 2014**

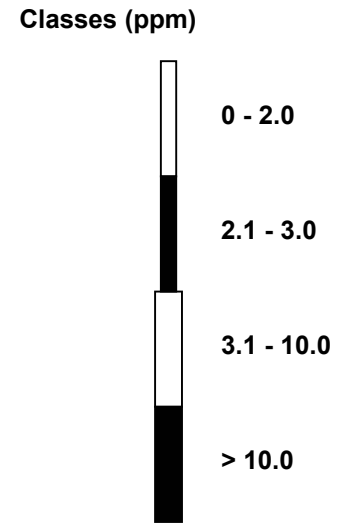
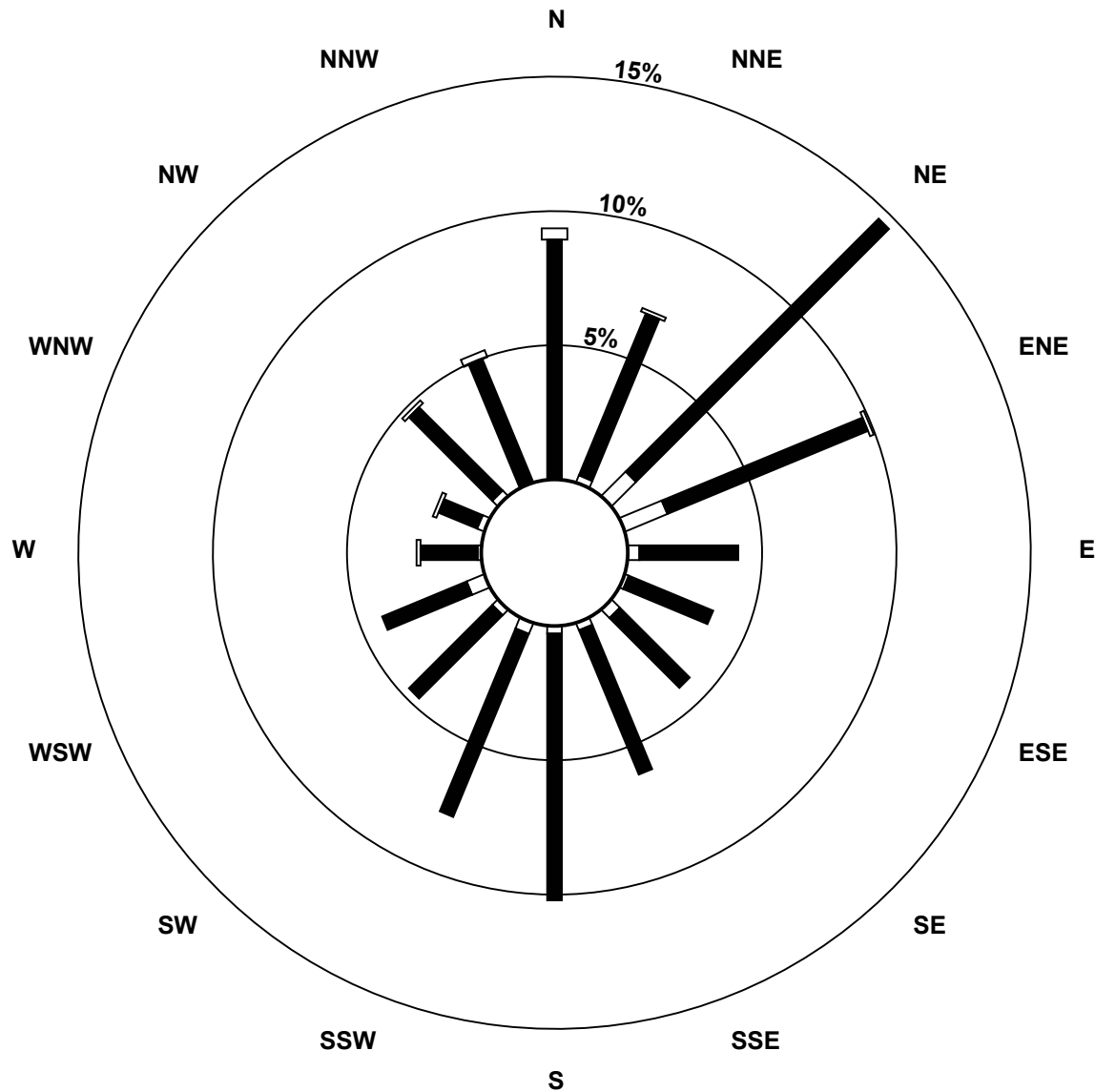
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	0	2	9	12	3	1	3	2	2	3	2	5	1	2	2	0	49
2.1 - 3.0	63	46	94	57	26	24	26	41	70	52	31	24	15	11	31	35	646
3.1 - 10.0	3	1	0	1	0	0	0	0	0	0	0	0	1	1	1	2	10
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	66	49	103	70	29	25	29	43	72	55	33	29	17	14	34	37	705

Total Number of Valid Hours: 705

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Total Hydrocarbons (THC) - ppm  
Shell Muskeg River (AMS 16)**



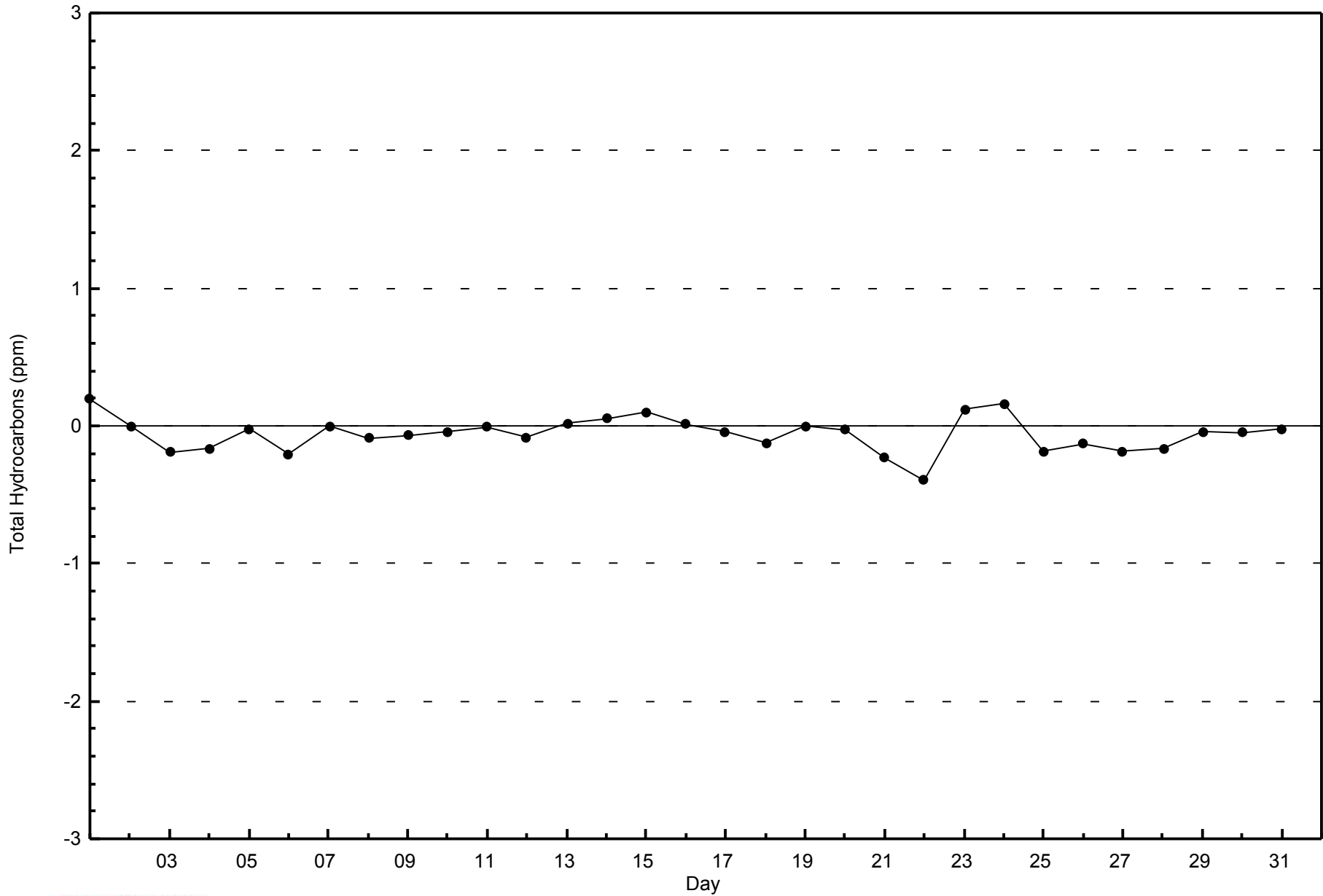
**Total Number of Valid Hours: 705**





WBEA  
Zero Responses

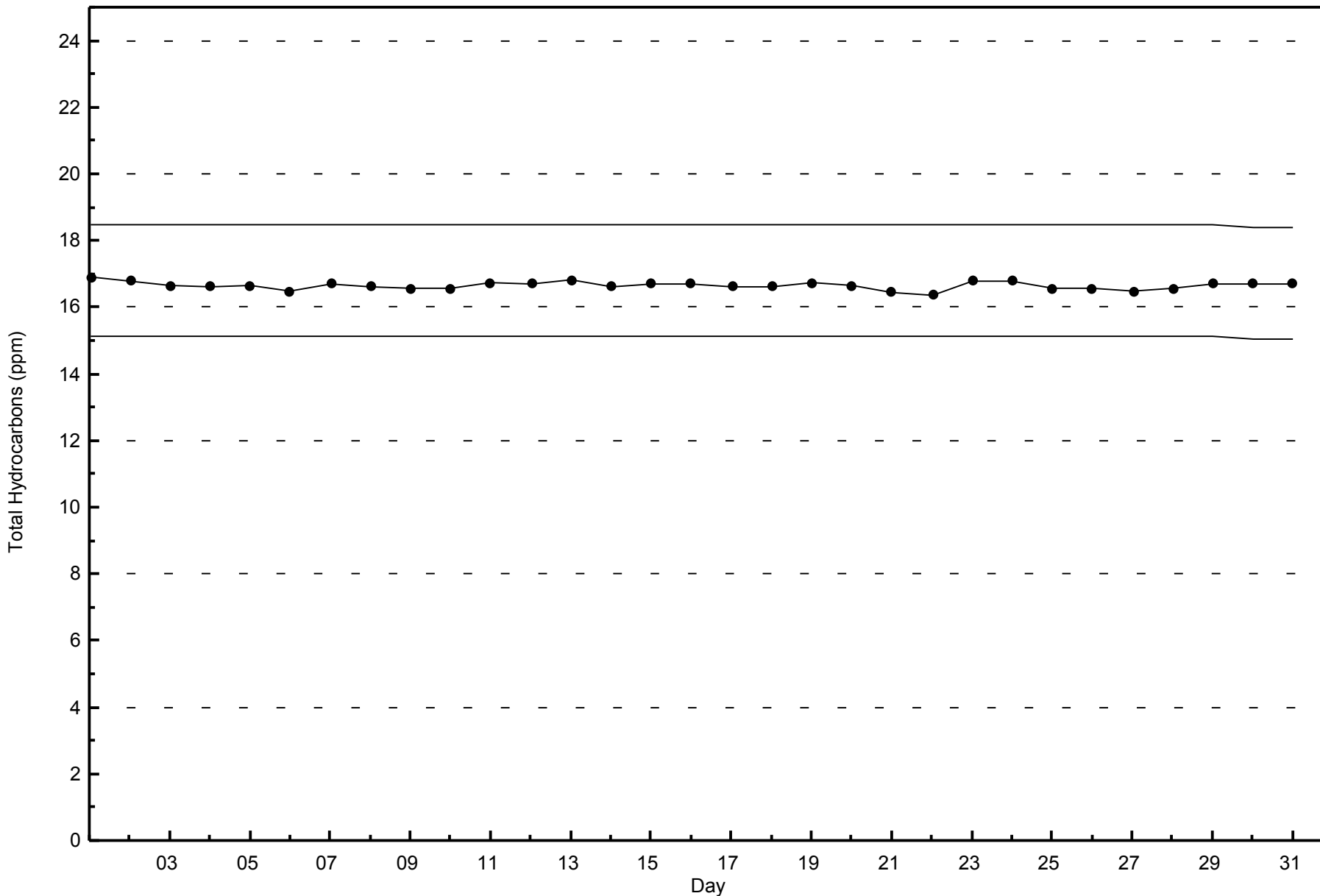
Total Hydrocarbons (THC) - ppm  
Shell Muskeg River - May 2014





WBEA  
Span Responses

Total Hydrocarbons (THC) - ppm  
Shell Muskeg River - May 2014



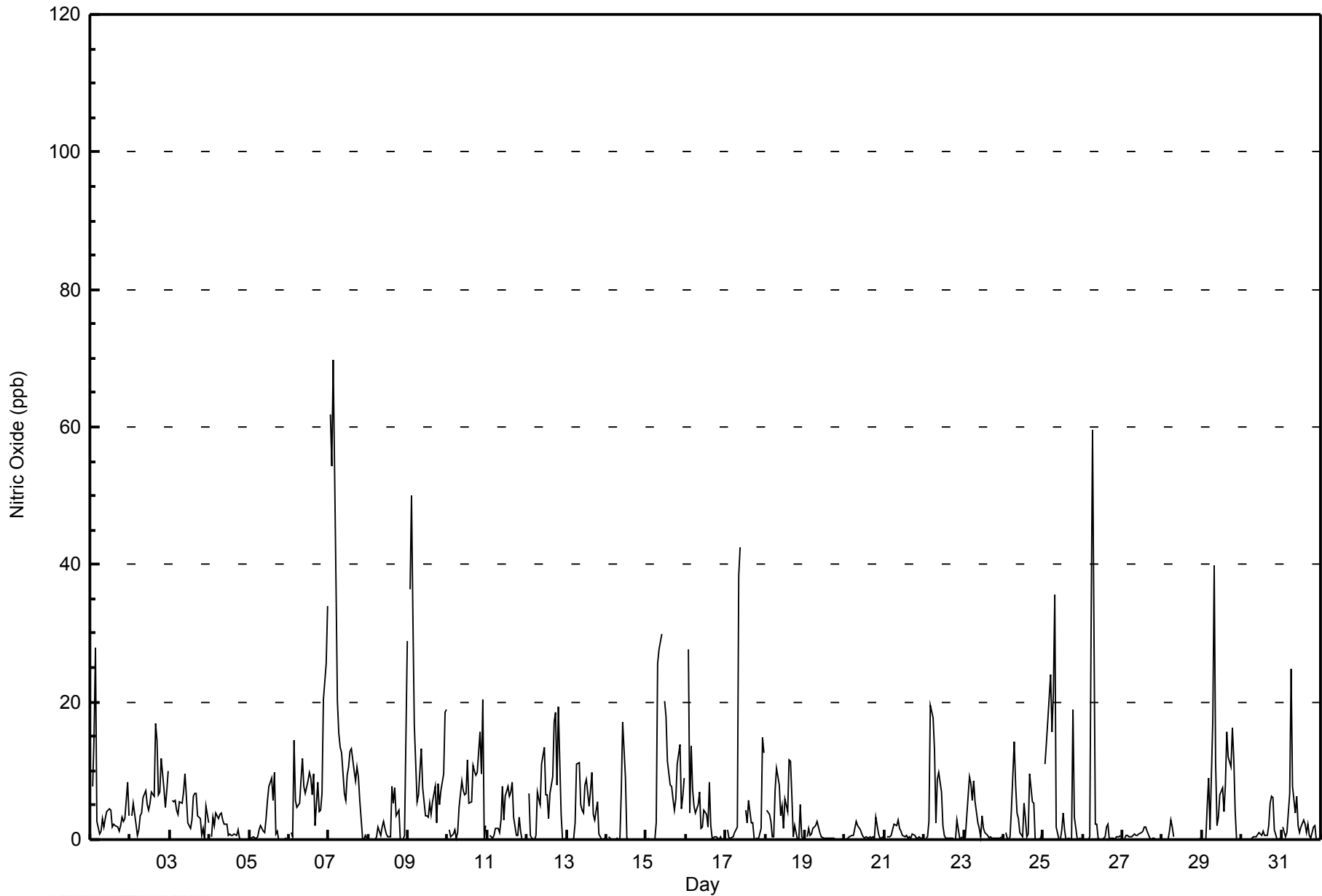


Maximum Value: 70 ppb on May 7 04:00																	Maximum Daily Average: 16.9 ppb on May 7																	Hours in Service: 744			
Minimum Value: 0 ppb on May 3 22:00																	Minimum Daily Average: 0.6 ppb on May 27																	Hours of Data: 703			
Maximum Diurnal Average: 8.0 ppb at hour 7																	Minimum Diurnal Average: 2.1 ppb at hour 21																	Hours of Missing Data: 41			
Monthly Average: 4.6 ppb																	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 0 Median = 2 Q <sub>3</sub> = 6 P <sub>90</sub> = 11 P <sub>99</sub> = 38																	Hours of Calibration: 38			
																																		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-May	Z	8	15	28	3	1	1	3	2	3	4	4	4	2	2	2	2	1	2	3	3	3	8	4	4.7	28											
2-May	Z	3	5	2	1	1	3	4	6	7	5	4	5	7	6	17	15	7	7	12	7	5	7	10	6.4	17											
3-May	Z	6	5	6	4	4	5	5	7	9	6	2	2	3	6	7	7	3	3	1	2	0	5	2	4.4	9											
4-May	Z	0	3	2	4	3	4	4	3	2	2	1	1	1	1	1	1	2	0	0	0	0	0	0	1.5	4											
5-May	Z	0	0	0	0	0	1	2	1	1	3	6	8	9	6	10	1	1	0	0	0	0	0	0	2.2	10											
6-May	Z	1	0	14	6	5	5	9	12	8	7	9	10	9	7	10	2	8	4	4	7	20	26	34	9.3	34											
7-May	Z	62	54	70	37	20	15	13	13	7	6	9	11	13	13	10	9	11	9	6	0	0	1	0	16.9	70											
8-May	Z	0	0	0	0	0	2	1	2	3	2	1	0	0	8	5	7	4	4	0	0	0	1	29	3.0	29											
9-May	Z	36	50	32	17	6	6	10	13	7	3	4	3	5	4	5	8	3	8	5	7	10	19	19	12.2	50											
10-May	Z	2	0	1	1	0	1	5	9	7	7	7	12	5	5	11	10	9	10	16	10	20	0	2	6.5	20											
11-May	Z	1	1	0	1	2	2	1	3	8	3	6	8	6	7	8	3	1	1	3	1	0	0	0	2.8	8											
12-May	Z	7	1	0	0	1	7	6	5	11	13	6	6	3	7	9	17	19	8	19	4	0	0	0	6.5	19											
13-May	Z	0	0	0	0	3	11	11	5	4	4	8	9	5	7	10	4	3	6	1	0	0	0	0	3.9	11											
14-May	Z	0	0	0	0	0	0	0	0	7	17	9	0	0	0	0	0	0	0	0	0	0	0	0	1.5	17											
15-May	Z	0	0	0	0	0	2	26	28	30	PF	20	18	11	8	8	6	4	6	11	14	4	6	9	9.6	30											
16-May	Z	28	4	14	7	5	4	5	7	2	2	4	4	2	8	2	0	0	0	0	0	0	0	0	4.3	28											
17-May	Z	1	0	0	0	1	1	2	38	42	PF	PF	4	2	6	2	2	0	0	0	0	2	15	13	6.4	42											
18-May	Z	4	4	3	0	0	7	10	8	3	5	2	6	4	12	11	6	0	2	0	0	5	0	0	4.1	12											
19-May	Z	0	2	1	1	2	2	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	3											
20-May	Z	0	0	0	1	1	2	3	2	1	1	0	0	0	0	0	0	0	0	3	1	0	0	0	0.8	3											
21-May	Z	0	0	0	1	1	2	2	3	2	1	1	0	1	0	0	0	1	1	0	0	0	0	0	0.8	3											
22-May	Z	0	0	3	19	18	13	3	9	10	7	2	1	0	0	0	0	0	0	0	3	0	0	0	3.9	19											
23-May	Z	0	3	9	8	6	9	6	2	2	0	4	2	1	1	0	0	0	0	0	0	0	0	0	2.4	9											
24-May	Z	1	0	0	0	4	14	8	4	3	1	0	5	3	0	1	10	6	5	0	0	0	1	1	3.0	14											
25-May	Z	11	14	17	24	16	21	36	2	0	0	1	4	2	0	0	0	0	19	3	0	0	0	0	7.4	36											
26-May	Z	0	0	0	0	32	60	2	2	0	0	0	0	0	2	2	0	0	0	0	0	0	0	1	4.5	60											
27-May	Z	0	1	1	0	0	1	1	1	1	1	1	1	2	2	1	0	0	0	0	0	0	0	0	0.6	2											
28-May	Z	0	0	0	1	3	2	0	C	C	C	C	C	C	C	0	0	0	0	0	0	0	0	0	--	3											
29-May	Z	0	0	5	9	2	17	40	11	2	3	6	8	4	8	16	12	11	16	12	4	0	0	0	8.1	40											
30-May	Z	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	2	5	6	6	1	0	0	0	1.2	6											
31-May	Z	2	0	1	4	7	25	8	4	6	2	1	2	3	2	1	2	1	0	2	2	0	0	0	3.2	25											
--	--	5.6	5.3	6.7	4.9	4.6	8.0	7.3	6.7	6.3	3.8	4.1	4.4	3.5	4.3	4.9	4.1	3.2	3.8	3.5	2.1	2.3	2.9	4.1	Diurnal Average												
--	--	62	54	70	37	32	60	40	38	42	17	20	18	13	13	17	17	19	19	19	14	20	26	34	Diurnal Maximum												
Z - zerospan		C - Calibration				PF - Power Failure																															



**WBEA**  
**Hourly Averages**

**Nitric Oxide (NO) - ppb**  
**Shell Muskeg River - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb**  
**Shell Muskeg River - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	679	96.59	96.59
21 - 40	18	2.56	99.15
41 - 80	6	0.85	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 703

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Nitric Oxide (NO) - ppb**  
**Shell Muskeg River - May 2014**

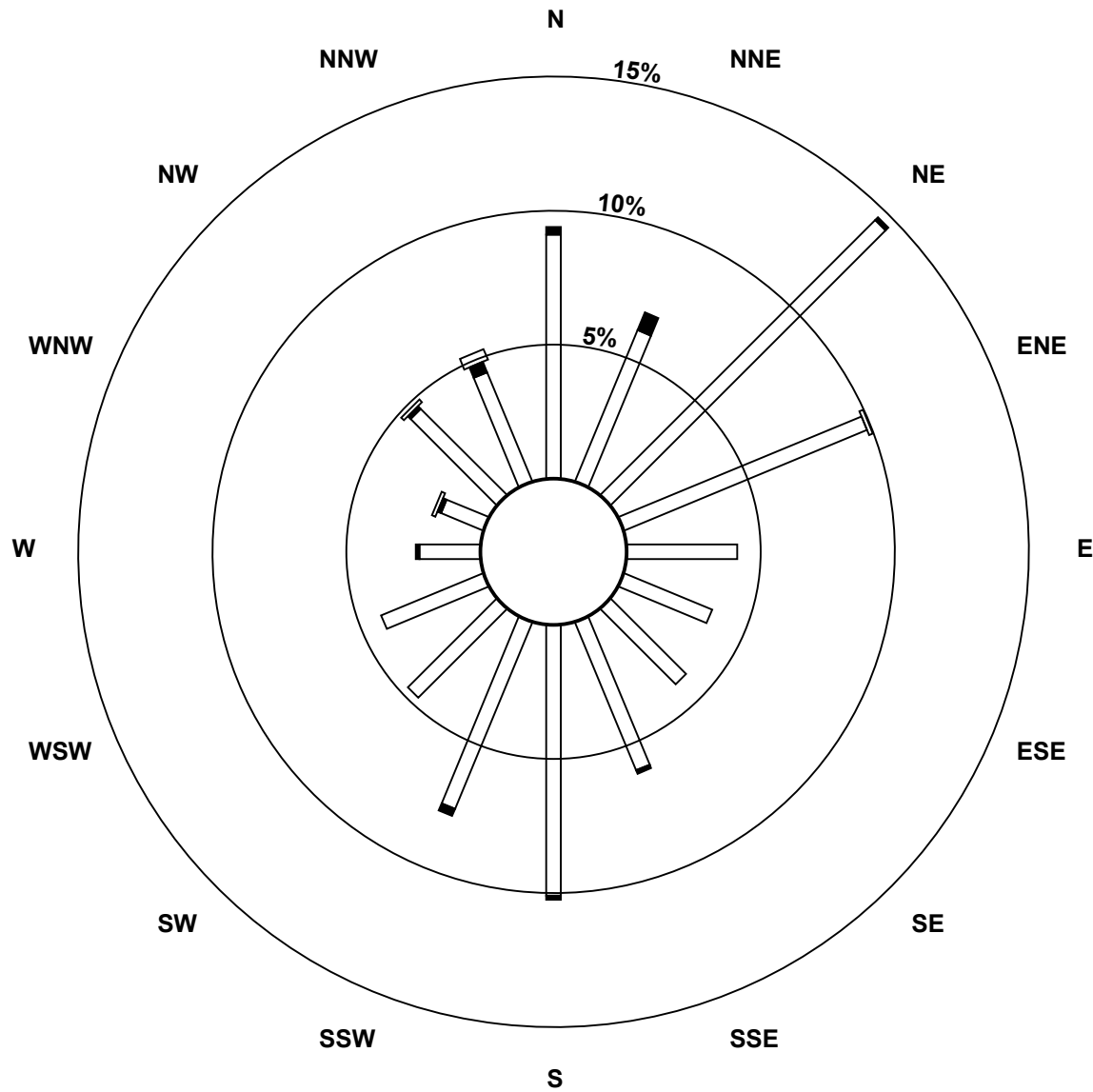
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	64	43	102	69	29	25	28	42	71	53	33	29	16	12	32	31	679
21 - 40	2	5	1	0	0	0	0	1	1	2	0	0	1	1	1	3	18
11 - 80	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	3	6
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	66	48	103	70	29	25	28	43	72	55	33	29	17	14	34	37	703

Total Number of Valid Hours: 703

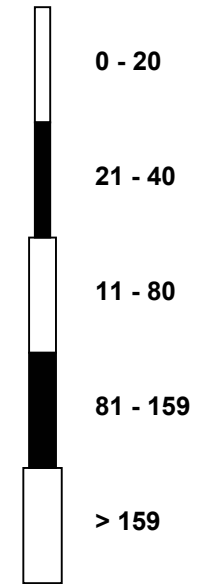
Total Number of Hours: 744

Wood Buffalo Environmental Association  
Wind Rose May 2014

Nitric Oxide (NO) - ppb  
Shell Muskeg River (AMS 16)



Classes (ppb)

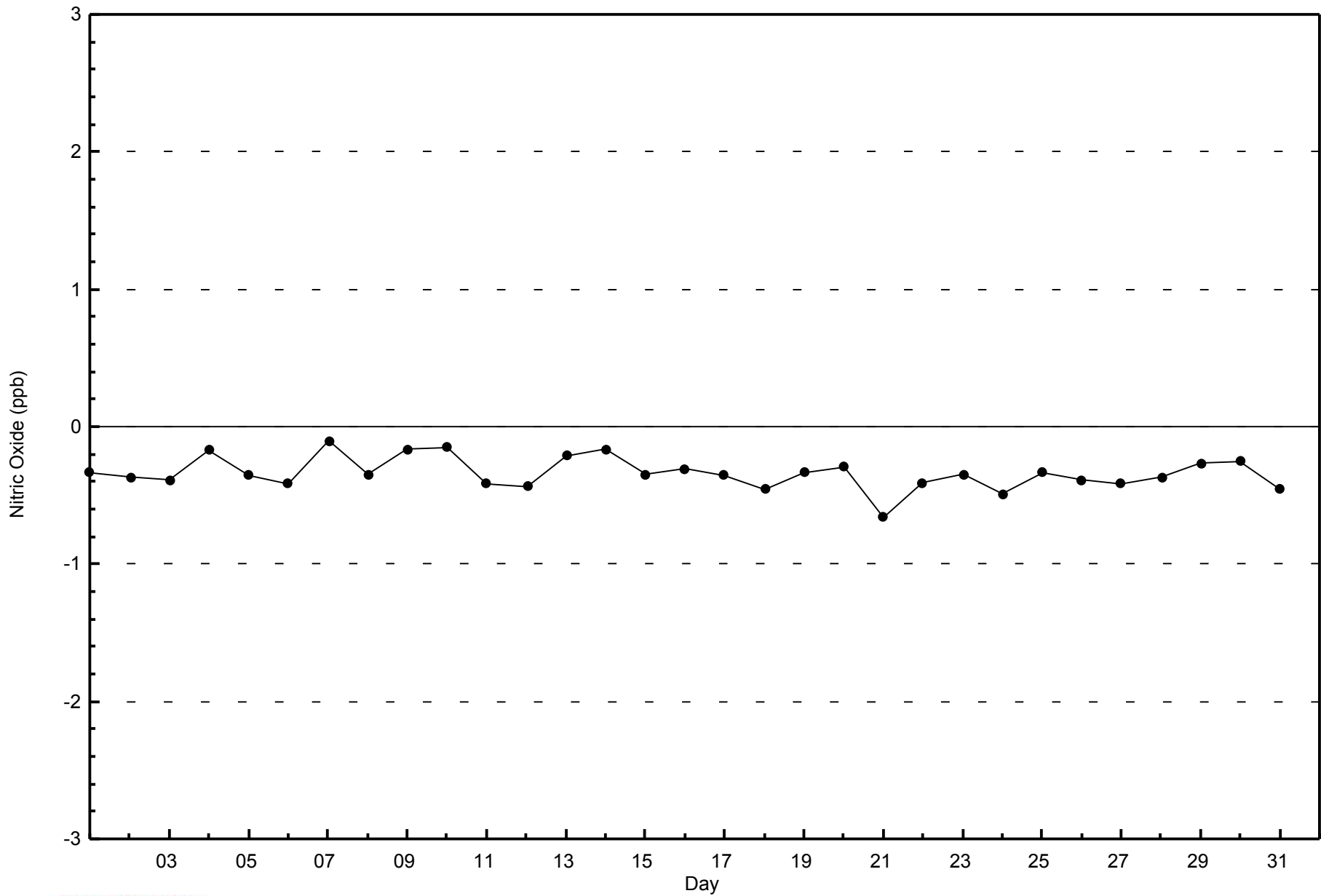


Total Number of Valid Hours: 703



WBEA  
Zero Responses

Nitric Oxide (NO) - ppb  
Shell Muskeg River - May 2014

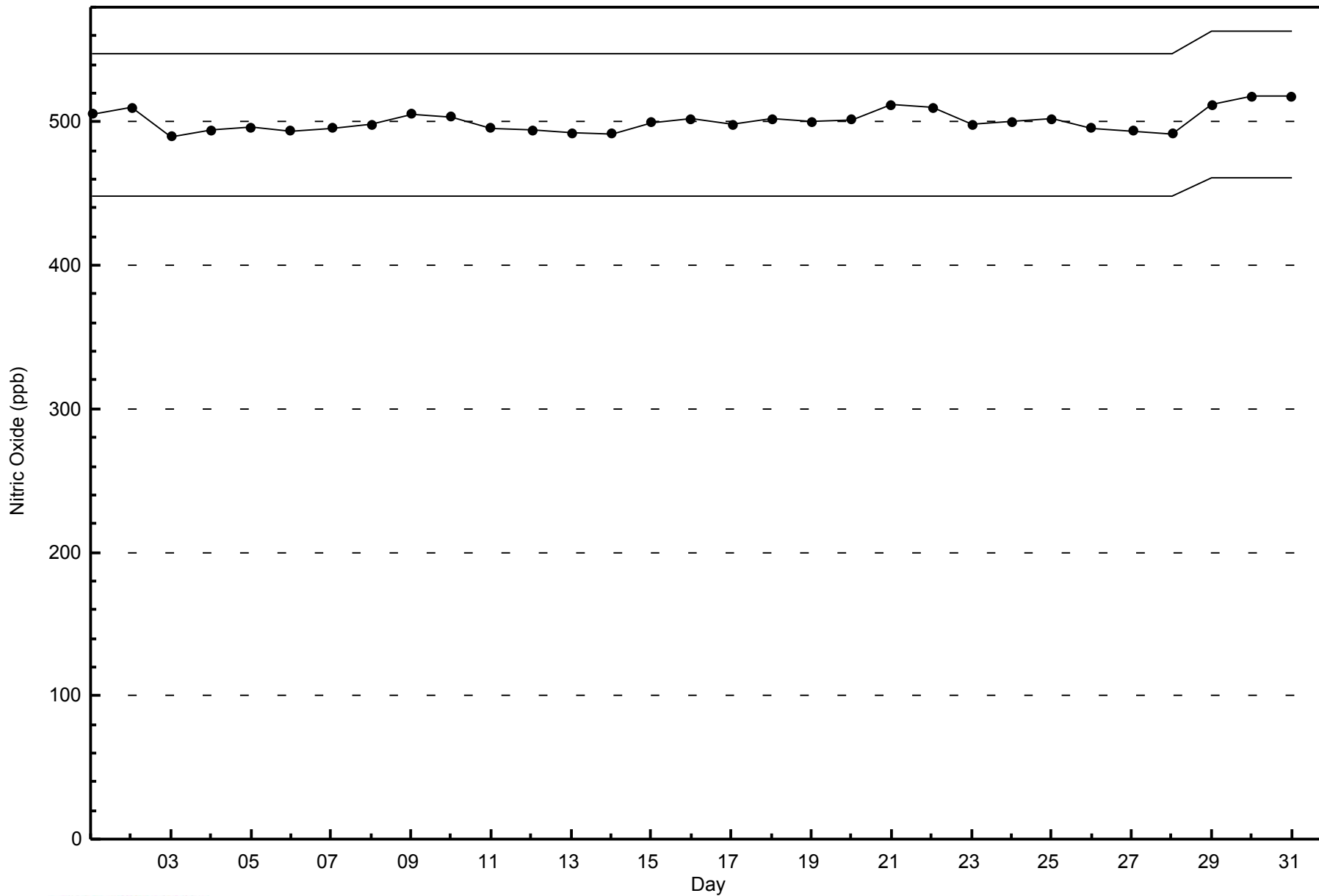






WBEA  
Span Responses

Nitric Oxide (NO) - ppb  
Shell Muskeg River - May 2014





Wood Buffalo Environmental Association

Summary of Hour Averages

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

Shell Muskeg River - May 2014

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 47 ppb on May 16 02:00	Maximum Daily Average: 18.8 ppb on May 15
Minimum Value: 0 ppb on May 28 17:00	Hours of Data: 703
Maximum Diurnal Average: 13.9 ppb at hour 2	Hours of Missing Data: 41
Monthly Average: 9.1 ppb	Hours of Calibration: 38
Minimum Daily Average: 2.1 ppb on May 27	Percent Operational Time: 99.6
Minimum Diurnal Average: 6.1 ppb at hour 18	
Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 1 Q <sub>1</sub> = 3 Median = 7 Q <sub>3</sub> = 13 P <sub>90</sub> = 20 P <sub>99</sub> = 39	

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-May	Z	29	36	31	25	15	12	13	6	8	10	10	9	6	9	8	8	8	13	20	20	28	34	23	16.6	36
2-May	Z	18	19	14	5	9	14	15	16	18	15	13	13	12	11	15	11	10	10	13	12	12	15	18	13.3	19
3-May	Z	16	18	18	15	14	14	13	11	12	8	4	3	3	6	7	7	4	5	4	8	4	13	8	9.3	18
4-May	Z	10	16	12	13	7	8	10	8	4	7	3	3	3	3	3	3	7	4	6	5	2	1	4	6.1	16
5-May	Z	16	13	3	7	5	6	8	6	4	7	9	11	12	9	13	2	3	1	1	1	1	1	2	6.0	16
6-May	Z	9	7	27	20	14	8	8	11	8	8	8	8	8	9	10	3	12	10	20	26	35	36	35	14.7	36
7-May	Z	40	40	42	39	31	22	19	16	9	9	12	13	12	13	12	9	11	14	10	2	1	2	3	16.5	42
8-May	Z	1	3	3	2	8	12	6	7	9	6	3	3	2	11	8	10	6	8	1	2	4	11	27	6.6	27
9-May	Z	35	33	30	23	14	13	19	22	14	7	6	7	10	8	10	13	9	11	18	24	25	33	28	17.8	35
10-May	Z	12	8	9	12	3	7	11	16	13	12	12	17	12	13	18	15	18	23	30	29	35	6	6	14.6	35
11-May	Z	5	7	5	4	4	6	5	6	12	5	10	13	10	12	12	8	2	3	8	6	4	5	5	6.7	13
12-May	Z	24	14	9	4	4	11	9	7	14	17	9	7	4	7	9	16	18	13	25	9	3	10	8	10.9	25
13-May	Z	6	5	4	7	14	21	20	13	10	10	16	16	12	12	11	6	5	13	3	3	3	6	9	9.7	21
14-May	Z	15	13	6	2	3	2	1	1	14	28	19	1	1	1	1	1	1	1	1	1	3	3	5	5.4	28
15-May	Z	6	6	6	5	4	6	25	22	22	PF	19	20	18	15	15	16	12	18	28	39	38	38	38	18.8	39
16-May	Z	47	25	39	21	12	10	13	14	5	5	11	11	7	17	7	2	3	5	3	2	13	7	10	12.6	47
17-May	Z	25	9	8	6	5	6	7	36	38	PF	PF	12	9	13	8	7	1	1	2	3	6	22	22	11.7	38
18-May	Z	12	10	11	4	1	8	14	10	7	10	6	19	13	16	18	11	2	6	2	5	10	3	5	8.7	19
19-May	Z	16	21	19	15	11	8	9	6	4	2	2	2	2	2	2	2	2	3	2	2	1	1	2	5.8	21
20-May	Z	6	16	16	11	5	7	9	7	5	4	2	1	2	3	2	2	2	1	18	5	2	4	9	6.0	18
21-May	Z	7	6	6	9	8	7	6	8	5	5	2	2	2	1	1	1	3	4	2	2	10	7	6	4.8	10
22-May	Z	14	13	13	22	14	15	9	14	17	16	7	3	1	1	1	1	1	1	3	14	12	11	8	9.1	22
23-May	Z	11	22	23	22	21	18	13	8	7	4	14	7	5	3	2	2	2	3	4	4	7	7	3	9.1	23
24-May	Z	20	2	2	3	11	21	14	14	9	3	2	7	4	2	2	8	6	6	0	2	4	5	5	6.6	21
25-May	Z	5	5	3	4	3	6	10	2	0	0	2	4	3	0	0	0	1	24	12	5	0	1	1	4.0	24
26-May	Z	1	2	1	6	19	25	7	6	1	0	0	0	3	6	5	1	3	2	1	3	3	3	3	4.3	25
27-May	Z	2	3	3	2	2	2	2	2	2	3	3	3	4	4	3	1	1	1	2	1	0	0	3	2.1	4
28-May	Z	7	1	1	3	6	4	1	C	C	C	C	C	C	C	0	0	0	0	0	0	1	1	1	--	7
29-May	Z	1	5	15	13	6	10	21	14	6	7	8	7	5	9	16	11	14	16	19	14	3	7	4	10.0	21
30-May	Z	3	2	1	1	2	4	3	2	1	2	2	2	3	3	4	12	23	19	17	3	1	5	4	5.1	23
31-May	Z	14	12	12	7	7	15	12	8	13	5	3	4	6	4	2	5	2	1	6	7	1	7	9	7.1	15

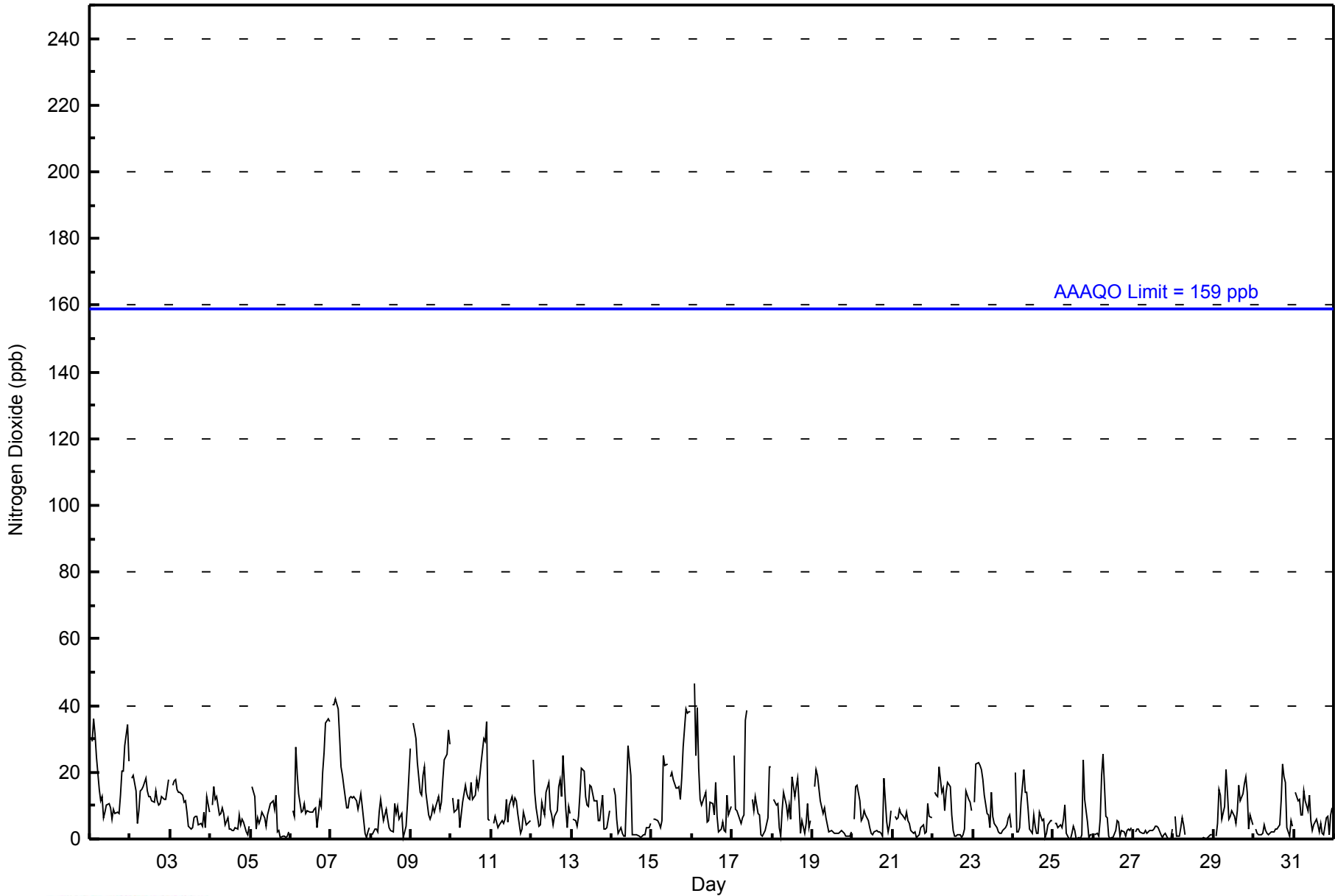
--	13.9	12.6	12.7	10.6	9.0	10.5	10.7	10.6	9.8	7.7	7.5	7.5	6.4	7.3	7.2	6.2	6.1	7.7	8.9	8.3	8.8	9.9	10.2	Diurnal Average
--	47	40	42	39	31	25	25	36	38	28	19	20	18	17	18	16	23	24	30	39	38	38	38	Diurnal Maximum

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



WBEA  
Hourly Averages

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Shell Muskeg River - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Shell Muskeg River - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	639	90.90	90.90
21 - 40	62	8.82	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: 703

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Shell Muskeg River - May 2014**

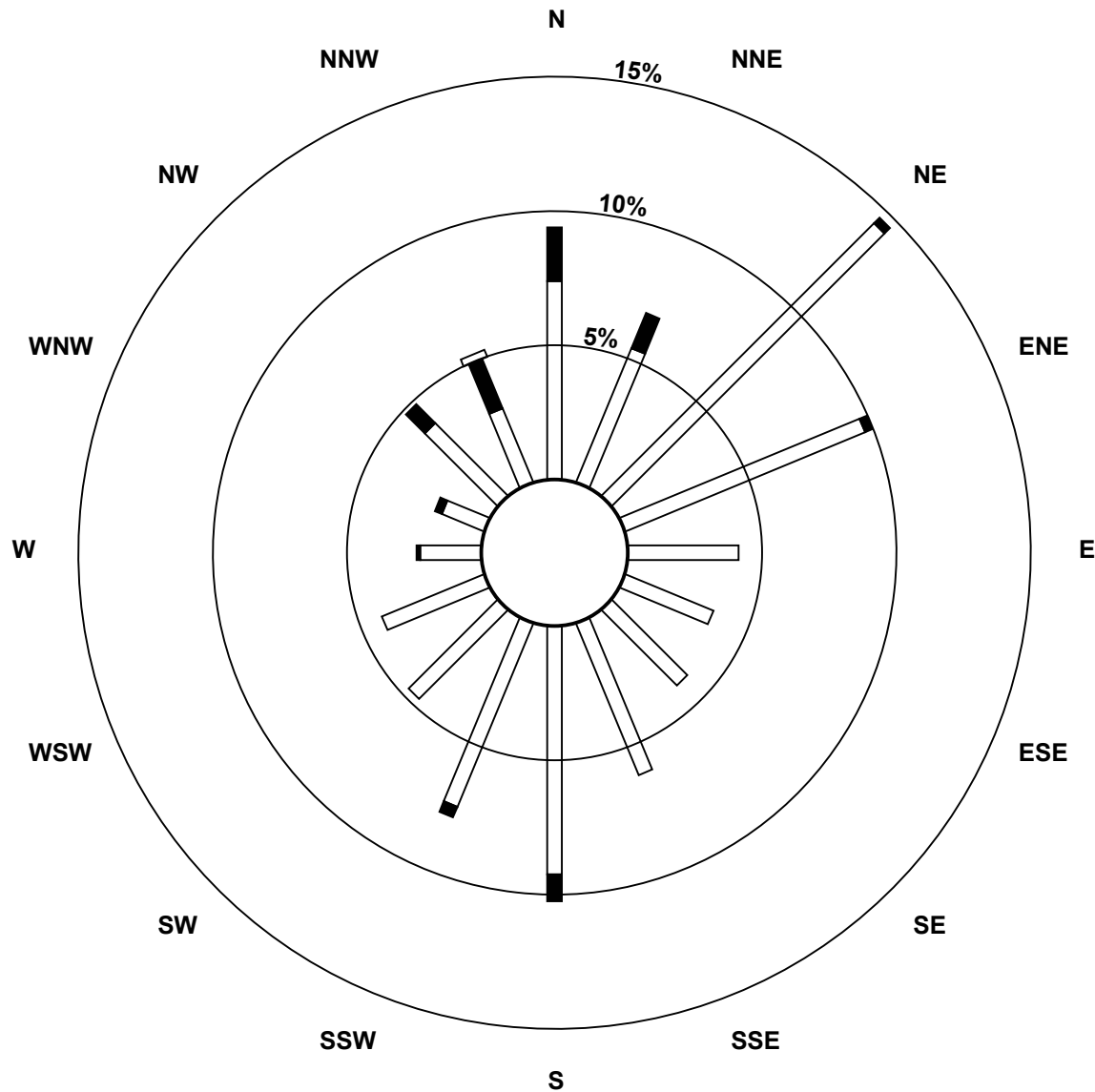
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	52	38	101	68	29	25	28	43	65	52	33	29	16	12	27	21	639
21 - 40	14	10	2	2	0	0	0	0	7	3	0	0	1	2	7	14	62
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	66	48	103	70	29	25	28	43	72	55	33	29	17	14	34	37	703

Total Number of Valid Hours: 703

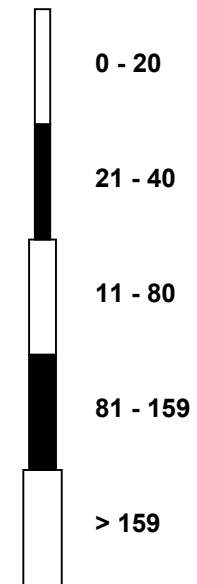
Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Shell Muskeg River (AMS 16)**



Classes (ppb)

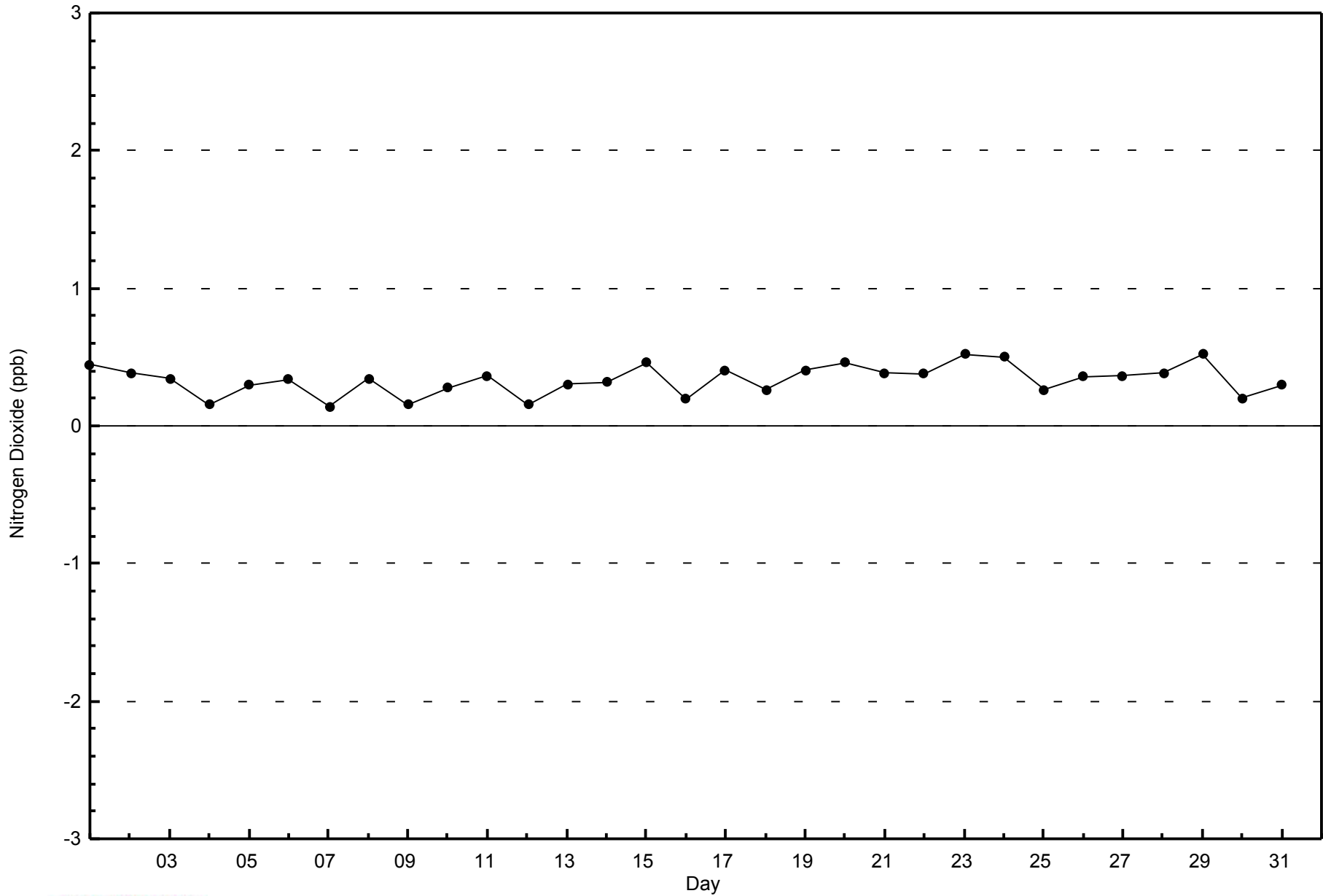


Total Number of Valid Hours: 703



WBEA  
Zero Responses

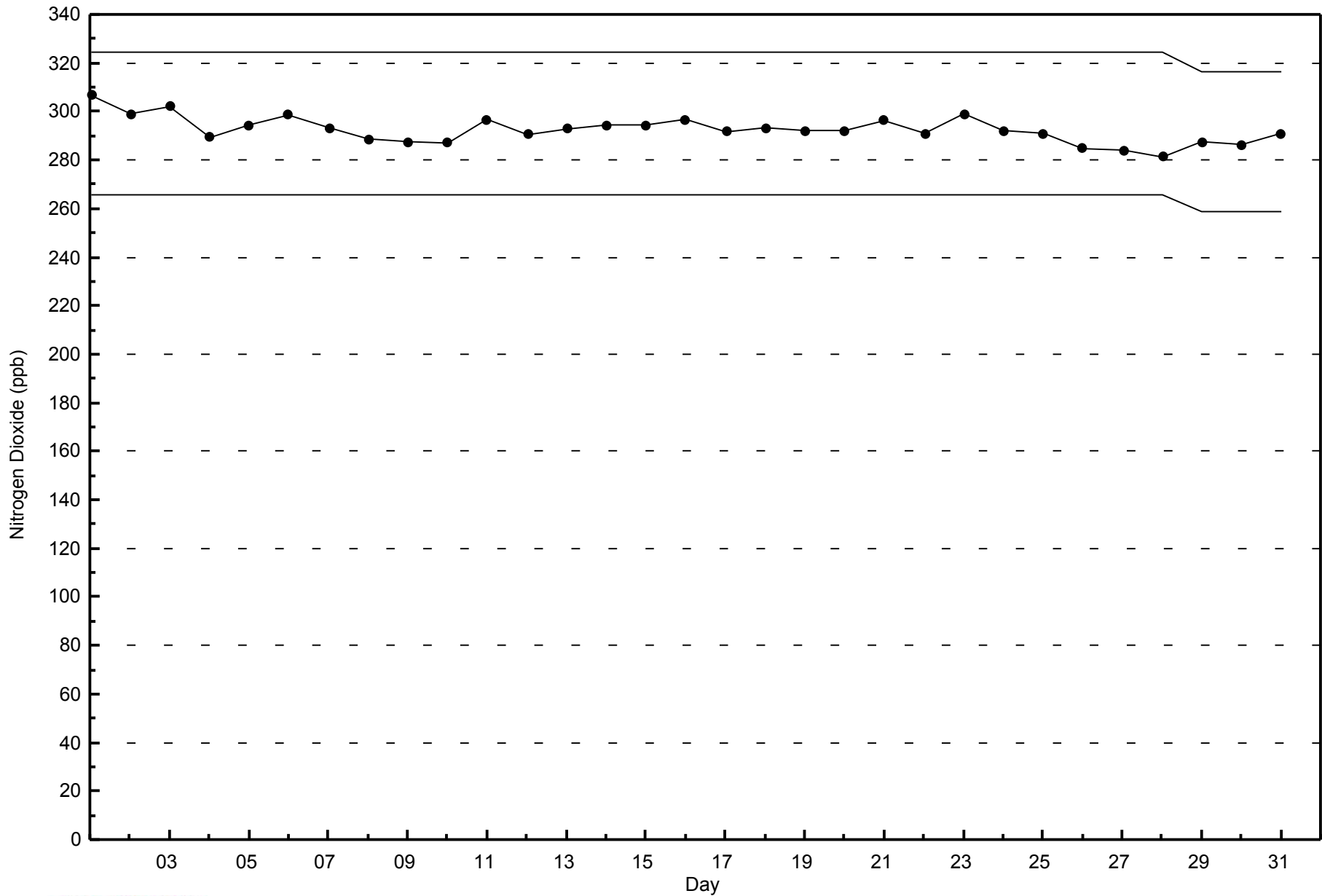
Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Shell Muskeg River - May 2014





WBEA  
Span Responses

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Shell Muskeg River - May 2014







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

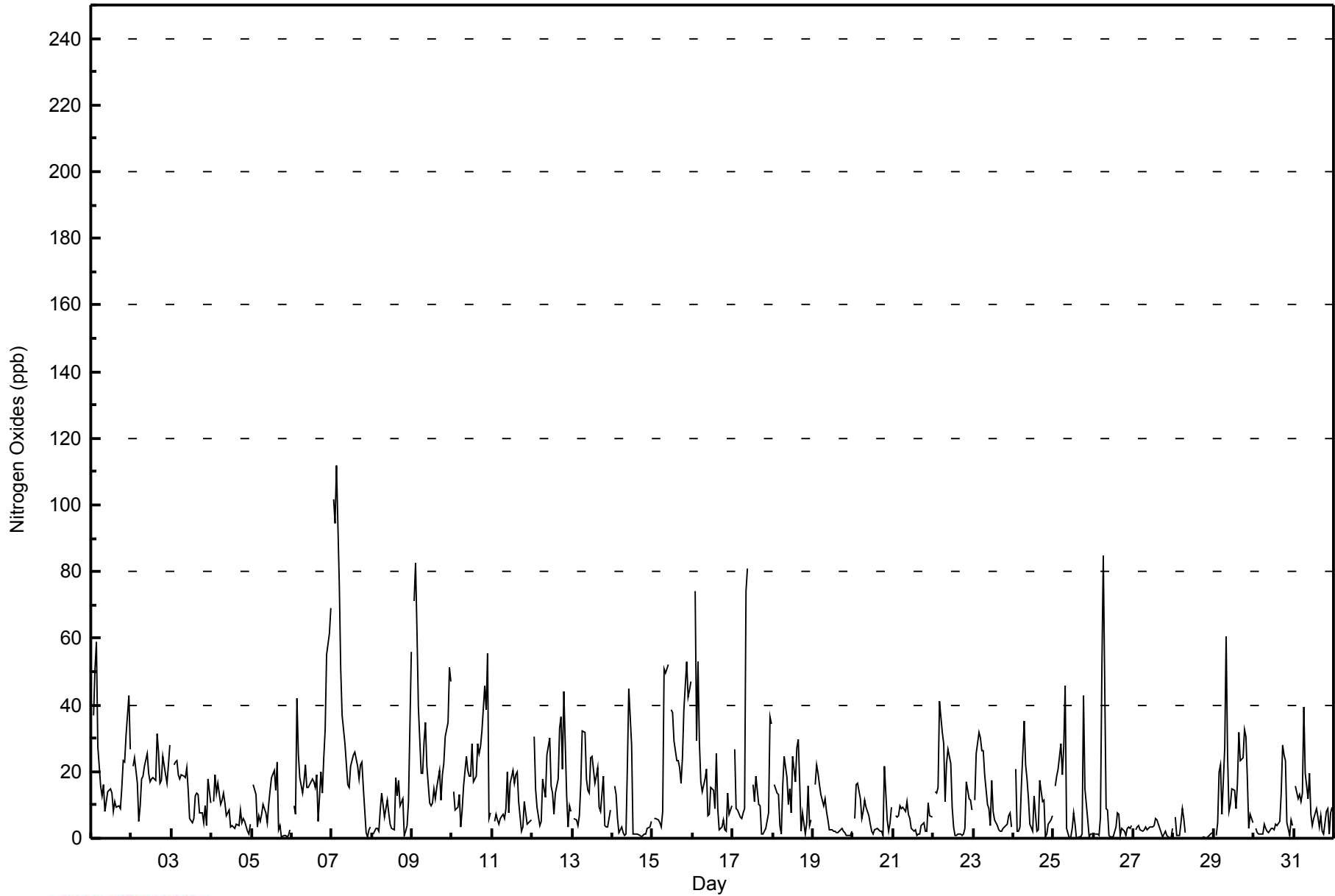
**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Shell Muskeg River - May 2014**

Maximum Value: 112 ppb on May 7 04:00																		Maximum Daily Average: 33.4 ppb on May 7																		Hours in Service: 744			
Minimum Value: 0 ppb on May 28 17:00																		Minimum Daily Average: 2.7 ppb on May 27																		Hours of Data: 703			
Maximum Diurnal Average: 19.6 ppb at hour 2																		Minimum Diurnal Average: 9.3 ppb at hour 18																		Hours of Missing Data: 41			
Monthly Average: 13.8 ppb																		Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 1 Q <sub>1</sub> = 3 Median = 9 Q <sub>3</sub> = 19 P <sub>90</sub> = 30 P <sub>99</sub> = 74																		Hours of Calibration: 38			
																																				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-May	Z	37	51	59	27	16	13	16	8	11	14	15	14	8	11	10	10	9	15	23	23	31	43	27	21.3	59													
2-May	Z	22	24	17	5	10	18	19	22	25	20	17	18	18	18	32	26	17	17	25	19	17	22	28	19.7	32													
3-May	Z	22	23	23	19	18	19	19	18	21	14	6	4	6	13	13	13	8	8	5	10	4	18	11	13.6	23													
4-May	Z	11	19	14	16	10	11	13	11	7	9	4	4	3	3	4	4	9	5	6	5	2	1	4	7.6	19													
5-May	Z	16	13	3	7	5	7	10	8	5	10	14	18	20	15	23	3	4	1	1	1	1	1	2	8.2	23													
6-May	Z	10	7	42	26	18	13	17	22	15	15	17	18	17	15	19	5	20	14	24	33	55	61	69	24.0	69													
7-May	Z	102	94	112	76	51	37	33	28	16	15	22	23	25	26	21	18	22	23	15	2	1	3	4	33.4	112													
8-May	Z	1	3	3	2	8	14	6	9	11	7	4	3	3	18	13	17	10	12	1	2	4	11	56	9.5	56													
9-May	Z	71	83	62	39	20	20	29	35	21	11	10	11	15	12	15	20	11	19	23	31	35	51	47	30.0	83													
10-May	Z	14	9	9	13	4	8	16	25	20	19	19	28	17	19	28	25	27	32	46	39	55	6	8	21.1	55													
11-May	Z	5	7	5	4	6	7	6	9	20	8	17	20	16	19	20	11	2	3	11	8	4	5	6	9.6	20													
12-May	Z	30	15	9	4	5	18	15	12	25	30	15	14	7	14	18	33	36	21	44	13	3	10	8	17.4	44													
13-May	Z	6	5	4	7	16	32	32	18	14	14	24	24	17	19	21	9	8	19	4	3	3	6	9	13.7	32													
14-May	Z	16	13	6	2	3	2	1	1	21	45	28	1	1	1	1	1	1	1	1	1	3	3	5	6.9	45													
15-May	Z	6	6	6	4	3	8	51	50	52	PF	39	38	29	23	23	21	16	24	39	53	42	44	47	28.4	53													
16-May	Z	74	29	53	29	17	14	18	21	7	7	15	14	9	25	9	2	4	5	3	2	13	7	10	16.9	74													
17-May	Z	27	9	9	6	6	8	9	74	81	PF	PF	16	11	19	10	10	1	1	2	3	8	37	34	18.1	81													
18-May	Z	16	14	13	4	1	15	24	18	10	15	8	25	17	27	30	17	2	8	1	5	15	4	6	12.8	30													
19-May	Z	16	22	19	16	13	10	12	8	5	2	3	2	2	2	2	2	3	2	2	1	1	1	2	6.4	22													
20-May	Z	6	16	17	12	6	8	11	9	7	4	2	1	3	3	2	2	2	1	22	6	2	5	9	6.8	22													
21-May	Z	7	7	7	10	9	10	8	11	7	6	3	2	3	1	1	1	4	5	2	2	11	7	6	5.6	11													
22-May	Z	14	14	15	41	32	28	11	23	27	23	9	3	1	1	1	1	1	1	3	17	12	12	9	13.0	41													
23-May	Z	11	26	32	30	26	26	19	10	9	4	18	8	6	4	2	2	2	3	4	4	7	7	4	11.5	32													
24-May	Z	21	2	2	4	16	35	22	18	12	4	2	13	7	2	3	18	11	11	0	1	4	6	7	9.6	35													
25-May	Z	16	19	21	28	19	27	46	3	0	0	3	8	4	0	0	1	43	15	5	0	1	1	1	11.4	46													
26-May	Z	1	1	1	6	51	85	9	9	1	0	0	0	3	7	7	1	3	2	1	3	3	3	4	8.8	85													
27-May	Z	2	3	4	3	2	2	3	3	3	3	4	4	6	6	4	2	0	1	2	1	0	0	3	2.7	6													
28-May	Z	7	1	1	5	9	6	2	C	C	C	C	C	C	C	0	0	0	0	0	0	1	1	2	--	9													
29-May	Z	1	5	20	22	7	27	61	25	8	10	15	14	9	16	32	23	24	33	30	18	3	7	4	18.1	61													
30-May	Z	3	2	1	1	1	4	3	2	2	3	3	3	4	4	5	14	28	25	23	5	1	5	4	6.3	28													
31-May	Z	16	12	13	11	14	39	19	12	19	7	4	6	9	6	3	7	2	1	8	9	1	8	9	10.3	39													
--	--	19.6	17.9	19.4	15.5	13.6	18.5	18.0	17.3	16.1	11.5	11.6	11.9	9.9	11.6	12.1	10.3	9.3	11.5	12.4	10.5	11.1	12.8	14.3	Diurnal Average														
--	--	102	94	112	76	51	85	61	74	81	45	39	38	29	27	32	33	36	43	46	53	55	61	69	Diurnal Maximum														
Z - zerospan		C - Calibration				PF - Power Failure																																	



WBEA  
Hourly Averages

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Shell Muskeg River - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Shell Muskeg River - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	554	78.81	78.81
21 - 40	110	15.65	94.45
41 - 80	33	4.69	99.15
81 - 159	5	0.71	99.86
> 159	0	0.00	99.86

Total Number of Valid Hours: 703

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Shell Muskeg River - May 2014**

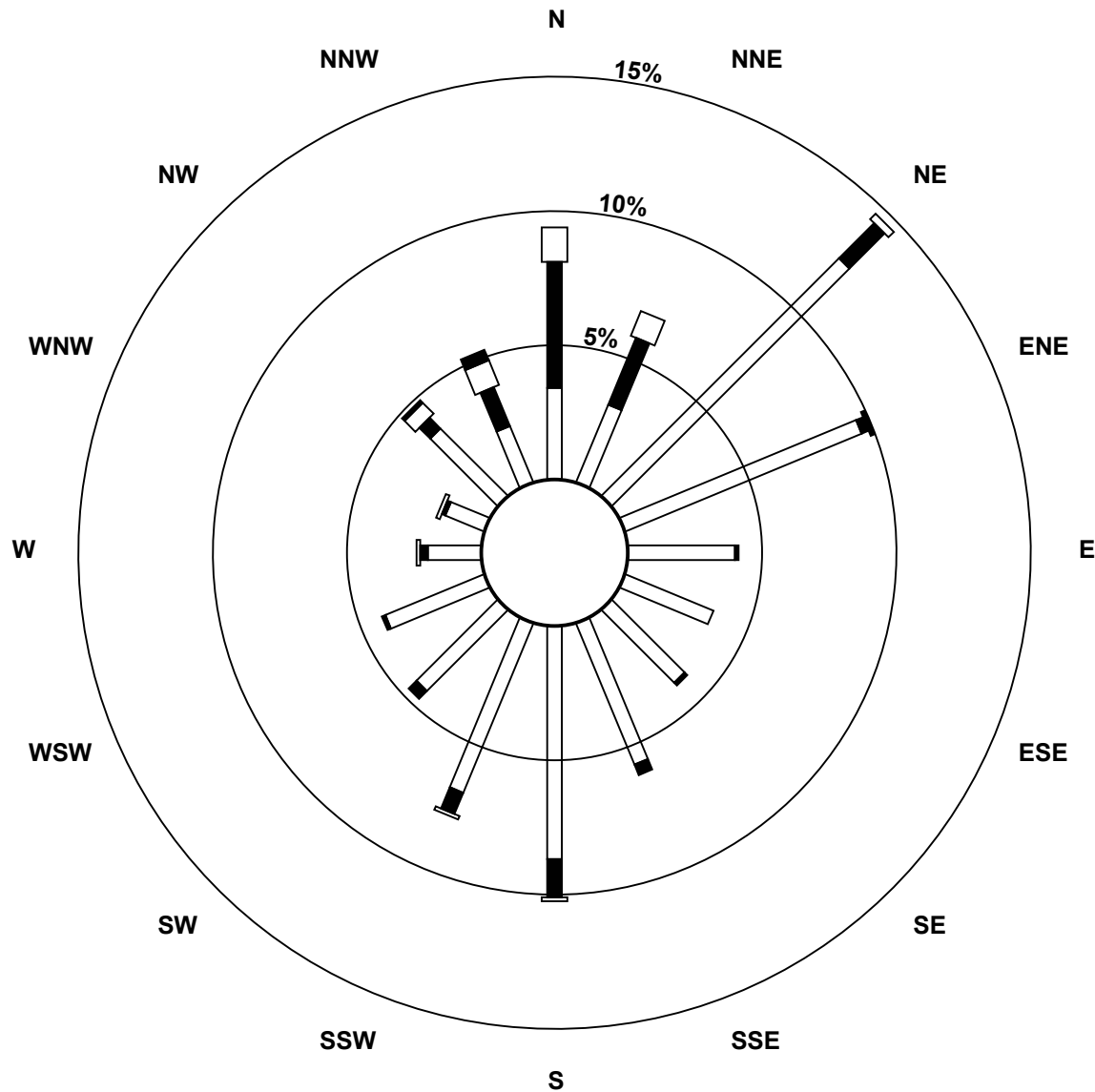
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	24	22	88	67	28	25	27	40	61	48	30	28	14	11	25	16	554
21 - 40	33	19	13	2	1	0	1	3	10	6	3	1	2	1	4	11	110
11 - 80	9	7	2	0	0	0	0	0	1	1	0	0	1	1	4	7	33
81 - 159	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	3	5
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	66	48	103	70	29	25	28	43	72	55	33	29	17	13	34	37	702

Total Number of Valid Hours: 703

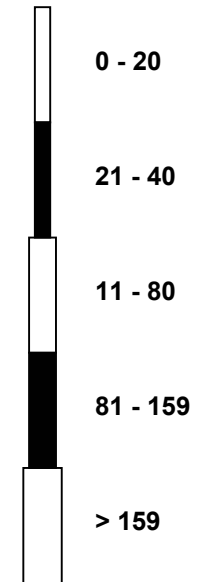
Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

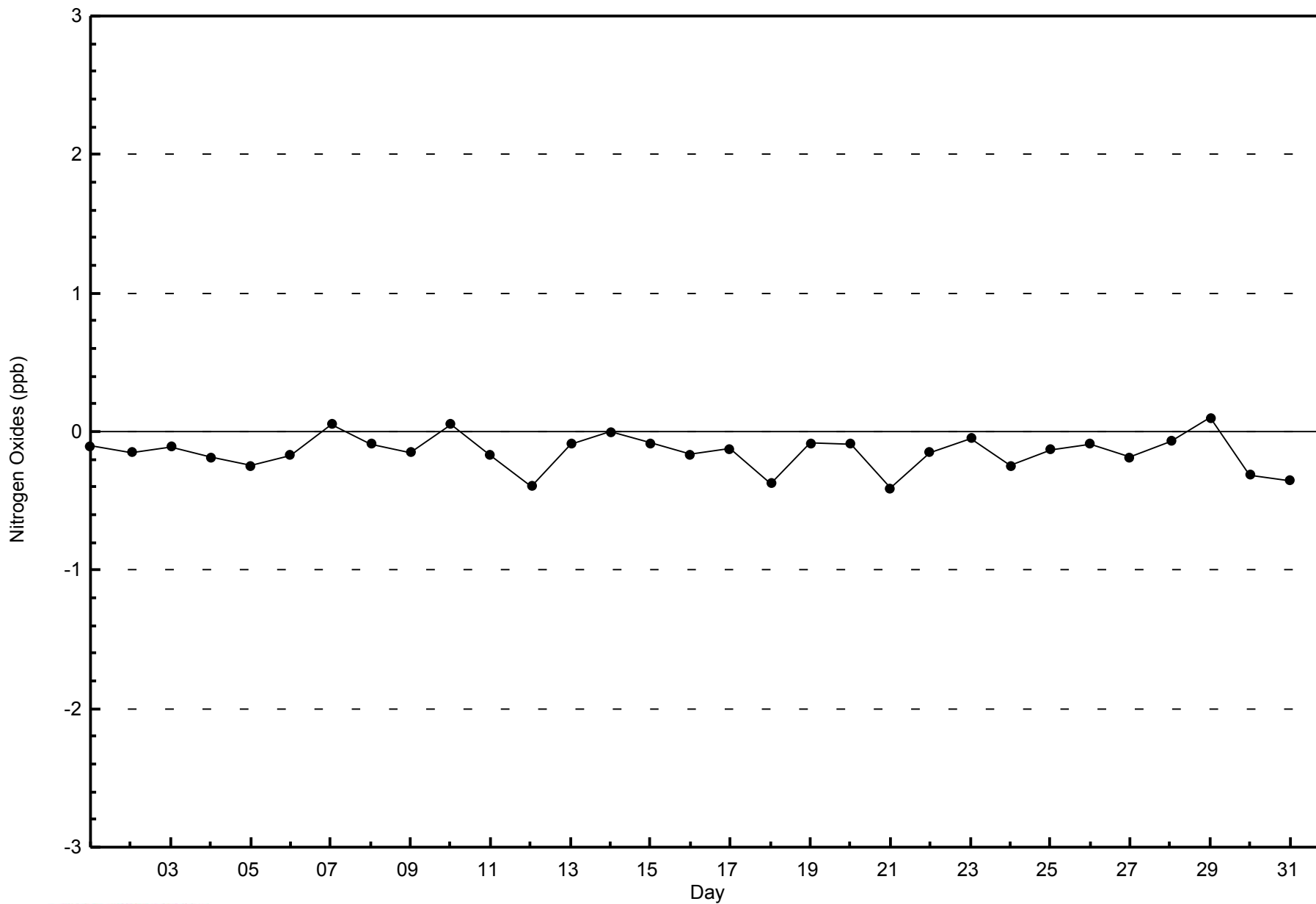
**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Shell Muskeg River (AMS 16)**



Classes (ppb)



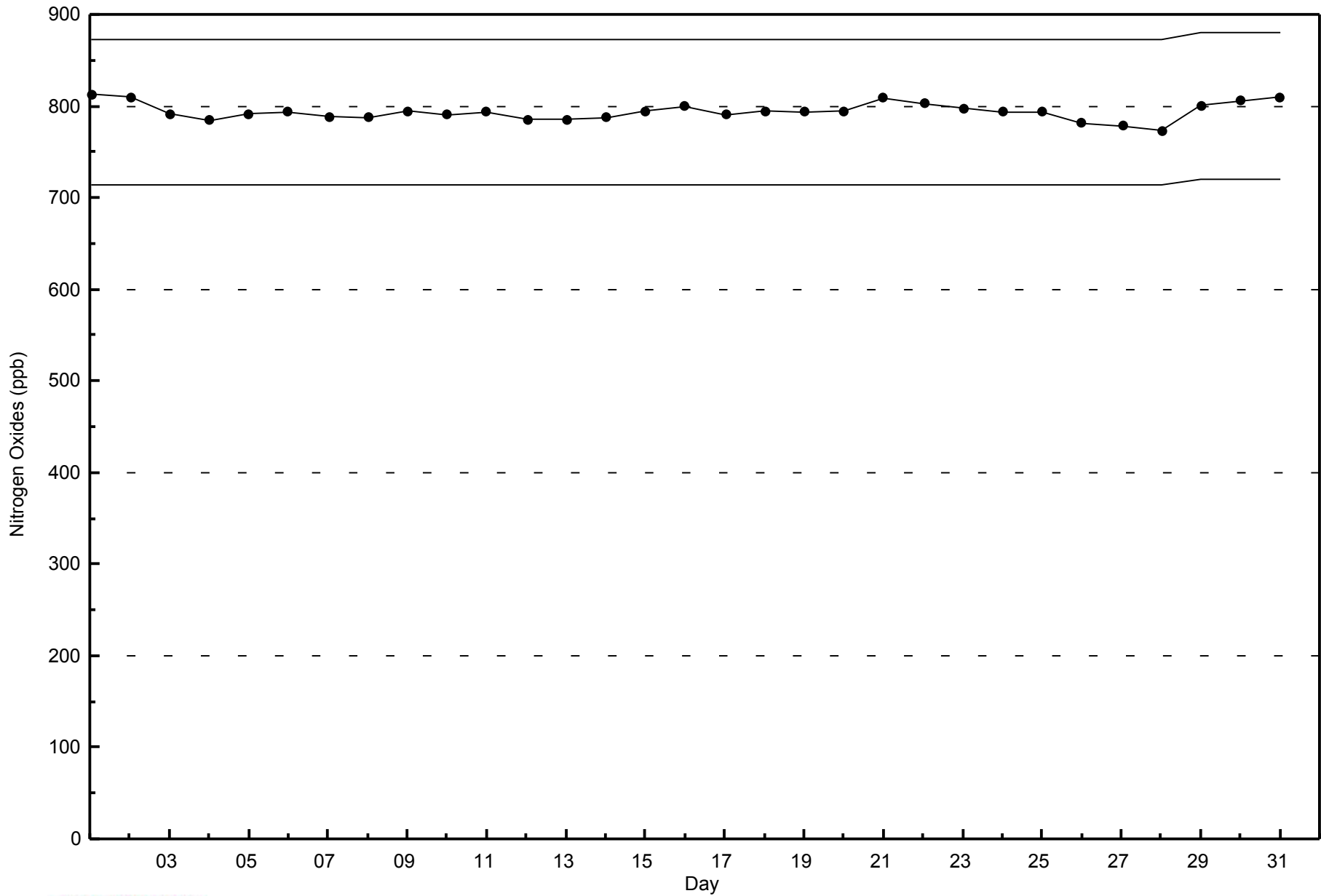
**Total Number of Valid Hours: 703**





WBEA  
Span Responses

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Shell Muskeg River - May 2014





Number of Exceedences (AAAQO): 24-hr: 0	Hours in Service: 744
Maximum Value: 25.3 µg/m <sup>3</sup> on May 7 02:00	Maximum Daily Average: 7.8 µg/m <sup>3</sup> on May 23
Minimum Value: 0.3 µg/m <sup>3</sup> on May 28 14:00	Hours of Data: 741
Maximum Diurnal Average: 5.5 µg/m <sup>3</sup> at hour 1	Hours of Missing Data: 3
Monthly Average: 4.83 µg/m <sup>3</sup>	Hours of Calibration: 0
Minimum Daily Average: 1.3 µg/m <sup>3</sup> on May 28	Percent Operational Time: 99.6
Minimum Diurnal Average: 3.4 µg/m <sup>3</sup> at hour 8	
Percentiles: P <sub>1</sub> = 0.5 P <sub>10</sub> = 1.5 Q <sub>1</sub> = 2.2 Median = 4.0 Q <sub>3</sub> = 6.3 P <sub>90</sub> = 9.1 P <sub>99</sub> = 18.1	

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-May	11.6	6.1	4.4	3.7	2.4	2.0	2.0	2.0	1.7	2.7	8.5	13.8	11.1	14.8	22.2	14.8	11.9	5.5	1.9	3.6	5.9	8.9	10.7	7.4	7.5	22.2																							
2-May	5.9	8.3	4.2	2.7	3.3	6.0	8.8	8.8	7.1	5.4	5.5	5.9	6.9	5.6	5.5	7.2	8.3	4.1	3.2	5.1	6.7	7.9	9.1	6.8	6.2	9.1																							
3-May	4.2	5.2	7.3	9.4	8.8	8.0	8.2	8.6	6.5	5.5	4.7	3.8	3.5	2.8	2.1	3.2	3.5	3.2	3.5	5.2	4.8	3.7	5.2	8.1	5.4	9.4																							
4-May	6.3	3.9	5.5	16.3	12.1	9.0	2.7	1.3	2.0	4.9	4.3	4.5	4.6	3.9	4.1	4.7	4.9	6.2	6.8	8.1	7.3	4.8	1.8	1.0	5.5	16.3																							
5-May	1.0	1.1	1.5	2.0	3.0	3.0	2.5	2.8	3.3	5.7	8.3	7.9	6.7	5.0	5.4	6.6	5.5	5.3	2.3	1.3	1.2	2.2	3.7	4.4	3.8	8.3																							
6-May	4.4	1.8	2.0	4.7	2.9	3.3	3.5	3.2	2.2	3.2	5.1	4.9	6.1	4.5	6.2	10.6	5.9	5.2	7.7	11.0	13.1	14.3	13.7	16.4	6.5	16.4																							
7-May	15.7	25.3	17.5	18.4	12.5	7.4	4.9	3.2	3.4	4.9	5.8	5.0	5.0	4.8	3.2	3.3	3.7	3.7	4.0	2.6	2.5	2.6	1.6	1.3	6.8	25.3																							
8-May	1.1	1.0	1.5	1.6	1.4	1.8	1.6	1.5	1.9	1.9	1.7	2.8	1.8	1.5	1.7	1.6	2.1	1.9	1.5	1.6	3.0	2.6	2.5	6.5	2.0	6.5																							
9-May	10.3	8.9	8.5	8.4	6.9	3.3	2.8	3.4	5.1	5.6	5.9	4.9	3.7	1.9	1.9	3.0	3.8	2.3	2.6	5.0	8.4	10.2	11.0	9.4	5.7	11.0																							
10-May	9.3	7.6	7.4	4.5	4.7	2.7	3.0	3.6	3.5	1.1	1.2	1.3	1.6	1.2	1.3	1.4	1.3	1.3	1.4	1.5	1.7	2.2	1.5	1.5	2.8	9.3																							
11-May	2.7	3.8	2.2	2.4	4.7	2.9	1.9	2.3	2.6	2.8	2.5	2.7	4.8	6.3	6.9	5.7	4.5	4.0	4.3	5.0	3.2	1.7	1.6	1.5	3.4	6.9																							
12-May	2.8	2.7	2.9	4.2	3.7	2.8	2.7	2.0	2.0	3.6	4.8	4.2	3.4	2.8	2.8	2.5	3.1	3.3	4.5	6.3	5.9	3.7	4.1	4.9	3.6	6.3																							
13-May	6.9	11.1	7.2	2.7	5.5	6.0	5.3	3.7	2.3	4.4	4.7	6.7	6.2	6.2	5.3	4.9	5.7	5.3	6.1	5.3	4.8	5.5	12.1	18.8	6.4	18.8																							
14-May	22.6	14.7	17.7	8.7	4.6	6.6	7.1	3.3	3.4	6.1	9.3	9.9	5.0	5.9	6.9	6.9	6.2	5.6	5.9	4.8	4.4	2.1	1.3	1.7	7.1	22.6																							
15-May	1.6	1.5	1.6	1.5	1.4	1.4	1.8	1.7	1.9	1.9	1.8	1.4	1.3	1.3	1.3	1.2	1.7	2.9	1.8	2.0	3.0	3.2	5.1	6.5	2.1	6.5																							
16-May	5.9	6.8	5.0	6.6	7.4	3.3	1.7	2.6	4.5	2.7	3.5	5.9	7.6	7.9	9.1	9.3	8.7	9.4	10.2	9.8	6.2	6.0	5.7	5.6	6.3	10.2																							
17-May	4.0	4.0	4.4	4.5	2.6	5.3	6.7	5.6	12.6	9.0	PF	PF	8.6	8.8	9.7	8.4	8.0	6.6	6.1	4.8	2.0	2.1	1.7	1.6	5.8	12.6																							
18-May	1.7	1.5	1.4	1.4	1.4	1.4	2.4	2.6	2.5	2.5	2.6	3.4	6.0	4.6	4.7	6.2	9.4	6.1	7.8	6.2	4.8	6.2	4.5	5.7	4.0	9.4																							
19-May	7.6	3.9	4.5	4.4	4.3	4.4	4.2	5.3	6.0	6.4	6.4	8.8	11.2	11.6	10.5	10.0	10.7	7.2	8.6	9.8	9.7	6.3	6.2	5.7	7.2	11.6																							
20-May	5.5	6.8	6.3	7.9	6.8	4.5	2.8	2.2	2.1	2.1	3.2	6.4	7.5	7.6	6.5	4.5	2.5	2.4	2.6	4.2	4.0	3.7	3.4	3.3	4.5	7.9																							
21-May	3.2	2.9	2.8	2.8	3.0	3.6	3.6	3.2	6.1	5.3	5.6	6.4	8.0	5.2	6.8	15.2	21.2	8.6	5.3	6.1	9.4	14.9	9.0	4.4	6.8	21.2																							
22-May	3.1	3.2	4.3	6.9	8.8	4.1	3.6	3.4	6.0	11.3	9.6	7.8	6.7	6.9	4.4	5.6	3.3	2.5	3.2	3.5	3.7	3.2	3.0	3.4	5.1	11.3																							
23-May	3.7	3.9	6.1	7.4	6.7	5.0	4.5	5.5	5.0	5.6	5.0	15.3	8.0	8.9	10.5	7.9	8.3	8.6	13.4	11.6	10.9	6.9	13.6	5.7	7.8	15.3																							
24-May	6.1	6.7	5.0	4.5	4.0	3.5	3.5	3.0	3.2	3.5	3.4	3.1	2.8	2.3	2.1	1.5	1.6	1.5	1.6	1.3	1.4	1.7	1.5	1.5	2.9	6.7																							
25-May	1.6	1.5	3.3	4.6	3.4	2.0	2.3	3.0	1.6	1.5	2.2	4.9	7.4	6.6	4.9	6.3	8.1	10.2	20.8	5.1	2.8	6.0	10.4	9.6	5.4	20.8																							
26-May	6.9	3.9	5.1	6.8	6.0	5.0	4.9	3.0	9.8	5.2	4.4	5.1	5.6	7.0	5.5	5.7	4.6	6.8	11.0	10.6	12.5	14.6	12.2	9.2	7.1	14.6																							
27-May	7.7	5.2	3.7	3.5	3.6	3.2	2.8	2.4	2.2	2.0	1.9	1.9	1.9	1.9	1.9	2.3	2.4	2.2	2.1	2.0	2.1	2.0	1.9	1.8	2.7	7.7																							
28-May	2.0	1.7	1.8	2.0	3.0	2.7	1.6	1.5	1.7	2.0	1.6	1.7	M	0.3	0.4	0.4	0.4	0.4	0.8	0.5	0.7	0.7	0.7	0.9	1.3	3.0																							
29-May	1.0	1.2	1.3	1.6	1.4	1.2	6.3	5.3	2.2	2.0	2.3	2.7	2.4	2.2	2.0	1.5	0.9	0.9	1.0	0.8	0.7	0.4	0.5	0.4	1.8	6.3																							
30-May	0.5	0.6	0.7	0.8	0.8	0.7	0.7	0.7	0.6	0.7	0.9	1.8	1.8	1.8	1.7	2.6	3.7	3.3	3.6	2.8	2.1	1.9	2.6	2.6	1.7	3.7																							
31-May	4.5	6.4	5.8	5.8	6.1	8.9	11.9	3.7	4.0	5.7	3.7	4.1	3.4	2.9	4.0	3.2	3.8	3.4	3.9	5.0	2.3	1.4	2.8	3.3	4.6	11.9																							
																								5.5	5.3	4.9	5.2	4.8	4.0	4.0	3.4	3.8	4.1	4.3	5.3	5.4	5.0	5.2	5.4	5.5	4.5	5.1	4.9	4.9	4.9	5.3	5.2	Diurnal Average	
																								22.6	25.3	17.7	18.4	12.5	9.0	11.9	8.8	12.6	11.3	9.6	15.3	11.2	14.8	22.2	15.2	21.2	10.2	20.8	11.6	13.1	14.9	13.7	18.8	Diurnal Maximum	

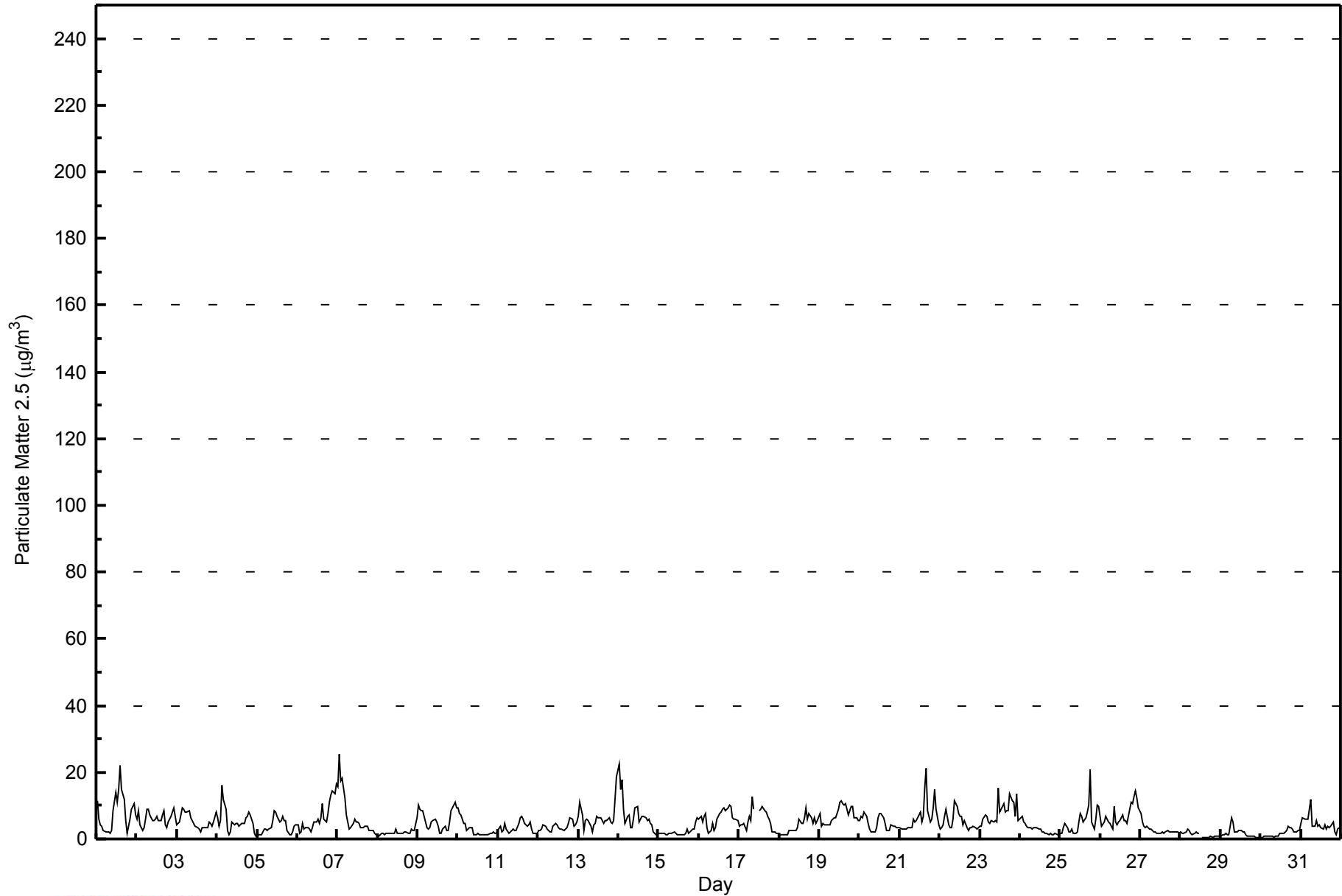
M - Maintenance PF - Power Failure  
 Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m<sup>3</sup>





WBEA  
Hourly Averages

Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
Shell Muskeg River - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Shell Muskeg River - May 2014**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
1 - 5	459	61.94	61.94
6 - 15	239	32.25	94.20
16 - 25	12	1.62	95.82
26 - 80	0	0.00	95.82
> 81.0	0	0.00	95.82

Total Number of Valid Hours: 741

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) - μg/m<sup>3</sup>**  
**Shell Muskeg River - May 2014**

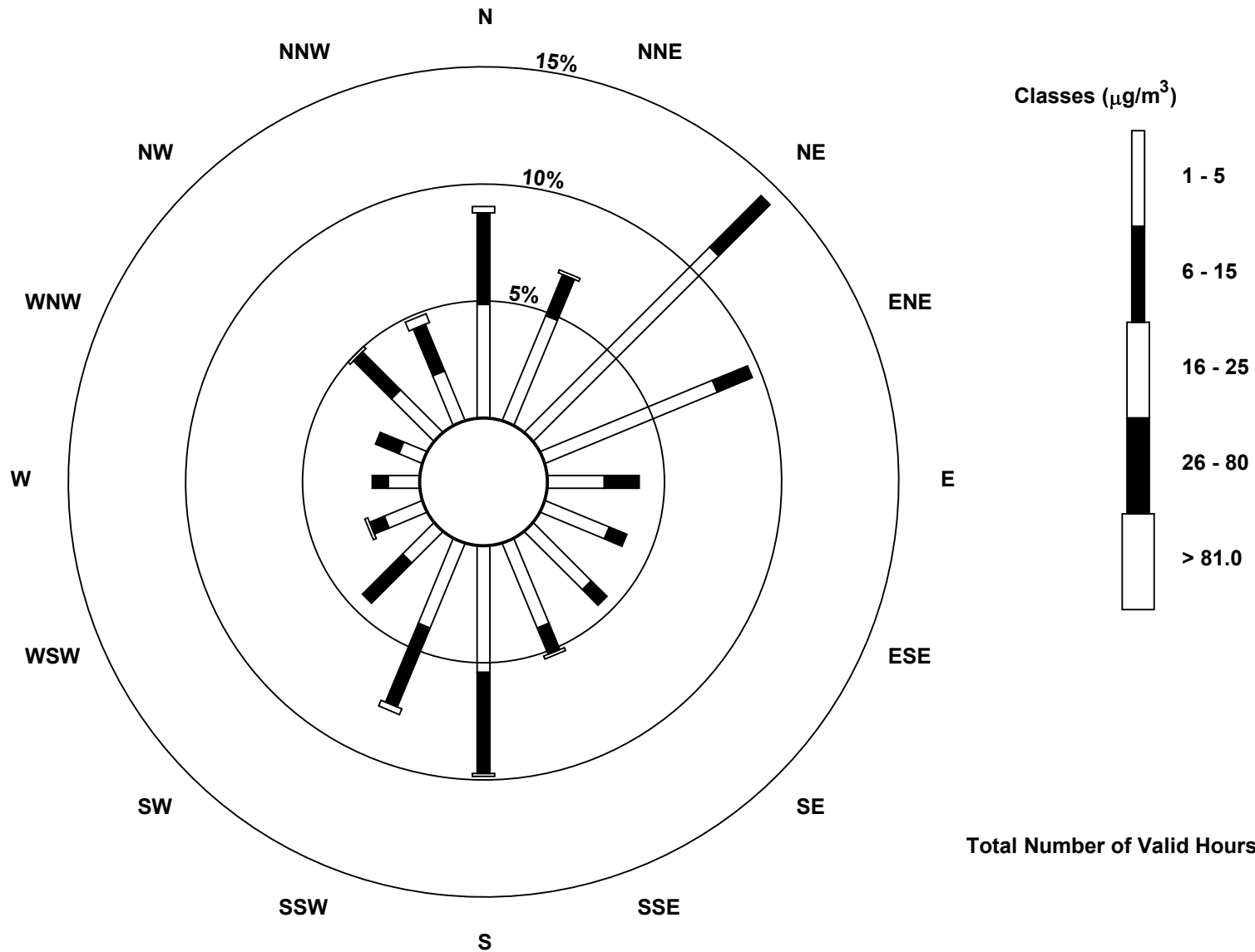
Concentration Ranges (μg/m <sup>3</sup> )	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	36	36	83	59	18	22	26	29	40	29	14	13	10	8	19	17	459
6 - 15	29	14	23	12	11	6	7	9	32	27	18	5	5	8	17	16	239
16 - 25	2	1	0	0	0	0	0	1	1	2	0	1	0	0	1	3	12
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	67	51	106	71	29	28	33	39	73	58	32	19	15	16	37	36	710

Total Number of Valid Hours: 741

Total Number of Hours: 744

Wood Buffalo Environmental Association  
 Wind Rose May 2014

Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
 Shell Muskeg River (AMS 16)



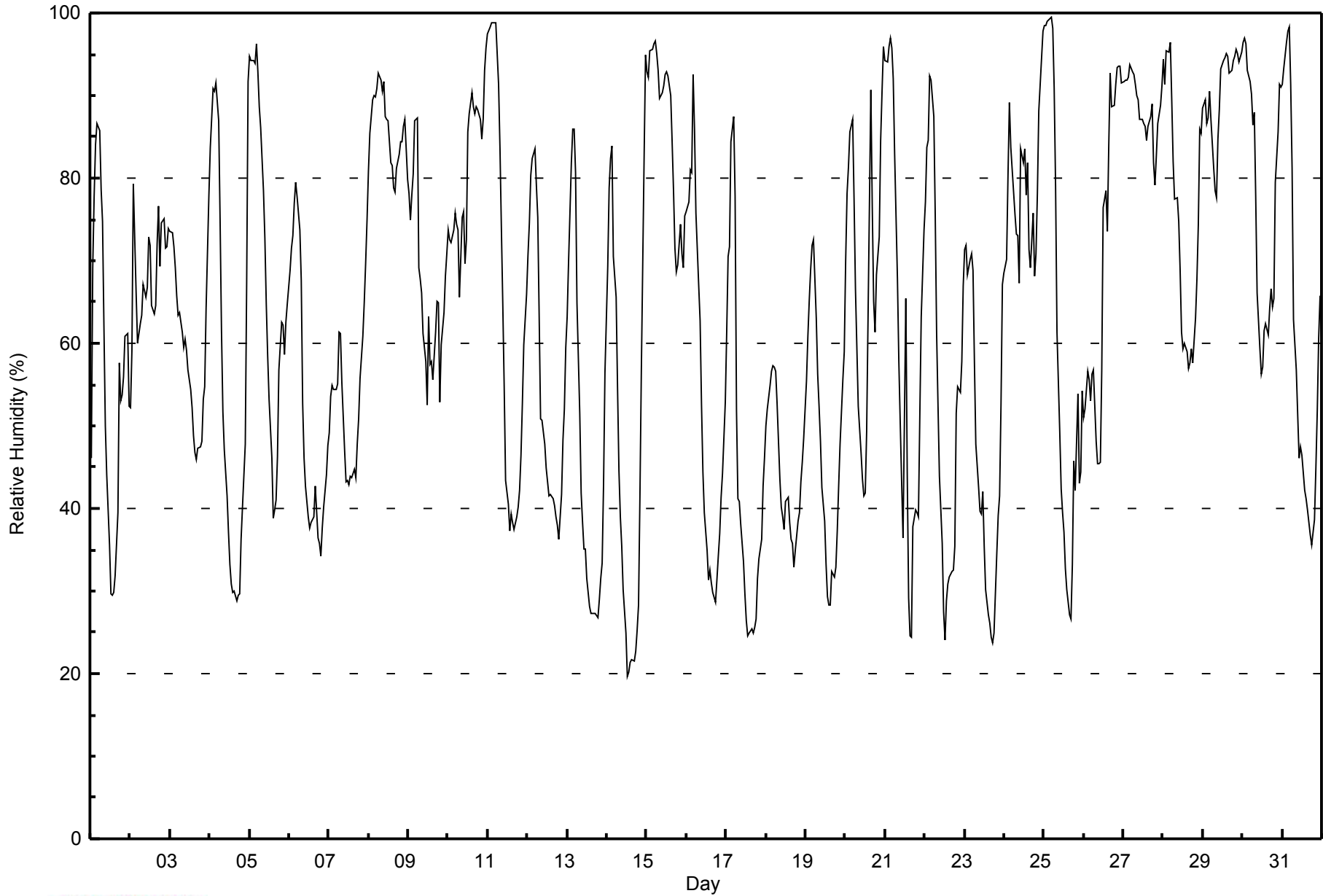


Maximum Value: 99 % on May 25 05:00																			Maximum Daily Average: 90.3 % on May 29						Hours in Service: 744																									
Minimum Value: 20 % on May 14 13:00																			Minimum Daily Average: 44.0 % on May 17						Hours of Data: 744																									
Maximum Diurnal Average: 83.3 % at hour 5																			Minimum Diurnal Average: 49.9 % at hour 16						Hours of Missing Data: 0																									
Monthly Average: 63.4 %																			Percentiles: P <sub>1</sub> = 24 P <sub>10</sub> = 33 Q <sub>1</sub> = 44 Median = 64 Q <sub>3</sub> = 84 P <sub>90</sub> = 92 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-May	46	69	78	84	87	86	79	75	62	50	44	36	30	30	30	32	40	58	53	54	56	61	61	52	56.3	87																								
2-May	52	59	79	66	60	61	62	63	67	66	67	73	72	65	64	65	72	77	69	75	75	72	72	74	67.7	79																								
3-May	74	73	72	69	66	63	64	61	60	61	59	57	54	52	49	47	46	47	48	48	53	55	64	78	59.1	78																								
4-May	84	87	91	90	91	87	75	62	52	47	41	37	33	31	30	30	29	29	30	36	40	48	67	92	55.8	92																								
5-May	95	94	94	94	96	93	89	86	78	73	65	59	53	46	39	40	41	46	57	63	62	59	63	65	68.7	96																								
6-May	69	72	73	77	80	78	74	68	53	46	43	39	38	38	39	39	43	36	36	34	38	40	44	48	51.8	80																								
7-May	49	54	55	54	54	55	61	61	55	47	43	43	43	44	44	45	44	48	51	56	61	65	70	75	53.2	75																								
8-May	81	86	89	90	90	91	93	92	91	92	87	87	87	82	81	79	78	81	83	84	84	86	87	80	85.9	93																								
9-May	78	75	78	80	87	87	69	68	66	61	58	52	63	57	58	56	61	65	65	53	60	64	68	71	66.7	87																								
10-May	74	73	72	74	76	74	74	66	75	76	70	73	86	88	90	89	88	89	88	87	85	87	93	96	80.9	96																								
11-May	97	98	99	99	99	99	91	84	74	65	55	43	41	37	39	38	38	39	40	42	46	53	60	66	64.2	99																								
12-May	71	75	80	82	84	79	75	63	51	51	48	45	43	42	42	41	40	39	38	36	42	48	52	60	55.3	84																								
13-May	63	70	82	86	86	81	65	51	42	38	35	35	32	28	27	27	27	27	27	29	32	33	43	56	46.8	86																								
14-May	69	79	82	84	70	66	55	45	39	35	30	25	20	20	21	22	22	23	25	28	42	57	83	95	47.3	95																								
15-May	93	92	95	96	96	97	95	93	90	90	91	93	93	92	90	84	78	71	69	69	74	71	69	75	85.8	97																								
16-May	76	77	81	81	93	86	76	67	63	53	44	39	35	31	33	31	30	29	31	34	37	41	44	53	52.7	93																								
17-May	61	70	72	84	87	78	52	41	41	38	33	30	26	25	25	25	25	26	27	31	34	36	43	46	44.0	87																								
18-May	50	52	55	57	57	57	57	53	44	40	39	38	41	41	38	36	36	33	35	39	39	43	46	48	44.7	57																								
19-May	55	61	65	69	72	72	63	56	52	48	42	38	33	29	28	28	32	32	33	37	43	48	56	59	48.1	72																								
20-May	70	78	81	86	87	77	67	59	52	47	44	42	42	49	77	91	77	65	61	68	73	85	90	96	69.3	96																								
21-May	94	94	96	97	96	92	83	68	58	50	43	36	65	44	29	24	24	38	40	39	39	51	63	74	60.0	97																								
22-May	77	84	85	92	92	87	76	61	52	44	36	27	24	29	31	32	32	33	35	52	55	54	58	67	54.8	92																								
23-May	71	72	68	70	71	69	58	48	42	40	39	42	35	30	27	26	24	24	25	35	39	42	53	67	46.6	72																								
24-May	68	70	80	89	84	81	76	73	73	67	84	82	84	78	82	71	69	76	68	71	78	88	95	98	78.5	98																								
25-May	99	99	99	99	99	98	91	79	61	49	42	39	37	33	30	27	27	33	46	42	54	43	44	54	59.4	99																								
26-May	51	52	57	56	53	56	57	48	45	45	46	57	76	78	74	84	93	89	89	91	93	93	94	92	69.5	94																								
27-May	92	92	92	92	94	93	92	91	90	89	87	87	87	86	85	86	87	89	82	79	83	87	89	91	88.4	94																								
28-May	94	91	95	95	96	90	82	77	78	75	69	61	59	60	59	57	58	59	58	63	68	74	86	85	74.6	96																								
29-May	88	89	87	87	91	87	81	78	78	85	88	93	94	95	95	95	93	93	94	95	96	95	94	95	90.3	96																								
30-May	96	97	96	93	92	90	86	88	78	66	59	56	57	62	62	61	64	67	64	65	80	86	91	91	77.0	97																								
31-May	91	93	96	98	98	91	81	63	57	51	46	47	46	42	41	40	38	37	36	39	45	52	61	66	60.7	98																								
																								75.2	78.3	81.5	82.9	83.3	80.7	74.1	67.4	61.9	57.6	54.2	52.0	52.6	50.5	50.3	49.9	50.2	51.5	51.7	54.0	58.2	61.8	67.8	73.0	Diurnal Average		
																								99	99	99	99	99	99	95	93	91	92	91	93	94	95	95	95	95	93	93	94	95	96	95	95	98	Diurnal Maximum	



**WBEA**  
**Hourly Averages**

**Relative Humidity (RH) - %**  
**Shell Muskeg River - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Relative Humidity (RH) - %**  
**Shell Muskeg River - May 2014**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	1	0.13	0.13
20 - 40	139	18.68	18.82
40 - 60	194	26.08	44.89
60 - 80	197	26.48	71.37
80 - 100	213	28.63	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



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

**Ambient Temperature (AT) - C**  
**Shell Muskeg River - May 2014**

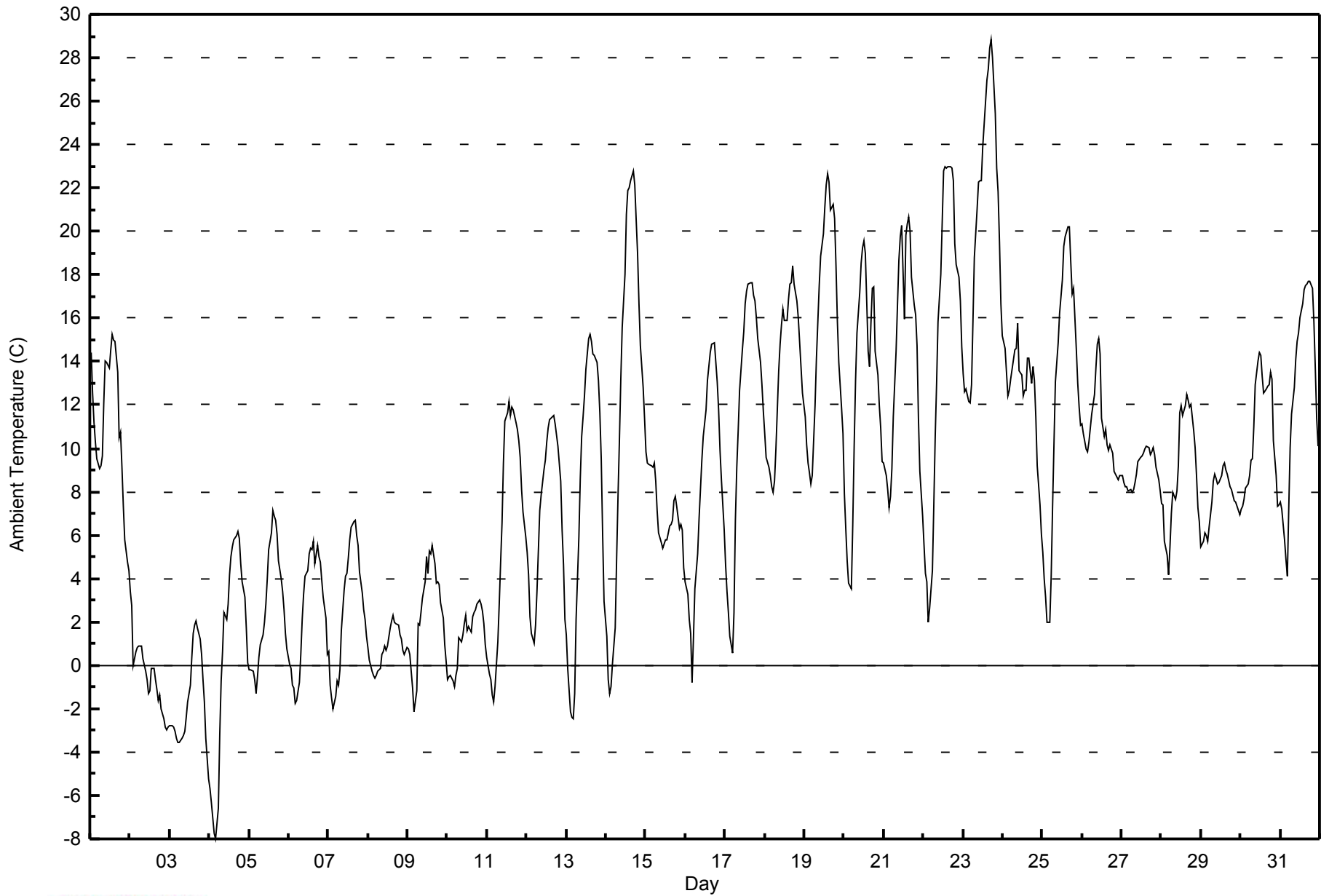
Maximum Value: 28.8 C on May 23 18:00		Maximum Daily Average: 20.6 C on May 23		Hours in Service: 744																																												
Minimum Value: -8.0 C on May 4 05:00		Minimum Daily Average: -1.6 C on May 3		Hours of Data: 744																																												
Maximum Diurnal Average: 12.3 C at hour 16		Minimum Diurnal Average: 3.1 C at hour 5		Hours of Missing Data: 0																																												
Monthly Average: 8.36 C		Percentiles: P <sub>1</sub> = -3.6 P <sub>10</sub> = -0.5 Q <sub>1</sub> = 2.5 Median = 8.3 Q <sub>3</sub> = 13.1 P <sub>90</sub> = 17.6 P <sub>99</sub> = 24.4		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-May	14.4	12.6	11.2	10.3	9.5	9.0	9.2	9.6	12.1	14.1	14.0	13.7	14.5	15.2	15.0	14.9	13.5	10.5	10.8	9.1	7.3	5.8	4.8	4.4	11.1	15.2																						
2-May	3.4	2.7	0.0	0.6	0.8	0.9	0.9	0.9	0.3	-0.3	-0.6	-1.3	-1.2	-0.1	-0.1	-0.6	-1.1	-1.6	-1.4	-2.0	-2.5	-2.8	-3.0	-2.9	-0.5	3.4																						
3-May	-2.8	-2.8	-2.8	-3.0	-3.4	-3.6	-3.6	-3.4	-3.3	-3.0	-2.4	-1.7	-0.9	0.3	1.5	1.9	2.0	1.8	1.2	0.5	-0.6	-1.7	-3.4	-5.2	-1.6	2.0																						
4-May	-5.7	-6.3	-7.0	-7.7	-8.0	-6.6	-3.2	-0.7	0.6	2.4	2.1	2.8	4.2	5.0	5.4	5.8	6.0	6.2	5.9	4.7	3.9	3.1	1.7	0.1	0.6	6.2																						
5-May	-0.2	-0.2	-0.2	-0.7	-1.3	-0.5	0.4	0.9	1.4	2.0	2.8	4.0	5.3	6.1	7.2	6.9	6.7	6.0	4.8	4.0	3.4	2.5	1.5	0.8	2.6	7.2																						
6-May	0.1	-0.1	-0.9	-1.1	-1.7	-1.6	-0.8	0.5	2.1	3.3	4.1	4.4	5.1	5.4	5.4	5.7	4.7	5.5	5.0	4.7	3.9	3.1	2.2	0.5	2.5	5.7																						
7-May	0.6	-0.9	-1.5	-2.0	-1.5	-0.7	-0.9	-0.2	1.6	3.5	4.1	4.2	4.9	5.8	6.4	6.6	6.7	5.9	5.5	4.3	3.4	2.6	2.1	1.3	2.6	6.7																						
8-May	0.8	0.3	-0.3	-0.5	-0.6	-0.5	-0.3	-0.2	0.5	0.6	0.9	0.7	0.9	1.7	2.1	2.3	2.0	1.9	1.9	1.4	1.2	0.7	0.5	0.8	0.8	2.3																						
9-May	0.8	0.5	-0.3	-1.1	-2.1	-1.2	1.9	1.9	2.4	3.1	3.9	5.0	4.2	5.3	5.1	5.5	4.7	3.8	3.9	3.7	2.9	2.2	1.0	0.2	2.4	5.5																						
10-May	-0.7	-0.6	-0.5	-0.7	-1.0	-0.5	-0.1	1.3	1.1	1.4	1.9	2.3	1.6	1.8	1.5	2.2	2.4	2.6	2.8	3.0	2.8	2.5	1.9	0.9	1.3	3.0																						
11-May	0.4	-0.4	-0.6	-1.3	-1.7	-1.0	1.1	2.8	4.7	6.6	9.3	11.3	11.7	12.2	11.5	11.9	11.8	11.2	10.9	10.4	9.6	8.1	7.1	5.9	6.4	12.2																						
12-May	5.2	4.1	2.3	1.5	1.0	1.9	3.4	5.2	7.1	7.9	9.0	9.4	10.3	10.9	11.3	11.5	11.5	11.1	10.6	10.1	8.5	6.2	4.6	2.1	7.0	11.5																						
13-May	1.4	-0.2	-2.1	-2.4	-2.5	-1.3	2.1	5.9	8.6	10.5	11.4	12.4	13.7	15.1	15.3	14.9	14.4	14.3	14.0	13.2	11.6	9.5	6.0	3.0	7.9	15.3																						
14-May	1.4	-0.6	-1.3	-1.0	0.1	1.7	4.9	7.8	10.3	13.2	15.6	18.0	20.8	21.9	22.0	22.3	22.8	22.1	20.6	19.0	16.6	14.7	12.8	11.4	12.4	22.8																						
15-May	9.9	9.3	9.3	9.2	9.1	9.3	8.5	7.2	6.1	5.7	5.4	5.6	5.8	5.8	6.4	6.5	6.7	7.6	7.8	7.3	6.3	6.5	6.2	4.5	7.2	9.9																						
16-May	3.9	3.3	2.1	1.4	-0.8	1.3	3.6	5.2	6.8	8.1	9.5	10.6	11.7	13.1	13.8	14.4	14.8	14.9	14.0	13.1	11.7	9.9	8.6	6.2	8.4	14.9																						
17-May	4.6	3.4	2.5	1.3	0.5	2.5	6.7	9.1	10.8	12.7	14.6	15.4	16.7	17.2	17.5	17.6	17.6	17.0	16.8	16.0	15.0	13.9	13.0	11.7	11.4	17.6																						
18-May	10.7	9.6	9.2	8.7	8.3	8.0	8.5	9.9	13.6	14.8	15.7	16.4	15.9	15.9	16.9	17.6	17.6	18.4	17.6	16.8	16.0	14.9	13.7	12.5	13.6	18.4																						
19-May	11.4	10.2	9.3	8.9	8.4	8.7	12.0	14.2	15.8	17.5	18.8	19.9	21.1	22.2	22.6	22.3	21.0	21.2	20.6	18.4	15.8	13.9	11.8	10.7	15.7	22.6																						
20-May	7.9	6.3	4.8	3.8	3.5	6.5	10.1	13.1	15.3	17.2	18.6	19.2	19.6	19.0	14.5	13.8	15.8	17.4	17.4	14.5	13.4	12.0	11.0	9.4	12.7	19.6																						
21-May	9.3	8.8	8.1	7.3	7.8	9.1	11.4	14.5	16.6	18.6	19.7	20.3	16.0	19.9	20.3	20.7	20.0	17.9	16.6	16.1	14.7	11.4	8.9	6.9	14.2	20.7																						
22-May	5.5	4.2	3.8	2.0	2.7	4.4	7.4	10.6	13.0	15.8	18.0	20.4	22.8	23.0	22.9	23.0	23.0	22.9	22.3	19.4	18.5	17.9	16.8	14.7	14.8	23.0																						
23-May	13.5	12.6	12.7	12.2	12.1	13.0	15.8	18.8	21.0	22.3	22.3	22.3	23.9	24.9	27.0	27.5	28.5	28.8	28.0	25.4	22.9	21.8	19.5	16.7	20.6	28.8																						
24-May	15.2	14.6	13.5	12.4	12.7	13.2	14.1	14.5	14.6	15.8	13.6	13.4	12.4	12.6	12.7	14.2	14.1	13.0	13.8	13.1	11.5	9.2	7.4	6.1	12.8	15.8																						
25-May	5.2	4.0	3.2	2.0	2.0	4.1	7.4	10.2	13.1	14.9	16.2	17.0	17.8	19.3	19.8	20.2	20.2	18.6	17.1	17.4	14.5	13.0	11.9	11.0	12.5	20.2																						
26-May	11.2	10.7	10.0	9.9	10.3	10.9	11.6	12.5	13.7	14.8	15.1	14.3	11.4	10.6	10.9	10.2	9.9	10.2	9.8	9.0	8.8	8.7	8.6	8.7	10.9	15.1																						
27-May	8.7	8.4	8.2	8.2	8.0	8.1	8.0	8.1	8.4	8.8	9.4	9.6	9.7	9.8	10.0	10.1	10.0	9.7	9.8	10.1	9.7	9.1	8.5	8.0	9.0	10.1																						
28-May	7.5	7.4	5.7	5.1	4.2	5.4	7.0	8.0	7.7	8.0	9.2	11.7	12.0	11.5	12.0	12.5	12.2	11.9	12.0	10.8	10.0	8.7	7.3	6.6	8.9	12.5																						
29-May	5.5	5.7	6.1	5.9	5.7	6.4	7.5	8.5	8.8	8.6	8.4	8.4	8.7	9.2	9.3	9.0	8.8	8.2	8.1	7.9	7.6	7.5	7.3	6.9	7.7	9.3																						
30-May	7.2	7.3	7.7	8.1	8.4	8.8	9.4	9.5	11.0	12.9	14.0	14.4	14.3	13.3	12.5	12.7	12.9	12.9	13.5	13.2	10.4	8.7	7.3	7.4	10.7	14.4																						
31-May	7.5	7.2	5.8	4.9	4.1	7.2	10.0	11.6	12.8	14.1	14.9	15.3	16.0	16.7	17.3	17.5	17.6	17.7	17.7	17.4	15.8	13.7	11.4	10.1	12.7	17.7																						
																								5.3	4.5	3.8	3.3	3.1	4.0	5.6	7.0	8.3	9.5	10.3	11.0	11.3	11.9	12.1	12.3	12.2	11.9	11.6	10.7	9.5	8.3	7.1	5.9	Diurnal Average
																								15.2	14.6	13.5	12.4	12.7	13.2	15.8	18.8	21.0	22.3	22.3	22.3	23.9	24.9	27.0	27.5	28.5	28.8	28.0	25.4	22.9	21.8	19.5	16.7	Diurnal Maximum





**WBEA**  
**Hourly Averages**

**Ambient Temperature (AT) - C**  
**Shell Muskeg River - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C**  
**Shell Muskeg River - May 2014**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	91	12.23	12.23
0 - 10	359	48.25	60.48
10 - 20	252	33.87	94.35
> 20	42	5.65	100.00

Total Number of Valid Hours: 744

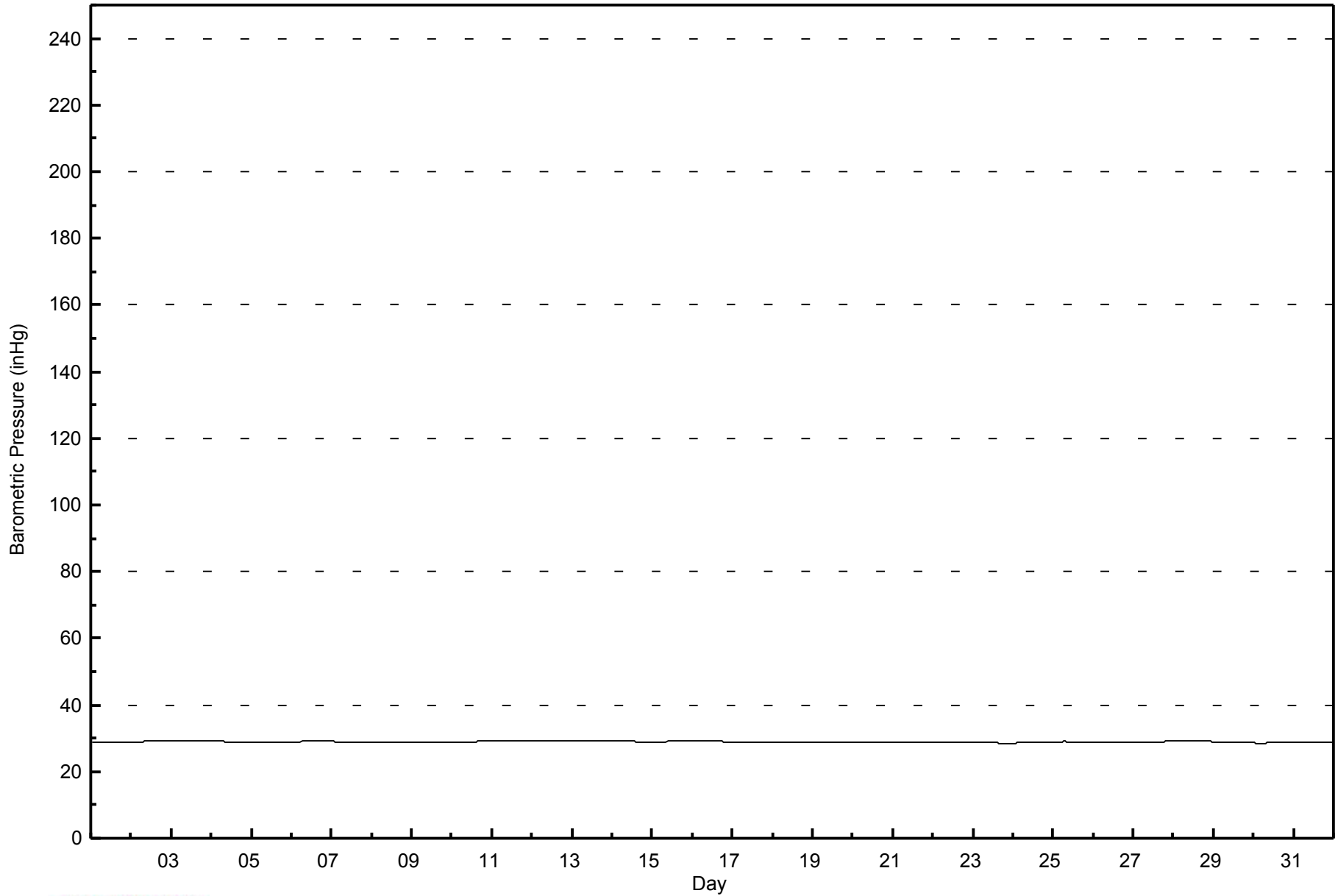
Total Number of Hours: 744





**WBEA**  
**Hourly Averages**

**Barometric Pressure (BP) - inHg**  
**Shell Muskeg River - May 2014**





Maximum Speed: 36 km/h on May 21 15:00	Maximum Daily Speed Average: 16.9 km/h on May 2	Hours in Service: 744
Minimum Speed Value: 0 km/h on May 25 14:00	Minimum Daily Speed Average: 2.7 km/h on May 16	Hours of Data: 744
Maximum Diurnal Speed Average: 8.1 km/h at hour 18	Minimum Diurnal Speed Average: 0.6 km/h at hour 5	Hours of Missing Data: 0
Monthly Average Velocity: 3.7 km/h 31.2 deg	Percentiles: P <sub>1</sub> = 2 P <sub>10</sub> = 4 Q <sub>1</sub> = 6 Median = 11 Q <sub>3</sub> = 16 P <sub>90</sub> = 20 P <sub>99</sub> = 28	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-May	WNW10	N10	N8 NNW10	NNW9	NW9	NW12WNW10	NW18 NNW21	NNW20	N23	N18 NNW18	NW18	NW24 NNW21	NW17 NNW16	N16	N14	NW10	NW11 NNW17									NNW14.3	NW24
2-May	NW13	N17	N16 NW17	NW20	NW17	NW16 NNW18	N18	N20	N17	N16	N15	N17	N14 NNE19	NNE21	N20	N20	NNE21	NNE21	N20	N22	N21					N16.9	N22
3-May	N20	N20	N18	N19	N21	N18	N14	N14 NNE14	NE11	NE12	ENE12	ENE12	NE17	NE17	NE15	NE16	NE17	ENE15	ENE11	ENE12	ENE9	ENE8	E6			NNE12.6	N21
4-May	SSW4	SW5	SW2 SSW4	S4	S3	S3	SSE4	SSE4	WSW6	NNW3	WSW4	W2	SW4	WSW7	SW5	W1	E5	SE5	SSE10	SW6	S9	S11	SSE5		SSW3.5	S11	
5-May	SE4	E4	SE4 SSW5	SW4	SSW4	S5	SSE6	SSE5	E8	E8	NE7	NNE10	NNE13	NNE11	NE17	NE21	NE26	ENE23	ENE21	ENE19	ENE20	NE19	NE20		ENE9.3	NE26	
6-May	NE19	NE20	NE18 NNE13	NNE18	NNE18	NE20	NE20	NE20	NE18	NNE19	NE20	NE21	NE18	NNE18	NNE19	NE20	NE15	NNE13	N11	NNE13	NNE13	NNE11	N9		NE16.3	NE21	
7-May	NNE7	NNW7	NNW7 NNW10	N10	N10	NNE12	N11	N15	N19	N20	N18	NNE18	NNE20	NNE19	NNE18	NNE18	NNE19	NNE17	NE18	ENE11	ENE9	ENE11	E8		NNE12.7	NNE20	
8-May	ESE5	ESE5	SE4 ESE5	ESE3	SE4	E5	ESE4	E4	NE10	NE15	ENE17	ENE16	ENE15	NE20	NE20	NE17	NE14	ENE8	SE5	SSW3	SSW3	SW4	NW6		ENE6.8	NE20	
9-May	NW7	NNW6	NW8 WNW7	SSW4	SSW4	W6	NW9	NNW9	NNW8	NW7	NNW9	NW12	N12 NNW11	NNW11	NNE12	N11	NNE14	N16	NNW17	N15	NNW11	NNW12			NNW8.6	NNW17	
10-May	NW11	NW12	NW13	NW12	NW12WNW12	W11	NW16	NNW16	NNW16	NNW19	NNW17	NNW12	NW10	NW10	N15	N16	N16	N13	NNW12	N12	NW7	WSW6	S5		NNW11.1	NNW19	
11-May	S5	SSW5	S2 SSW3	SW5	SSW5	SW6	SSW7	SSW11	SSW14	WSW8	N16	N15	N13	NNE10	NNE14	NNE12	NE19	NE16	NE18	NE16	ENE12	ENE9	NE11		NE4.0	NE19	
12-May	NE10	ENE6	ENE6	ENE8	ENE9	ENE5	ENE7	NE9	ENE9	NE11	NNE9	NE9	NE14	NE16	NE19	NE19	NE21	NE23	NE20	NE20	NE18	ENE15	ESE9	SSE6	NE11.7	NE23	
13-May	SW5	SSW4	S6	S7	S7	S7	S7	SSW10	WSW7	WNW3	N6	N5	N7	NE14	NE21	NE21	NE21	NE17	NE19	ENE13	ENE13	SE4	SSE4		ENE4.0	NE21	
14-May	SSW4	SSW3	S6	S6	S7	S3	SSW5	SSW4	SSE2	N5	NW7	SW1	SSE9	S10	S7	SSE7	SE11	SE13	SE14	SSE14	SSE8	SSW12	SSW8	SSE7	S5.7	SSE14	
15-May	SE8	SE2	SSE2	ESE5	E7	ENE11	NE13	NNE25	NNE32	NNE34	NNE26	NNE26	NNE23	N25	N23	N26	N23	N24	N21	N16	N11	N11	N13	N12	NNE15.6	NNE34	
16-May	N11 NNW11	NNW9	NNW5	S4	S5	S3	SW4	WSW6	WNW4	WNW4	NW4	SSW4	SW4	E3	ESE2	ENE8	E10	E11	ENE15	ENE15	ENE12	E11	ESE6		ENE2.7	ENE15	
17-May	ESE3	SSW4	SSW3	SE3	SE5	SE4	SSW3	SW3	W3	WNW3	NNW6	NE8	NNW6	NW8	NNW7	NE7	NE10	E9	E10	ENE11	ENE12	ENE12	NNE17	NNE20	NE4.2	NNE20	
18-May	NNE15	ENE8	NE15	NE12	NE16	NE20	NE16	NE9	ENE12	ENE13	NE5	W9	NNE10	NE13	NE14	NE14	NE16	ENE15	NE19	NE16	NE5	NE16	ENE12	ENE10	NE12.0	NE20	
19-May	ENE4	ESE5	S5	SSW5	S7	S8	S9	SSW15	SSW12	SSW12	S13	S13	S14	S15	S16	S16	S18	S16	S17	S17	SSW13	SSW15	SSW11	SSW9	S11.5	S18	
20-May	S6	SSE6	S8	SSE7	S10	S9	S13	S16	S15	S19	S19	S20	S16	SSW15	W15	SSE15	SSE13	SSE10	SSE12	N12	ENE13	ENE15	E12	SSE7	SSE8.7	S20	
21-May	S7	S8	S8	S8	S7	S7	S7	SSW9	SSW11	S11	SSW12	SW19	W9WSW16	SW36WSW32WSW29	NW21	NW16	NNW13	NNW19	WSW10	SW7	SSW5				WSW10.3	SW36	
22-May	SSW7	SSW6	SSE5	S6	S3	SSW4	SE3	S4	SSW6	SW8	SW9	WSW8	SSW13	WSW19	WSW17	SW14	WSW14	SSW5	ESE6	NW1	ENE9	E9	E6	SSE4	SSW4.7	WSW19	
23-May	N4	S5	SSW5	S7	S7	S8	S7	SW9	SW10	SSW5	S7	SSE10	S7	SW9	SW11	SSW12	SSW11	SW11	SW6	ESE4	ESE9	E7	W22WNW31		SSW6.3	WNW31	
24-May	WNW16	W6WSW13	WSW12	WNW12	NW9	N9	NE4	SSW2	NW2	NE15	NE16	NNE15	NNE16	ESE3	WSW9	N11	NE14	NNE11	ENE11	E9	ESE5	ESE5	SSE2		N4.1	NE16	
25-May	ESE4	ESE5	SSE3	SSE4	SSE3	S4	SSW4	SSW4	SE5	E6	ESE5	E5	NE6	S0	SE8	SE7	SSE8	SW3	N8	ENE5	SE6	SE8	SSE5	SSE6	SE3.5	SE8	
26-May	S4	SSW5	SSE6	SSE4	WSW4	NNE3	ENE7	ENE9	ESE6	SE13	SSE13	SSE11	ESE13	ENE22	NE21	ENE8	SE5	ENE11	NE16	ENE19	NE21	NE23	NE22	NE22	ENE8.4	NE23	
27-May	NE19	NE22	NE19	NE18	NNE17	NE20	NE21	NE23	NE22	NE20	NE20	NE20	NE21	NE22	NE23	NE21	NE14	ENE12	ENE13	ENE12	E10	E9	ESE9	ESE7	NE16.4	NE23	
28-May	SE5	ESE7	SE3	SE4	ESE7	ESE6	SE7	SE10	SE8	SE8	SE10	SSE11	S10	SSE8	S8	S10	S10	S12	SSE10	SSE9	SSE7	SSE6	S4	SSE4	SSE7.2	S12	
29-May	SSE4	SSE5	SE4	SE5	SSE5	S3	S2	NE6	ENE10	ENE13	NE10	NE13	NE17	ENE16	NNE12	NNW13	N15	NNW12	NW10	W9	WSW9	WSW15	WSW13	WSW13	N2.7	NE17	
30-May	WSW12	SW11	SW16	WSW18	WSW14	WSW13	WSW13	SW15	WSW19	WSW26	W25	W27	W29	W30	W26	W17	WNW13	NW9	WNW8	NE11	E12	SW4	SW9	SW9	W13.3	W30	
31-May	SW10	SSW5	SSW6	SW5	SSW5	SSW3	S1	ENE11	NE4	WNW8	NE8	E15	ENE17	ENE16	ENE16	ENE16	ENE17	E18	E16	ENE16	ENE18	E14	ESE8	SE6	E7.4	E18	

N1.4 NNE1.5	N0.8 NNW0.6 NNW0.6 NNE0.8	NE1.3 NNE1.6 NNE2.0 NNE3.1 NNE4.2 NNE4.6 NNE5.3	N5.5	N5.3 NNE5.7	NE6.9	NE8.1	NE8.0	NE8.0	NE7.1	ENE5.2	NE2.8	NNE2.2												Diurnal Average		
N20	NE22	NE19	N19	N21	NE20	NE21	NNE25	NNE32	NNE34	NNE26	W27	W29	W30	SW36	WSW32	WSW29	NE26	ENE23	ENE21	NNE21	NE23	W22	WNW31			Diurnal Maximum

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



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

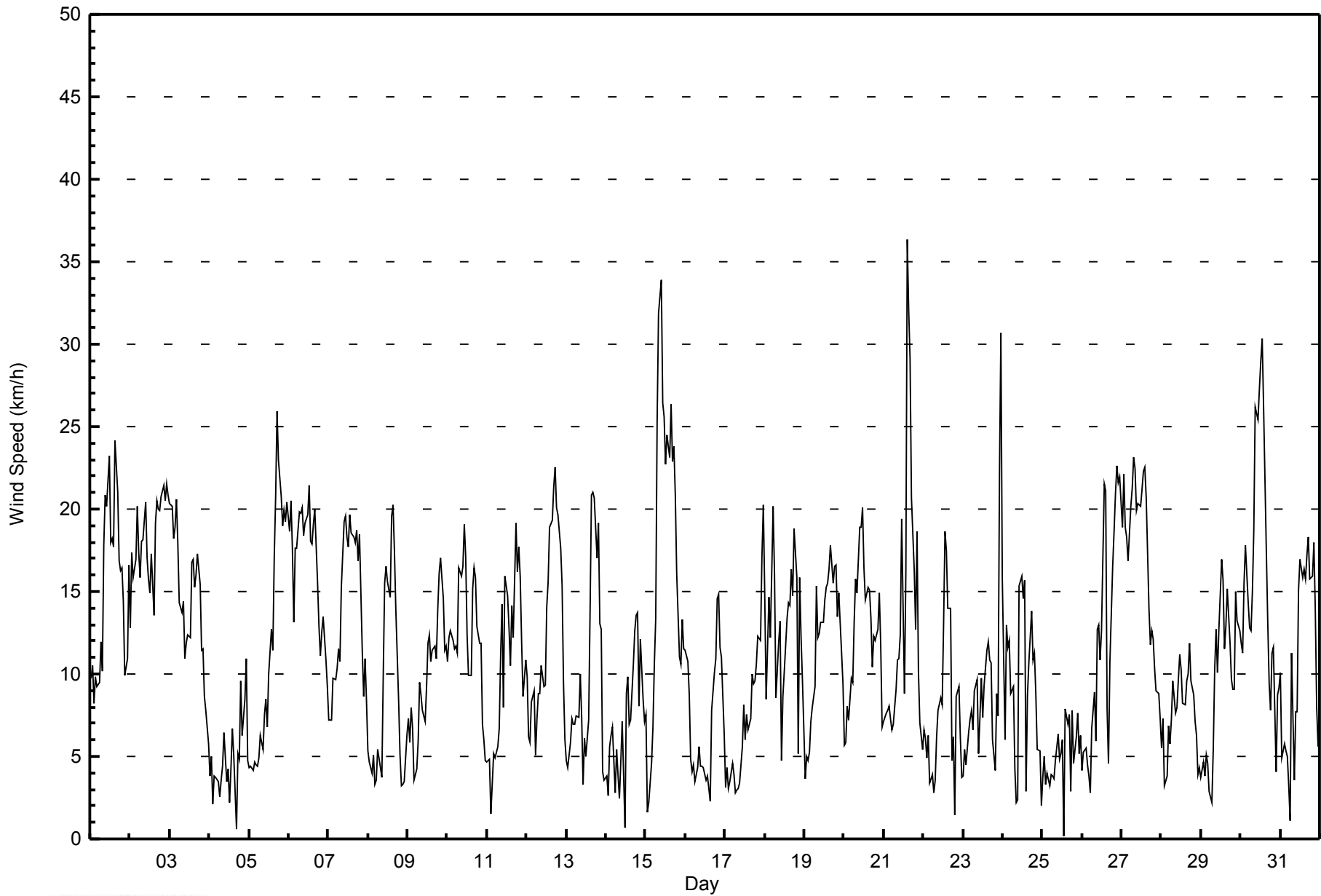
**Wind Speed (WS) - km/h**  
**Shell Muskeg River - May 2014**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 17 km/h on May 23 23:00 Minimum Value: 1 km/h on May 28 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> = 6 P <sub>99</sub> = 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-May	4	4	3	3	3	3	4	3	6	6	7	7	6	7	6	8	8	7	6	5	5	4	3	6	8
2-May	5	7	5	7	6	6	5	5	7	6	5	4	4	6	4	5	7	6	5	6	6	6	6	6	7
3-May	6	6	6	6	5	5	4	4	4	4	3	2	4	4	4	4	4	3	4	2	2	1	1	2	6
4-May	1	1	2	2	1	1	1	1	2	2	2	3	3	3	3	3	2	2	2	4	4	3	4	2	4
5-May	1	2	1	1	1	1	2	2	1	3	3	3	4	4	4	4	4	5	4	4	3	3	3	3	5
6-May	2	3	3	3	4	4	3	4	4	5	5	5	4	4	5	8	7	4	3	4	4	4	4	3	8
7-May	3	3	2	3	2	3	3	3	5	6	6	5	5	6	6	5	5	5	5	4	4	2	3	2	6
8-May	2	2	2	2	2	1	1	1	2	2	2	2	2	3	4	3	4	3	3	2	1	1	2	2	4
9-May	2	2	2	2	1	1	2	3	3	3	3	4	5	4	4	5	4	5	5	5	5	5	4	4	5
10-May	3	3	4	3	2	3	3	5	6	5	7	6	4	3	3	5	5	5	4	4	4	2	2	1	7
11-May	1	1	1	2	1	1	2	2	3	4	4	5	5	5	5	5	5	3	3	3	2	3	2	2	5
12-May	3	3	2	3	2	1	1	2	3	3	3	4	5	5	4	4	4	4	4	4	4	4	3	1	5
13-May	1	1	1	1	1	1	2	2	3	4	2	3	3	4	5	4	3	4	3	3	4	4	3	1	5
14-May	1	1	2	2	3	1	2	2	1	2	2	3	4	4	3	3	3	4	5	5	2	6	2	2	6
15-May	2	2	2	1	2	3	4	6	6	7	5	5	6	6	6	7	6	7	6	5	3	3	3	2	7
16-May	2	2	2	4	1	1	1	1	2	2	2	2	2	3	4	3	3	3	3	2	2	1	2	2	4
17-May	3	1	1	1	1	1	1	1	1	2	2	3	3	3	3	4	4	3	3	2	2	4	3	4	4
18-May	7	4	3	3	3	3	3	4	3	3	4	5	3	3	2	3	2	3	2	3	3	2	3	3	7
19-May	3	1	1	2	2	2	4	5	4	4	4	5	5	5	5	5	6	5	5	5	4	5	3	2	6
20-May	1	1	2	1	2	2	3	4	5	6	5	6	5	5	7	4	5	3	4	7	4	4	4	2	7
21-May	2	2	2	1	1	2	2	3	3	3	4	7	12	9	7	6	8	6	6	3	7	1	1	1	12
22-May	1	1	1	1	2	1	1	2	2	2	3	3	6	5	4	3	7	4	2	4	2	1	2	1	7
23-May	3	1	2	1	2	2	2	2	3	3	2	3	3	3	5	4	4	4	2	2	2	2	17	7	17
24-May	8	4	3	3	3	3	3	4	2	3	6	3	4	3	3	5	4	3	3	3	2	2	1	1	8
25-May	1	1	1	1	2	1	1	1	3	2	3	3	3	3	4	3	3	4	4	3	1	1	2	2	4
26-May	2	1	2	2	3	3	3	2	3	5	4	5	5	5	4	7	2	2	4	3	4	4	4	4	7
27-May	4	3	3	3	3	4	4	4	4	4	3	4	4	4	5	4	4	3	3	2	2	2	1	1	5
28-May	1	2	3	1	2	2	2	3	2	2	3	4	4	3	3	3	3	4	3	3	3	2	1	2	4
29-May	1	1	2	1	1	1	2	2	2	2	3	3	3	3	4	4	5	4	4	4	4	3	3	2	5
30-May	2	2	4	3	3	3	3	2	5	6	6	7	8	7	7	6	5	3	3	8	6	2	2	3	8
31-May	3	2	2	2	1	2	3	2	3	3	4	3	3	3	4	4	3	3	3	3	3	3	2	2	4
Diurnal Maximum																									



**WBEA**  
**Hourly Averages**

**Wind Speed (WS) - km/h**  
**Shell Muskeg River - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h**  
**Shell Muskeg River - May 2014**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	155	20.83	20.83
6 - 11	252	33.87	54.70
12 - 19	250	33.60	88.31
20 - 28	79	10.62	98.92
29 - 38	8	1.08	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744





**WBEA**  
**Frequency Distribution**

**Wind Speed (WS) - km/h**  
**Shell Muskeg River - May 2014**

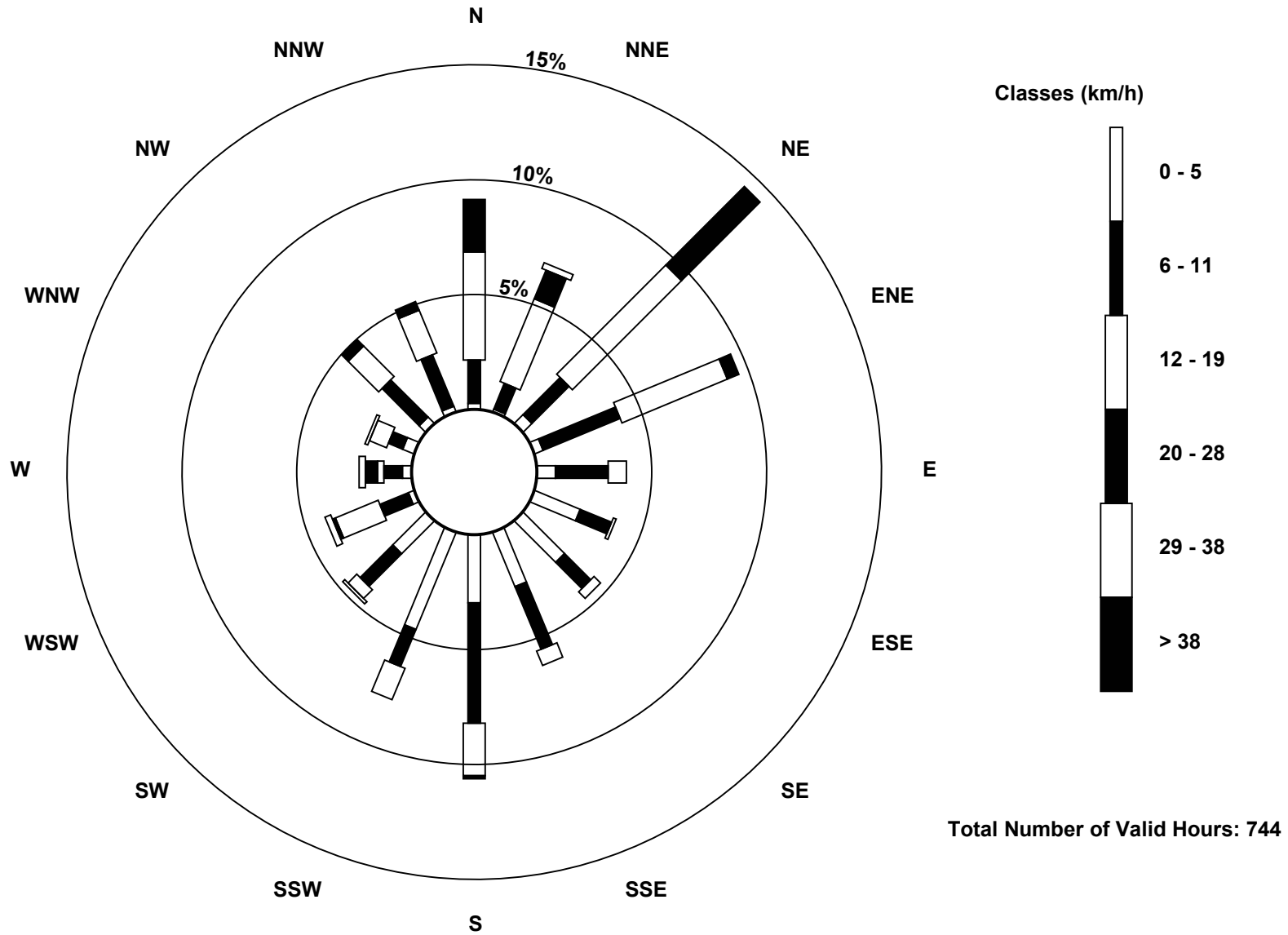
Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	2	1	4	3	6	16	19	19	22	34	15	2	3	4	3	2	155
6 - 11	14	9	17	27	17	11	12	22	39	13	15	10	6	5	17	18	252
12 - 19	35	29	50	37	6	1	3	5	17	11	4	15	2	6	14	15	250
20 - 28	17	10	36	4	0	0	0	0	1	0	0	1	4	0	3	3	79
29 - 38	0	2	0	0	0	0	0	0	0	0	1	2	2	1	0	0	8
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	68	51	107	71	29	28	34	46	79	58	35	30	17	16	37	38	744

Total Number of Valid Hours: 744

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**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 - May 2014**

Direction of Maximum Speed: 235 deg on May 21 15:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 353.7 deg on May 2	Hours of Data: 744
Direction of Minimum Speed: 180 deg on May 25 14:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 2.7 deg on May 16	Percent Operational Time: 100.0
Monthly Average Direction: 259.1 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-May	297	349	360	328	335	316	322	303	312	335	348	9	359	328	320	315	327	326	328	350	1	322	317	329	332.8
2-May	310	350	359	313	314	319	324	338	356	355	351	3	3	353	3	28	25	6	10	19	12	2	353	351	353.7
3-May	360	353	356	359	3	2	9	1	13	40	41	61	61	51	54	52	52	54	59	74	69	78	76	95	32.4
4-May	192	232	235	195	191	176	178	161	160	254	340	248	269	216	245	230	276	101	138	148	215	180	183	164	195.0
5-May	130	100	128	193	222	206	172	160	160	95	83	37	33	32	12	37	56	52	66	59	59	61	53	52	61.2
6-May	50	50	50	30	29	25	48	50	43	40	20	42	40	35	13	21	54	35	32	354	17	24	25	8	34.5
7-May	20	348	342	344	2	356	23	11	7	6	4	7	18	22	21	21	13	33	23	38	71	78	65	88	20.2
8-May	104	119	136	105	111	134	93	118	101	55	53	57	60	57	45	49	35	49	64	132	201	204	233	313	63.6
9-May	310	335	312	296	207	205	278	312	330	331	319	335	314	349	336	348	12	358	33	351	346	350	338	330	337.2
10-May	311	314	320	309	309	285	274	320	342	337	337	339	348	320	323	349	2	353	352	346	353	319	251	181	329.1
11-May	176	207	177	211	221	200	229	201	205	212	248	355	351	353	26	33	26	52	52	51	54	73	74	53	39.5
12-May	48	64	78	66	64	78	59	53	63	42	33	56	50	52	48	44	40	37	42	37	55	77	107	159	53.0
13-May	216	197	185	191	177	187	183	176	212	245	294	360	9	4	41	42	49	44	39	47	64	73	132	149	63.7
14-May	203	199	178	176	191	174	193	194	150	352	316	219	162	183	177	161	135	134	143	159	151	203	194	159	169.7
15-May	133	137	153	118	94	65	39	17	29	28	22	24	17	0	1	0	0	0	0	0	2	359	0	0	16.0
16-May	1	345	329	340	180	185	187	220	240	285	293	308	206	226	93	105	75	89	81	69	72	75	79	103	60.7
17-May	109	204	206	139	143	145	211	227	272	288	343	49	342	305	348	39	45	95	83	65	65	59	33	33	47.9
18-May	32	57	43	47	50	48	44	45	66	60	38	266	15	40	44	46	46	60	45	52	50	41	64	77	47.1
19-May	74	115	176	194	178	177	185	194	199	193	191	189	185	185	172	175	170	182	176	190	198	192	193	193	183.8
20-May	179	164	179	168	180	177	180	184	180	178	180	190	189	196	269	149	147	152	157	3	67	70	84	156	167.9
21-May	183	188	179	186	186	171	173	196	195	190	192	231	268	239	235	253	250	315	314	286	288	252	222	206	237.7
22-May	203	196	147	174	172	203	134	186	204	230	234	241	212	251	243	234	243	212	105	312	68	79	79	153	212.0
23-May	185	177	207	176	187	183	186	225	230	192	175	165	178	226	216	213	199	224	219	122	109	91	263	291	212.2
24-May	302	278	244	258	297	326	356	35	194	320	47	43	21	33	105	252	8	41	33	77	93	120	108	163	10.8
25-May	122	112	157	154	165	187	196	192	125	98	121	89	53	180	124	135	158	228	349	66	135	142	163	147	132.1
26-May	186	192	163	168	258	21	78	69	108	138	152	156	120	59	40	77	138	62	56	67	44	47	43	39	72.9
27-May	37	42	38	37	33	35	34	34	34	34	34	36	34	35	35	36	52	74	60	60	91	99	104	109	43.3
28-May	137	112	131	145	111	117	127	135	140	137	134	164	175	166	172	170	170	169	158	156	165	163	170	162	151.6
29-May	165	149	137	136	154	180	190	52	67	73	35	47	54	59	21	339	359	343	315	281	257	258	248	241	10.8
30-May	238	227	232	240	245	247	246	234	251	258	260	272	273	271	275	279	303	312	300	42	90	219	228	232	260.2
31-May	227	195	210	220	209	207	188	73	37	290	46	81	74	64	76	76	70	83	82	75	74	94	123	136	84.5
0.7 26.4 11.0 292.6 338.0 13.0 37.1 27.5 22.3 12.0 12.3 21.3 25.1 11.1 6.7 19.9 34.3 39.9 43.2 45.0 53.0 62.6 55.5 31.6																									
Diurnal Average																									

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



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

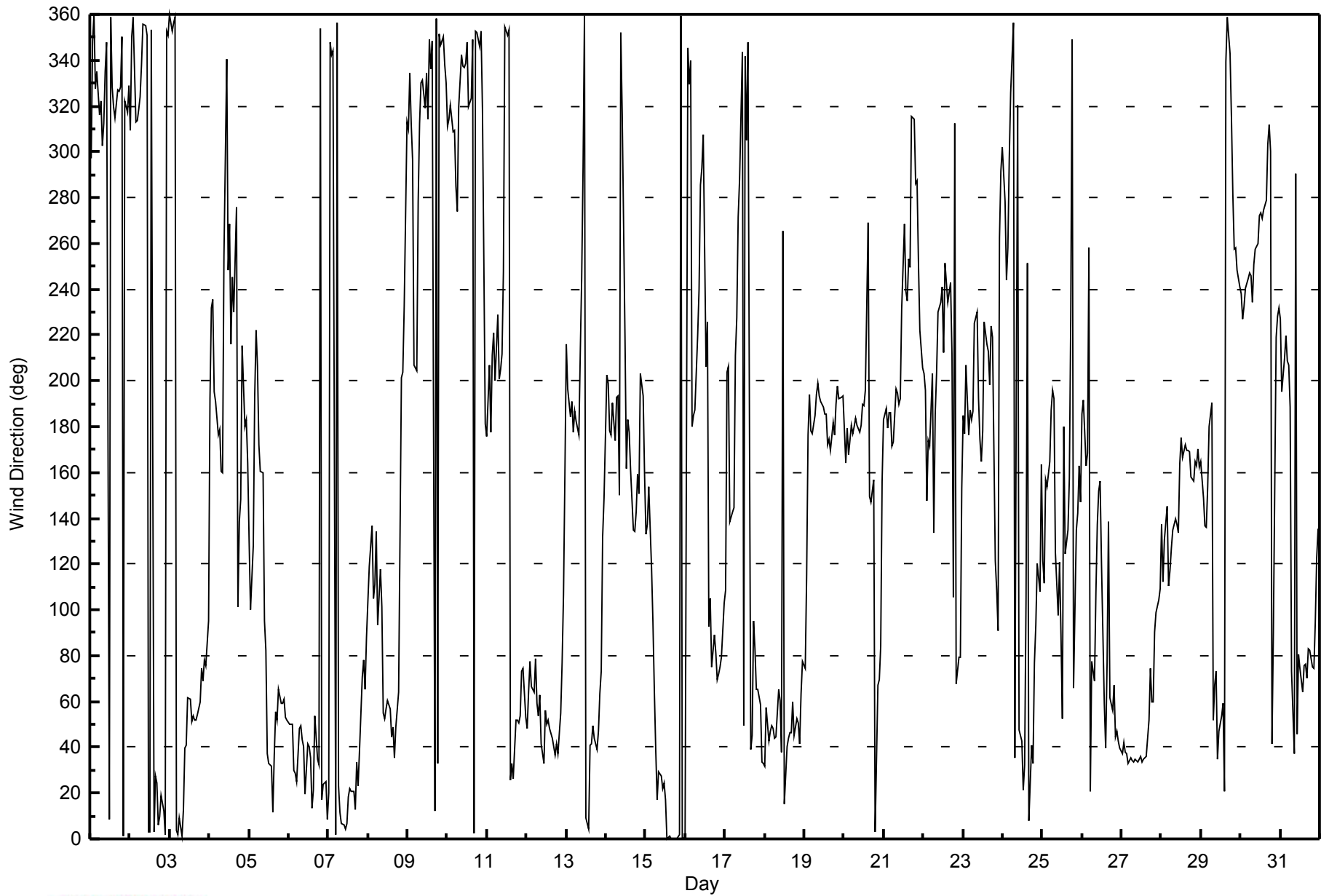
**Wind Direction (WD) - deg**  
**Shell Muskeg River - May 2014**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0																			Hours in Service: 744						
Maximum Value: 105 deg on May 25 14:00																			Hours of Data: 744						
Minimum Value: 0 deg on May 15 14:00																			Hours of Missing Data: 0						
Percentiles: P <sub>1</sub> = 5 P <sub>10</sub> = 10 Q <sub>1</sub> = 15 Median = 21 Q <sub>3</sub> = 31 P <sub>90</sub> = 51 P <sub>99</sub> = 94																			Hours of Calibration: 0						
																			Percent Operational Time: 100.0						
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-May	33	24	34	22	26	20	24	24	19	23	24	22	27	26	27	23	25	23	25	23	22	27	19	25	34
2-May	18	31	23	23	17	20	27	22	26	20	23	22	22	24	27	19	20	19	20	19	20	20	19	20	31
3-May	20	20	21	21	19	19	23	23	26	31	28	20	22	12	13	22	15	14	15	13	8	8	10	34	34
4-May	22	20	44	15	19	7	10	31	48	48	85	65	97	75	54	52	100	55	44	18	30	20	19	14	100
5-May	25	37	35	20	27	15	15	21	23	35	37	76	44	33	40	18	12	10	12	11	10	10	9	8	76
6-May	8	9	9	19	12	14	10	11	15	24	22	19	16	25	27	32	14	26	34	26	20	15	25	24	34
7-May	41	43	28	16	25	21	22	25	23	22	27	24	25	22	28	24	27	24	23	17	21	15	18	18	43
8-May	36	37	42	43	44	36	26	33	60	14	10	11	12	15	14	10	20	13	45	28	18	20	38	34	60
9-May	37	60	17	21	20	16	35	29	32	38	46	51	29	30	32	39	35	41	26	26	20	21	22	22	60
10-May	17	16	20	16	14	17	14	24	31	23	26	24	32	31	25	23	21	22	22	21	24	30	31	20	32
11-May	10	28	20	20	12	18	32	22	20	19	56	27	29	37	60	35	42	8	9	9	9	12	19	13	60
12-May	14	52	39	33	14	35	14	27	38	33	44	46	21	19	13	13	15	16	15	14	18	14	29	20	52
13-May	28	12	11	9	15	11	13	16	23	61	83	62	69	71	34	13	9	12	20	8	24	15	48	39	83
14-May	16	8	21	12	12	16	21	44	85	70	42	102	39	33	35	31	21	19	16	25	24	32	14	20	102
15-May	16	83	68	30	16	20	22	20	12	13	30	23	17	0	6	0	0	0	0	0	8	12	7	0	83
16-May	9	17	16	86	53	8	14	21	24	68	71	76	61	83	94	98	56	25	16	13	9	7	9	20	98
17-May	50	16	19	33	12	21	17	44	65	84	54	57	70	54	66	58	41	25	20	16	13	19	13	11	84
18-May	21	34	13	15	8	8	8	46	26	16	90	55	33	25	15	21	11	19	7	14	83	10	18	19	90
19-May	79	26	22	24	17	12	17	19	23	23	27	27	25	26	25	22	17	23	17	18	17	16	17	16	79
20-May	26	13	16	9	11	16	14	17	20	18	20	19	20	22	32	22	19	18	17	67	26	15	15	27	67
21-May	14	14	11	12	14	16	14	25	22	20	19	24	77	25	12	51	35	20	20	14	13	12	13	36	77
22-May	11	29	21	12	16	13	44	34	28	31	25	42	31	20	17	15	33	53	26	85	26	12	28	18	85
23-May	16	12	23	12	19	15	17	14	16	38	16	18	25	25	34	31	29	29	22	41	20	20	49	12	49
24-May	24	51	11	17	14	33	35	90	48	93	23	11	32	17	69	45	44	14	27	22	15	23	28	54	93
25-May	35	26	14	31	13	13	18	39	51	51	72	67	71	105	40	47	27	65	54	56	23	13	24	22	105
26-May	36	16	22	38	47	95	43	21	37	18	18	24	25	13	13	56	37	18	18	11	12	10	11	11	95
27-May	13	8	10	10	12	9	9	8	9	9	9	10	10	12	10	11	25	16	16	13	16	14	9	15	25
28-May	16	21	36	30	18	30	23	21	20	21	28	19	19	25	19	20	14	13	13	14	12	13	7	13	36
29-May	12	20	32	19	18	17	54	68	16	13	47	36	17	15	45	54	52	59	58	59	56	8	7	6	68
30-May	6	5	9	5	7	8	9	6	9	8	9	12	16	10	14	20	38	43	35	60	36	17	9	11	60
31-May	12	32	28	13	18	12	60	18	82	38	64	20	20	23	27	28	22	20	20	18	15	19	20	30	82
79 83 68 86 53 95 60 90 85 93 90 102 97 105 94 98 100 65 58 85 83 32 49 54																									
Diurnal Maximum																									



**WBEA**  
**Hourly Averages**

**Wind Direction (WD) - deg**  
**Shell Muskeg River - May 2014**





# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Report

### Station Information

Calibration Date	May 28, 2014	Previous Calibration	April 24, 2014
Station Name	Shell Muskeg River	Station Number	AMS 16
Reason:	Routine		
Start Time (MST)	9:00	End Time (MST)	14:20
Barometric Pressure	732 mmHg	Station temp.	21 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11081107
Cal Gas Concentration	50.8 ppm	Cal Gas Expiry Date	41788
Gas Cert Reference	LL107937		
DACS make/model	Campbell Scientific CR3000	DACS serial No.	3492
DACS voltage range	0-5 v	DACS channel #	1

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	1000	1000	PMT voltage	-710	-710
Analyzer Range (mv)	5000	5000	Lamp voltage	818	802
Calculated slope	0.996709	0.990866	Chamber temp.	45.0	44.8
Calculated intercept	2.575290	3.464572	Pressure (mmHg)	719.5	717.1
Analyzer Background	6.0	6.1	Flow (lpm)	0.436	0.462
Analyzer Coefficient	1.250	1.250	Intensity	89	91

Analyzer make Thermo 43i Analyzer serial # 1118148498

### Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.0	NA
as found span	5000	78.7	799.6	803.1	0.996
calibrator zero	5000	0.0	0.0	0.3	NA
high point	5000	78.7	799.6	806.2	0.992
second point	5000	39.4	400.3	396.0	1.011
third point	5000	19.7	200.2	196.5	1.018
calibrator zero	5000	0.0	0.0	0.2	NA
as left zero	5000	0.0	0.0	0.3	NA
as left span	5000	78.1	793.5	786.8	1.008
Average Correction Factor					1.007

Corrected As found 803.1 Previous response 799.7 % change -0.4%

#### Notes:

Good Calibration. Changed pump after as founds.

Calibration Performed By:

Devin Russell



# Wood Buffalo Environmental Association

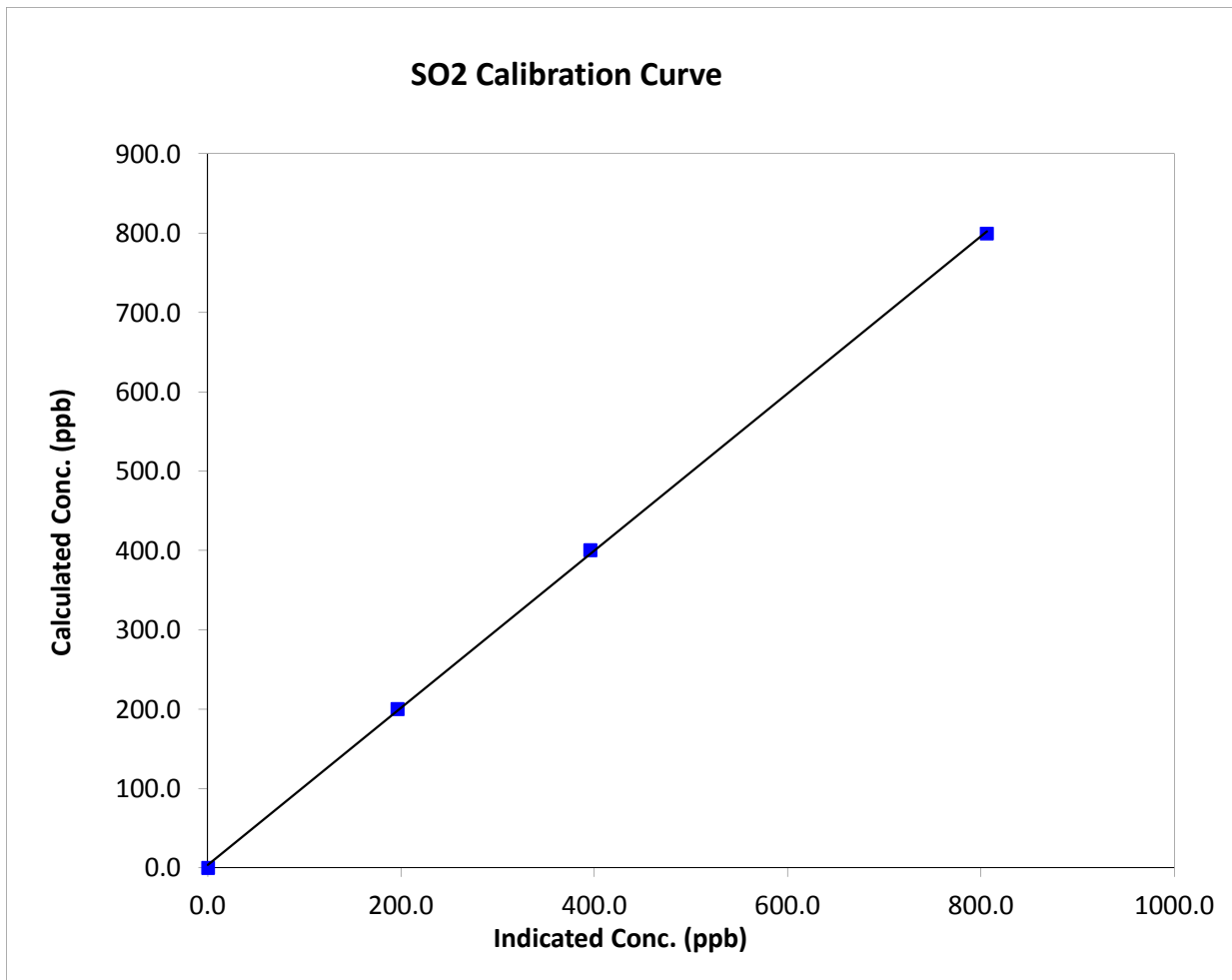
## SO<sub>2</sub> Calibration Summary

### Station Information

Calibration Date	May 28, 2014	Previous Calibration	April 24, 2014
Station Name	Shell Muskeg River	Station Number	AMS 16
Start Time (MST)	9:00	End Time (MST)	14:20
Analyzer make	Thermo 43i	Analyzer serial #	1118148498

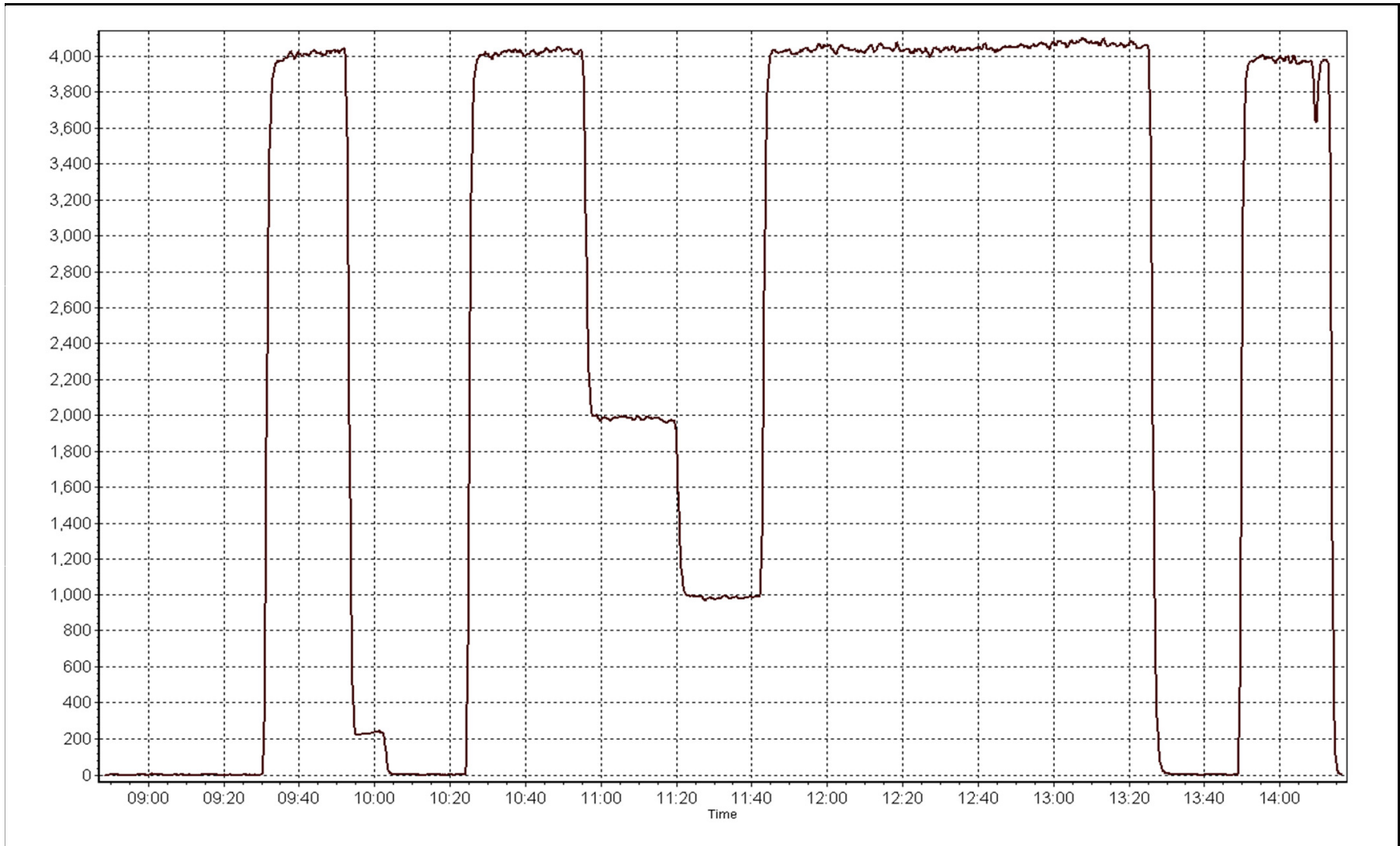
### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.3	N/A	Correlation Coefficient	0.999871
799.6	806.2	0.9919		
400.3	396.0	1.0109	Slope	0.990866
200.2	196.5	1.0184		
			Intercept	3.464572



SO2 Calibration Plot

Date: May 28, 2014







# Wood Buffalo Environmental Association

## THC Calibration Report

### Station Information

Calibration Date	May-28-14	Previous Calibration	April-24-14
Station Name	Shell Muskeg River	Station Number	AMS 16
Reason:	Routine		
Start Time (MST)	9:00	End Time (MST)	14:20
Barometric Pressure	732 mmHg	Station temp.	21 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11081107
Gas Cert Reference	LL107937	Cal Gas Expiry Date	41788
CH4 Cal Gas Conc.	515 ppm	CH4 Equiv Conc.	1078.8 ppm
C3H8 Cal Gas Conc.	205 ppm		
DACS make/model	Campbell Scientific CR3000	DACS serial No.	3492
DACS voltage range	0-5 VDC	DACS channel #	DIFF 4

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppm)	25	25	Sample Pressure	8.2	8.2
Analyzer Range (mv)	5000	5000	Air or Bypass press	34.8	34.9
Calculated slope	1.011608	1.003754	Fuel Pressure	24.2	24.2
Calculated intercept	0.023900	-0.007776			

Analyzer make Thermo 51i-LT Analyzer serial # 1218153485

### 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	N/A
as found span	5000	78.7	16.98	16.69	1.018
calibrator zero	5000	0.0	0.00	0.04	N/A
high point	5000	78.7	16.98	16.95	1.002
second point	5000	39.4	8.50	8.42	1.010
third point	5000	19.7	4.25	4.24	1.002
calibrator zero					
as left zero	5000	0.0	0.00	-0.02	N/A
as left span	5000	78.7	16.98	16.75	1.014
Average Correction Factor					1.004

Corrected As found 16.85 Previous response 16.76 % change -0.5%

#### Notes:

adjusted zero and span

Calibration Performed By:

Devin Russell



# Wood Buffalo Environmental Association

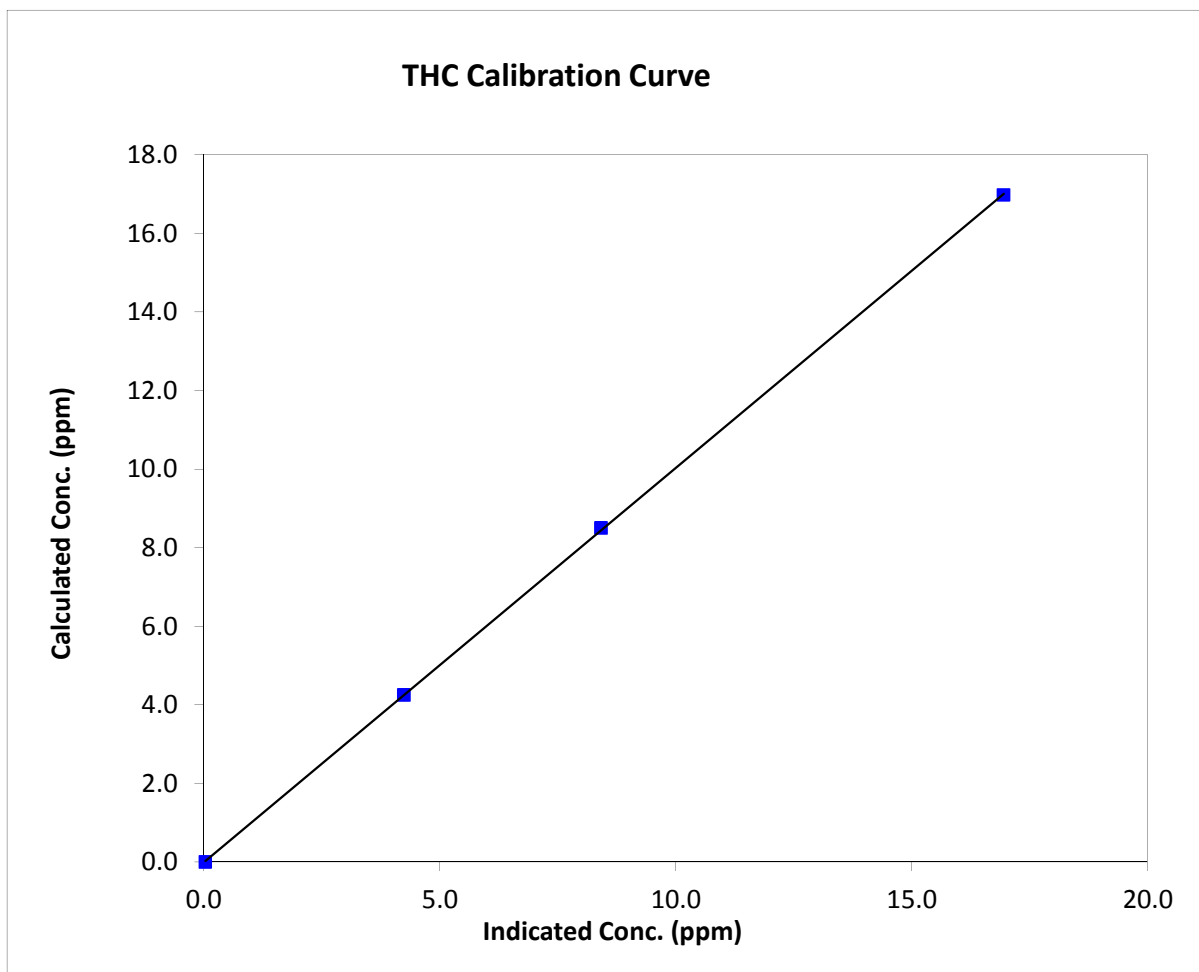
## THC Calibration Summary

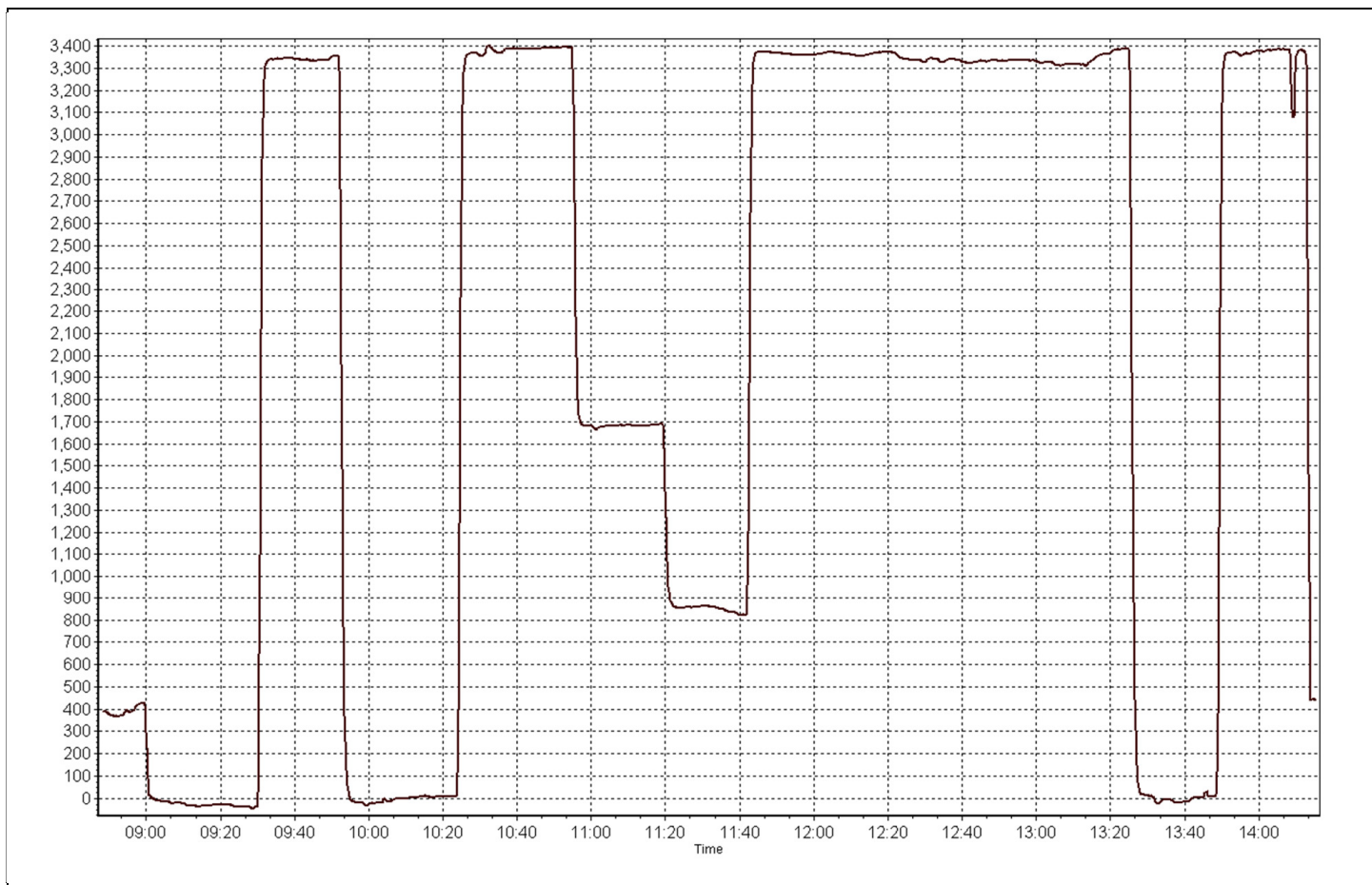
### Station Information

Calibration Date	May 28, 2014	Previous Calibration	April 24, 2014
Station Name	Shell Muskeg River	Station Number	AMS 16
Start Time (MST)	9:00	End Time (MST)	14:20
Analyzer make	Thermo 51i-LT	Analyzer serial #	1218153485

### Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.00	0.04	N/A	Correlation Coefficient	0.999970
16.98	16.95	1.0017		
8.50	8.42	1.0096	Slope	1.003754
4.25	4.24	1.0016		
			Intercept	-0.007776







# Wood Buffalo Environmental Association

## NO<sub>x</sub>-NO-NO<sub>2</sub> Calibration Report

### Station Information

Calibration Date	May 28, 2014	Previous Calibration	April 24, 2014
Station Name	Shell Muskeg River	Station Number	AMS 16
Reason:	Routine		
Start Time (MST)	9:00	End Time (MST)	14:20
Barometric Pressure	732 mmHg	Station Temperature	21.0 Deg C
Calibrator	SABIO 4010	Serial Number	11081107
NO Cal Gas Conc	51.2 ppm	Cal Gas Expiry Date	May 29, 2014
NOx Cal Gas Conc	51.3 ppm	Cal Gas Serial #	LL107937

### DACs Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	8346
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Parameter		NOx	NO	NO2
MV conversion	Analyzer Range (ppb)	1000	1000	1000
	Analyzer Range (mv)	5000	5000	5000
Before	Data Slope	1.001223	0.998046	1.028812
	Data Offset	2.892545	2.183780	1.094118
After	Data Slope	0.996369	0.995081	1.009622
	Data Offset	1.893079	2.595326	0.882955
Channel #		3	2	1
Voltage Range		0 - 5V	0 - 5V	0 - 5V

### Analyzer Information

Analyzer make/model	API T200	Analyzer serial #	724
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Test Point	before		after	
Concentration range	0-1000	ppb	0-1000	ppb
NO coefficient	1.231	ppb	1.293	ppb
NOx coefficient	1.230	ppb	1.288	ppb
NO2 coefficient	n/a	ppb	n/a	ppb
NO bkgrnd	0.7		0.7	
NOx bkgrnd	0.8		0.8	
Nt coefficient	n/a		n/a	
Chamber Temp	50.0	Deg C	50.0	Deg C
Moly Temp	315.8	Deg C	314.3	Deg C
PMT Temp	7.0	Deg C	7.0	Deg C
O3 flow	86.0	ccm	87.0	ccm
R Cell Press	3.5	mmHg	4.4	mmHg
Sample Flow	487	ccm	493	ccm

Notes:

adjusted span.



# Wood Buffalo Environmental Association

## NO<sub>x</sub>-NO-NO<sub>2</sub> Calibration Report

### Station Information

Calibration Date:

May 28, 2014

Station Number:

AMS 16

### 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 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
as found zero	5000	0.0	0.0	0.0	0.0	-0.3	-0.4	0.2	N/A	N/A
as found span	5000	78.7	807.5	805.9	1.6	773.0	771.0	2.2	1.0446	1.0453
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.4	0.4	N/A	N/A
high point	5000	78.7	807.5	805.9	1.6	810.5	810.1	0.9	0.9963	0.9948
second point	5000	39.4	404.2	403.5	0.8	401.3	398.5	1.9	1.0074	1.0124
third point	5000	19.7	202.1	201.7	0.4	198.1	197.2	0.3	1.0205	1.0230
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.2	-0.4	0.4	N/A	N/A
as left zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.5	N/A	N/A
as left span	5000	78.1	801.3	512.9	288.4	801.8	506.3	294.2	0.9994	1.0129
Average Correction Factor									1.0081	1.0101

Corrected As found

NO<sub>x</sub>= 773.3

NO= 771.4

Percent Change

NO<sub>x</sub>= 3.9%

NO= 4.4%

Previous Response

NO<sub>x</sub>= 803.6

NO= 805.3

### GPT Calibration Data

Dilution Flow

5000

ccm

Source Gas Flow

78.70

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			0.4			N/A	
1st NO <sub>2</sub> (300)	N/A	512.9	298.1	808.2	512.9	294.9	0.9836	1.0000	1.0108	98.9%
2nd NO <sub>2</sub> (200)	N/A	609.1	201.9	808.5	609.1	199.2	0.9832	1.0000	1.0132	98.7%
3rd NO <sub>2</sub> (100)	N/A	708.8	102.1	806.9	708.8	98.4	0.9852	1.0000	1.0386	96.3%
4th NO <sub>2</sub> (0)	810.9	N/A	-1.4	809.5	810.9	-1.0	0.9820	1.0000	N/A	N/A
Average Correction Factor							0.9835	1.0000	1.0209	98.0%

Calibration Performed By:

Devin Russell



# Wood Buffalo Environmental Association

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

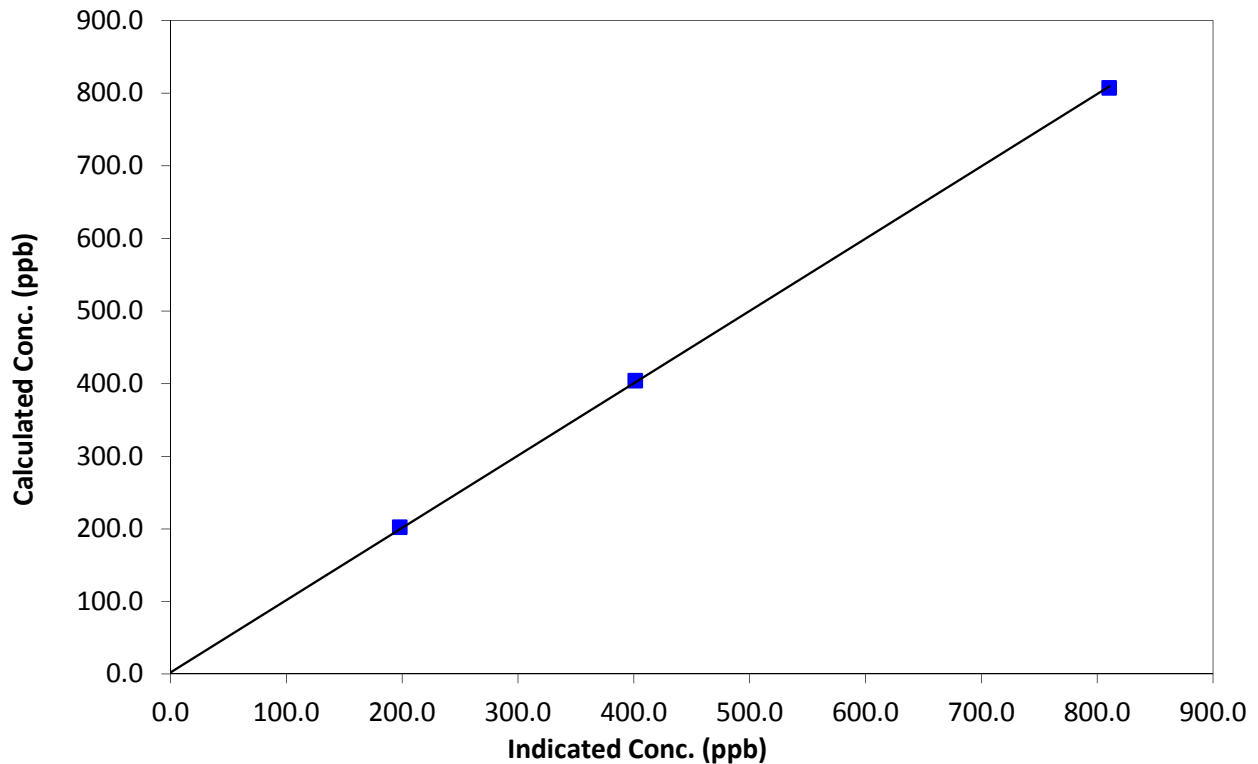
### Station Information

Calibration Date	May 28, 2014	Previous Calibration	April 24, 2014
Station Name	Shell Muskeg River	Station Number	AMS 16
Start Time (MST)	9:00	End Time (MST)	14:20
Analyzer make	API T200	Analyzer serial #	724

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	N/A	Correlation Coefficient	0.999946
807.5	810.5	0.9963		
404.2	401.3	1.0074	Slope	0.996369
202.1	198.1	1.0205		
0.0	-0.2	0.0000	Intercept	1.893079

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





# Wood Buffalo Environmental Association

## NO Calibration Summary

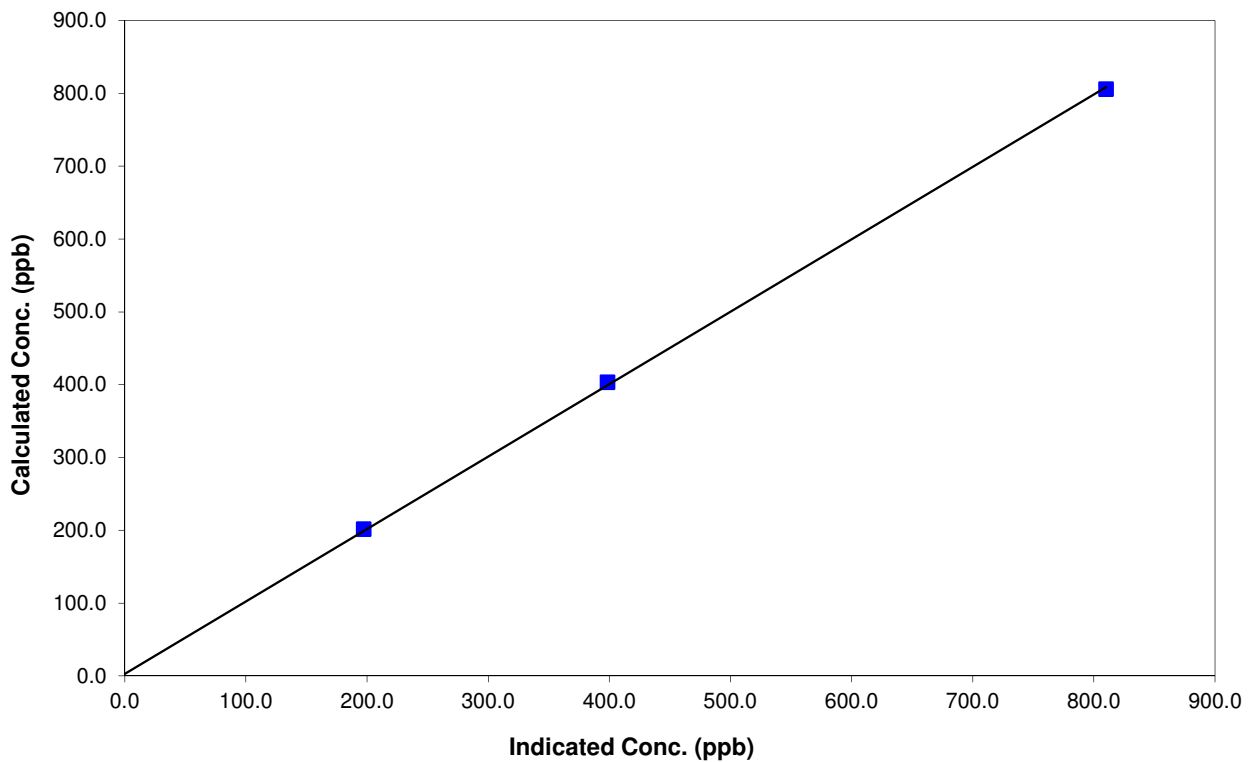
### Station Information

Calibration Date	April 24, 2014	Previous Calibration	April 24, 2014
Station Name	Shell Muskeg River	Station Number	AMS 16
Start Time (MST)	9:00	End Time (MST)	14:20
Analyzer make	API T200	Analyzer serial #	724

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.4	N/A	Correlation Coefficient	0.999902
805.9	810.1	0.9948		
403.5	398.5	1.0124	Slope	0.995081
201.7	197.2	1.0230		
0.0	-0.4	0.0000	Intercept	2.595326

### NO Calibration Curve





# Wood Buffalo Environmental Association

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

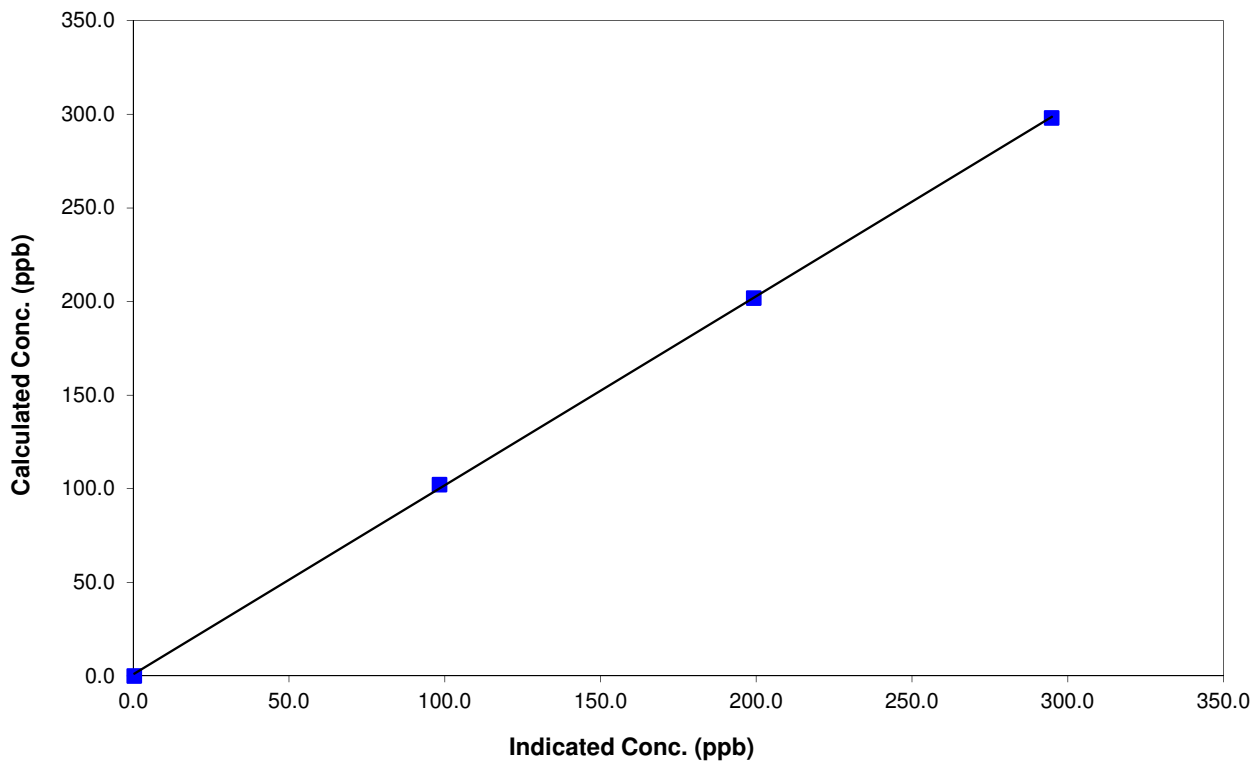
### Station Information

Calibration Date	May 28, 2014	Previous Calibration	April 24, 2014
Station Number	Shell Muskeg River	Station Number	AMS 16
Start Time (MST)	9:00	End Time (MST)	14:20
Analyzer make	API T200	Analyzer serial #	724

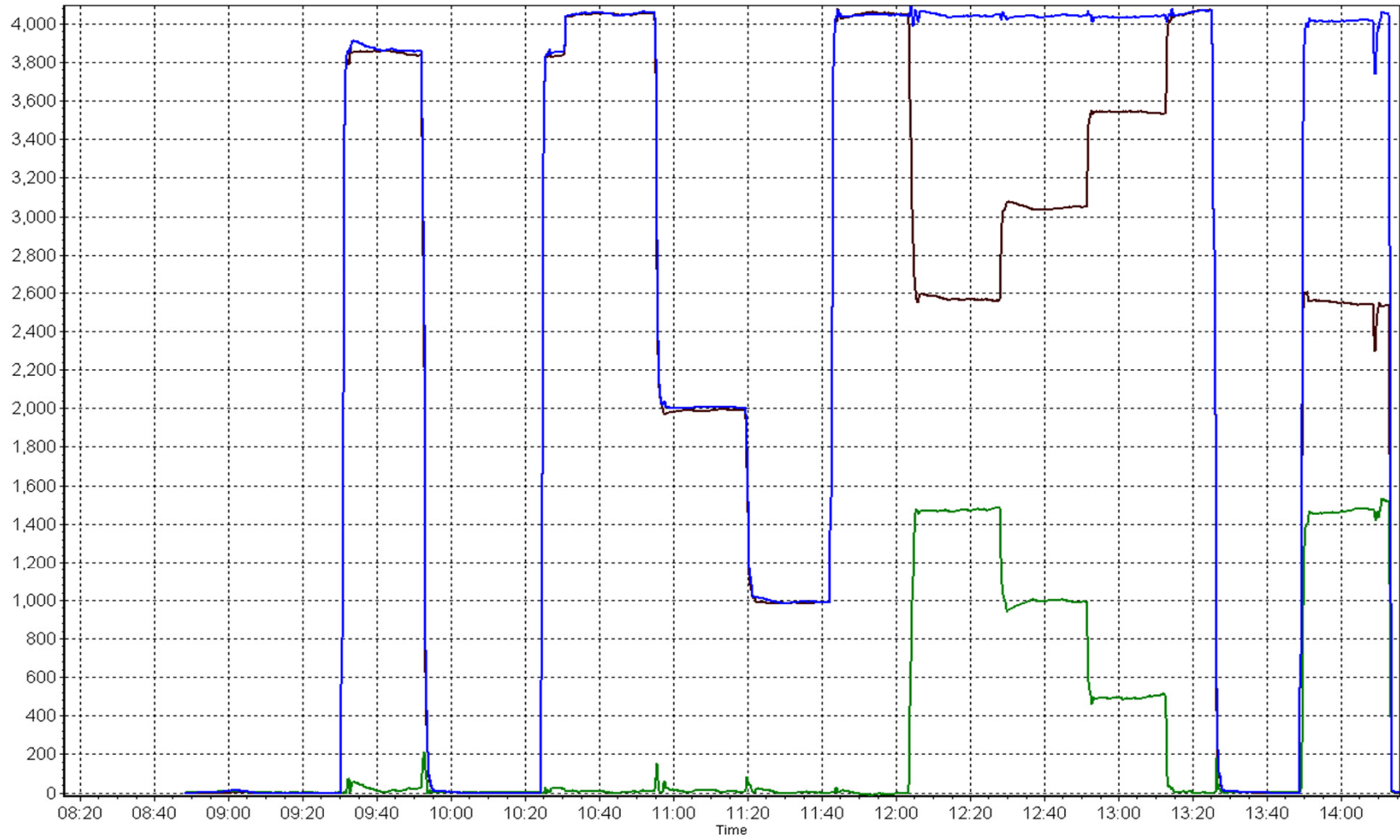
### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.4	N/A	Correlation Coefficient	0.999883
298.1	294.9	1.0108		
201.9	199.2	1.0132	Slope	1.009622
102.1	98.4	1.0386		
			Intercept	0.882955

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









# Wood Buffalo Environmental Association

## SHARP AUDIT / CALIBRATION

### STATION INFORMATION

Calibration Date:	<u>May 28, 2014</u>	Previous Calibration:	<u>April 24, 2014</u>
Station Name:	<u>Shell Muskeg River</u>	Station Number:	<u>AMS 16</u>
Start Time (MST):	<u>12:00</u>	End Time (MST):	<u>12:22</u>
Calibrator Make/Model:	<u>Delta Cal</u>	Calibrator Serial Number:	<u>954</u>

### SHARP INFORMATION

Particulate Fraction:	<u>PM2.5</u>
Make/Model:	<u>Thermo / SHARP 5030</u>
Serial Number	<u>E-772</u>
Source SN:	<u>4085</u>
Mass Foil Set SN:	<u>2598</u>
HEPA PN:	<u>12144</u>
Time Correct (MST):	<u>Yes</u>
Parameters Checked:	<u>T1, P3, Main Flow, Neph</u>

### AUDIT DATA

#### Temperature (deg C)

Sensor	Indicated	Measured	Difference	Final Indicated
T1	12.0	11.9	-0.1	12.0
T2	NA	NA	#VALUE!	NA
T3	NA	NA	#VALUE!	NA
T4	NA	NA	#VALUE!	NA

#### Pressure (Hpa)

Sensor	Indicated	Measured	Difference	Final Indicated
P3	984	986.0	2.0	984

#### Main Flow (Lph)

	Indicated	Measured	Difference	Final Indicated
	1000	1014.6	14.6	1000

#### Mass Foil Calibration

Zeroed?:	<u>NO</u>
Foil Mass:	<u>1265</u>
Previous Correction Factor:	<u>7200</u>
New Correction Factor:	<u>6802</u>

#### Nephelometer Calibration

Parameter	As Found	Zeroed	As Left
Analog	220	Yes	219
Neph	3	Yes	-0.2
C14	8.2	Yes	11.5
Indicated Concentration (ug/m3)	1.4	Yes	-0.1
Range 1		N/A	219.6
Range 2		N/A	33.2

#### INSPECTION DATA

Item	Condition	Item	Condition
Cyclone	Good, Changed	HEPA filter	Good
Pump	Good		
Filter Tape	Good		
Mass Foil Cal Set	Good		

#### NOTES:

Zeroed Neph.

Audit Performed By: Devin Russell

# **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

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

### **AMS 17 WAPASU MAY 2014**

Operations and Data Collection by:  
Wood Buffalo Environmental Association  
Fort McMurray, Alberta

QA/QC, Data Validation and Reporting by:  
Aurora Atmospheric Inc.  
Calgary, Alberta

June 27, 2014

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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WAPASU (AMS 17)  
MAY 2014

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	8	0	1	0
H2S (ppb) Average	708	36	36	100.00	1	0	0	0
THC (ppm) Average	708	35	36	99.87	2.4	-	2.2	-
O3 (ppb) Average	709	34	35	99.87	57	0	47	-
NO2 (ppb) Average	705	39	39	100.00	12	0	2	-
NO (ppb) Average	705	39	39	100.00	5	-	1	-
NOX (ppb) Average	705	39	39	100.00	14	-	3	-
PM2.5 (ug/m3) Average	712	0	32	95.70	23.4	-	10	0
Temperature 2 m (C) Average	743	0	1	99.87	26.4	-	20.3	-
Relative Humidity (%) Average	743	0	1	99.87	99	-	-	-
Wind Speed 10 m (km/h) Average	733	0	11	98.52	22	-	-	-
Wind Direction 10 m (deg) Average	733	0	11	98.52	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WAPASU (AMS 17)  
MAY 2014

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	0.3	1	-	0	0	0	0	0	1	8
H2S (ppb) Average	708	0.2	0	-	0	0	0	0	0	0	1
THC (ppm) Average	708	2.11	0.1	-	2	2	2.1	2.1	2.2	2.2	2.4
O3 (ppb) Average	709	32.8	11	-	1	16	26	33	41	48	57
NO2 (ppb) Average	705	1	1	-	0	0	0	1	1	3	12
NO (ppb) Average	705	0.6	0	-	0	0	0	0	1	1	5
NOX (ppb) Average	705	1.6	2	-	0	0	1	1	2	3	14
PM2.5 (ug/m3) Average	712	2.47	2.9	-	0	0.3	0.9	1.6	3	5.5	23.4
Temperature 2 m (C) Average	743	6.56	7.1	-	-10.4	-2.6	0.6	6.6	11.4	16.3	26.4
Relative Humidity (%) Average	743	65.6	24	-	20	33	44	68	89	95	99
Wind Speed 10 m (km/h) Average	733	8.6	4	-	1	4	6	8	11	14	22
Wind Direction 10 m (deg) Average	733	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WAPASU (AMS 17)  
MAY 2014

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
ALL PARAMETERS	15 May 2014 12:00	15 May 2014 12:00	1	Maintenance - stn operator on-site
PM2.5	10 May 2014 22:00	10 May 2014 23:00	2	Intermittent unstable operation - baseline drift
PM2.5	16 May 2014 10:00	16 May 2014 11:00	2	Flow and zero reference checks, sample head cleaning
PM2.5	17 May 2014 18:00	18 May 2014 10:00	17	Analyzer failure - Foreign material in detection chamber
PM2.5	20 May 2014 11:00	20 May 2014 12:00	2	Maintenance - cleaned detection chamber and follow-up cal.
PM2.5	24 May 2014 18:00	24 May 2014 22:00	5	Intermittent unstable operation - baseline drift
PM2.5	25 May 2014 06:00	25 May 2014 08:00	3	Intermittent unstable operation - baseline drift
Wind Speed, Wind Direction	04 May 2014 00:00	04 May 2014 00:00	1	Flatline in sensor output signal
Wind Speed, Wind Direction	08 May 2014 20:00	08 May 2014 23:00	4	Flatline in sensor output signal
Wind Speed, Wind Direction	09 May 2014 03:00	09 May 2014 04:00	2	Flatline in sensor output signal
Wind Speed, Wind Direction	16 May 2014 04:00	16 May 2014 06:00	3	Flatline in sensor output signal

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Summary of Hour Averages

Wapasu - May 2014

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 8 ppb on May 23 10:00	Maximum Daily Average: 1.3 ppb on May 23		Hours of Data:	709
Minimum Value: 0 ppb on May 1 04:00	Minimum Daily Average: 0.0 ppb on May 8		Hours of Missing Data:	35
Maximum Diurnal Average: 0.7 ppb at hour 8	Minimum Diurnal Average: 0.1 ppb at hour 24		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> = 4		Percent Operational Time:	100.0

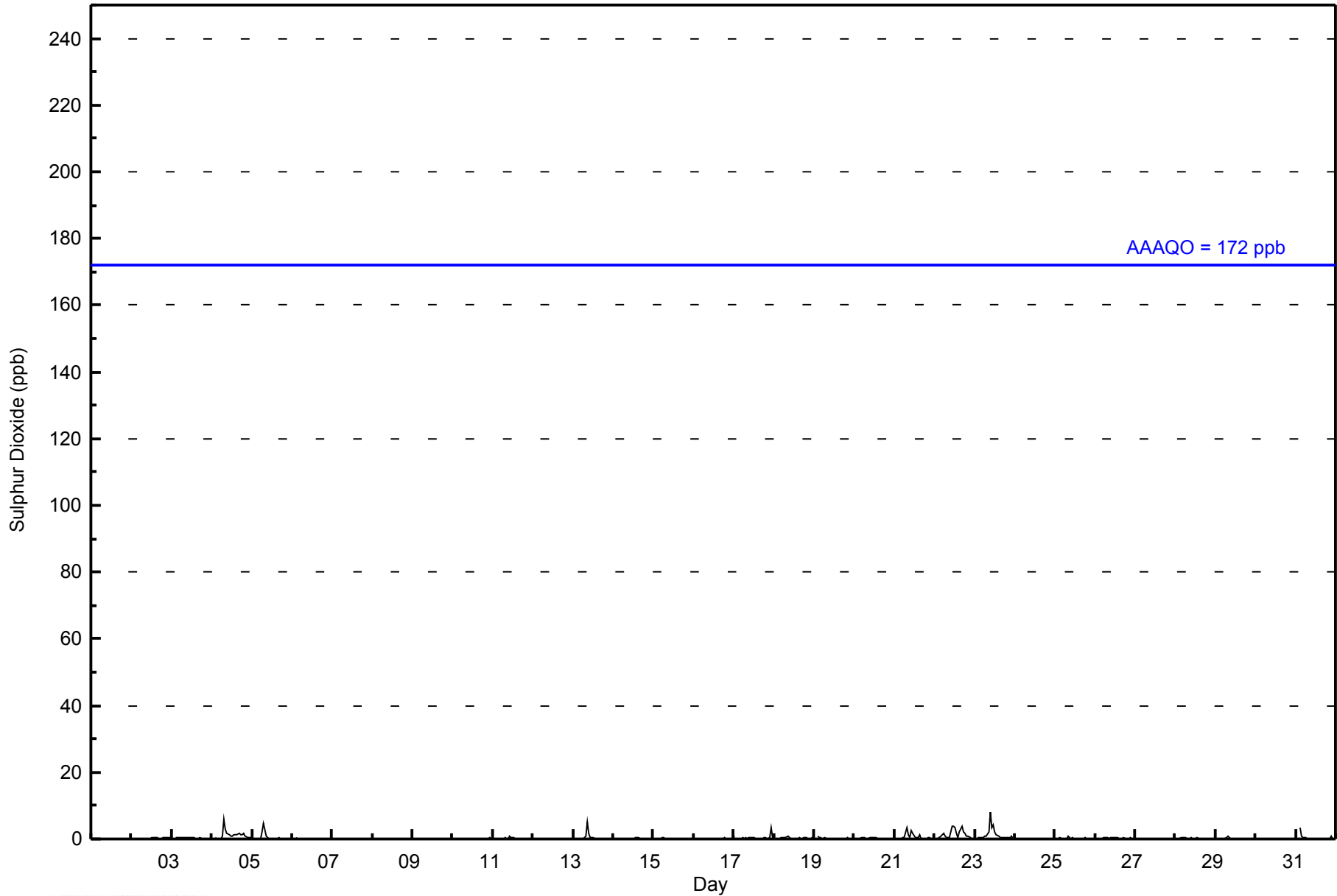
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-May	2	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	2
2-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
3-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
4-May	0	Z	0	0	0	0	1	6	3	2	1	1	1	1	1	1	2	1	1	2	1	0	0	0	0	1.2	6
5-May	0	Z	0	0	0	0	2	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	5
6-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
7-May	0	Z	0	0	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-May	0	Z	0	0	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-May	0	Z	0	0	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-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
11-May	0	Z	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
12-May	0	Z	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-May	0	Z	0	0	0	0	0	1	5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	5
14-May	0	Z	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
15-May	0	Z	0	0	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-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
17-May	1	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0.4	3
18-May	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
19-May	0	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
20-May	0	Z	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
21-May	0	Z	0	0	0	0	1	3	1	0	3	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0.6	3
22-May	0	Z	0	0	1	2	1	1	1	0	4	4	3	1	1	2	4	2	2	1	1	0	0	0	0	1.3	4
23-May	0	Z	0	1	0	0	1	1	2	8	3	4	2	1	1	1	1	1	1	1	0	0	1	0	1.3	8	
24-May	0	Z	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-May	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
26-May	0	Z	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
27-May	0	Z	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
28-May	0	Z	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
29-May	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	0.1	1
30-May	0	Z	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
31-May	0	Z	4	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.4	4
																								Diurnal Average			
																								Diurnal Maximum			

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



WBEA  
Hourly Averages

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Wapasu - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Wapasu - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	709	100.00	100.00
11 - 20	0	0.00	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Wapasu - May 2014**

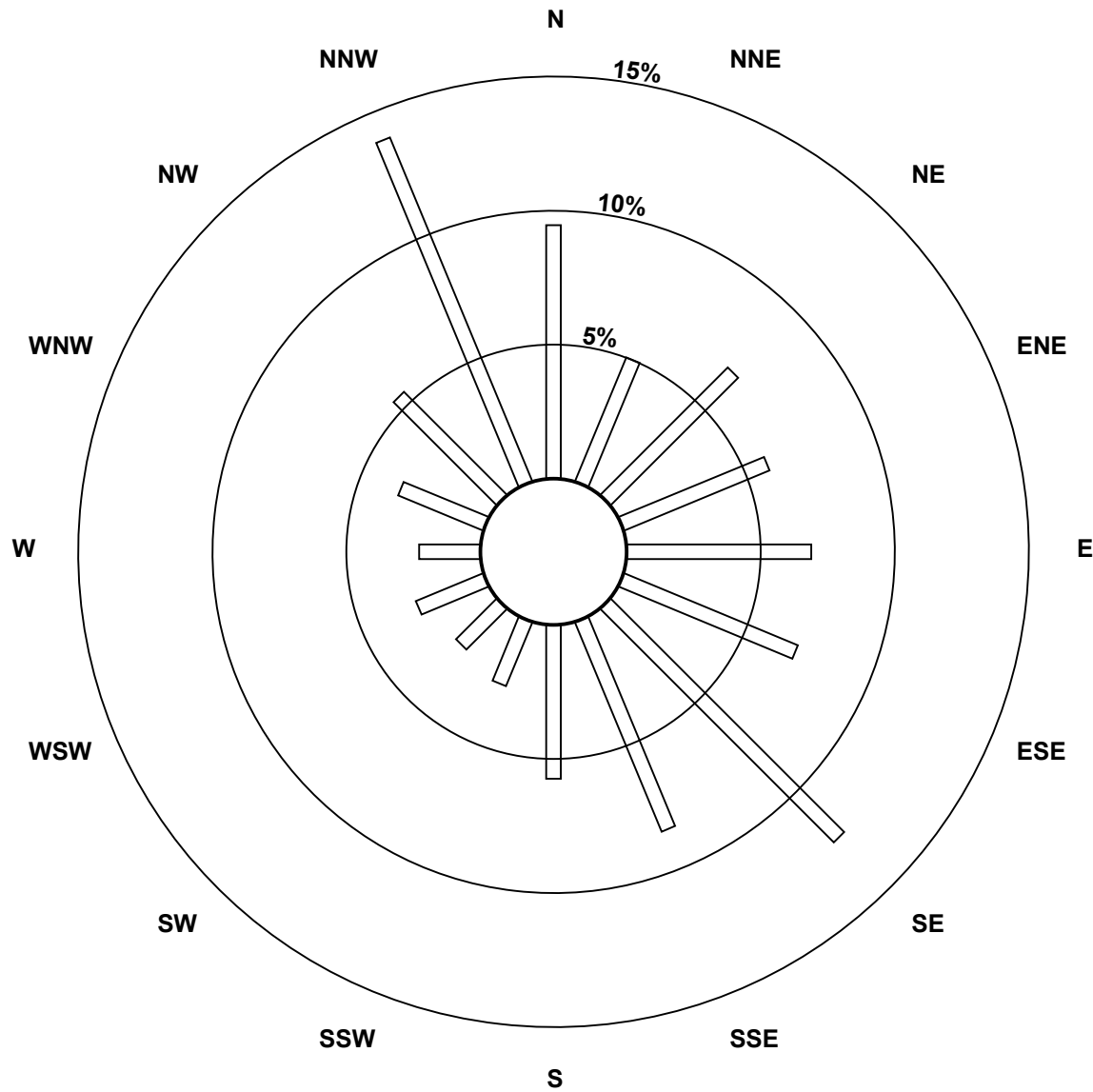
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	66	35	47	41	48	49	86	59	40	18	15	19	16	24	38	97	698
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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>	66	35	47	41	48	49	86	59	40	18	15	19	16	24	38	97	698

Total Number of Valid Hours: 698

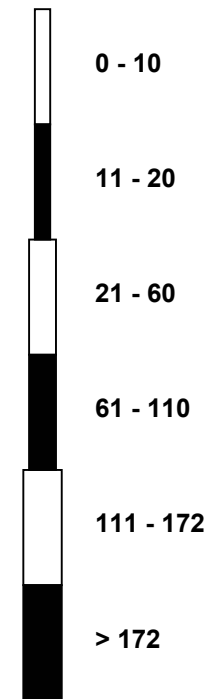
Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Wapasu (AMS 17)**



**Classes (ppb)**

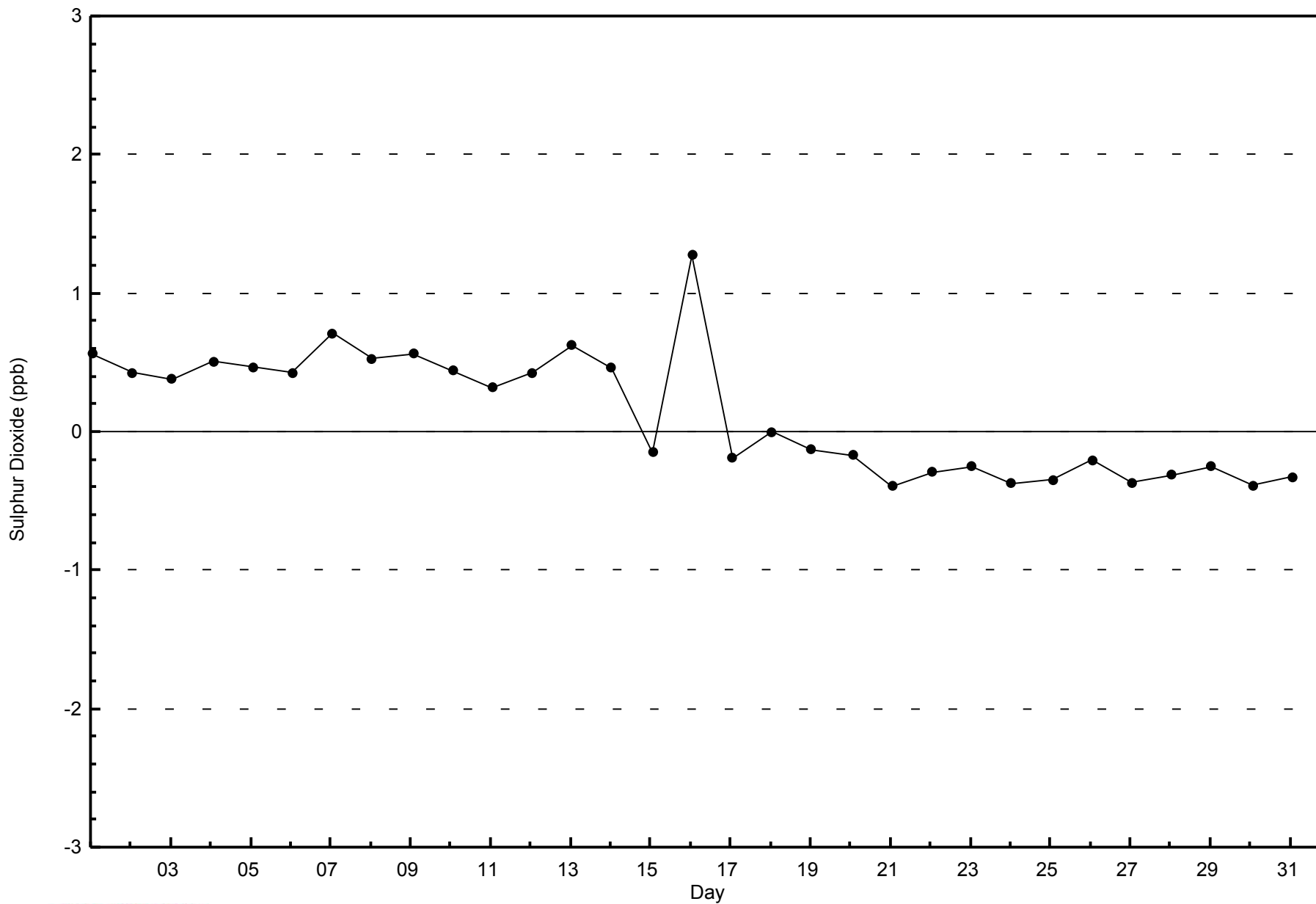


**Total Number of Valid Hours: 698**



WBEA  
Zero Responses

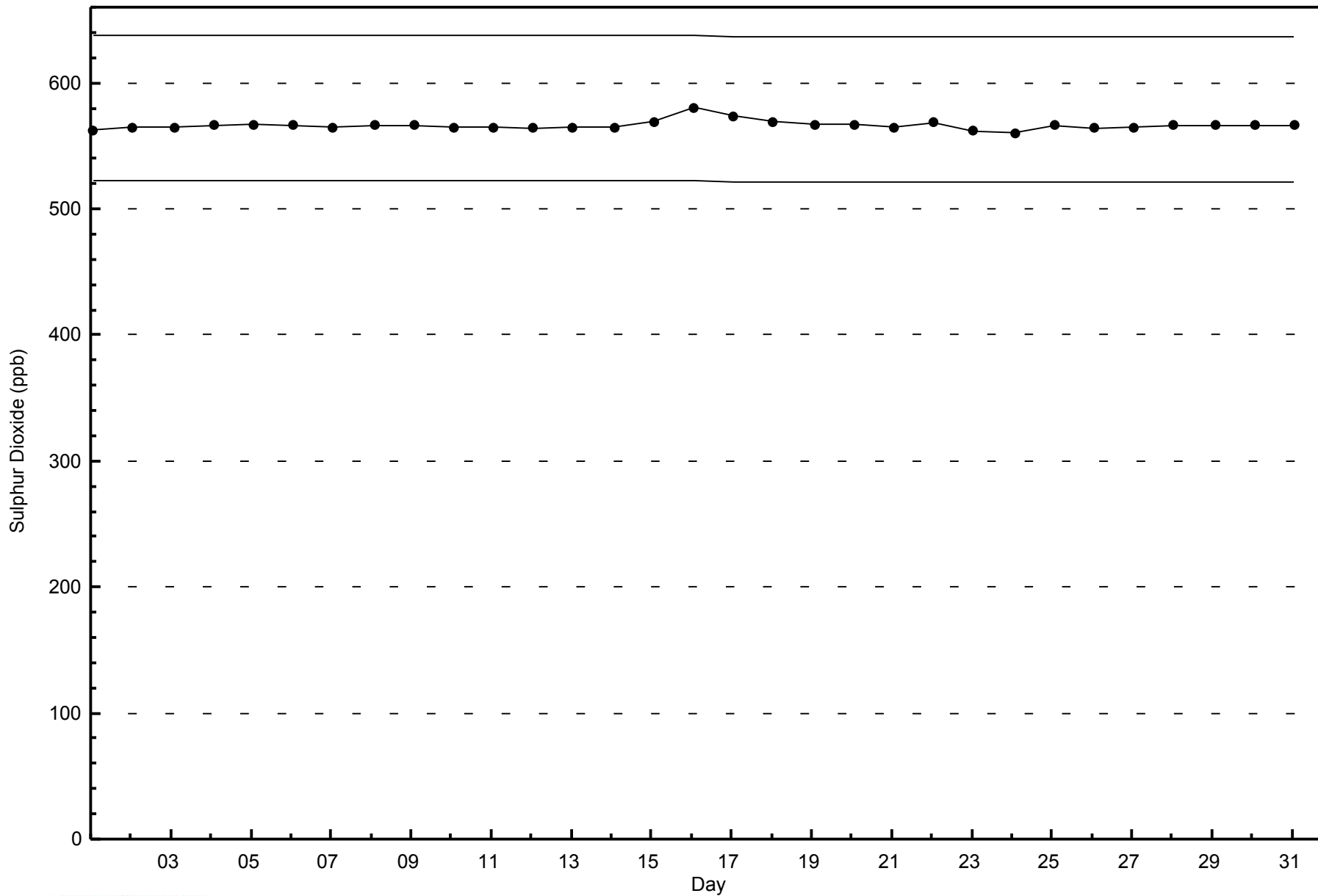
Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Wapasu - May 2014





WBEA  
Span Responses

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Wapasu - May 2014



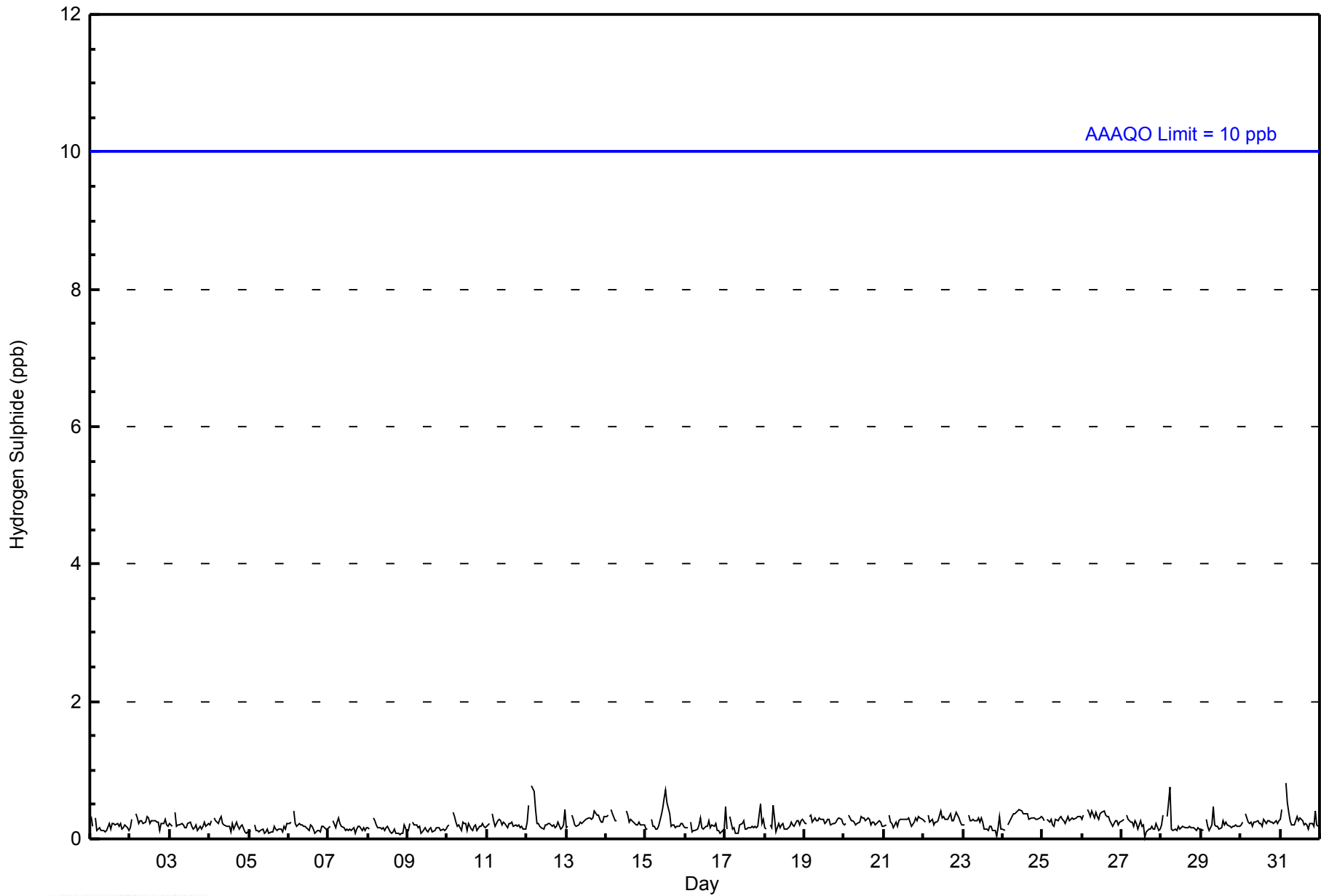






WBEA  
Hourly Averages

Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Wapasu - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Wapasu - May 2014**

<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



**WBEA**  
**Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Wapasu - May 2014**

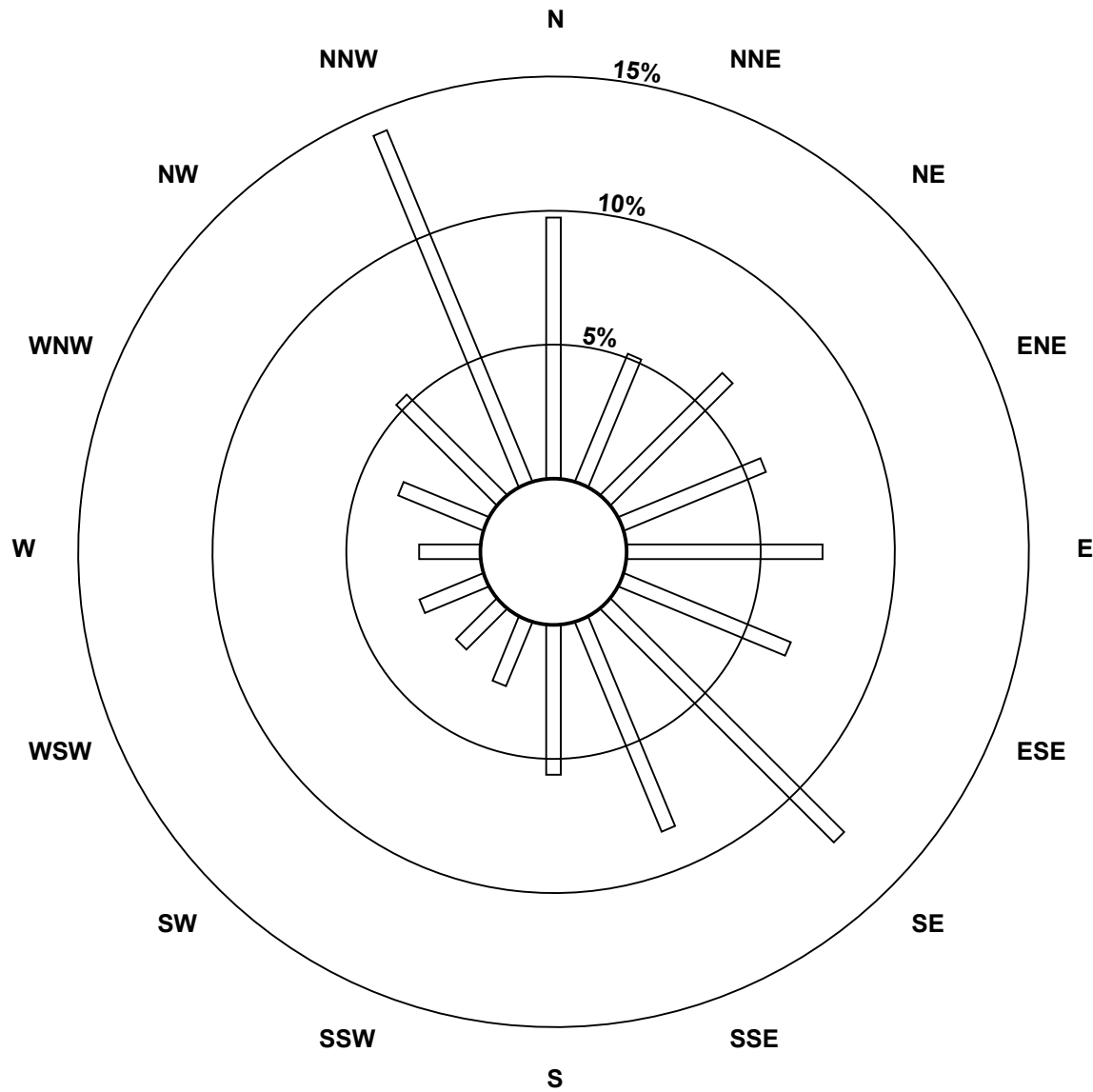
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	68	36	45	40	51	47	86	59	39	18	15	18	16	24	37	99	698
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	68	36	45	40	51	47	86	59	39	18	15	18	16	24	37	99	698

Total Number of Valid Hours: 698

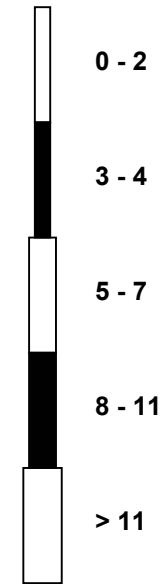
Total Number of Hours: 744

Wood Buffalo Environmental Association  
Wind Rose May 2014

Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Wapasu (AMS 17)



Classes (ppb)

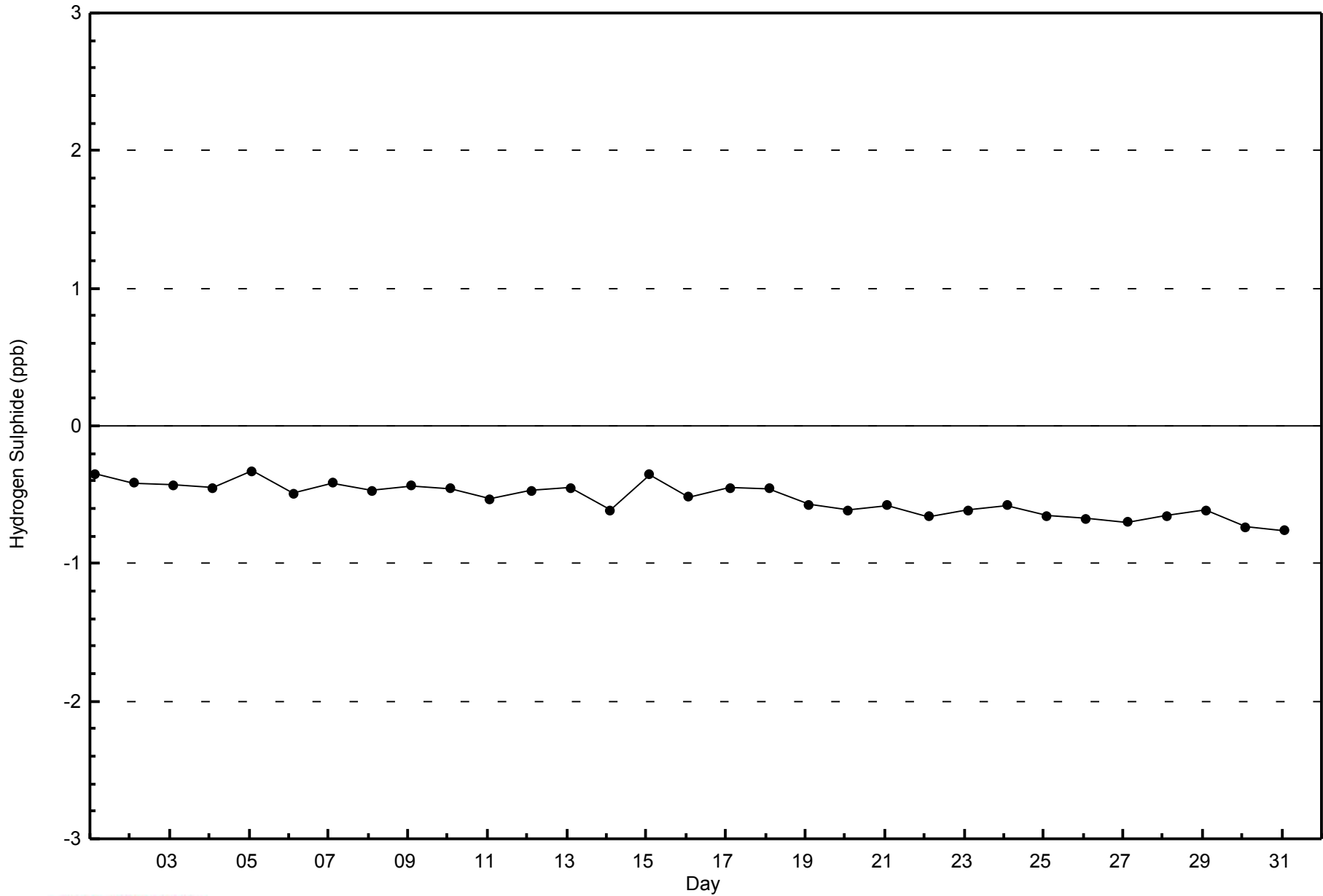


Total Number of Valid Hours: 698



WBEA  
Zero Responses

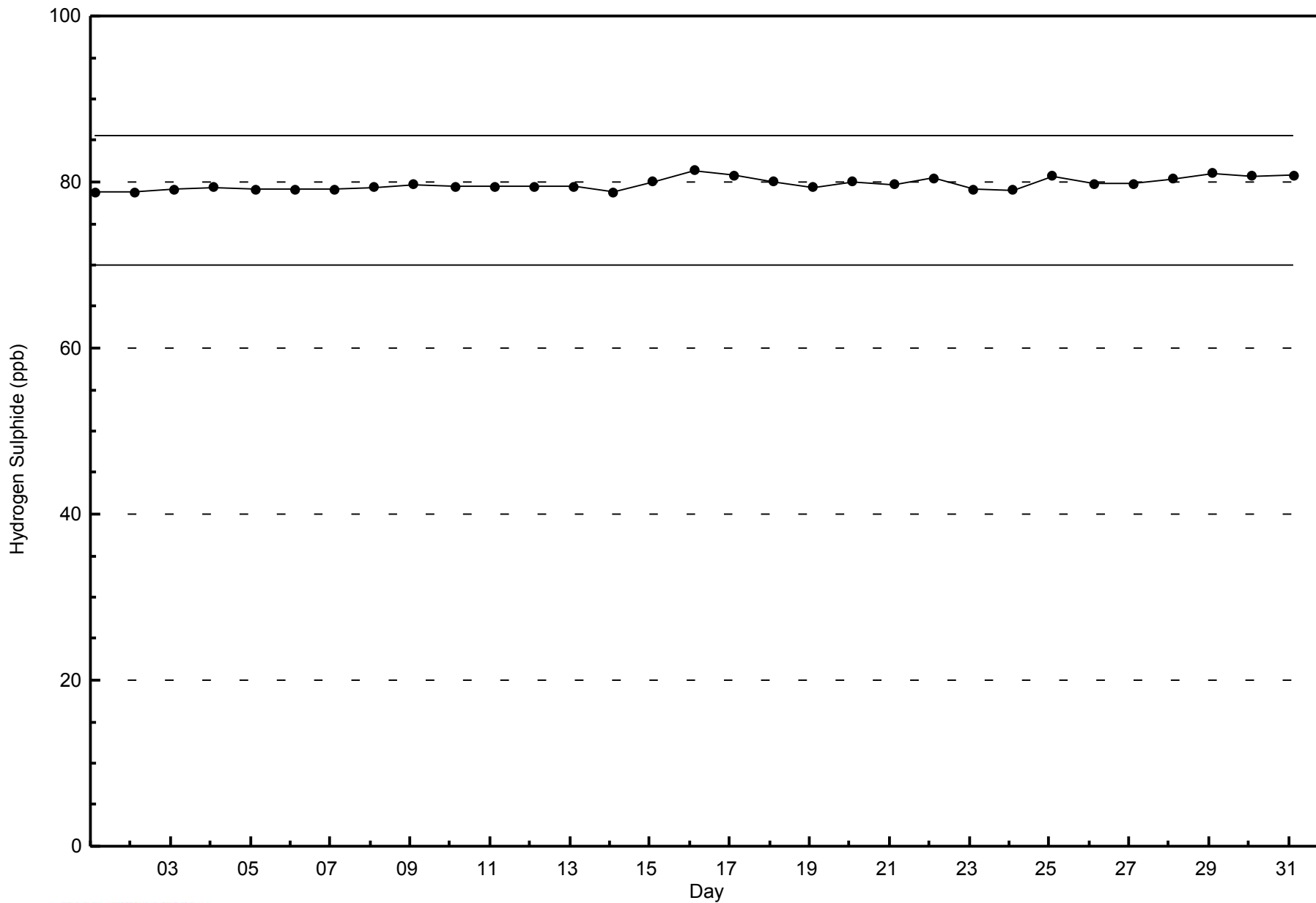
Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Wapasu - May 2014





WBEA  
Span Responses

Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Wapasu - May 2014

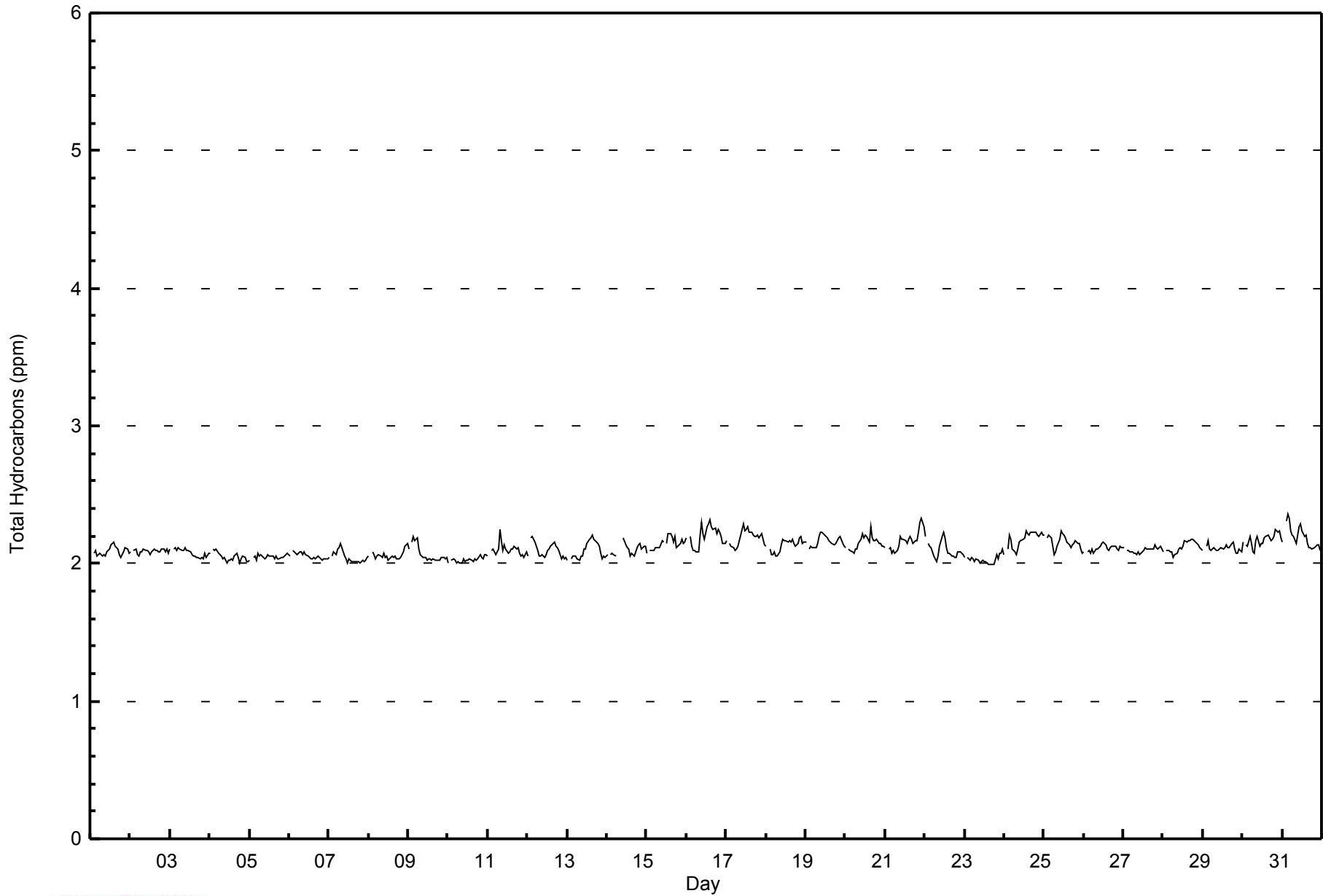






WBEA  
Hourly Averages

Total Hydrocarbons (THC) - ppm  
Wapasu - May 2014







**WBEA**  
**Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Wapasu - May 2014**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	139	19.63	19.63
2.1 - 3.0	569	80.37	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Wapasu - May 2014**

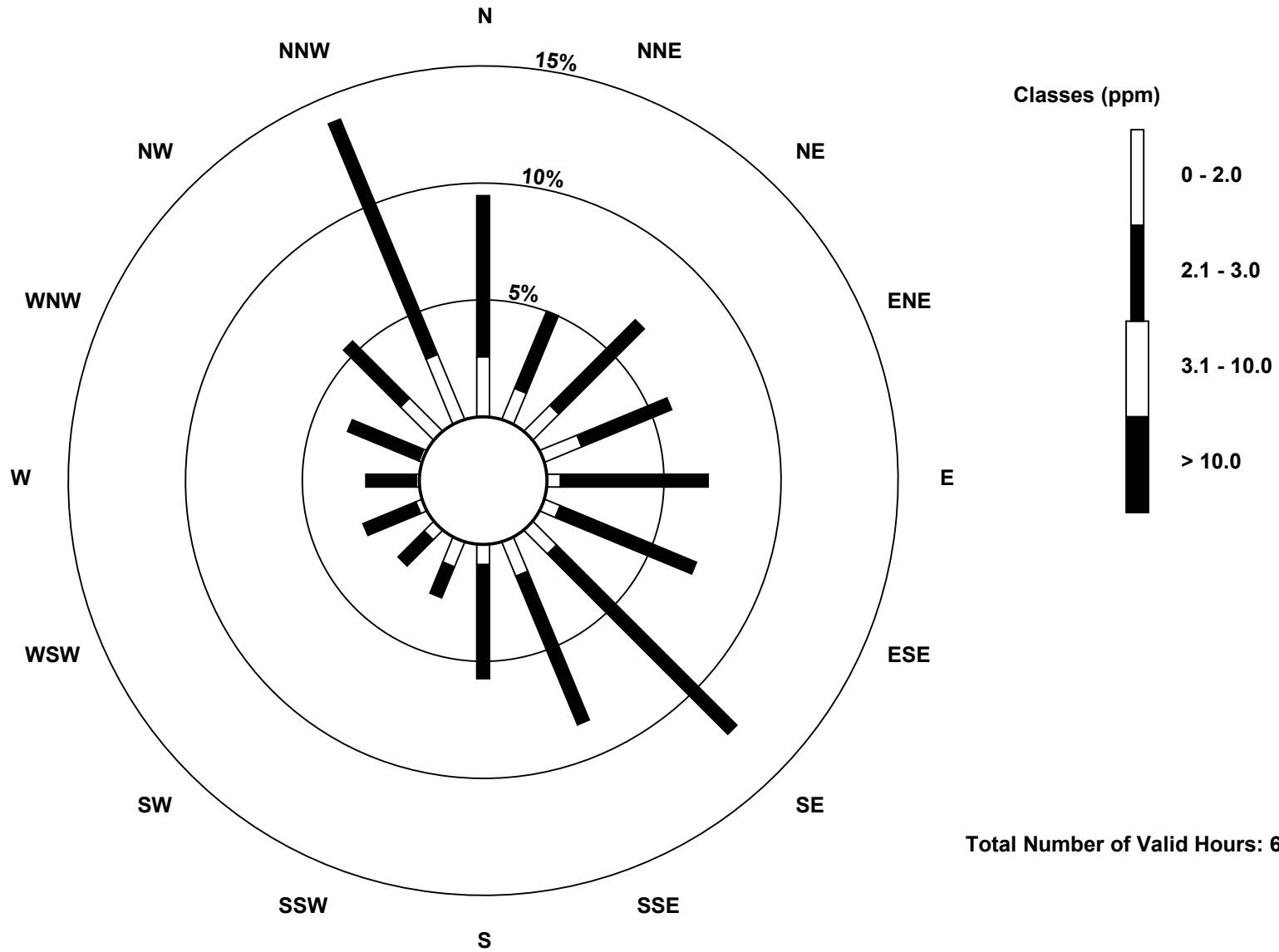
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	18	10	11	12	4	5	10	11	6	8	4	2	1	1	14	21	138
2.1 - 3.0	48	25	36	29	44	44	76	48	34	10	11	17	15	23	24	76	560
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	66	35	47	41	48	49	86	59	40	18	15	19	16	24	38	97	698

Total Number of Valid Hours: 698

Total Number of Hours: 744

Wood Buffalo Environmental Association  
Wind Rose May 2014

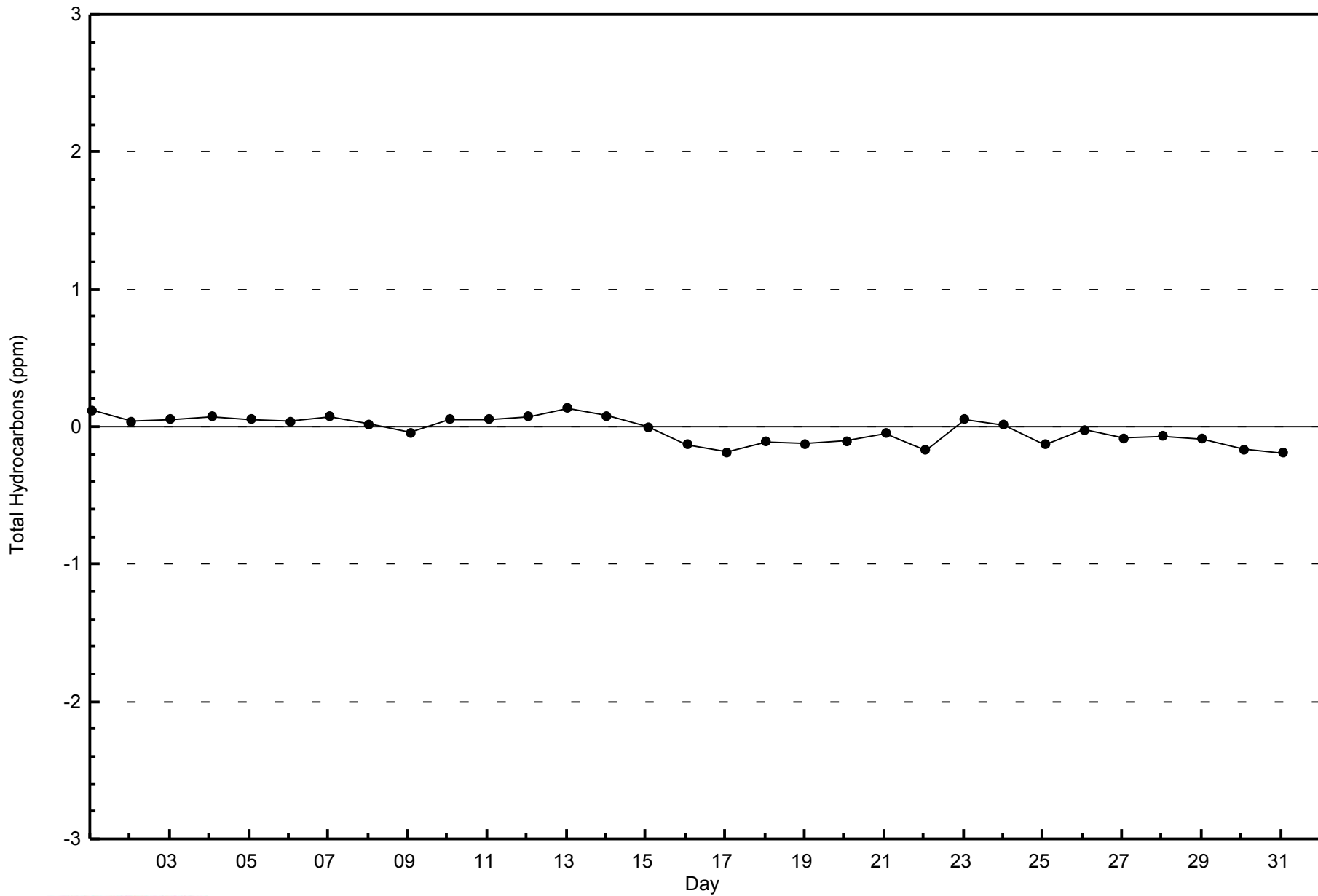
Total Hydrocarbons (THC) - ppm  
Wapasu (AMS 17)





WBEA  
Zero Responses

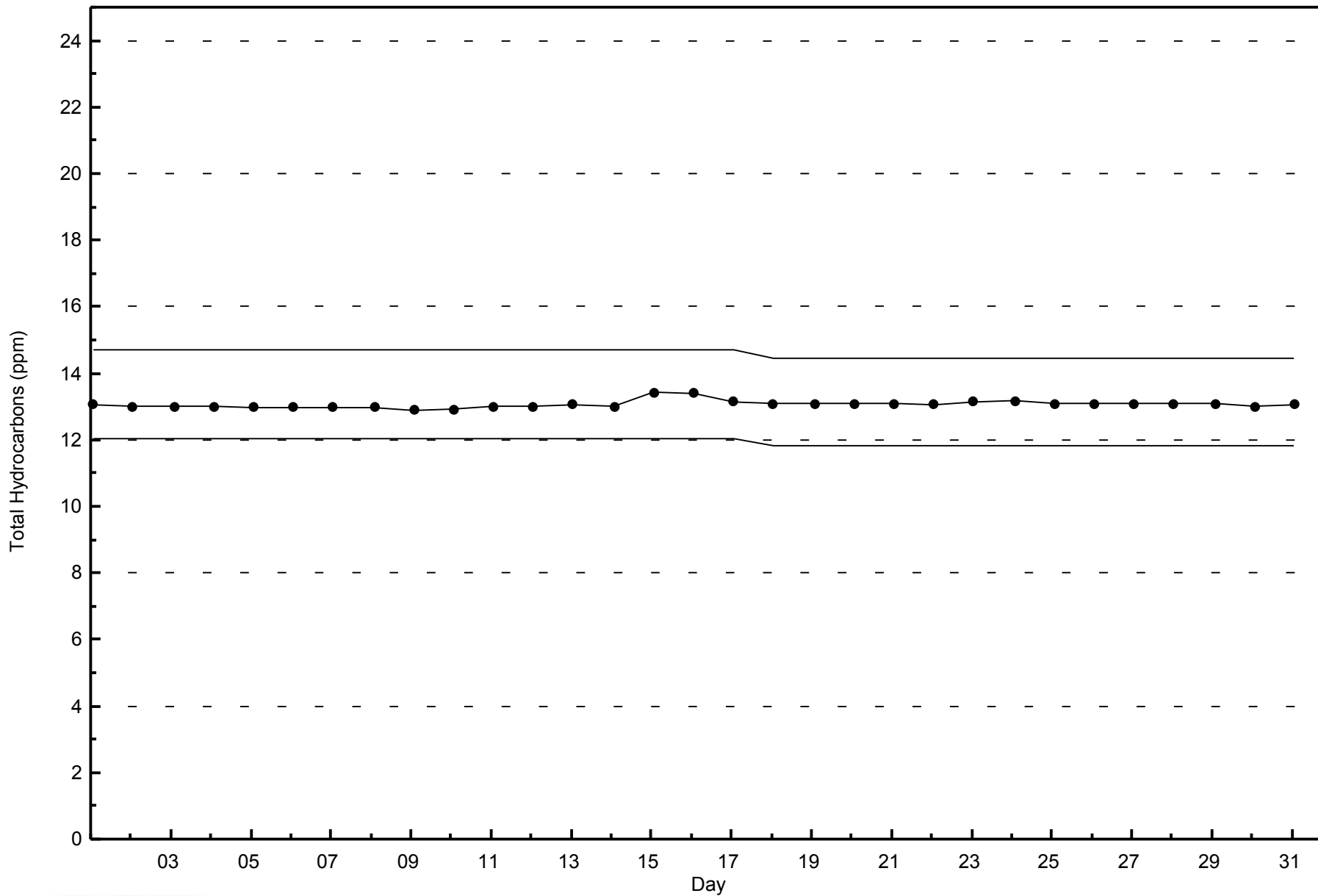
Total Hydrocarbons (THC) - ppm  
Wapasu - May 2014





WBEA  
Span Responses

Total Hydrocarbons (THC) - ppm  
Wapasu - May 2014





Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O<sub>3</sub>) - ppb

Wapasu - May 2014

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 57 ppb on May 21 17:00	Maximum Daily Average: 46.9 ppb on May 17		Hours of Data:	709
Minimum Value: 1 ppb on May 25 02:00	Minimum Daily Average: 14.6 ppb on May 29		Hours of Missing Data:	35
Maximum Diurnal Average: 38.2 ppb at hour 17	Minimum Diurnal Average: 22.8 ppb at hour 5		Hours of Calibration:	34
Monthly Average: 32.8 ppb	Percentiles: P <sub>1</sub> = 3 P <sub>10</sub> = 16 Q <sub>1</sub> = 26 Median = 33 Q <sub>3</sub> = 41 P <sub>90</sub> = 48 P <sub>99</sub> = 53		Percent Operational Time:	99.9

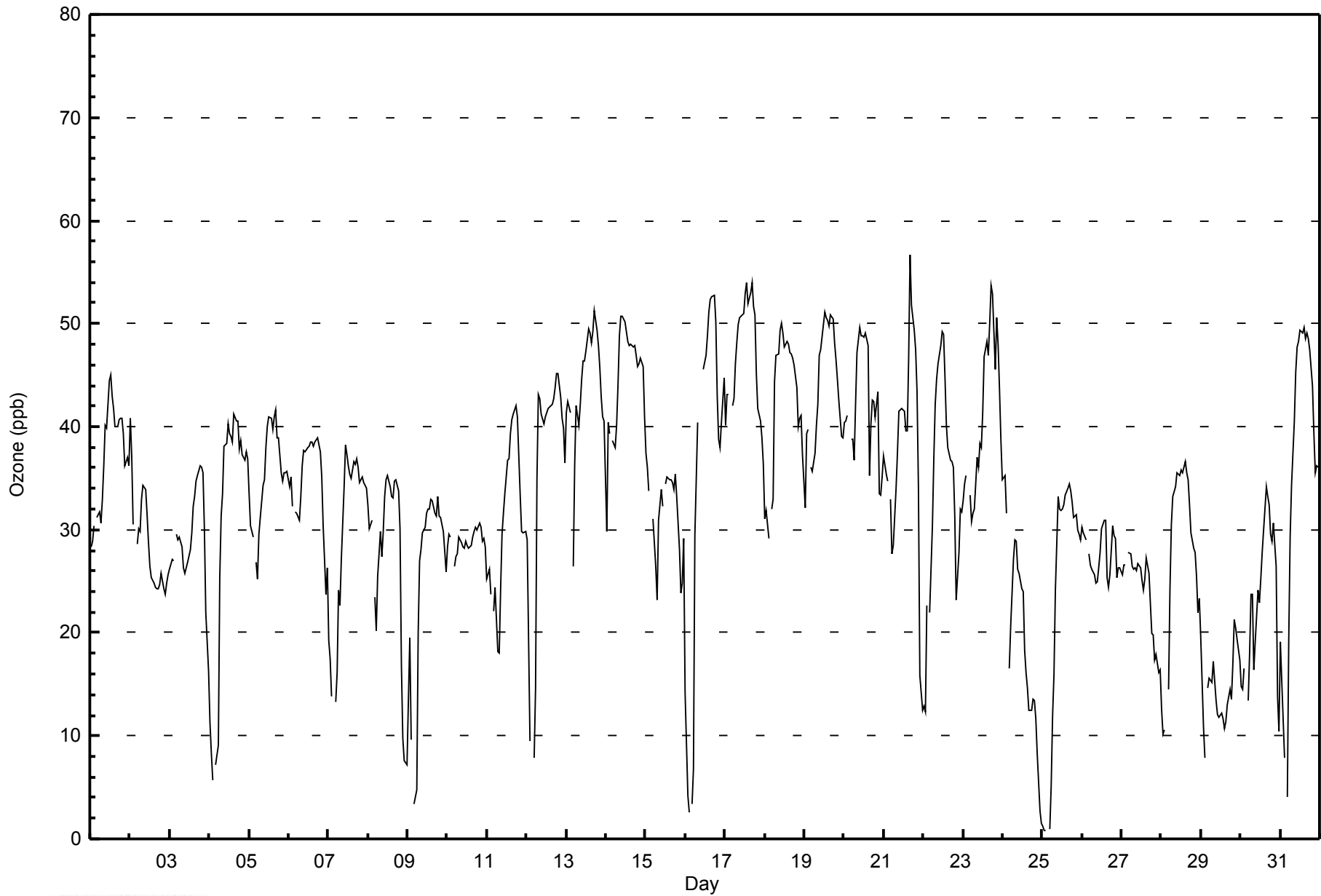
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-May	28	29	30	Z	31	32	31	33	36	40	40	44	45	43	42	40	40	41	41	41	39	36	37	36	37.2	45																							
2-May	41	37	30	Z	29	30	30	33	34	34	31	29	26	25	25	24	24	24	25	26	24	24	25	26	28.5	41																							
3-May	26	27	27	Z	30	29	29	28	26	26	26	27	28	30	32	33	35	35	36	36	36	30	22	16	29.2	36																							
4-May	11	8	6	Z	7	9	25	31	34	38	38	40	39	39	41	41	41	38	39	37	37	38	37	31.0	41																								
5-May	34	30	29	Z	27	25	30	31	34	35	38	40	41	41	40	41	42	39	39	36	35	36	36	35.3	42																								
6-May	34	35	32	Z	32	32	31	33	36	38	38	38	38	39	38	38	38	39	38	38	35	30	24	26	34.8	39																							
7-May	19	18	14	Z	13	16	24	23	27	34	38	37	36	35	35	37	36	37	36	35	35	35	34	34	29.9	38																							
8-May	32	30	31	Z	23	20	26	30	27	30	33	35	35	34	33	33	35	35	34	30	17	10	8	7	27.3	35																							
9-May	13	20	10	Z	3	5	20	27	28	30	30	32	32	32	33	33	32	31	33	31	31	30	28	26	25.6	33																							
10-May	28	30	29	Z	26	27	28	29	29	28	28	29	29	28	28	29	30	30	30	31	30	29	29	28	28.9	31																							
11-May	25	26	24	Z	22	24	18	18	24	30	32	33	37	37	39	41	41	42	41	37	33	30	30	30	31.1	42																							
12-May	29	19	9	Z	8	15	35	43	43	41	40	41	41	42	42	42	43	44	45	45	43	41	40	36	36.0	45																							
13-May	41	42	41	Z	26	36	42	40	42	45	46	46	47	49	49	48	49	51	49	48	46	43	41	41	44.0	51																							
14-May	30	40	39	Z	39	38	40	44	49	51	51	50	49	48	48	48	48	47	46	46	47	46	41	41	44.9	51																							
15-May	37	36	34	Z	31	29	26	23	31	34	32	M	34	35	35	35	35	34	35	33	28	24	25	29	31.6	37																							
16-May	14	4	3	Z	3	7	29	40	C	C	C	46	47	49	51	52	53	53	50	43	39	38	40	45	35.3	53																							
17-May	40	43	43	Z	42	43	46	48	50	51	51	51	53	54	52	53	54	52	51	45	42	41	39	36	46.9	54																							
18-May	31	32	29	Z	32	33	44	47	47	49	50	49	48	48	48	47	47	47	46	44	40	41	41	37	42.5	50																							
19-May	32	39	40	Z	36	36	37	40	42	47	47	50	51	51	50	50	51	50	48	47	45	43	39	39	43.9	51																							
20-May	40	40	41	Z	39	39	37	42	47	50	49	49	49	49	48	35	40	43	42	41	43	33	33	35	42.0	50																							
21-May	37	35	35	Z	33	28	28	34	38	41	42	42	42	40	40	47	57	52	49	47	43	34	16	12	37.9	57																							
22-May	13	12	23	Z	22	30	37	42	45	46	48	49	49	45	40	38	37	37	36	31	23	28	32	32	34.5	49																							
23-May	33	35	35	Z	33	31	32	32	37	36	38	38	41	47	48	47	50	54	53	46	51	48	44	39	41.1	54																							
24-May	35	35	32	Z	17	21	27	29	29	26	26	24	24	18	16	15	13	12	13	13	12	8	3	1	19.5	35																							
25-May	1	1	1	Z	1	5	12	16	24	33	32	32	32	32	33	34	34	34	33	31	31	30	30	29	23.6	34																							
26-May	30	30	29	Z	28	27	26	26	25	25	26	28	30	31	31	25	24	26	30	29	29	25	26	26	27.5	31																							
27-May	26	27	27	Z	28	28	26	26	26	26	27	26	25	24	25	27	26	23	20	20	17	18	16	16	23.9	28																							
28-May	13	10	11	Z	14	24	30	33	34	36	35	35	36	35	37	36	35	32	30	28	28	26	22	23	28.0	37																							
29-May	20	11	8	Z	15	16	15	17	15	13	12	12	12	12	11	11	13	14	14	17	21	20	19	17	14.6	21																							
30-May	15	15	17	Z	13	18	24	24	16	19	24	23	25	28	30	34	33	32	30	29	31	27	14	10	23.0	34																							
31-May	19	15	8	Z	4	19	29	34	40	45	48	48	49	49	50	49	49	49	47	44	39	35	36	36	36.7	50																							
																								26.8	26.2	24.7	--	22.8	24.9	29.5	32.2	33.9	35.9	36.6	37.5	37.8	37.7	37.7	37.5	38.2	38.1	37.4	35.7	33.9	31.4	29.4	28.6	Diurnal Average	
																								41	43	43	--	42	43	46	48	50	51	51	51	53	54	52	53	57	54	53	48	51	48	46	45	Diurnal Maximum	

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



**WBEA**  
**Hourly Averages**

**Ozone (O<sub>3</sub>) - ppb**  
**Wapasu - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Ozone (O<sub>3</sub>) - ppb**  
**Wapasu - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	102	14.39	14.39
21 - 50	582	82.09	96.47
51 - 82	25	3.53	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744





**WBEA**  
**Frequency Distribution**

**Ozone (O<sub>3</sub>) - ppb**  
**Wapasu - May 2014**

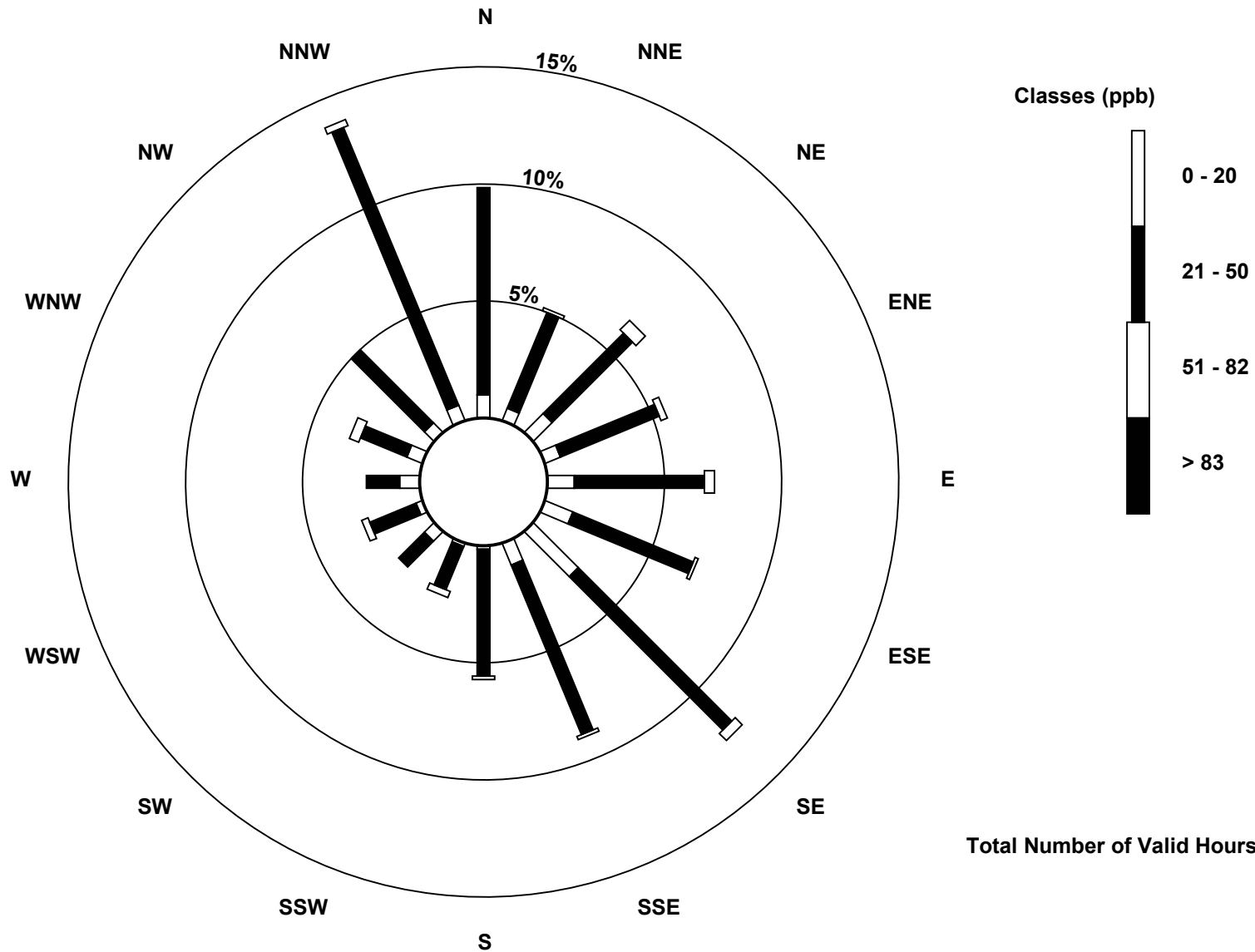
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	7	4	8	5	8	9	19	7	1	1	4	2	6	5	4	5	95
21 - 50	62	31	34	32	39	39	65	55	38	14	11	15	10	15	31	90	581
51 - 82	0	1	4	2	3	1	3	1	1	2	0	2	0	3	0	2	25
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	69	36	46	39	50	49	87	63	40	17	15	19	16	23	35	97	701

Total Number of Valid Hours: 701

Total Number of Hours: 744

Wood Buffalo Environmental Association  
 Wind Rose May 2014

Ozone (O<sub>3</sub>) - ppb  
 Wapasu (AMS 17)

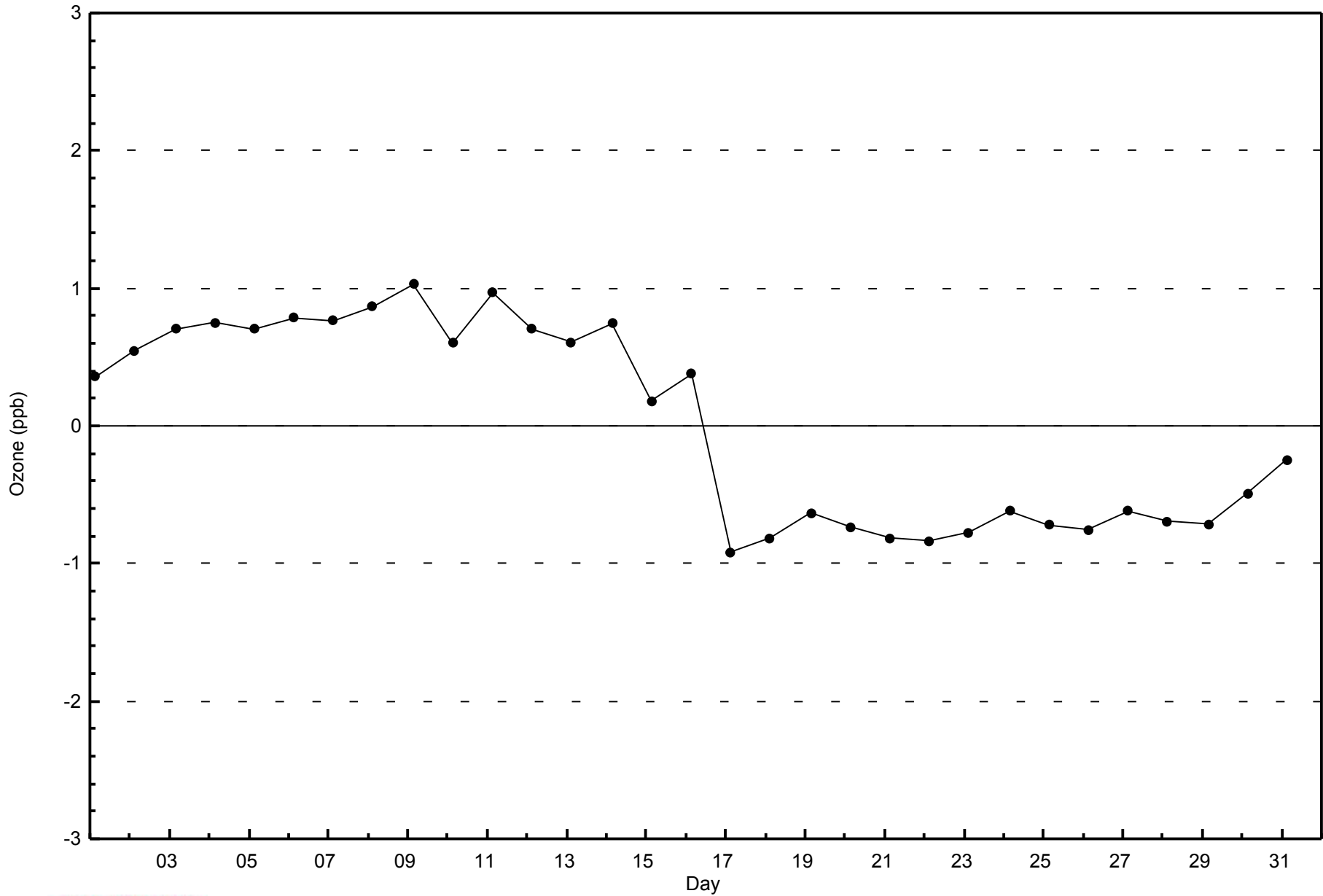


Total Number of Valid Hours: 701



WBEA  
Zero Responses

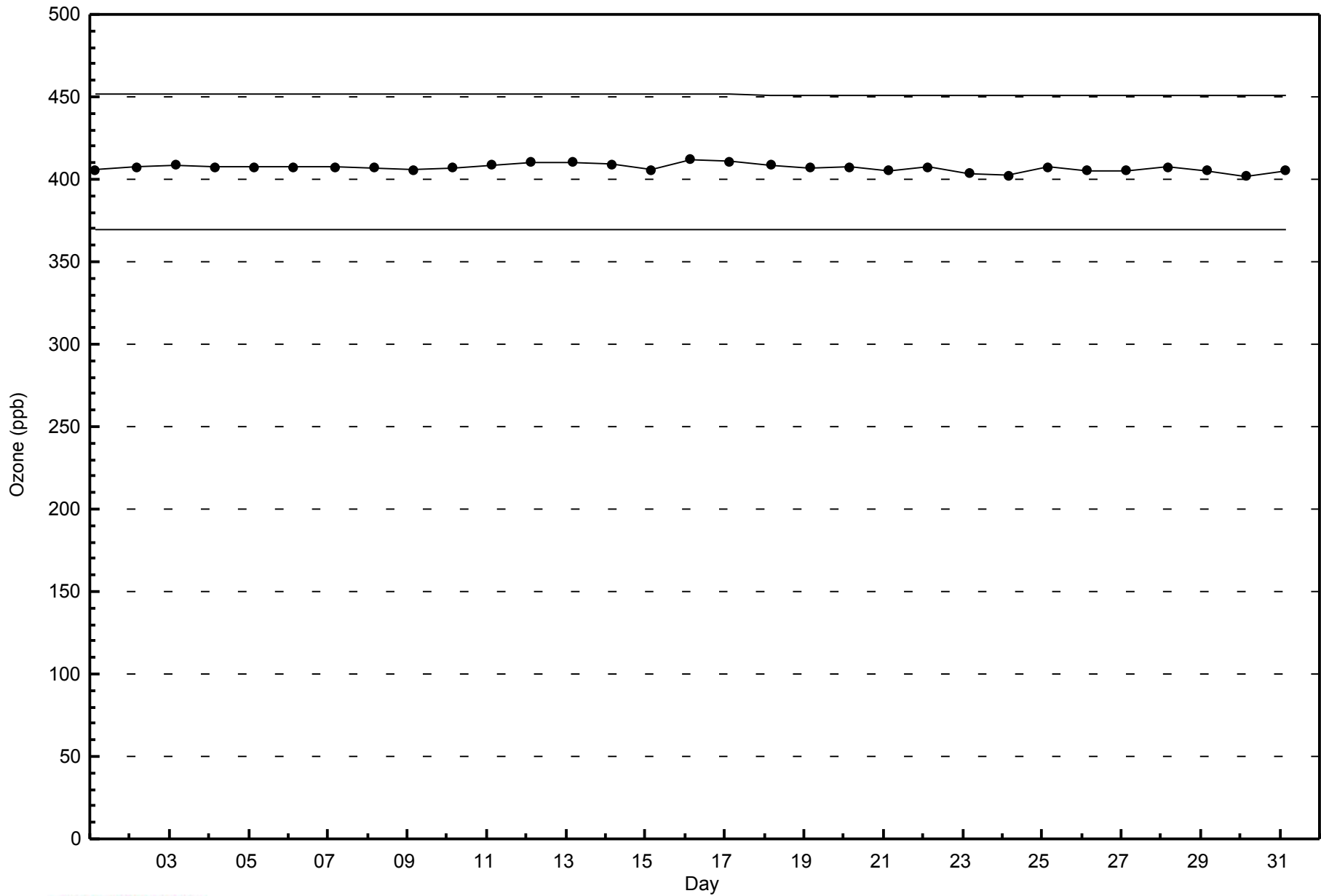
Ozone (O<sub>3</sub>) - ppb  
Wapasu - May 2014





WBEA  
Span Responses

Ozone (O<sub>3</sub>) - ppb  
Wapasu - May 2014



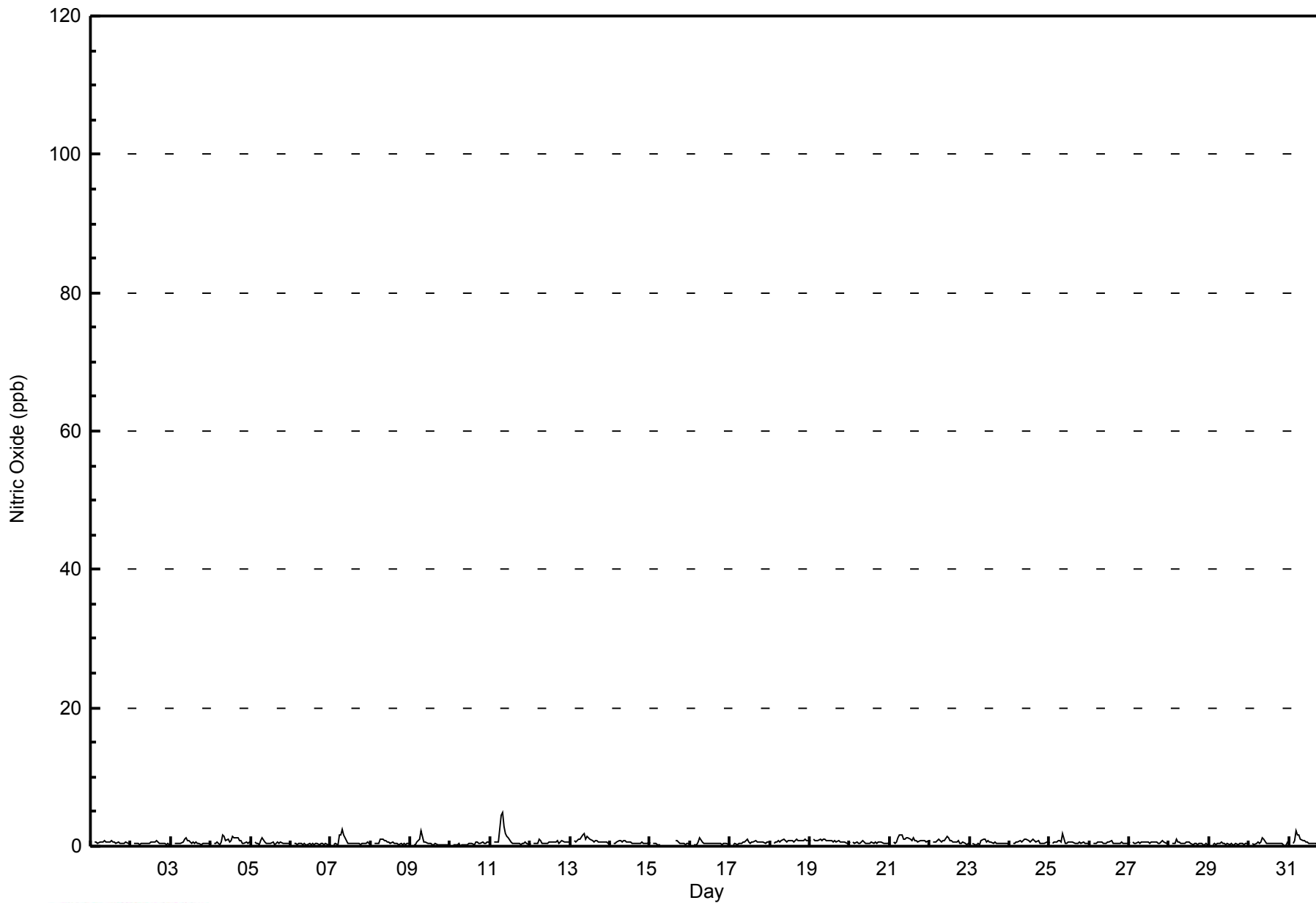


Maximum Value: 5 ppb on May 11 08:00																	Maximum Daily Average: 1.1 ppb on May 11																	Hours in Service: 744			
Minimum Value: 0 ppb on May 7 00:00																	Minimum Daily Average: 0.3 ppb on May 6																	Hours of Data: 705			
Maximum Diurnal Average: 1.0 ppb at hour 8																	Minimum Diurnal Average: 0.4 ppb at hour 22																	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 Q <sub>3</sub> = 1 P <sub>90</sub> = 1 P <sub>99</sub> = 2																	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-May	1	Z	1	1	0	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	1	0	0	0	0.6	1											
2-May	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0.4	1											
3-May	0	Z	0	0	0	0	0	1	1	1	1	1	0	1	0	1	0	0	0	0	0	0	0	0.5	1												
4-May	0	Z	0	1	1	0	1	2	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	1	0.8	2											
5-May	0	Z	1	0	0	0	1	1	1	0	0	0	1	1	0	0	1	0	1	0	0	0	0	0.5	1												
6-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0												
7-May	0	Z	0	0	0	2	2	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.6	2											
8-May	0	Z	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0.5	1												
9-May	0	Z	0	0	1	1	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2												
10-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	1	1	0.4	1												
11-May	1	Z	1	1	1	1	5	5	3	2	1	1	1	0	0	0	0	0	0	0	0	1	0	1.1	5												
12-May	0	Z	0	0	0	1	1	0	0	0	0	1	1	1	1	1	1	0	1	1	1	1	1	0.6	1												
13-May	1	Z	1	1	1	1	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.9	2												
14-May	0	Z	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	0	0	0	0.5	1												
15-May	0	Z	0	0	0	0	0	C	C	C	C	C	C	C	C	1	1	1	1	0	0	0	0	--	1												
16-May	0	Z	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1												
17-May	0	Z	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0.5	1												
18-May	1	Z	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.8	1												
19-May	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												
20-May	1	Z	1	0	1	0	0	1	1	0	0	0	1	0	1	0	1	0	1	1	1	1	0	0.5	1												
21-May	1	Z	1	0	1	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.9	2												
22-May	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0.7	1												
23-May	0	Z	0	0	0	0	0	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0.5	1												
24-May	0	Z	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	0.7	1												
25-May	1	Z	0	1	1	1	1	1	2	0	0	1	1	1	1	0	0	0	1	0	1	0	0	0.6	2												
26-May	0	Z	0	0	0	1	1	1	0	0	0	1	1	1	0	0	1	0	0	1	0	0	0	0.5	1												
27-May	1	Z	1	0	0	1	0	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	0.5	1												
28-May	1	Z	0	0	1	1	1	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0.4	1												
29-May	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1												
30-May	1	Z	0	0	0	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1												
31-May	0	Z	0	1	2	2	2	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.7	2												
																								Diurnal Average													
																								Diurnal Maximum													
Z - zerospan C - Calibration																																					



WBEA  
Hourly Averages

Nitric Oxide (NO) - ppb  
Wapasu - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb**  
**Wapasu - May 2014**

<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



**WBEA**  
**Frequency Distribution**

**Nitric Oxide (NO) - ppb**  
**Wapasu - May 2014**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	62	32	47	41	48	49	87	61	41	18	15	19	16	24	38	97	695
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>	62	32	47	41	48	49	87	61	41	18	15	19	16	24	38	97	695

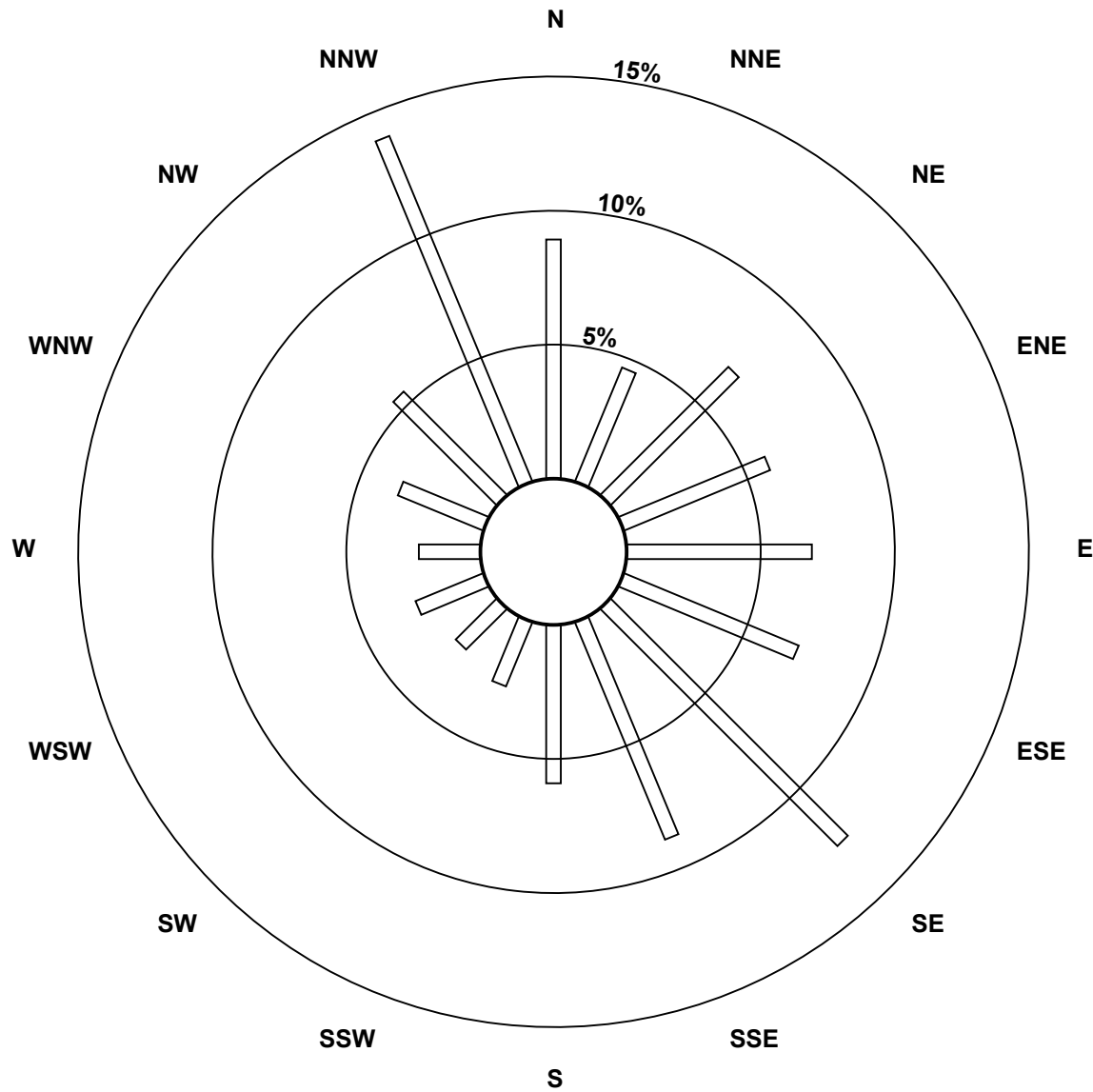
Total Number of Valid Hours: 695

Total Number of Hours: 744

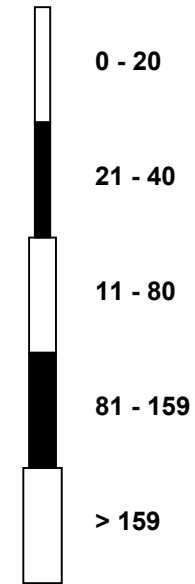


**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Nitric Oxide (NO) - ppb  
Wapasu (AMS 17)**



**Classes (ppb)**

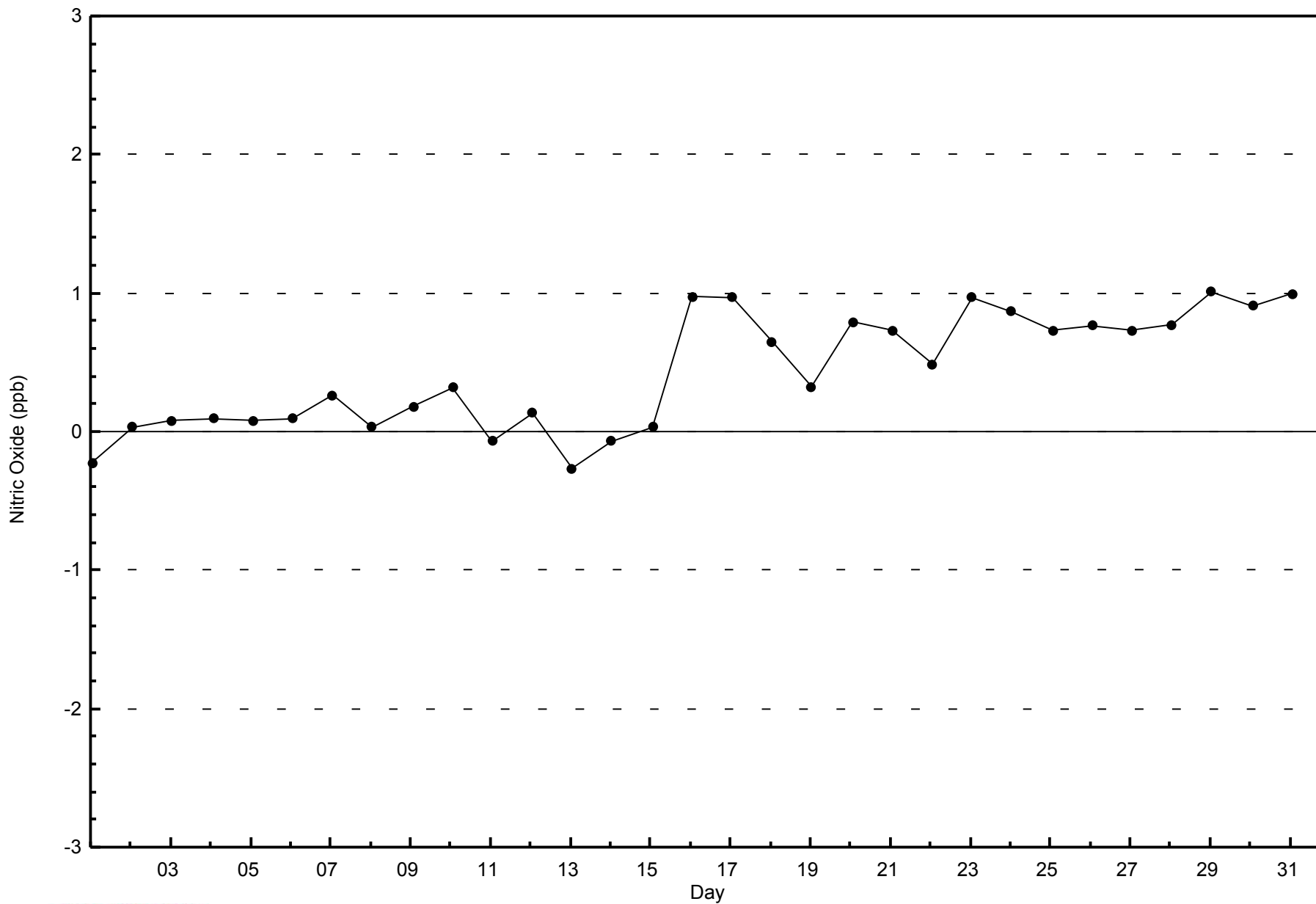


**Total Number of Valid Hours: 695**



WBEA  
Zero Responses

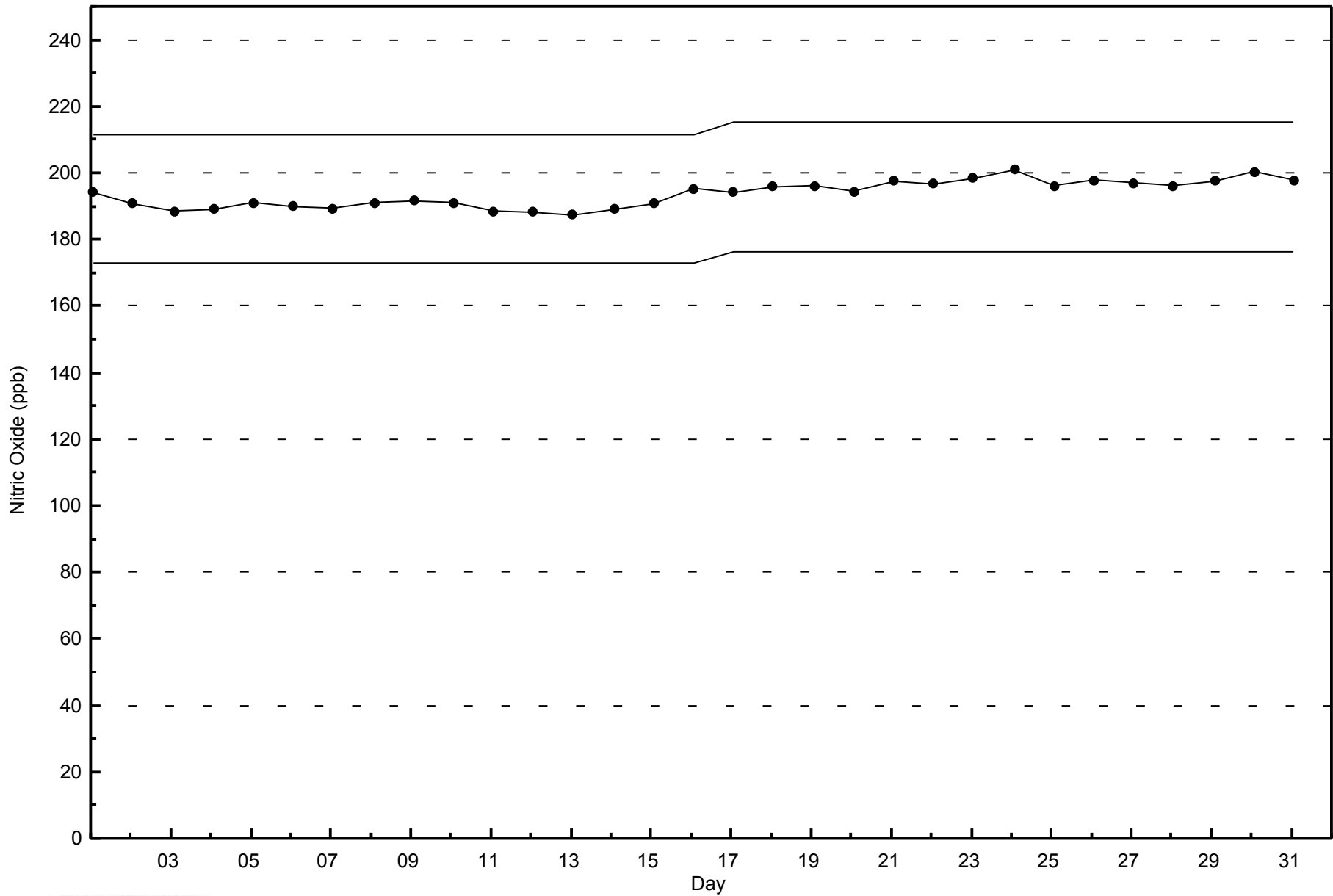
Nitric Oxide (NO) - ppb  
Wapasu - May 2014





**WBEA**  
**Span Responses**

**Nitric Oxide (NO) - ppb**  
**Wapasu - May 2014**





Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 12 ppb on May 31 03:00	Maximum Daily Average: 2.2 ppb on May 31		Hours of Data:	705
Minimum Value: 0 ppb on May 1 10:00	Minimum Daily Average: 0.1 ppb on May 6		Hours of Missing Data:	39
Maximum Diurnal Average: 1.9 ppb at hour 7	Minimum Diurnal Average: 0.5 ppb at hour 13		Hours of Calibration:	39
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> = 3 P <sub>99</sub> = 7		Percent Operational Time:	100.0

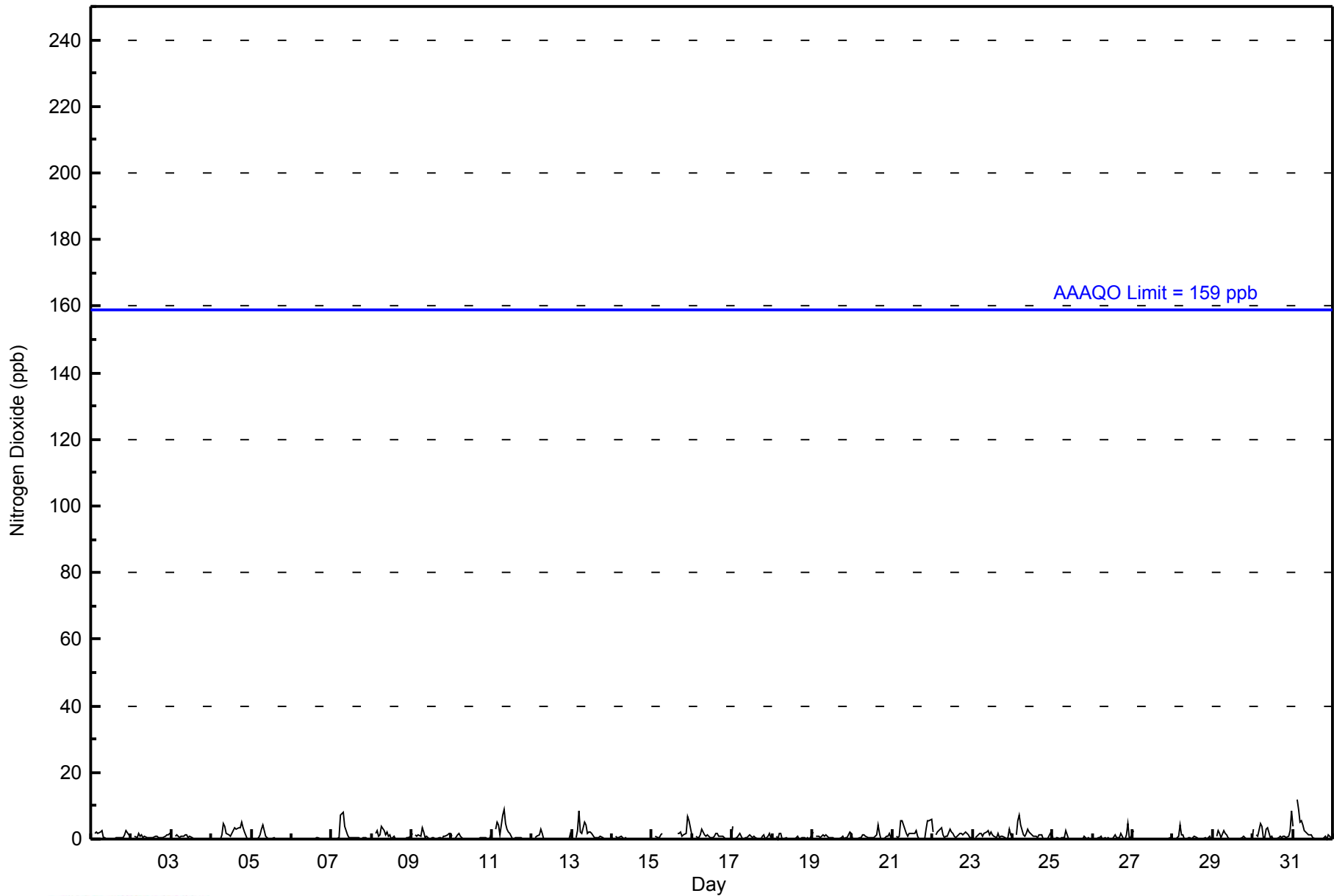
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-May	7	Z	2	2	2	2	2	0	0	0	0	0	0	0	0	0	0	1	1	1	1	3	1	1	1.2	7																						
2-May	0	Z	1	1	2	1	1	1	1	1	0	1	1	1	1	1	1	0	0	1	1	1	1	2	0.7	2																						
3-May	2	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	2																						
4-May	0	Z	0	0	0	0	1	5	4	2	1	1	2	3	4	3	3	3	5	3	2	0	0	0	1.8	5																						
5-May	0	Z	0	0	1	1	3	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	4																						
6-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.1	1																						
7-May	0	Z	0	0	0	7	8	8	4	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	1.4	8																						
8-May	0	Z	2	3	1	1	4	3	1	2	1	1	0	1	0	0	0	0	0	0	0	1	1	1	0.9	4																						
9-May	2	Z	1	1	1	1	3	2	1	1	0	0	1	0	0	1	0	0	1	1	1	1	2	2	1.0	3																						
10-May	1	Z	0	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.4	2																						
11-May	2	Z	3	5	4	1	7	9	5	3	2	2	0	0	0	0	0	0	0	0	0	0	0	0	1.9	9																						
12-May	0	Z	1	1	1	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.4	3																						
13-May	0	Z	1	3	8	2	2	5	4	2	2	2	1	1	1	1	1	1	0	0	0	0	0	0	1.5	8																						
14-May	0	Z	1	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
15-May	0	Z	1	0	0	1	2	C	C	C	C	C	C	C	C	2	2	2	1	1	2	7	6	3	--	7																						
16-May	1	Z	1	1	1	1	3	1	1	1	1	1	1	1	2	2	1	1	1	0	0	0	0	0	0.9	3																						
17-May	4	Z	1	0	2	1	0	0	1	1	1	1	1	1	0	0	0	0	1	1	0	1	2	1	0.8	4																						
18-May	1	Z	1	0	2	2	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1	0	1	0.4	2																						
19-May	2	Z	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	1	1	0	1	1	2	2	0.8	2																						
20-May	0	Z	0	0	0	0	1	1	1	1	1	0	1	1	1	4	2	0	0	0	1	1	2	0	0.8	4																						
21-May	0	Z	1	0	1	5	6	3	2	1	2	2	2	2	1	0	0	0	0	0	3	5	6	6	2.1	6																						
22-May	2	Z	1	2	3	4	1	0	1	1	3	2	2	1	0	1	2	2	1	2	2	1	1	0	1.5	4																						
23-May	0	Z	0	1	2	2	1	2	2	3	1	2	1	1	1	2	1	1	1	1	0	1	3	1	1.2	3																						
24-May	2	Z	1	6	7	4	1	1	2	3	2	1	1	1	1	1	1	1	0	0	0	0	2	1	1.7	7																						
25-May	1	Z	0	0	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.3	2																						
26-May	0	Z	0	0	0	1	0	0	0	0	0	0	1	0	0	1	2	0	0	1	5	0	0	0	0.6	5																						
27-May	2	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.2	2																						
28-May	0	Z	0	1	4	1	1	0	0	1	0	0	1	1	0	0	0	0	0	0	0	1	1	0	0.6	4																						
29-May	0	Z	1	3	2	0	2	2	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0.6	3																						
30-May	3	Z	1	1	5	4	1	1	3	3	1	1	0	0	0	0	1	1	1	1	0	1	3	9	1.7	9																						
31-May	4	Z	12	9	5	6	4	3	2	1	1	1	0	0	0	0	0	0	0	1	0	1	1	0	2.2	12																						
																								1.2	--	1.1	1.4	1.8	1.8	1.9	1.8	1.4	1.0	0.7	0.7	0.5	0.5	0.5	0.7	0.5	0.5	0.5	0.5	0.5	1.0	1.0	1.1	Diurnal Average
																								7	--	12	9	8	7	8	9	5	3	3	2	2	3	4	4	3	3	5	3	3	7	6	9	Diurnal Maximum

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



**WBEA**  
**Hourly Averages**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Wapasu - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Wapasu - May 2014**

<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



**WBEA**  
**Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Wapasu - May 2014**

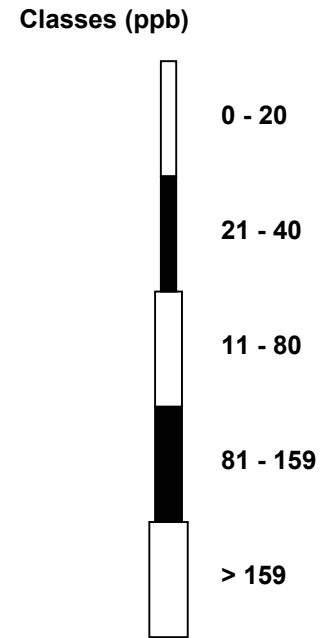
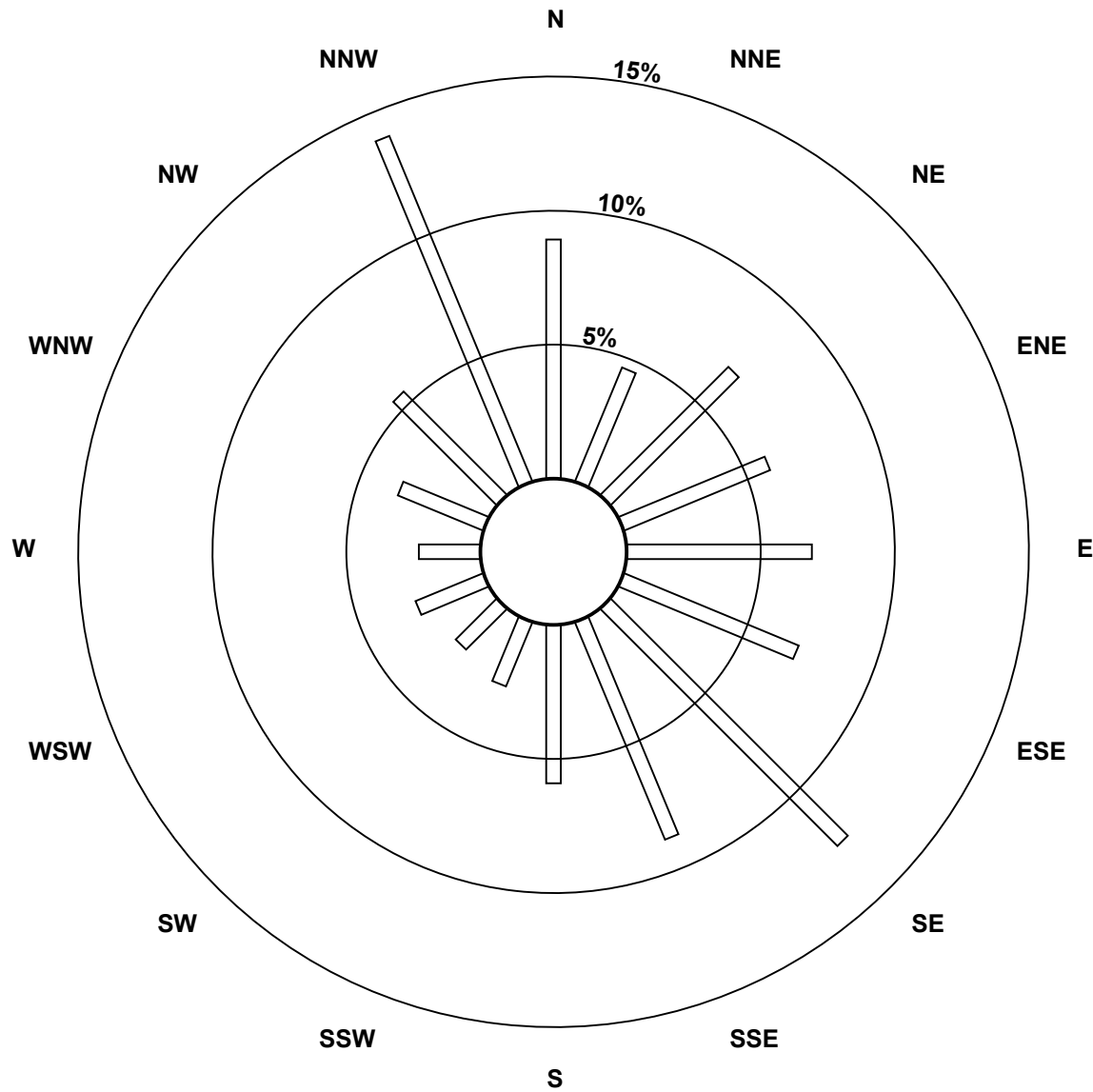
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	62	32	47	41	48	49	87	61	41	18	15	19	16	24	38	97	695
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	62	32	47	41	48	49	87	61	41	18	15	19	16	24	38	97	695

Total Number of Valid Hours: 695

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Wapasu (AMS 17)**



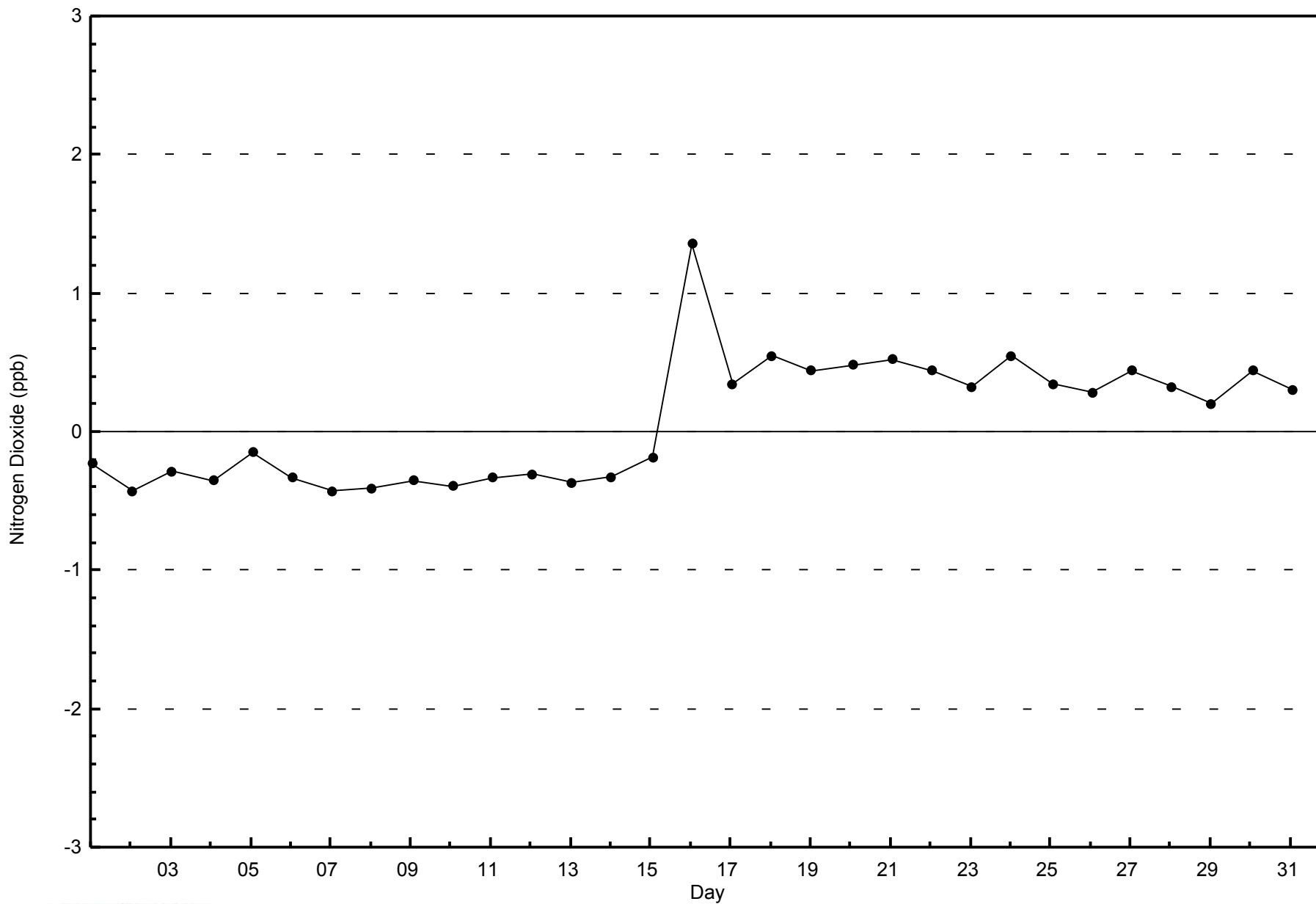
**Total Number of Valid Hours: 695**





WBEA  
Zero Responses

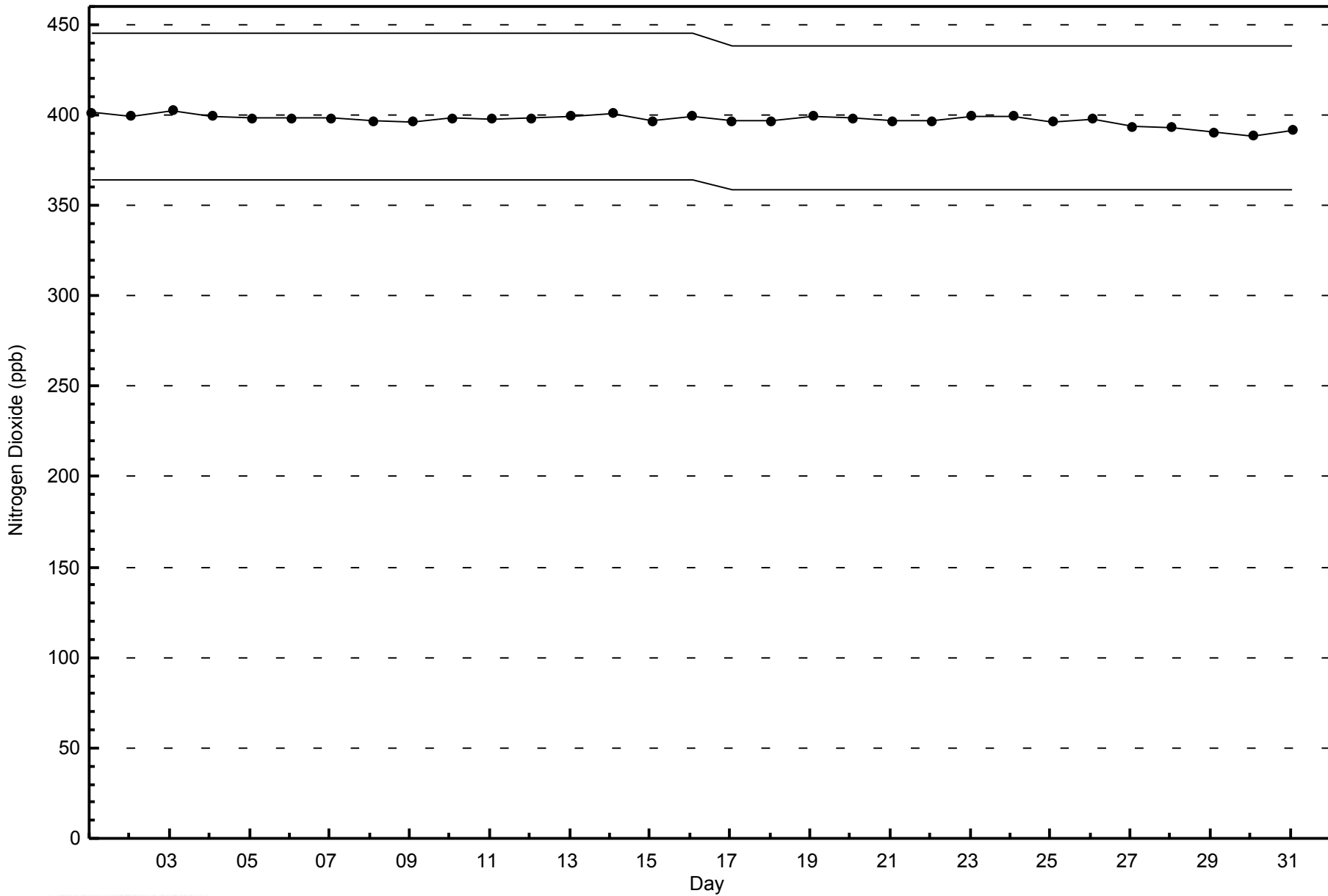
Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Wapasu - May 2014





WBEA  
Span Responses

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Wapasu - May 2014



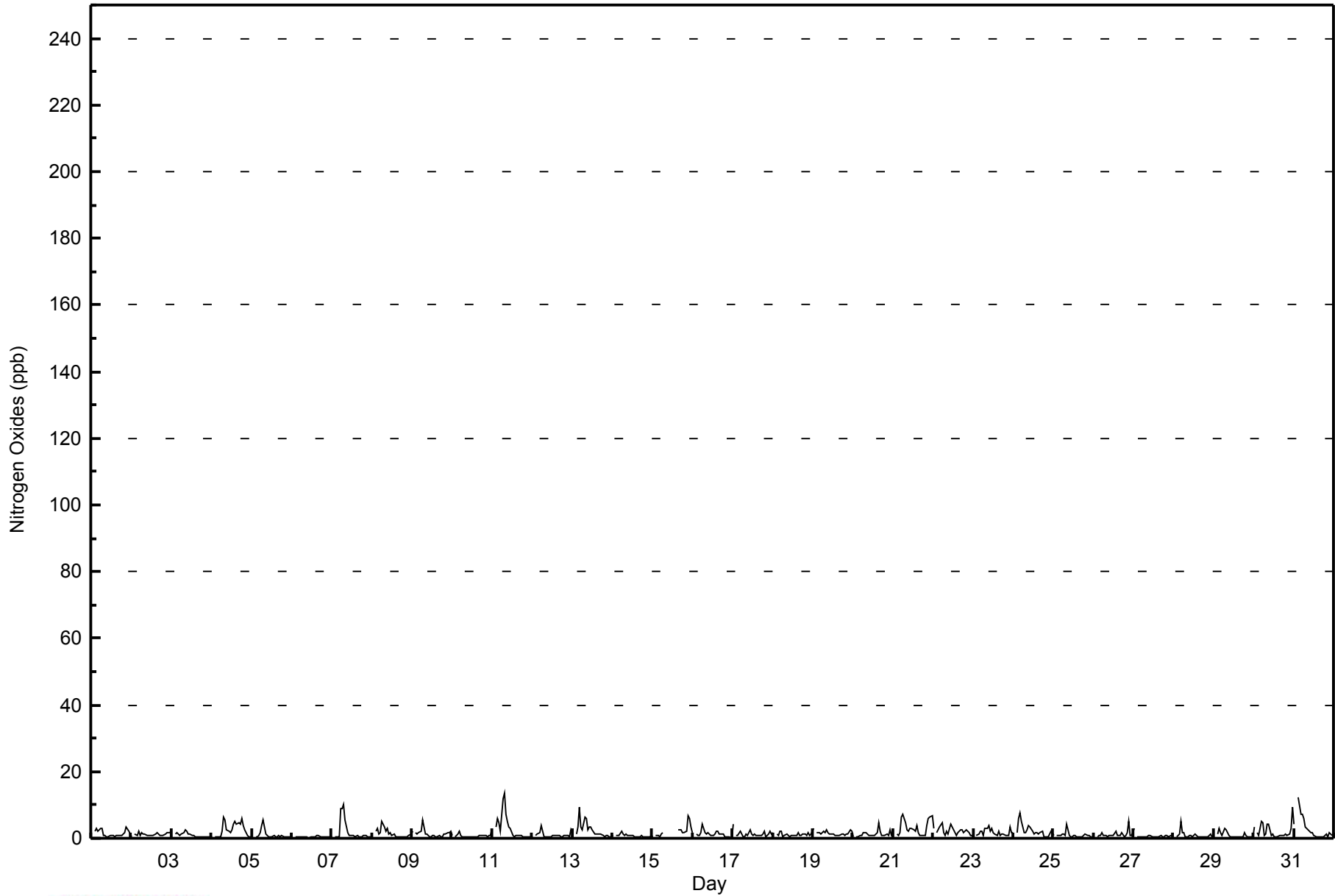


Maximum Value: 14 ppb on May 11 08:00																	Maximum Daily Average: 3.0 ppb on May 21																	Hours in Service: 744			
Minimum Value: 0 ppb on May 17 00:00																	Minimum Daily Average: 0.4 ppb on May 6																	Hours of Data: 705			
Maximum Diurnal Average: 2.8 ppb at hour 7																	Minimum Diurnal Average: 1.0 ppb at hour 19																	Hours of Missing Data: 39			
Monthly Average: 1.6 ppb																	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 1 Median = 1 Q <sub>3</sub> = 2 P <sub>90</sub> = 3 P <sub>99</sub> = 9																	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-May	8	Z	2	3	2	3	3	1	1	1	1	1	1	1	1	1	1	1	1	1	2	3	2	1	1.7	8											
2-May	0	Z	1	1	2	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1.2	2												
3-May	2	Z	1	2	1	1	1	2	2	2	1	1	1	0	1	0	0	0	0	0	0	0	0	1.0	2												
4-May	0	Z	0	1	1	0	2	6	5	2	2	2	4	5	4	5	4	6	4	2	1	0	1	2.6	6												
5-May	1	Z	1	0	1	2	4	5	1	1	1	1	1	0	0	1	0	1	1	0	0	0	0	1.0	5												
6-May	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0.4	1												
7-May	0	Z	0	0	1	9	9	10	5	2	1	1	1	1	1	1	0	0	1	1	0	1	1	2.0	10												
8-May	1	Z	2	3	1	2	5	3	2	3	1	2	1	1	0	0	0	0	0	1	1	1	1	1.4	5												
9-May	2	Z	2	1	2	2	6	3	1	1	1	1	1	0	1	1	1	1	0	1	1	2	2	1.4	6												
10-May	1	Z	0	1	2	1	1	0	0	0	0	0	1	0	1	1	1	1	1	1	1	1	1	0.7	2												
11-May	3	Z	3	6	5	2	12	14	7	5	3	3	1	1	1	1	1	0	0	0	1	0	0	3.0	14												
12-May	0	Z	1	1	1	4	2	0	0	0	1	1	1	1	1	1	0	1	1	1	1	1	3	1.0	4												
13-May	1	Z	1	3	9	3	3	7	6	3	3	3	1	1	1	1	1	1	1	1	1	1	0	2.4	9												
14-May	1	Z	1	1	1	2	1	1	1	1	1	1	0	1	0	0	1	0	1	0	0	0	1	0.8	2												
15-May	0	Z	1	1	1	1	2	C	C	C	C	C	C	C	C	3	3	3	2	2	2	7	6	--	7												
16-May	2	Z	1	1	1	2	4	2	1	1	1	1	1	2	2	1	1	1	1	0	0	0	0	1.3	4												
17-May	4	Z	1	1	2	1	0	1	1	1	2	1	1	1	1	1	1	1	1	2	1	1	2	1.3	4												
18-May	2	Z	1	1	2	2	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1.2	2												
19-May	3	Z	2	2	2	1	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	2	1.5	3												
20-May	1	Z	1	1	1	1	2	2	2	1	1	1	1	1	2	5	2	1	1	1	1	1	2	1.3	5												
21-May	1	Z	1	1	2	6	7	5	2	2	3	3	3	2	4	1	1	1	1	1	4	6	6	3.0	7												
22-May	3	Z	2	3	3	4	2	1	2	1	4	3	3	2	1	2	3	3	2	2	3	2	1	2.2	4												
23-May	0	Z	1	1	2	2	1	3	3	4	2	3	2	1	2	1	1	1	1	1	1	3	2	1.7	4												
24-May	2	Z	2	6	7	5	2	2	3	4	3	2	1	2	2	1	2	2	1	0	0	1	2	2.3	7												
25-May	1	Z	1	1	1	1	1	1	4	1	1	1	1	1	0	1	1	1	1	1	1	0	1	0.9	4												
26-May	0	Z	1	1	1	2	1	1	0	1	1	1	1	2	1	1	1	2	1	1	2	5	1	1.1	5												
27-May	3	Z	1	0	0	1	0	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	0.7	3												
28-May	1	Z	1	1	5	2	2	1	0	1	1	1	1	0	1	1	0	0	1	0	1	1	0	1.0	5												
29-May	1	Z	1	3	2	1	3	3	2	1	0	0	0	0	0	0	0	0	2	1	0	0	0	0.9	3												
30-May	3	Z	2	1	5	5	1	1	4	4	1	1	1	0	1	1	1	1	1	1	1	3	9	2.1	9												
31-May	4	Z	12	10	7	7	6	3	2	2	2	2	1	0	0	0	0	0	0	1	1	1	1	2.9	12												
1.7																	--																	Diurnal Average			
8																	--																	Diurnal Maximum			
Z - zerospan																	C - Calibration																				



**WBEA**  
**Hourly Averages**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Wapasu - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Wapasu - May 2014**

<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



**WBEA**  
**Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Wapasu - May 2014**

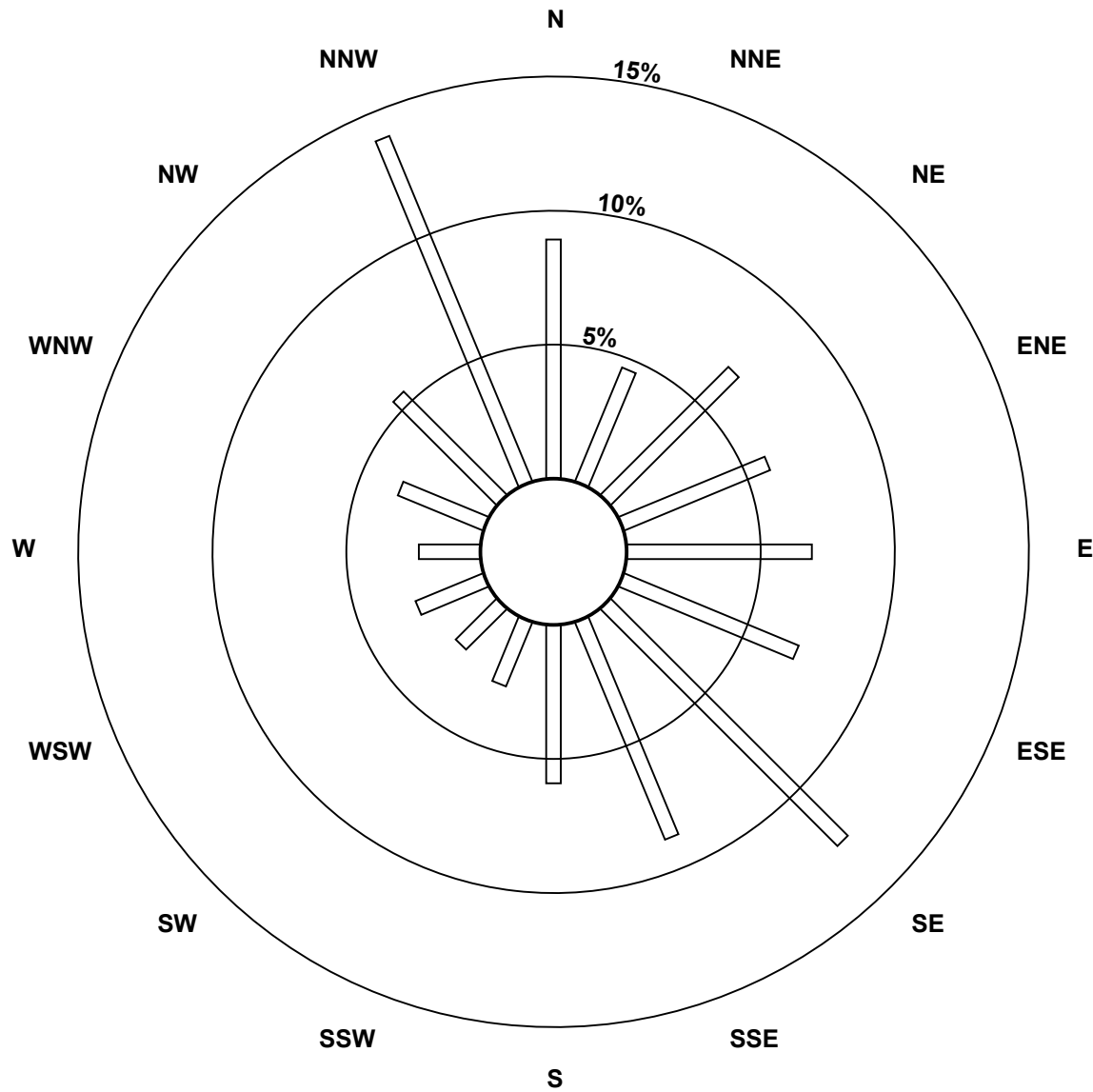
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	62	32	47	41	48	49	87	61	41	18	15	19	16	24	38	97	695
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	62	32	47	41	48	49	87	61	41	18	15	19	16	24	38	97	695

Total Number of Valid Hours: 695

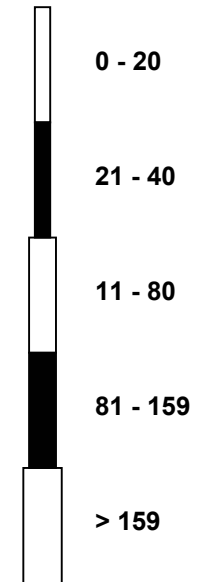
Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

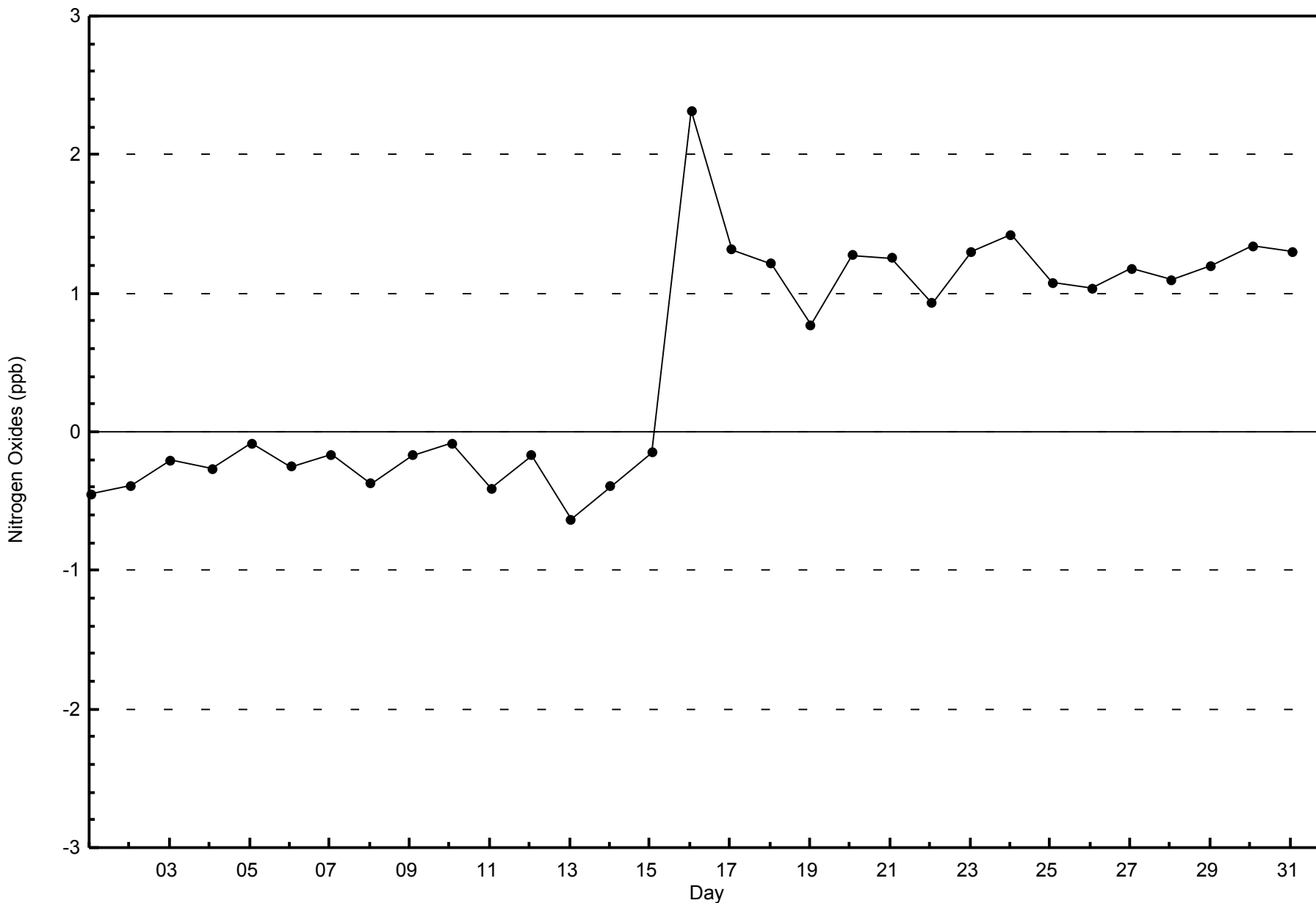
**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Wapasu (AMS 17)**



Classes (ppb)



Total Number of Valid Hours: 695

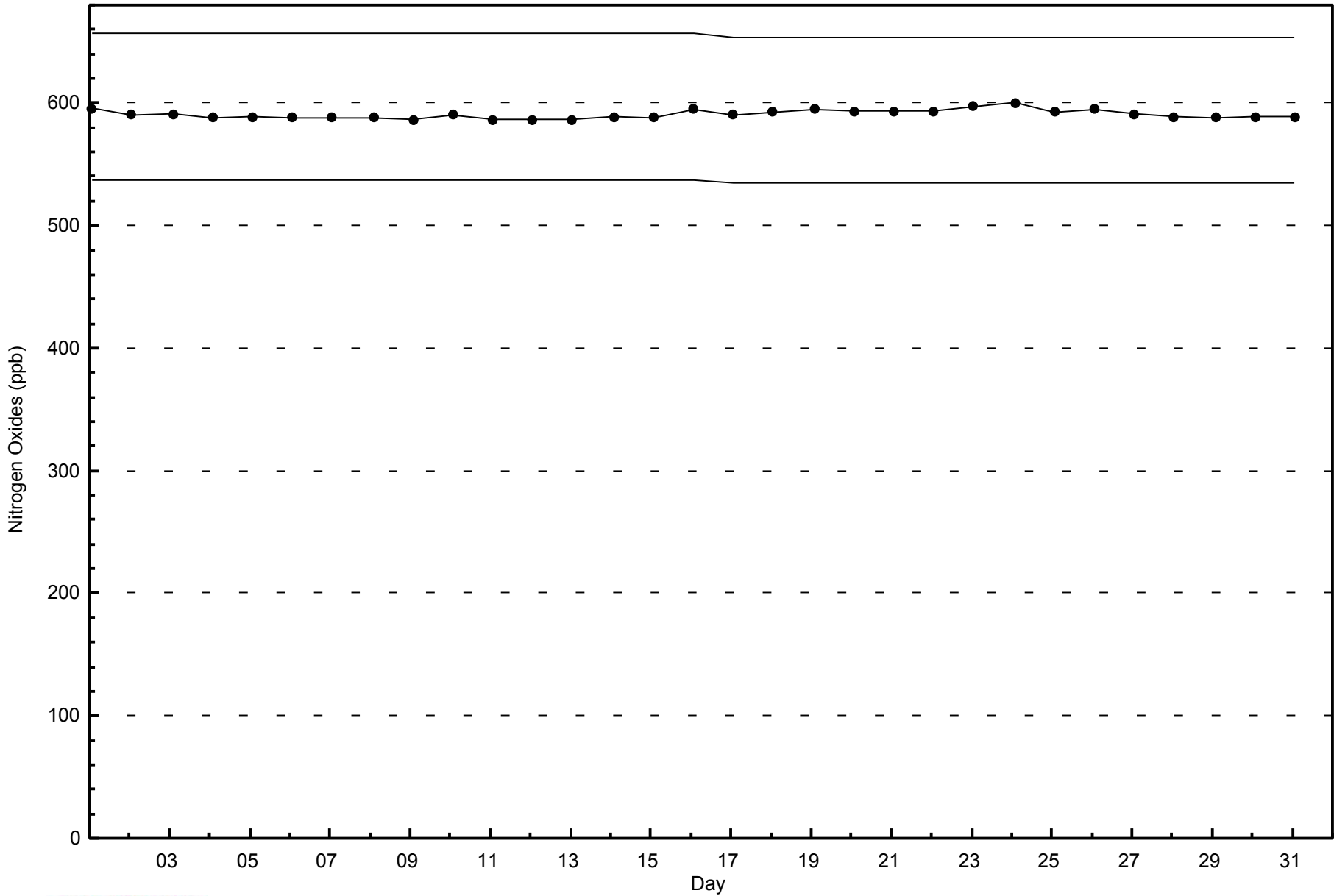






WBEA  
Span Responses

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Wapasu - May 2014





Summary of Hour Averages

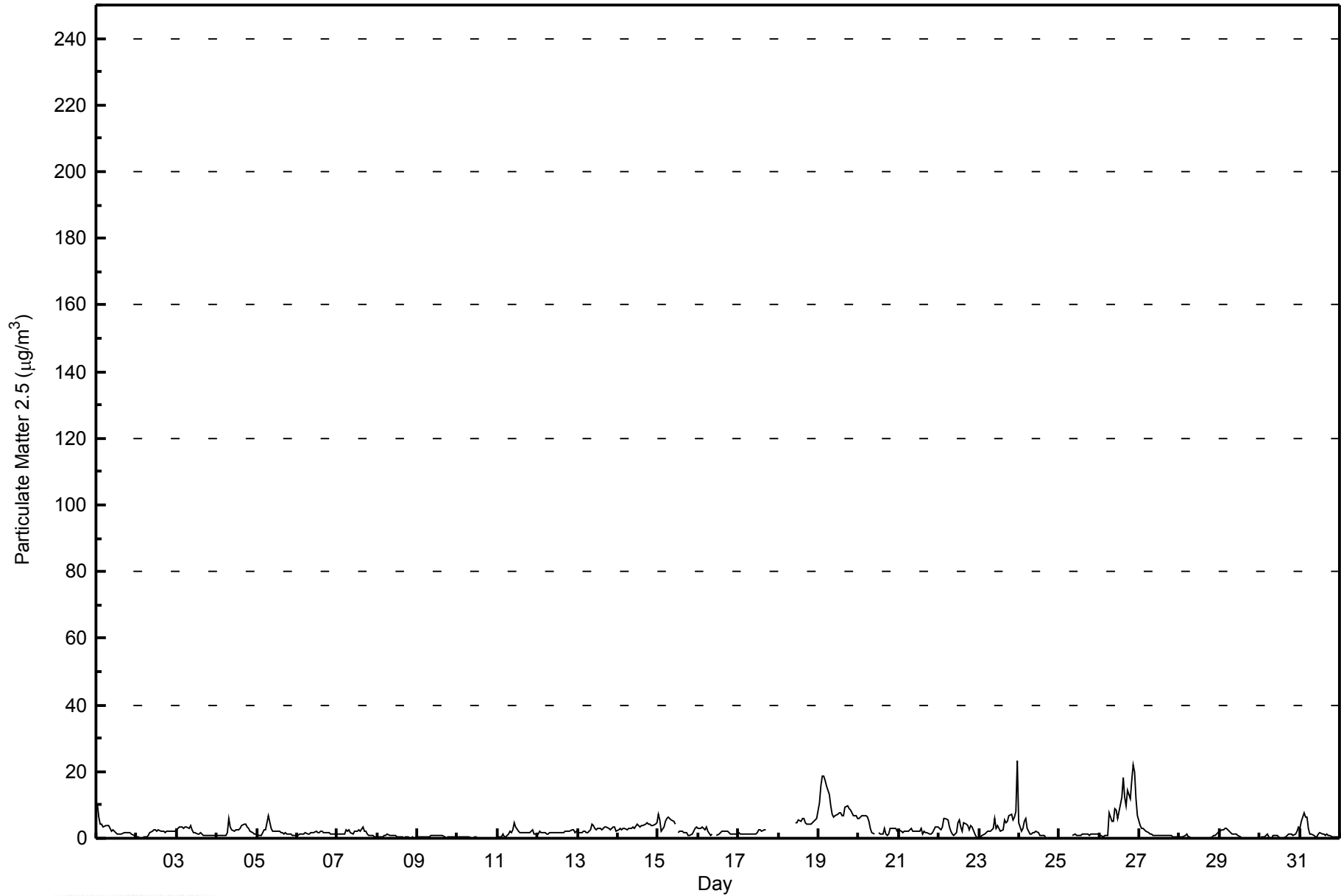
Wapasu - May 2014

Number of Exceedences (AAAQO): 24-hr: 0 Maximum Value: 23.4 µg/m <sup>3</sup> on May 24 00:00 Minimum Value: 0.0 µg/m <sup>3</sup> on May 24 23:00 Maximum Diurnal Average: 2.9 µg/m <sup>3</sup> at hour 5 Monthly Average: 2.47 µg/m <sup>3</sup>		Maximum Daily Average: 10.0 µg/m <sup>3</sup> on May 19 Minimum Daily Average: 0.2 µg/m <sup>3</sup> on May 10 Minimum Diurnal Average: 2.2 µg/m <sup>3</sup> at hour 9 Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.3 Q <sub>1</sub> = 0.9 Median = 1.6 Q <sub>3</sub> = 3.0 P <sub>90</sub> = 5.5 P <sub>99</sub> = 17.0		Hours in Service: 744 Hours of Data: 712 Hours of Missing Data: 32 Hours of Calibration: 0 Percent Operational Time: 95.7																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-May	10.0	6.3	4.0	4.2	3.4	3.6	3.7	3.7	3.0	2.3	2.4	1.8	1.4	1.2	1.1	1.3	1.5	1.7	1.6	1.6	1.6	1.2	0.8	0.6	2.7	10.0
2-May	0.4	0.6	0.2	0.2	0.3	0.3	0.6	1.0	1.5	2.3	2.4	2.5	2.0	2.4	2.3	2.3	2.1	1.9	2.2	2.0	2.1	2.1	2.2	2.3	1.6	2.5
3-May	2.7	3.3	3.4	3.6	3.1	3.4	3.6	3.1	3.6	2.4	1.6	1.5	1.4	1.3	1.5	1.2	0.9	0.9	0.9	0.9	1.0	1.0	0.9	0.9	2.0	3.6
4-May	0.8	0.8	0.8	0.8	0.9	1.0	1.9	5.9	3.3	2.5	2.3	2.4	2.5	3.0	3.6	4.2	4.1	3.5	2.9	2.1	1.6	1.4	1.2	2.3	5.9	
5-May	1.1	1.0	1.0	1.9	2.6	2.4	4.6	6.7	3.1	2.1	2.1	2.2	2.2	2.2	1.8	1.6	1.5	1.8	1.4	1.1	1.1	0.8	0.8	0.8	2.0	6.7
6-May	0.8	1.1	1.1	1.2	1.5	1.5	1.4	1.4	1.6	1.8	1.9	2.1	1.9	1.7	1.9	2.0	1.7	1.6	1.7	1.7	1.2	1.3	1.3	1.4	1.5	2.1
7-May	1.3	1.3	1.2	1.2	1.3	2.5	2.3	2.6	1.6	1.1	2.0	2.2	2.0	2.5	2.1	3.3	2.2	2.3	1.3	1.0	0.8	0.7	0.4	0.3	1.7	3.3
8-May	0.3	0.3	0.4	0.5	0.7	0.7	1.1	0.9	0.7	0.8	0.7	0.8	0.4	0.4	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.4	1.1
9-May	0.4	0.5	0.5	0.5	0.4	0.4	0.5	0.3	0.7	1.0	0.9	0.9	1.0	0.9	0.9	1.0	0.5	0.2	0.4	0.4	0.5	0.3	0.2	0.1	0.6	1.0
10-May	0.3	0.4	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.1	0.4	0.3	0.2	0.2	0.1	0.1	0.1	0.0	0.0	0.1	0.0	UO	UO	0.1	0.2	0.4
11-May	0.4	0.5	0.6	1.1	0.6	0.4	1.4	2.1	1.8	2.6	4.7	3.4	1.9	1.8	1.9	1.8	1.8	1.6	1.6	1.6	2.2	2.3	1.2	1.1	1.7	4.7
12-May	1.4	2.0	1.7	1.6	1.5	1.3	1.2	1.9	1.7	1.6	1.5	1.6	1.8	1.8	1.9	1.8	1.9	1.9	2.1	2.2	2.5	2.7	1.8	2.2	1.8	2.7
13-May	1.8	1.8	1.8	1.9	2.3	1.8	1.5	2.6	4.4	3.9	3.0	2.6	2.8	2.9	2.7	3.0	3.3	3.3	2.9	2.4	2.9	3.3	3.4	2.1	2.7	4.4
14-May	2.7	3.2	2.6	2.8	2.9	2.6	2.9	2.9	2.9	3.3	3.1	4.3	3.6	3.3	3.7	3.9	4.3	4.5	4.1	4.0	3.9	4.0	4.4	4.6	3.5	4.6
15-May	7.0	5.6	2.1	3.5	5.2	5.9	6.2	6.1	5.7	5.3	4.1	M	1.6	2.0	2.0	1.8	1.6	1.5	0.9	0.9	1.1	1.9	2.9	3.2	3.4	7.0
16-May	2.9	3.1	3.2	3.0	2.6	3.2	2.2	0.9	1.1	M	M	0.8	1.1	1.7	2.0	2.1	2.0	2.1	1.8	1.4	1.3	1.4	1.4	1.3	1.9	3.2
17-May	1.5	1.2	1.4	1.3	1.3	1.3	1.1	1.2	1.2	1.1	1.1	1.8	2.4	2.7	2.3	2.5	2.6	AF	AF	AF	AF	AF	AF	AF	--	2.7
18-May	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	4.7	4.9	5.5	5.3	6.0	6.1	4.5	4.1	4.1	4.3	4.5	5.2	5.6	6.1	--	6.1
19-May	10.4	15.9	18.7	18.6	17.4	15.6	13.1	9.9	7.4	6.5	6.8	7.0	7.6	7.5	6.9	6.9	9.2	9.8	8.9	8.5	7.7	6.6	7.0	6.1	10.0	18.7
20-May	6.1	6.4	6.7	6.6	6.8	6.5	5.1	3.0	1.7	1.2	M	M	1.5	1.3	1.1	3.0	1.5	0.9	1.2	3.1	3.0	2.8	3.1	2.0	3.4	6.8
21-May	2.3	2.2	1.9	1.9	2.2	2.1	2.2	2.8	2.2	2.0	2.1	2.2	2.1	2.9	1.5	2.2	1.7	1.9	1.3	1.4	1.5	2.4	3.3	3.5	2.2	3.5
22-May	3.1	2.5	3.4	5.7	6.1	5.3	3.3	2.2	1.4	1.0	1.6	4.5	5.4	3.3	2.3	4.8	4.2	3.7	2.4	3.9	3.4	1.3	0.4	0.2	3.1	6.1
23-May	0.4	0.5	0.9	1.3	1.6	2.0	2.0	2.3	3.1	5.8	3.0	3.9	2.8	2.1	2.6	5.5	4.7	5.1	6.6	7.0	5.5	6.5	8.1	23.4	4.4	23.4
24-May	4.8	2.0	3.1	5.1	6.0	2.9	1.2	1.2	1.5	1.8	2.1	1.7	1.0	0.7	0.7	0.7	0.5	UO	UO	UO	UO	UO	0.0	0.1	2.0	6.0
25-May	0.1	0.0	0.0	0.0	0.0	UO	UO	UO	0.9	1.1	0.9	0.9	1.0	1.0	1.1	1.3	1.5	1.1	1.0	1.3	1.1	1.4	1.3	1.1	0.9	1.5
26-May	1.1	0.7	0.6	0.7	0.8	1.0	7.5	5.2	5.2	8.9	8.6	5.8	8.3	12.2	18.1	12.3	9.7	14.2	12.0	17.2	22.1	20.1	11.7	7.0	8.8	22.1
27-May	3.7	3.0	2.9	2.7	2.1	1.8	1.4	1.2	1.0	0.8	0.8	0.8	0.9	0.9	0.8	0.8	0.8	0.9	1.0	0.7	0.5	0.4	0.4	0.4	1.3	3.7
28-May	0.5	0.6	0.5	0.7	1.2	0.4	0.2	0.1	0.0	0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.2	0.4	0.9	0.9	1.2	1.5	0.4	1.5
29-May	2.0	2.5	2.5	3.1	3.2	2.6	1.5	1.4	1.2	1.1	1.2	0.9	0.2	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	3.2
30-May	0.1	0.3	0.2	0.6	1.1	0.5	0.0	0.0	0.8	1.0	0.6	0.6	0.1	0.1	0.1	0.4	1.0	1.3	1.4	1.2	1.0	1.1	1.9	3.3	0.8	3.3
31-May	3.1	5.1	7.7	6.3	6.4	3.0	1.3	1.2	1.0	0.6	0.6	1.2	1.6	1.3	1.2	1.0	1.1	0.8	0.7	0.4	0.3	0.5	0.6	0.6	2.0	7.7
																								Diurnal Average		
																								Diurnal Maximum		
2.4 2.5 2.5 2.8 2.9 2.6 2.6 2.6 2.2 2.3 2.3 2.3 2.2 2.3 2.4 2.5 2.4 2.5 2.3 2.6 2.6 2.7 2.3 2.6 10.4 15.9 18.7 18.6 17.4 15.6 13.1 9.9 7.4 8.9 8.6 7.0 8.3 12.2 18.1 12.3 9.7 14.2 12.0 17.2 22.1 20.1 11.7 23.4																										
M - Maintenance AF - Analyzer Failure UO - Unstable Operation Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m <sup>3</sup>																										



**WBEA**  
**Hourly Averages**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Wapasu - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Wapasu - May 2014**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
1 - 5	427	59.97	59.97
6 - 15	63	8.85	68.82
16 - 25	10	1.40	70.22
26 - 80	0	0.00	70.22
> 81.0	0	0.00	70.22

Total Number of Valid Hours: 712  
Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Wapasu - May 2014**

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	48	29	27	24	27	21	52	38	28	13	13	15	8	9	9	63	424
6 - 15	2	1	1	1	8	4	11	12	11	5	2	1	2	1	1	0	63
16 - 25	0	0	0	0	4	0	0	5	0	0	0	0	1	0	0	0	10
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	50	30	28	25	39	25	63	55	39	18	15	16	11	10	10	63	497

Total Number of Valid Hours: 702

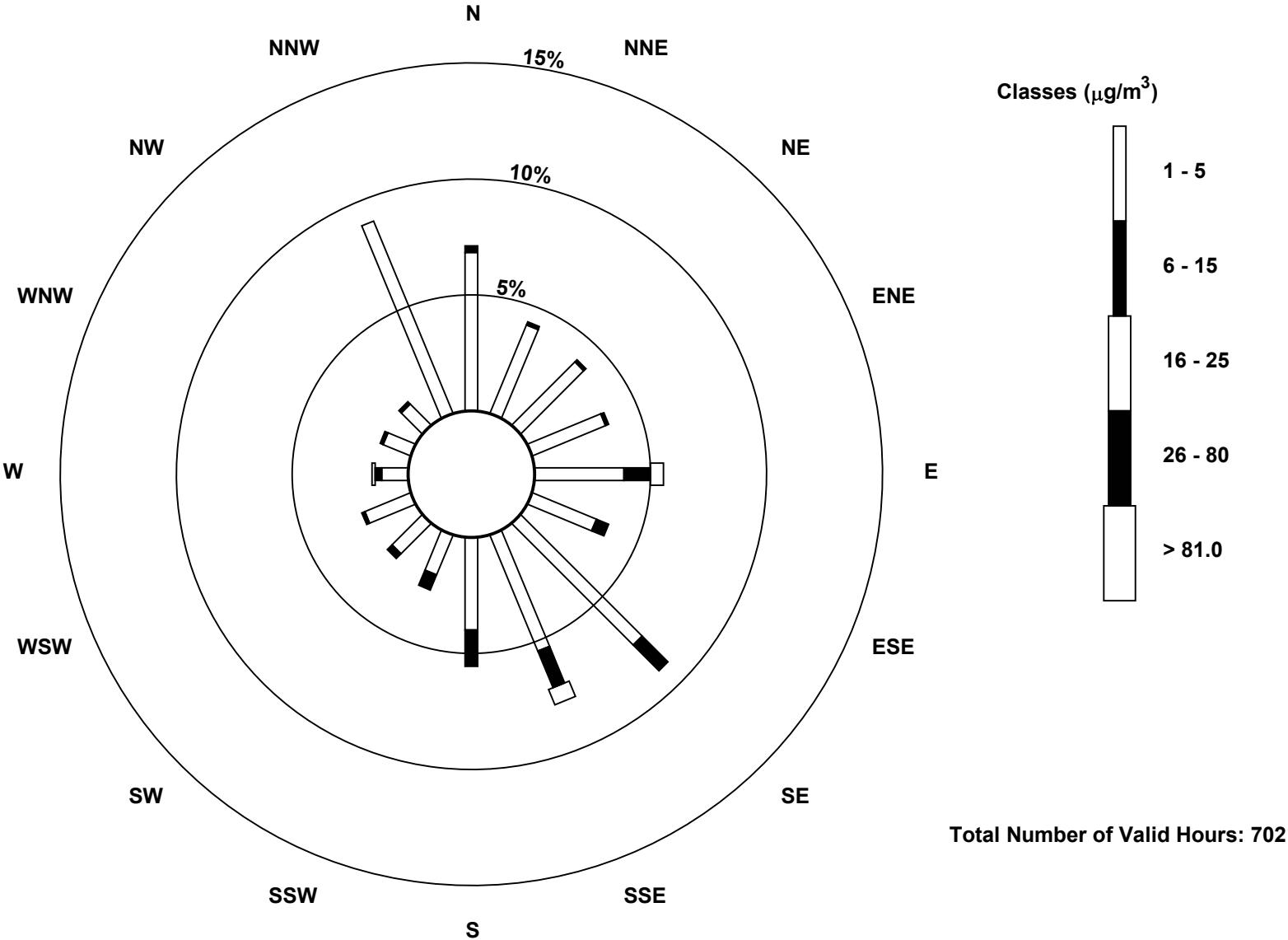
Total Number of Hours: 744

Wood Buffalo Environmental Association

Wind Rose May 2014

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

Wapasu (AMS 17)



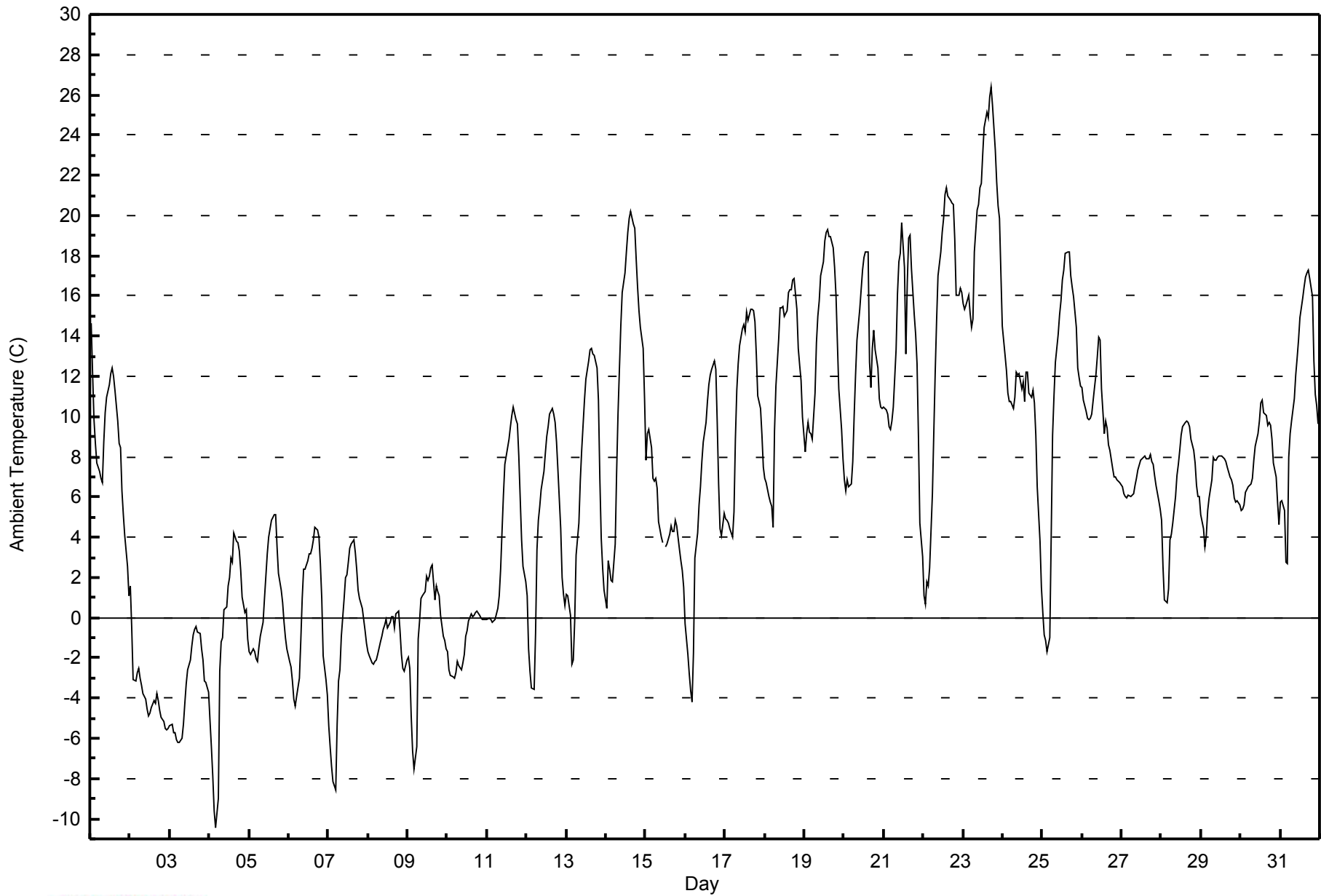


Maximum Value: 26.4 C on May 23 18:00		Maximum Daily Average: 20.3 C on May 23		Hours in Service: 744																						
Minimum Value: -10.4 C on May 4 05:00		Minimum Daily Average: -3.8 C on May 2		Hours of Data: 743																						
Maximum Diurnal Average: 10.2 C at hour 15		Minimum Diurnal Average: 1.7 C at hour 5		Hours of Missing Data: 1																						
Monthly Average: 6.56 C		Percentiles: P <sub>1</sub> = -7.4 P <sub>10</sub> = -2.6 Q <sub>1</sub> = 0.6 Median = 6.6 Q <sub>3</sub> = 11.4 P <sub>90</sub> = 16.3 P <sub>99</sub> = 22.3		Hours of Calibration: 0																						
				Percent Operational Time: 99.9																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-May	14.6	12.1	9.9	8.6	7.7	7.3	7.0	6.7	8.8	10.2	11.0	11.6	12.1	12.4	12.0	11.3	9.8	8.7	8.5	6.3	5.1	4.0	2.6	1.1	8.7	14.6
2-May	1.6	-0.5	-3.1	-3.1	-2.7	-2.5	-3.0	-3.4	-3.7	-4.1	-4.6	-4.9	-4.8	-4.5	-4.1	-4.3	-3.8	-4.1	-4.6	-4.9	-5.2	-5.5	-5.6	-5.5	-3.8	1.6
3-May	-5.4	-5.3	-5.7	-5.7	-6.0	-6.2	-6.2	-6.0	-5.3	-4.3	-3.3	-2.6	-2.1	-1.4	-0.8	-0.5	-0.4	-0.7	-0.8	-1.5	-2.1	-3.1	-3.2	-3.7	-3.4	-0.4
4-May	-5.1	-6.4	-7.8	-9.6	-10.4	-9.0	-2.6	-1.2	-1.0	0.4	0.6	1.6	2.0	3.0	2.8	4.2	3.8	3.8	3.3	2.3	1.0	0.2	0.4	-1.1	-1.0	4.2
5-May	-1.7	-1.8	-1.5	-1.7	-2.0	-2.2	-1.5	-1.0	-0.2	0.9	2.1	3.2	4.0	4.9	5.0	5.1	5.1	3.5	2.2	1.4	0.7	-0.2	-1.0	-1.6	0.9	5.1
6-May	-2.2	-2.5	-3.2	-4.0	-4.4	-3.9	-3.0	-1.1	0.9	2.4	2.4	2.8	3.2	3.1	3.5	3.9	4.5	4.4	4.0	2.7	0.9	-1.9	-3.1	-3.8	0.2	4.5
7-May	-5.3	-6.4	-7.4	-8.1	-8.5	-5.3	-3.1	-2.6	-0.9	0.9	2.0	2.1	2.7	3.5	3.7	3.9	3.2	2.4	1.4	1.0	0.5	-0.1	-0.7	-1.3	-0.9	3.9
8-May	-1.7	-1.9	-2.3	-2.3	-2.2	-2.1	-1.8	-1.2	-0.9	-0.6	-0.3	-0.1	-0.5	-0.2	0.0	0.1	-0.5	0.2	0.3	-0.6	-1.8	-2.5	-2.7	-2.1	-1.2	0.3
9-May	-1.9	-2.5	-4.9	-6.6	-7.6	-6.4	-1.1	-0.1	1.0	1.1	1.3	2.1	1.8	2.1	2.5	2.6	0.9	1.6	1.3	1.1	0.1	-0.9	-1.1	-1.5	-0.6	2.6
10-May	-1.7	-2.6	-2.8	-2.9	-3.0	-2.8	-2.2	-2.4	-2.6	-2.3	-1.9	-0.9	-0.6	-0.2	0.2	0.0	0.1	0.3	0.3	0.1	0.0	-0.1	-0.1	-0.1	-1.2	0.3
11-May	-0.1	0.0	-0.1	-0.2	-0.2	-0.1	0.5	1.1	2.4	4.3	6.1	7.6	8.4	8.9	9.5	10.0	10.4	9.9	9.6	8.0	6.0	3.9	2.5	1.8	4.6	10.4
12-May	1.1	-1.5	-2.7	-3.5	-3.6	-0.8	3.4	4.8	5.6	6.4	7.3	8.2	9.0	9.5	10.1	10.4	10.1	9.7	8.7	7.3	4.4	2.0	1.2	0.6	4.5	10.4
13-May	1.1	1.1	0.1	-2.3	-2.1	-0.1	3.1	4.7	6.8	8.3	9.6	10.8	11.9	12.8	13.3	13.4	13.1	13.0	12.4	10.8	6.9	4.0	2.5	1.3	6.5	13.4
14-May	0.4	2.8	2.4	1.8	1.8	3.7	7.2	10.1	12.4	14.5	16.2	17.1	18.2	19.2	19.8	20.2	19.6	19.4	17.9	16.4	15.2	14.4	13.4	10.9	12.3	20.2
15-May	7.9	9.2	9.3	8.4	6.9	6.8	7.0	6.4	4.8	4.0	3.7	M	3.6	3.7	4.2	4.6	4.3	4.3	4.8	4.6	3.4	2.8	2.4	1.5	5.2	9.3
16-May	-0.3	-1.8	-2.8	-3.6	-4.2	-1.7	2.9	4.2	5.6	6.5	7.8	8.8	9.7	10.7	11.6	12.1	12.4	12.8	12.3	9.7	6.6	4.4	4.1	5.2	5.5	12.8
17-May	4.9	4.8	4.7	4.4	4.0	5.3	8.9	11.3	12.6	13.5	14.4	14.6	14.2	15.2	14.8	15.3	15.4	15.3	14.7	13.0	11.0	10.4	9.1	7.5	10.8	15.4
18-May	6.9	6.7	6.0	5.8	5.5	4.5	9.3	11.5	13.9	15.4	15.4	15.5	15.0	15.3	16.2	16.3	16.3	16.8	16.8	15.3	13.4	12.5	11.8	10.0	12.2	16.8
19-May	8.2	9.1	9.7	9.3	9.2	8.8	11.2	13.7	15.0	15.8	17.0	17.7	18.8	19.1	19.3	19.0	19.0	18.4	17.4	16.0	13.7	11.4	9.4	7.9	13.9	19.3
20-May	6.8	6.3	6.8	6.5	6.7	7.8	10.0	12.1	13.8	15.3	16.3	17.3	17.9	18.2	18.2	12.7	11.5	13.4	14.3	13.3	12.4	10.9	10.5	10.4	12.1	18.2
21-May	10.5	10.4	10.1	9.5	9.3	9.8	10.5	13.3	16.1	17.7	18.1	19.6	17.4	13.1	16.7	18.9	19.0	17.4	15.1	14.1	12.6	9.0	4.7	3.0	13.2	19.6
22-May	1.1	0.7	1.8	1.6	2.5	6.2	9.2	12.2	14.8	17.0	18.2	19.2	19.8	21.0	21.4	21.0	20.8	20.6	20.6	18.8	16.0	16.0	16.4	16.1	13.9	21.4
23-May	15.6	15.3	15.5	16.0	15.1	14.4	14.8	18.2	20.3	20.5	21.4	21.6	23.1	24.3	25.2	24.8	25.9	26.4	25.5	23.3	21.6	20.5	19.9	17.2	20.3	26.4
24-May	14.5	13.1	12.3	11.1	10.8	10.7	10.4	10.9	12.2	12.1	12.1	11.4	11.7	10.8	12.2	12.2	11.2	10.9	11.3	10.6	9.1	6.5	3.8	1.5	10.6	14.5
25-May	0.3	-0.8	-1.1	-1.7	-1.0	4.0	9.1	11.1	12.7	14.1	15.0	15.8	16.8	17.3	18.1	18.2	18.2	17.0	16.5	15.9	14.4	12.4	11.9	11.5	11.1	18.2
26-May	11.4	10.8	10.2	9.9	9.9	9.9	10.1	11.4	12.1	13.0	13.9	13.8	11.4	9.1	9.8	9.4	8.6	8.3	7.4	7.0	7.0	6.9	6.8	6.7	9.8	13.9
27-May	6.5	6.2	6.0	6.0	6.1	6.0	6.1	6.1	6.6	6.9	7.3	7.8	7.9	8.0	8.1	7.9	7.9	8.1	7.7	7.7	7.1	6.6	5.8	5.4	6.9	8.1
28-May	4.8	2.5	0.9	0.7	1.4	3.9	4.2	4.7	6.1	7.0	7.6	8.3	9.1	9.5	9.7	9.8	9.7	9.5	8.9	8.3	7.7	6.6	6.1	6.1	6.4	9.8
29-May	5.2	4.4	3.5	4.1	5.3	5.9	6.9	8.0	7.8	7.9	8.0	8.0	8.1	7.9	7.9	7.7	7.5	7.0	6.9	6.6	6.0	5.8	5.8	5.6	6.6	8.1
30-May	5.3	5.4	5.6	6.3	6.5	6.6	6.7	6.9	7.8	8.6	9.1	9.8	10.7	10.9	10.2	10.1	9.5	9.7	9.6	8.9	7.7	7.0	5.7	4.6	7.9	10.9
31-May	5.7	5.8	5.3	2.8	2.7	7.9	9.1	9.8	10.9	12.1	12.9	13.8	14.9	15.9	16.5	16.9	17.1	17.3	16.9	16.0	12.8	11.1	10.5	9.6	11.4	17.3
																								Diurnal Average		
																								Diurnal Maximum		
M - Maintenance																										



**WBEA**  
**Hourly Averages**

**Ambient Temperature (AT) - C**  
**Wapasu - May 2014**







**WBEA**  
**Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C**  
**Wapasu - May 2014**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	165	22.21	22.21
0 - 10	342	46.03	68.24
10 - 20	215	28.94	97.17
> 20	21	2.83	100.00

Total Number of Valid Hours: 743

Total Number of Hours: 744

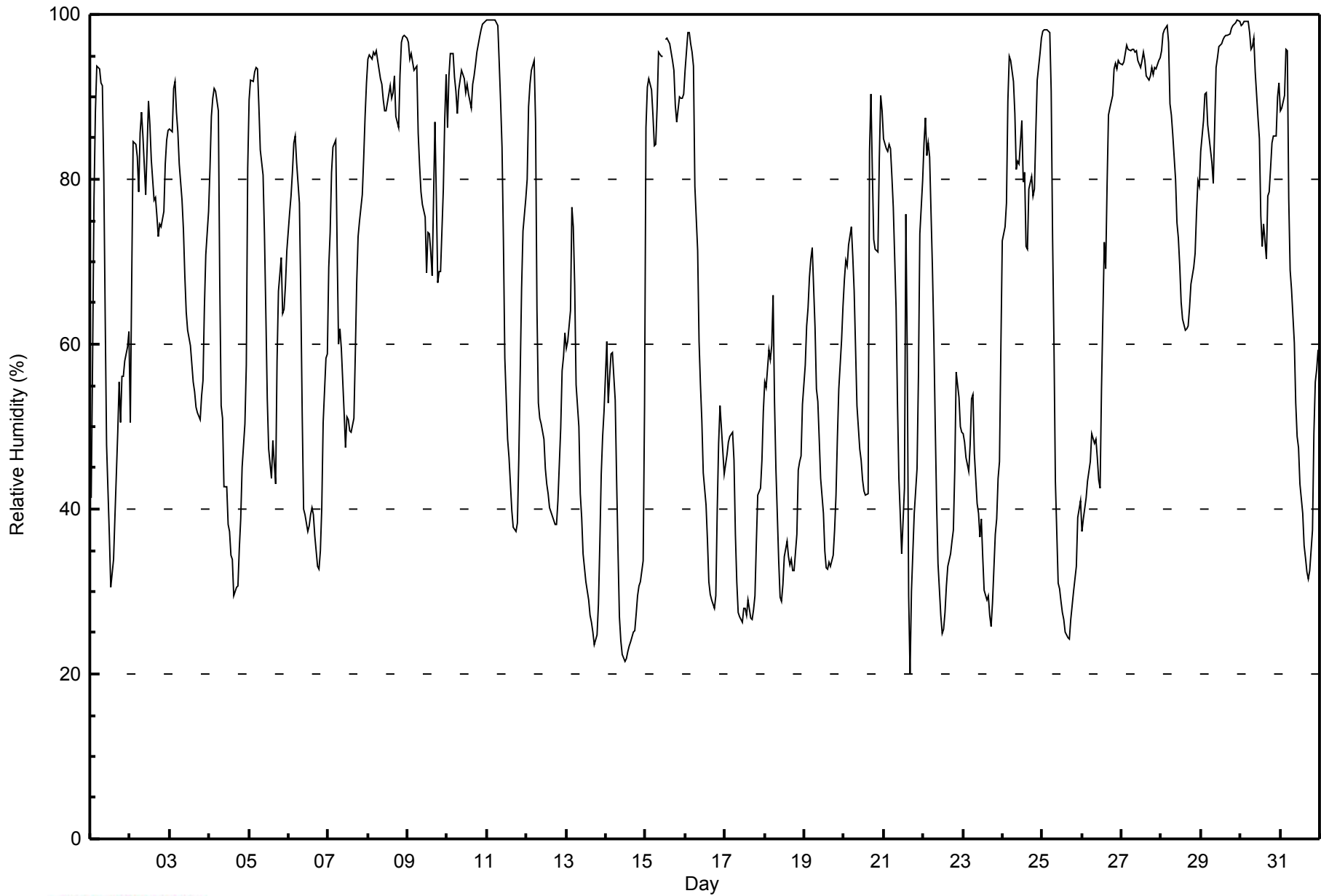


Maximum Value: 99 % on May 11 05:00																		Maximum Daily Average: 94.4 % on May 27																		Hours in Service: 744														
Minimum Value: 20 % on May 21 17:00																		Minimum Daily Average: 35.9 % on May 14																		Hours of Data: 743														
Maximum Diurnal Average: 83.5 % at hour 4																		Minimum Diurnal Average: 52.8 % at hour 15																		Hours of Missing Data: 1														
Monthly Average: 65.6 %																		Percentiles: P <sub>1</sub> = 24 P <sub>10</sub> = 33 Q <sub>1</sub> = 44 Median = 68 Q <sub>3</sub> = 89 P <sub>90</sub> = 95 P <sub>99</sub> = 99																		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-May	41	58	78	88	94	93	92	91	81	64	48	37	30	32	34	39	49	55	51	56	56	58	60	61	60.3	94																								
2-May	50	68	85	84	83	78	86	88	85	78	84	89	87	82	77	78	76	73	75	74	76	82	85	86	79.5	89																								
3-May	86	86	91	92	88	86	82	77	74	68	64	62	60	58	55	54	52	52	51	54	56	64	71	76	69.1	92																								
4-May	81	88	90	91	91	88	68	53	51	43	43	38	37	34	34	30	30	31	35	39	45	50	57	81	55.3	91																								
5-May	90	92	92	93	94	93	89	84	80	73	63	53	47	44	48	46	43	58	66	70	64	64	67	71	70.2	94																								
6-May	76	78	81	84	85	82	77	66	52	40	39	37	38	39	40	39	37	33	33	35	40	50	58	59	54.2	85																								
7-May	69	74	81	84	85	72	60	62	59	52	47	51	51	50	49	51	59	68	73	75	78	83	88	92	67.1	92																								
8-May	95	95	95	95	95	96	94	92	92	90	88	88	89	91	90	91	93	88	86	93	97	97	97	97	92.6	97																								
9-May	97	95	95	94	93	94	86	82	79	77	75	69	73	73	71	68	87	78	67	69	69	79	87	93	81.2	97																								
10-May	86	93	95	95	92	91	88	91	93	93	92	90	91	90	89	91	93	94	96	97	98	99	99	99	93.2	99																								
11-May	99	99	99	99	99	99	99	94	89	84	73	58	48	46	43	40	38	37	38	46	56	67	74	78	71.0	99																								
12-May	80	89	92	93	94	87	64	53	51	50	48	45	43	42	40	39	39	38	38	41	50	57	59	61	58.1	94																								
13-May	59	60	64	77	74	67	55	50	42	39	35	33	31	29	27	26	25	24	25	28	36	44	49	52	43.8	77																								
14-May	60	53	56	59	59	53	43	35	27	24	22	22	22	23	23	24	25	25	27	30	31	31	34	53	35.9	60																								
15-May	86	91	92	91	88	84	84	89	95	95	95	M	97	97	96	95	94	93	89	87	90	90	90	90	91.3	97																								
16-May	93	98	98	97	95	94	79	71	60	55	51	44	41	36	31	30	29	28	29	40	48	53	50	44	58.1	98																								
17-May	45	47	48	49	49	46	37	31	27	27	26	28	28	27	29	27	27	28	29	36	42	42	46	52	36.4	52																								
18-May	55	55	59	58	60	66	53	45	34	29	29	31	34	36	34	33	34	33	33	37	45	46	46	53	43.2	66																								
19-May	57	62	64	68	70	72	62	55	53	49	44	40	35	33	33	34	33	34	37	42	49	55	60	65	50.2	72																								
20-May	68	70	69	72	74	71	66	59	52	47	46	44	42	42	42	83	90	81	73	71	71	83	90	88	66.5	90																								
21-May	85	84	83	84	84	80	77	64	53	44	39	35	43	76	59	30	20	30	39	42	45	56	73	80	58.5	85																								
22-May	84	87	83	84	83	69	61	50	41	33	27	25	26	28	31	33	35	36	38	45	57	53	50	49	50.3	87																								
23-May	49	48	46	45	48	53	54	47	41	40	37	39	34	30	29	29	27	26	29	37	39	44	46	60	40.6	60																								
24-May	73	74	77	89	95	94	92	88	81	82	82	87	80	81	72	71	79	80	78	79	86	92	95	97	83.5	97																								
25-May	98	98	98	98	98	91	73	60	43	31	30	29	27	27	25	24	24	27	28	30	33	39	40	41	50.5	98																								
26-May	37	39	41	43	45	46	49	48	48	46	44	43	55	72	69	79	88	89	90	93	94	93	94	94	64.2	94																								
27-May	94	94	95	96	96	96	96	96	95	96	94	94	94	95	94	93	92	93	94	93	94	93	94	95	94.4	96																								
28-May	96	98	98	99	97	89	88	85	80	75	73	69	65	63	62	62	62	64	67	69	71	76	80	79	77.8	99																								
29-May	83	87	90	90	87	85	82	79	86	94	95	96	96	97	97	97	98	98	98	99	99	99	99	99	93.0	99																								
30-May	99	99	99	99	99	98	96	96	97	93	88	85	76	72	75	70	78	78	81	84	85	85	90	92	88.1	99																								
31-May	88	89	90	96	96	78	69	67	60	53	49	47	43	40	36	34	32	32	33	38	49	55	57	59	57.8	96																								
																								76.2	78.9	81.5	83.5	83.5	80.4	74.2	69.3	64.6	60.1	57.1	53.6	53.7	54.4	52.8	53.0	54.4	54.9	55.7	59.0	62.8	67.1	70.5	74.1	Diurnal Average		
																								99	99	99	99	99	99	99	96	97	96	95	96	97	97	97	97	97	98	98	98	99	99	99	99	99	Diurnal Maximum	
M - Maintenance																																																		



**WBEA**  
**Hourly Averages**

**Relative Humidity (RH) - %**  
**Wapasu - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Relative Humidity (RH) - %**  
**Wapasu - May 2014**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	152	20.46	20.46
40 - 60	175	23.55	44.01
60 - 80	136	18.30	62.32
80 - 100	280	37.69	100.00

Total Number of Valid Hours: 743

Total Number of Hours: 744



Maximum Speed: 22 km/h on May 21 17:00	Maximum Daily Speed Average: 14.7 km/h on May 2	Hours in Service: 744
Minimum Speed Value: 1 km/h on May 17 09:00	Minimum Daily Speed Average: 1.9 km/h on May 16	Hours of Data: 733
Maximum Diurnal Speed Average: 4.1 km/h at hour 18	Minimum Diurnal Speed Average: 0.4 km/h at hour 8	Hours of Missing Data: 11
Monthly Average Velocity: 1.6 km/h 44.6 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 4 Q <sub>1</sub> = 6 Median = 8 Q <sub>3</sub> = 11 P <sub>90</sub> = 14 P <sub>99</sub> = 17	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-May	WNW7	N8	NNW4	NNW7	NNW10	NNW7	NNW10	NW6	WNW11	NNW15	NNW21	NNW21	NNW19	NNW16	NNW16	NNW12	NNW16	NNW13	NNW12	NNW12	NNW9	NNW7	NNW6	NW10	NNW11.2	NNW21
2-May	NW12	NNW17	NNW18	NW11	NW10	NW12	NNW13	NNW17	NNW19	NNW18	NNW15	NNW16	NNW15	NNW13	N13	N14	NNW17	NNW17	NNW16	NNW15	NNW16	NNW15	NNW15	NNW13	NNW14.7	NNW19
3-May	NNW13	N11	N10	NNW10	N10	NNW9	NNW10	NNW10	NNW10	NNW11	N9	N9	N10	N9	NNE10	NE9	NNE7	NE8	NE8	ENE6	ENE4	ENE2	ENE2	AF	N7.7	NNW13
4-May	SE1	SE3	SE3	SE3	SE3	SE3	SE2	W3	SSW3	NNW5	S2	SW6	SW5	SW5	WNW4	SSW6	S6	NE5	ESE10	SE9	SE7	SSE5	SSE9	SE7	SSE2.8	ESE10
5-May	SE8	SE8	SSE7	SSE8	SSE6	S3	S3	S3	SSE4	SE6	SE5	NW2	NNE6	NE7	ENE11	NE11	ENE12	ENE15	ENE12	ENE13	E12	E14	E13	ENE11	E6.3	ENE15
6-May	ENE6	ENE9	NE6	NE7	NE9	NNE8	NE10	NE9	NNE11	NE14	NNE13	NNE13	NNE13	NE12	NNE12	N13	NNE12	NNE10	NE10	NNE7	NNE5	NE4	NE4	ENE3	NNE8.8	NE14
7-May	ENE3	NNE4	ENE2	ENE3	NNE3	N4	NNW6	N8	NNW10	NNW15	NNW17	N15	N15	N15	N13	N14	NNE11	NNE8	N7	N6	N4	N4	N4	N4	N8.1	NNW17
8-May	NNW5	NNW4	NE2	ENE1	SE2	NW3	W2	NW3	N3	N3	NE5	NNE5	ENE5	ENE6	NE7	NE9	NE7	NE6	N4	AF	AF	AF	AF	WNW1	NNE3.3	NE9
9-May	NNW2	N2	AF	AF	SE3	SE2	WNW2	NW7	NNW7	NNW9	NNW9	NNW9	NNW6	NW7	NNW8	N10	NNW5	N9	N8	NNW8	NNW9	NNW8	N9	NNW8	NNW6.1	N10
10-May	NNW12	NW12	NW12	NW10	NW10	NW10	NW12	NW14	NW15	NW16	NW15	NW17	NW18	NNW17	NNW17	NNW16	NNW14	NNW13	NNW10	NNW10	NNW9	NW6	NW6	NW6	NW12.4	NW18
11-May	NNW4	NNW3	NW4	NW3	W2	WSW2	S2	WSW6	S6	WSW8	WSW10	NW11	NNW14	N12	N12	N12	N12	N11	N10	NNE7	NE6	ENE6	E6	E7	NNW4.2	NNW14
12-May	E6	E2	SSE3	SE4	SSE5	SE5	E4	NE6	NNE5	N5	NNE5	N8	N8	N8	NNE8	N10	N11	NNE10	NNE9	NE9	ENE7	E6	ESE7	ESE7	NE4.4	N11
13-May	ESE8	SE9	SSE4	SW3	SSE4	SSE6	S7	SSW7	WSW10	W9	NNW10	NNW8	NNW10	N10	N11	N11	NNW11	NNW11	NNE9	NE8	ENE5	E4	E5	E5	N1.9	NNW11
14-May	ESE7	SE8	SE9	SE9	SE8	SE8	SSE7	SSE6	S6	SE7	SE8	S7	S8	S9	SSE7	SSE8	SE8	SE12	SE14	SE15	SSE15	SE15	SSE9	SSE7	SSE8.8	SSE15
15-May	SE10	SE10	ESE8	SE9	SE9	E4	NE3	N6	NNE12	NNE14	NNE14	M	N15	N15	N14	N14	N13	N12	NNW13	N9	NNW5	NNW5	N4	N5	NNE6.4	N15
16-May	NE2	E2	SE3	AF	AF	AF	N1	NW4	NW7	NNW7	NNW6	NW5	W7	WNW5	WNW5	ENE2	NE3	NE5	NE6	ENE6	E6	E7	E8	ESE9	NNE1.9	ESE9
17-May	SE8	SE7	SE7	SE8	SE7	SE6	SSE6	S5	ENE1	ESE2	E6	NNE4	WNW3	NNW2	NE8	NE4	E4	ENE6	E5	E5	E6	ESE7	ESE5	ENE5	ESE4.0	NE8
18-May	WSW2	SSE4	ESE4	E5	E5	ENE4	E9	E10	ESE12	ESE11	SSE6	S5	S5	ESE8	ENE9	E8	E11	E11	E10	ESE6	ESE6	SE7	E5	ESE6	ESE6.2	ESE12
19-May	SSE6	SSE10	SSE11	SSE9	SSE10	SSE9	SSE11	S11	SSW12	SSW12	S11	S11	S12	SSE13	SSE14	SSE13	SSW13	S13	S13	S11	S9	S7	S7	SSE7	S10.2	SSE14
20-May	SSE7	SSE7	SSE10	SSE10	SSE10	SSE12	SSE12	S12	S15	S18	S17	S16	S17	S15	SSW12	WSW11	SE11	SSE12	SSE15	SSE7	NNE7	ESE1	ESE7	SE12	SSE9.9	S18
21-May	SSE12	SSE11	SSE12	SSE11	S10	S10	S9	S9	SSW9	SW10	SW11	SW12	WSW12	S14	SSW10	WSW20	WSW22	WNW16	NW15	WNW5	W7	SW3	SSE5	SSE6	SSW7.3	WSW22
22-May	SE4	SE7	SE7	SE7	SE7	SSE6	SE7	SE9	S10	SW11	WSW11	WSW11	WSW12	SW14	WSW14	WSW12	SW10	SW8	SE6	S1	E3	ESE6	SE7	SE9	SSW5.4	SW14
23-May	SSE10	SSE10	SSE10	S9	SSE7	SSE7	SSE8	S4	W7	WSW5	S5	SSW5	SSW6	SSW7	SSW9	SW7	SSW5	WSW7	SSW1	SE5	SE10	ESE9	SE9	W15	S5.2	W15
24-May	W10	NNW5	W6	WNW4	W4	NW9	NNW11	NNW9	NNW7	NNW7	N7	N8	N11	N8	N9	NNW8	N4	NNW8	NNE7	NE6	E5	ESE4	SE4	SE4	NNW4.7	NNW11
25-May	SE4	SE4	ESE3	ESE4	SE4	SE5	SSE6	SSE6	SE6	SSE6	SSE6	ESE5	SSW6	ESE9	ESE10	SE9	SE10	SE9	SE9	SE9	SE8	SE10	SE13	SE13	SE6.9	SE13
26-May	SE17	SE17	SE14	SE14	ESE12	ESE12	SE12	SE15	SE16	SE15	SE17	SE15	SE14	E14	E10	ESE11	ESE9	E13	E14	E14	E15	E15	E13	E12	ESE13.2	SE17
27-May	E13	E12	E11	ENE10	E11	ENE11	ENE11	ENE9	NE8	NE8	ENE9	NE9	NE8	NE7	NE8	ENE10	ENE8	NE6	NE5	ENE5	E4	ESE6	ESE4	E4	ENE7.7	E13
28-May	ESE3	E4	E5	ESE6	ESE6	ESE7	ESE11	ESE12	SE11	ESE11	SSE8	SE6	ESE8	ESE8	SSE7	SE7	SE7	SSE7	SSE8	SE8	SE9	SE6	SSE6	SSE8	SE7.2	ESE12
29-May	SE5	ESE3	ENE4	E5	SE5	SE5	E3	ESE5	E4	ENE6	NE6	NE7	NE8	NE7	NE6	NNE7	N11	N10	NNW10	NNW14	NW14	NW11	WNW11	WNW12	N3.9	NW14
30-May	W11	W9	WSW8	W11	W10	WNW11	WNW11	WNW8	W11	W12	WNW11	WNW11	WNW15	WNW18	WNW17	WNW15	WNW12	NW11	NNW7	N7	NNE7	N3	SSW3	SW4	WNW9.0	WNW18
31-May	SW5	SW6	SW5	SSW3	NW2	NW6	NNW9	NNW10	NNW10	NNW11	NNW12	NNW10	N10	NE9	NNE9	NE9	ENE10	ENE8	ENE8	E8	ESE8	ESE11	ESE14	SE14	NE3.7	SE14

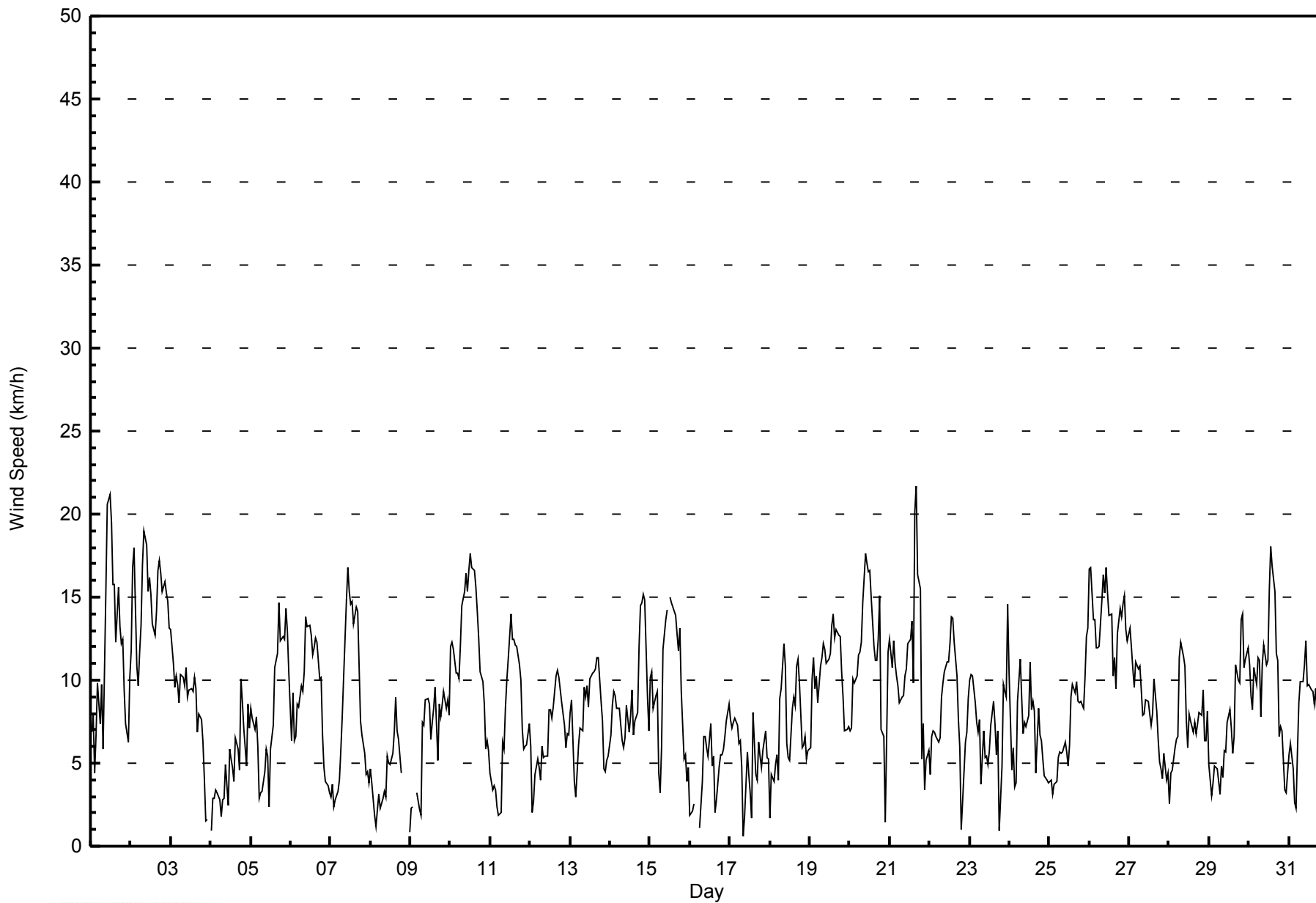
SE1.8 ESE2.5 SE2.4 SE2.3 SE2.5 ESE1.3 E1.1 NNE0.4 NW1.0 NNW2.0 NNW2.2 NNW3.1 NNW3.9 N2.9 N3.7 N3.6 NNE3.4 NNE4.1 NE4.1 NE3.7 ENE3.2 E3.2 ESE3.3 ESE2.5 SE17 SE17 NNW18 SE14 ESE12 ESE12 NNW13 NNW17 NNW19 NNW18 NNW21 NNW21 NNW19 NNW18 NNW17 WSW20 WSW22 NNW17 NNW16 NNW15 NNW16 NNW15 NNW15 W15	Diurnal Average
	Diurnal Maximum

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



**WBEA**  
**Hourly Averages**

**Wind Speed (WS) - km/h**  
**Wapasu - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h**  
**Wapasu - May 2014**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	174	23.74	23.74
6 - 11	392	53.48	77.22
12 - 19	163	22.24	99.45
20 - 28	4	0.55	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 733

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Wind Speed (WS) - km/h**  
**Wapasu - May 2014**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	14	7	11	16	21	13	25	9	10	6	7	3	4	8	8	12	174
6 - 11	36	21	34	22	18	33	50	48	20	8	7	10	11	9	18	47	392
12 - 19	19	8	2	4	13	5	19	10	11	4	2	4	2	7	13	40	163
20 - 28	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	4
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	69	36	47	42	52	51	94	67	41	18	16	19	17	24	39	101	733

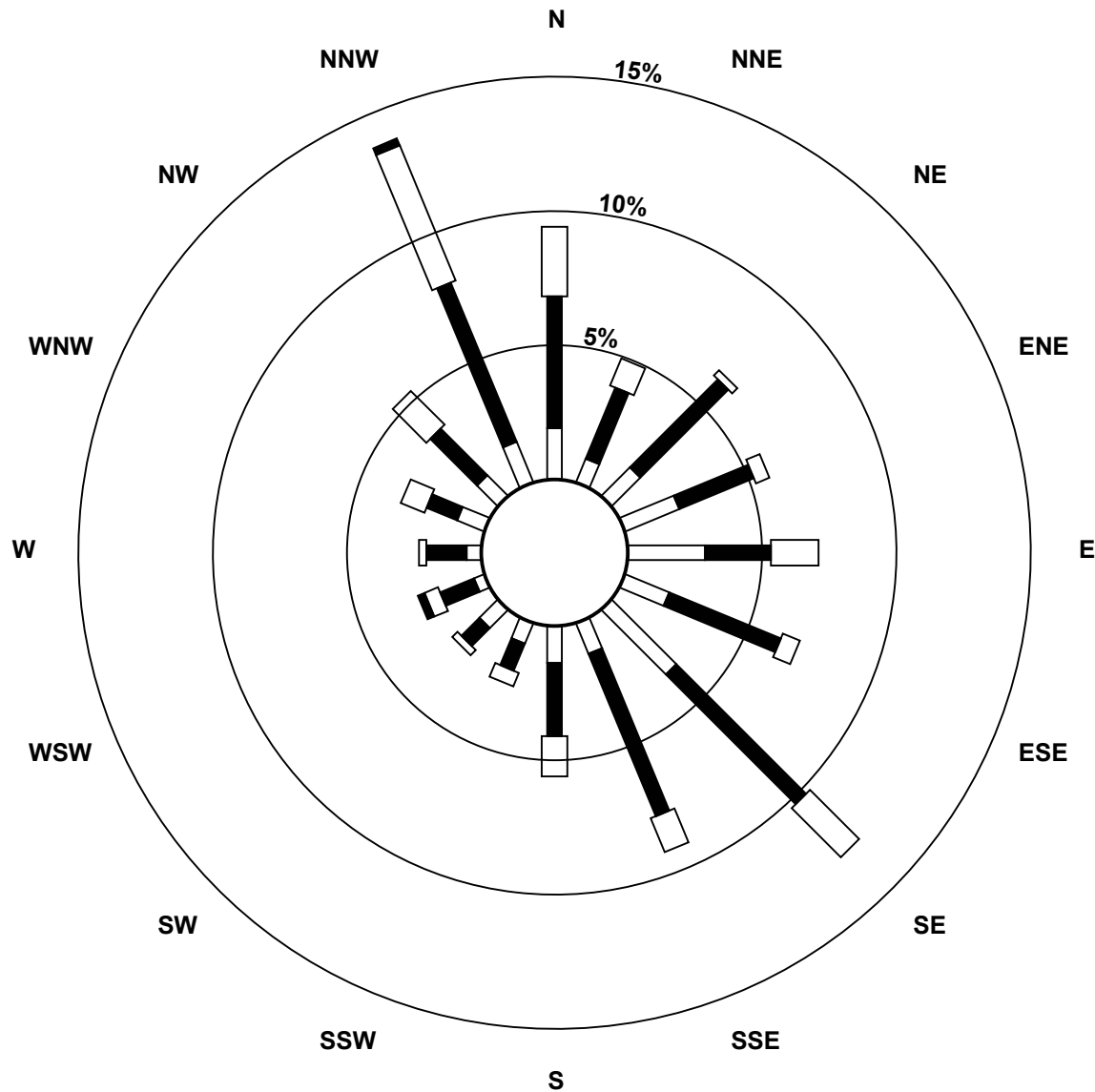
Total Number of Valid Hours: 733

Total Number of Hours: 744

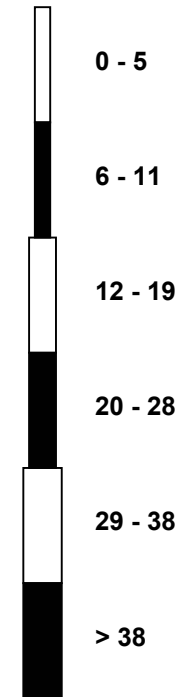


**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Wind Speed (WS) - km/h  
Wapasu (AMS 17)**



**Classes (km/h)**



**Total Number of Valid Hours: 733**



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

**Wind Speed (WS) - km/h**  
**Wapasu - May 2014**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 7 km/h on May 1 12:00 Minimum Value: 0 km/h on May 25 03:00 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> = 7																	Hours in Service: 744 Hours of Data: 733 Hours of Missing Data: 11 Hours of Calibration: 0 Percent Operational Time: 98.5								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-May	3	3	2	2	3	3	3	2	4	5	7	7	7	6	5	5	6	4	5	4	3	2	3	6	7
2-May	4	7	6	4	3	3	5	6	7	6	5	5	5	5	5	5	5	7	6	5	5	5	4	4	7
3-May	4	4	3	4	3	3	4	3	3	4	4	3	3	4	4	3	3	3	3	2	1	1	1	AF	4
4-May	1	1	0	1	0	0	1	2	2	3	2	3	3	3	2	3	3	3	3	2	2	2	4	3	4
5-May	2	2	3	3	2	2	2	2	2	3	4	2	2	4	3	4	4	4	4	4	4	4	4	4	4
6-May	2	3	2	3	3	3	3	3	4	5	5	5	5	5	5	5	5	4	4	2	1	1	1	0	5
7-May	1	1	0	1	1	1	2	2	4	6	6	6	5	5	5	5	5	4	3	2	3	2	2	2	6
8-May	2	1	1	1	1	1	1	1	1	1	2	2	2	3	2	3	3	2	2	AF	AF	AF	AF	1	3
9-May	2	1	AF	AF	1	1	2	2	3	4	3	3	3	3	4	4	3	4	3	3	3	2	3	3	4
10-May	3	4	3	3	3	3	5	5	5	5	4	5	5	5	5	4	4	4	3	3	2	2	1	1	5
11-May	1	1	1	1	1	1	1	2	2	3	3	5	5	4	5	5	5	4	4	3	2	2	2	2	5
12-May	2	2	1	1	0	1	3	2	3	3	3	4	4	4	4	4	4	4	3	3	2	1	1	1	4
13-May	2	2	2	2	1	1	3	3	3	4	3	5	4	4	5	4	4	4	3	2	1	1	1	1	5
14-May	1	2	2	2	2	1	2	2	2	3	3	4	4	4	4	2	5	4	4	4	4	4	4	2	5
15-May	2	2	3	2	2	3	1	3	4	5	5	M	5	6	5	5	4	4	5	3	1	1	1	1	6
16-May	1	1	1	AF	AF	AF	2	1	2	3	3	3	3	3	2	2	3	2	1	1	1	1	2	3	
17-May	1	1	2	2	1	1	2	2	2	2	3	2	3	3	3	3	3	2	2	1	1	1	2	3	
18-May	2	2	1	1	2	1	2	3	4	4	4	4	3	3	3	3	4	3	3	2	2	1	2	4	
19-May	2	3	3	3	3	2	3	4	4	4	4	4	4	5	4	4	4	5	4	4	3	2	2	2	5
20-May	2	2	3	2	2	3	4	4	5	6	6	6	7	5	5	5	3	3	4	3	3	3	2	3	7
21-May	3	3	4	3	3	3	3	3	3	4	4	5	7	6	4	7	7	6	6	2	3	1	1	1	7
22-May	1	1	1	1	1	1	2	3	4	4	3	4	5	4	5	4	3	4	2	2	1	1	1	2	5
23-May	2	3	3	3	2	2	2	1	2	2	2	2	3	4	4	3	4	3	2	4	3	2	3	6	6
24-May	4	2	3	2	2	4	4	3	2	2	3	3	4	3	3	3	2	3	3	2	2	1	1	1	4
25-May	1	1	0	1	1	1	2	2	3	3	3	3	3	5	4	4	3	2	3	2	2	2	3	3	5
26-May	5	4	3	4	3	4	3	4	5	5	5	5	5	5	3	4	3	4	4	4	5	5	4	4	5
27-May	4	4	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3	2	2	1	1	2	2	1	4
28-May	1	1	1	1	1	2	3	3	3	3	3	3	3	2	3	3	2	3	3	2	2	1	1	2	3
29-May	1	1	1	1	1	1	1	2	2	2	2	2	3	2	2	3	4	4	4	5	4	3	3	4	5
30-May	4	3	3	4	3	3	4	3	3	4	4	4	6	7	6	6	4	4	2	4	3	1	1	2	7
31-May	2	2	2	1	3	2	3	3	3	3	4	4	4	4	4	4	3	3	3	3	2	3	3	3	4
Diurnal Maximum																								5	
M - Maintenance AF - Analyzer Failure																									



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

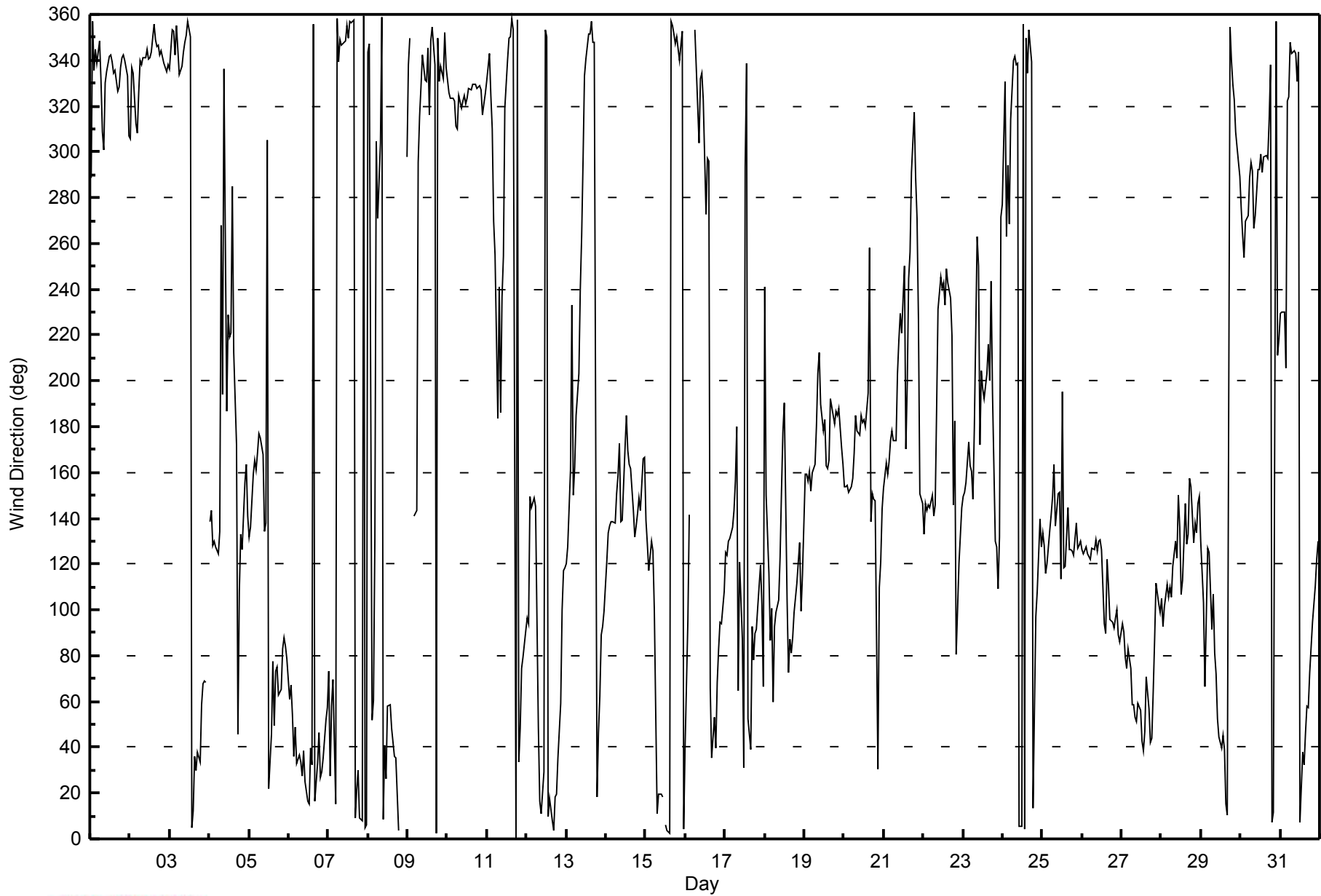
**Wind Direction (WD) - deg**  
**Wapasu - May 2014**

Direction of Maximum Speed: 256 deg on May 21 17:00																				Hours in Service: 744							
Direction of Maximum Daily Speed Average: 338.1 deg on May 2																				Hours of Data: 733							
Direction of Minimum Speed: 65 deg on May 17 09:00										Direction of Minimum Daily Speed Average: 1.9 deg on May 16										Hours of Missing Data: 11							
Monthly Average Direction: 331.7 deg																								Percent Operational Time: 98.5			
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-May	289	357	336	345	339	348	331	308	301	330	335	342	342	340	334	336	327	328	337	341	342	340	333	307	333.3		
2-May	305	337	335	312	308	326	340	338	341	341	345	341	341	343	355	349	346	346	342	344	339	337	335	338	338.1		
3-May	336	353	352	342	355	345	334	337	343	348	351	357	350	5	12	36	30	38	34	58	68	69	68	AF	0.5		
4-May	138	143	128	130	127	124	134	268	194	336	187	229	219	221	285	213	172	46	108	133	127	156	164	141	158.8		
5-May	132	136	159	165	161	169	177	175	168	134	138	305	22	46	77	50	73	75	63	65	83	88	84	78	92.9		
6-May	61	67	54	36	49	33	37	34	27	38	25	16	15	40	32	356	17	33	46	27	29	36	52	57	32.7		
7-May	73	27	58	70	15	358	340	349	346	348	348	355	350	357	356	358	9	22	30	9	8	359	5	6	1.1		
8-May	343	347	52	60	131	304	271	304	359	8	41	26	58	58	48	42	36	35	4	AF	AF	AF	AF	298	25.5		
9-May	338	350	AF	AF	141	143	295	315	328	342	331	330	345	316	348	355	338	2	350	331	337	332	352	337	339.0		
10-May	331	326	324	323	322	311	310	325	319	322	324	321	324	328	327	329	330	330	328	329	327	316	321	325	324.1		
11-May	331	343	324	310	270	255	184	241	186	237	254	319	340	350	350	358	353	0	358	33	48	74	79	91	345.0		
12-May	96	94	150	145	149	145	96	49	16	11	29	354	350	10	18	8	4	18	19	35	59	100	117	118	41.8		
13-May	120	127	161	233	150	162	185	203	240	264	297	333	341	351	352	357	348	348	18	46	62	89	93	100	359.1		
14-May	121	133	137	139	139	138	151	159	173	139	139	170	185	170	164	162	143	132	137	142	149	143	166	167	148.2		
15-May	139	129	117	130	125	100	55	11	20	20	18	M	6	4	3	357	355	352	347	350	340	347	353	4	19.8		
16-May	40	95	142	AF	AF	AF	353	320	304	332	335	323	273	297	296	66	36	53	40	69	83	95	94	108	22.7		
17-May	125	124	130	131	136	143	156	180	65	121	87	31	293	339	52	39	93	78	90	91	101	120	102	67	106.3		
18-May	241	150	116	87	101	60	93	99	104	123	152	178	190	104	73	87	81	88	99	112	121	129	99	115	106.8		
19-May	159	159	156	161	152	160	163	180	203	213	190	178	183	163	162	165	192	185	181	187	185	188	171	164	175.6		
20-May	154	154	154	151	153	157	168	185	178	177	185	182	183	180	195	258	139	151	148	148	30	110	121	144	167.1		
21-May	153	164	159	165	174	178	174	174	203	218	229	221	250	170	199	245	256	291	317	289	271	227	151	147	212.5		
22-May	133	146	144	146	144	150	141	146	187	231	245	240	243	233	249	243	236	220	146	182	81	120	132	145	195.8		
23-May	150	151	156	173	163	160	148	179	263	250	172	204	197	192	203	216	200	243	195	130	128	109	132	271	178.3		
24-May	277	330	263	294	269	314	340	342	338	339	5	5	356	4	350	334	353	339	14	56	97	108	140	128	345.0		
25-May	133	128	116	120	135	141	149	163	136	151	151	113	196	118	119	145	126	126	126	124	138	127	128	130	133.5		
26-May	126	124	127	125	123	122	127	126	131	126	130	131	126	94	90	122	110	96	94	92	97	100	89	86	114.0		
27-May	94	90	79	74	83	75	59	59	53	51	59	56	42	39	47	71	57	42	44	64	87	112	103	99	68.1		
28-May	105	93	101	111	106	110	106	119	130	123	150	136	107	113	147	129	133	157	154	129	138	134	147	149	127.2		
29-May	130	103	67	97	127	125	92	107	81	72	52	44	40	45	39	15	10	355	340	329	323	308	302	289	11.0		
30-May	275	264	254	270	272	289	296	292	267	272	292	292	299	291	298	299	297	314	338	7	12	357	211	218	290.9		
31-May	230	230	230	206	322	324	347	343	344	343	331	344	7	38	32	46	58	57	72	95	103	110	122	130	36.1		
126.9	111.1	127.6	132.4	129.1	120.3	89.0	28.1	312.7	335.9	341.0	334.2	334.6	9.9	7.3	356.7	11.7	22.0	40.4	52.2	66.3	92.0	103.2	113.6				
Diurnal Average																											
M - Maintenance      AF - Analyzer Failure																											
All monthly, daily, and diurnal averages have been calculated using vector methods																											



**WBEA**  
**Hourly Averages**

**Wind Direction (WD) - deg**  
**Wapasu - May 2014**





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

**Wind Direction (WD) - deg**  
**Wapasu - May 2014**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0																			Hours in Service: 744						
Maximum Value: 116 deg on May 17 09:00																			Hours of Data: 733						
Minimum Value: 5 deg on May 12 05:00																			Hours of Missing Data: 11						
Percentiles: P <sub>1</sub> = 8 P <sub>10</sub> = 17 Q <sub>1</sub> = 22 Median = 29 Q <sub>3</sub> = 37 P <sub>90</sub> = 50 P <sub>99</sub> = 85																			Hours of Calibration: 0						
Percent Operational Time: 98.5																									
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-May	41	31	28	29	25	32	22	28	28	27	29	31	33	35	29	29	27	29	29	30	26	28	24	20	41
2-May	23	33	25	22	23	22	27	26	30	28	30	28	28	32	35	33	31	32	29	29	27	26	24	25	35
3-May	24	33	33	28	35	28	26	25	33	32	43	36	35	42	39	38	46	34	40	30	31	33	37	AF	46
4-May	68	9	20	14	14	17	73	80	81	58	86	63	60	78	70	61	47	64	24	19	22	20	24	32	86
5-May	20	23	27	24	23	36	41	44	48	40	60	91	47	72	34	29	30	23	25	22	23	23	24	24	91
6-May	23	22	27	31	25	35	30	38	38	34	37	38	38	40	41	38	46	42	30	32	24	18	15	11	46
7-May	11	19	29	22	21	24	26	28	35	34	31	38	35	37	37	38	37	36	37	41	39	40	41	41	41
8-May	30	30	54	54	48	27	39	28	39	41	33	41	27	31	28	31	33	33	43	AF	AF	AF	AF	51	54
9-May	31	46	AF	AF	11	18	58	24	36	33	29	35	50	48	41	36	42	32	31	21	23	21	33	27	58
10-May	21	21	20	20	21	21	22	23	22	20	21	21	20	22	23	22	23	23	23	21	21	22	20	20	23
11-May	26	30	27	26	33	40	34	28	35	34	29	33	31	33	39	39	38	36	36	28	22	21	17	17	40
12-May	17	53	27	8	5	9	42	46	58	65	65	51	56	67	50	49	43	40	36	33	21	18	11	10	67
13-May	14	18	62	34	17	21	31	41	33	41	35	57	44	48	43	43	38	34	38	25	14	27	14	11	62
14-May	10	13	14	14	14	14	21	38	41	53	41	61	58	42	60	49	28	25	19	19	19	18	31	25	61
15-May	20	17	19	16	19	43	31	45	35	38	35	M	35	36	35	32	34	30	30	31	27	26	24	18	45
16-May	57	39	6	AF	AF	AF	69	35	37	48	57	69	47	75	73	100	75	53	36	17	14	12	11	15	100
17-May	13	15	16	15	11	14	22	60	116	90	75	69	77	90	30	65	64	42	27	13	11	13	35	19	116
18-May	81	19	35	10	20	34	20	25	25	38	72	66	59	34	37	32	27	26	24	18	17	13	53	23	81
19-May	15	22	22	24	20	23	26	35	37	36	41	39	41	34	33	35	36	34	32	32	31	32	24	18	41
20-May	17	17	19	18	19	22	29	35	32	33	36	36	35	34	40	41	22	20	20	69	60	88	32	16	88
21-May	20	24	24	25	29	27	30	31	35	37	33	34	44	33	42	24	27	36	21	31	26	34	16	9	44
22-May	23	6	7	6	8	8	18	22	34	37	32	37	38	35	32	30	26	42	19	86	41	15	17	17	86
23-May	17	19	21	30	23	25	19	47	28	45	50	51	66	53	44	39	59	40	78	28	26	17	46	26	78
24-May	28	37	24	37	32	35	30	29	42	32	41	36	35	38	41	32	50	27	44	24	30	44	15	23	50
25-May	28	26	22	23	21	8	21	41	44	53	63	84	61	59	43	40	35	27	20	18	15	15	17	16	84
26-May	18	18	18	18	19	20	20	20	21	21	23	25	25	25	26	21	23	24	22	23	22	22	23	24	26
27-May	23	23	21	23	24	25	25	26	26	24	26	27	28	33	35	26	26	28	29	32	19	15	17	22	35
28-May	42	16	10	11	13	19	25	23	27	26	29	51	30	33	34	31	26	29	23	21	19	15	17	18	51
29-May	13	32	15	14	14	17	22	27	32	24	28	25	30	32	34	35	34	37	27	24	21	23	26	24	37
30-May	26	26	26	28	25	25	27	28	25	25	28	28	25	27	27	25	29	23	31	36	36	39	30	29	39
31-May	29	23	28	39	78	23	30	35	33	32	26	39	43	45	46	51	35	41	30	22	14	17	18	17	78
																			81 53 62 54 78 43 73 80 116 90 86 91 77 90 73 100 75 64 78 86 60 88 53 51						
Diurnal Maximum																									
M - Maintenance												AF - Analyzer Failure													



# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Report

### Station Information

Calibration Date	May 14, 2014	Previous Calibration	April 2, 2014
Station Name	Wapasu	Station Number	AMS 17
Reason:	Routine		
Start Time (MST)	6:45	End Time (MST)	9:10
Barometric Pressure	716 mmHg	Station temp.	23 Deg C
Calibrator Make/Model	API T700	Serial Number	493
Cal Gas Concentration	47.8 ppm	Cal Gas Expiry Date	12-Dec-16
Gas Cert Reference	SA130010A		
DACS make/model	Campbell Scientific CR3000	DACS serial No.	6894
DACS voltage range	NA	DACS channel #	TCP/IP

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	1000	1000	PMT voltage	-702	-702
Analyzer Range (mv)	1000	1000	Lamp voltage	902	902
Calculated slope	0.990737	1.009640	Chamber temp.	45.0	45.0
Calculated intercept	0.621539	-0.791677	Pressure (mmHg)	697.0	697.0
Analyzer Background	8.3	8.3	Flow (lpm)	0.455	0.455
Analyzer Coefficient	0.794	0.794	Intensity	82	82

Analyzer make	Thermo 43i	Analyzer serial #	1218153459
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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	5000	0.0	0.0	0.0	NA
as found span	5000	60.4	577.4	572.0	1.009
calibrator zero	5000	0.0	0.0	0.0	NA
high point	5000	60.4	577.4	572.0	1.009
second point	5000	30.2	288.7	288.0	1.002
third point	5000	15.1	144.4	144.0	1.002
calibrator zero	6000	0.0	0.0	0.3	NA
as left zero	6000	0.0	0.0	0.3	NA
as left span	5000	60.4	577.4	575.0	1.004
Average Correction Factor					1.005

Corrected As found	572.0	Previous response	582.2	% change	1.8%
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#### Notes:

No Maintenance Done, Filter changed out, No adjustments,

Calibration Performed By:

Melissa Lemay



## Wood Buffalo Environmental Association

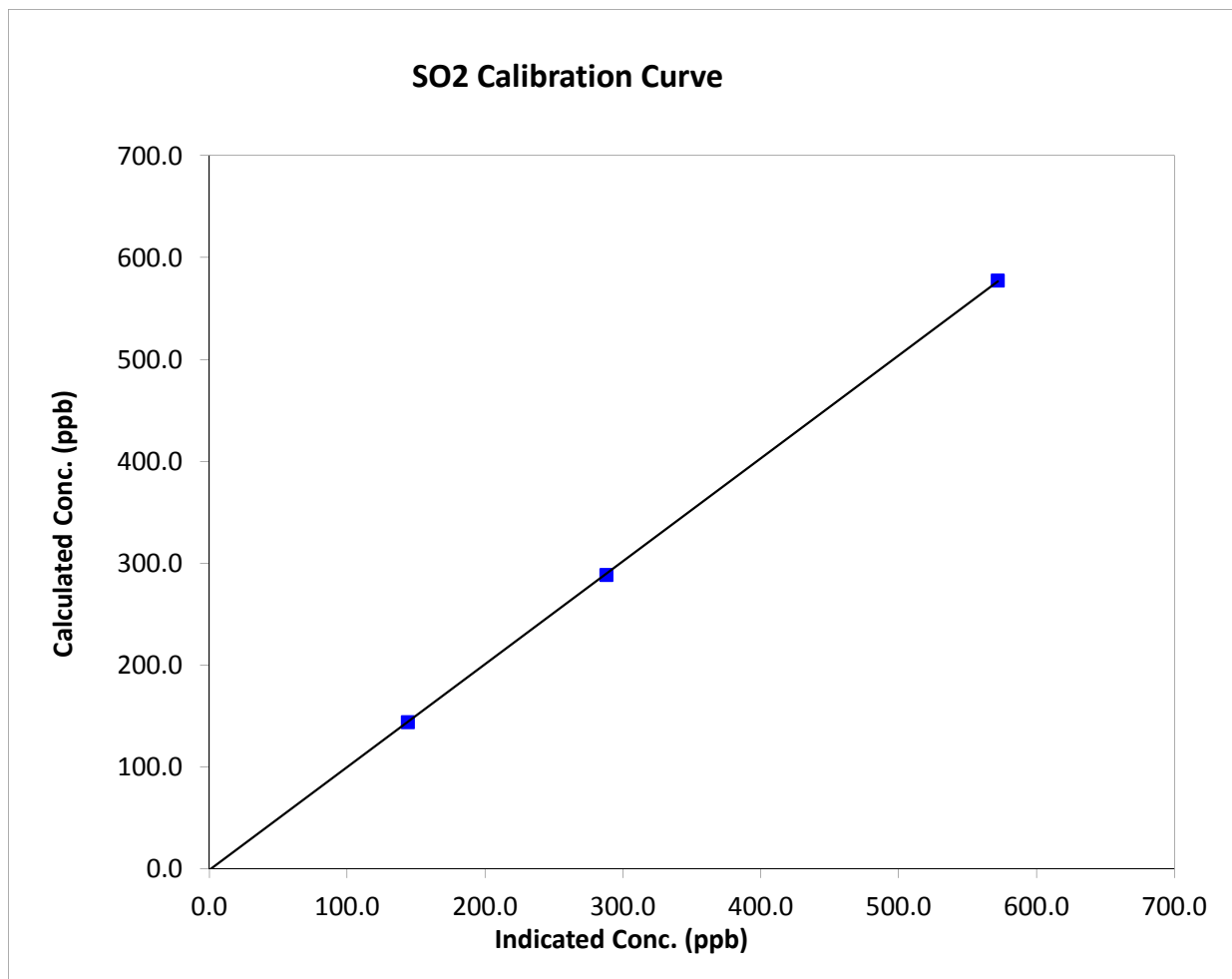
### SO<sub>2</sub> Calibration Summary

#### Station Information

Calibration Date	May 14, 2014	Previous Calibration	April 2, 2014
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	6:45	End Time (MST)	9:10
Analyzer make	Thermo 43i	Analyzer serial #	1218153459

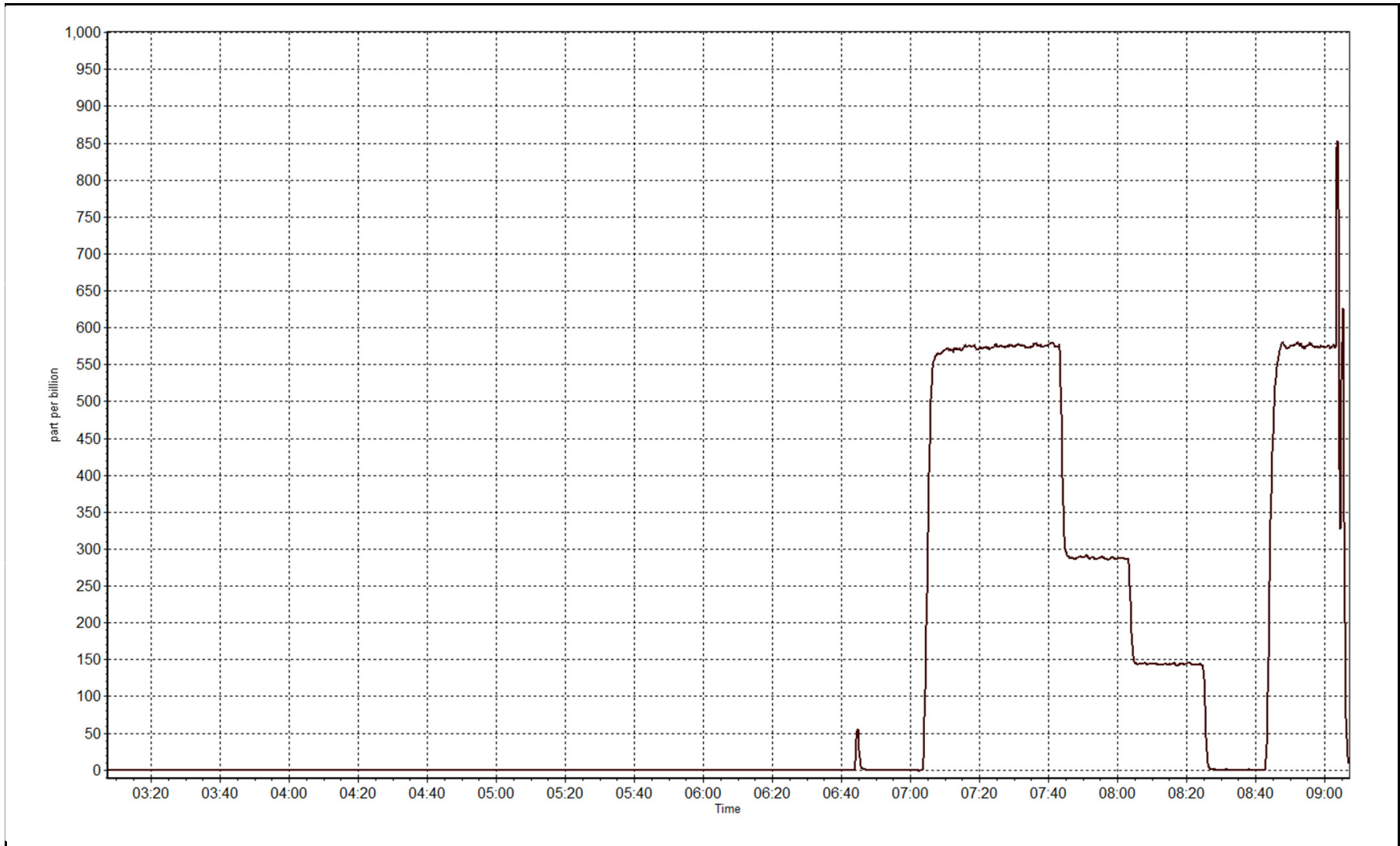
#### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999984
577.4	572.0	1.0095		
288.7	288.0	1.0025	Slope	1.009640
144.4	144.0	1.0025		
			Intercept	-0.791677



SO2 Calibration Plot

Date: May 14, 2014







# Wood Buffalo Environmental Association

## H2S Calibration Report

### Station Information

Calibration Date	May 14, 2014	Previous Calibration	April 9, 2014
Station Name	Wapasu	Station Number	AMS 17
Reason:	Routine		
Start Time (MST)	9:05	End Time (MST)	11:20
Barometric Pressure	mmHg	Station temp.	27 Deg C
Calibrator Make/Model	API T700	Serial number	997
Cal Gas Concentration	10.2 ppm H2S	Cal Gas Expiry Date	30-May-13
Gas Cert Reference	SA5558	SO2 gas conc.	47.8 ppm SO2
DACS make/model	Campbell Scientific CR3000	DACS serial No.	6894
DACS voltage range	NA	DACS channel #	TCP/IP

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	100	100	PMT voltage	-651	-651
Analyzer Range (mv)	100	100	Lamp voltage	817	819
Calculated slope	1.001148	1.001139	Chamber temp.	45	45
Calculated intercept	-0.182335	0.133319	Pressure	583.4	566.3
Analyzer Background	12.6	12.6	Flow	0.851	0.807
Analyzer Coefficient	0.856	0.856	Intensity	91	91
			Converter temp.	342	338

Analyzer make/model	450i	Analyzer serial #	1218153583
Converter make/model		Converter serial #	

### Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	-0.4	NA
as found span	5000	39.3	80.2	79.7	1.006
SO2 scrubber check	5000	60.4	577.4	4.8	NA
calibrator zero	5000	0.0	0.0	-0.4	NA
high point	5000	39.3	80.2	79.7	1.006
second point	5000	19.5	39.8	40.0	0.995
third point	6000	11.8	20.1	20.0	1.005
calibrator zero	5000	0.0	0.0	0.2	NA
as left zero	5000	0.0	0.0	0.2	NA
as left span	5000	39.2	80.0	81.7	0.979
Average Correction Factor					1.002

Corrected As found	80.1	Previous response	80.3	% change	0.2%
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#### Notes:

Scrubber checked third point, NO adjustments made, No Maintenance Done, filter changed

Calibration Performed By:

Melissa Lemay



# Wood Buffalo Environmental Association

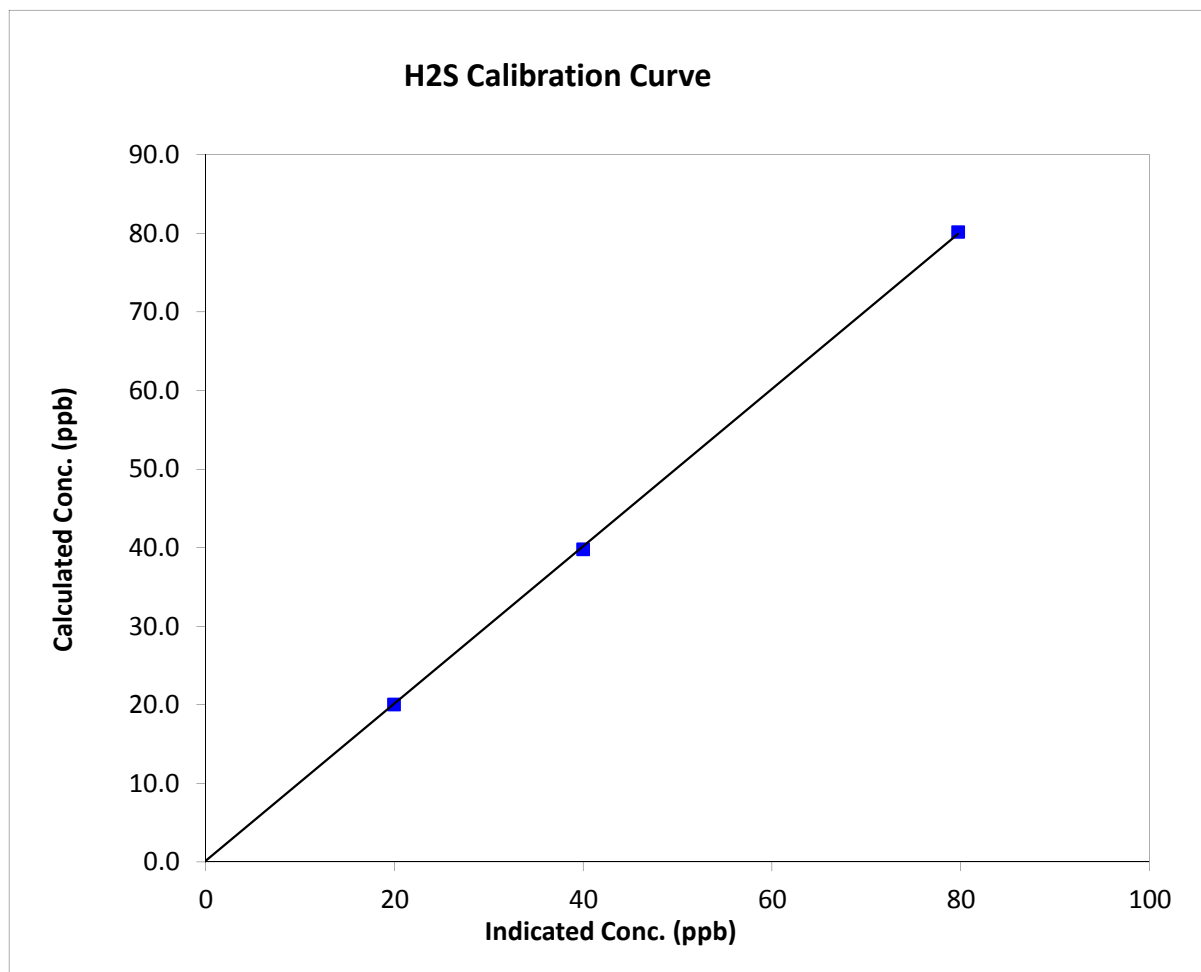
## H2S Calibration Summary

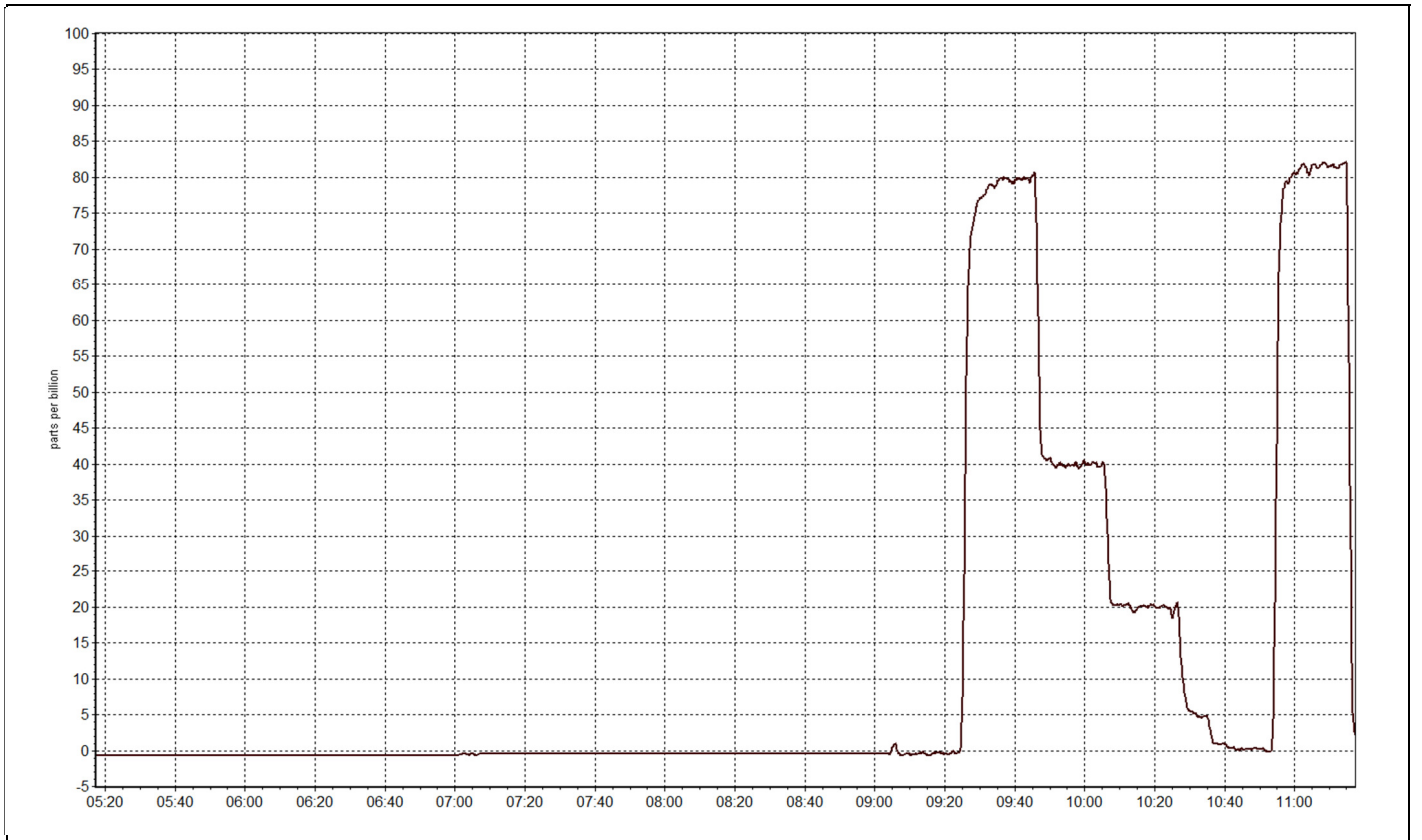
### Station Information

Calibration Date	May 14, 2014	Previous Calibration	April 9, 2014
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	9:05	End Time (MST)	11:20
Analyzer make	450i	Analyzer serial #	1218153583

### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.4	N/A	Correlation Coefficient	0.999923
80.2	79.7	1.0055		
39.8	40.0	0.9945	Slope	1.001139
20.1	20.0	1.0045		
			Intercept	0.133319







# Wood Buffalo Environmental Association

## THC Calibration Report

### Station Information

Calibration Date	May-14-14	Previous Calibration	April-02-14
Station Name	Wapasu	Station Number	AMS 17
Reason:	Routine		
Start Time (MST)	6:45	End Time (MST)	9:10
Barometric Pressure	716 mmHg	Station temp.	23 Deg C
Calibrator Make/Model	API T700	Serial Number	493
Gas Cert Reference	SA130010A	Cal Gas Expiry Date	12-Dec-16
CH4 Cal Gas Conc.	512 ppm	CH4 Equiv Conc.	1092.3 ppm
C3H8 Cal Gas Conc.	211 ppm		
DACS make/model	Campbell Scientific CR3000	DACS serial No.	6894
DACS voltage range	NA	DACS channel #	NA

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppm)	100	100	Sample Pressure	8.5	8.5
Analyzer Range (mv)	100	100	Air or Bypass press	39.8	40.0
Calculated slope	0.998415	0.999883	Fuel Pressure	24.8	24.8
Calculated intercept	-0.035740	-0.069273		2.3	2.4
				4.849	4.976

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	0.01	N/A
as found span	5000	60.4	13.19	12.92	1.021
calibrator zero	5000	0.0	0.00	0.01	N/A
high point	5000	60.4	13.19	13.22	0.998
second point	5000	30.2	6.60	6.74	0.979
third point	5000	15.1	3.30	3.40	0.970
calibrator zero	6000	0.0	0.00	0.10	N/A
as left zero	6000	0.0	0.00	0.10	N/A
as left span	5000	60.4	13.19	13.56	0.973
Average Correction Factor					0.982

Corrected As found	12.91	Previous response	13.25	% change	2.6%
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#### Notes:

Filter changed, span adjusted,

Calibration Performed By:

Melissa Lemay



# Wood Buffalo Environmental Association

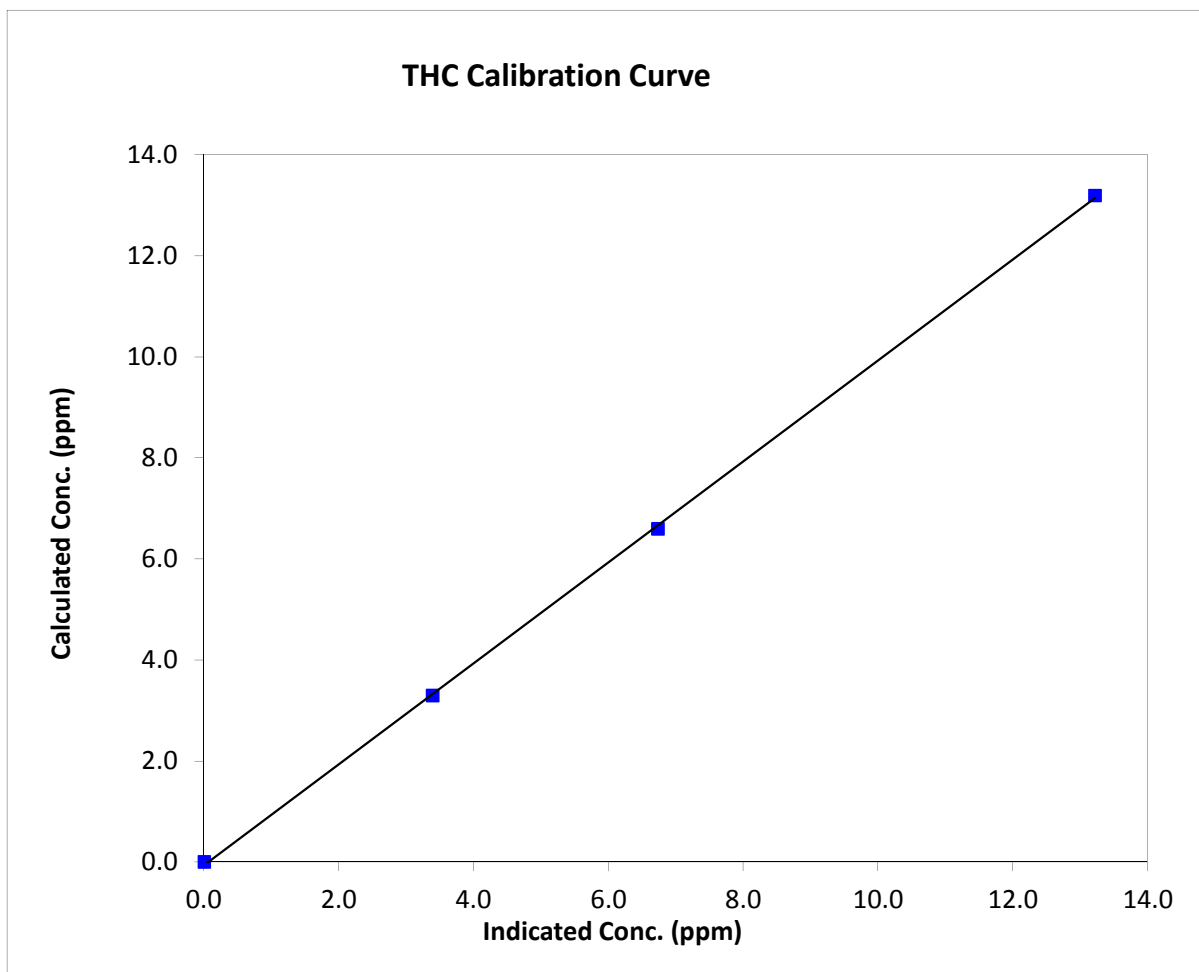
## THC Calibration Summary

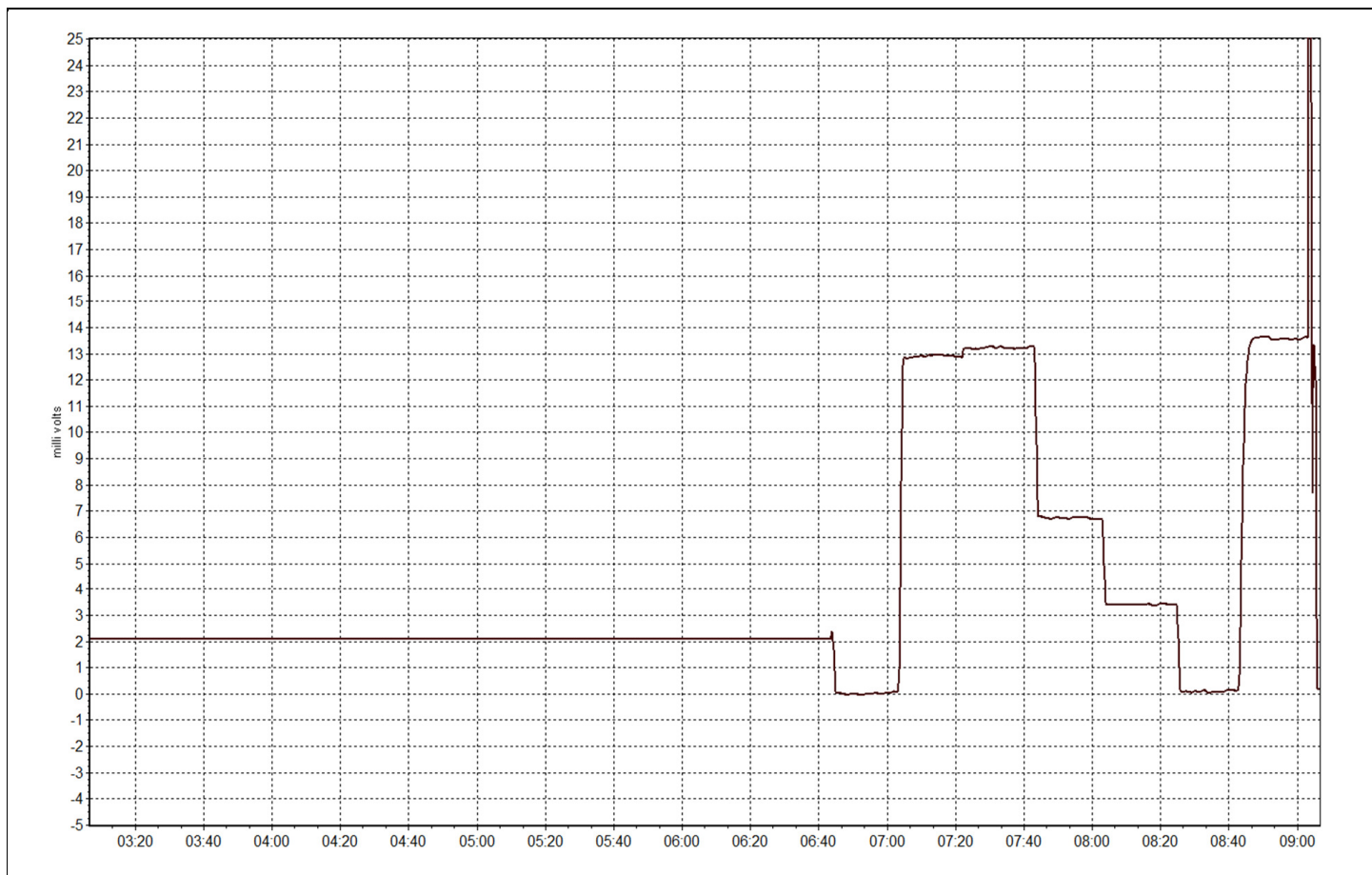
### Station Information

Calibration Date	May 14, 2014	Previous Calibration	April 2, 2014
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	6:45	End Time (MST)	9:10
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	0.01	N/A	Correlation Coefficient	0.999875
13.19	13.22	0.9981		
6.60	6.74	0.9788	Slope	0.999883
3.30	3.40	0.9702		
			Intercept	-0.069273







# Wood Buffalo Environmental Association

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

### Station Information

Calibration Date	May 16, 2014	Previous Calibration	April 4, 2014
Station Name	Wapasu	Station Number	AMS 17
Reason:	Routine		
Start Time (MST)	8:18	End Time (MST)	10:56
Barometric Pressure	23 mmHg	Station temp.	23 Deg C
Calibrator Make/Model	T700	Serial Number	997
NO2 calibration used	May-15-14	Transfer Standard	23
DACS make/model	N/A	DACS serial No.	N/A
DACS voltage range	N/A	DACS channel #	N/A

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	500	500	Box temp.	23.1	24.7
Analyzer Range (input)	500	500	Photo Lamp Temp.	58.0	58.0
Calculated slope	1.003606	0.987908	Pressure	26.2	25.4
Calculated intercept	1.133036	1.046850	Flow	688	666
Analyzer Background	1.436	1.436			
Analyzer Coefficient	1.012	1.012			

Analyzer make	T400	Analyzer serial #	824
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### Calibration Data

Set Point	Dilution air flow rate (cc/min)	Calibrator Lamp Intensity (mV)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	1.3	N/A
as found span	5000	933.1	405.0	405.0	1.000
calibrator zero	5000	0.0	0.0	-0.2	N/A
high point	5000	713.5	405.00	409.0	0.990
second point	5000	495.5	273.00	276.0	0.989
third point	5000	260.7	143.00	142.0	1.007
calibrator zero	5000	0.0	0.0	-0.3	N/A
as left zero	5000	0.0	0.0	-0.3	N/A
as left span	5000	714.7	405.0	413.0	0.981
Average Correction Factor					0.995

Corrected As found	403.7	Previous response	402.4	% change	-0.3%
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#### Notes:

No Maintenance Done, Span adjusted, Filter changed out

Calibration Performed By:

Melissa Lemay



# Wood Buffalo Environmental Association

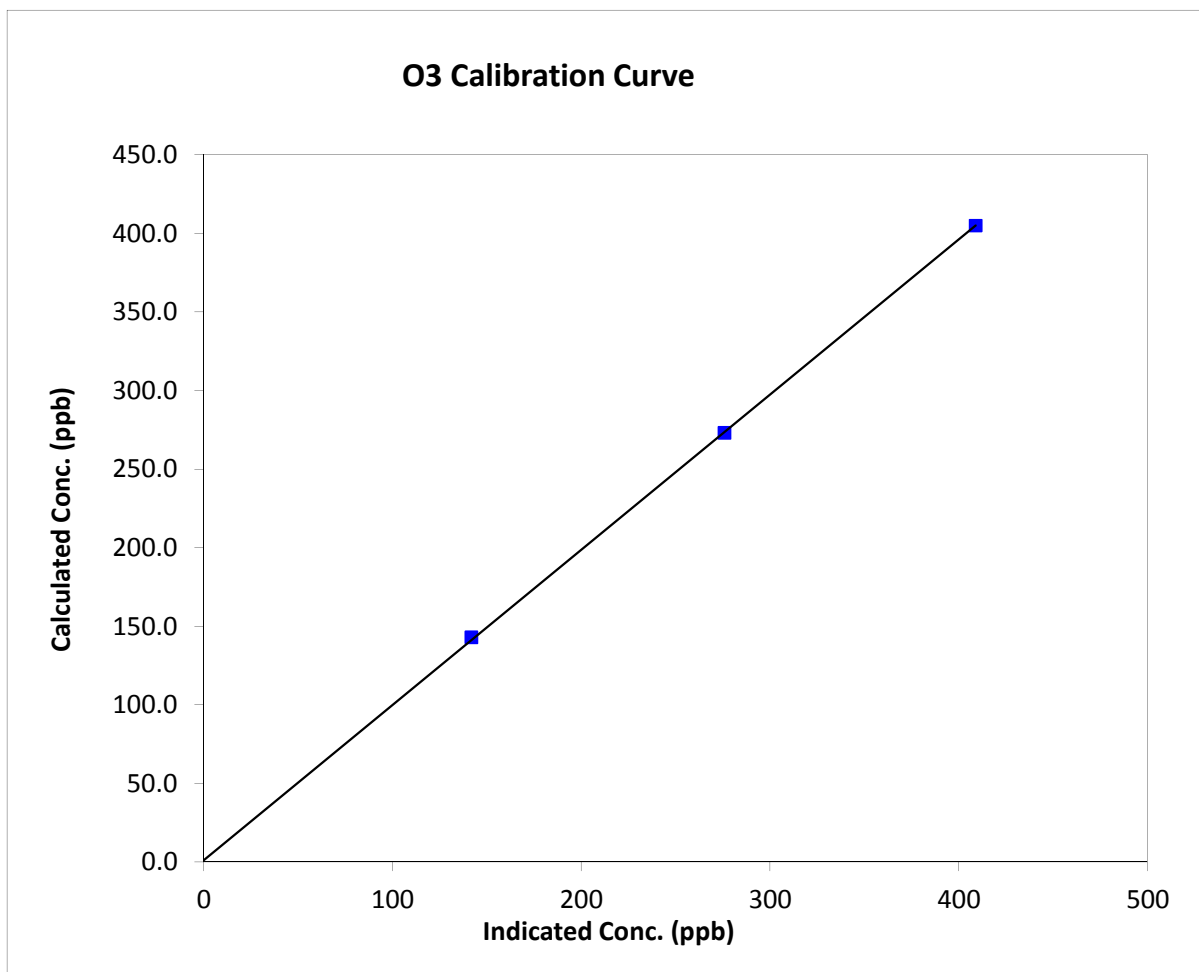
## O<sub>3</sub> Calibration Summary

### Station Information

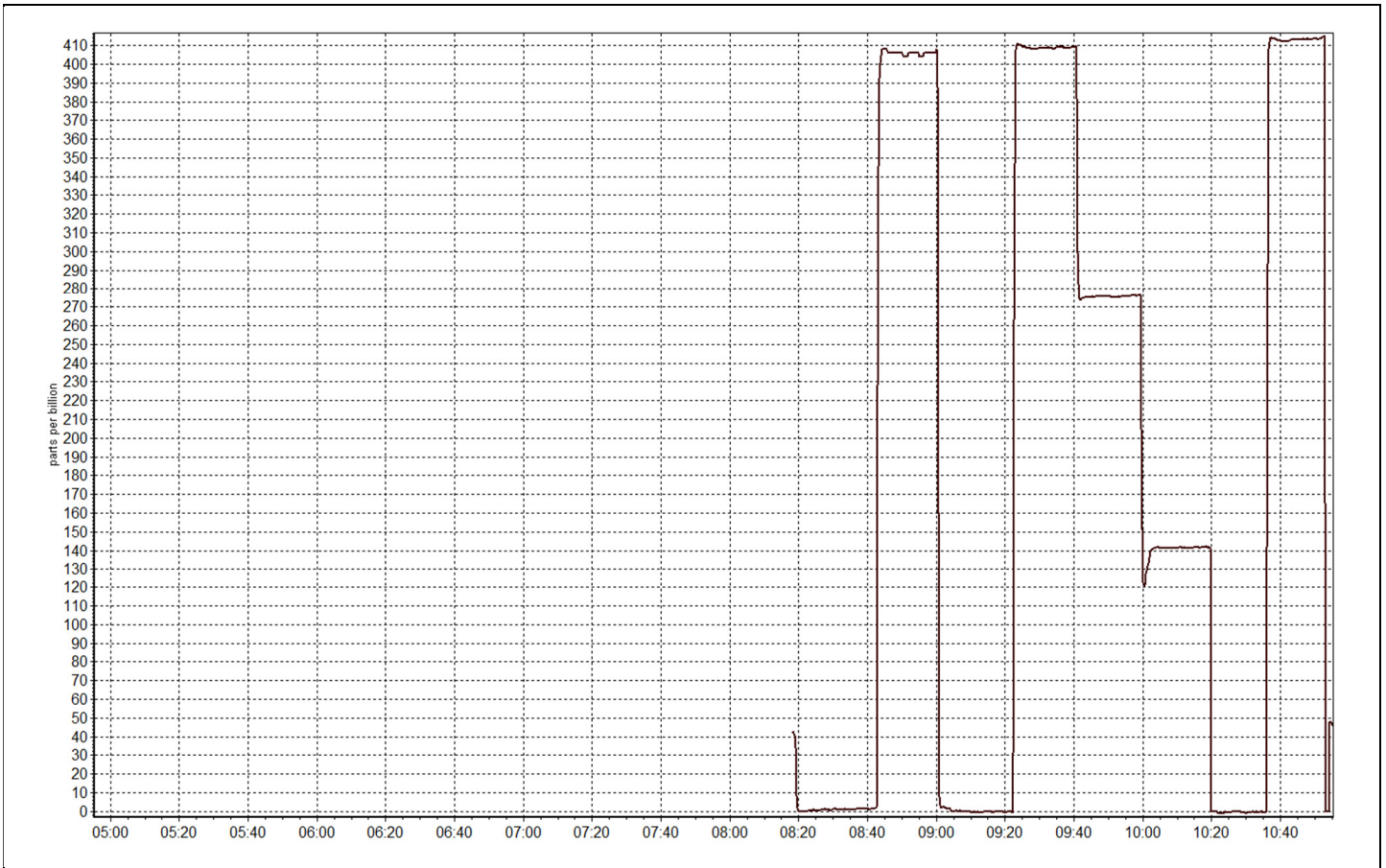
Calibration Date	May-16-14	Previous Calibration	April 4, 2014
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	8:18	End Time (MST)	10:56
Analyzer make	T400	Analyzer serial #	824

### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.2	N/A	Correlation Coefficient	0.999955
405.0	409.0	0.9902		
273.0	276.0	0.9891	Slope	0.987908
143.0	142.0	1.0070		
			Intercept	1.046850









# Wood Buffalo Environmental Association

## NO<sub>x</sub>-NO-NO<sub>2</sub> Calibration Report

### Station Information

Calibration Date	May 15, 2014	Previous Calibration	April 10, 2014
Station Name	Wapasu	Station Number	AMS 17
Reason:	Routine		
Start Time (MST)	11:30	End Time (MST)	14:30
Barometric Pressure	mmHg	Station Temperature	21.0 Deg C
Calibrator	API T700	Serial Number	997
NO Cal Gas Conc	49.7 ppm	Cal Gas Expiry Date	December 12, 2016
NOx Cal Gas Conc	49.7 ppm	Cal Gas Serial #	SA130010A

### DACS Information

DACS make & model Campbell Scientific CR3000      DACS serial No. 6894

Parameter		NOx	NO	NO2
MV conversion	Analyzer Range (ppb)	1000	1000	1000
	Analyzer Range (mv)	1000	1000	1000
Before	Data Slope	0.999095	0.998041	1.005342
	Data Offset	0.287661	0.433306	-0.048572
After	Data Slope	0.999657	0.997799	1.001676
	Data Offset	-1.281904	-0.439817	0.645145
Channel #				
Voltage Range				

### Analyzer Information

Analyzer make/model API T200      Analyzer serial # 833

Test Point	before		after	
Concentration range	1000	ppb	1000	ppb
NO coefficient	0.928	ppb	0.947	ppb
NOX coefficient	0.932	ppb	0.948	ppb
NO2 coefficient	1.000	ppb	1.000	ppb
NO bkgrnd	-0.5		-2.2	
NOX bkgrnd	1.1		-1.7	
Nt coefficient				
Chamber Temp	50.0	Deg C	50.0	Deg C
Moly Temp	316.8	Deg C	316.8	Deg C
PMT Temp	7.0	Deg C	7.0	Deg C
O3 flow	71.0	ccm	71.0	ccm
R Cell Press	4.8	mmHg	4.8	mmHg
Sample Flow	448.000	ccm	448.000	ccm

**Notes:**

Zero and span adjustments were performed.



# Wood Buffalo Environmental Association

## NO<sub>x</sub>-NO-NO<sub>2</sub> Calibration Report

### Station Information

Calibration Date:

May 15, 2014

Station Number:

AMS 17

### 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 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
as found zero	5000	0.0	0.0	0.0	0.0	-0.4	-0.4	0.0	N/A	N/A
as found span	5000	60.4	600.4	600.4	0.0	589.0	585.0	4.2	1.0193	1.0263
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	0.0	0.1	N/A	N/A
high point	5000	60.4	600.4	600.4	0.0	601.0	602.0	-0.3	0.9990	0.9973
second point	5000	30.2	300.2	300.2	0.0	303.0	302.0	0.3	0.9907	0.9940
third point	5000	15.1	150.1	150.1	0.0	152.0	150.0	1.4	0.9875	1.0006
calibrator zero	6000	0.0	0.0	0.0	0.0	1.4	1.2	0.2	N/A	N/A
as left zero	6000	0.0	0.0	0.0	0.0	1.4	1.2	0.2	N/A	N/A
as left span	5000	60.4	600.4	198.0	402.4	597.0	195.0	402.0	1.0057	1.0154
Average Correction Factor									0.9924	0.9973

Corrected As found

NO<sub>x</sub>= 589.4

NO= 585.4

Percent Change

NO<sub>x</sub>= 1.9%

NO= 2.7%

Previous Response

NO<sub>x</sub>= 600.6

NO= 601.1

### GPT Calibration Data

Dilution Flow

5000

ccm

Source Gas Flow

60.40

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			0.1			N/A	
1st NO <sub>2</sub> (300)	N/A	198.0	405.0	602.0	198.0	404.0	0.9854	1.0000	1.0025	99.8%
2nd NO <sub>2</sub> (200)	N/A	330.0	273.0	601.0	330.0	272.0	0.9870	1.0000	1.0037	99.6%
3rd NO <sub>2</sub> (100)	N/A	460.0	143.0	601.0	460.0	141.0	0.9870	1.0000	1.0142	98.6%
4th NO <sub>2</sub> (0)	603.0	N/A	-1.0	602.0	603.0	-0.4	0.9854	1.0000	N/A	N/A
Average Correction Factor							0.9862	1.0000	1.0068	99.3%

Calibration Performed By:

Melissa Lemay



# Wood Buffalo Environmental Association

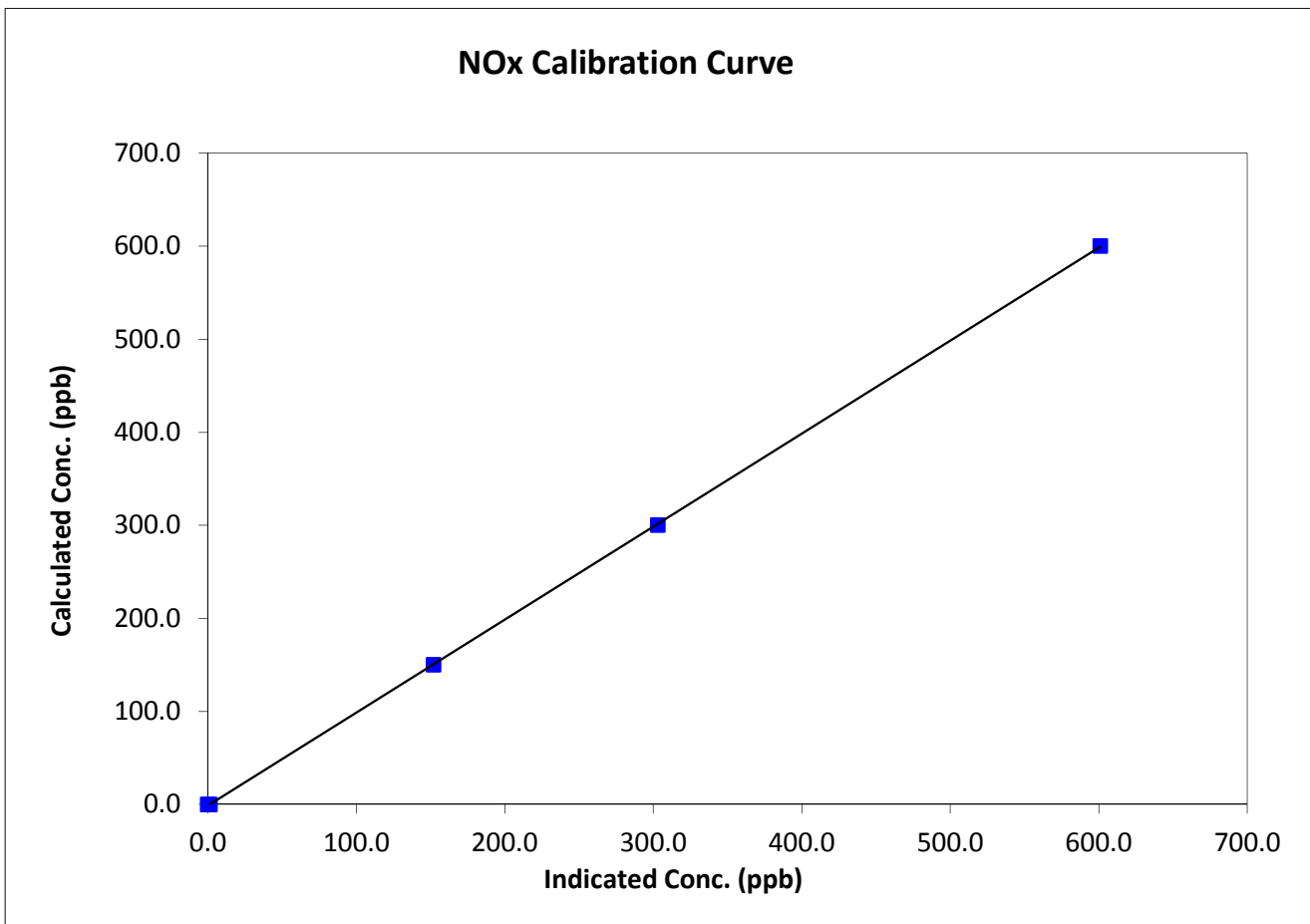
## NO<sub>x</sub> Calibration Summary

### Station Information

Calibration Date	May 15, 2014	Previous Calibration	April 10, 2014
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	11:30	End Time (MST)	14:30
Analyzer make	API T200	Analyzer serial #	833

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999981
600.4	601.0	0.9990		
300.2	303.0	0.9907	Slope	0.999657
150.1	152.0	0.9875		
0.0	1.4	0.0000	Intercept	-1.281904





# Wood Buffalo Environmental Association

## NO Calibration Summary

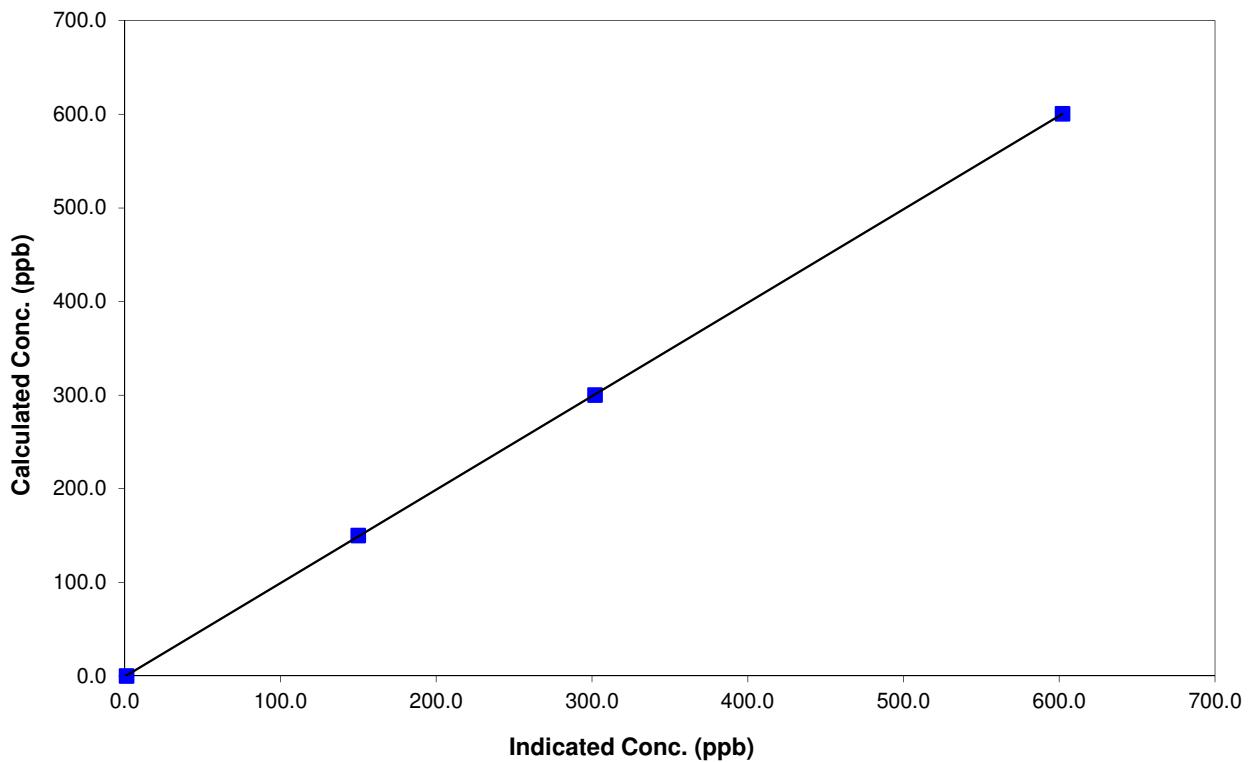
### Station Information

Calibration Date	May 15, 2014	Previous Calibration	April 10, 2014
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	11:30	End Time (MST)	14:30
Analyzer make	API T200	Analyzer serial #	833

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999992
600.4	602.0	0.9973		
300.2	302.0	0.9940	Slope	0.997799
150.1	150.0	1.0006		
0.0	1.2	0.0000	Intercept	-0.439817

### NO Calibration Curve





# Wood Buffalo Environmental Association

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

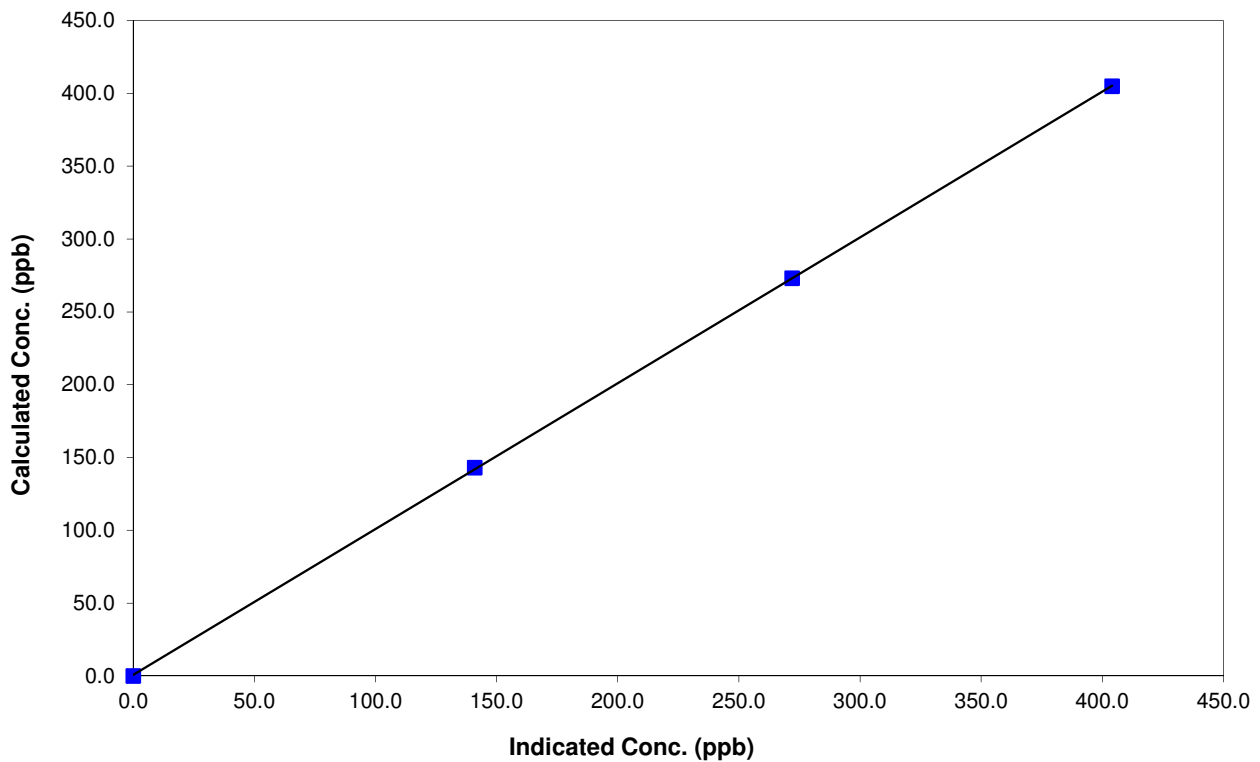
### Station Information

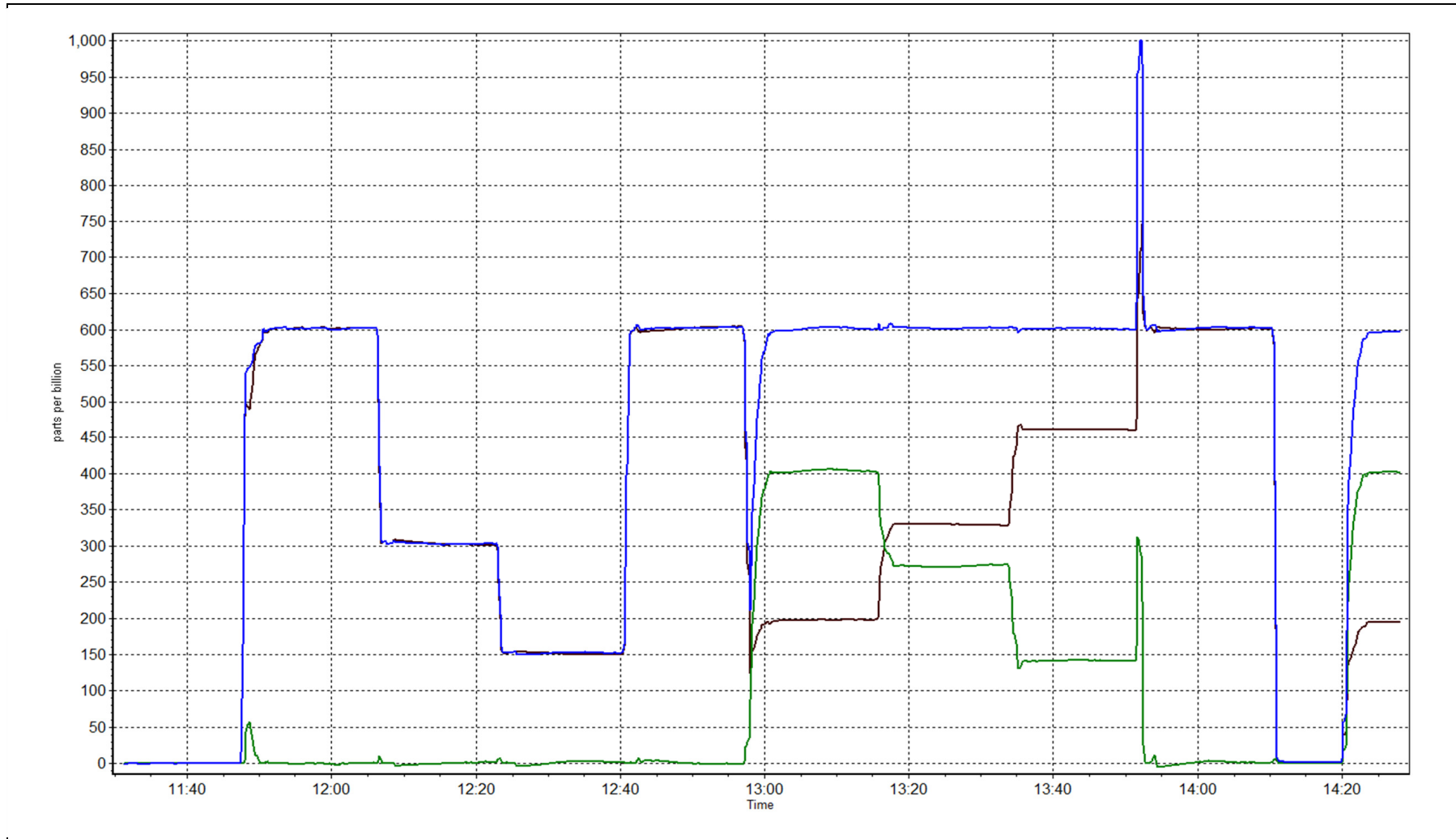
Calibration Date	May 15, 2014	Previous Calibration	April 10, 2014
Station Number	Wapasu	Station Number	AMS 17
Start Time (MST)	11:30	End Time (MST)	14:30
Analyzer make	API T200	Analyzer serial #	833

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	N/A	Correlation Coefficient	0.999980
405.0	404.0	1.0025		
273.0	272.0	1.0037	Slope	1.001676
143.0	141.0	1.0142		
			Intercept	0.645145

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







# Wood Buffalo Environmental Association

## SHARP AUDIT / CALIBRATION

### STATION INFORMATION

Calibration Date:	<u>May 16, 2014</u>	Previous Calibration:	<u>April 9, 2014</u>
Station Name:	<u>Wapasu</u>	Station Number:	<u>17</u>
Start Time (MST):	<u>11:04</u>	End Time (MST):	<u>11:53</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-1107</u>
Source SN:	<u>2518</u>
Mass Foil Set SN:	<u>1337</u>
HEPA PN:	<u>N/A</u>
Time Correct (MST):	<u>Yes</u>
Parameters Checked:	<u>T1, P3, Main Flow, Neph</u>

### AUDIT DATA

#### Temperature (deg C)

Sensor	Indicated	Measured	Difference	Final Indicated
T1	6.0	7.0	1.0	6.0
T2	N/A	N/A	#VALUE!	N/A
T3	N/A	N/A	#VALUE!	N/A
T4	N/A	N/A	#VALUE!	N/A

#### Pressure (Hpa)

Sensor	Indicated	Measured	Difference	Final Indicated
P3	959	958.0	-1.0	959

#### Main Flow (Lph)

	Indicated	Measured	Difference	Final Indicated
	1000	920	-80	1000

#### Mass Foil Calibration

Zeroed?:	<u>Yes</u>
Foil Mass:	<u>1337</u>
Previous Correction Factor:	<u>6775</u>
New Correction Factor:	<u>6924</u>

#### Nephelometer Calibration

Parameter	As Found	Zeroed	As Left
Analog	185	Yes	185.5
Neph	-10	Yes	-1.1
C14	-2.9	Yes	-2.9
Indicated Concentration (ug/m3)	1.1	Yes	-0.6
Range 1	183	Yes	183
Range 2	30.4	na	30.6

### INSPECTION DATA

Item	Condition	Item	Condition
Cyclone	Good	HEPA filter	Good
Pump	Good		
Filter Tape	Good		
Mass Foil Cal Set	Good		

### NOTES:

Cyclone Head Changed

**Audit Performed By:** Melissa Lemay





# Wood Buffalo Environmental Association

## SHARP AUDIT / CALIBRATION

### STATION INFORMATION

Calibration Date:	<u>May 20, 2014</u>	Previous Calibration:	<u>May 16, 2014</u>
Station Name:	<u>Wapasu</u>	Station Number:	<u>17</u>
Start Time (MST):	<u>10:10</u>	End Time (MST):	<u>11:49</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-1107</u>
Source SN:	<u>2518</u>
Mass Foil Set SN:	<u>1337</u>
HEPA PN:	<u>N/A</u>
Time Correct (MST):	<u>Yes</u>
Parameters Checked:	<u>Main Flow, Neph, Foil</u>

### AUDIT DATA

#### Temperature (deg C)

Sensor	Indicated	Measured	Difference	Final Indicated
T1	N/A	N/A	#VALUE!	N/A
T2	N/A	N/A	#VALUE!	N/A
T3	N/A	N/A	#VALUE!	N/A
T4	N/A	N/A	#VALUE!	N/A

#### Pressure (Hpa)

Sensor	Indicated	Measured	Difference	Final Indicated
P3	N/A	N/A	#VALUE!	N/A

#### Main Flow (Lph)

Indicated	Measured	Difference	Final Indicated
1000	1000	0	1000

#### Mass Foil Calibration

Zeroed?:	<u>Yes</u>
Foil Mass:	<u>1337</u>
Previous Correction Factor:	<u>6924</u>
New Correction Factor:	<u>7106</u>

#### Nephelometer Calibration

Parameter	As Found	Zeroed	As Left
Analog	183	NO	183
Neph	-0.3	NO	-0.3
C14	58.9	NO	58
Indicated Concentration (ug/m3)	-0.2	NO	-0.1
Range 1		na	
Range 2		na	

#### INSPECTION DATA

Item	Condition	Item	Condition
Cyclone	Good	HEPA filter	Good
Pump	Good		
Filter Tape	Good		
Mass Foil Cal Set	Good		

#### NOTES:

Cleaned out Nephelometer and Above the tape  
 Also found that the inlet was not tightened all the way  
 Performed HEPA filter zero test before and after maintenance

**Audit Performed By:** Melissa Lemay

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**WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS 500  
CENOVUS  
CHRISTINA LAKE  
MAY 2014**

Operations and Data Collection by:  
Wood Buffalo Environmental Association  
Fort McMurray, Alberta

QA/QC, Data Validation and Reporting by:  
Aurora Atmospheric Inc.  
Calgary, Alberta

June 27, 2014

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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CENOVUS CHRISTINA LAKE (AMS 500)  
MAY 2014

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	705	37	39	99.73	10	0	2	0
H2S (ppb) Average	659	32	85	92.88	2	0	0	0
NO2 (ppb) Average	705	37	39	99.73	16	0	5	-
NO (ppb) Average	705	37	39	99.73	17	-	3	-
NOX (ppb) Average	705	37	39	99.73	26	-	9	-
Temperature 2 m (C) Average	744	0	0	100.00	27.1	-	19.7	-
Relative Humidity (%) Average	744	0	0	100.00	99	-	-	-
Wind Speed 10 m (km/h) Average	723	0	21	97.18	32	-	-	-
Wind Direction 10 m (deg) Average	723	0	21	97.18	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - GENOVUS CHRISTINA LAKE (AMS 500)  
MAY 2014

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	705	0.6	1	-	0	0	0	0	1	1	10
H2S (ppb) Average	659	0.3	0	-	0	0	0	0	0	0	2
NO2 (ppb) Average	705	1.8	2	-	0	0	0	1	2	5	16
NO (ppb) Average	705	1.4	2	-	0	0	1	1	1	3	17
NOX (ppb) Average	705	3.2	4	-	0	1	1	2	4	8	26
Temperature 2 m (C) Average	744	7.82	6.9	-	-4.9	-1.4	1.9	7.8	12.8	17.2	27.1
Relative Humidity (%) Average	744	64.6	22	-	23	32	45	65	86	94	99
Wind Speed 10 m (km/h) Average	723	10.5	6	-	1	4	6	10	14	19	32
Wind Direction 10 m (deg) Average	723	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CENOVUS CHRISTINA LAKE (AMS 500)  
MAY 2014

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2	13 May 2014 03:00	13 May 2014 03:00	1	Stabilization after daily span
SO2	26 May 2014 03:00	26 May 2014 03:00	1	Stabilization after daily span
H2S	04 May 2014 11:00	06 May 2014 08:00	46	Analyzer Failure - thermal converter replaced
H2S	09 May 2014 02:00	09 May 2014 02:00	1	Intermittent unstable operation - baseline spike
H2S	10 May 2014 21:00	10 May 2014 21:00	1	Intermittent unstable operation - baseline spike
H2S	15 May 2014 14:00	15 May 2014 14:00	1	Intermittent unstable operation - baseline spike
H2S	21 May 2014 21:00	21 May 2014 21:00	1	Intermittent unstable operation - baseline spike
H2S	26 May 2014 10:00	26 May 2014 11:00	2	Intermittent unstable operation - baseline spike
H2S	30 May 2014 01:00	30 May 2014 01:00	1	Intermittent unstable operation - baseline spike
NO2, NO, NOX	12 May 2014 14:00	12 May 2014 15:00	2	Intermittent unstable operation - baseline/ power spike
Wind Speed, Wind Direction	05 May 2014 23:00	06 May 2014 11:00	13	Flatline in sensor output signal
Wind Speed, Wind Direction	16 May 2014 23:00	16 May 2014 23:00	1	Flatline in sensor output signal
Wind Speed, Wind Direction	18 May 2014 06:00	18 May 2014 06:00	1	Flatline in sensor output signal
Wind Speed, Wind Direction	22 May 2014 01:00	22 May 2014 01:00	1	Flatline in sensor output signal
Wind Speed, Wind Direction	22 May 2014 23:00	22 May 2014 23:00	1	Flatline in sensor output signal
Wind Speed, Wind Direction	23 May 2014 03:00	23 May 2014 04:00	2	Flatline in sensor output signal
Wind Speed, Wind Direction	23 May 2014 06:00	23 May 2014 06:00	1	Flatline in sensor output signal
Wind Speed, Wind Direction	25 May 2014 00:00	25 May 2014 00:00	1	Flatline in sensor output signal

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Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 10 ppb on May 24 14:00	Maximum Daily Average: 2.0 ppb on May 24		Hours of Data:	705
Minimum Value: 0 ppb on May 15 23:00	Minimum Daily Average: 0.2 ppb on May 26		Hours of Missing Data:	39
Maximum Diurnal Average: 1.0 ppb at hour 15	Minimum Diurnal Average: 0.3 ppb at hour 23		Hours of Calibration:	37
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> = 5		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-May	0	Z	0	0	0	2	2	1	1	1	0	1	1	1	0	0	0	1	0	0	0	0	0	0	0.6	2
2-May	1	Z	4	3	2	3	4	5	5	2	1	1	1	0	0	0	0	0	0	0	1	1	1	0	1.6	5
3-May	0	Z	4	7	3	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.9	7
4-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
5-May	0	Z	0	0	0	0	1	2	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0.4	2
6-May	0	Z	0	0	0	0	0	0	0	0	C	C	C	C	C	C	0	0	0	0	0	0	0	1	--	1
7-May	4	Z	7	4	1	0	2	3	1	1	2	3	1	3	2	2	0	1	1	1	1	0	0	0	1.8	7
8-May	0	Z	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0.6	1
9-May	0	Z	0	0	0	0	0	0	1	0	1	2	1	1	1	1	0	0	0	0	0	0	0	0	0.5	2
10-May	0	Z	1	1	2	2	1	2	3	2	2	2	3	1	2	1	1	1	0	0	0	0	1	2	1.3	3
11-May	3	Z	4	2	0	0	1	0	0	1	0	1	1	2	1	1	1	0	0	0	0	0	0	0	1.0	4
12-May	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	2	0	0	0	1	1	1	0	0	1	0.5	2
13-May	0	Z	UO	0	0	0	0	0	0	0	1	1	0	0	1	1	2	0	0	0	0	0	0	0	0.4	2
14-May	0	Z	0	0	0	0	0	0	1	0	0	1	0	1	1	0	1	1	1	0	1	0	0	0	0.5	1
15-May	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1
16-May	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0.4	1
17-May	0	Z	0	0	0	0	0	0	1	0	0	0	1	1	1	0	1	0	0	0	0	0	0	0	0.4	1
18-May	0	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-May	0	Z	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
20-May	0	Z	0	1	0	0	0	1	1	0	0	0	0	0	0	0	1	0	1	1	0	0	1	0	0.5	1
21-May	1	Z	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0.5	1
22-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
23-May	0	Z	0	0	0	0	0	1	1	1	1	1	1	0	1	1	0	1	0	0	0	0	0	4	0.6	4
24-May	1	Z	0	0	0	0	0	1	2	2	0	4	6	10	8	2	2	3	3	2	0	0	0	0	2.0	10
25-May	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0.4	1
26-May	0	Z	UO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
27-May	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0.3	1
28-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
29-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	1	0	0	0	0.5	3
30-May	0	Z	0	0	0	0	0	0	0	0	1	1	1	2	5	4	2	0	0	0	0	0	0	0	0.9	5
31-May	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0.3	1

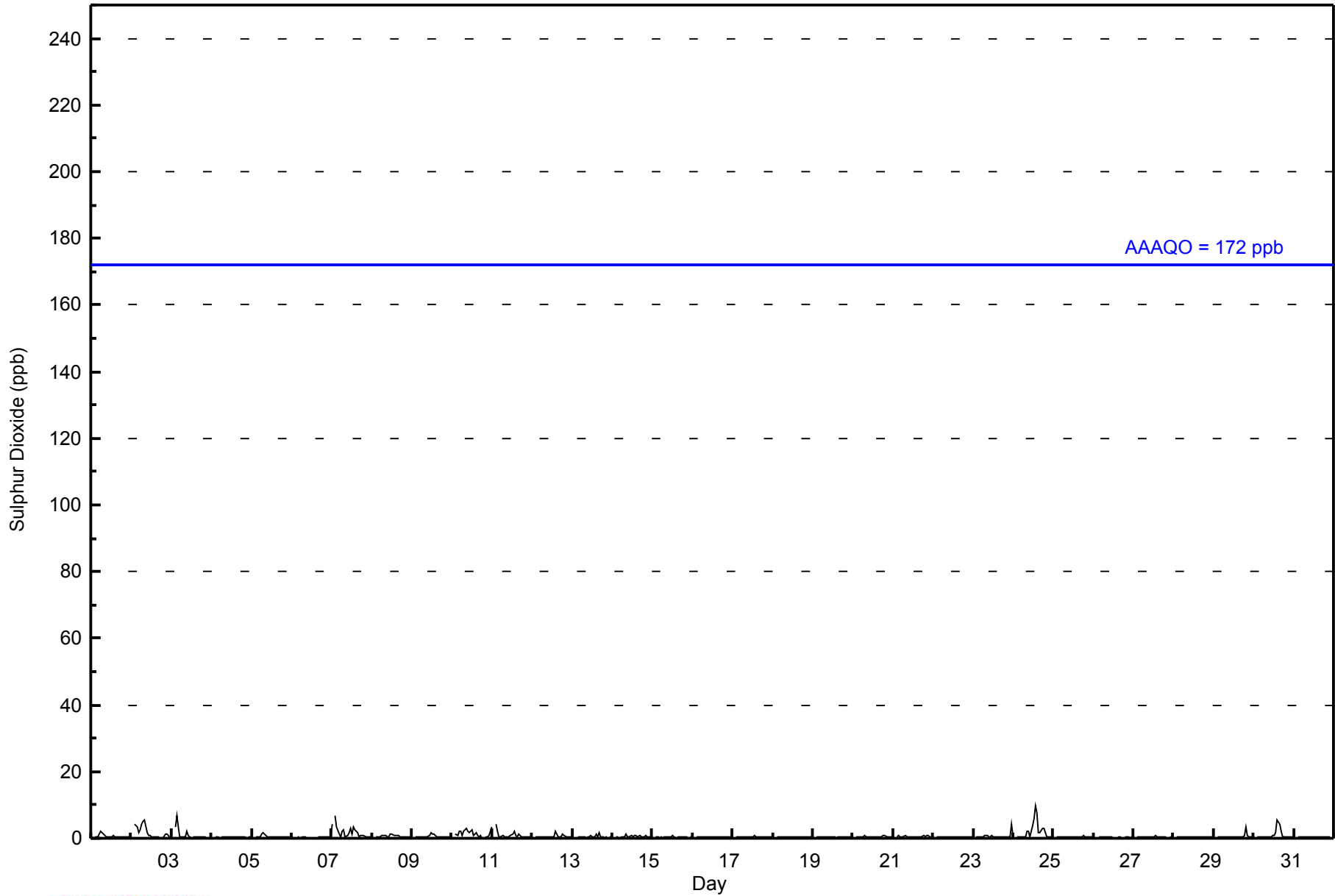
0.5	--	1.0	0.8	0.5	0.5	0.7	0.8	0.7	0.6	0.5	0.8	0.8	1.0	1.0	0.6	0.5	0.5	0.5	0.5	0.4	0.4	0.3	0.5	Diurnal Average	
4	--	7	7	3	3	4	5	5	2	2	4	6	10	8	4	2	3	3	3	1	1	1	4	Diurnal Maximum	

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



WBEA  
Hourly Averages

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Cenovus - Christina Lake - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Cenovus - Christina Lake - May 2014**

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

Total Number of Valid Hours: 705

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Cenovus - Christina Lake - May 2014**

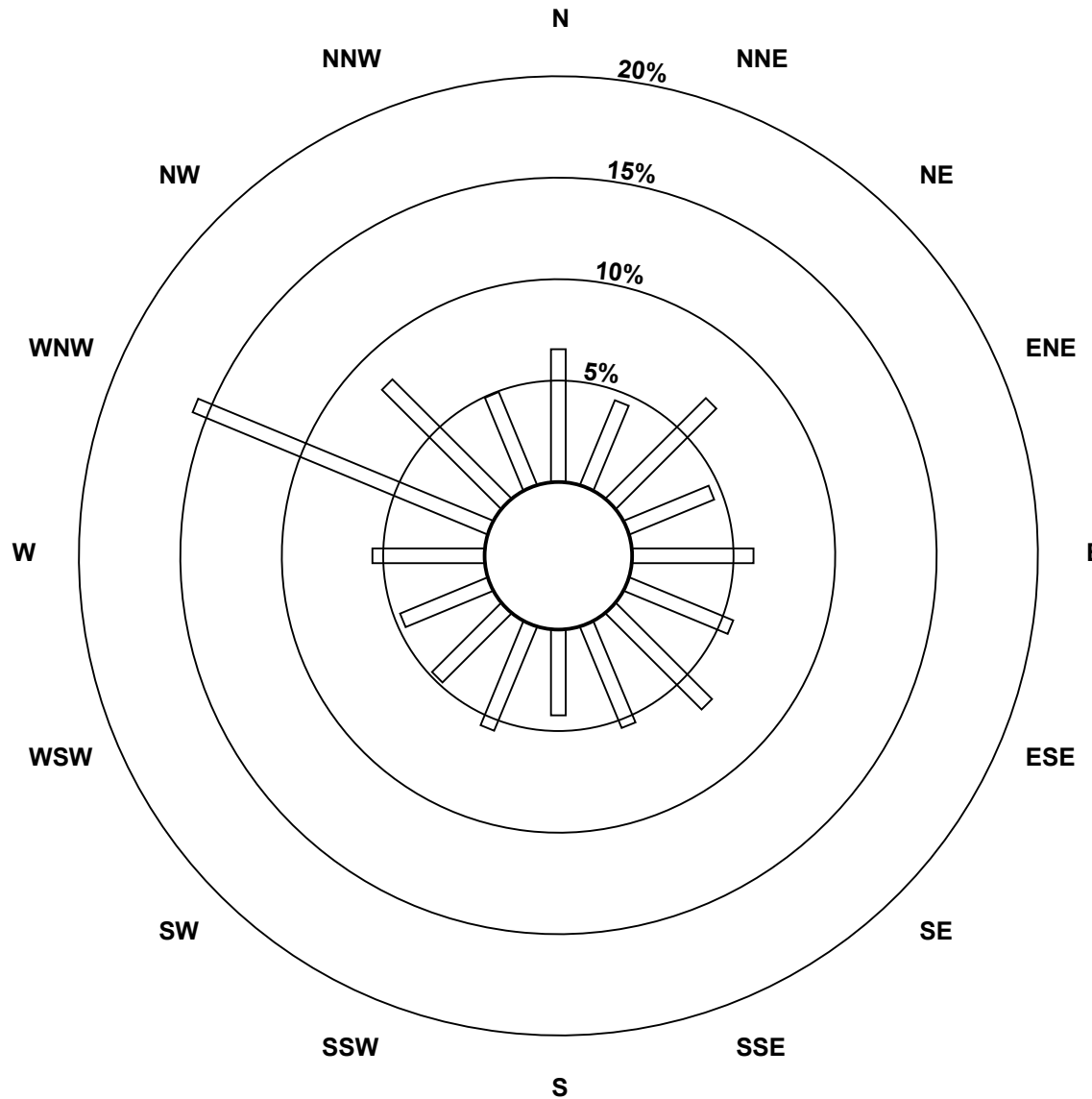
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	45	31	48	31	41	38	46	37	29	38	33	32	38	108	57	34	686
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	45	31	48	31	41	38	46	37	29	38	33	32	38	108	57	34	686

Total Number of Valid Hours: 686

Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Cenovus - Christina Lake (AMS500)**



Classes (ppb)

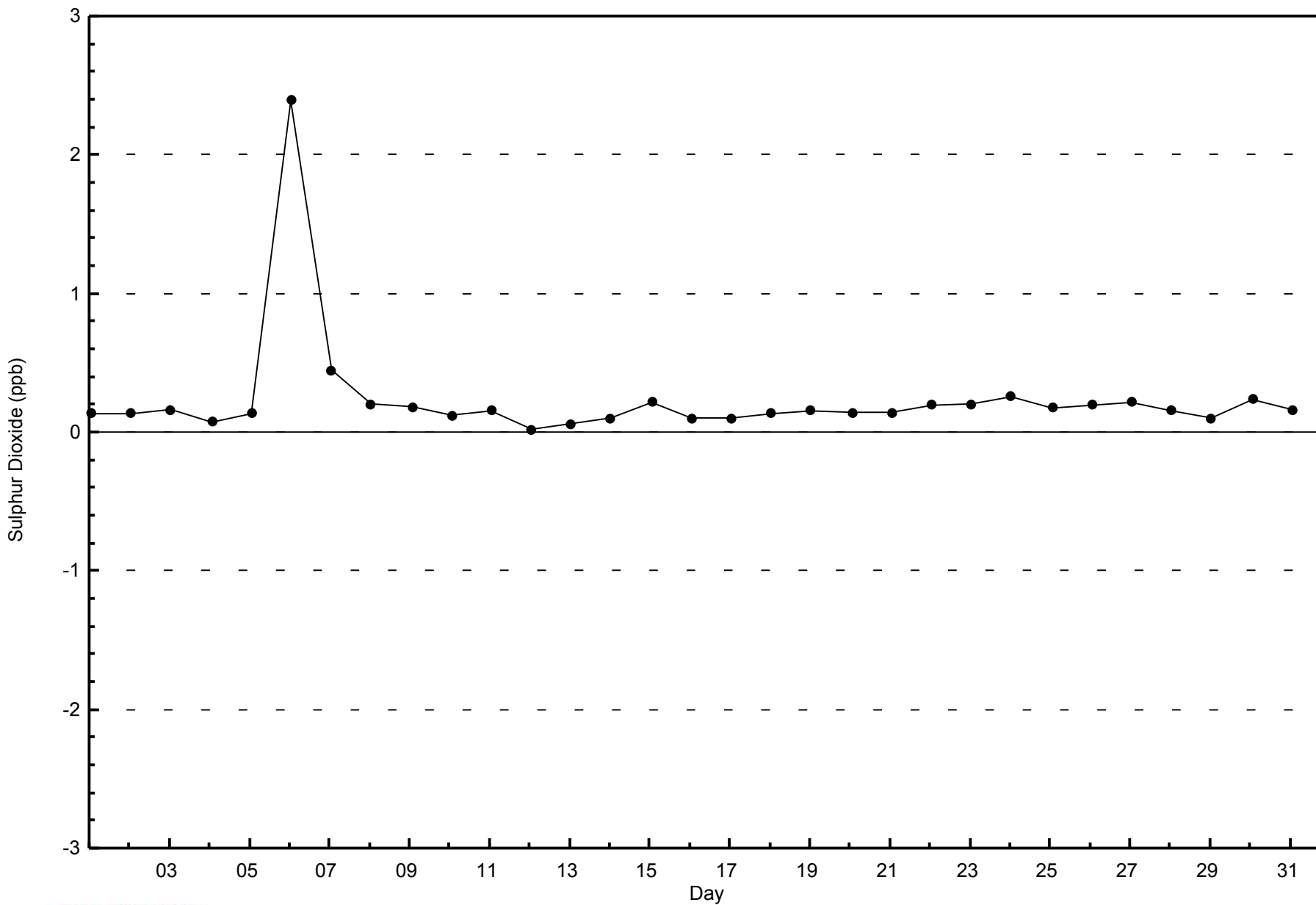


Total Number of Valid Hours: 686



WBEA  
Zero Responses

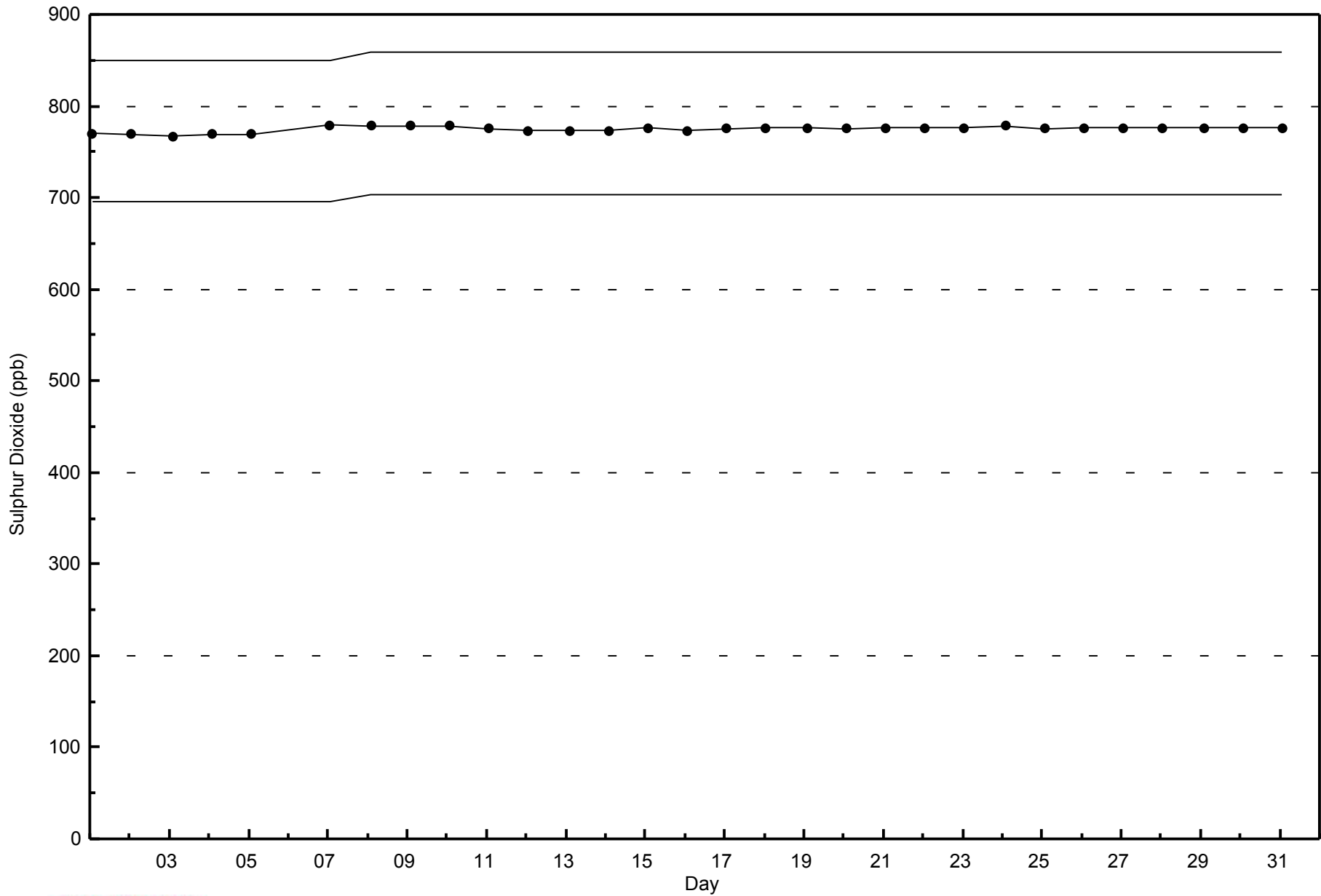
Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Cenovus - Christina Lake - May 2014





WBEA  
Span Responses

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Cenovus - Christina Lake - May 2014





Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 2 ppb on May 21 23:00	Maximum Daily Average: 0.5 ppb on May 2		Hours of Data:	659
Minimum Value: 0 ppb on May 16 11:00	Minimum Daily Average: 0.1 ppb on May 3		Hours of Missing Data:	85
Maximum Diurnal Average: 0.3 ppb at hour 23	Minimum Diurnal Average: 0.2 ppb at hour 18		Hours of Calibration:	32
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> = 0 P <sub>99</sub> = 1		Percent Operational Time:	92.9

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-May	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0.4	1
2-May	1	1	Z	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1
3-May	0	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
4-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	--	0
5-May	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-May	AF	AF	AF	AF	AF	AF	AF	AF	C	C	C	0	0	0	0	0	0	0	0	0	1	1	0	1	--	1
7-May	1	1	Z	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
8-May	0	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-May	0	UO	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
10-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	UO	0	1	1	0.3	1
11-May	1	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.3	1
12-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.3	1
13-May	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
14-May	0	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-May	0	0	Z	0	0	0	0	0	0	0	0	0	UO	0	0	0	0	0	0	0	0	0	0	0	0.3	0
16-May	0	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
17-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
18-May	0	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-May	0	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-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
21-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	UO	1	2	0	0.3	2
22-May	0	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
23-May	1	0	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
24-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.3	1
25-May	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
26-May	0	0	Z	0	0	0	0	0	0	UO	UO	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
27-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.2	1
28-May	0	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
29-May	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.2	1
30-May	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
31-May	0	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

0.3	0.3	--	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	Diurnal Average	
1	1	--	1	1	1	1	1	1	1	0	0	0	0	1	1	0	0	0	0	0	1	1	1	2	1	Diurnal Maximum

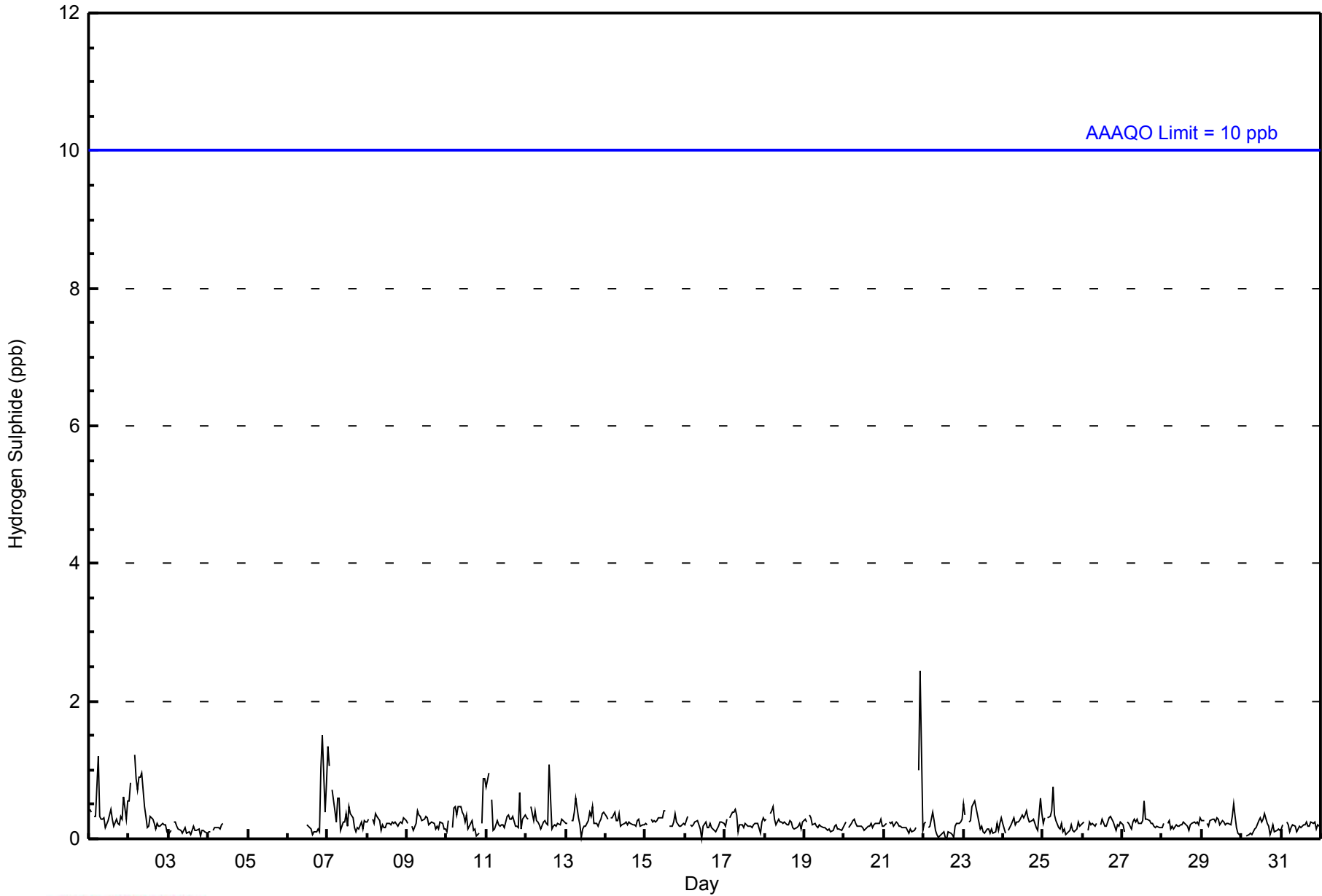
Z - zerospan                      C - Calibration                      AF - Analyzer Failure                      UO - Unstable Operation  
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb      24-hr 3 ppb





WBEA  
Hourly Averages

Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Cenovus - Christina Lake - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Cenovus - Christina Lake - May 2014**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	659	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: 659

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Cenovus - Christina Lake - May 2014**

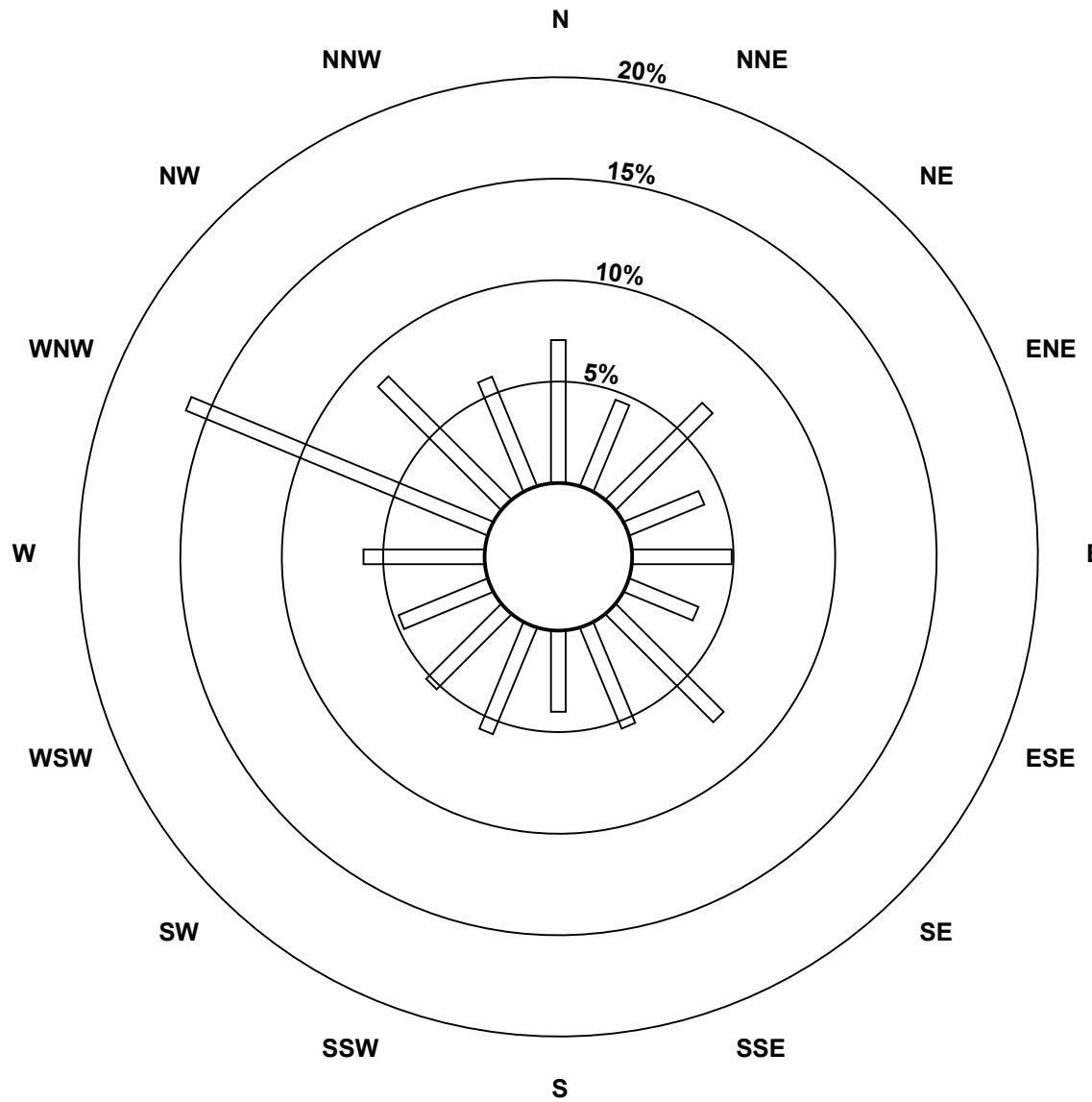
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	46	30	44	26	32	24	49	35	26	37	34	31	39	105	56	38	652
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	46	30	44	26	32	24	49	35	26	37	34	31	39	105	56	38	652

Total Number of Valid Hours: 652

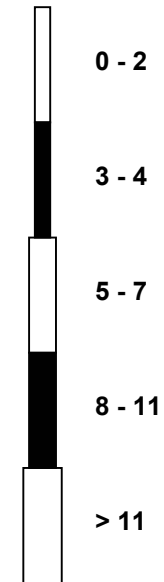
Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Cenovus - Christina Lake (AMS500)**



Classes (ppb)

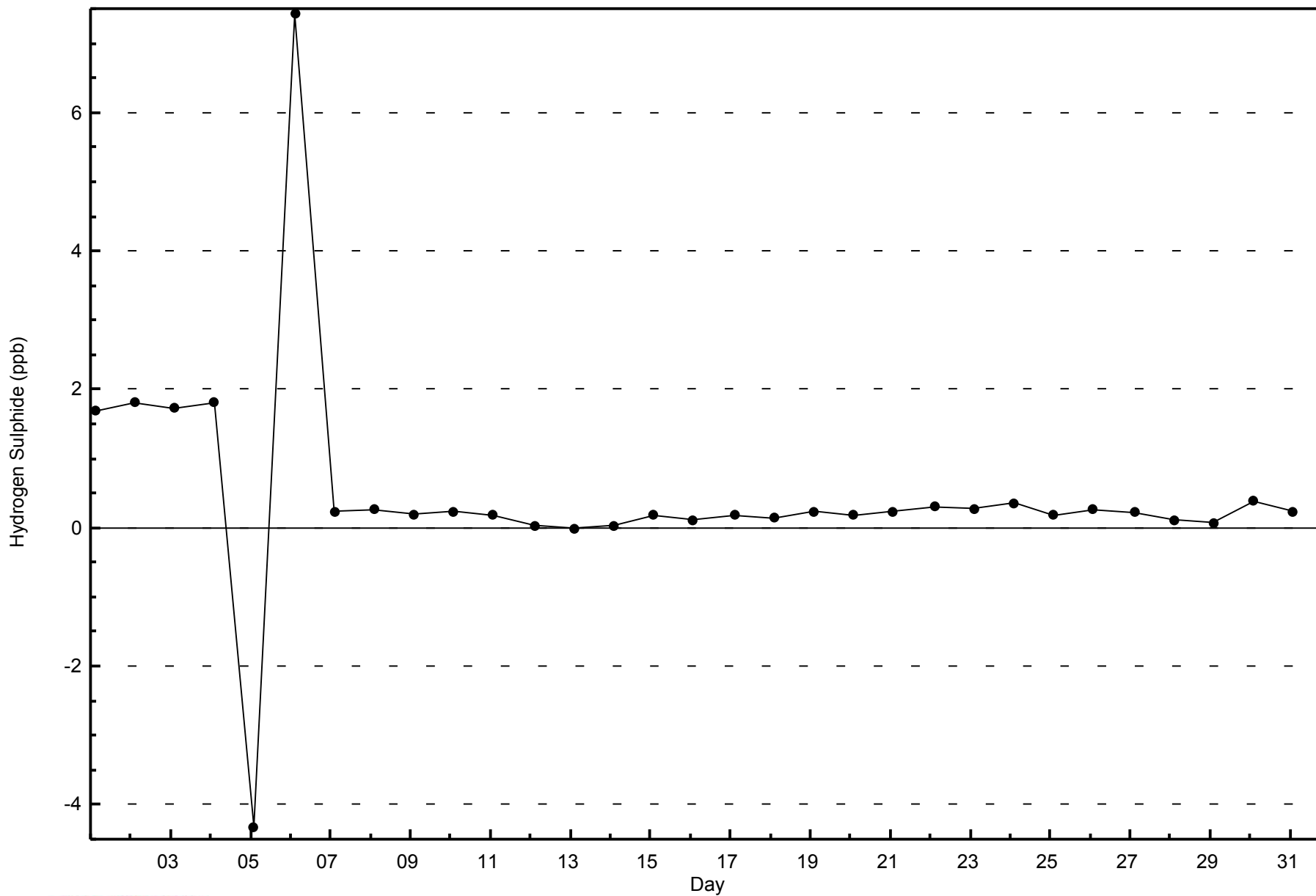


**Total Number of Valid Hours: 652**



WBEA  
Zero Responses

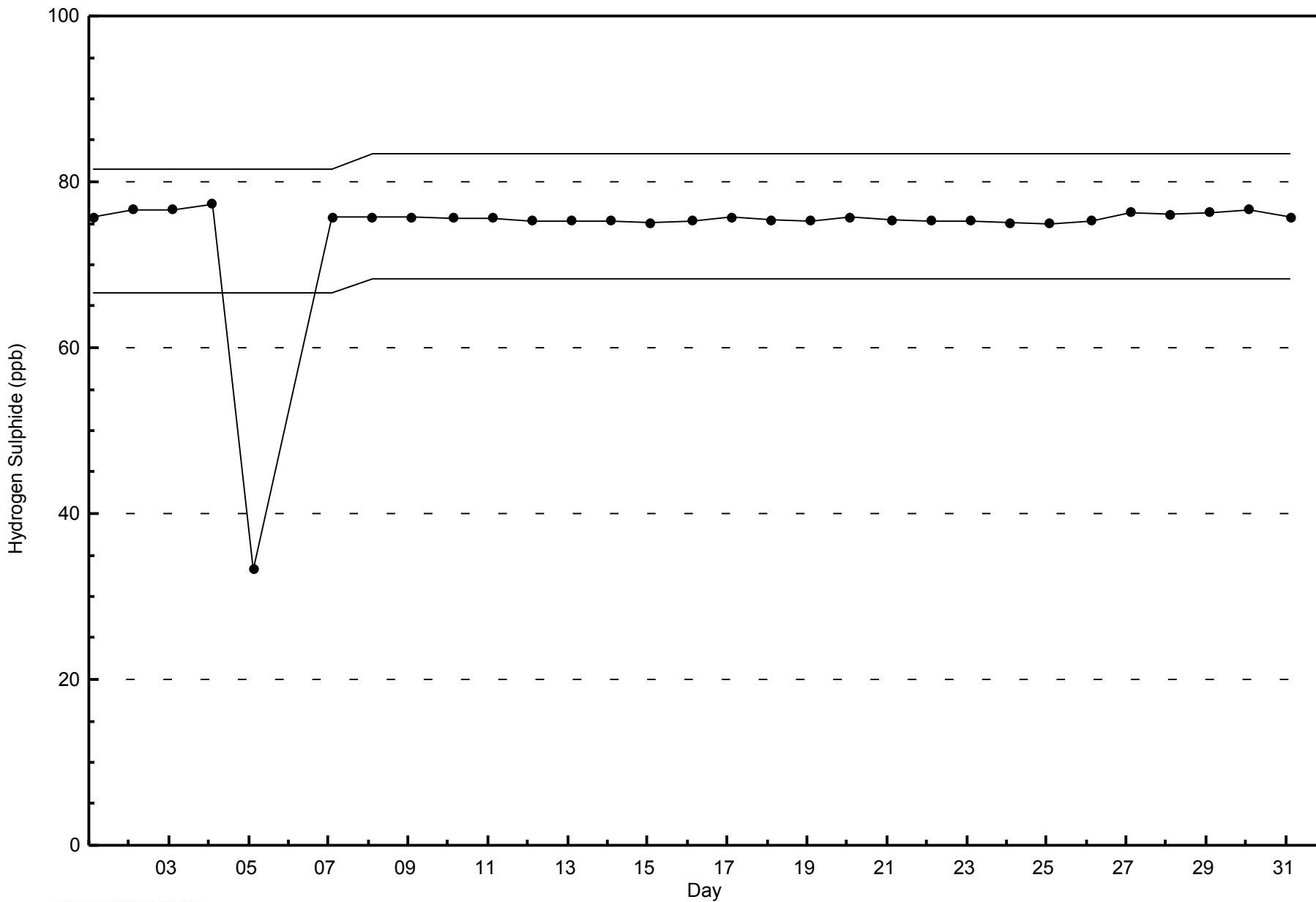
Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Cenovus - Christina Lake - May 2014





WBEA  
Span Responses

Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Cenovus - Christina Lake - May 2014



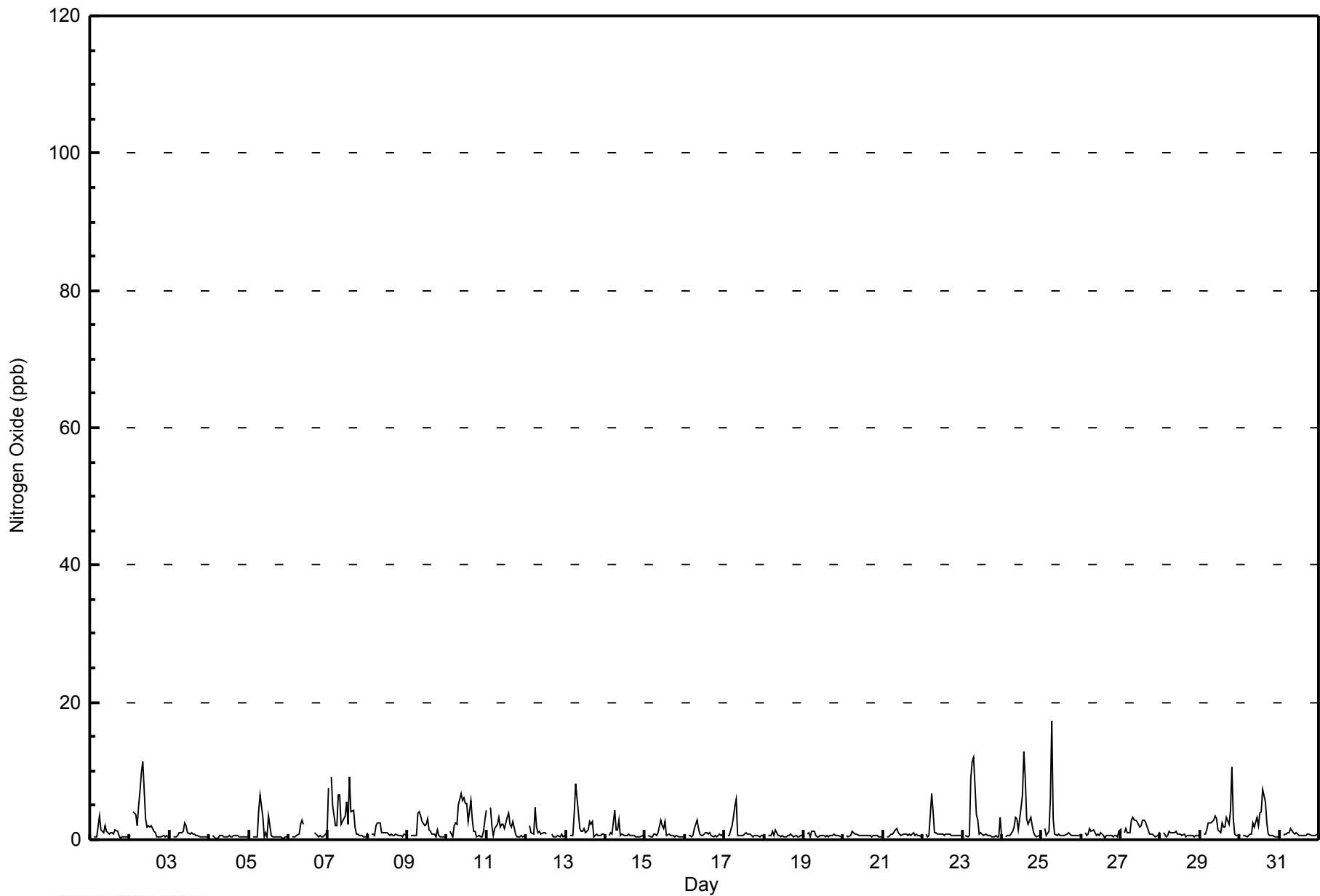


Maximum Value: 17 ppb on May 25 07:00																		Maximum Daily Average: 3.4 ppb on May 7						Hours in Service: 744																								
Minimum Value: 0 ppb on May 4 06:00																		Minimum Daily Average: 0.5 ppb on May 4						Hours of Data: 705																								
Maximum Diurnal Average: 3.2 ppb at hour 7																		Minimum Diurnal Average: 0.5 ppb at hour 22						Hours of Missing Data: 39																								
Monthly Average: 1.4 ppb																		Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 0 Q <sub>1</sub> = 1 Median = 1 Q <sub>3</sub> = 1 P <sub>90</sub> = 3 P <sub>99</sub> = 9						Hours of Calibration: 37																								
																		Percent Operational Time: 99.7																														
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-May	0	Z	0	0	0	3	1	1	1	2	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0.9	3																						
2-May	1	Z	4	4	2	5	7	10	11	3	2	2	2	2	1	1	0	0	0	0	1	0	1	0	2.6	11																						
3-May	0	Z	0	0	0	1	1	1	1	2	2	1	1	1	1	1	1	1	0	0	0	0	0	0	0.8	2																						
4-May	0	Z	1	0	0	0	1	1	1	0	0	0	1	0	0	1	1	1	0	0	0	0	0	0	0.5	1																						
5-May	1	Z	0	0	0	0	4	6	3	0	1	0	4	1	1	1	0	0	0	1	0	0	0	0	1.1	6																						
6-May	0	Z	0	0	0	1	1	2	3	2	C	C	C	C	C	C	1	1	0	1	0	0	1	1	--	3																						
7-May	8	Z	9	5	2	2	7	6	2	3	3	5	2	9	4	4	2	1	1	1	1	0	0	0	3.4	9																						
8-May	1	Z	1	1	1	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1.0	2																						
9-May	1	Z	1	1	1	1	4	4	3	3	2	2	3	1	1	1	1	1	1	1	1	0	0	0	1.4	4																						
10-May	0	Z	1	1	2	3	2	5	7	6	6	5	5	3	6	3	1	1	0	1	0	1	1	3	2.7	7																						
11-May	4	Z	5	2	1	2	2	3	2	2	2	2	3	4	2	2	3	1	0	0	0	1	0	1	1.9	5																						
12-May	1	Z	2	1	1	5	2	1	1	1	1	1	1	UO	UO	1	0	0	0	1	0	1	1	1	1.0	5																						
13-May	0	Z	1	1	1	4	8	4	2	1	1	2	1	2	3	2	3	0	1	1	1	1	1	1	1.7	8																						
14-May	0	Z	1	1	1	4	1	1	3	1	1	1	1	1	1	1	1	1	0	0	0	0	1	0	0.9	4																						
15-May	0	Z	1	0	0	1	1	1	1	3	2	2	3	1	1	1	1	1	1	0	1	0	0	0	0.9	3																						
16-May	1	Z	1	1	0	1	2	3	2	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	0.9	3																						
17-May	1	Z	1	1	2	3	5	6	1	1	1	1	1	1	1	1	1	0	1	1	1	0	1	1	1.2	6																						
18-May	0	Z	1	1	1	1	1	1	1	1	0	1	0	0	1	1	1	1	0	1	0	0	1	1	0.6	1																						
19-May	1	Z	1	1	1	1	1	1	0	0	1	1	1	1	1	0	1	1	1	1	1	1	1	0	0.6	1																						
20-May	1	Z	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	0	0	0.6	1																						
21-May	1	Z	0	0	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.8	2																						
22-May	1	Z	1	0	1	7	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.1	7																						
23-May	1	Z	1	0	1	9	11	12	4	3	1	1	1	1	1	1	1	1	0	0	1	0	0	3	2.3	12																						
24-May	1	Z	0	1	1	1	1	2	3	3	1	5	6	13	9	3	2	3	2	1	1	0	1	1	2.6	13																						
25-May	1	Z	2	1	1	6	17	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.8	17																						
26-May	1	Z	1	1	1	2	1	1	1	1	1	1	1	0	1	1	1	1	1	0	1	1	0	1	0.8	2																						
27-May	2	Z	1	2	1	1	3	3	3	3	3	2	2	3	3	3	1	1	1	1	1	0	1	1	1.7	3																						
28-May	1	Z	1	0	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	0.7	1																						
29-May	0	Z	1	1	1	2	2	3	3	3	3	1	1	2	2	2	3	2	4	11	3	1	1	1	2.4	11																						
30-May	1	Z	1	1	0	1	1	1	2	2	3	2	4	4	7	5	2	1	1	1	1	1	0	0	1.8	7																						
31-May	1	Z	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.8	2																						
																								0.9	--	1.2	0.9	0.8	2.3	3.2	2.9	2.2	1.7	1.5	1.4	1.7	1.9	1.8	1.3	1.1	0.8	0.7	0.9	0.6	0.5	0.6	0.7	Diurnal Average
																								8	--	9	5	2	9	17	12	11	6	6	5	6	13	9	5	3	3	4	11	3	1	1	3	Diurnal Maximum
Z - zerospan			C - Calibration					UO - Unstable Operation																																								



**WBEA**  
**Hourly Averages**

**Nitrogen Oxide (NO) - ppb**  
**Cenovus - Christina Lake - May 2014**







**WBEA**  
**Cumulative Frequency Distribution**

**Nitrogen Oxide (NO) - ppb**  
**Cenovus - Christina Lake - May 2014**

<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



**WBEA**  
**Frequency Distribution**

**Nitrogen Oxide (NO) - ppb**  
**Cenovus - Christina Lake - May 2014**

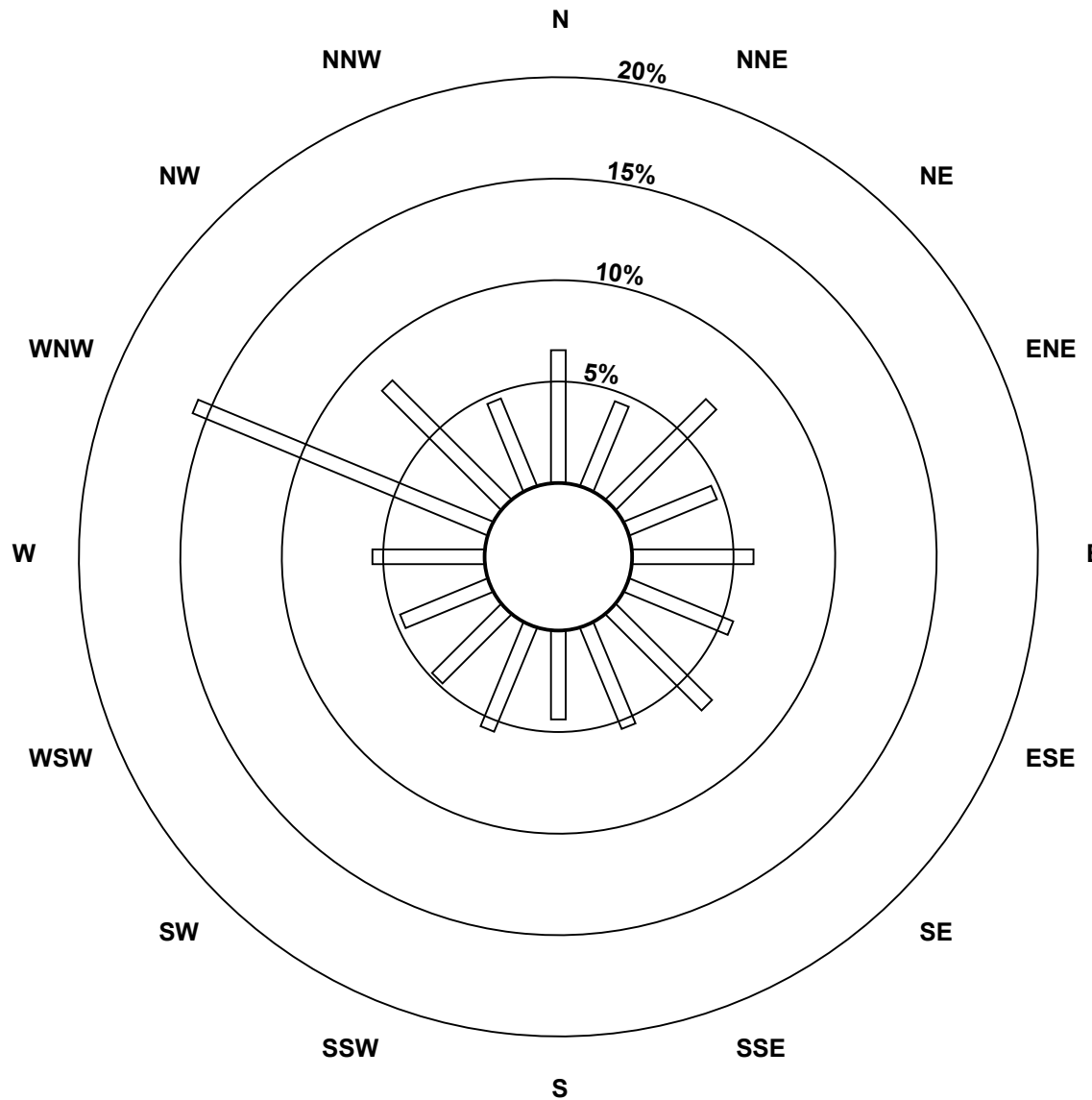
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	45	31	48	32	41	38	46	37	30	38	33	32	38	108	57	32	686
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	45	31	48	32	41	38	46	37	30	38	33	32	38	108	57	32	686

Total Number of Valid Hours: 686

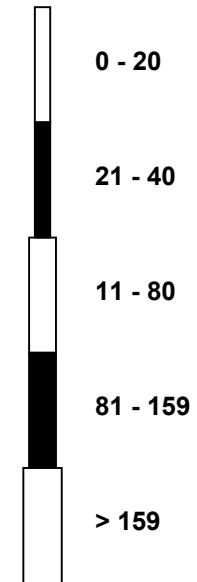
Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Nitrogen Oxide (NO) - ppb  
Cenovus - Christina Lake (AMS500)**



**Classes (ppb)**

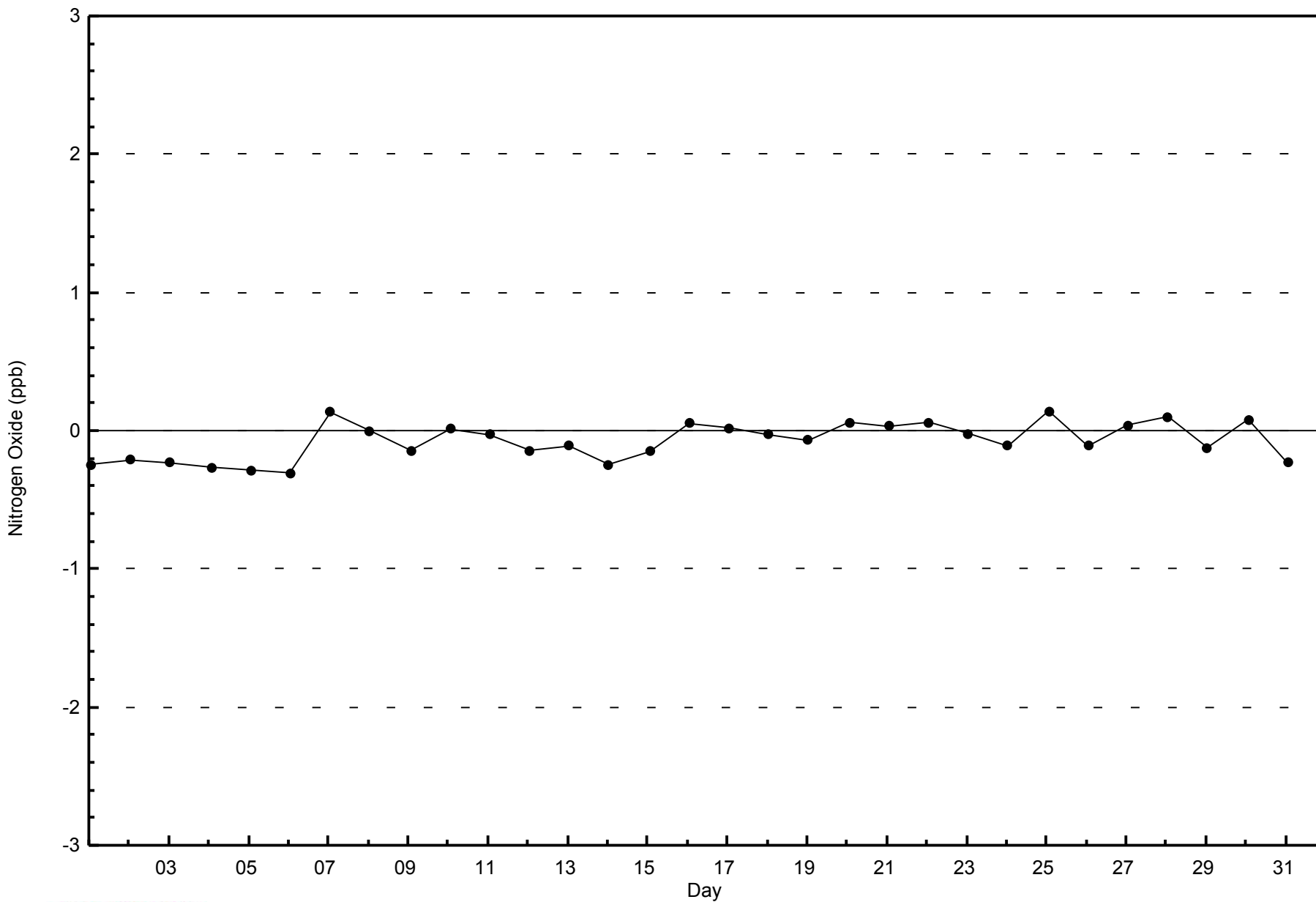


**Total Number of Valid Hours: 686**



WBEA  
Zero Responses

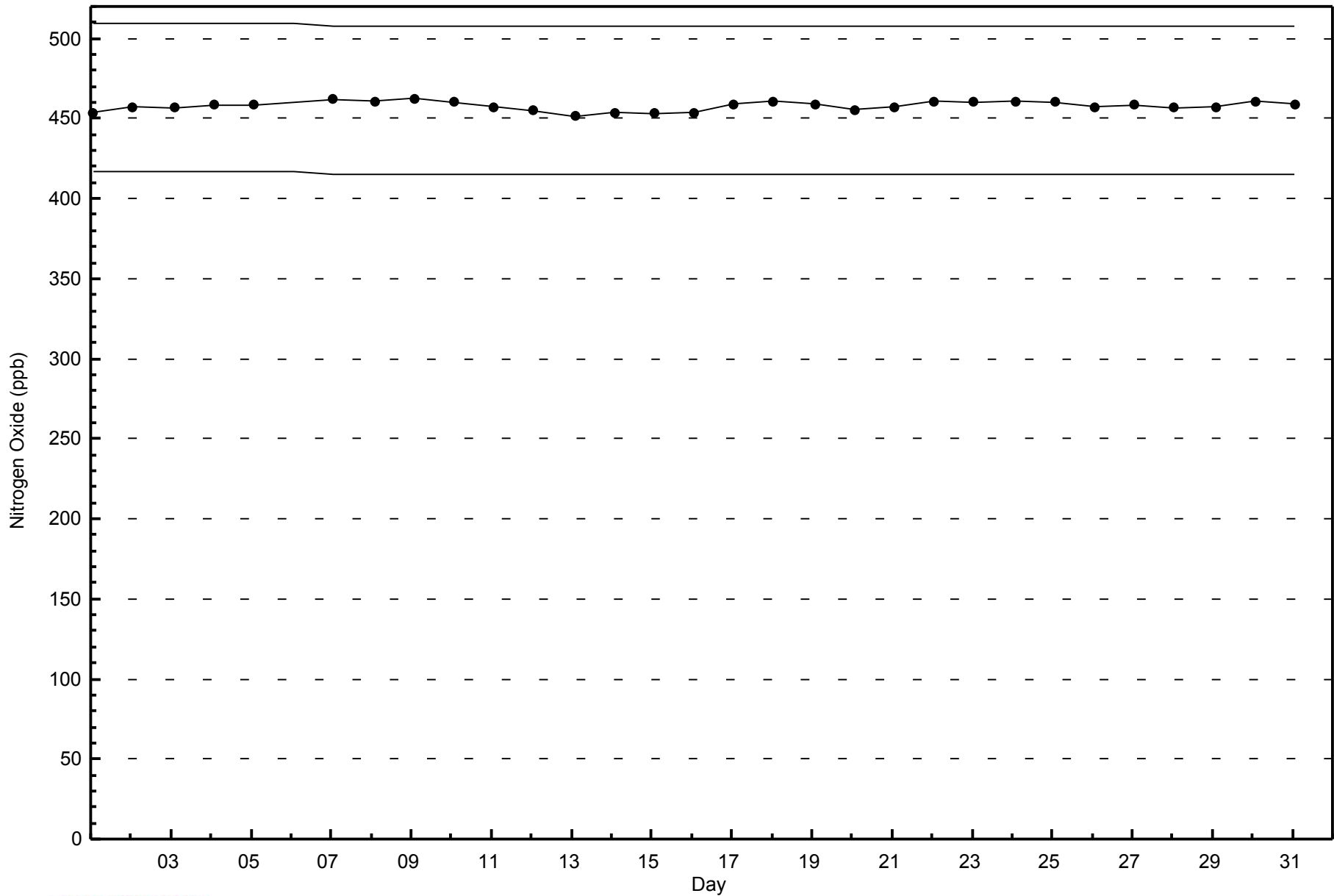
Nitrogen Oxide (NO) - ppb  
Cenovus - Christina Lake - May 2014





WBEA  
Span Responses

Nitrogen Oxide (NO) - ppb  
Cenovus - Christina Lake - May 2014





Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 16 ppb on May 7 03:00	Maximum Daily Average: 5.2 ppb on May 7		Hours of Data:	705
Minimum Value: 0 ppb on May 1 19:00	Minimum Daily Average: 0.1 ppb on May 28		Hours of Missing Data:	39
Maximum Diurnal Average: 3.9 ppb at hour 7	Minimum Diurnal Average: 0.5 ppb at hour 19		Hours of Calibration:	37
Monthly Average: 1.8 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> = 5 P <sub>99</sub> = 12		Percent Operational Time:	99.7

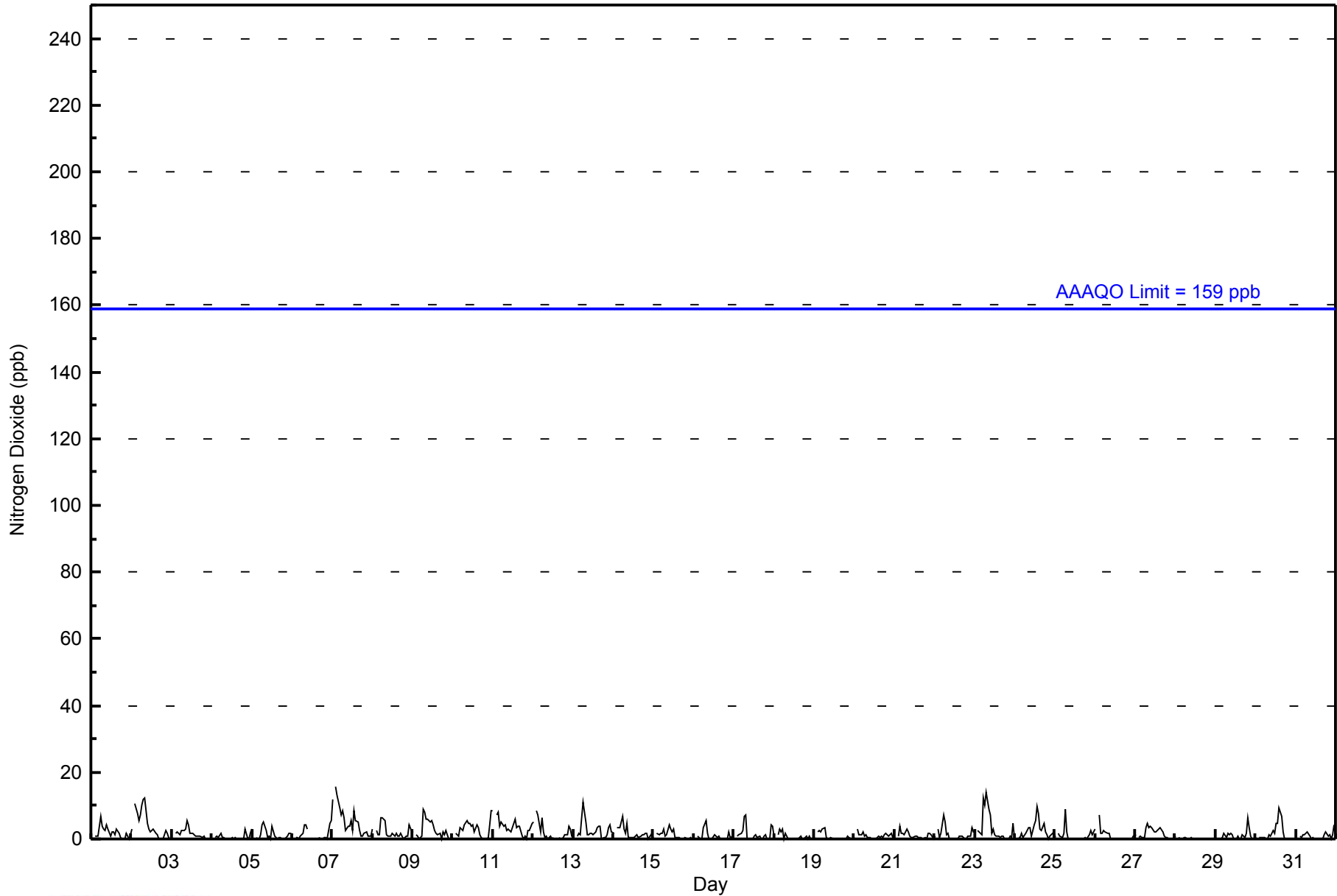
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-May	1	Z	1	1	1	7	4	3	2	4	3	1	2	2	1	3	2	1	0	0	0	2	0	1	1.8	7																						
2-May	3	Z	11	8	5	7	10	12	12	5	3	2	3	3	2	1	0	0	0	0	3	2	1	0	4.0	12																						
3-May	0	Z	2	2	2	1	3	3	3	6	4	2	2	1	1	1	1	1	0	1	0	0	0	1.5	6																							
4-May	0	Z	1	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	1	2	0.5	3																						
5-May	3	Z	1	0	0	1	4	5	3	0	1	0	4	1	0	0	0	0	0	0	1	1	2	2	1.3	5																						
6-May	1	Z	0	1	0	1	2	4	4	3	C	C	C	C	C	C	0	0	0	1	1	0	5	6	--	6																						
7-May	12	Z	16	13	9	7	9	6	3	4	4	5	3	9	5	5	2	1	1	2	2	1	1	1	5.2	16																						
8-May	3	Z	3	1	1	7	6	6	1	1	1	1	2	1	2	1	1	2	0	0	1	1	4	2	2.0	7																						
9-May	2	Z	1	1	0	1	9	8	6	6	5	6	4	3	2	1	2	0	2	1	3	0	0	0	2.7	9																						
10-May	1	Z	2	1	3	3	2	4	5	5	5	4	4	2	4	3	1	0	0	0	0	0	4	8	2.8	8																						
11-May	9	Z	7	8	4	5	4	4	2	3	3	2	5	6	3	4	4	1	0	1	0	3	2	5	3.6	9																						
12-May	5	Z	9	7	2	6	2	0	1	0	1	0	1	UO	UO	1	0	0	1	1	1	4	3	1	2.2	9																						
13-May	0	Z	1	2	1	6	11	5	1	1	2	2	1	2	4	4	4	0	0	0	1	4	4	2	2.5	11																						
14-May	2	Z	3	3	4	7	3	2	5	0	1	1	0	1	1	1	1	1	1	2	2	0	1	1	1.8	7																						
15-May	0	Z	2	1	2	2	3	1	1	4	3	2	3	0	1	1	1	0	0	0	0	0	0	0	1.2	4																						
16-May	0	Z	1	0	0	0	3	6	2	0	0	0	1	1	1	1	0	0	0	0	0	2	1	1	0.9	6																						
17-May	1	Z	1	1	2	3	7	7	0	0	0	0	1	1	0	1	0	0	1	1	0	0	4	4	1.5	7																						
18-May	1	Z	1	3	2	3	0	2	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0	0.6	3																						
19-May	0	Z	2	3	2	3	4	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0.7	4																						
20-May	0	Z	3	1	1	2	1	1	1	0	0	0	0	0	1	1	1	0	1	2	1	1	2	0	0.9	3																						
21-May	2	Z	1	4	2	2	1	3	2	1	1	0	1	1	1	1	0	0	1	0	2	2	1	0	1.2	4																						
22-May	1	Z	3	1	2	7	5	1	2	0	0	0	0	0	0	1	1	1	0	0	1	1	3	2	1.4	7																						
23-May	2	Z	3	2	1	12	10	14	9	7	2	3	1	1	1	1	1	1	0	0	0	1	1	5	3.3	14																						
24-May	1	Z	1	0	2	1	2	2	3	3	1	4	6	10	8	3	2	5	2	1	0	1	2	2	2.6	10																						
25-May	1	Z	2	1	1	2	9	2	0	0	0	0	0	0	0	0	0	0	0	0	1	3	1	2	1.1	9																						
26-May	3	Z	7	2	2	3	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.0	7																						
27-May	1	Z	0	1	1	1	3	5	3	4	4	2	2	3	3	4	2	1	0	0	0	0	0	0	1.8	5																						
28-May	1	Z	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1																						
29-May	0	Z	0	0	1	2	1	2	1	2	1	0	0	1	0	0	1	1	2	6	3	1	0	0	1.0	6																						
30-May	1	Z	0	0	0	0	0	0	1	1	2	2	5	5	9	7	2	0	0	0	0	0	0	0	1.5	9																						
31-May	0	Z	1	1	1	1	2	2	1	0	1	0	0	0	0	0	0	1	2	1	1	0	1	4	0.9	4																						
1.8																								--	2.7	2.3	1.7	3.3	3.9	3.7	2.5	2.0	1.5	1.3	1.6	1.8	1.7	1.4	1.0	0.5	0.5	0.7	0.9	1.0	1.4	1.7	Diurnal Average	
12																								--	16	13	9	12	11	14	12	7	5	6	6	10	9	7	4	5	2	6	3	4	5	8	Diurnal Maximum	

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



WBEA  
Hourly Averages

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Cenovus - Christina Lake - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Cenovus - Christina Lake - May 2014**

<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
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: 705

Total Number of Hours: 744





**WBEA**  
**Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Cenovus - Christina Lake - May 2014**

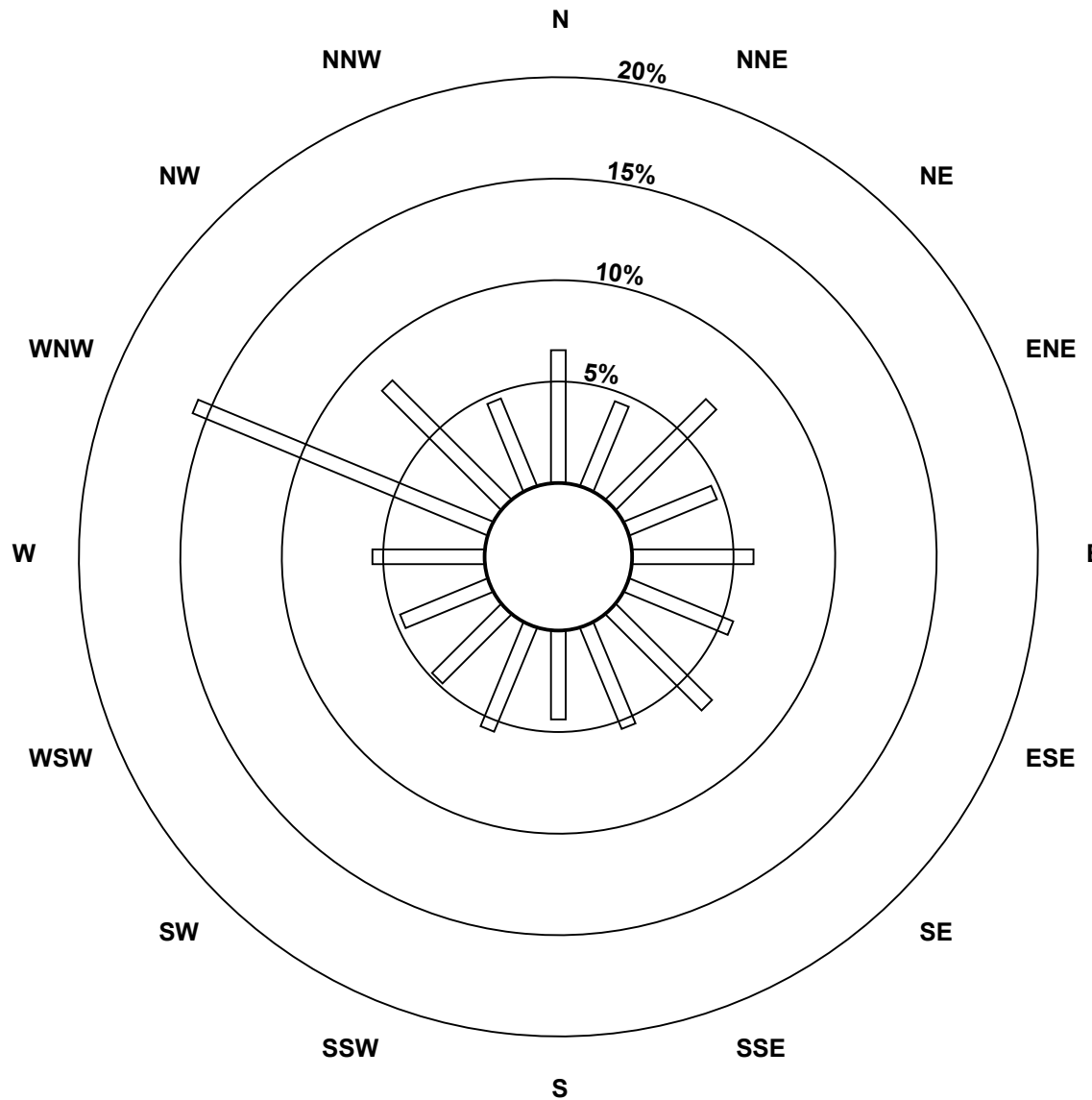
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	45	31	48	32	41	38	46	37	30	38	33	32	38	108	57	32	686
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	45	31	48	32	41	38	46	37	30	38	33	32	38	108	57	32	686

Total Number of Valid Hours: 686

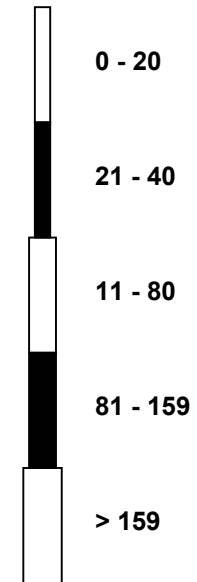
Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Cenovus - Christina Lake (AMS500)**



Classes (ppb)

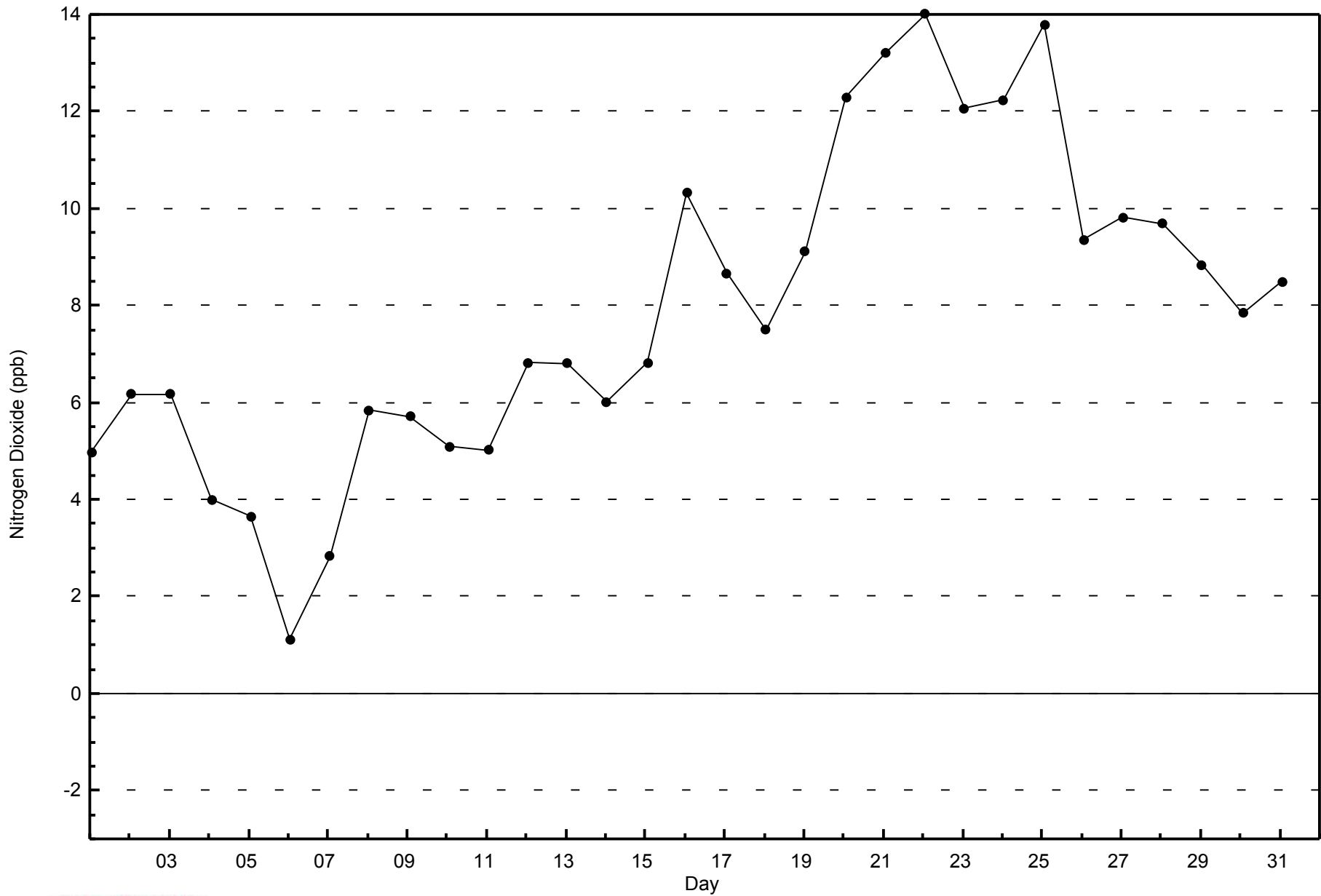


**Total Number of Valid Hours: 686**



WBEA  
Zero Responses

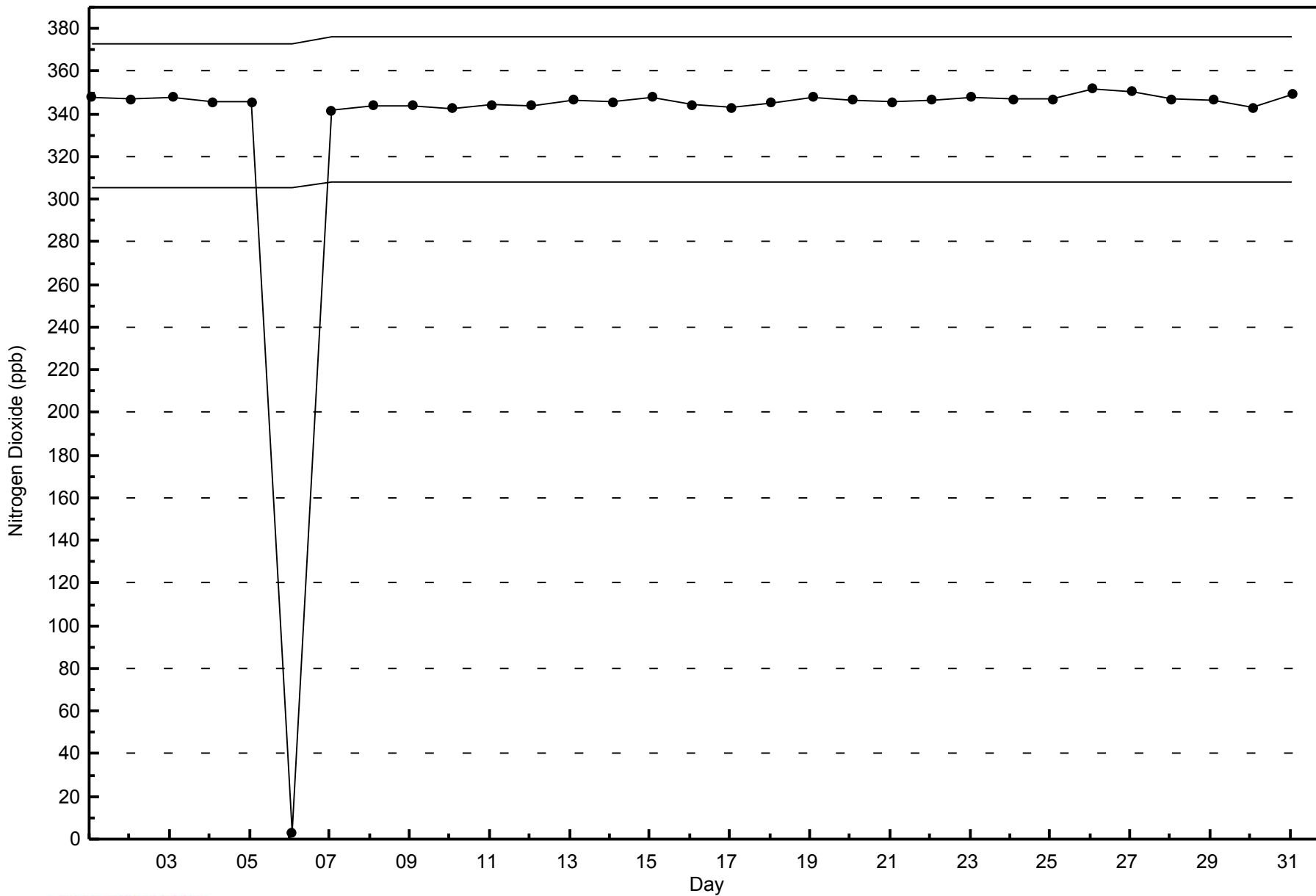
Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Cenovus - Christina Lake - May 2014





WBEA  
Span Responses

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Cenovus - Christina Lake - May 2014



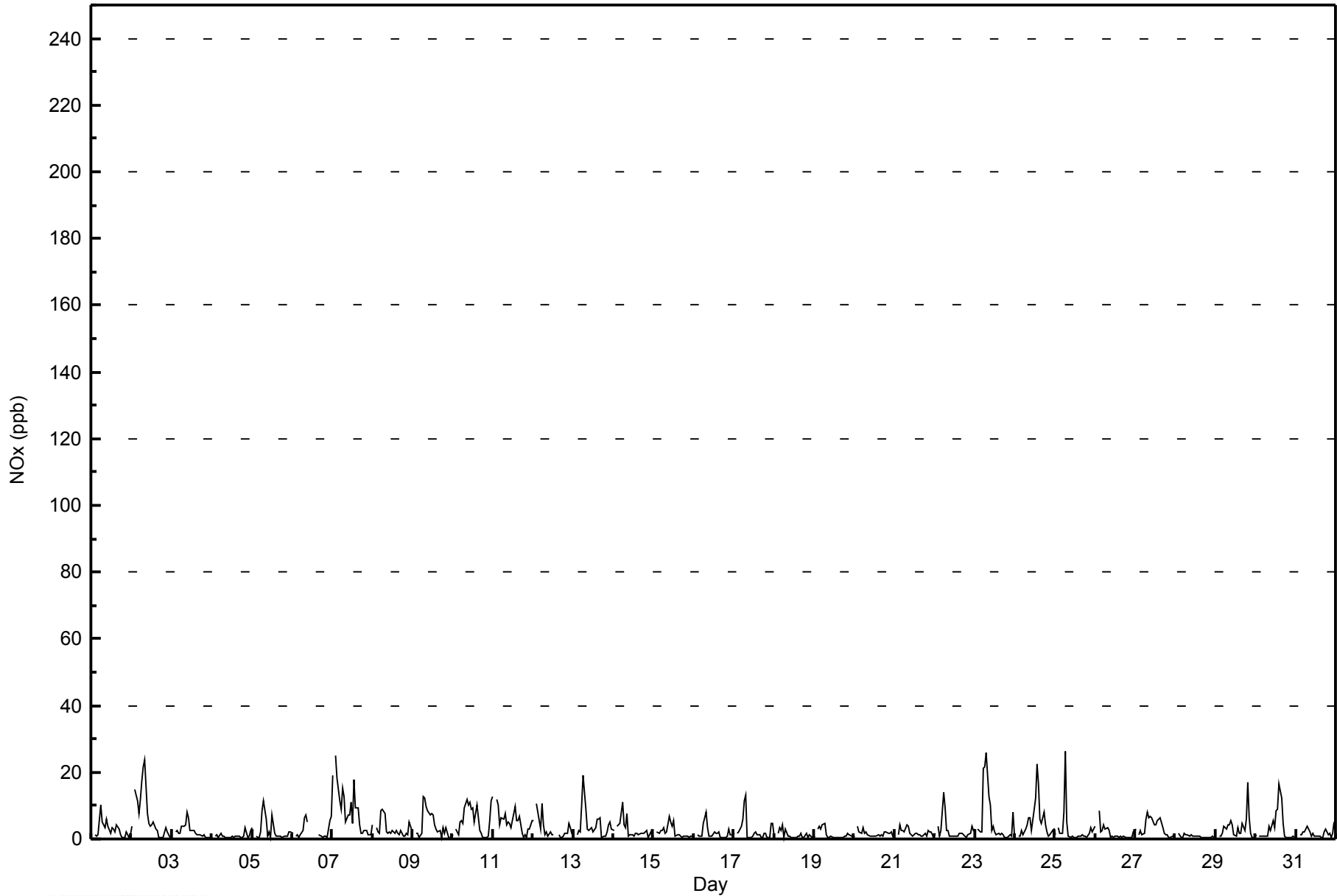


Maximum Value: 26 ppb on May 25 07:00														Maximum Daily Average: 8.6 ppb on May 7										Hours in Service: 744																								
Minimum Value: 0 ppb on May 1 19:00														Minimum Daily Average: 0.9 ppb on May 28										Hours of Data: 705																								
Maximum Diurnal Average: 7.1 ppb at hour 7														Minimum Diurnal Average: 1.2 ppb at hour 19										Hours of Missing Data: 39																								
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> = 8 P <sub>99</sub> = 21										Hours of Calibration: 37																								
																								Percent Operational Time: 99.7																								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-May	1	Z	1	1	1	10	5	4	3	6	4	2	3	3	2	4	3	1	0	0	1	2	0	1	2.7	10																						
2-May	4	Z	15	11	7	12	17	22	24	8	5	4	4	5	3	2	0	0	0	0	3	2	1	1	6.6	24																						
3-May	0	Z	2	2	2	2	4	4	4	8	6	3	2	2	2	1	1	1	1	1	0	0	0	0	2.2	8																						
4-May	1	Z	1	1	1	2	1	1	1	1	0	0	1	0	1	1	1	1	0	1	3	0	1	2	0.9	3																						
5-May	3	Z	1	1	1	2	9	11	6	1	2	1	7	2	1	1	1	1	0	1	1	1	2	2	2.4	11																						
6-May	2	Z	1	1	0	1	3	6	7	5	C	C	C	C	C	C	1	1	0	1	1	1	5	7	--	7																						
7-May	19	Z	25	18	11	9	15	13	5	7	11	5	18	9	9	4	2	2	2	3	1	1	1	1	8.6	25																						
8-May	4	Z	3	2	2	8	9	8	2	2	2	2	2	2	2	1	3	1	1	2	1	5	3	3.0	9																							
9-May	3	Z	2	2	1	2	13	12	10	8	7	8	7	4	3	2	2	1	3	2	3	1	0	0	4.2	13																						
10-May	1	Z	3	1	5	6	5	9	12	10	11	9	9	5	10	6	2	2	0	1	0	1	5	11	5.5	12																						
11-May	13	Z	12	10	4	7	6	8	4	5	5	4	8	10	6	6	7	2	1	1	1	3	3	5	5.5	13																						
12-May	6	Z	11	8	3	11	4	1	2	1	2	1	1	UO	UO	1	0	0	1	2	2	5	4	2	3.2	11																						
13-May	1	Z	1	2	2	10	19	9	3	2	3	4	2	4	6	6	6	0	1	1	2	4	5	3	4.2	19																						
14-May	2	Z	4	4	4	11	4	3	8	1	1	1	2	2	2	1	2	2	2	2	2	1	2	1	2.7	11																						
15-May	1	Z	2	2	2	2	4	2	2	7	5	4	6	1	1	1	1	1	1	1	1	1	1	1	2.1	7																						
16-May	1	Z	1	1	1	1	5	8	3	1	1	1	2	2	2	2	1	0	1	1	1	3	1	1	1.7	8																						
17-May	2	Z	2	2	4	6	11	13	1	1	1	1	2	2	1	1	1	0	2	2	1	0	5	5	2.7	13																						
18-May	1	Z	2	4	3	4	1	3	1	1	0	1	0	0	1	1	2	1	0	2	0	1	1	1	1.3	4																						
19-May	1	Z	3	4	3	4	5	1	1	1	1	1	1	1	0	1	1	1	1	1	2	1	1	0	1.4	5																						
20-May	1	Z	4	2	2	3	2	2	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	1	1.5	4																						
21-May	2	Z	1	4	2	3	2	4	4	2	1	1	2	2	1	1	1	1	2	1	2	2	2	1	1.9	4																						
22-May	2	Z	4	1	3	14	9	2	2	1	1	1	1	1	1	2	2	1	1	1	1	1	4	3	2.5	14																						
23-May	3	Z	3	2	2	21	21	26	13	10	3	4	2	1	1	1	2	1	0	0	1	1	1	8	5.6	26																						
24-May	1	Z	1	1	2	1	3	4	7	6	2	9	12	23	17	6	5	8	4	2	1	1	2	3	5.3	23																						
25-May	1	Z	4	2	2	8	26	5	1	1	1	1	1	1	1	1	1	1	1	1	2	3	2	3	2.9	26																						
26-May	4	Z	8	2	2	4	3	3	2	1	1	1	1	0	1	1	1	1	1	0	1	1	0	2	1.8	8																						
27-May	3	Z	1	3	1	2	6	8	6	7	6	4	4	5	6	6	3	2	1	1	1	0	1	1	3.5	8																						
28-May	1	Z	2	0	1	2	1	1	1	1	1	1	1	1	0	1	1	1	1	0	1	1	1	1	0.9	2																						
29-May	0	Z	1	1	2	4	3	4	4	5	4	1	1	3	2	2	5	3	6	17	6	2	1	1	3.4	17																						
30-May	1	Z	1	1	1	1	1	1	4	3	6	4	8	9	17	12	5	1	1	1	1	1	1	0	3.3	17																						
31-May	1	Z	1	1	2	2	3	4	2	1	2	1	1	1	1	1	1	2	3	1	2	1	2	5	1.7	5																						
																								2.7	--	3.9	3.2	2.5	5.6	7.1	6.6	4.7	3.7	3.1	2.7	3.3	3.8	3.5	2.8	2.0	1.3	1.2	1.6	1.5	1.5	2.0	2.4	Diurnal Average
																								19	--	25	18	11	21	26	26	24	10	11	11	12	23	17	12	7	8	6	17	6	5	5	11	Diurnal Maximum
Z - zerospan																								C - Calibration						UO - Unstable Operation																		



WBEA  
Hourly Averages

NOx (NO<sub>x</sub>) - ppb  
Cenovus - Christina Lake - May 2014





**WBEA**  
**Cumulative Frequency Distribution**

**NO<sub>x</sub> (NO<sub>x</sub>) - ppb**  
**Cenovus - Christina Lake - May 2014**

<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



**WBEA**  
**Frequency Distribution**

**NOx (NO<sub>x</sub>) - ppb**  
**Cenovus - Christina Lake - May 2014**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	44	31	48	32	41	38	46	37	30	38	33	32	34	108	57	30	679
21 - 40	1	0	0	0	0	0	0	0	0	0	0	0	4	0	0	2	7
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	45	31	48	32	41	38	46	37	30	38	33	32	38	108	57	32	686

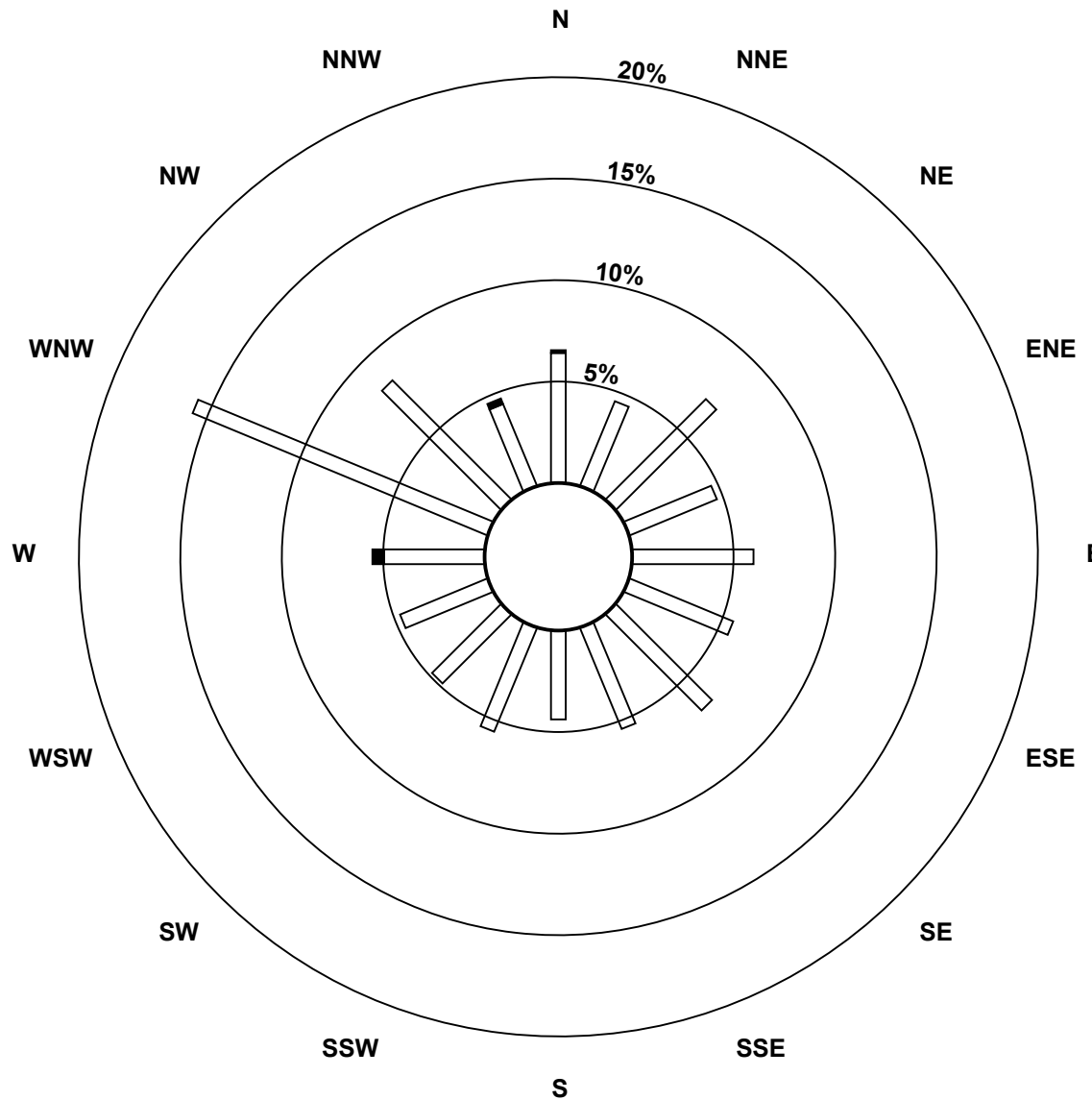
Total Number of Valid Hours: 686

Total Number of Hours: 744

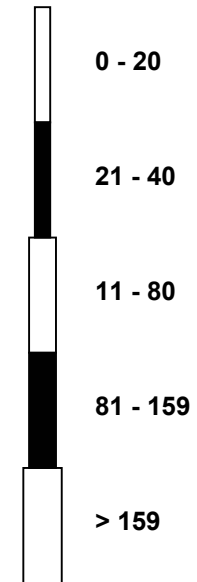


Wood Buffalo Environmental Association  
Wind Rose May 2014

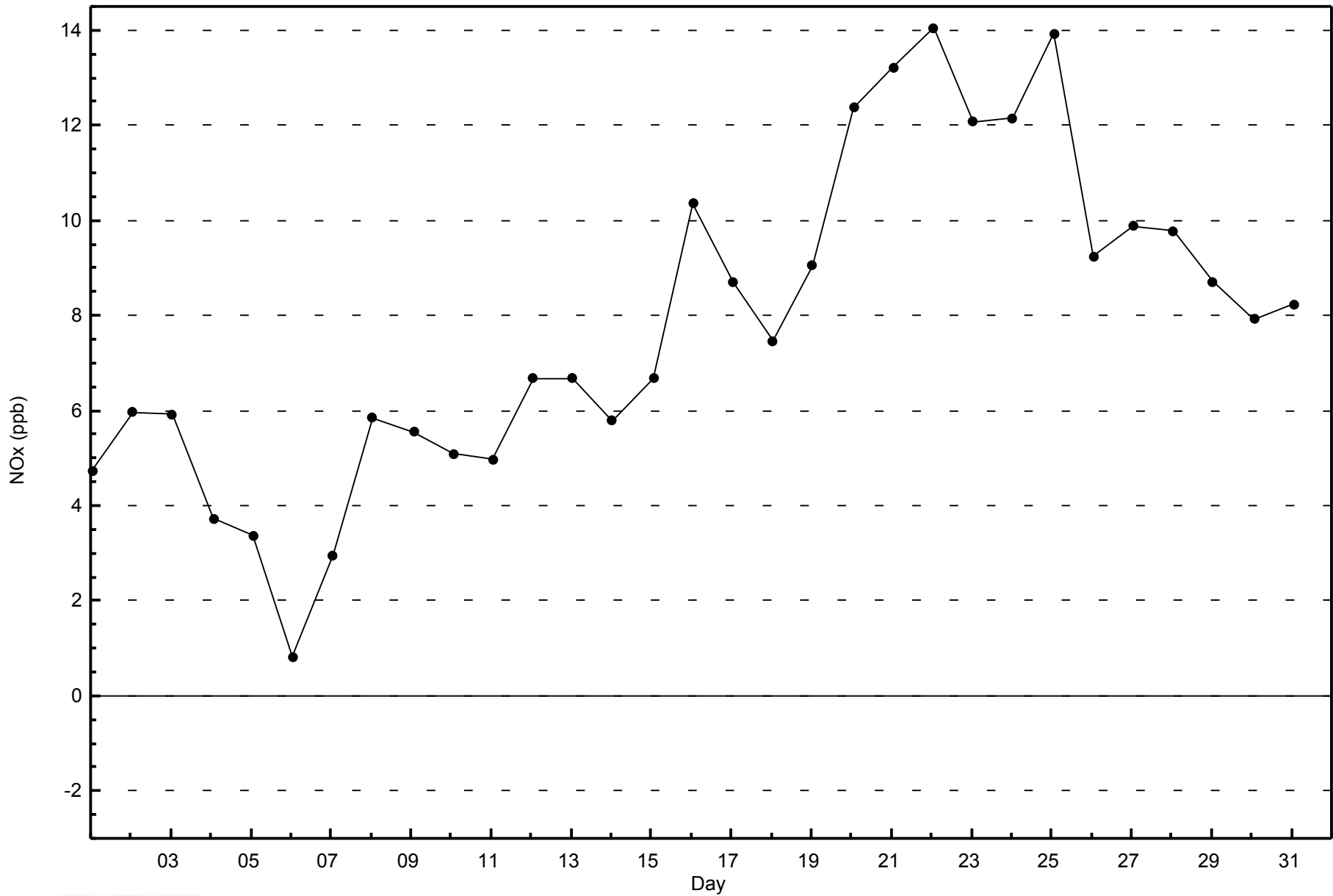
NO<sub>x</sub> (NO<sub>x</sub>) - ppb  
Cenovus - Christina Lake (AMS500)



Classes (ppb)



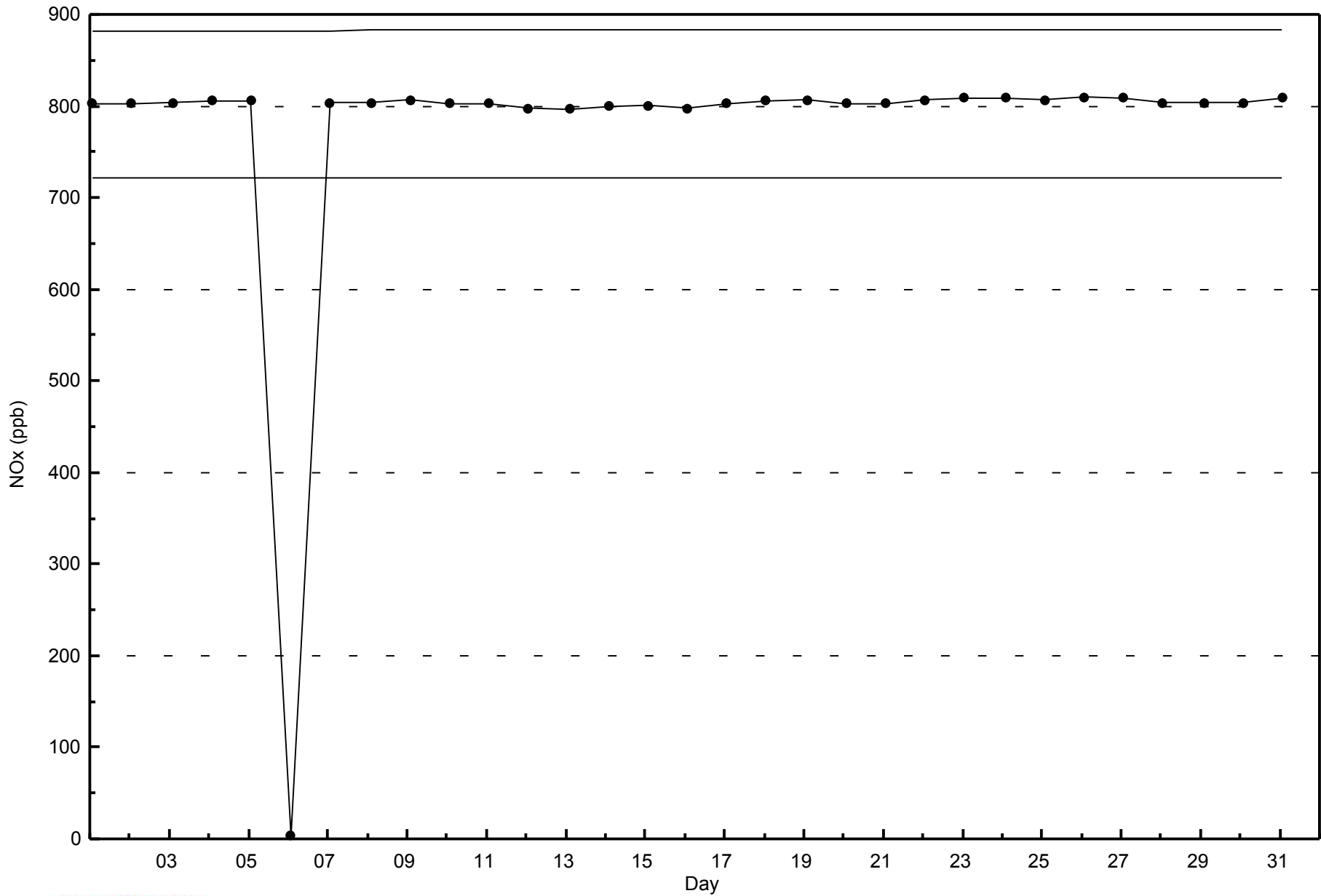
Total Number of Valid Hours: 686





WBEA  
Span Responses

NOx (NO<sub>x</sub>) - ppb  
Cenovus - Christina Lake - May 2014



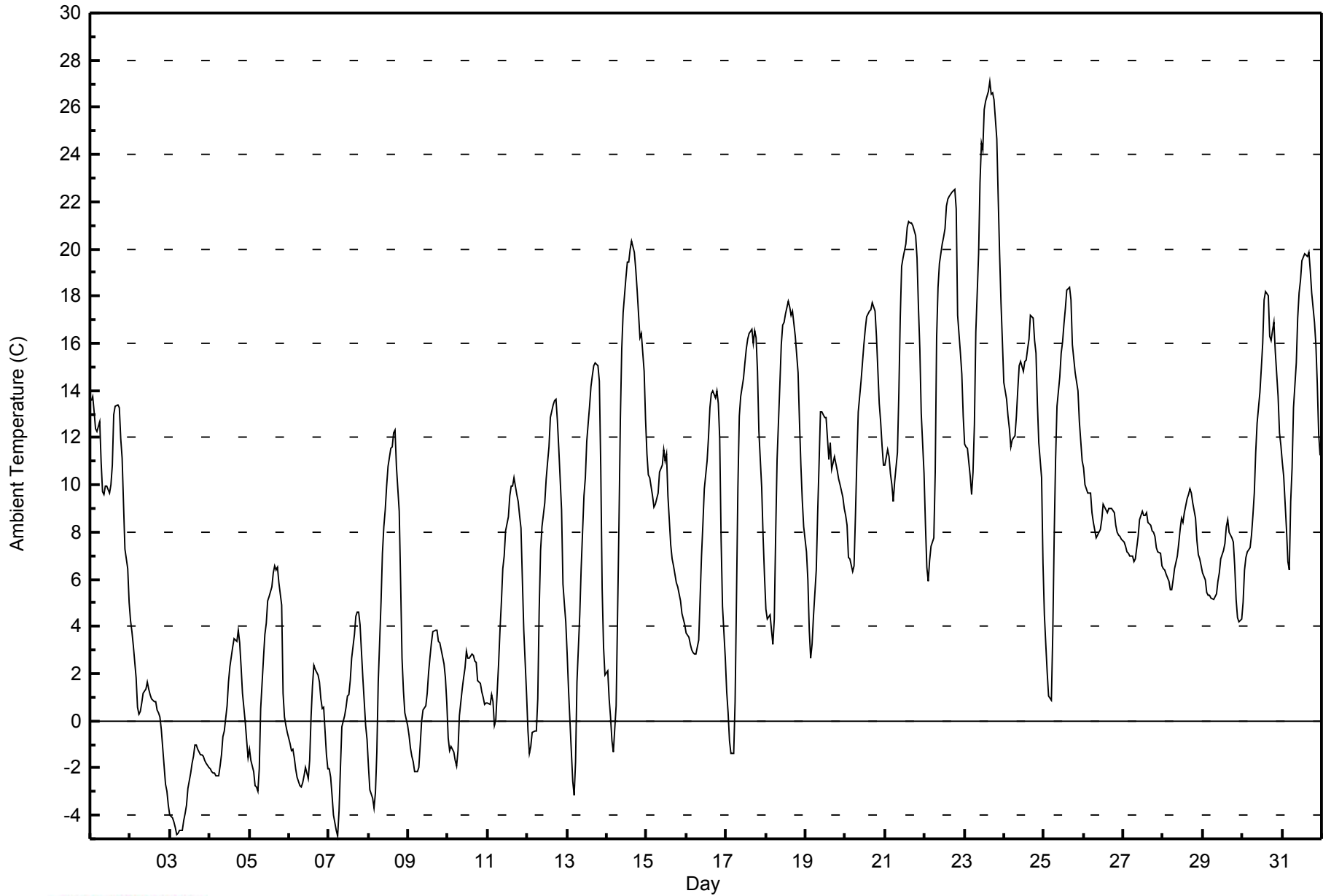


Maximum Value: 27.1 C on May 23 16:00		Maximum Daily Average: 19.7 C on May 23		Hours in Service: 744																																												
Minimum Value: -4.9 C on May 7 06:00		Minimum Daily Average: -2.9 C on May 3		Hours of Data: 744																																												
Maximum Diurnal Average: 11.9 C at hour 16		Minimum Diurnal Average: 2.9 C at hour 5		Hours of Missing Data: 0																																												
Monthly Average: 7.82 C		Percentiles: P <sub>1</sub> = -4.3 P <sub>10</sub> = -1.4 Q <sub>1</sub> = 1.9 Median = 7.8 Q <sub>3</sub> = 12.8 P <sub>90</sub> = 17.2 P <sub>99</sub> = 25.5		Hours of Calibration: 0																																												
				Percent Operational Time: 100.0																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-May	13.6	13.8	13.1	12.4	12.3	12.7	10.9	9.7	9.6	10.0	9.9	9.6	10.0	10.8	13.0	13.4	13.4	13.3	12.0	11.1	9.2	7.3	6.5	5.0	10.9	13.8																						
2-May	4.3	3.8	3.2	1.8	0.6	0.3	0.4	0.7	1.2	1.3	1.7	1.4	1.1	0.9	0.8	0.8	0.5	0.3	0.1	-0.4	-1.9	-2.7	-3.0	-3.6	0.6	4.3																						
3-May	-4.0	-4.1	-4.3	-4.5	-4.8	-4.7	-4.7	-4.7	-4.3	-3.9	-3.6	-2.9	-2.2	-1.8	-1.5	-1.1	-1.1	-1.2	-1.4	-1.5	-1.5	-1.7	-1.8	-2.0	-2.9	-1.1																						
4-May	-2.1	-2.2	-2.2	-2.2	-2.3	-2.3	-2.3	-1.9	-1.5	-0.7	-0.4	0.6	1.6	2.3	2.7	3.1	3.5	3.4	3.8	3.3	2.3	1.2	-0.1	-0.9	-1.6	0.3	3.8																					
5-May	-1.2	-1.7	-2.2	-2.7	-2.8	-3.0	-2.0	0.5	2.7	3.7	4.1	5.1	5.3	5.7	6.3	6.6	6.4	6.5	5.8	4.9	1.2	0.2	-0.2	-0.5	2.0	6.6																						
6-May	-1.0	-1.3	-1.2	-1.6	-2.0	-2.4	-2.8	-2.8	-2.6	-2.3	-2.0	-2.5	-1.7	0.1	1.5	2.3	2.2	1.9	1.6	0.9	0.5	0.6	-1.5	-2.0	-0.7	2.3																						
7-May	-2.0	-2.4	-3.1	-4.0	-4.7	-4.9	-3.8	-2.0	-0.3	0.2	0.6	1.0	1.1	1.7	2.7	3.6	4.4	4.6	4.6	4.1	1.8	0.8	-0.2	-0.8	0.1	4.6																						
8-May	-1.9	-2.9	-3.3	-3.7	-3.0	-1.3	1.6	5.0	7.1	8.2	8.9	9.9	10.8	11.6	11.6	12.2	12.3	10.8	8.9	5.8	2.7	1.3	0.3	-0.2	4.7	12.3																						
9-May	-0.6	-1.1	-1.5	-1.8	-2.2	-2.1	-2.0	-1.0	0.0	0.5	0.6	1.1	2.1	2.7	3.3	3.8	3.9	3.8	3.4	3.3	3.0	2.4	1.8	0.8	1.0	3.9																						
10-May	-0.7	-1.3	-1.1	-1.3	-1.7	-1.9	-1.3	0.2	1.4	1.8	2.3	3.0	2.7	2.7	2.8	2.8	2.6	2.5	1.7	1.6	1.2	1.0	0.7	0.8	0.9	3.0																						
11-May	0.8	0.7	1.1	0.8	-0.2	0.1	2.4	3.9	5.0	6.4	7.0	8.1	8.6	9.5	10.0	10.0	10.3	9.6	9.3	8.7	8.2	6.0	3.8	1.1	5.5	10.3																						
12-May	-0.4	-1.4	-1.1	-0.5	-0.4	-0.4	0.9	4.7	7.2	8.2	9.3	10.2	11.0	11.6	12.8	13.4	13.6	13.6	12.7	11.5	9.0	5.8	4.9	4.2	6.7	13.6																						
13-May	2.8	1.3	-1.3	-2.5	-3.2	-1.8	1.6	4.5	6.5	8.0	9.5	10.3	11.8	13.3	14.2	14.6	15.0	15.2	15.1	14.4	10.8	5.6	3.1	1.9	7.1	15.2																						
14-May	2.1	0.9	0.1	-0.8	-1.4	0.6	4.4	8.3	12.7	15.8	17.3	18.8	19.4	19.4	20.0	20.3	19.8	19.1	18.2	17.3	16.2	16.4	14.8	12.8	12.2	20.3																						
15-May	11.3	10.4	10.3	9.5	9.1	9.2	9.4	9.7	10.6	10.9	11.5	11.0	11.3	9.6	7.4	6.9	6.6	6.2	5.8	5.7	5.1	4.5	4.3	4.0	8.3	11.5																						
16-May	3.7	3.5	3.2	3.0	2.9	2.9	2.9	3.4	5.2	7.0	8.4	9.8	11.0	12.0	13.3	13.9	14.0	13.7	14.0	13.4	12.0	7.7	4.9	2.7	7.8	14.0																						
17-May	1.2	0.3	-0.9	-1.4	-1.4	0.8	5.2	9.9	12.9	13.7	14.5	15.1	15.8	16.2	16.4	16.6	16.0	16.5	16.2	14.8	12.3	9.9	7.8	6.2	9.8	16.6																						
18-May	4.7	4.3	4.5	3.9	3.2	4.3	7.9	11.1	14.3	15.9	16.8	16.9	17.3	17.8	17.5	17.2	17.4	16.8	16.3	14.8	12.7	10.8	9.3	8.3	11.8	17.8																						
19-May	7.1	6.0	3.8	2.7	3.3	4.4	6.4	8.8	10.9	13.1	13.1	12.9	12.9	12.0	11.1	11.8	10.6	11.2	10.9	10.6	10.2	10.0	9.5	9.0	9.3	13.1																						
20-May	8.7	8.3	6.9	6.9	6.3	6.6	8.7	11.1	13.1	14.4	15.2	15.9	16.6	17.1	17.4	17.4	17.7	17.5	17.4	16.3	13.5	12.7	11.6	10.9	12.8	17.7																						
21-May	10.8	11.5	11.2	10.5	10.0	9.3	10.1	11.4	13.9	17.1	19.3	19.6	20.2	20.9	21.2	21.1	21.1	21.0	20.6	19.6	17.5	15.8	13.0	10.5	15.7	21.2																						
22-May	8.3	6.5	5.9	6.8	7.4	7.8	10.5	16.2	18.4	19.4	20.2	20.5	20.9	21.8	22.1	22.2	22.4	22.5	22.5	21.7	17.2	15.6	14.7	12.9	16.0	22.5																						
23-May	11.8	11.6	11.6	10.4	9.6	10.6	12.6	16.5	19.8	22.9	24.5	24.2	25.9	26.3	26.7	27.1	26.5	26.6	26.3	24.7	22.2	19.8	17.7	16.1	19.7	27.1																						
24-May	14.3	13.6	12.9	12.4	11.6	11.9	12.1	12.9	14.0	15.0	15.2	14.8	15.2	15.3	15.8	16.2	17.2	17.1	16.1	15.6	13.4	11.8	10.3	6.7	13.8	17.2																						
25-May	4.5	3.3	2.1	1.1	0.9	3.7	7.8	11.1	13.3	14.6	15.6	16.1	16.8	17.5	18.3	18.4	17.8	15.9	15.4	14.8	14.0	12.7	11.9	11.0	11.6	18.4																						
26-May	10.7	10.0	9.6	9.6	9.7	8.8	8.4	7.8	7.9	8.0	8.1	8.5	9.2	8.9	8.8	9.0	9.0	9.0	8.8	8.3	8.0	7.8	7.8	7.7	8.7	10.7																						
27-May	7.6	7.4	7.2	7.1	7.0	7.0	6.8	6.9	7.3	7.8	8.5	8.9	8.7	8.7	8.8	8.4	8.3	8.1	8.0	7.8	7.3	7.1	7.1	6.5	7.7	8.9																						
28-May	6.4	6.4	6.2	5.9	5.5	5.6	6.0	6.5	7.0	7.5	8.1	8.6	8.4	8.8	9.4	9.6	9.8	9.7	9.2	8.6	7.6	7.1	6.9	6.6	7.6	9.8																						
29-May	6.3	6.0	5.4	5.3	5.3	5.2	5.2	5.3	5.4	5.9	6.3	6.9	7.2	7.5	8.2	8.5	8.0	7.8	7.6	6.5	5.2	4.4	4.2	4.3	6.2	8.5																						
30-May	5.0	6.4	6.9	7.2	7.4	7.9	8.7	9.6	11.4	12.6	13.9	14.9	16.0	17.8	18.2	18.0	16.3	16.1	16.6	16.9	15.7	13.7	12.2	11.7	12.6	18.2																						
31-May	11.0	10.4	8.1	6.7	6.4	9.3	10.7	13.3	15.2	17.1	18.2	18.6	19.5	19.8	19.7	19.7	19.8	19.1	18.1	16.9	15.9	14.3	12.2	11.3	14.6	19.8																						
																								4.6	4.1	3.6	3.1	2.9	3.4	4.6	6.4	7.9	9.0	9.8	10.3	10.8	11.3	11.6	11.9	11.8	11.6	11.1	10.4	8.7	7.4	6.3	5.2	Diurnal Average
																								14.3	13.8	13.1	12.4	12.3	12.7	12.6	16.5	19.8	22.9	24.5	24.2	25.9	26.3	26.7	27.1	26.5	26.6	26.3	24.7	22.2	19.8	17.7	16.1	Diurnal Maximum



**WBEA**  
**Hourly Averages**

**Ambient Temperature (AT) - C**  
**Cenovus - Christina Lake - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C**  
**Cenovus - Christina Lake - May 2014**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	116	15.59	15.59
0 - 10	355	47.72	63.31
10 - 20	243	32.66	95.97
> 20	30	4.03	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

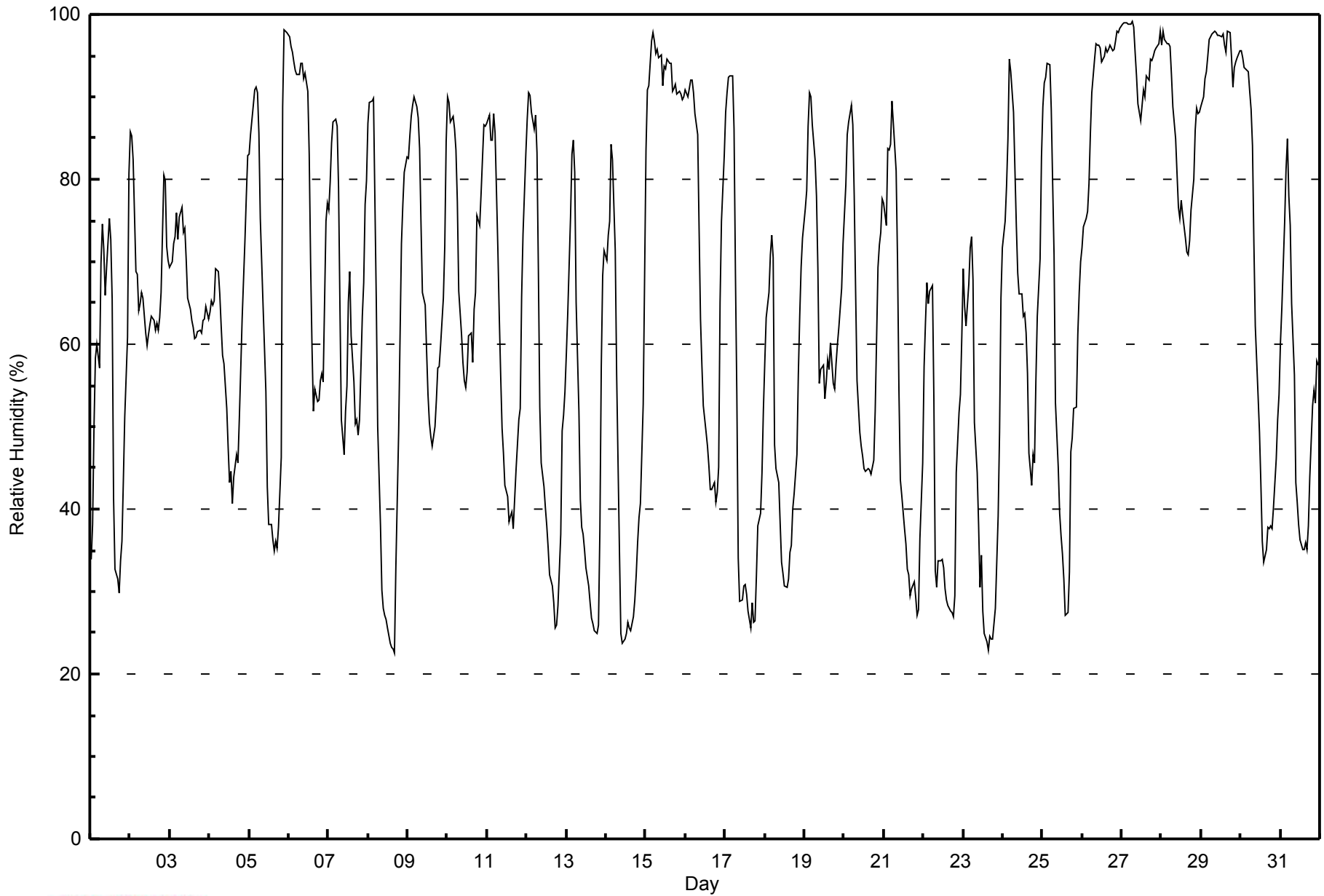


Maximum Value: 99 % on May 27 07:00																			Maximum Daily Average: 95.4 % on May 29						Hours in Service: 744																				
Minimum Value: 23 % on May 8 17:00																			Minimum Daily Average: 43.6 % on May 22						Hours of Data: 744																				
Maximum Diurnal Average: 84.9 % at hour 5																			Minimum Diurnal Average: 47.9 % at hour 16						Hours of Missing Data: 0																				
Monthly Average: 64.6 %																			Percentiles: P <sub>1</sub> = 24 P <sub>10</sub> = 32 Q <sub>1</sub> = 45 Median = 65 Q <sub>3</sub> = 86 P <sub>90</sub> = 94 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-May	34	38	50	58	60	57	70	75	72	66	69	75	73	65	41	33	32	30	34	36	43	51	61	81	54.3	81																			
2-May	86	85	82	69	68	64	65	66	66	61	60	61	62	63	63	62	63	62	63	66	81	80	72	70	68.4	86																			
3-May	69	70	72	73	76	73	75	77	74	74	70	66	64	63	62	61	61	61	62	61	63	63	65	63	67.4	77																			
4-May	64	65	65	65	69	69	66	62	59	58	52	47	43	45	41	44	47	46	51	57	63	72	78	83	58.8	83																			
5-May	83	85	89	91	91	91	86	75	65	60	54	43	38	38	36	35	36	35	38	46	89	98	98	98	66.6	98																			
6-May	97	96	95	94	93	93	93	94	94	92	93	91	83	70	60	52	55	53	53	56	57	55	75	77	77.9	97																			
7-May	76	80	84	87	87	86	79	64	51	47	52	55	65	69	61	55	50	51	49	51	63	67	77	80	66.2	87																			
8-May	87	89	90	90	77	65	50	38	30	28	27	27	26	24	23	23	23	33	49	61	72	77	81	83	53.0	90																			
9-May	82	85	88	89	90	89	87	84	75	66	65	59	54	50	49	48	50	53	57	57	60	66	72	85	69.1	90																			
10-May	90	89	87	88	86	84	77	66	61	58	56	55	57	61	61	58	64	66	76	74	78	83	87	87	72.8	90																			
11-May	87	88	85	85	88	86	72	63	56	50	47	43	42	38	39	40	38	45	48	51	52	66	73	83	60.9	88																			
12-May	87	90	90	88	86	88	83	69	52	46	43	40	38	35	32	31	29	26	26	28	37	49	51	54	54.1	90																			
13-May	59	64	75	83	85	81	65	52	41	38	37	35	33	31	29	27	26	25	25	26	38	57	68	71	48.7	85																			
14-May	70	73	75	84	82	71	56	46	35	25	24	24	25	26	26	25	27	29	32	36	39	41	53	68	45.5	84																			
15-May	84	91	91	97	98	97	95	96	95	95	91	94	93	95	94	94	91	91	91	90	91	90	90	90	92.6	98																			
16-May	91	90	91	92	92	90	88	85	74	63	57	53	49	48	45	42	42	43	41	42	45	65	75	83	66.2	92																			
17-May	88	91	92	93	93	86	69	54	34	29	29	31	31	30	28	26	29	26	26	32	38	40	44	52	49.5	93																			
18-May	58	63	66	71	73	70	48	45	43	38	34	32	31	31	32	35	36	40	42	47	56	63	69	73	49.8	73																			
19-May	76	79	86	90	90	87	82	78	69	55	57	58	53	56	58	57	60	55	55	58	60	62	67	72	67.5	90																			
20-May	76	79	85	87	89	87	78	66	56	49	48	46	45	45	45	45	44	45	46	52	69	72	74	78	62.7	89																			
21-May	77	74	84	84	84	89	87	81	70	54	44	42	38	36	33	32	29	30	31	29	27	28	36	46	52.7	89																			
22-May	57	63	67	65	66	67	53	33	31	34	34	34	33	30	29	28	28	27	27	30	44	52	54	61	43.6	67																			
23-May	69	65	62	67	72	73	68	50	44	38	30	34	28	25	24	23	25	24	24	28	34	39	49	66	44.2	73																			
24-May	72	75	79	85	95	93	88	81	74	69	66	66	63	64	61	56	47	43	47	46	56	63	70	83	68.4	95																			
25-May	89	92	92	94	94	89	79	71	53	45	40	37	35	31	27	27	32	47	49	52	52	61	66	70	59.3	94																			
26-May	72	74	75	76	80	86	90	95	96	96	96	96	94	95	96	95	96	96	96	96	97	98	98	98	91.1	98																			
27-May	99	99	99	99	99	99	99	98	96	93	89	87	89	91	90	93	92	95	94	95	96	96	97	98	95.0	99																			
28-May	96	98	97	97	96	96	93	89	85	81	77	75	78	76	73	71	71	73	76	80	86	89	88	88	84.5	98																			
29-May	89	90	92	93	95	97	98	98	98	98	97	97	97	98	96	95	98	98	95	91	94	94	95	96	95.4	98																			
30-May	96	95	94	93	93	91	89	84	72	62	54	49	43	36	33	35	38	38	38	38	40	46	51	54	60.9	96																			
31-May	60	64	75	81	85	78	74	65	56	43	41	38	36	35	35	36	35	38	44	53	54	53	58	58	54.0	85																			
																			78.1	80.0	82.5	84.1	84.9	82.9	77.5	71.0	63.7	58.4	55.8	54.5	52.9	51.5	49.1	47.9	48.1	49.2	51.1	53.7	60.4	65.7	70.7	75.7	Diurnal Average		
																			99	99	99	99	99	99	99	98	98	98	97	97	97	98	96	95	98	98	96	96	97	98	98	98	98	Diurnal Maximum	



**WBEA**  
**Hourly Averages**

**Relative Humidity (RH) - %**  
**Cenovus - Christina Lake - May 2014**







**WBEA**  
**Cumulative Frequency Distribution**

**Relative Humidity (RH) - %**  
**Cenovus - Christina Lake - May 2014**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	143	19.22	19.22
40 - 60	167	22.45	41.67
60 - 80	199	26.75	68.41
80 - 100	235	31.59	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Maximum Speed: 32 km/h on May 30 17:00	Maximum Daily Speed Average: 20.0 km/h on May 2	Hours in Service: 744
Minimum Speed Value: 1 km/h on May 4 03:00	Minimum Daily Speed Average: 1.6 km/h on May 31	Hours of Data: 723
Maximum Diurnal Speed Average: 5.1 km/h at hour 12	Minimum Diurnal Speed Average: 0.7 km/h at hour 22	Hours of Missing Data: 21
Monthly Average Velocity: 2.9 km/h 286.0 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 4 Q <sub>1</sub> = 6 Median = 10 Q <sub>3</sub> = 14 P <sub>90</sub> = 19 P <sub>99</sub> = 25	Percent Operational Time: 97.2

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-May	S10	SSW9	SSW9	SSW10	SSW14	SSW25	NW24	NW22	NW20	NW20	NW19	W15	WSW11	WNW21	WNW25	WNW23	WNW24	WNW15	WNW13	NW10	WNW8	WNW18	WNW11	W13.9	WNW25	
2-May	WSW13	W14	W14	W18	W15	W22	W23	W23	W22	WNW23	WNW27	WNW28	WNW27	WNW25	WNW23	WNW25	WNW24	WNW23	WNW21	WNW18	WNW16	NW18	NW17	NW23	W20.0	WNW28
3-May	NW21	NW16	NW17	NW16	NW15	NW14	NW13	NW13	NW11	NW13	NW13	NNW11	N11	N12	N12	N11	N11	NNE10	NNE9	N6	ENE5	NE6	NE7	NE6	NNW9.9	NW21
4-May	E3	SE2	S1	NNW4	N5	N6	NNE7	NE7	NE6	ENE7	E7	ENE8	E6	NE8	ENE6	E10	E11	E14	ESE13	ESE9	ESE10	ESE8	E6	SE2	E5.5	E14
5-May	SSE2	SE8	ESE6	ESE6	ESE5	ESE6	ESE5	E5	ENE6	ENE9	ESE7	SE7	S4	NE4	E7	E10	ENE10	ESE9	ESE12	ESE11	SE8	ESE10	AF	AF	ESE6.5	ESE12
6-May	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	NNW20	NNW18	NW13	NNW15	NNW17	NNE12	NNE12	N10	NW8	W11	W14	NW4	WSW6	---	NNW20
7-May	W13	W19	W13	WSW8	SW5	WSW6	WSW11	W17	WNW19	WNW18	WNW22	WNW24	WNW24	W20	W17	WNW15	WNW13	NW10	NW7	WNW4	SSE5	SSE7	SSE4	S3	W11.0	WNW24
8-May	ENE1	SE3	SE4	SE5	SSE6	S3	SSW6	SSW10	SW12	SSW13	SW13	SW15	SW14	SSW15	SW14	S11	SSW11	NW9	N22	N20	NNW15	N11	NNW8	NNW6	WSW3.9	N22
9-May	NW6	NW6	NW7	NW7	WNW6	WNW5	WNW7	WNW9	WNW11	NW11	NW9	WNW11	NW11	WNW7	NW7	SW1	NW8	NW10	NNW9	SSW4	WSW5	WNW10	WNW11	NW11	NW7.4	WNW11
10-May	NNW13	WNW8	W16	W14	WNW16	WNW17	WNW17	W17	W20	W22	W23	W24	W26	WNW24	WNW25	WNW23	WNW23	WNW24	WNW16	WNW16	WNW12	WNW14	W11	W11	WNW17.8	W26
11-May	WNW14	W10	WNW18	WSW7	SSW6	SSW6	W10	WNW14	WNW14	WNW16	WNW16	WNW15	W14	WSW18	WSW15	WNW14	WNW17	NW12	NW11	NNW7	NW6	E4	SSE4	ESE3	WNW9.4	WNW18
12-May	SSE4	SE2	E1	S3	NNW2	ENE2	ENE2	NE5	N11	N7	NW10	NNW10	NNW9	NNW11	NNW10	N14	N13	NW13	NNW14	N9	N6	N5	NNW6	N11	N6.2	NNW14
13-May	N9	N4	S4	SE2	S2	SSE3	E3	E4	NNE4	N4	NNW3	WNW10	NW7	WNW15	W15	WNW16	WNW17	WNW10	WNW12	NW9	NNE2	E4	ESE2	ESE5	NNW4.0	WNW17
14-May	ESE3	ENE5	E3	NNE3	E4	SSE5	SE5	ESE4	ESE4	E4	N1	ENE5	SE4	SSW6	SW6	SSE7	SSE8	SSE6	SE4	SSE4	SE9	S9	SSW11	S6	SSE3.7	SSW11
15-May	SSE7	SE10	WNW4	ENE2	SE6	SSE6	SSW8	SSW7	SW7	WSW6	WSW9	WSW12	WNW14	NW21	NW21	NW19	NW20	NW21	NW19	NW21	NW18	NW18	NW15	WNW10	WNW8.5	NW21
16-May	WNW9	W15	WNW11	WNW9	WNW10	WNW10	WNW9	WNW7	NW8	N7	N8	NNW5	WNW7	WNW7	WNW8	WSW8	WSW6	WNW9	WNW7	WNW9	NW6	N2	AF	SSE5	WNW6.7	W15
17-May	SSE2	SE3	S4	SSE4	SE2	E1	NNW2	NNE3	ENE9	NE9	NNE8	N9	N11	N12	N8	NW8	NE13	NE8	NE5	NE8	ENE9	ENE9	ENE6	NE4	NE4.7	NE13
18-May	ENE3	E4	NNE3	NNE3	ENE2	AF	ENE6	NNE5	ESE10	E11	ENE15	ENE13	E16	E15	ESE19	E18	E20	ESE17	ESE16	ESE11	E10	ESE12	ESE11	SE9	E10.0	E20
19-May	ESE4	SE4	ENE3	E2	ENE3	ENE4	E5	SE7	ESE8	ESE12	E19	E18	SE24	ESE21	ESE21	ESE22	ESE21	SE15	SE15	SE11	SE8	SSE8	SSE8	SE6	ESE10.6	SE24
20-May	SE4	SE8	ESE8	SE9	SSE4	E7	SE12	SSE17	SE22	SE23	SE21	SE20	SE19	SE20	SE20	SE18	SE18	SE15	SE15	S11	S8	SE11	SE7	SE10	SE13.3	SE23
21-May	SE9	SSE11	SSE11	SE11	SSE11	SSE10	SSE9	SE12	S7	S11	SSW13	S16	SSW18	SSW19	SSW19	SW17	SW18	SW16	SW16	WSW15	WSW12	WSW9	SW3	S4	SSW10.4	SSW19
22-May	AF	SE4	SE3	S4	SE4	SW1	ESE4	S9	SSW14	SW13	SW13	SSW12	SW11	SSW12	S12	SSW15	SSW15	SSW9	SSW8	S4	E5	ESE4	AF	E2	S6.9	SSW15
23-May	NE3	ESE4	AF	AF	E2	AF	NNW2	NNW3	N4	NNW6	SSW4	W10	S2	S2	S5	SSE10	SE11	SSE9	SSE10	SSE6	SSE7	SSE7	SW12	WSW21	S3.2	WSW21
24-May	SW13	SW11	SW9	S8	SW9	SW11	SW14	SW12	WSW14	WSW14	WSW15	W20	W24	W22	WSW18	W17	W16	W16	WNW15	WNW15	WNW12	WNW9	WNW5	AF	WSW12.7	W24
25-May	S3	S3	SE4	S3	SSE4	SE1	N2	NE6	NE11	NE8	NE6	E8	NE10	NE8	NE9	ENE8	ESE12	SSE16	SE13	SE10	E6	E4	NE6	ENE5	E5.0	SSE16
26-May	E5	E5	ENE5	NE5	N5	NNW7	NNE7	NNE8	NE9	NE11	NE13	NE12	NE12	NE14	NE12	NE11	NE11	NE9	NE11	ENE12	ENE9	NE8	NE6	N6	NE8.3	NE14
27-May	N7	N8	N8	NNW8	NNW9	NW8	WNW9	WNW11	WNW12	WNW11	WNW11	WNW11	WNW14	W13	WNW12	NW12	WNW7	NW7	NW7	NW5	WNW7	WNW6	NW6	N6	NW8.2	WNW14
28-May	NNE3	N6	N6	NNE7	NE5	NE4	E3	NNE7	NNE8	E6	NE5	NNE8	NNE11	NNE15	NNE15	NE10	NNE9	NE11	NE11	NNE10	NE8	NE7	NE6	NNE7	NNE7.3	NNE15
29-May	NE6	NNE5	NNE7	NNE4	NW7	NNW9	N13	NNW10	NNW16	NNW11	NNW13	N18	NNE12	N10	N18	NW9	WNW9	WNW13	W19	W19	WSW15	SW13	SW13	SSW10	NW7.4	WNW19
30-May	SSW15	SSW16	SSW16	SSW15	SSW16	SSW16	SW16	SW17	WSW19	SW19	WSW21	WSW21	WSW22	WSW25	WSW26	W29	WNW32	WNW17	SW3	SSW7	SW10	SSW9	SSW8	SW10	SW15.2	WNW32
31-May	SSW9	SW7	S5	SSE2	SSE6	S5	SSW9	WSW6	NW7	NNW6	NNW5	N4	N6	NW7	N7	NE11	NE11	E8	NNE1	WNW3	NE3	NE9	ENE10	E9	NNE1.6	ENE11

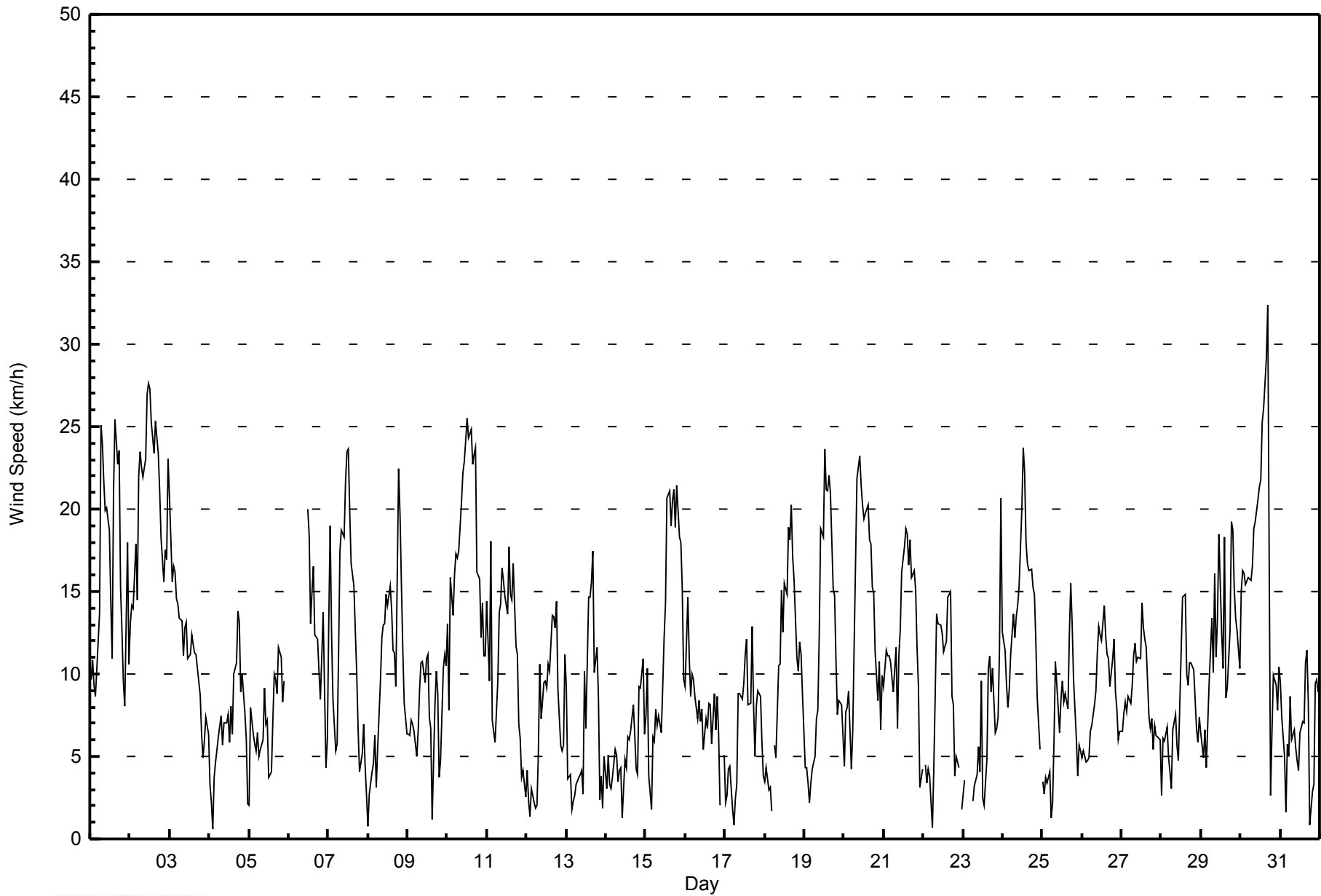
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NW21 W19 WNW18 W18 WNW16 W22 WNW25 WNW24 W22 SE23 WNW27 WNW28 WNW27 WSW25 WSW26 W29 WNW32 WNW24 N22 NW21 NW18 NW18 WNW18 NW23	Diurnal Maximum

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



**WBEA**  
**Hourly Averages**

**Wind Speed (WS) - km/h**  
**Cenovus - Christina Lake - May 2014**





**WBEA**  
**Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h**  
**Cenovus - Christina Lake - May 2014**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	153	21.16	21.16
6 - 11	310	42.88	64.04
12 - 19	190	26.28	90.32
20 - 28	68	9.41	99.72
29 - 38	2	0.28	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 723

Total Number of Hours: 744



**WBEA**  
**Frequency Distribution**

**Wind Speed (WS) - km/h**  
**Cenovus - Christina Lake - May 2014**

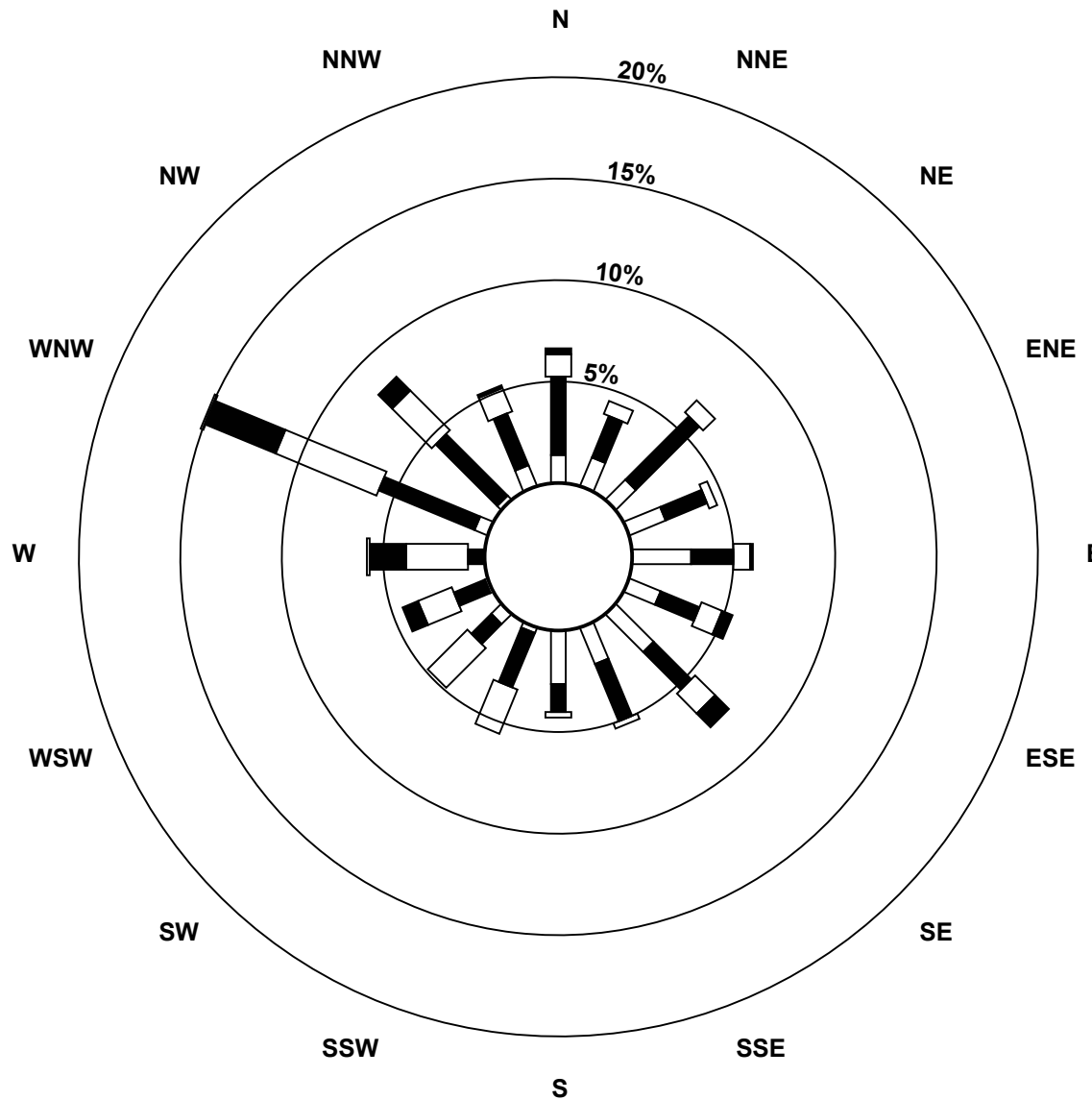
Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	10	11	10	14	21	12	19	14	19	2	5	1	0	5	2	8	153
6 - 11	28	16	32	16	15	15	19	22	10	21	10	12	6	37	31	20	310
12 - 19	8	5	6	3	6	8	10	2	2	17	20	13	22	39	20	9	190
20 - 28	2	0	0	0	1	4	7	0	0	0	0	6	13	27	7	1	68
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	48	32	48	33	43	39	55	38	31	40	35	32	42	109	60	38	723

Total Number of Valid Hours: 723

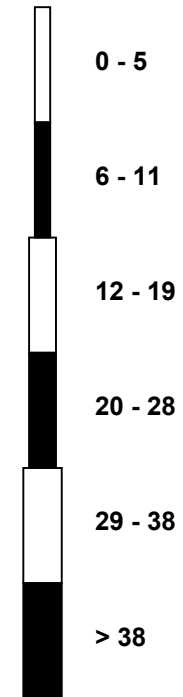
Total Number of Hours: 744

**Wood Buffalo Environmental Association  
Wind Rose May 2014**

**Wind Speed (WS) - km/h  
Cenovus - Christina Lake (AMS500)**



Classes (km/h)



Total Number of Valid Hours: 723



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 8 km/h on May 30 16:00	Hours of Data: 723
Minimum Value: 1 km/h on May 23 01:00	Hours of Missing Data: 21
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> = 7	Hours of Calibration: 0
	Percent Operational Time: 97.2

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

AF - Analyzer Failure



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

**Wind Direction (WD) - deg**  
**Cenovus - Christina Lake - May 2014**

Direction of Maximum Speed: 282 deg on May 30 17:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 286.7 deg on May 2	Hours of Data: 723
Direction of Minimum Speed: 186 deg on May 4 03:00	Direction of Minimum Daily Speed Average: 1.6 deg on May 31
Direction of Minimum Speed: 186 deg on May 4 03:00	Hours of Missing Data: 21
Monthly Average Direction: 287.8 deg	Percent Operational Time: 97.2

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-May	176	203	212	202	210	249	295	304	304	291	288	285	279	258	291	294	290	282	285	291	305	284	286	282	280.1
2-May	258	268	265	278	268	278	277	268	270	284	282	284	286	285	287	290	288	286	289	302	337	319	316	321	286.7
3-May	312	307	304	306	306	318	323	320	320	306	313	338	353	352	0	359	349	15	33	3	61	50	36	43	334.2
4-May	97	140	186	338	357	357	20	51	55	57	92	67	97	52	58	79	97	101	119	109	113	122	100	133	81.9
5-May	164	136	120	102	102	110	111	90	72	59	107	146	171	52	100	89	69	120	114	104	127	118	AF	AF	105.9
6-May	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	340	343	316	331	340	15	16	359	311	270	270	324	250	--
7-May	271	275	271	258	229	239	255	275	286	284	285	282	277	267	286	302	322	316	294	164	153	164	173	276.0	
8-May	70	132	144	135	151	171	192	201	222	206	236	218	225	211	226	191	209	311	356	349	347	355	340	330	246.1
9-May	326	314	326	325	296	300	288	293	302	304	318	298	314	302	306	233	308	305	342	202	245	295	300	309	304.9
10-May	329	288	280	280	282	284	286	271	277	278	277	280	276	284	285	284	284	286	292	288	290	289	280	277	283.5
11-May	283	274	283	244	205	205	274	293	288	289	293	284	273	256	252	303	290	305	326	339	309	81	156	111	281.9
12-May	163	136	92	176	332	62	63	50	7	356	321	344	344	342	342	354	357	315	339	350	2	350	348	352	349.5
13-May	359	357	178	143	170	153	100	90	12	357	336	301	313	299	278	293	283	301	300	304	32	82	116	111	306.7
14-May	107	66	83	31	90	157	144	116	103	82	10	68	146	200	224	152	153	155	145	151	142	177	210	172	147.0
15-May	157	126	284	58	126	153	196	207	221	250	256	244	295	323	319	311	309	311	311	319	318	316	314	299	299.1
16-May	287	272	284	289	286	288	287	299	319	2	5	337	293	297	289	247	247	302	286	295	305	10	AF	166	293.4
17-May	155	136	173	159	140	89	333	17	61	55	28	359	353	352	4	316	51	53	56	43	57	62	70	54	36.8
18-May	67	85	28	15	66	AF	73	14	121	100	75	75	91	99	103	85	82	120	113	111	97	111	118	125	95.5
19-May	110	139	57	95	71	74	92	126	108	115	84	100	126	114	106	103	117	127	136	139	144	160	155	136	115.8
20-May	135	143	109	139	153	80	125	147	145	140	139	136	143	139	136	144	140	144	141	175	178	132	127	124	139.5
21-May	136	166	166	143	164	158	151	144	170	174	193	177	197	203	203	218	227	225	233	237	237	247	226	169	194.6
22-May	AF	144	126	178	142	216	120	173	206	225	220	210	215	193	181	200	192	196	201	177	99	107	AF	89	191.1
23-May	40	120	AF	AF	94	AF	331	330	10	334	206	281	177	169	185	166	129	153	165	149	159	165	218	253	188.3
24-May	231	222	217	191	224	224	229	234	258	243	240	276	274	260	257	261	269	259	284	289	293	287	296	AF	255.9
25-May	170	175	145	175	153	130	356	34	54	56	45	86	49	50	54	70	103	151	140	127	95	100	47	78	91.4
26-May	83	80	75	51	4	340	24	12	37	45	49	48	52	55	53	41	37	37	56	64	60	52	39	355	44.8
27-May	350	353	356	340	333	319	299	295	293	293	294	296	282	281	284	309	287	321	318	309	300	289	310	5	306.8
28-May	18	354	358	20	49	35	98	25	22	95	52	13	19	20	27	38	27	40	44	30	40	52	43	25	31.2
29-May	36	20	15	18	324	338	351	347	348	345	343	357	20	353	351	324	298	288	281	266	238	227	223	205	320.5
30-May	197	206	201	204	206	211	226	227	238	230	239	237	241	244	253	264	282	291	225	212	219	212	213	217	234.9
31-May	212	226	175	157	153	188	211	256	321	348	346	353	357	323	8	36	56	80	13	298	47	50	69	81	33.2

260.0 232.4 255.7 247.9 237.5 262.1 274.0 278.4 292.6 287.6 288.1 293.7 289.0 286.7 291.5 297.8 302.5 296.8 314.7 306.9 310.5 301.2 293.7 293.2  
 Diurnal Average

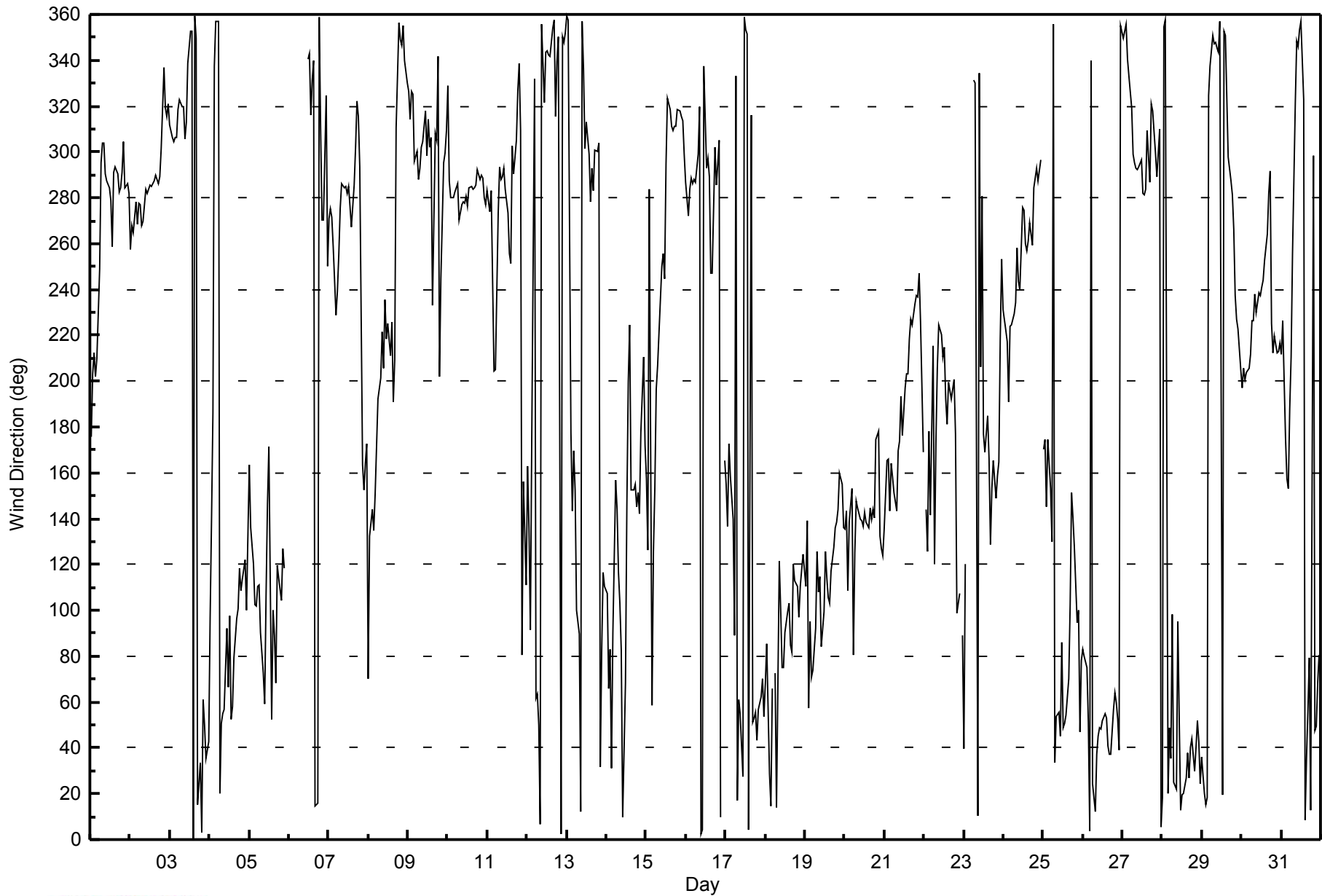
AF - Analyzer Failure  
 All monthly, daily, and diurnal averages have been calculated using vector methods





**WBEA**  
**Hourly Averages**

**Wind Direction (WD) - deg**  
**Cenovus - Christina Lake - May 2014**





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

**Wind Direction (WD) - deg**  
**Cenovus - Christina Lake - May 2014**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 100 deg on May 23 14:00	Hours of Data: 723
Minimum Value: 5 deg on May 17 00:00	Hours of Missing Data: 21
Percentiles: P <sub>1</sub> = 8 P <sub>10</sub> = 12 Q <sub>1</sub> = 15 Median = 20 Q <sub>3</sub> = 31 P <sub>90</sub> = 49 P <sub>99</sub> = 88	Hours of Calibration: 0
	Percent Operational Time: 97.2

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-May	16	20	22	14	19	23	15	12	13	14	15	13	28	37	15	13	15	12	12	12	14	11	11	23	37
2-May	29	29	23	13	26	12	12	15	16	13	12	12	15	14	14	13	14	12	12	14	16	14	18	16	29
3-May	14	16	13	14	13	16	16	19	24	17	18	24	24	25	28	25	20	29	20	30	34	25	14	28	34
4-May	35	52	73	39	16	10	16	22	44	37	46	50	55	34	37	33	26	17	19	11	9	11	26	70	73
5-May	68	11	14	15	14	23	23	22	32	36	38	44	83	64	43	26	42	34	31	29	31	27	AF	AF	83
6-May	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	17	18	15	17	16	30	19	16	22	10	12	69	53	69
7-May	16	7	17	18	26	26	24	11	13	13	18	15	14	17	24	23	24	15	21	47	9	7	33	47	47
8-May	88	62	20	32	12	65	38	21	23	30	29	24	25	27	21	26	22	61	16	15	13	12	13	12	88
9-May	14	14	14	18	12	16	14	14	15	24	27	20	26	38	38	99	34	26	17	88	58	16	13	14	99
10-May	20	16	9	9	9	11	11	21	17	17	18	17	15	14	16	13	13	14	14	11	12	11	16	17	21
11-May	12	15	10	36	44	36	40	13	21	19	19	31	31	23	29	27	19	35	24	22	41	68	29	63	68
12-May	23	67	75	88	61	48	48	38	23	39	27	44	64	39	36	28	25	29	23	13	17	12	16	12	88
13-May	12	69	13	45	51	15	32	41	55	62	89	31	70	33	30	22	20	37	20	15	41	26	64	15	89
14-May	17	12	31	16	26	14	19	44	49	57	95	60	77	51	61	50	25	39	32	66	25	37	27	21	95
15-May	20	8	75	76	17	17	20	38	25	38	37	20	21	14	14	13	13	13	13	14	15	14	14	14	76
16-May	10	10	11	11	10	10	13	14	30	49	41	53	63	61	46	53	46	18	31	12	18	21	AF	5	63
17-May	90	20	13	11	55	48	19	43	26	37	38	39	36	37	58	52	14	26	46	18	8	9	11	20	90
18-May	28	34	43	29	33	AF	17	39	21	34	23	29	24	18	15	16	18	20	15	14	11	11	7	8	43
19-May	42	50	31	40	24	17	25	17	31	26	16	21	14	18	17	16	15	14	12	11	14	13	17	16	50
20-May	24	21	18	16	30	22	17	15	17	16	20	17	21	18	16	16	17	19	15	37	23	8	21	8	37
21-May	11	23	14	13	25	15	15	14	30	21	26	20	20	23	21	24	22	20	20	15	18	28	51	26	51
22-May	AF	18	47	32	49	86	22	22	23	24	33	31	33	39	26	26	20	33	26	37	15	12	AF	35	86
23-May	34	29	AF	AF	29	AF	56	44	33	43	76	41	99	100	71	39	25	20	22	12	13	7	46	18	100
24-May	18	15	16	18	18	16	16	20	27	26	23	18	17	19	26	26	24	15	14	10	10	10	32	AF	32
25-May	22	34	19	16	14	53	44	32	24	47	54	56	34	61	47	49	20	15	18	13	21	24	15	13	61
26-May	21	20	21	16	22	20	15	12	12	11	11	12	13	12	12	12	12	14	14	12	12	13	26	14	26
27-May	17	12	12	13	13	19	12	12	14	15	15	14	13	19	30	20	17	20	26	22	13	12	23	28	30
28-May	47	10	14	15	19	22	48	29	28	31	35	22	16	14	18	18	21	17	12	15	20	16	16	16	48
29-May	23	26	17	31	20	19	15	16	12	14	13	16	17	22	23	21	12	10	10	18	17	16	16	18	31
30-May	16	18	17	16	17	18	18	18	18	20	19	19	19	20	19	19	13	16	72	38	14	14	13	15	72
31-May	15	59	45	73	35	30	17	45	21	46	59	91	50	58	46	36	20	16	83	67	79	9	13	14	91
	90	69	75	88	61	86	56	45	55	62	95	91	99	100	71	99	46	61	83	88	79	68	69	70	
	Diurnal Maximum																								

AF - Analyzer Failure



# Wood Buffalo Environmental Association

## SO<sub>2</sub> Calibration Report

### Station Information

Calibration Date	May 6, 2014	Previous Calibration	April 9, 2014
Station Name	Cenovus	Station Number	AMS 103
Reason:	Routine		
Start Time (MST)	10:33	End Time (MST)	15:24
Barometric Pressure	mmHg	Station temp.	24 Deg C
Calibrator Make/Model	API T700	Serial Number	451
Cal Gas Concentration	49.4 ppm	Cal Gas Expiry Date	06/10/2016
Gas Cert Reference	EY0000359		
DACS make/model	Campbell Scientific CR3000	DACS serial No.	8203
DACS voltage range	0-5V	DACS channel #	

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	1000	1000	PMT voltage	13	20
Analyzer Range (mv)	1000	1000	Lamp voltage	3168	3233
Calculated slope	0.997765	0.994050	Chamber temp.	50.0	50.0
Calculated intercept	-1.210639	-1.044229	Pressure (mmHg)	25.3	24.8
Analyzer Background	12.9	12.9	Flow (lpm)	637.000	623.000
Analyzer Coefficient	1.074	1.074	Intensity	78	80

Analyzer make	API T100	Analyzer serial #	720
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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	N/A
as found span	6000	95.4	785.5	780.0	1.007
calibrator zero	6000	0.0	0.0	0.1	N/A
high point	6000	95.4	785.5	790.5	0.994
second point	6000	47.7	392.7	397.3	0.988
third point	6000	23.9	196.8	199.5	0.986
calibrator zero	4996	0.0	0.0		N/A
as left zero	5000	0.0	0.0	1.0	N/A
as left span	5000	79.5	785.5	787.3	0.998
Average Correction Factor					0.989

Corrected As found	779.8	Previous response	784.9	% change	0.7%
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Notes: Small adjustment to span

Calibration Performed By: Ryan Power



## Wood Buffalo Environmental Association

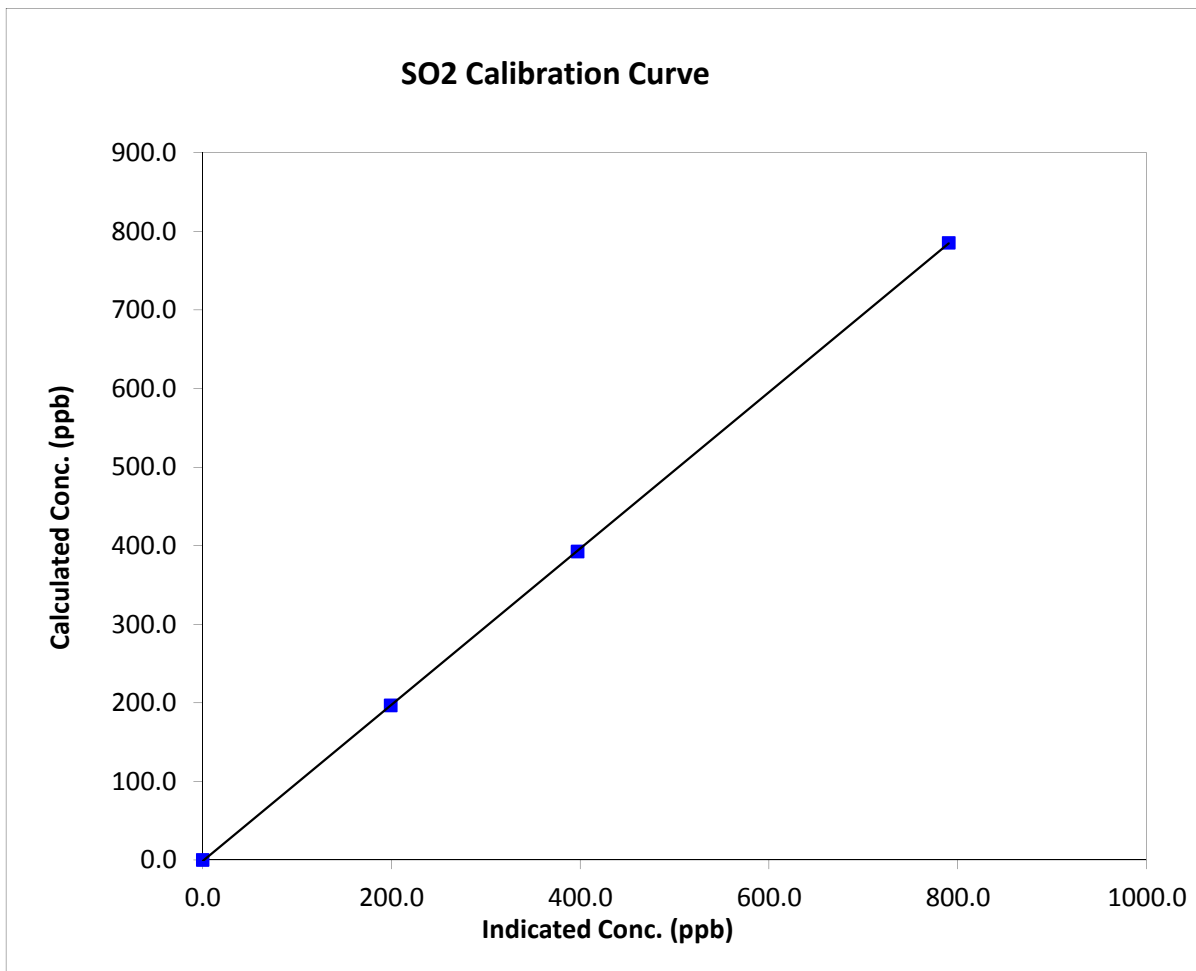
### SO<sub>2</sub> Calibration Summary

#### Station Information

Calibration Date	May-06-14	Previous Calibration	April 9, 2014
Station Name	Cenovus	Station Number	AMS 103
Start Time (MST)	10:33	End Time (MST)	15:24
Analyzer make	API T100	Analyzer serial #	720

#### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	N/A	Correlation Coefficient	0.999991
785.5	790.5	0.9936		
392.7	397.3	0.9885	Slope	0.994050
196.8	199.5	0.9863		
			Intercept	-1.044229



# SO<sub>2</sub> Calibration Plot

Date: May 6, 2014





# Wood Buffalo Environmental Association

## H2S Calibration Report

### Station Information

Calibration Date	May 6, 2014	Previous Calibration	NA
Station Name	Cenovus - Christina Lake	Station Number	AMS 103
Reason:	Routine		
Start Time (MST)	7:55	End Time (MST)	10:30
Barometric Pressure	NA mmHg	Station temp.	24 Deg C
Calibrator Make/Model	API T700	Serial number	451
Cal Gas Concentration	10.2 ppm H2S	Cal Gas Expiry Date	5/30/2016
Gas Cert Reference	LL23598	SO2 gas conc.	49.4 ppm SO2
DACS make/model	Campbell Scientific CR3000	DACS serial No.	8203
DACS voltage range		DACS channel #	

### Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	100	100	PMT voltage	23.1	27.0
Analyzer Range (mv)	100	100	Lamp voltage	2387	2387
Calculated slope	0.992420	0.984965	Chamber temp.	50	50
Calculated intercept	-0.163888	-0.335270	Pressure	23.8	23.7
Analyzer Background	22.9	17.6	Flow	571	570
Analyzer Coefficient	0.928	1.003	Intensity	59	59
			Converter temp.	315	316

Analyzer make/model	API T101	Analyzer serial #	157
Converter make/model	Internal	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					
as found span					
SO2 scrubber check	6000	24.3	200.1	5.2	NA
calibrator zero	6000	0.0	0.0	0.1	NA
high point	6000	44.1	75.0	76.2	0.983
second point	6000	23.5	40.0	41.2	0.970
third point	6000	11.8	20.1	20.9	0.960
calibrator zero					
as left zero	5000	0.0	0.0	0.2	NA
as left span	5000	36.8	75.1	76.6	0.980
Average Correction Factor					0.971

Corrected As found      NA      Previous response      NA      % change      NA

#### Notes:

Converter replaced overnight, allowed to settle in overnight. No As Finds due to plugging internal converter.

Calibration Performed By:

Ryan Power



## Wood Buffalo Environmental Association

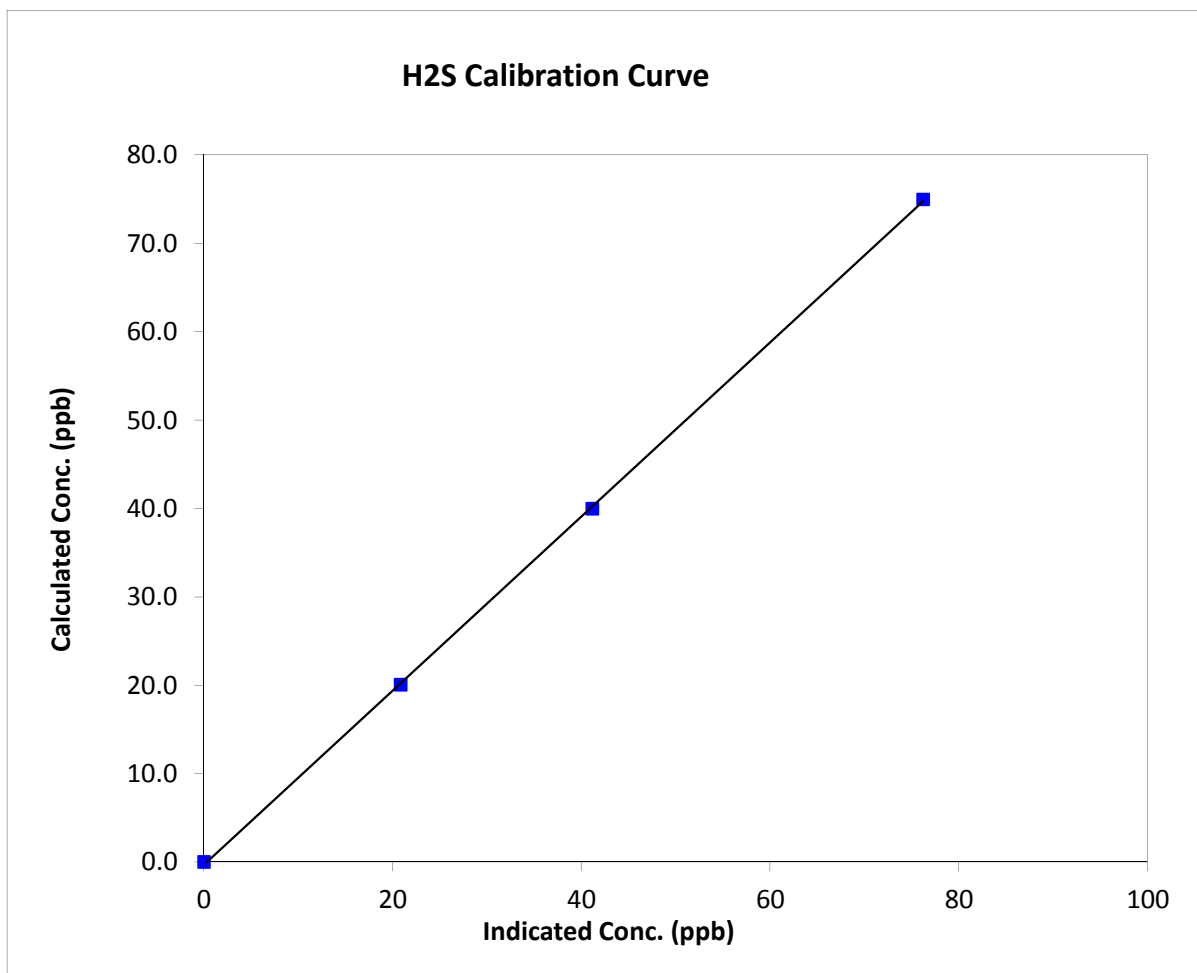
### H2S Calibration Summary

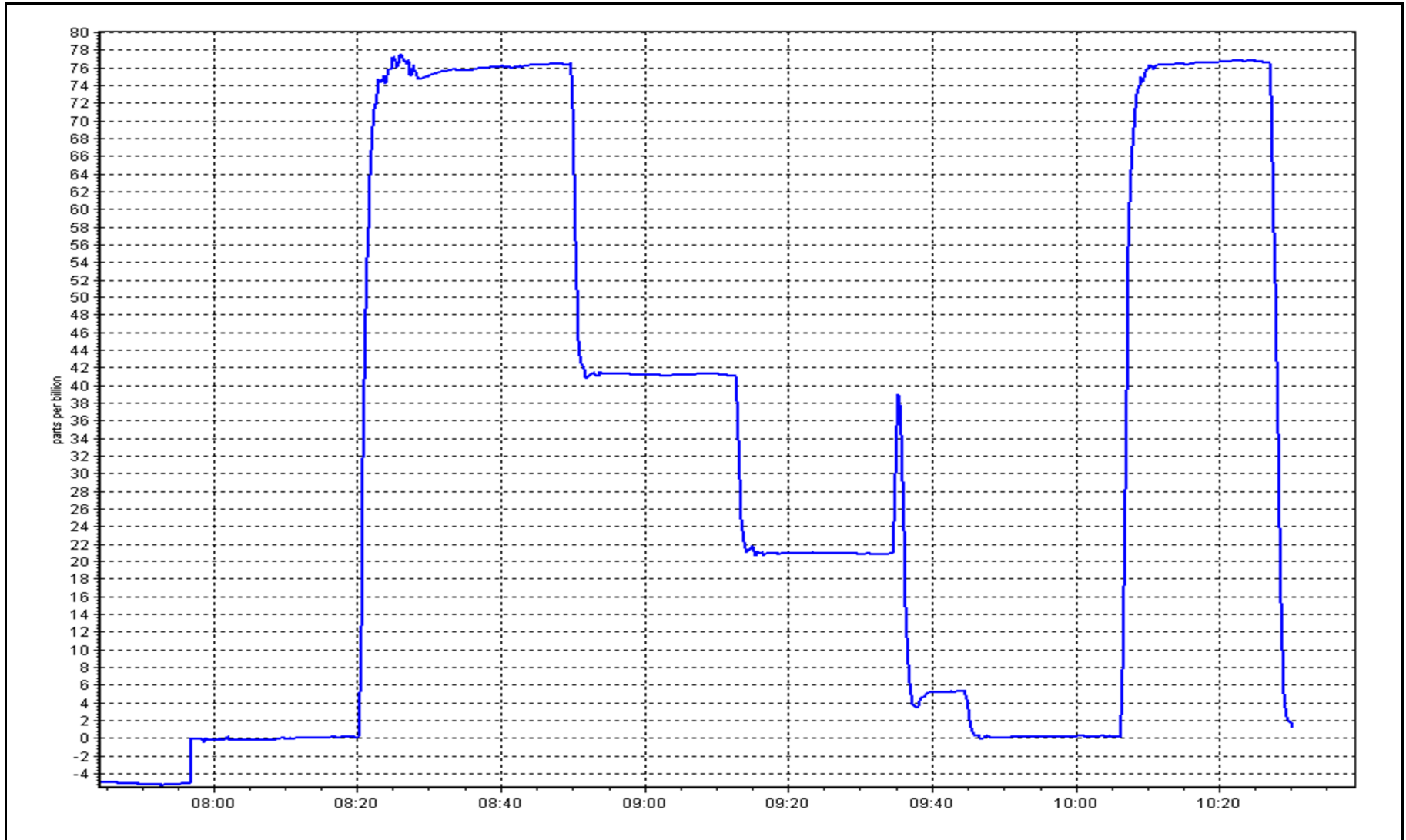
#### Station Information

Calibration Date	May 6, 2014	Previous Calibration	
Station Name	Cenovus - Christina Lake	Station Number	AMS 103
Start Time (MST)	7:55	End Time (MST)	10:30
Analyzer make	API T101	Analyzer serial #	157

#### Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.1	N/A	Correlation Coefficient	0.999921
75.0	76.2	0.9833		
40.0	41.2	0.9697	Slope	0.984965
20.1	20.9	0.9598		
			Intercept	-0.335270









# Wood Buffalo Environmental Association

## NO<sub>x</sub>-NO-NO<sub>2</sub> Calibration Report

### Station Information

Calibration Date	May 6, 2014	Previous Calibration	April 9, 2014
Station Name	Cenovus	Station Number	AMS 103
Reason:	Routine		
Start Time (MST)	10:33	End Time (MST)	15:25
Barometric Pressure	NA mmHg	Station Temperature	23.0 Deg C
Calibrator	API T700	Serial Number	451
NO Cal Gas Conc	50.3 ppm	Cal Gas Expiry Date	October 6, 2016
NOx Cal Gas Conc	50.6 ppm	Cal Gas Serial #	EY0000359

### DACs Information

DACs make & model	Campbell Scientific CR3000	DACs serial No.	8203
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Parameter		NOx	NO	NO2
MV conversion	Analyzer Range (ppb)	1000	1000	1000
	Analyzer Range (mv)	1000	1000	1000
Before	Data Slope	0.996209	1.000791	0.996131
	Data Offset	-0.215689	-0.699580	-0.927631
After	Data Slope	0.996757	1.002912	1.000080
	Data Offset	-0.355925	-0.863274	-0.505974
Channel #				
Voltage Range		0-5V	0-5V	0-5V

### Analyzer Information

Analyzer make/model	Teledyne T200	Analyzer serial #	722
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Test Point	before		after	
Concentration range	1000	ppb	1000	ppb
NO coefficient	0.985	ppb	0.985	ppb
NOx coefficient	0.984	ppb	0.984	ppb
NO2 coefficient		ppb		ppb
NO bkgnd	-0.3		-0.3	
NOx bkgnd	0.7		0.7	
Nt coefficient				
Chamber Temp	50.0	Deg C	50.0	Deg C
Moly Temp	316.0	Deg C	315.0	Deg C
PMT Temp	6.8	Deg C	6.8	Deg C
O3 flow	84.0	ccm	83.0	ccm
R Cell Press	4.9	mmHg	4.7	mmHg
Sample Flow	459	ccm	439	ccm

Notes: \_\_\_\_\_ Zero and span both with small adjustments.  
 \_\_\_\_\_  
 \_\_\_\_\_



# Wood Buffalo Environmental Association

## NO<sub>x</sub>-NO-NO<sub>2</sub> Calibration Report

### Station Information

Calibration Date:

May 6, 2014

Station Number:

AMS 103

### 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 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
as found zero	6000	0.0	0.0	0.0	0.0	3.9	-0.3	4.2	N/A	N/A
as found span	6000	95.4	804.5	799.8	4.8	805.6	797.8	8.4	0.9987	1.0025
calibrator zero	6000	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	N/A	N/A
high point	6000	95.4	804.5	799.8	4.8	802.7	802.1	0.5	1.0024	0.9971
second point	6000	47.7	402.3	399.9	2.4	402.2	403.0	-0.9	1.0002	0.9923
third point	6000	23.9	201.6	200.4	1.2	203.0	201.0	1.5	0.9929	0.9968
calibrator zero										
as left zero	5000	0.0	0.0	0.0	0.0	-0.6	0.3	-0.8	N/A	N/A
as left span	5000	79.5	804.5	478.8	325.7	805.3	459.7	345.6	0.9991	1.0415
Average Correction Factor									0.9985	0.9954

Corrected As found

NO<sub>x</sub>= 801.7

NO= 798.1

Percent Change

NO<sub>x</sub>= 0.0%

NO= 0.4%

Previous Response

NO<sub>x</sub>= 801.7

NO= 801.1

### GPT Calibration Data

Total Flow

6000

ccm

Source Gas Flow

95.40

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			0.0			N/A	
1st NO <sub>2</sub> (300)	N/A	478.8	324.5	803.6	478.8	324.8	0.9855	1.0000	0.9991	100.1%
2nd NO <sub>2</sub> (200)	N/A	567.7	235.6	803.5	567.7	235.9	0.9856	1.0000	0.9987	100.1%
3rd NO <sub>2</sub> (100)	N/A	691.1	112.2	804.8	691.1	113.6	0.9841	1.0000	0.9877	101.2%
4th NO <sub>2</sub> (0)	803.3	N/A	0.7	804.0	803.3	0.6	0.9850	1.0000	N/A	N/A
Average Correction Factor							0.9851	1.0000	0.9952	100.5%

Calibration Performed By:

Ryan Power



# Wood Buffalo Environmental Association

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

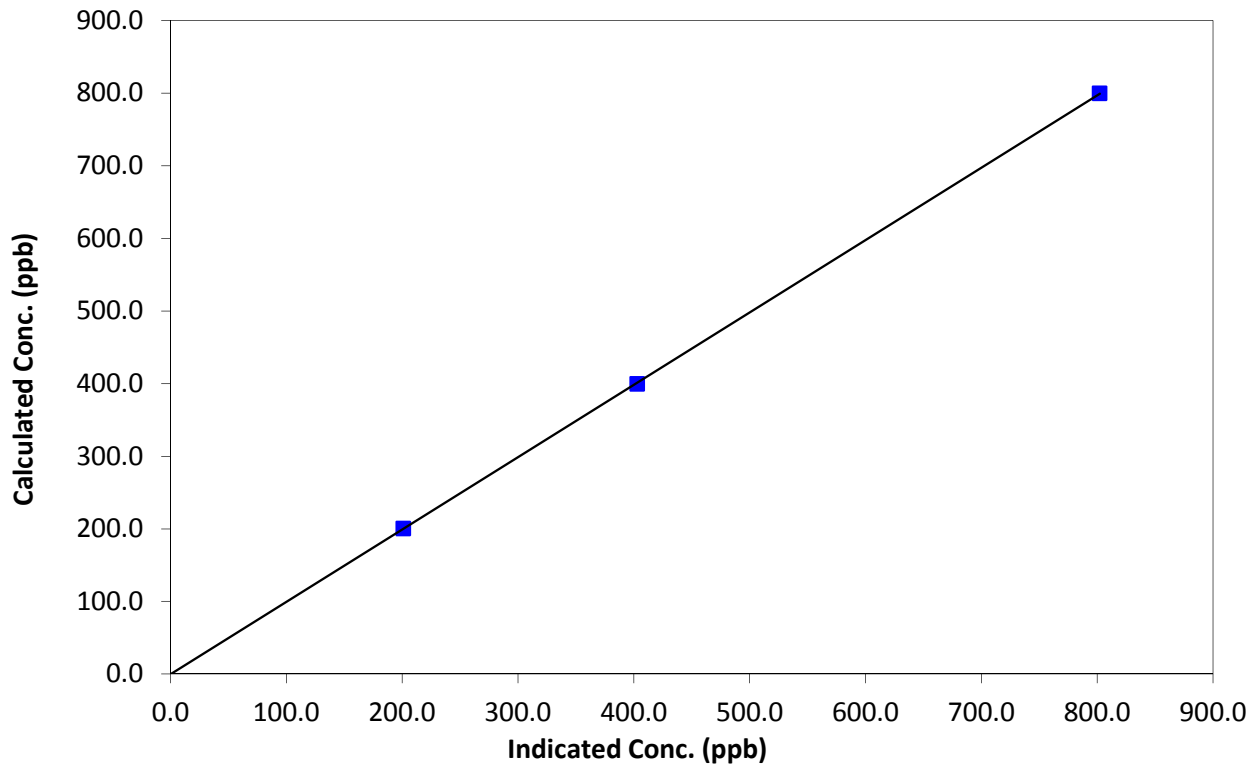
### Station Information

Calibration Date	May 6, 2014	Previous Calibration	April 9, 2014
Station Number	Cenovus	Station Number	AMS 103
Start Time (MST)	10:33	End Time (MST)	15:25
Analyzer make	Teledyne T200	Analyzer serial #	722

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999992
799.8	802.1	0.9971		
399.9	403.0	0.9923	Slope	0.996757
200.4	201.0	0.9968		
			Intercept	-0.355925

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





# Wood Buffalo Environmental Association

## NO Calibration Summary

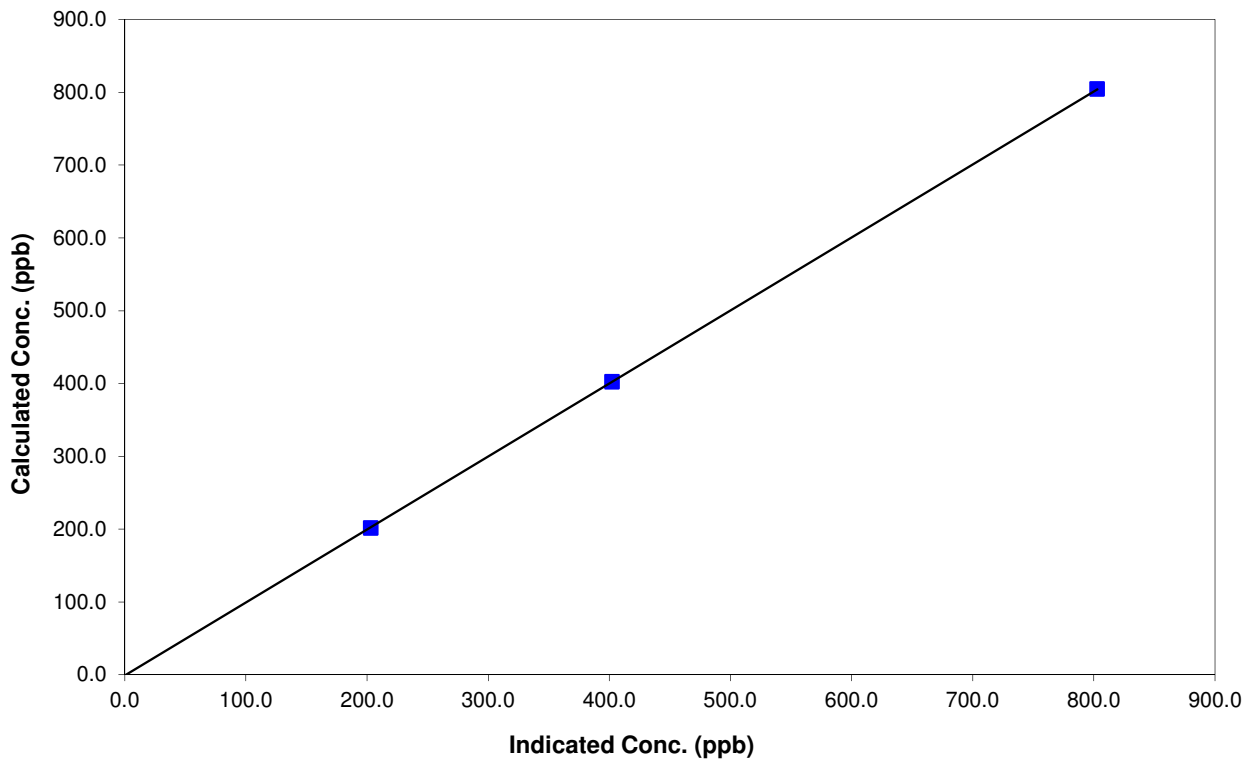
### Station Information

Calibration Date	May 6, 2014	Previous Calibration	April 9, 2014
Station Number	Cenovus	Station Number	AMS 103
Start Time (MST)	10:33	End Time (MST)	15:25
Analyzer make	Teledyne T200	Analyzer serial #	722

### Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999993
804.5	802.7	1.0024		
402.3	402.2	1.0002	Slope	1.002912
201.6	203.0	0.9929		
			Intercept	-0.863274

### NO Calibration Curve





# Wood Buffalo Environmental Association

## NO2 Calibration Summary

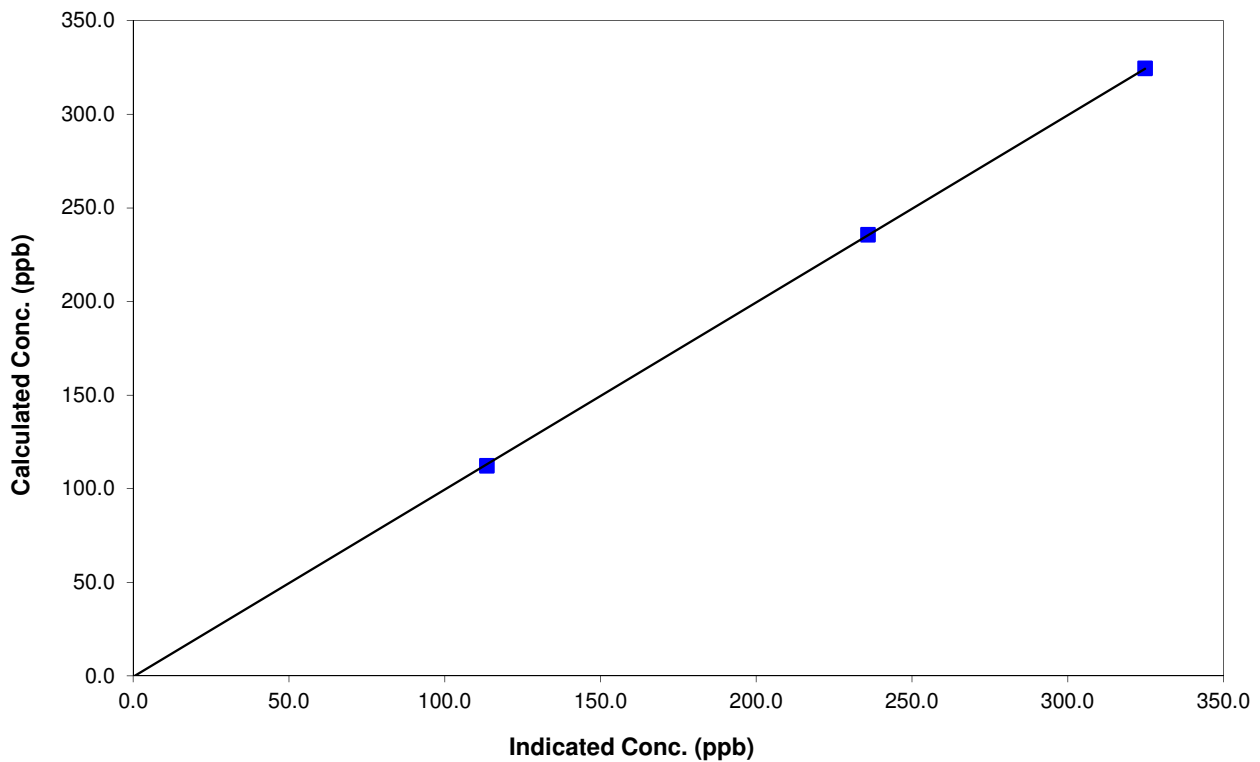
### Station Information

Calibration Date	May 6, 2014	Previous Calibration	April 9, 2014
Station Number	Cenovus	Station Number	AMS 103
Start Time (MST)	10:33	End Time (MST)	15:25
Analyzer make	Teledyne T200	Analyzer serial #	722

### Calibration Information

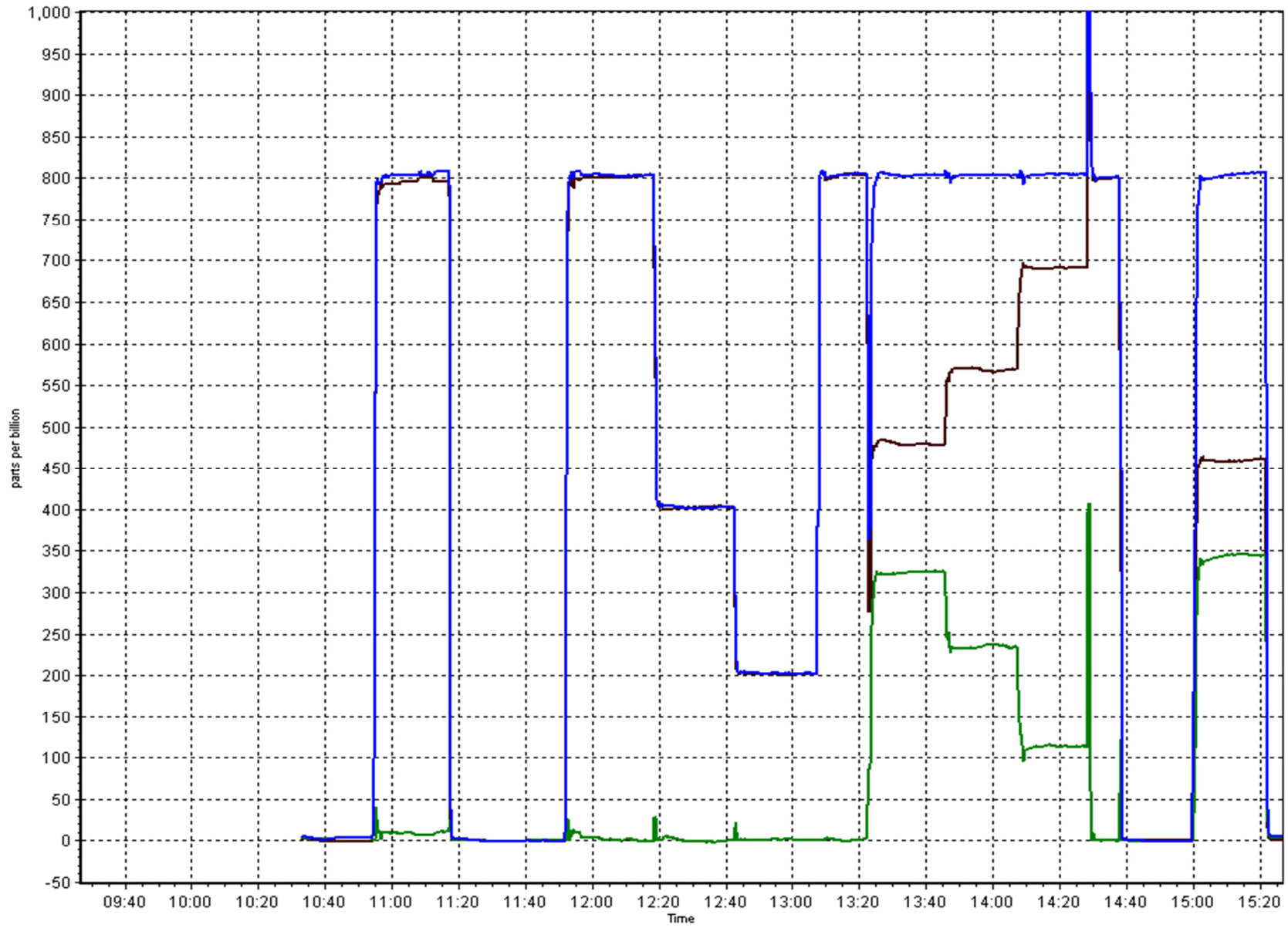
Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.0	N/A	Correlation Coefficient	0.999981
324.5	324.8	0.9991		
235.6	235.9	0.9987	Slope	1.000080
112.2	113.6	0.9877		
			Intercept	-0.505974

### NO2 Calibration Curve



NOx, NO & NO<sub>2</sub> Calibration Plot

Date: May 6, 2014



# WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

## INTEGRATED MONITORING PROGRAM MONTHLY REPORT

### DATA SUMMARY MAY 2014

Prepared  
June 27, 2014

#### SAMPLE COLLECTION

**Wood Buffalo Environmental Association**  
Fort McMurray, Alberta

#### LABORATORY ANALYSIS

passive: Maxxam Analytics Ltd  
Edmonton, Alberta

VOC: Alberta Innovates - Technology Futures  
Vegreville, Alberta

particulate: ALS Canada Ltd  
Burlington, Ontario

PAH: Air Zone One Incorporated  
Mississauga, Ontario

precipitation: Alberta Innovates - Technology Futures  
Vegreville, Alberta

#### DATA SUMMARY

Aurora Atmospherics Inc.  
Calgary, Alberta

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Compound Name	Results (ng/m3)						
	AMS 1	AMS 6	AMS 7	AMS 14	Lab Blank	Field Blank	AMS 1 Repeat
	Fort McKay 05-May	Patricia McInnes 05-May	Athabasca Valley 05-May	Anzac 05-May	05-May	05-May	Fort McKay 05-May
Naphthalene	8.68	33.1	18.6	10.4	0.006	0.453	9.26
Acenaphthylene	0.222	0.048	0.086	0.024	0.001	0.028	0.258
Acenaphthene	0.702	0.368	0.281	1.95	0.001	0.035	0.75
Fluorene	0.672	0.648	0.782	2.08	0.001	0.018	0.711
Phenanthrene	1.3	0.856	1.37	3.11	0.002	0.029	1.56
Anthracene	0.096	0.055	0.103	3.14	0.001	0.009	0.111
Acridine	0.383	0.149	0.138	0.051	0.001	0.014	0.408
Fluoranthene	0.107	0.138	0.22	0.205	0.001	0.015	0.112
Pyrene	0.089	0.135	0.239	0.107	0.001	0.014	0.096
Benzo(c)phenanthrene	0.021	0.004	0.038	0.011	0.001	<0.001	0.024
Benzo(a)anthracene	0.025	0.026	0.033	0.009	0.001	0.006	0.028
Chrysene	0.028	0.029	0.038	0.011	0.001	0.007	0.032
7,12-Dimethylbenz(a)anthracene	0.05	0.036	0.037	0.052	0.001	0.012	0.046
Benzo(b)fluoranthene	0.045	0.057	0.057	0.049	0.001	0.01	0.053
Benzo(k)fluoranthene	0.051	0.064	0.064	0.056	0.001	0.012	0.055
Benzo(a)pyrene	0.03	0.061	0.026	0.021	0.001	0.005	0.031
3-Methylcholanthrene	0.067	0.023	0.057	0.081	0.001	0.01	0.066
Indeno(123-cd)pyrene	0.089	0.074	0.055	0.076	0.001	0.015	0.093
Dibenz(a,h)anthracene	0.067	0.08	0.06	0.081	0.001	0.009	0.067
Benzo(ghi)perylene	0.08	0.082	0.07	0.059	0.001	0.012	0.087
Dibenzo(a,l)pyrene	0.031	0.088	0.068	0.052	0.005	0.005	0.036
Dibenzo(a,i)pyrene	0.019	0.08	0.031	0.054	0.003	0.005	0.02
Dibenzo(a,h)pyrene	0.026	0.071	0.061	0.057	0.005	0.006	0.024



Compound Name	Results (ng/m3)						
	AMS 1	AMS 6	AMS 7	AMS 14	Lab Blank	Field Blank	AMS 6 Repeat
	Fort McKay 11-May	Patricia McInnes 11-May	Athabasca Valley 11-May	Anzac 11-May	11-May	11-May	Patricia McInnes 11-May
Naphthalene	5.24	12.7	8.84	18.2	0.006	0.247	12.9
Acenaphthylene	0.351	0.478	0.17	0.097	0.001	0.003	0.412
Acenaphthene	0.795	0.349	0.387	5.26	0.001	0.006	0.328
Fluorene	0.351	0.435	0.547	3.4	0.002	0.002	0.428
Phenanthrene	1.19	0.602	0.952	3.87	0.002	0.037	0.579
Anthracene	0.153	0.084	0.1	0.324	0.001	0.004	0.079
Acridine	0.326	0.069	0.127	0.097	0.001	0.002	0.066
Fluoranthene	0.086	0.155	0.147	0.244	0.001	0.004	0.166
Pyrene	0.051	0.125	0.142	0.087	0.001	0.003	0.131
Benzo(c)phenanthrene	0.012	0.016	0.01	0.006	0.001	0.003	0.015
Benzo(a)anthracene	0.015	0.036	0.029	0.011	0.001	<0.001	0.03
Chrysene	0.018	0.044	0.034	0.01	0.001	<0.001	0.049
7,12-Dimethylbenz(a)anthracene	0.209	0.405	0.277	0.086	0.003	0.004	0.451
Benzo(b)fluoranthene	0.24	0.493	0.26	0.162	0.002	0.006	0.411
Benzo(k)fluoranthene	0.301	0.6	0.29	0.184	0.002	0.005	0.537
Benzo(a)pyrene	0.016	0.089	0.054	0.005	0.001	<0.001	0.078
3-Methylcholanthrene	0.019	0.062	0.083	0.021	0.001	0.002	0.064
Indeno(123-cd)pyrene	0.024	0.051	0.064	0.047	0.002	0.002	0.051
Dibenz(a,h)anthracene	0.048	0.113	0.112	0.041	0.002	0.003	0.105
Benzo(ghi)perylene	0.011	0.062	0.053	0.023	0.003	<0.001	0.065
Dibenzo(a,l)pyrene	0.05	0.047	0.059	0.077	0.005	0.002	0.046
Dibenzo(a,i)pyrene	0.073	0.052	0.049	0.064	0.004	0.003	0.047
Dibenzo(a,h)pyrene	0.052	0.012	0.041	0.037	0.002	<0.001	0.013



Compound Name	Results (ng/m3)						
	AMS 1	AMS 6	AMS 7	AMS 14	Lab Blank	Field Blank	AMS 7 Repeat
	Fort McKay 17-May	Patricia McInnes 17-May	Athabasca Valley 17-May	Anzac 17-May	17-May	17-May	Athabasca Valley 17-May
Naphthalene	0.304	21.3	8.49	8.52	0.006	0.27	8.41
Acenaphthylene	0.173	1.18	0.167	0.078	0.001	0.003	0.167
Acenaphthene	0.671	0.497	0.439	3.65	0.001	0.001	0.447
Fluorene	0.439	1.53	0.854	2.87	0.002	0.008	0.891
Phenanthrene	0.725	4.11	1.82	3.17	0.002	0.032	1.78
Anthracene	0.058	0.561	0.113	0.182	0.001	0.005	0.115
Acridine	0.248	0.329	0.169	0.057	0.001	0.004	0.151
Fluoranthene	0.064	0.842	0.33	0.222	0.001	0.004	0.327
Pyrene	0.067	0.619	0.287	0.103	0.001	0.002	0.283
Benzo(c)phenanthrene	0.02	0.032	0.016	0.054	0.001	0.002	0.016
Benzo(a)anthracene	0.036	0.183	0.082	0.005	0.001	0.001	0.073
Chrysene	0.042	0.21	0.093	0.007	0.001	<0.001	0.083
7,12-Dimethylbenz(a)anthracene	0.592	0.705	0.363	0.206	0.003	0.017	0.378
Benzo(b)fluoranthene	0.562	0.632	0.428	0.568	0.002	0.019	0.417
Benzo(k)fluoranthene	0.623	0.709	0.492	0.637	0.002	0.01	0.408
Benzo(a)pyrene	0.029	0.1	0.062	0.016	0.001	<0.001	0.059
3-Methylcholanthrene	0.026	0.009	0.025	0.037	0.001	<0.001	0.021
Indeno(123-cd)pyrene	0.068	0.064	0.062	0.052	0.002	0.007	0.07
Dibenz(a,h)anthracene	0.097	0.038	0.023	0.103	0.002	0.006	0.029
Benzo(ghi)perylene	0.025	0.052	0.041	0.04	0.003	0.022	0.041
Dibenzo(a,l)pyrene	0.014	0.071	0.042	0.03	0.005	0.003	0.037
Dibenzo(a,i)pyrene	0.006	0.037	0.005	0.032	0.004	<0.001	0.005
Dibenzo(a,h)pyrene	0.009	0.004	0.015	0.019	0.002	<0.001	0.019



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION  
Polycyclic Aromatic Hydrocarbons (PAHs)

2014  
Indicated Sites and Dates

Compound Name	Results (ng/m3)						
	AMS 1	AMS 6	AMS 7	AMS 14	Lab Blank	Field Blank	AMS 14 Repeat
	Fort McKay 23-May	Patricia McInnes 23-May	Athabasca Valley 23-May	Anzac 23-May	23-May	23-May	Anzac 23-May
Naphthalene	1.43	11.1	9.22	17.5	0.006	0.075	18.1
Acenaphthylene	0.051	0.232	0.266	0.101	0.001	0.006	0.109
Acenaphthene	0.562	0.366	0.56	13.5	0.001	0.005	13.8
Fluorene	0.741	1.06	1.2	10.9	0.002	0.002	11.1
Phenanthrene	1.51	3.26	1.97	21.6	0.002	0.053	21.9
Anthracene	0.164	0.546	0.209	0.738	0.001	0.008	0.717
Acridine	0.417	0.306	0.241	0.285	0.001	0.006	0.268
Fluoranthene	0.105	0.721	0.304	1.83	0.001	0.008	1.85
Pyrene	0.111	0.504	0.29	0.588	0.001	0.008	0.533
Benzo(c)phenanthrene	0.008	0.025	0.013	0.014	0.001	0.007	0.015
Benzo(a)anthracene	0.037	0.051	0.035	0.013	0.001	<0.001	0.012
Chrysene	0.043	0.058	0.04	0.016	0.001	<0.001	0.014
7,12-Dimethylbenz(a)anthracene	0.375	0.383	0.365	0.155	0.003	0.012	0.205
Benzo(b)fluoranthene	0.432	0.52	0.428	0.192	0.002	0.022	0.199
Benzo(k)fluoranthene	0.493	0.584	0.471	0.209	0.002	0.028	0.22
Benzo(a)pyrene	0.011	0.025	0.025	0.011	0.001	0.005	0.011
3-Methylcholanthrene	0.022	0.004	0.014	0.014	0.001	0.002	0.016
Indeno(123-cd)pyrene	0.035	0.029	0.048	0.014	0.002	0.002	0.015
Dibenz(a,h)anthracene	0.016	0.024	0.021	0.01	0.002	0.002	0.011
Benzo(ghi)perylene	0.024	0.042	0.056	0.025	0.003	<0.001	0.024
Dibenzo(a,l)pyrene	0.064	0.08	0.036	0.03	0.005	0.002	0.037
Dibenzo(a,i)pyrene	0.01	0.002	0.018	0.016	0.004	<0.001	0.017
Dibenzo(a,h)pyrene	0.02	0.013	0.037	0.023	0.002	<0.001	0.024



Compound Name	Results (ng/m3)						
	AMS 1	AMS 6	AMS 7	AMS 14	Lab Blank	Field Blank	AMS 1 Repeat
	Fort McKay 29-May	Patricia McInnes 29-May	Athabasca Valley 29-May	Anzac 29-May	29-May	29-May	Fort McKay 29-May
Naphthalene	1.05	15.8	10.7	6.54	0.006	0.075	1.14
Acenaphthylene	0.218	0.248	0.235	0.055	0.001	0.004	0.207
Acenaphthene	0.646	0.841	0.935	2.43	0.001	0.005	0.652
Fluorene	0.498	0.686	0.726	1.8	0.002	0.004	0.51
Phenanthrene	0.094	1.37	1.35	3.33	0.002	0.044	1.1
Anthracene	0.07	0.154	0.156	0.255	0.001	0.005	0.081
Acridine	0.315	0.219	0.323	0.111	0.001	0.004	0.298
Fluoranthene	0.098	0.192	0.186	0.307	0.001	0.004	0.089
Pyrene	0.074	0.155	0.172	0.111	0.001	0.003	0.071
Benzo(c)phenanthrene	0.007	0.007	0.008	0.019	0.001	<0.001	0.006
Benzo(a)anthracene	0.009	0.02	0.018	0.006	0.001	<0.001	0.007
Chrysene	0.011	0.024	0.02	0.008	0.001	<0.001	0.008
7,12-Dimethylbenz(a)anthracene	0.286	0.573	0.142	0.092	0.003	0.008	0.264
Benzo(b)fluoranthene	0.402	1.08	0.246	0.154	0.002	0.023	0.396
Benzo(k)fluoranthene	0.451	1.21	0.273	0.175	0.002	0.028	0.44
Benzo(a)pyrene	0.04	0.022	0.005	0.012	0.001	<0.001	0.037
3-Methylcholanthrene	0.01	0.045	0.025	0.041	0.001	<0.001	0.008
Indeno(123-cd)pyrene	0.04	0.04	0.017	0.022	0.002	0.002	0.04
Dibenz(a,h)anthracene	0.181	0.028	0.019	0.046	0.002	0.002	0.19
Benzo(ghi)perylene	0.025	0.029	0.016	0.012	0.003	0.002	0.026
Dibenzo(a,l)pyrene	0.028	0.051	0.051	0.034	0.005	<0.001	0.033
Dibenzo(a,i)pyrene	0.028	0.071	0.056	0.036	0.004	<0.001	0.025
Dibenzo(a,h)pyrene	0.017	0.086	0.082	0.057	0.002	<0.001	0.019

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